STRUCTURE GEOTECHNICAL REPORT
WESTBOUND INTERSTATE 290 RAMP BRIDGE TO SOUTHBOUND INTERSTATE 90/94
PROPOSED SN 016-1715, EXISTING SN 016-2450
SECTION 2014-013R&B-R
IDOT D-91-227-13, PTB 163/ITEM 001
CIRCLE INTERCHANGE RECONSTRUCTION
COOK COUNTY, ILLINOIS

for

AECOM

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Original: June 19, 2017
Revised: December 5, 2017

Technical Report Documentation Page

1. Title and Subtitle Structure Geotechnical Report: Westbound Interstate 290 Ramp Bridge to Southbound Interstate 90/94, WS Ramp Bridge, Circle Interchange Reconstruction		**2. Report Date** Original: June 19, 2017 Revised: December 5, 2017 **3. Report Type** ☒ SGR ☐ RGR ☐ Draft ☒ Final ☒ Revised
4. Route / Section / County FAI 290/90/94 / 2014-013R&B-R / Cook		**5. IDOT Project Number(s)** Job D-91-227-13
6. PTB / Item No. 163/001	**7. Existing Structure Number(s)** SN 016-2450	**8. Proposed Structure Number(s)** SN 016-1715
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11. Abstract

The existing West-South (WS) Ramp Bridge connecting Westbound Interstate 290 to Southbound Interstate 90/94 will be replaced by a new, seventeen-span structure The bridge will carry the ramp over both directions of I-90/94, both directions of I-290, and Harrison Street. The north end of the structure will connect to the existing Congress Viaduct (SN 016-0461) by way of a shared pier. The bridge will terminate north of Taylor Street at a proposed abutment. The total back-to-back bridge length will measure 1,919.4 feet and the out-to-out width will be variable.

Existing embankment materials encountered along the proposed alignment are made up of stiff to hard, silty clay loam and silty loam fill. Beneath the fill, the borings encountered 30 to 40 feet of very soft to medium stiff clay overlying stiff to hard silty clay. Deeper foundation soils include dense to very dense silty loam and hard silty clay loam resting on top of strong, fair to good quality dolostone, which was encountered at 90 to 100 feet below existing grade. The site classifies in the Seismic Class D and is in the Seismic Performance Zone 1.

New fill retaining walls will support the south approach embankment behind the abutment. The approach pavement settlement and global stability will depend on the type, height, and geometry of these new retaining walls and will be discussed in separate retaining wall SGRs.

The proposed abutment and piers could be supported on drilled shafts founded in the very dense silty loam, on top of bedrock or socketed into the bedrock. For shafts founded in silty loam, we estimate factored resistances of 230 to 930 kips for 3- to 6-foot diameter bases. For rock sockets, we estimate factored resistance of 1700 to 3100 kips. The shafts will require temporary casing to protect against groundwater infiltration and soft clay squeezing. Crosshole sonic logging is recommended to test the structural integrity of shafts on top of bedrock or into the bedrock if permanent casing is not installed.

A number of temporary excavations will likely be required to remove existing facilities and construct the new bridge abutment. The design of temporary sheeting should be in accordance with IDOT *Design Guide 3.13.1* or should include the pay item *Temporary Soil Retention System*.

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1.0 INTRODUCTION

This report presents the results of our subsurface investigation, laboratory testing, and geotechnical evaluations for the design and construction of the new West-South (WS) Ramp Bridge connecting Westbound Interstate 290 (I-290) with Southbound Interstate 90/94 (I-90/94) within the Circle Interchange in Chicago, Cook County, Illinois. A *Site Location Map* is presented as Exhibit 1.

1.1 Proposed Structure

Wang Engineering, Inc. (Wang) understands AECOM envisions a new, seventeen-span structure replacing the existing WS Ramp Bridge. The structure begins at the northeast end with a shared pier (Pier C2) with the Westbound Congress Viaduct (SN 016-0461), proceeds northwest over both directions of I-90/94, turns south to cross over both directions of I-290 and Harrison Street, and ultimately terminates at the south end with an abutment and mechanically-stabilized earth (MSE) walls on the sides. The bridge shares Pier 11 with the end of the proposed Taylor Street Bypass Bridge (SN 016-1718). The bridge will have a total length of 1,925'-$1\frac{3}{16}$" from CL Pier C2 to back of South Abutment and divided into five units. The individual units are further divided into seventeen spans with lengths ranging from 70.1 to 150.0 feet. The out-to-out bridge width will vary from 29.2 to 61.2 feet to accommodate one 16-foot wide lane, one 6-foot wide shoulder, one 4-foot wide shoulder, and two barriers.

The abutment at the south end of the structure will be constructed atop a new approach embankment supported on both sides by MSE walls (SNs 016-1803 and 016-1804). We estimate the walls will have

a maximum height of about 15 to 20 feet measured from the existing ground surface to the top of the proposed abutment. Temporary steel sheeting and/or *Temporary Soil Retention Systems* may be required.

The purpose of our investigation was to characterize the site soil and groundwater conditions, perform geotechnical analyses, and provide recommendations for the design and construction of the foundations.

1.2 Existing Structure

The proposed structure is a realignment of existing SN 016-2450. The existing structure built in 1950 is a twenty-span structure with an overall length of approximately 1329'-6". The new ramp will be positioned in the same general location as the existing. The primary adjustments include shifting the shared Congress Viaduct pier to the east by approximately 90 feet and straightening the curve along the southern 650 feet of ramp. The site is currently a system of numerous ramps, embankments, and expressways that are scheduled for complete renovation.

2.0 SITE CONDITIONS AND GEOLOGICAL SETTING

The site is located within the City of Chicago. On the USGS *Chicago Loop 7.5 Minute Series* map, the bridge is located in the NW¼ of Section 16, Tier 39 N, Range 14 E of the 3rd 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 confirm the dependability and consistency of the present subsurface investigation results. For the study of the regional geologic framework, Wang considered northeastern Illinois in general and Cook County in particular. Exhibit 2 illustrates the *Site and Regional Geology*.

2.1 Physiography

The site is situated within the northern section of the Chicago/Calumet lacustrine plain (Chrzatowsky and Thompson 1992). The flat, lakeward-sloping surface is a wave-scoured groundmoraine covered by thin and discontinuous offshore lacustrine silt and clay (Willman 1971).

At the proposed bridge location, a number of existing ramps cross the alignment, converging and diverging with I-90/94. The elevation along the existing ramps varies between 588 to 592 feet, whereas I-90/94 was constructed within a minor cut to an elevation of about 578 feet.

2.2 Surficial Cover

Within the project area, a more than 75-foot thick, Wisconsinan-age glacial drift covers the bedrock (Leetaru et al. 2004). The glacial cover is made up of clay and silt of the Equality Formation of the Mason Group and diamictons of the Wadsworth and Lemont Formations of the Wedron Group (Hansel and Johnson 1996). The Equality Formation is made up of bedded silt and clay, locally laminated, with lenses and/or thin beds of sand and gravel. The Wadsworth Formation consists of relatively homogenous, massive, gray till with clay to silty clay matrix, with dolostone and shale clasts and occasional lenses of sorted and stratified silt. The Wadsworth Formation is underlined by the pebbly silty clay loam to silty loam diamicton of the Yorkville Member of the Lemont Formation, known informally as the Chicago "hardpan."

The Equality Formation is characterized by low strength, medium to high plasticity, and medium to high moisture content. The underlying Wadsworth Formation is characterized by low plasticity, medium to low moisture content, medium to very stiff consistency, poor permeability, and low compressibility. The Yorkville Member is characterized by low plasticity, high blow counts, and low moisture content (Bauer et al. 1991; Peck and Reed 1954).

2.3 Bedrock

In the project area, the glacigenic deposits rest unconformably over a 350-foot thick Silurian-age dolostone. The top of bedrock may be encountered at elevations lower than 500 feet or 75 to 100 feet below ground surface (bgs). The Silurian dolostone dips gently eastward at a pace of 15 feet per mile. Only inactive faults are known in the area, and the seismic risk is minimal (Leetaru et al. 2004; Willman 1971). There are no records of mining activity in the area, but deep tunnel excavations are known to exist throughout the Circle Interchange area.

Our subsurface investigation results fit into the local geologic context. The borings drilled in the project area revealed the native sediments consist of clay to silty clay diamicton of the Wadsworth Formation resting on top of more competent silty clay loam diamicton (hardpan) of the Lemont Formation, which in turn is underlain by bedrock. Sound dolostone bedrock was sampled or inferred at depths deeper than 85.0 feet bgs or 479 to 492 feet elevation, within or close to the range

predicted by published geological data.

3.0 METHODS OF INVESTIGATION

The following sections outline the subsurface and laboratory investigations performed by Wang.

3.1 Subsurface Investigation

The subsurface investigation in the Circle Interchange, performed by Wang in March through October 2013, includes ten structure borings adjacent to the WS Ramp alignment. The borings are designated as 1703-B-05, 2055-B-04, 1714-B-01, 1714-B-02, 2081-B-03, 2081-B-04, 18-RWB-02, 18-RWB-03, 13-RWB-01, and 1087-B-01. The borings were drilled from elevations of 573.9 to 594.6 feet to depths of 50 to 117 feet bgs; the borings with RWB designations are retaining wall borings and are generally shallower. Northings and eastings were surveyed by Wang with a mapping-grade GPS unit, whereas elevations, stations, and offsets were provided by AECOM. The boring locations are presented in the *Boring Logs* (Appendix A) and in the *Boring Location Plan* (Exhibit 3).

After the first report submittal in December 2013, Wang drilled additional structure borings along the ramp. The additional borings are designated as 0461-B-01, 1087-B-02, 1087-B-02alt, 1706-B-02, 1714-B-01, 1714-B-02, 1715-B-01 through 1715-B-05, 1715-PMT-01, 22-RWB-03, 2055-B-04, 2081-B-03 through 2081-B-05, 10-RWB-01, 10-RWB-02, 13-RWB-01, 13-RWB-03, and 15-RWB-01.

A truck-mounted drilling rig, equipped with hollow stem augers and mud rotary equipment, was used to advance and 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 30 feet bgs and at 5-foot intervals thereafter. Samples collected from each interval were placed in sealed jars for further examination and testing. NWD4-size bedrock cores were collected from Boreholes 1087-B-02alt, 1706-B-02, 1714-B-02, 1715-B-05, 1715-PMT-01, 2055-B-04, 2081-B-03, 2081-B-05, 10-RWB-01, 10-RWB-02, and 13-RWB-03 in 10-foot runs.

Field boring logs, prepared and maintained by a Wang engineer, include lithological descriptions, visual-manual soil classifications (IDH Textural Classification), results of Rimac and/or pocket penetrometer unconfined compressive strength tests, and results of Standard Penetration Tests (SPT) recorded as blows per 6 inches of penetration. The bedrock cores were described and measured for recovery and Rock Quality Designation (RQD).

Groundwater observations were made during and at the end of drilling operations. The boreholes were grouted immediately upon completion.

3.2 Vane Shear Tests

Wang performed vane shear tests nearby the structure in Borings VST-01 and VST-06 to determine in-situ shear strength of very soft to soft silty clay. After drilling to the desired depth, casing was installed and vane shear test was performed using M-1000 Vane Borer Test Kit. Tests were performed in undisturbed and remolded conditions. In general, the vane shear values for soft clays were significantly higher than the corresponding values from unconfined compressive strength tests using the RIMAC apparatus. These vane shear test results were used in our analysis.

3.3 Laboratory Testing

Soil samples were tested in the laboratory for moisture content (AASHTO T-265). Atterberg limits (AASHTO T 89/T 90) and particle size (AASHTO T 88) analyses were performed to classify selected samples. Unconfined compressive strength test (T22) was performed on selected bedrock cores. Field visual descriptions of the soil samples were verified in the laboratory and the tested samples were classified in accordance with the IDH Textural Classification chart. Laboratory test results are shown in the *Boring Logs* (Appendix A) and in the *Laboratory Test Results* (Appendix B).

3.4 Piezometer Installation

Groundwater encountered during borings is noted on boring logs. However to better understand individual aquifer responses to precipitation events and record long-term water table, monitoring wells (piezometers) 10-PZ-01 and 1703-PZ-01 were installed in the area. Piezometers were installed in accordance with ASTM D 5092, "*Standard Practice for Design and Installation of Ground Water Monitoring Wells in Aquifers."* Piezometer installation involved drilling to the water bearing deposit of interest and installing a screened PVC casing within this discrete zone. A washed-sand filter pack was placed in the annular space around the screen and capped by a bentonite plug that isolates the layer. A solid riser PVC pipe was extended to the ground surface and the remainder of the boring was backfilled. The screen was placed within granular layer deposit above the bedrock.

To ensure that the installation allows for the free flow of groundwater, the piezometers were developed by pumping to remove sediment incorporated in the screen and filter pack during installation. Pumping continued until the piezometer produced the continuous flow of clear water.

Groundwater levels were recorded autonomously at defined intervals by digital pressure loggers suspended within the water column. Barometric affects are compensated by a second in-air pressure logger installed in the riser pipe. Data is retrieved from the loggers periodically, downloaded to a computer for analysis and presentation.

4.0 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.

4.1 Soil Conditions

The WS Ramp investigation sampled the existing SB I-90/94 shoulder, and the existing shoulders of both EB and WB I-290. The pavement sections include either 2 to 5 inches of asphalt over 7 to 15 inches of concrete or 14 to 16 inches of asphalt. The borings drilled off the roadways encountered 3 to 15 inches of black, loamy topsoil.

The alignment of the WS Ramp extends over a long section of the Circle Interchange site, and a significant degree of variability is evident in the boring logs, particularly when it comes to the fill materials used for the construction of embankments. In descending order, the general lithological succession encountered beneath pavement or topsoil includes 1) man-made ground (fill); 2) medium stiff to hard silty clay; 3) very soft to medium stiff clay to silty clay; 4) stiff to hard silty clay and silty clay loam; 5) medium stiff to very stiff clay; 6) dense to very dense silt loam and hard silty clay loam; and 7) strong, fair to good quality dolostone.

(1) Man-made ground (fill)

The existing embankments are made up of about 5 to 10 feet of stiff to hard, brown and black silty clay loam to silty loam fill. Very loose to medium dense sand was also encountered near the Harrison Street Bridge and along Taylor Street Exit Ramp. The fill has unconfined compressive strength (Q_u) values of 1.0 to greater than 4.5 tsf and moisture content values of 7 to 25%. The range and average of soil parameters depend on the embankment location. Thus, the embankments surrounding I-290 and Halsted Street generally consist of denser, clayey material, whereas the embankments around Harrison

Street and the existing East-South Ramp are made up of looser and more granular soils with N-values of 2 to 13 blows/foot, occasionally getting to 31 blows/foot.

(2) Medium stiff to hard silty clay loam

Underneath the fill, pavement or topsoil, borings encountered 2.5- to 10.0-foot of medium stiff to very stiff, brown and gray to gray silty clay to silty clay loam with Qu values of 0.7 to 4.5 tsf and averaging 2.0 tsf and MC values of 14 to 28% and averaging 20%.

(3) Very soft to medium stiff clay to silty clay

At elevations of about 563 to 583 feet, the borings advanced through about 30 to 45 feet of very soft to medium stiff, gray clay to silty clay. The unit have Q_u values of 0.03 to 0.8 tsf with an average of about 0.4 tsf and moisture content values of 15 to 36 averaging 25%. Laboratory index testing on samples of this material shows liquid limit (L_L) values of 30 to 37% and plastic limit (P_L) values of 15 to 18%.

(4) Stiff to hard silty clay

The very soft to medium stiff clay to silty clay is underlain by approximately 15 to 20 feet of stiff to hard, gray silty clay. The Q_u values range between 1.2 and 7.8 tsf averaging 3.7 tsf and moisture content values range from 13 to 24% averaging 18%. The L_L values measure between 22 and 37%; P_L values, 13 and 18%.

(5) Medium stiff to very stiff clay

At about 520 to 525 feet elevation, the borings encountered a thin, 5 to 7-foot thick layer of clay with noticeably higher moisture content and lower Q_u values. This material was encountered discontinuously along the alignment, but it is an important component of the subsurface profile due to its greater estimated deformability than the harder material directly above it. This soil has Q_u values of 0.7 to 3.4 tsf and moisture content values of 23 to 38%; index testing shows a L_L value of 35% and a P_L value of 17%. We recommend deep foundations extend below this layer.

Below this unit, discontinuously, thick lenses of about 5 to 20 feet of loose to very dense silt and sand are present. This lenses are water bearing.

(6) Dense to very dense silty loam and hard silty clay loam

At an elevation of about 511 to 536 feet, the borings advanced through dense to very dense, gray silty loam and hard, gray silty clay loam that extend to the top of weathered bedrock or very dense gravelly

sand. The silty loam has SPT N-values of 15 blows/foot to greater than 50 blows/6 inches and moisture contents of 9 to 24%, whereas the material classified as hard silty clay loam has Qu values of 5.7 to greater than 10.0 tsf and moisture content values of 10 to 23%.

In borings that reach the top of the bedrock, this unit includes or is underlain by very dense, gray gravelly sandy loam. The gravelly sandy loam recorded spoon refusals. Since the gravelly sand and silty loam were encountered wet, advancing uncased drilled shaft foundations through this water-bearing soil may present excavation challenges.

(7) Strong, fair to good quality dolostone

The top of sound bedrock are at elevations ranging from 479 to 492 feet. A 10-foot long bedrock cores were performed in borings near the structure. The coring revealed strong dolostone of very poor to good rock quality having RQD values of 8 to 86%. Strength testing on cores from borings in the Circle Interchange area measured uniaxial compressive strength values averaging about 9,500 psi.

4.2 Groundwater Conditions

Groundwater was encountered during drilling throughout the Circle Interchange within the gravelly sand and silty materials below an elevation of about 500 feet. In a number of borings, perched groundwater was also encountered in the fill materials immediately above the medium soft silty clay. At boring completion, the groundwater could not be measured because of mud rotary drilling was used below depths of 10 to 12.5 feet bgs. Two piezometers designated as 10-PZ-01 and 1703-PZ-01 were installed near the structure. The screen was placed within gravelly sand layer deposit just above the bedrock. The readings show an average water table at elevation 553 feet under hydrostatic pressure. The design and construction of the drilled shafts should consider groundwater table encountering under hydrostatic pressure within this granular deposit.

The groundwater levels monitored in the piezometer 10-PZ-01 show elevations ranging from 549.22 to 554.50 feet with an average water table elevation of 552.72 feet. The first and last readings were taken on December 16, 2014 and March 30, 2017 respectively.

The groundwater levels monitored in the piezometer 1703-PZ-01 show elevations ranging from 540.97 to 55.28 feet with an average water table elevation of 553.37 feet. The first and last readings were taken on November 22, 2014 and March 30, 2017 respectively.

4.3 Seismic Design Considerations

The seismic site class has been determined in accordance with the IDOT *All Geotechnical Manual Users (AGMU) 9.1* method of analysis. The soils within the top 100 feet have a weighted average S_u greater than 1.00 ksf (AASHTO 2014; Method C controlling), and the results classify the site in the Seismic Site Class D in accordance with the IDOT method. The analysis has been performed for shaft foundations with minimum diameters of 36 inches. Smaller diameter shafts or driven piles may have more conservative seismic design parameters. The project location belongs to the Seismic Performance Zone 1. The seismic spectral acceleration parameters recommended for design in accordance with AASHTO (2014) are summarized in Table 1. The factor of safety (FOS) against liquefaction for the bridge site is greater than the AASHTO-required value of 1.

Table 1: Seismic Design Parameters

Spectral Acceleration Period (sec)	Spectral Acceleration Coefficient[1)] (% g)	Site Class Factors	Design Spectrum for Site Class D[2)] (% g)
0.0	PGA = 4.2	F_{pga} = 1.6	**A_s = 6.6**
0.2	S_S = 9.0	F_a = 1.6	**S_{DS} = 14.4**
1.0	S_1 = 3.6	F_v = 2.4	**S_{D1} = 8.5**

1) Base spectral acceleration coefficients from AASHTO (2014)

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)

5.0 FOUNDATION ANALYSIS AND RECOMMENDATIONS

Geotechnical evaluations and recommendations for the approach embankment, approach slab, and structure foundations are included in the following sections. A new abutment at the south end of the bridge is shown on the latest TSL plan provided to Wang. Structure foundation base elevations are estimated from the information provided in the TSP plan. At this point in the SGR preparation, we recommend supporting the abutment and piers on drilled shafts.

5.1 Approach Embankments and Slabs

Wang will address settlement and global stability for the south approach embankment and approach

slabs in the individual retaining wall SGR. We anticipate the walls and backfill will undergo long-term consolidation settlements, and the walls will require ground improvement to meet the IDOT-required FOS for global stability.

5.1.1 Settlement

The ramp grading behind the abutment will include a 15 to 20-foot tall fill section. We anticipate the fill will induce long-term consolidation settlements of 6 to 10 inches without ground improvement and/or using light weight fill. The foundation soils will require improvement prior to fill placement; alternatively, the retaining walls will require deep foundations. These evaluations are included in a SGR for SN 016-1803.

5.1.2 Global Stability

The retaining walls proposed along the approach embankments will require ground improvement. The global slope stability for the walls is discussed in SGR for SN 016-1803.

5.2 Structure Foundations

Wang recommends supporting the abutments and piers on drilled shafts. The shafts could be supported within the very dense silty loam (**Layer 5**), on top of bedrock or socketed into the bedrock. Due to noise and vibration concerns, we do not recommend the use of driven piles.

Preliminary loads for the substructures provided by AECOM are shown below.

Location	*Total Service DL*	*Total Service LL*	*Total Service Load (DL + LL)*	*Total Factored DL*	*Total Factored LL*	*Total Factored Load (DL + LL)*
Pier 1	843.60	556.65	1400.25	1082.994	974.14	2057.13
Pier 2	995.22	631.64	1626.86	1282.714	1105.37	2388.08
Pier 3	1296.46	661.07	1957.53	1672.222	1156.87	2829.09
Pier 4	807.97	635.81	1443.78	1033.223	1112.67	2145.89
Pier 5	1015.77	575.30	1591.07	1306.814	1006.78	2313.59
Pier 6	971.68	580.59	1552.27	1251.439	1016.03	2267.47
Pier 7	952.83	577.08	1529.91	1226.973	1009.89	2236.86
Pier 8	677.64	627.50	1305.14	870.4494	1098.13	1968.57

Pier 9	790.35	520.16	1310.51	1018.086	910.28	1928.37
Pier 10	690.22	481.18	1171.40	888.7856	842.07	1730.85
Pier 11	1229.03	1096.03	2325.06	1547.699	1918.05	3465.75
Pier 12	1771.42	1041.30	2812.72	2288.744	1822.28	4111.02
Pier 13	1675.17	1041.30	2716.47	2168.438	1822.28	3990.71
Pier 14	1124.15	1032.72	2156.87	1447.845	1807.26	3255.10
Pier 15	1683.65	1041.30	2724.95	2179.041	1822.28	4001.32
Pier 16	1548.14	1041.00	2589.14	2009.541	1821.75	3831.29
S Abut	583.70	515.88	1099.58	750.9139	902.79	1653.70

5.2.1 Drilled Shafts

The foundations for the abutments and piers could be supported on drilled shafts. The borings encountered 15 feet or more of very dense silty loam at elevations below 515 feet. We estimate the shafts could be established within this material (**Layer 5**). Alternatively, the shafts could be supported on top of bedrock or socketed into the bedrock encountered at elevations ranging from 479 to 492 feet.

Shafts bearing on intermediate geomaterials with N-values greater than 50 blows per 6-inches of penetration should be designed for an end bearing resistance factor (ϕ_{stat}) of 0.55 (AASHTO 2014). We estimate the shafts in the very dense silty loam will have a nominal unit base resistance of 60 ksf and a factored unit base resistance of 33 ksf. The R_F, R_N, and estimated base elevations are summarized below in Table 2 for 3-, 4-, and 6-foot diameter base. We estimate the settlement of the shafts will be less than 1.0 inch if designed using the above recommended resistances.

The settlement mentioned in report Section 5.1.1 is calculated at the south abutment for the approach embankment without any ground improvement and considering regular embankment fill. There will be MSE walls identified as Wall 14 (SN 016-1803) on both sides at the south abutment. SGR for this wall recommends ground improvement using aggregate columns and using light weight cellular concrete fill (LCCF) for the MSE wall reinforced zone and in between the parallel MSE walls. Settlement with these recommendations is not expected to be more than one inch near the south abutment. The relative settlement is expected to be not more than 0.4 inches for the shafts established in hardpan. Therefore, there will be very negligible down drag loads on the drilled shafts. We do not see any need to include downdrag loads in Table 2.

Table 2: Estimated Resistances and Base Elevations for Shafts in Very Dense Silty Loam

Structure Unit	Shaft Cap Base Elevations (feet)	Nominal Unit Base Resistance (ksf)	Factored Base Resistance (ksf)	Base Diameter (feet)	Nominal Shaft Resistance, R_N (kips)	Factored Resistance Available, R_F (kips)	Total Shaft Length (feet)	Estimated Shaft Base Elevation (feet)
Piers 1 (1715-B-01)	583	60	33	3	424	233	75	508
				4	754	415	75	508
				6	1696	933	75	508
Piers 2 (22-RWB-03)	580	60	33	3	424	233	72	508
				4	754	415	72	508
				6	1696	933	72	508
Piers 3 (1715-B-02)	574	60	33	3	424	233	66	508
				4	754	415	66	508
				6	1696	933	66	508
Piers 4 (1706-B-02)	571	60	33	3	424	233	64	507
				4	754	415	64	507
				6	1696	933	64	507
Piers 5 (1715-B-03)	570	60	33	3	424	233	63	507
				4	754	415	63	507
				6	1696	933	63	507
Piers 6 (1715-B-03)	578	60	33	3	424	233	71	507
				4	754	415	71	507
				6	1696	933	71	507
Piers 7 (1715-B-04)	586	60	33	3	424	233	85	501
				4	754	415	85	501
				6	1696	933	85	501
Piers 8 (1714-B-01)	590	60	33	3	424	233	86	504
				4	754	415	86	504

Structure Unit	Shaft Cap Base Elevations (feet)	Nominal Unit Base Resistance (ksf)	Factored Base Resistance (ksf)	Base Diameter (feet)	Nominal Shaft Resistance, R_N (kips)	Factored Resistance Available, R_F (kips)	Total Shaft Length (feet)	Estimated Shaft Base Elevation (feet)
				6	1696	933	86	504
Pier 9 (1714-B-02)	576	60	33	3	424	233	70	506
				4	754	415	70	506
				6	1696	933	70	506
Pier 10 (2081-B-03)	578	60	33	3	424	233	65	513
				4	754	415	65	513
				6	1696	933	65	509
Piers 11 (2081-B-04)	579	60	33	3	318	175	68	511
				4	565	311	68	511
				6	1272	700	68	511
Piers 12 (1715-B-05)	574	60	33	3	424	233	71	503
				4	754	415	71	503
				6	1696	933	71	503
Pier 13 (13-RWB-02)	571	60	33	3	424	233	68	503
				4	754	415	68	503
				6	1696	933	68	503
Piers 14 (1087-B-02)	584	60	33	3	424	233	80	504
				4	754	415	80	504
				6	1696	933	80	504
Piers 15 (10-RWB-01)	584	60	33	3	424	233	80	504
				4	754	415	80	504
				6	1696	933	80	504
Piers 16 (10-RWB-02)	582	60	33	3	424	233	74	508
				4	754	415	74	508

Structure Unit	Shaft Cap Base Elevations (feet)	Nominal Unit Base Resistance (ksf)	Factored Base Resistance (ksf)	Base Diameter (feet)	Nominal Shaft Resistance, R_N (kips)	Factored Resistance Available, R_F (kips)	Total Shaft Length (feet)	Estimated Shaft Base Elevation (feet)
				6	1696	933	74	508
South Abutment (10-RWB-03)	581	60	33	3	424	233	79	502
				4	754	415	79	502
				6	1696	933	79	502

If the estimated bearing resistances for drilled shafts established within the silty loam do not meet the loading criteria, the shafts will require to be supported on top of rock or socketing into the rock. As per IDOT, the top of rock elevation is where it is first encountered. A summary of estimated top of rock and top of solid rock elevations for each substructure from nearby soil borings are presented in Table 3. We estimated top of rock for some piers from the nearby borings. The exact top of rock will need to be determined during construction.

Table 3: Top of Estimated Bedrock Elevations

Structure	Nearby Soil Boring	Estimated Top of Rock Elevation (feet)	Estimated Top of Solid Rock Elevation (feet)
Pier 1	0461-B-01	485.4	484.7
Pier 2	22-RWB-03	487.6	484.6
Pier 3	1715-B-02	488.0	486.0
Pier 4	1706-B-02	481.5	481.5
Pier 5	1715-B-03 2055-B-04	483.2	480.7
Pier 6	1715-B-03	483.2	480.7
Pier 7	1715-B-04	480.9	479.4
Pier 8	1714-B-01	484.5	482.2
Pier 9	1714-B-02	486.5	484.5
Pier 10	2081-B-03	489.4	489.4
Pier 11	2081-B-05	490.5	490.5
Pier 12	1715-B-05	491.1	489.9

Structure	Nearby Soil Boring	Estimated Top of Rock Elevation (feet)	Estimated Top of Solid Rock Elevation (feet)
Pier 13	13-RWB-03	489.2	489.2
Pier 14	1087-B-02alt	488.8	488.8
Pier 15	10-RWB-01	492.1	492.1
Pier 16	10-RWB-02	493.0	491.5
S. Abutment	10-RWB-02	493.0	491.5

The bedrock cores show very poor to good rock quality conditions. We estimate the rock sockets will have diameters of 3.0, 3.5, or 4.0 feet. Above the bedrock, the shafts should have diameters 6 inches larger than the sockets. We recommend designing the rock sockets based on the methods outlined in the 2014 AASHTO LRFD *Bridge Design Specifications*, which indicate the sockets should be designed for a geotechnical unit base resistance factor (ϕ_{stat}) 0.50 (AASHTO 2014). GSI values were determined considering the rock mass structure and surface conditions of discontinuities of rock cores taken from soil borings GSI values ranged from 35 to 60.

Downdrag Loads

We evaluated possibility of downdrag loads for drilled shafts on top of rock or socketed into rock at the south abutment. The ramp and the proposed MSE retaining walls will be supported on improved ground by aggregate columns and using light weight cellular concrete fill (LCCF) for the MSE wall reinforced zone and in between the parallel MSE walls. As per IDOT special provision, aggregate columns will be designed for a settlement not to exceed one inch after construction of embankment and walls.

According to 2012 IDOT Bridge Manual, downdrag occurs when soil against drilled shaft moves downward more than 0.4 inch after constructing drilled shaft. For LRFD design, we considered the load factor of 1.25 for downdrag on drilled shafts. We calculated downdrag loads and net factored unit tip resistance considering downdrag load. Based on this criterion, the net factored base resistances and estimated base elevations for 3.0-, 3.5-, and 4.0- foot diameter sockets are summarized below in Table 5. Table 4 provides net factored base resistances values for the drilled shafts established on top of the solid rock.

As per 2012 IDOT Bridge Manual drilled shafts extending into rock, in most cases, should be designed

utilizing only end bearing or side resistance in rock, whichever is larger. For shafts socketed into the bedrock less than 10-foot long, we estimate the end bearing will give more capacity than the side resistance. Therefore, we recommend considering only the end bearing resistance.

Table 4: Estimated Resistances and Base Elevations for Shafts on Top of Solid Rock

Structure Unit	Top of Bedrock Elevation (feet)	Shaft Diameter (feet)	Nominal Unit Base Resistance (ksf)	Net Factored Base Resistance (ksf)	Nominal Socket Resistance, R_N (kips)	Net Factored Resistance Available, R_F (kips)	Estimated Total Shaft Length (feet)
Piers 1 thru 16 and South Abutment	See Table 3	3.0	400	185	2828	1308	82 to 108
		3.5	400	187	3848	1800	82 to 108
		4.0	400	189	5026	2375	82 to 108

Table 5: Estimated Resistances and Base Elevations for Rock Socket Shafts

Structure Unit	Top of Solid Bedrock Elevation (feet)	Socket Diameter (feet)	Nominal Unit Socket Resistance (ksf)	Net Factored Socket Resistance (ksf)	Nominal Socket Resistance, R_N (kips)	Net Factored Resistance Available, R_F (kips)	Total Rock Socket Depth* (feet)	Estimated Total Shaft Length (feet)
Piers 1 thru 16 and South Abutment	See Table 3	3.0	600	283	4240	2000	3.0	85 to 111
		3.5	600	286	5772	2751	3.0	85 to 111
		4.0	600	288	7540	3619	3.0	85 to 111

* Below top of solid rock elevation

We recommend providing permanent casing to top of rock at Piers 10 and 11 to protect existing CTA retaining walls.

5.2.2 Lateral Loading

Lateral loads on drilled shafts should be analyzed for maximum moments and lateral deflections. Recommended lateral soil modulus and strain parameters required for analysis via the p-y curve method are included in Tables 6 through 21, and rock parameters are included in Table 22. The incremental parameters for the soft silty clay (**Layer 2**) were obtained from vane shear testing conducted in Borings VST-01 and VST-06. The boring logs containing vane shear testing are included in Appendix A for reference.

Table 6: Recommended Soil Parameters for Lateral Load Analysis Pier 1
(Reference Borings 1715-B-01 & VST-06)

Soil Type Elevation	Estimated Unit Weight, γ (pcf)	Undrained Shear Strength, c_u (psf)	Estimated Friction Angle, ϕ (°)	Estimated Lateral Soil Modulus Parameter, k (pci)	Estimated Soil Strain Parameter, ε_{50} (%)
Stiff to V Stiff SI CL LOAM EL 588.4* to 583.0 feet	120	1900	0	500	0.7
Soft to M Stiff CL to SI CL EL 583.0 to 565.0 feet	115	900	0	100	1.0
Soft to M Stiff CL to SI CL EL 565.0 to 550 feet	115	650	0	100	1.0
Soft to M Stiff CL to SI CL EL 550 to 541.0 feet	115	800	0	100	1.0
V Siff SI CL LOAM EL 541.0 to 536.0	120	3200	0	1000	0.5
Hard SI CL LOAM to SI LOAM EL 536.0 to 511.0	125	6500	0	2000	0.4
V Dense SI LOAM EL 511.0 to 491.0	125	0	36	65	--
V Dense GR SA EL 491.0 to 485.4**	125	0	38	65	--

*Top of the Boring, **Boring termination depth

Table 7: Recommended Soil Parameters for Lateral Load Analysis Pier 2
(Reference Borings 22-RWB-03 & VST-06)

Soil Type Elevation	Estimated Unit Weight, γ (pcf)	Undrained Shear Strength, c_u (psf)	Estimated Friction Angle, ϕ (°)	Estimated Lateral Soil Modulus Parameter, k (pci)	Estimated Soil Strain Parameter, ε_{50} (%)
V Stiff SI CL LOAM EL 587.6* to 582.0 feet	120	2300	0	500	0.7
Soft to M Stiff CL to SI CL EL 582.0 to 565.0 feet	115	900	0	100	1.0
Soft to M Stiff CL to SI CL EL 565.0 to 550 feet	115	650	0	100	1.0
Soft to M Stiff CL to SI CL EL 550 to 541.0 feet	115	800	0	100	1.0
V Siff to Hard SI CL LOAM EL 541.0 to 526.0	120	3000	0	1000	0.5
V Dense SAND EL 526.0 to 523.0	125	0	36	65	--
Hard SI CL LOAM EL 523.0 to 510.0	125	4400	0	2000	0.4
V Dense SI LOAM EL 510.0 to 491.0	125	0	36	65	--
V Dense SA GR EL 491.0 to 484.6**	125	0	38	65	--

*Top of the Boring, **Boring termination depth

Table 8: Recommended Soil Parameters for Lateral Load Analysis Pier 3
(Reference Borings 1715-B-02 & VST-06)

Soil Type Elevation	Estimated Unit Weight, γ (pcf)	Undrained Shear Strength, c_u (psf)	Estimated Friction Angle, ϕ (°)	Estimated Lateral Soil Modulus Parameter, k (pci)	Estimated Soil Strain Parameter, ε_{50} (%)
Loose CRUSHED STONE EL 579* to 576.0 feet	115	0	30	10	--
Soft to M Stiff CL to SI CL EL 576.0 to 565.0 feet	115	900	0	100	1.0
Soft to M Stiff CL to SI CL EL 565.0 to 550 feet	115	650	0	100	1.0
Soft to M Stiff CL to SI CL EL 550 to 541.0 feet	115	800	0	100	1.0
V Siff SI CL LOAM EL 541.0 to 527.0	120	2500	0	1000	0.5
Dense SI EL 527.0 to 522.0	125	0	33	45	--
Hard SI CL LOAM EL 522.0 to 507.0	125	5000	0	2000	0.4
V Dense SI LOAM EL 507.0 to 488.0	125	0	36	65	--
V Dense SA GR EL 488.0 to 486.0**	125	0	38	65	--

*Top of the Boring, **Boring termination depth

Table 9: Recommended Soil Parameters for Lateral Load Analysis Pier 4
(Reference Borings 1706-B-02 & VST-06)

Soil Type Elevation	Estimated Unit Weight, γ (pcf)	Undrained Shear Strength, c_u (psf)	Estimated Friction Angle, ϕ (°)	Estimated Lateral Soil Modulus Parameter, k (pci)	Estimated Soil Strain Parameter, ε_{50} (%)
M Dense CRUSHED STONE EL 574.0* to 570.0 feet	115	0	32	25	--
V Stiff SI CL LOAM 570.0 to 568.0 feet	120	3280	0	1000	0.5
Soft to M Stiff CL to SI CL EL 568.0 to 565.0 feet	115	900	0	100	1.0
Soft to M Stiff CL to SI CL EL 565.0 to 550 feet	115	650	0	100	1.0
Soft to M Stiff CL to SI CL EL 550 to 541.0 feet	115	800	0	100	1.0
Stiff SI CL EL 541.0 to 536.0	120	1230	0	500	0.7
V Siff SI CL LOAM EL 536.0 to 524.0	120	2900	0	1000	0.5
M Dense SI EL 524.0 to 516.0	115	0	29	20	--
Hard SI CL LOAM EL 516.0 to 501.0	125	6000	0	2000	0.4
V Dense GR SA LOAM EL 501.0 to 492.0	125	0	35	60	--
V Dense SA GR EL 492.0 to 481.5**	125	0	34	60	--

*Top of the Boring, **Top of Bedrock

Table 10: Recommended Soil Parameters for Lateral Load Analysis Pier 5 and Pier 6
(Reference Borings 1715-B-03, 2055-B-04 & VST-06)

Soil Type Elevation	Estimated Unit Weight, γ (pcf)	Undrained Shear Strength, c_u (psf)	Estimated Friction Angle, ϕ (°)	Estimated Lateral Soil Modulus Parameter, k (pci)	Estimated Soil Strain Parameter, ε_{50} (%)
M Dense SA GR EL 574.7* to 572.0 feet	115	0	30	25	--
Soft to M Stiff CL to SI CL EL 572.0 to 565.0 feet	115	900	0	100	1.0
Soft to M stiff CL to SI CL EL 565.0 to 550 feet	115	650	0	100	1.0
Soft to M Stiff CL to SI CL EL 550 to 541.0 feet	115	800	0	100	1.0
Stiff SI CL EL 541.0 to 538.0	120	1000	0	500	0.7
V Siff to Hard SI CL LOAM EL 538.0 to 523.0	120	3900	0	1000	0.5
M Stiff CL EL 523.0 to 518.0	115	750	0	100	1.0
Hard SI CL LOAM EL 518.0 to 513.0	125	4500	0	2000	0.4
V Dense SI LOAM EL 513.0 to 498.0	125	0	35	60	--
Hard SI CL LOAM EL 498.0 to 490.7	125	7300	0	2000	0.4
V Dense SI LOAM EL 490.7 to 480.7**	125	0	35	60	--

*Top of the Boring, **Boring Termination Depth

Table 11: Recommended Soil Parameters for Lateral Load Analysis Pier 7
(Reference Borings 1715-B-04 & VST-06)

Soil Type Elevation	Estimated Unit Weight, γ (pcf)	Undrained Shear Strength, c_u (psf)	Estimated Friction Angle, ϕ (°)	Estimated Lateral Soil Modulus Parameter, k (pci)	Estimated Soil Strain Parameter, ε_{50} (%)
Stiff to V Stiff SI CL LOAM EL 589.4* to 581.0 feet	115	0	32	25	--
Soft to M Stiff CL to SI CL EL 581.0 to 565.0 feet	115	900	0	100	1.0
Soft to M Stiff CL to SI CL EL 565.0 to 550 feet	115	650	0	100	1.0
Soft to M Stiff CL to SI CL EL 550 to 541.0 feet	115	800	0	100	1.0
Stiff SI CL EL 541.0 to 537.0	120	1100	0	500	0.7
V Siff to Hard SI CL LOAM EL 537.0 to 522.0	120	3400	0	1000	0.5
M Dense SI EL 522.0 to 517.0	115	0	29	20	--
Hard SI CL LOAM EL 517.0 to 507.0	125	9000	0	2000	0.4
Dense to V Dense SI EL 507.0 to 498.0	125	0	35	60	--
Hard SI CL LOAM EL 498.0 to 492.0	125	5400	0	2000	0.4
V Dense SA GR EL 492.0 to 487.0	125	0	34	60	--
V Dense SA GR EL 487.0 to 479.4**	125	0	36	65	--

*Top of the Boring, **Boring Termination Depth

Table 12: Recommended Soil Parameters for Lateral Load Analysis Pier 8
(Reference Borings 1714-B-01 & VST-06)

Soil Type Elevation	Estimated Unit Weight, γ (pcf)	Undrained Shear Strength, c_u (psf)	Estimated Friction Angle, ϕ (°)	Estimated Lateral Soil Modulus Parameter, k (pci)	Estimated Soil Strain Parameter, ε_{50} (%)
V Stiff to Hard SI CL LOAM EL 593.2* to 582.0 feet	125	4500	0	2000	0.4
Stiff SI CL EL 582.0 to 572.0 feet	120	1000	0	500	0.7
Soft to M Stiff CL to SI CL EL 572.0 to 565.0 feet	115	900	0	100	1.0
Soft to M Stiff CL to SI CL EL 565.0 to 550 feet	115	650	0	100	1.0
Soft to M Stiff CL to SI CL EL 550 to 541.0 feet	115	800	0	100	1.0
V Stiff SI CL EL 541.0 to 536.0	120	2950	0	1000	0.5
V Siff to Hard SI CL LOAM EL 536.0 to 506.0	125	6000	0	2000	0.4
V Dense SI to SI LOAM EL 506.0 to 486.0	125	0	35	65	--
V Dense GR LOAM EL 486.0 to 482.2**	125	0	36	65	--

*Top of the Boring, **Boring Termination Depth

Table 13: Recommended Soil Parameters for Lateral Load Analysis Pier 9
(Reference Borings 1714-B-02 & VST-06)

Soil Type Elevation	Estimated Unit Weight, γ (pcf)	Undrained Shear Strength, c_u (psf)	Estimated Friction Angle, ϕ (°)	Estimated Lateral Soil Modulus Parameter, k (pci)	Estimated Soil Strain Parameter, ε_{50} (%)
V Stiff SI CL LOAM EL 582.5* to 577.0 feet	120	3100	0	2000	0.4
Stiff SI CL LOAM EL 577.0 to 572.0 feet	120	1300	0	500	0.7
Soft to M Stiff CL to SI CL EL 572.0 to 565.0 feet	115	900	0	100	1.0
Soft to M Stiff CL to SI CL EL 565.0 to 550 feet	115	650	0	100	1.0
Soft to M Stiff CL to SI CL EL 550 to 541.0 feet	115	800	0	100	1.0
Stiff SI CL EL 541.0 to 535.0	115	1000	0	500	0.7
V Siff SI CL LOAM EL 535.0 to 520.0	120	3000	0	1000	0.5
M Dense SI EL 520.0 to 515.0	115	0	28	15	--
Hard SI CL LOAM EL 515.0 to 508.0	125	10000	0	2000	0.4
V Dense GR LOAM EL 508.0 to 484.5**	125	0	36	65	--

*Top of the Boring, **Top of Bedrock

Table 14: Recommended Soil Parameters for Lateral Load Analysis Pier 10
(Reference Borings 2081-B-03 & VST-06)

Soil Type Elevation	Estimated Unit Weight, γ (pcf)	Undrained Shear Strength, c_u (psf)	Estimated Friction Angle, ϕ (°)	Estimated Lateral Soil Modulus Parameter, k (pci)	Estimated Soil Strain Parameter, ε_{50} (%)
Loose to M Dense CRUSHED STONE EL 581.4* to 576.0 feet	115	0	30	15	--
Stiff SI CL EL 576.0 to 571.0 feet	120	1500	0	500	0.7
Soft to M Stiff CL to SI CL EL 571.0 to 565.0 feet	115	900	0	100	1.0
Soft to M Stiff CL to SI CL EL 565.0 to 550 feet	115	650	0	100	1.0
Soft to M Stiff CL to SI CL EL 550 to 544.0 feet	115	800	0	100	1.0
Stiff SI CL EL 544.0 to 539.0	115	1200	0	500	0.7
V Siff to Hard SI CL LOAM EL 539.0 to 524.0	120	4500	0	2000	0.4
M Dense SI EL 524.0 to 519.0	115	0	28	15	--
Hard SI CL LOAM EL 519.0 to 504.0	125	8000	0	2000	0.4
V Dense SI to GR SANDY LOAM EL 504.0 to 489.4**	125	0	36	65	--

*Top of the Boring, **Top of Bedrock

Table 15: Recommended Soil Parameters for Lateral Load Analysis Pier 11
(Reference Borings 2081-B-04 & 1729-VST-01)

Soil Type Elevation	Estimated Unit Weight, γ (pcf)	Undrained Shear Strength, c_u (psf)	Estimated Friction Angle, ϕ (°)	Estimated Lateral Soil Modulus Parameter, k (pci)	Estimated Soil Strain Parameter, ε_{50} (%)
V Stiff SI CL EL 578.7* to 575.0 feet	120	3800	0	1000	0.5
Loose to M Dense GR SA to CRUSHED STONE EL 575.0 to 563.0 feet	120	0	30	20	--
Soft to M Stiff CL to SI CL EL 563.0 to 556.0 feet	115	600	0	100	1.0
Soft to M Stiff CL to SI CL EL 556.0 to 544 feet	115	840	0	100	1.0
Soft to M Stiff CL to SI CL EL 544.0 to 541.0 feet	115	800	0	100	1.0
Stiff SI CL EL 541.0 to 531.0	115	1450	0	500	0.7
V Siff SI CL LOAM EL 531.0 to 522.0	120	3500	0	1000	0.5
M Stiff SI LOAM EL 522.0 to 517.0	115	0	980	100	1.0
Hard SI CL LOAM EL 517.0 to 493.7**	125	7500	0	2000	0.4

*Top of the Boring, **Top of Bedrock

Table 16: Recommended Soil Parameters for Lateral Load Analysis Pier 12
(Reference Borings 1715-B-05 & 1729-VST-01)

Soil Type Elevation	Estimated Unit Weight, γ (pcf)	Undrained Shear Strength, c_u (psf)	Estimated Friction Angle, ϕ (°)	Estimated Lateral Soil Modulus Parameter, k (pci)	Estimated Soil Strain Parameter, ε_{50} (%)
V Stiff SI CL EL 577.8* to 575.0 feet	120	2000	0	500	0.7
Soft to M Stiff CL to SI CL EL 575.0 to 571.0 feet	115	920	0	100	1.0
Soft to M Stiff CL to SI CL EL 571.0 to 556.0 feet	115	600	0	100	1.0
Soft to M Stiff CL to SI CL EL 556.0 to 544.0 feet	115	840	0	100	1.0
Stiff to V Stiff SI CL EL 544.0 to 535.0 feet	120	1900	0	500	0.7
V Stiff to Hard SI CL EL 535.0 to 521.0	120	3800	0	1000	0.5
M Dense CL EL 521.0 to 516.0	115	660	0	100	1.0
Loose SI EL 516.0 to 511.0	110	0	27	10	--
Hard SI CL LOAM EL 511.0 to 506.0	125	6000	0	2000	0.4
V Dense SI LOAM EL 506.0 to 489.9**	125	0	35	65	--

*Top of the Boring, **Top of Bedrock

Table 17: Recommended Soil Parameters for Lateral Load Analysis Pier 13
(Reference Borings 18-RWB-02, 13-RWB-01, 1087-B-02 & 1729-VST-01)

Soil Type Elevation	Estimated Unit Weight, γ (pcf)	Undrained Shear Strength, c_u (psf)	Estimated Friction Angle, ϕ (°)	Estimated Lateral Soil Modulus Parameter, k (pci)	Estimated Soil Strain Parameter, ε_{50} (%)
V Stiff SI CL EL 575.6* to 573.0 feet	120	2000	0	500	0.7
Soft to M Stiff CL to SI CL EL 573.0 to 571.0 feet	115	920	0	100	1.0
Soft to M Stiff CL to SI CL EL 571.0 to 556.0 feet	115	600	0	100	1.0
Soft to M Stiff CL to SI CL EL 556.0 to 544.0 feet	115	840	0	100	1.0
Stiff SI CL EL 544.0 to 538.0 feet	120	1500	0	500	0.7
V Stiff SI CL EL 538.0 to 519.0	120	3000	0	1000	0.5
Hard SI CL LOAM to SI LOAM EL 519.0 to 499.7	115	6670	0	2000	0.4
V Dense GR SA LOAM EL 499.7 to 488.8**	125	0	36	65	--

*Top of the Boring, **Top of Bedrock

Table 18: Recommended Soil Parameters for Lateral Load Analysis Pier 14
(Reference Borings 1087-B-02, 13-RWB-01, & 1729-VST-01)

Soil Type Elevation	Estimated Unit Weight, γ (pcf)	Undrained Shear Strength, c_u (psf)	Estimated Friction Angle, ϕ (°)	Estimated Lateral Soil Modulus Parameter, k (pci)	Estimated Soil Strain Parameter, ε_{50} (%)
Loose SI LOAM to SAND EL 593.6* to 585.0 feet	110	0	28	10	--
Stiff to V Stiff CL to SI CL EL 585.0 to 580.0 feet	120	2300	0	1000	0.5
Soft to M Stiff CL to SI CL EL 580.0 to 571.0 feet	115	920	0	100	1.0
Soft to M Stiff CL to SI CL EL 571.0 to 556.0 feet	115	600	0	100	1.0
Soft to M Stiff CL to SI CL EL 556.0 to 544.0 feet	115	840	0	100	1.0
Stiff SI CL EL 544.0 to 541.0 feet	120	1500	0	500	0.7
Hard SI CL to SI LOAM EL 541.0 to 525.0	125	6900	0	2000	0.4
V Stiff SI CL LOAM EL 525.0 to 520.0	120	2000	0	500	0.7
M Dense SA LOAM EL 520.0 to 515.0	115	0	29	20	--
Hard SI LOAM EL 515.0 to 500.0	125	6500	0	2000	0.4
V Dense GR SA LOAM EL 500.0 to 488.8**	125	0	36	65	--

*Top of the Boring, **Top of Bedrock

Table 19: Recommended Soil Parameters for Lateral Load Analysis Pier 15
(Reference Borings 10-RWB-01 & 1729-VST-01)

Soil Type Elevation	Estimated Unit Weight, γ (pcf)	Undrained Shear Strength, c_u (psf)	Estimated Friction Angle, ϕ (°)	Estimated Lateral Soil Modulus Parameter, k (pci)	Estimated Soil Strain Parameter, ε_{50} (%)
Loose SI LOAM to SAND EL 593.6* to 584.0 feet	110	0	28	10	--
Stiff to V Stiff CL to SI CL EL 584.0 to 578.0 feet	120	1800	0	500	0.7
Soft to M Stiff CL to SI CL EL 578.0 to 571.0 feet	115	920	0	100	1.0
Soft to M Stiff CL to SI CL EL 571.0 to 556.0 feet	115	600	0	100	1.0
Soft to M Stiff CL to SI CL EL 556.0 to 544.0 feet	115	840	0	100	1.0
Stiff SI CL EL 544.0 to 541.0 feet	120	1500	0	500	0.7
Hard SI CL to SI CL LOAM EL 541.0 to 521.0	125	5400	0	2000	0.4
Loose SI LOAM EL 521.0 to 516.0	110	0	28	10	--
Hard SI CL LOAM EL 516.0 to 506.0	125	5400	0	2000	0.4
V Dense SI LOAM to GR SA EL 506.0 to 492.1**	125	0	36	65	--

*Top of the Boring, **Top of Bedrock

Table 20: Recommended Soil Parameters for Lateral Load Analysis Pier 16
(Reference Borings 10-RWB-02, 1729-VST-01, & 1729-VST-02)

Soil Type Elevation	Estimated Unit Weight, γ (pcf)	Undrained Shear Strength, c_u (psf)	Estimated Friction Angle, ϕ (°)	Estimated Lateral Soil Modulus Parameter, k (pci)	Estimated Soil Strain Parameter, ε_{50} (%)
Loose SI LOAM to SAND EL 593.5* to 583.0 feet	110	0	28	10	--
Stiff to V Stiff CL to SI CL EL 583.0 to 576.0 feet	120	1800	0	500	0.7
Soft to M Stiff CL to SI CL EL 576.0 to 571.0 feet	115	920	0	100	1.0
Soft to M Stiff CL to SI CL EL 571.0 to 555.0 feet	115	600	0	100	1.0
Soft to M Stiff CL to SI CL EL 555.0 to 545.0 feet	115	740	0	100	1.0
Stiff SI CL EL 545.0 to 540.0 feet	120	1400	0	500	0.7
Hard SI CL to SI CL LOAM EL 540.0 to 526.0	125	5000	0	2000	0.4
Dense SI LOAM EL 526.0 to 516.0	125	0	32	50	--
Hard SI CL LOAM EL 516.0 to 506.0	125	9000	0	2000	0.4
V Dense SI EL 506.0 to 502.0	125	0	34	65	--
Hard SI CL LOAM EL 502.0 to 496.0	125	9000	0	2000	0.4
V Dense GR SI LOAM EL 496.0 to 491.5**	125	0	36	65	--

*Top of the Boring, **Top of Bedrock

Table 21: Recommended Soil Parameters for Lateral Load Analysis South Abutment
(Reference Borings 15-RWB-02, 10-RWB-02, 1729-VST-01, & 1729-VST-02)

Soil Type Elevation	Estimated Unit Weight, γ (pcf)	Undrained Shear Strength, c_u (psf)	Estimated Friction Angle, ϕ (°)	Estimated Lateral Soil Modulus Parameter, k (pci)	Estimated Soil Strain Parameter, ε_{50} (%)
M Dense SI LOAM to LOAM EL 593.5* to 585.0 feet	110	0	28	10	--
V Stiff SI CL EL 585.0 to 580.0 feet	120	1800	0	500	0.7
Soft to M Stiff CL to SI CL EL 580.0 to 571.0 feet	115	920	0	100	1.0
Soft to M Stiff CL to SI CL EL 571.0 to 555.0 feet	115	600	0	100	1.0
Soft to M Stiff CL to SI CL EL 556.0 to 545.0 feet	115	740	0	100	1.0
Stiff SI CL EL 545.0 to 540.0 feet	120	1400	0	500	0.7
Hard SI CL to SI CL LOAM EL 540.0 to 532.0	125	6000	0	2000	0.4
Dense SAND EL 532.0 to 516.0	125	0	34	50	--
Hard SI CL LOAM EL 516.0 to 496.0	125	7500	0	2000	0.4
V Dense GR SI LOAM EL 496.0 to 491.5**	125	0	36	65	--

*Top of the Boring, **Top of Bedrock

Table 22: Recommended Rock Parameters for Lateral Load Analysis

Rock Type	Total Unit Weight, γ (pcf)	Young's Modulus (ksi)	Uniaxial Comp. Strength (ksi)	Rock Quality Designation (%)	Lateral Rock Modulus Parameter
Fair to Good Quality DOLOSTONE	135	2,500	9.5	65	0.0005

5.3 Stage Construction Design Recommendations

Construction of the abutment will require embankment fill sections along the existing SB I-90/94 roadway. Ramp will be constructed in one stage however, coordination will be required with the existing ramp to remain open during construction. We estimate temporary shoring of excavations will be required. As per civil cross section near the south abutment, no more than 5 feet of excavation will be required for the MSE walls and the south abutment base will be at a higher elevation supported on drilled shafts. The temporary excavation support can be designed using IDOT Design Guide 3.13.1(IDOT 2012a) and *Temporary Soil Retentions System* will not be required. However, temporary Soil Retention System will be required at the piers.

