STRUCTURE GEOTECHNICAL REPORT

BRIDGE REPLACEMENT
I-72 over FAP 320 (IL 121) & IC RR

Section (58-63HVB)BR
Macon County, Illinois
Job No. P-97-007-15
Contract No. 74705
PTB 194-48
Existing Structure No. 058-0074 (EB)/058-0075 (WB)
Proposed Structure No. 058-0139 (EB)/058-0140 (WB)

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1.0 Project Description and Scope

1.1 Introduction

The geotechnical investigation summarized herein was performed for the proposed bridges at I-72 over FAP 320 (IL 121) & IC RR in Macon County, Illinois. See Appendix A for Location Map. The purpose of this report is to provide geotechnical design and construction recommendations to aid in the structure planning, final design plans and specification preparation.

1.2 Existing Structure Information

Originally built in 1976, the existing eastbound and westbound structures are three span, continuous, composite, haunched welded plate girders with an 8" reinforced concrete deck. The steel welded girders are 42" deep in span 1, 54" deep in span 2, and 42" deep in span 3. The superstructure is supported on reinforced concrete stub abutments on concrete piles and reinforced concrete five column piers with crashwalls on concrete pile supported spread footings. Pier 1 (south pier) is founded on 3 rows of concrete piles with 2 outside rows battered and center row straight. Pier 2 (north pier) is founded on 2 rows of battered concrete piles. The existing bridge back to back abutments is 268'-9¼" with approximate span lengths of 98'-0" – 124'-3" – 41'-9" and is constructed on a 7° 43' 15" right forward skew. The out-to-out bridge widths vary from 58'-4" to 71'-8".

In 1998, the pin and link located in span 3 (north span) was replaced. In 2006, bridge repairs were performed including deck repairs, link joint repairs, new 2¼" microsilica overlay, new silicone joints and elastomeric bearings at the south abutments.

SN 058-0074 (eastbound) has a sufficiency rating of 68.5 with a deck rating of 5, fair condition with minor section loss, superstructure rating of 4, poor condition with advanced deterioration, and a substructure rating of 4, poor condition with advanced deterioration. SN 058-0075 (westbound) has a sufficiency rating of 66.5 with a deck rating of 4, poor condition with advanced deterioration, superstructure rating of 4, poor condition with advanced deterioration, and a substructure rating of 6, satisfactory condition with minor deterioration.

1.3 Proposed Structure Information

The proposed replacement structures are 2 span bridges with continuous, composite, haunched welded plate girders with supporting 8" reinforced concrete deck on a 7° 43' 15" right forward skew. The steel welded girders are 36" deep in span 1 and 54" deep in span 2. Typical girder spacing is at 7'-6" centers with 3'-0" overhangs, though each structure has a set of 3 girders which spacing varies with the flared configuration. Proposed back to back abutment lengths are 267'-11½" with span lengths of 112'-3" – 152'-0". Out to out of bridges are flared varying from 58'-10¼" to 72'-4¼". The roadway cross sections consist of a 10'-0" shoulder, 3 – 12'-0" lanes, and a variable 10'-0¼" to 23'-6¼" shoulder. Proposed 4" concrete slopewalls are anticipated at each abutment. The minimum vertical clearance from the profile grade of IL Rte. 121 to bottom of proposed low girder is 22'-9" and from top of I.C.R.R. rail to bottom of proposed low girder is 23'-4". Staged construction will be utilized to maintain traffic. For further proposed structure information, see Appendix B for Type, Size, and Location Plan (TS&L).

2.0 Field Exploration

2.1 Subsurface Exploration and Testing

The subsurface investigation consisted of four borings (B-1 through B-4) drilled by the Illinois Department of Transportation in May and July of 2021. B-1 and B-4 were taken near the west and east abutment locations, respectively. B-2 and B-3 were taken near the WB and EB pier locations, respectively. Soil boring exploration was performed by drilling methods using a hollow stem auger and split spoon. See Appendix C for Subsurface Data Profile Plot and Appendix D for Soil Boring Logs.

Table 2.1 - Boring Log Summary

Boring Location	Station	Offset	Ground Surface Elevation
B-1 (S. Abut.)	722+38	At CL	710.78
B-2 (Pier WB)	724+09	118' LT	683.26
B-3 (Pier EB)	724+95	168' RT	681.61
B-4 (N. Abut.)	725+84	At CL	709.23

2.2 Subsurface Conditions

The groundwater conditions at each soil boring varies. See Table 2.2 below. Temperature, seasonal variations, and recent rainfall conditions may influence the levels of groundwater table. Without extended periods of observation, the measurement of groundwater conditions herein may not give a true indication of typical groundwater levels. Volume of water depends on the permeability of the soils.

Table 2.2 – Groundwater Conditions Summary

Boring Location	First Encounter	Upon Completion	After 24 Hours
B-1 (S. Abut.)	666.3	Washed	700.8
B-2 (Pier WB)	681.3	Washed	678.3
B-3 (Pier EB)	617.1	649.6	666.6
B-4 (N. Abut.)	624.7	Washed	677.2

Both abutment borings, B-1 and B-4, encountered embankment from the ground surface elevation to an approximate depth of 28 feet, which represents the height of embankment built up to construct the existing bridge above the surrounding ground elevation. The existing fill generally consisted of medium to stiff cohesive materials including clay, clay till, and sandy clay. SPT (N) values ranged from 5 to 14 blows per foot with Qu values of 1.2 to 7.0 tsf and moisture contents

ranging between 9% and 20%. Natural soil beneath the fill layer was generally medium to stiff cohesive material of primarily clay, clay till, and clay loam. SPT (N) values ranged from 5 to 33 blows per foot, Q_u values of 0.6 to 4.5 tsf, and moisture contents ranging between 6% and 22%. Within the natural, cohesive soil, a 5 foot thick loose sand layer exists approximately 70 feet below the natural soil line. SPT (N) values ranged from 2 to 10 blows per foot and moisture contents ranging between 10% and 15%.

3.0 Geotechnical Evaluations and Recommendations

3.1 Settlement

Based on the provided preliminary plan and profile, the anticipated difference between the existing and proposed elevations at the abutments is less than 4 inches. Minimal earthwork is expected as the proposed grading mimics the existing. Thus, settlement of the embankment is not anticipated due to minimal changes in loading and existing soil conditions. By inspection, the proposed structure should result in less than 0.4 inches of settlement. Per IDOT Geotechnical Manual Section 6.9.2, driven pile capacity need not account for downdrag if total settlement of soil around the piling is less than 0.4 inches.

Regarding settlement of approach slabs, one end of the slab is supported by the pile supported abutment. The other end of the slab is supported by the existing embankment subgrades. Provided proper compaction according to IDOT Standard Specifications is performed during construction, settlement of the approach slab is not a concern.

3.2 Slope Stability

As previously discussed herein, the difference in proposed profile grade and embankment from the existing is minimal. The proposed 1:2 (V:H) sideslopes match the existing sideslopes and the height of the proposed slope is approximately 24 feet. The critical fill is generally hard to stiff clay till with an average SPT (N) value of 10 and an average Qu value of 2.4 tsf. Using the general rule of thumb equation below, determine a preliminary assessment of the slope stability factor of safety (FOS).

$$FOS = 6c/\gamma h = 6(2{,}400\ psf)/[(120\ pcf)(24')] = 5.0$$

A preliminary FOS of 5.0 is greater than the minimum FOS of 1.5. As validation, no known issues or concerns are present or have been present at the existing slopes which have been in place for over 45 years. In addition, the existing piles supporting the abutments and piers will remain in place and increase the nominal slope stability FOS by intersecting the circular failure planes. For the reasons discussed, a slope stability analysis was not performed as slope stability is not considered a concern given the circumstances at this bridge.

3.3 Seismic Considerations

LRFD Seismic Soil Site Class Definition was determined based on the methodology described in IDOT AGMU 9.1 and the IDOT BBS 149 form for Seismic Site Class Determination. See Appendix E for determination.

Further seismic parameters were determined using the figures and tables provided in AASHTO LRFD Bridge Design Specifications, Article 3.10 for Earthquake Effects, EQ. These parameters are based on a 1000 Year Return Period with a Probability of Exceedance of 7% in 75 years. See table

below for a summary of seismic parameters.

Table 3.1 - Summary of Seismic Parameters

Parameter	Value
Seismic Soil Site Class	D
Spectral Acceleration Coefficient at period of 0.2 sec., Ss	0.175g
Spectral Acceleration Coefficient at period of 1.0 sec., S1	0.062g
Site Factor, Short Period, Fa	1.6
Site Factor, Long Period, Fv	2.4
Design Spectral Acceleration at 0.2 sec. (SDS)	0.280g
Design Spectral Acceleration at 1.0 sec. (SD1)	0.149g
Seismic Performance Zone	SPZ 1

The Spectral Acceleration Coefficient at T=1.0 sec. (SD1) and Seismic Performance Zone were confirmed using Bridge Manual Planning Section 2.3.10.3.

3.4 Scour

Scour is not applicable because this is a grade separation structure.

3.5 Mining Activity

Reviewing the Illinois State Geological Survey (ISGS) "Directory of Coal Mines in Illinois" for Macon County, no mining activity is present at the bridge location. The nearest underground mine proximity region is located in the southern part of Decatur, 4 miles southeast of the project location.

3.6 Liquefaction

According to IDOT AGMU Memo 10.1, liquefaction is not applicable in Seismic Performance Zone 1.

3.7 Lateral Load Analysis

The tables below provide soil parameters to structural engineer for lateral or displacement analysis of the foundations. The values were estimated based on the descriptions given in the soil boring logs. For short term conditions, full cohesion was used with a friction angle of 0 degrees for cohesive soils. For long term conditions, a nominal cohesion of 100 psf was used for cohesive soils.

No specific analyses were performed on the soil to determine the estimated parameters.

Table 3.2 –Soil Parameters for Lateral Load Analysis at South Abutment (B-1)

Soil Description	Elev. at Bottom of Layer	γ (pcf)	Short Term		Long Term		K (pci)	ε50
			c' (ksf)	θ (deg.)	c' (ksf)	θ (deg.)		
Very Stiff Clay Loam	703.78	130	3.1	0	0.1	26	500	0.005
Hard Clay	701.28	130	4.5	0	0.1	26	500	0.005
Medium Sandy Clay	698.78	120	0.8	0	0.1	28	100	0.010
Stiff Clay	691.28	125	1.2	0	0.1	26	300	0.007
Very Stiff Clay Loam	681.28	130	2.5	0	0.1	26	500	0.005
Very Stiff Clay	671.28	130	1.2	0	0.1	26	500	0.005
Hard Clay	656.28	130	2.7	0	0.1	26	500	0.005
Very Stiff Silty Clay	651.28	130	2.7	0	0.1	28	500	0.005
Very Stiff Sandy Silt	641.28	125	2.6	0	0.1	28	300	0.007
Very Stiff Clay	636.28	130	3.5	0	0.1	26	500	0.005
Medium Loam	631.28	120	0.6	0	0.1	28	100	0.010
Hard Clay Loam	626.28	125	4.1	0	0.1	28	300	0.007
Stiff Clay Loam	616.28	125	0.6	0	0.1	28	300	0.007
Very Stiff Clay	614.78	130	3.9	0	0.1	26	500	0.005

Table 3.3 –Soil Parameters for Lateral Load Analysis at Pier WB (B-2)

Soil Description	Elev. at Bottom of Layer	γ (pcf)	Short Term		Long Term		K (pci)	ε50
			c' (ksf)	θ (deg.)	c' (ksf)	θ (deg.)		
Clay	676.26	125	2.5	0	0.1	26	300	0.007
Stiff Silty Clay	673.76	125	1.1	0	0.1	26	300	0.007
Stiff Clay	671.26	125	1.4	0	0.1	26	300	0.007
Very Stiff Clay	656.26	130	1.2	0	0.1	26	500	0.005
Stiff Silty Sand	653.26	120	1.6	0	0.1	28	100	0.010
Very Stiff Clay	643.26	130	2.5	0	0.1	26	500	0.005
Stiff Clay	633.76	125	1.6	0	0.1	26	300	0.007
Medium Sandy Loam	628.76	120	1.0	0	0.1	28	100	0.010
Stiff Sandy Clay Loam	623.76	125	1.5	0	0.1	28	300	0.007
Stiff Clay Loam	608.76	125	1.0	0	0.1	28	300	0.007
Very Loose Fine Sand	603.76	115	0	30	0	30	100	0.010
Stiff Silty Clay	598.76	125	1.7	0	0.1	28	300	0.007
Very Stiff Clay	583.26	130	2.1	0	0.1	26	500	0.005
Hard Clay	582.26	130	6.6	0	0.1	26	500	0.005

Table 3.4 –Soil Parameters for Lateral Load Analysis at Pier EB (B-3)

Soil Description	Elev. at Bottom of Layer	γ (pcf)	Short Term		Long Term		K (pci)	ε50
			c' (ksf)	θ (deg.)	c' (ksf)	θ (deg.)		
Clay	677.11	125	1.1	0	0.1	26	300	0.007
Very Soft Sandy Loam	673.61	115	0.1	0	0.1	28	100	0.010
Stiff Clay	672.11	125	1.8	0	0.1	26	300	0.007
Very Stiff Clay	661.61	130	2.1	0	0.1	26	500	0.005
Stiff Clay	659.61	125	1.7	0	0.1	26	300	0.007
Medium Clay/Silty Loam	642.11	120	0.9	0	0.1	28	100	0.010
Very Stiff Clay	637.11	130	3.9	0	0.1	26	500	0.005
Stiff Sandy Clay	632.11	125	1.7	0	0.1	28	300	0.007
Medium Stiff Loam	622.11	120	1.0	0	0.1	28	100	0.010
Stiff Clay Loam	612.11	125	2.0	0	0.1	28	300	0.007
Loose Medium Sand	607.11	115	0	30	0	30	100	0.010
Very Stiff Clay	596.61	130	2.3	0	0.1	26	500	0.005
Very Stiff Clay	581.61	130	1.4	0	0.1	26	500	0.005
Hard Clay	580.61	130	8.2	0	0.1	26	500	0.005

Table 3.5 –Soil Parameters for Lateral Load Analysis at North Abutment (B-4)

Soil Description	Elev. at Bottom of Layer	γ (pcf)	Short Term		Long Term		K (pci)	ε50
			c' (ksf)	θ (deg.)	c' (ksf)	θ (deg.)		
Hard Clay	689.23	130	1.2	0	0.1	26	500	0.005
Stiff Clay	679.73	125	1.3	0	0.1	26	300	0.007
Very Stiff Clay with Silt	674.73	130	2.9	0	0.1	28	500	0.005
Stiff Clay	669.73	125	1.8	0	0.1	26	300	0.007
Very Stiff Clay	649.23	130	1.7	0	0.1	26	500	0.005
Stiff Clay	644.73	125	1.2	0	0.1	26	300	0.007
Stiff Silty Loam	639.73	125	1.0	0	0.1	28	300	0.007
Stiff Clay Loam	629.73	125	1.8	0	0.1	28	300	0.007
Stiff Sandy Clay	624.73	125	1.0	0	0.1	28	300	0.007
Medium Sandy Loam	619.73	120	0.5	0	0.1	28	100	0.010
Med to Dense Sand w Silt	614.73	120	0	30	0	30	100	0.010
Stiff Sandy Clay	609.73	125	1.3	0	0.1	28	300	0.007
Stiff Silt with Sand	604.73	120	1.2	0	0.1	28	100	0.010
Medium Silty Clay	599.73	125	0.9	0	0.1	28	300	0.007
Very Stiff Clay Loam	593.23	130	2.1	0	0.1	28	500	0.005

4.0 Foundation Recommendations

4.1 Abutments

Preliminary superstructure loads for the proposed structure configuration discussed above were provided by Hampton, Lenzini and Renwick, Inc. See tables below for total factored loads at each substructure.

