STRUCTURE GEOTECHNICAL REPORT
CIRCLE INTERCHANGE RECONSTRUCTION
SOUTHEAST RAMP BRIDGE OVER
INTERSTATES 290 AND 90/94

EXISTING SN 016-2452, PROPOSED SN 016-1714
FAI 290, SECTION 2014-013 R&B-R
IDOT D-91-227-13, PTB 163/ITEM 001
COOK COUNTY, ILLINOIS

For

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11. Abstract

The existing, fourteen-span ramp bridge over Interstates 290 and 90/94 will be removed and replaced with a new, eight-span structure with a closed abutment and multi-column piers. The bridge will have a back-to-back length of 740.8 feet and an out-to-out width of 29.2 feet.

The foundation soils consist of up to 15 feet of fill, 2.5 to 10 feet medium stiff to very stiff silty clay to silty loam crust, up to 38 feet of soft clay, and 32 to 52 feet of medium stiff to hard silty loam. Deeper foundation soils include up to 29 feet of hard silty clay or very dense silt or silty loam hardpan and very dense gravelly sand. The weathered bedrock elevations range from 484.5 to 498.6 feet and the top of sound bedrock elevations range from 481.3 to 490.9 feet. The site classifies in the Seismic Class E and is in the Seismic Performance Zone 1.

Wang understands that the profile grade along the spans will only change slightly; thus, we anticipate negligible settlements due to surcharge at the piers and suitable global stability. However, a new approach embankment and retaining wall will be constructed at north abutment where significant settlement may take place due to underlying soft clay. The new retaining wall named Wall 48 with SN 016-1835 will be discussed in a separate SGR.

The proposed abutment and piers could be supported on drilled shafts established within hardpan at elevations ranging from 504 to 512 feet with factored resistances of about 273 to 855 kips for 4- to 6-foot diameter bases. Drilled shafts could be also socketed into the bedrock at elevations ranging from 491 to 485 feet to achieve factored resistance as high as 4740 kips for a 4-foot diameter socket. Downdrag was considered for the abutment drilled shafts. Alternatively, micropiles may also be used to support the substructures.

Temporary Soil Retention System may be needed to construct the piers adjacent to the CTA tracks.

The selection of foundation type for the substructures should be based on the estimated loads and construction costs. The shafts near bedrock would likely require casing to protect against groundwater infiltration.

12. Path to archived file

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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 a new ramp bridge connecting Southbound Interstate 90/94 (SB I-90/94) to Eastbound Interstate 290 (EB I-290) within the Circle Interchange in Chicago, Cook County, Illinois. This structure is also identified as Ramp SE over I-290 and I-90/94. A *Site Location Map* is presented as Exhibit 1.

1.1 Proposed Structure

Wang Engineering, Inc. (Wang) understands AECOM envisions a new, eight-span bridge structure (SN 016-1714) supporting the interchange ramp as it flies south from the north abutment on I-90/94 and carries traffic over I-290 and I-90/94 turning east joining EB I-290. The bridge will have a back of north abutment to centerline of Pier E2 (SN 016-1704) length of 740.8 feet, with spans ranging from 67 to 128 feet in length. The out-to-out bridge width will measure 29.2 feet to accommodate a 16-foot wide lane, with 4 and 6-foot wide shoulders and barriers. The spans will be supported by 36-inch and 46-inch wide flange girders. The substructure will consist of a reinforced concrete closed abutment at the north end and multi-column piers (P1 through P7), all supported on drilled shaft foundations. The new bridge structure will connect to the existing Pier E2 on EB I-290 at the east end elevation. We estimate the north approach embankment will have retaining walls with maximum heights of 20 feet. The new retaining walls and approach embankment will be discussed in separate SGR's. The new bridge will be slightly higher and have a different alignment than the existing bridge that will be removed. The TSL dated May 8, 2017 is shown in the *Type Size Location Plan* (Appendix C).

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 existing structure (SN016-2452) is a 14-span bridge that was constructed in 1960 under FAI Route 1, Section 2424.28-B. The bridge has a total length, from back of north abutment to centerline of east pier, of 787.4 feet and an out-to-out bridge width of 29.0 feet. The spans are supported by 36-inch wide flange beams.

The substructures consist of a reinforced concrete open abutment and multi-column piers supported on drilled shaft foundations. The existing bridge will be removed and replaced by the new bridge.

2.0 SITE CONDITIONS AND GEOLOGICAL SETTING

The site is located within the City of Chicago at the I-90/94 and I-290 Circle Interchange. On the USGS *Chicago Loop 7.5 Minute Series* map, the bridge is located in the NE¼ of Section 16, Tier 39 N, Range 14 E of the Third 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 bridge is situated within the Chicago Lake Plain Physiographic Subsection. The area is characterized by a flat surface that slopes gently toward the lake, largely made of groundmoraine till covered by thin and discontinuous lacustrine silt and clay.

The bridge carrying the SB I-90/94 exit ramp to EB I-290 starts from approximate elevation of 603 feet at north abutment to elevation of 601 feet at the east end (Pier E2). The proposed ground lines are 581.37 (north abutment); 580.04 (Pier 1), 582.91 (Pier 2); 582.52 (Pier 3); 583.99 (Pier 4); 588.38 (Pier 5); 574.61 (Pier 6); and 575.10 (Pier 7).

2.2 Surficial Cover

The project area was shaped during the Wisconsinan-age glaciation, and more than 75-foot thick 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 underlain by the pebbly silty clay loam to silty loam diamicton of the Yorkville Member of the Lemont Formation, known informally as the Chicago “hardpan.”

From a geotechnical viewpoint, the Equality Formation is characterized by low strength, medium to high plasticity, and medium to high moisture content, whereas the 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 (hardpan) 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 unconformably rest over approximately 350-foot thick Silurian-age dolostone (Leetaru et al 2004). The top of bedrock may be encountered at 475 to 500 feet elevation or 75 to 100 feet below ground surface (bgs) or more. 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.

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 ranging from 90.5 to 109.0 feet bgs, corresponding to 490.9 to 481.3 feet elevation, within the range predicted based on published geological data.

3.0 METHODS OF INVESTIGATION

The following sections outline the subsurface and laboratory investigations. All elevations in this report are based on North American Vertical Datum (NAVD) 1988.

3.1 Subsurface Investigation

The subsurface investigation consisted of five structure borings designated as 1714-B-01 to 1714-B-05 along the new alignment and three nearby structure borings designated as 1705-B-07, 1705-B-10 and 2081-B-04.

The borings were drilled by Wang from the top of existing pavement or ground surface of the existing interchange from elevations of 573.3 to 593.2 feet to depths of 89 to 117 feet bgs. The as drilled boring elevations were surveyed by Dynasty Group Inc., and station and offset information for each boring were provided by AECOM. The station and offset referenced the wall alignment. Boring location data are presented in the *Boring Logs* (Appendix A). The as-drilled boring locations are shown in the *Boring Location Plan* (Exhibit 3).

A truck-mounted drilling rig, equipped with solid and 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 1714-B-02, 1714-B-04, 1714-B-05 and 1705-B-10 in 10-foot runs.

Field boring logs, prepared and maintained by a Wang engineer, include lithological descriptions, visual-manual soil/rock classifications, results of Rimac and pocket penetrometer unconfined compressive strength tests, results of Standard Penetration Tests (SPT) recorded as blows per 6 inches of penetration. The SPT N value, shown on the soil profile, is the sum of the second and third blows per 6 inches. The soils were described and classified according to Illinois Division of Highways (IDH) Textural Classification system. The field logs were finalized by an experienced engineering geologist after verifying the field visual classifications and laboratory test results. The bedrock cores in Borings 1714-B-02, 1714-B-04 and 1714-B-05 were described and measured for recovery and Rock Quality Designation (RQD). Geological Strength Index (GSI) values were also determined to represent the rock mass strength.

Wang performed vane shear tests in Boring 1705-B-10 to determine in-situ shear strength of soft/very soft silty clay. The tests were performed using an Acker Vane Shear Test kit in undisturbed and remolded conditions. The results are shown on the boring logs. The sensitivity is the ratio of shear strength in undisturbed and remolded conditions. In general, the vane shear values were significantly higher than the corresponding Rimac values. Vane shear test results were used for analyses.

Groundwater observations were made during and at the end of drilling operations. Due to safety considerations, boreholes were backfilled with grout immediately upon completion.

3.2 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. 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. Selected rock core samples were tested for unconfined compressive strength (ASTM D7012). Laboratory test results are shown in the *Boring Logs* (Appendix A) and in the *Laboratory Test Results* (Appendix B).

The soil and rock core samples will be retained in our laboratory for 60 days following this report submittal. The samples will be discarded unless a specific written request is received as to their disposition.

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

Along the proposed Ramp SE, the investigation revealed the surface to consist of dark brown loam to silty loam topsoil with thickness ranging from 2 to 15 inches; a composite pavement structure of 2 to 4 inches of asphalt overlying 8 to 12 inches of concrete overlying 6 to 12 inches of crushed stone base; or an 11 to 14 inches thick asphalt overlying 4 to 20 inches of sandy gravel base. In descending order, the general lithologic succession encountered beneath the topsoil/pavement includes

1) man-made ground (fill); 2) medium stiff to very stiff silty clay to silty loam; 3) very soft to medium stiff clay to silty clay; 4) medium stiff to hard silty clay to silty loam; 5) hard silty clay loam or very dense silt or silty loam; 6) very dense gravelly silty loam/sand, medium to very dense silt; and 7) strong dolostone bedrock.

1) Man-made ground (fill)

Underneath the topsoil or pavement, borings encountered 5.5- to 10.5-foot thick fill. The granular fill consists of medium dense sand to sandy loam with SPT N values of 11 to 17 blows per foot and moisture content (MC) values 8 to 13 %. The cohesive fill consists of very stiff to hard silty clay to clay loam with unconfined compressive strength (Qu) values of 2.62 to 6.56 with MC values of 13 to 20 %. The fill in Boring 2081-B-04 that is adjacent to the existing CTA Tracks retaining wall was about 15.5 feet thick.

2) Medium stiff to very stiff silty clay to silty loam

Below the fill, medium stiff to very stiff, gray clay "crust" approximately 2.5 to 10.0 feet thick, was encountered at depths of 1.25 to 10.50 feet bgs corresponding to 584.0 to 573.2 feet elevation. The clay layer has Q_u values ranging from 0.98 to 3.5 tsf with an average of 1.48 tsf, and MC from 16 to 24% with an average of 19%. The "crust" was not encountered in Borings 1714-B-04 and 2081-B-04.

3) Very soft to medium stiff clay to silty clay

Underneath the crust, borings encountered up to 38 feet of very soft to medium stiff, gray clay to silty clay deposits with Qu values of 0.08 to 0.98 tsf with an average of 0.36 tsf and MC values of 19 to 36% with an average of 25%. This layer is commonly known as the "Chicago Blue Clay."
Liquid (LL) and plastic (PL) limits measure 33 to 35% and 16 to 18%, respectively. The soil classifies as A-6 (9-17) under AASHTO M145.

4) Medium stiff to hard silty clay to silty loam

At elevations of 544.5 to 535.8 feet (about 32 to 52 feet bgs), borings advanced through up to 30 feet of medium stiff to hard silty clay to clay loam with layers of medium dense to very dense gravelly sand to silty loam. The clay has Qu values of 0.57 to 7.46 tsf with an average of 3.61 tsf, and MC values of 11 to 37% averaging 19%.

5) Hard silty clay loam or very dense silt or silty loam

At elevations ranging from 519.5 to 508.9 feet (about 57 to 79 feet bgs), the borings advanced through up to 29 feet of hard silty clay loam to dense to very dense silt/silty loam. The silty clay loam has Qu values of 5.33 to 10.25 tsf and MC values of 11 to 23% averaging 15% that correspond to a cohesive intermediate geomaterial (IGM) as per FHWA (2010). The silty loam has SPT N values of 60 to 81blows/foot, averaging 69 blows/foot which corresponds to cohesionless IGM material according to AASHTO (2012). This layer is commonly known as the "Chicago Hardpan." Liquid (LL) and plastic (PL) limits measures 35% and 17%, respectively, and the soil classifies as A-6 (10).

6) Very dense gravelly silty loam/sand, medium to very dense silt

At elevations of 504.9 to 492.0 feet (about 77 to 97 feet bgs) borings advanced through up to 17 feet of gray, very dense gravelly silty loam/sand, medium to very dense silt with SPT N values of 23 to greater than 100 blows/foot, and MC values of 11 to 24%. The unit rests on top of bedrock.

7) Strong dolostone bedrock

Dolostone bedrock was confirmed at 90.5 to 107.0 feet bgs in Borings 1714-B-02, 1714-B-04, 1714-B-05 and 1705-B-10 corresponding to elevations of 490.9 to 481.3 feet. Auger/bit refusal on the apparent top of bedrock was recorded at 94.0 and 109 feet bgs in Borings 1705-B-07 and 1714-B-01. The top 1 to 2 feet is considered weathered bedrock. Based on a 10-foot rock cores taken, the RQD ranges from 62 to 86% corresponding to fair to good quality rock. Dolostone bedrock was strong, light gray, fresh, thinly bedded, and slightly vuggy. Unconfined compressive strength of rock ranged from 9,480 to 11,660 psi. GSI values were determined considering the rock mass structure and surface conditions of discontinuities of rock cores taken from Borings 1714-B-02, 1714-B-04, 1714-B-05. GSI values ranged from 45 to 57 (average 51) for Boring 1714-B-02 which represents the rock mass quality for rock socketed shafts supporting the North abutment, Piers 1, and Pier 2. GSI values ranged from 35 to 45 (average 40) for Boring 1714-B-05 representing Piers 3, 4 and 5. Similarly, GSI values ranged from 40 to 50 (average 45) for Boring 1714-B-04 representing Piers 6 and 7. Bedrock core photographs are shown in Appendix A.

4.2 Groundwater Conditions

Groundwater may be perched within the water-bearing granular soils. This was observed at various levels in the saturated/wet samples of sand, silt, sandy loam and gravelly sand taken from Borings 1714-B-01 (at 516.5 and 496.2 feet), 1714-B-03 (at 510.9 feet) and 1714-B-04 (at 523.2, 518.2 and 498.2). The possibility of these layers should be accounted for during the design and construction of the foundations.

4.3 Seismic Design Considerations

Due to the fixity considerations included in the IDOT *All Geotechnical Manual Users (AGMU) 9.1* method of analysis, the seismic site class is dependent on the type of foundation chosen. A 3-foot diameter drilled shaft was assumed in the calculations. Based on the soil profile, the site is in the Seismic Site Class E in accordance with the IDOT method. The seismic design data is summarized in Table1. The project location belongs to the Seismic Performance Zone 1.

Table 1: Seismic Design Parameters

Seismic Performance Zone (SPZ) =	1
Design Spectral Acceleration at 1.0 sec. (**S_{D1}**) =	0.125g
Design Spectral Acceleration at 0.2 sec. (**S_{DS}**) **=**	0.225g
Soil Site Class =	E

5.0 FOUNDATION ANALYSIS AND RECOMMENDATIONS

Geotechnical evaluations and recommendations for the north abutment and pier structure foundations are included in the following sections. It is understood the design will be based on 2014 AASHTO LRFD Bridge Design Specification and IDOT 2012 Bridge Manual. We recommend supporting the new abutment and piers on drilled shafts. Due to noise and vibration concerns, we do not recommend the use of driven piles.

Wang understands that the profile grade along the spans will only change slightly, thus, we anticipate negligible settlements due to surcharge at the piers and suitable global stability. However, a new embankment and retaining wall will be constructed at north abutment where significant settlement may take place due to underlying soft clay. The new retaining wall named Wall 48 with SN 016-1835 will be discussed in a separate SGR. The north abutment will be supported by drilled shafts founded in hardpan or encased in bedrock. Downdrag should be considered for the drilled shafts at the north abutment.

Based on the TSL drawings, the existing bridge (SN 016-2452) abutment and piers are to be removed. The alignment of the new bridge is offset from the existing one and there should not be interference of the foundations except for Piers 1 and 2 where partial overlapping of the foundation footprints is observed. The possibility of using some of the existing drilled shafts in supporting the new pier should be considered at this location. A load test may be required to establish existing drilled shaft capacity.

5.1 Approach Embankments and Slabs

The settlement and slope stability of the north approach embankment and slab will be discussed in the SGR for retaining Wall 48 that will be produced separately for the north approach embankment.

5.2 Structure Foundations

Wang recommends supporting the north abutment and piers 1 through 7 on drilled shafts. Preliminary factored vertical and lateral loads for the north abutment and piers have been provided by TranSystems (Table 2).

Table 2: Summary of Factored Foundation Loads

Substructure ID	Maximum Vertical Load (kips)	Maximum Lateral Load (kips)
North Abutment	998	165
Pier 1	2072	263
Pier 2	2193	274
Pier 3	2200	287
Pier 4	2186	285
Pier 5	2162	276
Pier 6	2458	375
Pier 7	3248	118

5.2.1 Drilled Shafts

The foundations for the north abutment and piers could be supported on drilled shafts founded in the hard silty clay loam or very dense silty loam (hardpan) IGM (**Layer 5**) or socketed into bedrock (**Layer 7**) depending on the applied loads and lateral stability.

The borings encountered 10 feet or more of hardpan material at elevations ranging from 517.2 to 508.9 feet. We estimate that drilled shafts could be established within this material. Alternatively, the shafts should be socketed into sound bedrock that was encountered in Borings 1714-B-02, 1714-B-04, 1714-B-05 and 1705-B-10 at elevations of 490.9 to 481.3 feet. The weathered bedrock elevations range from 484.5 to 498.6 feet.