6.0 CONSTRUCTION CONSIDERATIONS

6.1 Site Preparation

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

6.2 Excavation

Foundation 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.

6.3 Filling and Backfilling

Fill material required to attain the final design elevations should be structural fill material and should be pre-approved prior to placement. Compacted cohesive or granular soil conforming to IDOT Section 204 would be acceptable as structural fill (IDOT 2012b). The fill material should be free of organic

matter and debris. Structural fill should be placed in lifts and compacted according to IDOT Section 205, *Embankment* (IDOT 2012b). The onsite fill materials could be considered as new fill material assuming it has an organic content lower than 10%.

Backfill materials must be pre-approved by the Resident Engineer. To backfill the abutment and piers we recommend porous granular material conforming to the requirements specified in the IDOT Special Provision, *Granular Backfill for Structures* (IDOT 2012b). Backfill material should be placed and compacted in accordance with the Special Provision.

6.4 Earthwork Operations

The required earthwork can be accomplished with conventional construction equipment. 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.

6.5 Drilled Shafts

The drilled shafts should be constructed in accordance with the IDOT Special Provision *Drilled Shafts* (GBSP No. 86). Drilled shaft installation procedure should be reviewed and approved by IDOT.

The groundwater is expected to be located within the granular fill soils layers above the hard silty clay. As a minimum, temporary casing will be required in the upper surficial granular fill soils extending into clay to prevent groundwater from entering the shafts and prevent loss of ground around the shafts. The temporary casing should be socketed a few feet into the clay soil to effectively seal the groundwater infiltration into the drilled shafts.

Our analysis indicates that the shear strength of the soft clay at some locations may not be sufficient to

resist squeeze into the drilled shafts. IDOT requires providing temporary casing through soft clay in order to properly construct the drilled shafts. We recommend providing temporary casing to two feet below soft clay. The following note should be shown on the plan.

"Based on the squeeze potential of the soft clay soils, the use of temporary casing will be required to two feet below soft clay in order to properly construct the drilled shafts. Casing may be pulled or left in place, as determined by the Contractor at no cost to the Department."

Groundwater is also expected from granular soil layers within very stiff to hard clay deposit and above the bedrock. Drilled shafts extending through these granular soils to top of bedrock or socketed into the bedrock will require permanent casing to top of bedrock. IDOT requires that in the event that permanent casing is not designed for the construction of shafts on top of bedrock or socketed into bedrock, slurry method should be used and the structural integrity should be verified by Crosshole Sonic Logging (CSL). The IDOT special provision "*Crosshole Sonic Logging*", dated March 9, 2010 or latest edition should be included in the project specifications for inspection and testing of the shafts on top of rock and socketed into rock. Wang recommends providing the CSL testing for at least one shaft per substructure along the WS Ramp Bridge.

We recommend providing permanent casing to top of rock at Piers 10 and 11 to protect existing CTA retaining walls. Special care should be taken to prevent loss of ground during shaft installation adjacent to the existing buried utilities. It is recommended to advance the casing ahead of the excavation operation.

7.0 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 AECOM 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 12-5-17

Corina T. Farez, P.E., P.G.
QA/QC Reviewer

License expires: 11-30-19

REFERENCES

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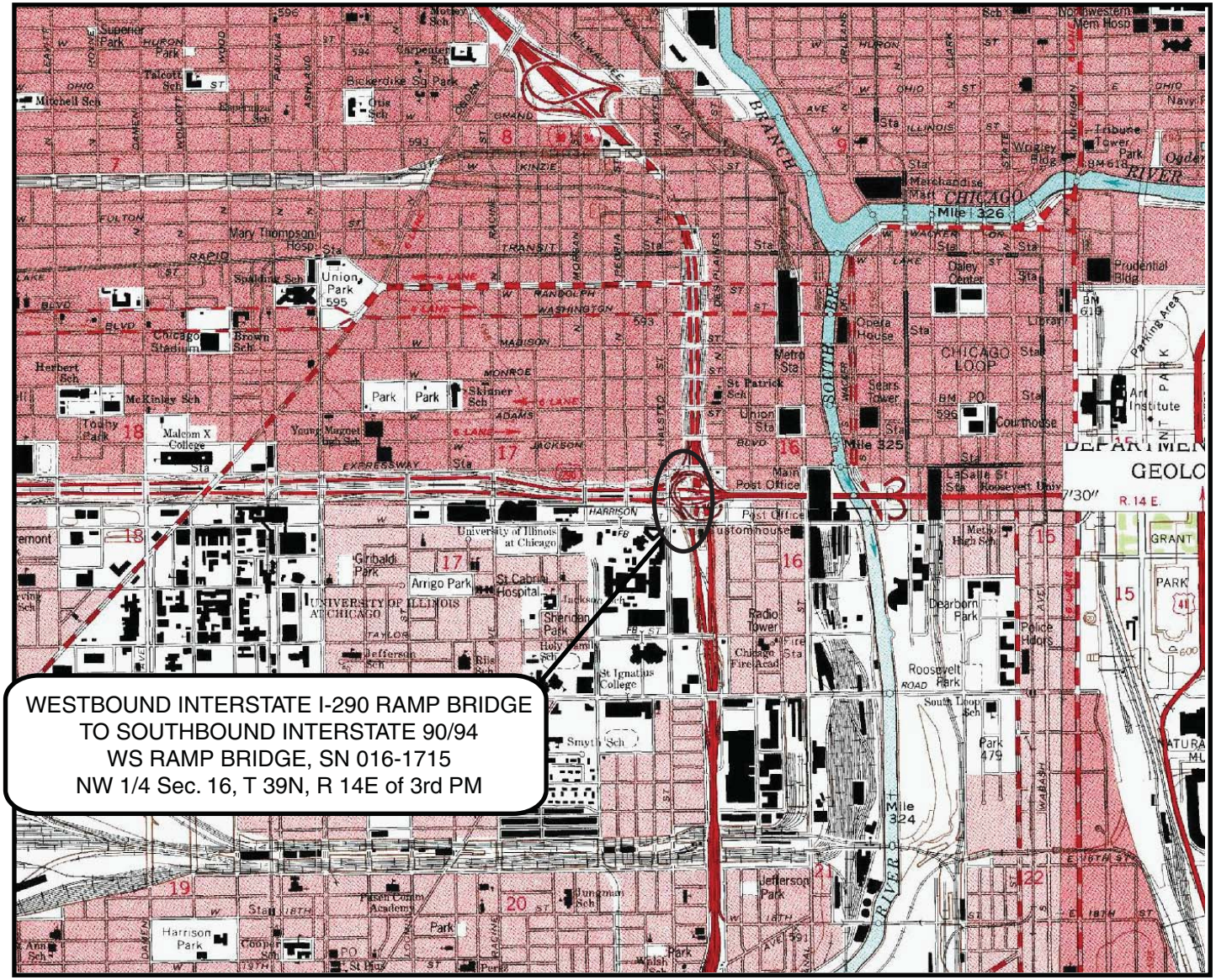
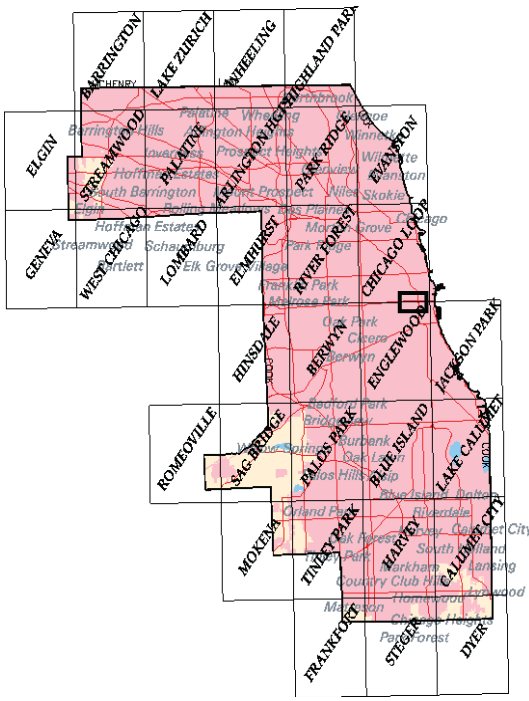
EXHIBITS





SITE LOCATION MAP: CIRCLE INTERCHANGE RECONSTRUCTION
WB I-290 RAMP BRIDGE TO SB I-90/94, SN 016-1715, COOK COUNTY

SCALE: GRAPHICAL	EXHIBIT 1	DRAWN BY: M. de los Reyes CHECKED BY: M. Snider

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SITE AND REGIONAL GEOLOGY: CIRCLE INTERCHANGE RECONSTRUCTION
WB I-290 RAMP BRIDGE TO SB I-90/94, SN 016-1715, COOK COUNTY

SCALE: GRAPHICAL	EXHIBIT 2	DRAWN BY: C. Marin CHECKED BY: L. Iordache

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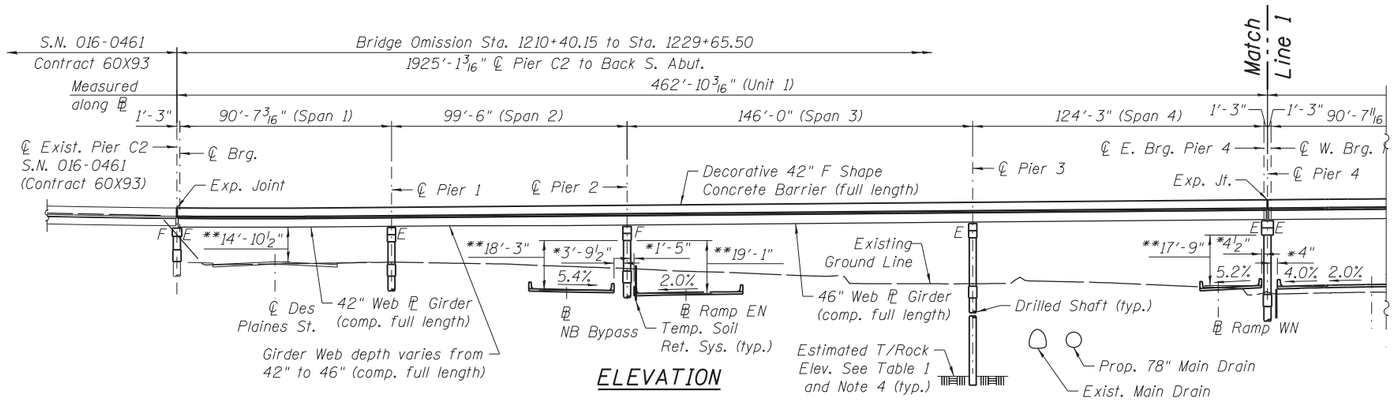
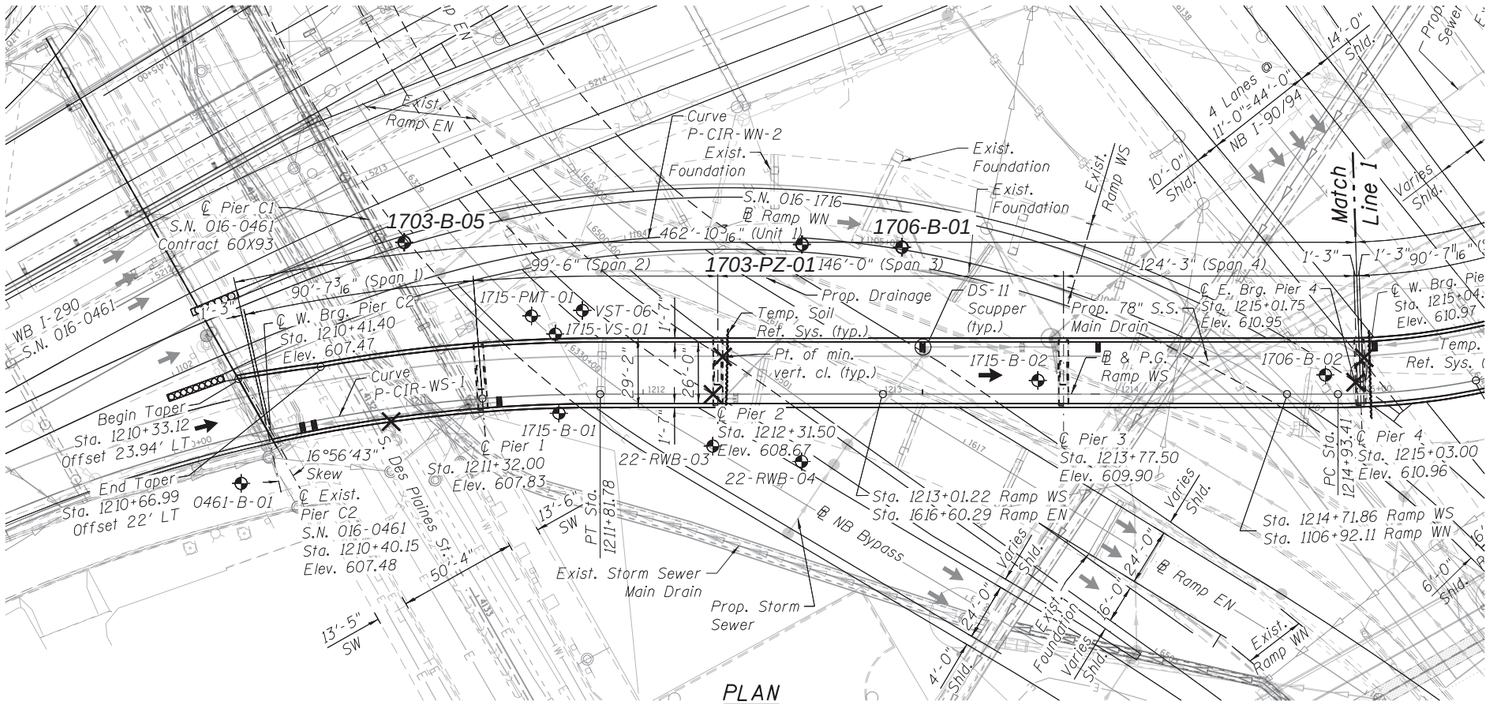
Bench Mark: Square cut at center of door entrance to 707 W. Harrison St; South side of Harrison St. ±90' west of west line of Des Plaines. Elevation 597.47.
A t cut in the SE anchor bolt at the 11th street light N. of Roosevelt on the W. side of Halsted. Elev. = 594.06

Existing Structure: S.N. 016-2450 was built in 1960 and carries WB I-290 traffic to SB I-90/94 over Ramp EN, Ramp NW, I-90/94, Ramp SE, I-290, CTA tracks & Ramp EN again. The existing twenty-span structure has an overall length of approx. 1329'-6". The existing superstructure consists of simple span wide-flange beams with 7 1/2" thick concrete deck with 1 1/2" overlay. The existing substructure consists of reinforced concrete abutment and multi-column piers. Existing substructure units are supported on caissons. Existing structure to be removed and replaced. Traffic to be detoured during construction.

No salvage.



ELEVATION



PLAN

LEGEND:

- Combined Sewer
- Electric — E —
- Fiber Optic — FO —
- Storm Sewer
- Water Line — W —
- Gas Line — G —
- Fire Hydrant
- Light Pole
- Point of Min. Vert. Clear. ×
- Soil Boring Location ⊕

HIGHWAY CLASSIFICATION

	Ramp WS	SB I-90/94	NB I-90/94	EB I-290	WB I-290	Ramp WN	Ramp SE	Ramp NW	Ramp EN	Ramp ES	NB Bypass	S. Des Plaines St.	FAU Rte. 1429 (Harrison St.)
Functional Class	Interstate	Interstate	Interstate	Interstate	Interstate	Interstate	Interstate	Interstate	Interstate	Interstate	Interstate	Principal Arter.	Urban Collector
ADT (2012)	7,200	100,100	96,700	32,500	29,700	7,200	4,600	32,500	26,600	43,900	NA	5,490	16,800
ADT (2040)	8,000	98,000	81,000	33,000	31,000	9,000	5,000	36,000	31,000	43,000	17,000	N/A	17,000
ADTT (2012)	114	11,351	11,217	380	460	204	123	2,483	1,032	4,386	NA	220	336
ADTT (2040)	127	11,113	9,396	386	480	255	134	2,750	1,203	4,296	378	N/A	340
DHV (2040)	710	6,340	4,780	2,610	2,130	790	440	2,790	1,910	2,060	1,680	N/A	1,700
Design Speed	25 m.p.h.	60 m.p.h.	60 m.p.h.	50 m.p.h.	45 m.p.h.	30 m.p.h.	25 m.p.h.	35 m.p.h.	30 m.p.h.	40 m.p.h.	30 m.p.h.	30 m.p.h.	25 m.p.h.
Posted Speed	25 m.p.h.	45 m.p.h.	45 m.p.h.	45 m.p.h.	45 m.p.h.	30 m.p.h.	25 m.p.h.	35 m.p.h.	30 m.p.h.	40 m.p.h.	NA	30 m.p.h.	25 m.p.h.
Traffic Type	One-Way												Two-Way
Directional Distribution	100:0												50:50

* Min. Horizontal Clearance
** Min. Vertical Clearance

DESIGN SPECIFICATIONS

2014 AASHTO LRFD Bridge Design Specifications
7th Edition with 2015 and 2016 Interim Revisions

DESIGN STRESSES

FIELD UNITS

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

LOADING HL-93

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

SEISMIC DATA

Seismic Performance Zone (SPZ) = 1
Design Spectral Acceleration at 1.0 sec. (S_{D1}) = 0.085g
Design Spectral Acceleration at 0.2 sec. (S_{DS}) = 0.144g
Soil Site Class = D

BORING LOCATION PLAN:CIRCLE INTERCHANGE RECONSTRUCTION
WB I-290 RAMP BRIDGE TO SB I-90/94, SN 016-1715, COOK COUNTY

SCALE: GRAPHICAL | EXHIBIT 3-1 | DRAWN BY: H. Bista, CHECKED BY: A. Kurnia

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TABLE 1

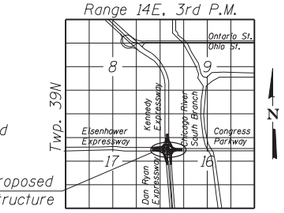
	Estimated T/Ground Elev.	Estimated T/Rock Elev.
Pier 1	588.14	485.4
Pier 2	585.34	487.6
Pier 3	578.91	488.0
Pier 4	575.45	481.5
Pier 5	574.88	483.2
Pier 6	582.79	483.2
Pier 7	590.43	480.9
Pier 8	594.59	484.5
Pier 9	581.77	486.5
Pier 10	583.24	489.4
Pier 11	583.36	490.5
Pier 12	579.24	491.1
Pier 13	576.01	489.2
Pier 14	589.26	488.8
Pier 15	588.81	492.1
Pier 16	587.16	493.0
S. Abut	585.83	493.0

DS-11 SCUPPER LOCATION

Station	Offset
1210+60	RT
1210+65	RT-SAG
1211+39	RT
1213+18	LT
1213+93	LT
1215+10	LT
1215+96	LT
1219+10	LT
1220+49	LT-SAG
1220+54	LT
1221+86	LT
1221+91	LT
1223+03	RT
1223+37	RT
1223+53	RT
1224+52	RT
1226+79	RT
1228+29	RT
1229+45	RT
1229+50	RT

NOTES:

1. All structural steel shall be metalized (thermal spraying).
2. Span lengths are measured along ℄ & P.G.L. Ramp WS.
3. All substructures are oriented 90° to ℄ Ramp WS unless noted otherwise.
4. All shaft shall be rock socketed. Depth and dia. of rock socket to be determined during final design.



LOCATION SKETCH

GENERAL PLAN & ELEVATION - 1
RAMP WS OVER I-90/94/290
F.A.I. RTE. 90/94/290
SECTION 2014-013R&B-R
COOK COUNTY
STATION 1216+37.21
STRUCTURE NO. 016-1715

016-1715-CIRCLE100-SHT-ACM-ST-TSL-001

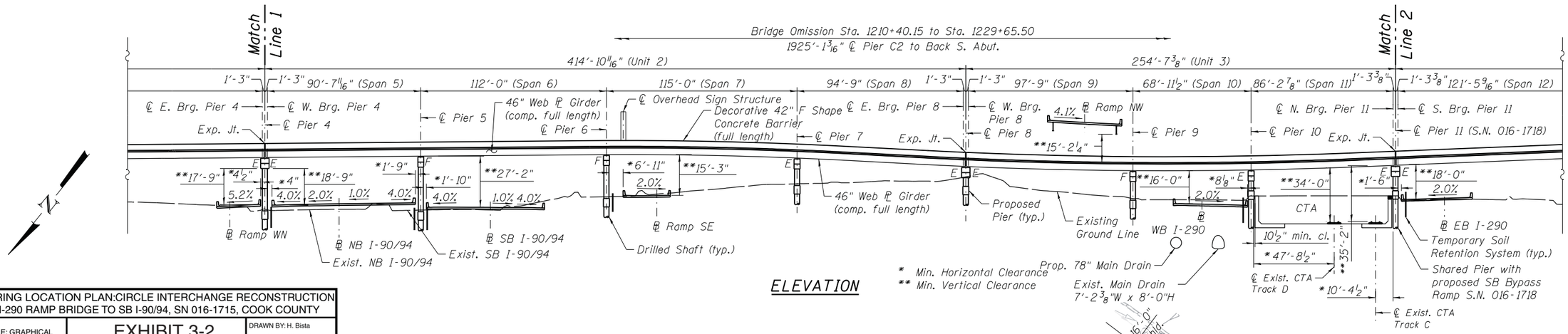
AECOM

USER NAME = vasudevana	DESIGNED - JXH	REVISED	
	CHECKED - ATB	REVISED	
PLOT SCALE = N.T.S.	DRAWN - GF	REVISED	
PLOT DATE = 11/29/2017	CHECKED - 06/16/2017	REVISED	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

STRUCTURE NO. 016-1715
SHEET NO. 1 OF 7 SHEETS

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
90/94/290	2014-013R&B-R	COOK		
		CONTRACT NO. 60X93		
		ILLINOIS FED. AID PROJECT		



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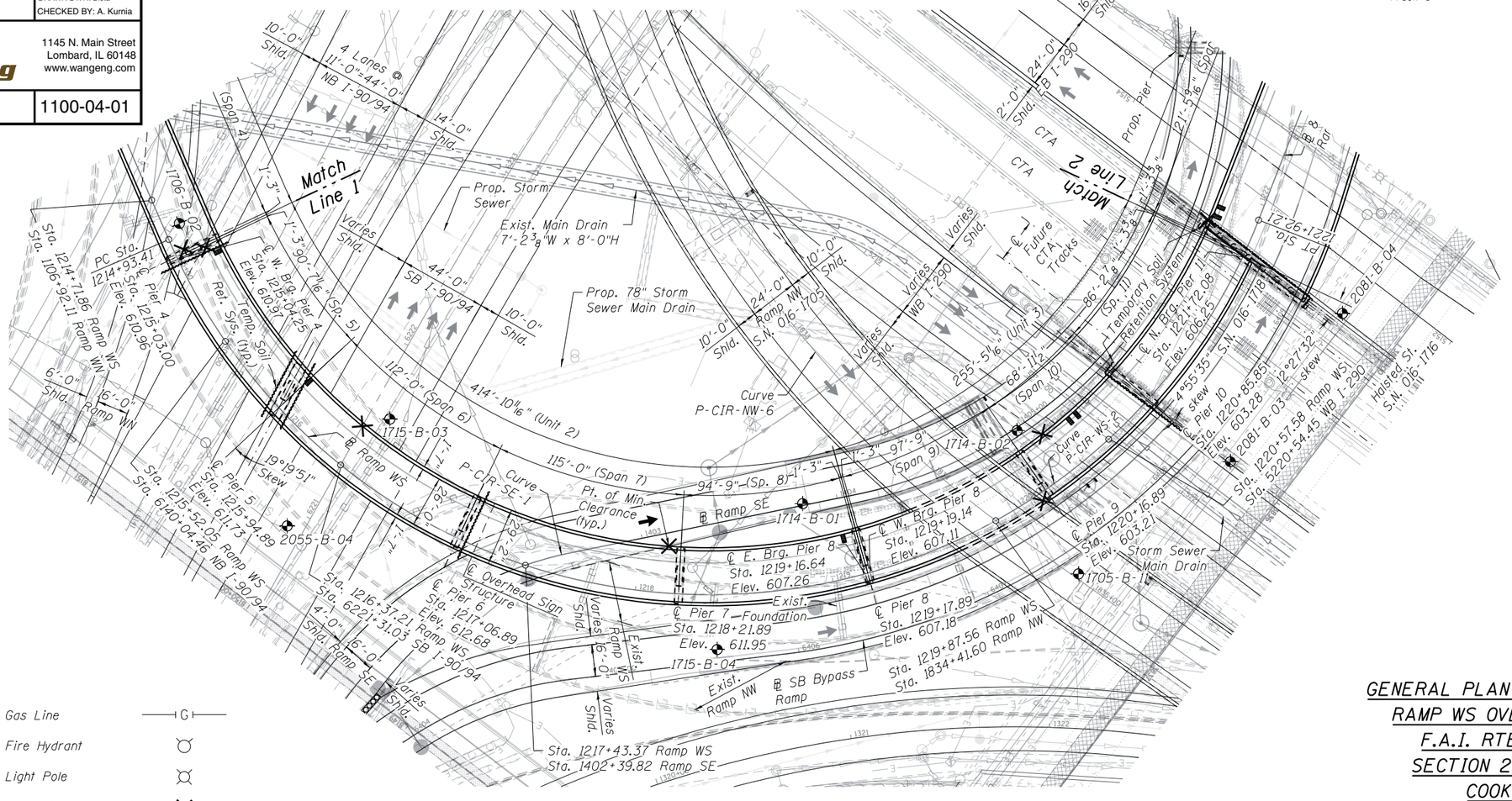

PLAN

BORING LOCATION PLAN:CIRCLE INTERCHANGE RECONSTRUCTION
WB I-290 RAMP BRIDGE TO SB I-90/94, SN 016-1715, COOK COUNTY

SCALE: GRAPHICAL	EXHIBIT 3-2	DRAWN BY: H. Bista CHECKED BY: A. Kurnia

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LEGEND:

Combined Sewer		Gas Line	G
Electric	E	Fire Hydrant	
Fiber Optic	FO	Light Pole	
Storm Sewer		Point of Min. Vert. Clear.	X
Water Line	W	Soil Boring Location	

GENERAL PLAN & ELEVATION - 2
RAMP WS OVER I-90/94/290
F.A.I. RTE. 90/94/290
SECTION 2014-013R&B-R
COOK COUNTY
STATION 1216+37.21
STRUCTURE NO. 016-1715

AECOM

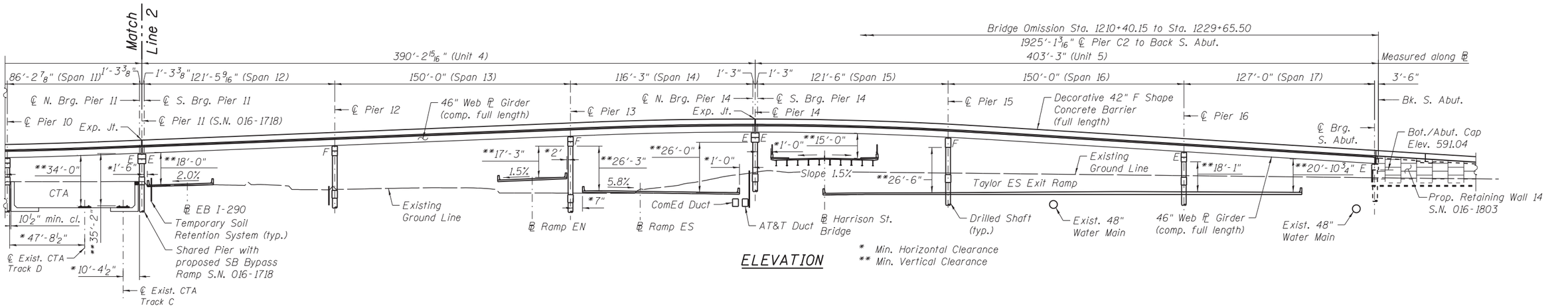
USER NAME = vasudevana	DESIGNED - JXH	REVISED
	CHECKED - ATB	REVISED
PLOT SCALE = N.T.S.	DRAWN - GF	REVISED
PLOT DATE = 11/29/2017	CHECKED - 06/16/2017	REVISED

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

STRUCTURE NO. 016-1715
SHEET NO. 2 OF 7 SHEETS

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
90/94/290	2014-013R&B-R	COOK		
		CONTRACT NO. 60X93		
	ILLINOIS FED. AID PROJECT			

016-1715-CIRCLE100-SHT-ACM-ST-TSL-002



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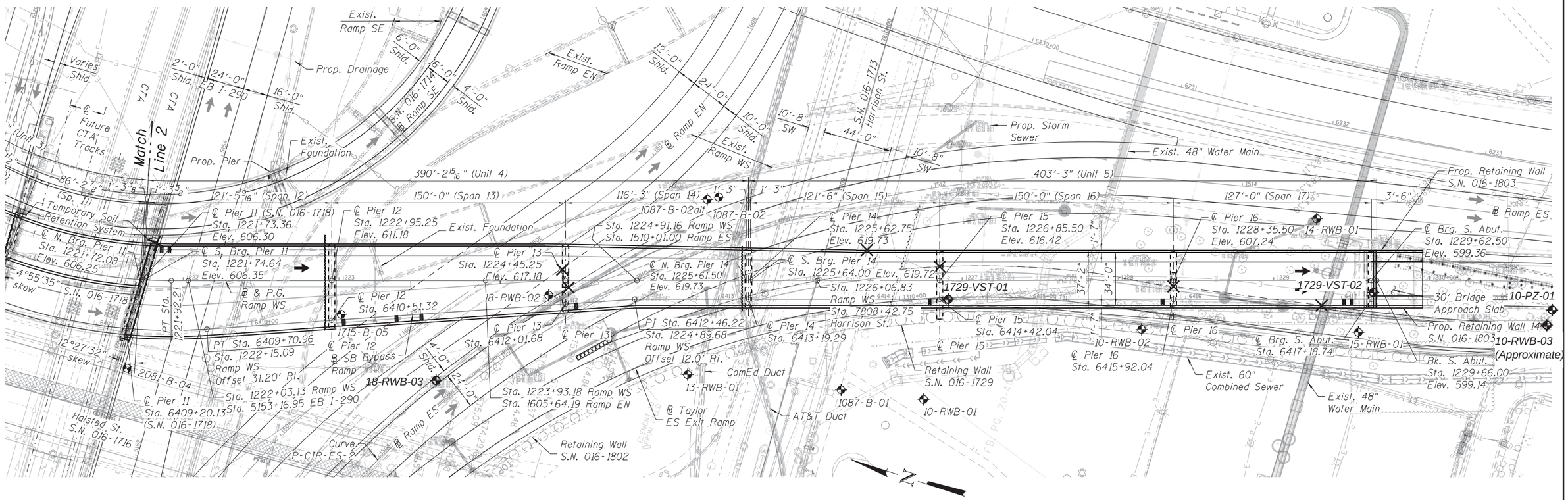

PLAN

LEGEND:

Combined Sewer		Gas Line	G
Electric	E	Fire Hydrant	
Fiber Optic	FO	Light Pole	
Storm Sewer		Point of Min. Vert. Clear.	
Water Line	W	Soil Boring Location	

BORING LOCATION PLAN:CIRCLE INTERCHANGE RECONSTRUCTION
WB I-290 RAMP BRIDGE TO SB I-90/94, SN 016-1715, COOK COUNTY

SCALE: GRAPHICAL	EXHIBIT 3-3	DRAWN BY: H. Bista CHECKED BY: A. Kurnia

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GENERAL PLAN & ELEVATION - 3
RAMP WS OVER I-90/94/290
F.A.I. RTE. 90/94/290
SECTION 2014-013R&B-R
COOK COUNTY
STATION 1216+37.21
STRUCTURE NO. 016-1715

AECOM

USER NAME = vasudevana	DESIGNED - JXH	REVISED	
	CHECKED - ATB	REVISED	
PLOT SCALE = N.T.S.	DRAWN - GF	REVISED	
PLOT DATE = 11/29/2017	CHECKED - 06/16/2017	REVISED	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

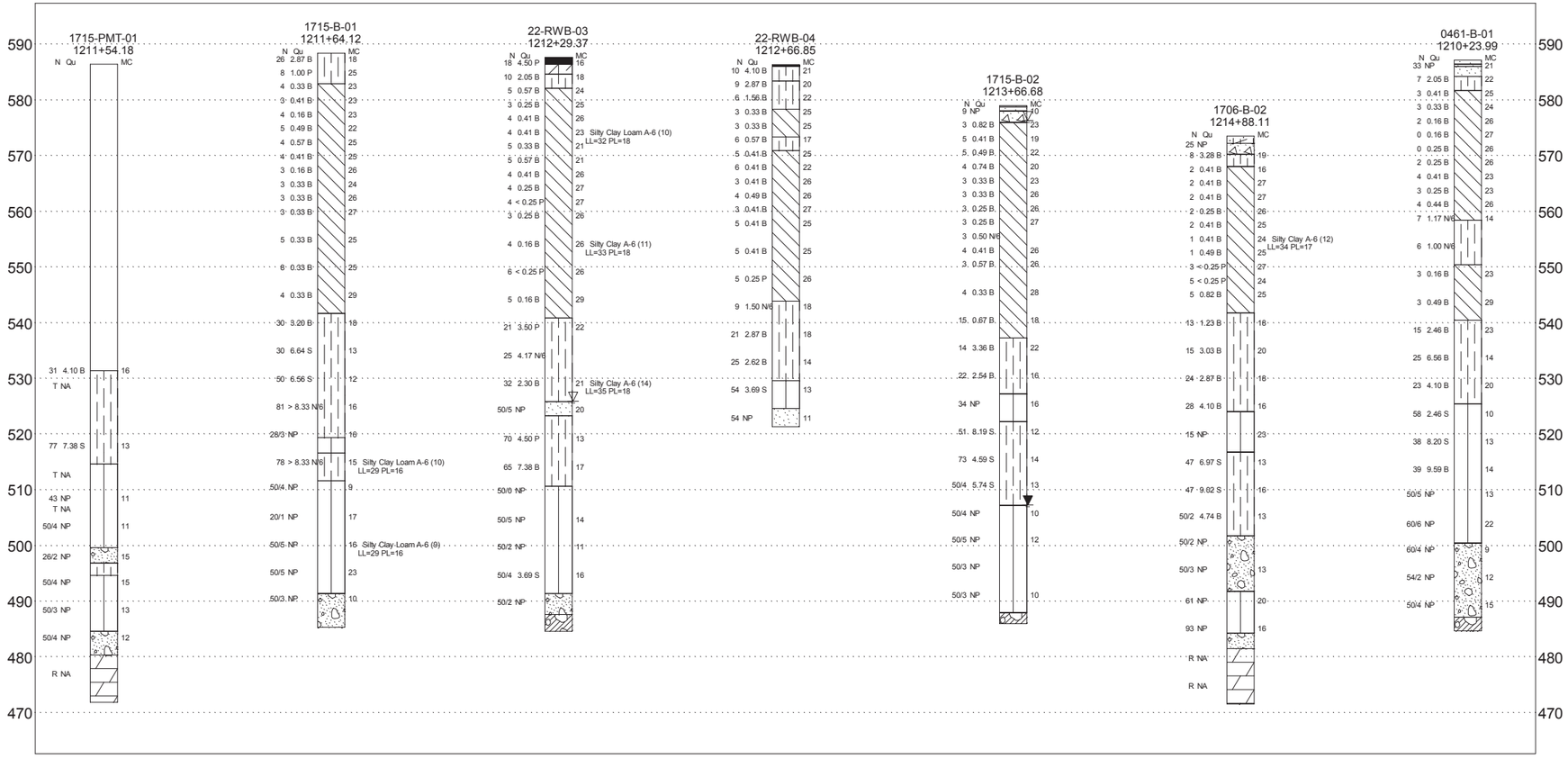
STRUCTURE NO. 016–1715
SHEET NO. 3 OF 7 SHEETS

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
90/94/290	2014-013R&B-R	COOK		
		CONTRACT NO. 60X93		
	ILLINOIS FED. AID PROJECT			

016-1715-CIRCLE100-SHT-ACM-ST-TSL-003

◄ E

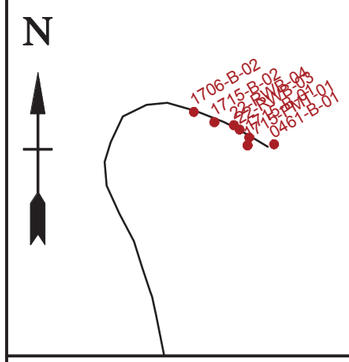
W ►



DISTANCE ALONG PROFILE (feet)

Lithology Graphics

- Concrete
- Crushed stone
- IDH Sand, Sandy Loam
- IDH Silty Clay, Silty Clay Loam
- IDH Clay
- IDH Silt, Silty Loam
- Gravelly sand, sandy gravel
- Weathered bedrock
- Pavement
- Dolomite or Dolomitic Limestone
- Topsoil
- IDH Clay Loam



Site Map Scale 1 inch equals 805 feet

Explanation:

0461-B-01
3603+12.64 — Borehole Number Station

Borehole Lithology

N--N-value, (blw/12 in)
Qu--UC Strength, (tsf)
MC--Moisture Content, (%)

Water Level Reading at time of drilling.

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

0 220

Horizontal Scale (feet)

Vertical Exaggeration: 9x

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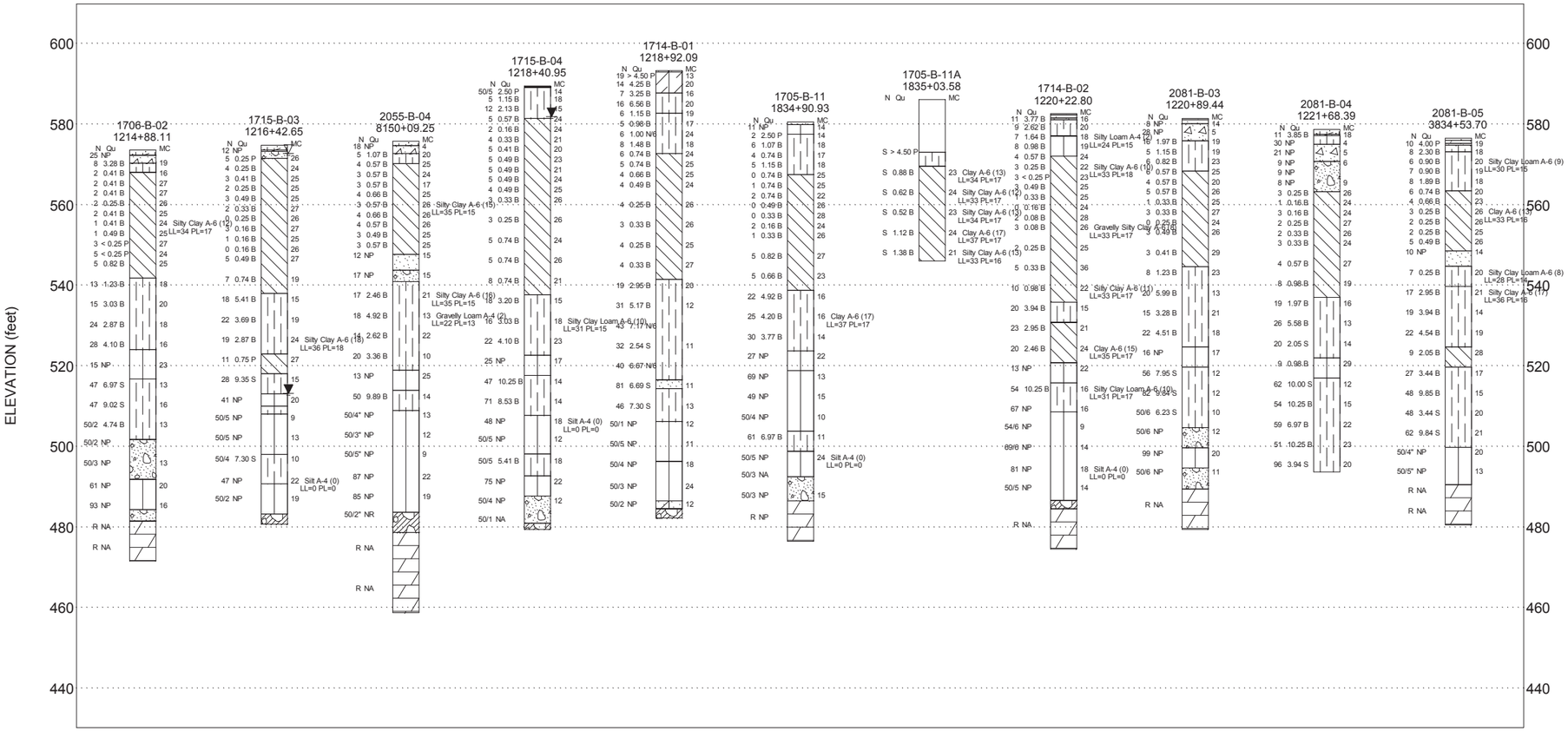
Soil Profile
SN 1715

WEI SINCE 1982

Circle Interchange Reconstruction
Section 17, T39N, R14E of 3rd PM

JOB NUMBER	PLATE NUMBER
1100-04-01	EXHIBIT 4-1

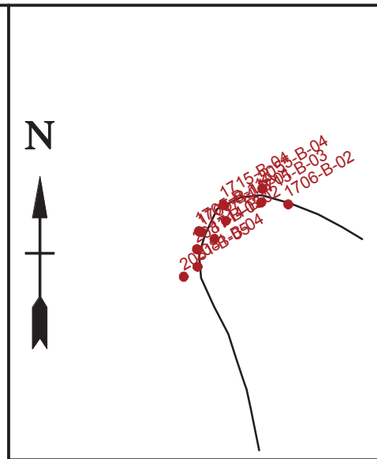
WEI 11X17 11000401.GPJ WANGENG.GDT 6/19/17



DISTANCE ALONG PROFILE (feet)

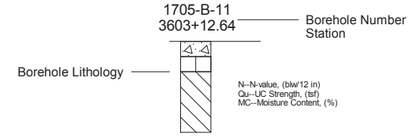
Lithology Graphics

- Crushed stone
- Gravelly sand, sandy gravel
- IDH Clay Loam
- Topsoil
- IDH Silt, Silty Loam
- Dolomite or Dolomitic Limestone
- IDH Sand, Sandy Loam
- IDH Silty Clay, Silty Clay Loam
- Pavement
- Weathered bedrock
- IDH Clay
- IDH Loam
- Concrete



Site Map Scale 1 inch equals 805 feet

Explanation:



Water Level Reading at time of drilling.

