STRUCTURE GEOTECHNICAL REPORT
CIRCLE INTERCHANGE RECONSTRUCTION
RETAINING WALL 37 (PROPOSED SN 016-1826)
JACKSON EXIT RAMP
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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Technical Report Documentation Page

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11. Abstract

To facilitate the widening and reconstruction of Circle Interchange, Retaining Wall 37 will be constructed along Jackson Exit Ramp between Adams Street Bridge west abutment to Jackson Street. The proposed 330-foot long Retaining Wall 37 will be constructed as a combination of 180-foot long, 18.7 feet maximum retained height new drilled shaft wall and 150-foot long, 10.7 feet maximum retained height drilled soldier pile and lagging wall. The wall height gradually decreasing from Adams Street to Jackson Street. This report provides geotechnical recommendations for the design and construction of the proposed retaining wall.

Beneath the pavement or topsoil, the subsurface soils consists of up to 10 feet of fill materials, up to 7 feet medium stiff to very stiff clay crust, up to 43 feet of very soft to medium stiff silty clay, 35 feet of stiff to hard clay loam, and very dense silt to silty loam and sand extending to the boring termination depths or weathered bedrock. Sound bedrock was encountered at an elevation of about 484 feet. Groundwater was encountered within the fill layers at elevations of 580 to 588 feet. Under pressure water-bearing layers are expected at deeper levels.

For the drilled shaft and drilled soldier pile and lagging walls, geotechnical parameters for design are presented in this report. The global stability factor of safety for the wall at the minimum recommended embedment elevation of 541 feet is 1.6 and 3.6 for undrained and drained conditions, respectively.

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1.0 INTRODUCTION

This report presents the results of our subsurface investigation, laboratory testing, geotechnical engineering evaluations and recommendations for a new retaining wall, designated as SN 016-1826 (Retaining Wall 37) proposed along the Jackson Exit Ramp 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 Wang Engineering, Inc. (Wang) investigation was to characterize the site soil and groundwater conditions, perform geotechnical engineering analyses, and provide recommendations for the design and construction of the new wall structure.

1.1 Project Description

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

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

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

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

1.2 Proposed Structure

Retaining wall 37 (SN 016-1826) is proposed along the Jackson Exit Ramp. Based on the Type, Size, and Location (TSL) plan dated November 29, 2017 provided by TranSystems Corporation, the 330-foot wall is proposed to be a combination of drilled shaft and drilled soldier pile walls. The 180-foot drilled shaft and lagging wall begins at Station 8282+72.47 at the Adams Street Bridge west abutment and ends at Station 8284+52.28. The 150-foot drilled soldier pile wall starts at the end of drilled shaft wall at Station 8284+52.28 ends at Station 8286+02.19. The drilled shaft and drilled soldier pile walls will have maximum retained heights of 18.69 and 10.68 feet, respectively. There will be 5.4 and 4.0-foot high concrete parapets on top of the drilled shaft and drilled soldier pile walls, respectively. The TSL plan is included in the Appendix D.

1.3 Existing Structure

There is an existing CIP cantilever wall, designated as Wall 16 with fence supported on pile foundations. The existing CIP wall alignment follows the proposed wall on the west side and crosses at an approximate Station 8284+60 then follows the proposed wall on the east side. Based on the TSL plan, the existing CIP wall will be removed.

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 581 feet at the south end to 591 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 475 to 500 feet elevation or 75 to 100 feet below ground surface (bgs) or more. The Silurian dolostone dips gently

eastward at a pace of 15 feet per mile. Only inactive faults are known in the area, and the seismic risk is minimal (Leetaru et al. 2004; Willman 1971). There are no records of mining activity in the area, but deep tunnel excavations are known to exist.

Our subsurface investigation results fit into the local geologic context. The borings drilled in the project area revealed the native sediments consist of clay to silty clay diamicton of the Wadsworth Formation resting on top of more competent silty clay loam diamicton (hardpan) of the Lemont Formation, which in turn is underlain by bedrock. Sound dolostone bedrock was sampled at a depth of 94 feet bgs, corresponding to 483.9 feet elevation, within the range predicted based on published geological data.

3.0 METHODS OF INVESTIGATION

The following sections outline the subsurface and laboratory investigations. All elevations in this report are based on NAVD 1988.

3.1 Subsurface Investigation

Wang drilled two structure borings, designated as 37-RWB-01 and 37-RWB-02 in July to August, 2014. Wang has also referenced five nearby structure borings, designated as 08-RWB-01 through 08-RWB-03, 0589-B-01, 1702-B-01, and 08-ST-01 drilled in June to November, 2014. 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).

We also considered the Piezometer 30-PZ-01 located about 800 feet northeast of Wall 37. The piezometer was installed in accordance with ASTM D5092, "*Standard Practice for Design and Installation of Groundwater Monitoring Wells in Aquifers*."

A truck-mounted drilling rig equipped with hollow stem augers, was used to advance and maintain an open borehole to 10 to 15 feet depths after that mud rotary was used to the boring termination depth. Soil sampling was performed according to AASHTO T 206, "*Penetration Test and Split Barrel Sampling of Soils*." The soil was sampled at 2.5-foot intervals to 30 feet bgs and at 5-foot intervals to boring termination depths. Soil samples collected from each sampling interval were placed in sealed

jars and transported to Wang Geotechnical Laboratory in Lombard, Illinois for further examination and laboratory testing.

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

Groundwater observations were made during drilling to depths of 10 to 15 feet before using rotary wash method. Due to safety considerations, boreholes were backfilled with grout immediately upon completion. Groundwater levels in the piezometer were recorded autonomously at defined intervals by digital pressure loggers suspended within the water column. Barometric affects are compensated by a second in-air pressure logger installed in the riser pipe. Data is retrieved from loggers periodically, downloaded to a computer for analysis.

3.2 Vane Shear Tests

Wang performed vane shear tests in Borings VST-02 and 0589-B-01. Vane shear tests are performed using calibrated RocTest vane shear equipment. Tests were performed in undisturbed and remolded conditions. The sensitivity shown on the boring logs is the ratio of shear strength in undisturbed and remolded conditions. In general, the vane shear strength 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 in our 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. Shelby tube samples from Boring 08-ST-01 were tested for unconfined compressive strength (T208), triaxial unconsolidated undrained compression (T296), and one-dimensional consolidation (T216). Field visual descriptions of the soil samples were verified in the laboratory. Laboratory test results are

shown in the *Boring Logs* (Appendix A), in the *Soil Profile* (Exhibit 4), and in the *Laboratory Test Results* (Appendix B).

4.0 RESULTS OF FIELD AND LABORATORY INVESTIGATIONS

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

4.1 Soil Conditions

Borings drilled on the roadway encountered 3 to 6 inches of asphalt and/or 8 to 12 inches of concrete followed by sand to gravelly sand base course. Borings drilled on the grassy area encountered 4 inches of silty clay loam topsoil. In descending order, the general lithologic succession encountered beneath the pavement structure or topsoil includes: 1) man-made ground (fill); 2) medium stiff to very stiff silty clay to silty clay loam; 3) very soft to medium stiff clay to silty clay; 4) stiff to hard silty clay to silty clay loam; 5) medium dense to very dense silt to silty loam and sand; and 6) weathered to sound dolostone.

1) Man-made ground (fill)

Underneath the topsoil or pavement structure, the borings encountered 3 to 10 feet of fill materials. Granular fill consists of loose to dense, black to gray sand to gravelly sand. Cohesive fill includes stiff to very stiff, brown and gray silty clay loam. The granular fill layer has N-values of 6 to 34 blows per foot and moisture content values of 3 to 14%. The cohesive fill layer has unconfined compressive strength (Q_u) values ranging from 1.3 to 2.5 tsf and moisture content values of 14 to 23%.

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

Beneath the fill, at elevations of 576 to 588 feet, the borings encountered 3 to 7 feet of medium stiff to very stiff, brown to gray silty clay to silty clay loam. This layer has Q_u values ranging from 0.6 to 2.5 tsf and moisture content values between 14 and 27%. This layer is commonly known as the “crust.”

3) Very soft to medium stiff clay to silty clay

At elevations of 569 to 582 feet (8 to 13 feet bgs), the borings revealed up to 43 feet of very soft to medium stiff, gray clay to silty clay with Rimac Qu values of 0.16 to 0.74 tsf and moisture content values of 16 to 30%. Laboratory index testing on samples from this layer showed liquid limit (L_L) values of 28 to 36% and plastic limit (P_L) values of 14 to 18%. Laboratory triaxial unconsolidated undrained test on samples from this layer showed undrained cohesion values ranging from 432 to 1008 psf. This layer is commonly known as the "*Chicago Blue Clay*."

As discussed in Section 3.2, undrained shear strength values from vane shear tests are generally higher than Rimac tests. In-situ undisturbed vane shear strengths obtained in Borings VST-02 and 0589-B-01 between elevations 575 and 542 feet varied from 430 to 1750 psf.

4) Stiff to hard silty clay to silty clay loam

At elevations of 541 to 552 feet (47 to 52 feet bgs), the borings encountered up to 35 feet of medium stiff to hard silty clay to silty clay loam. The silty clay to silty clay loam has Q_u values of 1.0 to 6.9 tsf and moisture content values of 13 to 30%. The borings encountered 3 to 5 feet of medium dense silt to silty loam layers with N values of 18 to 21 blows per foot.

(5) Medium dense to very dense silt to silty loam and sand

At elevations of 517 to 518 feet (49 to 59 feet bgs) the borings encountered medium dense to very dense silty loam and sand. This layer has N values of 18 to over 50 blows per foot.

(6) Weathered to sound bedrock

At an elevation of 504 feet (90 feet bgs) Boring 0589-B-01 revealed about 3 feet of weathered bedrock. Based on the nearby Boring 0589-B-02, strong bedrock was encountered at an elevation of 483.9 feet or 94 feet bgs.

4.2 Groundwater Conditions

Groundwater was observed during drilling at an elevation of 580 feet (8 bgs) within the granular fill layer. The groundwater was not observed during drilling or after drilling in borings due to the mud rotary drilling from 10 to 15 feet bgs.

Piezometer 30-PZ-01 was installed 800 feet northeast of Retaining Wall 37 within the granular soils (**layer 5**) with the top and bottom of piezometer screen elevations at 503.7 and 493.7 feet (89.5 to 99.5

feet bgs), respectively. The groundwater levels monitored in the piezometer showed groundwater elevations ranging from 544.1 to 547.4 feet, with an average hydrostatic elevation within aquifer at 546 feet. The first and last readings were taken on November 21, 2014 and March 30, 2017.

The design and construction of the wall should consider the perched groundwater between 580 and 588 feet elevations within the fill layers. The design and construction of the drilled shaft and drilled soldier pile walls should consider the granular soils (**layer 5**) as water bearing and under hydrostatic pressure.

4.3 Seismic Design Considerations

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

5.0 ANALYSIS AND RECOMMENDATIONS

5.1 Retaining Wall Type Evaluation

Based on the TSL plan, the proposed Retaining Wall 37 is a cut wall along the Jackson Exit Ramp. The proposed 330-foot long Retaining Wall 37 will be constructed in a combination of 180-foot long, 18.7 feet maximum retained height new drilled shaft and lagging wall and 150-foot long, 10.7 feet maximum retained height drilled soldier pile and lagging wall.

The following sections present the results of our geotechnical engineering analyses and recommendations for the drilled shaft and drilled soldier pile walls design and construction.

5.2 Drilled Shaft and Drilled Soldier Pile Walls

We recommend drilled shafts and drilled soldier piles should be designed for both lateral earth pressure and lateral deformation. The embedment depth in moment equilibrium for the wall section should be designed in accordance with the LRFD guidelines (AASHTO 2014). Generally, overconsolidated clayey soils, such as the stiff to very stiff clays and very dense silty loam will exhibit lower overall shear strength in the long-term condition; normally-consolidated clayey soils, however, such as the very soft to medium stiff clay to silty clay (Chicago blue clay) will likely exhibit significantly lower shear strength in the short-term condition. Therefore, the lateral earth pressure analysis should be performed for walls in both the short-term (undrained) and long-term (drained) condition using the soil parameters shown in Tables 1 and 2.

The undrained shear strength properties of the soft to medium stiff silty clay are taken from the vane shear test results shown in Borings VST-02 and 0589-B-01 and the earth pressure coefficients for the layers assumed horizontal slopes behind and in front of the walls. In addition, the results of unconfined compressive test results and undrained shear strength (cohesion) results from triaxial UU tests from Shelby tube boring 08-ST-01were also considered in the development of soil parameters. The drained soft to medium stiff silty clay friction angle parameters have been taken from the consolidated-undrained (CU) triaxial tests performed on this layer from the Circle Interchange project.

The design of the wall should ignore 3 feet of soil in front of the wall measured from the finished ground surface elevation in providing passive pressure due to excavation required for installation of concrete facing, drainage system and frost-heave condition. In developing the design lateral pressure, the lateral pressure due to construction equipment surcharge load should be added to the lateral earth pressure. Drainage behind the wall and underdrain should be as per 2012 IDOT *Bridge Manual* (IDOT 2012). The water pressure should be added to the earth pressure if drainage is not provided.

The potential pressure/load from the existing buildings and parking lots on the proposed wall must be considered in design of the wall. In addition, the design of soldier pile wall should also consider the existing abandoned fright tunnel crossing near Station 8284+70 and the existing ComEd Ductbank crossing near Station 8284+80 and should avoid soldier piles along the existing tunnel crossings.

Table 1: Short-term (Undrained) Geotechnical Parameters for Design of Drilled Shaft and Soldier Pile Walls (Reference Borings: 37-RWB-01, 37-RWB-02, VST-02, 08-ST-01, and 0589-B-01)

Soil Description (Layer)	Unit Weight, γ (pcf)	Undrained Shear Strength Properties		Earth Pressure Coefficients	
		Cohesion (psf)	Friction Angle (°)	Active Pressure	Passive Pressure
GRAVELLY SAND to SAND FILL Surface to EL 588 feet	120	0	30	0.31	3.00
Stiff to V Stiff SILTY CLAY EL 588 to 583 feet	120	1500	0	1.00	1.00
Soft to M Stiff CLAY to SILTY CLAY EL 583 to 580 feet	120	600	0	1.00	1.00
Soft to M Stiff CLAY to SILTY CLAY EL 580 to 566 feet	120	530	0	1.00	1.00
Soft to M Stiff CLAY to SILTY CLAY EL 566 to 553 feet	120	750	0	1.00	1.00
Soft to M Stiff CLAY to SILTY CLAY EL 553 to 545 feet	120	910	0	1.00	1.00
Stiff SILTY CLAY EL 545 to 541 feet	125	1300	0	1.00	1.00
V Stiff SILTY CLAY EL 541 to 537 feet	125	2100	0	1.00	1.00
M Dense to V Dense SILTY LOAM EL 537 to 525 feet	125	0	35	0.27	3.69
V Stiff SILTY CLAY EL 525 to 518 feet	125	2000	0	1.00	1.00
M Dense GRAVELLY SANDY LOAM to LOAM EL 518 to 513 feet	125	0	34	0.28	3.54
Dense SAND EL 513 to 504 feet	130	0	36	0.26	3.85

Soil Description (Layer)	Unit Weight, γ (pcf)	Undrained Shear Strength Properties		Earth Pressure Coefficients	
		Cohesion (psf)	Friction Angle (°)	Active Pressure	Passive Pressure
V Dense WEATHERED BEDROCK EL 504 to 501 feet	130	0	37	0.25	4.02

Table 2: Long-term (Drained) Geotechnical Parameters for Design of Drilled Shaft and Soldier Pile Walls (Reference Borings: 37-RWB-01, 37-RWB-02, VST-02, 08-ST-01, and 0589-B-01)

Soil Description (Layer)	Unit Weight, γ (pcf)	Drained Shear Strength Properties		Earth Pressure Coefficients	
		Cohesion (psf)	Friction Angle (°)	Active Pressure	Passive Pressure
GRAVELLY SAND to SAND FILL Surface to EL 588 feet	120	0	30	0.33	3.00
Stiff to V Stiff SILTY CLAY EL 588 to 583 feet	120	100	30	0.33	3.00
Soft to M Stiff CLAY to SILTY CLAY EL 583 to 580 feet	120	0	28	0.36	2.77
Soft to M Stiff CLAY to SILTY CLAY EL 580 to 566 feet	120	0	27	0.38	2.66
Soft to M Stiff CLAY to SILTY CLAY EL 566 to 553 feet	120	0	27	0.38	2.66
Soft to M Stiff CLAY to SILTY CLAY EL 553 to 545 feet	120	0	27	0.38	2.66
Stiff SILTY CLAY EL 545 to 541 feet	125	80	29	0.35	2.88
V Stiff SILTY CLAY EL 541 to 537 feet	125	100	30	0.33	3.00

Soil Description (Layer)	Unit Weight, γ (pcf)	Drained Shear Strength Properties		Earth Pressure Coefficients	
		Cohesion (psf)	Friction Angle (°)	Active Pressure	Passive Pressure
M Dense to V Dense SILTY LOAM EL 537 to 525 feet	125	0	35	0.27	3.69
V Stiff SILTY CLAY EL 525 to 518 feet	125	100	30	0.33	3.00
M Dense GRAVELLY SANDY LOAM to LOAM EL 518 to 513 feet	125	0	34	0.28	3.54
Dense SAND EL 513 to 504 feet	130	0	36	0.26	3.85
V Dense WEATHERED BEDROCK EL 504 to 501 feet	130	0	37	0.25	4.02

Design considerations should include deflection control at the top of the wall. The lateral deformation of the wall should be designed using the parameters shown in Table 3 using the p-y curve (COMP624) method.

