STRUCTURE
GEOTECHNICAL REPORT

RAMP D OVER F.A.I. RTE. 74 and F.A.I. RTE. 57
(STATION 414+78.50)

Proposed SN: 010-1004

Section (10-34-1) HBK
Champaign County

Contract No.: 70B99
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Prepared By: Christopher N. Farmer, P.E.
Bacon Farmer Workman Engineering & Testing, Inc.
500 South 17th Street
Paducah, Kentucky 42003
Phone: (270) 443-1995
Email: cfarmer@bfwengineers.com

Prepared For: Leo Marcatelli, PE
Crawford, Murphy, & Tilly, Inc.
203 Harrison Street
Peoria, Illinois 61602
Phone: (309) 680-1313

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Attachments:
Boring Locations / TS&L
Subsurface Boring Logs
Soil Boring Profile Sheet
Consolidation Data
Settlement Platform Detail

1.0 Project Description

The purpose of this geotechnical study is to explore the existing subsurface conditions present and to develop design and construction recommendations for the proposed structure locations: (SN 010-1004) (Station 414+78.50) carrying I-74 eastbound to I-57 northbound and adjacent MSE walls in Section 10R, Township 20 North, Range 8 East of the 3rd PM in the city of Champaign, Champaign County, Illinois.

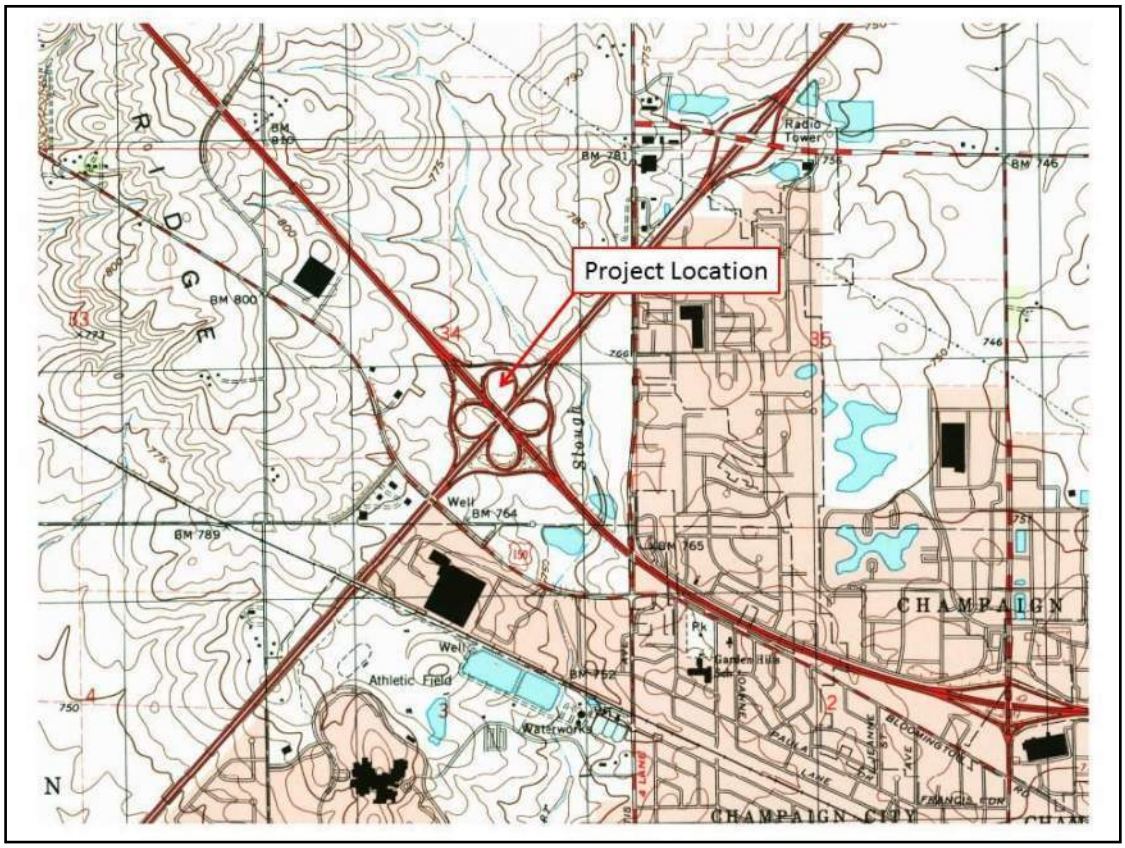


Exhibit 1: Project Location Map

2.0 Proposed Structure Information

Proposed Structures (SN 010-1004)

Based on the preliminary TS&L, Ramp D (SN 010-1004) over I-57 & 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. The superstructure will consist of a 76-inch deep web composite steel plate girder on a curved alignment with back to back abutments distance of 1,507'-9 3/8" as measured radially along the baseline. The structure width will be 39'-6" out to out deck. 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-57 and I-74 interchange. Existing site conditions include existing interstate roadways for both I-57 and I-74 and open areas along roadways. Elevations in the area range from 758.10 to 782.24.

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 activities 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 TS&L plan located in Appendix A. The subsurface exploration program was performed in accordance with applicable IDOT geotechnical manuals and procedures.

4.1 Subsurface Exploration

An original 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. Additional subsurface exploration was conducted from July 25 through July 26, 2017 and included advancing a total of four (4) SPT borings with two (2) Shelby Tube borings for consolidation data along both east and west MSE wall locations. Based on IDOT direction, two (2) additional SPT borings with one of the borings to include a Shelby Tube sample for consolidation data were advanced on February 11 through February 13, 2019 in the area of the western MSE wall to obtain additional soil and consolidation information. The locations of the soil borings are shown on the TS&L Plan provided in the Appendix A.

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

Boring ID	Location	Station	Offset	Depth (feet)	Surface Elevation (feet)
B-9	West Abutment	407+36.98	4.09 LT	75	779.30
B-10	Pier 1	409+18.57	2.69 RT	75	772.26
B-11	Pier 2	411+31.42	1.77 RT	75	782.24
B-12	Pier 3	413+31.02	12.10 LT	75	766.80
B-13	Pier 4	415+22.39	0.46 LT	75	758.60
B-14	Pier 5	417+09.64	1.28 LT	75	758.10
B-15	Pier 6	418+94.13	1.99 LT	75	759.50
B-16	Pier 7	420+74.44	2.84 LT	75	759.40
B-17	East Abutment	422+52.79	10.93 RT	89	760.16
DE-1	East MSE Wall	423+40.00	4.00 LT	35	757.75
DE-5	East MSE Wall	422+85.00	27.50 LT	35	757.07
DW-2	West MSE Wall	405+30.00	33.0 LT	35	773.41
DW-7	West MSE Wall	406+88.60	25.9 RT	35	771.88
D-101	West MSE Wall	406+00	31.7 LT	60	772.75
D-102	West MSE Wall	407+00	31.7 LT	50	779.05

The soil borings were drilled using a track mounted drill rig. All 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 representative 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 also collected from each sample interval and were placed in jars for laboratory moisture content testing. Shelby Tube samples were also obtained in several areas for laboratory consolidation testing.

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
- One Dimensional Consolidation ASTM D2435 / AASHTO T-216

The laboratory tests were performed in accordance with test procedures outlined in the IDOT Geotechnical Manual (1999) and per ASTM and AASHTO requirements. Moisture contents are shown on boring logs located in Appendix B. Consolidation testing was conducted on three (3) samples from three (3) MSE wall borings (DE-1, DW-2 and D-102.) The results of the consolidation testing program are included in Appendix D.

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-9 through B-17 were advanced in support of proposed Ramp D Structure (SN#010-1004) from February 3 through February 12, 2015 along the proposed ramp alignment. Borings DE-1, DE-5, DW2 and DW7 were advanced in the area of the proposed MSE walls from July 25 through July 26, 2017. Borings D-101 and 102 were advanced in the area of the proposed west abutment MSE wall on February 11 and 13, 2019.

Bridge Abutment Locations

Boring **B-9** was advanced near the proposed west abutment, located at Station 407+36.98 (Elev. 779.30'). The boring was advanced on the shoulder of the existing outer Ramp B with approximately 10 inches of HMA at the surface. The soil profile underlying the HMA in boring **B-9** is described as brown to gray brown, stiff to very stiff, silty clay loam, which extends to approximately 22 feet deep (Elev. 757.30'), where the material transitions to a gray, stiff to very stiff silty clay till. The upper soils had SPT N-values in the range of 4 to 14 and an unconfined compressive strength (Qu) from 1.07 to 4.5. The stiff to very stiff silty clay till extended to a depth of approximately 52 feet deep (Elev. 727.30) where the material transitioned into a gray, medium clean sand. The silty clay till soils had SPT N-values in the range of 10 to 13 and an unconfined compressive strength (Qu) from 0.91 to 3.5. The medium grain sand extended a depth of approximately 63 feet (Elev. 715.30) where it encountered a sand and gravel layer then immediately transitioning to a gray to brown silty clay loam till. The sand layer had SPT N-values in the range of 11 to 12. The silty clay loam till layer extended to boring termination depth of 75 feet (Elev. 704.30). The silty clay loam till had SPT N-values in the range of 13 to 17 and an unconfined compressive strength (Qu) from 1.5 to 2.68.

Boring **B-17** was advanced near the proposed east abutment, located at Station 422+52.79 (Elev. 760.16'). The boring was advanced in an open area near the existing outer Ramp G with approximately 8-inches of topsoil at the surface. The soil profile underlying the topsoil in boring **B-17** is described as brown, stiff to very stiff, silty clay loam, which extends to approximately 27.0 feet deep (Elev. 733.16'), where the material transitions to a gray, stiff to very stiff silty clay till. The upper soils had SPT N-values in the range of 9 to 13 and an unconfined compressive strength (Qu) from 0.90 to 2.25. The stiff to very stiff silty clay till extended to a depth of approximately 52 feet deep (Elev. 727.30) where the material transitioned into a gray, medium clean sand. The silty clay till soils had SPT N-values in the range of 10 to 13 and an unconfined compressive strength (Qu) from 0.91 to 3.5. The medium grain sand extended a depth of approximately 63 feet (Elev. 715.30) where it encountered a sand and gravel layer then immediately transitioning to a gray to brown silty clay loam till. The sand layer had SPT N-values in the range of 11 to 12. The silty clay loam till layer extended to boring termination depth of 75 feet (Elev. 704.30). The silty clay loam till had SPT N-values in the range of 13 to 17 and an unconfined compressive strength (Qu) from 1.5 to 2.68.

Pier Boring Locations

Borings **B-10, B-11, B-12, B-13, B-14, B-15 and B-16** were advanced near the proposed flyover pier locations, **Pier 1 (Sta. 409+05.33), Pier 2 (Sta. 411+30.67), Pier 3 (Sta. 413+21.00), Pier 4 (Sta. 415+11.00), Pier 5 (Sta. 417+01.00), Pier 6 (Sta. 418+91.00), and Pier 7 (Sta. 420+72.00)**, respectfully. In general, each boring was covered with 7- to 12-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-12 was described as fill material to a depth of 8 feet below ground surface. The silty clay and silty clay loam extended to depths of between 3 to 18 feet. The upper silty clay to silty clay loams had SPT N-values in the range of 4 to 28 and unconfined compressive strengths (Qu) from 0.21 to 7.01. Below the silty clay and silty clay loams and silty clay loam till was encountered in each of the borings. The silty clay loam till extended to depths ranging from 25 to 35 feet. At approximately 25 to 25 feet below surface a clayey, silty to fine sand layer was encountered and extended to depths of approximately 35 to 43 feet where the sand transitioned back into a silty clay loam till which continued in each boring to boring termination depths.

MSE Wall Locations

Borings **DE-1, DE-5, DW-2 and DW-7** were initially advanced along the proposed eastern and western MSE wall locations. Based on IDOT request, two additional borings, **D-101** and **D-102** were advanced along the northern MSE wall of the west abutment to obtain consolidation data. Borings were located at stations: **DE-1 (Sta. 423+40.00), DE-5 (Sta. 422+85.00), DW-2 (Sta. 405+30.00), DW-7 (Sta. 406+88.60), D-101 (Sta. 406+00) and D-102 (Sta.407+00)**. In general, each boring was covered with minimal topsoil. Below the topsoil, a brown, gray to olive brown silty clay to silty clay loam was encountered in each of the soil borings. The silty clay and silty clay loam extended to depths of between 5 to 10.5 feet. The upper silty clay to silty clay loams had SPT N-values in the range of 4 to 11 and unconfined compressive strengths (Qu) from 0.8 to 4.5 tsf. Below the silty clay and silty clay loams an olive brown to gray, very stiff, silty clay till was encountered. The silty clay till extended to depths between 18 to 29 feet. The silty clay till had SPT N-values in the range of 6 to 24 and Qu values from 1.4 to 4.5 tsf. In boring, DE-1, below the silty clay till, a gray, medium dense sand and sand with gravel was encountered. The medium dense sand and gravels extended to boring termination depth of 35. The medium dense sand and gravels had SPT N-values in the range of 7 to 20.

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 (@ boring completion)
B-9 (West Abut)	729.3	- - -
B-10 (Pier 1)	766.8	759.3
B-11 (Pier 2)	762.2	- - -
B-12 (Pier 3)	726.8	- - -
B-13 (Pier 4)	731.6	- - -
B-14 (Pier 5)	731.6	- - -
B-15 (Pier 6)	726.0	729.5
B-16 (Pier 7)	730.9	731.4
B-17 (East Abut)	720.2	749.2
DE-1	728.7	737.7
DE-5	722.1	- - -
DW-2	- - -	- - -
DW-7	751.9	751.9
D-101	729.8	769.8 (24-hours)
D-102	763.1	- - -

Only one 24-hour groundwater reading was noted on boring logs. 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

Boring	Elev @ Bottom of Layer	γ (pcf)	Short-Term		Long Term		K (pci)	N	Assumed % fines < #200	e_{50}
			c (psf)	Φ (degrees)	c (psf)	Φ (degrees)				
B-11	778.24	120	900	0	100	26	100	7	80	0.007
	774.24	120	1700	0	100	26	500	13	80	0.007
	772.24	120	2200	0	200	26	1000	20	80	0.005
	764.24	120	1200	0	90	26	500	13	80	0.007
	755.74	115	0	32	0	34	60	19	50	- - -
	740.24	120	1900	0	100	26	500	18	80	0.007
	730.74	120	1300	0	100	26	500	16	80	0.007
	718.24	115	0	32	0	34	100	25	80	- - -
	707.24	120	1400	0	100	26	500	15	80	0.007
B-15	753.50	120	2100	0	200	24	1000	16	80	0.005
	731.00	120	2000	0	200	26	1000	12	80	0.005
	726.00	120	2000	0	200	26	1000	14	80	0.005
	716.00	120	2100	0	200	26	1000	21	80	0.005
	706.00	120	1300	0	100	26	500	14	80	0.007
	696.00	120	1500	0	100	26	500	13	80	0.007
	691.00	110	250	0	50	24	30	0	80	0.02
	686.00	115	0	32	0	34	100	14	50	- - -
	684.50	120	2200	0	200	26	1000	18	80	0.005
B-16	750.90	120	2500	0	400	24	1000	14	80	0.005
	730.90	120	2000	0	200	26	1000	14	80	0.005
	725.90	115	0	32	0	34	60	10	50	- - -
	720.40	120	3000	0	500	26	1000	21	80	0.005
	715.90	120	3000	0	500	26	1000	34	80	0.005
	711.90	120	3000	0	500	26	1000	26	80	0.005
	707.40	120	3000	0	500	26	1000	23	80	0.005
	684.40	120	2600	0	400	26	1000	23	80	0.005
B-17	757.16	120	1100	0	100	26	500	10	80	0.007
	754.66	120	1150	0	100	26	500	9	80	0.007
	752.16	120	950	0	75	26	100	13	80	0.008
	749.66	120	1400	0	100	26	500	16	80	0.007
	744.66	120	1350	0	100	26	500	17	80	0.007
	742.16	120	1050	0	100	26	500	14	80	0.007
	738.16	115	950	0	75	26	100	14	80	0.008
	723.66	120	1250	0	100	26	500	15	80	0.007
	676.16	120	1300	0	100	26	500	23	80	0.007

* The Unit Weight (γ) of water (62.4 pcf) should be subtracted from soil unit weight when below water table.

5.2 Settlement

The new approach slabs on either end of the ramp D flyover will be supported by new mechanically stabilized earth (M.S.E.) walls with super elevation heights at the **west approach slab** of approximately 24'-2" (west corner) to 12'-10" (east corner) and heights at the **east approach slab** of approximately 29'-10" (south corner) to 21'-3 ½" (north corner), respectively. Results of settlement analysis for the M.S.E. wall abutment approaches are presented in *Section 5.9 Mechanically Stabilized Earth (M.S.E.) Walls.*

Ramp D 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 location using shallow foundations would produce settlements in the range of 2.0 to 3.0 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 D over I-57 and 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 are presented in *Section 5.9 Mechanically Stabilized Earth (M.S.E.) Walls.*

5.4 Seismic Parameters

The seismic hazard for the site was analyzed per the IDOT Geotechnical Manual, IDOT Bridge Design Manual, and AASHTO LRDF 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 D flyover bridge has a total length of **1,507'-9 3/8"** feet (back to back abutments), with **one** of seven single 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. ($\mathbf{S_{DS}}$)	0.233 g
Design Spectral Acceleration at 1.0 sec. ($\mathbf{S_{D1}}$)	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 D Flyover will cross over I-57 and 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_s 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 end. In accordance with the IDOT Bridge Manual, BFW evaluated the foundation soils at the approach slabs for bearing capacity and excessive settlement. With embankment settlement complete or less than 0.4 inches remaining and 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 D over I-57 and I-75 will be designed using mechanically stabilized earth (M.S.E.) walls at each bridge approach and at each bridge abutments due to embankment size constraints. The eastern M.S.E. wall is approximately 113'- 6 1/8" and 116'- 9" in length for the north and south sides with a maximum height from top of leveling pad elevation to bottom of parapet wall of 21'- 3 1/2" and 29'-10", respectively. The western M.S.E. wall is approximately 288'-3 5/8" and 39'- ½" in length for the north and south sides with a maximum height of 24'-2" and 12'-10", respectively.

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. walls for the abutment approaches was conducted and is discussed in the section below:

Settlement (External)

MSE wall sections for both the eastern and western abutments will be located and founded within fill embankments with MSE wall heights ranging from approximately 10 to 29 feet. From a review of the subsurface and laboratory data, the soils in the general area are just slightly to moderately over-consolidated. The over-consolidation is likely from the loadings from the geologic history of glaciation that have since receded.

Based on subsurface data along the western abutment MSE walls, borings DW-2 and D-101 encountered a layer of very soft and unconsolidated material at depths of approximately 3 to 5 feet below the existing ground surface. Shelby tube samples were collected from borings DW-2 (3'-5' & 35'-37'), and D-102 (14.6'-15.8') for consolidation testing. Samples yielded compression indices (Cc) ranging from 0.071 to 0.171. The sample from DW-2 (3'-5') collected from within the soft soil stratum, yielded suspect consolidation results and was not considered within the settlement calculations. The area of soft soils encountered within the upper 5 feet in borings DW-2 and D-101 would produce unacceptable settlements.

It is recommended that the low strength soils encountered in the area of the MSE walls between borings DW-2 and D-101 be excavated to a depth of 5 feet below exiting ground surface or as directed by the Engineer and replaced with general embankment. Embankment materials shall meet the requirements of Article 205 of the Standard Specifications for Road and Bridge Construction. However, if once excavated to depth, wet conditions exist so as to hinder construction equipment, the use of rockfill may be used. (see Bearing Resistance section below for rockfill specification). The recommended locations of the low strength soil excavation are provided in Table 5 located below.

Table 5 – West Abutment MSE Wall Low Strength Soil Excavation Limits

Location	Zones of 5' Low Strength Soil Excavation (approx. stations)
Ramp D - West Abutment North Wall	405+00 to 406+50

Potential settlement was calculated based on general soil profile data from soil borings and consolidation data from borings DE-1, DW-2 and D-102. Additional soil data was used from a nearby structure (010-1005 Ramp B) boring, B-5. Settlement analysis was performed using the settlement analysis procedure as defined in the IDOT Geotechnical Manual – Appendix D. The anticipated settlement for the eastern and western MSE Walls and embankments is approximately 3.9 to 5.0 inches, respectively. Time for 90% consolidation (t_{90}) is estimated at between approximately 15 to 17 months for eastern and western MSE Walls and embankments, respectively. However, sand and gravel layers were encountered throughout the borings which should settle quickly after loading. The values for t_{90} are based on instantaneous loading and do not consider the time to construct the embankment.

A comparative settlement analysis was also conducted using the IDOT Cohesive Settlement spreadsheet using Qu and moisture contents from subsurface borings. The spreadsheets computed settlement results of approximately 1 to 2 inches for the eastern and western embankments. Therefore, the actual settlements will likely be between the two methods.

The Ramp D MSE walls are located in general proximity to other embankments including Ramp B (SN: 010-1005) embankment near the western MSE wall and Ramp G (SN: 010-1003) embankment near the eastern MSE wall. Based on a review of the Roadway Geotechnical Report prepared by McCleary Engineering (Oct 28, 2015) for the I-57/I-74 Interchange Reconstruction, the anticipated settlements of the area of Ramp D is approximately 5.9 inches which is slightly higher than the calculation settlements. The difference in settlement can be attributed to the consolidation data that was obtained in the MSE wall areas after the RGR was written.

Based on the project Grading Plan, Ramps D (eastern portion) and Ramp G (northern portion) diverge from a common embankment into essentially two separate embankments. Therefore, the end of the two embankment areas will likely settle independently of one another with little interaction effect on the eastern MSE walls. However, the western portion of Ramp D and Ramp B (northern portion) diverge in closer proximity to one another and nearly on a single large embankment. Therefore, depending on the time of construction of the embankment, Ramp D and Ramp B embankments should settle at similar rates. However, the settlement of the embankment as a whole should be considered along with the settlement in the area of the western MSE wall.

It is recommended that settlement be monitored in the areas of both the western and eastern MSE walls. Settlement platforms should be constructed at the recommended locations provided in Table 6 or as directed by the Engineer. A standard drawing for settlement platform is provided in Appendix E. The contractor should install the settlement platforms according to Article 204.06 of the IDOT Standard Specifications. The settlement platforms should be placed near existing grade (after stripping organics) prior to the placement of any rockfill. The contractor shall obtain settlement pipe elevation data immediately after cutting the pipe to grade. The amount and rate of settlement should be monitored throughout any embankment or MSE wall construction and/or wait periods. Settlement data should be obtained by the Engineer weekly during the embankment or MSE wall construction and bi-weekly during any wait periods. Calculated time to 90% consolidation is approximately 15 to 17 months.

Table 6 –Settlement Platform Stations

Settlement Platform Stations	Station	Offset
West MSE Wall Embankment (non-reinforced section)	407+8.00	7.0' LT
East MSE Wall Embankment (non-reinforced section)	422+52.00	15.0' LT

The effects of settlement should be considered due to the amounts of settlement anticipated. Downdrag on abutment piles should be minimized and settlement should be near 90% consolidation or 0.4 inches or less remaining prior to final paving activities.

Several options for minimizing pile downdrag are provided in the following paragraphs and include the use of surcharge loads and wait times, pre-coring of pile locations, and use of pile sleeves/cans. The viability of the surcharge and wait time option will be dependent on the project schedule and time constraints. Regardless of the option chosen, settlements should be monitored by the Engineer through the MSE wall construction. Any wait periods may be reduced by the Engineer based on settlement platform data.

The use of wick drains or sand drains could also aid to decrease the time of consolidation; however, double drainage was already used in the time of consolidation analysis based on the presence of various sand or sandy layers throughout the borings.

Options for Order of Construction / Downdrag Mitigation

Option 1) Allow settlement of MSE wall and abutment areas to occur prior to MSE wall construction or driving of abutment piles using borrow material as surcharge load. Possible order of construction includes: 1) excavation of the low strength soil area (5' undercut) along western MSE wall. 2) install embankment material or rockfill (if wet conditions) in low strength soil excavation back to grade elevation 3) construct settlement platforms 4) drive

pile sleeves/cans in the locations of the abutment piles 5) add surcharge consisting of borrow material with surcharge at or above MSE wall final grade 6) wait period and settlement monitoring of soil consolidation to 90% consolidation or as directed by the Engineer 7) remove surcharge 8) drive abutment piles 9) place remaining rockfill under MSE wall 10) construct MSE wall.

Option 2) Allow settlement of MSE wall and abutment areas to occur during MSE wall construction but prior to driving abutment piles. Possible order of construction includes: 1) excavation of the low strength soil area (5' undercut) along western MSE wall 2) install embankment material or rockfill (if wet conditions) in low strength soil excavation back to grade elevation 3) construct settlement platforms 4) drive pile sleeves/cans in area of abutment piles 5) install rockfill 6) construct MSE wall 7) monitor settlement during construction with possible wait period or as directed by the Engineer 8) drive abutment piles.

Option 3) Pre-core of abutment pile locations. Possible order of construction includes: 1) excavation of the low strength soil area (5' undercut) along western MSE wall 2) install embankment material or rockfill (if wet conditions) in low strength soil excavation back to grade elevation 2) construct settlement platforms 3) pre-core abutment pile locations 4) install pile sleeves/cans in area of abutment piles 5) drive abutment piles 6) install rockfill 7) construct MSE wall with settlement monitoring throughout construction or as directed by the Engineer.

Pre-coring drilling should advance to Elevations 745.0 and 763.0 for the eastern and western abutment piles, respectively. Pre-coring drilling should be conducted with a diameter of 18-inches to the depths specified above.

Pile sleeves/cans should be installed to an adequate depth to ensure the cans are stable and remain vertical during wait times and during pile installation activities.

Bearing Resistance (External)

MSE wall sections for both the east and west abutments will be located and founded within fill embankments which will need to provide adequate bearing resistance. Based on our analysis, regular compacted earth embankment can only provide sufficient bearing resistance for wall heights less than 10 feet tall. Wall heights greater than 10 feet will need a specified thickness of rockfill placed (see Table 7) immediately underneath the MSE wall leveling pad to provide the necessary bearing resistance.

