STRUCTURE GEOTECHNICAL REPORT
I-80 RECONSTRUCTION FROM RIDGE ROAD TO HOUBOLT ROAD
I-55 RAMP AA RETAINING WALL
SN 099-W1002
WILL COUNTY, ILLINOIS

For

Stantec

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Submitted by

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11. Abstract

A new retaining wall is proposed along I-55 Ramp AA in Will County, Illinois. The wall will be about 240.0-foot long, extending from Station 13+72.08 to Station 16+06.08. The face of the wall will be constructed about 23.8 feet west of the Ramp AA centerline. The wall will have a maximum exposed height of 10.0 feet. This report provides geotechnical recommendations for the design and construction of the proposed retaining wall.

A topsoil thickness of 2 to 12 inches was noted along or near the proposed wall alignment. Along the proposed wall alignment, the foundation soils consist primarily of up to 7.0 feet of very stiff to hard clay to silty clay and silty clay loam to clay loam fill followed by 10.0 to 12.5 feet of stiff to hard clay to silty clay and silty clay loam to silty loam overlying dense to very dense silty loam to loam and clay loam and very dense weathered bedrock. Dolostone bedrock was encountered at 572 to 570 feet elevation. The groundwater level was measured at elevations ranging from 582 to 571 feet.

The proposed retaining wall will be in a cut section. Fill wall types such as Mechanically Stabilized Earth (MSE) and Reinforced Concrete Cantilever (RCC) will require additional open cut excavations into the existing embankment slope and possibly a temporary soil retention system. Cut wall types such as drilled soldier pile walls could be considered as they will not require excavation and temporary support, thus would be easier to build and more economical.

The designer envisions a drilled soldier-pile wall type at the site. Geotechnical parameters for the design and construction of soldier pile walls are provided. A cantilevered pile embedment depth to a minimum pile tip elevation of 586 feet is necessary to achieve a minimum factor of safety of 1.7 for global stability.

Drilling for soldier pile installation might encounter hard drilling conditions below an elevation of 571 feet and additional excavation efforts might be needed.

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1.0 INTRODUCTION

This report presents the results of our subsurface investigation, laboratory testing, geotechnical evaluations, and recommendations in support of the design and construction of a new retaining wall proposed along the new Ramp AA at I-55 south of Interstate 80 (I-80) in Will County, Illinois. The project area is located in west central Will County, extending along the proposed Ramp AA alignment, within Troy Township. On the USGS *Channahon Quadrangle 7.5 Minute Series* map, the project is located in the SE ¼ of Section 28, Tier 35 N, Range 9 E of the Third Principal Meridian. A *Site Location Map* is presented as Exhibit 1.

The purpose of this investigation was to characterize the site soil and groundwater conditions, perform geotechnical analyses, and provide recommendations for the design and construction of the proposed retaining wall. This retaining wall will be constructed as part of Construction Contract INT-2.

1.1 Existing Structure and Ground Conditions

There is no existing structure at the proposed retaining wall site. The site surface elevation is generally flat gently sloping westward toward DuPage River and steeper eastward toward Rock Run Creek. The proposed retaining wall is about halfway between the two valleys. DuPage River runs south about 0.5 miles west of the new retaining wall and Rock Run Creek runs south about 0.7 miles east of the retaining wall. The ground surface elevation is about 577 to 597 feet along the proposed retaining wall.

In the project area (see Exhibit 2), up to 10-feet of mainly cohesive man-made ground, roadway embankment, is placed over up to 20 feet of overburden. The overburden is made up of low to moderate plasticity, medium to high strength, and low to moderate moisture content silty clayey diamicton resting over granular, very dense, low compressibility silty loam diamicton with lenses of sand which unconformably covers the bedrock (Bauer et al. 1991, Hansel and Johnson 1996, Leighton et al. 1948, Willman et al. 1971). The bedrock is made up of shaly dolostone. Top of bedrock is mapped at about 572 to 583 feet elevation. The site is located just north of the inactive Sandwich Fault Zone (Kolata 2005). The shallow bedrock is highly to moderately weathered and may show the presence of cavities more likely filled with fine sediment. There are no records of mining activity within the proposed wall site. Neither the overburden nor the upper bedrock is known to include significant sources of water supply (Woller and Sanderson 1983).

1.2 Proposed Structure

Based on the *GPE* drawing prepared by Stantec and dated October 4, 2023, Wang understands the proposed retaining wall will measure about 240.0 feet in length, extending along Ramp AA from Station 13+72.08 to Station 16+06.08. The front face of the wall will be constructed at a distance of about 28.0 feet west of the proposed Ramp AA centerline. The wall will support the new 26.0-foot wide Ramp AA to be constructed southwest of the I-80/I-55 interchange. A drilled soldier-pile wall type installed into the bedrock is currently shown on the *GPE* sheets. Based on the drawings and *Cross-Sections*, we estimate the wall will have a maximum exposed height of approximately 10.0 feet near Station 15+18.33. The *GPE* drawing is included as Appendix E, whereas the *Cross-Sections* are included as Appendix F.

2.0 METHODS OF INVESTIGATION

The following sections outline the subsurface and laboratory investigations performed by Wang.

2.1 Field Investigation

The subsurface investigation consisted of six retaining wall borings, designated as AA-RWB-01 to AA-RWB-06 and one subgrade/stability boring, designated as 55AA-SGB-02, drilled by Wang in December of 2022. Boring 55AA-SGB-02 was included to supplement our analysis. The borings were drilled from elevations of 596.6 to 591.3 feet and were advanced to depths of 21.5 to 34.0 feet bgs. The as-drilled northings and eastings were acquired with a mapping-grade GPS unit. Stations, offsets, and elevations were provided by Stantec. Boring location data are presented in the *Boring Logs* (Appendix A) and the as-drilled boring locations are shown in the *Boring Location Plan* (Exhibit 3).

An ATV-mounted drilling rig, equipped with hollow stem augers, was used to advance and maintain open boreholes. Soil sampling was performed according to AASHTO T206, *"Penetration Test and Split Barrel Sampling of Soils."* The soil in the retaining wall borings was sampled at 2.5-foot intervals to 30.0 feet bgs and at 5.0-foot intervals thereafter to the boring termination depth or top of bedrock whereas the soil in the subgrade/stability boring was sampled continuously to 10.0 feet bgs and at 2.5-

foot intervals thereafter to the boring termination depth. Bedrock cores were obtained from Borings AA-RWB-01, AA-RWB-03, and AA-RWB-05 in 10-foot runs with an NWD4-sized core barrel. Soil samples collected from each sampling interval were placed in sealed jars, and rock cores were placed into boxes, and transported to the laboratory for further examination and testing.

Field boring logs, prepared and maintained by a Wang field engineer, included lithological descriptions, visual-manual soil (IDH Textural) classifications, results of Rimac and pocket penetrometer unconfined compressive strength tests, and results of Standard Penetration Tests (SPT) recorded as blows per 6 inches of penetration. Bedrock cores were measured for recovery and rock quality designation (RQD), described, and photographed.

Groundwater levels were measured while drilling and at completion of each of the borings. Prior to being backfilled, Borings 55AA-SGB-02, AA-RWB-02, and AA-RWB-04 were left open to record 24-to 72-hour water level readings. A groundwater monitoring piezometer (AA-PZ-01) was installed near Boring AA-RWB-01 with the screen set between elevations of 583.6 and 573.6 feet (11.8 to 21.8 feet bgs) to monitor the water level elevations over a longer period of time. Each borehole location was backfilled upon completion and, where necessary, the pavement surface was restored as much as possible to its original condition.

2.2 Laboratory Testing

Soil samples were tested in the laboratory for moisture content (AASHTO T265). Atterberg limits (AASHTO T89 and T90) and particle size (AASHTO T88) analyses were performed on selected samples. Unconfined compressive strength tests were performed on selected bedrock cores. Field visual descriptions of the soil samples were verified in the laboratory and index tested soils were classified according to the IDH Soil Classification System. The laboratory test results are shown in the *Boring Logs* (Appendix A) and in the *Laboratory Test Results* (Appendix B).

3.0 INVESTIGATION RESULTS

Detailed descriptions of the soil conditions encountered during the subsurface investigation are presented in the attached *Boring Logs* (Appendix A) and in the *Soil Profile* (Exhibit 4). Please note that strata contact lines represent approximate boundaries between soil types. The actual transition between soil types in the field may be gradual in horizontal and vertical directions.

Our subsurface investigation results fit into the local geologic context. The borings drilled in the project area revealed the native sediments consists of silty clay to silty clay loam diamicton (Unit 2) with occasional lenses of silt and sand, over silty loam to silty clay loam diamicton (Unit 3), resting over weathered bedrock (Unit 4). The sand and silt lenses in Unit 2 are water-bearing with seasonal fluctuation. Top of dolostone bedrock was encountered at elevations of 572 to 583 feet (5.0 to 22.0 feet bgs) as predicted based on geologic data.

3.1 Lithological Profile

The borings were drilled along the proposed Ramp AA alignment and sampled 2 to 12 inches of silty clay topsoil at the surface. In descending order, the general lithologic succession encountered beneath the topsoil includes: 1) man-made ground (fill); 2) stiff to hard clay to silty clay and silty clay loam to silty loam; 3) dense to very dense silty loam to loam; 4) very dense weathered bedrock; and 5) strong, very poor to poor quality dolostone.

1) Man-made ground (fill)

Beneath the topsoil, the borings encountered up to 7.0 feet of cohesive fill. The cohesive fill consists of very stiff to hard, black, brown, and gray clay to silty clay and silty clay loam to clay loam with unconfined compressive strength (Q_u) values of 2.3 to 7.5 tsf and moisture content (MC) values of 16 to 24%. Laboratory index testing on a sample from the fill layer showed liquid limit (LL) and plastic limit (PL) values of 48 and 19%, respectively.

A 4-foot thick layer of granular fill was sampled in Boring AA-RWB-03 directly underneath the cohesive fill. This granular fill layer consists of medium dense, brown, and gray gravelly loam to sandy loam with a SPT N-value (N) of 16 blows per foot and an MC of 7%.

2) Stiff to hard clay to silty clay and silty clay loam to silty loam

Beneath the fill, at elevations of 591 to 586 feet, the borings advanced through 10.0 to 12.5 feet of stiff to hard, brown, gray, and orange clay to silty clay and silty clay loam to silty loam. This layer is characterized by Q_u values of 1.1 to more than 10.2 tsf and MC values of 13 to 23%. Laboratory index testing on samples from this layer showed liquid limit LL and PL values of 18 to 59% and 12 to 20%, respectively.

An approximately 2-foot thick layer of medium stiff brown and gray silty clay to silty clay loam was sampled in Boring AA-RWB-05 at an elevation of 585 feet. This layer has a Q_u value of 0.9 tsf and an MC of 20%.

An intermittent 2- to 18-inch thick wet to saturated silty to silty loam and sandy loam to sandy gravel layer was encountered within this unit at elevations of 582 to 579 feet in Borings 55AA-SGB-02, AA-RWB-01, AA-RWB-05, and AA-RWB-06. This layer is considered saturated.

3) Dense to very dense silty loam to loam

At depths of 15.5 to 20.5 feet bgs, or elevations of about 576 to 575 feet, the borings augured through 3.0 to 5.0 feet of dense to very dense, gray, moist to damp silty loam to loam and clay loam. This soil unit has N values of 42 blows per foot to more than 50 blows per 4 inches and MC values of 8 to 13%. Auger refusal indicating the apparent top of bedrock was noted within this layer at depths of 25.0 feet bgs (elevations of 570 feet) in Boring AA-RWB-04. Additionally, dolostone chips and/or fragments were noted at depths of 15.5 to 20.5 feet bgs (elevations of 576 to 575 feet) in Borings AA-RWB-03 to AA-RWB-06.

A 2.5- to 5.0-foot thick layer of stiff gray clay loam was sampled within the silty loam at elevations of 576 to 575 feet in Borings AA-RWB-02 and AA-RWB-05. This layer has Q_u values of 1.5 to 2.7 tsf and MC values of 10 to 16%.

4) Very dense weathered bedrock

At elevations of 574 to 571 feet, the borings advanced through up to 1.5 feet of very dense, gray, saturated weathered bedrock. This soil unit has N values of 50 blows per 4 inches to 50 blows per 2 inches and MC values of 11 to 12%. Auger refusal indicating the apparent top of bedrock was noted within this layer at depths of 21.5 to 24.0 feet bgs (elevations of 573 to 571 feet) in Borings 55AA-SGB-02, AA-RWB-02, and AA-RWB-06.

5) Strong, very poor to poor quality dolostone

At elevations of 572 to 570 feet (23.0 to 24.0 feet bgs), Borings AA-RWB-01, AA-RWB-03, and AA-RWB-05 cored strong, very poor to poor quality, highly to slightly weathered dolostone bedrock. The rock quality designation (RQD) ranges from 16 to 19% and uniaxial compressive strength testing revealed a Q_u value of 13,673 psi. The bedrock core data and pictures are shown in the *Bedrock Core Photographs* (Appendix C).

3.2 Groundwater Conditions

Groundwater was encountered while drilling at elevations of 582 to 571 feet (11.5 to 24.0 feet bgs). At the completion of drilling, the groundwater level was observed at elevations of 582 to 577 feet (11.0 to 20.0 feet bgs). At the end of drilling, Borings 55AA-SGB-02, AA-RWB-02, and AA-RWB-04 were left open to measure 24- to 72-hour groundwater levels. The 24- to 72-hour groundwater level was recorded as either dry due to borehole cave-in or at an elevation of 582 feet (13.0 feet bgs). It should be noted that groundwater levels might change with seasonal rainfall patterns and long-term climate fluctuations or may be influenced by local site conditions.

A groundwater monitoring piezometer (AA-PZ-01) was installed along the proposed Ramp AA alignment near Boring AA-RWB-01. The piezometer is screened between elevations of 583.6 to 573.6 feet within the saturated granular layers. A summary of the groundwater monitoring data recorded between January and October of 2023 is shown in Figure 1.

Figure 1: Groundwater Monitoring Data at AA-PZ-01

The information from the piezometer shows groundwater levels correlating to the information contained in the boring logs. The average groundwater elevation is approximately 585 feet. The maximum recorded groundwater elevation was 587 feet.

4.0 FOUNDATION ANALYSIS AND RECOMMENDATIONS

The retaining wall will support the new 26.0-foot wide Ramp AA proposed southwest of the I-80 and I-55 interchange. Based on the *GPE* and *Cross-Sections* (Appendixes E and F), the wall will have a total length of 240.0 feet and a maximum exposed height of 10.0 feet near Station 15+18.33. The proposed wall is a cut wall which will support the new Ramp AA roadway embankments.

Fill wall types, such as Mechanically Stabilized Earth (MSE) and Reinforced Concrete Cantilever (RCC) walls would require additional large open cut excavations into the existing embankment, temporary soil retention systems, and will impact the existing roadway. The construction of these wall types would likely also require more backfilling thus longer construction time. In our opinion, non-gravity wall types such as a sheet pile or soldier pile type wall would be more appropriate considering the soil conditions, constructability, and cost. A driven sheet pile wall type will not be feasible due to potential difficulty of driving the sheet piles in cohesive soils with unconfined compressive strength values of greater than 4.5 tsf. Considering the presence of shallow bedrock, we anticipate a soldier pile socketed into bedrock will likely be the most suitable wall type at this location as proposed by the designer and shown on the GPE. However, the final wall type should be selected based on a wall-type study including cost and construction considerations. Recommendations for the design and construction of the proposed wall type are discussed in the following sections.

4.1 Seismic Design Considerations

Seismic design is not required for retaining wall structures located in Seismic Performance Zone (SPZ) 1 in accordance with the IDOT *Bridge Manual* (2012).

4.2 Soldier-Pile and Lagging Wall

A soldier-pile wall type could be considered at this location. If soldier piles are designed to support the wall, they could be installed by setting them within prebored holes with diameters sized in accordance with IDOT criteria. The wall should be designed for both lateral earth pressure and lateral deformation. The embedment depth in moment equilibrium for the wall sections should be designed in accordance with the AASHTO LRFD guidelines (AASHTO 2020).

Generally, both granular soils and overconsolidated clayey soils, such as the stiff to hard silty clay to silty clay loam encountered in the borings will exhibit lower overall shear strength in the long-term condition. Therefore, in accordance with AASHTO (2020), the lateral earth pressure analysis should be performed for walls in the long-term (drained) condition using the soil parameters recommended in Table 1. Elevations provided in Table 1 are based on the average layer elevations across the soil profile and may vary from one boring location to another. The active and passive earth pressure coefficients are provided for a backslope of 1:3 (V: H) behind the wall and straight backfill in front of the wall.