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

0 220

Horizontal Scale (feet)

Vertical Exaggeration: 6.5x

Wang Engineering
1145 N Main Street
Lombard, IL 60148

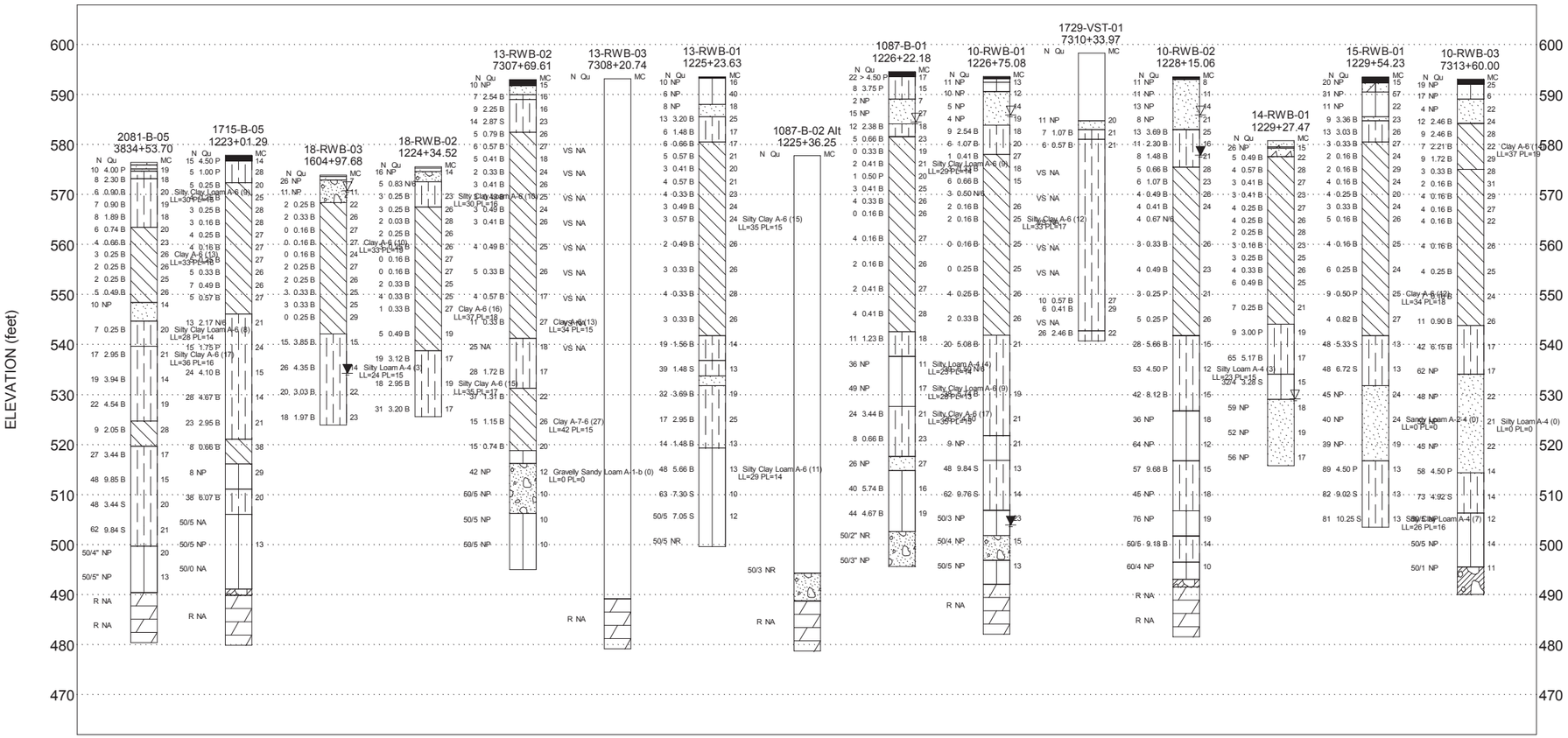
Soil Profile
SN 1715

WEI SINCE 1982

Circle Interchange Reconstruction
Section 17, T39N, R14E of 3rd PM

JOB NUMBER	PLATE NUMBER
1100-04-01	EXHIBIT 4-2

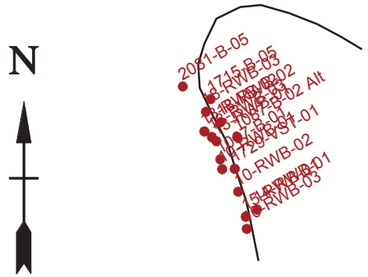
WEI 11X17 11000401.GPJ WANGENG.GDT 6/19/17



DISTANCE ALONG PROFILE (feet)

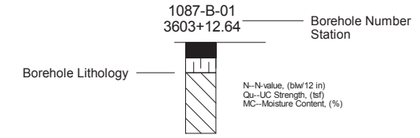
Lithology Graphics

- Topsoil
- IDH Silty Clay, Silty Clay Loam
- IDH Sand, Sandy Loam
- IDH Clay
- IDH Silt, Silty Loam
- Gravelly sand, sandy gravel
- Dolomite or Dolomitic Limestone
- Weathered bedrock
- Concrete
- Pavement
- Crushed stone
- IDH Loam



Site Map Scale 1 inch equals 805 feet

Explanation:



Water Level Reading at time of drilling.

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

0 220

Horizontal Scale (feet)

Vertical Exaggeration: 8.5x

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Lombard, IL 60148

Soil Profile
SN 1715

Circle Interchange Reconstruction
Section 17, T39N, R14E of 3rd PM

JOB NUMBER	PLATE NUMBER
1100-04-01	EXHIBIT 4-3

WEI SINCE 1982

WEI 11X17 11000401.GPJ WANGENG.GDT 6/19/17

APPENDIX A

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BORING LOG 0461-B-01

WEI Job No.: 1100-04-01

Client **AECOM**
Project **Circle Interchange Reconstruction**
Location **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 587.18 ft
North: 1898107.11 ft
East: 1172063.72 ft
Station: 1210+23.99
Offset: 19.2353 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	586.4	10-inch thick CONCRETE --PAVEMENT--						
	586.0	4-inch thick GRAVELLY SAND --BASE COURSE--						
		Dense, gray, fine SAND --FILL--			1	15 15 18	NP	21
	584.2							
		Very stiff, gray SILTY CLAY, trace gravel	5		2	3 3 4	2.05 B	22
	581.7							
		Very soft to soft, gray CLAY to SILTY CLAY, trace gravel			3	2 1 2	0.41 B	25
			10		4	0 1 2	0.33 B	24
					5	0 1 1	0.16 B	26
			15		6	0 0 0	0.16 B	27
					7	0 0 0	0.25 B	26
			20		8	0 0 2	0.25 B	26
			25		9	1 2 2	0.41 B	23
					10	0 1 2	0.25 B	23
					11	0 2 2	0.44 B	26
	558.4	Stiff, gray SILTY CLAY LOAM, trace gravel	30		12	2 2 5	1.17 N/6	14
			35		13	2 3 3	1.00 N/6	
	550.4	Very soft to soft, gray CLAY to SILTY CLAY, trace gravel						
			40		14	0 1 2	0.16 B	23

GENERAL NOTES

Begin Drilling **03-24-2014** Complete Drilling **03-24-2014**
Drilling Contractor **Wang Testing Services** Drill Rig **CME-55 TMR [85%]**
Driller **R&N** Logger **M. de los Reyes** Checked by **C. Marin**
Drilling Method **2.25" SSA to 12.5', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **Rotary wash**
At Completion of Drilling ▼ **mud in the borehole**
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 0461-B-01

WEI Job No.: 1100-04-01

Client **AECOM**
Project **Circle Interchange Reconstruction**
Location **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 587.18 ft
North: 1898107.11 ft
East: 1172063.72 ft
Station: 1210+23.99
Offset: 19.2353 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
			45		15	0 1 2	0.49 B	29
	540.4	Very stiff to hard, gray SILTY CLAY to SILTY CLAY LOAM, trace gravel						
			50		16	1 7 8	2.46 B	23
			55		17	8 11 14	6.56 B	14
			60		18	6 10 13	4.10 B	20
	525.4	Hard, gray SILTY CLAY LOAM to SILTY LOAM, trace gravel						
			65		19	18 30 28	2.46 S	10
			70		20	15 17 21	8.20 S	13
			75		21	11 17 22	9.59 B	14
			80		22	50/5	NP	13

GENERAL NOTES

Begin Drilling **03-24-2014** Complete Drilling **03-24-2014**
Drilling Contractor **Wang Testing Services** Drill Rig **CME-55 TMR [85%]**
Driller **R&N** Logger **M. de los Reyes** Checked by **C. Marin**
Drilling Method **2.25" SSA to 12.5', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **Rotary wash**
At Completion of Drilling ▼ **mud in the borehole**
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 0461-B-01

WEI Job No.: 1100-04-01

Client **AECOM**
Project **Circle Interchange Reconstruction**
Location **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 587.18 ft
North: 1898107.11 ft
East: 1172063.72 ft
Station: 1210+23.99
Offset: 19.2353 RT

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--						
		--Possible Cobbles--						
					23	40	NP	22
						60/6		
			85					
	500.4							
		Very dense, gray GRAVELLY SAND						
		--Moist--						
					24	60/4	NP	9
			90					
		--HARD DRILLING--						
		--Possible Cobbles--						
					25		NP	12
						54/2		
			95					
		--HARD DRILLING--						
		--Possible Cobbles--						
					26	50/4	NP	15
	487.2		100					

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--WEATHERED BEDROCK--						
		--DIFFICULT DRILLING--						
	484.7	--AUGER REFUSAL--						
		Boring terminated at 102.50 ft						
			105					
			110					
			115					
			120					

GENERAL NOTES

Begin Drilling **03-24-2014** Complete Drilling **03-24-2014**
Drilling Contractor **Wang Testing Services** Drill Rig **CME-55 TMR [85%]**
Driller **R&N** Logger **M. de los Reyes** Checked by **C. Marin**
Drilling Method **2.25" SSA to 12.5', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **Rotary wash**
At Completion of Drilling ▼ **mud in the borehole**
Time After Drilling **NA**
Depth to Water ▼ **NA**

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BORING LOG 1087-B-01

WEI Job No.: 1100-04-01

Client: **AECOM**
Project: **Circle Interchange Reconstruction**
Location: **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 594.63 ft
North: 1897505.91 ft
East: 1171279.56 ft
Station: 1226+22.18
Offset: 70.1849 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	593.6	12-inch thick, black SILTY CLAY --TOPSOIL--						
		Very stiff to hard, dark brown to brown SILTY CLAY, trace gravel, concrete and brick fragments --FILL--			1	4 5 17	> 4.50 P	17
			5		2	3 4 4	3.75 P	15
	589.1	Very loose to medium dense, brown, fine SAND, trace concrete, clay, and rock fragments --FILL--			3	2 1 1	NP	7
			10		4	10 4 11	NP	27
	584.1	Very stiff, gray SILTY CLAY, trace gravel			5	3 5 7	2.38 B	18
	581.6	Very soft to medium stiff, gray CLAY, trace gravel			6	2 2 3	0.66 B	23
			15		7	0 0 0	0.33 B	19
		--L_L(%)=29, P_L(%)=16-- --%Gravel=5.7-- --%Sand=17.7--	20		8	0 0 2	0.41 B	21
		--%Silt=52.3-- --%Clay=24.4-- --A-6 (9)--	25		9	0 0 1	0.50 P	20
					10	0 0 3	0.41 B	25
			30		11	0 2 2	0.33 B	26
					12	0 0 0	0.16 B	26
			35		13	0 2 2	0.16 B	27
			40		14	0 0 2	0.16 B	26

GENERAL NOTES

Begin Drilling: **03-03-2013** Complete Drilling: **03-04-2013**
Drilling Contractor: **Wang Testing Services** Drill Rig: **B-57 TMR [100%]**
Driller: **R&J** Logger: **D. Kolpacki** Checked by: **C. Marin**
Drilling Method: **2.25" SSA to 15', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **10.50 ft**
At Completion of Drilling: **mud in the borehole**
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 1087-B-01

WEI Job No.: 1100-04-01

Client: **AECOM**
Project: **Circle Interchange Reconstruction**
Location: **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 594.63 ft
North: 1897505.91 ft
East: 1171279.56 ft
Station: 1226+22.18
Offset: 70.1849 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--%Silt=55.6-- --%Clay=15.8-- --A-4 (4)--						
		--L_L(%)=28, P_L(%)=13-- --%Gravel=6.7-- --%Sand=16.0-- --%Silt=54.0-- --%Clay=23.2-- --A-6 (9)--	45		15	0 0 2	0.41 B	27
	527.6	Medium stiff to very stiff, gray SILTY CLAY, trace gravel						
		--L_L(%)=35, P_L(%)=15-- --%Gravel=1.1-- --%Sand=8.1-- --%Silt=53.3-- --%Clay=37.5-- --A-6 (17)--	50		16	1 2 2	0.41 B	28
	542.6	Stiff, gray SILTY CLAY, trace gravel						
			55		17	0 4 7	1.23 B	18
	537.6	Dense, gray SILTY LOAM to SILTY CLAY LOAM, trace gravel and sand seams						
		--L_L(%)=23, P_L(%)=14-- --%Gravel=5.1-- --%Sand=23.5--	60		18	16 19 17	NP	11
	517.6	Medium dense, gray SANDY LOAM, trace gravel	65		19	10 24 25	NP	17
			70		20	6 12 12	3.44 B	21
			75		21	0 3 5	0.66 B	23
	514.9		80		22	4 11 15	NP	27

GENERAL NOTES

Begin Drilling: **03-03-2013** Complete Drilling: **03-04-2013**
Drilling Contractor: **Wang Testing Services** Drill Rig: **B-57 TMR [100%]**
Driller: **R&J** Logger: **D. Kolpacki** Checked by: **C. Marin**
Drilling Method: **2.25" SSA to 15', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **10.50 ft**
At Completion of Drilling: **mud in the borehole**
Time After Drilling: **NA**
Depth to Water: **NA**

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BORING LOG 1087-B-01

WEI Job No.: 1100-04-01

Client **AECOM**
Project **Circle Interchange Reconstruction**
Location **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 594.63 ft
North: 1897505.91 ft
East: 1171279.56 ft
Station: 1226+22.18
Offset: 70.1849 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		Hard, gray SILTY LOAM, trace gravel						
					23	6 15 25	5.74 B	16
			85					
					24	11 14 30	4.67 B	19
			90					
	502.6							
		Very dense, gray GRAVELLY SANDY LOAM, some dolostone fragments						
					25	50/2"	NR	
			95					
					26	50/3"	NP	
	495.6							
		Boring terminated at 99.00 ft						
			100					

GENERAL NOTES

Begin Drilling **03-03-2013** Complete Drilling **03-04-2013**
Drilling Contractor **Wang Testing Services** Drill Rig **B-57 TMR [100%]**
Driller **R&J** Logger **D. Kolpacki** Checked by **C. Marin**
Drilling Method **2.25" SSA to 15', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **10.50 ft**
At Completion of Drilling ▼ **mud in the borehole**
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 1087-B-02

WEI Job No.: 1100-04-01

Client **AECOM**
Project **Circle Interchange Reconstruction**
Location **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 577.83 ft
North: 1897618.19 ft
East: 1171373.71 ft
Station: 1225+43.65
Offset: 53.5267 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	577.5	4-inch thick ASPHALT --PAVEMENT--						
		15-inch thick CONCRETE --PAVEMENT--						
	576.2	Medium dense CRUSHED STONE --FILL--			1	10 9 12	NP	
			5		2	4 2 3	NP	7
	572.3	Medium stiff, gray SILTY CLAY, trace gravel			3	2 3 2	0.74 B	20
	569.8	Soft to medium stiff, gray CLAY, trace gravel	10		4	2 2 3	0.33 B	21
		--L_L(%)=32, P_L(%)=17-- --%Gravel=1.9-- --%Sand=15.6-- --%Silt=52.2-- --%Clay=30.3-- --A-6 (11)--			5	2 1 2	0.25 B	24
			15		6	1 2 1	0.16 B	27
					7	1 2 1	0.25 B	27
			20		8	1 2 2	0.25 P	28
			25		9	0 2 1	0.25 B	27
					10	0 0 3	0.41 B	26
					11	1 1 2	0.41 B	25
			30		12	1 2 2	0.57 B	26
	541.1	Hard, gray SILTY LOAM, trace gravel and sand lenses	35		13	0 1 1	0.49 B	29
			40		14	9 10 13	7.79 B	18

GENERAL NOTES

Begin Drilling **03-06-2013** Complete Drilling **03-14-2013**
Drilling Contractor **Wang Testing Services** Drill Rig **B-57 TMR [100%]**
Driller **R&J** Logger **D. Kolpacki** Checked by **C. Marin**
Drilling Method **2.25" SSA to 20', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **3.50 ft**
At Completion of Drilling ▼ **mud in the borehole**
Time After Drilling **NA**
Depth to Water ▼ **NA**

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BORING LOG 1087-B-02

WEI Job No.: 1100-04-01

Client **AECOM**
Project **Circle Interchange Reconstruction**
Location **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 577.83 ft
North: 1897618.19 ft
East: 1171373.71 ft
Station: 1225+43.65
Offset: 53.5267 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--L_L(%)=24, P_L(%)=13--						
		--%Gravel=3.5--						
		--%Sand=28.1--						
		--%Silt=52.4--	45		15	7 10 18	6.47 B	13
		--%Clay=16.0--						
		--A-6 (5)--						
	530.8	Very stiff to hard, gray SILTY CLAY, trace gravel						
		--L_L(%)=40, P_L(%)=15--						
		--%Gravel=0.4--						
		--%Sand=3.8--						
		--%Silt=49.8--	55		17	6 6 7	2.05 S	24
		--%Clay=46.1--						
		--A-6 (24)--						
	520.8	Medium dense, gray, SANDY LOAM						
		--%Gravel=0.0--						
		--%Sand=74.0--						
		--%Silt=25.1--	60		18	5 7 10	NP	23

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--%Clay=0.9--						
		--A-2-4 (0)--						
	515.8	Hard, gray SILTY LOAM, trace gravel						
			65		19	12 20 25	10.25 B	13
		--L_L(%)=22, P_L(%)=12--						
		--%Gravel=4.6--						
		--%Sand=19.7--						
		--%Silt=61.8--	70		20	19 30 34	5.00 S	13
		--%Clay=13.9--						
		--A-4 (5)--						
			75		21	27 34 47	> 4.50 P	18
	500.8	Very dense, gray GRAVELLY SANDY LOAM, some dolostone fragments						
			80		22	50/3	NP	15

GENERAL NOTES

Begin Drilling **03-06-2013** Complete Drilling **03-14-2013**
Drilling Contractor **Wang Testing Services** Drill Rig **B-57 TMR [100%]**
Driller **R&J** Logger **D. Kolpacki** Checked by **C. Marin**
Drilling Method **2.25" SSA to 20', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **3.50 ft**
At Completion of Drilling ▼ **mud in the borehole**
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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Fax: 630 953-9938

BORING LOG 1087-B-02

WEI Job No.: 1100-04-01

Client **AECOM**
Project **Circle Interchange Reconstruction**
Location **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 577.83 ft
North: 1897618.19 ft
East: 1171373.71 ft
Station: 1225+43.65
Offset: 53.5267 LT

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--	85		23	50/3	NR	
	488.8							
		Strong, good rock quality, light gray, fresh, slightly fractured, joint breaks with little to no infill, slightly vuggy DOLOSTONE Run#1: 89 to 99 feet --RECOVERY=100%-- --RQD=84%-- ROCK MASS RATING: Strength of rock material = 12 Drill core quality RQD = 17 Spacing of joints = 20 Condition of joints =20 Groundwater condition =10	90 95		24	CORE		
	478.8							
		Boring terminated at 99.00 ft	100					

GENERAL NOTES

Begin Drilling **03-06-2013** Complete Drilling **03-14-2013**
Drilling Contractor **Wang Testing Services** Drill Rig **B-57 TMR [100%]**
Driller **R&J** Logger **D. Kolpacki** Checked by **C. Marin**
Drilling Method **2.25" SSA to 20', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **3.50 ft**
At Completion of Drilling ▼ **mud in the borehole**
Time After Drilling **NA**
Depth to Water ▼ **NA**

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BORING LOG 1087-B-02 Alt

WEI Job No.: 1100-04-01

Client **AECOM**
Project **Circle Interchange Reconstruction**
Location **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 577.78 ft
North: 1897624.78 ft
East: 1171370.00 ft
Station: 1225+36.25
Offset: 51.9824 LT

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--	5					
			10					
			15					
			20					

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
			25					
			30					
			35					
			40					

GENERAL NOTES

Begin Drilling **03-14-2013** Complete Drilling **03-14-2013**
Drilling Contractor **Wang Testing Services** Drill Rig **B-57 TMR [100%]**
Driller **R&J** Logger **N. Boddy** Checked by **C. Marin**
Drilling Method **2.25" SSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **Rotary wash**
At Completion of Drilling ▼ **mud in the borehole**
Time After Drilling **NA**
Depth to Water ▼ **NA**

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BORING LOG 1087-B-02 Alt

WEI Job No.: 1100-04-01

Client **AECOM**
Project **Circle Interchange Reconstruction**
Location **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 577.78 ft
North: 1897624.78 ft
East: 1171370.00 ft
Station: 1225+36.25
Offset: 51.9824 LT

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--	45					
			50					
			55					
		--DRILLED WITHOUT SAMPLING--	60					

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
			65					
			70					
			75					
			80					

GENERAL NOTES

Begin Drilling **03-14-2013** Complete Drilling **03-14-2013**
Drilling Contractor **Wang Testing Services** Drill Rig **B-57 TMR [100%]**
Driller **R&J** Logger **N. Boddy** Checked by **C. Marin**
Drilling Method **2.25" SSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **Rotary wash**
At Completion of Drilling ▼ **mud in the borehole**
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 1087-B-02 Alt

WEI Job No.: 1100-04-01

Client **AECOM**
Project **Circle Interchange Reconstruction**
Location **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 577.78 ft
North: 1897624.78 ft
East: 1171370.00 ft
Station: 1225+36.25
Offset: 51.9824 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	494.3							
		--HARD DRILLING--	85		23	50/3	NR	
	488.8	Strong, good rock quality, light gray, fresh, slightly fractured, joint breaks with little to no infill, slightly vuggy DOLOSTONE Run#1: 89 to 99 feet --RECOVERY=100%-- --RQD=84%--	90			CORE		
			95		24			
	478.8	Boring terminated at 99.00 ft	100					

GENERAL NOTES

Begin Drilling **03-14-2013** Complete Drilling **03-14-2013**
Drilling Contractor **Wang Testing Services** Drill Rig **B-57 TMR [100%]**
Driller **R&J** Logger **N. Boddy** Checked by **C. Marin**
Drilling Method **2.25" SSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **Rotary wash**
At Completion of Drilling ▼ **mud in the borehole**
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 10-RWB-01

WEI Job No.: 1100-04-01

Client: **AECOM**
Project: **Circle Interchange Reconstruction**
Location: **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 593.61 ft
North: 1897453.61 ft
East: 1171289.67 ft
Station: 1226+75.08
Offset: 76.3653 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	593.3	4-inch thick, dark brown SILTY LOAM						
	592.4	--TOPSOIL--						
		Hard, brown SILTY CLAY LOAM, trace gravel and brick fragments --FILL--			1	9 4 7	NP	13
	590.6	Medium dense, brown SILTY LOAM, trace gravel and brick fragments --FILL--			2	5 5 5	NP	12
		Loose to medium dense, brown, fine SAND --FILL--	5		3	3 3 2	NP	14
					4	3 2 2	NP	19
	583.9	Stiff to hard, gray brown and gray SILTY CLAY, trace gravel	10		5	3 4 5	2.54 B	18
			15		6	3 3 3	1.07 B	20
	578.1	Very soft to medium stiff, gray CLAY to SILTY CLAY, trace gravel			7	0 0 1	0.41 B	27
			20		8	1 2 1	0.33 B	18
			25		9	2 3 3	0.66 B	15
					10	0 1 2	0.50 N/6	
					11	1 1 1	0.16 B	26
		--L_L(%)=33, P_L(%)=17-- --%Gravel=3.4-- --%Sand=14.9-- --%Silt=48.7-- --%Clay=32.9-- --A-6 (12)--	30		12	0 1 1	0.16 B	25
			35		13	0 0 0	0.16 B	25
			40		14	0 0 0	0.25 B	25

GENERAL NOTES

Begin Drilling: **02-26-2014** Complete Drilling: **03-03-2014**
Drilling Contractor: **Wang Testing Services** Drill Rig: **CME-55 TMR [85%]**
Driller: **R&K** Logger: **D. Kolpacki** Checked by: **C. Marin**
Drilling Method: **2.25" SSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **8.00 ft**
At Completion of Drilling: **90.00 ft**
Time After Drilling: **NA**
Depth to Water: **NA**

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BORING LOG 10-RWB-01

WEI Job No.: 1100-04-01

Client **AECOM**
Project **Circle Interchange Reconstruction**
Location **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 593.61 ft
North: 1897453.61 ft
East: 1171289.67 ft
Station: 1226+75.08
Offset: 76.3653 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
			45		15	0 2 2	0.25 B	26
			50		16	0 0 2	0.33 B	26
	541.9	Hard, gray SILTY CLAY to SILTY CLAY LOAM, trace gravel	55		17	6 8 12	5.08 B	21
			60		18	14 15 24	6.50 N/6	
			65		19	10 14 24	5.74 B	19
			70		20	11 11 15	> 4.50	21
	521.9	Loose, gray SILTY LOAM, trace gravel --Saturated--	75		21	4 4 5	NP	21
	516.9	Hard, gray SILTY CLAY LOAM, trace gravel	80		22	17 19 29	9.84 S	13

GENERAL NOTES

Begin Drilling **02-26-2014** Complete Drilling **03-03-2014**
Drilling Contractor **Wang Testing Services** Drill Rig **CME-55 TMR [85%]**
Driller **R&K** Logger **D. Kolpacki** Checked by **C. Marin**
Drilling Method **2.25" SSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **8.00 ft**
At Completion of Drilling ▼ **90.00 ft**
Time After Drilling **NA**
Depth to Water ▼ **NA**

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BORING LOG 10-RWB-01

WEI Job No.: 1100-04-01

Client **AECOM**
Project **Circle Interchange Reconstruction**
Location **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 593.61 ft
North: 1897453.61 ft
East: 1171289.67 ft
Station: 1226+75.08
Offset: 76.3653 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
			85		23	17 22 40	9.76 S	14
	506.9	Very dense, gray GRAVELLY SILTY LOAM --Saturated--						
			90		24	15 21 50/3	NP	23
		--HARD DRILLING-- *--Possible Cobbles--*						
	501.9	Very dense, gray GRAVELLY SAND --Saturated--						
			95		25	50/4	NP	15
		--HARD DRILLING-- *--Possible Cobbles--*						
	496.9	Very dense, gray SILTY LOAM, trace gravel						
			100		26	50/5	NP	13

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	492.1	Strong, light gray, fair rock mass quality, bedded fresh DOLOSTONE, up to 10-inch beds, 1- to 8-inch spaced joints, horizontal and vertical joints with none to more than 0.2-inch infilling, hard joint wall, with stylolitic surfaces, and moderately vuggy porosity. --Run 1 - RECOVERY=100%-- --RQD=53%--	105		1	CORE		
			110					
	482.1	Boring terminated at 111.50 ft						
			115					
			120					

GENERAL NOTES

Begin Drilling **02-26-2014** Complete Drilling **03-03-2014**
Drilling Contractor **Wang Testing Services** Drill Rig **CME-55 TMR [85%]**
Driller **R&K** Logger **D. Kolpacki** Checked by **C. Marin**
Drilling Method **2.25" SSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **8.00 ft**
At Completion of Drilling ▼ **90.00 ft**
Time After Drilling **NA**
Depth to Water ▽ **NA**

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BORING LOG 10-RWB-02

WEI Job No.: 1100-04-01

Client: **AECOM**
Project: **Circle Interchange Reconstruction**
Location: **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 593.54 ft
North: 1897333.82 ft
East: 1171374.94 ft
Station: 1228+15.06
Offset: 31.338 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	593.0	6-inch thick, black and brown SILTY LOAM --TOPSOIL-- Loose to medium dense, brown, fine SAND --FILL--			1	3 5 6	NP	8
			5		2	3 4 7	NP	11
					3	8 7 6	NP	14
			10		4	4 4 4	NP	21
	583.0	Stiff to very stiff, gray SILTY CLAY LOAM, trace gravel			5	3 5 8	3.69 B	25
			15		6	4 6 5	2.30 B	16
					7	3 3 5	1.48 B	21
	575.5	Soft to stiff, gray CLAY to SILTY CLAY, trace gravel	20		8	2 2 3	0.66 B	28
			25		9	1 3 3	1.07 B	23
					10	2 2 2	0.49 B	28
					11	1 2 2	0.41 B	24
			30		12	1 2 2	0.67 N/6	
			35		13	0 1 2	0.33 B	26
					14	1 2 2	0.49 B	23
			40					

GENERAL NOTES

Begin Drilling: **02-26-2014** Complete Drilling: **03-03-2014**
Drilling Contractor: **Wang Testing Services** Drill Rig: **B-57 TMR [100%]**
Driller: **P&P** Logger: **F. Bozga** Checked by: **C. Marin**
Drilling Method: **2.25" HSA to 15', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **8.00 ft**
At Completion of Drilling: **mud at 7 ft**
Time After Drilling: **144 hours**
Depth to Water: **16.00 ft**

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

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BORING LOG 10-RWB-02

WEI Job No.: 1100-04-01

Client **AECOM**
Project **Circle Interchange Reconstruction**
Location **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 593.54 ft
North: 1897333.82 ft
East: 1171374.94 ft
Station: 1228+15.06
Offset: 31.338 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--disturbed sample--	45		15	1 1 2	0.25 P	21
		--disturbed sample--	50		16	2 2 3	0.25 P	26
	541.8	Hard, gray SILTY CLAY LOAM to SILTY LOAM, trace gravel						
			55		17	11 11 17	5.66 B	15
		--L_L(%)=23, P_L(%)=15-- --%Gravel=6.7-- --%Sand=26.9--	60		18	14 24 29	4.50 P	12
		--%Silt=49.7-- --%Clay=16.7-- --A-4 (3)--	65		19	11 19 23	8.12 B	15
	526.8	Dense to very dense, gray SILTY LOAM, trace gravel --Moist--						
			70		20	14 16 20	NP	18
			75		21	23 25 39	NP	12
	516.8	Hard, gray SILTY CLAY LOAM, trace gravel						
			80		22	16 26 31	9.68 B	15

GENERAL NOTES

Begin Drilling **02-26-2014** Complete Drilling **03-03-2014**
Drilling Contractor **Wang Testing Services** Drill Rig **B-57 TMR [100%]**
Driller **P&P** Logger **F. Bozga** Checked by **C. Marin**
Drilling Method **2.25" HSA to 15', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **8.00 ft**
At Completion of Drilling ▼ **mud at 7 ft**
Time After Drilling **144 hours**
Depth to Water ▼ **16.00 ft**

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BORING LOG 10-RWB-02

WEI Job No.: 1100-04-01

Client **AECOM**
Project **Circle Interchange Reconstruction**
Location **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 593.54 ft
North: 1897333.82 ft
East: 1171374.94 ft
Station: 1228+15.06
Offset: 31.338 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
			85		23	12 19 26	NP	18
	506.8	Very dense, gray SILT --Moist--						
			90		24	40 36 40	NP	19
	501.8	Hard, gray SILTY CLAY LOAM, trace gravel						
			95		25	20 28 50/5	9.18 B	14
	496.5	Very dense, gray GRAVELLY SILTY LOAM --Dry--						
			100		26	60/4	NP	10

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	493.0	--DIFFICULT DRILLING-- --WEATHERED BEDROCK--						
	491.5	Strong, light gray, very poor rock mass quality, bedded fresh DOLOSTONE, up to 8-inch beds, up to 4-inch spaced joints, horizontal and vertical joints with none to more than 0.2-inch greenish gray infilling, hard joint wall, with stylolitic surfaces, and moderately vuggy porosity. --Run 1 - RECOVERY=97%-- --RQD=8%--	105		1	CORE		
		--Run 2 - RECOVERY=87%-- --RQD=20%--	110		2	CORE		
	481.5	Boring terminated at 68.50 ft	115					
			120					

GENERAL NOTES

Begin Drilling **02-26-2014** Complete Drilling **03-03-2014**
Drilling Contractor **Wang Testing Services** Drill Rig **B-57 TMR [100%]**
Driller **P&P** Logger **F. Bozga** Checked by **C. Marin**
Drilling Method **2.25" HSA to 15', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **8.00 ft**
At Completion of Drilling ▼ **mud at 7 ft**
Time After Drilling **144 hours**
Depth to Water ▼ **16.00 ft**

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

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BORING LOG 13-RWB-01

WEI Job No.: 1100-04-01

Client: **AECOM**
Project: **Circle Interchange Reconstruction**
Location: **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 593.57 ft
North: 1897602.80 ft
East: 1171259.06 ft
Station: 1225+23.63
Offset: 60.4088 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	593.3	4-inch thick, black SILTY CLAY LOAM, trace gravel, trace wood fragments --TOPSOIL--						
		Loose to medium dense, gray and black SILTY LOAM, trace gravel, brick fragments, slag, and roots --FILL--			1	8 5 5	NP	16
			5		2	8 3 3	NP	40
	588.1	Loose, brown fine to medium SAND, trace gravel --FILL--			3	5 4 4	NP	18
	585.6	Stiff to very stiff, gray SILTY CLAY	10		4	4 6 7	3.20 B	25
					5	3 3 3	1.48 B	17
	580.6	Soft to medium stiff, gray CLAY to SILTY CLAY, trace gravel	15		6	3 3 3	0.66 B	17
					7	1 2 3	0.57 B	21
			20		8	1 1 2	0.41 B	20
			25		9	1 2 2	0.57 B	21
					10	1 1 3	0.33 B	23
					11	1 1 2	0.49 B	24
		--L_L(%)=35, P_L(%)=15-- --%Gravel=2.2-- --%Sand=16.1-- --%Silt=50.7-- --%Clay=31.0-- --A-6 (15)--	30		12	1 1 2	0.57 B	24
			35		13	0 1 1	0.49 B	26
			40		14	0 2 1	0.33 B	26

GENERAL NOTES

Begin Drilling: **06-28-2013** Complete Drilling: **07-01-2013**
Drilling Contractor: **Wang Testing Services** Drill Rig: **D-25 ATV [93%]**
Driller: **P&N** Logger: **A. Tomaras** Checked by: **C. Marin**
Drilling Method: **2.25" HSA to 15', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **Rotary wash**
At Completion of Drilling: **mud in the borehole**
Time After Drilling: **NA**
Depth to Water: **NA**

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BORING LOG 13-RWB-01

WEI Job No.: 1100-04-01

Client **AECOM**
Project **Circle Interchange Reconstruction**
Location **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 593.57 ft
North: 1897602.80 ft
East: 1171259.06 ft
Station: 1225+23.63
Offset: 60.4088 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
			45		15	1 2 2	0.33 B	28
			50		16	0 2 1	0.33 B	26
	541.8	Stiff, gray SILTY CLAY LOAM, trace seams of sand and silt	55		17	4 8 11	1.56 B	14
	536.8	Stiff, gray SILTY CLAY LOAM, trace gravel	60		18	11 17 22	1.48 S	13
	533.8							
		Gray, medium SAND	65		19	8 13 19	3.69 B	19
	531.8	Stiff to very stiff, gray SILTY CLAY LOAM, trace gravel	70		20	6 8 9	2.95 B	25
	519.4	--2-inch, gray SILT, moist-- Hard, gray SILTY LOAM to SILTY CLAY LOAM, trace gravel	75		21	5 6 8	1.48 B	13
		--L_L(%)=29, P_L(%)=14-- --%Gravel=2.2-- --%Sand=11.8--	80		22	15 18 30	5.66 B	13

GENERAL NOTES

Begin Drilling **06-28-2013** Complete Drilling **07-01-2013**
Drilling Contractor **Wang Testing Services** Drill Rig **D-25 ATV [93%]**
Driller **P&N** Logger **A. Tomaras** Checked by **C. Marin**
Drilling Method **2.25" HSA to 15', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **Rotary wash**
At Completion of Drilling ▼ **mud in the borehole**
Time After Drilling **NA**
Depth to Water ▼ **NA**

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BORING LOG 13-RWB-01

WEI Job No.: 1100-04-01

Client **AECOM**
Project **Circle Interchange Reconstruction**
Location **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 593.57 ft
North: 1897602.80 ft
East: 1171259.06 ft
Station: 1225+23.63
Offset: 60.4088 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--%Silt=61.8--						
		--%Clay=24.2--						
		--A-6 (11)--						
			85		23	20 33 30	7.30 S	10
			90		24	50/5	7.05 S	12
	499.7				25	50/5	NR	
		Boring terminated at 93.90 ft	95					
			100					

GENERAL NOTES

Begin Drilling **06-28-2013** Complete Drilling **07-01-2013**
Drilling Contractor **Wang Testing Services** Drill Rig **D-25 ATV [93%]**
Driller **P&N** Logger **A. Tomaras** Checked by **C. Marin**
Drilling Method **2.25" HSA to 15', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **Rotary wash**
At Completion of Drilling ▼ **mud in the borehole**
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 13-RWB-03

WEI Job No.: 1100-04-01

Client **AECOM**
Project **Circle Interchange Reconstruction**
Location **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 593.23 ft
North: 1897624.69 ft
East: 1171234.97 ft
Station: 7308+20.74
Offset: 20.9635 RT

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						
		--In-Situ Vane Shear, 15.0 feet--	15		1	VS		
		--$S_{u\ undis}$ = 1036.0 psf--						
		--$S_{u\ remold}$ = 543.9 psf--						
		--Sensitivity = 1.90--						
		--In-Situ Vane Shear, 19.5 feet--	20		2			
		--$S_{u\ undis}$ = 1113.7 psf--				VS		
		--$S_{u\ remold}$ = 777 psf--						
		--Sensitivity = 1.43--						
		--In-Situ Vane Shear, 24.5 feet--	25		3	VS		
		--$S_{u\ undis}$ = 880.6 psf--						
		--$S_{u\ remold}$ = 647.5 psf--						
		--Sensitivity = 1.36--						
		--In-Situ Vane Shear, 29.5 feet--	30		4	VS		
		--$S_{u\ undis}$ = 802.9 psf--						
		--$S_{u\ remold}$ = 440.3 psf--						
		--Sensitivity = 1.82--						
		--In-Situ Vane Shear, 34.5 feet--	35		5	VS		
		--$S_{u\ undis}$ = 802.9 psf--						
		--$S_{u\ remold}$ = 466.2 psf--						
		--Sensitivity = 1.72--						
		--In-Situ Vane Shear, 39.5 feet--	40		6			

GENERAL NOTES

Begin Drilling **07-02-2013** Complete Drilling **07-03-2013**
Drilling Contractor **Wang Testing Services** Drill Rig **CME-55 TMR [85%]**
Driller **R&J** Logger **D. Kolpacki** Checked by **C. Marin**
Drilling Method **2.25" HSA to 13', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **Rotary wash**
At Completion of Drilling ▼ **mud in the borehole**
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 13-RWB-03

WEI Job No.: 1100-04-01

Client **AECOM**
Project **Circle Interchange Reconstruction**
Location **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 593.23 ft
North: 1897624.69 ft
East: 1171234.97 ft
Station: 7308+20.74
Offset: 20.9635 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--$S_{u\ undis}$ = 647.5 psf--				VS		
		--$S_{u\ remold}$ = 440.3 psf--						
		--Sensitivity = 1.47--						
		--In-Situ Vane Shear, 44.5 feet--	45		7	VS		
		--$S_{u\ undis}$ = 1292.5 psf--						
		--$S_{u\ remold}$ = 620.4 psf--						
		--Sensitivity = 2.08--						
		--In-Situ Vane Shear, 49.5 feet--	50		8	VS		
		--$S_{u\ undis}$ = 1344.2 psf--						
		--$S_{u\ remold}$ = 620.4 psf--						
		--Sensitivity = 2.16--						
		--In-Situ Vane Shear, 54.5 feet--	55		9	VS		
		--$S_{u\ undis}$ = 7600 psf--						
		--$S_{u\ remold}$ = NA psf--						
		--Sensitivity = NA--						
			60					

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
			65					
			70					
			75					
			80					

GENERAL NOTES

Begin Drilling **07-02-2013** Complete Drilling **07-03-2013**
Drilling Contractor **Wang Testing Services** Drill Rig **CME-55 TMR [85%]**
Driller **R&J** Logger **D. Kolpacki** Checked by **C. Marin**
Drilling Method **2.25" HSA to 13', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **Rotary wash**
At Completion of Drilling ▼ **mud in the borehole**
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 13-RWB-03

WEI Job No.: 1100-04-01

Client **AECOM**
Project **Circle Interchange Reconstruction**
Location **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 593.23 ft
North: 1897624.69 ft
East: 1171234.97 ft
Station: 7308+20.74
Offset: 20.9635 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	489.2	Strong, light gray, fair rock mass quality, bedded fresh DOLOSTONE, up to 18-inch beds, 7-inch joint spacing, horizontal and vertical joints with none to less than 0.2-inch greenish gray infilling, hard joint wall, with stylolitic surfaces, and moderately vuggy porosity.	105	CORE	1	CORE		
		--Run 1 RECOVERY=100%-- --RQD=66%--						
		Qu = 13,410 psi	110					
		Qu = 10,600 psi						
	479.2	Boring terminated at 114.00 ft	115					
			120					

GENERAL NOTES

Begin Drilling **07-02-2013** Complete Drilling **07-03-2013**
Drilling Contractor **Wang Testing Services** Drill Rig **CME-55 TMR [85%]**
Driller **R&J** Logger **D. Kolpacki** Checked by **C. Marin**
Drilling Method **2.25" HSA to 13', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **Rotary wash**
At Completion of Drilling ▼ **mud in the borehole**
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 14-RWB-01

WEI Job No.: 1100-04-01

Client **AECOM**
Project **Circle Interchange Reconstruction**
Location **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 580.85 ft
North: 1897238.90 ft
East: 1171475.76 ft
Station: 1229+27.47
Offset: 39.6372 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		15-inch thick CONCRETE --PAVEMENT--						
	579.6							
	579.3	3-inch thick ASPHALT						
		Medium dense, brownish white CRUSHED STONE --BASE COURSE--			1	15 17 9	NP	15
	577.6	Soft, gray CLAY to SILTY CLAY, trace gravel						
			5		2	3 2 3	0.49 B	22
					3	1 2 2	0.57 B	28
			10		4	1 2 1	0.41 B	27
					5	2 1 2	0.41 B	23
			15		6	2 2 2	0.25 B	27
					7	2 1 3	0.25 B	26
			20		8	1 1 1	0.25 B	28
			25		9	1 2 1	0.16 B	23
					10	1 2 1	0.25 B	25
			30		11	0 2 2	0.33 B	26
					12	2 3 3	0.49 B	25
	544.1	Very stiff to hard, gray SILTY CLAY, trace gravel	35		13	2 3 4	0.25 B	21
			40		14	3 4 5	3.00 P	19

GENERAL NOTES

Begin Drilling **07-28-2014** Complete Drilling **07-29-2014**
Drilling Contractor **Wang Testing Services** Drill Rig **CME-55 TMR [85%]**
Driller **R&J** Logger **A. Happel** Checked by **C. Marin**
Drilling Method **2.25" HSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **52.00 ft**
At Completion of Drilling ▼ **mud in the borehole**
Time After Drilling **NA**
Depth to Water ▼ **NA**

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BORING LOG 14-RWB-01

WEI Job No.: 1100-04-01

Client **AECOM**
Project **Circle Interchange Reconstruction**
Location **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 580.85 ft
North: 1897238.90 ft
East: 1171475.76 ft
Station: 1229+27.47
Offset: 39.6372 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
			45		15	12 18 47	5.17 B	17
	534.1	Very stiff, gray SILTY LOAM to SILTY CLAY LOAM, trace gravel						
			50		16	33 45 32/4	3.28 S	15
	529.1	Very dense, gray SAND to SANDY LOAM, trace gravel						
			55		17	17 23 36	NP	18
			60		18	13 30 22	NP	19
			65		19	14 23 33	NP	17
	515.8	Boring terminated at 65.00 ft						
			70					
			75					
			80					

GENERAL NOTES

Begin Drilling **07-28-2014** Complete Drilling **07-29-2014**
Drilling Contractor **Wang Testing Services** Drill Rig **CME-55 TMR [85%]**
Driller **R&J** Logger **A. Happel** Checked by **C. Marin**
Drilling Method **2.25" HSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **52.00 ft**
At Completion of Drilling ▼ **mud in the borehole**
Time After Drilling **NA**
Depth to Water ▼ **NA**

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BORING LOG 15-RWB-01

WEI Job No.: 1100-04-01

Client: **AECOM**
Project: **Circle Interchange Reconstruction**
Location: **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 593.54 ft
North: 1897200.61 ft
East: 1171415.26 ft
Station: 1229+54.23
Offset: 33.2105 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		14-inch thick, black SILTY LOAM --TOPSOIL--						
	592.4							
		Medium dense, black and brown LOAM, some gravel and brick fragments --FILL--			1	6 10 10	NP	15
	590.5							
		Medium dense to dense, black and brown SILTY LOAM, trace gravel and brick fragments --FILL--	5		2	3 17 14	NP	57
					3	9 6 5	NP	22
	585.5							
	584.8	Gray, medium SAND, trace gravel						
		Very stiff, gray SILTY CLAY, trace gravel	10		4	2 3 6	3.36 B	23
					5	5 6 7	3.03 B	26
	580.5							
		Very soft to medium stiff, gray CLAY to SILTY CLAY, trace gravel	15		6	2 1 2	0.33 B	27
					7	1 1 1	0.16 B	24
			20		8	1 1 1	0.16 B	29
			25		9	2 1 3	0.16 B	24
					10	2 2 2	0.25 B	20
					11	2 1 2	0.33 B	24
			30		12	1 2 3	0.16 B	26
			35		13	1 2 2	0.16 B	25
			40		14	2 3 3	0.25 B	24

GENERAL NOTES

Begin Drilling: **02-25-2014** Complete Drilling: **02-28-2014**
Drilling Contractor: **Wang Testing Services** Drill Rig: **D-25 ATV [93%]**
Driller: **N&J** Logger: **A. Happel** Checked by: **C. Marin**
Drilling Method: **2.25" HSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **Rotary wash**
At Completion of Drilling: **mud in the borehole**
Time After Drilling: **NA**
Depth to Water: **NA**

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BORING LOG 15-RWB-01

WEI Job No.: 1100-04-01

Client: **AECOM**
Project: **Circle Interchange Reconstruction**
Location: **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 593.54 ft
North: 1897200.61 ft
East: 1171415.26 ft
Station: 1229+54.23
Offset: 33.2105 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--L_L(%)=34, P_L(%)= 18--						
		--%Gravel=4.4--						
		--%Sand=14.5--						
		--%Silt=47.7--	45		15	3 4 5	0.50 P	25
		--%Clay=33.3--						
		--A-6 (12)--						
			50		16	2 2 2	0.82 B	27
	541.8	Hard, gray SILTY CLAY LOAM, trace gravel						
			55		17	14 18 30	5.33 S	13
			60		18	14 22 26	6.72 S	13
	531.8	Dense, gray, medium SAND, trace gravel						
		--Moist to wet--						
			65		19	13 20 25	NP	24
		--HARD DRILLING--						
		--Possible Cobbles--						
		--%Gravel=0.2--						
		--%Sand=79.5--						
		--%Silt=18.3--						
		--%Clay=2.0--	70		20	22 16 24	NP	24
		--A-2-4 (0)--						
			75		21	14 18 21	NP	19
	516.8	Hard, gray SILTY CLAY LOAM to SILTY LOAM, trace gravel						
			80		22	18 39 50	4.50 P	13

GENERAL NOTES

Begin Drilling: **02-25-2014** Complete Drilling: **02-28-2014**
Drilling Contractor: **Wang Testing Services** Drill Rig: **D-25 ATV [93%]**
Driller: **N&J** Logger: **A. Happel** Checked by: **C. Marin**
Drilling Method: **2.25" HSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **Rotary wash**
At Completion of Drilling: **mud in the borehole**
Time After Drilling: **NA**
Depth to Water: **NA**

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BORING LOG 15-RWB-01

WEI Job No.: 1100-04-01

Client **AECOM**
Project **Circle Interchange Reconstruction**
Location **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 593.54 ft
North: 1897200.61 ft
East: 1171415.26 ft
Station: 1229+54.23
Offset: 33.2105 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
			85		23	22 32 50	9.02 S	13
		--L_L(%)=26, P_L(%)=16-- --%Gravel=0.1-- --%Sand=11.7-- --%Silt=62.6-- --%Clay=25.6-- --A-4 (7)--						
	503.5		90		24	25 33 48	10.25 S	13
		Boring terminated at 90.00 ft	95					
			100					