Rockfill shall meet the requirements in Article 1005.01 of the Standard Specifications for Road and Bridge Construction and consist of primary crusher run. It shall not contain objectionable quantities of dirt, sand, clay, or rock fines. The material shall be well graded with a maximum stone dimension of 18-inches (200 mm). No more than 35% shall have a

dimension less than 2 inches (50 mm). Rockfill shall be capped with a minimum of 6-inches of compacted CA-6.

Table 7 – Rockfill Thickness below MSE Reinforced Mass

MSE Wall Height Interval (ft.)	Thickness of Rockfill below MSE Reinforced Mass (ft.)
10 - 15	2
15 - 20	5
20 - 25	7
25 - 30	10
30 - 35	12

Horizontal extents of the rockfill were being based on an approximate pressure distribution of 1H:1V out from the base of the wall. The Rockfill zones should extend horizontally 5' out for MSE wall heights of between 10 to 20 feet and 10' horizontally for walls heights above 20 feet. The approximate stations of the Rockfill zones are provided in Table 8 and 9 for the East and West Abutment MSE walls.

Table 8 – East Abutment Rockfill Zones

Location	Zones of Rockfill (approx. stations)
Ramp D - East Abutment North Wall	422+89.32 to 422+17.75
Ramp D - East Abutment South Wall	423+08.39 to 422+17.86
Ramp D - East Abutment End Wall	422+17.75 to 422+17.86

Table 9 – West Abutment Rockfill Zones

Location	Zones of Rockfill (approx. stations)
Ramp D - West Abutment North Wall	405+81.13 to 407+39.34
Ramp D - West Abutment South Wall	407+18.76 to 407+34.14
Ramp D - West Abutment End Wall	407+34.14 to 407+39.34

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 and west abutments was calculated for the soil at 5,000 pounds per square feet (psf) for rockfill improvements.

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°. The factor of safety against sliding was determined to be above 1.2 which is adequate for the sliding resistance.

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 met 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 = 115 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 010-1004), Station 414+78.50 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 a 76-inch web depth on stub abutments with an estimated abutment length of 39'-10". 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; however metal shell piles are preferred. Anticipated factored structural loadings were obtained from the structural engineer and are provided in Table 10

Table 10 – Factored Structural Loadings

I-57 - I 74 INTERCHANGE STRUCTURES
Information for Geotechnical Engineering SGR's 03.24.2015; **04.20.2020 UPDT**

Structure: RAMP D over I-57 & I-74
S.N. 010-1004
No. of Spans: 8

Option No.		Superstructure Type / Option	Substructure								
1	Details	STEEL PLATE GIRDER, WEB DEPTH = 76 IN.									
		Superstructure: Curved Girder on Curved Alignment									
		Substructure Element	W. ABUT	PIER1	PIER 2**	PIER 3	PIER 4	PIER 5	PIER 6**	PIER 7**	E. ABUT
		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	HLMR	HLMR	HLMR	HLMR	HLMR	HLMR	HLMR	HLMR	HLMR
		Est. Abutment Length (Feet)	37.75								37.75
		Est. Abut. Bottom of Cap/Pier Bottom of Footing	793.10 - 795.10	775.50	776.00	764.00	753.00	751.00	754.00	754.00	780.10 - 782.10
		Est. Pier Footing Dimensions (ft. x ft.)		22x16	22x16	22x16	22x16	22x16	22x16	22x16	
		Total Factored Vertical DL + LL (kips) *	1,130	3,225	3,230	2,960	2,620	2,585	3,030	3,425	1,110
		Additional Notes / Comments	* Dynamic Load Allowance (IM) not included in Live Load. ** Piers Subject To Vehicle Collision (Lateral) Force per AASHTO LRFD 8th Ed. Art. 3.6.5								

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.

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 (including 16" metal shell) 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 cause concern for potential downdrag on the piles within the stub abutments. Several options were provided in the settlement subsection of Section 5.9 to mitigate pile downdrag. One option included allowing for 90% consolidation of the soils underlying the MSE wall and abutment areas by use of either the MSE wall weight (during/after construction) or by addition of borrow material surcharge (prior to MSE wall construction). A wait time would likely be required for both scenarios with a time of consolidation of 90% calculated at approximately 15 to 17 months. A second option was the use of pre-coring of the pile locations down to Elevations of 745.0 and 763.0 for the eastern and western abutment pile locations, respectively. Additionally, the use of pile sleeves/cans were also recommended to minimize pile downdrag by creating a slip plane between the MSE wall fill and abutment piles. Either of these options would mitigate downdrag to negligible amounts. Downdrag is not anticipated for the piles in the area of the individual roadway piers.

Based on the results of the subsurface investigation and settlement mitigation recommendations, no geotechnical losses due to liquefaction or downdrag were included in the axial pile capacity calculations for the abutment piles or 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 and is based on the subsurface conditions encountered within the soil boring depths. 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 12 and 13 summarize the estimated pile lengths at various axial resistances for metal shell piles in various diameters for the stub abutment at the East and West abutments. The tables include pile capacities for both 90% soil consolidation and pile location pre-coring with minimal downdrag effects.

Tables 14 through 20 summarize the estimated pile lengths for various metal shell pile diameters for the each of the individual hammerhead type pier locations.

The pile cutoff elevations used for analysis were Elev. 782.1 and Elev. 795.1 for the East and West abutments, respectively. The pile cutoff elevation included a 2 feet embedment into the abutment for the stub abutment as required by the Bridge Manual.

For pier foundations that are subject to a potential extreme lateral load event of vehicle collision force, a minimum pile embedment of 2 feet into the pier cap can be considered by the structural engineer. Pile cutoff elevations used for analysis for individual pier locations are provided in Table 11 and include a 2 feet embedment into the pier cap for consideration of extreme event loading as requested by the structural design team.

Table 11 – Pile Cutoff Elevations

Pier	1	2	3	4	5	6	7
Pile Cutoff Elevation	777.5	778.0	766.0	755.0	753.0	756.0	756.0

Pile shoes HP piles should not be required due to the subsurface conditions and the absence of bedrock. However, due to some layers of cobbles, pile shoes are recommended for metal shell piles in the locations of Pier 3 and Pier 4.

Due to the distance between the abutments, one test pile should be required for each abutment. Test pile locations for individual piers should be chosen by pier designer based on complexity of the structure and anticipated structural loading. 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

The use of M.S.E. walls in the areas of the abutments creates the potential for down drag on the piles within the stub abutments. Several options were provided in the settlement subsection of Section 5.9 to mitigate pile downdrag including the use of pile sleeves/cans at the abutment pile locations. Either of these options would mitigate downdrag to negligible amounts, therefore, no downdrag, liquefaction or scour issues are anticipated that would result in the loss of capacity of the piling.

Table 12 - Pile Capacity Tables
(West Stub Abutment)

West Abutment - 90% Consolidation		
Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft)
Metal Shell 12" Φ w/0.25 walls		
312	171	54
327	180	56
343	188	58
366	201	61
384	211	64
392*	215*	67*
Metal Shell 14" Φ w/0.25 walls		
339	187	51
369	203	54
387	213	56
405	223	58
432	237	61
452	248	64
459*	252*	67*
Metal Shell 14" Φ w/0.312 walls		
550	303	74
564	310	77
534	294	80
549	302	82
553	304	84
559	307	85
570*	313*	86*
Metal Shell 16" Φ w/0.312 walls		
641	352	71
648	357	77
614	337	80
631	347	82
634	348	84
640	352	85
654*	360*	86*
Metal Shell 16" Φ w/0.375 walls		
657	361	77
615	338	80
633	348	82
635	349	84
641	353	85
666	366	86
689	379	88

*Max Nominal Req Bearing

West Abutment – Precore to Elev. 763.0		
Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft)
Metal Shell 12" Φ w/0.25 walls		
381	210	77
361	198	80
374	206	82
378	208	84
383	211	85
392*	215*	86*
Metal Shell 14" Φ w/0.25 walls		
441	243	74
455	250	77
425	234	80
440	242	82
444	244	84
450	247	85
459*	252*	86*
Metal Shell 14" Φ w/0.312 walls		
425	234	80
440	242	82
444	244	84
450	247	85
469	258	86
490	269	89
510	280	91
Metal Shell 16" Φ w/0.312 walls		
490	270	80
508	279	82
510	281	84
517	284	85
541	298	86
565	311	89
588	323	91
Metal Shell 16" Φ w/0.375 walls		
490	270	80
508	279	82
510	281	84
517	284	85
541	298	86
565	311	89
588	323	91

Table 13 - Pile Capacity Tables
(East Stub Abutment)

East Abutment - 90% Consolidation		
Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft)
Metal Shell 12" Φ w/0.25 walls		
331	182	84
344	189	87
357	196	89
370	204	92
382	210	94
392*	215*	96*
Metal Shell 14" Φ w/0.25 walls		
372	205	82
390	214	84
405	223	87
420	231	89
435	239	92
448	247	94
459*	252*	96*
Metal Shell 14" Φ w/0.312 walls		
420	231	89
435	239	92
448	247	94
463	255	97
484	266	99
509	280	103
570*	313*	104*
Metal Shell 16" Φ w/0.312 walls		
483	266	89
500	275	92
516	284	94
532	293	97
558	307	99
586	322	103
654*	360*	104*
Metal Shell 16" Φ w/0.375 walls		
483	266	89
500	275	92
516	284	94
532	293	97
558	307	99
586	322	103
782*	430*	104*

East Abutment - Precore to Elev. 745.0		
Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft)
Metal Shell 12" Φ w/0.25 walls		
322	177	92
335	184	95
347	191	97
359	197	100
377	207	103
392*	215*	105*
Metal Shell 14" Φ w/0.25 walls		
363	200	90
378	208	92
393	216	95
407	224	97
422	232	100
443	244	102
459*	252*	104*
Metal Shell 14" Φ w/0.312 walls		
378	208	92
393	216	95
407	224	97
422	232	100
443	244	102
468	257	106
570*	313*	107*
Metal Shell 16" Φ w/0.312 walls		
436	240	92
453	249	95
468	258	97
485	267	100
511	281	102
539	296	106
654*	360*	107*
Metal Shell 16" Φ w/0.375 walls		
453	249	95
468	258	97
485	267	100
511	281	102
539	296	106
755	415	107
782*	430*	109*

*Max Nominal Req Bearing

Table 14 - Pile Capacity Tables (Pier 1)

Pier 1 (B-10 data)		
Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft)
Metal Shell 12" Φ w/0.25 walls		
174	96	30
190	105	32
205	113	35
303	167	52
321	177	55
392*	215*	57*
Metal Shell 14" Φ w/0.25 walls		
206	113	30
225	124	32
242	133	35
359	197	52
380	209	55
459*	252*	57*
Metal Shell 14" Φ w/0.312 walls		
359	197	52
380	209	55
423	233	60
447	246	67
449	247	70
469	258	72
Metal Shell 16" Φ w/0.312 walls		
440	242	55
464	255	57
489	269	60
501	276	62
511	281	67
514	283	70
Metal Shell 16" Φ w/0.375 walls		
415	228	52
440	242	55
464	255	57
489	269	60
501	276	62
511	281	67
514	283	70

*Max Nominal Req Bearing

Table 15 - Pile Capacity Tables (Pier 2)

Pier 2 (B-11 data)		
Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft)
Metal Shell 12" Φ w/0.25 walls		
210	116	37
223	123	40
232	128	42
243	134	45
307	169	47
392*	215*	50*
Metal Shell 14" Φ w/0.25 walls		
248	136	37
263	145	40
273	150	42
286	157	45
370	204	47
459*	252*	50*
Metal Shell 14" Φ w/0.312 walls		
248	136	37
263	145	40
273	150	42
286	157	45
370	204	47
570*	313*	50*
Metal Shell 16" Φ w/0.312 walls		
287	158	37
304	167	40
315	173	42
329	181	45
438	241	47
451	248	50
Metal Shell 16" Φ w/0.375 walls		
451	248	50
465	256	57
482	265	60
493	271	62
508	279	65
523	288	67
532	293	69

Table 16 - Pile Capacity Tables (Pier 3)

Pier 3 (B-12 data)		
Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft)
Metal Shell 12" Φ w/0.25 walls		
202	111	34
211	116	37
226	124	39
392*	215*	42*
Metal Shell 14" Φ w/0.25 walls		
214	118	29
229	126	32
237	130	34
248	136	37
226	146	39
459*	252*	42*
Metal Shell 14" Φ w/0.312 walls		
237	130	34
248	136	37
266	146	39
281	155	42
422	232	49
570*	313*	52*
Metal Shell 16" Φ w/0.312 walls		
273	150	34
286	157	37
307	169	39
325	179	42
496	273	49
507	279	52
Metal Shell 16" Φ w/0.375 walls		
535	294	64
557	306	67
573	315	69
592	326	72
623	342	74
637	350	76

*Max Nominal Req Bearing

Table 17 - Pile Capacity Tables (Pier 4)

Pier 4 (B-13 data)		
Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft)
Metal Shell 12" Φ w/0.25 walls		
205	113	32
234	129	45
251	138	47
392*	215*	50*
Metal Shell 14" Φ w/0.25 walls		
248	137	32
297	163	47
423	233	50
437	240	52
445	245	55
459*	252*	57*
Metal Shell 14" Φ w/0.312 walls		
278	153	45
297	163	47
423	233	50
437	240	52
445	245	55
570*	313*	57*
Metal Shell 16" Φ w/0.312 walls		
322	177	45
344	189	47
506	278	50
522	287	52
531	292	53
546	300	57
Metal Shell 16" Φ w/0.375 walls		
322	177	45
344	189	47
506	278	50
522	287	52
531	292	55
546	300	57

Table 18 - Pile Capacity Tables (Pier 5)

Pier 5 (B-14 data)		
Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft)
Metal Shell 12" Φ w/0.25 walls		
295	162	47
310	170	49
331	182	52
392*	215*	54*
Metal Shell 14" Φ w/0.25 walls		
314	173	42
333	183	44
348	191	47
365	201	49
392	215	52
459*	252*	54*
Metal Shell 14" Φ w/0.312 walls		
341	188	42
361	198	44
375	206	47
392	216	49
419	230	52
570*	313*	54*
Metal Shell 16" Φ w/0.312 walls		
363	200	42
385	212	44
401	221	47
421	232	49
453	249	52
477	263	54
Metal Shell 16" Φ w/0.375 walls		
549	302	62
573	315	64
588	323	67
608	335	69
621	341	72
631	347	73

*Max Nominal Req Bearing

Table 19 - Pile Capacity Tables (Pier 6)

Pier 6 (B-15 data)		
Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft)
Metal Shell 12" Φ w/0.25 walls		
285	157	52
295	162	55
297	163	57
392*	215*	60*
Metal Shell 14" Φ w/0.25 walls		
311	171	47
331	182	50
334	184	52
346	190	55
346	191	57
459*	252*	60*
Metal Shell 14" Φ w/0.312 walls		
334	184	52
346	190	55
346	191	57
349	192	60
400	220	67
411	226	69
Metal Shell 16" Φ w/0.312 walls		
360	198	47
384	211	50
396	218	57
400	220	60
462	254	67
474	261	69
Metal Shell 16" Φ w/0.375 walls		
396	218	57
400	220	60
522	287	62
536	295	65
462	254	67
474	261	69

Table 20 - Pile Capacity Tables
(Pier 7)

Pier 7 (B-16 data)		
Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft)
Metal Shell 12" Φ w/0.25 walls		
276	152	41
301	166	43
326	179	46
392*	215*	48*
Metal Shell 14" Φ w/0.25 walls		
239	131	31
302	166	38
328	180	41
359	197	43
387	213	46
459*	252*	48*
Metal Shell 14" Φ w/0.312 walls		
387	213	46
405	223	48
428	235	51
455	250	53
480	264	56
570*	313*	58*
Metal Shell 16" Φ w/0.312 walls		
527	290	53
556	306	56
569	313	58
592	325	61
622	342	63
648	356	66
Metal Shell 16" Φ w/0.375 walls		
527	290	53
556	306	56
569	313	58
592	325	61
622	342	63
648	356	66

*Max Nominal Req Bearing

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 were anticipated to be less than 3 kips except for piers subject to extreme lateral loading events such as vehicle collision forces on piers. If piles are subjected to lateral forces greater than 3 kips/pile (for LRFD), a more detailed soil structure interaction analysis should be performed such that the designer can evaluated pile adequacy. Based on subsurface information, soils in the upper 10 feet are generally softer in consistency which will lower lateral resistance in this upper soil zone. The use of pile batter should be considered for pier locations or the consider increased depths to pile fixity for nonbattered piles.

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

The proposed construction of Ramp D over I-57 and 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. M.S.E. walls are governed by IDOT Standard Specification Article 522 - Retaining 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.

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 (2016) and the Supplemental Specifications and Recurring Special Provisions (2020). 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 above 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.

7.5 Temporary Soil Retention System

The preliminary TS&L plans indicate that the construction of several of the proposed ramp individual pier foundations will be in close proximity of the existing interstates. The construction of Pier 1, Pier 2 and Pier 3 affect F.A.I. Rte. 74 and Pier 6 and Pier 7 will affect F.A.I. Rte. 57. Therefore, the use of a retaining system will be required.

Based on preliminary information, the ground surface around the proposed retained areas will not be level. The IDOT Design Guide and charts for Temporary Cantilever Sheet Piling could not be used to determine the feasibility of sheet piling due to level ground surfaces not existing behind and in front of the proposed sheet piling. Therefore, the use of temporary soil retention systems will be required.

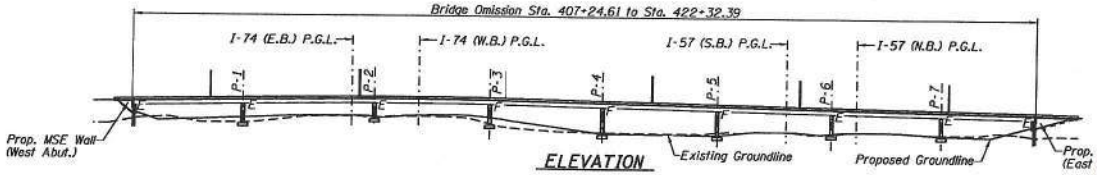
8.0 Limitations

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 has 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

Boring Locations / TSL



ELEVATION

HIGHWAY CLASSIFICATION

Ramp D
Functional Class: Interstate (Ramp)
ADT: 500 (2013); 1000 (2040)
ADTT: 95 (2013); 190 (2040)
DHV: 140 (2040)
Design Speed: 55 m.p.h.
Posted Speed: 55 m.p.h.
One-Way Traffic

F.A.P. Rte. 74 - I 74
Functional Class: Interstate
ADT: 38,900 (2013); 59,900 (2040)
ADTT: 4,832 (2013); 13,717 (2040)
DHV: 3,153 (2040)
Design Speed: 75 m.p.h.
Posted Speed: 70 m.p.h.
Two-Way Traffic
Directional Distribution: 50:50

F.A.P. Rte. 57 - I 57
Functional Class: Interstate
ADT: 32,400 (2013); 49,900 (2040)
ADTT: 4,572 (2013); 14,172 (2040)
DHV: 2,113 (2040)
Design Speed: 75 m.p.h.
Posted Speed: 70 m.p.h.
Two-Way Traffic
Directional Distribution: 50:50

DESIGN SPECIFICATIONS

2017 AASHTO LRFD 8th Edition, Bridge Design Specifications

LOADING HL-93

Allow 50 psf for future wearing surface

DESIGN STRESSES

FIELD UNITS

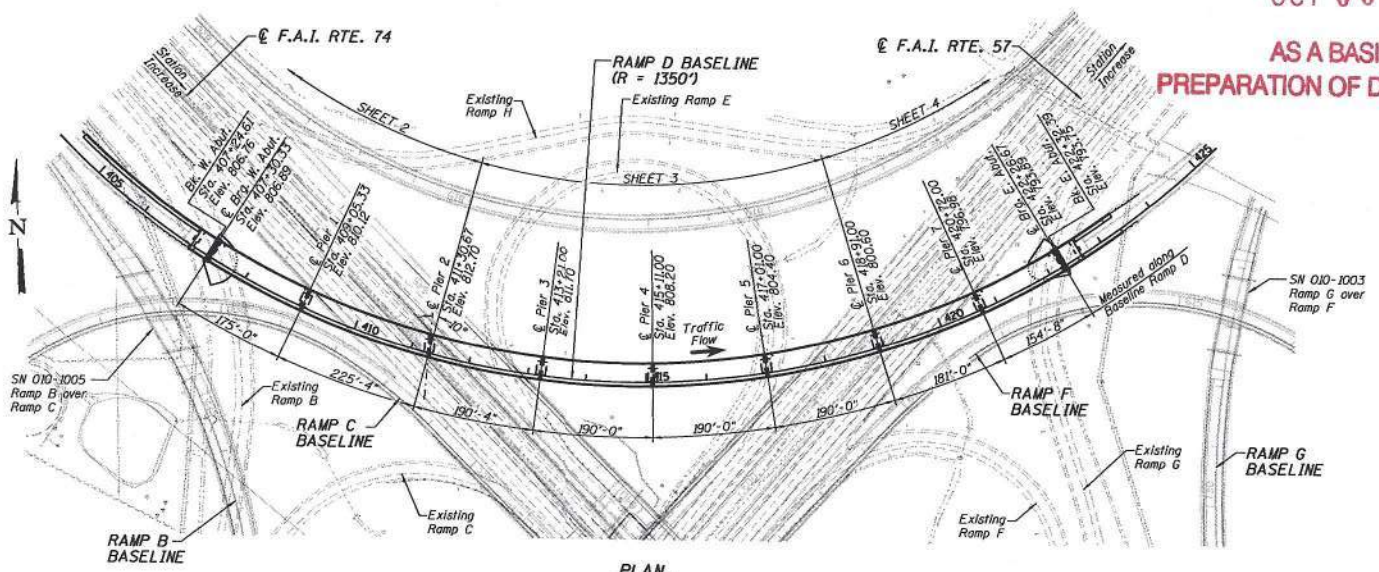
f'c = 3,500 psi (Cast-in-Place)
f'c = 4,000 psi (Superstructure Concrete)
fy = 60,000 psi (Reinforcement)
fy = 50,000 psi (M270 Grade 50)*

*All structural steel shall be metalized or galvanized.

**Stainless steel reinforcement for the deck to be incorporated in final design

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

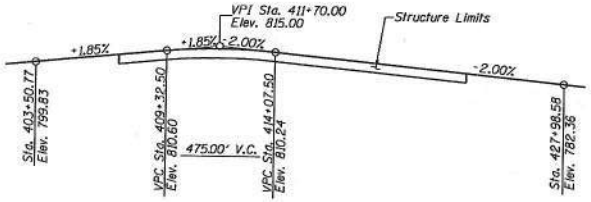


PLAN
(SEE SHEETS 2, 3 & 4 FOR ENLARGED PLANS)

Note:
Up to 1/4" may be ground off the bridge deck and the bridge approach slabs.

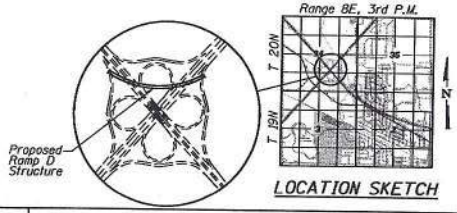
CURVE DATA
(RAMP D)

PI Sta. = 421+90.36
Δ = 109° 32' 31" (Lt.)
D = 4° 14' 39"
R = 1,350.00'
T = 1,911.69'
L = 2,581.02'
E = 990.32'
e = 7.4%
T.R. = N/A
S.E. RUN = 250'
P.C. Sta. = 402+78.67
P.T. Sta. = 428+59.69



PROPOSED RAMP D PROFILE

Note:
The profile grade shows the final elevations after grinding.



LOCATION SKETCH

GENERAL PLAN
RAMP D OVER
F.A.I. RTE. 74 AND F.A.I. RTE. 57
SECTION (10-34-1) HBK
CHAMPAIGN COUNTY
STATION 414+78.50
STRUCTURE NO. 010-1004

CMT

USER NAME = Denise Herrera	DESIGNED	L.M.	REVISED
D:\70899?-TSL-10_Ramp D over I74 and I57\	CHECKED	R.J.K.	REVISED
PLOT SCALE =	DRAWN	G.L.D. and D.H.	REVISED
PLOT DATE = May 11, 2020	CHECKED	L.M.	REVISED

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

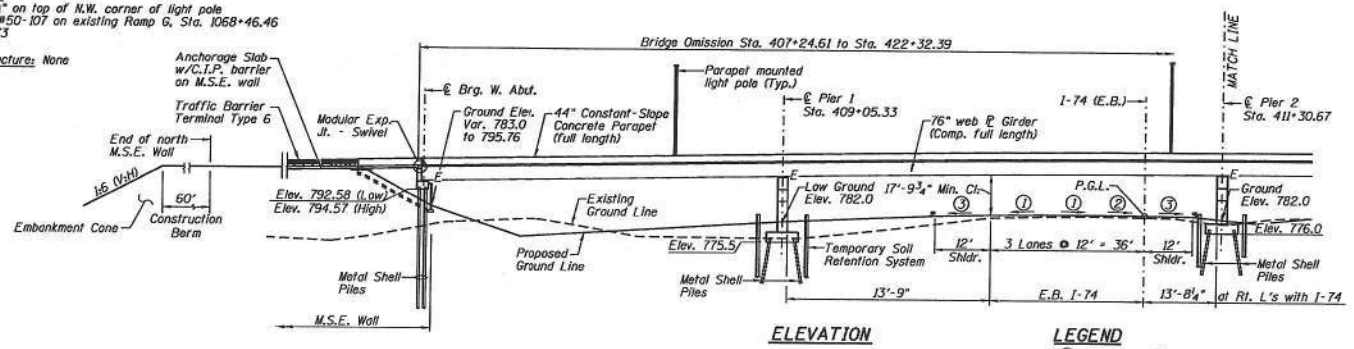
I-57 & I-74 INTERCHANGE
STRUCTURE NO. 010-1004 – GENERAL PLAN & ELEVATION
SHEET NO. 1 OF 9 SHEETS

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
74 & 57	(10-34-1) HBK	CHAMPAIGN		
		CONTRACT NO. 70899		
		ILLINOIS FED. AID PROJECT		

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

Existing Structure: None

No Salvage



ELEVATION

LEGEND

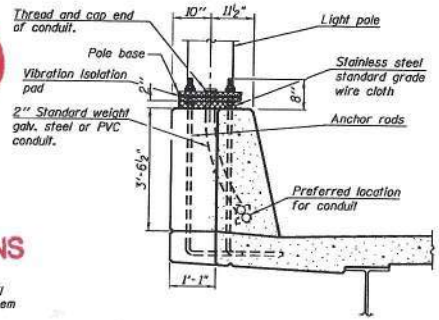
① 1.5% Cross Slope
② 2.0% Cross slope
③ 4.0% Cross Slope

LIGHT POLE LOCATIONS

STATION	**OFFSET
406+13.00	32.33' Lt.
408+56.07	32.33' Lt.
411+02.74	32.33' Lt.
413+48.41	32.33' Lt.
415+92.74	32.33' Lt.
418+38.60	32.33' Lt.
420+84.48	32.33' Lt.
423+22.00	32.33' Lt.