Shafts bearing on the hardpan should be designed for an end bearing resistance factor (ϕ_{stat}) of 0.55 in accordance with AASHTO (2014). The hardpan soil encountered above the bedrock has N60 values of more than 50 blows per foot and may be considered an IGM as per AASHTO (2014). We estimate the shafts will have a nominal unit base resistance of 55 ksf for the north abutment and Piers 1 through 4, and 50 ksf for Piers 5, 6, and 7, corresponding to factored unit base resistance of 30.0 and 27.5 ksf, respectively. The R_F, R_N, and estimated base elevations are summarized below in Table 3 for 4-, 5-, and 6-foot diameter shafts. We estimate the settlement of the shafts will be less than 0.5 inch. The available factored resistance for the North Abutment includes a reduction for downdrag due to greater than 0.4-inch embankment settlement expected adjacent to the abutment creating downdrag to an elevation of 547.50 feet.

Table 3: Estimated Resistances and Base Elevations for Shafts in Hardpan (IGM)

Structure Unit	Shaft Cap Base Elevations (feet)	Nominal Unit Base Resistance (ksf)	Base Diameter (feet)	Nominal Shaft Resistance, R_N (kips)	Factored Resistance Available, R_F (kips)	Total Shaft Length[1] (feet)	Estimated Shaft Base Elevation (feet)
North Abutment (1714-B-02)	593.54	55	4	691	273*	84	511.0
			5	1080	461*	84	511.0
			6	1555	695*	84	511.0
Pier 1 (1714-B-02)	572.54	55	4	691	380	63	511.0
			5	1080	594	63	511.0
			6	1555	855	63	511.0
Pier 2	575.41	55	4	691	380	66	511.0

Structure Unit	Shaft Cap Base Elevations (feet)	Nominal Unit Base Resistance (ksf)	Base Diameter (feet)	Nominal Shaft Resistance, R_N (kips)	Factored Resistance Available, R_F (kips)	Total Shaft Length¹ (feet)	Estimated Shaft Base Elevation (feet)
(2081-B-04)			5	1080	594	66	511.0
			6	1555	855	66	511.0
Pier 3 (1714-B-03)	577.52	55	4	691	380	75	504.0
			5	1080	594	75	504.0
			6	1555	855	75	504.0
Pier 4 (1714-B-03)	578.99	55	4	691	380	76	504.0
			5	1080	594	76	504.0
			6	1555	855	76	504.0
Pier 5 (1714-B-05)	583.38	50	4	628	345	73	512.0
			5	982	540	73	512.0
			6	1414	777	73	512.0
Pier 6 (1714-B-04)	569.61	50	4	628	345	63	508.0
			5	982	540	63	508.0
			6	1414	777	63	508.0
Pier 7 (1705-B-07)	570.10	50	4	628	345	65	507.0
			5	982	540	65	507.0
			6	1414	777	65	507.0

*Factored resistance available includes a reduction for downdrag at the Abutment to an elevation of 547.50 below which the settlement becomes less than 0.4-inch.

[1] The lengths shown in the table include a 1-foot shaft embedment into the abutments and piers

If the estimated bearing resistances for shafts established within the hardpan do not meet the loading criteria, the shafts may be established in rock sockets bearing upon sound bedrock. The bedrock cores show uniform, fair to good rock quality conditions, with sound, unfractured bedrock beginning about 2 feet below the top of weathered rock. We estimate the rock sockets will have diameters of 3.0 to 4.0 feet. Above the bedrock, the shafts should have diameters 6 inches larger than the sockets. Due to the possible presence of water-bearing granular materials above the bedrock, the shafts should have casings extending to the top of the rock.

We recommend designing the rock sockets based on the methods outlined in the 2014 AASHTO LRFD *Bridge Design Specifications*, that indicate the sockets should be designed for a geotechnical unit base resistance factor (ϕ_{stat}) 0.50 (AASHTO 2014). Based on this criterion, the R_F, R_N, and estimated base elevations for 3.0-, 3.5-, and 4.0- foot diameter sockets are summarized below in Table 4. We estimate the settlement of the rock sockets will be less than 0.5 inch. The available factored resistance for the North Abutment includes a reduction for downdrag due to greater than 0.4-inch embankment settlement expected adjacent to the abutment creating downdrag to Elevation 547.50.
As per IDOT (2012a), in most cases drilled shafts extending into rock should be designed utilizing only end bearing or side resistance in rock, whichever is larger. For shafts socketed into the bedrock less than 10 feet, we estimate the end bearing will give more capacity than the side resistance; thus, only the end bearing/tip resistance was considered in the calculations.

The rock mass jointing and joint conditions were evaluated based on the geologic conditions in accordance with Hoek and Marinos (2000). The GSI values were determined considering the rock mass structure and surface conditions of discontinuities of rock cores taken from Borings 1714-B-02, 1714-B-04, 1714-B-05. Borings nearest to an abutment or pier structure was assigned to represent rock conditions at that location. Boring 1714-B-02 represents the rock mass quality for rock socketed shafts supporting the North abutment, Piers 1, and Pier 2 where GSI values ranged from 45 to 57 (average 51). Boring 1714-B-05 represents Piers 3, 4 and 5 where GSI values ranged from 35 to 45 (average 40). Similarly, Boring 1714-B-04 represents Piers 6 and 7 where GSI values ranged from 40 to 50 (average 45).

Table 4: Estimated Resistances and Base Elevations for 3-foot Length Rock Socket Shafts***

Structure Unit	Shaft Cap Base Elevations (feet)	Top of Bedrock Elevation (feet)	Nominal Unit Socket Base Resistance (ksf)	Nominal Socket Resistance, R_N (kips)	Factored Resistance Available***, R_F (kips)	Total Socket Diameter (feet)	Estimated Total Shaft Length¹ (feet)
North Abutment (1714-B-02) *GSI - 51*	593.54	484.50 (actual)*	755	5330	2665	3.0	113
			755	7260	3630	3.5	113
			755	9480	4740	4.0	113
Pier 1 (1714-B-02) *GSI - 51*	572.54	484.50 (actual)*	755	5330	2665	3.0	92
			755	7260	3630	3.5	92
			755	9480	4740	4.0	92
Pier 2 (1714-B-02) *GSI - 51*	575.41	484.50 (actual)*	755	5330	2665	3.0	95
			755	7260	3630	3.5	95
			755	9480	4740	4.0	95
Pier 3 (1714-B-05) *GSI - 40*	577.52	490.90 (actual)*	550	3880	1940	3.0	91
			550	5290	2645	3.5	91
			550	6910	3455	4.0	91
Pier 4 (1714-B-05) *GSI - 40*	578.99	490.90 (actual)*	550	3880	1940	3.0	92
			550	5290	2645	3.5	92
			550	6910	3455	4.0	92
Pier 5 (1714-B-05) *GSI - 40*	583.38	490.90* (actual)*	550	3880	1940	3.0	97
			550	5290	2645	3.5	97

Structure Unit	Shaft Cap Base Elevations (feet)	Top of Bedrock Elevation (feet)	Nominal Unit Socket Base Resistance (ksf)	Nominal Socket Resistance, R_N (kips)	Factored Resistance Available***, R_F (kips)	Total Socket Diameter (feet)	Estimated Total Shaft Length[1] (feet)
			550	6910	3455	4.0	97
Pier 6 (1714-B-04) *GSI - 45*	569.61	484.90 (actual)*	720	5090	2545	3.0	89
			720	6920	3460	3.5	89
			720	9040	4520	4.0	89
Pier 7 (1714-B-04) *GSI - 45*	570.10	484.90 (actual) *	720	5090	2545	3.0	90
			720	6920	3460	3.5	90
			720	9040	4520	4.0	90

* Actual top of sound bedrock from the nearest boring with bedrock cores.

** The 3-foot rock socket starts in sound bedrock, after any weathered bedrock.

*** Unit base resistance factor (ϕ_{stat}) 0.5 was used in accordance with Table 10.5.5.2.4-1, AASHTO 2014.

[1] The lengths shown in the table include a 1-foot shaft embedment into the abutments and piers

5.2.2 Micropiles

Alternatively, micropiles may be used to support the abutment and pier foundations since they cause minimal vibrations and noise and can be installed in low headroom conditions. Micropiles should be embedded into the sound bedrock encountered at elevations ranging from 490.9 to 481.3 feet. However, the weathered bedrock elevations range from 484.5 to 498.6 feet. Micropiles will likely be the most economical micropile system. The contractor shall design, furnish, install and test micropiles in accordance with FHWA-SA-97-070 (2000), “Micropile Design and Construction Guidelines.”

5.2.3 Lateral Loading

Lateral loads on piles and 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 Table 5 and rock parameters are included in Table 6. The incremental parameters for the soft silty clay (**Layer 3**) were obtained from vane shear testing conducted in Boring 1705-B-10 along Ramp NW (SN 016-1705) adjacent to this ramp bridge.

Table 5: Recommended Soil Parameters for Lateral Load Analysis
Boring 1705-B-10

Soil Type (Layer)	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}
588.29 to 582.8 Loam	115	0	30	25	--
582.8 to 580.3 Silty Clay	120	1300	0	400	0.0090
580.3 to 567.8 Clay to Silty Clay	120	700	0	100	0.0120
567.8 to 550.3 Clay to Silty Clay	115	600	0	100	0.0130
550.3 to 545.3 Clay to Silty Clay	120	1000	0	500	0.0100
545.3 to 535.3 Clay to Silty Clay	120	2700	0	950	0.0055
535.3 to 521.5 Silty Clay	120	4400	0	1500	0.0045
521.5 to 516.5 Clay	120	1300	0	420	0.0076
516.5 to 504.0 Silty Clay Loam to Silty Loam	120	9200	0	2000	0.004
504.0 to 492.0 Silt to Silty Loam	120	0	36	250	--
492.0 to 486.5 Silt	120	0	36	250	--
486.5 to 481.3 Gravelly Sand	120	0	36	250	--

Table 6: Recommended Rock Parameters for Lateral Load Analysis
Boring 1714-B-05

Rock Type	Total Unit Weight, γ (pcf)	Young's Modulus (ksi)	Uniaxial Comp. Strength (ksi)	RQD (%)	Lateral Rock Modulus Parameter
Fair Quality DOLOSTONE	135	2,500	10.1	62	0.0005

5.3 Stage Construction Design Recommendations

The existing bridge will be closed and traffic will be detoured during construction. Stage construction will be used for maintaining traffic on the I-290 and I-90/94. The removal of the existing substructures and foundations may require temporary shoring of the surrounding soils. We estimate temporary shoring of these excavations based on the charts included in *Design Guide 3.13.1* (IDOT 2012) will not be feasible. At the abutments, if the soils cannot be sloped at a maximum grade of 1:2 (V:H), they should be supported by *Temporary Soil Retention Systems* designed by the Contractor and approved by IDOT prior to construction. New Piers 1 and 2 will be constructed adjacent to the significant grade separation between the expressway and the CTA tracks, and will require *Temporary Soil Retention Systems* at these locations.

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.

The removal of existing structures shall be in accordance with IDOT Section 501, *Removal of Existing Structures* (IDOT 2016).

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 2016). 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 2016). 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 the porous granular material conforming to the requirements specified in the IDOT Special Provision, *Granular Backfill for Structures* (IDOT 2016). Backfill material should be placed and compacted in accordance with the Special Provision. Estimated design parameters for granular structural backfill materials are presented in Table 7.

Table 7: Estimated Granular Backfill Parameters

Soil Description	Porous Granular Material Backfill
Unit Weight	125 lbs/ft^3
Angle of Effective Internal Friction	32 degrees
Active Earth Pressure Coefficient	0.31
Passive Earth Pressure Coefficient	3.26
At-Rest Earth Pressure Coefficient	0.5

Lightweight cellular concrete fill should not be allowed to adhere to the drilled shafts during construction. Therefore, a bond breaker will be needed between the lightweight fill and the drilled shafts.

6.4 Earthwork Operations

The required earthwork can be accomplished with conventional construction equipment. Moisture and traffic will cause deterioration of exposed soils. Precautions should be taken by the Contractor to prevent water erosion of the exposed soils. A compacted grade 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 installation of drilled shafts through the water-bearing sand and gravelly sand frequently occurring above the hard silty clay and/or immediately atop of bedrock may present challenges. We expect the shaft excavations will encounter groundwater in granular layer shown in borings. Casing will be necessary and/or drilling fluid at each shaft location. For shafts socketed into the underlying bedrock, casing extending to the top of bedrock elevation will be required to seal the excavation for coring. Failure to anticipate the challenges posed by the groundwater at this depth will result in caving or heaving sand and complicate bedrock coring operations. Prior to coring the bedrock, casing should be firmly seated into the top of the rock, and any drilling fluid removed to prevent caking of mud on the sides of the bedrock sockets. The shafts should be designed 6 inches larger in diameter than the proposed sockets.

In the event that permanent casing is not designed for the construction of drilled shaft socketed into bedrock, shafts structural integrity should be verified by Crosshole Sonic Logging (CSL). IDOT special provision “Crosshole Sonic Logging” dated March 9, 2010 or latest edition should be included in the specifications for inspection and testing of drilled shaft socketed into bedrock. Wang recommends providing CSL structural integrity testing for at least one drilled shaft per substructure.

It is recommended to case the shafts drilled for Piers 1 and 2 adjacent to the CTA tracks to ensure the stability of the tracks and existing walls during construction. The soft soil layer with Qu less than 0.5 tsf (500 ksf cohesion) is prone to squeeze if left open for long period of time. Therefore, to minimize the squeeze potential, casing should also be provided. Due to high squeeze potential, the following note should be provided on the final plans.

“Based on the squeeze potential of the clay soils, the use of temporary casing will be required to Elevation 540.00 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.”

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.

Exp. 11/30/2019

METIN WOLFGANG SEYHUN
062-052588

Corin T. Farez

Metin W. Seyhun, P.E.
Senior Geotechnical Engineer

Corina T. Farez, P.E., P.G.
Principal

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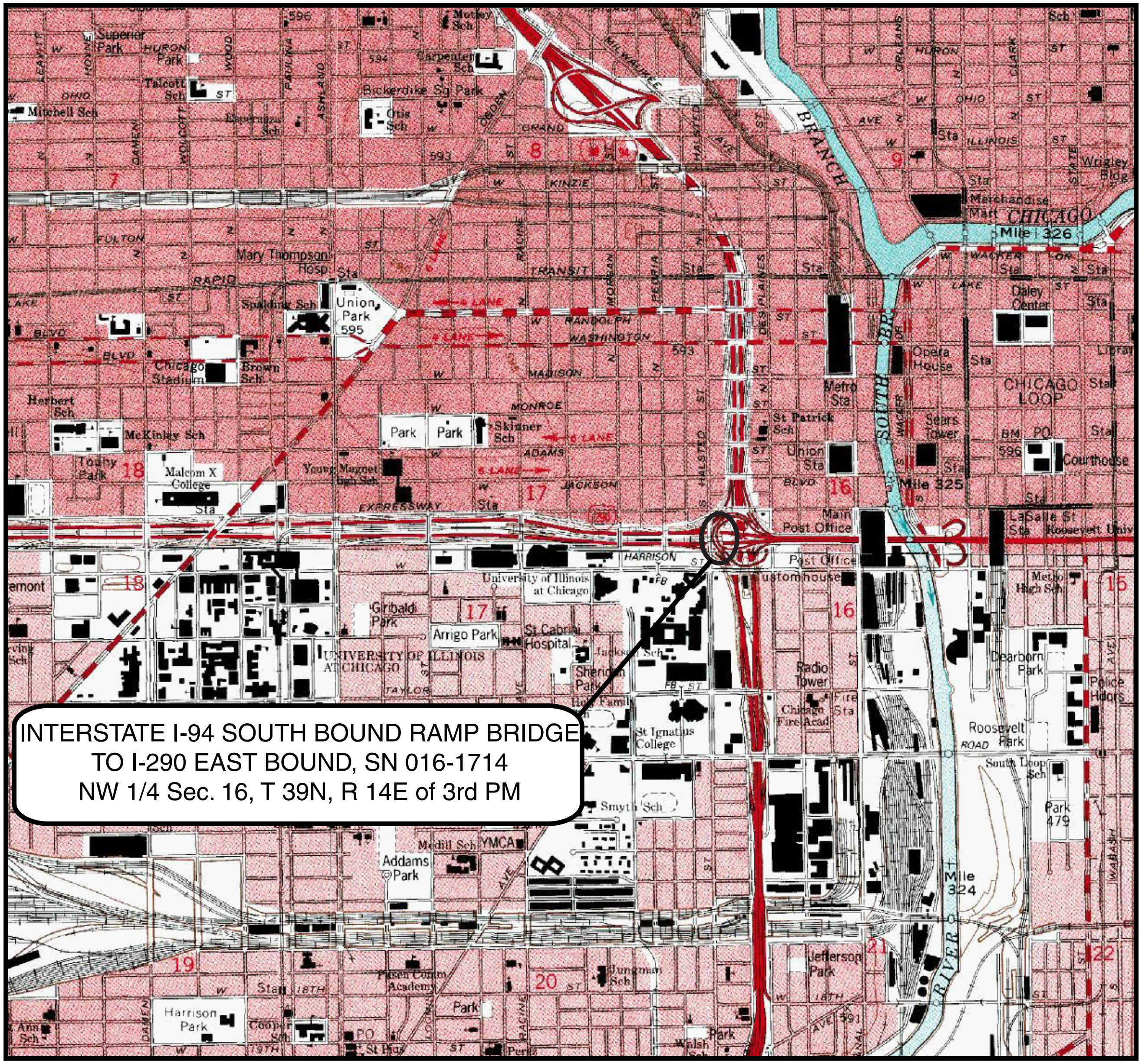
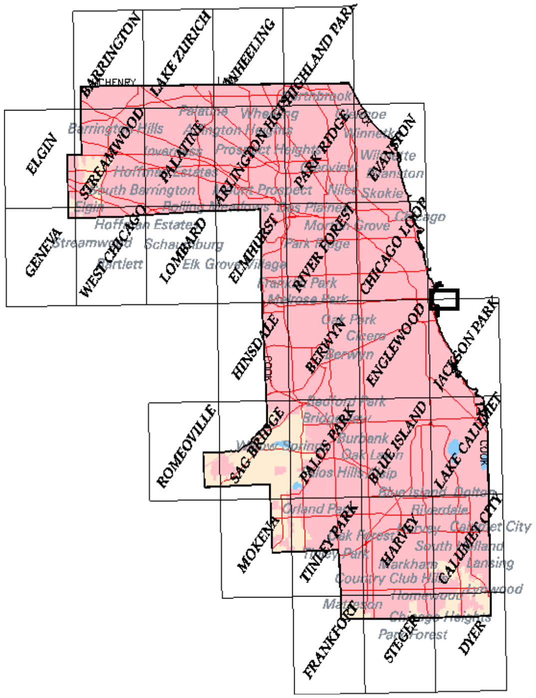
EXHIBITS