The design of the wall should ignore 3.0 feet of soil in front of the wall measured from the finished ground surface elevation in providing passive pressure due to excavations required for installation of concrete facing, drainage systems, and frost-heave conditions. In developing the design lateral pressure, the pressure due to construction equipment surcharge loads should be added to the lateral earth pressure. Drainage behind the wall should be in accordance with IDOT guidelines (IDOT 2012). The water pressures should be added to the earth pressure if drainage is not provided.

Table 1: Drained Geotechnical Parameters for Design of Soldier-Pile Walls
Borings AA-RWB-01 to AA-RWB-05

Elevation Range (feet) Soil Description	Unit Weight, γ (pcf)	Drained Shear Strength Properties		Earth Pressure Coefficients	
		Cohesion (psf)	Friction Angle (°)	Active Pressure (2) (1V:3H)	Passive Pressure (Straight)
Existing Grade to EL 586(1) Hard SILTY CLAY to CLAY LOAM FILL	120	100	30	0.43	--
EL 592 to 586 (AA-RWB-03) GRAVELLY LOAM to SANDY LOAM FILL	120	0	30	0.43	--
EL 586 to 580 Hard SILTY CLAY	120	100	30	0.43	3.00
EL 580 to 575 Stiff to V Stiff SILTY LOAM	58(3)	0	30	0.43	3.00
EL 575 to 572(4) V Dense SILTY LOAM to CLAY LOAM	58(3)	0	33	0.37	3.39

(1) Proposed bottom of fascia panel; (2) Earth pressure coefficients for 1:3 (V: H) back slope; (3) Submerged unit weight; (4) Approximate top of bedrock

The lateral deformation of the wall should be designed for movement and moment fixity at the base of the pile. The roadway and utilities should not be impacted by the lateral movement of the wall. Therefore, the design of the soldier pile wall should establish lateral movement limits. The evaluations should be performed using the recommended soil parameters shown in Tables 2 and 3, via the p-y curve (COM624) method. Elevations provided in Tables 2 and 3 are based on the average layer elevations across the profile and may vary from one boring location to another.

Table 2: Recommended Soil Parameters for Lateral Load Analysis of Soldier Pile Walls
Borings AA-RWB-01 to AA-RWB-05

Elevation Range (feet) Soil Type (Layer)	Unit Weight, γ (pcf)	Undrained Shear Strength, c_u (psf)	Estimated Friction Angle, Φ (°)	Estimated Lateral Soil Modulus Parameter, k (pci)	Estimated Soil Strain Parameter, ε_{50} (%)
Existing Grade to EL 586 Hard SI CLAY to CLAY LOAM FILL	120	3000	0	1000	0.5
EL 592 to 586 (AA-RWB-03) GRAVELLY LOAM to SANDY LOAM FILL	120	0	30	30	--
EL 586 to 580 Hard SI CLAY	120	4000	0	2000	0.4
EL 580 to 575 Stiff to V Stiff SILTY LOAM	58(2)	1500	0	500	0.7
EL 575 to 572(3) V Dense SILTY LOAM to CLAY LOAM	58(2)	0	33	125	--

(1) Proposed bottom of fascia panel; (2) Submerged unit weight; (3) Approximate top of bedrock

Table 3: Recommended Bedrock Parameters for Lateral Load Analysis of Soldier Pile Walls
(Borings AA-RWB-01, AA-RWB-03, and AA-RWB-05)

Bedrock	Total Unit Weight, γ (pcf)	Modulus of Rock Mass (ksi)	Poisson's Ratio, μ	Uniaxial Compressive Strength (psi)	RQD (%)	Strain Factor
Dolostone	140	500	0.3	13,673	16 to 19	0.0005

4.3 Settlement

Based on the information provided by Stantec, we understand the existing grade at the wall location will be lowered to accommodate the new Ramp AA construction. As such, we do not anticipate the placement of new fill loads or surcharge at the proposed retaining wall location and long-term settlements of less than 1.0 inch are anticipated.

4.4 Global Stability

The global stability of the proposed wall was analyzed based on the soil profile described in Section 3.1 and the information provided in the design drawings and cross-sections. The stability was analyzed at the critical section near Station 15+00 where the maximum exposed height is about 10.0 feet. The minimum required factor of safety (FOS) is 1.7 in both short-term (undrained) and long-term (drained) conditions (IDOT 2020a).

Details of the global stability analysis with critical failure surfaces and results are presented in Appendix D. The short-term and long-term analyses do not consider the resistance from the distance measured from the proposed finished grade to the bottom of the fascia panel at the front face of the wall. We estimate the wall will have an adequate FOS of 6.5 (Appendix D-1) in the undrained condition. Global stability evaluations were performed to estimate the minimum pile tip elevation required to achieve an FOS of 1.7 in the drained condition. The embedded portion of the cantilevered piles will provide resistance against the slope instability above the tip of the piles. The results of our analysis are summarized in Table 4. We recommend that the wall tip elevations be installed at or deeper than the minimum elevation shown in Table 4 to provide long-term global stability FOS values of at least 1.7 as shown in Appendix D-2. It should be noted that typically, the lateral earth pressure and deformation analyses will determine the minimum embedment depth for cantilevered pile walls. Therefore, the designer should perform other analyses including lateral earth pressure and deflection analyses to determine the required design pile embedment. We understand the designer proposes soldier piles installed in the bedrock.

Table 4: Results of Global Stability Analysis

Station	Reference Boring(s)	Exposed Wall Height (feet)	Short-term (Undrained) Condition		Long-term (Drained) Condition	
			FOS	Minimum Tip Elevation (feet)	FOS	Minimum Tip Elevation (feet)
15+00	AA-RWB-03	10.0	6.5	-/-	1.7	586

5.0 CONSTRUCTION CONSIDERATIONS

5.1 Site Preparation

Vegetation, surface topsoil, pavement, and debris should be cleared and stripped where the structure will be placed. If unstable or unsuitable materials are exposed during excavation, they should be removed and replaced with compacted structural fill as described in Section 5.3.

5.2 Excavation, Dewatering, and Utilities

Excavations should be performed in accordance with local, state, and federal regulations. The potential effect of ground movements upon nearby utilities should be considered during construction. Excavations for the construction of the wall should be sloped at no steeper than 1:2 (V: H). Any slope that cannot be graded at 1:2 (V:H) should be properly shored. Dewatering may be necessary if groundwater perched within the granular layers is encountered.

For cantilevered pile walls, it should be noted that higher N-values of 54 to more than 50 blows per 3 inches, dolostone chips, and possible cobbles were noted in the borings at elevations of 576 to 571 feet (18.0 to 23.0 feet bgs) and should be anticipated during pile drilling. Excavation may be needed due to the possible presence of cobbles.

Groundwater was encountered while drilling at elevations of 582 to 571 feet (11.5 to 24.0 feet bgs). At the completion of drilling, the groundwater was observed at elevations of 582 to 577 feet (11.0 to 20.0 feet bgs). If drilled soldier piles are designed, temporary casing and wet installation methods will be needed for drilling and setting into the granular layers and/or bedrock below an elevation of 580 feet. Additionally, perched or temporary water may be encountered during times of heavy precipitation while excavating within the upper fill soils and will require dewatering efforts. Water that does accumulate in open excavations by seepage or runoff should be immediately removed by sump pump. Any soils allowed to soften under standing water should be removed and replaced with compacted fill as described in Section 5.3.

5.3 Filling and Backfilling

Fill material used to attain final design elevations should be pre-approved, compacted, cohesive or granular soil conforming to Section 204, *Borrow and Furnished Excavation* (IDOT 2022). The fill material should be free of organic matter and debris and should be placed in lifts and compacted according to Section 205, *Embankment* (IDOT 2022). Backfill materials must be pre-approved by the Resident Engineer.

5.4 Earthwork Operations

The required earthwork can be accomplished with conventional construction equipment. Moisture and traffic will cause deterioration of exposed subgrade soils. Precautions should be taken by the Contractor to prevent water erosion of the exposed subgrade. A compacted subgrade will minimize water runoff erosion.

Earth moving operations should be scheduled to not coincide with excessive cold or wet weather (early spring, late fall or winter). Any soil allowed to freeze or soften due to the standing water should be removed. Wet weather can cause problems with subgrade compaction.

It is recommended that an experienced geotechnical engineer be retained to inspect the exposed subgrade, monitor earthwork operations, and provide material inspection services during the construction phase of this project.

6.0 QUALIFICATIONS

The analysis and recommendations submitted in this report are based upon the data obtained from the borings drilled at the locations shown on the boring logs and in Exhibit 3. This report does not reflect any variations that may occur between the borings or elsewhere on the site, variations whose nature and extent may not become evident until the course of construction. In the event that any changes in the design and/or location of the structure are planned, we should be timely informed so that our recommendations can be adjusted accordingly.

It has been a pleasure to assist Stantec and the Illinois Department of Transportation on this project. Please call if there are any questions, or if we can be of further service.

Respectfully Submitted,

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Wang
Engineering

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Phone (630) 953-9928
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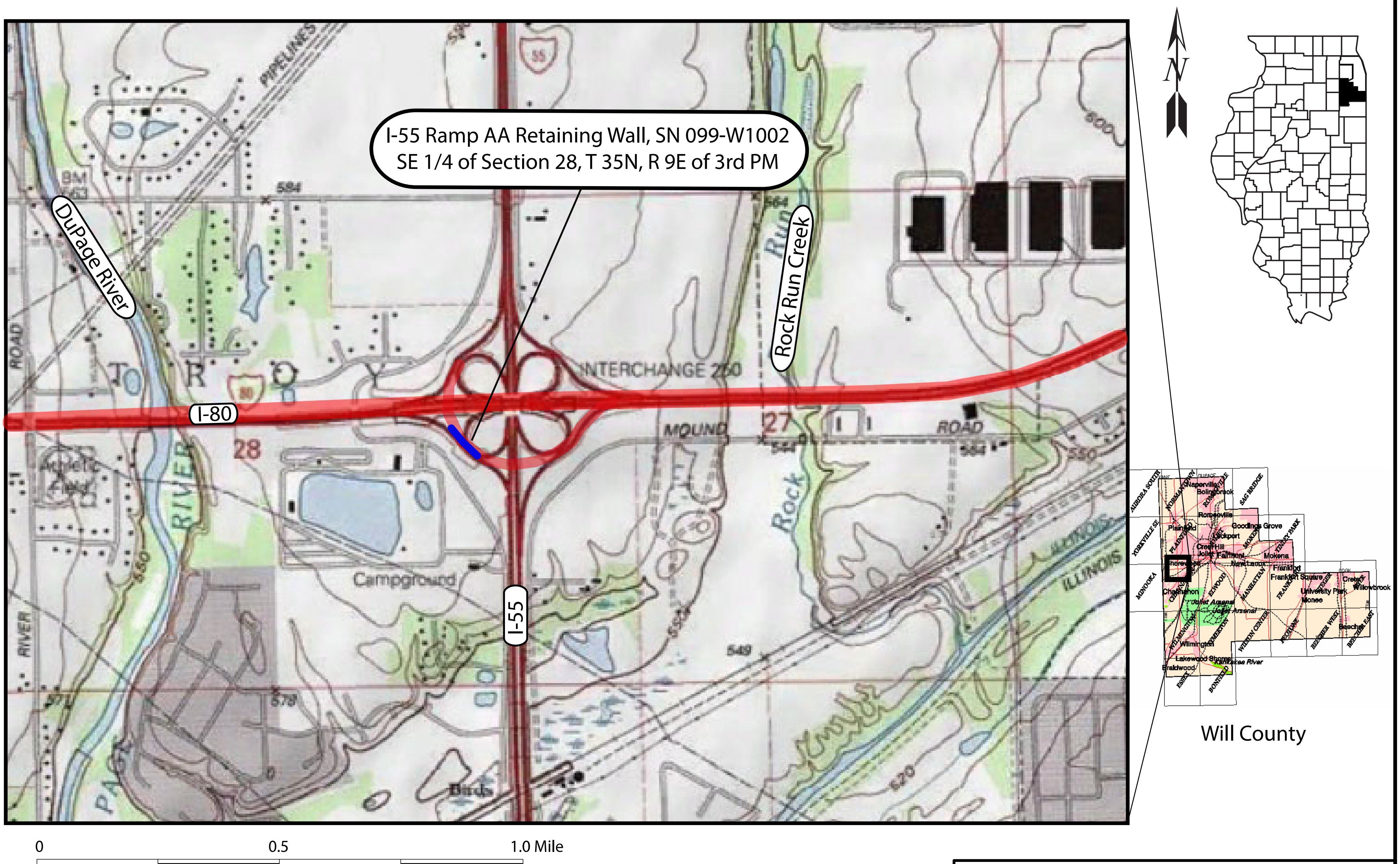
EXHIBITS



SITE LOCATION MAP: I-55 RAMP RETAINING WALL, SN 099-W1002; I-80 RECONSTRUCTION FROM EAST OF RIDGE RD TO HOUBOLT RD; WILL COUNTY, ILLINOIS

SCALE: GRAPHICAL	EXHIBIT 1	DRAWN BY: J. Bensen CHECKED BY: A. Hamad

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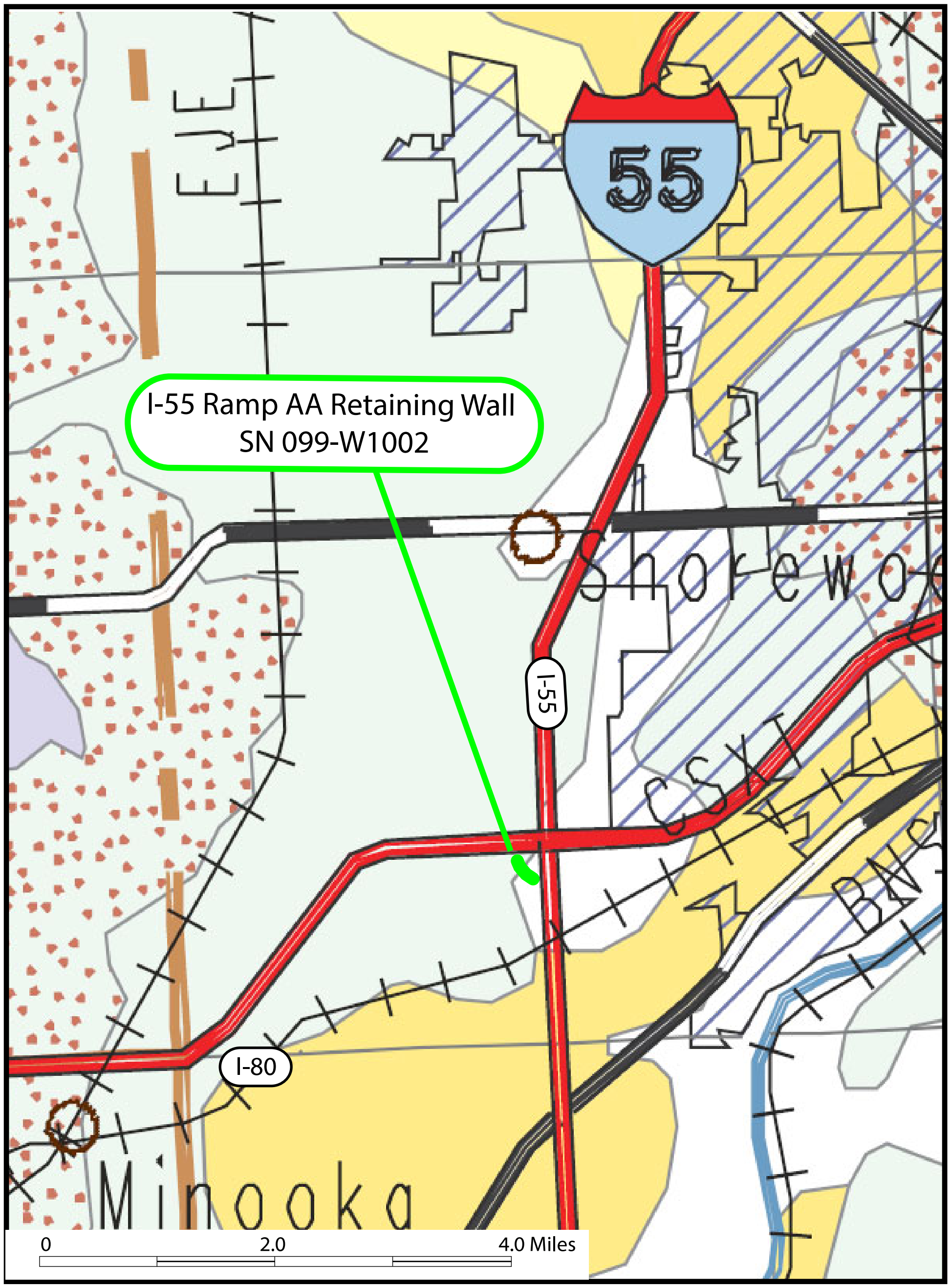
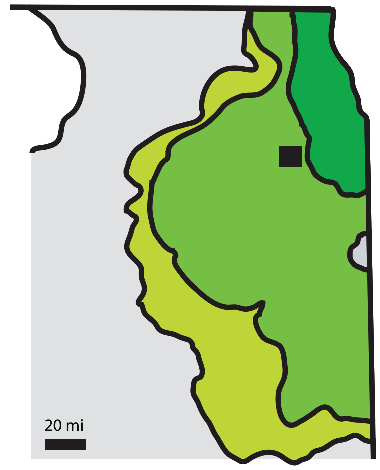
FOR STANTEC