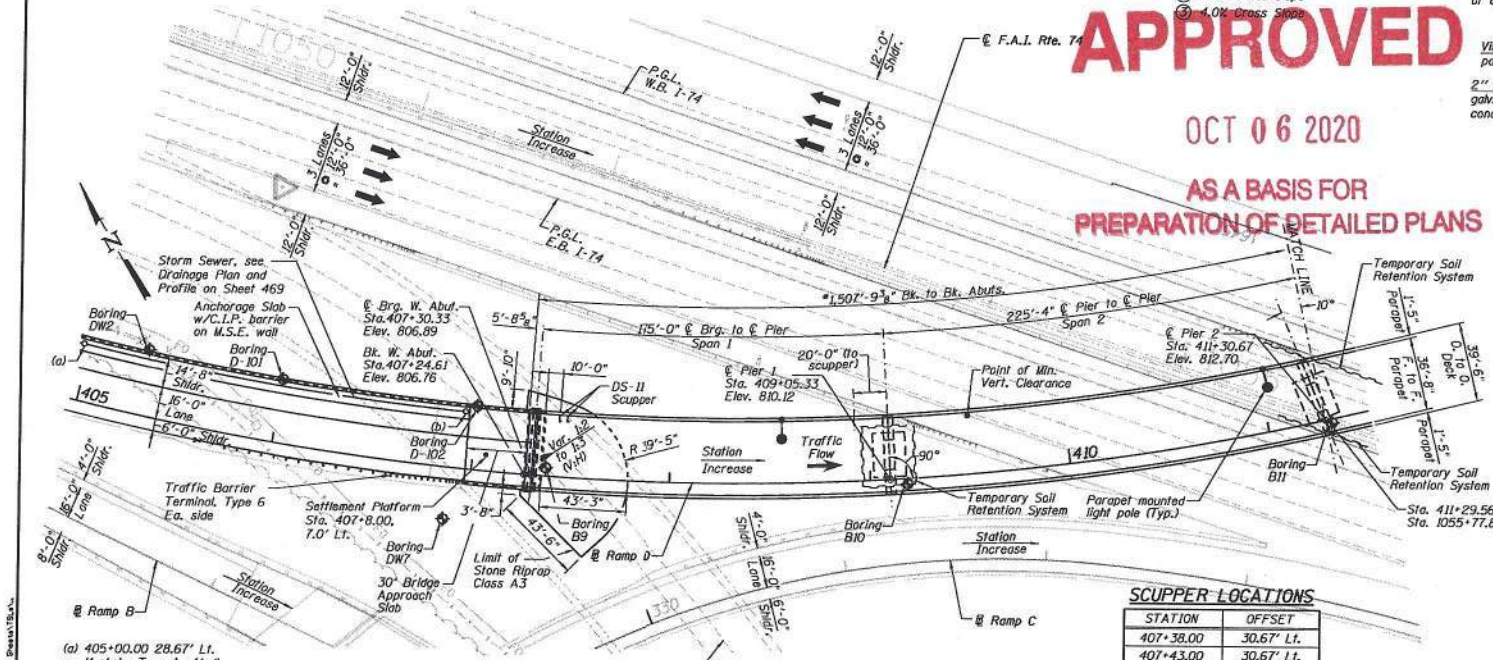
**From ℄ Ramp D

Note: Pole height is 45 ft. with an 8 ft. mast arm. Bolt circle diameter is 15 in.



PARAPET MOUNTED LIGHT POLE

APPROVED
OCT 06 2020
AS A BASIS FOR
PREPARATION OF DETAILED PLANS



(a) 405+00.00 28.67' Lt.
Manhole, Type A, 4' dia.
Type 20 Frame and Grate.
See Drainage Plan and Profile Sheet 469.

(b) Sta. 406+87.00, 28.67' Lt.
Manhole, Type A, 4' dia.
Type 20 Frame and Grate.
See Drainage Plan and Profile Sheet 469.

*Measured along ℄ Ramp D with all abutments & piers radial to alignment except Pier 2.

PLAN

SCUPPER LOCATIONS

STATION	OFFSET
407+38.00	30.67' Lt.
407+43.00	30.67' Lt.
409+00.00	30.67' Lt.
413+11.00	30.67' Lt.
415+00.00	30.67' Lt.
416+90.00	30.67' Lt.
420+82.00	30.67' Lt.
422+09.00	30.67' Lt.
422+14.00	30.67' Lt.

SOIL BORING LOCATIONS

Boring No.	Station	Offset	Northing	Easting
B9	407+36.98	4.09' Lt.	1267740.170	997355.733
B10	409+18.57	2.69' Rt.	1267645.173	997510.376
B11	411+31.42	1.77' Rt.	1267569.508	997709.458
D-101	406+00.00	31.7' Lt.	1267842.199	997262.973
D-102	407+00.00	31.7' Lt.	1267783.483	997340.973
DW2	405+30.00	33.0' Lt.	1267887.625	997211.933
DW7	406+88.60	25.9' Rt.	1267742.892	997298.552

NOTES:

1. Existing Outer Ramp B shall be relocated not to impede W. Abutment construction.
2. ℄ Ramp D elevations shown are prior to grinding.

L:\10071\108682\D-ex\CADD_Sheets\Structural Sheets\TSLa.dgn

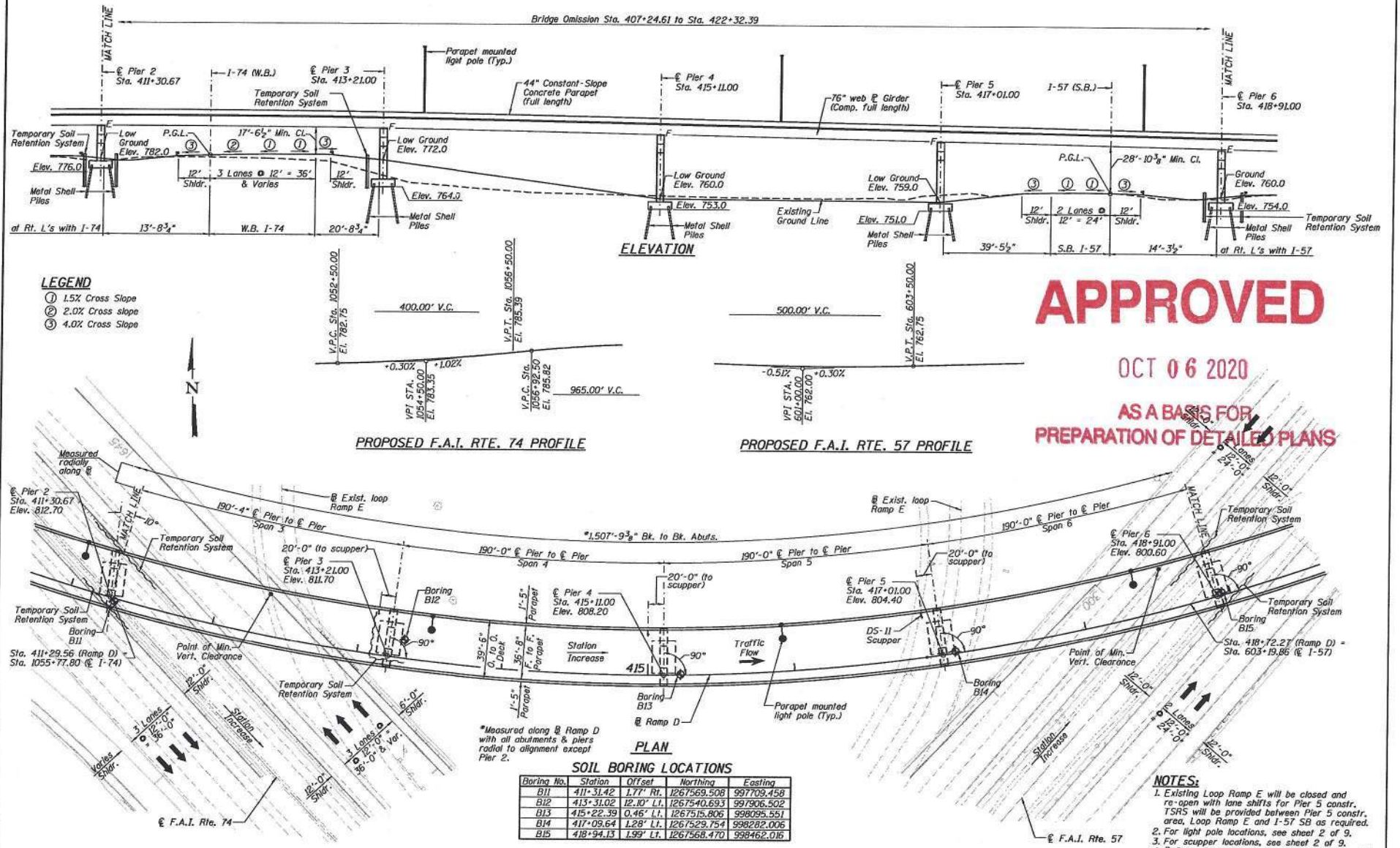
CMT

USER NAME = Denise Herrera	DESIGNED L.M.	REVISED
=\D57689?-TSL-01.Ramp D over I74 and I57.dgn	CHECKED R.J.K.	REVISED
PLOT SCALE =	DRAWN G.L.D. and D.H.	REVISED
PLOT DATE = May 11, 2020	CHECKED L.M.	REVISED

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

I-57 & I-74 INTERCHANGE
STRUCTURE NO. 010-1004 – GENERAL PLAN 1
SHEET NO. 2 OF 9 SHEETS

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
74 & 57	(10-34-1) HBK	CHAMPAIGN		
		CONTRACT NO. 70B99		
		ILLINOIS FED. AID PROJECT		



SOIL BORING LOCATIONS

Boring No.	Station	Offset	Northing	Easting
B11	411+31.42	1.77' Rt.	1267569.508	997709.458
B12	413+31.02	12.10' Lt.	1267540.693	997906.502
B13	415+22.39	0.46' Lt.	1267515.806	998095.551
B14	417+09.64	1.28' Lt.	1267529.754	998282.006
B15	418+94.13	1.99' Lt.	1267568.470	998462.016

APPROVED

OCT 06 2020

AS A BASIS FOR PREPARATION OF DETAILED PLANS

NOTES:

1. Existing Loop Ramp E will be closed and re-open with lane shifts for Pier 5 constr. TSRS will be provided between Pier 5 constr. area, Loop Ramp E and I-57 SB as required.
2. For light pole locations, see sheet 2 of 9.
3. For scupper locations, see sheet 2 of 9.
4. @ Ramp D elevations are shown prior to grinding.

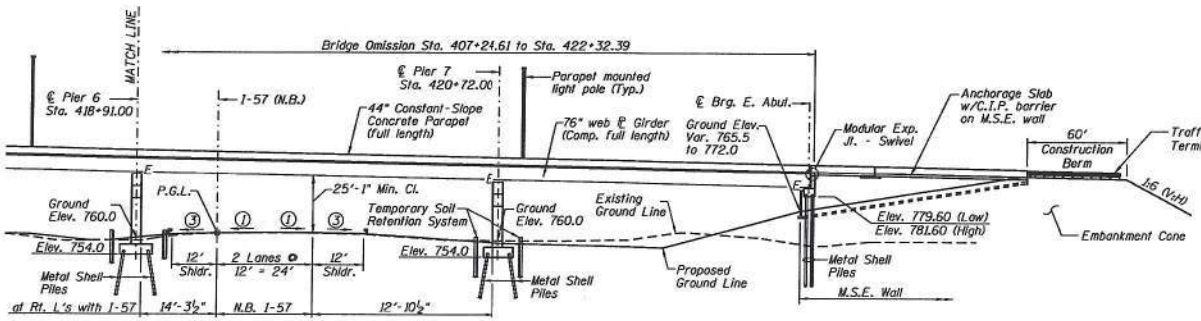
CMT

USER NAME = Danae Herrera	DESIGNED L.M.	REVISED
...\D1578897-TSL-I25,Ramp D over I74 and I57.dgn	CHECKED R.J.K.	REVISED
PLOT SCALE =	DRAWN G.L.D. and D.H.	REVISED
PLOT DATE = May 11, 2020	CHECKED L.M.	REVISED

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

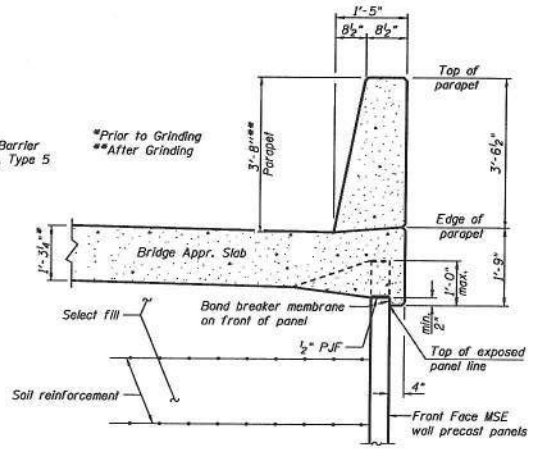
I-57 & I-74 INTERCHANGE
STRUCTURE NO. 010-1004 - GENERAL PLAN II
SHEET NO. 3 OF 9 SHEETS

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
74 & 57	(10-34-1) HSK	CHAMPAIGN		
		CONTRACT NO. 70B99		
		ILLINOIS FED. AID PROJECT		

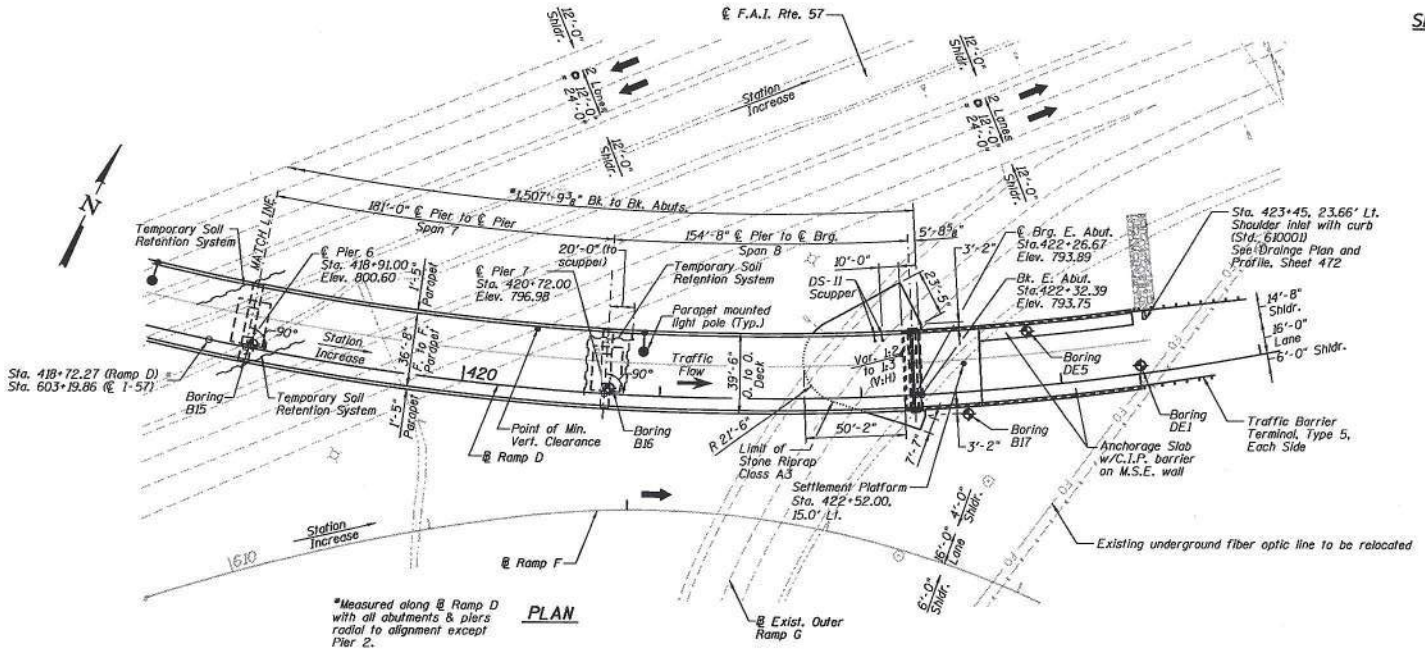


ELEVATION

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



SECTION THRU BRIDGE APPROACH SLAB



*Measured along ℄ Ramp D with all abutments & piers radial to alignment except Pier 2.

PLAN

APPROVED
OCT 06 2020
AS A BASIS FOR PREPARATION OF DETAILED PLANS

SOIL BORING LOCATIONS

Boring No.	Station	Offset	Northing	Easting
B15	418+94.13	1.99' Lt.	1267568.470	998462.016
B16	420+74.44	2.84' Lt.	1267629.768	998631.110
B17	422+52.79	10.93' Rt.	1267699.443	998796.285
DE1	423+40.00	4.00' Lt.	1267759.464	998861.577
DE5	422+85.00	27.50' Lt.	1267748.968	998803.299

NOTE:
1. Existing Outer Ramp G shall be relocated not to impede the E. Abut. construction.
2. For light pole locations, see sheet 2 of 9.
3. For scupper locations, see sheet 2 of 9.
4. @ Ramp D elevations shown are prior to grinding.

CMT

USER NAME = Denise Herrera	DESIGNED L.M.	REVISED
\\0578897-TSL-I3_Ramp D over I74 and I57.dgn	CHECKED R.J.K.	REVISED
PLOT SCALE =	DRAWN G.L.D. and D.H.	REVISED
PLOT DATE = May 11, 2020	CHECKED L.M.	REVISED

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

I-57 & I-74 INTERCHANGE
STRUCTURE NO. 010-1004 – GENERAL PLAN III
SHEET NO. 4 OF 9 SHEETS

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
74 & 57	(10-34-1) HBK	CHAMPAIGN		
		CONTRACT NO. 70B99		
	ILLINOIS FED. AID PROJECT			

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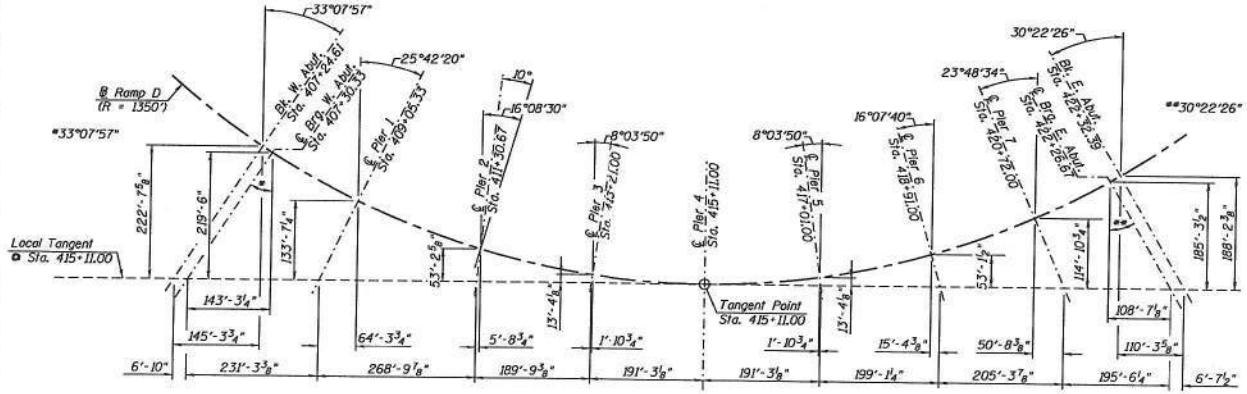
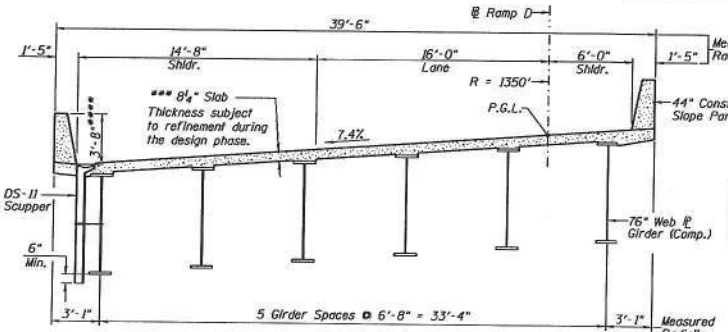
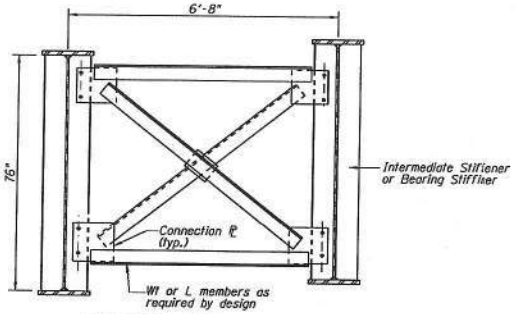


OFFSET SKETCH

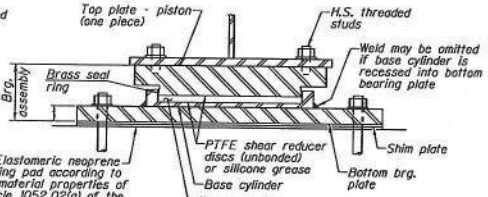


CROSS SECTION
(Looking Upstation)

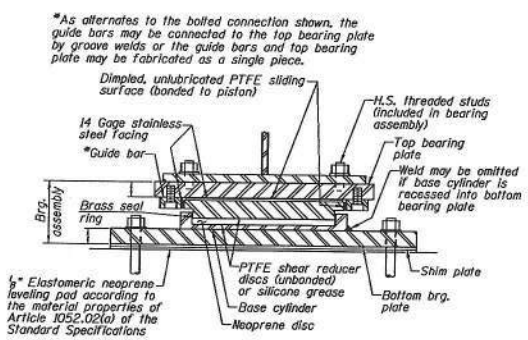
***Prior to Grinding
*****After Grinding



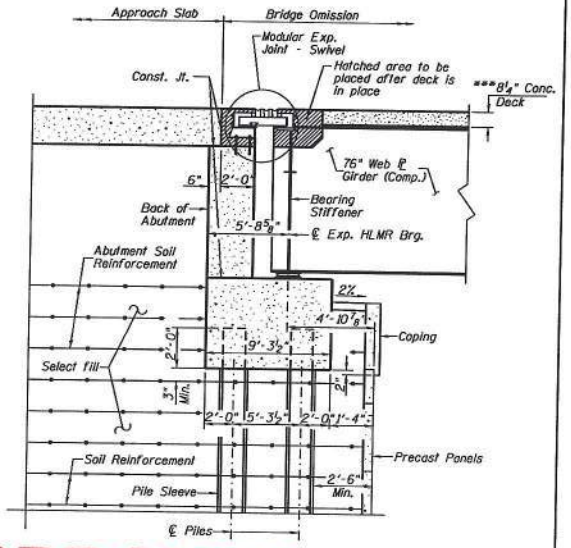
INTERIOR CROSS FRAME



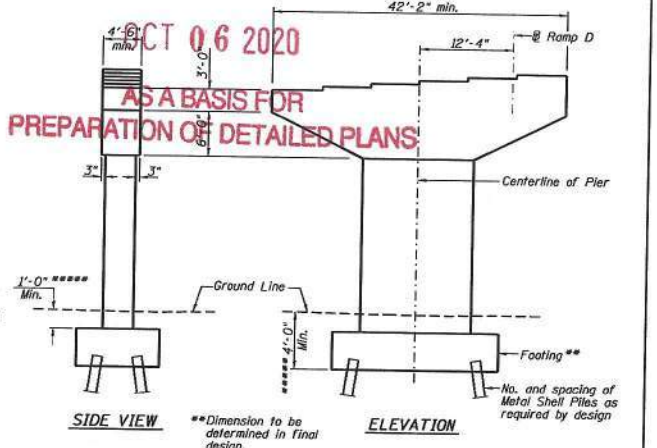
FIXED HLMR BEARING
Piers 3, 4 & 5



GUIDED EXPANSION HLMR BEARING
W. Abut., Piers 1, 2, 6 & 7, and E. Abut.



SECTION THRU ABUTMENT



SIDE VIEW

**Dimension to be determined in final design.

ELEVATION

PIER 1 THRU PIER 7 SKETCH
(Looking Upstation)

***** For footing thicknessse greater than 3.0', bottom of footing shall be established so that there is a minimum of 1.0' of soil above top of footing.