GENERAL NOTES

Begin Drilling **02-25-2014** Complete Drilling **02-28-2014**
Drilling Contractor **Wang Testing Services** Drill Rig **D-25 ATV [93%]**
Driller **N&J** Logger **A. Happel** Checked by **C. Marin**
Drilling Method **2.25" HSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **Rotary wash**
At Completion of Drilling ▼ **mud in the borehole**
Time After Drilling **NA**
Depth to Water ▼ **NA**

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BORING LOG 1703-B-05

WEI Job No.: 1100-04-01

Client **AECOM**
Project **Circle Interchange Reconstruction**
Location **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 586.64 ft
North: 1898050.50 ft
East: 1171954.33 ft
Station: 5213+04.97
Offset: 31.8899 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		Stiff to very stiff, brown and gray SILTY CLAY LOAM, trace gravel --FILL--			1	8 7 5	2.00 P	25
			5		2	4 4 5	1.48 B	22
	581.1	Very soft to medium stiff, gray CLAY to SILTY CLAY, trace gravel			3	2 2 3	0.66 B	24
			10		4	1 2 3	0.41 B	25
					5	1 1 2	0.33 B	24
			15		6	1 1 2	0.25 B	25
					7	1 1 3	0.25 B	25
			20		8	1 3 3	0.33 B	17
			25		9	2 2 3	0.25 B	25
					10	2 2 3	0.33 B	26
					11	2 2 2	0.25 B	22
			30		12	1 2 2	0.25 B	28
			35		13	1 2 2	0.16 B	28
			40		14	1 2 4	< 0.25 P	28

GENERAL NOTES

Begin Drilling **10-21-2013** Complete Drilling **10-22-2013**
Drilling Contractor **Wang Testing Services** Drill Rig **D-25 ATV [93%]**
Driller **P&N** Logger **D. Kolpacki** Checked by **C. Marin**
Drilling Method **2.25" HSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **89.00 ft**
At Completion of Drilling ▼ **89.00 ft**
Time After Drilling **NA**
Depth to Water ▼ **NA**

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BORING LOG 1703-B-05

WEI Job No.: 1100-04-01

Client: **AECOM**
Project: **Circle Interchange Reconstruction**
Location: **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 586.64 ft
North: 1898050.50 ft
East: 1171954.33 ft
Station: 5213+04.97
Offset: 31.8899 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
			45		15	1 2 3	0.25 B	21
	539.9	Very stiff to hard, gray SILTY CLAY, trace gravel						
			50		16	9 16 24	2.54 B	14
			55		17	12 20 29	6.64 B	14
	527.9	Dense, gray SANDY LOAM, trace gravel --Moist--	60		18	28 25 24	NP	15
	524.9	Hard, gray SILTY CLAY LOAM, trace gravel						
			65		19	18 25 31	5.41 S	13
			70		20	17 21 34	4.10 S	13
			75		21	15 27 46	8.28 B	15
	509.9	Very dense, gray SILTY LOAM, trace gravel						
			80		22	50/5	NP	10

GENERAL NOTES

Begin Drilling: **10-21-2013** Complete Drilling: **10-22-2013**
Drilling Contractor: **Wang Testing Services** Drill Rig: **D-25 ATV [93%]**
Driller: **P&N** Logger: **D. Kolpacki** Checked by: **C. Marin**
Drilling Method: **2.25" HSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **89.00 ft**
At Completion of Drilling: **89.00 ft**
Time After Drilling: **NA**
Depth to Water: **NA**

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BORING LOG 1703-B-05

WEI Job No.: 1100-04-01

Client: **AECOM**
Project: **Circle Interchange Reconstruction**
Location: **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 586.64 ft
North: 1898050.50 ft
East: 1171954.33 ft
Station: 5213+04.97
Offset: 31.8899 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	504.9	Hard, gray SILTY CLAY LOAM, trace gravel						
					23	28 38 50/5	10.00 S	12
			85					
		--HARD DRILLING-- *--Possible Cobbles--*						
	497.6							
		Very dense, gray SILT, trace gravel			24	14 24 43	NP	23
			90					
		--HARD DRILLING-- *--Possible Cobbles--*						
					25	50/4	NP	17
			95					
	489.9							
		Very dense, gray GRAVELLY SAND --Saturated--						
					26	50/4	NP	14
			100					

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	484.9	--HARD DRILLING-- Very dense, greenish gray SILT/SHALE, some DOLOSTONE fragments --WEATHERED BEDROCK--			27	50/5	NP	16
			105					
	479.6	Boring terminated at 107.00 ft						
			110					
			115					
			120					

GENERAL NOTES

Begin Drilling: **10-21-2013** Complete Drilling: **10-22-2013**
Drilling Contractor: **Wang Testing Services** Drill Rig: **D-25 ATV [93%]**
Driller: **P&N** Logger: **D. Kolpacki** Checked by: **C. Marin**
Drilling Method: **2.25" HSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **89.00 ft**
At Completion of Drilling: **89.00 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 1705-B-11

WEI Job No.: 1100-04-01

Client: **AECOM**
Project: **Circle Interchange Reconstruction**
Location: **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 580.50 ft
North: 1898132.10 ft
East: 1171174.95 ft
Station: 1834+90.93
Offset: 2.3250 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	579.8	8-inch thick CRUSHED STONE						
		Medium dense, brown SILTY LOAM, trace gravel and pieces of cinders --FILL--			1	4 5 6	NP	14
	577.5	Medium stiff to very stiff, brown SILTY CLAY LOAM, trace gravel, pockets of fine sand	5		2	2 1 1	2.50 P	14
					3	2 3 3	1.07 B	18
			10		4	2 1 3	0.74 B	17
					5	0 2 3	1.15 B	18
	567.5	Very soft to medium stiff, gray and brown CLAY to SILTY CLAY, trace gravel	15		6	0 0 0	0.74 B	25
					7	0 0 1	0.74 B	25
			20		8	0 0 2	0.74 B	22
			25		9	0 0 0	0.49 B	26
					10	0 0 0	0.33 B	28
					11	0 0 2	0.16 B	24
			30		12	0 0 1	0.33 B	26
			35		13	0 2 3	0.82 B	27
			40		14	2 2 3	0.66 B	23

GENERAL NOTES

Begin Drilling: **07-28-2013** Complete Drilling: **07-29-2013**
Drilling Contractor: **Wang Testing Services** Drill Rig: **D-50 TMR [78%]**
Driller: **R&N** Logger: **A. Happel** Checked by: **C. Marin**
Drilling Method: **2.25" SSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **Rotary wash**
At Completion of Drilling: **mud in the borehole**
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 1705-B-11

WEI Job No.: 1100-04-01

Client: **AECOM**
Project: **Circle Interchange Reconstruction**
Location: **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 580.50 ft
North: 1898132.10 ft
East: 1171174.95 ft
Station: 1834+90.93
Offset: 2.3250 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	538.8	Very stiff to hard, gray CLAY to SILTY CLAY , trace gravel	45		15	5 9 13	4.92 B	16
		--L_L(%)=37, P_L(%)=17-- --%Gravel=1.9-- --%Sand=11.6-- --%Silt=47.1-- --%Clay=39.5-- --A-6 (17)--	50		16	7 10 15	4.20 B	16
			55		17	6 12 18	3.77 B	14
	523.8	Medium dense, gray SILT --Moist--	60		18	8 11 16	NP	22
	518.8	Dense to very dense, gray SILTY LOAM, trace gravel	65		19	20 27 42	NP	13
			70		20	14 20 29	NP	15
			75		21	29 45 50/4	NP	10
		--HARD DRILLING-- *--Possible Cobbles--*						
	503.8	Hard, gray SILTY CLAY LOAM, trace gravel	80		22	12 25 36	6.97 B	11

GENERAL NOTES

Begin Drilling: **07-28-2013** Complete Drilling: **07-29-2013**
Drilling Contractor: **Wang Testing Services** Drill Rig: **D-50 TMR [78%]**
Driller: **R&N** Logger: **A. Happel** Checked by: **C. Marin**
Drilling Method: **2.25" SSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **Rotary wash**
At Completion of Drilling: **mud in the borehole**
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 1705-B-11

WEI Job No.: 1100-04-01

Client: **AECOM**
Project: **Circle Interchange Reconstruction**
Location: **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 580.50 ft
North: 1898132.10 ft
East: 1171174.95 ft
Station: 1834+90.93
Offset: 2.3250 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	498.8	Very dense, gray SILT, trace gravel						
		--%Gravel=1.0-- --%Sand=1.5-- --%Silt=92.3-- --%Clay=5.2-- --A-4 (0)--	85		23	26 46 50/5	NP	24
	492.5	Very dense, GRAVEL, trace cobbles			24	50/3	NA	
		--HARD DRILLING to 94'-- *--Possible Cobbles--*	90					
	486.5	Strong, fair rock quality, light gray, fresh, vertical and horizontal joints, joint breaks with little to no infill, horizontal stylolites, slightly vuggy DOLOSTONE			25	50/3 CORE	NP	15
		--Run 1 - RECOVERY=100%-- --RQD (top 5ft)=70%-- --RQD (10ft)=82%--	95					
			100				NP	

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	476.5	Boring terminated at 104.00 ft	105					
			110					
			115					
			120					

GENERAL NOTES

Begin Drilling: **07-28-2013** Complete Drilling: **07-29-2013**
Drilling Contractor: **Wang Testing Services** Drill Rig: **D-50 TMR [78%]**
Driller: **R&N** Logger: **A. Happel** Checked by: **C. Marin**
Drilling Method: **2.25" SSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **Rotary wash**
At Completion of Drilling: **mud in the borehole**
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 1706-B-02

WEI Job No.: 1100-04-01

Client: **AECOM**
Project: **Circle Interchange Reconstruction**
Location: **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 573.51 ft
North: 1898279.12 ft
East: 1171636.73 ft
Station: 1214+88.11
Offset: 8.0782 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		16-inch thick ASPHALT \--PAVEMENT--						
	572.2							
		Medium dense, white and gray CRUSHED STONE --BASE COURSE--			1	6 12 13	NP	
	570.3							
		Very stiff, gray SILTY CLAY LOAM, trace gravel			2	2 4 4	3.28 B	19
	568.0		5					
		Very soft to medium stiff, gray CLAY to SILTY CLAY, trace gravel			3	1 1 1	0.41 B	16
					4	0 0 2	0.41 B	27
			10					
					5	0 1 1	0.41 B	27
					6	0 1 1	0.25 B	26
			15					
					7	0 1 1	0.41 B	25
					8	0 0 1	0.41 B	24
			20					
					9	0 0 1	0.49 B	25
					10	0 1 2	< 0.25 P	27
			25					
					11	1 2 3	< 0.25 P	24
					12	2 2 3	0.82 B	25
			30					
	541.8	Stiff to hard, gray SILTY CLAY, trace gravel			13	7 6 7	1.23 B	18
			35					
					14	4 7 8	3.03 B	20
			40					

GENERAL NOTES

Begin Drilling: **03-27-2014** Complete Drilling: **03-31-2014**
Drilling Contractor: **Wang Testing Services** Drill Rig: **D-50 TMR [78%]**
Driller: **R&J** Logger: **M. de los Reyes** Checked by: **C. Marin**
Drilling Method: **2.25" SSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **Rotary wash**
At Completion of Drilling: **mud in the borehole**
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 1706-B-02

WEI Job No.: 1100-04-01

Client: **AECOM**
Project: **Circle Interchange Reconstruction**
Location: **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 573.51 ft
North: 1898279.12 ft
East: 1171636.73 ft
Station: 1214+88.11
Offset: 8.0782 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
			45		15	4 6 18	2.87 B	18
	524.0		50		16	5 15 13	4.10 B	16
		Medium dense, gray SILT						
		--Wet--	55		17	7 7 8	NP	23
	516.8	Hard, gray SILTY CLAY LOAM to SILTY LOAM, trace gravel						
			60		18	15 20 27	6.97 S	13
			65		19	15 20 27	9.02 S	16
			70		20	16 26 50/2	4.74 B	13
	501.8	--HARD DRILLING-- *--Possible Cobbles--*						
		Very dense, gray GRAVELLY SANDY LOAM			21	50/2	NP	
			75					
		--Wet--			22	50/3	NP	13
			80					

GENERAL NOTES

Begin Drilling: **03-27-2014** Complete Drilling: **03-31-2014**
Drilling Contractor: **Wang Testing Services** Drill Rig: **D-50 TMR [78%]**
Driller: **R&J** Logger: **M. de los Reyes** Checked by: **C. Marin**
Drilling Method: **2.25" SSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **Rotary wash**
At Completion of Drilling: **mud in the borehole**
Time After Drilling: **NA**
Depth to Water: **NA**

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BORING LOG 1706-B-02

WEI Job No.: 1100-04-01

Client **AECOM**
Project **Circle Interchange Reconstruction**
Location **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 573.51 ft
North: 1898279.12 ft
East: 1171636.73 ft
Station: 1214+88.11
Offset: 8.0782 LT

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-- *--Possible Cobbles--*						
	491.8	Very dense, gray SILT, trace CLAY lamination						
		--DRY--	85		23	20 33 28	NP	20
		--DRY--						
	484.3	Very dense, gray GRAVELLY SAND	90		24	17 50 43	NP	16
		--Wet--						
	481.5	Strong, light gray, good rock mass quality, bedded fresh DOLOSTONE, up to 12-inch beds, 9-inch joints spacing, horizontal and vertical joints with none to more than 0.2-inch infilling, up to 2-inch greenish gray argillaceous partings, hard joint wall, with stylolitic surfaces, and moderately vuggy porosity.	95		1	CORE		
		--Run 1 - RECOVERY=100%-- --RQD=83%--				CORE		
		--Run 2 - RECOVERY=97%-- --RQD=92%--	100		2			
	471.5	Boring terminated at 102.00 ft	105					
			110					
			115					
			120					

GENERAL NOTES

Begin Drilling **03-27-2014** Complete Drilling **03-31-2014**
Drilling Contractor **Wang Testing Services** Drill Rig **D-50 TMR [78%]**
Driller **R&J** Logger **M. de los Reyes** Checked by **C. Marin**
Drilling Method **2.25" SSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **Rotary wash**
At Completion of Drilling ▼ **mud in the borehole**
Time After Drilling **NA**
Depth to Water ▼ **NA**

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BORING LOG 1714-B-01

WEI Job No.: 1100-04-01

Client **AECOM**
Project **Circle Interchange Reconstruction**
Location **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 593.22 ft
North: 1898191.77 ft
East: 1171304.89 ft
Station: 1218+92.09
Offset: 41.4568 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	593.0	3-inch thick, brown LOAM --TOPSOIL--						
		Hard, brown CLAY LOAM, trace gravel and brick fragments --FILL--			1	6 10 9	> 4.50 P	13
			5		2	7 7 7	4.25 B	20
	587.7							
		Very stiff to hard, brown and gray SILTY CLAY, trace gravel --FILL--			3	3 3 4	3.25 B	16
			10		4	6 8 8	6.56 B	20
	582.7							
		Medium stiff to stiff, gray SILTY CLAY, trace gravel			5	2 3 3	1.15 B	19
			15		6	2 2 3	0.98 B	17
					7	2 2 4	1.00 N/6	24
			20		8	2 4 4	1.48 B	18

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	572.7							
		Soft to medium stiff, gray CLAY to SILTY CLAY, trace gravel			9	2 3 3	0.74 B	24
			25		10	2 3 2	0.74 B	25
					11	2 2 2	0.66 B	25
			30		12	2 2 2	0.49 B	24
			35		13	1 2 2	0.25 B	26
			40		14	1 1 2	0.33 B	26

GENERAL NOTES

Begin Drilling **10-16-2013** Complete Drilling **10-16-2013**
Drilling Contractor **Wang Testing Services** Drill Rig **CME-55 TMR [85%]**
Driller **R&J** Logger **A. Tomaras** Checked by **C. Marin**
Drilling Method **2.25" HSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **Rotary wash**
At Completion of Drilling ▼ **mud in the borehole**
Time After Drilling **NA**
Depth to Water ▼ **NA**

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BORING LOG 1714-B-01

WEI Job No.: 1100-04-01

Client: **AECOM**
Project: **Circle Interchange Reconstruction**
Location: **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 593.22 ft
North: 1898191.77 ft
East: 1171304.89 ft
Station: 1218+92.09
Offset: 41.4568 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
			45		15	2 2 2	0.25 B	25
			50		16	2 2 2	0.33 B	27
	541.5	Very stiff to hard, gray SILTY CLAY to SILTY CLAY LOAM, trace gravel	55		17	7 7 12	2.95 B	20
			60		18	16 15 16	5.17 B	12
			65		19	18 20 23	7.17 N/6	
			70		20	10 13 19	2.54 S	11
	516.5	Gray SANDY LOAM --Wet--	75		21	12 17 23	6.67 N/6	
	514.3	Hard, gray SILTY CLAY LOAM, trace gravel	80		22	33 41 40	6.69 S	11

GENERAL NOTES

Begin Drilling: **10-16-2013** Complete Drilling: **10-16-2013**
Drilling Contractor: **Wang Testing Services** Drill Rig: **CME-55 TMR [85%]**
Driller: **R&J** Logger: **A. Tomaras** Checked by: **C. Marin**
Drilling Method: **2.25" HSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **Rotary wash**
At Completion of Drilling: **mud in the borehole**
Time After Drilling: **NA**
Depth to Water: **NA**

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BORING LOG 1714-B-01

WEI Job No.: 1100-04-01

Client **AECOM**
Project **Circle Interchange Reconstruction**
Location **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 593.22 ft
North: 1898191.77 ft
East: 1171304.89 ft
Station: 1218+92.09
Offset: 41.4568 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
			85		23	16 21 25	7.30 S	13
		--HARD DRILLING-- *--Possible Cobbles--*						
	506.2	Very dense, gray SILTY LOAM, trace gravel and cobbles						
					24	50/1	NP	12
			90					
		--HARD DRILLING-- *--Possible Cobbles--*						
					26	50/5	NP	11
			95					
		--HARD DRILLING-- *--Possible Cobbles--*						
	496.2	Very dense, gray SILT --Saturated--						
					27	50/4	NP	18
			100					

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
			105		28	30 45 50/3	NP	24
	486.5	Very dense, gray GRAVELLY LOAM, trace pyrite and dolostone fragments						
	484.5	--WEATHERED BEDROCK-- --ROLLER BIT REFUSAL--			29	50/2	NP	12
			110					
	482.2	Boring terminated at 111.00 ft						
			115					
			120					

GENERAL NOTES

Begin Drilling **10-16-2013** Complete Drilling **10-16-2013**
Drilling Contractor **Wang Testing Services** Drill Rig **CME-55 TMR [85%]**
Driller **R&J** Logger **A. Tomaras** Checked by **C. Marin**
Drilling Method **2.25" HSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **Rotary wash**
At Completion of Drilling ▼ **mud in the borehole**
Time After Drilling **NA**
Depth to Water ▼ **NA**

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BORING LOG 1714-B-02

WEI Job No.: 1100-04-01

Client: **AECOM**
Project: **Circle Interchange Reconstruction**
Location: **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 582.53 ft
North: 1898095.52 ft
East: 1171244.20 ft
Station: 1220+22.80
Offset: 32.5079 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	582.2	4-inch thick ASPHALT --PAVEMENT--						
	581.5	8-inch thick CONCRETE --PAVEMENT--						
	581.0	6-inch thick CRUSHED STONE --BASE COURSE--						
		Very stiff, brown and gray SILTY CLAY LOAM, trace gravel --FILL--		1	1	6 5 6	3.77 B	16
			5	2	2	3 4 5	2.62 B	20
	577.0	Medium stiff to stiff, gray SILTY LOAM, trace gravel --L_L(%)=24, P_L(%)=15-- --%Gravel=14.0-- --%Sand=28.0-- --%Silt=45.7-- --%Clay=12.4--		3	3	2 3 4	1.64 B	18
			10	4	4	3 4 4	0.98 B	19
	572.0	Very soft to medium stiff, gray CLAY to SILTY CLAY, trace to some gravel		5	5	0 2 2	0.57 B	24
		--L_L(%)=33, P_L(%)=18-- --%Gravel=10.6-- --%Sand=13.5-- --%Silt=45.8-- --%Clay=30.1-- --A-6 (10)--	15	6	6	1 1 2	0.25 B	22
				7	7	1 1 2	< 0.25 P	23
			20	8	8	1 1 2	0.49 B	25
			25	9	9	0 0 1	0.33 B	25
				10	10	0 0 0	0.16 B	24
				11	11	0 0 2	0.08 B	28
		--L_L(%)=33, P_L(%)=17-- --%Gravel=23.0-- --%Sand=12.5-- --%Silt=38.7-- --%Clay=25.9-- --A-6 (8)--	30	12	12	0 1 2	0.08 B	26
			35	13	13	0 0 2	0.25 B	25
			40	14	14	2 2 3	0.33 B	36

GENERAL NOTES

Begin Drilling: **10-08-2013** Complete Drilling: **10-08-2013**
Drilling Contractor: **Wang Testing Services** Drill Rig: **D-50 TMR [78%]**
Driller: **R&R** Logger: **D. Kolpacki** Checked by: **C. Marin**
Drilling Method: **3.25" HSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **DRY**
At Completion of Drilling: **mud in the borehole**
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 1714-B-02

WEI Job No.: 1100-04-01

Client: **AECOM**
Project: **Circle Interchange Reconstruction**
Location: **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 582.53 ft
North: 1898095.52 ft
East: 1171244.20 ft
Station: 1220+22.80
Offset: 32.5079 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--L_L(%)=33, P_L(%)=17-- --%Gravel=8.5-- --%Sand=12.3-- --%Silt=46.1-- --%Clay=33.1-- --A-6 (11)--	45		15	2 4 6	0.98 B	22
	535.8	Very stiff, gray SILTY CLAY, trace gravel						
			50		16	5 8 12	3.94 B	15
	530.8	Very stiff, gray CLAY						
			55		17	4 9 14	2.95 B	21
		--L_L(%)=35, P_L(%)=17-- --%Gravel=2.9-- --%Sand=11.2--	60		18	6 8 12	2.46 B	24
		--%Silt=47.7-- --%Clay=38.2-- --A-6 (15)--	65		19	8 7 6	NP	22
	520.8	Medium dense, gray SILT						
	515.8	Hard, gray SILTY CLAY LOAM, trace gravel						
		--L_L(%)=31, P_L(%)=17-- --%Gravel=3.5-- --%Sand=14.1-- --%Silt=55.7-- --%Clay=26.7-- --A-6 (10)--	70		20	13 21 33	10.25 B	16
	508.5	Very dense, gray SILT to SILTY LOAM, trace gravel	75		21	11 17 50	NP	16
			80		22	54/6	NP	9

GENERAL NOTES

Begin Drilling: **10-08-2013** Complete Drilling: **10-08-2013**
Drilling Contractor: **Wang Testing Services** Drill Rig: **D-50 TMR [78%]**
Driller: **R&R** Logger: **D. Kolpacki** Checked by: **C. Marin**
Drilling Method: **3.25" HSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **DRY**
At Completion of Drilling: **mud in the borehole**
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 1714-B-02

WEI Job No.: 1100-04-01

Client: **AECOM**
Project: **Circle Interchange Reconstruction**
Location: **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 582.53 ft
North: 1898095.52 ft
East: 1171244.20 ft
Station: 1220+22.80
Offset: 32.5079 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
			85		23	69/6	NP	14
		--%Gravel=1.9-- --%Sand=6.8-- --%Silt=83.8-- --%Clay=7.4-- --A-4 (0)--	90		24	31 45 36	NP	18
			95		25	50/5	NP	14
	486.5	--HARD DRILLING-- --WEATHERED BEDROCK--						
	484.5	Strong, white and light gray, rock quality, horizontally bedded DOLOSTONE, beds up to 18 inch, joint spacing up to 18 inch,	100			CORE		
		joints with less than 0.2 inch or no infilling, vuggy and cherty, with stylolitic surfaces. --Run 1 - RECOVERY= 93%-- --RQD= 86%--	105		1			
	474.5	Boring terminated at 108.00 ft	110					
			115					
			120					

GENERAL NOTES

Begin Drilling: **10-08-2013** Complete Drilling: **10-08-2013**
Drilling Contractor: **Wang Testing Services** Drill Rig: **D-50 TMR [78%]**
Driller: **R&R** Logger: **D. Kolpacki** Checked by: **C. Marin**
Drilling Method: **3.25" HSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **DRY**
At Completion of Drilling: **mud in the borehole**
Time After Drilling: **NA**
Depth to Water: **NA**

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BORING LOG 1715-B-01

WEI Job No.: 1100-04-01

Client: **AECOM**
Project: **Circle Interchange Reconstruction**
Location: **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 588.39 ft
North: 1898143.12 ft
East: 1171931.11 ft
Station: 1211+64.12
Offset: 7.8377 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		Stiff to very stiff, brown SILTY CLAY LOAM --FILL--			1	13 12 14	2.87 B	18
					2	4 3 5	1.00 P	25
	582.9	Very soft to medium stiff, gray CLAY to SILTY CLAY, trace gravel	5		3	2 2 2	0.33 B	23
					4	1 1 2	0.41 B	23
			10		5	1 2 2	0.16 B	23
					6	1 2 3	0.49 B	22
			15		7	1 2 2	0.57 B	25
					8	1 1 3	0.41 B	25
			20		9	1 1 2	0.16 B	26
			25		10	1 1 2	0.33 B	24
					11	1 1 2	0.33 B	26
			30		12	2 1 2	0.33 B	27
			35		13	1 2 3	0.33 B	25
			40		14	2 3 5	0.33 B	25

GENERAL NOTES

Begin Drilling: **03-04-2014** Complete Drilling: **03-06-2014**
Drilling Contractor: **Wang Testing Services** Drill Rig: **D-25 ATV [93%]**
Driller: **N&J** Logger: **A. Happel** Checked by: **C. Marin**
Drilling Method: **2.25" HSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **Rotary wash**
At Completion of Drilling: **mud in the borehole**
Time After Drilling: **NA**
Depth to Water: **NA**

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BORING LOG 1715-B-01

WEI Job No.: 1100-04-01

Client: **AECOM**
Project: **Circle Interchange Reconstruction**
Location: **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 588.39 ft
North: 1898143.12 ft
East: 1171931.11 ft
Station: 1211+64.12
Offset: 7.8377 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
			45		15	1 2 2	0.33 B	29
	541.6	Very stiff hard, gray SILTY CLAY LOAM to SILTY LOAM, trace gravel						
			50		16	7 10 20	3.20 B	18
			55		17	12 15 15	6.64 S	13
			60		18	28 26 24	6.56 S	12
			65		19	26 33 48	> 8.33 N/6	16
	519.4	Very dense, gray SILTY LOAM, trace gravel --Moist--	70		20	26 46 28/3	NP	16
	516.6	Hard, gray SILTY CLAY LOAM, trace gravel --L_L(%)=29, P_L(%)=16-- --%Gravel=1.6-- --%Sand=10.8-- --%Silt=63.8-- --%Clay=23.7-- --A-6 (10)--	75		21	17 30 48	> 8.33 N/6	15
	511.6	Very dense, gray SILTY LOAM, trace gravel						
			80		22	50/4	NP	9

GENERAL NOTES

Begin Drilling: **03-04-2014** Complete Drilling: **03-06-2014**
Drilling Contractor: **Wang Testing Services** Drill Rig: **D-25 ATV [93%]**
Driller: **N&J** Logger: **A. Happel** Checked by: **C. Marin**
Drilling Method: **2.25" HSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **Rotary wash**
At Completion of Drilling: **mud in the borehole**
Time After Drilling: **NA**
Depth to Water: **NA**

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BORING LOG 1715-B-01

WEI Job No.: 1100-04-01

Client: **AECOM**
Project: **Circle Interchange Reconstruction**
Location: **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 588.39 ft
North: 1898143.12 ft
East: 1171931.11 ft
Station: 1211+64.12
Offset: 7.8377 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
			85		23	35 45 20/1	NP	17
		--L_L(%)=29, P_L(%)=16-- --%Gravel=4.7-- --%Sand=10.1-- --%Silt=57.1-- --%Clay=28.0- --A-6 (9)--	90		24	24 50/5	NP	16
			95		25	37 50/5	NP	23
		--HARD DRILLING-- *--Possible Cobbles--*						
	491.4	Very dense, gray GRAVELLY SAND	100		26	50/3	NP	10
		--HARD DRILLING-- *--Possible Cobbles--*						
	485.4	--AUGER REFUSAL-- Boring terminated at 103.00 ft	105					
			110					
			115					
			120					

GENERAL NOTES

Begin Drilling: **03-04-2014** Complete Drilling: **03-06-2014**
Drilling Contractor: **Wang Testing Services** Drill Rig: **D-25 ATV [93%]**
Driller: **N&J** Logger: **A. Happel** Checked by: **C. Marin**
Drilling Method: **2.25" HSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **Rotary wash**
At Completion of Drilling: **mud in the borehole**
Time After Drilling: **NA**
Depth to Water: **NA**

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BORING LOG 1715-B-02

WEI Job No.: 1100-04-01

Client: **AECOM**
Project: **Circle Interchange Reconstruction**
Location: **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 578.98 ft
North: 1898224.57 ft
East: 1171745.64 ft
Station: 1213+66.68
Offset: 5.771 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	578.8	2-inch thick ASPHALT --PAVEMENT--						
	578.0	10-inch thick CONCRETE --PAVEMENT--						
		Loose, light brown CRUSHED STONE						
	576.0	--BASE COURSE--						
		Soft to medium stiff, gray CLAY to SILTY CLAY, trace gravel						
					1	4 5 4	NP	10
			5		2	0 1 2	0.82 B	23
					3	2 2 3	0.41 B	19
			10		4	2 2 3	0.49 B	22
					5	1 2 2	0.74 B	20
			15		6	0 1 2	0.33 B	23
					7	1 1 2	0.33 B	26
			20		8	1 1 2	0.25 B	26
			25		9	0 1 2	0.25 B	27
					10	1 1 2	0.50 N/6	
			30		11	0 2 2	0.41 B	26
					12	1 1 2	0.57 B	26
			35		13	2 2 2	0.33 B	28
			40		14	4 6 9	0.67 B	18

GENERAL NOTES

Begin Drilling: **02-23-2014** Complete Drilling: **03-23-2014**
Drilling Contractor: **Wang Testing Services** Drill Rig: **B-57 TMR [100%]**
Driller: **P&P** Logger: **D. Kolpacki** Checked by: **C. Marin**
Drilling Method: **3.25" HSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: ▽ **3.00 ft**
At Completion of Drilling: ▼ **mud in the borehole**
Time After Drilling: **24 hours**
Depth to Water: ▼ **72.00 ft**

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

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BORING LOG 1715-B-02

WEI Job No.: 1100-04-01

Client: **AECOM**
Project: **Circle Interchange Reconstruction**
Location: **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 578.98 ft
North: 1898224.57 ft
East: 1171745.64 ft
Station: 1213+66.68
Offset: 5.771 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	537.2	Very stiff, gray SILTY CLAY LOAM, trace gravel						
			45		15	7 7 7	3.36 B	22
			50		16	6 10 12	2.54 B	16
	527.2	Dense, gray SILT --Wet--						
			55		17	14 16 18	NP	16
	522.2	Hard, gray SILTY CLAY LOAM to SILTY LOAM, trace gravel						
			60		18	18 24 27	8.19 S	12
			65		19	20 31 42	4.59 S	14
			70		20	20 50/4	5.74 S	13
	507.2	Very dense, gray SILTY LOAM, trace to some gravel --WET--						
			75		21	30 50/4	NP	10
		--HARD DRILLING-- *--Possible Cobbles--*						
			80		22	50/5	NP	12

GENERAL NOTES

Begin Drilling: **02-23-2014** Complete Drilling: **03-23-2014**
Drilling Contractor: **Wang Testing Services** Drill Rig: **B-57 TMR [100%]**
Driller: **P&P** Logger: **D. Kolpacki** Checked by: **C. Marin**
Drilling Method: **3.25" HSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **3.00 ft**
At Completion of Drilling: **mud in the borehole**
Time After Drilling: **24 hours**
Depth to Water: **72.00 ft**

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

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BORING LOG 1715-B-02

WEI Job No.: 1100-04-01

Client **AECOM**
Project **Circle Interchange Reconstruction**
Location **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 578.98 ft
North: 1898224.57 ft
East: 1171745.64 ft
Station: 1213+66.68
Offset: 5.771 LT

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-- *--Possible Cobbles--*	85	○	23	50/3	NP	
		--HARD DRILLING-- *--Possible Cobbles--*		⊠	24	50/3	NP	10
	488.0		90					
		--VERY HARD, STEADY DRILLING-- --WEATHERED BEDROCK-- --ROLLER BIT REFUSAL--						
	486.0	Boring terminated at 93.00 ft	95					
			100					

GENERAL NOTES

Begin Drilling **02-23-2014** Complete Drilling **03-23-2014**
Drilling Contractor **Wang Testing Services** Drill Rig **B-57 TMR [100%]**
Driller **P&P** Logger **D. Kolpacki** Checked by **C. Marin**
Drilling Method **3.25" HSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **3.00 ft**
At Completion of Drilling ▼ **mud in the borehole**
Time After Drilling **24 hours**
Depth to Water ▼ **72.00 ft**

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

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BORING LOG 1715-B-03

WEI Job No.: 1100-04-01

Client: **AECOM**
Project: **Circle Interchange Reconstruction**
Location: **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 574.74 ft
North: 1898289.14 ft
East: 1171492.75 ft
Station: 1216+42.65
Offset: 33.3447 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	573.5	14-inch thick ASPHALT --PAVEMENT--						
	573.2	4-inch thick CRUSHED STONE --BASE COURSE--			1	5 6 6	NP	
		Medium dense, brown SANDY GRAVEL						
	571.5	--FILL--						
		Very soft to medium stiff, gray CLAY to SILTY CLAY, trace gravel	5		2	4 2 3	0.25 P	26
					3	2 1 3	0.25 B	24
			10		4	1 1 2	0.41 B	25
					5	0 0 2	0.25 B	25
			15		6	1 2 1	0.49 B	25
					7	1 1 1	0.33 B	27
			20		8	0 0 0	0.25 B	26
			25		9	1 1 2	0.16 B	27
					10	0 0 1	0.16 B	25
					11	0 0 0	0.16 B	26
			30		12	1 2 3	0.49 B	27
	538.0	Very stiff to hard, gray SILTY CLAY, trace gravel	35		13	1 3 4	0.74 B	19
			40		14	6 8 10	5.41 B	15

GENERAL NOTES

Begin Drilling: **03-19-2014** Complete Drilling: **03-19-2014**
Drilling Contractor: **Wang Testing Services** Drill Rig: **B-57 TMR [100%]**
Driller: **P&P** Logger: **D. Kolpacki** Checked by: **C. Marin**
Drilling Method: **3.25" HSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **2.50 ft**
At Completion of Drilling: **62.00 ft**
Time After Drilling: **NA**
Depth to Water: **NA**

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BORING LOG 1715-B-03

WEI Job No.: 1100-04-01

Client: **AECOM**
Project: **Circle Interchange Reconstruction**
Location: **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 574.74 ft
North: 1898289.14 ft
East: 1171492.75 ft
Station: 1216+42.65
Offset: 33.3447 LT

Depth (ft)	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	513.0	Gray SILT, trace gravel --Wet--					
45				15	4 8 14	3.69 B	19
65	510.0	Hard (>4.5P), gray SILTY CLAY LOAM, trace gravel		19	16 20 21	NP	20
	508.0	Very dense, gray SILTY LOAM, little to some gravel					
50		--L_L(%)=36, P_L(%)=18-- --%Gravel=0.5-- --%Sand=3.1-- --%Silt=59.8-- --%Clay=36.7-- --A-6 (18)--		16	5 9 10	2.87 B	24
70				20	50/5	NP	9
	523.0	Medium stiff, gray CLAY, trace gravel					
55				17	4 5 6	0.75 P	27
75		--HARD DRILLING-- *--Possible Cobbles--*		21	50/5	NP	13
	518.0	Hard, gray SILTY CLAY LOAM, trace gravel					
	498.0	Hard, gray SILTY CLAY LOAM, trace gravel					
60				18	10 12 16	9.35 S	15
80				22	33 50/4	7.30 S	10

GENERAL NOTES

Begin Drilling: **03-19-2014** Complete Drilling: **03-19-2014**
Drilling Contractor: **Wang Testing Services** Drill Rig: **B-57 TMR [100%]**
Driller: **P&P** Logger: **D. Kolpacki** Checked by: **C. Marin**
Drilling Method: **3.25" HSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **2.50 ft**
At Completion of Drilling: **62.00 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 1715-B-03

WEI Job No.: 1100-04-01

Client **AECOM**
Project **Circle Interchange Reconstruction**
Location **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 574.74 ft
North: 1898289.14 ft
East: 1171492.75 ft
Station: 1216+42.65
Offset: 33.3447 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	490.7	Very dense, gray SILTY LOAM to SILT, trace gravel	85		23	13 19 28	NP	22
		--Wet--						
		--L_L(%)=NP, P_L(%)=NP--						
		--%Gravel=0.1--						
		--%Sand=1.1--						
		--%Silt=92.6--						
		--%Clay=6.3--						
		--A-4 (0)--						
					24	50/2	NP	19
			90					
	483.2	--DIFFICULT DRILLING--						
		--WEATHERED BEDROCK--						
	480.7	--ROLLER BIT REFUSAL--						
		Boring terminated at 94.00 ft						
			95					
			100					

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)

GENERAL NOTES

Begin Drilling **03-19-2014** Complete Drilling **03-19-2014**
Drilling Contractor **Wang Testing Services** Drill Rig **B-57 TMR [100%]**
Driller **P&P** Logger **D. Kolpacki** Checked by **C. Marin**
Drilling Method **3.25" HSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **2.50 ft**
At Completion of Drilling ▼ **62.00 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 1715-B-04

WEI Job No.: 1100-04-01

Client: **AECOM**
Project: **Circle Interchange Reconstruction**
Location: **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 589.41 ft
North: 1898275.77 ft
East: 1171292.09 ft
Station: 1218+40.95
Offset: 27.5424 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	589.2	3-inch thick, black SILTY LOAM --TOPSOIL--						
		Stiff to very stiff, brown and gray SILTY CLAY LOAM, trace gravel --FILL--			1	50/5	2.50 P	14
			5		2	2 3 2	1.15 B	18
					3	4 5 7	2.13 B	15
	581.4			▼				
		Soft to medium stiff, gray CLAY to SILTY CLAY, trace gravel	10		4	1 2 3	0.57 B	24
					5	0 0 2	0.16 B	24
			15		6	1 2 2	0.33 B	21
					7	1 2 3	0.41 B	20
			20		8	1 2 3	0.49 B	23
			25		9	2 2 3	0.49 B	21
					10	1 2 3	0.49 B	24
					11	1 2 2	0.49 B	25
			30		12	1 1 2	0.33 B	26
			35		13	0 1 2	0.25 B	26
			40		14	1 2 3	0.74 B	24

GENERAL NOTES

Begin Drilling: **03-17-2014** Complete Drilling: **03-18-2014**
Drilling Contractor: **Wang Testing Services** Drill Rig: **CME-55 TMR [85%]**
Driller: **R&N** Logger: **F. Bozga** Checked by: **C. Marin**
Drilling Method: **2.25" SSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **Rotary wash**
At Completion of Drilling: **mud at 8 ft**
Time After Drilling: **24 hours**
Depth to Water: **8.00 ft**

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

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BORING LOG 1715-B-04

WEI Job No.: 1100-04-01

Client: **AECOM**
Project: **Circle Interchange Reconstruction**
Location: **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 589.41 ft
North: 1898275.77 ft
East: 1171292.09 ft
Station: 1218+40.95
Offset: 27.5424 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
			45		15	2 2 3	0.74 B	26
			50		16	2 3 5	0.74 B	21
	537.7	Very stiff to hard, gray SILTY CLAY to SILTY CLAY LOAM, trace gravel						
			55		17	4 7 11	3.20 B	15
		--L_L(%)=31, P_L(%)=15-- --%Gravel=2.8-- --%Sand=19.7--	60		18	3 5 11	3.03 B	18
		--%Silt=49.4-- --%Clay=28.0-- --A-6 (10)--	65		19	4 10 12	4.10 B	23
	522.7	Medium dense, gray SILT, trace fine sand interbeds --Wet--						
			70		20	6 11 14	NP	17
	517.7	Hard, gray SILTY CLAY LOAM to SILTY LOAM, trace gravel						
			75		21	13 17 30	10.25 B	14
			80		22	19 29 42	8.53 B	14

GENERAL NOTES

Begin Drilling: **03-17-2014** Complete Drilling: **03-18-2014**
Drilling Contractor: **Wang Testing Services** Drill Rig: **CME-55 TMR [85%]**
Driller: **R&N** Logger: **F. Bozga** Checked by: **C. Marin**
Drilling Method: **2.25" SSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **Rotary wash**
At Completion of Drilling: **mud at 8 ft**
Time After Drilling: **24 hours**
Depth to Water: **8.00 ft**

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

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BORING LOG 1715-B-04

WEI Job No.: 1100-04-01

Client: **AECOM**
Project: **Circle Interchange Reconstruction**
Location: **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 589.41 ft
North: 1898275.77 ft
East: 1171292.09 ft
Station: 1218+40.95
Offset: 27.5424 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	507.7	Dense to very dense, gray SILT, trace gravel						
		--L_L(%)=NP, P_L(%)=NP--						
		--%Gravel=1.1--						
		--%Sand=7.3--						
		--%Silt=83.5--	85		23	17 22 26	NP	18
		--%Clay=8.2--						
		--A-4 (0)--						
		--HARD DRILLING--						
		--Possible Cobbles--						
					24	50/5	NP	12
			90					
	498.2	Hard, gray SILTY CLAY, trace gravel						
					25	28 50/5	5.41 B	18
			95					
	492.7	Very dense, gray SILT						
		--MOIST--						
					26	18 33 42	NP	22
			100					

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	487.7	Very dense, gray GRAVELLY SANDY LOAM						
		--MOIST--						
					27	30 50/4	NP	12
			105					
		--HARD DRILLING--						
		--Possible Cobbles--						
	480.9				28	50/1	NA	
		--DIFFICULT DRILLING--						
		--WEATHERED BEDROCK--						
	479.4	--ROLLER BIT REFUSAL--	110					
		Boring terminated at 110.00 ft						
			115					
			120					

GENERAL NOTES

Begin Drilling: **03-17-2014** Complete Drilling: **03-18-2014**
Drilling Contractor: **Wang Testing Services** Drill Rig: **CME-55 TMR [85%]**
Driller: **R&N** Logger: **F. Bozga** Checked by: **C. Marin**
Drilling Method: **2.25" SSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **Rotary wash**
At Completion of Drilling: **mud at 8 ft**
Time After Drilling: **24 hours**
Depth to Water: **8.00 ft**

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

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BORING LOG 1715-B-05

WEI Job No.: 1100-04-01

Client: **AECOM**
Project: **Circle Interchange Reconstruction**
Location: **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 577.87 ft
North: 1897826.42 ft
East: 1171228.58 ft
Station: 1223+01.29
Offset: 21.767 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	576.9	Dark brown SILTY LOAM, trace gravel						
		--TOPSOIL--						
		Stiff to hard, brown and gray SILTY CLAY LOAM, trace gravel and roots			1	6 8 7	4.50 P	14
		--FILL--			2	1 3 2	1.00 P	28
	572.4		5					
		Very soft to medium stiff, gray CLAY to SILTY CLAY, trace gravel			3	1 2 3	0.25 B	20
					4	1 2 2	0.25 B	25
			10		5	1 1 2	0.25 B	28
					6	1 2 1	0.16 B	28
			15		7	1 2 2	0.25 B	27
					8	1 2 2	0.16 B	27
			20					
					9	1 2 3	0.25 B	27
			25		10	2 2 3	0.33 B	26
					11	3 3 4	0.49 B	26
			30		12	2 2 3	0.57 B	27
	546.1	Stiff to hard, gray SILTY CLAY LOAM, trace gravel						
			35		13	4 5 8	2.17 N/6	21
			40		14	4 5 10	1.75 P	24

GENERAL NOTES

Begin Drilling: **04-14-2014** Complete Drilling: **04-17-2014**
Drilling Contractor: **Wang Testing Services** Drill Rig: **D-25 ATV [93%]**
Driller: **N&J** Logger: **A. Happel** Checked by: **C. Marin**
Drilling Method: **2.25" HSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **Rotary wash**
At Completion of Drilling: **mud in the borehole**
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 1715-B-05

WEI Job No.: 1100-04-01

Client: **AECOM**
Project: **Circle Interchange Reconstruction**
Location: **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 577.87 ft
North: 1897826.42 ft
East: 1171228.58 ft
Station: 1223+01.29
Offset: 21.767 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	521.1	Medium stiff, gray CLAY, trace gravel	45		15	8 10 14	4.10 B	15
			50		16	10 12 16	4.67 B	14
			55		17	8 9 14	2.95 B	21
			60		18	4 3 5	0.66 B	38
	516.1	Loose, gray SILT	65		19	4 4 4	NP	29
	511.1	Hard, gray SILTY CLAY LOAM, trace gravel	70		20	10 16 22	6.07 B	20
	506.1	Very dense, gray SILTY LOAM, some gravel	75		21	7 36 50/5	NA	
		--HARD DRILLING-- *--Possible Cobbles--*	80		22	50/5	NP	13

GENERAL NOTES

Begin Drilling: **04-14-2014** Complete Drilling: **04-17-2014**
Drilling Contractor: **Wang Testing Services** Drill Rig: **D-25 ATV [93%]**
Driller: **N&J** Logger: **A. Happel** Checked by: **C. Marin**
Drilling Method: **2.25" HSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **Rotary wash**
At Completion of Drilling: **mud in the borehole**
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 1715-B-05

WEI Job No.: 1100-04-01

Client: **AECOM**
Project: **Circle Interchange Reconstruction**
Location: **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 577.87 ft
North: 1897826.42 ft
East: 1171228.58 ft
Station: 1223+01.29
Offset: 21.767 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
					23	50/0		
		--HARD DRILLING--						
		--Possible Cobbles--	85					
	491.1	--DIFFICULT DRILLING--						
		--WEATHERED BEDROCK--						
	489.9	Strong, light gray, fair rock quality, bedded DOLOSTONE, beds up to 10 inch, 6 inch joint spacing, joints with more than 0.2 inch or no infilling, vuggy, and with stylolitic surfaces.	90			C O R E		
		--Run 1 -RECOVERY= 91%--						
		--RQD= 66%--			1			
			95					
	479.9	Boring terminated at 98.00 ft						
			100					

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)

GENERAL NOTES

Begin Drilling: **04-14-2014** Complete Drilling: **04-17-2014**
Drilling Contractor: **Wang Testing Services** Drill Rig: **D-25 ATV [93%]**
Driller: **N&J** Logger: **A. Happel** Checked by: **C. Marin**
Drilling Method: **2.25" HSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **Rotary wash**
At Completion of Drilling: **mud in the borehole**
Time After Drilling: **NA**
Depth to Water: **NA**

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BORING LOG 1715-PMT-01

WEI Job No.: 1100-04-01

Client **AECOM**
Project **Circle Interchange Reconstruction**
Location **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 586.37 ft
North: 1898101.38 ft
East: 1171922.25 ft
Station: 1211+54.18
Offset: 33.616 LT

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	5					
			10					
			15					
			20					

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
			25					
			30					
			35					
			40					

GENERAL NOTES

Begin Drilling **04-24-2014** Complete Drilling **04-24-2014**
Drilling Contractor **Wang Testing Services** Drill Rig **D-25 ATV [93%]**
Driller **N&J** Logger **A. Happel** Checked by **C. Marin**
Drilling Method **2.25" HSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **Rotary wash**
At Completion of Drilling ▼ **mud in the borehole**
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 1715-PMT-01

WEI Job No.: 1100-04-01

Client **AECOM**
Project **Circle Interchange Reconstruction**
Location **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 586.37 ft
North: 1898101.38 ft
East: 1171922.25 ft
Station: 1211+54.18
Offset: 33.616 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	531.4	Hard, gray SILTY CLAY, little gravel	55		1	11 11 20	4.10 B	16
		--Pressuremeter Test--	60	P	1	P M T		
	514.6	Very dense, gray SILTY LOAM to SILTY CLAY LOAM, little gravel	70		2	18 29 48	7.38 S	13
		--Pressuremeter Test--	75	P	2	P M T		
			80		3	43	NP	11

GENERAL NOTES

Begin Drilling **04-24-2014** Complete Drilling **04-24-2014**
Drilling Contractor **Wang Testing Services** Drill Rig **D-25 ATV [93%]**
Driller **N&J** Logger **A. Happel** Checked by **C. Marin**
Drilling Method **2.25" HSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **Rotary wash**
At Completion of Drilling ▼ **mud in the borehole**
Time After Drilling **NA**
Depth to Water ▼ **NA**

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BORING LOG 1715-PMT-01

WEI Job No.: 1100-04-01

Client **AECOM**
Project **Circle Interchange Reconstruction**
Location **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 586.37 ft
North: 1898101.38 ft
East: 1171922.25 ft
Station: 1211+54.18
Offset: 33.616 LT

Elevation (ft)	Depth (ft)	SOIL AND ROCK DESCRIPTION	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--Pressuremeter Test--	P	3	P M T		
	85			4	50/4	NP	11
499.6		Very dense, gray SANDY GRAVEL					
				5	34 40 26/2	NP	15
496.9	90	Hard (4.5P), gray SILTY CLAY LOAM					
494.6		Very dense, gray SILTY LOAM, trace gravel					
				6	50/4	NP	15
	95	--HARD DRILLING 95-98.5 ft-- *--Possible Cobbles--*					
				7	50/3	NP	13
	100						