255-39-01



Modified after William W. Shilts (2000)

REGIONAL GEOLOGY



Wedron Group

- Wadsworth Formation
- Lemont Formation
- Tiskilwa Formation

Modified after Hansel and Johnson (1996)

Legend

Cahokia Formation
Bedded silts, clays and sand and gravel deposited in floodplains and channels of modern rivers and streams

Equality Formation
Laminated silt, clay, or fine sand deposited in slackwater, glacial, and postglacial lakes; massive to bedded, calcareous

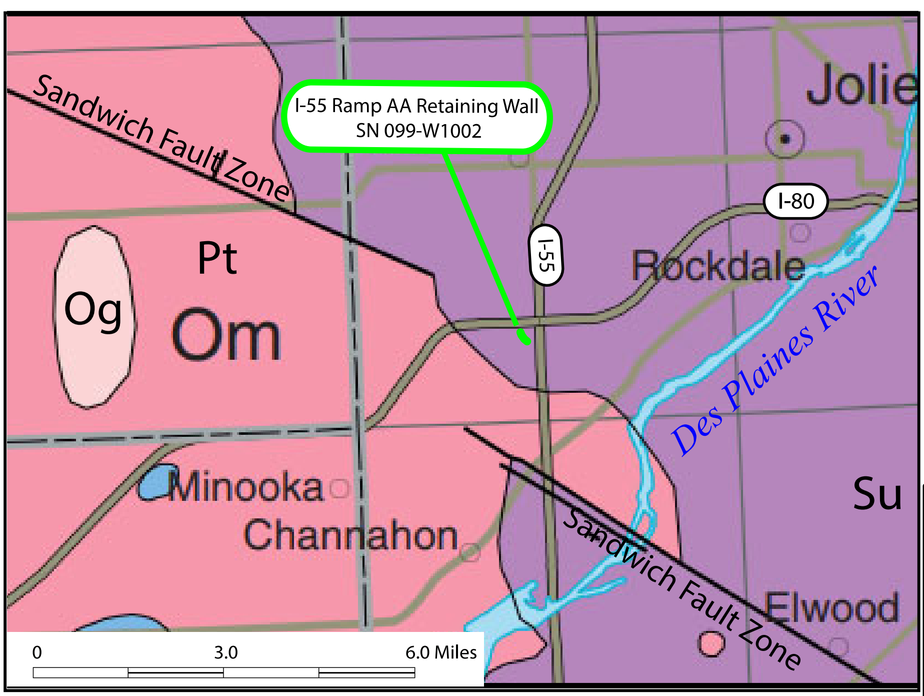
Henry Formation
Predominantly stratified sand and gravel; locally occurring silt, clay, organic debris, wood, shell lenses; outwash on floodplains

Lemont Formation
Diamicton; silty clay loam to silty clay; fine grained matrix; unsorted, unstratified mixture of gravel, sand, silt, and clay; containing lenses of sand, gravel and/or silt.

Bedrock near or at the surface

Major metropolitan area

Modified after William W. Shilts (2000)



Modified after Dennis R. Kolata (2005)

Legend

Pt	Pennsylvanian Shale	Tadewater Formation
Su	Silurian Dolomitic Limestone	
Om	Ordovician Formation	Maquoketa Group
Og	Ordovician Formation	Galena Group

SITE AND REGIONAL GEOLOGY: I-55 RAMP AA RETAINING WALL, SN 099-W1002; I-80 RECONSTRUCTION FROM EAST OF RIDGE RD TO HOUBOLT RD; WILL COUNTY, ILLINOIS

SCALE: GRAPHICAL | EXHIBIT 2 | DRAWN BY: J. Bensen | CHECKED BY: A. Hamad

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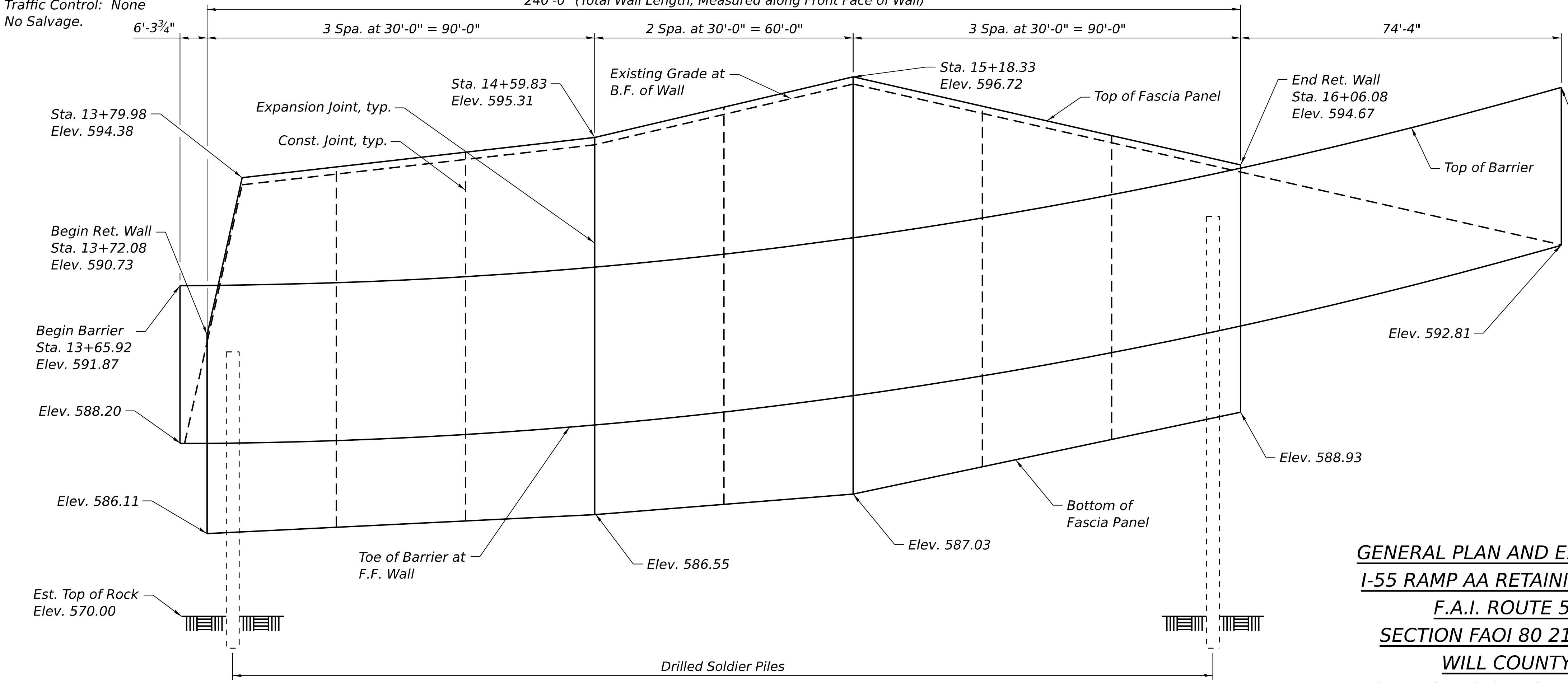
FOR STANTEC | 255-39-01

Benchmark: Set 2" CWA aluminum disc in concrete base of light pole on north side of westbound I-80, approximately 250'± east of mile marker 126 & 950'± west of I-55 centerline. Elev. 609.80

Existing Structure: None
Traffic Control: None
No Salvage.



ELEVATION

CURVE DATA

PRBL_RAMPAA
P.I. Sta. = 16+71.68
Δ = 94°06'00"
D = 06°11'39"
R = 925.00'
T = 993.68'
L = 1,519.18'
E = 432.58'
e = 6.0%
T.R. = N/A
S.E. Run = N/A
P.C. Sta. = 6+78.00
P.C.C. Sta. =21+97.18

DESIGN SPECIFICATIONS

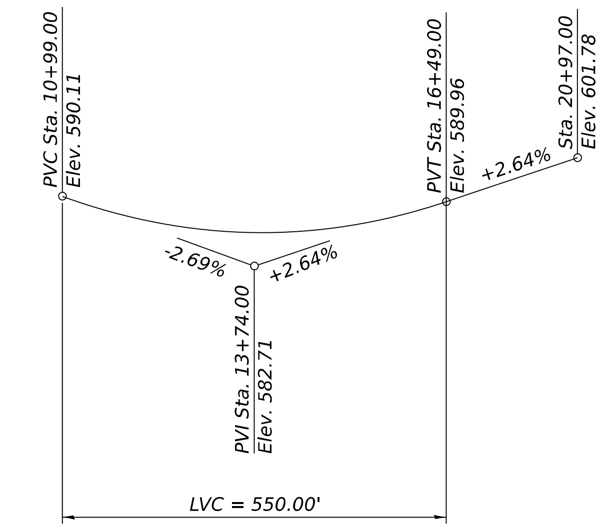
2020 AASHTO LRFD Bridge Design Specifications, 9th Edition

DESIGN STRESSES

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

HIGHWAY CLASSIFICATION

FAI Rte. 55 - I-55 Ramp AA
Functional Class: Interstate
ADT: 7,600 (2021); 15,800 (2040)
ADTT: 1,930 (2021); 5,060 (2040)
DHV: 2,270 (2040)
Design Speed: 50 m.p.h.
Posted Speed: 50 m.p.h.
One-Way Traffic
Directional Distribution: 100:0

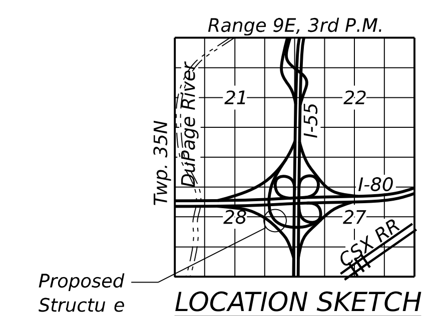


PROFILE GRADE
Ramp AA

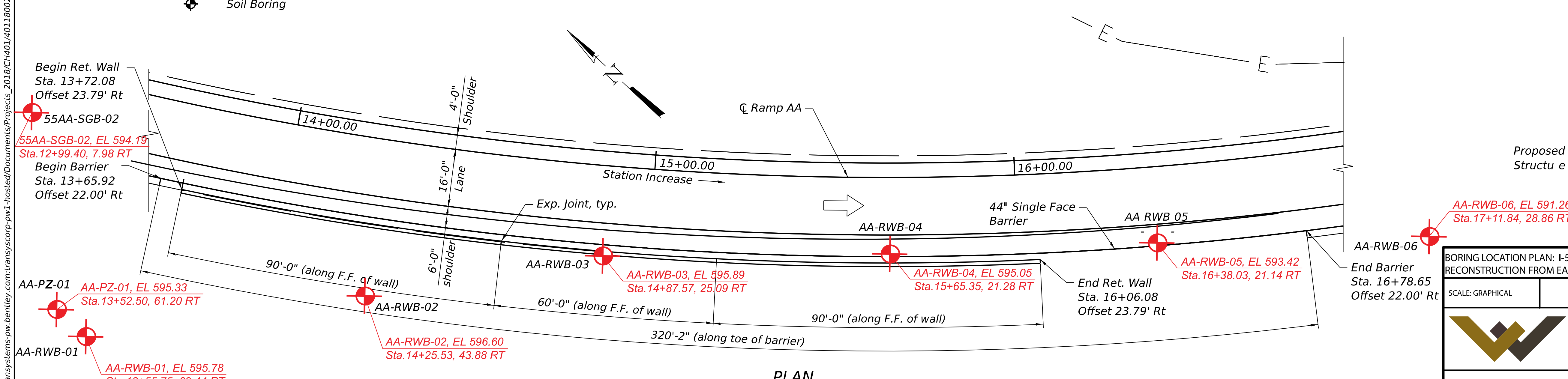
GENERAL PLAN AND ELEVATION
I-55 RAMP AA RETAINING WALL
F.A.I. ROUTE 55
SECTION FAOI 80 21 DEMO
WILL COUNTY
STA. 13+72.07 TO 16+06.08
STRUCTURE NO. 099-W1002

LEGEND

E Existing Electrical Line
Soil Boring



LOCATION SKETCH



PLAN

BORING LOCATION PLAN: I-55 RAMP RETAINING WALL, SN 099-W1002; I-80 RECONSTRUCTION FROM EAST OF RIDGE RD TO HOUBOLT RD; WILL COUNTY, ILLINOIS

SCALE: GRAPHICAL	EXHIBIT 3	DRAWN BY: D. You CHECKED BY: A. Hamad

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FOR STANTEC | 255-39-01

MODEL: Default
FILE NAME: pw://transystems-pw.bentley.com:transyscorp-pw1-hosted/Documents/Projects_2018/CH401/401180022/01-Stantec/CAD/INT-02_62R26/04-Sheet/04-Structures/099W1002 Ramp AA Retaining Wall/TSL/099W1002 62R26-Retaining Wall-TSL-001.dgn

Stantec

USER NAME = eoskoui	DESIGNED - EAO	REVISED -
	CHECKED - JZ	REVISED -
PLOT SCALE = 32.0000 ' / in.	DRAWN - EAO	REVISED -
PLOT DATE = 10/4/2023	CHECKED - JZ	REVISED -

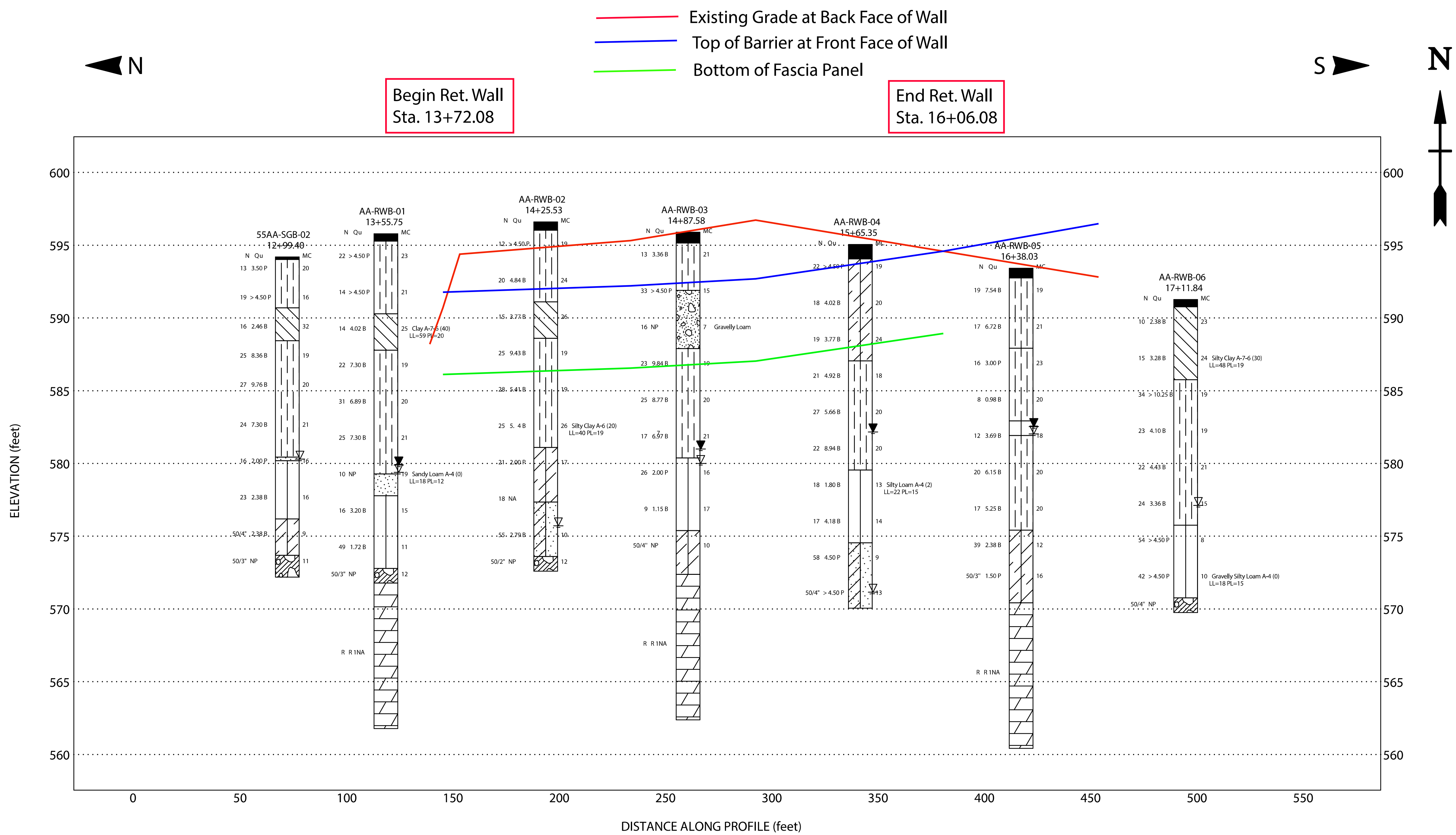
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