Table 3: Recommended Parameters for Lateral Load Analysis of Drilled Shaft and Soldier Pile Walls (Reference Borings: 37-RWB-01, 37-RWB-02, VST-02, 08-ST-01, and 0589-B-01)

Soil Type (Layer)	Unit Weight, γ (pcf)	Undrained Shear Strength, c_u (psf)	Estimated Friction Angle, Φ (°)	Estimated Lateral Soil Modulus Parameter, k (pci)	Estimated Soil Strain Parameter, ε_{50} (%)
GRAVELLY SAND to SAND FILL Surface to EL 588 feet	120	0	30	30	--
Stiff to V Stiff SILTY CLAY EL 588 to 583 feet	120	1500	0	500	0.8
Soft to M Stiff CLAY to SILTY CLAY EL 583 to 580 feet	120	600	0	70	1.0

Soil Type (Layer)	Unit Weight, γ (pcf)	Undrained Shear Strength, c_u (psf)	Estimated Friction Angle, Φ (°)	Estimated Lateral Soil Modulus Parameter, k (pci)	Estimated Soil Strain Parameter, ε_{50} (%)
Soft to M Stiff CLAY to SILTY CLAY EL 580 to 566 feet	120	530	0	60	1.0
Soft to M Stiff CLAY to SILTY CLAY EL 566 to 553 feet	120	750	0	80	1.0
Soft to M Stiff CLAY to SILTY CLAY EL 553 to 545 feet	120	910	0	100	1.0
Stiff SILTY CLAY EL 545 to 541 feet	125	1300	0	500	0.4
V Stiff SILTY CLAY EL 541 to 537 feet	125	2100	0	1000	0.5
M Dense to V Dense SILTY LOAM EL 537 to 525 feet	125	0	35	100	--
V Stiff SILTY CLAY EL 525 to 518 feet	125	2000	0	1000	0.4
M Dense GRAVELLY SANDY LOAM to LOAM EL 518 to 513 feet	125	0	34	60	--
Dense SAND EL 513 to 504 feet	130	0	36	125	--
V Dense WEATHERED BEDROCK EL 504 to 501 feet	130	0	37	125	--

5.2.1 Settlement Analyses

Based on the *Cross-Section* drawings, to reach the design finished grade at backface of the drilled shaft and drilled soldier pile walls, we estimate that up to 7 feet of new fill will be required creating a surcharge load behind the wall. Our settlement analyses show the soil will undergo up to 0.5 inches of settlement which is generally acceptable for parking lot or landscaping areas.

The nearest existing building (765 W Adams Street) is 13.6 to 30 feet away from the proposed Wall 37. The surface settlement induced by installation of Wall 37 is discussed in Section 5.4.

5.2.2 Global Stability Analyses

The global stability of the retaining wall at Station 8282+72.47 was analyzed based on the soil profile described in Section 4.1 and the information provided in the TSL. Due to the presence of soft and medium stiff clay, the tip of the shaft should not terminate above an elevation of 541 feet. The minimum required FOS for both short (undrained) and long-term (drained) conditions is 1.5 (IDOT 2012). *Slide v6.0* evaluation exhibits employing the Bishop Simplified method of analysis are shown in Appendix C. We estimate the wall tip elevation at elevation 541 feet has a minimum undrained FOS of 1.5 (Appendix C-1) and a drained FOS of 3.5(Appendix C-2). The FOS meets the minimum requirement.

5.3 Ground Movement Evaluations

There is an existing building at 765 W. Adams Street (Arkadia Tower) behind the Drilled shaft Wall between Station 8282+72.47 and Station 8284+52.58. The building is about 13 to 30 feet away from the Wall 37. From information provided by TranSystems, Wang understands that the Arkadia Tower is supported on deep foundations.

Wall 37's potential impact on the building was determined at three locations (Station 8282+73, Station 8283+60, and Station 8284+52) considering IDOT wall deflection criteria issued on November 14, 2016. IDOT's wall deflection criteria states that the project limitations are set for a maximum allowable wall deflection of up to 1.0% of the exposed wall height (which is about 1.3 to 2.2 inches), if the wall is not supporting sensitive structures or facilities. For walls supporting sensitive structures, the maximum allowable wall deflection should be limited to 0.5% of the exposed wall height (which is about 0.6 to 1.1 inches), or less as required, to prevent detrimental effects on adjacent structures or facilities. The TSL plan shows the maximum total lateral wall deflection of the wall is 1 inch. The acceptable surface movement by CDOT is maximum 0.25 inches.

Using empirical data compiled from various research papers, Wang estimates the ground movement adjacent to the building induced by the maximum lateral wall deflection of 1 inch is about 0.3 to 0.6 inches which exceeds CDOT's ground movement criteria. Ground movement estimates including method used are included in Appendix E. Since the building is supported on deep foundations, there might not be a damaging effect on the general structure. The potential impact of the wall deflection inducing ground movements on other existing structures such as the existing structure walls, any buried

utilities, and slab- on-grades must be considered on the final design to ensure specific deformation limits are not exceeded, leading to settlement and structural displacements.

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. Any open excavation to a depth of 4 feet should have a slope of 1:2 (V:H) for cohesive soils and 1:2.5 (V:H) for granular soils or flatter. Based on the TSL plan, a Temporary Soil Retention System (TSRS) will be used for the removal of the existing retaining wall. In addition, the TSRS will also be used to construct catch basins and other drainage structures in front of the proposed wall. The influence of the construction of these structures on the new wall must be considered during the wall design. The TSRS should have deflection control to prevent movement of the proposed wall if they are constructed after the proposed wall construction.

6.2 Filling and Backfilling

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

6.3 Drilled Shaft Encasement

Groundwater was encountered within the granular fill, about 3 to 8 feet below the ground surface, and will be encountered during drilling of the drilled shafts and drilled soldier pile excavations. The installation of drilled shafts and drilled soldier piles extending into the medium dense to very dense silt and silty loam and sand (**Layer 5**) will encounter groundwater that will present challenges in maintaining an open borehole. Temporary or permanent casings should be used when the groundwater is encountered. Failure to anticipate the challenges posed by the groundwater at this location will result in caving or heaving sand and weakening of the foundation soils.

The soft soil layer with Qu less than 0.5 tsf (500 psf cohesion) is prone to squeeze if left open for long period of time. Therefore, to minimize the squeeze potential, casing should be provided. Due to high squeeze potential, the following note should appear on the final plans:

'Due to the squeeze potential of the clay soils, the use of temporary casing will be required to properly construct the shafts. Casing may be pulled or remain in place, as determined by the Contractor at no cost to the Department.'

6.4 Wall Construction

The wall should be constructed as per IDOT *Standard Specification for Road and Bridge Construction* (IDOT 2016).

6.5 Construction Monitoring

Given the proximity of structure, roads, and utilities, Wang recommends special precautions should be taken during the construction to not to undermine the existing foundations, pavements and utilities.

To prevent any damage to the existing Arkadia Tower, we recommend the following monitoring during construction of the wall:

- Establish survey points on the east side wall of the Arkadia Tower to monitor the vertical and horizontal movements;
- Establish survey points at top of the wall to monitor deflection of the wall during and after construction of the wall;
- Install inclinometers before the wall construction begins between the proposed wall location and the building to monitor ground movement.

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 37 (SN016-1826) 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,

Exp. 11/30/2019

WANG ENGINEERING, INC.

METIN WOLFGANG SEYHUN
062-052588
LICENSED
PROFESSIONAL
ENGINEER
OF
ILLINOIS

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

Corina T. Farez, P.E., P.G.
Vice President

Nesam S. Balakumaran
Project Geotechnical Engineer

REFERENCES

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

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

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

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

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

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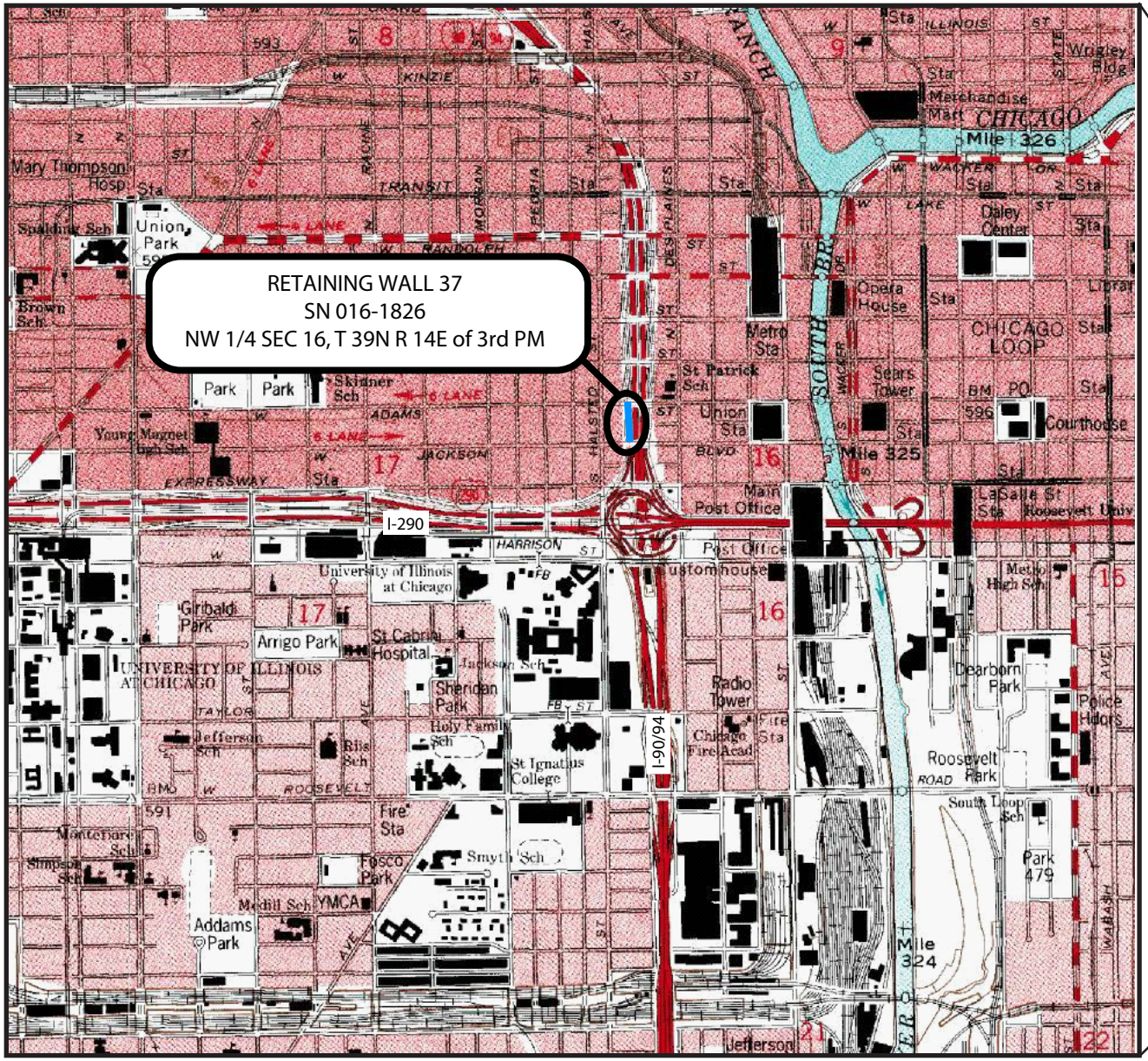
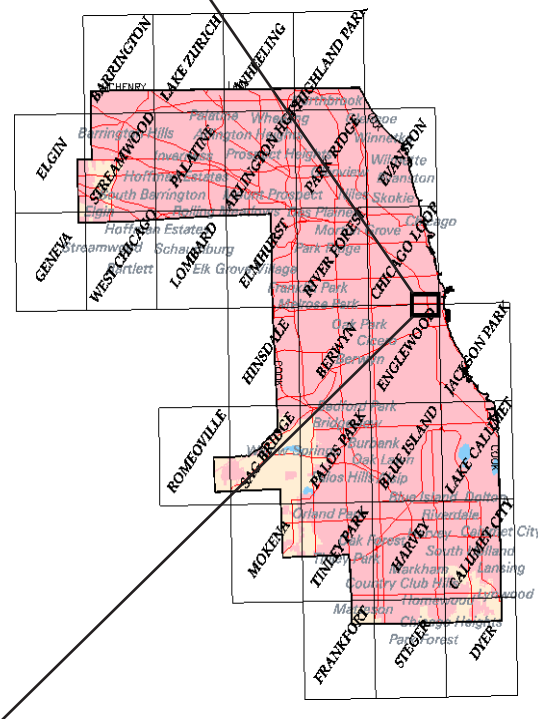
PECK, R.B., and REED, W.C., 1954, *Engineering Properties of Chicago Subsoils*: University of Illinois Engineering Experiment Station Bulletin No. 423: Urbana, University of Illinois, 62 p.

EXHIBITS





Cook County

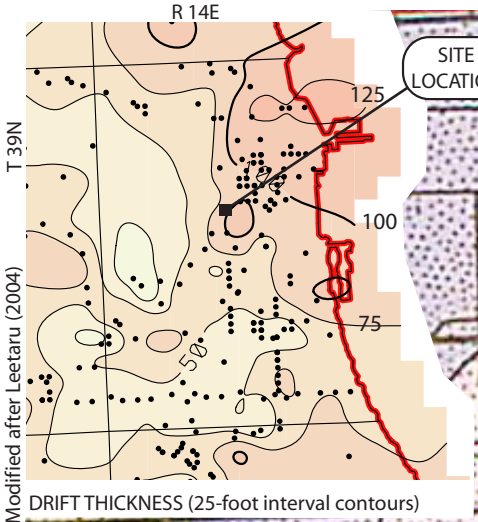
SCALE
0 1Mile

SITE LOCATION MAP: CIRCLE INTERCHANGE RECONSTRUCTION,
RETAINING WALL 37, SN 016-1826, COOK COUNTY, ILLINOIS

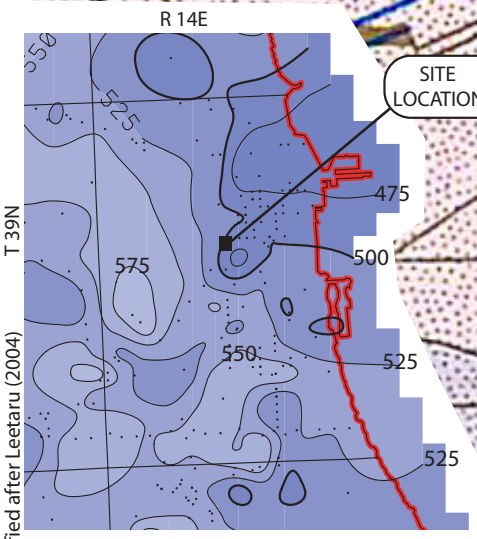
SCALE: GRAPHICAL	EXHIBIT 1	DRAWN BY: HKB CHECKED BY: NSB

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

FOR AECOM	1100-04-01



DRIFT THICKNESS (25-foot interval contours)



BEDROCK TOPOGRAPHY (25-foot interval contours)

0 2 4 6 Miles

RETAINING WALL 37,
SN 016-1826
NW 1/4 Sec 16, T 39N, R 14E of 3rd PM

Chicago Harbor

CHICAGO

I-290

I-90/I-94

Congress Parkway

Roosevelt Road

Chicago River

CICERO

94

0 0.5 1.0 1.5 2.0 2.5 Miles

Modified after Willman (1971)

N

LEGEND

m	Man-made land
ec	Equality Formation Largely s ilt and clay well bedded, locally lam inated, containing thin beds of sand near the shorel ine
ed	Henry Formation (Dalton facies) Largely shallow-water, near shore lake sed iments; dominantly sand w ith beds of s ilt and local lenses of sandy gravel
lp	Wadsworth Formation (Lake pla in) Floors of glac ial lakes flattened by wave eros ion; largely underla in by glac ial till; occas inal coverd by th in depos its of s ilt, clay and sand of the Equal ity Format ion
S	Silurin Bedrock Largely dolostone, sl ightly to moderately arg illaceous w ith scattered chert nodules; mass ive to well bedded dolomite with minor beds of shale and shaly dolom ite

Dotted pattern stands for densely bu ilt-up res idential and commerc ial areas

SITE AND REGIONAL GEOLOGY: CIRCLE INTERCHANGE RECONSTRUCTION, RETAINING WALL 37, SN 016-1826, COOK COUNTY

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

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

FOR AECOM	1100-04-01

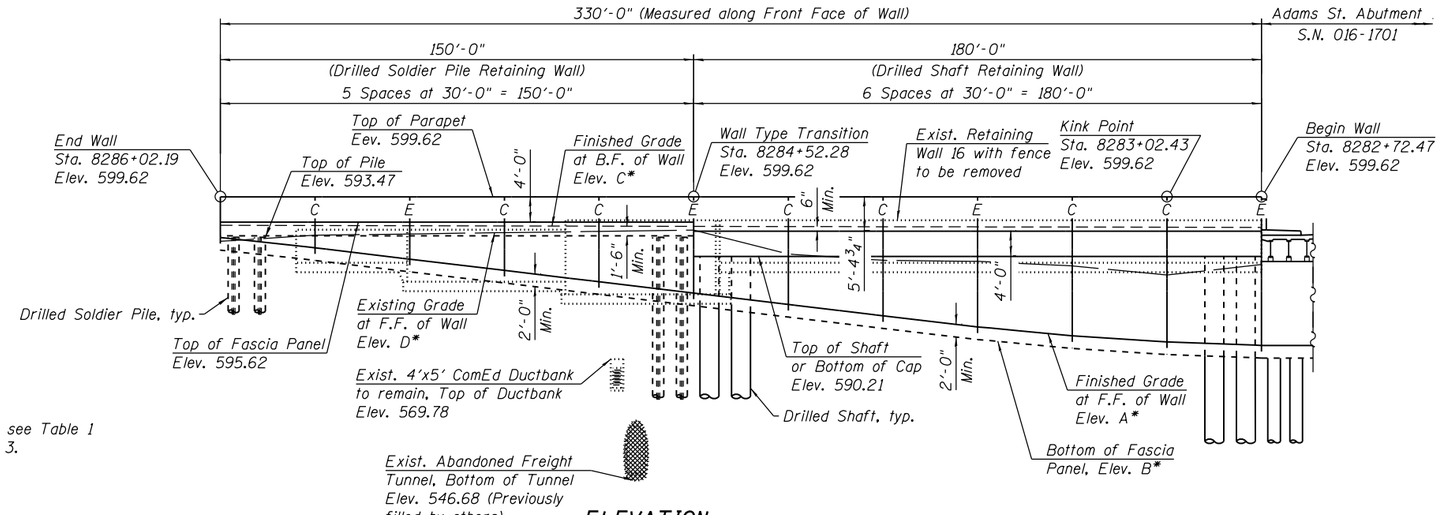
Bench Mark: Set "X" on east barrier wall of I-90 at ℄ of Adams Street. Elev. 581.17.

