STRUCTURE GEOTECHNICAL REPORT
NORTHEAST RETAINING WALL
INTERSTATE 55 BRIDGE OVER IL ROUTE 53
SN 099-W100, SECTION 2018-043-BD&BJR
WILL COUNTY, ILLINOIS

For

Lin Engineering, Ltd.

3261 South Meadowbrook Road

Springfield, IL 62771

Submitted by

Wang Engineering, Inc.

1145 North Main Street

Lombard, IL 60148

Original Report: June 12, 2020

Revised Report: July 23, 2020, November 23, 2020, and December 9, 2020

Technical Report Documentation Page

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Interstate 55 over IL Route 53 Bridge</td><td>2. Original Date: June 12, 2020
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3. Report Type ☒ SGR ☐ RGR
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11. Abstract

To facilitate the widening of Interstate 55 over IL Route 53 Bridge, the existing retaining wall at the northeast corner of the bridge will be replaced with a new retaining wall. The new retaining wall will be about 6.4 to 7.1 feet in front of the existing wall. The proposed wall will extend from Station 211+51.04 to Station 217+32.61 and will have a maximum total height of about 10.4 feet.

Beneath the pavement, the lithologic profile includes up to 15 to 25 feet of cohesive and granular fill materials. Beneath the fill, the native soils includes up to 12 to 25 feet of stiff to very stiff silty clay to silty clay loam extending to the boring termination depth of 40 below ground surface. We estimate the groundwater may be encountered at 697 feet elevation.

The proposed retaining wall will be in a fill section and may be a Mechanically Stabilized Earth (MSE) wall, a reinforced-concrete cantilever (RCC) wall or a soldier pile and lagging wall. Following the recommended removal and replacement, we estimate the foundation soil has a maximum factored resistance of 5,800 psf for MSE wall and 4,900 psf for RCC wall. The foundation soils will undergo long-term settlement of less than 1.0 inch. We estimate the factor of safety in global stability for MSE and RCC walls will be greater than 1.5.

A flexible soldier pile and lagging wall should be drilled and set to provide more passive resistance. The embedment depth for moment equilibrium of wall should be designed in accordance with the LRFD guidelines (AASHTO 2020). The deflection should be limited to 0.5% of the wall height.

For the construction of MSE/RCC walls, temporary soil retention should be considered. The drilled soldier pile construction should expect hard drilling conditions during excavation, and temporary casing and wet installation will be required for granular fill soils.

12. Path to archived file

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NORTHEAST RETAINING WALL
INTERSTATE 55 BRIDGE OVER IL ROUTE 53
SN 099-W100, SECTION 2018-043-BD&BJR
WILL COUNTY, ILLINOIS
FOR
LIN ENGINEERING, LTD.

1.0 INTRODUCTION

This report presents the results of our subsurface investigation, laboratory testing, geotechnical evaluations, and recommendations for a new retaining wall, designated as Northeast Wall (SN 099-W100), along the southbound Interstate 55 (I-55) at the northeast corner of I-55 over IL Route 53 (IL 53) Bridge widening in Will County, Illinois. A *Site Location Map* is presented as Exhibit 1.

1.1 Proposed Structure

Based on approved *General Plan and Elevation* (GPE) sheets dated November 12, 2020 prepared by Ciorba, Wang Engineering, Inc. (Wang) understands the proposed retaining wall runs from Station 211+52.60 to Station 217+32.62 with offsets of 62.25 to 66.05 feet left. The proposed wall is shown in the GPE as a drilled soldier pile and lagging wall with a maximum retained height of about 8.4 feet. There will be a 3.7-foot high parapet with anchorage slab on the top of the proposed wall. The proposed wall is located about 6.4 to 7.1 feet in front of the existing wall and will have a slope of approximately 1:2.5 (V:H) in front of the wall.

Wang prepared a separate Structure Geotechnical Report (SGR) for the proposed I-55 over IL 53 Bridge widening. This SGR addresses the proposed Northeast retaining wall.

1.2 Existing Structure

There is currently a RCC wall at the top of the embankment slope parallel to the proposed wall alignment. The top 1.0- to 2.5-foot of the existing RCC wall will be removed and remaining wall will be left in-place.

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.

2.0 METHODS OF INVESTIGATION

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

2.1 Field Investigation

The subsurface investigation along the wall alignment included seven structure borings, designated as RWB-01 through RWB-07 drilled by Wang in the period of May 18 to May 20, 2020. The borings were drilled from elevations of 710.91 to 718.87 feet to depths of 40 feet below ground surface (bgs). Boring BSB-06 drilled for the I-55 Bridge over IL 53 was considered to supplement our engineering analysis. As-drilled northing and easting were surveyed by Wang and elevations, stations, and offsets were provided by Lin. 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 2).

A truck-mounted drilling rig equipped with hollow stem augers was used to advance and maintain an open borehole. Soil sampling was performed according to AASHTO T 206, "*Penetration Test and Split Barrel Sampling of Soils*" at 2.5-foot intervals to 30 feet bgs and at 5.0-foot interval the boring termination depths of 40 feet bgs. Soil samples collected from each sampling interval were placed in sealed jars and transported to the laboratory for further examination and laboratory testing.

Field boring logs, prepared and maintained by a Wang field engineer, included lithological descriptions, visual-manual soil classifications, pocket penetrometer and Rimac unconfined compressive strength tests, and results of field standard penetration test (SPT) results recorded as blows per 6 inches of penetration.

Groundwater levels were measured while drilling and at completion of each boring. Boring RWB-03 was kept open with hollow stem augers for 24-hour to take water table measurement. The boreholes were backfilled upon completion with grouting and, where necessary, the pavement surface was restored to its original condition.

2.2 Laboratory Testing

Soil samples were tested in our laboratory for moisture content (AASHTO T 265). Atterberg limit (AASHTO T 89/90) and particle size (AASHTO T 88) analyses were performed on selected samples. Field visual descriptions of 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 *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 3). 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.

3.1 Lithological Profile

The borings were advanced along the shoulder of southbound I-55 and encountered 16 to 18 inches of asphalt pavement over sand to gravelly sand. In descending order, the general lithologic succession encountered beneath the pavement includes 1) man-made ground (fill); 2) stiff to hard silty clay to silty clay loam; 3) dense to very dense sand to gravelly sand.

(1) Man-made ground (fill)

Below the pavement, the borings encountered 15 to 28 feet of granular and cohesive fill materials. The granular fill consists of loose to medium dense, brown coarse sand to gravelly sand with N values of 4 to 17 blows per foot and moisture content values of 4 to 16%. The cohesive fill consists of stiff to hard, black to brown and brown to gray silty clay to silty clay loam and clay loam with unconfined compressive strength (Q_u) values of 0.8 to greater than 4.5 tsf and moisture content values of 15 to 27%. Laboratory testing on a sample shows a liquid limit (L_L) value of 49% and a plastic limit (P_L) value of 17%. Beneath the fill, Boring RWB-05 encountered 1 foot of buried topsoil with Q_u value of 1.89 tsf and a moisture content value of 29%.

(2) Stiff to very stiff silty clay to silty clay loam

Beneath the fill and buried topsoil, at elevations of 691 to 695 feet, the borings advanced through 12 to 25 feet of stiff to very stiff, brown to gray clay, silty clay to silty clay loam extending to the boring termination depths of 40 feet bgs. This unit has Q_u values of 1.2 to 4.4 tsf, with an average of 2.4 tsf and moisture content values of 12 to 28%, averaging 18%. Laboratory testing on a silty clay sample shows L_L values of 28 and 36% and P_L values of 13 and 16%.

(3) Dense to very dense sand to gravelly sand

At an elevation of 655 feet, Bridge Boring BSB-06 advanced through up to 32 feet of dense to very dense, gray, saturated sand to gravelly sand. This soil unit has N-values of 22 blows per foot to 77 blows per foot and moisture content values of 9 to 22%. Cobbles were encountered throughout this unit.

3.2 Groundwater Conditions

Groundwater was encountered while drilling at elevations of 697 to 713 feet (5.5 to 20.5 feet bgs). At completion of drilling, the groundwater was measured at elevations of 680 to 697 feet (17 to 37 feet bgs). Boring RWB-03 was kept open with hollow stem augers for 24 hours and measured the groundwater elevation of 697 feet (20.5 feet bgs). We estimate the groundwater may be encountered at 697 feet elevation. It should be noted that groundwater levels might vary with seasonal rainfall patterns and long-term climate fluctuations or be influenced by local site conditions.

4.0 FOUNDATION ANALYSIS AND RECOMMENDATIONS

Based on the information and the GPE drawing provided by Ciorba, we understand the wall design will be based on LRFD method in accordance with 2020 AASHTO LRFD Bridge Design Specifications, 9th Edition (AASHTO 2020).

The proposed 580.3-foot long wall will support the southbound I-55 widening between Stations 211+51.04 and 217+32.61 with offsets of 62 to 66 feet left. The wall will have a maximum total height of about 10.4 feet, with an exposed maximum height of about 8.4 feet. The proposed wall will be about 6.4 to 7.1 feet in front of the existing wall and will have a slope of 1:2.5 (V:H) in front of the wall. The top 2.5-foot of the existing wall will be removed below the top of proposed roadway and the remaining wall will be left in-place.

The proposed wall is a fill wall to retain the widened embankment. The wall type suitable for fill wall typically includes gravity walls such as Mechanically Stabilized Earth (MSE) and Reinforced Cantilever Concrete (RCC) walls. Flexible walls such as solider pile and lagging wall could be considered; however it may require drilled piles to provide more passive resistance and to minimize noise and vibrations. Based on the approved GPE, we understand that the drilled soldier pile and lagging wall is the preferred alternative. In this report, we included the recommendations for all three feasible wall types. The final wall type should be selected based on constructability and cost.

4.1 MSE Wall

The MSE wall base should be established at a minimum of 3.5 feet below the proposed finished grade at the front face of wall (IDOT 2012). The MSE wall reinforcement zone width should be 0.7 times the total height but no less than 8 feet (AASHTO 2020).

Based on information provided by Ciorba, we understand the MSE wall top of granular pad elevations vary from 701.0 to 710.0 feet. Based on our investigation, the stiff to very stiff silty clay fill or loose sand fill is expected to be encountered. Exception should be noted in Boring RWB-01, where medium stiff silty clay fill with Q_u value of 0.75 tsf and a moisture content value 26% was encountered at the proposed wall base elevation. To provide adequate bearing and tolerable settlement, we recommend removing these soils to elevation 706 feet (4 feet below the granular pad) and replacing it with compacted granular fill such as IDOT District One *Aggregate Subgrade Improvement.* The removal and replacement should extend a minimum of 1.0 foot outside the edge of wall. The foundation treatment is summarized in Table 1. The actual extent of the removal shall be determined in the field during construction.

Table 1: Summary of Foundation Soil Treatment for MSE Wall

Location	Treatment Width	Foundation Soils Removal Depth / Elevation (feet)	Reference Boring, Foundation Concerns
Sta. 211+52.60 to 212+55.30	Entire reinforcement width plus 1-foot on each side	4.0 (below the granular pad) / 706	RWB-01 (Q_u=0.75 tsf, MC=26%)

4.1.1 Bearing Capacity and Sliding

Following the recommended foundation treatment, we estimate the foundation soils will have a maximum factored bearing resistance of 5,800 psf using a resistance factor of 0.65 (AASHTO 2020). We estimate the wall will apply a maximum factored bearing pressure of 4,200 psf, accounting for vertical and lateral load factors (AASHTO 2020). The foundation soil allowable bearing capacity is sufficient to support the MSE wall.

The estimated friction angles between the base and the cohesive and the granular fill are 26 and 30 degrees and the corresponding friction coefficients can be taken 0.49 and 0.58, respectively. The MSE wall should be designed based on geotechnical sliding resistance factor of 1.0 (AASHTO 2020). We estimate the MSE wall has sufficient sliding resistance and the eccentricity lies within the required 2/3 of the wall (AASHTO 2020).

4.1.2 Settlement

We estimate the MSE wall will experience long term settlement of about 0.7 inches under the MSE wall equivalent bearing pressure. The settlement estimates are acceptable for the construction of the MSE wall.

4.2 RCC Wall

The RCC wall base should be established at a minimum of 4.0 feet. If RCC wall is selected as a preferred alternative, we understand the RCC wall will be founded at an elevation of 708.5 feet that about the same foundation base elevation as the existing wall. Based on our investigation, the stiff to very stiff silty clay fill or loose sand fill is expected to be encountered. Exception should be noted in Boring RWB-01, where medium stiff silty clay fill with Q_u value of 0.75 tsf and a moisture content value 26% was encountered at the proposed wall base elevation. To provide adequate bearing and tolerable settlement, we recommend removing these soils to elevation 706 feet (2.5 feet below the base of wall) and replacing it with compacted granular fill such as IDOT District One *Aggregate Subgrade Improvement.* The removal and replacement should extend a minimum of 1.0 foot outside the edge of wall base. The foundation treatment is summarized in Table 2. The actual extent of the removal shall be determined in the field during construction.

Table 2: Summary of Foundation Soil Treatment for RCC Wall

Location	Treatment Width	Foundation Soils Removal Depth / Elevation (feet)	Reference Boring, Foundation Concerns
Sta. 211+52.60 to 212+55.30	Entire wall plus 1-foot on each side	2.5 (below footing base) / 706	RWB-01 (Q_u=0.75 tsf, MC=26%)

4.2.1 Bearing Capacity and Sliding

Following the recommended foundation treatment, we estimate the foundation soils will have a maximum factored resistance of 4,900 psf using a resistance factor of 0.55 (AASHTO 2020).

The estimated friction angles between the concrete base and the cohesive and the granular fill are 26 and 30 degrees and the corresponding ultimate values of the friction coefficients can be taken 0.50 and 0.55, respectively. The wall should be designed based on a geotechnical sliding resistance factor of 1.0 (AASHTO 2020). In addition, the wall should also be checked for eccentricity, applies pressure, and sliding for final configuration.

4.2.2 Settlement

We estimate the RCC wall will experience long term settlement of 1.0 inch or less under the recommended allowable soil bearing resistance. The settlement estimates are acceptable for the construction of the RCC wall.

4.3 Soldier Pile and Lagging Wall

Solider piles 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 LRFD guidelines (AASHTO 2020), which will require an active lateral earth load factor of 1.5 and a passive lateral earth pressure resistance factor of 0.75.

