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Testing • Inspection • Training • Consulting • Research • Geotechnical
Founded 1912

October 31, 2024

Robert T. Boro, P.E.
Senior Project Manager
HBM Engineering Group, LLC
4415 Harrison Street, Suite 231
Hillside, IL 60162

Re: Abbreviated Roadway Geotechnical Report
IDOT PTB 204-012 WO 3
IDOT Contract 62W87
WB US 6 to NB I-94 Ramp Y1
South Holland, Illinois

CTL Project No. 24F763

Dear Mr. Boro,

Chicago Testing Laboratory, Inc. (CTL) completed a geotechnical investigation for the proposed realignment and reconstruction for the ramp from WB US 6 to NB I-94 (Ramp Y1) for IDOT Contract 62W87 in South Holland, Illinois. The purpose of the investigation was to obtain subsurface soil samples to characterize and determine the soil properties, determine the groundwater conditions, and provide analysis and recommendations for the proposed improvements. Appendix A shows the Site Location Map with the contract limits.

1.0 Project Information

Based on the preliminary information provided by HBM Engineering Group (HBM), the proposed project will include realignment of Ramp Y1 to accommodate a longer merge lane along NB I-94. The proposed pavement section thicknesses have not been determined at this time but, our understanding, will consist of asphalt pavement underlain by a base course meeting the requirement of the BDE Special Provisions for Aggregate Subgrade Improvement. The surrounding area includes urban properties throughout the project site.

2.0 Subsurface Exploration

This section describes the subsurface exploration and laboratory testing programs completed as part of this project. The subsurface investigation program was performed, according to applicable IDOT and AASHTO manuals and procedures.

2.1 Subsurface Site Investigation

The subsurface investigation was conducted on October 10, 2024, which included advancing two (2) soil borings to a depth of 10 feet below ground surface (bgs) for the proposed improvements. The boring locations were selected by CTL, with approval from HBM, and completed in the field based on site conditions and accessibility. Elevations of the boring locations were estimated using the provided plan and profiles and internet resources. Table 1 below presents a summary of the soil boring completed.

Table 1: Summary of Soil Borings

Boring	Location	Elevation (ft MSL)	Depth (ft)
SB-1-1	Ramp Y1, STA 105+00	596.0	10
SB-1-2	Ramp Y1, STA 109+50	596.5	10

The soil boring was conducted by GeoServices, a subcontracted drilling firm, under the field supervision by a CTL engineer using a truck mounted Mobile B-57 drill rig equipped with 2-1/4-inch I.D. hollow stem augers and an automatic hammer. Soil sampling was performed according to AASHTO T206 “Penetration Test and Split Barrel Sampling of Soils” using the Standard Penetration Test (SPT, ASTM D1556). In this procedure, a 2-inch O.D. split barrel or split spoon sampler is driven 18 inches into undisturbed soil using a 30-inch drop of a 140-pound hammer. The number of hammer drops (blow counts) is recorded in 6-inch intervals for each sample collected. The number of blow counts to advance the sampler the final 12 inches is called the SPT “N-value”. The N-values are shown on the Soil Boring Logs (Appendix C).

Soil samples were obtained with the split barrel sampler at 2.5-foot intervals to the boring termination depths. A CTL field technician inspected, visually classified, and logged the soil samples throughout the subsurface exploration. Unconfined compressive strength values (Qu) of the cohesive soils encountered during the subsurface investigation were obtained in the field using a calibrated Rimac tester in according to IDOT procedures or using a Pocket Penetrometer when the soil sample is small or disturbed. Representative soil samples from each sampling interval were collected, placed in sealed glass jars, and returned to the laboratory for further evaluation and testing.

2.2 Laboratory Testing Program

All soil samples collected during the subsurface exploration were inspected in the laboratory to verify the field classifications. A laboratory testing program was conducted on the soils encountered to characterize and determine the engineering properties for the design of the proposed improvements. Moisture Contents (AASHTO T265) were performed on all soil samples.

Based on the laboratory test results, soil samples were classified using the Illinois Division of Highways (IDH) classification systems. The laboratory and field test results are shown on the Soil Boring Logs (Appendix C).

2.3 General Subsurface Conditions

General subsurface conditions are described below and are grouped based on similar soils encountered throughout the proposed improvements.

Generally, the borings encountered near surface materials consisting of 3 to 6 inches of aggregate shoulder. Below the surficial layer, the borings encountered stiff to hard, black to brown and gray silty clay to depths of 6 to 9 feet bgs with unconfined compressive strengths between 1.7 and 4.2 tsf underlain by loose, brown silty loam to the boring termination depth of 10 feet with SPT N values ranging from 6 to 10 blows per foot.