Existing Structure: Existing Retaining Wall 16. Constructed in 1957 under F.A.I. Route 2, Section 0101.6-2P. Cast-in-place concrete retaining wall on spread footing that measures 330'-0" from Adams Street south to Jackson Boulevard. Maximum height from top of wall to bottom of footing measures 13'-3". The existing retaining wall is to be removed and replaced.

Traffic on Jackson Exit Ramp will be detoured during construction.

No Salvage.

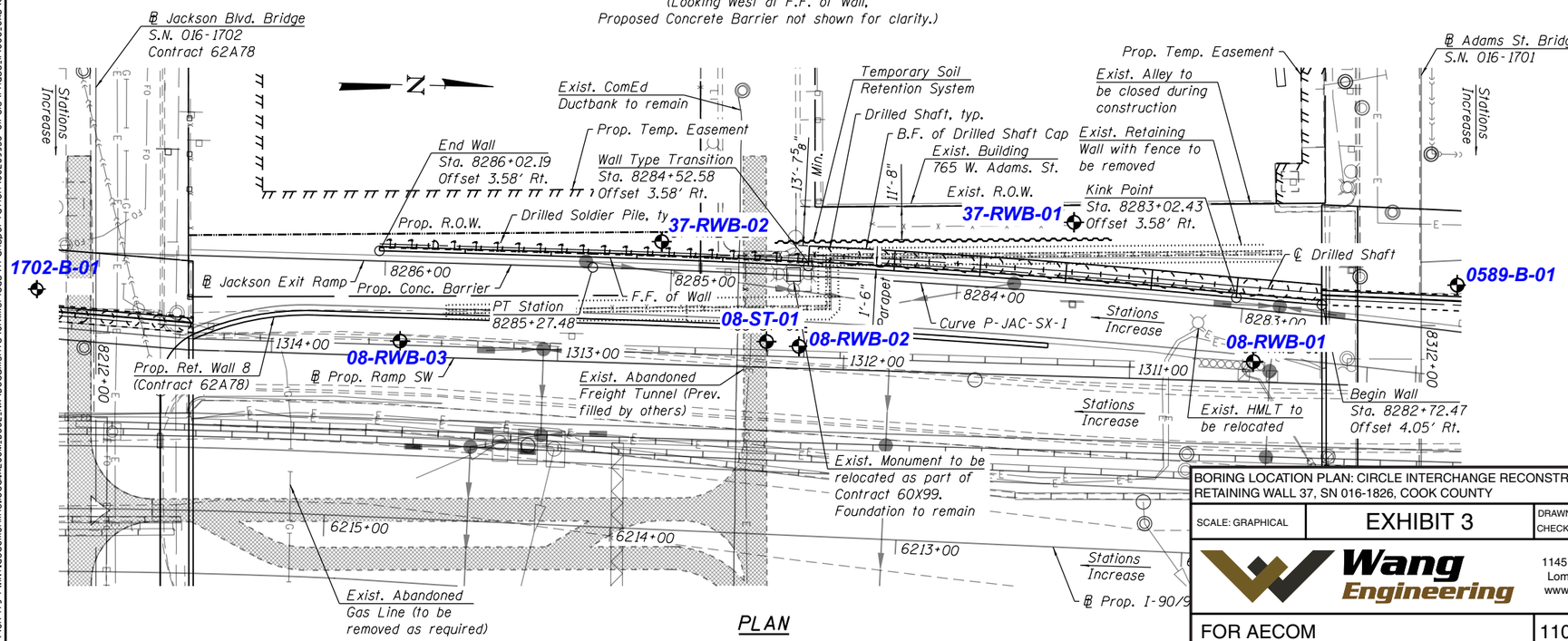
Notes:
1.) Wall offsets are measured from the ℄ of Jackson Exit Ramp to the front face of cast-in-place fascia panels.
2.) C denotes Construction Joint
3.) E denotes Expansion Joint
4.) F.F. denotes Front Face.
5.) B.F. denotes Back Face.
6.) Wall to be built along straight chords between kink points.
7.) Soldier Pile section, shaft diameter, spacing and tip elevation to be determined during final design.
8.) Proposed drainage information shown is conceptual and will be determined during final design.
9.) Soldier piles shall be spaced to avoid Existing ComEd Ductbank. Clearance requirements will be coordinated with ComEd during final design.



ELEVATION

(Looking West at F.F. of Wall. Proposed Concrete Barrier not shown for clarity.)

* For elevations, see Table 1 on Sheet 3 of 3.



PLAN

CURVE DATA

(Jackson Exit Ramp)
Prop. Curve P-JAC-SX-1
P.I. Sta. = 8283+78.27
Δ = 5° 01' 56"
D = 1° 41' 07"
R = 3,400.00'
T = 149.40'
L = 298.61'
E = 3.28'
e = 2.00%
T.R. = NA
S.E. Run = NA
P.C. Sta. = 8282+28.87
P.T. Sta. = 8285+27.48

HIGHWAY CLASSIFICATION

Jackson Exit Ramp
Functional Class: Interstate
ADT: 2,900 (2012); 4,000 (2040)
ADTT: 0 (2012); 0 (2040)
DHV: 410 (2040)
Design Speed: 30 m.p.h.
Posted Speed: 30 m.p.h.
One-Way Traffic
Directional Distribution: 100%

DESIGN SPECIFICATIONS

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

DESIGN STRESSES

FIELD UNITS

f'c = 7,000 psi (Drilled Shafts)**
f'c = 3,500 psi (All other concrete)
fy = 60,000 psi (Reinforcement)

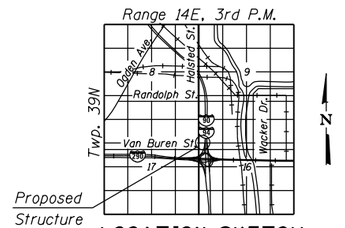
SOLDIER PILES

fy = 50,000 psi (AASHTO M270 Gr. 50)

** Final concrete strength will be determined during final design

WALL DEFLECTION CRITERIA:

Maximum total lateral wall deflection at top of wall: 1 inch.



LOCATION SKETCH

SUGGESTED SEQUENCE OF CONSTRUCTION

1.) Install temporary soil retention system along alley.
2.) Remove portion of Existing Retaining Wall 16 that is in conflict with the proposed drilled shafts.
3.) Drill shafts and install soldier piles.
4.) Remove portion of Existing Retaining Wall 16 in front of the proposed wall and excavate to install timber lagging.
5.) Construct concrete fascia panels, cap, and parapet.

LEGEND:

Ex. Chain Link Fence	— X — X —	Soil Boring	⌖
Combined Sewer	→→→→→→→→	Existing Catch Basin	○
Electric	——E——	Proposed Catch Basin	●
Ex. Storm Sewer	——▷——▷——	Existing Manhole	◎
Prop. Storm Sewer	——▶——▶——	Proposed Manhole	◉
	— — — —		

BORING LOCATION PLAN: CIRCLE INTERCHANGE RECONSTRUCTION, RETAINING WALL 37, SN 016-1826, COOK COUNTY

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

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FOR AECOM | 1100-04-01

GENERAL PLAN
RETAINING WALL 37 ALONG JACKSON EXIT RAMP
F.A.I. RTE. 90/94 (KENNEDY EXPRESSWAY)
SECTION 2014-015 R&B-R
COOK COUNTY
STATION 8282+72.47 TO STATION 8286+02.19
STRUCTURE NO. 016-1826

TranSystems

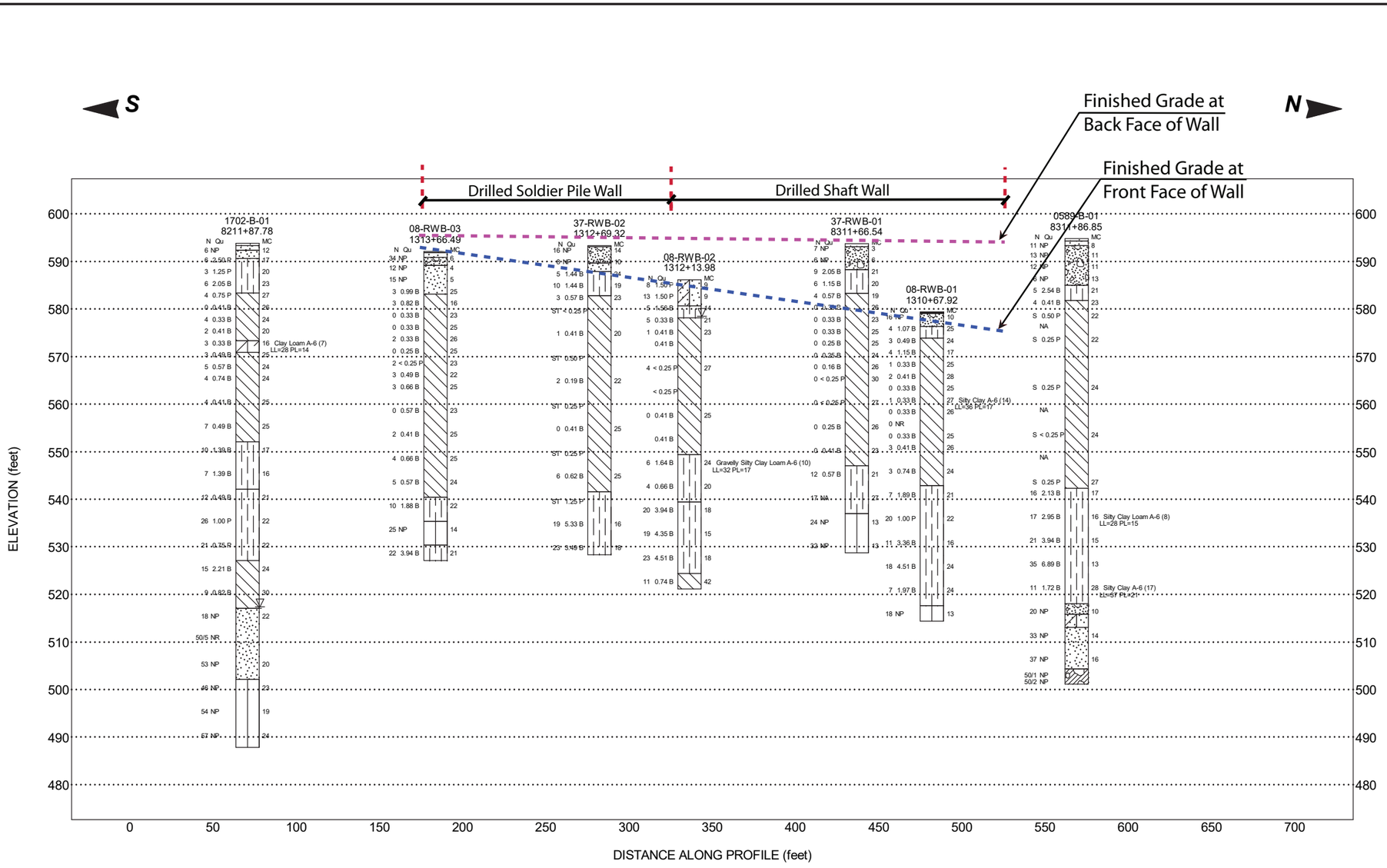
USER NAME = wjcolletti	DESIGNED - WJC	REVISED -	
	CHECKED - JM/MDS	REVISED -	
PLOT SCALE = 48.0000 ' / in.	DRAWN - WJC	REVISED -	
PLOT DATE = 11/29/2017	CHECKED - JM/MDS	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

SHEET NO. 1 OF 3 SHEETS

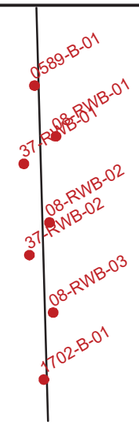
F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
90/94	2014-015 R&B-R	COOK	3	1
		CONTRACT NO. 60X94		
	ILLINOIS FED. AID PROJECT			

9:11:03 AM - pw:\\61479-PWINT.aecomonline.local:AECOM_DS02_NA\Documents\01Americas\Transportation\60269938 Circle\Phase_IN\000_CAD\008.Structural\Structure.016-1826\TSL\Sheets\016826-60X94-SHT-TSL-001



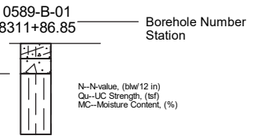
Lithology Graphics

- Pavement
- Concrete
- Gravelly sand, sandy gravel
- IDH Silty Clay, Silty Clay Loam
- IDH Clay
- IDH Loam
- IDH Sand, Sandy Loam
- Weathered bedrock
- Topsoil
- IDH Silt, Silty Loam
- IDH Clay Loam



Site Map Scale 1 inch equals 255 feet

Explanation:



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

0 70

Horizontal Scale (feet)

Vertical Exaggeration: 3x

Wang Engineering, Inc.
1145 N. Main Street
Lombard/IL/60148

Subsurface Data Profile
Retaining Wall 37, SN 016-1826

WEI SINCE 1982

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

JOB NUMBER	PLATE NUMBER
1100-04-01	EXHIBIT 4

APPENDIX A

Wang Engineering
wangeng@wangeng.com
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Lombard, IL 60148
Telephone: 630 953-9928
Fax: 630 953-9938

BORING LOG 0589-B-01

WEI Job No.: 1100-04-01

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

Datum: NAVD 88
Elevation: 594.82 ft
North: 1899347.34 ft
East: 1171345.80 ft
Station: 8311+86.85
Offset: 16.7442 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	594.3	6-inch thick ASPHALT --PAVEMENT--						
	593.3	12-inch thick CONCRETE --PAVEMENT--						
		Medium dense, brown and black GRAVELLY SAND; dry to moist --FILL--			1	5 5 6	NP	8
			5		2	1 8 5	NP	11
					3	4 6 6	NP	11
					4	3 3 3	NP	13
	585.0		10					
		Very stiff to hard (4.0P), brown and gray SILTY CLAY LOAM, trace gravel			5	1 2 3	2.54 B	21
	581.8							
		Very soft to medium stiff, gray CLAY to SILTY CLAY, trace gravel			6	1 2 2	0.41 B	23
			15		1	P U S H	0.50 P	22
		--In-Situ Vane Shear, 19.0 feet-- --$S_{u\ undis}$ = 958.3 psf-- --$S_{u\ remold}$ = 543.9 psf--			1			
			20					

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--Sensitivity = 1.76--						
					2	P U S H	0.25 P	22
			25					
					3	P U S H	0.25 P	24
			30					
		--In-Situ Vane Shear, 36.5 feet-- --$S_{u\ undis}$ = 802.9 psf-- --$S_{u\ remold}$ = 284.9 psf-- --Sensitivity = 2.82--	35		2			
			40					

GENERAL NOTES

Begin Drilling: **06-22-2014** Complete Drilling: **06-22-2014**
Drilling Contractor: **Wang Testing Services** Drill Rig: **B-57 TMR [100%]**
Driller: **N&R** Logger: **A. Happel** Checked by: **C. Marin**
Drilling Method: **2.25" HSA to 15', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **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 10/25/17

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BORING LOG 0589-B-01

WEI Job No.: 1100-04-01

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

Datum: NAVD 88
Elevation: 594.82 ft
North: 1899347.34 ft
East: 1171345.80 ft
Station: 8311+86.85
Offset: 16.7442 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
					4	PUSH	< 0.25 P	24
			45					
		--In-Situ Vane Shear, 46.5 feet-- --$S_{u\ undis}$ = 1087.8 psf-- --$S_{u\ remold}$ = 647.5 psf-- --Sensitivity = 1.68--			3			
			50					
	542.3				5	PUSH	0.25 P	27
		Very stiff to hard, gray SILTY CLAY to SILTY CLAY LOAM, trace gravel			7	4 6 10	2.13 B	17
			55					
		--L_L(%)=28, P_L(%)=15-- --%Gravel=4.8-- --%Sand=16.4--			8	5 8 9	2.95 B	16
			60					

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--%Silt=55.6-- --%Clay=23.2-- --A-6 (8)--						
			65		9	8 9 12	3.94 B	15
			70		10	12 17 18	6.89 B	13
		--L_L(%)=37, P_L(%)=21-- --%Gravel=0.5-- --%Sand=1.9-- --%Silt=63.3-- --%Clay=34.3-- --A-6 (17)--	75		11	4 5 6	1.72 B	28
	518.1	Gray GRAVELLY SANDY LOAM; moist						
	515.8	Medium dense, gray LOAM; moist			12	12 10 10	NP	10
			80					

GENERAL NOTES

Begin Drilling **06-22-2014** Complete Drilling **06-22-2014**
Drilling Contractor **Wang Testing Services** Drill Rig **B-57 TMR [100%]**
Driller **N&R** Logger **A. Happel** Checked by **C. Marin**
Drilling Method **2.25" HSA to 15', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **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 0589-B-01

WEI Job No.: 1100-04-01

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

Datum: NAVD 88
Elevation: 594.82 ft
North: 1899347.34 ft
East: 1171345.80 ft
Station: 8311+86.85
Offset: 16.7442 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	513.1							
		Dense, gray, fine to medium SAND; moist			13	12 16 17	NP	14
			85					
					14	13 17 20	NP	16
			90					
	504.3							
		--DIFFICULT DRILLING at 90.5 --						
		Very dense, grayish DOLOSTONE fragments						
		--WEATHERED BEDROCK--			15	50/1	NP	
		--AUGER REFUSAL--						
	501.1				16	50/2	NP	
		Boring terminated at 93.50 ft						
			95					
			100					

GENERAL NOTES

Begin Drilling **06-22-2014** Complete Drilling **06-22-2014**
Drilling Contractor **Wang Testing Services** Drill Rig **B-57 TMR [100%]**
Driller **N&R** Logger **A. Happel** Checked by **C. Marin**
Drilling Method **2.25" HSA to 15', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **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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Fax: 630 953-9938