Elevation (ft)	Depth (ft)	SOIL AND ROCK DESCRIPTION	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
484.6		Very dense, gray SANDY GRAVEL					
	105			8	50/4	NP	12
480.4		Strong, light gray and white, poor rock mass quality, bedded, moderately vuggy porosity, fresh DOLOSTONE, up to 7-inch beds, 3-inch spaced joints, horizontal joints with 0.05 to more than 0.2-inch infilling, hard joint wall, with greenish gray argillaceous infill, and stylolitic surfaces.			C O R E		
	110	--Run 1-RECOVERY=77%-- --RQD =40%--		1			
471.9		Boring terminated at 114.50 ft					
	115						
	120						

GENERAL NOTES

Begin Drilling **04-24-2014** Complete Drilling **04-24-2014**
Drilling Contractor **Wang Testing Services** Drill Rig **D-25 ATV [93%]**
Driller **N&J** Logger **A. Happel** Checked by **C. Marin**
Drilling Method **2.25" HSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **Rotary wash**
At Completion of Drilling ▼ **mud in the borehole**
Time After Drilling **NA**
Depth to Water ▼ **NA**

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BORING LOG 1715-VS-01

WEI Job No.: 1100-04-01

Client **AECOM**
Project **Circle Interchange Reconstruction**
Location **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 586.35 ft
North: 1898112.83 ft
East: 1171916.87 ft
Station: 1211+63.56
Offset: 25.6204 LT

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	5					
		--In-Situ Vane Shear, 10.0 feet--	10		1	VS		
		--$S_{u\ undis}$ = 1036.0 psf--						
		--$S_{u\ remold}$ = 543.9 psf--						
		--Sensitivity = 1.90--						
		--In-Situ Vane Shear, 15.0 feet--	15		2	VS		
		--$S_{u\ undis}$ = 880.6 psf--						
		--$S_{u\ remold}$ = 466.2 psf--						
		--Sensitivity = 1.89--						
		--In-Situ Vane Shear, 20.0 feet--	20					
		--$S_{u\ undis}$ = 958.3 psf--			3	VS		
		--$S_{u\ remold}$ = 595.7 psf--						
		--Sensitivity = 1.61--						
		--In-Situ Vane Shear, 25.0 feet--	25		4	VS		
		--$S_{u\ undis}$ = 595.7 psf--						
		--$S_{u\ remold}$ = 414.4 psf--						
		--Sensitivity = 1.44--						
		--In-Situ Vane Shear, 30.0 feet--	30		5	VS		
		--$S_{u\ undis}$ = 828.8 psf--						
		--$S_{u\ remold}$ = 466.2 psf--						
		--Sensitivity = 1.78--						
		--In-Situ Vane Shear, 35.0 feet--	35		6	VS		
		--$S_{u\ undis}$ = 1139.6 psf--						
		--$S_{u\ remold}$ = 673.4 psf--						
		--Sensitivity = 1.69--						
		--In-Situ Vane Shear, 40.0 feet--	40					

GENERAL NOTES

Begin Drilling **03-27-2014** Complete Drilling **03-27-2014**
Drilling Contractor **Wang Testing Services** Drill Rig **D-25 ATV [93%]**
Driller **N&J** Logger **F. Bozga** Checked by **C. Marin**
Drilling Method **3.25" HSA, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **Rotary wash**
At Completion of Drilling ▼ **mud in the borehole**
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 1715-VS-01

WEI Job No.: 1100-04-01

Client **AECOM**
Project **Circle Interchange Reconstruction**
Location **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 586.35 ft
North: 1898112.83 ft
East: 1171916.87 ft
Station: 1211+63.56
Offset: 25.6204 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	545.9	--$S_{u\ undis}$ = 1139.6 psf-- --$S_{u\ remold}$ = 725.2 psf-- --Sensitivity = 1.57-- Boring terminated at 40.50 ft			7	VS		

GENERAL NOTES

Begin Drilling **03-27-2014** Complete Drilling **03-27-2014**
Drilling Contractor **Wang Testing Services** Drill Rig **D-25 ATV [93%]**
Driller **N&J** Logger **F. Bozga** Checked by **C. Marin**
Drilling Method **3.25" HSA, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **Rotary wash**
At Completion of Drilling ▼ **mud in the borehole**
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 1729-VST-01

WEI Job No.: 1100-04-01

Client **AECOM**
Project **Circle Interchange Reconstruction**
Location **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 598.29 ft
North: 1897455.09 ft
East: 1171356.40 ft
Station: 7310+33.97
Offset: 1.45 RT

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						
	584.8	Medium dense, brown and black SANDY LOAM; trace gravel; trace brick and wood fragments; mosit	15		1	4 6 5	NP	20
	583.0	--FILL--						
		Stiff, gray SILTY CLAY LOAM, trace gravel						
		--FILL--			2	3 3 4	1.07 B	21
	581.0	Medium stiff, gray SILTY CLAY, trace gravel	20		3	2 3 3	0.57 B	21

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--In-Situ Vane Shear, 25.0 feet--	25		1	VS		
		--$S_{u\ undis}$ = 926.51 psf--						
		--$S_{u\ remold}$ = 452.48 psf--						
		--Sensitivity = 2.05--						
		--In-Situ Vane Shear, 30.0 feet--	30		2	VS		
		--$S_{u\ undis}$ = 603.30 psf--						
		--$S_{u\ remold}$ = 344.75 psf--						
		--Sensitivity = 1.75--						
		--In-Situ Vane Shear, 35.0 feet--	35		3	VS		
		--$S_{u\ undis}$ = 592.53 psf--						
		--$S_{u\ remold}$ = 301.65 psf--						
		--Sensitivity = 1.96--						
		--In-Situ Vane Shear, 40.0 feet--	40		4			

GENERAL NOTES

Begin Drilling **07-25-2016** Complete Drilling **07-26-2016**
Drilling Contractor **Wang Testing Services** Drill Rig **D-25 ATV [93%]**
Driller **N&N** Logger **F. Bozga** Checked by **M. Seyhun**
Drilling Method **2.25" IDA HSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **Rotary wash**
At Completion of Drilling ▼ **Mud at 20 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 1729-VST-01

WEI Job No.: 1100-04-01

Client **AECOM**
Project **Circle Interchange Reconstruction**
Location **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 598.29 ft
North: 1897455.09 ft
East: 1171356.40 ft
Station: 7310+33.97
Offset: 1.45 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--$S_{u\ undis}$ = 635.62 psf--				VS		
		--$S_{u\ remold}$ = 355.52 psf--						
		--Sensitivity = 1.78--						
		--In-Situ Vane Shear, 45.0 feet--	45		5	VS		
		--$S_{u\ undis}$ = 840.32 psf--						
		--$S_{u\ remold}$ = 430.93 psf--						
		--Sensitivity = 1.95--						
			50		4	4 5 5	0.57 B	27
					5	2 3 3	0.41 B	29
		--In-Situ Vane Shear, 54.5 feet--	55		6	VS		
		--$S_{u\ undis}$ = 1508.26 psf--						
	542.8	--$S_{u\ remold}$ = 1249.71 psf--						
		--Sensitivity = 1.21--						
		Very stiff, gray SILTY CLAY, trace gravel			6	5 10 16	2.46 B	22
	540.8	Boring terminated at 57.50 ft						
			60					

GENERAL NOTES

Begin Drilling **07-25-2016** Complete Drilling **07-26-2016**
Drilling Contractor **Wang Testing Services** Drill Rig **D-25 ATV [93%]**
Driller **N&N** Logger **F. Bozga** Checked by **M. Seyhun**
Drilling Method **2.25" IDA HSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **Rotary wash**
At Completion of Drilling ▼ **Mud at 20 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 1729-VST-02

WEI Job No.: 1100-04-01

Client **AECOM**
Project **Circle Interchange Reconstruction**
Location **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 592.70 ft
North: 1897206.55 ft
East: 1171441.79 ft
Station: 7312+95.08
Offset: 32.79 LT

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	5					
			10					
			15					
	574.2	Very soft to medium stiff, gray SILTY CLAY, trace gravel	20		1	2 2 3	NR	
			25		2	2 3 5	< 0.25 P	23
		--In-Situ Vane Shear, 27.0 feet-- --Failed test--			1	VS		
		--In-Situ Vane Shear, 30.0 feet-- --$S_{u\ undis}$ = 624.85 psf-- --$S_{u\ remold}$ = 409.38 psf-- --Sensitivity = 1.53--	30		2	VS		
		--In-Situ Vane Shear, 35.0 feet-- --$S_{u\ undis}$ = 603.31 psf-- --$S_{u\ remold}$ = 387.84 psf-- --Sensitivity = 1.56--	35		3	VS		
		--In-Situ Vane Shear, 40.0 feet--	40		4			

GENERAL NOTES

Begin Drilling **07-27-2016** Complete Drilling **07-27-2016**
Drilling Contractor **Wang Testing Services** Drill Rig **D-25 ATV [93%]**
Driller **N&N** Logger **F. Bozga** Checked by **M. Seyhun**
Drilling Method **2.25" IDA HSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **Rotary wash**
At Completion of Drilling ▼ **Mud at 22.5 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 1729-VST-02

WEI Job No.: 1100-04-01

Client: **AECOM**
Project: **Circle Interchange Reconstruction**
Location: **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 592.70 ft
North: 1897206.55 ft
East: 1171441.79 ft
Station: 7312+95.08
Offset: 32.79 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--$S_{u\ undis}$ = 743.36 psf--				VS		
		--$S_{u\ remold}$ = 452.48 psf--						
		--Sensitivity = 1.64--						
		--In-Situ Vane Shear, 45.0 feet--	45		5	VS		
		--Failed test--						
		--In-Situ Vane Shear, 47.5 feet--			6	VS		
		--$S_{u\ undis}$ = 1422.08 psf--						
		--$S_{u\ remold}$ = 775.68 psf--						
		--Sensitivity = 1.83--						
		--In-Situ Vane Shear, 49.5 feet--	50		7	VS		
		--$S_{u\ undis}$ = 1422.07 psf--						
		--$S_{u\ remold}$ = 775.68 psf--						
		--Sensitivity = 1.83--						
					3		0.50 P	23
	540.4							
	540.2	Hard, gray SILTY CLAY, trace gravel						
		Boring terminated at 52.50 ft						
			55					
			60					

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)

GENERAL NOTES

Begin Drilling: **07-27-2016** Complete Drilling: **07-27-2016**
Drilling Contractor: **Wang Testing Services** Drill Rig: **D-25 ATV [93%]**
Driller: **N&N** Logger: **F. Bozga** Checked by: **M. Seyhun**
Drilling Method: **2.25" IDA HSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **Rotary wash**
At Completion of Drilling: **Mud at 22.5 ft**
Time After Drilling: **NA**
Depth to Water: **NA**

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BORING LOG 18-RWB-02

WEI Job No.: 1100-04-01

Client: **AECOM**
Project: **Circle Interchange Reconstruction**
Location: **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 575.58 ft
North: 1897703.15 ft
East: 1171280.67 ft
Station: 1224+34.52
Offset: 9.451 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	575.3	3-inch thick ASPHALT --PAVEMENT--						
	574.6	9-inch thick CONCRETE --PAVEMENT--						
		Medium dense, brown SANDY GRAVEL			1	11 10 6	NP	14
	572.6	--FILL--						
		Soft to medium stiff, gray SILTY CLAY LOAM, trace gravel			2	2 2 3	0.83 N/6	
		--L_L(%)=30, P_L(%)=14-- --%Gravel=3.5-- --%Sand=15.1-- --%Silt=56.3-- --%Clay=25.2-- --A-6 (10)--	5		3	1 1 2	0.25 B	23
	567.6	Very soft to medium stiff, gray CLAY to SILTY CLAY, trace gravel			4	1 1 2	0.25 B	26
			10		5	0 0 2	0.03 B	28
					6	0 1 1	0.25 B	26
			15		7	0 1 2	0.25 B	26
					8	0 0 0	0.16 B	27
			20		9	0 0 0	0.16 B	27
			25		10	0 0 2	0.33 B	25
					11	0 2 2	0.33 B	25
		--L_L(%)=37, P_L(%)=18-- --%Gravel=3.2-- --%Sand=10.5-- --%Silt=47.4-- --%Clay=38.9-- --A-6 (16)--	30		12	0 0 1	0.33 B	27
	538.8	Very stiff, gray SILTY CLAY, trace gravel	35		13	1 2 3	0.49 B	19
			40		14	4 9 10	3.12 B	17

GENERAL NOTES

Begin Drilling: **10-14-2013** Complete Drilling: **10-14-2013**
Drilling Contractor: **Wang Testing Services** Drill Rig: **D-50 TMR [78%]**
Driller: **R&N** Logger: **D. Kolpacki** Checked by: **C. Marin**
Drilling Method: **3.25" HSA, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **Rotary wash**
At Completion of Drilling: **mud in the borehole**
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 18-RWB-02

WEI Job No.: 1100-04-01

Client: **AECOM**
Project: **Circle Interchange Reconstruction**
Location: **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 575.58 ft
North: 1897703.15 ft
East: 1171280.67 ft
Station: 1224+34.52
Offset: 9.451 RT

Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	--L_L(%)=35, P_L(%)=17-- --%Gravel=2.2-- --%Sand=9.4-- --%Silt=51.7-- --%Clay=36.7-- --A-6 (15)-	45		15	4 8 10	2.95 B	19
525.6		50		16	6 17 14	3.20 B	17
	Boring terminated at 50.00 ft						
		55					
		60					

GENERAL NOTES

Begin Drilling **10-14-2013** Complete Drilling **10-14-2013**
Drilling Contractor **Wang Testing Services** Drill Rig **D-50 TMR [78%]**
Driller **R&N** Logger **D. Kolpacki** Checked by **C. Marin**
Drilling Method **3.25" HSA, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **Rotary wash**
At Completion of Drilling ▼ **mud in the borehole**
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 18-RWB-03

WEI Job No.: 1100-04-01

Client: **AECOM**
Project: **Circle Interchange Reconstruction**
Location: **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 573.93 ft
North: 1897759.34 ft
East: 1171203.61 ft
Station: 1604+97.68
Offset: 33.9208 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	573.6	4-inch thick ASPHALT --PAVEMENT--						
	572.9	8-inch thick CONCRETE --PAVEMENT--						
		Medium dense, brown SANDY GRAVEL and CRUSHED STONE --FILL--			1	12 14 12	NP	7
			5		2	4 5 6	NP	11
	568.4	Very soft to soft, gray CLAY to SILTY CLAY, trace gravel			3	2 1 1	0.25 B	22
			10		4	0 1 1	0.33 B	26
					5	0 0 0	0.16 B	27
		--L_L(%)=33, P_L(%)=19-- --%Gravel=2.2-- --%Sand=9.4-- --%Silt=51.7-- --%Clay=36.7-- --A-6 (10)--	15		6	0 0 0	0.16 B	27
					7	0 0 0	0.16 B	24
			20		8	0 1 1	0.25 B	27
			25		9	0 0 2	0.25 B	26
					10	0 1 2	0.33 B	25
			30		11	0 1 2	0.33 B	25
					12	0 0 0	0.25 B	29
	542.2	Stiff to hard, gray SILTY CLAY LOAM to SILTY LOAM, trace gravel						
			35		13	3 5 10	3.85 B	15
		--L_L(%)=24, P_L(%)=15-- --%Gravel=8.4-- --%Sand=24.5--	40		14	8 12 14	4.35 B	14

GENERAL NOTES

Begin Drilling: **10-14-2013** Complete Drilling: **10-14-2013**
Drilling Contractor: **Wang Testing Services** Drill Rig: **D-50 TMR [78%]**
Driller: **R&N** Logger: **D. Kolpacki** Checked by: **C. Marin**
Drilling Method: **3.25" HSA, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **3.50 ft**
At Completion of Drilling: **40.00 ft**
Time After Drilling: **NA**
Depth to Water: **NA**

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BORING LOG 18-RWB-03

WEI Job No.: 1100-04-01

Client **AECOM**
Project **Circle Interchange Reconstruction**
Location **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 573.93 ft
North: 1897759.34 ft
East: 1171203.61 ft
Station: 1604+97.68
Offset: 33.9208 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--%Silt=49.1--						
		--%Clay=18.1--						
		--A-4 (3)--						
			45		15	5 8 12	3.03 B	22
	523.9		50		16	5 8 10	1.97 B	23
		Boring terminated at 50.00 ft						
			55					
			60					

GENERAL NOTES

Begin Drilling **10-14-2013** Complete Drilling **10-14-2013**
Drilling Contractor **Wang Testing Services** Drill Rig **D-50 TMR [78%]**
Driller **R&N** Logger **D. Kolpacki** Checked by **C. Marin**
Drilling Method **3.25" HSA, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **3.50 ft**
At Completion of Drilling ▼ **40.00 ft**
Time After Drilling **NA**
Depth to Water ▼ **NA**

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BORING LOG 2055-B-04

WEI Job No.: 1100-04-01

Client: **AECOM**
Project: **Circle Interchange Reconstruction**
Location: **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 575.69 ft
North: 1898363.22 ft
East: 1171499.16 ft
Station: 8150+09.25
Offset: 43.5063 RT

Depth (ft)	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
0	574.7	5-inch thick ASPHALT over 7-inch thick CONCRETE --PAVEMENT--					
		Medium dense, brown SANDY GRAVEL --BASE COURSE--		1	5 9 9	NP	4
	572.7	Stiff, gray SILTY CLAY					
5				2	3 2 3	1.07 B	20
	570.2	Soft to medium stiff, gray CLAY to SILTY CLAY, trace gravel					
				3	1 2 2	0.57 B	25
10				4	1 1 2	0.57 B	24
				5	0 1 2	0.57 B	17
15				6	0 2 2	0.66 B	25
		--L_L(%)=35, P_L(%)=15-- --%Gravel=4.3-- --%Sand=15.2-- --%Silt=48.0-- --%Clay=32.4-- --A-6 (15)--		7	0 1 2	0.57 B	26
20				8	0 2 2	0.66 B	26
25				9	0 2 2	0.57 B	26
				10	0 1 2	0.49 B	25
				11	0 1 2	0.57 B	25
30	547.7	Medium dense, gray, coarse SAND, little gravel		12	2 5 7	NP	15
	543.7	Medium dense, gray SANDY GRAVEL		13	8 8 9	NP	15
35	540.9	Very stiff, gray SILTY CLAY to SILTY CLAY LOAM to LOAM, trace to some gravel					
		--L_L(%)=35, P_L(%)=15-- --%Gravel=3.6-- --%Sand=9.8-		14	4 7 10	2.46 B	21
40							

GENERAL NOTES

Begin Drilling: **05-19-2013** Complete Drilling: **05-20-2013**
Drilling Contractor: **Wang Testing Services** Drill Rig: **CME-55 TMR [85%]**
Driller: **P&N** Logger: **F. Bozga** Checked by: **C. Marin**
Drilling Method: **2.25" HSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **Rotary wash**
At Completion of Drilling: **mud in the borehole**
Time After Drilling: **NA**
Depth to Water: **NA**

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BORING LOG 2055-B-04

WEI Job No.: 1100-04-01

Client **AECOM**
Project **Circle Interchange Reconstruction**
Location **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 575.69 ft
North: 1898363.22 ft
East: 1171499.16 ft
Station: 8150+09.25
Offset: 43.5063 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--%Silt=50.5--						
		--%Clay=36.1--						
		--A-6 (16)--						
		--L_L(%)=22, P_L(%)=13--						
		--%Gravel=15.4--						
		--%Sand=31.5--						
		--%Silt=41.5--	45		15	5 8 10	4.92 B	13
		--%Clay=11.6--						
		--A-4 (2)--						
			50		16	4 6 8	2.62 B	22
			55		17	5 8 12	3.36 B	10
	518.9	Medium dense, gray SILT						
			60		18	4 5 8	NP	25
	513.9	Hard, gray SILTY CLAY LOAM, trace gravel						
			65		19	12 21 29	9.89 B	14
	508.9	Very dense, gray SILT to SILTY LOAM, trace to some gravel						
			70		20	23 50/4"	NP	13
			75		21	36 50/3"	NP	12
			80		22	50/5"	NP	9

GENERAL NOTES

Begin Drilling **05-19-2013** Complete Drilling **05-20-2013**
Drilling Contractor **Wang Testing Services** Drill Rig **CME-55 TMR [85%]**
Driller **P&N** Logger **F. Bozga** Checked by **C. Marin**
Drilling Method **2.25" HSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **Rotary wash**
At Completion of Drilling ▼ **mud in the borehole**
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 2055-B-04

WEI Job No.: 1100-04-01

Client **AECOM**
Project **Circle Interchange Reconstruction**
Location **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 575.69 ft
North: 1898363.22 ft
East: 1171499.16 ft
Station: 8150+09.25
Offset: 43.5063 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
			85		23	34 42 45	NP	22
			90		24	22 40 45	NP	19
	483.7	--HARD DRILLING-- Boulders, Sandy Gravel						
			95		25	50/2"	NR	
	478.7	--AUGER REFUSAL-- Strong, light gray, fair rock mass quality, bedded fresh DOLOSTONE, up to 18-inch beds, 1- to 18-inch spaced joints, horizontal and oblique joints with less than 0.2- to 3-inch greenish gray silty infilling, hard joint wall,	100	C O R E				
		with stylolitic surfaces, and moderately vuggy porosity. --Run 1 - RECOVERY = 95% RQD = 53%	105		1			
		--Run 1 - RECOVERY = 98% --RQD = 53%	110		2	C O R E		
	458.7	Boring terminated at 117.00 ft	115 120					

GENERAL NOTES

Begin Drilling **05-19-2013** Complete Drilling **05-20-2013**
Drilling Contractor **Wang Testing Services** Drill Rig **CME-55 TMR [85%]**
Driller **P&N** Logger **F. Bozga** Checked by **C. Marin**
Drilling Method **2.25" HSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **Rotary wash**
At Completion of Drilling ▼ **mud in the borehole**
Time After Drilling **NA**
Depth to Water ▼ **NA**

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BORING LOG 2081-B-03

WEI Job No.: 1100-04-01

Client **AECOM**
Project **Circle Interchange Reconstruction**
Location **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 581.38 ft
North: 1898040.36 ft
East: 1171151.03 ft
Station: 1220+89.44
Offset: 51.7421 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	581.1	4-inch thick ASPHALT --PAVEMENT--						
	580.1	11-inch thick CONCRETE --PAVEMENT--						
		Loose to medium dense, gray CRUSHED STONE --FILL--			1	2 3 5	NP	14
			5		2	7 16 12	NP	5
	575.9	Medium stiff to stiff, gray SILTY CLAY, trace gravel			3	5 8 8	1.97 B	19
			10		4	2 2 3	1.15 B	19
					5	2 3 3	0.82 B	23
	568.4	Soft to medium stiff, gray CLAY			6	2 3 3	0.57 B	25
			15		7	0 2 2	0.57 B	20
			20		8	0 2 3	0.57 B	26
			25		9	0 0 1	0.33 B	25
					10	0 1 2	0.33 B	27
					11	0 0 0	0.25 B	24
			30		12	0 1 2	0.49 B	26
	544.6	Stiff to hard, gray SILTY CLAY, trace gravel			13	0 1 2	0.41 B	29
			35					
					14	1 4 4	1.23 B	23
			40					

GENERAL NOTES

Begin Drilling **03-28-2013** Complete Drilling **03-29-2013**
Drilling Contractor **Wang Testing Services** Drill Rig **B-57 TMR [100%]**
Driller **P&N** Logger **D. Wind** Checked by **C. Marin**
Drilling Method **3.25" HSA to 8.5', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **Rotary wash**
At Completion of Drilling ▼ **mud in the borehole**
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 2081-B-03

WEI Job No.: 1100-04-01

Client **AECOM**
Project **Circle Interchange Reconstruction**
Location **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 581.38 ft
North: 1898040.36 ft
East: 1171151.03 ft
Station: 1220+89.44
Offset: 51.7421 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	524.6	Medium dense, gray SILT	45		15	7 8 12	5.99 B	13
			50		16	5 5 10	3.28 B	21
			55		17	4 9 13	4.51 B	18
			60		18	4 7 9	NP	17
	519.6	Hard, gray SILTY CLAY LOAM to SILTY LOAM, trace gravel	65		19	18 24 32	7.95 S	12
			70		20	16 32 50	9.84 S	12
			75		21	35 50/6	6.23 S	10
	504.6	Very dense, gray GRAVELLY SANDY LOAM	80		22	50/6	NP	12

GENERAL NOTES

Begin Drilling **03-28-2013** Complete Drilling **03-29-2013**
Drilling Contractor **Wang Testing Services** Drill Rig **B-57 TMR [100%]**
Driller **P&N** Logger **D. Wind** Checked by **C. Marin**
Drilling Method **3.25" HSA to 8.5', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **Rotary wash**
At Completion of Drilling ▼ **mud in the borehole**
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 2081-B-03

WEI Job No.: 1100-04-01

Client **AECOM**
Project **Circle Interchange Reconstruction**
Location **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 581.38 ft
North: 1898040.36 ft
East: 1171151.03 ft
Station: 1220+89.44
Offset: 51.7421 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	499.6	Very dense, gray SILT --MOIST--	85		23	39 49 50	NP	20
	494.6	Very dense, gray GRAVELLY SANDY LOAM	90		24	50/6	NP	11
	489.4	Strong, very poor rock quality 92'-94', light gray, highly fractured, slightly vuggy DOLOSTONE Run 1 = 92' to 102' --RECOVERY=100% --RQD=72% -Strong, good rock quality 94'-102' , light gray, fresh, slightly fractured, joint breaks with little to no infill, slightly vuggy DOLOSTONE ROCK MASS RATING: Strength of rock material = 12 Drill core quality RQD = 13 Spacing of joints = 10 Condition of joints =12	95 100		1	CORE		
	479.4	Groundwater condition =10 Boring terminated at 102.00 ft	105 110 115 120					

GENERAL NOTES

Begin Drilling **03-28-2013** Complete Drilling **03-29-2013**
Drilling Contractor **Wang Testing Services** Drill Rig **B-57 TMR [100%]**
Driller **P&N** Logger **D. Wind** Checked by **C. Marin**
Drilling Method **3.25" HSA to 8.5', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **Rotary wash**
At Completion of Drilling ▼ **mud in the borehole**
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 2081-B-04

WEI Job No.: 1100-04-01

Client **AECOM**
Project **Circle Interchange Reconstruction**
Location **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 578.68 ft
North: 1897947.00 ft
East: 1171154.08 ft
Station: 1221+68.39
Offset: 57.4771 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	577.5	14-inch thick ASPHALT --PAVEMENT--						
	577.2	4-inch thick CRUSHED STONE --BASE COURSE--						
		Very stiff, brown and gray SILTY CLAY LOAM, trace gravel --FILL--			1	4 5 6	3.85 B	18
	574.9	Medium dense CRUSHED STONE --FILL--	5		2	11 16 14	NP	4
					3	10 12 9	NP	5
	570.7	Loose, light brown GRAVELLY SAND --FILL--	10		4	6 5 4	NP	6
					5	10 5 4	NP	
			15		6	8 4 4	NP	9
	563.2	Very soft to medium stiff, gray CLAY, trace gravel			7	0 1 2	0.25 B	26
			20		8	0 0 1	0.16 B	24
			25		9	1 2 1	0.16 B	24
					10	0 0 2	0.25 B	27
					11	0 0 2	0.33 B	26
			30		12	0 1 2	0.33 B	24
			35		13	1 1 3	0.57 B	27
			40		14	2 4 4	0.98 B	19

GENERAL NOTES

Begin Drilling **04-01-2013** Complete Drilling **04-01-2013**
Drilling Contractor **Wang Testing Services** Drill Rig **D-50 TMR [78%]**
Driller **R&N** Logger **D. Kolpacki** Checked by **C. Marin**
Drilling Method **2.25" SSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **DRY**
At Completion of Drilling ▼ **mud in the borehole**
Time After Drilling **NA**
Depth to Water ▼ **NA**

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BORING LOG 2081-B-04

WEI Job No.: 1100-04-01

Client **AECOM**
Project **Circle Interchange Reconstruction**
Location **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 578.68 ft
North: 1897947.00 ft
East: 1171154.08 ft
Station: 1221+68.39
Offset: 57.4771 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	536.9							
		Stiff to hard, gray SILTY CLAY LOAM, trace gravel						
			45		15	7 8 11	1.97 B	16
			50		16	9 13 13	5.58 B	13
			55		17	8 9 11	2.05 S	14
	521.9							
		Medium stiff, gray SILTY LOAM, trace silt and sand seams						
			60		18	4 4 5	0.98 B	29

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	516.9							
		Hard, gray SILTY CLAY LOAM to SILTY LOAM, trace gravel						
			65		19	15 30 32	10.00 S	12
			70		20	14 23 31	10.25 B	15
			75		21	11 19 40	6.97 B	22
			80		22	14 20 31	10.25 B	23

GENERAL NOTES

Begin Drilling **04-01-2013** Complete Drilling **04-01-2013**
Drilling Contractor **Wang Testing Services** Drill Rig **D-50 TMR [78%]**
Driller **R&N** Logger **D. Kolpacki** Checked by **C. Marin**
Drilling Method **2.25" SSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **DRY**
At Completion of Drilling ▼ **mud in the borehole**
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 2081-B-04

WEI Job No.: 1100-04-01

Client **AECOM**
Project **Circle Interchange Reconstruction**
Location **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 578.68 ft
North: 1897947.00 ft
East: 1171154.08 ft
Station: 1221+68.39
Offset: 57.4771 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	493.7	Boring terminated at 85.00 ft	85		23	23 49 47	3.94 S	20
			90					
			95					
			100					

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)

GENERAL NOTES

Begin Drilling **04-01-2013** Complete Drilling **04-01-2013**
Drilling Contractor **Wang Testing Services** Drill Rig **D-50 TMR [78%]**
Driller **R&N** Logger **D. Kolpacki** Checked by **C. Marin**
Drilling Method **2.25" SSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **DRY**
At Completion of Drilling ▼ **mud in the borehole**
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 22-RWB-03

WEI Job No.: 1100-04-01

Client: **AECOM**
Project: **Circle Interchange Reconstruction**
Location: **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 587.62 ft
North: 1898185.65 ft
East: 1171879.86 ft
Station: 1212+29.37
Offset: 21.9731 RT

Elevation (ft)	Depth (ft)	SOIL AND ROCK DESCRIPTION	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
586.4		15-inch thick, black and brown SILTY LOAM					
		--TOPSOIL--					
		Hard, brown CLAY LOAM, trace gravel		1	7 8 10	4.50 P	16
		--FILL--					
584.6							
		Very stiff, gray SILTY CLAY LOAM, trace gravel		2	3 4 6	2.05 B	18
	5						
582.1							
		Very soft to medium stiff, gray CLAY to SILTY CLAY, trace gravel		3	2 2 3	0.57 B	24
				4	1 1 2	0.25 B	25
	10						
				5	1 2 2	0.41 B	26
		--L_L(%)=32, P_L(%)=18--		6	1 2 2	0.41 B	23
		--%Gravel=2.5--					
		--%Sand=15.0--					
		--%Silt=57.1--					
	15	--%Clay=25.4--					
		--A-6 (10)--					
				7	2 2 3	0.33 B	21
				8	2 2 3	0.57 B	21
	20						

Elevation (ft)	Depth (ft)	SOIL AND ROCK DESCRIPTION	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
				9	1 2 2	0.41 B	26
				10	1 2 2	0.25 B	27
	25						
				11	2 2 2	< 0.25 P	27
				12	2 1 2	0.25 B	26
	30						
		--L_L(%)=33, P_L(%)=18--		13	1 2 2	0.16 B	26
		--%Gravel=2.7--					
		--%Sand=15.7--					
		--%Silt=57.1--					
	35	--%Clay=25.4--					
		--A-6 (11)--					
				14	2 2 4	< 0.25 P	26
	40						

GENERAL NOTES

Begin Drilling: **03-07-2014** Complete Drilling: **03-10-2014**
Drilling Contractor: **Wang Testing Services** Drill Rig: **D-25 ATV [93%]**
Driller: **N&J** Logger: **A. Happel** Checked by: **C. Marin**
Drilling Method: **2.25" HSA to 15', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: ▽ **62.00 ft**
At Completion of Drilling: ▼ **mud in the borehole**
Time After Drilling: **NA**
Depth to Water: ▼ **NA**

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BORING LOG 22-RWB-03

WEI Job No.: 1100-04-01

Client: **AECOM**
Project: **Circle Interchange Reconstruction**
Location: **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 587.62 ft
North: 1898185.65 ft
East: 1171879.86 ft
Station: 1212+29.37
Offset: 21.9731 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	540.9	Very stiff to hard, gray SILTY CLAY LOAM, trace gravel	45		15	2 2 3	0.16 B	29
			50		16	5 9 12	3.50 P	22
			55		17	10 9 16	4.17 N/6	
		--L_L(%)=35, P_L(%)=18-- --%Gravel=1.8-- --%Sand=10.2--	60		18	8 10 22	2.30 B	21
		--%Silt=54.1-- --%Clay=33.9-- --A-6 (14)--						
	525.9	Very dense, gray, coarse SAND, little gravel --Moist--						
	523.3	Hard, gray SILTY CLAY LOAM to SILTY LOAM, trace gravel	65		19	35 50/5	NP	20
			70		20	25 33 37	4.50 P	13
			75		21	16 27 38	7.38 B	17
		--HARD DRILLING from 77 ft-- *--Possible Cobbles--*						
	510.6	Very dense, gray SILTY LOAM, trace gravel			22	50/0	NP	
			80					

GENERAL NOTES

Begin Drilling: **03-07-2014** Complete Drilling: **03-10-2014**
Drilling Contractor: **Wang Testing Services** Drill Rig: **D-25 ATV [93%]**
Driller: **N&J** Logger: **A. Happel** Checked by: **C. Marin**
Drilling Method: **2.25" HSA to 15', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **62.00 ft**
At Completion of Drilling: **mud in the borehole**
Time After Drilling: **NA**
Depth to Water: **NA**

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BORING LOG 22-RWB-03

WEI Job No.: 1100-04-01

Client **AECOM**
Project **Circle Interchange Reconstruction**
Location **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 587.62 ft
North: 1898185.65 ft
East: 1171879.86 ft
Station: 1212+29.37
Offset: 21.9731 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	491.4	Very dense, gray SANDY GRAVEL --Wet--	85		23	50/5	NP	14
			90		24	50/2	NP	11
			95		25	50/4	3.69 S	16
	487.6		100		26	50/2	NP	
		--VERY HARD, STEADY DRILLING-- --WEATHERED BEDROCK--	105					
	484.6	--ROLLER BIT REFUSAL-- Boring terminated at 103.00 ft	110					
			115					
			120					

GENERAL NOTES

Begin Drilling **03-07-2014** Complete Drilling **03-10-2014**
Drilling Contractor **Wang Testing Services** Drill Rig **D-25 ATV [93%]**
Driller **N&J** Logger **A. Happel** Checked by **C. Marin**
Drilling Method **2.25" HSA to 15', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **62.00 ft**
At Completion of Drilling ▼ **mud in the borehole**
Time After Drilling **NA**
Depth to Water ▼ **NA**

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BORING LOG 22-RWB-04

WEI Job No.: 1100-04-01

Client: **AECOM**
Project: **Circle Interchange Reconstruction**
Location: **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 586.36 ft
North: 1898208.77 ft
East: 1171849.77 ft
Station: 1212+66.85
Offset: 28.4715 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	586.1	3-inch thick, brown SILTY LOAM --TOPSOIL--						
		Hard, brown SILTY CLAY LOAM, trace gravel --FILL--			1	3 4 6	4.10 B	21
	583.4	Stiff to very stiff, gray SILTY CLAY, trace gravel			2	3 4 5	2.87 B	20
			5		3	2 3 3	1.56 B	22
	578.4	Soft, gray CLAY, trace gravel			4	1 1 2	0.33 B	25
			10		5	1 1 2	0.33 B	25
	573.4	Medium stiff, gray SILTY CLAY LOAM, trace gravel			6	1 2 4	0.57 B	17
			15		7	1 2 3	0.41 B	25
	570.9	Soft, gray CLAY to SILTY CLAY, trace gravel			8	2 2 4	0.41 B	22
			20		9	1 1 2	0.41 B	26
			25		10	2 2 2	0.49 B	26
					11	2 1 2	0.41 B	27
			30		12	1 2 3	0.41 B	25
			35		13	1 2 3	0.41 B	25
			40		14	1 2 3	0.25 P	26

GENERAL NOTES

Begin Drilling: **08-05-2014** Complete Drilling: **08-05-2014**
Drilling Contractor: **Wang Testing Services** Drill Rig: **D-25 ATV [93%]**
Driller: **P&N** Logger: **M. de los Reyes** Checked by: **C. Marin**
Drilling Method: **2.25" HSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **Rotary wash**
At Completion of Drilling: **mud in the borehole**
Time After Drilling: **NA**
Depth to Water: **NA**

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BORING LOG 22-RWB-04

WEI Job No.: 1100-04-01

Client **AECOM**
Project **Circle Interchange Reconstruction**
Location **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 586.36 ft
North: 1898208.77 ft
East: 1171849.77 ft
Station: 1212+66.85
Offset: 28.4715 RT

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 at 42.5 ft-- *--Possible Cobbles--*						
	543.9	Stiff to very stiff, gray SILTY CLAY LOAM, trace gravel						
			45		15	2 4 5	1.50 N/6	18
			50		16	5 9 12	2.87 B	18
			55		17	9 11 14	2.62 B	14
	529.6	Very stiff, gray SILTY LOAM to SILTY CLAY LOAM, trace gravel and sand seams						
			60		18	13 19 35	3.69 S	13
	524.6	Very dense, gray SANDY LOAM, trace gravel --Moist--						
	521.4	Boring terminated at 65.00 ft	65		19	13 19 35	NP	11
			70					
			75					
			80					

GENERAL NOTES

Begin Drilling **08-05-2014** Complete Drilling **08-05-2014**
Drilling Contractor **Wang Testing Services** Drill Rig **D-25 ATV [93%]**
Driller **P&N** Logger **M. de los Reyes** Checked by **C. Marin**
Drilling Method **2.25" HSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **Rotary wash**
At Completion of Drilling ▼ **mud in the borehole**
Time After Drilling **NA**
Depth to Water ▼ **NA**

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BORING LOG VST-06

WEI Job No.: 1100-04-01

Client **AECOM**
Project **Circle Interchange Reconstruction**
Location **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 585.69 ft
North: 1898109.29 ft
East: 1171902.18 ft
Station: 1211+74.65
Offset: 35.3599 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		Hard, brown SILTY CLAY LOAM, trace gravel --FILL--						
			5		1	7 6 6	> 4.50 P	16
	580.2							
		Soft, gray SILTY CLAY LOAM			2	1 2 3	0.41 B	23
	576.7							
			10					
		--In-Situ Vane Shear, 10.5 feet-- --$S_{u\ undis}$ = 972.0 psf-- --$S_{u\ remold}$ = 611.6 psf-- --Sensitivity = 1.6--			1	VS		
		--In-Situ Vane Shear, 13.0 feet-- --$S_{u\ undis}$ = 982.9 psf-- --$S_{u\ remold}$ = 589.7 psf-- --Sensitivity = 1.7--			2	VS		
			15					
		--In-Situ Vane Shear, 15.5 feet-- --$S_{u\ undis}$ = 873.7 psf-- --$S_{u\ remold}$ = 513.3 psf-- --Sensitivity = 1.7--			3	VS		
		--In-Situ Vane Shear, 18.0 feet-- --$S_{u\ undis}$ = 928.3 psf-- --$S_{u\ remold}$ = 360.4 psf-- --Sensitivity = 2.6--			4	VS		
			20					
		--In-Situ Vane Shear, 20.5 feet-- --$S_{u\ undis}$ = 775.4 psf-- --$S_{u\ remold}$ = 360.4 psf-- --Sensitivity = 2.2--			5	VS		
		--In-Situ Vane Shear, 23.0 feet-- --$S_{u\ undis}$ = 600.6 psf-- --$S_{u\ remold}$ = 305.8 psf-- --Sensitivity = 2.0--			6	VS		
			25					
		--In-Situ Vane Shear, 25.5 feet-- --$S_{u\ undis}$ = 578.8 psf-- --$S_{u\ remold}$ = 316.7 psf-- --Sensitivity = 1.8--			7	VS		
		--In-Situ Vane Shear, 28.0 feet-- --$S_{u\ undis}$ = 611.6 psf-- --$S_{u\ remold}$ = 338.5 psf-- --Sensitivity = 1.8--			8	VS		
			30					
		--In-Situ Vane Shear, 30.5 feet-- --$S_{u\ undis}$ = 786.3 psf-- --$S_{u\ remold}$ = 382.2 psf-- --Sensitivity = 2.1--			9	VS		
		--In-Situ Vane Shear, 33.0 feet-- --$S_{u\ undis}$ = 698.9 psf-- --$S_{u\ remold}$ = 404.1 psf-- --Sensitivity = 1.7--			10	VS		
			35					
		--In-Situ Vane Shear, 35.5 feet-- --$S_{u\ undis}$ = 808.1 psf-- --$S_{u\ remold}$ = 502.4 psf-- --Sensitivity = 1.6--			11	VS		
		--In-Situ Vane Shear, 38.0 feet-- --$S_{u\ undis}$ = 982.9 psf-- --$S_{u\ remold}$ = 546.0 psf-- --Sensitivity = 1.8--			12	VS		
			40					

GENERAL NOTES

Begin Drilling **12-09-2015** Complete Drilling **12-14-2015**
Drilling Contractor **Wang Testing Services** Drill Rig **CME-55 TMR [85%]**
Driller **R&N** Logger **F. Bozga** Checked by **A. Kurnia**
Drilling Method **2.25" HSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **Rotary wash**
At Completion of Drilling ▼ **mud in the borehole**
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 VST-06

WEI Job No.: 1100-04-01

Client **AECOM**
Project **Circle Interchange Reconstruction**
Location **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 585.69 ft
North: 1898109.29 ft
East: 1171902.18 ft
Station: 1211+74.65
Offset: 35.3599 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--In-Situ Vane Shear, 40.5 feet--			13	VS		
		--$S_{u\ undis}$ = 906.4 psf--						
		--$S_{u\ remold}$ = 524.2 psf--						
		--Sensitivity = 1.7--						
		--In-Situ Vane Shear, 43.0 feet--			14	VS		
	542.2	--$S_{u\ undis}$ = 677.1 psf--						
		--$S_{u\ remold}$ = 393.1 psf--						
		--Sensitivity = 1.7--						
		Boring terminated at 43.50 ft	45					
			50					
			55					
			60					

GENERAL NOTES

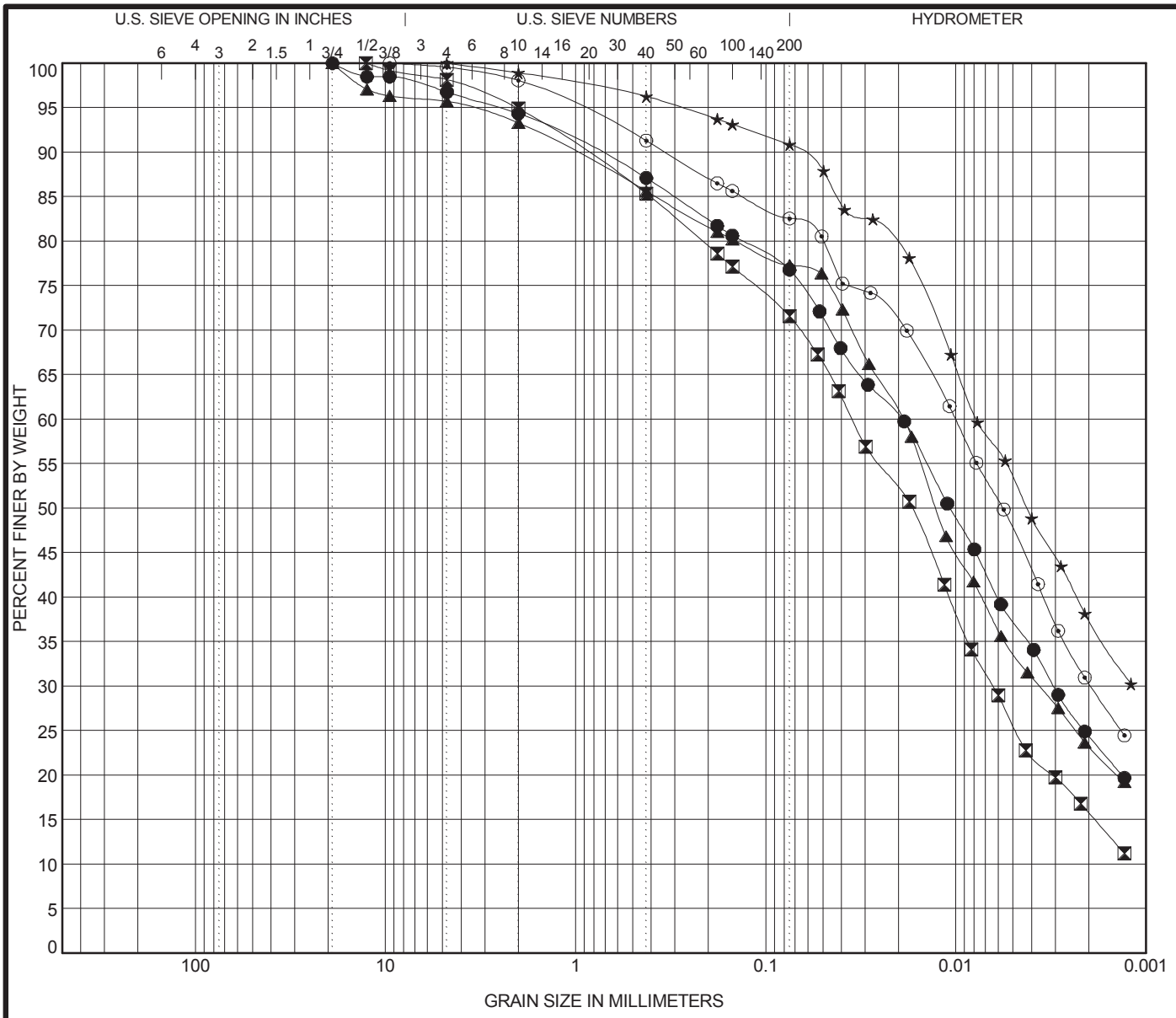
Begin Drilling **12-09-2015** Complete Drilling **12-14-2015**
Drilling Contractor **Wang Testing Services** Drill Rig **CME-55 TMR [85%]**
Driller **R&N** Logger **F. Bozga** Checked by **A. Kurnia**
Drilling Method **2.25" HSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **Rotary wash**
At Completion of Drilling ▼ **mud in the borehole**
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
● 1087-B-01#8	18.5 ft	**Silty Clay Loam**	**29**	**14**	**15**		
⊠ 1087-B-01#18	58.5 ft	**Silty Loam**	**23**	**14**	**9**		
▲ 1087-B-01#19	63.5 ft	**Silty Clay Loam**	**28**	**13**	**15**		
★ 1087-B-01#20	68.5 ft	**Silty Clay**	**35**	**15**	**20**		
⊙ 1087-B-02#5	11.0 ft	**Silty Clay**	**32**	**17**	**15**		

Specimen Identification		D95	D90	D84	D50	%Gravel	%Sand	%Silt	%Clay
● 1087-B-01#8	18.5 ft	**2.528**	**0.789**	**0.259**	**0.011**	**5.7**	**17.7**	**52.3**	**24.4**
⊠ 1087-B-01#18	58.5 ft	**2.059**	**0.904**	**0.358**	**0.017**	**5.1**	**23.5**	**55.6**	**15.8**
▲ 1087-B-01#19	63.5 ft	**3.687**	**1.028**	**0.313**	**0.013**	**6.7**	**16.0**	**54.0**	**23.2**
★ 1087-B-01#20	68.5 ft	**0.277**	**0.067**	**0.04**	**0.004**	**1.1**	**8.1**	**53.3**	**37.5**
⊙ 1087-B-02#5	11.0 ft	**0.991**	**0.337**	**0.104**	**0.006**	**1.9**	**15.6**	**52.2**	**30.3**

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GRAIN SIZE DISTRIBUTION

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Location: Section 17, T39N, R14E of 3rd PM