Detailed descriptions of the soil borings are provided in Appendix C (Soil Boring Logs) which provides specific conditions encountered at each soil boring location. The stratifications shown on the soil boring logs represent the conditions only at the actual soil boring location and represents the approximate boundary between subsurface materials; however, the actual transition may be gradual.

2.4 Groundwater Conditions

Groundwater was not encountered while drilling or upon completion of the soil borings. None of the borings were left open to collect delayed water readings after leaving the site due to safety concerns.

Based on the color change from brown to gray, the long-term groundwater may be at a depth greater than 10 feet bgs. The brown color of the soil is typically caused by oxidation that occurs above the long-term water level. In general, it should be noted that the groundwater levels could fluctuate based on seasonal precipitation and surface run-off.

3.0 Geotechnical Analysis and Recommendations

This section provides the geotechnical analysis and recommendations for the proposed roadway reconstruction based on the results of the field exploration and laboratory testing.

3.1 Drainage Characteristics

Per the IDOT Geotechnical Manual Section 6.3.4.1, the subgrade soils were evaluated based on soil type, moisture content, proposed roadway profile and topography. Based on the results of the field investigation and the proposed roadway profile, the roadway reconstruction will be supported on the native soils encountered. These soils consisted of native silty clay soils throughout the project site.

According to Table 6.3.4.1, Drainage Classification, in the IDOT Geotechnical Manual, the drainage class of the site was determined. Based on the proposed improvements and the existing

roadway conditions, shallow ditches will be constructed on the edge of the roadways, with grades greater than 0.5%. The drainage class should be taken as fair for the proposed realignment.

3.2 Frost Susceptibility

Per the IDOT Geotechnical Manual Section 6.3.2.2.3, the frost susceptibility of the subgrade soils that will be encountered in the proposed subgrade were evaluated. Based on the IDOT Geotechnical Manual, the maximum anticipated frost protection depth below pavement in northern Illinois is 45 to 60 inches for extreme weather conditions. Table 6.3.2.2.3-1 of the IDOT Geotechnical Manual, Frost Susceptibility Classification in Soils, was used to determine the frost class of the subgrade soils. The subgrade soils generally consisted of silty clay soils with a Plasticity Index (PI) greater than 12, silt and sand greater than 65% and capillary rise not within the frost depth zone. Therefore, the subgrade soils have a Frost Class of F3.

3.3 Organic Content

Any soils encountered during the subsurface investigation with potential organic content were evaluated. Typically, subgrade soils with an organic content greater than 10 percent are considered unsuitable to remain below the proposed pavement areas. Based on the soil borings, it is not anticipated that highly organic soils will be encountered in the proposed roadway subgrade.

3.4 Subgrade Support Rating

The Subgrade Support Rating (SSR) was determined for the proposed roadway construction based on Section 6.3.1 of the IDOT Geotechnical Manual, for pavement design purposes if the Mechanistic Pavement Design method is used. The SSR triangular chart consists of three categories (poor, fair or granular). The subgrade soils consisted of silty clay soils with an SSR of Fair. If the pavement is to be designed based on the CBR/IBR method, we recommend that an average CBR/IBR of 3 be used for the subgrade soils encountered in the soil borings at a depth of 2 feet bgs.

3.5 Subgrade Suitability and Stability

Based on the results of the field investigation and laboratory tests, no high moisture and/or unstable soils were encountered. If unstable soils are encountered during construction, treatment may include the use of a geotextile fabric and removal and replacement with approved structural fill or Aggregate Subgrade. Materials considered unstable to remain below the proposed roadway should be undercut and replaced with crushed aggregate meeting the requirement of the IDOT BDE Special Provision for Aggregate Subgrade Improvement. Based on the moisture contents and strength values in the soil borings, we believe the assumed 12-inch Aggregate Subgrade is adequate to provide a stable construction platform for the proposed roadway alignment.

3.6 Groundwater Management

Based on the subsurface investigation and the anticipated depth of the groundwater table, groundwater issues are not anticipated for this project. If water is encountered during any

excavation activities, the contractor should provide a dry condition for construction by using conventional sumping or temporary ditches to provide proper drainage on the site.

