
**STRUCTURE GEOTECHNICAL REPORT
US 52/IL 64 BRIDGE OVER
MISSISSIPPI RIVER
EXISTING SN: 008-6000, PROPOSED SN: 008-0052
IDOT Job No. P-92-001-11 / D-92-001-11
PTB 158/18
CARROL (IL) AND JACKSON (IA) COUNTIES**

for

PARSONS

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11. Abstract		
<p>The existing bridge structure will be replaced with a 12-span structure carrying US 52 over Mississippi River. The new bridge is proposed about 100 feet south of the existing bridge. The west and east abutments are proposed to be supported by vertical and battered driven piles with aggregate end slopes. This report provides geotechnical evaluations for the proposed approach embankments and bridge foundations.</p> <p>Below the surface, at the east abutment, up to 29-foot thick hard silty clay colluvium overlies the shale and dolostone bedrock. Going west along the bridge alignment, very loose to very dense sand and gravelly sand alluvium and outwash deposits with thicknesses from 4.0 to 132.0 feet cover the dolostone bedrock. Bedrock was encountered at elevations varying from 601.7 to 455.0 feet. The site classifies in the Seismic Classes C and D.</p> <p>The proposed approach embankment has 1:2 (V:H) end and side slopes at west abutment, and 1:4 (V:H) side and 1:2 end slopes at east abutment. Global slope stability analyses show suitable factors of safety for the slopes with some ground improvement.</p> <p>The possibilities of different types of foundation systems are discussed. All geotechnical design parameters necessary to complete the Final Plans such as pile capacities and lengths and for pile analysis under lateral loads; and for the rock socketed drilled shafts to be used for the piers will be provided in a Geotechnical Design Memorandum. Cofferdams are not required for drilled shafts for the main channel river piers. Cofferdams for land piers and piers supported on piles will be required.</p>		
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EXHIBITS

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- 2. Site and Regional Geology*
- 3. Boring Location Plans*
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Boring Logs

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Laboratory Test Results

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Global Stability Evaluations

APPENDIX D

Seismic Data

APPENDIX E

TSL Plan

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US 52/IL 64 BRIDGE OVER MISSISSIPPI RIVER
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CARROL, ILLINOIS AND JACKON, IOWA COUNTIES**

FOR

PARSONS TRANSPORTATION

1.0 INTRODUCTION

This Structure Geotechnical Report (SGR) presents the results of Wang Engineering, Inc. (Wang) geotechnical investigation, laboratory testing, and geotechnical engineering evaluations for the proposed US 52/IL 64 Bridge over Mississippi River in Carroll County, Illinois and Jackson County, Iowa. This SGR is prepared based on geotechnical investigation performed for Phase I Stages 1 and 2 investigations. Wang submitted a Technical Memorandum dated January 13, 2012 for the preliminary bridge foundation type evaluation based on borings performed in the river main channel and near the Illinois approach. Subsequently Wang submitted preliminary SGR dated February 15, 2013. A *Site Location Map* is presented as Exhibit 1.

The purpose of our investigations were to characterize the site soil, bedrock and groundwater conditions, perform geotechnical evaluations, and provide recommendations for the new bridge foundation systems to be considered in Type Size and Location plan (TSL plan) preparation.

Wang will perform final engineering analyses and will prepare Geotechnical Design Memorandum (GDM) consisting of refined geotechnical design data for design of the substructure foundations.

1.1 Project Description

The US 52/IL 64/IL 84 project includes the replacement of the existing US 52 Bridge over the Mississippi River and reconstruction of the IL 84 from approximately Randolph Street to the main entrance of the Mississippi Palisades State Park. The new bridge will be wider and will be on a new alignment to the south of the existing location to eliminate the need for an excessive detour route.

The IL 84 work includes widening of shoulders, upgrading existing guardrail, culvert replacement, and roadway resurfacing. The existing bridge will remain in service until the new bridge is open to the traffic. A connection will be made from the old Iowa’s causeway to the new Iowa approach.

1.2 Proposed Structures

The proposed bridge structure will be a 12-span steel tied-arch bridge with cast-in-place concrete deck. The bridge will carry one 12-foot wide lane and one 8-foot shoulder in each direction with no median barrier and parapet with railing. The structure will be 43’-2” wide out-to-out and 2462’-9” long back-to-back abutments. The lengths of spans vary from 125’-0” to 240’-0” and main navigation channel span will be 546’-0” measured along the Profile Grade Line (PGL). Two piers (numbers 4 and 5) will be located on an existing island on the Iowa side and Pier 11 on land just east of the river shore line on Illinois side. All other piers will be located within the river water. The substructure locations are shown in Exhibit 3, *Boring Location Plan*. Both abutments will be retained by end slope at 1:2 (V:H) maximum. The TSL plan dated February 10, 2014 provided by the designer (Parsons) is included in Appendix E. Preliminary service and factored loads provided by Parsons are shown in Table 1.

Table 1: Preliminary Foundation Loads

Location	Estimated Total Service DL (kips)	Estimated Total Service LL (kips)	Estimated Total Service Load (DL + LL) (kips)	Estimated Total Factored DL (kips)	Estimated Total Factored LL (kips)	Estimated Total Factored Load (DL + LL) (kips)
W Abut	1310	325	1635	1690	570	2260
Pier 1	2410	460	2870	3110	805	3915
Pier 2	2630	485	3115	3390	850	4240
Pier 3	2670	485	3155	3445	850	4295
Pier 4	2830	510	3340	3650	890	4540
Pier 5	3430	575	4005	4420	1005	5425
Pier 6	4140	630	4770	5330	1100	6430
Pier 7	4075	610	4685	5240	1065	6305
Pier 8	6960	930	7890	8900	1630	10530
Pier 9	6565	900	7465	8400	1575	9975
Pier 10	3220	520	3740	4140	910	5050
Pier 11	3005	520	3525	3870	910	4780

Location	Estimated Total Service DL (kips)	Estimated Total Service LL (kips)	Estimated Total Service Load (DL + LL) (kips)	Estimated Total Factored DL (kips)	Estimated Total Factored LL (kips)	Estimated Total Factored Load (DL + LL) (kips)
E Abut	1390	345	1735	1795	605	2400

Notes:

DL and LL are approximate.

DL and LL are calculated at the bottom of the Column

1.3 Existing Structure

The existing bridge structure was originally built in 1932 and is divided into three sections, Iowa side approach viaduct, main channel and BNSF railroad crossing and Illinois side approach viaduct. The bridge carries 2 lanes of traffic, one in each direction. The width of the existing bridge is 20 feet face-to-face of rail, approximately 2,468 feet in length.

The Iowa side approach viaduct consists of 18 simple spans with a typical span length of 53 feet. The main truss includes four truss spans with a total span length of approximately 1,443 feet. The deck consists of an open grid steel deck supported on floor beams and stringers.

The Illinois approach consists of a 16-inch thick continuous concrete deck cast monolithic with the concrete pier cap. The Illinois approach is approximately 78-foot long of variable width and variable length spans; and ends at the IL 84 edge of pavement. Since 1932, repairs have been made in 1985, 1999 and 2008.

The Iowa approach structure piers are supported on driven 12x74 size H-piles. The piers of main channel trusses are supported on sunken caisson, some using piles extended to the bedrock. The piers of Illinois approach structure appear to be supported on spread footings.

2.0 SITE CONDITIONS AND GEOLOGICAL SETTING

The project area is located just north of Savanna, Carroll County, Illinois, and two miles north of Sabula, Jackson County, Iowa. On the USGS *Savanna Quadrangle 7.5 Minute Series* map, the Illinois side of the proposed bridge is located in the NW¼ of Section 4, Tier 24 N, Range 3 E of the Fourth Principal Meridian; the Iowa side, in the NE¼ of Section 8 of Tier 84 N, Range 7 E of the

Fifth Principal Meridian.

The following review of published geologic data, with emphasis on factors that might influence the design and construction of the proposed engineering works, is meant to place the project area within a geological framework and, thus, to confirm the dependability and consistency of the present subsurface investigation results. For the study of the regional geologic framework, Wang considered northwestern Illinois and northeastern Iowa area in general and Carroll and Jackson Counties in particular. Exhibit 2 illustrates the *Site and Regional Geology*.

2.1 Physiography

Northwestern Carroll County and a slice of northeastern Jackson County are part of the Wisconsin Driftless Section, which lacks a cover of tills and erratics. It is a low plateau area dissected by the outwash-filled valley of the upper Mississippi River (Leighton et al. 1948). On the Illinois side, the site is located in the east side of the Mississippi Valley, at the south end of the bluffs that make up the Mississippi Palisades (Frankie 2001). At the time of our investigation, the Mississippi River water surface elevation measured 582.5 feet. From west to east, elevations climb from the river level to 600 feet at BNSF railroad, 633 feet on the IL 84 highway, and more than 870 feet at the top of the Palisades. On the Iowa side, west of the main river channel, forested, marshy lowlands make up a more than 1.5-mile wide floodplain having elevations lower than 600 feet.

2.2 Surficial Cover

The surficial cover is made up of stratified sand, silt, and clay of the Cahokia Alluvium, which makes up the modern floodplain and channel deposits, and sand and gravel outwash deposits of the Henry Formation that probably fills most of the valley (Grimley 1997). From east to west, along the new bridge alignment, the surficial cover ranges in thickness from 0 to over 120 feet.

2.3 Bedrock

The project lies on the southwestern flank of the gently sloping Wisconsin Arch. The bedrock outcrops along the Illinois side of the project in the Mississippi Palisades. Westward, across the river valley, the bedrock surface elevation becomes gradually deeper; on the Iowa side of the main river channel bedrock lies at approximately 120 feet below the water surface. The general lithological profile includes Silurian dolostone over Ordovician shale and dolostone (Frankie 2001).

The existing and proposed bridge alignments are located within the up to 4,000-foot wide, east-west trending Plum River Fault Zone. The fault is considered inactive, but the near vertical fault lines with a strike-slip component of movement have resulted in a structure with horsts and grabens and zones of breccia with rotated blocks. The Silurian dolostone that crop out in the Mississippi Palisades are part of the down-through fault block, whereas the up-thrown block south of Savanna is made up of Ordovician rocks. Just west of the existing bridge, the vertical displacement along the fault plane likely measures 100 to 150 feet (Kolata and Buschbach 1976).

The nearest active underground industrial mines are identified by the Illinois State Geological Survey at approximately 7 mile east from the bridge, just west from the village of Mt. Carroll. Dolostone quarry operations were and are active on the Illinois side of the project area. The nearest inactive quarry is located 1000 feet north of the existing bridge and the nearest active quarry is located 7 miles east of the bridge just north of US 52.

Our subsurface investigation results fit into the local geologic context. The borings drilled in the project area revealed the native sediments consists of gravelly sand, sand, and silt (Cahokia Alluvium and the Henry Formation). Borings referenced in this report encountered the bedrock at depths ranging from 22.0 to 119.2 feet below ground surface (bgs), that is, at elevations of 601.7 to 463.2 feet.

3.0 EXISTING GEOTECHNICAL DATA

Geotechnical data for the existing bridge structure are scarce. Iowa Department of Transportation bridge repair plans dated April 23, 1985, include log of Borings PB-1, PB-2, PB-6 and PB-10 with description of soil layers but no test data. Most boring depths vary from 105 to 112 feet below river level at that time. Boring PB-1 was performed on the land, near exiting west abutment. All borings show sand from below ground/riverbed to the boring termination depths.

4.0 METHODS OF INVESTIGATION

4.1 Subsurface Investigation

During Phase 1, Stage 1 investigation, Wang drilled 10 structure borings: Borings BSB-01, BSB-02, BSB-03, BSB-05, and BSB-06 were drilled from a barge within the Mississippi River; Borings BSB-04 and BSB-04A were drilled on the east bank of the river; and Borings BSB-07,

BSB-08, and BSB-09 were drilled on land, within the floodplain, on Iowa side. Drilling and sampling were completed during the months of October and November of 2011 and 2012. Boring depths were measured either from the river water surface or from the ground surface and ranged from 84.5 to 180.5 feet.

During Phase 1, Stage 2 investigation, Wang drilled 16 structure borings: Borings BSB-12 through BSB-19, BSB-12A, BSB-15A, BSB-15B, and BSB-15C were drilled from a barge within the Mississippi River; Borings BSB-10 and BSB-11 were drilled on the east side of the river; Boring BSB-23 was drilled from a barge within a floodplain channel (Sheepshead Bay); and Borings BSB-20, BSB-21, BSB-22, and BSB-24 were drilled on land, within the floodplain, on Iowa side. Drilling and sampling were completed between August 14 and November 11, 2013. Boring depths were measured either from the river water surface or from the ground surface and ranged from 39.0 to 172.0 feet.

Truck-and ATV-mounted drilling rigs were used to complete the borings. Drilling was conducted with hollow stem augers (HSA) to advance, case, and/or maintain an open borehole. Soil sampling was performed according to AASHTO T 206, "*Penetration Test and Split Barrel Sampling of Soils.*" The soil was sampled at 2.5-foot intervals to 50 feet and at 5-foot intervals thereafter. Up to 70 feet of bedrock cores in one borehole were collected in 5- and 10-foot runs. Samples collected from each sampling interval were placed in sealed glass jars. As-drilled northing, easting, and elevations were surveyed by Wang using a mapping-grade Trimble GPS survey system, capable of 4-inch vertical and lateral accuracy. Boring coordinates are shown in the *Boring Logs* (Appendix A). The as-drilled locations are shown in the *Boring Location Plans* (Exhibits 3).

Field boring logs, prepared and maintained by a Wang field engineer, included lithological descriptions, visual-manual soil and classifications, results of Rimac or pocket penetrometer unconfined compression tests, Standard Penetration Tests (SPT) recorded as blows per 6 inches of penetration, rock cores recovery, and Rock Quality Designation (RQD). The SPT N value, shown on the soil profile, is the sum of the second and third blows per 6 inches. The soils were described and classified according to Illinois Division of Highways (IDH) Textural Classification system. The field logs were finalized by an experienced engineering geologist after verifying the field visual classifications and laboratory test results.

Groundwater observations were made during and at the end of drilling operations. Boreholes were backfilled with soil cuttings, bentonite chips, or grout immediately upon completion.

4.2 Laboratory Testing

Field samples were transported to our in-house laboratory in Lombard, Illinois. The testing program included moisture content (AASHTO T 265) determinations on all soil samples. Particle-size analyses (AASHTO T 88-97) were performed on selected soil samples. Uniaxial compressive strength tests were performed on selected rock cores. Field visual classifications were verified in the laboratory. The laboratory test results are shown in the *Boring Logs* (Appendix A) and are included in the *Laboratory Test Results* (Appendix B).

The soil samples will be retained in our laboratory for 60 days following the final report submittal. After that, the samples will be discarded unless a specific written request is received as to their disposition.

5.0 RESULTS OF FIELD AND LABORATORY INVESTIGATIONS

Detailed descriptions of the soil conditions encountered during the subsurface investigation are presented in the attached *Boring Logs* (Appendix A) and in the *Soil Profile* (Exhibit 4). Please note that strata contact lines represent approximate boundaries between soil types. The actual transition between soil types in the field may be gradual in horizontal and vertical directions.

5.1 Soil and Bedrock Conditions

5.1.1 Illinois Side Lithological Profile

Borings BSB-04, BSB-04A, and BSB-10 were drilled from the IL 84 level, and Boring BSB-11 was drilled from a lower elevation, closer to the BNSF tracks level. The borings were advanced to 39.0 to 113.5 feet bgs. In descending order the following subsurface conditions were encountered: 1) man-made ground (fill); 2) loose sand; 3) very stiff to hard silty clay; 4) shale; and 5) dolostone.

1) Man-made ground (fill)

Below the surface, borings encountered 5.5 feet of loose to very dense sandy loam fill characterized by SPT N-values of 6 blow/foot to spoon refusal, and moisture content (MC) of 4 to 7%;

2) Loose sand

Below the fill, Boring BSB-04 advanced through 3.5-foot thick loose fine sand with SPT N-value of 4 blows/foot and MC of 4%. Up to 2.5 feet of gravelly sand characterized by hard drilling and spoon refusal underlies the loose sand.

3) Very stiff to hard silty clay

The unit measures up to 21.2 feet in thickness, and most of it is made up of 15-foot thick very stiff to hard silty clay with little gravel. The silty clay has confined compressive strength (Q_u) values of 2.3 to 6.6 tsf and MC values of 10 to 21%. The silty clay is underlain by 2.5-foot thick medium stiff sandy clay loam with Q_u of 0.75 tsf and MC of 26%, which in turn rests on top of 2.5 feet of dense to very dense gravelly sandy loam with SPT N-value of 38 to 52 blow/foot. The very stiff to hard silty clay probably represents shale-derived colluvium.

4) Shale

At 576.5 to 603.2 feet elevation, the borings encountered bedrock and advanced through up to 63-foot thick, Ordovician-age mudstones and shales characterized in Boring BSB-04 by sampler refusal and MC values of 14 to 20% and in Borings BSB-04A, BSB-10, and BSB-11 by RQD values of 15 to 100%. The uniaxial compressive strength (UCS) tests run on selected core samples from the shale bedrock show UCS values ranging from 2,350 to 8,120 psi. The average UCS value for the top ten feet of the shale bedrock is approximately 7,200 psi and for the following 10 feet is 7,100 psi. UCS test results are shown in *Laboratory Tests* (Appendix B) and in *Boring Logs* (Appendix A).

5) Dolostone

At 540.2 to 545.5 feet elevation, vuggy, strong, moderately to slightly fractured, dolostone underlies the shale. The dolostone bedrock shows RQDs of 50 to 95%. The bedrock core data is summarized in Table 1.

UCS tests were run on selective dolostone rock core samples and the results shown UCS values ranging from 6,960 to 15,010 psi. The test results are shown in *Laboratory Tests* (Appendix B) and in *Boring Logs* (Appendix A).

5.1.2 Mississippi River Valley Lithological Profile

Stage 1 Borings BSB-01, BSB-02, BSB-03, BSB-05, BSB-06, BSB-07, BSB-08 and BSB-09 and Stage 2 Borings BSB-12 through BSB-24, BSB-12A, BSB-15A, BSB-15B, and BSB-15C were drilled within the Mississippi River channel and floodplain. The river bed was encountered at elevation varying from 554.4 to 580.5 feet. In descending order, the lithological profile is made up of

1) Very soft to stiff silty clay to silty clay loam

The top 2.5- to 11.0-foot thick unit found at the bottom of the river consists of very soft to stiff silty clay loam with traces of organic matter. The unit is characterized by Q_u values of less than 0.2 to 1.0 tsf and MC values of 22 to 83%.

2) Loose to very dense sand to gravelly sand

The 4.0 to 98.0 feet of loose to dense sand to gravelly sand alluvial and outwash deposits characterized by SPT N-values of 4 blows/foot to spoon refusal made up most of the subsurface soils;

3) Shale

Borings BSB-01 and BSB-12 encountered up to 2.5-foot thick shale overlaying the Ordovician – Galena Group dolostone at 19 to 22 feet bgs. (560.6 to 564.2 feet elevation).

4) Dolostone

Stage 1 Borings BSB-01 through BSB-03 and Stage 2 Borings BSB-12 through BSB-20, BSB-12A, BSB-15A, BSB-15B, and BSB-15C encountered dolostone bedrock at 17.0 to 132.0 feet bgs (576.5 to 455.0 feet elevation) and cored it to depths varying from 72.5 to 172.0 feet bgs. The strong, poor to excellent rock quality, horizontally bedded dolostone has horizontal and occasionally vertical joints and fractures, shale partings, and stylolitic discontinuities. The RQDs measure 0 to 100%. The bedrock core data is summarized in Table 2.

The Q_u values range from 3,100 to 38,660 psi. The average Q_u value for the top ten feet of the

dolostone bedrock is approximately 9,400 psi and for the following 10 feet is 10,100 psi. Unconfined compressive strength test results are shown in *Laboratory Tests* (Appendix B) and in *Boring Logs* (Appendix A).

Table 2: Rock Coring Data Summary

Boring Number	Run Number	Run Length (feet)	Depth Range (feet)	Elevation Range (feet)	Recovery* (%)	RQD** (%)
BSB-01	1	10	24.5 - 34.5	558.1 - 548.1	98	98
BSB-01	2	10	34.5 - 44.5	548.1 - 538.1	100	95
BSB-01	3	10	44.5 - 54.5	538.1 - 528.1	100	93
BSB-01	4	10	54.5 - 64.5	528.1 - 518.1	100	100
BSB-01	5	10	64.5 - 74.5	518.1 - 508.1	100	100
BSB-01	6	10	74.5 - 84.5	508.1 - 498.1	100	97
BSB-02	1	10	58.5 - 68.5	524.2 - 514.2	100	47
BSB-02	2	10	68.5 - 78.5	514.2 - 504.2	100	83
BSB-02	3	10	78.5 - 88.5	504.2 - 494.2	98	92
BSB-02	4	10	88.5 - 98.5	494.2 - 484.2	100	30
BSB-02	5	10	98.5 - 108.5	484.2 - 474.2	93	80
BSB-02	6	10	108.5 - 118.5	474.2 - 464.2	99	85
BSB-03	1	10	120.5 - 130.5	462.2 - 452.2	96	70
BSB-03	2	10	130.5 - 140.5	452.2 - 442.2	100	89
BSB-03	3	10	140.5 - 150.5	442.2 - 432.2	100	100
BSB-03	4	10	150.5 - 160.5	432.2 - 422.2	96	85
BSB-03	5	10	160.5 - 170.5	422.2 - 412.2	100	96
BSB-03	6	10	170.5 - 180.5	412.2 - 402.2	100	96
BSB-04	1	10	93.5 - 103.5	537.7 - 527.7	98	50
BSB-04	2	10	103.5 - 113.5	527.7 - 517.7	100	69
BSB-04A	1	5	31.5 - 36.5	599.7 - 594.7	100	80
BSB-04A	2	5	36.5 - 41.5	594.7 - 589.7	27	15
BSB-04A	3	5	41.5 - 46.5	589.7 - 584.7	100	100
BSB-04A	4	5	46.5 - 51.5	584.7 - 579.7	100	100
BSB-04A	5	5	51.5 - 56.5	579.7 - 574.7	100	100

Boring Number	Run Number	Run Length (feet)	Depth Range (feet)	Elevation Range (feet)	Recovery* (%)	RQD** (%)
BSB-04A	6	5	56.5 - 61.5	574.7 - 569.7	100	100
BSB-04A	7	5	61.5 - 66.5	569.7 - 564.7	100	93
BSB-04A	8	5	66.5 - 71.5	564.7 - 559.7	100	100
BSB-04A	9	5	71.5 - 76.5	559.7 - 554.7	100	100
BSB-04A	10	5	76.5 - 81.5	554.7 - 549.7	100	100
BSB-04A	11	5	81.5 - 86.5	549.7 - 544.7	97	80
BSB-04A	12	5	86.5 - 91.5	544.7 - 539.7	98	77
BSB-10	1	10	29.0 - 39.0	601.1 - 591.1	100	42
BSB-11	1	7	9.5 - 16.5	576.5 - 569.5	88	32
BSB-11	2	10	16.5 - 26.5	569.5 - 559.5	98	70
BSB-11	3	10	26.5 - 36.5	559.5 - 549.5	96	70
BSB-11	4	10	36.5 - 46.5	549.5 - 539.5	98	95
BSB-11	5	10	46.5 - 56.5	539.5 - 529.5	100	52
BSB-11	6	10	56.5 - 66.5	529.5 - 519.5	100	50
BSB-12	1	5	22.5 - 27.5	560.2 - 555.2	92	65
BSB-12	2	10	27.5 - 37.5	555.2 - 545.2	98	68
BSB-12	3	10	37.5 - 47.5	545.2 - 535.2	100	25
BSB-12	4	10	47.5 - 57.5	535.2 - 525.2	100	0
BSB-12	5	5	57.5 - 62.5	525.2 - 520.2	100	28
BSB-12	6	10	62.5 - 72.5	520.2 - 510.2	100	66
BSB-12A	1	10	22.0 - 32.0	560.4 - 550.4	100	93
BSB-12A	2	10	32.0 - 42.0	550.4 - 540.4	100	84
BSB-12A	3	10	42.0 - 52.0	540.4 - 530.4	98	47
BSB-12A	4	10	52.0 - 62.0	530.4 - 520.4	98	91
BSB-12A	5	10	62.0 - 72.0	520.4 - 510.4	100	7
BSB-12A	6	10	72.0 - 82.0	510.4 - 500.4	91	23
BSB-12A	7	10	82.0 - 92.0	500.4 - 490.4	96	55
BSB-13	1	5	40.5 - 45.5	541.9 - 536.9	100	99
BSB-13	2	10	45.5 - 55.5	536.9 - 526.9	100	65
BSB-13	3	7	55.5 - 62.5	526.9 - 519.9	100	60

Boring Number	Run Number	Run Length (feet)	Depth Range (feet)	Elevation Range (feet)	Recovery* (%)	RQD** (%)
BSB-13	4	10	62.5 – 72.5	519.9 – 509.9	98	86
BSB-13	5	10	72.5 – 82.5	509.9 – 499.9	100	85
BSB-14	1	10	17.0 – 27.0	565.4 – 555.4	100	43
BSB-14	2	10	27.0 – 37.0	555.4 – 545.4	96	16
BSB-14	3	10	37.0 – 47.0	545.4 – 535.4	100	41
BSB-14	4	10	47.0 – 57.0	535.4 – 525.4	100	43
BSB-14	5	10	57.0 – 67.0	525.4 – 515.4	100	60
BSB-14	6	10	67.0 – 77.0	515.4 – 505.4	100	90
BSB-15	1	3.5	68.0 – 71.5	514.5 – 511.0	82	0
BSB-15	2	6.5	71.5 – 78.0	511.0 – 504.5	95	39
BSB-15	3	10	78.0 – 88.0	504.5 – 494.5	47	30
BSB-15	4	10	88.0 – 98.0	494.5 – 484.5	13	0
BSB-15	5	10	98.0 – 108.0	484.5 – 474.5	15	0
BSB-15	6	10	108.0 – 118.0	474.5 – 464.5	98	50
BSB-15	7	10	118.0 – 128.0	464.5 – 454.5	10	0
BSB-15A	1	10	66.0 – 76.0	516.5 – 506.5	98	53
BSB-15A	2	10	76.0 – 86.0	506.5 – 496.5	100	72
BSB-15A	3	10	86.0 – 94.0	496.5 – 488.5	75	0
BSB-15A	4	10	94.0 – 104.0	488.5 – 478.5	100	39
BSB-15A	5	10	104.0 – 114.0	478.5 – 468.5	25	64
BSB-15A	6	10	114.0 – 124.0	468.5 – 458.5	50	53
BSB-15B	1	10	67.0 – 77.0	515.6 – 505.6	100	61
BSB-15B	2	10	77.0 – 87.0	505.6 – 495.6	100	60
BSB-15B	3	10	87.0 – 97.0	495.6 – 485.6	100	39
BSB-15B	4	10	97.0 – 107.0	485.6 – 475.6	98	76
BSB-15B	5	10	107.0 – 117.0	475.6 – 465.6	98	67
BSB-15B	6	10	117.0 – 127.0	465.6 – 455.6	100	63
BSB-15C	1	10	63.5 – 73.5	519.1 – 509.1	67	26
BSB-15C	2	10	73.5 – 83.5	509.1 – 499.1	100	63
BSB-15C	3	10	83.5 – 93.5	499.1 – 489.1	100	60

Boring Number	Run Number	Run Length (feet)	Depth Range (feet)	Elevation Range (feet)	Recovery* (%)	RQD** (%)
BSB-15C	4	10	93.5 – 103.5	489.1 – 479.1	100	65
BSB-16	1	10	68.0 – 78.0	514.4 – 504.4	93	68
BSB-16	2	10	78.0 – 88.0	504.4 – 494.4	100	88
BSB-16	3	10	88.0 – 98.0	494.4 – 484.4	100	73
BSB-16	4	10	98.0 – 108.0	484.4 – 474.4	100	86
BSB-17	1	10	80.5 – 90.5	502.0 – 492.0	97	53
BSB-17	2	10	90.5 – 100.5	492.0 – 482.0	99	75
BSB-17	3	10	100.5 – 110.5	482.0 – 472.0	100	73
BSB-17	4	10	110.5 – 120.5	472.0 – 462.0	20	8
BSB-17	5	10	120.5 – 130.5	462.0 – 452.0	100	48
BSB-17	6	10	130.5 – 140.5	452.0 – 442.0	100	65
BSB-18	1	10	81.0 – 91.0	501.4 – 491.4	100	45
BSB-18	2	10	91.0 – 101.0	491.4 – 481.4	100	91
BSB-18	3	10	101.0 – 111.0	481.4 – 471.4	100	93
BSB-18	4	10	111.0 – 121.0	471.4 – 461.4	100	81
BSB-19	1	9.5	116.0 – 125.5	466.4 – 456.9	100	73
BSB-19	2	10	125.5 – 135.5	456.9 – 446.9	100	85
BSB-19	3	10	135.5 – 145.5	446.9 – 436.9	100	91
BSB-19	4	10	145.5 – 155.5	436.9 – 426.9	100	99
BSB-20	1	10	132.0 – 142.0	455.0 – 445.0	100	88
BSB-20	2	10	142.0 – 152.0	445.0 – 435.0	100	97
BSB-20	3	10	152.0 – 162.0	435.0 – 425.0	100	72
BSB-20	4	10	162.0 – 172.0	425.0 – 415.0	100	93
BSB-21	1	7	132.0 – 139.0	455.0 – 448.0	95	76
BSB-21	2	10	139.0 – 149.0	448.0 – 438.0	98	92
BSB-21	3	10	149.0 – 159.0	438.0 – 428.0	100	95
BSB-21	4	10	159.0 – 169.0	428.0 – 418.0	100	85
BSB-21	5	3	169.0 – 172.0	418.0 – 415.0	100	82

***Recovery:** Ratio of rock core recovered to the core run length (%)

****RQD:** Percent of rock core recovered in intact pieces of 4 inches or more in length of a core run (%).

5.2 Bedrock depth at substructures

Estimated top of bedrock elevations at each substructure location are shown in Table 3. It is possible that bedrock may be at different depth than shown in Table 3. It should be noted that accurate top of bedrock elevations at each substructure will be found during construction.

Table 3: Bedrock Depth at Bridge Substructures

Substructure	Proposed BOF elevation, (feet)	Estimated bedrock depth below BOF, (feet)	Estimated top of bedrock elevation, (feet)
West Abutment	593.5	Unknown >130	<464.0
Pier 1	569.5	Unknown >104.0	<465.4
Pier 2	575.5	Unknown >112.0	<464.0
Pier 3	575.5	Unknown >112.0	<464.0
Pier 4	579.5	Unknown >122.7	<456.8
Pier 5	585.0*	130.0	455.0
Pier 6	580.0	113.1	466.9
Pier 7	580.0	78.6	501.4
Pier 8	580.0	65.6	514.4
Pier 9	580.0	38.1	541.9
Pier 10	580.0	19.8	560.2
Pier 11	588.0**	11.5 42.5	576.5 Shale 545.5 Dolomite
East Abutment	619.3	18.3 Shale 79.3 Dolostone	601.0 Shale 540.0 Dolostone

* Bottom of strut, ** Top of drilled shafts, BOF: Bottom of footing

5.3 Groundwater Conditions

The water level in the borings drilled on land was encountered slightly above the river water level. The Mississippi River water level was surveyed twice a day during drilling operations and the water surface elevation is shown on the attached borings logs.

6.0 ANALYSIS AND RECOMMENDATIONS

Wang understands that the bridge structure will be designed following the 2012 AASHTO LRFD Bridge Design Specifications with 2013 Interims except modified by the 2012 IDOT Bridge Manual. The following sections present geotechnical engineering evaluations and recommendations for the bridge approach embankments and bridge foundation.

6.1 Scour Design Considerations

The scour analysis was performed by Parsons (Bridge Hydraulic Analysis Report Draft dated January 4, 2013). As per TSL Plans dated January 20, 2014, the 50-year design high water elevation (DHWE) is 594.95 feet. The estimated streambed elevations are shown in Exhibit 3. The Estimated Water Surface Elevation (EWSE) and Normal Pool Elevations are 582.30 feet.

The calculated scour depths for the proposed condition shown in TSL Plan were reviewed for possibility of reductions in the final design scour amount when cohesive soils or bedrock existed within the calculated scour depths as per IDOT 2012 Bridge Manual. The recommended design scour elevations based on Stage 1 investigations was provided in SGR dated February 15, 2013. The IDOT provided scour design table as a review comment for the TSL plan. Subsequently Stage 2 borings were performed. We reviewed IDOT provided scour elevations; and Stages 1 and 2 borings information for scour depths.

For the Piers 1 through 9, since the riverbed has only granular soils within calculated scour depths, reduction in calculated scour depth cannot be made. Design scour depth for the Piers 10 and 11 required to be changed since the bedrock was encountered within the calculated scour depths. There is no scour potential at the abutments. The recommended design scour elevations are shown in Tables 4 for the TSL plan. Scour elevations for the Q500 event should be shown for the final plans.

The drilled shafts for the piers should be designed to take in account the scour losses. Thus the shafts penetration after the design scour event should satisfy required axial and lateral resistance.

The soil lost due to scour should not be considered in contributing the overburden stress in the soil below the score zone.

Table 4: Design Scour Elevations (ft.) for TSL Plans

Event	West Abutment	Pier 1	Pier 2	Pier 3	Pier 4	Pier 5	Pier 6	Pier 7
Q100	593.5	555.4	558.1	565.7	567.0	520.6	505.8	509.1
Q500	593.5	553.4	556.2	563.7	565.0	519.6	503.8	507.1

Table 4-continue: Design Scour Elevations (ft.) for TSL Plans

Event	Pier 8	Pier 9	Pier 10	Pier 11	East Abutment
Q100	520.6	541.9	560.2	576.5	619.3
Q500	519.6	541.9	560.2	576.5	619.3

6.2 Seismic Design Considerations

The Seismic Site Class was determined according to the IDOT Design Guide AGMU Memo 09.01 LRFD Seismic Soil Site Class Definition dated January 7, 2009 and using IDOT spreadsheet “Seismic Site Class Determination” dated December 10 2010. For a structure total length exceeding 750 feet or with individual span length more than 200 feet, site class determination for the individual substructure units is required. The total length of the proposed bridge structure is 2462’-9” and four spans are more than 200 feet in length. Therefore we calculated Seismic Soil Site Class for each substructure.

As per 2012 IDOT Bridge Manual, for a bridge on major river crossing, 2500 years design return period is warranted along with more sophisticated design methods than those in AASHTO Specifications. The seismic spectral acceleration parameters were determined using United States Geological Survey (USGS) Seismic Hazard 2008 Data by specifying latitude and longitude for a 2500-year design return period (2% probability of exceedance in 50 years).

Considering seismic design spectrum values and Soil Site Class and based on Table 3.15.2-1 and Figure 2.3.10-2 in the IDOT 2012 Bridge Manual, the Seismic Performance Zone is 1. The recommended seismic design data are summarized in Table 5.

Table 5: Seismic Design Data

Table 5a: Seismic Design Parameters for West Abutment and Piers 1 through 8

Seismic Site Class D, Seismic Performance Zone 1			
Spectral Acceleration Period (sec)	Spectral Acceleration Coefficient ¹⁾ (% g)	Site Class Factors	Design Spectrum for Site Class D ²⁾ (% g)
0.0	PGA= 4.84	$F_{pga}= 1.6$	$A_s= 7.74$
0.2	$S_s= 10.06$	$F_a= 1.6$	$S_{DS}= 16.10$
1.0	$S_1= 4.96$	$F_v= 2.4$	$S_{D1}= 11.90$

1) Base spectral acceleration coefficients from US Seismic Hazard 2008 USGS

2) Site Class D values to be presented on plans ($A_s = PGA * F_{pga}$; $S_{DS} = S_s * F_a$; $S_{D1} = S_1 * F_v$)

Table 5b: Seismic Design Parameters for East Abutment, and Piers 9, 10 and 11

Seismic Site Class C, Seismic Performance Zone 1			
Spectral Acceleration Period (sec)	Spectral Acceleration Coefficient ¹⁾ (% g)	Site Class Factors	Design Spectrum for Site Class C ²⁾ (% g)
0.0	PGA= 4.84	$F_{pga}= 1.2$	$A_s= 5.81$
0.2	$S_s= 10.06$	$F_a= 1.2$	$S_{DS}= 12.07$
1.0	$S_1= 4.96$	$F_v= 1.7$	$S_{D1}= 8.43$

1) Base spectral acceleration coefficients from US Seismic Hazard 2008 USGS

2) Site Class C values to be presented on plans ($A_s = PGA * F_{pga}$; $S_{DS} = S_s * F_a$; $S_{D1} = S_1 * F_v$)

6.3 Approach Embankments and Slabs

It is understood that the roadway profile grade will remain the same at the east abutment. However, additional fill will be required, up to 23 feet at the west abutment on the south side of existing roadway embankment.

6.3.1 Settlement Analysis

West Embankment

Settlement of the west embankment will occur from the foundation soils and within the embankment mass. Borings BSB-05, BSB-24 and 52-SGB-12 encountered very loose silty loam, sandy loam and fine sand to a depth of about 12 feet below river bed. Most of the settlement is expected to occur from these very loose soils. Since these soils are granular in nature, only elastic (immediate) settlement is expected and will occur at the same rate as the construction. We estimate a total settlement on the order of 6 inches from the foundation soils under half portion of the embankment on the east bound roadway where new embankment is up to 23 feet above existing grade. Settlement from within the embankment could be 1 to 2 inches.

East Embankment

We expect settlement of the new approach embankment at the east abutment to be less than 0.5 inches.

6.3.2 Global Slope Stability

Removal and Replacement Option

Global slope stability evaluations were performed for the embankment near the west abutment based on the cross section at Station 1560+50 for the end and side slopes and considering scour countermeasure as shown on TSL plan and providing additional toe stability countermeasure (ground improvement). A computer program, SLIDE Version 5.0, was used to calculate the factor of safety (FOS) using the circular surface method. The results of the global stability analyses are summarized in Table 6 and presented in Appendix C. The TSL plan dated January 20, 2014 shows end and side slopes of 1V:2H. The analyses were performed with scour countermeasure by riprap as shown on TSL plan, by changing side slope and with ground improvement by providing additional riprap and constructing new embankment with higher shear strength. We performed analysis for various scenarios until we obtain minimum FOS of 1.50.

Global stability analysis result show that by providing an embankment with higher shear strength does not increase factor of safety to 1.5 for side slope. It can be seen that additional riprap beyond shown on TSL plan will be required to obtain minimum required factor of safety of 1.5 for the embankment stability. The amount of ground improvement required at the toe of embankment

decreases by providing flatter slope. The global stability analysis shows FOS of 1.36 for the side slope of the existing embankment.

The abutment piles will be installed before construction of the embankment and end slope. The embedded portion of the piles will provide resistance against the slope instability above the tip of the piles. Therefore, we do not anticipate a deep seated rotational failure for the end slope.

Based on a cursory review of the cross section at Station 1585+00, slopes at the east abutment are expected to be stable.

Table 6: West Abutment Global Stability Analysis Results

Slope	Reference Borings	New Fill Shear Strength, Cu, psf	Ground Improvement at the Toe	Factor of Safety	Exhibit
End Slope 1V:2H	BSB-24 and BSB-05	1000	No	1.11	C-1
End Slope 1V:2H	BSB-24 and BSB-05	1000	Yes	1.53 (Note 2)	C-2
End Slope 1V:2H	BSB-24 and BSB-05	1250 (Note 1)	No	1.25	C-3
End Slope 1V:2H	BSB-24 and BSB-05	1250 (Note 1)	Yes	1.50 (Note 2)	C-4
Side Slope 1V:2H	BSB-24 and 52-SGB-12	1000	No	0.91	C-5
Side Slope 1V:2H	BSB-24 and 52-SGB-12	1000	Yes	1.53 (Note 2)	C-6
Side Slope 1V:2H	BSB-24 and 52-SGB-12	1250 (Note 1)	No	0.93	C-7
Side Slope 1V:2H	BSB-24 and 52-SGB-12	1250 (Note 1)	Yes	1.50	C-8
Side Slope 1V:2.5H	BSB-24 and 52-SGB-12	1000	No	1.00	C-9
Side Slope 1V:2.5H	BSB-24 and 52-SGB-12	1000	Yes	1.63 (Note 2)	C-10
Side Slope 1V:2.5H	BSB-24 and 52-SGB-12	1250 (Note 1)	No	1.0	C-11
Side Slope 1V:2.5H	BSB-24 and 52-SGB-12	1250 (Note 1)	Yes	1.64 (Note 2)	C-12
Side Slope 1V:3H	BSB-24 and 52-SGB-12	1000	No	1.07	C-13
Side Slope 1V:3H	BSB-24 and 52-SGB-12	1000	Yes	1.58	C-14

Slope	Reference Borings	New Fill Shear Strength, Cu, psf	Ground Improvement at the Toe	Factor of Safety	Exhibit
Side Slope 1V:3H	BSB-24 and 52-SGB-12	1250 (Note 1)	No	1.08	C-15
Side Slope 1V:3H	BSB-24 and 52-SGB-12	1250 (Note 1)	Yes	1.58	C-16
Existing Side Slope 1V:1.6H	BSB-24 and 52-SGB-12	No	No	1.36	C-17
End Slope 1V:2H	BSB-24 and BSB-05	1500 (Note 1)	Yes	1.5	C-18
Side Slope 1V:2H	BSB-24 and 52-SGB-12	1500 (Note 1)	Yes	1.61	C-19

- Notes:
 1. With extra compaction effort and field verification
 2. With ground improvement
 3. Minimum factor of safety required by IDOT is 1.50.
 4. IDOT requires shear strength of 1000 psf to be considered for the new embankment fill (IDOT 1999 Geotechnical Manual)

Permanent Steel Sheet Pile Wall Option

We also performed global stability analysis considering concept of providing permanent steel sheet piling near existing embankment toe at the proposed west abutment. This concept eliminates the need of extensive removal of muck deposit. In our analysis, we considered that top of the sheet piling will be one foot above normal river elevation (582.3 feet) and sheet pile wall will be 10 feet from the toe of existing embankment. Exhibits C-20 through 23 show results of this analysis indicating that the required removal of existing muck and replacing with riprap is small compared to without sheet pile wall. Steel sheet piles can be driven before driving abutment piles. The following is explanation of the exhibits.

- Exhibit C-20: Sheet pile wall location is based on obtaining minimum factor of safety of 1.50 with cohesive new embankment.
- Exhibit C-21: Failure circle was considered below sheet piling with cohesive new embankment.
- Exhibit C-22: Sheet pile wall location is based on obtaining minimum factor of safety of 1.50 with granular new embankment.
- Exhibit C-23: Failure circle was considered below sheet piling with granular for new embankment.

Recommendations

Based on our analysis for different options, we recommend the following:

- Install permanent steel sheet pile wall approximately 10 feet from toe of existing embankment on the south and east side between approximate Stations 1560+00 and 1561+00 except under the new west abutment.
- Location of sheet pile wall should be determined such that it does not interfere with the battered abutment piles.
- Cohesive soil should be used for construction of embankment above riprap cap.
- There is no need of specifying higher shear strength for cohesive fill for embankment.
- Remove existing muck to elevation 575.0 feet (approximately one to two feet below existing river bed. The excavation depth could be different at the time of construction due to water flow current and scouring.)
- Top of steel sheet pile wall and Riprap should be placed to one foot above EWSE (582.3 feet) with capping.
- Tip of steel sheet pile wall should be to a minimum elevation 559.0 feet. Steel sheet pile size and tip elevation should be based on structural design.
- Riprap should be placed between existing embankment slope to toe of the proposed embankment.
- The proposed embankment slope can be 1:2 (V:H).

6.3.3 Approach Slabs

Approach slab will be supported on abutment and other end on approach footing foundation. Approach footing requires minimum unconfined compressive strength of embankment to be 2 ksf which we expect to be available from the existing and new embankments.

6.4 Bridge Structure Foundations

Wang evaluated possible foundation solutions that could be considered for support of the proposed bridge structure. Foundation options to be considered at each substructure unit are presented in the following sections.

6.4.1 West Abutment

Shallow Foundation

Based on Borings BSB-24 and BSB-05 information, we anticipate low bearing capacity and

intolerable settlement and therefore we do not recommend shallow foundation system.

Driven Piles

The abutments could be supported on driven piles. The most common types of piles used for a bridge structure are steel H-piles and concrete piles consisting of metal shell filled with concrete either 12" or 14" diameter designed as friction piles. Normally metal shell piles are more economical compare to H-piles. We recommend considering driven metal shell piles filled with concrete.

The length of metal shell piles driven to Maximum NRB could be on the order of 55 to 75 feet below bottom of footing (BOF) with BOF elevation of 593.5. There is no need for pile shoes.

Relative settlement between pile and surrounding soils of more than 0.4 inches would result in downdrag loads. Based on the cross sections, it appears that the new embankment height south of the existing bridge approach embankment could be up to 23 feet above existing grade. Due to the very loose silty loam, sandy loam and fine sand encountered by Borings BSB-24, 52-SGB-12 and BSB-05 drilled near the west abutment, total settlement on the order of 6 inches is estimated, and is expected to occur at the same rate as construction. We estimated some downdrag loads on piles.

Drilled Shafts

Bedrock was not encountered in Borings BSB-24 and BSB-05 even after drilling to a depth approximately 129.5 feet below BOF. Top of bedrock is not known. Therefore, rock socketed drilled shafts foundation will not be economical foundation system.

6.4.2 Piers

6.4.2.1 Piers 1 through 4

Shallow Foundation:

Based on borings data, expected loads and scour depths, shallow foundation is not possible.

Driven Piles

The piers could be supported on driven piles. The most common types of piles used for a bridge structure are steel H-piles and concrete piles consisting of metal shell filled with concrete either 12” or 14” diameter designed as friction piles. Normally metal shell piles are economical compare to H-piles.

The length of metal shell piles driven to Maximum NRB could be on the order of 50 to 80 feet below BOF with BOF elevation of 569.5 to 579.5 feet. There is no need for pile shoes.

Drilled Shafts

Bedrock was not encountered in Borings BSB-05 through BSB-08, BSB-22 and BSB-23 even after drilling to a depth of 123.0 feet below river level, approximately 115 feet below BOF. Therefore, we do not consider drilled shafts foundation to be economical foundation system.

6.4.2.3 Piers 5 through 10

Shallow Foundation:

Based on borings data, expected loads and scour depths shallow foundation is not possible.

Driven Piles

We do not recommend driven piles considering high unsupported lengths due to scour depths and very short or no lengths below scour depths. It is understood that due to scour concerns, IDOT (BBS Planning and Hydraulics Units) recommended to consider drilled shafts foundation instead of metal shell pile supported foundation.

Drilled Shafts

We recommend considering drilled shafts established into dolostone bedrock.

6.4.2.4 Pier 11

Shallow Foundation

Pier 11 is located just east of the river water edge. Based on Boring BSB-11, it appears that the shale bedrock could be at a shallow depth estimated to be at 10 feet below exiting grade. Pier 11 could be supported on shallow foundation consisting of spread footing established into shale bedrock. Construction of footing will require water tight temporary excavation support system.

Driven Piles

We do not recommend driven piles considering very short pile length due to anticipated shallow bedrock depth.

Drilled Shafts

Drilled shafts established into shale bedrock could be considered. Drilled shafts could be established into dolostone bedrock below shale for higher capacity drilled shafts. Based on Boring BSB-11 drilled shafts length to top of shale bedrock would be 11.5 feet and 42.5 feet to top of dolostone.

6.4.3 East Abutment

Shallow Foundation

Borings BSB-04, BSB-04A and BSB-10 were performed for the proposed east abutment. The abutment could be supported on shallow foundation consisting of a spread footing established at proposed elevation 619.3 feet, approximately 11 to 12 feet below existing grade. Based on our preliminary analysis, we recommend a Nominal Bearing Resistance of 24 kips per square foot (ksf) and a Factored Bearing Resistance of 11 ksf considering bearing resistance factor of 0.45. Boring BSB-04 encountered about 2.5-foot thick layer of medium stiff cohesive soil with unconfined compressive strength of 0.75 tons per square foot (tsf) approximately 11 feet below bottom of the footing level. We performed preliminary settlement analysis for footing established at elevation 619.3 feet with applied bearing pressure of 11.0 ksf. For footing sizes of 6'x40', 8'x40' and 10'x50' we calculate settlement of 0.56, 0.62, and 0.66 inches respectively.

Driven Piles

The abutments could be supported on driven piles. The most common types of piles used for a bridge structure are steel H-piles designed as friction piles or driven to the bedrock and concrete piles consisting of metal shell filled with concrete either 12" or 14" diameter designed as friction piles.

Driving the metal shell pile through layers of hard cohesive soil will be difficult and could possibly damage the pile toe and cause deformation at the pile head. Also due to shorter driven lengths, the metal shell piles may not develop required fixity for the lateral load capacity. Metal shell piles driven to bedrock to Maximum Nominal Required Bearing (NRB) would not be appropriate due to damage to piles. Therefore, we do not recommend considering metal shell

piles.

The H-piles designed as friction piles could be considered. However, by driving few more feet to the top or into the bedrock, the Maximum NRB (maximum allowable structural pile capacity) can also be obtained. H-pile lengths would be on the order of 20 feet below bottom of footing (BOF) considering BOF elevation of 619.3 and assuming that H-piles would penetrate 2.5 feet into the shale bedrock.

Relative settlement between pile and surrounding soils of more than 0.4 inches would result in downdrag loads. Since the settlement of the abutment is expected to be less than 0.4 inches, we expect no downdrag loads. The driven pile foundation is expected to undergo negligible settlement.

Drilled Shaft

Drilled shafts established into shale bedrock could be considered. The top of shale bedrock was encountered in Borings BSB-04 and BSB-10 at approximate elevation 601.7 feet and 601.1 feet, about 17.6 feet and 18.2 feet below BOF respectively. We recommend considering drilled shaft base at or below elevation 589.0, approximately 30 feet below BOF. Since dolostone bedrock was encountered at elevation 540.2 and 543.2 feet in Boring BSB-04 and BSB-04A respectively, the depth to dolostone below BOF could be on the order of 80 feet.

Relative settlement between drilled shafts and surrounding soils of more than 0.4 inch would result in downdrag loads. Since the settlement of the abutment is expected to be less than 0.4 inches, we expect no downdrag loads. The drilled shafts foundation is expected to undergo negligible settlement.

8.0 CONSTRUCTION CONSIDERATIONS

8.1 Stage Construction Considerations

This bridge is on a new alignment and the existing bridge will be used until the end of construction, we do not anticipate stage construction. Since no cuts are anticipated, we do not see need for temporary sheet piling support at the east abutment. To retain existing west embankment from the existing grade to the river bed, temporary soil retention system will be required. If any changes to the road closure or construction staging are made, Wang should be notified to provide revised recommendations.

8.2 Site Preparation

All vegetation, surface topsoil, existing pavement, and debris should be cleared and stripped where approach embankment fills will be placed.

West embankment can be constructed by dumping riprap in layers starting from the land side and few feet above river level until stable condition is achieved. A layer of coarse aggregate on top of riprap with a capping of crushed stone (CA-6) should be placed before placement of embankment material. Embankment should be constructed as per Section 205 of the IDOT Standard Specifications. The contractor can use similar construction method or any other method to construct causeway.

8.3 Excavation and Utilities

Excavations should be performed in accordance with local, state, and federal regulations. The potential effect of ground movements upon nearby utilities should be considered during construction. The Contractor should ensure there are no utility conflicts with the final design and construction program.

8.4 Filling and Backfilling

Embankment fill required to attain the final design subgrade elevations should be in accordance with Section 205 of the IDOT Standard Specifications. All fill and backfill materials should be pre-approved by the site engineer. The fill should be free of organic materials and debris. The backfill behind the abutments should be in accordance with IDOT 2012 Bridge Manual. Fill used for embankment construction at the abutments should be select material, which will not obstruct pile penetration.

8.5 West Embankment Construction

West embankment can be constructed by dumping riprap Gradation RR 5 (IDOT Standard Specifications Section 1005) in layers starting from the land side and at bridge at least one foot above river water surface level until stable condition is achieved. A 12-inch thick layer of coarse aggregate Gradation RR 1 (IDOT Standard Specifications Section 1005) on top of riprap with a capping of 8-inch thick crushed stone Gradation CA-6 (IDOT Standard Specifications Section 1004) should be placed before placement of embankment material. Embankment should be constructed as per Section 205 of the IDOT Standard Specifications. The finished end and side slopes should be provided with Class A5 stone riprap. The contractor can use similar construction

method or any other method to construct causeway.

We recommend that all the vegetation, topsoil and riprap material should be completely removed from the area of new embankment without destabilizing the existing slopes before placement of new fill. The new fill should be benched into the side slopes of the existing embankment to provide interlocking between the old and new fill. During benching, any water seeped from the existing embankment should be removed or placement of new fill should be postponed until the area is dry enough. In general, embankment should be constructed in accordance with Section 2107 Embankment of Iowa Standard Specifications for Highway and Bridge Construction (IASSHBC). We recommend benching the slopes and placement in accordance with Article 2107.01.C.2 and 2127.03.B respectively of IASSHBC.

The existing pavement should be broken into pieces not to exceed three square feet in surface area up to a depth of not less than 6 inch before placement of new fill. This requirement should be shown as a note on the plan because Section 205.03 of the IDOT Standard Specifications only requires breaking if the pavement is raised 3 feet or less.

The new fill should be placed in layers, each layer 8 inch in loose thickness and compacted to at least 95 percent of the maximum dry density. To minimize the settlement within the new fill material, the upper 5 feet of embankment should be compacted to not less than 100 percent of maximum dry density. The maximum laboratory dry density and optimum moisture content should be determined in accordance with AASHTO T 99 (Method C).

Proper construction including quality control and inspection during construction is vital for the overall stability of the embankment even for a short-term use. The failure of widened embankment may result due to sub-standard compaction of fill, inadequate benching into the existing embankment and no proper drainage control.

A special provision for the embankment material and construction will be needed requiring minimum shear strength of 1500 psf for in place condition.

8.6 Earthwork Operations

The contractor should use required construction equipment which are in satisfactory condition and of sufficient capacity to perform earthwork. Moisture and traffic will cause deterioration of exposed

subgrade soils. Precautions should be taken by the contractor to prevent water erosion of the exposed subgrade. A compacted subgrade will minimize water runoff erosion. Earth moving operations should be scheduled to not coincide with excessive cold or wet weather (early spring, late fall or winter). Any soil allowed to freeze or soften due to the standing water should be removed. Wet weather can cause problems with subgrade compaction. It is recommended that an experienced geotechnical engineer be retained to inspect the exposed subgrade, monitor earthwork operations, and provide material inspection services during the construction phase of this project.

8.7 Piling Installation

Piles should be installed in accordance with Section 512 of the IDOT Standard Specifications and Special Provisions.

We suggest the following general procedure for driving west abutment piles and constructing the embankment.

The contractor can build out a riprap embankment platform from the west to the east, south of the sheet pile and parallel with the road. The riprap construction platform would be incorporated into the permanent slope. The contractor will excavate and place riprap to advance and work from the top of the platform to install the sheet piles on the north side of the platform. Once the sheet piles are installed, riprap can be placed in the remaining areas. As they get up to the abutment piles, they will drive the abutment piles out in front of the riprap platform before riprap is placed leaving the piles sticking up well above grade. Next, the remaining riprap around the piles will be placed and the embankment construction will continue vertically above the riprap and around the piles. After installing vertical and batter piles, a sleeve pipe can be placed on driven piles from top of riprap cap to bottom of abutment footing. Placement of permanent sheet piling should be determined such that it does not interfere with the battered abutment piles. The contractor should take all the precautions not to destabilize existing embankment and abutment.

We recommend delaying construction of abutment footing as much as possible to minimize downdrag load on the piles. Most of the settlement of the embankment along with driven piles is expected to be occurring at the same rate as construction and will be elastic in nature due to granular foundation soils. Sleeves around the piles will avoid downdrag load from within the embankment settlement.

8.8 Drilled Shafts

The drilled shafts should be constructed in accordance with Section 516 Drilled Shafts of the IDOT Standard Specifications. Permanent casing to top of the rock is recommended.

We recommend that the shafts excavation, steel casing and the rock socket should be inspected by lowering television camera (shaft inspection device-SID) into the shaft. The television camera and lighting equipment should be capable of operating in submerged conditions encountered during the inspection. We recommend that the drilled shafts installation procedure should be reviewed and approved by IDOT.

8.9 Cofferdam

It is understood that water line footings are proposed for river piers. To facilitate river pier cap construction, the contractor can select appropriate method. Cofferdam Type 2 will be required for Piers 1 through 3 to be constructed at locations where riverbed is at a shallow depth. Cofferdam Type 2 will also be required at Pier 4 because a sealcoat will be required. At Pier 5 no cofferdam will be required for a single row of drilled shafts and Type I cofferdam will be required if a group of drilled shafts is designed. A Float-in-Cofferdam will be required for Piers 6 through 10.

9.0 QUALIFICATIONS

The analysis and recommendations submitted in this report are based upon the data obtained from the borings drilled at the locations shown on the boring logs and in Exhibit 3. This report does not reflect any variations that may occur between the borings or elsewhere on the site, variations whose nature and extent may not become evident until the course of construction. In the event that any changes in the design and/or location of the bridge are planned, we should be timely informed so that our recommendations can be adjusted accordingly.

It has been a pleasure to assist Parsons and the Illinois Department of Transportation on this project. Please call if there are any questions, or if we can be of further service.

Respectfully Submitted,

WANG ENGINEERING, INC.



Mohammed A. Kothawala, P.E., D.GE
Senior Geotechnical Engineer *9-4-2014*



Jerry W.H. Wang, PhD., P.E.
QA/QC Reviewer

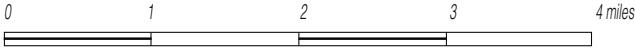
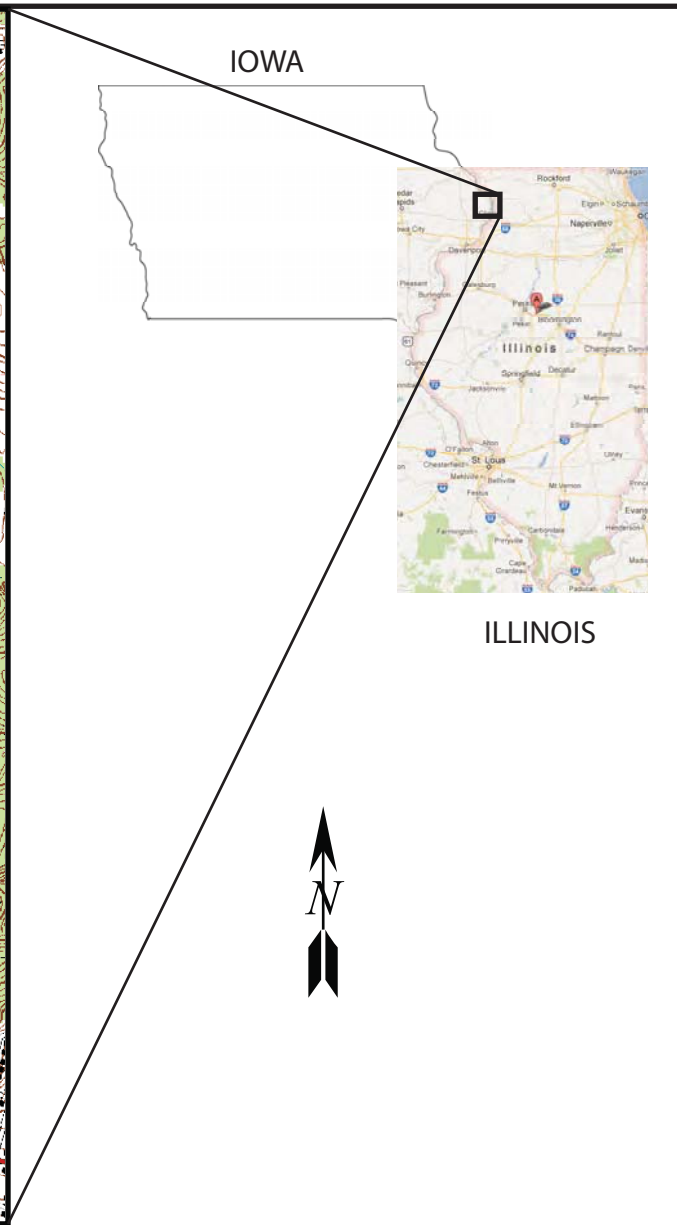
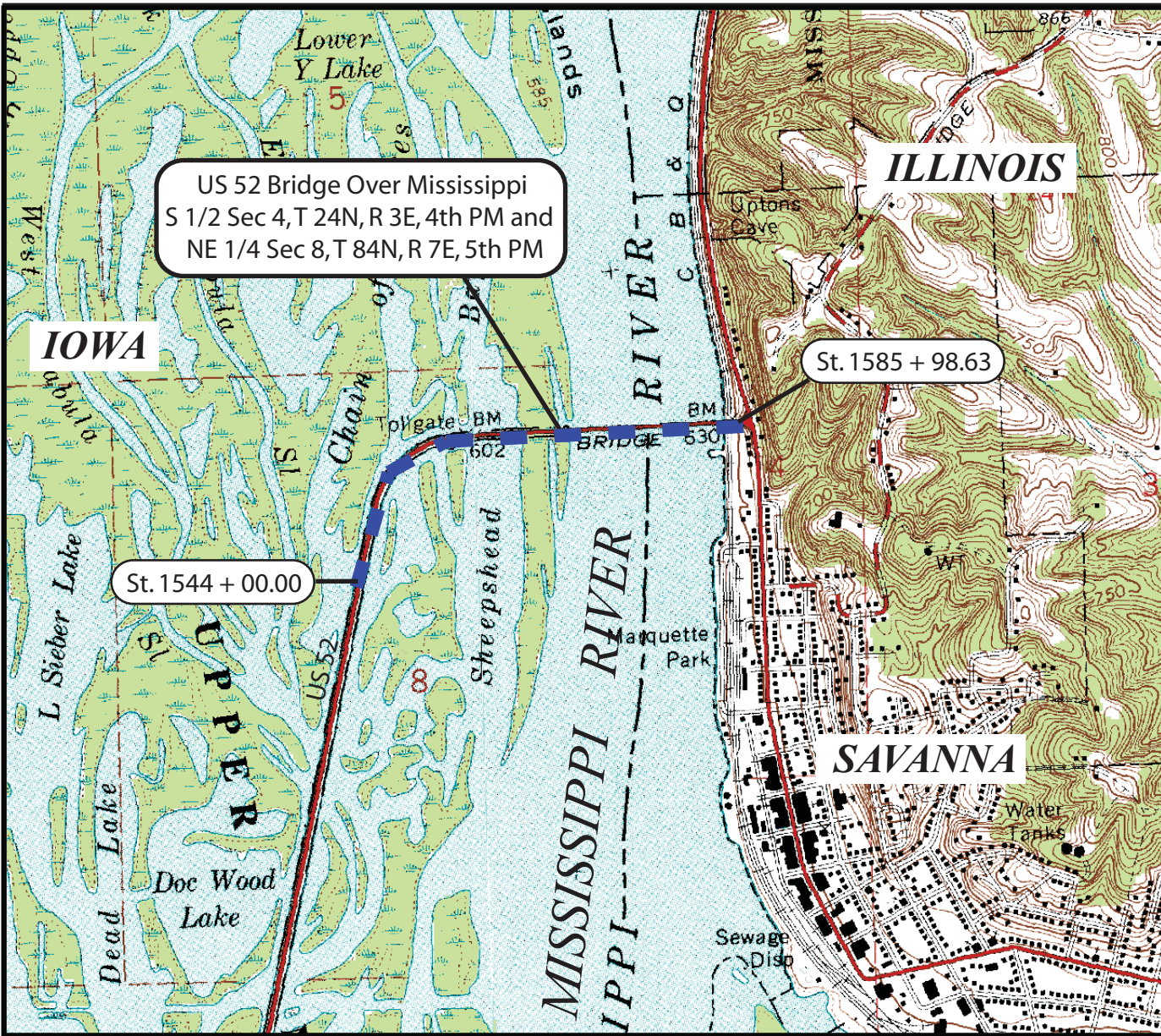
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REFERENCES

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EXHIBITS

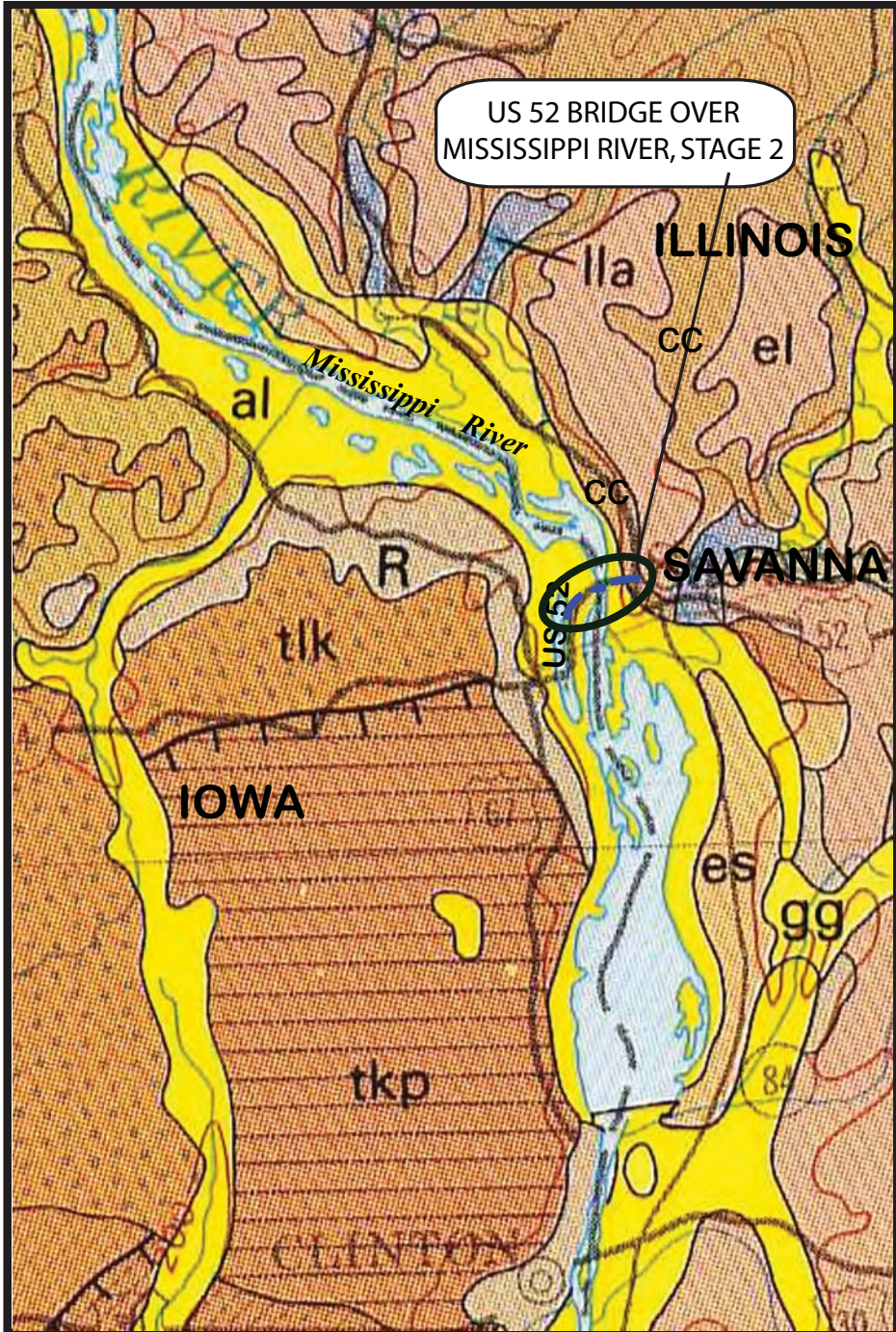


SITE LOCATION MAP: US 52 OVER MISSISSIPPI RIVER, STAGE 2
 CARROLL COUNTY, ILLINOIS and JACKSON COUNTY, IOWA

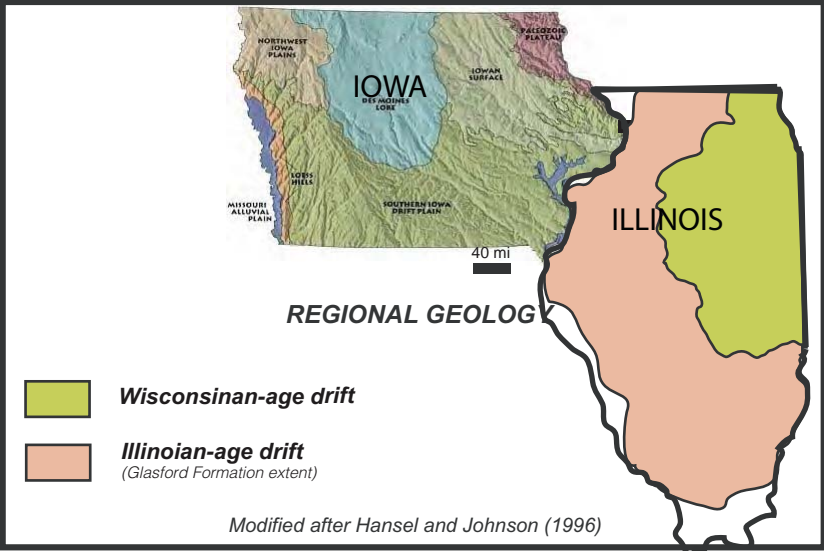
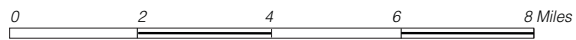
SCALE: GRAPHICAL	EXHIBIT 1	DRAWN BY: A. Happel CHECKED BY: C. Marin
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	FOR PARSONS

342-06-01



Modified after Richmond et al. (1991)



- Wisconsinan-age drift**
- Illinoian-age drift**
(Glasford Formation extent)

Modified after Hansel and Johnson (1996)

LEGEND

- al** **Cahokia Alluvium,**
Deposits in flood plains and channels of modern rivers and streams; stratified silt, clay and sand with wood and shell fragments;
- es** **Parkland Sand,**
Eolian sheet sand, brown, well-sorted, medium to fine sand; blanketlike deposits and dune overlies the lake deposits;
- el** **Peoria Loess,**
Gray to yellowish-brown windblown silt and silt loam; mapped only in Illinois and where its thickness is more than 6 m;
- cc** **Collivium,**
Material transported and deposited by mass-wasting processes; brown or reddish-brown to gray clay, sandy caly, or clayey sand contains angular and subangular clasts of dolostone, chert, minor limestone and sandstone; thin discontinuous patches, mapped only in Illinois;
- lla** **Equality Formation,**
Slackwater lake deposits; stratified silt, clay and sand; yellowish-brown to brown and gray, massive to thinly laminated silty clay and silt;
- gg** **Henry Formation,**
Outwash sand and gravel deposits; yellowish-brown to gray pebble to cobble gravel in fine to coarse sand matrix; mapped only in Illinois;
- tkp** **Glasford Formation,**
Ground moraine; loamy till, reddish-brown to bluish-gray clay lom and loam; texture from sany loam to clay loam, massive and compact with clasts of limestone and dolostone, occasionaly shale, sandstone, granite, coal;
- tk** **Walf Creek Formation,**
Pre-Illinoian loamy till, light- to dark-gray sandy to silty loam; nonsorted to poorly sorted; compact calcareous; clasts of pebble and gravel size, most are granite and fine-grained igneous and metamorphis rocks.
- R** **Bedrock,**
Silurian dolostone and Ordovician Maquoketa shale and Galena dolostone

Modified after Richmond et al. (1991)

SITE AND REGIONAL GEOLOGY: US 52 BRIDGE OVER MISSISSIPPI RIVER, STAGE 2, CARROLL COUNTY, ILLINOIS and JACKSON COUNTY, IOWA

SCALE: GRAPHICAL	EXHIBIT 2	DRAWN BY: C. Marin CHECKED BY: L. Iordache
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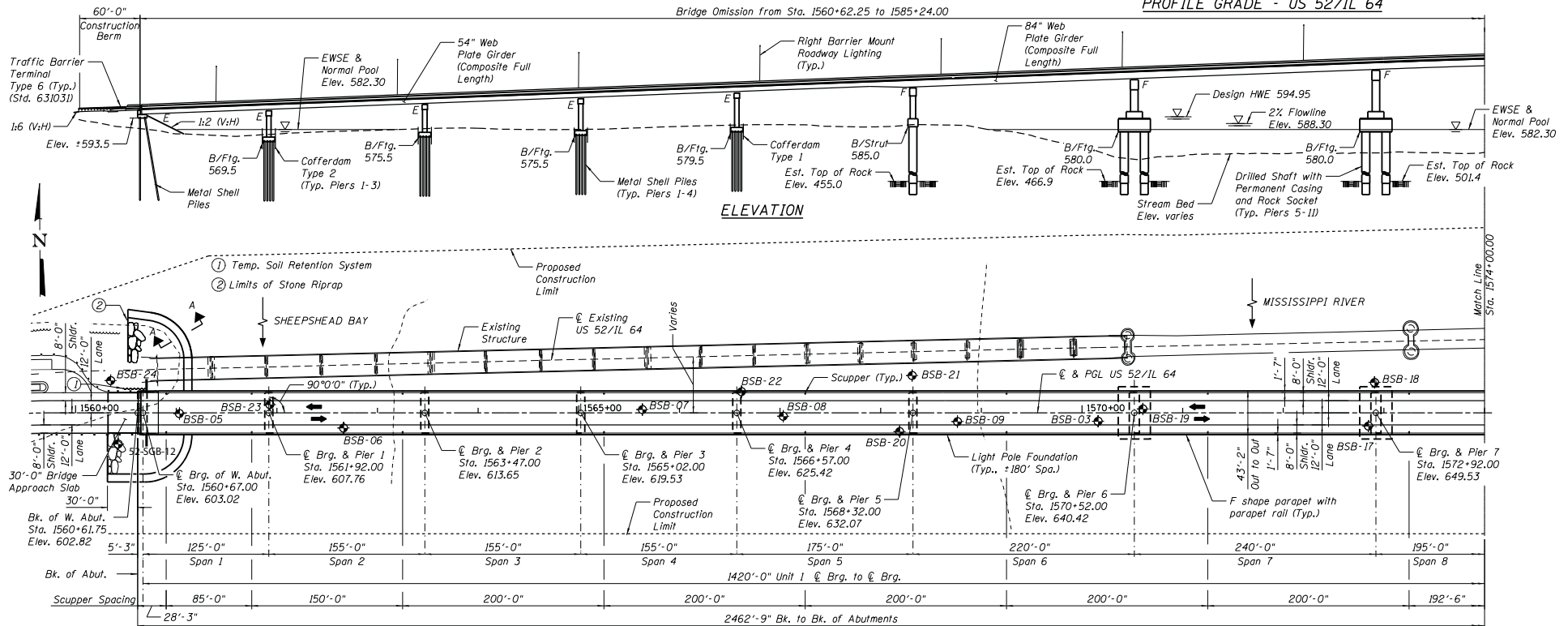
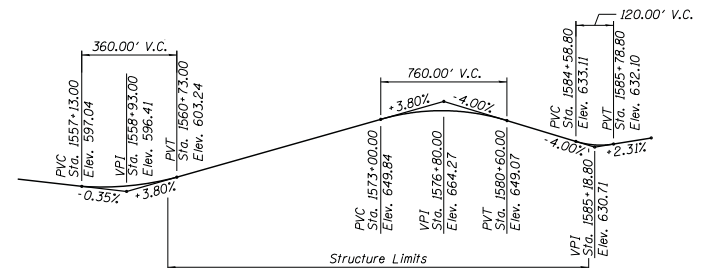
FOR PARSONS	342-06-01
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THIS EXHIBIT IS TO BE USED FOR BORING LOCATIONS ONLY

Benchmark:
 BM CP5 - Concrete pedestal set south of the west abutment of Illinois River Bridge SN 008-6000 on US 52 @ Savanna Sta. 1560+65.46; Offset 24.85' Lt. NAVD 88 = 597.891 Ft.

