STRUCTURE
GEOTECHNICAL REPORT

RAMP E OVER RAMP F
and
F.A.I. RTE. 74 and F.A.I. RTE. 57
(STATION 516+05.45)

Proposed SN: 010-1001, 010-W003, 010-W004

Section 10 (5-1-RS-1, 14-1,6) R
Champaign County

Contract No.: 70897
P-95-030-11
PTB: 161-28

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Attachments: Boring Location Map
Preliminary TS&L
Subsurface Boring Logs
Boring Profile Sheet
Pile Capacity Tables
Est. Factored Loadings

1.0 Project Description

The purpose of this geotechnical study is to explore the existing subsurface conditions present at the proposed structure location (SN 010-1001) (Station 516+05.45) carrying I-74 eastbound to I-57 northbound in Section 10R, Township 20 North, Range 8 East of the 3rd PM in the city of Champaign, Champaign County, Illinois. In addition, to determine engineering properties of the subsurface soil, and develop design and construction recommendations for the project.

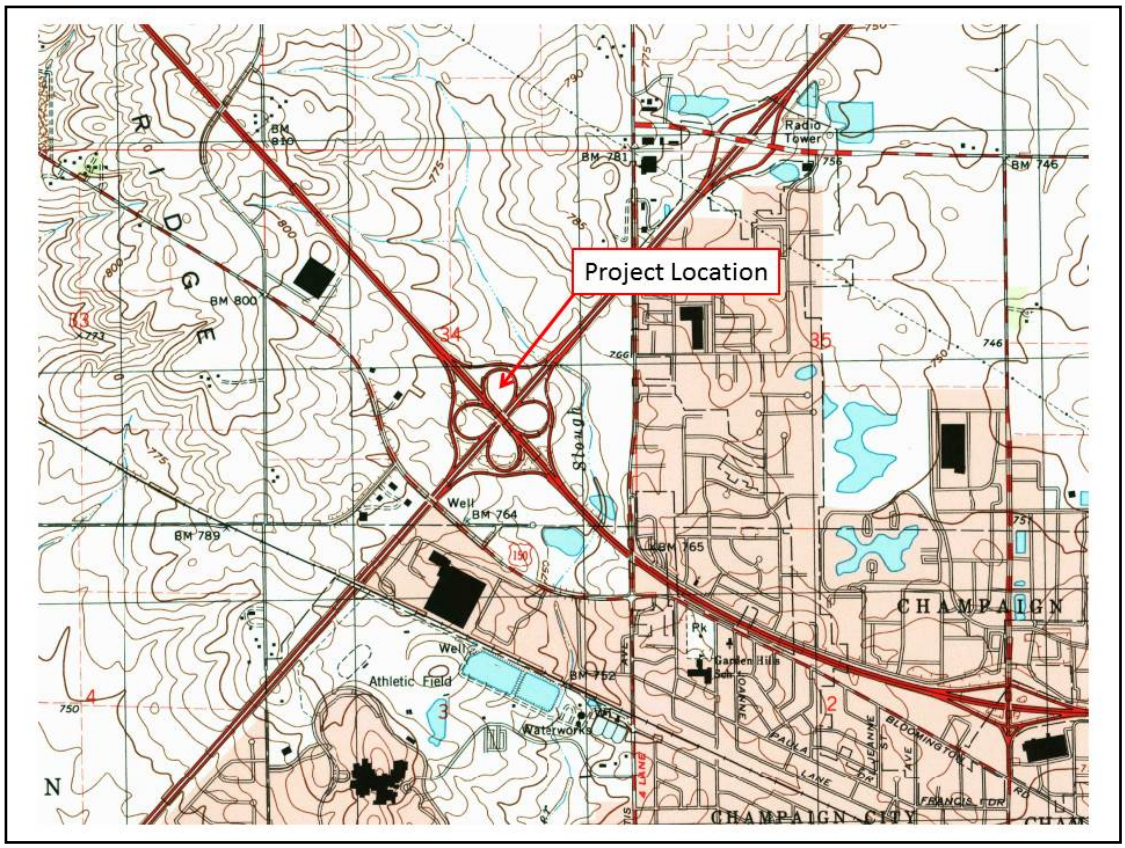


Exhibit 1: Project Location Map

2.0 Proposed Structure Information

Proposed Structures (SN 010-1001, 010-W003, 010-W004)

Based on the preliminary TS&L, Ramp E (SN 010-1001) over Ramp F, I-57 and I-74 will consist of a multi-span, fly-over structure supported by seven hammerhead style piers with pile supported stub abutments. The ramp approaches will consist of anchorage slabs with cast-in-place barriers on M.S.E. walls (S.N. 010-W003 & 010-W004). The superstructure will consist of 84-inch deep web hybrid plate girder on a curved alignment with back to back abutments distance of 1,751'-3 5/8 " as measured radially along the baseline. The structure width will be 38'-6" front to front of parapet with 1'-7" parapet walls on each side. Stub abutments will bear on two rows of vertical steel piles.

3.0 Existing Site Conditions

The location of the proposed ramp structure extends across the existing I-74 and I-57 interchange and proposed Ramp F. Existing site conditions include interstate roadways for both I-74 and I-57 and existing ramps. Elevations in the area range from 754.24 to 780.54.

3.1 Regional Geology

According to the Illinois State Geological Survey, "Bedrock Geology of Illinois" map, the site and surrounding area is situated in the Illinois Basin and is underlain by the Pennsylvanian-aged Tradewater Formation. The Illinois Basin is a Paleozoic depositional and structural basin centered in and underlying most of the state of Illinois. An Illinois Basin study reveals that the Tradewater Formation is composed of 70 to 80 percent shale and siltstone, 20 to 30 percent sandstone, and generally less than 5 percent coal and limestone. The Tradewater Formation is overlain by the Wedron Group, which is composed of mostly glacial till (an unsorted mixture of clay, silt, sand, and gravel) in broad ridges (last glaciation), and forms end moraines. The Wedron Group is finally capped by the Peoria and Roxana Silts, which are composed of windblown silt (loess) generally thicker than 20 feet blankets upland surfaces in these areas.

4.0 Subsurface Exploration and Generalized Subsurface Conditions

This section describes the subsurface exploration program and laboratory testing program completed as part of this Structure Geotechnical Report (SGR). The locations and subsurface data were provided by McCleary Engineering and were completed based on field conditions and accessibility. No site observations have been made by BFW relative to existing conditions of the structure, roadway or of subsurface sample conditions. The locations of the soil borings are shown on the Boring Location Map located in Appendix A.

The subsurface exploration program was performed in accordance with applicable IDOT geotechnical manuals and procedures.

4.1 Subsurface Exploration

The site subsurface exploration was conducted from February 3 through February 12, 2015 and included advancing one (1) standard penetration test (SPT) boring within the vicinity of each proposed abutment locations and one (1) SPT boring within the vicinity of each individual pier location. The locations of the soil borings are shown on the **Boring Location Map** provided in Appendix A.

Table 1 – Summary of Subsurface Exploration Ramp E over Ramp F & I-57 & I-74

Boring ID	Location	Station	Offset	Depth (feet)	Surface Elevation (feet)
B-18	East Abutment	506+81.72	5.08 RT	75	754.24
B-19	Near Pier 1	508+81.19	1.38 RT	75	756.38
B-20A	Near Pier 1	510+83.87	1.21 LT	35	756.18
B-20B	Near Pier 1	510+80.98	7.13 LT	75	756.18
B-21	Pier 2	512+39.59	13.53 RT	75	759.18
B-22	Pier 3	514+32.86	15.86 RT	75	780.54
B-23	Pier 4	516+15.94	13.31 RT	75	761.81
B-24	Pier 5	517+87.57	19.18 RT	75	760.71
B-25	Pier 6	519+75.77	7.88 RT	75	763.51
B-26	Pier 7	522+02.29	20.96 RT	75	762.81
B-27	West Abutment	524+80.74	3.09 RT	75	766.63

The soil borings were drilled using a track mounted drill rig. All of the borings were drilled using 3¼ - inch I.D. hollow stem augers. Soil sampling was performed according to AASHTO T 206, "Penetration Test and Split Barrel Sampling of Soils." Soil samples were obtained at 2.5 foot intervals to a minimum depth of 20 feet below existing grade and 5 foot intervals thereafter. McCleary Engineering field representatives inspected, visually classified and logged the soil samples during the subsurface exploration activities, and performed unconfined compressive strength tests on cohesive soil samples using a calibrated Rimac compression tester and a calibrated hand penetrometer in accordance with IDOT procedures and requirements. Representative soil samples were collected from each sample interval, and were placed in jars and returned to the laboratory for further testing and evaluation.

4.2 Laboratory Testing

All samples were inspected in the laboratory to verify the field classifications. A laboratory testing program was undertaken to characterize and determine engineering properties of the subsurface soils encountered in the area of the proposed bridge.

The following laboratory tests were performed on representative soil samples:

- Moisture content ASTM D2216 / AASHTO T-265
- Grain Size Analysis ASTM C136 / AASHTO T-88 / AASHTO T-90
- Unconfined compression ASTM D2166 / AASHTO T-208

The laboratory tests were performed in accordance with test procedures outlined in the IDOT Geotechnical Manual (1999) and per ASTM and AASHTO requirements. Based on the laboratory test results, the soils encountered were classified according to the AASHTO classification system. The results of the laboratory testing program are included in the Appendix and are shown along with the field test results in the Soil Boring Logs also located in the appendix.

4.3 Subsurface Conditions

This section provides a brief description of the soils encountered in the borings performed in the vicinity of the proposed improvements. Variations in the general subsurface soil profile were noted during the drilling activities. Detailed descriptions of the subsurface soils are provided in the Soil Boring Logs located in Appendix B and are shown graphically in the Subsurface Profiles. The soil boring logs provide specific soil conditions encountered at each soil boring location. The soil boring logs include soil descriptions, stratifications, penetration resistance, elevations, location of the samples and laboratory test data. Unless

otherwise noted, soil descriptions indicated on boring logs are visual identifications. The stratifications shown on the boring logs represent the conditions only at the actual boring locations, and represent the approximate boundary between subsurface materials; however, the actual transition may be gradual.

Subsurface information was obtained during a larger geotechnical investigation conducted over the entire proposed I-57 / I-74 interchange modifications. Borings B-18 through B-27 were advanced in support of proposed Ramp E Structure (SN#010-1001) from January 27, 2015 through February 13, 2015 along the proposed ramp alignment.

Bridge Abutment Locations

Boring **B-18** was advanced near the proposed east abutment, located at Station 506+81.72 (Elev. 754.24'). The boring was advanced through 12 inches of topsoil. The soil profile underlying the topsoil in boring **B-18** is described as brown to gray brown, soft to medium, silty clay loam, which extends to approximately 5.5 feet deep (Elev. 748.74'), where the material transitions to a brown medium dense wet coarse sand. The sand continues deeper to 8 feet deep (Elev. 746.24'), where the soil changes to a gray-brown silty clay loam till that is soft to stiff. The upper soils had SPT N-values in the range of 2 to 14 and an unconfined compressive strength (Qu) from 0.3 to 1.1. By 13 feet deep (Elev. 741.24'), the soil changes to a gray stiff moist silty clay till that was encountered to boring completion depth of 75 feet deep (Elev. 679.24'). The till has a soft layer from 31.5 – 36.5 feet deep (Elev. 722.74' – 717.24'); however the remainder of the till is stiff to very stiff, exhibiting SPT N-values ranging 15 to 25 and an unconfined compressive strength (Qu) of 1.2 to 2.1.

Boring **B-27** was advanced near the proposed west abutment, located at Station 524+80.74 (Elev. 766.63'). The boring was advanced through ten inches of asphalt. The soil profile underlying the asphalt in boring **B-27** is described as brown to black, soft to stiff, silty clay loam, which extends to approximately 13 feet deep (Elev. 753.63'), where the material transitions to a brown-gray very stiff silty clay loam till. The upper soils had SPT N-values in the range of 3 to 12 and an unconfined compressive strength (Qu) from 0.3 to 3.7. The till continues to 37 feet deep (Elev. 729.63'), where the material changes to a gray loose to medium dense sand and gravel, that continues to 49 feet deep (Elev. 717.63'). Underlying the sand and gravel is a gray stiff to very stiff silty clay loam till with SPT N-values ranging 17 to 25 and Qu of 2.1 to 7.0, extending to boring completion depth of 75 feet deep (Elev. 691.63').

Pier Boring Locations

Borings **B-19, B-20A, B-20B, B-21, B-22, B-23, B-24, B-25, and B-26** were advanced near the proposed flyover pier locations, **Pier 1 (Sta. 509+35.00), Pier 2 (Sta. 511+75.00), Pier 3 (Sta. 514+15.00), Pier 4 (Sta. 516+20.00), Pier 5 (Sta. 518+20.00), Pier 6 (Sta. 520+25.00), and Pier 7 (Sta. 522+75.00)**, respectively. In general, each boring was covered with 5- to 24-inches of topsoil. Below the topsoil, a brown to gray silty clay to silty clay loam was encountered in each of the soil borings. The silty clay loam in boring B-22 was described as fill material with limestone and concrete fragments to a depth of 27 feet below ground surface. The silty clay and silty clay loam extended to depths of between 8 to 15.5 feet. The upper silty clay to silty clay loams had SPT N-values in the range of 2 to 34 and unconfined compressive strengths (Qu) from 0.4 to 4.1. Below the silty clay and silty clay loams a stiff silty clay loam till was encountered in each of the borings to boring completion depths. At times, this till is mixed with sands and gravels, often interlayered with loose to dense layers of coarse-grained sediments.

4.4 Groundwater Conditions

Water levels were checked in each boring to determine the general groundwater conditions present at the site and were measured while drilling and after each boring was completed.

Groundwater was identified in each boring as follows:

Table 2 – Groundwater Elevations

Boring	Groundwater Elevation (@ time of drilling)	Groundwater Elevation (@ time after boring completion)
B-18 (East Abut)	702.2	- - -
B-19 (Near Pier 1)	- - -	- - -
B-20A (Near Pier 1)	747.2	- - -
B-20B (Near Pier 1)	747.2	711.4 @ 18Hr
B-21 (Pier 2)	732.2	- - -
B-22 (Pier 3)	734.0	- - -
B-23 (Pier 4)	717.8	- - -
B-24 (Pier 5)	691.7	- - -
B-25 (Pier 6)	- - -	- - -
B-26 (Pier 7	722.8	- - -
B-27 (West Abut)	729.6	- - -

No 24-hour groundwater readings were noted. No streambed elevations or surface water elevations were noted.

Water level readings were made in the boreholes at times and under conditions shown on the boring logs and stated in the text of this report. However, it should be noted that fluctuations in groundwater level may occur due to variations in rainfall, other climatic conditions, or other factors not evident at the time measurements were made and reported.

5.0 Geotechnical Evaluations

The section provides geotechnical analysis and recommendations for the design of the proposed bridge based on the results of the field exploration, laboratory testing, and geotechnical analysis.

5.1 Derivation of Soil Parameters for Design

Unit weights, friction angles and shear strength parameters were estimated using standard penetration test (SPT) using published correlations for N values results. **Table 3** - presents generalized soil parameters to be used based for designs on the laboratory and in-situ testing data:

Table 3 – Summary of Soil Parameters

Approximate Depth Range (feet)	Soil Description	In situ Unit Weight γ (pcf)	Undrained		Drained	
			Cohesion c (psf)	Friction Angle Φ (degrees)	Cohesion c (psf)	Friction Angle Φ (degrees)
1 – 10	Silty Clay	112	1200	0	100	28
2 – 15	Silty Clay Loam	120	1500	0	115	28
6 – 75	Silty Clay Loam Till	125	1,000	0	125	28

5.2 Settlement

The new approach slabs on either end of the ramp E flyover will be supported by new mechanically stabilized earth (M.S.E.) walls with super elevation heights at the **west abutment** of approximately 16.30 (west corner) to 25.38 feet (east corner) and heights at the **east abutment** of approximately 24.88 (south corner) to 36.30 feet (north corner), respectively. Results of settlement analysis for the M.S.E. wall abutment approaches is presented in *Section 5.9 Mechanically Stabilized Earth (M.S.E.) Walls.*

Ramp E will also consist of seven (7) hammerhead type piers at locations along the length of the flyover. Based on preliminary settlement calculations, the increase in stress due to the anticipated structural loadings at each pier locations using shallow foundations would produce settlements in the range of 3.5 to 4 inches. These settlements ranges would be considered unacceptable due to the settlement occurring after the pier is fully loaded. Therefore, the use of deep foundations will be required for the seven hammerhead type pier locations.

5.3 Slope Stability – Bridge Abutments

The proposed construction of Ramp E over proposed Ramp F and I-57 / I-75 will be designed using mechanically stabilized earth (M.S.E.) walls for each bridge approach due to size constraints in the area of the abutments. Results of slope stability analysis for the M.S.E. wall abutment approaches is presented in *Section 5.9 Mechanically Stabilized Earth (M.S.E.) Walls*. No other general slope stability analysis was required for this project.

5.4 Seismic Parameters

The seismic hazard for the site was analyzed per the IDOT Geotechnical Manual, IDOT Bridge Design Manual, and AASHTO LRFD Bride Design Specifications. The Seismic Soil Site Class was determined per the requirements of All Geotechnical Manual Users (AGMU) Memo 9.1, Design Guide for Seismic Site Class Determination, and the "Seismic Site Class Determination" Excel spreadsheet provided by IDOT.

The proposed Ramp E flyover bridge has a total length of **1,751' - 3$^{5/8}$"** feet (back to back abutments), with each of seven spans longer than 200 feet. Based on AGMU Memo 9.1, the site class data from the individual substructure units should not be averaged to obtain a global N(bar), Nch(bar) or Su(bar) for the structure. However, based on conversations with the BBS, due to the consistency of soil type, overall size of the structure, the use of a global Site Class Definition in this specific case would be acceptable.

According to Table 3.10.3.1-1 (Site Class Definitions) of the 2008 AASHTO LRFD Manual, the project site soil profile is most accurately described as the AASHTO **Soil Site Class D.** According to Table 3.10.6-1 (Seismic Zones) of the 2008 AASHTO LRFD Manual, the Seismic Performance Zone is most accurately described as **(SPZ)=1** (F_vS_1#0.15).