Generally, both overconsolidated clayey and granular soils, such as the stiff to hard silty clay encountered in the borings will exhibit lower overall shear strength in the long-term condition. However, the lateral earth pressure analysis should be performed for wall in the short-term (undrained) and long-term (drained) conditions using the soil parameters shown in Tables 3 and 4. Since the soil layers elevation vary significantly along the wall, the boring logs should be referenced for the elevation range of each layer. The active and passive earth pressure coefficients are provided for horizontal back slope and 1:2.5 (V:H) front slope.

The design of the wall should ignore 3 feet of soil in front of the wall measured from finished ground surface elevation in providing passive pressure due to excavations required for installation of concrete facing, drainage system, 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 considerations should be as per 2012 IDOT *Bridge Manual* (IDOT 2012). The water pressure should be added to the earth pressure if drainage is not provided.

Table 3: Geotechnical Parameters (Undrained) for Design of Soldier Pile and Lagging Wall
Reference Borings: RWB-01 through RWB-07, and BSB-06

Soil Description	Unit Weight, γ (pcf)	Undrained Shear Strength Properties		Earth Pressure Coefficients	
		Cohesion (psf)	Friction Angle (°)	Active Pressure (Straight)	Passive Pressure (Straight)
New GRANULAR FILL	120	0	30	0.33	--
Loose to M Dense SAND to GRAVELLY SAND FILL	120	0	30	0.33	--
M Stiff to Stiff SILTY CLAY FILL	115	1100	0	1.00	1.00
Stiff to V Stiff SILTY CLAY to SILTY CLAY LOAM, CLAY LOAM FILL	120	2000	0	1.00	1.00
Stiff to V Stiff SILTY CLAY to SILTY CLAY LOAM	120	2400	0	1.00	1.00
Dense to V Dense SAND to GRAVELLY SAND	63 (submerged)	0	35	0.27	3.69

Table 4: Geotechnical Parameters (Drained) for Design of Soldier Pile and Lagging Wall
Reference Borings: RWB-01 through RWB-07, and BSB-06

Soil Description Elevations	Unit Weight, γ (pcf)	Drained Shear Strength Properties		Earth Pressure Coefficients	
		Cohesion (psf)	Friction Angle (°)	Active Pressure (Straight)	Passive Pressure (Straight)
New GRANULAR FILL	120	0	30	0.33	--
Loose to M Dense SAND to GRAVELLY SAND FILL	120	0	30	0.33	--

Soil Description Elevations	Unit Weight, γ (pcf)	Drained Shear Strength Properties		Earth Pressure Coefficients	
		Cohesion (psf)	Friction Angle (°)	Active Pressure (Straight)	Passive Pressure (Straight)
M Stiff to Stiff SILTY CLAY FILL	115	100	30	0.33	1.98 (1:2.5)
Stiff to V Stiff SILTY CLAY to SILTY CLAY LOAM, CLAY LOAM FILL	120	100	30	0.33	1.98 (1:2.5)
Stiff to V Stiff SILTY CLAY to SILTY CLAY LOAM	120	100	30	0.33	3.00
Dense to V Dense SAND to GRAVELLY SAND	63 (submerged)	0	35	0.27	3.69

The lateral deformation of the wall should be designed for movement and moment fixity at the base of the soldier pile. The roadway and utilities should not be impacted by the lateral movement of wall. Therefore, the design of soldier pile wall should establish the lateral movement limits. The evaluations should be performed using the parameters shown in Table 5.

Table 5: Parameters for Lateral Load Analysis of Soldier Pile and Lagging Wall
Reference Borings: RWB-01 through RWB-07, and BSB-06

Soil Description Elevations	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} (%)
New GRANULAR FILL	120	0	30	30	--
Loose to M Dense SAND to GRAVELLY SAND FILL	120	0	30	30	--
M Stiff to Stiff SILTY CLAY FILL	115	1100	0	500	1.0
Stiff to V Stiff SILTY CLAY to SILTY CLAY LOAM, CLAY LOAM FILL	120	2000	0	900	0.7

Soil Description Elevations	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} (%)
Stiff to V Stiff SILTY CLAY to SILTY CLAY LOAM	120	2400	0	1000	0.5
Dense to V Dense SAND to GRAVELLY SAND	63 (submerged)	0	35	125	--

4.4 Global Stability

The global stability of the MSE retaining wall at the highest wall location near Station 214+00 was analyzed based on Boring RWB-04 and GPE drawing. The minimum required FOS is 1.5 in both short-term (undrained) and long-term (drained) conditions (IDOT 2012). *Slide v6.0* evaluation exhibits employing the Bishop Simplified method of analysis are shown in Appendix C. We estimate the MSE wall will have adequate FOS of 3.46 (Appendix C-1) and 1.73 (Appendix C-2) in the undrained and drained conditions, respectively. The FOSs meet the IDOT minimum requirement.

The global stability of RCC wall at the highest wall location near bridge was analyzed based on Borings RWB-06 and BSB-06 and in-progress cross-section drawing. We estimate RCC wall will have adequate FOS of 2.78 (Appendix C-1) and 1.56 (Appendix C-2) in the undrained and drained conditions, respectively. The FOSs meet the IDOT minimum requirement.

The global stability of the soldier pile and lagging wall at the highest wall location near Station 214+20.68 was analyzed based on Boring RWB-04 and approved GPE drawing. We have considered pile embedment at an elevation of 699 feet. Our analysis shows the wall will have FOS of 3.46 (Appendix C-5) and 1.68 (Appendix C-6) in the undrained and drained conditions, respectively. However, the designer should perform other analysis including lateral earth pressure and deflection to determine the required pile embedment.

Since the temporary soil retention system will be required during the proposed MSE/RCC walls construction in front of the existing wall, we do not anticipate global instability concerns during foundation soil removal and replacement for the new wall construction.

5.0 CONSTRUCTION CONSIDERATIONS

5.1 Site Preparation

Vegetation and surface topsoil encountered 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 fill as described in Section 6.3.

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 MSE/RCC walls should be sloped no steeper than 1:1.5 (V:H) for cohesive soils and 1:2 (V:H) for granular soils. The proposed MSE/RCC walls construction will require the excavation of up to 13 feet deep including removal and replacement along the existing embankment slope. For the MSE/RCC wall construction, it is our opinion that an open cut excavation may not be feasible due to the close proximity of existing wall and I-55 southbound traffic lane. We have evaluated temporary sheet piling using IDOT Design Guide 3.13.1. Our analyses show temporary sheet piling will be feasible along the wall with an exception of the north end of wall near Boring RWB-07 where the hard soil with Q_u of greater than 4.5 tsf is encountered. Therefore, a temporary soil retention system should be considered.

In general, the groundwater is about 11 feet below the MSE/RCC walls base elevations. Water that does accumulate in open excavations by seepage or runoff should be immediately removed by sump pump. Perched water within the granular fill should be anticipated during construction of RCC wall. For drilled soldier piles, temporary casing and wet method of installation will be required**.**

The Contractor should ensure proper surface grading to prevent the pooling of water and runoff into open excavations. Precipitation allowed to enter excavations should be immediately removed via sump pump. Any soils allowed to soften under standing water should be removed and replaced with compacted fill as described in Section 6.3.

5.3 Filling and Backfilling

Fill material used to attain final design elevations should be pre-approved, compacted, cohesive or granular soil conforming to IDOT Section 205 (2016). The fill material should be free of organic matter and debris and should be placed in lifts and compacted according to the Standard.

Backfill materials for the MSE/RCC walls must be pre-approved by the Resident Engineer. To backfill the wall, we recommend porous granular material conforming to the requirements specified in the IDOT Supplemental Specification Section 586, *Granular Backfill for Structures* (2017).

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 2. 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 walls are planned, we should be timely informed so that our recommendations can be adjusted accordingly.

It has been a pleasure to assist Lin Engineering, Ltd. 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,

WANG ENGINEERING, INC.

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Senior Geotechnical Engineer

Nesam S. Balakumaran, P.Eng.
Project Geotechnical Engineer

Corina T. Farez, P.E., P.G.
QA/QC Reviewer

REFERENCES

AMERICAN ASSOCIATION OF STATE HIGHWAY TRANSPORTATION OFFICIALS (2020) "AASHTO LRFD Bridge Design Specifications, 9th Edition" United States Depart of Transportation, Washington, D.C

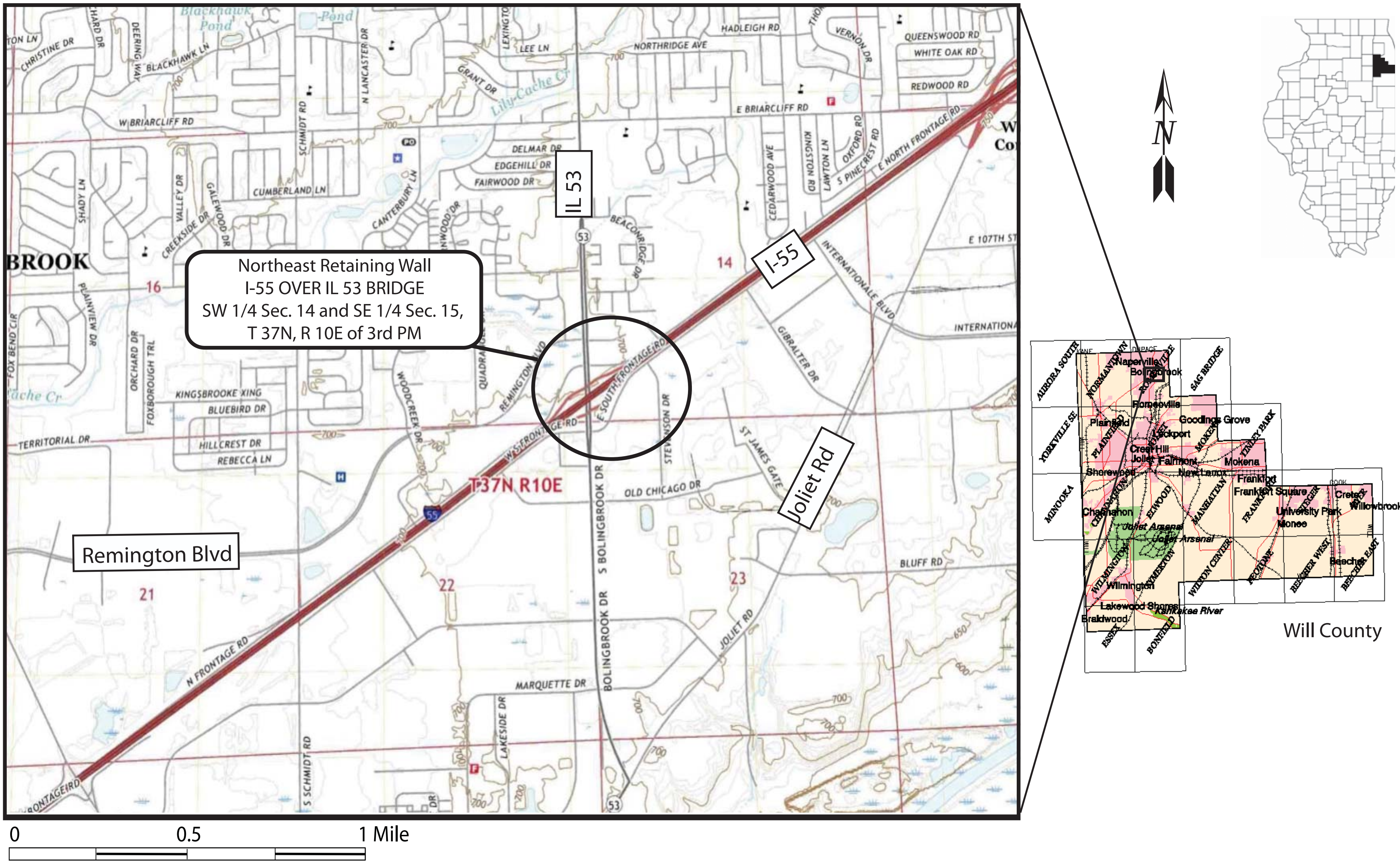
IDOT (2012) Bridge Manual. Illinois Department of Transportation.

IDOT (2015) Geotechnical Manual. Illinois Department of Transportation.

IDOT (2016) Standard Specifications for Road and Bridge Construction. Illinois Department of Transportation, 1098 pp.

