STRUCTURE GEOTECHNICAL REPORT
CIRCLE INTERCHANGE RECONSTRUCTION
RETAINING WALL 20 (PROPOSED SN 016-1811)
F.A.I ROUTE 90/94/290
IDOT D-91-227-13/ PTB 163-001
COOK COUNTY, ILLINOIS

For

AECOM

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Technical Report Documentation Page

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11. Abstract

A 414.7-foot long, 13.6 feet maximum retained height new Mechanically Stabilized Earth (MSE) retaining walls will be constructed along the back-to-back and extended sections to retain the proposed Ramp EN Bridge east approach as well as the NB CD Road back slope. The proposed back-to-back fill MSE wall wraps around the proposed east abutment of EN Ramp Bridge.

Beneath the pavement or topsoil, the subsurface soils consists of up to 3 to 13 feet of fill materials, up to 5 feet medium stiff to very stiff clay crust, up to 43 feet of very soft to medium stiff silty clay, 25 feet of very stiff to hard clay loam, and 40 feet of hard silty clay loam or dense to very dense silt to silty loam and sand extending to the boring termination depths or weathered bedrock. Sound bedrock was encountered at an elevation of about 490 feet. Groundwater was encountered within the fill layers at elevations of 580 to 589 feet. Groundwater is also present within the granular layers just above the top of bedrock.

For the back-to-back portion of MSE wall between Stations 1610+98.10 and 1611+59.91, the proposed MSE wall is feasible with the use of Class III LCCF fill material. The wall will have a maximum factored bearing resistance of 2,200 psf using a geotechnical resistance factor of 0.65. The maximum long-term consolidation settlement of foundation soils will be less than 1-inch.

For the extended portion of South MSE wall, to minimize the excavation behind the wall between Stations 1611+59.91 and 1613+88.64, we recommend using Class III LCCF with 0.7 H reinforcement width. It should be noted that the normal weight portion of the overall embankment behind the wall system be laid back so it does not exert any earth pressure on the LCCF backfill that is to be placed behind the LCCF MSE Mass. It is understood that an MSE wall was used in this portion because of the presence of a main drain under it at an elevation of about 560 feet.

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1.0 INTRODUCTION

This report presents the results of Wang Engineering, Inc. (Wang) subsurface investigation, laboratory testing, geotechnical engineering evaluations and recommendations for a new retaining wall, designated as SN 016-1811 (Retaining Wall 20) proposed along the east approach of Ramp EN Bridge (SN 016-1712) in connection with the Circle Interchange Reconstruction project in the City of Chicago, Cook County, Illinois. A *Site Location Map* is presented as Exhibit 1.

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

1.1 Project Description

The Circle Interchange is over 50 years old and has significant congestion and safety problems. The project is aiming to improve safety and mobility as well as upgrade the mainline and interchange facilities. The project will also improve other modes of transportation such as transit, pedestrians and bicyclists within the same corridor.

The Circle Interchange Reconstruction project is along Interstate 90/94 (I-90/94) from south of Roosevelt Road to north of Lake Street, along Interstate 290 (I-290) from Loomis Street to the Circle Interchange; and along Congress Parkway from the Circle Interchange to Canal Street/Old Post Office. The routes typically have three lanes of traffic in each direction with mostly one lane ramp at interchanges. Locally, the north leg is known as the Kennedy Expressway, the south leg as the Dan Ryan Expressway and the west leg as the Eisenhower Expressway. Within the project area, there are

several cross street bridges over I-90/94 and I-290 considered for reconstruction. Along I-90/94, from south to north, the cross street overpasses include Taylor Street, Van Buren Street, Jackson Boulevard, and Adams Street. Along I-290, from west to east, the cross street overpasses include Morgan Street, Peoria Street, and Halsted Street.

The proposed improvements include additional through lanes in each direction on I-90/94. The horizontal alignment and vertical profiles throughout the interchange will be improved. A new two-lane flyover, Ramp NW (Flyover) will be constructed for I-90/94 northbound to I-290 westbound traffic. Cross street bridges, Morgan Street, Harrison Street, Halsted Street, Peoria Street, Taylor Street, Adams Street, Jackson Boulevard, and Van Buren Street will be reconstructed. Various existing ramps will be reconstructed and up to fifty new retaining walls will be constructed.

1.2 Proposed Structure

Retaining wall 20 (SN 016-1811) is proposed to support the east approach of the EN Ramp Bridge. Based on the Type, Size, and Location (TSL) plan dated September 22, 2017 provided by HBM Engineering Group, LLC. (HBM), the wall is proposed to be a Mechanically Stabilized Earth (MSE) wall. The north MSE wall begins at Station 1611+59.91 on north side of EN Ramp, wraps the proposed EN Bridge east abutment, and ends at Station 1610+98.10 on south side of EN Ramp. The south wall begins at this point and ends at Station 1613+88.64. The north MSE wall will have a maximum retained of 13.6 feet. The TSL plan is included in the *Appendix D*.

1.3 Existing Structure

There is no existing retaining wall structure due to a new alignment of EN Ramp 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 wall is located in the NW¼ 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 wall 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 ground elevation along the wall ranges from 583 feet at the west end to 591 feet at the east end.

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 at a depth of 102 feet bgs, corresponding to 490 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 NAVD 1988.

3.1 Subsurface Investigation

Wang drilled six structure borings, designated as 20-RWB-01 and 21-RWB-01 through 21-RWB-05 drilled in September to November, 2013. Wang has also referenced two nearby structure borings, designated as 1710-B-01 and 1705-B-06A drilled from July to September, 2013. Wang also performed Boring VST-06 to obtain in-situ vane shear strength of soft clay. The as-drilled boring locations were surveyed by Dynasty Group, Inc. and station and offset information for each boring were provided by AECOM. 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).

ATV- and truck-mounted drilling rigs equipped with hollow stem augers, were used to advance and maintain an open borehole to 10 feet depth after that mud rotary was used to the boring termination depth. 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 to boring termination depths. Soil samples collected from each sampling interval were placed in sealed jars and transported to Wang Geotechnical Laboratory in Lombard, Illinois for further examination and laboratory testing.

Field boring logs, prepared and maintained by a Wang engineer or geologist, 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.

Groundwater observations were made during drilling to a depth of 10 feet before using rotary wash method. Due to safety considerations, boreholes were backfilled with grout immediately upon completion.

3.2 Vane Shear Tests

Wang performed vane shear tests in Boring VST-06. Vane shear test was performed using calibrated RocTest vane shear equipment. Tests were performed in undisturbed and remolded conditions. The sensitivity shown on the boring logs is the ratio of shear strength in undisturbed and remolded conditions. In general, the vane shear values for soft clays were significantly higher than the corresponding values from unconfined compressive strength tests using the RIMAC apparatus. Vane shear test results were used for analyses.

3.3 Laboratory Testing

The soil samples were tested in the laboratory for moisture content (AASHTO T265). Atterberg limits (AASHTO T 89/T 90) and particle size analyses (AASHTO T 88) tests were performed on selected soil samples representing the main soil layers encountered during the investigation. Field visual descriptions of the soil samples were verified in the laboratory. Laboratory test results are shown in the *Boring Logs* (Appendix A), in the *Soil Profile* (Exhibit 4), and in the *Laboratory Test Results* (Appendix B).

4.0 RESULTS OF FIELD AND LABORATORY INVESTIGATIONS

Detailed descriptions of the soil conditions encountered during our 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

Borings drilled on the roadway encountered 13 to 14 inches of concrete overlying 3 to 5 inches of asphalt followed by crushed stone base course. Borings drilled on the grassy area encountered 5 to 12 inches of silty loam topsoil. In descending order, the general lithologic succession encountered

beneath the pavement structure or topsoil includes: 1) man-made ground (fill); 2) medium stiff to very stiff silty clay to silty clay loam; 3) very soft to medium stiff clay to silty clay; 4) stiff to hard clay to silty clay loam; 5) hard silty clay loam and dense to very dense silt to silty loam and gravelly sand; and 6) strong dolostone.

1) Man-made ground (fill)

Underneath the topsoil, pavement structure, or at the surface, the borings encountered 3 to 13 feet of fill materials. Granular fill consists of medium dense to dense, gray crushed stone to brown sandy gravel and sandy loam. Cohesive fill includes very stiff to hard, brown to gray silty clay to silty clay loam and clay loam. The granular fill layer has N-values of 15 to over 50 blows per foot and moisture content values of 6 to 17%. The cohesive fill layer has unconfined compressive strength (Qu) values of 1.0 to 7.8 tsf and moisture content values of 13 to 19%.

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

Beneath the fill, at elevations of 580 to 587 feet, the borings encountered 3 to 5-foot thick of medium stiff to very stiff, brown to gray silty clay to silty clay loam. This layer has Qu values ranging from 0.8 to 3.0 tsf and moisture content values of 17 to 25%. This layer is commonly known as the "crust."

3) Very soft to medium stiff clay to silty clay

At elevations of 574 to 582 feet (3 to 16 feet bgs), the borings revealed up to 43 feet of very soft to medium stiff, gray clay to silty clay with Rimac Qu values of 0.08 to 0.82 tsf and moisture content values of 18 to 29%. Laboratory index testing on samples from this layer showed liquid limit (L_L) values of 31 to 34% and plastic limit (P_L) values of 16 to 17%. This layer is commonly known as the "*Chicago Blue Clay*."

As discussed in Section 3.2, undrained shear strength values from vane shear tests are generally higher than Rimac tests. In-situ undisturbed vane shear strengths obtained in Boring VST-06 between elevations 577 and 542 feet varied from 580 to 980 psf.

4) Stiff to hard clay to silty clay loam

At elevations of 536 to 542 feet (42 to 52 feet bgs), the borings encountered up to 25 feet of stiff to hard clay to silty clay loam. The clay to silty clay has Qu values of 1.2 to 8.5 tsf and moisture content values of 11 to 27%. Laboratory index testing on samples from this layer showed L_L values of 25 to 41% and P_L values of 15 to 18%.

(5) Hard silty clay loam and very dense silt to silty loam and gravelly sand

At elevations of 515 to 531 feet (57 to 82 feet bgs) the borings encountered up to 40 feet of hard silty clay loam to silty loam, dense to very dense silt to silty loam and very dense gravelly sand. This layer has Qu values of greater than 4.5 tsf, moisture content values of 10 to 17%, and N values of 38 to over 50 blows per foot. Numerous sampler refusal and hard drilling conditions were recorded within this layer.

(6) Strong dolostone

The nearby structure boring, 1705-B-06A encountered strong bedrock at elevation of 490 feet or 102 feet bgs. Based on the 10-foot rock core obtained from the borings, the measured RQD value is 62% corresponding fair rock quality. *Bedrock core photograph is* shown in Appendix A.

4.2 Groundwater Conditions

The groundwater was not observed during drilling or after drilling in borings due to the mud rotary drilling from 10 feet bgs. A Piezometer 1703-PZ-01 was installed for the nearby structure about 400 feet north of the proposed retaining wall 20 on November 12, 2014 and monitored until July 2017. The screen was placed with the top and bottom elevations at 507.2 and 487.2 feet (75 to 95 feet bgs), respectively within granular layers above bedrock. A summary of the monitoring data between November 2014 and March 2017 is shown in Figure 1.

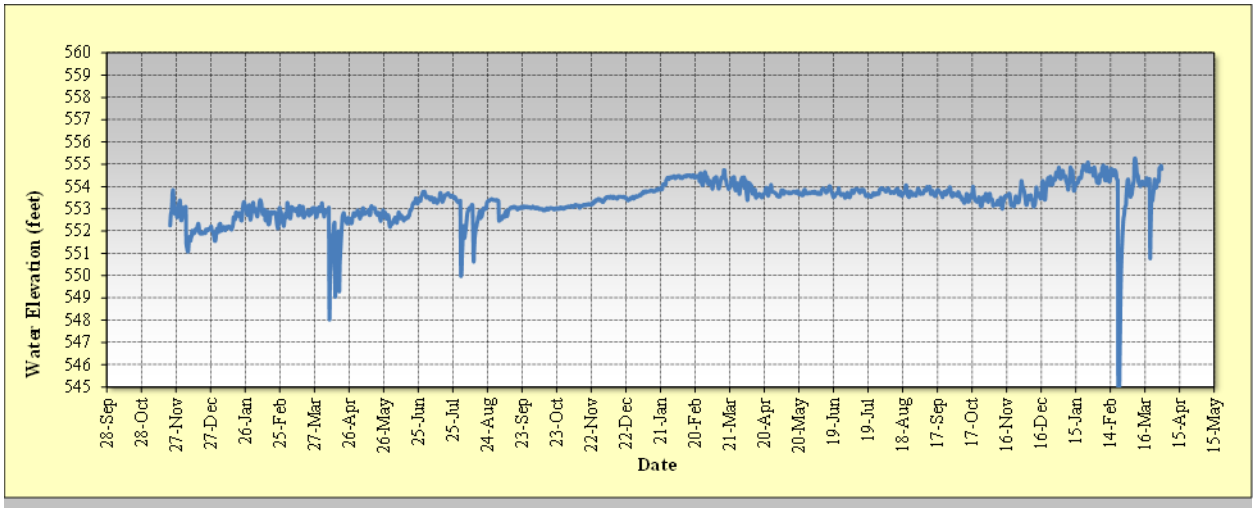

Figure 1: Summary of Groundwater Monitoring Data

The data shows groundwater that is under hydrostatic pressure head. The average hydrostatic elevation within the aquifer is about 553 feet. However, the hydrostatic pressure will not impact the proposed Wall 20 construction since the MSE wall is proposed at much higher elevations.

Although groundwater was not observed within upper fill layers, we anticipate perched water may be encountered during times of heavy precipitation. Therefore, the design and construction of the wall should consider the perched water between 589 and 580 feet elevations within the fill layers with permanent groundwater elevation for 553 feet.

4.3 Seismic Design Considerations

The retaining wall is located in Seismic Performance Zone (SPZ) 1 and is not required to be designed for seismic forces as per 2012 IDOT *Bridge Manual* (IDOT 2012).

5.0 ANALYSIS AND RECOMMENDATIONS

5.1 Retaining Wall Type Evaluation

Based on the TSL plan, the proposed Retaining Wall 20 is mostly fill wall between Station 1610+99.10 and Station 1611+59.91 retaining the east approach of the Ramp EN Bridge then it becomes a primarily cut wall between Station 1611+59.91 and Station 1613+88.64 to retain EN Ramp embankment and northbound CD Road backslope. The back-to-back portion of the MSE wall is fill wall and will have a maximum retained height of approximately 13.5 feet and a maximum wall

height measured from the top of levelling pad to the top of Coping/Finished Grade at B.F. of wall will be 17.0 feet. The extended portion of MSE wall is a cut wall and will have a maximum total height of 14.2 feet and a maximum retained height of 10.7 feet.

Consideration was given in using standard cast-in-place concrete cantilever (T-type) with spread footings; however, it was ruled out due to low bearing resistance and excessive settlements of foundation soils. They would need to be supported on driven piles or drilled shafts. Driven piles are not considered suitable due to noise and vibration concerns but drilled shafts placed on hardpan could be used. The proposed MSE wall is a feasible option but will require preloading or ground improvement with lightweight fill to satisfy the maximum 1-inch settlement criterion for the roadway for back-to-back portion of the wall.

The following sections present the results of our geotechnical engineering analyses and recommendations for the MSE wall design and construction.

5.2 Back-to-Back MSE Wall Section

This section covers our evaluations and recommendation for the back-to-back MSE wall section. The MSE retaining wall base should be established a minimum of 3.5 feet below the finished grade at the front face of the wall for frost protection. The proposed MSE walls on the north and south sides are back-to-back wall sections and are retaining new fill. We note that there is an existing main drain alignment enters the wall area at an approximate Station 1610+70 on the south side, primarily follows the right edge right side wall on the south side and exits at an approximate Station 1612+30 on the south side. Based on the cross sections, the existing main is a 4.5-foot wide and 4.0-foot high with an invert elevation of 556.85 feet.

5.2.1 Bearing Resistance and External Stability Analyses

Based on our boring data, the foundation soils at the MSE wall base elevations includes about 3.5 feet of granular fill overlying up to 35 feet of soft to medium stiff clay to silty clay. We estimate, without treatment, the foundation soils will have a nominal bearing resistance of 3,400 psf and a factored bearing resistance of 2,200 psf based on a geotechnical resistance factor of 0.65 (AASHTO 2014).

We analyzed the following options to satisfy the factored bearing resistance available, external stability, and settlement. A reinforcement length equal to 70 percent of the total wall height or a minimum of 8 feet was used.

1. Using regular fill material (unit weight of 125 pcf) for the MSE wall zone and fill area; and
2. Using IDOT District One Class III Lightweight Cellular Concrete Fill (LCCF) for the MSE reinforcement zone between the back-to-back walls.

For the Option 1, at the highest portion of the wall near Station 1611+04.56, the wall will apply a maximum factored equivalent bearing pressure of 4,750 psf with a regular MSE wall fill material (unit weight is 125 pcf) which exceeds the factored bearing resistance available, thus Option 1 is not feasible.

In Option 2, to reduce the applied wall pressure, we have considered IDOT District One Class III LCCF with unit weight of 42 pcf for the MSE wall zone, and fill area in the back-to-back wall. There are no lateral forces pushing the wall; therefore, eccentricity is not a concern. We estimate the wall will apply a maximum equivalent factored bearing pressure of 1,700 psf; thus, the foundation soils will have sufficient bearing resistance to support the wall. This option is recommended.

The estimated friction angle between an MSE wall base and underlying cohesive soil is 30º, and the corresponding friction coefficient is 0.58. MSE retaining walls are designed based on a geotechnical sliding resistance factor of 1.0 for soil-on-soil contact (AASHTO 2014).

5.2.2 Settlement Analyses

We performed settlement analyses using data from Borings 20-RWB-01 and 21-RWB-01 since it is more conservative and closest to maximum height of the wall. We calculated the corresponding long-term settlement of cohesive foundation soils using IDOT *Spreadsheet for Cohesive Soils* dated December 9, 2014.

We noted that in calculating the net service pressure for settlement evaluations, the effect of excavation required to the MSE wall base was taken into consideration. The estimated long-term settlement at the maximum height was less than 1 inch, which is governed by the roadway.

5.2.3 Global Stability Analyses

With Class III LCCF being used as a fill material in reinforced zone and in between the walls and the whole mass will act as rigid body with significant reduction of the driving forces, we do not see global instability concerns for the proposed back-to-back MSE retaining wall section.

5.3 Extended South MSE Wall Section

The extended MSE Wall section between Station 1611+59.91 and 1613+88.64 is a primarily cut wall to retain the proposed Ramp EN embankment and the proposed Northbound CD Road backslope. The MSE retaining wall base should be established a minimum of 3.5 feet below the finished grade at the front face of the wall for frost protection. For open cut excavations needed for the MSE Wall, the excavation backslope shall be 1:1.5 (V:H) and be backfilled with LCCF in order to reduce lateral pressure exerted by regular backfill on the LCCF fill. It is understood that an MSE wall was used in this portion because of the presence of a main drain under it at an elevation of about 560 feet.

5.3.1 Bearing Resistance and External Stability Analyses

Based on our boring data, the foundation soils at the MSE wall base elevations includes about 3 feet of stiff to very stiff silty clay overlying up to 40 feet of soft to medium stiff clay to silty clay. We estimate the foundation soils will have a nominal bearing resistance of 3,100 psf and a factored bearing resistance of 2,000 psf based on a geotechnical resistance factor of 0.65 (AASHTO 2014).

We have considered reinforcement lengths equal to 70 percent of the total wall height or a minimum of 8 feet. We have analyzed several alternatives for the fill material to be used in the reinforcement zone and fill area on top of 1:1.5 (V:H) excavation back-slope, as follows:

1. Using regular fill material (unit weight of 125 pcf) for the MSE wall zone fill area;
2. Using IDOT District One Class III LCCF for the MSE reinforcement zone and on top of laid back excavation back-slope.; and
3. Using IDOT District One Class III LCCF (unit weight of 42 pcf) for the bottom MSE wall zone and regular fill (unit weight of 125 pcf) for the top 3 feet of MSE wall zone fill area, and on top of laid back excavation back-slope.

For the Option 1, at the highest portion of the wall near Station 1611+59.91, the wall will apply a maximum factored equivalent bearing pressure of 4,150 psf for 0.7 H reinforcement length with

regular MSE wall fill material (unit weight is 125 pcf) which exceeds the factored bearing resistance available.

For the Option 2, we have considered Class III LCCF for the MSE wall reinforcement zone and on top of laid back excavation back-slope, thus no lateral push was considered. We estimate the wall will apply a maximum factored equivalent bearing pressure of 1,250 psf, thus the foundation soils will have sufficient bearing resistance to support the wall.

For the Option 3, we have considered Class III LCCF for bottom of the MSE wall and regular fill for the top 3 feet of the MSE wall and on top of laid back excavation back-slope. We estimate the wall backfilled with Class III LCCF will apply a maximum equivalent factored bearing pressure of 1,900 psf, thus the foundation soils will have sufficient bearing resistance to support the wall. The wall will have an adequate resistance against sliding.

The estimated friction angle between an MSE wall base and underlying cohesive soil is 30º, and the corresponding friction coefficient is 0.58. MSE retaining walls are designed based on a geotechnical sliding resistance factor of 1.0 for soil-on-soil contact (AASHTO 2014).

To minimize the excavation behind the wall, we recommend Options 2 or Option 3 with 0.7 H reinforcement width for the extended wall section. It should be noted that the normal weight portion of the overall embankment behind the wall system be laid back so it does not exert any earth pressure on the LCCF backfill that is to be placed behind the LCCF MSE Mass.

5.3.2 Settlement Analyses

For the Options 2 and 3, considering the unloading and reloading effect and the placement of LCCF in at least the half of MSE Wall zone area, the estimated long-term settlement will be 1 inch or less.

5.3.3 Global Stability Analyses

Global stability analysis was performed for the MSE wall maximum section with total height of 14.2 feet for both short-term (undrained) and long-term (drained). The computer program, SLIDE Version 6.0, was used to calculate the factor of safety (FOS). We estimate the maximum wall section has a short-term factor of safety (FOS) of 2.4 and a long-term FOS of 2.3 (Appendices C-1 and C-2), therefore satisfying the minimum IDOT FOS requirements (IDOT, 2015). The undrained analysis for

temporarily excavated ground sloped at 1:1.5 (V:H) before construction of MSE wall showed FOS of 2.6 (Appendix C-3).

6.0 CONSTRUCTION CONSIDERATIONS

6.1 Excavation

Any required excavations should be performed in accordance with local, state, and federal regulations including current OSHA regulations. The potential effect of ground movements upon nearby structures and utilities should be considered during construction. The extended portion of south wall will require temporary open cut excavations that could have maximum back-slope of 1:1.5 (V:H), depending on actual ground conditions encountered during construction.

6.2 Dewatering

Based on the results of our investigation and proposed excavation for the wall, perched water is likely to be encountered during construction during times of heavy precipitation which should be removed through conventional sump and pump methods.

6.3 Filling and Backfilling

All fill and backfill materials will be as per IDOT *Standard Specification for Road and Bridge Construction* (IDOT 2016).

6.4 Wall Construction

The wall should be constructed as per IDOT *Standard Specification for Road and Bridge Construction* (IDOT 2016). Class III LCCF should be as per IDOT District One special provision.

6.5 Construction Monitoring

There is no need for special construction monitoring for the retaining wall except normally required by the IDOT *Standard Specification for Road and Bridge Construction* (IDOT 2016).

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 Retaining Wall 20 (SN016-1811) 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.

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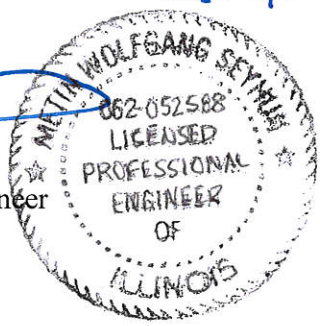

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REFERENCES

AMERICAN ASSOCIATION OF STATE HIGHWAY TRANSPORTATION OFFICIALS (2014) *LRFD Bridge Design Specifications*. United States Department of Transportation, Washington, D.C.