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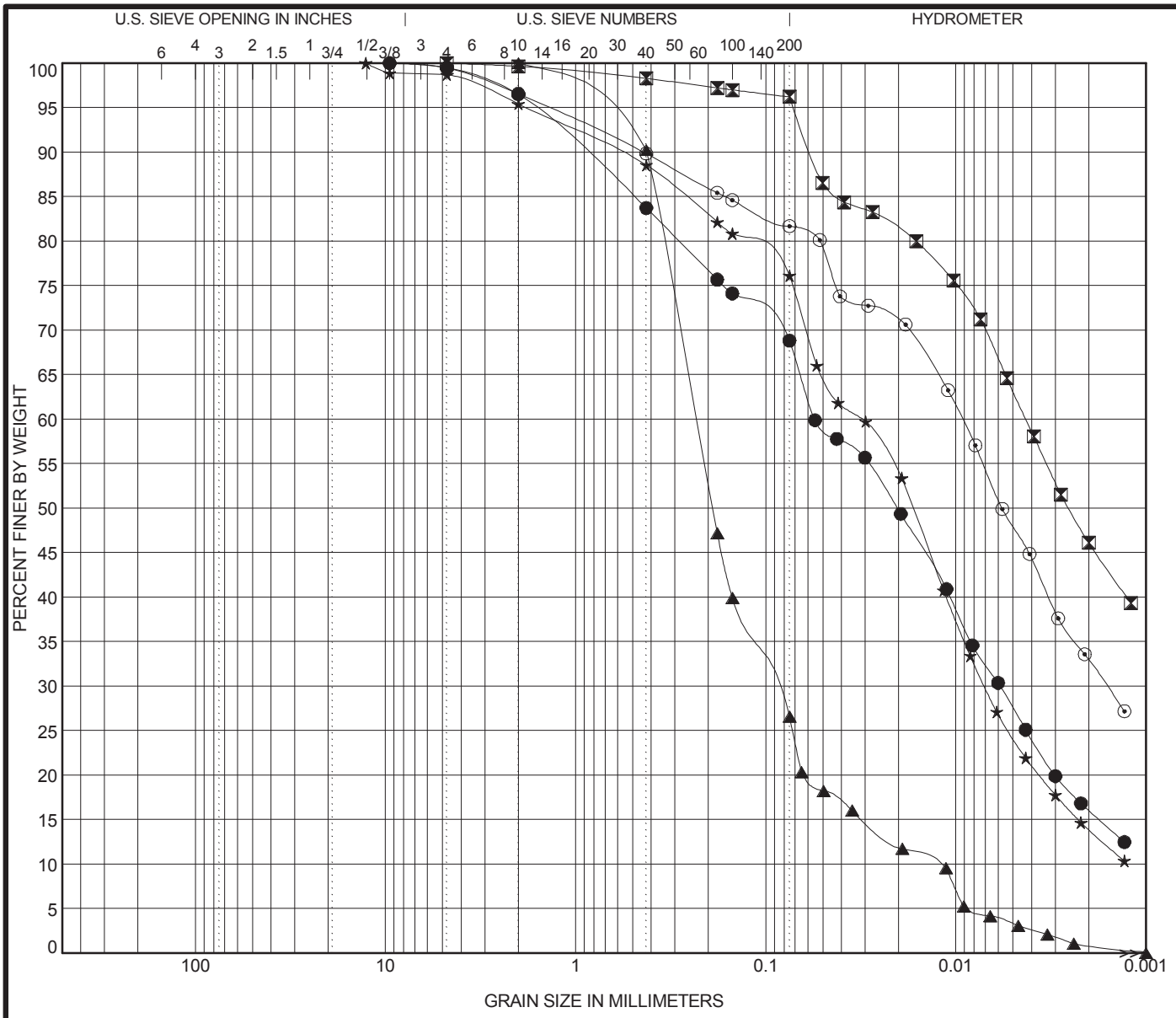

COBBLES	GRAVEL	SAND		SILT AND CLAY
		coarse	fine	

Specimen Identification			IDH Classification	LL	PL	PI	Cc	Cu
●	1087-B-02#15	43.5 ft	**Silty Loam**	**24**	**13**	**11**		
⊠	1087-B-02#17	53.5 ft	**Silty Clay**	**40**	**15**	**25**		
▲	1087-B-02#18	58.5 ft	**Sandy Loam**	**NP**	**NP**	**NP**	**2.75**	**18.48**
★	1087-B-02#20	68.5 ft	**Silty Loam**	**22**	**12**	**10**		
⊙	10-RWB-01#12	28.5 ft	**Silty Clay**	**33**	**17**	**16**		

Specimen Identification			D95	D90	D84	D50	%Gravel	%Sand	%Silt	%Clay
●	1087-B-02#15	43.5 ft	**1.665**	**0.908**	**0.439**	**0.02**	**3.5**	**28.1**	**52.4**	**16.0**
⊠	1087-B-02#17	53.5 ft	**0.071**	**0.058**	**0.034**	**0.003**	**0.4**	**3.8**	**49.8**	**46.1**
▲	1087-B-02#18	58.5 ft	**0.905**	**0.423**	**0.375**	**0.19**	**0.0**	**74.0**	**25.1**	**0.9**
★	1087-B-02#20	68.5 ft	**1.819**	**0.589**	**0.231**	**0.017**	**4.6**	**19.7**	**61.8**	**13.9**
⊙	10-RWB-01#12	28.5 ft	**1.395**	**0.441**	**0.13**	**0.006**	**3.4**	**14.9**	**48.7**	**32.9**

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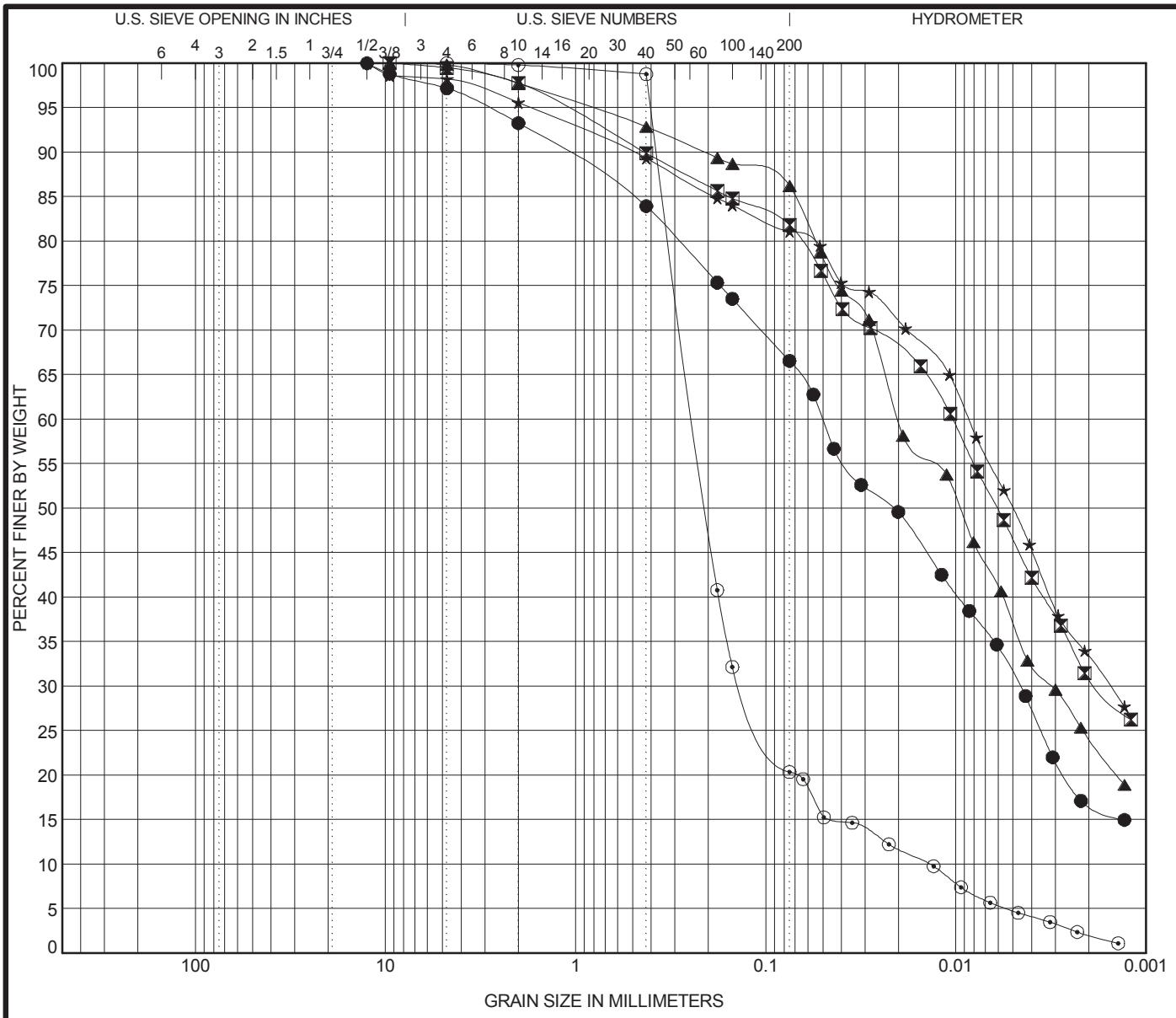

COBBLES	GRAVEL	SAND		SILT AND CLAY
		coarse	fine	

Specimen Identification			IDH Classification	LL	PL	PI	Cc	Cu
●	10-RWB-02#18	58.5 ft	**Silty Loam**	**23**	**15**	**8**		
⊠	13-RWB-01#12	28.5 ft	**Silty Clay**	**35**	**15**	**20**		
▲	13-RWB-01#22	78.5 ft	**Silty Clay Loam**	**29**	**14**	**15**		
★	15-RWB-01#15	43.5 ft	**Clay**	**34**	**18**	**16**		
⊙	15-RWB-01#20	68.5 ft	**Sandy Loam**	**NP**	**NP**	**NP**	**5.29**	**17.33**

Specimen Identification			D95	D90	D84	D50	%Gravel	%Sand	%Silt	%Clay
●	10-RWB-02#18	58.5 ft	**2.929**	**1.163**	**0.429**	**0.021**	**6.7**	**26.9**	**49.7**	**16.7**
⊠	13-RWB-01#12	28.5 ft	**1.159**	**0.435**	**0.124**	**0.006**	**2.2**	**16.1**	**50.7**	**31.0**
▲	13-RWB-01#22	78.5 ft	**0.838**	**0.211**	**0.067**	**0.01**	**2.2**	**11.8**	**61.8**	**24.2**
★	15-RWB-01#15	43.5 ft	**1.732**	**0.501**	**0.148**	**0.005**	**4.4**	**14.5**	**47.7**	**33.3**
⊙	15-RWB-01#20	68.5 ft	**0.402**	**0.373**	**0.342**	**0.206**	**0.2**	**79.5**	**18.3**	**2.0**

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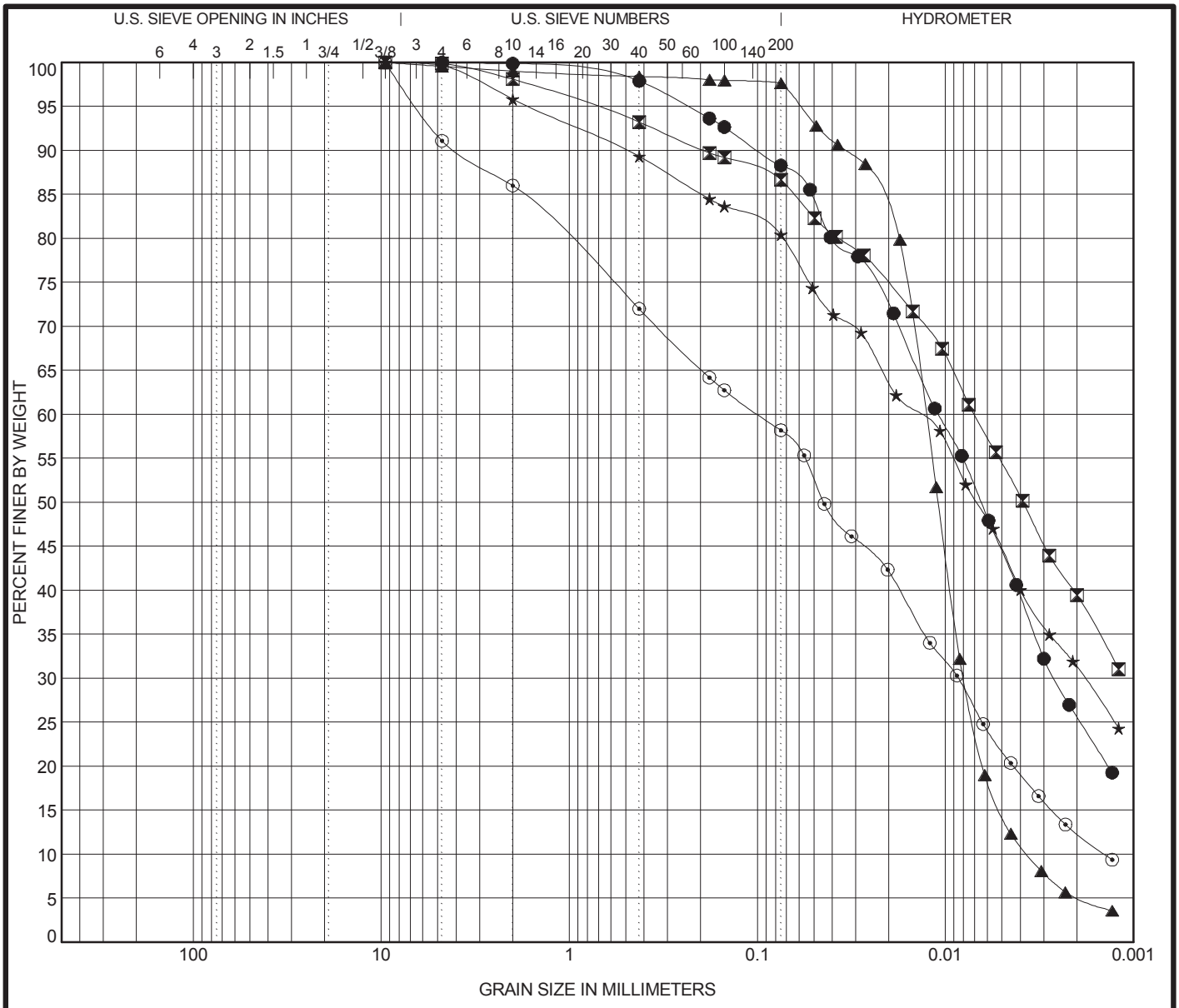

COBBLES	GRAVEL	SAND		SILT AND CLAY
		coarse	fine	

Specimen Identification		IDH Classification	LL	PL	PI	Cc	Cu
● 15-RWB-01#24	88.5 ft	**Silty Clay Loam**	**26**	**16**	**10**		
⊠ 1705-B-11#16	48.5 ft	**Clay**	**37**	**17**	**20**		
▲ 1705-B-11#23	83.5 ft	**Silt**	**NP**	**NP**	**NP**	**1.36**	**3.48**
★ 1706-B-02#8	18.5 ft	**Silty Clay**	**34**	**17**	**17**		
⊙ 1714-B-02#3	6.0 ft	**Silty Loam**	**24**	**15**	**9**	**0.52**	**69.46**

Specimen Identification		D95	D90	D84	D50	%Gravel	%Sand	%Silt	%Clay
● 15-RWB-01#24	88.5 ft	**0.237**	**0.098**	**0.049**	**0.006**	**0.1**	**11.7**	**62.6**	**25.6**
⊠ 1705-B-11#16	48.5 ft	**0.747**	**0.193**	**0.058**	**0.004**	**1.9**	**11.6**	**47.1**	**39.5**
▲ 1705-B-11#23	83.5 ft	**0.059**	**0.034**	**0.021**	**0.011**	**1.0**	**1.5**	**92.3**	**5.2**
★ 1706-B-02#8	18.5 ft	**1.641**	**0.499**	**0.162**	**0.007**	**4.2**	**15.6**	**49.0**	**31.3**
⊙ 1714-B-02#3	6.0 ft	**6.437**	**3.943**	**1.602**	**0.044**	**14.0**	**28.0**	**45.7**	**12.4**

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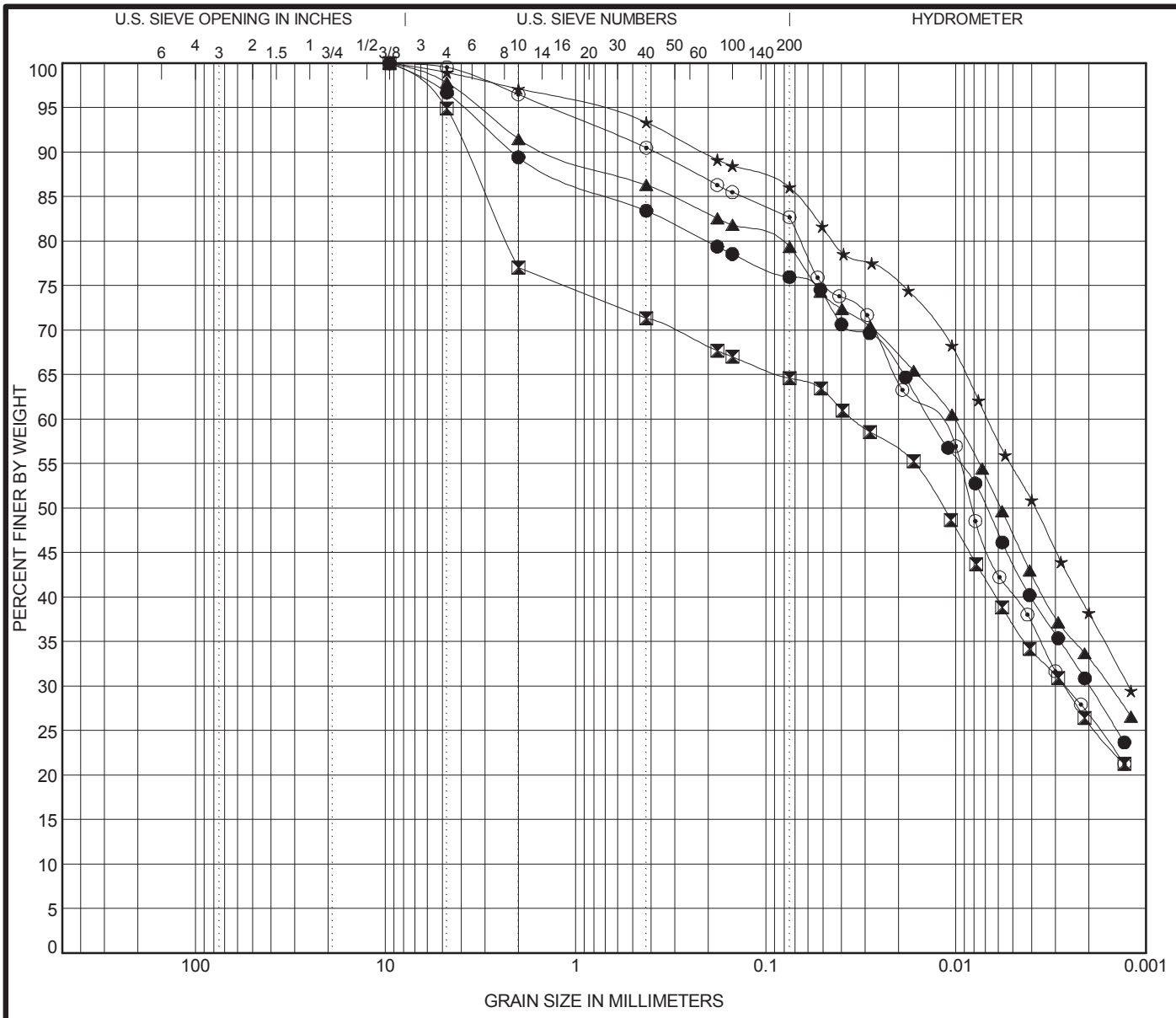

COBBLES	GRAVEL	SAND		SILT AND CLAY
		coarse	fine	

Specimen Identification		IDH Classification	LL	PL	PI	Cc	Cu
● 1714-B-02#6	13.5 ft	**Silty Clay**	**33**	**18**	**15**		
⊠ 1714-B-02#12	28.5 ft	**Gravelly Silty Clay**	**33**	**17**	**16**		
▲ 1714-B-02#15	43.5 ft	**Silty Clay**	**33**	**17**	**16**		
★ 1714-B-02#18	58.5 ft	**Clay**	**35**	**17**	**18**		
⊙ 1714-B-02#20	68.5 ft	**Silty Clay Loam**	**31**	**17**	**14**		

Specimen Identification		D95	D90	D84	D50	%Gravel	%Sand	%Silt	%Clay
● 1714-B-02#6	13.5 ft	**3.884**	**2.14**	**0.494**	**0.007**	**10.6**	**13.5**	**45.8**	**30.1**
⊠ 1714-B-02#12	28.5 ft	**4.826**	**3.749**	**2.803**	**0.012**	**23.0**	**12.5**	**38.7**	**25.9**
▲ 1714-B-02#15	43.5 ft	**3.23**	**1.282**	**0.25**	**0.006**	**8.5**	**12.3**	**46.1**	**33.1**
★ 1714-B-02#18	58.5 ft	**0.835**	**0.214**	**0.062**	**0.004**	**2.9**	**11.2**	**47.7**	**38.2**
⊙ 1714-B-02#20	68.5 ft	**1.362**	**0.384**	**0.104**	**0.008**	**3.5**	**14.1**	**55.7**	**26.7**

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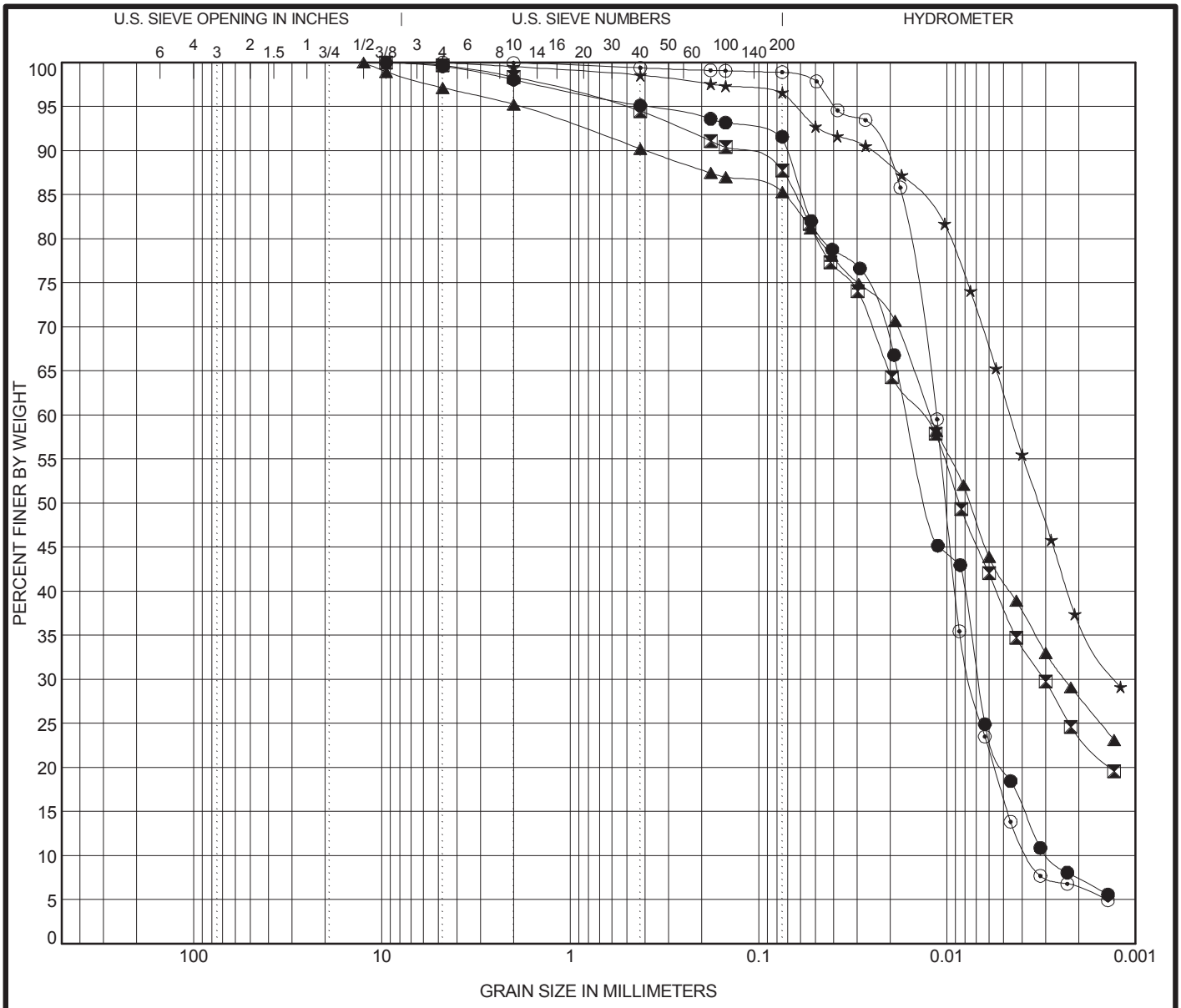

COBBLES	GRAVEL	SAND		SILT AND CLAY
		coarse	fine	

Specimen Identification		IDH Classification	LL	PL	PI	Cc	Cu
● 1714-B-02#24	88.5 ft	**Silt**	**NP**	**NP**	**NP**	**1.01**	**5.59**
⊠ 1715-B-01#21	73.5 ft	**Silty Clay Loam**	**29**	**16**	**13**		
▲ 1715-B-01#24	88.5 ft	**Silty Clay Loam**	**29**	**16**	**13**		
★ 1715-B-03#16	48.5 ft	**Silty Clay**	**36**	**18**	**18**		
⊙ 1715-B-03#23	83.5 ft	**Silt**	**NP**	**NP**	**NP**	**1.33**	**3.11**

Specimen Identification		D95	D90	D84	D50	%Gravel	%Sand	%Silt	%Clay
● 1714-B-02#24	88.5 ft	**0.393**	**0.071**	**0.057**	**0.013**	**1.9**	**6.8**	**83.8**	**7.4**
⊠ 1715-B-01#21	73.5 ft	**0.521**	**0.135**	**0.061**	**0.009**	**1.6**	**10.8**	**63.8**	**23.7**
▲ 1715-B-01#24	88.5 ft	**1.847**	**0.397**	**0.067**	**0.008**	**4.7**	**10.1**	**57.2**	**28.0**
★ 1715-B-03#16	48.5 ft	**0.063**	**0.025**	**0.013**	**0.003**	**0.5**	**3.1**	**59.8**	**36.7**
⊙ 1715-B-03#23	83.5 ft	**0.039**	**0.022**	**0.017**	**0.01**	**0.1**	**1.1**	**92.6**	**6.3**

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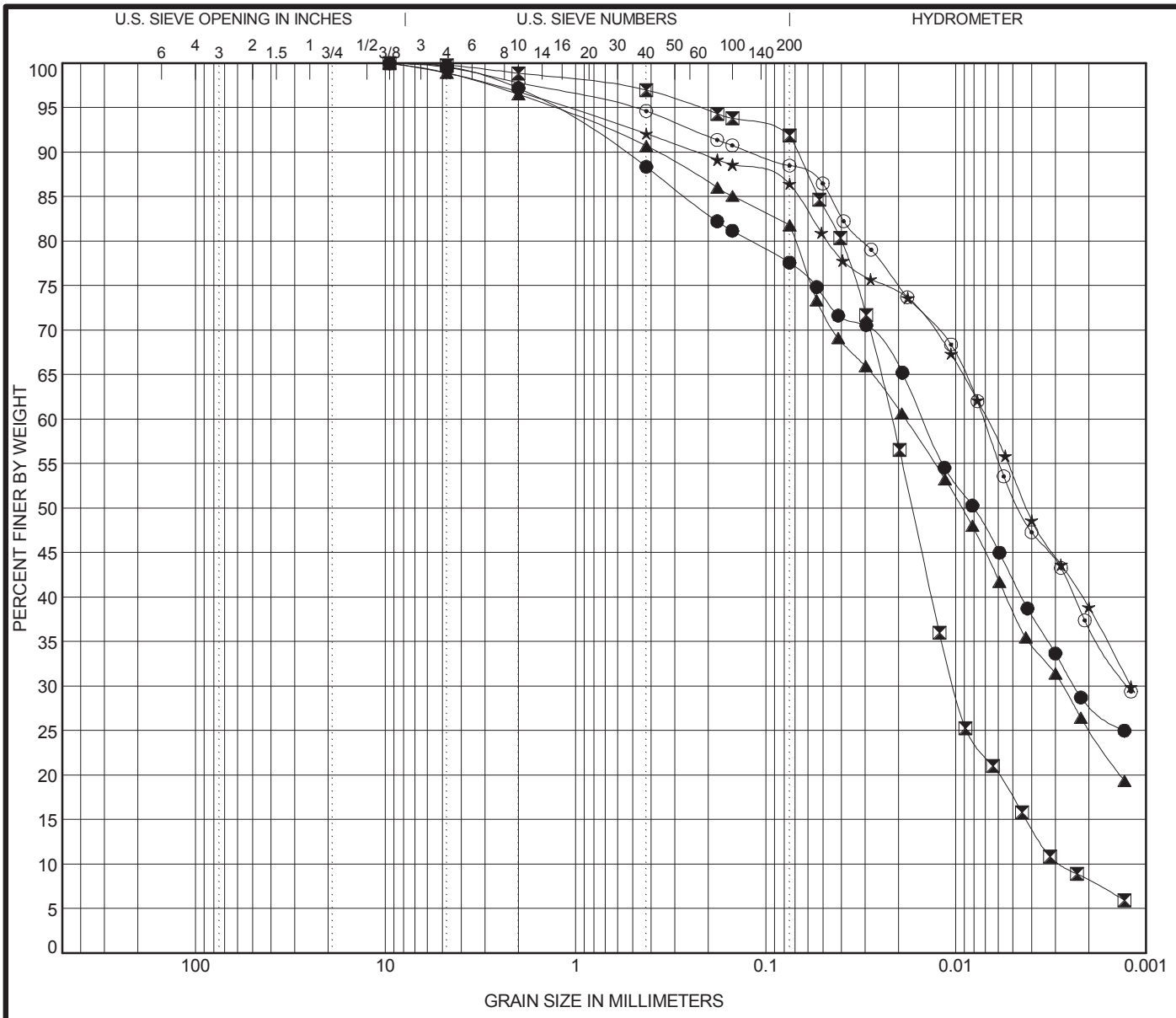

COBBLES	GRAVEL	SAND		SILT AND CLAY
		coarse	fine	

	Specimen Identification		IDH Classification	LL	PL	PI	Cc	Cu
●	1715-B-04#18	58.5 ft	**Silty Clay Loam**	**31**	**15**	**16**		
⊠	1715-B-04#23	83.5 ft	**Silt**	**NP**	**NP**	**NP**	**1.74**	**7.82**
▲	18-RWB-02#3	6.0 ft	**Silty Clay Loam**	**30**	**16**	**14**		
★	18-RWB-02#12	28.5 ft	**Clay**	**37**	**18**	**19**		
⊙	18-RWB-02#15	43.5 ft	**Silty Clay**	**35**	**17**	**18**		

	Specimen Identification		D95	D90	D84	D50	%Gravel	%Sand	%Silt	%Clay
●	1715-B-04#18	58.5 ft	**1.361**	**0.567**	**0.231**	**0.008**	**2.8**	**19.7**	**49.4**	**28.0**
⊠	1715-B-04#23	83.5 ft	**0.224**	**0.068**	**0.05**	**0.017**	**1.1**	**7.3**	**83.5**	**8.2**
▲	18-RWB-02#3	6.0 ft	**1.339**	**0.373**	**0.119**	**0.009**	**3.5**	**15.1**	**56.3**	**25.2**
★	18-RWB-02#12	28.5 ft	**1.113**	**0.23**	**0.063**	**0.004**	**3.2**	**10.5**	**47.4**	**38.9**
⊙	18-RWB-02#15	43.5 ft	**0.511**	**0.119**	**0.043**	**0.005**	**2.2**	**9.4**	**51.7**	**36.7**

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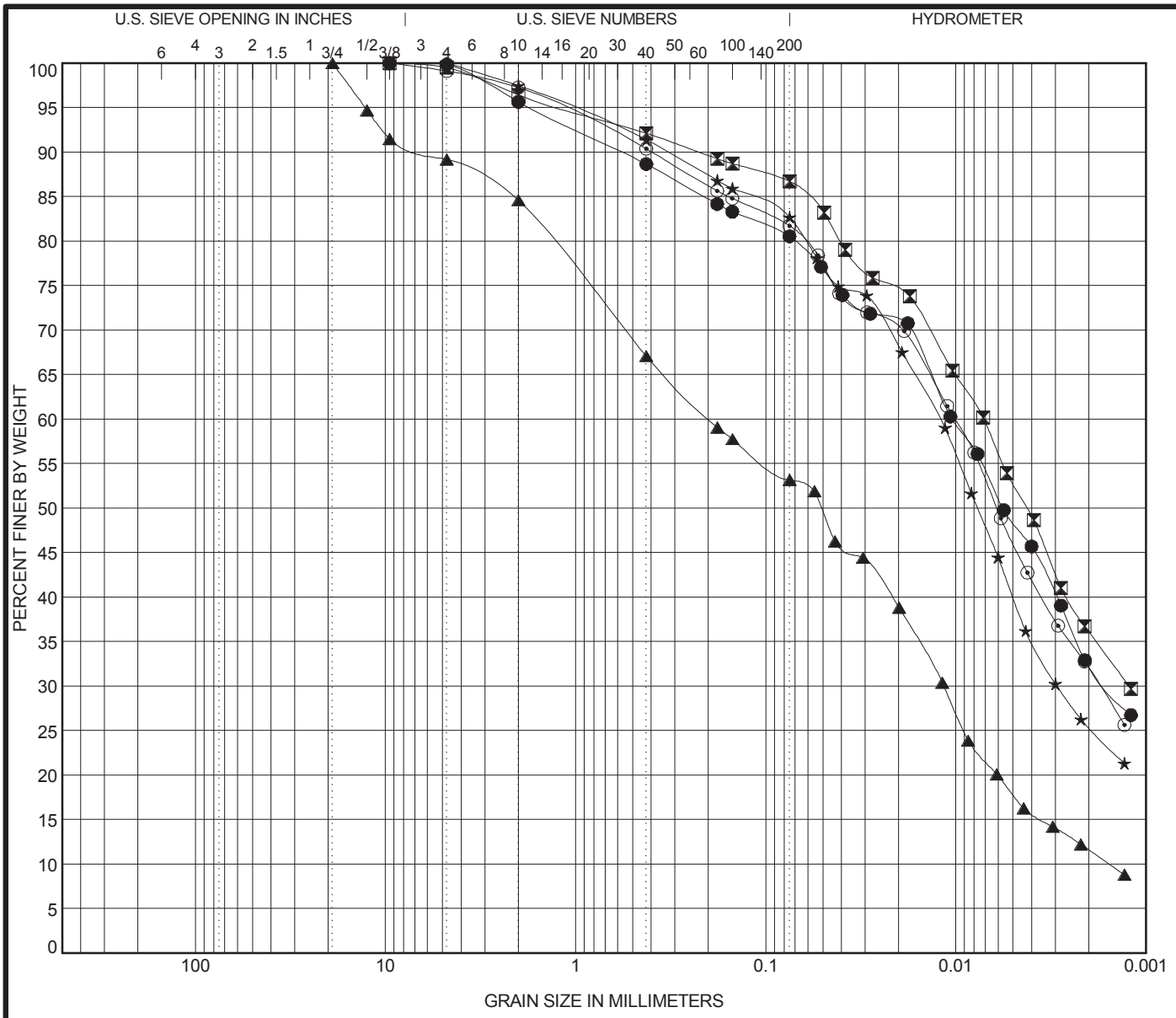

COBBLES	GRAVEL	SAND		SILT AND CLAY
		coarse	fine	

Specimen Identification		IDH Classification	LL	PL	PI	Cc	Cu
● 2055-B-04#7	16.0 ft	**Silty Clay**	**35**	**15**	**20**		
⊠ 2055-B-04#14	38.5 ft	**Silty Clay**	**35**	**15**	**20**		
▲ 2055-B-04#15	43.5 ft	**Gravelly Loam**	**22**	**13**	**9**	**0.43**	**127.28**
★ 22-RWB-03#6	13.5 ft	**Silty Clay Loam**	**32**	**18**	**14**		
⊙ 22-RWB-03#13	33.5 ft	**Silty Clay**	**33**	**18**	**15**		

Specimen Identification		D95	D90	D84	D50	%Gravel	%Sand	%Silt	%Clay
● 2055-B-04#7	16.0 ft	**1.731**	**0.571**	**0.173**	**0.006**	**4.3**	**15.2**	**48.0**	**32.4**
⊠ 2055-B-04#14	38.5 ft	**1.199**	**0.224**	**0.054**	**0.004**	**3.6**	**9.8**	**50.5**	**36.1**
▲ 2055-B-04#15	43.5 ft	**12.781**	**6.06**	**1.896**	**0.051**	**15.4**	**31.5**	**41.5**	**11.6**
★ 22-RWB-03#6	13.5 ft	**1.063**	**0.327**	**0.099**	**0.008**	**2.5**	**15.0**	**57.1**	**25.4**
⊙ 22-RWB-03#13	33.5 ft	**1.2**	**0.396**	**0.125**	**0.006**	**2.7**	**15.7**	**49.6**	**32.0**

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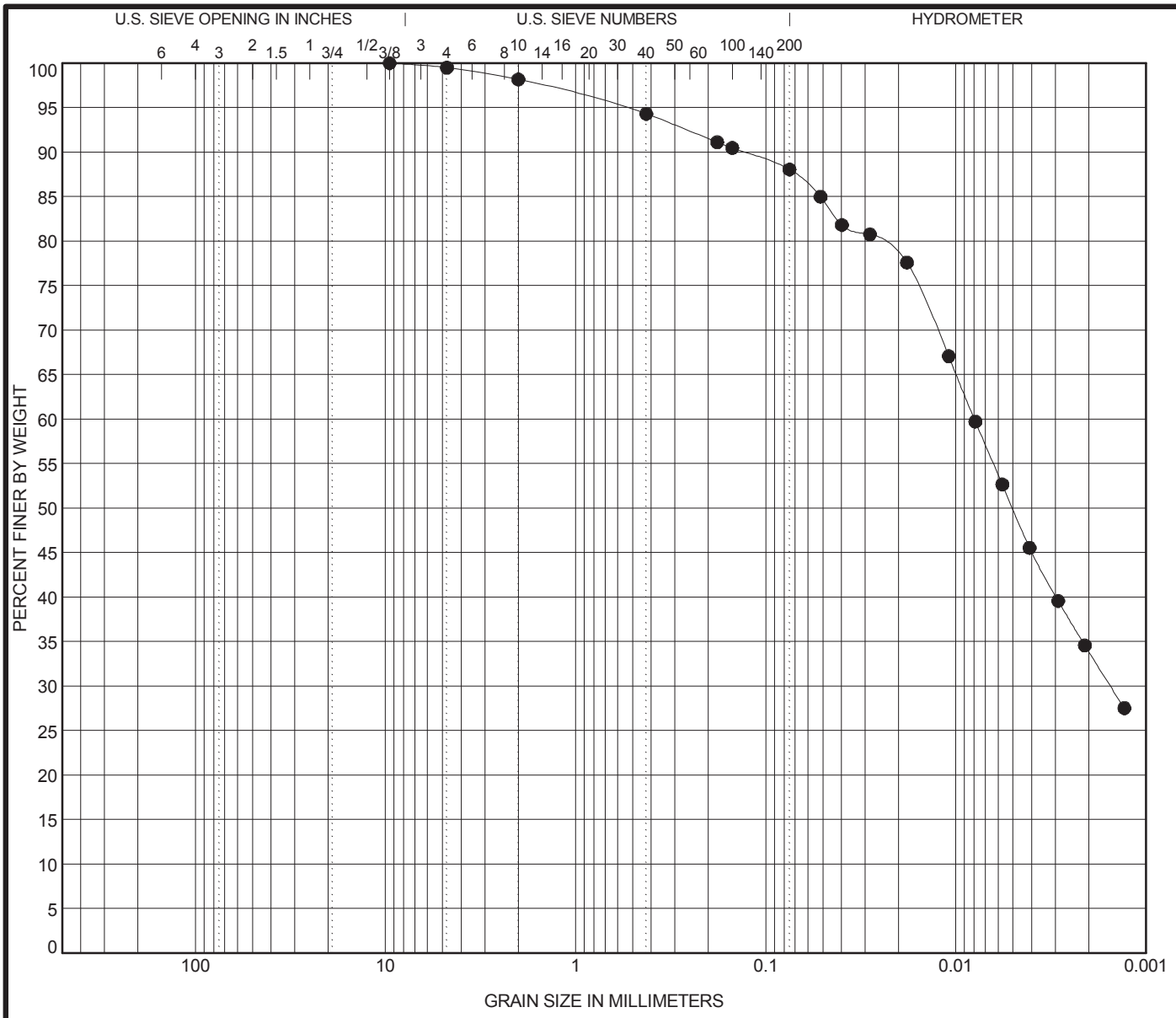

COBBLES	GRAVEL	SAND		SILT AND CLAY
		coarse	fine	

	Specimen Identification	IDH Classification	LL	PL	PI	Cc	Cu
●	**22-RWB-03#18 58.5 ft**	**Silty Clay**	**35**	**18**	**17**		

	Specimen Identification	D95	D90	D84	D50	%Gravel	%Sand	%Silt	%Clay
●	**22-RWB-03#18 58.5 ft**	**0.56**	**0.131**	**0.048**	**0.005**	**1.8**	**10.2**	**54.1**	**33.9**

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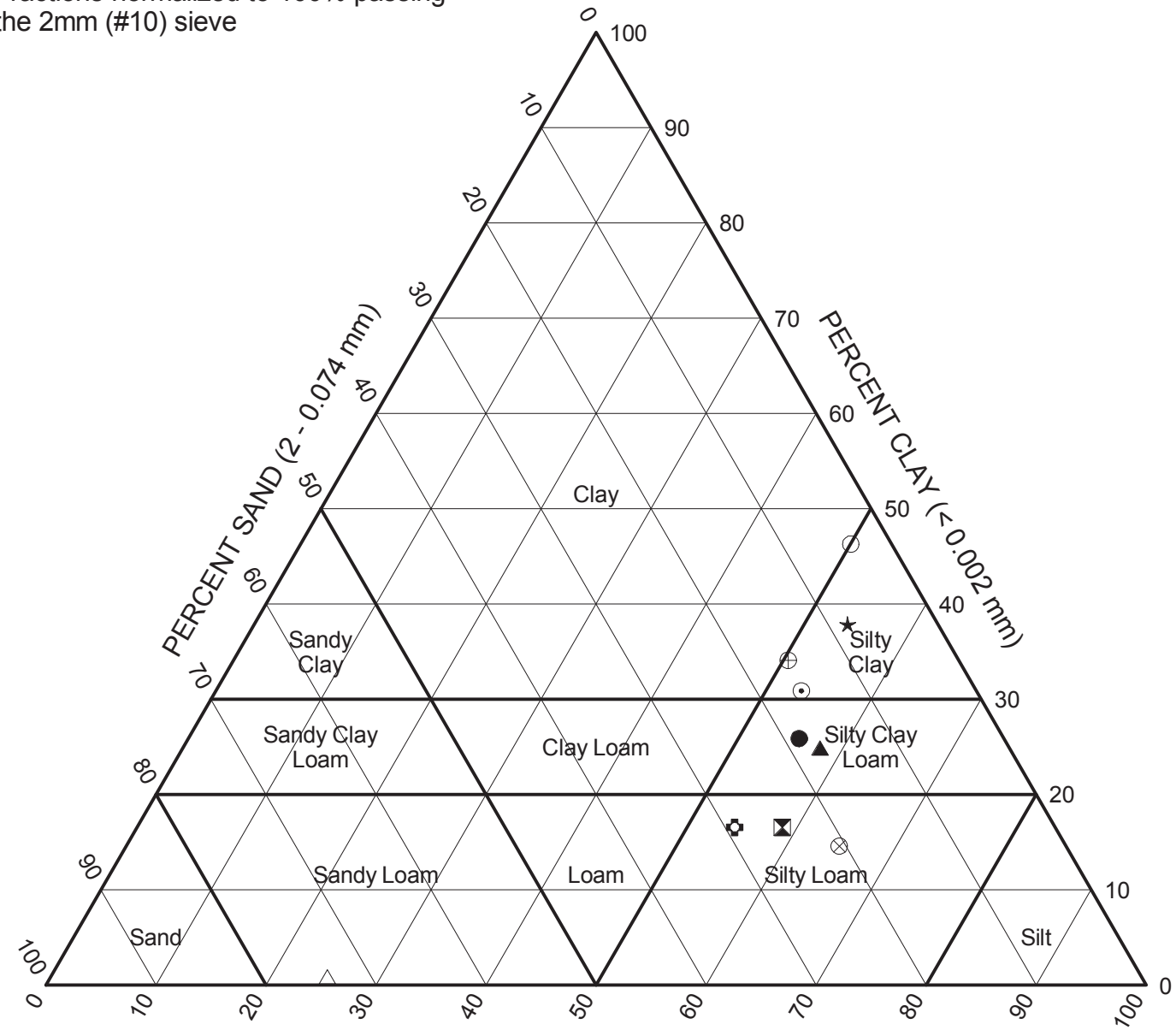
Number: 1100-04-01

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



	Sample	Depth (ft)	Sand (%)	Silt (%)	Clay (%)	Classification		
						IL DOT	AASHTO	ASTM
●	1087-B-01#8	18.5	18.8	55.5	25.9	Silty Clay Loam	A-6 (9)	CL
⧓	1087-B-01#18	58.5	24.8	58.6	16.6	Silty Loam	A-4 (4)	CL
▲	1087-B-01#19	63.5	17.1	57.9	24.9	Silty Clay Loam	A-6 (9)	CL
★	1087-B-01#20	68.5	8.2	53.9	37.9	Silty Clay	A-6 (17)	CL
⊙	1087-B-02#5	11.0	15.9	53.2	30.9	Silty Clay	A-6 (11)	CL
✿	1087-B-02#15	43.5	29.1	54.3	16.6	Silty Loam	A-6 (5)	CL
○	1087-B-02#17	53.5	3.8	50.0	46.3	Silty Clay	A-6 (24)	CL
△	1087-B-02#18	58.5	74.0	25.1	0.9	Sandy Loam	A-2-4 (0)	SM
⊗	1087-B-02#20	68.5	20.6	64.8	14.6	Silty Loam	A-4 (5)	CL
⊕	10-RWB-01#12	28.5	15.4	50.4	34.1	Silty Clay	A-6 (12)	CL

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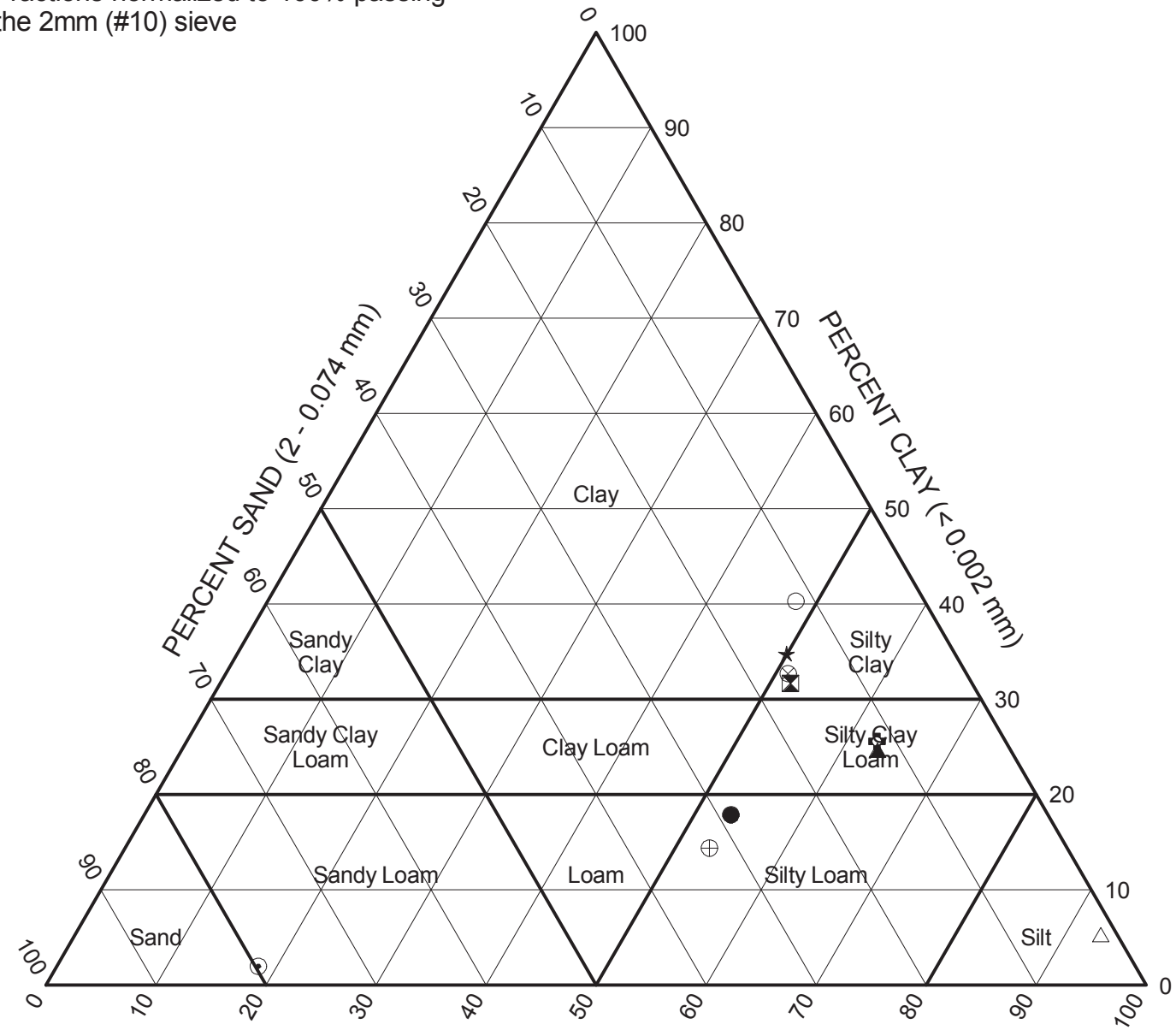
IDH Textural Classification Chart

