STRUCTURE GEOTECHNICAL REPORT
RETAINING WALL AT RAMP A
SN 099-Z043
I-80 AND LARKIN AVENUE INTERCHANGE
WILL COUNTY, ILLINOIS

For

TranSystems Corporation

1475 Woodfield Road, Suite 600

Schaumburg, IL 60173-5440

Submitted by

Wang Engineering, Inc. a Terracon Company

1145 North Main Street

Lombard, IL 60148

Original Report: May 8, 2023
Revised Report: TBD

Technical Report Documentation Page

1. Title and Subtitle Structure Geotechnical Report Retaining Wall at Ramp A EB I-80 to Larkin Avenue		**2. Report Date:** May 8, 2023 **Revised Date:** **3. Report Type** ☒ SGR ☐ RGR ☐ Draft ☒ Final ☐ Revised
4. Route / Section / County F.A.I I-80/ 2021-151-B/ Will/ One/ One		**5. IDOT Contract** D-91-207-19/ 62R27
6. PTB / Item No. 194/011	**7. Existing Structure Number(s)** None	**8. Proposed Structure Number(s)** SN 099-Z043
9. Prepared by Wang Engineering, Inc. 1145 N Main Street Lombard, IL 60148	**Contributor(s)** Author: Metin W. Seyhun, P.E. Reviewed By: Corina T. Farez, PE, PG. PM: Andri A. Kurnia, PE	**Contact Information** (847) 778-4975 akurnia@wangeng.com
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11. Abstract

To support an exit ramp from EB I-80 to Larkin Avenue, Retaining Wall Ramp A (SN099-Z043) will be constructed on the southwest quadrant of the interchange. The wall will be about 191.5-foot long, extending from Station 912+05.00 feet to Station 913+85.00. The wall will have a maximum retained height of 3.0 feet, a maximum total height of 6.5 feet, and a 3.7-foot-tall parapet on the top.

Along the proposed wall alignment, the foundation soils consist of up to 11.0 feet of medium stiff to hard, silty clay overlying stiff to hard silty clay to silty clay loam to the boring termination depths. Perched groundwater was encountered only at Boring RW1-04 within the gravelly loam interbed at an elevation of 629.8 feet or 5.5 feet below ground surface (bgs).

A Mechanically Stabilized Earth (MSE) wall is proposed to retain the new fill for the roadway grade adjustments along Ramp A connecting EB I-80 to the SB Larkin Avenue. The subgrade soils expected to be encountered below the proposed levelling pad are composed of stiff to hard clayey soils that are competent soils. Based on our evaluation of the external stability of the MSE wall at the maximum total height of 6.5 feet at Station 913+25.00, we estimate the wall can be designed using a maximum factored bearing resistance is 6,500 psf. We estimate the sliding along the clayey soils has sufficient resistance and the eccentricity lies within the required middle 2/3 of the wall.

Global stability analyses of the wall at the maximum MSE wall height with 0.7H reinforcement length showed factor of safety (FOS) values under undrained and drained conditions exceeding the IDOT minimum required FOS of 1.5 in both short-term (undrained) and long-term (drained) conditions. We anticipate the long-term settlement of the wall will be approximately 0.25 inches or less.

Perched groundwater is expected within the gravelly loam at about 629.8 feet elevation which is above the proposed leveling pad bearing elevation of 629.1 feet, thus any water that accumulates in open excavations by seepage or runoff should be immediately removed via sump pumps. Temporary sheet pile as per IDOT is not feasible due to the presence of hard clay below the proposed levelling pad, thus a Temporary Soil Retention System (TSRS) may be required.

12. Path to archived file

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WILL COUNTY, ILLINOIS
FOR
TRANSYSTEMS CORPORATION

1.0 INTRODUCTION

This report presents the results of our subsurface investigation, laboratory testing, geotechnical evaluations, and recommendations to support the design and construction of a new retaining wall along the Ramp A at Interstate 80 (I-80) and Larkin Avenue Interchange in Joliet, Will County, Illinois. On the USGS *Quadrangle 7.5 Minute Series* map, the project site is located at SE $^{1}/_{4}$ of Section 18, Township 35N, Range 10E 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.

1.1 Proposed Structure

Based on the preliminary *General Plan and Elevation* (GPE, Appendix D) drawings provided by TranSystems Corporation (TranSystems) dated April 18, 2023, Wang Engineering, Inc. (Wang), a Terracon Company, understands the proposed Mechanically Stabilized Earth (MSE) wall begins at Station 912+05.00 feet with an offset of 12.76 feet Right and ends at Station 913+85.00 feet with an offset of 27.16 feet Right. The wall length measured along front face of wall will be 191.5 feet long. The wall at Station 913+25.00 will have a maximum retained height of 3.0 feet, a maximum total height of 6.5 feet, and will have a 3.7-foot-tall parapet installed on the top.

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 four structure borings, designated as RW1-01 through RW1-04, drilled through the existing ramp shoulders. The borings were performed on April 1, 2023. The borings were drilled from elevations of 634.63 to 635.66 feet to depths of 30 to 35 feet below ground surface (bgs). The as-drilled boring locations were surveyed by Wang with a mapping-grade GPS unit. Elevations, stations, and offsets were provided by TranSystems. Boring location data are presented in the *Boring Logs* (Appendix A). The as-drilled boring locations are shown in the *Boring Location Plan* (Exhibit 2).

A geoprobe 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 was sampled at 2.5-foot intervals to the boring termination depths. 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 Wang geologists, include 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), N-values recorded as blows per 6 inches of penetration.

Groundwater levels were measured while drilling and at completion of each boring. For safety considerations each borehole was backfilled immediately upon completion with soil cuttings and/or bentonite chips.

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 our 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

Borings drilled from existing ramp's shoulders along the proposed retaining wall encountered 7 to 12 inches of gravelly loam. In descending order, the general lithologic succession encountered beneath the gravelly surface includes: 1) man-made ground (fill); and 2) stiff to hard silty clay to silty clay loam.

1) Man-made ground (fill)

Underneath the roadway shoulders, the borings encountered 4.5 to 11 feet of fill. The fill consists of medium stiff to hard, brown, brown and gray silty clay. This layer has unconfined compressive strength (Q_u) values of 0.75 to 5.99 tsf and moisture content values of 16 to 25%. Laboratory test results on samples from this layer show Liquid Limit (L_L) value of 43 and Plastic Limit (P_L) value of 17%.

At an elevation of 629.8 feet (5.5 feet bgs), Boring RW1-04 revealed a 2.5-foot thick wet medium dense, brown gravelly loam.

2) Stiff to hard silty clay to silty clay loam

Beneath the fill, at elevations of 623 to 629 feet (5.5 to 12 feet bgs), the borings encountered stiff to hard, brown to gray silty clay to silty clay loam to the boring termination depths of up to 35 feet bgs. This unit has Q_u values of 1.6 to 8.7 tsf and moisture content of 13 to 23%.

3.2 Groundwater Conditions

Groundwater was not encountered during and at completion of drilling in all borings, except for Boring RW1-04 where perched groundwater was encountered while drilling within the wet gravelly loam layer at an elevation of 629.8 feet (5.5 feet bgs). If excavations are made into or through this layer, dewatering efforts should be anticipated. Sump pumps should be able to control groundwater flow and maintain a dry working area. 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.

4.0 ANALYSIS AND RECOMMENDATIONS

We understand an MSE wall type is proposed to support the new fill for the roadway grade adjustment along Ramp A connecting EB I-80 to the SB Larkin Avenue. A summary of the proposed retaining wall limits, length along station wall limits, total wall length, and maximum wall height as shown on GPE drawings is shown in Table 1.