Existing Structure: SN 008-6000 Steel girder, steel truss and concrete slab superstructure bridge on pile bents and piers. Approximately 50' to 100' upstream. Approximately 2470' long by 20' wide. Constructed in 1932. To be removed after new structure is complete.
Traffic Control: none
No Salvage

- Notes:**
- All Elevations are given in NAVD 1988 Datum unless noted. NAVD 1988 = NGVD 1929 - 0.10'.
 - EWSE = Estimated Water Surface Elevation.
 - HWE = High Water Elevation.
 - For ground elevations see Sheet 5.
 - Denotes soil boring.
 - For scupper type see Cross Sections on Sheet 3 & 4.
 - Proposed lighting unit: 35 ft. aluminum pole, 8 ft. davit arm, 250W HPS luminaire, MC2 distribution, mounted on bridge parapet wall.
 - Lighting unit is subject to refinement during the design phase.
 - For Section A-A see Sheet 5.



SEISMIC DATA

Seismic Performance Zone (SPZ) = 1
 Design Spectral Acceleration at 1.0 sec. (S_{D1}) = 0.077g
 Design Spectral Acceleration at 0.2 sec. (S_{D5}) = 0.114g
 Soil Site Class = D (West Abut., Piers 1-8)
 Design Spectral Acceleration at 1.0 sec. (S_{D1}) = 0.054g
 Design Spectral Acceleration at 0.2 sec. (S_{D5}) = 0.086g
 Soil Site Class = C (Piers 9-11, East Abut.)

DESIGN STRESSES

FIELD UNITS
 f'_c = 3,500 psi
 f'_c = 4,000 psi (Drilled Shafts)
 f_y = 60,000 psi (Reinforcement)
 f_y = 50,000 psi (M270 Grade 50)
 f_y = 50,000 psi (M270 Grade HPS50W, Unit 2 Hanger Plates, Ties & Knuckles)

LOADING HL - 93

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

DESIGN SPECIFICATIONS

2012 AASHTO LRFD Bridge Design Specifications, 6th Edition with 2013 Interims

BORING LOCATION PLAN: US 52/IL 64 OVER MISSISSIPPI RIVER, CARROLL COUNTY, ILLINOIS AND JACKSON COUNTY, IOWA

Date: 1/29/14
EXHIBIT 3-1
 DRAWN BY: C. Mann
 CHECKED BY: M. Kohn

 1145 N. Main Street
 Lombard, IL 60148
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 FOR PARSONS 342-06-01

GENERAL PLAN & ELEVATION - 1
US 52/IL 64 OVER THE MISSISSIPPI RIVER

PUBLIC WATER
 F.A.P. RTE. 17 - SEC. 104B-2
 CARROLL (IL) AND JACKSON (IA) COUNTIES
 STATION 1577+60.00
 STRUCTURE NO. 008-0052

FILE NAME	USER NAME	DESIGNED	REVISED
PARSONS		- TSB	
DATE	CHECKED	- GTH	REVISED
1/20/2014			
PLOT SCALE	DRAWN	- TSB	REVISED
PLOT DATE	CHECKED	- GTH	REVISED

STATE OF ILLINOIS
 DEPARTMENT OF TRANSPORTATION

FILE NO.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
17	104B-2	Carroll		
CONTRACT NO. 64C59			ILLINOIS FED. AID PROJECT	

SHEET NO. 1 OF 5 SHEETS

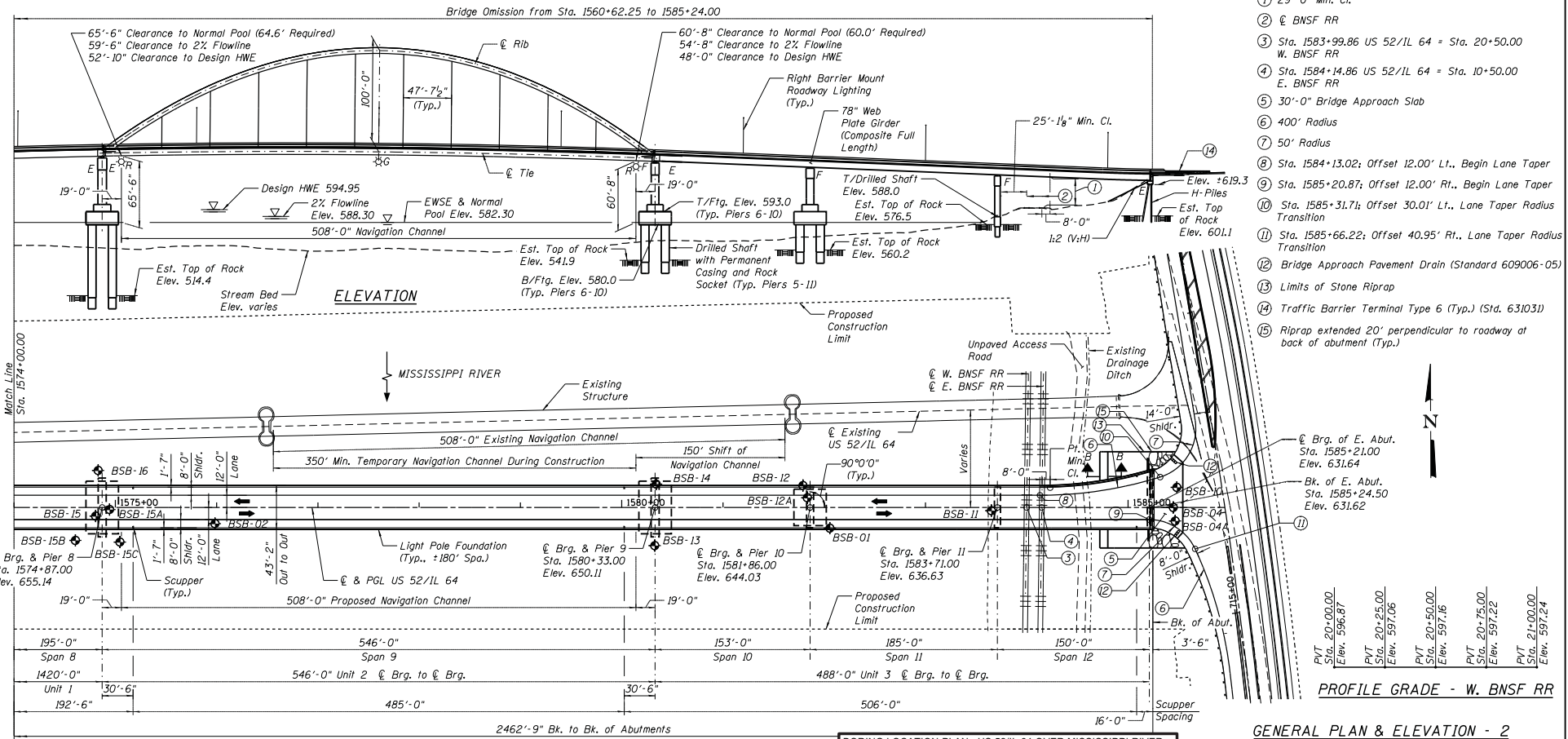
THIS EXHIBIT IS TO BE USED FOR BORING LOCATIONS ONLY

Notes:

- All Elevations are given in NAVD 1988 Datum unless noted.
- EWSE = Estimated Water Surface Elevation.
- HWE = High Water Elevation.
- For ground elevations see Sheet 5.
- ◆ Denotes soil boring.
- For scupper type see Cross Sections on Sheet 3 & 4.
- Proposed lighting unit; 35 ft. aluminum pole, 8 ft. davit arm, 250W HPS luminaire, MC2 distribution, mounted on bridge parapet wall.
- Lighting unit is subject to refinement during the design phase.
- 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.
- For Section B-B see Sheet 5.

WATERWAY INFORMATION

Drainage Area = 85,500 sq. mi.		Low Grade Elev. 596.98		Sta. 1557+43.0				
Flood	Frea. Yr.	O C.F.S.	Opening Sq. Ft.		Nat. Head - Ft.	Headwater El.		
			Exist.	Prop.			H.W.E.	Exist. Prop.
Ten-Year	10	202,000	93,196.8	93,292.9	591.67	0.00	591.68	591.69
Design	50	259,000	122,842.9	122,919.8	594.94	0.00	594.94	594.95
Base	100	281,290	133,150.7	133,204.0	596.07	0.00	596.07	596.07
Max. Calc.	500	337,000	154,320.5	154,357.4	598.21	0.00	598.21	598.21



- 29'-0" Min. Cl.
- ± BNSF RR
- Sta. 1583+99.86 US 52/IL 64 = Sta. 20+50.00 W. BNSF RR
- Sta. 1584+14.86 US 52/IL 64 = Sta. 10+50.00 E. BNSF RR
- 30'-0" Bridge Approach Slab
- 400' Radius
- 50' Radius
- Sta. 1584+13.02; Offset 12.00' Lt., Begin Lane Taper
- Sta. 1585+20.87; Offset 12.00' Rt., Begin Lane Taper
- Sta. 1585+31.71; Offset 30.01' Lt., Lane Taper Radius Transition
- Sta. 1585+66.22; Offset 40.95' Rt., Lane Taper Radius Transition
- Bridge Approach Pavement Drain (Standard 609006-05)
- Limits of Stone Riprap
- Traffic Barrier Terminal Type 6 (Typ.) (Std. 631031)
- Riprap extended 20' perpendicular to roadway at back of abutment (Typ.)

DESIGN SCOUR ELEVATION TABLE

Design Scour Elevation (ft.)	West Abut.	Pier 1	Pier 2	Pier 3	Pier 4	Pier 5	Pier 6	Pier 7	Pier 8	Pier 9	Pier 10	Pier 11	East Abut.
0100	593.5	555.4	558.1	565.7	567.0	520.6	505.8	509.1	520.6	541.9	560.2	576.5	619.3
0500	593.5	553.4	556.2	563.7	565.0	519.6	503.8	507.1	519.6	541.9	560.2	576.5	619.3

BORING LOCATION PLAN: US 52/IL 64 OVER MISSISSIPPI RIVER, GARROLL COUNTY, ILLINOIS AND JACKSON COUNTY, IOWA

Date: 1/29/14 **EXHIBIT 3-2** DRAWN BY: C. Mann
 CHECKED BY: M. Kothawala

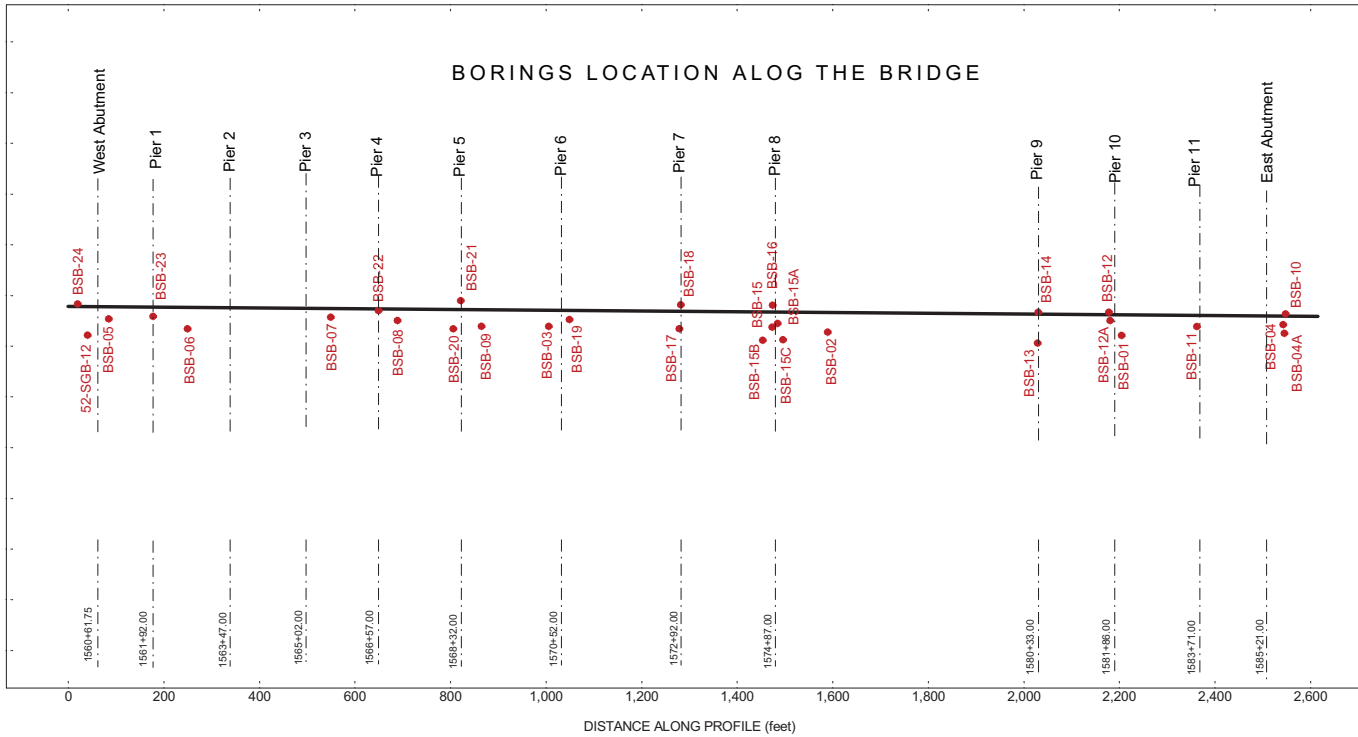
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FOR PARSONS 342-06-01

GENERAL PLAN & ELEVATION - 2
 US 52/IL 64 OVER THE MISSISSIPPI RIVER
 PUBLIC WATER
 F.A.P. RTE. 17 - SEC. 104B-2
 CARROLL (IL) AND JACKSON (IA) COUNTIES
 STATION 1577+60.00
 STRUCTURE NO. 008-0052



BORINGS LOCATION ALONG THE BRIDGE



DISTANCE ALONG PROFILE (feet)

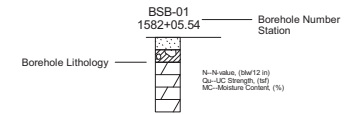
Lithology Graphics

- | | | | |
|-----------------------------|-------------------|---|--|
| IDH Sand, Sandy Loam | Weathered bedrock | Shale | Dolomite or Dolomitic Limestone |
| Gravelly sand, sandy gravel | Topsoil | IDH Silty Clay, Silty Clay Loam | IDH Sandy Clay, Sandy Clay Loam |
| IDH Silt, Silty Loam | Coarse sand | USCS High Plasticity Organic silt or clay | USCS Low Plasticity Organic silt or clay |
| Pavement | IDH Loam | IDH Clay Loam | |

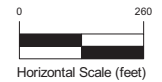
LEGEND

Site Map Scale 1 inch equals 955 feet

Explanation:



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



Vertical Exaggeration: 5.5x

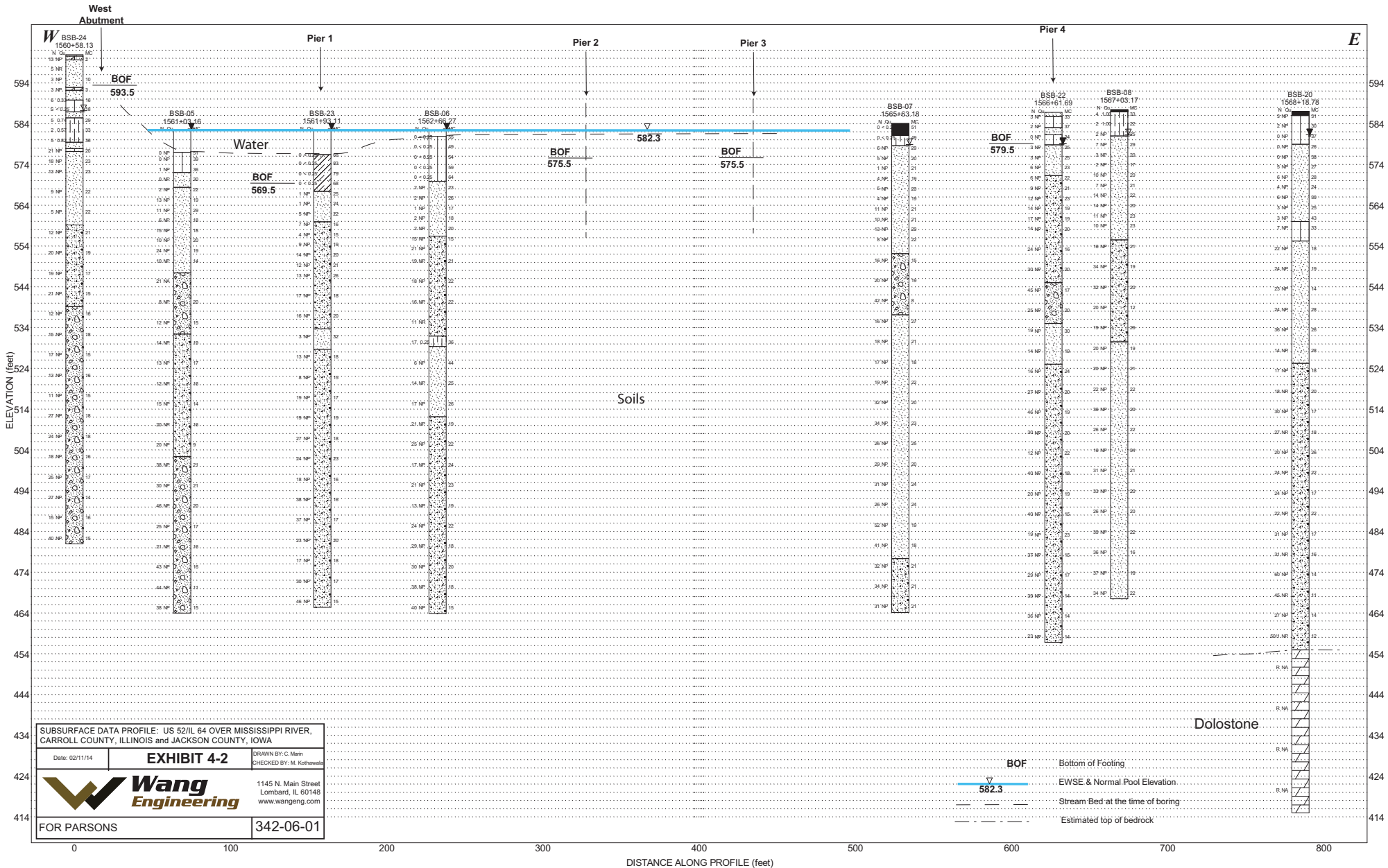
Wang Engineering
 1145 N Main Street
 Lombard, IL 60148

SUBSURFACE DATA LEGEND US 52 over Mississippi River



US 52 / IL 64 Over the Mississippi River
 Carroll County, IL and Jackson County, IA

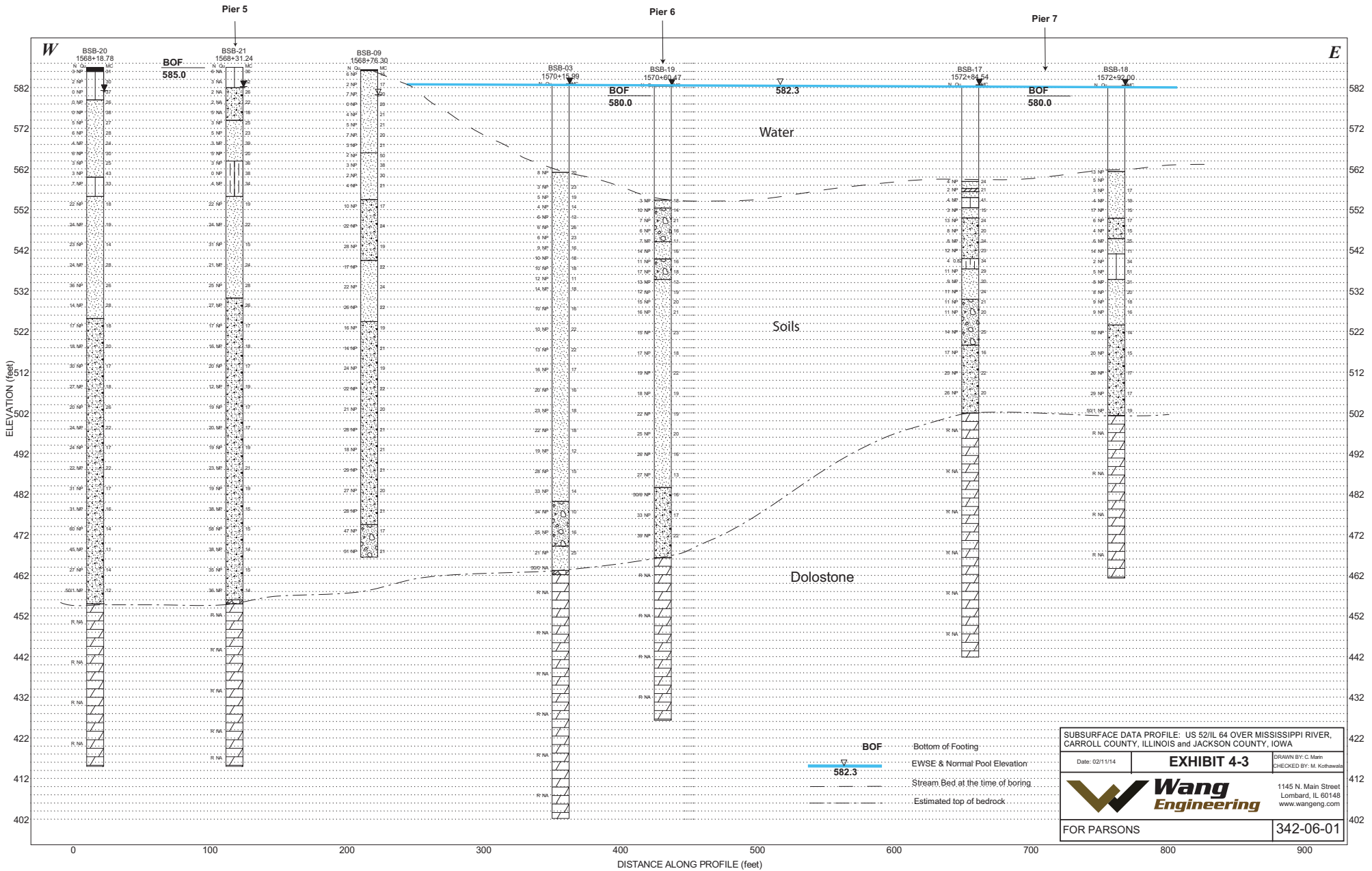
JOB NUMBER	PLATE NUMBER
342-06-01	EXHIBIT 4-1

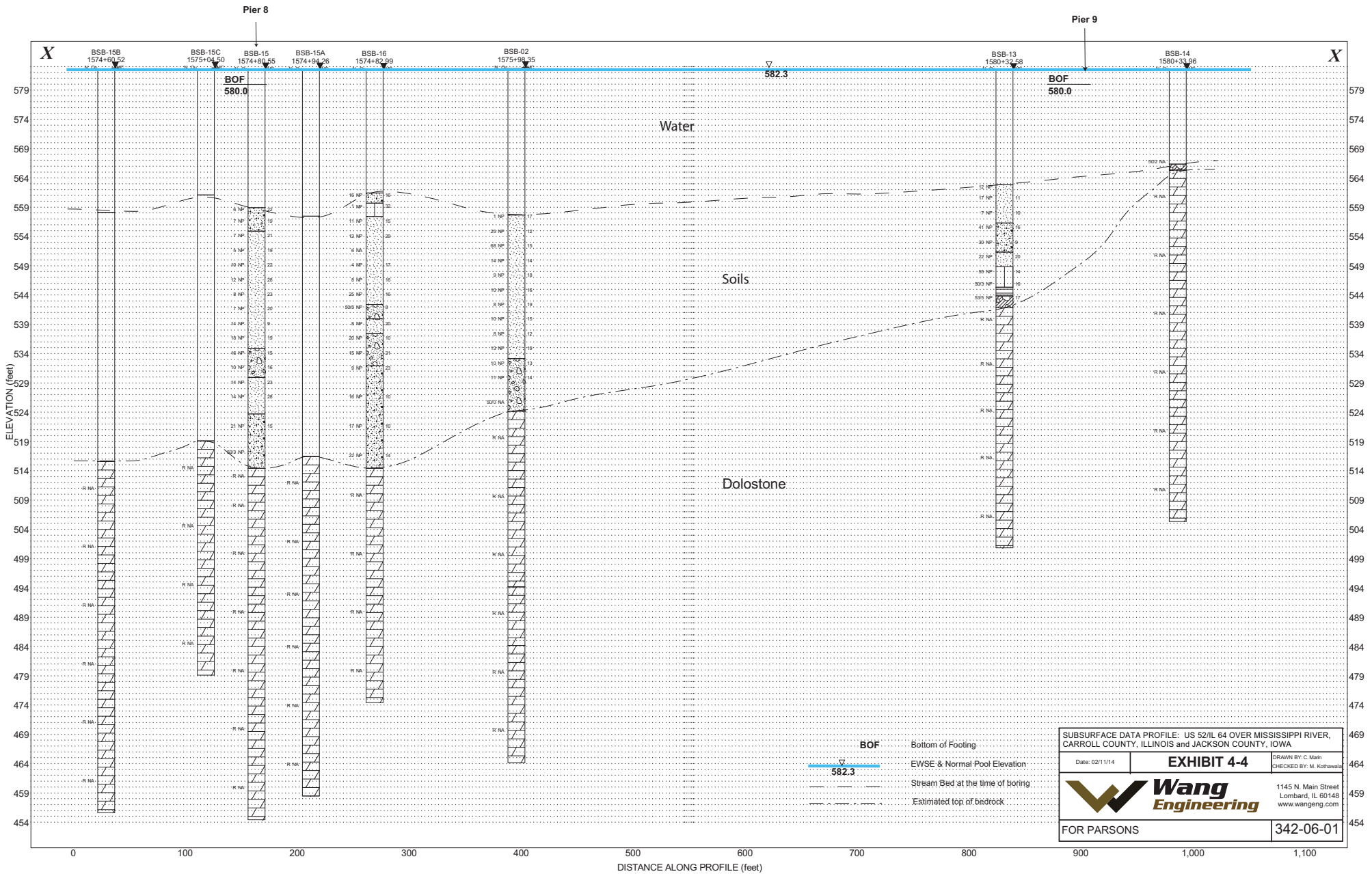


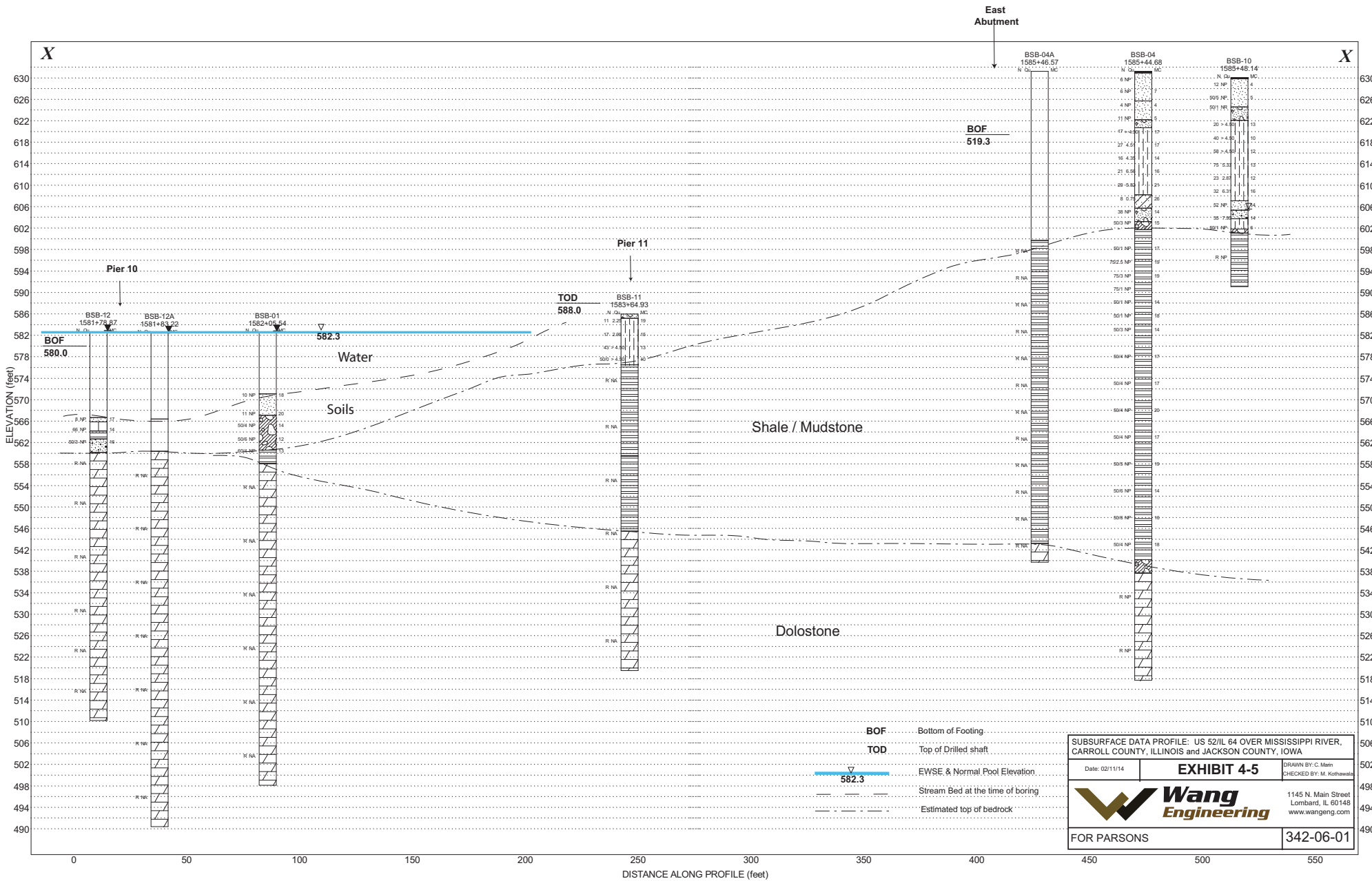
SUBSURFACE DATA PROFILE: US 52/IL 64 OVER MISSISSIPPI RIVER, CARROLL COUNTY, ILLINOIS and JACKSON COUNTY, IOWA

Date: 02/11/14	EXHIBIT 4-2	DRAWN BY: C. Mast CHECKED BY: M. Kohawala
Wang Engineering		1145 N. Main Street Lombard, IL 60148 www.wangeng.com
FOR PARSONS		342-06-01

- BOF** Bottom of Footing
- 582.3** EWSE & Normal Pool Elevation
- Stream Bed at the time of boring
- Estimated top of bedrock







APPENDIX A

LEGEND FOR BORING LOG

Relative Density of Non-Cohesive Soils	
N-Blows/ 12 inches	Relative Density Term
0-3	Very Loose
4-9	Loose
10-29	Medium Dense
30-49	Dense
50-80+	Very Dense

Consistency of Cohesive Soils	
Unconfined Compressive Strength Q_u , tsf	Consistency Term
<0.25	Very Soft
0.25-0.49	Soft
0.50-0.99	Medium Stiff
1.00-1.99	Stiff
2.00-3.99	Very Stiff
>4.00	Hard

Proportional Terms		Percent of Dry Weight
Trace	1-9	
Little	10-19	
Some	20-34	
And	35-50	
Gradation Terminology		
Boulders	>200mm	
Cobbles	200mm to 75mm	
Gravel	75mm to 2mm	
Sand	2-0mm to 0.074mm	
Silt	0.074mm to 0.002mm	
Clay	<0.002mm	

SS = Split Spoon
 ST = Shelby Tube
 SPT = Standard Penetration Test
 Q_u = Unconfined Compressive Strength
 P = Pocket Penetrometer
 S = Shear failure of sample, Rimac test
 B = Bulge failure of sample, Rimac test
 SSA = Solid Stem Augers,
 HSA = Hollow Stem Augers,

Sample Type Symbols



Split Spoon



Rock Core



In-situ Vane Shear Test



No Recovery



Shelby Tube



Geoprobe



Auger Cuttings

SPT = Standard Penetration Test
 N Value is the sum of the second and the third numbers



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

BORING LOG BSB-01

WEI Job No.: 342-06-01

Client: **PARSONS**
 Project: **US 52 / IL 64 Over the Mississippi River**
 Location: **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 582.63 ft
 North: 1980420.11 ft
 East: 2298615.04 ft
 Station: 1582+05.54
 Offset: 20.42 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--WATER--															
			5								Strong to very strong, good to very good rock quality, light gray, brownish gray and gray, fresh, moderate to slightly fractured, vuggy, DOLOSTONE with trace fossils and pyrite, mostly horizontally fractured						
											Qu=7580 psi ---> --RUN 1 - RECOVERY= 98%-- --RQD=98%--			1			
											24.5 to 29.5 = 4 min/foot 29.5 to 34.5 = 5 min/foot						
											Qu=10780 psi --->						
			10								--RUN 2 - RECOVERY= 100%-- --RQD=95%--						
											Qu=12060 psi --->						
	571.1	Medium dense, dark gray SAND, trace shell fragments			1	255	NP	18			34.5 to 37.5 = 4 min/foot 37.5 to 41.5 = 3 min/foot 41.5 to 44.5 = 4 min/foot			2			
		--%Gravel=9.7-- --%Sand=84.9-- --%Silt=5.2-- --%Clay=0.2-- --A-3 (0)--	15								Qu=12320 psi --->						
	567.1	Medium dense to very dense, brown to dark gray SILTY CLAY LOAM to SILTY LOAM			2	1147	NP	20									
		--WEATHERED SHALE BEDROCK--			3	1550/4	NP	14			Qu=10700 psi --->						
			20		4	2250/6	NP	12			--RUN 3 - RECOVERY= 100%-- --RQD=93%--						
					5	60/4	NP	13			44.5 to 48.5 = 4 min/foot 48.5 to 54.5 = 4.5 min/foot			3			
	560.6	Very dense, gray and black SHALE															
		Hard drilling from 24.0 ft															
	558.1										Qu=11640 psi --->						

GENERAL NOTES

Begin Drilling **10-31-2011** Complete Drilling **11-01-2011**
 Drilling Contractor **Wang Testing Services** Drill Rig **B-57 TMR**
 Driller **R&N** Logger **F. Bozga** Checked by **C. Marin**
 Drilling Method **3.25" HSA, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ∇ **0.00 ft**
 At Completion of Drilling \blacktriangledown **0.00 ft**
 Time After Drilling **NA**
 Depth to Water ∇ **NA**

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

WANGENGINC 3420601.GPJ WANGENG.GDT 2/12/14



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BORING LOG BSB-01

WEI Job No.: 342-06-01

Client: **PARSONS**
 Project: **US 52 / IL 64 Over the Mississippi River**
 Location: **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 582.63 ft
 North: 1980420.11 ft
 East: 2298615.04 ft
 Station: 1582+05.54
 Offset: 20.42 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
											--RUN 6 - RECOVERY=100%-- --RQD=98%-- 74.5 to 79.5 = 4.5 min/foot 79.5 to 84.5 = 5 min/foot						
		Qu=9880 psi ---> Qu=8800 psi ---> --RUN 4 - RECOVERY= 100%-- --RQD=100%-- 54.5 to 59.5 = 5 min/foot 59.5 to 64.5 = 6 min/foot	55											6			
					4					498.1							
		Qu=10050 psi --->									Boring terminated at 84.50 ft	85					
		Qu=10150 psi --->															
		Qu=7290 psi ---> --RUN 5 - RECOVERY= 100%-- --RQD=100%-- 64.5 to 66.5 = 6 min/foot 66.5 to 74.5 = 5 min/foot	65														
		Qu=9520 psi --->	70		5												
		Qu=9390 psi --->															
		Qu=9020 psi --->	75														

GENERAL NOTES

WATER LEVEL DATA

Begin Drilling **10-31-2011** Complete Drilling **11-01-2011**
 Drilling Contractor **Wang Testing Services** Drill Rig **B-57 TMR**
 Driller **R&N** Logger **F. Bozga** Checked by **C. Marin**
 Drilling Method **3.25" HSA, boring backfilled upon completion**

While Drilling ∇ **0.00 ft**
 At Completion of Drilling ∇ **0.00 ft**
 Time After Drilling **NA**
 Depth to Water ∇ **NA**

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

Run #1



BOTTOM

Run #2



BOTTOM

Run #3



BOTTOM

Run #4



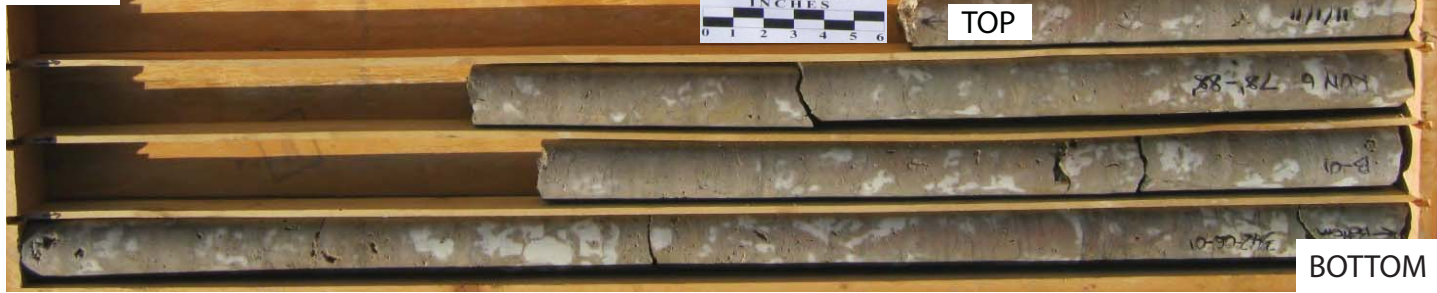
BOTTOM

Run #5



BOTTOM

Run #6



BOTTOM


Boring	Run No.	From (ft)	To (ft)	Recovery (%)	RQD (%)
BSB-01	1	24.5	34.5	98.3	98.3
	2	34.5	44.5	100	95
	3	44.5	54.5	100	93.3
	4	54.5	64.5	100	100
	5	64.5	74.5	100	100
	6	74.5	84.5	100	97.5

BEDROCK CORE: US 52/IL 64 OVER MISSISSIPPI RIVER, SAVANNA, ILLINOIS / SABULA, IOWA

SCALE: GRAFIC

BSB-01

DRAWN BY: C.L.M.
CHECKED BY: M.A.K.



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FOR PARSONS CORPORATION

342-06-01



BORING LOG BSB-02

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WEI Job No.: 342-06-01

Client: **PARSONS**
 Project: **US 52 / IL 64 Over the Mississippi River**
 Location: **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 582.70 ft
 North: 1980427.34 ft
 East: 2298007.87 ft
 Station: 1575+98.35
 Offset: 15.96 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	557.7	--WATER--								533.2	Very loose to very dense, brown to gray SAND, trace gravel						
			5											1	0 0 1		17
														2	7 9 16		12
														3	21 33 35		15
														4	8 7 7		14
														5	3 4 5		18
														6	4 5 5		16
														7	3 4 4		19
														8	2 4 6		15
														9	3 4 4		12
														10	4 6 7		19

--%Gravel=3.5--
 --%Sand=88.0--
 --%Silt=8.1--
 --%Clay=0.4--
 --A-1-b (0)--

--%Gravel=13.3--40
 --%Sand=85.1--
 --%Silt=1.5--
 --%Clay=0.1--
 --A-3 (0)--

GENERAL NOTES

WATER LEVEL DATA

Begin Drilling **11-02-2011** Complete Drilling **11-03-2011**
 Drilling Contractor **Wang Testing Services** Drill Rig **B-57 TMR**
 Driller **R&N** Logger **F. Bozga** Checked by **C. Marin**
 Drilling Method **3.25" HSA, boring backfilled upon completion**

While Drilling ∇ **0.00 ft**
 At Completion of Drilling ∇ **0.00 ft**
 Time After Drilling **NA**
 Depth to Water ∇ **NA**

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



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BORING LOG BSB-02

WEI Job No.: 342-06-01

Client: **PARSONS**
 Project: **US 52 / IL 64 Over the Mississippi River**
 Location: **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 582.70 ft
 North: 1980427.34 ft
 East: 2298007.87 ft
 Station: 1575+98.35
 Offset: 15.96 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		Medium dense, gray GRAVELLY SAND			11	5 5 5 5	NP	13									
		--%Gravel=33.3-- --%Sand=63.4-- --%Silt=3.2-- --%Clay=0.1-- --A-1-b (0)--			12	5 5 6	NP	14			Qu=7070 psi --->						
			55								--RUN 3 - RECOVERY=98% --RQD=92%-- Qu=5850 psi --->80						
		Hard drilling at 57.5 ft			13		NA				78.5 to 88.5 = 3.5 min/foot						
	524.2					50/0								3			
		Strong, poor to good rock quality, light gray, gray, and brown, slightly weathered to fresh, moderate to slightly fractured, and vuggy DOLOSTONE with trace fossils and pyrite, mostly horizontally fractured --Qu=8150 psi --->	60														
		--RUN 1 - RECOVERY= 100%-- --RQD=47%--			1					494.2	Qu=10620 psi --->						
		58.5 to 68.5 = 5 min/foot									Strong, poor rock quality, brown and gray, weathered, intensely fractured, and vuggy DOLOSTONE with trace fossils and pyrite	90					
		Qu=7250 psi --->									--RUN 4 - RECOVERY= 100%-- --RQD=30%-- Qu=7710 psi --->			4			
		--RUN 2 - RECOVERY= 100%-- --RQD=83%-- Qu=9960 psi --->70	65								88.5 to 98.5 = 2.5 min/foot						
		68.5 to 72.5 = 2 min/foot 72.5 to 78.5 = 3 min/foot															
					2					484.2	Qu=6900 psi --->						
			75								Strong, good rock quality, gray, fresh, moderate to slightly fractured, and vuggy	100					

GENERAL NOTES

WATER LEVEL DATA

Begin Drilling **11-02-2011** Complete Drilling **11-03-2011**
 Drilling Contractor **Wang Testing Services** Drill Rig **B-57 TMR**
 Driller **R&N** Logger **F. Bozga** Checked by **C. Marin**
 Drilling Method **3.25" HSA, boring backfilled upon completion**

While Drilling **0.00 ft**
 At Completion of Drilling **0.00 ft**
 Time After Drilling **NA**
 Depth to Water **NA**

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

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BORING LOG BSB-02

WEI Job No.: 342-06-01

Client **PARSONS**
 Project **US 52 / IL 64 Over the Mississippi River**
 Location **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 582.70 ft
 North: 1980427.34 ft
 East: 2298007.87 ft
 Station: 1575+98.35
 Offset: 15.96 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	464.2	DOLOSTONE with trace fossils, chert nodules, and pyrite, mostly horizontally fractured --RUN 5 - RECOVERY= 93%-- --RQD=80%-- 98.5 to 103.5 = 1.5 min/foot 103.5 to 108.5 = 2.5 min/foot Qu=6090 psi --->	105		5												
		--RUN 6 - RECOVERY= 99%-- --RQD=85%-- Qu=6530 psi ---> 108.5 to 118.5 = 2 min/foot	110		6												
		Boring terminated at 118.50 ft	120														
			125														

GENERAL NOTES

WATER LEVEL DATA

Begin Drilling **11-02-2011** Complete Drilling **11-03-2011**
 Drilling Contractor **Wang Testing Services** Drill Rig **B-57 TMR**
 Driller **R&N** Logger **F. Bozga** Checked by **C. Marin**
 Drilling Method **3.25" HSA, boring backfilled upon completion**

While Drilling ∇ **0.00 ft**
 At Completion of Drilling \blacktriangledown **0.00 ft**
 Time After Drilling **NA**
 Depth to Water ∇ **NA**

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

Run #1

TOP



Run #2

TOP



Run #3

TOP



Run #4

TOP



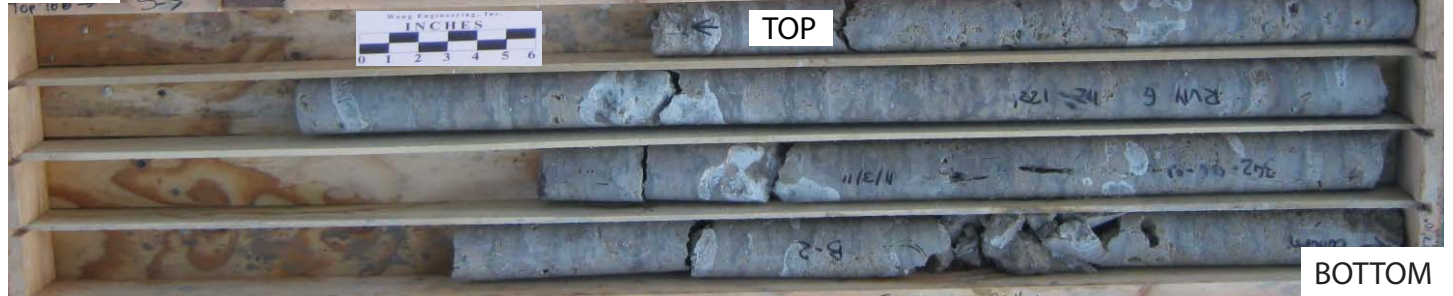
Run #5

TOP



Run #6

TOP




Boring	Run No.	From (ft)	To (ft)	Recovery (%)	RQD (%)
BSB-02	1	58.5	68.5	100	46.7
	2	68.5	78.5	100	82.5
	3	78.5	88.5	98.3	91.7
	4	88.5	98.5	100	30
	5	98.5	108.5	92.5	80
	6	108.5	118.5	99.2	85

BEDROCK CORE: US 52/IL 64 OVER MISSISSIPPI RIVER,
SAVANNA, ILLINOIS / SABULA, IOWA

SCALE: GRAFIC

BSB-02

DRAWN BY: C.L.M.
CHECKED BY: M.A.K.



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342-06-01



BORING LOG BSB-03

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WEI Job No.: 342-06-01

Client: **PARSONS**
 Project: **US 52 / IL 64 Over the Mississippi River**
 Location: **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 582.70 ft
 North: 1980437.61 ft
 East: 2297425.56 ft
 Station: 1570+15.99
 Offset: 08.33 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--WATER--															
														2	1 2 1	NP	23
														3	3 2 3	NP	19
			5											4	1 2 2	NP	14
											--trace shell fragments--			5	2 3 3	NP	13
			10											6	3 3 3	NP	26
											--%Gravel=0.8-- --%Sand=97.8-- --%Silt=0.7-- --%Clay=0.7-- --A-3 (0)--			7	2 3 3	NP	23
			15											8	3 4 5	NP	16
														9	3 4 6	NP	18
			20											10	4 5 5	NP	18
	561.2	Very loose to dense, gray SAND, trace gravel and shell fragments			1	2 4 4	NP	20						11	7 6 6	NP	11
			25								--some gravel--						

GENERAL NOTES

WATER LEVEL DATA

Begin Drilling **11-04-2011** Complete Drilling **11-01-0110**
 Drilling Contractor **Wang Testing Services** Drill Rig **B-57 TMR**
 Driller **R&N** Logger **F. Bozga** Checked by **C. Marin**
 Drilling Method **3.25" HSA, boring backfilled upon completion**

While Drilling ∇ **0.00 ft**
 At Completion of Drilling ∇ **0.00 ft**
 Time After Drilling **NA**
 Depth to Water ∇ **NA**

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

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BORING LOG BSB-03

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WEI Job No.: 342-06-01

Client **PARSONS**
 Project **US 52 / IL 64 Over the Mississippi River**
 Location **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 582.70 ft
 North: 1980437.61 ft
 East: 2297425.56 ft
 Station: 1570+15.99
 Offset: 08.33 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
					12	4 6 8	NP	18			--%Gravel=0.0-- --%Sand=97.6-- --%Silt=1.1-- --%Clay=1.2-- --A-1-b (0)--			17	8 9 11	NP	16
		--%Gravel=0.3-- --%Sand=96.8-- --%Silt=1.5-- --%Clay=1.4-- --A-3 (0)--	55		13	4 5 5	NP	16				80		18	8 11 12	NP	18
			60		14	3 4 6	NP	22				85		19	9 11 11	NP	18
			65		15	5 6 7	NP	22				90		20	8 9 10	NP	12
			70		16	7 8 8	NP	17			--%Gravel=2.3-- --%Sand=95.7-- --%Silt=0.9-- --%Clay=1.0-- --A-1-b (0)--	95		21	9 12 16	NP	15
			75									100					

GENERAL NOTES

WATER LEVEL DATA

Begin Drilling **11-04-2011** Complete Drilling **11-01-0110**
 Drilling Contractor **Wang Testing Services** Drill Rig **B-57 TMR**
 Driller **R&N** Logger **F. Bozga** Checked by **C. Marin**
 Drilling Method **3.25" HSA, boring backfilled upon completion**

While Drilling ∇ **0.00 ft**
 At Completion of Drilling \blacktriangledown **0.00 ft**
 Time After Drilling **NA**
 Depth to Water ∇ **NA**

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



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BORING LOG BSB-03

WEI Job No.: 342-06-01

Client: **PARSONS**
 Project: **US 52 / IL 64 Over the Mississippi River**
 Location: **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 582.70 ft
 North: 1980437.61 ft
 East: 2297425.56 ft
 Station: 1570+15.99
 Offset: 08.33 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	480.2	Medium dense, gray GRAVELLY SAND --hard drilling from 102.5 to 104.5 ft-- --%Gravel=16.4-- --%Sand=80.3-- --%Silt=1.6-- --%Clay=1.7-- --A-1-b (0)--	105	X	22	9 16 17	NP	14			--RUN 1 - RECOVERY= 96%-- --RQD= 70%-- Qu=10280 psi ---> 120.5 to 125.5 = 15 min/foot 125.5 to 126.5 = 10 sec/foot 126.5 to 130.5 = 2 min/foot	130		1			
	469.2	Medium dense, gray SAND	110	X	23	12 15 19	NP	10			--RUN 2 - RECOVERY= 100%-- --RQD= 89%-- 130.5 to 135.5 = 2 min/foot 135.5 to 140.5 = 2.5 min/foot	135		2			
	463.2	Medium dense, gray SAND	115	X	24	20 14 11	NP	16			Qu=14140 psi ---> Qu=7780 psi --->	140					
	463.2	--Hard drilling--	120	X	25	8 10 11	NP	25			Qu=4510 psi ---> --RUN 3 - RECOVERY= 100%-- --RQD= 100%-- 140.5 to 150.5 = 2 min/foot	145					
	462.2	--WEATHERED BEDROCK-- Strong, fair to excellent rock quality, light gray to gray and brownish gray, vuggy microcrystalline DOLOSTONE with horizontal wavy shaly black partings, occasional cherty nodules, moderately to slightly horizontally fractured, trace pyrite	125		26	50/0	NA				Qu=10350 psi --->	150		3			

GENERAL NOTES

WATER LEVEL DATA

Begin Drilling **11-04-2011** Complete Drilling **11-01-0110**
 Drilling Contractor **Wang Testing Services** Drill Rig **B-57 TMR**
 Driller **R&N** Logger **F. Bozga** Checked by **C. Marin**
 Drilling Method **3.25" HSA, boring backfilled upon completion**

While Drilling ∇ **0.00 ft**
 At Completion of Drilling ∇ **0.00 ft**
 Time After Drilling **NA**
 Depth to Water ∇ **NA**

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

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BORING LOG BSB-03

WEI Job No.: 342-06-01

Client: **PARSONS**
 Project: **US 52 / IL 64 Over the Mississippi River**
 Location: **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 582.70 ft
 North: 1980437.61 ft
 East: 2297425.56 ft
 Station: 1570+15.99
 Offset: 08.33 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
CORRE	402.2	Qu=10630 psi ---> --RUN 4 - RECOVERY= 96%-- --RQD= 85%-- 150.5 to 160.5 = 2 min/foot	155		4				CORRE	402.2	Qu=8800 psi --->	180		6			
		Qu=6220 psi --->	160					CORRE			402.2	Qu=6950 psi --->	180				
		--RUN 5 - RECOVERY= 100%-- --RQD= 96%-- Qu=9790 psi ---> 160.5 to 170.5 = 2.5 min/foot	165		5												
CORRE	402.2	Qu=9800 psi --->	170					CORRE	402.2	Boring terminated at 180.50 ft	195						
		--RUN 6 - RECOVERY= 100%-- --RQD= 96%-- Qu=11410 psi ---> 170.5 to 180.5 = 2 min / foot	175										200				

GENERAL NOTES

WATER LEVEL DATA

Begin Drilling **11-04-2011** Complete Drilling **11-01-0110**
 Drilling Contractor **Wang Testing Services** Drill Rig **B-57 TMR**
 Driller **R&N** Logger **F. Bozga** Checked by **C. Marin**
 Drilling Method **3.25" HSA, boring backfilled upon completion**

While Drilling ∇ **0.00 ft**
 At Completion of Drilling ∇ **0.00 ft**
 Time After Drilling **NA**
 Depth to Water ∇ **NA**

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

Run #1



Run #2



Run #3



Run #4



Run #5



Run #6



Boring	Run No.	From (ft)	To (ft)	Recovery (%)	RQD (%)
BSB-03	1	120.5	130.5	95.8	70
	2	130.5	140.5	100	89.2
	3	140.5	150.5	100	100
	4	150.5	160.5	95.8	85
	5	160.5	170.5	100	95.8
	6	170.5	180.5	100	95.8

BEDROCK CORE: US 52/IL 64 OVER MISSISSIPPI RIVER,
SAVANNA, ILLINOIS / SABULA, IOWA

SCALE: GRAFIC

BSB-03

DRAWN BY: C.L.M.
CHECKED BY: M.A.K.



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BORING LOG BSB-04

WEI Job No.: 342-06-01

Client: **PARSONS**
 Project: **US 52 / IL 64 Over the Mississippi River**
 Location: **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 631.23 ft
 North: 1980439.68 ft
 East: 2298954.27 ft
 Station: 1585+44.68
 Offset: 00.69 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	630.94	4-inch thick, black SILTY LOAM --TOPSOIL-- Loose, brown SANDY LOAM, trace wood and concrete fragments --FILL--			1	3 3 3 3	NP			605.7	Dense, brown GRAVELLY SANDY LOAM			11	18 22 16	NP	14
			5		2	4 3 3	NP	7		603.2	Very dense, gray, weathered SHALES			12	50/3	NP	15
	625.7	Loose to medium dense, brown, very fine to fine SAND			3	1 2 2	NP	4		601.7	Very dense, dark gray, interbedded SHALES and MUDSTONE 29.5' to 33.5' = 1 min/foot	30					
	622.2	Rock fragments --Hard drilling--	10		4	16 7 4	NP	5			Hard drilling (3 min/foot)	35		13	50/1	NP	17
	620.7	Hard, brown and gray SILTY CLAY, trace gravel			5	6 7 10	4.50 P	17						14	75/2.5	NP	19
			15		6	10 13 14	4.51 S	17			Hard drilling (1.5 min/foot)	40		15	75/3	NP	19
					7	6 7 9	4.35 B	14			Hard drilling (1.5 min/foot)			16	75/1	NP	
			20		8	6 9 12	6.56 B	16			Hard drilling (2 min/foot)	45		17	50/1	NP	14
					9	6 10 10	5.82 B	21			Hard drilling (2 min/foot)			18	50/1	NP	18
	608.2	Medium stiff, brown SANDY CLAY LOAM			10	3 3 5	0.75 P	26			Hard drilling (2 min/foot)	50		19	50/3	NP	14

GENERAL NOTES

WATER LEVEL DATA

Begin Drilling **11-15-2011** Complete Drilling **11-16-2011**
 Drilling Contractor **Wang Testing Services** Drill Rig **B-57 TMR**
 Driller **R&N** Logger **F. Bozga** Checked by **C. Marin**
 Drilling Method **3.25" HSA, boring backfilled upon completion**

While Drilling **DRY**
 At Completion of Drilling **DRY**
 Time After Drilling **NA**
 Depth to Water **NA**

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

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BORING LOG BSB-04

WEI Job No.: 342-06-01

Client: **PARSONS**
 Project: **US 52 / IL 64 Over the Mississippi River**
 Location: **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 631.23 ft
 North: 1980439.68 ft
 East: 2298954.27 ft
 Station: 1585+44.68
 Offset: 00.69 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		Hard drilling (2 min/foot)	55		20	50/4	NP	17			Hard drilling (2.5 min/foot)	80		25	50/6	NP	14
		Hard drilling (2 min/foot)	60		21	50/4	NP	17			Hard drilling (2.5 min/foot)	85		26	50/6	NP	16
		Hard drilling (2 min/foot)	65		22	50/4	NP	20			Hard drilling (2 min/foot)	90		27	50/4	NP	18
		Hard drilling (2 min/foot)	70		23	50/4	NP	17		540.2	--Possible WEATHERED DOLOSTONE BEDROCK--						
		Hard drilling (2.5 min/foot)	75		24	50/5	NP	19		537.7	Qu=9680 psi ---> Strong, fair rock quality, light gray, fresh, moderately to slightly fractured, vuggy, DOLOSTONE with pyrite, horizontally fractured --RUN 1 - RECOVERY= 98%-- --RQD= 50%-- 93.5' to 103.5' = 4 min/foot Qu=14950 psi --->	95		1		NP	

GENERAL NOTES

WATER LEVEL DATA

Begin Drilling **11-15-2011** Complete Drilling **11-16-2011**
 Drilling Contractor **Wang Testing Services** Drill Rig **B-57 TMR**
 Driller **R&N** Logger **F. Bozga** Checked by **C. Marin**
 Drilling Method **3.25" HSA, boring backfilled upon completion**

While Drilling **DRY**
 At Completion of Drilling **DRY**
 Time After Drilling **NA**
 Depth to Water **NA**

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

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BORING LOG BSB-04

WEI Job No.: 342-06-01

Client: **PARSONS**
 Project: **US 52 / IL 64 Over the Mississippi River**
 Location: **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 631.23 ft
 North: 1980439.68 ft
 East: 2298954.27 ft
 Station: 1585+44.68
 Offset: 00.69 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	517.7	--RUN 2 - RECOVERY= 100%-- --RQD= 69%-- 103.5- to 113.5' = 3 min/foot	105		2	MPCC	NP										
		Qu=11060 psi --->															
		Qu=12800 psi --->															
		Boring terminated at 113.50 ft	115														
			120														
			125														

GENERAL NOTES

WATER LEVEL DATA


Begin Drilling **11-15-2011** Complete Drilling **11-16-2011**
 Drilling Contractor **Wang Testing Services** Drill Rig **B-57 TMR**
 Driller **R&N** Logger **F. Bozga** Checked by **C. Marin**
 Drilling Method **3.25" HSA, boring backfilled upon completion**

While Drilling **DRY**
 At Completion of Drilling **DRY**
 Time After Drilling **NA**
 Depth to Water **NA**

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



Boring	Run No.	From (ft)	To (ft)	Recovery (%)	RQD (%)
BSB-04	1	93.5	103.5	98.3	50
	2	103.5	113.5	100	69

BEDROCK CORE: US 52/IL 64 OVER MISSISSIPPI RIVER, SAVANNA, ILLINOIS / SABULA, IOWA		
SCALE: GRAFIC	BSB-04	DRAWN BY: C.L.M. CHECKED BY: M.A.K.
		1145 N. Main Street Lombard, IL 60148 www.wangeng.com
FOR PARSONS CORPORATION		342-06-01



BORING LOG BSB-04A

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WEI Job No.: 342-06-01

Client: **PARSONS**
 Project: **US 52 / IL 64 Over the Mississippi River**
 Location: **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 631.23 ft
 North: 1980425.66 ft
 East: 2298956.03 ft
 Station: 1585+46.57
 Offset: 11.33 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		Drilled to 31.5 feet without sampling	5							599.7	Moderate to strong, very good to excellent rock quality, dark gray, interbedded SHALE and MUDSTONE	30					
			10								Qu=6900 psi --> --RUN 1 - RECOVERY= 100%-- --RQD= 80%-- 31.5' to 36.5' = 3 min/foot	35		1			
			15								--RUN 2 - RECOVERY= 27%-- --RQD= 15%-- 36.5' to 41.5' = 3 min/foot	40		2			
			20								--RUN 3 - RECOVERY= 100%-- --RQD= 100%-- 41.5' to 46.5' = 3 min/foot	45		3			
			25								Qu=8120 psi --> --RUN 4 - RECOVERY= 100%-- --RQD= 100%-- 46.5' to 51.5' = 3 min/foot	50		4			

GENERAL NOTES

WATER LEVEL DATA

Begin Drilling **11-17-2011** Complete Drilling **11-17-2011**
 Drilling Contractor **Wang Testing Services** Drill Rig **B-57 TMR**
 Driller **R&N** Logger **F. Bozga** Checked by **C. Marin**
 Drilling Method **3.25" HSA, boring backfilled upon completion**

While Drilling **DRY**
 At Completion of Drilling **DRY**
 Time After Drilling **NA**
 Depth to Water **NA**

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



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WEI Job No.: 342-06-01

Client **PARSONS**
 Project **US 52 / IL 64 Over the Mississippi River**
 Location **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 631.23 ft
 North: 1980425.66 ft
 East: 2298956.03 ft
 Station: 1585+46.57
 Offset: 11.33 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--RUN 5 - RECOVERY= 100%-- --RQD= 100%-- 51.5' to 56.5' = 3 min/foot Qu=3910 psi --->55	55		5						--RUN 10 - RECOVERY= 100%-- --RQD= 100%-- 76.5' to 81.5'= 3 min/foot	80		10			
		--RUN 6 - RECOVERY= 100%-- --RQD= 100%-- Qu=2350 psi --> 56.5' to 61.5' = 3 min/foot	60		6						--RUN 11 - RECOVERY= 97%-- --RQD= 80%-- 81.5' to 86.5'= 4 min/foot	85		11			
		--RUN 7 - RECOVERY= 100%-- --RQD= 93%-- 61.5' to 66.5' = 3 min/foot	65		7					543.286.5'	--RUN 12 - RECOVERY= 98%-- --RQD= 77%-- 543.286.5' to 91.5'= 3 min/foot Strong, very good rock quality, light gray, fossiliferous DOLOSTONE	90		12			
		--RUN 8 - RECOVERY= 100%-- --RQD= 100%-- 66.5' to 71.5'= 4 min/foot	70		8					539.7	Boring terminated at 91.50 ft	95					
		--RUN 9 - RECOVERY= 100%-- --RQD= 100%-- 71.5- to 76.5'= 2 min/foot	75		9							100					

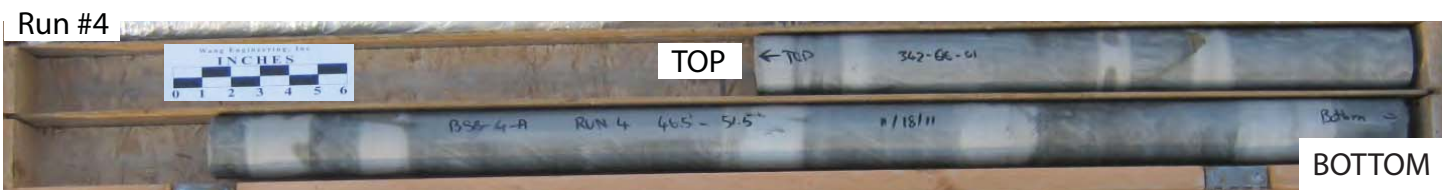
GENERAL NOTES

WATER LEVEL DATA

Begin Drilling **11-17-2011** Complete Drilling **11-17-2011**
 Drilling Contractor **Wang Testing Services** Drill Rig **B-57 TMR**
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While Drilling **DRY**
 At Completion of Drilling **DRY**
 Time After Drilling **NA**
 Depth to Water **NA**

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



Boring	Run No.	From (ft)	To (ft)	Recovery (%)	RQD (%)
BSB-04A	1	31.5	36.5	100	80
	2	36.5	41.5	26.7	15
	3	41.5	46.5	100	100
	4	46.5	51.5	100	100
	5	51.5	56.5	100	100
	6	56.5	61.5	100	100

BEDROCK CORE: US 52/IL 64 OVER MISSISSIPPI RIVER, SAVANNA, ILLINOIS / SABULA, IOWA

SCALE: GRAFIC

BSB-04A

DRAWN BY: C.L.M.
CHECKED BY: M.A.K.