INTERSTATE I-94 SOUTH BOUND RAMP BRIDGE
TO I-290 EAST BOUND, SN 016-1714
NW 1/4 Sec. 16, T 39N, R 14E of 3rd PM

N

Illinois



Cook County

0 0.25 0.5 Mile

SITE LOCATION MAP: CIRCLE INTERCHANGE RECONSTRUCTION
I-94 SB RAMP BRIDGE TO I-290 EB, SN 016-1714, COOK COUNTY

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

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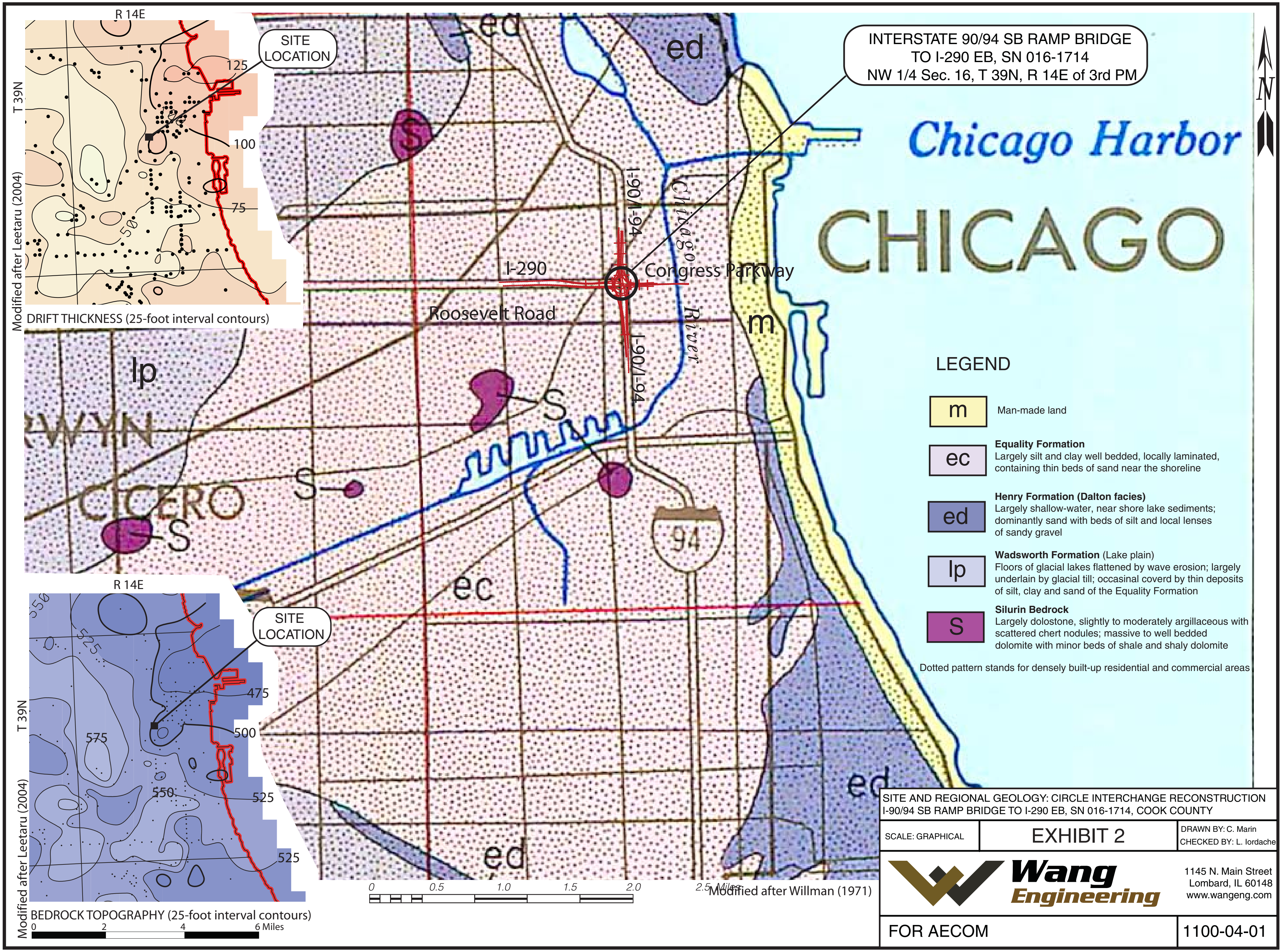

INTERSTATE 90/94 SB RAMP BRIDGE
TO I-290 EB, SN 016-1714
NW 1/4 Sec. 16, T 39N, R 14E of 3rd PM

LEGEND

m	Man-made land
ec	**Equality Formation** Largely silt and clay well bedded, locally laminated, containing thin beds of sand near the shoreline
ed	**Henry Formation (Dalton facies)** Largely shallow-water, near shore lake sediments; dominantly sand with beds of silt and local lenses of sandy gravel
lp	**Wadsworth Formation** (Lake plain) Floors of glacial lakes flattened by wave erosion; largely underlain by glacial till; occasinal coverd by thin deposits of silt, clay and sand of the Equality Formation
S	**Silurin Bedrock** Largely dolostone, slightly to moderately argillaceous with scattered chert nodules; massive to well bedded dolomite with minor beds of shale and shaly dolomite

Dotted pattern stands for densely built-up residential and commercial areas

SITE AND REGIONAL GEOLOGY: CIRCLE INTERCHANGE RECONSTRUCTION
I-90/94 SB RAMP BRIDGE TO I-290 EB, SN 016-1714, COOK COUNTY

SCALE: GRAPHICAL

EXHIBIT 2

DRAWN BY: C. Marin
CHECKED BY: L. Iordache

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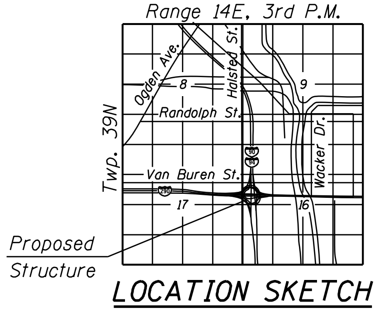
1100-04-01

Bench Mark: Chisel "X" on chain bolt of fire hydrant in front of 555 W. Harrison St. Elev. 594.46.

Existing Structure: SN 016-2452. Constructed in 1960 under F.A.I. Route 1, Section 2424.28-B. Fourteen span bridge that measures 787'-4" from back of north abutment to centerline of east pier. Out-to-out width of 29'-0". The spans are supported by 36" wide flange beams, concrete T-beams and a reinforced concrete slab. Substructure is reinforced concrete closed abutment, multi-column and solid wall piers founded on bell caissons. The existing bridge is to be removed and replaced.

The existing bridge will be closed and traffic will be detoured during construction. Traffic on I-290 and I-90/94 will be maintained with stage construction.

No Salvage.



LOCATION SKETCH

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

DESIGN SPECIFICATIONS

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

DESIGN STRESSES

FIELD UNITS

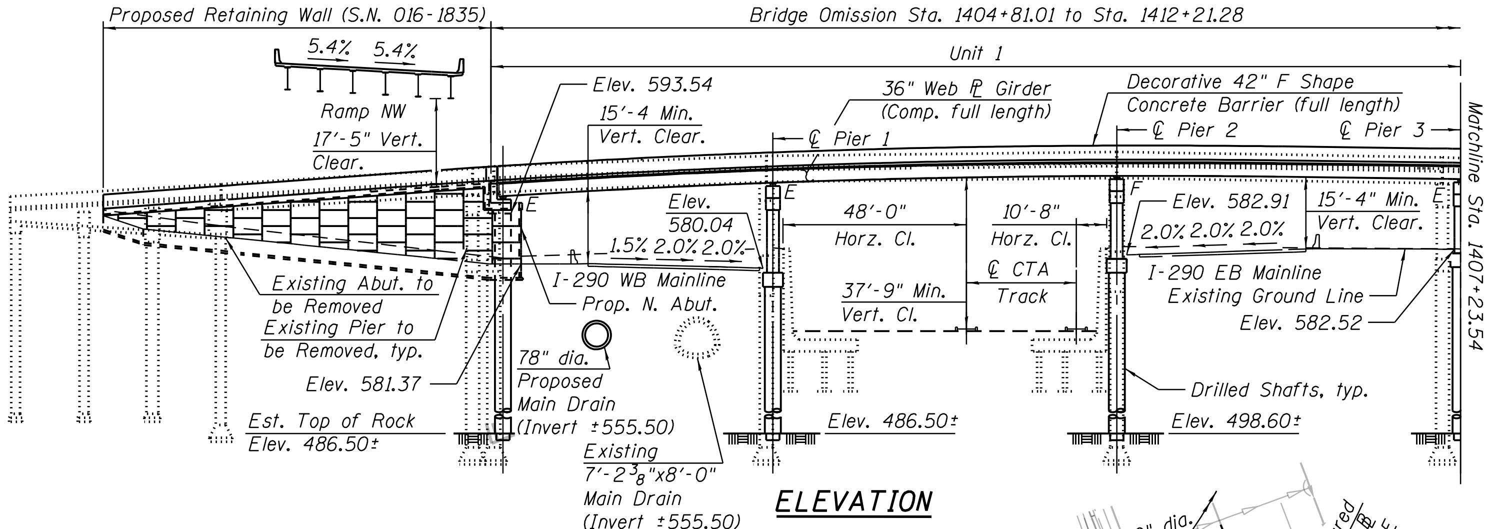
f'c = 3,500 psi
f'c = 4,000 psi (Superstructure Concrete)
fy = 60,000 psi (Reinforcement)
fy = 50,000 psi (M270 Grade 50)

LOADING HL-93

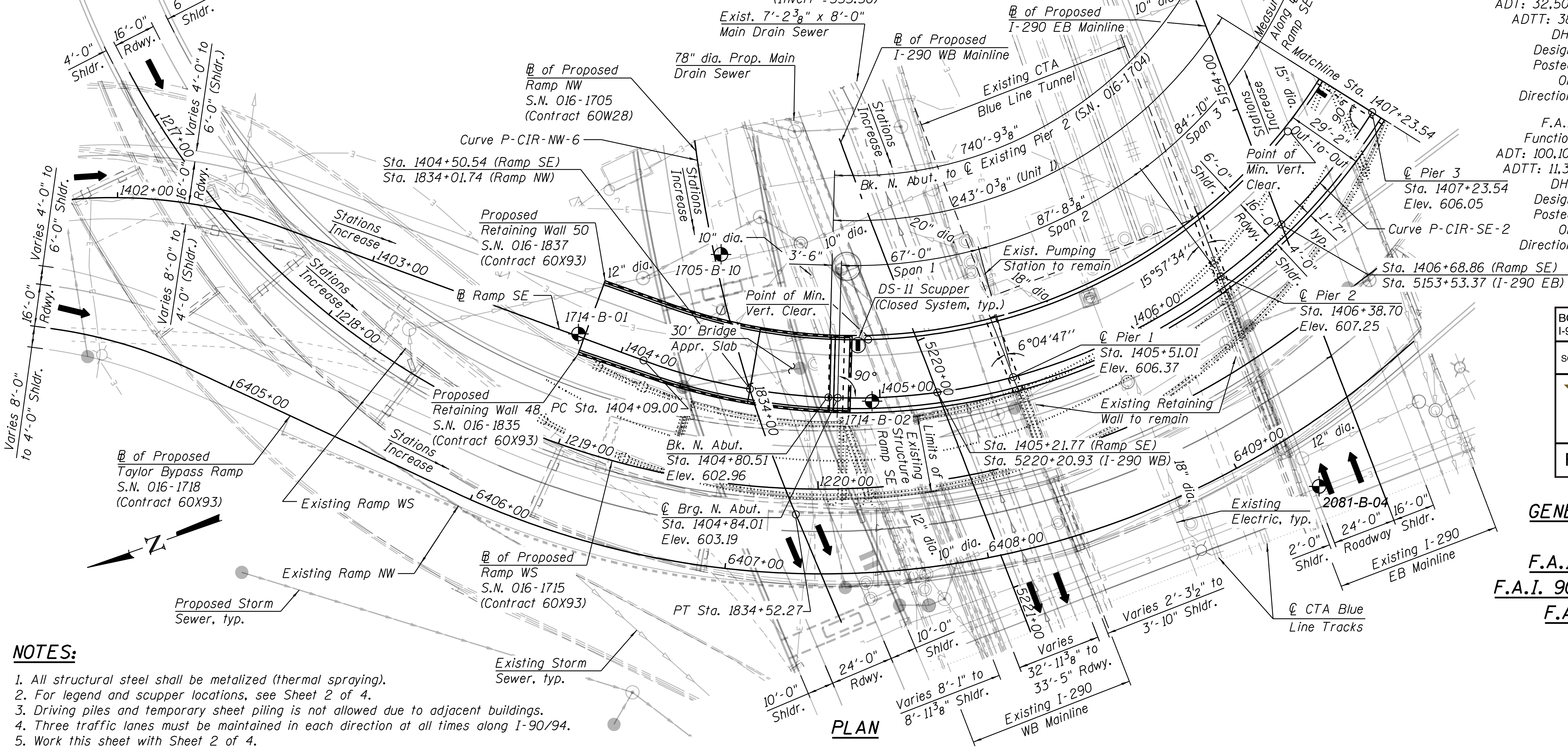
Allow 50#/sq. ft. for future wearing surface.

HIGHWAY CLASSIFICATION

Ramp SE	Ramp NW
Functional Class: Interstate	Functional Class: Interstate
ADT: 4,600 (2010); 5,000 (2040)	ADT: 32,500 (2012); 36,000 (2040)
ADTT: 123 (2012); 134 (2040)	ADTT: 2,483 (2012); 2,750 (2040)
DHV: 440 (2040)	DHV: 2,790 (2040)
Design Speed: 25 m.p.h.	Design Speed: 35 m.p.h.
Posted Speed: 25 m.p.h.	Posted Speed: 35 m.p.h.
One-Way Traffic	One-Way Traffic
Directional Distribution: 100%	Directional Distribution: 100%
F.A.I. Rte. 290 EB	F.A.I. Rte. 290 WB
Functional Class: Interstate	Functional Class: Interstate
ADT: 32,500 (2012); 33,000 (2040)	ADT: 29,700 (2012); 31,000 (2040)
ADTT: 380 (2012); 386 (2040)	ADTT: 460 (2012); 480 (2040)
DHV: 2,610 (2040)	DHV: 2,130 (2040)
Design Speed: 50 m.p.h.	Design Speed: 45 m.p.h.
Posted Speed: 45 m.p.h.	Posted Speed: 45 m.p.h.
One-Way Traffic	One-Way Traffic
Directional Distribution: 100%	Directional Distribution: 100%
F.A.I. Rte. 90/94 SB	F.A.I. Rte. 90/94 NB
Functional Class: Interstate	Functional Class: Interstate
ADT: 100,100 (2012); 98,000 (2040)	ADT: 96,700 (2012); 81,000 (2040)
ADTT: 11,351 (2012); 11,113 (2040)	ADTT: 11,217 (2012); 9,396 (2040)
DHV: 6,340 (2040)	DHV: 4,780 (2040)
Design Speed: 60 m.p.h.	Design Speed: 60 m.p.h.
Posted Speed: 45 m.p.h.	Posted Speed: 45 m.p.h.
One-Way Traffic	One-Way Traffic
Directional Distribution: 100%	Directional Distribution: 100%



ELEVATION



PLAN

NOTES:

1. All structural steel shall be metalized (thermal spraying).
2. For legend and scupper locations, see Sheet 2 of 4.
3. Driving piles and temporary sheet piling is not allowed due to adjacent buildings.
4. Three traffic lanes must be maintained in each direction at all times along I-90/94.
5. Work this sheet with Sheet 2 of 4.