USER NAME = Denise Herrera	DESIGNED L.M.	REVISED	
\\DOT88197-TSL-141_Ramp D over I74 and I57	CHECKED R.J.K.	REVISED	
PLOT SCALE =	DRAWN G.L.D. and D.H.	REVISED	
PLOT DATE = May 11, 2020	CHECKED L.M.	REVISED	

CMT

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

I-57 & I-74 INTERCHANGE
STRUCTURE NO. 010-1004 – GENERAL DETAILS
SHEET NO. 5 OF 9 SHEETS

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
I74 & I57	010-34-1) HBK	CHAMPAIGN		
		CONTRACT NO. 70B99		
	ILLINOIS FED. AID PROJECT			

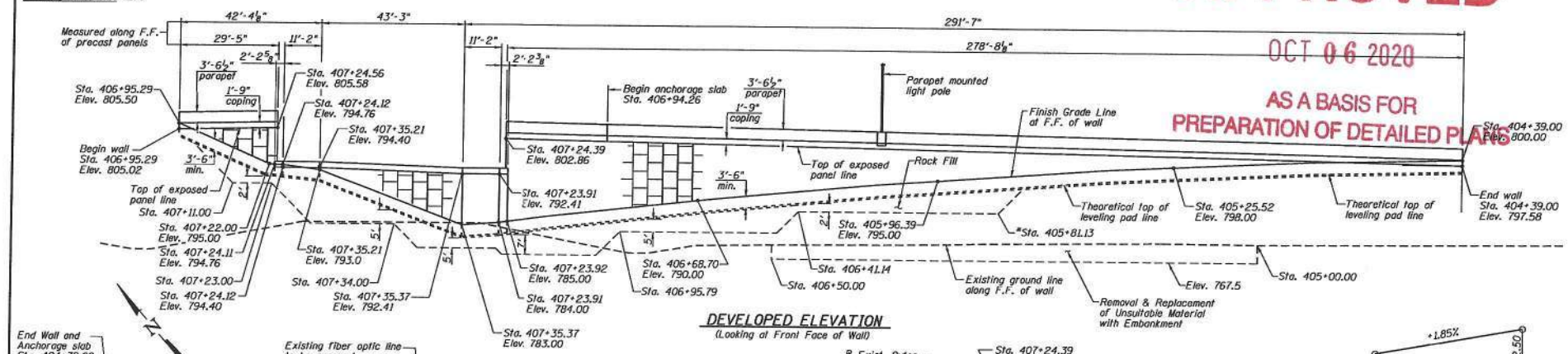
APPROVED

OCT 06 2020

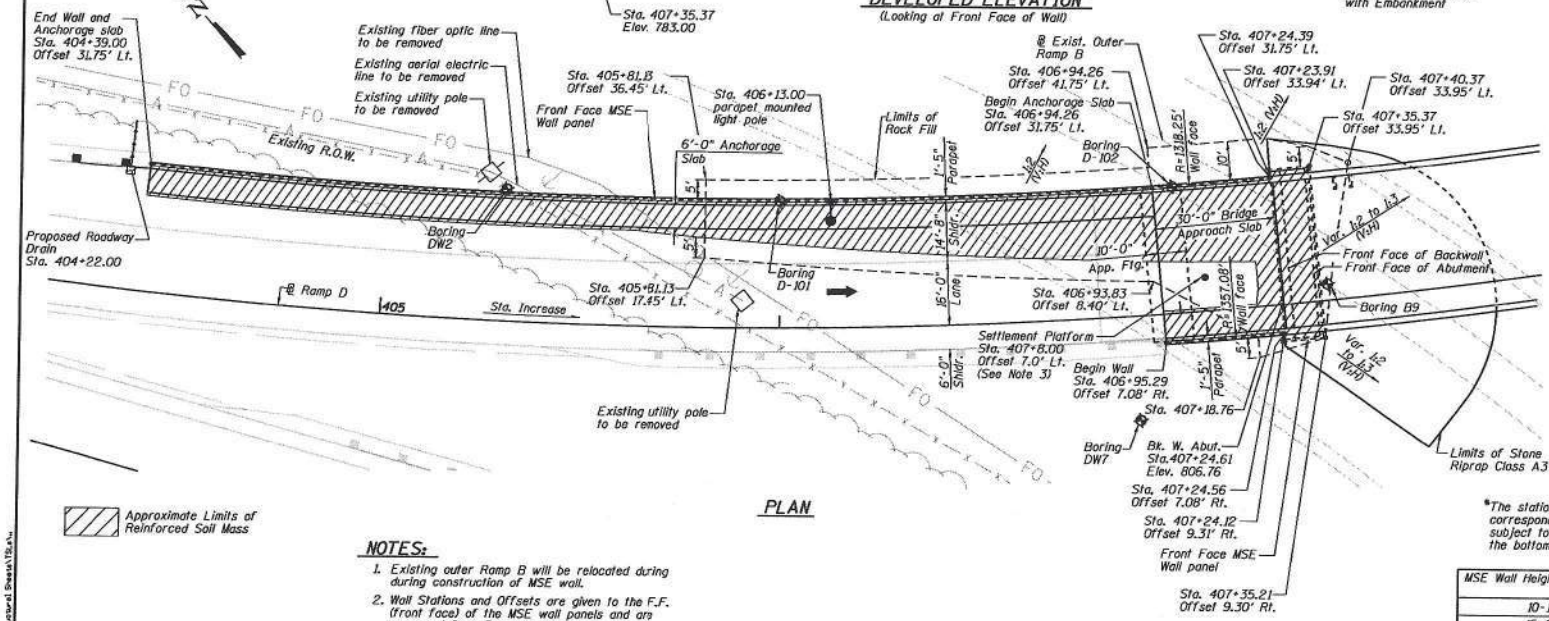
AS A BASIS FOR PREPARATION OF DETAILED PLANS

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

Existing Structure: None



DEVELOPED ELEVATION
(Looking at Front Face of Wall)

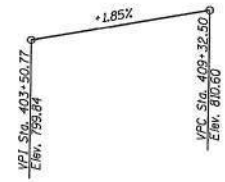


PLAN

Approximate Limits of Reinforced Soil Mass

NOTES:

1. Existing outer Ramp B will be relocated during during construction of MSE wall.
2. Wall Stations and Offsets are given to the F.F. (front face) of the MSE wall panels and are measured from Ramp D baseline.
3. See SGR for additional information regarding Settlement Platform. Location and monitoring requirements subject to refinement in final design. Install according to Art. 204.06 of the Standard Specifications.



PROPOSED RAMP D PROFILE
(Along Ramp D ℄)

Note:
The profile grade shows the final elevations after grinding

CURVE DATA
(RAMP D)

PI Sta. = 421+90.36
Δ = 109° 32' 31" (Lt.)
D = 4° 14' 39"
R = 1,350.00'
T = 1,911.69'
L = 2,581.02'
E = 990.32'
e = 7.4%
T.R. = N/A
S.E. RUN = 250'
P.C. Sta. = 402+78.67
P.T. Sta. = 428+59.69

*The stationings for the different depths of Rock Fill corresponding to different MSE wall height intervals are subject to change during construction based on how the bottom of the MSE wall will be stepped in the field.

MSE Wall Height Interval (ft.)	Thickness of Rock Fill below Mse Reinforced Mass (ft.)
10-15	2
15-20	5
20-25	7
25-30	10
30-35	12

CMT

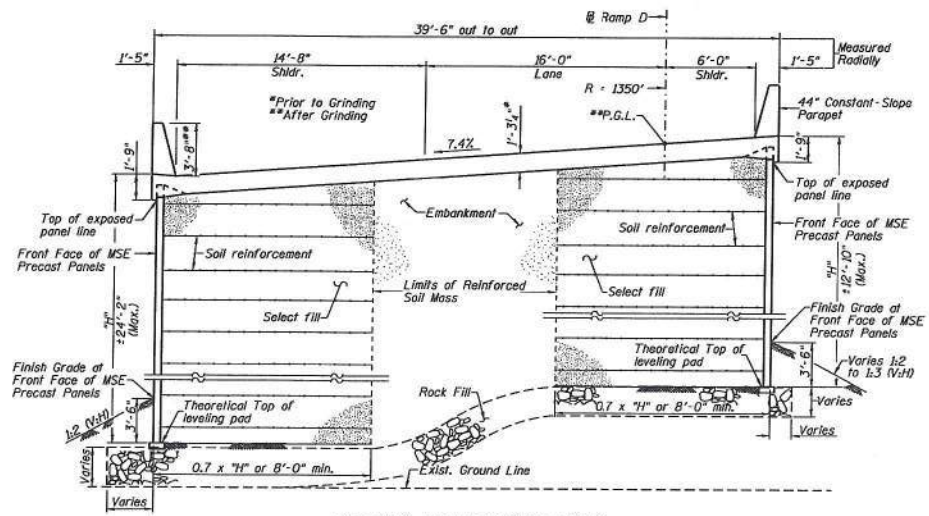
USER NAME = Denise Herrera
—\0570897-TSL-151,Ramp D over 174 and 157.dgn
PLOT SCALE =
PLOT DATE = May 11, 2020

DESIGNED	L.M.	REVISED
CHECKED	R.J.K.	REVISED
DRAWN	G.L.D. and D.H.	REVISED
CHECKED	L.M.	REVISED

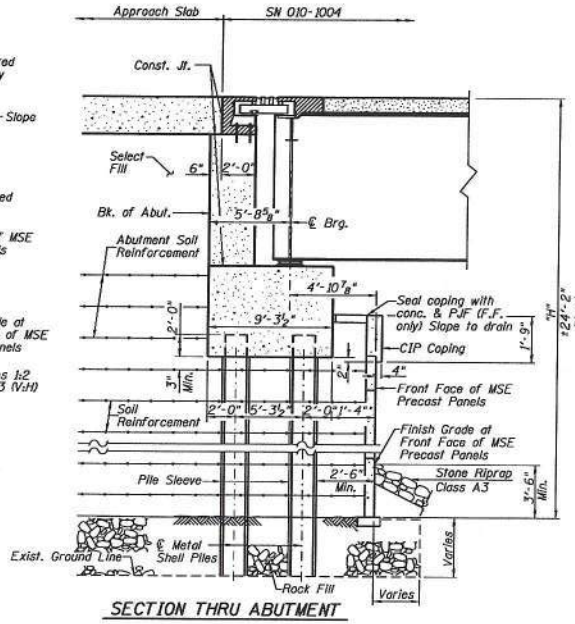
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

I-57 & I-74 INTERCHANGE
STRUCTURE NO. 010-1004 – WEST ABUTMENT MSE WALL
SHEET NO. 6 OF 9 SHEETS

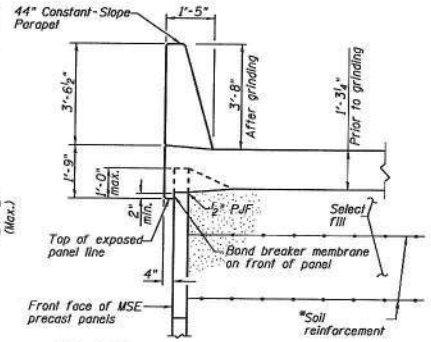
F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
74 & 57	(10-34-1) NBK	CHAMPAIGN		
		CONTRACT NO. 70B99		
	ILLINOIS FED. AID PROJECT			



SECTION AT APPROACH SLAB
(Looking Upstation)

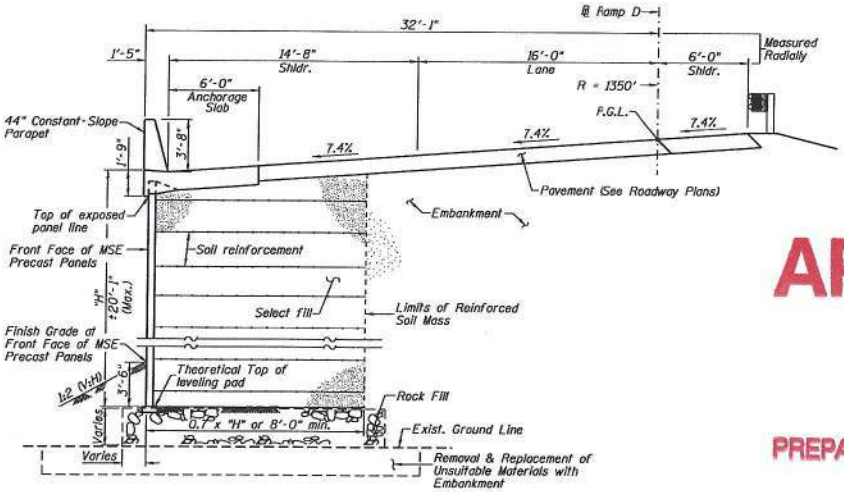


SECTION THRU ABUTMENT



*The M.S.E. wall supplier's internal stability design shall account for the anchorage slab's bearing pressure surcharge of 1.0 ksf and horizontal sliding force of 0.5 kips/ft. of wall.

SECTION THRU CIP BARRIER AND ANCHORAGE SLAB ON PRECAST PANELS

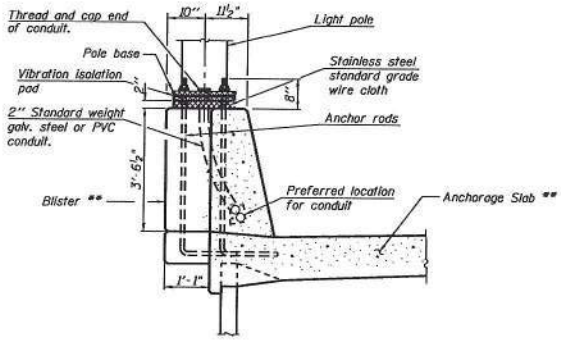


SECTION AT ROADWAY
(℄ Ramp D Sta 404+39.00 to Sta 406+94.26)

APPROVED

OCT 06 2020

AS A BASIS FOR
PREPARATION OF DETAILED PLANS



PARAPET MOUNTED LIGHT POLE

** MSE Wall supplier shall account for the anchorage slab's bearing pressure surcharge and horizontal sliding force to resists dead and live loads imposed by the light pole and blister.

CMT	USER NAME = Denise Herrera	DESIGNED L.M.	REVISED
	...\D578897-TSL-183.Ramp D over I74 and I57.dgn	CHECKED R.J.K.	REVISED
	PLOT SCALE =	DRAWN G.L.D. and D.H.	REVISED
	PLOT DATE = May 11, 2020	CHECKED L.M.	REVISED

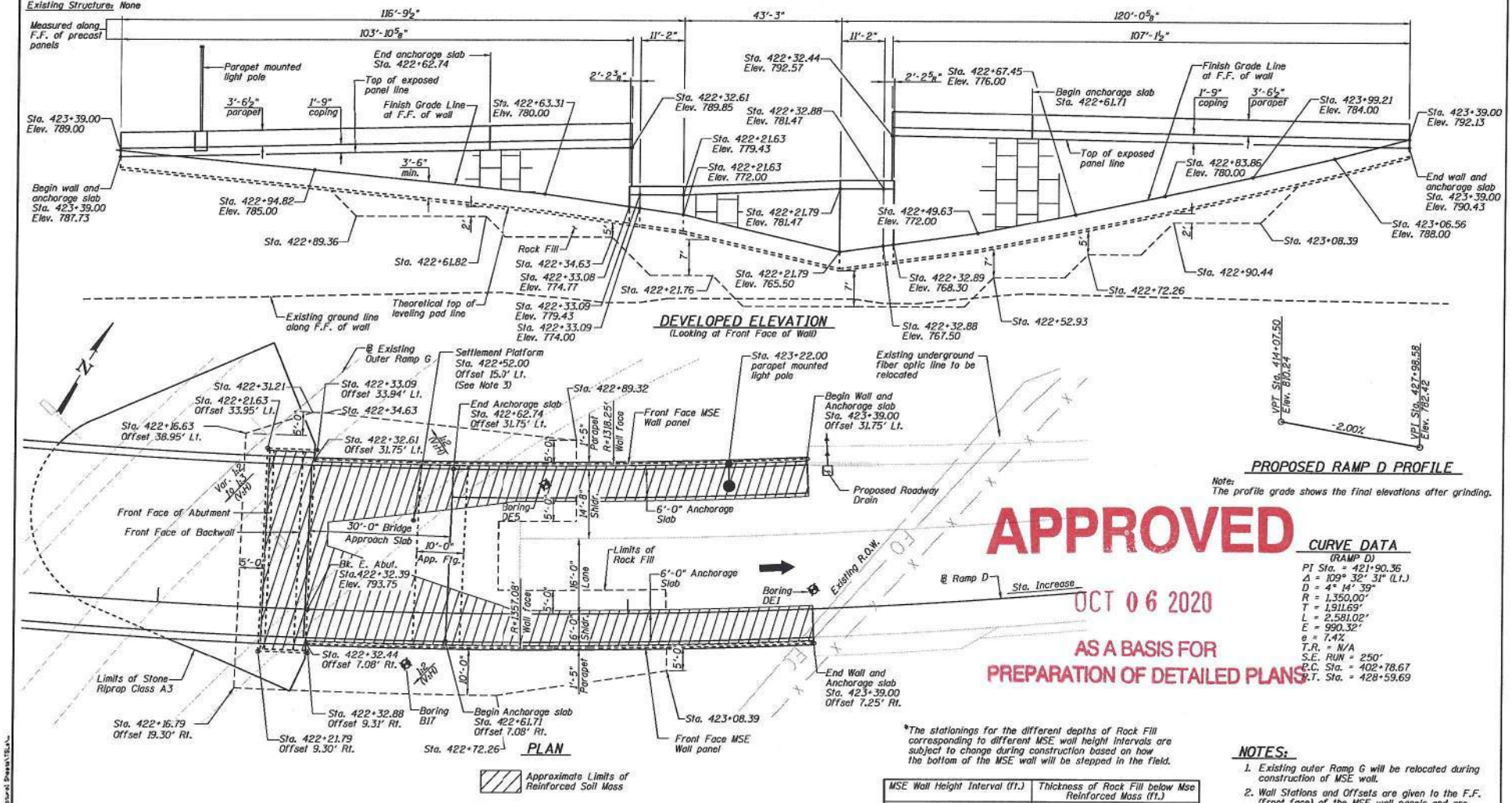
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

I-57 & I-74 INTERCHANGE
STRUCTURE NO. 010-1004 – WEST ABUTMENT MSE WALL
SHEET NO. 7 OF 9 SHEETS

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
74 & 57	(10-34-1) HSK	CHAMPAIGN		
		CONTRACT NO. 70899		
		ILLINOIS FED. AID PROJECT		

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

Existing Structure: None



PROPOSED RAMP D PROFILE

Note:
The profile grade shows the final elevations after grinding.

APPROVED
OCT 06 2020
AS A BASIS FOR PREPARATION OF DETAILED PLANS

CURVE DATA
(RAMP D)
PI Sta. = 421+90.36
Δ = 109° 32' 31" (Lt.)
D = 4° 14' 39"
R = 1,350.00'
T = 1,911.69'
L = 2,581.02'
E = 990.32'
e = 7.4%
T.R. = N/A
S.E. RUN = 250'
P.C. Sta. = 402+78.67
P.T. Sta. = 428+59.69

*The stationings for the different depths of Rock Fill corresponding to different MSE wall height intervals are subject to change during construction based on how the bottom of the MSE wall will be stepped in the field.

MSE Wall Height Interval (ft.)	Thickness of Rock Fill below Mse Reinforced Mass (ft.)
10-15	2
15-20	5
20-25	7
25-30	10
30-35	12

NOTES:
1. Existing outer Ramp G will be relocated during construction of MSE wall.
2. Wall Stations and Offsets are given to the F.F. (front face) of the MSE wall panels and are measured from Ramp D baseline.
3. See SGR for additional information regarding Settlement Platform. Location and monitoring requirements subject to refinement in final design. Install according to Art. 204.06 of the Standard Specifications.

L:\2021\1189882\Dsn\CADD Sheets\Structural Sheets\TSL4.dwg

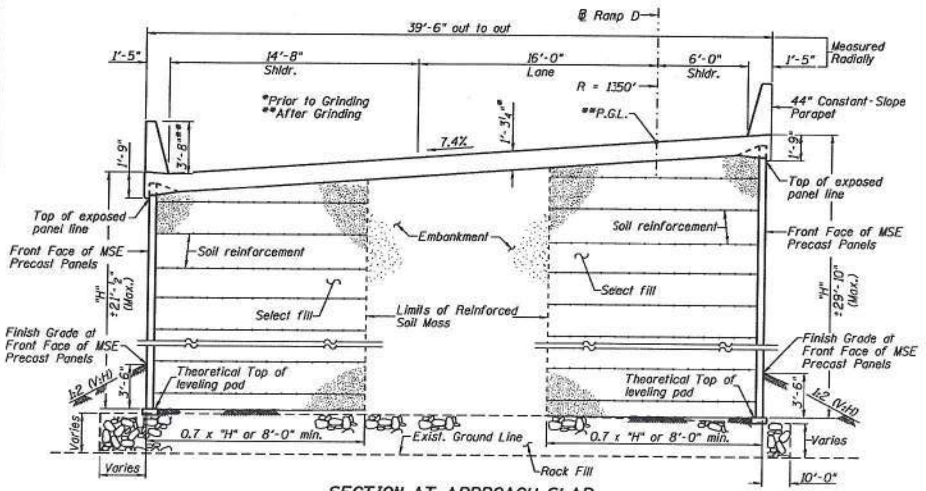
CMT

USER NAME = Denise Herrera	DESIGNED L.M.	REVISED
...\D5788897-TSL-171_Ramp D over I74 and I57.dgn	CHECKED R.J.K.	REVISED
PLOT SCALE =	DRAWN G.I.D. and D.H.	REVISED
PLOT DATE = May 11, 2020	CHECKED L.M.	REVISED

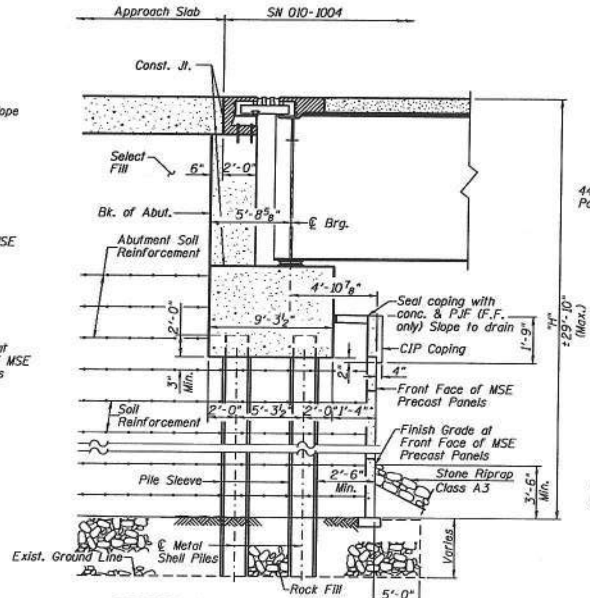
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

I-57 & I-74 INTERCHANGE
STRUCTURE NO. 010-1004 – EAST ABUTMENT MSE WALL
SHEET NO. 8 OF 9 SHEETS

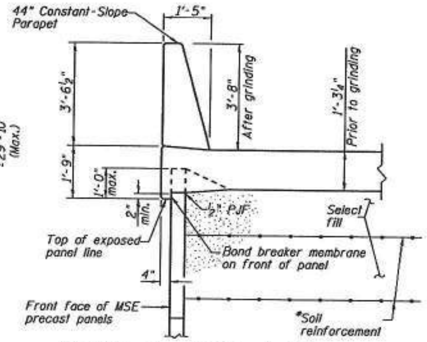
F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
74 & 57	(10-34-1) HBR	CHAMPAIGN		
		CONTRACT NO. 70899		
		ILLINOIS FED. AID PROJECT		



SECTION AT APPROACH SLAB
(Looking Upstation)

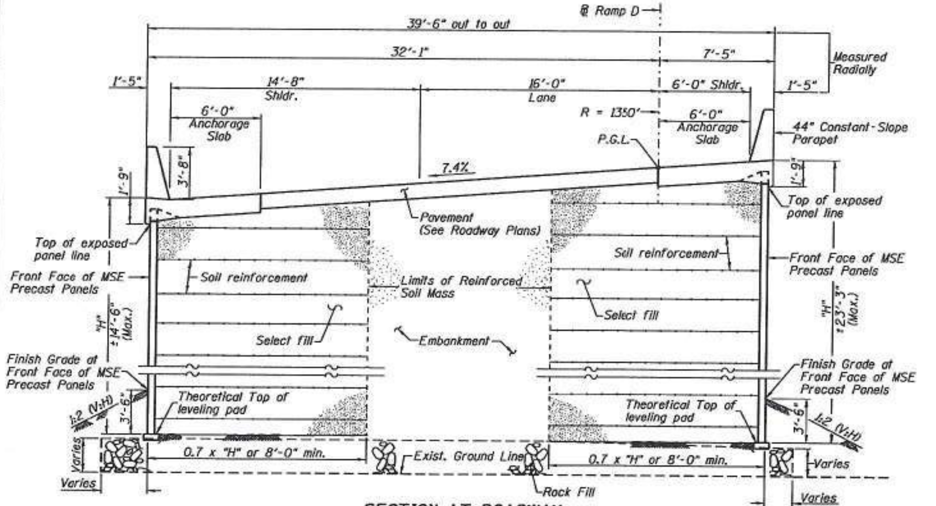


SECTION THRU ABUTMENT

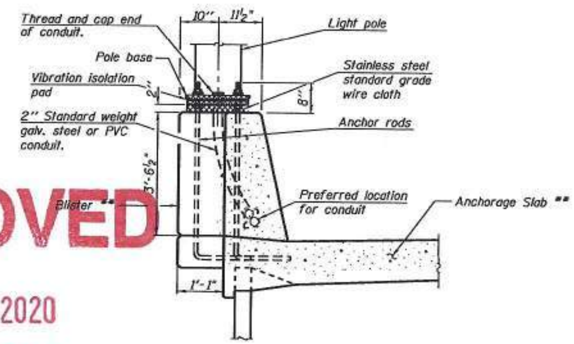


*The M.S.E. wall supplier's internal stability design shall account for the anchorage slab's bearing pressure surcharge of 1.0 ksf and horizontal sliding force of 0.5 kips/ft. of wall.

SECTION THRU CIP BARRIER AND ANCHORAGE SLAB ON PRECAST PANELS



SECTION AT ROADWAY
(Looking Upstation)



PARAPET MOUNTED LIGHT POLE

**MSE Wall supplier shall account for the anchorage slab's bearing pressure surcharge and horizontal sliding force to resists dead and live loads imposed by the light pole and blister.