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342-06-01



Boring	Run No.	From (ft)	To (ft)	Recovery (%)	RQD (%)
BSB-04A	7	61.5	66.5	100	93.3
	8	66.5	71.5	100	100
	9	71.5	76.5	100	100
	10	76.5	81.5	100	100
	11	81.5	86.5	96.7	80
	12	86.5	91.5	98.3	76.7

BEDROCK CORE: US 52/IL 64 OVER MISSISSIPPI RIVER, SAVANNA, ILLINOIS / SABULA, IOWA

SCALE: GRAFIC

BSB-04A

DRAWN BY: C.L.M.
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FOR PARSONS CORPORATION

342-06-01



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BORING LOG BSB-05

WEI Job No.: 342-06-01

Client: **PARSONS**
 Project: **US 52 / IL 64 Over the Mississippi River**
 Location: **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 582.40 ft
 North: 1980449.35 ft
 East: 2296512.77 ft
 Station: 1561+03.16
 Offset: 00.75 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--WATER--															
	577.0	Very loose, dark gray, SILTY LOAM, trace organic matter	5	X	1	0 0 0	NP	51				30	X	11	4 9 15	NP	19
				X	2	0 0 0	NP	39					X	12	2 4 6	NP	14
	572.1	Very loose, gray, SANDY LOAM	10	X	3	0 0 1	NP	36		547.4	Loose to medium dense, gray, SANDY GRAVEL	35					
				X	4	1 0 0	NP	30					O	13	4 8 13	NA	
	568.4	Very loose to medium dense, gray, fine to medium SAND	15	X	5	0 1 1	NP	22				40					
				X	6	4 6 7	NP	19					X	14	4 4 4	NP	20
			20	X	7	3 5 6	NP	29				45					
		--%Gravel=3.3-- --%Sand=95.3-- --%Silt=1.2-- --%Clay=0.2-- --A-3 (0)--		X	8	2 3 3	NP	18					X	15	5 6 6	NP	15
			25	X						532.4		50					

GENERAL NOTES

WATER LEVEL DATA

Begin Drilling **11-16-2012** Complete Drilling **11-19-2012**
 Drilling Contractor **K&S** Drill Rig **CME-45**
 Driller **C&E** Logger **D. Kolpacki** Checked by **C. Marin**
 Drilling Method **3.25" HSA, boring backfilled upon completion**

While Drilling ∇ **0.00 ft**
 At Completion of Drilling ∇ **0.00 ft**
 Time After Drilling **NA**
 Depth to Water ∇ **NA**

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

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BORING LOG BSB-05

WEI Job No.: 342-06-01

Client: **PARSONS**
 Project: **US 52 / IL 64 Over the Mississippi River**
 Location: **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 582.40 ft
 North: 1980449.35 ft
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 Station: 1561+03.16
 Offset: 00.75 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
[Patterned Column]	55	Medium dense, gray, coarse SAND, trace gravel	55	NP	16	5 6 6	NP	19	[Patterned Column]	502.4	Medium dense to dense, gray GRAVELLY SAND	80	NP	21	8 8 12	NP	9
			60	NP	17	5 6 7	NP	17				85	NP	22	11 17 21	NP	21
			65	NP	18	4 5 7	NP	16				90	NP	23	10 13 17	NP	21
			70	NP	19	3 7 8	NP	14				95	NP	24	17 20 26	NP	20
			75	NP	20	8 9 11	NP	16				100	NP	25	10 10 15	NP	17

--%Gravel=15.6--
 --%Sand=82.3--
 --%Silt=2.0--
 --%Clay=0.1--
 --A-1-b (0)--

GENERAL NOTES

Begin Drilling **11-16-2012** Complete Drilling **11-19-2012**
 Drilling Contractor **K&S** Drill Rig **CME-45**
 Driller **C&E** Logger **D. Kolpacki** Checked by **C. Marin**
 Drilling Method **3.25" HSA, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ∇ **0.00 ft**
 At Completion of Drilling ∇ **0.00 ft**
 Time After Drilling **NA**
 Depth to Water ∇ **NA**

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



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BORING LOG BSB-05

WEI Job No.: 342-06-01

Client: **PARSONS**
 Project: **US 52 / IL 64 Over the Mississippi River**
 Location: **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 582.40 ft
 North: 1980449.35 ft
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 Station: 1561+03.16
 Offset: 00.75 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	464.0		105	⊗	26	11 9 12	NP	16									
			110	⊗	27	15 21 22	NP	16									
			115	⊗	28	17 20 24	NP	11									
			120	⊗	29	15 18 20	NP	15									
		Boring terminated at 118.40 ft	125														

GENERAL NOTES

WATER LEVEL DATA

Begin Drilling **11-16-2012** Complete Drilling **11-19-2012**
 Drilling Contractor **K&S** Drill Rig **CME-45**
 Driller **C&E** Logger **D. Kolpacki** Checked by **C. Marin**
 Drilling Method **3.25" HSA, boring backfilled upon completion**

While Drilling ∇ **0.00 ft**
 At Completion of Drilling \blacktriangledown **0.00 ft**
 Time After Drilling **NA**
 Depth to Water ∇ **NA**

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



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BORING LOG BSB-06

WEI Job No.: 342-06-01

Client: **PARSONS**
 Project: **US 52 / IL 64 Over the Mississippi River**
 Location: **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 582.42 ft
 North: 1980434.34 ft
 East: 2296675.81 ft
 Station: 1562+66.27
 Offset: 15.025 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	
		--WATER--								556.4								
	580.9	Very loose, dark brown SILTY CLAY LOAM, trace organic matter		X	1	0 0 0	< 0.25 P	55			Medium dense, gray, coarse SAND, trace gravel		X	11	2 7 8		NP	15
			5	X	2	0 0 0	< 0.25 P	49				30	○	12	3 7 14		NP	
		--L _L (%)=50, P _L (%)=26-- --%Gravel=0.0-- --%Sand=0.8-- --%Silt=77.3-- --%Clay=21.9-- --A-7-6 (28)--		X	3	0 0 0	< 0.25 P	54					X	13	4 7 12		NP	21
			10	X	4	0 0 0	< 0.25 P	59				35						
	569.9	Very loose, gray, medium SAND, trace clay seams, wood fragments		X	5	0 0 0	< 0.25 P	64			--%Gravel=8.0-- --%Sand=90.5-- --%Silt=1.4-- --%Clay=0.1-- --A-1-b (0)--		X	14	6 7 11		NP	22
			15	X	6	1 1 1		NP	23			40						
				X	7	0 1 1		NP	26				X	15	7 8 8		NP	22
			20	X	8	0 0 1		NP	17			45						
				X	9	1 1 1		NP	18				○	16	6 6 5		NR	
			25	X	10	1		NP	20			50						

GENERAL NOTES

WATER LEVEL DATA

Begin Drilling **11-20-2012** Complete Drilling **11-21-2012**
 Drilling Contractor **K&S** Drill Rig **CME-45**
 Driller **C&E** Logger **D. Kolpacki** Checked by **C. Marin**
 Drilling Method **3.25" HSA, boring backfilled upon completion**

While Drilling **▽ 0.00 ft**
 At Completion of Drilling **▼ 0.00 ft**
 Time After Drilling **NA**
 Depth to Water **▽ NA**

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



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WEI Job No.: 342-06-01

Client: **PARSONS**
 Project: **US 52 / IL 64 Over the Mississippi River**
 Location: **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 582.42 ft
 North: 1980434.34 ft
 East: 2296675.81 ft
 Station: 1562+66.27
 Offset: 15.025 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	531.9	Soft, gray, SILTY CLAY LOAM, trace organic matter															
	529.4	Loose to medium dense, gray, medium to coarse SAND, trace gravel	55	X	17	2 8 2	0.25 P	36				80	X	22	8 13 12		
		--Trace organic matter--	60	X	18	3 3 3	NP	44				85	X	23	8 8 9		
			65	X	19	6 7 7	NP	25				90	X	24	10 10 11		
			70	X	20	7 9 8	NP	26				95	X	25	8 6 7		
	512.2	Medium dense, gray, coarse SAND, trace gravel	75	X	21	7 10 11	NP	19				100	X	26	8 10 14		

GENERAL NOTES

Begin Drilling **11-20-2012** Complete Drilling **11-21-2012**
 Drilling Contractor **K&S** Drill Rig **CME-45**
 Driller **C&E** Logger **D. Kolpacki** Checked by **C. Marin**
 Drilling Method **3.25" HSA, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ∇ **0.00 ft**
 At Completion of Drilling \blacktriangledown **0.00 ft**
 Time After Drilling **NA**
 Depth to Water ∇ **NA**

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

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BORING LOG BSB-06

WEI Job No.: 342-06-01

Client: **PARSONS**
 Project: **US 52 / IL 64 Over the Mississippi River**
 Location: **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 582.42 ft
 North: 1980434.34 ft
 East: 2296675.81 ft
 Station: 1562+66.27
 Offset: 15.025 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	463.9																
					27	10 14 15	NP	18									
			105														
					28	8 14 16	NP	20									
			110														
					29	15 18 20	NP	18									
			115														
					30	17 19 21	NP	15									
		Boring terminated at 118.50 ft	120														
			125														

GENERAL NOTES

Begin Drilling **11-20-2012** Complete Drilling **11-21-2012**
 Drilling Contractor **K&S** Drill Rig **CME-45**
 Driller **C&E** Logger **D. Kolpacki** Checked by **C. Marin**
 Drilling Method **3.25" HSA, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ∇ **0.00 ft**
 At Completion of Drilling ∇ **0.00 ft**
 Time After Drilling **NA**
 Depth to Water ∇ **NA**

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



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BORING LOG BSB-07

WEI Job No.: 342-06-01

Client: **PARSONS**
 Project: **US 52 / IL 64 Over the Mississippi River**
 Location: **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 584.15 ft
 North: 1980451.25 ft
 East: 2296972.80 ft
 Station: 1565+63.18
 Offset: 03.25 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	581.2	Very soft, dark brown SILTY CLAY LOAM --TOPSOIL--	0		1	0 0 0	< 0.25 P	51		584.15		0		11	4 6 7	NP	20
	578.7	Very soft, brown and gray SILTY CLAY LOAM, trace organic matter	5		2	0 0 0	< 0.25 P	49		584.15		30		12	3 3 5	NP	22
		Very loose to medium dense, gray medium SAND, trace gravel	10		3	3 3 3	NP	20		552.2	Medium dense to dense, gray GRAVELLY SAND	35		13	8 8 8	NP	15
			15		4	1 3 2	NP	20				40		14	7 8 12	NP	19
			20		5	1 0 1	NP	21				45		15	15 24 18	NP	8
		--%Gravel=1.3-- --%Sand=96.8-- --%Silt=1.8-- --%Clay=0.1-- --A3 (0)--	25		6	1 1 3	NP	19				50		16	3 6 10	NP	27
					7	3 3 2	NP	20		537.2	Medium dense to very dense, gray medium to coarse SAND, trace gravel						
					8	3 4 7	NP	21									
					9	2 3 7	NP	21									
					10												

GENERAL NOTES

WATER LEVEL DATA

Begin Drilling **10-17-2012** Complete Drilling **10-17-2012**
 Drilling Contractor **Wang Testing Services** Drill Rig **D-50 ATV**
 Driller **K&K** Logger **D. Kolpacki** Checked by **C. Marin**
 Drilling Method **3.25" HSA, boring backfilled upon completion**

While Drilling ∇ **5.50 ft**
 At Completion of Drilling ∇ **NA**
 Time After Drilling **NA**
 Depth to Water ∇ **NA**

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

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BORING LOG BSB-07

WEI Job No.: 342-06-01

Client **PARSONS**
 Project **US 52 / IL 64 Over the Mississippi River**
 Location **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 584.15 ft
 North: 1980451.25 ft
 East: 2296972.80 ft
 Station: 1565+63.18
 Offset: 03.25 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
											--A-3 (0)--						
			55		17	5 9 9	NP	21				80		22	12 14 12	NP	25
		--%Gravel=0.2-- --%Sand=96.8-- --%Silt=2.9-- --%Clay=0.1-- --A-3 (0)--	60		18	7 9 8	NP	18				85		23	8 12 17	NP	20
			65		19	7 9 10	NP	22				90		24	13 14 17	NP	24
			70		20	11 15 17	NP	20				95		25	12 11 15	NP	24
		--%Gravel=0.0-- --%Sand=95.3-- --%Silt=4.5-- --%Clay=0.2--	75		21	11 16 18	NP	23				100		26	17 24 28	NP	19

GENERAL NOTES

WATER LEVEL DATA

Begin Drilling **10-17-2012** Complete Drilling **10-17-2012**
 Drilling Contractor **Wang Testing Services** Drill Rig **D-50 ATV**
 Driller **K&K** Logger **D. Kolpacki** Checked by **C. Marin**
 Drilling Method **3.25" HSA, boring backfilled upon completion**

While Drilling ∇ **5.50 ft**
 At Completion of Drilling ∇ **NA**
 Time After Drilling **NA**
 Depth to Water ∇ **NA**

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



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BORING LOG BSB-07

WEI Job No.: 342-06-01

Client: **PARSONS**
 Project: **US 52 / IL 64 Over the Mississippi River**
 Location: **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 584.15 ft
 North: 1980451.25 ft
 East: 2296972.80 ft
 Station: 1565+63.18
 Offset: 03.25 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
			105		27	14 20 21	NP	18									
	477.4	Dense, gray, coarse SAND	110		28	8 16 16	NP	21									
			115		29	11 16 18	NP	21									
	464.2	Boring terminated at 118.50 ft	120		30	12 13 18	NP	21									
			125														

GENERAL NOTES

WATER LEVEL DATA

Begin Drilling **10-17-2012** Complete Drilling **10-17-2012**
 Drilling Contractor **Wang Testing Services** Drill Rig **D-50 ATV**
 Driller **K&K** Logger **D. Kolpacki** Checked by **C. Marin**
 Drilling Method **3.25" HSA, boring backfilled upon completion**

While Drilling ∇ **5.50 ft**
 At Completion of Drilling \blacktriangledown **NA**
 Time After Drilling **NA**
 Depth to Water ∇ **NA**

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BORING LOG BSB-08

WEI Job No.: 342-06-01

Client: **PARSONS**
 Project: **US 52 / IL 64 Over the Mississippi River**
 Location: **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 587.50 ft
 North: 1980444.03 ft
 East: 2297112.76 ft
 Station: 1567+03.17
 Offset: 03.34 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	587.0	6-inch thick, black SILTY CLAY LOAM --TOPSOIL-- Stiff, brown SILTY CLAY LOAM, trace organic matter			1	2 2 2	1.00 P	33			--%Gravel=0.5-- --%Sand=97.6-- --%Silt=1.3-- --%Clay=0.6-- --A-1-b (0)--			11	4 5 6	NP	23
			5		2	1 1 1	1.00 P	22				30		12	3 4 6	NP	23
	581.0	Very loose to medium dense, brown and gray SAND			3	0 0 2	NP	25		555.5	Medium dense to dense, gray medium to coarse SAND, little gravel						
			10		4	1 3 4	NP	29				35		13	7 8 8	NP	21
					5	0 1 2	NP	20									
			15		6	1 1 1	NP	17				40		14	8 14 20	NP	19
					7	2 5 5	NP	20									
		--%Gravel=0.7-- --%Sand=97.3-- --%Silt=1.8-- --%Clay=0.1-- --A-3 (0)--			8	2 3 4	NP	21			--%Gravel=11.3-- --%Sand=85.9-- --%Silt=2.6-- --%Clay=0.1-- --A-1-b (0)--			15	11 14 18	NP	20
					9	5 6 8	NP	22									
			25		10	4 7 7	NP	20				50		16	10 9 11	NP	12

GENERAL NOTES

Begin Drilling **10-16-2012** Complete Drilling **10-16-2012**
 Drilling Contractor **Wang Testing Services** Drill Rig **D-50 ATV**
 Driller **K&K** Logger **D. Kolpacki** Checked by **C. Marin**
 Drilling Method **3.25" HSA, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ∇ **6.50 ft**
 At Completion of Drilling ∇ **NA**
 Time After Drilling **NA**
 Depth to Water ∇ **NA**

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BORING LOG BSB-08

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WEI Job No.: 342-06-01

Client: **PARSONS**
 Project: **US 52 / IL 64 Over the Mississippi River**
 Location: **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 587.50 ft
 North: 1980444.03 ft
 East: 2297112.76 ft
 Station: 1567+03.17
 Offset: 03.34 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	530.5	Medium dense to dense, gray SAND	55	X	17	10 10 9	NP	26				80	X	22	9 12 14	NP	22
			60	X	18	9 9 11	NP	19				85	X	23	6 7 9	NP	54
			65	X	19	9 10 10	NP	21			--%Gravel=0.1-- --%Sand=95.8-- --%Silt=3.9--90 --%Clay=0.2-- --A-1-b (0)--	95	X	24	10 12 19	NP	21
			70	X	20	8 10 12	NP	22				95	X	25	10 14 19	NP	20
			75	X	21	11 18 18	NP	20				100	X	26	10 12 14	NP	20

GENERAL NOTES

WATER LEVEL DATA

Begin Drilling **10-16-2012** Complete Drilling **10-16-2012**
 Drilling Contractor **Wang Testing Services** Drill Rig **D-50 ATV**
 Driller **K & K** Logger **D. Kolpacki** Checked by **C. Marin**
 Drilling Method **3.25" HSA, boring backfilled upon completion**

While Drilling ∇ **6.50 ft**
 At Completion of Drilling ∇ **NA**
 Time After Drilling **NA**
 Depth to Water ∇ **NA**

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

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BORING LOG BSB-08

WEI Job No.: 342-06-01

Client: **PARSONS**
 Project: **US 52 / IL 64 Over the Mississippi River**
 Location: **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 587.50 ft
 North: 1980444.03 ft
 East: 2297112.76 ft
 Station: 1567+03.17
 Offset: 03.34 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	467.5		105		27	13 14 21	NP	22									
			110		28	15 15 21	NP	16									
			115		29	24 20 17	NP	18									
			120		30	14 17 17	NP	22									
		Boring terminated at 120.00 ft															
			125														

GENERAL NOTES

WATER LEVEL DATA

Begin Drilling **10-16-2012** Complete Drilling **10-16-2012**
 Drilling Contractor **Wang Testing Services** Drill Rig **D-50 ATV**
 Driller **K&K** Logger **D. Kolpacki** Checked by **C. Marin**
 Drilling Method **3.25" HSA, boring backfilled upon completion**

While Drilling ∇ **6.50 ft**
 At Completion of Drilling \blacktriangledown **NA**
 Time After Drilling **NA**
 Depth to Water ∇ **NA**

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



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BORING LOG BSB-09

WEI Job No.: 342-06-01

Client: **PARSONS**
 Project: **US 52 / IL 64 Over the Mississippi River**
 Location: **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 586.50 ft
 North: 1980437.90 ft
 East: 2297285.86 ft
 Station: 1568+76.30
 Offset: 08.68 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	586.33	3-inch thick, dark brown SANDY LOAM --TOPSOIL-- Very loose to loose, brown SANDY LOAM to SAND			1	2 3 3	NP	15			--A-2-4 (0)--			11	0 0 2	NP	30
			5		2	1 1 1	NP	17				30		12	1 2 2	NP	21
					3	1 3 4	NP	20		554.5	Medium dense, gray medium to coarse SAND, trace gravel						
		--%Gravel=0.2-- --%Sand=97.4-- --%Silt=2.2-- --%Clay=0.2-- --A-3 (0)--	10		4	1 0 0	NP	20				35		13	5 4 6	NP	17
					5	0 2 2	NP	21									
			15		6	1 2 3	NP	21			--%Gravel=0.1-- --%Sand=97.7-- --%Silt=2.1-- --%Clay=0.2-- --A-3 (0)--	40		14	5 11 11	NP	24
					7	3 3 4	NP	20									
			20		8	0 1 2	NP	21				45		15	8 12 16	NP	19
	566.0	Very loose, gray fine SAND, some CLAY laminations			9	1 1 1	NP	50		539.5	Medium dense, gray fine to medium SAND, trace gravel						
		--%Gravel=1.1-- --%Sand=84.7-- --%Silt=11.6-- --%Clay=2.6--	25		10	0 2 1	NP	38				50		16	5 6 11	NP	22

GENERAL NOTES

WATER LEVEL DATA

Begin Drilling **10-15-2012** Complete Drilling **10-15-2012**
 Drilling Contractor **Wang Testing Services** Drill Rig **D-50 ATV**
 Driller **K&K** Logger **D. Kolpacki** Checked by **C. Marin**
 Drilling Method **3.25" HSA, boring backfilled upon completion**

While Drilling ∇ **6.50 ft**
 At Completion of Drilling ∇ **NA**
 Time After Drilling **NA**
 Depth to Water ∇ **NA**

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

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BORING LOG BSB-09

WEI Job No.: 342-06-01

Client: **PARSONS**
 Project: **US 52 / IL 64 Over the Mississippi River**
 Location: **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 586.50 ft
 North: 1980437.90 ft
 East: 2297285.86 ft
 Station: 1568+76.30
 Offset: 08.68 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
											--A-3 (0)--						
		--%Gravel=0.4-- --%Sand=93.7-- --%Silt=5.8-- --%Clay=0.1--55 --A-3 (0)--			17	9 11 11	NP	24				80		22	8 10 12	NP	22
					18	9 12 14	NP	22				85		23	10 11 10	NP	20
	524.5	Medium dense, gray, medium to coarse SAND			19	6 8 8	NP	19				90		24	10 12 16	NP	21
					20	6 7 7	NP	21				95		25	7 10 8	NP	21
		--%Gravel=10.5-- --%Sand=85.8-- --%Silt=3.5-- --%Clay=0.2--75			21	10 10 14	NP	19				100		26	10 14 15	NP	21

GENERAL NOTES

WATER LEVEL DATA

Begin Drilling **10-15-2012** Complete Drilling **10-15-2012**
 Drilling Contractor **Wang Testing Services** Drill Rig **D-50 ATV**
 Driller **K & K** Logger **D. Kolpacki** Checked by **C. Marin**
 Drilling Method **3.25" HSA, boring backfilled upon completion**

While Drilling **6.50 ft**
 At Completion of Drilling **NA**
 Time After Drilling **NA**
 Depth to Water **NA**

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



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BORING LOG BSB-09

WEI Job No.: 342-06-01

Client: **PARSONS**
 Project: **US 52 / IL 64 Over the Mississippi River**
 Location: **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 586.50 ft
 North: 1980437.90 ft
 East: 2297285.86 ft
 Station: 1568+76.30
 Offset: 08.68 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
			105		27	11 12 15	NP	20									
			110		28	14 13 15	NP	21									
	474.5	Dense to very dense, gray GRAVELLY SAND															
			115		29	13 21 26	NP	17									
	466.5	Boring terminated at 120.00 ft	120		30	22 25 26	NP	21									
			125														

GENERAL NOTES

WATER LEVEL DATA

Begin Drilling **10-15-2012** Complete Drilling **10-15-2012**
 Drilling Contractor **Wang Testing Services** Drill Rig **D-50 ATV**
 Driller **K&K** Logger **D. Kolpacki** Checked by **C. Marin**
 Drilling Method **3.25" HSA, boring backfilled upon completion**

While Drilling ∇ **6.50 ft**
 At Completion of Drilling \blacktriangledown **NA**
 Time After Drilling **NA**
 Depth to Water ∇ **NA**

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



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BORING LOG BSB-10

WEI Job No.: 342-06-01

Client: **PARSONS**
 Project: **US 52 / IL 64 Over the Mississippi River**
 Location: **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 630.10 ft
 North: 1980458.87 ft
 East: 2298957.81 ft
 Station: 1585+48.14
 Offset: 19.90 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	
	629.93	3-inch thick, dark brown, SANDY LOAM with gravel --TOPSOIL--								603.8	Brown, coarse SAND, trace gravel							
		Medium dense, brown SANDY LOAM, some gravel --FILL--			1	6 6 6	NP	4		601.9	Hard, brown SILTY CLAY, trace gravel			11	13 11 24	7.95 S	14	
					2	3 4 50/5	NP	5		601.1	--WEATHERED BEDROCK--			12		NP	6	
	624.6	Very dense, brown SANDY GRAVEL --FILL--			3	50/1	NR				30.0ft-Qu=7340 psi ---->30 Moderate strength, dark gray, poor rock mass quality, bedded, slightly weathered to fresh SHALE and MUDSTONE interbedded, laminated, up to 18-inch beds, 1- to 18-inch spaced joints, horizontal no infilling, hard joint wall --RUN 1 - RECOVERY= 100%-- --RQD= 42%-- 29 to 34 = 2.5 min/foot 34 to 39 = 2 min/foot							
	622.1	Very stiff to hard, brown and gray SILTY CLAY, trace gravel			4	10 11 9	> 4.50 P	13							1		NP	
					5	7 18 22	> 4.50 P	10										
					6	6 18 40	> 4.50 P	12										
					7	9 47 28	5.33 B	13										
					8	6 12 11	2.87 B	12										
					9	8 13 19	6.31 B	16										
	607.1	Very dense, brown SANDY LOAM, trace gravel			10	18 29 23	NP	14			591.1	Boring terminated at 39.00 ft						
	605.4				25													

GENERAL NOTES

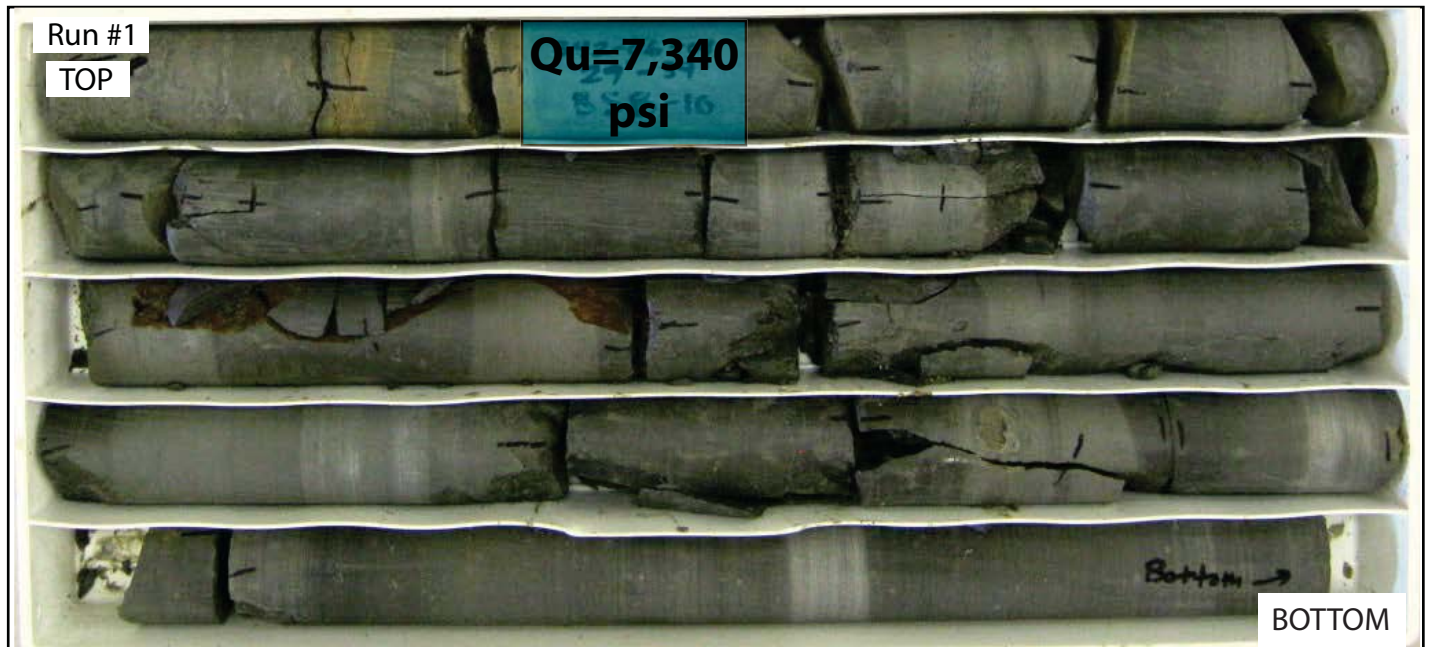
WATER LEVEL DATA

Begin Drilling **09-26-2013** Complete Drilling **09-26-2013**
 Drilling Contractor **Wang Testing Services** Drill Rig **D-50 ATV**
 Driller **R&R** Logger **D. Kolpacki** Checked by **C. Marin**
 Drilling Method **2.25" HSA, boring backfilled upon completion**

While Drilling ∇ **24.75 ft**
 At Completion of Drilling ∇ **NA**
 Time After Drilling **NA**
 Depth to Water ∇ **NA**

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


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Boring	Run No.	From (ft)	To (ft)	Recovery (%)	RQD (%)
BSB-10	1	601.1	591.1	100	42

BEDROCK CORE: US 52/IL 64 OVER MISSISSIPPI RIVER,
SAVANNA, ILLINOIS / SABULA, IOWA

SCALE: GRAPHIC **BSB-10** DRAWN BY: A. Happel
CHECKED BY: C. Marin



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FOR PARSONS CORPORATION 342-06-01



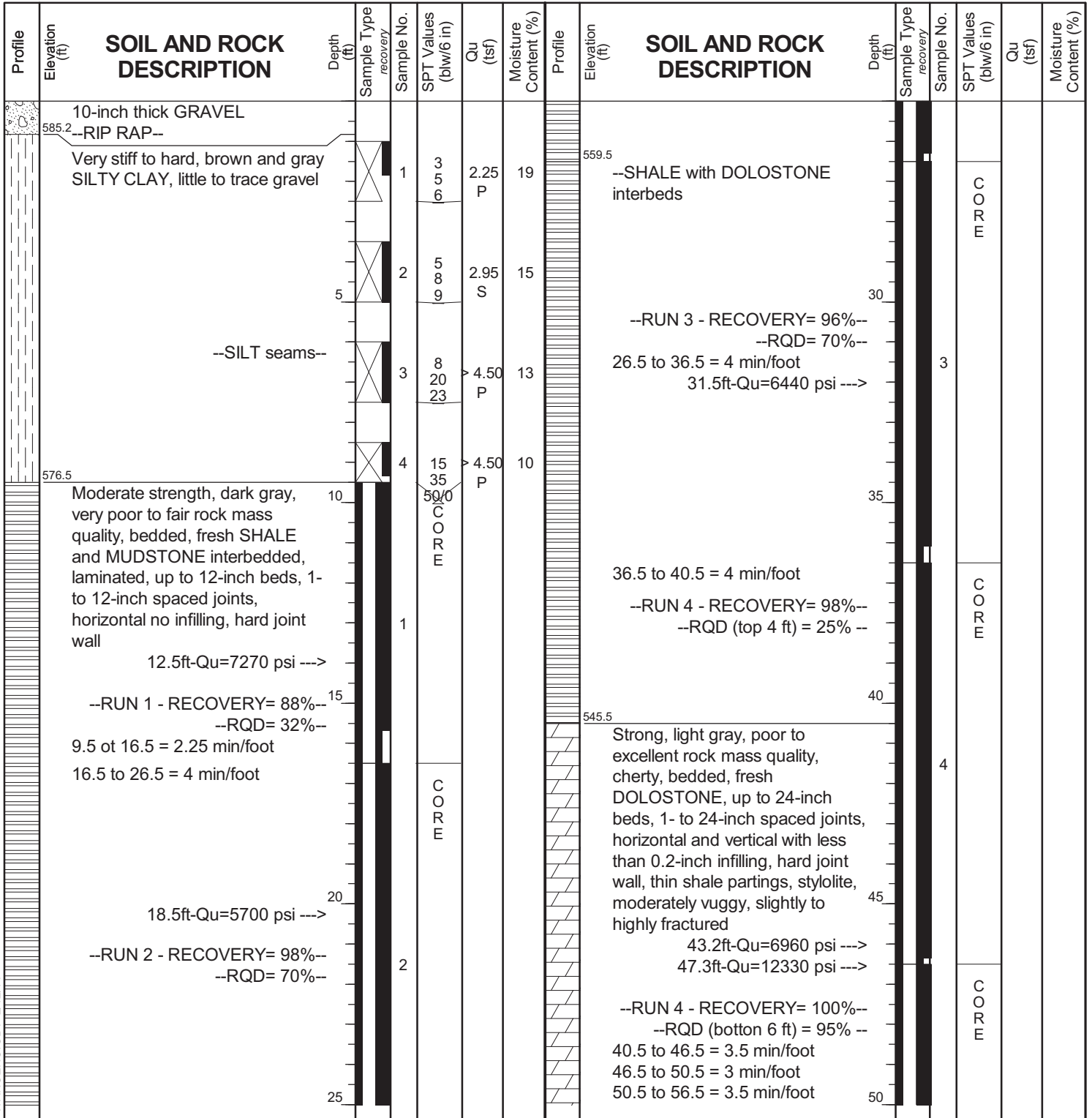
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BORING LOG BSB-11

WEI Job No.: 342-06-01

Client: **PARSONS**
 Project: **US 52 / IL 64 Over the Mississippi River**
 Location: **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 586.01 ft
 North: 1980436.67 ft
 East: 2298774.51 ft
 Station: 1583+64.93
 Offset: 03.14 RT



GENERAL NOTES

WATER LEVEL DATA

Begin Drilling **09-26-2013** Complete Drilling **09-26-2013**
 Drilling Contractor **Wang Testing Services** Drill Rig **D-50 ATV**
 Driller **P&N** Logger **B. Wilson** Checked by **C. Marin**
 Drilling Method **2.25" HSA, boring backfilled upon completion**

While Drilling **DRY**
 At Completion of Drilling **NA**
 Time After Drilling **NA**
 Depth to Water **NA**

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BORING LOG BSB-11

WEI Job No.: 342-06-01

Client: **PARSONS**
 Project: **US 52 / IL 64 Over the Mississippi River**
 Location: **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 586.01 ft
 North: 1980436.67 ft
 East: 2298774.51 ft
 Station: 1583+64.93
 Offset: 03.14 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--RUN 5 - RECOVERY= 100%-- --RQD= 52%--			5												
		56.5 to 61.5 = 2.75 min/foot 61.5 to 66.5 = 2.75 min/foot 58.0ft-Qu=15010 psi --->															
		--RUN 6 - RECOVERY= 100%-- --RQD= 50%--			6												
	519.5	Boring terminated at 66.50 ft															

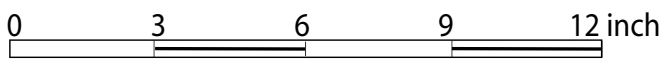
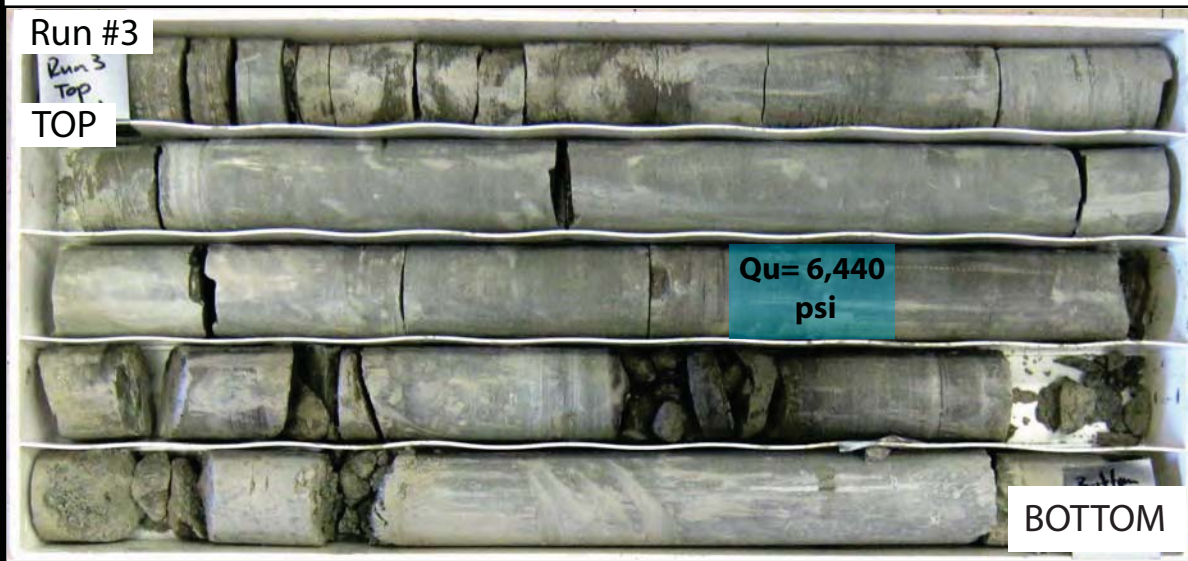
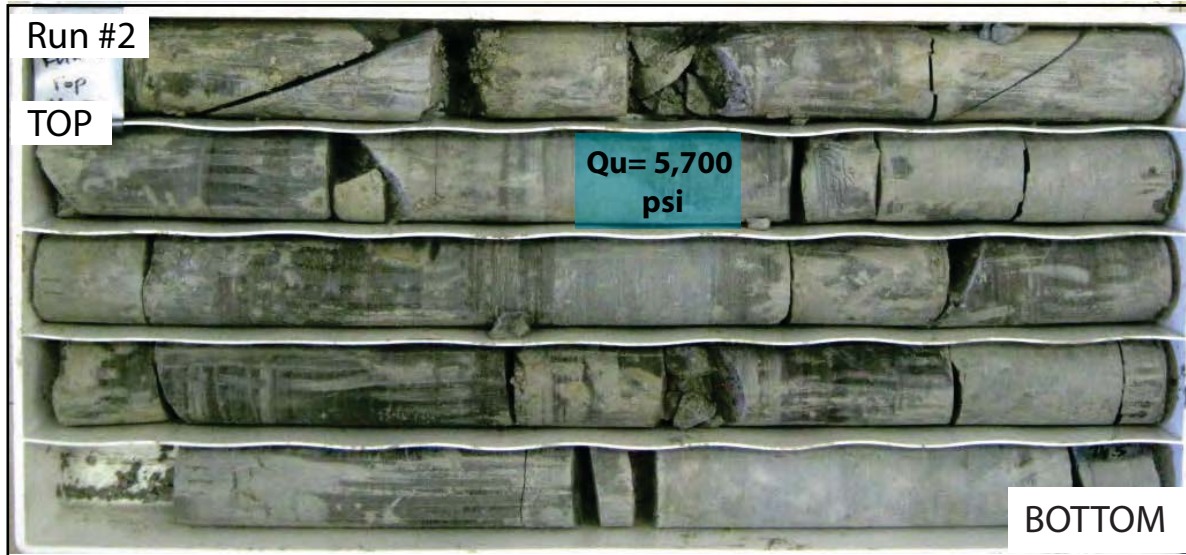
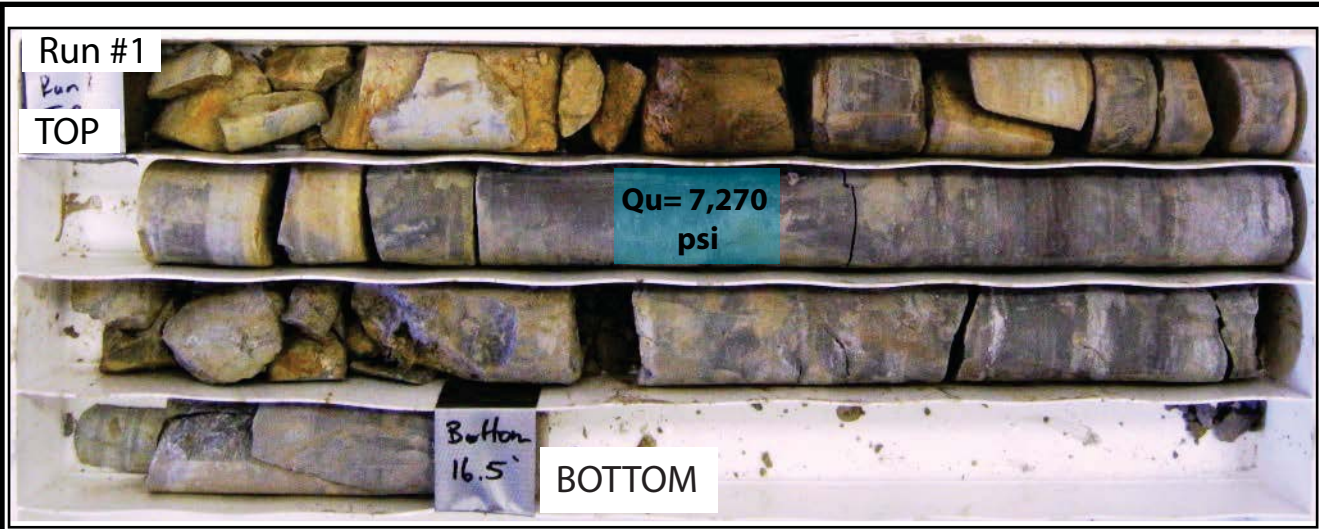
GENERAL NOTES

WATER LEVEL DATA

Begin Drilling **09-26-2013** Complete Drilling **09-26-2013**
 Drilling Contractor **Wang Testing Services** Drill Rig **D-50 ATV**
 Driller **P&N** Logger **B. Wilson** Checked by **C. Marin**
 Drilling Method **2.25" HSA, boring backfilled upon completion**

While Drilling ∇ **DRY**
 At Completion of Drilling ∇ **NA**
 Time After Drilling **NA**
 Depth to Water ∇ **NA**


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



Boring	Run No.	From (ft)	To (ft)	Recovery (%)	RQD (%)
BSB-11	1	576.5	569.5	88	32
	2	569.5	559.5	98	70
	3	559.5	549.5	96	70

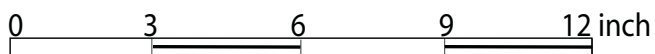
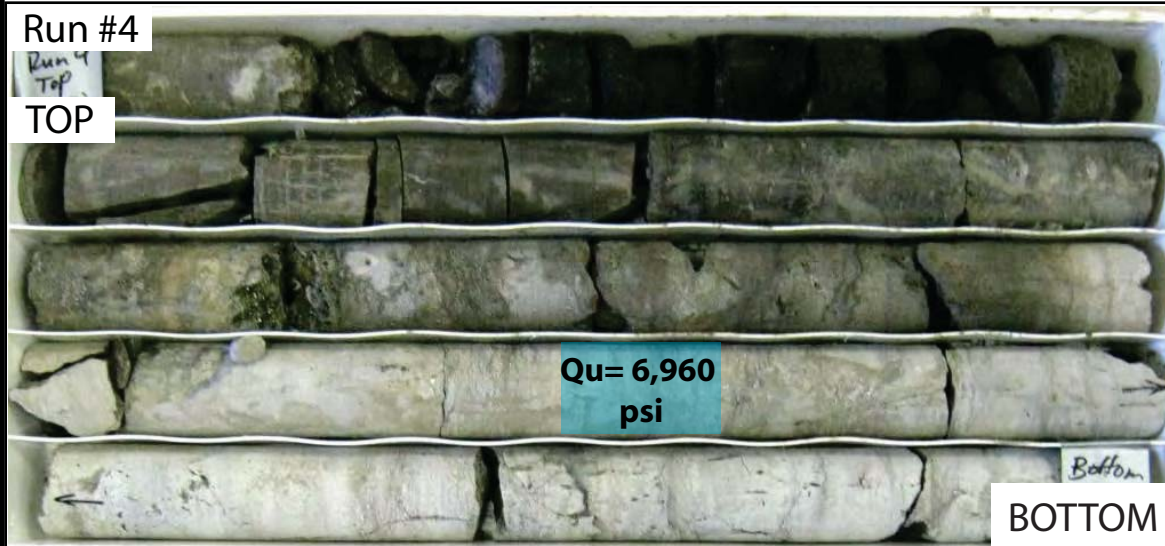
BEDROCK CORE: US 52/IL 64 OVER MISSISSIPPI RIVER,
SAVANNA, ILLINOIS / SABULA, IOWA

SCALE: GRAPHIC **BSB-11** DRAWN BY: A. Happel
CHECKED BY: C. Marin



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Boring	Run No.	From (ft)	To (ft)	Recovery (%)	RQD (%)
BSB-11	4	549.5	539.5	98	60
	5	539.5	529.5	100	52
	6	529.5	519.5	100	50

BEDROCK CORE: US 52/IL 64 OVER MISSISSIPPI RIVER,
SAVANNA, ILLINOIS / SABULA, IOWA

SCALE: GRAPHIC

BSB-11

DRAWN BY: A. Happel
CHECKED BY: C. Marin

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342-06-01



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BORING LOG BSB-12

WEI Job No.: 342-06-01

Client: **PARSONS**
 Project: **US 52 / IL 64 Over the Mississippi River**
 Location: **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 582.70 ft
 North: 1980462.36 ft
 East: 2298588.56 ft
 Station: 1581+78.87
 Offset: 21.70 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--WATER--									to 8-inch beds, 1- to 8-inch spaced joints, horizontal and vertical with less than 0.2-inch infilling, hard joint wall, thin shale partings, stylolite, moderately vuggy, slightly to highly fractured			1			
			5								--RUN 1 - RECOVERY= 92%-- --RQD= 65%-- 22.5 to 27.5 = 3 min/foot 27.5 to 37.5 = 3.5 min/foot 28.5ft-Qu=14710 psi --->	30		2			
			10								36.7ft-Qu=16050 psi --->	35					
			15								37.5 to 47.5 = 3 min/foot	40					
	566.7	Brown, fine SAND, trace gravel and shell fragments			1	6 4 4	NP	17			--RUN 3 - RECOVERY= 100%-- --RQD= 25%--			3			
	565.9	Loose, brown and gray SILTY LOAM			2	9 18 48	NP	14			42.5ft-Qu=11090 psi --->						
	564.2	Very dense, black SHALE, laminated			3	7 9 50/3	NP	16									
	562.7	Very dense, gray, coarse SAND, some shale fragments	20														
	560.2	23.5ft-Qu=15830 psi ---> Strong, light gray, very poor to fair rock mass quality, thin bedded, fresh DOLOSTONE, up	25								47.5 to 57.5 = 3 min/foot	50					

GENERAL NOTES

WATER LEVEL DATA

Begin Drilling **08-14-2013** Complete Drilling **08-16-2013**
 Drilling Contractor **Wang Testing Services** Drill Rig **D-50 ATV**
 Driller **R&N** Logger **F. Bozga** Checked by **C. Marin**
 Drilling Method **4" Casing, mud rotary, boring backfilled upon completion**

While Drilling ∇ **0.00 ft**
 At Completion of Drilling ∇ **0.00 ft**
 Time After Drilling **NA**
 Depth to Water ∇ **NA**

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

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BORING LOG BSB-12

WEI Job No.: 342-06-01

Client: **PARSONS**
 Project: **US 52 / IL 64 Over the Mississippi River**
 Location: **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 582.70 ft
 North: 1980462.36 ft
 East: 2298588.56 ft
 Station: 1581+78.87
 Offset: 21.70 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
					4												
		--RUN 4 - RECOVERY= 100%-- --RQD= 0% --	55														
		57.5 to 62.5 = 2.5 min/foot 58.0ft-Qu=14390 psi --->															
		--RUN 5 - RECOVERY= 100%-- --RQD= 28%--	60		5												
		62.5 to 72.5 = 2 min/foot 64.0ft-Qu=14500 psi --->	65														
		--RUN 6 - RECOVERY= 100%-- --RQD= 66%--			6												
		69.5ft-Qu=12420 psi --->	70														
	510.2	Boring terminated at 72.5 ft															
			75														

GENERAL NOTES

WATER LEVEL DATA

Begin Drilling **08-14-2013** Complete Drilling **08-16-2013**
 Drilling Contractor **Wang Testing Services** Drill Rig **D-50 ATV**
 Driller **R&N** Logger **F. Bozga** Checked by **C. Marin**
 Drilling Method **4" Casing, mud rotary, boring backfilled upon completion**

While Drilling ∇ **0.00 ft**
 At Completion of Drilling ∇ **0.00 ft**
 Time After Drilling **NA**
 Depth to Water ∇ **NA**

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

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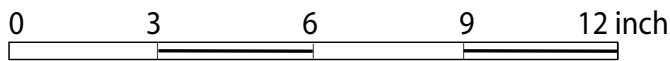
Run #1



Run #2




Run #3



Boring	Run No.	From (ft)	To (ft)	Recovery (%)	RQD (%)
BSB-12	1	560.2	555.2	92	65
	2	555.2	545.2	98	68
	3	545.2	535.2	100	25

BEDROCK CORE: US 52/IL 64 OVER MISSISSIPPI RIVER,
SAVANNA, ILLINOIS / SABULA, IOWA

SCALE: GRAPHIC **BSB-12** DRAWN BY: A. Happel
CHECKED BY: C. Marin



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Run #4

TOP



BOTTOM

Run #5

TOP



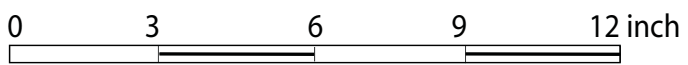
BOTTOM

Run #6

TOP




BOTTOM



Boring	Run No.	From (ft)	To (ft)	Recovery (%)	RQD (%)
BSB-12	4	535.2	525.2	100	0
	5	525.2	520.2	100	28
	6	520.2	510.2	100	66

BEDROCK CORE: US 52/LR 64 OVER MISSISSIPPI RIVER,
SAVANNA, ILLINOIS / SABULA, IOWA

SCALE: GRAPHIC **BSB-12** DRAWN BY: A. Happel
CHECKED BY: C. Marin



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BORING LOG BSB-12A

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WEI Job No.: 342-06-01

Client **PARSONS**
 Project **US 52 / IL 64 Over the Mississippi River**
 Location **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 582.42 ft
 North: 1980450.26 ft
 East: 2298592.85 ft
 Station: 1581+83.22
 Offset: 09.62 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--WATER--									beds, 1- to 24-inch spaced joints, horizontal and vertical with less than 0.2-inch infilling, hard joint wall, thin shale partings, stylolite, moderately vuggy, slightly to highly fractured --Run 1- RECOVERY= 100%-- --RQD= 93%-- 22 to 32 = 2 min/foot	30		1			
											32 to 42 = 2 min/foot 33.3ft-Qu=6960 psi --->						
											--RUN 2 - RECOVERY= 100%-- --RQD= 84%-- 39.0ft-Qu=14430 psi --->	40		2			
	566.4	--?-PROBABLE RIVER BED-?--															
		--Drilled without sampling--															
											42 to 52 = 2 min/foot 45.0ft-Qu=12110 psi --->	45					
	560.4	23.0ft-Qu=13310 psi ---> Strong, light gray, poor to excellent rock mass quality, cherty, bedded, fresh DOLOSTONE, up to 24-inch	25														
											--RUN 3 - RECOVERY= 98%-- --RQD= 47%--	50		3			

GENERAL NOTES

WATER LEVEL DATA

Begin Drilling **09-17-2013** Complete Drilling **09-17-2013**
 Drilling Contractor **Wang Testing Services** Drill Rig **D-50 TMR**
 Driller **R&R** Logger **D. Kolpacki** Checked by **C. Marin**
 Drilling Method **4" Casing, mud rotary, boring backfilled upon completion**

While Drilling ∇ **0.00 ft**
 At Completion of Drilling ∇ **0.00 ft**
 Time After Drilling **NA**
 Depth to Water ∇ **NA**

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



BORING LOG BSB-12A

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WEI Job No.: 342-06-01

Client: **PARSONS**
 Project: **US 52 / IL 64 Over the Mississippi River**
 Location: **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 582.42 ft
 North: 1980450.26 ft
 East: 2298592.85 ft
 Station: 1581+83.22
 Offset: 09.62 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		52 to 62 = 2 min/foot									--RUN 6 - RECOVERY= 91%-- --RQD= 23%--			6			
		53.3ft-Qu=13880 psi --->									--Highly fractured--						
			55														
		--RUN 4 - RECOVERY= 98%-- --RQD= 91%--			4						82 to 92 = 2 min/foot						
			60														
		60.7ft-Qu=6020 psi --->									85.0ft-Qu=11270 psi --->						
		62 to 72 = 2 min/foot									--RUN 7 - RECOVERY= 96%-- --RQD= 55%--			7			
		--Highly fractured--															
			65														
		--RUN 5 - RECOVERY= 100%-- --RQD= 7%--			5					490.4	Boring terminated at 92.00 ft						
		67.5ft-Qu=10960 psi --->															
		72 to 82 = 2 min/foot															
			70														
		74.0ft-Qu=9950 psi --->															
			75														

GENERAL NOTES

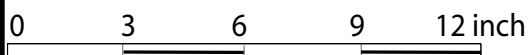
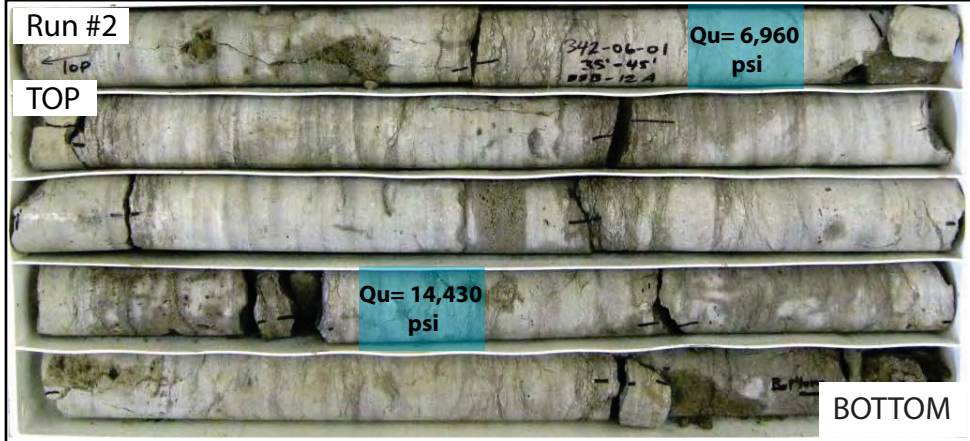
Begin Drilling **09-17-2013** Complete Drilling **09-17-2013**
 Drilling Contractor **Wang Testing Services** Drill Rig **D-50 TMR**
 Driller **R&R** Logger **D. Kolpacki** Checked by **C. Marin**
 Drilling Method **4" Casing, mud rotary, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ∇ **0.00 ft**
 At Completion of Drilling ∇ **0.00 ft**
 Time After Drilling **NA**
 Depth to Water ∇ **NA**

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

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Boring	Run No.	From (ft)	To (ft)	Recovery (%)	RQD (%)
BSB-12A	1	560.4	550.4	100	93
	2	550.4	540.4	100	84
	3	540.4	530.4	98	47
	4	530.4	520.4	98	91

BEDROCK CORE: US 52/IL 64 OVER MISSISSIPPI RIVER,
SAVANNA, ILLINOIS / SABULA, IOWA

SCALE: GRAPHIC

BSB-12A

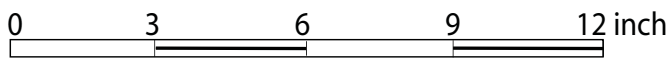
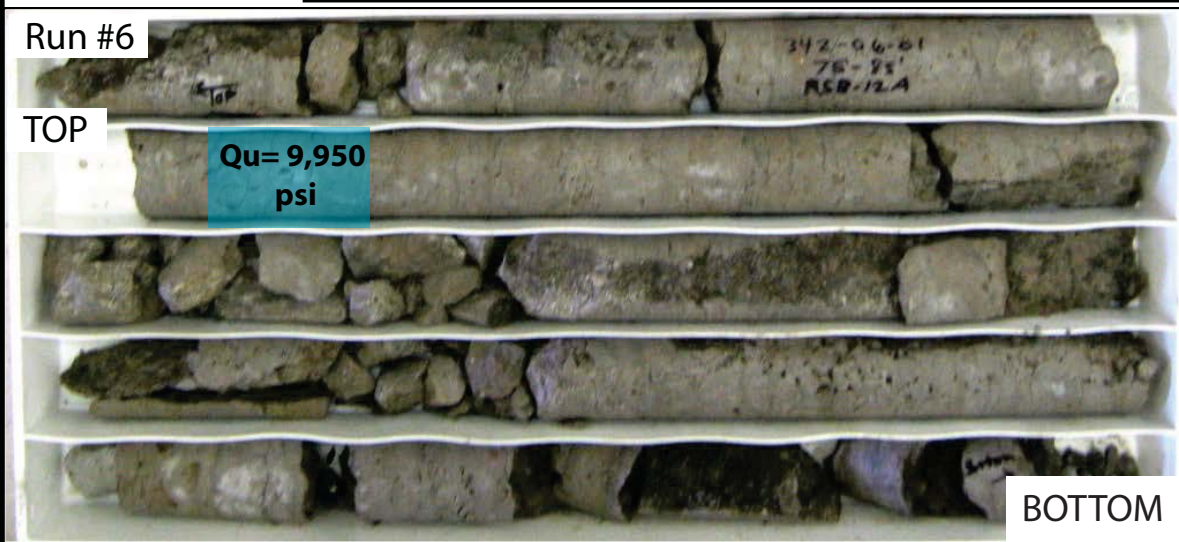
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CHECKED BY: C. Marin

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342-06-01



Boring	Run No.	From (ft)	To (ft)	Recovery (%)	RQD (%)
BSB-12A	5	520.4	510.4	100	7
	6	510.4	500.4	91	23
	7	500.4	490.4	96	55

BEDROCK CORE: US 52/IL 64 OVER MISSISSIPPI RIVER,
SAVANNA, ILLINOIS / SABULA, IOWA

SCALE: GRAPHIC **BSB-12A** DRAWN BY: A. Happel
CHECKED BY: C. Marin

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FOR PARSONS CORPORATION 342-06-01



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BORING LOG BSB-13

WEI Job No.: 342-06-01

Client: **PARSONS**
 Project: **US 52 / IL 64 Over the Mississippi River**
 Location: **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 582.35 ft
 North: 1980403.67 ft
 East: 2298442.00 ft
 Station: 1580+32.58
 Offset: 37.65 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	
		--WATER--								556.4	Dense, gray, coarse SAND, some gravel			4				
											--HARD DRILLING-- --Possible Cobbles--			20 24 17		NP	16	
			5									30		15 17 13		NP	9	
										551.4	Medium dense, gray, fine SAND			6	13 12 10		NP	20
										548.9	Very dense, gray and brown, SILTY LOAM, trace gravel			7	14 12 43		NP	14
										545.4	--%Gravel=0.3--35 --%Sand=9.8-- --%Silt=73.2-- --%Clay=16.7-- --A-4 (0)--			8	28		NP	16
										543.9	Black SHALE			9	50/3		NP	17
										541.9	Very dense, brown and gray SILTY LOAM --WEATHERED SHALE BEDROCK--			9	53/5		NP	17
											42.5ft-Qu=8320 psi ---> Strong, light gray, fair to excellent rock mass quality, cherty, bedded, fresh DOLOSTONE, up to 12-inch beds, 1- to 12-inch spaced joints, horizontal with less than 0.2-inch infilling, hard joint wall, thin shale partings, moderately vuggy, slightly to highly fractured			1				
											--RUN 1- RECOVERY= 100%-- --RQD= 99%-- 40.5 to 45.5 = 1.6 min/foot 45.5 to 50.5 = 1.8 min/foot 50.5 to 55.5 = 1.4 min/foot							
	562.9	Loose to medium dense, brown and gray, fine to medium SAND, trace gravel	20		1	5 7 5	NP											
					2	14 11 6	NP	11										
					3	7	NP	10										

GENERAL NOTES

WATER LEVEL DATA

Begin Drilling **09-05-2013** Complete Drilling **09-05-2013**
 Drilling Contractor **Wang Testing Services** Drill Rig **D-50 ATV**
 Driller **R&R** Logger **A. Happel** Checked by **C. Marin**
 Drilling Method **4" Casing, mud rotary, boring backfilled upon completion**

While Drilling ∇ **0.00 ft**
 At Completion of Drilling ∇ **0.00 ft**
 Time After Drilling **NA**
 Depth to Water ∇ **NA**

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

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BORING LOG BSB-13

WEI Job No.: 342-06-01

Client: **PARSONS**
 Project: **US 52 / IL 64 Over the Mississippi River**
 Location: **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 582.35 ft
 North: 1980403.67 ft
 East: 2298442.00 ft
 Station: 1580+32.58
 Offset: 37.65 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--RUN 2 - RECOVERY= 100%-- --RQD= 65%--			2												
		52.0ft-Qu=10040 psi --->												5			
		55.5 to 62.5 = 1.7 min/foot	55							500.9		80					
		--RUN 3 - RECOVERY= 100%-- --RQD= 60%--			3						Boring terminated at 81.50 ft						
		59.7ft-Qu=18200 psi --->60 --Highly fractured--										85					
		62.5 to 72.5 = 1.4 min/foot															
		66.0ft-Qu=12840 psi --->	65		4							90					
		--RUN 4 - RECOVERY= 98%-- --RQD= 86%--															
		72.5 to 82.5 = 1.6 min/foot	70									95					
			75									100					

GENERAL NOTES

Begin Drilling **09-05-2013** Complete Drilling **09-05-2013**
 Drilling Contractor **Wang Testing Services** Drill Rig **D-50 ATV**
 Driller **R&R** Logger **A. Happel** Checked by **C. Marin**
 Drilling Method **4" Casing, mud rotary, boring backfilled upon completion**

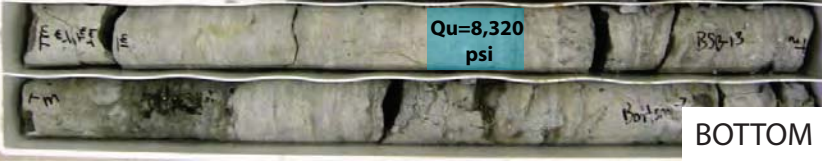
WATER LEVEL DATA

While Drilling **0.00 ft**
 At Completion of Drilling **0.00 ft**
 Time After Drilling **NA**
 Depth to Water **NA**

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

Run #1

TOP



BOTTOM

Run #2

TOP



BOTTOM

Run #3

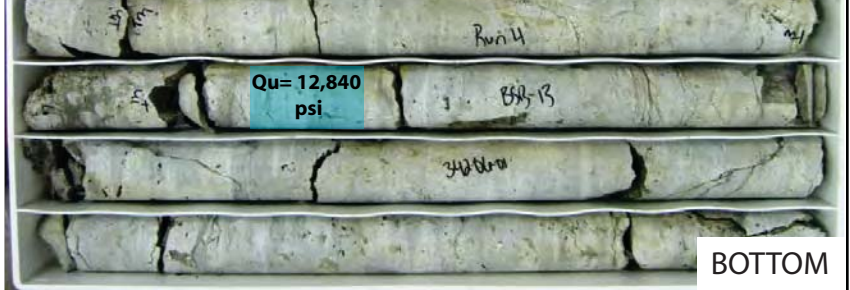
TOP



BOTTOM

Run #4

TOP



BOTTOM

Run #5

TOP



BOTTOM

0 3 6 9 12 inch

Boring	Run No.	From (ft)	To (ft)	Recovery (%)	RQD (%)
BSB-13	1	541.9	536.9	100	99
	2	536.9	526.9	100	65
	3	526.9	520.9	100	60
	4	520.9	510.9	98	86
	5	510.9	500.9	100	85

BEDROCK CORE: US 52/IL 64 OVER MISSISSIPPI RIVER, SAVANNA, ILLINOIS / SABULA, IOWA

SCALE: GRAPHIC

BSB-13

DRAWN BY: A. Happel
CHECKED BY: C. Marin



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FOR PARSONS CORPORATION

342-06-01



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BORING LOG BSB-14

WEI Job No.: 342-06-01

Client: **PARSONS**
 Project: **US 52 / IL 64 Over the Mississippi River**
 Location: **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 582.37 ft
 North: 1980464.41 ft
 East: 2298443.65 ft
 Station: 1580+33.96
 Offset: 23.09 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--WATER--									17 to 20 = 2 min/foot 20 to 27 = 3 min/foot						
			5								27 to 37 = 4.7 min/foot 27.5ft-Qu=13130 psi --->						
			10								--RUN 2 - RECOVERY= 96%-- --RQD= 16%--		2				
			15								37 to 47 = 3 min/foot 38.5ft-Qu=8000 psi --->						
	566.4	--WEATHERED BEDROCK--			1												
	565.4	18.5ft-Qu=12260 psi ---> Strong, light brown to light gray, very poor to poor rock mass quality, cherty, bedded, slightly weathered to fresh DOLOSTONE, up to 24-inch beds, 1- to 24-inch spaced joints, horizontal and vertical with less than 0.2-inch infilling, hard joint wall, thin shale partings, slightly weathered joints, moderately vuggy, slightly fractured	20														
		23.5ft-Qu=11390 psi ---> --RUN 1 - RECOVERY= 100%-- --RQD= 43%--	25		1												
											47 to 57 = 3 min/foot						

GENERAL NOTES

Begin Drilling **09-09-2013** Complete Drilling **09-09-2013**
 Drilling Contractor **Wang Testing Services** Drill Rig **D-50 TMR**
 Driller **R&R** Logger **A. Happel** Checked by **C. Marin**
 Drilling Method **4" Casing, mud rotary, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ∇ **0.00 ft**
 At Completion of Drilling \blacktriangledown **0.00 ft**
 Time After Drilling **NA**
 Depth to Water ∇ **NA**

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

WANGENGINC 3420601.GPJ WANGENG.GDT 2/12/14



BORING LOG BSB-14

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WEI Job No.: 342-06-01

Client: **PARSONS**
 Project: **US 52 / IL 64 Over the Mississippi River**
 Location: **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 582.37 ft
 North: 1980464.41 ft
 East: 2298443.65 ft
 Station: 1580+33.96
 Offset: 23.09 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--RUN 4 - RECOVERY= 100%-- --RQD= 43%-- 51.5ft-Qu=10520 psi --->			4					505.4	Boring terminated at 77.00 ft						
		57 to 67 = 2 min/foot	55									80					
		59.5ft-Qu=10570 psi --->	60									85					
		--RUN 5 - RECOVERY= 100%-- --RQD= 60%--			5							90					
		67 to 77 = 2 min/foot	65														
		68.5ft-Qu=11870 psi --->	70									95					
		--RUN 6 - RECOVERY= 100%-- --RQD= 90%--			6							100					

GENERAL NOTES

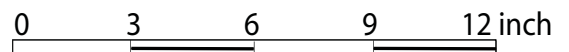
WATER LEVEL DATA

Begin Drilling **09-09-2013** Complete Drilling **09-09-2013**
 Drilling Contractor **Wang Testing Services** Drill Rig **D-50 TMR**
 Driller **R&R** Logger **A. Happel** Checked by **C. Marin**
 Drilling Method **4" Casing, mud rotary, boring backfilled upon completion**

While Drilling ∇ **0.00 ft**
 At Completion of Drilling ∇ **0.00 ft**
 Time After Drilling **NA**
 Depth to Water ∇ **NA**

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


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Boring	Run No.	From (ft)	To (ft)	Recovery (%)	RQD (%)
BSB-14	1	565.4	555.4	100	43
	2	555.4	545.4	96	16
	3	545.4	535.4	100	41

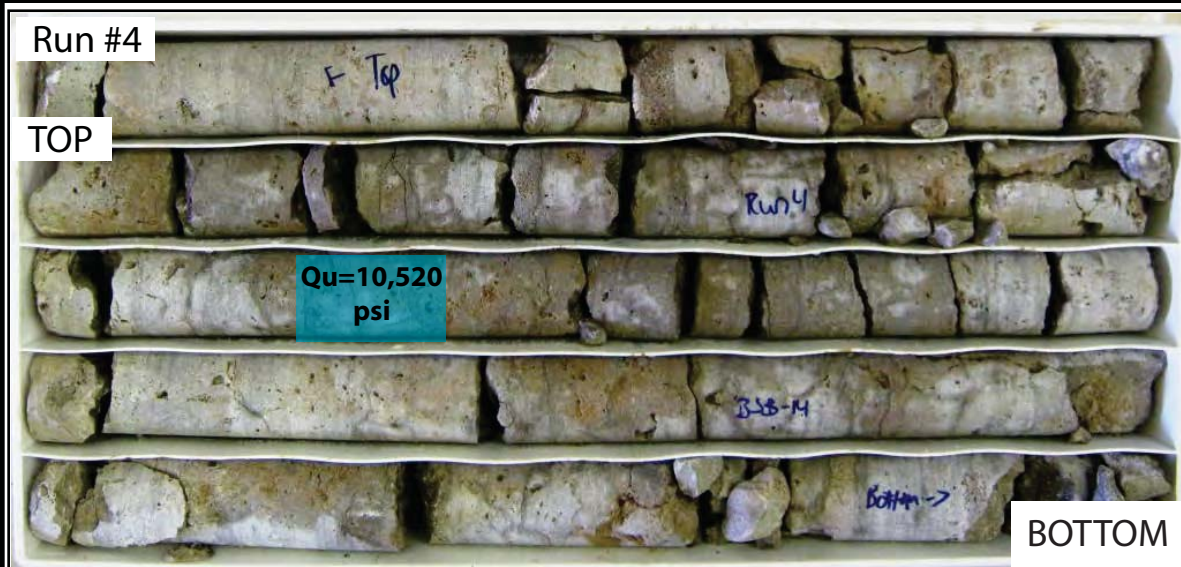
BEDROCK CORE: US 52/IL 64 OVER MISSISSIPPI RIVER,
SAVANNA, ILLINOIS / SABULA, IOWA

SCALE: GRAPHIC **BSB-14** DRAWN BY: A. Happel
CHECKED BY: C. Marin



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FOR PARSONS CORPORATION 342-06-01



Boring	Run No.	From (ft)	To (ft)	Recovery (%)	RQD (%)
BSB-14	4	535.4	525.4	100	43
	5	525.4	515.4	100	60
	6	515.4	505.4	100	90

BEDROCK CORE: US 52/IL 64 OVER MISSISSIPPI RIVER, SAVANNA, ILLINOIS / SABULA, IOWA

SCALE: GRAPHIC

BSB-14

DRAWN BY: A. Happel
CHECKED BY: C. Marin

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FOR PARSONS CORPORATION

342-06-01



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BORING LOG BSB-15

WEI Job No.: 342-06-01

Client: **PARSONS**
 Project: **US 52 / IL 64 Over the Mississippi River**
 Location: **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 582.45 ft
 North: 1980435.35 ft
 East: 2297890.11 ft
 Station: 1574+80.55
 Offset: 08.48 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--Water--															
	559.0									555.0	Loose to medium dense, gray, fine to medium SAND			2	5 4 3	NP	19
												30		3	4 4 3	NP	21
														4	1 3 2	NP	19
														5	3 4 6	NP	22
														6	4 5 7	NP	28
														7	4 4 4	NP	23
														8	3 4 3	NP	20
														9	8 8 6	NP	9
														10	4 7 11	NP	19
	535.0									535.0	Medium dense, gray GRAVELLY SAND			11	9 8 8	NP	15
	559.0	Loose, gray, coarse SAND, trace gravel	25		1	4 4 2	NP	22									

--%Gravel=0.4--
 --%Sand=97.7--
 --%Silt=1.4--
 --%Clay=0.5--40
 --A-3 (0)--
 --trace shell fragments--

GENERAL NOTES

WATER LEVEL DATA

Begin Drilling **08-19-2013** Complete Drilling **08-21-2013**
 Drilling Contractor **Wang Testing Services** Drill Rig **D-50 TMR**
 Driller **R&N** Logger **D. Kolpacki** Checked by **C. Marin**
 Drilling Method **4" Casing, mud rotary, boring backfilled upon completion**

While Drilling ∇ **0.00 ft**
 At Completion of Drilling ∇ **0.00 ft**
 Time After Drilling **NA**
 Depth to Water ∇ **NA**

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

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BORING LOG BSB-15

WEI Job No.: 342-06-01

Client: **PARSONS**
 Project: **US 52 / IL 64 Over the Mississippi River**
 Location: **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 582.45 ft
 North: 1980435.35 ft
 East: 2297890.11 ft
 Station: 1574+80.55
 Offset: 08.48 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	530.0				12	7 4 6	NP	16									
		Medium dense, gray SAND, trace gravel			13	4 5 9	NP	23									
			55		14	7 7 7	NP	28									
	523.7	Medium dense to very dense, gray, coarse SAND, trace to some gravel			15	5 9 12	NP	15									
		--%Gravel=9.6-- --%Sand=88.3-- --%Silt=2.0-- --%Clay=0.1-- --A-1-b (0)--	60		16	5 0 3	NP										
		--HARD GRAVEL-- --Possible Cobbles--	65														
	514.5	Strong, light brown to light gray, very poor to poor rock mass quality, top 3.5' braciated, thereafter bedded, moderately to slightly weathered cherty DOLOSTONE, up to 12-inch beds, up to 12-inch spaced joints, horizontal and vertical with less than 0.2-inch infilling, hard joint wall, thin shale partings, highly to moderately weathered joints, moderately vuggy, moderately to intensely fractured	70		1												
			75		2												

GENERAL NOTES								WATER LEVEL DATA									
Begin Drilling	08-19-2013	Complete Drilling	08-21-2013	While Drilling	▽	0.00 ft		At Completion of Drilling	▼	0.00 ft		Time After Drilling	NA		Depth to Water	▽	NA
Drilling Contractor	Wang Testing Services	Drill Rig	D-50 TMR	The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.													
Driller	R&N	Logger	D. Kolpacki	Checked by	C. Marin												
Drilling Method	4" Casing, mud rotary, boring backfilled upon completion																

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BORING LOG BSB-15

WEI Job No.: 342-06-01

Client: **PARSONS**
 Project: **US 52 / IL 64 Over the Mississippi River**
 Location: **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 582.45 ft
 North: 1980435.35 ft
 East: 2297890.11 ft
 Station: 1574+80.55
 Offset: 08.48 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--RUN 5 - RECOVERY= 15%-- --RQD= 0%--															
	454.5	--Highly fractured--			5						Boring terminated at 128.00 ft						
		108 to 118 = 1.5 min/foot 108.5ft-Qu=10060 psi --->	105									130					
		--RUN 6 - RECOVERY= 98%-- --RQD= 50%--															
		115.0ft-Qu=11760 psi --->	110		6							135					
		118 to 128 = 2 min/foot															
		--RUN 7 - RECOVERY= 10%-- --RQD= 0%--	115									140					
			120									145					
					7												
			125									150					

GENERAL NOTES

Begin Drilling **08-19-2013** Complete Drilling **08-21-2013**
 Drilling Contractor **Wang Testing Services** Drill Rig **D-50 TMR**
 Driller **R&N** Logger **D. Kolpacki** Checked by **C. Marin**
 Drilling Method **4" Casing, mud rotary, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ∇ **0.00 ft**
 At Completion of Drilling ∇ **0.00 ft**
 Time After Drilling **NA**
 Depth to Water ∇ **NA**

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

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Run 1

TOP

342-06-01
Run 1

Run 2

BOTTOM

TOP

N 2

342-06-01
Run 2

Qu= 9,930
psi

Qu=10,270
psi

Bottom
Run 2

BOTTOM

Run 3

TOP

Qu= 8,350
psi

BOTTOM

Run 4

TOP

BOTTOM

Run 5

BOTTOM

TOP

Run 6

Qu= 10,060
psi

TOP

Qu= 11,760
psi

Bottom

BOTTOM

Run 7

TOP

BOTTOM

0 3 6 9 12 inch

BEDROCK CORE: US 52/IL 64 OVER MISSISSIPPI RIVER,
SAVANNA, ILLINOIS / SABULA, IOWA

Boring	Run No.	From (ft)	To (ft)	Recovery (%)	RQD (%)
BSB-15	1	514.5	511.0	82	0
	2	511.0	504.5	95	39
	3	504.5	494.5	47	30
	4	494.5	484.5	13	0
	5	484.5	474.5	15	0
	6	474.5	464.5	98	50
	7	464.5	454.5	10	0

SCALE: GRAPHIC

BSB-15

DRAWN BY: A. Happel
CHECKED BY: C. Marin



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FOR PARSONS CORPORATION

342-06-01



BORING LOG BSB-15A

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WEI Job No.: 342-06-01

Client **PARSONS**
 Project **US 52 / IL 64 Over the Mississippi River**
 Location **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 582.48 ft
 North: 1980441.73 ft
 East: 2297903.85 ft
 Station: 1574+94.26
 Offset: 02.04 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--WATER--															
			5								--Drilled without sampling--	30					
			10									35					
			15									40					
			20									45					
	557.5	--RIVER BED--	25									50					

GENERAL NOTES

WATER LEVEL DATA

Begin Drilling **09-18-2013** Complete Drilling **09-18-2013**
 Drilling Contractor **Wang Testing Services** Drill Rig **D-50 TMR**
 Driller **R&R** Logger **D. Kolpacki** Checked by **C. Marin**
 Drilling Method **4" Casing, mud rotary, boring backfilled upon completion**

While Drilling ∇ **0.00 ft**
 At Completion of Drilling \blacktriangledown **0.00 ft**
 Time After Drilling **NA**
 Depth to Water ∇ **NA**

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



BORING LOG BSB-15A

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WEI Job No.: 342-06-01

Client: **PARSONS**
 Project: **US 52 / IL 64 Over the Mississippi River**
 Location: **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 582.48 ft
 North: 1980441.73 ft
 East: 2297903.85 ft
 Station: 1574+94.26
 Offset: 02.04 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--Drilled without sampling--									75.5ft-Qu=9230 psi ---> 76 to 86 = 2 min/foot 76.5ft-Qu=11880 psi --->						
			55								--RUN 2 - RECOVERY= 100%-- --RQD= 72%--	80		2			
			60								83.0ft-Qu=7900 psi ---> 86 to 94 = 2 min/foot --Highly fractures-- --Highly weathered joints--	85					
			65								--RUN 3 - RECOVERY= 75%-- --RQD= 0%--	90		3			
	516.5	Strong, yellowish to light gray, very poor to fair rock mass quality, cherty, bedded moderately weathered to fresh DOLOSTONE, 2- to 12-inch beds, 2- to 12-inch spaced joints, horizontal and vertical with less than 0.2-inch infilling, hard joint wall, thin shale partings, highly to moderately weathered joints, moderately vuggy, moderately to intensely fractured	70		1						94 to 104 = 2 min/foot 95.2.0ft-Qu=6620 psi --->	95					
			75								--RUN 4 - RECOVERY= 100%-- --RQD= 39%--	100		4			

GENERAL NOTES

WATER LEVEL DATA

Begin Drilling **09-18-2013** Complete Drilling **09-18-2013**
 Drilling Contractor **Wang Testing Services** Drill Rig **D-50 TMR**
 Driller **R&R** Logger **D. Kolpacki** Checked by **C. Marin**
 Drilling Method **4" Casing, mud rotary, boring backfilled upon completion**

While Drilling ∇ **0.00 ft**
 At Completion of Drilling ∇ **0.00 ft**
 Time After Drilling **NA**
 Depth to Water ∇ **NA**

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

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BORING LOG BSB-15A

WEI Job No.: 342-06-01

Client: **PARSONS**
 Project: **US 52 / IL 64 Over the Mississippi River**
 Location: **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 582.48 ft
 North: 1980441.73 ft
 East: 2297903.85 ft
 Station: 1574+94.26
 Offset: 02.04 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		104 to 114 = 2 min/foot	105		5												
		--RUN 5 - RECOVERY= 25%-- --RQD= 64%--															
		114 to 124 = 2 min/foot	115		6												
		115.0ft-Qu=13750 psi ---> --RUN 6 - RECOVERY= 50%-- --RQD= 53%--															
	458.5	Boring terminated at 124.00 ft	125														

GENERAL NOTES

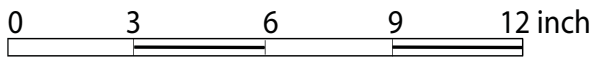
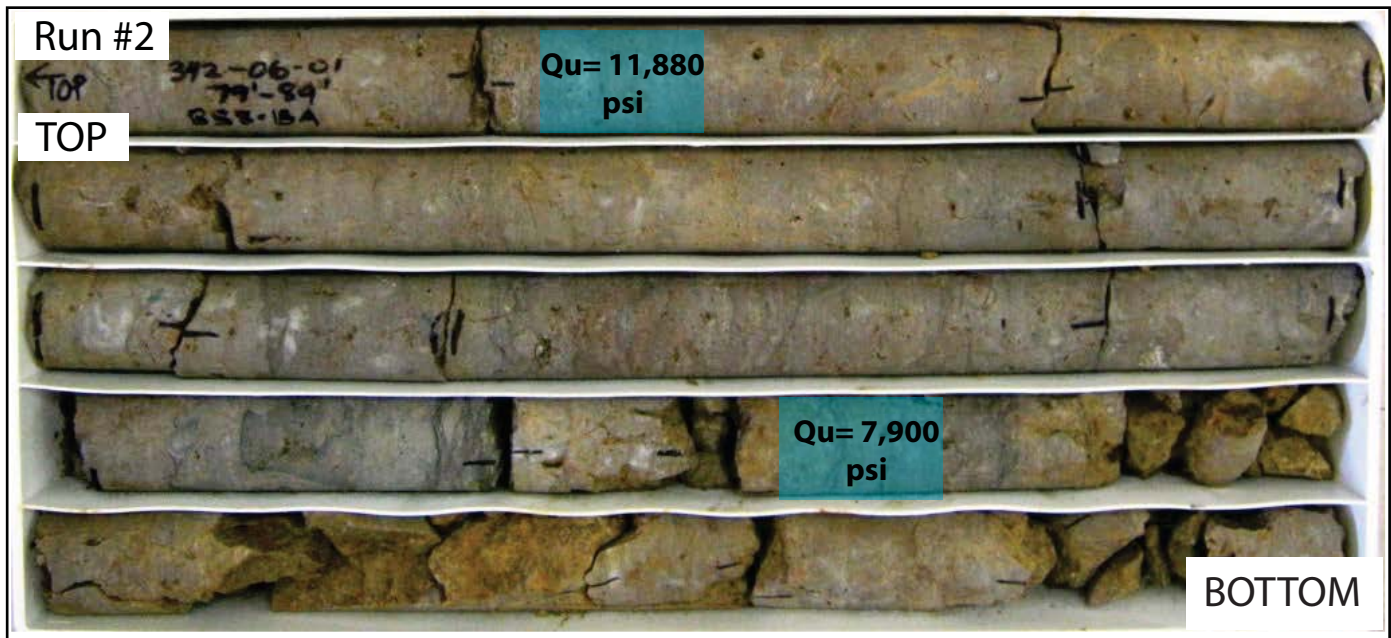
WATER LEVEL DATA

Begin Drilling **09-18-2013** Complete Drilling **09-18-2013**
 Drilling Contractor **Wang Testing Services** Drill Rig **D-50 TMR**
 Driller **R&R** Logger **D. Kolpacki** Checked by **C. Marin**
 Drilling Method **4" Casing, mud rotary, boring backfilled upon completion**

While Drilling ∇ **0.00 ft**
 At Completion of Drilling \blacktriangledown **0.00 ft**
 Time After Drilling **NA**
 Depth to Water ∇ **NA**

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

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Boring	Run No.	From (ft)	To (ft)	Recovery (%)	RQD (%)
BSB-15A	1	516.5	506.5	98	53
	2	506.5	496.5	100	72
	3	496.5	488.5	75	0

BEDROCK CORE: US 52/IL 64 OVER MISSISSIPPI RIVER,
SAVANNA, ILLINOIS / SABULA, IOWA

SCALE: GRAPHIC

BSB-15A

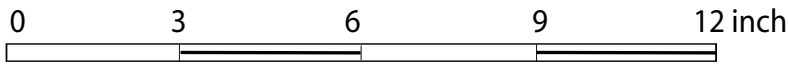
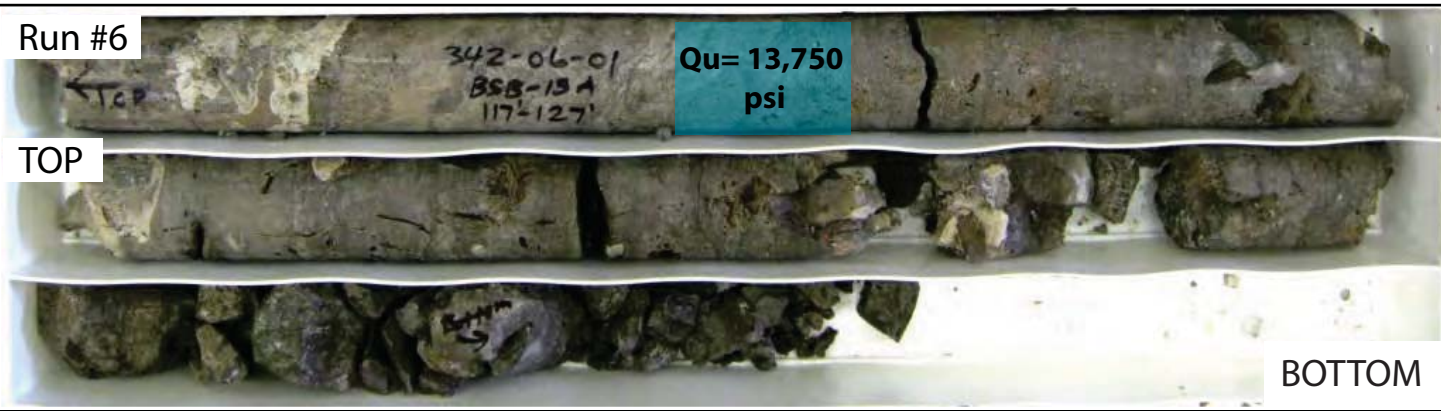
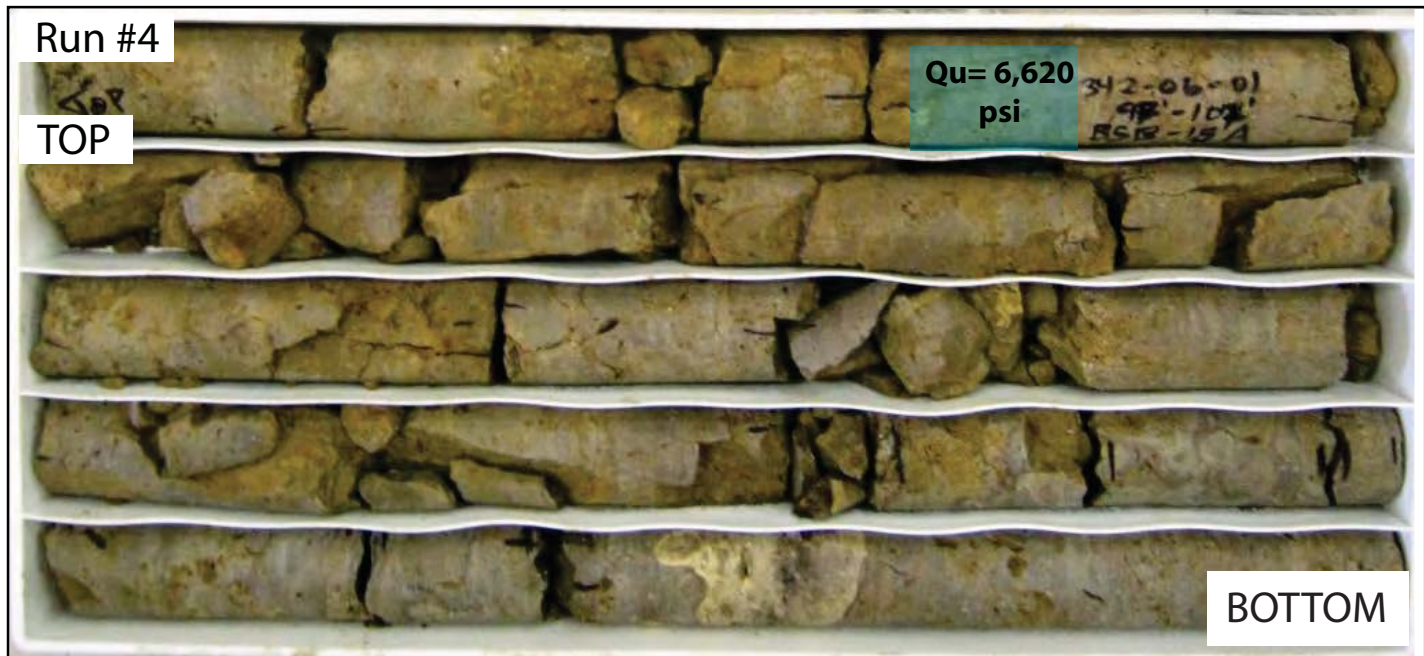
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342-06-01