BAUER, R.A., CURRY, B.B., GRAESE, A.M., VAIDEN, R.C., SU, W.J., and HASEK, M.J., 1991, *Geotechnical Properties of Selected Pleistocene, Silurian, and Ordovician Deposits of Northeastern Illinois*: Environmental Geology 139, Illinois State Geological Survey, 69 p.

HANSEL, A.K., and JOHNSON, W.H. (1996) W*edron and Mason Groups: Lithostratigraphic Reclassification of the Wisconsin Episode, Lake Michigan Lobe Area: ISGS Bulletin 104.* Illinois State Geological Survey, Champaign, IL. 116 p.

LEETARU, H.E., SARGENT, M.L., AND KOLATA, D.R, 2004, *Geologic Atlas of Cook County for Planning Purposes*, ISGS, Champaign, IL

ILLINOIS DEPARTMENT OF TRANSPORTATION (2015) *Geotechnical Manual.* IDOT Bureau of Materials and Physical Research, Springfield, IL.

ILLINOIS DEPARTMENT OF TRANSPORTATION (2016) *Standard Specifications for Road and Bridge Construction.* IDOT Division of Highways, Springfield, IL.

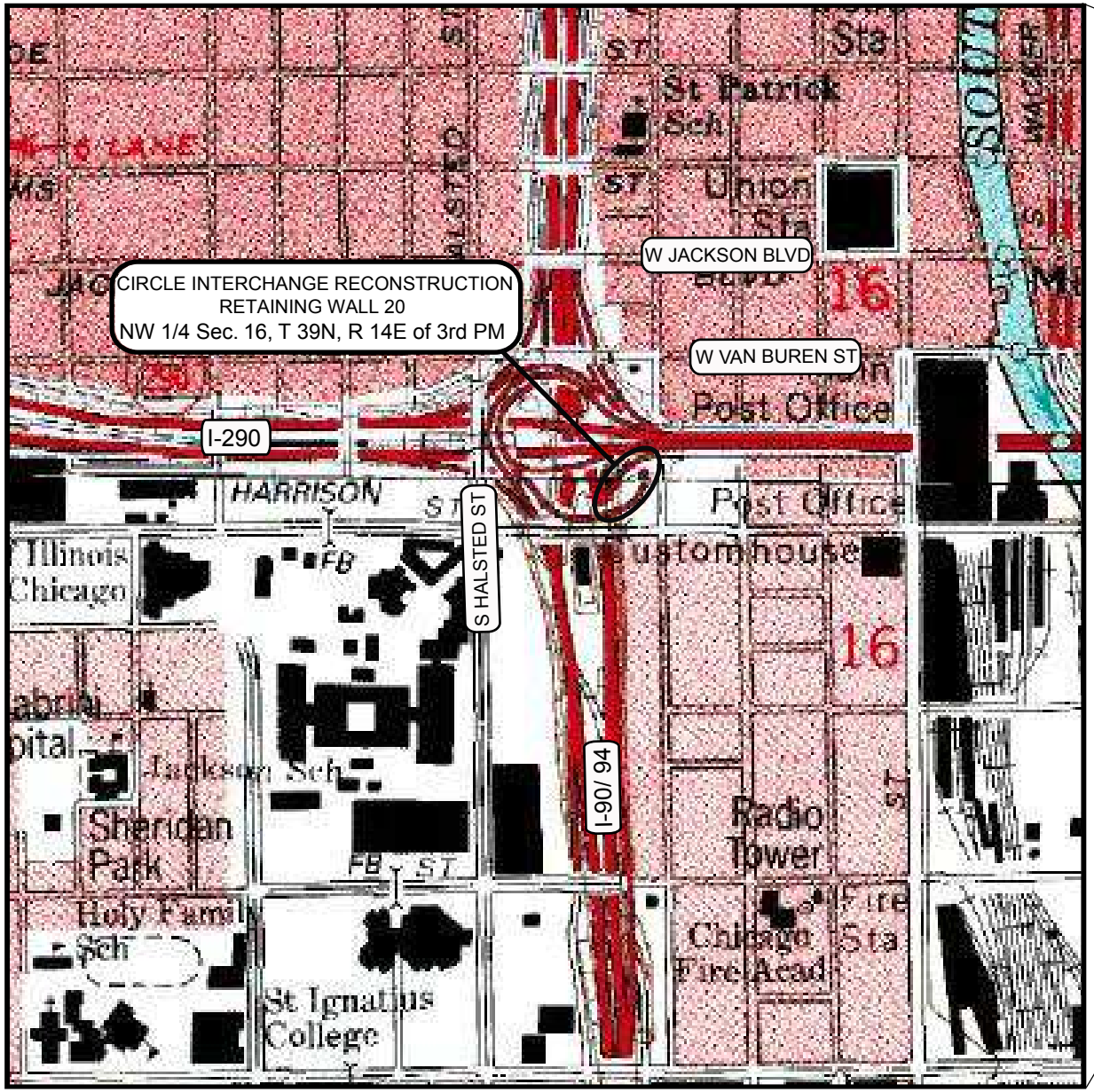
ILLINOIS DEPARTMENT OF TRANSPORTATION (2012) *Bridge Manual.* IDOT Bureau of Bridges and Structures, Springfield, IL.

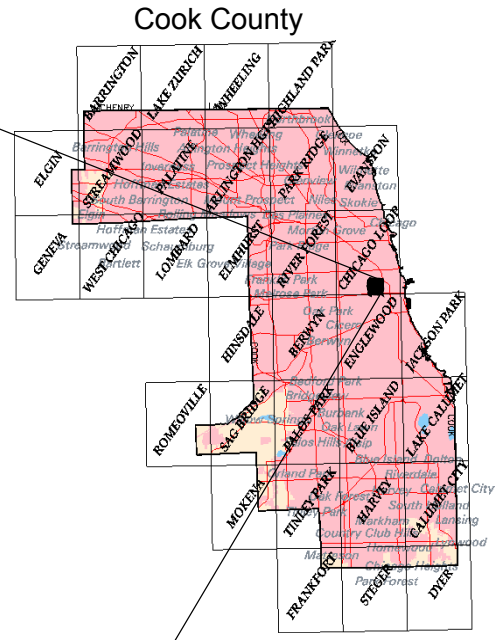
WILLMAN, H.B., 1971, *Summary of the Geology of the Chicago Area*, ISGS Circular C460: Urbana, Illinois State Geological Survey, p. 77.

PECK, R.B., and REED, W.C., 1954, *Engineering Properties of Chicago Subsoils*: University of Illinois Engineering Experiment Station Bulletin No. 423: Urbana, University of Illinois, 62 p.

FEDERAL HIGHWAY ADMINISTRATION (1983) *Design and Construction of Stone Columns Vol 1*. US Department of Transportation Report No. FHWA/RD-83/026, McLean, Virginia.

EXHIBITS





SITE LOCATION MAP: CIRCLE INTERCHANGE RECONSTRUCTION, RETAINING WALL 20, SN 016-1811, CHICAGO, IL

SCALE: GRAPHICAL	EXHIBIT 1	DRAWN BY: RKC CHECKED BY: NSB

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Lombard, IL 60148
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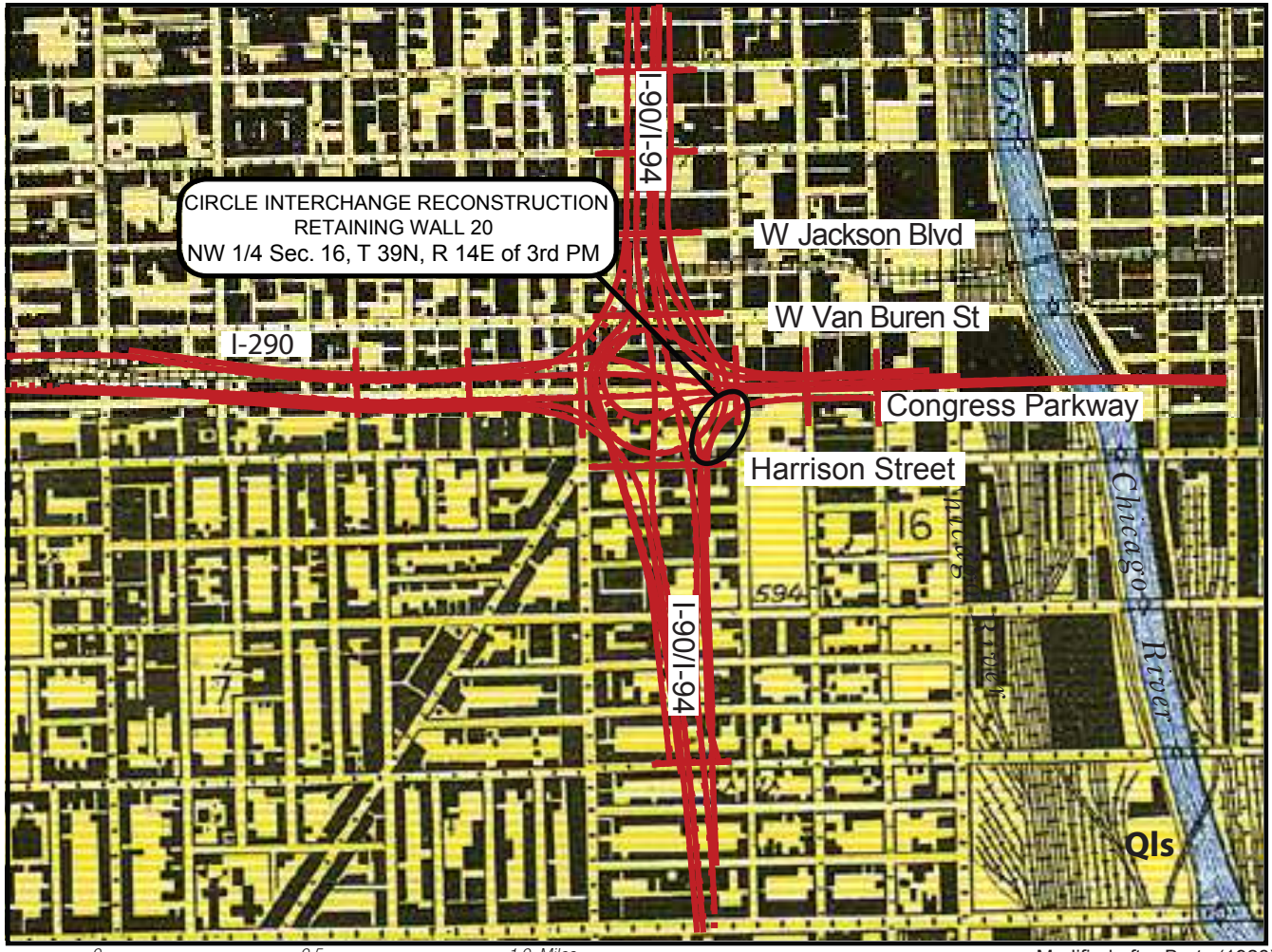
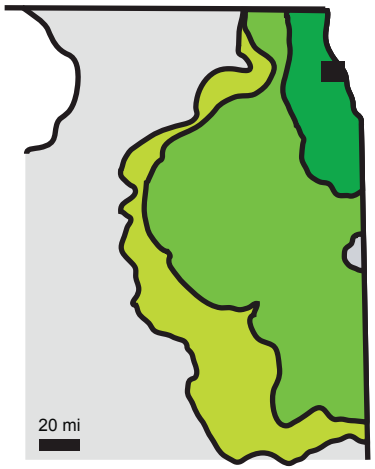


Modified after Bretz (1926)

N

REGIONAL GEOLOGY



Wedron Group

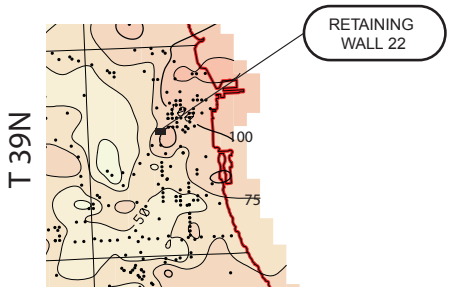
- Wadsworth Formation
- Lemont Formation
- Tiskilwa Formation

Modified after Hansel and Johnson (1996)

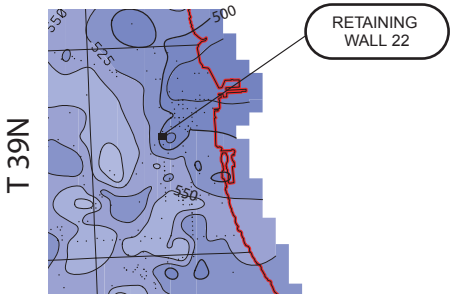
Legend

Qls — Glacial lake bottom
(Covered by lacustrine deposits)

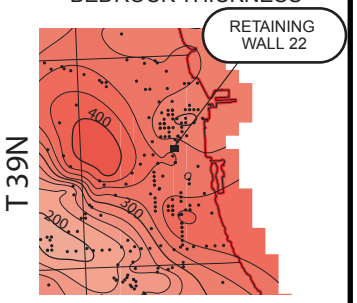
DRIFT THICKNESS



BEDROCK TOPOGRAPHY



BEDROCK THICKNESS



Modified after Leetaru et. al. (2004)

0 2 4 8 miles

SITE AND REGIONAL GEOLOGY: CIRCLE INTERCHANGE RECONSTRUCTION, RETAINING WALL 20, SN 016-1811, CHICAGO, IL

SCALE: GRAPHICAL	EXHIBIT 2	DRAWN BY: RKC CHECKED BY: NSB

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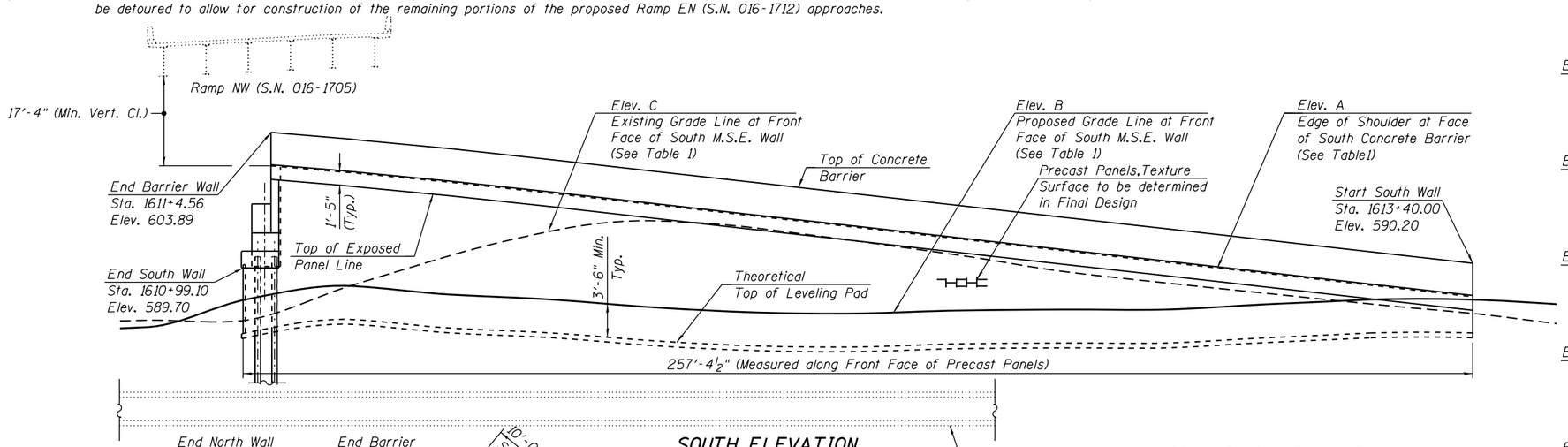
Benchmark: Cut square on center of door entrance to 707 W. Harrison St. (south side of Harrison St., approx. 90' west of west line of Des Plaines St.). Elevation 597.47.

Existing Structure: None. Traffic shall be maintained on the existing Ramp EN Structure (S.N. 016-2453) during construction of the proposed retaining wall. Subsequently, traffic shall be detoured to allow for construction of the remaining portions of the proposed Ramp EN (S.N. 016-1712) approaches.

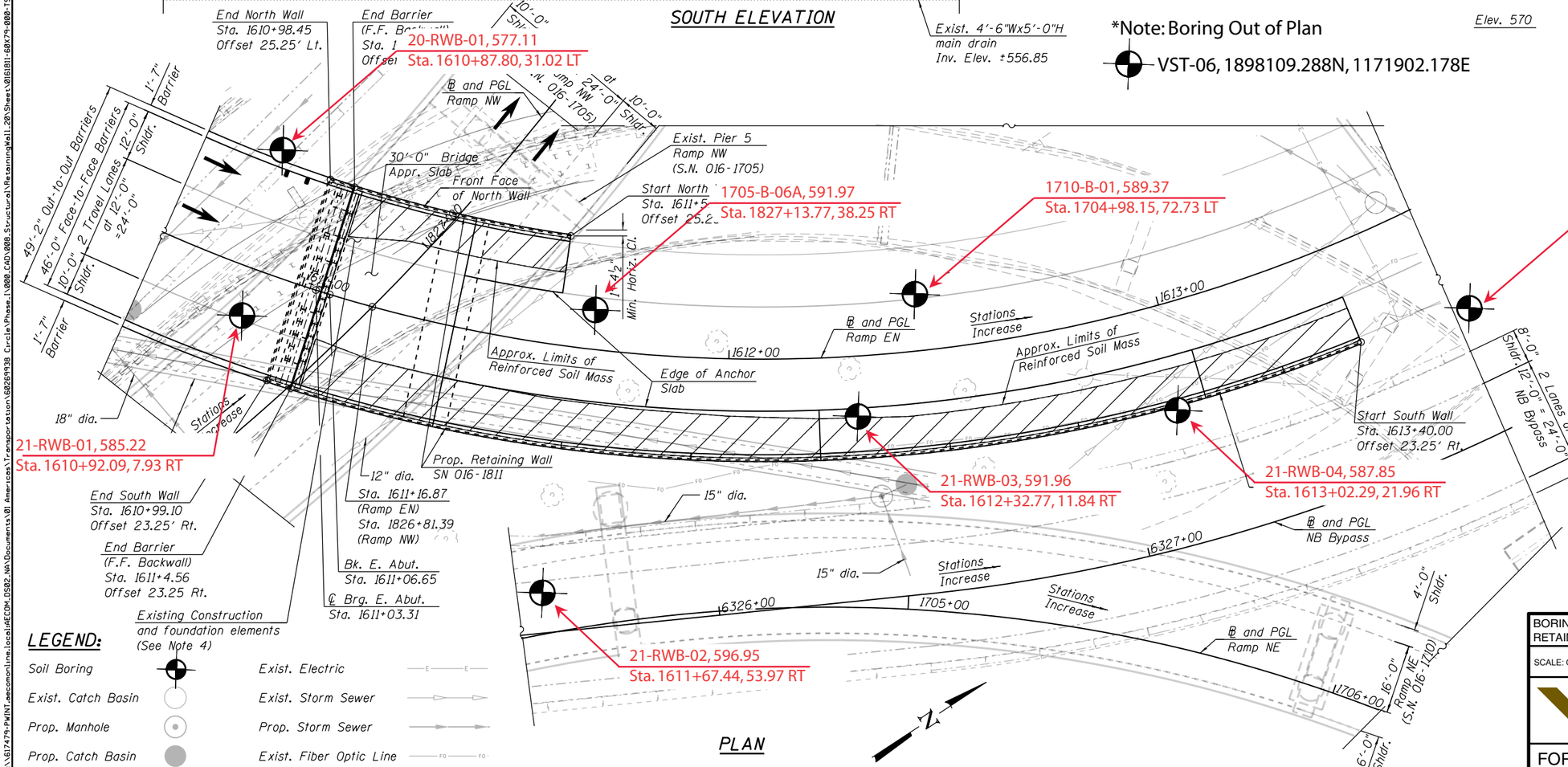


SOUTH ELEVATION

Exist. 4'-6"Wx5'-0"H main drain Inv. Elev. ±556.85

*Note: Boring Out of Plan

VST-06, 1898109.288N, 1171902.178E



PLAN

LEGEND:

Soil Boring	Exist. Electric
Exist. Catch Basin	Exist. Storm Sewer
Prop. Manhole	Prop. Storm Sewer
Prop. Catch Basin	Exist. Fiber Optic Line

HIGHWAY CLASSIFICATION

Ramp EN
Functional Class: Interstate
ADT: 26,600 (2012); 31,000 (2040)
ADTT: 1,032 (2012); 1,203 (2040)
DHV: 1,910 (2040)
Design Speed: 30 m.p.h.
Posted Speed: 30 m.p.h.
One-Way Traffic
Directional Distribution: 100%

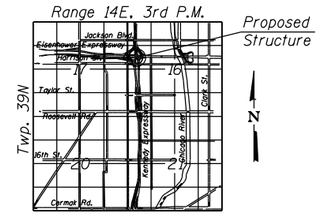
GENERAL PLAN
RETAINING WALL 20
F.A.I. RTE. 90/94/290 - SECTION 2014-005R&B
COOK COUNTY
STATION 1610+97.82 TO 1613+40.00
STRUCTURE NO. 016-1811

SEISMIC DATA

Seismic Performance Zone (SPZ) = 1
Design Spectral Acceleration at 1.0 sec. (SD1) = 0.085g
Design Spectral Acceleration at 0.2 sec. (SDS) = 0.144g
Soil Site Class = D

NOTES:

1. For North and East Abutment MSE Wall Elevations and additional Highway Classification Data, see Sheet 2.
2. For Table 1, Profile Grade Lines and Curve data, see Sheet 3..
3. Horizontal dimensions measured along Front Face of Precast Panels relative to ℄ Ramp EN.
4. [illegible] ont Face of
5. Existing Construction and foundation elements (sheet piling, drilled shafts, steel piles, ets.) are present at the proposed location of North wall. Methods for resolving potential conflicts will be determined during the design phase.



