STRUCTURE GEOTECHNICAL REPORT
CIRCLE INTERCHANGE RECONSTRUCTION
RETAINING WALL 31 (PROPOSED SN 016-1820)
F.A.I ROUTE 90/94 (KENNEDY EXPRESSWAY)
IDOT D-91-227-13/ PTB 163-001
COOK COUNTY, ILLINOIS

For

AECOM

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Submitted by

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Technical Report Documentation Page

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11. Abstract

A new Retaining Wall 31 will be constructed to support the west embankment to the Madison NB Exit Ramp. The 207.6-foot long MSE wall will start at Station 8546+77.99 and end at Station 8548+87.21. The maximum total height near the ramp abutment will be about 22 feet and will have a 3.5-foot tall parapet on the top.

Beneath the pavement, the subsurface soils consists of up to 2 to 15 feet of fill materials, up to 5 feet stiff clay crust, up to 43 feet of very soft to medium stiff silty clay, 28 feet of stiff to hard clay to silty clay loam, and 33 feet of very dense silt to silty loam and sand to gravelly sand extending to the bedrock. Sound bedrock was encountered at elevations 480.8 and 482.0 feet. Groundwater was observed at elevations 556.1 and 585.6 during drilling. Groundwater is also present within the granular layers just above the top of bedrock and at peached locations.

The proposed MSE wall is feasible with the use of Class I LCCF fill material as well as backfill area for temporary excavation slope of 1:2 (V:H) with Temporary Soil Retention System left in place. The wall will have a maximum factored bearing resistance of 1,500 psf using a geotechnical resistance factor of 0.65. Considering the unloading and reloading effect and the use of LCCF, the settlement is not a concern.

It should be noted that there will be large cuts (up to 12 feet) in front of drilled soldier pile retaining wall 30 in order to install MSE wall 31. Therefore, drilled soldier pile retaining wall 30 design must take into account of the effect of these excavations during construction to ensure no excessive deflection of wall 30 occurs, to prevent any negative impact to the adjacent existing parking lot structure.

12. Path to archived file

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TABLE OF CONTENTS

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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 Mechanically Stabilized Earth (MSE) retaining wall to support the west side embankment to the existing Madison NB Exit Ramp. The new wall is designated as SN 016-1820 (Retaining Wall 31) and will be constructed 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 about fifty new retaining walls will be constructed.

1.2 Proposed Structure

Based on the Type, Size, and Location (TSL) plan received on April 4, 2019 provided by TranSystems Corporation (TranSystems), the proposed Retaining Wall 31 (SN 016-1820) will support the west embankment of the Madison NB Exit Ramp. The 207.6-foot long MSE Wall will start at Station 8546+77.99 and end at Station 8548+87.21 with offset of 20.41 to 27.67 feet left. The maximum total height near the ramp abutment will be 22 feet and will have a 3.5-foot tall parapet on the top. There is a new Soldier Pile and Lagging Wall 30 (SN 016-1819) proposed to retain the east side embankment of Madison Exit Ramp and will be constructed first under Contract 62A76. The TSL plan is included in *Appendix D*.

1.3 Existing Structure

There is an existing Retaining Wall 23 constructed in 1957. The existing wall is cast-in-place concrete retaining wall on metal shell piles and spread footing that measure 178.84 feet from Madison Street southeast wingwall south to Monroe Street. Maximum height from top of wall to bottom of footing measures 18.1 feet. The existing wall is to be removed and replaced with an MSE wall.

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 585 feet at the south end to 592 feet at the north 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 about 480 feet elevation or 95 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 depths of 111.5 and 112.5 feet bgs, corresponding to 480.8 and 482.0 feet elevation, within the predicted range 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 three structure borings, designated as 31-RWB-01 through 31-RWB-03 in June 2014. Wang has also referenced two nearby structure borings located at the east side of the wall, designated as 30-RWB-01 and 30-RWB-03 drilled in July 2014. In addition, Wang performed one Shelby tube boring, designated as 30-ST-01 for nearby structure. Wang also performed Boring VST-03 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 or bedrock. 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-03. Boring VST-03 is located about 60 feet east of Wall 31. Vane shear tests were performed in undisturbed and remolded conditions using calibrated RocTest vane shear equipment. 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 on our engineering 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 Madison NB Exit Ramp encountered 3 to 6 inches of asphalt overlying 8 to 18 inches of concrete followed by crushed stone base course. In descending order, the general lithologic succession encountered beneath the pavement structure: 1) man-made ground (fill); 2) stiff silty clay to silty clay loam; 3) very soft to medium stiff clay to silty clay; 4) stiff to very stiff clay to silty clay loam; 5) very dense silt to silty loam and sand to gravelly sand; and 6) strong dolostone.

1) Man-made ground (fill)

Underneath the pavement structure, the borings encountered 2 to 15 feet of fill. Granular fill consists of loose to medium dense, brown gravelly sand to sandy gravel. Cohesive fill includes soft to stiff, brown and gray silty clay loam to clay loam. The granular fill layer has N-values of 4 to 24 blows per foot and moisture content values of 4 to 24%. The cohesive fill layer has unconfined compressive strength (Q_u) values of 0.3 to 1.9 tsf and moisture content values of 19 and 25%.

2) Stiff silty clay to silty clay loam

Beneath the fill, at elevation of 585.8 feet, Boring 30-ST-01 encountered 5-foot thick of stiff, brown to gray silty clay to silty clay loam. This layer has Q_u value of 1.6 tsf and moisture content values of 19 and 27%.

3) Very soft to medium stiff clay to silty clay

At elevations of 574.8 to 586.5 feet (5.5 to 15.5 feet bgs), the borings revealed up to 43 feet of very soft to medium stiff, gray clay to silty clay with Rimac Q_u values of 0.08 to 0.83 tsf and moisture content values of 18 to 30%. This layer is commonly known as the "*Chicago Blue Clay*."

Laboratory index testing on samples from this layer showed liquid limit (L_L) values of 30 to 34% and plastic limit (P_L) values of 16 to 17%. The UU triaxial test on Shelby tube samples from Boring 30-ST-1 show undrained cohesion of 432 psf. The CU triaxial test on a Shelby tube sample from Boring 30-RWB-03 shows drained cohesion of 340 psf. The UC test on a Shelby tube sample from 30-RWB-03 shows undrained shear strength of 480 psf.

As discussed in Section 3.2, undrained shear strength values from vane shear tests were generally higher than Rimac tests. In-situ undisturbed vane shear strengths obtained in Boring VST-03 between elevations 574 and 542 feet ranged from 370 to 1680 psf.

4) Stiff to very stiff clay to silty clay loam

At elevations of 541.4 to 545.1 feet (37 to 52 feet bgs), the borings encountered up to 28 feet of stiff to hard clay to silty clay loam. The unit has Q_u values of 0.9 to 3.5 tsf and moisture content values of 11 to 27%. Laboratory index testing on samples from this layer showed a liquid limit (L_L) value of 39% and a plastic limit (P_L) value of 18%.

(5) Very dense silt to silty loam and sand to gravelly sand

At elevations of 511.8 and 513.6 feet (82 and 80 feet bgs), Borings 30-RWB-01 and 31-RWB-03 encountered up to 33 feet of very dense silt to silty loam and sand to gravelly sand. This layer has N values of over 50 blows per foot.

(6) Strong dolostone

Borings 30-RWB-01 and 31-RWB-03 encountered strong bedrock at elevations of 482.0 and 480.8 feet or 111.5 and 112.5 feet bgs, respectively. Based on the 2 and 10-foot long rock cores obtained from the borings, the measured RQD values are 21 and 38% corresponding very poor to poor rock quality. *Bedrock core photograph is* shown in Appendix A.

4.2 Groundwater Conditions

Groundwater was observed during drilling at elevations of 556.1 and 585.6 feet (37 and 8 feet bgs) in Borings 30-ST-01 and 31-RWB-03, respectively. Water-bearing silt and gravel layers may also be present at deeper levels. A Piezometer 30-PZ-01 was installed for the nearby structure about 80 feet east of the proposed Retaining Wall 31 on November 21, 2014 and monitored until March 2017. The screen was placed with the top and bottom elevations at 503.7 and 493.7 feet (89.5 to 99.5 feet bgs), respectively within granular layers above bedrock. Piezometer readings show an average water table

elevation of 545.8 feet indicating groundwater under hydrostatic pressure within the granular deposit encountered on top of the bedrock. Within upper granular fill layers, we anticipate perched water may be encountered during times of heavy precipitation.

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 TSL, the proposed Retaining Wall 31 (SN 016-1820) will support the approach embankment to the Madison NB Exit Ramp structure. The 208-foot long back-to-back MSE walls will start at Station 8546+77.99 and end at Station 8548+87.21. The maximum total height near the Madison Bridge east abutment will be about 22 feet and will have a 3.5-foot tall parapet on the top.

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

5.2 MSE Walls

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.

5.2.1 Bearing Resistance and External Stability Analyses

Based on our boring data, the foundation soils at the MSE wall base elevations consist of up to 29 feet of soft to medium stiff clay to silty clay. We estimate, without foundation treatment, the soils will have a nominal bearing resistance of 2,300 psf and a factored bearing resistance of 1,500 psf based on a geotechnical resistance factor of 0.65 (AASHTO 2017).

We have considered reinforcement lengths equal to 70 percent of the total wall height or a minimum of 8 feet. We analyzed several alternatives for the fill material to be used in the reinforcement zone as well as temporary excavation with slope of 1:2 (V:H) backfill area. We understand the temporary excavation slope of 1:2 (V:H) will not be possible along the entire wall alignment due to the Wall 30 and right of way constrains. A temporary soil retention system (TSRS) is proposed to be installed

prior to the excavations for the MSE wall 31. We recommend that the TSRS be left in place after the Wall 31 construction to eliminate lateral earth pressures on the LCCF. The following fill alternatives were considered for the MSE wall and temporary excavation slope.

1. Using regular fill material (unit weight of 125 pcf) for the MSE wall reinforced zone area; and
2. Using IDOT District One Class III Lightweight Cellular Concrete Fill (LCCF) for the MSE wall reinforcement zone and the temporary excavation slope of 1:2 (V:H); and
3. Using IDOT District One Class I LCCF for the MSE wall reinforcement zone and the temporary excavation slope of 1:2 (V:H).

For Option 1, at the highest portion of the wall near Station 8548+87.21, the wall will apply a maximum factored equivalent bearing pressure of 5,900 psf with a regular MSE wall fill material (unit weight is 125 pcf) and 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 Special Provisions Class III LCCF with as-cast density ranging from 36 to 44 pcf for the MSE wall zone and the temporary excavation slope of 1:2 (V:H) backfill and TSRS left in place creating no lateral earth pressures on the LCCF. We estimate the wall will apply a maximum equivalent factored bearing pressure of 1,700 psf which exceeds the factored bearing resistance, thus Option 2 is also not feasible.

In Option 3, to further reduce the applied wall pressure, we have considered IDOT District One Special Provisions Class I LCCF with as-cast density ranging from 24 to 32 pcf for the MSE wall zone and the temporary excavation slope of 1:2 (V:H) backfill and TSRS left in place creating no lateral earth pressures on the LCCF. We estimate the wall will apply a maximum equivalent factored bearing pressure of 1,400 psf; thus, the foundation soils will have sufficient bearing resistance to support the wall.

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 2017).

We recommend Option 3 with 0.7 H reinforcement width and the temporary excavation slope of 1:2 (V:H) with TSRS left in place.

5.2.2 Settlement Analyses

Considering the unloading and reloading effect and the placement of LCCF, the applied service pressure will be less than the existing pressure. Therefore, the settlement is not concern.

5.2.3 Global Stability Analyses

Global stability analysis was performed near Station 8548+75 for both short-term (undrained) and long-term (drained) soil conditions using Class I LCCF for MSE wall and backfill area for temporary excavation. The computer program, SLIDE Version 6.0, was used to calculate the FOS. The minimum required FOS against global instability according to IDOT is 1.5 for both conditions. We estimate the MSE wall section has a short-term FOS of 1.49 (Appendix C-1) and a long-term FOS of 1.87 (Appendix C-2). The abandonment of the temporary soil retention system in place will improve global slope stability by providing additional resistance.

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.

At the southern end, it is understood that the drilled soldier retaining wall 30 (SN016-1819) will be constructed prior to Wall 31. This wall will act to eliminate all lateral forces on Wall 31 LCCF. It should be noted that there will be large cuts (up to 12 feet) in front of Wall 30 in order to install Wall 31 MSE wall. Therefore, drilled soldier pile retaining Wall 30 design must take into account of the effect of these deep excavations to ensure no excessive deflection of Wall 30 occurs, to prevent any negative impact to the adjacent existing parking lot structure.

As per TSL plan, the Madison NB Exit Ramp traffic will be detoured during MSE wall 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 I LCCF should be as per IDOT District One special provision dated June 18, 2018.

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 31 (SN016-1820) are planned, we should be timely informed so that our recommendations can be adjusted accordingly.

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

Respectfully Submitted,

WANG ENGINEERING, INC.

Exp. 11/30/2021

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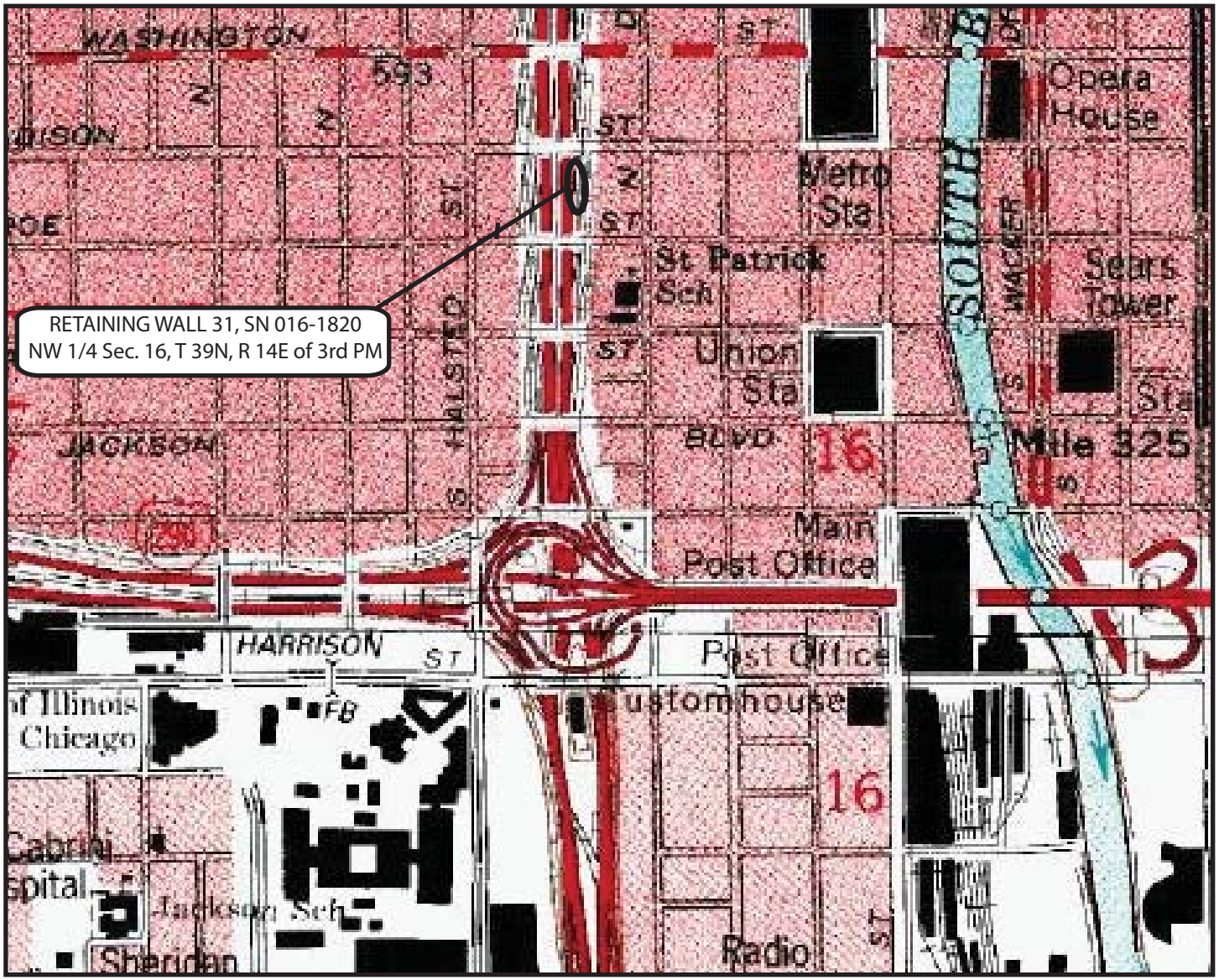
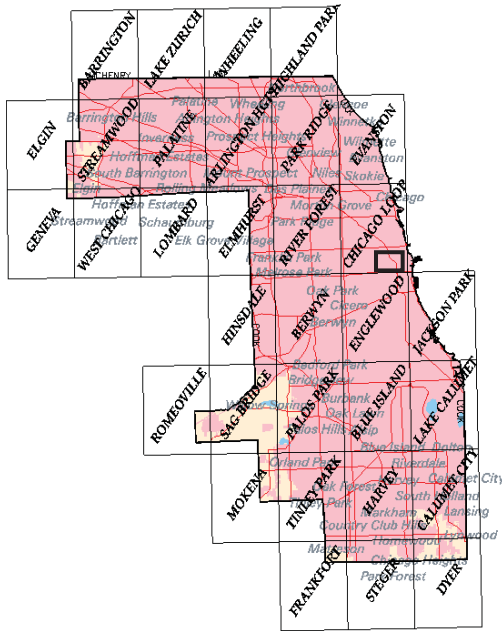
EXHIBITS





Cook County

0 0.25 0.5 Mile

SITE LOCATION MAP: CIRCLE INTERCHANGE RECONSTRUCTION
RETAINING WALL 31, SN 016-1820, COOK COUNTY

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

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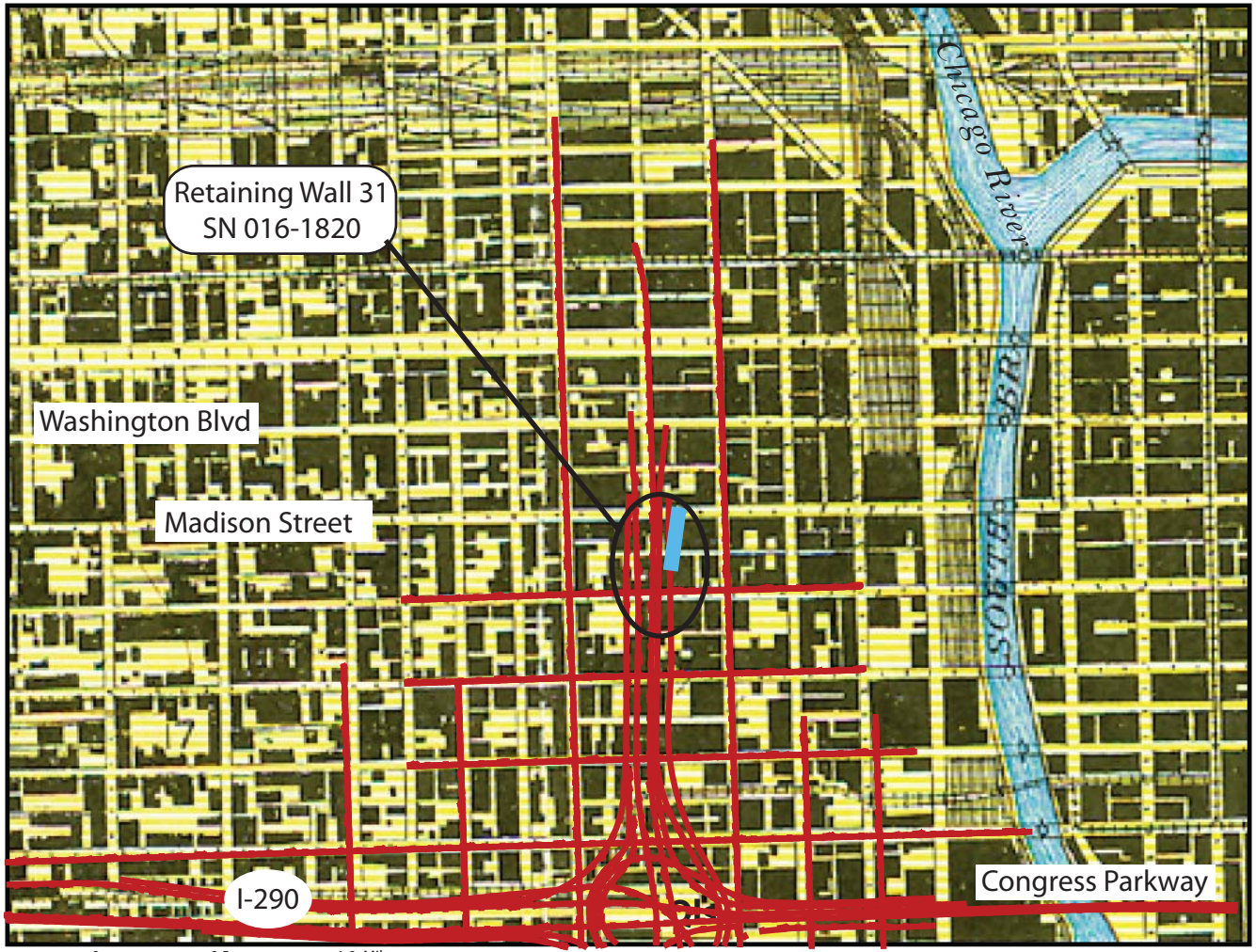

Modified after Bretz (1926)

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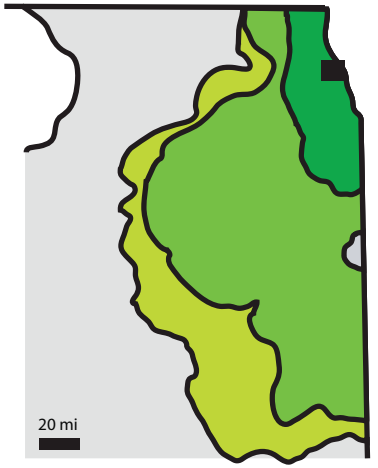
REGIONAL GEOLOGY



Wedron Group

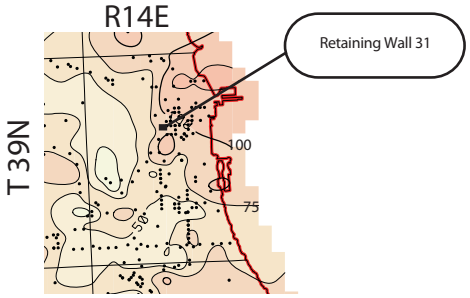
- Wadsworth Formation
- Lemont Formation
- Tiskilwa Formation

Modified after Hansel and Johnson (1996)

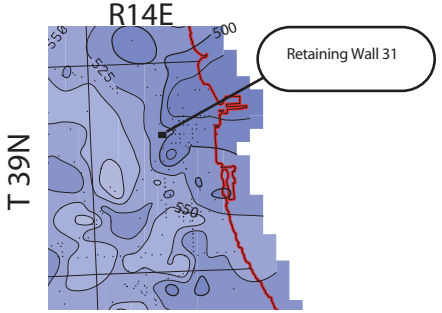
Legend

Qls — Glacial lake bottom
(Covered by lacustrine deposits)

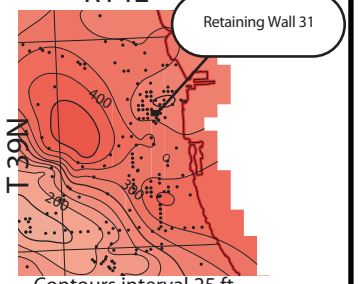
DRIFT THICKNESS



BEDROCK TOPOGRAPHY



BEDROCK THICKNESS



Contours interval 25 ft
Modified after Leetaru et. al. (2004)

0 2 4 8 miles

SITE AND REGIONAL GEOLOGY: CIRCLE INTERCHANGE RECONSTRUCTION, RETAINING WALL 31, SN 016-1820, COOK COUTY, IL

SCALE: GRAPHIC AL	EXHIBIT 2	DRAWN BY: R. KC CHECKED BY : C. Marin

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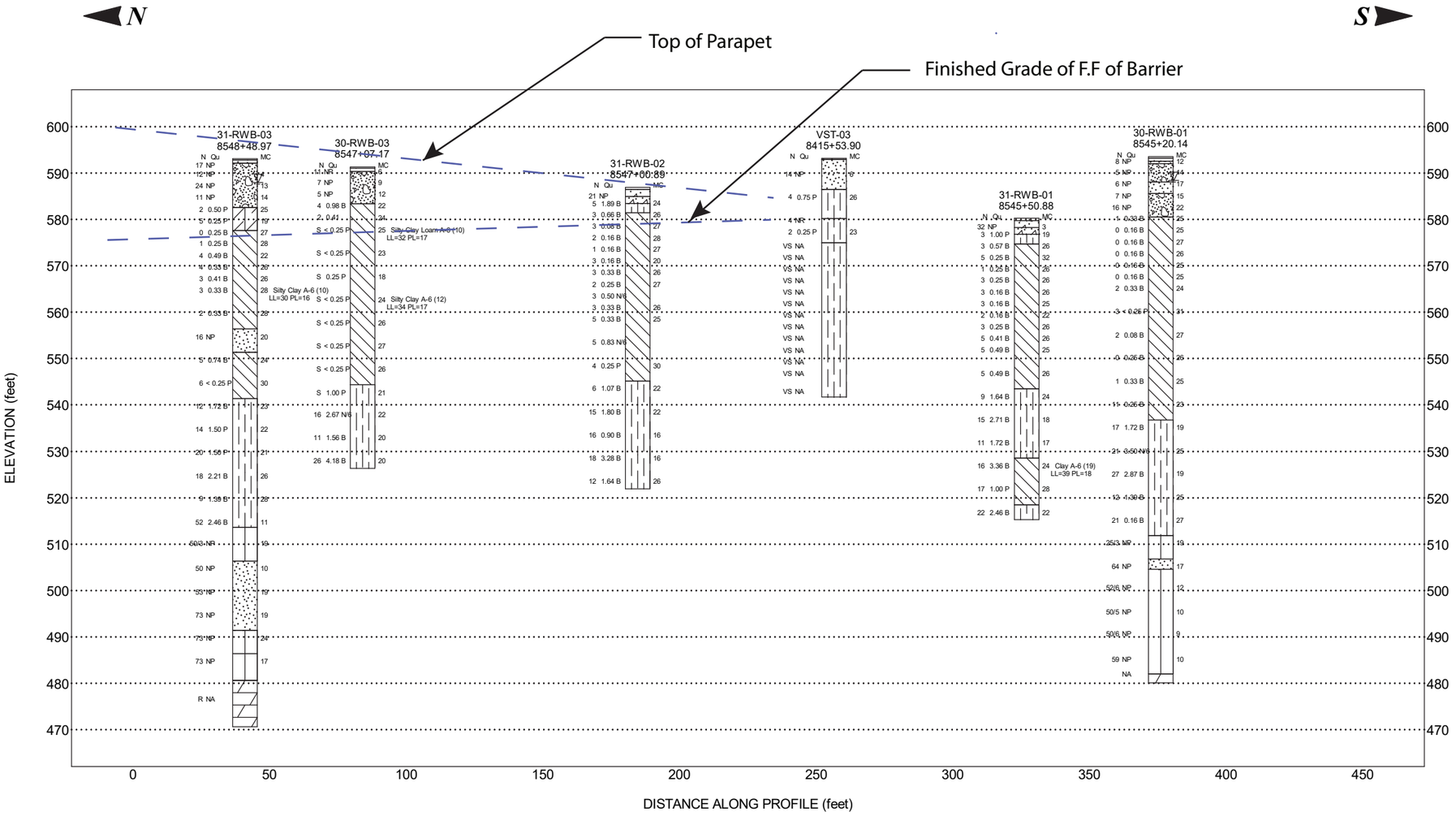
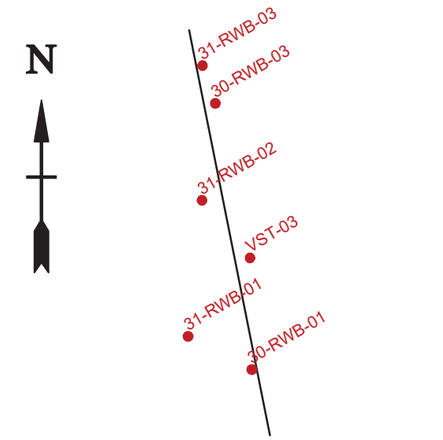


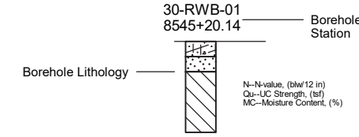
Lithology Graphics

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



Site Map Scale 1 inch equals 165 feet

Explanation:



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

0 45

Horizontal Scale (feet)

Vertical Exaggeration: 1.5x

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Soil Profile
Retaining Wall 31 (SN 016-1820)

WEI SINCE 1982

Jane Byrne Interchange
Section 17, T39N, R14E of 3rd PM

JOB NUMBER	PLATE NUMBER
1100-04-01	EXHIBIT 4

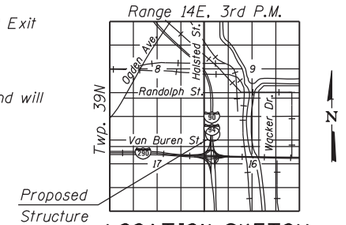
Bench Mark: Set "X" on northwest corner of handhole along east edge of SB I-90/94 20 feet north of Madison Street. Elev. 596.13.

Existing Structure: Existing Retaining Wall 23. Constructed in 1957 under F.A.I. Route 90/94, Section 0202.6-IP. Cast-in-place concrete retaining wall on metal shell piles and spread footing that measures 178'-10⅛" from Madison Street SE Wingwall south to Monroe Street. Maximum height from top of wall to bottom of footing measures 18'-1". The existing retaining wall is to be removed and replaced.

Traffic on Madison NB Exit Ramp will be detoured during construction.

No Salvage.

Notes:
1.) Wall offsets are measured from the ℄ of Madison NB Exit Ramp to the front face of the precast panels.
2.) F.F. denotes Front Face.
3.) B.F. denotes Back Face.
4.) Proposed drainage information shown is conceptual and will be determined during final design.



LOCATION SKETCH

LEGEND:

- Combined Sewer
- Electric — E
- Ex. Storm Sewer
- Prop. Storm Sewer
- Ex. Water — W
- Ex. Fiber Optic — FO
- Limits of Soil Reinforcement

HIGHWAY CLASSIFICATION

Madison NB Exit Ramp
Functional Class: Interstate
ADT: 5,200 (2012); 6,000 (2040)
ADTT: 94 (2012); 0 (2040)
DHV: ___ (2040)
Design Speed: 30 m.p.h.
Posted Speed: 30 m.p.h.
One-Way Traffic
Directional Distribution: 100%

NB C-D Road
Functional Class: Interstate
ADT: NA (2012); 17,000 (2040)
ADTT: NA (2012); 440 (2040)
DHV: 1,680 (2040)
Design Speed: 30 m.p.h.
Posted Speed: 30 m.p.h.
One-Way Traffic
Directional Distribution: 100%

DESIGN SPECIFICATIONS

2017 AASHTO LRFD Bridge Design Specifications 8th Edition

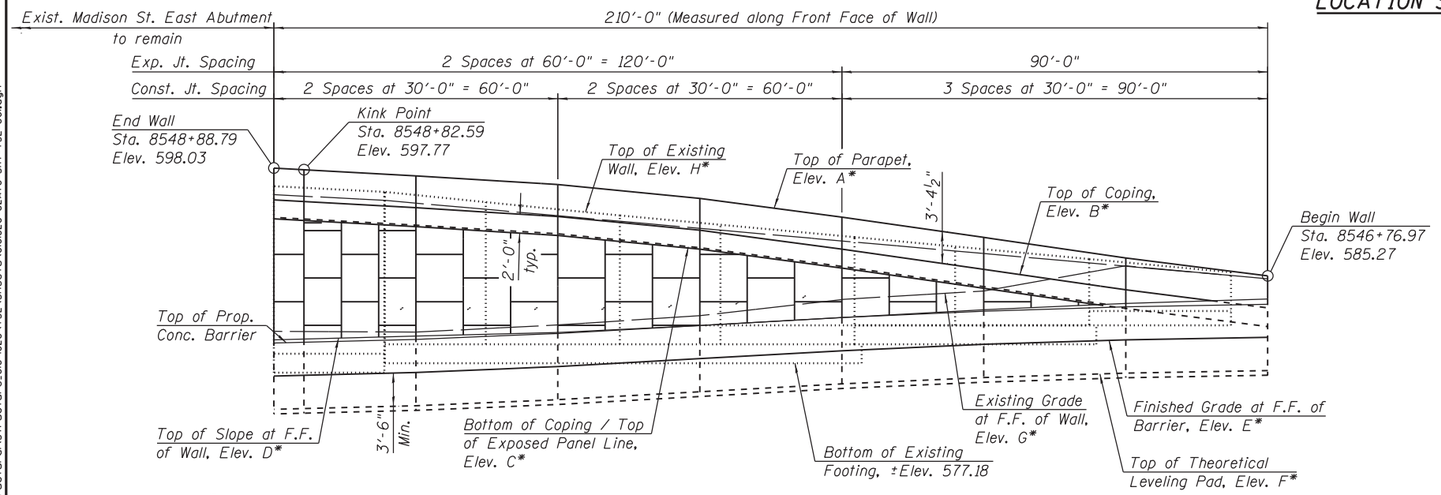
DESIGN STRESSES

FIELD UNITS

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

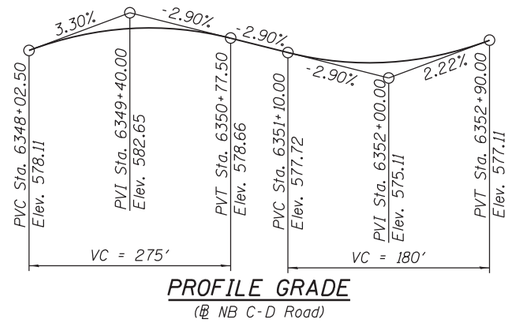
PRECAST UNITS

f'c = 4,500 psi



* For elevations, see Table 1 on Sheet 2 of 2.