4.0 Professional Disclaimer

This report was prepared on the basis of the project information supplied by the client and is intended only for use on this project. This report was prepared by interpreting the data from the soil borings and field tests made within the project limits and from the results of the laboratory tests obtained from the samples taken. The report gives a representative, but not exhaustive, picture of the project subsurface conditions. The geotechnical engineer warrants that the findings, recommendations, specifications, and professional advice given within this report have been prepared using generally accepted professional engineering practices. The recommendations provided in the report are specific to the project described herein and are based on the information obtained from the soil boring locations within the proposed roadway improvements. Changes involving the proposed roadway alignment and wall structures, from those enumerated within this report, should be submitted for our review to evaluate our recommendations.

Chicago Testing Laboratory, Inc. (CTL) appreciates the opportunity to work with you on this project and look forward to serving as your Geotechnical Engineering Consultant on this project during construction or future projects. We would be pleased to discuss any questions you have about the contents of this report.

Respectfully Submitted,
CHICAGO TESTING LABORATORY, INC.

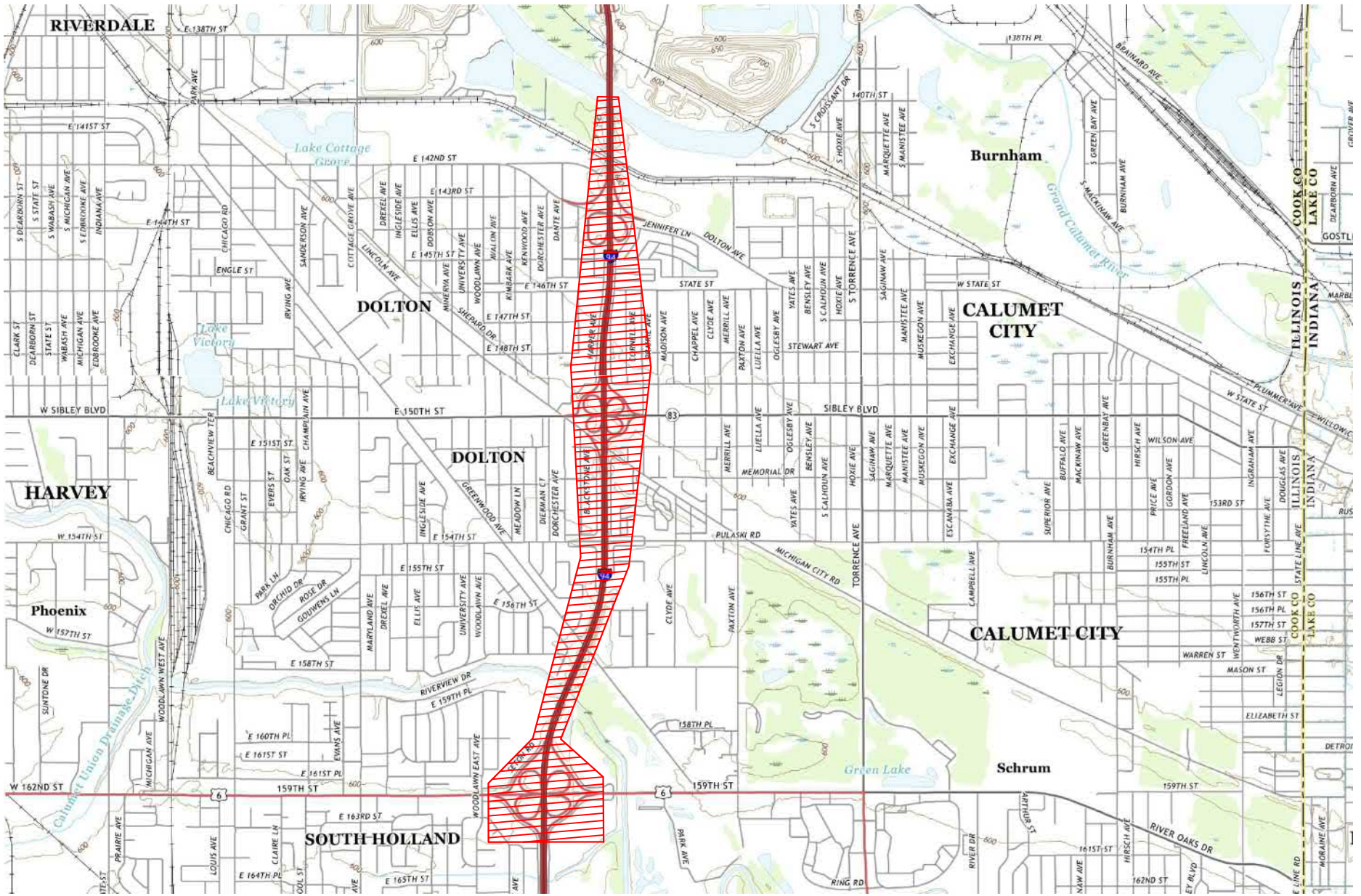
Jeffrey Rothamer, P.E.
Director of Technical Services