BORING LOG 08-RWB-01

WEI Job No.: 1100-04-01

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

Datum: NAVD 88
Elevation: 579.35 ft
North: 1899261.44 ft
East: 1171382.28 ft
Station: 1310+67.92
Offset: 1.7942 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	579.0	4-inch thick, brown SILTY CLAY LOAM						
		Medium dense, gray SANDY GRAVEL; damp			1	8 10 6	NP	10
	576.3	Stiff, brown SILTY CLAY, trace gravel			2	2 2 2	1.07 B	25
	573.8	Soft to medium stiff, gray CLAY to SILTY CLAY, trace gravel	5		3	0 1 2	0.49 B	24
					4	0 2 2	1.15 B	17
			10		5	0 0 1	0.33 B	25
					6	0 0 2	0.41 B	28
			15		7	0 0 0	0.33 B	25
		--L_L(%)=36, P_L(%)=17-- --%Gravel=6.6-- --%Sand=13.3-- --%Silt=49.2--			8	0 0 1	0.33 B	27
			20					
		--%Clay=30.9-- --A-6 (14)--			9	0 0 0	0.33 B	26
			25		10	0 0 0	NR	
					11	0 0 0	0.33 B	25
			30		12	0 0 3	0.41 B	26
	542.8	Stiff to hard, gray SILTY CLAY, trace gravel	35		13	0 1 2	0.74 B	24
			40		14	3 3 4	1.89 B	21

GENERAL NOTES

Begin Drilling: **07-10-2014** Complete Drilling: **07-10-2014**
Drilling Contractor: **Wang Testing Services** Drill Rig: **CME-55 TMR [85%]**
Driller: **A&K** Logger: **A. Mohammed** Checked by: **C. Marin**
Drilling Method: **3.25" SSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

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

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

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BORING LOG 08-RWB-01

WEI Job No.: 1100-04-01

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

Datum: NAVD 88
Elevation: 579.35 ft
North: 1899261.44 ft
East: 1171382.28 ft
Station: 1310+67.92
Offset: 1.7942 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	517.6	Medium dense, gray SILT; damp	45		15	3 9 11	1.00 P	22
	514.3	Boring terminated at 65.00 ft	50		16	3 4 7	3.36 B	16
			55		17	4 9 9	4.51 B	24
			60		18	2 4 3	1.97 B	24
			65		19	29 12 6	NP	13
			70					
			75					
			80					

GENERAL NOTES

Begin Drilling **07-10-2014** Complete Drilling **07-10-2014**
Drilling Contractor **Wang Testing Services** Drill Rig **CME-55 TMR [85%]**
Driller **A&K** Logger **A. Mohammed** Checked by **C. Marin**
Drilling Method **3.25" SSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

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

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

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BORING LOG 08-RWB-02

WEI Job No.: 1100-04-01

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

Datum: NAVD 88
Elevation: 586.14 ft
North: 1899115.44 ft
East: 1171371.20 ft
Station: 1312+13.98
Offset: 8.4733 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		Stiff, black LOAM, some gravel --FILL--			1	7 5 3	1.50 P	9
			5		2	10 8 5	1.50 P	9
	580.6							
		Stiff, gray SILTY CLAY LOAM, trace gravel --FILL--			3	1 3 2	1.56 B	14
	578.1							
		Very soft to soft, gray CLAY to SILTY CLAY, trace gravel	10		4	1 2 3	0.33 B	21
					5	0 0 1	0.41 B	23
		--In-Situ Vane Shear, 14 feet-- --$S_{u\ undis}$ = 984 psf-- --$S_{u\ remold}$ = 648 psf-- --Sensitivity = 1.52--	15		6			
			20		7	0 2 2	< 0.25 P	27
		--In-Situ Vane Shear, 24 feet-- --$S_{u\ undis}$ = 777 psf-- --$S_{u\ remold}$ = 518 psf-- --Sensitivity = 1.5--	25		8			
			30		9	0 0 0	0.41 B	25
		--In-Situ Vane Shear, 34 feet-- --$S_{u\ undis}$ = 1295 psf-- --$S_{u\ remold}$ = 570 psf-- --Sensitivity = 2.27--	35		10			
	549.4							
		Stiff very stiff, gray GRAVELLY SILTY CLAY LOAM --L_L(%)=32, P_L(%)=17-- --%Gravel=15.2-- --%Sand=9.0-- --%Silt=51.4--	40		11	1 2 4	1.64 B	24

GENERAL NOTES

Begin Drilling **07-10-2014** Complete Drilling **07-10-2014**
Drilling Contractor **Wang Testing Services** Drill Rig **D-50 TMR [78%]**
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 ▽ **8.00 ft**
At Completion of Drilling ▼ **mud in the borehole**
Time After Drilling **NA**
Depth to Water ▼ **NA**

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BORING LOG 08-RWB-02

WEI Job No.: 1100-04-01

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

Datum: NAVD 88
Elevation: 586.14 ft
North: 1899115.44 ft
East: 1171371.20 ft
Station: 1312+13.98
Offset: 8.4733 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--%Clay=24.3-- --A-6 (10)--						
	539.4	Very stiff to hard, gray SILTY CLAY LOAM to SILTY LOAM, trace gravel	45		12	0 1 3	0.66 B	20
			50		13	4 8 12	3.94 B	18
			55		14	4 8 11	4.35 B	15
			60		15	5 9 14	4.51 B	18
	524.4	Medium stiff, gray CLAY						
	521.1	Boring terminated at 65.00 ft	65		16	3 4 7	0.74 B	42
			70					
			75					
			80					

GENERAL NOTES

Begin Drilling **07-10-2014** Complete Drilling **07-10-2014**
Drilling Contractor **Wang Testing Services** Drill Rig **D-50 TMR [78%]**
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 ▽ **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 08-RWB-03

WEI Job No.: 1100-04-01

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

Datum: NAVD 88
Elevation: 592.12 ft
North: 1898962.89 ft
East: 1171377.44 ft
Station: 1313+66.49
Offset: 1.3750 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	591.9	3-inch thick ASPHALT --PAVEMENT--						
	590.9	12-inch thick CONCRETE --PAVEMENT--						
		Dense, brown SANDY GRAVEL --BASE COURSE--			1	27 18 16	NP	6
	589.1	Medium dense, brown, fine to medium SAND, trace gravel --FILL--	5		2	7 7 5	NP	4
					3	4 7 8	NP	5
	583.1	Soft to medium stiff, gray CLAY to SILTY CLAY, trace gravel	10		4	2 1 2	0.99 B	25
					5	0 1 2	0.82 B	16
			15		6	0 0 0	0.33 B	23
					7	0 0 0	0.33 B	25
			20		8	0 0 2	0.33 B	26
			25		9	0 0 0	0.25 B	25
					10	0 0 2	< 0.25 P	23
					11	0 1 2	0.49 B	22
			30		12	0 0 3	0.66 B	25
			35		13	0 0 0	0.57 B	23
			40		14	0 0 2	0.41 B	25

GENERAL NOTES

Begin Drilling **07-10-2014** Complete Drilling **07-10-2014**
Drilling Contractor **Wang Testing Services** Drill Rig **D-50 TMR [78%]**
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 ▽ **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 08-RWB-03

WEI Job No.: 1100-04-01

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

Datum: NAVD 88
Elevation: 592.12 ft
North: 1898962.89 ft
East: 1171377.44 ft
Station: 1313+66.49
Offset: 1.3750 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
			45		15	0 1 3	0.66 B	25
			50		16	1 2 3	0.57 B	24
	540.4	Stiff, gray SILTY CLAY, trace gravel						
			55		17	2 4 6	1.88 B	22
	535.4	Medium dense, gray SILTY LOAM, trace gravel						
			60		18	9 12 13	NP	14
	530.4	Very stiff, gray SILTY CLAY, trace gravel						
			65		19	5 8 14	3.94 B	21
	527.1	Boring terminated at 65.00 ft						
			70					
			75					
			80					

GENERAL NOTES

Begin Drilling **07-10-2014** Complete Drilling **07-10-2014**
Drilling Contractor **Wang Testing Services** Drill Rig **D-50 TMR [78%]**
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 ▽ **Rotary wash**
At Completion of Drilling ▼ **mud in the borehole**
Time After Drilling **NA**
Depth to Water ▼ **NA**

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BORING LOG 08-ST-01

WEI Job No.: 1100-04-01

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

Datum: NAVD 88
Elevation: 585.42 ft
North: 1899122.49 ft
East: 1171372.69 ft
Station: 1312+06.92
Offset: 7.0183 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	585.1	4-inch thick, black SILTY CLAY LOAM						
		--TOPSOIL--						
		Very stiff, brown SILTY CLAY LOAM, little gravel; damp			1	3 4 9	2.75 P	10
		--FILL--						
	581.2	Soft to medium stiff, gray CLAY to SILTY CLAY, trace gravel; moist	5		2	2 2 3	0.83 N/6	
					3	1 2 2	0.25 P	25
			10		1	PUSH	< 0.25 P	24
		--S_u =0.43 tsf (UU TXC) --w_n(%)=23			2	PUSH	< 0.25 P	24
			15		3	PUSH	< 0.25 P	25
		--S_u =0.29 tsf (UU TXC) --w_n(%)=24			4	PUSH	< 0.25 P	26
			20					
		--S_u =0.22 tsf (UU TXC) --w_n(%)=25	25		5	PUSH	< 0.25 P	24
					6	PUSH	< 0.25 P	24
					7	PUSH	0.25 P	24
		--S_u =0.43 tsf (UU TXC) --w_n(%)=24	30		8	PUSH	0.50 P	23
		--S_u =0.50 tsf (UU TXC) --w_n(%)=23	35		9	PUSH	0.25 P	25
					10	PUSH	0.50 P	23
		--C_c=0.219, OCR=1.05--	40			PU		

GENERAL NOTES

Begin Drilling: **11-03-2014** Complete Drilling: **11-03-2014**
Drilling Contractor: **Wang Testing Services** Drill Rig:
Driller: **P&P** Logger: **F. Bozga** Checked by: **C. Marin**
Drilling Method: **3.25" HSA, boring backfilled upon completion**

WATER LEVEL DATA

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

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BORING LOG 08-ST-01

WEI Job No.: 1100-04-01

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

Datum: NAVD 88
Elevation: 585.42 ft
North: 1899122.49 ft
East: 1171372.69 ft
Station: 1312+06.92
Offset: 7.0183 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
					11	S H	0.50 P	26
		--Laboratory Q_u=0.39 tsf (B), w_n(%)=21--			12	P U S H	0.25 P	25
		--Laboratory Q_u=0.19 tsf (B), w_n(%)=25--	45		13	P U S H	0.75 P	25
	537.9							
		Very stiff, gray SILTY CLAY LOAM, trace gravel; damp --Laboratory Q_u=3.31 tsf (B), w_n(%)=19--	50		14	P U S H	3.25 P	19
	532.9				4	5 8 12	3.85 B	20
		Boring terminated at 51.50 ft	55					
			60					

GENERAL NOTES

Begin Drilling: **11-03-2014** Complete Drilling: **11-03-2014**
Drilling Contractor: **Wang Testing Services** Drill Rig:
Driller: **P&P** Logger: **F. Bozga** Checked by: **C. Marin**
Drilling Method: **3.25" HSA, boring backfilled upon completion**

WATER LEVEL DATA

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

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

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BORING LOG 1702-B-01

WEI Job No.: 1100-04-01

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

Datum: NAVD 88
Elevation: 593.83 ft
North: 1898849.46 ft
East: 1171361.60 ft
Station: 8211+87.78
Offset: 18.3545 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	593.3	6-inch thick, ASPHALT --PAVEMENT--						
	592.3	12-inch thick, CONCRETE --PAVEMENT--						
		Loose, brown and gray, fine and medium SAND, trace gravel --FILL--			1	3 3 3	NP	12
	590.6	Stiff to very stiff, brown and gray SILTY CLAY LOAM, trace gravel and sand layers --FILL--	5		2	3 3 3	2.50 P	17
					3	2 1 2	1.25 P	20
			10		4	2 2 4	2.05 B	23
	583.3	Soft to medium stiff, gray CLAY to SILTY CLAY, trace gravel			5	3 2 2	0.75 P	27
			15		6	0 0 0	0.41 B	26
					7	0 2 2	0.33 B	24
			20		8	0 0 2	0.41 B	20

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	573.3	Soft, gray CLAY LOAM, trace gravel --L_L(%)=28, P_L(%)=14-- --%Gravel=5.4-- --%Sand=23.0-- --%Silt=46.7-- --%Clay=24.8-- --A-6 (7)--			9	1 1 2	0.33 B	16
	570.8	Soft to medium stiff, gray CLAY to SILTY CLAY, trace gravel	25		10	1 1 2	0.49 B	25
					11	0 3 2	0.57 B	24
			30		12	0 2 2	0.74 B	24
			35		13	1 2 2	0.41 B	25
			40		14	2 3 4	0.49 B	25

GENERAL NOTES

Begin Drilling: **06-17-2014** Complete Drilling: **06-17-2014**
Drilling Contractor: **Wang Testing Services** Drill Rig: **B-57 TMR [100%]**
Driller: **N&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: **76.75 ft**
At Completion of Drilling: **Rotary wash**
Time After Drilling: **NA**
Depth to Water: **NA**

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BORING LOG 1702-B-01

WEI Job No.: 1100-04-01

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

Datum: NAVD 88
Elevation: 593.83 ft
North: 1898849.46 ft
East: 1171361.60 ft
Station: 8211+87.78
Offset: 18.3545 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	552.1	Stiff, gray SILTY CLAY LOAM to SILTY LOAM, trace gravel	45		15	3 4 6	1.39 B	17
			50		16	2 4 3	1.39 B	16
	542.1	Soft to stiff, gray SILTY CLAY, trace gravel	55		17	4 6 6	0.49 B	21
			60		18	5 9 17	1.00 P	22
	527.1	Medium stiff to very stiff, gray CLAY, trace gravel	65		19	5 7 14	0.75 P	22
			70		20	5 7 8	2.21 B	24
	517.1	Medium dense to very dense, gray, fine SAND and SILT laminations --Moist--	75		21	3 4 5	0.82 B	30
			80		22	10 7 11	NP	22

GENERAL NOTES

Begin Drilling **06-17-2014** Complete Drilling **06-17-2014**
Drilling Contractor **Wang Testing Services** Drill Rig **B-57 TMR [100%]**
Driller **N&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 ▽ **76.75 ft**
At Completion of Drilling ▼ **Rotary wash**
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 1702-B-01

WEI Job No.: 1100-04-01

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

Datum: NAVD 88
Elevation: 593.83 ft
North: 1898849.46 ft
East: 1171361.60 ft
Station: 8211+87.78
Offset: 18.3545 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
			85		23	50/5	NR	
			90		24	20 21 32	NP	20
	502.1	Dense to very dense, gray SILTY LOAM --Moist--	95		25	22 23 23	NP	23
			100		26	18 27 27	NP	19
			105		27	23 32 25	NP	24
	487.8	--AUGER REFUSAL-- Boring terminated at 106.00 ft	110					
			115					
			120					

GENERAL NOTES

Begin Drilling **06-17-2014** Complete Drilling **06-17-2014**
Drilling Contractor **Wang Testing Services** Drill Rig **B-57 TMR [100%]**
Driller **N&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 ▽ **76.75 ft**
At Completion of Drilling ▼ **Rotary wash**
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-PZ-01

WEI Job No.: 1100-04-01

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

Datum: NAVD 88
Elevation: 593.22 ft
North: 1900001.55 ft
East: 1171691.06 ft
Station: 8546+56.54
Offset: 38.1896 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--Drilled without sampling--						
		--piezometer stabilized water level reading -- --reading during well development (11/21/2014) = 48.90 feet bgs-- --reading date: 12/11/2014 = 48.45 feet bgs--	5 10 15 20					
		Piezometer Data: *--Installed in Nov. 5, 2014* *--Bentonite Seal 85 to 87.5 feet* *--Top of Sand Pack at 87.5 feet* *--Top of Screen at 89.5 feet* *--Bottom of Screen at 99.5 feet*	25 30 35 40					

GENERAL NOTES

Begin Drilling **11-05-2014** Complete Drilling **11-06-2014**
Drilling Contractor **Wang Testing Services** Drill Rig **B-57 TMR [100%]**
Driller **P&P** Logger **F. Bozga** Checked by **CLM**
Drilling Method **4.25" HSA, monitoring water well**

WATER LEVEL DATA

While Drilling ▽ **48.00 ft**
At Completion of Drilling ▼ **32.00 ft**
Time After Drilling **24 hours**
Depth to Water ▼ **62.20 ft**

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

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BORING LOG 30-PZ-01

WEI Job No.: 1100-04-01

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

Datum: NAVD 88
Elevation: 593.22 ft
North: 1900001.55 ft
East: 1171691.06 ft
Station: 8546+56.54
Offset: 38.1896 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--piezometer stabilized water level reading -- --reading during well development (11/21/2014) = 48.90 feet bgs-- --reading date: 12/11/2014 = 48.45 feet bgs--	45 50 55 60					

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

GENERAL NOTES

Begin Drilling **11-05-2014** Complete Drilling **11-06-2014**
Drilling Contractor **Wang Testing Services** Drill Rig **B-57 TMR [100%]**
Driller **P&P** Logger **F. Bozga** Checked by **CLM**
Drilling Method **4.25" HSA, monitoring water well**

WATER LEVEL DATA

While Drilling ▽ **48.00 ft**
At Completion of Drilling ▼ **32.00 ft**
Time After Drilling **24 hours**
Depth to Water ▼ **62.20 ft**

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

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BORING LOG 30-PZ-01

WEI Job No.: 1100-04-01

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

Datum: NAVD 88
Elevation: 593.22 ft
North: 1900001.55 ft
East: 1171691.06 ft
Station: 8546+56.54
Offset: 38.1896 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		Piezometer Data: *--Installed in Nov. 5, 2014* *--Bentonite Seal 85 to 87.5 feet* *--Top of Sand Pack at 87.5 feet* *--Top of Screen at 89.5 feet* *--Bottom of Screen at 99.5 feet*	85					
	505.2	Very dense, gray, coarse SAND, trace gravel --Wet--	90		1	20 21 21	NP	16
	501.5	Very dense, gray GRAVELLY SAND --Wet--	95		2	36 35 20	NP	8
	493.2	Boring terminated at 100.00 ft	100		3	25 45 47	NP	6

GENERAL NOTES

Begin Drilling **11-05-2014** Complete Drilling **11-06-2014**
Drilling Contractor **Wang Testing Services** Drill Rig **B-57 TMR [100%]**
Driller **P&P** Logger **F. Bozga** Checked by **CLM**
Drilling Method **4.25" HSA, monitoring water well**