Boring	Run No.	From (ft)	To (ft)	Recovery (%)	RQD (%)
BSB-15A	4	488.5	478.5	100	39
	5	478.5	468.5	25	64
	6	468.5	458.5	50	53

BEDROCK CORE: US 52/IL 64 OVER MISSISSIPPI RIVER,
SAVANNA, ILLINOIS / SABULA, IOWA

SCALE: GRAPHIC **BSB-15A** DRAWN BY: A. Happel
CHECKED BY: C. Marin



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FOR PARSONS CORPORATION 342-06-01



BORING LOG BSB-15B

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WEI Job No.: 342-06-01

Client: **PARSONS**
 Project: **US 52 / IL 64 Over the Mississippi River**
 Location: **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 582.62 ft
 North: 1980411.43 ft
 East: 2297869.96 ft
 Station: 1574+60.52
 Offset: 32.49 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--WATER--															
			5								--Drilled without sampling--	30					
			10									35					
			15									40					
			20									45					
	558.1	--RIVER BED--	25									50					

GENERAL NOTES

Begin Drilling **09-20-2013** Complete Drilling **09-20-2013**
 Drilling Contractor **Wang Testing Services** Drill Rig **D-50 TMR**
 Driller **R&R** Logger **D. Kolpacki** Checked by **C. Marin**
 Drilling Method **4" Casing, mud rotary, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ∇ **0.00 ft**
 At Completion of Drilling \blacktriangledown **0.00 ft**
 Time After Drilling **NA**
 Depth to Water ∇ **NA**

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



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WEI Job No.: 342-06-01

Client: **PARSONS**
 Project: **US 52 / IL 64 Over the Mississippi River**
 Location: **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 582.62 ft
 North: 1980411.43 ft
 East: 2297869.96 ft
 Station: 1574+60.52
 Offset: 32.49 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--Drilled without sampling--									67 to 72 = 2 min/foot 72 to 77 = 1.75 min/foot						
			55								77 to 87 = 1.75 min/foot						
											79.5ft-Qu=9020 psi --->						
											--RUN 2 - RECOVERY= 100%-- --RQD= 60%--			2			
			60								85.8ft-Qu=11370 psi --->						
											87 to 92 = 1.75 min/foot 92 to 97 = 1.5 min/foot						
			65								90.0ft-Qu=9910 psi --->						
	515.6	70.5ft-Qu=12050 psi ---> Strong, yellowish to light gray, poor to fair rock mass quality, cherty, bedded moderately weathered to fresh DOLOSTONE, 2- to 12-inch beds, 2- to 12-inch spaced joints, horizontal and vertical with less than 0.2-inch infilling, hard joint wall, thin shale partings, highly to moderately weathered joints, moderately vuggy	70								--RUN 3 - RECOVERY= 100%-- --RQD= 39%--			3			
		73.50ft-Qu=6560 psi ---> --RUN 1 - RECOVERY= 100%-- --RQD= 61%--	75		1						97 to 107 = 1.25 min/foot						

GENERAL NOTES

WATER LEVEL DATA

Begin Drilling **09-20-2013** Complete Drilling **09-20-2013**
 Drilling Contractor **Wang Testing Services** Drill Rig **D-50 TMR**
 Driller **R&R** Logger **D. Kolpacki** Checked by **C. Marin**
 Drilling Method **4" Casing, mud rotary, boring backfilled upon completion**

While Drilling ∇ **0.00 ft**
 At Completion of Drilling ∇ **0.00 ft**
 Time After Drilling **NA**
 Depth to Water ∇ **NA**

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



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BORING LOG BSB-15B

WEI Job No.: 342-06-01

Client: **PARSONS**
 Project: **US 52 / IL 64 Over the Mississippi River**
 Location: **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 582.62 ft
 North: 1980411.43 ft
 East: 2297869.96 ft
 Station: 1574+60.52
 Offset: 32.49 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		100.2ft-Qu=7050 psi --->			4					455.6	Boring terminated at 127.00 ft						
		--RUN 4 - RECOVERY= 98%-- --RQD= 76%--															
		107 to 112 = 1.5 min/foot 112 to 117 = 1.75 min/foot															
		110.0ft-Qu=6380 psi --->			5												
		--RUN 5 - RECOVERY= 98%-- --RQD= 67%--															
		115.5ft-Qu=6370 psi --->															
		117 to 127 = 1.75 min/foot															
		--RUN 6 - RECOVERY= 100%-- --RQD= 63%--			6												
		121.5ft-Qu=7780 psi --->															

GENERAL NOTES

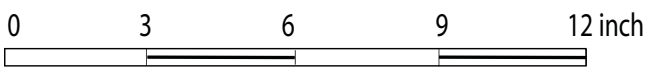
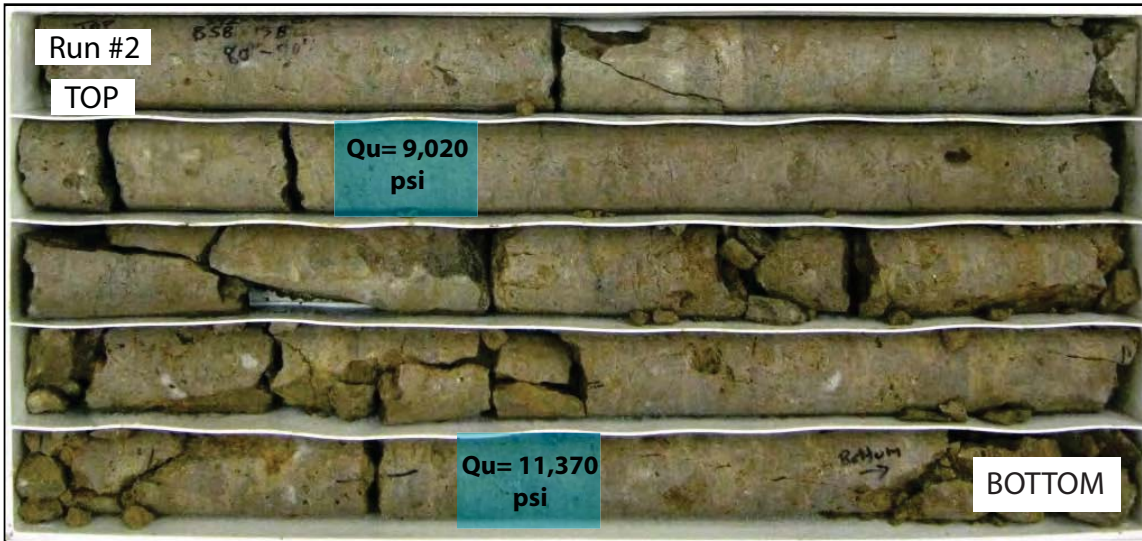
WATER LEVEL DATA

Begin Drilling **09-20-2013** Complete Drilling **09-20-2013**
 Drilling Contractor **Wang Testing Services** Drill Rig **D-50 TMR**
 Driller **R&R** Logger **D. Kolpacki** Checked by **C. Marin**
 Drilling Method **4" Casing, mud rotary, boring backfilled upon completion**

While Drilling ∇ **0.00 ft**
 At Completion of Drilling \blacktriangledown **0.00 ft**
 Time After Drilling **NA**
 Depth to Water ∇ **NA**

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


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Boring	Run No.	From (ft)	To (ft)	Recovery (%)	RQD (%)
BSB-15B	1	515.6	505.6	100	61
	2	505.6	495.6	100	60
	3	495.6	485.6	100	39

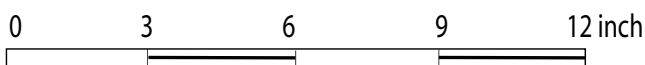
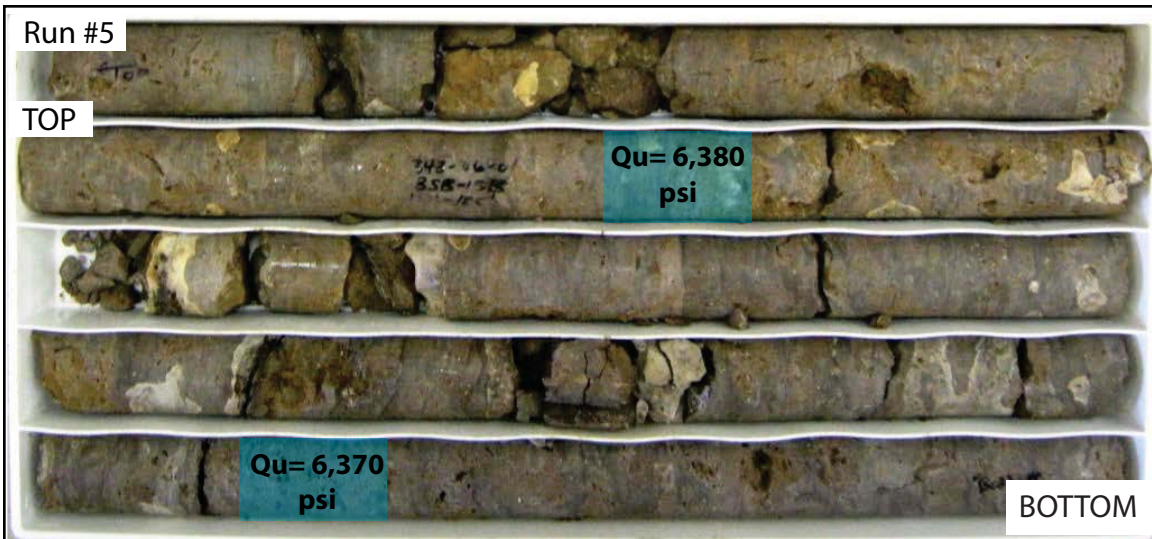
BEDROCK CORE: US 52/IL 64 OVER MISSISSIPPI RIVER,
SAVANNA, ILLINOIS / SABULA, IOWA

SCALE: GRAPHIC **BSB-15B** DRAWN BY: A. Happel
CHECKED BY: C. Marin



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FOR PARSONS CORPORATION 342-06-01



Boring	Run No.	From (ft)	To (ft)	Recovery (%)	RQD (%)
BSB-15B	4	485.6	475.6	98	76
	5	475.6	465.6	98	67
	6	465.6	455.6	100	63

BEDROCK CORE: US 52/IL 64 OVER MISSISSIPPI RIVER,
SAVANNA, ILLINOIS / SABULA, IOWA

SCALE: GRAFIC

BSB-15B

DRAWN BY: A. Happel
CHECKED BY: C. Marin

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FOR PARSONS CORPORATION

342-06-01



BORING LOG BSB-15C

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 Telephone: 630 953-9928
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WEI Job No.: 342-06-01

Client: **PARSONS**
 Project: **US 52 / IL 64 Over the Mississippi River**
 Location: **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 582.62 ft
 North: 1980409.58 ft
 East: 2297913.94 ft
 Station: 1575+04.50
 Offset: 34.14 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--WATER--															
			5									30					
			10									35					
			15									40					
		--RIVER BED--	20									45					
	561.1																
		--Drilled without sampling--	25									50					

GENERAL NOTES

Begin Drilling **09-24-2013** Complete Drilling **09-24-2013**
 Drilling Contractor **Wang Testing Services** Drill Rig **D-50 TMR**
 Driller **R&R** Logger **D. Kolpacki** Checked by **C. Marin**
 Drilling Method **4" Casing, mud rotary, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ∇ **0.00 ft**
 At Completion of Drilling \blacktriangledown **0.00 ft**
 Time After Drilling **NA**
 Depth to Water ∇ **NA**

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



BORING LOG BSB-15C

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WEI Job No.: 342-06-01

Client: **PARSONS**
 Project: **US 52 / IL 64 Over the Mississippi River**
 Location: **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 582.62 ft
 North: 1980409.58 ft
 East: 2297913.94 ft
 Station: 1575+04.50
 Offset: 34.14 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--Drilled without sampling--									76.0ft-Qu=12370 psi --->						
			55								--RUN 2 - RECOVERY= 100%-- --RQD= 63%--	80		2			
											83.5 to 93.5 = 1.75 min/foot						
			60								85.3ft-Qu=14820 psi --->						
	519.1	Strong, yellowish to light gray and white, poor to fair rock mass quality, cherty, bedded slightly weathered to fresh DOLOSTONE, 2- to 18-inch beds, 2- to 18-inch spaced joints, horizontal and vertical with less than 0.1-inch infilling, hard joint wall, thin shale partings, moderately vuggy, fossiliferous, and trace pyrite	65								--RUN 3 - RECOVERY= 100%-- --RQD= 60%--			3			
											92.3ft-Qu=8450 psi --->						
			70								93.5 to 98.5 = 2 min/foot 98.5 to 103.5 = 1.5 min/foot						
											95.0ft-Qu=11630 psi --->						
			75								--RUN 4 - RECOVERY= 100%-- --RQD= 65%--			4			

GENERAL NOTES

WATER LEVEL DATA

Begin Drilling **09-24-2013** Complete Drilling **09-24-2013**
 Drilling Contractor **Wang Testing Services** Drill Rig **D-50 TMR**
 Driller **R&R** Logger **D. Kolpacki** Checked by **C. Marin**
 Drilling Method **4" Casing, mud rotary, boring backfilled upon completion**

While Drilling ∇ **0.00 ft**
 At Completion of Drilling ∇ **0.00 ft**
 Time After Drilling **NA**
 Depth to Water ∇ **NA**

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

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WEI Job No.: 342-06-01

Client: **PARSONS**
 Project: **US 52 / IL 64 Over the Mississippi River**
 Location: **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 582.62 ft
 North: 1980409.58 ft
 East: 2297913.94 ft
 Station: 1575+04.50
 Offset: 34.14 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	479.1	101.3ft-Qu=10250 psi ---> 102.2ft-Qu=8900 psi --->															
		Boring terminated at 103.50 ft	105														
			110														
			115														
			120														
			125														

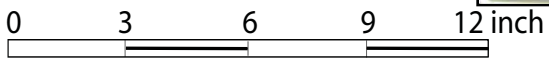
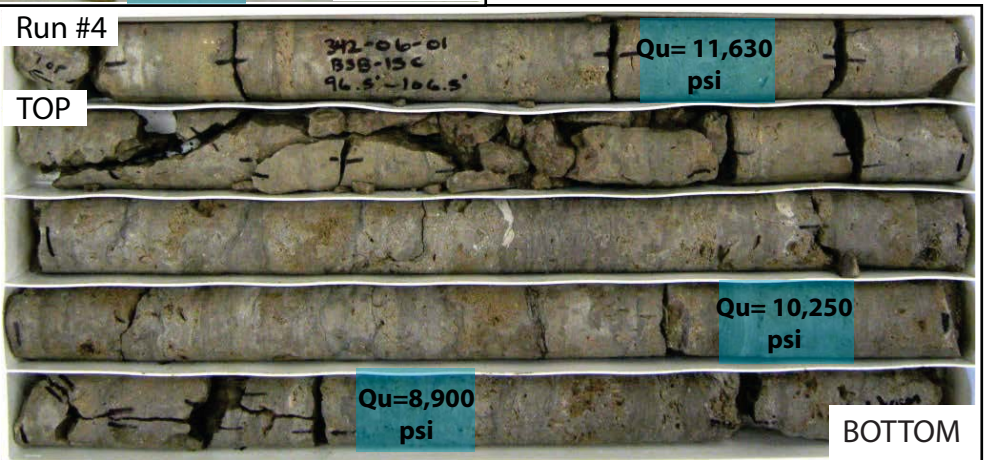
GENERAL NOTES

Begin Drilling **09-24-2013** Complete Drilling **09-24-2013**
 Drilling Contractor **Wang Testing Services** Drill Rig **D-50 TMR**
 Driller **R&R** Logger **D. Kolpacki** Checked by **C. Marin**
 Drilling Method **4" Casing, mud rotary, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ∇ **0.00 ft**
 At Completion of Drilling \blacktriangledown **0.00 ft**
 Time After Drilling **NA**
 Depth to Water ∇ **NA**

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



Boring	Run No.	From (ft)	To (ft)	Recovery (%)	RQD (%)
BSB-15C	1	519.1	509.1	67	26
	2	509.1	499.1	100	63
	3	499.1	489.1	100	60
	4	489.1	479.1	100	65

BEDROCK CORE: US 52/IL 64 OVER MISSISSIPPI RIVER,
SAVANNA, ILLINOIS / SABULA, IOWA

SCALE: GRAPHIC

BSB-15C

DRAWN BY: A. Happel
CHECKED BY: C. Marin

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FOR PARSONS CORPORATION

342-06-01



BORING LOG BSB-16

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WEI Job No.: 342-06-01

Client: **PARSONS**
 Project: **US 52 / IL 64 Over the Mississippi River**
 Location: **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 582.43 ft
 North: 1980480.31 ft
 East: 2297892.76 ft
 Station: 1574+82.99
 Offset: 36.49 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--WATER--															
											Loose to medium dense, gray, medium to coarse SAND			3	2 5 6	NP	15
														4	7 5 7	NP	29
			5											5	3 3 3	NA	
														6	3 1 3	NP	17
			10											7	3 4 4	NP	16
														8	5 9 16	NP	16
			15							542.4	Very dense, gray GRAVELLY SAND			9	5 50/5	NP	8
										539.9	Loose, gray SAND			10	3 4 4	NP	20
			20							537.4	Medium dense, gray GRAVELLY SAND			11	8 9 11	NP	10
	561.4	Medium dense, brown, medium SAND			1	3 10 6	NP	16						12	8 8 7	NP	21
	559.7	Very loose, gray SILTY LOAM			2	0 0 1	NP	32			--%Gravel=17.0-- --%Sand=80.7-- --%Silt=2.2-- --%Clay=0.1-- --A-3 (0)--50						
	557.4		25														

GENERAL NOTES

WATER LEVEL DATA

Begin Drilling **09-04-2013** Complete Drilling **09-04-2013**
 Drilling Contractor **Wang Testing Services** Drill Rig **D-50 TMR**
 Driller **R&N** Logger **A. Happel** Checked by **C. Marin**
 Drilling Method **4" Casing, mud rotary, boring backfilled upon completion**

While Drilling ∇ **0.00 ft**
 At Completion of Drilling ∇ **0.00 ft**
 Time After Drilling **NA**
 Depth to Water ∇ **NA**

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

WANGENG 3420601.GPJ WANGENG.GDT 2/12/14



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BORING LOG BSB-16

WEI Job No.: 342-06-01

Client: **PARSONS**
 Project: **US 52 / IL 64 Over the Mississippi River**
 Location: **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 582.43 ft
 North: 1980480.31 ft
 East: 2297892.76 ft
 Station: 1574+82.99
 Offset: 36.49 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)													
	531.9	Loose to medium dense, gray, coarse SAND	53.0 - 55.0	X	13	3	NP	23	[Pattern]	531.9	75.5ft-Qu=11060 psi ---> 68 to 78 = 2 min/foot	53.0 - 55.0	[Pattern]	1	3	[Pattern]	[Pattern]													
			55.0 - 60.0	X	14	7 7 9	NP	10	[Pattern]		80.5ft-Qu=8580 psi ---> 78 to 88 = 1.5 min/foot	55.0 - 60.0	[Pattern]																	
			60.0 - 65.0	X	15	6 7 10	NP	10	[Pattern]		--Run 2 - RECOVERY= 100%-- --RQD= 88%-- 87.0ft-Qu=11700 psi ---> 88 to 98 = 1.5 min/foot	60.0 - 65.0	[Pattern]	2																
		--%Gravel=12.5-- --%Sand=83.5-- --%Silt=4.0-- --%Clay=0.1-- --A-1-b (0)--	65.0 - 70.0	X	16	9 11 11	NP	14	[Pattern]		--Run 3 - RECOVERY= 100%-- --RQD= 73%-- 95.5ft-Qu=11650 psi ---> 98 to 108 = 2 min/foot	65.0 - 70.0	[Pattern]	3																
	514.4	Strong, yellowish to light gray and white, fair to good rock mass quality, cherty, bedded, moderately weathered to fresh DOLOSTONE, 2- to 24-inch beds, 2- to 24-inch spaced joints, horizontal with less than 0.1-inch infilling, hard joint wall, thin shale partings, highly vuggy, fossiliferous, and trace pyrite 71.0ft-Qu=13150 psi ---> --Run 1 - RECOVERY= 93%-- --RQD= 68%--	70.0 - 75.0	[Pattern]	1	CORE	[Pattern]	[Pattern]	[Pattern]	514.4	98 to 108 = 2 min/foot	70.0 - 75.0	[Pattern]	CORE	[Pattern]	[Pattern]	[Pattern]													

GENERAL NOTES

Begin Drilling **09-04-2013** Complete Drilling **09-04-2013**
 Drilling Contractor **Wang Testing Services** Drill Rig **D-50 TMR**
 Driller **R&N** Logger **A. Happel** Checked by **C. Marin**
 Drilling Method **4" Casing, mud rotary, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ∇ **0.00 ft**
 At Completion of Drilling ∇ **0.00 ft**
 Time After Drilling **NA**
 Depth to Water ∇ **NA**

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

WANGENG 3420601.GPJ WANGENG.GDT 2/12/14



BORING LOG BSB-16

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WEI Job No.: 342-06-01

Client: **PARSONS**
 Project: **US 52 / IL 64 Over the Mississippi River**
 Location: **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 582.43 ft
 North: 1980480.31 ft
 East: 2297892.76 ft
 Station: 1574+82.99
 Offset: 36.49 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	474.4	--Run 4 - RECOVERY= 100%-- --RQD= 86%-- 103.5ft-Qu=6480 psi --->	105		4												
		Boring terminated at 108.00 ft	110														
			115														
			120														
			125														

GENERAL NOTES

WATER LEVEL DATA

Begin Drilling **09-04-2013** Complete Drilling **09-04-2013**
 Drilling Contractor **Wang Testing Services** Drill Rig **D-50 TMR**
 Driller **R&N** Logger **A. Happel** Checked by **C. Marin**
 Drilling Method **4" Casing, mud rotary, boring backfilled upon completion**

While Drilling ∇ **0.00 ft**
 At Completion of Drilling \blacktriangledown **0.00 ft**
 Time After Drilling **NA**
 Depth to Water ∇ **NA**

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

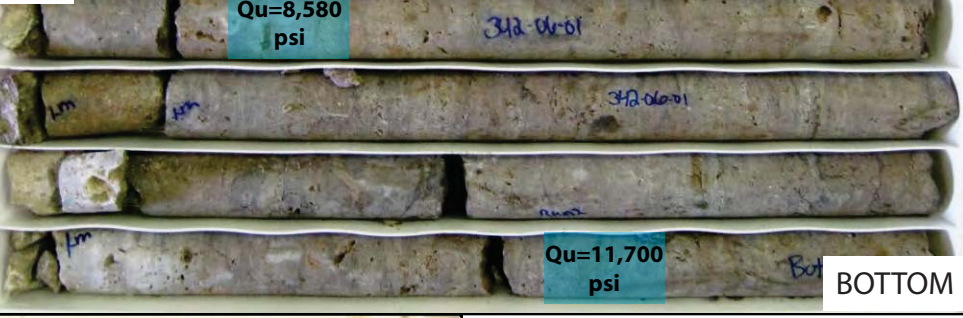
Run #1

TOP



Run #2

TOP



Run #3

TOP



Run #4

TOP




0 3 6 9 12 inch

Boring	Run No.	From (ft)	To (ft)	Recovery (%)	RQD (%)
BSB-16	1	514.4	504.4	93	68
	2	504.4	494.4	100	88
	3	494.4	484.4	100	73
	4	484.4	474.4	100	86

BEDROCK CORE: US 52/IL 64 OVER MISSISSIPPI RIVER, SAVANNA, ILLINOIS / SABULA, IOWA

SCALE: GRAPHIC **BSB-16** DRAWN BY: A. Happel
CHECKED BY: C. Marin



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FOR PARSONS CORPORATION 342-06-01



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BORING LOG BSB-17

WEI Job No.: 342-06-01

Client: **PARSONS**
 Project: **US 52 / IL 64 Over the Mississippi River**
 Location: **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 582.45 ft
 North: 1980431.61 ft
 East: 2297694.08 ft
 Station: 1572+84.54
 Offset: 13.11 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--WATER--								567.2	Very loose, gray, organic SILT						
										556.5	Very loose, gray medium SAND		X	2	1 1 1	NP	21
										555.0	Loose, gray SILT, trace SAND interbeds		X	3	1 1 3	NP	41
			5							552.5	Loose, gray SANDY LOAM, little gravel		X	4	3 2 1	NP	15
										550.0	Loose to medium dense, gray, coarse SAND, trace gravel		X	5	2 6 7	NP	24
			10										X	6	8 4 4	NP	20
											--%Gravel=2.9-- --%Sand=96.2-- --%Silt=0.5-- --%Clay=0.5--40 --A-3 (0)--		X	7	3 3 5	NP	24
			15										X	8	3 6 6	NP	23
										540.0	Medium stiff, gray, SILTY CLAY LOAM, trace silt layers		X	9	1 1 3	0.82 B	34
			20							537.5	Medium dense, gray, fine to medium SAND, trace gravel		X	10	4 5 6	NP	29
										559.0	Loose, brown, fine SAND		X	11	3 4 5	NP	20
			25		1	5 2 2	NP	24									

GENERAL NOTES

WATER LEVEL DATA

Begin Drilling **08-26-2013** Complete Drilling **08-26-2013**
 Drilling Contractor **Wang Testing Services** Drill Rig **D-50 ATV**
 Driller **R&N** Logger **D. Kolpacki** Checked by **C. Marin**
 Drilling Method **4" Casing, mud rotary, boring backfilled upon completion**

While Drilling ∇ **0.00 ft**
 At Completion of Drilling ∇ **0.00 ft**
 Time After Drilling **NA**
 Depth to Water ∇ **NA**

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

WANGENG 3420601.GPJ WANGENG.GDT 2/12/14



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BORING LOG BSB-17

WEI Job No.: 342-06-01

Client: **PARSONS**
 Project: **US 52 / IL 64 Over the Mississippi River**
 Location: **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 582.45 ft
 North: 1980431.61 ft
 East: 2297694.08 ft
 Station: 1572+84.54
 Offset: 13.11 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)		
	530.0	Medium dense, gray GRAVELLY SAND --%Gravel=29.9-- --%Sand=67.7-- --%Silt=1.2-- --%Clay=1.2-- --A-1-b (0)--	55	X	12	5 5 6	NP	24			--%Gravel=2.0-- --%Sand=95.8-- --%Silt=2.1-- --%Clay=0.1-- --A-3 (0)--	55	X	18	9 14 12	NP	20		
	518.7	Medium dense, gray, coarse SAND, little gravel	65	X	13	4 5 6	NP	21		502.0	Strong, yellowish to light gray and white, very poor to fair rock mass quality, highly cherty, thin bedded, slightly weathered to fresh DOLOSTONE, 2- to 12-inch beds, 2- to 12-inch spaced joints, horizontal and vertical with less than 0.2-inch infilling, hard joint wall, slightly weathered joints, thin shale partings, moderately vuggy, fossiliferous, and trace pyrite 85.5ft-Qu=6860 psi ---> 80.5 to 90.5 = 2 min/foot --RUN 1 - RECOVERY=97%-- --RQD= 53%-- 89.5ft-Qu=8040 psi --->90 90.5 to 100.5 = 2.25 min/foot 91.2ft-Qu=8130 psi--->	80							
			60	X	14	4 5 6	NP	20				85		1					
			65	X	15	6 6 8	NP	25				90							
			70	X	16	8 8 9	NP	16				95		2					
			75	X	17	12 13 12	NP	22				100							

GENERAL NOTES

Begin Drilling **08-26-2013** Complete Drilling **08-26-2013**
 Drilling Contractor **Wang Testing Services** Drill Rig **D-50 ATV**
 Driller **R&N** Logger **D. Kolpacki** Checked by **C. Marin**
 Drilling Method **4" Casing, mud rotary, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ∇ **0.00 ft**
 At Completion of Drilling ∇ **0.00 ft**
 Time After Drilling **NA**
 Depth to Water ∇ **NA**

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

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BORING LOG BSB-17

WEI Job No.: 342-06-01

Client: **PARSONS**
 Project: **US 52 / IL 64 Over the Mississippi River**
 Location: **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 582.45 ft
 North: 1980431.61 ft
 East: 2297694.08 ft
 Station: 1572+84.54
 Offset: 13.11 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		100.5 to 110.5 = 2.25 min/foot 101.8ft-Qu=5840 psi --->									--RUN 5 - RECOVERY=100%-- --RQD= 48%-- 127.5ft-Qu=5810 psi --->			5			
		--RUN 3 - RECOVERY=100%-- --RQD= 73%-- 105.5ft-Qu=7430 psi --->	105		3						130.5 to 140.5 = 2.5 min/foot 132.0ft-Qu=3100 psi --->	130					
		110.5 to 120.5 = 2.5 min/foot --Highly fractured rock--	110								--RUN 6 - RECOVERY=100%-- --RQD= 65%-- 137.5ft-Qu=8810 psi --->	135		6			
		--RUN 4 - RECOVERY=20%-- --RQD= 8%--	115		4					442.0	Boring terminated at 140.50 ft	140					
		120.5 to 130.5 = 2.25 min/foot	120									145					
		124.5ft-Qu=5560 psi --->	125									150					

GENERAL NOTES

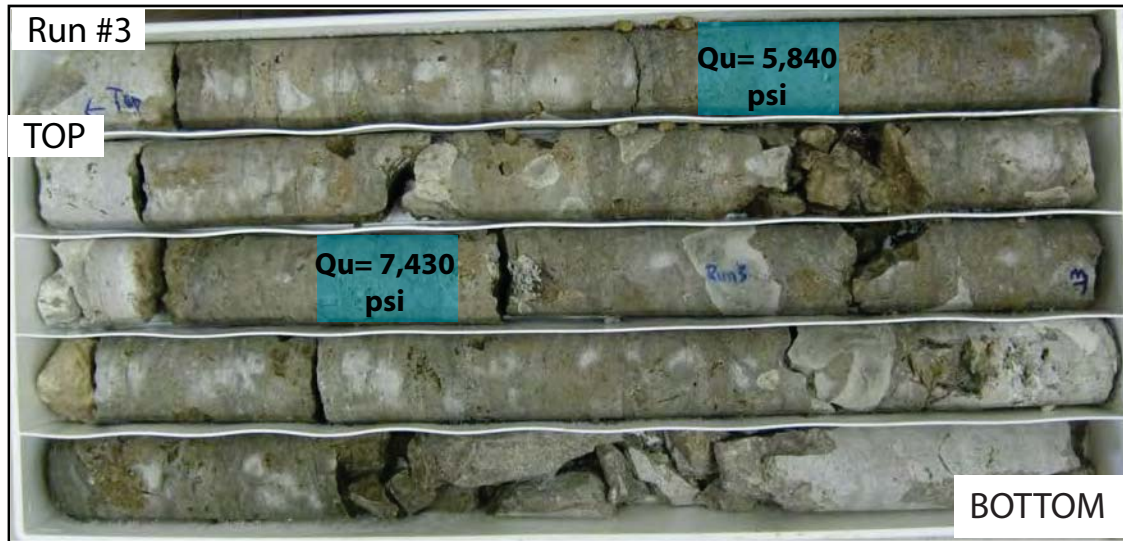
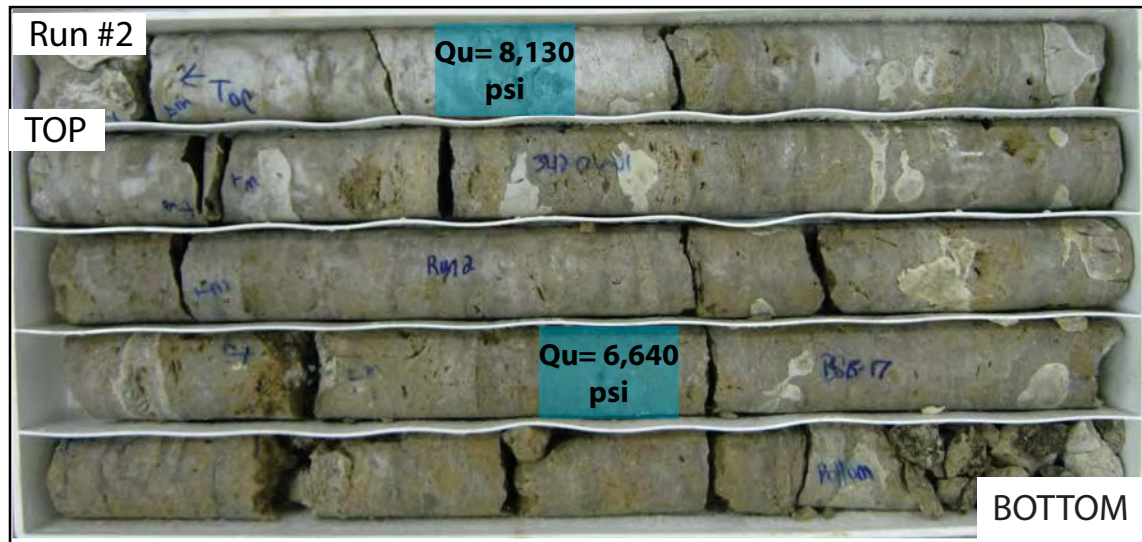
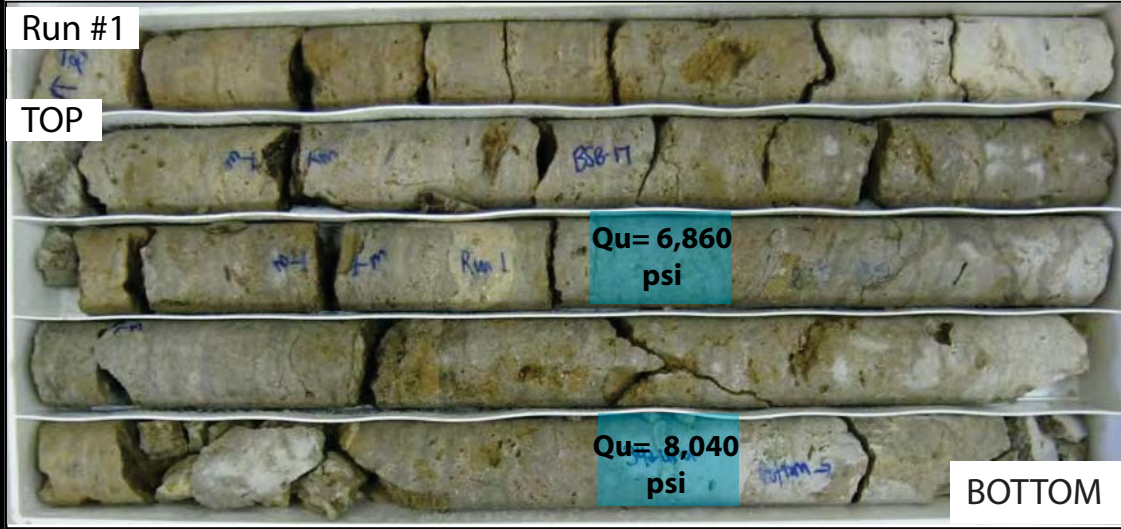
WATER LEVEL DATA

Begin Drilling **08-26-2013** Complete Drilling **08-26-2013**
 Drilling Contractor **Wang Testing Services** Drill Rig **D-50 ATV**
 Driller **R&N** Logger **D. Kolpacki** Checked by **C. Marin**
 Drilling Method **4" Casing, mud rotary, boring backfilled upon completion**

While Drilling ∇ **0.00 ft**
 At Completion of Drilling \blacktriangledown **0.00 ft**
 Time After Drilling **NA**
 Depth to Water ∇ **NA**

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

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0 3 6 9 12 inch

Boring	Run No.	From (ft)	To (ft)	Recovery (%)	RQD (%)
BSB-17	1	502.0	492.0	97	53
	2	492.0	482.0	99	75
	3	482.0	472.0	100	73

BEDROCK CORE: US 52/IL 64 OVER MISSISSIPPI RIVER,
SAVANNA, ILLINOIS / SABULA, IOWA

SCALE: GRAPHIC

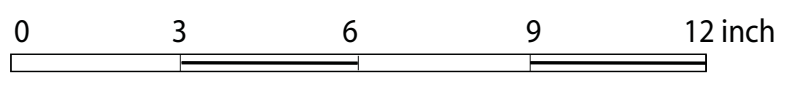
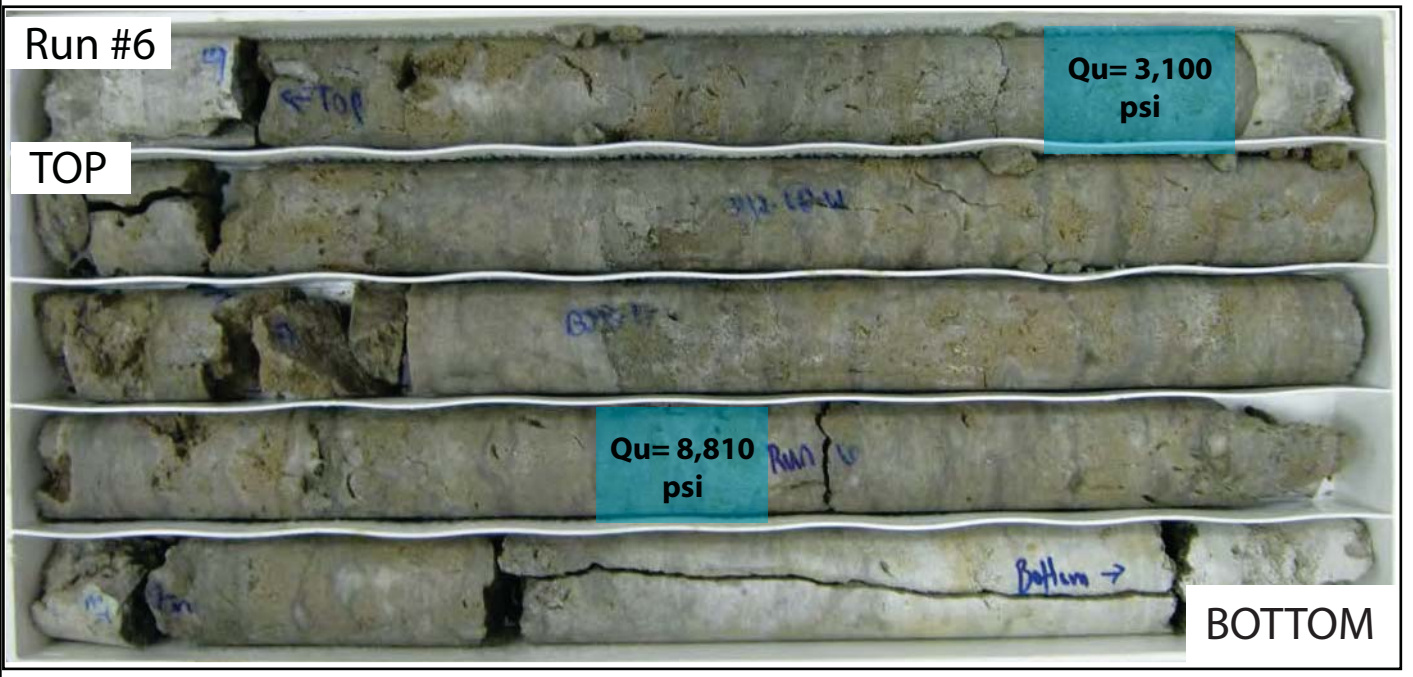
BSB-17

DRAWN BY: A. Happel
CHECKED BY: C. Marin

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342-06-01



Boring	Run No.	From (ft)	To (ft)	Recovery (%)	RQD (%)
BSB-17	4	472.0	462.0	20	8
	5	462.0	452.0	100	48
	6	452.0	442.0	100	65

BEDROCK CORE: US 52/IL 64 OVER MISSISSIPPI RIVER, SAVANNA, ILLINOIS / SABULA, IOWA

SCALE: GRAPHIC **BSB-17** DRAWN BY: A. Happel
 CHECKED BY: C. Marin



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FOR PARSONS CORPORATION 342-06-01



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BORING LOG BSB-18

WEI Job No.: 342-06-01

Client: **PARSONS**
 Project: **US 52 / IL 64 Over the Mississippi River**
 Location: **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 582.37 ft
 North: 1980474.92 ft
 East: 2297700.40 ft
 Station: 1572+92.00
 Offset: 30.23 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--WATER--															
			5									30		3	1 1 2	NP	17
														4	3 2 2	NP	19
														5	16 11 6	NP	15
										549.9	Loose, gray, coarse SAND, little gravel			6	3 3 3	NP	17
			10									35		7	2 2 2	NP	15
										544.9	Loose, gray SANDY LOAM --%Gravel=0.2-- --%Sand=63.2-- --%Silt=31.4-- --%Clay=5.2--40 --A-4 (0)--			8	4 3 3	NP	25
			15											9	11 12 2	NP	11
										541.1	Very loose to loose, SILTY LOAM, trace gravel			10	1 1 1	NP	34
			20											11	1 1 4	NP	51
	561.4	Very loose to medium dense, brown, fine to medium SAND, little gravel			1	6 9 4	NP										
					2	6 3 6	NP										
			25							534.9	Loose to medium dense, gray, fine to medium SAND, little gravel			12	2 3 5	NP	21

GENERAL NOTES

WATER LEVEL DATA

Begin Drilling **08-27-2013** Complete Drilling **08-28-2013**
 Drilling Contractor **Wang Testing Services** Drill Rig **D-50 ATV**
 Driller **R&R** Logger **A. Happel** Checked by **C. Marin**
 Drilling Method **4" Casing, mud rotary, boring backfilled upon completion**

While Drilling ∇ **0.00 ft**
 At Completion of Drilling ∇ **0.00 ft**
 Time After Drilling **NA**
 Depth to Water ∇ **NA**

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

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BORING LOG BSB-18

WEI Job No.: 342-06-01

Client: **PARSONS**
 Project: **US 52 / IL 64 Over the Mississippi River**
 Location: **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 582.37 ft
 North: 1980474.92 ft
 East: 2297700.40 ft
 Station: 1572+92.00
 Offset: 30.23 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	523.6	Medium dense, to very dense, gray, coarse SAND, little gravel	55		13	3 3 5	NP	20		501.4	84.0ft-Qu=7430 psi ---> Strong, yellowish to light gray and white, poor to excellent rock mass quality, cherty, thin bedded, slightly weathered to fresh DOLOSTONE, 2- to 24-inch beds, 2- to 24-inch spaced joints, horizontal and vertical with less than 0.1-inch infilling, hard joint wall, slightly weathered joints, thin shale partings, moderately vuggy, fossiliferous, and trace pyrite	80		19	10 14 15	NP	17
		--%Gravel=3.8-- --%Sand=93.5-- --%Silt=2.5-- --%Clay=0.1-- --A-1-b (0)--			14	4 4 5	NP	18			87.0ft-Qu=5120 psi ---> --RUN 1 - RECOVERY= 100%-- --RQD= 45%-- 81 to 91 = 2 min/foot	85		20	50/100 CORRE	NP	19
			60		16	4 5 5	NP	14			91 to 101 = 2.25 min/foot	90		1			
			65		17	5 9 11	NP	15			92.2ft-Qu=6400 psi --->	95		2			
		--%Gravel=0.2-- --%Sand=96.1-- --%Silt=3.6-- --%Clay=0.1-- --A-1-b (0)--	70		18	9 13 13	NP	17			96.2ft-Qu=7350 psi ---> --RUN 2 - RECOVERY= 100%-- --RQD= 91%--	100					

GENERAL NOTES

WATER LEVEL DATA

Begin Drilling **08-27-2013** Complete Drilling **08-28-2013**
 Drilling Contractor **Wang Testing Services** Drill Rig **D-50 ATV**
 Driller **R&R** Logger **A. Happel** Checked by **C. Marin**
 Drilling Method **4" Casing, mud rotary, boring backfilled upon completion**

While Drilling ∇ **0.00 ft**
 At Completion of Drilling ∇ **0.00 ft**
 Time After Drilling **NA**
 Depth to Water ∇ **NA**

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

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BORING LOG BSB-18

WEI Job No.: 342-06-01

Client: **PARSONS**
 Project: **US 52 / IL 64 Over the Mississippi River**
 Location: **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 582.37 ft
 North: 1980474.92 ft
 East: 2297700.40 ft
 Station: 1572+92.00
 Offset: 30.23 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
461.4		101 to 111 = 2 min/foot 102.2ft-Qu=10060 psi --->	105														
		--RUN 3 - RECOVERY= 100%-- --RQD= 93%-- 107.5ft-Qu=8380 psi --->			3												
		111 to 121 = 2 min/foot 112.2ft-Qu=6930 psi --->	115														
		115.3ft-Qu=8900 psi ---> --RUN 4 - RECOVERY= 100%-- --RQD= 81%--	120		4												
	461.4	Boring terminated at 121.00 ft	125														

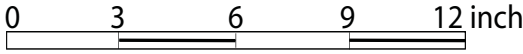
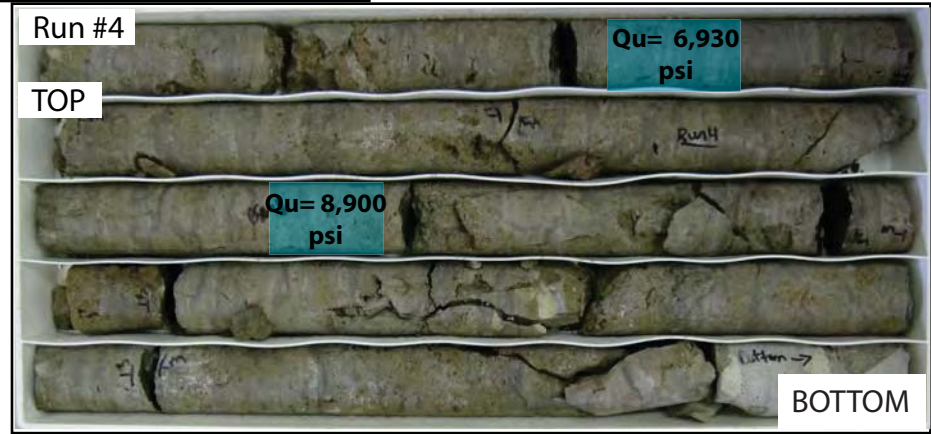
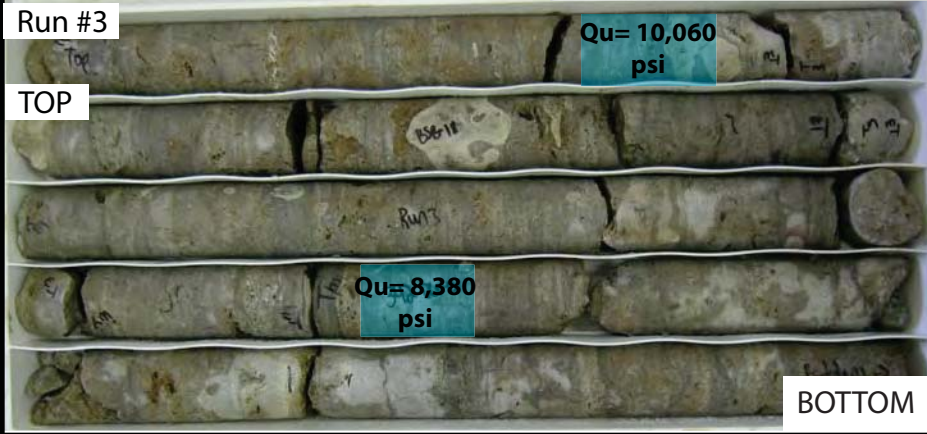
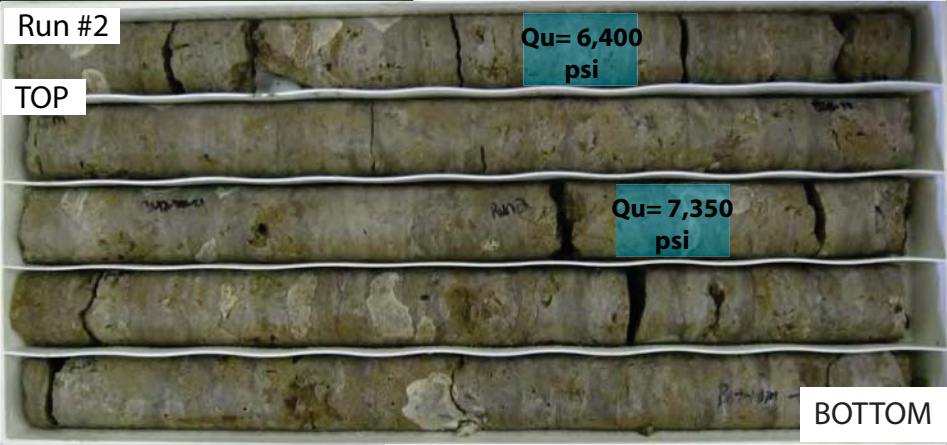
GENERAL NOTES

WATER LEVEL DATA

Begin Drilling **08-27-2013** Complete Drilling **08-28-2013**
 Drilling Contractor **Wang Testing Services** Drill Rig **D-50 ATV**
 Driller **R&R** Logger **A. Happel** Checked by **C. Marin**
 Drilling Method **4" Casing, mud rotary, boring backfilled upon completion**

While Drilling ∇ **0.00 ft**
 At Completion of Drilling \blacktriangledown **0.00 ft**
 Time After Drilling **NA**
 Depth to Water ∇ **NA**

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



Boring	Run No.	From (ft)	To (ft)	Recovery (%)	RQD (%)
BSB-18	1	501.4	491.4	100	45
	2	491.4	481.4	100	91
	3	481.4	471.4	100	93
	4	471.4	461.4	100	81

BEDROCK CORE: US 52/IL 64 OVER MISSISSIPPI RIVER, SAVANNA, ILLINOIS / SABULA, IOWA

SCALE: GRAFIC

BSB-18

DRAWN BY: A. Happel
CHECKED BY: C. Marin

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FOR PARSONS CORPORATION

342-06-01



BORING LOG BSB-19

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WEI Job No.: 342-06-01

Client **PARSONS**
 Project **US 52 / IL 64 Over the Mississippi River**
 Location **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 582.37 ft
 North: 1980449.59 ft
 East: 2297470.09 ft
 Station: 1570+60.47
 Offset: 03.85 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--WATER--															
	554.4	Very loose, medium SAND	5		1	5 2 1				554.4	Very loose, medium SAND	5		1	5 2 1		18
	552.4	Loose to medium dense, black, gray and brown, SANDY GRAVEL	30		2	23 5 5				552.4	Loose to medium dense, black, gray and brown, SANDY GRAVEL	30		2	23 5 5		14
					3	6 3 4								3	6 3 4		21
					4	2 2 4								4	2 2 4		16
	544.1	Loose to medium dense, gray, fine to medium SAND, little gravel	40		5	4 4 3				544.1	Loose to medium dense, gray, fine to medium SAND, little gravel	40		5	4 4 3		11
					6	17 7 7								6	17 7 7		16
	539.9	Medium dense, gray GRAVELLY SAND	20		7	3 5 6				539.9	Medium dense, gray GRAVELLY SAND	20		7	3 5 6		16
		--%Gravel=26.8-- --%Sand=71.3-- --%Silt=1.8--45 --%Clay=0.0-- --A-1-b (0)--			8	5 7 10								8	5 7 10		18
	534.9	Medium dense, gray, fine to medium SAND, little gravel	25		9	6 6 7				534.9	Medium dense, gray, fine to medium SAND, little gravel	25		9	6 6 7		13

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GENERAL NOTES

Begin Drilling **08-29-2013** Complete Drilling **08-29-2013**
 Drilling Contractor **Wang Testing Services** Drill Rig **D-50 TMR**
 Driller **R&N** Logger **A. Happel** Checked by **C. Marin**
 Drilling Method **4" Casing, mud rotary, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **0.00 ft**
 At Completion of Drilling ▼ **0.00 ft**
 Time After Drilling **NA**
 Depth to Water ▼ **NA**
 The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.



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BORING LOG BSB-19

WEI Job No.: 342-06-01

Client **PARSONS**
 Project **US 52 / IL 64 Over the Mississippi River**
 Location **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 582.37 ft
 North: 1980449.59 ft
 East: 2297470.09 ft
 Station: 1570+60.47
 Offset: 03.85 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		Medium dense, gray, fine to medium SAND, little gravel	55		10	6 4 8	NP	19				80		16	6 8 10	NP	19
					11	6 7 8	NP	20									
			60		12	6 8 8	NP	21				85		17	8 10 12	NP	19
					13	6 7 8	NP	23									
			65		14	7 7 10	NP	18				90		18	8 11 14	NP	20
					15	6 8 11	NP	22									
		--%Gravel=2.4-- --%Sand=96.2-- --%Silt=1.2-- --%Clay=0.2-- --A-3 (0)--	70		19	11 13 13	NP	16				95		19	11 13 13	NP	16
					20	14 13 14	NP	13									
			75							483.6	Dense to very dense, gray, coarse SAND, trace gravel	100					

--%Gravel=2.8--
 --%Sand=94.0--
 --%Silt=3.1--
 --%Clay=0.1--
 --A-3 (0)--

GENERAL NOTES

Begin Drilling **08-29-2013** Complete Drilling **08-29-2013**
 Drilling Contractor **Wang Testing Services** Drill Rig **D-50 TMR**
 Driller **R&N** Logger **A. Happel** Checked by **C. Marin**
 Drilling Method **4" Casing, mud rotary, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ∇ **0.00 ft**
 At Completion of Drilling ∇ **0.00 ft**
 Time After Drilling **NA**
 Depth to Water ∇ **NA**

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



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BORING LOG BSB-19

WEI Job No.: 342-06-01

Datum: NAVD 88
 Elevation: 582.37 ft
 North: 1980449.59 ft
 East: 2297470.09 ft
 Station: 1570+60.47
 Offset: 03.85 LT

Client **PARSONS**
 Project **US 52 / IL 64 Over the Mississippi River**
 Location **Carroll County, IL and Jackson County, IA**

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
			105		21	12 28 50/6	NP	16			125.5 to 135.5 = 2.25 min/foot						
			110		22	13 15 18	NP	17			128.0ft-Qu=10650 psi ---> --RUN 2 - RECOVERY= 100%-+30 --RQD= 85%--			2			
		--%Gravel=0.5-- --%Sand=95.9-- --%Silt=3.5-- --%Clay=0.1-- --A-3 (0)--	115		23	12 16 23	NP	22			135.5 to 145.5 = 2.25 min/foot						
	466.4	117.0ft-Qu=8920 psi ---> Strong, yellowish to light gray and white, good to excellent rock mass quality, cherty, thin bedded fresh DOLOSTONE, 2- to 24-inch beds, 2- to 24-inch spaced joints, horizontal with less than 0.1-inch infilling, hard joint wall, thin shale partings, moderately vuggy, fossiliferous, and trace pyrite	120		1						137.5ft-Qu=9880 psi ---> --RUN 3 - RECOVERY= 100%-+40 --RQD= 91%--			3			
		122.0ft-Qu=9760 psi ---> --RUN 1 - RECOVERY= 100%-- --RQD= 73%--	125								143.0ft-Qu=10320 psi --->						
		116 to 125.5 = 2.25 min/foot									145.5 to 155.5 = 2 min/foot						
											148.6ft-Qu=15670 psi --->						

GENERAL NOTES

WATER LEVEL DATA

Begin Drilling **08-29-2013** Complete Drilling **08-29-2013**
 Drilling Contractor **Wang Testing Services** Drill Rig **D-50 TMR**
 Driller **R&N** Logger **A. Happel** Checked by **C. Marin**
 Drilling Method **4" Casing, mud rotary, boring backfilled upon completion**

While Drilling ▽ **0.00 ft**
 At Completion of Drilling ▼ **0.00 ft**
 Time After Drilling **NA**
 Depth to Water ▼ **NA**

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

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BORING LOG BSB-19

WEI Job No.: 342-06-01

Client: **PARSONS**
 Project: **US 52 / IL 64 Over the Mississippi River**
 Location: **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 582.37 ft
 North: 1980449.59 ft
 East: 2297470.09 ft
 Station: 1570+60.47
 Offset: 03.85 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	426.4	--RUN 4 - RECOVERY= 100%-- --RQD= 99%--	155		4												
		Boring terminated at 156.00 ft	160														
			165														
			170														
			175														

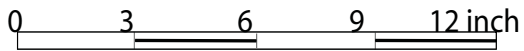
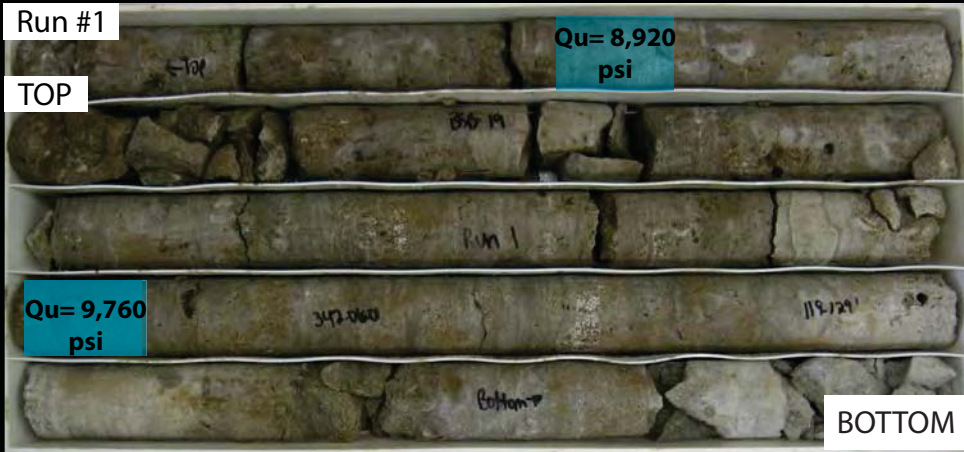
GENERAL NOTES

WATER LEVEL DATA

Begin Drilling **08-29-2013** Complete Drilling **08-29-2013**
 Drilling Contractor **Wang Testing Services** Drill Rig **D-50 TMR**
 Driller **R&N** Logger **A. Happel** Checked by **C. Marin**
 Drilling Method **4" Casing, mud rotary, boring backfilled upon completion**

While Drilling ∇ **0.00 ft**
 At Completion of Drilling \blacktriangledown **0.00 ft**
 Time After Drilling **NA**
 Depth to Water ∇ **NA**

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



Boring	Run No.	From (ft)	To (ft)	Recovery (%)	RQD (%)
BSB-19	1	466.4	456.4	100	73
	2	456.4	446.4	100	85
	3	446.4	436.4	100	91
	4	436.4	426.4	100	99

BEDROCK CORE: US 52/IL 64 OVER MISSISSIPPI RIVER, SAVANNA, ILLINOIS / SABULA, IOWA

SCALE: GRAPHIC

BSB-19

DRAWN BY: A. Happel
CHECKED BY: C. Marin

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BORING LOG BSB-20

WEI Job No.: 342-06-01

Client **PARSONS**
 Project **US 52 / IL 64 Over the Mississippi River**
 Location **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 587.00 ft
 North: 1980428.26 ft
 East: 2297228.30 ft
 Station: 1568+18.78
 Offset: 18.58 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	586.0	Brown SILTY LOAM --TOPSOIL--															
		Very loose, brown SILTY LOAM to SILTY CLAY LOAM, trace gravel, seams of black silt and roots		X	1	1 2 1	NP	31		560.0	Very loose to loose, gray SILTY LOAM, trace organic matter		X	11	1 1 2	NP	43
		--Fibrous material throughout-- --L _L (%)=33, P _L (%)=20-- --%Gravel=0.0-- --%Sand=20.1-- --%Silt=69.6-- --%Clay=10.2-- --A-6 (9)--	5	X	2	1 1 1	NP	30				30	X	12	1 1 6	NP	33
	579.0	Loose to very loose, gray, fine to medium SAND		X	4	0 0 0	NP	26			Medium dense to dense, gray, fine to medium SAND, trace gravel		X	13	6 10 12	NP	18
			10	X	5	0 0 0	NP	38					X	14	8 9 15	NP	19
			15	X	6	2 2 3	NP	27			--%Gravel=0.4-- --%Sand=97.0-- --%Silt=2.4-- --%Clay=0.2-- --A-3 (0)--		X	15	8 11 12	NP	14
			20	X	8	0 2 2	NP	24					X	16	9 10 14	NP	28
		--%Gravel=0.0-- --%Sand=95.6-- --%Silt=4.1-- --%Clay=0.3-- --A-3 (0)-- --1 inch layer of wood, black silt and sand--	25	X	10	3 3 3	NP	30					X	16	9 10 14	NP	28
				X	10	3 2 1	NP	25					X	16	9 10 14	NP	28

GENERAL NOTES

Begin Drilling **08-19-2013** Complete Drilling **08-20-2013**
 Drilling Contractor **Wang Testing Services** Drill Rig **D-50 ATV**
 Driller **K&K** Logger **A. Happel** Checked by **C. Marin**
 Drilling Method **2.25" SSA to 15', 4" Casing, mud rotary thereafter,**
borings backfilled upon completion

WATER LEVEL DATA

While Drilling ∇ **6.00 ft**
 At Completion of Drilling ∇ **6.00 ft**
 Time After Drilling **NA**
 Depth to Water ∇ **NA**

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

WANGENG 3420601.GPJ WANGENG.GDT 2/12/14



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BORING LOG BSB-20

WEI Job No.: 342-06-01

Client: **PARSONS**
 Project: **US 52 / IL 64 Over the Mississippi River**
 Location: **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 587.00 ft
 North: 1980428.26 ft
 East: 2297228.30 ft
 Station: 1568+18.78
 Offset: 18.58 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
			55	X	17	10 16 20	NP	26				80	X	22	9 12 15	NP	18
			60	X	18	6 6 8	NP	28					X	23	7 10 10	NP	26
	525.3	Medium dense to very dense, gray, medium to coarse SAND, trace gravel															
			65	X	19	7 8 9	NP	18				90	X	24	8 10 14	NP	22
			70	X	20	7 9 9	NP	20				95	X	25	10 12 12	NP	17
			75	X	21	7 11 19	NP	17				100	X	26	9 10 12	NP	22

--%Gravel=0.1--
 --%Sand=96.6--
 --%Silt=3.2--
 --%Clay=0.1--85
 --A-3 (0)--

GENERAL NOTES

WATER LEVEL DATA

Begin Drilling **08-19-2013** Complete Drilling **08-20-2013**
 Drilling Contractor **Wang Testing Services** Drill Rig **D-50 ATV**
 Driller **K&K** Logger **A. Happel** Checked by **C. Marin**
 Drilling Method **2.25" SSA to 15', 4" Casing, mud rotary thereafter, boring backfilled upon completion**

While Drilling ∇ **6.00 ft**
 At Completion of Drilling \blacktriangledown **6.00 ft**
 Time After Drilling **NA**
 Depth to Water ∇ **NA**
 The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.