Project: Circle Interchange Reconstruction

Location: Section 17, T39N, R14E of 3rd PM

Number: 1100-04-01

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



	Sample	Depth (ft)	Sand (%)	Silt (%)	Clay (%)	Classification		
						IL DOT	AASHTO	ASTM
●	10-RWB-02#18	58.5	**28.8**	**53.3**	**17.9**	**Silty Loam**	**A-4 (3)**	**CL**
⊠	13-RWB-01#12	28.5	**16.5**	**51.8**	**31.7**	**Silty Clay**	**A-6 (15)**	**CL**
▲	13-RWB-01#22	78.5	**12.1**	**63.2**	**24.7**	**Silty Clay Loam**	**A-6 (11)**	**CL**
★	15-RWB-01#15	43.5	**15.2**	**49.9**	**34.8**	**Clay**	**A-6 (12)**	**CL**
⊙	15-RWB-01#20	68.5	**79.7**	**18.3**	**2.0**	**Sandy Loam**	**A-2-4 (0)**	**SM**
✿	15-RWB-01#24	88.5	**11.7**	**62.7**	**25.6**	**Silty Clay Loam**	**A-4 (7)**	**CL**
○	1705-B-11#16	48.5	**11.8**	**48.0**	**40.3**	**Clay**	**A-6 (17)**	**CL**
△	1705-B-11#23	83.5	**1.5**	**93.2**	**5.3**	**Silt**	**A-4 (0)**	**ML**
⊗	1706-B-02#8	18.5	**16.3**	**51.1**	**32.7**	**Silty Clay**	**A-6 (12)**	**CL**
⊕	1714-B-02#3	6.0	**32.6**	**53.1**	**14.4**	**Silty Loam**	**A-4 (2)**	**CL**

WEI SINCE 1982

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Telephone: 630 953-9928
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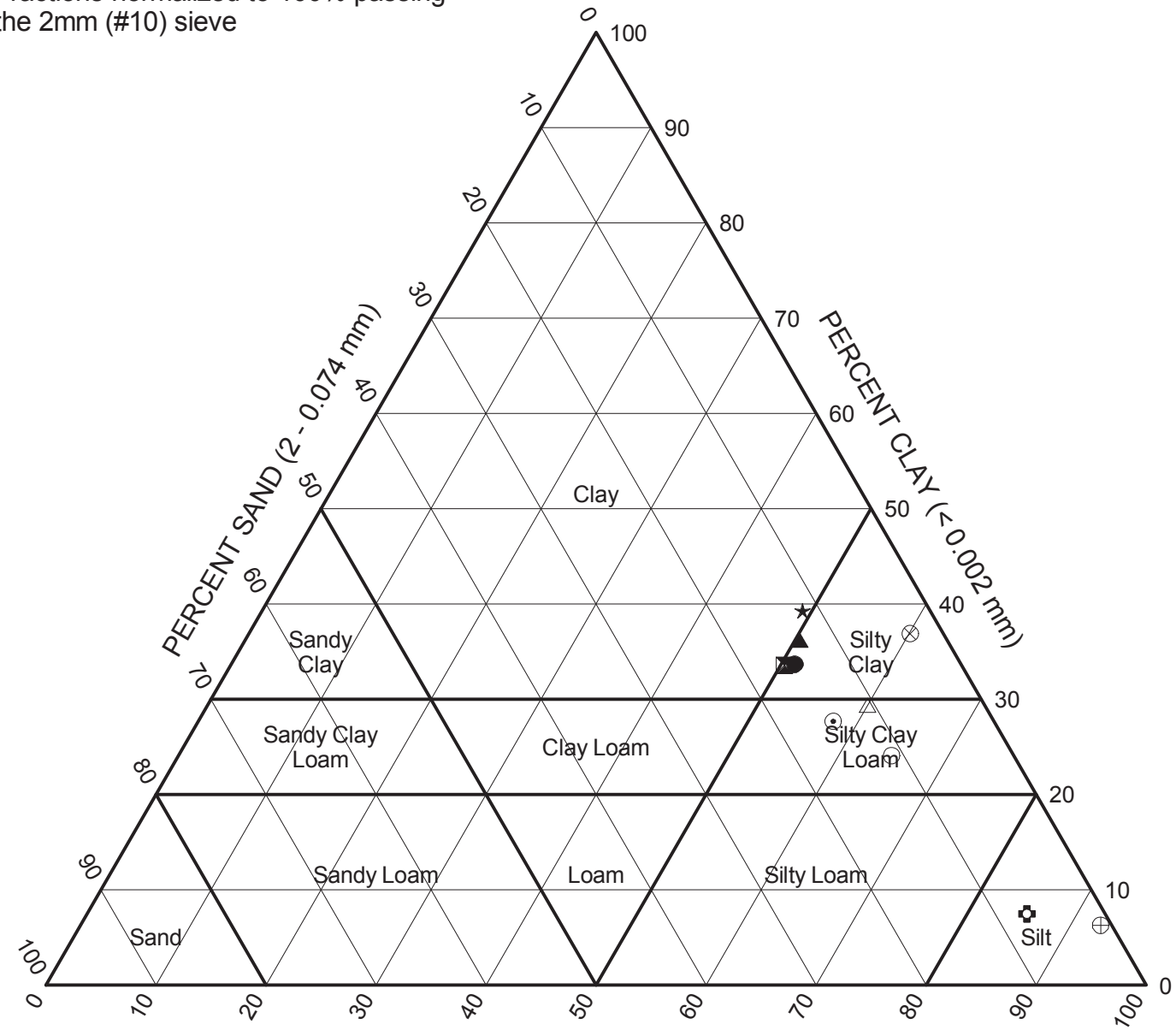
IDH Textural Classification Chart

Project: Circle Interchange Reconstruction

Location: Section 17, T39N, R14E of 3rd PM

Number: 1100-04-01

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



	Sample	Depth (ft)	Sand (%)	Silt (%)	Clay (%)	Classification		
						IL DOT	AASHTO	ASTM
●	1714-B-02#6	13.5	15.1	51.2	33.7	Silty Clay	A-6 (10)	CL
⧓	1714-B-02#12	28.5	16.2	50.3	33.6	Gravelly Silty Clay	A-6 (8)	CL
▲	1714-B-02#15	43.5	13.4	50.4	36.2	Silty Clay	A-6 (11)	CL
★	1714-B-02#18	58.5	11.5	49.1	39.3	Clay	A-6 (15)	CL
⊙	1714-B-02#20	68.5	14.6	57.7	27.7	Silty Clay Loam	A-6 (10)	CL
✿	1714-B-02#24	88.5	6.9	85.4	7.5	Silt	A-4 (0)	ML
○	1715-B-01#21	73.5	11.0	64.8	24.1	Silty Clay Loam	A-6 (10)	CL
△	1715-B-01#24	88.5	10.6	60.0	29.4	Silty Clay Loam	A-6 (9)	CL
⊗	1715-B-03#16	48.5	3.1	60.1	36.9	Silty Clay	A-6 (18)	CL
⊕	1715-B-03#23	83.5	1.1	92.7	6.3	Silt	A-4 (0)	ML

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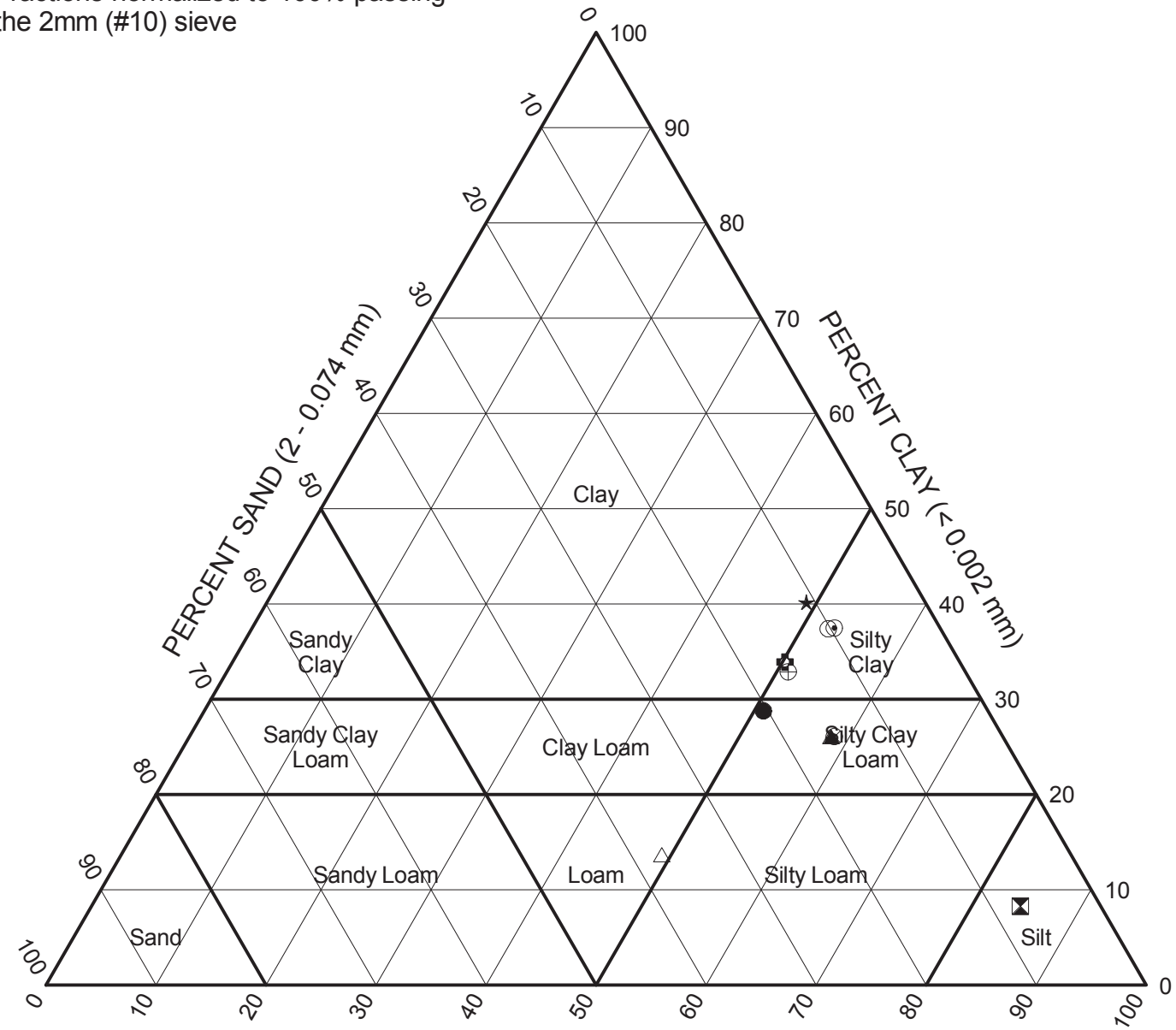

	Sample	Depth (ft)	Sand (%)	Silt (%)	Clay (%)	Classification		
						IL DOT	AASHTO	ASTM
●	1715-B-04#18	58.5	20.3	50.8	28.8	**Silty Clay Loam**	**A-6 (10)**	**CL**
⧓	1715-B-04#23	83.5	7.4	84.4	8.3	**Silt**	**A-4 (0)**	**ML**
▲	18-RWB-02#3	6.0	15.6	58.3	26.1	**Silty Clay Loam**	**A-6 (10)**	**CL**
★	18-RWB-02#12	28.5	10.8	49.0	40.2	**Clay**	**A-6 (16)**	**CL**
⊙	18-RWB-02#15	43.5	9.6	52.9	37.5	**Silty Clay**	**A-6 (15)**	**CL**
✿	2055-B-04#7	16.0	15.9	50.2	33.9	**Silty Clay**	**A-6 (15)**	**CL**
○	2055-B-04#14	38.5	10.2	52.4	37.4	**Silty Clay**	**A-6 (16)**	**CL**
△	2055-B-04#15	43.5	37.2	49.1	13.7	**Gravelly Loam**	**A-4 (2)**	**CL**
⊗	22-RWB-03#6	13.5	15.4	58.6	26.1	**Silty Clay Loam**	**A-6 (10)**	**CL**
⊕	22-RWB-03#13	33.5	16.1	51.0	32.9	**Silty Clay**	**A-6 (11)**	**CL**

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Location: Section 17, T39N, R14E of 3rd PM

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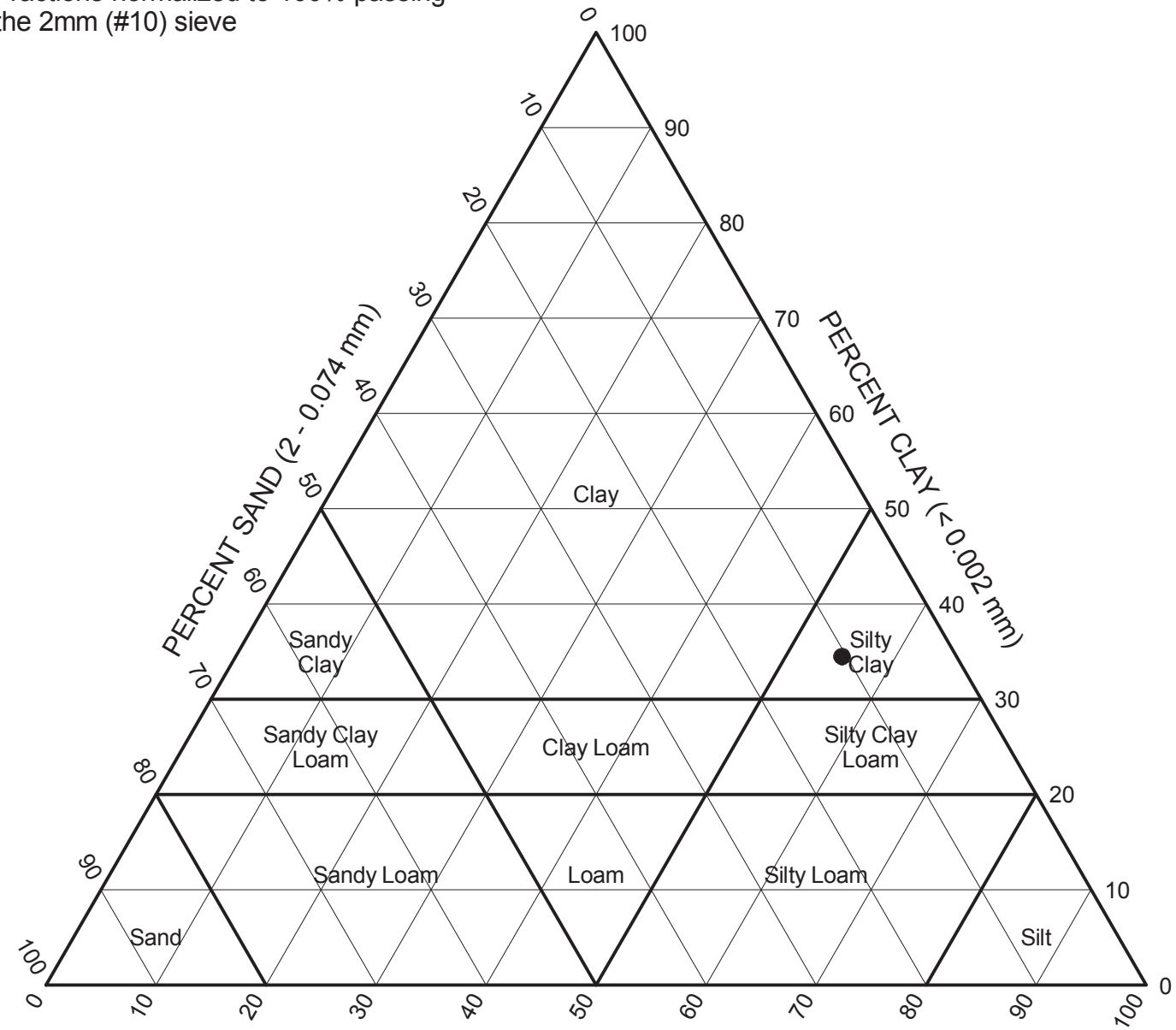
Fractions normalized to 100% passing the 2mm (#10) sieve



	Sample	Depth (ft)	Sand (%)	Silt (%)	Clay (%)	Classification		
						IL DOT	AASHTO	ASTM
●	**22-RWB-03#18**	**58.5**	**10.4**	**55.1**	**34.5**	**Silty Clay**	**A-6 (14)**	**CL**

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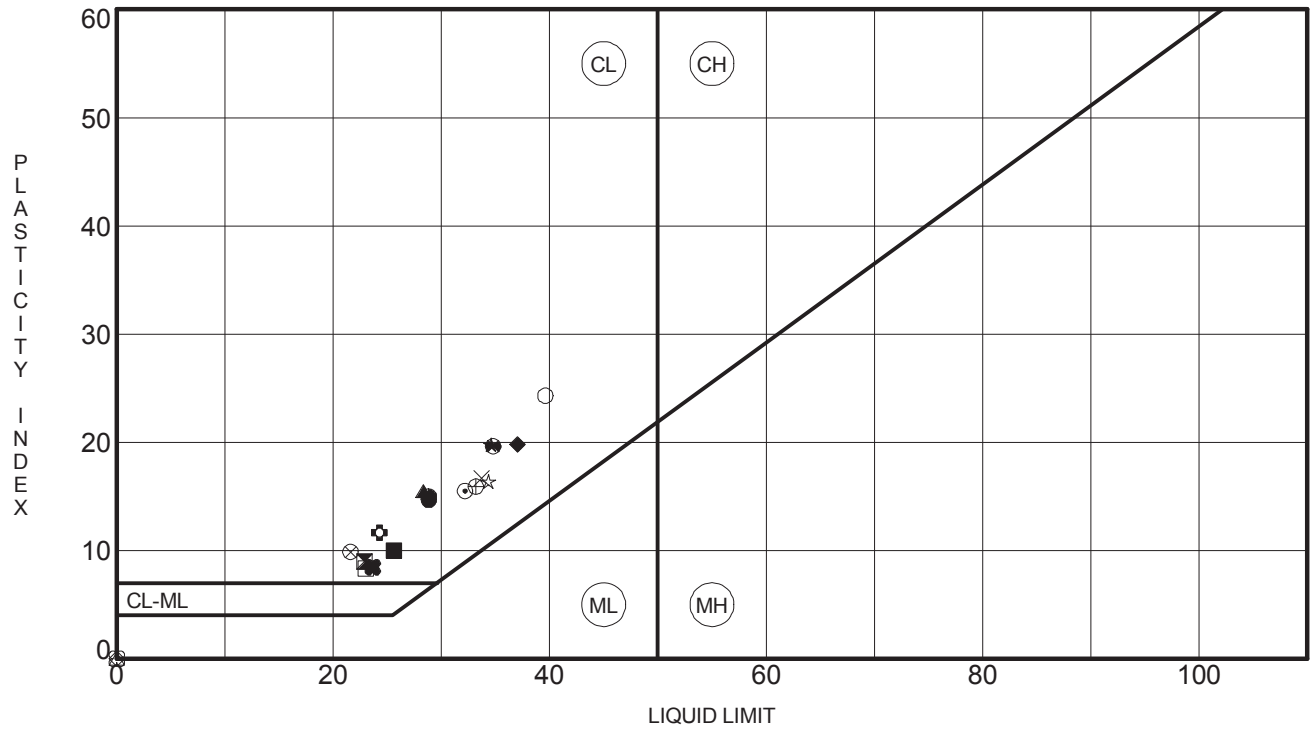

	Specimen Identification		LL	PL	PI	Fines	IDH Classification
●	1087-B-01#8	18.5 ft	29	14	15	77	Silty Clay Loam
⊠	1087-B-01#18	58.5 ft	23	14	9	72	Silty Loam
▲	1087-B-01#19	63.5 ft	28	13	15	77	Silty Clay Loam
★	1087-B-01#20	68.5 ft	35	15	20	91	Silty Clay
⊙	1087-B-02#5	11.0 ft	32	17	15	83	Silty Clay
✿	1087-B-02#15	43.5 ft	24	13	11	69	Silty Loam
○	1087-B-02#17	53.5 ft	40	15	25	96	Silty Clay
△	1087-B-02#18	58.5 ft	NP	NP	NP	27	Sandy Loam
⊗	1087-B-02#20	68.5 ft	22	12	10	76	Silty Loam
⊕	10-RWB-01#12	28.5 ft	33	17	16	82	Silty Clay
□	10-RWB-02#18	58.5 ft	23	15	8	67	Silty Loam
⊛	13-RWB-01#12	28.5 ft	35	15	20	82	Silty Clay
◔	13-RWB-01#22	78.5 ft	29	14	15	86	Silty Clay Loam
☆	15-RWB-01#15	43.5 ft	34	18	16	81	Clay
⊠	15-RWB-01#20	68.5 ft	NP	NP	NP	20	Sandy Loam
■	15-RWB-01#24	88.5 ft	26	16	10	88	Silty Clay Loam
◆	1705-B-11#16	48.5 ft	37	17	20	87	Clay
◇	1705-B-11#23	83.5 ft	NP	NP	NP	98	Silt
×	1706-B-02#8	18.5 ft	34	17	17	80	Silty Clay
✖	1714-B-02#3	6.0 ft	24	15	9	58	Silty Loam

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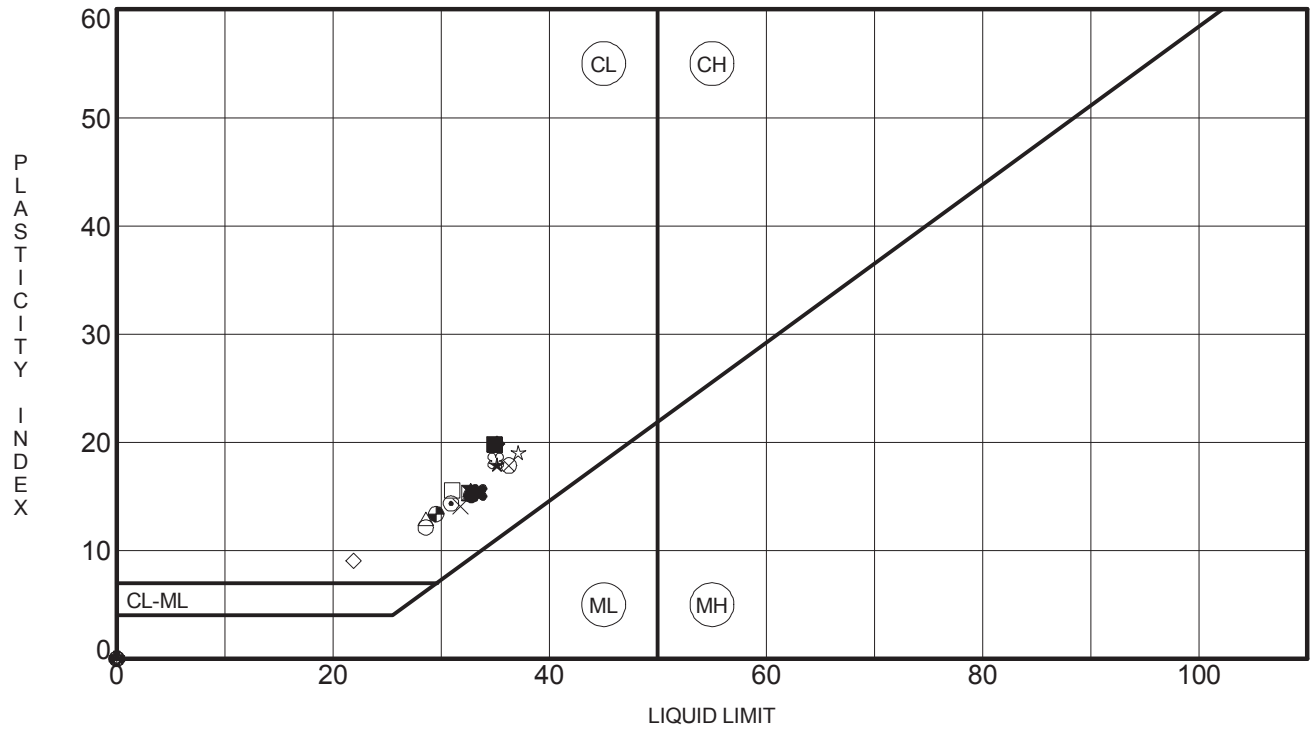
ATTERBERG LIMITS' RESULTS

Project: Circle Interchange Reconstruction

Location: Section 17, T39N, R14E of 3rd PM

Number: 1100-04-01



Specimen Identification			LL	PL	PI	Fines	IDH Classification
●	1714-B-02#6	13.5 ft	33	18	15	76	Silty Clay
⊠	1714-B-02#12	28.5 ft	33	17	16	65	Gravelly Silty Clay
▲	1714-B-02#15	43.5 ft	33	17	16	79	Silty Clay
★	1714-B-02#18	58.5 ft	35	17	18	86	Clay
⊙	1714-B-02#20	68.5 ft	31	17	14	83	Silty Clay Loam
✿	1714-B-02#24	88.5 ft	NP	NP	NP	92	Silt
○	1715-B-01#21	73.5 ft	29	16	13	88	Silty Clay Loam
△	1715-B-01#24	88.5 ft	29	16	13	85	Silty Clay Loam
⊗	1715-B-03#16	48.5 ft	36	18	18	97	Silty Clay
⊕	1715-B-03#23	83.5 ft	NP	NP	NP	99	Silt
□	1715-B-04#18	58.5 ft	31	15	16	78	Silty Clay Loam
⊛	1715-B-04#23	83.5 ft	NP	NP	NP	92	Silt
◔	18-RWB-02#3	6.0 ft	30	16	14	82	Silty Clay Loam
☆	18-RWB-02#12	28.5 ft	37	18	19	86	Clay
⊠	18-RWB-02#15	43.5 ft	35	17	18	88	Silty Clay
■	2055-B-04#7	16.0 ft	35	15	20	81	Silty Clay
◆	2055-B-04#14	38.5 ft	35	15	20	87	Silty Clay
◇	2055-B-04#15	43.5 ft	22	13	9	53	Gravelly Loam
⊠	22-RWB-03#6	13.5 ft	32	18	14	83	Silty Clay Loam
✖	22-RWB-03#13	33.5 ft	33	18	15	82	Silty Clay

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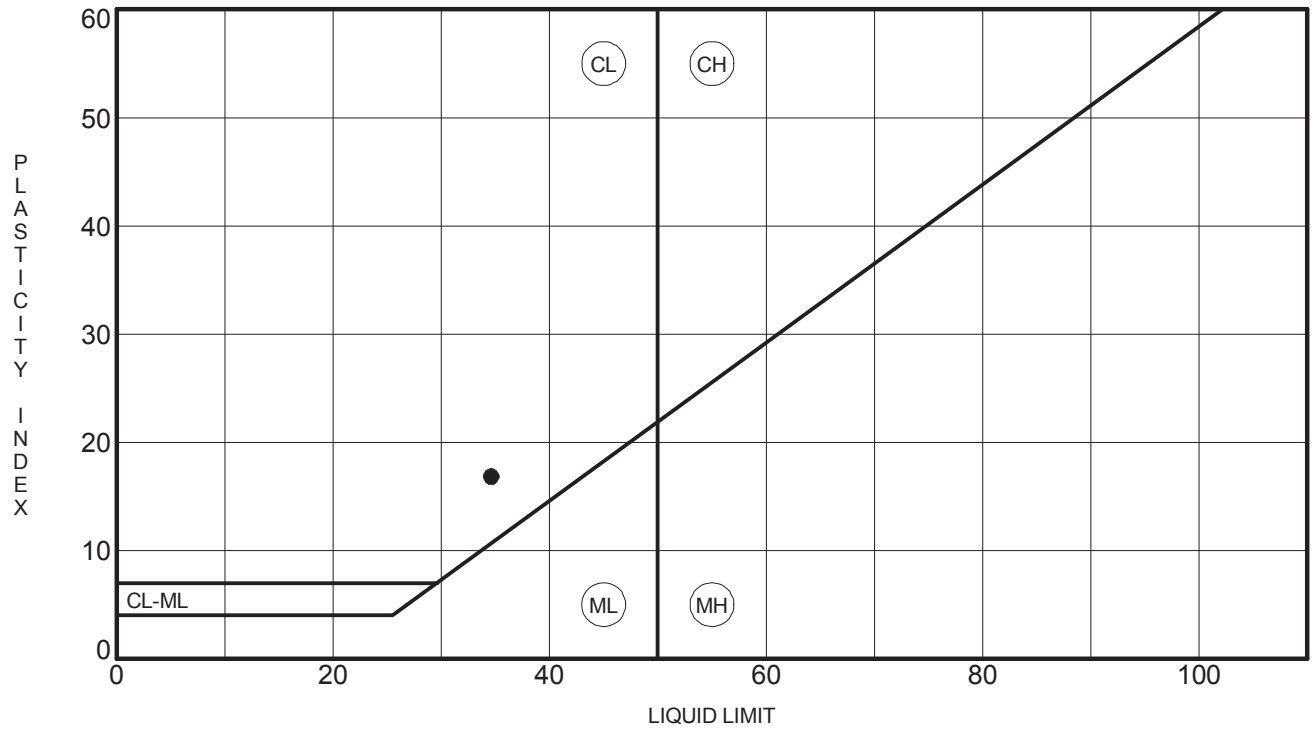
ATTERBERG LIMITS' RESULTS

Project: Circle Interchange Reconstruction

Location: Section 17, T39N, R14E of 3rd PM

Number: 1100-04-01



Specimen Identification		LL	PL	PI	Fines	IDH Classification
● 22-RWB-03#18	58.5 ft	35	18	17	88	Silty Clay

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ATTERBERG LIMITS' RESULTS

Project: Circle Interchange Reconstruction

Location: Section 17, T39N, R14E of 3rd PM

Number: 1100-04-01

APPENDIX C

Run #1

TOP

BOTTOM

0 3 6 9 12 inches

Boring 1705-B-11:

Run #1, 94' to 104', RECOVERY= 100% , RQD (top 5 ft)=70%, RQD (10ft)=82%

BEDROCK CORE: CIRCLE INTERCHANGE RECONSTRUCTION CHICAGO, IL		
SCALE : GRAPHIC	1705-B-11	DRAWN BY: B. Wilson CHECKED BY: C. Marin
Wang Engineering		1145 N. Main Street Lombard, IL 60148 www.wangeng.com
FOR AECOM		1100-04-01

0 3 6 9 12 inch

Borin 1706-B-02:
Run 1, 92' to 97', RECOVERY = 100% , RQD = 83%
Run 2, 97' to 102', RECOVERY = 97% , RQD = 92%

BEDROCK CORE: CIRCLE INTERCHANGE RECONSTRUCTION CHICAGO. IL		
SCALE : GRAPHIC	1706-B-02	DRAWN BY: M. de los Reyes CHECKED BY: C. Marin
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FOR AECOM		1100-04-01

0 3 6 9 12 inches

Boring 1714-B-02
Run #1: 98 to 108 feet
RECOVERY = 93%
RQD = 86%

BEDROCK CORE: CIRCLE INTERCHANGE RECONSTRUCTION
WB I-290 RAMP BRIDGE TO SB I-90/94, SN 016-1715, COOK COUNTY

SCALE : GRAPHIC	1714-B-02	DRAWN BY: A. Tomaras CHECKED BY: C. Marin

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FOR AECOM	1100-04-01

Run 1

0 3 6 9 12 inches

Boring 1715-PMT-01:
Run 1, 106' to 114.5', RECOVERY = 77%, RQD = 40%

BEDROCK CORE: CIRCLE INTERCHANGE RECONSTRUCTION
STRUCTURE SN 016-1714, CHICAGO, IL

SCALE : GRAPHIC	1715-PMT-01	DRAWN BY: A. Tomaras CHECKED BY: C.Marin

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FOR AECOM	1100-04-01

Boring 1715-B-05:
Run 1, 88' to 98', RECOVERY = 91%, RQD = 66%

BEDROCK CORE: CIRCLE INTERCHANGE RECONSTRUCTION
STRUCTURE SN 016-1714, CHICAGO, IL

SCALE : GRAPHIC	1715-B-05	DRAWN BY: A. Tomaras CHECKED BY: C.Marin

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FOR AECOM	1100-04-01

Boring 1087-B-02:
Run #1, 89' to 99', RECOVERY = 100%, RQD = 84%

0 3 6 9 12 inch

BEDROCK CORE: CIRCLE INTERCHANGE RECONSTRUCTION
HARRISON STREET BRIDGE OVER SB I-90/94, SN 016-1087, CHICAGO

SCALE : GRAPHIC	1087-B-02	DRAWN BY: D. Kolpacki CHECKED BY: C. Marin

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FOR AECOM | 1100-04-01

0 3 6 9 12 inches

Boring 2055-B-04
Run #1: 97 to 107 feet
RECOVERY = 95%
RQD = 53%

BEDROCK CORE: CIRCLE INTERCHANGE RECONSTRUCTION
WB I-290 RAMP BRIDGE TO SB I-90/94, SN 016-1715, COOK COUNTY

SCALE : GRAPHIC	2055-B-04	DRAWN BY: A. Tomaras CHECKED BY: C. Marin

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FOR AECOM	1100-04-01

0 3 6 9 12 inches

Boring 2055-B-04
Run #2: 107 to 117 feet
RECOVERY = 98%
RQD = 53%

BEDROCK CORE: CIRCLE INTERCHANGE RECONSTRUCTION
WB I-290 RAMP BRIDGE TO SB I-90/94, SN 016-1715, COOK COUNTY

SCALE : GRAPHIC	2055-B-04	DRAWN BY: A. Tomaras CHECKED BY: C. Marin

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FOR AECOM	1100-04-01

0 3 6 9 12 inches

Boring 2081-B-03
Run #1: 92 to 102 feet
RECOVERY = 100%
RQD = 72%

BEDROCK CORE: CIRCLE INTERCHANGE RECONSTRUCTION
WB I-290 RAMP BRIDGE TO SB I-90/94, SN 016-1715, COOK COUNTY

SCALE : GRAPHIC	2081-B-03	DRAWN BY: A. Tomaras CHECKED BY: C. Marin

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FOR AECOM	1100-04-01

Run #1

Boring 2081-B-05:
Run #1, 86' to 91', RECOVERY=100%, RQD=77%
Run #2 , 91' to 96', RECOVERY=100%, RQD=84%

BEDROCK CORE: CIRCLE INTERCHANGE RECONSTRUCTION HALSTED STREET BRIDGE OVER I-290 AND CTA, CHICAGO, IL		
SCALE : GRAPHIC	**2081-B-05**	DRAWN BY: R. Gorlagunta CHECKED BY: L. Iordache
Wang Engineering		1145 N. Main Street Lombard, IL 60148 www.wangeng.com
FOR AECOM		**1100-04-01**

Run #1

0 3 6 9 12 inch

Boring 10-RWB-01:
Run #1, 101.5' to 111.5', RECOVERY = 100% , RQD = 53%

BEDROCK CORE: CIRCLE INTERCHANGE RECONSTRUCTION, RETAINING WALL 10, SN 016-1729, CHICAGO. IL

SCALE : GRAPHIC	10-RWB-01	DRAWN BY: M. de los Reyes CHECKED BY: C. Marin

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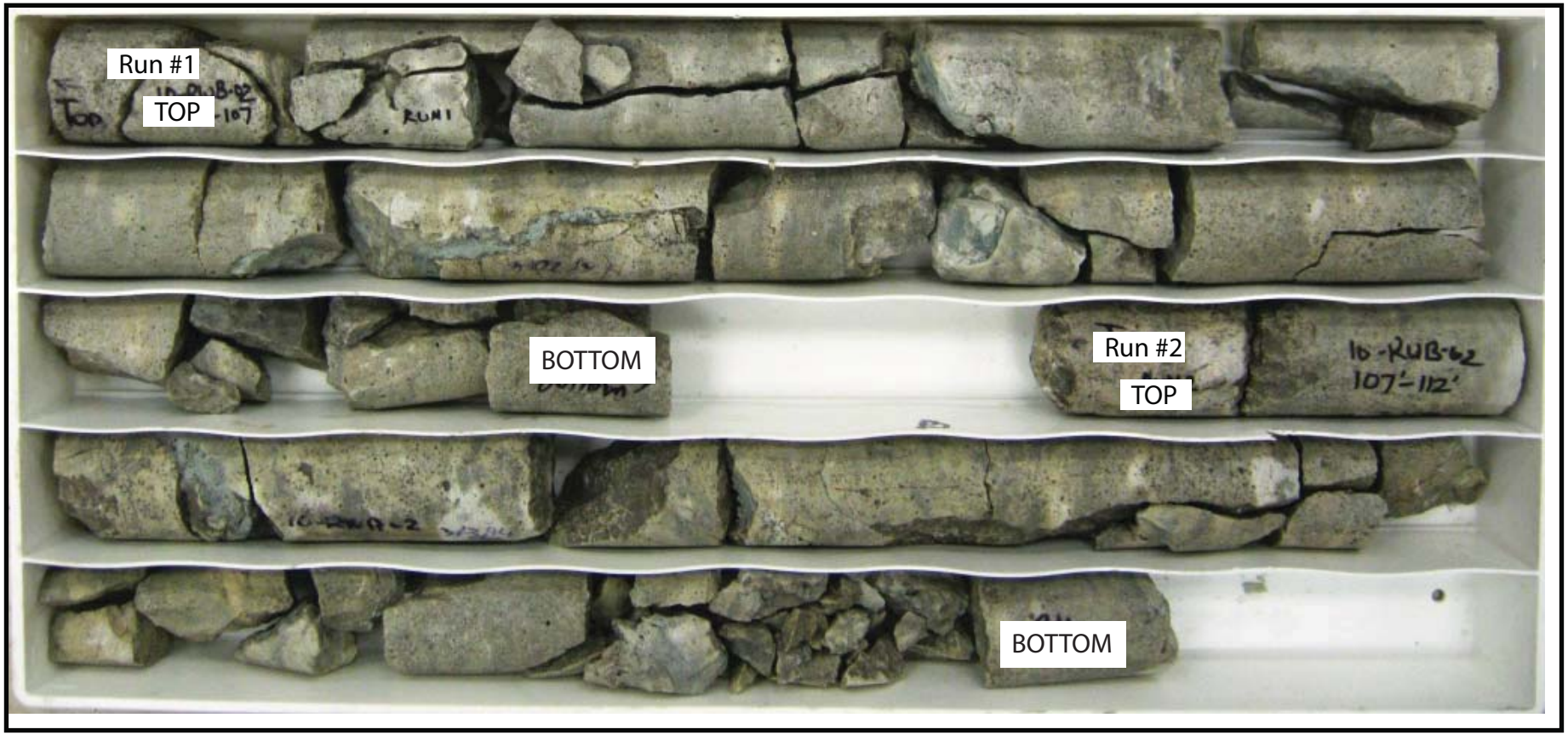
FOR AECOM	1100-04-01



0 3 6 9 12 inch

Boring 10-RWB-02:
Run #1, 102' to 107', RECOVERY = 97% , RQD = 8%
Run #2, 107' to 112', RECOVERY = 87% , RQD = 20%

BEDROCK CORE: CIRCLE INTERCHANGE RECONSTRUCTION, RETAINING WALL 10, SN 016-1729, CHICAGO. IL

SCALE : GRAPHIC	10-RWB-02	DRAWN BY: M. de los Reyes CHECKED BY: C. Marin

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FOR AECOM	1100-04-01

Boring 13-RWB-03:
Run #1, 104' to 114', RECOVERY = 100%, RQD = 66%

BEDROCK CORE: CIRCLE INTERCHANGE RECONSTRUCTION
RETAINING WALL 13 , CHICAGO. IL

SCALE : GRAPHIC	13-RWB-03	DRAWN BY: A. Tomaras CHECKED BY: C. Marin

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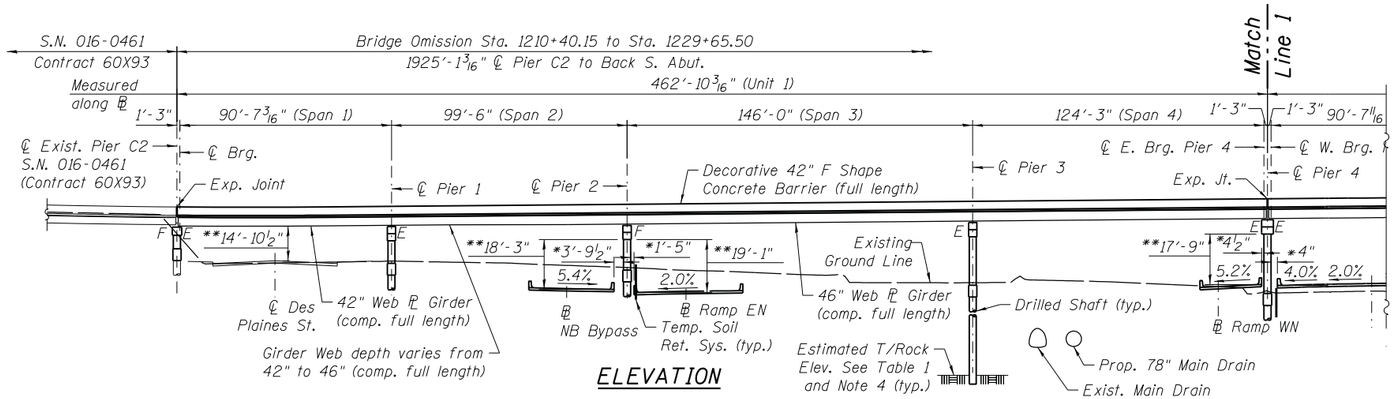
FOR AECOM	1100-04-01

APPENDIX D

Bench Mark: Square cut at center of door entrance to 707 W. Harrison St; South side of Harrison St. ±90' west of west line of Des Plaines. Elevation 597.47.
A t cut in the SE anchor bolt at the 11th street light N. of Roosevelt on the W. side of Halsted. Elev. = 594.06

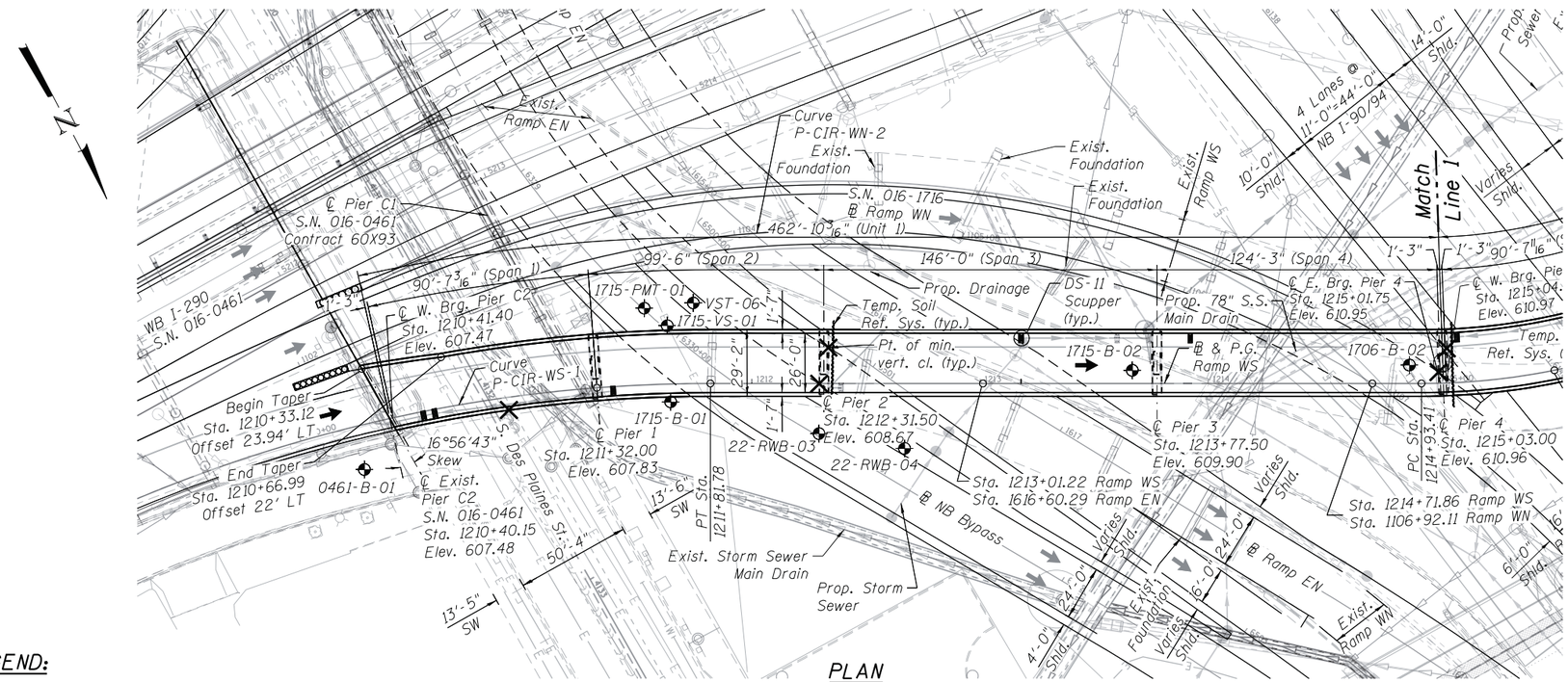
Existing Structure: S.N. 016-2450 was built in 1960 and carries WB I-290 traffic to SB I-90/94 over Ramp EN, Ramp NW, I-90/94, Ramp SE, I-290, CTA tracks & Ramp EN again. The existing twenty-span structure has an overall length of approx. 1329'-6". The existing superstructure consists of simple span wide-flange beams with 7 1/2" thick concrete deck with 1 1/2" overlay. The existing substructure consists of reinforced concrete abutment and multi-column piers. Existing substructure units are supported on caissons. Existing structure to be removed and replaced. Traffic to be detoured during construction.

No salvage.



ELEVATION

* Min. Horizontal Clearance
** Min. Vertical Clearance



PLAN

DESIGN SPECIFICATIONS

2014 AASHTO LRFD Bridge Design Specifications
7th Edition with 2015 and 2016 Interim Revisions

LOADING HL-93

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

DESIGN STRESSES

FIELD UNITS

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

SEISMIC DATA

Seismic Performance Zone (SPZ) = 1
Design Spectral Acceleration at 1.0 sec. (S_{D1}) = 0.085g
Design Spectral Acceleration at 0.2 sec. (S_{DS}) = 0.144g
Soil Site Class = D

TABLE 1

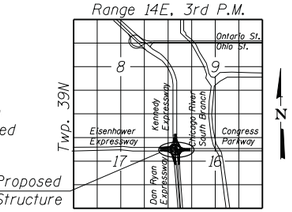
	Estimated T/Ground Elev.	Estimated T/Rock Elev.
Pier 1	588.14	485.4
Pier 2	585.34	487.6
Pier 3	578.91	488.0
Pier 4	575.45	481.5
Pier 5	574.88	483.2
Pier 6	582.79	483.2
Pier 7	590.43	480.9
Pier 8	594.59	484.5
Pier 9	581.77	486.5
Pier 10	583.24	489.4
Pier 11	583.36	490.5
Pier 12	579.24	491.1
Pier 13	576.01	489.2
Pier 14	589.26	488.8
Pier 15	588.81	492.1
Pier 16	587.16	493.0
S. Abut	585.83	493.0

DS-11 SCUPPER LOCATION

Station	Offset
1210+60	RT
1210+65	RT-SAG
1211+39	RT
1213+18	LT
1213+93	LT
1215+10	LT
1215+96	LT
1219+10	LT
1220+49	LT-SAG
1220+54	LT
1221+86	LT
1221+91	LT
1223+03	RT
1223+37	RT
1223+53	RT
1224+52	RT
1226+79	RT
1228+29	RT
1229+45	RT
1229+50	RT

NOTES:

1. All structural steel shall be metalized (thermal spraying).
2. Span lengths are measured along ℄ & P.G.L. Ramp WS.
3. All substructures are oriented 90° to ℄ Ramp WS unless noted otherwise.
4. All shaft shall be rock socketed. Depth and dia. of rock socket to be determined during final design.