IDOT (2017) Supplemental Specifications and Recurring Special Provisio*ns*

EXHIBITS



SITE LOCATION MAP: NORTHEAST RETAINING WALL, INTERSTATE 55 OVER IL ROUTE 53 BRIDGE WIDENING, WILL COUNTY, IL		
SCALE: GRAPHIC AL	EXHIBIT 1	DRAWN BY: J. Bensen CHECKED BY: A. Kurnia
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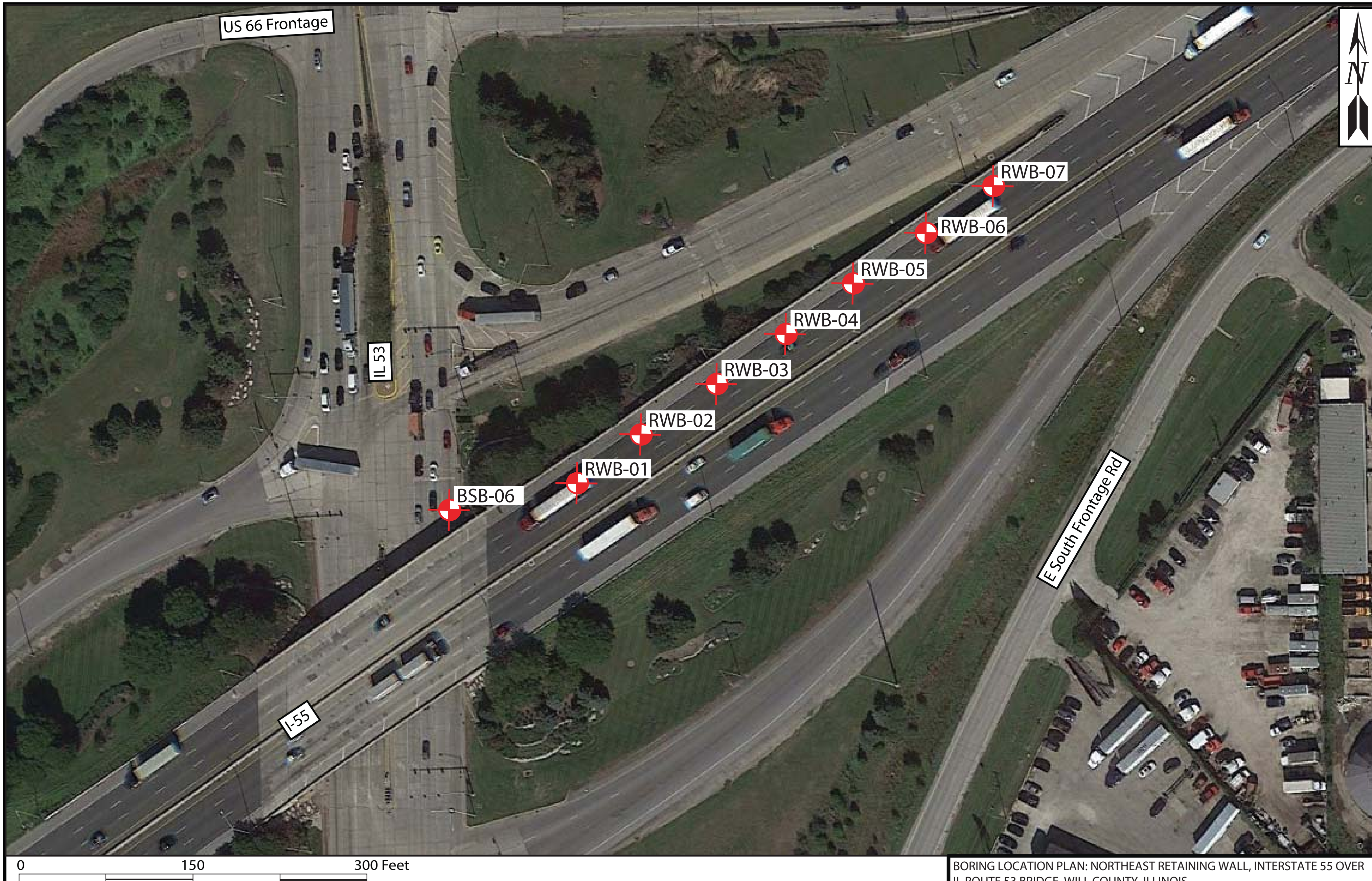
FOR LIN ENGINEERING, LTD.		498-01-02



Legend

Soil Boring

BORING LOCATION PLAN: NORTHEAST RETAINING WALL, INTERSTATE 55 OVER IL ROUTE 53 BRIDGE, WILL COUNTY, ILLINOIS		
SCALE: GRAPHICAL	EXHIBIT 2	DRAWN BY: J. Bensen CHECKED BY: A. Kurnia
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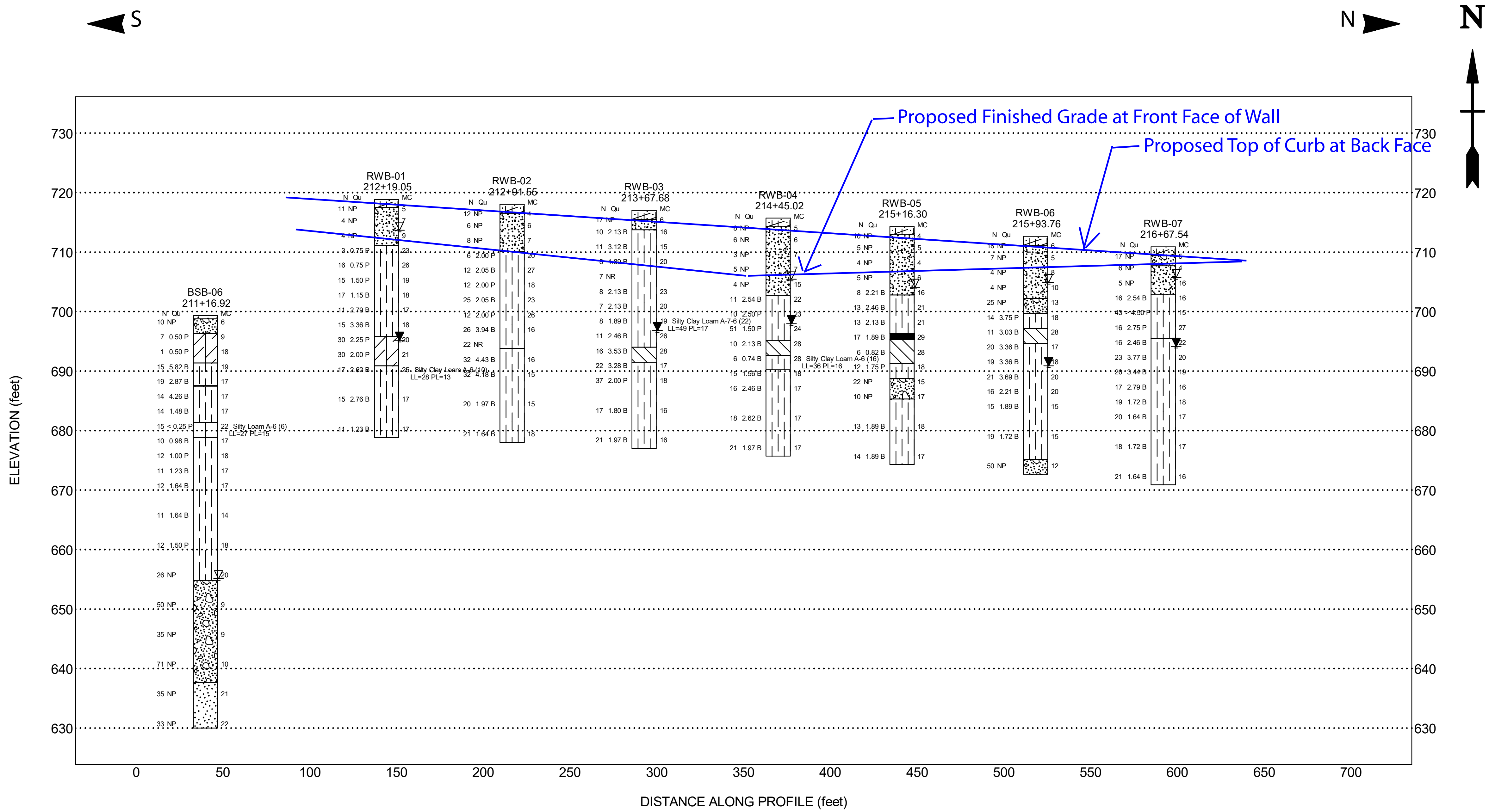
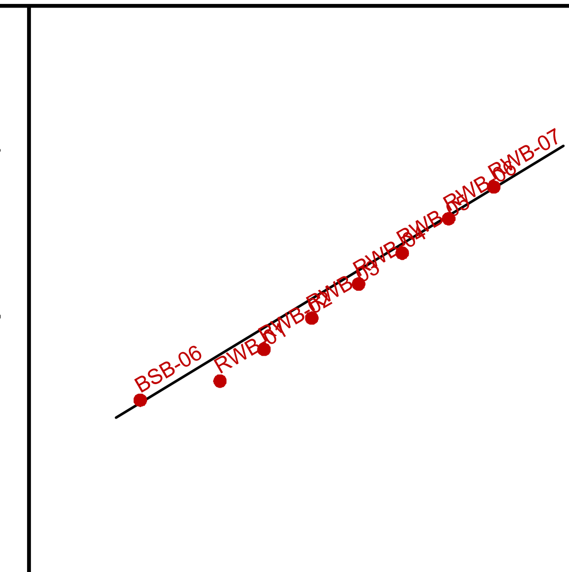
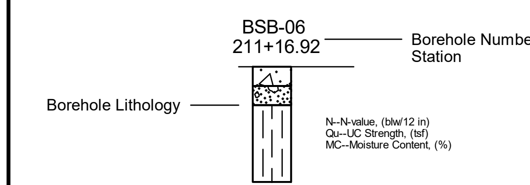




Site Map Scale 1 inch equals 255 feet

Explanation:



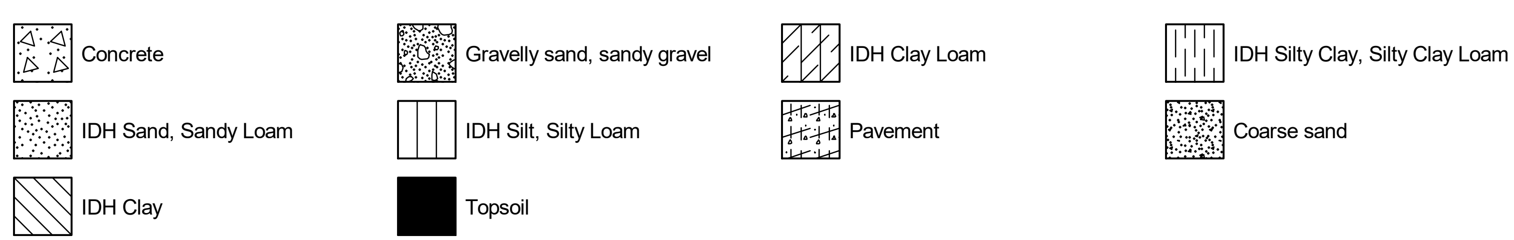
Water Level Reading at time of drilling.

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

Horizontal Scale (feet)

Vertical Exaggeration: 3.5x

Lithology Graphics



Wang Engineering, Inc.
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Soil Profile
Northeast Retaining Wall, SN 099-W100

WEI SINCE 1982

Interstate 55 over IL Route 53
Will County, Illinois

JOB NUMBER	PLATE NUMBER
498-01-02	EXHIBIT 3

WEI 11X17 4980102.GPJ BEARING-TRIAL.GDT 7/17/20

APPENDIX A

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BORING LOG BSB-06

WEI Job No.: 498-01-02

Client: **Lin Engineering, Ltd.**
Project: **Interstate 55 over IL Route 53**
Location: **Will County, Illinois**

Datum: NAVD 88
Elevation: 699.35 ft
North: 1828125.20 ft
East: 1056828.11 ft
Station: 211+16.92
Offset: 85.15' LT

Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
698.8	7-inch thick, CONCRETE					
696.3	Loose, brown SANDY GRAVEL; damp --AGGREGATE BASE--		1	5 7 3	NP	6
691.3	Medium stiff, gray and brown CLAY LOAM, trace to some gravel; damp --FILL-- --RDR 2--	5	2	5 4 3	0.50 P	9
	--disturbed sample--		3	1 0 1	0.50 P	18
687.5	Very stiff to hard, brown to gray, SILTY CLAY, trace gravel; damp --RDR 2--	10	4	3 7 8	5.82 B	19
			5	4 8 11	2.87 B	17
687.3	2-inch thick, medium SAND; saturated					
681.3	Stiff to hard, gray SILTY CLAY LOAM, trace gravel; damp --RDR 2--	15	6	4 6 8	4.26 B	17
			7	3 4 10	1.48 B	17
	Very soft, gray SILTY LOAM to SILTY CLAY LOAM, little gravel; moist to wet --RDR 2--	20	8	5 7 8	< 0.25 P	22
678.8	--L_L(%)=27, P_L(%)=15-- --%Gravel=11.9-- --%Sand=15.9-- --%Silt=55.3-- --%Clay=16.9-- --A-6 (6)--		9	5 4 6	0.98 B	17
	Medium stiff to stiff, gray SILTY CLAY to SILTY CLAY LOAM, trace gravel; moist --RDR 2--	25	10	5 6 6	1.00 P	18
			11	4 5 6	1.23 B	17
		30	12	4 5 7	1.64 B	17
		35	13	4 5 6	1.64 B	14
		40	14	4 5 7	1.50 P	18

GENERAL NOTES

Begin Drilling **05-06-2020** Complete Drilling **05-06-2020**
Drilling Contractor **Wang Testing Services** Drill Rig **17B57T [91%]**
Driller **N&K** Logger **I. Nenn** Checked by **C. Marin**
Drilling Method **2.25" IDA HSA, mud rotary after 10 feet; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **44.50 ft**
At Completion of Drilling ▼ **9' mud**
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 BSB-06

WEI Job No.: 498-01-02

Client: **Lin Engineering, Ltd.**
Project: **Interstate 55 over IL Route 53**
Location: **Will County, Illinois**

Datum: NAVD 88
Elevation: 699.35 ft
North: 1828125.20 ft
East: 1056828.11 ft
Station: 211+16.92
Offset: 85.15' LT

Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		45	15	4, 12, 14	NP	20
654.8	Dense to very dense, gray GRAVELLY SAND, trace cobbles; saturated --RDR 2 to 3--					
	--frequent rig chatter, 51 to 61 feet-- --possible cobbles--	50	16	12, 27, 23	NP	9
		55	17	11, 18, 17	NP	9
		60	18	31, 49, 22	NP	10
637.6	Medium dense to dense, gray, fine to medium SAND; saturated --RDR 2--					
		65	19	10, 14, 21	NP	21
		70	20	16, 16, 17	NP	22
		75	21	12, 12, 15	NP	22
622.6	Medium stiff, brown SILTY CLAY LOAM, trace gravel; damp --RDR 2--					
619.3		80	22	15, 13, 9	0.82 B	14
	Boring terminated at 80.00 ft					

GENERAL NOTES

Begin Drilling **05-06-2020** Complete Drilling **05-06-2020**
Drilling Contractor **Wang Testing Services** Drill Rig **17B57T [91%]**
Driller **N&K** Logger **I. Nenn** Checked by **C. Marin**
Drilling Method **2.25" IDA HSA, mud rotary after 10 feet; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling	44.50 ft
At Completion of Drilling	9' mud
Time After Drilling	NA
Depth to Water	NA

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BORING LOG RWB-01

WEI Job No.: 498-01-02

Client: **Lin Engineering, Ltd.**
Project: **Interstate 55 over IL Route 53**
Location: **Will County, Illinois**

Datum: NAVD 88
Elevation: 718.87 ft
North: 1828150.71 ft
East: 1056934.73 ft
Station: 212+19.05
Offset: 45.29' LT

Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	17-inch thick ASPHALT --PAVEMENT--					
717.5	Loose to medium dense, brown, coarse SAND, trace gravel; damp --FILL-- --RDR 2--		1	6, 6, 5	NP	5
		5	2	3, 2, 2	NP	7
			3	2, 2, 2	NP	9
711.1	Medium stiff to very stiff, brown, gray and black to brown and gray, SILTY CLAY, trace to some gravel --FILL-- --RDR 2--	10	4	2, 1, 2	0.75 P	23
			5	22, 10, 6	0.75 P	26
		15	6	10, 8, 7	1.50 P	19
			7	4, 7, 10	1.15 B	18
		20	8	3, 4, 7	2.79 B	17
			9	7, 9, 6	3.36 B	18
695.9	Very stiff, brown and gray to gray CLAY LOAM, few to little gravel; damp --FILL-- --RDR 2--	25	10	14, 16, 14	2.25 P	20
			11	12, 15, 15	2.00 P	21
690.9	Stiff to very stiff, gray SILTY CLAY to SILTY CLAY LOAM, trace gravel; damp --RDR 2-- --L_L(%)=28, P_L(%)=13-- --%Gravel=6.8-- --%Sand=11.1-- --%Silt=57.6-- --%Clay=24.5--	30	12	5, 8, 9	2.62 B	25
		35	13	5, 7, 8	2.76 B	17
678.9		40	14	5, 5, 6	1.23 B	17

Boring terminated at 40.00 ft

GENERAL NOTES

Begin Drilling **05-20-2020** Complete Drilling **05-20-2020**
Drilling Contractor **Wang Testing Services** Drill Rig **18CME55T [85%]**
Driller **R&J** Logger **F. Bozga** Checked by **C. Marin**
Drilling Method **2.25" IDA HSA; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **5.50 ft**
At Completion of Drilling ▼ **24.00 ft**
Time After Drilling **NA**
Depth to Water ▼ **NA**

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BORING LOG RWB-02

WEI Job No.: 498-01-02

Client: **Lin Engineering, Ltd.**
Project: **Interstate 55 over IL Route 53**
Location: **Will County, Illinois**

Datum: NAVD 88
Elevation: 718.05 ft
North: 1828193.05 ft
East: 1056993.64 ft
Station: 212+91.55
Offset: 46.46' LT

Elevation (ft)	Soil and Rock Description	Depth (ft)	Sample Type (recovery)	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	18-inch thick ASPHALT --PAVEMENT--						
716.6	Loose to medium dense, brown, coarse SAND, trace gravel; dry --FILL-- --RDR 1 to 2--		SS	1	11 7 5	NP	4
		5	SS	2	3 3 3	NP	6
			SS	3	3 4 4	NP	7
710.1	Very stiff, black and gray to brown and gray, SILTY CLAY to SILTY CLAY LOAM, trace gravel; damp --FILL-- --RDR 2--	10	SS	4	2 2 4	2.00 P	20
			SS	5	4 5 7	2.05 B	27
		15	SS	6	5 5 7	2.00 P	18
			SS	7	5 7 18	2.05 B	23
	--sample sheared--	20	SS	8	4 5 7	2.00 P	26
			SS	9	7 12 14	3.94 B	16
693.8	Stiff to hard, brown SILTY CLAY to , trace gravel; damp --RDR 2--	25	No recovery	10	12 8 14	NR	
			SS	11	12 14 18	4.43 B	16
		30	SS	12	10 14 18	4.18 B	15
		35	SS	13	5 9 11	1.97 B	15
678.1	Boring terminated at 40.00 ft	40	SS	14	6 10 11	1.64 B	18

GENERAL NOTES

Begin Drilling **05-20-2020** Complete Drilling **05-20-2020**
Drilling Contractor **Wang Testing Services** Drill Rig **18CME55T [85%]**
Driller **R&J** Logger **F. Bozga** Checked by **C. Marin**
Drilling Method **2.25" IDA HSA; boring backfilled upon completion**

WATER LEVEL DATA

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

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BORING LOG RWB-03

WEI Job No.: 498-01-02

Client: **Lin Engineering, Ltd.**
Project: **Interstate 55 over IL Route 53**
Location: **Will County, Illinois**

Datum: NAVD 88
Elevation: 717.00 ft
North: 1828234.91 ft
East: 1057057.42 ft
Station: 213+67.68
Offset: 44.63' LT

Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	18-inch thick ASPHALT --PAVEMENT--					
715.5	Medium dense, brown, coarse SAND, trace gravel; dry --FILL--		1	5 10 7	NP	6
713.8	Stiff to very stiff, brown, gray and black, SILTY CLAY, trace gravel --FILL-- --RDR 2--	5	2	4 4 6	2.13 B	16
			3	5 5 6	3.12 B	15
		10	4	3 3 5	1.89 B	20
			5	2 3 4	NR	
		15	6	3 3 5	2.13 B	23
			7	3 3 4	2.13 B	20
	--L_L(%)=49, P_L(%)=17-- --%Gravel=12.5-- --%Sand=14.3--	20	8	3 3 5	1.89 B	19
	--%Silt=47.4-- --%Clay=25.9--					
			9	4 5 6	2.46 B	26
694.0	Very stiff, brown CLAY to SILTY CLAY; damp --RDR 2--	25	10	5 8 8	3.53 B	28
691.5	Stiff to very stiff, brown to gray, SILTY CLAY, trace gravel --RDR 2--		11	7 10 12	3.28 B	17
		30	12	16 17 20	2.00 P	18
		35	13	7 7 10	1.80 B	16
677.0		40	14	7 9 12	1.97 B	16
	Boring terminated at 40.00 ft					

GENERAL NOTES

Begin Drilling **05-19-2020** Complete Drilling **05-19-2020**
Drilling Contractor **Wang Testing Services** Drill Rig **18CME55T [85%]**
Driller **R&J** Logger **F. Bozga** Checked by **C. Marin**
Drilling Method **2.25" IDA HSA; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ∇ **20.50 ft**
At Completion of Drilling ▼ **37.00 ft**
Time After Drilling **24 hours**
Depth to Water ▼ **20.50 ft**

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BORING LOG RWB-04

WEI Job No.: 498-01-02

Client: **Lin Engineering, Ltd.**
Project: **Interstate 55 over IL Route 53**
Location: **Will County, Illinois**

Datum: NAVD 88
Elevation: 715.68 ft
North: 1828280.53 ft
East: 1057120.08 ft
Station: 214+45.02
Offset: 46.75' LT

Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	16-inch thick ASPHALT --PAVEMENT--					
714.4	Loose to very loose, brown, coarse SAND, trace gravel; dry to wet --FILL-- --RDR 1--		1	3 4 4	NP	5
		5	2	4 3 3	NR	6
			3	2 1 2	NP	7
		10	4	2 2 3	NP	7
			5	2 2 2	NP	15
702.7	Stiff to very stiff, brown and gray, SILTY CLAY --FILL-- --RDR 2--	15	6	3 4 7	2.54 B	22
	--trace gravel--		7	4 4 6	2.50 P	23
	--some debris-- --sample sheared--	20	8	8 25 26	1.50 P	24
695.2	Very stiff, gray CLAY to SILTY CLAY; damp --RDR 2--		9	5 4 6	2.13 B	28
692.7	Medium stiff, brown and gray, SILTY CLAY LOAM, trace gravel; moist --RDR 1-- --L_L(%)=36, P_L(%)=16-- --%Gravel=4.1-- --%Sand=10.5-- --%Silt=58.5-- --%Clay=26.9--	25	10	2 3 3	0.74 B	28
690.2	Stiff to very stiff, brown and gray to gray, SILTY CLAY, trace gravel; damp --RDR 2--		11	5 7 8	1.56 B	18
		30	12	6 7 9	2.46 B	17
		35	13	6 8 10	2.62 B	17
	--hard drilling, 37 to 38 feet-- --possible cobbles and boulders--					
675.7		40	14	8 10 11	1.97 B	17

Boring terminated at 40.00 ft

GENERAL NOTES

Begin Drilling **05-19-2020** Complete Drilling **05-19-2020**
Drilling Contractor **Wang Testing Services** Drill Rig **18CME55T [85%]**
Driller **R&J** Logger **F. Bozga** Checked by **C. Marin**
Drilling Method **2.25" IDA HSA; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **10.50 ft**
At Completion of Drilling ▼ **18.00 ft**
Time After Drilling **NA**
Depth to Water **NA**

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BORING LOG RWB-05

WEI Job No.: 498-01-02

Client: **Lin Engineering, Ltd.**
Project: **Interstate 55 over IL Route 53**
Location: **Will County, Illinois**

Datum: NAVD 88
Elevation: 714.30 ft
North: 1828321.90 ft
East: 1057178.30 ft
Station: 215+16.30
Offset: 48.09' LT

Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	16-inch thick ASPHALT --PAVEMENT--					
713.0	Loose to medium dense, brown, coarse SAND, trace gravel; dry to wet --FILL-- --RDR 2--		1	6 5 5	NP	4
		5	2	5 3 2	NP	5
			3	2 2 2	NP	4
		10	4	2 2 3	NP	6
702.8	Very stiff, brown and gray, SILTY CLAY, trace gravel; damp --FILL-- --RDR 2--		5	2 3 5	2.21 B	16
		15	6	4 5 8	2.46 B	21
	--brown, gray and black--		7	5 6 7	2.13 B	21
696.3	Very stiff, black SILTY CLAY LOAM --BURIED TOPSOIL--					
695.3	Medium stiff to stiff, gray CLAY to SILTY CLAY; damp --RDR 1 to 2--	20	8	5 8 9	1.89 B	29
			9	1 2 4	0.82 B	28
691.3	Stiff, gray SILTY CLAY LOAM, little gravel; damp --RDR 2--	25	10	5 5 7	1.75 P	18
688.8	Medium dense, gray SANDY GRAVEL to GRAVELLY SAND; wet --RDR 2--		11	9 10 12	NP	15
685.3	Stiff, gray SILTY CLAY LOAM, trace gravel; damp --RDR 2--	30	12	6 4 6	NP	17
		35	13	4 6 7	1.89 B	18
674.3		40	14	4 6 8	1.89 B	17
	Boring terminated at 40.00 ft					

GENERAL NOTES

Begin Drilling **05-18-2020** Complete Drilling **05-19-2020**
Drilling Contractor **Wang Testing Services** Drill Rig **18CME55T [85%]**
Driller **R&J** Logger **F. Bozga** Checked by **C. Marin**
Drilling Method **2.25" IDA HSA; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling **10.50 ft**
At Completion of Drilling **DRY**
Time After Drilling **NA**
Depth to Water **NA**

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BORING LOG RWB-06

WEI Job No.: 498-01-02

Client: **Lin Engineering, Ltd.**
Project: **Interstate 55 over IL Route 53**
Location: **Will County, Illinois**

Datum: NAVD 88
Elevation: 712.64 ft
North: 1828367.87 ft
East: 1057240.40 ft
Station: 215+93.76
Offset: 51.12' LT

Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	18-inch thick ASPHALT --PAVEMENT--					
711.1	Loose to medium dense, brown, coarse SAND, trace gravel; damp to wet --FILL-- --RDR 1 to 2--		1	8, 10, 8	NP	6
		5	2	6, 4, 3	NP	5
			3	2, 2, 2	NP	8
		10	4	3, 2, 2	NP	10
702.1	Medium dense, brown and gray SANDY GRAVEL; wet --debris-- --FILL-- --RDR 2--		5	7, 16, 9	NP	13
699.6	Very stiff, black, brown and gray, SILTY CLAY LOAM, trace gravel --FILL-- --RDR 2--	15	6	6, 6, 8	3.75 P	18
697.1	Very stiff, black, brown and gray CLAY to SILTY CLAY, trace gravel; damp --FILL-- --RDR 2--		7	4, 5, 6	3.03 B	28
694.6	Stiff to very stiff, brown to gray, SILTY CLAY, trace gravel --RDR 2--	20	8	7, 8, 12	3.36 B	17
			9	5, 7, 12	3.36 B	18
		25	10	6, 10, 11	3.69 B	20
			11	5, 7, 9	2.21 B	20
		30	12	5, 6, 9	1.89 B	15
		35	13	6, 8, 11	1.72 B	15
675.1	Very dense, gray SANDY GRAVEL; wet --RDR 3 to 4 -- --hard drilling, 37.5 to 40 feet-- --possible cobbles--		14	28, 24, 26	NP	12
672.6	Boring terminated at 40.00 ft	40				

GENERAL NOTES

Begin Drilling: **05-18-2020** Complete Drilling: **05-18-2020**
Drilling Contractor: **Wang Testing Services** Drill Rig: **18CME55T [85%]**
Driller: **R&J** Logger: **F. Bozga** Checked by: **C. Marin**
Drilling Method: **2.25" IDA HSA; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **8.00 ft**
At Completion of Drilling: **22.00 ft**
Time After Drilling: **NA**
Depth to Water: **NA**

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BORING LOG RWB-07

WEI Job No.: 498-01-02

Client: **Lin Engineering, Ltd.**
Project: **Interstate 55 over IL Route 53**
Location: **Will County, Illinois**

Datum: NAVD 88
Elevation: 710.91 ft
North: 1828410.30 ft
East: 1057300.77 ft
Station: 216+67.54
Offset: 51.86' LT

Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	18-inch thick ASPHALT --PAVEMENT--					
709.4	Medium dense, brown GRAVELLY SAND; dry --AGGREGATE BASE-- --RDR 2--		1	5, 10, 7	NP	5
707.7	Loose, brown, coarse SAND, trace gravel; dry to wet --FILL-- --RDR 2--	5	2	2, 3, 3	NP	4
			3	2, 2, 3	NP	16
702.9	Very stiff to hard, brown to brown and gray, SILTY CLAY LOAM, trace gravel --FILL-- --RDR 2--	10	4	5, 8, 8	2.54 B	16
	--black, brown and gray--		5	4, 26, 17	> 4.50 P	15
	--sample sheared--	15	6	7, 7, 9	2.75 P	27
695.4	Stiff to very stiff, brown and gray to gray, SILTY CLAY, trace gravel --RDR 2--		7	5, 6, 10	2.46 B	22
		20	8	6, 10, 13	3.77 B	20
			9	5, 9, 11	3.44 B	19
	--gray--	25	10	5, 7, 10	2.79 B	16
			11	4, 8, 11	1.72 B	18
		30	12	4, 8, 12	1.64 B	17
		35	13	4, 8, 10	1.72 B	17
670.9		40	14	8, 10, 11	1.64 B	16