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BORING LOG BSB-20

WEI Job No.: 342-06-01

Client: **PARSONS**
 Project: **US 52 / IL 64 Over the Mississippi River**
 Location: **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 587.00 ft
 North: 1980428.26 ft
 East: 2297228.30 ft
 Station: 1568+18.78
 Offset: 18.58 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
			105		27	11 14 17	NP	17									
			110		28	12 14 17	NP	16		455.0							
		--%Gravel=2.9-- --%Sand=91.7-- --%Silt=5.1-- --%Clay=0.3-- --A-1-b (0)--	115		29	14 27 33	NP	14			132.5ft-Qu=9600 psi ---> Strong, yellowish to light gray and white, good to excellent rock mass quality, cherty, thin bedded fresh DOLOSTONE, 2- to 24-inch beds, 2- to 44-inch spaced joints, horizontal with less than 0.1-inch infilling, hard joint wall, with stylolitic surfaces, thin shale partings, moderately vuggy, fossiliferous, and 137.5ft-Qu=6530 psi ---> --RUN 1 - RECOVERY= 100%-- --RQD= 88%-- 132 to 142 = 3 min/foot	135		32	27 29 50/1	NP	12
			120		30	24 25 20	NP	11			142 to 152 = 3.25 min/foot 143.0ft-Qu=6140 psi ---> --RUN 2 - RECOVERY= 100%-- --RQD= 97%--	140					
			125		31	16 10 17	NP	14			149.5ft-Qu=7660 psi --->	145					

GENERAL NOTES

WATER LEVEL DATA

Begin Drilling **08-19-2013** Complete Drilling **08-20-2013**
 Drilling Contractor **Wang Testing Services** Drill Rig **D-50 ATV**
 Driller **K&K** Logger **A. Happel** Checked by **C. Marin**
 Drilling Method **2.25" SSA to 15', 4" Casing, mud rotary thereafter,**
borings backfilled upon completion

While Drilling ∇ **6.00 ft**
 At Completion of Drilling ∇ **6.00 ft**
 Time After Drilling **NA**
 Depth to Water ∇ **NA**

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

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BORING LOG BSB-20

WEI Job No.: 342-06-01

Client: **PARSONS**
 Project: **US 52 / IL 64 Over the Mississippi River**
 Location: **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 587.00 ft
 North: 1980428.26 ft
 East: 2297228.30 ft
 Station: 1568+18.78
 Offset: 18.58 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		152 to 162 = 3 min/foot															
		155.5ft-Qu=7710 psi --->	155		3												
		--RUN 3 - RECOVERY= 100%-- --RQD= 72%--															
		161.5ft-Qu=6910 psi --->	160														
		162 to 172 = 2.5 min/foot															
		165.2ft-Qu=13500 psi --->	165		4												
		--RUN 4 - RECOVERY= 100%-- --RQD= 93%--															
		169.5ft-Qu=7500 psi --->	170														
	415.0	Boring terminated at 172.00 ft															
			175														

GENERAL NOTES

WATER LEVEL DATA

Begin Drilling **08-19-2013** Complete Drilling **08-20-2013**
 Drilling Contractor **Wang Testing Services** Drill Rig **D-50 ATV**
 Driller **K&K** Logger **A. Happel** Checked by **C. Marin**
 Drilling Method **2.25" SSA to 15', 4" Casing, mud rotary thereafter, boring backfilled upon completion**

While Drilling ∇ **6.00 ft**
 At Completion of Drilling ∇ **6.00 ft**
 Time After Drilling **NA**
 Depth to Water ∇ **NA**

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

Run #1

TOP

Qu= 9,600
psi

Qu= 6,530
psi

BOTTOM

Run #2

TOP

Qu= 6,140
psi

Qu= 7,660
psi

BOTTOM

Run #3

TOP

Qu= 7,710
psi

Qu= 6,910
psi

BOTTOM

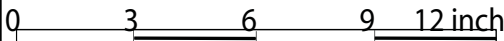
Run #4

TOP

Qu= 13,500
psi

Qu= 7,500
psi

BOTTOM



Boring	Run No.	From (ft)	To (ft)	Recovery (%)	RQD (%)
BSB-20	1	455.0	445.0	100	88
	2	445.0	435.0	100	97
	3	435.0	425.0	100	72
	4	425.0	415.0	100	93

BEDROCK CORE: US 52/IL 64 OVER MISSISSIPPI RIVER,
SAVANNA, ILLINOIS / SABULA, IOWA

SCALE: GRAPHIC

BSB-20

DRAWN BY: A. Happel
CHECKED BY: C. Marin



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FOR PARSONS CORPORATION

342-06-01



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BORING LOG BSB-21

WEI Job No.: 342-06-01

Client: **PARSONS**
 Project: **US 52 / IL 64 Over the Mississippi River**
 Location: **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 587.00 ft
 North: 1980483.88 ft
 East: 2297241.01 ft
 Station: 1568+31.24
 Offset: 37.09 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	582.0	Very loose to loose, brown SILTY LOAM, trace gravel and roots	30	X	1	3 2 4		30		555.3	--L _L (%)=43, P _L (%)=25-- --%Gravel=0.1-- --%Sand=26.1-- --%Silt=63.5-- --%Clay=10.3-- --A-7-6 (13)--	30	X	11	0 0 0		38
			32	X	2	2 1 2		32				30	X	12	0 0 4		34
		Very loose to loose, brown, medium to coarse SAND	26	X	3	1 1 1		26			Medium dense, gray SANDY LOAM						
			22	X	4	3 1 1		22				35	X	13	11 11 11		19
		--%Gravel=1.0-- --%Sand=93.2-- --%Silt=5.6-- --%Clay=0.2-- --A-3 (0)--	18	X	5	5 2 3		18									
	574.0	Very loose to loose, SANDY LOAM, trace gravel	25	X	6	3 1 2	NP	25				40	X	14	9 10 14		22
			23	X	7	3 3 2	NP	23									
		--%Gravel=0.0-- --%Sand=72.7-- --%Silt=23.5-- --%Clay=3.7--20 --A-2-4 (0)--	39	X	8	0 0 3	NP	39				45	X	15	14 16 15		15
			20	X	9	1 2 3	NP	20									
	564.0	Very loose to loose, gray SILTY LOAM, with seams of fine to medium sand, trace organic matter	36	X	10	2 2 1	NP	36			--%Gravel=0.1-- --%Sand=90.7-- --%Silt=8.9-- --%Clay=0.3--50		X	16	9 10 11		24

GENERAL NOTES

WATER LEVEL DATA

Begin Drilling **08-14-2013** Complete Drilling **08-15-2013**
 Drilling Contractor **Wang Testing Services** Drill Rig **D-50 ATV**
 Driller **K&K** Logger **A. Happel** Checked by **C. Marin**
 Drilling Method **2.25" SSA to 15', 4" Casing, mud rotary thereafter, boring backfilled upon completion**

While Drilling ∇ **5.00 ft**
 At Completion of Drilling ∇ **5.00 ft**
 Time After Drilling **NA**
 Depth to Water ∇ **NA**

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

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BORING LOG BSB-21

WEI Job No.: 342-06-01

Client: **PARSONS**
 Project: **US 52 / IL 64 Over the Mississippi River**
 Location: **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 587.00 ft
 North: 1980483.88 ft
 East: 2297241.01 ft
 Station: 1568+31.24
 Offset: 37.09 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--A-3 (0)--															
			55		17	11 12 13	NP	28				80		22	6 6 6	NP	19
	530.3	Medium dense to dense, gray, medium to coarse SAND, trace gravel															
			60		18	12 13 14	NP	26				85		23	9 9 10	NP	17
		--%Gravel=0.3-- --%Sand=96.4-- --%Silt=3.2-- --%Clay=0.1--															
		--A-1-b (0)--	65		19	9 7 10	NP	17				90		24	7 9 11	NP	17
			70		20	8 8 8	NP	18				95		25	9 9 10	NP	19
			75		21	13 10 10	NP	17				100		26	12 12 11	NP	21

GENERAL NOTES

WATER LEVEL DATA

Begin Drilling **08-14-2013** Complete Drilling **08-15-2013**
 Drilling Contractor **Wang Testing Services** Drill Rig **D-50 ATV**
 Driller **K&K** Logger **A. Happel** Checked by **C. Marin**
 Drilling Method **2.25" SSA to 15', 4" Casing, mud rotary thereafter, boring backfilled upon completion**

While Drilling ∇ **5.00 ft**
 At Completion of Drilling \blacktriangledown **5.00 ft**
 Time After Drilling **NA**
 Depth to Water ∇ **NA**

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

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BORING LOG BSB-21

WEI Job No.: 342-06-01

Client: **PARSONS**
 Project: **US 52 / IL 64 Over the Mississippi River**
 Location: **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 587.00 ft
 North: 1980483.88 ft
 East: 2297241.01 ft
 Station: 1568+31.24
 Offset: 37.09 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
			105		27	8 9 10	NP	19				130		32	19 19 17	NP	14
	456.0	--WEATHERED BEDROCK--								455.0							
		Strong, yellowish to light gray and white, good to excellent rock mass quality, cherty, thin bedded fresh DOLOSTONE, 2- to 24-inch beds, 2- to 44-inch spaced joints, horizontal with less than 0.1-inch infilling, hard joint wall, with stylolitic surfaces, thin shale partings, moderately vuggy, fossiliferous, and pyrite	110		28	19 19 19	NP	15				140		1			
		134.0ft-Qu=6890 psi ---> --RUN 1 - RECOVERY= 95%-- --RQD= 76%--	115		29	16 23 35	NP	15				145		2			
		138.00ft-Qu=11470 psi ---> 132 to 139 = 2 min/foot 139 to 144 = 1.5 min/foot 144 to 149 = 1.5 min/foot	120		30	15 17 21	NP	14				150					
		--RUN 2 - RECOVERY= 98%-- --RQD= 92%--	125		31	20 18 17	NP	15									
		144.0ft-Qu=8510 psi ---> 149 to 159 = 2 min/ foot															

GENERAL NOTES

WATER LEVEL DATA

Begin Drilling **08-14-2013** Complete Drilling **08-15-2013**
 Drilling Contractor **Wang Testing Services** Drill Rig **D-50 ATV**
 Driller **K&K** Logger **A. Happel** Checked by **C. Marin**
 Drilling Method **2.25" SSA to 15', 4" Casing, mud rotary thereafter, boring backfilled upon completion**

While Drilling ∇ **5.00 ft**
 At Completion of Drilling ∇ **5.00 ft**
 Time After Drilling **NA**
 Depth to Water ∇ **NA**

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

WANGENG 3420601.GPJ WANGENG.GDT 2/12/14



BORING LOG BSB-21

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WEI Job No.: 342-06-01

Datum: NAVD 88
 Elevation: 587.00 ft
 North: 1980483.88 ft
 East: 2297241.01 ft
 Station: 1568+31.24
 Offset: 37.09 LT

Client: **PARSONS**
 Project: **US 52 / IL 64 Over the Mississippi River**
 Location: **Carroll County, IL and Jackson County, IA**

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--RUN 3 - RECOVERY= 100%-- --RQD=95%--			3												
		154.0ft-Qu=6270 psi --->	155														
		155.0ft-Qu=6790 psi --->															
		159 to 169 = 1.75 min/foot															
		162.5ft-Qu=4340 psi --->	160														
		--RUN 4 - RECOVERY= 100%-- --RQD= 82%--			4												
		168.0ft-Qu=11640 psi --->	165														
		169 to 172 = 2.75 min/foot --RUN 5 - RECOVERY= 100%-- --RQD=82%--			5												
		170.0ft-Qu=12070 psi --->															
	415.0	Boring terminated at 172.00 ft															
			175														

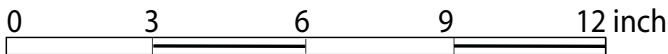
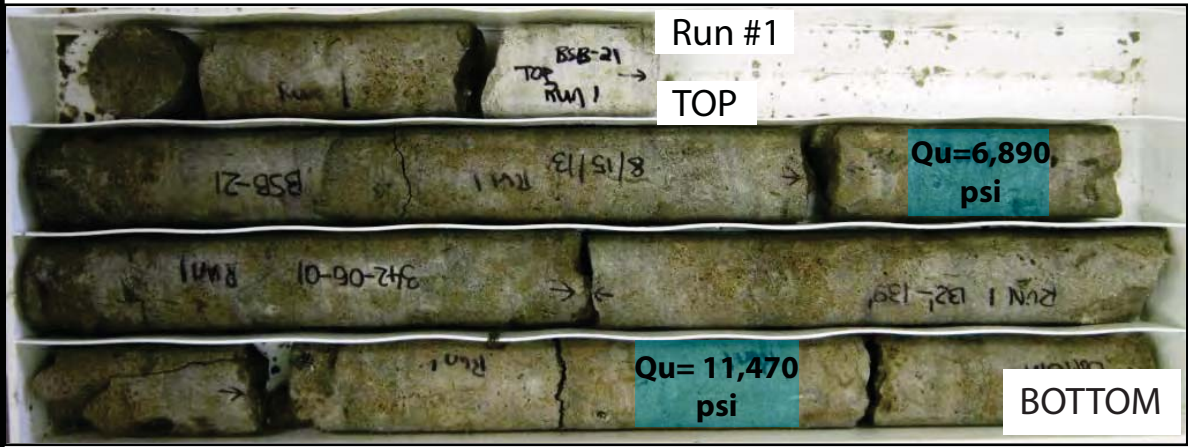
GENERAL NOTES

WATER LEVEL DATA

Begin Drilling **08-14-2013** Complete Drilling **08-15-2013**
 Drilling Contractor **Wang Testing Services** Drill Rig **D-50 ATV**
 Driller **K&K** Logger **A. Happel** Checked by **C. Marin**
 Drilling Method **2.25" SSA to 15', 4" Casing, mud rotary thereafter,**
boring backfilled upon completion

While Drilling ∇ **5.00 ft**
 At Completion of Drilling ∇ **5.00 ft**
 Time After Drilling **NA**
 Depth to Water ∇ **NA**


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



Boring	Run No.	From (ft)	To (ft)	Recovery (%)	RQD (%)
BSB-21	1	455.0	445.0	95	76
	2	445.0	435.0	98	92
	3	435.0	425.0	100	95

BEDROCK CORE: US 52/IL 64 OVER MISSISSIPPI RIVER,
SAVANNA, ILLINOIS / SABULA, IOWA

SCALE: GRAPHIC **BSB-21** DRAWN BY: A. Happel
CHECKED BY: C. Marin



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FOR PARSONS CORPORATION 342-06-01



Boring	Run No.	From (ft)	To (ft)	Recovery (%)	RQD (%)
BSB-21	4	425.0	418.0	100	82
	5	418.0	415.0	100	82

BEDROCK CORE: US 52/IL 64 OVER MISSISSIPPI RIVER,
SAVANNA, ILLINOIS / SABULA, IOWA

SCALE: GRAPHIC

BSB-21

DRAWN BY: A. Happel
CHECKED BY: C. Marin

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FOR PARSONS CORPORATION

342-06-01



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BORING LOG BSB-22

WEI Job No.: 342-06-01

Client: **PARSONS**
 Project: **US 52 / IL 64 Over the Mississippi River**
 Location: **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 586.80 ft
 North: 1980468.60 ft
 East: 2297071.39 ft
 Station: 1566+61.69
 Offset: 21.04 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	585.8	Brown, SILT and SAND															
		Very loose, brown SILTY LOAM to SILTY CLAY LOAM, trace gravel and roots		X	1	3 2 1	NP	33					X	11	9 9 8	NP	19
	583.1	Very loose, brown SANDY LOAM	5	X	2	2 1 1	NP	37				30	X	12	5 6 8	NP	20
	581.3	Very loose, gray SILTY LOAM, trace roots		X	3	0 0 0	NP	34									
	578.8	Very loose to loose, brown to gray, fine SAND, trace gravel	10	X	4	1 1 2	NP	25					X	13	9 11 13	NP	16
				X	5	0 2 1	NP	25									
		--%Gravel=1.0-- --%Sand=93.6-- --%Silt=5.1-- --%Clay=0.2-- --A-3 (0)--	15	X	6	2 2 4	NP	23				40	X	14	11 13 17	NP	20
	571.3	Loose to medium dense, gray, medium to coarse SAND		X	7	9 3 3	NP	22			545.1						
			20	X	8	4 4 5	NP	21					X	15	13 19 26	NP	17
				X	9	4 6 6	NP	23									
			25	X	10	4 6 8	NP	19					X	16	11 12 13	NP	20

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GENERAL NOTES

Begin Drilling **08-21-2013** Complete Drilling **08-22-2013**
 Drilling Contractor **Wang Testing Services** Drill Rig **D-50 ATV**
 Driller **K&K** Logger **A. Happel** Checked by **C. Marin**
 Drilling Method **2.25" SSA to 15', 4" Casing, mud rotary thereafter,**
boring backfilled upon completion

WATER LEVEL DATA

While Drilling ∇ **8.00 ft**
 At Completion of Drilling ∇ **8.00 ft**
 Time After Drilling **NA**
 Depth to Water ∇ **NA**

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



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BORING LOG BSB-22

WEI Job No.: 342-06-01

Client: **PARSONS**
 Project: **US 52 / IL 64 Over the Mississippi River**
 Location: **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 586.80 ft
 North: 1980468.60 ft
 East: 2297071.39 ft
 Station: 1566+61.69
 Offset: 21.04 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	535.1	Medium dense, gray, fine SAND															
			55	X	17	4 8 11	NP	30				80	X	22	14 15 15	NP	20
			60	X	18	5 6 8	NP	19				85	X	23	6 6 6	NP	22
	525.1	Medium dense to dense, gray, medium to coarse SAND															
			65	X	19	9 8 8	NP	24					X	24	13 17 23	NP	18
			70	X	20	9 12 15	NP	20				95	X	25	7 9 11	NP	19
			75	X	21	15 20 26	NP	19				100	X	26	15 18 22	NP	15

--%Gravel=0.7--
 --%Sand=95.4--
 --%Silt=3.6--
 --%Clay=0.2--
 --A-1-b (0)--

--%Gravel=0.2--
 --%Sand=96.3--
 --%Silt=2.8--
 --%Clay=0.7--
 --A-3 (0)--

GENERAL NOTES

WATER LEVEL DATA

Begin Drilling **08-21-2013** Complete Drilling **08-22-2013**
 Drilling Contractor **Wang Testing Services** Drill Rig **D-50 ATV**
 Driller **K&K** Logger **A. Happel** Checked by **C. Marin**
 Drilling Method **2.25" SSA to 15', 4" Casing, mud rotary thereafter,**
boring backfilled upon completion

While Drilling ∇ **8.00 ft**
 At Completion of Drilling \blacktriangledown **8.00 ft**
 Time After Drilling **NA**
 Depth to Water ∇ **NA**

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



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BORING LOG BSB-22

WEI Job No.: 342-06-01

Client: **PARSONS**
 Project: **US 52 / IL 64 Over the Mississippi River**
 Location: **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 586.80 ft
 North: 1980468.60 ft
 East: 2297071.39 ft
 Station: 1566+61.69
 Offset: 21.04 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
											--A-1-b (0)--						
			105		27	8 9 10	NP	23		456.8		130		32	7 9 14	NP	14
											Boring terminated at 130.00 ft						
		--%Gravel=3.1-- --%Sand=93.6-- --%Silt=3.0-- --%Clay=0.2-110 --A-1-b (0)--			28	16 16 21	NP	15				135					
			115		29	12 14 15	NP	17				140					
			120		30	17 18 21	NP	14				145					
		--%Gravel=3.9-- --%Sand=92.2-- --%Silt=3.8-- --%Clay=0.1-125			31	14 16 20	NP	14				150					

GENERAL NOTES

WATER LEVEL DATA

Begin Drilling **08-21-2013** Complete Drilling **08-22-2013**
 Drilling Contractor **Wang Testing Services** Drill Rig **D-50 ATV**
 Driller **K&K** Logger **A. Happel** Checked by **C. Marin**
 Drilling Method **2.25" SSA to 15', 4" Casing, mud rotary thereafter,
 boring backfilled upon completion**

While Drilling ∇ **8.00 ft**
 At Completion of Drilling \blacktriangledown **8.00 ft**
 Time After Drilling **NA**
 Depth to Water ∇ **NA**

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

WANGENGINC 3420601.GPJ WANGENG.GDT 2/12/14



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BORING LOG BSB-23

WEI Job No.: 342-06-01

Client: **PARSONS**
 Project: **US 52 / IL 64 Over the Mississippi River**
 Location: **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 582.43 ft
 North: 1980457.89 ft
 East: 2296602.74 ft
 Station: 1561+93.11
 Offset: 08.21 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--WATER--															
			5									30		9	2 1 3	NP	15
			10									35		10	3 4 5	NP	19
	576.4	Very soft, dark gray ORGANIC SILTY CLAY	10		1	0 0 0	< 0.25 P	68				40		11	4 6 8	NP	20
			15		2	0 0 0	< 0.25 P	83				45		12	5 6 6	NP	21
		--L _L (%)=64, P _L (%)=30-- --%Gravel=0.0-- --%Sand=1.1-- --%Silt=66.2-- --%Clay=32.8-- --A-7-5 (41)--	15		3	0 0 0	< 0.25 P	79				50		13	6 6 7	NP	26
	576.4	Very loose to loose, gray SANDY LOAM	20		4	0 0 0	< 0.25 P	68				55					
		--%Gravel=0.0-- --%Sand=71.6-- --%Silt=25.3-- --%Clay=3.1-- --A-2-4 (0)--	20		5	1 1 0	NP	25				60		14	6 8 9	NP	18
			25		6	0 0 1	NP	24				65					
			25		7	1 2 3	NP	22				70		15	8 9 7	NP	20
	559.9	Loose to medium dense, gray, medium to coarse, SAND, trace gravel	25		8	3 4 3	NP	16				50					
										533.7	Very loose, gray SANDY LOAM						

GENERAL NOTES

WATER LEVEL DATA

Begin Drilling **09-11-2013** Complete Drilling **09-12-2013**
 Drilling Contractor **Wang Testing Service** Drill Rig **D-50 TMR**
 Driller **R&R** Logger **A. Happel** Checked by **C. Marin**
 Drilling Method **2.25" SSA to 30', 4" Casing, mud rotary thereafter, boring backfilled upon completion**

While Drilling ∇ **0.00 ft**
 At Completion of Drilling ∇ **0.00 ft**
 Time After Drilling **NA**
 Depth to Water ∇ **NA**

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

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BORING LOG BSB-23

WEI Job No.: 342-06-01

Client **PARSONS**
 Project **US 52 / IL 64 Over the Mississippi River**
 Location **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 582.43 ft
 North: 1980457.89 ft
 East: 2296602.74 ft
 Station: 1561+93.11
 Offset: 08.21 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	528.7	Loose to dense, gray, medium to coarse SAND	55		16	3 2 1	NP	32				80		21	9 14 13	NP	18
			60		17	5 6 7	NP	18				85		22	10 11 13	NP	23
				65		18	5 4 4	NP	15			90		23	9 8 10	NP	16
			--%Gravel=3.3-- --%Sand=94.8-- --%Silt=2.0-- --%Clay=0.0-- --A-1-b (0)--	70		19	9 9 10	NP	17			95		24	13 14 24	NP	16
				75		20	5 8 11	NP	19				100		25	15 20 17	NP
											--%Gravel=7.6-- --%Sand=88.3-- --%Silt=3.9-- --%Clay=0.1-- --A-1-b (0)--						

GENERAL NOTES

WATER LEVEL DATA

Begin Drilling **09-11-2013** Complete Drilling **09-12-2013**
 Drilling Contractor **Wang Testing Service** Drill Rig **D-50 TMR**
 Driller **R&R** Logger **A. Happel** Checked by **C. Marin**
 Drilling Method **2.25" SSA to 30', 4" Casing, mud rotary thereafter,**
boring backfilled upon completion

While Drilling ∇ **0.00 ft**
 At Completion of Drilling ∇ **0.00 ft**
 Time After Drilling **NA**
 Depth to Water ∇ **NA**

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BORING LOG BSB-23

WEI Job No.: 342-06-01

Client: **PARSONS**
 Project: **US 52 / IL 64 Over the Mississippi River**
 Location: **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 582.43 ft
 North: 1980457.89 ft
 East: 2296602.74 ft
 Station: 1561+93.11
 Offset: 08.21 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
					26	13 10 13	NP	20									
			105		27	9 8 9	NP	18									
		--%Gravel=6.2-- --%Sand=90.1-- --%Silt=3.6-- --%Clay=0.1-- --A-1-b (0)--	110		28	11 13 17	NP	17									
			115		29	15 21 25	NP	15									
	465.4	Boring terminated at 117.00 ft															
			120														
			125														

GENERAL NOTES

Begin Drilling **09-11-2013** Complete Drilling **09-12-2013**
 Drilling Contractor **Wang Testing Service** Drill Rig **D-50 TMR**
 Driller **R&R** Logger **A. Happel** Checked by **C. Marin**
 Drilling Method **2.25" SSA to 30', 4" Casing, mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ∇ **0.00 ft**
 At Completion of Drilling ∇ **0.00 ft**
 Time After Drilling **NA**
 Depth to Water ∇ **NA**

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BORING LOG BSB-24

WEI Job No.: 342-06-01

Client: **PARSONS**
 Project: **US 52 / IL 64 Over the Mississippi River**
 Location: **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 600.94 ft
 North: 1980482.42 ft
 East: 2296444.64 ft
 Station: 1560+58.13
 Offset: 37.04 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	
	600.64	5.5-inch thick, ASPHALT --PAVEMENT--																
	599.7	Medium dense, brown LOAM, little gravel --FILL--			1	9 9 4	NP	2			medium SAND, trace gravel			11	6 8 10	NP	23	
		Very loose to medium dense, brown, medium to coarse SAND, trace gravel --FILL--	5		2	2 3 2	NR				--%Gravel=0.1-- --%Sand=96.3-- --%Silt=3.5-- --%Clay=0.2--30 --A-3 (0)--			12	4 6 7	NP	23	
					3	2 2 1	NP	10										
	592.9	Very soft (<0.25P), brown CLAY LOAM --FILL--			4	2 2 1	NP	3						13	3 4 5	NP	22	
		Very loose to loose, brown, medium to coarse SAND, trace organic matter	10															
	589.8	Very soft to soft, brown and gray SILTY LOAM, trace sand lenses --L _L (%)=36, P _L (%)=20-- --%Gravel=0.0-- --%Sand=16.5-- --%Silt=67.4-- --%Clay=16.0-- --A-6 (13)--			5	2 2 4	0.33 B	16										
	586.9				6	P U S H	< 0.25 P	18						14	2 3 2	NP	22	
	585.4	Brown and gray SANDY LOAM Medium stiff, brown and gray SILTY CLAY, trace organic matter			7	1 2 3	0.74 B	29		559.2	Medium dense, gray, coarse SAND, trace to some gravel							
					8	1 1 1	0.57 B	33						15	6 6 6	NP	21	
			20															
	579.4	Loose, gray, medium SAND			9	1 2 3	0.82 B	36			--%Gravel=0.8-- --%Sand=96.3-- --%Silt=2.6-- --%Clay=0.3-- --A-3 (0)--							
	577.9	Medium stiff (0.5P), gray SILTY CLAY			10	6 11 10	NP	20						16	10 10 10	NP	19	
	577.2	Loose to medium sense, gray,	25															

GENERAL NOTES

Begin Drilling **11-11-2013** Complete Drilling **11-15-2013**
 Drilling Contractor **Wang Testing Service** Drill Rig **D-50 TMR**
 Driller **R&N** Logger **A. Tomaras** Checked by **C. Marin**
 Drilling Method **3.25" HSA to 18', 4" Casing, mud rotary thereafter,
 boring backfilled upon completion**

WATER LEVEL DATA

While Drilling **14.00 ft**
 At Completion of Drilling **NA**
 Time After Drilling **NA**
 Depth to Water **NA**

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

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BORING LOG BSB-24

WEI Job No.: 342-06-01

Client: **PARSONS**
 Project: **US 52 / IL 64 Over the Mississippi River**
 Location: **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 600.94 ft
 North: 1980482.42 ft
 East: 2296444.64 ft
 Station: 1560+58.13
 Offset: 37.04 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		Medium dense, gray, coarse SAND, trace to some gravel	55	X	17	7 10 9	NP	17									
			60	X	18	9 11 10	NP	15									
	539.2	Medium dense to dense, gray GRAVELLY SAND	65	X	19	8 6 6	NP	16									
			70	X	20	7 7 8	NP	18									
			75	X	21	8 8 9	NP	15									
				X	22	5 6 7	NP	16			--%Gravel=3.5-- --%Sand=94.7-- --%Silt=1.5-- --%Clay=0.3--80 --A-1-b (0)--						
			85	X	23	6 5 6	NP	15									
			90	X	24	11 12 15	NP	18									
			95	X	25	10 11 13	NP	18									
			100	X	26	7 8 10	NP	16									

GENERAL NOTES

WATER LEVEL DATA

Begin Drilling **11-11-2013** Complete Drilling **11-15-2013**
 Drilling Contractor **Wang Testing Service** Drill Rig **D-50 TMR**
 Driller **R&N** Logger **A. Tomaras** Checked by **C. Marin**
 Drilling Method **3.25" HSA to 18', 4" Casing, mud rotary thereafter, boring backfilled upon completion**

While Drilling ∇ **14.00 ft**
 At Completion of Drilling ∇ **NA**
 Time After Drilling **NA**
 Depth to Water ∇ **NA**
 The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.

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BORING LOG BSB-24

WEI Job No.: 342-06-01

Client: **PARSONS**
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 Location: **Carroll County, IL and Jackson County, IA**

Datum: NAVD 88
 Elevation: 600.94 ft
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 Offset: 37.04 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	480.9	Medium dense to dense, gray GRAVELLY SAND	105		27	11 12 13	NP	17									
		--%Gravel=10.8-- --%Sand=86.2-- --%Silt=2.6-- --%Clay=0.3-10 --A-1-b (0)--			28	10 12 15	NP	14									
			115		29	10 7 8	NP	16									
			120		30	17 21 19	NP	15									
		Boring terminated at 120.00 ft															
			125														

GENERAL NOTES

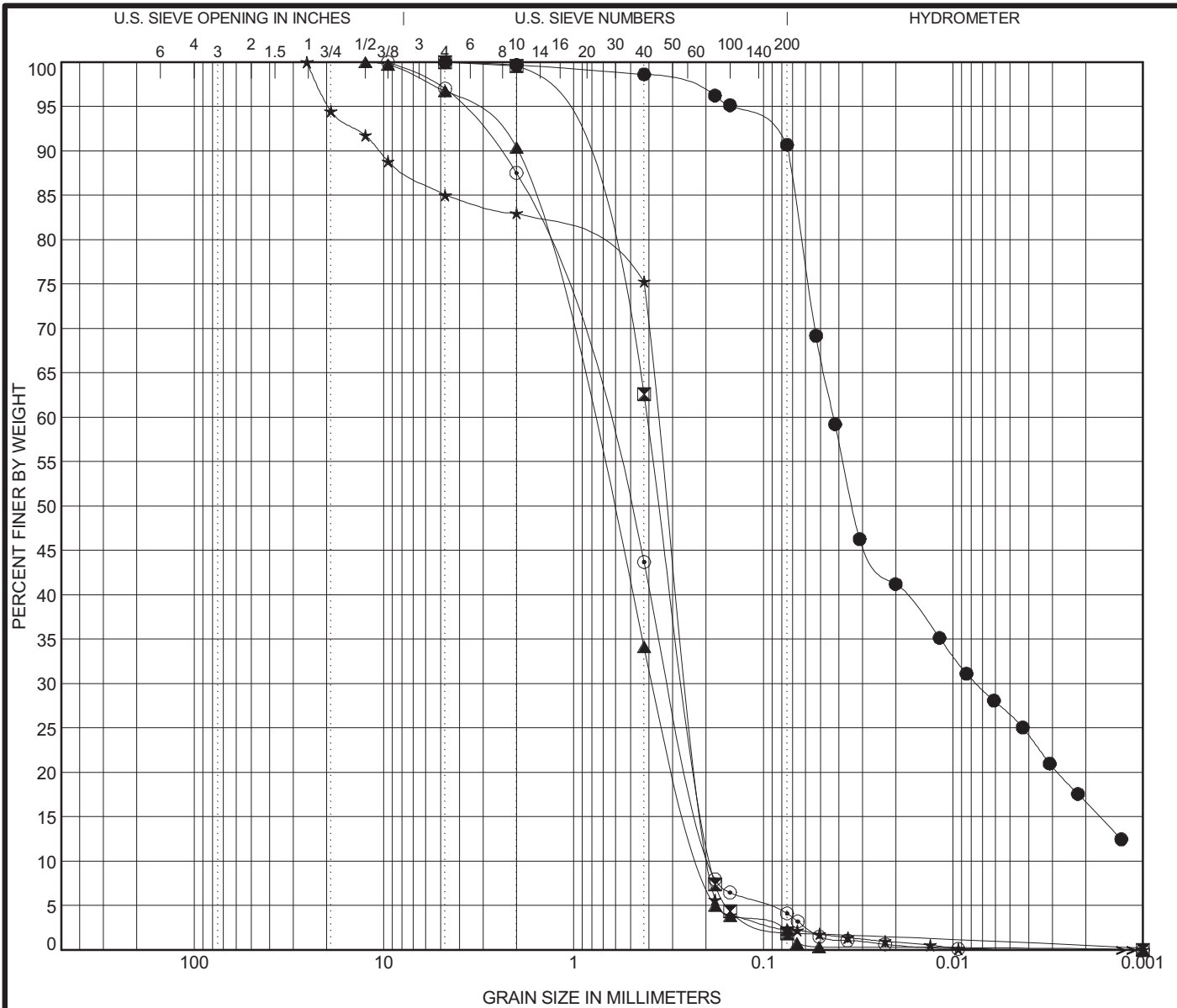
WATER LEVEL DATA

Begin Drilling **11-11-2013** Complete Drilling **11-15-2013**
 Drilling Contractor **Wang Testing Service** Drill Rig **D-50 TMR**
 Driller **R&N** Logger **A. Tomaras** Checked by **C. Marin**
 Drilling Method **3.25" HSA to 18', 4" Casing, mud rotary thereafter, boring backfilled upon completion**

While Drilling ∇ **14.00 ft**
 At Completion of Drilling \blacktriangledown **NA**
 Time After Drilling **NA**
 Depth to Water ∇ **NA**

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

APPENDIX B



COBBLES	GRAVEL	SAND		SILT AND CLAY
		coarse	fine	

Specimen Identification		IDH Classification					LL	PL	PI	Cc	Cu
●	BSB-13#7 34.0 ft	Silty Loam					NP	NP	NP		
☒	BSB-15#7 38.0 ft	Sand					NP	NP	NP	0.86	2.18
▲	BSB-15#15 60.5 ft	Sand					NP	NP	NP	0.78	4.15
★	BSB-16#12 48.0 ft	Gravelly Sand					NP	NP	NP	0.88	1.85
◎	BSB-16#15 60.5 ft	Sand					NP	NP	NP	0.65	4.00
Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay		
●	BSB-13#7 34.0 ft	4.75	0.043	0.008		0.3	9.8	73.2	16.7		
☒	BSB-15#7 38.0 ft	4.75	0.408	0.256	0.187	0.4	97.7	1.4	1.9	0.5	
▲	BSB-15#15 60.5 ft	12.5	0.866	0.376	0.209	9.6	88.3	2.0	0.1		
★	BSB-16#12 48.0 ft	25.4	0.352	0.243	0.19	17.0	80.7	2.2	0.1		
◎	BSB-16#15 60.5 ft	9.5	0.756	0.306	0.189	12.5	83.5	4.0	0.1		

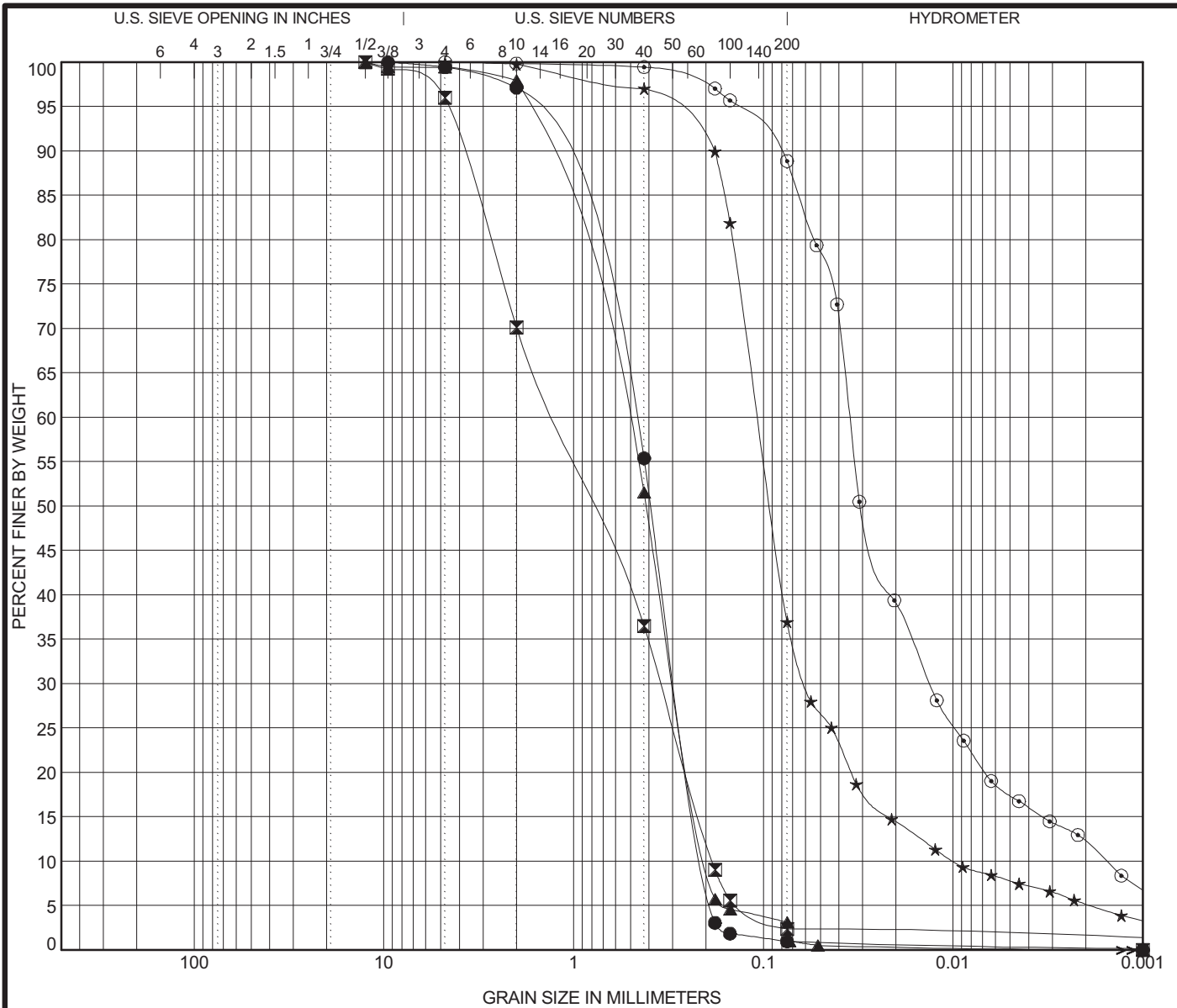


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GRAIN SIZE DISTRIBUTION

Project: US 52 / IL 64 Over the Mississippi River
 Location: Carroll County, IL and Jackson County, IA
 Number: 342-06-01

WEI GRAIN SIZE IDH 3420601.GPJ US LAB.GDT 11/6/13



COBBLES	GRAVEL	SAND		SILT AND CLAY
		coarse	fine	

Specimen Identification		IDH Classification					LL	PL	PI	Cc	Cu
●	BSB-17#7 38.0 ft	Sand					NP	NP	NP	0.77	2.50
☒	BSB-17#13 53.0 ft	Gravelly Sand					NP	NP	NP	0.52	6.76
▲	BSB-17#18 75.5 ft	Sand					NP	NP	NP	0.73	2.89
★	BSB-18#8 37.0 ft	Sandy Loam					NP	NP	NP	3.39	10.79
⊙	BSB-18#11 44.5 ft	Silty Loam					36	22	14	3.22	22.33
Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay		
●	BSB-17#7 38.0 ft	9.5	0.504	0.28	0.202	2.9	96.2	0.5	1.0	0.5	
☒	BSB-17#13 53.0 ft	12.5	1.254	0.347	0.185	29.9	67.7	1.2	2.4	1.2	
▲	BSB-17#18 75.5 ft	12.5	0.564	0.284	0.195	2.0	95.8	2.1	0.1		
★	BSB-18#8 37.0 ft	4.75	0.107	0.06	0.01	0.2	63.2	31.4	5.2		
⊙	BSB-18#11 44.5 ft	4.75	0.035	0.013	0.002	0.2	11.3	76.4	12.1		

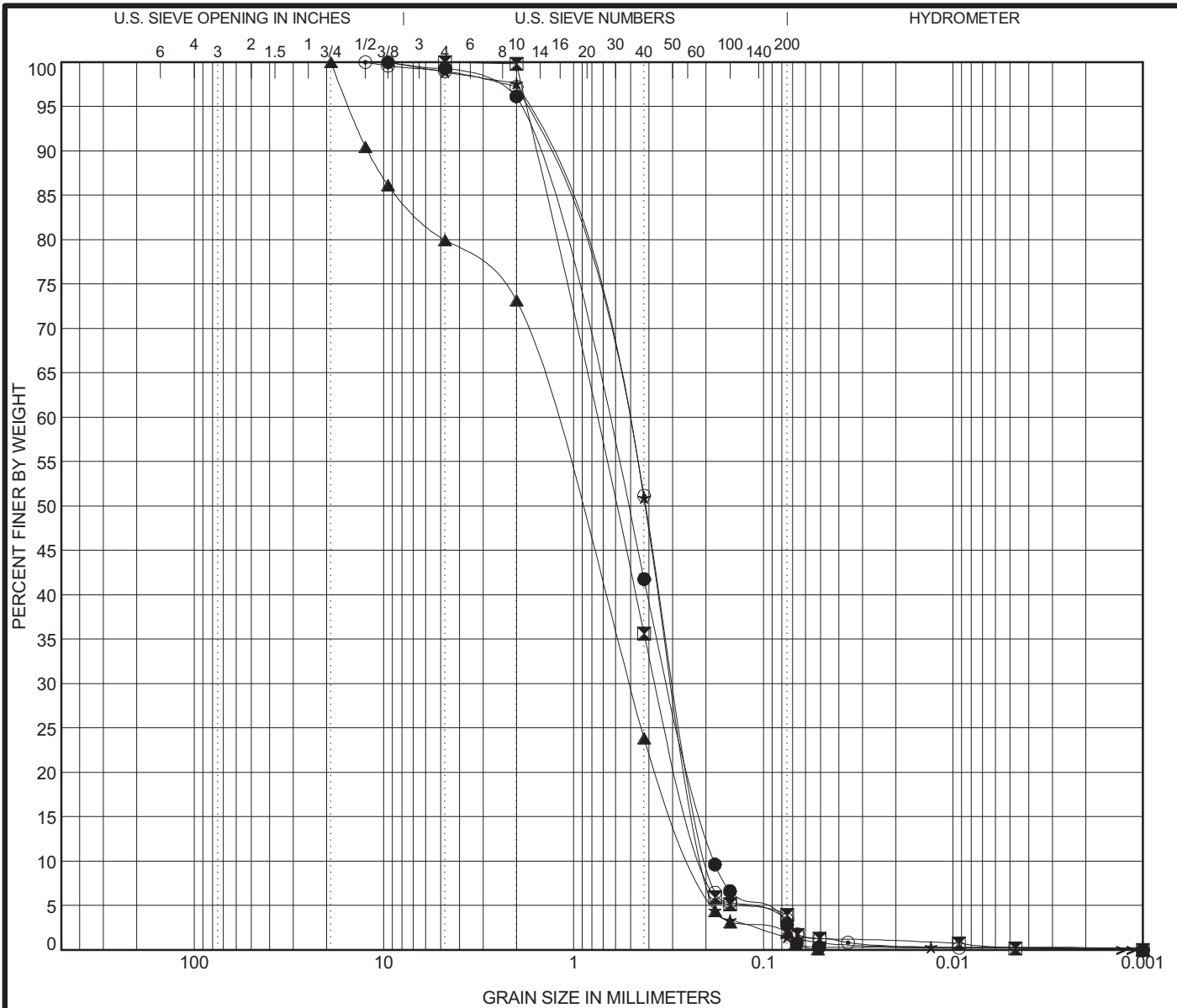
WEI GRAIN SIZE IDH 3420601.GPJ US LAB.GDT 11/6/13



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GRAIN SIZE DISTRIBUTION

Project: US 52 / IL 64 Over the Mississippi River
 Location: Carroll County, IL and Jackson County, IA
 Number: 342-06-01



COBBLES	GRAVEL	SAND		SILT AND CLAY
		coarse	fine	

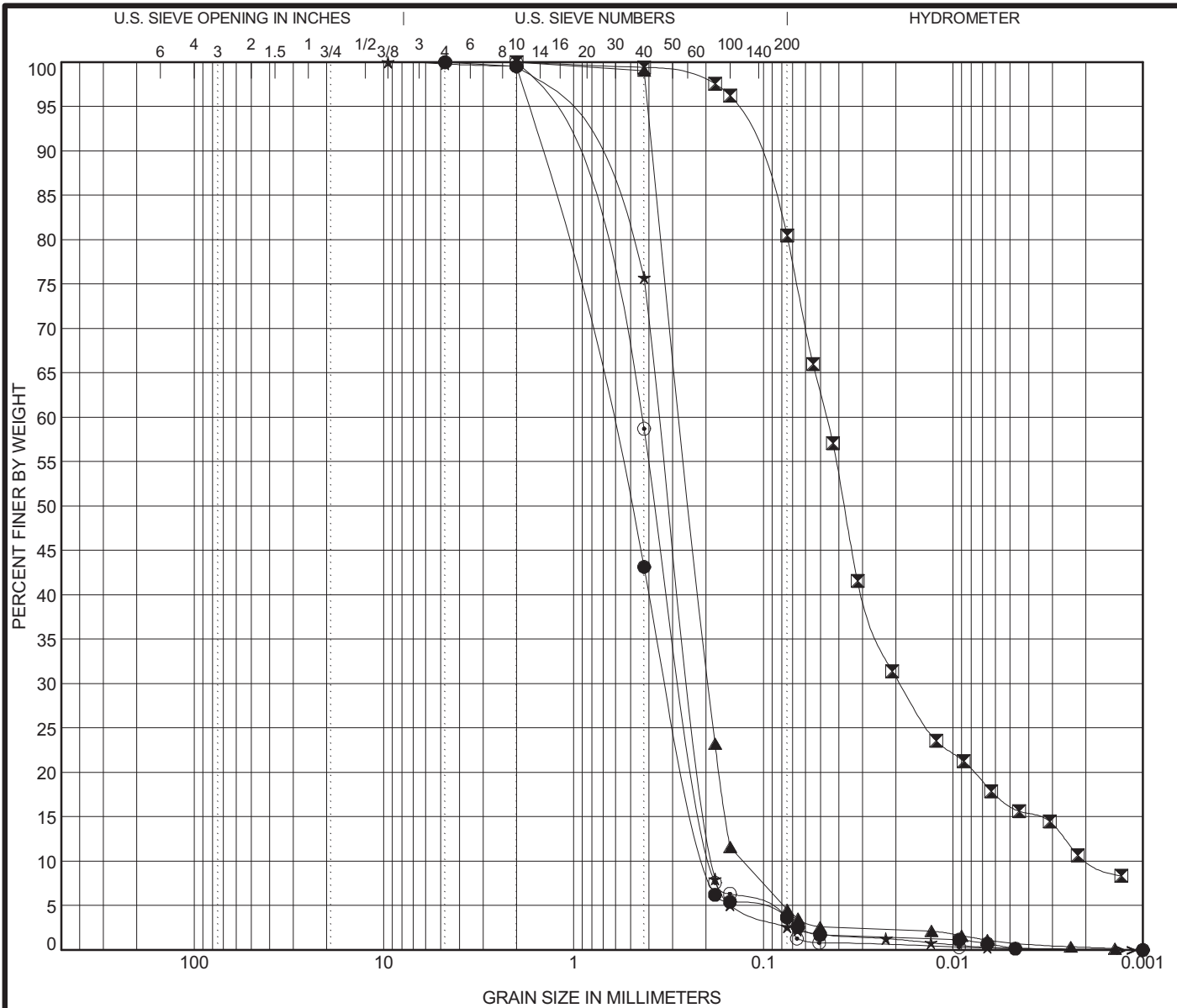
Specimen Identification		IDH Classification					LL	PL	PI	Cc	Cu
●	BSB-18#15 54.5 ft	Sand					NP	NP	NP	0.74	3.93
■	BSB-18#18 69.5 ft	Sand					NP	NP	NP	0.84	3.78
▲	BSB-19#7 44.0 ft	Gravelly Sand					NP	NP	NP	0.87	5.74
★	BSB-19#15 71.5 ft	Sand					NP	NP	NP	0.73	2.88
○	BSB-19#19 91.5 ft	Sand					NP	NP	NP	0.73	2.97
Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay		
●	BSB-18#15 54.5 ft	9.5	0.714	0.31	0.182	3.8	93.5	2.5	0.1		
■	BSB-18#18 69.5 ft	4.75	0.765	0.361	0.202	0.2	96.1	3.6	0.1		
▲	BSB-19#7 44.0 ft	19	1.323	0.515	0.23	26.8	71.3	1.8	0.0		
★	BSB-19#15 71.5 ft	9.5	0.574	0.289	0.199	2.4	96.2	1.2	0.2		
○	BSB-19#19 91.5 ft	12.5	0.572	0.283	0.193	2.8	94.0	3.1	0.1		



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GRAIN SIZE DISTRIBUTION
 Project: US 52 / IL 64 Over the Mississippi River
 Location: Carroll County, IL and Jackson County, IA
 Number: 342-06-01

WEI GRAIN SIZE IDH 3420601.GPJ US LAB.GDT 11/6/13



COBBLES	GRAVEL	SAND		SILT AND CLAY
		coarse	fine	

Specimen Identification	IDH Classification	LL	PL	PI	Cc	Cu
● BSB-19#23 111.5 ft	Sand	NP	NP	NP	0.74	3.44
☒ BSB-20#2 3.5 ft	Silty Loam	33	20	13	4.10	24.61
▲ BSB-20#9 21.0 ft	Sand	NP	NP	NP	1.08	2.13
★ BSB-20#14 38.5 ft	Sand	NP	NP	NP	0.88	1.89
⊙ BSB-20#23 83.5 ft	Sand	NP	NP	NP	0.82	2.38

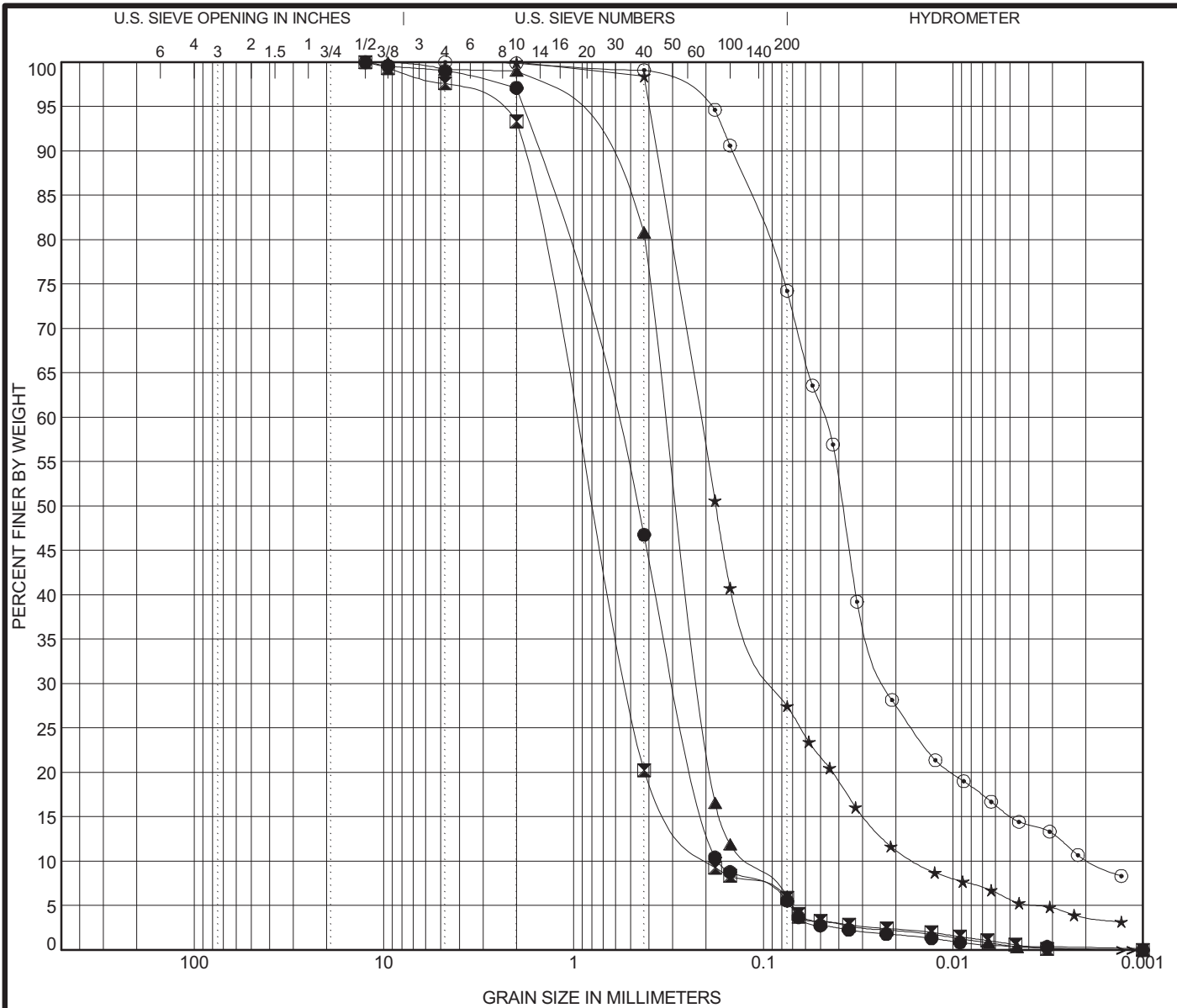
Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● BSB-19#23 111.5 ft	4.75	0.675	0.313	0.197	0.5	95.9	3.5	0.1
☒ BSB-20#2 3.5 ft	2	0.047	0.019	0.002	0.0	20.1	69.6	10.2
▲ BSB-20#9 21.0 ft	2	0.273	0.194	0.128	0.0	95.6	4.1	0.3
★ BSB-20#14 38.5 ft	9.5	0.348	0.238	0.185	0.4	97.0	2.4	0.1
⊙ BSB-20#23 83.5 ft	4.75	0.446	0.262	0.188	0.1	96.6	3.2	0.1



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GRAIN SIZE DISTRIBUTION
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 Location: Carroll County, IL and Jackson County, IA
 Number: 342-06-01

WEI GRAIN SIZE IDH 3420601.GPJ US LAB.GDT 11/6/13



COBBLES	GRAVEL	SAND		SILT AND CLAY
		coarse	fine	

Specimen Identification		IDH Classification					LL	PL	PI	Cc	Cu
●	BSB-20#29 113.5 ft	Sand					NP	NP	NP	0.75	3.72
☒	BSB-20#32 128.5 ft	Sand					NP	NP	NP	1.45	5.19
▲	BSB-21#5 11.0 ft	Sand					NP	NP	NP	1.20	2.68
★	BSB-21#8 18.5 ft	Sandy Loam					NP	NP	NP	2.18	13.50
◎	BSB-21#11 26.0 ft	Silty Loam					43	25	18	5.58	25.54
Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay		
●	BSB-20#29 113.5 ft	12.5	0.639	0.286	0.172	2.9	91.7	5.1	0.3		
☒	BSB-20#32 128.5 ft	12.5	0.987	0.522	0.19	6.7	87.6	5.6	0.1		
▲	BSB-21#5 11.0 ft	9.5	0.322	0.215	0.12	1.0	93.2	5.6	0.2		
★	BSB-21#8 18.5 ft	2	0.213	0.086	0.016	0.0	72.7	23.5	3.7		
◎	BSB-21#11 26.0 ft	4.75	0.048	0.023	0.002	0.1	26.1	63.5	10.3		

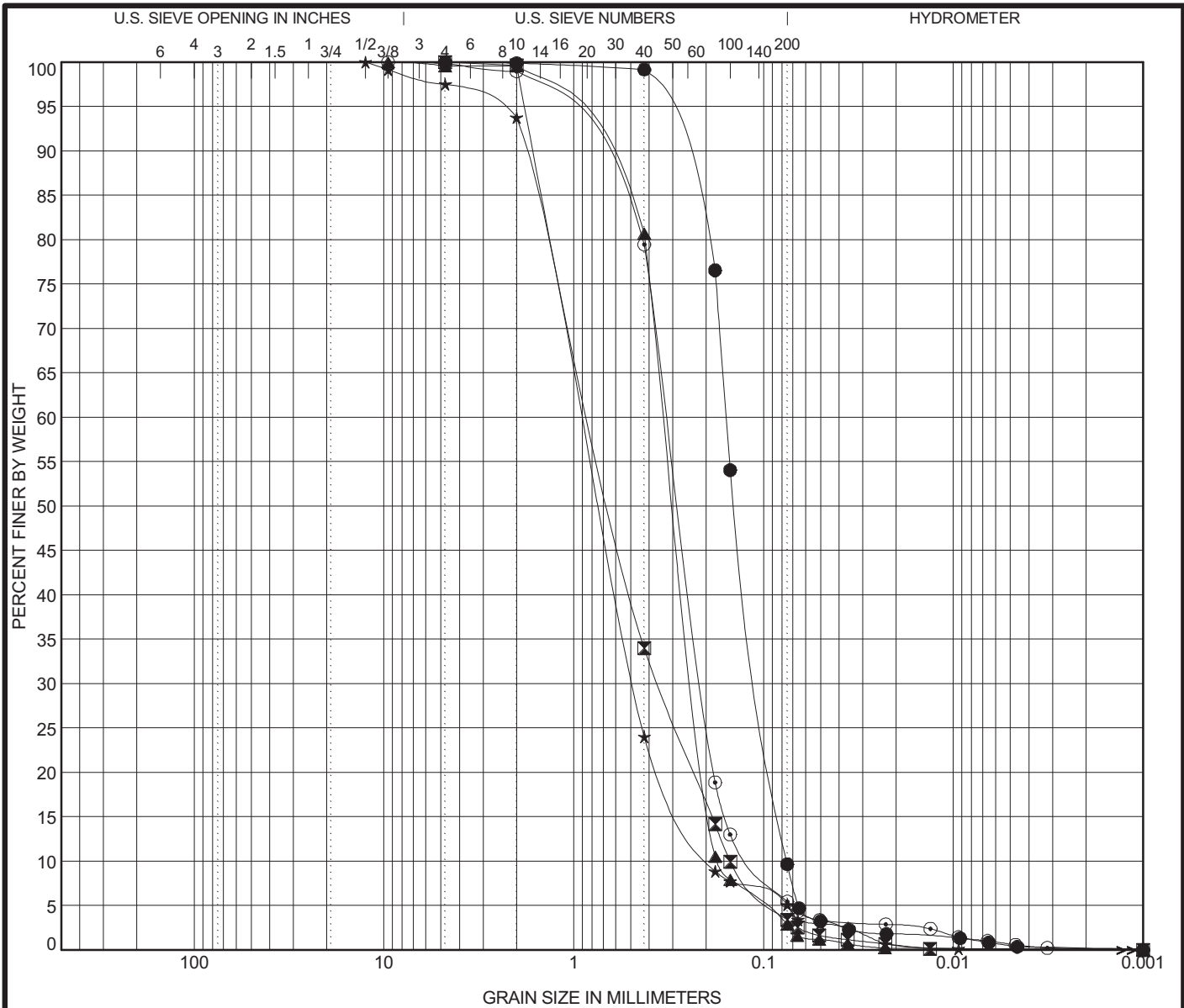
WEI GRAIN SIZE IDH 3420601.GPJ US LAB.GDT 11/6/13



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 Location: Carroll County, IL and Jackson County, IA
 Number: 342-06-01



COBBLES	GRAVEL	SAND		SILT AND CLAY
		coarse	fine	

Specimen Identification		IDH Classification					LL	PL	PI	Cc	Cu
●	BSB-21#16 48.5 ft	Sand					NP	NP	NP	0.89	2.09
☒	BSB-21#19 63.5 ft	Sand					NP	NP	NP	1.08	5.23
▲	BSB-21#25 93.5 ft	Sand					NP	NP	NP	0.91	1.90
★	BSB-21#32 128.5 ft	Sand					NP	NP	NP	1.30	4.92
⊙	BSB-22#6 13.5 ft	Sand					NP	NP	NP	1.21	2.83
Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay		
●	BSB-21#16 48.5 ft	4.75	0.157	0.103	0.075	0.1	90.7	8.9	0.3		
☒	BSB-21#19 63.5 ft	4.75	0.785	0.358	0.15	0.3	96.4	3.2	0.1		
▲	BSB-21#25 93.5 ft	9.5	0.33	0.229	0.174	0.5	96.8	2.6	0.1		
★	BSB-21#32 128.5 ft	12.5	0.945	0.486	0.192	6.2	88.9	4.8	0.1		
⊙	BSB-22#6 13.5 ft	9.5	0.322	0.211	0.114	1.0	93.6	5.1	0.2		

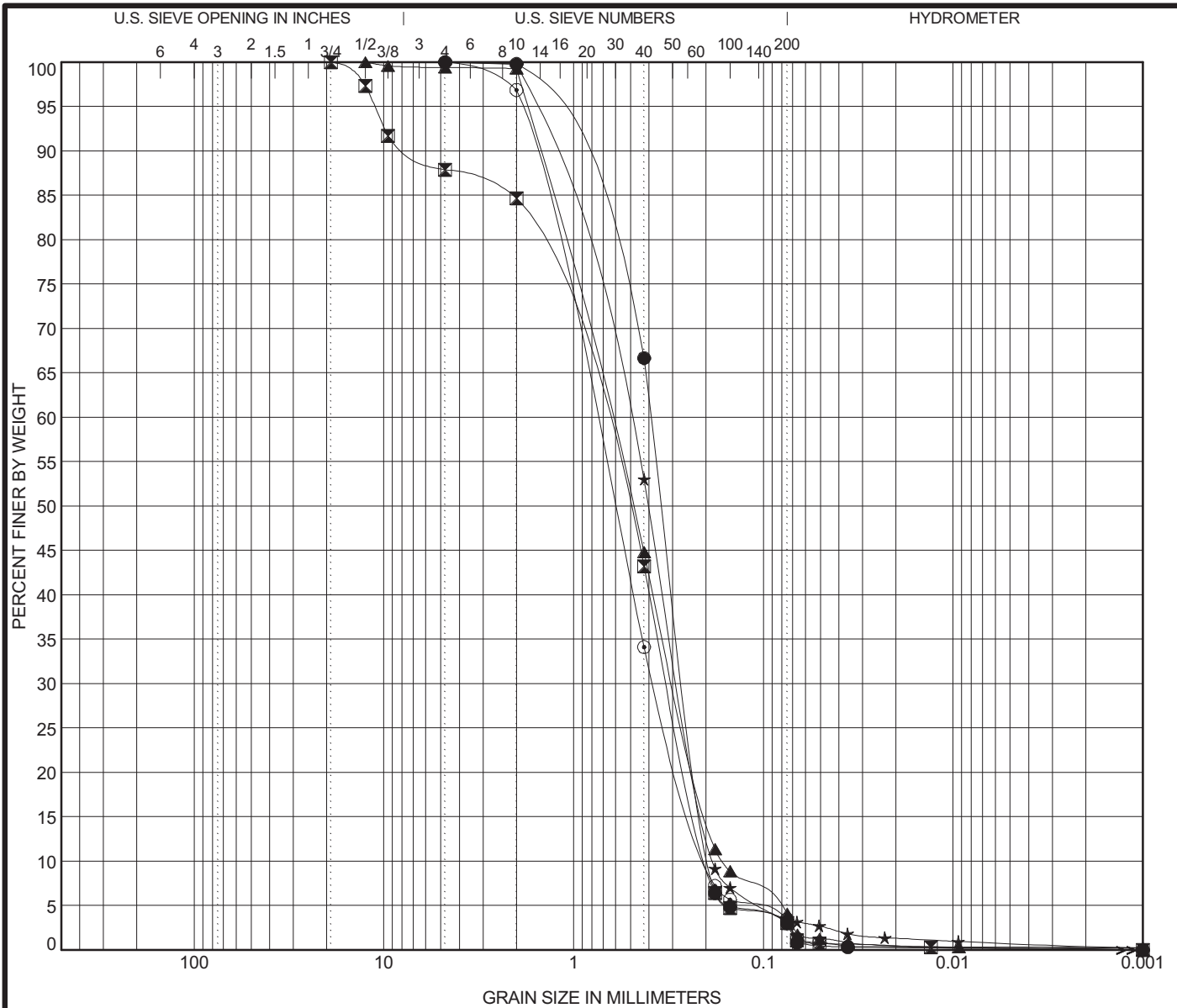
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GRAIN SIZE DISTRIBUTION

Project: US 52 / IL 64 Over the Mississippi River
 Location: Carroll County, IL and Jackson County, IA
 Number: 342-06-01



COBBLES	GRAVEL	SAND		SILT AND CLAY
		coarse	fine	

Specimen Identification	IDH Classification	LL	PL	PI	Cc	Cu
● BSB-22#13 33.5 ft	Sand	NP	NP	NP	0.87	2.04
☒ BSB-22#16 48.5 ft	Gravelly Sand	NP	NP	NP	0.63	4.06
▲ BSB-22#20 68.5 ft	Sand	NP	NP	NP	0.79	4.02
★ BSB-22#24 88.5 ft	Sand	NP	NP	NP	0.75	2.93
◎ BSB-22#28 108.5 ft	Sand	NP	NP	NP	0.88	4.09

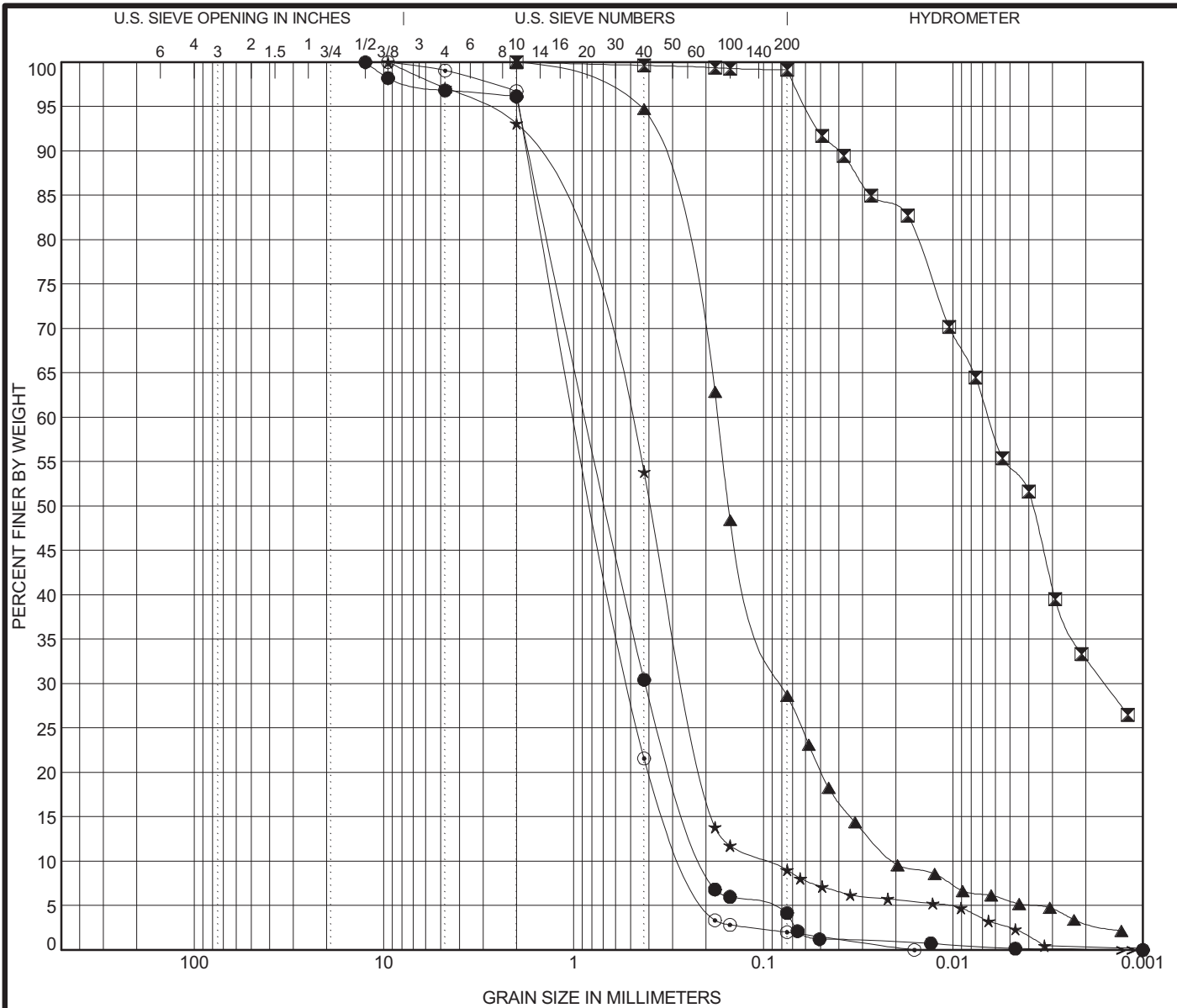
Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● BSB-22#13 33.5 ft	4.75	0.386	0.252	0.189	0.2	97.0	2.6	0.2
☒ BSB-22#16 48.5 ft	19	0.795	0.312	0.196	15.3	81.8	2.7	0.2
▲ BSB-22#20 68.5 ft	12.5	0.655	0.291	0.163	0.7	95.4	3.6	0.2
★ BSB-22#24 88.5 ft	4.75	0.536	0.271	0.183	0.2	96.3	2.8	0.7
◎ BSB-22#28 108.5 ft	4.75	0.805	0.373	0.197	3.1	93.6	3.0	0.2



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GRAIN SIZE DISTRIBUTION
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 Location: Carroll County, IL and Jackson County, IA
 Number: 342-06-01

WEI GRAIN SIZE IDH 3420601.GPJ US LAB.GDT 11/6/13



COBBLES	GRAVEL	SAND		SILT AND CLAY
		coarse	fine	

Specimen Identification		IDH Classification					LL	PL	PI	Cc	Cu
●	BSB-22#31 123.5 ft	Sand					NP	NP	NP	1.01	4.22
☒	BSB-23#3 10.5 ft	Silty Clay					64	30	34		
▲	BSB-23#6 18.0 ft	Sandy Loam					NP	NP	NP	1.73	8.45
★	BSB-23#14 40.5 ft	Sand					NP	NP	NP	1.25	5.63
⊙	BSB-23#19 65.5 ft	Sand					NP	NP	NP	1.11	3.81
Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay			
● BSB-22#31 123.5 ft	12.5	0.853	0.418	0.202	3.9	92.2	3.8	0.1			
☒ BSB-23#3 10.5 ft	2	0.006	0.002		0.0	1.1	66.2	32.8			
▲ BSB-23#6 18.0 ft	2	0.174	0.079	0.021	0.0	71.6	25.3	3.1			
★ BSB-23#14 40.5 ft	9.5	0.542	0.255	0.096	6.9	84.2	8.5	0.4			
⊙ BSB-23#19 65.5 ft	9.5	0.938	0.506	0.246	3.3	94.8	2.0	0.0			

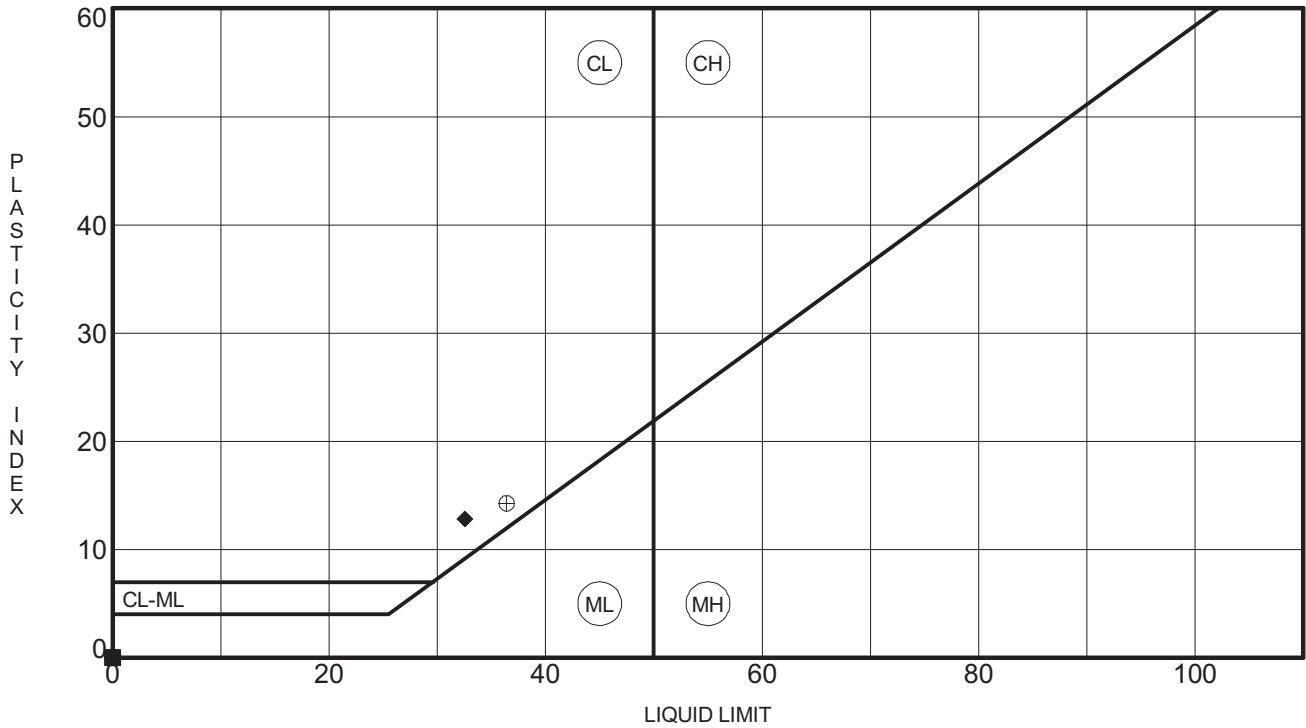
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GRAIN SIZE DISTRIBUTION

Project: US 52 / IL 64 Over the Mississippi River
 Location: Carroll County, IL and Jackson County, IA
 Number: 342-06-01



Specimen Identification	LL	PL	PI	Fines	IDH Classification
● BSB-13#7	34.0 ft	NP	NP	NP	91 Silty Loam
☒ BSB-15#7	38.0 ft	NP	NP	NP	2 Sand
▲ BSB-15#15	60.5 ft	NP	NP	NP	2 Sand
★ BSB-16#12	48.0 ft	NP	NP	NP	2 Gravelly Sand
⊙ BSB-16#15	60.5 ft	NP	NP	NP	4 Sand
⊕ BSB-17#7	38.0 ft	NP	NP	NP	1 Sand
○ BSB-17#13	53.0 ft	NP	NP	NP	2 Gravelly Sand
△ BSB-17#18	75.5 ft	NP	NP	NP	3 Sand
⊗ BSB-18#8	37.0 ft	NP	NP	NP	37 Sandy Loam
⊕ BSB-18#11	44.5 ft	36	22	14	89 Silty Loam
□ BSB-18#15	54.5 ft	NP	NP	NP	3 Sand
⊕ BSB-18#18	69.5 ft	NP	NP	NP	4 Sand
⊕ BSB-19#7	44.0 ft	NP	NP	NP	2 Gravelly Sand
☆ BSB-19#15	71.5 ft	NP	NP	NP	1 Sand
⊗ BSB-19#19	91.5 ft	NP	NP	NP	3 Sand
■ BSB-19#23	111.5 ft	NP	NP	NP	4 Sand
◆ BSB-20#2	3.5 ft	33	20	13	80 Silty Loam
◇ BSB-20#9	21.0 ft	NP	NP	NP	5 Sand
× BSB-20#14	38.5 ft	NP	NP	NP	3 Sand
⊗ BSB-20#23	83.5 ft	NP	NP	NP	4 Sand

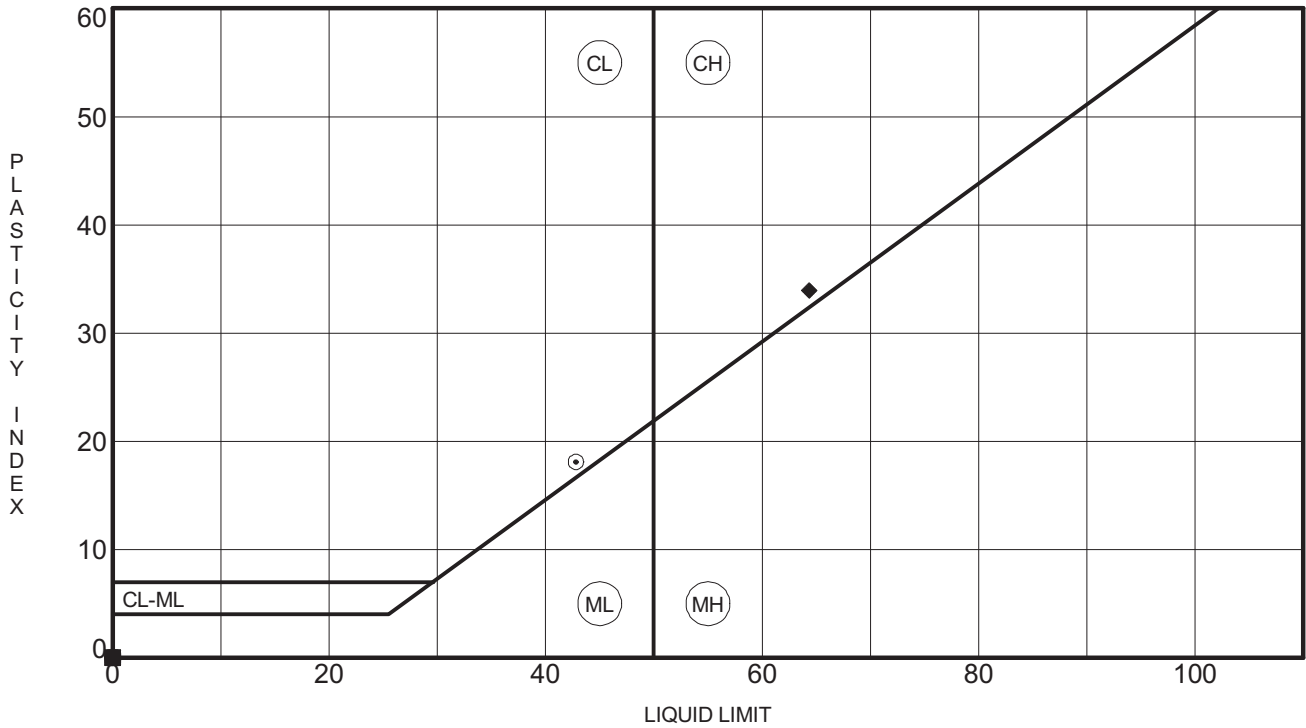
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ATTERBERG LIMITS' RESULTS

Project: US 52 / IL 64 Over the Mississippi River
 Location: Carroll County, IL and Jackson County, IA
 Number: 342-06-01



Specimen Identification	LL	PL	PI	Fines	IDH Classification
● BSB-20#29 113.5 ft	NP	NP	NP	6	Sand
☒ BSB-20#32 128.5 ft	NP	NP	NP	6	Sand
▲ BSB-21#5 11.0 ft	NP	NP	NP	6	Sand
★ BSB-21#8 18.5 ft	NP	NP	NP	27	Sandy Loam
⊙ BSB-21#11 26.0 ft	43	25	18	74	Silty Loam
⊕ BSB-21#16 48.5 ft	NP	NP	NP	10	Sand
○ BSB-21#19 63.5 ft	NP	NP	NP	3	Sand
△ BSB-21#25 93.5 ft	NP	NP	NP	3	Sand
⊗ BSB-21#32 128.5 ft	NP	NP	NP	5	Sand
⊕ BSB-22#6 13.5 ft	NP	NP	NP	5	Sand
□ BSB-22#13 33.5 ft	NP	NP	NP	3	Sand
⊕ BSB-22#16 48.5 ft	NP	NP	NP	3	Gravelly Sand
⊕ BSB-22#20 68.5 ft	NP	NP	NP	4	Sand
☆ BSB-22#24 88.5 ft	NP	NP	NP	3	Sand
⊗ BSB-22#28 108.5 ft	NP	NP	NP	3	Sand
■ BSB-22#31 123.5 ft	NP	NP	NP	4	Sand
◆ BSB-23#3 10.5 ft	64	30	34	99	Silty Clay
◇ BSB-23#6 18.0 ft	NP	NP	NP	29	Sandy Loam
× BSB-23#14 40.5 ft	NP	NP	NP	9	Sand
⊗ BSB-23#19 65.5 ft	NP	NP	NP	2	Sand

WEI ATTERBERG LIMITS IDH 3420601.GPJ US LAB.GDT 11/6/13

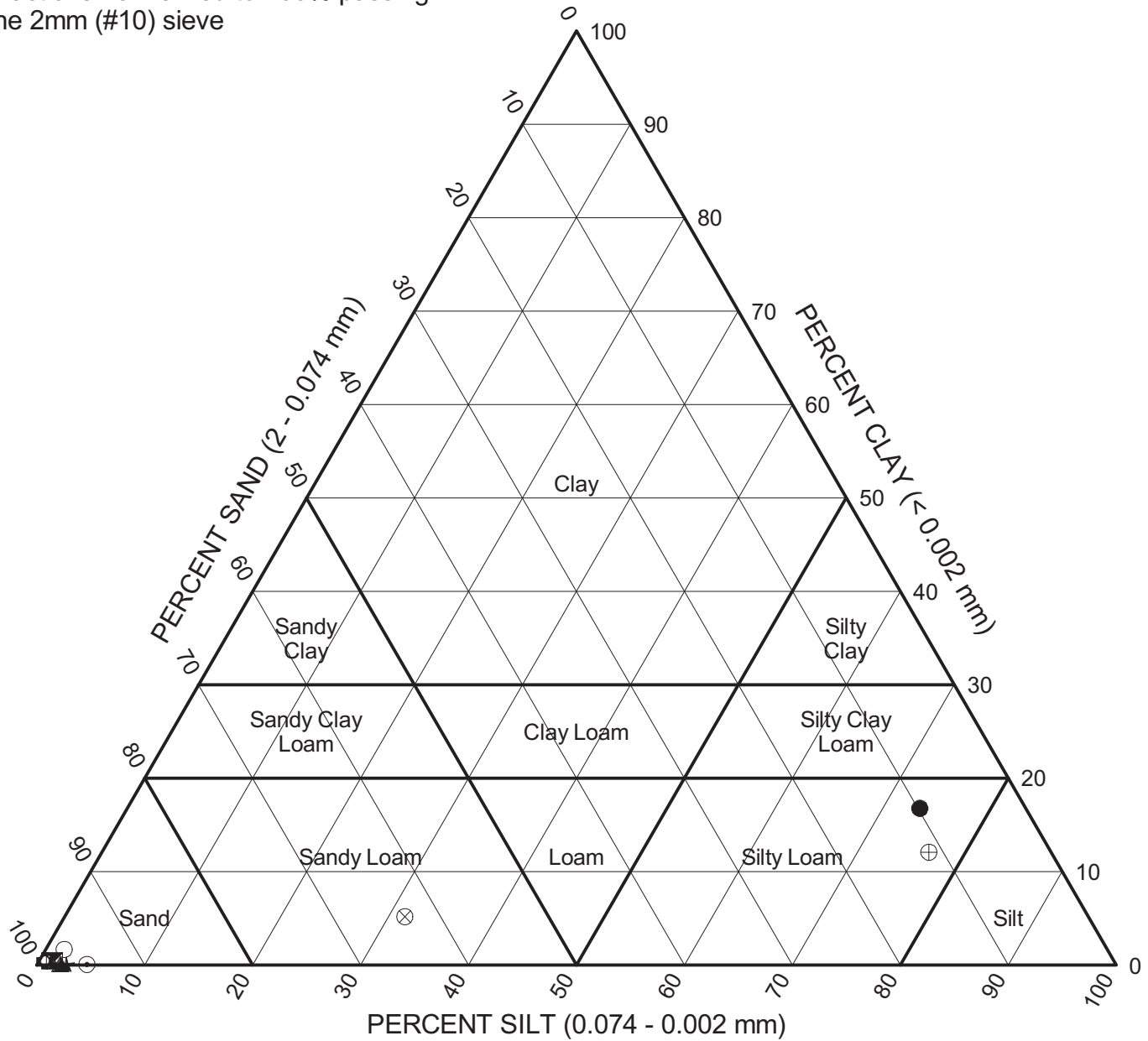


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ATTERBERG LIMITS' RESULTS

Project: US 52 / IL 64 Over the Mississippi River
 Location: Carroll County, IL and Jackson County, IA
 Number: 342-06-01