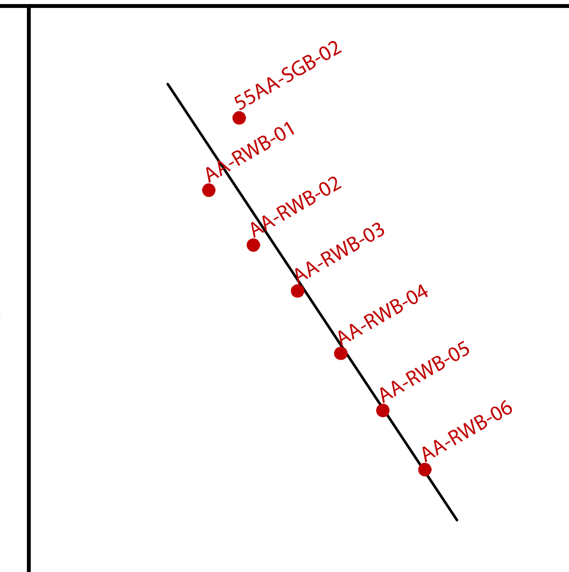
SHEET OF SHEETS

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
55	FAOI 80 21 DEMO	WILL	2	1

CONTRACT NO. 62R26
ILLINOIS | FED. AID PROJECT

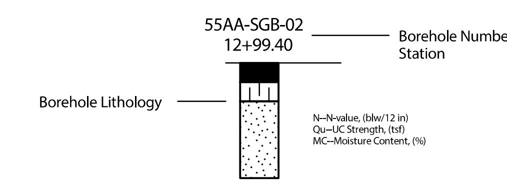
10/4/2023 1:26:13 PM





Site Map Scale 1 inch equals 200 feet

Explanation:



Water Level Reading at time of drilling.

Water Level Reading 24-hr after drilling or at end of drilling

0 55

Horizontal Scale (feet)

Vertical Exaggeration: 6.5x

Lithology Graphics

- Topsoil
- IDH Silt, Silty Loam
- IDH Loam
- IDH Silty Clay, Silty Clay Loam
- IDH Clay Loam
- Gravelly sand, sandy gravel
- IDH Clay
- Weathered bedrock
- IDH Sand, Sandy Loam
- Dolomite or Dolomitic Limestone

Wang Engineering, Inc.
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Soil Profile
I-55 Ramp AA Retaining Wall, SN 099-W1002

WEI SINCE 1982

I-80 Reconstruction, Ridge Road to Houbolt Road
Will County, Illinois

JOB NUMBER	PLATE NUMBER
255-39-01	EXHIBIT 4

WEI 11X17 2553901.GPJ WANGENG.GDT 10/16/23

APPENDIX A

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BORING LOG 55AA-SGB-02

WEI Job No.: 255-39-01

Client: **Stantec**
Project: **I-80 Reconstruction, Ridge Road to Houbolt Road**
Location: **Will County, Illinois**

Datum: NAVD 88
Elevation: 594.19 ft
North: 1755226.09 ft
East: 1020690.05 ft
Station: 12+99.40
Offset: 7.98 RT

Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
594.0	2-inch thick brown SILTY CLAY; dry --TOPSOIL--					
	Very stiff to hard, brown and gray SILTY CLAY, trace gravel; damp --FILL-- --RDR 2--		1	3 6 7 10	3.50 P	20
			2	6 9 10 9	> 4.50 P	16
590.7	Very stiff, black and gray CLAY to SILTY CLAY; damp --RDR 2--	5	3	6 6 10 10	2.46 B	32
588.4	Hard, brown and gray SILTY CLAY, trace gravel; damp --RDR 2--		4	7 13 12 19	8.36 B	19
		10	5	7 12 15 20	9.76 B	20
			6	6 10 14	7.30 B	21
580.4	Orange and tan, SANDY LOAM, trace gravel; wet					
580.2	Very stiff, gray SILTY LOAM to SILTY CLAY LOAM, trace gravel; damp to moist --RDR 2--	15	7	16 9 7	2.00 P	16
			8	6 8 15	2.38 B	16
576.2	Very stiff, gray SILTY LOAM to CLAY LOAM, little gravel; moist --RDR 2--	20	9	11 25 50/4"	2.38 B	9
573.7	Very dense, gray GRAVEL; saturated --RDR 2-- --Weathered BEDROCK--		10	50/3"	NP	11
572.2	--AUGER REFUSAL-- Boring terminated at 22.00 ft					

GENERAL NOTES

Begin Drilling **12-08-2022** Complete Drilling **12-08-2022**
Drilling Contractor **Wang Testing Services** Drill Rig **21GeoA[96%]**
Driller **RR&JD** Logger **B. Miller** Checked by **C. Marin**
Drilling Method **2.25" ID HSA; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling **14.00 ft**
At Completion of Drilling **13.00 ft**
Time After Drilling **NA**
Depth to Water **NA**

The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.

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BORING LOG AA-RWB-01

WEI Job No.: 255-39-01

Client **Stantec**
Project **I-80 Reconstruction, Ridge Road to Houbolt Road**
Location **Will County, Illinois**

Datum: NAVD 88
Elevation: 595.78 ft
North: 1755150.16 ft
East: 1020658.18 ft
Station: 13+55.75
Offset: 69.44 RT

Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
595.3	6-inch thick, brown SILTY CLAY; damp --TOPSOIL--					
	Hard, brown SILTY CLAY, trace gravel; damp --FILL-- --RDR 2--		1	6 10 12	> 4.50 P	23
		5	2	3 6 8	> 4.50 P	21
590.3	Hard, black and gray CLAY; damp --RDR 2-- --L_L(%)=59, P_L(%)=20-- --%Gravel=0.5-- --%Sand=5.8-- --%Silt=43.4-- --%Clay=50.4--		3	4 6 8	4.02 B	25
587.8	Hard, brown to brown and gray SILTY CLAY LOAM, trace gravel; moist --RDR 2--	10	4	5 9 13	7.30 B	19
			5	8 13 18	6.89 B	20
		15	6	6 10 15	7.30 B	21
579.3	Medium dense, orange and brown SANDY LOAM, trace gravel; saturated --L_L(%)=18, P_L(%)=12-- --%Gravel=3.4-- --%Sand=55.1-- --%Silt=33.4-- --%Clay=8.2--		7	5 4 6	NP	19
577.8		20	8	4 7 9	3.20 B	15
	Stiff to very stiff, gray SILTY LOAM to CLAY LOAM, trace to little gravel; moist --RDR 2--		9	15 15 34	1.72 B	11
572.8	Very dense, gray GRAVEL; saturated --Weathered BEDROCK--		10	50/3"	NP	12
571.8	Strong, gray, poor rock quality, shaly DOLOSTONE; closely spaced, slightly weathered, horizontal and vertical joints, with <0.05 inch opening, rough walls, and <0.05 to no infill. -- Run 1: 24.0 to 34.0 feet-- --Recovery = 100%-- --RQD = 19%-- --Qu=13,673 psi	25, 30	11	CORE	R 1	
561.8	Boring terminated at 34.00 ft	35, 40				

GENERAL NOTES

Begin Drilling **12-08-2022** Complete Drilling **12-19-2022**
Drilling Contractor **Wang Testing Services** Drill Rig **21D120A[78%]**
Driller **RR&JD** Logger **B. Miller** Checked by **C. Marin**
Drilling Method **3.25" ID HSA; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **16.50 ft**
At Completion of Drilling ▼ **16.00 ft**
Time After Drilling **NA**
Depth to Water ▼ **NA**

The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.

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BORING LOG AA-RWB-02

WEI Job No.: 255-39-01

Client: **Stantec**
Project: **I-80 Reconstruction, Ridge Road to Houbolt Road**
Location: **Will County, Illinois**

Datum: NAVD 88
Elevation: 596.60 ft
North: 1755092.49 ft
East: 1020704.93 ft
Station: 14+25.53
Offset: 43.88 RT

Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
596.0	7-inch thick brown SILTY CLAY; damp --TOPSOIL--					
	Hard, brown SILTY CLAY, trace gravel; damp --FILL-- --RDR 2--		1	4 5 7	> 4.50 P	19
		5	2	4 6 14	4.84 B	24
591.1	Very stiff, black and gray CLAY to SILTY CLAY; damp --RDR 2--		3	8 7 8	3.77 B	26
588.6	Hard, gray SILTY CLAY to SILTY CLAY LOAM, trace to little gravel; damp --RDR 2--	10	4	6 11 14	9.43 B	19
			5	7 12 16	5.41 B	19
	--L_L(%)=40, P_L(%)=19-- --%Gravel=3.3-- --%Sand=5.2-- --%Silt=50.7-- --%Clay=40.8--	15	6	7 11 14	5.74 B	26
581.1	Very stiff, brown to gray SILTY LOAM to CLAY LOAM, little gravel; wet --RDR 2--		7	10 11 10	2.00 P	17
577.4	Medium dense to very dense, gray LOAM to CLAY LOAM, some gravel; damp --RDR 2--	20	8	5 7 11	NA	
			9	15 22 33	2.79 B	10
573.6	Very dense, gray GRAVEL; saturated --RDR 2--		10	50/2"	NP	12
572.6	--Weathered BEDROCK-- --AUGER REFUSAL-- Boring terminated at 24.00 ft	25				
		30				
		35				
		40				

GENERAL NOTES

Begin Drilling **12-08-2022** Complete Drilling **12-08-2022**
Drilling Contractor **Wang Testing Services** Drill Rig **21D120A[78%]**
Driller **RR&JD** Logger **B. Miller** Checked by **C. Marin**
Drilling Method **2.25" ID HSA; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **21.00 ft**
At Completion of Drilling ▼ **20.00 ft**
Time After Drilling **72 hours**
Depth to Water ▼ **Dry (cave in 3 ft) ft**

The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.

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BORING LOG AA-RWB-03

WEI Job No.: 255-39-01

Client: **Stantec**
Project: **I-80 Reconstruction, Ridge Road to Houbolt Road**
Location: **Will County, Illinois**

Datum: NAVD 88
Elevation: 595.89 ft
North: 1755044.19 ft
East: 1020751.41 ft
Station: 14+87.58
Offset: 25.09 RT

Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
595.1	9-inch thick, brown SILTY CLAY; damp --TOPSOIL--					
	Very stiff to hard, brown SILTY CLAY, trace gravel; damp --FILL-- --RDR 2--		1	4 4 9	3.36 B	21
591.9	Medium dense to dense, brown and gray Gravelly LOAM to SANDY LOAM; damp --FILL-- --RDR 2-- --%Gravel=33.8-- --%Sand=30.4-- --%Silt=28.6-- --%Clay=7.3--	5	2	27 20 13	> 4.50 P	15
			3	26 11 5	NP	7
587.9	Hard, brown and gray SILTY CLAY, trace gravel; damp --RDR 2--	10	4	4 8 15	9.84 B	19
			5	7 10 15	8.77 B	20
		15	6	5 8 9	6.97 B	21
580.4	Stiff to very stiff, orange, brown, and gray SILTY LOAM to SILTY CLAY LOAM, trace to some gravel; moist to saturated --RDR 2-3--		7	6 8 18	2.00 P	16
		20	8	2 4 5	1.15 B	17
575.4	Very dense, gray LOAM to CLAY LOAM, little gravel; moist --dolostone chips--		9	21 23 50/4"	NP	10
572.4	Strong, light gray, very poor rock quality, DOLOSTONE; closely spaced, highly weathered, horizontal, oblique and vertical joints, with <0.2 inch opening, rough walls, and <0.2 inch thick clay infill. -- Run 1: 23.5 to 33.5 feet-- --Recovery = 95%-- --RQD = 19%--	25, 30	10	CORE	R 1	
562.4	Boring terminated at 33.50 ft	35, 40				

GENERAL NOTES

Begin Drilling **12-21-2022** Complete Drilling **12-21-2022**
Drilling Contractor **Wang Testing Services** Drill Rig **21D120A[78%]**
Driller **NC&DZ** Logger **B. Miller** Checked by **C. Marin**
Drilling Method **3.25" ID HSA; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **16.00 ft**
At Completion of Drilling ▼ **15.00 ft**
Time After Drilling **NA**
Depth to Water ▼ **NA**

The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.

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BORING LOG AA-RWB-04

WEI Job No.: 255-39-01

Client: **Stantec**
Project: **I-80 Reconstruction, Ridge Road to Houbolt Road**
Location: **Will County, Illinois**

Datum: NAVD 88
Elevation: 595.05 ft
North: 1754978.59 ft
East: 1020796.84 ft
Station: 15+65.35
Offset: 21.28 RT

Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	12-inch thick dark brown SILTY CLAY					
594.1	--Buried TOPSOIL--					
	Very stiff to hard, brown SILTY CLAY LOAM to CLAY LOAM, trace gravel; damp --FILL-- --RDR 2--		1	4, 9, 13	> 4.50 P	19
		5	2	7, 8, 10	4.02 B	20
	--black and brown--		3	4, 7, 12	3.77 B	24
587.1	Hard, brown and gray to gray SILTY CLAY LOAM, trace gravel; damp --RDR 2--	10	4	6, 8, 13	4.92 B	18
			5	9, 11, 16	5.66 B	20
		15	6	6, 9, 13	8.94 B	20
579.6	Stiff to hard, gray SILTY LOAM to SILTY CLAY LOAM, trace gravel; damp --RDR 2-- --L_L(%)=22, P_L(%)=15-- --%Gravel=7.8-- --%Sand=20.2-- --%Silt=57.9-- --%Clay=14.1--		7	8, 9, 9	1.80 B	13
	--wet gravelly sand lenses--	20	8	5, 8, 9	4.18 B	14
	--gray--					
574.6	Hard, light gray Gravelly SILTY LOAM to CLAY LOAM, few dolostone fragments; moist --RDR 2-3--		9	14, 19, 39	4.50 P	9
	--RDR 3--		10	30, 41, 50/4"	> 4.50 P	13
570.1	--AUGER REFUSAL-- Boring terminated at 25.00 ft	25				
		30				
		35				
		40				

GENERAL NOTES

Begin Drilling **12-19-2022** Complete Drilling **12-08-2022**
Drilling Contractor **Wang Testing Services** Drill Rig **21D120A[78%]**
Driller **NC&DZ** Logger **B. Miller** Checked by **C. Marin**
Drilling Method **2.25" ID HSA; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **24.00 ft**
At Completion of Drilling ▼ **13.00 ft**
Time After Drilling **24 hours**
Depth to Water ▼ **13.00 ft**

The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.