Table 4.1 – E.B. Abutment Load

Location	Total Factored Reaction (k)
S. Abut.	1,800
N. Abut.	2,400

Table 4.2 – W.B. Abutment Load

Location	Total Factored Reaction (k)
S. Abut.	1,950
N. Abut.	2,600

Per the preliminary TS&L, integral abutments are anticipated with the bottom of the south abutment at Elev. 704.8 (W.B.) and Elev. 705.0 (E.B.) and bottom of north abutment at Elev. 702.7 (W.B.) and 702.8 (E.B.). Integral abutments are preferred to eliminate joints in the bridge decks, decreasing maintenance costs and increasing service life. Foundation type for integral abutments shall be pile supported with a pile placed under each girder. See results of preliminary Integral Abutment Feasibility Analysis in Appendix F. In addition, see IDOT Bridge Manual 3.8.3 for further integral abutment design guidance.

The use of H-piles and metal shell piles were both evaluated. Without a suitable end bearing material, the axial resistance will be primarily through friction. H-piles have a smaller relative cross sectional displacement when driven and are typically considered a non-displacement pile; while metal shell piles have a larger relative cross sectional displacement when driven and are considered a more effective displacement pile. Metal shell piles will develop an equivalent required bearing at shorter pile lengths than H-piles in friction soil situations. Thus, metal shell piles are preferred pile type.

Tables 4.3 and 4.4 below summarize the nominal required bearing (R_N), factored resistance available (R_F), estimated pile length and estimated pile tip elevation for the strength limit state. R_N indicates the resistance of the pile during driving, which assists the Contractor from causing damage to the pile. R_F represents the net long term axial geotechnical resistance available to support the factored structure loads. The estimated pile lengths include a 2 foot embedment into the abutment. Analyses have been performed using the IDOT Static Method of Estimating Pile Length. See Appendix G.

The factored resistance available values shown in the tables are intended to provide the designer with a range of feasible options for the anticipated vertical loading. Piles shall be evaluated for lateral resistance in final design.

IDOT integral abutment policy requires one pile under each beam. If the tables below do not provide adequate resistance for final design loading conditions, additional piles may be placed at the midpoint between girders. The designer shall verify integral abutment feasibility analysis with final configuration.

Table 4.3 – Metal Shell Pile Capacity at the South Abutment

Pile Size	Nominal Required Bearing, R_N (kips)	Factored Resistance Available, R_F (kips)	Estimated Pile Length (ft.)	Estimated Pile Tip Elevation (ft.)
MS 14x0.312	392	216	69	637.8
	431	237	79	627.8
	448	246	84	622.8
MS 16x0.312/ MS 16x0.375	450	247	69	637.8
	496	273	79	627.8
	513	282	84	622.8

Table 4.4 – Metal Shell Pile Capacity at the North Abutment

Pile Size	Nominal Required Bearing, R_N (kips)	Factored Resistance Available, R_F (kips)	Estimated Pile Length (ft.)	Estimated Pile Tip Elevation (ft.)
MS 14x0.312	396	218	65	639.7
	434	239	75	629.7
	449	247	80	624.7
MS 16x0.312/ MS 16x0.375	455	250	65	639.7
	498	274	75	629.7
	514	283	80	624.7

Piles smaller than shown in the following tables were either inadequate for the anticipated vertical loading or did not meet the limits required for integral abutment feasibility. 16" metal shell piles are combined in the tables above as they provide the same resistance.

One test pile is recommended at each abutment location. Pile shoes are not required.

4.2 Piers

Preliminary superstructure loads for the proposed structure configuration discussed above were provided by Hampton, Lenzini and Renwick, Inc. See tables below for total factored loads at each substructure.

Table 4.5 – E.B. Pier Load

Location	Total Factored Reaction (k)
Pier	5,425

Table 4.6 – W.B. Pier Load

Location	Total Factored Reaction (k)
Pier	5,875

Per the preliminary TS&L, the bottom of the pier footing is located at Elev. 676.2 (W.B. and E.B.). Drilled shaft foundation, spread footing on soil and pile-supported spread footing are several options considered at the pier. The existing piers are concrete pile-supported spread footings.

Drilled Shafts: Drilled shafts are typically preferred when subsurface information indicates a highly sloping, irregular, or very poorly defined rock surface. At the project location, rock surface was not present within the soil boring.

Spread Footing on Soil: Soil layers within 10 feet of the bottom of the pier footings have Qu values which vary from 0.1 tsf to 2.9 tsf. The stiffer clay layers may offer satisfactory bearing values, but the lesser, weaker layers are inadequate by inspection. Thus, spread footings on soil are not ideal due to potential over excavation required down to the stiffer soil layers.

Pile-Supported Footing: As noted above, a pile-supported footing matches the existing substructure foundations. In addition, driven piles are recommended at the abutments so pile driving equipment will already be mobilized. Driven piles appear to be the most efficient pier foundation type.

Per the preliminary TS&L, the pier is a multi-column pier with three proposed rows of piles in the footing with the bottom of the footing near the bottom of existing pier footing. The number of pile rows proposed at each pier matches the existing. Similar to the abutments, metal shell piles are recommended over H-piles without a suitable end bearing material present.

Table 4.4 below summarizes the nominal required bearing (R_N), factored resistance available (R_F), estimated pile length and estimated pile tip elevation. R_N indicates the resistance of the pile during driving, which assists the Contractor from causing damage to the pile. R_F represents the net long term axial geotechnical resistance available to support the factored structure loads. The estimated pile lengths include a 1 foot embedment into the pier footing. Analysis has been performed using the IDOT Static Method of Estimating Pile Length. See Appendix G.

The factored resistance available values shown in the tables are intended to provide the designer with a range of feasible options for the anticipated vertical loading. Piles shall be evaluated for lateral resistance in final design.

Table 4.7 – Metal Shell Pile Capacity at the WB Pier

Pile Size	Nominal Required Bearing, R_N (kips)	Factored Resistance Available, R_F (kips)	Estimated Pile Length (ft.)	Estimated Pile Tip Elevation (ft.)
MS 12x0.250	274	150	53	624.2
	314	173	63	614.2
	341	188	73	604.2
MS 14x0.250/ MS 14x0.312	273	150	43	634.2
	321	176	53	624.2
	368	203	63	614.2

Table 4.8 – Metal Shell Pile Capacity at the EB Pier

Pile Size	Nominal Required Bearing, R_N (kips)	Factored Resistance Available, R_F (kips)	Estimated Pile Length (ft.)	Estimated Pile Tip Elevation (ft.)
MS 12x0.250	260	143	60	617.2
	305	168	70	607.2
	338	186	76	601.2
MS 14x0.250/ MS 14x0.312	273	150	55	622.2
	306	168	60	617.2
	360	198	70	607.2

14" metal shell piles are combined in the tables above as they provide the same resistance. The designer shall consider the piles selected at the abutments when selecting the pier piles. Hammer size and economics of using the same pile size at all substructure units shall be considered.

Proposed piers are located near the same stationing as existing piers. To avoid the existing pier foundations, proposed piles shall be centered between existing piles, which spacing ranges from 3'-7" to 4'-2". Per BM 3.10.1.11, the minimum pile spacing is 3 times the pile diameter for friction piles. MS12 and MS14 piles accommodate the minimum pile spacing requirement.

Battered piles may be investigated if lateral loading warrants in final design. Though, vertical piles designed for combined axial and bending loads are recommended.

One test pile is recommended at each pier location. Pile shoes are not required.

5.0 Construction Considerations

5.1 Construction Activities

All construction activities shall be performed in accordance with the current IDOT Standard Specifications for Road and Bridge Construction and any pertinent Special Provisions or Policies.

5.2 Temporary Soil Retention System / Sheet Piling

Temporary shoring will be required at the abutments during staged construction. From the preliminary TS&L, the distance from the proposed profile grade to the bottom of proposed abutment is approximately 10 feet, which represents the maximum soil retention anticipated. Investigating the subsurface conditions below the excavation line, the use of the IDOT temporary sheet piling design charts appears feasible at the abutments.

In addition, temporary shoring was investigated at the pier during staged construction. On the railroad side of the pier, the excavation necessary for construction of the pier appears to fall within the Zone B limits of the AREMA "Guidelines for Temporary Shoring" and will require a temporary soil retention system. The temporary soil retention system shall be designed to the satisfaction of AREMA and CN/IC specifications and guidelines. On the IL 121 side of the pier, the distance between the pier and the roadway appears adequate to safely slope the groundline without shoring.

5.3 Foundation Construction

Conventional pile driving equipment and methodologies shall be assumed.

Due to the proximity of the proposed pile locations to the existing pile locations, attention shall be given to IDOT Standard Specification Section 512.12 for tolerances in driving.

5.4 Excavation

Excavation shall be performed in accordance with IDOT Standard Specifications Section 202. Substructure construction shall occur after removal of the existing structure is complete.

A Joint Utility Locating Information for Excavators (J.U.L.I.E.) locate shall be performed prior to commencing construction activities to determine underground utilities within the project limits. In addition, IDOT shall be contacted to locate private utilities.

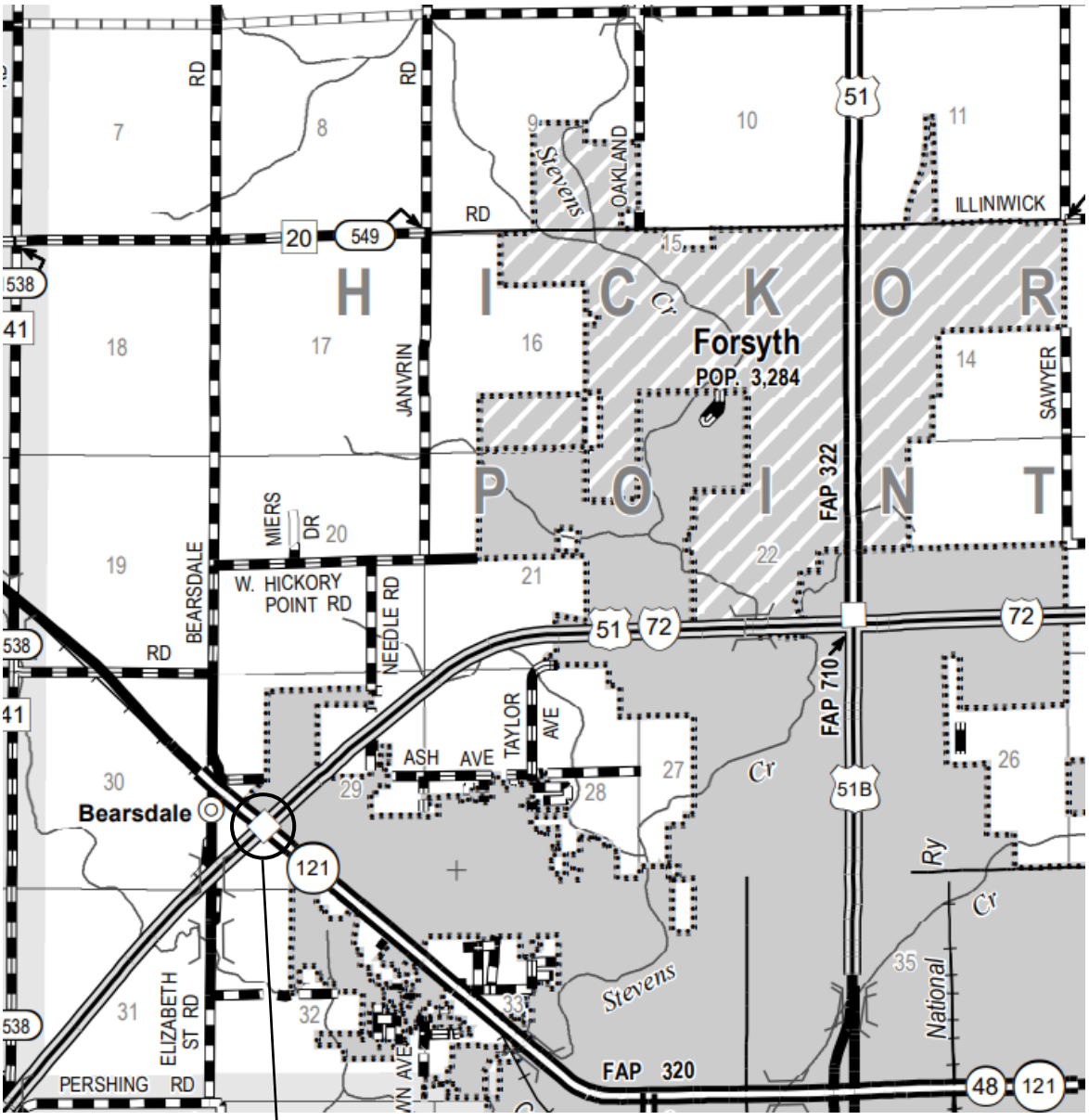
At foundation and structural fill locations, the exposed subgrade shall be proofrolled to aid in locating any unstable and unsuitable materials. Unstable and unsuitable materials shall be removed and replaced with compacted structural fill.

6.0 Limitations

The analysis and discussion provided herein are for the exclusive use of IDOT and Hampton, Lenzini and Renwick, Inc. They are based upon the subsurface data obtained at boring locations within the bridge area and are specific to the project described, our understanding of the project as described herein, and geotechnical engineering practice consistent with the standard of care.

Appendix A

Location Map



Project Location

Location Map

I-72 over IL 121 & CN/IC RR

Macon County, Illinois

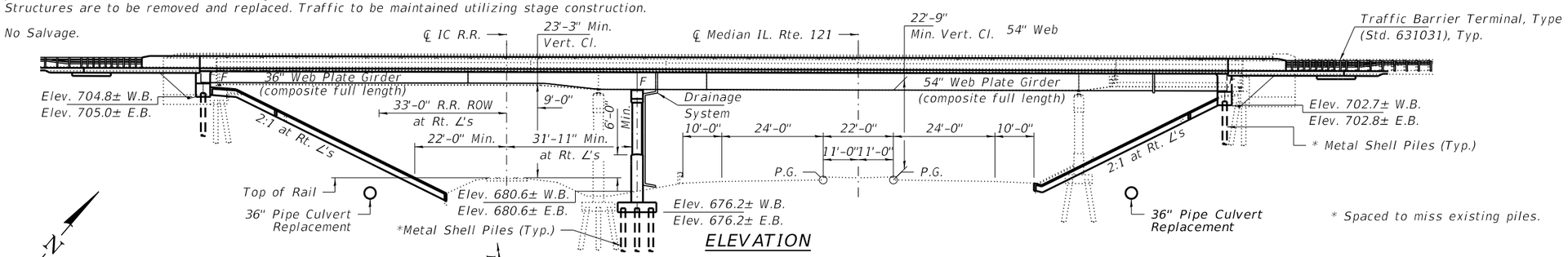
Appendix B

Type, Size, and Location Plan (TS&L)

BENCHMARK: Brass disk set in concrete, IL. Rte. 121, 115' Lt., Sta. 909+40, Elev. 712.91.

EXISTING STRUCTURES: 58-63 HVB – S.N. 058-0074 (EB) S.N. 058-0075 (WB), Sta. 724+45.63 (F.A.I. 72) and Sta. 909+38.59 (IL. RTE. 121). The existing Dual structures were originally built in 1976. The structures consist of steel plate girders with a pin & link detail located on span 3, carrying a partially composite concrete deck. The superstructures are supported by multi-column piers and stub abutments, all founded on precast concrete piles. The back to back of abutment length is 268'-9¼". 58'-4¾" to 66'-3" o.-o. deck Eastbound.; 66'-4⅛" to 71'-7⅞" o.-o. deck Westbound. Structures are to be removed and replaced. Traffic to be maintained utilizing stage construction.