WATER LEVEL DATA

While Drilling ▽ **48.00 ft**
At Completion of Drilling ▼ **32.00 ft**
Time After Drilling **24 hours**
Depth to Water ▼ **62.20 ft**

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

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BORING LOG 37-RWB-01

WEI Job No.: 1100-04-01

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

Datum: NAVD 88
Elevation: 593.73 ft
North: 1899214.79 ft
East: 1171327.81 ft
Station: 8311+66.54
Offset: 22.2819 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	8-inch thick, CONCRETE --PAVEMENT--						
		Loose, gray GRAVELLY SAND --FILL--			1	5 4 3	NP	3
			5		2	3 3 3	NP	6
	588.2	Stiff to very stiff, gray SILTY CLAY, trace gravel			3	2 4 5	2.05 B	21
			10		4	1 3 3	1.15 B	20
	583.2	Very soft to medium stiff, gray CLAY to SILTY CLAY, trace gravel			5	0 2 2	0.57 B	19
			15		6	0 0 0	0.33 B	26
					7	0 0 0	0.33 B	23
			20		8	0 0 0	0.33 B	25
			25		9	0 0 0	0.25 B	25
					10	0 0 0	0.25 B	24
					11	0 0 0	0.16 B	26
			30		12	0 0 0	< 0.25 P	30
			35		13	0 0 0	< 0.25 P	27
			40		14	0 0 0	0.25 B	26

GENERAL NOTES

Begin Drilling **07-31-2014** Complete Drilling **07-31-2014**
Drilling Contractor **Wang Testing Services** Drill Rig **D-50 TMR [78%]**
Driller **R&J** Logger **S. Woods** Checked by **CLM (-Coord)**
Drilling Method **2.25" SSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

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

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

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BORING LOG 37-RWB-01

WEI Job No.: 1100-04-01

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

Datum: NAVD 88
Elevation: 593.73 ft
North: 1899214.79 ft
East: 1171327.81 ft
Station: 8311+66.54
Offset: 22.2819 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	0.41 B	23
	547.0	Medium stiff, gray SILTY CLAY, trace to some gravel						
			50		16	3 6 6	0.57 B	21
		--Disturbed sample--	55		17	5 6 11	NA	27
	537.0	Medium dense to dense, gray SILTY LOAM, trace gravel, sand lenses						
			60		18	8 9 15	NP	13
			65		19	10 15 17	NP	13
	528.7	Boring terminated at 65.00 ft						
		--SAND lenses--	70					
			75					
			80					

GENERAL NOTES

Begin Drilling **07-31-2014** Complete Drilling **07-31-2014**
Drilling Contractor **Wang Testing Services** Drill Rig **D-50 TMR [78%]**
Driller **R&J** Logger **S. Woods** Checked by **CLM (-Coord)**
Drilling Method **2.25" SSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

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

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

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BORING LOG 37-RWB-02

WEI Job No.: 1100-04-01

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

Datum: NAVD 88
Elevation: 593.30 ft
North: 1899060.29 ft
East: 1171337.17 ft
Station: 1312+69.32
Offset: 42.1927 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	593.0	3-inch thick, ASPHALT --PAVEMENT--						
		Medium dense, brown GRAVELLY SAND --FILL-- --Moist--			1	5 6 10	NP	14
	589.6	Loose, brown fine SAND --Moist--	5		2	4 4 4	NP	10
	587.8	Stiff, gray SILTY CLAY to SILTY CLAY LOAM, trace gravel			3	1 2 3	1.44 B	24
			10		4	3 5 5	1.44 B	19
	582.8	Very soft to medium stiff, gray CL:AY to SILTY CLAY, trace gravel			5	1 1 2	0.57 B	23
			15		1	ST	< 0.25 P	
			20		6	0 0 1	0.41 B	20
			25		2	ST	0.50 P	
			30		7	0 0 2	0.19 B	22
			35		3	ST	0.25 P	
			40		8	0 0 0	0.41 B	25

GENERAL NOTES

Begin Drilling **08-03-2014** Complete Drilling **08-03-2014**
Drilling Contractor **Wang Testing Services** Drill Rig **D-50 TMR [78%]**
Driller **R&J** Logger **M. de los Reyes** Checked by **C. Marin**
Drilling Method **2.25" SSA to 11', 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 37-RWB-02

WEI Job No.: 1100-04-01

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

Datum: NAVD 88
Elevation: 593.30 ft
North: 1899060.29 ft
East: 1171337.17 ft
Station: 1312+69.32
Offset: 42.1927 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		4	ST	0.25 P	
			50		9	0 2 4	0.62 B	25
	541.5	Stiff to hard, gray SILTY CLAY LOAM to SILTY LOAM, trace gravel						
			55		5	ST	1.25 P	
			60		10	9 8 11	5.33 B	16
			65		11	7 10 13	3.49 B	18
	528.3	Boring terminated at 65.00 ft						
			70					
			75					
			80					

GENERAL NOTES

Begin Drilling **08-03-2014** Complete Drilling **08-03-2014**
Drilling Contractor **Wang Testing Services** Drill Rig **D-50 TMR [78%]**
Driller **R&J** Logger **M. de los Reyes** Checked by **C. Marin**
Drilling Method **2.25" SSA to 11', 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-02

WEI Job No.: 1100-04-01

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

Datum: NAVD 88
Elevation: 585.26 ft
North: 1899543.57 ft
East: 1171652.91 ft
Station: 8415+02.96
Offset: 258.109 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		Medium stiff, black and gray SILTY CLAY, trace sand and gravel --FILL--						
			5		1	6 4 3	0.90 B	28
	579.8							
		Very soft, gray SILTY CLAY, trace sand and gravel			2	1 2 1	0.20 B	25
	576.8							
			10					
		--In-Situ Vane Shear, 10.5 feet-- --$S_{u\ undis}$ = 425.9 psf-- --$S_{u\ remold}$ = 218.4 psf-- --Sensitivity = 2.0--			1	VS		
		--In-Situ Vane Shear, 13.0 feet-- --$S_{u\ undis}$ = 589.7 psf-- --$S_{u\ remold}$ = 283.9 psf-- --Sensitivity = 2.1--	15		2	VS		
		--In-Situ Vane Shear, 15.5 feet-- --$S_{u\ undis}$ = 622.5 psf-- --$S_{u\ remold}$ = 425.9 psf-- --Sensitivity = 1.5--			3	VS		
		--In-Situ Vane Shear, 18.0 feet-- --$S_{u\ undis}$ = 491.4 psf-- --$S_{u\ remold}$ = 415.0 psf-- --Sensitivity = 1.2--	20		4	VS		
		--In-Situ Vane Shear, 20.5 feet-- --$S_{u\ undis}$ = 884.6 psf-- --$S_{u\ remold}$ = 655.2 psf-- --Sensitivity = 1.4--			5	VS		
		--In-Situ Vane Shear, 23.0 feet-- --$S_{u\ undis}$ = 939.2 psf-- --$S_{u\ remold}$ = 655.2 psf-- --Sensitivity = 1.4--	25		6	VS		
		--In-Situ Vane Shear, 25.5 feet-- --$S_{u\ undis}$ = 786.3 psf-- --$S_{u\ remold}$ = 611.6 psf-- --Sensitivity = 1.3--			7	VS		
		--In-Situ Vane Shear, 28.0 feet-- --$S_{u\ undis}$ = 644.3 psf-- --$S_{u\ remold}$ = 382.2 psf-- --Sensitivity = 1.7--	30		8	VS		
		--In-Situ Vane Shear, 30.5 feet-- --$S_{u\ undis}$ = 720.8 psf-- --$S_{u\ remold}$ =458.7 psf-- --Sensitivity = 1.6--			9	VS		
		--In-Situ Vane Shear, 33.0 feet-- --$S_{u\ undis}$ = 851.8 psf-- --$S_{u\ remold}$ = 567.9 psf-- --Sensitivity = 1.5--	35		10	VS		
		--In-Situ Vane Shear, 35.5 feet-- --$S_{u\ undis}$ = 895.5 psf-- --$S_{u\ remold}$ = 666.2 psf-- --Sensitivity = 1.3--			11	VS		
		--In-Situ Vane Shear, 38.0 feet-- --$S_{u\ undis}$ = 993.8 psf-- --$S_{u\ remold}$ = 720.8 psf-- --Sensitivity = 1.4--	40		12	VS		

GENERAL NOTES

Begin Drilling **12-04-2015** Complete Drilling **12-05-2015**
Drilling Contractor **Wang Testing Services** Drill Rig **CME-55 TMR [85%]**
Driller **R&N** Logger **I. Mohammud** 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-02

WEI Job No.: 1100-04-01

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

Datum: NAVD 88
Elevation: 585.26 ft
North: 1899543.57 ft
East: 1171652.91 ft
Station: 8415+02.96
Offset: 258.109 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--In-Situ Vane Shear, 40.5 feet--			13	VS		
		--$S_{u\ undis}$ = 1277.7 psf--						
		--$S_{u\ remold}$ = 808.1 psf--						
		--Sensitivity = 1.6--						
		--In-Situ Vane Shear, 43.0 feet--			14	VS		
	541.8	--$S_{u\ undis}$ > 1750 psf--						
		Boring terminated at 43.50 ft						
			45					
			50					
			55					
			60					

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

GENERAL NOTES

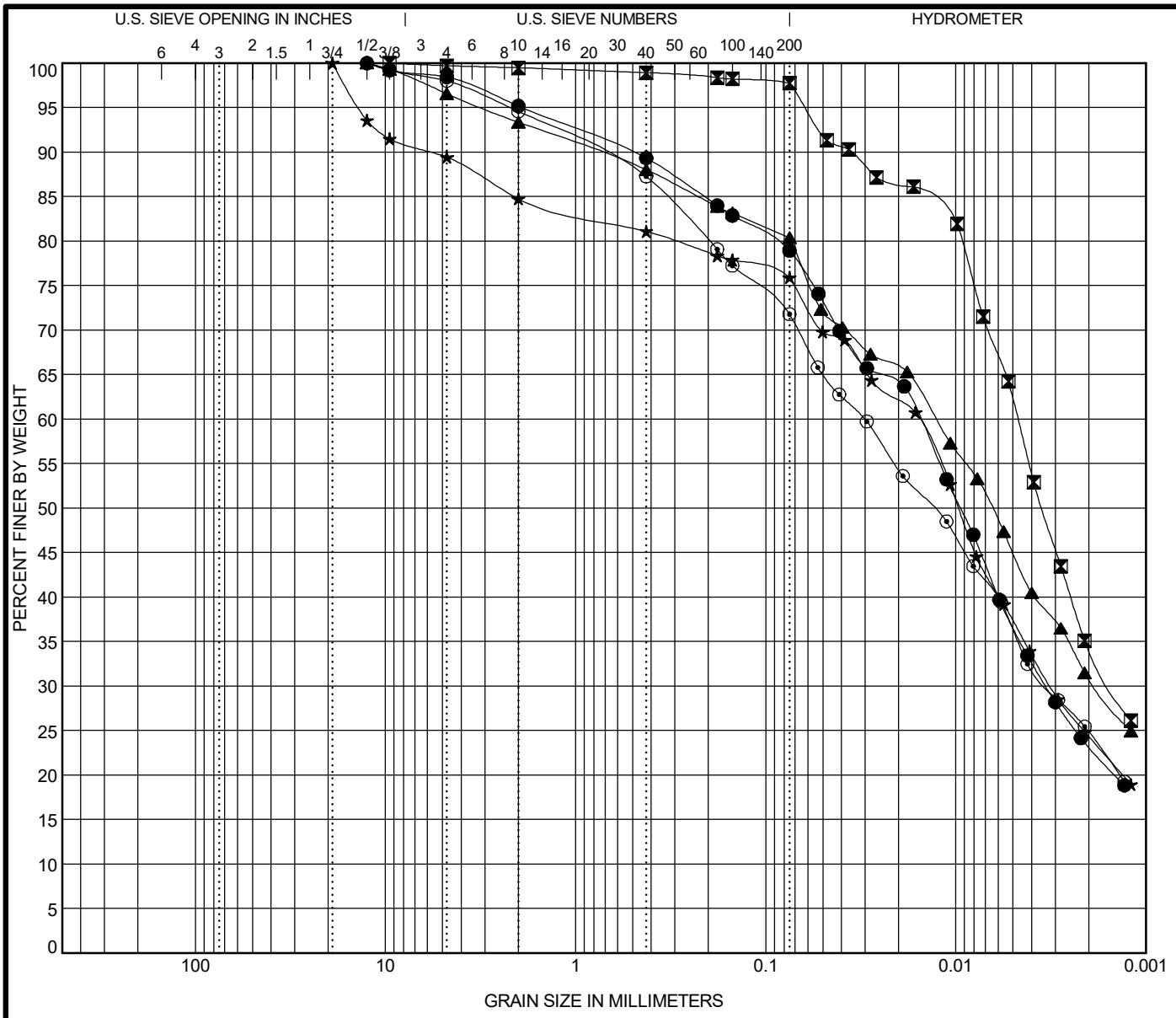
Begin Drilling **12-04-2015** Complete Drilling **12-05-2015**
Drilling Contractor **Wang Testing Services** Drill Rig **CME-55 TMR [85%]**
Driller **R&N** Logger **I. Mohammud** Checked by **A. Kurnia**
Drilling Method **2.25" HSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

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

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

APPENDIX B



COBBLES	GRAVEL	SAND		SILT AND CLAY
		coarse	fine	

	Specimen Identification		IDH Classification	LL	PL	PI	Cc	Cu
●	0589-B-01#8	58.5 ft	**Silty Clay Loam**	**28**	**15**	**13**		
⊠	0589-B-01#11	73.5 ft	**Silty Clay**	**37**	**21**	**16**		
▲	08-RWB-01#8	18.5 ft	**Silty Clay**	**36**	**17**	**19**		
★	08-RWB-02#11	38.5 ft	**Gravelly Silty Clay Loam**	**32**	**17**	**15**		
⊙	1702-B-01#9	21.0 ft	**Clay Loam**	**28**	**14**	**14**		

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	0589-B-01#8	58.5 ft	**12.5**	**0.016**	**0.003**		**4.8**	**16.4**	**55.6**	**23.2**
⊠	0589-B-01#11	73.5 ft	**9.5**	**0.005**	**0.002**		**0.5**	**1.9**	**63.3**	**34.3**
▲	08-RWB-01#8	18.5 ft	**12.5**	**0.013**	**0.002**		**6.6**	**13.3**	**49.2**	**30.9**
★	08-RWB-02#11	38.5 ft	**19**	**0.016**	**0.003**		**15.2**	**9.0**	**51.4**	**24.3**
⊙	1702-B-01#9	21.0 ft	**12.5**	**0.03**	**0.003**		**5.4**	**23.0**	**46.7**	**24.8**

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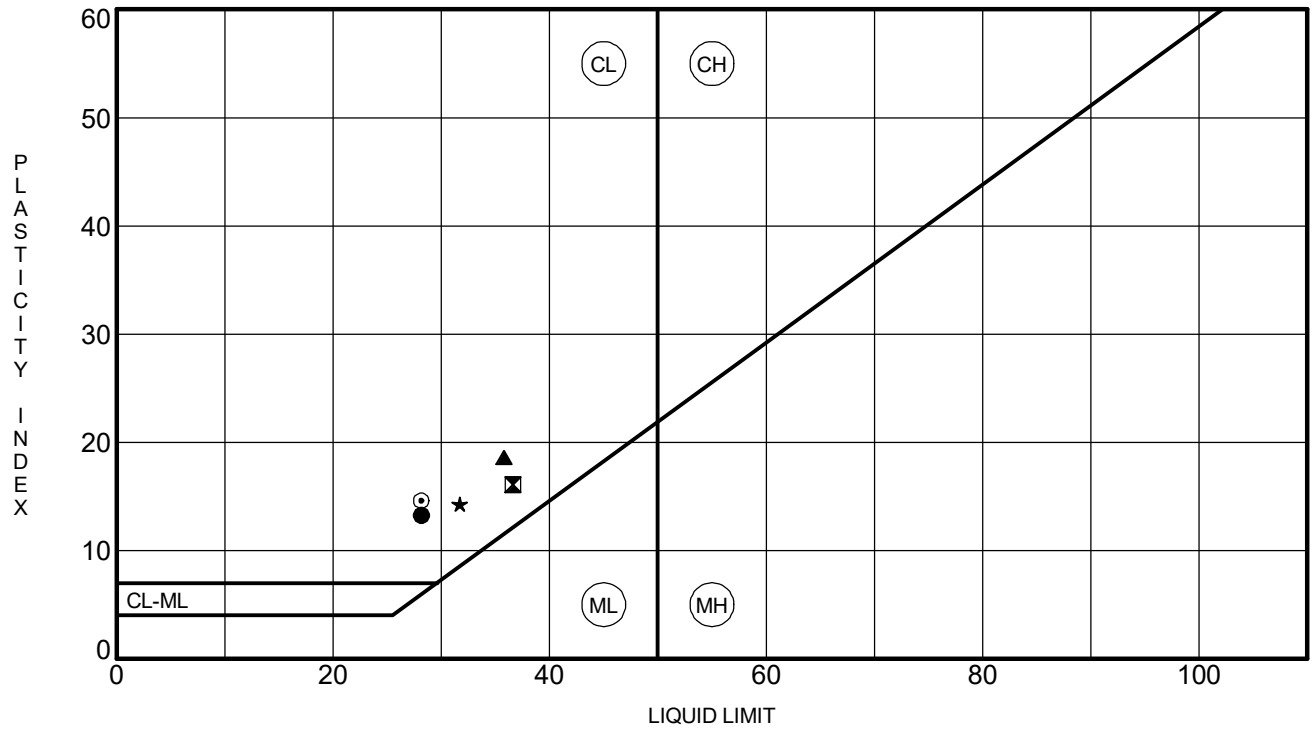
GRAIN SIZE DISTRIBUTION