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BORING LOG AA-RWB-05

WEI Job No.: 255-39-01

Client **Stantec**
Project **I-80 Reconstruction, Ridge Road to Houbolt Road**
Location **Will County, Illinois**

Datum: NAVD 88
Elevation: 593.42 ft
North: 1754918.56 ft
East: 1020841.00 ft
Station: 16+38.03
Offset: 21.14 RT

SOIL AND ROCK DESCRIPTION

Elevation (ft)	Soil and Rock Description
592.8	8-inch thick, brown SILTY CLAY, trace gravel; damp --TOPSOIL--
587.9	Hard, brown SILTY CLAY, trace gravel; damp --FILL-- --RDR 2--
582.9	Medium stiff to very stiff, brown and gray SILTY CLAY to SILTY CLAY LOAM, trace gravel; damp to moist --RDR 2--
581.9	Brown SILT to SILTY LOAM; saturated
575.4	Very stiff to hard, brown and gray SILTY CLAY, trace gravel; damp --RDR 2--
570.4	Stiff to very stiff, gray Gravelly CLAY LOAM; moist --RDR 2-- --dolostone chips--
560.4	Strong, light gray, very poor rock quality, DOLOSTONE; closely spaced, highly weathered, horizontal, oblique and vertical joints, with <0.05 inch opening, rough walls, and <0.05 inch thick clay infill. -- Run 1: 23.0 to 33.0 feet-- --Recovery = 97%-- --RQD = 16%--
	Boring terminated at 33.00 ft

Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
1	5 / 7 / 12	7.54 B	19
2	4 / 7 / 10	6.72 B	21
3	6 / 8 / 8	3.00 P	23
4	3 / 3 / 5	0.98 B	20
5	3 / 5 / 7	3.69 B	18
6	7 / 8 / 12	6.15 B	20
7	4 / 7 / 10	5.25 B	20
8	4 / 7 / 32	2.38 B	12
9	7 / 50/3"	1.50 P	16
10	CORE	R 1	

GENERAL NOTES

Begin Drilling **12-21-2022** Complete Drilling **12-21-2022**
Drilling Contractor **Wang Testing Services** Drill Rig **21D120A[78%]**
Driller **NC&DZ** Logger **B. Miller** Checked by **C. Marin**
Drilling Method **3.25" ID HSA; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ∇ **11.50 ft**
At Completion of Drilling ▼ **11.00 ft**
Time After Drilling **NA**
Depth to Water ▼ **NA**

The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.

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wangeng@wangeng.com
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Telephone: 630 953-9928
Fax: 630 053-9938

BORING LOG AA-RWB-06

WEI Job No.: 255-39-01

Client **Stantec**
Project **I-80 Reconstruction, Ridge Road to Houbolt Road**
Location **Will County, Illinois**

Datum: NAVD 88
Elevation: 591.26 ft
North: 1754856.43 ft
East: 1020885.08 ft
Station: 17+11.84
Offset: 28.86 RT

Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
590.8	6-inch thick, brown SILTY CLAY, trace gravel; damp --TOPSOIL--					
	Very stiff, brown and gray CLAY to SILTY CLAY, trace gravel; damp --FILL-- --RDR 2-- --L_L(%)=48, P_L(%)=19-- --%Gravel=0.9-- --%Sand=4.5-- --%Silt=55.1-- --%Clay=39.5--		1	3, 4, 6	2.38 B	23
		5	2	4, 7, 8	3.28 B	24
585.8	Very stiff to hard, brown and gray SILTY CLAY, trace gravel; damp --RDR 2-- --2-inch thick orange sandy gravel seam; wet--		3	13, 15, 19	> 10.25 B	19
		10	4	6, 10, 13	4.10 B	19
			5	6, 9, 13	4.43 B	21
		15	6	5, 13, 11	3.36 B	15
575.8	Hard, gray Gravelly SILTY LOAM to CLAY LOAM; damp to moist --RDR 2-- --L_L(%)=18, P_L(%)=15-- --%Gravel=41.3-- --%Sand=23.0-- --%Silt=31.6-- --%Clay=4.1-- --bedrock chips--		7	6, 19, 35	> 4.50 P	8
		20	8	7, 19, 23	> 4.50 P	10
570.8						
	Very dense, gray GRAVEL; saturated --Weathered BEDROCK--		9	50/4"		NP
569.8	--AUGER REFUSAL-- Boring terminated at 21.50 ft					
		25				
		30				
		35				
		40				

GENERAL NOTES

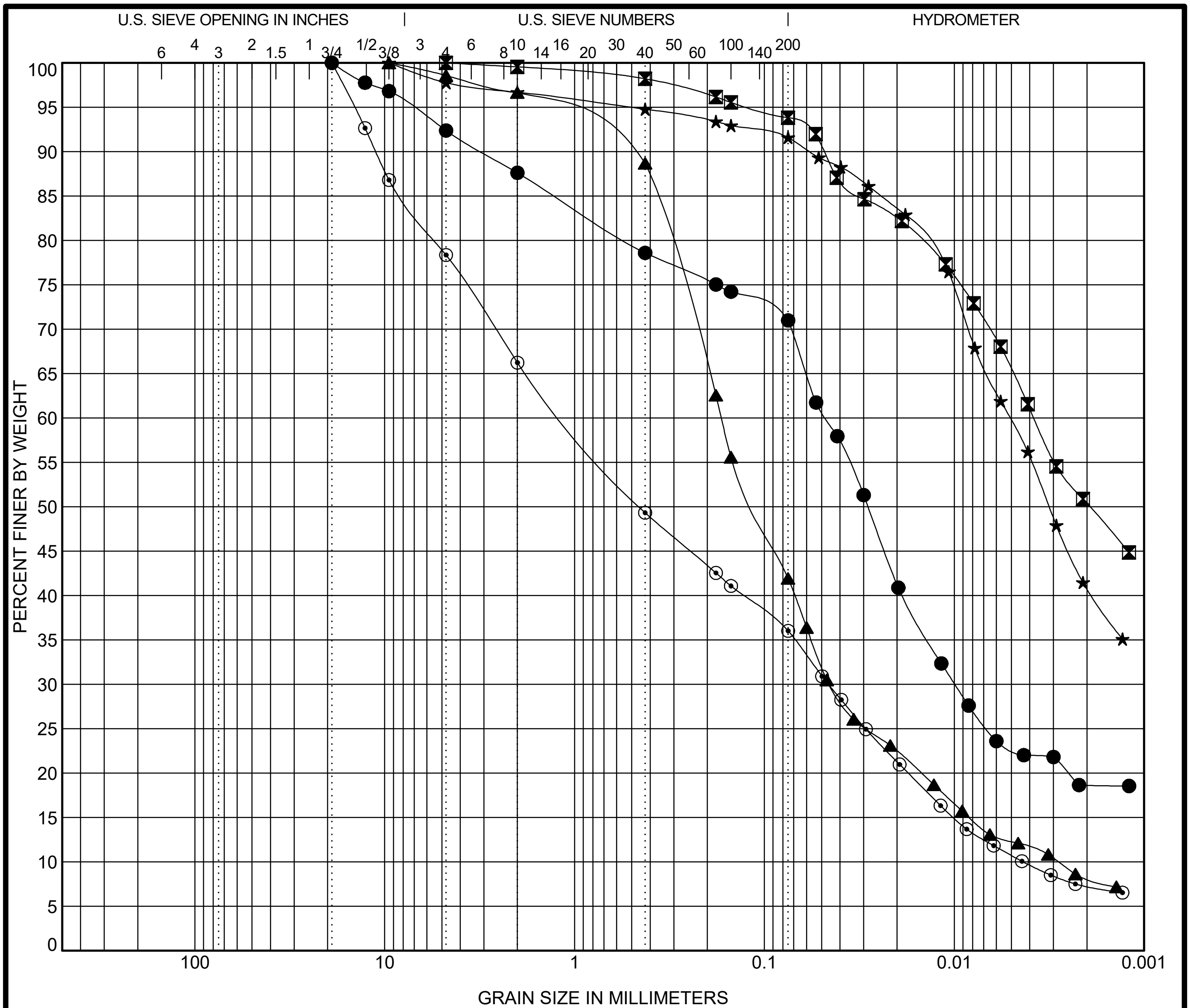
Begin Drilling **12-21-2022** Complete Drilling **12-21-2022**
Drilling Contractor **Wang Testing Services** Drill Rig **21D120A[78%]**
Driller **NC&DZ** Logger **B. Miller** Checked by **C. Marin**
Drilling Method **3.25" ID HSA; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling **14.25 ft**
At Completion of Drilling **NA**
Time After Drilling **NA**
Depth to Water **NA**

The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.

APPENDIX B



COBBLES	GRAVEL	SAND		SILT AND CLAY
		coarse	fine	

	Specimen Identification		IDH Classification	LL	PL	PI	Cc	Cu
●	55BB-SGB-02#3	4.0 ft	**Silty Clay Loam**	28	15	13		
⊠	AA-RWB-01#3	6.0 ft	**Clay**	59	20	39		
▲	AA-RWB-01#7	16.0 ft	**Sandy Loam**	18	12	6	4.32	59.58
★	AA-RWB-02#6	13.5 ft	**Silty Clay**	40	19	21		
⊙	AA-RWB-03#3	6.0 ft	**Gravelly Loam**				0.43	260.94

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	55BB-SGB-02#3	4.0 ft	19	0.047	0.01		12.4	17.0	52.0	18.6
⊠	AA-RWB-01#3	6.0 ft	4.75	0.004			0.5	5.8	43.4	50.4
▲	AA-RWB-01#7	16.0 ft	9.5	0.168	0.045	0.003	3.4	55.1	33.4	8.2
★	AA-RWB-02#6	13.5 ft	9.5	0.005			3.3	5.2	50.7	40.8
⊙	AA-RWB-03#3	6.0 ft	19	1.13	0.046	0.004	33.8	30.4	28.6	7.3

WEI
SINCE 1982

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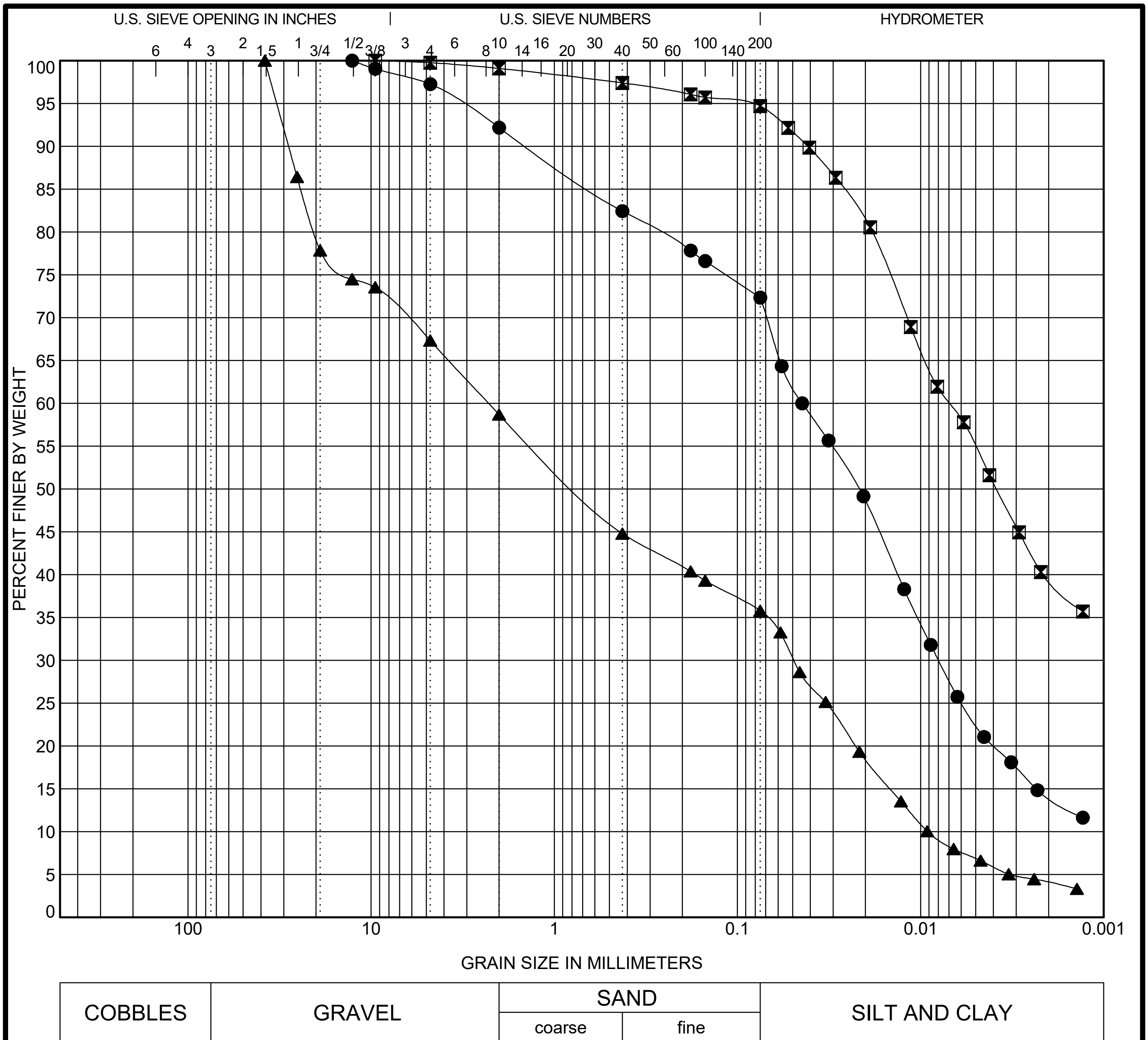
Lombard, IL, 60148
Telephone: 630 953 9928
Fax: 630 953 9938

GRAIN SIZE DISTRIBUTION

Project: I-80 Reconstruction, Ridge Road to Houbolt Road

Location: Will County, Illinois

Number: 255-39-01



	Specimen Identification		IDH Classification	LL	PL	PI	Cc	Cu
●	**AA-RWB-04#7**	**16.0 ft**	**Silty Loam**	**22**	**15**	**7**		
⧗	**AA-RWB-06#2**	**3.5 ft**	**Silty Clay**	**48**	**19**	**29**		
▲	**AA-RWB-06#8**	**18.5 ft**	**Gravelly Silty Loam**	**18**	**15**	**3**	**0.12**	**250.02**

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**AA-RWB-04#7**	**16.0 ft**	**12.7**	**0.044**	**0.008**		**7.8**	**20.2**	**57.9**	**14.1**
⧗	**AA-RWB-06#2**	**3.5 ft**	**9.5**	**0.007**			**0.9**	**4.5**	**55.1**	**39.5**
▲	**AA-RWB-06#8**	**18.5 ft**	**38.1**	**2.283**	**0.049**	**0.009**	**41.3**	**23.0**	**31.6**	**4.1**

WEI SINCE 1982
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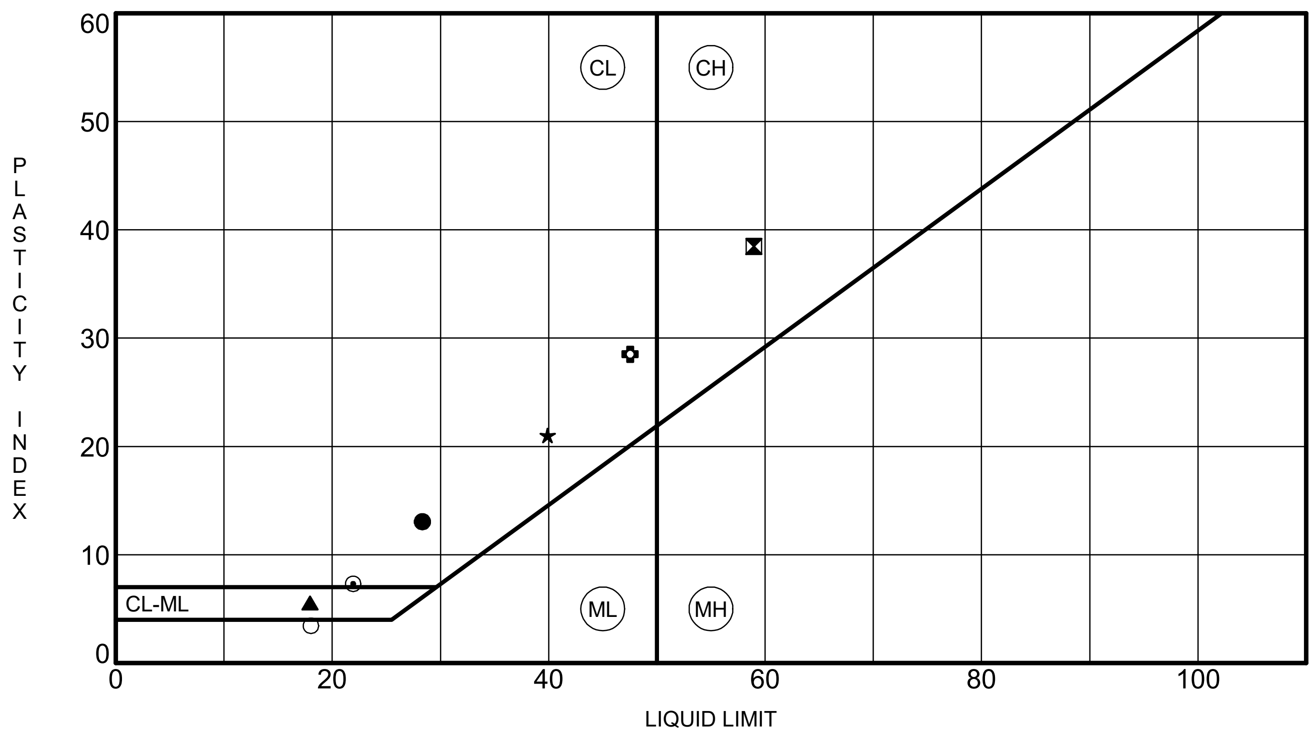
GRAIN SIZE DISTRIBUTION