LOCATION SKETCH

BORING LOCATION PLAN: CIRCLE INTERCHANGE RECONSTRUCTION, RETAINING WALL 20, SN 016-1811, CHICAGO, IL

SCALE: GRAPHICAL	EXHIBIT 3	DRAWN BY: RKC CHECKED BY: NSB

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FILE PATH = pw:\\617479-PWINT.aecomonline.local\AECOM_0502_NA\Documents\01 Americas\Transportation\60269938 Circle\Phase 1\000_CAD\008 Structural\Retaining Wall 20\Sheet\016181-60X79-000-TSL-001

HBM ENGINEERING GROUP, LLC
CONSULTING & DESIGN INSPECTION & RATING RESEARCH & TESTING
4415 WEST HARRISON ST. SUITE 231 HILLSIDE, IL 60162 PHONE: (708) 236-0900 FAX: (708) 236-0901

USER NAME = Ken.drabant	DESIGNED - MI, JJS	REVISED -	
	DRAWN - SK	REVISED -	
PLOT SCALE = 28.00 ' / in.	CHECKED - MAI, MI	REVISED -	
PLOT DATE = 9/15/2017	DATE - 08/11/2017	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

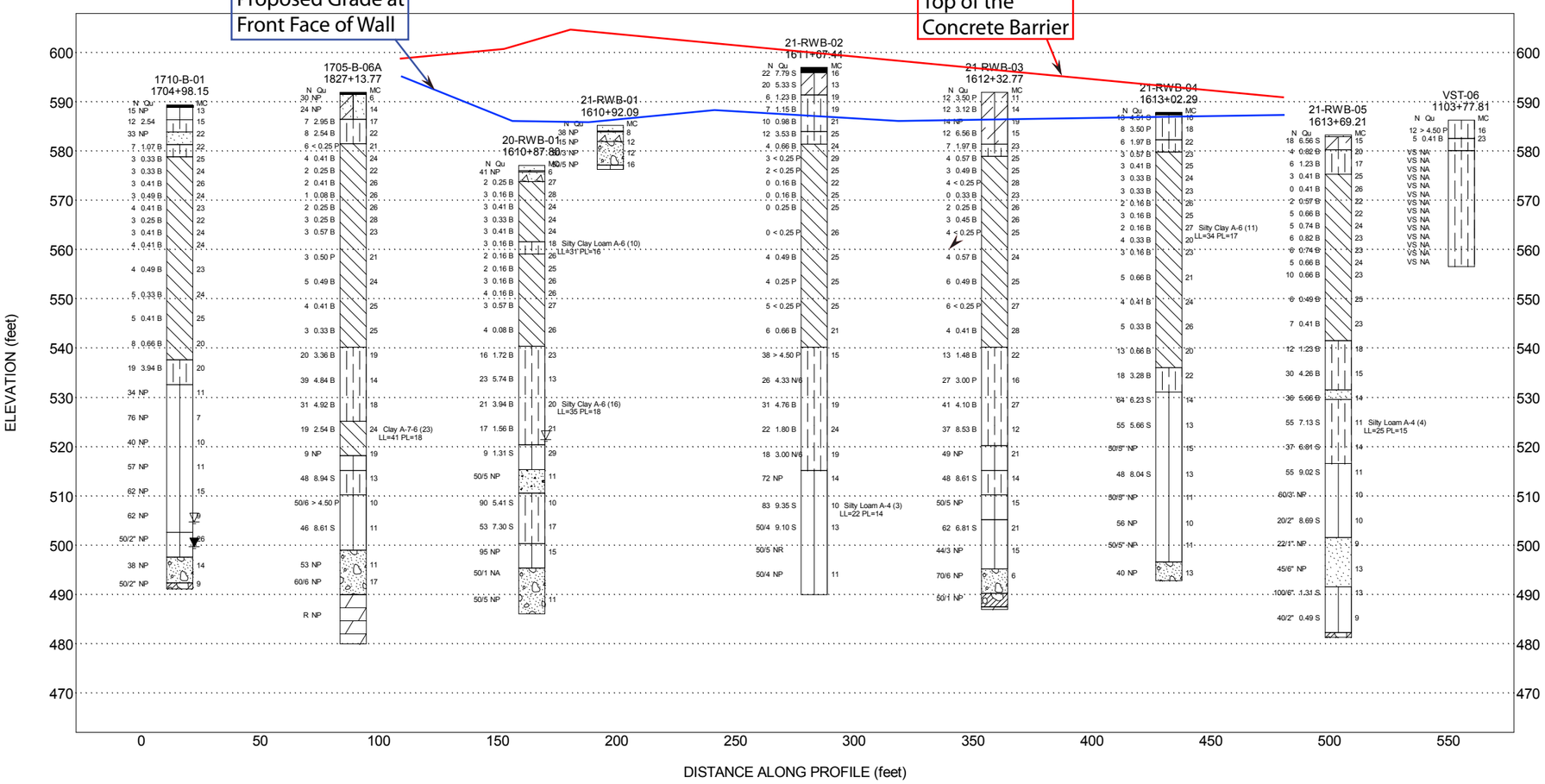
STRUCTURE NO. 016-1811

SCALE: | SHEET 1 OF 3 SHEETS | STA. | TO STA.

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
90/94/290	2014-005R&B	COOK	3	1
		CONTRACT NO. 60X79		
	ILLINOIS	FED. AID PROJECT		

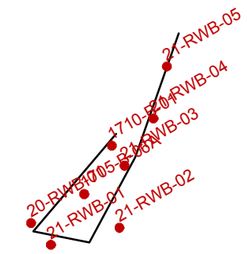
◄E W►◄NS►W◄ E►

N



Lithology Graphics

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



Site Map Scale 1 inch equals 200 feet

Explanation:

1705-B-06A
3603+12.64 — Borehole Number Station

Borehole Lithology

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

Water Level Reading at time of drilling.

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

0 55

Horizontal Scale (feet)

Vertical Exaggeration: 2x

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Lombard, IL 60148

Subsurface Soil Data Profile
Retaining Wall 20, SN 016-1811

WEI SINCE 1982

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

JOB NUMBER	PLATE NUMBER
1100-04-01	EXHIBIT 4

WEI 11X17 1100401.GPJ WANGENG.GDT 9/13/17

APPENDIX A

Wang Engineering
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1145 N Main Street
Lombard, IL 60148
Telephone: 630 953-9928
Fax: 630 953-9938

BORING LOG 20-RWB-01

WEI Job No.: 1100-04-01

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

Datum: NAVD 88
Elevation: 577.12 ft
North: 1897711.41 ft
East: 1171734.33 ft
Station: 1610+87.80
Offset: 31.0288 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	576.0	13.5-inch thick CONCRETE --PAVEMENT--						
	575.8	4.5-inch thick ASPHALT --PAVEMENT--						
		Dense, white CRUSHED STONE --BASE COURSE--			1	26 30 11	NP	6
	573.9	Very soft to soft, gray CLAY to SILTY CLAY, trace gravel			2	2 1 1	0.25 B	27
			5		3	2 2 1	0.16 B	28
			10		4	1 1 2	0.41 B	24
					5	1 2 1	0.33 B	24
			15		6	1 1 2	0.41 B	24
	561.6	SOft, gray SILTY CLAY LOAM, trace gravel --L_L(%)=31, P_L(%)=16-- --%Gravel=4.8-- --%Sand=16.1-- --%Silt=54.8-- --%Clay=24.3-- --A-6 (10)--			7	2 1 2	0.16 B	18
	559.1	Very soft to medium stiff, gray CLAY to SILTY CLAY, trace	20		8	0 1 1	0.16 B	26
		gravel	25		9	0 1 1	0.16 B	25
					10	0 1 2	0.16 B	26
					11	1 2 2	0.16 B	26
			30		12	2 2 1	0.57 B	27
	540.4	Stiff to hard, gray SILTY CLAY to SILTY CLAY LOAM, trace gravel	35		13	1 2 2	0.08 B	26
			40		14	3 6 10	1.72 B	23

GENERAL NOTES

Begin Drilling **10-28-2013** Complete Drilling **11-03-2013**
Drilling Contractor **Wang Testing Services** Drill Rig **CME-55 TMR [85%]**
Driller **R&J** Logger **A. Tomaras** Checked by **CLM**
Drilling Method **2.25" SSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **56.00 ft**
At Completion of Drilling ▼ **mud in the borehole**
Time After Drilling **NA**
Depth to Water ▼ **NA**

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

WANGENGINC 11000401.GPJ WANGENG.GDT 9/14/17

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BORING LOG 20-RWB-01

WEI Job No.: 1100-04-01

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

Datum: NAVD 88
Elevation: 577.12 ft
North: 1897711.41 ft
East: 1171734.33 ft
Station: 1610+87.80
Offset: 31.0288 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--L_L(%)=35, P_L(%)=18--						
		--%Gravel=1.0--						
		--%Sand=6.7--						
		--%Silt=53.8--						
		--%Clay=38.6--						
		--A-6 (16)--						
	520.4	Loose, gray SILT						
		--Saturated--						
			45		15	7 8 15	5.74 B	13
			50		16	6 9 12	3.94 B	20
			55		17	6 8 9	1.56 B	21
			60		18	3 3 6	1.31 S	29
	515.4	--HARD DRILLING--						
		--Possible Cobbles--						
		Very dense, gray, coarse SAND						
	510.6	--HARD DRILLING--						
		--Possible Cobbles--						
		Hard, gray SILTY CLAY LOAM to SILTY LOAM, trace gravel						
	500.4	Very dense, gray SILTY LOAM, trace gravel						
			65		19	48 50/5	NP	11
			70		20	32 45 45	5.41 S	10
			75		21	20 18 35	7.30 S	17
			80		22	39 47 48	NP	15

GENERAL NOTES

Begin Drilling **10-28-2013** Complete Drilling **11-03-2013**
Drilling Contractor **Wang Testing Services** Drill Rig **CME-55 TMR [85%]**
Driller **R&J** Logger **A. Tomaras** Checked by **CLM**
Drilling Method **2.25" SSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **56.00 ft**
At Completion of Drilling ▼ **mud in the borehole**
Time After Drilling **NA**
Depth to Water ▼ **NA**

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

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Fax: 630 953-9938

BORING LOG 20-RWB-01

WEI Job No.: 1100-04-01

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

Datum: NAVD 88
Elevation: 577.12 ft
North: 1897711.41 ft
East: 1171734.33 ft
Station: 1610+87.80
Offset: 31.0288 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--HARD DRILLING-- *--Possible Cobbles--*						
	495.4							
		Very dense, gray GRAVELLY SAND, some cobbles			23	50/1	NA	
			85					
					24	39 50/5	NP	11
		--HARD DRILLING-- *--Possible Boulders--*	90					
	486.1	--ROLLER BIT REFUSAL--						
		Boring terminated at 91.00 ft						
			95					
			100					

GENERAL NOTES

Begin Drilling **10-28-2013** Complete Drilling **11-03-2013**
Drilling Contractor **Wang Testing Services** Drill Rig **CME-55 TMR [85%]**
Driller **R&J** Logger **A. Tomaras** Checked by **CLM**
Drilling Method **2.25" SSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **56.00 ft**
At Completion of Drilling ▼ **mud in the borehole**
Time After Drilling **NA**
Depth to Water ▼ **NA**

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

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Telephone: 630 953-9928
Fax: 630 953-9938

BORING LOG 21-RWB-01

WEI Job No.: 1100-04-01

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

Datum: NAVD 88
Elevation: 585.23 ft
North: 1897682.52 ft
East: 1171760.80 ft
Station: 1610+92.09
Offset: 7.9354 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	584.1	13-inch thick CONCRETE --PAVEMENT--						
	583.9	3-inch thick ASPHALT --PAVEMENT--						
		CRUSHED STONE --BASE COURSE--			1	13 20 18	NP	8
	582.0	Medium dense to very dense, brown GRAVELLY SAND --FILL--			2	9 10 5	NP	12
			5		3	25 50/3	NP	12
	577.2	Very dense, brown SILTY LOAM, trace gravel			4	50/5	NP	16
	576.3	--AUGER REFUSAL-- --Obstruction--	10					
		Boring terminated at 8.90 ft						
			15					
			20					

GENERAL NOTES

Begin Drilling **10-13-2013** Complete Drilling **10-13-2013**
Drilling Contractor **Wang Testing Services** Drill Rig **D-50 TMR [78%]**
Driller **R&N** Logger **D. Kolpacki** Checked by **L. Iordache**
Drilling Method **2.25" SSA , boring backfilled upon completion**

WATER LEVEL DATA

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

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

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Fax: 630 953-9938

BORING LOG 21-RWB-02

WEI Job No.: 1100-04-01

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

Datum: NAVD 88
Elevation: 596.95 ft
North: 1897705.23 ft
East: 1171851.95 ft
Station: 1611+67.44
Offset: 53.9743 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	596.0	12-inch thick, brown LOAM, trace gravel						
		--TOPSOIL--						
		Hard, gray CLAY LOAM, trace gravel			1	13 11 11	7.79 S	16
		--FILL--						
			5		2	5 9 11	5.33 S	13
	591.5	Stiff to medium stiff, gray and brown, SILTY CLAY, trace gravel, slag, brick and wood			3	2 2 4	1.23 B	19
		--FILL--						
			10		4	2 3 4	1.15 B	19
					5	3 5 5	0.98 B	21
	584.0	Very stiff, brown and gray SILTY CLAY, trace gravel						
			15		6	3 5 7	3.53 B	25
	581.5	Very soft to medium stiff, gray CLAY to SILTY CLAY, trace gravel			7	0 2 2	0.66 B	24
			20		8	1 1 2	< 0.25 P	29
			25		9	1 1 1	< 0.25 P	25
					10	0 0 0	0.16 B	22
			30		11	0 0 0	0.16 B	25
					12	0 0 0	0.25 B	25
			35		13	0 0 0	< 0.25 P	26
			40		14	0 1 3	0.49 B	25

GENERAL NOTES

Begin Drilling **09-25-2013** Complete Drilling **09-30-2013**
Drilling Contractor **Wang Testing Services** Drill Rig **CME-55 TMR [85%]**
Driller **R&J** Logger **A. Tomaras** Checked by **L. Iordache**
Drilling Method **2.25" HSA, boring backfilled upon completion**

WATER LEVEL DATA

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

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

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BORING LOG 21-RWB-02

WEI Job No.: 1100-04-01

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

Datum: NAVD 88
Elevation: 596.95 ft
North: 1897705.23 ft
East: 1171851.95 ft
Station: 1611+67.44
Offset: 53.9743 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
			45		15	2 2 2	0.25 P	25
			50		16	1 2 3	< 0.25 P	25
	540.2	Stiff to hard, gray SILTY CLAY LOAM, trace gravel	55		17	1 3 3	0.66 B	21
			60		18	15 17 21	> 4.50 P	15
			65		19	11 10 16	4.33 N/6	
			70		20	10 12 19	4.76 B	19
			75		21	6 10 12	1.80 B	24
			80		22	6 8 10	3.00 N/6	19

GENERAL NOTES

Begin Drilling **09-25-2013** Complete Drilling **09-30-2013**
Drilling Contractor **Wang Testing Services** Drill Rig **CME-55 TMR [85%]**
Driller **R&J** Logger **A. Tomaras** Checked by **L. Iordache**
Drilling Method **2.25" HSA, boring backfilled upon completion**

WATER LEVEL DATA

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

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BORING LOG 21-RWB-02

WEI Job No.: 1100-04-01

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

Datum: NAVD 88
Elevation: 596.95 ft
North: 1897705.23 ft
East: 1171851.95 ft
Station: 1611+67.44
Offset: 53.9743 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	515.2	Very dense, gray SILTY LOAM, little to some gravel and cobbles						
			85		23	13 31 41	NP	14
			90		24	18 35 48	9.35 S	10
			95		25	20 36 50/4	9.10 S	13
		--HARD DRILLING-- *--Possible Cobbles--*						
			100		26	50/5	NR	
		--HARD DRILLING-- *--Possible Cobbles--*	105		27	50/4	NP	11
	490.0	--ROLLER BIT REFUSAL-- Boring terminated at 107.00 ft	110					
			115					
			120					

GENERAL NOTES

Begin Drilling **09-25-2013** Complete Drilling **09-30-2013**
Drilling Contractor **Wang Testing Services** Drill Rig **CME-55 TMR [85%]**
Driller **R&J** Logger **A. Tomaras** Checked by **L. Iordache**
Drilling Method **2.25" HSA, boring backfilled upon completion**

WATER LEVEL DATA

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

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

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BORING LOG 21-RWB-03

WEI Job No.: 1100-04-01

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

Datum: NAVD 88
Elevation: 591.97 ft
North: 1897787.89 ft
East: 1171858.64 ft
Station: 1612+32.77
Offset: 11.8407 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		Very stiff to hard, brown CLAY LOAM, trace brick fragments --FILL--			1	3 4 8	3.50 P	11
			5		2	5 5 7	3.12 B	14
		--3-inch thick, red, crushed Brick--			3	13 8 6	NP	19
			10		4	5 5 7	6.56 B	15
	581.5							
		Stiff, gray SILTY CLAY, trace gravel			5	2 3 4	1.97 B	23
	579.0							
		Very soft to medium stiff, gray CLAY, trace gravel	15		6	2 1 3	0.57 B	25
					7	2 1 2	0.49 B	25
			20		8	2 2 2	< 0.25 P	28
			25		9	0 0 0	0.33 B	23
					10	0 0 2	0.25 B	26
					11	0 1 2	0.45 B	26
			30		12	2 2 2	< 0.25 P	25
			35		13	1 2 2	0.57 B	24
			40		14	2 3 3	0.49 B	25

GENERAL NOTES

Begin Drilling **09-23-2013** Complete Drilling **09-23-2013**
Drilling Contractor **Wang Testing Services** Drill Rig **CME-55 TMR [85%]**
Driller **R&J** Logger **A. Tomaras** Checked by **L. Iordache**
Drilling Method **3.25" HSA, boring backfilled upon completion**

WATER LEVEL DATA

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

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

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BORING LOG 21-RWB-03

WEI Job No.: 1100-04-01

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

Datum: NAVD 88
Elevation: 591.97 ft
North: 1897787.89 ft
East: 1171858.64 ft
Station: 1612+32.77
Offset: 11.8407 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
			45		15	2 3 3	< 0.25 P	27
			50		16	0 2 2	0.41 B	28
	540.2	Very stiff to hard, SILTY CLAY to SILTY CLAY LOAM, trace gravel						
			55		17	4 5 8	1.48 B	22
			60		18	14 12 15	3.00 P	16
	520.2	Dense, gray SILT	65		19	15 17 24	4.10 B	27
			70		20	16 17 20	8.53 B	12
			75		21	20 26 23	NP	21
	515.2	Hard, gray SILTY CLAY LOAM, trace gravel						
			80		22	19 20 28	8.61 S	14

GENERAL NOTES

Begin Drilling **09-23-2013** Complete Drilling **09-23-2013**
Drilling Contractor **Wang Testing Services** Drill Rig **CME-55 TMR [85%]**
Driller **R&J** Logger **A. Tomaras** Checked by **L. Iordache**
Drilling Method **3.25" HSA, boring backfilled upon completion**

WATER LEVEL DATA

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

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

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BORING LOG 21-RWB-03

WEI Job No.: 1100-04-01

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

Datum: NAVD 88
Elevation: 591.97 ft
North: 1897787.89 ft
East: 1171858.64 ft
Station: 1612+32.77
Offset: 11.8407 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	510.2	Very dense, gray SILT --HARD DRILLING--						
					23	31 32 50/5	NP	15
			85					
	505.2	Very dense, gray SILTY LOAM, trace gravel						
					24	23 33 29	6.81 S	21
			90					
					25	66/6 ~~44/3~~	NP	15
			95					
	495.2	--HARD DRILLING-- Very dense, brown SANDY GRAVEL --possibly underpressure groundwater bearing--						
					26	30 70/6	NP	6
			100					

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	490.2	Very dense, weathered DOLOSTONE fragments --WEATHERED BEDROCK--						
					27	50/1	NP	
	487.5	--ROLLER BIT REFUSAL--						
	487.0	DOLI	105					
		Boring terminated at 104.50 ft						
			110					
			115					
			120					

GENERAL NOTES

Begin Drilling **09-23-2013** Complete Drilling **09-23-2013**
Drilling Contractor **Wang Testing Services** Drill Rig **CME-55 TMR [85%]**
Driller **R&J** Logger **A. Tomaras** Checked by **L. Iordache**
Drilling Method **3.25" HSA, boring backfilled upon completion**

WATER LEVEL DATA

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

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

WANGENGINC 11000401.GPJ WANGENG.GDT 9/14/17

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BORING LOG 21-RWB-04

WEI Job No.: 1100-04-01

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

Datum: NAVD 88
Elevation: 587.85 ft
North: 1897850.59 ft
East: 1171897.08 ft
Station: 1613+02.29
Offset: 21.9615 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	587.4	5 -inch thick, black SILTY LOAM --TOPSOIL--						
		Very stiff to hard, brown SILTY CLAY LOAM, trace gravel --FILL--			1	5 6 7	4.51 S	16
			5		2	5 3 5	3.50 P	18
	582.4	Stiff, brown and gray SILTY CLAY, trace gravel			3	3 3 3	1.97 B	22
	579.9	Very soft to medium stiff, brown CLAY to SILTY CLAY, trace gravel	10		4	1 1 2	0.57 B	23
					5	1 1 2	0.41 B	25
			15		6	1 1 2	0.33 B	24
					7	1 1 2	0.33 B	23
			20		8	0 1 1	0.16 B	26
			25		9	1 1 2	0.16 B	25
					10	1 1 1	0.16 B	27
			30		11	1 2 2	0.33 B	20
					12	1 1 2	0.16 B	23
			35		13	1 2 3	0.66 B	21
			40		14	2 2 2	0.41 B	24

GENERAL NOTES

Begin Drilling **09-23-2013** Complete Drilling **09-23-2013**
Drilling Contractor **K&S** Drill Rig **D-120 TMR**
Driller **R&E** Logger **F. Bozga** Checked by **L. Iordache**
Drilling Method **4.25" HSA, boring backfilled upon completion**

WATER LEVEL DATA

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

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

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BORING LOG 21-RWB-04

WEI Job No.: 1100-04-01

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

Datum: NAVD 88
Elevation: 587.85 ft
North: 1897850.59 ft
East: 1171897.08 ft
Station: 1613+02.29
Offset: 21.9615 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
			45		15	1 2 3	0.33 B	26
			50		16	3 5 8	0.66 B	20
	536.1	Very stiff, gray SILTY CLAY, trace gravel						
			55		17	4 7 11	3.28 B	22
	531.1	Dense to very dense, gray SILTY LOAM to SILTY CLAY LOAM, trace to little gravel						
			60		18	16 26 38	6.23 S	14
		--HARD DRILLING-- *--Possible Cobbles--*	65		19	26 25 30	5.66 S	13
			70		20	38 50/5"	NP	15
			75		21	12 19 29	8.04 S	13
			80		22	22 50/5"	NP	11

GENERAL NOTES

Begin Drilling **09-23-2013** Complete Drilling **09-23-2013**
Drilling Contractor **K&S** Drill Rig **D-120 TMR**
Driller **R&E** Logger **F. Bozga** Checked by **L. Iordache**
Drilling Method **4.25" HSA, boring backfilled upon completion**

WATER LEVEL DATA

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

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BORING LOG 21-RWB-04

WEI Job No.: 1100-04-01

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

Datum: NAVD 88
Elevation: 587.85 ft
North: 1897850.59 ft
East: 1171897.08 ft
Station: 1613+02.29
Offset: 21.9615 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
			85		23	19 25 31	NP	10
			90		24	50/5"	NP	11
	496.6	Dense, gray SANDY GRAVEL						
	492.9		95		25	11 21 19	NP	13
		Boring terminated at 95.00 ft						
			100					

GENERAL NOTES

Begin Drilling **09-23-2013** Complete Drilling **09-23-2013**
Drilling Contractor **K&S** Drill Rig **D-120 TMR**
Driller **R&E** Logger **F. Bozga** Checked by **L. Iordache**
Drilling Method **4.25" HSA, boring backfilled upon completion**

WATER LEVEL DATA

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

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BORING LOG 21-RWB-05

WEI Job No.: 1100-04-01

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

Datum: NAVD 88
Elevation: 583.32 ft
North: 1897919.78 ft
East: 1171915.09 ft
Station: 1613+69.21
Offset: 25.0245 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	582.9	5-inch thick, white CRUSHED STONE						
		--FILL--						
		Hard, gray and brown CLAY LOAM, trace gravel			1	6 9 9	6.56 S	15
		--FILL--						
	580.3	Medium stiff to stiff, gray SILTY CLAY, trace gravel			2	2 2 2	0.82 B	20
			5		3	1 3 3	1.23 B	17
	575.3	Soft to medium stiff, gray CLAY to SILTY CLAY, trace gravel			4	0 2 1	0.41 B	25
			10		5	0 0 0	0.41 B	26
					6	0 0 2	0.57 B	22
			15		7	2 3 2	0.66 B	22
					8	0 2 3	0.74 B	24
			20		9	2 2 4	0.82 B	23
					10	2 3 3	0.74 B	23
			25		11	2 2 3	0.66 B	24
					12	3 4 6	0.66 B	23
			30		13	2 3 3	0.49 B	25
			35		14	3 3 4	0.41 B	23
			40					

GENERAL NOTES

Begin Drilling **09-24-2013** Complete Drilling **09-25-2013**
Drilling Contractor **Wang Testing Services** Drill Rig **CME-55 TMR [85%]**
Driller **R&J** Logger **A. Tomaras** Checked by **L. Iordache**
Drilling Method **2.25" HSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

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

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

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BORING LOG 21-RWB-05

WEI Job No.: 1100-04-01

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

Datum: NAVD 88
Elevation: 583.32 ft
North: 1897919.78 ft
East: 1171915.09 ft
Station: 1613+69.21
Offset: 25.0245 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	541.6							
		Stiff to hard, gray SILTY CLAY LOAM, trace gravel						
			45		15	2 4 8	1.23 B	18
			50		16	6 12 18	4.26 B	15
	531.6							
		Gray, coarse SAND						
	529.6							
		Hard, gray SILTY CLAY LOAM, trace gravel						
			55		17	13 15 21	5.66 B	14
			60		18	16 24 31	7.13 S	11
	516.6							
		Very dense, gray SILTY LOAM, trace to some gravel						
			65		19	10 16 21	6.81 S	14
			70		20	15 25 30	9.02 S	11
			75		21	41 60/3"	NP	10
			80		22	34 45 20/2"	8.69 S	10

GENERAL NOTES

Begin Drilling **09-24-2013** Complete Drilling **09-25-2013**
Drilling Contractor **Wang Testing Services** Drill Rig **CME-55 TMR [85%]**
Driller **R&J** Logger **A. Tomaras** Checked by **L. Iordache**
Drilling Method **2.25" HSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