Riyad Wahab, PhD, P.E.
Senior Geotechnical Engineer

Attachments - Appendix A: Site Location Map
Appendix B: Boring Location Plan
Appendix C: Soil Boring Logs
Appendix D: Design Plans (HBM)

APPENDIX A

SITE LOCATION MAP



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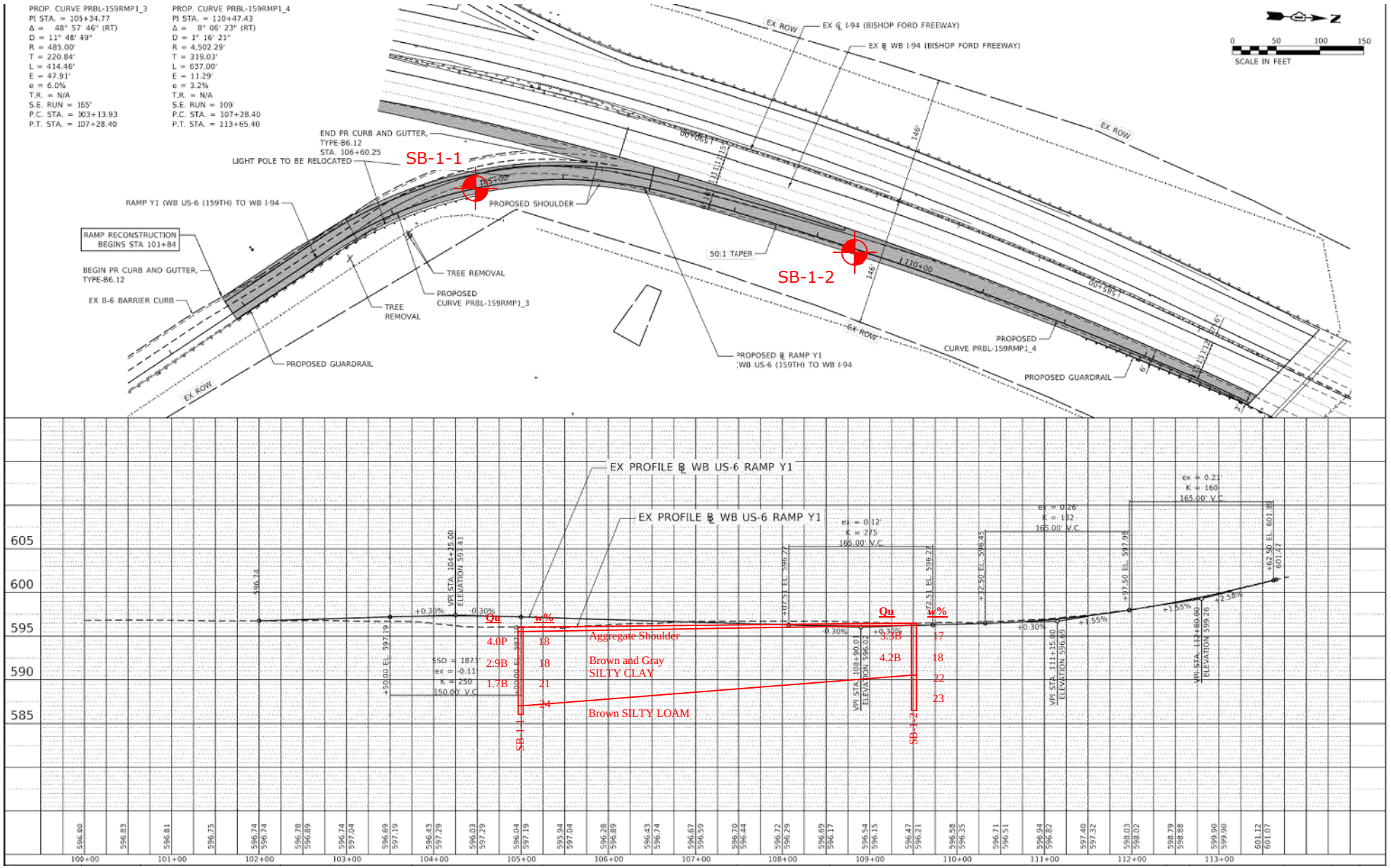
PHONE: (630) 393-2851
FAX : (630) 393-2857