Fractions normalized to 100% passing the 2mm (#10) sieve



	Sample	Depth (ft)	Sand (%)	Silt (%)	Clay (%)	Classification		
						IL DOT	AASHTO	ASTM
●	BSB-13#7	34.0	9.8	73.4	16.8	Silty Loam	A-4 (0)	ML
☒	BSB-15#7	38.0	98.1	1.4	0.5	Sand	A-3 (0)	SP
▲	BSB-15#15	60.5	97.7	2.2	0.1	Sand	A-1-b (0)	SP
★	BSB-16#12	48.0	97.2	2.7	0.1	Gravelly Sand	A-3 (0)	SP
⊙	BSB-16#15	60.5	95.4	4.6	0.1	Sand	A-1-b (0)	SP
⊕	BSB-17#7	38.0	99.1	0.5	0.5	Sand	A-3 (0)	SP
○	BSB-17#13	53.0	96.6	1.7	1.7	Gravelly Sand	A-1-b (0)	SP
△	BSB-17#18	75.5	97.8	2.1	0.1	Sand	A-3 (0)	SP
⊗	BSB-18#8	37.0	63.3	31.5	5.2	Sandy Loam	A-4 (0)	SM
⊕	BSB-18#11	44.5	11.3	76.6	12.1	Silty Loam	A-6 (13)	CL

WEI IDH 3420601.GPJ WANGENG_GDT 11/6/13

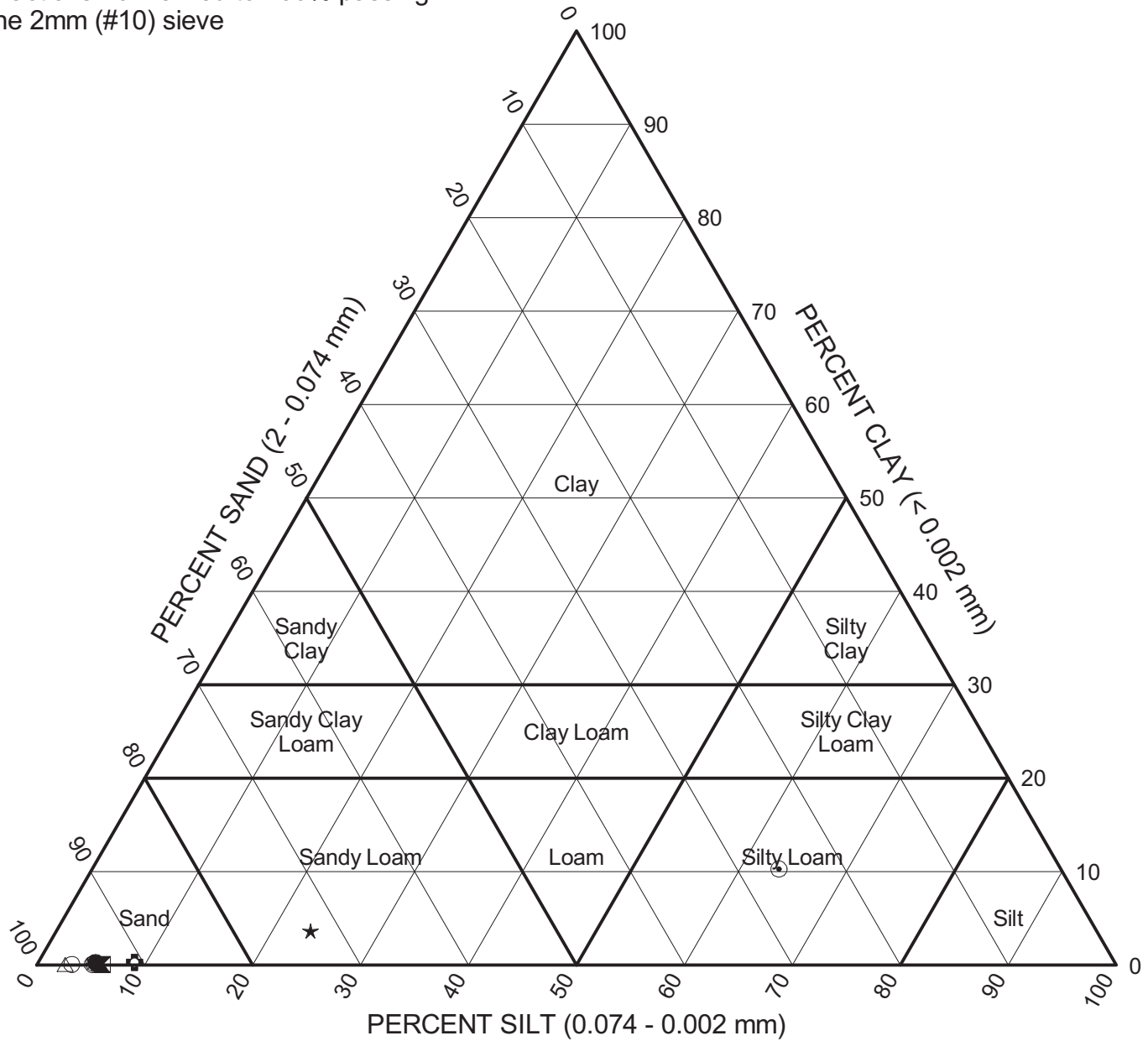


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IDH Textural Classification Chart

Project: US 52 / IL 64 Over the Mississippi River
 Location: Carroll County, IL and Jackson County, IA
 Number: 342-06-01

Fractions normalized to 100% passing the 2mm (#10) sieve



	Sample	Depth (ft)	Sand (%)	Silt (%)	Clay (%)	Classification		
						IL DOT	AASHTO	ASTM
●	BSB-20#29	113.5	94.4	5.3	0.3	Sand	A-1-b (0)	SP-SM
⊠	BSB-20#32	128.5	93.9	6.0	0.1	Sand	A-1-b (0)	SP-SM
▲	BSB-21#5	11.0	94.1	5.7	0.2	Sand	A-3 (0)	SP-SM
★	BSB-21#8	18.5	72.7	23.5	3.7	Sandy Loam	A-2-4 (0)	SM
⊙	BSB-21#11	26.0	26.1	63.6	10.3	Silty Loam	A-7-6 (13)	CL
⊕	BSB-21#16	48.5	90.8	8.9	0.3	Sand	A-3 (0)	SP-SM
○	BSB-21#19	63.5	96.7	3.2	0.1	Sand	A-1-b (0)	SP
△	BSB-21#25	93.5	97.3	2.6	0.1	Sand	A-3 (0)	SP
⊗	BSB-21#32	128.5	94.8	5.1	0.1	Sand	A-1-b (0)	SP-SM
⊕	BSB-22#6	13.5	94.5	5.2	0.2	Sand	A-3 (0)	SP-SM

WEI IDH 3420601.GPJ WANGENG_GDT 11/6/13

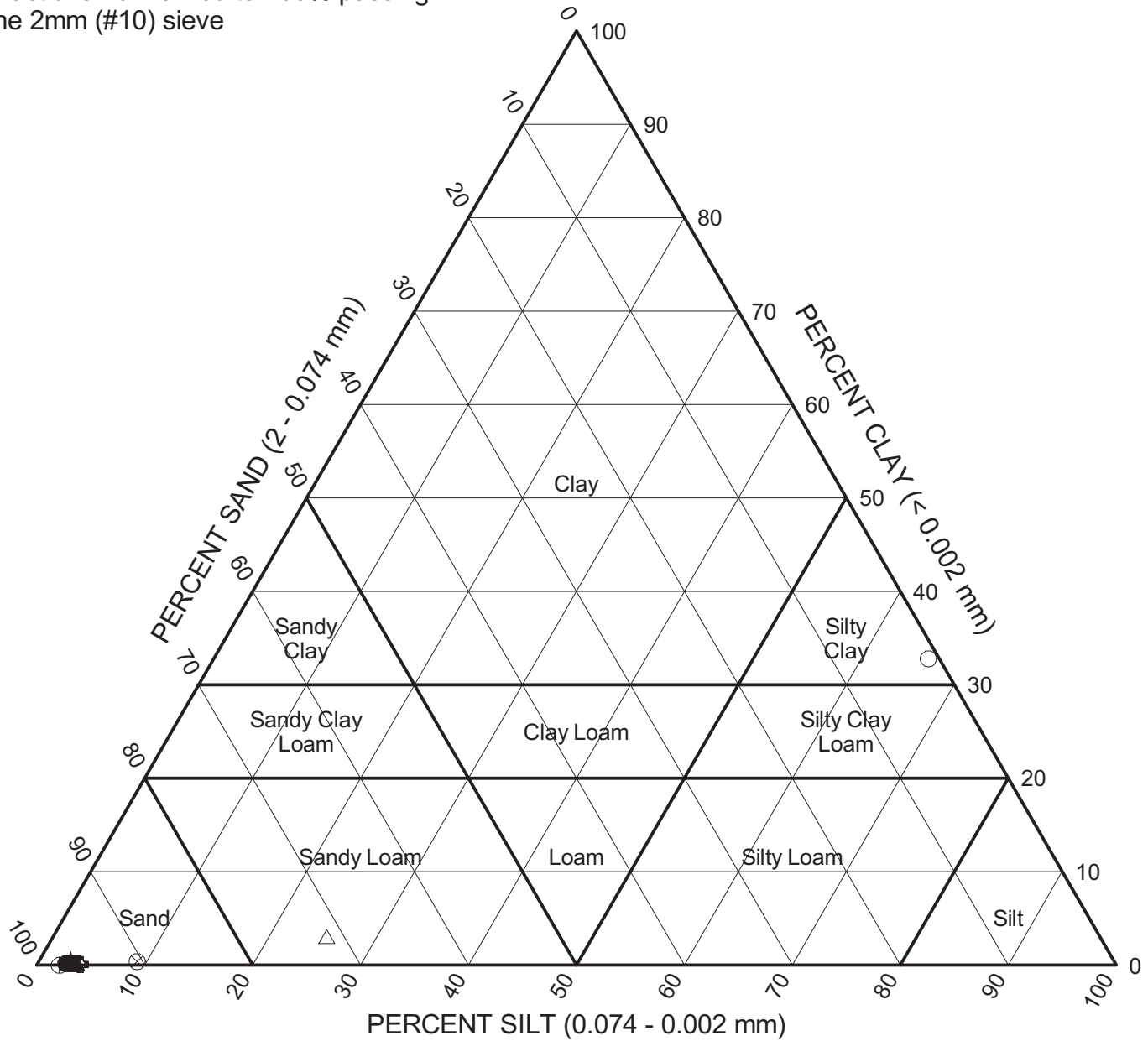


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IDH Textural Classification Chart

Project: US 52 / IL 64 Over the Mississippi River
 Location: Carroll County, IL and Jackson County, IA
 Number: 342-06-01

Fractions normalized to 100% passing the 2mm (#10) sieve



	Sample	Depth (ft)	Sand (%)	Silt (%)	Clay (%)	Classification		
						IL DOT	AASHTO	ASTM
●	BSB-22#13	33.5	97.2	2.6	0.2	Sand	A-3 (0)	SP
⊠	BSB-22#16	48.5	96.6	3.2	0.2	Gravelly Sand	A-1-b (0)	SP
▲	BSB-22#20	68.5	96.1	3.6	0.2	Sand	A-1-b (0)	SP
★	BSB-22#24	88.5	96.5	2.8	0.7	Sand	A-3 (0)	SP
⊙	BSB-22#28	108.5	96.6	3.1	0.2	Sand	A-1-b (0)	SP
⊕	BSB-22#31	123.5	95.9	4.0	0.1	Sand	A-1-b (0)	SP
○	BSB-23#3	10.5	1.1	66.2	32.8	Silty Clay	A-7-5 (41)	CH
△	BSB-23#6	18.0	71.6	25.3	3.1	Sandy Loam	A-2-4 (0)	SM
⊗	BSB-23#14	40.5	90.4	9.1	0.4	Sand	A-3 (0)	SP-SM
⊕	BSB-23#19	65.5	98.0	2.1	0.0	Sand	A-1-b (0)	SP

WEI IDH 3420601.GPJ WANGENG_GDT 11/6/13

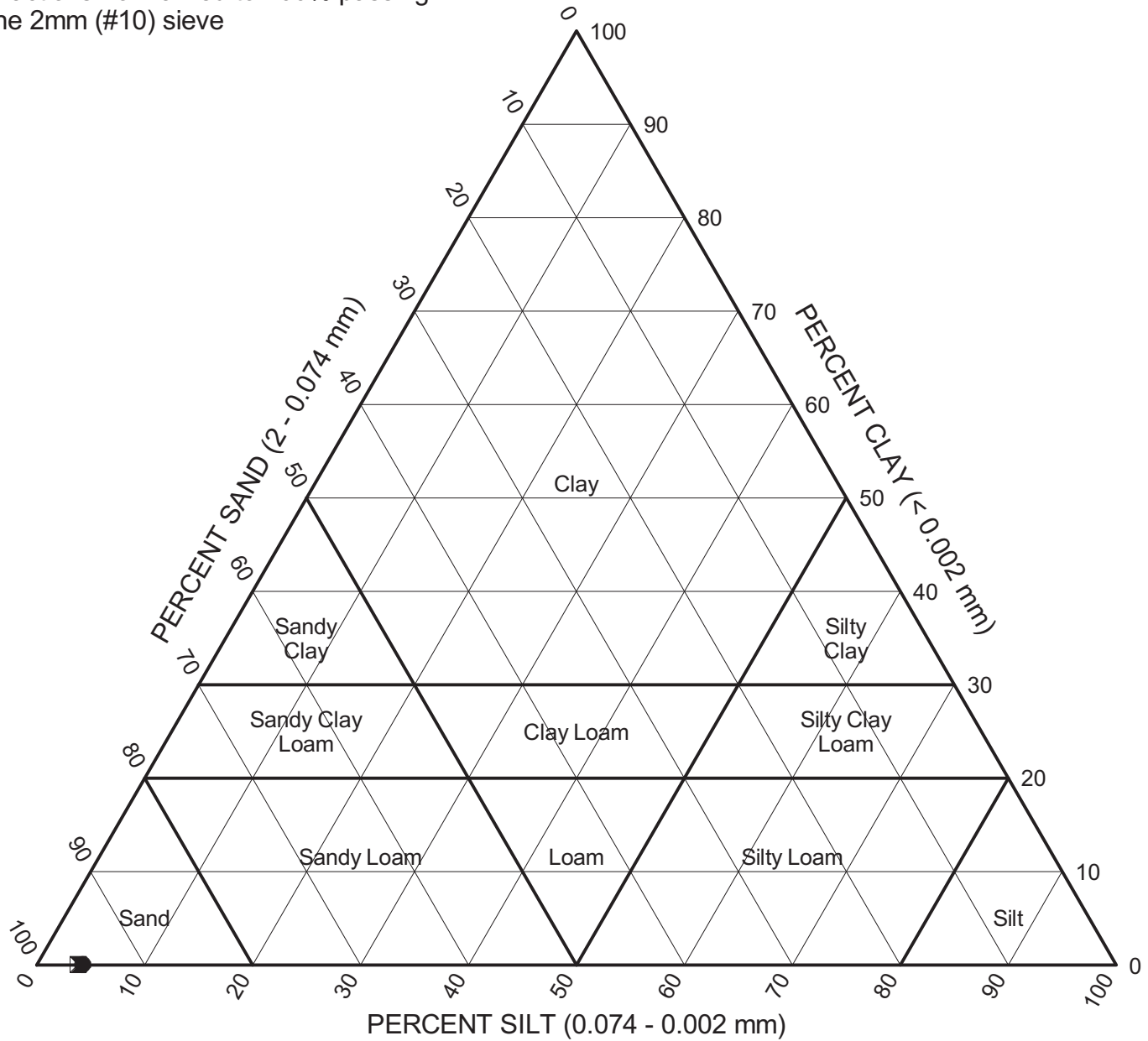


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IDH Textural Classification Chart

Project: US 52 / IL 64 Over the Mississippi River
Location: Carroll County, IL and Jackson County, IA
Number: 342-06-01

Fractions normalized to 100% passing the 2mm (#10) sieve



	Sample	Depth (ft)	Sand (%)	Silt (%)	Clay (%)	Classification		
						IL DOT	AASHTO	ASTM
●	BSB-23#25	95.5	95.6	4.2	0.1	Sand	A-1-b (0)	SP
☒	BSB-23#28	110.5	96.1	3.8	0.1	Sand	A-1-b (0)	SP

WEI IDH 3420601.GPJ WANGENG_GDT 11/6/13



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IDH Textural Classification Chart

Project: US 52 / IL 64 Over the Mississippi River
 Location: Carroll County, IL and Jackson County, IA
 Number: 342-06-01



Unconfined Compressive Strength of Intact Rock Core Specimens

Project: US 52 / IL 64 Over Mississippi River

Client: Parsons

IDOT P-92-001-11

WEI Job No.: 342-06-01

Note: The specimens were sulphur capped for a more uniform break

Field Sample ID	Lab Specimen ID	Break Date	Location	Length (in)			Diameter (in)	Total Load (lbs)	Total Pressure (psi)	Fracture Type*	Tested By	Area (in ²)
				Total Core	Before Capping	After Capping						
BSB-01, RUN 1, @ 25.0'	5142	1/10/2013	US 52 / IL 64 Over Mississippi River		3.89	4.15	2.05	38410	11640	3	KM	3.30
BSB-01, RUN 1, @ 29.5'	5143	1/10/2013	US 52 / IL 64 Over Mississippi River		4.06	4.35	2.06	25230	7580	3	KM	3.33
BSB-01, RUN 1, @ 33.0'	5144	1/10/2013	US 52 / IL 64 Over Mississippi River		3.96	4.04	2.05	35560	10780	3	KM	3.30
BSB-01, RUN 2, @ 36.0'	5145	1/10/2013	US 52 / IL 64 Over Mississippi River		4.11	4.22	2.05	39800	12060	3	KM	3.30
BSB-01, RUN 2, @ 39.5'	5146	1/10/2013	US 52 / IL 64 Over Mississippi River		3.97	4.10	2.05	40650	12320	3	KM	3.30
BSB-01, RUN 2, @ 43.5'	5147	1/10/2013	US 52 / IL 64 Over Mississippi River		3.96	4.11	2.05	35300	10700	3	KM	3.30

*** Fracture Types:**

- Type 1 - Reasonably well-formed cones on both ends, less than 1 in. [25 mm] of cracking through caps;
- Type 2 - Well-formed cone on one end, vertical cracks running through caps, no well defined cone on other end;
- Type 3 - Columnar vertical cracking through both ends, no well-formed cones;
- Type 4 - Diagonal fracture with no cracking through ends; tap with hammer to distinguish from Type 1;
- Type 5 - Side fractures at top or bottom (occur commonly with unbonded caps);
- Type 6 - Similar to Type 5 but end of cylinder is pointed.

Prepared by: G. A. 1-18-13

Checked by: AL 1/18/13



Unconfined Compressive Strength of Intact Rock Core Specimens

Project: US 52 / IL 64 Over Mississippi River

Client: Parsons

DOT P-92-001-11

WEI Job No.: 342-06-01

Note: The specimens were sulphur capped for a more uniform break

Field Sample ID	Lab Specimen ID	Break Date	Location	Length (in)			Diameter (in)	Total Load (lbs)	Total Pressure (psi)	Fracture Type*	Tested By	Area (in ²)
				Total Core	Before Capping	After Capping						
BSB-01, RUN 3, @ 47.0'	5148	1/10/2013	US 52 / IL 64 Over Mississippi River		3.95	4.14	2.05	38660	11720	3	KM	3.30
BSB-01, RUN 3, @ 54.0'	5149	1/10/2013	US 52 / IL 64 Over Mississippi River		3.97	4.20	2.05	32590	9880	3	KM	3.30
BSB-01, RUN 4, @ 54.5'	5150	1/10/2013	US 52 / IL 64 Over Mississippi River		4.01	4.33	2.05	29040	8800	3	KM	3.30
BSB-01, RUN 4, @ 61.0'	5151	1/10/2013	US 52 / IL 64 Over Mississippi River		3.93	4.14	2.05	33170	10050	3	KM	3.30
BSB-01, RUN 4, @ 64.0'	5152	1/10/2013	US 52 / IL 64 Over Mississippi River		3.92	4.15	2.05	33480	10150	3	KM	3.30
BSB-01, RUN 5, @ 65.5'	5153	1/10/2013	US 52 / IL 64 Over Mississippi River		3.82	4.19	2.05	24070	7290	3	KM	3.30

*** Fracture Types:**

- Type 1 - Reasonably well-formed cones on both ends, less than 1 in. [25 mm] of cracking through caps;
- Type 2 - Well-formed cone on one end, vertical cracks running through caps, no well defined cone on other end;
- Type 3 - Columnar vertical cracking through both ends, no well-formed cones;
- Type 4 - Diagonal fracture with no cracking through ends; tap with hammer to distinguish from Type 1;
- Type 5 - Side fractures at top or bottom (occur commonly with unbonded caps);
- Type 6 - Similar to Type 5 but end of cylinder is pointed.

Prepared by: G.R. 1-18-13

Checked by: [Signature] 1/18/13



Unconfined Compressive Strength of Intact Rock Core Specimens

Project: US 52 / IL 64 Over Mississippi River

Client: Parsons

IDOT P-92-001-11

WEI Job No.: 342-06-01

Note: The specimens were sulphur capped for a more uniform break

Field Sample ID	Lab Specimen ID	Break Date	Location	Length (in)			Diameter (in)	Total Load (lbs)	Total Pressure (psi)	Fracture Type*	Tested By	Area (in ²)
				Total Core	Before Capping	After Capping						
BSB-01, RUN 5, @ 70.0'	5154	1/10/2013	US 52 / IL 64 Over Mississippi River		3.89	4.28	2.05	31430	9520	3	KM	3.30
BSB-01, RUN 5, @ 74.0'	5155	1/10/2013	US 52 / IL 64 Over Mississippi River		3.78	4.00	2.05	30980	9390	3	KM	3.30
BSB-01, RUN 6, @ 75.0'	5156	1/10/2013	US 52 / IL 64 Over Mississippi River		3.92	4.11	2.05	29750	9020	3	KM	3.30
BSB-01, RUN 6, @ 79.0'	5157	1/10/2013	US 52 / IL 64 Over Mississippi River		4.08	4.24	2.05	33030	10010	3	KM	3.30
BSB-01, RUN 6, @ 83.0'	5158	1/10/2013	US 52 / IL 64 Over Mississippi River		4.11	4.26	2.05	39090	11850	3	KM	3.30

*** Fracture Types:**

- Type 1 - Reasonably well-formed cones on both ends, less than 1 in. [25 mm] of cracking through caps;
- Type 2 - Well-formed cone on one end, vertical cracks running through caps, no well defined cone on other end;
- Type 3 - Columnar vertical cracking through both ends, no well-formed cones;
- Type 4 - Diagonal fracture with no cracking through ends; tap with hammer to distinguish from Type 1;
- Type 5 - Side fractures at top or bottom (occur commonly with unbonded caps);
- Type 6 - Similar to Type 5 but end of cylinder is pointed.

Prepared by: G. An 1-18-13

Checked by: Asf 1/18/13

Unconfined Compressive Strength of Intact Rock Core Specimens

Project: US 52 / IL 64 Over Mississippi River

Client: Parsons

IDOT P-92-001-11

WEI Job No.: 342-06-01

Note: The specimens were sulphur capped for a more uniform break

Field Sample ID	Lab Specimen ID	Break Date	Location	Length (in)			Diameter (in)	Total Load (lbs)	Total Pressure (psi)	Fracture Type*	Tested By	Area (in ²)
				Total Core	Before Capping	After Capping						
BSB-02, RUN 1, @ 62.5'	5159	1/10/2013	US 52 / IL 64 Over Mississippi River		3.87	4.10	2.05	26890	8150	3	KM	3.30
BSB-02, RUN 1, @ 68.0'	5160	1/10/2013	US 52 / IL 64 Over Mississippi River		4.33	4.50	2.05	23910	7250	3	KM	3.30
BSB-02, RUN 2, @ 69.5'	5161	1/10/2013	US 52 / IL 64 Over Mississippi River		3.78	3.99	2.05	32880	9960	3	KM	3.30
BSB-02, RUN 2, @ 74.0'	5162	1/10/2013	US 52 / IL 64 Over Mississippi River		4.06	4.30	2.05	22760	6900	3	KM	3.30
BSB-02, RUN 2, @ 77.5'	5163	1/10/2013	US 52 / IL 64 Over Mississippi River		4.00	4.21	2.05	23320	7070	3	KM	3.30
BSB-02, RUN 3, @ 79.5'	5164	1/10/2013	US 52 / IL 64 Over Mississippi River		4.00	4.11	2.05	19310	5850	3	KM	3.30

*** Fracture Types:**

- Type 1 - Reasonably well-formed cones on both ends, less than 1 in. [25 mm] of cracking through caps;
- Type 2 - Well-formed cone on one end, vertical cracks running through caps, no well defined cone on other end;
- Type 3 - Columnar vertical cracking through both ends, no well-formed cones;
- Type 4 - Diagonal fracture with no cracking through ends; tap with hammer to distinguish from Type 1;
- Type 5 - Side fractures at top or bottom (occur commonly with unbonded caps);
- Type 6 - Similar to Type 5 but end of cylinder is pointed.

Prepared by: G. Allen 1-18-13

Checked by: ASL 1/18/13



Unconfined Compressive Strength of Intact Rock Core Specimens

Project: US 52 / IL 64 Over Mississippi River

Client: Parsons

IDOT P-92-001-11

WEI Job No.: 342-06-01

Note: The specimens were sulphur capped for a more uniform break

Field Sample ID	Lab Specimen ID	Break Date	Location	Length (in)			Diameter (in)	Total Load (lbs)	Total Pressure (psi)	Fracture Type*	Tested By	Area (in ²)
				Total Core	Before Capping	After Capping						
BSB-02, RUN 3, @ 85.5'	5165	1/11/2013	US 52 / IL 64 Over Mississippi River		3.84	4.00	2.04	31290	9570	3	KM	3.27
BSB-02, RUN 3, @ 88.0'	5166	1/11/2013	US 52 / IL 64 Over Mississippi River		3.93	4.13	2.04	34740	10620	3	KM	3.27
BSB-02, RUN 4, @ 92.5'	5167	1/11/2013	US 52 / IL 64 Over Mississippi River		4.13	4.31	2.04	25200	7710	3	KM	3.27
BSB-02, RUN 5, @ 107.0'	5168	1/11/2013	US 52 / IL 64 Over Mississippi River		3.91	4.07	2.04	19920	6090	3	KM	3.27
BSB-02, RUN 6, @ 110.0'	5169	1/11/2013	US 52 / IL 64 Over Mississippi River		3.93	4.20	2.04	21340	6530	3	KM	3.27
BSB-02, RUN 6, @ 115.5'	5170	1/11/2013	US 52 / IL 64 Over Mississippi River		4.03	4.22	2.04	26740	8180	3	KM	3.27

*** Fracture Types:**

- Type 1 - Reasonably well-formed cones on both ends, less than 1 in. [25 mm] of cracking through caps;
- Type 2 - Well-formed cone on one end, vertical cracks running through caps, no well defined cone on other end;
- Type 3 - Columnar vertical cracking through both ends, no well-formed cones;
- Type 4 - Diagonal fracture with no cracking through ends; tap with hammer to distinguish from Type 1;
- Type 5 - Side fractures at top or bottom (occur commonly with unbonded caps);
- Type 6 - Similar to Type 5 but end of cylinder is pointed.

Prepared by: G. Nam 1-18-13

Checked by: AL 4/18/13



Unconfined Compressive Strength of Intact Rock Core Specimens

Project: US 52 / IL 64 Over Mississippi River

Client: Parsons

IDOT P-92-001-11

WEI Job No.: 342-06-01

Note: The specimens were sulphur capped for a more uniform break

Field Sample ID	Lab Specimen ID	Break Date	Location	Length (in)			Diameter (in)	Total Load (lbs)	Total Pressure (psi)	Fracture Type*	Tested By	Area (in ²)
				Total Core	Before Capping	After Capping						
BSB-03, RUN 1, @ 127.5'	5171	1/14/2013	US 52 / IL 64 Over Mississippi River		3.96	4.15	2.04	33630	10280	3	KM	3.27
BSB-03, RUN 2, @ 137.0'	5172	1/14/2013	US 52 / IL 64 Over Mississippi River		4.07	4.27	2.04	46230	14140	3	KM	3.27
BSB-03, RUN 2, @ 138.0'	5173	1/14/2013	US 52 / IL 64 Over Mississippi River		3.92	4.08	2.04	25430	7780	3	KM	3.27
BSB-03, RUN 3, @ 140.5'	5174	1/14/2013	US 52 / IL 64 Over Mississippi River		3.92	4.12	2.03	14600	4510	3	KM	3.24
BSB-03, RUN 3, @ 147.2'	5175	1/14/2013	US 52 / IL 64 Over Mississippi River		3.85	4.10	2.04	33830	10350	3	KM	3.27
BSB-03, RUN 4, @ 151.2'	5176	1/14/2013	US 52 / IL 64 Over Mississippi River		3.92	4.12	2.04	34760	10630	3	KM	3.27

*** Fracture Types:**

- Type 1 - Reasonably well-formed cones on both ends, less than 1 in. [25 mm] of cracking through caps;
- Type 2 - Well-formed cone on one end, vertical cracks running through caps, no well defined cone on other end;
- Type 3 - Columnar vertical cracking through both ends, no well-formed cones;
- Type 4 - Diagonal fracture with no cracking through ends; tap with hammer to distinguish from Type 1;
- Type 5 - Side fractures at top or bottom (occur commonly with unbonded caps);
- Type 6 - Similar to Type 5 but end of cylinder is pointed.

Prepared by: G. Alan 1-18-13

Checked by: AL 1/18/13



Unconfined Compressive Strength of Intact Rock Core Specimens

Project: US 52 / IL 64 Over Mississippi River

Client: Parsons

IDOT P-92-001-11

WEI Job No.: 342-06-01

Note: The specimens were sulphur capped for a more uniform break

Field Sample ID	Lab Specimen ID	Break Date	Location	Length (in)			Diameter (in)	Total Load (lbs)	Total Pressure (psi)	Fracture Type*	Tested By	Area (in ²)
				Total Core	Before Capping	After Capping						
BSB-03, RUN 4, @ 158.7'	5177	1/14/2013	US 52 / IL 64 Over Mississippi River		3.84	4.09	2.04	20330	6220	3	KM	3.27
BSB-03, RUN 5, @ 162.0'	5178	1/14/2013	US 52 / IL 64 Over Mississippi River		4.09	4.30	2.04	32020	9790	3	KM	3.27
BSB-03, RUN 5, @ 167.0'	5179	1/14/2013	US 52 / IL 64 Over Mississippi River		4.06	4.27	2.04	32060	9800	3	KM	3.27
BSB-03, RUN 6, @ 172.0'	5180	1/14/2013	US 52 / IL 64 Over Mississippi River		3.95	4.13	2.04	37310	11410	3	KM	3.27
BSB-03, RUN 6, @ 175.0'	5181	1/14/2013	US 52 / IL 64 Over Mississippi River		4.02	4.19	2.04	28760	8800	3	KM	3.27
BSB-03, RUN 6, @ 179.0'	5182	1/14/2013	US 52 / IL 64 Over Mississippi River		4.02	4.13	2.04	22740	6950	3	KM	3.27

*** Fracture Types:**

- Type 1 - Reasonably well-formed cones on both ends, less than 1 in. [25 mm] of cracking through caps;
- Type 2 - Well-formed cone on one end, vertical cracks running through caps, no well defined cone on other end;
- Type 3 - Columnar vertical cracking through both ends, no well-formed cones;
- Type 4 - Diagonal fracture with no cracking through ends; tap with hammer to distinguish from Type 1;
- Type 5 - Side fractures at top or bottom (occur commonly with unbonded caps);
- Type 6 - Similar to Type 5 but end of cylinder is pointed.

Prepared by: G. Mai 1-18-13

Checked by: A. P. 1/18/13



Unconfined Compressive Strength of Intact Rock Core Specimens

Project: US 52 / IL 64 Over Mississippi River

Client: Parsons

IDOT P-92-001-11

WEI Job No.: 342-06-01

Note: The specimens were sulphur capped for a more uniform break

Field Sample ID	Lab Specimen ID	Break Date	Location	Length (in)			Diameter (in)	Total Load (lbs)	Total Pressure (psi)	Fracture Type*	Tested By	Area (in ²)
				Total Core	Before Capping	After Capping						
BSB-04, RUN 1, @ 94.0'	5183	1/14/2013	US 52 / IL 64 Over Mississippi River		3.86	4.10	2.03	31370	9680	3	KM	3.24
BSB-04, RUN 1, @ 99.5'	5184	1/14/2013	US 52 / IL 64 Over Mississippi River		3.88	4.06	2.03	48430	14950	3	KM	3.24
BSB-04, RUN 2, @ 107.5'	5185	1/14/2013	US 52 / IL 64 Over Mississippi River		3.81	4.05	2.03	35850	11060	3	KM	3.24
BSB-04, RUN 2, @ 112.0'	5186	1/14/2013	US 52 / IL 64 Over Mississippi River		4.09	4.26	2.03	41460	12800	3	KM	3.24

*** Fracture Types:**

- Type 1 - Reasonably well-formed cones on both ends, less than 1 in. [25 mm] of cracking through caps;
- Type 2 - Well-formed cone on one end, vertical cracks running through caps, no well defined cone on other end;
- Type 3 - Columnar vertical cracking through both ends, no well-formed cones;
- Type 4 - Diagonal fracture with no cracking through ends; tap with hammer to distinguish from Type 1;
- Type 5 - Side fractures at top or bottom (occur commonly with unbonded caps);
- Type 6 - Similar to Type 5 but end of cylinder is pointed.

Prepared by: G. Nam 1-18-13

Checked by: Lab. 1/18/13



Rock Core Breaks ASTM C39

Project: US 52 / IL 64 Over Mississippi River

Client: Parsons

IDOT P-92-001-11

WEI Job No.: 342-06-01

Field Sample ID	Lab Specimen ID	Break Date	Location	Length (in)			Diameter (in)	Total Pressure (lbs)	Total Pressure (psi)	Break Type	Tested By	Area (in ²)
				Total Core	Before Capping	After Capping						
BSB-04A, Run #1 33.5' to 33.8'	2654	1/6/2012	Carroll County		4.09	4.20	2.03	22350	6900	2	KM	3.24
BSB-04A, Run #3 43.5' to 43.8'	2655	1/6/2012	Carroll County		3.97	4.09	2.03	26300	8120	3	KM	3.24
BSB-04A, Run #4 47.7' to 48.0'	2675	1/9/2012	Carroll County		4.11	4.28	2.03	22710	7010	3	KM	3.24
BSB-04A, Run #5 54.7' to 55.0'	2656	1/6/2012	Carroll County		3.89	4.00	2.03	12670	3910	3	KM	3.24
BSB-04A, Run #6 57.8' to 58.1'	2676	1/9/2012	Carroll County		4.22	4.38	2.03	7610	2350	3	KM	3.24

Prepared by G. Nari

Date 1-10-12

Checked by Asf

Date 1/10/12



Unconfined Compressive Strength of Intact Rock Core Specimens

Project: US 52 / IL 64 Over the Mississippi River, Savannah, IL / Sabula, IA

Client: Parsons

WEI Job No.: 342-06-01

Note: The specimens were sulphur capped for a more uniform break

Field Sample ID	Lab Specimen ID	Depth (ft)	Location	Length (in)			Diameter (in)	Total Load (lbs)	Total Pressure (psi)	Fracture Type*	Break Date	Tested By	Area (in ²)
				Total Core	Before Capping	After Capping							
BSB-10 RUN 1	8973	30.0	Bridge over Mississippi	N/A	3.84	3.93	2.04	24000	7340	3	1/3/14	AM	3.27

- * Fracture Types:
- Type 1 - Reasonably well-formed cones on both ends, less than 1 in. [25 mm] of cracking through caps;
 - Type 2 - Well-formed cone on one end, occasional cracks running through caps, no well defined cone on other end;
 - Type 3 - Columnar vertical cracking on both ends, no well-formed cones;
 - Type 4 - Diagonal fracture with no cracking through ends; tap with hammer to distinguish from Type 1;
 - Type 5 - Side fractures at top or bottom (occur commonly with unbonded caps);
 - Type 6 - Similar to Type 5 but end of cylinder is pointed.

Prepared by: G. Lee 1/27/14

Checked by: A. L. 1/27/14



Unconfined Compressive Strength of Intact Rock Core Specimens

Project: US 52 / IL 64 Over the Mississippi River, Savannah, IL / Sabula, IA

Client: Parsons

WEI Job No.: 342-06-01

Note: The specimens were sulphur capped for a more uniform break

Field Sample ID	Lab Specimen ID	Depth (ft)	Location	Length (in)			Diameter (in)	Total Load (lbs)	Total Pressure (psi)	Fracture Type*	Break Date	Tested By	Area (in ²)
				Total Core	Before Capping	After Capping							
BSB-11 RUN 1	8974	12.5	Bridge over Mississippi	N/A	4.18	4.36	2.04	23780	7270	3	1/6/14	AM	3.27
BSB-11 RUN 2	8975	18.5	Bridge over Mississippi	N/A	4.11	4.29	2.05	18810	5700	3	1/6/14	AM	3.30
BSB-11 RUN 3	8990	31.5	Bridge over Mississippi	N/A	4.09	4.27	2.05	21240	6440	3	1/6/14	AM	3.30
BSB-11 RUN 4	8976	43.2	Bridge over Mississippi	N/A	4.08	4.30	2.05	22980	6960	3	1/6/14	AM	3.30
BSB-11 RUN 5	8977	47.3	Bridge over Mississippi	N/A	4.09	4.28	2.05	40700	12330	3	1/6/14	AM	3.30
BSB-11 RUN 6	8978	58.0	Bridge over Mississippi	N/A	4.12	4.33	2.05	49520	15010	3	1/6/14	AM	3.30

*** Fracture Types:**

- Type 1 - Reasonably well-formed cones on both ends, less than 1 in. [25 mm] of cracking through caps;
- Type 2 - Well-formed cone on one end, vertical cracks running through caps, no well defined cone on other end;
- Type 3 - Columnar vertical cracking through both ends, no well-formed cones;
- Type 4 - Diagonal fracture with no cracking through ends; tap with hammer to distinguish from Type 1;
- Type 5 - Side fractures at top or bottom (occur commonly with unbonded caps);
- Type 6 - Similar to Type 5 but end of cylinder is pointed.

Prepared by: G. An 1/27/14

Checked by: AL 1/27/14



Unconfined Compressive Strength of Intact Rock Core Specimens

Project: US 52 / IL 64 Over the Mississippi River, Savannah, IL / Sabula, IA

Client: Parsons

WEI Job No.: 342-06-01

Note: The specimens were sulphur capped for a more uniform break

Field Sample ID	Lab Specimen ID	Depth (ft)	Location	Length (in)			Diameter (in)	Total Load (lbs)	Total Pressure (psi)	Fracture Type*	Break Date	Tested By	Area (in ²)
				Total Core	Before Capping	After Capping							
BSB-12 RUN 1	8966	23.5	Bridge over Mississippi	N/A	3.90	4.03	2.05	52250	15830	3	1/3/14	AM	3.30
BSB-12 RUN 2	8967	28.5	Bridge over Mississippi	N/A	3.80	3.96	2.05	48540	14710	3	1/3/14	AM	3.30
BSB-12 RUN 2	8968	36.7	Bridge over Mississippi	N/A	4.04	4.10	2.05	52960	16050	3	1/3/14	AM	3.30
BSB-12 RUN 3	8969	42.5	Bridge over Mississippi	N/A	4.02	4.17	2.05	36610	11090	3	1/3/14	AM	3.30
BSB-12 RUN 5	8970	58.0	Bridge over Mississippi	N/A	3.98	4.12	2.05	47480	14390	3	1/3/14	AM	3.30
BSB-12 RUN 6	8971	64.0	Bridge over Mississippi	N/A	4.01	4.13	2.04	47410	14500	3	1/3/14	AM	3.27
BSB-12 RUN 6	8972	69.5	Bridge over Mississippi	N/A	3.93	4.10	2.05	41000	12420	3	1/3/14	AM	3.30

*** Fracture Types:**

- Type 1 - Reasonably well-formed cones on both ends, less than 1 in. [25 mm] of cracking through caps;
- Type 2 - Well-formed cone on one end, vertical cracks running through caps, no well defined cone on other end;
- Type 3 - Columnar vertical cracking through both ends, no well-formed cones;
- Type 4 - Diagonal fracture with no cracking through ends; tap with hammer to distinguish from Type 1;
- Type 5 - Side fractures at top or bottom (occur commonly with unbonded caps);
- Type 6 - Similar to Type 5 but end of cylinder is pointed.

Prepared by: G. Nam 1/27/14

Checked by: A. L. 1/27/14



Unconfined Compressive Strength of Intact Rock Core Specimens

Project: US 52 / IL 64 Over the Mississippi River, Savannah, IL / Sabula, IA

Client: Parsons

WEI Job No.: 342-06-01

Note: The specimens were sulphur capped for a more uniform break

Field Sample ID	Lab Specimen ID	Depth (ft)	Location	Length (in)			Diameter (in)	Total Load (lbs)	Total Pressure (psi)	Fracture Type*	Break Date	Tested By	Area (in ²)
				Total Core	Before Capping	After Capping							
BSB-12 A RUN 1	8942	23.0	Bridge over Mississippi	N/A	4.00	4.12	2.05	43930	13310	3	12/27/13	AM	3.30
BSB-12 A RUN 2	8943	33.3	Bridge over Mississippi	N/A	4.01	4.16	2.05	22980	6960	3	12/27/13	AM	3.30
BSB-12 A RUN 2	8944	39.0	Bridge over Mississippi	N/A	4.07	4.19	2.05	47620	14430	3	12/27/13	AM	3.30
BSB-12 A RUN 3	8945	45.0	Bridge over Mississippi	N/A	3.99	4.09	2.05	39970	12110	3	12/27/13	AM	3.30
BSB-12 A RUN 4	8946	53.3	Bridge over Mississippi	N/A	3.98	4.07	2.05	45810	13880	3	12/27/13	AM	3.30
BSB-12 A RUN 4	8947	60.7	Bridge over Mississippi	N/A	4.01	4.10	2.05	19870	6020	3	12/27/13	AM	3.30
BSB-12 A RUN 5	8948	67.5	Bridge over Mississippi	N/A	3.99	4.19	2.05	36160	10960	3	12/27/13	AM	3.30
BSB-12 A RUN 6	8949	74.0	Bridge over Mississippi	N/A	3.97	4.21	2.05	32820	9950	3	12/27/13	AM	3.30
BSB-12 A RUN 7	8950	85.0	Bridge over Mississippi	N/A	3.95	4.06	2.05	37200	11270	3	12/27/13	AM	3.30

*** Fracture Types:**

- Type 1 - Reasonably well-formed cones on both ends, less than 1 in. [25 mm] of cracking through caps;
- Type 2 - Well-formed cone on one end, vertical cracks running through caps, no well defined cone on other end;
- Type 3 - Columnar vertical cracking through both ends, no well-formed cones;
- Type 4 - Diagonal fracture with no cracking through ends; tap with hammer to distinguish from Type 1;
- Type 5 - Side fractures at top or bottom (occur commonly with unbonded caps);
- Type 6 - Similar to Type 5 but end of cylinder is pointed.

Prepared by: G. Neri 1/27/14

Checked by: A. L. 1/27/14



Unconfined Compressive Strength of Intact Rock Core Specimens

Project: US 52 / IL 64 Over the Mississippi River, Savannah, IL / Sabula, IA

Client: Parsons

WEI Job No.: 342-06-01

Note: The specimens were sulphur capped for a more uniform break

Field Sample ID	Lab Specimen ID	Depth (ft)	Location	Length (in)			Diameter (in)	Total Load (lbs)	Total Pressure (psi)	Fracture Type*	Break Date	Tested By	Area (in ²)
				Total Core	Before Capping	After Capping							
BSB-13 RUN 1	8979	42.5	Bridge over Mississippi	N/A	4.14	4.25	2.05	27470	8320	3	1/6/14	AM	3.30
BSB-13 RUN 2	8980	52.0	Bridge over Mississippi	N/A	4.14	4.27	2.05	33140	10040	3	1/6/14	AM	3.30
BSB-13 RUN 3	8981	59.7	Bridge over Mississippi	N/A	4.15	4.29	2.05	60070	18200	3	1/6/14	AM	3.30
BSB-13 RUN 4	8982	66.0	Bridge over Mississippi	N/A	4.16	4.31	2.05	42360	12840	3	1/6/14	AM	3.30
BSB-13 RUN 5	8983	76.0	Bridge over Mississippi	N/A	4.16	4.31	2.05	37170	11260	3	1/6/14	AM	3.30

*** Fracture Types:**

- Type 1 - Reasonably well-formed cones on both ends, less than 1 in. [25 mm] of cracking through caps;
- Type 2 - Well-formed cone on one end, vertical cracks running through caps, no well defined cone on other end;
- Type 3 - Columnar vertical cracking through both ends, no well-formed cones;
- Type 4 - Diagonal fracture with no cracking through ends; tap with hammer to distinguish from Type 1;
- Type 5 - Side fractures at top or bottom (occur commonly with unbonded caps);
- Type 6 - Similar to Type 5 but end of cylinder is pointed.

Prepared by: G. An 1/27/14

Checked by: A. F. 1/27/14



Unconfined Compressive Strength of Intact Rock Core Specimens

Project: US 52 / IL 64 Over the Mississippi River, Savannah, IL / Sabula, IA

Client: Parsons

WEI Job No.: 342-06-01

Note: The specimens were sulphur capped for a more uniform break

Field Sample ID	Lab Specimen ID	Depth (ft)	Location	Length (in)			Diameter (in)	Total Load (lbs)	Total Pressure (psi)	Fracture Type*	Break Date	Tested By	Area (in ²)
				Total Core	Before Capping	After Capping							
BSB-14 RUN 1	8828	18.5	Bridge over Mississippi	N/A	3.88	4.12	2.05	40450	12260	3	12/8/13	AM	3.30
BSB-14 RUN 1	8829	23.5	Bridge over Mississippi	N/A	3.98	4.30	2.05	37580	11390	3	12/8/13	AM	3.30
BSB-14 RUN 2	8830	27.5	Bridge over Mississippi	N/A	4.02	4.30	2.05	43320	13130	3	12/8/13	AM	3.30
BSB-14 RUN 3	8831	38.5	Bridge over Mississippi	N/A	3.90	4.12	2.04	26150	8000	3	12/8/13	AM	3.27
BSB-14 RUN 4	8831	51.5	Bridge over Mississippi	N/A	4.02	4.18	2.05	34720	10520	3	12/8/13	AM	3.30
BSB-14 RUN 5	8833	59.5	Bridge over Mississippi	N/A	3.97	4.14	2.05	34870	10570	3	12/8/13	AM	3.30
BSB-14 RUN 6	8834	68.5	Bridge over Mississippi	N/A	3.93	4.06	2.04	38800	11870	3	12/8/13	AM	3.27

*** Fracture Types:**

- Type 1 - Reasonably well-formed cones on both ends, less than 1 in. [25 mm] of cracking through caps;
- Type 2 - Well-formed cone on one end, vertical cracks running through caps, no well defined cone on other end;
- Type 3 - Columnar vertical cracking through both ends, no well-formed cones;
- Type 4 - Diagonal fracture with no cracking through ends; tap with hammer to distinguish from Type 1;
- Type 5 - Side fractures at top or bottom (occur commonly with unbonded caps);
- Type 6 - Similar to Type 5 but end of cylinder is pointed.

Prepared by: G. Law 1/27/14
 Checked by: A. L. 1/27/14



Unconfined Compressive Strength of Intact Rock Core Specimens

Project: US 52 / IL 64 Over the Mississippi River, Savannah, IL / Sabula, IA

Client: Parsons

WEI Job No.: 342-06-01

Note: The specimens were sulphur capped for a more uniform break

Field Sample ID	Lab Specimen ID	Depth (ft)	Location	Length (in)			Diameter (in)	Total Load (lbs)	Total Pressure (psi)	Fracture Type*	Break Date	Tested By	Area (in ²)
				Total Core	Before Capping	After Capping							
BSB-15 RUN 2	8880	75.3	Bridge over Mississippi	N/A	3.95	4.07	2.05	32770	9930	3	12/16/13	AM	3.30
BSB-15 RUN 2	8881	77.5	Bridge over Mississippi	N/A	4.01	4.12	2.05	33890	10270	3	12/16/13	AM	3.30
BSB-15 RUN 3	8882	79.5	Bridge over Mississippi	N/A	4.04	4.13	2.05	27560	8350	3	12/16/13	AM	3.30
BSB-15 RUN 6	8883	108.5	Bridge over Mississippi	N/A	4.00	4.26	2.04	32900	10060	3	12/16/13	AM	3.27
BSB-15 RUN 6	8884	115.0	Bridge over Mississippi	N/A	4.04	4.20	2.05	38810	11760	3	12/16/13	AM	3.30

*** Fracture Types:**

- Type 1 - Reasonably well-formed cones on both ends, less than 1 in. [25 mm] of cracking through caps;
- Type 2 - Well-formed cone on one end, vertical cracks running through caps, no well defined cone on other end;
- Type 3 - Columnar vertical cracking through both ends, no well-formed cones;
- Type 4 - Diagonal fracture with no cracking through ends; tap with hammer to distinguish from Type 1;
- Type 5 - Side fractures at top or bottom (occur commonly with unbonded caps);
- Type 6 - Similar to Type 5 but end of cylinder is pointed.

Prepared by: G. Now 1/27/14

Checked by: A. F. 1/27/14



Unconfined Compressive Strength of Intact Rock Core Specimens

Project: US 52 / IL 64 Over the Mississippi River, Savannah, IL / Sabula, IA

Client: Parsons

WEI Job No.: 342-06-01

Note: The specimens were sulphur capped for a more uniform break

Field Sample ID	Lab Specimen ID	Depth (ft)	Location	Length (in)			Diameter (in)	Total Load (lbs)	Total Pressure (psi)	Fracture Type*	Break Date	Tested By	Area (in ²)
				Total Core	Before Capping	After Capping							
BSB-15A RUN 1	8885	69.5	Bridge over Mississippi	N/A	3.97	4.14	2.06	26970	8100	3	12/17/13	AM	3.33
BSB-15A RUN 1	8886	75.5	Bridge over Mississippi	N/A	4.00	4.20	2.05	30450	9230	3	12/17/13	AM	3.30
BSB-15A RUN 2	8887	76.5	Bridge over Mississippi	N/A	4.00	4.15	2.05	39210	11880	3	12/17/13	AM	3.30
BSB-15A RUN 2	8888	85.0	Bridge over Mississippi	N/A	4.03	4.18	2.05	26070	7900	3	12/17/13	AM	3.30
BSB-15A RUN 4	8889	95.2	Bridge over Mississippi	N/A	4.03	4.17	2.05	21830	6620	3	12/17/13	AM	3.30
BSB-15A RUN 6	8890	115.0	Bridge over Mississippi	N/A	4.00	4.14	2.05	45360	13750	3	12/17/13	AM	3.30

*** Fracture Types:**

- Type 1 - Reasonably well-formed cones on both ends, less than 1 in. [25 mm] of cracking through caps;
- Type 2 - Well-formed cone on one end, vertical cracks running through caps, no well defined cone on other end;
- Type 3 - Columnar vertical cracking through both ends, no well-formed cones;
- Type 4 - Diagonal fracture with no cracking through ends; tap with hammer to distinguish from Type 1;
- Type 5 - Side fractures at top or bottom (occur commonly with unbonded caps);
- Type 6 - Similar to Type 5 but end of cylinder is pointed.

Prepared by: G. Na. 1/27/14

Checked by: A. F. 1/27/14



Unconfined Compressive Strength of Intact Rock Core Specimens

Project: US 52 / IL 64 Over the Mississippi River, Savannah, IL / Sabula, IA

Client: Parsons

WEI Job No.: 342-06-01

Note: The specimens were sulphur capped for a more uniform break

Field Sample ID	Lab Specimen ID	Depth (ft)	Location	Length (in)			Diameter (in)	Total Load (lbs)	Total Pressure (psi)	Fracture Type*	Break Date	Tested By	Area (in ²)
				Total Core	Before Capping	After Capping							
BSB-15 B RUN 1	8951	70.5	Bridge over Mississippi	N/A	4.00	4.17	2.05	39750	12050	3	12/27/13	AM	3.30
BSB-15 B RUN 1	8952	73.5	Bridge over Mississippi	N/A	4.00	4.15	2.05	21650	6560	3	12/27/13	AM	3.30
BSB-15B RUN 2	8953	79.5	Bridge over Mississippi	N/A	3.97	4.15	2.05	29760	9020	3	12/27/13	AM	3.30
BSB-15B RUN 2	8954	85.8	Bridge over Mississippi	N/A	4.00	4.12	2.05	37520	11370	3	12/27/13	AM	3.30
BSB-15B RUN 3	8955	90.0	Bridge over Mississippi	N/A	4.00	4.11	2.05	32710	9910	3	12/27/13	AM	3.30
BSB-15B RUN 4	8956	100.2	Bridge over Mississippi	N/A	4.03	4.16	2.05	23270	7050	3	12/27/13	AM	3.30
BSB-15B RUN 5	8957	110.0	Bridge over Mississippi	N/A	4.02	4.15	2.05	21040	6380	3	12/27/13	AM	3.30
BSB-15B RUN 5	8958	115.5	Bridge over Mississippi	N/A	4.04	4.19	2.05	21010	6370	3	12/27/13	AM	3.30
BSB-15B RUN 6	8959	121.5	Bridge over Mississippi	N/A	4.05	4.19	2.05	25690	7780	3	12/27/13	AM	3.30

*** Fracture Types:**

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- Type 3 - Columnar vertical cracking through both ends, no well-formed cones;
- Type 4 - Diagonal fracture with no cracking through ends; tap with hammer to distinguish from Type 1;
- Type 5 - Side fractures at top or bottom (occur commonly with unbonded caps);
- Type 6 - Similar to Type 5 but end of cylinder is pointed.

Prepared by: G. Alan 1/27/14

Checked by: A. C. 1/27/14



Unconfined Compressive Strength of Intact Rock Core Specimens

Project: US 52 / IL 64 Over the Mississippi River, Savannah, IL / Sabula, IA

Client: Parsons

WEI Job No.: 342-06-01

Note: The specimens were sulphur capped for a more uniform break

Field Sample ID	Lab Specimen ID	Depth (ft)	Location	Length (in)			Diameter (in)	Total Load (lbs)	Total Pressure (psi)	Fracture Type*	Break Date	Tested By	Area (in ²)
				Total Core	Before Capping	After Capping							
BSB-15C RUN 1	8952	66.0	Bridge over Mississippi	N/A	3.97	4.18	2.05	32580	9870	3	1/3/14	AM	3.30
BSB-15C RUN 2	8953	76.0	Bridge over Mississippi	N/A	3.92	4.13	2.05	40810	12370	3	1/3/14	AM	3.30
BSB-15C RUN 3	8954	85.3	Bridge over Mississippi	N/A	4.07	4.17	2.05	48890	14820	3	1/3/14	AM	3.30
BSB-15C RUN 3	8955	92.3	Bridge over Mississippi	N/A	3.98	4.16	2.05	27880	8450	3	1/3/14	AM	3.30
BSB-15C RUN 4	8956	95.0	Bridge over Mississippi	N/A	4.02	4.11	2.05	38370	11630	3	1/3/14	AM	3.30
BSB-15C RUN 4	8957	102.2	Bridge over Mississippi	N/A	4.04	4.15	2.05	29360	8900	3	1/3/14	AM	3.30
BSB-15C RUN 4	8958	101.3	Bridge over Mississippi	N/A	4.19	4.29	2.05	33810	10250	3	1/3/14	AM	3.30

*** Fracture Types:**

- Type 1 - Reasonably well-formed cones on both ends, less than 1 in. [25 mm] of cracking through caps;
- Type 2 - Well-formed cone on one end, vertical cracks running through caps, no well defined cone on other end;
- Type 3 - Columnar vertical cracking through both ends, no well-formed cones;
- Type 4 - Diagonal fracture with no cracking through ends; tap with hammer to distinguish from Type 1;
- Type 5 - Side fractures at top or bottom (occur commonly with unbonded caps);
- Type 6 - Similar to Type 5 but end of cylinder is pointed.

Prepared by: G. Law 1/27/14

Checked by: A. P. 1/27/14



Unconfined Compressive Strength of Intact Rock Core Specimens

Project: US 52 / IL 64 Over the Mississippi River, Savannah, IL / Sabula, IA

Client: Parsons

WEI Job No.: 342-06-01

Note: The specimens were sulphur capped for a more uniform break

Field Sample ID	Lab Specimen ID	Depth (ft)	Location	Length (in)			Diameter (in)	Total Load (lbs)	Total Pressure (psi)	Fracture Type*	Break Date	Tested By	Area (in ²)
				Total Core	Before Capping	After Capping							
BSB-16 RUN 1	8984	71.0	Bridge over Mississippi	N/A	3.97	4.16	2.04	43010	13150	3	1/7/14	AM	3.27
BSB-16 RUN 1	8985	75.6	Bridge over Mississippi	N/A	3.65	3.79	2.04	36170	11060	3	1/7/14	AM	3.27
BSB-16 RUN 2	8986	80.5	Bridge over Mississippi	N/A	3.89	4.06	2.04	28060	8580	3	1/7/14	AM	3.27
BSB-16 RUN 2	8987	87.0	Bridge over Mississippi	N/A	3.92	4.07	2.04	38270	11700	3	1/7/14	AM	3.27
BSB-16 RUN 3	8988	95.5	Bridge over Mississippi	N/A	3.91	4.02	2.04	38100	11650	3	1/7/14	AM	3.27
BSB-16 RUN 4	8989	103.5	Bridge over Mississippi	N/A	3.95	4.09	2.05	21380	6480	3	1/7/14	AM	3.30

*** Fracture Types:**

- Type 1 - Reasonably well-formed cones on both ends, less than 1 in. [25 mm] of cracking through caps;
- Type 2 - Well-formed cone on one end, vertical cracks running through caps, no well defined cone on other end;
- Type 3 - Columnar vertical cracking through both ends, no well-formed cones;
- Type 4 - Diagonal fracture with no cracking through ends; tap with hammer to distinguish from Type 1;
- Type 5 - Side fractures at top or bottom (occur commonly with unbonded caps);
- Type 6 - Similar to Type 5 but end of cylinder is pointed.

Prepared by: Gilan 1/27/14

Checked by: A. F. 1/27/14



Unconfined Compressive Strength of Intact Rock Core Specimens

Project: US 52 / IL 64 Over the Mississippi River, Savannah, IL / Sabula, IA

Client: Parsons

WEI Job No.: 342-06-01

Note: The specimens were sulphur capped for a more uniform break

Field Sample ID	Lab Specimen ID	Depth (ft)	Location	Length (in)			Diameter (in)	Total Load (lbs)	Total Pressure (psi)	Fracture Type*	Break Date	Tested By	Area (in ²)
				Total Core	Before Capping	After Capping							
BSB-17 RUN 1	8782	85.5	Bridge over Mississippi	N/A	3.99	4.15	2.04	22440	6860	3	12/5/13	AM	3.27
BSB-17 RUN 1	8783	89.5	Bridge over Mississippi	N/A	3.96	4.11	2.06	26770	8040	3	12/5/13	AM	3.33
BSB-17 RUN 2	8784	91.2	Bridge over Mississippi	N/A	3.98	4.12	2.05	26830	8130	3	12/5/13	AM	3.30
BSB-17 RUN 2	8785	97.5	Bridge over Mississippi	N/A	3.95	4.21	2.04	21700	6640	3	12/5/13	AM	3.27
BSB-17 RUN 3	8786	101.8	Bridge over Mississippi	N/A	4.03	4.26	2.05	19280	5840	3	12/5/13	AM	3.30
BSB-17 RUN 3	8787	105.5	Bridge over Mississippi	N/A	4.04	4.30	2.05	24520	7430	3	12/6/13	AM	3.30
BSB-17 RUN 5	8788	124.5	Bridge over Mississippi	N/A	3.96	4.18	2.05	18350	5560	3	12/6/13	AM	3.30
BSB-17 RUN 5	8789	127.5	Bridge over Mississippi	N/A	3.97	4.16	2.04	19000	5810	3	12/6/13	AM	3.27
BSB-17 RUN 6	8802	132.0	Bridge over Mississippi	N/A	3.92	4.28	2.05	10220	3100	3	12/6/13	AM	3.30

*** Fracture Types:**

- Type 1 - Reasonably well-formed cones on both ends, less than 1 in. [25 mm] of cracking through caps;
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- Type 5 - Side fractures at top or bottom (occur commonly with unbonded caps);
- Type 6 - Similar to Type 5 but end of cylinder is pointed.

Prepared by: G. Na. 1/27/14

Checked by: A. P. 1/27/14



Unconfined Compressive Strength of Intact Rock Core Specimens

Project: US 52 / IL 64 Over the Mississippi River, Savannah, IL / Sabula, IA

Client: Parsons

WEI Job No.: 342-06-01

Note: The specimens were sulphur capped for a more uniform break

Field Sample ID	Lab Specimen ID	Depth (ft)	Location	Length (in)			Diameter (in)	Total Load (lbs)	Total Pressure (psi)	Fracture Type*	Break Date	Tested By	Area (in ²)
				Total Core	Before Capping	After Capping							
BSB-17 RUN 6	8803	137.5	Bridge over Mississippi	N/A	3.97	4.08	2.05	29060	8810	3	12/6/13	AM	3.30

*** Fracture Types:**

- Type 1 - Reasonably well-formed cones on both ends, less than 1 in. [25 mm] of cracking through caps;
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- Type 3 - Columnar vertical cracking through both ends, no well-formed cones;
- Type 4 - Diagonal fracture with no cracking through ends; tap with hammer to distinguish from Type 1;
- Type 5 - Side fractures at top or bottom (occur commonly with unbonded caps);
- Type 6 - Similar to Type 5 but end of cylinder is pointed.

Prepared by: G. Lan 1/27/14

Checked by: A.P. 1/27/14



Unconfined Compressive Strength of Intact Rock Core Specimens

Project: US 52 / IL 64 Over the Mississippi River, Savannah, IL / Sabula, IA

Client: Parsons

WEI Job No.: 342-06-01

Note: The specimens were sulphur capped for a more uniform break

Field Sample ID	Lab Specimen ID	Depth (ft)	Location	Length (in)			Diameter (in)	Total Load (lbs)	Total Pressure (psi)	Fracture Type*	Break Date	Tested By	Area (in ²)
				Total Core	Before Capping	After Capping							
BSB-18 RUN 1	8774	84.0	Bridge over Mississippi	N/A	4.07	4.32	2.04	24310	7430	3	12/5/13	AM	3.27
BSB-18 RUN 1	8775	87.0	Bridge over Mississippi	N/A	3.93	4.19	2.04	16750	5120	3	12/5/13	AM	3.27
BSB-18 RUN 2	8776	92.2	Bridge over Mississippi	N/A	3.99	4.25	2.04	20920	6400	3	12/5/13	AM	3.27
BSB-18 RUN 2	8777	96.2	Bridge over Mississippi	N/A	3.94	4.10	2.04	24050	7350	3	12/5/13	AM	3.27
BSB-18 RUN 3	8778	102.2	Bridge over Mississippi	N/A	4.02	4.13	2.04	32890	10060	3	12/5/13	AM	3.27
BSB-18 RUN 3	8779	107.5	Bridge over Mississippi	N/A	4.00	4.21	2.05	27660	8380	3	12/5/13	AM	3.30
BSB-18 RUN 4	8780	112.2	Bridge over Mississippi	N/A	3.95	4.20	2.04	22650	6930	3	12/5/13	AM	3.27
BSB-18 RUN 4	8781	115.3	Bridge over Mississippi	N/A	4.01	4.20	2.04	29090	8900	3	12/5/13	AM	3.27

*** Fracture Types:**

- Type 1 - Reasonably well-formed cones on both ends, less than 1 in. [25 mm] of cracking through caps;
- Type 2 - Well-formed cone on one end, vertical cracks running through caps, no well defined cone on other end;
- Type 3 - Columnar vertical cracking through both ends, no well-formed cones;
- Type 4 - Diagonal fracture with no cracking through ends; tap with hammer to distinguish from Type 1;
- Type 5 - Side fractures at top or bottom (occur commonly with unbonded caps);
- Type 6 - Similar to Type 5 but end of cylinder is pointed.

Prepared by: G. Lane 1/27/14

Checked by: A. R. 1/27/14



Unconfined Compressive Strength of Intact Rock Core Specimens

Project: US 52 / IL 64 Over the Mississippi River, Savannah, IL / Sabula, IA

Client: Parsons

WEI Job No.: 342-06-01

Note: The specimens were sulphur capped for a more uniform break

Field Sample ID	Lab Specimen ID	Depth (ft)	Location	Length (in)			Diameter (in)	Total Load (lbs)	Total Pressure (psi)	Fracture Type*	Break Date	Tested By	Area (in ²)
				Total Core	Before Capping	After Capping							
BSB-19 RUN 1	8959	117.0	Bridge over Mississippi	N/A	3.98	4.11	2.04	29180	8920	3	1/3/14	AM	3.27
BSB-19 RUN 1	8960	122.0	Bridge over Mississippi	N/A	3.93	4.10	2.04	31910	9760	3	1/3/14	AM	3.27
BSB-19 RUN 2	8961	128.0	Bridge over Mississippi	N/A	3.93	4.18	2.04	34810	10650	3	1/3/14	AM	3.27
BSB-19 RUN 2	8962	131.6	Bridge over Mississippi	N/A	3.98	4.15	2.04	21940	6710	3	1/3/14	AM	3.27
BSB-19 RUN 3	8963	137.5	Bridge over Mississippi	N/A	3.96	4.12	2.04	32300	9880	3	1/3/14	AM	3.27
BSB-19 RUN 3	8964	143.0	Bridge over Mississippi	N/A	3.94	4.07	2.04	33760	10320	3	1/3/14	AM	3.27
BSB-19 RUN 4	8965	148.6	Bridge over Mississippi	N/A	3.91	4.05	2.04	51230	15670	3	1/3/14	AM	3.27

*** Fracture Types:**

- Type 1 - Reasonably well-formed cones on both ends, less than 1 in. [25 mm] of cracking through caps;
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- Type 3 - Columnar vertical cracking through both ends, no well-formed cones;
- Type 4 - Diagonal fracture with no cracking through ends; tap with hammer to distinguish from Type 1;
- Type 5 - Side fractures at top or bottom (occur commonly with unbonded caps);
- Type 6 - Similar to Type 5 but end of cylinder is pointed.

Prepared by: G. Ma 1/27/14

Checked by: A. L. 1/27/14



Unconfined Compressive Strength of Intact Rock Core Specimens

Project: US 52 / IL 64 Over the Mississippi River, Savannah, IL / Sabula, IA

Client: Parsons

WEI Job No.: 342-06-01

Note: The specimens were sulphur capped for a more uniform break

Field Sample ID	Lab Specimen ID	Depth (ft)	Location	Length (in)			Diameter (in)	Total Load (lbs)	Total Pressure (psi)	Fracture Type*	Break Date	Tested By	Area (in ²)
				Total Core	Before Capping	After Capping							
BSB-20 RUN 1	8872	132.5	Bridge over Mississippi	N/A	3.98	4.14	2.04	31380	9600	3	12/16/13	AM	3.27
BSB-20 RUN 1	8873	137.5	Bridge over Mississippi	N/A	4.03	4.18	2.04	21360	6530	3	12/16/13	AM	3.27
BSB-20 RUN 2	8874	143.0	Bridge over Mississippi	N/A	3.98	4.19	2.04	20070	6140	3	12/16/13	AM	3.27
BSB-20 RUN 2	8875	149.5	Bridge over Mississippi	N/A	3.99	4.23	2.04	25040	7660	3	12/16/13	AM	3.27
BSB-20 RUN 3	8876	155.5	Bridge over Mississippi	N/A	3.99	4.20	2.04	25210	7710	3	12/17/13	AM	3.27
BSB-20 RUN 3	8877	161.5	Bridge over Mississippi	N/A	3.95	4.16	2.04	22580	6910	3	12/17/13	AM	3.27
BSB-20 RUN 4	8878	165.2	Bridge over Mississippi	N/A	4.02	4.20	2.04	44130	13500	3	12/17/13	AM	3.27
BSB-20 RUN 4	8879	169.5	Bridge over Mississippi	N/A	3.95	4.13	2.04	24540	7500	3	12/17/13	AM	3.27

*** Fracture Types:**

- Type 1 - Reasonably well-formed cones on both ends, less than 1 in. [25 mm] of cracking through caps;
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- Type 3 - Columnar vertical cracking through both ends, no well-formed cones;
- Type 4 - Diagonal fracture with no cracking through ends; tap with hammer to distinguish from Type 1;
- Type 5 - Side fractures at top or bottom (occur commonly with unbonded caps);
- Type 6 - Similar to Type 5 but end of cylinder is pointed.

Prepared by: GA 1/27/14

Checked by: AL 1/27/14



Unconfined Compressive Strength of Intact Rock Core Specimens

Project: US 52 / IL 64 Over the Mississippi River, Savannah, IL / Sabula, IA

Client: Parsons

WEI Job No.: 342-06-01

Note: The specimens were sulphur capped for a more uniform break

Field Sample ID	Lab Specimen ID	Depth (ft)	Location	Length (in)			Diameter (in)	Total Load (lbs)	Total Pressure (psi)	Fracture Type*	Break Date	Tested By	Area (in ²)
				Total Core	Before Capping	After Capping							
BSB-21 RUN 1	8864	134.5	Bridge over Mississippi	N/A	4.02	4.24	2.02	22040	6890	3	12/16/13	AM	3.20
BSB-21 RUN 1	8865	138.0	Bridge over Mississippi	N/A	4.02	4.19	2.02	36700	11470	3	12/16/13	AM	3.20
BSB-21 RUN 2	8866	144.0	Bridge over Mississippi	N/A	4.04	4.19	2.03	27570	8510	3	12/16/13	AM	3.24
BSB-21 RUN 3	8867	154.0	Bridge over Mississippi	N/A	3.98	4.11	2.03	20330	6270	3	12/16/13	AM	3.24
BSB-21 RUN 3	8868	155.0	Bridge over Mississippi	N/A	4.06	4.14	2.03	22010	6790	3	12/17/13	AM	3.24
BSB-21 RUN 4	8869	162.5	Bridge over Mississippi	N/A	3.93	4.02	2.02	13890	4340	3	12/17/13	AM	3.20
BSB-21 RUN 4	8870	168.0	Bridge over Mississippi	N/A	4.03	4.09	2.03	37710	11640	3	12/17/13	AM	3.24
BSB-21 RUN 5	8871	170.0	Bridge over Mississippi	N/A	4.03	4.18	2.04	39460	12070	3	12/17/13	AM	3.27

*** Fracture Types:**

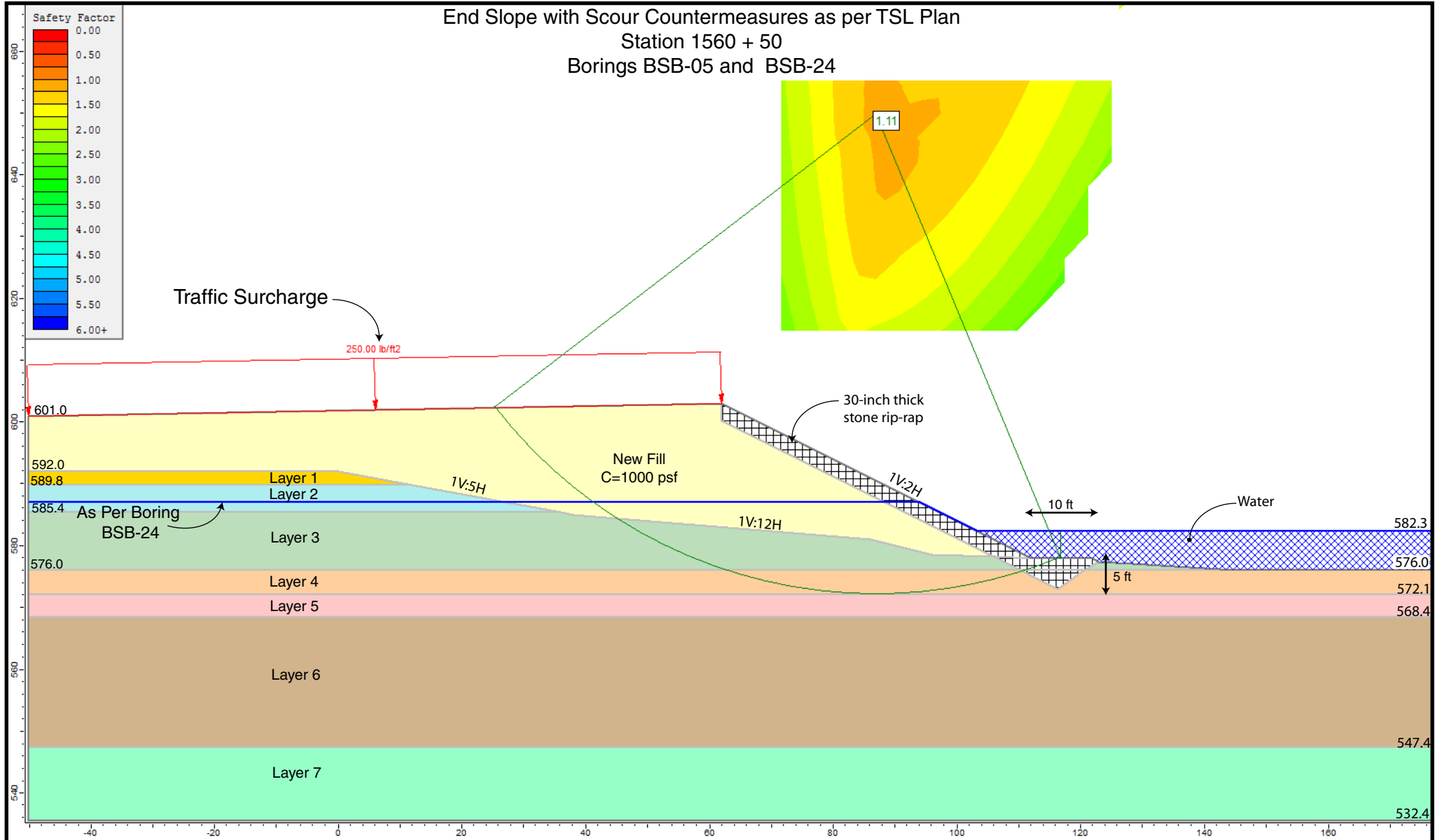
- Type 1 - Reasonably well-formed cones on both ends, less than 1 in. [25 mm] of cracking through caps;
- Type 2 - Well-formed cone on one end, vertical cracks running through caps, no well defined cone on other end;
- Type 3 - Columnar vertical cracking through both ends, no well-formed cones;
- Type 4 - Diagonal fracture with no cracking through ends; tap with hammer to distinguish from Type 1;
- Type 5 - Side fractures at top or bottom (occur commonly with unbonded caps);
- Type 6 - Similar to Type 5 but end of cylinder is pointed.