Boring terminated at 40.00 ft

GENERAL NOTES

Begin Drilling **05-18-2020** Complete Drilling **05-18-2020**
Drilling Contractor **Wang Testing Services** Drill Rig **18CME55T [85%]**
Driller **R&J** Logger **F. Bozga** Checked by **C. Marin**
Drilling Method **2.25" IDA HSA; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **5.50 ft**
At Completion of Drilling ▼ **17.00 ft**
Time After Drilling **NA**
Depth to Water ▼ **NA**

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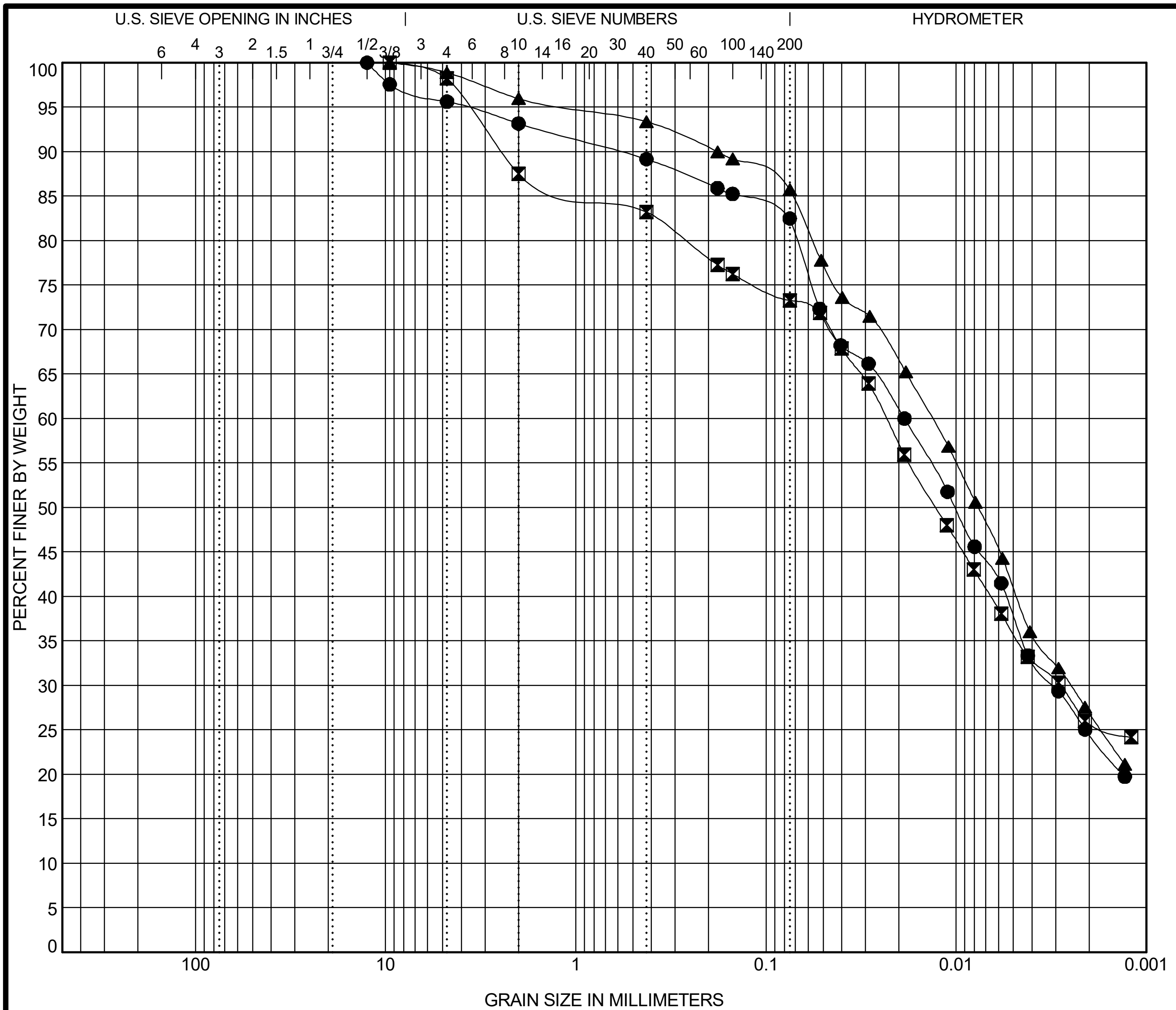
APPENDIX B



COBBLES	GRAVEL	SAND		SILT AND CLAY
		coarse	fine	

	Specimen Identification		IDH Classification	LL	PL	PI	Cc	Cu
●	RWB-01#12	28.5 ft	**Silty Clay Loam**	**28**	**13**	**15**		
⧗	RWB-03#8	18.5 ft	**Silty Clay Loam**	**49**	**17**	**32**		
▲	RWB-04#10	23.5 ft	**Silty Clay Loam**	**36**	**16**	**20**		

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	RWB-01#12	28.5 ft	**12.5**	**0.019**	**0.003**		**6.8**	**11.1**	**57.6**	**24.5**
⧗	RWB-03#8	18.5 ft	**9.5**	**0.023**	**0.003**		**12.5**	**14.3**	**47.4**	**25.9**
▲	RWB-04#10	23.5 ft	**9.5**	**0.013**	**0.003**		**4.1**	**10.5**	**58.5**	**26.9**

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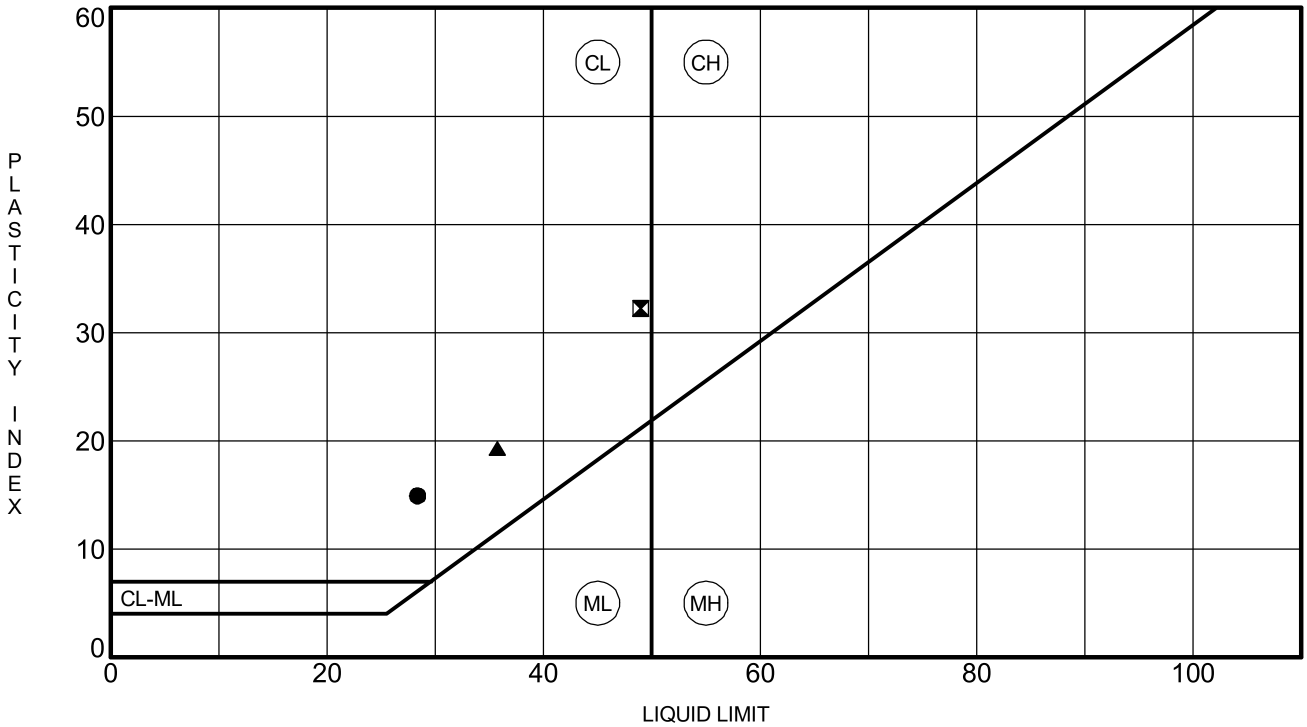
1145 N. Main Street
Lombard/IL/60148
Telephone: 6309539928
Fax: 6309539938

GRAIN SIZE DISTRIBUTION

Project: Interstate 55 over IL Route 53

Location: Will County, Illinois

Number: 498-01-02



	Specimen Identification		LL	PL	PI	Fines	IDH Classification
●	**RWB-01#12**	**28.5 ft**	**28**	**13**	**15**	**82**	**Silty Clay Loam**
⧗	**RWB-03#8**	**18.5 ft**	**49**	**17**	**32**	**73**	**Silty Clay Loam**
▲	**RWB-04#10**	**23.5 ft**	**36**	**16**	**20**	**86**	**Silty Clay Loam**

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ATTERBERG LIMITS' RESULTS

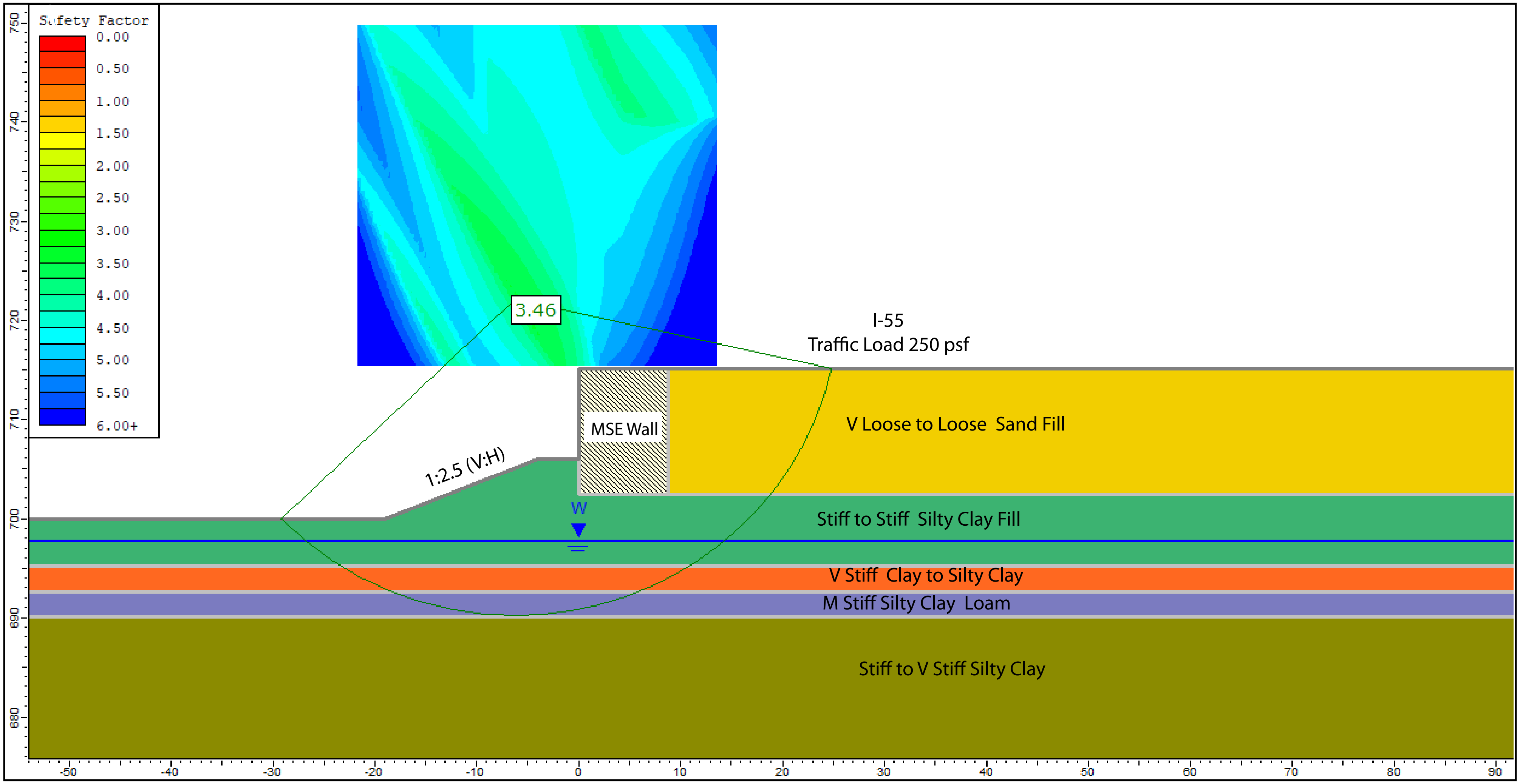
Project: Interstate 55 over IL Route 53

Location: Will County, Illinois

Number: 498-01-02

1145 North Main Street
Lombard, Illinois 60148
Phone (630) 953-9928
www.wangeng.com

APPENDIX C



Undrained Analysis, Retaining Wall, Station 214+00, Ref Boring: RWB-04

Layer ID	Description	Total Unit Weight (pcf)	Undrained Cohesion (psf)	Undrained Friction Angle (degrees)
1	V Loose to Loose Sand Fill	120	0	30
2	Stiff to V Stiff Silty Clay Fill	120	2100	0
3	V Stiff Clay to Silty Clay	120	2100	0
4	M Stiff Silty Clay Loam	115	750	0
5	Stiff to V Stiff Silty Caly	120	2200	0