Table 1: Retaining Wall Summary

Retaining Wall ID	Limits	Total Length along Station (feet)	Maximum Wall Total Height (feet)	Station
SN 099-Z043	Sta. 912+05 to 913+85[1]	191.5	6.5	913+25.00

[1] Bottom of MSE Wall below the existing grade

The drawings indicate the wall's top of levelling pad ranges from 629 to 632 feet elevation with a finished grade in front of the wall graded at a slope of 1: 3 (V: H). Recommendations for the MSE wall are outlined 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 MSE Wall

The MSE retaining wall base should be established a minimum of 3.5 feet below the finished grade at the front face of the wall. The MSE wall reinforcement zone width should be 0.7 times the total height (H) or a minimum of 8 feet (IDOT 2012). MSE walls should be constructed in accordance with IDOT (2022) Section 522.

4.2.1 Bearing Resistance and Sliding

From the *GPE* drawings (Appendix D), we evaluated the external stability of the MSE wall based on the maximum total height of 6.5 feet at Station 913+25.00 and the weaker soil conditions of a generalized soil profile. We estimate the wall will apply a maximum factored uniform bearing pressure of 2,000 psf and factored horizontal sliding force of 2.5 kips/feet accounting for vertical and lateral load factors

(AASHTO 2020). The applied pressure should be refined based on the final geometry and any other loads that might impact the wall design.

Based on the subsurface investigation, stiff to hard clayey soils are expected to be encountered below the proposed levelling pad elevations. We estimate these foundation soils will provide a maximum nominal bearing resistance of 10,000 psf and a maximum factored bearing resistance of 6,500 psf based on a geotechnical resistance factor of 0.65 (AASHTO 2020).

The estimated friction angle between the MSE Wall base and the underlying cohesive soil on drained conditions is 30°, and the corresponding friction coefficient is 0.58. MSE walls are designed based on an AASTHO soil-to-soil contact geotechnical sliding resistance factor of 1.0 (AASHTO 2020). We estimate the sliding along the clayey soils has sufficient resistance and the eccentricity lies within the required middle 2/3 of the wall (AASHTO 2020). However, these calculations should be verified during the final design. Earth pressure coefficients required for the design of MSE wall are provided in Table 2.

Table 2: Long-term (Drained) Parameters for the Design of MSE Wall
(Ref. Borings:RW1-01 to RW1-04)

Soil Description (Layer)	Unit Weight, (pcf)	Drained Shear Strength Properties		Earth Pressure Coefficients (Straight Backfill)		
		Cohesion (psf)	Friction Angle (°)	Active Pressure (K_a)	At Rest Pressure (K_o)	Passive Pressure (K_p)
New Embankment Fill	125	100	30	0.33	0.50	3.00
Stiff to Hard SI Clay Fill Ground Surface to EL 626.5 ft	120	100	30	0.33	0.50	3.00
V Stiff to Hard SI Clay EL 626.5 to EL 614.6	125	100	32	0.31	0.47	3.25
Stiff to Hard SI Clay EL 614.6 to EL 602.7	120	100	30	0.33	0.50	3.00

4.2.2 Settlement

Settlement under the MSE wall fill surcharge has been estimated using consolidation parameters correlated to measured index properties as well as the IDOT spreadsheet *"Cohesive Soil Settlement*

Estimate." The samples chosen for index testing along the length of the retaining wall alignment show Liquidity Indices (L_I) between 0.08 and 0.33. Clayey soil samples showing low liquidity index are mostly unsaturated, overconsolidated, and not prone to excessive settlement. The analysis conducted using traditional consolidation methods and soil properties gave a total of 0.6 inches of long-term settlement at the maximum wall height section; however, for clayey soils with Qu values between 0.5 and 2.0 tsf, the actual settlements are likely to range from between one-fourth and one-tenth of the total value, in accordance with the IDOT *Geotechnical Manual* (2015, Revised 2020) thus, we anticipate the long-term settlement of the wall will be approximately 0.25 inches or less.

4.2.3 Global Stability

The global stability of the proposed wall was analyzed using *Slide v6* computer software with the Bishop Simplified Method of analysis 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 with the maximum wall height is 6.5 feet. The minimum required factor of safety (FOS) is 1.5 in both short-term (undrained) and long-term (drained) soils conditions (IDOT 2020). We estimate the wall will have FOSs of 18.2 and 4.0 in the undrained and drained conditions, respectively, thus meeting the minimum required FOSs. Details of the global stability analysis with critical failure surfaces and results are presented in Appendix C.

5.0 CONSTRUCTION CONSIDERATIONS

5.1 Site Preparation

Shoulder gravel, vegetation, surface topsoil, should be cleared and stripped where the structure foundations will be placed. After stripping, the stability of the exposed subgrade should be observed for the presence of any unsuitable and/or unstable soils to determine if remedial treatment is necessary. Using either a static or dynamic cone penetrometer, any unstable and/or unsuitable subgrade soils revealed during excavation should be tested and evaluated for undercut depth according to the IDOT *Subgrade Stability Manual* (IDOT 2005). If unstable or unsuitable materials are exposed during excavation, they should be removed and replaced with compacted 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 roadways and utilities should be considered during design and at the time of construction.

The in-place bearing stratum for the wall foundation should be checked to verify the in-situ condition. If the actual conditions deviate from the conditions discussed in Section 4.2, the geotechnical engineer should be consulted to determine if additional measures are necessary. Prior to placing fill, all loose and soft material and water must be removed from the bottom of the foundation excavations.

Perched groundwater is expected within the wet gravelly loam at about 629.8 feet elevation which is above the proposed leveling pad bearing elevation of 629.1 feet, thus any water that accumulates in open excavations by seepage or runoff should be immediately removed via sump pumps.

Unstable or unsuitable materials exposed during excavation should be removed and replaced with compacted structural fill. The replacement material could be an IDOT District One "*Aggregate Subgrade Improvement*" materials. The actual extent of the removal shall be determined in the field by a geotechnical soil inspector at the time of construction.

Excavations below existing grade will be needed for the construction of the MSE wall. Temporary open cuts with a slope 1:2 (V:H) in granular soils and 1:1.5 (V:H) in cohesive soils can be considered if the space is available and there is no underground utilities conflict. Wang expect up to 6 feet of excavation from the existing ground. Temporary sheet pile wall as per IDOT is not feasible due to the presence of hard clay below the proposed levelling pad, thus a Temporary Soil Retention System (TSRS) may be required.

5.3 Filling and Backfilling

Fill used as embankment material 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 in accordance with section 205, *Embankment*.

The existing fill material excavated from along the proposed improvement, may be reused if it conforms to the following criteria: a) L_L less than 50%; b) plasticity index more than 12%; c) maximum dry density greater than 90 pcf according to AASHTO T 99; d) organic content less than 10%; and e) percent silt and fine sand less than 65%.

5.4 Earthwork Operations

The required earthwork can be accomplished with conventional construction equipment. Moisture and traffic will cause deterioration of exposed subgrade soils. The Contractor should take precautions 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. If 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 TranSystems Corporation 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.