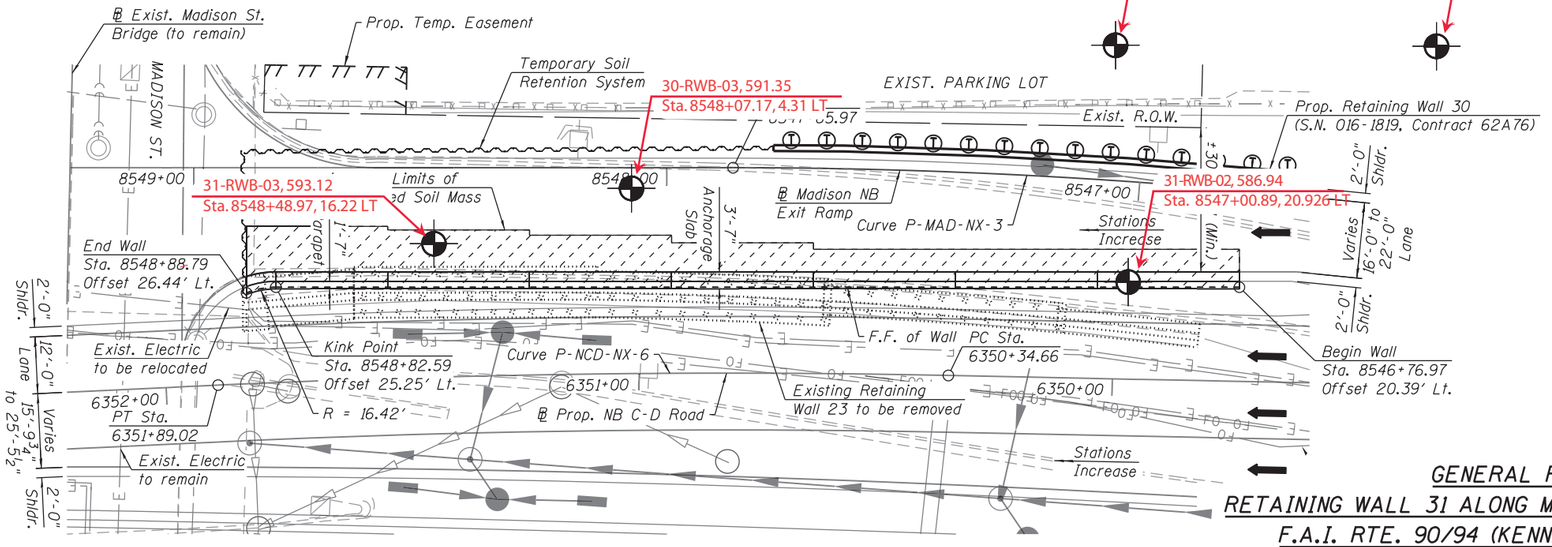
ELEVATION
(Looking East at F.F. of Wall)



PROFILE GRADE
(℄ NB C-D Road)

LEGEND:

- Soil Boring
- Existing Catch Basin
- Proposed Catch Basin
- Existing Manhole
- Proposed Manhole
- Proposed Inlet



PLAN

GENERAL PLAN
RETAINING WALL 31 ALONG MADISON NB EXIT RAMP
F.A.I. RTE. 90/94 (KENNEDY EXPRESSWAY)
SECTION 2015-019R
COOK COUNTY
STATION 8546+76.97 TO STATION 8548+88.79
STRUCTURE NO. 016-1820

BORING LOCATION PLAN: RETAINING WALL 31 ALONG MADISON NB EXIT RAMP, SN 016-1820, COOK COUNTY, IL

SCALE: GRAPHICAL	EXHIBIT 3	DRAWN BY: RKC CHECKED BY: N. Balakumaran

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TranSystems

USER NAME = jnpilotte	DESIGNED - JNP	REVISED -
	CHECKED - WJC/MDS	REVISED -
PLOT SCALE = 32.0000 ' / in.	DRAWN - JNP	REVISED -
PLOT DATE = 4/12/2019	CHECKED - WJC/MDS	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

SHEET NO. 1 OF 2 SHEETS

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
90/94	2015-019R	COOK	2	1
		CONTRACT NO. 62A76		
		ILLINOIS FED. AID PROJECT		

APPENDIX A

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Fax: 630-953-9938

BORING LOG 30-RWB-01

WEI Job No.: 1100-04-01

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

Datum: NAVD 88
Elevation: 593.54 ft
North: 1899863.46 ft
East: 1171695.35 ft
Station: 8545+20.14
Offset: 45.6914 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	593.24	4-inch thick, ASPHALT --PAVEMENT--						
	592.5	8-inch thick, CONCRETE --PAVEMENT--						
	592.0	6-inch thick, loose black SANDY LOAM, little gravel --FILL--						
		Loose, brownish red SANDY GRAVEL, trace brick fragments --FILL--	5		1	4 3 5	NP	12
					2	3 3 2	NP	14
	588.0	Loose, black SANDY LOAM, little gravel --FILL--			3	4 3 3	NP	17
	585.5	Loose to medium dense, brown GRAVELLY SAND, trace brick fragments --FILL--	10		4	3 4 3	NP	15
					5	15 9 7	NP	22
	580.5	Very soft to soft, gray CLAY to SILTY CLAY, trace gravel	15		6	0 1 0	0.33 B	25
					7	0 0 0	0.16 B	25
			20		8	0 0 0	0.16 B	27
			25		9	0 0 0	0.16 B	26
					10	0 0 0	0.16 B	25
					11	0 0 0	0.16 B	25
			30		12	0 0 2	0.33 B	24
			35		13	0 1 2	< 0.25 P	31
			40		14	0 0 2	0.08 B	27

GENERAL NOTES

Begin Drilling: **07-24-2014** Complete Drilling: **07-27-2014**
Drilling Contractor: **Wang Testing Services** Drill Rig:
Driller: **R&J** Logger: **S. Woods** Checked by: **C. Marin**
Drilling Method: **2.25" SSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **5.50 ft**
At Completion of Drilling: **mud in the borehole**
Time After Drilling: **NA**
Depth to Water: **NA**

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

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BORING LOG 30-RWB-01

WEI Job No.: 1100-04-01

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

Datum: NAVD 88
Elevation: 593.54 ft
North: 1899863.46 ft
East: 1171695.35 ft
Station: 8545+20.14
Offset: 45.6914 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 0 0	0.25 B	26
			50		16	0 0 1	0.33 B	25
			55		17	2 5 6	0.25 B	23
	536.8	Very stiff, gray SILTY CLAY to SILTY CLAY LOAM, trace to some gravel	60		18	4 7 10	1.72 B	19
			65		19	5 9 12	3.50 N/6	25
			70		20	7 12 15	2.87 B	19
			75		21	4 5 7	1.39 B	25
			80		22	11 11 10	0.16 B	27

GENERAL NOTES

Begin Drilling: **07-24-2014** Complete Drilling: **07-27-2014**
Drilling Contractor: **Wang Testing Services** Drill Rig:
Driller: **R&J** Logger: **S. Woods** Checked by: **C. Marin**
Drilling Method: **2.25" SSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: ▽ **5.50 ft**
At Completion of Drilling: ▼ **mud in the borehole**
Time After Drilling: **NA**
Depth to Water: ▼ **NA**

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

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BORING LOG 30-RWB-01

WEI Job No.: 1100-04-01

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

Datum: NAVD 88
Elevation: 593.54 ft
North: 1899863.46 ft
East: 1171695.35 ft
Station: 8545+20.14
Offset: 45.6914 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	511.8	Very dense, gray SILT, trace gravel						
			85		23	30 45 25/3	NP	19
	506.8	Gray fine SAND; moist						
	504.5	Very dense, gray SILTY LOAM, trace gravel	90		24	20 28 36	NP	17
			95		25	52/6	NP	12
			100		26	36 50/5	NP	10
			105		27	50/6	NP	9
			110		28	18 24 35	NP	10
	482.0	Strong, light gray, poor rock mass quality, bedded slightly weathered DOLOSTONE, with shale partings, up to 18-inch beds, <2-inch spaced joints, horizontal joints with none or less than <0.2-inch infilling, hard joint wall, with stylolitic surfaces, and moderately vuggy porosity. Run 1 - RECOVERY = 100% RQD = 21%			1			
	480.0	Boring terminated at 113.50 ft	115					
			120					

GENERAL NOTES

Begin Drilling: **07-24-2014** Complete Drilling: **07-27-2014**
Drilling Contractor: **Wang Testing Services** Drill Rig:
Driller: **R&J** Logger: **S. Woods** Checked by: **C. Marin**
Drilling Method: **2.25" SSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **5.50 ft**
At Completion of Drilling: **mud in the borehole**
Time After Drilling: **NA**
Depth to Water: **NA**

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

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0 3 6 9 12 inch

Boring 30-RWB-01:
Run #1, 111.5' to 113.5', RECOVERY = 100% , RQD = 21%

BEDROCK CORE: CIRCLE INTERCHANGE RECONSTRUCTION RETAINING WALL
30, SN 016-1819, COOK COUNTY

SCALE : GRAPHIC	30-RWB-01	DRAWN BY: A. HAPPEL CHECKED BY: C. Marin

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FOR AECOM	1100-04-01

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Fax: 630-953-9938

BORING LOG 30-RWB-02

WEI Job No.: 1100-04-01

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

Datum: NAVD 88
Elevation: 593.36 ft
North: 1900001.45 ft
East: 1171691.10 ft
Station: 8546+56.85
Offset: 31.0382 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	593.1	3-inch thick, ASPHALT 21-inch thick, CONCRETE and BRICK						
	591.4	Loose to very dense, brown and gray LOAM to SANDY LOAM, little gravel and brick fragments --FILL--			1	2 3 5	NP	16
			5		2	5 19 5	NP	19
					3	50/3	NP	16
	586.1	Medium dense, gray SANDY GRAVEL --FILL--			4	5 6 5	NP	
			10					
	582.9	Stiff, gray and brown, SILTY CLAY, trace gravel			5	2 3 4	1.72 B	24
	580.4	Very soft to soft, gray CLAY to SILTY CLAY, trace gravel			6	1 2 2	0.49 B	24
			15		7	0 0 2	0.41 B	21
					8	0 0 1	0.41 B	26
			20					
			25		9	1 2 2	0.25 B	22
					10	0 2 4	0.33 B	24
					11	3 2 3	0.41 B	26
			30		12	2 2 2	0.49 B	25
			35		13	0 2 3	0.33 B	26
			40		14	2 3 2	0.41 B	25

GENERAL NOTES

Begin Drilling: **07-24-2014** Complete Drilling: **07-27-2014**
Drilling Contractor: **Wang Testing Services** Drill Rig:
Driller: **A&K** Logger: **A. Happel** Checked by: **C. Marin**
Drilling Method: **3.25" 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 30-RWB-02

WEI Job No.: 1100-04-01

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

Datum: NAVD 88
Elevation: 593.36 ft
North: 1900001.45 ft
East: 1171691.10 ft
Station: 8546+56.85
Offset: 31.0382 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	3 3 4	0.49 B	25
			50		16	3 4 4	0.49 B	25
	541.6	Very stiff, gray SILTY CLAY, trace gravel						
			55		17	7 10 13	2.79 B	21
			60		18	6 10 13	2.95 B	17

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	528.4	Boring terminated at 65.00 ft	65		19	5 11 18	2.87 B	19
			70					
			75					
			80					

GENERAL NOTES

Begin Drilling: **07-24-2014** Complete Drilling: **07-27-2014**
Drilling Contractor: **Wang Testing Services** Drill Rig:
Driller: **A&K** Logger: **A. Happel** Checked by: **C. Marin**
Drilling Method: **3.25" 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 30-RWB-03

WEI Job No.: 1100-04-01

Client: **AECOM**
Project: **Jane Byrne Interchange**
Location: **Section 16, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 591.35 ft
North: 1900153.32 ft
East: 1171655.49 ft
Station: 8548+07.17
Offset: 04.31 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	591.1	3-inch thick ASPHALT --PAVEMENT--						
	590.3	9-inch thick CONCRETE --PAVEMENT--						
		Loose to medium dense, black, brown, and white SANDY GRAVEL, trace brick fragments --FILL--			1	5 6 5	NP	6
			5		2	4 4 3	NP	9
					3	6 3 2	NP	12
	583.3	Very soft to medium stiff, gray CLAY to SILTY CLAY, trace gravel			4	1 1 3	0.98 B	22
			10		5	1 1 1	0.41	24
		--L_L(%)=32, P_L(%)=17-- --%Gravel=3.2-- --%Sand=19.5-- --%Silt=49.2-- --%Clay=28.1-- --A-6 (10)--	15		1	P U S H	< 0.25 P	25
			20		2	P U S	< 0.25	23
			25		3	P U S H	0.25 P	18
		--L_L(%)=34, P_L(%)=17-- --%Gravel=5.1-- --%Sand=16.3-- --%Silt=48.1-- --%Clay=30.5-- --A-6 (12)-- --CU test-- --Shear strength (Cu) = 340 psf--	30		4	P U S H	< 0.25 P	24
		--UC test-- --Shear strength (Cu) = 480 psf--	35		5	P U S H	< 0.25 P	26
			40		6	P U S	< 0.25	27

GENERAL NOTES

Begin Drilling: **06-25-2014** Complete Drilling: **06-25-2014**
Drilling Contractor: **Wang Testing Services** Drill Rig:
Driller: **R&J** Logger: **S. Woods** Checked by: **C. Marin**
Drilling Method: **2.25" IDA HSA to 10',mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **groundwater not observed**
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 30-RWB-03

WEI Job No.: 1100-04-01

Client **AECOM**
Project **Jane Byrne Interchange**
Location **Section 16, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 591.35 ft
North: 1900153.32 ft
East: 1171655.49 ft
Station: 8548+07.17
Offset: 04.31 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
						H	P	
			45		7	P U S H	< 0.25 P	26
	544.3	Stiff to hard, gray SILTY CLAY to SILTY CLAY LOAM, trace to some gravel						
			50		8	P U S H	1.00 P	21
			55		6	5 6 10	2.67 N/6	22
			60		7	4 5 6	1.56 B	20
			65					
	526.3	Boring terminated at 65.00 ft						
			70					
			75					
			80					

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
			65		8	5 10 16	4.18 B	20

GENERAL NOTES

Begin Drilling **06-25-2014** Complete Drilling **06-25-2014**
Drilling Contractor **Wang Testing Services** Drill Rig
Driller **R&J** Logger **S. Woods** Checked by **C. Marin**
Drilling Method **2.25" IDA HSA to 10',mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **groundwater not observed**
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 30-ST-01

WEI Job No.: 1100-04-01

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

Datum: NAVD 88
Elevation: 593.58 ft
North: 1900053.37 ft
East: 1171690.05 ft
Station: 8547+07.45
Offset: 28.0086 RT

Depth (ft)	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
0	592.9	8-inch thick ASPHALT --PAVEMENT--					
		Loose, black to brown, SANDY GRAVEL, brick fragments --FILL--		1	6 5 4	NP	14
5				2	1 2 2	NP	12
				3	3 4 4	NP	24
	585.6	Stiff, brown and gray SILTY CLAY LOAM, trace gravel					
10				4	2 2 3	1.56 B	27
				5	1 3 3	1.56 B	19
	580.6	Soft, gray CLAY to SILTY CLAY, trace gravel					
15				6	1 1 2	0.41 B	23
				1	PUSH	< 0.25 P	24
20					PU		
25				2	SH	< 0.25 P	25
				3	PUSH	< 0.25 P	23
				4	PUSH	< 0.25 P	25
30				5	PUSH	< 0.25 P	22
				6	PUSH	< 0.25 P	27
35		--UU test-- --Shear strength (Cu) = 432 psf--		7	PUSH	< 0.25 P	24
				8	PUSH	< 0.25 P	27
40							

GENERAL NOTES

Begin Drilling: **10-22-2014** Complete Drilling: **10-22-2014**
Drilling Contractor: **Wang Testing Services** Drill Rig:
Driller: **P&P** Logger: **F. Bozga** Checked by: **C. Marin**
Drilling Method: **2.25" HSA to 15', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **8.00 ft**
At Completion of Drilling: **mud 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 30-ST-01

WEI Job No.: 1100-04-01

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

Datum: NAVD 88
Elevation: 593.58 ft
North: 1900053.37 ft
East: 1171690.05 ft
Station: 8547+07.45
Offset: 28.0086 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--UU test-- --Shear strength (Cu) = 432 psf--			9	PUSH	< 0.25 P	26
					10	PUSH	0.50 P	24
			45					
					11	PUSH	0.25 P	25
	545.1							
		Stiff, gray SILTY CLAY, trace gravel --UC test-- --Shear strength (Cu) = 560 psf--	50		12	PUSH	0.50 P	16
		--UC test-- --Shear strength (Cu) = 1790 psf--			13	PUSH	1.25 P	22
			55					
					7	4 6 8	1.89 B	22
	536.6							
		Boring terminated at 57.00 ft						
			60					

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

GENERAL NOTES

Begin Drilling: **10-22-2014** Complete Drilling: **10-22-2014**
Drilling Contractor: **Wang Testing Services** Drill Rig:
Driller: **P&P** Logger: **F. Bozga** Checked by: **C. Marin**
Drilling Method: **2.25" HSA to 15', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: ▽ **8.00 ft**
At Completion of Drilling: ▼ **mud 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 31-RWB-01

WEI Job No.: 1100-04-01

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

Datum: NAVD 88
Elevation: 580.25 ft
North: 1899899.70 ft
East: 1171625.80 ft
Station: 8545+50.88
Offset: 26.4632 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	579.8	6-inch thick, ASPHALT --PAVEMENT--						
		18-inch thick, CONCRETE --PAVEMENT--						
	578.3	Dense, gray and white CRUSHED STONE --BASE COURSE--			1	9 19 13	NP	3
	576.9	Stiff, brown and gray SILTY CLAY LOAM, trace gravel --FILL--	5		2	2 1 2	1.00 P	19
	574.8	Very soft to medium stiff, gray CLAY to SILTY CLAY, trace gravel			3	1 1 2	0.57 B	26
			10		4	1 2 3	0.25 B	32
					5	0 0 1	0.25 B	26
			15		6	0 2 1	0.25 B	26
					7	1 1 2	0.16 B	26
			20		8	1 1 2	0.16 B	25
			25		9	1 1 1	0.16 B	22
					10	1 1 2	0.25 B	26
					11	1 2 3	0.41 B	26
			30		12	1 3 2	0.49 B	25
	543.5	Stiff to very stiff, gray SILTY CLAY to SILTY CLAY LOAM, trace gravel			13	2 2 3	0.49 B	26
			35		14	3 4 5	1.64 B	24
			40					

GENERAL NOTES

Begin Drilling: **06-25-2014** Complete Drilling: **06-26-2014**
Drilling Contractor: **Wang Testing Services** Drill Rig:
Driller: **N&K** Logger: **A. Happel** Checked by: **C. Marin**
Drilling Method: **2.25" HSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

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

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

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BORING LOG 31-RWB-01

WEI Job No.: 1100-04-01

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

Datum: NAVD 88
Elevation: 580.25 ft
North: 1899899.70 ft
East: 1171625.80 ft
Station: 8545+50.88
Offset: 26.4632 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
			45		15	4 6 9	2.71 B	18
			50		16	4 4 7	1.72 B	17
	528.5	Stiff to very stiff, gray CLAY, trace gravel --L_L(%)=39, P_L(%)=18-- --%Gravel=3.1-- --%Sand=5.7-- --%Silt=48.1-- --%Clay=43.0-- --A-6 (19)--	55		17	5 7 9	3.36 B	24
			60		18	7 8 9	1.00 P	28
	518.5	Very stiff, gray SILTY CLAY, trace gravel						
	515.3	Boring terminated at 65.00 ft	65		19	8 10 12	2.46 B	22
			70					
			75					
			80					

GENERAL NOTES

Begin Drilling: **06-25-2014** Complete Drilling: **06-26-2014**
Drilling Contractor: **Wang Testing Services** Drill Rig:
Driller: **N&K** Logger: **A. Happel** Checked by: **C. Marin**
Drilling Method: **2.25" HSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

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

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BORING LOG 31-RWB-02

WEI Job No.: 1100-04-01

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

Datum: NAVD 88
Elevation: 586.94 ft
North: 1900047.77 ft
East: 1171641.00 ft
Station: 8547+00.89
Offset: 20.9256 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	586.4	6-inch thick ASPHALT --PAVEMENT--						
		18-inch thick CONCRETE --PAVEMENT--						
	584.9	Medium dense, gray and white CRUSHED STONE --BASE COURSE--			1	12 14 7	NP	
	583.4	Stiff, brown and gray SILTY CLAY LOAM, trace gravel --FILL--	5		2	2 2 3	1.89 B	24
	581.4	Very soft to medium stiff, gray CLAY to SILTY CLAY, trace gravel			3	1 2 1	0.66 B	26
			10		4	0 2 1	0.08 B	27
					5	1 1 1	0.16 B	28
			15		6	0 0 1	0.16 B	27
					7	1 1 2	0.16 B	20
			20		8	1 2 1	0.33 B	26
			25		9	1 1 1	0.25 B	27
					10	1 2 1	0.50 N/6	
					11	2 1 2	0.33 B	26
			30		12	1 2 3	0.33 B	25
			35		13	2 2 3	0.83 N/6	
			40		14	1 2 2	0.25 P	30

GENERAL NOTES

Begin Drilling: **06-24-2014** Complete Drilling: **06-24-2014**
Drilling Contractor: **Wang Testing Services** Drill Rig:
Driller: **N&K** Logger: **A. Happel** Checked by: **C. Marin**
Drilling Method: **2.25" HSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

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

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BORING LOG 31-RWB-02

WEI Job No.: 1100-04-01

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

Datum: NAVD 88
Elevation: 586.94 ft
North: 1900047.77 ft
East: 1171641.00 ft
Station: 8547+00.89
Offset: 20.9256 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	545.2	Medium stiff to very stiff, gray SILTY CLAY, trace gravel						
			45		15	3 3 3	1.07 B	22
			50		16	4 6 9	1.80 B	22
			55		17	4 6 10	0.90 B	16
			60		18	10 8 10	3.28 B	16
	521.9	Boring terminated at 65.00 ft	65		19	4 5 7	1.64 B	26
			70					
			75					
			80					

GENERAL NOTES

Begin Drilling: **06-24-2014** Complete Drilling: **06-24-2014**
Drilling Contractor: **Wang Testing Services** Drill Rig:
Driller: **N&K** Logger: **A. Happel** Checked by: **C. Marin**
Drilling Method: **2.25" HSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

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

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BORING LOG 31-RWB-03

WEI Job No.: 1100-04-01

Client: **AECOM**
Project: **Jane Byrne Interchange**
Location: **Section 16, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 593.12 ft
North: 1900194.50 ft
East: 1171641.58 ft
Station: 8548+48.97
Offset: 16.22 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	592.9	3-inch thick ASPHALT --PAVEMENT--						
	592.1	9-inch thick CONCRETE --PAVEMENT--						
		Medium dense, brownish red and gray GRAVELLY SAND, trace gravel and brick fragments --FILL--			1	17 10 7	NP	
			5		2	3 4 8	NP	4
					3	11 12 12	NP	13
			10		4	3 5 6	NP	14
	582.6	Soft to medium stiff, gray CLAY LOAM, trace gravel --FILL--			5	0 1 1	0.50 P	25
			15		6	4 2 3	0.25 P	19
	577.6	Soft to medium stiff, gray CLAY to SILTY CLAY, trace gravel			7	0 0 0	0.25 B	27
			20		8	0 0 1	0.25 B	28
			25		9	0 1 3	0.49 B	22
					10	1 2 2	0.33 B	26
					11	0 1 2	0.41 B	26
		--L_L(%)=30, P_L(%)=16-- --%Gravel=4.5-- --%Sand=13.5-- --%Silt=53.2-- --%Clay=28.8-- --A-6 (10)--	30		12	1 1 2	0.33 B	28
			35		13	0 0 2	0.33 B	28
	556.4	Medium dense, brownish gray SANDY LOAM, trace gravel --Wet--						
			40		14	3 7 9	NP	20

GENERAL NOTES

Begin Drilling: **06-24-2014** Complete Drilling: **06-24-2014**
Drilling Contractor: **Wang Testing Services** Drill Rig:
Driller: **R&J** Logger: **S. Woods** Checked by: **C. Marin**
Drilling Method: **2.25" HSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **5.50 ft**
At Completion of Drilling: **mud in the borehole**
Time After Drilling: **NA**
Depth to Water: **NA**

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BORING LOG 31-RWB-03

WEI Job No.: 1100-04-01

Client: **AECOM**
Project: **Jane Byrne Interchange**
Location: **Section 16, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 593.12 ft
North: 1900194.50 ft
East: 1171641.58 ft
Station: 8548+48.97
Offset: 16.22 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	551.4							
		Very soft to medium stiff, gray CLAY to SILTY CLAY, trace gravel						
			45		15	1 2 3	0.74 B	24
			50		16	3 2 4	< 0.25 P	30
	541.4							
		Stiff to very stiff, gray SILTY CLAY to SILTY CLAY LOAM, trace gravel						
			55		17	2 5 7	1.72 B	23
			60		18	4 6 8	1.50 P	22
			65		19	4 8 12	1.50 P	21
			70		20	5 8 10	2.21 B	26
			75		21	1 4 5	1.39 B	28
	513.6							
		Very dense, gray SILTY LOAM,	80		22	7 17 35	2.46 B	11

GENERAL NOTES

Begin Drilling: **06-24-2014** Complete Drilling: **06-24-2014**
Drilling Contractor: **Wang Testing Services** Drill Rig:
Driller: **R&J** Logger: **S. Woods** Checked by: **C. Marin**
Drilling Method: **2.25" HSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **5.50 ft**
At Completion of Drilling: **mud in the borehole**
Time After Drilling: **NA**
Depth to Water: **NA**

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BORING LOG 31-RWB-03

WEI Job No.: 1100-04-01

Client: **AECOM**
Project: **Jane Byrne Interchange**
Location: **Section 16, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 593.12 ft
North: 1900194.50 ft
East: 1171641.58 ft
Station: 8548+48.97
Offset: 16.22 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		trace gravel						
			85		23	37 50/3	NP	19
	506.4							
		Very dense, gray, fine to medium SAND, trace gravel						
			90		24	20 25 25	NP	10
			95		25	16 25 28	NP	19
			100		26	29 34 39	NP	19
	491.4							
		Very dense, gray SILTY LOAM to SILT						
			105		27	28 28 45	NP	24
	486.4							
		Very dense, gray SILT to fine SAND						
			110		28	27 39 34	NP	17
	480.6							
		Strong, light gray, poor rock mass quality, bedded slightly weathered DOLOSTONE, with shale partings, up to 20-inch beds, 3-inch spaced joints, horizontal and vertical joints with none or less than <0.2-inch infilling, hard joint wall, with stylolitic surfaces, and moderately vuggy porosity. Run 1 - RECOVERY = 100% RQD = 38%	115		1	CORE		
			120					

GENERAL NOTES

Begin Drilling: **06-24-2014** Complete Drilling: **06-24-2014**
Drilling Contractor: **Wang Testing Services** Drill Rig:
Driller: **R&J** Logger: **S. Woods** Checked by: **C. Marin**
Drilling Method: **2.25" HSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **5.50 ft**
At Completion of Drilling: **mud in the borehole**
Time After Drilling: **NA**
Depth to Water: **NA**

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

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BORING LOG 31-RWB-03

WEI Job No.: 1100-04-01

Client: **AECOM**
Project: **Jane Byrne Interchange**
Location: **Section 16, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 593.12 ft
North: 1900194.50 ft
East: 1171641.58 ft
Station: 8548+48.97
Offset: 16.22 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	470.6	Boring terminated at 122.50 ft	125					
			130					
			135					
			140					

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

GENERAL NOTES

Begin Drilling: **06-24-2014** Complete Drilling: **06-24-2014**
Drilling Contractor: **Wang Testing Services** Drill Rig:
Driller: **R&J** Logger: **S. Woods** Checked by: **C. Marin**
Drilling Method: **2.25" HSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: ▽ **5.50 ft**
At Completion of Drilling: ▼ **mud in the borehole**
Time After Drilling: **NA**
Depth to Water: ▼ **NA**

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

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0 3 6 9 12 inch

Borin 31-RWB-03:
Run #1, 112.5' to 122.5', RECOVERY = 100% , RQD = 38%

BEDROCK CORE: CIRCLE INTERCHANGE RECONSTRUCTION CHICAGO. IL		
SCALE : GRAPHIC	31-RWB-03	DRAWN BY: A. HAPPEL CHECKED BY: C. Marin
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FOR AECOM		1100-04-01

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BORING LOG VST-03

WEI Job No.: 1100-04-01

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

Datum: NAVD 88
Elevation: 593.21 ft
North: 1899985.05 ft
East: 1171693.33 ft
Station: 8415+53.90
Offset: 182.276 LT

Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
592.9	ASPHALT --PAVEMENT-- Medium dense, brown gravelly coarse SAND --FILL--	5		1	5 7 7	NP	6
586.5	Medium stiff, brown and gray SILTY CLAY LOAM	10		2	3 2 2	0.75 P	26
580.2	Soft, gray SILTY CLAY	15		3	3 2 2	NR	
				4	1 1 1	0.25 P	23
575.0	--In-Situ Vane Shear, 19.5 feet--	20		1	VS		
	--$S_{u\ undis}$ = 425.9 psf-- --$S_{u\ remold}$ = 371.3 psf-- --Sensitivity = 1.1--				VS		
	--In-Situ Vane Shear, 22.0 feet-- --$S_{u\ undis}$ = 371.3 psf-- --$S_{u\ remold}$ = 305.8 psf-- --Sensitivity = 1.2--			2	VS		
	--In-Situ Vane Shear, 24.5 feet--	25		3	VS		
	--$S_{u\ undis}$ = 382.2 psf-- --$S_{u\ remold}$ = 316.7 psf-- --Sensitivity = 1.2--						
	--In-Situ Vane Shear, 27.0 feet-- --$S_{u\ undis}$ = 393.1 psf-- --$S_{u\ remold}$ = 338.5 psf-- --Sensitivity = 1.2--			4	VS		
	--In-Situ Vane Shear, 29.5 feet--	30		5	VS		
	--$S_{u\ undis}$ = 622.5 psf-- --$S_{u\ remold}$ = 371.3 psf-- --Sensitivity = 1.7--						
	--In-Situ Vane Shear, 32.0 feet-- --$S_{u\ undis}$ = 535.1 psf-- --$S_{u\ remold}$ = 327.6 psf-- --Sensitivity = 1.6--			6	VS		
	--In-Situ Vane Shear, 34.5 feet--	35		7	VS		
	--$S_{u\ undis}$ = 535.1 psf-- --$S_{u\ remold}$ = 393.1 psf-- --Sensitivity = 1.4--						
	--In-Situ Vane Shear, 37.0 feet-- --$S_{u\ undis}$ = 655.2 psf-- --$S_{u\ remold}$ = 404.1 psf-- --Sensitivity = 1.6--			8	VS		
	--In-Situ Vane Shear, 39.5 feet--	40		9			

GENERAL NOTES

Begin Drilling: **12-02-2015** Complete Drilling: **12-02-2015**
Drilling Contractor: **Wang Testing Services** Drill Rig:
Driller: **R&N** Logger: **F. Bozga** Checked by: **A. Kurnia**
Drilling Method: **2.25" HSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