GLOBAL STABILITY: NORTHEAST RETAINING WALL, INTERSTATE 55 OVER IL ROUTE 53 BRIDGE WIDENING, WILL COUNTY, IL

SCALE: GRAPHICAL

APPENDIX C-1

DRAWN BY: N. Balakumaran
CHECKED BY: A. Kurnia

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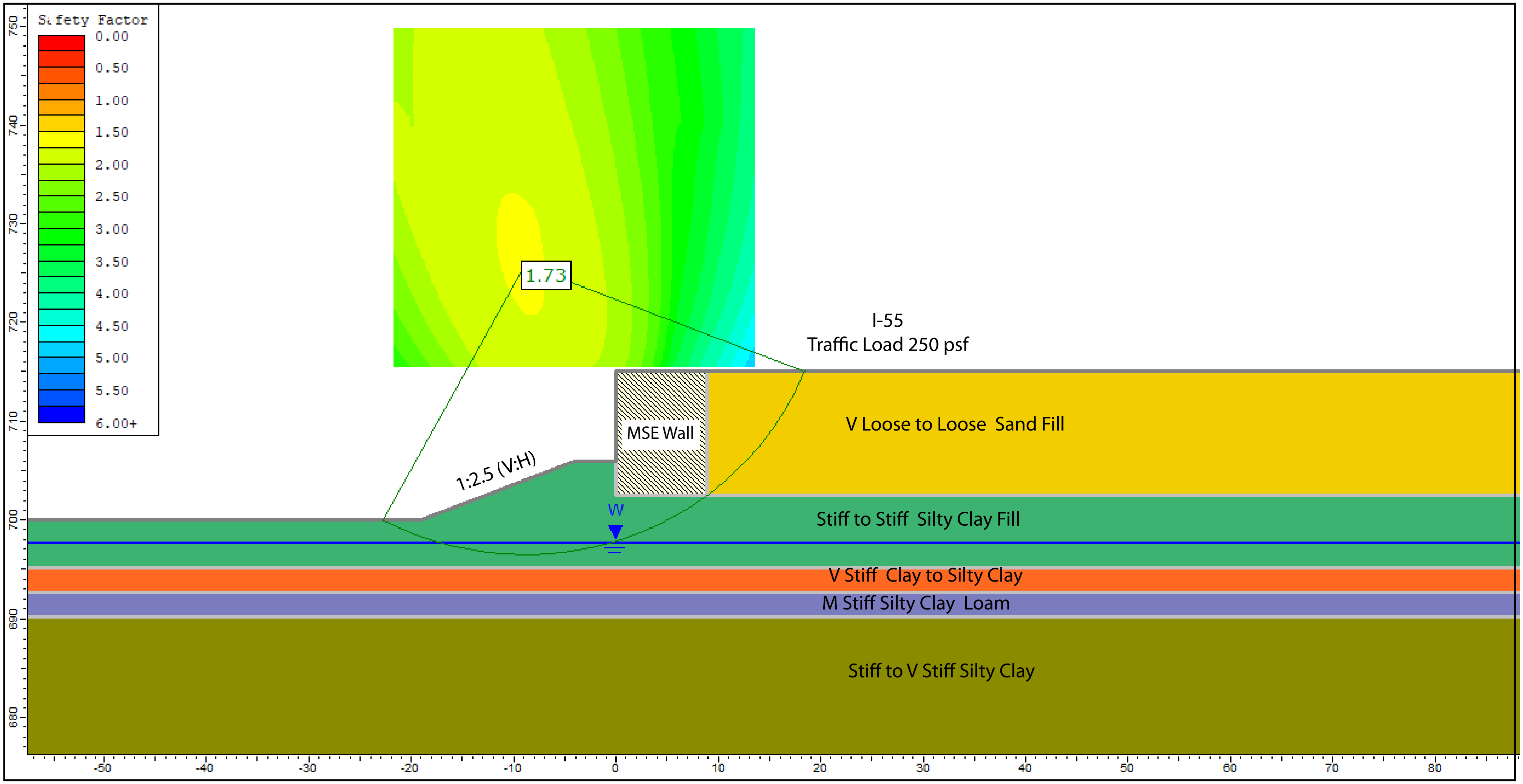
498-01-02



Drained Analysis, Retaining Wall, Station 214+00, Ref Boring: RWB-04

Layer ID	Description	Total Unit Weight (pcf)	Drained Cohesion (psf)	Drained Friction Angle (degrees)
1	V Loose to Loose Sand Fill	120	0	30
2	Stiff to V Stiff Silty Clay Fill	120	100	30
3	V Stiff Clay to Silty Clay	120	100	30
4	M Stiff Silty Clay Loam	115	0	29
5	Stiff to V Stiff Silty Caly	120	100	30

GLOBAL STABILITY: NORTHEAST RETAINING WALL, INTERSTATE 55 OVER IL ROUTE 53 BRIDGE WIDENING, WILL COUNTY, IL

SCALE: GRAPHICAL | APPENDIX C-2 | DRAWN BY: N. Balakumaran | CHECKED BY: A. Kurnia

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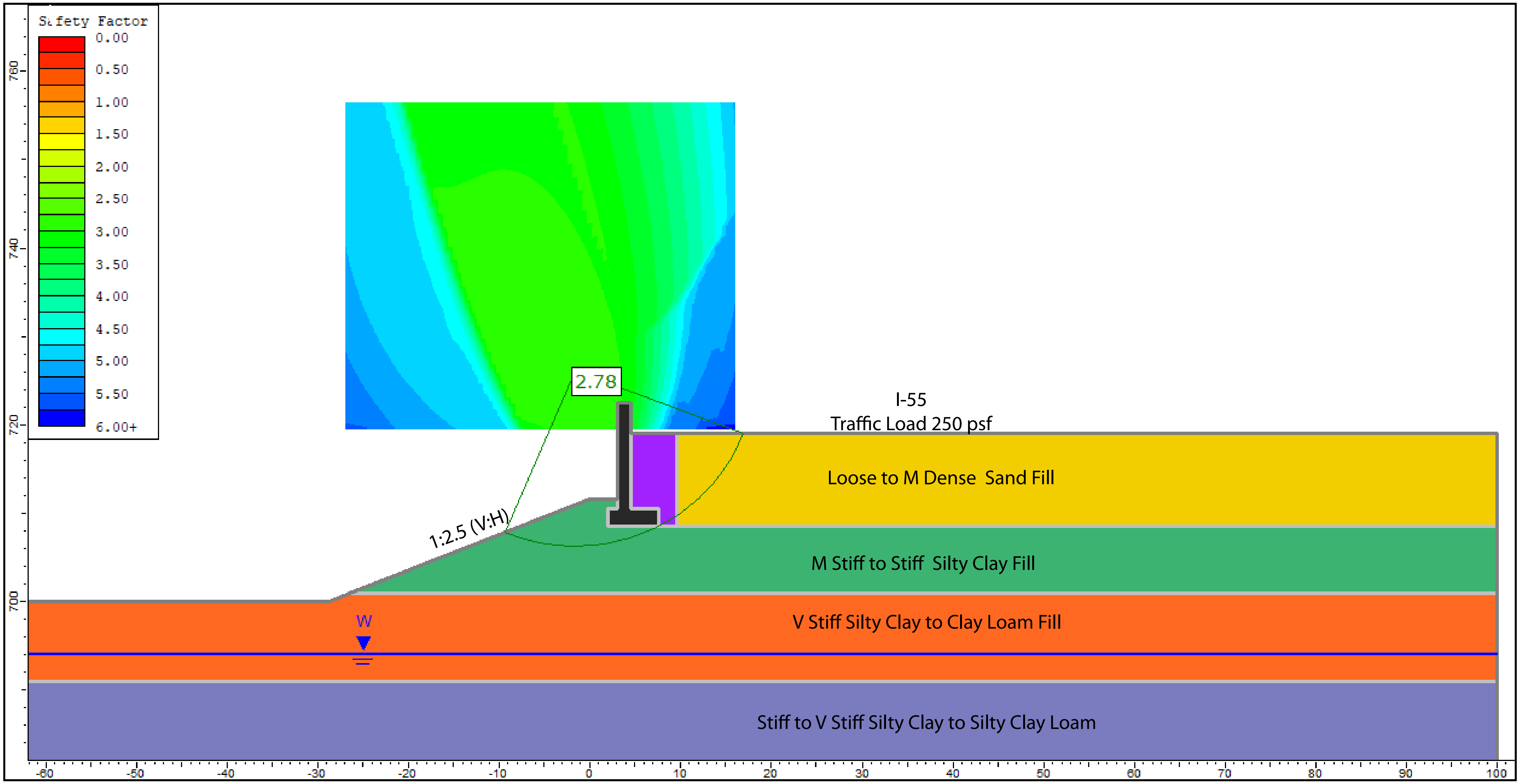

Undrained Analysis, Retaining Wall, Ref Boring: RWB-01 and BSB-06

Layer ID	Description	Total Unit Weight (pcf)	Undrained Cohesion (psf)	Undrained Friction Angle (degrees)
1	Loose to M Dense Sand Fill	120	0	30
2	M Stiff to Stiff Silty Clay Fill	120	1100	0
3	V Stiff Silty Clay to Silty Clay Loam Fill	120	2600	0
4	Stiff to V Stiff Si CL to Si Clay Loam	120	2200	0
5	Granular Backfill	120	0	32

GLOBAL STABILITY: NORTHEAST RETAINING WALL, INTERSTATE 55 OVER IL ROUTE 53 BRIDGE WIDENING, WILL COUNTY, IL

SCALE: GRAPHICAL

APPENDIX C-3

DRAWN BY: N. Balakumaran
CHECKED BY: A. Kurnia

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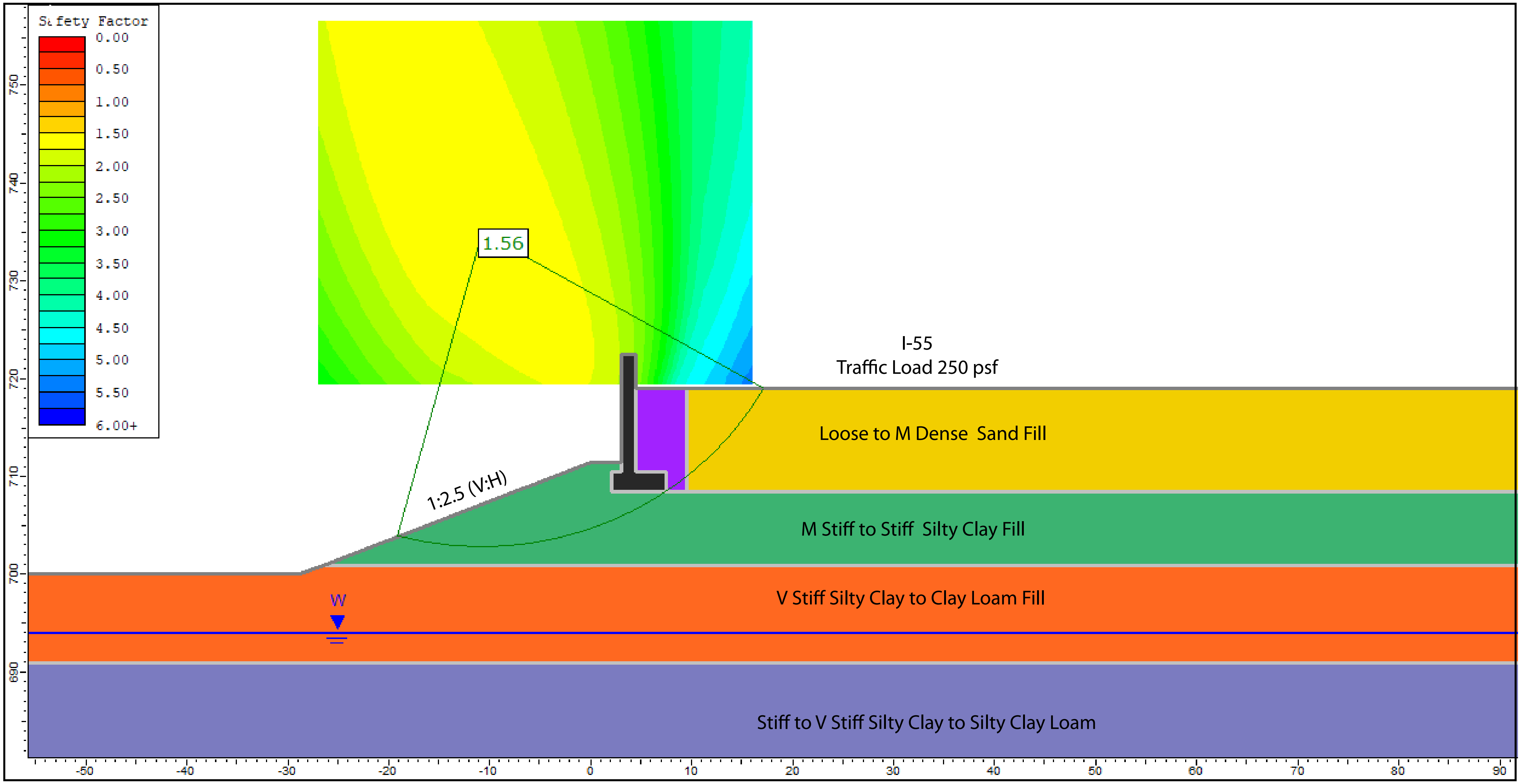

Drained Analysis, Retaining Wall, Ref Boring: RWB-01 and BSB-06

Layer ID	Description	Total Unit Weight (pcf)	Drained Cohesion (psf)	Drained Friction Angle (degrees)
1	Loose to M Dense Sand Fill	120	0	30
2	M Stiff to Stiff Silty Clay Fill	120	100	30
3	V Stiff Silty Clay to Silty Clay Loam Fill	120	100	30
4	Stiff to V Stiff Si CL to Si Clay Loam	120	100	30
5	Granular Backfill	120	0	32