Metin W. Seyhun, P.E.
Senior Geotechnical Engineer

Andri A. Kurnia, P.E.
Project Manager

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

REFERENCES

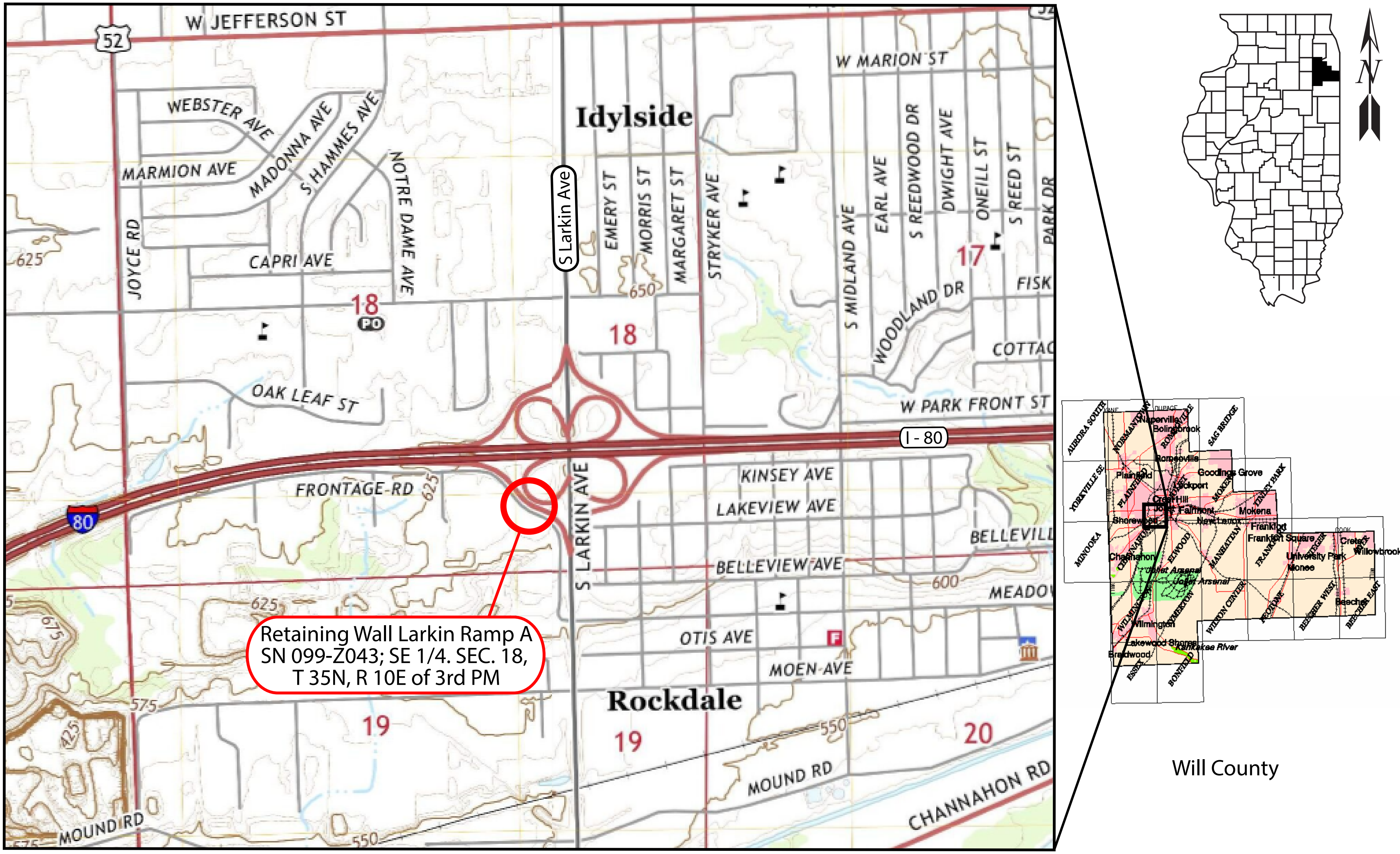
AMERICAN ASSOCIATION OF STATE HIGHWAY TRANSPORTATION OFFICIALS (2020) *AASHTO LRFD Bridge Design Specification.* United States Depart of Transportation, Washington, D.C.

ILLINOIS DEPARTMENT OF TRANSPORTATION (2020) *Geotechnical Manual.* IDOT Bureau of Materials and Physical Research, Springfield, IL.

ILLINOIS DEPARTMENT OF TRANSPORTATION (2022) *Standard Specifications for Road and Bridge Construction.* IDOT Division of Highways, Springfield, IL.

ILLINOIS DEPARTMENT OF TRANSPORTATION (2012) *Bridge Manual.* IDOT Division of Highways, Springfield, IL.

EXHIBITS



Legend

Site Locations

Scale

0 | 0.5 | 1.0 Miles

SITE LOCATION MAP: RETAINING WALL LARKIN RAMP A, SN: 099-Z043; I-80 RECONSTRUCTION FROM HOUBOLT RD TO W CENTER ST & LARKIN AVE INTERCHANGE, WILL COUNTY, ILLINOIS

SCALE: GRAPHICAL	EXHIBIT 1	DRAWN BY: D. You CHECKED BY: M. Seyhun

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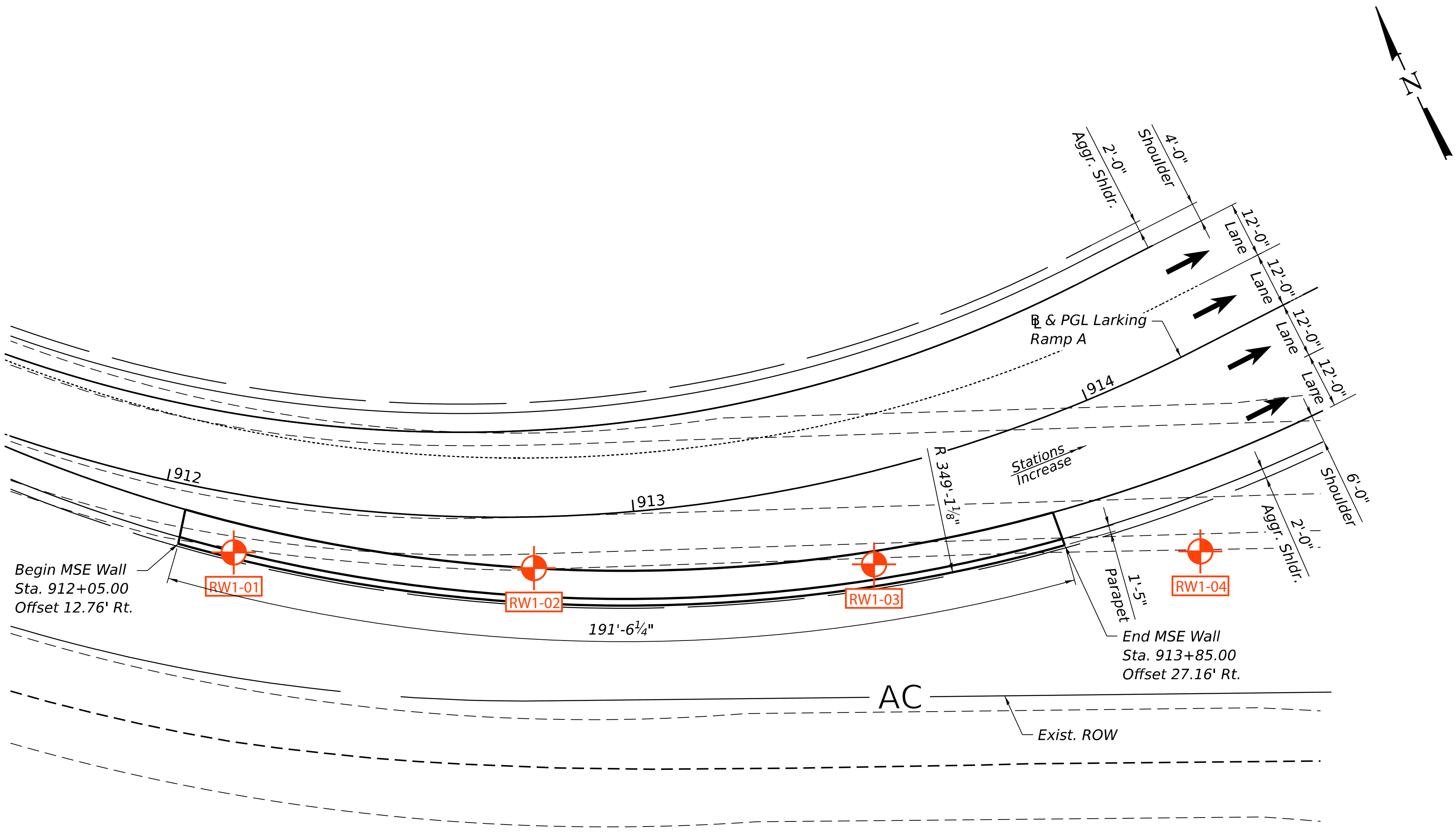
FOR TRANSYSTEMS | KE225089



Legend

Boring Location

BORING LOCATION PLAN: RETAINING WALL LARKIN RAMP A, SN: 099-Z043; I-80 RECONSTRUCTION FROM HOUBOLT RD TO W CENTER ST & LARKIN AVE INTERCHANGE, WILL COUNTY, ILLINOIS