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

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

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BORING LOG VST-03

WEI Job No.: 1100-04-01

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

Datum: NAVD 88
Elevation: 593.21 ft
North: 1899985.05 ft
East: 1171693.33 ft
Station: 8415+53.90
Offset: 182.276 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		$-S_{u\ undis}$ = 622.5 psf--				VS		
		$-S_{u\ remold}$ = 382.2 psf--						
		--Sensitivity = 1.6--						
		--In-Situ Vane Shear, 42.0 feet--			10	VS		
		$-S_{u\ undis}$ = 851.8 psf--						
		$-S_{u\ remold}$ = 458.7 psf--						
		--Sensitivity = 1.9--						
		--In-Situ Vane Shear, 44.5 feet--	45		11	VS		
		$-S_{u\ undis}$ = 928.3 psf--						
		$-S_{u\ remold}$ = 600.6 psf--						
		--Sensitivity = 1.5--						
		--In-Situ Vane Shear, 47.0 feet--			12	VS		
		$-S_{u\ undis}$ = 1266.8 psf--						
		$-S_{u\ remold}$ = 633.4 psf--						
		--Sensitivity = 2.0--						
			50					
	541.7	--In-Situ Vane Shear, 51.0 feet--			13	VS		
		$-S_{u\ undis}$ = 1681.8 psf--						
		$-S_{u\ remold}$ = 1266.8 psf--						
		--Sensitivity = 1.3--						
		Boring terminated at 51.50 ft						
			55					
			60					

GENERAL NOTES

Begin Drilling: **12-02-2015** Complete Drilling: **12-02-2015**
Drilling Contractor: **Wang Testing Services** Drill Rig:
Driller: **R&N** Logger: **F. Bozga** Checked by: **A. Kurnia**
Drilling Method: **2.25" HSA to 10', mud rotary thereafter, boring backfilled upon completion**

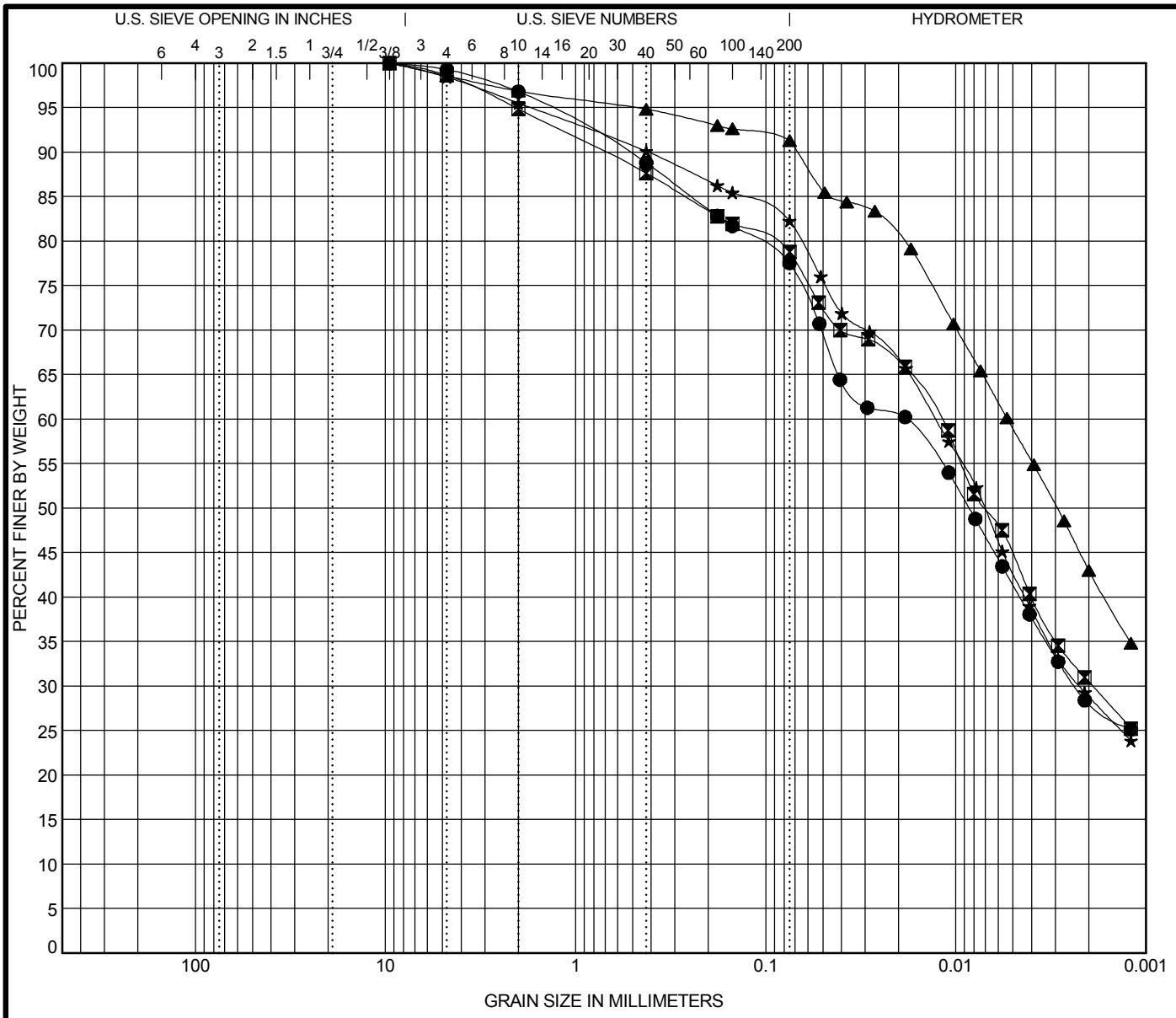
WATER LEVEL DATA

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.

WANGENGINC 11000401.GPJ WANGENG.GDT 4/26/19

APPENDIX B



COBBLES	GRAVEL	SAND		SILT AND CLAY
		coarse	fine	

	Specimen Identification		IDH Classification	LL	PL	PI	Cc	Cu
●	30-RWB-03#1	13.5 ft	**Silty Clay Loam**	**32**	**17**	**15**		
⊠	30-RWB-03#4	28.5 ft	**Silty Clay**	**34**	**17**	**17**		
▲	31-RWB-01#17	53.5 ft	**Clay**	**39**	**18**	**21**		
★	31-RWB-03#12	28.5 ft	**Silty Clay**	**30**	**16**	**14**		

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	30-RWB-03#1	13.5 ft	**9.5**	**0.018**	**0.002**		**3.2**	**19.5**	**49.2**	**28.1**
⊠	30-RWB-03#4	28.5 ft	**9.5**	**0.012**	**0.002**		**5.1**	**16.3**	**48.1**	**30.5**
▲	31-RWB-01#17	53.5 ft	**9.5**	**0.005**			**3.1**	**5.7**	**48.1**	**43.0**
★	31-RWB-03#12	28.5 ft	**9.5**	**0.013**	**0.002**		**4.5**	**13.5**	**53.2**	**28.8**

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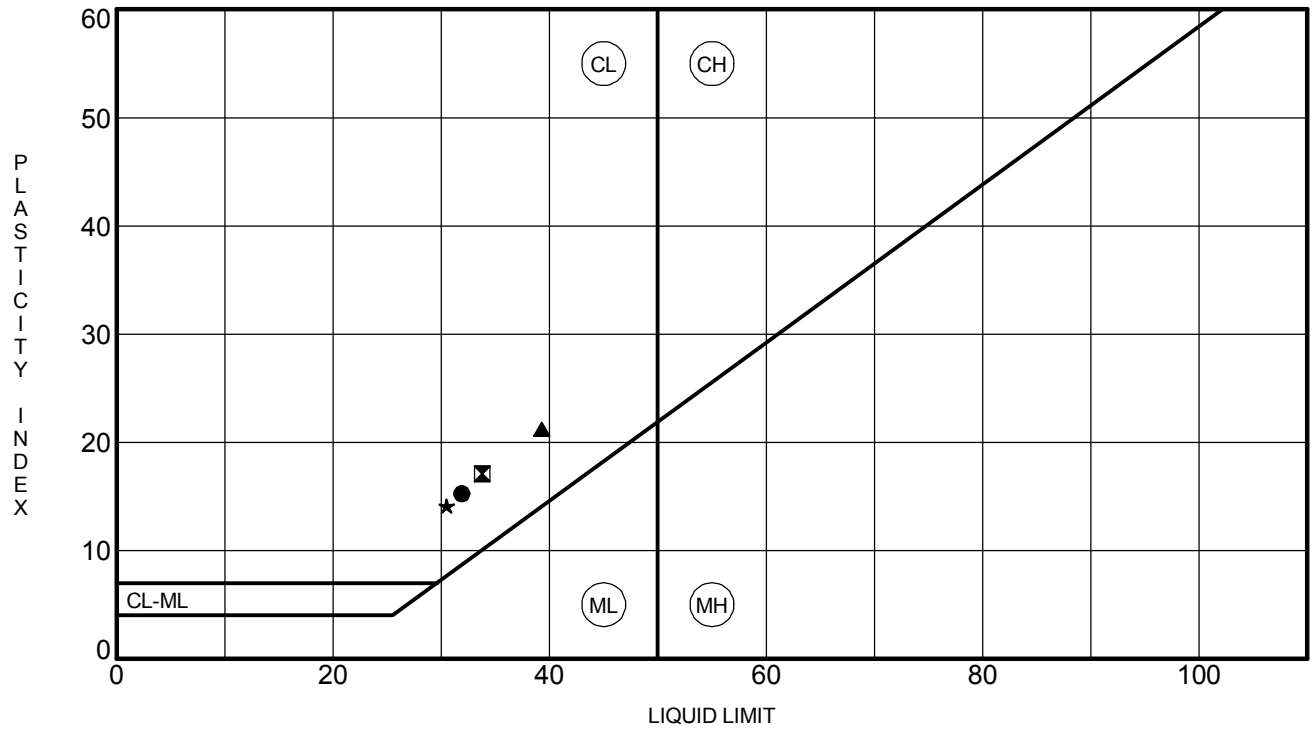
Fax: 630-953-9938

GRAIN SIZE DISTRIBUTION

Project: Jane Byrne Interchange

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

Number: 1100-04-01



	Specimen Identification		LL	PL	PI	Fines	IDH Classification
●	30-RWB-03#1	13.5 ft	32	17	15	78	Silty Clay Loam
⊠	30-RWB-03#4	28.5 ft	34	17	17	79	Silty Clay
▲	31-RWB-01#17	53.5 ft	39	18	21	91	Clay
★	31-RWB-03#12	28.5 ft	30	16	14	82	Silty Clay

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ATTERBERG LIMITS' RESULTS

Project: Jane Byrne Interchange

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

Number: 1100-04-01

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UNCONFINED COMPRESSIVE STRENGTH of COHESIVE SOIL

(AASHTO T 208 / ASTM D 2166)

Project: Circle Interchange
Client: AECOM
WEI Job No.: 1100-04-01
Soil Sample ID: 30-RWB-03, ST#5 (33.5-35.0ft)
Type/Condition: ST/Undisturbed
Liquid Limit (%): NA
Plastic Limit (%): NA

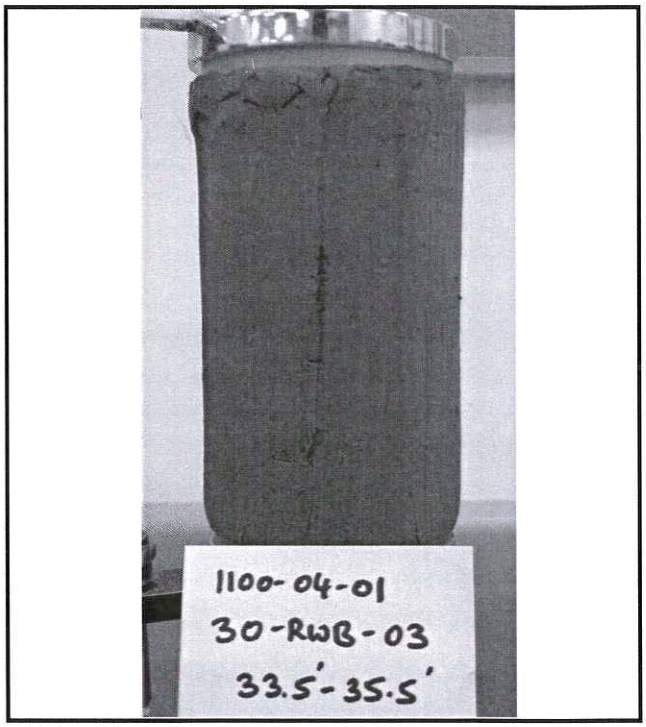
Analyst name: A. Mohammed
Date received: 6/25/2014
Test date: 11/15/2014
Sample description: Gray Silty Clay

Sand(%): NA
Silt(%): NA
Clay(%): NA

Average initial height h_0 =	6.04	in
Average initial diameter d_0 =	2.85	in
Height to diameter ratio=	2.12	
Mass of wet sample =	1285.00	g
Mass of dry sample and tare =	1040.60	g
Mass of tare =	14.03	g
Specific gravity =	2.76	(estimated)

Initial water content w =	25.17%	(specimen)
Initial unit weight g =	127.43	pcf
Initial dry unit weight g_d =	101.80	pcf
Initial void ratio e_0 =	0.69	
Initial degree of saturation S_r =	100%	
Average Rate of Strain=	1%/min	
Unconfined compressive strength q_u =	0.48	tsf
Shear Strength=	0.24	tsf

Displacement (in) Δh	Force (lbs) F	Strain (%) e	Stress (tsf) s
0.00	0.00	0.00	0.00
0.03	4.15	0.50	0.05
0.06	8.30	0.99	0.09
0.09	11.41	1.49	0.13
0.12	16.59	1.99	0.18
0.15	20.74	2.48	0.23
0.18	24.89	2.98	0.27
0.21	26.96	3.48	0.29
0.24	30.07	3.97	0.33
0.27	32.15	4.47	0.35
0.30	33.18	4.97	0.36
0.35	35.26	5.79	0.38
0.40	39.41	6.62	0.42
0.45	41.48	7.45	0.43
0.50	43.55	8.28	0.45
0.55	45.63	9.10	0.47
0.60	46.67	9.93	0.48
0.65	46.67	10.76	0.47
0.70	47.70	11.59	0.48
0.80	47.70	13.24	0.47
0.90	48.74	14.90	0.47



NOTES:

Prepared by: _____ Date: 11/17/14

Checked by: _____ Date: 11/17/14

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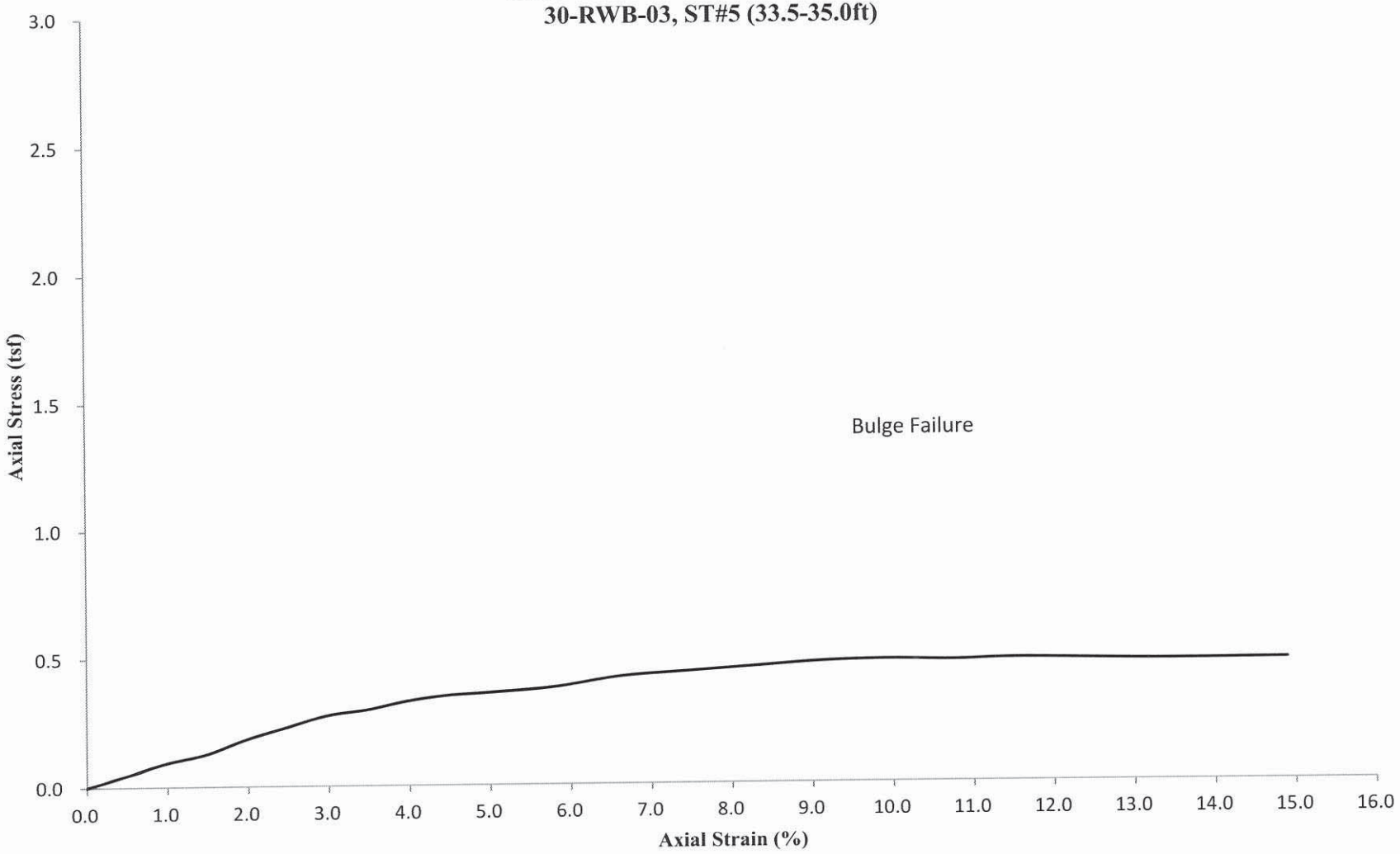
Unconfined Axial Stress v. Axial Strain
30-RWB-03, ST#5 (33.5-35.0ft)



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UNCONFINED COMPRESSIVE STRENGTH of COHESIVE SOIL

(AASHTO T 208 / ASTM D 2166)

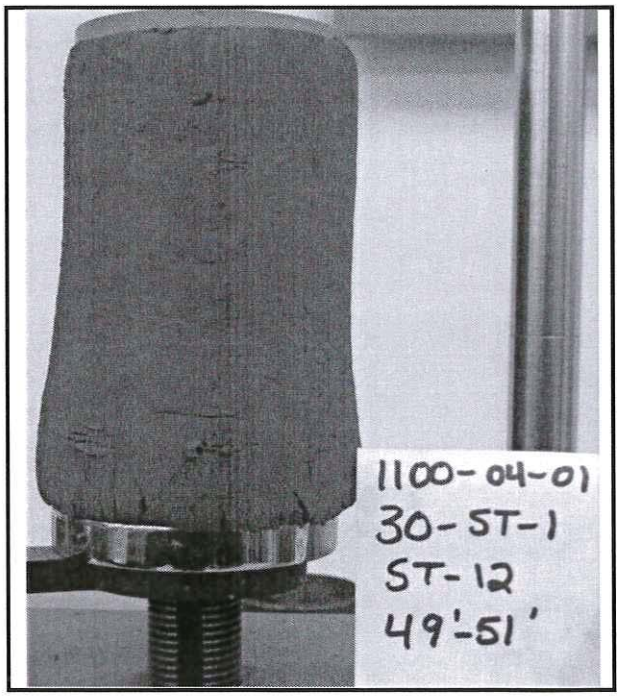
Project: Circle Interchange
Client: AECOM
WEI Job No.: 1100-04-01
Soil Sample ID: 30-ST-01, ST#12 (49.0-51.0ft)
Type/Condition: ST/Undisturbed
Liquid Limit (%): NA
Plastic Limit (%): NA

Analyst name: S. Woods
Date received: 10/22/2014
Test date: 11/17/2014
Sample description: Gray Silty Clay

Sand(%): NA
Silt(%): NA
Clay(%): NA

Average initial height h_0 =	6.04	in	Initial water content w =	26.84%	(specimen)
Average initial diameter d_0 =	2.85	in	Initial unit weight g =	125.48	pcf
Height to diameter ratio=	2.12		Initial dry unit weight g_d =	98.93	pcf
Mass of wet sample =	1272.10	g	Initial void ratio e_0 =	0.74	
Mass of dry sample and tare =	1190.70	g	Initial degree of saturation S_r =	100%	
Mass of tare =	187.80	g	Average Rate of Strain=	1%/min	
Specific gravity =	2.76	(estimated)	Unconfined compressive strength q_u =	0.56	tsf
			Shear Strength=	0.28	tsf

Displacement (in) Δh	Force (lbs) F	Strain (%) e	Stress (tsf) s
0.00	0.00	0.00	0.00
0.03	12.44	0.50	0.14
0.06	20.74	0.99	0.23
0.09	26.96	1.49	0.30
0.12	29.04	1.99	0.32
0.15	33.18	2.48	0.36
0.18	37.33	2.98	0.41
0.21	39.41	3.47	0.43
0.24	41.48	3.97	0.45
0.27	43.55	4.47	0.47
0.30	45.63	4.96	0.49
0.35	47.70	5.79	0.51
0.40	49.78	6.62	0.52
0.45	49.78	7.45	0.52
0.50	51.85	8.27	0.54
0.55	53.92	9.10	0.55
0.60	53.92	9.93	0.55
0.65	53.92	10.76	0.54
0.70	56.00	11.58	0.56
0.80	56.00	13.24	0.55
0.90	56.00	14.89	0.54



NOTES:

Prepared by: _____ Date: 11/19/14

Checked by: _____ Date: 11/19/14

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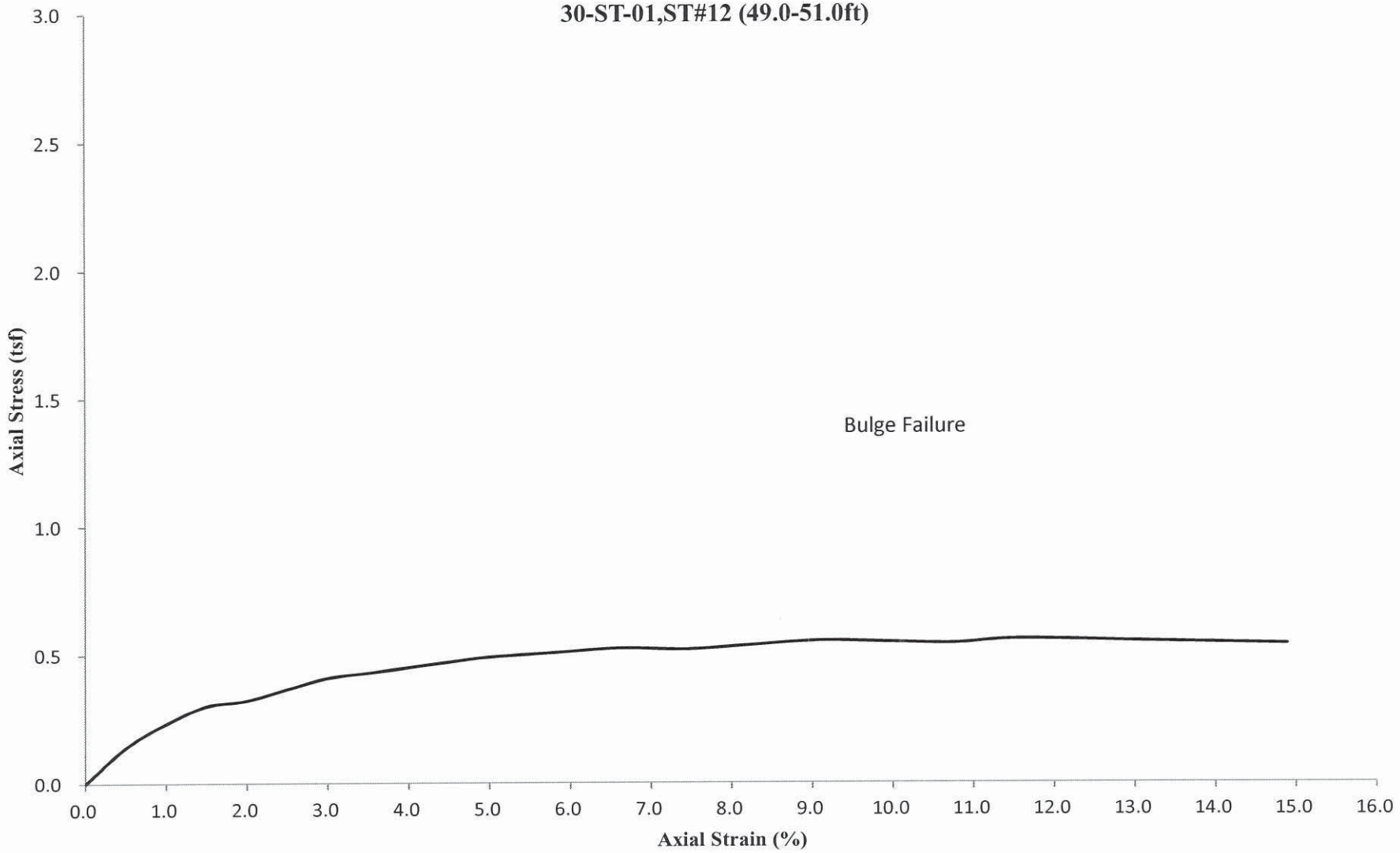
Unconfined Axial Stress v. Axial Strain
30-ST-01,ST#12 (49.0-51.0ft)



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UNCONFINED COMPRESSIVE STRENGTH of COHESIVE SOIL

(AASHTO T 208 / ASTM D 2166)

Project: Circle Interchange
Client: AECOM
WEI Job No.: 1100-04-01
Soil Sample ID: 30-ST-01, ST#13 (52.0-54.0ft)
Type/Condition: ST/Undisturbed
Liquid Limit (%): NA
Plastic Limit (%): NA

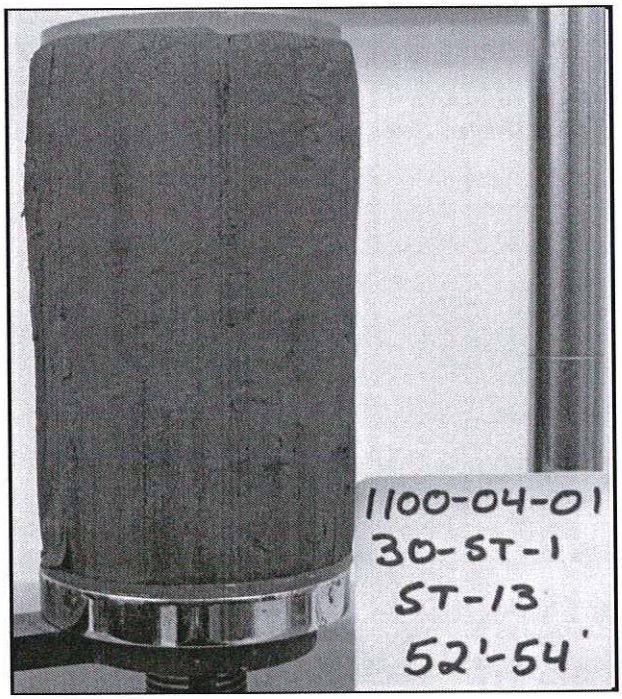
Analyst name: S. Woods
Date received: 10/22/2014
Test date: 11/17/2014
Sample description: Gray Silty Clay

Sand(%): NA
Silt(%): NA
Clay(%): NA

Average initial height h_0 =	6.03	in
Average initial diameter d_0 =	2.85	in
Height to diameter ratio=	2.11	
Mass of wet sample =	1331.10	g
Mass of dry sample and tare =	1200.00	g
Mass of tare =	72.52	g
Specific gravity =	2.76	(estimated)

Initial water content w =	18.06%	(specimen)
Initial unit weight g =	131.35	pcf
Initial dry unit weight g_d =	111.26	pcf
Initial void ratio e_0 =	0.55	
Initial degree of saturation S_r =	91%	
Average Rate of Strain=	1%/min	
Unconfined compressive strength q_u =	1.79	tsf
Shear Strength=	0.89	tsf

Displacement (in) Δh	Force (lbs) F	Strain (%) e	Stress (tsf) s
0.00	0.00	0.00	0.00
0.03	24.89	0.50	0.28
0.06	39.41	0.99	0.44
0.09	56.00	1.49	0.62
0.12	68.44	1.99	0.75
0.15	78.81	2.49	0.86
0.18	89.18	2.98	0.97
0.21	97.48	3.48	1.06
0.24	105.77	3.98	1.14
0.27	114.07	4.47	1.23
0.30	120.29	4.97	1.29
0.35	130.66	5.80	1.39
0.40	138.96	6.63	1.46
0.45	149.33	7.46	1.56
0.50	155.55	8.29	1.61
0.55	161.77	9.11	1.65
0.60	167.99	9.94	1.70
0.65	167.99	10.77	1.69
0.70	174.22	11.60	1.73
0.80	178.36	13.26	1.74
0.90	186.66	14.91	1.79



NOTES:

Prepared by: _____ Date: 11/19/14

Checked by: _____ Date: 11/19/14

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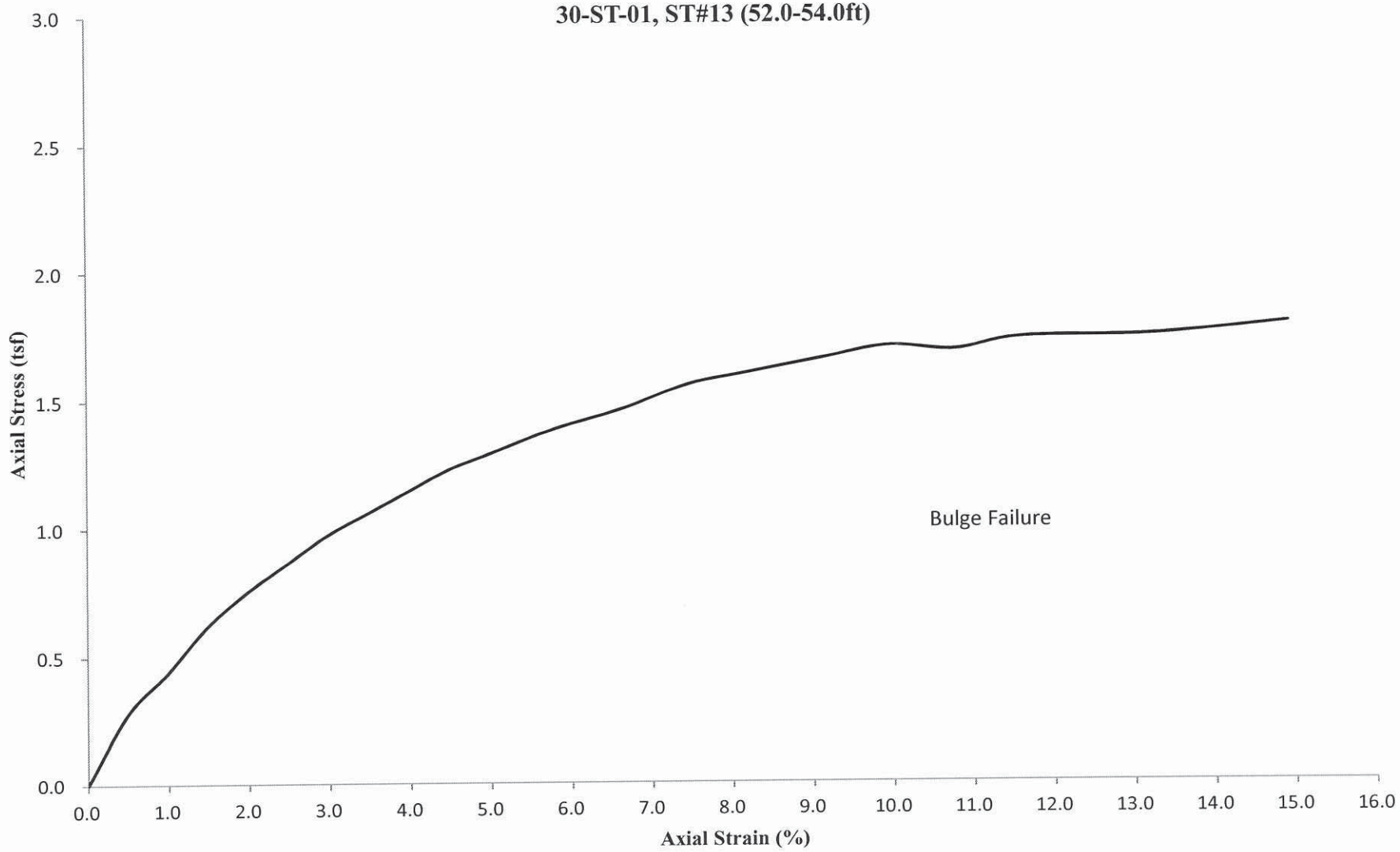
Unconfined Axial Stress v. Axial Strain
30-ST-01, ST#13 (52.0-54.0ft)



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UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