DRAWN BY:	JAR
CHECKED BY:	RW
SCALE:	NTS
DATE:	10/16/24

SITE LOCATION MAP
PTB 204-012 WO3
IDOT 62W87 WB US 6 TO NB I-94 RAMP
SOUTH HOLLAND, ILLINOIS

APPENDIX B

BORING LOCATION PLAN AND PROFILE



BORING LOCATION

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30W114 BUTTERFIELD ROAD
WARRENVILLE, IL 60555
PHONE: (630) 393-2851
FAX : (630) 393-2857

DRAWN BY:	CHECKED BY:	SCALE:	DATE:
JAR	RW	NTS	10/16/24

BORING LOCATION PLAN AND PROFILE
PTB 204-012 WO3
IDOT 62W87 WB US 6 TO NB I-94 RAMP
SOUTH HOLLAND, ILLINOIS

APPENDIX C

SOIL BORING LOGS

Illinois Department of Transportation

Division of Highways
Chicago Testing Laboratory, Inc

SOIL BORING LOG

Date 10/10/24

ROUTE FAI RTE 94 (I-94 Bishop Ford Expy) **DESCRIPTION** WB US6 to NB I-94 Ramp **LOGGED BY** KL

SECTION 2019-180-RS&T **LOCATION** NE 1/4, **SEC.** 11, **TWP.** 36N, **RNG.** 25E, 3rd **PM**

COUNTY Cook **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE** Auto

STRUCT. NO. N/A
Station N/A

BORING NO. SB-1-1
Station 105+00
Offset 0.00ft CL
Ground Surface Elev. 596.00 ft

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

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

		DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
6 inches of Aggregate Shoulder	595.50				
Stiff to Hard Brown and Gray, Moist SILTY CLAY (CL/ML, A-6)			3		
			6 7	4.0 P	18.2
			3		
			4 6	2.9 B	17.7
		-5			
			3		
			5 7	1.7 B	21.4
			3		
	587.00				
Loose Brown, Very Moist SILTY LOAM (MLS, A-4)	586.00	-10	4 2		23.7
End of Boring					
		-15			
		-20			

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

Illinois Department of Transportation

Division of Highways
Chicago Testing Laboratory, Inc

SOIL BORING LOG

Date 10/10/24

ROUTE FAI RTE 94 (I-94 Bishop Ford Expy) **DESCRIPTION** WB US6 to NB I-94 Ramp **LOGGED BY** KL

SECTION 2019-180-RS&T **LOCATION** NE 1/4, **SEC.** 11, **TWP.** 36N, **RNG.** 25E, 3rd **PM**

COUNTY Cook **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE** Auto

STRUCT. NO. N/A
Station N/A

BORING NO. SB-1-2
Station 109+50
Offset 3.00ft RT
Ground Surface Elev. 596.50 ft

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

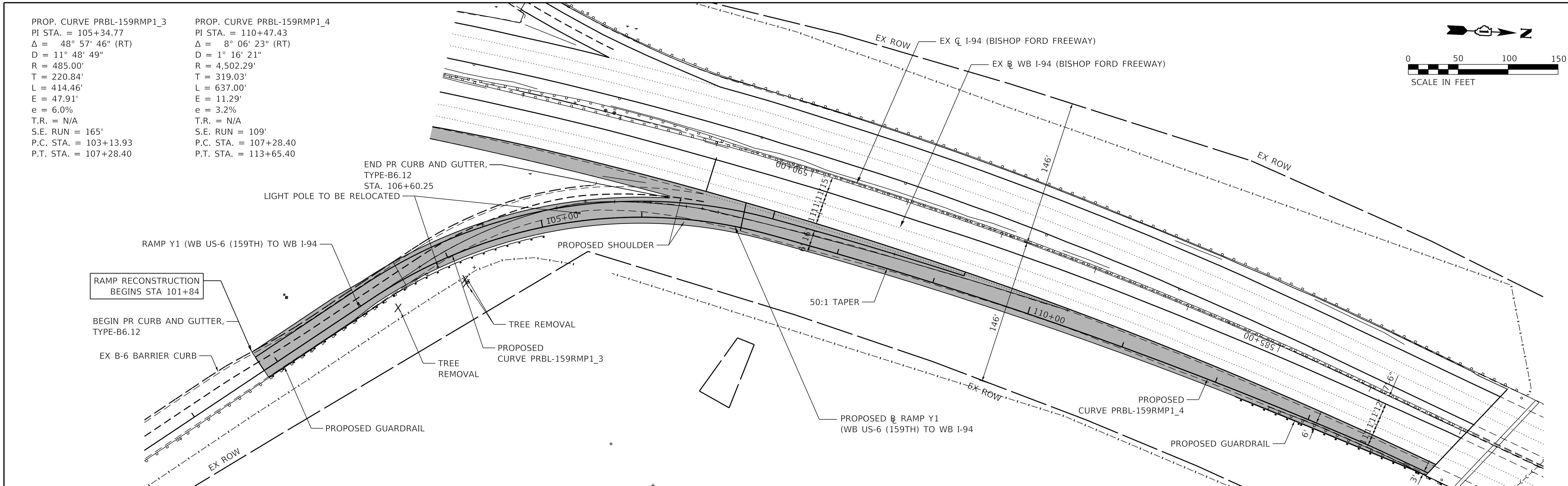
Groundwater Elev.:
First Encounter None ft
Upon Completion N/A ft
After N/A **Hrs.** N/A ft