SCALE: GRAPHICAL	EXHIBIT 2	DRAWN BY: D. You CHECKED BY: M. Seyhun

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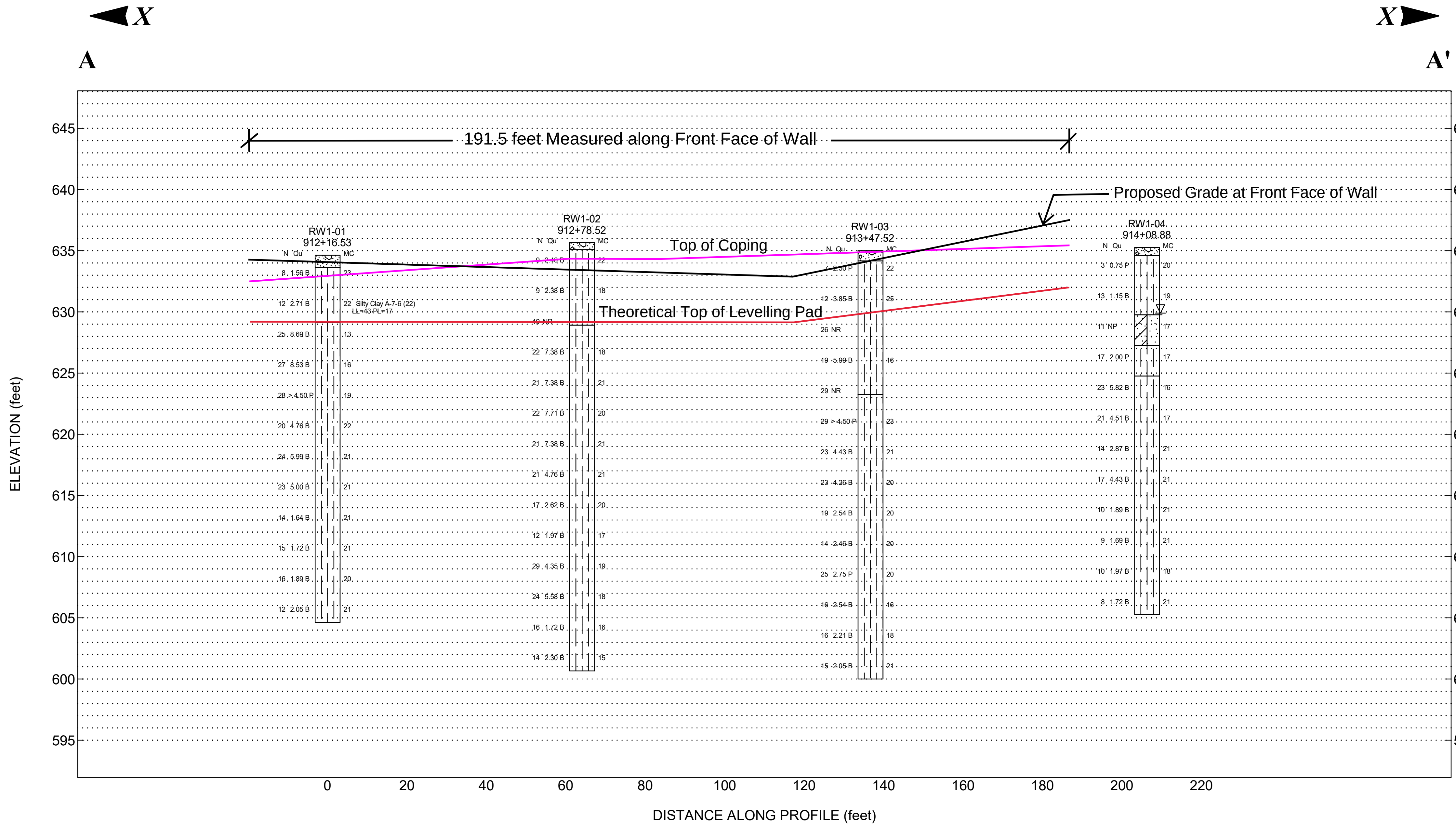
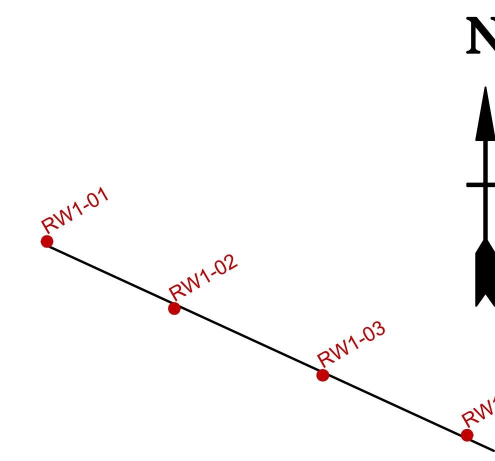


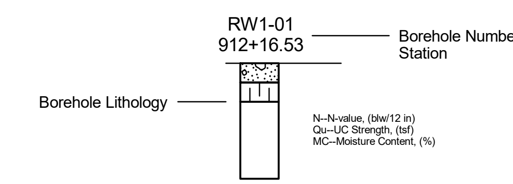
Lithology Graphics

Gravelly sand, sandy gravel | IDH Silty Clay, Silty Clay Loam | IDH Loam



Site Map Scale 1 inch equals 80 feet

Explanation:



Water Level Reading at time of drilling.

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

0 31

Horizontal Scale (feet)

Vertical Exaggeration: 3x

Wang Engineering, Inc
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Lombard, IL 60148

Soil Profile
Retaining Wall (SN099-Z043)

WEI SINCE 1982

I-80 Reconstruction (Houbolt Rd to Center St)
Will County, Illinois

JOB NUMBER	PLATE NUMBER
KE225089	EXHIBIT 3

WEI 11X17 79011501_1.GPJ WANGENG.GDT 4/27/23

APPENDIX A

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BORING LOG RW1-01

WEI Job No.: 7901-15-01

Client: **TranSystems Corporation**
Project: **I-80 Reconstruction (Houbolt Rd to Center St)**
Location: **Will County, Illinois**

Datum: NAVD 88
Elevation: 634.63 ft
North: 1764040.90 ft
East: 1041033.49 ft
Station: 912+16.53
Offset: 12.389 RT

Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
633.6	12-inch thick, brown Gravelly LOAM; moist --SHOULDER--	1.0					
	Stiff to very stiff, brown, dark brown and gray SILTY CLAY, trace gravel --FILL-- --L_L(%)=43, P_L(%)=17-- --%Gravel=1.5-- --%Sand=12.1-- --%Silt=52.3-- --%Clay=34.0-- --A-7-6 (22)--		SS	1	2 3 5	1.56 B	23
			SS	2	2 5 7	2.71 B	22
629.1		5.5					
	Stiff to hard, brown to gray SILTY CLAY to SILTY CLAY LOAM, trace gravel --RDR 2--		SS	3	5 11 14	8.69 B	13
			SS	4	5 11 16	8.53 B	16
			SS	5	7 11 17	> 4.50 P	19
			SS	6	5 7 13	4.76 B	22
			SS	7	4 10 14	5.99 B	21
			SS	8	6 9 14	5.00 B	21
			SS	9	5 6 8	1.64 B	21
			SS	10	4 5 10	1.72 B	21
			SS	11	4 7 9	1.89 B	20
604.6		30	SS	12	3 5 7	2.05 B	21
	Boring terminated at 30.00 ft						

GENERAL NOTES

Begin Drilling **03-01-2023** Complete Drilling **03-01-2023**
Drilling Contractor **Wang Testing Services** Drill Rig **21GeoA[96%]**
Driller **AG&EH** Logger **F. Bozga** Checked by **J. Bensen**
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**

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

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BORING LOG RW1-02

WEI Job No.: 7901-15-01

Client: **TranSystems Corporation**
Project: **I-80 Reconstruction (Houbolt Rd to Center St)**
Location: **Will County, Illinois**