No Salvage.



ELEVATION

PLAN

DESIGN SPECIFICATIONS

2020 AASHTO LRFD Bridge Design Specifications, 9th Edition.

LOADING HL-93

Allow 50#/sq. ft. for future wearing surface.

DESIGN STRESSES

FIELD UNITS

f'c = 4,000 psi (Superstructure)
f'c = 3,500 psi (Substructure)
fy = 60,000 psi (Reinf.)
fy = 50,000 psi (M270 Grade 50)
All Structural Steel shall be metallized.

HIGHWAY CLASSIFICATION

F.A.I. 72 : I-72
Functional Class: Interstate
ADT: 7,200 (2017) / 10,300 (2044)
ADTT: 1,750 (2017) / 2,503 (2044)
DVH = 1,071
Design Speed: 75 m.p.h.
Posted Speed: 70 m.p.h.
One-Way Traffic
Directional Distribution: 100%

F.A.P. 320 / IL. 121
Functional Class: Other, Principal Arterial
ADT: 7,900 (2021) / 9,200 (2044)
ADTT: 1,027 (2021) / 1,196 (2044)
DVH = 1,012
Design Speed: 60 m.p.h.
Posted Speed: 55 m.p.h.
Two-Way Traffic
Directional Distribution: 53% / 47%

SEISMIC DATA

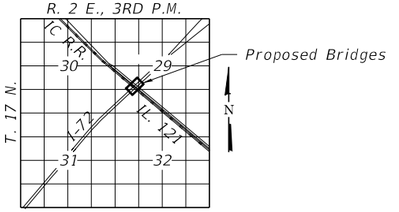
Seismic Performance Zone (SPZ) = 1
Design Spectral Acceleration at 1.0 sec. (S_{D1}) = 0.149g
Design Spectral Acceleration at 0.2 sec. (S_{DS}) = 0.280g
Soil Site Class = D

Notes:

See sheet 2 of 4 for Sections A-A & B-B.

No freefall deck drains will be permitted in the span over the tracks or within 10 ft. of cross arms of a railroad pole line.

Up to ¼" may be ground off the bridge deck and the bridge approach slabs. The elevations shown in plan represents elevations after grinding.



LOCATION SKETCH

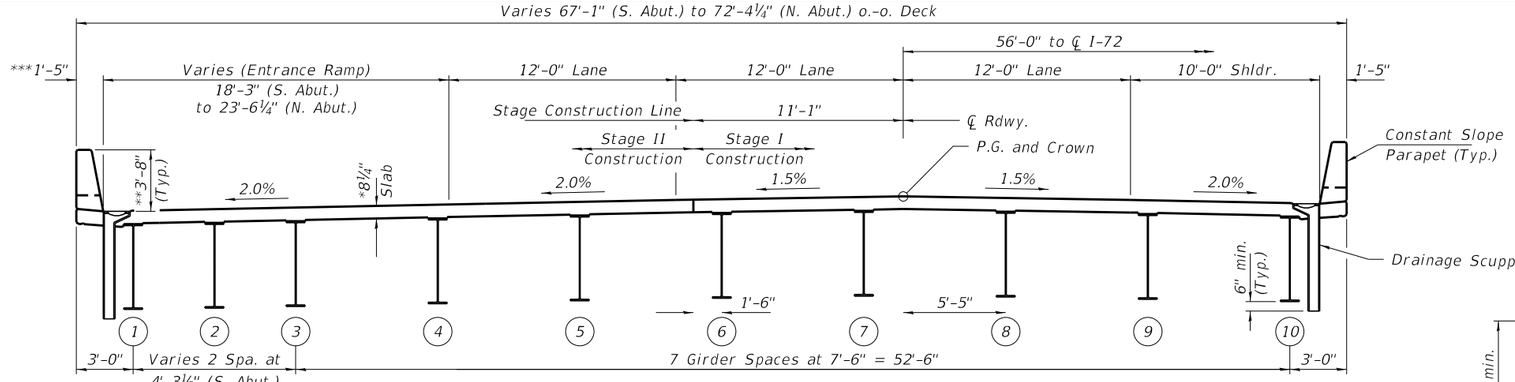
GENERAL PLAN & ELEVATION
I-72 OVER IL. 121 & IC R.R.
F.A.I. 72 SECTION (58-63HVB)BR
MACON COUNTY
STATION 724+45.63
STRUCTURE NO. 058-0139 (E.B.)
STRUCTURE NO. 058-0140 (W.B.)

FILE NAME = 190501-sht-bridge.dgn	USER NAME = gmetcalf	DESIGNED - S.M.S.	REVISED -
HAMPTON, LENZINI AND RENWICK, INC. 3085 STEVENSON DRIVE, SUITE 201 SPRINGFIELD, ILLINOIS 62703 ILLINOIS PROFESSIONAL DESIGN FIRM LS / PE / SE CORP. 184.000959		CHECKED - S.W.M.	REVISED -
	PLOT SCALE =	DRAWN - R.D.H.	REVISED -
	PLOT DATE = 9/20/2023	CHECKED - S.M.S.	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

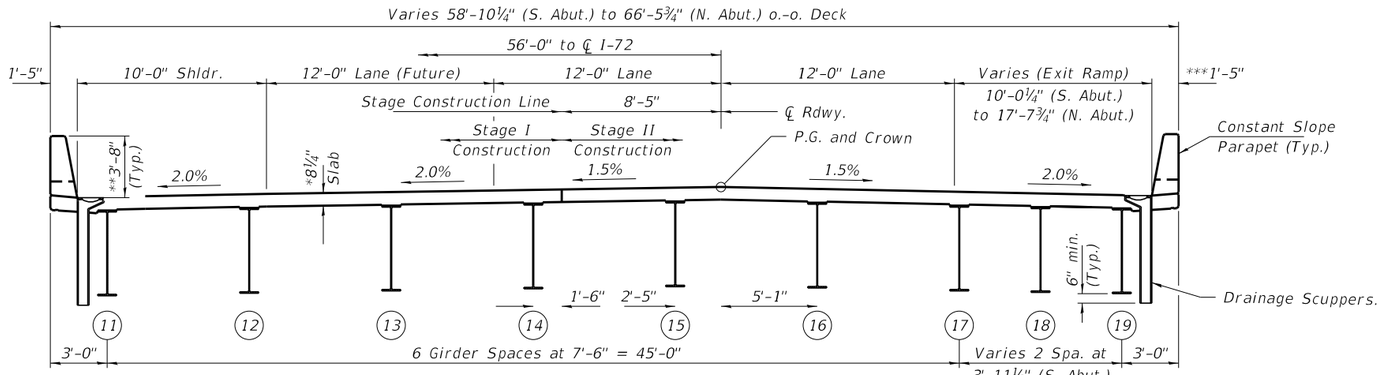
SHEET NO. 1 OF 4 SHEETS

F.A.I.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
72	(58-63HVB)BR	MACON	4	1
		CONTRACT NO. 74705		
	ILLINOIS	FED. AID PROJECT		



CROSS SECTION (WEST BOUND LANES)

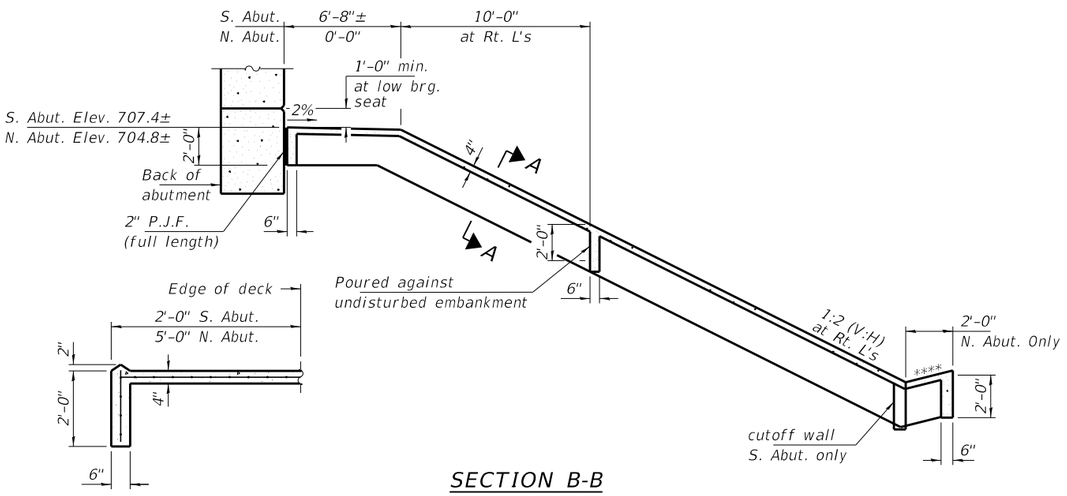
(Dimensions perpendicular to roadway along abutment ℄)
(Looking Northeast)



CROSS SECTION (EAST BOUND LANES)

(Dimensions perpendicular to roadway along abutment ℄)
(Looking Northeast)

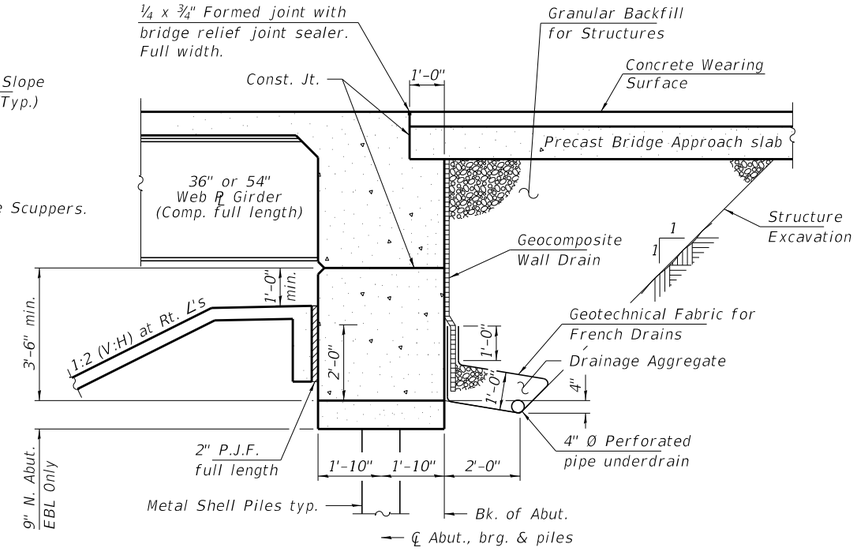
* Prior to Grinding
** After Grinding
*** Measured perpendicular to the edge of deck.



SECTION A-A

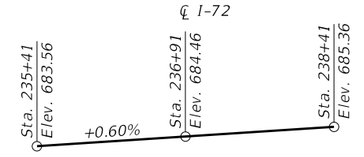
SECTION B-B
CONCRETE SLOPEWALL

**** 1:4 (V:H) at Rt. L's



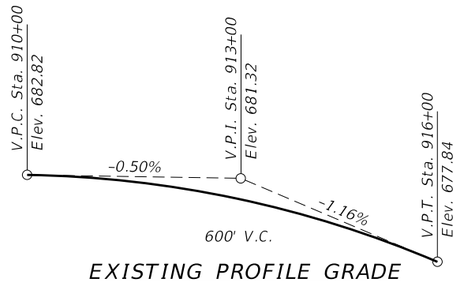
SECTION THRU INTEGRAL ABUTMENT

(Horiz. dim. at Rt. ∠'s)



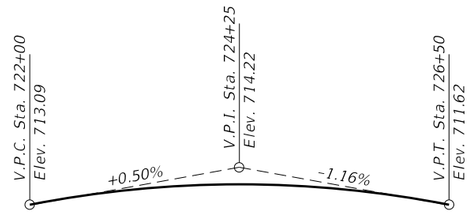
PROFILE GRADE

EXISTING IC RR.



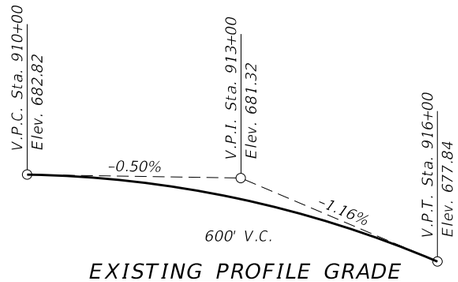
EXISTING PROFILE GRADE

ILL. Rte. 121 NB



PROFILE GRADE

F.A. I-72 (Along I-72 EB/WB PGLS)



EXISTING PROFILE GRADE

ILL. Rte. 121 SB

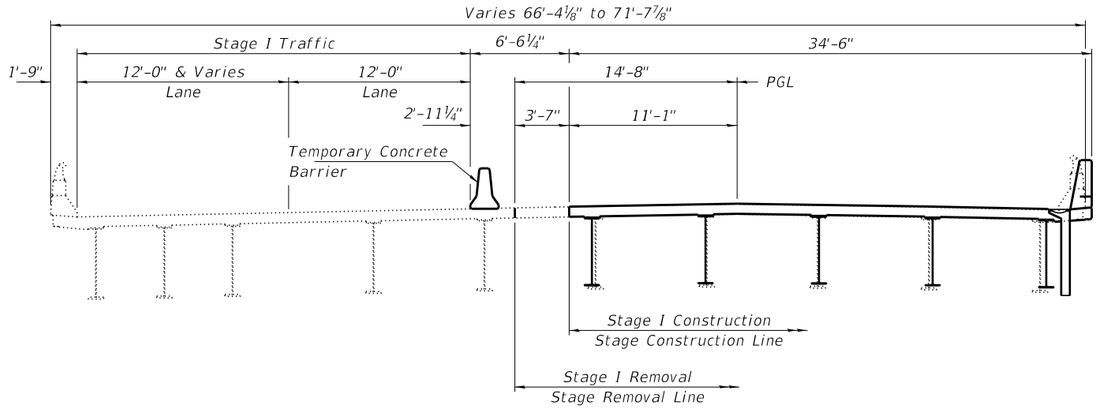
GENERAL DETAILS
I-72 OVER IL. 121 & IC R.R.
F.A.I. 72 SECTION (58-63HVB)BR
MACON COUNTY
STATION 724+45.63
STRUCTURE NO. 058-0139 (E.B.)
STRUCTURE NO. 058-0140 (W.B.)