BORING LOCATION PLAN: CIRCLE INTERCHANGE RECONSTRUCTION I-90/94 SB RAMP BRIDGE TO I-290 EB, RAMP SE SN 016-1714, COOK COUNTY		
SCALE: GRAPHICAL	EXHIBIT 3-1	DRAWN BY: C. Marin CHECKED BY: M. Seyhun
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FOR AECOM		1100-04-01

GENERAL PLAN & ELEVATION - UNIT 1
RAMP SE OVER
F.A.I. 290 (EISENHOWER EXPRESSWAY),
F.A.I. 90/94 (KENNEDY EXPRESSWAY) AND CTA
F.A.I. 94 (I-90/94 SB to I-290 EB)
SECTION 2014-013 R&B-R
COOK COUNTY
STATION 1408+50.90
STRUCTURE NO. 016-1714

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		CHECKED - MDS/TLR	REVISED -
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	PLOT DATE = 5/8/2017	CHECKED - MDS/TLR	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

SHEET NO. 1 OF 4 SHEETS

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
0094	2014-013 R&B-R	COOK	4	1
		CONTRACT NO. 60X93		
		ILLINOIS FED. AID PROJECT		

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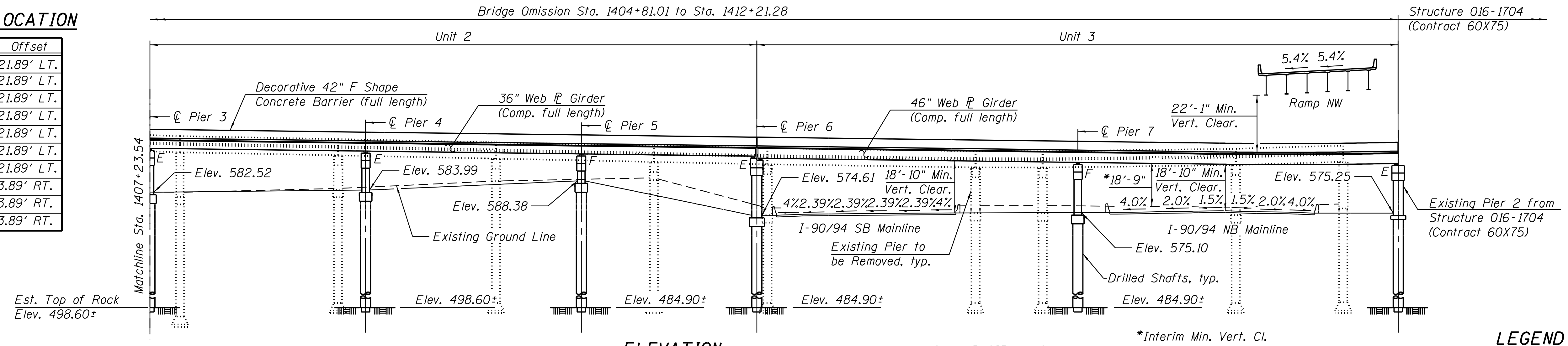
5/8/2017

SCUPPER LOCATION

Station	Offset
1404+91.80	21.89' LT.
1407+19.00	21.89' LT.
1408+05.00	21.89' LT.
1408+91.00	21.89' LT.
1409+61.00	21.89' LT.
1410+69.00	21.89' LT.
1410+89.00	21.89' LT.
1411+49.12	3.89' RT.
1411+54.12	3.89' RT.
1411+74.12	3.89' RT.



ELEVATION

LEGEND

Electric	——E——
Prop. Storm Sewer	——▶——▶——
Exist. Storm Sewer	——▷——▷——
Light Pole	¤
Soil Boring	⊕

BORING LOCATION PLAN: CIRCLE INTERCHANGE RECONSTRUCTION
I-90/94 SB RAMP BRIDGE TO I-290 EB, RAMP SE SN 016-1714, COOK COUNTY

SCALE: GRAPHICAL	EXHIBIT 3-2	DRAWN BY: C. Marin CHECKED BY: M. Seyhun

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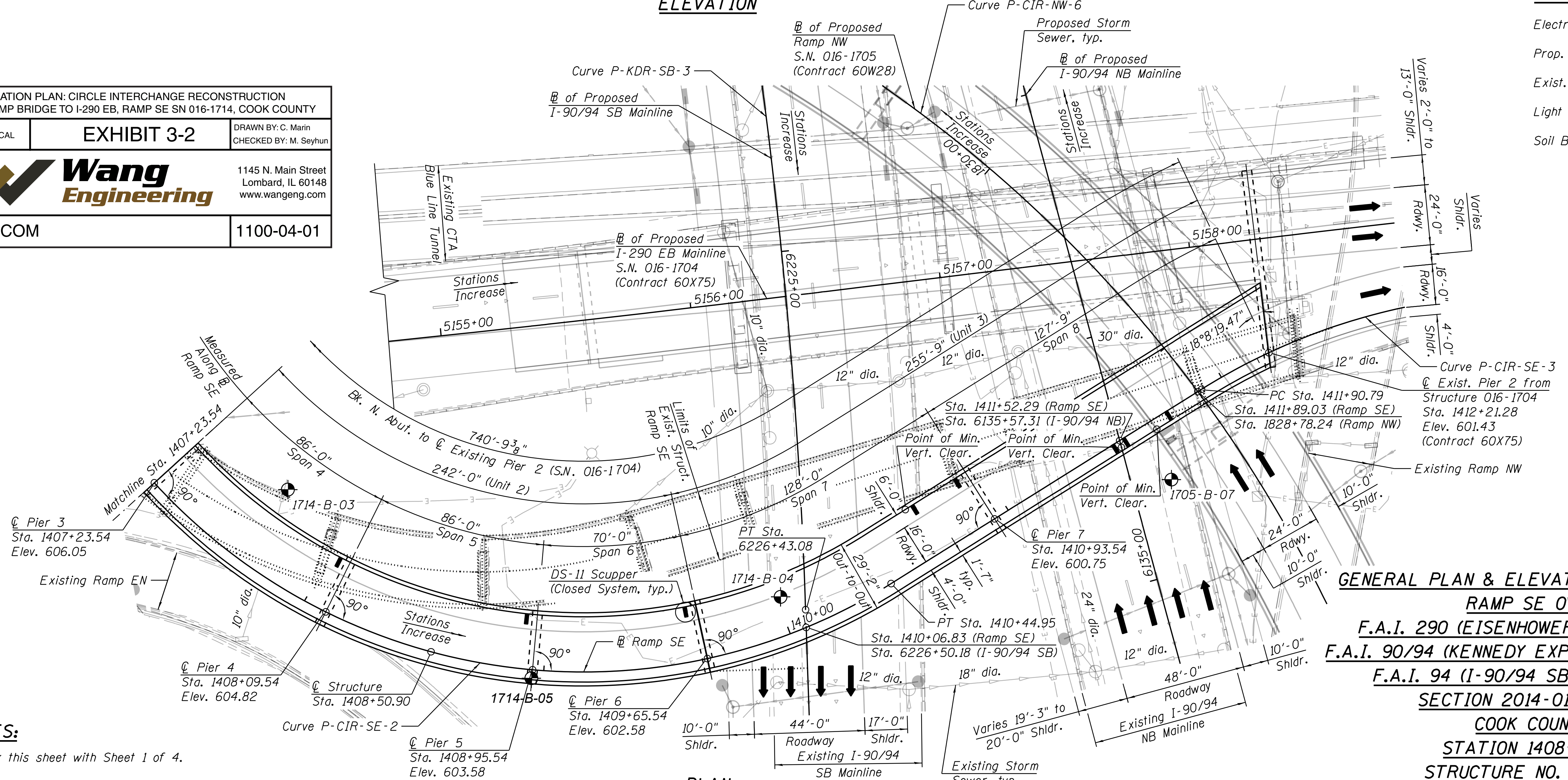

PLAN

GENERAL PLAN & ELEVATION - UNITS 2&3
RAMP SE OVER
F.A.I. 290 (EISENHOWER EXPRESSWAY),
F.A.I. 90/94 (KENNEDY EXPRESSWAY) AND CTA
F.A.I. 94 (I-90/94 SB TO I-290 EB)
SECTION 2014-013 R&B-R
COOK COUNTY
STATION 1408+50.90
STRUCTURE NO. 016-1714

NOTES:

1. Work this sheet with Sheet 1 of 4.

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5/8/2017

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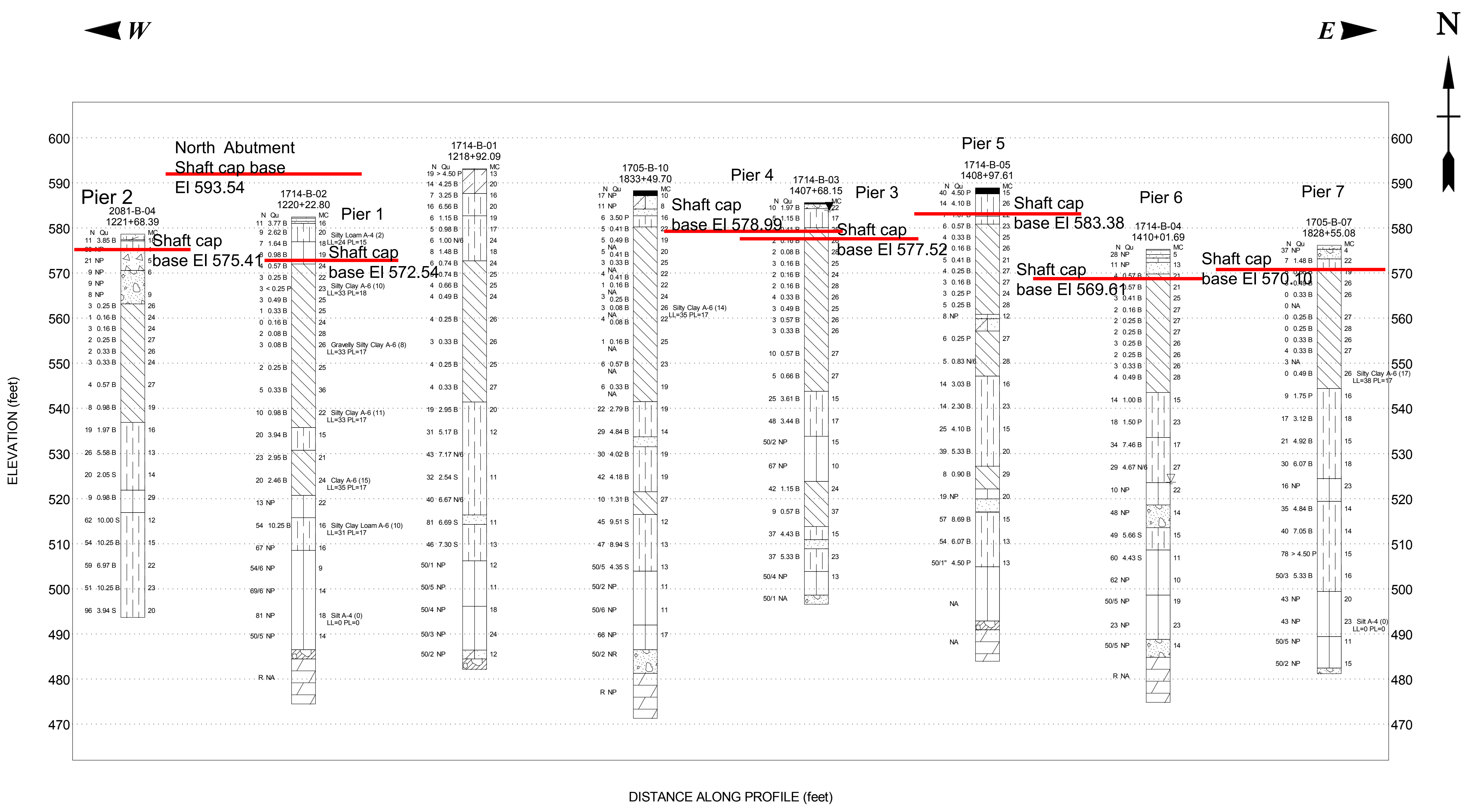
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

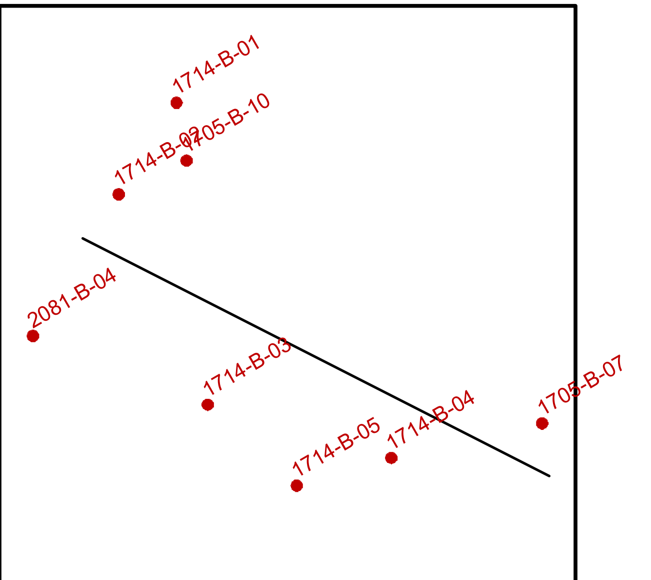
SHEET NO. 2 OF 4 SHEETS

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
0094	2014-013R&B-R	COOK	4	2
		CONTRACT NO. 60X93		
		ILLINOIS FED. AID PROJECT		



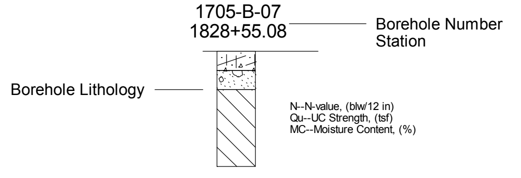
Lithology Graphics

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



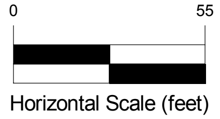
Site Map Scale 1 inch equals 200 feet

Explanation:



▽ Water Level Reading at time of drilling.

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



Vertical Exaggeration: 2x

Wang Engineering
1145 N Main Street
Lombard, IL 60148

Soil Profile

WEI
SINCE 1982

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

JOB NUMBER	PLATE NUMBER
1100-04-01	EXHIBIT 4

WEI 11X17 11000401.GPJ WANGENG.GDT 8/29/17

APPENDIX A

Wang Engineering

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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: 1403+82.49
Offset: 00.00

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
	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
			45	☒	15	2 2 2	0.25 B	25
			50	☒	16	2 2 2	0.33 B	27

GENERAL NOTES

Begin Drilling **10-16-2013** Complete Drilling **10-16-2013**
Drilling Contractor **Wang Testing Services** Drill Rig **CME-55 TMR**
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 ▽ **NA**
At Completion of Drilling ▼ **NA**
Time After Drilling **NA**
Depth to Water ▼ **NA**

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

Wang Engineering

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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: 1403+82.49
Offset: 00.00

Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
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
		75		21	12 17 23	6.67 N/6	

Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
516.5	Gray SANDY LOAM --Wet--						
514.3	Hard, gray SILTY CLAY LOAM, trace gravel	80		22	33 41 40	6.69 S	11
		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					

GENERAL NOTES

Begin Drilling **10-16-2013** Complete Drilling **10-16-2013**
Drilling Contractor **Wang Testing Services** Drill Rig **CME-55 TMR**
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 ▽ **NA**
At Completion of Drilling ▼ **NA**
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: 1403+82.49
Offset: 00.00

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type *recovery*	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
					28	30 45 50/3	NP	24
			105					
	486.5	Very dense, gray GRAVELLY LOAM, trace pyrite and dolostone fragments						
	484.5				29	50/2	NP	12
		--WEATHERED BEDROCK-- --ROLLER BIT REFUSAL--	110					
	482.2	Boring terminated at 111.00 ft						
			115					
			120					
			125					

GENERAL NOTES

Begin Drilling **10-16-2013** Complete Drilling **10-16-2013**
Drilling Contractor **Wang Testing Services** Drill Rig **CME-55 TMR**
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 ▽ **NA**
At Completion of Drilling ▼ **NA**
Time After Drilling **NA**
Depth to Water ▼ **NA**

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

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BORING LOG 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: 1404+96.58
Offset: 00.00

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--			1	6 5 6	3.77 B	16
		Very stiff, brown and gray SILTY CLAY LOAM, trace gravel --FILL--	5		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--			3	2 3 4	1.64 B	18
		--%Sand=28.0-- --%Silt=45.7-- --%Clay=12.4--	10		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	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	1 1 2	0.25 B	22
					7	1 1 2	< 0.25 P	23
			20		8	1 1 2	0.49 B	25
					9	0 0 1	0.33 B	25
			25		10	0 0 0	0.16 B	24
					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	0 1 2	0.08 B	26
			35		13	0 0 2	0.25 B	25
			40		14	2 2 3	0.33 B	36
		--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

GENERAL NOTES

Begin Drilling **10-08-2013** Complete Drilling **10-08-2013**
Drilling Contractor **Wang Testing Services** Drill Rig **D-50 TMR**
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 ▼ **NA**
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: 1404+96.58
Offset: 00.00

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	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-- --%Silt=47.7-- --%Clay=38.2-- --A-6 (15)--	60		18	6 8 12	2.46 B	24
	520.8	Medium dense, gray SILT						
			65		19	8 7 6	NP	22
	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

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
					22	54/6	NP	9
			80					
					23	69/6	NP	14
			85					
		--%Gravel=1.9-- --%Sand=6.8-- --%Silt=83.8-- --%Clay=7.4-- --A-4 (0)--	90		24	31 45 36	NP	18
					25	50/5	NP	14
			95					
	486.5	--WEATHERED BEDROCK--						
	484.5	Strong, white and light gray, rock quality, horizontally bedded DOLOSTONE, beds (6" to 18"), joint spacing 12" to 18", joints	100			CORE		

GENERAL NOTES

Begin Drilling **10-08-2013** Complete Drilling **10-08-2013**
Drilling Contractor **Wang Testing Services** Drill Rig **D-50 TMR**
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 ▼ **NA**
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: 1404+96.58
Offset: 00.00

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type *recovery*	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type *recovery*	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		with >0.2" or no infilling, vuggy and cherty, with stylolites. --Run 1 - RECOVERY= 93%-- --RQD= 86%--			1												
			105														
	474.5	Boring terminated at 108.00 ft															
			110														
			115														
			120														
			125														

GENERAL NOTES

Begin Drilling **10-08-2013** Complete Drilling **10-08-2013**
Drilling Contractor **Wang Testing Services** Drill Rig **D-50 TMR**
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 ▼ **NA**
Time After Drilling **NA**
Depth to Water ▼ **NA**

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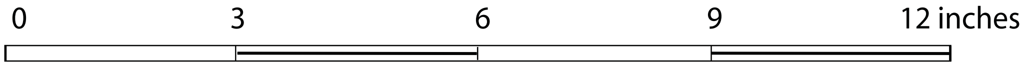