APPROVED
OCT 06 2020
AS A BASIS FOR PREPARATION OF DETAILED PLANS

CMT	USER NAME = Denise Herrera	DESIGNED L.M.	REVISED	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	I-57 & I-74 INTERCHANGE STRUCTURE NO. 010-1004 – EAST ABUTMENT MSE WALL	F.A.I. RTE. 74 & 57	SECTION (10-34-1) HBK	COUNTY CHAMPAIGN
	PLOT SCALE =	CHECKED R.J.K.	REVISED					CONTRACT NO. 70B99
	PLOT DATE = May 11, 2020	DRAWN G.L.D. and D.H.	REVISED		SHEET NO. 9 OF 9 SHEETS		ILLINOIS FED. AID PROJECT	
		CHECKED L.M.	REVISED					

Appendix B

Subsurface Boring Logs

Illinois Department of Transportation

Division of Highways
Bacone Farmer Workmand Engineering & Testing, LLC

SOIL BORING LOG

Date 2/12/15

ROUTE I-57/74 DESCRIPTION West Abut - Ramp D LOGGED BY TLM

SECTION (10-34-1) HBK LOCATION , SEC. 34, TWP. 20N, RNG. 8E, 3rd PM,
Latitude 40.147763, Longitude -88.286452

COUNTY Champaign DRILLING METHOD HSA HAMMER TYPE AUTO

STRUCT. NO. 010-1004
Station 414+78.50

BORING NO. B-9
Station 407+36.98
Offset 4.1 ft LT
Ground Surface Elev. 779.30 ft

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

Groundwater Elev.:
First Encounter 729.3 ft ▼
Upon Completion ft
After Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				10" HMA SHOULDER
				778.50
				SILTY LOAM: Brown, hard
	10			
	5 7	4.5 P	10	
				776.30
				SILTY CLAY LOAM: Very stiff
	7			
-5	5 6	2.3 B	15	
				773.80
				SILTY CLAY LOAM: Gray to Brown, very stiff
	6			
	4 6	3.9 B	11	
				771.30
				SILTY CLAY LOAM: Gray, very stiff
	6			
-10	6 8	2.9 B	11	
				768.80
				SILTY LOAM: Brown, stiff
	5			
	2 3	1.5 B	24	
	2			
-15	2 2	1.2 B	26	
				763.80
				SILTY CLAY LOAM: Brown, stiff 2" sand seam
	2			
	2 4	1.1 B	15	
				761.30
				SILTY CLAY: Brown, very stiff
	3			
-20	5 6	3.1 B	14	
				SILTY CLAY: Brown, very stiff *(continued)*
				757.30
				SILTY CLAY TILL: Gray, very stiff
	5			
-25	6 6	3.5 B	12	
				752.30
				SILTY CLAY TILL: Gray, stiff
	4			
-30	4 6	1.9 B	12	
				747.80
				SILTY CLAY TILL: Gray, very stiff
	3			
-35	5 5	2.7 B	13	
				742.30
				SILTY CLAY TILL: Gray, stiff
	2			
-40	5 7	1.7 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 2/12/15

ROUTE I-57/74 **DESCRIPTION** West Abut - Ramp D **LOGGED BY** TLM

SECTION (10-34-1) HBK ~~10(5-1-RS-1,14-1,6)R~~ **LOCATION** , SEC. 34, TWP. 20N, RNG. 8E, 3rd PM, Latitude 40.147763, Longitude -88.286452

COUNTY Champaign **DRILLING METHOD** HSA **HAMMER TYPE** AUTO

STRUCT. NO. 010-1004
Station 414+78.50

BORING NO. B-9
Station 407+36.98
Offset 4.1 ft LT
Ground Surface Elev. 779.30 ft

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

Groundwater Elev.:
First Encounter 729.3 ft ▼
Upon Completion ft
After ___ **Hrs.** ft

Description	Elev.	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
SILTY CLAY TILL: Gray, stiff *(continued)*	737.30				
SILTY CLAY TILL: Gray, very stiff		-45	3 6 7	2.5 B	12
	732.30				
SILTY CLAY TILL: Gray, medium, wet		▼ -50	3 4 6	0.9 B	12
	727.30				
CLEAN SAND: Gray, medium, coarse grained		-55	5 2 10		15
	722.30				
No Recovery	719.30	-60	4 4 7		

Description	Elev.	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Gray sand and gravel	715.30		5		5
SILTY CLAY LOAM TILL: Gray to Brown, very stiff		-65	5 8	2.5 B	12
	712.30				
SILTY CLAY GRAVELLY TILL: Brown, stiff	709.80		6 7 10	1.5 P	12
SILTY CLAY TILL: Gray		-70			
	707.30				
CLAYEY TILL: Gray, very stiff	704.30	-75	3 7 10	2.7 B	16
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)

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

SOIL BORING LOG

Date 2/12/15

ROUTE I-57/74 DESCRIPTION Pier 1 ~~Pier~~ Boring Ramp D LOGGED BY TLM

SECTION (10-34-1) HBK ~~10(5-1 RS-1 14-1 6)R~~ LOCATION , SEC. 34, TWP. 20N, RNG. 8E, 3rd PM,
Latitude 40.147502, Longitude -88.285899

COUNTY Champaign DRILLING METHOD HSA HAMMER TYPE AUTO

STRUCT. NO. 010-1004
Station 414+78.50

BORING NO. B-10
Station 409+18.57
Offset 2.7 ft RT
Ground Surface Elev. 772.26 ft

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

Groundwater Elev.:
First Encounter 766.8 ft ▼
Upon Completion 759.3 ft ▽
After ____ Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				8" TOPSOIL: Silty Clay, dark brown — 771.66
	2			SILTY CLAY: Brown, very stiff
	4 6	2.0 P	30	
				769.26
	1			SANDY LOAM: Brown, loose
-5	2 2	0.2 B	22	
				766.76 ▼
	3			SANDY CLAY LOAM: Brown, medium stiff, wet
	3 4	0.7 B	18	
	2			
-10	6 7	1.7 B	17	
				761.76
	4			SILTY FINE SAND: Brown, medium dense, wet
	8 8		16	
				759.26 ▽
	4			SILTY CLAY LOAM TILL: Gray, very stiff
-15	8 8	3.3 B	11	
	4			
	8 10	2.1 B	12	
				754.26
	3			SILTY CLAY TILL: Gray, very stiff
-20	5 7	2.1 B	13	
				SILTY CLAY TILL: Gray, very stiff *(continued)*
	4			
-25	5 9	2.1 B	12	
	4			<0.5" sand seam at 29.5 ft.
-30	4 8	2.1 B	13	
				740.26
	3			SILTY CLAY LOAM TILL: Gray, stiff
-35	5 6	1.7 B	12	
				735.26
	3			SILTY CLAY LOAM TILL: Gray, very stiff
-40	7 6	2.1 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 Highwaye
Becone Farmer Workmand Engineering & Teeting, LLC

SOIL BORING LOG

Date 2/12/15

ROUTE I-57/74 DESCRIPTION Pier 1 Pier Boring Ramp D LOGGED BY TLM

SECTION (10-34-1) HBK 10(5-1-RS-1, 14-16)R LOCATION , SEC. 34, TWP. 20N, RNG. 8E, 3rd PM,
Latitude 40.147502, Longitude -88.285899

COUNTY Champaign DRILLING METHOD HSA HAMMER TYPE AUTO

STRUCT. NO. 010-1004
Station 414+78.50

BORING NO. B-10
Station 409+18.57
Offset 2.7 ft RT
Ground Surface Elev. 772.26 ft

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

Groundwater Elev.:
First Encounter 766.8 ft ▼
Upon Completion 759.3 ft ▽
After ____ Hrs. ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
SILTY CLAY LOAM TILL: Gray, very stiff *(continued)*				
730.26				
SAND: Gray, medium dense, medium, with trace fine gravel		3		
		9		16
	-45	12		
		12		
		8		11
	-50	10		
720.26				
SAND: Gray, medium dense, gravel				
Washing sand out of augers.		13		
		7		16
	-55	7		
714.76				
SILTY CLAY TILL: Gray, very stiff		5		
		6	2.9	17
Silt seam at 59.5 ft.	-60	8	B	

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
SILTY CLAY TILL: Gray, very stiff *(continued)*				
		5		
		7	2.9	13
	-65	9	B	
		5		
702.76		6	2.1	15
SILT: Gray, medium dense	-70	6	B	
		4		
		6	0.2	20
697.26	-75	8	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)

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 2 ~~Pier~~ Boring Ramp D LOGGED BY TC (from sample

SECTION (10-34-1) HBK 10(5-1,RS-1,14-1,6)R LOCATION , SEC. 34, TWP. 20N, RNG. 8E, 3rd PM,
Latitude 40.147294, Longitude -88.285187

COUNTY Champaign DRILLING METHOD HSA HAMMER TYPE AUTO

STRUCT. NO. 010-1004
Station 414+78.50

BORING NO. B-11
Station 411+31.42
Offset 1.8 ft RT
Ground Surface Elev. 782.24 ft

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

Groundwater Elev.:
First Encounter 762.2 ft ▼
Upon Completion ft
After ____ Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				8" TOPSOIL
781.54				
	4			SANDY SILTY CLAY: Black/Gray/Brown, stiff
	3 4	1.0 B	17	
	6			
778.24				
	6 7	4.0 P	12	SILTY CLAY LOAM: Brown, stiff
-5				
	4			
	7 8	1.7 B	13	
774.24				
	6			SILTY CLAY LOAM w/ FINE GRAVEL: Brown, hard
	9 11	4.1 B	18	
772.24				
-10				
	5			SILTY CLAY LOAM: Brown, very stiff 2-10-2015 Begin Drilling After Repairs
	7 8	2.5 B	22	
769.24				
	3			SILTY CLAY LOAM: Brown, stiff
	5 7	1.2 B	18	
-15				
	3			
	3 5	1.2 B	19	
764.24				
	3			SAND: Brown, medium, coarse, wet
	6 8		19	
▼-20				
				SAND: Brown, medium, coarse, wet *(continued)*
	4			
	8 11		19	
-25				
755.74				
				SILTY CLAY TILL: Gray, very stiff
	4			
	7 8	2.1 B	12	
-30				
750.24				
				SILTY CLAY TILL: Gray, stiff
	3			
	6 9	1.5 B	13	
-35				
745.24				
				SILTY CLAY TILL: Very stiff
	3			
	7 11	2.1 B	12	
-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)

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 2 Pier Boring Ramp D LOGGED BY TC (from sample

SECTION (10-34-1) HBK 10/5-1-RS-1-14-1.6\R LOCATION , SEC. 34, TWP. 20N, RNG. 8E, 3rd PM,
Latitude 40.147294, Longitude -88.285187

COUNTY Champaign DRILLING METHOD HSA HAMMER TYPE AUTO

STRUCT. NO. 010-1004
Station 414+78.50

BORING NO. B-11
Station 411+31.42
Offset 1.8 ft RT
Ground Surface Elev. 782.24 ft

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

Groundwater Elev.:
First Encounter 762.2 ft ▼
Upon Completion ft
After Hrs. ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
SILTY CLAY TILL: Very stiff *(continued)*				
740.24				
SILTY CLAY TILL: Gray, stiff		4		
	-45	7 9	1.7 B	13
		4		
	-50	7 8	1.3 B	12
730.74				
SAND: Gray, medium, coarse		1		
	-55	1 12		16
725.74				
SAND: Gray, dense, coarse		12		
	-60	14 21		13
SAND: Gray, dense, coarse *(continued)*				
718.24		6		
SILTY CLAY LOAM TILL: Gray, stiff	-65	12 13	1.7 B	17
		3		
	-70	5 7	1.3 B	13
710.74				
SILTY CLAY TILL: Gray, stiff		5		
707.24	-75	7 11	1.4 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)

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

SOIL BORING LOG

Date 2/11/15

ROUTE I-57/74 **DESCRIPTION** Pier 3 ~~Pier~~ Boring Ramp D **LOGGED BY** DLB/TC (sample 13-20)

SECTION (10-34-1) HBK 10(5-1-RS-1,14-1,6)R **LOCATION** , **SEC.** 34, **TWP.** 20N, **RNG.** 8E, 3rd **PM**,
Latitude 40.147178, **Longitude** -88.283806

COUNTY Champaign **DRILLING METHOD** HSA **HAMMER TYPE** AUTO

STRUCT. NO. 010-1004
Station 414+78.50

BORING NO. B-12
Station 413+31.02
Offset 12.1 ft LT
Ground Surface Elev. 766.80 ft

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

Groundwater Elev.:
First Encounter 726.8 ft ▼
Upon Completion ft
After Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
766.20				8" TOPSOIL: Dark brown
	3			FILL: Clay loam, brown, stiff
764.80	8	1.5	16	
	13	P	15	
763.80				FILL: Sand, brown, fine to medium, medium dense
	5			FILL: Silty Clay Loam Till, gray, stiff to very stiff
	5	1.1	11	
-5	4	B		
	3			
	6	2.5	15	
	6	B		
758.80				
	4			SILTY CLAY TILL: Gray, very stiff
	6	2.1	18	
-10	7	B		
	4			
	4	2.1	12	
	7	B		
	3			
	7	2.1	12	
-15	7	B		
	3			
	6	2.1	11	
	8	B		
	3			
	6	2.1	12	
746.80	-20	8	B	

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				SILTY CLAY LOAM TILL: Gray, stiff
				Cobbles/Gravel? Augers vibrated as they went through this layer between 21' to 23.5'. This is also shown in the first blowcount.
	27			
	10	1.5	13	
-25	13	P		Only 2" recovery
	3			
	6	1.7	12	
-30	7	B		
	4			
	5	1.1	11	
-35	7	B		
	7			
	10	1.7	21	
▼ -40	18	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 2/11/15

ROUTE I-57/74 **DESCRIPTION** Pier 3 xxx Boring Ramp D **LOGGED BY** TC (sample 13-20)

SECTION (10-34-1) HBK 10(5-1-RS-1,14-1-6)R **LOCATION** , **SEC.** 34, **TWP.** 20N, **RNG.** 8E, 3rd **PM**,
Latitude 40.147178, **Longitude** -88.283806

COUNTY Champaign **DRILLING METHOD** HSA **HAMMER TYPE** AUTO

STRUCT. NO. 010-1004
Station 414+78.50

BORING NO. B-12
Station 413+31.02
Offset 12.1 ft LT
Ground Surface Elev. 766.80 ft

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

Groundwater Elev.:
First Encounter 726.8 ft ▼
Upon Completion ft
After Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				SILTY CLAY LOAM TILL: Gray, stiff *(continued)*
725.30				
				CLAYEY SAND: Gray, dense
	6			
-45	10 23		18	
720.30				
				SAND: Gray, medium, coarse
	4			
-50	1 11		19	
	4			
712.30	13		10	
-55	16			CLAYEY SAND: Gray, medium
	4			
-60	6 7		20	
				CLAYEY SAND: Gray, medium *(continued)*
704.80				
				SILTY CLAY LOAM TILL: Gray, very stiff
	4			
-65	7 8	2.5 B	14	
				Gravelly
699.80				
				SILTY CLAY TILL: Gray, very stiff
	4			
-70	8 12	2.1 B	13	
	6			
691.80 -75	12 17	2.8 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)

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

SOIL BORING LOG

Date 2/11/15

ROUTE I-57/74 DESCRIPTION Pier 4 ~~Pier~~ Boring Ramp D LOGGED BY TC/TLM

SECTION (10-34-1) HBK ~~10(5-1,RS-1,14-1,6)R~~ LOCATION , SEC. 34, TWP. 20N, RNG. 8E, 3rd PM,
Latitude 40.147146, Longitude -88.283806

COUNTY Champaign DRILLING METHOD HSA HAMMER TYPE AUTO

STRUCT. NO. 010-1004
Station 414+78.50

BORING NO. B-13
Station 415+22.40
Offset 0.5 ft LT
Ground Surface Elev. 758.60 ft

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

Groundwater Elev.:
First Encounter 731.6 ft ▼
Upon Completion ft
After ____ Hrs. ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
8" TOPSOIL 758.00				
SILTY LOAM: Brown, hard		8		
		13 11	5.0 B	11
755.60				
SILTY CLAY LOAM: Gray, very stiff		3		
	-5	7 6	3.3 B	11
		3		
		5 7	2.3 B	12
750.60				
SILTY CLAY TILL: Gray, very stiff		4		
	-10	5 6	2.9 B	12
748.10				
SILTY CLAY TILL: Gray, stiff		3		
		5 6	2.0 B	12
		3		
	-15	5 6	1.4 B	12
743.10				
SILTY CLAY TILL: Gray, very stiff		3		
		4 7	2.1 B	12
740.60				
SILTY CLAY TILL: Gray, stiff		2		
	-20	5 6	1.4 B	12
SILTY CLAY TILL: Gray, stiff *(continued)*				
736.10				
SILTY CLAY LOAM TILL: Gray, stiff		6		
	-25	6 7	1.2 B	11
732.10				
SILTY CLAY LOAM TILL: Gray, very stiff ▼				
6" sand seam		7		
	-30	8 10	2.3 B	14
726.60				
CLAYEY SAND: Gray, loose		2		
	-35	2 8		14
		7		
719.10		9		12
SILTY CLAY TILL: Very stiff	-40	14		

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 & Tssting, LLC

SOIL BORING LOG

Date 2/11/15

ROUTE I-57/74 DESCRIPTION Pier 4 Rxx Boring Ramp D LOGGED BY TC/TLM
SECTION (10-34-1) HBK LOCATION , SEC. 34, TWP. 20N, RNG. 8E, 3rd PM,
Latitude 40.147146, Longitude -88.283806
COUNTY Champaign DRILLING METHOD HSA HAMMER TYPE AUTO

STRUCT. NO. 010-1004
Station 414+78.50
BORING NO. B-13
Station 415+22.40
Offset 0.5 ft LT
Ground Surface Elev. 758.60 ft

Surface Water Elev. n/a ft
Stream Bed Elev. ft
Groundwater Elev.:
First Encounter 731.6 ft
Upon Completion ft
After Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				SILTY CLAY TILL: Very stiff *(continued)*
	4			
-45	11 15	4.1 B	13	
	5			
-50	14 13	2.5 B	16	
708.60				Begin drilling again on 2-11-15
				SILTY CLAY TILL: Gray, very stiff
	6			
-55	12 15	3.5 B	14	
				6" Gray silt seam, dense, at 54.5 ft.
				Cobbles? at 56.6 ft.
	10			SILTY CLAY TILL: Gray, very stiff
-60	11 15	3.7 B	15	
				SILTY CLAY TILL: Gray, very stiff *(continued)*
	53			
-65	48 15	4.0 P	14	Cobble was pushed aside by spoon. Retrieved 6" of SILTY CLAY TILL: Gray, hard.
691.60				
				SAND: Gray, fine, very loose to medium dense
	WR			
-70	WR 10		21	
686.60				
				SILTY CLAY LOAM TILL: Gray, very stiff
	6			
683.60 -75	12 16	3.5 P	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)

Illinois Department of Transportation
Division of Highways
Become Farmer Workmend Engineering & Testing, LLC

SOIL BORING LOG

Date 2/10/15

ROUTE I-57/74 **DESCRIPTION** Pier 5 Rev Boring Ramp D **LOGGED BY** TC

SECTION (10-34-1) HBK **LOCATION** , **SEC.** 34, **TWP.** 20N, **RNG.** 8E, 3rd **PM**,
Latitude 40.147184, **Longitude** -88.283139

COUNTY Champaign **DRILLING METHOD** HSA **HAMMER TYPE** AUTO

STRUCT. NO. 010-1004
Station 414+78.50

BORING NO. B-14
Station 417+09.64
Offset 1.3 ft LT
Ground Surface Elev. 758.10 ft

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

Groundwater Elev.:
First Encounter 731.6 ft ▼
Upon Completion ft
After Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Material Description
				12" TOPSOIL
				757.10
	6			SILTY CLAY LOAM: Brown, hard
	12	7.0	10	
	16	B		
				755.10
				SILTY CLAY LOAM: Gray, stiff
	3			
	4	1.7	14	
-5	7	B		
				752.60
				SILTY CLAY TILL: Gray, stiff
	3			
	5	1.6	13	
	7	B		
	3			
	6	1.7	12	
-10	9	B		
	4			
	5	1.6	12	
	6	B		
	3			
	4	1.3	12	
-15	8	B		
				742.60
				SILTY CLAY LOAM TILL: Gray, stiff
				2" sand seam @ 16 ft.
	3			
	5	1.5	11	
	6	B		
				740.10
				CLAYEY GRAVEL: Gray, medium
	3			
	14		12	
-20	10			

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Material Description
				CLAYEY GRAVEL: Gray, medium *(continued)*
				736.10
				SILTY CLAY LOAM TILL: Gray, soft
	2			
	9	0.3	10	
-25	14	B		
				731.60 ▼
				SAND: Coarse Drilled past sampling depth, tried to get blow counts, but sand kept filling the augers. After several attemptes to flush sand-continued to 35 ft.
			15	
-30				
				726.10
				SILTY CLAY TILL: Gray, stiff
	8			
	11	2.1	12	
-35	13	B		
				721.10
				No recovery
	13			
	30			
-40	27			

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 Highwaye
Bacone Farmer Workmend Engineering & Teeting, LLC

SOIL BORING LOG

Date 2/10/15

ROUTE I-57/74 DESCRIPTION Pier 5 ~~Pier~~ Boring Ramp D LOGGED BY TC

SECTION (10-34-1) HBK ~~10(5.1-RS-1,14,16)R~~ LOCATION , SEC. 34, TWP. 20N, RNG. 8E, 3rd PM,
Latitude 40.147184, Longitude -88.283139

COUNTY Champaign DRILLING METHOD HSA HAMMER TYPE AUTO

STRUCT. NO. 010-1004
Station 414+78.50

BORING NO. B-14
Station 417+09.64
Offset 1.3 ft LT
Ground Surface Elev. 758.10 ft

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

Groundwater Elev.:
First Encounter 731.6 ft ▼
Upon Completion ft
After ____ Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				No recovery *(continued)*
716.10				
				SILTY CLAY TILL: Gray, very stiff
	5			
-45	12 13	2.5 B	12	
	4			
-50	13 17	2.1 B	13	
	5			
-55	11 16	2.9 B	12	
701.60				
				No recovery
	6			
-60	12 15			
				No recovery *(continued)*
696.10				
				SILTY CLAY TILL: Gray, very stiff
	6			
-65	11 14	2.8 B	13	
	4			
-70	10 15	2.2 B	13	
686.60				
				SILTY CLAY TILL: Gray, stiff
	6			
683.10 -75	12 16	1.7 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 2/12/15

ROUTE I-57/74 DESCRIPTION Pier 6 ~~xxx~~ Boring Ramp D LOGGED BY GW

SECTION (10-34-1) HBK ~~10(5.1-RS-1,14-16)R~~ LOCATION , SEC. 34, TWP. 20N, RNG. 8E, 3rd PM,
Latitude 40.147290, Longitude -88.282495

COUNTY Champaign DRILLING METHOD HSA HAMMER TYPE AUTO

STRUCT. NO. 010-1004
Station 414+78.50

BORING NO. B-15
Station 418+94.13
Offset 2.0 ft LT
Ground Surface Elev. 759.50 ft

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

Groundwater Elev.:
First Encounter 726.0 ft ▼
Upon Completion 729.5 ft ▽
After ____ Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				7" TOPSOIL: Silty Clay, dark brown
				758.90
	3			SILTY CLAY: Brown, stiff, moist, trace gravel, trace organics
	5 8	2.0 B	15	
				756.00
	5			SILTY CLAY: Brownish-Gray, very stiff, moist, trace pebbles
-5	7 9	3.1 B	12	
				753.50
	3			SILTY CLAY LOAM TILL: Gray, stiff, moist, trace pebbles
	6 8	1.7 S	12	
	3			
	6 9	2.6 B	13	trace gravel
-10				
	3			
	5 8	1.8 B	12	
	3			
	6 7	2.2 B	13	
-15				
	3			less sand
	5 7	2.0 B	13	
	3			
	5 8	1.8 B	12	
-20				
-25	4			SILTY CLAY LOAM TILL: Gray, stiff, moist, trace pebbles *(continued)*
	7 8	2.5 B	12	
				731.00
	3			SILTY CLAY LOAM: Gray, stiff, moist, trace gravel
▽ -30	5 9	2.1 B	12	
				726.00 ▼
	7			SILTY CLAY: Grayish-Brown, very stiff, wet, trace gravel
	8 13	2.2 B	14	
-35				
	7			
	10 19	0.8 P	15	some fine-medium grain sand
-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)

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

SOIL BORING LOG

Date 2/12/15

ROUTE I-57/74 DESCRIPTION Pier 6 ~~Pier~~ Boring Ramp D LOGGED BY GW

SECTION (10-34-1) HBK 10(5-1,RS-1,14-16)R LOCATION , SEC. 34, TWP. 20N, RNG. 8E, 3rd PM,
Latitude 40.147290, Longitude -88.282495

COUNTY Champaign DRILLING METHOD HSA HAMMER TYPE AUTO

STRUCT. NO. 010-1004
Station 414+78.50

BORING NO. B-15
Station 418+94.13
Offset 2.0 ft LT
Ground Surface Elev. 759.50 ft

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

Groundwater Elev.:
First Encounter 726.0 ft ▼
Upon Completion 729.5 ft ▽
After ____ Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				SILTY CLAY: Grayish-Brown, very stiff, wet, trace gravel *(continued)*
716.00				
	3			SILTY CLAY: Gray, stiff, wet, trace gravel
-45	5 8	1.6 B	14	
	4			
-50	4 10	1.3 B	17	
706.00				
	6			SILTY CLAY: Very stiff, some fine-medium grain sand
-55	8 10	2.6 B	11	
	3			
-60	4 7	1.2 B	14	sand not visible
				SILTY CLAY: Very stiff, some fine-medium grain sand *(continued)*
696.00				
	WOH			SILT: Gray, very soft, wet
-65	WOH WOH	<0.25 P	17	
691.00				
	6			SAND: Gray, fine, medium dense, wet
-70	7 7		11	
686.00				
	4			SILTY CLAY LOAM: Gray, very stiff, wet, trace gravel
684.50				
-75	7 11	2.3 B	14	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)