Project: Circle Interchange Reconstruction

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

Number: 1100-04-01



Specimen Identification		LL	PL	PI	Fines	IDH Classification
● 0589-B-01#8	58.5 ft	28	15	13	79	**Silty Clay Loam**
⊠ 0589-B-01#11	73.5 ft	37	21	16	98	**Silty Clay**
▲ 08-RWB-01#8	18.5 ft	36	17	19	80	**Silty Clay**
★ 08-RWB-02#11	38.5 ft	32	17	15	76	**Gravelly Silty Clay Loam**
⊙ 1702-B-01#9	21.0 ft	28	14	14	72	**Clay Loam**

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ATTERBERG LIMITS' RESULTS

Project: Circle Interchange Reconstruction

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

Number: 1100-04-01

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UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

AASHTO T 296 / ASTM D 2850-95

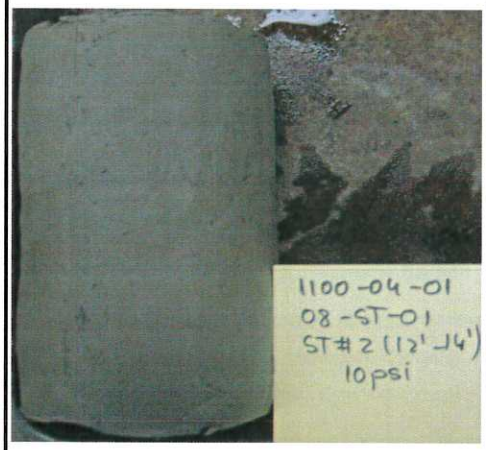
Project: Circle Interchange
Client: AECOM
WEI Job No.: 1100-04-01
Soil Sample ID: 08-ST-01, ST#2 (12.0-14.0ft)
Type/Condition: ST/Undisturbed

Analyst name: M. de los Reyes
Date received: 11/3/2014
Test date: 12/4/2014
Sample description: Soft Gray CLAY

Initial height h_0 =	5.67 in	Initial water content w =	23.03%
Initial diameter d_0 =	2.85 in	Initial unit weight γ_w =	129.45 pcf
Initial area A_0 =	6.36 in^2	Initial dry unit weight γ_d =	105.22 pcf
Mass of wet sample and tare M_t =	1411.30 g	Initial void ratio e_0 =	0.649
Mass of dry sample and tare M_d =	1182.10 g	Initial degree of saturation S_r =	99%
Mass of tare M_t =	187.00 g		
Mass of sample Ms=	1224.30 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 =	1.99		

Deviator stress at failure $D\sigma_f$ = 0.88 tsf
Major principal stress at failure σ_1 = 1.60 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	12.19	0.07	1.92
0.01	21.05	0.16	3.31
0.01	25.10	0.25	3.94
0.02	27.30	0.35	4.28
0.02	29.28	0.44	4.59
0.03	31.04	0.54	4.86
0.04	32.71	0.64	5.11
0.04	34.39	0.74	5.37
0.05	36.05	0.83	5.62
0.05	37.65	0.93	5.87
0.08	44.93	1.40	6.97
0.11	50.96	1.87	7.87
0.13	56.03	2.34	8.61
0.16	60.02	2.80	9.18
0.19	62.92	3.29	9.57
0.21	65.67	3.77	9.94
0.24	68.62	4.27	10.33
0.27	70.48	4.76	10.56
0.30	72.42	5.27	10.79
0.33	74.40	5.75	11.03
0.35	76.02	6.24	11.21
0.38	76.83	6.74	11.27
0.41	78.03	7.23	11.39
0.44	79.57	7.72	11.55
0.47	80.43	8.21	11.61
0.50	81.66	8.75	11.72
0.52	83.00	9.21	11.85
0.55	83.82	9.68	11.91
0.60	84.94	10.66	11.94
0.66	86.72	11.61	12.06
0.71	88.42	12.58	12.16
0.77	89.05	13.55	12.11
0.82	90.41	14.53	12.16



Bulge Failure

Prepared by: Jay Date: 12.17.14

Checked by: LL Date: 12/17/14

AASHTO R18

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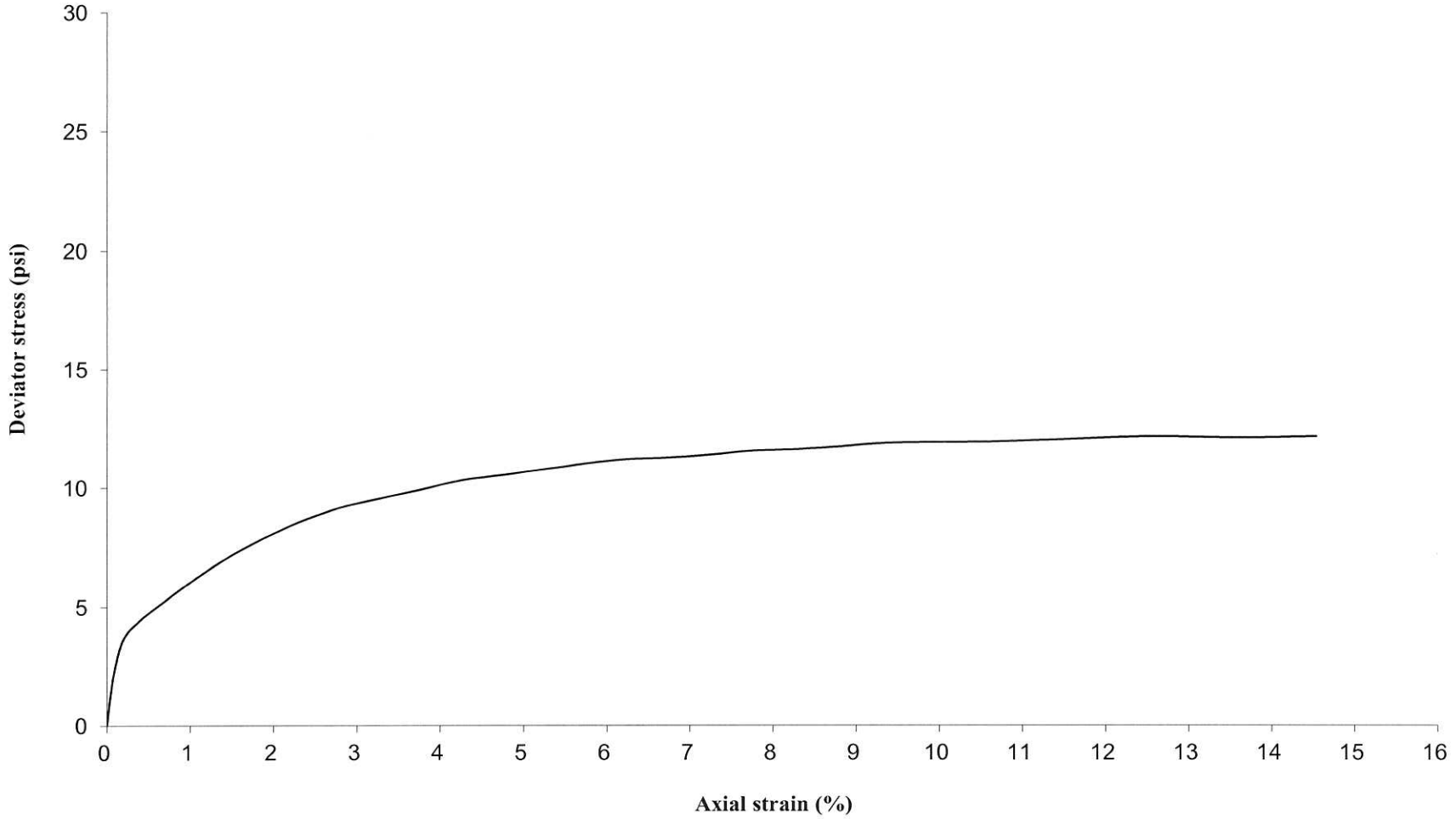
Unconsolidated-Undrained Triaxial Test

Deviator Stress v. Axial Strain

08-ST-01,ST#2(12.0-14.0ft) @ 10 psi



AASHTO R18

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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: 08-ST-01, ST#2 (12.0-14.0ft)
Type/Condition: ST/Undisturbed

Analyst name: M. de los Reyes
Date received: 11/3/2014
Test date: 12/4/2014
Sample description: Soft Gray CLAY

Initial height h_0 =	5.63 in	Initial water content w =	23.02%
Initial diameter d_0 =	2.83 in	Initial unit weight γ_w =	130.54 pcf
Initial area A_0 =	6.29 in^2	Initial dry unit weight γ_d =	106.11 pcf
Mass of wet sample and tare M_i =	1377.67 g	Initial void ratio e_0 =	0.635
Mass of dry sample and tare M_d =	1150.70 g	Initial degree of saturation S_r =	100%
Mass of tare M_t =	164.57 g		
Mass of sample Ms=	1213.10 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 =	1.99		

Deviator stress at failure $D\sigma_f$ = 0.79 tsf
Major principal stress at failure σ_1 = 2.23 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	1.44	0.03	0.23
0.01	1.53	0.12	0.24
0.01	9.45	0.21	1.50
0.02	14.86	0.30	2.36
0.02	17.72	0.39	2.81
0.03	19.52	0.49	3.09
0.03	20.88	0.59	3.30
0.04	22.12	0.69	3.49
0.04	23.30	0.79	3.68
0.05	24.39	0.88	3.84
0.08	29.41	1.37	4.61
0.10	33.92	1.84	5.29
0.13	38.11	2.31	5.92
0.16	41.96	2.78	6.49
0.18	45.44	3.28	6.99
0.21	48.63	3.76	7.44
0.24	51.55	4.27	7.85
0.27	54.27	4.78	8.22
0.30	56.75	5.29	8.55
0.33	58.99	5.78	8.84
0.35	61.06	6.26	9.10
0.38	63.00	6.75	9.34
0.41	64.72	7.24	9.55
0.44	66.51	7.74	9.76
0.46	68.06	8.22	9.93
0.49	69.56	8.77	10.09
0.52	70.91	9.24	10.23
0.55	72.19	9.71	10.37
0.60	74.37	10.67	10.56
0.66	76.49	11.65	10.75
0.71	78.24	12.63	10.87
0.77	79.83	13.61	10.97
0.82	81.29	14.60	11.04

Bulge Failure

Prepared by: Jay Date: 12.17.14

Checked by: N.L Date: 12/17/14

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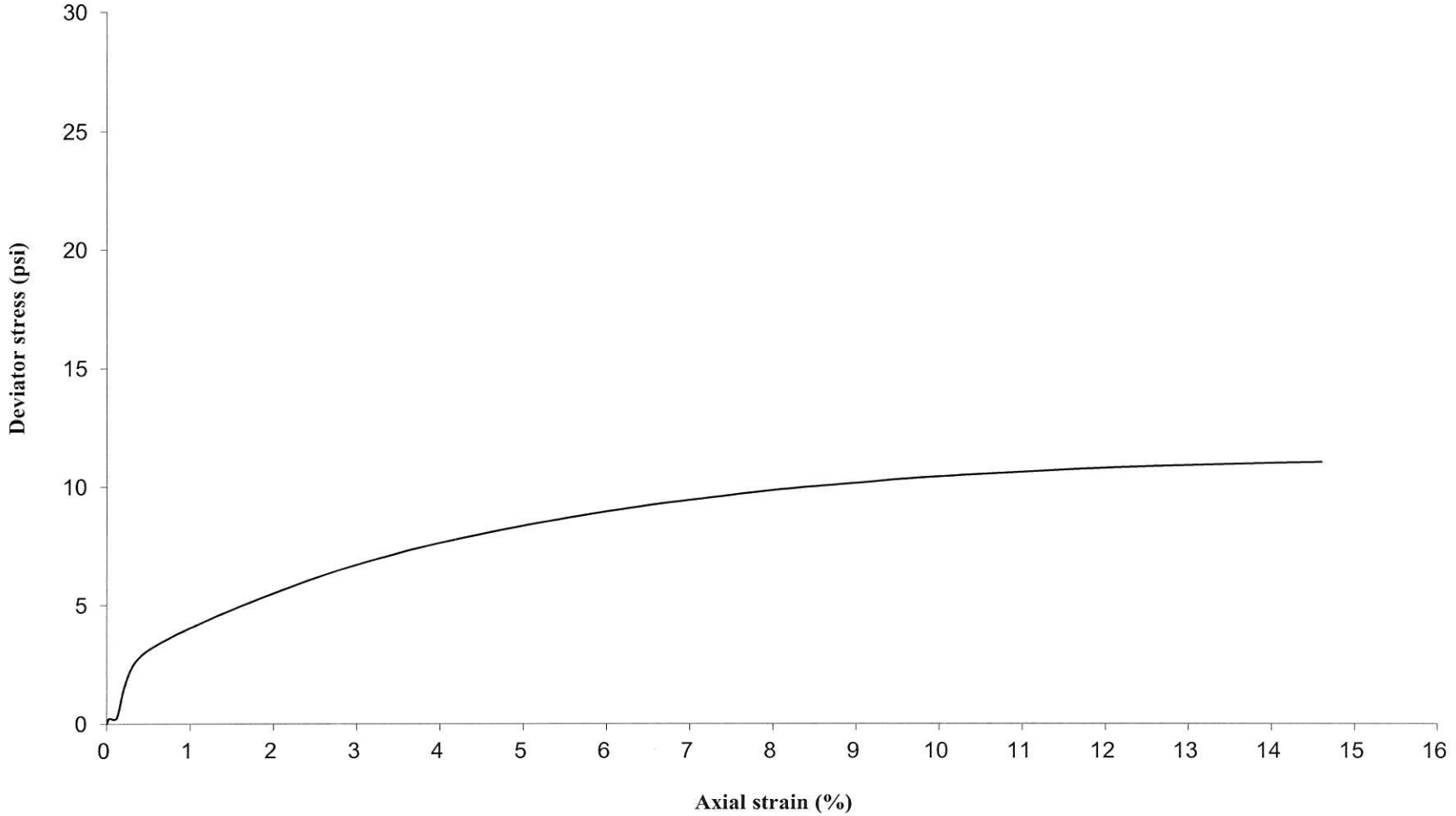
Unconsolidated-Undrained Triaxial Test

Deviator Stress v. Axial Strain

08-ST-01,ST#2 (12.0-14.0ft) @ 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: 08-ST-01, ST#2 (12.0-14.0ft)
Type/Condition: ST/Undisturbed

Analyst name: M. de los Reyes
Date received: 11/3/2014
Test date: 12/4/2014
Sample description: Soft Gray CLAY

Initial height h_0 =	5.64	in	Initial water content w =	23.51%	
Initial diameter d_0 =	2.83	in	Initial unit weight γ_w =	131.67	pcf
Initial area A_0 =	6.29	in^2	Initial dry unit weight γ_d =	106.61	pcf
Mass of wet sample and tare M_t =	1410.74	g	Initial void ratio e_0 =	0.627	
Mass of dry sample and tare M_d =	1177.60	g	Initial degree of saturation S_r =	100%	
Mass of tare M_t =	185.84	g			
Mass of sample Ms=	1224.90	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 =	1.99				

Deviator stress at failure $D\sigma_f$ = 0.77 tsf
Major principal stress at failure σ_1 = 3.65 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	3.61	0.07	0.57
0.01	3.81	0.16	0.60
0.01	3.81	0.25	0.60
0.02	6.71	0.34	1.06
0.02	13.49	0.44	2.14
0.03	18.15	0.54	2.87
0.04	20.55	0.64	3.25
0.04	22.15	0.73	3.50
0.05	23.48	0.82	3.70
0.05	24.72	0.92	3.90
0.08	29.94	1.40	4.69
0.11	34.54	1.87	5.39
0.13	38.79	2.35	6.02
0.16	42.66	2.82	6.59
0.19	46.08	3.32	7.08
0.22	49.18	3.82	7.52
0.24	52.06	4.33	7.92
0.27	54.70	4.83	8.28
0.30	57.01	5.34	8.58
0.33	59.06	5.82	8.85
0.36	61.02	6.30	9.09
0.38	62.69	6.80	9.29
0.41	64.34	7.29	9.49
0.44	65.93	7.78	9.67
0.47	67.35	8.26	9.83
0.50	68.74	8.80	9.97
0.52	69.88	9.30	10.08
0.55	71.01	9.77	10.19
0.61	73.01	10.75	10.36
0.66	74.84	11.72	10.51
0.72	76.68	12.69	10.65
0.77	78.01	13.69	10.71
0.83	79.25	14.69	10.75

Bulge Failure

Prepared by: Jay Date: 12.17.14

Checked by: A.L. Date: 12/17/14

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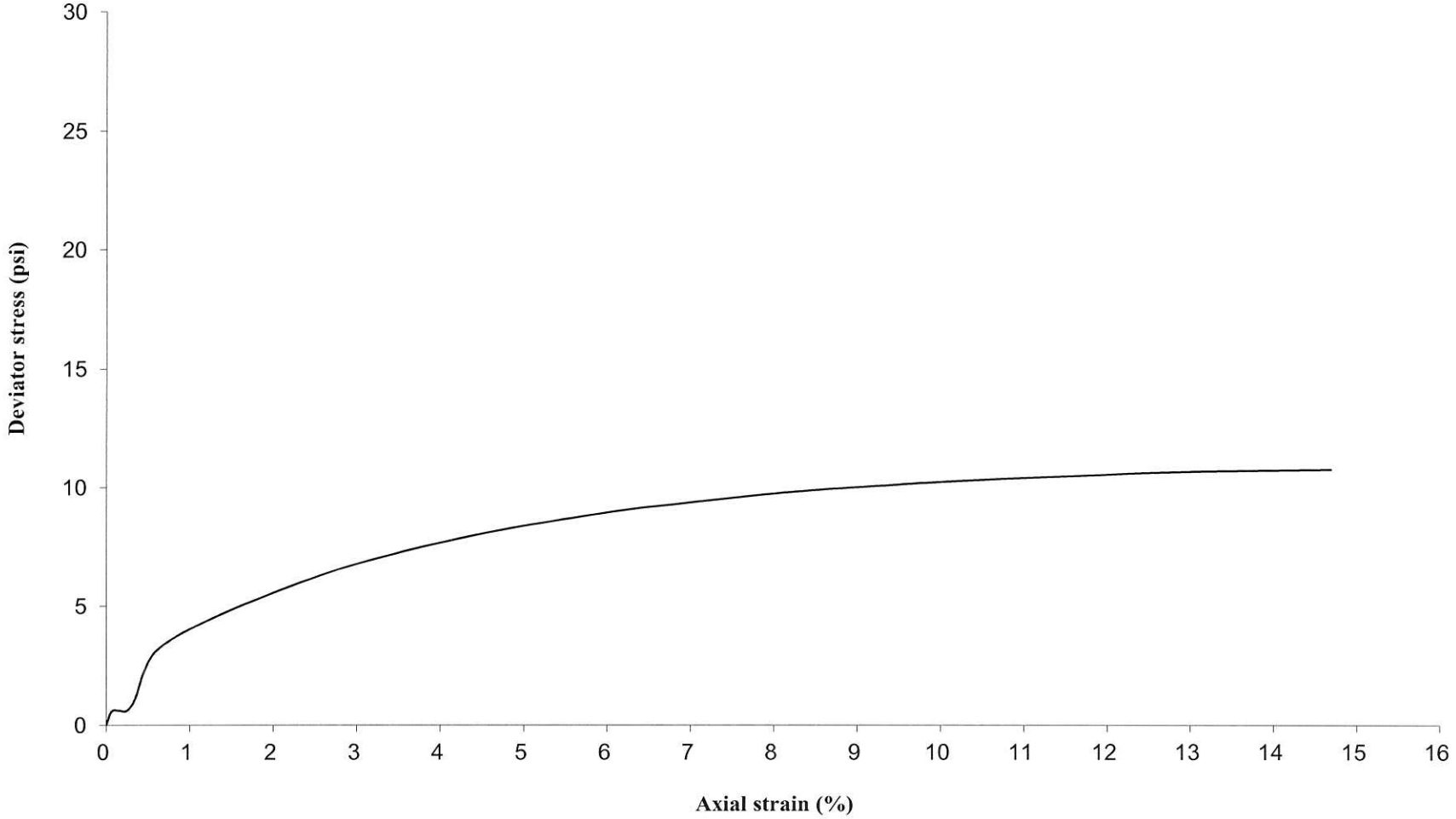
Unconsolidated-Undrained Triaxial Test