FILE NAME = 190501-shl-bridge.dgn	USER NAME = gmetcalf	DESIGNED - S.M.S.	REVISED -	
HAMPTON, LENZINI AND RENWICK, INC. 3085 STEVENSON DRIVE, SUITE 201 SPRINGFIELD, ILLINOIS 62703 ILLINOIS PROFESSIONAL DESIGN FIRM LS / PE / SE CORP. 184.000959		CHECKED - S.W.M.	REVISED -	
	PLOT SCALE =	DRAWN - R.D.H.	REVISED -	
	PLOT DATE = 9/20/2023	CHECKED - S.M.S.	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

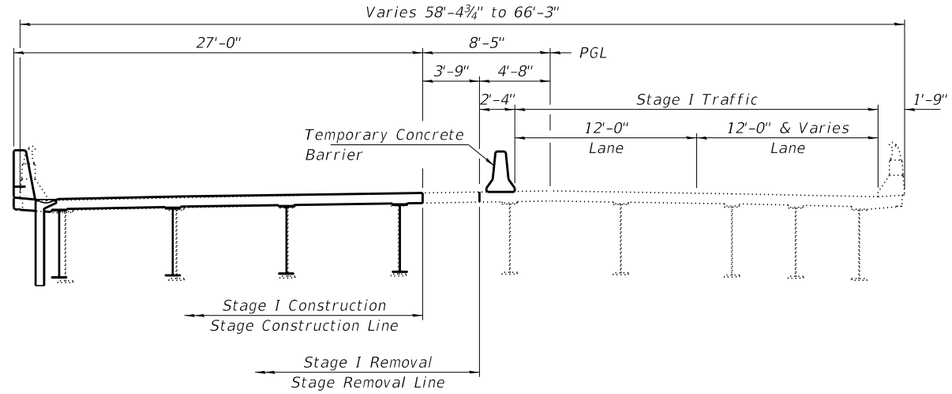
SHEET NO. 2 OF 4 SHEETS

F.A.I.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
72	(58-63HVB)BR	MACON	4	2
		CONTRACT NO. 74705		
		ILLINOIS	FED. AID PROJECT	



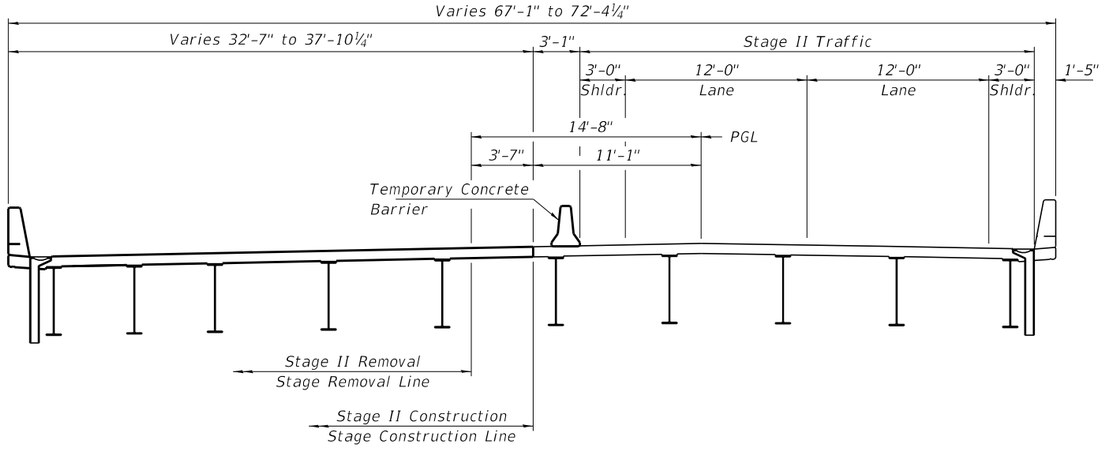
STAGE I REMOVAL AND CONSTRUCTION (WEST BOUND LANES)

(Looking Northeast, South Abutment along Abutment ℄)



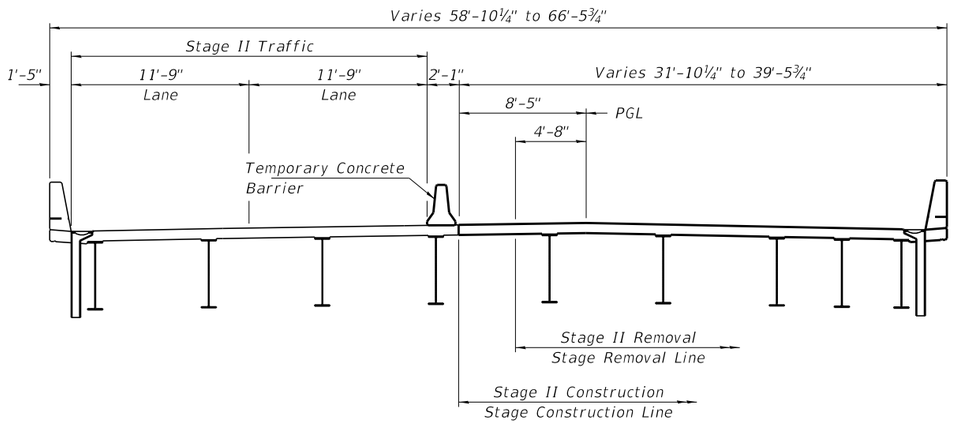
STAGE I REMOVAL AND CONSTRUCTION (EAST BOUND LANES)

(Looking Northeast, South Abutment along Abutment ℄)



STAGE II REMOVAL AND CONSTRUCTION (WEST BOUND LANES)

(Looking Northeast, South Abutment along Abutment ℄)



STAGE II REMOVAL AND CONSTRUCTION (EAST BOUND LANES)

(Looking Northeast, South Abutment along Abutment ℄)

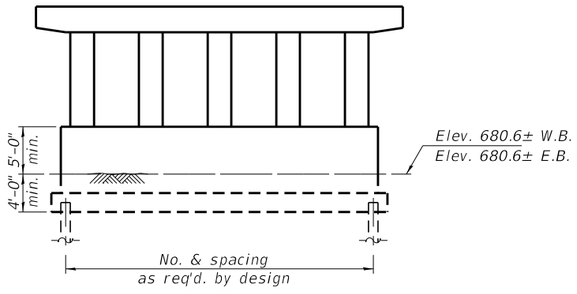
STAGE CONSTRUCTION DETAILS
I-72 OVER IL. 121 & IC R.R.
F.A.I. 72 SECTION (58-63HVB)BR
MACON COUNTY
STATION 724+45.63
STRUCTURE NO. 058-0139 (E.B.)
STRUCTURE NO. 058-0140 (W.B.)

FILE NAME = 190501-sht-bridge.dgn	USER NAME = gmetcalf	DESIGNED - S.M.S.	REVISED -
HAMPTON, LENZINI AND RENWICK, INC.		CHECKED - S.W.M.	REVISED -
3085 STEVENSON DRIVE, SUITE 201 SPRINGFIELD, ILLINOIS 62703	PLOT SCALE =	DRAWN - R.D.H.	REVISED -
ILLINOIS PROFESSIONAL DESIGN FIRM LS / PE / SE CORP. 184.000959	PLOT DATE = 9/20/2023	CHECKED - S.M.S.	REVISED -

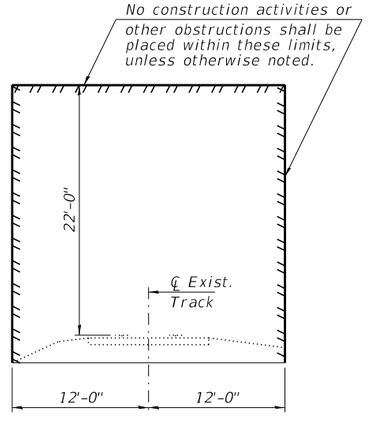
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

SHEET NO. 3 OF 4 SHEETS

F.A.I.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
72	(58-63HVB)BR	MACON	4	3
		CONTRACT NO. 74705		
		ILLINOIS	FED. AID PROJECT	



PIER SKETCH



CONSTRUCTION CLEARANCE DIAGRAM
(Horiz. dim. @ r∠'s to ℄ track)

PIER DETAILS
I-72 OVER IL. 121 & IC R.R.
F.A.I. 72 SECTION (58-63HVB)BR
MACON COUNTY
STATION 724+45.63
STRUCTURE NO. 058-0139 (E.B.)
STRUCTURE NO. 058-0140 (W.B.)

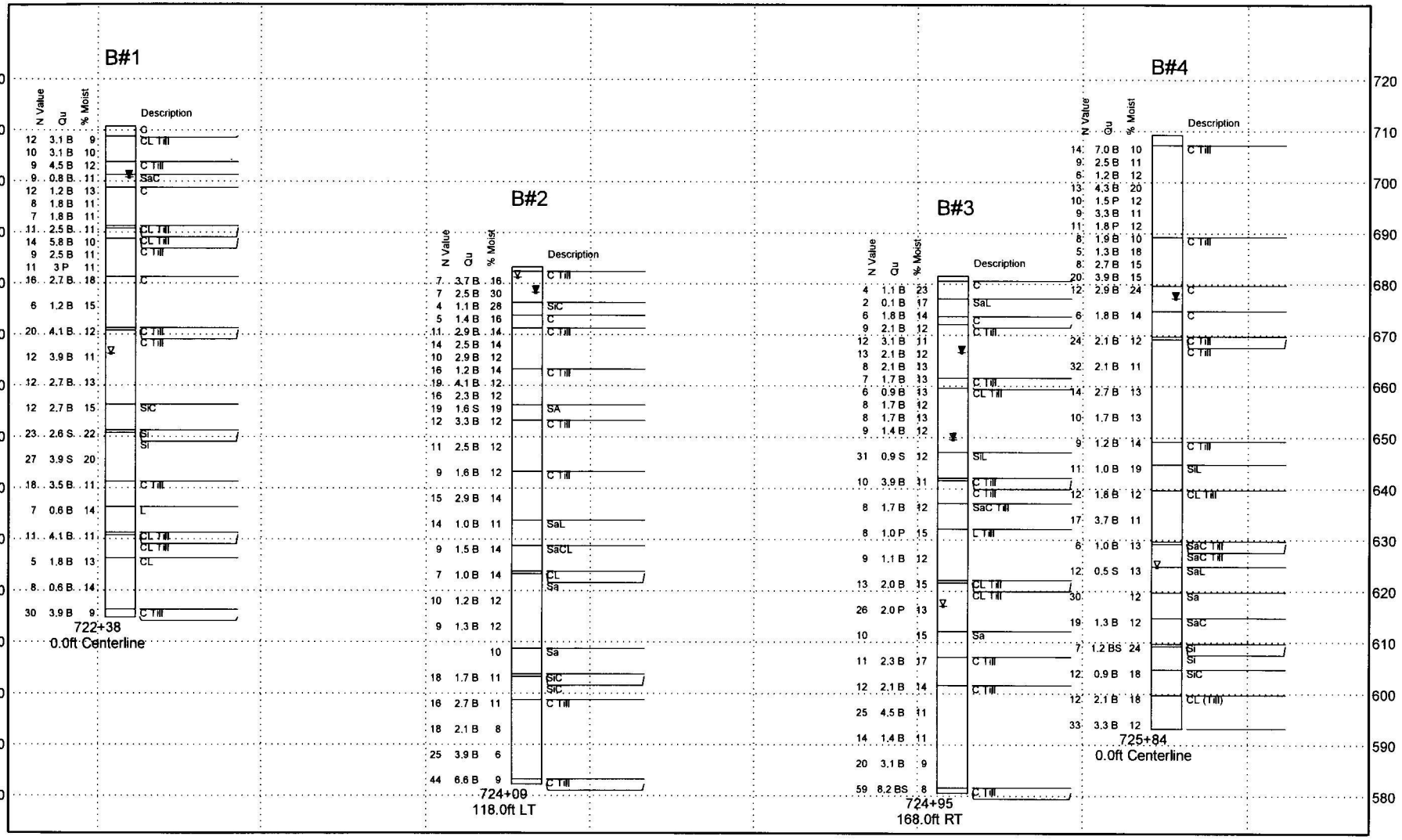
FILE NAME = 190501-shl-bridge.dgn	USER NAME = gmetcalf	DESIGNED - S.M.S.	REVISED -	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION			
HAMPTON, LENZINI AND RENWICK, INC. 3085 STEVENSON DRIVE, SUITE 201 SPRINGFIELD, ILLINOIS 62703		CHECKED - S.W.M.	REVISED -				
ILLINOIS PROFESSIONAL DESIGN FIRM LS / PE / SE CORP. 184.000959	PLOT SCALE =	DRAWN - R.D.H.	REVISED -				
	PLOT DATE = 9/20/2023	CHECKED - S.M.S.	REVISED -		SHEET NO. 4 OF 4 SHEETS		

F.A.I.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
72	(58-63HVB)BR	MACON	4	4
		CONTRACT NO. 74705		
	ILLINOIS	FED. AID PROJECT		

Appendix C

Subsurface Data Profile Plot

Structure Number 058-0074,-0075 (E) 058-0139,-0140 (P) I-72 over IL 121 and CN/ICC Railroad
Located in the SW 1/4 of Section 29, Township 17N, Range 2E of the 3 P.M.



NOT TO HORIZONTAL SCALE

Illinois Department of Transportation
Division of Highways
IDOT D7

VARIATIONS IN SUBSURFACE CONDITIONS MAY EXIST BETWEEN BORINGS

Groundwater
- First Encounter
- Completion
- after (refer to log) hours

Abbreviations
WH - Sampler Advanced by Weight of Hammer, WOP - Weight of Pipe
B.S. - Before Seating

SUBSURFACE DATA PROFILE

Route: FAI 72 (I-72)

Section: (58-63HVB)BR

County: Macon

TEST FENCE 2 058-0074,-0075 SOIL 2021.GPJ D7.GDT 7/30/21

TEST FENCE 2 058-0074,-0075 SOIL 2021.GPJ D7.GDT 7/30/21

Appendix D

Soil Boring Logs

Illinois Department of Transportation

Division of Highways
IDOT D7

SOIL BORING LOG

Date 7/6/21

ROUTE FAI 72 (I-72) **DESCRIPTION** I-72 over IL 121 and CN/ICC Railroad **LOGGED BY** E. Sandschafer

SECTION (58-63HVB)BR **LOCATION** SW 1/4, **SEC.** 29, **TWP.** 17N, **RNG.** 2E, 3rd **PM**,
Latitude N 39.894004, **Longitude** W 89.007421

COUNTY Macon **DRILLING METHOD** Hollow stem auger & split spoon **HAMMER** Auto ETR = 91.8% @ 57.4 bpm

STRUCT. NO. 058-0074,-0075 (E) 058-0139,-0140 (P)
Station 724+45.63

BORING NO. 1 - West Abutment
Station 722+38
Offset 0.0 ft Centerline
Ground Surface Elev. 710.78 ft

Surface Water Elev. NA ft
Stream Bed Elev. NA ft

Groundwater Elev.:
First Encounter 666.3 ft ▼
Upon Completion Washed ft
After 24 **Hrs.** 700.8 ft ▽

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Brown, CLAY				
708.78				
Very stiff, moist, brown, CLAY LOAM Till (Embankment)		4		
		5	3.1	9
		7	B	
Brown/grey	-5	3		
		3	3.1	10
		7	B	
703.78				
Hard, moist, grey, CLAY Till (Embankment)		3		
		3	4.5	12
		6	B	
701.28				
Medium, moist, grey, SANDY CLAY (Embankment)	▽10	3		
		5	0.8	11
		4	B	
698.78				
Stiff, moist, grey, CLAY (Embankment) *Broken, reassembled*		3		
		5	1.2	13
		7	B	
	-15	2		
		4	1.8	11
		4	B	
		2		
		3	1.8	11
		4	B	
691.28				
690.78	-20	4		

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Very stiff, moist, grey, CLAY LOAM Till (Embankment)		5	2.5	11
		6	B	
688.78				
Hard, moist, grey, CLAY Till (Embankment)		4		
		6	5.8	10
		8	B	
Very stiff	-25	3		
		4	2.5	11
		5	B	
		2		
		5	3.0	11
		6	P	
681.28				
Very stiff, moist, grey, CLAY	-30	3		
		6	2.7	18
		10	B	
Stiff, brown	-35	1		
		3	1.2	15
		3	B	
671.28				
Hard, moist, brown, CLAY Till	670.78 -40	3		

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

BBS, form 137 (Rev. 8-99)

SOIL BORING 058-0074,-0075 SOIL 2021.GPJ IL_DOT.GDT 7/29/21

Illinois Department of Transportation
Division of Highways
IDOT D7

SOIL BORING LOG

Date 7/6/21

ROUTE FAI 72 (I-72) **DESCRIPTION** I-72 over IL 121 and CN/ICC Railroad **LOGGED BY** E. Sandschafer

SECTION (58-63HVB)BR **LOCATION** SW 1/4, **SEC.** 29, **TWP.** 17N, **RNG.** 2E, 3rd **PM**,
Latitude N 39.894004, **Longitude** W 89.007421