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

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

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BORING LOG 21-RWB-05

WEI Job No.: 1100-04-01

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

Datum: NAVD 88
Elevation: 583.32 ft
North: 1897919.78 ft
East: 1171915.09 ft
Station: 1613+69.21
Offset: 25.0245 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	501.6	Very dense, gray SANDY LOAM, trace gravel						
			85		23	78/6" 22/1"	NP	9
		--HARD DRILLING-- *--Possible Cobbles--*						
			90		24	64 45/6"	NP	13
	491.6	Very dense, gray GRAVELLY SILTY LOAM, trace to some cobbles						
			95		25	100/6"	1.31 S	13
		--HARD DRILLING-- *--Possible Cobbles--*						
			100		26	64 40/2"	0.49 S	9

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	482.3	--WEATHERED BEDROCK-- --ROLLER BIT REFUSAL--						
	481.3	Boring terminated at 102.00 ft						
			105					
			110					
			115					
			120					

GENERAL NOTES

Begin Drilling **09-24-2013** Complete Drilling **09-25-2013**
Drilling Contractor **Wang Testing Services** Drill Rig **CME-55 TMR [85%]**
Driller **R&J** Logger **A. Tomaras** Checked by **L. Iordache**
Drilling Method **2.25" HSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

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

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

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BORING LOG 1705-B-06A

WEI Job No.: 1100-04-01

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

Datum: NAVD 88
Elevation: 591.98 ft
North: 1897749.88 ft
East: 1171805.18 ft
Station: 1827+13.77
Offset: 38.2558 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	591.5	6-inch thick, black SILTY LOAM --TOPSOIL--						
		Medium dense to dense, brown LOAM, little gravel and brick fragments --FILL--			1	9 17 13	NP	6
			5		2	2 15 9	NP	14
	586.5	Very stiff, gray SILTY CLAY LOAM, trace gravel			3	2 3 4	2.95 B	17
			10		4	2 4 4	2.54 B	22
	581.5	Very soft to medium stiff, gray CLAY to SILTY CLAY, trace gravel			5	3 3 3	< 0.25 P	21
			15		6	0 2 2	0.41 B	24
					7	0 1 1	0.25 B	22
			20		8	0 0 2	0.41 B	26
			25		9	0 0 1	0.08 B	26
					10	0 0 2	0.25 B	26
					11	0 0 3	0.25 B	28
			30		12	0 1 2	0.57 B	23
			35		13	0 1 2	0.50 P	21
			40		14	0 3 2	0.49 B	24

GENERAL NOTES

Begin Drilling **07-25-2013** Complete Drilling **07-26-2013**
Drilling Contractor **Wang Testing Services** Drill Rig **CME-55 TMR [85%]**
Driller **R&J** Logger **A. Tomaras** Checked by **C. Marin**
Drilling Method **2.25" SSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

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

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

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BORING LOG 1705-B-06A

WEI Job No.: 1100-04-01

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

Datum: NAVD 88
Elevation: 591.98 ft
North: 1897749.88 ft
East: 1171805.18 ft
Station: 1827+13.77
Offset: 38.2558 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
			45		15	0 2 2	0.41 B	25
			50		16	1 1 2	0.33 B	25
	540.2	Very stiff to hard, gray SILTY CLAY, trace gravel						
			55		17	6 7 13	3.36 B	19
			60		18	13 18 21	4.84 B	14
			65		19	10 12 19	4.92 B	18
	525.2	Very stiff, gray CLAY, trace gravel						
		--L_L(%)=41, P_L(%)=18-- --%Gravel=0.1-- --%Sand=3.0-- --%Silt=46.6-- --%Clay=50.3-- --A-7-6 (23)--	70		20	6 9 10	2.54 B	24
	518.2	Loose, gray SILT --Wet--	75		21	2 4 5	NP	19
	515.2	Hard, gray SILTY CLAY, trace gravel						
			80		22	13 20 28	8.94 S	13

GENERAL NOTES

Begin Drilling **07-25-2013** Complete Drilling **07-26-2013**
Drilling Contractor **Wang Testing Services** Drill Rig **CME-55 TMR [85%]**
Driller **R&J** Logger **A. Tomaras** Checked by **C. Marin**
Drilling Method **2.25" SSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

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

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

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BORING LOG 1705-B-06A

WEI Job No.: 1100-04-01

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

Datum: NAVD 88
Elevation: 591.98 ft
North: 1897749.88 ft
East: 1171805.18 ft
Station: 1827+13.77
Offset: 38.2558 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	510.2	Very dense to hard, gray SILTY LOAM to SILTY CLAY LOAM, trace gravel						
			85		23	33 46 50/6	> 4.50 P	10
			90		24	13 20 26	8.61 S	11
		--HARD DRILLING-- *--Possible Cobbles--*						
	499.0	Very dense, SANDY GRAVEL, with rock fragments						
			95		25	21 24 29	NP	11
		--HARD DRILLING-- *--Possible Cobbles--*						
			100					

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
					26	60/6	NP	17
	490.0	Strong, fair to good rock quality, light gray, fresh, joint breaks with little to no infill, slightly vuggy DOLOSTONE with stylolites				C O R E		
		--Run 1 - RECOVERY=100%-- --RQD (top 5ft)=45%-- --RQD= (10ft)=62%--	105					
					1		NP	
			110					
	480.0	Boring terminated at 112.00 ft						
			115					
			120					

GENERAL NOTES

Begin Drilling **07-25-2013** Complete Drilling **07-26-2013**
Drilling Contractor **Wang Testing Services** Drill Rig **CME-55 TMR [85%]**
Driller **R&J** Logger **A. Tomaras** Checked by **C. Marin**
Drilling Method **2.25" SSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

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

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

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BORING LOG 1710-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: 589.38 ft
North: 1897814.39 ft
East: 1171841.78 ft
Station: 1704+98.15
Offset: 72.7367 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	589.0	5-inch thick, brown SILTY CLAY LOAM --TOPSOIL--						
		Medium dense, brown SILTY LOAM, trace gravel --FILL--			1	5 7 8	NP	13
	586.4							
		Very stiff, brown SILTY CLAY LOAM, trace gravel, brick fragments --FILL--	5		2	5 7 5	2.54	15
	583.9							
		Dense, brown, SANDY LOAM, trace gravel, brick fragments --FILL--			3	10 16 17	NP	22
	581.4							
		Stiff, gray SILTY CLAY LOAM, trace gravel	10		4	3 3 4	1.07 B	22
	578.9							
		Soft to medium stiff, CLAY to SILTY CLAY, trace gravel			5	1 1 2	0.33 B	25
			15		6	1 1 2	0.33 B	24
					7	1 1 2	0.41 B	26
			20		8	1 1 2	0.49 B	24
			25		9	1 2 2	0.41 B	23
					10	1 1 2	0.25 B	22
					11	1 1 2	0.41 B	24
			30		12	1 2 2	0.41 B	24
			35		13	1 1 3	0.49 B	23
			40		14	1 2 3	0.33 B	24

GENERAL NOTES

Begin Drilling: **09-24-2013** Complete Drilling: **09-25-2013**
Drilling Contractor: **K&S** Drill Rig: **D-120 TMR**
Driller: **R&E** Logger: **F. Bozga** Checked by: **L. Iordache**
Drilling Method: **4.25" HSA, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **85.00 ft**
At Completion of Drilling: **90.00 ft**
Time After Drilling: **NA**
Depth to Water: **NA**

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BORING LOG 1710-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: 589.38 ft
North: 1897814.39 ft
East: 1171841.78 ft
Station: 1704+98.15
Offset: 72.7367 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
			45		15	1 2 3	0.41 B	25
			50		16	2 3 5	0.66 B	20
	537.6	Very stiff, gray SILTY CLAY, trace gravel						
			55		17	4 7 12	3.94 B	20
	532.6	Dense to very dense, gray SILTY LOAM, trace gravel						
			60		18	11 14 20	NP	11
			65		19	23 39 37	NP	7
			70		20	12 20 20	NP	10
			75		21	13 20 37	NP	11
			80		22	10 22 40	NP	15

GENERAL NOTES

Begin Drilling **09-24-2013** Complete Drilling **09-25-2013**
Drilling Contractor **K&S** Drill Rig **D-120 TMR**
Driller **R&E** Logger **F. Bozga** Checked by **L. Iordache**
Drilling Method **4.25" HSA, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **85.00 ft**
At Completion of Drilling ▼ **90.00 ft**
Time After Drilling **NA**
Depth to Water ▼ **NA**

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BORING LOG 1710-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: 589.38 ft
North: 1897814.39 ft
East: 1171841.78 ft
Station: 1704+98.15
Offset: 72.7367 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
			85		23	17 25 37	NP	9
	502.6	Very dense, gray SILT						
			90		24	13 50/2"	NP	26
	497.6	Dense, gray GRAVELLY SAND						
			95		25	10 18 20	NP	14
	492.4	--HARD DRILLING-- Very dense, gray DOLOSTONE fragments						
	491.2	--WEATHERED BEDROCK-- --AUGER REFUSAL-- Boring terminated at 98.20 ft	100		26	50/2"	NP	9

GENERAL NOTES

Begin Drilling **09-24-2013** Complete Drilling **09-25-2013**
Drilling Contractor **K&S** Drill Rig **D-120 TMR**
Driller **R&E** Logger **F. Bozga** Checked by **L. Iordache**
Drilling Method **4.25" HSA, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **85.00 ft**
At Completion of Drilling ▼ **90.00 ft**
Time After Drilling **NA**
Depth to Water ▼ **NA**

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BORING LOG VST-06

WEI Job No.: 1100-04-01

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

Datum: NAVD 88
Elevation: 585.69 ft
North: 1898109.29 ft
East: 1171902.18 ft
Station: 1103+77.81
Offset: 27.3835 RT

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

GENERAL NOTES

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

WATER LEVEL DATA

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

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BORING LOG VST-06

WEI Job No.: 1100-04-01

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

Datum: NAVD 88
Elevation: 585.69 ft
North: 1898109.29 ft
East: 1171902.18 ft
Station: 1103+77.81
Offset: 27.3835 RT

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

GENERAL NOTES

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

WATER LEVEL DATA

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

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

GENERAL NOTES

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

WATER LEVEL DATA

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

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BORING LOG VST-06

WEI Job No.: 1100-04-01

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

Datum: NAVD 88
Elevation: 585.69 ft
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Offset: 27.3835 RT

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

GENERAL NOTES

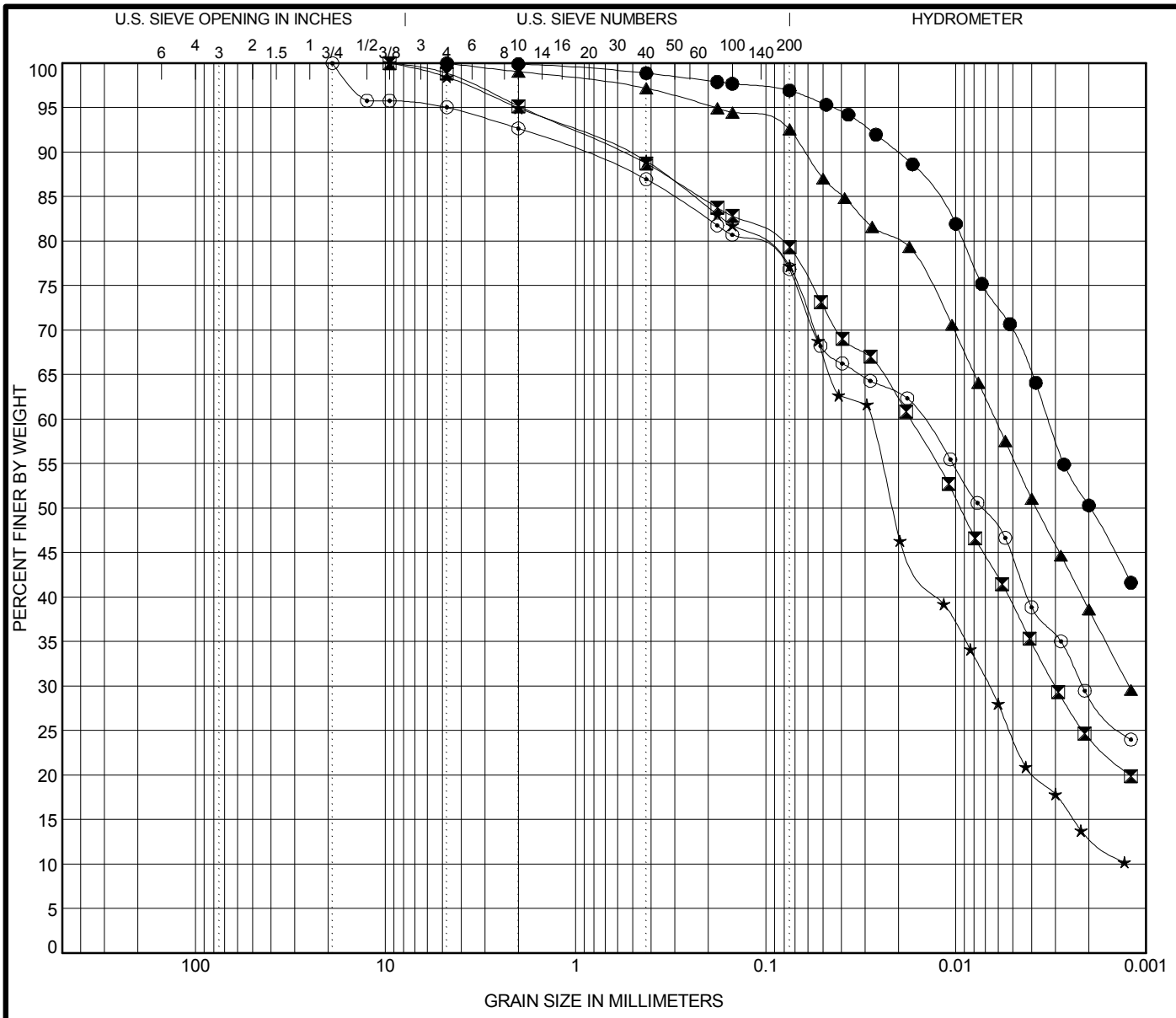
Begin Drilling **12-09-2015** Complete Drilling **12-14-2015**
Drilling Contractor **Wang Testing Services** Drill Rig **CME-55 TMR [85%]**
Driller **R&N** Logger **F. Bozga** Checked by **A. Kurnia**
Drilling Method **2.25" HSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

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

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

APPENDIX B



COBBLES	GRAVEL	SAND		SILT AND CLAY
		coarse	fine	

	Specimen Identification		IDH Classification	LL	PL	PI	Cc	Cu
●	1705-B-06A#20	68.5 ft	**Clay**	**41**	**18**	**23**		
⊠	20-RWB-01#7	16.0 ft	**Silty Clay Loam**	**31**	**16**	**15**		
▲	20-RWB-01#16	48.5 ft	**Silty Clay**	**35**	**18**	**17**		
★	21-RWB-02#24	89.0 ft	**Silty Loam**	**22**	**14**	**8**		
⊙	21-RWB-04#10	23.5 ft	**Silty Clay**	**34**	**17**	**17**		

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	1705-B-06A#20	68.5 ft	**4.75**	**0.003**			**0.1**	**3.0**	**46.6**	**50.3**
⊠	20-RWB-01#7	16.0 ft	**9.5**	**0.017**	**0.003**		**4.8**	**16.1**	**54.8**	**24.3**
▲	20-RWB-01#16	48.5 ft	**4.75**	**0.006**	**0.001**		**1.0**	**6.7**	**53.8**	**38.6**
★	21-RWB-02#24	89.0 ft	**9.5**	**0.028**	**0.007**		**5.0**	**18.1**	**63.8**	**13.1**
⊙	21-RWB-04#10	23.5 ft	**19**	**0.015**	**0.002**		**7.3**	**16.1**	**47.5**	**29.0**

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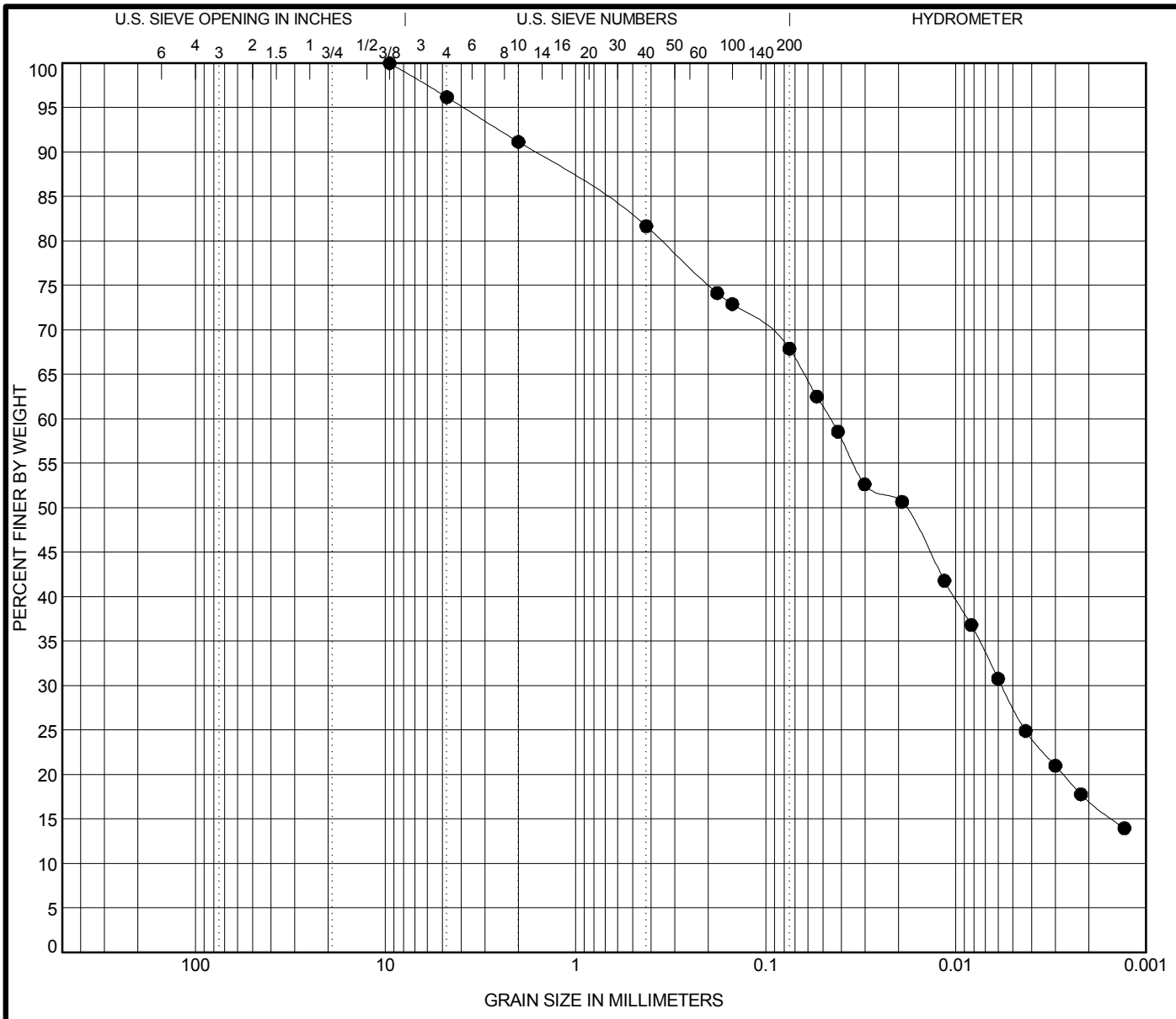
GRAIN SIZE DISTRIBUTION

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
●	**21-RWB-05#18 58.5 ft**	**Silty Loam**	**25**	**15**	**10**		

	Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**21-RWB-05#18 58.5 ft**	**9.5**	**0.046**	**0.006**		**8.8**	**23.5**	**50.6**	**17.1**

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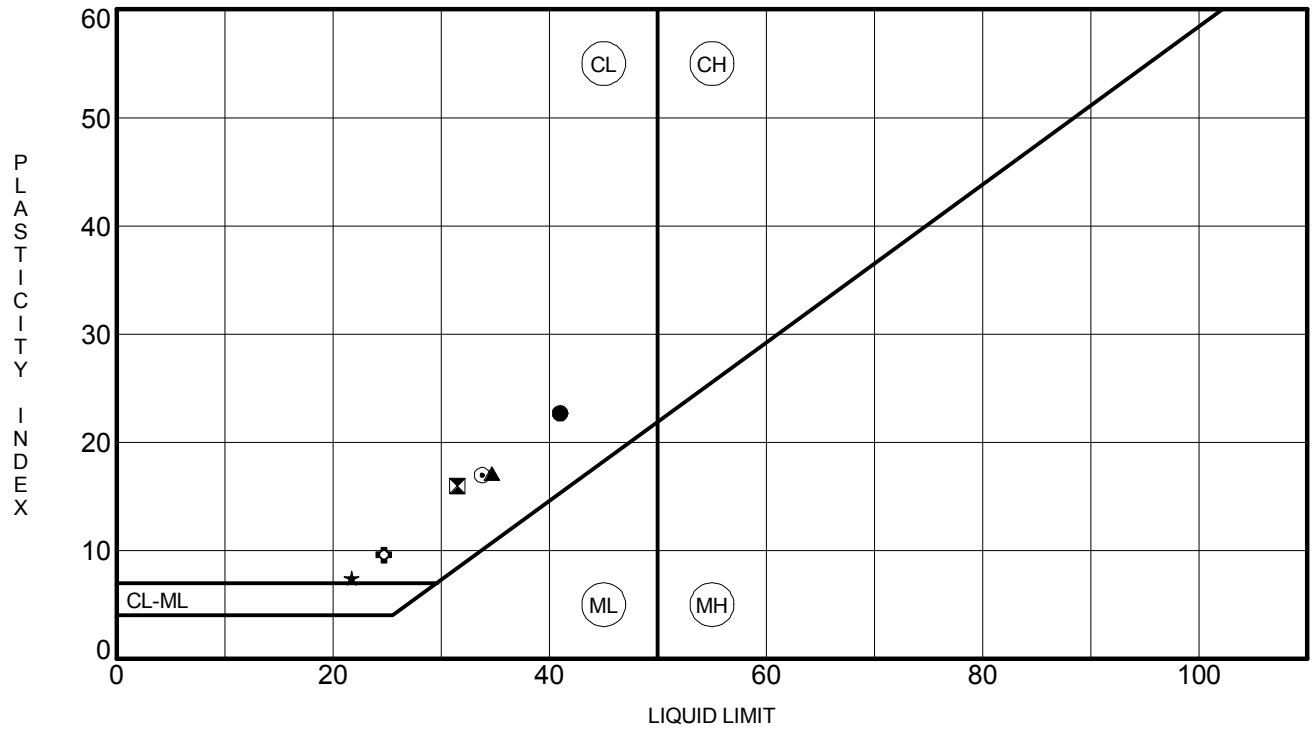
GRAIN SIZE DISTRIBUTION

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-06A#20	68.5 ft	41	18	23	97	Clay
⊠	20-RWB-01#7	16.0 ft	31	16	15	79	Silty Clay Loam
▲	20-RWB-01#16	48.5 ft	35	18	17	93	Silty Clay
★	21-RWB-02#24	89.0 ft	22	14	8	77	Silty Loam
⊙	21-RWB-04#10	23.5 ft	34	17	17	77	Silty Clay
✿	21-RWB-05#18	58.5 ft	25	15	10	68	Silty Loam