Boring 1714-B-02:
Run 1, 98' to 108', RECOVERY = 93%, RQD = 86%

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

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

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FOR AECOM

1100-04-01

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BORING LOG 1705-B-10

WEI Job No.: 1100-04-01

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

Datum: NAVD 88
Elevation: 588.29 ft
North: 1898131.01 ft
East: 1171315.43 ft
Station: 1833+49.76
Offset: 256 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		12-inch thick, dark brown LOAM --TOPSOIL--						
	587.3	Medium dense, brown LOAM, trace gravel, crushed stone, and brick fragments --FILL--		☒	1	4 10 7	NP	10
	584.3	Medium dense, brown SAND --FILL--	5	☒	2	9 6 5	NP	8
	582.8	Very stiff, gray SILTY CLAY, trace gravel		☒	3	3 3 3	3.50 P	16
	580.3	Very soft to medium stiff, gray CLAY to SILTY CLAY, trace gravel	10	☒	4	3 2 3	0.41 B	22
				☒	5	1 2 3	0.49 B	19
		--In-Situ Vane Shear, 13.0 feet-- --$S_{u\ undis}$ = 1061.9 psf-- --$S_{u\ remold}$ = 543.9 psf-- --Sensitivity = 1.95--		□	1			
			15	☒	6	2 2 3	0.41 B	20
				☒	7	0 2 1	0.33 B	25
		--In-Situ Vane Shear, 18.0 feet-- --$S_{u\ undis}$ = 1191.4 psf-- --$S_{u\ remold}$ = 543.9 psf-- --Sensitivity = 2.19--		□	2			
			20	☒	8	1 2 2	0.41 B	22
				☒	9	0 0 1	0.16 B	22
		--In-Situ Vane Shear, 23.0 feet-- --$S_{u\ undis}$ = 802.9 psf-- --$S_{u\ remold}$ = 414.4 psf-- --Sensitivity = 1.94--		□	3			
			25	☒	10	0 2 1	0.25 B	24
		--L_L(%)=35, P_L(%)=17-- --%Gravel=2.9-- --%Sand=13.3-- --%Silt=49.9-- --%Clay=33.9-- --A-6 (14)--		☒	11	1 1 2	0.08 B	26
		--In-Situ Vane Shear, 28.0 feet-- --$S_{u\ undis}$ = 699.3 psf-- --$S_{u\ remold}$ = 414.9 psf-- --Sensitivity = 1.69--		□	4			
			30	☒	12	0 2 2	0.08 B	22
			35	☒	13	0 0 1	0.16 B	25
		--In-Situ Vane Shear, 35.5 feet-- --$S_{u\ undis}$ = 880.6 psf-- --$S_{u\ remold}$ = 518.0 psf-- --Sensitivity = 1.70--		□	5			
			40	☒	14	0 3 3	0.57 B	23
		--In-Situ Vane Shear, 40.5 feet-- --$S_{u\ undis}$ = 1809.5 psf-- --$S_{u\ remold}$ = 1137.4 psf-- --Sensitivity = 1.59--		□	6			
			45	☒	15	2 2 4	0.33 B	19
		--In-Situ Vane Shear, 45.5 feet-- --$S_{u\ undis}$ = 2585.0 psf-- --$S_{u\ remold}$ = 1551.0 psf-- --Sensitivity = 1.66--		□	7			
	541.5	Very stiff, gray SILTY CLAY, trace gravel						
			50	☒	16	5 8 14	2.79 B	19

GENERAL NOTES

Begin Drilling **07-30-2013** Complete Drilling **08-01-2013**
Drilling Contractor **Wang Testing Services** Drill Rig **CME-55 TMR**
Driller **R&J** Logger **A. Tomaras** 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 ▼ **NA**
Time After Drilling **NA**
Depth to Water ▽ **NA**
The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.

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BORING LOG 1705-B-10

WEI Job No.: 1100-04-01

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

Datum: NAVD 88
Elevation: 588.29 ft
North: 1898131.01 ft
East: 1171315.43 ft
Station: 1833+49.76
Offset: 256 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type *recovery*	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
			55		17	8 12 17	4.84 B	14
	533.8	Medium dense, gray, medium SAND						
	531.5	Hard, gray SILTY CLAY, trace gravel and fine sand lenses						
			60		18	6 10 20	4.02 B	19
			65		18	5 12 30	4.18 B	19
	521.5	Stiff, gray, laminated layers of CLAY and SILT						
			70		20	5 4 6	1.31 B	27
	516.5	Hard, gray SILTY CLAY LOAM to SILTY LOAM, trace gravel						
			75		21	10 14 31	9.51 S	12

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type *recovery*	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
			80		22	18 22 25	8.94 S	13
	504.0	Very dense, gray SILT to SILTY LOAM, trace to some gravel	85		23	37 37 50/5	4.35 S	13
		--HARD DRILLING (5 min/0.5')-- --Possible Cobbles--			24	50/2	NP	11
			90					
		--HARD DRILLING-- --Possible Cobbles--						
					25	50/6	NP	11
			95					
	492.0	Very dense, gray SILT						
			100		26	20 26 40	NP	17

GENERAL NOTES

Begin Drilling **07-30-2013** Complete Drilling **08-01-2013**
Drilling Contractor **Wang Testing Services** Drill Rig **CME-55 TMR**
Driller **R&J** Logger **A. Tomaras** 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 ▼ **NA**
Time After Drilling **NA**
Depth to Water ▼ **NA**

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BORING LOG 1705-B-10

WEI Job No.: 1100-04-01

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

Datum: NAVD 88
Elevation: 588.29 ft
North: 1898131.01 ft
East: 1171315.43 ft
Station: 1833+49.76
Offset: 256 LT

Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type *recovery*	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
486.5	Very dense, gray GRAVELLY SAND, trace cobbles --HARD DRILLING-- --Possible Cobbles--		○	27	50/2	NR	
		105					
481.3	Strong, poor to fair rock quality, light gray, fresh, vertical and horizontal joints, joint breaks with little to no infill, horizontal stylolites, slightly vuggy DOLOSTONE --Run 1 - RECOVERY= 97.5%-- --RQD(top 5ft)=73%-- --RQD(10ft)=50%--	110		1	CORE	NP	
		115					
471.3	Boring terminated at 117.00 ft						
		120					
		125					

GENERAL NOTES

Begin Drilling **07-30-2013** Complete Drilling **08-01-2013**
Drilling Contractor **Wang Testing Services** Drill Rig **CME-55 TMR**
Driller **R&J** Logger **A. Tomaras** 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 ▼ **NA**
Time After Drilling **NA**
Depth to Water ▼ **NA**

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

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BORING LOG 1714-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: 585.63 ft
North: 1897874.84 ft
East: 1171337.66 ft
Station: 1407+67.90
Offset: 33.82 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type *recovery*	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	585.4	2-inch thick, dark brown SILTY LOAM --TOPSOIL--						
	584.3	Brown GRAVELLY SAND --FILL--	▼		1	4 4 6	1.97 B	22
		Stiff, gray SILTY CLAY LOAM, trace gravel	5		2	2 2 3	1.15 B	17
	580.1	Very soft to medium stiff, gray CLAY to SILTY CLAY, trace gravel			3	1 2 2	0.41 B	25
			10		4	1 1 1	0.16 B	26
					5	1 1 1	0.08 B	28
			15		6	1 1 2	0.16 B	25
					7	1 1 1	0.16 B	24
			20		8	0 1 1	0.16 B	28
					9	1 1 3	0.33 B	26
			25		10	1 1 2	0.49 B	25
					11	1 1 2	0.57 B	26
			30		12	1 1 2	0.33 B	26
			35		13	2 4 6	0.57 B	27
			40		14	1 2 3	0.66 B	27
	543.9	Very stiff, gray SILTY CLAY LOAM, trace gravel						
			45		15	3 8 17	3.61 B	15
			50		16	7 16 32	3.44 B	17

GENERAL NOTES

Begin Drilling **10-17-2013** Complete Drilling **10-18-2013**
Drilling Contractor **Wang Testing Services** Drill Rig **D-25 ATV**
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 ▽ **DRY**
At Completion of Drilling ▼ **MUD (2')**
Time After Drilling **24 hours**
Depth to Water ▼ **2.00 ft**

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

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BORING LOG 1714-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: 585.63 ft
North: 1897874.84 ft
East: 1171337.66 ft
Station: 1407+67.90
Offset: 33.82 RT

Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
533.9	Very dense, gray SILTY LOAM, trace gravel					
			17	16 50/2	NP	15
		55				
			18	21 31 36	NP	10
		60				
523.9	Medium stiff to stiff, gray CLAY					
			19	3 9 33	1.15 B	24
		65				
			20	3 4 5	0.57 B	37
		70				
513.9	Hard, gray SILTY CLAY, trace gravel					
			21	9 14 23	4.43 B	15
510.9		75				

Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	Gray, fine SAND --Wet--					
508.9	Hard, gray SILTY CLAY LOAM, trace gravel					
			22	10 15 22	5.33 B	23
		80				
503.9	Very dense, gray SILTY LOAM, trace gravel and dolostone fragments					
			23	50/4	NP	13
		85				
498.6	--HARD DRILLING-- --WEATHERED BEDROCK--					
			24	50/1		
496.6	Boring terminated at 30.00 ft					
		90				
		95				
		100				

GENERAL NOTES

Begin Drilling **10-17-2013** Complete Drilling **10-18-2013**
Drilling Contractor **Wang Testing Services** Drill Rig **D-25 ATV**
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 ▽ **DRY**
At Completion of Drilling ▼ **MUD (2')**
Time After Drilling **24 hours**
Depth to Water ▼ **2.00 ft**

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

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BORING LOG 1714-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: 575.37 ft
North: 1897818.98 ft
East: 1171530.45 ft
Station: 5238+29.69
Offset: 63.7269 RT

Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
575.2	2-inch thick ASPHALT --PAVEMENT--					
574.2	12-inch thick CONCRETE --PAVEMENT--		1	13 19 9	NP	5
573.4	10-inch thick CRUSHED STONE --BASE COURSE--					
572.4	Brown SILTY LOAM --FILL--		2	7 6 5	NP	13
	Medium dense, gray SANDY LOAM --FILL--	5				
569.9	Very soft to soft, gray CLAY to SILTY CLAY, trace gravel		3	1 2 2	0.57 B	21
		10	4	1 2 2	0.57 B	21
			5	0 1 2	0.41 B	25
		15	6	0 1 1	0.16 B	27
			7	0 1 1	0.25 B	27
		20	8	1 1 1	0.25 B	27
			9	0 1 2	0.25 B	26
		25	10	1 1 1	0.25 B	26
			11	1 1 2	0.33 B	26
		30	12	1 2 2	0.49 B	28
543.6	Stiff, gray SILTY CLAY, trace gravel					
		35	13	3 6 8	1.00 B	15
		40	14	6 5 13	1.50 P	23
533.6	Hard, gray SILTY CLAY LOAM, trace gravel					
		45	15	7 10 24	7.46 B	17
		50	16	9 11 18	4.67 N/6	27

GENERAL NOTES

Begin Drilling **10-27-2013** Complete Drilling **10-27-2013**
Drilling Contractor **Wang Testing Services** Drill Rig **CME-55 TMR**
Driller **R&J** Logger **A. Tomaras** Checked by **DRAFT**
Drilling Method **2.25" SSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

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

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BORING LOG 1714-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: 575.37 ft
North: 1897818.98 ft
East: 1171530.45 ft
Station: 5238+29.69
Offset: 63.7269 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type *recovery*	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	523.6	Medium dense, gray SILTY LOAM --Saturated--	▽					
			55		17	6 5 5	NP	22
	518.6	Dense, gray GRAVELLY SAND --Saturated--						
			60		18	18 40 8	NP	14
	513.6	Hard. gray SILTY CLAY LOAM, trace gravel						
			65		19	12 16 33	5.66 S	15
	508.6	Very dense, gray SILTY LOAM, trace gravel						
			70		20	22 27 33	4.43 S	11
			75		21	15 27 35	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 (%)
	498.6	Medium dense to dense, gray SILT --Saturated--						
			80		22	29 50/5	NP	19
			85		23	15 8 15	NP	23
	488.9	Very dense, gray GRAVELLY SILTY LOAM						
			90		24	50/5	NP	14
	484.9	Strong, light gray, fair rock quality, bedded DOLOSTONE, beds (2" to 12"), joint spacing 2" to 12", joints with >0.2" or no infilling, vuggy, with stylolites. --Run 1 - RECOVERY= 100%-- --RQD= 63%--	95 100		1	C O R E		

GENERAL NOTES

Begin Drilling **10-27-2013** Complete Drilling **10-27-2013**
Drilling Contractor **Wang Testing Services** Drill Rig **CME-55 TMR**
Driller **R&J** Logger **A. Tomaras** Checked by **DRAFT**
Drilling Method **2.25" SSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

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

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

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BORING LOG 1714-B-04

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

Datum: NAVD 88
Elevation: 575.37 ft
North: 1897818.98 ft
East: 1171530.45 ft
Station: 5238+29.69
Offset: 63.7269 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type *recovery*	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	474.9							
		Boring terminated at 100.50 ft						
			105					
			110					
			115					
			120					
			125					

GENERAL NOTES

Begin Drilling **10-27-2013** Complete Drilling **10-27-2013**
Drilling Contractor **Wang Testing Services** Drill Rig **CME-55 TMR**
Driller **R&J** Logger **A. Tomaras** Checked by **DRAFT**
Drilling Method **2.25" SSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

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

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

0 3 6 9 12 inches

Boring 1714-B-04:
Run 1, 90.5′ to 100.5′, RECOVERY = 100%, RQD = 63%

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

SCALE : GRAPHIC	1714-B-04	DRAWN BY: A. Tomaras CHECKED BY: C.Marin

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FOR AECOM 1100-04-01

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BORING LOG 1705-B-07

WEI Job No.: 1100-04-01

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

Datum: NAVD 88
Elevation: 576.23 ft
North: 1897855.27 ft
East: 1171688.90 ft
Station: 1828+55.18
Offset: 28.83 LT

Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type *recovery*	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	11-inch thick, ASPHALT --PAVEMENT--						
575.3	25-inch thick SANDY GRAVEL --BASE COURSE--		☒	1	18 22 15	NP	4
573.2	Stiff, gray SILTY CLAY, trace gravel	5	☒	2	2 3 4	1.48 B	22
570.7	Soft to medium stiff, gray CLAY to SILTY CLAY, trace gravel		☒	3	1 2 3	0.66 B	19
		10	☒	4	0 1 2	0.49 B	26
			☒	5	0 0 0	0.33 B	26
		15	○	6	0 0 0	NA	
			☒	7	0 0 0	0.25 B	27
		20	☒	8	0 0 0	0.25 B	28
			☒	9	0 0 0	0.33 B	26
		25	☒	10	2 2 2	0.33 B	27
			○	11	0 0 3	NA	
	--L_L(%)=38, P_L(%)=17-- --%Gravel=2.0-- --%Sand=13.4-- --%Silt=51.3-- --%Clay=33.2-- --A-6 (17)--	30	☒	12	0 0 0	0.49 B	26
544.5	Stiff to hard, gray SILTY CLAY LOAM, trace gravel						
		35	☒	13	2 3 6	1.75 P	16
		40	☒	14	4 6 11	3.12 B	18
		45	☒	15	5 8 13	4.92 B	15
		50	☒	16	6 13 17	6.07 B	18

GENERAL NOTES

Begin Drilling **07-24-2013** Complete Drilling **07-25-2013**
Drilling Contractor **Wang Testing Services** Drill Rig **D-50 TMR**
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 ▽ **NA**
At Completion of Drilling ▼ **MUD (11')**
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-07

WEI Job No.: 1100-04-01

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

Datum: NAVD 88
Elevation: 576.23 ft
North: 1897855.27 ft
East: 1171688.90 ft
Station: 1828+55.18
Offset: 28.83 LT

Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
524.5	Medium dense, gray SILT					
		55	17	4 7 9	NP	23
519.5	Hard, gray SILTY CLAY LOAM, trace gravel					
		60	18	13 15 20	4.84 B	14
		65	19	8 16 24	7.05 B	14
		70	20	24 36 42	> 4.50 P	15
		75	21	12 16 50/3	5.33 B	16

Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
499.5	Dense, gray SILT					
		80	22	11 18 25	NP	20
	--%Gravel=0.4-- --%Sand=3.9-- --%Silt=88.1-- --%Clay=7.7-- --A-4 (0)--	85	23	14 19 24	NP	23
489.5	Very dense, gray SILTY LOAM, little gravel					
			24	50/5	NP	11
		90				
482.5	ROCK FRAGMENTS		25	50/2	NP	15
481.2	--HARD DRILLING-- --AUGER REFUSAL--	95				
	Boring terminated at 95.00 ft					
		100				