The following Seismic Coefficients should be used for design:

$\mathbf{S_s}$=0.146 g, $\mathbf{F_a}$=1.60; therefore Design Spectral Accelerations at 0.2 sec, ($\mathbf{S_{Ds}}$)=0.233g
$\mathbf{S_1}$=0.056 g, $\mathbf{F_v}$=2.40; therefore Design Spectral Accelerations at 1.0 sec, ($\mathbf{S_{D1}}$)=0.135g

Table 4 – Seismic Coefficients Summary Table

Seismic Performance Zone (SPZ)	1
Design Spectral Acceleration at 0.2 sec. (S_{DS})	0.233 g
Design Spectral Acceleration at 1.0 sec. (S_{D1})	0.135 g
Soil Site Class	D

Liquefaction analysis was conducted using Design Guide AGMU Memo 10.1 – Liquefaction Analysis. As noted in the previous paragraph the Seismic Performance Zone (SPZ) is SPZ – 1 and the Peak Ground Acceleration (PGA) modified by the zero-period site factor, F_{pga} is less than 0.15. Therefore, no liquefaction of soil layers is anticipated to occur.

5.5 Scour

The proposed Ramp E Flyover will cross over proposed Ramp F and I-57 / I-74. No waterways are in the vicinity of the proposed project; therefore scour will not be a concern for this project.

5.6 Mining Activity

Based on a review of the Illinois State Geological Survey's on-line collection of County Coal Maps and Directories, the proposed structure is not located over a mine or mined out area.

5.7 Liquefaction

Based on the AGMU Memo 10.1 – Liquefaction Analysis Seismic Performance Zones 3 and 4 required liquefaction analysis, as well as, SPZ 2 with a Peak Seismic Ground Surface Acceleration, As equal to or greater than 0.15. The subject site is in SPZ 1 with a less than 0.15. Therefore liquefaction was not considered as a reduction for the pile design capacity or other foundation considerations included herein.

5.8 Approach Slabs

Based on information from the structural engineer, the approach slabs are 30 feet in length and will be cast-in-place. The approach slabs will bear on the abutment on one side and an approach footing on the other side. In accordance with the IDOT Bridge Manual, BFW evaluated the foundation soils at the approach slabs for bearing capacity and excessive settlement. With proper compaction of the M.S.E. wall backfill during construction, the bearing capacity and settlement requirements will be acceptable for the constructed approach slabs.

5.9 Mechanically Stabilized Earth (M.S.E.) Walls

The proposed construction of Ramp E over proposed Ramp F and I-57 / I-75 will be designed using mechanically stabilized earth (M.S.E.) walls at each bridge abutments due to embankment size constraints. In regard to the abutment locations, based on the 2012 IDOT Bridge Manual, Section 3.11.1 *Mechanically Stabilized Earth (MSE)*, the TSL planning engineer using the SGR is responsible for analyzing the applied loadings and foundation soils as well as specifying both the reinforced mass minimum dimensions and any foundation treatments necessary to assure that global (overall slope stability) and external stability is satisfied. Subsurface information has been provided within this SGR to assist in M.S.E. wall external design and global stability considerations. Internal stability of the reinforced mass is designed by approved M.S.E. wall supplier selected by the contactor.

External design considerations for M.S.E. walls include bearing resistance, sliding, settlement and overturning/eccentricity. Global stability for M.S.E. walls includes overall slope stability. Preliminary analysis of the external and global stability of the M.S.E. wall abutment approaches was conducted and is discussed in the sections below:

The new approach slabs on either end of the ramp E flyover will be supported by new mechanically stabilized earth (M.S.E.) walls with super elevation heights at the west abutment of approximately 16.30 (west corner) to 25.38 feet (east corner) and heights at the east abutment of approximately 24.88 (south corner) to 36.30 feet (north corner), respectively.

Bearing Resistance (External)

Preliminary bearing resistance analysis for the M.S.E. wall section near each approach was assessed by estimating the anticipated load induced to the soil by the M.S.E. walls with traffic loading that will be applied to the footprint of the M.S.E. wall. Footprint of the M.S.E. wall analyzed was the 30 feet approach slabs times the width of M.S.E. wall approach at abutments. This load was compared to the factored soil bearing resistance that was obtained by normal soil bearing capacity equations *(Vesic's Method: Das, "Fundamentals of Geotechnical Engineering," Section 12.2).*

The factored bearing resistance (Φ=0.45 for SPT) for the east abutment was calculated for the soil at 4,700 pounds per square feet (psf) due to a soft zone at a depth of approximately 3 to 5 feet below existing ground surface elevation. The factored bearing resistance (Φ=0.45 for SPT) for the west abutment was calculated for the soil at 8,100 psf.

Based on preliminary bearing resistance calculations, the in-situ soils allowable bearing capacity at the **east abutment** will require ground improvements under the reinforced earth wall section. Ground improvement consisting of lime stabilization or removal and replacement of unsuitable materials should be considered. Preliminary minimum required bearing capacity of east abutment area should be a minimum of 8,500 psf. Replacement material should have a minimum phi (Φ) angle of 35°. The ground improvement lateral extends should be a minimum of 10 feet beyond M.S.E. wall foundation limits. Ground improvements are not recommended at the west abutment area.

Sliding (External)

The analysis of sliding resistance of the M.S.E. wall is dependent on a number of factors. The factor of safety against sliding, is typically determined by summing the horizontal resisting forces of the wall and dividing that sum by the summation of driving forces acting on the wall. The horizontal resisting forces typically only consist of the normal force acting on the base of the wall times the coefficient of sliding resistance. The normal force acting on the base consists of the weight of the reinforced soil mass, surcharge loads acting on the top of the reinforced soil mass, and the vertical component of the design lateral pressure acting on the pressure surface.

The coefficient of sliding resistance to calculate the frictional resistance at the base of the wall that should be used based on in-situ soils is Tan Φ = 0.53 where Φ=28°

Settlement (External)

Preliminary settlement analysis was conducted by treating the M.S.E. structure as a continuous strip footing of width equal to the strip length (approx. 0.7 x height) with the estimated bearing pressure.

Based on preliminary settlement calculations using IDOT Excel spreadsheet for Cohesive Soil Settlement, the increase in stress due to the increase in fill would produce settlements in the range of 3-inch of the soil underlying the new M.S.E. embankment near the **east abutment** based on subsurface data prior to any ground improvement. Once ground improvement activities are complete the anticipated settlement for the east abutment would be less than 2-inch.

Based on preliminary settlement calculations, the increase in stress due to the increase in fill would produce settlements in the range of 2-inch or less of the soil underlying the new M.S.E. embankment near the **west abutment** based on subsurface data. The anticipated settlement should not adversely affect the approach pavements due to due primary settlement occurring during construction activities of the west abutment M.S.E. wall.

Due to the use of MSE walls at both the East and West abutments, the proposed abutment piles will need to be driven prior to the construction of the MSE walls. As a result, the addition of MSE wall construction backfill will create a surcharge on the underlying soils that will settle to some degree, resulting in some negative shaft resistance on the piles which will could affect the design of the piles. Since the estimated settlement is approximately 2-inches the effect of the downdrag should be minor. However, it is recommended that a pile sleeve system be used which will create a slip plane between the settling abutment backfill and the previously driven bridge abutment piles which will result in a reduction of the pile downdrag forces. A downdrag factor of 1.05 should be used in the MSE wall section for the factored resistance available.

It is recommended that Settlement Platforms be constructed near Station 507+31.00 Offset 5' Rt. for the east abutment and Station 524+83.00 Offset 3.1' Rt for the west abutment. Settlement plates shall be installed prior to embankment construction for monitoring the rate and amount of settlement throughout the embankment construction.

Slope Stability (Global)

Global slope stability of the M.S.E. wall near the abutment approaches was evaluated using slope stability analysis software: *GSTABL7 with STEDwin.* Global slope stability was assessed by modeling the reinforced soil mass as a block using a high cohesion value to force the failure surfaces being examined to be external to the structure. In addition, the elevation of the proposed M.S.E. wall is higher than the existing ground surface elevation which will require fill to be placed prior to M.S.E. wall construction.

According to the current standard of practice, the target FOS is 1.3 against global instability is adequate for M.S.E walls. Based on the analysis performed, the proposed M.S.E. wall meet the minimum required factor of safety of 1.3 for global stability.

It should be noted that recommendations provided in the SGR are based on the well-defined soil data obtained from subsurface exploration near the proposed abutment locations where M.S.E. walls will be necessary.

Soil parameters for slope stability: Unit weight of retained fill (embankment) = 120 pcf
Unit weight of reinforced soil mass = 130 pcf
Internal friction angle for the retained soil = 28°

6.0 Foundation Type Evaluation and Design Recommendations

6.1 Foundation Type Feasibility

Based on the preliminary TS&L, the proposed structure (SN 010-1001), Station 516+05.45 will consist of a multi-span structure supported by stub abutment with seven (7) individual hammerhead type pier foundations. M.S.E. embankments will be constructed for each abutments approach and will support new 30 feet long approach slabs that will be constructed on either end of the bridge.

The flyover structure will consist of Steel Plate Girder with an 84-inch web hybrid plate girder (composite) on stub abutments with an estimated abutment width of 41'-8". Stub abutments will bear on two rows of vertical steel piles. Each hammerhead pier will be supported by multiple steel piles.

The proposed abutment type for this structure is stub abutments based on the presence of M.S.E. walls. According to the IDOT Bridge manual, metal shell or HP-piles are permitted for stub abutment. Anticipated factored structural loadings were obtained from the structural engineer and are provided in Table 5

6.2 Shallow Foundations

Based on the soils encountered, the use of M.S.E. wall supported approaches, and the significant factored structural loadings for each individual hammerhead type pier locations, shallow foundations are not a feasible option for use at either the proposed abutments or the individual pier locations due to potential settlement concerns and are not discussed in the report.

Table 5 – Factored Structural Loadings

I-57 - I 74 INTERCHANGE STRUCTURES
Information for Geotechnical Engineering SGR's **04.28.2015; 08.21.2015 updt**

Structure: RAMP E over I-57 & I-74 & Ramp F
S.N. 010-1001
No. of Spans: 8

Option No.		Superstructure Type / Option	Substructure								
1	Details	**STEEL PLATE GIRDER, WEB DEPTH = 84 IN.**									
		Superstructure: Curved Girder on Curved Alignment									
		Substructure Element	ABUT 1	PIER1	PIER 2	PIER 3	PIER 4	PIER 5	PIER 6	PIER 7	ABUT 2
		Abutment Type: (Integral, Semi Integral, Stub, etc.)	Stub	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Stub
		Pier Type	n/a	Hammerhead	Hammerhead	Hammerhead	Hammerhead	Hammerhead	Hammerhead	Hammerhead	n/a
		Deck Joints	Modular	None	None	None	None	None	None	None	Modular
		Bearing Type	Exp. HLMR	Exp. HLMR	Exp. HLMR	Fixed HLMR	Fixed HLMR	Fixed HLMR	Exp. HLMR	Exp. HLMR	Exp. HLMR
		Est. Bottom of Abutment Elevation	781.32								776.72
		Est. Abutment Length (Feet)	40'-0"								40'-0"
		Est. Pier Bottom of Footing		745.50	753.25	773.24	753.57	751.97	756.50	753.55	
		Est. Pier Footing Dimensions (ft. x ft.)		16' x 34'	16' x 34'	16' x 34'	16' x 34'	16' x 34'	16' x 34'	16' x 34'	
		Total Factored Vertical DL + LL (kips) *	2,010	5,660	5,613	4,916	4,656	4,622	5,269	5,784	1,951
		Additional Notes / Comments	* Dynamic Load Allowance (IM) not included in Live Load.								

6.3 Driven Pile Supported Foundations

Piles considered for this site include HP-piles and metal shell piles. The Modified IDOT static method Excel spreadsheet was used to estimate the pile lengths at various axial geotechnical resistances for driven piles per AGMU Memo 10.2.

Factored resistance includes reduction for the geotechnical resistance of 0.55 for the pile installation. In the area of the abutments the use of M.S.E. walls causes concern for potential down drag on the piles within the stub abutments. Therefore, the use of pile sleeves is recommended for each stub abutment. A downdrag factor of 1.05 is also included in the factored resistance in the area of the upper M.S.E. retained earth section. Based on the results of the subsurface investigation no geotechnical losses due to liquefaction were included in the axial pile capacity calculations for the individual pier foundations. As per AASHTO The Nominal Required Bearing (R_N) represents the resistance the pile will experience during driving as well as assists the contractor in selecting a proper hammer size. The Factored Resistance Available (RF) documents the net long-term axial factored pile capacity available at the top of the pile to support factored substructure loads. The Maximum Nominal Required Bearing (R_{Nmax}) is the maximum nominal required bearing that can be safely specified in the pile table due to pile driving stresses.

Tables 6 and 7 summarize the estimated pile lengths at various axial resistances for metal shell piles and HP-piles various sizes piles for the stub abutment at the East and West abutments and includes tables with and without the effects of down drag.

Tables 8 through 14 summarize the estimated pile lengths for various metal shell piles and HP-piles for the each of the individual hammerhead type pier locations. The complete IDOT Pile Design Tables for each substructure are included in the Appendix. It should be noted that each type of metal shell piles met the maximum nominal required bearing and are listed in the pile capacity table provided below.

The pile cutoff elevations used for analysis were Elev. 782.32 and Elev. 778.33 for the East and West abutments, respectively. The pile cutoff elevation included a 1 feet embedment into the abutment for the stub abutment as required by the Bridge Manual.

Pile cutoff elevations used for analysis for individual pier locations are listed below and include a 1 feet embedment into the pier cap as required by the Bridge Manual.

Pier	1	2	3	4	5	6	7
Pile Cutoff Elevation	746.50	754.25	774.24	754.57	752.97	757.50	754.55

Pile shoes for HP piles should not be required due to the subsurface conditions and the absence of bedrock. However, due to some layers of cobbles and dense sands, piles shoes are recommended for metal shell piles.

Due to the distance between the abutments, one test pile should be required for each abutment and at each pier. A test pile is performed prior to production driving so that actual, on-site field data can be gathered to further evaluate pile driving requirements for the project. This is also the time in which the contractor's proposed equipment and methodologies identified in their Pile Installation Plan can be assessed.

Design Capacity Limitations

In the area of the abutments the use of M.S.E. walls causes concern for potential down drag on the piles within the stub abutments. Therefore, the use of pile sleeves is recommended for each stub abutment.

There are no liquefaction, scour, or settlement issues at this structure that would result in the loss of capacity of the piling. Therefore, no design capacity limitations are necessary.

6.4 Lateral Load Resistance

Section 3.10.1.10 of the 2012 IDOT Bridge manual requires performing detailed structure interaction analysis if the factored lateral loading per pile exceeds 3 kips. Lateral loadings applied to pile foundations are typically resisted by battering selected piles, the soil/structure interaction, pile flexure, or a combination of these factors. Based on information provided by the structural engineer the lateral loads at the abutments were anticipated to be less than 3 kips per pile. Battered piles will most likely be required at pier foundations.

6.5 Mechanically Stabilized Earth (M.S.E.) Walls

The proposed construction of Ramp E over proposed Ramp F and I-57/ I-75 abutment approach ramps will be designed using mechanically stabilized earth (M.S.E.) walls. Contractors shall select one of the IDOT approved M.S.E. wall suppliers who will be responsible for designing the internal stability of the reinforced mass. The design shall provide corrosion allowance to ensure a design life of at least 75 years. The Shop Drawings and internal stability design calculations submitted by the supplier are reviewed by the BBS Foundations and Geotechnical and Design Units to ensure compliance with the contract plan requirements and adequacy of the internal stability design. IDOT Guide Bridge Special Provisions (GBSP-38) coves M.S.E. walls.

6.6 Wing Wall Foundation Recommendations

Based on information provided by the structural engineer and the preliminary TS&L no wing wall will be required for the stub abutments.

Table 6 - Pile Capacity Tables
(East Stub Abutment)

East Abutment		
Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft)
Metal Shell 12" Φ w/0.25 walls		
272	150	74
294	162	79
316	174	84
343	188	89
353*	194*	91
Metal Shell 14" Φ w/0.25 walls		
265	146	64
293	161	69
320	176	74
346	190	79
370	204	84
403	221	89
413*	227*	91
Metal Shell 14" Φ w/0.312 walls		
346	190	79
370	204	84
403	221	89
431	237	94
468	258	99
492	271	104
513*	282*	108

East Abutment – With Downdrag		
Nominal Required Bearing (Kips)	Factored Resistance Available with DD (Kips)	Estimated Pile Length (Ft)
Metal Shell 12" Φ w/0.25 walls		
294	104	79
305	110	82
316	116	84
330	124	87
353*	131*	89
Metal Shell 14" Φ w/0.25 walls		
333	116	77
346	123	79
358	129	82
370	136	84
387	146	87
403	154	89
413*	157*	90*
Metal Shell 14" Φ w/0.312 walls		
416	162	92
431	170	94
451	181	97
468	190	99
478	196	101
492	203	102
513*	211*	103*

***=** Max. Nominal Required Bearing of Pile

Table 7 - Pile Capacity Tables
(West Stub Abutment)

West Abutment		
Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft)
Metal Shell 12" Φ w/0.25 walls		
225	124	37
225	124	40
226	124	42
316	174	45
333	183	47
291	160	50
353*	194*	52
Metal Shell 14" Φ w/0.25 walls		
267	147	37
263	145	40
264	145	42
387	213	45
407	224	47
346	190	50
413*	227*	54
Metal Shell 14" Φ w/0.312 walls		
372	205	52
435	239	55
465	256	57
452	248	60
475	261	62
492	270	65
513*	282*	68

West Abutment – With Downdrag		
Nominal Required Bearing (Kips)	Factored Resistance Available with DD (Kips)	Estimated Pile Length (Ft)
Metal Shell 12" Φ w/0.25 walls		
189	80	32
208	91	35
225	100	40
226	101	42
291	136	50
313	149	51
353*	168*	52
Metal Shell 14" Φ w/0.25 walls		
223	95	32
247	109	35
263	117	40
264	118	42
346	163	50
372	177	52
413*	196*	53
Metal Shell 14" Φ w/0.312 walls		
435	212	55
452	221	60
475	234	62
492	243	65
512	250	67
513*	254*	68

***=** Max. Nominal Required Bearing of Pile

Table 8 - Pile Capacity Tables
(Pier 1)

Pier 1		
Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft)
Metal Shell 12" Φ w/0.25 walls		
251	138	37
265	146	40
292	161	45
305	168	47
319	176	50
345	190	55
353*	194*	56
Metal Shell 14" Φ w/0.25 walls		
296	163	37
312	172	40
344	189	45
359	198	47
376	207	50
392	216	52
413*	227*	56
Metal Shell 14" Φ w/0.312 walls		
329	181	42
359	198	47
392	216	52
421	231	57
471	259	62
511	281	67
513*	282*	69

***=** Max. Nominal Required Bearing of Pile

Table 9 - Pile Capacity Tables
(Pier 2)

Pier 2		
Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft)
Metal Shell 12" Φ w/0.25 walls		
310	171	36
220	121	41
243	134	46
275	151	51
333	183	56
350	192	61
353*	194*	63
Metal Shell 14" Φ w/0.25 walls		
386	212	36
258	142	41
286	157	46
324	178	51
396	218	56
411	226	61
413*	227*	63