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

SOIL BORING LOG

Date 2/12/15

ROUTE I-57/74 DESCRIPTION Pier 7 ~~Pier~~ Boring Ramp D LOGGED BY GW

SECTION (10-34-1) HBK ~~10(5-1 RS-1 14-16)R~~ LOCATION , SEC. 34, TWP. 20N, RNG. 8E, 3rd PM,
Latitude 40.147458, Longitude -88.281890

COUNTY Champaign DRILLING METHOD HSA HAMMER TYPE AUTO

STRUCT. NO. 010-1004
Station 414+78.50

BORING NO. B-16
Station 420+74.44
Offset 2.8 ft LT
Ground Surface Elev. 759.40 ft

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

Groundwater Elev.:
First Encounter 730.9 ft ▼
Upon Completion 731.4 ft ▽
After ____ Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				8" TOPSOIL: Silty Clay, dark brown
				758.80
	4			SILTY CLAY: Brown, stiff, moist, trace pebbles
	6 9	2.2 B	13	
	4			
	6 8	4.7 B	14	trace organics
-5				
	3			
				752.90
	2 6	1.2 B	13	SILTY CLAY: Brown, medium stiff
				750.90
	3			SILTY CLAY LOAM TILL: Gray, stiff, trace gravel
	6 8	3.1 B	12	
-10				
	5			
	6 8	1.3 P	16	
	3			
	3 6	1.7 B	14	
-15				
	4			
	6 8	1.8 B	12	
	3			
	6 9	3.2 B	15	
-20				

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				SILTY CLAY LOAM TILL: Gray, stiff, trace gravel *(continued)*
	4			
	7 8	2.2 B	11	
-25				
				▽ 730.90 ▼
	WOH			SAND AND GRAVEL: Grayish-Brown, loose, wet
	4 6		16	
-30				
				725.90
	7			SILTY CLAY LOAM TILL: Gray, very stiff, wet, trace gravel
	7 13	3.5 B	14	
-35				
				720.40
	9			SILTY CLAY LOAM TILL: Gray, hard, wet, trace gravel
	13 21	5.4 S	11	
-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)

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

SOIL BORING LOG

Date 2/12/15

ROUTE I-57/74 DESCRIPTION Pier 7 ~~Pier~~ Boring Ramp D LOGGED BY GW

SECTION (10-34-1) HBK ~~10/5.1-RS-1, 14.1.6\R~~ LOCATION , SEC. 34, TWP. 20N, RNG. 8E, 3rd PM,
Latitude 40.147458, Longitude -88.281890

COUNTY Champaign DRILLING METHOD HSA HAMMER TYPE AUTO

STRUCT. NO. 010-1004
Station 414+78.50

BORING NO. B-16
Station 420+74.44
Offset 2.8 ft LT
Ground Surface Elev. 759.40 ft

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

Groundwater Elev.:
First Encounter 730.9 ft ▼
Upon Completion 731.4 ft ▽
After ____ Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				SILTY CLAY LOAM TILL: Gray, hard, wet, trace gravel *(continued)*
715.90				
	5			SILTY CLAY TILL: Gray, very stiff, wet, trace gravel
-45	10 16	3.8 B	13	
711.90				
	6			SILTY CLAY TILL: Gray, hard, wet, trace gravel
-50	8 15	4.2 B	13	
707.40				
	7			SILTY CLAY TILL: Gray, very stiff, wet, trace gravel
-55	8 15	3.3 B	13	
	6			
-60	9 15	3.6 B	13	
	6			SILTY CLAY TILL: Gray, very stiff, wet, trace gravel *(continued)*
-65	10 16	2.6 B	12	
	5			
-70	9 14	3.1 B	13	
	8			
684.40 -75	13 22	3.6 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)

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** East Abut - Ramp D **LOGGED BY** TC

SECTION (10-34-1) HBK 10/5-1-RS-1-14-1-6YR **LOCATION** , **SEC.** 34, **TWP.** 20N, **RNG.** 8E, 3rd **PM**,
Latitude 40.147649, **Longitude** -88.281299

COUNTY Champaign **DRILLING METHOD** HSA **HAMMER TYPE** AUTO

STRUCT. NO. 010-1004
Station 414+78.50

BORING NO. B-17
Station 422+52.79
Offset 10.9 ft Right
Ground Surface Elev. 760.16 ft

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

Groundwater Elev.:
First Encounter 720.2 ft ▼
Upon Completion 749.2 ft ▽
After ____ **Hrs.** ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				8" TOPSOIL 759.56
	2 4 6	2.2 B	22	SILTY CLAY LOAM: Brown, very stiff
				757.16
	2 3 6	2.3 P	17	SANDY CLAY LOAM: Brown, very stiff
-5				
				754.66
	3 6 7	1.9 B	20	SILTY CLAY LOAM: Brown, stiff
				752.16
	3 7 11	2.8 B	17	SANDY CLAY LOAM: Brown, very stiff
-10				
				749.66
	4 7 10	2.7 B	12	SILTY CLAY TILL: Gray, very stiff ▽
	3 6 8	2.1 B	12	
-15				
				744.66
	4 5 9	2.1 B	11	SILTY CLAY LOAM: Gray, very stiff
				742.16
	3 7 7	1.9 B	13	SILTY CLAY LOAM: Gray, stiff
-20				
				SILTY CLAY LOAM: Gray, stiff *(continued)*
				738.16
	2 5 7	0.9 B	12	SILTY CLAY LOAM: Gray, medium
-25				
				733.16
	4 7 8	2.5 B	11	SILTY CLAY TILL: Gray, very stiff
-30				
	6 9 11	2.6 B	13	
-35				
				723.66
	11 19 21	2.0 P	15	SILTY CLAY TILL: Gray, stiff, wet, trace gravel
▼ -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)

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 East Abut - Ramp D LOGGED BY TC

SECTION (10-34-1) HBK 10/5-1-RS-1 14-1 6VR LOCATION , SEC. 34, TWP. 20N, RNG. 8E, 3rd PM,
Latitude 40.147649, Longitude -88.281299

COUNTY Champaign DRILLING METHOD HSA HAMMER TYPE AUTO

STRUCT. NO. 010-1004
Station 414+78.50

BORING NO. B-17
Station 422+52.79
Offset 10.9 ft Right
Ground Surface Elev. 760.16 ft

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

Groundwater Elev.:
First Encounter 720.2 ft ▼
Upon Completion 749.2 ft ▽
After ____ Hrs. ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
SILTY CLAY TILL: Gray, stiff, wet, trace gravel *(continued)*				
		8		
	-45	12 16	3.5 B	14
713.66				
SILTY CLAY LOAM TILL: Gray, stiff				
		3		
6" sand seam	-50	6 7	1.2 B	11
		2		
	-55	5 8	1.2 B	13
		3		
	-60	7 10	1.3 B	13
SILTY CLAY LOAM TILL: Gray, stiff *(continued)*				
		4		
	-65	10 21	1.7 B	13
		5		
	-70	10 13	1.7 B	14
		4		
	-75	8 12	1.6 B	13
		5		
	-80	11 16	2.2 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 2/3/15

ROUTE I-57/74 DESCRIPTION East Abut - Ramp D LOGGED BY TC

SECTION (10-34-1) HBK 10(5-1 RS-1, 14-16)R LOCATION , SEC. 34, TWP. 20N, RNG. 8E, 3rd PM,
Latitude 40.147649, Longitude -88.281299

COUNTY Champaign DRILLING METHOD HSA HAMMER TYPE AUTO

STRUCT. NO. 010-1004
Station 414+78.50

BORING NO. B-17
Station 422+52.79
Offset 10.9 ft Right
Ground Surface Elev. 760.16 ft

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

Groundwater Elev.:
First Encounter 720.2 ft
Upon Completion 749.2 ft
After Hrs. ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
SILTY CLAY LOAM TILL: Gray, stiff *(continued)*				
676.16		36		5
SILTY CLAY LOAM TILL: Gray, very hard, with limestone pieces	-85	50/3"		
671.08		70		12
End of Boring	-90	25/1"		
	-95			
	-100			

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)

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Peru, IL 61354
815-780-8486

SOIL BORING LOG

Solutions You Can Build On

Date 7/26/17

ROUTE I-57/74 **DESCRIPTION** Ramp D, east abut. MSE wall **LOGGED BY** TLM

SECTION (10-34-1) HBK **LOCATION** , **SEC.** , **TWP.** , **RNG.** ,
Latitude 40.147757, **Longitude** -88.281052

COUNTY Champaign **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE** Automatic

STRUCT. NO. 010-1004
Station 414+78.50

BORING NO. DE 1
Station 423+40.00
Offset 4.0 ft Lt.
Ground Surface Elev. 757.75 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 728.7 ft ▼
Upon Completion 737.7 ft ▽
After Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Material Description
				Hard Dark Brown Silty Clay, dry
	4			
	5 6	4.5 P	14	
755.00				
				Stiff Brown/Gray to Olive Brown Silty Clay Loam, moist
	3			
	2 2	1.5 B	19	
752.75 -5				
		ST		Shelby tube pulled from 4.5 ft. to 6.5 ft.
	2			
	2 4	1.4 B	21	Stiff Brown Silty Clay Till, moist
749.75				
	4			Very Stiff Olive Brown/Brown Silty Clay Till, moist
	7 8	2.9 B	13	
-10				
747.25				
	4			Very Stiff Gray Silty Clay Loam Till, moist
	7 8	2.3 B	12	
744.75				
	3			Stiff Gray Silty Clay Loam Till, moist
	4 6	1.7 B	12	
-15				
	3			
	5 6	1.4 B	12	
	2			
	4 6	1.7 B	12	
737.75 ▽ -20				

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Material Description
	2			Stiff to Very Stiff Gray Silty Clay Loam Till, with occasional thin (< 2 mm) sand seam, moist
	4 6	1.7 B	11	
	2			
	4 6	1.9 B	11	
-25				
	4			
	7 7	2.1 B	11	
728.75 ▼				
	5	4.5 P	17	
	10			Medium Dense Gray, Medium to Coarse Sand, trace gravel, wet
-30	10	-		
725.75				
				Loose Gray Clayey Sand and Gravel, wet Gravel is small (<3/8") and very angular, more sand than gravel
	5			
722.75 -35	4 3	-	23	
				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)

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SOIL BORING LOG

Solutions You Can Build On

Date 7/26/17

ROUTE I-57/74 **DESCRIPTION** Ramp D, east abut. MSE wall **LOGGED BY** TLM

SECTION (10-34-1) HBK **LOCATION** , **SEC.** , **TWP.** , **RNG.** ,
Latitude 40.147775, **Longitude** -88.281275

COUNTY Champaign **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE** Automatic

STRUCT. NO. 010-1004
Station 414+78.50

BORING NO. DE 5
Station 422+85.00
Offset 27.5 ft Lt.
Ground Surface Elev. 757.07 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 722.1 ft ▼
Upon Completion ft
After Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Hard Dark Brown Silty Clay Loam Topsoil, dry			
	3		
	4 5	4.5 P	16
	4		
752.57	2 3	2.5 P	15
Very Stiff Brown Silty Clay Loam, moist -5			
	2		
	5 6	1.9 B	15
	3		
-10	5 6	2.1 B	13
746.57			
Very Stiff Gray Silty Clay Loam Till, moist	4		
	8 9	2.7 B	10
	3		
-15	6 8	2.9 B	10
	4		
	7 8	2.9 B	11
739.07			
Stiff Gray Silty Clay Loam Till, moist	2		
737.07 -20	5 7	1.9 B	11
Very Stiff Gray Silty Clay Loam Till, moist	3		
	5 7	2.3 B	11
734.07			
Stiff Gray Silty Clay Loam Till, moist	3		
-25	5 6	2.0 B	11
731.57			
Stiff Gray Silty Clay Loam Till with occasional thin (<2mm) sand seams, moist	4		
	7 8	2.0 B	11
	5		
-30	6 7	2.0 B	10
725.07			
Hard Brown/Gray Sandy Clay Loam Till, moist	9		
722.07 ▼ -35	16 22	7.4 B	10
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)

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SOIL BORING LOG

Solutions You Can Build On

Date 7/25/17

ROUTE I-57/74 **DESCRIPTION** Ramp D, west abut. MSE wall **LOGGED BY** TLM

SECTION (10-34-1) HBK **LOCATION** , **SEC.** , **TWP.** , **RNG.** ,
Latitude 40.148176, **Longitude** -88.286972

COUNTY Champaign **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE** Automatic

STRUCT. NO. 010-1004
Station 414+78.50

BORING NO. DW 2
Station 405+30.00
Offset 33.0 ft Lt.
Ground Surface Elev. 773.41 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 Description
				Very Stiff Brown Clay to Silty Clay, dry
	3			
	5 3	3.7 S	19	
770.16				
		ST		Shelby Tube collected from 3 ft to 5 ft.
	3			
-5	2 3	0.8 B	17	
				Medium Stiff Silty Clay, trance sand, moist
	4			
	5 6	1.0 B	12	
765.91				
				Very Stiff Olive Brown to Gray Silty Clay Loam Till
	3			
-10	4 6	2.7 B	13	
762.91				
				Very Stiff Gray Silty Clay Loam Till
	3			
	7 9	2.9 B	11	
	3			
-15	6 9	2.3 B	11	
	6			
	6 8	2.7 B	12	
755.41				
				Medium Dense, Gray, Medium to Coarse Sand, wet
	3			
-20	4 7	-	15	
753.41				

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Material Description
				+/- 6" Layers of Wet, Gray, Medium Dense Sand and Gravel and Gray Silty Clay Loam Till, moist
	5			
	7 6	2.9 B	12	
750.41				
				Very Stiff Gray Silty Clay Loam Till
	4			
-25	6 9	2.1 B	12	
	3			
-30	5 7	1.2 B	13	
	4			
-35	5 7	1.2 B	13	
738.41				
		ST		Shelby Tube collected from 35 ft. to 37 ft.
736.41				
				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)

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SOIL BORING LOG

Solutions You Can Build On

Date 7/25/17

ROUTE I-57/74 **DESCRIPTION** Ramp D, west abut. MSE wall **LOGGED BY** TLM

SECTION (10-34-1) HBK **LOCATION** , **SEC.** , **TWP.** , **RNG.** ,
Latitude 40.14777, **Longitude** -88.28666

COUNTY Champaign **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE** Automatic

STRUCT. NO. 010-1004
Station 414+78.50

BORING NO. DW 7
Station 406+88.6
Offset 25.9 ft Rt.
Ground Surface Elev. 771.88 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 751.9 ft ▼
Upon Completion 751.9 ft ▽
After Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				Stiff Brown Silty Clay, organic, dry
	4			
	5	1.0	18	
	6	P		
768.63				
	4			Very Stiff Born Silty Clay, organic, dry
	5	2.5	20	
-5	6	P		
767.13				
	2			Very Stiff Brown Silty Clay, little recovery (<3")
	1	2.5	20	
	2	P		
763.88				
	2			Stiff Brown Silty Clay Till
	4	1.9	13	
-10	7	B		
760.38				
	4			
	8	2.5	13	Very Stiff Olive Brown to Brown Silty Clay Till
	8	B		
	4			
	7	2.5	14	
-15	9	P		
755.38				
	7			
	10	4.5	11	Hard Gray Silty Clay Loam Till, wth thin (<2mm) thick sand seams
	14	P		
	4			
	7	4.5	9	
751.88 ▼ -20	11	P		

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				Very Stiff to Stiff Gray Silty Clay Loam Till, 1/2" sand seams at approximately 8" spacing
	6			
	9	3.2	12	
	12	B		
	6			
	9	2.5	11	
-25	8	B		
	5			
	6	1.7	13	
	8	B		
	4			
	5	1.5	13	
-30	8	B		
	3			
	7	2.7	11	
736.88 -35	9	B		
				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)

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SOIL BORING LOG

Solutions You Can Build On

Date 2/11/19

ROUTE I-57/74 **DESCRIPTION** Ramp D MSE Retaining Wall W. Abut. **LOGGED BY** TLM

SECTION (10-34-1) HBK **LOCATION** SE 1/4, **SEC.** 34, **TWP.** 20N, **RNG.** 8E, 3rd **PM**,
Latitude 40.148073, **Longitude** 88.286803

COUNTY Champaign **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE** CME Automatic

STRUCT. NO. 010-1004
Station 414+78.50

BORING NO. D-101 Backslope of Ditch
Station 406+00
Offset 31.7 ft Lt.
Ground Surface Elev. 772.75 ft

Surface Water Elev. - ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 729.8 ft
Upon Completion - ft
After 24 **Hrs.** 769.8 ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Material
	3			Stiff brown/gray Clay
	4 5	1.5 P	29	
769.75				
	2			Soft brown Silty Clay
-5	2 2	<0.25 P	27	
766.75				
	1			no sample, rock in shoe
	2 3	-		
764.75				
	3			Very stiff brown Clay Loam Till, moist
-10	5 6	2.3 B	14	
	3			
760.75	5 7	1.9 B	12	
				Stiff gray Clay Loam Till, moist
	4			
-15	6 9	2.1 B	12	
	4			
	7 9	2.5 B	12	
	4			
-20	7 9	2.1 B	12	
	4			Stiff gray Clay Loam Till, moist *(continued)*
	5 8	2.1 B	12	
	7			
-25	5 7	2.3 B	13	
747.25				
	2			Very stiff to hard gray Clay Loam Till, moist
	5 7	2.7 B	12	
	3			
-30	5 7	2.5 B	12	
	4			
-35	7 10	5.0 B	11	
	5			
-40	6 10	3.7 B	10	

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)

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Peru, Illinois 61354
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SOIL BORING LOG

Solutions You Can Build On

Date 2/11/19

ROUTE I-57/74 **DESCRIPTION** Ramp D MSE Retaining Wall W. Abut. **LOGGED BY** TLM

SECTION (10-34-1) HBK **LOCATION** SE 1/4, **SEC.** 34, **TWP.** 20N, **RNG.** 8E, 3rd **PM**,
Latitude 40.148073, **Longitude** 88.286803

COUNTY Champaign **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE** CME Automatic

STRUCT. NO. 010-1004
Station 414+78.50

BORING NO. D-101 Backslope of Ditch
Station 406+00
Offset 31.7 ft Lt.
Ground Surface Elev. 772.75 ft

Surface Water Elev. - ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 729.8 ft ▼
Upon Completion - ft
After 24 **Hrs.** 769.8 ft ▽

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Very stiff to hard gray Clay Loam Till, moist *(continued)*			
730.25			
Very loose gray Medium Coarse to Coarse Sand, wet ▼	2		
	WR	-	15
-45	1		
	4		
	6	-	12
-50	9		
720.25			
Medium dense Fine to Coarse Sand, wet	5		
	4	-	10
-55	10		
	4		
	5	-	9
712.75 -60	5		
End of Boring -65			
-70			
-75			
-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)

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SOIL BORING LOG

Solutions You Can Build On

Date 2/13/19

ROUTE I-57/74 **DESCRIPTION** Ramp D MSE Retaining Wall W. Abut. **LOGGED BY** TLM

SECTION (10-34-1) HBK **LOCATION** SE 1/4, **SEC.** 34, **TWP.** 20N, **RNG.** 8E, 3rd **PM**, **Latitude** 40.147882, **Longitude** 88.286505

COUNTY Champaign **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE** CME Automatic

STRUCT. NO. 010-1004
Station 414+78.50

BORING NO. D-102 Shld. of Exist. Ramp
Station 407+00
Offset 31.7 ft Lt.
Ground Surface Elev. 779.05 ft

Surface Water Elev. - ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 763.1 ft ▼
Upon Completion - ft
After - **Hrs.** - ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Dark gray Silty Clay, fill			
777.55	5		
Frost down to 18 inches	3 4	2.1 B	21
776.05			
Stiff brown Silty Clay, moist, fill	6		
-5	5 3	1.4 B	22
773.55			
Very stiff to hard gray Clay Loam Till, moist, fill	4		
	4 6	3.7 B	10
	5		
769.55	5 5	4.1 B	11
-10 Dark brown Silty Clay Topsoil			
768.55			
Stiff olive brown Clay	3		
	3 3	1.6 B	28
766.05			
Soft brown Clay	1		
	2 2	0.4 B	24
-15			
763.05 ▼			
No sample, rock in shoe	2		
	3 3		
761.05			
Very stiff brown Clay	4		
	7 9	3.1 B	17
759.05 -20			

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Very stiff to hard gray Clay Loam Till, moist			
	6		
	9 12	2.3 B	12
	6		
-25	9 11	3.3 B	10
	6		
752.05	9 14	4.1 B	10
Dense gray Silt, wet			
750.05	6		
Very stiff gray Clay Loam Till, moist	9 10	3.5 B	11
-30			
	5		
	6 9	3.1 B	12
-35			
	4		
	6 9	3.1 B	12
-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)

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Peru, Illinois 61354
815-780-8486

SOIL BORING LOG

Solutions You Can Build On

Date 2/13/19

ROUTE I-57/74 **DESCRIPTION** Ramp D MSE Retaining Wall W. Abut. **LOGGED BY** TLM

SECTION (10-34-1) HBK **LOCATION** SE 1/4, **SEC.** 34, **TWP.** 20N, **RNG.** 8E, 3rd **PM**,
Latitude 40.147882, **Longitude** 88.286505

COUNTY Champaign **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE** CME Automatic

STRUCT. NO. 010-1004
Station 414+78.50

BORING NO. D-102 Shld. of Exist. Ramp
Station 407+00
Offset 31.7 ft Lt.
Ground Surface Elev. 779.05 ft

Surface Water Elev. - ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 763.1 ft ▼
Upon Completion - ft
After - **Hrs.** - ft

		DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Very stiff gray Clay Loam Till, moist *(continued)*					
			3		
			7	2.5	11
		-45	9	B	
	730.05		6		
2" Silt Seam	729.55		7	2.3	12
Med. dense gray Medium to Coarse Sand, wet	729.05	-50	10	S	
End of Boring					
		-55			
		-60			

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)

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SOIL BORING LOG

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Date 2/13/19

ROUTE I-57/74 **DESCRIPTION** Ramp D MSE Retaining Wall W. Abut. **LOGGED BY** TLM

SECTION (10-34-1) HBK **LOCATION** SE 1/4, **SEC.** 34, **TWP.** 20N, **RNG.** 8E, 3rd **PM**,
Latitude 40.147882, **Longitude** 88.286505

COUNTY Champaign **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE** CME Automatic

STRUCT. NO. 010-1004
Station 414+78.50
D-102ST
BORING NO Shld. of Exist. Ramp
Station 407+00
Offset 31.7 ft Lt.
Ground Surface Elev. 779.05 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 (%)	
-5				
-10				
765.05				
Soft brown Clay		ST		
-15				
763.05				
End of Boring				
-20				

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

Appendix C

Boring Profile Sheet

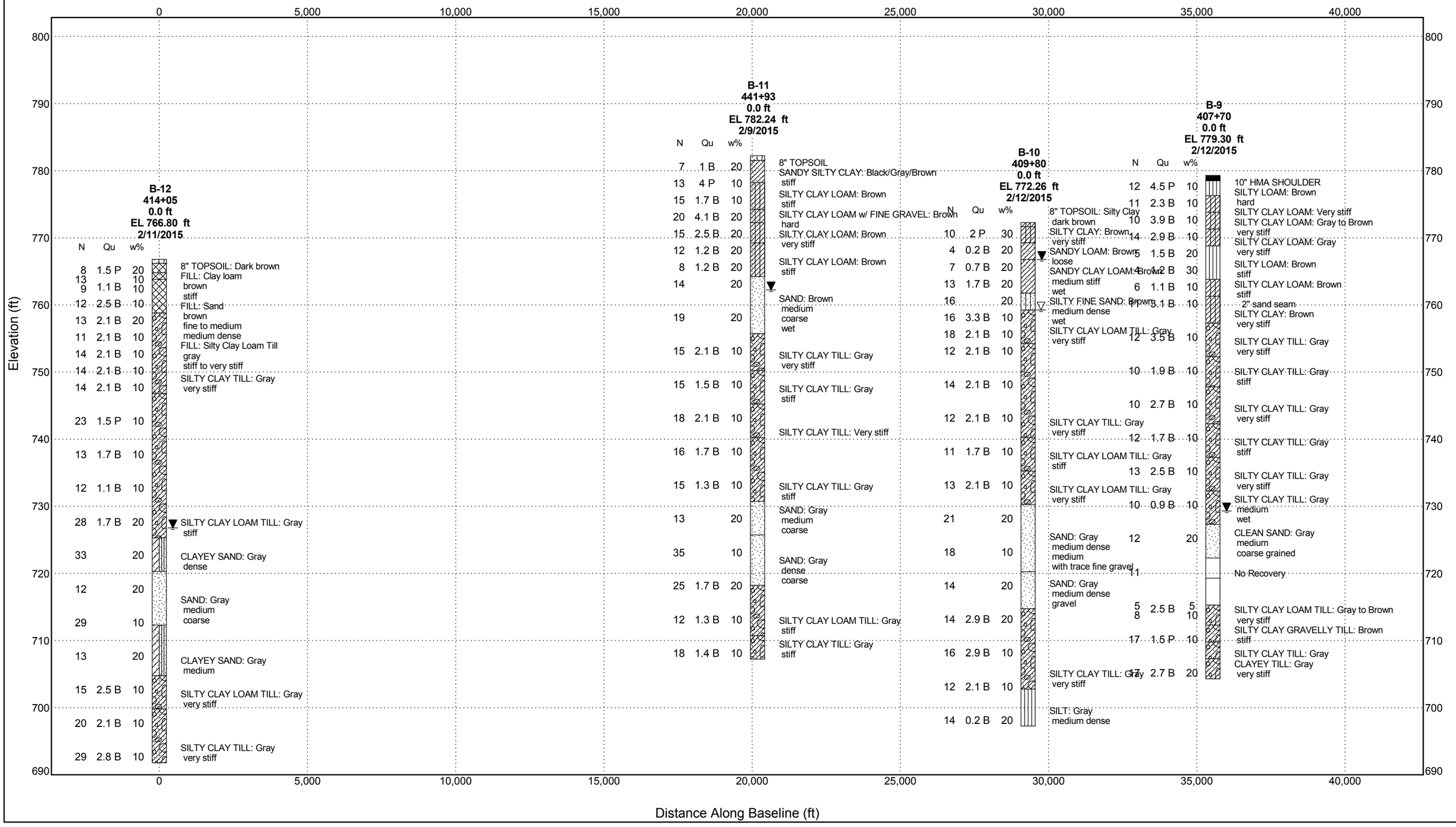
Illinois Department of Transportation
Division of Highways
BFW Engineering & Testing Inc.