COUNTY Macon **DRILLING METHOD** Hollow stem auger & split spoon **HAMMER** Auto ETR = 91.8% @ 57.4 bpm

STRUCT. NO. 058-0074,-0075 (E) 058-0139,-0140 (P)
Station 724+45.63

BORING NO. 1 - West Abutment
Station 722+38
Offset 0.0 ft Centerline
Ground Surface Elev. 710.78 ft

Surface Water Elev. NA ft
Stream Bed Elev. NA ft

Groundwater Elev.:
First Encounter 666.3 ft ▼
Upon Completion Washed ft
After 24 **Hrs.** 700.8 ft ▽

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Hard, moist, brown, CLAY Till	8 12	4.1 B	12
-45 ▼	2		
Very stiff, grey	4 8	3.9 B	11
-50	2		
	4 8	2.7 B	13
656.28			
Very stiff, moist, grey, SILTY CLAY			
-55	2		
	5 7	2.7 B	15
651.28			
650.78 -60	3		

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Very stiff, moist, grey, SANDY SILT	10 13	2.6 S	22
-65	7		
	13 14	3.9 S	20
641.28			
Very stiff, moist, grey, CLAY Till			
-70	4		
	7 11	3.5 B	11
636.28			
Medium, moist, grey, LOAM			
-75	2		
	3 4	0.6 B	14
631.28			
630.78 -80	2		

SOIL BORING 058-0074,-0075 SOIL 2021.GPJ IL_DOT.GDT 7/29/21

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

Illinois Department of Transportation
Division of Highways
IDOT D7

SOIL BORING LOG

Date 7/6/21

ROUTE FAI 72 (I-72) **DESCRIPTION** I-72 over IL 121 and CN/ICC Railroad **LOGGED BY** E. Sandschafer

SECTION (58-63HVB)BR **LOCATION** SW 1/4, **SEC.** 29, **TWP.** 17N, **RNG.** 2E, 3rd **PM**,
Latitude N 39.894004, **Longitude** W 89.007421

COUNTY Macon **DRILLING METHOD** Hollow stem auger & split spoon **HAMMER** Auto ETR = 91.8% @ 57.4 bpm

STRUCT. NO. 058-0074,-0075 (E) 058-0139,-0140 (P)
Station 724+45.63

BORING NO. 1 - West Abutment
Station 722+38
Offset 0.0 ft Centerline
Ground Surface Elev. 710.78 ft

Surface Water Elev. NA ft
Stream Bed Elev. NA ft

Groundwater Elev.:
First Encounter 666.3 ft
Upon Completion Washed ft
After 24 **Hrs.** 700.8 ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Hard, moist, grey, CLAY LOAM Till		5 6	4.1 B	11
626.28				
Stiff, moist, grey, CLAY LOAM	-85	1		
		1 4	1.8 B	13
Medium	-90	3		
		4 4	0.6 B	14
616.28				
Very stiff, moist, grey, CLAY Till	-95	9		
		12 18	3.9 B	9
614.78				
Benchmark: DEC MAINT AZ - Brass disk set in concrete at Sta. 909+40, 115' LT. End of Boring				
	-100			

SOIL BORING 058-0074,-0075 SOIL 2021.GPJ IL_DOT.GDT 7/29/21

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

Illinois Department of Transportation
Division of Highways
IDOT D7

SOIL BORING LOG

Date 5/24/21

ROUTE FAI 72 (I-72) **DESCRIPTION** I-72 over IL 121 and CN/ICC Railroad **LOGGED BY** E. Sandschafer

SECTION (58-63HVB)BR **LOCATION** SW 1/4, **SEC.** 29, **TWP.** 17N, **RNG.** 2E, 3rd **PM**,
Latitude N 39.894423, **Longitude** W 89.007250

COUNTY Macon **DRILLING METHOD** Hollow stem auger & split spoon **HAMMER** Auto ETR = 91.8% @ 57.4 bpm

STRUCT. NO. 058-0074,-0075 (E) 058-0139,-0140 (P)
Station 724+45.63

BORING NO. 2 - Pier 1
Station 724+09
Offset 118.0 ft LT
Ground Surface Elev. 683.26 ft

Surface Water Elev. NA ft
Stream Bed Elev. NA ft

Groundwater Elev.:
First Encounter 681.3 ft
Upon Completion Washed ft
After 24 **Hrs.** 678.3 ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Asphalt Shoulder				
682.36				
Grey, CLAY Till				
Very stiff, moist		1		
		3 4	3.7 B	16
Brown/grey, with Silt	-5	2		
		2 5	2.5 B	30
676.26				
Stiff, moist, grey, SILTY CLAY		1		
		2 2	1.1 B	28
673.76				
Stiff, moist, grey, CLAY	-10	1		
		1 4	1.4 B	16
671.26				
Very stiff, moist, brown, CLAY Till		1		
		3 8	2.9 B	14
	-15	4		
		6 8	2.5 B	14
Very stiff, grey		1		
		3 7	2.9 B	12
663.26	-20	2		
Very stiff, moist, brown, CLAY Till		7 9	1.2 B	14
Hard, Grey		5		
		8 11	4.1 B	12
Very stiff	-25	5		
		6 10	2.3 B	12
656.26				
Stiff, moist, grey, SILTY SAND		2		
		7 12	1.6 S	19
653.26	-30	2		
Very stiff, moist, grey, CLAY Till		5 7	3.3 B	12
	-35	3		
		5 6	2.5 B	12
643.26	-40	1		

SOIL BORING 058-0074,-0075 SOIL 2021.GPJ IL_DOT.GDT 7/29/21

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

Illinois Department of Transportation
Division of Highways
IDOT D7

SOIL BORING LOG

Date 5/24/21

ROUTE FAI 72 (I-72) **DESCRIPTION** I-72 over IL 121 and CN/ICC Railroad **LOGGED BY** E. Sandschafer

SECTION (58-63HVB)BR **LOCATION** SW 1/4, **SEC.** 29, **TWP.** 17N, **RNG.** 2E, 3rd **PM**,
Latitude N 39.894423, **Longitude** W 89.007250

COUNTY Macon **DRILLING METHOD** Hollow stem auger & split spoon **HAMMER** Auto ETR = 91.8% @ 57.4 bpm

STRUCT. NO. 058-0074,-0075 (E) 058-0139,-0140 (P)
Station 724+45.63

BORING NO. 2 - Pier 1
Station 724+09
Offset 118.0 ft LT
Ground Surface Elev. 683.26 ft

Surface Water Elev. NA ft
Stream Bed Elev. NA ft

Groundwater Elev.:
First Encounter 681.3 ft ▼
Upon Completion Washed ft
After 24 **Hrs.** 678.3 ft ▽

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Stiff, moist, grey, CLAY Till		3 6	1.6 B	12
	-45	2		
Very stiff		6 9	2.9 B	14
	633.76			
Medium, moist, grey, SANDY LOAM	-50	5		
		8 6	1.0 B	11
	628.76			
Stiff, moist, grey, SANDY CLAY LOAM	-55	1		
		4 5	1.5 B	14
	623.76			
Stiff, moist, grey, CLAY LOAM	623.26 -60	WH		
		3 4	1.0 B	14
	-65	1		
		3 7	1.2 B	12
	-70	WH		
		3 6	1.3 B	12
	608.76			
Very loose, wet, grey, fine-grained, SAND *2.0% passing #200 Sieve*	-75	WH WH 2		10
	603.76			
Stiff, moist, brown, SILTY CLAY	603.26 -80	4		

SOIL BORING 058-0074,-0075 SOIL 2021.GPJ IL_DOT.GDT 7/29/21

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

Illinois Department of Transportation
Division of Highways
IDOT D7

SOIL BORING LOG

Date 5/24/21

ROUTE FAI 72 (I-72) **DESCRIPTION** I-72 over IL 121 and CN/ICC Railroad **LOGGED BY** E. Sandschafer

SECTION (58-63HVB)BR **LOCATION** SW 1/4, **SEC.** 29, **TWP.** 17N, **RNG.** 2E, 3rd **PM**,
Latitude N 39.894423, **Longitude** W 89.007250

COUNTY Macon **DRILLING METHOD** Hollow stem auger & split spoon **HAMMER** Auto ETR = 91.8% @ 57.4 bpm

STRUCT. NO. 058-0074,-0075 (E) 058-0139,-0140 (P)
Station 724+45.63

BORING NO. 2 - Pier 1
Station 724+09
Offset 118.0 ft LT
Ground Surface Elev. 683.26 ft

Surface Water Elev. NA ft
Stream Bed Elev. NA ft

Groundwater Elev.:
First Encounter 681.3 ft ▼
Upon Completion Washed ft
After 24 **Hrs.** 678.3 ft ▽

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Stiff, moist, brown, SILTY CLAY		8 10	1.7 B	11
598.76				
Very stiff, moist, grey, CLAY Till	-85	3		
		6 10	2.7 B	11
	-90	3		
		8 10	2.1 B	8
	-95	5		
		9 16	3.9 B	6
583.26	-100	7		
Hard, moist, grey, CLAY Till		19 25	6.6 B	9
582.26				
Benchmark: IDOT 515 - Located in the median of Illinois 121.				
End of Boring	-105			
	-110			
	-115			
	-120			

SOIL BORING 058-0074,-0075 SOIL 2021.GPJ IL_DOT.GDT 7/29/21

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

Illinois Department of Transportation

Division of Highways
IDOT D7

SOIL BORING LOG

Date 5/25/21

ROUTE FAI 72 (I-72) **DESCRIPTION** I-72 over IL 121 and CN/ICC Railroad **LOGGED BY** E. Sandschafer

SECTION (58-63HVB)BR **LOCATION** SW 1/4, **SEC.** 29, **TWP.** 17N, **RNG.** 2E, 3rd **PM**,
Latitude N 39.894185, **Longitude** W 89.006319

COUNTY Macon **DRILLING METHOD** Hollow stem auger & split spoon **HAMMER** Auto ETR = 91.8% @ 57.4 bpm

STRUCT. NO. 058-0074,-0075 (E) 058-0139,-0140 (P)
Station 724+45.63

BORING NO. 3 - Pier 2
Station 724+95
Offset 168.0 ft RT
Ground Surface Elev. 681.61 ft

Surface Water Elev. NA ft
Stream Bed Elev. NA ft

Groundwater Elev.:
First Encounter 617.1 ft ▼
Upon Completion 649.6 ft ▽
After 24 **Hrs.** 666.6 ft ▽

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Aggregate Shoulder				
680.61				
Brown, CLAY		2		
Stiff, moist		2 2	1.1 B	23
677.11				
Very soft, wet, brown, SANDY LOAM	-5	WH		
		1 1	0.1 B	17
		1		
673.61		2 4	1.8 B	14
Stiff, moist, brown, CLAY				
672.11				
Very stiff, moist, brown, CLAY Till	-10	1		
		4 5	2.1 B	12
Grey		1		
		5 7	3.1 B	11
▽	15	3		
		5 8	2.1 B	12
		3		
		4 4	2.1 B	13
661.61	-20	2		
Stiff, moist, grey, CLAY Till		3 4	1.7 B	13
659.61				
Medium, moist, grey, CLAY LOAM Till		1		
		3 3	0.9 B	13
	-25	1		
Stiff		3 5	1.7 B	12
		1		
		3 5	1.7 B	13
	-30	2		
		4 5	1.4 B	12
▽				
647.11				
Medium, moist, grey, SILTY LOAM	-35	5		
		16 15	0.9 S	12
642.11				
Very stiff, moist, grey, CLAY Till	641.61 -40	2		

SOIL BORING 058-0074,-0075 SOIL 2021.GPJ IL_DOT.GDT 7/29/21

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

Illinois Department of Transportation
Division of Highways
IDOT D7

SOIL BORING LOG

Date 5/25/21

ROUTE FAI 72 (I-72) **DESCRIPTION** I-72 over IL 121 and CN/ICC Railroad **LOGGED BY** E. Sandschafer

SECTION (58-63HVB)BR **LOCATION** SW 1/4, **SEC.** 29, **TWP.** 17N, **RNG.** 2E, 3rd **PM**,
Latitude N 39.894185, **Longitude** W 89.006319

COUNTY Macon **DRILLING METHOD** Hollow stem auger & split spoon **HAMMER** Auto ETR = 91.8% @ 57.4 bpm

STRUCT. NO. 058-0074,-0075 (E) 058-0139,-0140 (P)
Station 724+45.63

BORING NO. 3 - Pier 2
Station 724+95
Offset 168.0 ft RT
Ground Surface Elev. 681.61 ft

Surface Water Elev. NA ft
Stream Bed Elev. NA ft

Groundwater Elev.:
First Encounter 617.1 ft ▼
Upon Completion 649.6 ft ▽
After 24 **Hrs.** 666.6 ft ▽

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Very stiff, moist, grey, CLAY Till		4 6	3.9 B	11
637.11				
Stiff, moist, grey, SANDY CLAY Till	-45	4		
		3 5	1.7 B	12
632.11				
Medium stiff, moist, grey, LOAM Till	-50	2		
		3 5	1.0 P	15
	-55	3		
Stiff		4 5	1.1 B	12
622.11				
621.61	-60	4		
Stiff, moist, grey, CLAY LOAM Till		5 8	2.0 B	15
▼	-65	17		
Stiff to very stiff, rock in sampler		13 13	2.0 P	13
612.11				
Loose, wet, grey, medium-grained, SAND *2.6% passing # 200 Sieve*	-70	3		
		5 5		15
607.11				
Very stiff, moist, grey, CLAY Till	-75	6		
		5 6	2.3 B	17
Grey/blue 601.61	-80	3		

SOIL BORING 058-0074,-0075 SOIL 2021.GPJ IL_DOT.GDT 7/29/21

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

Illinois Department of Transportation
Division of Highways
IDOT D7

SOIL BORING LOG

Date 5/25/21

ROUTE FAI 72 (I-72) **DESCRIPTION** I-72 over IL 121 and CN/ICC Railroad **LOGGED BY** E. Sandschafer

SECTION (58-63HVB)BR **LOCATION** SW 1/4, **SEC.** 29, **TWP.** 17N, **RNG.** 2E, 3rd **PM**,
Latitude N 39.894185, **Longitude** W 89.006319

COUNTY Macon **DRILLING METHOD** Hollow stem auger & split spoon **HAMMER** Auto ETR = 91.8% @ 57.4 bpm

STRUCT. NO. 058-0074,-0075 (E) 058-0139,-0140 (P)
Station 724+45.63

BORING NO. 3 - Pier 2
Station 724+95
Offset 168.0 ft RT
Ground Surface Elev. 681.61 ft

Surface Water Elev. NA ft
Stream Bed Elev. NA ft

Groundwater Elev.:
First Encounter 617.1 ft ▼
Upon Completion 649.6 ft ▽
After 24 **Hrs.** 666.6 ft ▽

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Very stiff, moist, grey/blue, CLAY Till		5 7	2.1 B	14
Hard, grey	-85	8		
		10 15	4.5 B	11
Stiff	-90	9		
		7 7	1.4 B	11
Very stiff	-95	3		
		9 11	3.1 B	9
	581.61 -100	50		

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Hard, wet, grey, CLAY Till *Large rock bent sampler shoe* 580.61		4-1/4" 26 33	8.2 BS	8
Benchmark: IDOT 515 - Located in the median of Illinois 121. End of Boring	-105 -110 -115 -120			

SOIL BORING 058-0074,-0075 SOIL 2021.GPJ IL_DOT.GDT 7/29/21

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

Illinois Department of Transportation

Division of Highways
IDOT D7

SOIL BORING LOG

Date 7/7/21

ROUTE FAI 72 (I-72) **DESCRIPTION** I-72 over IL 121 and CN/ICC Railroad **LOGGED BY** E. Sandschafer