Table 10 - Pile Capacity Tables
(Pier 3)

Pier 3		
Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft)
Metal Shell 12" Φ w/0.25 walls		
231	127	27
257	141	30
267	147	32
285	157	35
296	163	37
311	171	40
353*	194*	41
Metal Shell 14" Φ w/0.25 walls		
277	153	27
307	169	30
316	174	32
337	186	35
349	192	37
367	202	40
413*	227*	41
Metal Shell 14" Φ w/0.312 walls		
425	234	50
471	259	55
478	263	57
491	270	60
500	275	62
511	281	65
513*	282*	66

***=** Max. Nominal Required Bearing of Pile

Table 11 - Pile Capacity Tables
(Pier 4)

Pier 4		
Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft)
Metal Shell 12" Φ w/0.25 walls		
212	116	37
224	123	39
232	128	42
256	141	47
278	153	52
301	166	57
353*	194*	64
Metal Shell 14" Φ w/0.25 walls		
264	145	39
273	150	42
284	156	44
317	174	49
338	186	54
368	203	59
413*	227*	64

Table 12 - Pile Capacity Tables
(Pier 5)

Pier 5		
Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft)
Metal Shell 12" Φ w/0.25 walls		
276	152	51
285	157	54
295	162	56
304	167	59
323	178	61
338	186	64
353*	194*	66
Metal Shell 14" Φ w/0.25 walls		
324	178	51
334	184	54
345	190	56
356	196	59
380	209	61
398	219	64
413*	227*	66

Table 13 - Pile Capacity Tables
(Pier 6)

Pier 6		
Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft)
Metal Shell 12" Φ w/0.25 walls		
269	148	52
280	154	55
293	161	57
306	168	60
321	176	62
334	184	65
353*	194*	67
Metal Shell 14" Φ w/0.25 walls		
316	174	52
329	181	55
345	190	57
359	198	60
377	207	62
393	216	65
413*	227*	67

***=** Max. Nominal Required Bearing of Pile

Table 14 - Pile Capacity Tables
(Pier 7)

Pier 7		
Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft)
Metal Shell 12" Φ w/0.25 walls		
242	133	35
258	142	37
273	150	40
289	159	42
304	167	45
320	176	47
353*	194*	50
Metal Shell 14" Φ w/0.25 walls		
286	157	35
304	167	37
323	177	40
341	187	42
359	198	45
377	208	47
413*	227*	50
Metal Shell 14" Φ w/0.312 walls		
400	220	50
421	231	52
434	239	55
451	248	57
476	262	60
496	273	62
513*	282*	65

***=** Max. Nominal Required Bearing of Pile

7.0 Construction Considerations

All work performed for the proposed project should conform to the requirements in the IDOT Standard Specifications for Road and Bridge Construction (2012) and the Supplemental Specifications and Recurring Special Provisions (2015). Any deviation from the requirements in the manuals above should be approved by the design engineer.

7.1 Groundwater Management

Based on the depth of groundwater observed in the borings, significant groundwater management is not anticipated for bridge construction. The contactor should control groundwater and surface water infiltration to provide construction in dry condition. Temporary ditches, sumps, granular drainage blankets, stone ditch protection, or hand-laid riprap with geotextile underlayment could be used to divert groundwater if significant seepage is encountered during construction. If water seepage occurs during footing or where wet conditions are encountered such that the water cannot be removed with conventional sumping, we recommend placing open grade stone similar to IDOT CA-7 to stabilize the bottom of the excavation.

The CA-7 stone should be placed to 12 inches about the water table, in 12-inch lifts, and should be compacted with the use of a heavy smooth drum roller or heavy vibratory plate compactor until stable. The remaining portion of the excavation beneath the footing should be backfilled using approved structural fill.

7.2 Temporary Sheeting and Soil Retention

The preliminary TS&L plans indicate that the construction of the proposed ramp individual pier foundations will be in close proximity of the existing interstates. The construction of Pier 1 will affect the existing Outer Ramp G, Pier 2, will affect Ramp F, Pier 3 and Pier 4 will affect F.A.I. Rte. 74, Pier 5, Pier 6 and Pier 7 will affect F.A.I. Rte. 57.

Temporary Sheeting and Soil Retention

Due to the geometry of the site location and the areas where fill is being placed, along the presence of materials with Qu values higher than 4.5 tsf the use of temporary cantilever sheet piling may not be feasible. It is recommended that the use of Temporary Soil Retention Systems be used. The following are estimated heights of retention.

Location	Pier 1	Pier 2	Pier 3 (East Side)	Pier 3 (West Side)	Pier 4	Pier 5	Pier 6 (East Side)	Pier 6 (West Side)	Pier 7
Est. Retained Height (ft)	18.3	20.95	8.96	9.56	9.03	11.23	8.90	9.00	13.05

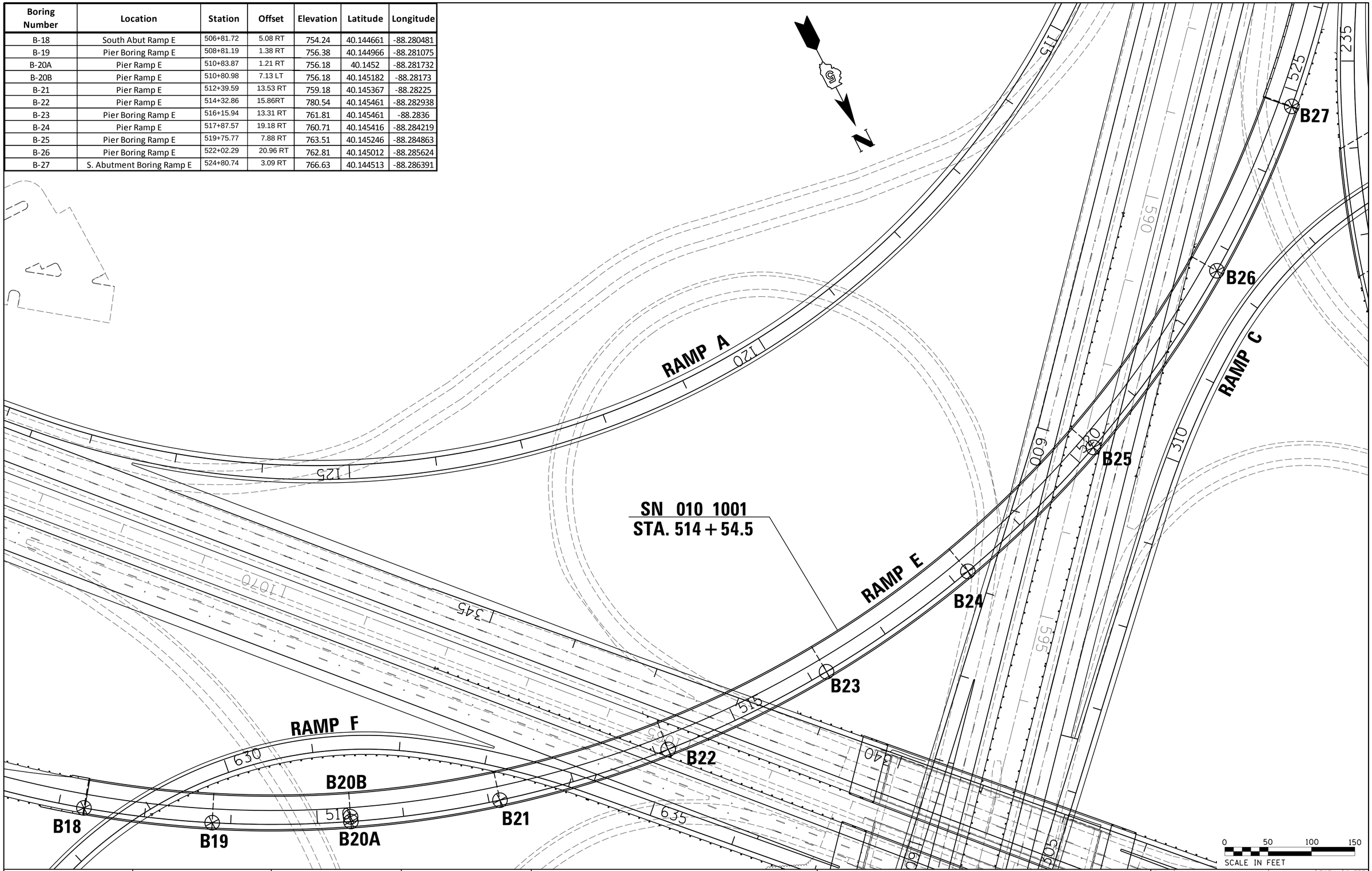
8.0 Limitations

This report has been prepared for the exclusive use of the Illinois Department of Transportation and its structural consultant. 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 project limits. The analysis have been performed and the recommendations have been provided in this report are based on subsurface conditions determined at the location of the borings. The report may not reflect all variations that may occur between boring locations or at some other time, the nature and extend of which may not become evident until during the time of construction. If variations in subsurface conditions become evident after submission of this report, it will be necessary to evaluate their nature and review the recommendations provided herein in light of the new conditions

Appendix A

Soil Boring Location Map

Boring Number	Location	Station	Offset	Elevation	Latitude	Longitude
B-18	South Abut Ramp E	506+81.72	5.08 RT	754.24	40.144661	-88.280481
B-19	Pier Boring Ramp E	508+81.19	1.38 RT	756.38	40.144966	-88.281075
B-20A	Pier Ramp E	510+83.87	1.21 RT	756.18	40.1452	-88.281732
B-20B	Pier Ramp E	510+80.98	7.13 LT	756.18	40.145182	-88.28173
B-21	Pier Ramp E	512+39.59	13.53 RT	759.18	40.145367	-88.28225
B-22	Pier Ramp E	514+32.86	15.86RT	780.54	40.145461	-88.282938
B-23	Pier Boring Ramp E	516+15.94	13.31 RT	761.81	40.145461	-88.2836
B-24	Pier Ramp E	517+87.57	19.18 RT	760.71	40.145416	-88.284219
B-25	Pier Boring Ramp E	519+75.77	7.88 RT	763.51	40.145246	-88.284863
B-26	Pier Boring Ramp E	522+02.29	20.96 RT	762.81	40.145012	-88.285624
B-27	S. Abutment Boring Ramp E	524+80.74	3.09 RT	766.63	40.144513	-88.286391



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		DRAWN -	REVISED -
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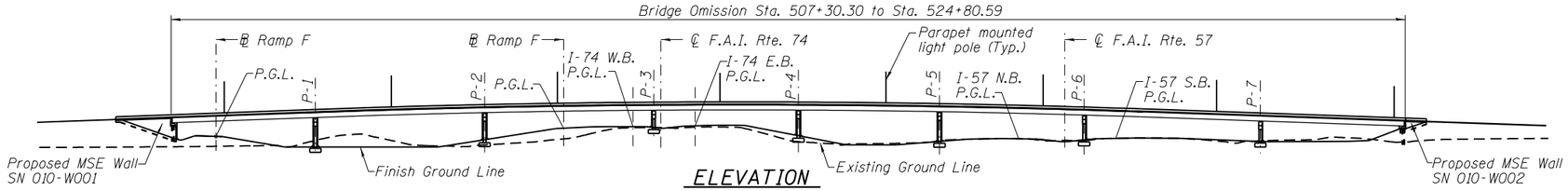
	PLOT DATE = $DATE$	DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

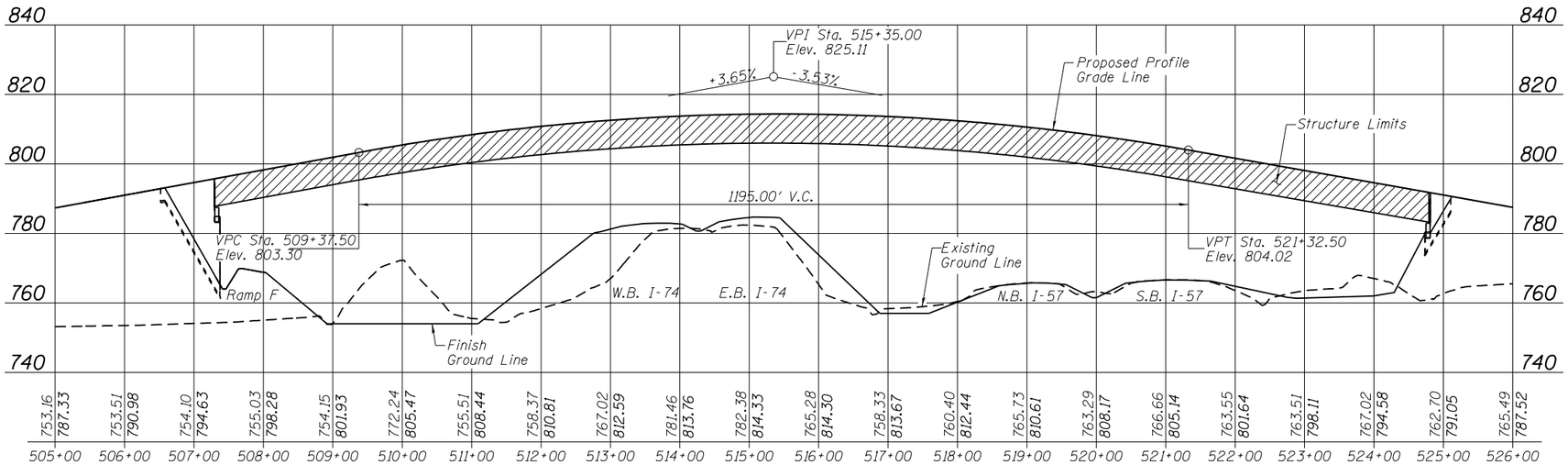
RAMP E
(I–57/I–74 INTERCHANGE)

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

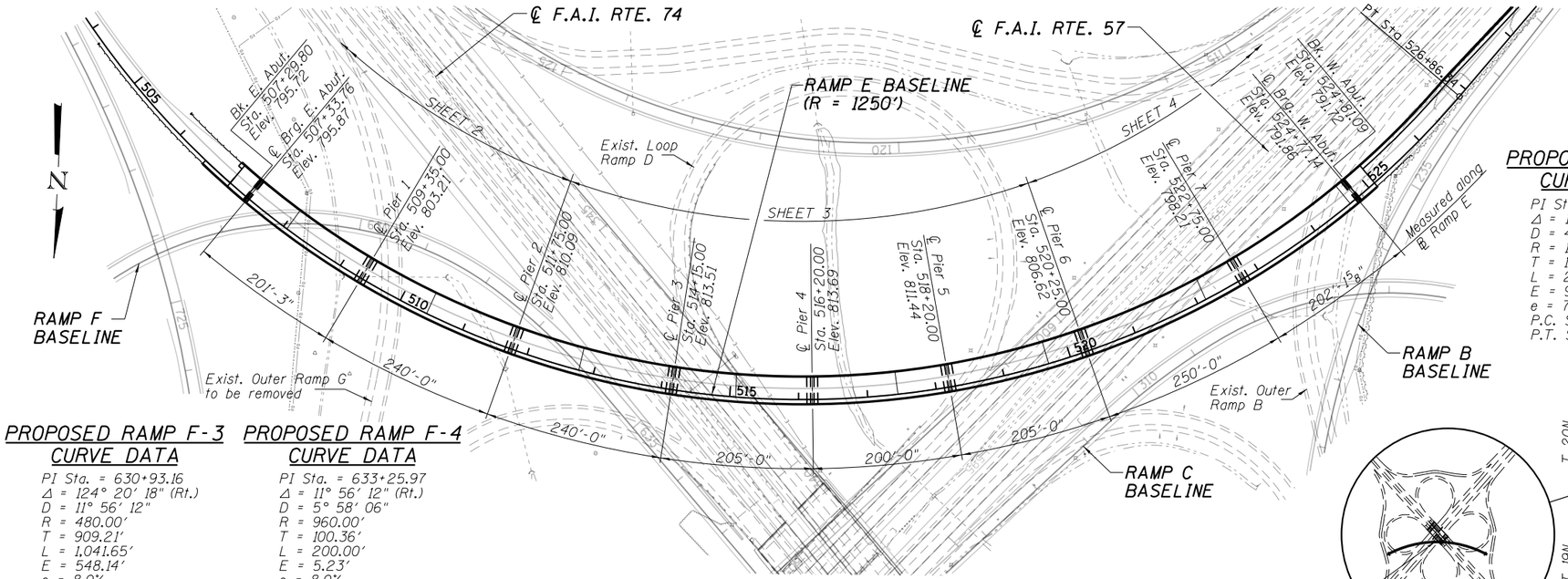
F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
57/74	10(5-1-RS-1, 14-1, 6)R	CHAMPAIGN		
		CONTRACT NO. 70897		
	ILLINOIS FED. AID PROJECT			



ELEVATION



PROPOSED RAMP E PROFILE



PROPOSED RAMP E CURVE DATA

PI Sta. = 520+74.57
Δ = 110° 15' 02" (Lt.)
D = 4° 35' 01"
R = 1,250.00'
T = 1,793.52'
L = 2,405.30'
E = 936.14'
e = 7.6%
P.C. Sta. = 502+81.04
P.T. Sta. = 526+86.34

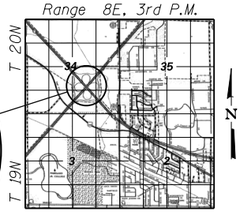
PROPOSED RAMP F-3 CURVE DATA

PI Sta. = 630+93.16
Δ = 124° 20' 18" (Rt.)
D = 11° 56' 12"
R = 480.00'
T = 909.21'
L = 1,041.65'
E = 548.14'
e = 8.0%
P.C. Sta. = 621+83.95
P.T. Sta. = 632+25.60

PROPOSED RAMP F-4 CURVE DATA

PI Sta. = 633+25.97
Δ = 11° 56' 12" (Rt.)
D = 5° 58' 06"
R = 960.00'
T = 100.36'
L = 200.00'
E = 5.23'
e = 8.0%
S.E. RUN = 275'
P.C. Sta. = 632+25.60
P.T. Sta. = 634+25.60

PLAN



LOCATION SKETCH

HIGHWAY CLASSIFICATION

F.A.I. 57/74 - Ramp E
Functional Class: Interstate Ramp
ADT: 5,700 (2013); 9,900 (2040)
ADTT: 1,197 (2013); 2,079 (2040)
DHV: 920
Design Speed: 55 m.p.h.
Posted Speed: 55 m.p.h.
One-Way Traffic
Directional Distribution = 100%

F.A.I. Rte. 74 - I 74
Functional Class: Interstate
ADT: 38,900 (2013); 59,900 (2040)
ADTT: 9,336 (2013); 14,376 (2040)
DHV: 3,921 (2040)
Design Speed: 75 m.p.h.
Posted Speed: 70 m.p.h.
Two-Way Traffic
Directional Distribution: 50:50

F.A.I. Rte. 57 - I 57
Functional Class: Interstate
ADT: 32,400 (2013); 49,900 (2040)
ADTT: 7,776 (2013); 11,976 (2040)
DHV: 1,956 (2040)
Design Speed: 75 m.p.h.
Posted Speed: 70 m.p.h.
Two-Way Traffic
Directional Distribution: 50:50

F.A.I. 57/74 - Ramp F
Functional Class: Interstate Ramp
ADT: 3,300 (2013); 4,950 (2040)
ADTT: 901 (2013); 1,351 (2040)
DHV: 360
Design Speed: 40 m.p.h.
Posted Speed: 40 m.p.h.
One-Way Traffic
Directional Distribution: 100% NB

DESIGN SPECIFICATIONS

2014 AASHTO LRFD 7th Edition,
Bridge Design Specifications
w/2015 Interims

LOADING HL-93

Allow 50 psf for future wearing surface

DESIGN STRESSES

FIELD UNITS

f'c = 3,500 psi
f'c = 4,000 psi (Superstructure Concrete)
fy = 60,000 psi (Reinforcement)
fy = 50,000 psi (M270 Grade 50W)
fy = 70,000 psi (M270 Grade HPS 70W)

SEISMIC DATA

Seismic Performance Zone (SPZ) = 1
Design Spectral Acceleration at 1.0 sec (SD1) = 0.135g
Design Spectral Acceleration at 0.2 sec (SDS) = 0.233g
Soil Site Class = D

PRELIMINARY

GENERAL PLAN
RAMP E OVER
RAMP F AND
F.A.I. RTE. 74 AND F.A.I. RTE. 57
SECTION 10 (5-1-RS-1, 14-1,6) R
CHAMPAIGN COUNTY
STATION 516+05.45
STRUCTURE NO. 010-1001

L:\IDOT\186682\Draw\CADD Sheets\Structural Sheets\TSLs\...