LOCATION SKETCH

LEGEND:

Combined Sewer
Electric — E —
Fiber Optic — FO —
Storm Sewer
Water Line — W —
Gas Line — G —
Fire Hydrant
Light Pole
Point of Min. Vert. Clear. ×
Soil Boring Location ⊕

HIGHWAY CLASSIFICATION

	Ramp WS	SB I-90/94	NB I-90/94	EB I-290	WB I-290	Ramp WN	Ramp SE	Ramp NW	Ramp EN	Ramp ES	NB Bypass	S. Des Plaines St.	FAU Rte. 1429 (Harrison St.)
Functional Class	Interstate	Interstate	Interstate	Interstate	Interstate	Interstate	Interstate	Interstate	Interstate	Interstate	Interstate	Principal Arter.	Urban Collector
ADT (2012)	7,200	100,100	96,700	32,500	29,700	7,200	4,600	32,500	26,600	43,900	NA	5,490	16,800
ADT (2040)	8,000	98,000	81,000	33,000	31,000	9,000	5,000	36,000	31,000	43,000	17,000	N/A	17,000
ADTT (2012)	114	11,351	11,217	380	460	204	123	2,483	1,032	4,386	NA	220	336
ADTT (2040)	127	11,113	9,396	386	480	255	134	2,750	1,203	4,296	378	N/A	340
DHV (2040)	710	6,340	4,780	2,610	2,130	790	440	2,790	1,910	2,060	1,680	N/A	1,700
Design Speed	25 m.p.h.	60 m.p.h.	60 m.p.h.	50 m.p.h.	45 m.p.h.	30 m.p.h.	25 m.p.h.	35 m.p.h.	30 m.p.h.	40 m.p.h.	30 m.p.h.	30 m.p.h.	25 m.p.h.
Posted Speed	25 m.p.h.	45 m.p.h.	45 m.p.h.	45 m.p.h.	45 m.p.h.	30 m.p.h.	25 m.p.h.	35 m.p.h.	30 m.p.h.	40 m.p.h.	NA	30 m.p.h.	25 m.p.h.
Traffic Type	One-Way												Two-Way
Directional Distribution	100:0												50:50

GENERAL PLAN & ELEVATION - 1
RAMP WS OVER I-90/94/290
F.A.I. RTE. 90/94/290
SECTION 2014-013R&B-R
COOK COUNTY
STATION 1216+37.21
STRUCTURE NO. 016-1715

AECOM

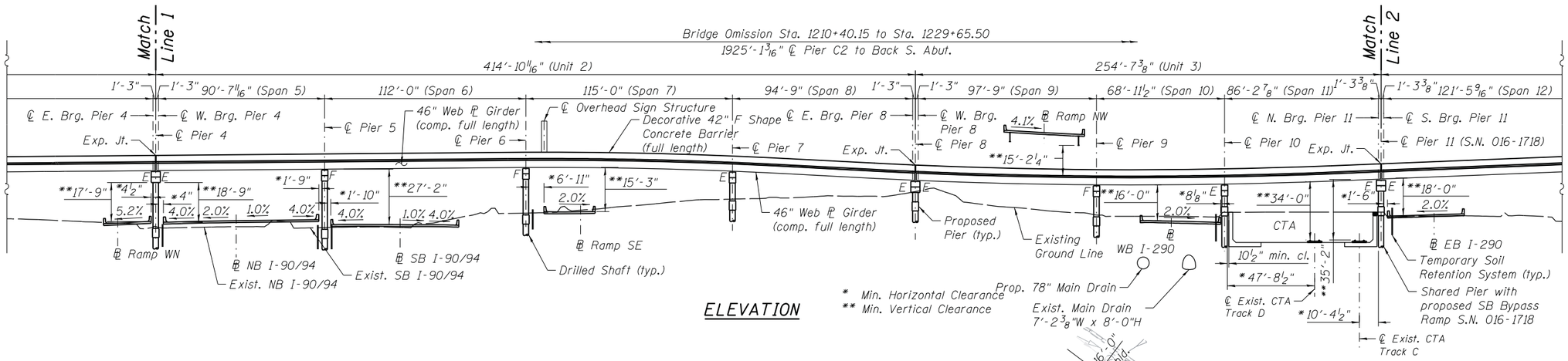
USER NAME = vasudevana	DESIGNED - JXH	REVISED	
	CHECKED - ATB	REVISED	
PLOT SCALE = N.T.S.	DRAWN - GF	REVISED	
PLOT DATE = 11/29/2017	CHECKED - 06/16/2017	REVISED	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

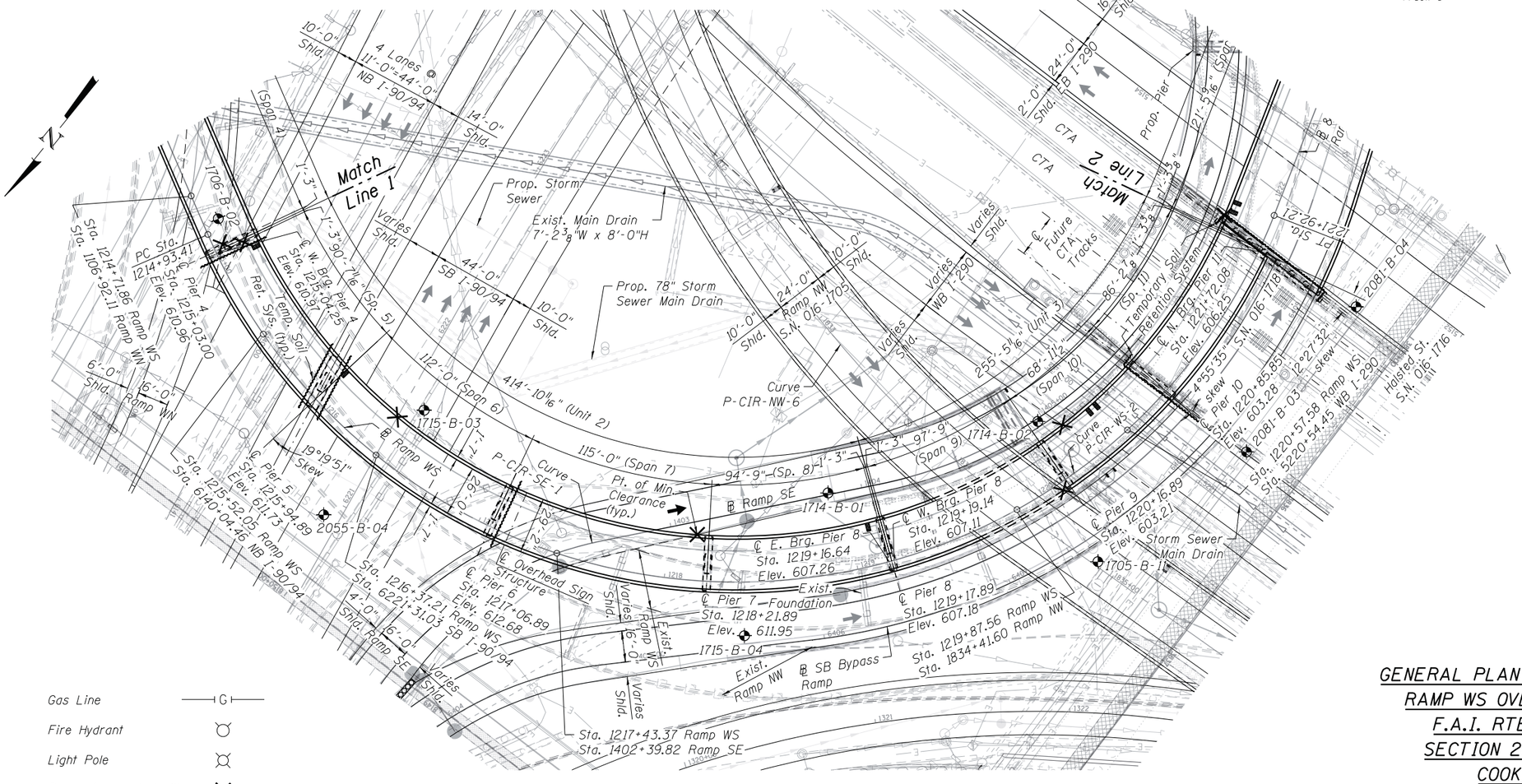
STRUCTURE NO. 016-1715
SHEET NO. 1 OF 7 SHEETS

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
90/94/290	2014-013R&B-R	COOK		
		CONTRACT NO. 60X93		
		ILLINOIS FED. AID PROJECT		

016-1715-CIRCLE100-SHT-ACM-ST-TSL-001



ELEVATION



PLAN

LEGEND:

Combined Sewer		Gas Line	—G—
Electric	—E—	Fire Hydrant	
Fiber Optic	—FO—	Light Pole	
Storm Sewer		Point of Min. Vert. Clear.	
Water Line	—W—	Soil Boring Location	

GENERAL PLAN & ELEVATION - 2
RAMP WS OVER I-90/94/290
F.A.I. RTE. 90/94/290
SECTION 2014-013R&B-R
COOK COUNTY
STATION 1216+37.21
STRUCTURE NO. 016-1715

AECOM

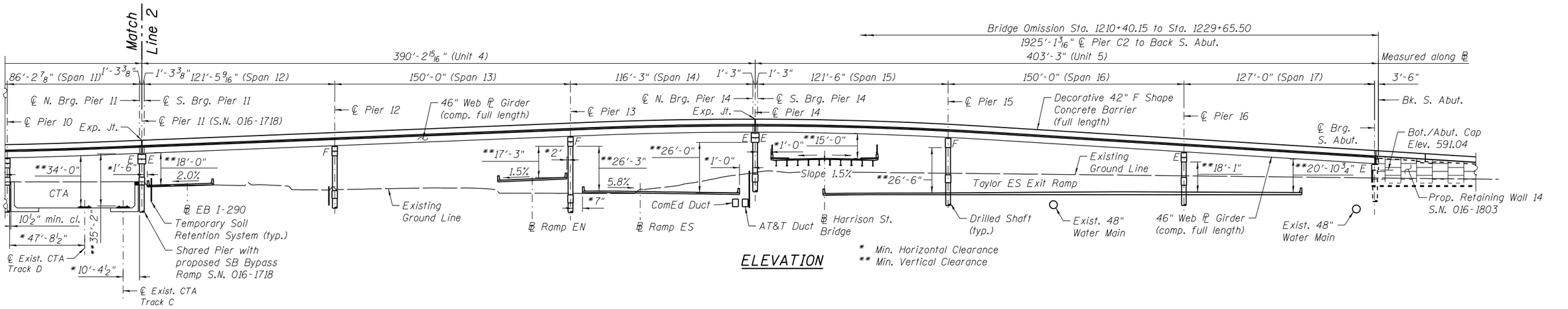
USER NAME = vasudevana	DESIGNED - JXH	REVISED	
	CHECKED - ATB	REVISED	
PLOT SCALE = N.T.S.	DRAWN - GF	REVISED	
PLOT DATE = 11/29/2017	CHECKED - 06/16/2017	REVISED	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

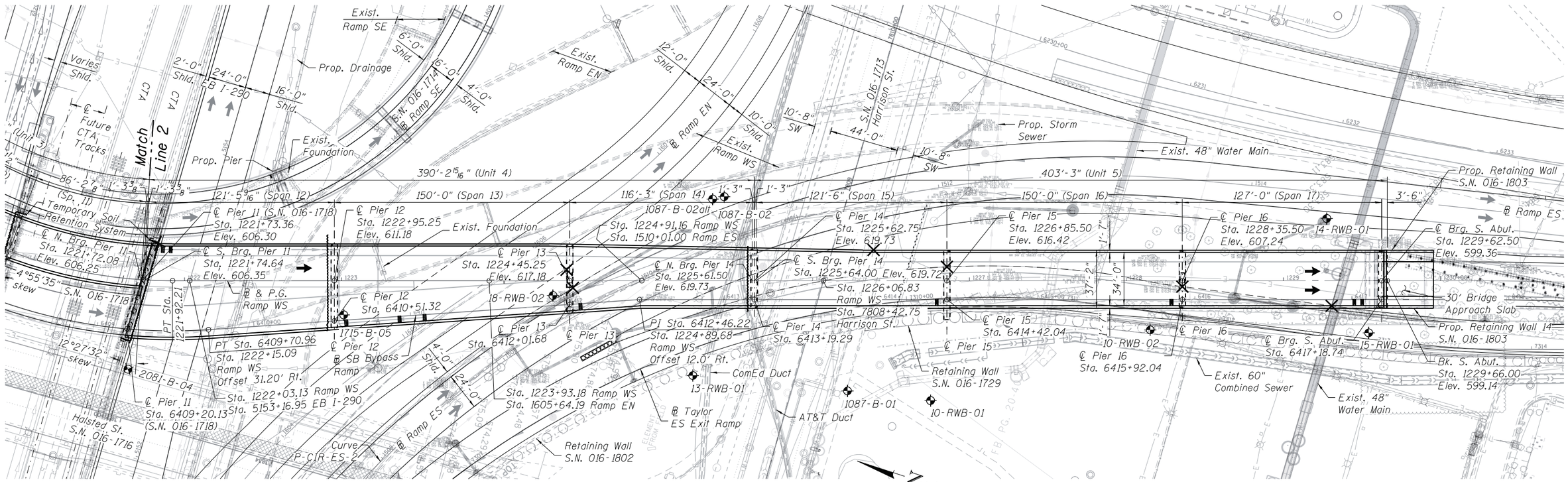
STRUCTURE NO. 016-1715
SHEET NO. 2 OF 7 SHEETS

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
90/94/290	2014-013R&B-R	COOK		
		CONTRACT NO. 60X93		
	ILLINOIS FED. AID PROJECT			

016-1715-CIRCLE100-SHT-ACM-ST-TSL-002



ELEVATION



PLAN

LEGEND:

Combined Sewer	——C——C——C——	Gas Line	——G——
Electric	——E——	Fire Hydrant	○
Fiber Optic	——FO——	Light Pole	⊗
Storm Sewer	——►——	Point of Min. Vert. Clear.	✕
Water Line	——W——	Soil Boring Location	◈

GENERAL PLAN & ELEVATION - 3
RAMP WS OVER I-90/94/290
F.A.I. RTE. 90/94/290
SECTION 2014-013R&B-R
COOK COUNTY
STATION 1216+37.21
STRUCTURE NO. 016-1715

AECOM

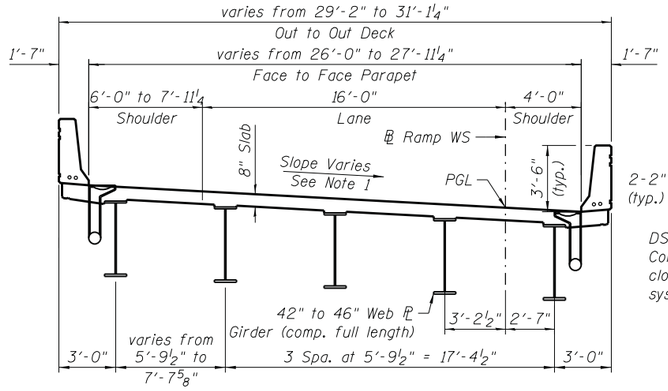
USER NAME = vasudevana	DESIGNED - JXH	REVISED	
	CHECKED - ATB	REVISED	
PLOT SCALE = N.T.S.	DRAWN - GF	REVISED	
PLOT DATE = 11/29/2017	CHECKED - 06/16/2017	REVISED	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

STRUCTURE NO. 016-1715
SHEET NO. 3 OF 7 SHEETS

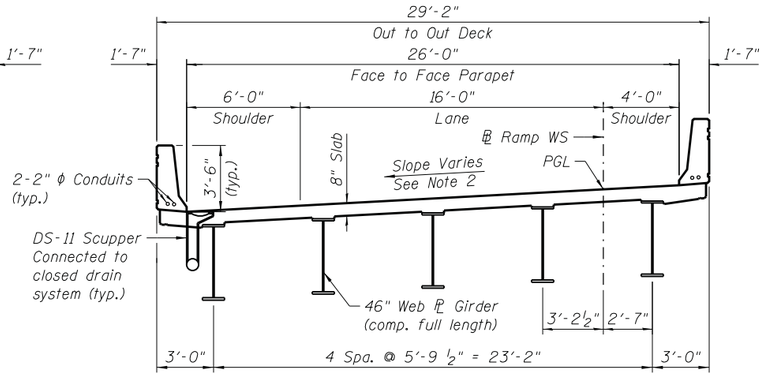
F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
90/94/290	2014-013R&B-R	COOK		
		CONTRACT NO. 60X93		
	ILLINOIS FED. AID PROJECT			

016-1715-CIRCLE100-SHT-ACM-ST-TSL-003



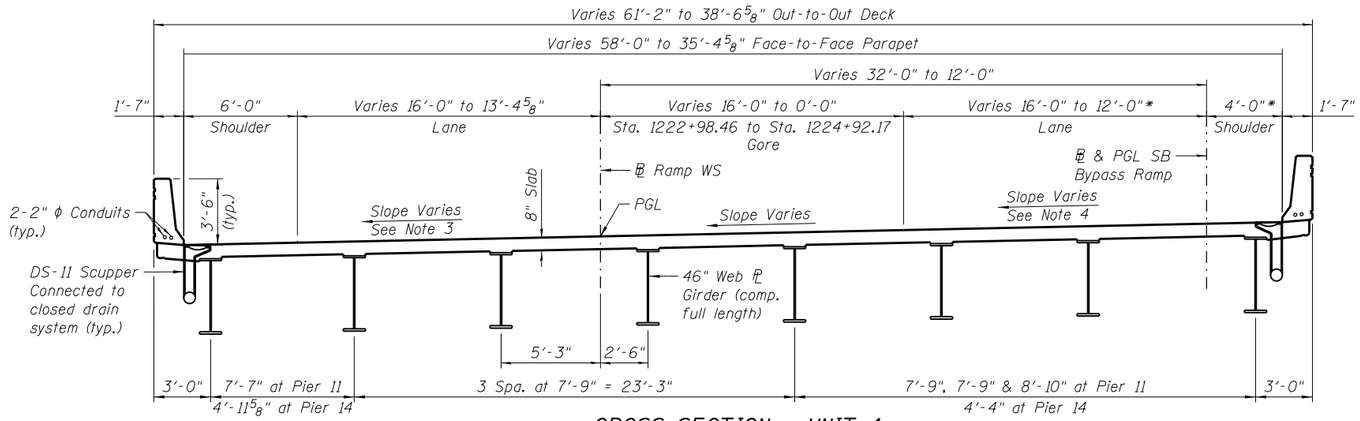
CROSS SECTION - UNIT 1

(Looking Upstation)
(Dimensions are measured radially along ℄)



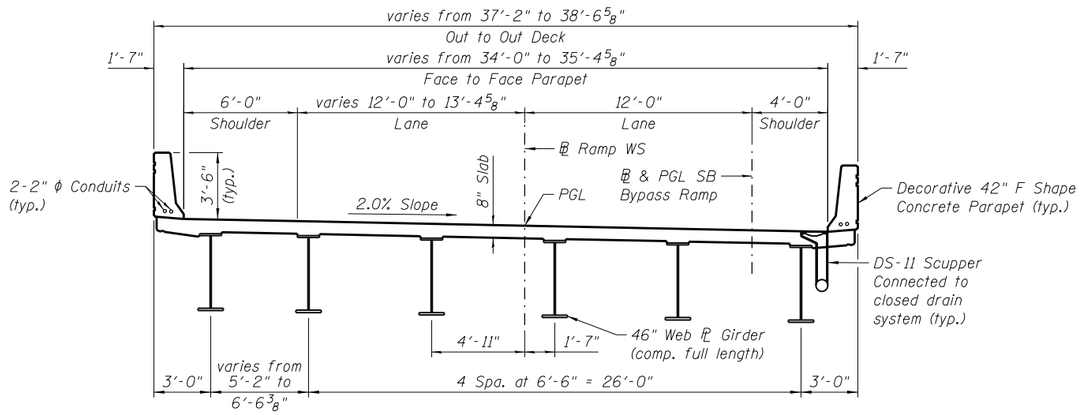
CROSS SECTION - UNITS 2 & 3

(Looking Upstation)
(Dimensions are measured radially along ℄)



CROSS SECTION - UNIT 4

(Looking Upstation)
(Dimensions are measured perpendicular to ℄ Ramp WS U.N.O.)
*Dimensions are measured perpendicular to ℄ SB Bypass Ramp



CROSS SECTION - UNIT 5

(Looking Upstation)

CROSS SLOPE NOTES:

1. (Direction of slope referenced from left edge of pavement)
   Slope transition (-5.20% to 2.00%) Sta. 1211+37.05 to Sta. 1213+23.05;
   Constant slope (2.00%) Sta. 1213+23.05 to Sta. 1214+62.51;
   Slope transition (2.00% to 5.00%) Sta. 1214+62.51 to Sta. 1215+31.51.

2. (Direction of slope referenced from left edge of pavement)
   Slope transition (2.00% to 5.00%) Sta. 1214+62.51 to Sta. 1215+31.51;
   Full S.E. (5.00%) Sta. 1215+31.51 to Sta. 1221+54.11;
   Slope transition (5.00% to -2.00%) Sta. 1221+54.11 to Sta. 1223+14.11.

3. (Direction of slope referenced from left edge of pavement)
   Slope transition (5.00% to -2.00%) Sta. 1221+54.11 to Sta. 1223+14.11;
   Constant slope (-2.00%) Sta. 1223+14.11 to Sta. 1225+62.75.

4. (Direction of slope referenced from right edge of pavement. All stations listed below are along the baseline of SB Bypass Ramp)
   Full S.E. (-5.00%) Sta. 6409+19.15 to Sta. 6409+32.86.
   Slope transition (-5.00% 2.00%) Sta. 6409+32.86 to Sta. 6410+92.86.
   Constant slope (2.00%) Sta. 6410+92.86 to Sta. 6413+19.29.

RAMP WS OVER I-90/94/290
F.A.I. RTE. 90/94/290
SECTION 2014-013R&B-R
COOK COUNTY
STATION 1216+37.21
STRUCTURE NO. 016-1715

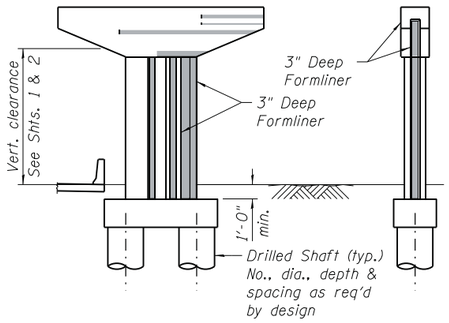
016-1715-CIRCLE100-SHT-ACM-ST-TSL-004

AECOM	USER NAME = vasudevana	DESIGNED - JXH	REVISED
		CHECKED - ATB	REVISED
	PLOT SCALE = N.T.S.	DRAWN - GF	REVISED
	PLOT DATE = 11/29/2017	CHECKED - 06/16/2017	REVISED

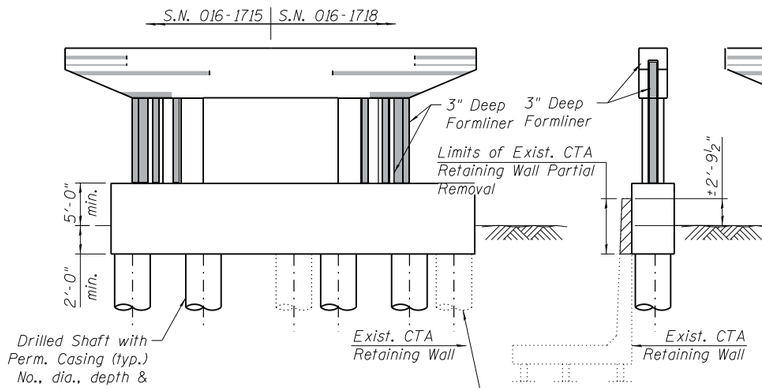
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

STRUCTURE NO. 016-1715
SHEET NO. 4 OF 7 SHEETS

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
90/94/290	2014-013R&B-R	COOK		
		CONTRACT NO. 60X93		
	ILLINOIS FED. AID PROJECT			

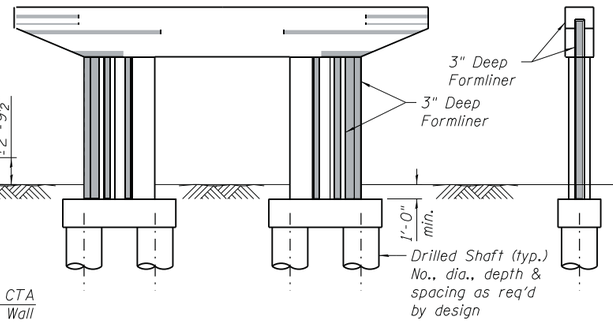


PIER 1 THRU 9 SKETCH

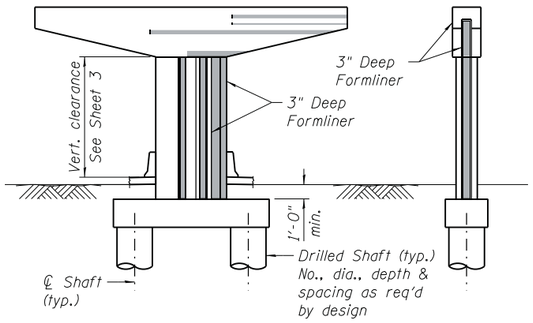


PIER 11 SKETCH

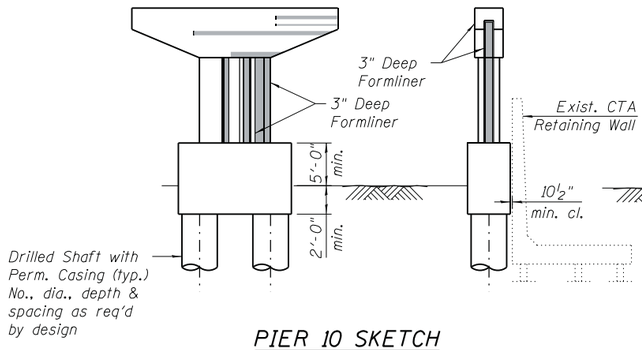
(Shared Pier with S.N. 016-1718)



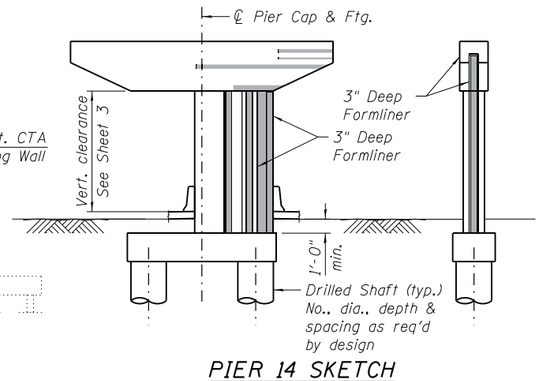
PIER 12 SKETCH



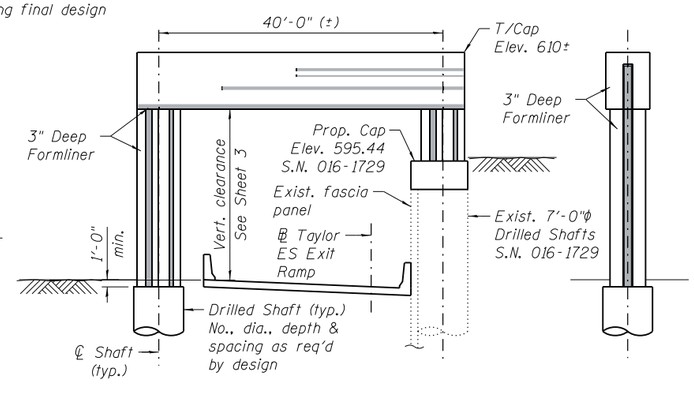
PIER 13 SKETCH



PIER 10 SKETCH

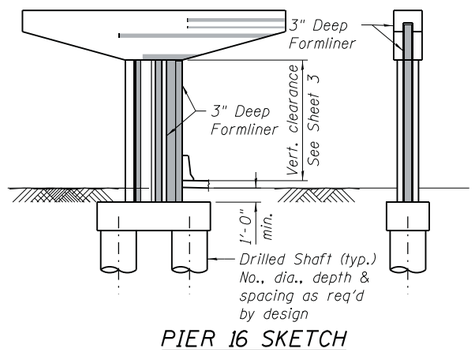


PIER 14 SKETCH

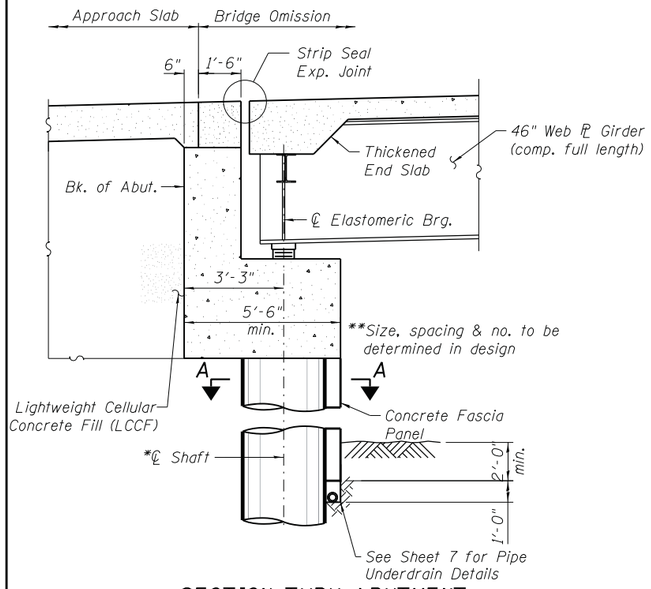


PIER 15 SKETCH

(Looking Upstation)



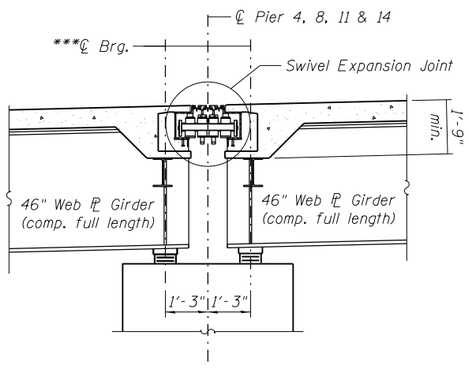
PIER 16 SKETCH



SECTION THRU ABUTMENT

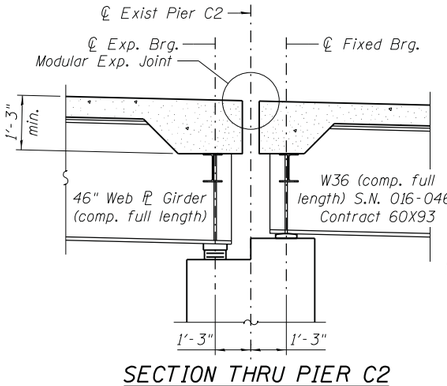
(Horiz. Dims. @ Rt. L's to ℄ Brg.)

See Sheet 7 for Section A-A



SECTION THRU EXP. PIER

(Horiz. Dims. @ Rt. L's to ℄ Pier)



SECTION THRU PIER C2

(Horiz. Dims. @ Rt. L's to ℄ Pier)

STRUCTURE DETAILS
RAMP WS OVER I-90/94/290
F.A.I. RTE. 90/94/290
SECTION 2014-013R&B-R
COOK COUNTY
STATION 1216+37.21
STRUCTURE NO. 016-1715

016-1715-CIRCLE100-SHT-ACM-ST-TSL-005

AECOM

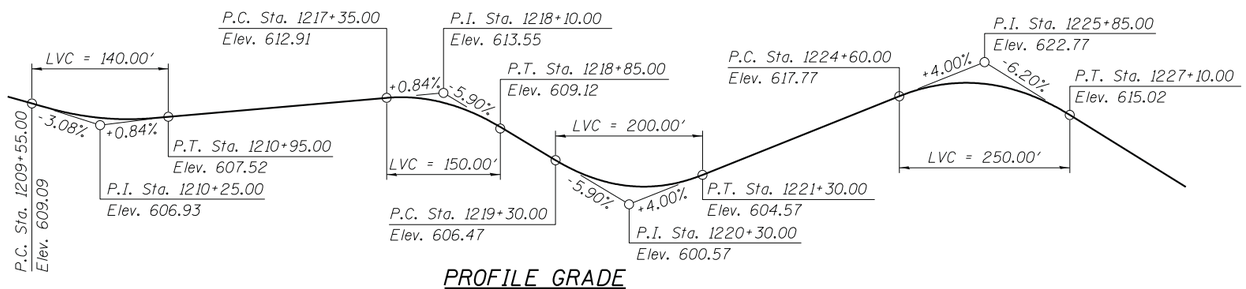
USER NAME = vasudevana	DESIGNED - JXH	REVISED
	CHECKED - ATB	REVISED
PLOT SCALE = N.T.S.	DRAWN - GF	REVISED
PLOT DATE = 11/29/2017	CHECKED - 06/16/2017	REVISED

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

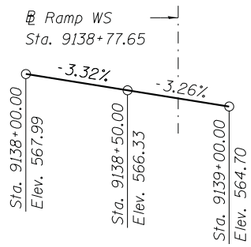
STRUCTURE NO. 016-1715

SHEET NO. 5 OF 7 SHEETS

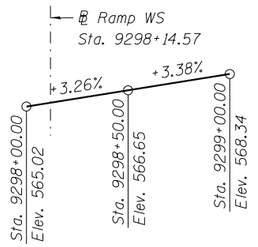
F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
90/94/290	2014-013R&B-R	COOK		
		CONTRACT NO. 60X93		
		ILLINOIS FED. AID PROJECT		



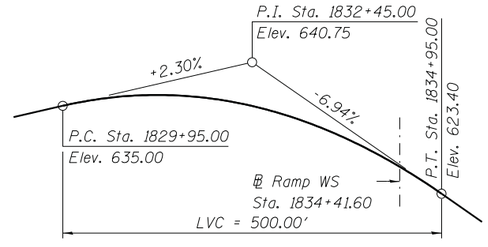
PROFILE GRADE
(along ℄ Ramp WS)



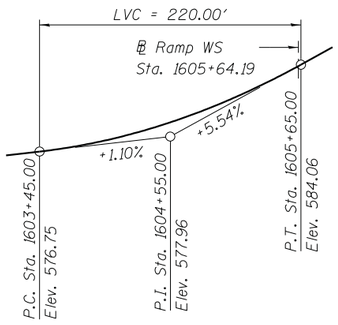
PROFILE GRADE
(along ℄ CTA Track C)



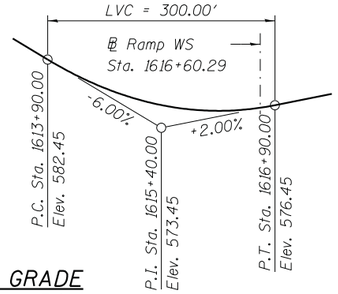
PROFILE GRADE
(along ℄ CTA Track D)

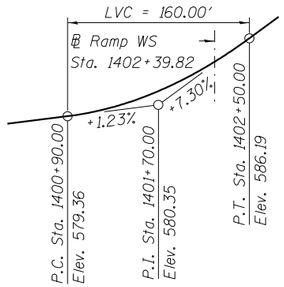


PROFILE GRADE
(along ℄ Ramp NW)

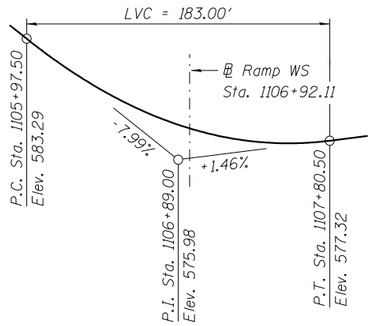


PROFILE GRADE
(along ℄ Ramp EN)

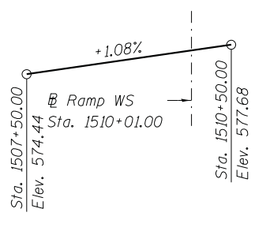




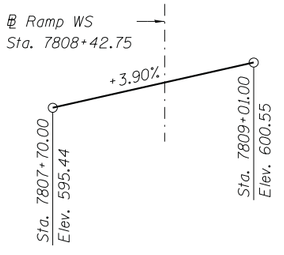
PROFILE GRADE
(along ℄ Ramp SE)



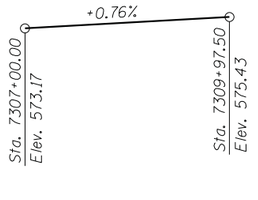
PROFILE GRADE
(along ℄ Ramp WN)



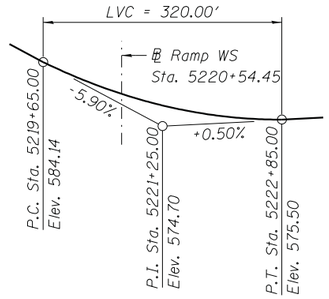
PROFILE GRADE
(along ℄ Ramp ES)



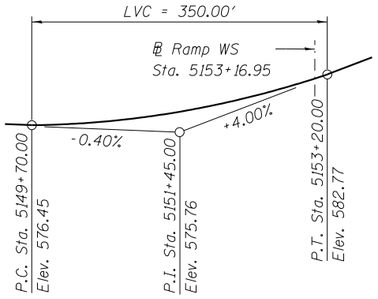
PROFILE GRADE
(along ℄ Harrison Street)



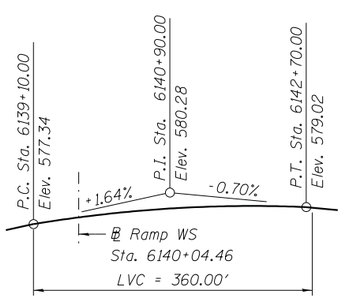
PROFILE GRADE
(along ℄ Taylor ES Exit Ramp)



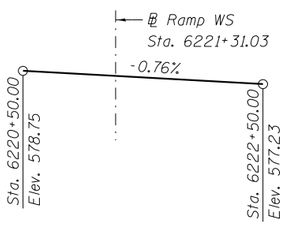
PROFILE GRADE
(along ℄ WB I-290)



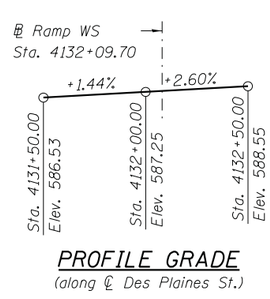
PROFILE GRADE
(along ℄ EB I-290)



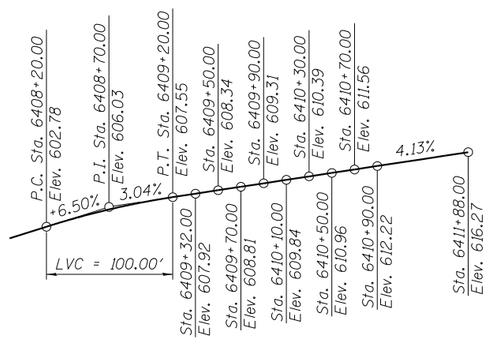
PROFILE GRADE
(along ℄ NB I-90/94)



PROFILE GRADE
(along ℄ SB I-90/94)



PROFILE GRADE
(along ℄ Des Plaines St.)



PROFILE GRADE
(Along ℄ SB Bypass Ramp)

CURVE DATA
(Ramp WS)

Curve: P-CIR-WS-1
PI Sta. = 1210+36.88
Δ = 26° 00′ 07" (Rt)
D = 8° 48′ 53"
R = 650.00′
T = 150.08′
L = 294.98′
E = 17.10′
e = 5.20%
T.R. = 52′
S.E. Run = 134′
P.C. Sta. = 1208+86.80
P.T. Sta. = 1211+81.78
DS = 35

Curve: P-CIR-WS-2
PI Sta. = 1222+12.72
Δ = 135° 15′ 55" (Lt)
D = 19° 21′ 24"
R = 296.00′
T = 719.31′
L = 698.80′
E = 481.83′
e = 5.00%
T.R. = 46′
S.E. Run = 114′
P.C. Sta. = 1214+93.41
P.T. Sta. = 1221+92.21
DS = 25

CURVE DATA
(Ramp WN)

Curve: P-CIR-WN-2
PI Sta. = 1105+88.67
Δ = 69° 00′ 44" (RT)
D = 12° 43′ 57"
R = 450.00′
T = 309.35′
L = 542.02′
E = 96.07′
e = 5.20%
T.R. = NA
S.E. Run = 46′
P.C. Sta. = 1102+79.32
P.T. Sta. = 1108+21.34
DS = 30

CURVE DATA
(Ramp SE)

Curve: P-CIR-SE-1
PI Sta. = 1401+94.82
Δ = 45° 11′ 30" (RT)
D = 30° 58′ 14"
R = 185.00′
T = 76.99′
L = 145.92′
E = 15.38′
e = 6.00%
T.R. = NA
S.E. Run = 91
P.C. Sta. = 1401+17.83
P.T. Sta. = 1402+63.75
DS = 25

CURVE DATA
(Ramp NW)

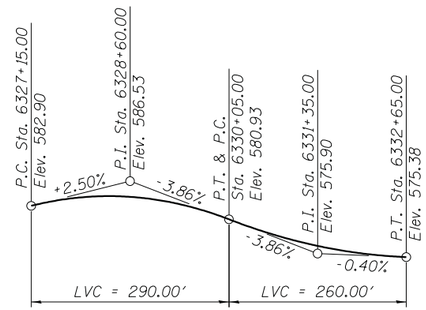
Curve: P-CIR-NW-6
PI Sta. = 1831+44.30
Δ = 88° 30′ 25" (LT)
D = 10° 36′ 37"
R = 540.00′
T = 526.11′
L = 834.16′
E = 213.92′
e = 5.40%
T.R. = 39′
S.E. Run = 105′
P.C. Sta. = 1826+18.11
P.T. Sta. = 1834+52.27
DS = 35

CURVE DATA
(Ramp ES)

Curve: P-CIR-ES-2
PI Sta. = 1510+49.08
Δ = 63° 26′ 03" (RT)
D = 8° 37′ 44"
R = 664.00′
T = 410.37′
L = 735.14′
E = 116.58′
e = 5.80%
T.R. = 41′
S.E. Run = 120′
P.C. Sta. = 1506+38.71
P.T. Sta. = 1513+73.85
DS = 40

CURVE DATA
(Taylor ES Exit Ramp)

Curve: P-TAY-ES-4
PI STA. = 7309+26.26
Δ = 44° 07′ 39" (RT)
D = 10° 13′ 53"
R = 560.00′
T = 226.98′
L = 431.30′
E = 44.25′
e = 5.80%
T.R. = NA
S.E. RUN = 150′
P.C. STA. = 7306+99.28
P.T. STA. = 7311+30.57
DS = 35



PROFILE GRADE
(along ℄ NB Bypass)

PROFILES & CURVE DATA
RAMP WS OVER I-90/94/290
F.A.I. RTE. 90/94/290
SECTION 2014-013R&B-R
COOK COUNTY
STATION 1216+37.21
STRUCTURE NO. 016-1715

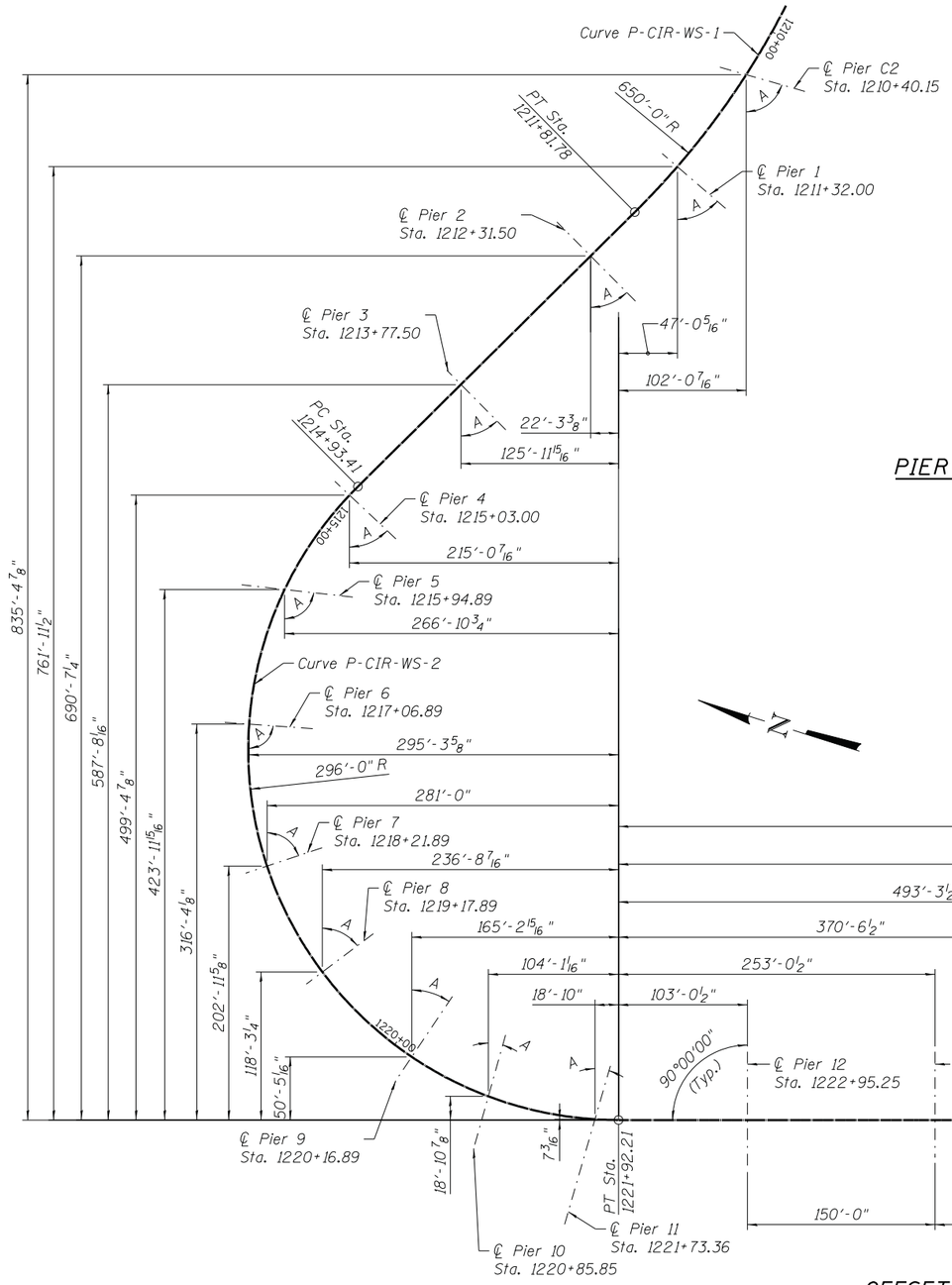
AECOM	USER NAME = vasudevana	DESIGNED - JXH	REVISED
		CHECKED - ATB	REVISED
	PLOT SCALE = N.T.S.	DRAWN - GF	REVISED
	PLOT DATE = 11/29/2017	CHECKED - 06/16/2017	REVISED

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

STRUCTURE NO. 016-1715
SHEET NO. 6 OF 7 SHEETS

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
90/94/290	2014-013R&B-R	COOK		
		CONTRACT NO. 60X93		
	ILLINOIS FED. AID PROJECT			

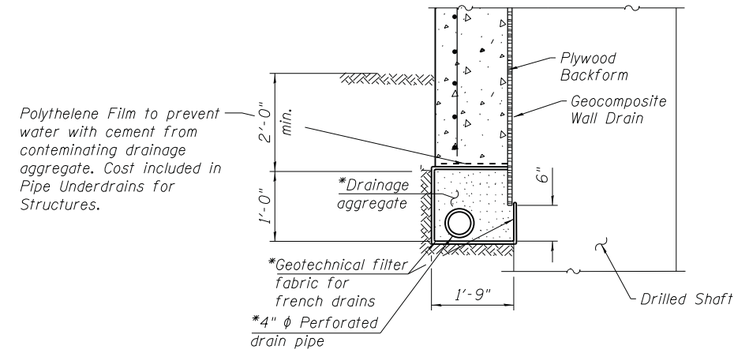
016-1715-CIRCLE100-SHT-ACM-ST-TSL-006



PIER ORIENTATION ANGLE

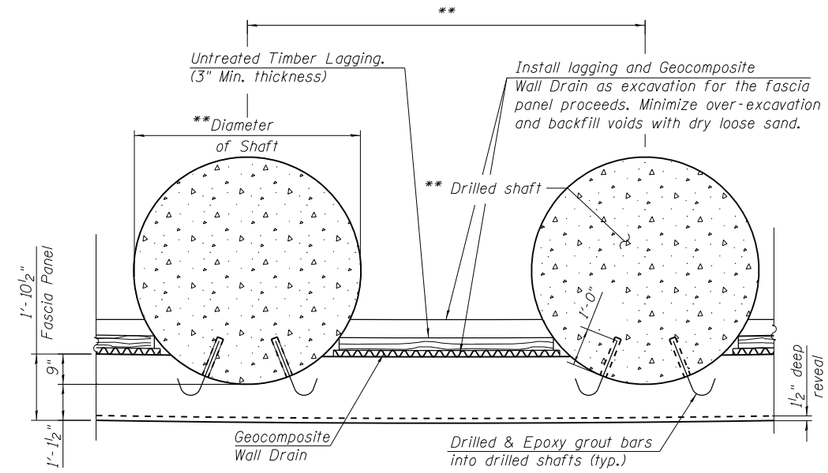
Pier	A
C2	74°09'53"
1	49°07'23"
2	44°44'05"
3	44°44'05"
4	46°35'31"
5	83°42'36"
6	86°03'33"
7	71°40'54"
8	53°05'57"
9	33°56'09"
10	15°39'42"
11	16°6'24"

OFFSET SKETCH



PIPE UNDERDRAIN DETAIL

(Between Drilled Shaft)



SECTION A-A

(Shaft Reinforcement not shown for clarity)

NOTES:

* Included in the cost of pipe Underdrains for Structures.

** Drilled shaft diameter, spacing, tip elevation and casing to be determined during final design.

OFFSET SKETCH
RAMP WS OVER I-90/94/290
F.A.I. RTE. 90/94/290
SECTION 2014-013R&B-R
COOK COUNTY
STATION 1216+37.21
STRUCTURE NO. 016-1715

016-1715-CIRCLE100-SHT-ACM-ST-TSL-007

AECOM

USER NAME = vasudevana	DESIGNED - JXH	REVISED	
	CHECKED - ATB	REVISED	
PLOT SCALE = N.T.S.	DRAWN - GF	REVISED	
PLOT DATE = 11/29/2017	CHECKED - 06/16/2017	REVISED	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

STRUCTURE NO. 016-1715
SHEET NO. 7 OF 7 SHEETS

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
90/94/290	2014-013R&B-R	COOK		
		CONTRACT NO. 60X93		
	ILLINOIS FED. AID PROJECT			