SECTION (58-63HVB)BR **LOCATION** SW 1/4, **SEC.** 29, **TWP.** 17N, **RNG.** 2E, 3rd **PM**,
Latitude N 39.894599, **Longitude** W 89.006521

COUNTY Macon **DRILLING METHOD** Hollow stem auger & split spoon **HAMMER** Auto ETR = 91.8% @ 57.4 bpm

STRUCT. NO. 058-0074,-0075 (E) 058-0139,-0140 (P)
Station 724+45.63

BORING NO. 4 - East Abutment
Station 725+84
Offset 0.0 ft Centerline
Ground Surface Elev. 709.23 ft

Surface Water Elev. NA ft
Stream Bed Elev. NA ft

Groundwater Elev.:
First Encounter 624.7 ft ▼
Upon Completion Washed ft
After 24 **Hrs.** 677.2 ft ▽

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Topsoil				
	707.23			
Hard, moist, brown, CLAY Till *Embankment*		4		
		7 7	7.0 B	10
	-5	4		
Very stiff, grey		4 5	2.5 B	11
		3		
Stiff		3 3	1.2 B	12
	-10	3		
Hard		6 7	4.3 B	20
		3		
Stiff, rock damaged shoe		4 6	1.5 P	12
	-15	3		
Very stiff		4 5	3.3 B	11
		3		
Stiff		6 5	1.8 P	12
	689.23 -20	2		
Stiff, moist, grey, CLAY Till *Embankment*		4 4	1.9 B	10
		1		
		2 3	1.3 B	18
	-25	2		
Very stiff		2 6	2.7 B	15
		2		
		6 14	3.9 B	15
	679.73			
Very stiff, moist, grey, CLAY with SILT	-30	3		
		5 7	2.9 B	24
▽				
	674.73			
Stiff, moist, brown, CLAY	-35	1		
		3 3	1.8 B	14
	669.73			
Very stiff, moist, grey, CLAY Till	669.23 -40	8		

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

Illinois Department of Transportation
Division of Highways
IDOT D7

SOIL BORING LOG

Date 7/7/21

ROUTE FAI 72 (I-72) **DESCRIPTION** I-72 over IL 121 and CN/ICC Railroad **LOGGED BY** E. Sandschafer

SECTION (58-63HVB)BR **LOCATION** SW 1/4, **SEC.** 29, **TWP.** 17N, **RNG.** 2E, 3rd **PM,**
Latitude N 39.894599, **Longitude** W 89.006521

COUNTY Macon **DRILLING METHOD** Hollow stem auger & split spoon **HAMMER** Auto ETR = 91.8% @ 57.4 bpm

STRUCT. NO. 058-0074,-0075 (E) 058-0139,-0140 (P)
Station 724+45.63

BORING NO. 4 - East Abutment
Station 725+84
Offset 0.0 ft Centerline
Ground Surface Elev. 709.23 ft

Surface Water Elev. NA ft
Stream Bed Elev. NA ft

Groundwater Elev.:
First Encounter 624.7 ft ▼
Upon Completion Washed ft
After 24 **Hrs.** 677.2 ft ▽

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Very stiff, moist, grey, CLAY Till		11 13	2.1 B	12
	-45	11		
2" rock in sampler		15 17	2.1 B	11
	-50	3		
		6 8	2.7 B	13
Stiff	-55	1		
		4 6	1.7 B	13
	649.23 -60	1		
Stiff, moist, grey, CLAY Till		3 6	1.2 B	14
	644.73 -65	1		
Stiff, moist, grey, SILTY LOAM		4 7	1.0 B	19
	639.73 -70	2		
Stiff, moist, grey, CLAY LOAM Till		4 8	1.8 B	12
Very stiff	-75	2		
		7 10	3.7 B	11
	629.73			
	629.23 -80	1		

SOIL BORING 058-0074,-0075 SOIL 2021.GPJ IL_DOT.GDT 7/29/21

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

Illinois Department of Transportation
Division of Highways
IDOT D7

SOIL BORING LOG

Date 7/7/21

ROUTE FAI 72 (I-72) **DESCRIPTION** I-72 over IL 121 and CN/ICC Railroad **LOGGED BY** E. Sandschafer

SECTION (58-63HVB)BR **LOCATION** SW 1/4, **SEC.** 29, **TWP.** 17N, **RNG.** 2E, 3rd **PM**,
Latitude N 39.894599, **Longitude** W 89.006521

COUNTY Macon **DRILLING METHOD** Hollow stem auger & split spoon **HAMMER** Auto ETR = 91.8% @ 57.4 bpm

STRUCT. NO. 058-0074,-0075 (E) 058-0139,-0140 (P)
Station 724+45.63

BORING NO. 4 - East Abutment
Station 725+84
Offset 0.0 ft Centerline
Ground Surface Elev. 709.23 ft

Surface Water Elev. NA ft
Stream Bed Elev. NA ft

Groundwater Elev.:
First Encounter 624.7 ft ▼
Upon Completion Washed ft
After 24 **Hrs.** 677.2 ft ▽

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Stiff, moist, grey, SANDY CLAY Till		2 4	1.0 B	13
624.73 ▼				
Medium, moist, grey, SANDY LOAM	-85	1 5 7	0.5 S	13
619.73				
Medium to dense, moist, grey, SAND with SILT	-90	7 14 16		12
614.73				
Stiff, moist, grey, SANDY CLAY	-95	13 11 8	1.3 B	12
609.73				
609.23	-100	5		
Stiff, moist, brown, SILT with SAND		4 3	1.2 BS	24
604.73				
Medium, moist, grey, SILTY CLAY *Washed*	-105	4 6 6	0.9 B	18
599.73				
Very stiff, moist, blue grey, CLAY LOAM Till	-110	2 5 7	2.1 B	18
	-115	6 13 20	3.3 B	12
593.23				
Benchmark: DEC MAINT AZ - Brass disk set in concrete at Sta. 909+40, 115' LT. End of Boring	-120			

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

BBS, form 137 (Rev. 8-99)

SOIL BORING 058-0074,-0075 SOIL 2021.GPJ IL_DOT.GDT 7/29/21

Appendix E

Seismic Site Class Determination

Illinois Department of Transportation

SEISMIC SITE CLASS DETERMINATION

PROJECT TITLE=====I-72 over IL 121 & CN/IC RR

Substructure 1

Base of Substruct. Elev. (or ground surf for bents	704.8	ft.
Pile or Shaft Dia.	14	inches
Boring Number	B-1	
Top of Boring Elev.	710.78	ft.
Approximate Fixity Elev.	697.8	ft.

Individual Site Class Definition:

N (bar): 12 (Blows/ft.) Soil Site Class E
N_{ch} (bar): (Blows/ft.) NA
s_u (bar): 2.06 (ksf) Soil Site Class C <----Controls

Seismic Soil Column Depth (ft)	Bot. Of Sample Elevation	Sample Thick. (ft.)	N	Qu (tsf)	Layer Description Boundary
	708.8	2.00	12	3.10	B
	706.3	2.50	12	3.10	
	703.8	2.50	10	3.10	B
	701.3	2.50	9	4.50	B
	698.8	2.50	9	0.80	B
1.5	696.3	2.50	12	1.20	
4.0	693.8	2.50	8	1.80	
6.5	691.3	2.50	7	1.80	B
9.0	688.8	2.50	11	2.50	B
11.5	686.3	2.50	14	5.80	
14.0	683.8	2.50	9	2.50	
16.5	681.3	2.50	11	3.00	B
21.5	676.3	5.00	16	2.70	
26.5	671.3	5.00	6	1.20	B
31.5	666.3	5.00	20	4.10	
36.5	661.3	5.00	12	3.90	
41.5	656.3	5.00	12	2.70	B
46.5	651.3	5.00	12	2.70	B
51.5	646.3	5.00	23	2.60	
56.5	641.3	5.00	27	3.90	B
61.5	636.3	5.00	18	3.50	B
66.5	631.3	5.00	7	0.60	B
71.5	626.3	5.00	11	4.10	B
76.5	621.3	5.00	5	1.80	
81.5	616.3	5.00	8	0.60	B
87.0	610.8	5.50	30	3.90	B

Substructure 2

Base of Substruct. Elev. (or ground surf for bents	676.2	ft.
Pile or Shaft Dia.	14	inches
Boring Number	B-2	
Top of Boring Elev.	682.36	ft.
Approximate Fixity Elev.	669.2	ft.

Individual Site Class Definition:

N (bar): 10 (Blows/ft.) Soil Site Class E
N_{ch} (bar): NA (Blows/ft.) NA
s_u (bar): 1.86 (ksf) Soil Site Class D <----Controls

Seismic Soil Column Depth (ft)	Bot. Of Sample Elevation	Sample Thick. (ft.)	N	Qu (tsf)	Layer Description Boundary
	679.3	3.10	7	3.70	
	676.3	3.00	7	2.50	B
	673.8	2.50	4	1.10	B
	671.3	2.50	5	1.40	B
0.4	668.8	2.50	11	2.90	
2.9	666.3	2.50	14	2.50	
5.4	663.8	2.50	10	2.90	B
7.9	661.3	2.50	16	1.20	
10.4	658.8	2.50	19	4.10	
12.9	656.3	2.50	16	2.30	B
15.9	653.3	3.00	19	1.60	B
20.9	648.3	5.00	12	3.30	
25.9	643.3	5.00	11	2.50	B
30.9	638.3	5.00	9	1.60	
35.4	633.8	4.50	15	2.90	B
40.4	628.8	5.00	14	1.00	B
45.4	623.8	5.00	9	1.50	B
50.4	618.8	5.00	7	1.00	
55.4	613.8	5.00	10	1.20	
60.4	608.8	5.00	9	1.30	B
65.4	603.8	5.00	2		B
70.4	598.8	5.00	18	1.70	B
75.9	593.3	5.50	16	2.70	
80.9	588.3	5.00	18	2.10	
85.9	583.3	5.00	25	3.90	B
86.9	582.3	1.00	44	6.60	B

Substructure 3

Base of Substruct. Elev. (or ground surf for bents	676.2	ft.
Pile or Shaft Dia.	14	inches
Boring Number	B-3	
Top of Boring Elev.	680.61	ft.
Approximate Fixity Elev.	669.2	ft.

Individual Site Class Definition:

N (bar): 12 (Blows/ft.) Soil Site Class E
N_{ch} (bar): NA (Blows/ft.) NA
s_u (bar): 1.77 (ksf) Soil Site Class D <----Controls

Seismic Soil Column Depth (ft)	Bot. Of Sample Elevation	Sample Thick. (ft.)	N	Qu (tsf)	Layer Description Boundary
	677.1	3.50	4	1.10	B
	673.6	3.50	2	0.10	B
	672.1	1.50	6	1.80	B
	669.6	2.50	9	2.10	
2.1	667.1	2.50	12	3.10	
4.6	664.6	2.50	13	2.10	
7.1	662.1	2.50	8	2.10	
9.6	659.6	2.50	7	1.70	B
12.6	656.6	3.00	6	0.90	
15.1	654.1	2.50	8	1.70	
17.6	651.6	2.50	8	1.70	
22.1	647.1	4.50	9	1.40	B
27.1	642.1	5.00	31	0.90	B
32.1	637.1	5.00	10	3.90	B
37.1	632.1	5.00	8	1.70	B
42.1	627.1	5.00	8	1.00	
47.1	622.1	5.00	9	1.10	B
52.1	617.1	5.00	13	2.00	
57.1	612.1	5.00	26	2.00	B
62.1	607.1	5.00	10		B
67.6	601.6	5.50	11	2.30	B
72.6	596.6	5.00	12	2.10	
77.6	591.6	5.00	25	4.50	
82.6	586.6	5.00	14	1.40	
87.6	581.6	5.00	20	3.10	B
88.6	580.6	1.00	59	8.20	B

Substructure 4

Base of Substruct. Elev. (or ground surf for bents	702.7	ft.
Pile or Shaft Dia.	14	inches
Boring Number	B-4	
Top of Boring Elev.	707.23	ft.
Approximate Fixity Elev.	695.7	ft.

Individual Site Class Definition:

N (bar): 12 (Blows/ft.) Soil Site Class E
N_{ch} (bar): NA (Blows/ft.) NA
s_u (bar): 1.45 (ksf) Soil Site Class D <----Controls

Seismic Soil Column Depth (ft)	Bot. Of Sample Elevation	Sample Thick. (ft.)	N	Qu (tsf)	Layer Description Boundary
	704.2	3.00	14	7.00	
	701.7	2.50	9	2.50	
	699.2	2.50	6	1.20	
	696.7	2.50	13	4.30	
1.5	694.2	2.50	10	1.50	
4.0	691.7	2.50	9	3.30	
6.5	689.2	2.50	11	1.80	B
9.0	686.7	2.50	8	1.90	
11.5	684.2	2.50	5	1.30	
14.0	681.7	2.50	8	2.70	
16.0	679.7	2.00	20	3.90	B
21.0	674.7	5.00	12	2.90	B
26.0	669.7	5.00	6	1.80	B
31.0	664.7	5.00	24	2.10	
36.0	659.7	5.00	32	2.10	
41.0	654.7	5.00	14	2.70	
46.0	649.7	5.00	10	1.70	
51.0	644.7	5.00	9	1.20	B
56.0	639.7	5.00	11	1.00	B
61.0	634.7	5.00	12	1.80	
66.0	629.7	5.00	17	3.70	B
71.0	624.7	5.00	6	1.00	B
76.0	619.7	5.00	12	0.50	B
81.0	614.7	5.00	30		B
86.0	609.7	5.00	19	1.30	B
88.5	607.2	2.50	7	1.20	B

Global Site Class Definition: Substructures 1 through 4

N (bar): 12 (Blows/ft.) Soil Site Class E
N_{ch} (bar): (Blows/ft.) NA, H < 0.1*H (Total)
s_u (bar): 1.79 (ksf) Soil Site Class D <----Controls

Appendix G

Integral Abutment Feasibility Analysis

Illinois Department of Transportation

INTEGRAL ABUTMENT FEASIBILITY ANALYSIS

Modified 10/30/17

GENERAL DATA

STRUCTURE NUMBER	058-0139 & 058-0140		TOTAL STRUCTURE LENGTH	268.00	FT
STRUCTURE TYPE	MULTI-SPAN		NUMBER OF SPANS	2	
STRUCTURE SKEW	7.72	DEGREES	END SPAN LENGTH	112.25	FT
SUPER. DATA IN REFERENCE TO SUB. DATA	ABUT 1		ADJACENT INTERIOR SPAN LENGTH	0.01	FT

SUPERSTRUCTURE POSITIVE MOMENT REGION DATA (END OR MAIN SPAN)

BEAM TYPE	PLATE GIRDER	
TOP FLANGE WIDTH	14.00	IN
TOP FLANGE THICKNESS	0.75	IN
WEB DEPTH	36.00	IN
WEB THICKNESS	0.50	IN
BOTTOM FLANGE WIDTH	14.00	IN
BOTTOM FLANGE THICKNESS	1.00	IN
BEAM SPACING PERP. TO CL	7.50	FT
SLAB THICKNESS	8.00	IN
SLAB F'C	4.00	KSI

SUPERSTRUCTURE POSITIVE MOMENT REGION DATA (ADJACENT SPAN)

TOP FLANGE WIDTH	16.00	IN
TOP FLANGE THICKNESS	1.00	IN
WEB DEPTH	54.00	IN
WEB THICKNESS	0.75	IN
BOTTOM FLANGE WIDTH	16.00	IN
BOTTOM FLANGE THICKNESS	1.50	IN
BEAM SPACING PERP. TO CL	7.50	FT
SLAB THICKNESS	8.00	IN
SLAB F'C	4.00	KSI