AASHTO T 296 / ASTM D 2850-95

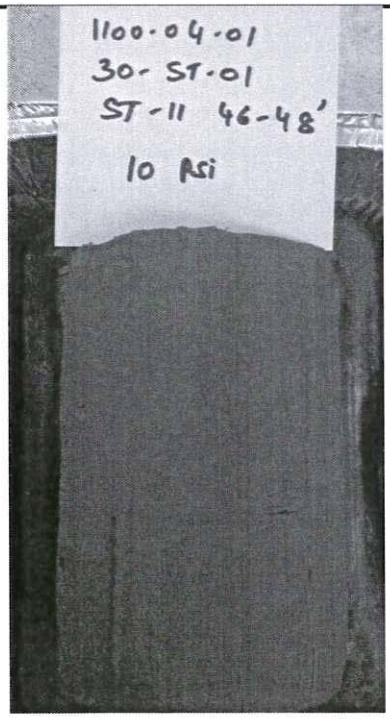
Project: Circle Interchange
Client: AECOM
WEI Job No.: 1100-04-01
Soil Sample ID: 30-ST-01, ST# 11 (46.0-48.0ft)
Type/Condition: ST/Undisturbed

Analyst name: M. de los Reyes
Date received: 10/22/2014
Test date: 11/24/2014
Sample description: Gray SILTY CLAY

Initial height h_0 =	5.76 in	Initial water content w =	25.57%
Initial diameter d_0 =	2.87 in	Initial unit weight γ_w =	124.02 pcf
Initial area A_0 =	6.46 in^2	Initial dry unit weight γ_d =	98.77 pcf
Mass of wet sample and tare M_t =	1223.54 g	Initial void ratio e_0 =	0.756
Mass of dry sample and tare M_d =	977.10 g	Initial degree of saturation S_r =	94%
Mass of tare M_t =	13.34 g		
Mass of sample Ms=	1210.20 g	Liquid Limit (%):	NA
Estimated specific gravity G_s =	2.78	Plastic Limit (%):	NA
Cell confining pressure σ_3 =	10.0 psi	Sand(%):	NA
Rate of strain =	1 %/min	Silt(%):	NA
Proving Ring Factor =	1.000	Clay(%):	NA
Height to diameter ratio =	2.01		

Deviator stress at failure $D\sigma_f$ = 0.85 tsf
Major principal stress at failure σ_1 = 1.57 tsf

Axial Displacement (in) Δh	Axial Force (lbs) F	Axial Strain (%) e	Deviator Stress (psi) σ_1-σ_3
0.00	0.00	0.00	0.00
0.01	5.20	0.11	0.80
0.01	9.49	0.22	1.47
0.02	12.49	0.33	1.93
0.03	15.00	0.44	2.31
0.03	17.23	0.56	2.65
0.04	18.79	0.66	2.89
0.04	20.26	0.75	3.11
0.05	22.10	0.88	3.39
0.06	23.88	1.00	3.66
0.06	24.61	1.06	3.77
0.09	31.25	1.63	4.76
0.12	36.15	2.11	5.48
0.15	41.35	2.69	6.23
0.18	45.70	3.20	6.85
0.22	50.11	3.76	7.47
0.25	54.36	4.32	8.05
0.28	57.67	4.80	8.50
0.31	61.59	5.36	9.02
0.34	64.74	5.88	9.43
0.37	68.08	6.43	9.86
0.40	71.14	6.97	10.25
0.43	74.01	7.51	10.60
0.46	76.68	8.03	10.92
0.49	79.16	8.55	11.21
0.52	81.76	9.12	11.50
0.56	84.12	9.64	11.77
0.58	85.92	10.16	11.95
0.62	88.03	10.71	12.17
0.68	91.55	11.77	12.51
0.74	94.89	12.82	12.81
0.80	98.10	13.92	13.07
0.86	100.80	14.96	13.27
0.92	103.52	16.06	13.45



Bulge Failure

Prepared by: Jay Date: 11/25/14

Checked by: LF Date: 11/25/14

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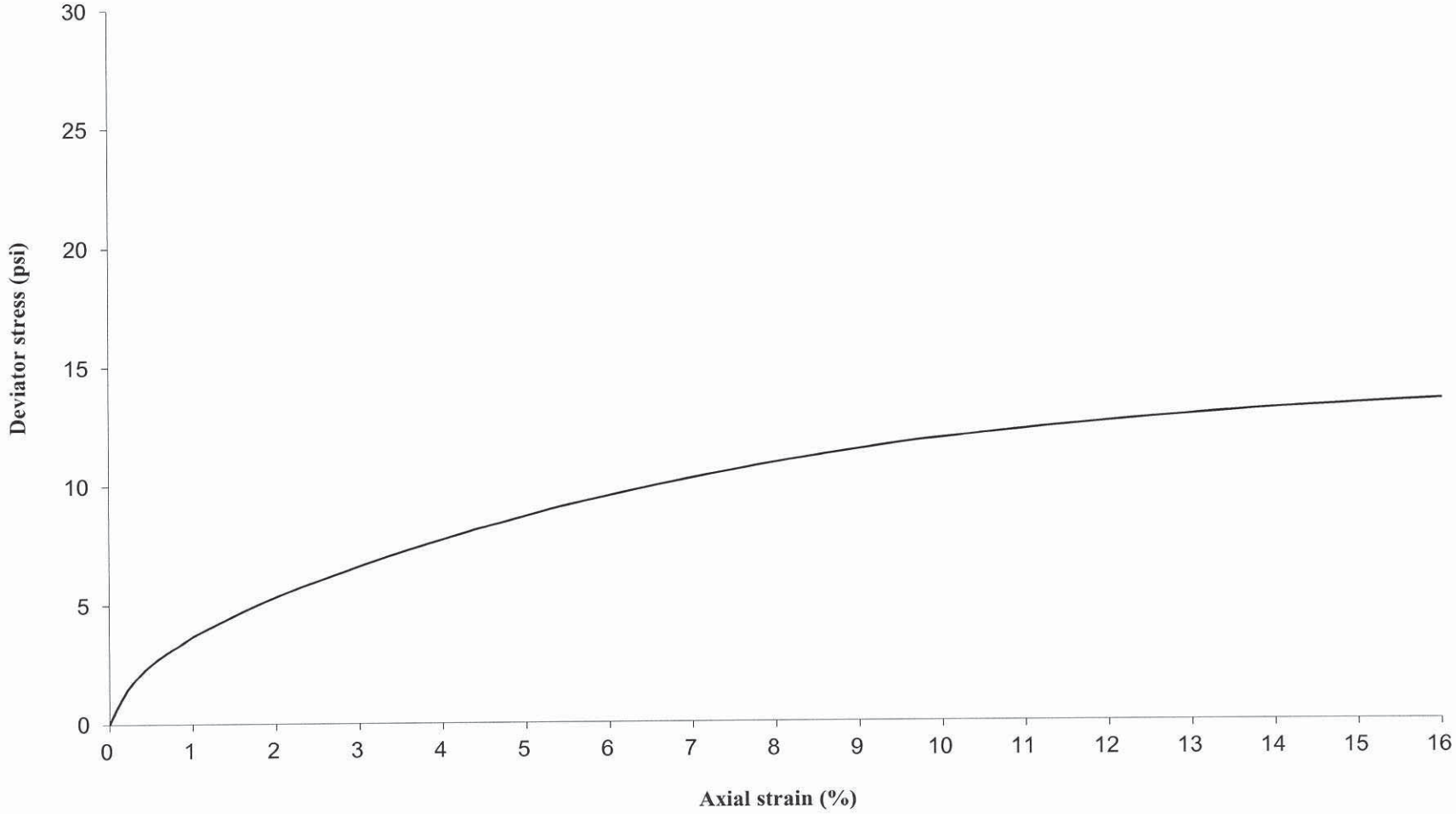
Unconsolidated-Undrained Triaxial Test

Deviator Stress v. Axial Strain

30-ST-01,ST#11 (46.0-48.0ft) @ 10 psi



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UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

AASHTO T 296 / ASTM D 2850-95

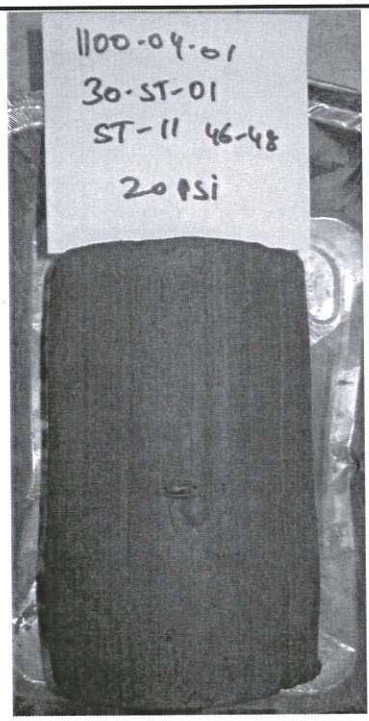
Project: Circle Interchange
Client: AECOM
WEI Job No.: 1100-04-01
Soil Sample ID: 30-ST-01, ST# 11 (46.0-48.0ft)
Type/Condition: ST/Undisturbed

Analyst name: M. de los Reyes
Date received: 10/22/2014
Test date: 11/24/2014
Sample description: Gray SILTY CLAY

Initial height h_0 =	5.75 in	Initial water content w =	24.58%
Initial diameter d_0 =	2.83 in	Initial unit weight γ_w =	128.96 pcf
Initial area A_0 =	6.30 in^2	Initial dry unit weight γ_d =	103.51 pcf
Mass of wet sample and tare M_i =	1239.89 g	Initial void ratio e_0 =	0.676
Mass of dry sample and tare M_d =	997.90 g	Initial degree of saturation S_r =	100%
Mass of tare M_t =	13.59 g		
Mass of sample Ms=	1226.30 g	Liquid Limit (%):	NA
Estimated specific gravity G_s =	2.78	Plastic Limit (%):	NA
Cell confining pressure σ_3 =	20.0 psi	Sand(%):	NA
Rate of strain =	1 %/min	Silt(%):	NA
Proving Ring Factor =	1.000	Clay(%):	NA
Height to diameter ratio =	2.03		

Deviator stress at failure $D\sigma_f$ = 0.87 tsf
Major principal stress at failure σ_1 = 2.31 tsf

Axial Displacement (in) Δh	Axial Force (lbs) F	Axial Strain (%) e	Deviator Stress (psi) σ_1-σ_3
0.00	0.00	0.00	0.00
0.01	5.20	0.11	0.82
0.01	9.49	0.22	1.50
0.02	12.49	0.33	1.98
0.03	15.00	0.44	2.37
0.03	17.23	0.56	2.72
0.04	18.79	0.66	2.96
0.04	20.26	0.75	3.19
0.05	22.10	0.88	3.48
0.06	23.88	1.00	3.75
0.06	24.61	1.06	3.86
0.09	31.25	1.64	4.88
0.12	36.15	2.11	5.62
0.15	41.35	2.69	6.39
0.18	45.70	3.20	7.02
0.22	50.11	3.76	7.65
0.25	54.36	4.33	8.25
0.28	57.67	4.81	8.71
0.31	61.59	5.37	9.25
0.34	64.74	5.88	9.67
0.37	68.08	6.44	10.11
0.40	71.14	6.98	10.50
0.43	74.01	7.52	10.86
0.46	76.68	8.04	11.19
0.49	79.16	8.56	11.49
0.52	81.76	9.13	11.79
0.56	84.12	9.65	12.06
0.58	85.92	10.17	12.25
0.62	88.03	10.72	12.47
0.68	91.55	11.78	12.82
0.74	94.89	12.83	13.13
0.80	98.10	13.94	13.40
0.86	100.80	14.97	13.60
0.92	103.52	16.07	13.79



Bulge Failure

Prepared by: Jay Date: 11/25/14

Checked by: Lif Date: 11/25/14

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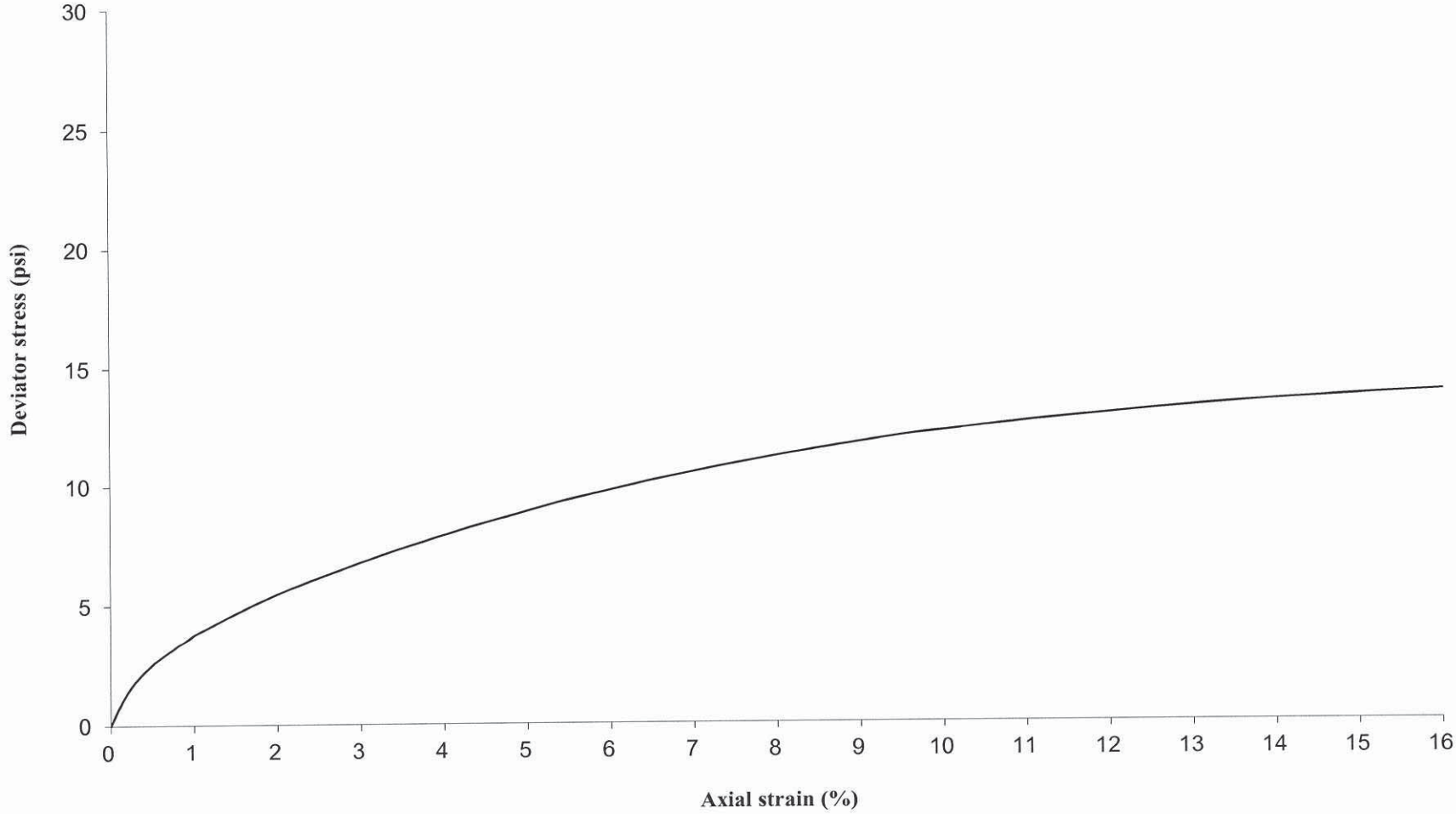
Unconsolidated-Undrained Triaxial Test

Deviator Stress v. Axial Strain

30-ST-01,ST#11 (46.0-48.0ft) @ 20 psi



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UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

AASHTO T 296 / ASTM D 2850-95

Project: Circle Interchange
Client: AECOM
WEI Job No.: 1100-04-01
Soil Sample ID: 30-ST-01, ST# 11 (46.0-48.0ft)
Type/Condition: ST/Undisturbed

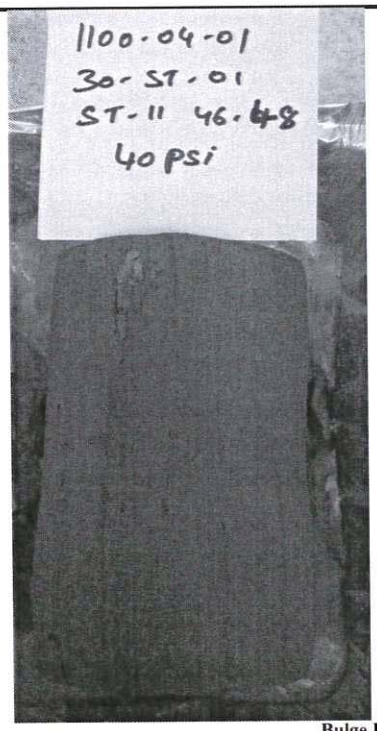
Analyst name: M. de los Reyes
Date received: 10/22/2014
Test date: 11/24/2014
Sample description: Gray SILTY CLAY

Initial height h_0 =	5.69	in
Initial diameter d_0 =	2.87	in
Initial area A_0 =	6.48	in^2
Mass of wet sample and tare M_t =	1234.04	g
Mass of dry sample and tare M_d =	997.20	g
Mass of tare M_t =	13.44	g
Mass of sample Ms=	1220.60	g
Estimated specific gravity G_s =	2.78	
Cell confining pressure σ_3 =	40.0	psi
Rate of strain =	1	%/min
Proving Ring Factor =	1.000	
Height to diameter ratio =	1.98	

Initial water content w =	24.07%
Initial unit weight γ_w =	125.96 pcf
Initial dry unit weight γ_d =	101.52 pcf
Initial void ratio e_0 =	0.709
Initial degree of saturation S_r =	94%
Liquid Limit (%):	NA
Plastic Limit (%):	NA
Sand(%):	NA
Silt(%):	NA
Clay(%):	NA

Deviator stress at failure $D\sigma_f$ = 0.84 tsf
Major principal stress at failure σ_1 = 3.72 tsf

Axial Displacement (in) Δh	Axial Force (lbs) F	Axial Strain (%) e	Deviator Stress (psi) σ_1-σ_3
0.00	0.00	0.00	0.00
0.01	5.20	0.11	0.80
0.01	9.49	0.23	1.46
0.02	12.49	0.34	1.92
0.03	15.00	0.45	2.30
0.03	17.23	0.57	2.64
0.04	18.79	0.66	2.88
0.04	20.26	0.76	3.10
0.05	22.10	0.89	3.38
0.06	23.88	1.01	3.64
0.06	24.61	1.07	3.75
0.09	31.25	1.65	4.74
0.12	36.15	2.13	5.46
0.15	41.35	2.72	6.20
0.18	45.70	3.23	6.82
0.22	50.11	3.80	7.43
0.25	54.36	4.37	8.02
0.28	57.67	4.86	8.46
0.31	61.59	5.42	8.98
0.34	64.74	5.94	9.39
0.37	68.08	6.50	9.82
0.40	71.14	7.05	10.20
0.43	74.01	7.59	10.55
0.46	76.68	8.12	10.86
0.49	79.16	8.64	11.15
0.52	81.76	9.22	11.45
0.56	84.12	9.75	11.71
0.58	85.92	10.27	11.89
0.62	88.03	10.83	12.11
0.68	91.55	11.90	12.44
0.74	94.89	12.96	12.74
0.80	98.10	14.08	13.00
0.86	100.80	15.12	13.19
0.92	103.52	16.23	13.37



Bulge Failure

Prepared by: Jony Date: 11/25/14

Checked by: MSL Date: 11/25/14

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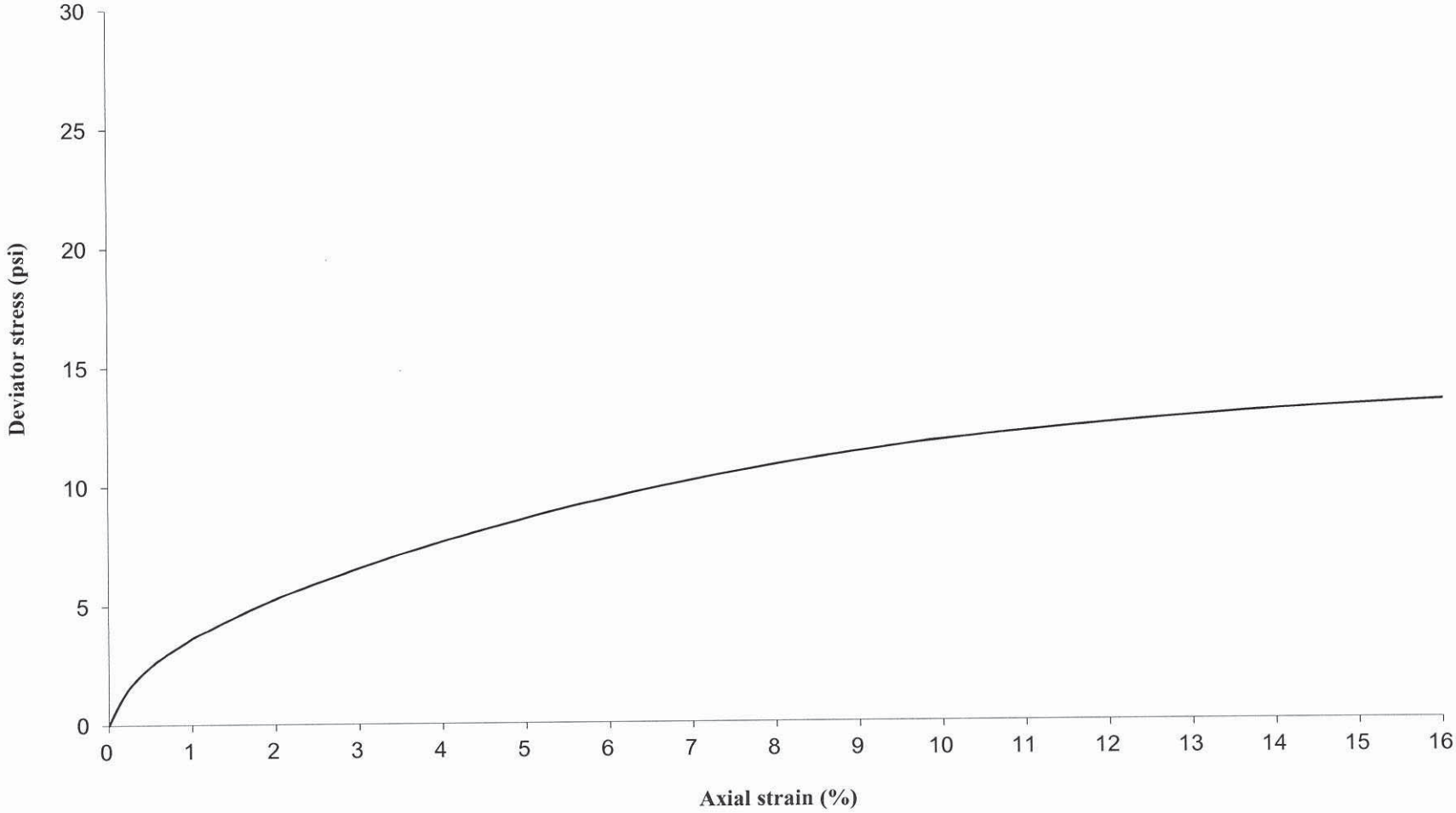
Unconsolidated-Undrained Triaxial Test

Deviator Stress v. Axial Strain

30-ST-01,ST#11 (46.0-48.0ft) @ 40 psi



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UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

AASHTO T 296 / ASTM D 2850-95

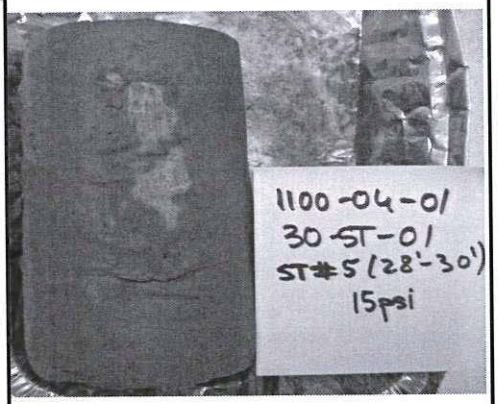
Project: Circle Interchange
Client: AECOM
WEI Job No.: 1100-04-01
Soil Sample ID: 30-ST-01, ST# 5 (28.0-30.0ft)
Type/Condition: ST/Undisturbed

Analyst name: M. de los Reyes
Date received: 10/22/2014
Test date: 11/25/2014
Sample description: Gray CLAY trace Gravel

Initial height h_0 =	5.66 in	Initial water content w =	22.17%
Initial diameter d_0 =	2.84 in	Initial unit weight γ_w =	131.78 pcf
Initial area A_0 =	6.36 in^2	Initial dry unit weight γ_d =	107.87 pcf
Mass of wet sample and tare M_i =	1260.27 g	Initial void ratio e_0 =	0.608
Mass of dry sample and tare M_d =	1034.40 g	Initial degree of saturation S_r =	100%
Mass of tare M_t =	15.37 g		
Mass of sample Ms=	1244.90 g	Liquid Limit (%):	NA
Estimated specific gravity G_s =	2.78	Plastic Limit (%):	NA
Cell confining pressure σ_3 =	15.0 psi	Sand(%):	NA
Rate of strain =	1 %/min	Silt(%):	NA
Proving Ring Factor =	1.000	Clay(%):	NA
Height to diameter ratio =	1.99		

Deviator stress at failure $D\sigma_f$ = 0.55 tsf
Major principal stress at failure σ_1 = 1.63 tsf

Axial Displacement (in) Δh	Axial Force (lbs) F	Axial Strain (%) e	Deviator Stress (psi) $\sigma_1-\sigma_3$
0.00	0.00	0.00	0.00
0.00	2.19	0.02	0.34
0.01	6.65	0.11	1.05
0.01	8.68	0.21	1.36
0.02	9.80	0.30	1.54
0.02	10.62	0.40	1.66
0.03	11.43	0.50	1.79
0.03	12.23	0.60	1.91
0.04	13.05	0.70	2.04
0.05	13.85	0.80	2.16
0.05	14.59	0.90	2.28
0.08	18.07	1.39	2.80
0.10	21.22	1.85	3.28
0.13	24.15	2.33	3.71
0.16	26.92	2.81	4.12
0.19	29.31	3.30	4.46
0.21	31.62	3.77	4.79
0.24	33.69	4.27	5.07
0.27	35.67	4.76	5.35
0.30	37.52	5.26	5.59
0.33	39.26	5.75	5.82
0.35	40.98	6.24	6.05
0.38	42.30	6.74	6.21
0.41	43.63	7.23	6.37
0.44	45.02	7.74	6.53
0.47	46.27	8.25	6.68
0.50	47.54	8.80	6.82
0.53	48.59	9.29	6.93
0.55	49.78	9.77	7.07
0.61	51.13	10.75	7.18
0.67	52.87	11.74	7.34
0.72	54.48	12.72	7.48
0.77	55.74	13.68	7.57
0.83	57.19	14.64	7.68



Bulge Failure

Prepared by: _____ Date: 11/27/14

Checked by: _____ Date: 11/27/14

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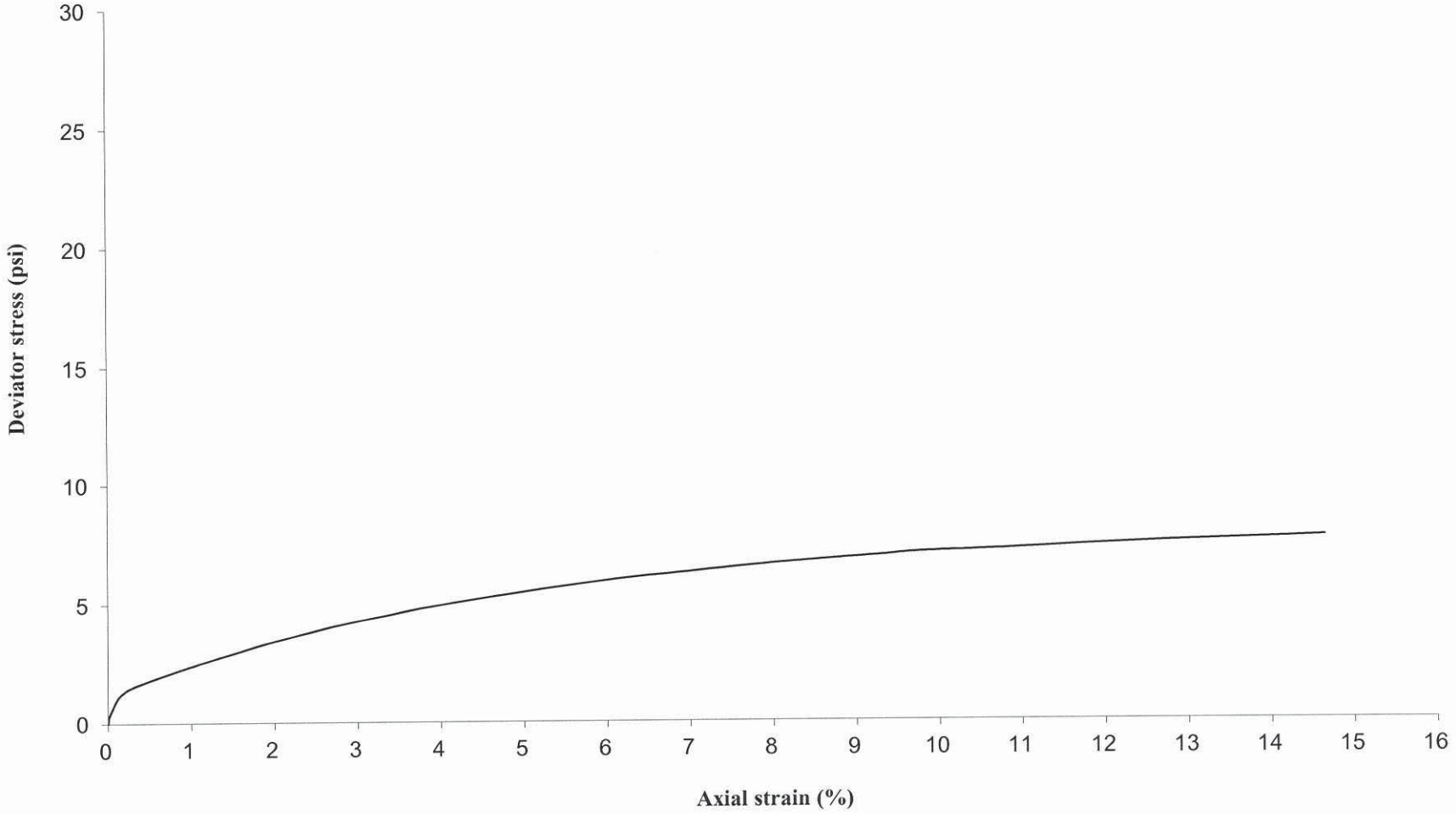
Unconsolidated-Undrained Triaxial Test

Deviator Stress v. Axial Strain

30-ST-01,ST#5 (28.0-30.0ft) @ 15 psi



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UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

AASHTO T 296 / ASTM D 2850-95

Project: Circle Interchange
Client: AECOM
WEI Job No.: 1100-04-01
Soil Sample ID: 30-ST-01, ST# 5 (28.0-30.0ft)
Type/Condition: ST/ Undisturbed

Analyst name: M. de los Reyes
Date received: 10/22/2014
Test date: 12/8/2014
Sample description: Gray CLAY trace Gravel

Initial height h_0 =	5.57 in	Initial water content w =	21.72%
Initial diameter d_0 =	2.79 in	Initial unit weight γ_w =	133.25 pcf
Initial area A_0 =	6.13 in^2	Initial dry unit weight γ_d =	109.47 pcf
Mass of wet sample and tare M_t =	1208.11 g	Initial void ratio e_0 =	0.585
Mass of dry sample and tare M_d =	994.90 g	Initial degree of saturation S_r =	100%
Mass of tare M_t =	13.21 g		
Mass of sample Ms=	1194.90 g	Liquid Limit (%):	NA
Estimated specific gravity G_s =	2.78	Plastic Limit (%):	NA
Cell confining pressure σ_3 =	30.0 psi	Sand(%):	NA
Rate of strain =	1 %/min	Silt(%):	NA
Proving Ring Factor =	1.000	Clay(%):	NA
Height to diameter ratio =	1.99		

Deviator stress at failure $D\sigma_f$ = 1.19 tsf
Major principal stress at failure σ_1 = 3.35 tsf

Axial Displacement (in) Δh	Axial Force (lbs) F	Axial Strain (%) e	Deviator Stress (psi) σ_1-σ_3
0.00	0.00	0.00	0.00
0.01	5.72	0.10	0.93
0.01	19.48	0.20	3.17
0.02	25.13	0.29	4.09
0.02	29.11	0.39	4.73
0.03	32.31	0.49	5.24
0.03	35.02	0.59	5.68
0.04	37.43	0.69	6.06
0.04	39.56	0.79	6.40
0.05	41.37	0.90	6.69
0.06	43.16	0.99	6.97
0.08	51.13	1.49	8.21
0.11	57.49	1.99	9.19
0.14	62.94	2.48	10.01
0.17	67.62	2.98	10.70
0.19	72.05	3.48	11.34
0.22	76.18	4.00	11.93
0.25	79.51	4.52	12.38
0.28	82.84	5.02	12.83
0.31	85.73	5.51	13.21
0.33	89.47	5.99	13.72
0.36	92.01	6.48	14.03
0.39	94.10	6.97	14.28
0.42	96.81	7.46	14.61
0.44	98.26	7.96	14.75
0.47	100.32	8.46	14.97
0.50	102.90	8.99	15.27
0.53	105.67	9.47	15.60
0.55	106.69	9.96	15.66
0.61	109.97	10.95	15.97
0.67	111.22	11.98	15.96
0.72	115.98	12.98	16.46
0.78	117.30	13.97	16.45
0.84	118.58	14.99	16.44