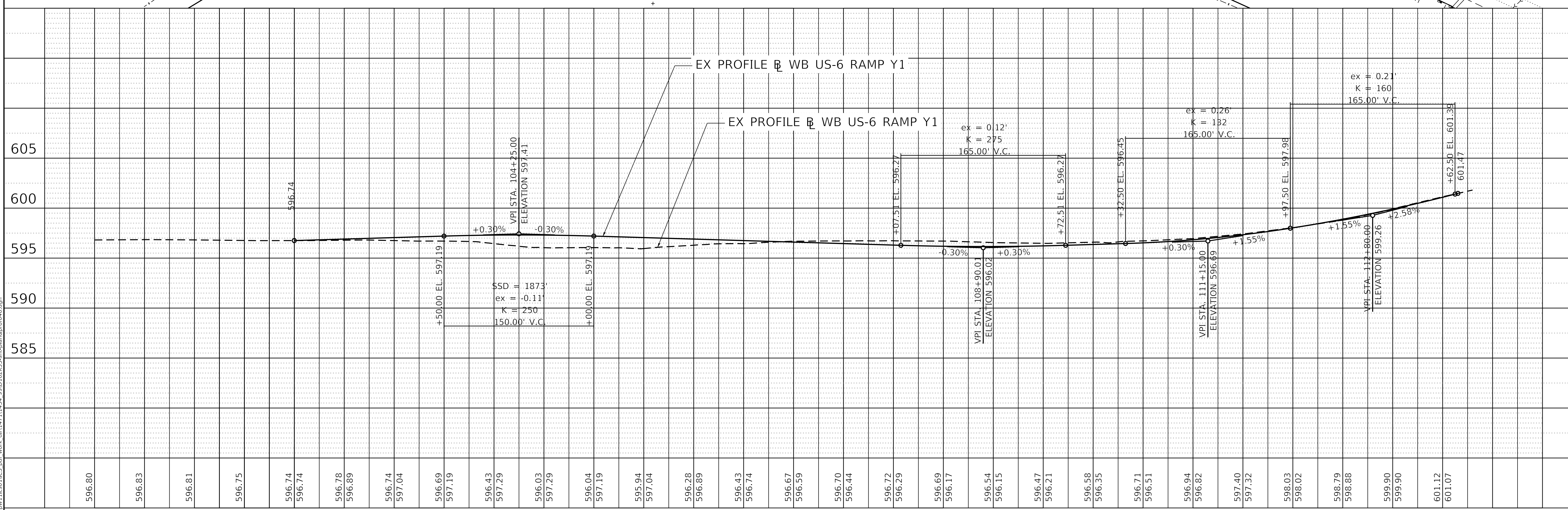
DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
596.25				3 inches of Aggregate Shoulder
	4			Very Stiff Black, Moist SILTY CLAY (CL/ML, A-6)
	7 8	3.3 B	17.4	
593.50				Hard Brown and Gray, Moist SILTY CLAY (CL/ML, A-6)
	4			
	6 7	4.2 B	17.1	
-5				
590.50				Loose Brown, Very Moist SILTY LOAM (MLS, A-4)
	2			
	5 5		22.3	
	5			
	5 4		22.9	
586.50 -10				End of Boring
-15				
-20				

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

APPENDIX D

DESIGN PLANS (HBM)





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STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

PROPOSED PLAN AND PROFILE – US 6 RAMP
I–94 (BISHOP FORD EXPY)