Prepared by: G. Law 1/27/14

Checked by: GL 1/27/14

APPENDIX C

End Slope with Scour Countermeasures as per TSL Plan
 Station 1560 + 50
 Borings BSB-05 and BSB-24



Soil Properties

Layer ID	Soil Type	Unit Weight	Undrained Parameter	
		(pcf)	C_u (psf)	ϕ (deg.)
FILL	Cohesive FILL	125	1000	0
1	Very Loose to Medium Dense SAND FILL	110	0	29
2	Very Soft to Soft SILTY LOAM	115	500	0
3	Medium Stiff SILTY CLAY	115	710	0
4	Very Soft SILTY CLAY	110	250	0
5	Very Loose SANDY LOAM	105	0	27
6	Medium Dense SAND	115	0	31
7	Loose to Medium Dense SANDY GRAVEL	115	0	32

SLOPE STABILITY ANALYSIS: US 52/ IL64 BRIDGE OVER MISSISSIPPI RIVER, CARROLL COUNTY, ILLINOIS and JACKSON COUNTY, IOWA

SCALE: GRAPHICAL

APPENDIX C-1

DRAWN BY: A. Hamad
 CHECKED BY: M. Kothawala

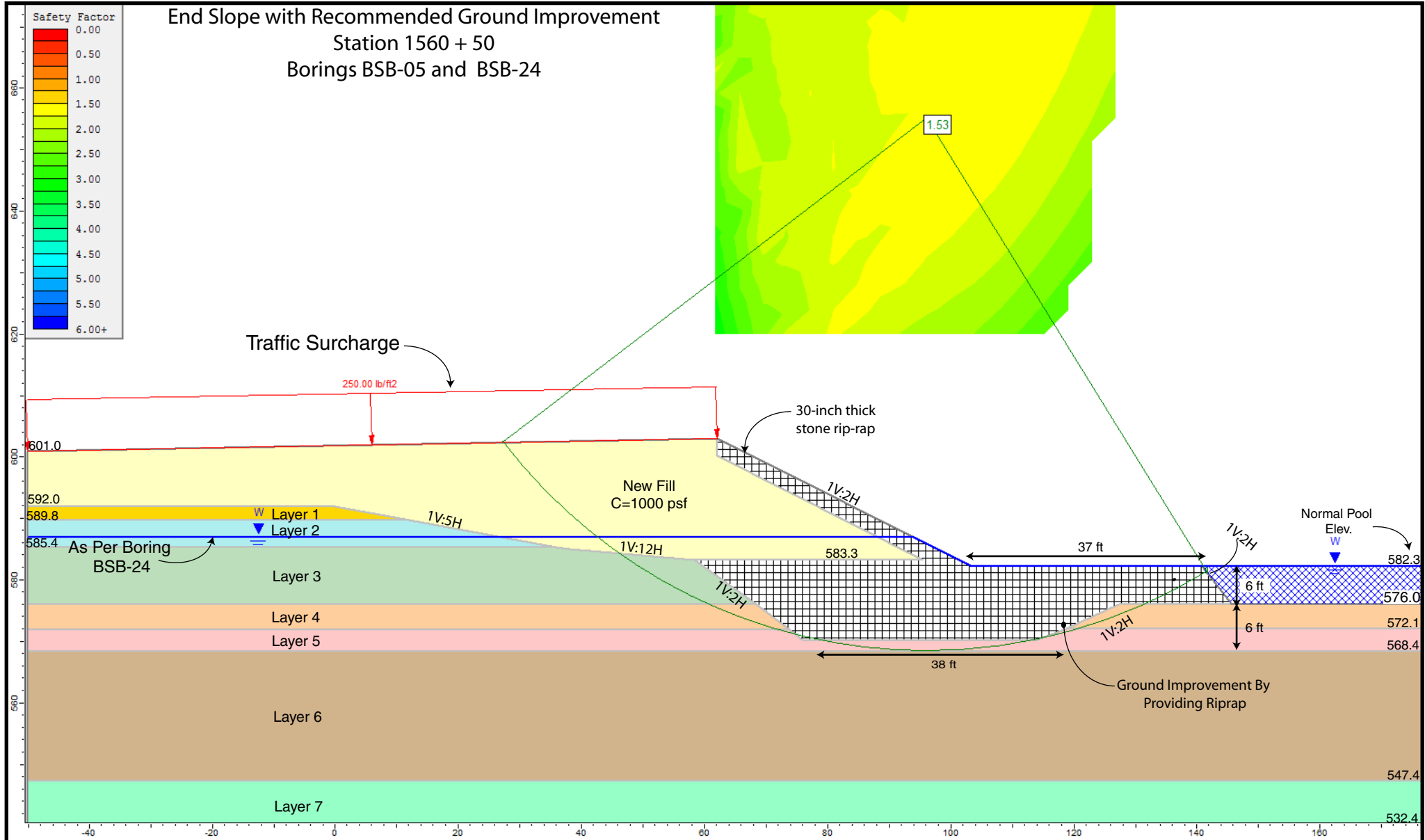


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End Slope with Recommended Ground Improvement
 Station 1560 + 50
 Borings BSB-05 and BSB-24



Soil Properties

Layer ID	Soil Type	Soil Properties		
		Unit Weight (pcf)	Undrained Parameter C _u (psf)	φ (deg.)
Rip-Rap	Stone Rip-Rap	125	0	40
FILL	Cohesive FILL	125	1000	0
1	Very Loose to Medium Dense SAND FILL	110	0	29
2	Very Soft to Soft SILTY LOAM	115	500	0
3	Medium Stiff SILTY CLAY	115	710	0
4	Very Soft SILTY CLAY	110	250	0
5	Very Loose SANDY LOAM	105	0	27
6	Medium Dense SAND	115	0	31
7	Loose to Medium Dense SANDY GRAVEL	115	0	32

SLOPE STABILITY ANALYSIS: US 52/ IL64 BRIDGE OVER MISSISSIPPI RIVER, CARROLL COUNTY, ILLINOIS and JACKSON COUNTY, IOWA

SCALE: GRAPHICAL

APPENDIX C-2

DRAWN BY: A. Hamad
 CHECKED BY: M. Kothawala

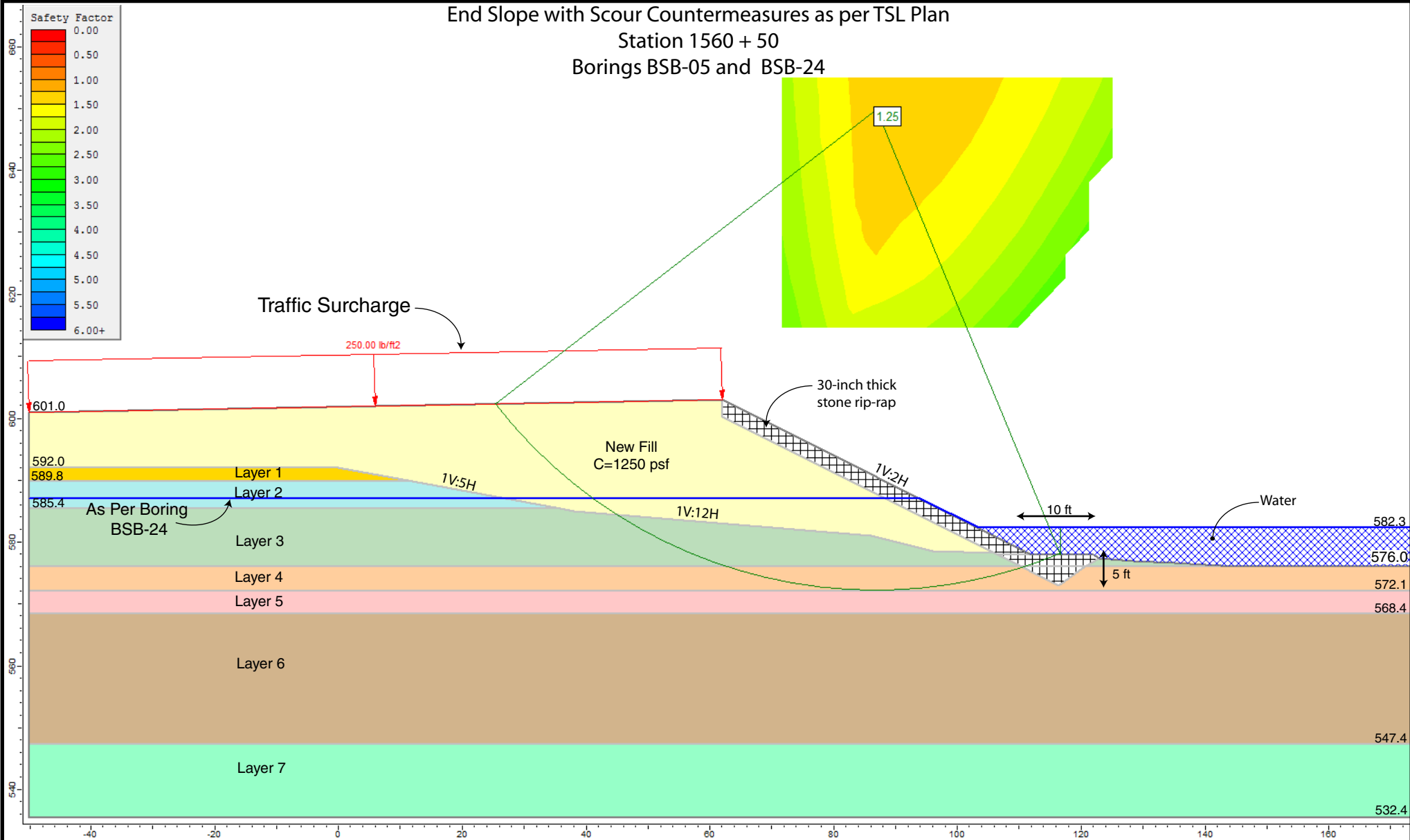


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End Slope with Scour Countermeasures as per TSL Plan
 Station 1560 + 50
 Borings BSB-05 and BSB-24



Soil Properties

Layer ID	Soil Type	Unit Weight		Undrained Parameter	
		(pcf)		C_u (psf)	ϕ (deg.)
FILL	Cohesive FILL	125		1250	0
1	Very Loose to Medium Dense SAND FILL	110		0	29
2	Very Soft to Soft SILTY LOAM	115		500	0
3	Medium Stiff SILTY CLAY	115		710	0
4	Very Soft SILTY CLAY	110		250	0
5	Very Loose SANDY LOAM	105		0	27
6	Medium Dense SAND	115		0	31
7	Loose to Medium Dense SANDY GRAVEL	115		0	32

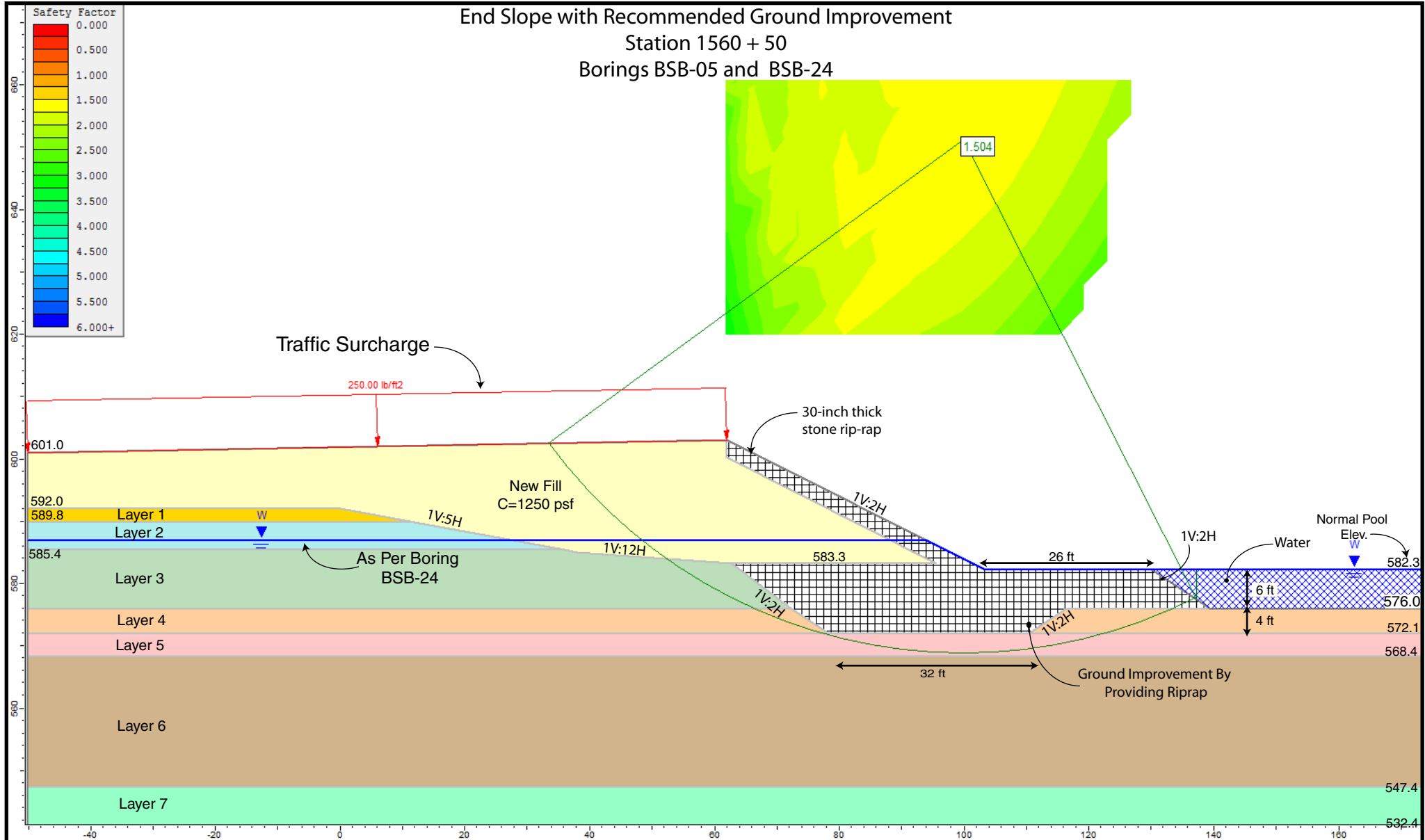
SLOPE STABILITY ANALYSIS: US 52/ IL64 BRIDGE OVER MISSISSIPPI RIVER, CARROLL COUNTY, ILLINOIS and JACKSON COUNTY, IOWA

SCALE: GRAPHICAL | **APPENDIX C-3** | DRAWN BY: A. Hamad
 CHECKED BY: M. Kothawala

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FOR PARSONS | **342-06-01**

End Slope with Recommended Ground Improvement
 Station 1560 + 50
 Borings BSB-05 and BSB-24



Soil Properties

Layer ID	Soil Type	Undrained Parameter		
		Unit Weight (pcf)	C _u (psf)	φ (deg.)
Rip-Rap	Stone Rip-Rap	125	0	40
FILL	Cohesive FILL	125	1000	0
1	Very Loose to Medium Dense SAND FILL	110	0	29
2	Very Soft to Soft SILTY LOAM	115	500	0
3	Medium Stiff SILTY CLAY	115	710	0
4	Very Soft SILTY CLAY	110	250	0
5	Very Loose SANDY LOAM	105	0	27
6	Medium Dense SAND	115	0	31
7	Loose to Medium Dense SANDY GRAVEL	115	0	32

SLOPE STABILITY ANALYSIS: US 52/ IL64 BRIDGE OVER MISSISSIPPI RIVER, CARROLL COUNTY, ILLINOIS and JACKSON COUNTY, IOWA

SCALE: GRAPHICAL

APPENDIX C-4

DRAWN BY: A. Hamad
 CHECKED BY: M. Kothawala

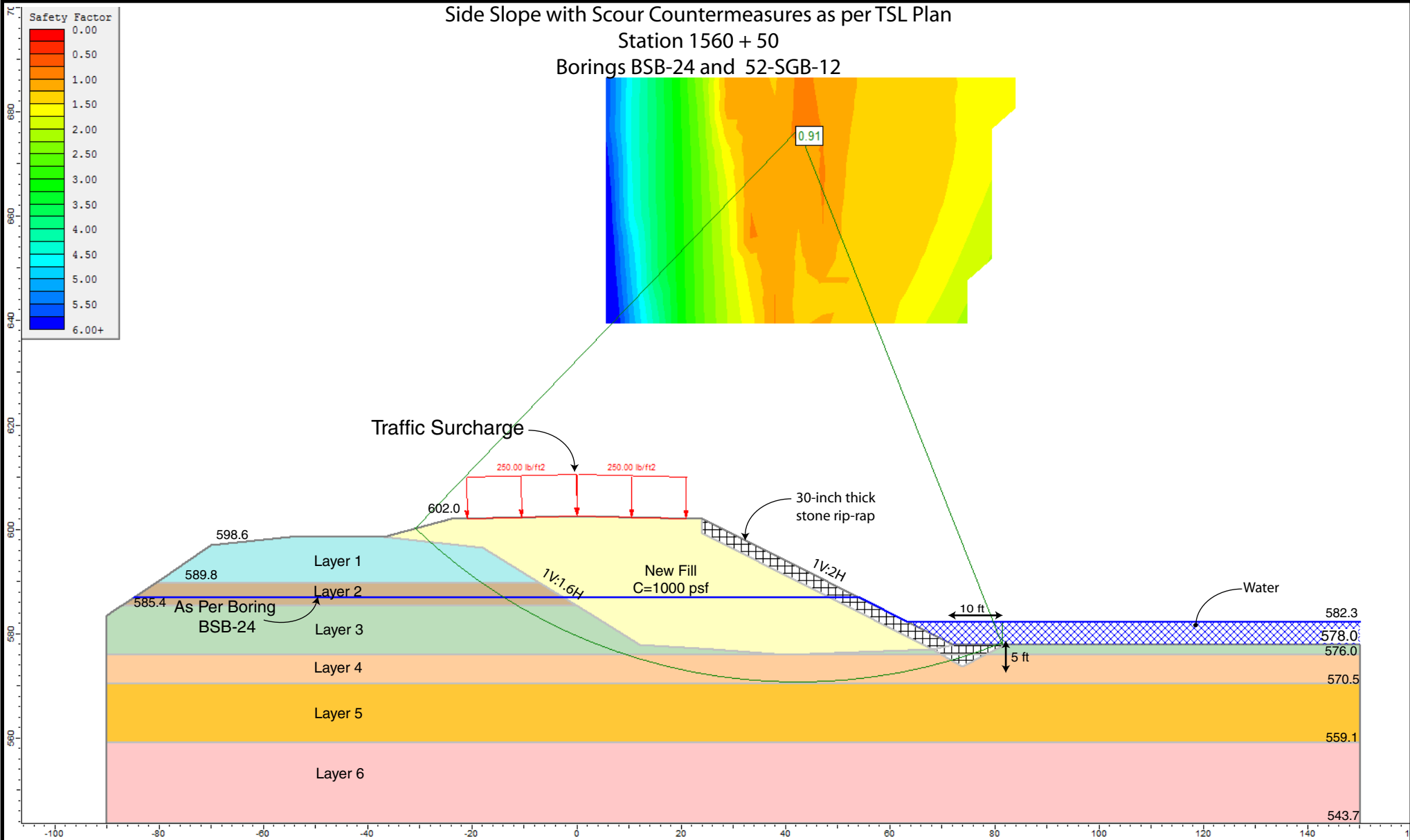


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Side Slope with Scour Countermeasures as per TSL Plan
 Station 1560 + 50
 Borings BSB-24 and 52-SGB-12



Soil Properties

Layer ID	Soil Type	Unit Weight	Undrained Parameter	
		(pcf)	C_u (psf)	ϕ (deg.)
Rip-Rap	Stone Rip-Rap Ground Improvement	125	0	40
FILL	Cohesive FILL	125	1250	0
1	Very Loose to Medium Dense SAND FILL	110	0	29
2	Very Soft to Soft SILTY LOAM	115	500	0
3	Medium Stiff SILTY CLAY	115	710	0
4	Very Soft SILTY CLAY	110	250	0
5	Very Loose to Loose SANDY LOAM	110	0	28
6	Medium Dense SAND	115	0	32

SLOPE STABILITY ANALYSIS: US 52/ IL64 BRIDGE OVER MISSISSIPPI RIVER, CARROLL COUNTY, ILLINOIS and JACKSON COUNTY, IOWA

SCALE: GRAPHICAL

APPENDIX C-5

DRAWN BY: A. Hamad
 CHECKED BY: M. Kothawala

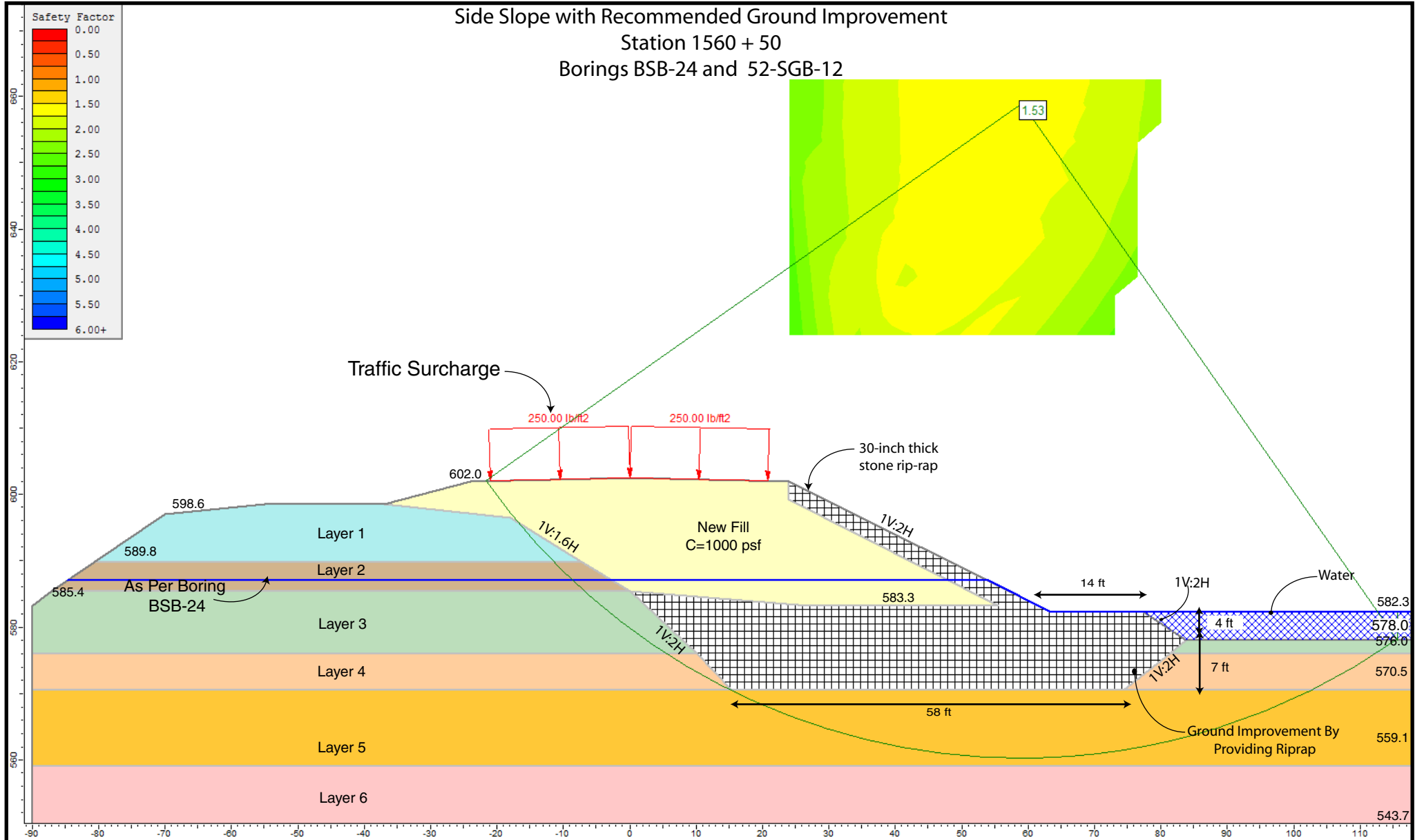


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Side Slope with Recommended Ground Improvement
 Station 1560 + 50
 Borings BSB-24 and 52-SGB-12



Soil Properties

Layer ID	Soil Type	Unit Weight	Undrained Parameter	
		(pcf)	C _u (psf)	φ (deg.)
Rip-Rap	Stone Rip-Rap	125	0	40
FILL	Cohesive FILL	125	1000	0
1	Very Loose to Medium Dense SAND FILL	110	0	29
2	Very Soft to Soft SILTY LOAM	115	500	0
3	Medium Stiff SILTY CLAY	115	710	0
4	Very Soft SILTY CLAY	110	250	0
5	Very Loose to Loose SANDY LOAM	105	0	28
6	Medium Dense SAND	115	0	32

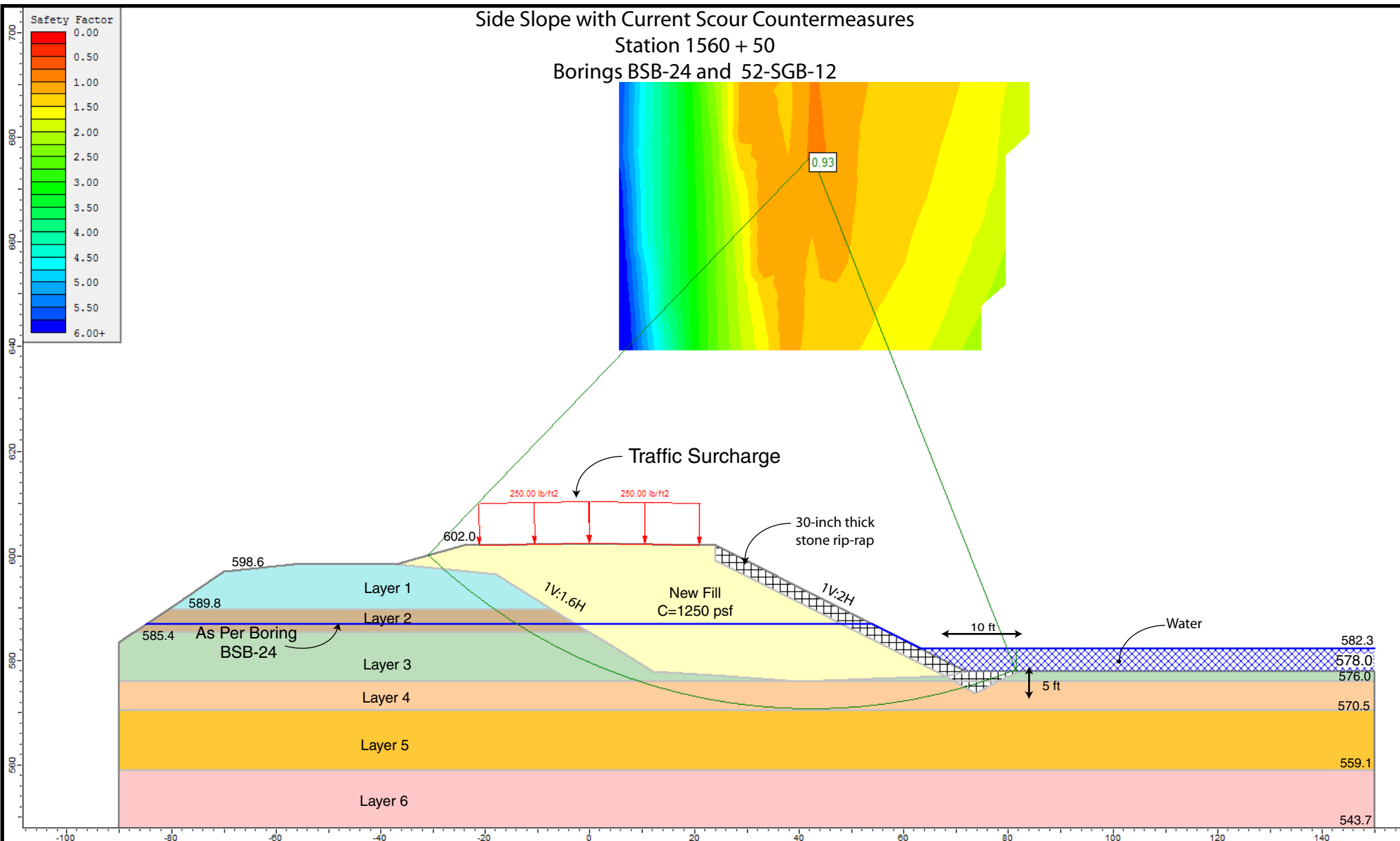
SLOPE STABILITY ANALYSIS: US 52/ IL64 BRIDGE OVER MISSISSIPPI RIVER, CARROLL COUNTY, ILLINOIS and JACKSON COUNTY, IOWA

SCALE: GRAPHICAL | **APPENDIX C-6** | DRAWN BY: A. Hamad
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FOR PARSONS | **342-06-01**

Side Slope with Current Scour Countermeasures
 Station 1560 + 50
 Borings BSB-24 and 52-SGB-12



Soil Properties

Layer ID	Soil Type	Unit Weight	Undrained Parameter	
		(pcf)	C_u (psf)	ϕ (deg.)
Rip-Rap	Stone Rip-Rap Ground Improvement	125	0	40
FILL	Cohesive FILL	125	1250	0
1	Very Loose to Medium Dense SAND FILL	110	0	29
2	Very Soft to Soft SILTY LOAM	115	500	0
3	Medium Stiff SILTY CLAY	115	710	0
4	Very Soft SILTY CLAY	110	250	0
5	Very Loose to Loose SANDY LOAM	110	0	28
6	Medium Dense SAND	115	0	32

SLOPE STABILITY ANALYSIS: US 52/ IL64 BRIDGE OVER MISSISSIPPI RIVER, CARROLL COUNTY, ILLINOIS and JACKSON COUNTY, IOWA

SCALE: GRAPHICAL

APPENDIX C-7

DRAWN BY: A. Hamad
 CHECKED BY: M. Kothawala



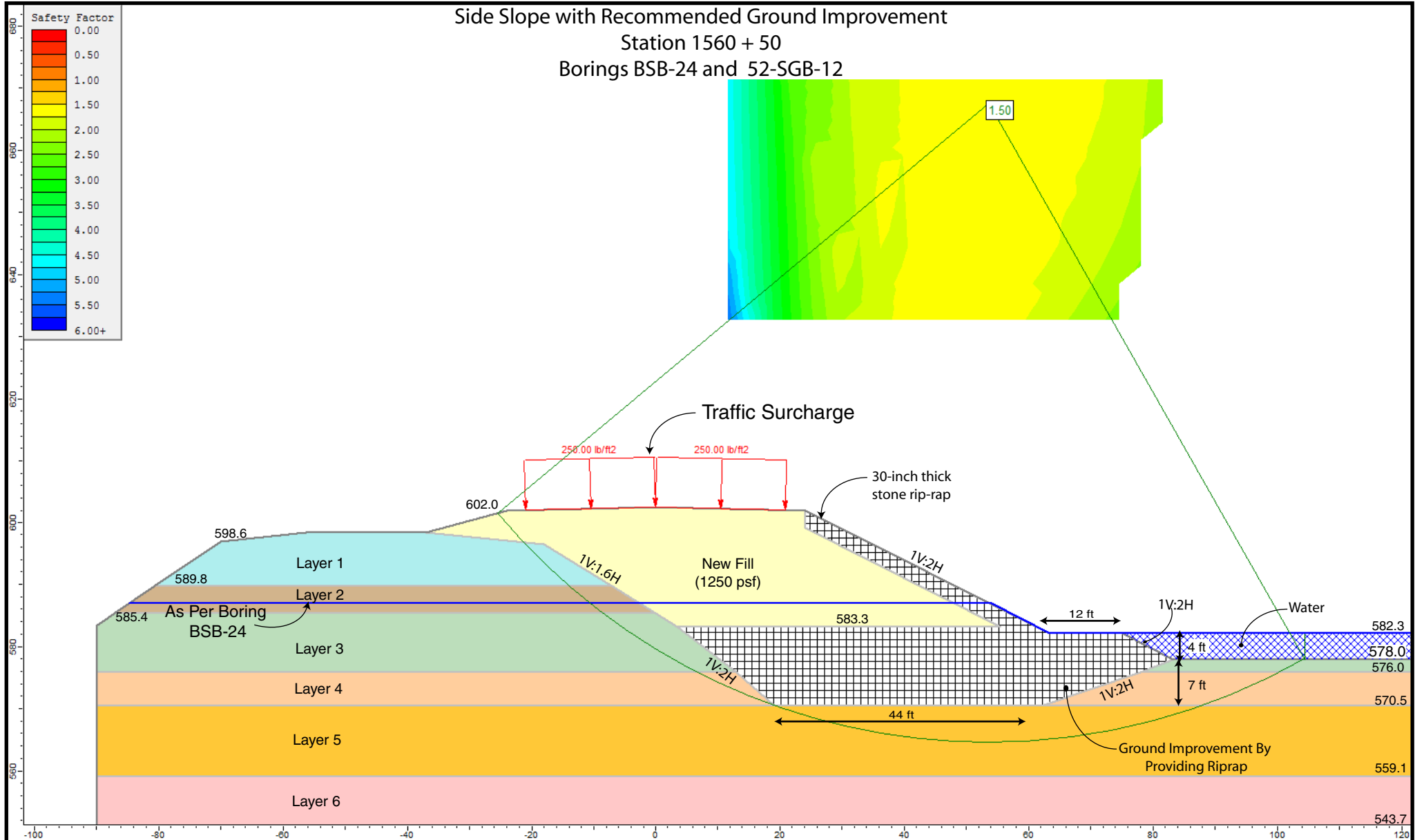
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Side Slope with Recommended Ground Improvement
 Station 1560 + 50
 Borings BSB-24 and 52-SGB-12



Soil Properties

Layer ID	Soil Type	Unit Weight	Undrained Parameter	
		(pcf)	C_u (psf)	ϕ (deg.)
Rip-Rap	Stone Rip-Rap	125	0	40
FILL	Cohesive FILL	125	1000	0
1	Very Loose to Medium Dense SAND FILL	110	0	29
2	Very Soft to Soft SILTY LOAM	115	500	0
3	Medium Stiff SILTY CLAY	115	710	0
4	Very Soft SILTY CLAY	110	250	0
5	Very Loose to Loose SANDY LOAM	105	0	28
6	Medium Dense SAND	115	0	32

SLOPE STABILITY ANALYSIS: US 52/ IL64 BRIDGE OVER MISSISSIPPI RIVER, CARROLL COUNTY, ILLINOIS and JACKSON COUNTY, IOWA

SCALE: GRAPHICAL

APPENDIX C-8

DRAWN BY: A. Hamad
 CHECKED BY: M. Kothawala

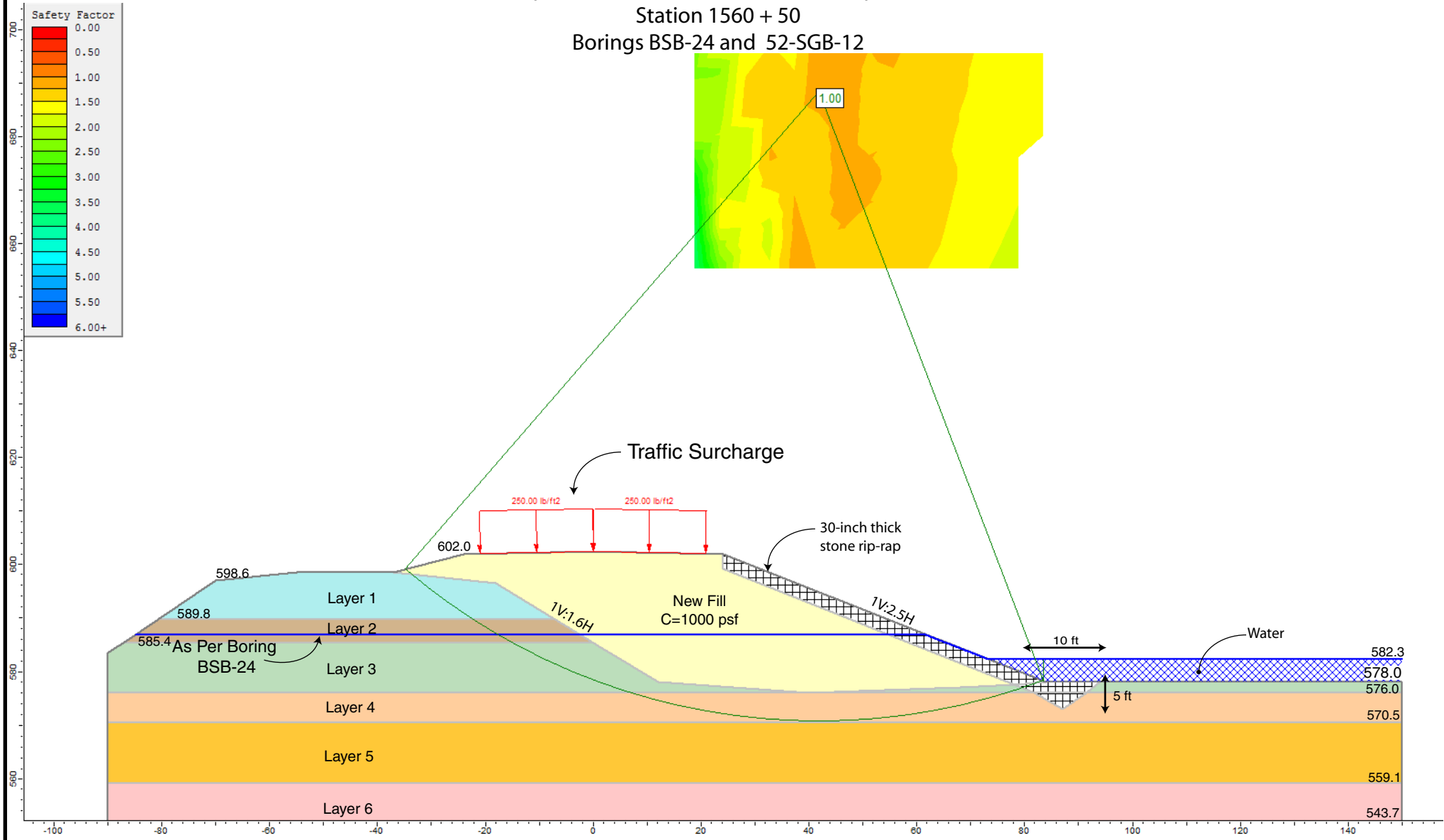


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FOR PARSONS

342-06-01

Side Slope with Scour Countermeasures as per TSL Plan
 Station 1560 + 50
 Borings BSB-24 and 52-SGB-12



Soil Properties

Layer ID	Soil Type	Undrained Parameter		
		Unit Weight (pcf)	C_u (psf)	ϕ (deg.)
Rip-Rap	Stone Rip-Rap Ground Improvement	125	0	40
FILL	Cohesive FILL	125	1250	0
1	Very Loose to Medium Dense SAND FILL	110	0	29
2	Very Soft to Soft SILTY LOAM	115	500	0
3	Medium Stiff SILTY CLAY	115	710	0
4	Very Soft SILTY CLAY	110	250	0
5	Very Loose to Loose SANDY LOAM	110	0	28
6	Medium Dense SAND	115	0	32

SLOPE STABILITY ANALYSIS: US 52/ IL64 BRIDGE OVER MISSISSIPPI RIVER,
 CARROLL COUNTY, ILLINOIS and JACKSON COUNTY, IOWA

SCALE: GRAPHICAL

APPENDIX C-9

DRAWN BY: A. Hamad
 CHECKED BY: M. Kothawala

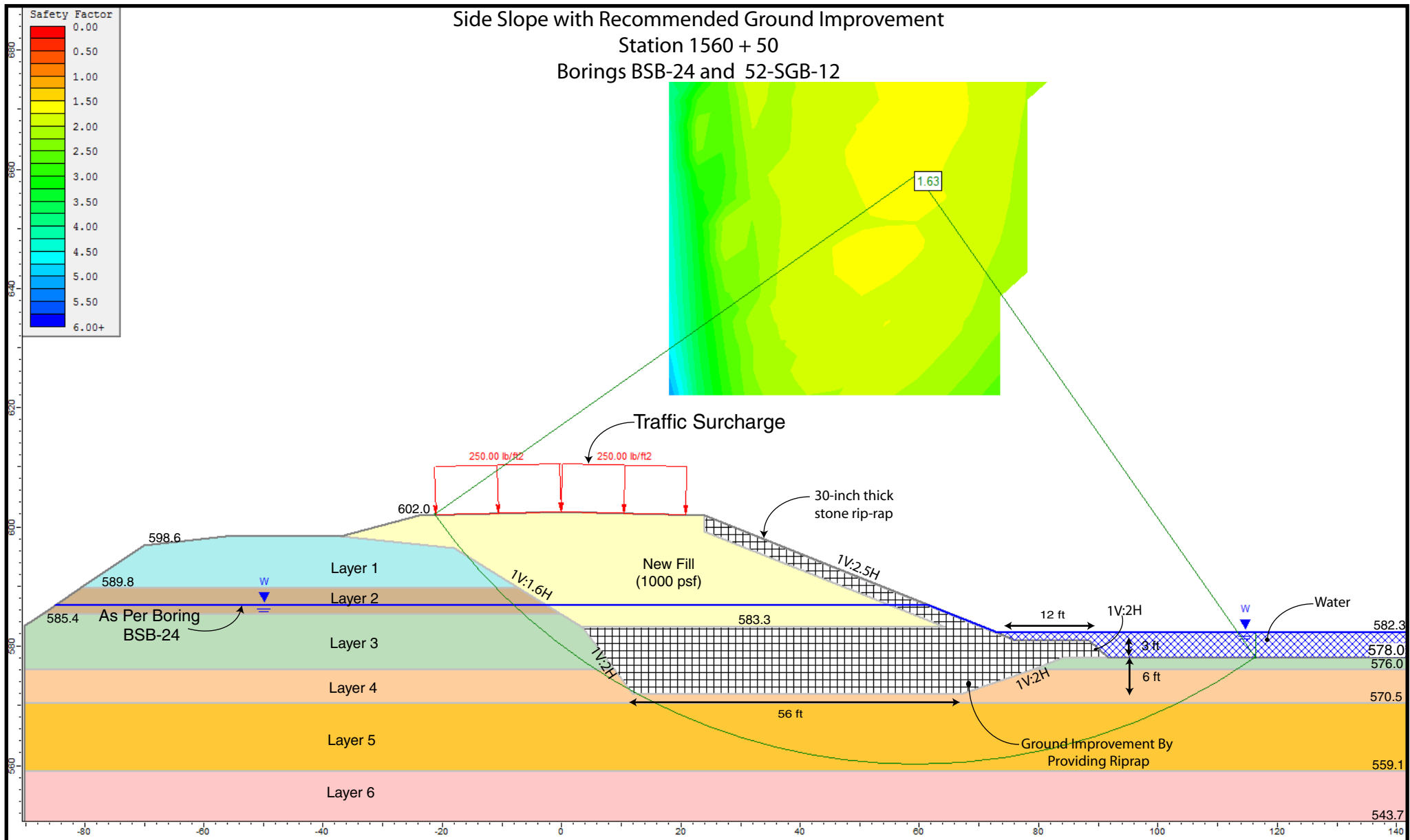


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Side Slope with Recommended Ground Improvement Station 1560 + 50 Borings BSB-24 and 52-SGB-12



Soil Properties

Layer ID	Soil Type	Undrained Parameter		
		Unit Weight (pcf)	C_u (psf)	ϕ (deg.)
Rip-Rap	Stone Rip-Rap	125	0	40
FILL	Cohesive FILL	125	1000	0
1	Very Loose to Medium Dense SAND FILL	110	0	29
2	Very Soft to Soft SILTY LOAM	115	500	0
3	Medium Stiff SILTY CLAY	115	710	0
4	Very Soft SILTY CLAY	110	250	0
5	Very Loose to Loose SANDY LOAM	105	0	28
6	Medium Dense SAND	115	0	32

SLOPE STABILITY ANALYSIS: US 52/ IL64 BRIDGE OVER MISSISSIPPI RIVER, CARROLL COUNTY, ILLINOIS and JACKSON COUNTY, IOWA

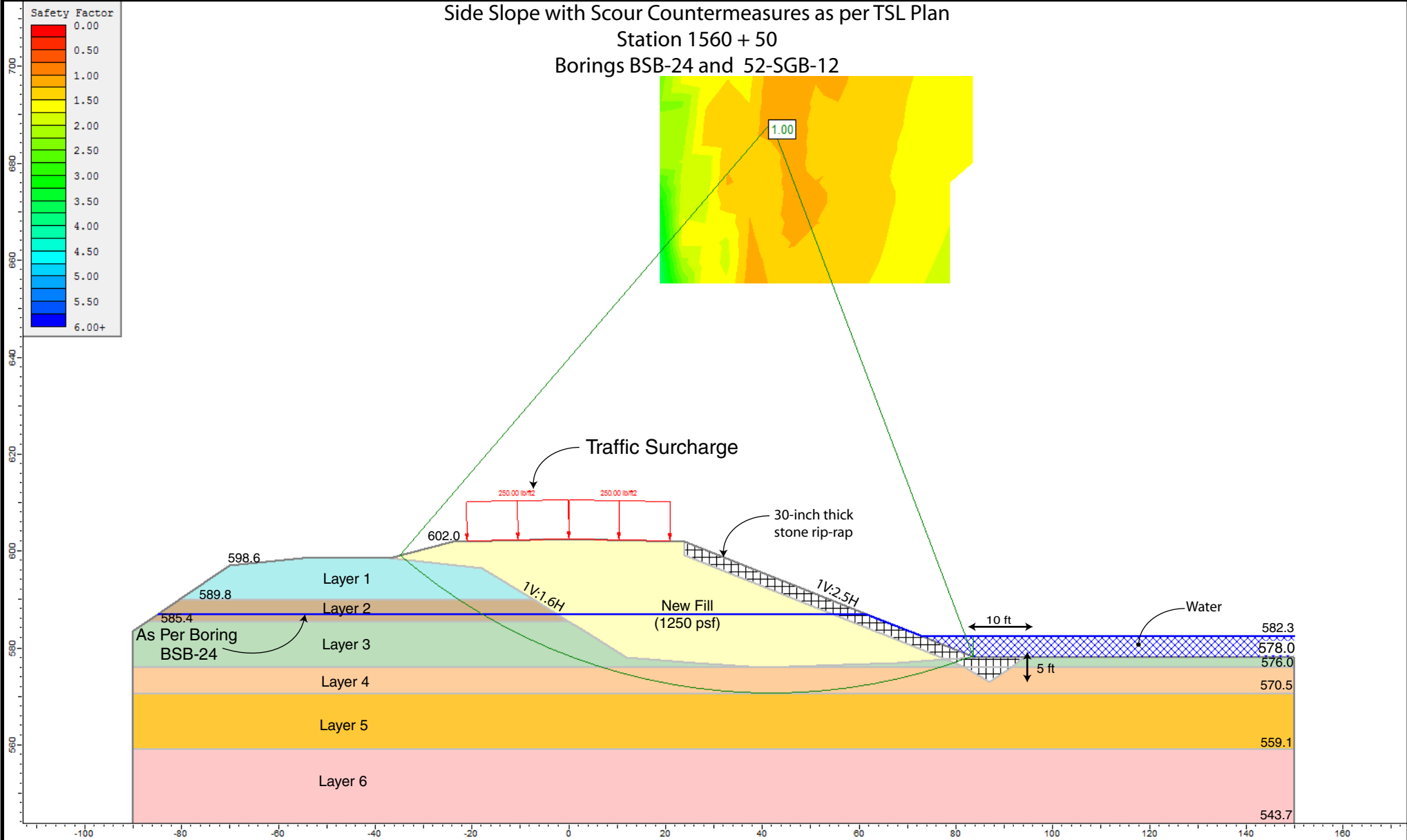
SCALE: GRAPHICAL | **APPENDIX C-10** | DRAWN BY: A. Hamad
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Side Slope with Scour Countermeasures as per TSL Plan
 Station 1560 + 50
 Borings BSB-24 and 52-SGB-12



Soil Properties

Layer ID	Soil Type	Undrained Parameter		
		Unit Weight (pcf)	C_u (psf)	ϕ (deg.)
Rip-Rap	Stone Rip-Rap Ground Improvement	125	0	40
FILL	Cohesive FILL	125	1250	0
1	Very Loose to Medium Dense SAND FILL	110	0	29
2	Very Soft to Soft SILTY LOAM	115	500	0
3	Medium Stiff SILTY CLAY	115	710	0
4	Very Soft SILTY CLAY	110	250	0
5	Very Loose to Loose SANDY LOAM	110	0	28
6	Medium Dense SAND	115	0	32

SLOPE STABILITY ANALYSIS: US 52/ IL64 BRIDGE OVER MISSISSIPPI RIVER, CARROLL COUNTY, ILLINOIS and JACKSON COUNTY, IOWA

SCALE: GRAPHICAL

APPENDIX C-11

DRAWN BY: A. Hamad
 CHECKED BY: M. Kothawala

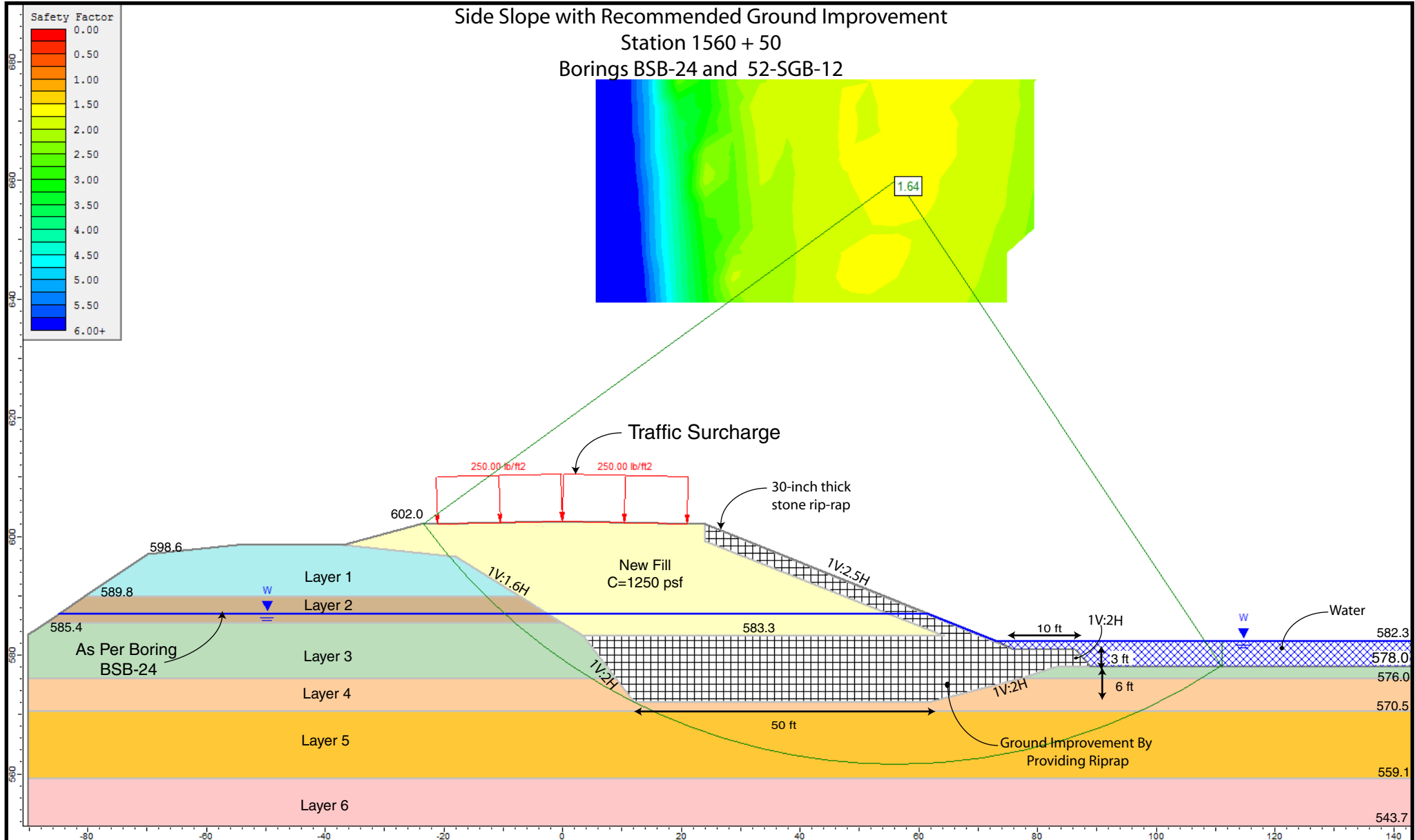


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FOR PARSONS

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Side Slope with Recommended Ground Improvement
 Station 1560 + 50
 Borings BSB-24 and 52-SGB-12



Soil Properties

Layer ID	Soil Type	Unit Weight	Undrained Parameter	
		(pcf)	C_u (psf)	ϕ (deg.)
Rip-Rap	Stone Rip-Rap	125	0	40
FILL	Cohesive FILL	125	1250	0
1	Very Loose to Medium Dense SAND FILL	110	0	29
2	Very Soft to Soft SILTY LOAM	115	500	0
3	Medium Stiff SILTY CLAY	115	710	0
4	Very Soft SILTY CLAY	110	250	0
5	Very Loose to Loose SANDY LOAM	105	0	28
6	Medium Dense SAND	115	0	32

SLOPE STABILITY ANALYSIS: US 52/ IL64 BRIDGE OVER MISSISSIPPI RIVER, CARROLL COUNTY, ILLINOIS and JACKSON COUNTY, IOWA

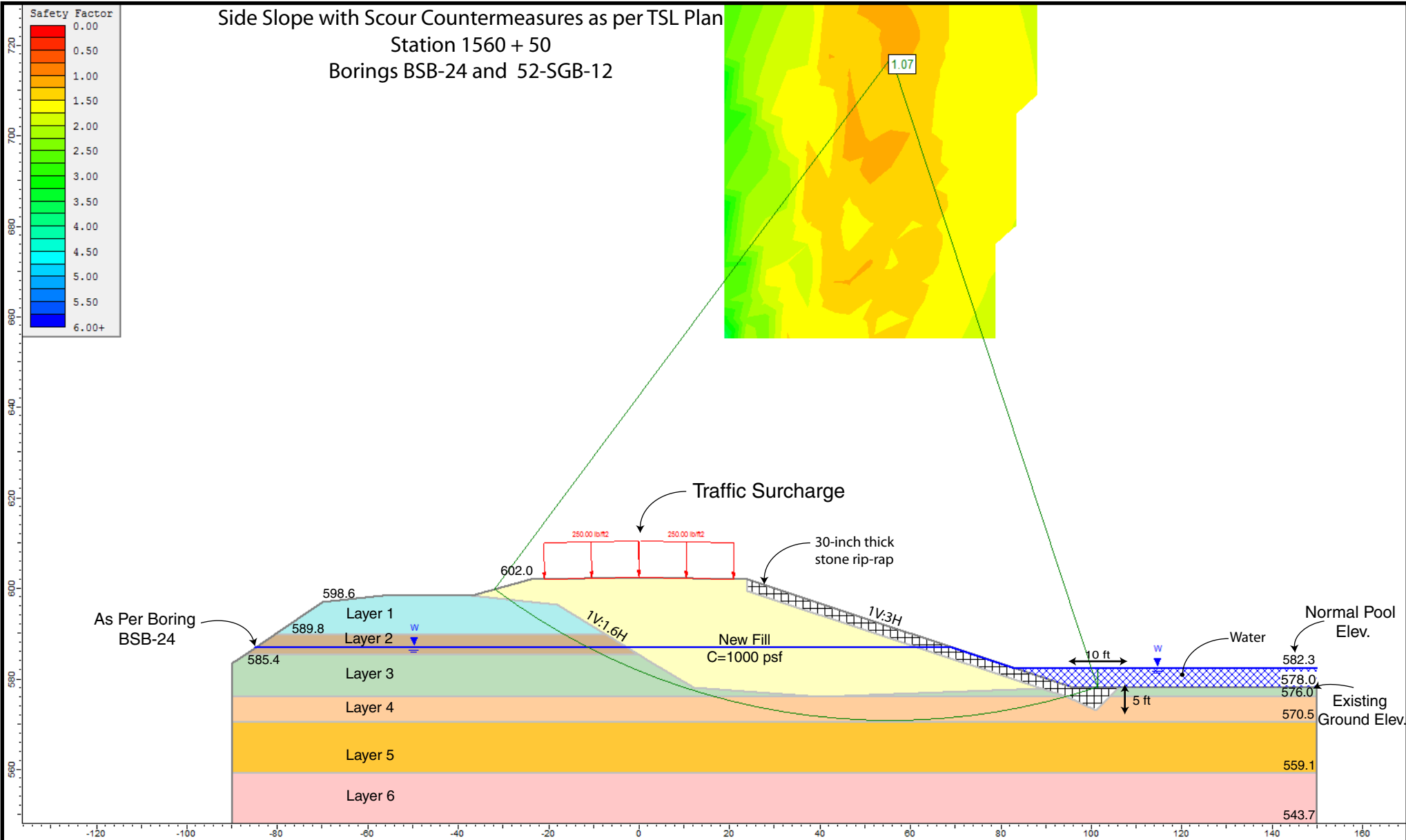
SCALE: GRAPHICAL | **APPENDIX C-12** | DRAWN BY: A. Hamad
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Side Slope with Scour Countermeasures as per TSL Plan
 Station 1560 + 50
 Borings BSB-24 and 52-SGB-12



Soil Properties

Layer ID	Soil Type	Undrained Parameter		
		Unit Weight (pcf)	C_u (psf)	ϕ (deg.)
Rip-Rap	Stone Riprap	125	0	35
FILL	Cohesive FILL	125	1000	0
1	Very Loose to Medium Dense SAND FILL	110	0	29
2	Very Soft to Soft SILTY LOAM	115	500	0
3	Medium Stiff SILTY CLAY	115	710	0
4	Very Soft SILTY CLAY	110	250	0
5	Very Loose to Loose SANDY LOAM	110	0	28
6	Medium Dense SAND	115	0	32

SLOPE STABILITY ANALYSIS: US 52/ IL64 BRIDGE OVER MISSISSIPPI RIVER, CARROLL COUNTY, ILLINOIS and JACKSON COUNTY, IOWA

SCALE: GRAPHICAL

APPENDIX C-13

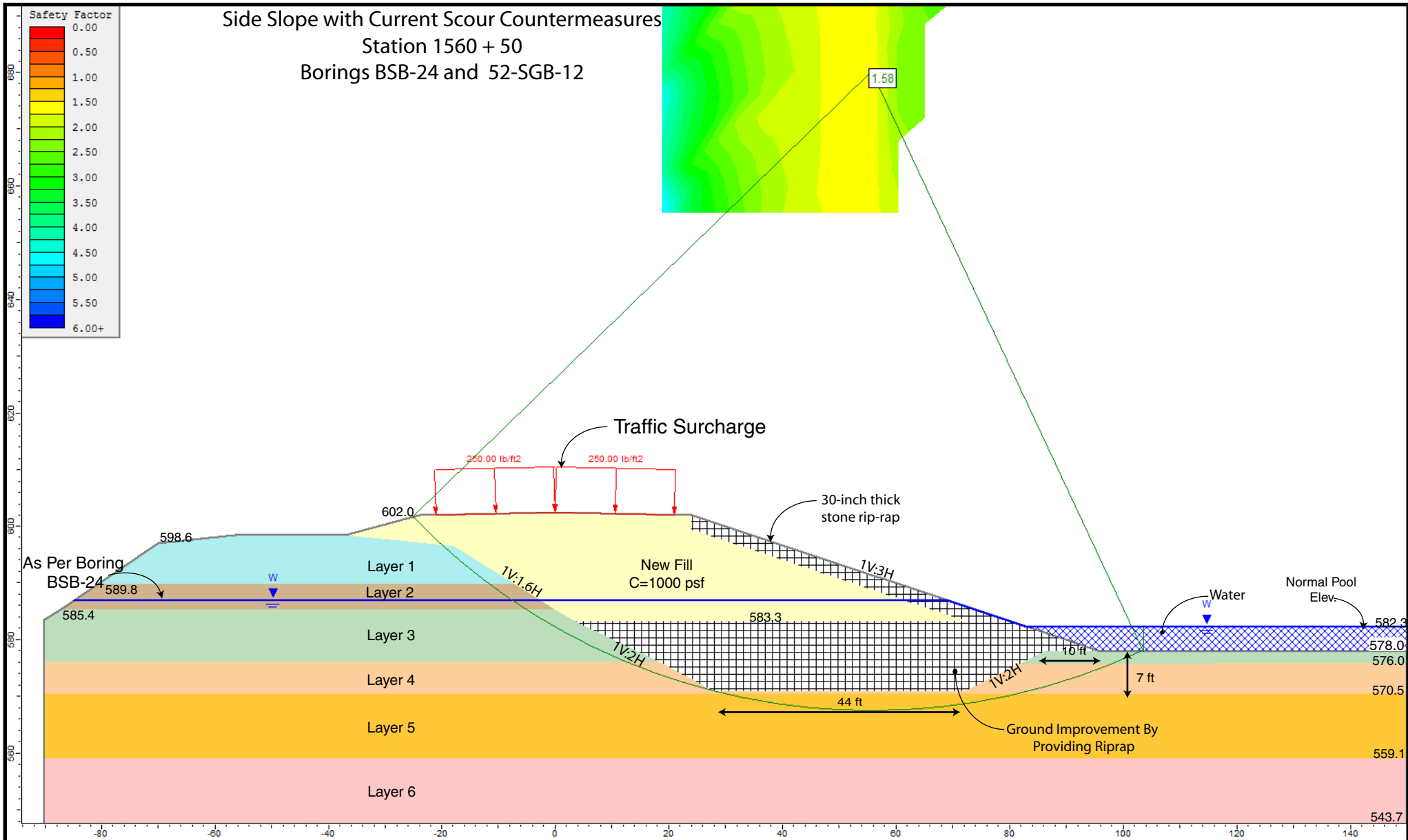
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Soil Properties

Layer ID	Soil Type	Undrained Parameter		
		Unit Weight (pcf)	C _u (psf)	φ (deg.)
Rip-Rap	Stone Rip-Rap	125	0	40
FILL	Cohesive FILL	125	1000	0
1	Very Loose to Medium Dense SAND FILL	110	0	29
2	Very Soft to Soft SILTY LOAM	115	500	0
3	Medium Stiff SILTY CLAY	115	710	0
4	Very Soft SILTY CLAY	110	250	0
5	Very Loose to Loose SANDY LOAM	110	0	28
6	Medium Dense SAND	115	0	32

SLOPE STABILITY ANALYSIS: US 52/ IL64 BRIDGE OVER MISSISSIPPI RIVER, CARROLL COUNTY, ILLINOIS and JACKSON COUNTY, IOWA

SCALE: GRAPHICAL

APPENDIX C-14

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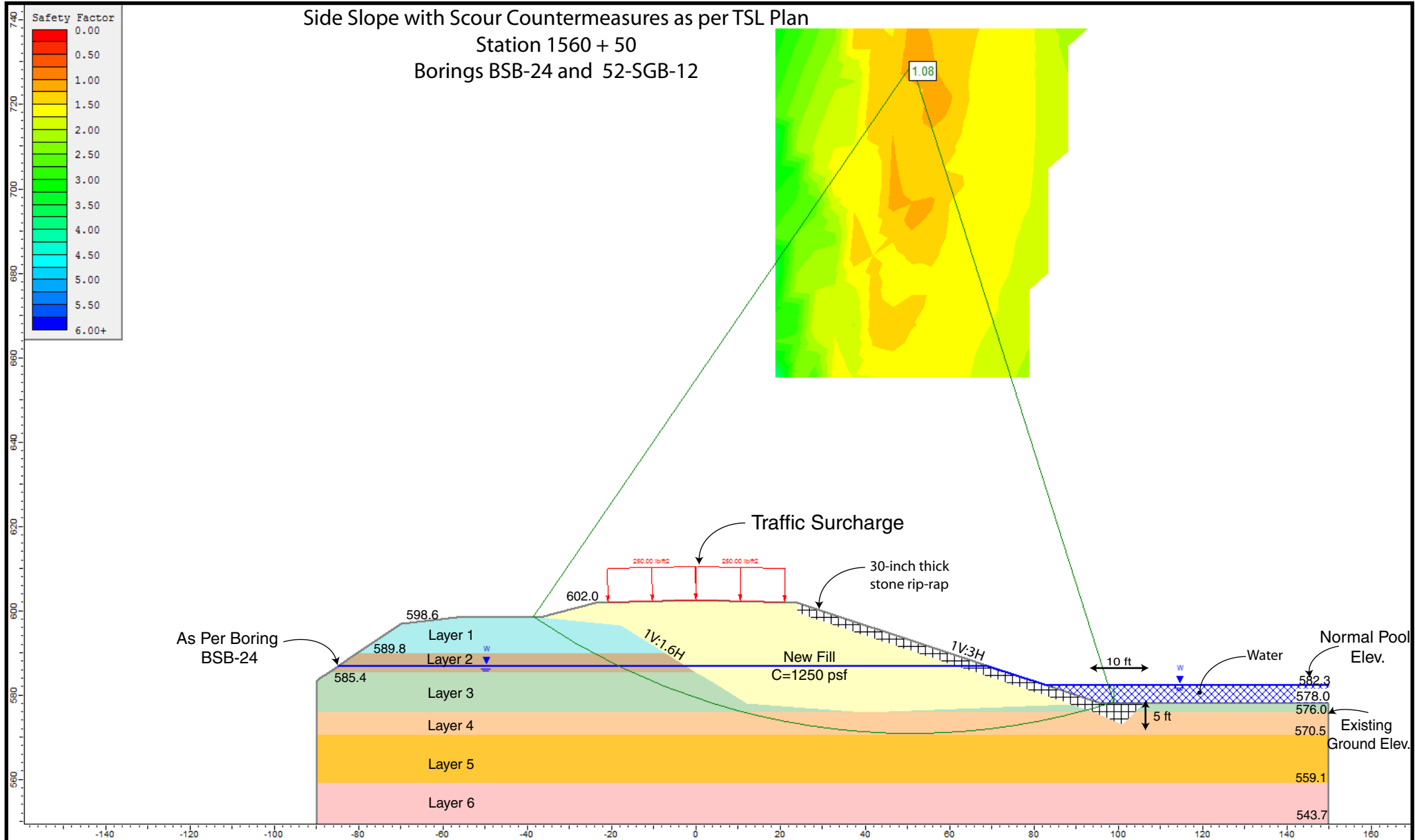
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Side Slope with Scour Countermeasures as per TSL Plan

Station 1560 + 50
 Borings BSB-24 and 52-SGB-12



Soil Properties

Layer ID	Soil Type	Undrained Parameter		
		Unit Weight (pcf)	C_u (psf)	ϕ (deg.)
Rip-Rap	Stone Rip-Rap Ground Improvement	125	0	40
FILL	Cohesive FILL	125	1250	0
1	Very Loose to Medium Dense SAND FILL	110	0	29
2	Very Soft to Soft SILTY LOAM	115	500	0
3	Medium Stiff SILTY CLAY	115	710	0
4	Very Soft SILTY CLAY	110	250	0
5	Very Loose to Loose SANDY LOAM	110	0	28
6	Medium Dense SAND	115	0	32

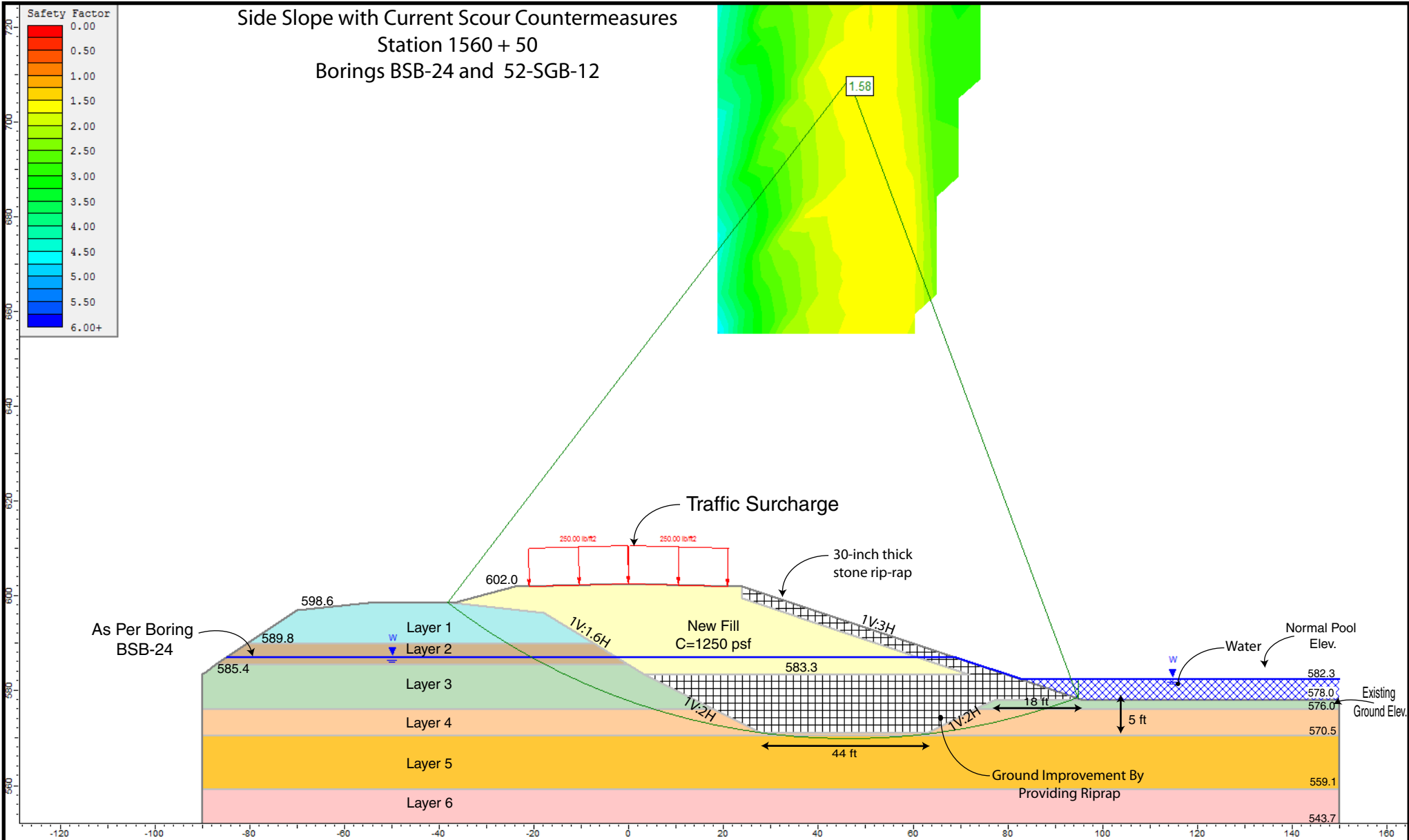
SLOPE STABILITY ANALYSIS: US 52/ IL64 BRIDGE OVER MISSISSIPPI RIVER, CARROLL COUNTY, ILLINOIS and JACKSON COUNTY, IOWA

SCALE: GRAPHICAL | **APPENDIX C-15** | DRAWN BY: A. Hamad | CHECKED BY: M. Kothawala



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Soil Properties

Layer ID	Soil Type	Unit Weight (pcf)	Undrained Parameter C_u (psf)	Undrained Parameter ϕ (deg.)
Rip-Rap	Stone Rip-Rap Ground Improvement	125	0	40
FILL	Cohesive FILL	125	1250	0
1	Very Loose to Medium Dense SAND FILL	110	0	29
2	Very Soft to Soft SILTY LOAM	115	500	0
3	Medium Stiff SILTY CLAY	115	710	0
4	Very Soft SILTY CLAY	110	250	0
5	Very Loose to Loose SANDY LOAM	110	0	28
6	Medium Dense SAND	115	0	32

SLOPE STABILITY ANALYSIS: US 52/ IL64 BRIDGE OVER MISSISSIPPI RIVER, CARROLL COUNTY, ILLINOIS and JACKSON COUNTY, IOWA

SCALE: GRAPHICAL

APPENDIX C-16

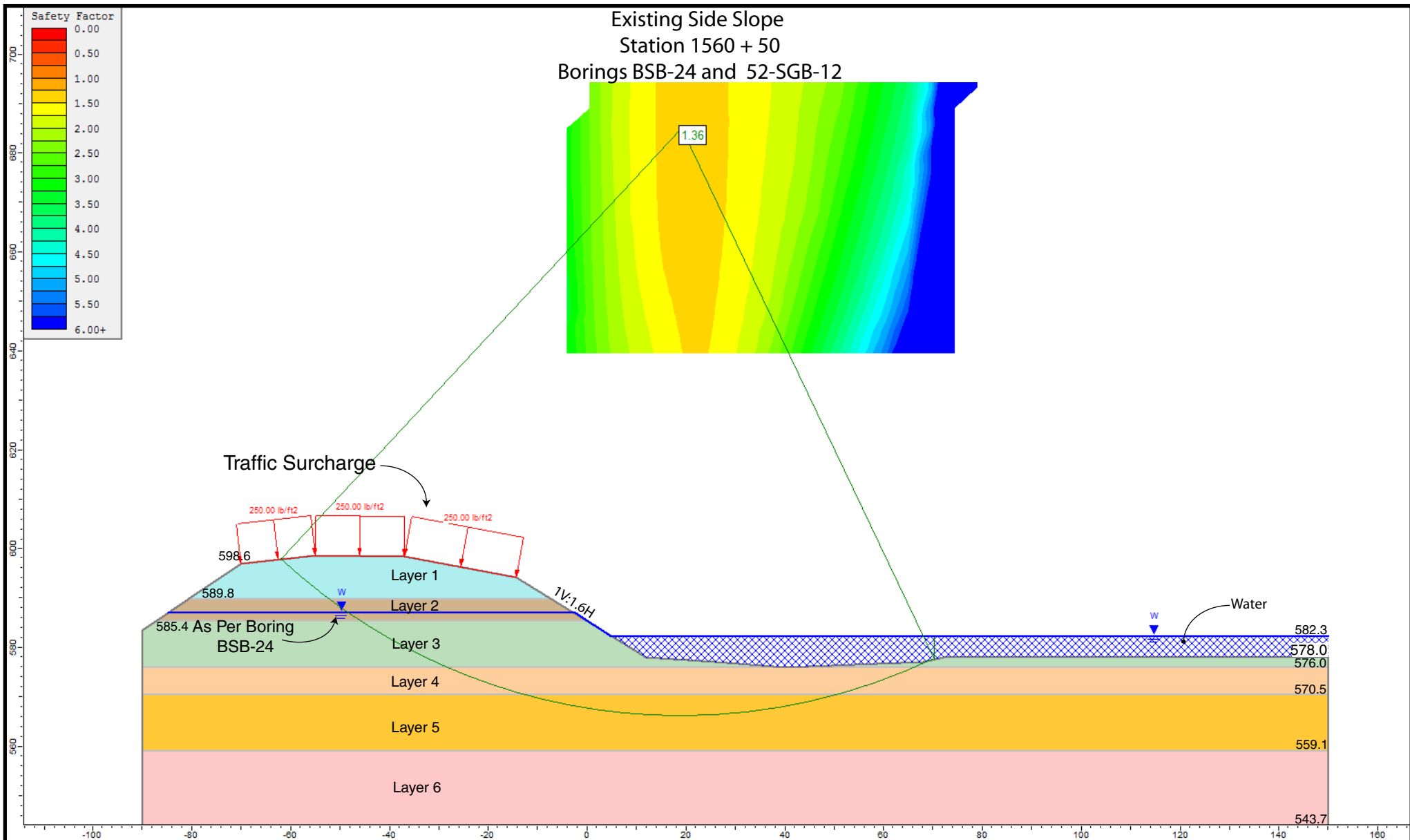
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Layer ID	Soil Type	Unit Weight	Undrained Parameter	
		(pcf)	C _u (psf)	φ (deg.)
1	Very Loose to Medium Dense SAND FILL	110	0	29
2	Very Soft to Soft SILTY LOAM	115	500	0
3	Medium Stiff SILTY CLAY	115	710	0
4	Very Soft SILTY CLAY	110	250	0
5	Very Loose to Loose SANDY LOAM	110	0	28
6	Medium Dense SAND	15	0	32