Bulge Failure

Prepared by: Jay Date: 12/10/14

Checked by: LF Date: 12/16/14

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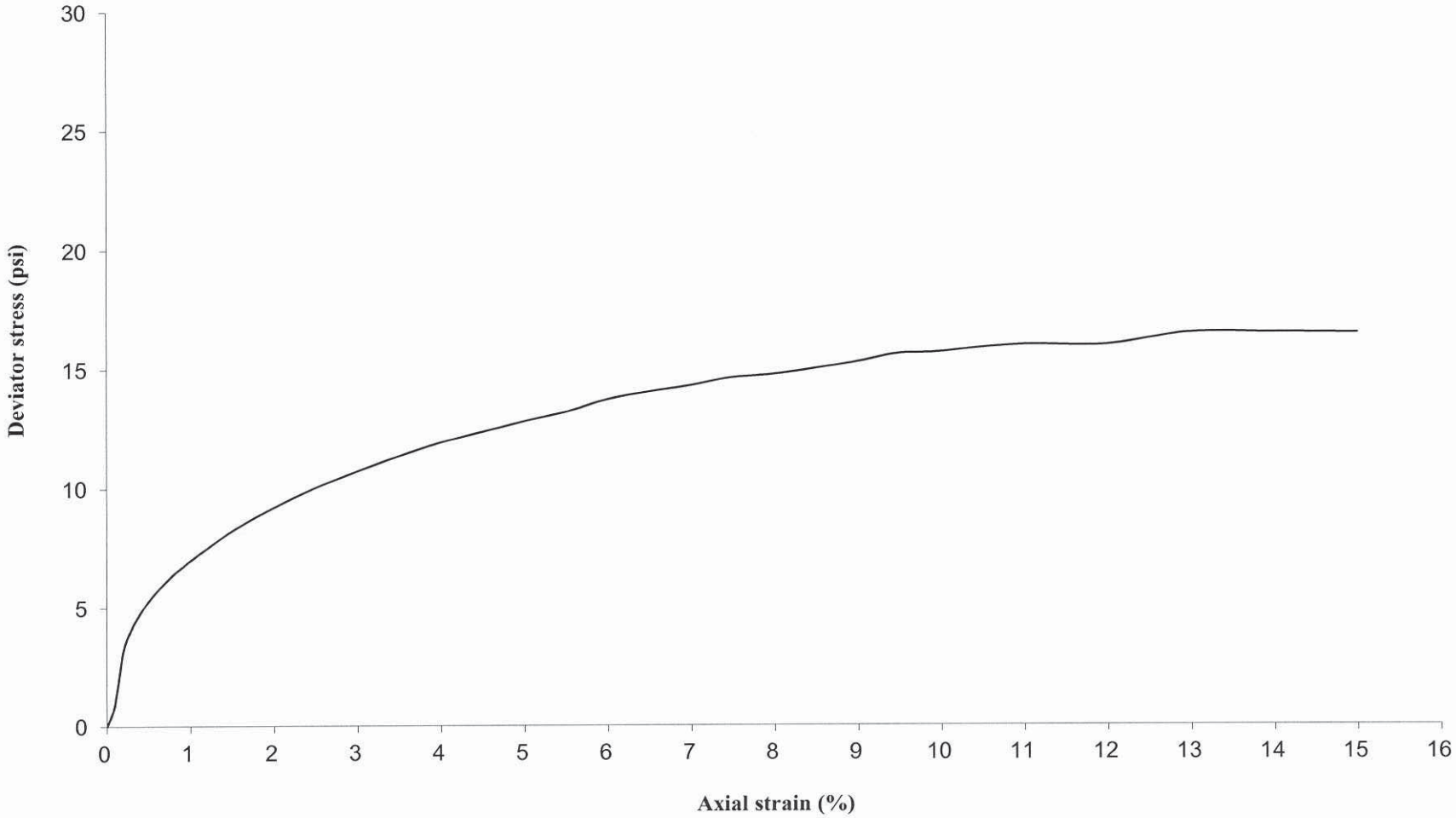
Unconsolidated-Undrained Triaxial Test

Deviator Stress v. Axial Strain

30-ST-01,ST#5 (28.0-30.0ft) @ 30 psi



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UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

AASHTO T 296 / ASTM D 2850-95

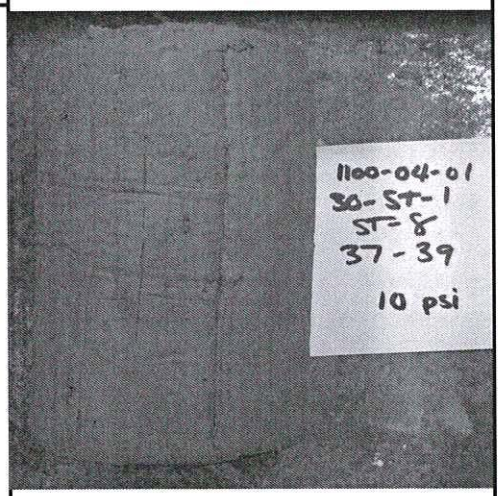
Project: Circle Interchange
Client: AECOM
WEI Job No.: 1100-04-01
Soil Sample ID: 30-ST-01, ST# 8 (37.0-39.0ft)
Type/Condition: ST/Undisturbed

Analyst name: M. de los Reyes
Date received: 10/22/2014
Test date: 11/25/2014
Sample description: Gray CLAY

Initial height h_0 =	5.59 in	Initial water content w =	25.03%
Initial diameter d_0 =	2.79 in	Initial unit weight γ_w =	129.56 pcf
Initial area A_0 =	6.12 in^2	Initial dry unit weight γ_d =	103.62 pcf
Mass of wet sample and tare M_t =	1349.07 g	Initial void ratio e_0 =	0.674
Mass of dry sample and tare M_d =	1116.20 g	Initial degree of saturation S_r =	100%
Mass of tare M_t =	185.67 g		
Mass of sample Ms=	1163.40 g	Liquid Limit (%):	NA
Estimated specific gravity G_s =	2.78	Plastic Limit (%):	NA
Cell confining pressure σ_3 =	10.0 psi	Sand(%):	NA
Rate of strain =	1 %/min	Silt(%):	NA
Proving Ring Factor =	1.000	Clay(%):	NA
Height to diameter ratio =	2.00		

Deviator stress at failure $D\sigma_f$ = 0.40 tsf
Major principal stress at failure σ_1 = 1.12 tsf

Axial Displacement (in) Δh	Axial Force (lbs) F	Axial Strain (%) e	Deviator Stress (psi) σ_1-σ_3
0.00	0.00	0.00	0.00
0.01	0.79	0.10	0.13
0.01	1.35	0.19	0.22
0.02	1.94	0.29	0.32
0.02	2.65	0.38	0.43
0.03	3.40	0.48	0.55
0.03	3.89	0.58	0.63
0.04	4.23	0.69	0.69
0.04	4.61	0.80	0.75
0.05	5.26	0.90	0.85
0.06	5.91	1.01	0.96
0.08	8.53	1.50	1.37
0.11	10.77	2.00	1.72
0.14	12.28	2.49	1.96
0.17	14.38	2.97	2.28
0.19	16.33	3.45	2.58
0.22	18.04	3.91	2.83
0.25	19.99	4.44	3.12
0.28	22.33	4.93	3.47
0.30	24.21	5.44	3.74
0.33	24.75	5.94	3.81
0.36	25.62	6.43	3.92
0.39	27.16	6.92	4.13
0.41	28.53	7.41	4.32
0.44	29.58	7.94	4.45
0.47	31.51	8.46	4.72
0.50	32.87	9.03	4.89
0.53	33.13	9.52	4.90
0.56	33.40	10.02	4.91
0.61	34.75	10.99	5.06
0.67	36.76	12.02	5.29
0.73	37.50	13.01	5.33
0.78	37.86	13.97	5.32
0.84	39.53	14.95	5.49



Bulge Failure

Prepared by: Jay Date: 11/29/14

Checked by: [illegible] Date: 11/24/14

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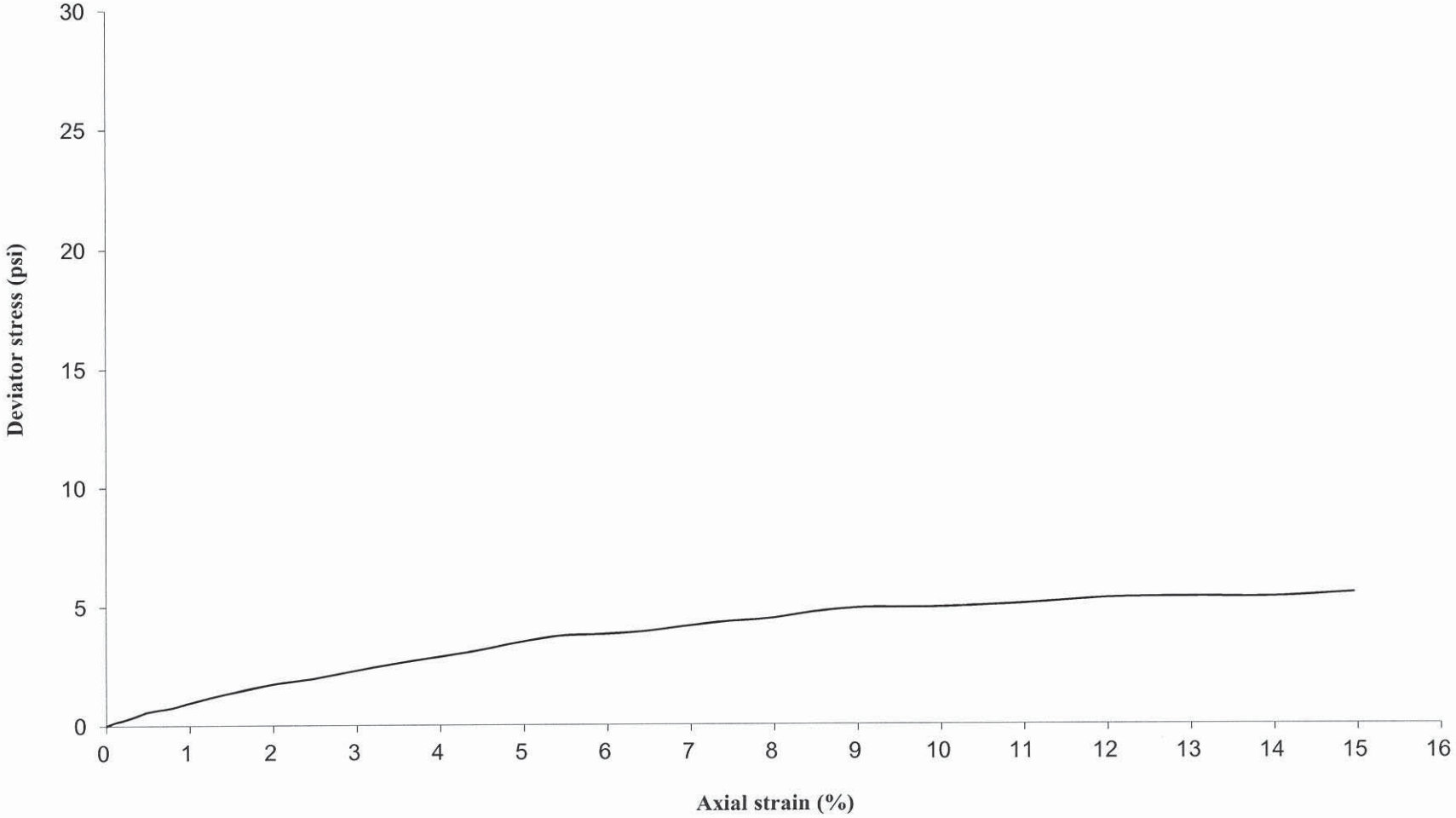
Unconsolidated-Undrained Triaxial Test

Deviator Stress v. Axial Strain

30-ST-01,ST#8 (37.0-39.0ft) @ 10 psi



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UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

AASHTO T 296 / ASTM D 2850-95

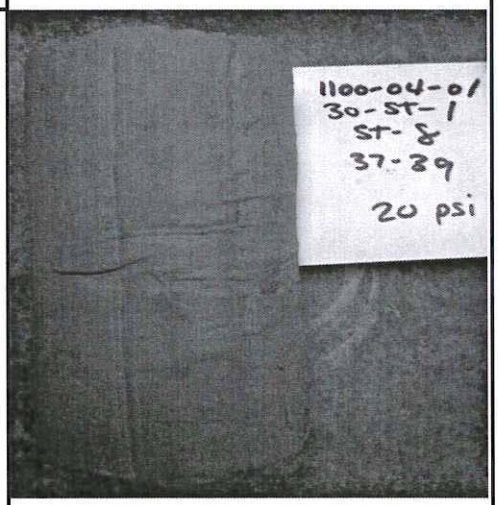
Project: Circle Interchange
Client: AECOM
WEI Job No.: 1100-04-01
Soil Sample ID: 30-ST-01, ST# 8 (37.0-39.0ft)
Type/Condition: ST/Undisturbed

Analyst name: M. de los Reyes
Date received: 10/22/2014
Test date: 11/25/2014
Sample description: Gray CLAY

Initial height h_0 =	6.15 in	Initial water content w =	24.56%
Initial diameter d_0 =	2.83 in	Initial unit weight γ_w =	116.04 pcf
Initial area A_0 =	6.28 in^2	Initial dry unit weight γ_d =	93.16 pcf
Mass of wet sample and tare M_t =	1364.76 g	Initial void ratio e_0 =	0.862
Mass of dry sample and tare M_d =	1132.60 g	Initial degree of saturation S_r =	79%
Mass of tare M_t =	187.16 g		
Mass of sample Ms=	1177.60 g	Liquid Limit (%):	NA
Estimated specific gravity G_s =	2.78	Plastic Limit (%):	NA
Cell confining pressure σ_3 =	20.0 psi	Sand(%):	NA
Rate of strain =	1 %/min	Silt(%):	NA
Proving Ring Factor =	1.000	Clay(%):	NA
Height to diameter ratio =	2.18		

Deviator stress at failure $D\sigma_f$ = 0.56 tsf
Major principal stress at failure σ_1 = 2.00 tsf

Axial Displacement (in) Δh	Axial Force (lbs) F	Axial Strain (%) e	Deviator Stress (psi) $\sigma_1-\sigma_3$
0.00	0.00	0.00	0.00
0.01	5.73	0.09	0.91
0.01	8.36	0.18	1.33
0.02	10.30	0.27	1.63
0.02	11.70	0.37	1.86
0.03	13.29	0.46	2.11
0.03	14.67	0.55	2.32
0.04	15.61	0.65	2.47
0.05	16.74	0.74	2.64
0.05	18.03	0.83	2.85
0.06	19.05	0.93	3.00
0.09	21.32	1.39	3.35
0.11	25.46	1.85	3.98
0.14	28.22	2.29	4.39
0.17	29.68	2.74	4.60
0.20	33.48	3.19	5.16
0.22	36.29	3.63	5.57
0.25	39.60	4.09	6.05
0.28	40.01	4.53	6.08
0.31	42.05	4.98	6.36
0.33	43.49	5.43	6.55
0.36	42.93	5.87	6.43
0.39	42.81	6.32	6.38
0.42	43.84	6.76	6.51
0.44	49.10	7.22	7.25
0.47	49.42	7.68	7.26
0.50	50.25	8.19	7.34
0.53	50.66	8.65	7.37
0.56	49.76	9.11	7.20
0.62	49.48	10.02	7.09
0.67	50.97	10.95	7.23
0.73	55.40	11.85	7.77
0.78	52.76	12.75	7.33
0.84	54.57	13.65	7.50



Bulge Failure

Prepared by: Jany Date: 11/29/14

Checked by: LF Date: 11/29/14

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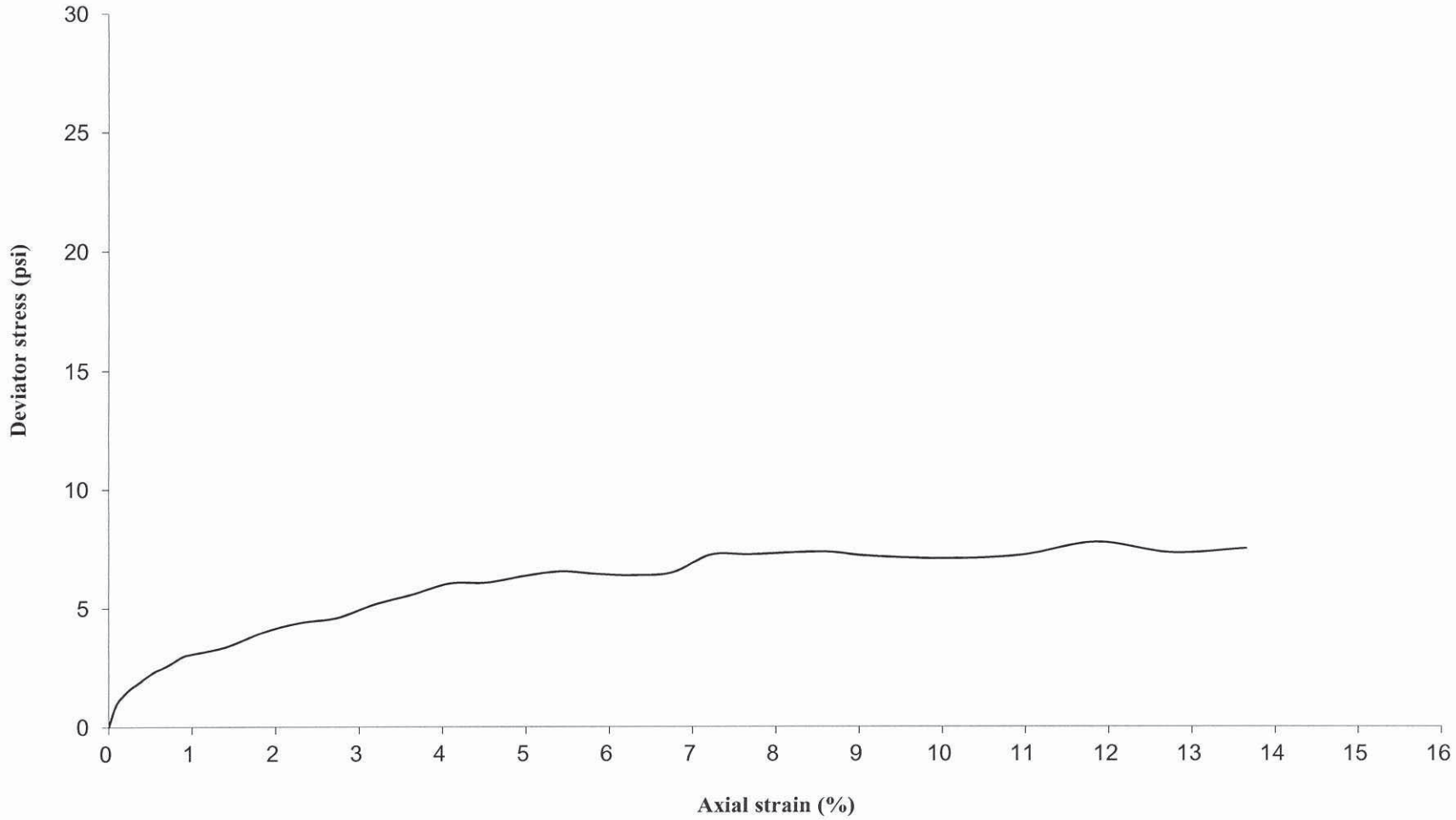
Unconsolidated-Undrained Triaxial Test

Deviator Stress v. Axial Strain

30-ST-01,ST#8 (37.0-39.0ft) @ 20 psi



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UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

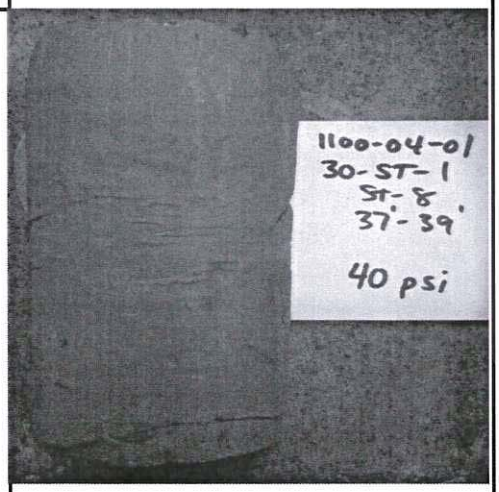
AASHTO T 296 / ASTM D 2850-95

Project: Circle Interchange
Client: AECOM
WEI Job No.: 1100-04-01
Soil Sample ID: 30-ST-01, ST# 8 (37.0-39.0ft)
Type/Condition: ST/Undisturbed

Analyst name: M. de los Reyes
Date received: 10/22/2014
Test date: 11/25/2014
Sample description: Gray CLAY

Initial height h_0 =	5.62 in	Initial water content w =	25.15%
Initial diameter d_0 =	2.78 in	Initial unit weight γ_w =	131.56 pcf
Initial area A_0 =	6.07 in^2	Initial dry unit weight γ_d =	105.13 pcf
Mass of wet sample and tare M_t =	1365.90 g	Initial void ratio e_0 =	0.650
Mass of dry sample and tare M_d =	1129.10 g	Initial degree of saturation S_r =	100%
Mass of tare M_t =	187.40 g		
Mass of sample Ms=	1178.50 g	Liquid Limit (%):	NA
Estimated specific gravity G_s =	2.78	Plastic Limit (%):	NA
Cell confining pressure σ_3 =	40.0 psi	Sand(%):	NA
Rate of strain =	1 %/min	Silt(%):	NA
Proving Ring Factor =	1.000	Clay(%):	NA
Height to diameter ratio =	2.02		
		Deviator stress at failure $D\sigma_f$ =	**0.56 tsf**
		Major principal stress at failure σ_1 =	**3.44 tsf**

Axial Displacement (in) Δh	Axial Force (lbs) F	Axial Strain (%) e	Deviator Stress (psi) σ_1-σ_3
0.00	0.00	0.00	0.00
0.01	3.12	0.10	0.51
0.01	7.74	0.21	1.27
0.02	9.80	0.32	1.61
0.02	11.02	0.42	1.81
0.03	11.93	0.52	1.95
0.03	12.78	0.62	2.09
0.04	13.53	0.72	2.21
0.05	14.21	0.82	2.32
0.05	14.91	0.92	2.43
0.06	15.56	1.02	2.54
0.08	18.81	1.50	3.05
0.11	22.09	1.99	3.56
0.14	25.22	2.47	4.05
0.17	28.10	2.96	4.49
0.19	30.83	3.42	4.90
0.22	33.40	3.94	5.28
0.25	35.78	4.43	5.63
0.28	37.76	4.92	5.91
0.30	39.62	5.41	6.17
0.33	41.34	5.89	6.41
0.36	42.72	6.39	6.58
0.39	44.06	6.87	6.76
0.42	45.37	7.39	6.92
0.44	46.58	7.91	7.06
0.47	47.59	8.42	7.18
0.50	48.63	8.97	7.29
0.53	49.60	9.46	7.39
0.56	50.32	9.96	7.46
0.62	51.75	10.96	7.59
0.67	53.00	11.96	7.68
0.73	54.00	12.93	7.74
0.78	54.94	13.90	7.79
0.84	55.92	14.90	7.83



Bulge Failure

Prepared by: Jay Date: 11/29/14

Checked by: MF Date: 11/29/14

AASHTO R18

Wang Engineering

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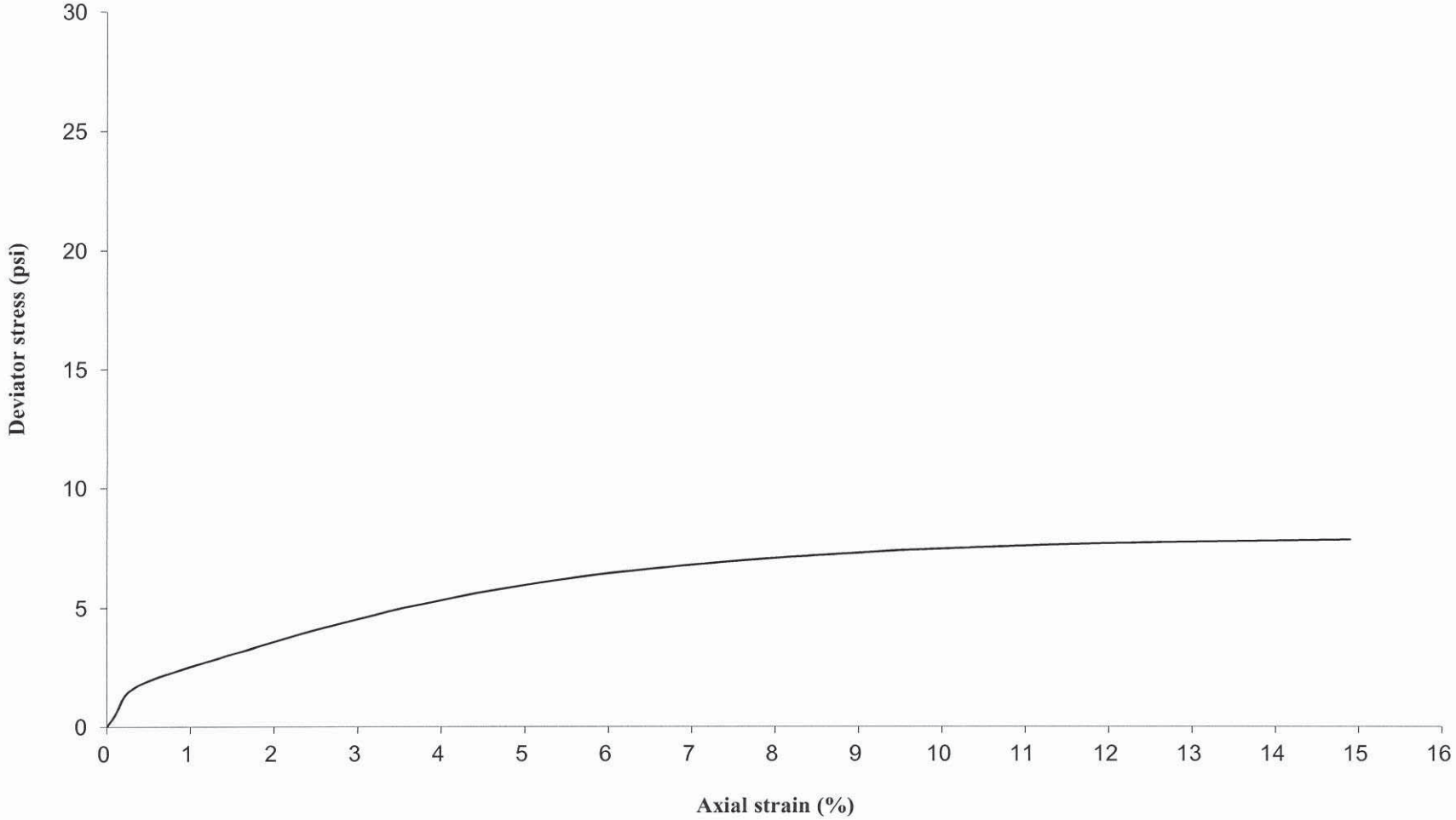
Unconsolidated-Undrained Triaxial Test

Deviator Stress v. Axial Strain

30-ST-01,ST#8 (37.0-39.0ft) @ 40 psi



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UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

AASHTO T 296 / ASTM D 2850-95

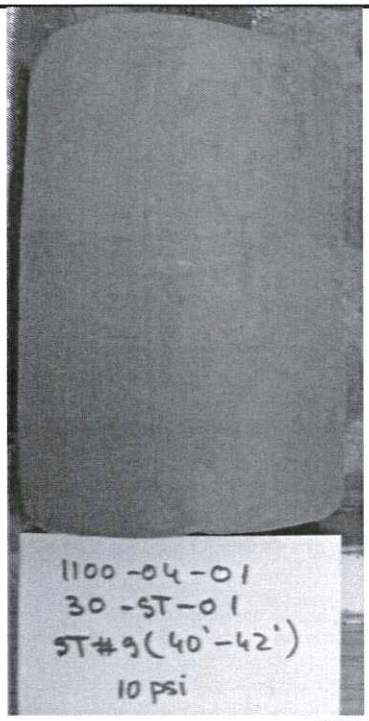
Project: Circle Interchange
Client: AECOM
WEI Job No.: 1100-04-01
Soil Sample ID: 30-ST-01, ST# 9 (40.0-42.0ft)
Type/Condition: ST/Undisturbed

Analyst name: M. de los Reyes
Date received: 10/22/2014
Test date: 12/4/2014
Sample description: Gray SILTY CLAY trace Gravel

Initial height h_0 =	5.59	in	Initial water content w =	25.15%	
Initial diameter d_0 =	2.85	in	Initial unit weight γ_w =	126.10	pcf
Initial area A_0 =	6.37	in^2	Initial dry unit weight γ_d =	100.76	pcf
Mass of wet sample and tare M_t =	1363.86	g	Initial void ratio e_0 =	0.722	
Mass of dry sample and tare M_d =	1127.30	g	Initial degree of saturation S_r =	97%	
Mass of tare M_t =	186.86	g			
Mass of sample Ms=	1177.00	g	Liquid Limit (%):	NA	
Estimated specific gravity G_s =	2.78		Plastic Limit (%):	NA	
Cell confining pressure σ_3 =	10.0	psi	Sand(%):	NA	
Rate of strain =	1	%/min	Silt(%):	NA	
Proving Ring Factor =	1.000		Clay(%):	NA	
Height to diameter ratio =	1.96				

Deviator stress at failure $D\sigma_f$ = 0.60 tsf
Major principal stress at failure σ_1 = 1.32 tsf

Axial Displacement (in) Δh	Axial Force (lbs) F	Axial Strain (%) e	Deviator Stress (psi) $\sigma_1-\sigma_3$
0.00	0.00	0.00	0.00
0.00	7.42	0.07	1.17
0.01	11.75	0.15	1.84
0.01	13.72	0.25	2.15
0.02	14.82	0.34	2.32
0.02	15.91	0.44	2.49
0.03	17.06	0.53	2.66
0.04	17.72	0.63	2.77
0.04	18.55	0.74	2.89
0.05	19.55	0.83	3.05
0.05	20.52	0.93	3.19
0.08	25.36	1.41	3.93
0.11	29.81	1.90	4.59
0.13	33.81	2.38	5.18
0.16	37.44	2.87	5.71
0.19	40.62	3.36	6.16
0.21	43.58	3.85	6.58
0.24	45.64	4.36	6.85
0.27	47.74	4.88	7.13
0.30	49.37	5.38	7.34
0.33	50.82	5.87	7.51
0.35	52.06	6.35	7.66
0.38	53.15	6.83	7.78
0.41	54.54	7.30	7.94
0.44	55.07	7.79	7.98
0.46	56.13	8.29	8.08
0.49	57.02	8.83	8.16
0.52	57.52	9.31	8.19
0.55	57.92	9.78	8.21
0.60	59.66	10.73	8.36
0.66	59.81	11.73	8.29
0.71	60.03	12.73	8.23
0.77	61.62	13.71	8.35
0.82	61.36	14.71	8.22