Deviator Stress v. Axial Strain

08-ST-01,ST#2 (12.0-14.0ft) @ 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: 08-ST-01, ST#4 (18.0-20.0ft)
Type/Condition: ST/Undisturbed

Analyst name: M. de los Reyes
Date received: 11/3/2014
Test date: 12/8/2014
Sample description: Soft Gray CLAY

Initial height h_0 =	5.56 in	Initial water content w =	23.66%
Initial diameter d_0 =	2.85 in	Initial unit weight γ_w =	130.14 pcf
Initial area A_0 =	6.40 in^2	Initial dry unit weight γ_d =	105.24 pcf
Mass of wet sample and tare M_t =	1228.82 g	Initial void ratio e_0 =	0.648
Mass of dry sample and tare M_d =	996.30 g	Initial degree of saturation S_r =	100%
Mass of tare M_t =	13.62 g		
Mass of sample Ms=	1215.20 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 =	1.95		

Deviator stress at failure $D\sigma_f$ = 0.65 tsf
Major principal stress at failure σ_1 = 1.37 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	0.79	0.05	0.12
0.01	5.10	0.14	0.80
0.01	13.08	0.23	2.04
0.02	16.82	0.32	2.62
0.02	18.16	0.42	2.83
0.03	18.87	0.52	2.93
0.03	19.48	0.62	3.03
0.04	20.07	0.72	3.11
0.05	20.70	0.82	3.21
0.05	21.29	0.92	3.30
0.08	23.94	1.41	3.69
0.11	26.21	1.91	4.02
0.13	28.19	2.40	4.30
0.16	30.27	2.90	4.60
0.19	32.71	3.40	4.94
0.22	34.89	3.90	5.24
0.25	35.94	4.41	5.37
0.27	37.88	4.92	5.63
0.30	39.63	5.43	5.86
0.33	41.48	5.92	6.10
0.36	43.29	6.40	6.33
0.38	46.15	6.89	6.72
0.41	47.68	7.37	6.90
0.44	48.56	7.86	6.99
0.46	50.78	8.36	7.27
0.50	52.37	8.91	7.46
0.52	53.59	9.39	7.59
0.55	55.35	9.86	7.80
0.60	58.72	10.84	8.18
0.66	61.53	11.85	8.48
0.72	62.45	12.87	8.51
0.77	66.78	13.87	8.99
0.83	66.40	14.87	8.84

Bulge Failure

Prepared by: Jay Date: 12.17.14

Checked by: L. F. Date: 12/17/14

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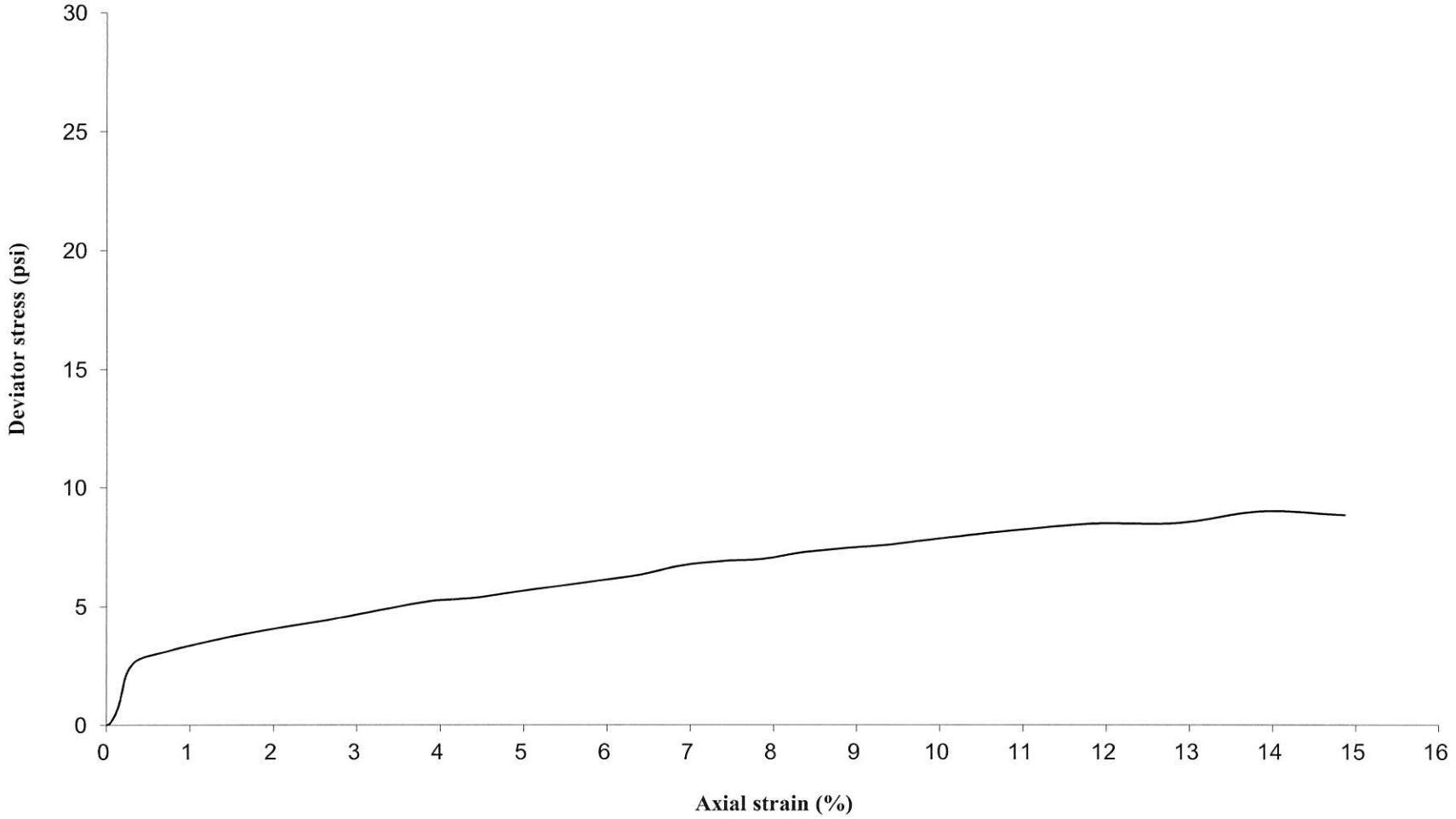
Unconsolidated-Undrained Triaxial Test

Deviator Stress v. Axial Strain

08-ST-01,ST#4 (18.0-20.0ft) @ 10 psi



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UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

AASHTO T 296 / ASTM D 2850-95

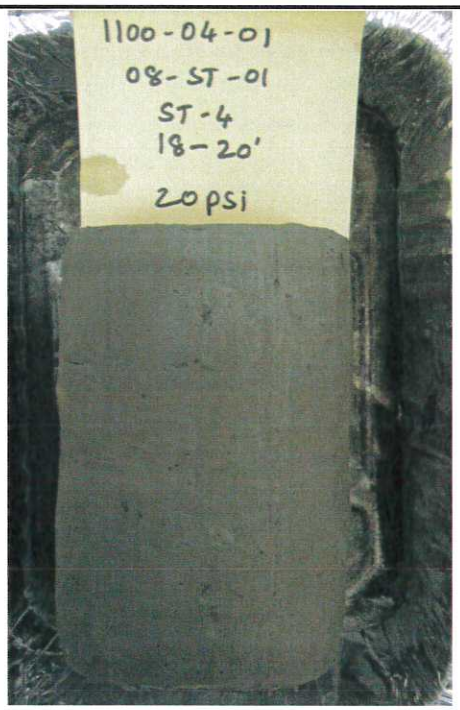
Project: Circle Interchange
Client: AECOM
WEI Job No.: 1100-04-01
Soil Sample ID: 08-ST-01,ST#4 (18.0-20.0ft)
Type/Condition: ST/Undisturbed

Analyst name: M. de los Reyes
Date received: 11/3/2014
Test date: 12/8/2014
Sample description: Soft Gray CLAY

Initial height h_0 =	5.59 in	Initial water content w =	24.21%
Initial diameter d_0 =	2.83 in	Initial unit weight γ_w =	129.07 pcf
Initial area A_0 =	6.28 in^2	Initial dry unit weight γ_d =	103.91 pcf
Mass of wet sample and tare M_t =	1203.10 g	Initial void ratio e_0 =	0.669
Mass of dry sample and tare M_d =	971.20 g	Initial degree of saturation S_r =	100%
Mass of tare M_t =	13.40 g		
Mass of sample Ms=	1189.70 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 =	1.98		

Deviator stress at failure $D\sigma_f$ = 0.76 tsf
Major principal stress at failure σ_1 = 2.20 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	0.79	0.05	0.13
0.01	2.96	0.14	0.47
0.01	9.36	0.23	1.49
0.02	14.15	0.33	2.25
0.02	16.82	0.43	2.66
0.03	18.75	0.53	2.97
0.04	20.29	0.64	3.21
0.04	21.79	0.74	3.44
0.05	23.14	0.84	3.65
0.05	24.32	0.94	3.83
0.08	29.87	1.45	4.68
0.11	34.43	1.96	5.37
0.14	38.32	2.45	5.95
0.16	41.86	2.94	6.47
0.19	45.09	3.44	6.93
0.22	48.01	3.92	7.34
0.25	50.66	4.43	7.71
0.28	53.06	4.93	8.03
0.30	55.32	5.42	8.33
0.33	57.22	5.90	8.57
0.36	58.97	6.38	8.79
0.38	60.77	6.86	9.01
0.41	62.26	7.34	9.18
0.44	64.63	7.83	9.48
0.47	65.75	8.33	9.59
0.50	67.53	8.87	9.80
0.52	68.00	9.36	9.81
0.55	69.08	9.84	9.91
0.61	71.10	10.83	10.09
0.66	73.78	11.85	10.35
0.72	75.40	12.86	10.46
0.77	76.42	13.83	10.48
0.83	78.36	14.82	10.62



Bulge Failure

Prepared by: _____ Date: 12.17.14

Checked by: _____ Date: 12/17/14

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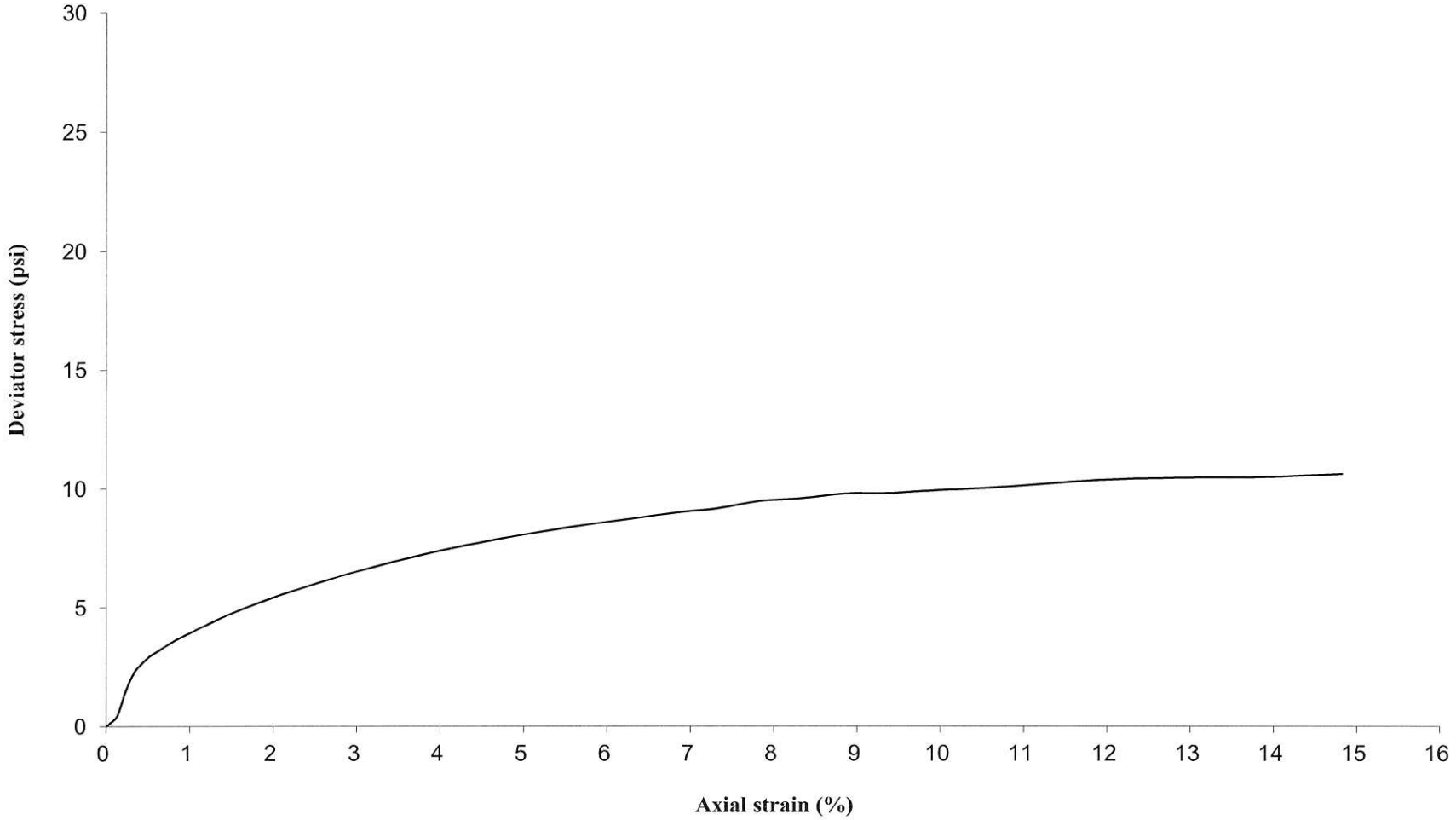
Unconsolidated-Undrained Triaxial Test

Deviator Stress v. Axial Strain

08-ST-01,ST#4 (18.0-20.0ft) @ 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: 08-ST-01,ST#4 (18.0-20.0ft)
Type/Condition: ST/Undisturbed

Analyst name: M. de los Reyes
Date received: 11/3/2014
Test date: 12/8/2014
Sample description: Soft Gray CLAY

Initial height h_0 =	5.62 in	Initial water content w =	19.65%
Initial diameter d_0 =	2.85 in	Initial unit weight γ_w =	147.15 pcf
Initial area A_0 =	6.36 in^2	Initial dry unit weight γ_d =	122.98 pcf
Mass of wet sample and tare M_t =	1540.99 g	Initial void ratio e_0 =	0.411
Mass of dry sample and tare M_d =	1314.20 g	Initial degree of saturation S_r =	100%
Mass of tare M_t =	160.29 g		
Mass of sample Ms=	1380.70 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 =	1.98		

Deviator stress at failure $D\sigma_f$ = 0.94 tsf
Major principal stress at failure σ_1 = 3.82 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	1.25	0.10	0.20
0.01	15.95	0.20	2.50
0.02	22.59	0.30	3.54
0.02	26.36	0.40	4.13
0.03	29.18	0.49	4.57
0.03	31.24	0.59	4.88
0.04	33.24	0.69	5.19
0.04	35.04	0.79	5.47
0.05	36.62	0.89	5.71
0.06	38.17	0.99	5.94
0.08	44.19	1.49	6.84
0.11	49.15	1.97	7.58
0.14	53.32	2.46	8.18
0.17	56.83	2.95	8.67
0.19	60.20	3.45	9.14
0.22	63.24	3.97	9.55
0.25	66.61	4.48	10.00
0.28	68.77	4.98	10.27
0.31	70.50	5.46	10.48
0.33	72.60	5.94	10.74
0.36	74.49	6.42	10.96
0.39	76.41	6.90	11.18
0.42	78.30	7.40	11.40
0.44	80.67	7.90	11.68
0.47	81.90	8.39	11.80
0.50	82.96	8.91	11.88
0.53	84.50	9.39	12.04
0.55	86.71	9.86	12.29
0.61	88.25	10.86	12.37
0.67	90.43	11.87	12.53
0.72	93.14	12.86	12.76
0.78	95.36	13.85	12.92
0.84	97.63	14.86	13.07