GENERAL NOTES

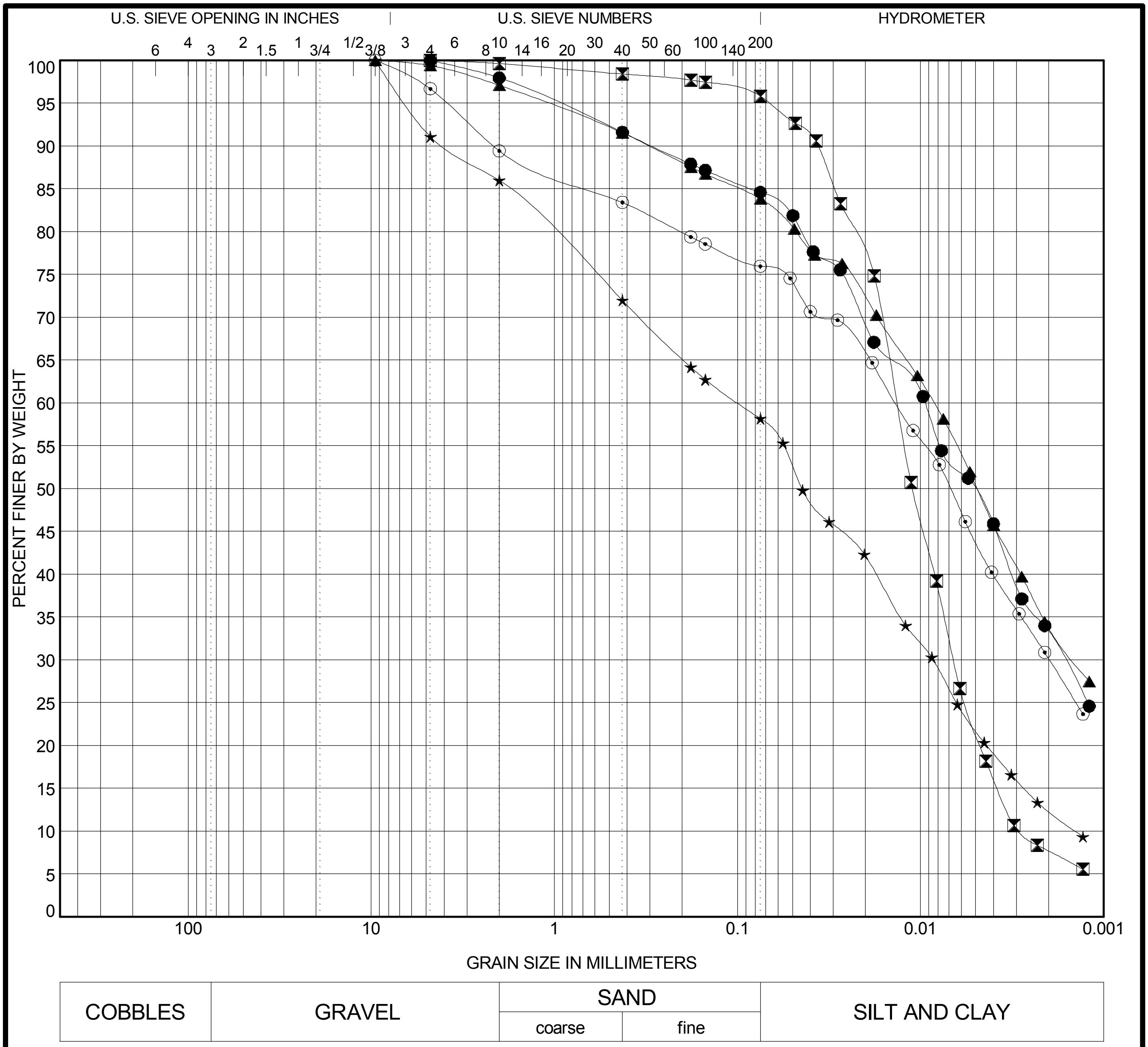
Begin Drilling **07-24-2013** Complete Drilling **07-25-2013**
Drilling Contractor **Wang Testing Services** Drill Rig **D-50 TMR**
Driller **R&N** Logger **F. Bozga** Checked by **C. Marin**
Drilling Method **2.25" SSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **NA**
At Completion of Drilling ▼ **MUD (11')**
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



Specimen Identification			IDH Classification	LL	PL	PI	Cc	Cu
●	**1705-B-07#12**	**28.5 ft**	**Silty Clay**	**38**	**17**	**21**		
⧗	**1705-B-07#23**	**83.5 ft**	**Silt**	**NP**	**NP**	**NP**	**1.14**	**4.74**
▲	**1705-B-10#11**	**26.0 ft**	**Silty Clay**	**35**	**17**	**18**		
★	**1714-B-02#3**	**6.0 ft**	**Silty Loam**	**24**	**15**	**9**	**0.52**	**69.46**
⊙	**1714-B-02#6**	**13.5 ft**	**Silty Clay**	**33**	**18**	**15**		

Specimen Identification			D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**1705-B-07#12**	**28.5 ft**	**4.75**	**0.009**	**0.002**		**2.0**	**13.4**	**51.3**	**33.2**
⧗	**1705-B-07#23**	**83.5 ft**	**4.75**	**0.013**	**0.007**	**0.003**	**0.4**	**3.9**	**88.1**	**7.7**
▲	**1705-B-10#11**	**26.0 ft**	**9.5**	**0.008**	**0.001**		**2.9**	**13.3**	**49.9**	**33.9**
★	**1714-B-02#3**	**6.0 ft**	**9.5**	**0.099**	**0.009**	**0.001**	**14.0**	**28.0**	**45.7**	**12.4**
⊙	**1714-B-02#6**	**13.5 ft**	**9.5**	**0.014**	**0.002**		**10.6**	**13.5**	**45.8**	**30.1**

WEI
SINCE 1982
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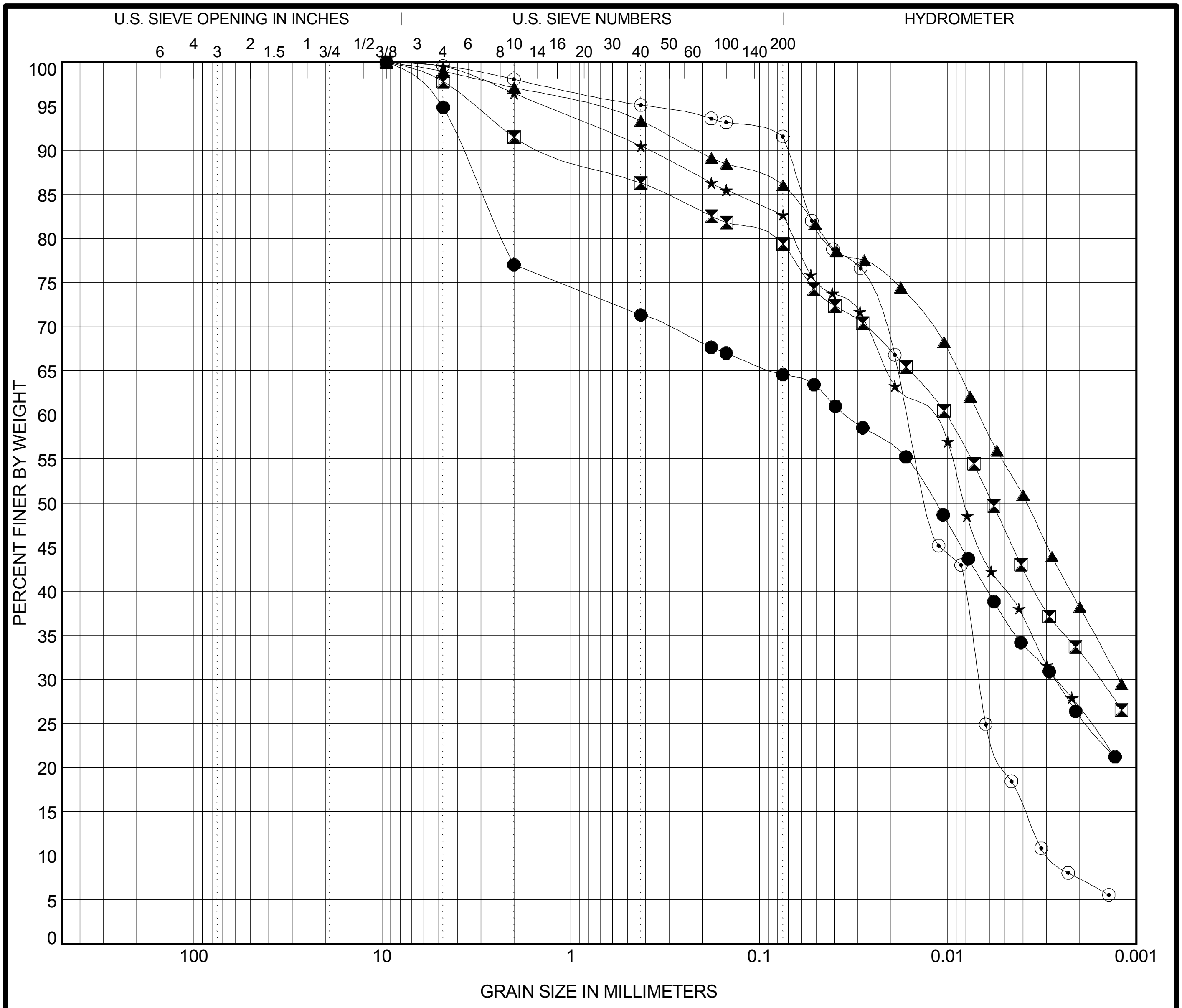
GRAIN SIZE DISTRIBUTION

Project: Circle Interchange Reconstruction

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

Number: 1100-04-01



COBBLES	GRAVEL	SAND		SILT AND CLAY
		coarse	fine	

Specimen Identification			IDH Classification	LL	PL	PI	Cc	Cu
●	**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**		
⊙	**1714-B-02#24**	**88.5 ft**	**Silt**	**NP**	**NP**	**NP**	**1.01**	**5.59**

Specimen Identification			D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**1714-B-02#12**	**28.5 ft**	**9.5**	**0.034**	**0.003**		**23.0**	**12.5**	**38.7**	**25.9**
⧗	**1714-B-02#15**	**43.5 ft**	**9.5**	**0.01**	**0.002**		**8.5**	**12.3**	**46.1**	**33.1**
▲	**1714-B-02#18**	**58.5 ft**	**9.5**	**0.007**	**0.001**		**2.9**	**11.2**	**47.7**	**38.2**
★	**1714-B-02#20**	**68.5 ft**	**9.5**	**0.014**	**0.003**		**3.5**	**14.1**	**55.7**	**26.7**
⊙	**1714-B-02#24**	**88.5 ft**	**9.5**	**0.016**	**0.007**	**0.003**	**1.9**	**6.8**	**83.8**	**7.4**

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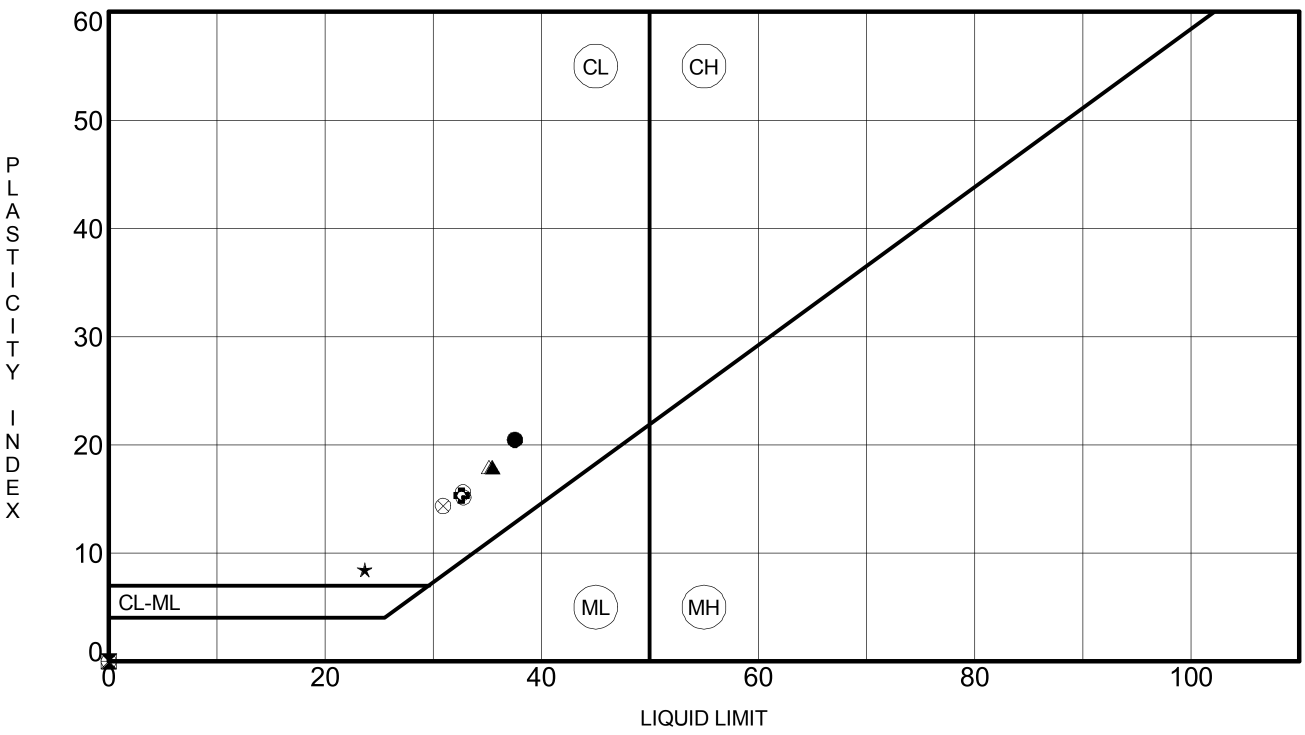
GRAIN SIZE DISTRIBUTION

Project: Circle Interchange Reconstruction

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

Number: 1100-04-01



	Specimen Identification		LL	PL	PI	Fines	IDH Classification
●	**1705-B-07#12**	**28.5 ft**	**38**	**17**	**21**	**85**	**Silty Clay**
⧗	**1705-B-07#23**	**83.5 ft**	**NP**	**NP**	**NP**	**96**	**Silt**
▲	**1705-B-10#11**	**26.0 ft**	**35**	**17**	**18**	**84**	**Silty Clay**
★	**1714-B-02#3**	**6.0 ft**	**24**	**15**	**9**	**58**	**Silty Loam**
⊙	**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**

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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

Bench Mark: Chisel "X" on chain bolt of fire hydrant in front of 555 W. Harrison St. Elev. 594.46.

Existing Structure: SN 016-2452. Constructed in 1960 under F.A.I. Route 1, Section 2424.28-B. Fourteen span bridge that measures 787'-4" from back of north abutment to centerline of east pier. Out-to-out width of 29'-0". The spans are supported by 36" wide flange beams, concrete T-beams and a reinforced concrete slab. Substructure is reinforced concrete closed abutment, multi-column and solid wall piers founded on bell caissons. The existing bridge is to be removed and replaced.

The existing bridge will be closed and traffic will be detoured during construction. Traffic on I-290 and I-90/94 will be maintained with stage construction.

No Salvage.

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

DESIGN SPECIFICATIONS

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

DESIGN STRESSES

FIELD UNITS

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

LOADING HL-93

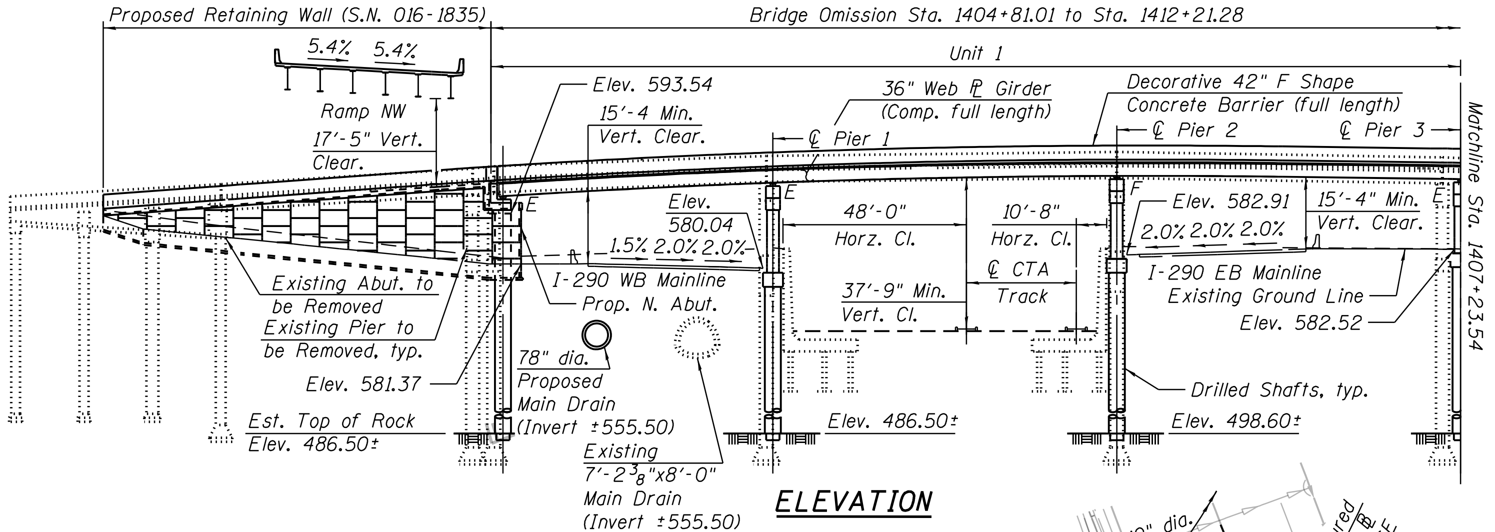
Allow 50#/sq. ft. for future wearing surface.