Project: I-80 Reconstruction, Ridge Road to Houbolt Road

Location: Will County, Illinois

Number: 255-39-01



	Specimen Identification		LL	PL	PI	Fines	IDH Classification
●	**55BB-SGB-02#3**	**4.0 ft**	**28**	**15**	**13**	**71**	**Silty Clay Loam**
⧗	**AA-RWB-01#3**	**6.0 ft**	**59**	**20**	**39**	**94**	**Clay**
▲	**AA-RWB-01#7**	**16.0 ft**	**18**	**12**	**6**	**42**	**Sandy Loam**
★	**AA-RWB-02#6**	**13.5 ft**	**40**	**19**	**21**	**92**	**Silty Clay**
⊙	**AA-RWB-04#7**	**16.0 ft**	**22**	**15**	**7**	**72**	**Silty Loam**
✿	**AA-RWB-06#2**	**3.5 ft**	**48**	**19**	**29**	**95**	**Silty Clay**
○	**AA-RWB-06#8**	**18.5 ft**	**18**	**15**	**3**	**36**	**Gravelly Silty Loam**

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ATTERBERG LIMITS' RESULTS

Project: I-80 Reconstruction, Ridge Road to Houbolt Road

Location: Will County, Illinois

Number: 255-39-01

Unconfined Compressive Strength of Intact Rock Core Specimens

Project: I-80

Client: Stantec

WEI Job No.: KE225039

Field Sample ID	Run #	Depth (ft)	Location	Sample Description	Length (in) Before Capping	Length (in) After Capping	Diameter (in)	Total Load (lbs)	Total Pressure (psi)	Fracture Type*	Break Date	Tested By	Area (in^2)
AA-RWB-01	1	30.5	Ramp AA Retaining Wall	Dolostone	4.01	NA	2.04	44690	13673	3	1/3/23	KJ	3.27

*** Fracture Types:**

Type 1 - Reasonably well-formed cones on both ends, less than 1 in. [25 mm] of cracking through caps;
Type 2 - Well-formed cone on one end, vertical cracks running through caps, no well defined cone on other end;
Type 3 - Columnar vertical cracking through both ends, no well-formed cones;
Type 4 - Diagonal fracture with no cracking through ends; tap with hammer to distinguish from Type 1;
Type 5 - Side fractures at top or bottom (occur commonly with unbonded caps);
Type 6 - Similar to Type 5 but end of cylinder is pointed.

Prepared by:_______________________________

Checked by: _______________________________

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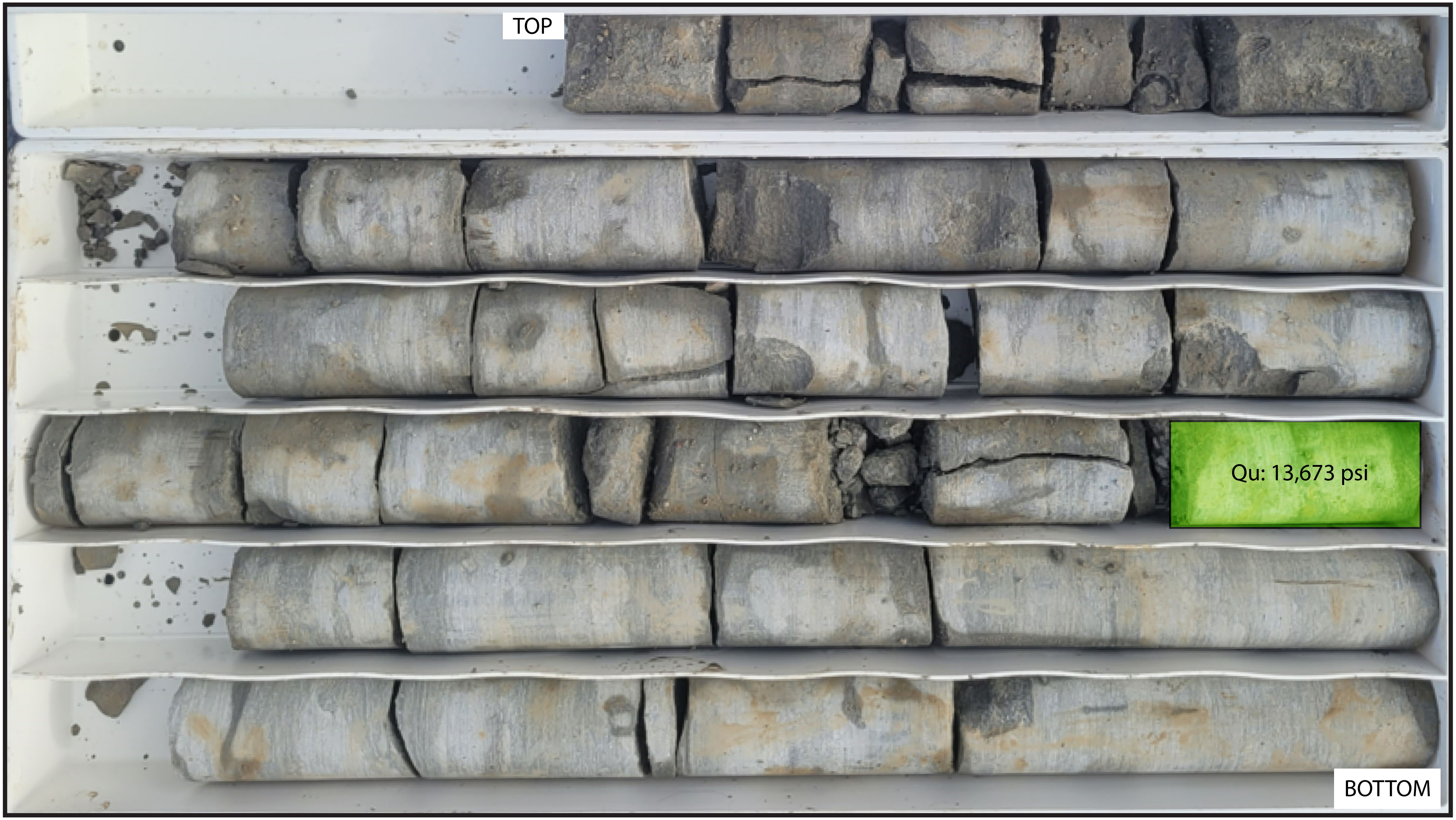
APPENDIX C

Run #1



0 6 inches

Boring AA-RWB-01:
Run #1, 24.0 to 34.0 feet, RECOVERY=100%, RQD=19%

BEDROCK CORE: I-55 RAMP AA RETAINING WALL, SN 099-W1002; I-80 RECONSTRUCTION FROM EAST OF RIDGE RD TO HOUBOLT RD; WILL COUNTY, ILLINOIS		
SCALE: GRAPHICAL	APPENDIX C-1	DRAWN BY: D. You CHECKED BY: A. Hamad
Wang Engineering		1145 N. Main Street Lombard, IL 60148 www.wangeng.com
FOR STANTEC		255-39-01

Run #1

0 6 inches

Boring AA-RWB-03:
Run #1, 23.5 to 33.5 feet, RECOVERY=95%, RQD=19%

BEDROCK CORE: I-55 RAMP AA RETAINING WALL, SN 099-W1002; I-80 RECONSTRUCTION FROM EAST OF RIDGE RD TO HOUBOLT RD; WILL COUNTY, ILLINOIS		
SCALE: GRAPHICAL	APPENDIX C-2	DRAWN BY: D. You CHECKED BY: A. Hamad
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FOR STANTEC		255-39-01

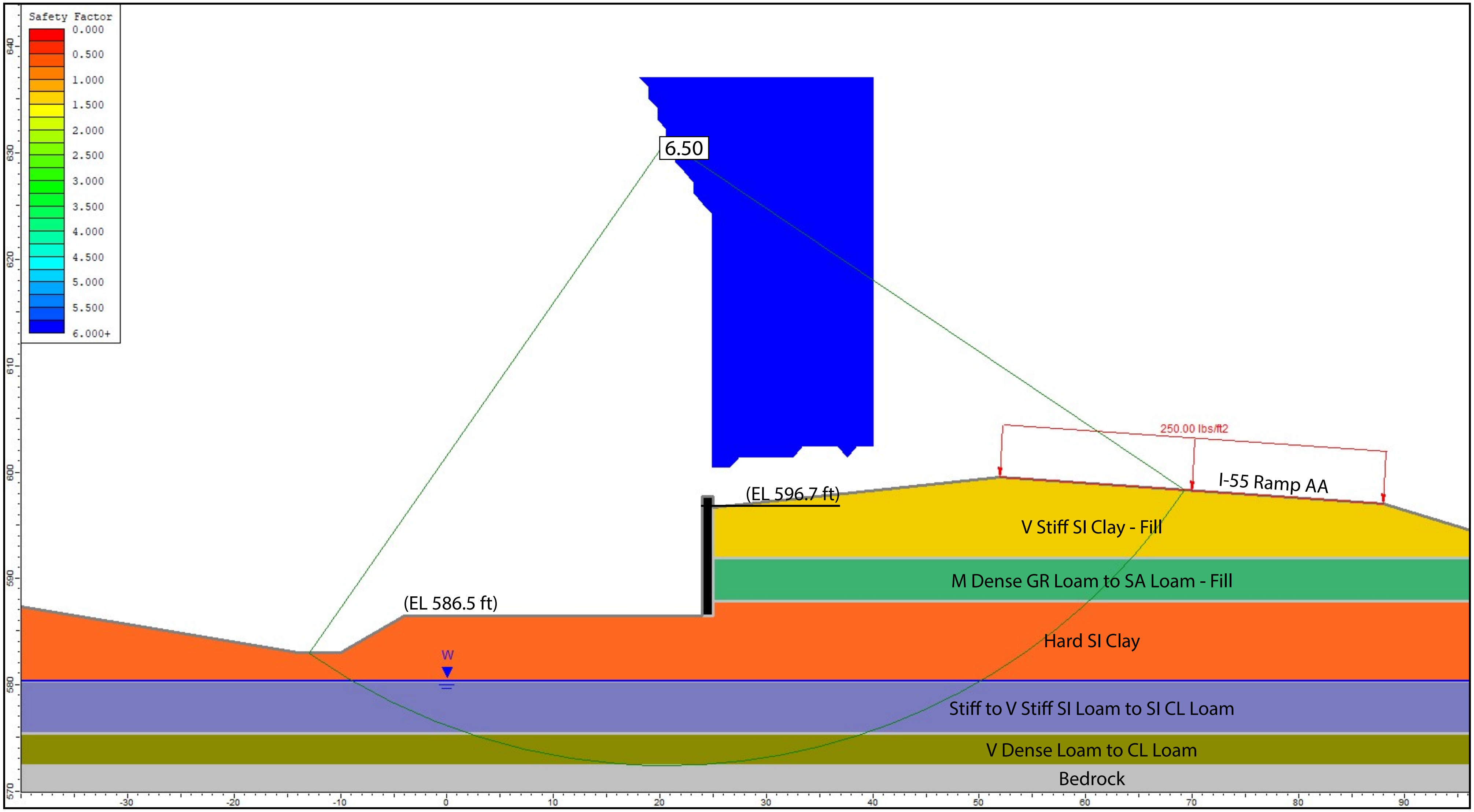
Run #1

0 6 inches

Boring AA-RWB-08:
Run #1, 8.0 to 18.0 feet, RECOVERY=100%, RQD=21%

BEDROCK CORE: I-55 RAMP AA RETAINING WALL, SN 099-W1002; I-80 RECONSTRUCTION FROM EAST OF RIDGE RD TO HOUBOLT RD; WILL COUNTY, ILLINOIS		
SCALE: GRAPHICAL	APPENDIX C-4	DRAWN BY: D. You CHECKED BY: A. Hamad
Wang Engineering		1145 N. Main Street Lombard, IL 60148 www.wangeng.com
FOR STANTEC		255-39-01

APPENDIX D



Undrained Analysis, Retaining Wall, Sta.15+00, Ref Boring: AA-RWB-03

Layer ID	Description	Total Unit Weight (pcf)	Undrained Cohesion (psf)	Undrained Friction Angle (degrees)
1	V Stiff SI Clay - Fill	120	3300	0
2	M Dense GR Loam to SA Loam - Fill	120	0	30
3	Hard SI Clay	125	4500	0
4	Stiff to V Stiff SI Loam to SI CL Loam	120	1600	0
5	V Dense Loam to CL Loam	125	0	33

GLOBAL STABILITY: I-55 RAMP AA RETAINING WALL, SN 099-W1002; I-80 RECONSTRUCTION FROM EAST OF RIDGE RD TO HOUBOLT RD; WILL COUNTY, ILLINOIS

SCALE: GRAPHICAL | APPENDIX D-1 | DRAWN BY: D. You | CHECKED BY: A. Hamad

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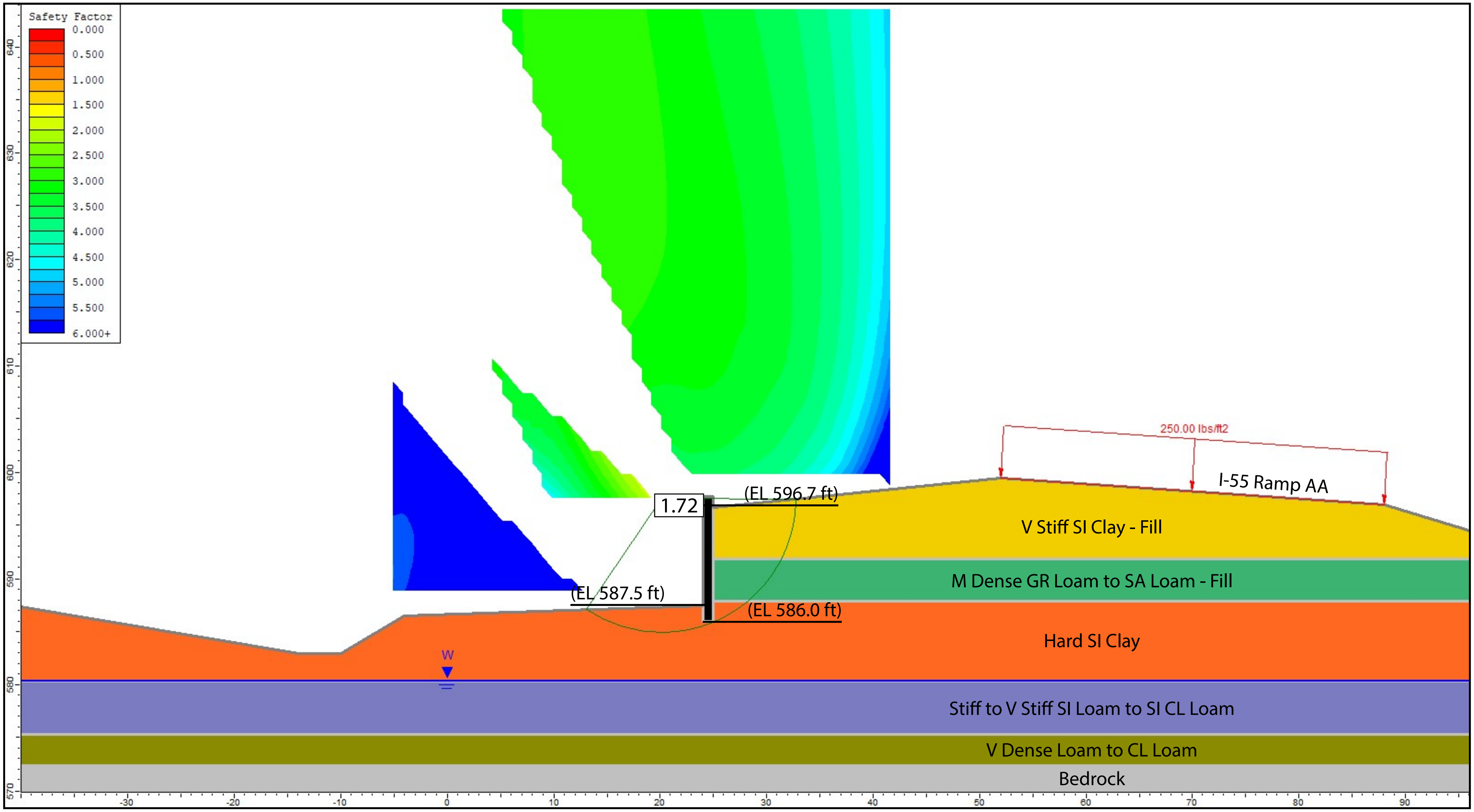