GLOBAL STABILITY: NORTHEAST RETAINING WALL, INTERSTATE 55 OVER IL ROUTE 53 BRIDGE WIDENING, WILL COUNTY, IL

SCALE: GRAPHICAL

APPENDIX C-4

DRAWN BY: N. Balakumaran
CHECKED BY: A. Kurnia

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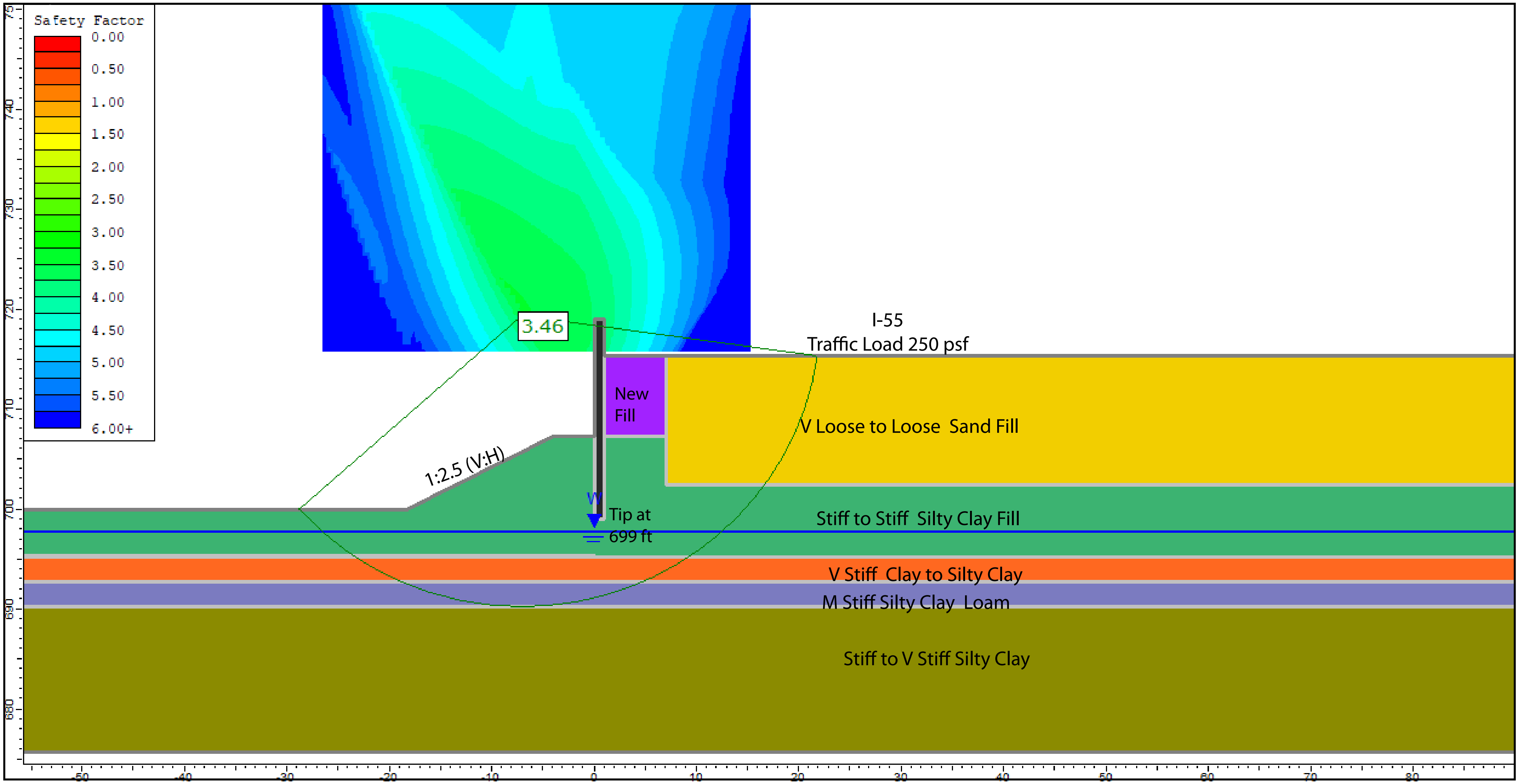

Undrained Analysis, Soldier Pile and Lagging Wall, Station 214+20.68, Ref Boring: RWB-04

Layer ID	Description	Total Unit Weight (pcf)	Undrained Cohesion (psf)	Undrained Friction Angle (degrees)
1	V Loose to Loose Sand Fill	120	0	30
2	Stiff to V Stiff Silty Clay Fill	120	2100	0
3	V Stiff Clay to Silty Clay	120	2100	0
4	M Stiff Silty Clay Loam	115	750	0
5	Stiff to V Stiff Silty Caly	120	2200	0

GLOBAL STABILITY: NORTHEAST RETAINING WALL, INTERSTATE 55 OVER IL ROUTE 53 BRIDGE WIDENING, WILL COUNTY, IL

SCALE: GRAPHICAL	APPENDIX C-5	DRAWN BY: N. Balakumaran CHECKED BY: A. Kurnia

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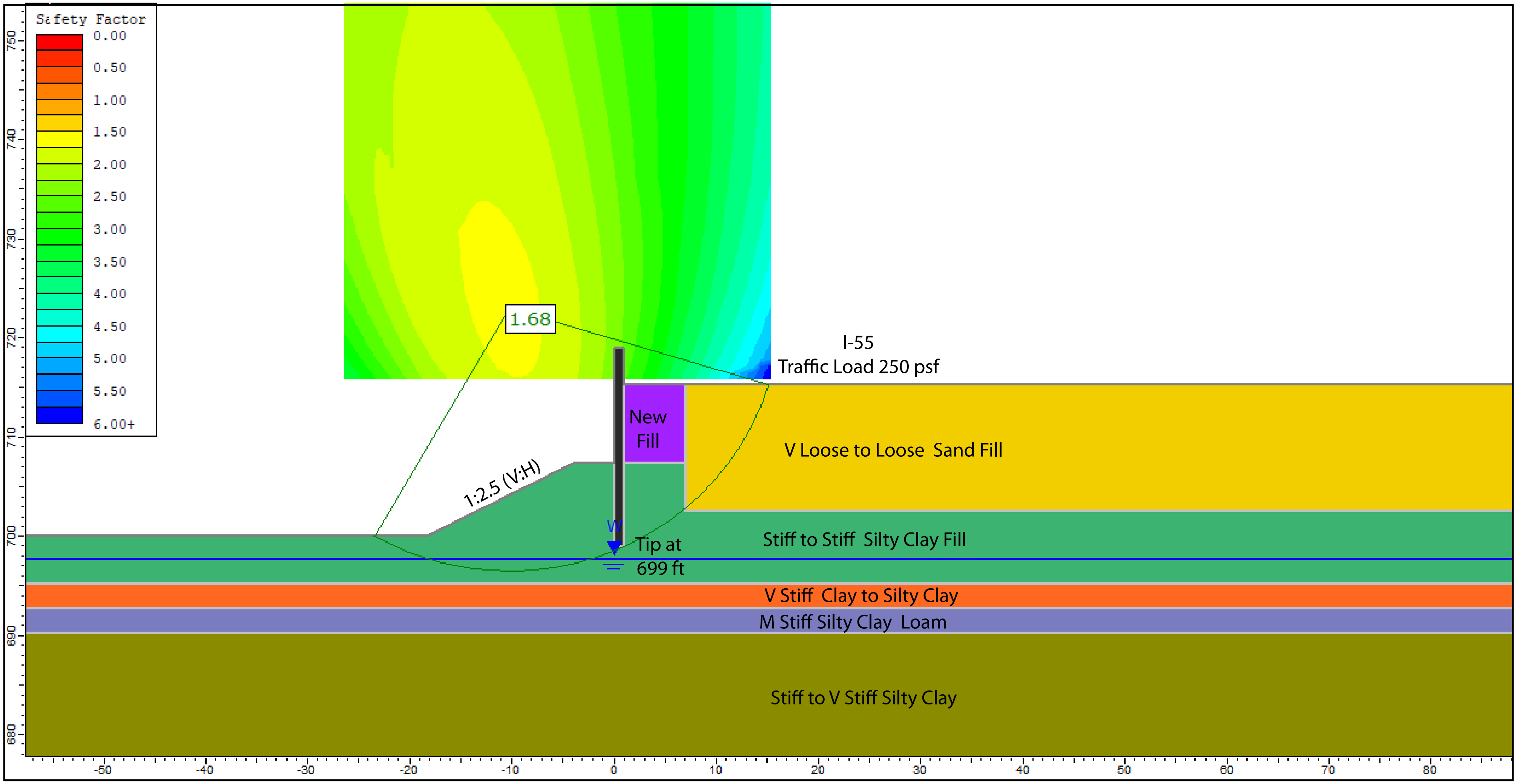

Drained Analysis, Soldier Pile and Lagging Wall, Station 214+20.68, Ref Boring: RWB-04

Layer ID	Description	Total Unit Weight (pcf)	Drained Cohesion (psf)	Drained Friction Angle (degrees)
1	V Loose to Loose Sand Fill	120	0	30
2	Stiff to V Stiff Silty Clay Fill	120	100	30
3	V Stiff Clay to Silty Clay	120	100	30
4	M Stiff Silty Clay Loam	115	0	29
5	Stiff to V Stiff Silty Caly	120	100	30

GLOBAL STABILITY: NORTHEAST RETAINING WALL, INTERSTATE 55 OVER IL ROUTE 53 BRIDGE WIDENING, WILL COUNTY, IL

SCALE: GRAPHICAL	APPENDIX C-6	DRAWN BY: N. Balakumaran CHECKED BY: A. Kurnia

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APPENDIX D

Bench Mark: Cut □ in Northwest corner of Median wall of F.A.P. RTE. 112 (IL-53) North of F.A.I. RTE. 55 Bridge, Sta. 210+36.66 Offset 73.72' Rt., Elevation 703.84

Existing Structure: Existing wall is cast in place reinforced wall.
Year of construction and existing plans are not available.

Traffic Control: Traffic is to be maintained during construction utilizing Stage Construction.

No Salvage.

DESIGN SPECIFICATIONS

2020 AASHTO LRFD Bridge Design Specifications, 9th Edition

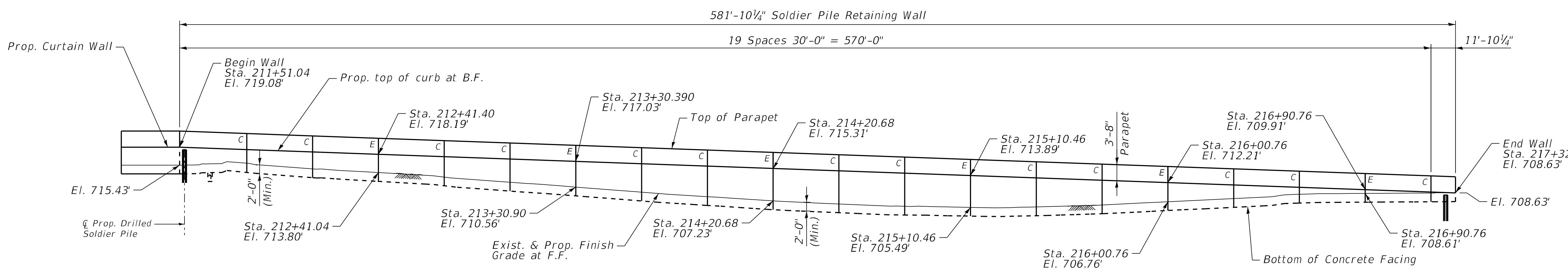
DESIGN STRESSES

FIELD UNITS

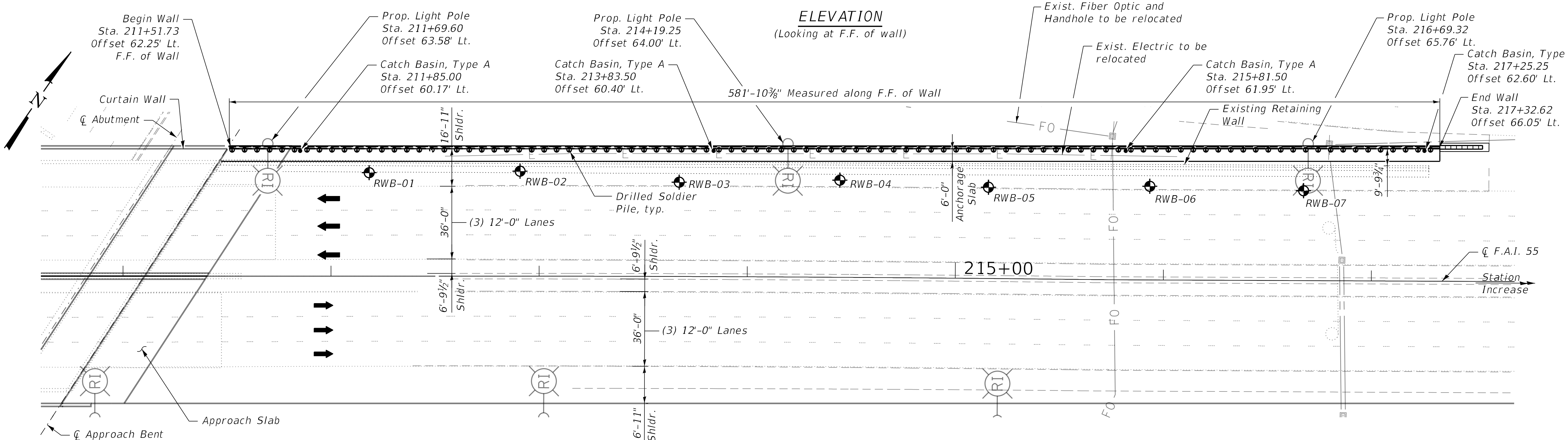
f'c = 3,500 psi
fy = 60,000 psi (Reinforcement)

SOLDIER PILES

fy = 50,000 psi (AASHTO M270 Gr. 50)



ELEVATION
(Looking at F.F. of wall)



PLAN

NOTES

1. Stations and Offsets are measured from ℄ F.A.I. 55 to the Front Face of the Retaining Wall.
2. F.F. denotes Front Face.
3. B.F. denotes Back Face.
4. C denotes Construction Joint
5. E denotes Expansion Joint

APPROVED

NOVEMBER 13, 2020

AS A BASIS FOR
PREPARATION OF DETAILED PLANS

GENERAL PLAN
F.A.I. RTE. 55 (I-55) OVER F.A.P. RTE. 112 (IL-53)
F.A.I. RTE. 55 (I-55) - SEC. 2018-043-BD&BJR
WILL COUNTY
STATION 211+52.60 TO STATION 217+32.62
S.N. 099-W100

CiorbaGroup 8725 W. Higgins Rd, Ste 600, Chicago, IL 60631 P 773.775.4009 | www.ciorba.com	USER NAME = Structural	DESIGNED - RA	REVISED -	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	GENERAL PLAN STRUCTURE NO. 099-W100	
		CHECKED - BWS	REVISED -			
	PLOT SCALE = 0:2.0000 ':" / in.	DRAWN - RA	REVISED -			
	PLOT DATE = 11/12/2020	CHECKED - BWS	REVISED -		SHEET 8 OF 9 SHEETS	

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
55	2018-043-BD&BJR	WILL	9	8
		CONTRACT NO. 62H03		
		ILLINOIS	FED. AID PROJECT	