CMT

USER NAME = Christopher Whitfield	DESIGNED CJW	REVISED
...\D570897-TSL-(0)_Ramp E over 174 and 157.dgn	CHECKED WLB	REVISED
PLOT SCALE =	DRAWN GLD	REVISED
PLOT DATE =	CHECKED CJW	REVISED

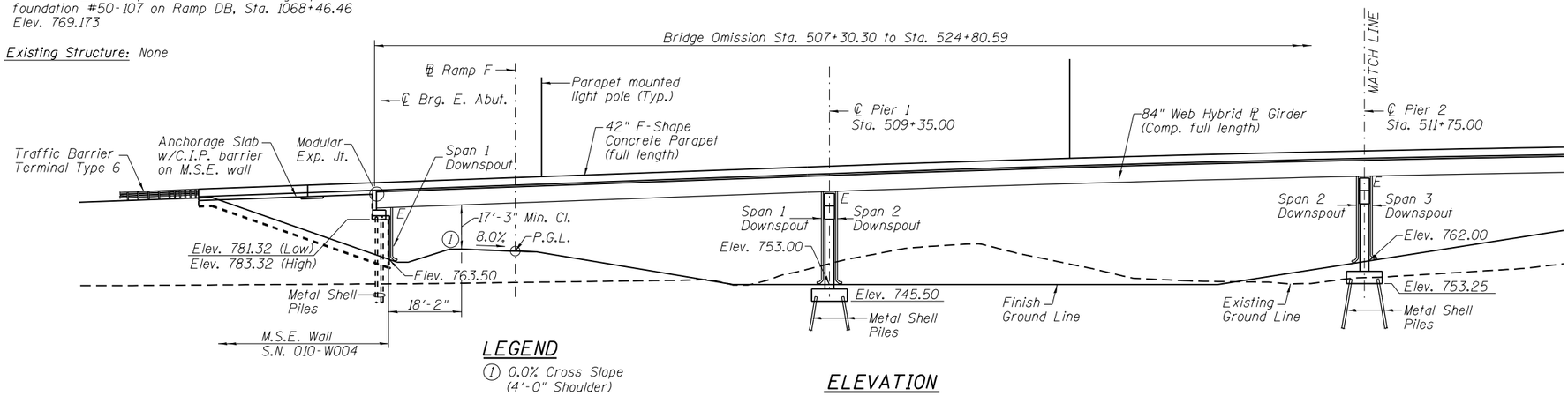
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

SHEET NO. OF SHEETS

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
				1
		CONTRACT NO.		
ILLINOIS FED. AID PROJECT				

Bench Marks:
Chiseled "□" on top of N.W. corner of light pole foundation #50-107 on Ramp DB, Sta. 1068+46.46
Elev. 769.173

Existing Structure: None



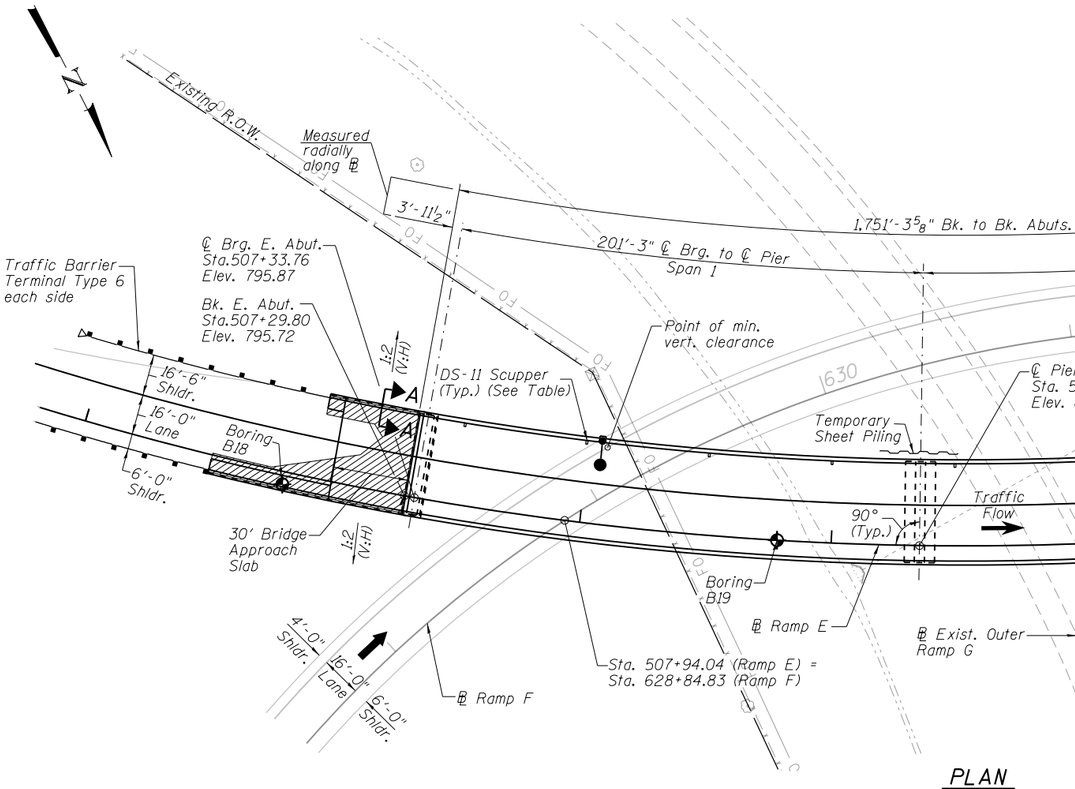
LEGEND
① 0.0% Cross Slope (4'-0" Shoulder)

ELEVATION

LIGHT POLE LOCATIONS

STATION	*OFFSET
508+05.26	34.08' Lt.
510+42.26	34.08' Lt.
512+77.12	34.08' Lt.
515+07.47	34.08' Lt.
517+43.29	34.08' Lt.
519+67.07	34.08' Lt.
522+15.36	34.08' Lt.
524+64.51	34.08' Lt.

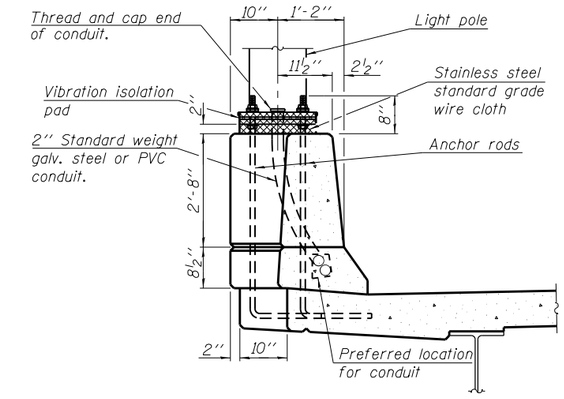
*From ℄ Ramp E
10"ϕ Light pole has height of 45 ft. with an 8 ft. mast arm. Bolt circle diameter is 15 in.



PLAN

NOTES:
1. See sheet 4 for Section A-A.
2. Existing Outer Ramp G shall be removed prior to Ramp E construction.

▨ Approximate limits of Reinforced Soil Mass



PARAPET MOUNTED LIGHT POLE

PRELIMINARY

SOIL BORING LOCATIONS

Boring No.	Station	Offset	Northing	Easting
B18	506+81.72	5.08' Rt.	1266611.090	999025.606
B19	508+81.19	1.38' Rt.	1266722.099	998859.480
B20A	510+83.87	1.21' Lt.	1266807.235	998675.757
B20B	510+80.98	7.13' Lt.	1266800.678	998676.320
B21	512+39.59	13.53' Rt.	1266867.987	998530.909

DS-11 SCUPPER LOCATIONS

STATION	OFFSET	STATION	OFFSET	STATION	OFFSET	STATION	OFFSET	STATION	OFFSET	STATION	OFFSET
507+49.00	32.5' Lt.	510+49.00	32.5' Lt.	513+49.00	32.5' Lt.	516+49.00	32.5' Lt.	519+49.00	32.5' Lt.	522+49.00	32.5' Lt.
507+99.00	32.5' Lt.	510+99.00	32.5' Lt.	513+99.00	32.5' Lt.	516+99.00	32.5' Lt.	519+99.00	32.5' Lt.	522+99.00	32.5' Lt.
508+49.00	32.5' Lt.	511+49.00	32.5' Lt.	514+49.00	32.5' Lt.	517+49.00	32.5' Lt.	520+49.00	32.5' Lt.	523+49.00	32.5' Lt.
508+99.00	32.5' Lt.	511+99.00	32.5' Lt.	514+99.00	32.5' Lt.	517+99.00	32.5' Lt.	520+99.00	32.5' Lt.	523+99.00	32.5' Lt.
509+49.00	32.5' Lt.	512+49.00	32.5' Lt.	515+49.00	32.5' Lt.	518+49.00	32.5' Lt.	521+49.00	32.5' Lt.	524+49.00	32.5' Lt.
509+99.00	32.5' Lt.	512+99.00	32.5' Lt.	515+99.00	32.5' Lt.	518+99.00	32.5' Lt.	521+99.00	32.5' Lt.		

L:\IDOT\106802\Draw\CADD_Sheets\Structural Sheets\TSLs\...

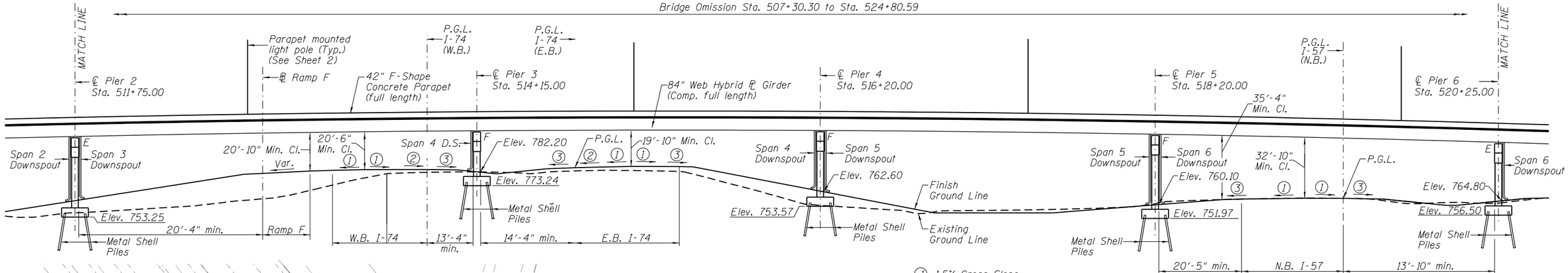
CMT

USER NAME = Christopher Whitfield	DESIGNED CJW	REVISED
...\D570897-TSL-(1)_Ramp E over I74 and I57.dgn	CHECKED WLB	REVISED
PLOT SCALE =	DRAWN GLD	REVISED
PLOT DATE =	CHECKED CJW	REVISED

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

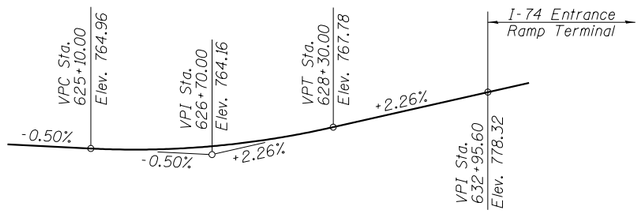
I-57 & I-74 INTERCHANGE
STRUCTURE NO. 010-1001 – GENERAL PLAN I
SHEET NO. OF SHEETS

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
				2
		CONTRACT NO.		
	ILLINOIS FED. AID PROJECT			



ELEVATION

① 1.5% Cross Slope
② 2.0% Cross slope
③ 4.0% Cross Slope



PROPOSED RAMP F PROFILE

NOTE:

1. Horizontal clearance given from E.O.P. to Pier Cap.
2. See Plan View for location of Temporary Sheet piling.

PLAN

NOTE:

1. Existing Loop Ramp D shall be in service during Ramp E construction.

SOIL BORING LOCATIONS

Boring No.	Station	Offset	Northing	Easting
B21	512+39.59	13.53' Rt.	1266867.987	998530.909
B22	514+32.86	15.86' Rt.	1266902.120	998338.552
B23	516+15.94	13.31' Rt.	1266902.016	998153.483
B24	517+87.57	19.18' Rt.	1266885.527	997980.444
B25	519+75.77	7.88' Rt.	1266823.499	997800.440

PRELIMINARY

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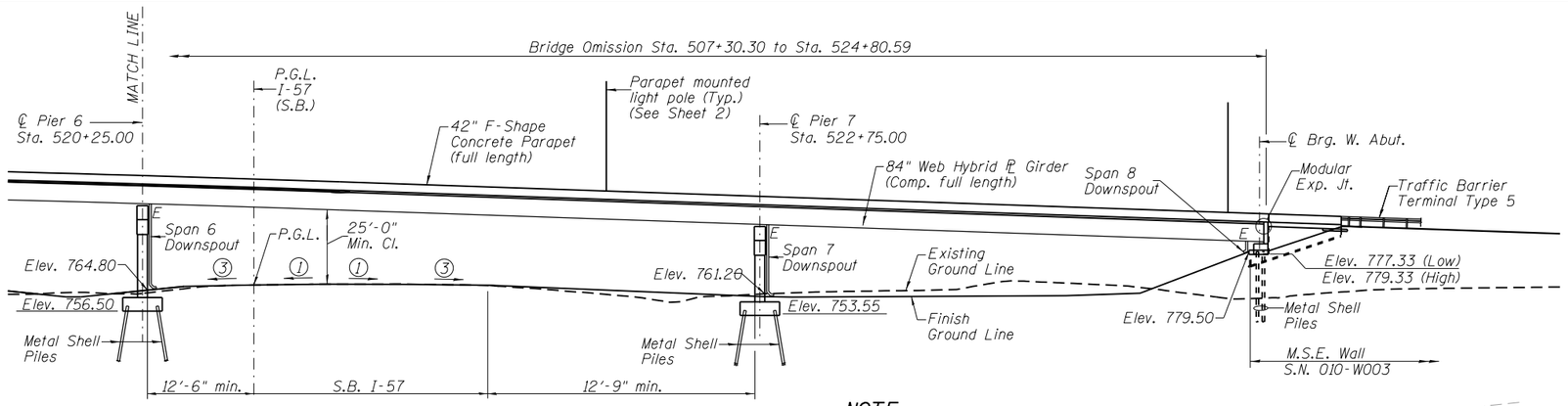
CMT

USER NAME = Christopher Whitfield	DESIGNED CJW	REVISED
...\D570897-TSL-(2).Ramp E over I74 and I57.dgn	CHECKED WLB	REVISED
PLOT SCALE =	DRAWN GLD	REVISED
PLOT DATE =	CHECKED CJW	REVISED

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

I-57 & I-74 INTERCHANGE
STRUCTURE NO. 010-1001 – GENERAL PLAN II
SHEET NO. OF SHEETS

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
				3
		CONTRACT NO.		
	ILLINOIS FED. AID PROJECT			