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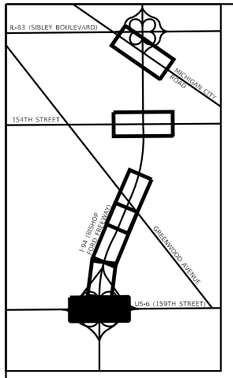
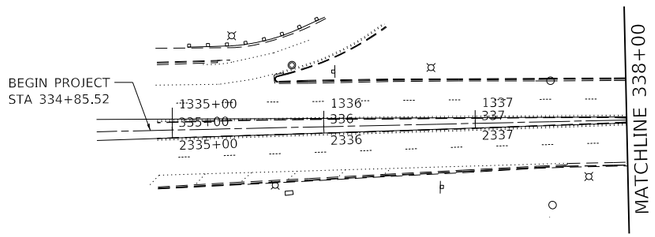
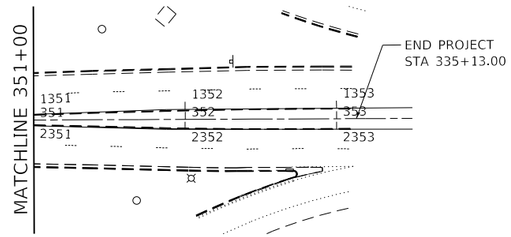
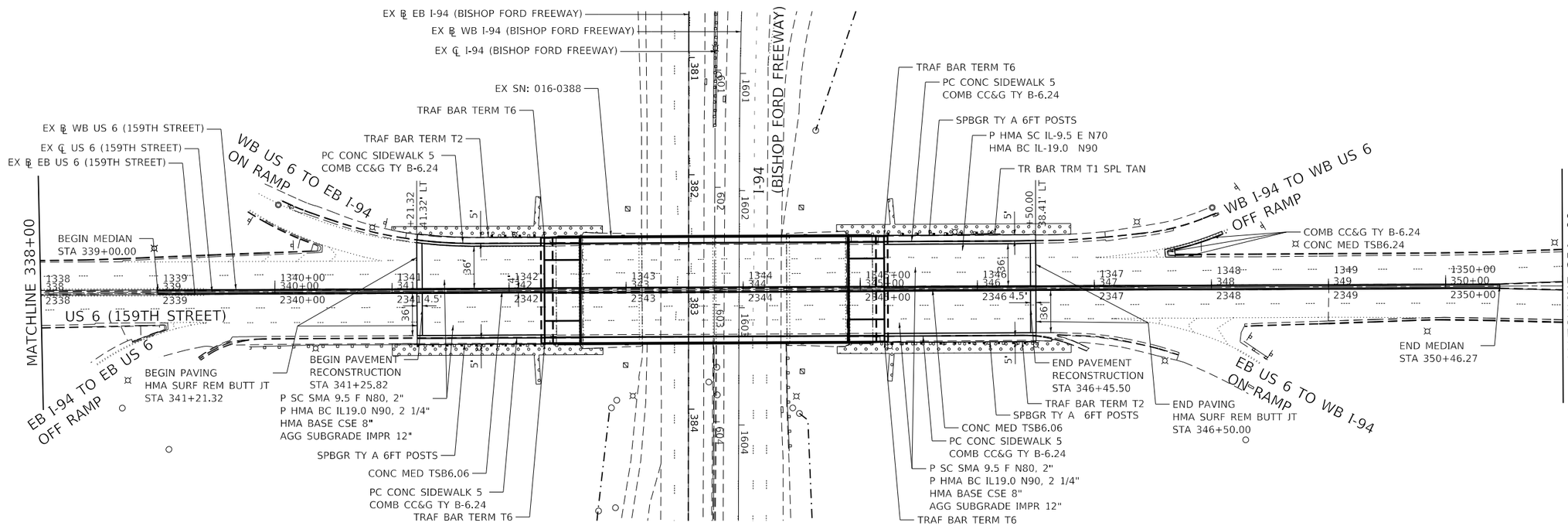
CONTRACT NO. 62W87

ILLINOIS | FED. AID PROJECT









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STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