ABUTMENT #1 DATA

ABUTMENT NAME	South	
ABUTMENT REFERENCE BORING	B-1	
BOTTOM OF ABUTMENT ELEVATION	704.9	FT
ESTIMATED NUMBER OF PILES AT ABUT.	9	
PILE SPACING PERP. TO CL	7.5	FT

ABUTMENT #2 DATA

ABUTMENT NAME	North	
ABUTMENT REFERENCE BORING	B-4	
BOTTOM OF ABUTMENT ELEVATION	702.8	FT
ESTIMATED NUMBER OF PILES AT ABUT.	9	
PILE SPACING PERP. TO CL	7.5	FT

SOIL DATA FOR 10 FT BENEATH BOTTOM OF ABUTMENT #1

BOT. OF LAYER ELEV. (FT)	*LAYER THICKNESS (FT)*	*UNCONFINED COMPRESSIVE STRENGTH (TSF)*	*N S.P.T. VALUE (BLOWS/12 IN.)*	*Qu EQUIV. FOR N VALUE (TSF)*
703.78	1.12	3.1		
701.28	2.50	4.5		
698.78	2.50	0.8		
696.28	2.50	1.2		
694.90	1.38	1.8		

10.00 FT = TOTAL DEPTH ENTERED

SOIL DATA FOR 10 FT BENEATH BOTTOM OF ABUTMENT #2

BOT. OF LAYER ELEV. (FT)	*LAYER THICKNESS (FT)*	*UNCONFINED COMPRESSIVE STRENGTH (TSF)*	*N S.P.T. VALUE (BLOWS/12 IN.)*	*Qu EQUIV. FOR N VALUE (TSF)*
701.73	1.07	2.5		
699.23	2.50	1.2		
696.73	2.50	4.3		
694.23	2.50	1.50		
692.80	1.43	3.30		

10.00 FT = TOTAL DEPTH ENTERED

WEIGHTED AVERAGE Qu FOR ABUTMENT #1 = 2.22 TSF

PILE STIFFNESS MODIFIER FOR ABUTMENT #1
= 1/(1.45-[0.3*2.22]) = 1.28

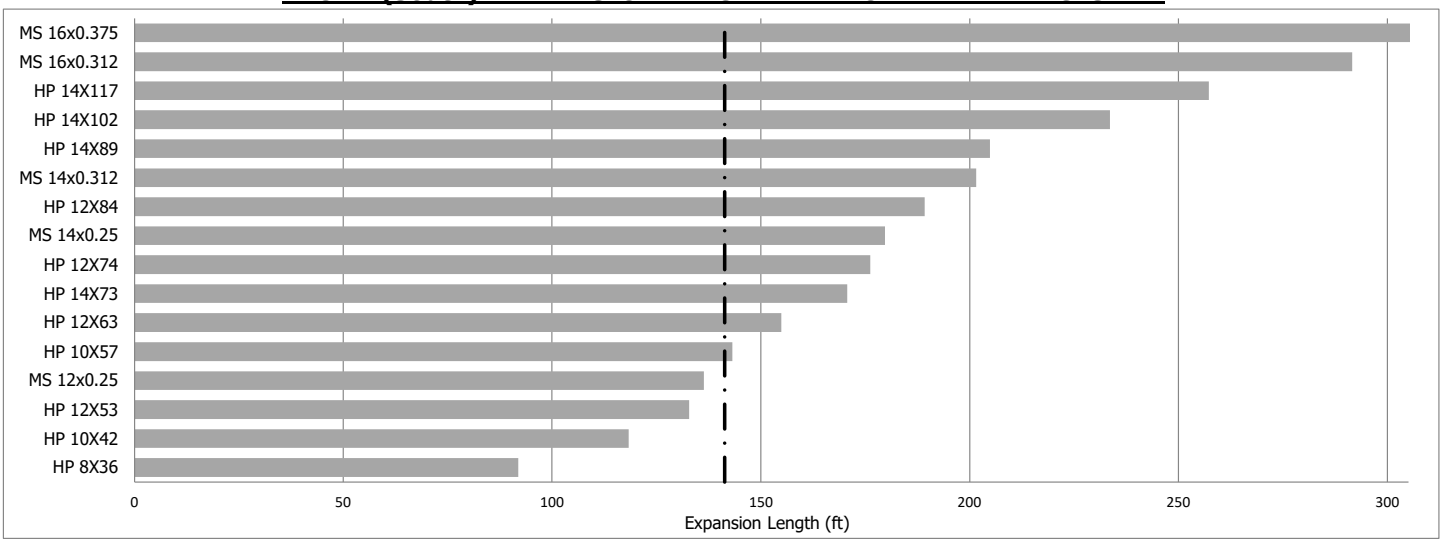
WEIGHTED AVERAGE Qu FOR ABUTMENT #2 = 2.49 TSF

PILE STIFFNESS MODIFIER FOR ABUTMENT #2
= 1/(1.45-[0.3*2.49]) = 1.42

DISTANCE TO CENTROID OF STIFFNESS FROM ABUTMENT #1 = [1.28*9*0+1.42*9*268]/[1.28*9+1.42*9] = 141.27 FT

DISTANCE TO CENTROID OF STIFFNESS FROM ABUTMENT #2 = [1.42*9*0+1.28*9*268]/[1.42*9+1.28*9] = 126.73 FT

ABUT 1 (South) - EXPANSION LENGTH LIMIT CHART - 7.7 DEG. SKEW



= Estimated expansion length for the indicated abutment. Piles with an expansion length greater than this are suitable for consideration.
(Note: The same size pile should be used at both abutments.)

Illinois Department of Transportation

INTEGRAL ABUTMENT FEASIBILITY ANALYSIS

Modified 10/30/17

GENERAL DATA

STRUCTURE NUMBER	058-0139 & 058-0140		TOTAL STRUCTURE LENGTH	268.00	FT
STRUCTURE TYPE	MULTI-SPAN		NUMBER OF SPANS	2	
STRUCTURE SKEW	7.72	DEGREES	END SPAN LENGTH	112.25	FT
SUPER. DATA IN REFERENCE TO SUB. DATA	ABUT 2		ADJACENT INTERIOR SPAN LENGTH	0.01	FT

SUPERSTRUCTURE POSITIVE MOMENT REGION DATA (END OR MAIN SPAN)

BEAM TYPE	PLATE GIRDER	
TOP FLANGE WIDTH	14.00	IN
TOP FLANGE THICKNESS	0.75	IN
WEB DEPTH	36.00	IN
WEB THICKNESS	0.50	IN
BOTTOM FLANGE WIDTH	14.00	IN
BOTTOM FLANGE THICKNESS	1.00	IN
BEAM SPACING PERP. TO CL	7.50	FT
SLAB THICKNESS	8.00	IN
SLAB F'C	4.00	KSI

SUPERSTRUCTURE POSITIVE MOMENT REGION DATA (ADJACENT SPAN)

TOP FLANGE WIDTH	16.00	IN
TOP FLANGE THICKNESS	1.00	IN
WEB DEPTH	54.00	IN
WEB THICKNESS	0.75	IN
BOTTOM FLANGE WIDTH	16.00	IN
BOTTOM FLANGE THICKNESS	1.50	IN
BEAM SPACING PERP. TO CL	7.50	FT
SLAB THICKNESS	8.00	IN
SLAB F'C	4.00	KSI

ABUTMENT #1 DATA

ABUTMENT NAME	South	
ABUTMENT REFERENCE BORING	B-1	
BOTTOM OF ABUTMENT ELEVATION	704.9	FT
ESTIMATED NUMBER OF PILES AT ABUT.	9	
PILE SPACING PERP. TO CL	7.5	FT

ABUTMENT #2 DATA

ABUTMENT NAME	North	
ABUTMENT REFERENCE BORING	B-4	
BOTTOM OF ABUTMENT ELEVATION	702.8	FT
ESTIMATED NUMBER OF PILES AT ABUT.	9	
PILE SPACING PERP. TO CL	7.5	FT

SOIL DATA FOR 10 FT BENEATH BOTTOM OF ABUTMENT #1

BOT. OF LAYER ELEV. (FT)	*LAYER THICKNESS (FT)*	*UNCONFINED COMPRESSIVE STRENGTH (TSF)*	*N S.P.T. VALUE (BLOWS/12 IN.)*	*Qu EQUIV. FOR N VALUE (TSF)*
703.78	1.12	3.1		
701.28	2.50	4.5		
698.78	2.50	0.8		
696.28	2.50	1.2		
694.90	1.38	1.8		

10.00 FT = TOTAL DEPTH ENTERED

SOIL DATA FOR 10 FT BENEATH BOTTOM OF ABUTMENT #2

BOT. OF LAYER ELEV. (FT)	*LAYER THICKNESS (FT)*	*UNCONFINED COMPRESSIVE STRENGTH (TSF)*	*N S.P.T. VALUE (BLOWS/12 IN.)*	*Qu EQUIV. FOR N VALUE (TSF)*
701.73	1.07	2.5		
699.23	2.50	1.2		
696.73	2.50	4.3		
694.23	2.50	1.50		
692.80	1.43	3.30		

10.00 FT = TOTAL DEPTH ENTERED

WEIGHTED AVERAGE Qu FOR ABUTMENT #1 = 2.22 TSF

PILE STIFFNESS MODIFIER FOR ABUTMENT #1
= 1/(1.45-[0.3*2.22]) = 1.28

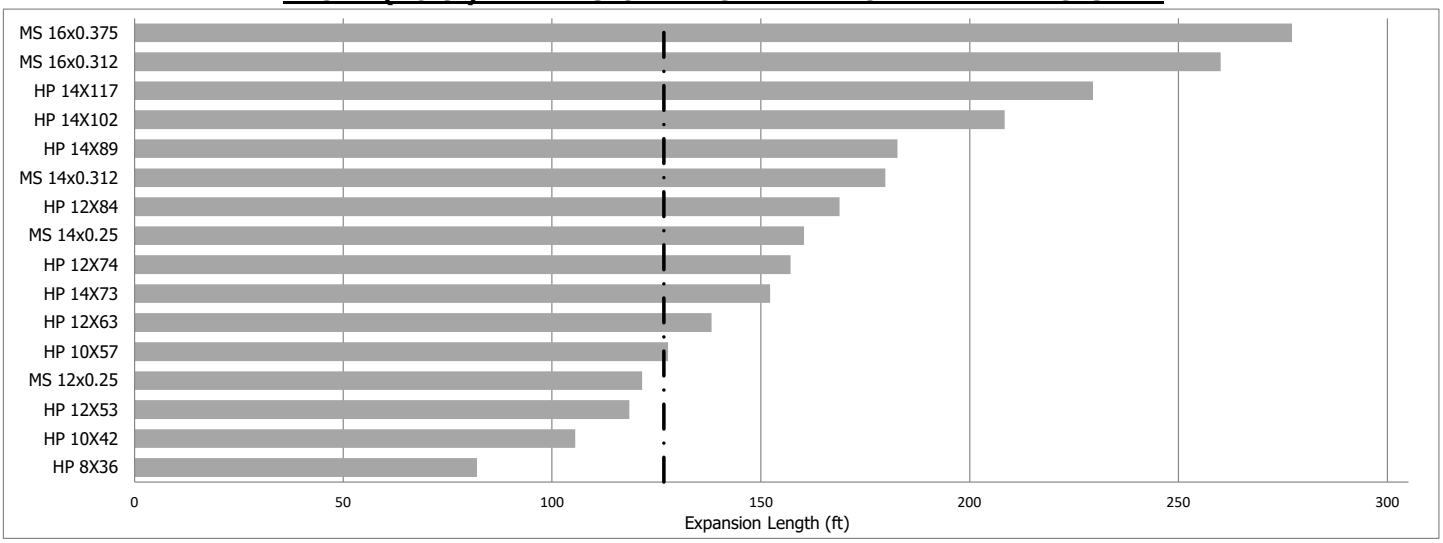
WEIGHTED AVERAGE Qu FOR ABUTMENT #2 = 2.49 TSF

PILE STIFFNESS MODIFIER FOR ABUTMENT #2
= 1/(1.45-[0.3*2.49]) = 1.42

DISTANCE TO CENTROID OF STIFFNESS FROM ABUTMENT #1 = [1.28*9*0+1.42*9*268]/[1.28*9+1.42*9] = 141.27 FT

DISTANCE TO CENTROID OF STIFFNESS FROM ABUTMENT #2 = [1.42*9*0+1.28*9*268]/[1.42*9+1.28*9] = 126.73 FT

ABUT 2 (North) - EXPANSION LENGTH LIMIT CHART - 7.7 DEG. SKEW



= Estimated expansion length for the indicated abutment. Piles with an expansion length greater than this are suitable for consideration.
(Note: The same size pile should be used at both abutments.)

Appendix H

Driven Pile Analysis

IDOT STATIC METHOD OF ESTIMATING PILE LENGTH

SUBSTRUCTURE========== S Abutment
REFERENCE BORING ========== B-1
LRFD or ASD or SEISMIC ========== LRFD
PILE CUTOFF ELEV. ========== 706.80 ft
GROUND SURFACE ELEV. AGAINST PILE DURING DRIVING = 704.80 ft
GEOTECHNICAL LOSS TYPE (None, Scour, Liquef., DD) ====== None
BOTTOM ELEV. OF SCOUR, LIQUEF., or DD ========== ft
TOP ELEV. OF LIQUEF. (so layers above apply DD) ========== ft

TOTAL FACTORED SUBSTRUCTURE LOAD ========== 1950 kips
TOTAL LENGTH OF SUBSTRUCTURE (along skew)========== 67.00 ft
NUMBER OF ROWS OF PILES PER SUBSTRUCTURE ======= 1
Approx. Factored Loading Applied per pile at 8 ft. Cts ========== 232.84 KIPS
Approx. Factored Loading Applied per pile at 3 ft. Cts ========== 87.31 KIPS

PILE TYPE AND SIZE ========== Metal Shell 14"Φ w/.312" walls
Pile Perimeter========== 3.665 FT.
Pile End Bearing Area========== 1.069 SQFT.

MAX. REQUIRED BEARING & RESISTANCE for Selected Pile, Soil Profile, & Losses

Maximum Nominal Req'd Bearing of Pile	Maximum Nominal Req.d Bearing of Boring	Maximum Factored Resistance Available in Boring	Maximum Pile Driveable Length in Boring
570 KIPS	**451** KIPS	**248** KIPS	**86** FT.