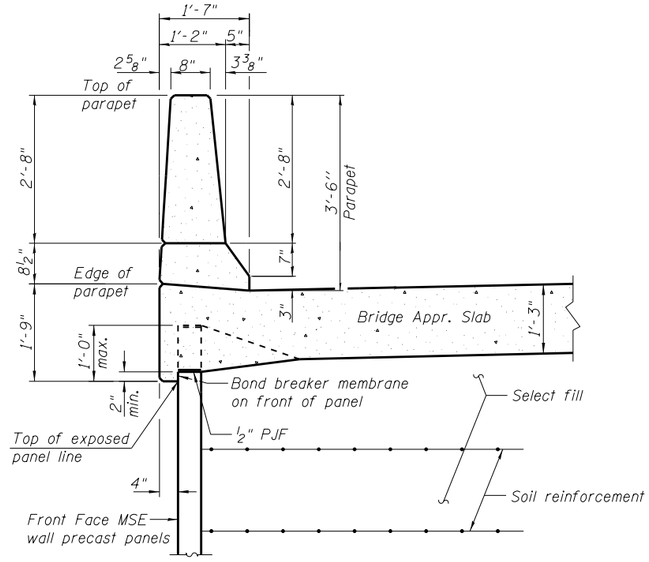
ELEVATION

LEGEND

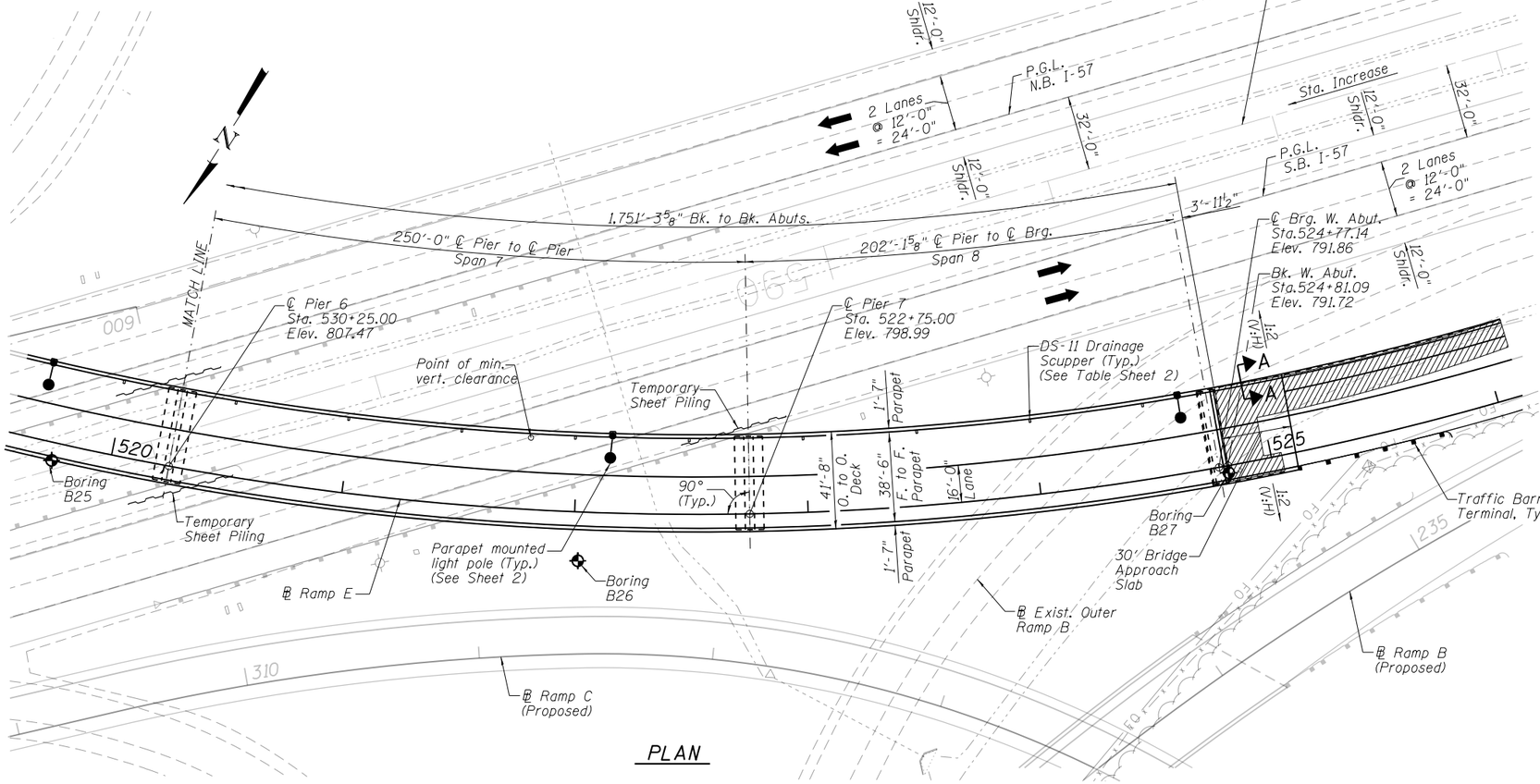
① 1.5% Cross Slope
② 2.0% Cross slope
③ 4.0% Cross Slope

NOTE:

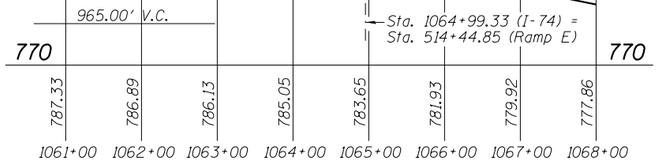
1. Horizontal clearance given from E.O.P. to Pier Cap.
2. See Plan View for location of Temporary Sheet piling.



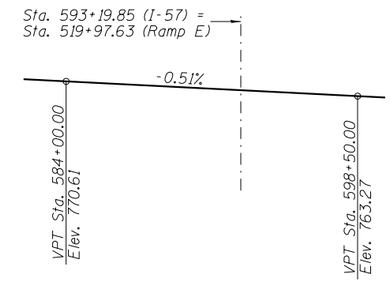
SECTION A-A



PLAN



PROPOSED F.A.I. RTE. 74 PROFILE



PROPOSED F.A.I. RTE. 57 PROFILE

NOTE:

1. Existing Outer Ramp B shall be temporarily relocated to not impede West Abutment construction.

Approximate limits of Reinforced Soil Mass

SOIL BORING LOCATIONS

Boring No.	Station	Offset	Northing	Easting
B25	519+75.77	7.88' Rt.	1266823.499	997800.440
B26	522+02.29	20.96' Rt.	1266738.141	997587.740
B27	524+80.74	3.09' Rt.	1266556.248	997373.411

PRELIMINARY

CMT

USER NAME = Christopher Whitfield	DESIGNED CJW	REVISED
...\D570897-TSL-(3)_Ramp E over I74 and I57.dgn	CHECKED WLB	REVISED
PLOT SCALE =	DRAWN GLD	REVISED
PLOT DATE =	CHECKED CJW	REVISED

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

I-57 & I-74 INTERCHANGE
STRUCTURE NO. 010-1001 – GENERAL PLAN III
SHEET NO. OF SHEETS

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
				4

CONTRACT NO.
ILLINOIS FED. AID PROJECT

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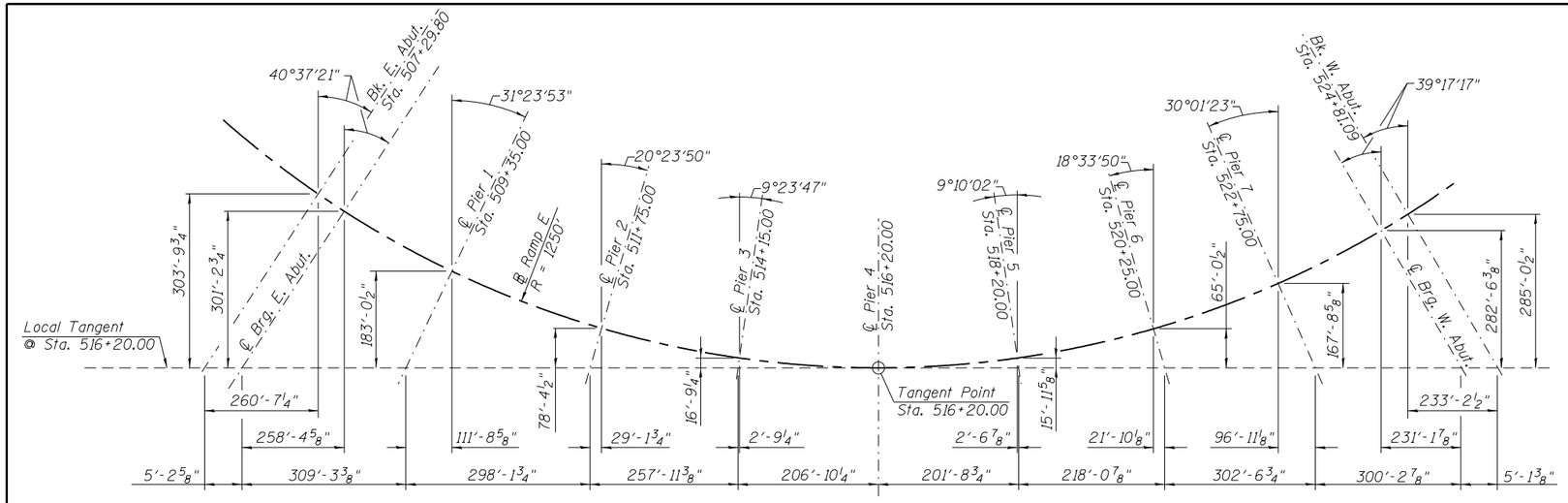
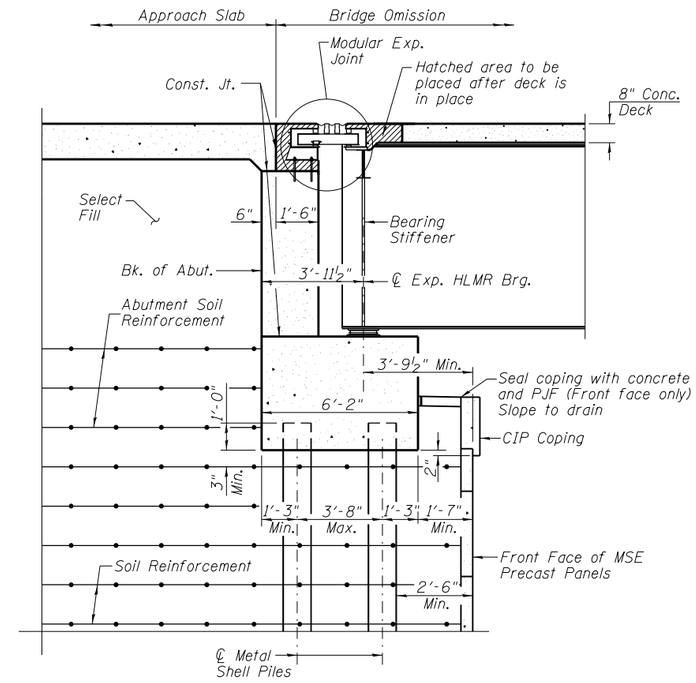
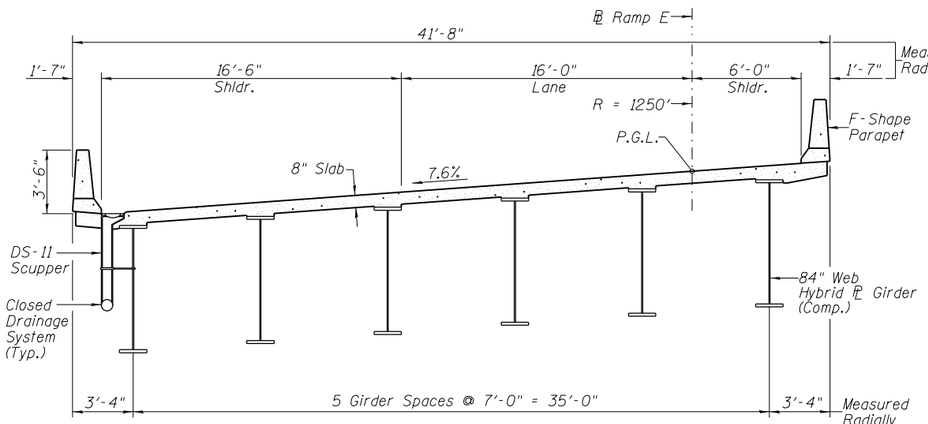


OFFSET SKETCH

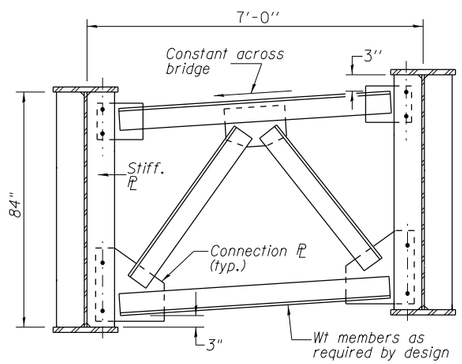


SECTION THRU ABUTMENT

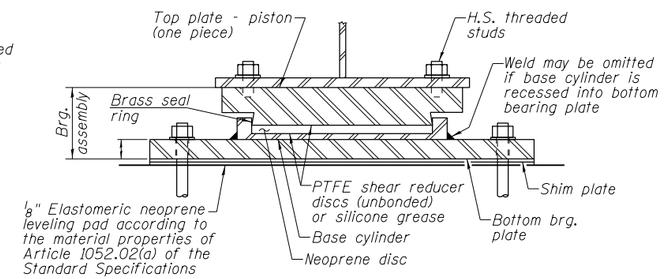


CROSS SECTION

(Looking Upstation)



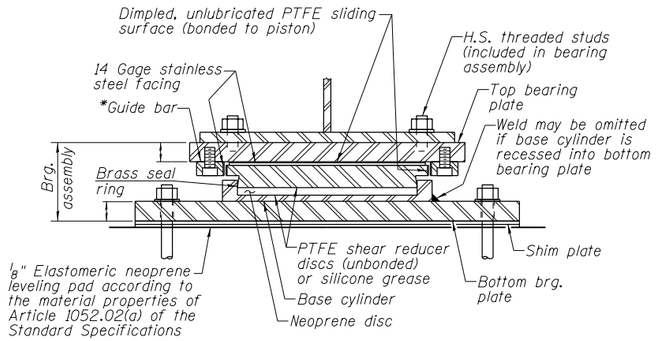
INTERIOR CROSS FRAME



FIXED HLMR BEARING

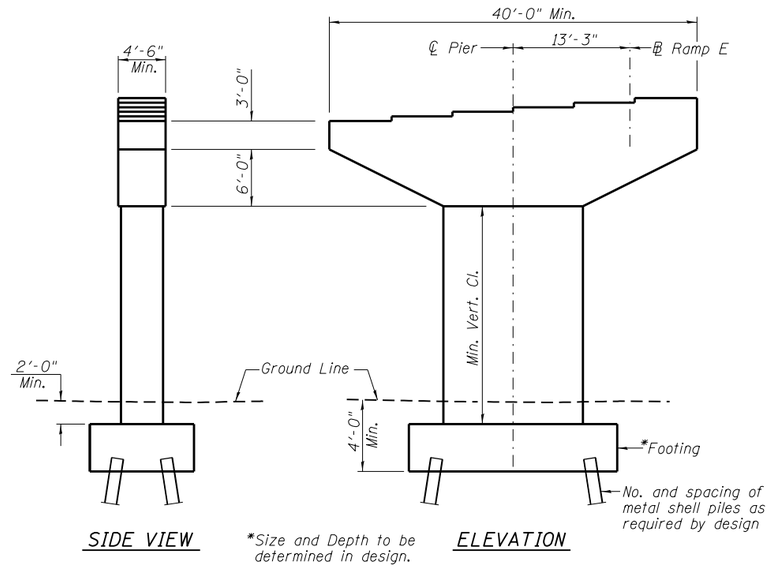
Pier 3 - 5

*As alternates to the bolted connection shown, the guide bars may be connected to the top bearing plate by groove welds or the guide bars and top bearing plate may be fabricated as a single piece.



GUIDED EXPANSION HLMR BEARING

E. Abut., Pier 1, 2, 6 & 7, and W. Abut.



PIER 1 THRU PIER 7 SKETCH

(Looking Upstation)

PRELIMINARY

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USER NAME = Christopher Whitfield	DESIGNED CJW	REVISED
...\D570897-TSL-(4)_Ramp E over I74 and I57.dgn	CHECKED WLB	REVISED
PLOT SCALE =	DRAWN GLD	REVISED
PLOT DATE =	CHECKED CJW	REVISED

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

I-57 & I-74 INTERCHANGE
STRUCTURE NO. 010-1001 - GENERAL DETAILS
SHEET NO. OF SHEETS

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
				5
		CONTRACT NO.		
	ILLINOIS FED. AID PROJECT			

Appendix B

Subsurface Boring Logs

Illinois Department of Transportation

Division of Highways
Bacone Farmer Workmand Engineering & Testing, LLC

SOIL BORING LOG

Date 1/27/15

ROUTE I-57/74 DESCRIPTION South Abut - Ramp E LOGGED BY TC

SECTION 10(5-1-RS-1, 14-1,6)R LOCATION , SEC. 34, TWP. 20N, RNG. 8E, 3rd PM,
Latitude 40.144661, Longitude -88.280481

COUNTY Champaign DRILLING METHOD HSA HAMMER TYPE Auto

STRUCT. NO.
Station

BORING NO. B-18
Station 506+81.72
Offset 5.1 ft RT
Ground Surface Elev. 754.24 ft

Surface Water Elev. n/a ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 702.2 ft ▼
Upon Completion ft
After ____ Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Soil Description
				TOPSOIL: Silty Clay, dark brown
				753.24
	1			SILTY CLAY LOAM: Gray to Brown, medium, moist
	4 3	0.8 B	26	
				751.24
	1			SILTY CLAY LOAM: Gray to Brown, soft, moist
-5	1 1	0.3 B	23	
				748.74
	5			SAND: Brown, medium dense, wet, coarse
	5 9		17	
				746.24
	3			SILTY CLAY TILL: Gray, soft, wet
-10	5 8	0.4 B	13	
				743.74
	3			SILTY CLAY LOAM: Brown, stiff, moist
	5 7	1.1 B	14	
				741.24
	6			SILTY CLAY TILL: Gray, stiff, moist
-15	7 11	1.7 B	11	
	3			
	6 9	1.2 B	12	
	6			
-20	8 10	1.4 B	11	
				SILTY CLAY TILL: Gray, stiff, moist *(continued)*
	6			
-25	8 12	1.2 B	11	
	5			
-30	7 8	1.5 B	11	
				722.74
				SILTY CLAY TILL: Gray, soft, moist, trace sand
	5			
-35	13 13	0.5 P	10	
				717.74
				SILTY CLAY TILL: Gray, stiff, moist
	6			
-40	8 11	1.3 B	12	

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

BBS, form 137 (Rev. 8-99)

Illinois Department of Transportation
Division of Highways
Bacone Farmer Workmand Engineering & Testing, LLC

SOIL BORING LOG

Date 1/27/15

ROUTE I-57/74 DESCRIPTION South Abut - Ramp E LOGGED BY TC

SECTION 10(5-1-RS-1, 14-1,6)R LOCATION , SEC. 34, TWP. 20N, RNG. 8E, 3rd PM,
Latitude 40.144661, Longitude -88.280481

COUNTY Champaign DRILLING METHOD HSA HAMMER TYPE Auto

STRUCT. NO. _____
Station _____

BORING NO. B-18
Station 506+81.72
Offset 5.1 ft RT
Ground Surface Elev. 754.24 ft

Surface Water Elev. n/a ft
Stream Bed Elev. _____ ft

Groundwater Elev.:
First Encounter 702.2 ft ▼
Upon Completion _____ ft
After _____ Hrs. _____ ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				SILTY CLAY TILL: Gray, stiff, moist *(continued)*
	7			
-45	9 12	1.4 B	12	
	6			
-50	9 15	1.4 B	12	
702.24 ▼				
				SILTY CLAY TILL: Gray, stiff, wet
	5			
-55	7 11	1.3 B	14	
	6			
-60	10 15	1.7 B	14	
				SILTY CLAY TILL: Gray, stiff, wet *(continued)*
	4			
-65	9 12	1.6 B	13	
687.24				
				SILTY CLAY TILL: Gray, very stiff, moist
	7			
-70	10 15	2.1 B	13	
682.74				
				SILTY CLAY TILL: Gray, stiff, moist
	6			
679.24 -75	9 15	1.5 B	13	
				End of Boring
-80				