ROUTE I-57/74
SECTION (10-34-1) HBK
COUNTY Champaign
PROJECT LOCATION

SUBSURFACE PROFILE
SN 010-1004 (1 OF 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 3/23/15

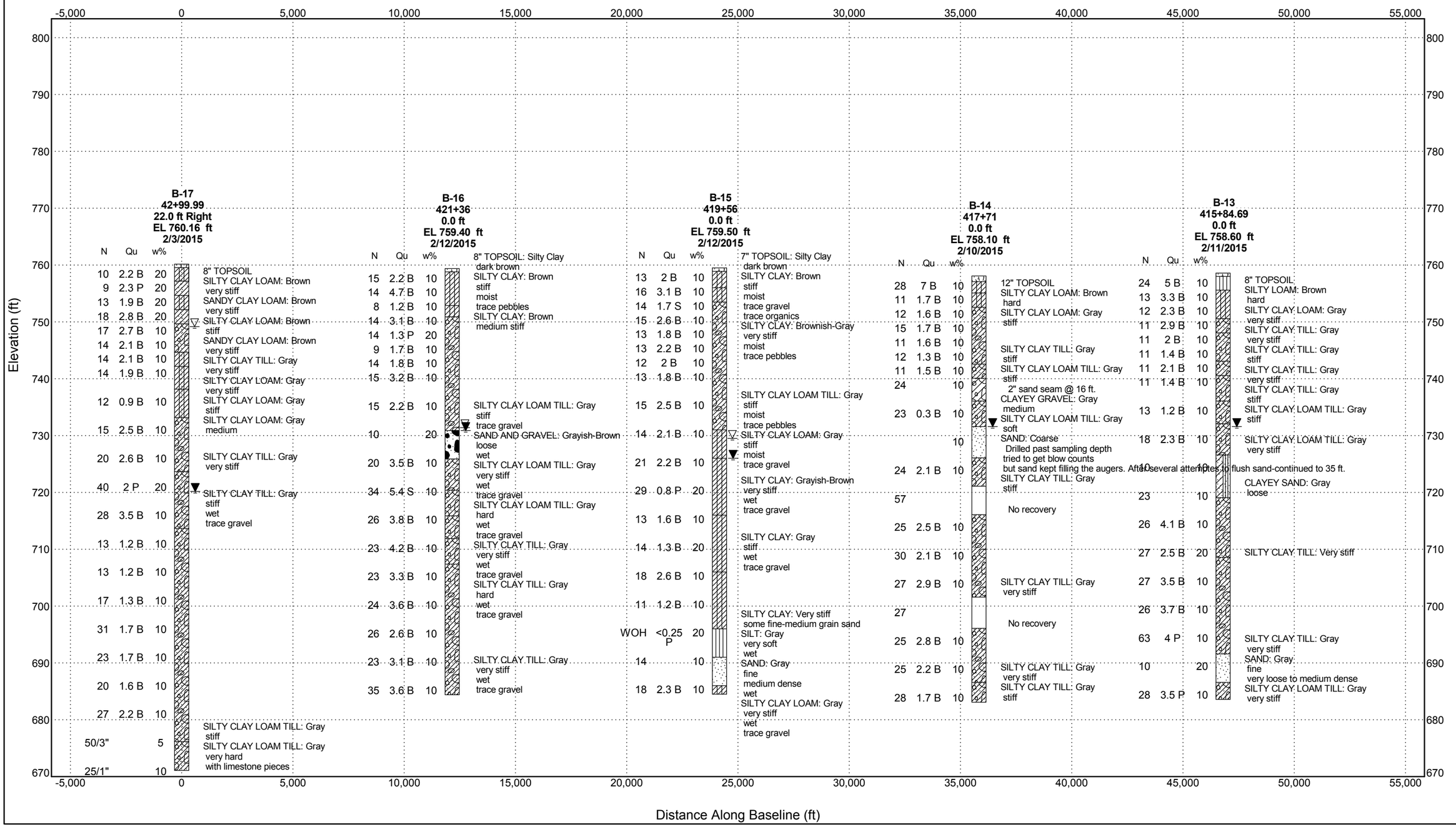
Illinois Department of Transportation
Division of Highways
BFW Engineering & Testing Inc.

ROUTE I-57/74
SECTION (10-34-1) HBK
COUNTY Champaign
PROJECT LOCATION

SUBSURFACE PROFILE
SN 010-1004 (2 OF 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 3/23/15

Appendix D

Consolidation Data

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

ONE-DIMENSIONAL CONSOLIDATION TEST

AASHTO T 216 / ASTM D 2435

Project: Interstate 57/74
Client: McCleary Engineering
Soil Sample ID: Boring DE-1, 4.5 to 6.5 feet
Sample Description: Brown SILTY CLAY, little gravel

Tested by: M. Snider
Prepared by: M. Snider
Test date: 8/11/2017
WEI: 613-15-01

Initial sample height =	0.779	in	Ring diameter =	2.500	in
Initial sample mass =	128.58	g	Ring mass =	62.72	g
Initial water content =	19.59%		Initial sample and ring mass =	191.30	g
Initial dry unit weight =	107.14	pcf	Tare mass =	12.03	g
Initial void ratio =	0.596		Final ring and sample mass =	189.90	g
Initial degree of saturation =	90.07%		Mass of wet sample and tare =	138.90	g
			Mass of dry sample and tare =	119.55	g
Final sample mass =	126.87	g	Initial dial reading =	0.01000	in
Final dry sample mass =	107.52	g	Final dial reading =	0.06998	in
Final water content =	18.00%		LL=	NA	%
Final dry unit weight =	116.07	pcf	PL=	NA	%
Final void ratio =	0.473		% Sand=	NA	
Final degree of saturation =	100.00%		% Silt=	NA	
Estimated specific gravity =	2.74		% Clay=	NA	
			In-Situ Vertical Effective Stress =	750	psf

Compression and Swelling Indices

Compression index C_c =	0.171		**Preconsolidation pressure,s_C**		
Field corrected C_c =	0.171		Casagrande Method =	3288	psf
Swelling index C_s =	0.048		**Over-Consolidation Ratio (OCR) =**	4.38	

Load number	Vertical stress	Dial reading	System deflection	Vertical strain	Void ratio	C_v	Cae	Elapsed time
	psf	in	in	%		ft^2/day	%	min
1	100.0	0.00865	0.00010	-0.16	0.598	N/A	N/A	720
2	200.0	0.00842	0.00023	-0.17	0.599	0.2816	0.00	720
3	500.0	0.01080	0.00058	0.18	0.593	0.0859	0.10	720
4	1000.0	0.01680	0.00090	0.99	0.580	0.0853	0.10	720
5	2000.0	0.02666	0.00135	2.31	0.559	0.0490	0.01	720
6	4000.0	0.03964	0.00193	4.05	0.531	0.0843	0.20	720
7	8000.0	0.05675	0.00253	6.33	0.495	0.0731	0.21	1440
8	16000.0	0.07900	0.00324	9.27	0.448	0.0580	0.28	720
9	32000.0	0.10325	0.00413	12.50	0.396	0.0554	0.29	720
10	8000.0	0.09814	0.00295	11.69	0.409	N/A	N/A	720
11	2000.0	0.08687	0.00198	10.12	0.434	N/A	N/A	840
12	500.0	0.07166	0.00123	8.07	0.467	N/A	N/A	1440

Prepared by: _____ Date: _____

Checked by: _____ Date: _____

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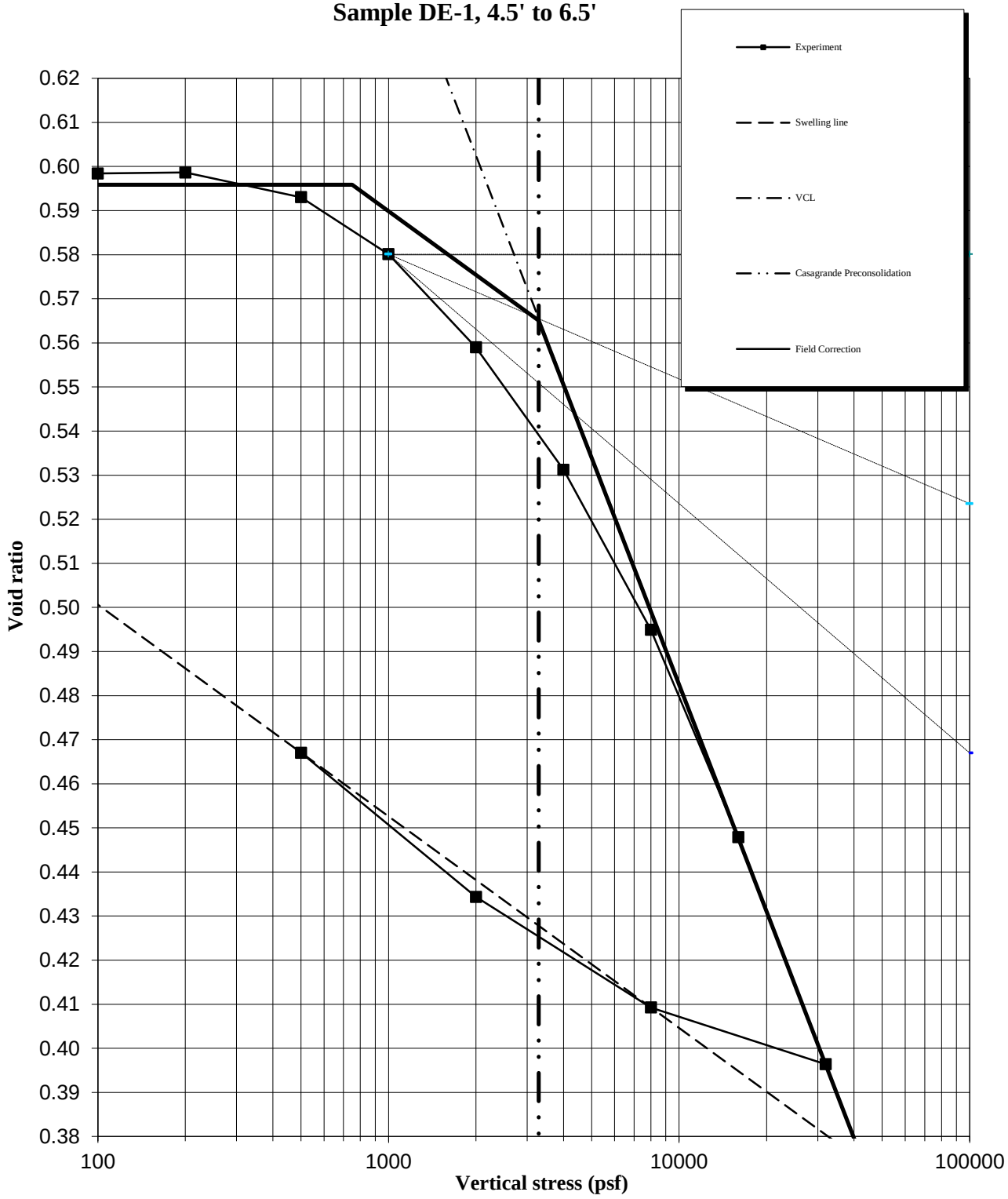
CONSOLIDATION CURVE

Sample DE-1, 4.5' to 6.5'



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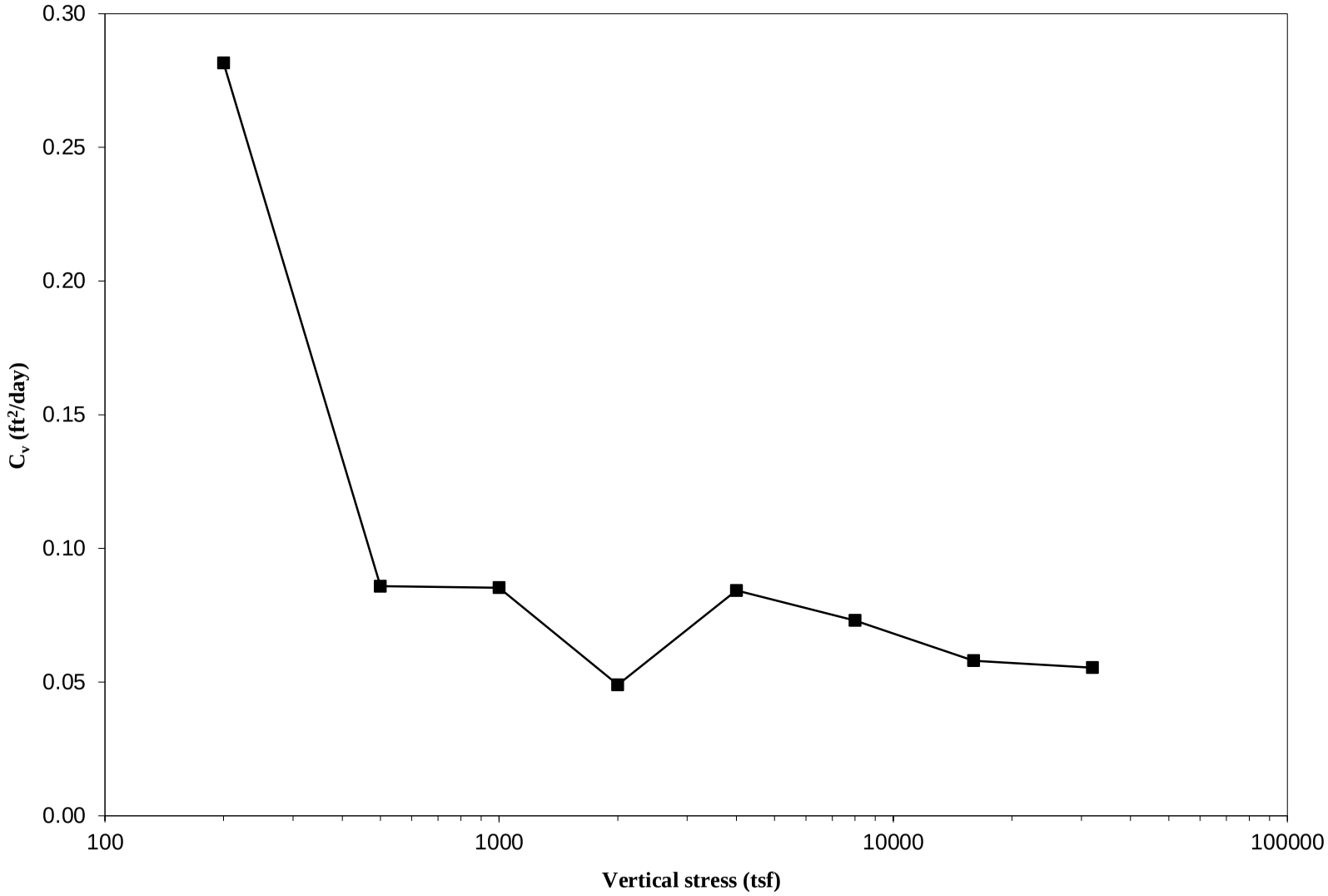
CONSOLIDATION COEFFICIENT (C_v) vs. VERTICAL STRESS

Sample DE-1, 4.5' to 6.5'



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ONE-DIMENSIONAL CONSOLIDATION TEST

AASHTO T 216 / ASTM D 2435

Project: Interstate 57/74
Client: McCleary Engineering
Soil Sample ID: Boring DW-2, 35 to 37 feet
Sample Description: Gray SILTY CLAY LOAM

Tested by: M. Snider
Prepared by: M. Snider
Test date: 8/11/2017
WEI: 613-15-01

Initial sample height =	0.985	in	Ring diameter =	2.499	in
Initial sample mass =	182.07	g	Ring mass =	109.90	g
Initial water content =	12.11%		Initial sample and ring mass =	291.97	g
Initial dry unit weight =	128.09	pcf	Tare mass =	12.07	g
Initial void ratio =	0.335		Final ring and sample mass =	290.35	g
Initial degree of saturation =	99.06%		Mass of wet sample and tare =	190.89	g
			Mass of dry sample and tare =	174.48	g
Final sample mass =	178.82	g	Initial dial reading =	0.01000	in
Final dry sample mass =	162.41	g	Final dial reading =	0.05736	in
Final water content =	10.10%		LL=	NA	%
Final dry unit weight =	134.56	pcf	PL=	NA	%
Final void ratio =	0.271		% Sand=	NA	
Final degree of saturation =	100.00%		% Silt=	NA	
Estimated specific gravity =	2.74		% Clay=	NA	
			In-Situ Vertical Effective Stress =	3000	psf

Compression and Swelling Indices

Compression index C_c =	0.071	**Preconsolidation pressure,s_C**	
Field corrected C_c =	0.079	Casagrande Method =	3556 psf
Swelling index C_s =	0.015	**Over-Consolidation Ratio (OCR) =**	1.19

Load number	Vertical stress	Dial reading	System deflection	Vertical strain	Void ratio	C_v	Cae	Elapsed time
	psf	in	in	%		ft^2/day	%	min
1	100.0	0.00978	0.00010	-0.01	0.335	N/A	N/A	720
2	200.0	0.01003	0.00023	0.03	0.334	0.1337	0.02	720
3	500.0	0.01419	0.00058	0.48	0.328	0.1259	0.12	720
4	1000.0	0.01886	0.00090	0.99	0.322	0.0869	0.07	720
5	2000.0	0.02511	0.00135	1.67	0.313	0.0662	0.04	720
6	4000.0	0.03341	0.00193	2.57	0.300	0.1658	0.13	720
7	8000.0	0.04340	0.00253	3.65	0.286	0.2091	0.12	1440
8	16000.0	0.05616	0.00324	5.01	0.268	0.1937	0.14	720
9	32000.0	0.07107	0.00413	6.62	0.246	0.2150	0.13	720
10	8000.0	0.07019	0.00295	6.41	0.249	N/A	N/A	720
11	2000.0	0.06502	0.00198	5.79	0.258	N/A	N/A	840
12	500.0	0.05841	0.00123	5.04	0.268	N/A	N/A	1440

Prepared by: _____ Date: _____

Checked by: _____ Date: _____

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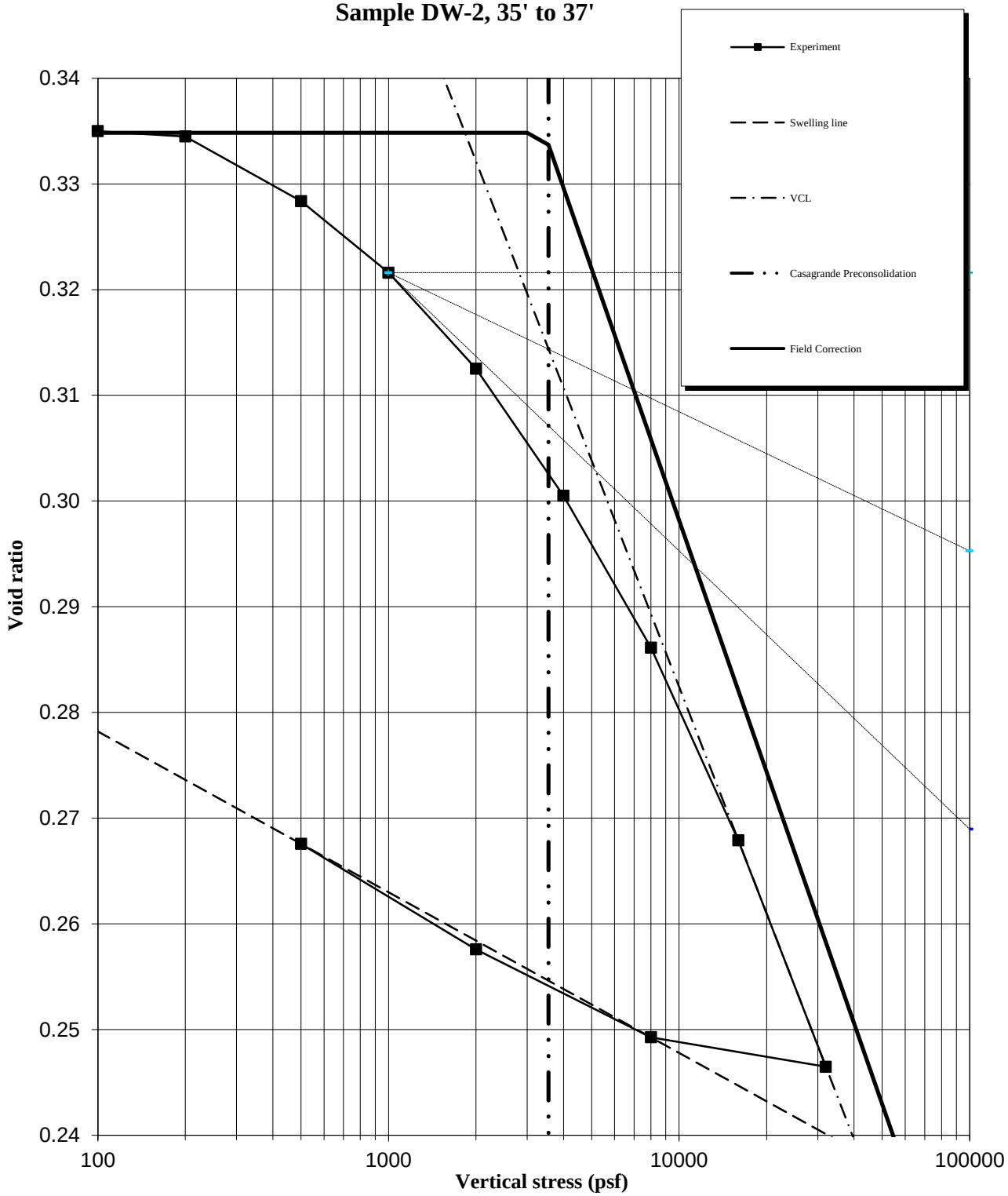
CONSOLIDATION CURVE

Sample DW-2, 35' to 37'



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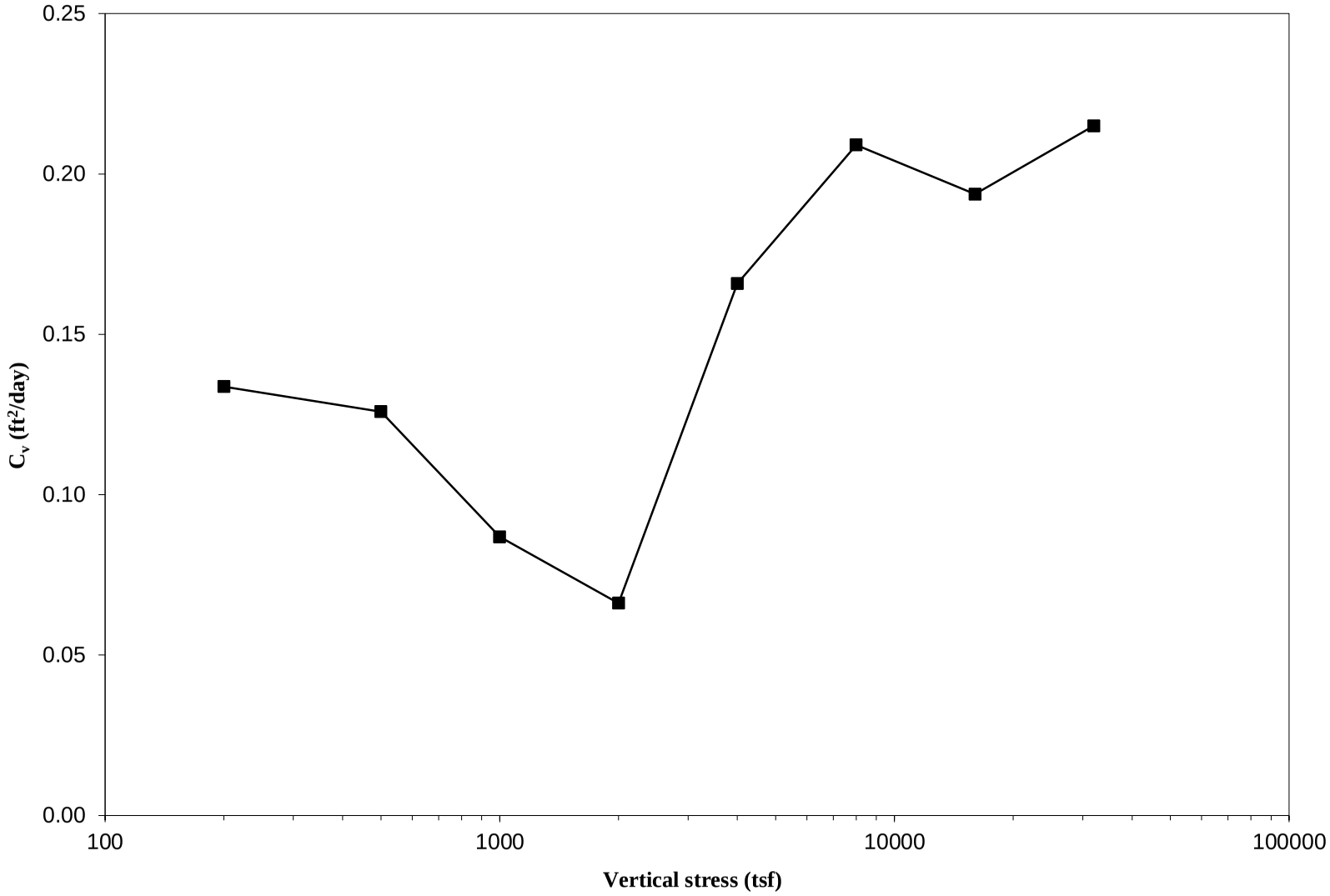
CONSOLIDATION COEFFICIENT (C_v) vs. VERTICAL STRESS

Sample DW-2, 35' to 37'