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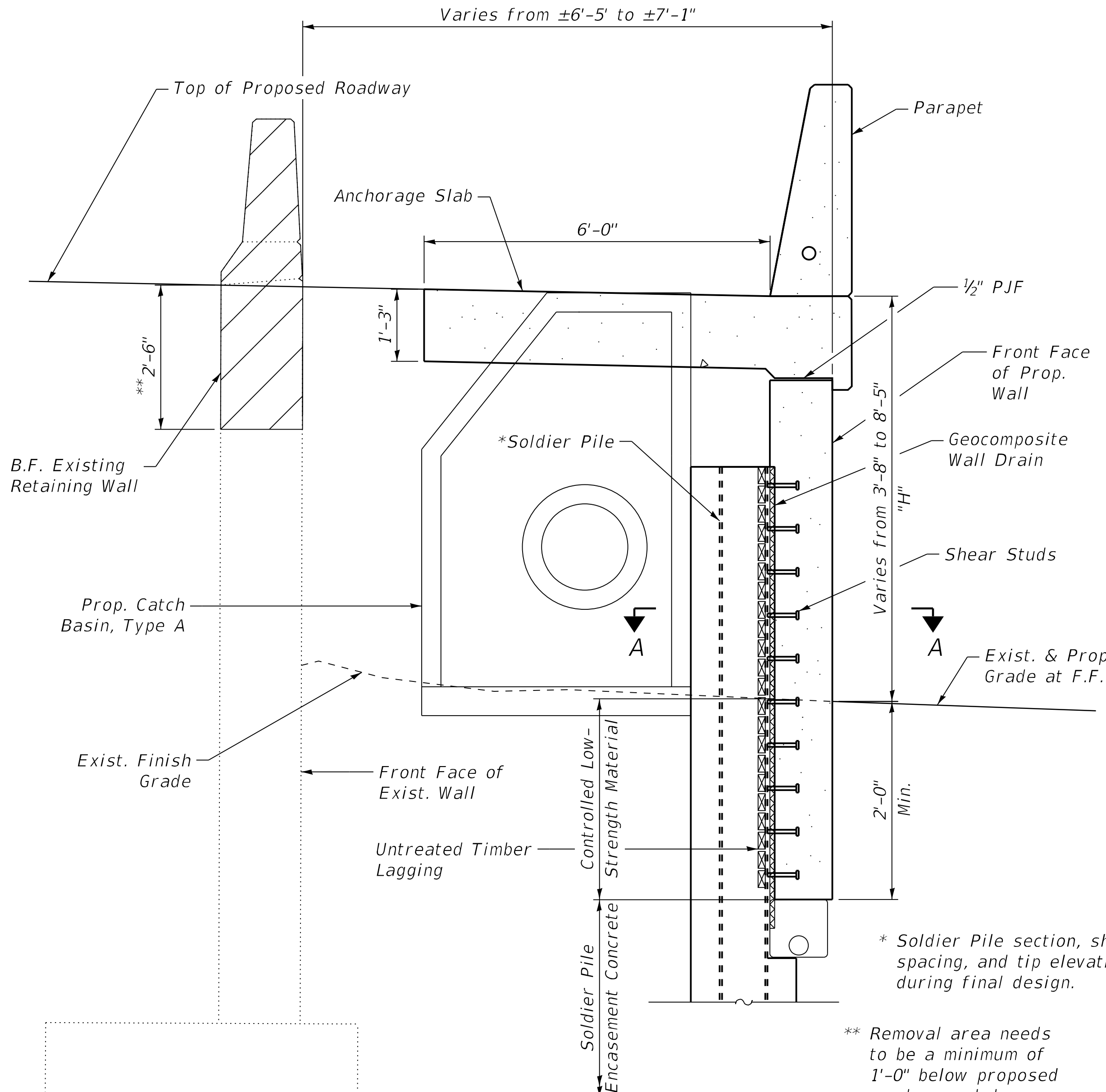
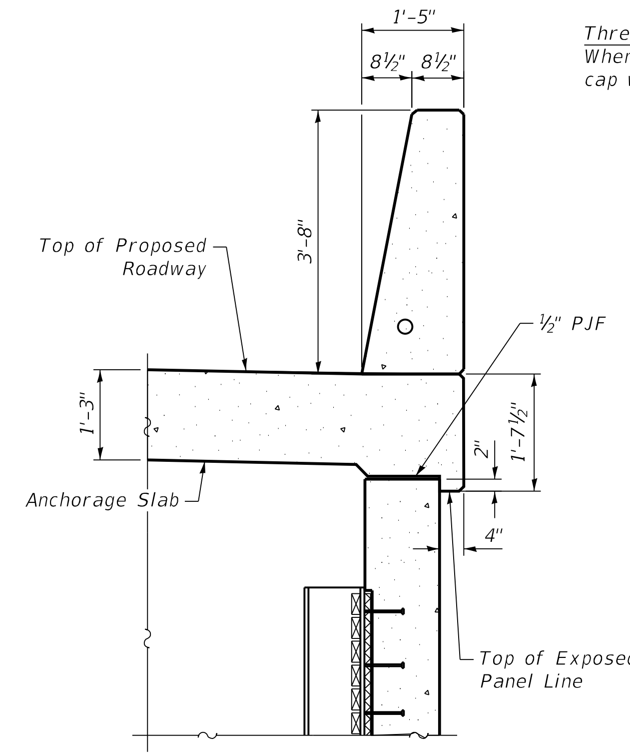


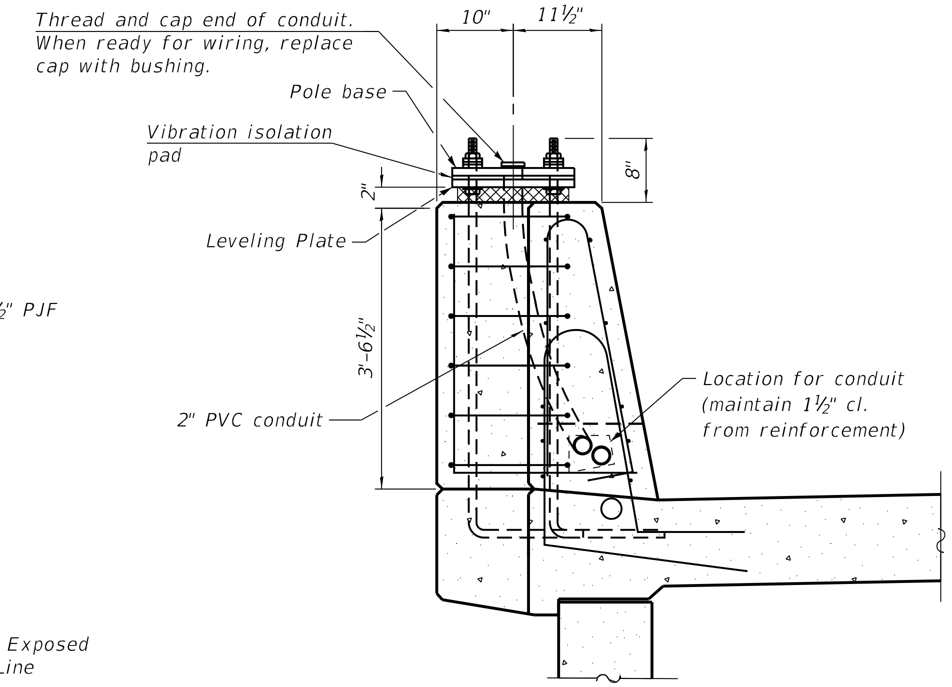
* Soldier Pile section, shaft diameter, spacing, and tip elevation to be determined during final design.

** Removal area needs to be a minimum of 1'-0" below proposed roadway sub-base.

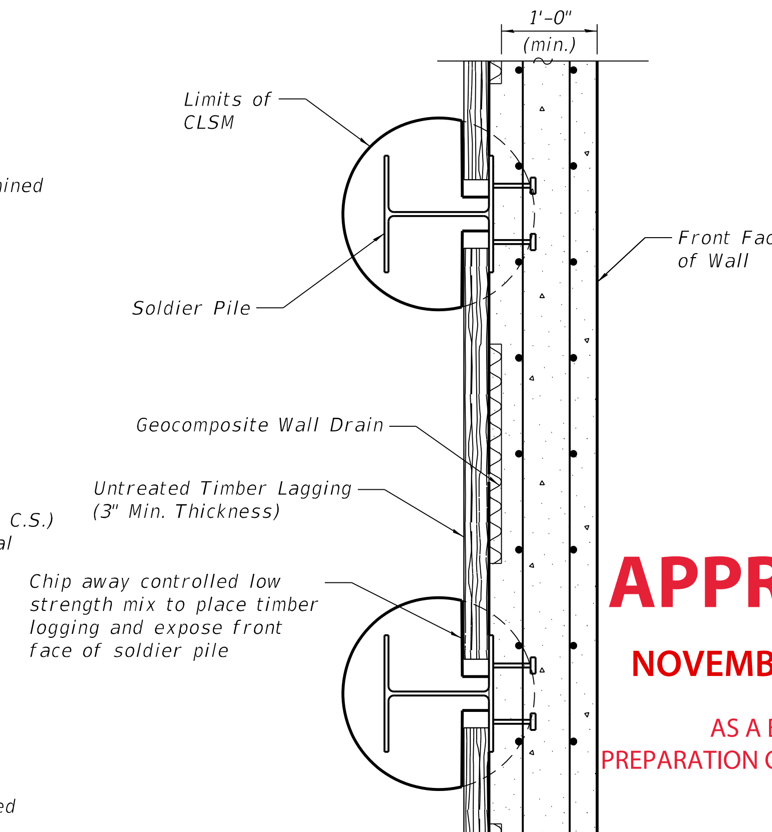
TYPICAL CROSS-SECTION



SECTION THROUGH PARAPET AND ANCHORAGE SLAB

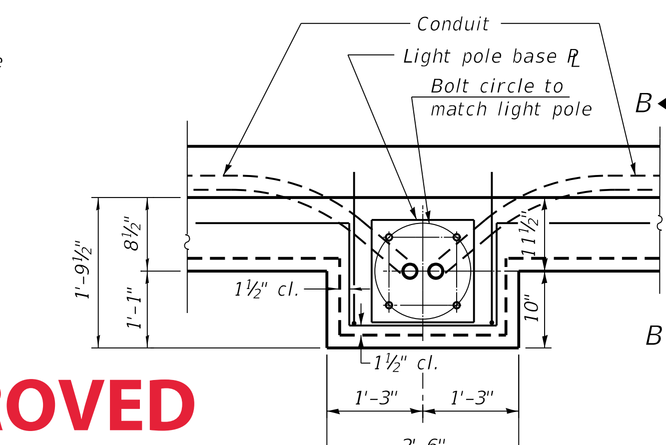


SECTION B-B



SECTION A-A

Catch Basin not shown for clarity

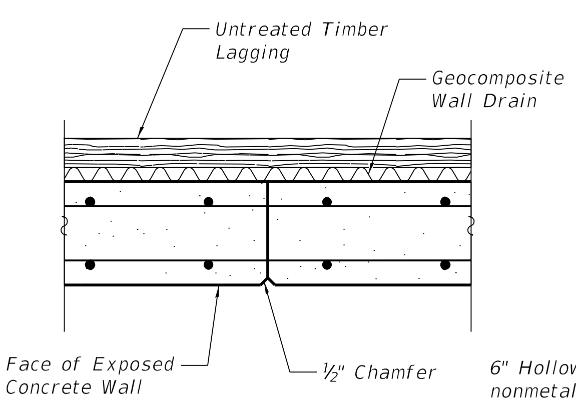


LIGHT POLE BASE DETAIL

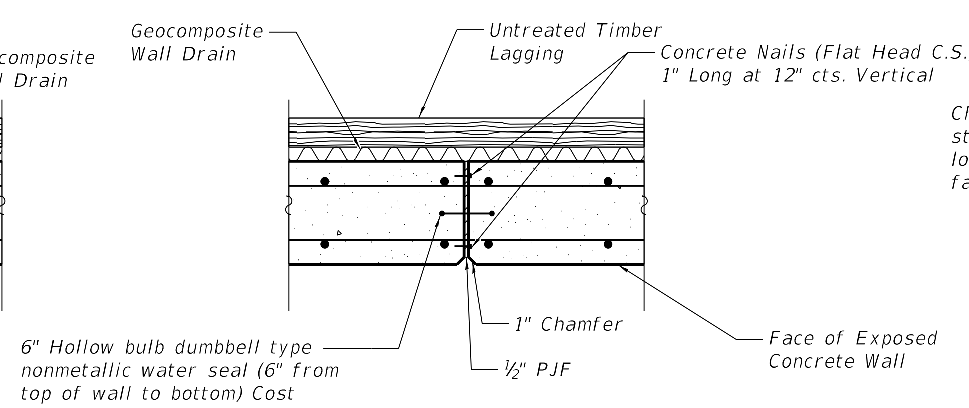
APPROVED

NOVEMBER 13, 2020

AS A BASIS FOR PREPARATION OF DETAILED PLANS



CONSTRUCTION JOINT



EXPANSION JOINT

LEGEND

▱ Existing Removal Limits

RETAINING WALL DETAILS

F.A.I. RTE. 55 (I-55) OVER F.A.P. RTE. 112 (IL-53)

F.A.I. RTE. 55 (I-55) - SEC. 2018-043-BD&BJR

WILL COUNTY

STATION 211+52.60 TO STATION 217+32.62

S.N. 099-W100

FILE NAME: N:\PROJ\0021086.01\CADD\Sht\Structural\TSL Sheets\0021086.01_TSL 9.dgn

CiorbaGroup 8725 W. Higgins Rd, Ste 600, Chicago, IL 60631 P 773.775.4009 | www.ciorba.com	USER NAME = Structural	DESIGNED - RA	REVISED -	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	RETAINING WALL DETAILS STRUCTURE NO. 099-W100
		CHECKED - BWS	REVISED -		
	PLOT SCALE = 0:2.0000 ':" / in.	DRAWN - RA	REVISED -		
	PLOT DATE = 11/12/2020	CHECKED - BWS	REVISED -		SHEET 9 OF 9 SHEETS

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
55	2018-043-BD&BJR	WILL	9	9
		CONTRACT NO. 62H03		
		ILLINOIS FED. AID PROJECT		

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