Bulge Failure

Prepared by: Jay Date: 12/8/14

Checked by: AL Date: 12/8/14

AASHTO R18

Wang Engineering

1145 North Main Street
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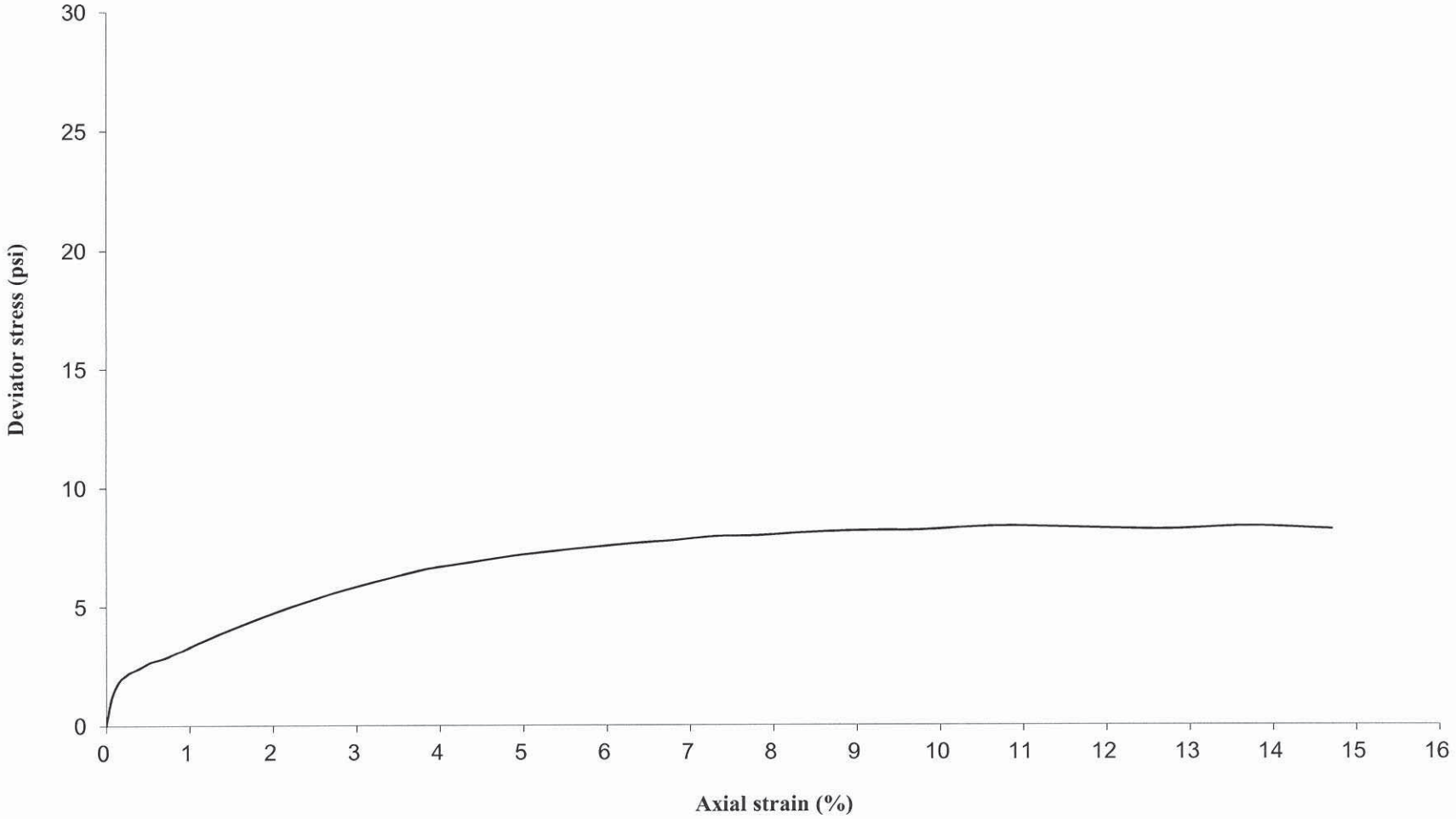
Unconsolidated-Undrained Triaxial Test

Deviator Stress v. Axial Strain

30-ST-01,ST#9 (40.0-42.0ft) @ 10 psi



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UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

AASHTO T 296 / ASTM D 2850-95

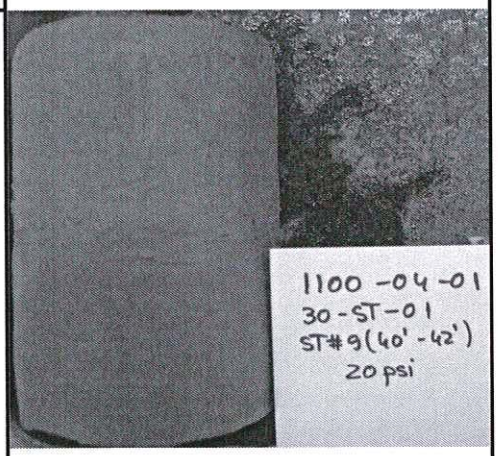
Project: Circle Interchange
Client: AECOM
WEI Job No.: 1100-04-01
Soil Sample ID: 30-ST-01, ST# 9 (40.0-42.0ft)
Type/Condition: ST/Undisturbed

Analyst name: M. de los Reyes
Date received: 10/22/2014
Test date: 12/4/2014
Sample description: Gray SILTY CLAY trace Gravel

Initial height h_0 =	6.15	in	Initial water content w =	25.09%	
Initial diameter d_0 =	2.83	in	Initial unit weight γ_w =	113.50	pcf
Initial area A_0 =	6.28	in^2	Initial dry unit weight γ_d =	90.74	pcf
Mass of wet sample and tare M_t =	1339.32	g	Initial void ratio e_0 =	0.912	
Mass of dry sample and tare M_d =	1108.30	g	Initial degree of saturation S_r =	76%	
Mass of tare M_t =	187.42	g			
Mass of sample Ms=	1151.90	g	Liquid Limit (%):	NA	
Estimated specific gravity G_s =	2.78		Plastic Limit (%):	NA	
Cell confining pressure σ_3 =	20.0	psi	Sand(%):	NA	
Rate of strain =	1	%/min	Silt(%):	NA	
Proving Ring Factor =	1.000		Clay(%):	NA	
Height to diameter ratio =	2.18				

Deviator stress at failure $D\sigma_f$ = 0.64 tsf
Major principal stress at failure σ_1 = 2.08 tsf

Axial Displacement (in) Δh	Axial Force (lbs) F	Axial Strain (%) e	Deviator Stress (psi) σ_1-σ_3
0.00	0.00	0.00	0.00
0.00	1.15	0.05	0.18
0.01	1.33	0.13	0.21
0.01	5.78	0.22	0.92
0.02	8.51	0.30	1.35
0.02	10.15	0.39	1.61
0.03	11.31	0.48	1.79
0.04	12.04	0.57	1.90
0.04	12.66	0.66	2.00
0.05	13.28	0.76	2.10
0.05	13.79	0.85	2.18
0.08	16.38	1.31	2.57
0.11	18.78	1.77	2.94
0.14	21.19	2.21	3.30
0.16	23.68	2.65	3.67
0.19	26.24	3.09	4.05
0.22	28.79	3.51	4.42
0.24	31.09	3.97	4.75
0.27	33.62	4.42	5.11
0.30	35.97	4.87	5.45
0.33	38.20	5.31	5.76
0.35	40.44	5.73	6.07
0.38	42.54	6.16	6.35
0.41	44.64	6.58	6.64
0.43	46.42	7.03	6.87
0.46	48.36	7.49	7.12
0.49	50.17	7.99	7.35
0.52	51.78	8.43	7.55
0.55	53.41	8.87	7.75
0.60	56.46	9.76	8.11
0.66	58.84	10.68	8.36
0.71	60.90	11.59	8.57
0.77	63.06	12.47	8.78
0.82	64.78	13.35	8.93



Bulge Failure

Prepared by: Jay Date: 12/18/14

Checked by: AF Date: 12/18/14

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Wang Engineering

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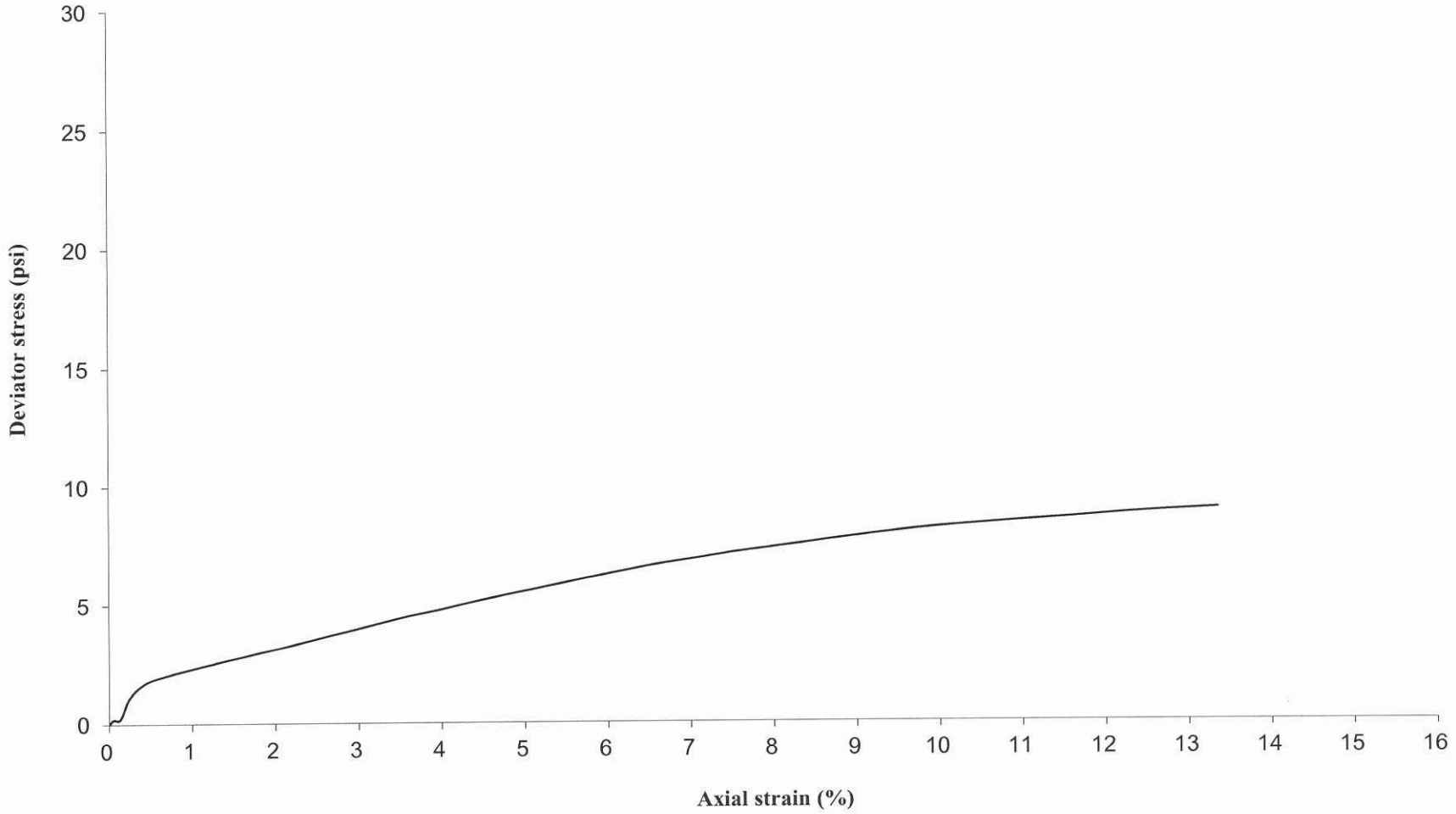
www.wangeng.com

Unconsolidated-Undrained Triaxial Test

Deviator Stress v. Axial Strain

30-ST-01,ST#9 (40.0-42.0ft) @ 20 psi



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UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

AASHTO T 296 / ASTM D 2850-95

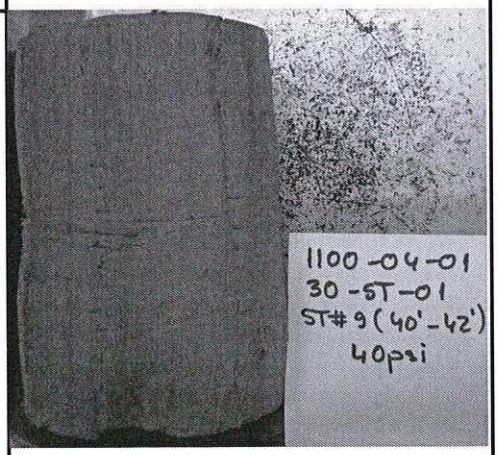
Project: Circle Interchange
Client: AECOM
WEI Job No.: 1100-04-01
Soil Sample ID: 30-ST-01, ST# 9 (40.0-42.0ft)
Type/Condition: ST/Undisturbed

Analyst name: M. de los Reyes
Date received: 10/22/2014
Test date: 12/4/2014
Sample description: Gray SILTY CLAY trace Gravel

Initial height h_0 =	6.15 in	Initial water content w =	24.64%
Initial diameter d_0 =	2.83 in	Initial unit weight γ_w =	117.94 pcf
Initial area A_0 =	6.28 in^2	Initial dry unit weight γ_d =	94.63 pcf
Mass of wet sample and tare M_i =	1359.88 g	Initial void ratio e_0 =	0.833
Mass of dry sample and tare M_d =	1123.30 g	Initial degree of saturation S_r =	82%
Mass of tare M_t =	162.98 g		
Mass of sample Ms=	1196.90 g	Liquid Limit (%):	NA
Estimated specific gravity G_s =	2.78	Plastic Limit (%):	NA
Cell confining pressure σ_3 =	40.0 psi	Sand(%):	NA
Rate of strain =	1 %/min	Silt(%):	NA
Proving Ring Factor =	1.000	Clay(%):	NA
Height to diameter ratio =	2.18		

Deviator stress at failure $D\sigma_f$ = 0.82 tsf
Major principal stress at failure σ_1 = 3.70 tsf

Axial Displacement (in) Δh	Axial Force (lbs) F	Axial Strain (%) e	Deviator Stress (psi) $\sigma_1-\sigma_3$
0.00	0.00	0.00	0.00
0.01	5.58	0.09	0.89
0.01	12.60	0.18	2.00
0.02	16.16	0.27	2.57
0.02	18.61	0.35	2.95
0.03	20.70	0.44	3.28
0.03	22.53	0.53	3.57
0.04	24.15	0.62	3.82
0.04	25.77	0.70	4.07
0.05	27.26	0.79	4.31
0.05	28.69	0.88	4.53
0.08	34.92	1.31	5.48
0.11	40.22	1.74	6.29
0.13	45.14	2.18	7.03
0.16	49.31	2.62	7.64
0.19	53.47	3.09	8.25
0.22	56.33	3.56	8.65
0.25	59.38	4.02	9.07
0.27	61.91	4.47	9.41
0.30	63.59	4.92	9.62
0.33	65.52	5.36	9.87
0.36	67.26	5.80	10.08
0.39	69.54	6.26	10.38
0.41	70.21	6.71	10.42
0.44	71.72	7.16	10.60
0.47	73.23	7.59	10.77
0.50	73.72	8.07	10.79
0.52	74.69	8.50	10.88
0.55	75.58	8.94	10.95
0.61	76.98	9.84	11.05
0.66	79.33	10.73	11.27
0.72	79.72	11.62	11.21
0.77	81.54	12.53	11.35
0.83	81.51	13.46	11.23



Bulge Failure

Prepared by: Sang Date: 12/8/14

Checked by: Lif Date: 12/8/14

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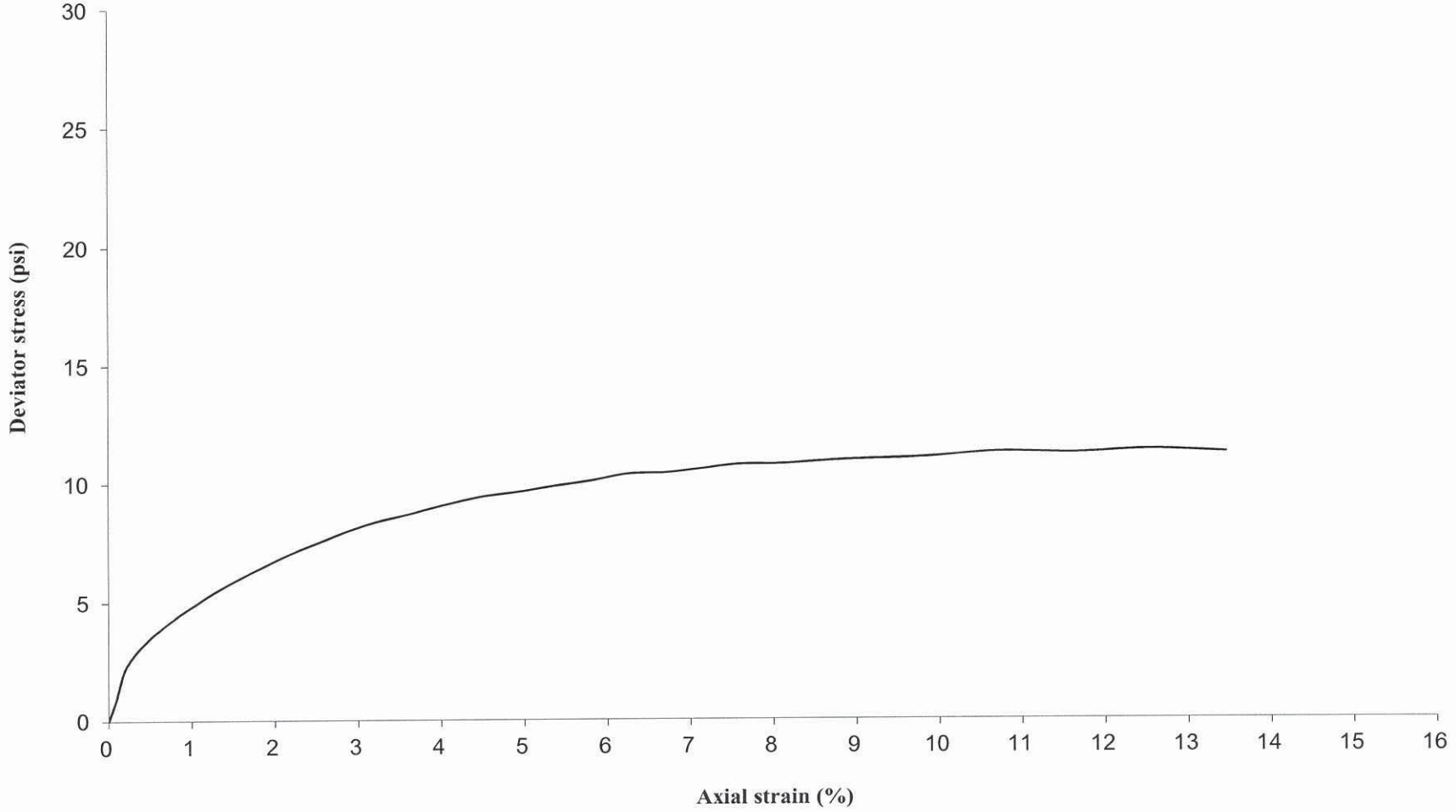
Unconsolidated-Undrained Triaxial Test

Deviator Stress v. Axial Strain

30-ST-01,ST#9 (40.0-42.0ft) @ 40 psi



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CONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

AASHTO T 297 / ASTM D 4767

Project:	**Circle Interchange Reconstruction**	**Tested by:**	**Wang Engineering, Inc.**
Client:	**AECOM**	**Prepared by:**	**M. Snider**
Soil Sample ID:	**Boring 30-RWB-03, ST#4, 28.5' to 30'**	**Test date:**	**October 17, 2014**
Sample description:	**Gray SILTY CLAY (CL)**	**WEI Job No.:**	**1100-04-01**
Initial sample height:	5.67 in	Tare mass:	13.60 g
Initial sample diameter:	2.84 in	Measured sample mass w/out Tare:	1220.60 g
Initial sample mass:	1220.60 g	Tare and final sample mass:	1224.50 g
Soil specific gravity:	2.75 (estimated)	Tare and dry sample mass:	995.60 g
Dry sample mass:	982.00 g		
Final sample mass:	1210.90 g	Saturation (B) coefficient:	99%
Initial water content:	24.30% (specimen)	Rate of loading:	1.0E-02 %/min
Initial unit weight:	129.22 pcf	Volume change during consolidation:	0.68 in^3
Initial dry unit weight:	103.96 pcf	Void ratio after consolidation:	0.619
Initial void ratio:	0.651	Dry unit weight after consolidation:	105.98 pcf
Initial saturation:	102.7%	Height after consolidation:	5.63 in
Final water content:	23.31% (specimen)	Volume after consolidation:	35.30 in^3
Liquid Limit, %:	34	Area after consolidation:	6.27 in^2
Plastic Limit, %:	17	Time at 50% Consolidation:	43.70 min
% Sand:	16.3		
% Silt:	48.1	Effective consolidation stress:	10.0 psi
% Clay:	30.5	Shear modulus:	399.01 psi

Axial displacement (Dh)	Axial force (F)	Pore pressure (u)	Axial strain (eps)	Deviator stress	Total vertical stress	Effective vertical stress	Effective horizontal stress	Shear stress, q=q'	Effective spherical stress, p'	Total spherical stress, p	Effective Principal Stress Ratio
in	pound	psi	%	psi	psi	psi	psi	psi	psi	psi	psi
0.00	0.000	0.00	0.00	0.0	10.0	10.0	10.00	0.00	10.00	10.00	1.00
0.01	21.327	1.77	0.10	3.4	13.4	11.6	8.23	1.70	9.93	11.70	1.41
0.01	30.154	2.84	0.20	4.8	14.8	12.0	7.16	2.40	9.56	12.40	1.67
0.02	35.240	3.40	0.30	5.6	15.6	12.2	6.60	2.80	9.40	12.80	1.85
0.02	38.822	3.81	0.40	6.2	16.2	12.4	6.19	3.08	9.27	13.08	2.00
0.03	41.851	4.09	0.50	6.6	16.6	12.5	5.91	3.32	9.23	13.32	2.12
0.03	44.033	4.31	0.60	7.0	17.0	12.7	5.69	3.49	9.18	13.49	2.23
0.04	46.127	4.47	0.70	7.3	17.3	12.8	5.53	3.65	9.18	13.65	2.32
0.05	48.278	4.59	0.80	7.6	17.6	13.0	5.41	3.82	9.23	13.82	2.41
0.05	50.500	4.72	0.90	8.0	18.0	13.3	5.28	3.99	9.27	13.99	2.51
0.06	52.643	4.80	1.00	8.3	18.3	13.5	5.20	4.16	9.35	14.16	2.60
0.08	58.375	5.04	1.50	9.2	19.2	14.1	4.96	4.59	9.55	14.59	2.85
0.11	63.494	5.10	2.00	9.9	19.9	14.8	4.90	4.96	9.86	14.96	3.02
0.14	68.063	5.04	2.50	10.6	20.6	15.5	4.96	5.29	10.25	15.29	3.13
0.17	70.323	4.94	3.00	10.9	20.9	15.9	5.06	5.44	10.50	15.44	3.15
0.20	72.049	4.85	3.50	11.1	21.1	16.2	5.15	5.54	10.69	15.54	3.15
0.23	74.417	4.74	4.00	11.4	21.4	16.7	5.26	5.70	10.95	15.70	3.17
0.26	77.403	4.68	4.50	11.8	21.8	17.1	5.32	5.89	11.22	15.89	3.21
0.28	78.221	4.59	5.00	11.9	21.9	17.3	5.41	5.93	11.34	15.93	3.19
0.31	80.973	4.49	5.50	12.2	22.2	17.7	5.51	6.10	11.61	16.10	3.21
0.34	83.021	4.42	6.00	12.4	22.4	18.0	5.58	6.22	11.81	16.22	3.23
0.37	83.097	4.33	6.50	12.4	22.4	18.1	5.67	6.20	11.86	16.20	3.19
0.40	83.782	4.23	7.00	12.4	22.4	18.2	5.77	6.21	11.98	16.21	3.15
0.43	85.298	4.13	7.50	12.6	22.6	18.4	5.87	6.29	12.16	16.29	3.15
0.45	87.749	4.07	8.00	12.9	22.9	18.8	5.93	6.44	12.37	16.44	3.17
0.48	87.854	3.98	8.50	12.8	22.8	18.8	6.02	6.41	12.43	16.41	3.13
0.51	89.666	3.92	9.00	13.0	23.0	19.1	6.08	6.51	12.59	16.51	3.14
0.54	90.655	3.85	9.50	13.1	23.1	19.2	6.15	6.54	12.69	16.54	3.13
0.57	90.272	3.78	10.00	13.0	23.0	19.2	6.22	6.48	12.70	16.48	3.08
0.62	92.152	3.66	11.00	13.1	23.1	19.4	6.34	6.54	12.88	16.54	3.06
0.68	93.932	3.53	12.00	13.2	23.2	19.7	6.47	6.59	13.06	16.59	3.04
0.74	95.639	3.48	13.00	13.3	23.3	19.8	6.52	6.64	13.15	16.64	3.04
0.79	95.932	3.45	14.00	13.2	23.2	19.7	6.55	6.58	13.13	16.58	3.01
0.85	97.761	3.36	15.00	13.3	23.3	19.9	6.64	6.63	13.27	16.63	3.00

Notes:

$p=S1+S3/2$ $q=S1-S3/2$

$p'=S1'+S3'/2$ $q'=S1'-S3'/2$

Wet Method Saturation

Prepared by: Jay Date: 10/20/14

Checked by: KF Date: 10/20/14

P:\1210201\LWS_Wang_MLS_1650401TXCCU_20140506

AASHTO R18

Wang Engineering

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Phone (630) 953-9928
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CONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

AASHTO T 297 / ASTM D 4767

Project:	**Circle Interchange Reconstruction**	**Tested by:**	**Wang Engineering, Inc.**
Client:	**AECOM**	**Prepared by:**	**M. Snider**
Soil Sample ID:	**Boring 30-RWB-03, ST#4, 28.5' to 30'**	**Test date:**	**October 17, 2014**
Sample description:	**Gray SILTY CLAY (CL)**	**WEI Job No.:**	**1100-04-01**
Initial sample height:	5.58 in	Tare mass:	163.02 g
Initial sample diameter:	2.81 in	Measured sample mass w/out Tare:	1180.70 g
Initial sample mass:	1180.70 g	Tare and final sample mass:	1319.20 g
Soil specific gravity:	2.75 (estimated)	Tare and dry sample mass:	1112.50 g
Dry sample mass:	949.48 g		
Final sample mass:	1156.18 g	Saturation (B) coefficient:	99%
Initial water content:	24.35% (specimen)	Rate of loading:	1.0E-02 %/min
Initial unit weight:	130.17 pcf	Volume change during consolidation:	1.55 in^3
Initial dry unit weight:	104.68 pcf	Void ratio after consolidation:	0.566
Initial void ratio:	0.639	Dry unit weight after consolidation:	109.61 pcf
Initial saturation:	104.7%	Height after consolidation:	5.50 in
Final water content:	21.77% (specimen)	Volume after consolidation:	33.00 in^3
Liquid Limit, %:	34	Area after consolidation:	6.00 in^2
Plastic Limit, %:	17	Time at 50% Consolidation:	147.96 min
% Sand:	16.3		
% Silt:	48.1	Effective consolidation stress:	20.0 psi
% Clay:	30.5	Shear modulus:	554.42 psi

Axial displacement (Dh)	Axial force (F)	Pore pressure (u)	Axial strain (eps)	Deviator stress	Total vertical stress	Effective vertical stress	Effective horizontal stress	Shear stress, q=q'	Effective spherical stress, p'	Total spherical stress, p	Effective Principal Stress Ratio
in	pound	psi	%	psi	psi	psi	psi	psi	psi	psi	psi
0.00	0.000	0.00	0.00	0.0	20.0	20.0	20.00	0.00	20.00	20.00	1.00
0.01	27.865	2.41	0.10	4.6	24.6	22.2	17.59	2.32	19.91	22.32	1.26
0.01	39.947	4.04	0.20	6.6	26.6	22.6	15.96	3.32	19.28	23.32	1.42
0.02	47.125	5.19	0.30	7.8	27.8	22.6	14.81	3.91	18.73	23.91	1.53
0.02	52.355	6.02	0.40	8.7	28.7	22.7	13.98	4.34	18.33	24.34	1.62
0.03	56.180	6.68	0.50	9.3	29.3	22.6	13.32	4.66	17.98	24.66	1.70
0.03	59.335	7.22	0.60	9.8	29.8	22.6	12.78	4.91	17.69	24.91	1.77
0.04	62.043	7.70	0.70	10.3	30.3	22.6	12.30	5.13	17.43	25.13	1.83
0.04	64.279	8.08	0.80	10.6	30.6	22.5	11.92	5.31	17.23	25.31	1.89
0.05	66.371	8.42	0.90	11.0	31.0	22.5	11.58	5.48	17.06	25.48	1.95
0.06	68.343	8.70	1.00	11.3	31.3	22.6	11.30	5.64	16.93	25.64	2.00
0.08	76.590	9.56	1.50	12.6	32.6	23.0	10.44	6.29	16.73	26.29	2.20
0.11	83.223	10.15	2.00	13.6	33.6	23.4	9.85	6.80	16.65	26.80	2.38
0.14	87.185	10.44	2.50	14.2	34.2	23.7	9.56	7.08	16.64	27.08	2.48
0.17	91.163	10.54	3.00	14.7	34.7	24.2	9.46	7.37	16.82	27.37	2.56
0.20	94.672	10.55	3.50	15.2	35.2	24.7	9.45	7.61	17.06	27.61	2.61
0.22	98.308	10.54	4.00	15.7	35.7	25.2	9.46	7.86	17.33	27.86	2.66
0.25	100.616	10.53	4.50	16.0	36.0	25.5	9.47	8.01	17.47	28.01	2.69
0.28	103.593	10.46	5.00	16.4	36.4	25.9	9.54	8.20	17.74	28.20	2.72
0.31	106.695	10.38	5.50	16.8	36.8	26.4	9.62	8.40	18.02	28.40	2.75
0.33	108.078	10.30	6.00	16.9	36.9	26.6	9.70	8.46	18.17	28.46	2.74
0.36	109.794	10.20	6.50	17.1	37.1	26.9	9.80	8.55	18.35	28.55	2.75
0.39	111.815	10.10	7.00	17.3	37.3	27.2	9.90	8.66	18.57	28.66	2.75
0.42	113.620	10.00	7.50	17.5	37.5	27.5	10.00	8.76	18.76	28.76	2.75
0.45	115.300	9.86	8.00	17.7	37.7	27.8	10.14	8.84	18.98	28.84	2.74
0.47	116.907	9.75	8.50	17.8	37.8	28.1	10.25	8.91	19.16	28.91	2.74
0.50	119.099	9.65	9.00	18.1	38.1	28.4	10.35	9.03	19.38	29.03	2.74
0.53	120.059	9.57	9.50	18.1	38.1	28.5	10.43	9.05	19.49	29.05	2.74
0.56	121.123	9.42	10.00	18.2	38.2	28.7	10.58	9.08	19.66	29.08	2.72
0.61	123.174	9.25	11.00	18.3	38.3	29.0	10.75	9.13	19.89	29.13	2.70
0.67	124.986	9.20	12.00	18.3	38.3	29.1	10.80	9.16	19.96	29.16	2.70
0.73	127.297	9.09	13.00	18.5	38.5	29.4	10.91	9.23	20.14	29.23	2.69
0.78	128.889	8.95	14.00	18.5	38.5	29.5	11.05	9.23	20.29	29.23	2.67
0.84	129.935	8.90	15.00	18.4	38.4	29.5	11.10	9.20	20.31	29.20	2.66

Notes:

$p=S1+S3/2$ $q=S1-S3/2$

$p'=S1'+S3'/2$ $q'=S1'-S3'/2$

Wet Method Saturation

Prepared by: Jerry Date: 10/20/14

Checked by: [illegible] Date: 10/20/14

AASHTO R18

Wang Engineering

1145 North Main Street
Lombard, Illinois 60148
Phone (630) 953-9928
www.wangeng.com

CONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

AASHTO T 297 / ASTM D 4767

Project: Circle Interchange Reconstruction
Client: AECOM
Soil Sample ID: Boring 30-RWB-03, ST#4, 28.5' to 30'
Sample description: Gray SILTY CLAY (CL)

Tested by: Wang Engineering, Inc.
Prepared by: M. Snider
Test date: October 17, 2014
WEI Job No.: 1100-04-01

Initial sample height:	5.55 in	Tare mass:	250.10 g
Initial sample diameter:	2.84 in	Measured sample mass w/out Tare:	1241.80 g
Initial sample mass:	1241.80 g	Tare and final sample mass:	1454.10 g
Soil specific gravity:	2.75 (estimated)	Tare and dry sample mass:	1277.40 g
Dry sample mass:	1027.30 g		
Final sample mass:	1204.00 g	Saturation (B) coefficient:	99%
Initial water content:	20.88% (specimen)	Rate of loading:	1.0E-02 %/min
Initial unit weight:	134.81 pcf	Volume change during consolidation:	2.02 in^3
Initial dry unit weight:	111.53 pcf	Void ratio after consolidation:	0.450
Initial void ratio:	0.539	Dry unit weight after consolidation:	118.34 pcf
Initial saturation:	106.6%	Height after consolidation:	5.44 in
Final water content:	17.20% (specimen)	Volume after consolidation:	33.07 in^3
Liquid Limit, %:	34	Area after consolidation:	6.08 in^2
Plastic Limit, %:	17	Time at 50% Consolidation:	134.46 min
% Sand:	16.3		
% Silt:	48.1	Effective consolidation stress:	40.0 psi
% Clay:	30.5	Shear modulus:	1123.92 psi