Datum: NAVD 88
Elevation: 635.66 ft
North: 1764011.00 ft
East: 1041090.23 ft
Station: 912+78.52
Offset: 10.932 RT

Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
635.1	7-inch thick, dark gray Gravelly LOAM; moist --SHOULDER--						
	Very stiff, brown, dark brown and gray SILTY CLAY, trace gravel --FILL-- --RDR 2--			1	2 3 6	2.46 B	22
		5		2	3 4 5	2.38 B	18
628.9	Stiff to hard, brown to gray SILTY CLAY to SILTY CLAY LOAM, trace gravel --RDR 2--			3	6 7 12	NR	
		10		4	6 9 13	7.38 B	18
				5	4 8 13	7.38 B	21
		15		6	4 9 13	7.71 B	20
				7	4 8 13	7.38 B	21
		20		8	4 9 12	4.76 B	21
				9	4 7 10	2.62 B	20
		25		10	2 4 8	1.97 B	17
				11	5 9 20	4.35 B	19
		30		12	4 10 14	5.58 B	18
				13	5 7 9	1.72 B	16
600.7		35		14	4 6 8	2.30 B	15
	Boring terminated at 35.00 ft						
		40					
		45					
		50					

GENERAL NOTES

Begin Drilling **03-01-2023** Complete Drilling **03-01-2023**
Drilling Contractor **Wang Testing Services** Drill Rig **21GeoA[96%]**
Driller **AG&EH** Logger **F. Bozga** Checked by **J. Bensen**
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**

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

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BORING LOG RW1-03

WEI Job No.: 7901-15-01

Client **TranSystems Corporation**
Project **I-80 Reconstruction (Houbolt Rd to Center St)**
Location **Will County, Illinois**

Datum: NAVD 88
Elevation: 635.01 ft
North: 1763981.25 ft
East: 1041156.43 ft
Station: 913+47.52
Offset: 19.399 RT

Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
634.2	10-inch thick Gravelly LOAM; moist --SHOULDER--					
	Very stiff to hard, dark brown and gray SILTY CLAY, trace gravel --FILL-- --RDR 2--		1	3 3 4	2.50 P	22
		5	2	6 5 7	3.85 B	25
			3	5 12 14	NR	
		10	4	4 8 11	5.99 B	16
623.3	Very stiff to hard, brown to gray SILTY CLAY, trace gravel --RDR 2--		5	7 12 17	NR	
		15	6	11 13 16	> 4.50 P	23
			7	5 10 13	4.43 B	21
		20	8	5 10 13	4.26 B	20
			9	4 9 10	2.54 B	20
		25	10	2 6 8	2.46 B	20
			11	9 11 14	2.75 P	20
		30	12	4 7 9	2.54 B	16
			13	5 7 9	2.21 B	18
600.0		35	14	4 6 9	2.05 B	21
	Boring terminated at 35.00 ft					
		40				
		45				
		50				

GENERAL NOTES

Begin Drilling **03-01-2023** Complete Drilling **03-01-2023**
Drilling Contractor **Wang Testing Services** Drill Rig **21GeoA[96%]**
Driller **AG&EH** Logger **F. Bozga** Checked by **J. Bensen**
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**

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

Wang Engineering

wangeng@wangeng.com
1145 N Main Street
Lomard, IL 60148
Telephone: 630 953-9928
Fax: 630 953-9938

BORING LOG RW1-04

WEI Job No.: 7901-15-01

Client: **TranSystems Corporation**
Project: **I-80 Reconstruction (Houbolt Rd to Center St)**
Location: **Will County, Illinois**

Datum: NAVD 88
Elevation: 635.26 ft
North: 1763954.52 ft
East: 1041220.77 ft
Station: 914+08.88
Offset: 39.287 RT

Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
634.6	8-inch thick, gray Gravelly LOAM --SHOULDER--					
	Medium stiff to stiff, dark brown SILTY CLAY, trace gravel --FILL-- --RDR 1--		1	2 3 0	0.75 P	20
		5	2	2 5 8	1.15 B	19
629.8	Medium dense, brown Gravelly LOAM; wet --FILL-- --RDR 1--		3	1 5 6	NP	17
627.3	Very stiff, brown SILTY CLAY, trace gravel --FILL-- --RDR 2--	10	4	4 8 9	2.00 P	17
624.8	Stiff to hard, brown to gray SILTY CLAY, trace gravel --RDR 2--		5	3 9 14	5.82 B	16
		15	6	4 8 13	4.51 B	17
			7	3 6 8	2.87 B	21
		20	8	3 7 10	4.43 B	21
			9	3 4 6	1.89 B	21
		25	10	2 4 5	1.69 B	21
			11	3 4 6	1.97 B	18
605.3		30	12	2 3 5	1.72 B	21
	Boring terminated at 30.00 ft					

GENERAL NOTES

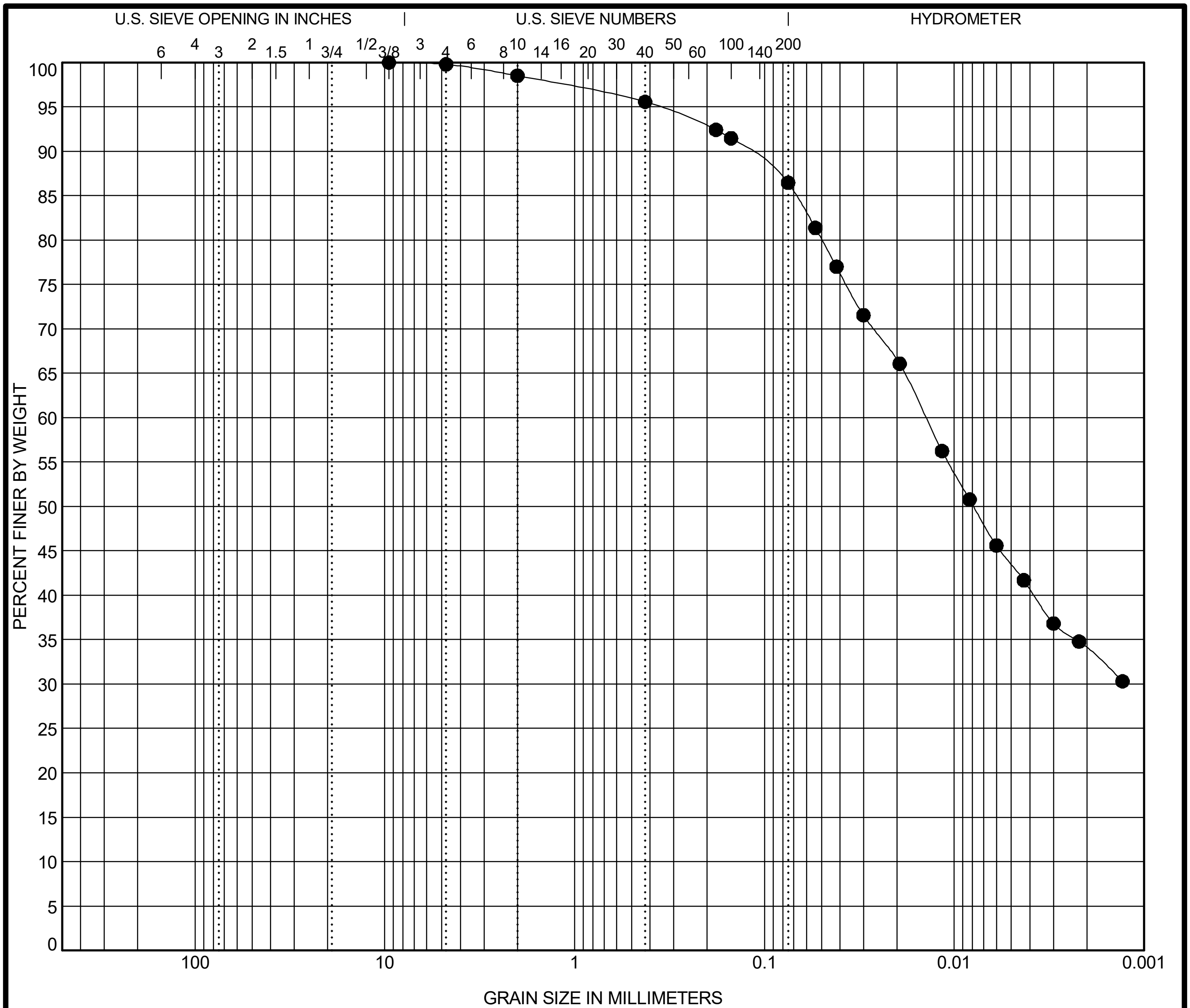
Begin Drilling **03-01-2023** Complete Drilling **03-01-2023**
Drilling Contractor **Wang Testing Services** Drill Rig **21GeoA[96%]**
Driller **AG&EH** Logger **F. Bozga** Checked by **J. Bensen**
Drilling Method **2.25" IDA HSA; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ∇ **5.50 ft**
At Completion of Drilling **DRY**
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 coarse	SAND fine	SILT AND CLAY