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

BBS, form 137 (Rev. 8-99)

Illinois Department of Transportation

Division of Highways
Bacone Farmer Workmand Engineering & Testing, LLC

SOIL BORING LOG

Date 2/3/15

ROUTE I-57/74 DESCRIPTION Pier Boring Ramp E LOGGED BY TC

SECTION 10(5-1-RS-1, 14-1,6)R LOCATION , SEC. 34, TWP. 20N, RNG. 8E, 3rd PM,
Latitude 40.144966, Longitude -88.281075

COUNTY Champaign DRILLING METHOD HSA HAMMER TYPE AUTO

STRUCT. NO. _____
Station _____

BORING NO. B-19
Station 508+81.19
Offset 1.4 ft RT
Ground Surface Elev. 756.38 ft

Surface Water Elev. _____ ft
Stream Bed Elev. _____ ft

Groundwater Elev.:
First Encounter _____ ft
Upon Completion _____ ft
After _____ Hrs. _____ ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Material
				6" TOPSOIL 755.88
	2			SILTY CLAY LOAM: Brown, medium
	2 4	0.7 B	31	
				753.38
	1			SILTY CLAY LOAM: Brown, soft
-5	2 3	0.4 B	28	
	1			
	2 2	0.5 B	29	
				748.38
	18			SANDY CLAY LOAM: Brown, stiff
-10	15 4	1.8 P	14	
	12			
	23 11	1.5 P	16	
				743.38
	4			SANDY CLAY LOAM: Gray, stiff
-15	6 8	1.9 B	13	
				740.88
	3			SILTY CLAY TILL: Gray, stiff
	8 8	2.9 B	12	
	3			
-20	6 7	2.3 B	12	
				SILTY CLAY TILL: Gray, stiff *(continued)*
	4			
-25	7 9	2.3 B	12	
				729.38
	6			SANDY CLAY TILL: Gray, very stiff
-30	12 19	3.3 B	9	
				724.38
	6			SILTY SAND: Gray, dense
-35	14 19		9	
				719.38
	4			SILTY CLAY TILL: Gray, very stiff
-40	6 11	2.4 B	13	water in pipe

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

BBS, form 137 (Rev. 8-99)

Illinois Department of Transportation
Division of Highways
Bacone Farmer Workmand Engineering & Testing, LLC

SOIL BORING LOG

Date 2/3/15

ROUTE I-57/74 DESCRIPTION Pier Boring Ramp E LOGGED BY TC

SECTION 10(5-1-RS-1, 14-1,6)R LOCATION , SEC. 34, TWP. 20N, RNG. 8E, 3rd PM,
Latitude 40.144966, Longitude -88.281075

COUNTY Champaign DRILLING METHOD HSA HAMMER TYPE AUTO

STRUCT. NO. _____
Station _____

BORING NO. B-19
Station 508+81.19
Offset 1.4 ft RT
Ground Surface Elev. 756.38 ft

Surface Water Elev. _____ ft
Stream Bed Elev. _____ ft

Groundwater Elev.:
First Encounter _____ ft
Upon Completion _____ ft
After _____ Hrs. _____ ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Material
				SILTY CLAY TILL: Gray, very stiff *(continued)*
	5			
-45	8 12	2.1 B	13	
709.38				
				SILTY CLAY TILL: Gray, stiff
	3			
-50	6 8	2.0 B	14	
704.38				
				SILTY CLAY LOAM TILL: Gray, stiff
	4			
-55	9 12	1.8 B	13	
699.38				
				SILTY CLAY TILL: Gray, stiff
	4			
-60	6 11	1.9 B	13	
				SILTY CLAY TILL: Gray, stiff *(continued)*
	3			
-65	9 10	1.7 B	13	
689.38				
				SILTY CLAY TILL: Gray, very stiff
	5			
-70	10 12	2.9 B	13	
	7			
681.38 -75	11 16	2.7 B	13	
				End of Boring
-80				

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

BBS, form 137 (Rev. 8-99)

Illinois Department of Transportation

Division of Highways
Bacone Farmer Workmand Engineering & Testing, LLC

SOIL BORING LOG

Date 2/4/15

ROUTE I-57/74 DESCRIPTION Pier Ramp E LOGGED BY TLM

SECTION 10(5-1-RS-1, 14-1,6)R LOCATION , SEC. 34, TWP. 20N, RNG. 8E, 3rd PM,
Latitude 40.145200, Longitude -88.281732

COUNTY Champaign DRILLING METHOD HSA HAMMER TYPE AUTO

STRUCT. NO.
Station

BORING NO. B-20A
Station 510+83.87
Offset 1.2 ft LT
Ground Surface Elev. 756.18 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 747.2 ft ▼
Upon Completion washed ft
After Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				6" TOPSOIL: Silty Clay, brown 755.68
	7			SILTY CLAY: Brown, very stiff
	8 7	3.3 B	15	
				753.18
	3			SILTY CLAY: Brown with Gray, medium, trace sand
-5	4 6	1.0 B	17	
				750.68
	4			SILTY CLAY LOAM: Brown, hard
	8 10	4.1 B	13	
				748.18
	5			SAND: Brown, medium dense, medium to coarse, wet ▼
-10	8 11	3.7 B	16	746.68
	7			SILTY CLAY LOAM TILL: Gray, very stiff to hard
	10 10	4.5 B	11	
				743.18
	4			SILTY CLAY LOAM TILL: Gray, very stiff
-15	6 7	3.3 B	11	
	3			
	6 7	2.5 B	13	
				738.18
	2			SILTY CLAY TILL: Gray, stiff
-20	4 5	1.8 B	13	

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				SILTY CLAY TILL: Gray, stiff *(continued)*
				734.18
				SANDY CLAY LOAM TILL: Gray, hard
	8			
	20	3.3	10	731.68
-25	22	B		SAND: Gray, fine, dense
				729.18
				SAND AND GRAVEL: Gray, medium, medium dense
	7			(washed sand from auger)
	14		11	
-30	8			
				724.18
				SILTY CLAY TILL: Gray, very hard
	22			
	22	4.5	14	
-35	50/1"	P		721.18
				End of Boring
-40				

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

BBS, form 137 (Rev. 8-99)

Illinois Department of Transportation

Division of Highways
Bacone Farmer Workmand Engineering & Testing, LLC

SOIL BORING LOG

Date 2/5/15

ROUTE I-57/74 DESCRIPTION Pier Ramp E LOGGED BY TLM

SECTION 10(5-1-RS-1, 14-1,6)R LOCATION , SEC. 34, TWP. 20N, RNG. 8E, 3rd PM,
Latitude 40.145182, Longitude -88.281730

COUNTY Champaign DRILLING METHOD HSA HAMMER TYPE AUTO

STRUCT. NO. _____
Station _____

BORING NO. B-20B
Station 510+80.98
Offset 7.1 ft LT
Ground Surface Elev. 756.18 ft

Surface Water Elev. _____ ft
Stream Bed Elev. _____ ft

Groundwater Elev.:
First Encounter 747.2 ft ▼
Upon Completion _____ ft
After 18 Hrs. 711.4 ft ▽

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				BLIND DRILLING
-5				
▼				
-10				
-15				
-20				
				BLIND DRILLING *(continued)*
-25				
-30				
722.68				
	8			SILTY CLAY TILL: Gray, hard
	14	4.5	12	
-35	19	B		
719.68				
				SILTY CLAY LOAM TILL: Gray, hard
	8			
	12	4.3	13	
-40	17	B		

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

BBS, form 137 (Rev. 8-99)

Illinois Department of Transportation
Division of Highways
Bacone Farmer Workmand Engineering & Testing, LLC

SOIL BORING LOG

Date 2/5/15

ROUTE I-57/74 DESCRIPTION Pier Ramp E LOGGED BY TLM

SECTION 10(5-1-RS-1, 14-1,6)R LOCATION , SEC. 34, TWP. 20N, RNG. 8E, 3rd PM,
Latitude 40.145182, Longitude -88.281730

COUNTY Champaign DRILLING METHOD HSA HAMMER TYPE AUTO

STRUCT. NO. _____
Station _____

BORING NO. B-20B
Station 510+80.98
Offset 7.1 ft LT
Ground Surface Elev. 756.18 ft

Surface Water Elev. _____ ft
Stream Bed Elev. _____ ft

Groundwater Elev.:
First Encounter 747.2 ft ▼
Upon Completion _____ ft
After 18 Hrs. 711.4 ft ▽

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
SILTY CLAY LOAM TILL: Gray, hard *(continued)*		6		
		10 14	2.5 B	13
711.18	-45			
SILTY CLAY LOAM TILL: Gray, very stiff 2-4-15 Pulley broke on wench Stopped drilling for the day at 11:05 A 2-5-15 Pulley fixed begin drilling at 9:40		7		
		8 18	3.3 B	11
	-50			
cobbly		7		
		10 14	2.9 B	13
	-55			
699.18				
SILTY FINE SAND TO SILT: Gray, medium dense		4		
		7 11	4.5 P	17
696.68	-60			

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
SILTY CLAY LOAM TILL: Gray, hard *(continued)* cobbly		7		
3" silt seam @ 63.5'		10 12	2.9 B	14
	-65			
		6		
2" silt seam @ 69'		10 16	3.1 B	15
	-70			
		6		
		11 13		12
681.18	-75			
End of Boring	-80			

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

BBS, form 137 (Rev. 8-99)

Illinois Department of Transportation

Division of Highways
Bacone Farmer Workmand Engineering & Testing, LLC

SOIL BORING LOG

Date 2/5/15

ROUTE I-57/74 DESCRIPTION Pier Ramp E LOGGED BY TLM

SECTION 10(5-1-RS-1, 14-1,6)R LOCATION , SEC. 34, TWP. 20N, RNG. 8E, 3rd PM,
Latitude 40.145367, Longitude -88.282250

COUNTY Champaign DRILLING METHOD HSA HAMMER TYPE AUTO

STRUCT. NO.
Station

BORING NO. B-21
Station 512+39.59
Offset 13.5 ft RT
Ground Surface Elev. 759.18 ft

Surface Water Elev. n/a ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 732.2 ft ▼
Upon Completion washed ft
After Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				10" TOPSOIL: Silty Clay, dark brown
758.38				
	4			SILTY CLAY: Brown, very stiff
	7 7	2.5 B	24	
756.18				
	2			SILTY CLAY: Brown, stiff
-5	4 6	1.4 B	21	
753.68				
	3			SILTY CLAY: Brown, very stiff
	7 7	2.1 B	15	
751.18				
	3			SILTY CLAY TILL: Gray, very stiff
-10	6 8	2.1 B	12	
748.68				
	3			SILTY CLAY LOAM TILL: Gray, stiff
	5 7	1.7 B	12	
	3			
-15	4 5	1.8 B	12	
	2			
	3 5	1.2 B	13	
	2			
739.68				
-20	6 11	1.0 B	12 18	

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				SILTY SAND: Gray, fine, medium dense *(continued)*
737.18				
				SILTY CLAY LOAM TILL: Gray, stiff
	3			
-25	2 6	1.1 B	11	
732.18 ▼				
				SAND: Gray, fine to medium, medium dense, trace gravel
	7			
-30	3 16		18	
	3			
725.18				washed auger
	3			
-35	8 12	3.7 B	13	SILTY CLAY LOAM TILL: Brown, very stiff
	10			
-40	15 18	3.9 B	11	

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

BBS, form 137 (Rev. 8-99)

Illinois Department of Transportation
Division of Highways
Bacone Farmer Workmand Engineering & Testing, LLC

SOIL BORING LOG

Date 2/5/15

ROUTE I-57/74 DESCRIPTION Pier Ramp E LOGGED BY TLM

SECTION 10(5-1-RS-1, 14-1,6)R LOCATION , SEC. 34, TWP. 20N, RNG. 8E, 3rd PM,
Latitude 40.145367, Longitude -88.282250

COUNTY Champaign DRILLING METHOD HSA HAMMER TYPE AUTO

STRUCT. NO.
Station

BORING NO. B-21
Station 512+39.59
Offset 13.5 ft RT
Ground Surface Elev. 759.18 ft

Surface Water Elev. n/a ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 732.2 ft ▼
Upon Completion washed ft
After Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				SILTY CLAY LOAM TILL: Brown, very stiff *(continued)*
717.18				
				SILTY CLAY TILL: Gray, medium stiff
	6			
-45	8 11	1.0 B	14	
712.18				
				SILTY CLAY LOAM TILL: Gray, stiff
	2			
-50	3 5	1.4 B	15	
707.18				
				SILTY CLAY LOAM TILL: Gray, very stiff LL: 21 PL:11 PI: 10
	4			
-55	7 12	2.1 B	14	
702.18				
				SILT: Gray, hard
	5			
-60	9 20	4.3 B	17	4" silt seam @ 59.5'
				SILT: Gray, hard *(continued)*
698.18				
				SILTY CLAY LOAM TILL: Gray, stiff
	3			
-65	6 12	1.8 B	13	
692.18				
				CLAY LOAM TILL: Gray, very stiff
	4			
-70	6 11	2.1 B	13	
	5			
684.18 -75	11 14	2.1 B	12	
				End of Boring
-80				

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

BBS, form 137 (Rev. 8-99)

Illinois Department of Transportation

Division of Highways
Bacone Farmer Workmand Engineering & Testing, LLC

SOIL BORING LOG

Date 2/6/15

ROUTE I-57/74 DESCRIPTION Pier Ramp E LOGGED BY TLM

SECTION 10(5-1-RS-1, 14-1,6)R LOCATION , SEC. 34, TWP. 20N, RNG. 8E, 3rd PM,
Latitude 40.145461, Longitude -88.282938

COUNTY Champaign DRILLING METHOD HSA HAMMER TYPE AUTO

STRUCT. NO. _____
Station _____

BORING NO. B-22
Station 514+32.86
Offset 15.9 ft RT
Ground Surface Elev. 780.54 ft

Surface Water Elev. _____ ft
Stream Bed Elev. _____ ft

Groundwater Elev.:
First Encounter 734.0 ft ▼
Upon Completion _____ ft
After _____ Hrs. _____ ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				8" TOPSOIL
779.87				
	1			FILL: Silty Clay, brown, medium
	2	0.8	17	
	4	B		
777.54				
				FILL: Silty Clay, brown, stiff, trace gravel
	6			
	9	1.8	9	
-5	9	B		
775.04				
				FILL: Silty Clay, brown, very stiff, with limestone pieces
	5			
	5	2.9	12	
	13	B		
	10			
	11	2.3	9	
-10	13	B		
770.04				
				FILL: Silty Clay, brown, stiff, with pieces of concrete
	5			
	14	1.5	12	
	17	P		
767.54				
				FILL: Silty Clay, brown, very stiff
	5			
	8	2.9	16	
-15	11	B		
	6			
	9	2.9	14	
	9	B		
	4			
	8	4.6	18	
760.54 -20	6	B		

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				FILL: Silty Clay, brown/gray, stiff
	3			
	3	1.7	25	
-25	4	B		
753.54				
				SILTY CLAY: Brown, very stiff
	4			
	6	3.7	14	
-30	9	B		
748.54				
				SILTY CLAY TILL: Gray, hard
	4			
	10	4.7	11	
-35	10	B		
743.54				
				SILTY CLAY TILL: Gray, very stiff
	5			
	10	2.9	11	
-40	12	B		

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
Bacone Farmer Workmand Engineering & Testing, LLC

SOIL BORING LOG

Date 2/6/15

ROUTE I-57/74 DESCRIPTION Pier Ramp E LOGGED BY TLM

SECTION 10(5-1-RS-1, 14-1,6)R LOCATION , SEC. 34, TWP. 20N, RNG. 8E, 3rd PM,
Latitude 40.145461, Longitude -88.282938

COUNTY Champaign DRILLING METHOD HSA HAMMER TYPE AUTO

STRUCT. NO. _____
Station _____

BORING NO. B-22
Station 514+32.86
Offset 15.9 ft RT
Ground Surface Elev. 780.54 ft

Surface Water Elev. _____ ft
Stream Bed Elev. _____ ft

Groundwater Elev.:
First Encounter 734.0 ft ▼
Upon Completion _____ ft
After _____ Hrs. _____ ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
SILTY CLAY TILL: Gray, very stiff *(continued)*		4		
	-45	8 8	2.1 B	12
734.04 ▼				
SAND: Gray, dense, medium to coarse, trace gravel				
731.54		13		13
SILTY CLAY LOAM TILL: Gray, very stiff		19		
	-50	25	3.7 B	8
728.04				
SILTY CLAY TILL: Brown, stiff		4		
	-55	7 10	1.9 B	14
723.04				
SILTY CLAY TILL: Gray, very stiff		5		
	-60	8 11	2.7 B	12
SILTY CLAY TILL: Gray, very stiff *(continued)*		3		
	-65	6 7	1.5 B	14
LL: 22 PL: 13 PI: 9				
		3		
	-70	6 10	1.1 B	14
708.54				
SILTY CLAY LOAM TILL: Gray, stiff LL: 21 PL: 12 PI: 9		5		
705.54	-75	9 11	1.9 B	13
End of Boring	-80			

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

BBS, form 137 (Rev. 8-99)

Illinois Department of Transportation

Division of Highways
Bacone Farmer Workmand Engineering & Testing, LLC

SOIL BORING LOG

Date 2/9/15

ROUTE I-57/74 DESCRIPTION Pier Boring Ramp E LOGGED BY TLM

SECTION 10(5-1-RS-1, 14-1,6)R LOCATION , SEC. 34, TWP. 20N, RNG. 8E, 3rd PM,
Latitude 40.145461, Longitude -88.283600

COUNTY Champaign DRILLING METHOD HSA HAMMER TYPE AUTO

STRUCT. NO. _____
Station _____

BORING NO. B-23
Station 516+15.94
Offset 13.3 ft RT
Ground Surface Elev. 761.81 ft

Surface Water Elev. n/a ft
Stream Bed Elev. _____ ft

Groundwater Elev.:
First Encounter 717.8 ft ▼
Upon Completion _____ ft
After _____ Hrs. _____ ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
TOPSOIL: Silty Clay, dark brown		2		
759.81		3 5	2.3 B	25
CLAY: Brown, stiff		2		
	-5	2 2	1.5 B	28
756.31				
SILTY CLAY: Brown, soft		1		
755.31		1 1	0.4 B	29
SILTY CLAY: Gray, soft		2		
753.81		3 6	0.7 B	16
SILTY CLAY: Brown, soft	-10	3		
751.31		5 8	2.5 B	13
SILTY CLAY TILL: Brown/Gray, very stiff		4		
748.81		6 9	2.3 B	12
SILTY CLAY TILL: Gray, very stiff	-15	3		
746.31		6 8	2.3 B	11
SILTY CLAY LOAM TILL: Gray, very stiff		3		
743.81		4 6	1.8 B	12
SILTY CLAY TILL: Gray, stiff	-20			