BOT. OF LAYER ELEV. (FT.)	LAYER THICK. (FT.)	UNCONF. COMPR. STRENGTH (TSF.)	S.P.T. N VALUE (BLOWS)	GRANULAR OR ROCK LAYER DESCRIPTION	NOMINAL SIDE RESIST. (KIPS)	NOMINAL END BRG. RESIST. (KIPS)	NOMINAL TOTAL RESIST. (KIPS)				NOMINAL REQ'D BEARING (KIPS)	FACTORED GEOTECH. LOSS FROM SCOUR or DD (KIPS)	FACTORED GEOTECH. LOSS LOAD FROM DD (KIPS)	FACTORED RESISTANCE AVAILABLE (KIPS)	ESTIMATED PILE LENGTH (FT.)
703.78	1.02		10	Hard Till	2.1		***20.3***				20	0	0	11	3
701.28	2.50		9	Hard Till	4.5	18.3	***16.0***				16	0	0	9	6
698.78	2.50	0.80			8.5	9.4	***29.1***				29	0	0	16	8
696.28	2.50	1.20			11.8	14.1	***47.9***				48	0	0	26	11
693.78	2.50	1.80			15.6	21.1	***63.5***				64	0	0	35	13
691.28	2.50	1.80			15.6	21.1	***87.3***				87	0	0	48	16
688.78	2.50	2.50			19.3	29.3	***148.0***				148	0	0	81	18
686.28	2.50		14	Hard Till	7.1	70.7	***113.7***				114	0	0	63	21
683.78	2.50	2.50			19.3	29.3	***138.9***				139	0	0	76	23
681.28	2.50	3.00			21.9	35.2	***157.3***				157	0	0	87	26
676.28	5.00	2.70			40.7	31.7	***180.5***				180	0	0	99	31
671.28	5.00	1.20			23.5	14.1	***290.9***				291	0	0	160	36
666.28	5.00		20	Hard Till	20.2	100.9	***270.7***				271	0	0	149	41
661.28	5.00		12	Hard Till	12.1	60.6	***253.9***				254	0	0	140	46
656.28	5.00	2.70			40.7	31.7	***294.6***				295	0	0	162	51
651.28	5.00	2.70			40.7	31.7	***334.2***				334	0	0	184	56
646.28	5.00	2.60			39.7	30.5	***479.6***				480	0	0	264	61
641.28	5.00		27	Hard Till	27.3	136.3	***461.5***				461	0	0	254	66
636.28	5.00		18	Hard Till	18.2	90.8	***395.8***				396	0	0	218	71
631.28	5.00	0.60			13.2	7.0	***457.5***				457	0	0	252	76
626.28	5.00		11	Hard Till	11.1	55.5	***434.2***				434	0	0	239	81
621.28	5.00	1.80			31.2	21.1	***451.3***				451	0	0	248	86
616.28	5.00	0.60			13.2	7.0	***608.9***				~~609~~	~~0~~	~~0~~	~~335~~	~~91~~
614.78	1.50		30	Hard Till		151.4									

IDOT STATIC METHOD OF ESTIMATING PILE LENGTH

SUBSTRUCTURE========== Pier WB
REFERENCE BORING ========== B-2
LRFD or ASD or SEISMIC ========== LRFD
PILE CUTOFF ELEV. ========== 677.20 ft
GROUND SURFACE ELEV. AGAINST PILE DURING DRIVING = 676.20 ft
GEOTECHNICAL LOSS TYPE (None, Scour, Liquef., DD) ====== None
BOTTOM ELEV. OF SCOUR, LIQUEF., or DD ========== ft
TOP ELEV. OF LIQUEF. (so layers above apply DD) ========== ft

TOTAL FACTORED SUBSTRUCTURE LOAD ========== 5425 kips
TOTAL LENGTH OF SUBSTRUCTURE (along skew)========== 62.00 ft
NUMBER OF ROWS OF PILES PER SUBSTRUCTURE ======= 3
Approx. Factored Loading Applied per pile at 8 ft. Cts ========== 233.33 KIPS
Approx. Factored Loading Applied per pile at 3 ft. Cts ========== 87.50 KIPS

PILE TYPE AND SIZE ========== Metal Shell 14"Φ w/.312" walls
Pile Perimeter========== 3.665 FT.
Pile End Bearing Area========== 1.069 SQFT.

MAX. REQUIRED BEARING & RESISTANCE for Selected Pile, Soil Profile, & Losses

Maximum Nominal Req'd Bearing of Pile	Maximum Nominal Req.d Bearing of Boring	Maximum Factored Resistance Available in Boring	Maximum Pile Driveable Length in Boring
570 KIPS	**481** KIPS	**264** KIPS	**84** FT.

BOT. OF LAYER ELEV. (FT.)	LAYER THICK. (FT.)	UNCONF. COMPR. STRENGTH (TSF.)	S.P.T. N VALUE (BLOWS)	GRANULAR OR ROCK LAYER DESCRIPTION	NOMINAL SIDE RESIST. (KIPS)	NOMINAL END BRG. RESIST. (KIPS)	NOMINAL TOTAL RESIST. (KIPS)				NOMINAL REQ'D BEARING (KIPS)	FACTORED GEOTECH. LOSS FROM SCOUR or DD (KIPS)	FACTORED GEOTECH. LOSS LOAD FROM DD (KIPS)	FACTORED RESISTANCE AVAILABLE (KIPS)	ESTIMATED PILE LENGTH (FT.)
673.76	2.44	1.10			10.7		***27.1***				27	0	0	15	3
671.26	2.50	1.40			13.2	16.4	***57.9***				58	0	0	32	6
668.76	2.50	2.90			21.4	34.0	***74.6***				75	0	0	41	8
666.26	2.50	2.50			19.3	29.3	***98.6***				99	0	0	54	11
663.76	2.50	2.90			21.4	34.0	***100.1***				100	0	0	55	13
661.26	2.50	1.20			11.8	14.1	***193.7***				194	0	0	107	16
658.76	2.50		19	Hard Till	9.6	95.9	***134.3***				134	0	0	74	18
656.26	2.50	2.30			18.3	27.0	***144.4***				144	0	0	79	21
653.26	3.00	1.60			17.3	18.8	***203.5***				204	0	0	112	24
648.26	5.00		12	Hard Till	12.1	60.6	***184.4***				184	0	0	101	29
643.26	5.00	2.50			38.6	29.3	***212.5***				212	0	0	117	34
638.26	5.00	1.60			28.8	18.8	***256.5***				257	0	0	141	39
633.76	4.50	2.90			38.6	34.0	***272.8***				273	0	0	150	43
628.76	5.00	1.00			20.4	11.7	***299.1***				299	0	0	164	48
623.76	5.00	1.50			27.6	17.6	***320.8***				321	0	0	176	53
618.76	5.00	1.00			20.4	11.7	***343.5***				344	0	0	189	58
613.76	5.00	1.20			23.5	14.1	***368.2***				368	0	0	203	63
608.76	5.00	1.30			24.9	15.2	***391.4***				391	0	0	215	68
603.76	5.00		2	Fine Sand	3.2	13.5	***401.0***				401	0	0	221	73
598.76	5.00	1.70			30.0	19.9	***442.8***				443	0	0	244	78
593.26	5.50	2.70			44.8	31.7	***480.6***				481	0	0	264	84
588.26	5.00	2.10			34.4	24.6	***616.5***				~~617~~	~~0~~	~~0~~	~~339~~	~~89~~
583.26	5.00		25	Hard Till	25.2	126.2	***737.7***				~~738~~	~~0~~	~~0~~	~~406~~	~~94~~
582.26	1.00		44	Hard Till		222.1									

IDOT STATIC METHOD OF ESTIMATING PILE LENGTH

SUBSTRUCTURE========== Pier EB
REFERENCE BORING ========== B-3
LRFD or ASD or SEISMIC ========== LRFD
PILE CUTOFF ELEV. ========== 677.20 ft
GROUND SURFACE ELEV. AGAINST PILE DURING DRIVING = 676.20 ft
GEOTECHNICAL LOSS TYPE (None, Scour, Liquef., DD) ====== None
BOTTOM ELEV. OF SCOUR, LIQUEF., or DD ========== ft
TOP ELEV. OF LIQUEF. (so layers above apply DD) ========== ft

TOTAL FACTORED SUBSTRUCTURE LOAD ========== 5875 kips
TOTAL LENGTH OF SUBSTRUCTURE (along skew)========== 62.00 ft
NUMBER OF ROWS OF PILES PER SUBSTRUCTURE ======= 3
Approx. Factored Loading Applied per pile at 8 ft. Cts ========== 252.69 KIPS
Approx. Factored Loading Applied per pile at 3 ft. Cts ========== 94.76 KIPS

PILE TYPE AND SIZE ========== Metal Shell 14"Φ w/.312" walls
Pile Perimeter========== 3.665 FT.
Pile End Bearing Area========== 1.069 SQFT.

MAX. REQUIRED BEARING & RESISTANCE for Selected Pile, Soil Profile, & Losses

Maximum Nominal Req'd Bearing of Pile	Maximum Nominal Req.d Bearing of Boring	Maximum Factored Resistance Available in Boring	Maximum Pile Driveable Length in Boring
570 KIPS	**560** KIPS	**308** KIPS	**91** FT.

BOT. OF LAYER ELEV. (FT.)	LAYER THICK. (FT.)	UNCONF. COMPR. STRENGTH (TSF.)	S.P.T. N VALUE (BLOWS)	GRANULAR OR ROCK LAYER DESCRIPTION	NOMINAL SIDE RESIST. (KIPS)	NOMINAL END BRG. RESIST. (KIPS)	NOMINAL TOTAL RESIST. (KIPS)				NOMINAL REQ'D BEARING (KIPS)	FACTORED GEOTECH. LOSS FROM SCOUR or DD (KIPS)	FACTORED GEOTECH. LOSS LOAD FROM DD (KIPS)	FACTORED RESISTANCE AVAILABLE (KIPS)	ESTIMATED PILE LENGTH (FT.)
673.61	2.59	0.10			1.2		***22.3***				22	0	0	12	4
672.11	1.50	1.80			9.4	21.1	***35.2***				35	0	0	19	5
669.61	2.50	2.10			17.2	24.6	***88.4***				88	0	0	49	8
667.11	2.50		12	Hard Till	6.1	60.6	***58.5***				58	0	0	32	10
664.61	2.50	2.10			17.2	24.6	***75.7***				76	0	0	42	13
662.11	2.50	2.10			17.2	24.6	***88.2***				88	0	0	49	15
659.61	2.50	1.70			15.0	19.9	***93.9***				94	0	0	52	18
656.61	3.00	0.90			11.2	10.6	***114.5***				114	0	0	63	21
654.11	2.50	1.70			15.0	19.9	***129.5***				130	0	0	71	23
651.61	2.50	1.70			15.0	19.9	***141.0***				141	0	0	78	26
647.11	4.50	1.40			23.7	16.4	***158.8***				159	0	0	87	30
642.11	5.00	0.90			18.7	10.6	***217.4***				217	0	0	120	35
637.11	5.00		10	Hard Till	10.1	50.5	***197.0***				197	0	0	108	40
632.11	5.00	1.70			30.0	19.9	***218.8***				219	0	0	120	45
627.11	5.00	1.00			20.4	11.7	***240.4***				240	0	0	132	50
622.11	5.00	1.10			22.0	12.9	***272.9***				273	0	0	150	55
617.11	5.00	2.00			33.4	23.5	***306.3***				306	0	0	168	60
612.11	5.00	2.00			33.4	23.5	***383.5***				384	0	0	211	65
607.11	5.00		10	Medium Sand	16.9	67.3	***360.1***				360	0	0	198	70
601.61	5.50	2.30			40.2	27.0	***397.9***				398	0	0	219	76
596.61	5.00	2.10			34.4	24.6	***533.9***				534	0	0	294	81
591.61	5.00		25	Hard Till	25.2	126.2	***449.4***				449	0	0	247	86
586.61	5.00	1.40			26.3	16.4	***560.2***				560	0	0	308	91
581.61	5.00		20	Hard Till	20.2	100.9	***777.3***				~~777~~	~~0~~	~~0~~	~~427~~	~~96~~
580.61	1.00		59	Hard Till		297.8									

Illinois Department of Transportation

IDOT STATIC METHOD OF ESTIMATING PILE LENGTH

SUBSTRUCTURE========== N Abutment
REFERENCE BORING ========== B-4
LRFD or ASD or SEISMIC ========== LRFD
PILE CUTOFF ELEV. ========== 704.70 ft
GROUND SURFACE ELEV. AGAINST PILE DURING DRIVING = 702.70 ft
GEOTECHNICAL LOSS TYPE (None, Scour, Liquef., DD) ====== None
BOTTOM ELEV. OF SCOUR, LIQUEF., or DD ========== ft
TOP ELEV. OF LIQUEF. (so layers above apply DD) ========== ft

TOTAL FACTORED SUBSTRUCTURE LOAD ========== 2600 kips
TOTAL LENGTH OF SUBSTRUCTURE (along skew)========== 72.50 ft
NUMBER OF ROWS OF PILES PER SUBSTRUCTURE ======= 1
Approx. Factored Loading Applied per pile at 8 ft. Cts ========== 286.90 KIPS
Approx. Factored Loading Applied per pile at 3 ft. Cts ========== 107.59 KIPS

PILE TYPE AND SIZE ========== Metal Shell 14"Φ w/.312" walls
Pile Perimeter========== 3.665 FT.
Pile End Bearing Area========== 1.069 SQFT.

MAX. REQUIRED BEARING & RESISTANCE for Selected Pile, Soil Profile, & Losses

Maximum Nominal Req'd Bearing of Pile	Maximum Nominal Req.d Bearing of Boring	Maximum Factored Resistance Available in Boring	Maximum Pile Driveable Length in Boring
570 KIPS	**449** KIPS	**247** KIPS	**80** FT.

BOT. OF LAYER ELEV. (FT.)	LAYER THICK. (FT.)	UNCONF. COMPR. STRENGTH (TSF.)	S.P.T. N VALUE (BLOWS)	GRANULAR OR ROCK LAYER DESCRIPTION	NOMINAL SIDE RESIST. (KIPS)	NOMINAL END BRG. RESIST. (KIPS)	NOMINAL TOTAL RESIST. (KIPS)				NOMINAL REQ'D BEARING (KIPS)	FACTORED GEOTECH. LOSS FROM SCOUR or DD (KIPS)	FACTORED GEOTECH. LOSS LOAD FROM DD (KIPS)	FACTORED RESISTANCE AVAILABLE (KIPS)	ESTIMATED PILE LENGTH (FT.)
701.73	0.97	2.50			7.5		***21.6***				22	0	0	12	3
699.23	2.50	1.20			11.8	14.1	***64.0***				64	0	0	35	5
696.73	2.50		13	Hard Till	6.6	44.8	***43.4***				43	0	0	24	8
694.23	2.50	1.50			13.8	17.6	***85.0***				85	0	0	47	10
691.73	2.50		9	Hard Till	4.5	45.4	***65.3***				65	0	0	36	13
689.23	2.50	1.80			15.6	21.1	***82.0***				82	0	0	45	15
686.73	2.50	1.90			16.2	22.3	***91.1***				91	0	0	50	18
684.23	2.50	1.30			12.5	15.2	***120.0***				120	0	0	66	20
681.73	2.50	2.70			20.4	31.7	***209.7***				210	0	0	115	23
679.73	2.00		20	Hard Till	8.1	100.9	***150.8***				151	0	0	83	25
674.73	5.00	2.90			42.8	34.0	***180.8***				181	0	0	99	30
669.73	5.00	1.80			31.2	21.1	***215.5***				215	0	0	119	35
664.73	5.00	2.10			34.4	24.6	***249.9***				250	0	0	137	40
659.73	5.00	2.10			34.4	24.6	***291.4***				291	0	0	160	45
654.73	5.00	2.70			40.7	31.7	***320.4***				320	0	0	176	50
649.73	5.00	1.70			30.0	19.9	***344.6***				345	0	0	190	55
644.73	5.00	1.20			23.5	14.1	***365.7***				366	0	0	201	60
639.73	5.00	1.00			20.4	11.7	***395.5***				396	0	0	218	65
634.73	5.00	1.80			31.2	21.1	***491.4***				491	0	0	270	70
629.73	5.00		17	Hard Till	17.2	85.8	***434.5***				434	0	0	239	75
624.73	5.00	1.00			20.4	11.7	***449.0***				449	0	0	247	80
619.73	5.00	0.50			11.2	5.9	***656.2***				~~656~~	~~0~~	~~0~~	~~361~~	~~85~~
614.73	5.00		30	Medium Sand	53.0	201.9	***522.6***				523	0	0	287	90
609.73	5.00	1.30			24.9	15.2	***546.3***				546	0	0	300	95
604.73	5.00	1.20			23.5	14.1	***566.3***				566	0	0	311	100
599.73	5.00	0.90			18.7	10.6	***599.1***				~~599~~	~~0~~	~~0~~	~~330~~	~~105~~
594.23	5.50	2.10			37.9	24.6	***778.9***				~~779~~	~~0~~	~~0~~	~~428~~	~~110~~
593.23	1.00		33	Hard Till		166.6									