	Specimen Identification		IDH Classification	LL	PL	PI	Cc	Cu
●	**RW1-01#2**	**3.5 ft**	**Silty Clay**	**43**	**17**	**26**		

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**RW1-01#2**	**3.5 ft**	**9.5**	**0.014**			**1.5**	**12.3**	**52.3**	**34.0**

WEI SINCE 1982

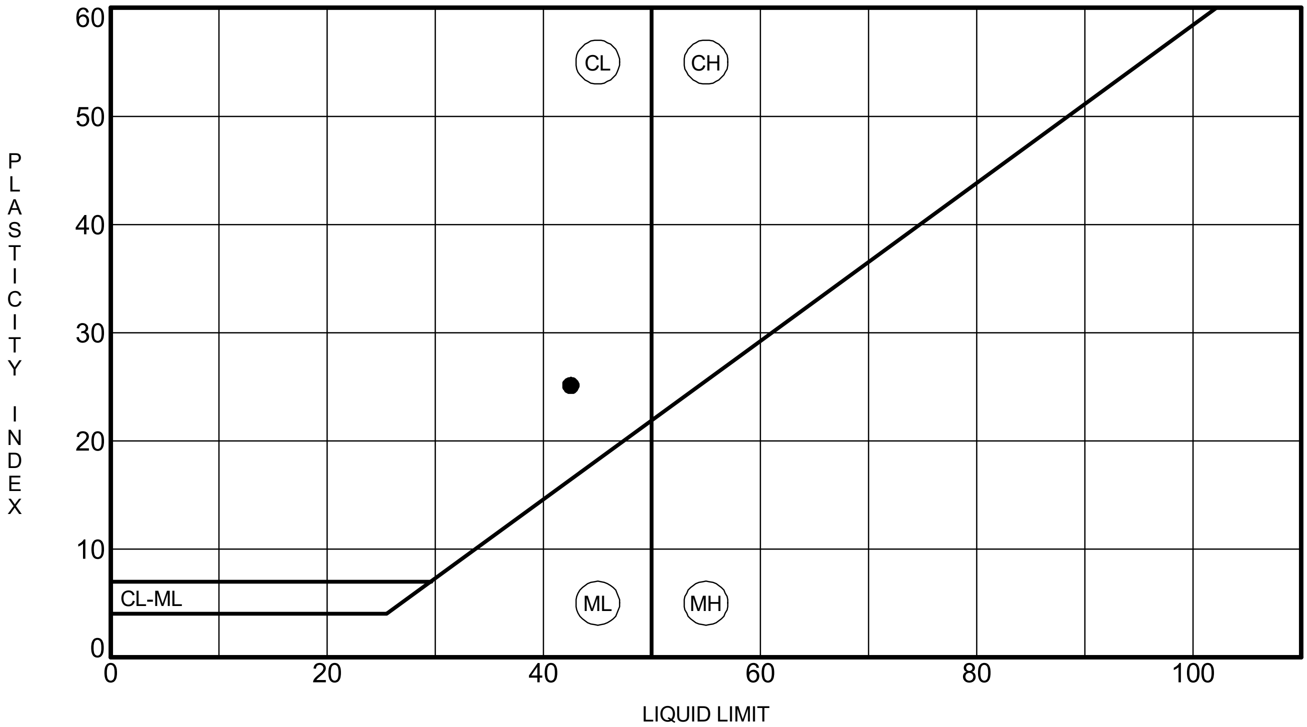
Terracon
1145 N. Main Street
Lombard, IL 60148
Telephone: 630-953-9928
Fax: 630-953-9938

GRAIN SIZE DISTRIBUTION

Project: I-80 Reconstruction (Houbolt Rd to Center St)

Location: Will County, Illinois

Number: 7901-15-01



	Specimen Identification		LL	PL	PI	Fines	IDH Classification
●	**RW1-01#2**	**3.5 ft**	**43**	**17**	**26**	**86**	**Silty Clay**

WEI
SINCE 1982

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Telephone: 630-953-9928
Fax: 630-953-9938

ATTERBERG LIMITS' RESULTS

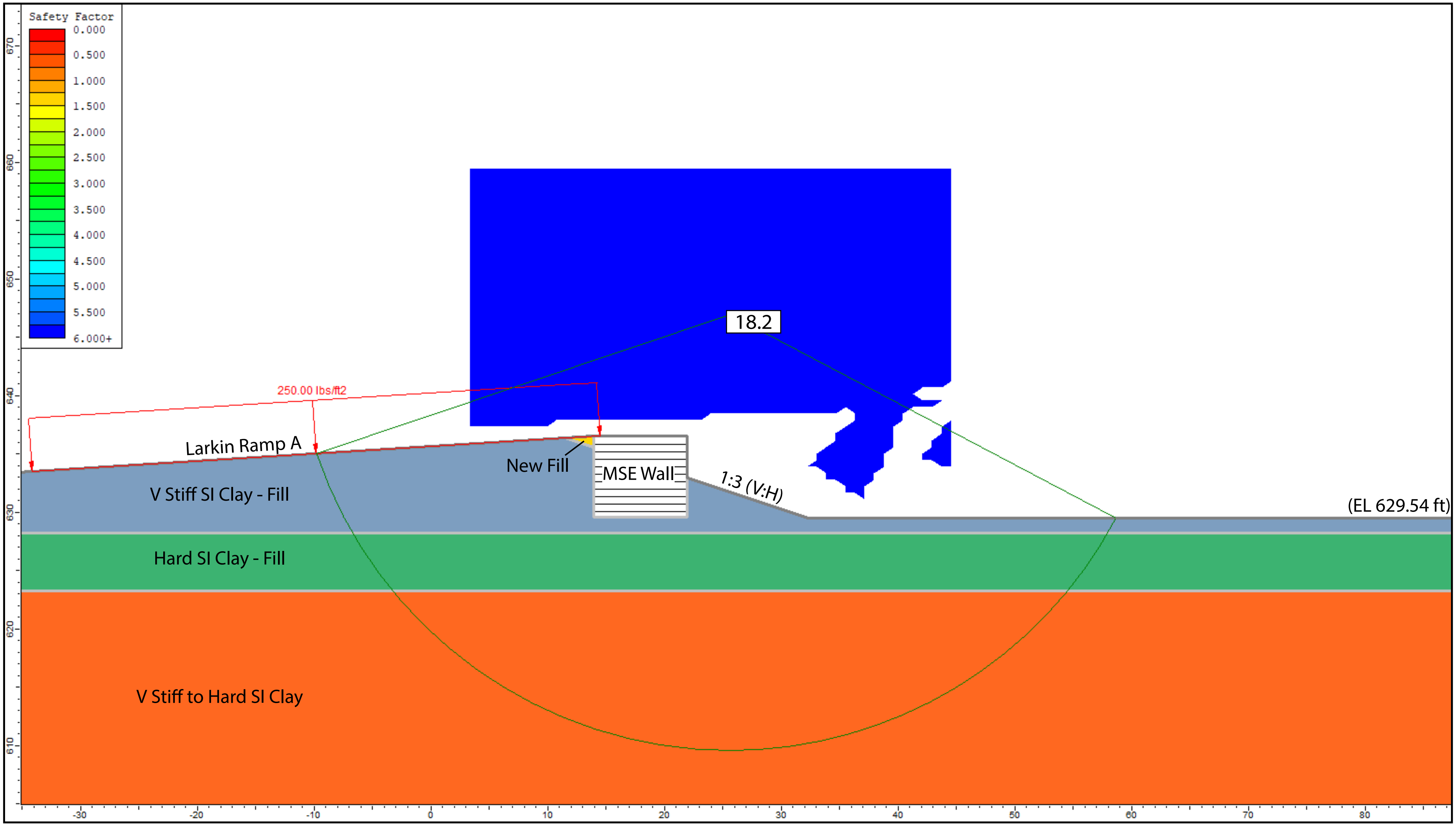
Project: I-80 Reconstruction (Houbolt Rd to Center St)