HIGHWAY CLASSIFICATION

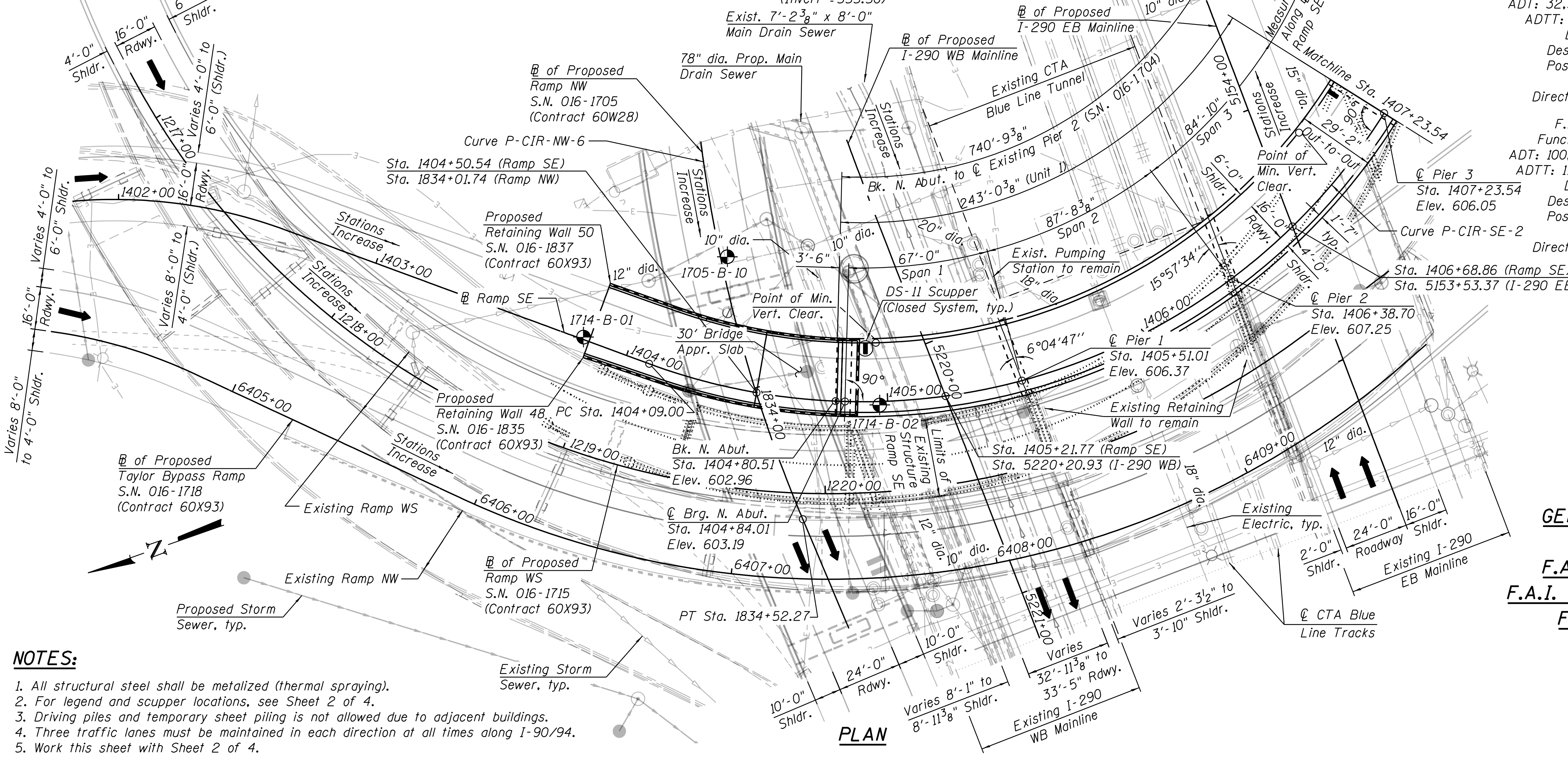
Ramp SE	Ramp NW
Functional Class: Interstate	Functional Class: Interstate
ADT: 4,600 (2010); 5,000 (2040)	ADT: 32,500 (2012); 36,000 (2040)
ADTT: 123 (2012); 134 (2040)	ADTT: 2,483 (2012); 2,750 (2040)
DHV: 440 (2040)	DHV: 2,790 (2040)
Design Speed: 25 m.p.h.	Design Speed: 35 m.p.h.
Posted Speed: 25 m.p.h.	Posted Speed: 35 m.p.h.
One-Way Traffic	One-Way Traffic
Directional Distribution: 100%	Directional Distribution: 100%

F.A.I. Rte. 290 EB	F.A.I. Rte. 290 WB
Functional Class: Interstate	Functional Class: Interstate
ADT: 32,500 (2012); 33,000 (2040)	ADT: 29,700 (2012); 31,000 (2040)
ADTT: 380 (2012); 386 (2040)	ADTT: 460 (2012); 480 (2040)
DHV: 2,610 (2040)	DHV: 2,130 (2040)
Design Speed: 50 m.p.h.	Design Speed: 45 m.p.h.
Posted Speed: 45 m.p.h.	Posted Speed: 45 m.p.h.
One-Way Traffic	One-Way Traffic
Directional Distribution: 100%	Directional Distribution: 100%

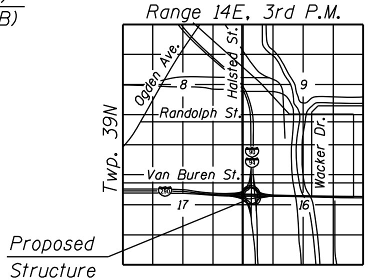
F.A.I. Rte. 90/94 SB	F.A.I. Rte. 90/94 NB
Functional Class: Interstate	Functional Class: Interstate
ADT: 100,100 (2012); 98,000 (2040)	ADT: 96,700 (2012); 81,000 (2040)
ADTT: 11,351 (2012); 11,113 (2040)	ADTT: 11,217 (2012); 9,396 (2040)
DHV: 6,340 (2040)	DHV: 4,780 (2040)
Design Speed: 60 m.p.h.	Design Speed: 60 m.p.h.
Posted Speed: 45 m.p.h.	Posted Speed: 45 m.p.h.
One-Way Traffic	One-Way Traffic
Directional Distribution: 100%	Directional Distribution: 100%



ELEVATION



PLAN



LOCATION SKETCH

NOTES:

1. All structural steel shall be metalized (thermal spraying).
2. For legend and scupper locations, see Sheet 2 of 4.
3. Driving piles and temporary sheet piling is not allowed due to adjacent buildings.
4. Three traffic lanes must be maintained in each direction at all times along I-90/94.
5. Work this sheet with Sheet 2 of 4.

GENERAL PLAN & ELEVATION - UNIT 1
RAMP SE OVER
F.A.I. 290 (EISENHOWER EXPRESSWAY),
F.A.I. 90/94 (KENNEDY EXPRESSWAY) AND CTA
F.A.I. 94 (I-90/94 SB to I-290 EB)
SECTION 2014-013 R&B-R
COOK COUNTY
STATION 1408+50.90
STRUCTURE NO. 016-1714

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5/8/2017

TranSystems

USER NAME = wjcolletti	DESIGNED - WJC	REVISED -
	CHECKED - MDS/TLR	REVISED -
PLOT SCALE = 48:0 ':' / in.	DRAWN - WJC	REVISED -
PLOT DATE = 5/8/2017	CHECKED - MDS/TLR	REVISED -

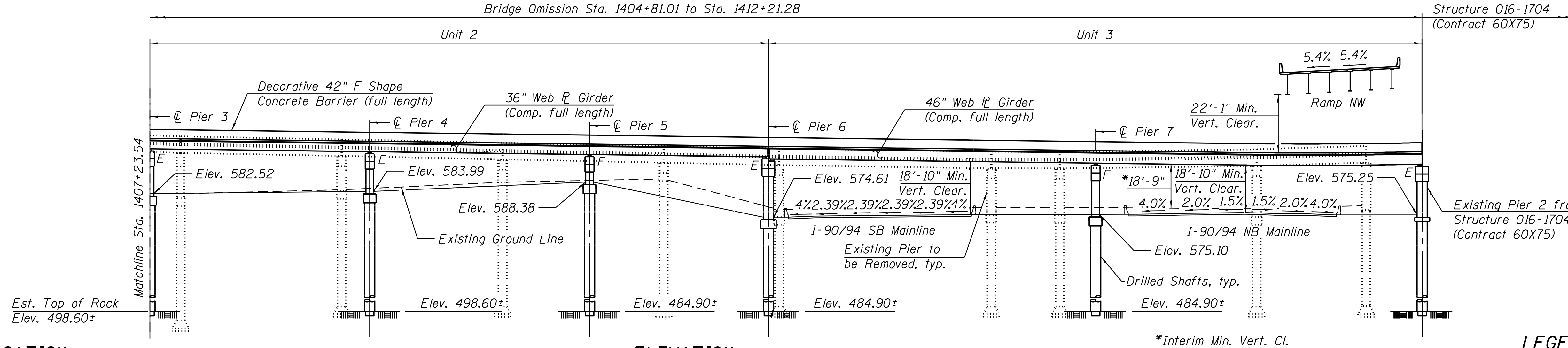
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

SHEET NO. 1 OF 4 SHEETS

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
0094	2014-013 R&B-R	COOK	4	1

CONTRACT NO. 60X93

ILLINOIS FED. AID PROJECT



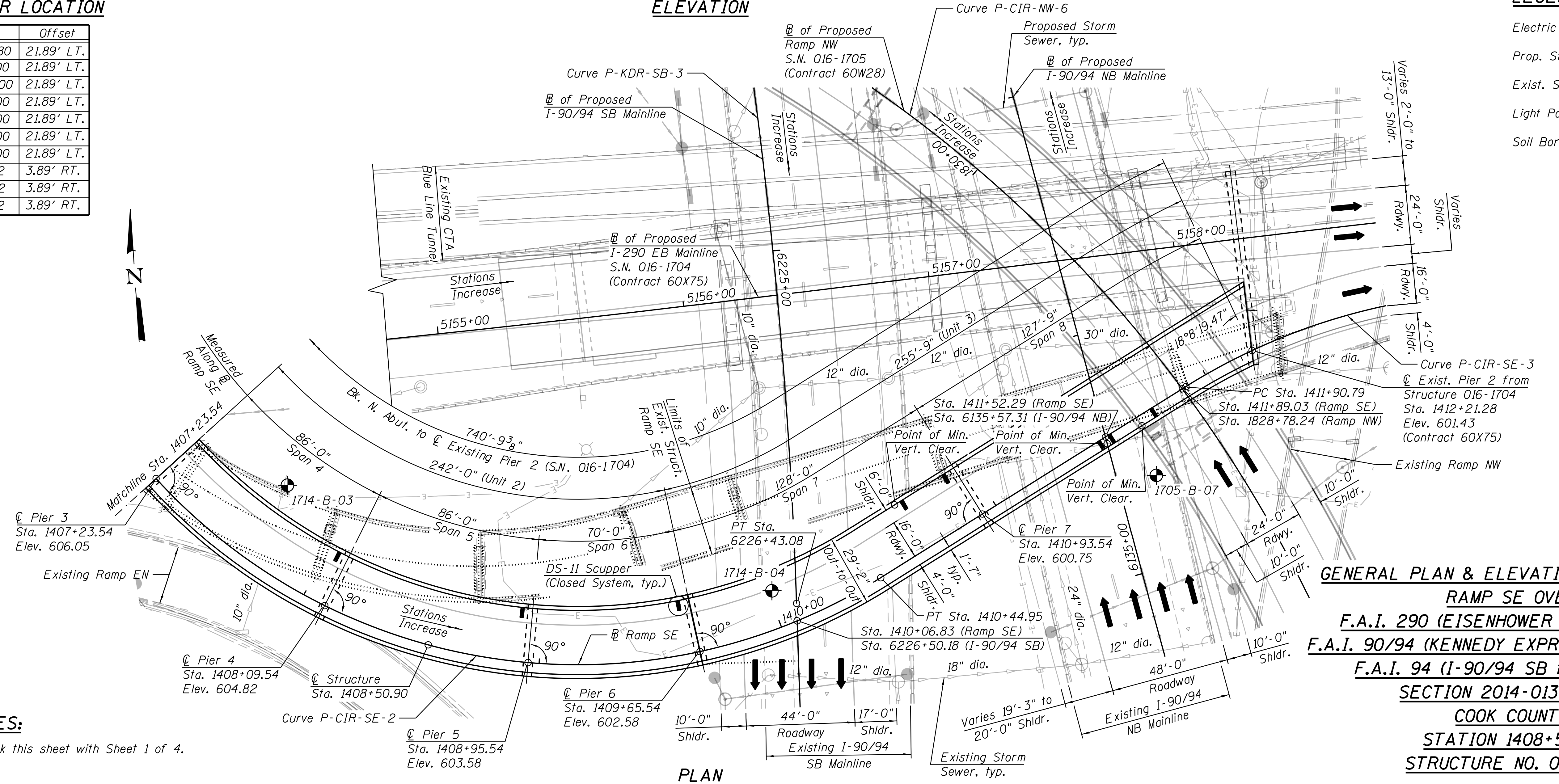
ELEVATION

SCUPPER LOCATION

Station	Offset
1404+91.80	21.89' LT.
1407+19.00	21.89' LT.
1408+05.00	21.89' LT.
1408+91.00	21.89' LT.
1409+61.00	21.89' LT.
1410+69.00	21.89' LT.
1410+89.00	21.89' LT.
1411+49.12	3.89' RT.
1411+54.12	3.89' RT.
1411+74.12	3.89' RT.

LEGEND

Electric	——E——
Prop. Storm Sewer	——▶——▶——
Exist. Storm Sewer	——▷——▷——
Light Pole	¤
Soil Boring	⊕



PLAN

NOTES:

1. Work this sheet with Sheet 1 of 4.

GENERAL PLAN & ELEVATION - UNITS 2&3
RAMP SE OVER
F.A.I. 290 (EISENHOWER EXPRESSWAY),
F.A.I. 90/94 (KENNEDY EXPRESSWAY) AND CTA
F.A.I. 94 (I-90/94 SB to I-290 EB)
SECTION 2014-013 R&B-R
COOK COUNTY
STATION 1408+50.90
STRUCTURE NO. 016-1714

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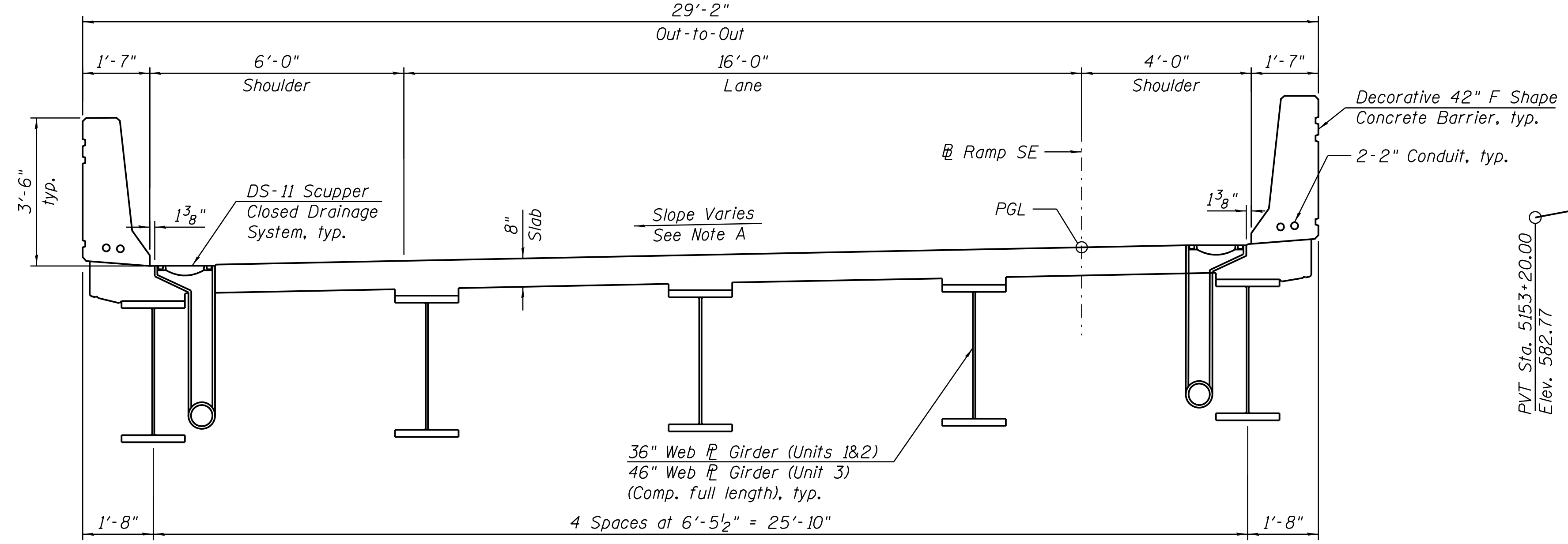
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

SHEET NO. 2 OF 4 SHEETS

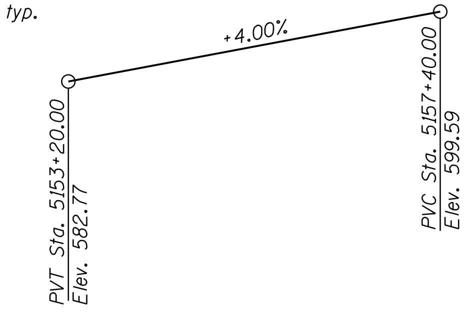
F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
0094	2014-013R&B-R	COOK	4	2
		CONTRACT NO. 60X93		
	ILLINOIS FED. AID PROJECT			



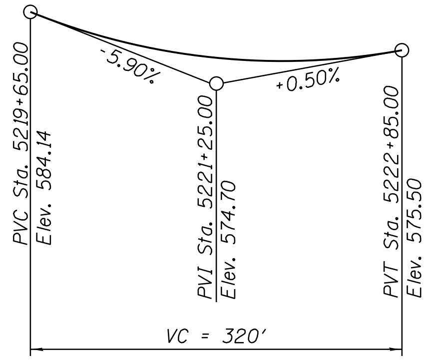
CROSS SECTION
(Looking Upstation)

NOTES:

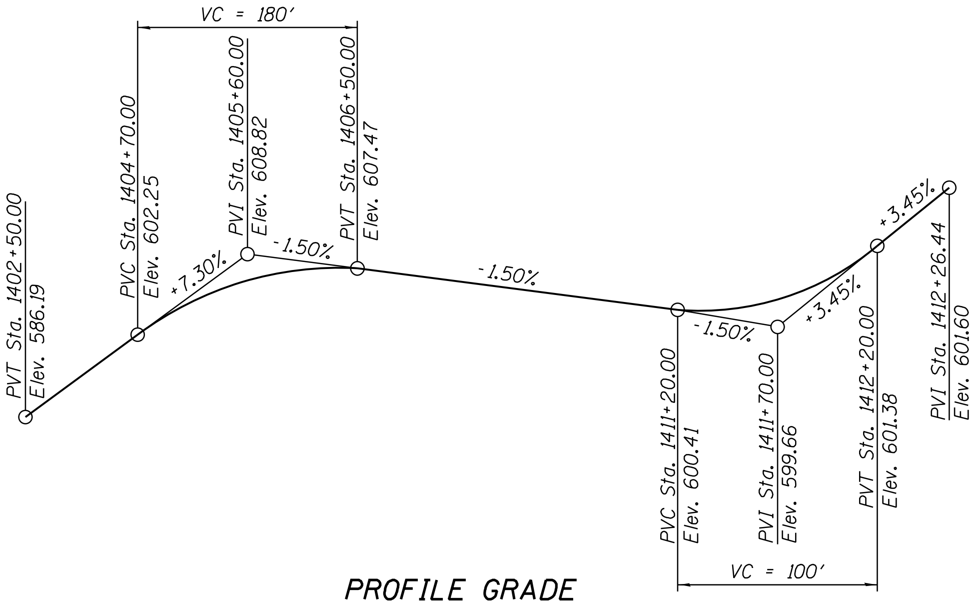
1. Direction of slope referenced from right edge of pavement.
   Cross Slope (-5.60%) Sta. 1404+68.00 to Sta. 1409+90.00
   Transition (-5.60% to 0.00%) Sta. 1409+90.00 to Sta. 1411+19.31
   Transition (0.00% to 5.40%) Sta. 1411+19.31 to Sta. 1412+43.00