SLOPE STABILITY ANALYSIS: US 52/ IL64 BRIDGE OVER MISSISSIPPI RIVER, CARROLL COUNTY, ILLINOIS and JACKSON COUNTY, IOWA

SCALE: GRAPHICAL

APPENDIX C-17

DRAWN BY: A. Hamad
CHECKED BY: M. Kothawala

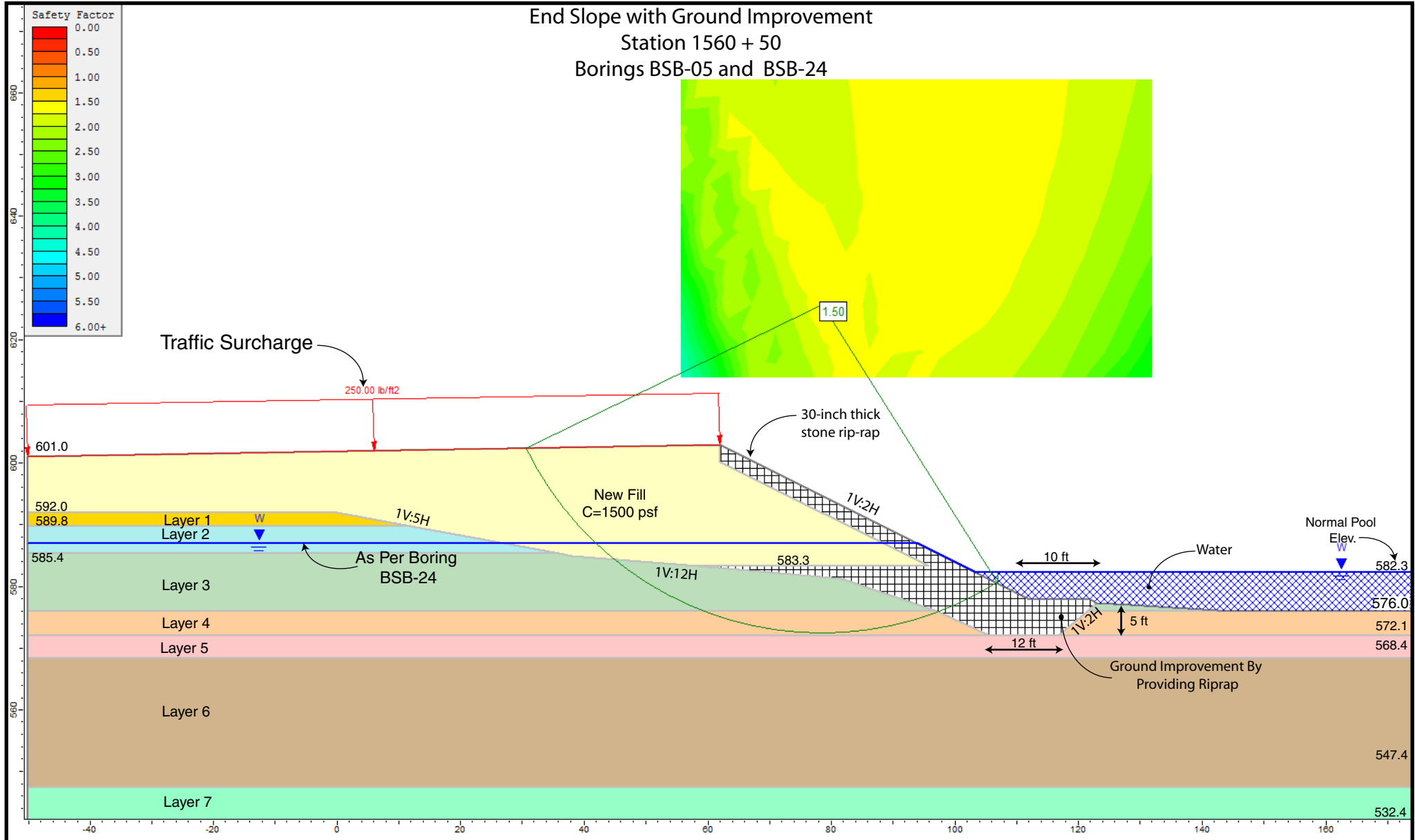


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342-06-01

End Slope with Ground Improvement
 Station 1560 + 50
 Borings BSB-05 and BSB-24



Soil Properties

Layer ID	Soil Type	Undrained Parameter		
		Unit Weight (pcf)	C _u (psf)	φ (deg.)
Rip-Rap	Stone Rip-Rap Ground Improvement	145	0	40
FILL	Cohesive FILL	125	1500	0
1	Very Loose to Medium Dense SAND FILL	110	0	30
2	Very Soft to Soft SILTY LOAM	115	500	0
3	Medium Stiff SILTY CLAY	115	710	0
4	Very Soft SILTY CLAY	110	250	0
5	Very Loose to Loose SANDY LOAM	110	0	30
6	Medium Dense SAND	115	0	32

SLOPE STABILITY ANALYSIS: US 52/ IL64 BRIDGE OVER MISSISSIPPI RIVER, CARROLL COUNTY, ILLINOIS and JACKSON COUNTY, IOWA

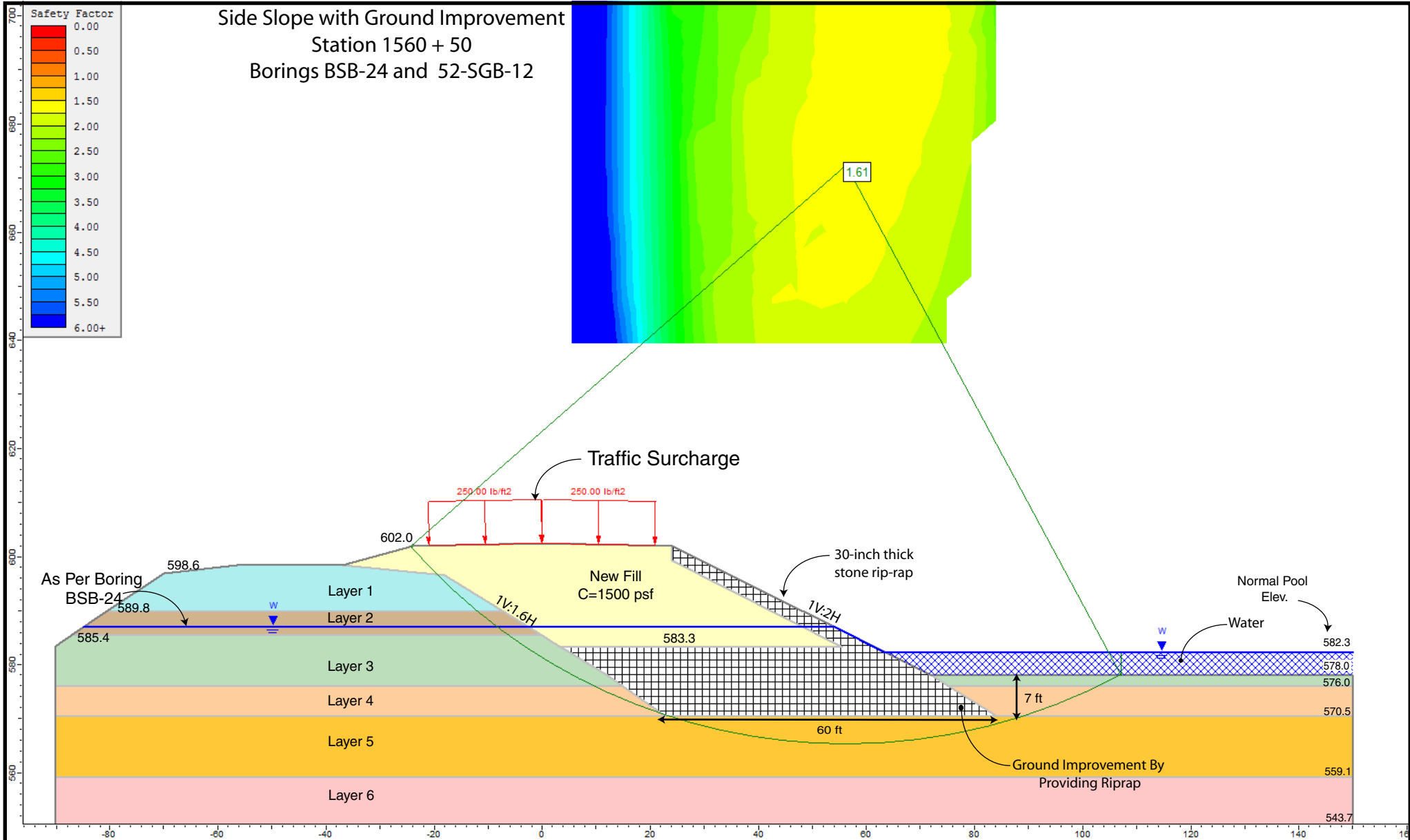
SCALE: GRAPHICAL | **APPENDIX C-18** | DRAWN BY: A. Hamad | CHECKED BY: M. Kothawala



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Side Slope with Ground Improvement
 Station 1560 + 50
 Borings BSB-24 and 52-SGB-12



Soil Properties

Layer ID	Soil Type	Undrained Parameter		
		Unit Weight (pcf)	C_u (psf)	ϕ (deg.)
Rip-Rap	Stone Rip-Rap Ground Improvement	145	0	40
FILL	Cohesive FILL	125	1500	0
1	Very Loose to Medium Dense SAND FILL	110	0	30
2	Very Soft to Soft SILTY LOAM	115	500	0
3	Medium Stiff SILTY CLAY	115	710	0
4	Very Soft SILTY CLAY	110	250	0
5	Very Loose to Loose SANDY LOAM	110	0	30
6	Medium Dense SAND	115	0	32

SLOPE STABILITY ANALYSIS: US 52/ IL64 BRIDGE OVER MISSISSIPPI RIVER,
 CARROLL COUNTY, ILLINOIS and JACKSON COUNTY, IOWA

SCALE: GRAPHICAL

APPENDIX C-19

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 CHECKED BY: M. Kothawala

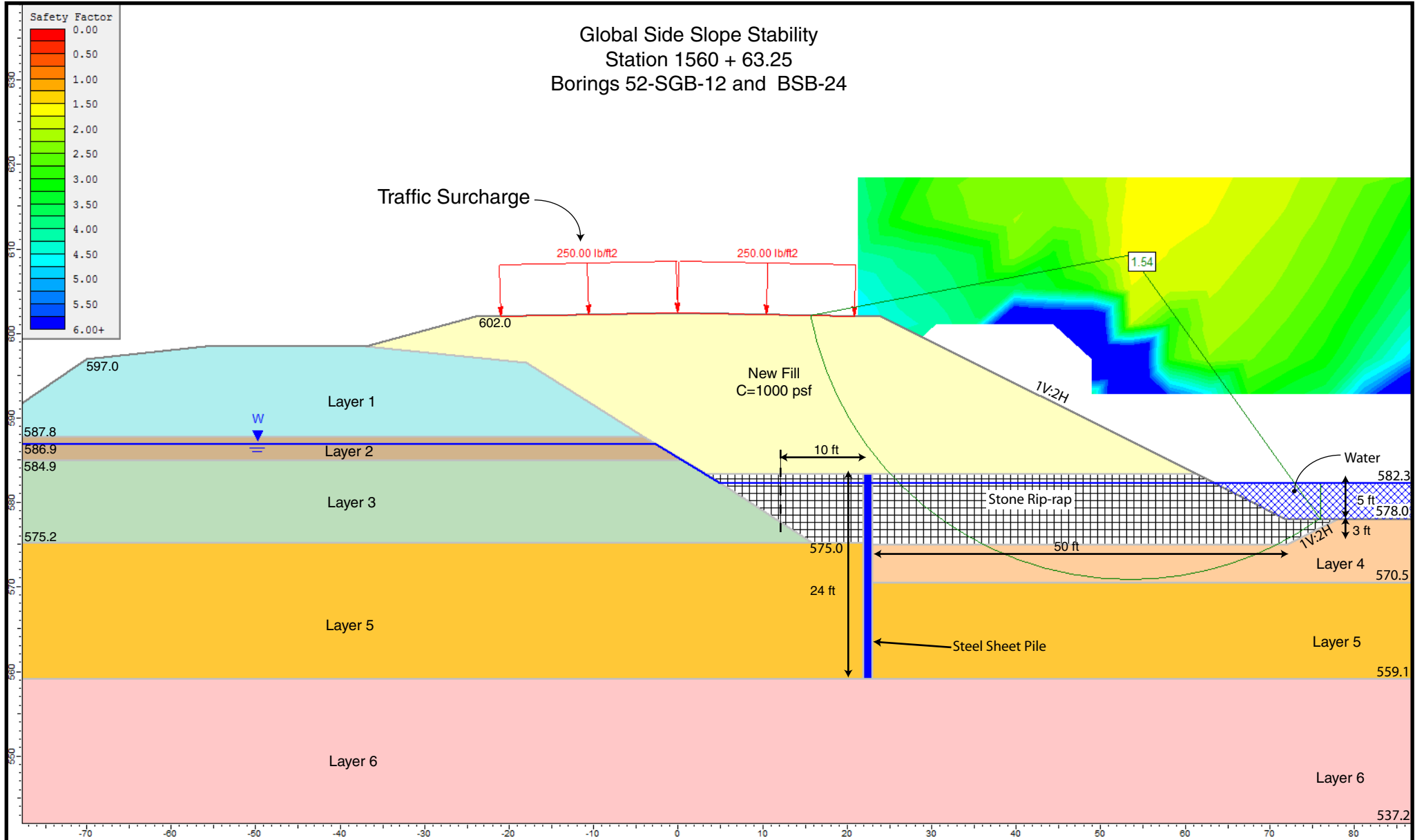


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FOR PARSONS

342-06-01

Global Side Slope Stability
 Station 1560 + 63.25
 Borings 52-SGB-12 and BSB-24



Soil Properties

Layer ID	Soil Type	Unit Weight	Undrained Parameter	
		(pcf)	C_u (psf)	ϕ (deg.)
FILL	New Cohesive FILL	125	1000	0
1	Very Loose to Medium Dense SAND FILL	110	0	29
2	Very Soft to Soft SILTY LOAM FILL	115	500	0
3	Medium Stiff SILTY CLAY	115	710	0
4	Very Soft SILTY CLAY	110	250	0
5	Very Looseto Medium Dense SANDY LOAM to SAND	105	0	27
6	Medium Dense SAND	115	0	31

SLOPE STABILITY ANALYSIS: US 52/ IL64 BRIDGE OVER MISSISSIPPI RIVER, CARROLL COUNTY, ILLINOIS and JACKSON COUNTY, IOWA

SCALE: GRAPHICAL

APPENDIX C-20

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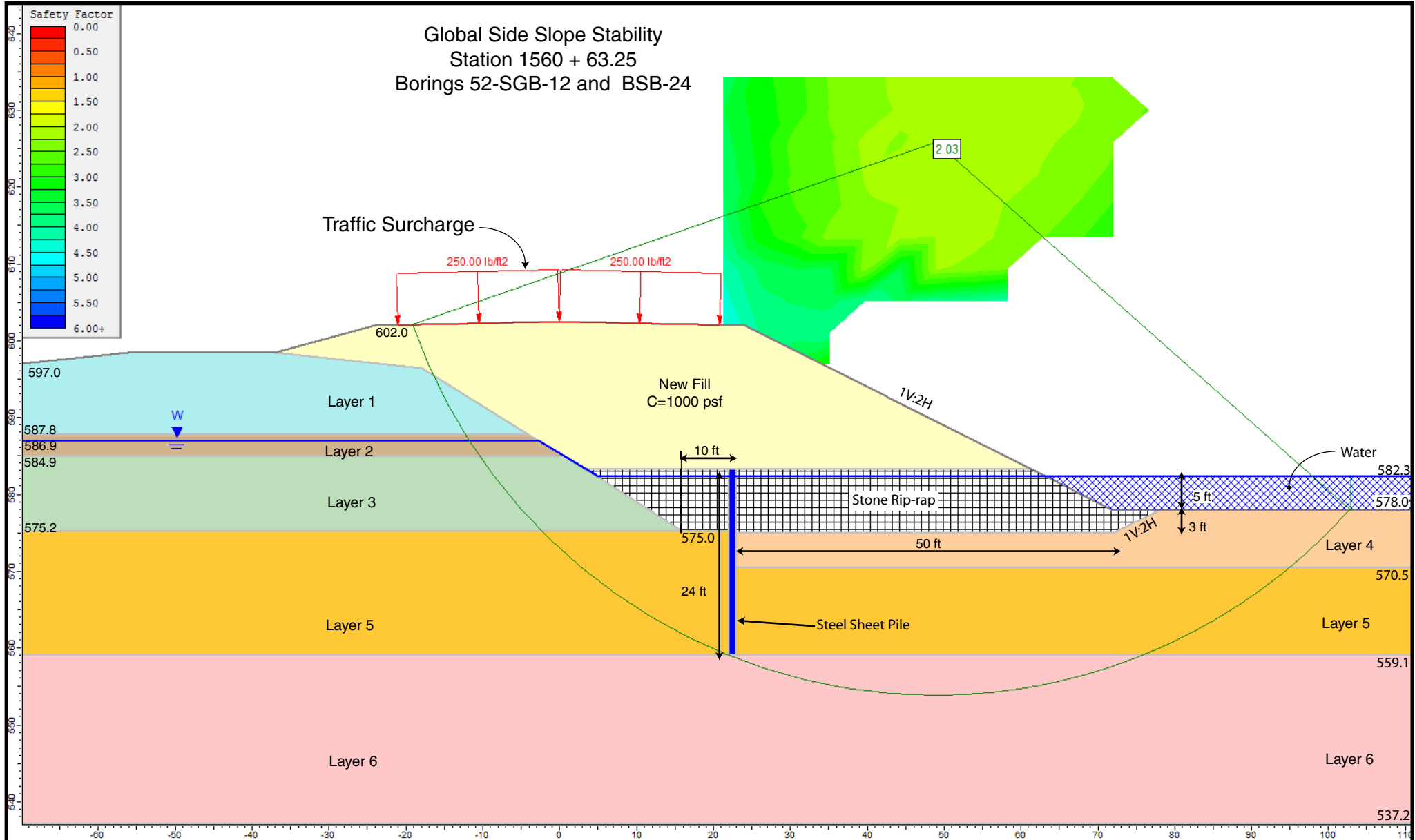


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 Borings 52-SGB-12 and BSB-24



Soil Properties

Layer ID	Soil Type	Unit Weight	Undrained Parameter	
		(pcf)	C_u (psf)	ϕ (deg.)
FILL	New Cohesive FILL	125	1000	0
1	Very Loose to Medium Dense SAND FILL	110	0	29
2	Very Soft to Soft SILTY LOAM FILL	115	500	0
3	Medium Stiff SILTY CLAY	115	710	0
4	Very Soft SILTY CLAY	110	250	0
5	Very Loose to Medium Dense SANDY LOAM to SAND	105	0	27
6	Medium Dense SAND	115	0	31

SLOPE STABILITY ANALYSIS: US 52/ IL64 BRIDGE OVER MISSISSIPPI RIVER, CARROLL COUNTY, ILLINOIS and JACKSON COUNTY, IOWA

SCALE: GRAPHICAL

APPENDIX C-21

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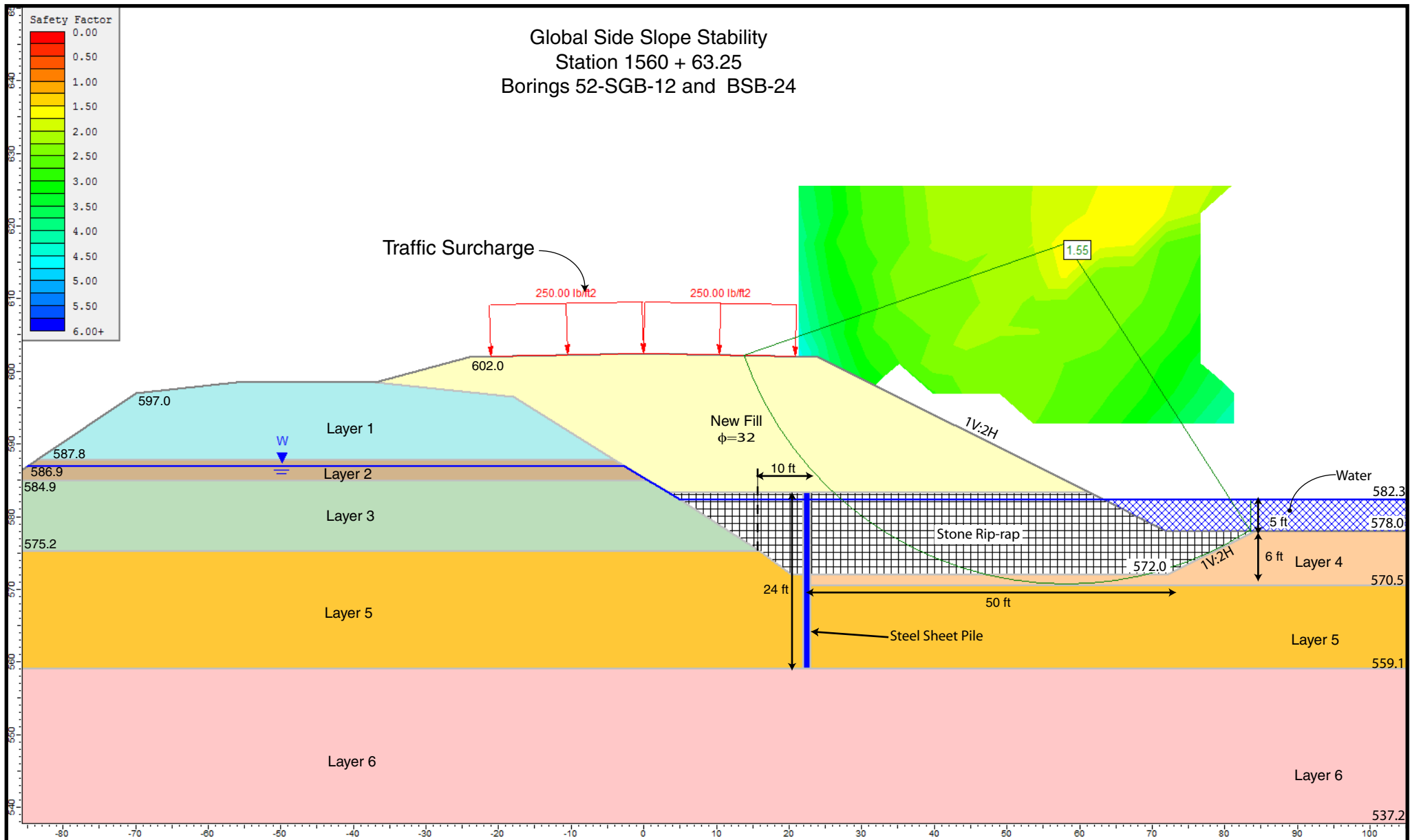


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 Station 1560 + 63.25
 Borings 52-SGB-12 and BSB-24



Soil Properties

Layer ID	Soil Type	Unit Weight	Undrained Parameter	
		(pcf)	C_u (psf)	ϕ (deg.)
FILL	New Granular FILL	125	0	32
1	Very Loose to Medium Dense SAND FILL	110	0	29
2	Very Soft to Soft SILTY LOAM FILL	115	500	0
3	Medium Stiff SILTY CLAY	115	710	0
4	Very Soft SILTY CLAY	110	250	0
5	Very Looseto Medium Dense SANDY LOAM to SAND	105	0	27
6	Medium Dense SAND	115	0	31

SLOPE STABILITY ANALYSIS: US 52/ IL64 BRIDGE OVER MISSISSIPPI RIVER, CARROLL COUNTY, ILLINOIS and JACKSON COUNTY, IOWA

SCALE: GRAPHICAL

APPENDIX C-22

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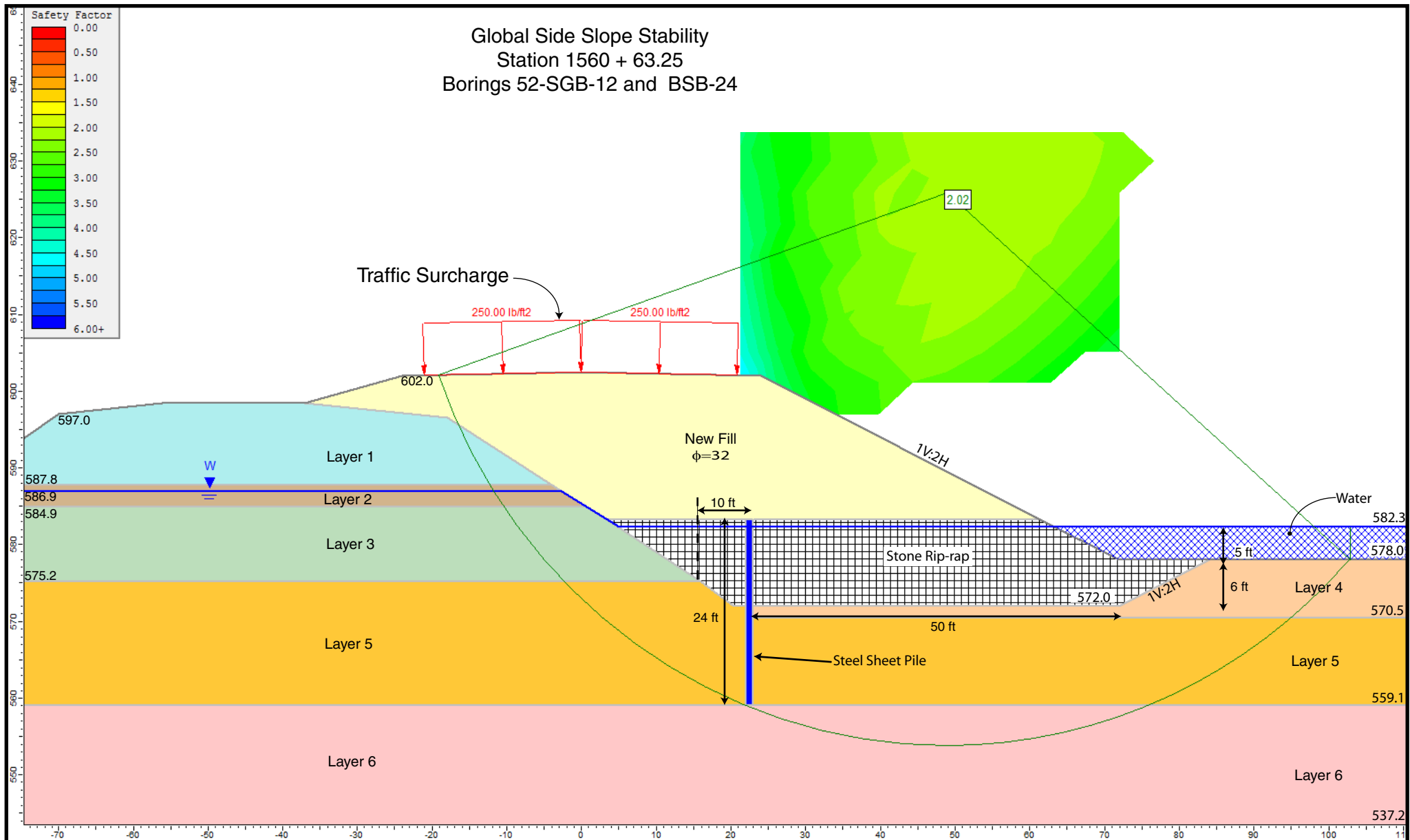


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Global Side Slope Stability
 Station 1560 + 63.25
 Borings 52-SGB-12 and BSB-24



Soil Properties

Layer ID	Soil Type	Unit Weight	Undrained Parameter	
		(pcf)	C_u (psf)	ϕ (deg.)
FILL	New Granular FILL	125	0	32
1	Very Loose to Medium Dense SAND FILL	110	0	29
2	Very Soft to Soft SILTY LOAM FILL	115	500	0
3	Medium Stiff SILTY CLAY	115	710	0
4	Very Soft SILTY CLAY	110	250	0
5	Very Looseto Medium Dense SANDY LOAM to SAND	105	0	27
6	Medium Dense SAND	115	0	31

SLOPE STABILITY ANALYSIS: US 52/ IL64 BRIDGE OVER MISSISSIPPI RIVER, CARROLL COUNTY, ILLINOIS and JACKSON COUNTY, IOWA

SCALE: GRAPHICAL

APPENDIX C-23

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APPENDIX D

SEISMIC SITE CLASS DETERMINATION

I.D.O.T. BBS FOUNDATIONS AND GEOTECHNICAL UNIT

Modified on 12/10/10

PROJECT TITLE=====US 52 Over Mississippi River (West Abutment to Pier 6)

Substructure 1					
Base of Substruct. Elev. (or ground surf for bents)					593.5
Pile or Shaft Dia.					12
Boring Number					BSB-24
Top of Boring Elev.					600.94
Approximate Fixity Elev.					587.5
Individual Site Class Definition:					
N (bar):		13 (Blows/ft.)		Soil Site Class E	
N _{ch} (bar):		16 (Blows/ft.)		Soil Site Class D <----Controls	
s _u (bar):				NA, H < 0.1*H (Soil)	
Seismic Soil Column	Bot. Of Sample	Sample	Layer Description		
Depth	Elevation	Thick.	N	Qu	Boundary
(ft)	(ft.)	(ft.)	(tsf)		
	597.9	3.00	13		B
	595.4	2.50	5		B
	592.9	2.50	3		
	590.4	2.50	3		B
	587.9	2.50	6	0.33	
2.1	585.4	2.50	6	0.25	B
4.6	582.9	2.50	5	0.74	
7.1	580.4	2.50	2	0.57	
9.6	577.9	2.50	5	0.82	B
12.1	575.4	2.50	21		
14.6	572.9	2.50	18		
19.6	567.9	5.00	13		B
24.6	562.9	5.00	9		
28.3	559.2	3.70	5		B
33.3	554.2	5.00	12		
38.3	549.2	5.00	20		
43.3	544.2	5.00	19		
48.3	539.2	5.00	21		
53.3	534.2	5.00	12		
58.3	529.2	5.00	15		
63.3	524.2	5.00	17		
68.3	519.2	5.00	13		
73.3	514.2	5.00	11		
78.3	509.2	5.00	27		
83.3	504.2	5.00	24		
88.3	499.2	5.00	18		
93.3	494.2	5.00	25		
98.3	489.2	5.00	27		
103.3	484.2	5.00	15		B
106.6	480.9	3.30	40		B

Substructure 2					
Base of Substruct. Elev. (or ground surf for bents)					569.5
Pile or Shaft Dia.					12
Boring Number					BSB-23
Top of Boring Elev.					576.4
Approximate Fixity Elev.					563.5
Individual Site Class Definition:					
N (bar):		11 (Blows/ft.)		Soil Site Class E <----Controls	
N _{ch} (bar):		11 (Blows/ft.)		Soil Site Class E	
s _u (bar):				NA	
Seismic Soil Column	Bot. Of Sample	Sample	Layer Description		
Depth	Elevation	Thick.	N	Qu	Boundary
(ft)	(ft.)	(ft.)	(tsf)		
	574.4	2.00	0	0.25	
	572.4	2.00	0	0.25	
	569.9	2.50	0	0.25	
	567.4	2.50	0	0.25	B
	564.9	2.50	1		
1.1	562.4	2.50	1		B
3.6	559.9	2.50	5		
6.1	557.4	2.50	7		
8.6	554.9	2.50	4		
11.1	552.4	2.50	9		B
13.6	549.9	2.50	14		
16.1	547.4	2.50	12		
21.1	542.4	5.00	13		
26.1	537.4	5.00	17		
29.8	533.7	3.70	16		B
34.8	528.7	5.00	3		B
39.8	523.7	5.00	13		B
44.8	518.7	5.00	8		B
49.8	513.7	5.00	19		
54.8	508.7	5.00	19		
59.8	503.7	5.00	27		
64.8	498.7	5.00	24		
69.8	493.7	5.00	18		B
74.8	488.7	5.00	38		
79.8	483.7	5.00	37		B
84.8	478.7	5.00	23		
89.8	473.7	5.00	17		B
94.8	468.7	5.00	30		
98.1	465.4	3.30	46		
100.0	463.5	1.90	31		

Substructure 3					
Base of Substruct. Elev. (or ground surf for bents)					575.5
Pile or Shaft Dia.					12
Boring Number					BSB-06
Top of Boring Elev.					580.9
Approximate Fixity Elev.					569.5
Individual Site Class Definition:					
N (bar):		9 (Blows/ft.)		Soil Site Class E <----Controls	
N _{ch} (bar):		9 (Blows/ft.)		Soil Site Class E	
s _u (bar):				NA, H < 0.1*H (Soil)	
Seismic Soil Column	Bot. Of Sample	Sample	Layer Description		
Depth	Elevation	Thick.	N	Qu	Boundary
(ft)	(ft.)	(ft.)	(tsf)		
	578.9	2.00	0	0.25	
	576.4	2.50	0	0.25	
	573.9	2.50	0	0.25	
	571.4	2.50	0	0.25	
0.6	568.9	2.50	0	0.25	B
3.1	566.4	2.50	2		
5.6	563.9	2.50	2		
8.1	561.4	2.50	1		
10.6	558.9	2.50	2		
13.1	556.4	2.50	2		B
15.6	553.9	2.50	15		
18.1	551.4	2.50	21		
23.1	546.4	5.00	19		
28.1	541.4	5.00	18		
33.1	536.4	5.00	16		
37.6	531.9	4.50	11		B
42.6	526.9	5.00	17	0.25	B
47.6	521.9	5.00	6		B
52.6	516.9	5.00	14		
57.3	512.2	4.70	17		
62.3	507.2	5.00	21		
67.3	502.2	5.00	25		
72.3	497.2	5.00	17		B
77.3	492.2	5.00	21		
82.3	487.2	5.00	13		
87.3	482.2	5.00	24		
92.3	477.2	5.00	29		B
97.3	472.2	5.00	30		
102.3	467.2	5.00	38		
105.6	463.9	3.30	40		

Substructure 4					
Base of Substruct. Elev. (or ground surf for bents)					575.5
Pile or Shaft Dia.					12
Boring Number					BSB-07
Top of Boring Elev.					584.15
Approximate Fixity Elev.					569.5
Individual Site Class Definition:					
N (bar):		17 (Blows/ft.)		Soil Site Class D <----Controls	
N _{ch} (bar):		17 (Blows/ft.)		Soil Site Class D	
s _u (bar):				NA	
Seismic Soil Column	Bot. Of Sample	Sample	Layer Description		
Depth	Elevation	Thick.	N	Qu	Boundary
(ft)	(ft.)	(ft.)	(tsf)		
	581.2	3.00	0	0.25	
	578.7	2.50	0	0.25	B
	576.2	2.50	6		
	573.7	2.50	5		B
	571.2	2.50	1		B
0.9	568.7	2.50	4		
3.4	566.2	2.50	5		
5.9	563.7	2.50	4		B
8.4	561.2	2.50	11		
10.9	558.7	2.50	10		
13.4	556.2	2.50	13		B
17.4	552.2	4.00	8		B
22.4	547.2	5.00	16		
27.4	542.2	5.00	20		B
32.4	537.2	5.00	42		B
37.4	532.2	5.00	16		
42.4	527.2	5.00	18		
47.4	522.2	5.00	17		
52.4	517.2	5.00	19		B
57.4	512.2	5.00	32		
62.4	507.2	5.00	34		B
67.4	502.2	5.00	26		
72.4	497.2	5.00	29		B
77.4	492.2	5.00	31		B
82.4	487.2	5.00	26		B
87.4	482.2	5.00	52		
92.2	477.4	4.80	41		
97.2	472.4	5.00	32		
102.2	467.4	5.00	34		
105.4	464.2	3.20	31		

Global Site Class Definition: Substructures 1 through 8					
N (bar):		18 (Blows/ft.)		Soil Site Class D	
N _{ch} (bar):		19 (Blows/ft.)		Soil Site Class D <----Controls	
s _u (bar):				NA, H < 0.1*H (Total)	

SEISMIC SITE CLASS DETERMINATION

I.D.O.T. BBS FOUNDATIONS AND GEOTECHNICAL UNIT

Modified on 12/10/10

PROJECT TITLE=====

Substructure 5

Base of Substruct. Elev. (or ground surf for bents)	579.5	ft.
Pile or Shaft Dia.	12	inches
Boring Number	BSB-22	
Top of Boring Elev.	586.8	ft.
Approximate Fixity Elev.	573.5	ft.

Individual Site Class Definition:

N (bar): 20 (Blows/ft.) Soil Site Class D <----Controls
 N_{ch} (bar): 20 (Blows/ft.) Soil Site Class D
 s_u (bar): _____ (ksf) NA

Seismic Soil Column Depth (ft)	Bot. Of Sample Elevation (ft)	Sample		Layer Description Boundary
		Thick. (ft)	N Qu (tsf)	
	583.8	3.00	3	B
	581.3	2.50	2	B
	578.8	2.50	0	B
	576.3	2.50	3	
	573.8	2.50	3	B
2.2	571.3	2.50	6	
4.7	568.8	2.50	6	
7.2	566.3	2.50	9	B
9.7	563.8	2.50	12	
12.2	561.3	2.50	14	
14.7	558.8	2.50	17	
19.7	553.8	5.00	14	
24.7	548.8	5.00	24	B
28.4	545.1	3.70	30	
33.4	540.1	5.00	45	B
38.4	535.1	5.00	25	
43.4	530.1	5.00	19	
48.4	525.1	5.00	14	
53.4	520.1	5.00	16	
58.4	515.1	5.00	27	B
63.4	510.1	5.00	46	
68.4	505.1	5.00	30	B
73.4	500.1	5.00	12	B
78.4	495.1	5.00	40	B
83.4	490.1	5.00	20	B
88.4	485.1	5.00	40	B
93.4	480.1	5.00	19	B
98.4	475.1	5.00	37	B
103.4	470.1	5.00	29	B
108.4	465.1	5.00	39	
113.4	460.1	5.00	36	B
116.7	456.8	3.30	23	B

Substructure 6

Base of Substruct. Elev. (or ground surf for bents)	585	ft.
Pile or Shaft Dia.	48	inches
Boring Number	BSB-20	
Top of Boring Elev.	587	ft.
Approximate Fixity Elev.	561	ft.

Individual Site Class Definition:

N (bar): 26 (Blows/ft.) Soil Site Class D <----Controls
 N_{ch} (bar): 26 (Blows/ft.) Soil Site Class D
 s_u (bar): _____ (ksf) NA, H < 0.1*H (Soil)

Seismic Soil Column Depth (ft)	Bot. Of Sample Elevation (ft)	Sample		Layer Description Boundary
		Thick. (ft)	N Qu (tsf)	
	584.0	3.00	3	
	581.5	2.50	2	
	579.0	2.50	0	
	576.5	2.50	0	
	574.0	2.50	0	B
	571.5	2.50	5	
	569.0	2.50	6	
	566.5	2.50	4	
	564.0	2.50	6	B
	561.5	2.50	3	
2.0	559.0	2.50	3	B
5.7	555.3	3.70	7	B
10.7	550.3	5.00	22	
15.7	545.3	5.00	24	
20.7	540.3	5.00	23	
25.7	535.3	5.00	24	B
30.7	530.3	5.00	36	B
35.7	525.3	5.00	14	
40.7	520.3	5.00	17	
45.7	515.3	5.00	18	B
50.7	510.3	5.00	30	B
55.7	505.3	5.00	27	
60.7	500.3	5.00	20	
65.7	495.3	5.00	24	
70.7	490.3	5.00	24	
75.7	485.3	5.00	22	B
80.7	480.3	5.00	31	
85.7	475.3	5.00	31	B
90.7	470.3	5.00	60	B
95.7	465.3	5.00	45	B
100.7	460.3	5.00	27	B
106.0	455.0	5.30	79	B
146.0	415.0	40.00	100 5.00	R

Substructure 7

Base of Substruct. Elev. (or ground surf for bents)	585	ft.
Pile or Shaft Dia.	48	inches
Boring Number	BSB-21	
Top of Boring Elev.	587	ft.
Approximate Fixity Elev.	561	ft.

Individual Site Class Definition:

N (bar): 26 (Blows/ft.) Soil Site Class D <----Controls
 N_{ch} (bar): 26 (Blows/ft.) Soil Site Class D
 s_u (bar): _____ (ksf) NA, H < 0.1*H (Soil)

Seismic Soil Column Depth (ft)	Bot. Of Sample Elevation (ft)	Sample		Layer Description Boundary
		Thick. (ft)	N Qu (tsf)	
	584.0	3.00	6	B
	581.5	2.50	3	B
	579.0	2.50	2	
	576.5	2.50	2	B
	574.0	2.50	5	B
	571.5	2.50	3	B
	569.0	2.50	5	B
	566.5	2.50	3	B
	564.0	2.50	5	B
	561.5	2.50	3	
2.0	559.0	2.50	0	B
5.8	555.3	3.75	4	B
10.8	550.3	5.00	22	
15.8	545.3	5.00	24	B
20.8	540.3	5.00	31	B
25.8	535.3	5.00	21	
30.8	530.3	5.00	25	
35.8	525.3	5.00	27	
40.8	520.3	5.00	17	
45.8	515.3	5.00	16	
50.8	510.3	5.00	20	
55.8	505.3	5.00	12	
60.8	500.3	5.00	19	
65.8	495.3	5.00	20	
70.8	490.3	5.00	19	
75.8	485.3	5.00	23	
80.8	480.3	5.00	19	B
85.8	475.3	5.00	38	B
90.8	470.3	5.00	58	B
95.8	465.3	5.00	38	
100.8	460.3	5.00	35	
106.1	455.0	5.30	36	B
146.1	415.0	40.00	100 5.00	R

Substructure 8

Base of Substruct. Elev. (or ground surf for bents)	580	ft.
Pile or Shaft Dia.	48	inches
Boring Number	BSB-19	
Top of Boring Elev.	556	ft.
Approximate Fixity Elev.	556	ft.

Individual Site Class Definition:

N (bar): 20 (Blows/ft.) Soil Site Class D <----Controls
 N_{ch} (bar): 20 (Blows/ft.) Soil Site Class D
 s_u (bar): _____ (ksf) NA, H < 0.1*H (Soil)

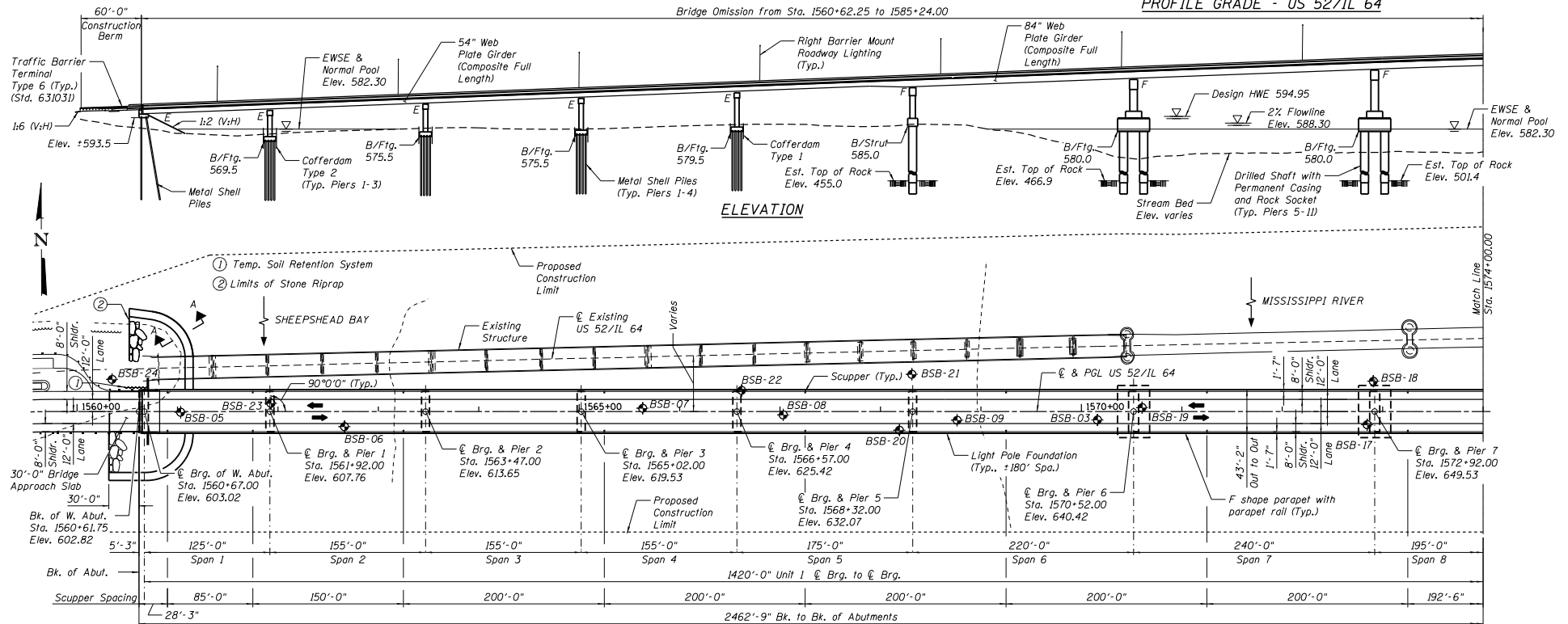
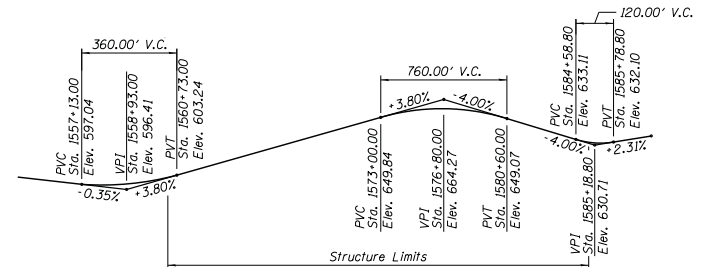
Seismic Soil Column Depth (ft)	Bot. Of Sample Elevation (ft)	Sample		Layer Description Boundary
		Thick. (ft)	N Qu (tsf)	
3.6	552.4	3.60	3	B
6.1	549.9	2.50	10	B
8.6	547.4	2.50	7	
11.1	544.9	2.50	6	
13.6	542.4	2.50	7	B
16.1	539.9	2.50	14	
18.6	537.4	2.50	11	
21.1	534.9	2.50	17	
23.6	532.4	2.50	13	
26.1	529.9	2.50	12	
28.6	527.4	2.50	15	
33.6	522.4	5.00	16	
38.6	517.4	5.00	15	
43.6	512.4	5.00	17	
48.6	507.4	5.00	19	
53.6	502.4	5.00	18	
58.6	497.4	5.00	22	
63.6	492.4	5.00	25	
68.6	487.4	5.00	26	
72.4	483.6	3.80	27	B
77.4	478.6	5.00	78	B
82.4	473.6	5.00	33	
89.6	466.4	7.20	39	B
129.6	426.4	40.00	100 5.00	R

APPENDIX E

Benchmark:
 BM CP5 - Concrete pedestal set south of the west abutment of Illinois River Bridge SN 008-6000 on US 52 @ Savanna Sta. 1560+65.46; Offset 24.85' Lt. NAVD 88 = 597.891 Ft.

Existing Structure: SN 008-6000 Steel girder, steel truss and concrete slab superstructure bridge on pile bents and piers. Approximately 50' to 100' upstream. Approximately 2470' long by 20' wide. Constructed in 1932. To be removed after new structure is complete.
 Traffic Control: none
 No Salvage

- Notes:
- All Elevations are given in NAVD 1988 Datum unless noted. NAVD 1988 = NGVD 1929 - 0.10'.
 - EWSE = Estimated Water Surface Elevation.
 - HWE = High Water Elevation.
 - For ground elevations see Sheet 5.
 - Denotes soil boring.
 - For scupper type see Cross Sections on Sheet 3 & 4.
 - Proposed lighting unit: 35 ft. aluminum pole, 8 ft. davit arm, 250W HPS luminaire, MC2 distribution, mounted on bridge parapet wall.
 - Lighting unit is subject to refinement during the design phase.
 - For Section A-A see Sheet 5.



SEISMIC DATA

Seismic Performance Zone (SPZ) = 1
 Design Spectral Acceleration at 1.0 sec. (S_{D1}) = 0.077g
 Design Spectral Acceleration at 0.2 sec. (S_{D5}) = 0.114g
 Soil Site Class = D (West Abut., Piers 1-8)
 Design Spectral Acceleration at 1.0 sec. (S_{D1}) = 0.054g
 Design Spectral Acceleration at 0.2 sec. (S_{D5}) = 0.086g
 Soil Site Class = C (Piers 9-11, East Abut.)

HIGHWAY CLASSIFICATION

US 52/IL 64 (FAP 17)
 Functional Class: Minor Arterial (Non-urban)
 ADT: 2200 (2015); 2400 (2035)
 ADTT: 230 (2015); 250 (2035)
 DVA: 240
 Design Speed: 45 m.p.h.
 Posted Speed: 40 m.p.h.
 Two-Way Traffic
 Directional Distribution: 50/50

PLAN

DESIGN STRESSES

FIELD UNITS
 f'_c = 3,500 psi
 f'_c = 4,000 psi (Drilled Shafts)
 f_y = 60,000 psi (Reinforcement)
 f_y = 50,000 psi (M270 Grade 50)
 f_y = 50,000 psi (M270 Grade HPS50W, Unit 2 Hanger Plates, Ties & Knuckles)

LOADING HL-93

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

DESIGN SPECIFICATIONS

2012 AASHTO LRFD Bridge
 Design Specifications, 6th Edition
 with 2013 Interims

GENERAL PLAN & ELEVATION - 1
US 52/IL 64 OVER THE MISSISSIPPI RIVER
PUBLIC WATER

F.A.P. RTE. 17 - SEC. 104B-2
 CARROLL (IL) AND JACKSON (IA) COUNTIES
 STATION 1577+60.00
 STRUCTURE NO. 008-0052

FILE NAME =	USER NAME =	DESIGNED - TSB	REVISED
DATE = 1/20/2014	CHECKED - GTH	REVISED	
PLOT SCALE =	DRAWN - TSB	REVISED	
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STATE OF ILLINOIS
 DEPARTMENT OF TRANSPORTATION

FILE NO.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
17	104B-2	Carroll		
CONTRACT NO. 64659			ILLINOIS FED. AID PROJECT	

SHEET NO. 1 OF 5 SHEETS

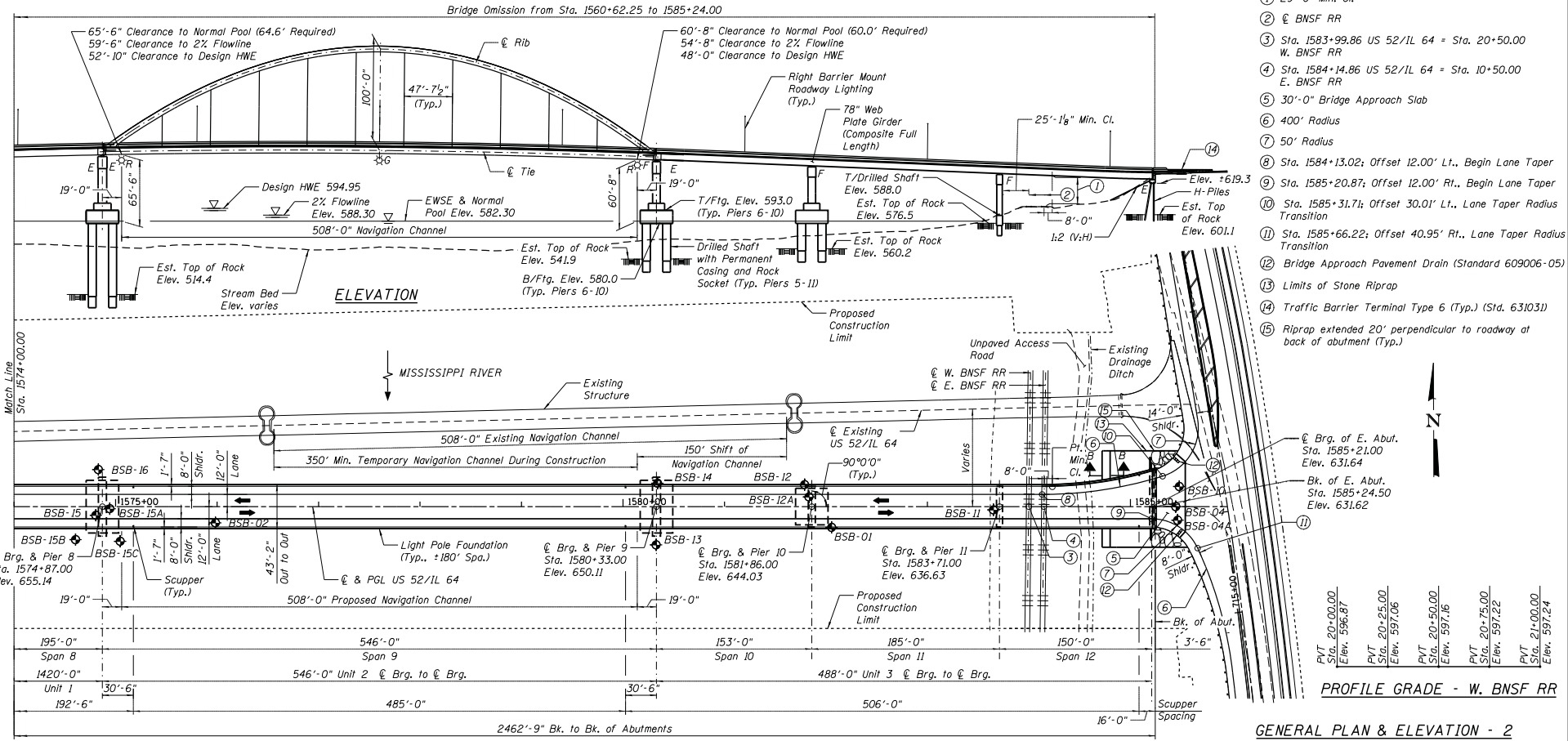
Notes:

1. All Elevations are given in NAVD 1988 Datum unless noted.
2. EWSE = Estimated Water Surface Elevation.
3. HWE = High Water Elevation.
4. For ground elevations see Sheet 5.
5. ♦ Denotes soil boring.
6. For scupper type see Cross Sections on Sheet 3 & 4.
7. Proposed lighting unit; 35 ft. aluminum pole, 8 ft. davit arm, 250W HPS luminaire, MC2 distribution, mounted on bridge parapet wall.
8. Lighting unit is subject to refinement during the design phase.
9. 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.
10. For Section B-B see Sheet 5.

WATERWAY INFORMATION

Drainage Area = 85,500 sq. mi. Low Grade Elev. 596.98 @ Sta. 1557+43.0

Flood	Frea. Yr.	O C.F.S.	Opening Sq. Ft.		Nat. Head - Ft.		Headwater El.		
			Exist.	Prop.	Exist.	Prop.	Exist.	Prop.	
Ten-Year	10	202,000	93,196.8	93,292.9	591.67	0.00	0.01	591.68	591.69
Design	50	259,000	122,842.9	122,919.8	594.94	0.00	0.01	594.94	594.95
Base	100	281,290	133,150.7	133,204.0	596.07	0.00	0.00	596.07	596.07
Max. Calc.	500	337,000	154,320.5	154,357.4	598.21	0.00	0.00	598.21	598.21



- 1 29'-0" Min. Cl.
- 2 @ BNSF RR
- 3 Sta. 1583+99.86 US 52/IL 64 = Sta. 20+50.00 W. BNSF RR
- 4 Sta. 1584+14.86 US 52/IL 64 = Sta. 10+50.00 E. BNSF RR
- 5 30'-0" Bridge Approach Slab
- 6 400' Radius
- 7 50' Radius
- 8 Sta. 1584+13.02; Offset 12.00' Lt., Begin Lane Taper
- 9 Sta. 1585+20.87; Offset 12.00' Rt., Begin Lane Taper
- 10 Sta. 1585+31.71; Offset 30.01' Lt., Lane Taper Radius Transition
- 11 Sta. 1585+66.22; Offset 40.95' Rt., Lane Taper Radius Transition
- 12 Bridge Approach Pavement Drain (Standard 609006-05)
- 13 Limits of Stone Riprap
- 14 Traffic Barrier Terminal Type 6 (Typ.) (Std. 613031)
- 15 Riprap extended 20' perpendicular to roadway at back of abutment (Typ.)

DESIGN SCOUR ELEVATION TABLE

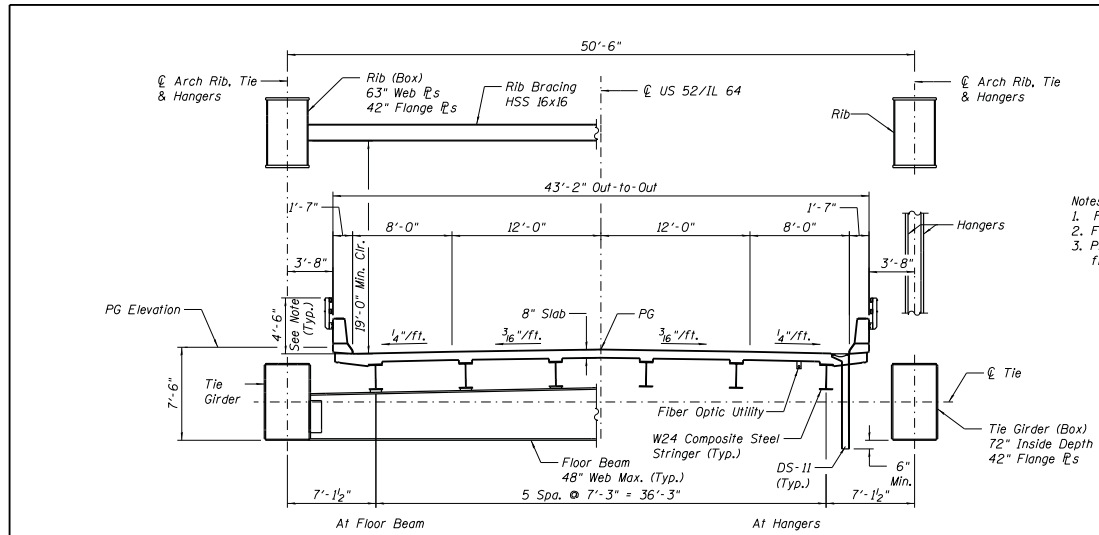
Design Scour Elevation (ft.)	West Abut.	Pier 1	Pier 2	Pier 3	Pier 4	Pier 5	Pier 6	Pier 7	Pier 8	Pier 9	Pier 10	Pier 11	East Abut.
0100	593.5	555.4	558.1	565.7	567.0	520.6	505.8	509.1	520.6	541.9	560.2	576.5	619.3
0500	593.5	553.4	556.2	563.7	565.0	519.6	503.8	507.1	519.6	541.9	560.2	576.5	619.3

PLAN

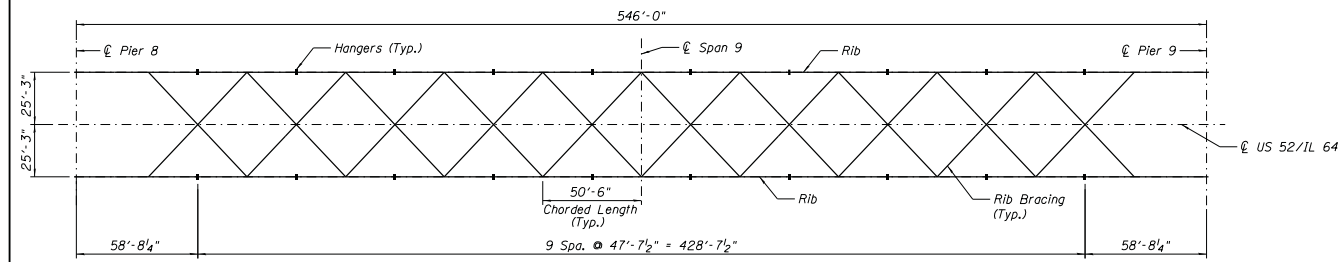
PROFILE GRADE - E. BNSF RR

PVT Sta. 10+00.00 Elev. 597.09	PVT Sta. 10+25.00 Elev. 596.92	PVT Sta. 10+50.00 Elev. 597.06	PVT Sta. 10+75.00 Elev. 597.20	PVT Sta. 11+00.00 Elev. 597.14
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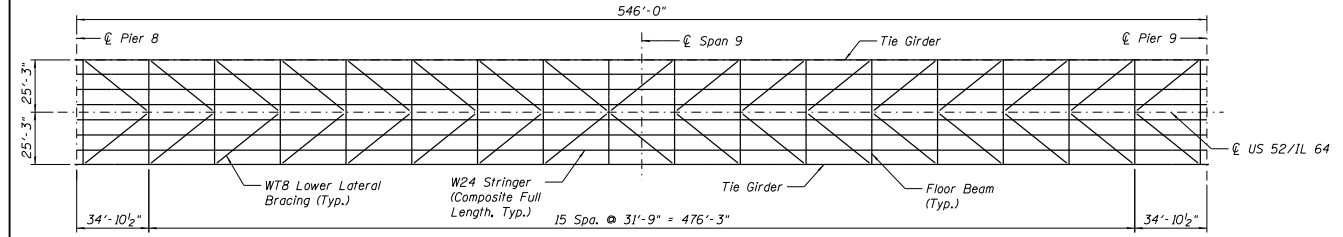
GENERAL PLAN & ELEVATION - 2
US 52/IL 64 OVER THE MISSISSIPPI RIVER
 PUBLIC WATER
 F.A.P. RTE. 17 - SEC. 104B-2
 CARROLL (IL) AND JACKSON (IA) COUNTIES
 STATION 1577+60.00
 STRUCTURE NO. 008-0052



CROSS SECTION - UNIT 2
(Looking East)

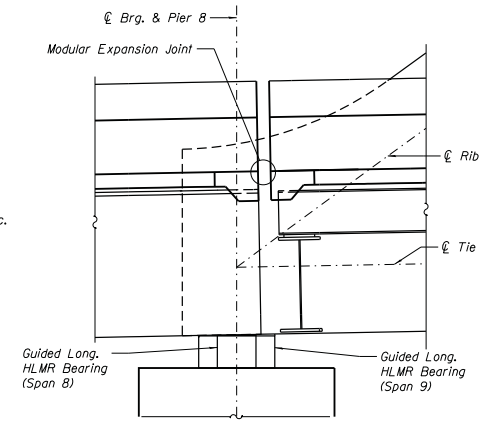


RIB CROSS BRACING PLAN - UNIT 2

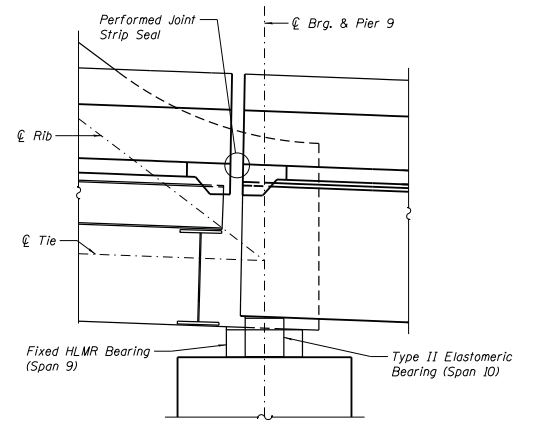


FRAMING PLAN - UNIT 2

- Notes:
 1. For Parapet Detail see Sheet 4.
 2. Fiber Optic Utility - 2" conduit for Windstream - KDL, Inc.
 3. Provide downspout brace to floor beam at 1'-9" distance from the bottom of the downspout.



SECTION THROUGH EXPANSION JOINT PIER 8



SECTION THROUGH EXPANSION JOINT PIER 9

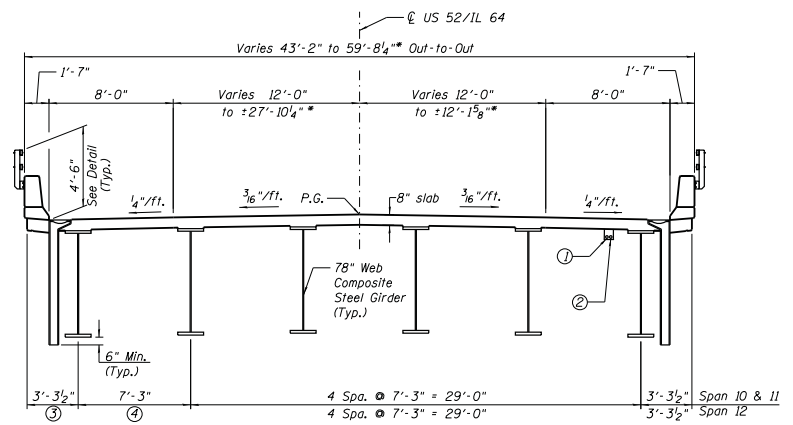
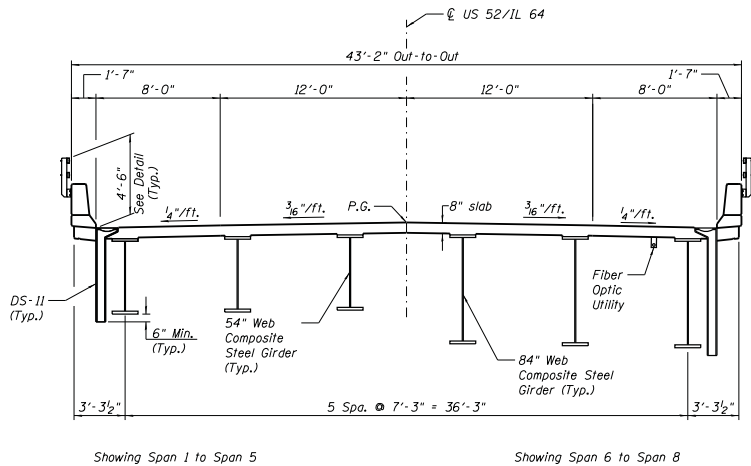
DETAILS - 1
 US 52/IL 64 OVER THE MISSISSIPPI RIVER
 PUBLIC WATER
 F.A.P. RTE. 17 - SEC. 104B-2
 CARROLL (IL) AND JACKSON (IA) COUNTIES
 STATION 1577+60.00
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PARSONS	1/20/2014	CHECKED -	GTH	REVISED
		DRAWN -	PY	REVISED
		CHECKED -	GTH	REVISED

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
17	104B-2	Carroll		
			CONTRACT NO. 64659	
ILLINOIS FED. AID PROJECT				

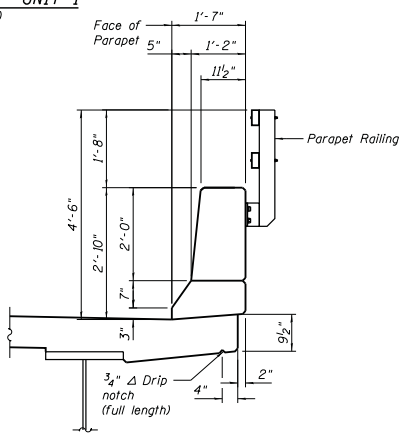
- ① Fiber Optic Utility
- ② Bridge Electrical Utility
- ③ Varies 2'-0" min. to 3'-8" max.
- ④ 3 Spa. @ 7'-5 5/8" = 22'-4 7/8"
 Ⓢ E. Abut.



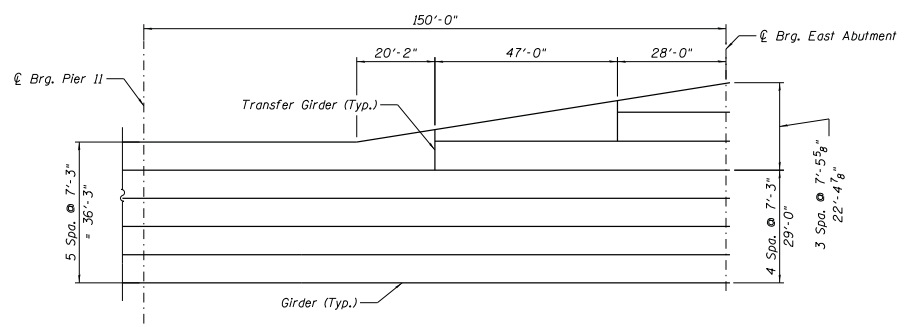
CROSS SECTION - UNIT 3
(Looking East)

* Dimension \perp to \perp US 52/IL 64 Ⓢ Bk. of E. Abut.

CROSS SECTION - UNIT 1
(Looking East)

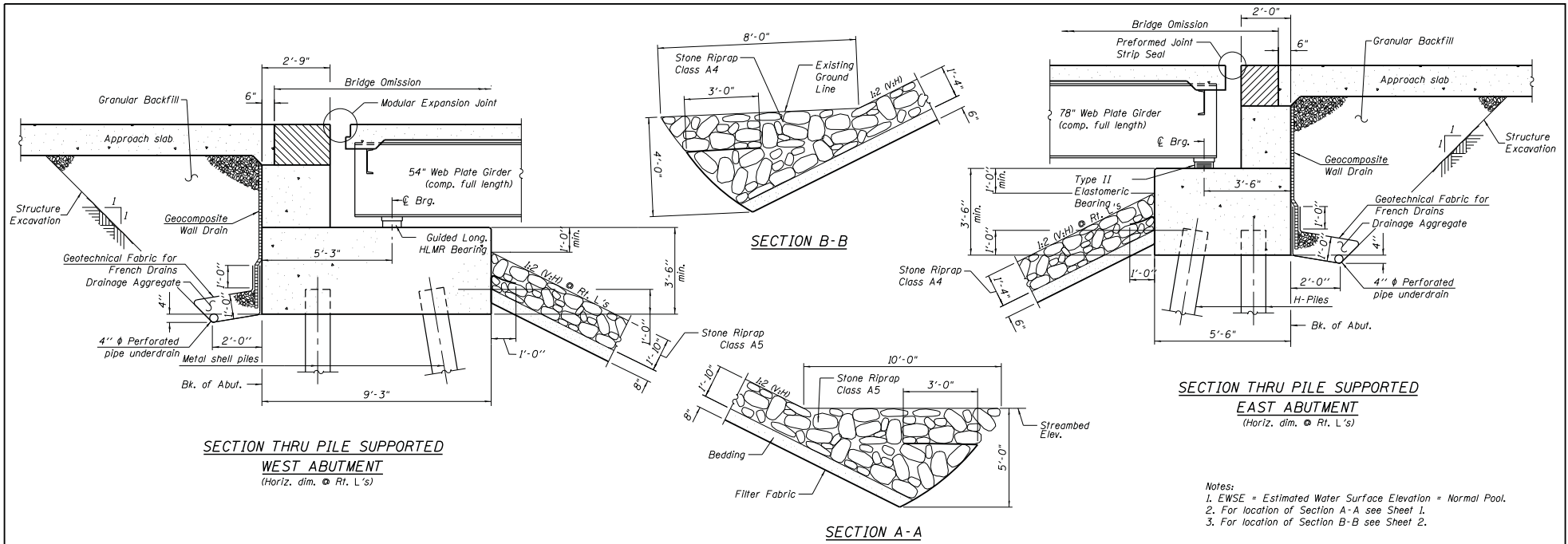


Notes:
 1. Fiber Optic Utility - 2" Conduit for Windstream - KDL, Inc.
 2. Bridge Electrical Utility - 2" Conduit for Span 9 interior maintenance electrical and lighting and navigation lighting.



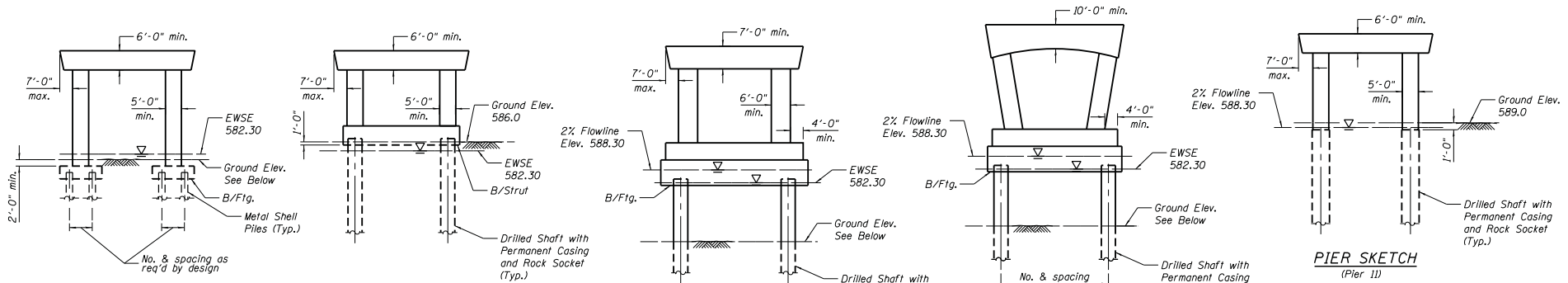
DETAILS - 2
US 52/IL 64 OVER THE MISSISSIPPI RIVER
PUBLIC WATER
F.A.P. RTE. 17 - SEC. 104B-2
CARROLL (IL) AND JACKSON (IA) COUNTIES
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		DATE = 1/20/2014	CHECKED - TSB	REVISIONS		17	104B-2	Carroll	NO.
		PLOT SCALE =	DRAWN - TSB	REVISIONS		CONTRACT NO. 64059			
		PLOT DATE =	CHECKED - GTH	REVISIONS		ILLINOIS FED. AID PROJECT			
SHEET NO. 4 OF 5 SHEETS									



SECTION THRU PILE SUPPORTED EAST ABUTMENT
(Horiz. dim. @ Rt. L's)

Notes:
1. EWSE = Estimated Water Surface Elevation - Normal Pool.
2. For location of Section A-A see Sheet 1.
3. For location of Section B-B see Sheet 2.



PIER SKETCH
(Piers 1-4)

Pier	Ground Elev.
1	576.0
2	582.0
3	582.0
4	586.0

PIER SKETCH
(Pier 5)

PIER SKETCH
(Piers 6, 7 & 10)

Pier	Ground Elev.
6	552.0
7	559.0
10	567.0

PIER SKETCH
(Piers 8 & 9)

Pier	Ground Elev.
8	556.0
9	563.0

PIER SKETCH
(Pier 11)

DETAILS - 3
US 52/IL 64 OVER THE MISSISSIPPI RIVER
PUBLIC WATER
F.A.P. RTE. 17 - SEC. 104B-2
CARROLL (IL) AND JACKSON (IA) COUNTIES
STATION 1577+60.00
STRUCTURE NO. 008-0052

PARSONS	FILE NAME :	USER NAME :	DESIGNED - TMB	REVISED	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	<table border="1"> <tr> <th>F.A.P. RTE.</th> <th>SECTION</th> <th>COUNTY</th> <th>TOTAL SHEETS</th> </tr> <tr> <td>17</td> <td>104B-2</td> <td>Carroll</td> <td>NO.</td> </tr> <tr> <td colspan="3"></td> <td>CONTRACT NO. 64659</td> </tr> <tr> <td colspan="4">ILLINOIS FED. AID PROJECT</td> </tr> </table>	F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	17	104B-2	Carroll	NO.				CONTRACT NO. 64659	ILLINOIS FED. AID PROJECT			
	F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS																		
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SHEET NO. 5 OF 5 SHEETS																						