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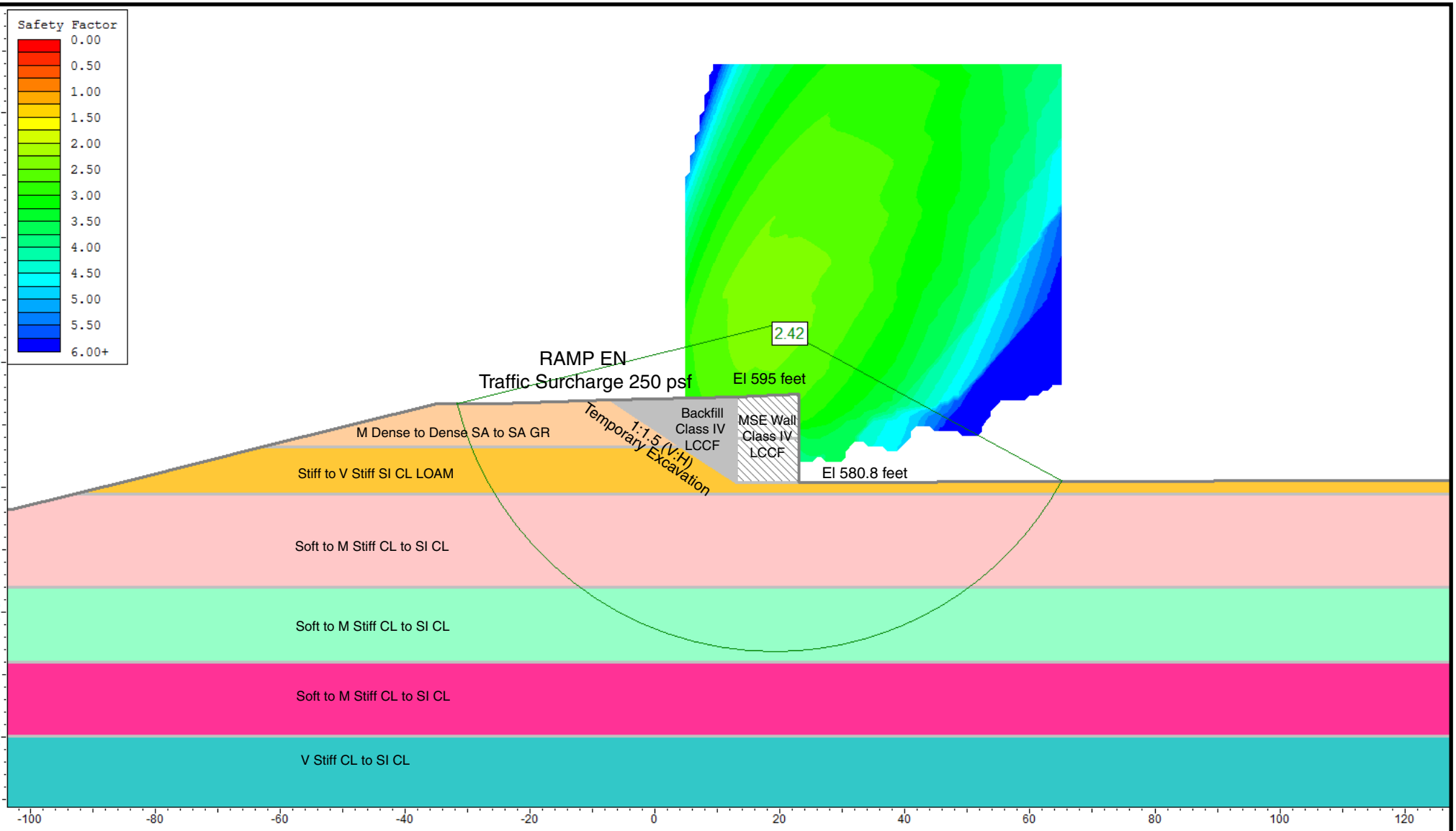
ATTERBERG LIMITS' RESULTS

Project: Circle Interchange Reconstruction

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

Number: 1100-04-01

APPENDIX C



Undrained Analysis for MSE Wall at Station 1612+00, Ref Borings 1705-B-06A and VST-06

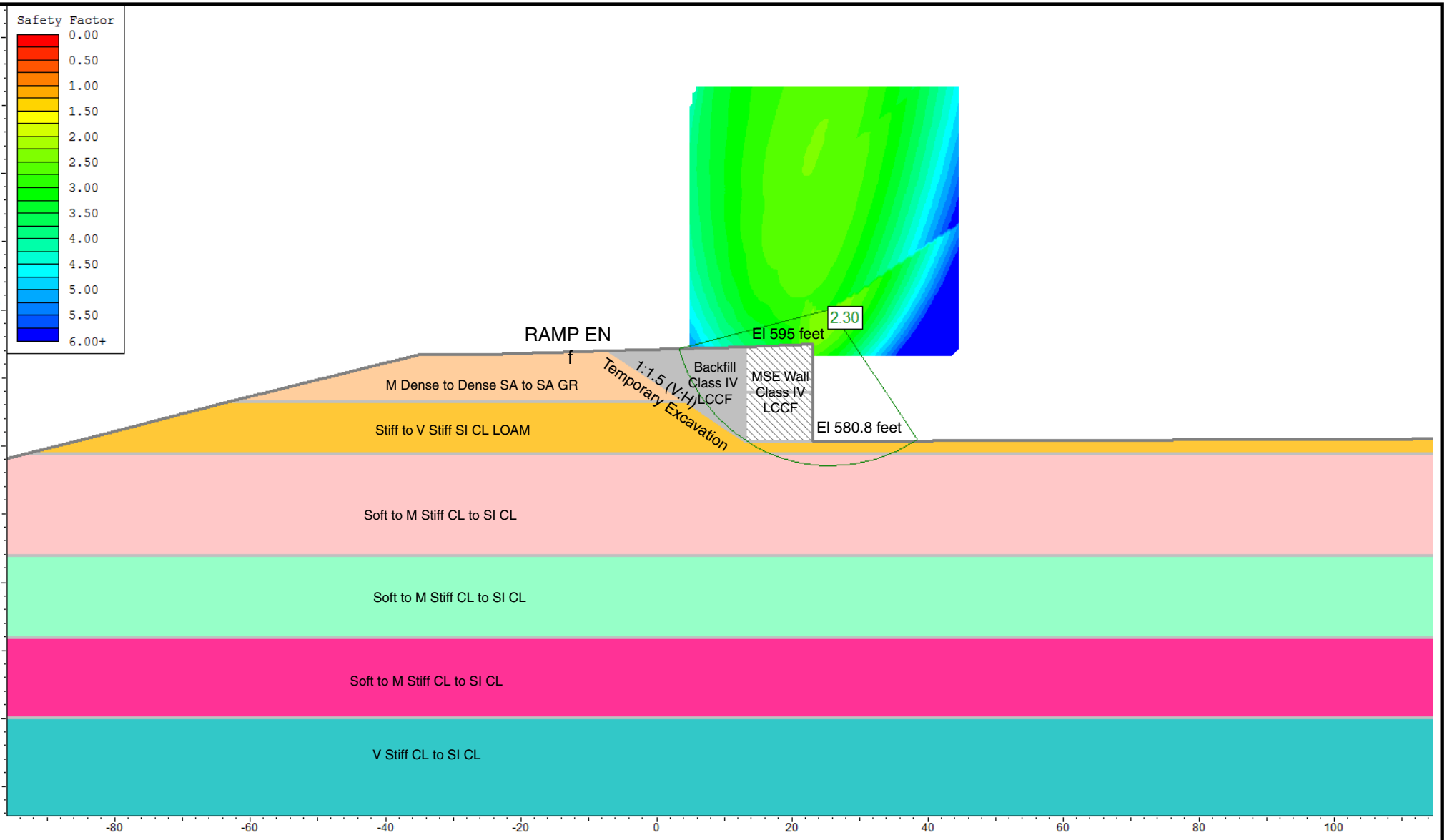
Layer ID	Description	Unit Weight (pcf)	Undrained Cohesion (psf)	Undrained Friction Angle (degrees)
1	M Dense to Dense LOAM	125	0	32
2	Stiff to V Stiff SI CL	120	2000	0
3	Soft to M Stiff CL to SI CL	110	600	0
4	Soft to M Stiff CL to SI CL	110	700	0
5	Soft to M Stiff CL to SI CL	110	900	0
6	V Stiff CL to SI CL	120	3000	0

GLOBAL STABILITY ANALYSIS: CIRCLE INTERCHANGE RECONSTRUCTION, RETAINING WALL 20, SN 016-1811, CHICAGO, IL

SCALE: GRAPHICAL | APPENDIX C-1 | DRAWN BY: NSB CHECKED BY: MWS

Wang Engineering
1145 N. Main Street
Lombard, IL 60148
www.wangeng.com

FOR AECOM | 1100-04-01



Drained Analysis for MSE Wall at Station 1612+00, Ref Borings 1705-B-06A and VST-06

Layer ID	Description	Unit Weight (pcf)	Drained Cohesion (psf)	Drained Friction Angle (degrees)
1	M Dense to Dense LOAM	125	0	32
2	Stiff to V Stiff SI CL	120	2000	0
3	Soft to M Stiff CL to SI CL	110	600	0
4	Soft to M Stiff CL to SI CL	110	700	0
5	Soft to M Stiff CL to SI CL	110	900	0
6	V Stiff CL to SI CL	120	3000	0

GLOBAL STABILITY ANALYSIS: CIRCLE INTERCHANGE RECONSTRUCTION, RETAINING WALL 20, SN 016-1811, CHICAGO, IL

SCALE: GRAPHICAL | APPENDIX C-2 | DRAWN BY: NSB CHECKED BY: MWS

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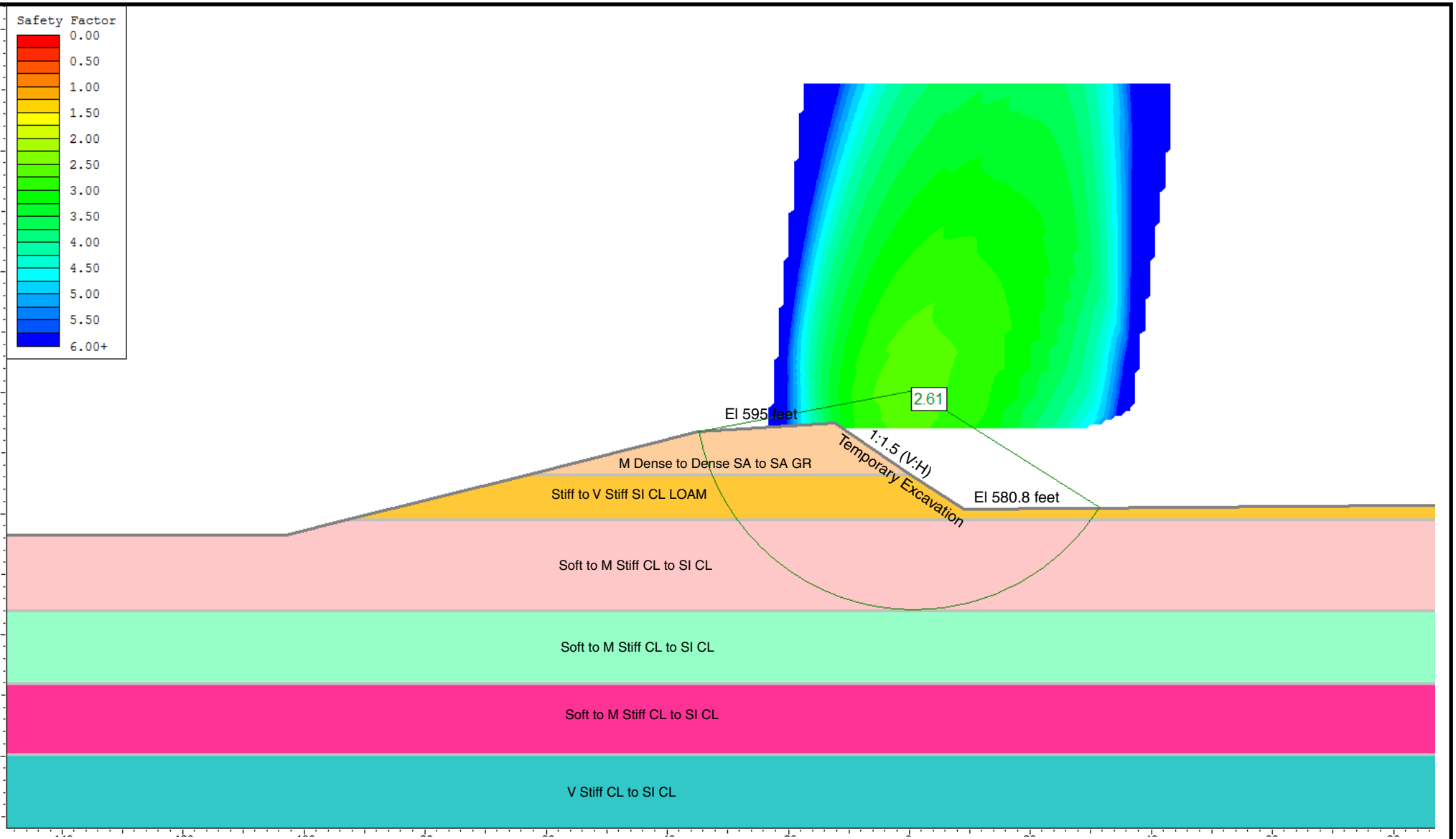

Undrained Analysis for Temporary Excavation, Ref Borings 1705-B-06A and VST-06

Layer ID	Description	Unit Weight (pcf)	Undrained Cohesion (psf)	Undrained Friction Angle (degrees)
1	M Dense to Dense LOAM	125	0	32
2	Stiff to V Stiff SI CL	120	2000	0
3	Soft to M Stiff CL to SI CL	110	600	0
4	Soft to M Stiff CL to SI CL	110	700	0
5	Soft to M Stiff CL to SI CL	110	900	0
6	V Stiff CL to SI CL	120	3000	0

GLOBAL STABILITY ANALYSIS: CIRCLE INTERCHANGE RECONSTRUCTION, RETAINING WALL 20, SN 016-1811, CHICAGO, IL

SCALE: GRAPHICAL | APPENDIX C-3 | DRAWN BY: NSB CHECKED BY: MWS

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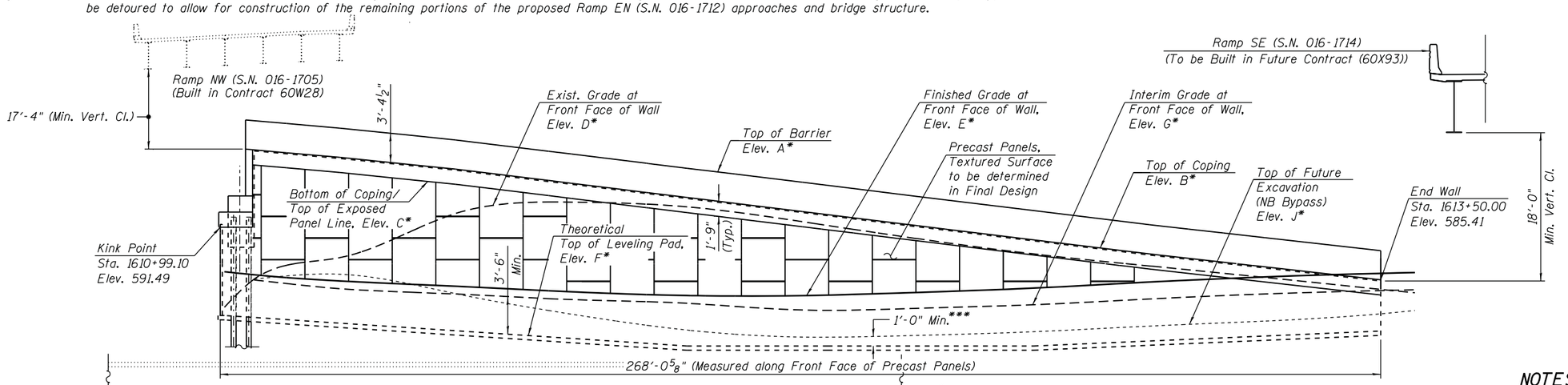
APPENDIX D

Benchmark: Cut square on center of door entrance to 707 W. Harrison St. (south side of Harrison St., approx. 90' west of west line of Des Plaines St.). Elevation 597.47.

Existing Structure: None. Traffic shall be maintained on the existing Ramp EN Structure (S.N. 016-2453) during construction of the proposed retaining wall. Subsequently, traffic shall be detoured to allow for construction of the remaining portions of the proposed Ramp EN (S.N. 016-1712) approaches and bridge structure.



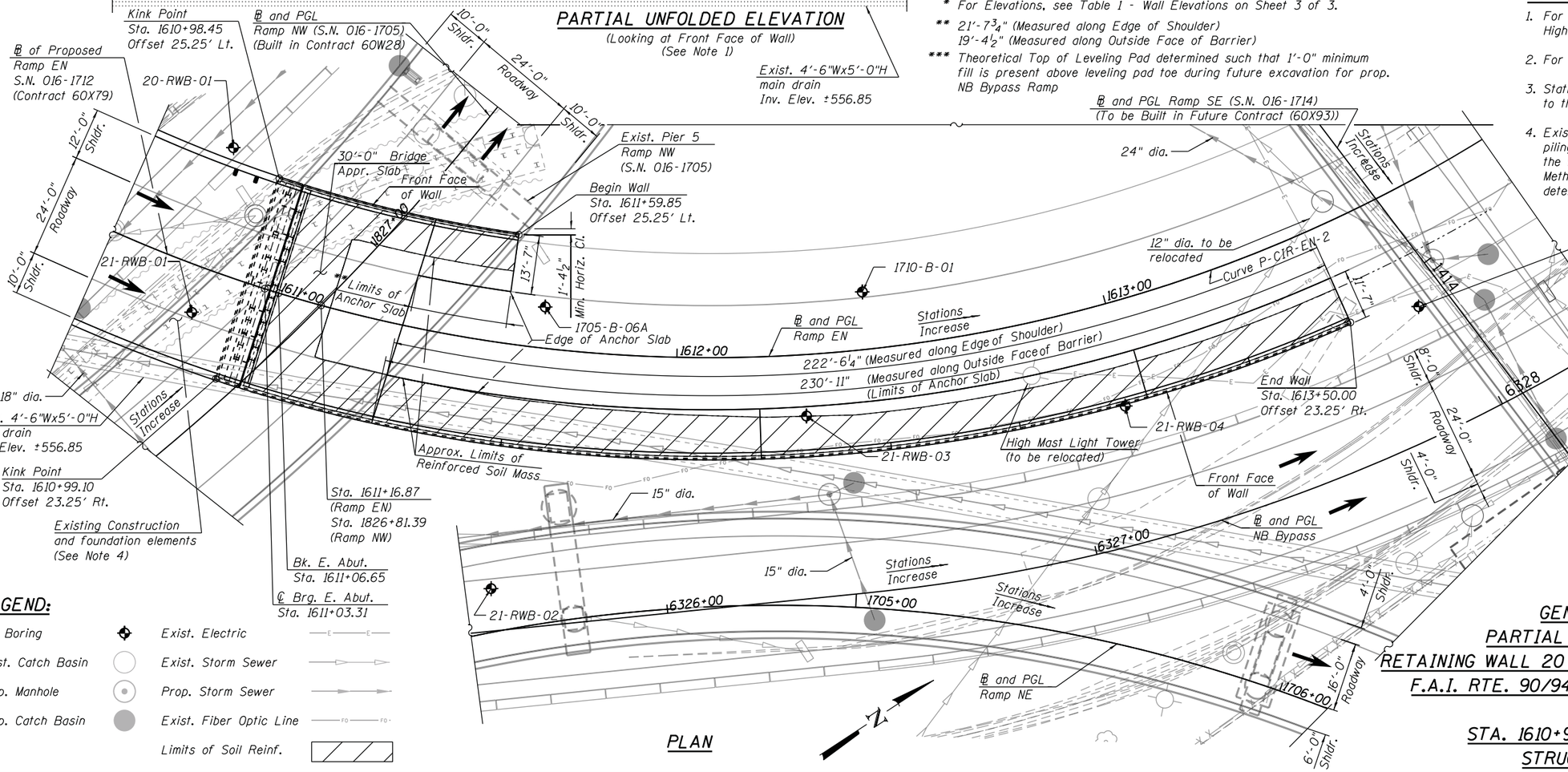
PARTIAL UNFOLDED ELEVATION

(Looking at Front Face of Wall)
(See Note 1)

* For Elevations, see Table 1 - Wall Elevations on Sheet 3 of 3.

** 21'-7¾" (Measured along Edge of Shoulder)
19'-4½" (Measured along Outside Face of Barrier)

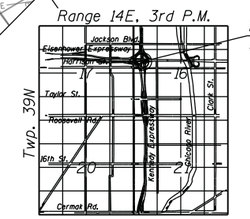
*** Theoretical Top of Leveling Pad determined such that 1'-0" minimum fill is present above leveling pad toe during future excavation for prop. NB Bypass Ramp



PLAN

LEGEND:

Soil Boring	Exist. Electric
Exist. Catch Basin	Exist. Storm Sewer
Prop. Manhole	Prop. Storm Sewer
Prop. Catch Basin	Exist. Fiber Optic Line
	Limits of Soil Reinf.



LOCATION SKETCH

HIGHWAY CLASSIFICATION

Ramp EN
Functional Class: Interstate
ADT: 26,600 (2012); 31,000 (2040)
ADTT: 1,032 (2012); 1,203 (2040)
DHV: 1,910 (2040)
Design Speed: 30 m.p.h.
Posted Speed: 30 m.p.h.
One-Way Traffic
Directional Distribution: 100%

DESIGN SPECIFICATIONS

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

DESIGN STRESSES

FIELD UNITS

f'c = 3,500 psi
fy = 60,000 psi (Reinforcement)

PRECAST UNITS

f'c = 4,500 psi

NOTES:

1. For remaining portions of Unfolded Elevation and Highway Classification Data, see Sheet 2.
2. For Table 1 - Wall Elevations, see Sheet 3.
3. Stations and offsets are measured along ℄ Ramp EN to the front face of precast panels.
4. Existing construction and foundation elements (sheet piling, drilled shafts, steel piles, etc.) are present at the north portion of proposed Retaining Wall 20. Methods for resolving potential conflicts will be determined during the design phase.

GENERAL PLAN AND PARTIAL UNFOLDED ELEVATION RETAINING WALL 20 ALONG RAMP EN EAST ABUTMENT F.A.I. RTE. 90/94/290 - SECTION 2014-005R&B COOK COUNTY STA. 1610+99.10 TO STA. 1613+50.00 STRUCTURE NO. 016-1811

HBM ENGINEERING GROUP, LLC.
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FAX: (708) 236-0901

USER NAME = will.mardauss	DESIGNED - MI, JJS	REVISED -	
	DRAWN - SK	REVISED -	
PLOT SCALE = 28.00 ' / in.	CHECKED - MAI, MI	REVISED -	
PLOT DATE = 3/24/2018	DATE - 03/23/2018	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

STRUCTURE NO. 016-1811

SCALE: | SHEET 1 OF 3 SHEETS | STA. | TO STA.