Axial displacement (Dh)	Axial force (F)	Pore pressure (u)	Axial strain (eps)	Deviator stress	Total vertical stress	Effective vertical stress	Effective horizontal stress	Shear stress, q=q'	Effective spherical stress, p'	Total spherical stress, p	Effective Principal Stress Ratio
in	pound	psi	%	psi	psi	psi	psi	psi	psi	psi	psi
0.00	0.000	0.00	0.00	0.0	40.0	40.0	40.00	0.00	40.00	40.00	1.00
0.01	51.882	3.69	0.10	8.5	48.5	44.8	36.31	4.26	40.57	44.26	1.23
0.01	82.417	7.35	0.20	13.5	53.5	46.2	32.65	6.77	39.41	46.77	1.41
0.02	98.057	9.81	0.30	16.1	56.1	46.3	30.19	8.04	38.23	48.04	1.53
0.02	108.560	11.66	0.40	17.8	57.8	46.1	28.34	8.89	37.23	48.89	1.63
0.03	116.589	13.17	0.50	19.1	59.1	45.9	26.83	9.54	36.38	49.54	1.71
0.03	122.916	14.40	0.60	20.1	60.1	45.7	25.60	10.05	35.65	50.05	1.79
0.04	128.382	15.45	0.70	21.0	61.0	45.5	24.55	10.49	35.03	50.49	1.85
0.04	132.763	16.34	0.80	21.7	61.7	45.3	23.66	10.83	34.50	50.83	1.92
0.05	136.494	17.13	0.90	22.3	62.3	45.1	22.87	11.13	34.00	51.13	1.97
0.06	139.315	17.81	1.00	22.7	62.7	44.9	22.19	11.35	33.53	51.35	2.02
0.08	149.668	20.18	1.50	24.3	64.3	44.1	19.82	12.13	31.95	52.13	2.22
0.11	158.081	21.59	2.00	25.5	65.5	43.9	18.41	12.74	31.15	52.74	2.38
0.14	164.429	22.40	2.50	26.4	66.4	44.0	17.60	13.19	30.79	53.19	2.50
0.17	170.712	22.89	3.00	27.2	67.2	44.4	17.11	13.62	30.73	53.62	2.59
0.19	173.876	23.13	3.50	27.6	67.6	44.5	16.87	13.80	30.67	53.80	2.64
0.22	180.271	23.29	4.00	28.5	68.5	45.2	16.71	14.24	30.95	54.24	2.70
0.25	184.170	23.37	4.50	28.9	68.9	45.6	16.63	14.47	31.10	54.47	2.74
0.28	185.727	23.36	5.00	29.0	69.0	45.7	16.64	14.51	31.16	54.51	2.74
0.31	189.456	23.31	5.50	29.5	69.5	46.1	16.69	14.73	31.42	54.73	2.76
0.33	190.888	23.29	6.00	29.5	69.5	46.2	16.71	14.76	31.47	54.76	2.77
0.36	194.829	23.21	6.50	30.0	70.0	46.8	16.79	14.99	31.78	54.99	2.78
0.39	195.711	23.10	7.00	29.9	69.9	46.8	16.90	14.97	31.87	54.97	2.77
0.42	199.881	23.00	7.50	30.4	70.4	47.4	17.00	15.21	32.21	55.21	2.79
0.44	202.321	22.85	8.00	30.6	70.6	47.8	17.15	15.31	32.46	55.31	2.79
0.47	202.734	22.66	8.50	30.5	70.5	47.9	17.34	15.26	32.60	55.26	2.76
0.50	205.242	22.63	9.00	30.7	70.7	48.1	17.37	15.36	32.73	55.36	2.77
0.53	206.156	22.45	9.50	30.7	70.7	48.2	17.55	15.35	32.90	55.35	2.75
0.55	208.356	22.47	10.00	30.9	70.9	48.4	17.53	15.43	32.96	55.43	2.76
0.61	212.113	22.32	11.00	31.1	71.1	48.7	17.68	15.53	33.21	55.53	2.76
0.67	214.243	22.10	12.00	31.0	71.0	48.9	17.90	15.51	33.41	55.51	2.73
0.72	215.481	22.00	13.00	30.8	70.8	48.8	18.00	15.42	33.42	55.42	2.71
0.74	215.974	21.98	13.30	30.8	70.8	48.8	18.02	15.40	33.42	55.40	2.71
0.75	217.803	22.00	13.60	31.0	71.0	49.0	18.00	15.48	33.48	55.48	2.72

Notes:
$p=S1+S3/2$ $q=S1-S3/2$
$p'=S1'+S3'/2$ $q'=S1'-S3'/2$
Wet Method Saturation

Prepared by: Jay Date: 10/20/14
Checked by: AL Date: 10/20/14

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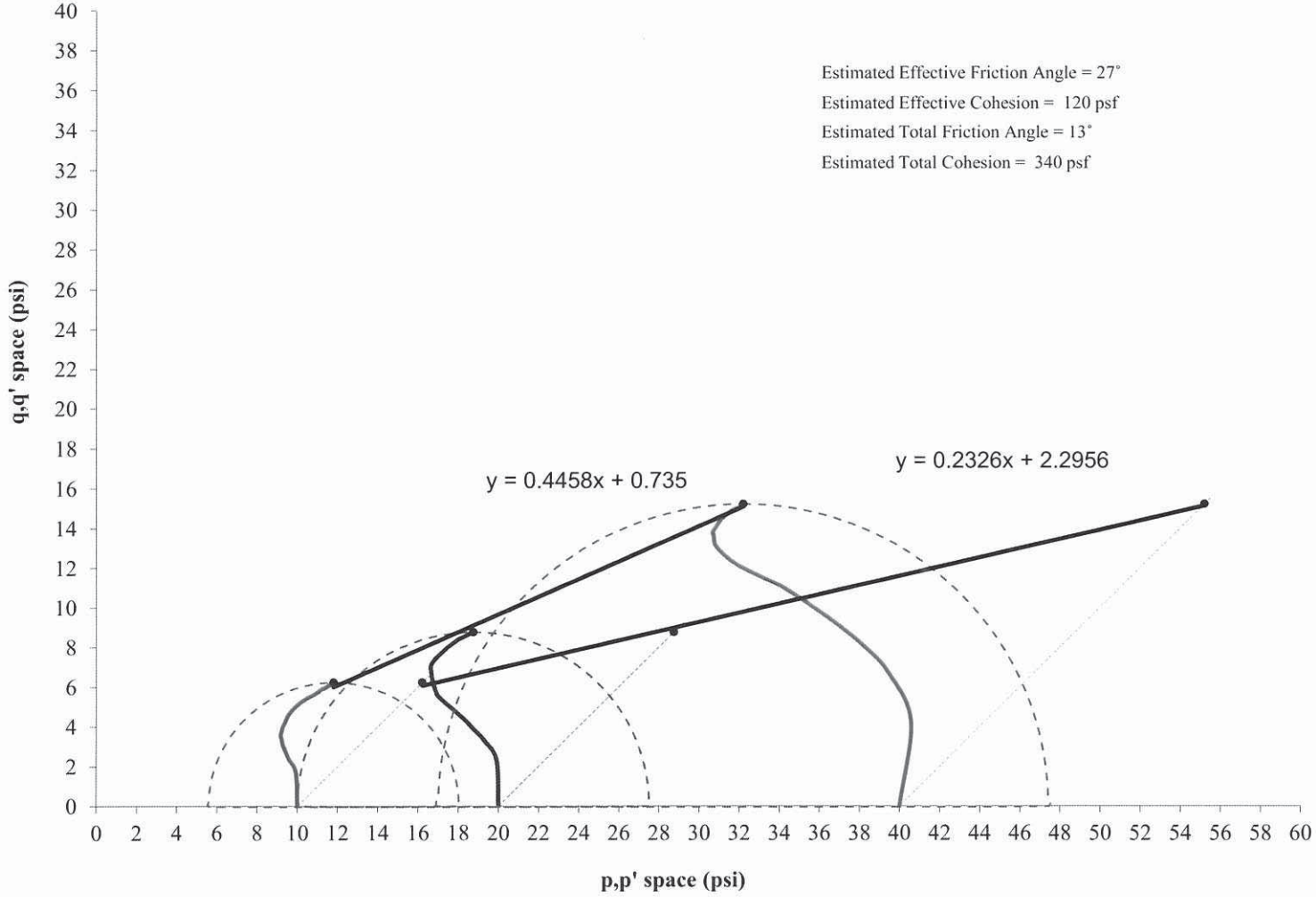
Triaxial Compression Total and Effective Stress Paths at Failure (p-q Space)
Max Effective Stress Ratio, Sample 30RWB-03, ST#4, 28.5' to 30'



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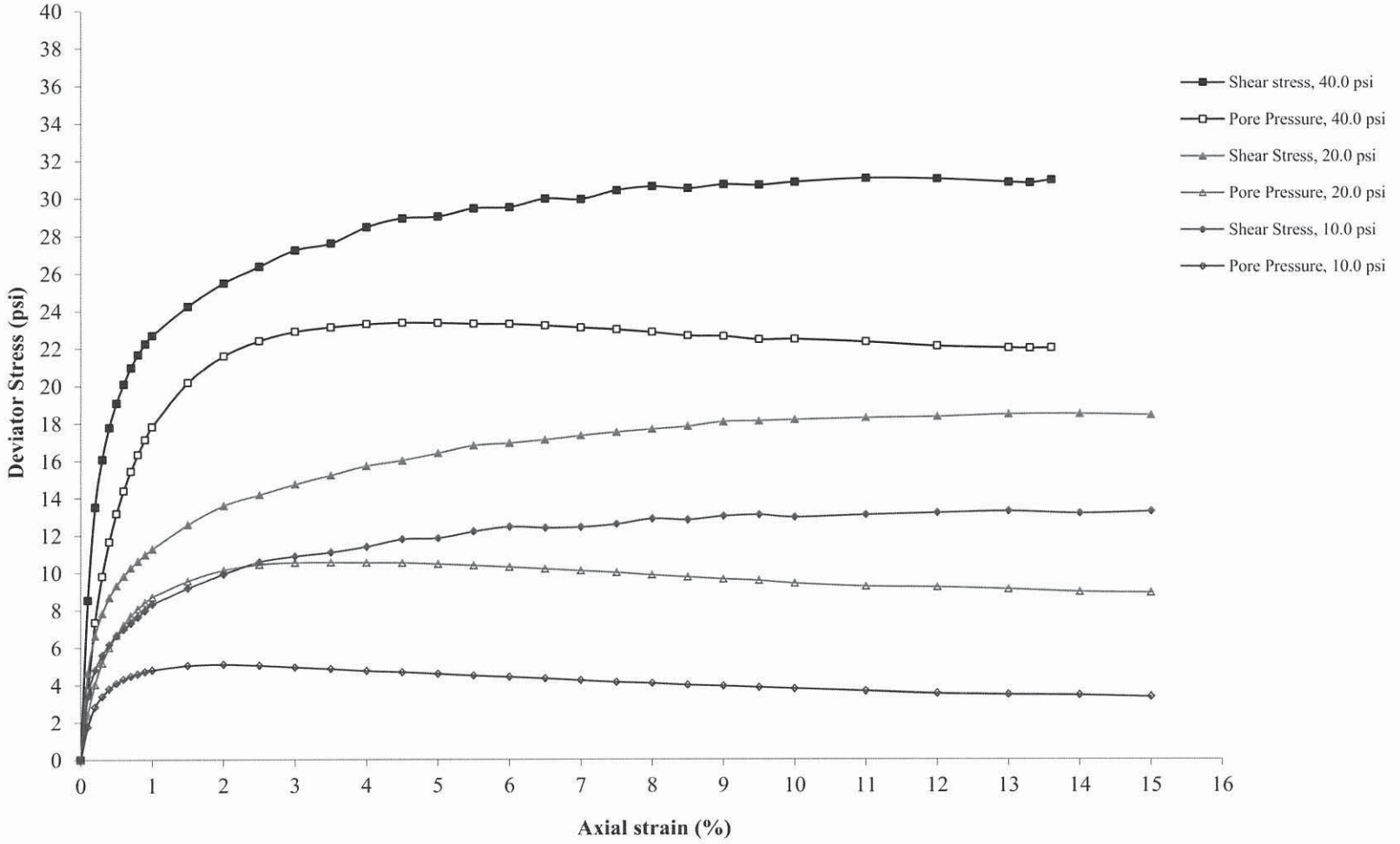
Sample 30-RWB-03, ST#4, 28.5' to 30': Stress v. Strain and Pore Pressure v. Strain Curves
All Confining Pressures



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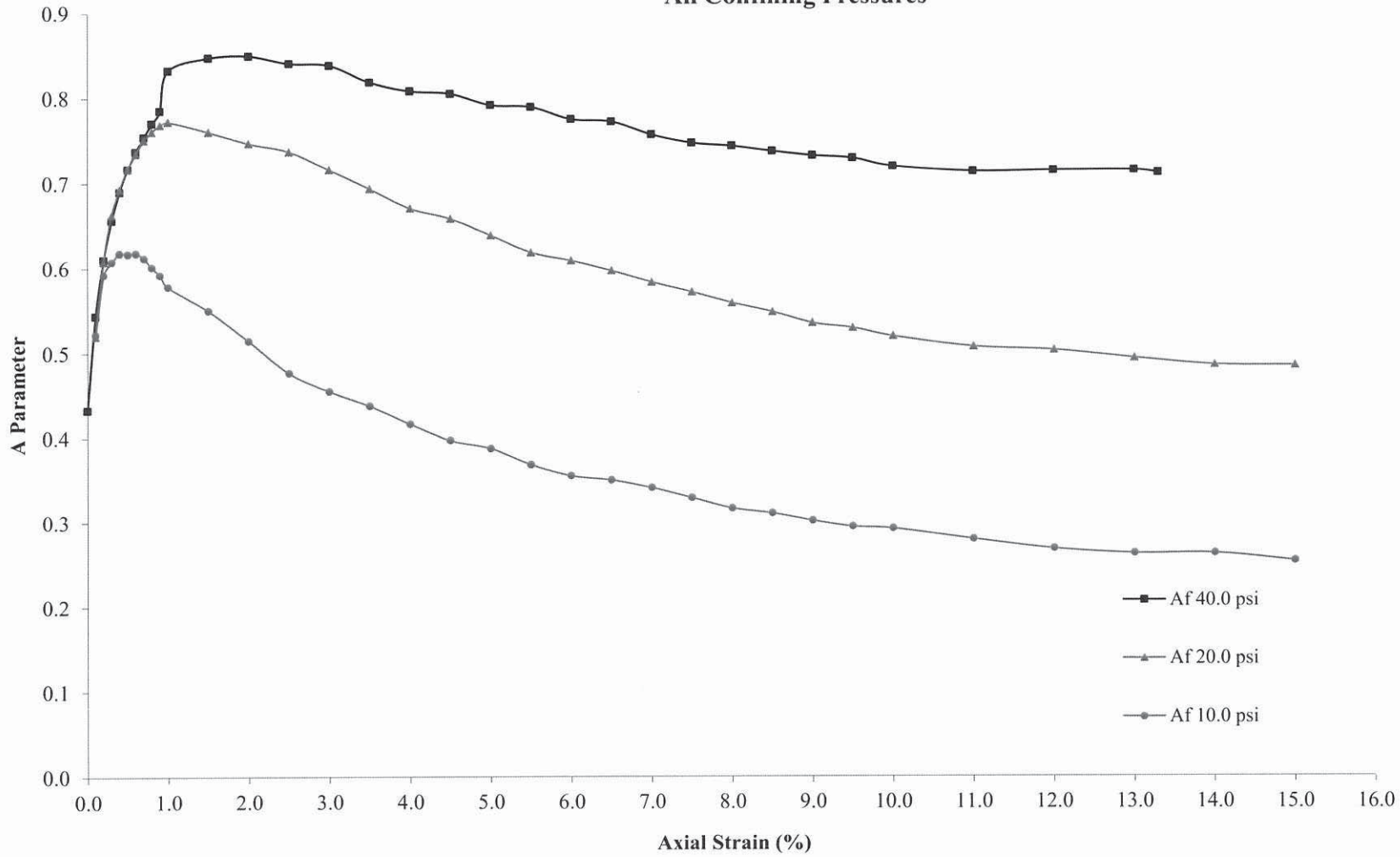
Sample 30-RWB-03, ST#4, 28.5' to 30': A-Parameter During Shearing
All Confining Pressures



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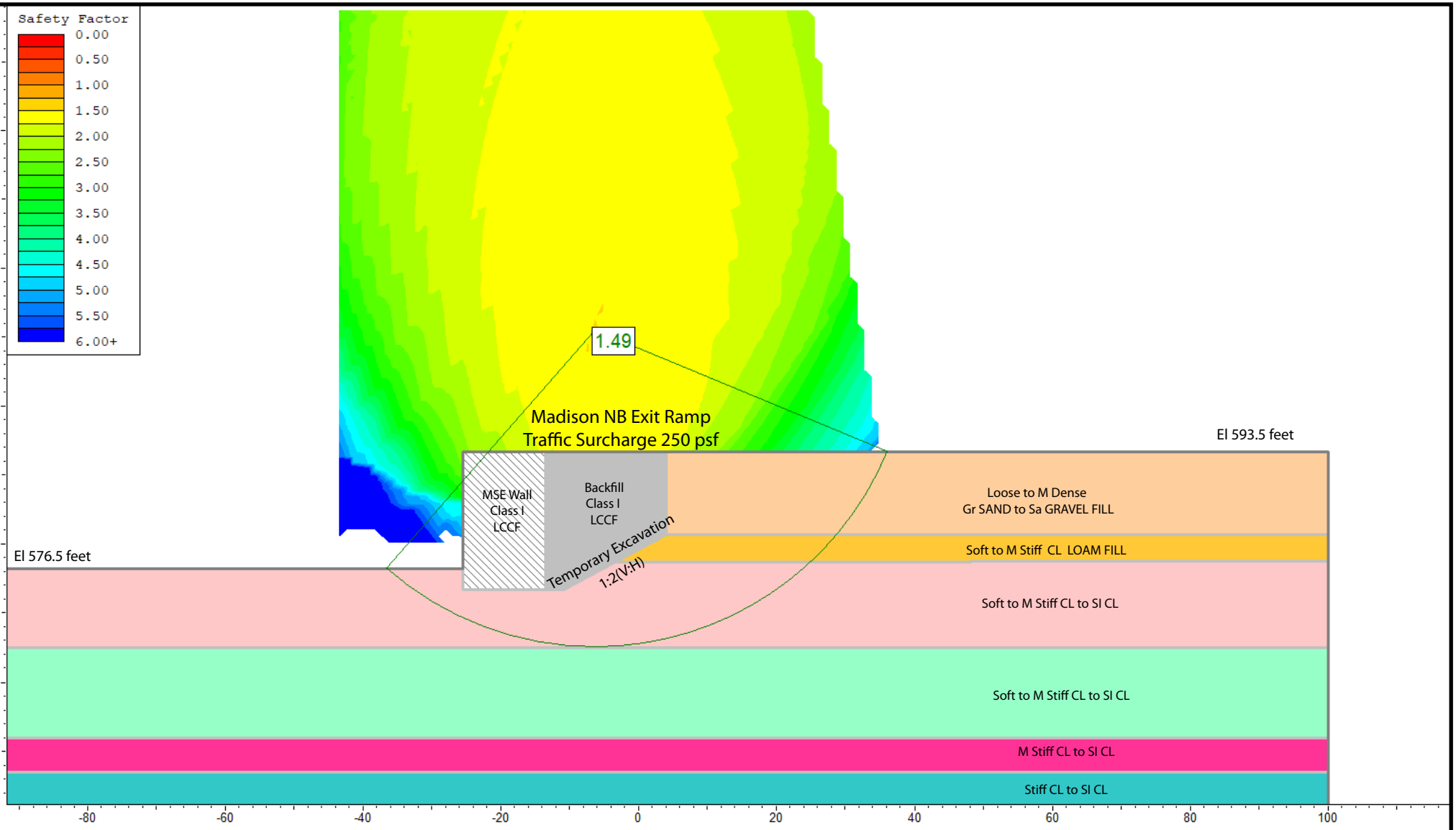
APPENDIX C



Undrained Analysis for MSE Wall at Station 8548+75, Ref Borings 31-RWB-03 and VST-03

Layer ID	Description	Unit Weight (pcf)	Undrained Cohesion (psf)	Undrained Friction Angle (degrees)
1	Loose to M Dense Gr SAND to SA GRAVEL FILL	125	0	30
2	Soft to M Stiff CL LOAM FILL	120	1200	0
3	Soft to M Stiff CL to SI CL	110	480	0
4	Soft to M Stiff CL to SI CL	110	590	0
5	M Stiff CL to SI CL	115	850	0
6	Stiff CL to SI CL	120	1300	0

GLOBAL STABILITY ANALYSIS: CIRCLE INTERCHANGE RECONSTRUCTION, RETAINING WALL 31, SN 016-1820, CHICAGO, IL

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

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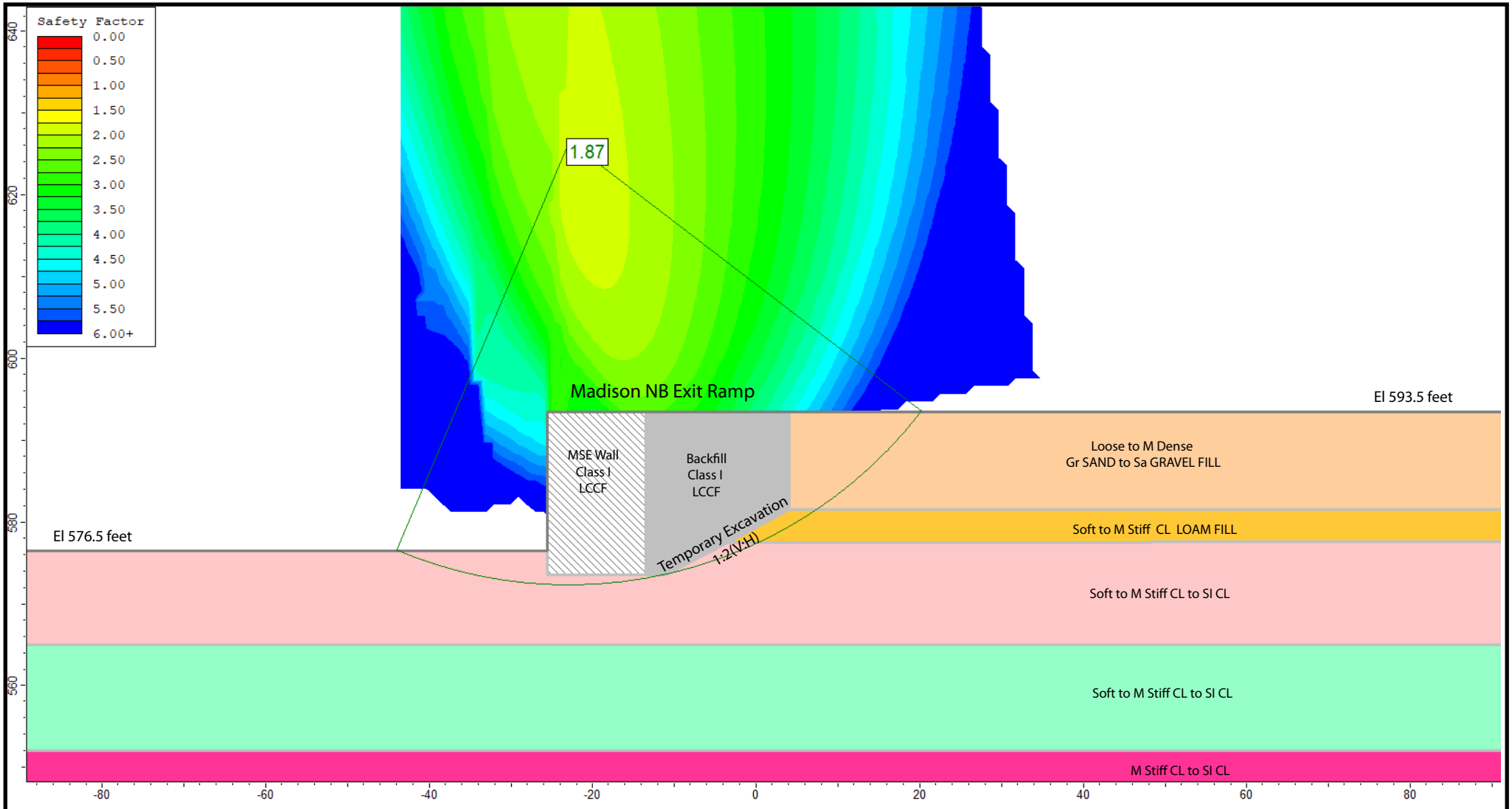

Drained Analysis for MSE Wall at Station 8548+75, Ref Borings 31-RWB-03 and VST-03

Layer ID	Description	Unit Weight (pcf)	Drained Cohesion (psf)	Drained Friction Angle (degrees)
1	Loose to M Dense Gr SAND to SA GRAVEL FILL	125	0	30
2	Soft to M Stiff CL LOAM FILL	120	100	30
3	Soft to M Stiff CL to SI CL	110	0	28
4	Soft to M Stiff CL to SI CL	110	0	28
5	M Stiff CL to SI CL	115	0	28
6	Stiff CL to SI CL	120	100	30

GLOBAL STABILITY ANALYSIS: CIRCLE INTERCHANGE RECONSTRUCTION, RETAINING WALL 31, SN 016-1820, CHICAGO, IL

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

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APPENDIX D

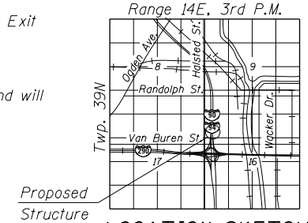
Bench Mark: Set "X" on northwest corner of handhole along east edge of SB I-90/94 20 feet north of Madison Street. Elev. 596.13.

Existing Structure: Existing Retaining Wall 23. Constructed in 1957 under F.A.I. Route 90/94, Section 0202.6-1P. Cast-in-place concrete retaining wall on metal shell piles and spread footing that measures 178'-10⅛" from Madison Street SE Wingwall south to Monroe Street. Maximum height from top of wall to bottom of footing measures 18'-1". The existing retaining wall is to be removed and replaced.

Traffic on Madison NB Exit Ramp will be detoured during construction.

No Salvage.

Notes:
1.) Wall offsets are measured from the ℄ of Madison NB Exit Ramp to the front face of the precast panels.
2.) F.F. denotes Front Face.
3.) B.F. denotes Back Face.
4.) Proposed drainage information shown is conceptual and will be determined during final design.



LOCATION SKETCH

CURVE DATA
(Madison NB Exit Ramp)

Prop. Curve P-MAD-NX-3
P.I. Sta. = 8547+10.96
Δ = 7° 10′ 23" (LT)
D = 2° 29′ 48"
R = 2,295.00′
T = 143.85′
L = 287.32′
E = 4.50′
e = NA
T.R. = NA
S.E. Run = NA
P.C. Sta. = 8545+67.11
P.T. Sta. = 8548+54.43

CURVE DATA
(NB C-D Road)

Prop. Curve P-NCD-NX-7
P.I. Sta. = 6351+11.87
Δ = 3° 51′ 44" (LT)
D = 2° 30′ 07"
R = 2,290.00′
T = 77.21′
L = 154.36′
E = 1.30′
e = NA
T.R. = NA
S.E. Run = NA
P.C. Sta. = 6350+34.66
P.T. Sta. = 6351+89.02

HIGHWAY CLASSIFICATION

Madison NB Exit Ramp
Functional Class: Interstate
ADT: 5,200 (2012); 6,000 (2040)
ADTT: 94 (2012); 108 (2040)
DHV: 540 (2040)
Design Speed: 20 m.p.h.
Posted Speed: 20 m.p.h.
One-Way Traffic
Directional Distribution: 100%

NB C-D Road
Functional Class: Interstate
ADT: NA (2012); 17,000 (2040)
ADTT: NA (2012); 440 (2040)
DHV: 1,680 (2040)
Design Speed: 30 m.p.h.
Posted Speed: 30 m.p.h.
One-Way Traffic
Directional Distribution: 100%

DESIGN SPECIFICATIONS

2017 AASHTO LRFD Bridge Design Specifications 8th Edition

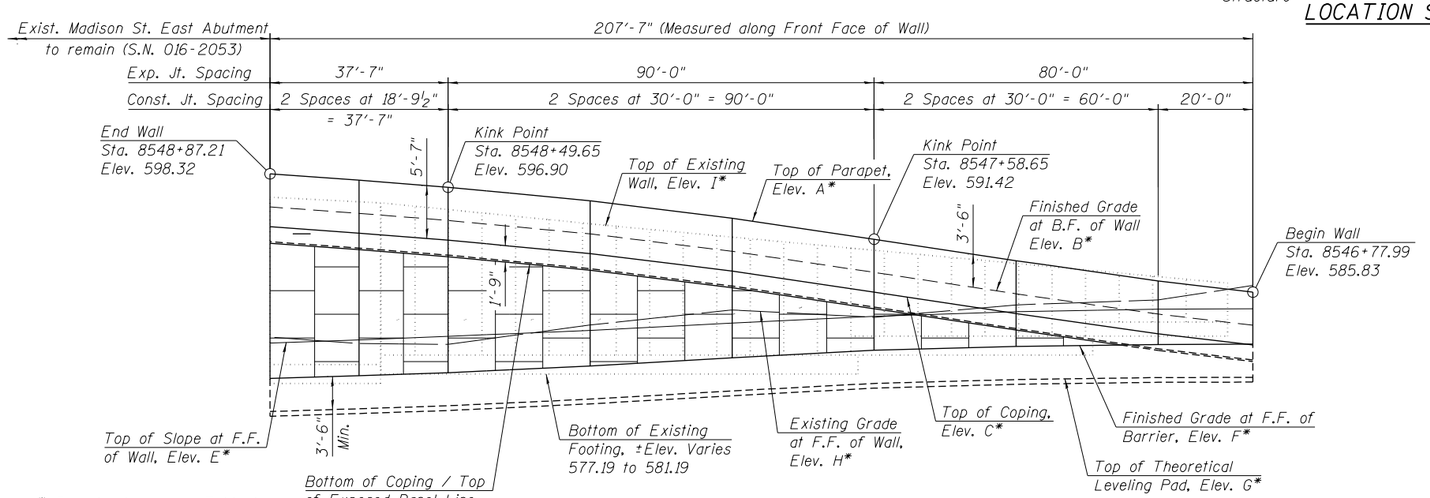
DESIGN STRESSES

FIELD UNITS

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

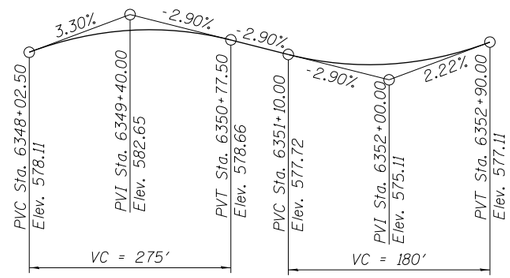
PRECAST UNITS

f'c = 4,500 psi

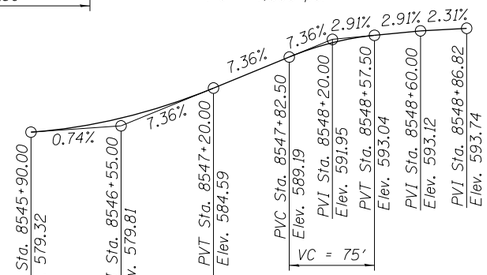


* For elevations, see Table 1 on Sheet 2 of 2.