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
SILTY CLAY TILL: Gray, stiff *(continued)*		2		
	-25	4 7	1.4 B	13
734.81				
SILTY CLAY TILL: Gray, very stiff, with very thin sand seams		4		
	-30	6 8	2.1 B	12
729.81				
SILTY CLAY LOAM TILL: Gray, soft		3		
	-35	4 6	0.5 B	11
724.81				
SILTY CLAY LOAM TILL: Gray, very hard		6		
	-40	11 14	8.5 B	11

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
Bacone Farmer Workmand Engineering & Testing, LLC

SOIL BORING LOG

Date 2/9/15

ROUTE I-57/74 DESCRIPTION Pier Boring Ramp E LOGGED BY TLM

SECTION 10(5-1-RS-1, 14-1,6)R LOCATION , SEC. 34, TWP. 20N, RNG. 8E, 3rd PM,
Latitude 40.145461, Longitude -88.283600

COUNTY Champaign DRILLING METHOD HSA HAMMER TYPE AUTO

STRUCT. NO. _____
Station _____

BORING NO. B-23
Station 516+15.94
Offset 13.3 ft RT
Ground Surface Elev. 761.81 ft

Surface Water Elev. n/a ft
Stream Bed Elev. _____ ft

Groundwater Elev.:
First Encounter 717.8 ft ▼
Upon Completion _____ ft
After _____ Hrs. _____ ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				SILTY CLAY LOAM TILL: Gray, very hard *(continued)*
	4			▼
-45	4 7	1.6 B	13	
				714.81
				SILTY CLAY TILL: Gray, stiff
	3			
-50	4 6	1.1 B	14	
	4			
-55	5 8	1.7 B	14	
				704.81
				SILTY CLAY TILL: Gray, stiff, with silt seams
	3			
-60	5 7	1.2 B	15	
				SILTY CLAY TILL: Gray, stiff, with silt seams *(continued)*
				699.81
				SILTY CLAY TILL: Gray, stiff
	3			
-65	5 7	1.6 B	14	
	4			
-70	7 8	1.8 B	14	
	6			
-75	8 9	1.8 B	13	
				686.81
				End of Boring
-80				

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

BBS, form 137 (Rev. 8-99)

Illinois Department of Transportation

Division of Highways
Bacone Farmer Workmand Engineering & Testing, LLC

SOIL BORING LOG

Date 2/9/15

ROUTE I-57/74 DESCRIPTION Pier Ramp E LOGGED BY TLM

SECTION 10(5-1-RS-1, 14-1,6)R LOCATION , SEC. 34, TWP. 20N, RNG. 8E, 3rd PM,
Latitude 40.145416, Longitude -88.284219

COUNTY Champaign DRILLING METHOD HSA HAMMER TYPE AUTO

STRUCT. NO.
Station

BORING NO. B-24
Station 517+87.57
Offset 19.2 ft RT
Ground Surface Elev. 760.71 ft

Surface Water Elev. n/a ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 691.7 ft ▼
Upon Completion ft
After Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Material
				5" TOPSOIL: Silty Clay, dark brown — 760.31
	2			SILTY CLAY: Brown, stiff
	4 5	1.2 S	20	
	3			
-5	5 4	1.9 B	19	
				755.21
	3			SILTY CLAY: Brown/Gray, stiff
	5 6	1.5 B	15	
				752.71
	3			SILTY CLAY LOAM: Gray, stiff, with silt seams
-10	6 7	1.7 S	14	
				750.21
	3			SILTY CLAY: Gray, very stiff
	4 8	2.5 B	16	
				747.71
	3			SILTY CLAY TILL: Gray, very stiff
-15	4 8	2.1 B	11	
	4			
	6 8	2.3 B	12	
				742.71
	3			SILTY CLAY TILL: Gray, stiff
-20	7 7	1.7 B	13	
	3			
-25	5 7	1.7 B	13	
				SILTY CLAY TILL: Gray, stiff *(continued)*
	4			
-30	7 8	1.5 P	10	
				728.71
	3			SILTY CLAY TILL: Gray, very stiff, with thin sand seams
-35	5 6	2.5 B	12	
	7			
-40	9 9		12	

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

BBS, form 137 (Rev. 8-99)

Illinois Department of Transportation
Division of Highways
Bacone Farmer Workmand Engineering & Testing, LLC

SOIL BORING LOG

Date 2/9/15

ROUTE I-57/74 DESCRIPTION Pier Ramp E LOGGED BY TLM

SECTION 10(5-1-RS-1, 14-1,6)R LOCATION , SEC. 34, TWP. 20N, RNG. 8E, 3rd PM,
Latitude 40.145416, Longitude -88.284219

COUNTY Champaign DRILLING METHOD HSA HAMMER TYPE AUTO

STRUCT. NO. _____
Station _____

BORING NO. B-24
Station 517+87.57
Offset 19.2 ft RT
Ground Surface Elev. 760.71 ft

Surface Water Elev. n/a ft
Stream Bed Elev. _____ ft

Groundwater Elev.:
First Encounter 691.7 ft ▼
Upon Completion _____ ft
After _____ Hrs. _____ ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				SILTY CLAY TILL: Gray, very stiff, with thin sand seams *(continued)*
718.71				
				SILTY CLAY TILL: Gray, stiff, with 4" silt seam @ 44'
	5			
-45	6 6	1.7 B	14	
	3			
	6 8		15	Very disturbed sample. Rock in shoe; No Qu.
-50				SILTY CLAY TILL: Gray, stiff
	7			
	6 7	1.7 B	13	
-55				
	3			
	4 7	1.0 B	14	
-60				

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				SILTY CLAY TILL: Gray, stiff, with 4" silt seam @ 44' *(continued)*
	3			
	5 7	1.1 B	13	
-65				
694.21				
				SILTY CLAY LOAM TILL: Gray, very stiff
▼	3			
	5 10	2.2 B	13	Sand fraction is very fine to fine.
-70				
689.21				
				SILTY CLAY LOAM: Gray, stiff
	5			
	12 16	1.8 B	12	
685.71 -75				
				End of Boring
-80				

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

BBS, form 137 (Rev. 8-99)

Illinois Department of Transportation

Division of Highways
Bacone Farmer Workmand Engineering & Testing, LLC

SOIL BORING LOG

Date 2/10/15

ROUTE I-57/74 DESCRIPTION Pier Boring Ramp E LOGGED BY TLM

SECTION 10(5-1-RS-1, 14-1,6)R LOCATION , SEC. 34, TWP. 20N, RNG. 8E, 3rd PM,
Latitude 40.145246, Longitude -88.284863

COUNTY Champaign DRILLING METHOD HSA HAMMER TYPE AUTO

STRUCT. NO.
Station

BORING NO. B-25
Station 519+75.77
Offset 7.9 ft LT
Ground Surface Elev. 763.51 ft

Surface Water Elev. n/a ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter Dry ft
Upon Completion Dry ft
After ____ Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				TOPSOIL: Silty Clay, dark brown to black
	2			
762.01				
	5	1.9	21	SILTY CLAY: Brown/Black, stiff
	9	B		
	3			
	4	1.6	14	
-5	7	B		
758.01				
				SILTY CLAY LOAM: Brown, stiff
	3			
	6	1.2	14	
	8	B		
755.51				
				SILTY CLAY: Brown, stiff
	3			
	6	1.5	14	
-10	8	B		
				1" sand seam @ 9.95 ft.
753.01				
				SILTY CLAY: Gray, very stiff, with periodic thin sand seams >1/8"
	3			
	6	2.1	11	
	8	B		
750.51				
				SILTY CLAY LOAM TILL: Gray, stiff
	3			
	4	1.8	14	
-15	7	B		
748.01				
				CLAY TILL: Gray, stiff
	2			
	4	1.7	18	
	7	B		
745.51				
				SILTY CLAY LOAM TILL: Gray, medium
	2			
	4	1.0	12	
-20	4	B		
				SILTY CLAY LOAM TILL: Gray, medium *(continued)*
741.51				
				CLAY TILL: Gray, medium
	2			
	3	0.9	15	
-25	4	B		
				1" sand seam at 24.5 ft.
736.51				
				SILTY CLAY TILL: Gray, stiff
	3			
	5	1.5	12	
-30	7	B		
				(<1" recovery, rock in shoe)
	3			
	4		11	
-35	6			
726.51				
				SILTY CLAY TILL: Brown, very stiff
	6			
	8	2.5	12	
-40	10	B		

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
Bacone Farmer Workmand Engineering & Testing, LLC

SOIL BORING LOG

Date 2/10/15

ROUTE I-57/74 DESCRIPTION Pier Boring Ramp E LOGGED BY TLM

SECTION 10(5-1-RS-1, 14-1,6)R LOCATION , SEC. 34, TWP. 20N, RNG. 8E, 3rd PM,
Latitude 40.145246, Longitude -88.284863

COUNTY Champaign DRILLING METHOD HSA HAMMER TYPE AUTO

STRUCT. NO.
Station

BORING NO. B-25
Station 519+75.77
Offset 7.9 ft LT
Ground Surface Elev. 763.51 ft

Surface Water Elev. n/a ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter Dry ft
Upon Completion Dry ft
After ____ Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
SILTY CLAY TILL: Brown, very stiff *(continued)*			
721.51			
SILTY CLAY TILL: Gray, very stiff, with thin silt seams			
	3		
-45	4 7	2.1 B	15
716.51			
SILTY CLAY TILL: Gray, stiff			
	3		
-50	5 7	1.7 B	14
(sample very disturbed from rock in shoe)	8		
-55	11 12		14
	3		
-60	5 7	1.3 B	14
SILTY CLAY TILL: Gray, stiff *(continued)*			
	3		
-65	6 8	1.6 B	13
	3		
-70	6 9	1.9 B	13
	6		
688.51 -75	7 10	1.6 B	13
End of Boring			
-80			

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

BBS, form 137 (Rev. 8-99)

Illinois Department of Transportation
Division of Highways
Bacone Farmer Workmand Engineering & Testing, LLC

SOIL BORING LOG

Date 2/10/15

ROUTE I-57/74 DESCRIPTION Pier Boring Ramp E LOGGED BY TLM

SECTION 10(5-1-RS-1, 14-1,6)R LOCATION , SEC. 34, TWP. 20N, RNG. 8E, 3rd PM,
Latitude 40.145012, Longitude -88.285624

COUNTY Champaign DRILLING METHOD HSA HAMMER TYPE AUTO

STRUCT. NO.
Station

BORING NO. B-26
Station 522+02.29
Offset 21.0 ft RT
Ground Surface Elev. 762.81 ft

Surface Water Elev. n/a ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 722.8 ft ▼
Upon Completion ft
After Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
	2			TOPSOIL: Silty Clay, dark brown
	2 3	1.0 P	27	
760.81				SILTY CLAY: Brown/Gray, soft
	1			
-5	2 3	0.5 B	24	
757.31				SILTY CLAY: Brown/Gray, medium, trace gravel
	2			
	3 3	0.7 B	16	
754.81				SILTY CLAY: Brown, medium
	1			
-10	3 3	0.7 B	16	
752.31				SILTY CLAY TILL: Gray, very stiff
	2			
	6 7	2.1 B	12	
	3			
-15	5 6	2.5 B	11	
	4			
	5 6	2.1 B	12	
	4			
-20	5 6	2.1 B	12	
	2			SILTY CLAY TILL: Gray, very stiff *(continued)*
740.81				SILTY CLAY LOAM TILL: Gray, stiff
	2			
-25	4 5	1.7 B	13	
	2			
-30	4 6	2.0 B	12	
	1			
728.31				SILTY CLAY LOAM TILL: Gray, very stiff, with thin silt and sand seams
-35	6 19	3.5 B	9	
725.31				SILTY CLAY TILL: Brown, very stiff
	4			
▼40	8 9	3.9 B	12	

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
Bacone Farmer Workmand Engineering & Testing, LLC

SOIL BORING LOG

Date 2/10/15

ROUTE I-57/74 DESCRIPTION Pier Boring Ramp E LOGGED BY TLM

SECTION 10(5-1-RS-1, 14-1,6)R LOCATION , SEC. 34, TWP. 20N, RNG. 8E, 3rd PM,
Latitude 40.145012, Longitude -88.285624

COUNTY Champaign DRILLING METHOD HSA HAMMER TYPE AUTO

STRUCT. NO.
Station

BORING NO. B-26
Station 522+02.29
Offset 21.0 ft RT
Ground Surface Elev. 762.81 ft

Surface Water Elev. n/a ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 722.8 ft ▼
Upon Completion ft
After Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				SILTY CLAY TILL: Brown, very stiff *(continued)*
720.81				
				SILTY CLAY TILL: Gray, very stiff
	4			
	6 7	2.3 B	12	
-45				
	3			
	5 8	2.3 B	12	
-50				
710.81				
				SILTY CLAY LOAM TILL: Gray, very stiff
	3			
	7 9	2.3 B	13	
-55				
	4			
	8 9	2.7 B	12	
-60				

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				SILTY CLAY LOAM TILL: Gray, very stiff *(continued)*
	4			
	7 10	2.1 B	12	
-65				
	4			
	9 13	2.7 B	11	
-70				
	4			
	9 11	2.1 B	13	
687.81 -75				
				End of Boring
-80				

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

BBS, form 137 (Rev. 8-99)

Illinois Department of Transportation

Division of Highways
Bacone Farmer Workmand Engineering & Testing, LLC

SOIL BORING LOG

Date 2/13/15

ROUTE I-57/74 DESCRIPTION S. Abutment Boring Ramp E LOGGED BY TLM

SECTION 10(5-1-RS-1, 14-1,6)R LOCATION , SEC. 34, TWP. 20N, RNG. 8E, 3rd PM,
Latitude 40.144513, Longitude -88.286391

COUNTY Champaign DRILLING METHOD HSA HAMMER TYPE AUTO

STRUCT. NO.
Station

BORING NO. B-27
Station 524+80.74
Offset 3.1 ft RT
Ground Surface Elev. 766.63 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 729.6 ft ▼
Upon Completion washed ft
After Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Soil Description
				10" HMA
				765.83
	8			SILTY CLAY: Brown, stiff
	3 3	1.5 P	22	
				764.63
				SILTY CLAY: Black, stiff
	3			
-5	4 7	1.7	25	
	2			
	3 3	1.5 P	20	
				758.63
	1			SILTY CLAY: Brown and Gray, soft
-10	1 2	0.3 P	29	
				756.13
	3			SILTY CLAY LOAM: Brown, very stiff, possible till
	5 7	3.7 B	12	
				753.63
	4			SILTY CLAY LOAM TILL: Brown to Gray, very stiff
-15	7 9	2.7 B	11	
				751.13
	3			SILTY CLAY LOAM TILL: Gray, very stiff
	5 6	2.5 B	10	
	3			
-20	5 5	2.7 B	11	
				SILTY CLAY LOAM TILL: Gray, very stiff *(continued)*
				744.13
				SILTY CLAY TILL: Gray, stiff
	2			
-25	3 6	1.7 B	12	
	5			No recovery
-30	8 8			
				734.63
				SILTY CLAY LOAM TILL: Gray, very stiff
	5			
-35	6 9	2.5 B	11	
				729.63 ▼
	WR			SAND AND GRAVEL: Gray, loose
	WR		13	
-40	6			

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

BBS, form 137 (Rev. 8-99)

Illinois Department of Transportation
Division of Highways
Bacone Farmer Workmand Engineering & Testing, LLC

SOIL BORING LOG

Date 2/13/15

ROUTE I-57/74 DESCRIPTION S. Abutment Boring Ramp E LOGGED BY TLM

SECTION 10(5-1-RS-1, 14-1,6)R LOCATION , SEC. 34, TWP. 20N, RNG. 8E, 3rd PM,
Latitude 40.144513, Longitude -88.286391

COUNTY Champaign DRILLING METHOD HSA HAMMER TYPE AUTO

STRUCT. NO. _____
Station _____

BORING NO. B-27
Station 524+80.74
Offset 3.1 ft RT
Ground Surface Elev. 766.63 ft

Surface Water Elev. _____ ft
Stream Bed Elev. _____ ft

Groundwater Elev.:
First Encounter 729.6 ft ▼
Upon Completion washed ft
After _____ Hrs. _____ ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
SAND AND GRAVEL: Gray, loose *(continued)*				
724.63				
SAND AND GRAVEL: Gray, medium dense sand, fine gravel Washed sand and gravel from auger at 45 ft.		6		
		10		17
	-45	15		
717.63		8		
SILTY CLAY LOAM TILL: Gray, very stiff		7	3.9	11
	-50	10	B	
714.63				
SILTY CLAY LOAM TILL: Gray, hard		7		
		11	7.0	12
	-55	14	B	
709.63				
SILTY CLAY TILL: Gray, very stiff		4		
		7	3.3	12
	-60	12	B	
SILTY CLAY TILL: Gray, very stiff *(continued)*		4		
		8	2.7	12
	-65	12	B	
		5		
		7	2.9	13
	-70	11	B	
		4		
		9	2.1	13
691.63	-75	11	B	
End of Boring	-80			

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

BBS, form 137 (Rev. 8-99)