Drained Analysis, Retaining Wall, Sta.15+00, Ref Boring: AA-RWB-03

Layer ID	Description	Total Unit Weight (pcf)	Drained Cohesion (psf)	Drained Friction Angle (degrees)
1	V Stiff SI Clay - Fill	120	100	30
2	M Dense GR Loam to SA Loam - Fill	120	0	30
3	Hard SI Clay	125	100	30
4	Stiff to V Stiff SI Loam to SI CL Loam	120	100	30
5	V Dense Loam to CL Loam	125	0	33

GLOBAL STABILITY: I-55 RAMP AA RETAINING WALL, SN 099-W1002; I-80 RECONSTRUCTION FROM EAST OF RIDGE RD TO HOUBOLT RD; WILL COUNTY, ILLINOIS

SCALE: GRAPHICAL

APPENDIX D-2

DRAWN BY: D. You
CHECKED BY: A. Hamad

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Lombard, IL 60148
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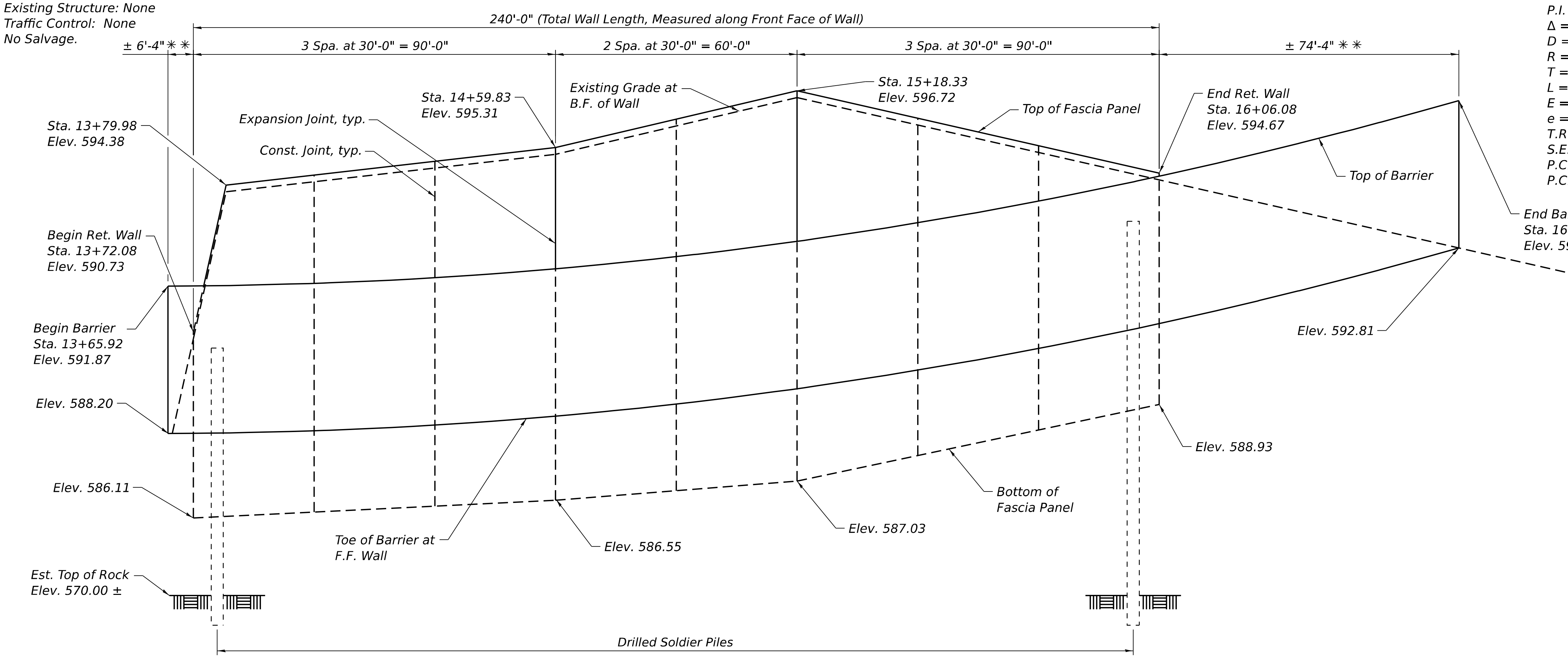
FOR STANTEC

255-39-01

APPENDIX E

Benchmark: Set 2" CWA aluminum disc in concrete base of light pole on north side of westbound I-80, approximately 250'± east of mile marker 126 & 950'± west of I-55 centerline. Elev. 609.80

Existing Structure: None
Traffic Control: None
No Salvage.



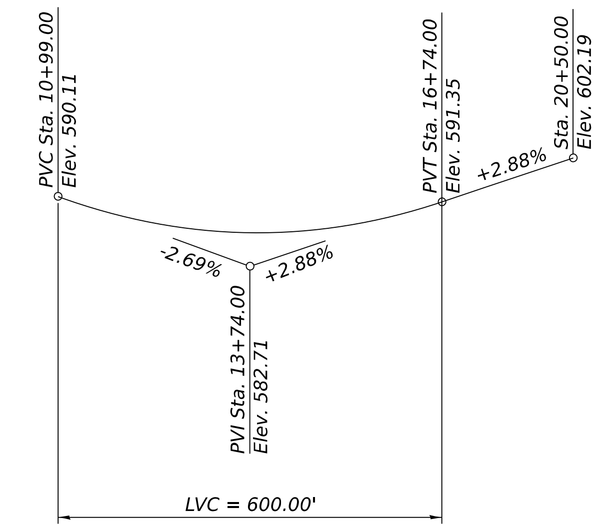
ELEVATION
(Looking at Front Face of Wall)

CURVE DATA
PR. ℄ RAMP AA
P.I. Sta. = 16+71.68
Δ = 94°06'00"
D = 06°11'39"
R = 925.00'
T = 993.68'
L = 1,519.18'
E = 432.58'
e = 6.0%
T.R. = N/A
S.E. Run = N/A
P.C. Sta. = 6+78.00
P.C.C. Sta. =21+97.18

DESIGN SPECIFICATIONS
2020 AASHTO LRFD Bridge Design Specifications, 9th Edition

DESIGN STRESSES
FIELD UNITS
f'c = 3,500 psi
fy = 60,000 psi (Reinforcement)
fy = 50,000 psi (M270 Grade 50)

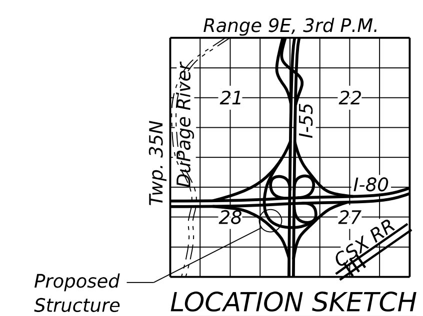
HIGHWAY CLASSIFICATION
FAI Rte. 55 - I-55 Ramp AA
Functional Class: Interstate
ADT: 7,600 (2021); 15,800 (2040)
ADTT: 1,930 (2021); 5,060 (2040)
DHV: 2,270 (2040)
Design Speed: 50 m.p.h.
Posted Speed: 50 m.p.h.
One-Way Traffic
Directional Distribution: 100:0



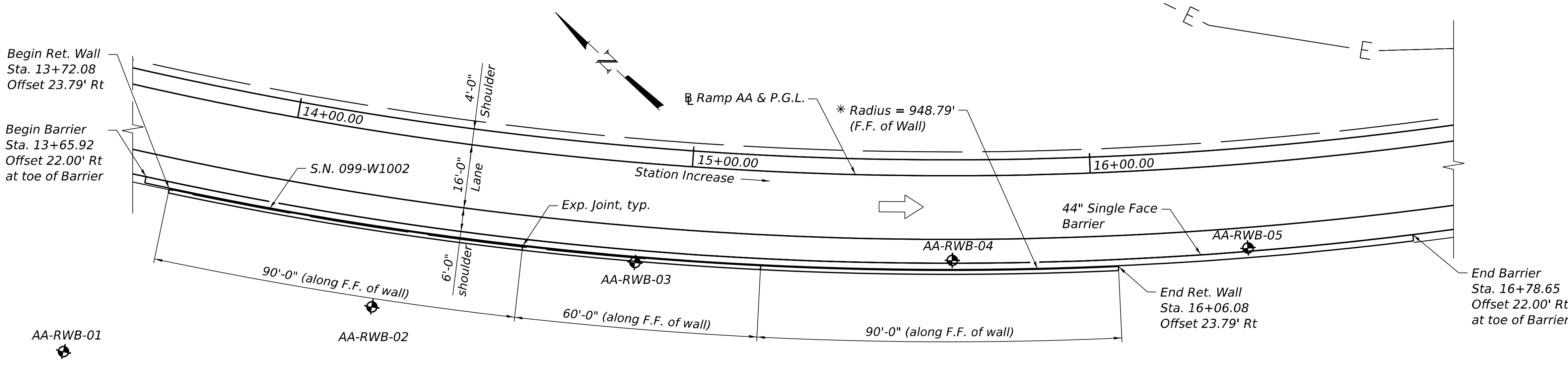
PROFILE GRADE
Along ℄ Ramp AA

LEGEND
E — Existing Electrical Line
Soil Boring

✳ Wall to be built along Ramp AA curve
✳✳ Measured along toe of Barrier



LOCATION SKETCH



PLAN

GENERAL PLAN AND ELEVATION
I-55 RAMP AA RETAINING WALL
F.A.I. ROUTE 55
SECTION FAOI 80 21 DEMO
WILL COUNTY
STA. 13+72.08 TO 16+06.08
STRUCTURE NO. 099-W1002

MODEL: Default
FILE NAME: pw://transystems-pw.bentley.com:transyscorp-pw1-hosted/Documents/Projects_2018/CH401/401180022/01-Stantec/CAD/INT-02_62R26/04-Sheet/04-Structures/099W1002 Ramp AA Retaining Wall/TSL/099W1002 62R26-Retaining Wall-TSL-001.dgn

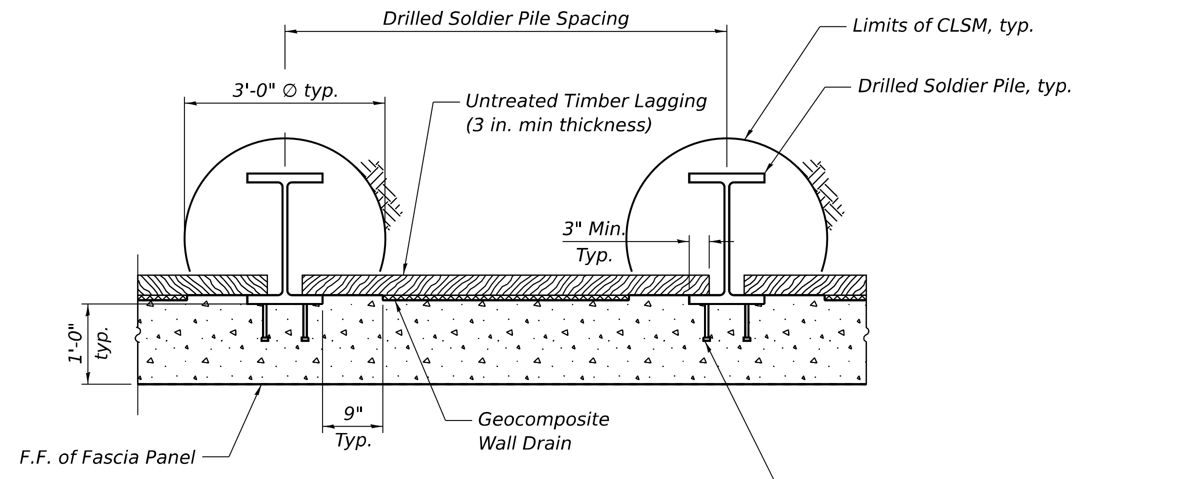
Stantec

USER NAME = eoskoui	DESIGNED - EAO	REVISED -	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION
	CHECKED - JZ	REVISED -	
PLOT SCALE = 32.0000 ' / in.	DRAWN - EAO	REVISED -	
PLOT DATE = 10/11/2023	CHECKED - JZ	REVISED -	

SHEET OF SHEETS

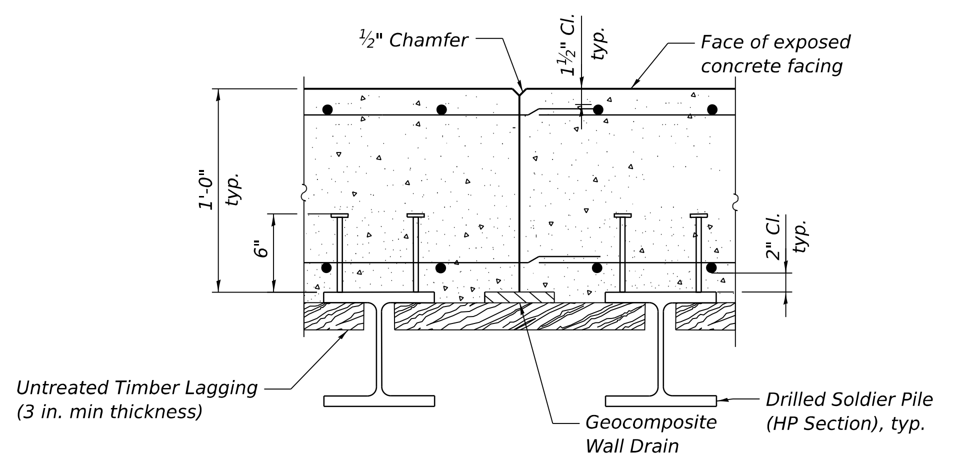
F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
55	FAOI 80 21 DEMO	WILL	2	1
		CONTRACT NO. 62R26		
	ILLINOIS	FED. AID PROJECT		

10/11/2023 1:30:55 PM

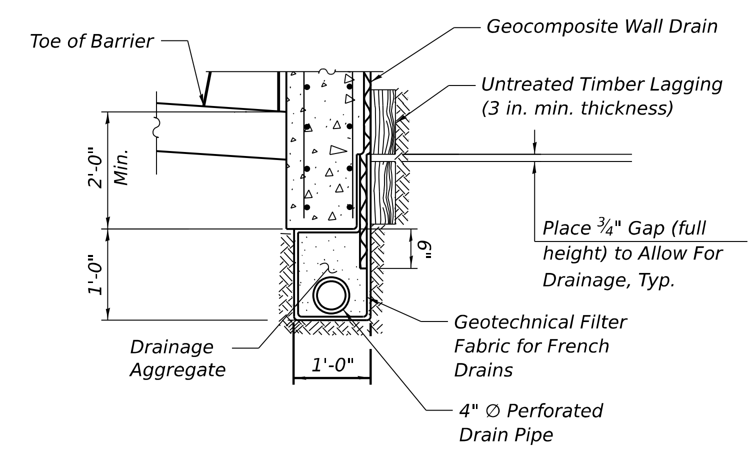


SECTION A-A

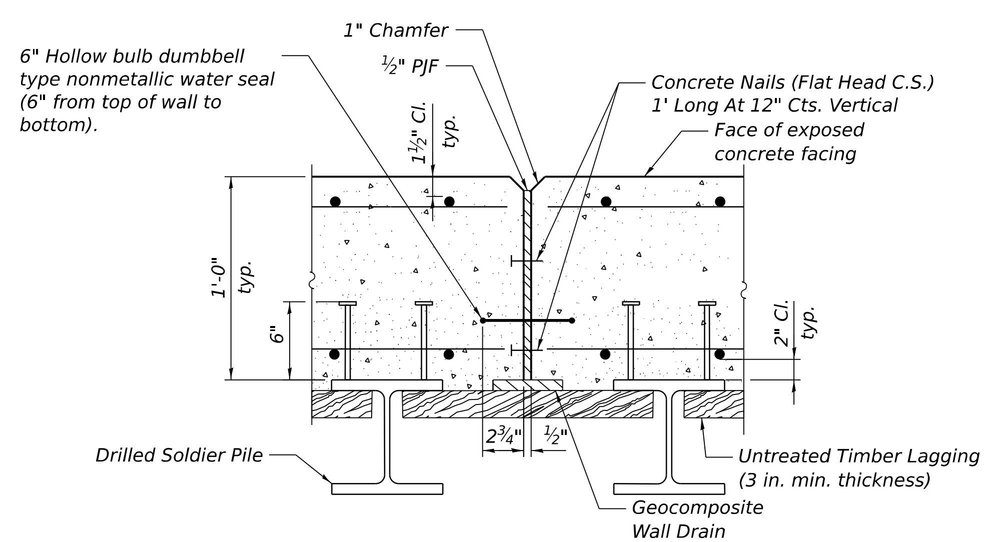
44" Single Face Barrier not shown for clarity