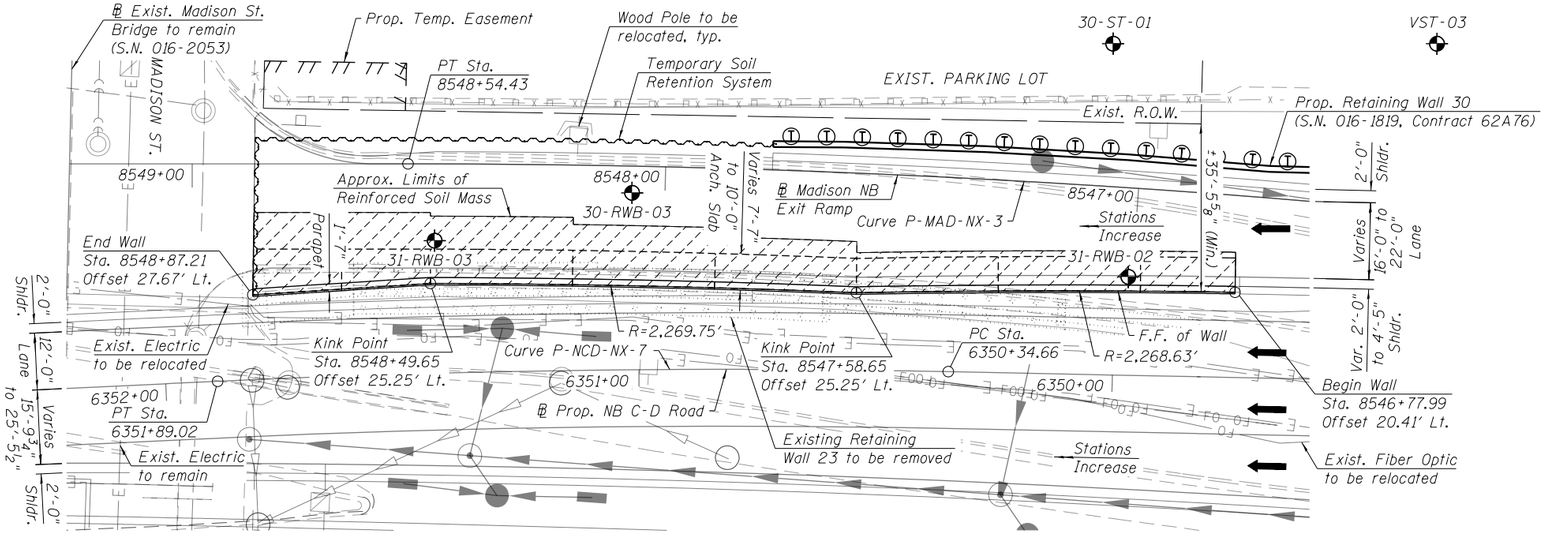
ELEVATION
(Looking East at F.F. of Wall, Proposed Concrete Barrier not shown for clarity)



PROFILE GRADE
(℄ NB C-D Road)



PROFILE GRADE
(℄ Madison NB Exit Ramp)



PLAN

LEGEND:

Combined Sewer		Soil Boring	
Electric	E	Existing Catch Basin	
Ex. Storm Sewer		Proposed Catch Basin	
Prop. Storm Sewer		Existing Manhole	
Ex. Water	W	Proposed Manhole	
Ex. Fiber Optic	FO	Proposed Inlet	
Limits of Soil Reinforcement			

GENERAL PLAN
RETAINING WALL 31 ALONG MADISON NB EXIT RAMP
F.A.I. RTE. 90/94 (KENNEDY EXPRESSWAY)
SECTION 2015-019R
COOK COUNTY
STATION 8546+77.99 TO STATION 8548+87.21
STRUCTURE NO. 016-1820

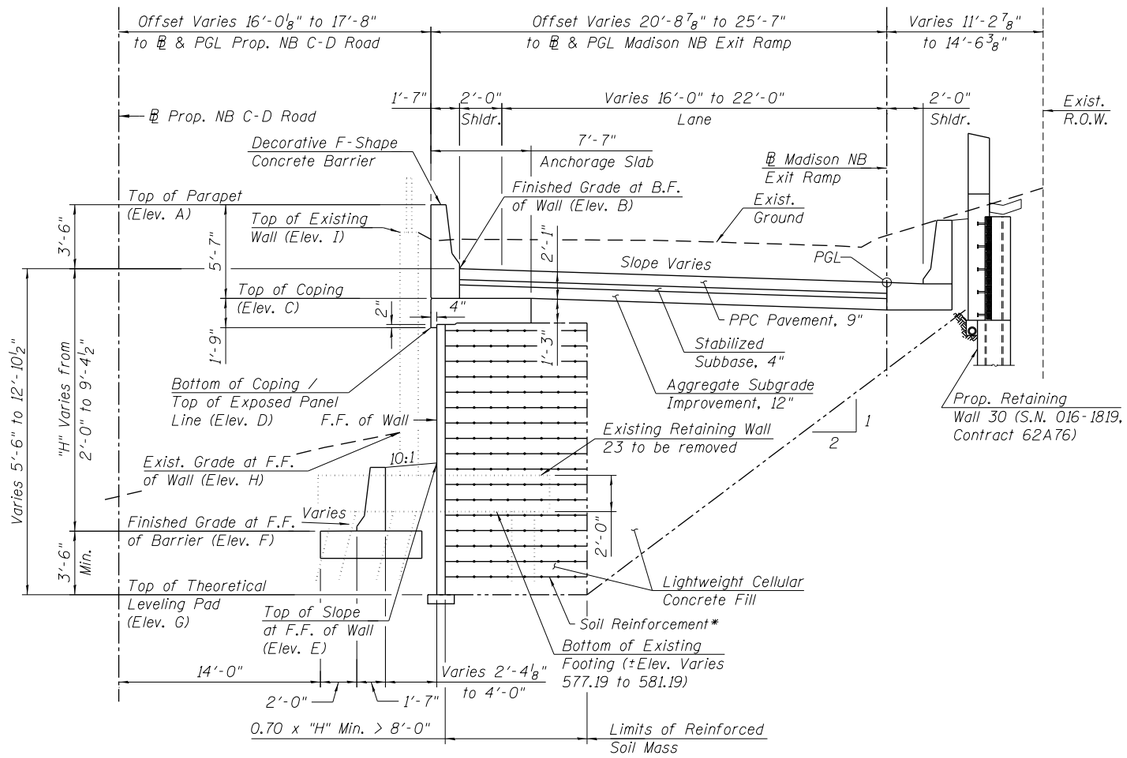
TranSystems

USER NAME = wjcollett1	DESIGNED - JNP	REVISED -	
	CHECKED - WJC/MDS	REVISED -	
PLOT SCALE = 32.0000 ' / in.	DRAWN - JNP	REVISED -	
PLOT DATE = 5/10/2019	CHECKED - WJC/MDS	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

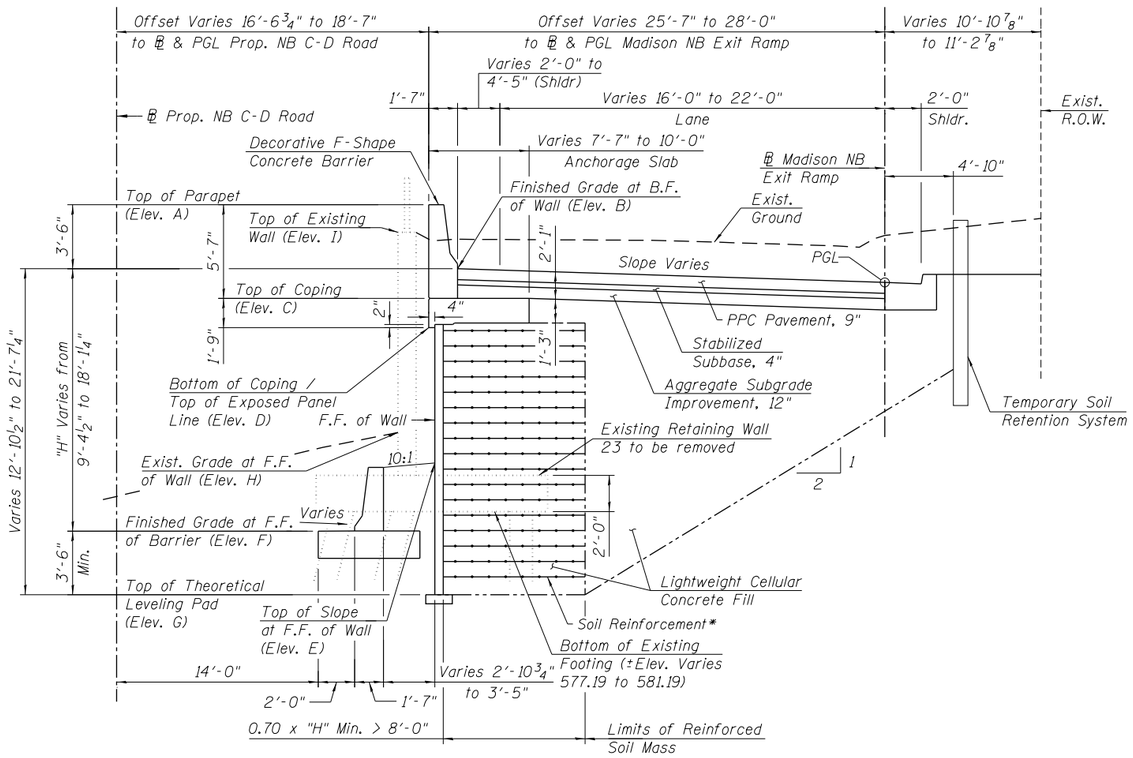
SHEET NO. 1 OF 2 SHEETS

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
90/94	2015-019R	COOK	2	1
		CONTRACT NO. 62A76		
		ILLINOIS FED. AID PROJECT		



CROSS SECTION

(Looking Upstation, Sta. 8546+77.99 to Sta. 8547+77.43)



CROSS SECTION

(Looking Upstation, Sta. 8547+77.43 to Sta. 8548+87.21)

* The M.S.E. 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.

TABLE 1 - WALL ELEVATIONS

Station	Offset	Elevation A	Elevation B	Elevation C	Elevation D	Elevation E	Elevation F	Elevation G	Elevation H	Elevation I
8546+77.99	20.41' Lt.	585.83	582.33	580.25	578.50	584.07	580.33	576.83	586.53	-
8546+98.14	21.62' Lt.	587.01	583.51	581.43	579.68	584.03	580.30	576.80	585.00	585.73
8547+28.38	23.43' Lt.	589.15	585.65	583.57	581.82	583.76	580.10	576.60	584.48	586.44
8547+58.65	25.25' Lt.	591.42	587.92	585.83	584.08	583.27	579.69	576.19	583.17	590.33
8547+88.98	25.25' Lt.	593.64	590.14	588.05	586.30	582.56	578.89	575.39	583.95	591.67
8548+19.32	25.25' Lt.	595.48	591.98	589.90	588.15	581.78	578.03	574.53	582.36	592.73
8548+49.65	25.25' Lt.	596.90	593.40	591.32	589.57	581.17	577.33	573.83	580.31	593.72
8548+68.45	26.46' Lt.	597.65	594.15	592.06	590.31	580.79	577.01	573.51	580.40	594.16
8548+87.21	27.67' Lt.	598.32	594.82	592.74	590.99	580.45	576.72	573.22	581.08	594.69

Elevation A - Top of Parapet
Elevation B - Finished Grade at B.F. of Wall
Elevation C - Top of Coping
Elevation D - Bottom of Coping / Top of Exposed Panel Line
Elevation E - Top of Slope at F.F. of Wall
Elevation F - Finished Grade at F.F. of Barrier
Elevation G - Top of Theoretical Leveling Pad
Elevation H - Existing Grade at F.F. of Wall
Elevation I - Top of Existing Wall

LEGEND:

B.F. - denotes Back Face.
F.F. - denotes Front Face.

CROSS SECTION AND DETAILS
RETAINING WALL 31 ALONG MADISON NB EXIT RAMP
F.A.I. RTE. 90/94 (KENNEDY EXPRESSWAY)
SECTION 2015-019R
COOK COUNTY
STATION 8546+77.99 TO STATION 8548+87.21
STRUCTURE NO. 016-1820

TranSystems

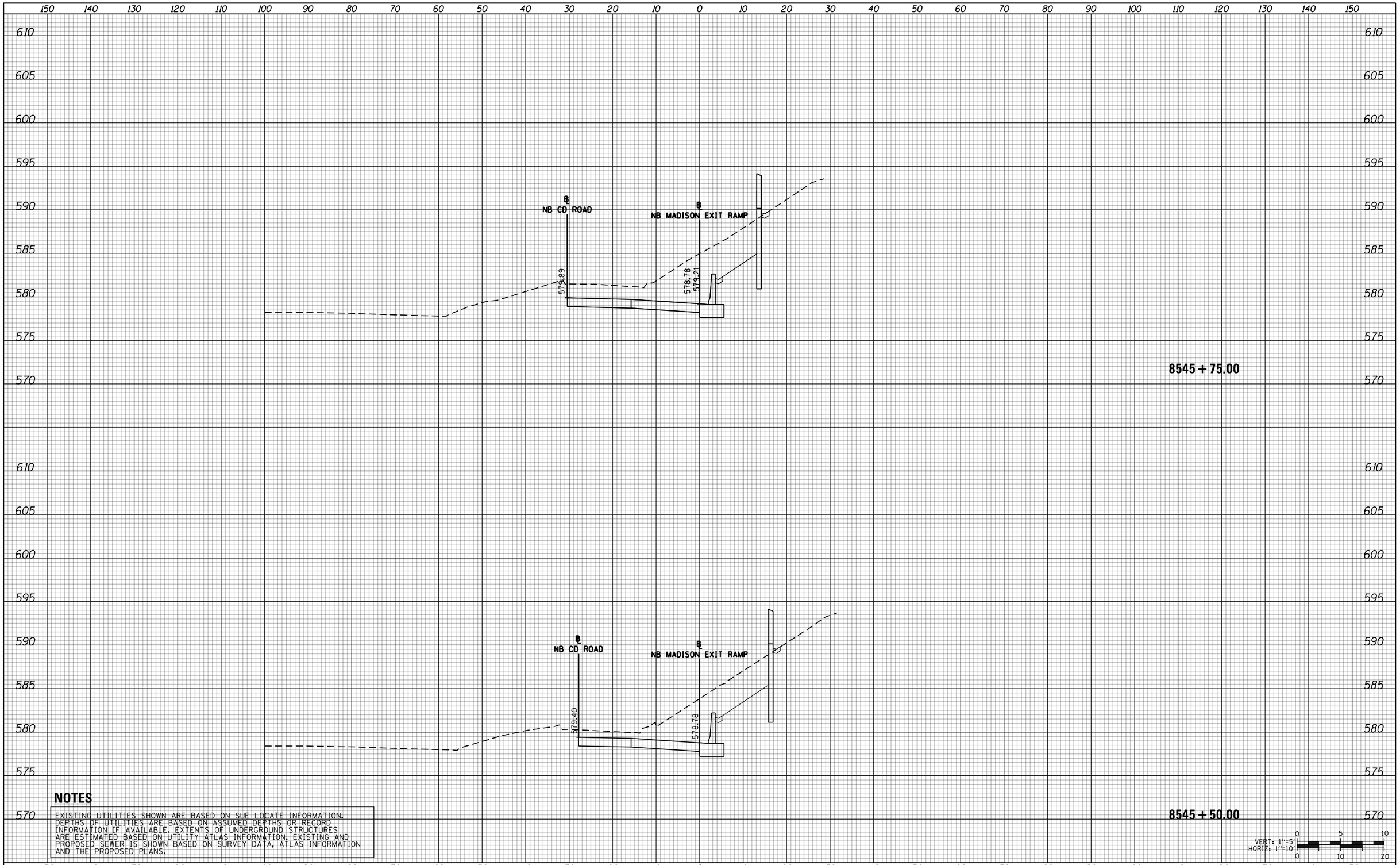
USER NAME = wjcolletti	DESIGNED - JNP	REVISED -	
	CHECKED - WJC/MDS	REVISED -	
PLOT SCALE = 0.17 '/ in.	DRAWN - JNP	REVISED -	
PLOT DATE = 5/10/2019	CHECKED - WJC/MDS	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

SHEET NO. 2 OF 2 SHEETS

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
90/94	2015-019R	COOK	2	2
		CONTRACT NO. 62A76		
		ILLINOIS FED. AID PROJECT		

APPENDIX E



DATE	BY	
		SURVEYED
		PLOTTED
		TEMPLATE
		AREAS
		AREAS CHECKED

FINAL SURVEY
NOTE BOOK
NO.

DATE	BY	
		SURVEYED
		PLOTTED
		TEMPLATE
		AREAS
		AREAS CHECKED

ORIGINAL SURVEY
NOTE BOOK
NO.

NOTES

EXISTING UTILITIES SHOWN ARE BASED ON SUE LOCATE INFORMATION. DEPTHS OF UTILITIES ARE BASED ON ASSUMED DEPTHS OR RECORD INFORMATION IF AVAILABLE. EXTENTS OF UNDERGROUND STRUCTURES ARE ESTIMATED BASED ON UTILITY ATLAS INFORMATION. EXISTING AND PROPOSED SEWER IS SHOWN BASED ON SURVEY DATA, ATLAS INFORMATION AND THE PROPOSED PLANS.

TranSystems

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PLOT DATE = 5/1/2019	DATE - $DATE	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

CROSS SECTIONS
RETAINING WALL NO. 31

SCALE: 10:H 5:V | SHEET OF SHEETS | STA. TO STA.

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
90/94/290	2015-D18R	COOK	$TOT	1
		CONTRACT NO. 62A76		
		ILLINOIS	FED. AID PROJECT	

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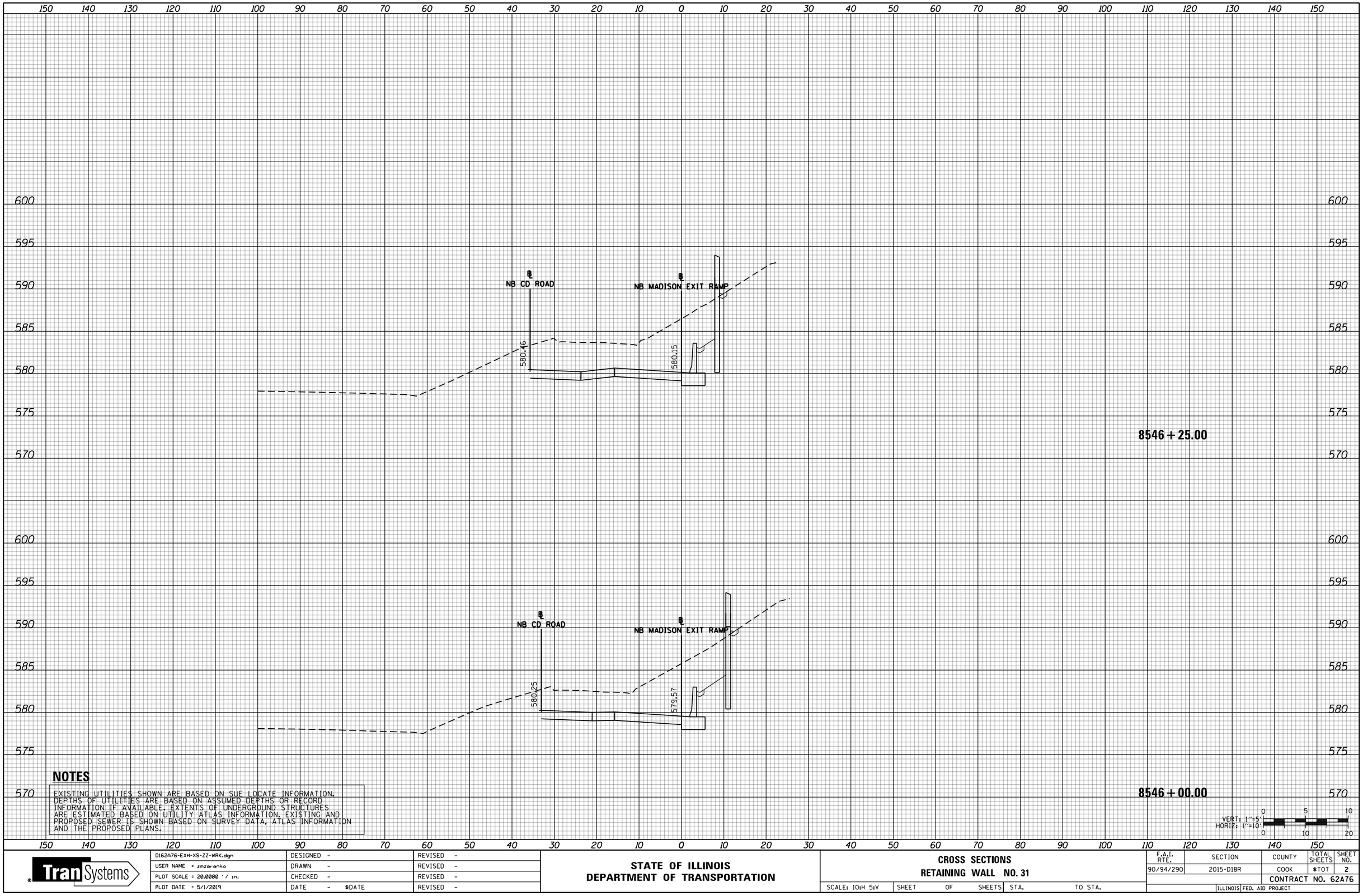
AREAS		
AREAS CHECKED		



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PLOT DATE = 5/1/2019	DATE - $DATE	REVISED -

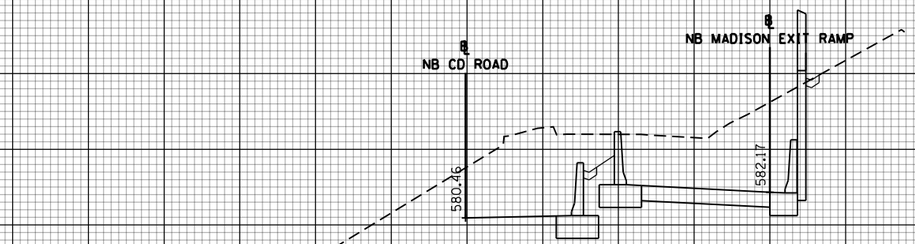
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

CROSS SECTIONS
RETAINING WALL NO. 31

SCALE: 10:H 5:V | SHEET OF SHEETS | STA. TO STA.

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
90/94/290	2015-D18R	COOK	$TOT	2
		CONTRACT NO. 62A76		
		ILLINOIS	FED. AID PROJECT	

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



8546 + 75.00

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

8546 + 50.00

VERT: 1"=5'
HORIZ: 1"=10'

NOTES

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TranSystems

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PLOT DATE = 5/1/2019	DATE - $DATE	REVISED -

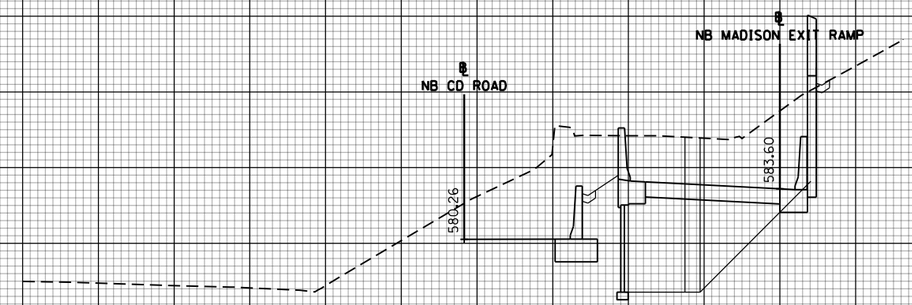
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

CROSS SECTIONS
RETAINING WALL NO. 31

SCALE: 10:H 5:V | SHEET OF SHEETS | STA. | TO STA.

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
90/94/290	2015-D18R	COOK	$TOT	3
		CONTRACT NO. 62A76		
		ILLINOIS FED. AID PROJECT		

8547+25.00



8547+00.00

VERT: 1"=5'
HORIZ: 1"=10'

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

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

TranSystems

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PLOT DATE = 5/1/2019	DATE - $DATE	REVISED -

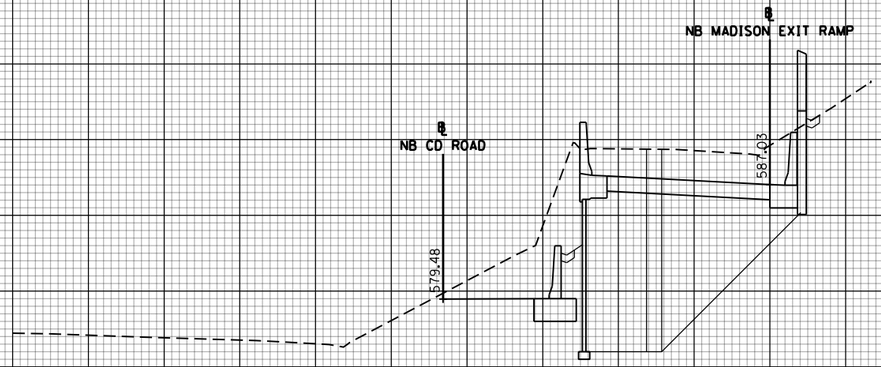
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

CROSS SECTIONS
RETAINING WALL NO. 31

SCALE: 10:H 5:V | SHEET OF SHEETS | STA. TO STA.

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
90/94/290	2015-D18R	COOK	$TOT	4
		CONTRACT NO. 62A76		
		ILLINOIS	FED. AID PROJECT	

8547 + 75.00



8547 + 50.00

VERT: 1"=5'
HORIZ: 1"=10'

NOTES

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

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

TranSystems

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STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

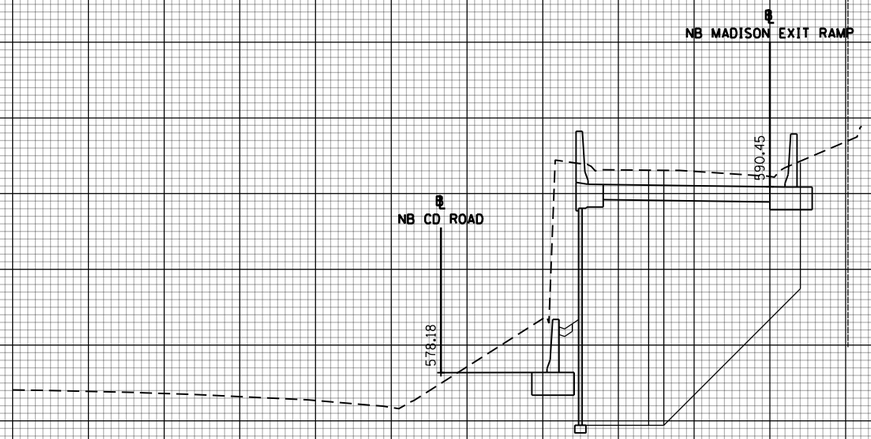
CROSS SECTIONS
RETAINING WALL NO. 31

SCALE: 10:H 5:V | SHEET OF SHEETS | STA. TO STA.

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
90/94/290	2015-D18R	COOK	$TOT	5
		CONTRACT NO. 62A76		
		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		



8548 + 00.00

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VERT: 1"=5'
HORIZ: 1"=10'

TranSystems

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PLOT DATE = 5/1/2019	DATE - $DATE	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

CROSS SECTIONS
RETAINING WALL NO. 31

SCALE: 10:H 5:V | SHEET OF SHEETS | STA. TO STA.

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
90/94/290	2015-D18R	COOK	$TOT	6
			CONTRACT NO. 62A76	
		ILLINOIS	FED. AID PROJECT	

FINAL SURVEY	SURVEYED	BY	DATE
NOTE BOOK	PLOTTED		
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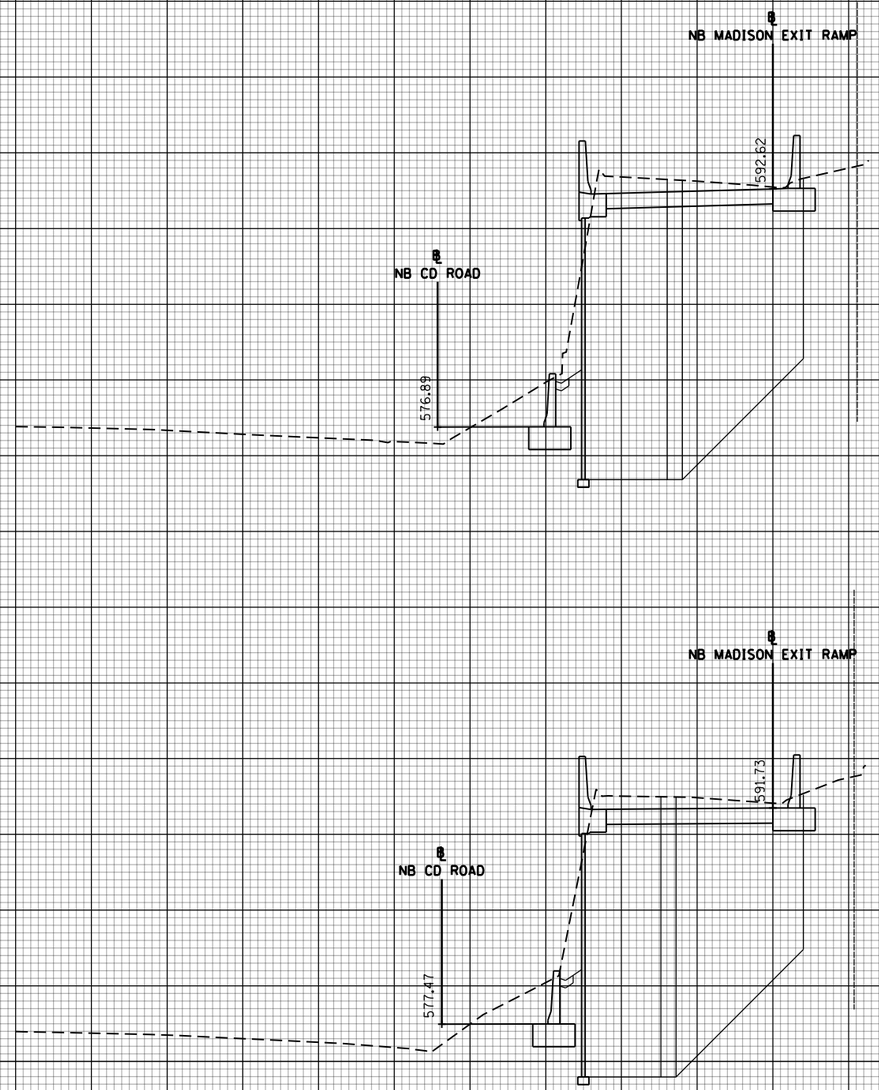

8548 + 50.00

8548 + 25.00

VERT: 1"=5'
HORIZ: 1"=10'

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ORIGINAL SURVEY	SURVEYED	BY	DATE
NOTE BOOK	PLOTTED		
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TranSystems

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STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

CROSS SECTIONS
RETAINING WALL NO. 31

SCALE: 10:H 5:V | SHEET OF SHEETS | STA. | TO STA.

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
90/94/290	2015-D18R	COOK	$TOT	7
		CONTRACT NO. 62A76		
		ILLINOIS FED. AID PROJECT		

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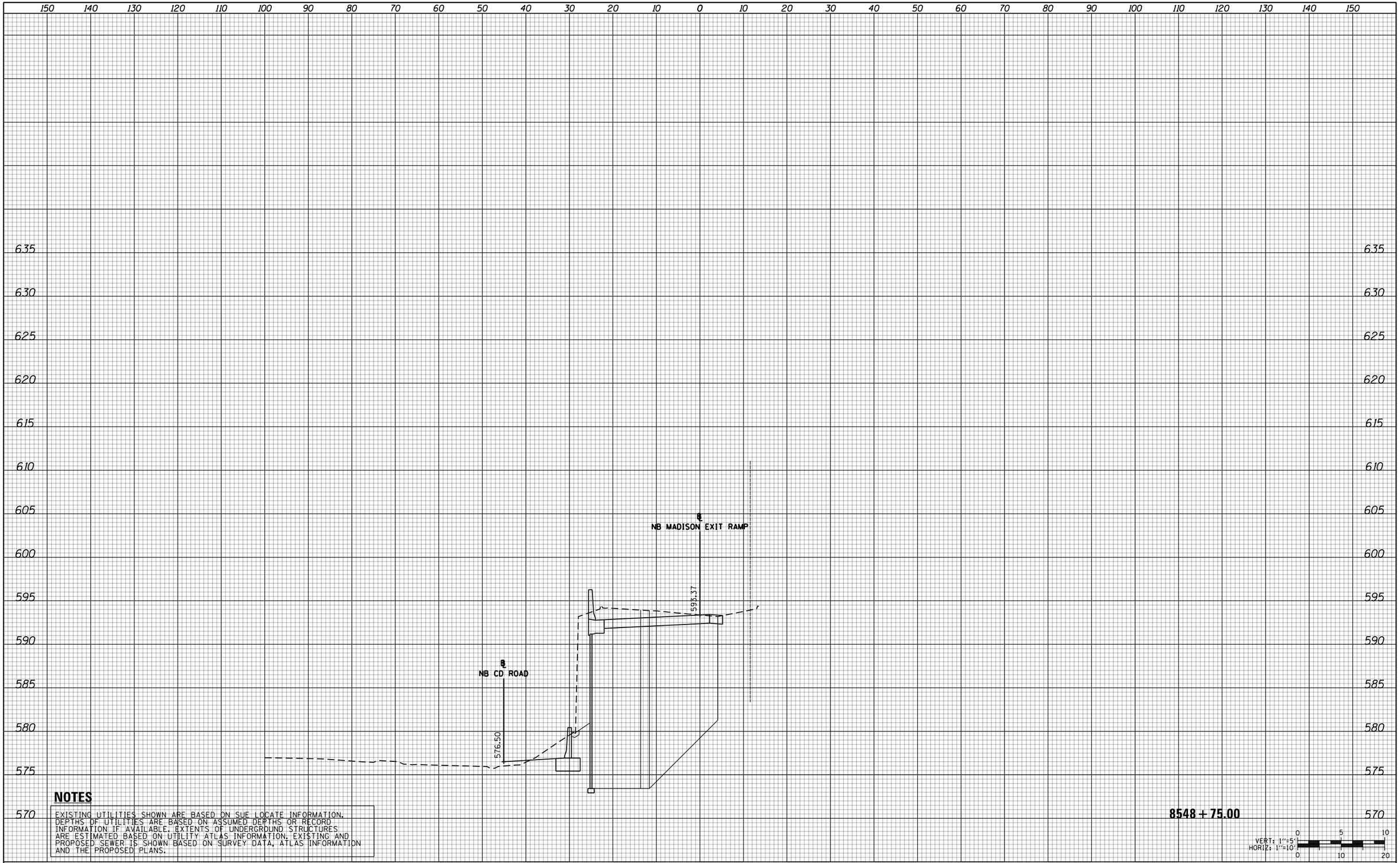
	AREAS
	AREAS CHECKED



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PLOT DATE = 5/1/2019	DATE - $DATE	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

CROSS SECTIONS
RETAINING WALL NO. 31

SCALE: 10:H 5:V | SHEET OF SHEETS | STA. | TO STA.

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
90/94/290	2015-D18R	COOK	$TOT	8
		CONTRACT NO. 62A76		
	ILLINOIS FED. AID PROJECT			