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
90/94/290	2014-005R&B	COOK	3	1
		CONTRACT NO. 60X79		
	ILLINOIS FED. AID PROJECT			

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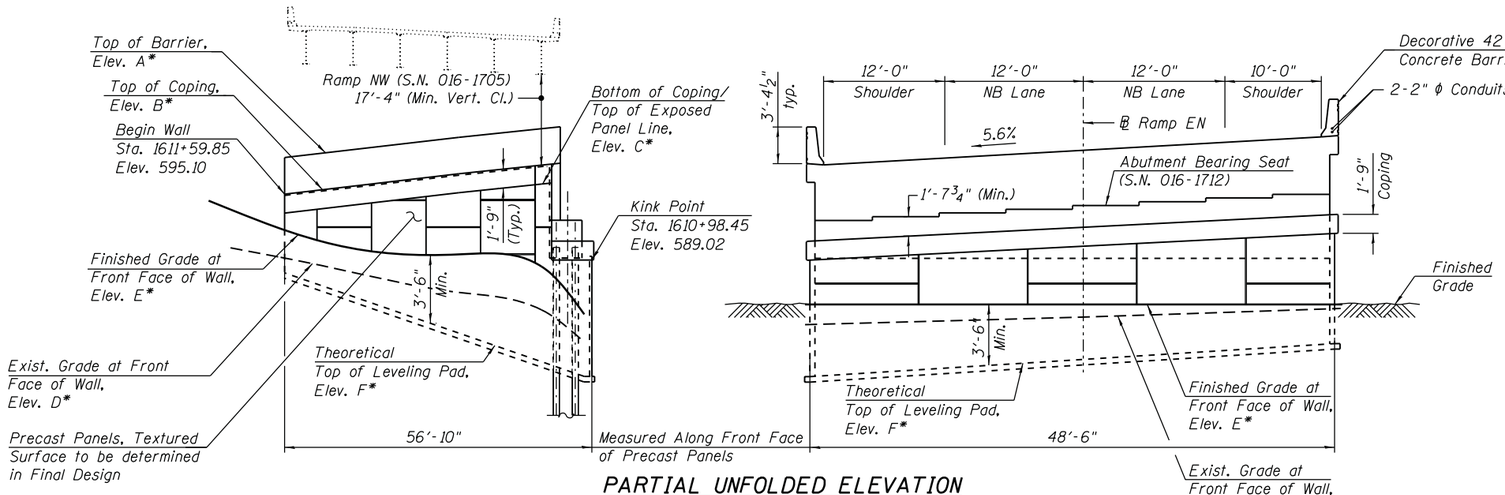
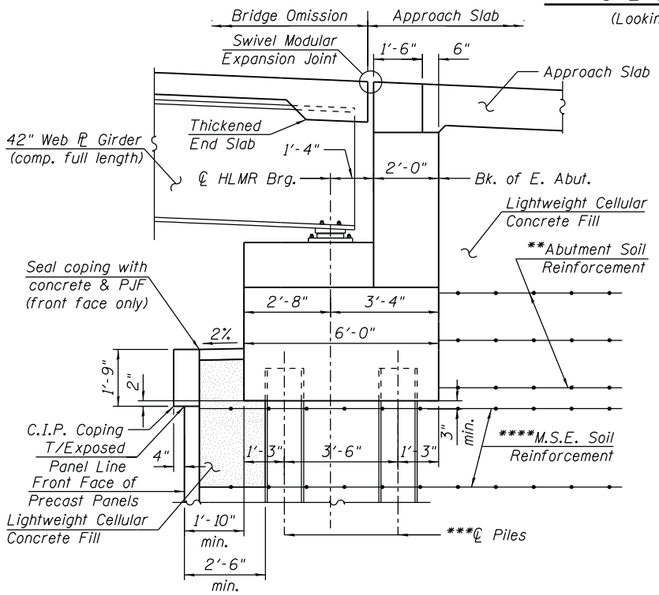


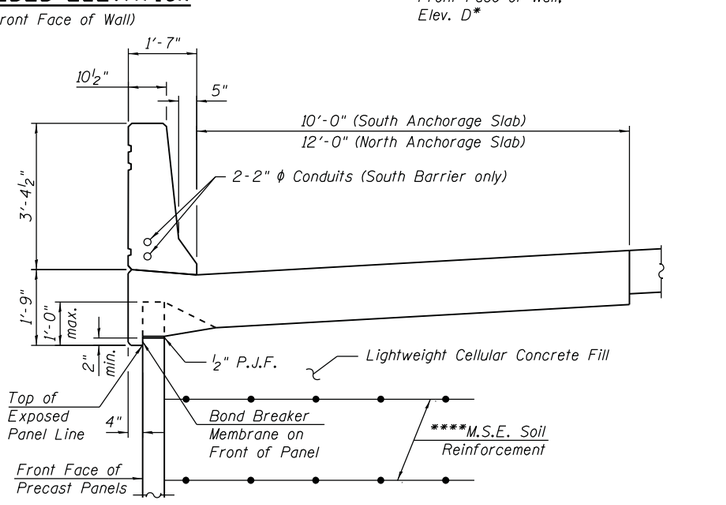
PARTIAL UNFOLDED ELEVATION

(Looking at Front Face of Wall)



SECTION THRU EAST ABUTMENT

(Horiz. Dims. @ Rt. L's to ℄ Brg.)

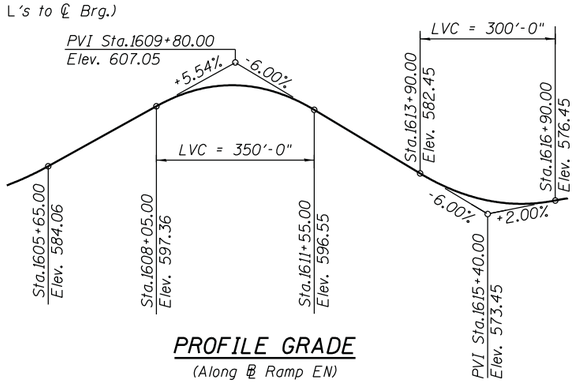


SECTION THROUGH BARRIER AND ANCHORAGE SLAB

CURVE DATA

(RAMP EN)
(PROP. CURVE P-CIR-EN-2)

PI STA. = 1624+41.43
Δ = 158° 32' 09" (LT)
D = 16° 51' 06"
R = 340.00'
T = 1,793.89'
L = 940.77'
E = 1,485.82'
e = 5.60%
T.R. = 36'
S.E. RUN = 102'
P.C. STA. = 1606+47.54
P.T. STA. = 1615+88.31
DS = 30
PS = 30



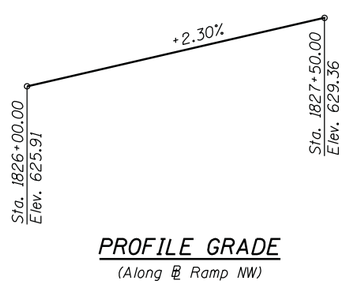
PROFILE GRADE

(Along ℄ Ramp EN)

CURVE DATA

(RAMP NW)
(Prop. Curve 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 = 5.40%
T.R. = 39'
S.E. Run = 105'
P.C. Sta. = 1826+18.11
P.T. Sta. = 1834+52.27
DS = 35
PS = 35



PROFILE GRADE

(Along ℄ Ramp NW)

HIGHWAY CLASSIFICATION

Ramp NW	NB Bypass	Ramp SE
Functional Class: Interstate	Functional Class: Interstate	Functional Class: Interstate
ADT: 32,500 (2012); 36,000 (2040)	ADT: NA (2012); 17,000 (2040)	ADT: 4,600 (2010); 5,000 (2040)
ADTT: 2,483 (2012); 2,730 (2040)	ADTT: NA (2012); 442 (2040)	ADTT: 123 (2012); 134 (2040)
DHV: 2,790 (2040)	DHV: 1,680 (2040)	DHV: 440 (2040)
Design Speed: 35 m.p.h.	Design Speed: 30 m.p.h.	Design Speed: 25 m.p.h.
Posted Speed: 35 m.p.h.	Posted Speed: 30 m.p.h.	Posted Speed: 25 m.p.h.
One-Way Traffic	One-Way Traffic	One-Way Traffic
Directional Distribution: N/A	Directional Distribution: NA	Directional Distribution: 100%

NOTES:

1. All Lightweight Cellular Concrete Fill shall be Class III.
2. For additional Notes, see Sheet 1.

* For Elevations, see Table 1 - Wall Elevations on Sheet 3 of 3.

** Abutment soil reinforcement to resist lateral loads in lieu of steel piles.

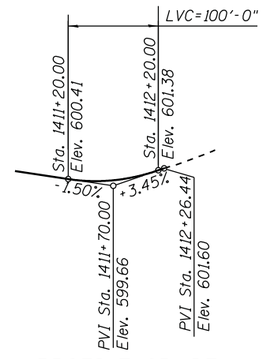
*** Size, spacing, depth and number as required by design.

**** The MSE Wall supplier's internal stability design shall account for the anchorage slab's bearing pressure surcharge of 1 ksf and horizontal sliding force of 0.83 kips/ft of wall.

CURVE DATA

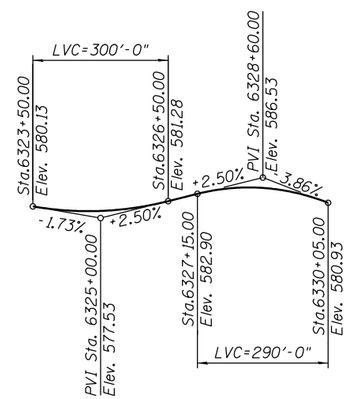
(RAMP SE)
PROP. CURVE P-CIR-SE-2

PI STA. = 1415+83.08
Δ = 157° 44' 18" (LT)
D = 24° 48' 12"
R = 231.00'
T = 1,174.08'
L = 635.96'
E = 965.59'
e = 5.60%
T.R. = NA
S.E. RUN = 128'
P.C. STA. = 1404+09.00
P.T. STA. = 1410+44.95
DS = 25
PS = 25



PROFILE GRADE

(Along ℄ RAMP SE)



PROFILE GRADE

(Along ℄ NB Bypass)

CURVE DATA

(RAMP NB Bypass)
(Prop. Curve P-NCD-NX-4)

P.I. Sta. = 6328+76.78
Δ = 59° 05' 41" (LT)
D = 14° 08' 50"
R = 405.00'
T = 229.58'
L = 417.72'
E = 60.54'
e = 5.40%
T.R. = 36'
S.E. Run =98'
P.C. Sta. = 6326+47.20
P.T. Sta. = 6330+64.91
DS = 30
PS = 30

PARTIAL UNFOLDED ELEVATIONS, SECTIONS, AND DETAILS
RETAINING WALL 20 ALONG RAMP EN EAST ABUTMENT
F.A.I. RTE. 90/94/290 - SECTION 2014-005R&B
COOK COUNTY
STA. 1610+99.10 TO STA. 1613+50.00
STRUCTURE NO. 016-1811

HBM ENGINEERING GROUP, LLC
CONSULTING & DESIGN
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PHONE: (708) 236-0900
FAX: (708) 236-0901

USER NAME = will.mardauss	DESIGNED - MI, JJS	REVISED -	
	DRAWN - SK	REVISED -	
PLOT SCALE = 28.00 ' / in.	CHECKED - MAI, MI	REVISED -	
PLOT DATE = 3/24/2018	DATE - 03/23/2018	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

STRUCTURE NO. 016-1811

SCALE: | SHEET 2 OF 3 SHEETS | STA. | TO STA.

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
90/94/290	2014-005R&B	COOK	3	2
		CONTRACT NO. 60X79		
	ILLINOIS FED. AID PROJECT			

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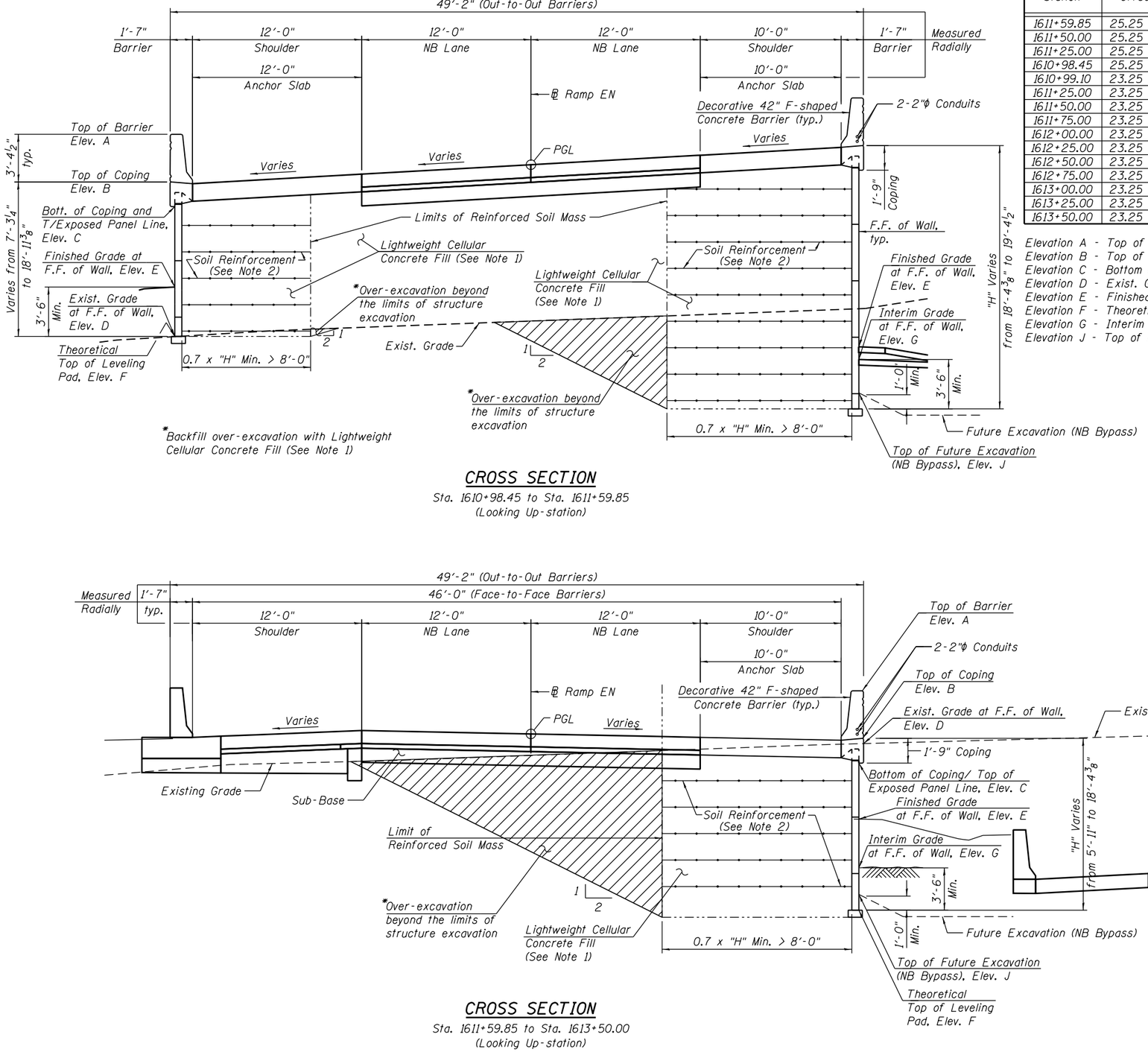

CROSS SECTION

Sta. 1610+98.45 to Sta. 1611+59.85
(Looking Up-station)

CROSS SECTION

Sta. 1611+59.85 to Sta. 1613+50.00
(Looking Up-station)

TABLE 1 - WALL ELEVATIONS

Station	Offset	Elevation A	Elevation B	Elevation C	Elevation D	Elevation E	Elevation F	Elevation G	Elevation J
1611+59.85	25.25 LT.	598.48	595.11	593.36	589.19	591.78	587.83	-	-
1611+50.00	25.25 LT.	599.01	595.64	593.89	586.02	589.53	586.26	-	-
1611+25.00	25.25 LT.	600.36	596.99	595.24	583.99	587.86	582.25	-	-
1610+98.45	25.25 LT.	-	-	-	-	-	-	-	-
1610+99.10	23.25 RT.	-	-	-	-	-	-	-	-
1611+25.00	23.25 RT.	602.94	599.57	597.82	587.99	585.29	580.42	584.40	586.07
1611+50.00	23.25 RT.	601.58	598.21	596.46	593.08	584.68	579.54	583.78	583.82
1611+75.00	23.25 RT.	599.95	596.58	594.83	594.40	584.04	578.66	583.14	581.46
1612+00.00	23.25 RT.	598.31	594.94	593.19	593.85	583.61	577.78	582.71	579.62
1612+25.00	23.25 RT.	596.68	593.31	591.56	592.13	583.60	577.78	581.93	578.81
1612+50.00	23.25 RT.	595.04	591.67	589.92	590.16	583.97	577.78	582.13	579.00
1612+75.00	23.25 RT.	593.41	590.04	588.29	588.41	584.46	577.78	582.54	579.42
1613+00.00	23.25 RT.	591.79	588.42	586.67	587.02	585.16	578.35	583.21	580.08
1613+25.00	23.25 RT.	590.29	586.92	585.17	585.69	585.75	578.93	583.79	580.66
1613+50.00	23.25 RT.	588.79	585.42	583.67	584.32	586.17	579.50	584.18	581.50

Elevation A - Top of Barrier
Elevation B - Top of Coping
Elevation C - Bottom of Coping/Top of Exposed Panel Line
Elevation D - Exist. Grade at Front Face of Wall
Elevation E - Finished Grade at Front Face of Wall
Elevation F - Theoretical Top of Leveling Pad
Elevation G - Interim Grade at Front Face of Wall
Elevation J - Top of Future Excavation (NB Bypass)

NOTES:

1. All lightweight cellular concrete fill shall be Class III.
2. The MSE wall supplier's internal stability design shall account for the anchorage slab's bearing pressure surcharge of 1.0 ksf and horizontal sliding force of 0.83 kips/ft. of wall.
3. F.F. denotes Front Face.
4. For additional notes, see Sheet 1.

SECTIONS
RETAINING WALL 20 ALONG RAMP EN EAST ABUTMENT
F.A.I. RTE. 90/94/290 - SECTION 2014-005R&B
COOK COUNTY
STA. 1610+99.10 TO STA. 1613+50.00
STRUCTURE NO. 016-1811

HBM ENGINEERING GROUP, LLC
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USER NAME = will.mardauss	DESIGNED - MI, JJS	REVISED -	
	DRAWN - SK	REVISED -	
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PLOT DATE = 3/24/2018	DATE - 03/23/2018	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

STRUCTURE NO. 016-1811

SCALE: | SHEET 3 OF 3 SHEETS | STA. | TO STA.

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
90/94/290	2014-005R&B	COOK	3	3
		CONTRACT NO. 60X79		
	ILLINOIS	FED. AID PROJECT		

APPENDIX E

FINAL SURVEY	NOTE BOOK	SURVEYED	BY	DATE
		PLOTTED		
		TEMPLATE		
		AREAS		
NO.		AREAS CHECKED		

ORIGINAL SURVEY	NOTE BOOK	SURVEYED	BY	DATE
		PLOTTED		
		TEMPLATE		
		AREAS		
NO.		AREAS CHECKED		

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635 630 625 620 615 610 605 600 595 590 585 580 575 570 565 560 555

RAMP NE

B
RAMP EN

B
NB CD ROAD

EXISTING 4.5' X 5' DIA
MAIN DRAIN

1611+03.21

Jane Byrne INTERCHANGE	XS_SHEET	DESIGNED -	REVISED -
	USER NAME = dshevaz	DRAWN -	REVISED -
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	PLOT DATE = 9/19/2017	DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

CROSS SECTIONS - RAMP EN

SCALE: | SHEET 21 OF 36 SHEETS | STA. 1611+03.21 | TO STA. 1611+03.21

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
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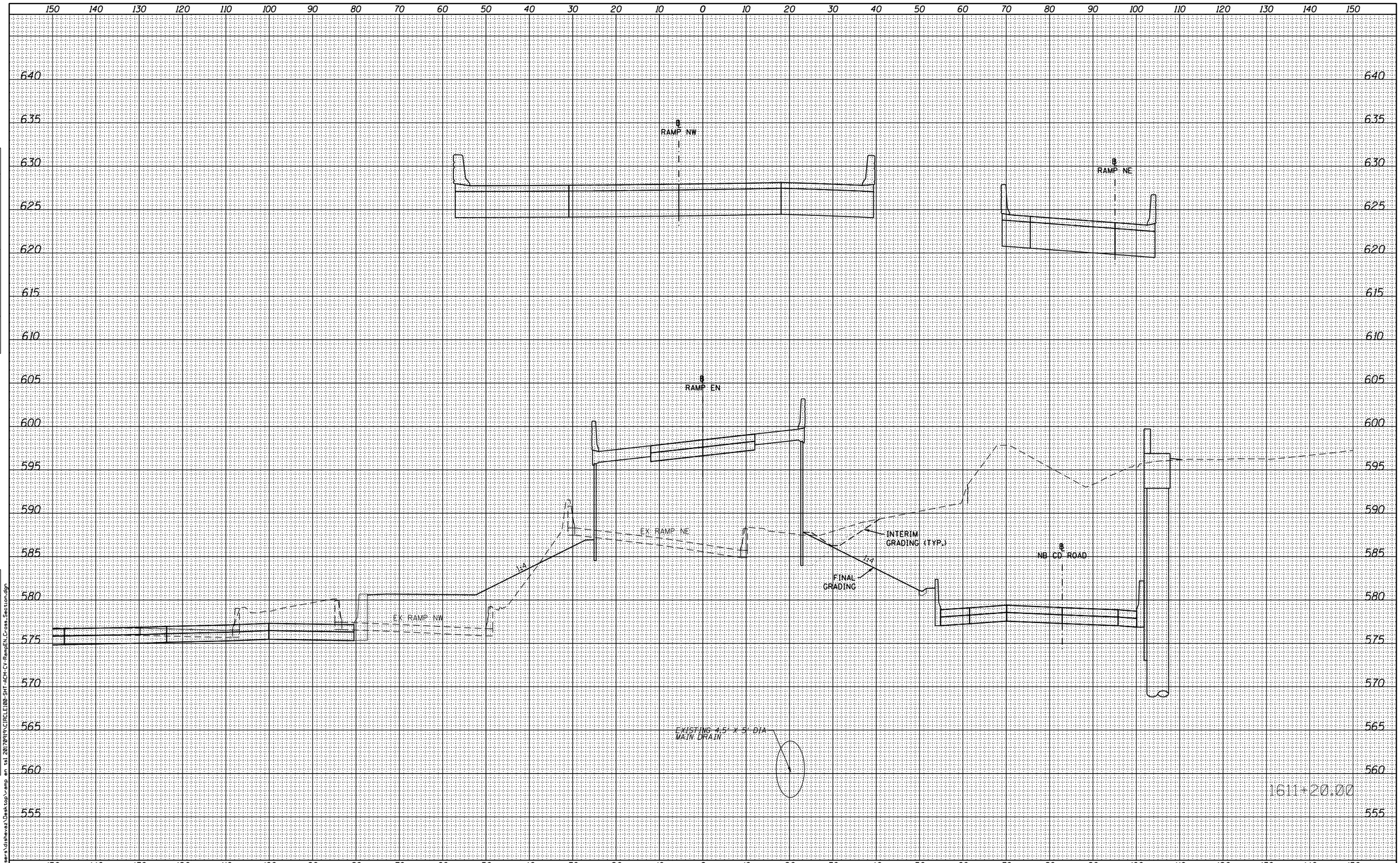
		CONTRACT NO.		
	ILLINOIS FED. AID PROJECT			



FINAL SURVEY	NOTE BOOK	NO.
SURVEYED		
PLOTTED		
TEMPLATE		
AREAS		
AREAS CHECKED		

BY	DATE

ORIGINAL SURVEY	NOTE BOOK
SURVEYED	
PLOTTED	
TEMPLATE	
AREAS	
AREAS CHECKED	

BY	DATE

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Jane Byrne INTERCHANGE

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PLOT DATE = 9/19/2017	DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

CROSS SECTIONS - RAMP EN

SCALE:

SHEET 22 OF 36 SHEETS STA. 1611+20.00 TO STA. 1611+20.00

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
			36	

CONTRACT NO.