I–94 (BISHOP FORD FREEWAY) AT US 6 (159TH STREET)
PROPOSED PLAN SHEET

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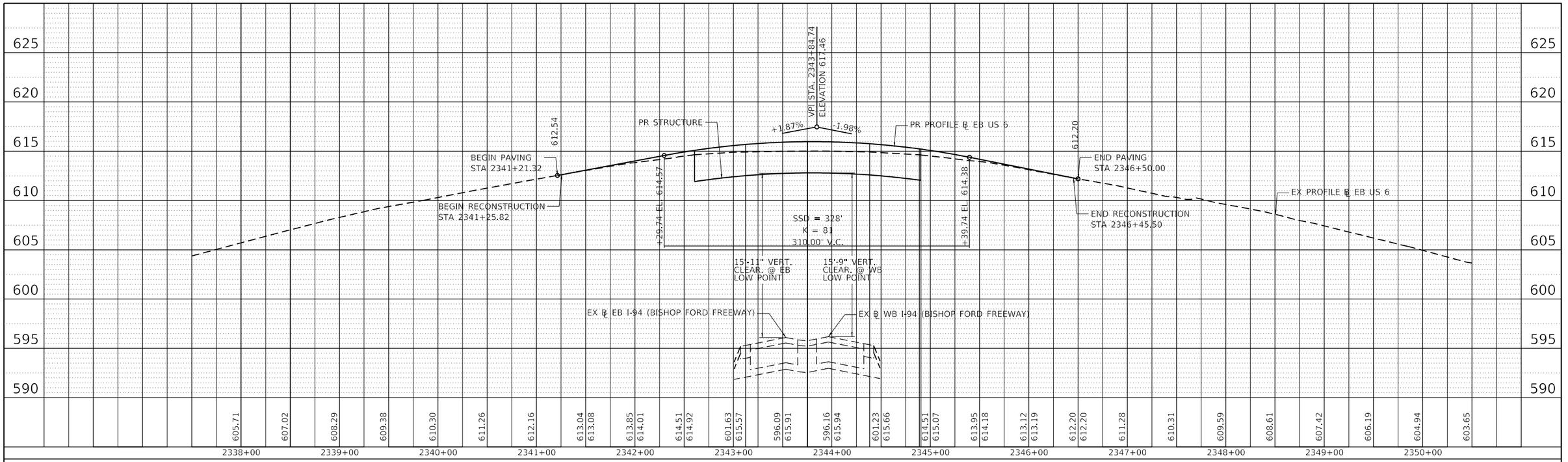
	ILLINOIS FED. AID PROJECT			



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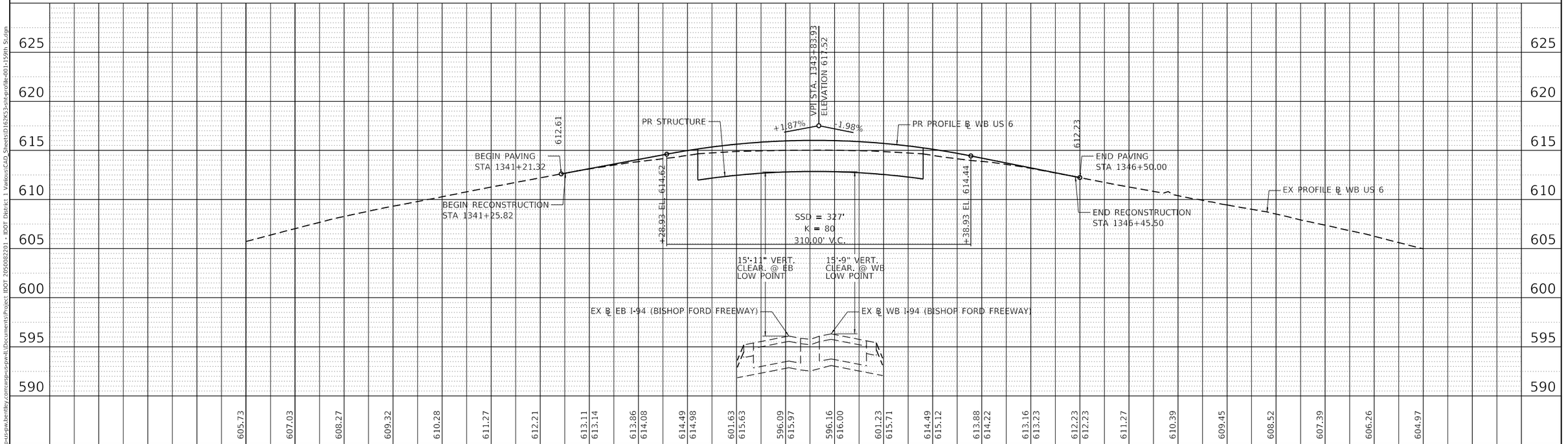

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STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

I-94 (BISHOP FORD FREEWAY) AT US 6 (159TH STREET)
PROFILE SHEET

SCALE: 1"=50' | SHEET 1 OF 1 SHEETS | STA. | TO STA.

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