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ONE-DIMENSIONAL CONSOLIDATION TEST

AASHTO T 216 / ASTM D 2435

Project: Interstate 57/74
Client: McCleary Engineering
Soil Sample ID: Boring DW-2, 3 to 5 feet
Sample Description: Brown SILTY CLAY LOAM, strong odor

Tested by: M. Snider
Prepared by: M. Snider
Test date: 8/25/2017
WEI: 613-15-01

Initial sample height =	0.992	in	Ring diameter =	2.497	in
Initial sample mass =	165.1	g	Ring mass =	109.80	g
Initial water content =	20.12%		Initial sample and ring mass =	274.90	g
Initial dry unit weight =	107.81	pcf	Tare mass =	62.19	g
Initial void ratio =	0.586		Final ring and sample mass =	277.48	g
Initial degree of saturation =	94.08%		Mass of wet sample and tare =	229.24	g
			Mass of dry sample and tare =	199.64	g
Final sample mass =	167.05	g	Initial dial reading =	0.02000	in
Final dry sample mass =	137.45	g	Final dial reading =	0.02081	in
Final water content =	21.54%		LL=	NA	%
Final dry unit weight =	107.90	pcf	PL=	NA	%
Final void ratio =	0.585		% Sand=	NA	
Final degree of saturation =	100.00%		% Silt=	NA	
Estimated specific gravity =	2.74		% Clay=	NA	
			In-Situ Vertical Effective Stress =	600	psf

Compression and Swelling Indices

Compression index C_c =	0.037	**Preconsolidation pressure,s_C**	
Field corrected C_c =	0.038	Casagrande Method =	17881 psf
Swelling index C_s =	0.007	**Over-Consolidation Ratio (OCR) =**	29.80

Load number	Vertical stress	Dial reading	System deflection	Vertical strain	Void ratio	C_v	Cae	Elapsed time
	psf	in	in	%		ft^2/day	%	min
1	100.0	0.00161	0.00010	-1.84	0.615	N/A	N/A	720
2	200.0	0.00251	0.00023	-1.74	0.613	0.0782	0.04	720
3	500.0	0.00840	0.00058	-1.11	0.604	0.0813	0.03	1440
4	1000.0	0.01677	0.00090	-0.24	0.590	0.0755	0.21	1440
5	2000.0	0.01968	0.00135	0.10	0.584	0.0753	0.04	1440
6	4000.0	0.02119	0.00193	0.31	0.581	0.3045	0.04	1440
7	8000.0	0.02313	0.00253	0.57	0.577	0.1594	0.00	1440
8	16000.0	0.02585	0.00324	0.92	0.571	0.2678	0.03	1440
9	32000.0	0.03192	0.00413	1.62	0.560	0.2632	0.00	1440
10	8000.0	0.02421	0.00295	0.72	0.574	N/A	N/A	720
11	2000.0	0.02207	0.00198	0.41	0.579	N/A	N/A	1440
12	500.0	0.02081	0.00123	0.20	0.583	N/A	N/A	1440

Prepared by: _____ Date: _____

Checked by: _____ Date: _____

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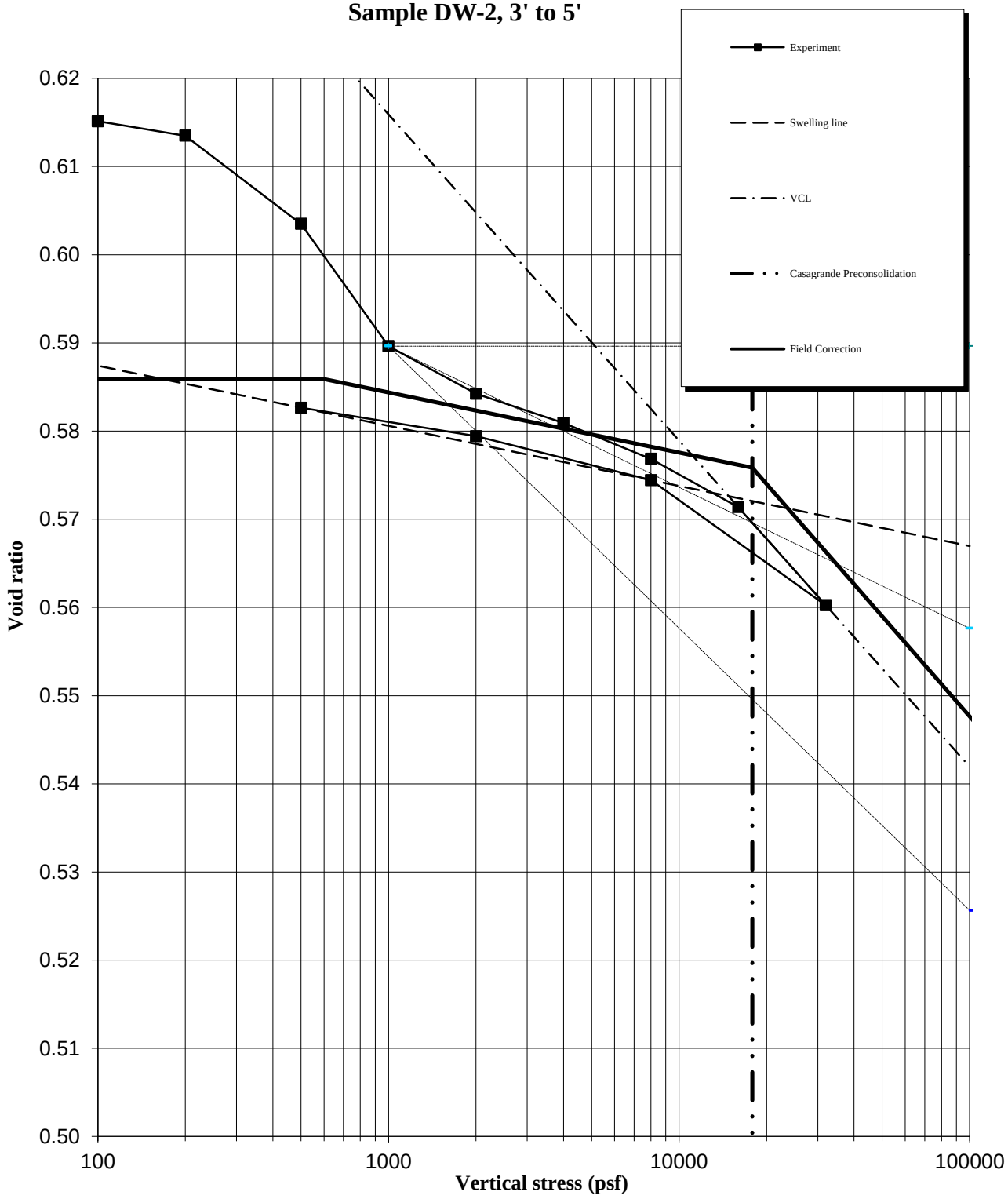
CONSOLIDATION CURVE

Sample DW-2, 3' to 5'



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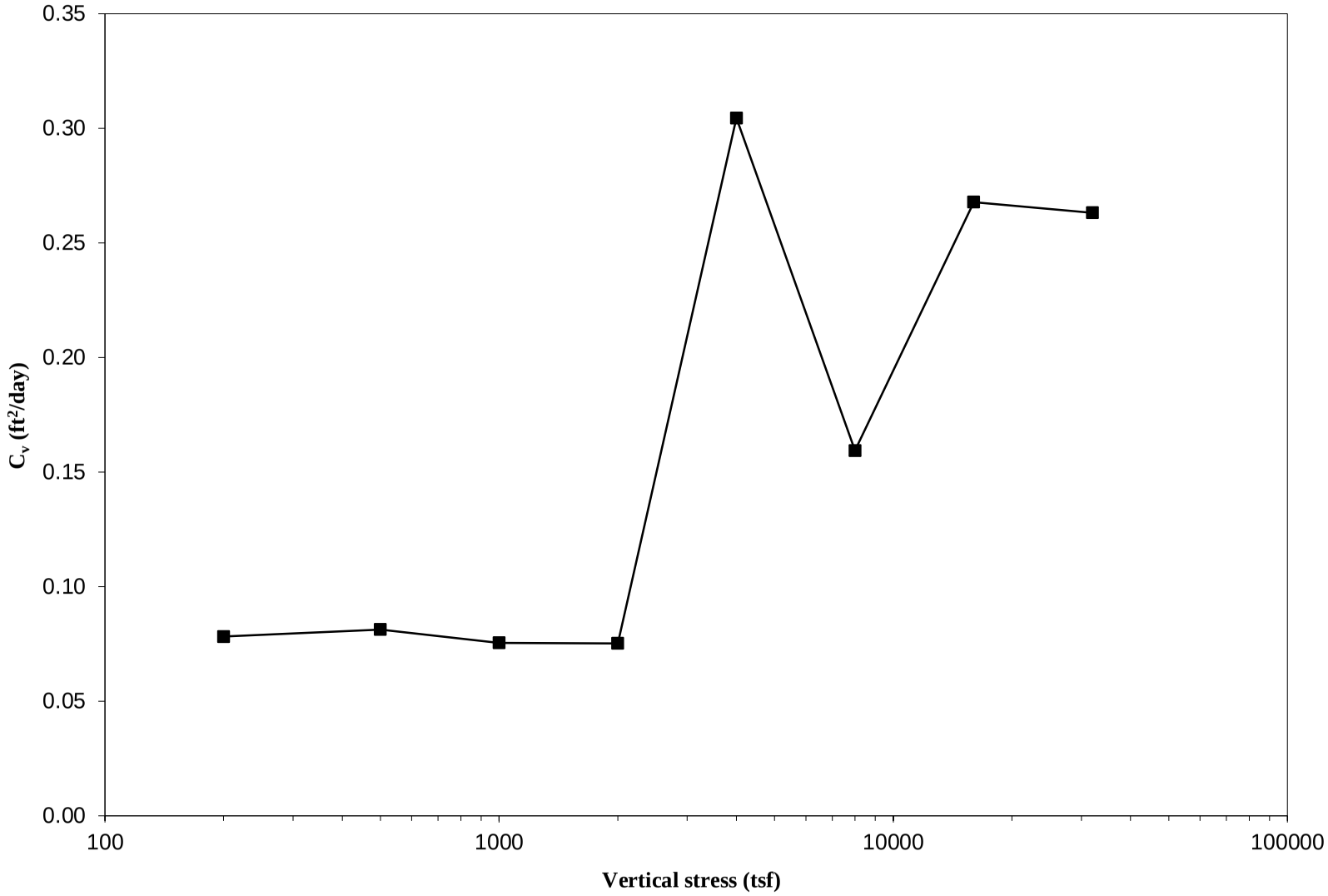
CONSOLIDATION COEFFICIENT (C_v) vs. VERTICAL STRESS

Sample DW-2, 3' to 5'



AASHTO R18

ATTACHMENT A

LABORATORY TEST RESULTS

Boring D-102ST

Illinois Department of Transportation

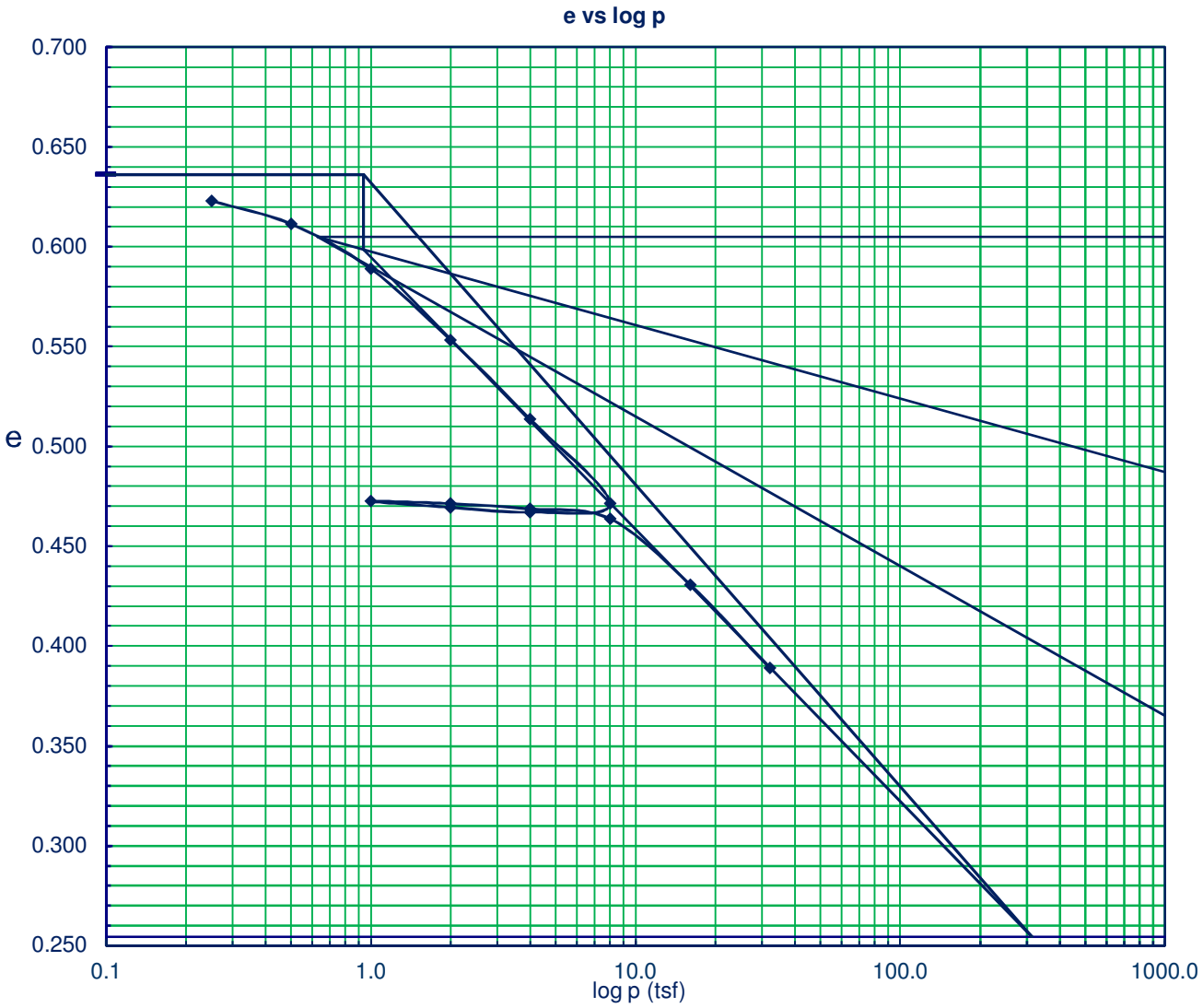
Shelby Tube Test Results

Boring No.:	D-102ST	Route:	I-57/74	Tube Length/Diameter:	30-in. / 3-in.	Page:	1 of 1
Station:	407+00	Section:	(10-34-1) HBK	Ground Surface Elev.:	779.1 ft.	Date:	5/6/2019
Offset:	31.7 ft. Lt.	County:	Champaign	Begin Sampling Depth:	765.1 ft.	Job No.:	D-95-032-18
Latitude:	40.147882	Structure No.:	010-1004	Ground Water Elev.:	763.1 ft.	Soils Lab Project No.:	19001
Longitude:	-88.286505	Contract No.:	70B99	Drilled by:	TLM	Prepared by:	Kurt Schmuck

Sample No.	Depth (ft)	Elev. (ft)	Qu (tsf)	Moist. (%)	Unit Wt. (pcf)	c (psf)	Φ (deg)	c' (psf)	Φ' (deg)	Soil Type, Description and Observations
	0.0	779.1	---	---	---	---	---	---	---	Not Sampled
	↓	↓	---	---	---	---	---	---	---	↓
	14.0	765.1	---	---	---	---	---	---	---	↓
1-1	14.63	764.5	0.85	25.9	123.7					Greenish-Gray Silty Clay Loam w/ Silty Clay streaks & pockets, small stones
1-2	15.25	763.9	cons	20.3	128.1					Greenish-Gray Silty Clay w/ stones & gravel, Sandy Clay pockets
1-3	15.88	763.2	1.71	15.6	137.7					Brownish-Gray Silty Clay w/ Silty Loam pockets & gravel, isolated large stone
	16.0	763.1								end of tube

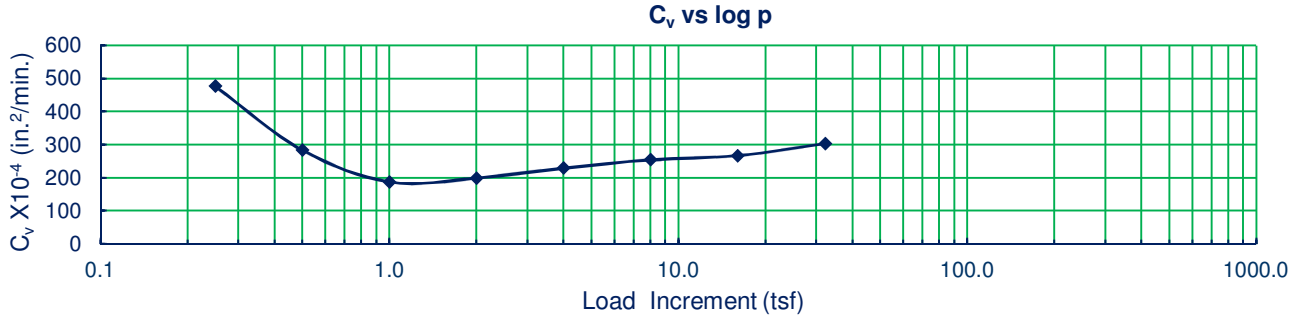
The Unit Wt. column represents the Moist Unit Weight.
The Qu column represents the Unconfined Compressive Strength using AASHTO T 208.
The c and Φ column represents cohesion and friction angle for total stress using AASHTO T 296 (unconsolidated-undrained triaxial testing).
The c' and Φ' column represents cohesion and friction angle for effective stress using either AASHTO T 297 (consolidated-undrained triaxial testing), or AASHTO T 296 with pore pressure measurement.

District	5	Lab Project Number	19001	
County	Champaign	Sample Number	1-2	
Route	I-57/I-74 Ramp D	Boring ID	D-102ST	
Section	(10-34-1) HBK	Boring Station	407+00	
Job Number	D-95-032-18	Boring Offset	31.7	ft LT of BL



Layer 1

p_0 = 0.918 tsf p_c = 0.939 tsf c_r = 0.006 c_c = 0.151 e_o = 0.636



Lab Project **19001**

Layer 1 Worksheet

Sample Number	1-2	Boring Station	407+00
Machine Number	1	Boring Offset	31.7 ft LT of BL
District	5	Boring ID	D-102ST
County	Champaign	Job Number	D-95-032-18
Route	I-57/I-74 Ramp D	Structure Number	010-1004
Section	(10-34-1) HBK	Contract number	70B99

C_v calculations curve	log	e calculations curve	log

e Calculations

Increment	Increment duration min.	Loading tsf	Ht. in.	MD in.	Adjusted Ht.** inches	V cm^3	V/V_s	e V/V_s-1	C_v X 10^{-4} $in.^2$/min
Seating load	N/A	0.025	0.7500	0.0000	0.7500	60.3	1.636	0.636	
1	403	0.250	0.7440	0.0016	0.7440	59.8	1.623	0.623	477
2	883	0.500	0.7386	0.0024	0.7386	59.4	1.611	0.611	283
3	504	1.000	0.7283	0.0035	0.7283	58.6	1.589	0.589	188
4	899	2.000	0.7120	0.0048	0.7120	57.3	1.553	0.553	199
5	500	4.000	0.6939	0.0065	0.6939	55.8	1.514	0.514	230
6	902	8.000	0.6745	0.0085	0.6745	54.3	1.471	0.471	255
7*	1533	4.000	0.6725	0.0073	0.6725	54.1	1.467	0.467	
8*	1424	2.000	0.6736	0.0061	0.6736	54.2	1.469	0.469	
9*	1338	1.000	0.6750	0.0051	0.6750	54.3	1.473	0.473	
10	468	2.000	0.6744	0.0057	0.6744	54.3	1.471	0.471	
11	928	4.000	0.6733	0.0069	0.6733	54.2	1.469	0.469	
12	493	8.000	0.6710	0.0085	0.6710	54.0	1.464	0.464	
13	895	16.070	0.6559	0.0112	0.6559	52.8	1.431	0.431	267
14	494	32.190	0.6367	0.0151	0.6367	51.2	1.389	0.389	304
Final reading	N/A	32.190	0.6334	0.0151	0.6485	51.7	1.401	0.401	

Lab Sample Test Results

Tare	76.6	gr.
Wet+Tare	197.5	gr.
Cons+Tare	189.7	gr.
Dry+Tare	174.9	gr.
W_s	98.3	gr.
$W_w = V_w$	22.6	cm^3
V_s	36.9	cm^3

	Initial	Final
Moisture content	23.0	15.1
Dry Unit Wt.	101.7	118.8

Lab Test Procedures

Test Method	T 216 B
Sample Condition	inundated
Inundation pressure	.025 tsf
Test Preparation	Trimmed with cutting shoe

Lab Comments:

COMMENTS:

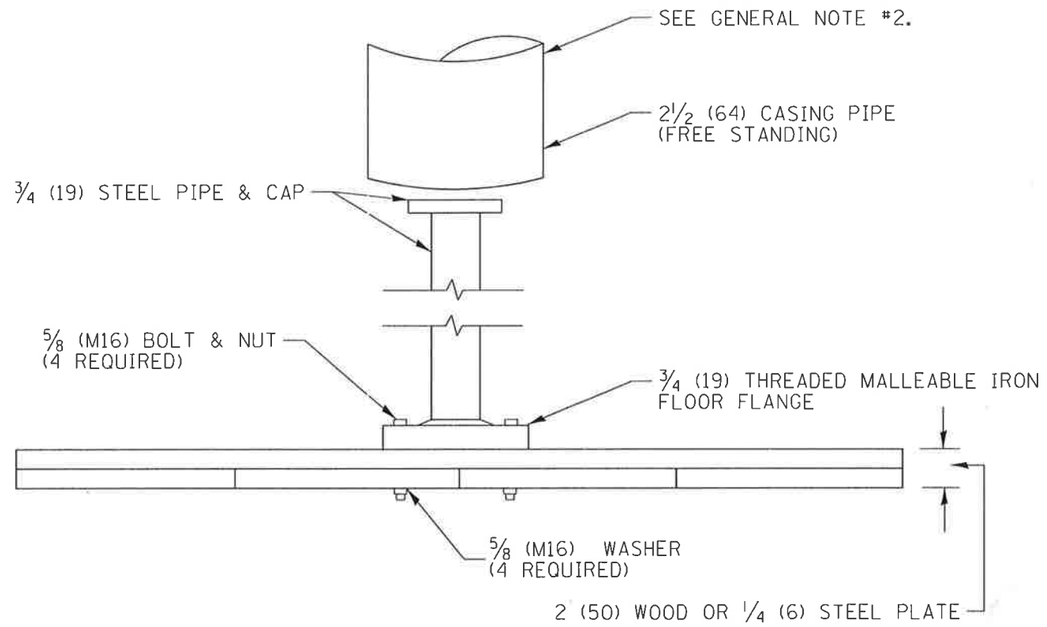
* For unload sequences, the sample height at the end of the load sequence is used instead of H_{100}.

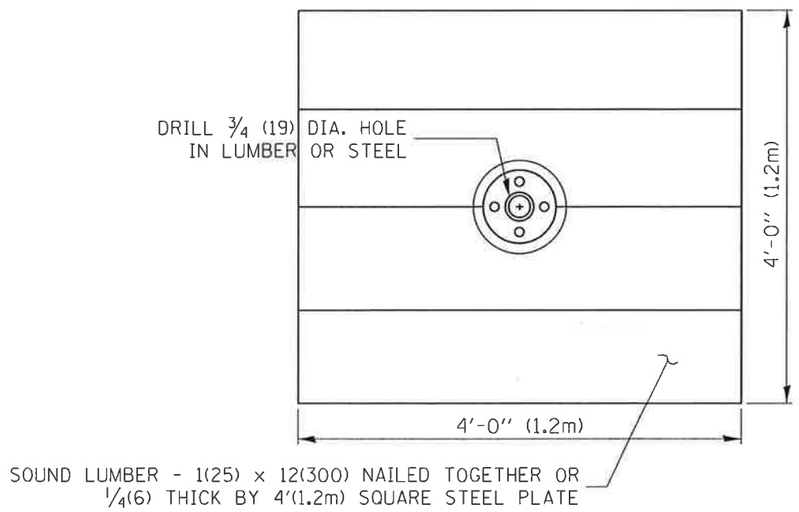
** Adjusted Heights are the same as the Heights because the adjustment was already applied in the original consolidation data.

Appendix E

Settlement Platform

DESIGNER NOTES:
1. SEE SOILS REPORT AND BUREAU OF MATERIALS FOR USAGE, LOCATIONS, AND SETTLEMENT RATES.
2. CONSIDER USE ON BRIDGE EMBANKMENT AND OTHER SETTLEMENT SENSITIVE FILLS.
3. THIS DRAWING ALLOWS FOR WOODBASE PLATE OPTION.





GENERAL NOTES:

1. Settlement Platform shall be in accordance with the appicable portions of Article 204.06 of the Standard Specifications.

2. Do Not install casing pipe until after one section of ¾"(19 mm) has been covered with earth. The casing pipe should not rest on platform.

All dimensions are in inches (millimeters) unless otherwise noted.

1-1-97	RENUM. L-5.04. NEW REVISION BOX, REVISED NOTES,	T.P.	8-23-01	UPOATE FOR NEW SPEC.	M.A.	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	SETTLEMENT PLATFORM	F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS / SHEET NO.
	REVISED TITLE BOX		10-16-06	REVISED TO 2007 SPEC.	M.A.						
4-14-99	ADDED "CASING PIPE" REQUIREMENT	J.A.								CONTRACT NO.	
5-19-99	CORRECTIONS TO CASING PIPE	J.A.					NOT TO SCALE CA00 STO. 205101-04	FED. ROAD DIST. NO.	ILLINOIS	FED. AID PROJECT	