ILLINOIS FED. AID PROJECT

FINAL SURVEY	NOTE BOOK	NO.
	SURVEYED	
	PLOTTED	
	TEMPLATE	
	AREAS	
	AREAS CHECKED	

BY	DATE

ORIGINAL SURVEY	NOTE BOOK	NO.
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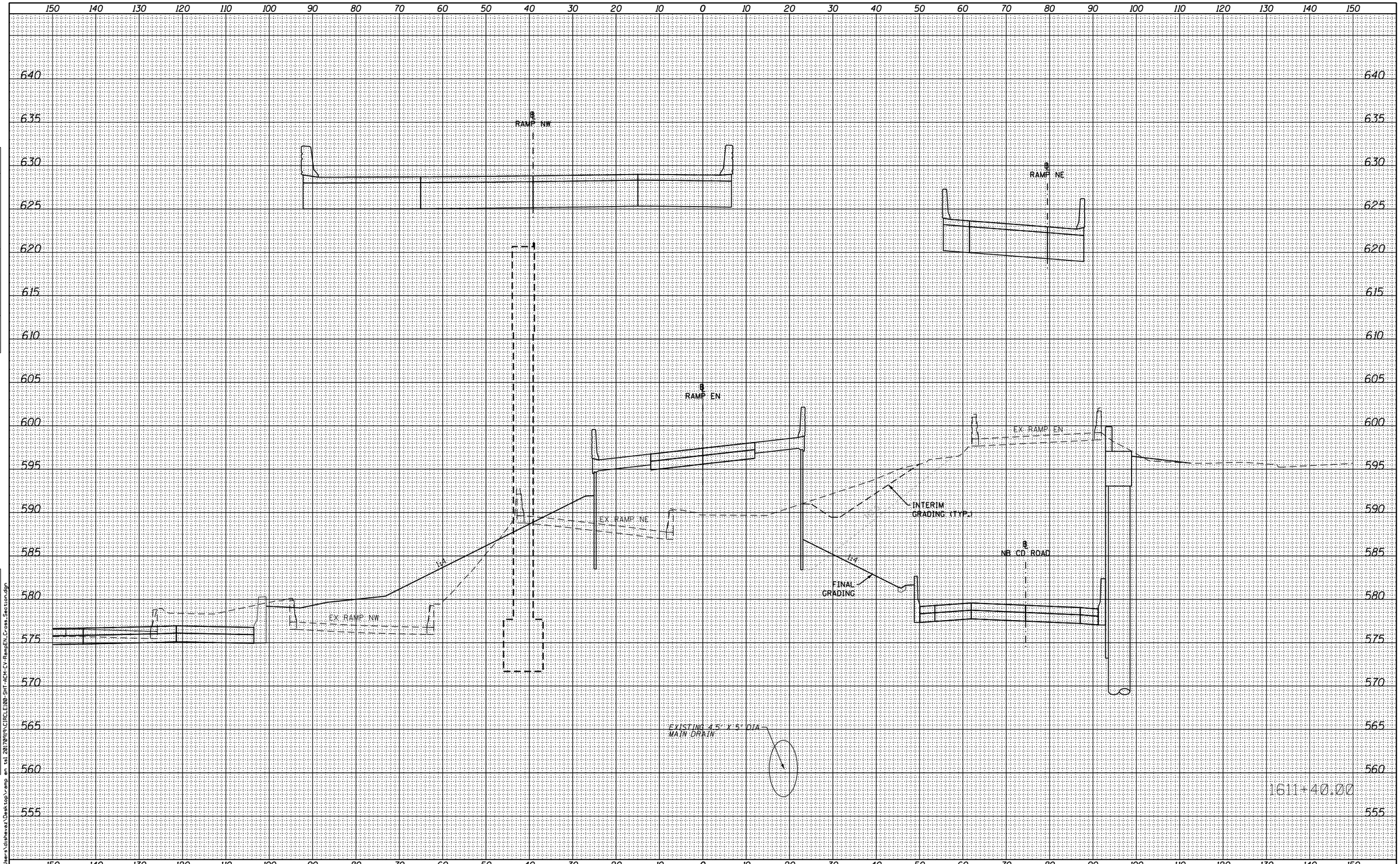
	PLOTTED	
	TEMPLATE	
	AREAS	
	AREAS CHECKED	

BY	DATE



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Jane Byrne INTERCHANGE

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PLOT DATE = 9/19/2017	DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

CROSS SECTIONS - RAMP EN

SCALE: | SHEET 23 OF 36 SHEETS | STA. 1611+40.00 | TO STA. 1611+40.00

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
			36	

CONTRACT NO.

ILLINOIS | FED. AID PROJECT

FINAL SURVEY	NOTE BOOK	NO.
	SURVEYED	
	PLOTTED	
	TEMPLATE	
	AREAS	
	AREAS CHECKED	

ORIGINAL SURVEY	NOTE BOOK	NO.
	SURVEYED	
	PLOTTED	
	TEMPLATE	
	AREAS	
	AREAS CHECKED	

FILE PATH = C:\Users\dshevaz\Desktop\vamp en tal 20170919\CIRCLE100-SHT-ACM-CV-RampEN_Cross_Section.dgn

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

640 635 630 625 620 615 610 605 600 595 590 585 580 575 570 565 560 555

B RAMP NW

B RAMP NE

B RAMP EN

EX RAMP EN

EX RAMP NE

EX RAMP NW

INTERIM GRADING (TYP.)

FINAL GRADING

B NB CD ROAD

1:4

EXISTING 4.5' X 5' DIA MAIN DRAIN

1611+60.00

XS_SHEET	DESIGNED -	REVISED -	
USER NAME = dshevaz	DRAWN -	REVISED -	
PLOT SCALE = 20.0000 ' / in.	CHECKED -	REVISED -	
PLOT DATE = 9/19/2017	DATE -	REVISED -	

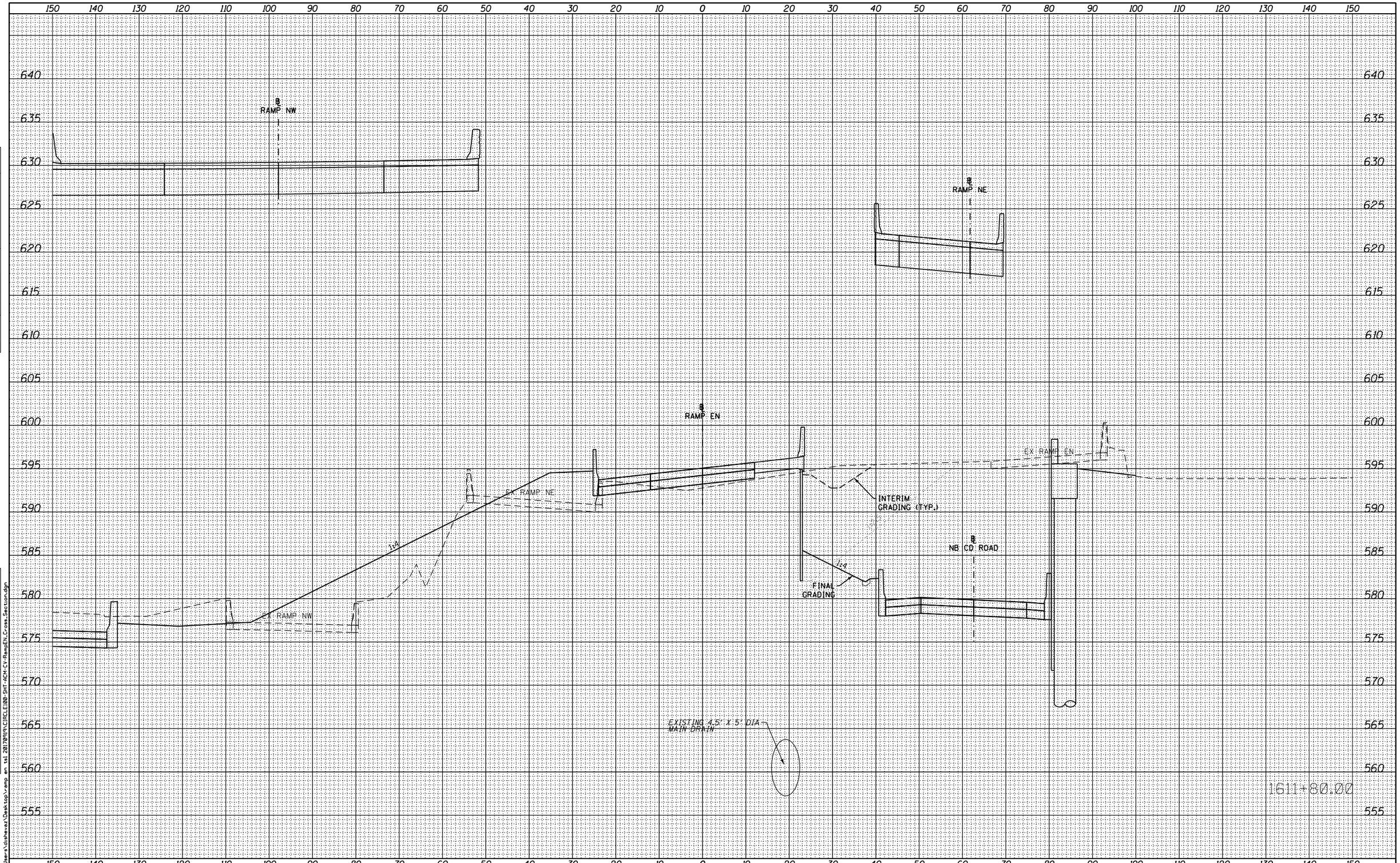
Jane Byrne INTERCHANGE

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

CROSS SECTIONS - RAMP EN

SCALE: | SHEET 24 OF 36 SHEETS | STA. 1611+60.00 | TO STA. 1611+60.00

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
			36	
		CONTRACT NO.		
	ILLINOIS	FED. AID PROJECT		



FINAL SURVEY	NOTE BOOK	NO.
	SURVEYED	
	PLOTTED	
	TEMPLATE	
	AREAS	
	AREAS CHECKED	

ORIGINAL SURVEY	NOTE BOOK	NO.	BY	DATE
	SURVEYED			
	PLOTTED			
	TEMPLATE			
	AREAS			
	AREAS CHECKED			

FILE PATH = C:\Users\dshevaz\Desktop\ramp en tsl 20170919\CIRCLE100-SHT-ACM-CV-RampEN_Cross_Section.dgn

Jane Byrne INTERCHANGE

XS_SHEET	DESIGNED -	REVISED -
USER NAME = dshevaz	DRAWN -	REVISED -
PLOT SCALE = 20.0000 ' / in.	CHECKED -	REVISED -
PLOT DATE = 9/19/2017	DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

CROSS SECTIONS - RAMP EN

SCALE: | SHEET 25 OF 36 SHEETS | STA. 1611+80.00 | TO STA. 1611+80.00

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
			36	

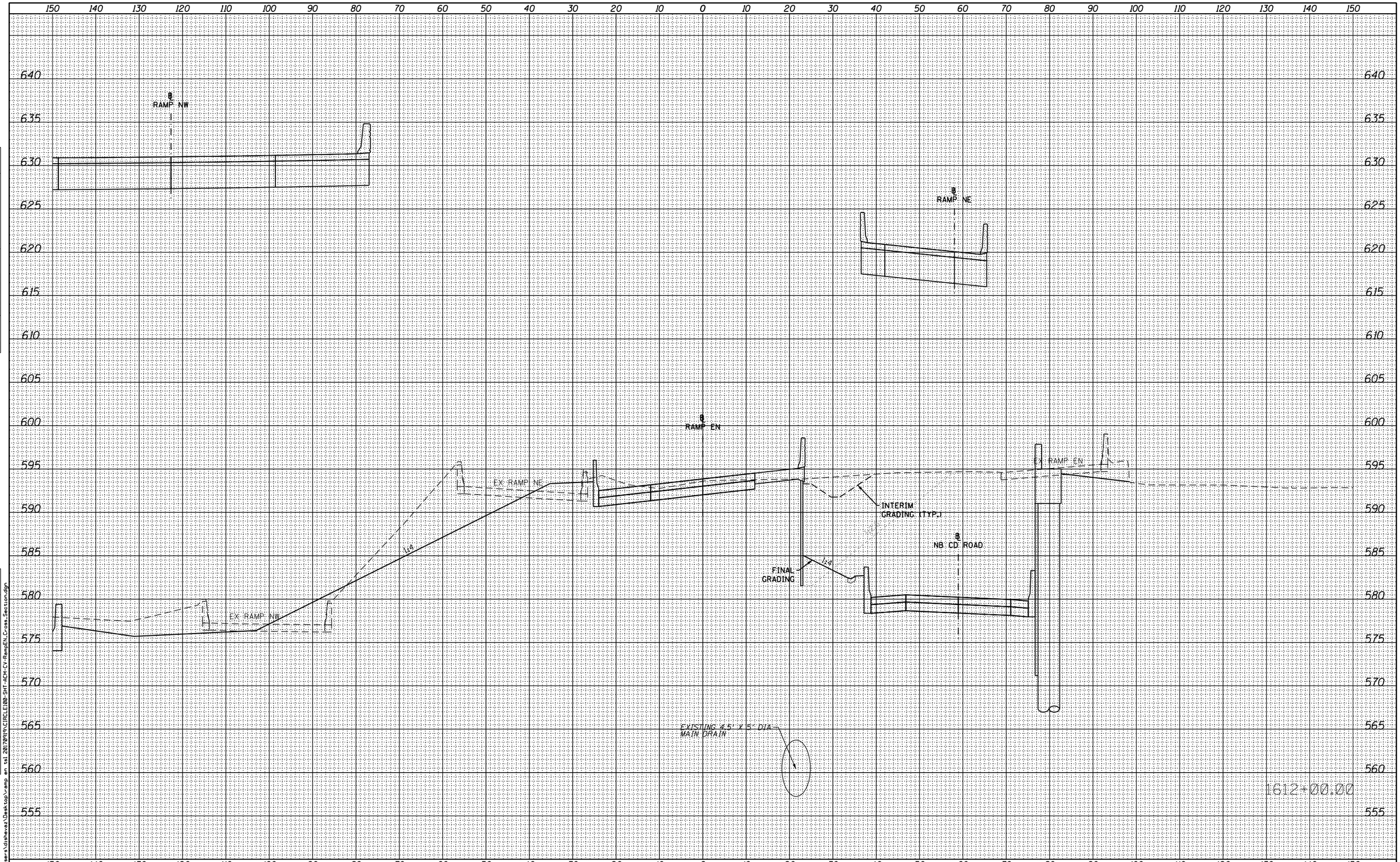
CONTRACT NO.

ILLINOIS | FED. AID PROJECT

FINAL SURVEY	NOTE BOOK	NO.
	SURVEYED	BY
	PLOTTED	
	TEMPLATE	
	AREAS	
	AREAS CHECKED	DATE

ORIGINAL SURVEY	NOTE BOOK	NO.
	SURVEYED	BY
	PLOTTED	
	TEMPLATE	
	AREAS	
	AREAS CHECKED	DATE

FILE PATH = C:\Users\dshevaz\Desktop\ramp en tsl 20170919\CIRCLE100-SHT-ACM-CV-RampEN_Cross_Section.dgn



XS_SHEET	DESIGNED -	REVISED -	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION
USER NAME = dshevaz	DRAWN -	REVISED -	CROSS SECTIONS - RAMP EN
PLOT SCALE = 20.0000 ' / in.	CHECKED -	REVISED -	SCALE: SHEET 26 OF 36 SHEETS STA. 1612+00.00 TO STA.1612+00.00
PLOT DATE = 9/19/2017	DATE -	REVISED -	

Jane Byrne INTERCHANGE

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
			36	
CONTRACT NO.				
ILLINOIS	FED. AID PROJECT			

RAMP NW

RAMP NE

RAMP EN

EX RAMP NE

EX RAMP NW

EX RAMP EN

INTERIM GRADING (TYP.)

NB CD ROAD

FINAL GRADING

1:4

EXISTING 4.5' x 5' DIA MAIN DRAIN

1612+20.00

Jane Byrne INTERCHANGE	XS_SHEET	DESIGNED -	REVISED -
	USER NAME = dshevaz	DRAWN -	REVISED -
	PLOT SCALE = 20.0000 ' / in.	CHECKED -	REVISED -
	PLOT DATE = 9/19/2017	DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

CROSS SECTIONS - RAMP EN

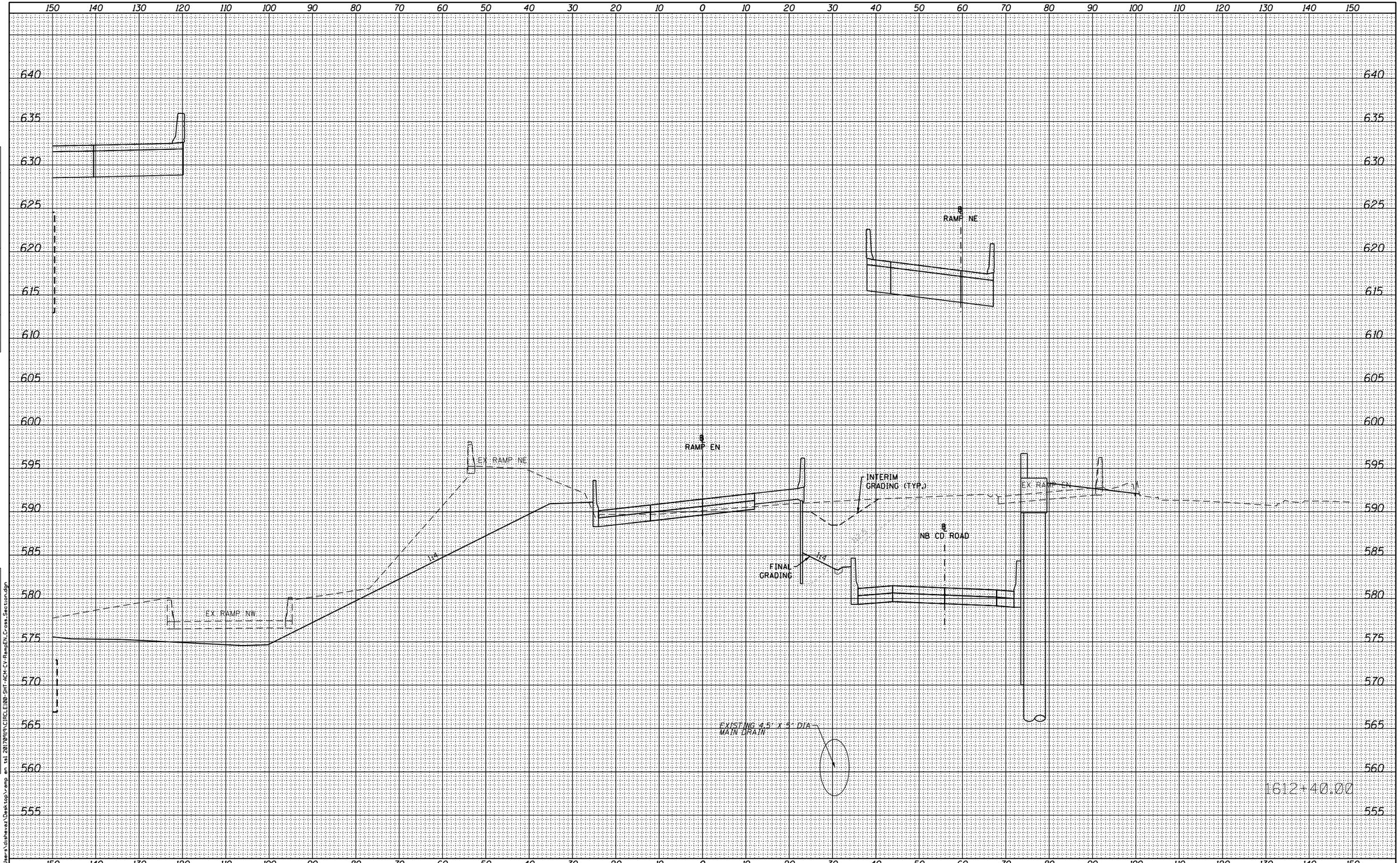
SCALE: | SHEET 27 OF 36 SHEETS | STA. 1612+20.00 | TO STA. 1612+20.00

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
			36	
		CONTRACT NO.		
	ILLINOIS FED. AID PROJECT			

ORIGINAL SURVEY	NO.	BY	DATE
NOTE BOOK			
SURVEYED			
PLOTTED			
TEMPLATE			
AREAS			
AREAS CHECKED			

FINAL SURVEY	NO.	BY	DATE
NOTE BOOK			
SURVEYED			
PLOTTED			
TEMPLATE			
AREAS			
AREAS CHECKED			

FILE PATH = C:\Users\dshevaz\Desktop\ramp en tsl 20170919\CIRCLE100-SHT-ACM-CV-RampEN_Cross_Section.dgn



FINAL SURVEY	NOTE BOOK	NO.
SURVEYED		
PLOTTED		
TEMPLATE		
AREAS		
AREAS CHECKED		

BY	DATE

ORIGINAL SURVEY	NOTE BOOK	NO.
SURVEYED		
PLOTTED		
TEMPLATE		
AREAS		
AREAS CHECKED		

BY	DATE

FILE PATH = C:\Users\dshevaz\Desktop\ramp en tsl 20170919\CIRCLE100-SHT-ACM-CV-RampEN_Cross_Section.dgn

Jane Byrne INTERCHANGE

XS_SHEET	DESIGNED -	REVISED -
USER NAME = dshevaz	DRAWN -	REVISED -
PLOT SCALE = 20.0000 ' / in.	CHECKED -	REVISED -
PLOT DATE = 9/19/2017	DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

CROSS SECTIONS - RAMP EN

SCALE: | SHEET 28 OF 36 SHEETS | STA. 1612+40.00 | TO STA. 1612+40.00

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
			36	

CONTRACT NO.

ILLINOIS | FED. AID PROJECT

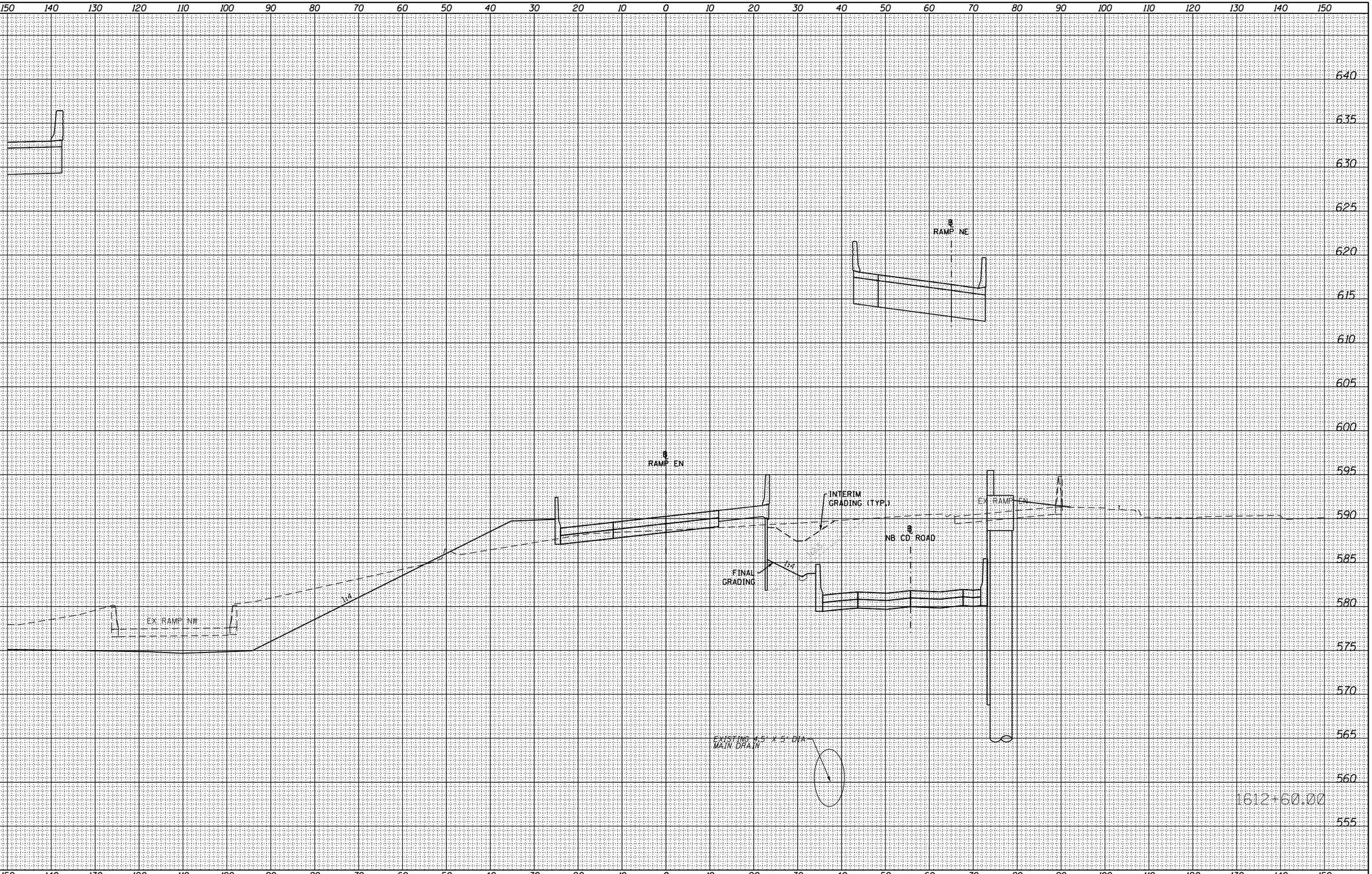
FINAL SURVEY	NOTE BOOK	NO.
	SURVEYED	
	PLOTTED	
	TEMPLATE	
	AREAS	
	AREAS CHECKED	