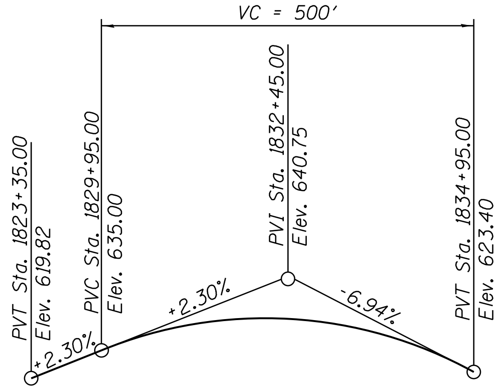
PROFILE GRADE
(Along ℄ EB I-290)



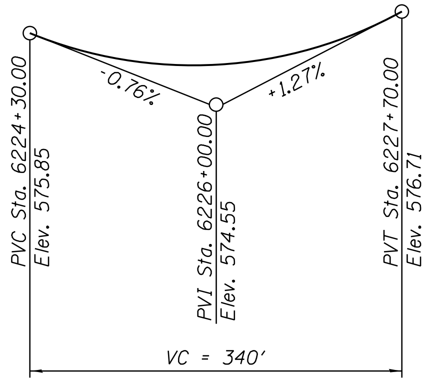
PROFILE GRADE
(Along ℄ WB I-290)



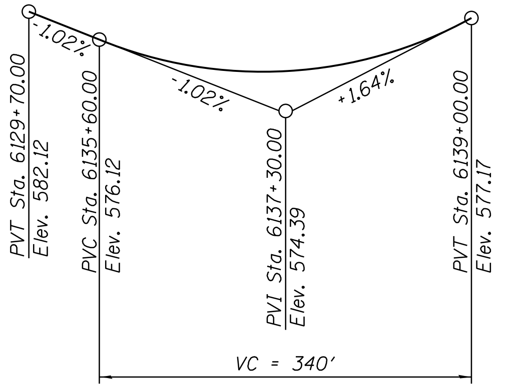
PROFILE GRADE
(Along ℄ Ramp SE)



PROFILE GRADE
(Along ℄ Ramp NW)



PROFILE GRADE
(Along ℄ SB I-90/94)



PROFILE GRADE
(Along ℄ NB I-90/94)

CURVE DATA
(Ramp SE)

P-CIR-SE-2
P.I. Sta. = 1415+83.08
Δ = 157°44'18" (LT)
D = 24°48'12"
R = 231.00'
T = 1174.08'
L = 635.96'
E = 965.59'
e = 5.6%
T.R. = NA
S.E. Run = 128'
P.C. Sta. = 1404+09.00
P.T. Sta. = 1410+44.95

P-CIR-SE-3
P.I. Sta. = 1412+44.91
Δ = 24°25'53" (RT)
D = 22°55'06"
R = 250.00'
T = 54.12'
L = 106.60'
E = 5.79'
e = 5.4%
T.R. = NA
S.E. Run = 78'
P.C. Sta. = 1411+90.79
P.T. Sta. = 1412+97.39

CURVE DATA
(Ramp NW)

P-CIR-NW-6
P.I. Sta. = 1831+44.22
Δ = 88°30'25" (LT)
D = 10°36'37"
R = 540.00'
T = 526.11'
L = 834.16'
E = 213.92'
e = 5.4%
T.R. = NA
S.E. Run = 66'
P.C. Sta. = 1826+18.11
P.T. Sta. = 1834+52.27

CURVE DATA
(F.A.I. Rte. SB 90/94)

P-KDR-SB-3
P.I. Sta. = 6224+30.06
Δ = 11°28'39" (RT)
D = 2°41'06"
R = 2,134.00'
T = 214.46'
L = 427.48'
E = 10.75'
e = 4.2%
T.R. = NA
S.E. Run = 203'
P.C. Sta. = 6222+15.60
P.T. Sta. = 6226+43.08

CROSS SECTION, PROFILE GRADES AND CURVE DATA
RAMP SE OVER
F.A.I. 290 (EISENHOWER EXPRESSWAY),
F.A.I. 90/94 (KENNEDY EXPRESSWAY) AND CTA
F.A.I. 94 (I-90/94 SB to I-290 EB)
SECTION 2014-013R&B-R
COOK COUNTY
STATION 1408+50.90
STRUCTURE NO. 016-1714

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DESIGNED - WJC
CHECKED - MDS/TLR
DRAWN - WJC
CHECKED - MDS/TLR

REVISED -
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REVISED -

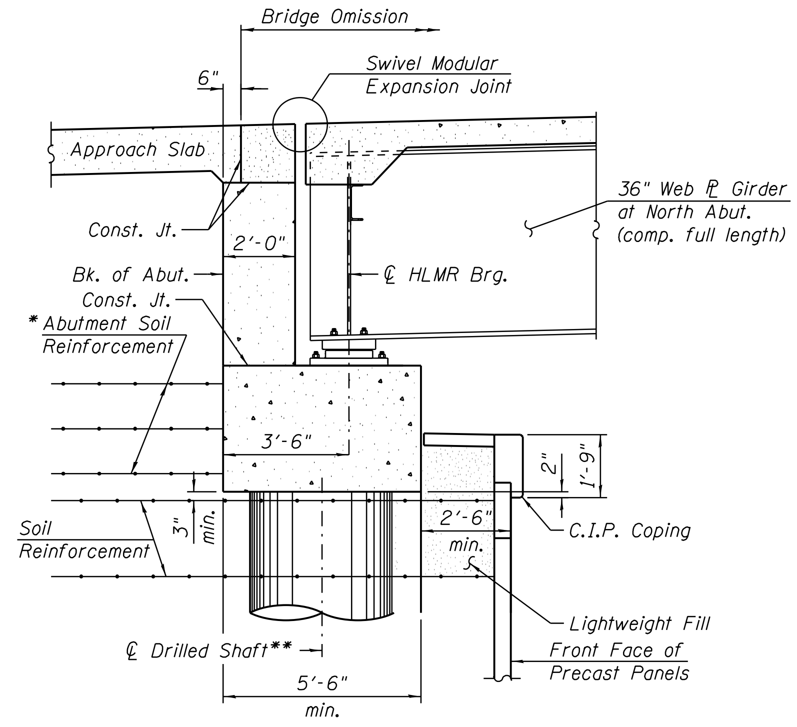
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

SHEET NO. 3 OF 4 SHEETS

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
0094	2014-013R&B-R	COOK	4	3

CONTRACT NO. 60X93

ILLINOIS FED. AID PROJECT

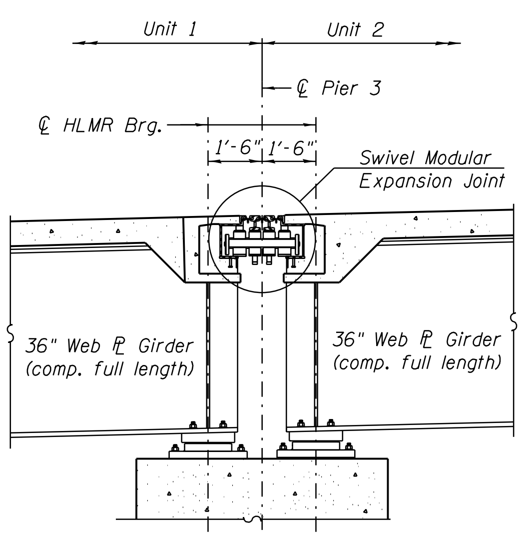


SECTION THRU ABUTMENT

(Horiz. Dim. @ Rt. L's)

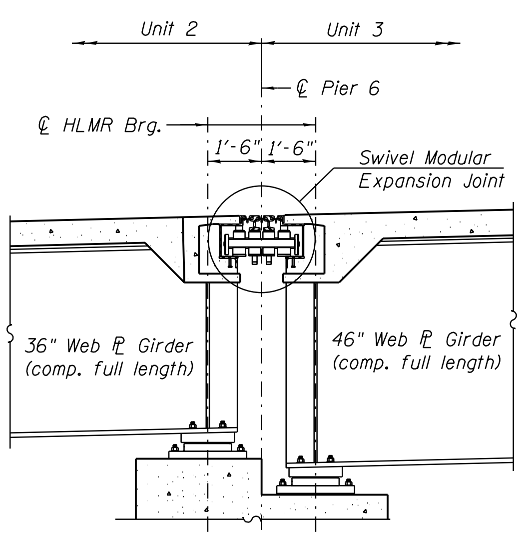
* Abutment Soil Reinforcement to resist lateral loads in lieu of drilled shafts.

** Size, spacing and number to be determined in design.



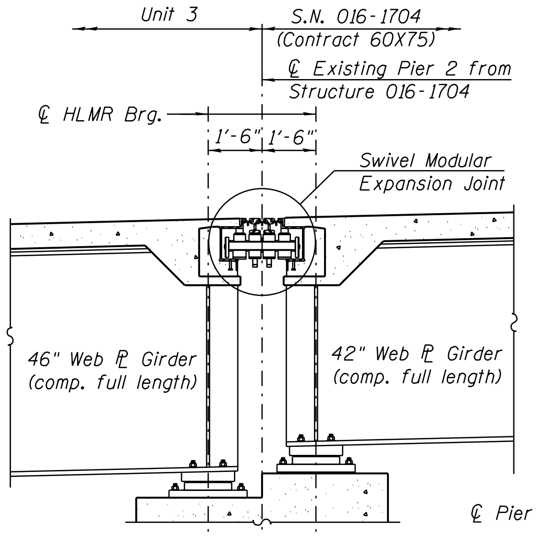
SECTION THRU EXP. PIER

(Horiz. Dim. @ Rt. L's)



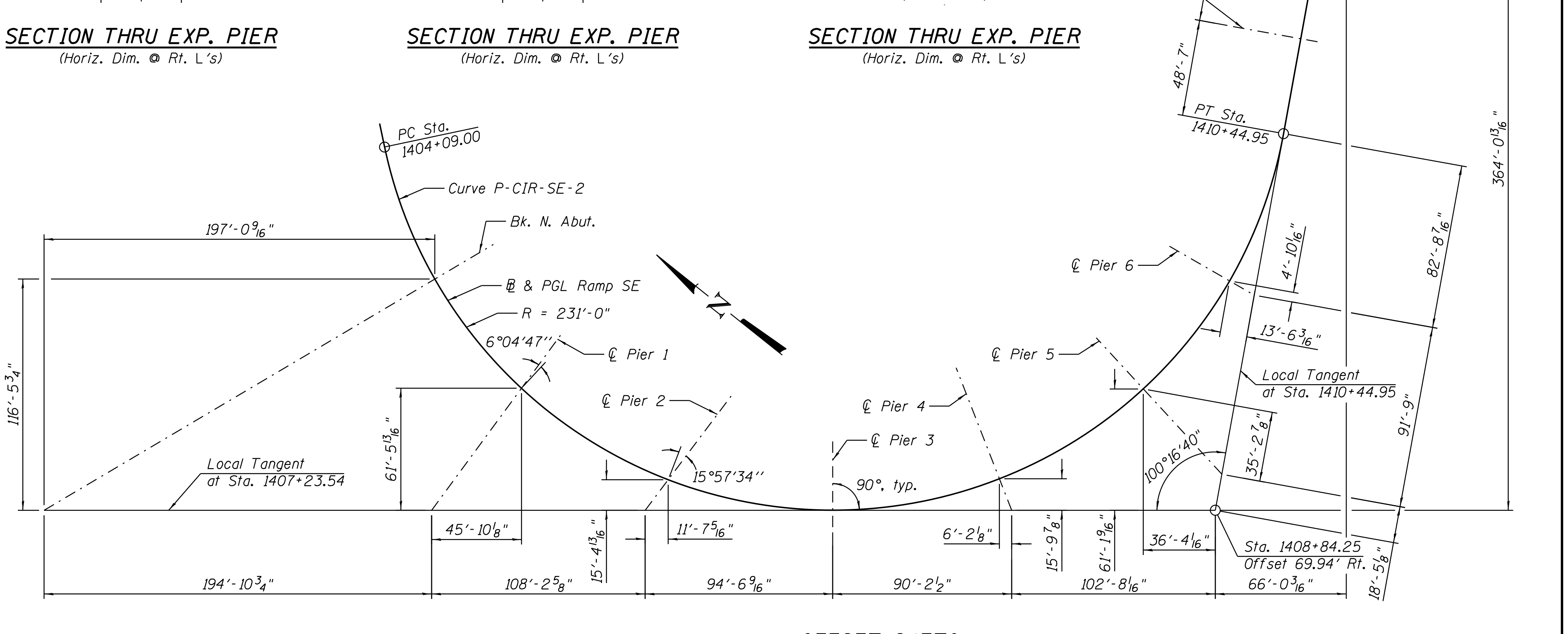
SECTION THRU EXP. PIER

(Horiz. Dim. @ Rt. L's)

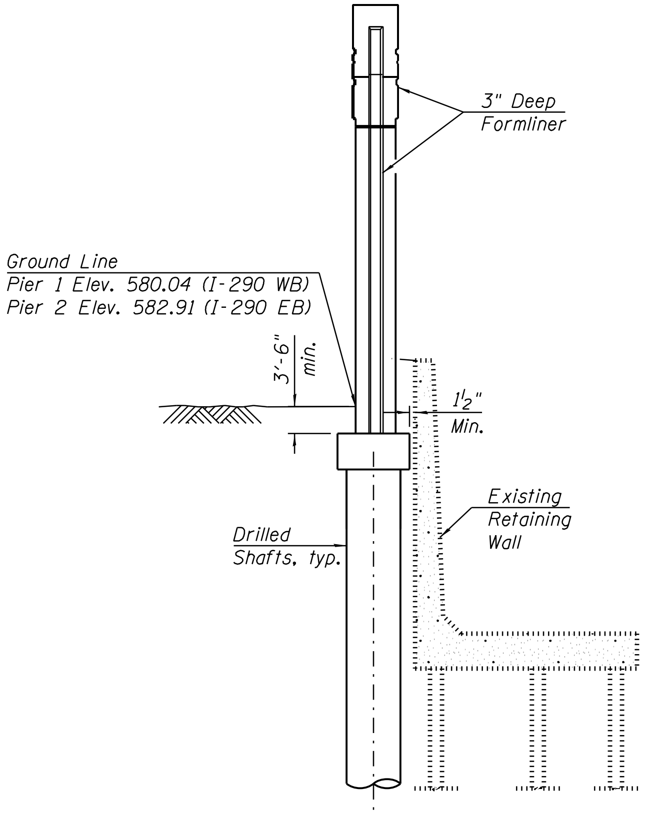


SECTION THRU EXP. PIER

(Horiz. Dim. @ Rt. L's)

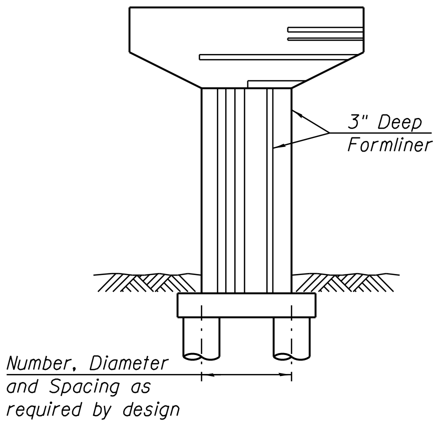


OFFSET SKETCH

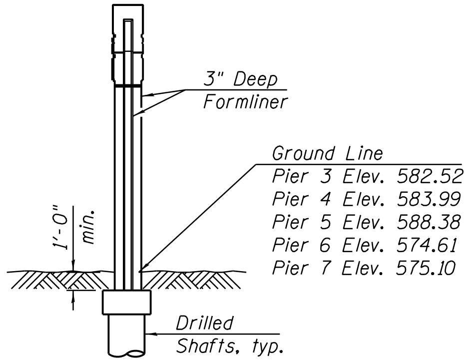


PIERS 1 AND 2 SIDE VIEW

Permanent casing will be required for drilled shafts at Piers 1 and 2.



PIER SKETCH



PIERS 3 THRU 7 SIDE VIEW

SECTION THRU ABUTMENT, PIER AND OFFSET SKETCH
RAMP SE OVER
F.A.I. 290 (EISENHOWER EXPRESSWAY),
F.A.I. 90/94 (KENNEDY EXPRESSWAY) AND CTA
F.A.I. 94 (I-90/94 SB to I-290 EB)
SECTION 2014-013R&B-R
COOK COUNTY
STATION 1408+50.90
STRUCTURE NO. 016-1714

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5/8/2017

TranSystems

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	CHECKED - MDS/TLR	REVISED -
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PLOT DATE = 5/8/2017	CHECKED - MDS/TLR	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

SHEET NO. 4 OF 4 SHEETS

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
0094	2014-013R&B-R	COOK	4	4

CONTRACT NO. 60X93

ILLINOIS FED. AID PROJECT