Location: Will County, Illinois

Number: 7901-15-01

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

APPENDIX C



Undrained Analysis, MSE Wall SN099-XXXX, Sta.913+25.00, Ref Boring: RW1-03

Layer ID	Description	Total Unit Weight (pcf)	Undrained Cohesion (psf)	Undrained Friction Angle (degrees)
1	New Fill	125	1000	0
2	V Stiff SI Clay - Fill	120	3100	0
3	Hard SI Clay - Fill	125	4500	0
4	V Stiff to Hard SI Clay	120	3100	0

GLOBAL STABILITY: RETAINING WALL LARKIN RAMP A, SN: 099-Z043; I-80 RECONSTRUCTION FROM HOUBOLT RD TO W CENTER ST & LARKIN AVE INTERCHANGE, WILL COUNTY, ILLINOIS

SCALE: GRAPHICAL

APPENDIX C-1

DRAWN BY: D. You
CHECKED BY: M. Seyhun

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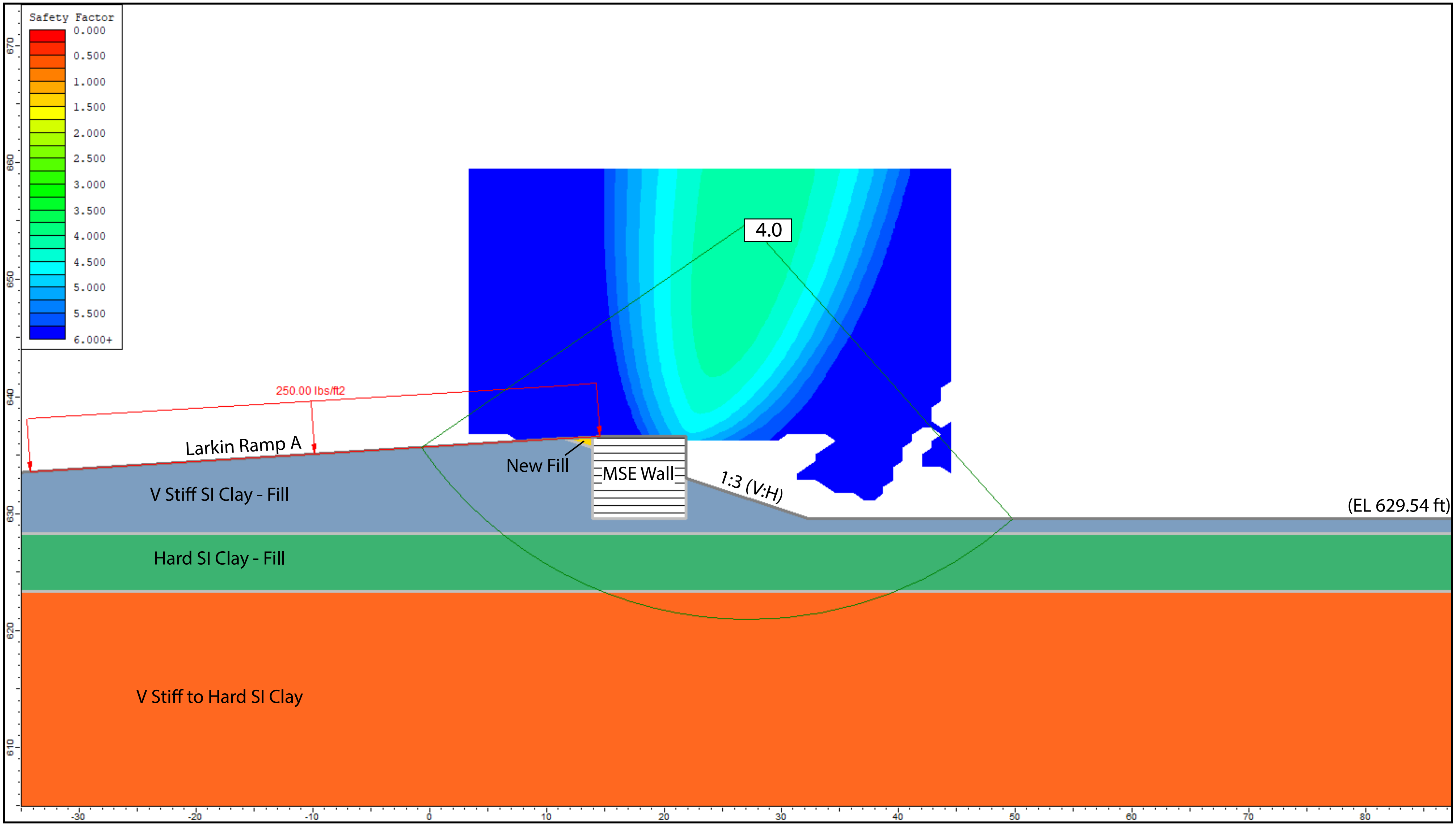
Lombard, IL 60148
www.wangeng.com

FOR TRANSYSTEMS

KE225089



Drained Analysis, MSE Wall SN099-XXXX, Sta.913+25.00, Ref Boring: RW1-03

Layer ID	Description	Total Unit Weight (pcf)	Drained Cohesion (psf)	Drained Friction Angle (degrees)
1	New Fill	125	100	30
2	V Stiff SI Clay - Fill	120	100	30
3	Hard SI Clay - Fill	125	100	31
4	V Stiff to Hard SI Clay	120	100	30

GLOBAL STABILITY: RETAINING WALL LARKIN RAMP A, SN: 099-Z043; I-80 RECONSTRUCTION FROM HOUBOLT RD TO W CENTER ST & LARKIN AVE INTERCHANGE, WILL COUNTY, ILLINOIS