BY	DATE

ORIGINAL SURVEY	NOTE BOOK	NO.
	SURVEYED	
	PLOTTED	
	TEMPLATE	
	AREAS	
	AREAS CHECKED	

BY	DATE

FILE PATH = C:\Users\dshevaz\Desktop\ramp en tsl 20170919\CIRCLE1100-SHT-ACM-CV-RampEN_Cross_Section.dgn



Jane Byrne INTERCHANGE	XS_SHEET	DESIGNED -	REVISED -
	USER NAME = dshevaz	DRAWN -	REVISED -
	PLOT SCALE = 20.0000 ' / in.	CHECKED -	REVISED -
	PLOT DATE = 9/19/2017	DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

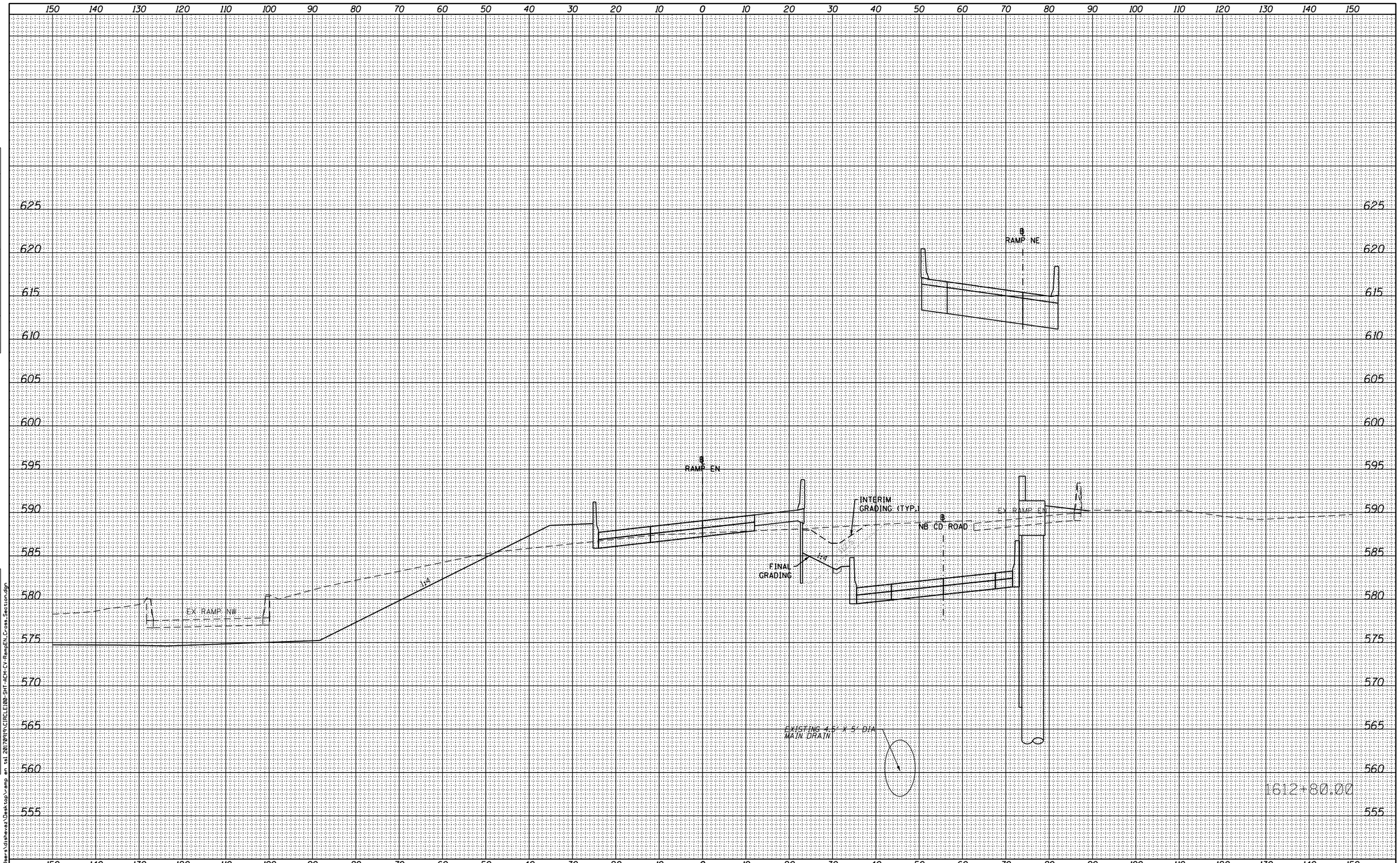
CROSS SECTIONS - RAMP EN

SCALE: | SHEET 29 OF 36 SHEETS | STA. 1612+60.00 | TO STA. 1612+60.00

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
			36	

CONTRACT NO.

ILLINOIS | FED. AID PROJECT



FINAL SURVEY	NOTE BOOK	NO.
	SURVEYED	
	PLOTTED	
	TEMPLATE	
	AREAS	
	AREAS CHECKED	

BY	DATE

ORIGINAL SURVEY	NOTE BOOK	NO.
	SURVEYED	
	PLOTTED	
	TEMPLATE	
	AREAS	
	AREAS CHECKED	

BY	DATE

FILE PATH = C:\Users\dshevaz\Desktop\ramp en tsl 20170919\CIRCLE1100-SHT-ACM-CV-RampEN_Cross_Section.dgn

Jane Byrne INTERCHANGE

XS_SHEET	DESIGNED -	REVISED -
USER NAME = dshevaz	DRAWN -	REVISED -
PLOT SCALE = 20.0000 ' / in.	CHECKED -	REVISED -
PLOT DATE = 9/19/2017	DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

CROSS SECTIONS - RAMP EN

SCALE: | SHEET 30 OF 36 SHEETS | STA. 1612+80.00 | TO STA. 1612+80.00

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
			36	

CONTRACT NO.

ILLINOIS | FED. AID PROJECT

FINAL SURVEY	NOTE BOOK	NO.
	SURVEYED	
	PLOTTED	
	TEMPLATE	
	AREAS	
	AREAS CHECKED	

BY	DATE

ORIGINAL SURVEY	NOTE BOOK	NO.
	SURVEYED	
	PLOTTED	
	TEMPLATE	
	AREAS	
	AREAS CHECKED	

BY	DATE

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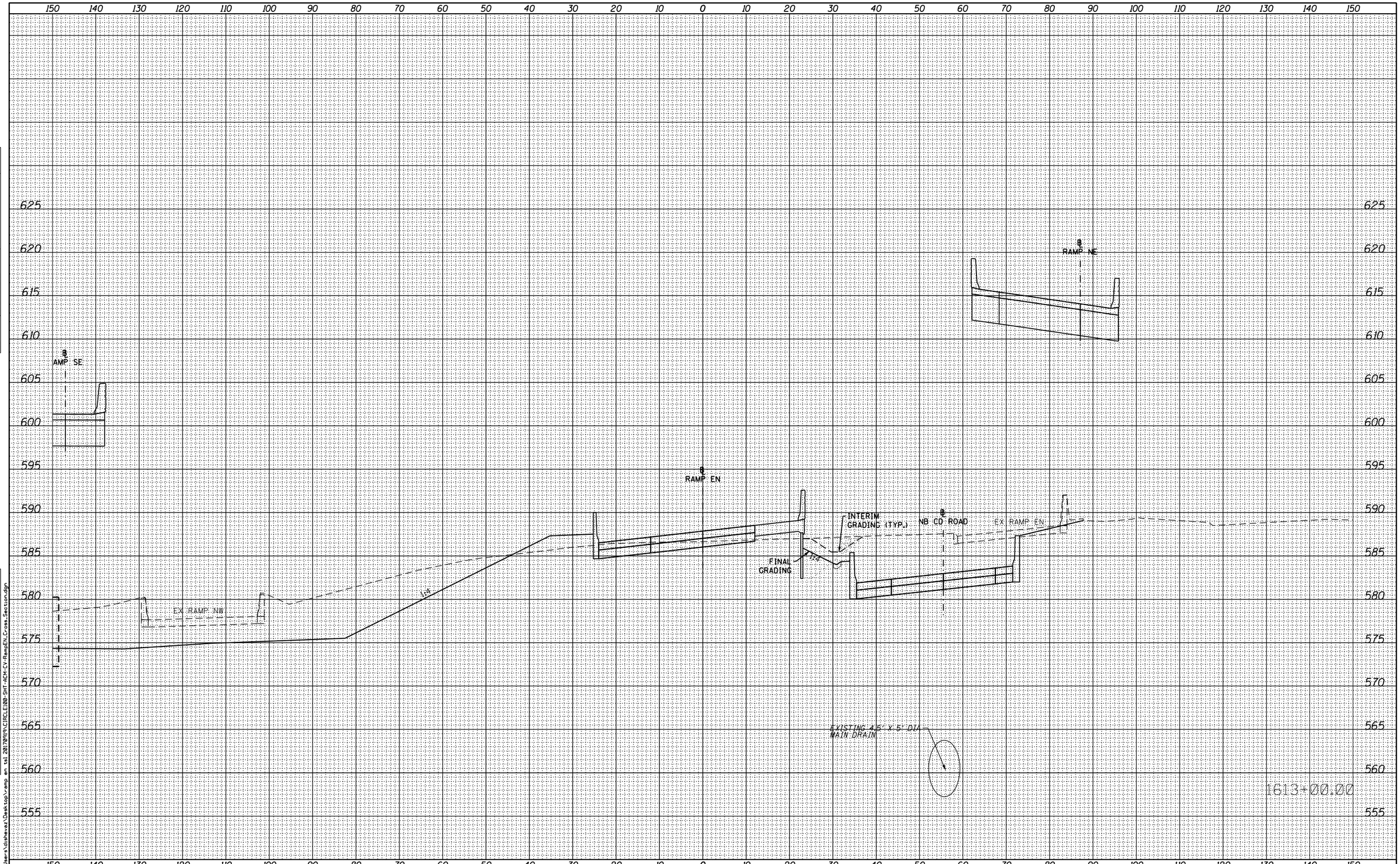


Jane Byrne INTERCHANGE

XS_SHEET	DESIGNED -	REVISED -
USER NAME = dshevez	DRAWN -	REVISED -
PLOT SCALE = 20.0000 ' / in.	CHECKED -	REVISED -
PLOT DATE = 9/19/2017	DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

CROSS SECTIONS - RAMP EN

SCALE: | SHEET 31 OF 36 SHEETS | STA. 1613+00.00 | TO STA. 1613+00.00

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
			36	
		CONTRACT NO.		
	ILLINOIS	FED. AID PROJECT		

FINAL SURVEY	NOTE BOOK	SURVEYED	BY	DATE
		PLOTTED		
		TEMPLATE		
		AREAS		
NO.		AREAS CHECKED		

ORIGINAL SURVEY	NOTE BOOK	SURVEYED	BY	DATE
		PLOTTED		
		TEMPLATE		
		AREAS		
NO.		AREAS CHECKED		

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

625 620 615 610 605 600 595 590 585 580 575 570 565 560 555

B RAMP SE

B RAMP NE

B RAMP EN

B NB CD ROAD

INTERIM GRADING (TYP.

FINAL GRADING

EX RAMP EN

EX RAMP NW

1:4

EXISTING 4.5' X 5' DIA MAIN DRAIN

1613+20.00

FILE PATH = C:\Users\dshevaz\Desktop\amp en tsl 20170919\CIRCLE1B0-SHT-ACM-CV-RampEN_Cross_Section.dgn

Jane Byrne INTERCHANGE

XS_SHEET	DESIGNED -	REVISED -	
USER NAME = dshevaz	DRAWN -	REVISED -	
PLOT SCALE = 20.0000 ' / in.	CHECKED -	REVISED -	
PLOT DATE = 9/19/2017	DATE -	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

CROSS SECTIONS - RAMP EN

SCALE: | SHEET 32 OF 36 SHEETS | STA. 1613+20.00 | TO STA. 1613+20.00

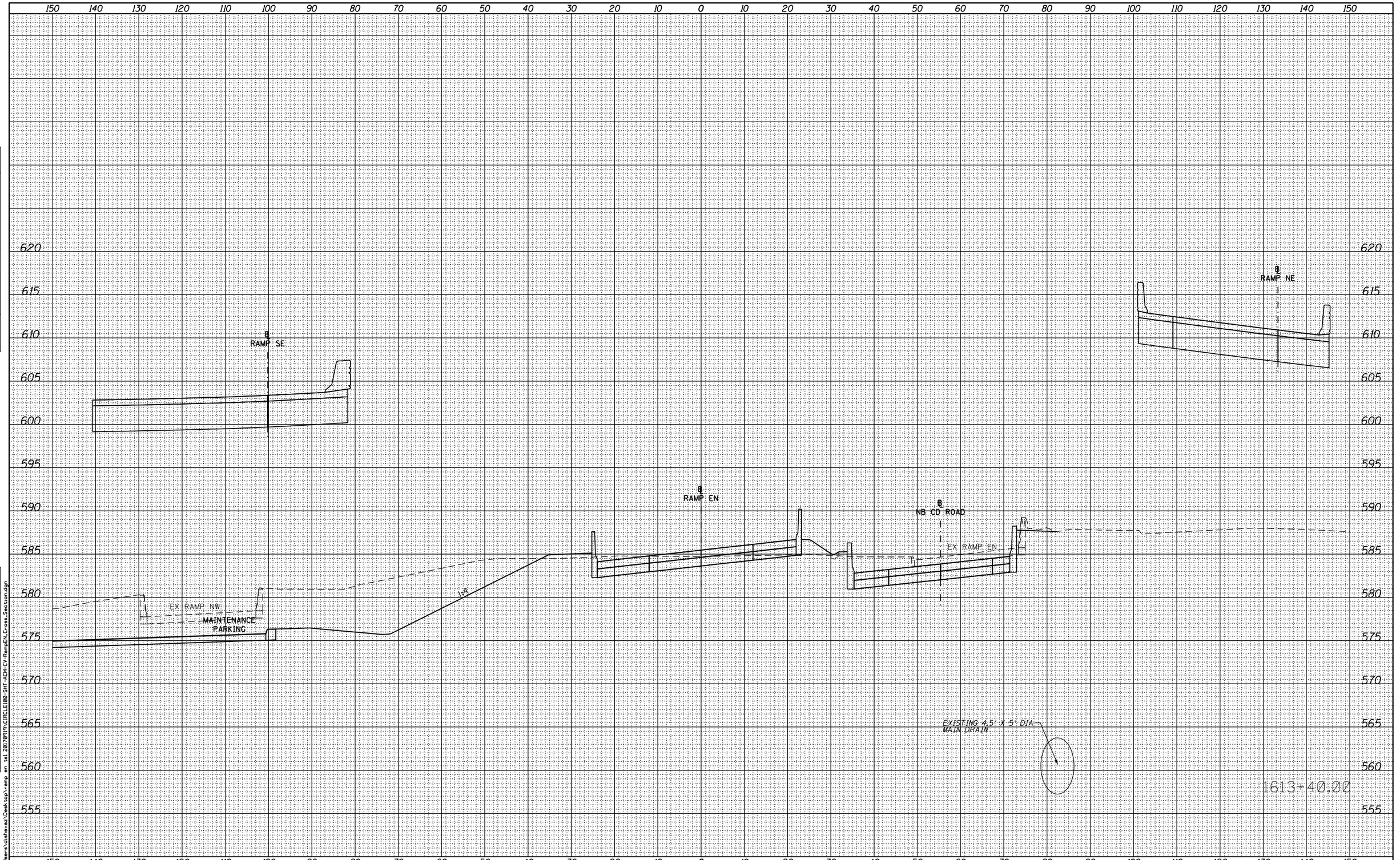
F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
			36	
		CONTRACT NO.		
	ILLINOIS FED. AID PROJECT			

FINAL SURVEY	NOTE BOOK	NO.
	SURVEYED	
	PLOTTED	
	TEMPLATE	
	AREAS	
	AREAS CHECKED	

BY	DATE

ORIGINAL SURVEY	NOTE BOOK	NO.
	SURVEYED	
	PLOTTED	
	TEMPLATE	
	AREAS	
	AREAS CHECKED	

BY	DATE



FILE PATH = C:\Users\dshevaz\Desktop\vamp en tsl 20170919\CIRCLE1B0-SHT-ACM-CV-RampEN_Cross_Section.dgn

Jane Byrne INTERCHANGE	XS_SHEET	DESIGNED -	REVISED -
	USER NAME = dshevaz	DRAWN -	REVISED -
	PLOT SCALE = 20.0000 ' / in.	CHECKED -	REVISED -
	PLOT DATE = 9/19/2017	DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

CROSS SECTIONS - RAMP EN

SCALE: | SHEET 33 OF 36 SHEETS | STA. 1613+40.00 | TO STA. 1613+40.00

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
			36	

CONTRACT NO.

ILLINOIS | FED. AID PROJECT

FINAL SURVEY	NOTE BOOK	NO.
	SURVEYED	
	PLOTTED	
	TEMPLATE	
	AREAS	
	AREAS CHECKED	

BY	DATE

ORIGINAL SURVEY	NOTE BOOK	NO.
	SURVEYED	
	PLOTTED	
	TEMPLATE	
	AREAS	
	AREAS CHECKED	

BY	DATE

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

620 615 610 605 600 595 590 585 580 575 570 565 560 555

℄ RAMP EN

℄ NB CD ROAD

EX RAMP NW

MAINTENANCE PARKING

EX RAMP EN

EXISTING 4'-0" X 5" DIA MAIN DRAIN

1613+60.00

FILE PATH = C:\Users\dshevaz\Desktop\vamp en tsl 2017\9\9\CIRCLE180-SHT-ACM-CV-RampEN_Cross_Section.dgn

Jane Byrne INTERCHANGE	XS_SHEET	DESIGNED -	REVISED -
	USER NAME = dshevaz	DRAWN -	REVISED -
	PLOT SCALE = 20.0000 ' / in.	CHECKED -	REVISED -
	PLOT DATE = 9/19/2017	DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

CROSS SECTIONS - RAMP EN

SCALE: | SHEET 34 OF 36 SHEETS | STA. 1613+60.00 | TO STA. 1613+60.00

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
			36	

CONTRACT NO.

ILLINOIS | FED. AID PROJECT

FINAL SURVEY	NOTE BOOK	SURVEYED	PLOTTED	TEMPLATE	AREAS	AREAS CHECKED
NO.					BY	DATE

ORIGINAL SURVEY	NOTE BOOK	SURVEYED	PLOTTED	TEMPLATE	AREAS	AREAS CHECKED
NO.					BY	DATE

FILE PATH = C:\Users\dshevaz\Desktop\vamp en tsl 2017\9\9\CIRCLE1180-SHT-ACM-CV-RampEN_Cross_Section.dgn

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

595 590 585 580 575 570 565 560 555

℄ RAMP EN

℄ NB CD ROAD

EX RAMP NW

MAINTENANCE PARKING

EX RAMP EN

EXISTING 4.5' X 5' DIA MAIN DRAIN

1614+00.00

1613+80.00

Jane Byrne INTERCHANGE	XS_SHEET	DESIGNED -	REVISED -
	USER NAME = dshevaz	DRAWN -	REVISED -
	PLOT SCALE = 20.0000 ' / in.	CHECKED -	REVISED -
	PLOT DATE = 9/19/2017	DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

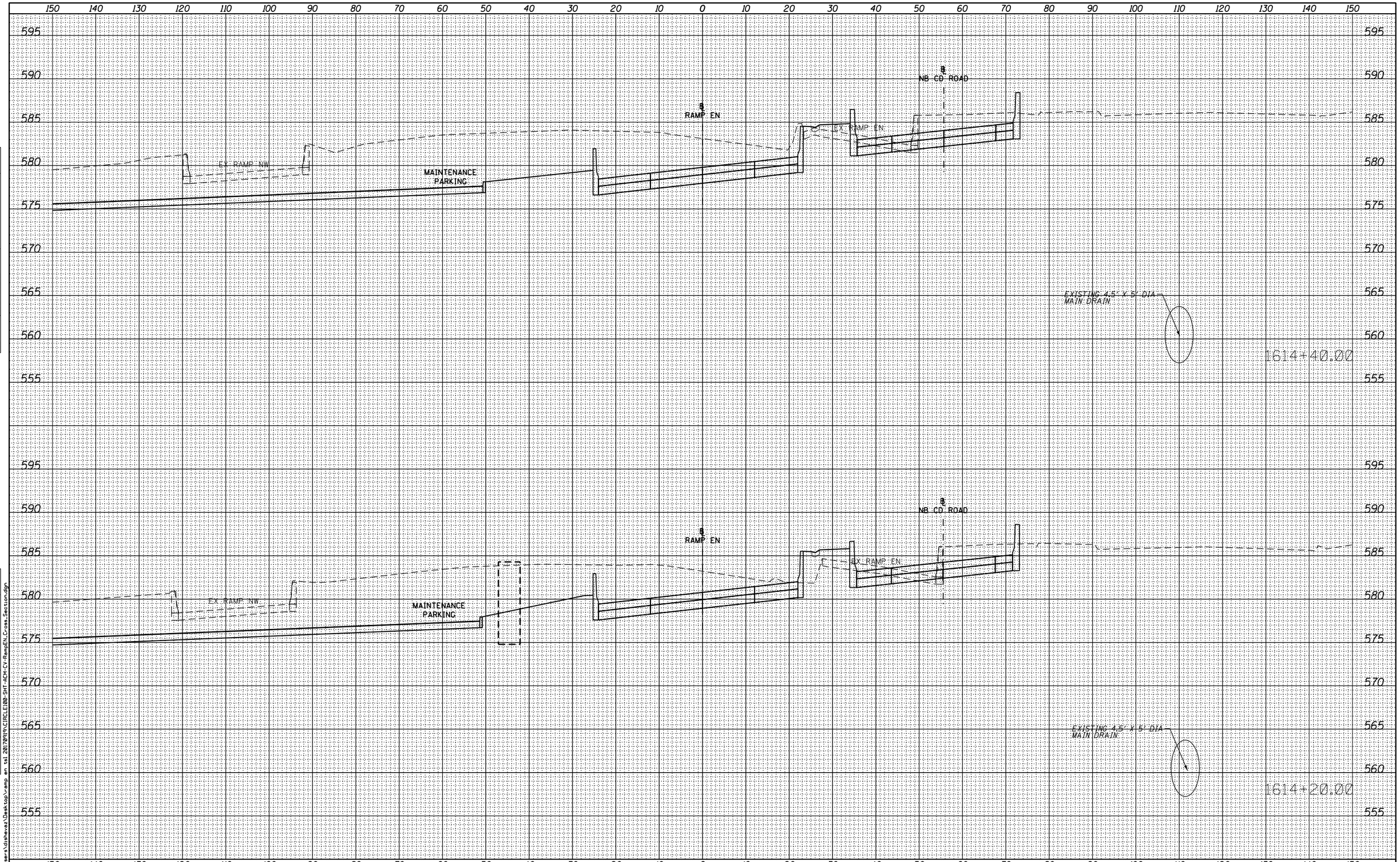
CROSS SECTIONS - RAMP EN

SCALE: | SHEET 35 OF 36 SHEETS | STA. 1613+80.00 | TO STA. 1614+00.00

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
			36	

CONTRACT NO.

ILLINOIS | FED. AID PROJECT



FINAL SURVEY	NOTE BOOK	SURVEYED	PLOTTED	TEMPLATE	AREAS	AREAS CHECKED
NO.					BY	DATE

ORIGINAL SURVEY	NOTE BOOK	SURVEYED	PLOTTED	TEMPLATE	AREAS	AREAS CHECKED
NO.					BY	DATE

FILE PATH = C:\Users\dshevaz\Desktop\ramp en tsl 20170919\CIRCLE1800-SHT-ACM-CV-RampEN_Cross_Section.dgn

Jane Byrne INTERCHANGE

XS_SHEET	DESIGNED -	REVISED -
USER NAME = dshevaz	DRAWN -	REVISED -
PLOT SCALE = 20.0000 ' / in.	CHECKED -	REVISED -
PLOT DATE = 9/19/2017	DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

CROSS SECTIONS - RAMP EN

SCALE: | SHEET 36 OF 36 SHEETS | STA. 1614+20.00 | TO STA. 1614+40.00

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
			36	

CONTRACT NO.

ILLINOIS | FED. AID PROJECT