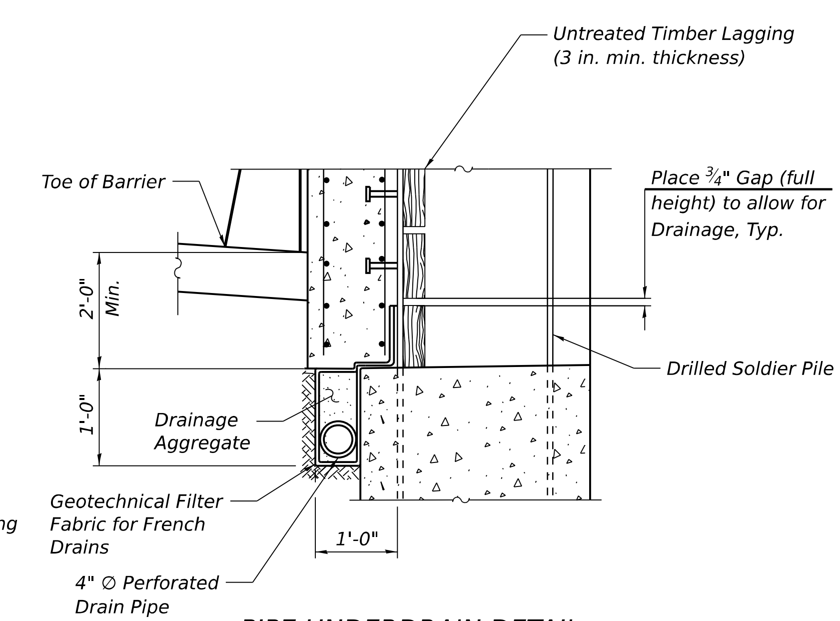
CONSTRUCTION JOINT DETAILS



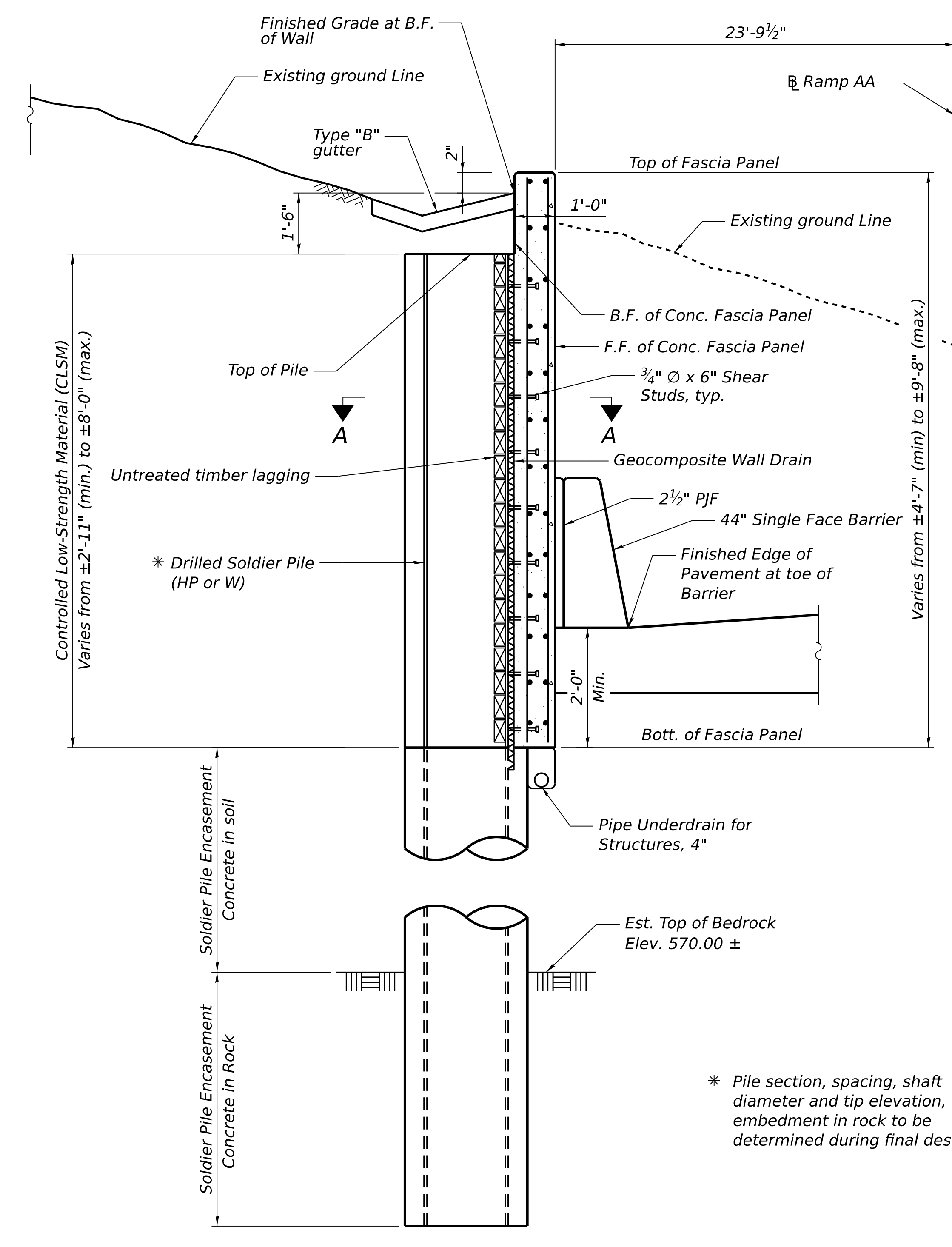
PIPE UNDERDRAIN DETAIL BETWEEN SOLDIER PILES



EXPANSION JOINT DETAILS



PIPE UNDERDRAIN DETAIL AT SOLDIER PILE



✳ Pile section, spacing, shaft diameter and tip elevation, or embedment in rock to be determined during final design.

TYPICAL CROSS SECTION

(Looking North)

I-55 RAMP AA RETAINING WALL
F.A.I. ROUTE 55
SECTION FAOI 80 21 DEMO
WILL COUNTY
STA. 13+72.08 TO 16+06.08
STRUCTURE NO. 099-W1002

MODEL: Default
FILE NAME: pw://transystems-pw.bentley.com:transyscorp-pw1-hosted/Documents/Projects_2018/CH401/401180022/01-Stantec/CAD/INT-02_62R26/04-Sheet/04-Structures/099W1002 Ramp AA Retaining Wall/TSL/099W1002 62R26-Retaining Wall-TSL-002.dgn

Stantec

USER NAME = eoskoui	DESIGNED - EAO	REVISED -	
	CHECKED - JZ	REVISED -	
PLOT SCALE = 15.0000 ' / in.	DRAWN - EAO	REVISED -	
PLOT DATE = 10/11/2023	CHECKED - JZ	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

SHEET 2 OF 2 SHEETS

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
55	FAOI 80 21 DEMO	WILL	2	2
		CONTRACT NO. 62R26		
		ILLINOIS	FED. AID PROJECT	

10/11/2023 1:31:04 PM

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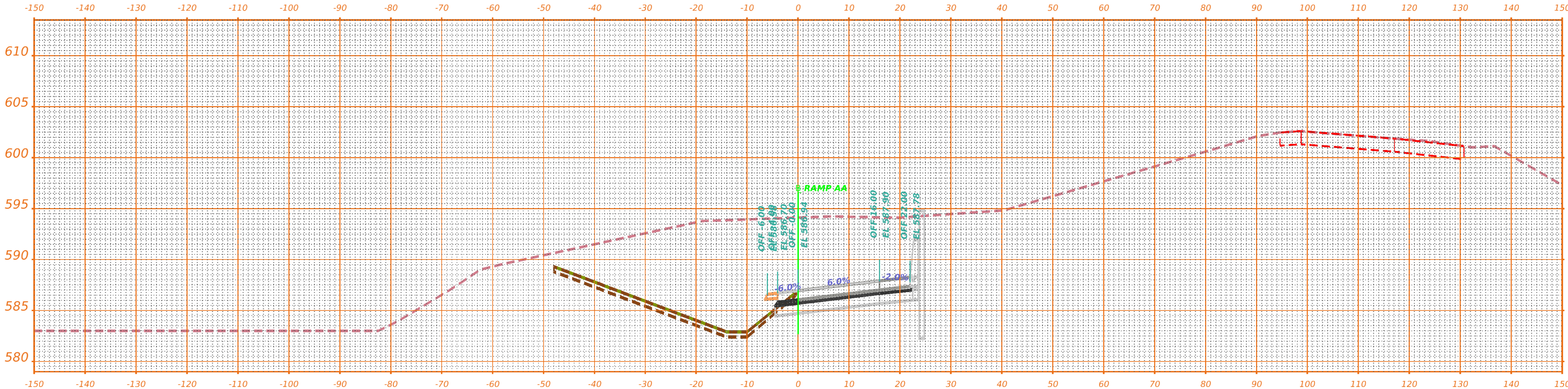
APPENDIX F



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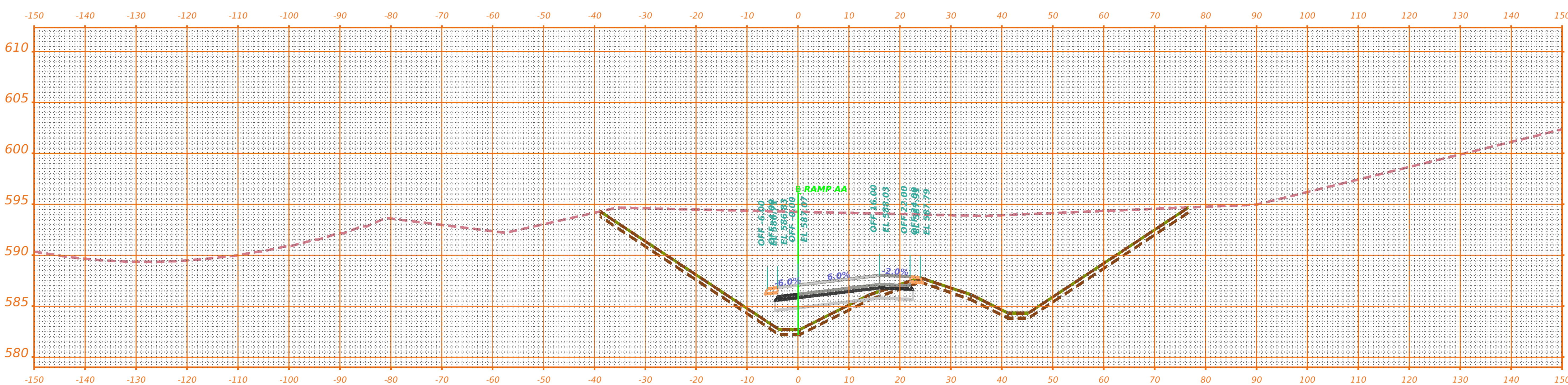

STA 13+00.00

FINAL SURVEY	SURVEYED / PLOTTED / TEMPLATE / AREAS / AREAS CHECKED
NOTE BOOK	NO.
BY	DATE

ORIGINAL SURVEY	SURVEYED / PLOTTED / TEMPLATE / AREAS / AREAS CHECKED
NOTE BOOK	NO.
BY	DATE

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Stantec

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	DRAWN -	REVISED -
PLOT SCALE = 0.16666667 ' / in.	CHECKED -	REVISED -
PLOT DATE = 10/2/2023	DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

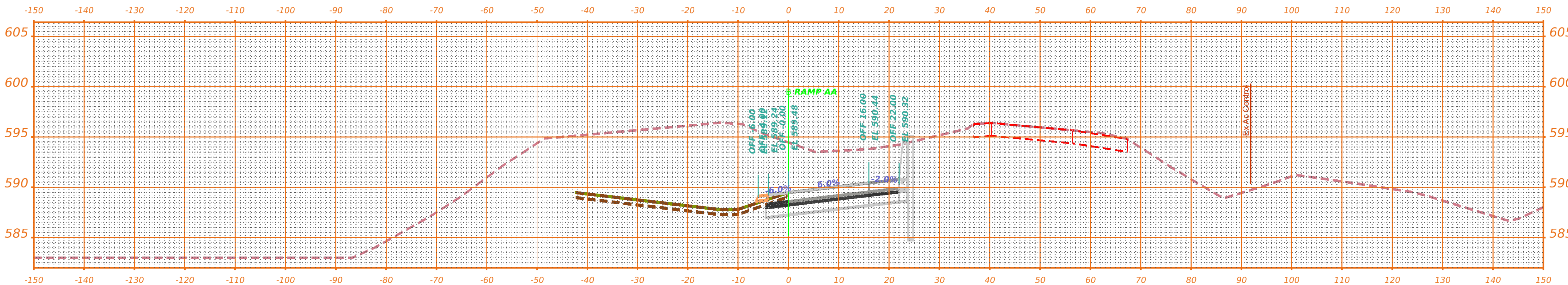
CROSS SECTIONS

SCALE: | SHEET OF SHEETS | STA.

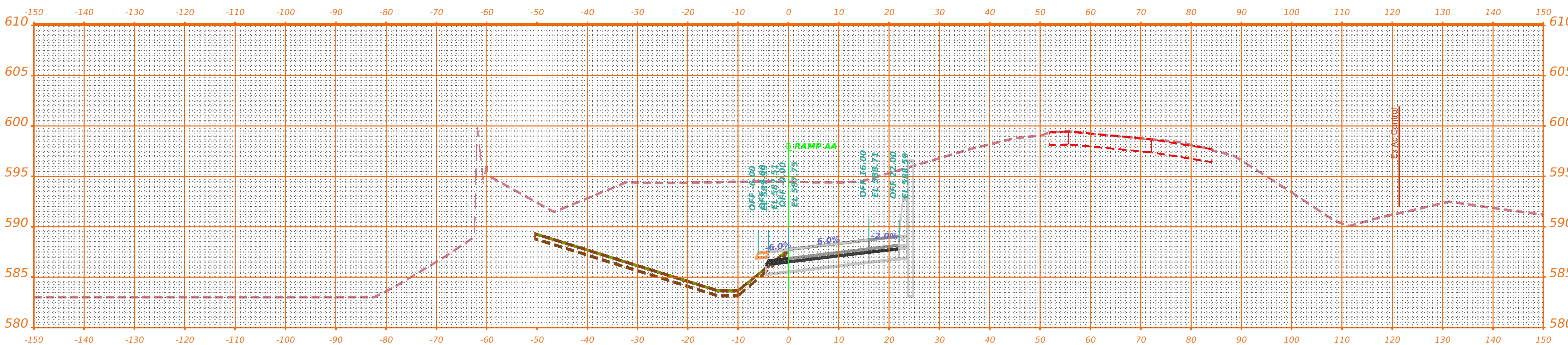
F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
$RTE	$SEC	$CNTY	$TOT	

CONTRACT NO. $CONTRACT

ILLINOIS | FED. AID PROJECT



STA 16+00.00



STA 15+00.00

USER NAME = eoskoui	DESIGNED -	REVISED -	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION
	DRAWN -	REVISED -	
PLOT SCALE = 0.16666667 ' / in.	CHECKED -	REVISED -	
PLOT DATE = 10/2/2023	DATE -	REVISED -	

CROSS SECTIONS

SCALE: SHEET OF SHEETS STA.

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
$RTE	$SEC	$CNTY	$TOT	

CONTRACT NO. $CONTRACT

ILLINOIS FED. AID PROJECT

MODEL: P/BL-RampAA - 15+00.00