SCALE: GRAPHICAL

APPENDIX C-2

DRAWN BY: D. You
CHECKED BY: M. Seyhun

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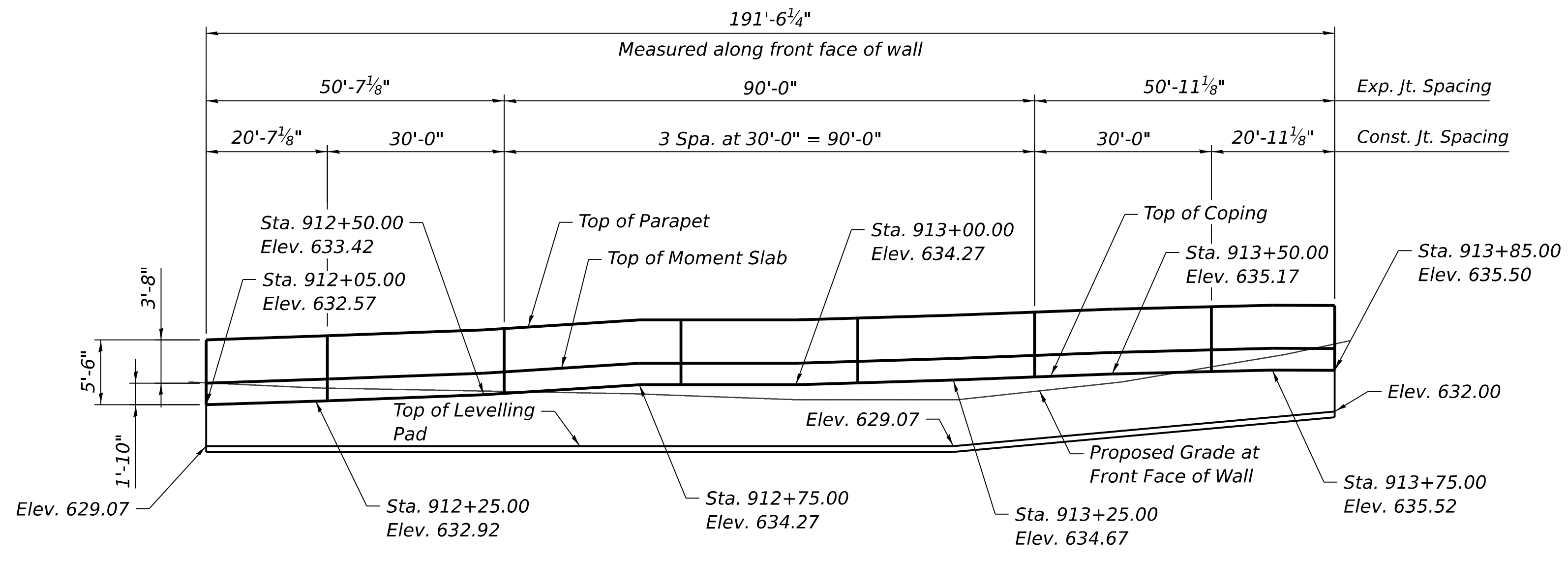
FOR TRANSYSTEMS

KE225089

APPENDIX D

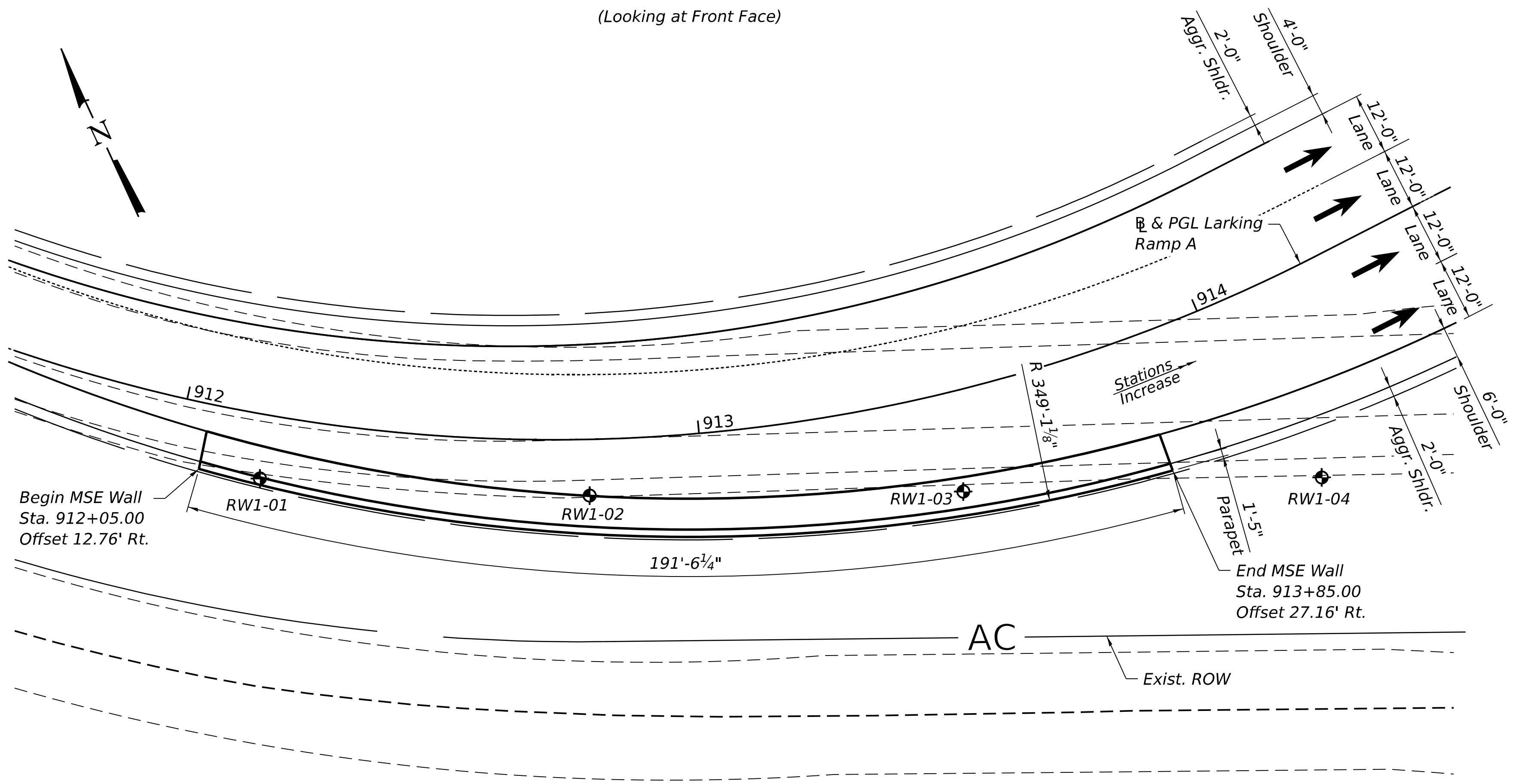
Bench Mark: BM 24 Set cut square on northwesterly corner of pier seat of most southerly Larkin Ave bridge pier on South side of Eastbound I-80. Elev. 634.804.

Existing Structure: None.



ELEVATION

(Looking at Front Face)



PLAN

HIGHWAY CLASSIFICATION

F.A.I. Rte. 80 - I-80
Functional Class: Interstate
ADT: 1,900 (2017); 2,900 (2040)
ADTT: (2017); (2040)
DHV: (2040)
Design Speed: 30 mph
Posted Speed: 30 mph
1-Way Traffic

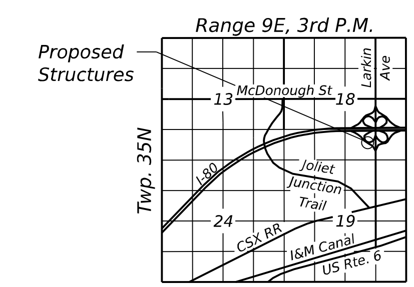
DESIGN SPECIFICATIONS

2020 AASHTO LRFD Bridge Design Specifications, 9th Edition.

DESIGN STRESSES

FIELD UNITS

f'c = 4,000 psi
fy = 60,000 psi (Reinforcement)



LOCATION SKETCH

LEGEND

AC Exist. ROW / Access Control

Soil Boring

GENERAL PLAN & ELEVATION
LARKIN RAMP A
F.A.I. RTE. I-80 - SEC. XXXX-XXXX
WILL COUNTY
STATION 912+05.00 TO 913+85.00
STRUCTURE NO. XXX-XXXX

MODEL: Default
FILE NAME: pw://transystems-pw.bentley.com:transyscorp-pw1-hosted/Documents/Projects_2018/CH401/401180022/02-TranSystems/CAD/62R25/Sheets/23-Structural/Retaining Wall/D162R25-SHT-RET-WALL-GPE-01.dgn

TRANSYSTEMS

USER NAME = iipsaropassione	DESIGNED -	REVISED -	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION		
	CHECKED -	REVISED -			
PLOT SCALE = 32.039 ' / in.	DRAWN -	REVISED -			
PLOT DATE = 4/26/2023	CHECKED -	REVISED -		SHEET OF SHEETS	

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
I-80	FAI 80 22 BR	WILL		
		CONTRACT NO. 62R89		
	ILLINOIS	FED. AID PROJECT		