Appendix C

Soil Boring Profile Sheet

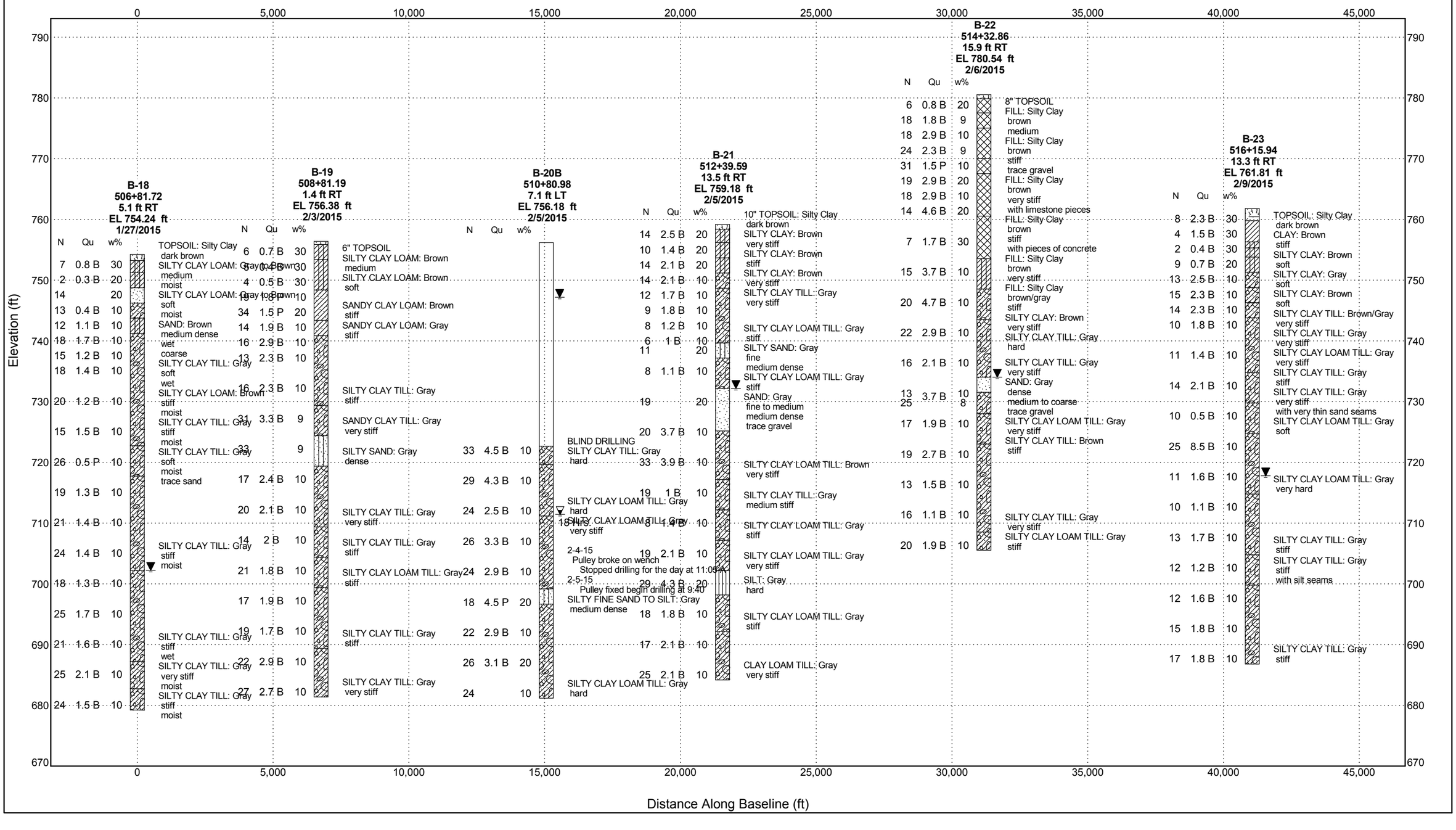
Illinois Department of Transportation
Division of Highways
Bacone Farmer Workmand Engineering & Testing, LLC

ROUTE I-57/74
SECTION 10(5-1-RS-1, 14-1,6)R
COUNTY Champaign
PROJECT LOCATION

SUBSURFACE PROFILE
RAMP E FLYOVER (SHEET 1/2)

LEGEND
EL = Elevation (ft)
D = Depth Below Existing Ground Surface (ft)
N = SPT N-Value (AASHTO T206)
Qu = Unconfined compressive Strength (tsf)
Failure Mode (B= Bulge, S= shear, P= penetrometer)
w% = Moisture Content Percentage

WATER TABLE LEGEND
▼ = First Encountered
▽ = Upon Completion
▼ = After __ hours



ROADWAY PROFILE - BETA I 57 74 CHAMPAIGN COUNTY.GPJ IL_DOT_D4_9-15-10.GDT 9/4/15

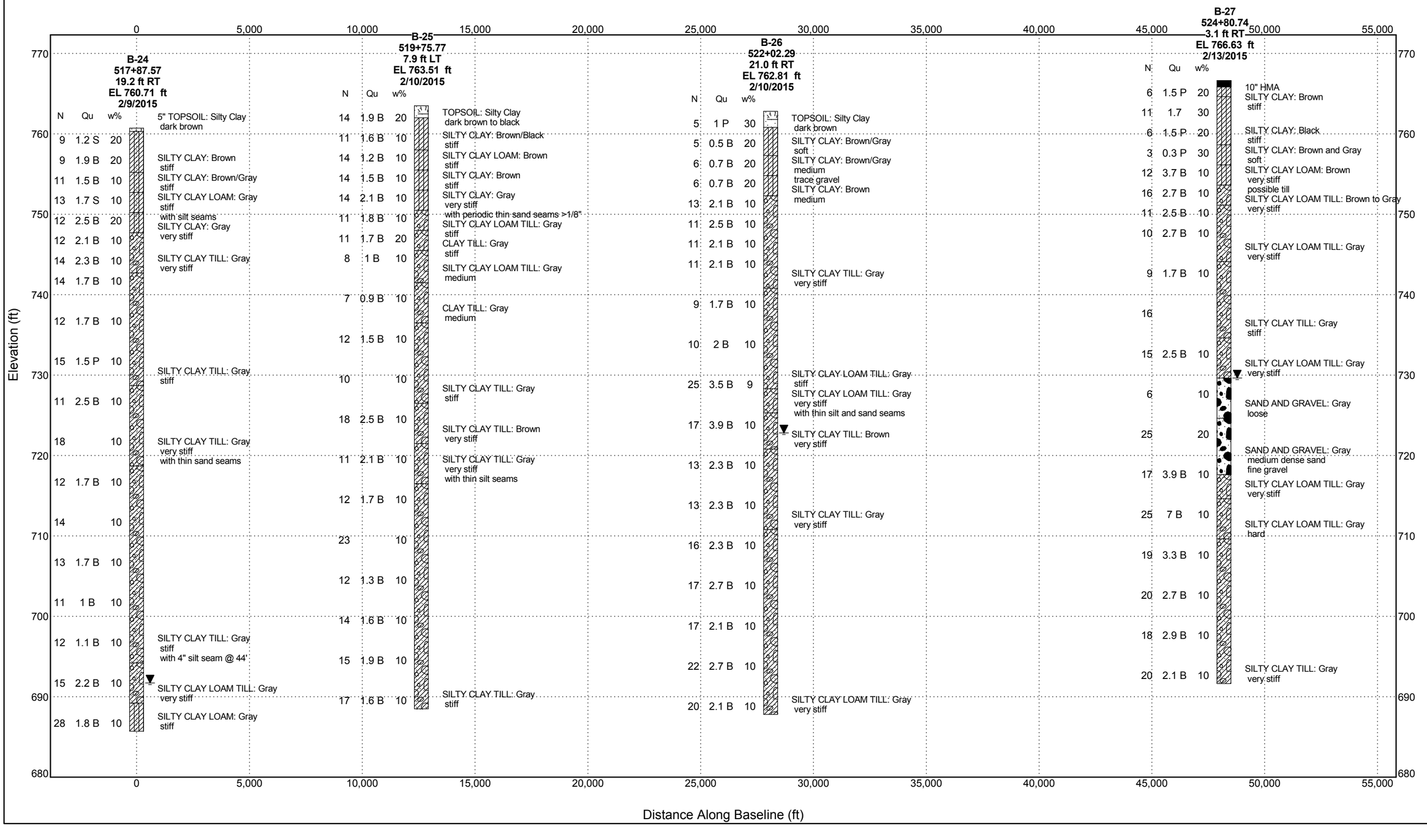
Illinois Department of Transportation
Division of Highways
Bacone Farmer Workmand Engineering & Testing, LLC

ROUTE I-57/74
SECTION 10(5-1-RS-1, 14-1,6)R
COUNTY Champaign
PROJECT LOCATION

SUBSURFACE PROFILE
RAMP E FLYOVER (SHEET 2/2)

LEGEND
EL = Elevation (ft)
D = Depth Below Existing Ground Surface (ft)
N = SPT N-Value (AASHTO T206)
Qu = Unconfined compressive Strength (tsf)
Failure Mode (B= Bulge, S= shear, P= penetrometer)
w% = Moisture Content Percentage

WATER TABLE LEGEND
▼ = First Encountered
▽ = Upon Completion
▼ = After __ hours



ROADWAY PROFILE - BETA I 57 74 CHAMPAIGN COUNTY.GPJ IL_DOT_D4_9-15-10.GDT 9/4/15

Appendix D

PILE CAPACITY TABLE

Pile Table

East Abutment

Pile Design Table for EAST ABUT utilizing Boring #18

Nominal Required Bearing (Kips)	Factored Resistance Available* (Kips)	Estimated Pile Length (Ft.)
Metal Shell 12"Φ w/.179" walls		
194	49	54
207	56	57
219	63	59
222	64	62
227	67	64
238	73	67
249	79	69
Metal Shell 12"Φ w/.25" walls		
194	49	54
207	56	57
219	63	59
222	64	62
227	67	64
238	73	67
249	79	69
261	86	72
272	92	74
283	98	77
294	104	79
305	110	82
316	116	84
330	124	87
343	131	89
Metal Shell 14"Φ w/.25" walls		
206	46	49
217	52	52
229	58	54
244	67	57
258	74	59
260	75	62
265	79	64
280	87	67
293	94	69
306	101	72
320	108	74
333	116	77
346	123	79
358	129	82
370	136	84
387	146	87
403	154	89
Metal Shell 14"Φ w/.312" walls		
206	46	49
217	52	52
229	58	54
244	67	57
258	74	59
260	75	62
265	79	64

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)

* with DD

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)

280	87	67
293	94	69
306	101	72
320	108	74
333	116	77
346	123	79
358	129	82
370	136	84
387	146	87
403	154	89
416	162	92
431	170	94
451	181	97
468	190	99
478	196	102
492	203	104

Pile Table

West Abutment

Pile Design Table for WEST ABUT utilizing Boring #27

Nominal Required Bearing (Kips)	Factored Resistance Available* (Kips)	Estimated Pile Length (Ft.)
Metal Shell 12"Φ w/.179" walls		
163	66	27
176	73	30
189	80	32
208	91	35
225	100	40
226	101	42
Metal Shell 12"Φ w/.25" walls		
163	66	27
176	73	30
189	80	32
208	91	35
225	100	40
226	101	42
291	136	50
313	149	52
Metal Shell 14"Φ w/.25" walls		
178	70	25
193	79	27
208	87	30
223	95	32
247	109	35
263	117	40
264	118	42
346	163	50
372	177	52
Metal Shell 14"Φ w/.312" walls		
178	70	25
193	79	27
208	87	30
223	95	32
247	109	35
263	117	40
264	118	42
346	163	50
372	177	52
435	212	55
452	221	60
475	234	62
492	243	65
512	254	67

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)

* with DD

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)

Pile Table

Pier 1

Pile Design Table for PIER 1 utilizing Boring #19

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)
Metal Shell 12"Φ w/.179" walls		
116	64	17
Metal Shell 12"Φ w/.25" walls		
223	123	32
236	130	35
251	138	37
265	146	40
279	154	42
292	161	45
305	168	47
319	176	50
333	183	52
345	190	55
Metal Shell 14"Φ w/.25" walls		
139	77	17
245	135	30
264	145	32
279	154	35
296	163	37
312	172	40
329	181	42
344	189	45
359	198	47
376	207	50
392	216	52
406	223	55
Metal Shell 14"Φ w/.312" walls		
139	77	17
245	135	30
264	145	32
279	154	35
296	163	37
312	172	40
329	181	42
344	189	45
359	198	47
376	207	50
392	216	52
406	223	55
421	231	57
450	247	60
471	259	62
490	270	65

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)

Pile Table

Pier 2

Pile Design Table for PIER 2 utilizing Boring #21

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)
Metal Shell 12"Φ w/.179" walls		
183	101	31
Metal Shell 12"Φ w/.25" walls		
220	121	41
232	127	44
243	134	46
260	143	49
275	151	51
309	170	54
333	183	56
337	185	59
350	192	61
Metal Shell 14"Φ w/.25" walls		
220	121	31
248	136	39
258	142	41
273	150	44
286	157	46
307	169	49
324	178	51
367	202	54
396	218	59
411	226	61
Metal Shell 14"Φ w/.312" walls		
220	121	31
248	136	39
258	142	41
273	150	44
286	157	46
307	169	49
324	178	51
367	202	54
396	218	59
411	226	61
430	237	64
448	246	66
465	256	69
475	261	70
492	271	73

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)

Pile Table

Pier 3

Pile Design Table for PIER 3 utilizing Boring #22

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)
Metal Shell 12"Φ w/.179" walls		
178	98	22
200	110	25
231	127	27
Metal Shell 12"Φ w/.25" walls		
178	98	22
200	110	25
231	127	27
257	141	30
267	147	32
285	157	35
296	163	37
311	171	40
Metal Shell 14"Φ w/.25" walls		
176	97	20
214	118	22
240	132	25
277	153	27
307	169	30
316	174	32
337	186	35
349	192	37
367	202	40
Metal Shell 14"Φ w/.312" walls		
176	97	20
214	118	22
240	132	25
277	153	27
307	169	30
316	174	32
337	186	35
349	192	37
367	202	40

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)

Pile Table

Pier 4

Pile Design Table for PIER 4 utilizing Boring #23

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)
Metal Shell 12"Φ w/.179" walls		
146	80	29
212	116	37
224	123	39
232	128	42
242	133	44
Metal Shell 12"Φ w/.25" walls		
146	80	29
212	116	37
224	123	39
232	128	42
242	133	44
256	141	47
269	148	49
278	153	52
288	158	54
301	166	57
314	172	59
328	180	62
341	188	64
Metal Shell 14"Φ w/.25" walls		
172	94	29
250	137	37
264	145	39
273	150	42
284	156	44
302	166	47
317	174	49
326	179	52
338	186	54
354	195	57
368	203	59
385	212	62
401	220	64
Metal Shell 14"Φ w/.312" walls		
172	94	29
250	137	37
264	145	39
273	150	42
284	156	44
302	166	47
317	174	49
326	179	52
338	186	54
354	195	57
368	203	59
385	212	62
401	220	64
416	229	67
421	232	68
453	249	73
484	256	78

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)

Pile Table

Pier 5

Pile Design Table for PIER 5 utilizing Boring #24

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)
Metal Shell 12"Φ w/.179" walls		
173	95	29
205	113	36
218	120	39
231	127	41
244	134	44
Metal Shell 12"Φ w/.25" walls		
173	95	29
205	113	36
218	120	39
231	127	41
244	134	44
257	141	46
269	148	49
276	152	51
285	157	54
295	162	56
304	167	59
323	178	61
338	186	64
350	192	66
Metal Shell 14"Φ w/.25" walls		
161	89	24
187	103	26
206	113	29
242	133	36
257	141	39
272	150	41
287	158	44
302	166	46
317	174	49
324	178	51
334	184	54
345	190	56
356	196	59
380	209	61
398	219	64
411	226	66
Metal Shell 14"Φ w/.312" walls		
161	89	24
187	103	26
206	113	29
242	133	36
257	141	39
272	150	41
287	158	44
302	166	46
317	174	49
324	178	51
334	184	54

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)
Metal Shell 14" ϕ w/.312" walls (Cont)		
345	190	56
356	196	59
380	209	61
398	219	64
411	226	66
419	230	67
450	248	72
481	265	77
513	282	82

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)

Pile Table

Pier 6

Pile Design Table for PIER 6 utilizing Boring #25

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)
Metal Shell 12"Φ w/.179" walls		
210	115	40
221	122	42
234	129	45
247	136	47
Metal Shell 12"Φ w/.25" walls		
210	115	40
221	122	42
234	129	45
247	136	47
260	143	50
269	148	52
280	154	55
293	161	57
306	168	60
321	176	62
334	184	65
346	190	67
Metal Shell 14"Φ w/.25" walls		
197	108	32
217	119	35
231	127	37
248	137	40
261	144	42
276	152	45
291	160	47
306	168	50
316	174	52
329	181	55
345	190	57
359	198	60
377	207	62
393	216	65
406	223	67
Metal Shell 14"Φ w/.312" walls		
197	108	32
217	119	35
231	127	37
248	137	40
261	144	42
276	152	45
291	160	47
306	168	50
316	174	52
329	181	55
345	190	57
359	198	60
377	207	62
393	216	65
406	223	67

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)
Metal Shell 14" ϕ w/.312" walls (Cont)		
419	230	69
446	245	74
475	261	79
504	277	84

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)

Pile Table

Pier 7

Pile Design Table for PIER 7 utilizing Boring #26

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)
Metal Shell 12"Φ w/.179" walls		
210	115	30
233	128	32
242	133	35
Metal Shell 12"Φ w/.25" walls		
210	115	30
233	128	32
242	133	35
258	142	37
273	150	40
289	159	42
304	167	45
320	176	47
339	187	50
Metal Shell 14"Φ w/.25" walls		
222	122	27
251	138	30
278	153	32
286	157	35
304	167	37
323	177	40
341	187	42
359	198	45
377	208	47
400	220	50
Metal Shell 14"Φ w/.312" walls		
222	122	27
251	138	30
278	153	32
286	157	35
304	167	37
323	177	40
341	187	42
359	198	45
377	208	47
400	220	50
421	231	52
434	239	55
451	248	57
476	262	60
496	273	62
509	280	65
Steel HP 8 X 36		
226	124	60
235	129	62
241	133	65
248	136	67
264	145	72
281	154	77

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)

Appendix D

Estimated Factored Structural Loadings

I-57 - I 74 INTERCHANGE STRUCTURES

Information for Geotechnical Engineering SGR's **04.28.2015; 08.21.2015 updt**

Structure: RAMP E over I-57 & I-74 & Ramp F
S.N. 010-1001
No. of Spans: 8

Option No.		Superstructure Type / Option	Substructure								
1	Details	**STEEL PLATE GIRDER, WEB DEPTH = 84 IN.**									
		Superstructure: Curved Girder on Curved Alignment									
		Substructure Element	ABUT 1	PIER1	PIER 2	PIER 3	PIER 4	PIER 5	PIER 6	PIER 7	ABUT 2
		Abutment Type: (Integral, Semi Integral, Stub, etc.)	Stub	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Stub
		Pier Type	n/a	Hammerhead	Hammerhead	Hammerhead	Hammerhead	Hammerhead	Hammerhead	Hammerhead	n/a
		Deck Joints	Modular	None	None	None	None	None	None	None	Modular
		Bearing Type	Exp. HLMR	Exp. HLMR	Exp. HLMR	Fixed HLMR	Fixed HLMR	Fixed HLMR	Exp. HLMR	Exp. HLMR	Exp. HLMR
		Est. Bottom of Abutment Elevation	781.32								776.72
		Est. Abutment Length (Feet)	40'-0"								40'-0"
		Est. Pier Bottom of Footing		745.50	753.25	773.24	753.57	751.97	756.50	753.55	
		Est. Pier Footing Dimensions (ft. x ft.)		16' x 34'	16' x 34'	16' x 34'	16' x 34'	16' x 34'	16' x 34'	16' x 34'	
		Total Factored Vertical DL + LL (kips) *	2,010	5,660	5,613	4,916	4,656	4,622	5,269	5,784	1,951
		Additional Notes / Comments	* Dynamic Load Allowance (IM) not included in Live Load.								