Bulge Failure

Prepared by: Jany Date: 12.17.14

Checked by: Li Li Date: 12/17/14

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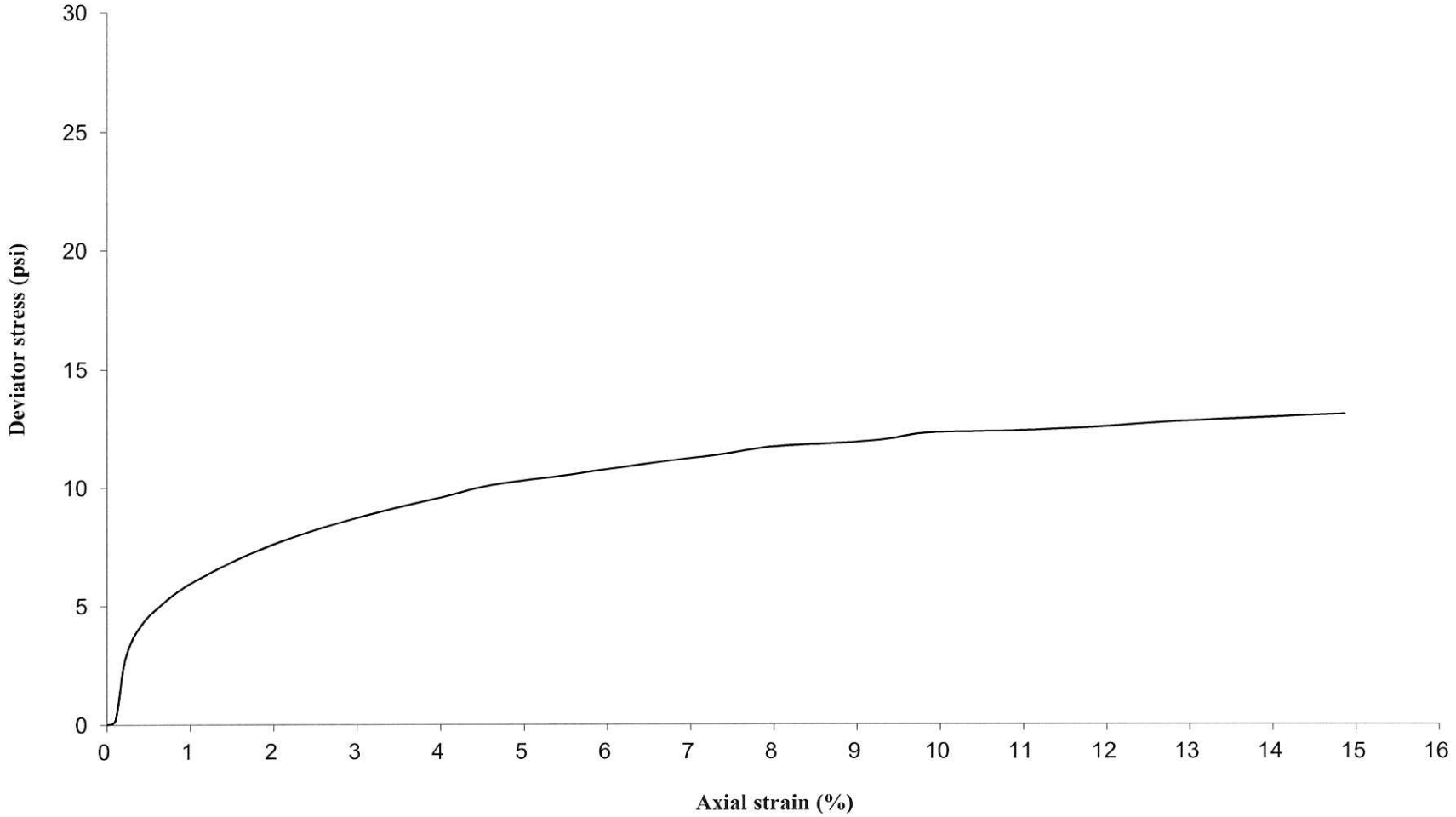
Unconsolidated-Undrained Triaxial Test

Deviator Stress v. Axial Strain

08-ST-01,ST#4 (18.0-20.0ft) @ 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: 08-ST-01,ST#6 (24.0-26.0ft)
Type/Condition: ST/Undisturbed

Analyst name: M. de los Reyes
Date received: 11/3/2014
Test date: 12/9/2014
Sample description: Gray SILTY CLAY

Initial height h_0 =	5.75 in	Initial water content w =	25.04%
Initial diameter d_0 =	2.81 in	Initial unit weight γ_w =	130.77 pcf
Initial area A_0 =	6.18 in^2	Initial dry unit weight γ_d =	104.58 pcf
Mass of wet sample and tare M_i =	1232.74 g	Initial void ratio e_0 =	0.659
Mass of dry sample and tare M_d =	988.70 g	Initial degree of saturation S_r =	100%
Mass of tare M_t =	14.14 g		
Mass of sample Ms=	1218.60 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 =	2.05		

Deviator stress at failure $D\sigma_f$ = 0.45 tsf
Major principal stress at failure σ_1 = 1.17 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	3.43	0.04	0.56
0.01	5.52	0.14	0.89
0.01	6.71	0.23	1.08
0.02	7.59	0.32	1.22
0.02	8.29	0.41	1.34
0.03	8.97	0.51	1.44
0.04	9.48	0.61	1.52
0.04	10.00	0.71	1.61
0.05	10.81	0.80	1.74
0.05	11.51	0.90	1.85
0.08	13.47	1.38	2.15
0.11	15.51	1.85	2.46
0.13	17.78	2.33	2.81
0.16	19.63	2.79	3.09
0.19	20.96	3.28	3.28
0.22	23.26	3.75	3.62
0.24	24.12	4.25	3.74
0.27	25.68	4.76	3.96
0.30	27.04	5.26	4.15
0.33	28.58	5.75	4.36
0.36	30.23	6.23	4.59
0.39	30.86	6.71	4.66
0.41	32.65	7.19	4.90
0.44	33.33	7.68	4.98
0.47	34.25	8.17	5.09
0.50	35.32	8.71	5.22
0.53	36.73	9.18	5.40
0.55	37.91	9.65	5.54
0.61	39.45	10.59	5.71
0.66	40.59	11.56	5.81
0.72	42.43	12.53	6.01
0.78	43.22	13.50	6.05
0.83	44.76	14.48	6.19

Bulge Failure

Prepared by: Jay Date: 12.17.14

Checked by: A. L. Date: 12/17/14

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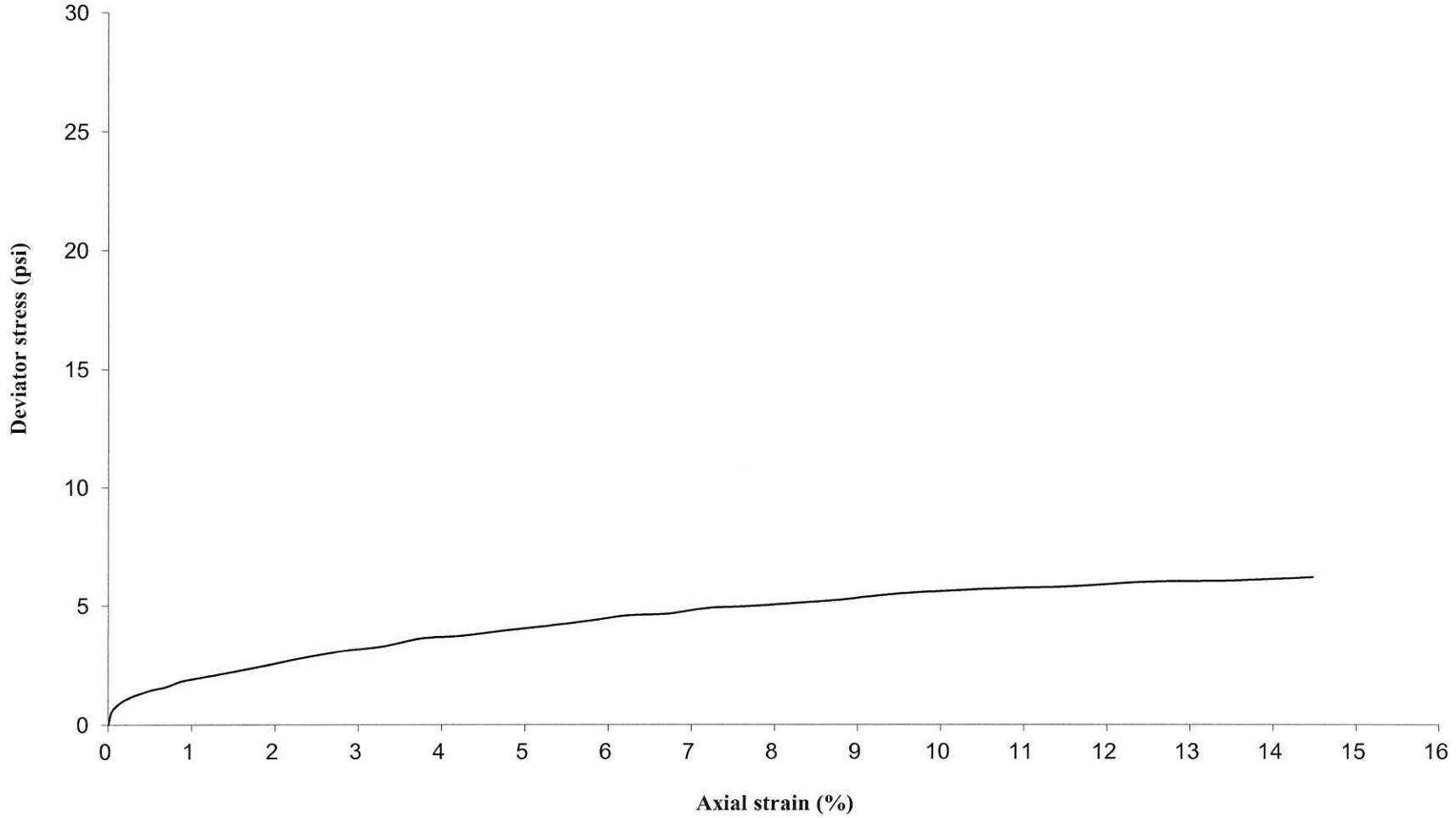
Unconsolidated-Undrained Triaxial Test

Deviator Stress v. Axial Strain

08-ST-01,ST#6 (24.0-26.0ft) @ 10 psi



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UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

AASHTO T 296 / ASTM D 2850-95

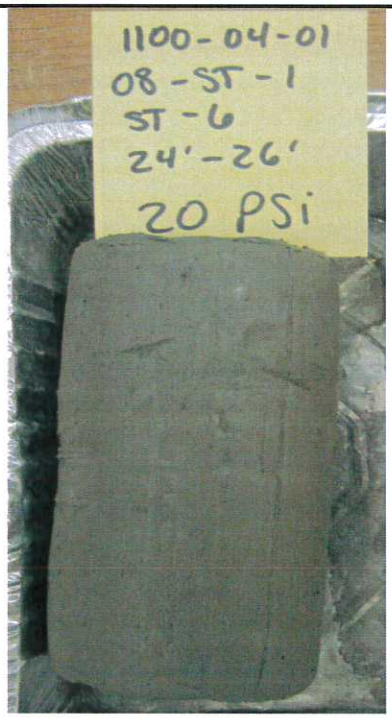
Project: Circle Interchange
Client: AECOM
WEI Job No.: 1100-04-01
Soil Sample ID: 08-ST-01, ST#6 (24.0-26.0ft)
Type/Condition: ST/Undisturbed

Analyst name: Example
Date received: Example
Test date: Example
Sample description: Example

Initial height h_0 =	5.81	in	Initial water content w =	25.30%	
Initial diameter d_0 =	2.83	in	Initial unit weight γ_w =	128.61	pcf
Initial area A_0 =	6.28	in^2	Initial dry unit weight γ_d =	102.64	pcf
Mass of wet sample and tare M_t =	1244.80	g	Initial void ratio e_0 =	0.690	
Mass of dry sample and tare M_d =	996.20	g	Initial degree of saturation S_r =	100%	
Mass of tare M_t =	13.60	g			
Mass of sample Ms=	1231.20	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 =	2.05				

Deviator stress at failure $D\sigma_f$ = 0.45 tsf
Major principal stress at failure σ_1 = 1.89 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	3.30	0.03	0.52
0.01	6.73	0.12	1.07
0.01	8.57	0.21	1.36
0.02	9.81	0.30	1.56
0.02	10.71	0.39	1.70
0.03	11.49	0.49	1.82
0.03	12.05	0.58	1.91
0.04	12.58	0.68	1.99
0.04	13.25	0.77	2.09
0.05	13.81	0.86	2.18
0.08	15.98	1.34	2.51
0.11	17.93	1.81	2.80
0.13	20.01	2.28	3.11
0.16	21.87	2.75	3.39
0.19	23.15	3.24	3.57
0.22	24.97	3.72	3.83
0.25	26.16	4.22	3.99
0.27	27.55	4.72	4.18
0.30	28.85	5.21	4.36
0.33	30.32	5.71	4.55
0.36	31.77	6.17	4.75
0.39	32.59	6.65	4.85
0.41	33.98	7.12	5.03
0.44	34.90	7.60	5.14
0.47	35.96	8.08	5.26
0.50	37.03	8.61	5.39
0.53	38.23	9.07	5.54
0.55	39.33	9.53	5.67
0.61	40.86	10.47	5.83
0.66	42.28	11.43	5.96
0.72	43.81	12.40	6.11
0.78	44.93	13.37	6.20
0.83	46.09	14.34	6.29



Bulge Failure

Prepared by: Jay Date: 12.17.14

Checked by: A.L. Date: 12/17/14

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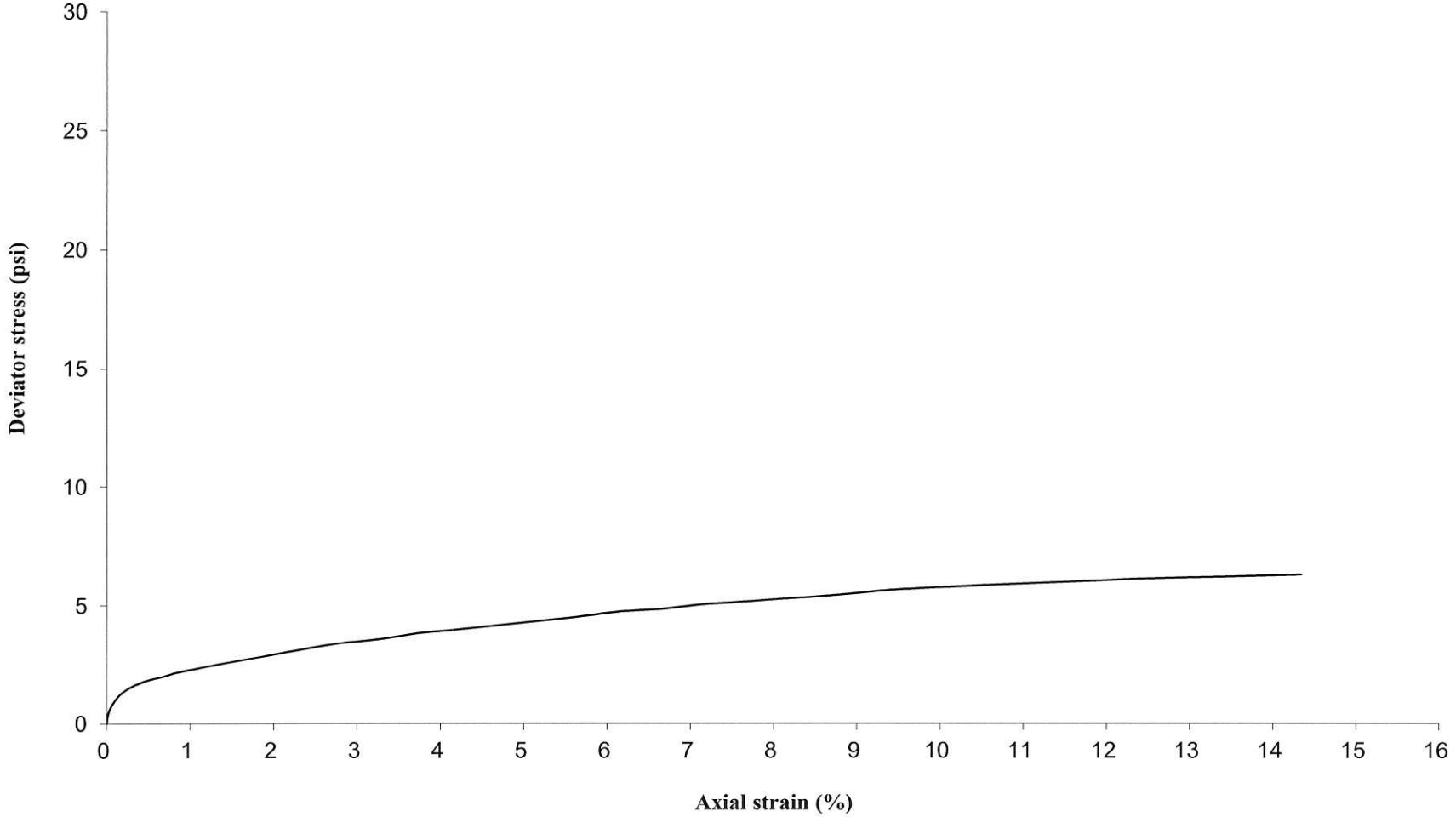
Unconsolidated-Undrained Triaxial Test

Deviator Stress v. Axial Strain

08-ST-01,ST#6 (24.0-26.0ft) @ 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: 08-ST-01,ST#6 (24.0-26.0ft)
Type/Condition: ST/Undisturbed

Analyst name: M. de los Reyes
Date received: 11/3/2014
Test date: 12/9/2014
Sample description: Gray SILTY CLAY

Initial height h_0 =	5.80 in	Initial water content w =	24.94%
Initial diameter d_0 =	2.83 in	Initial unit weight γ_w =	129.80 pcf
Initial area A_0 =	6.29 in^2	Initial dry unit weight γ_d =	103.89 pcf
Mass of wet sample and tare M_t =	1255.72 g	Initial void ratio e_0 =	0.670
Mass of dry sample and tare M_d =	1007.70 g	Initial degree of saturation S_r =	100%
Mass of tare M_t =	13.32 g		
Mass of sample Ms=	1242.40 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 =	2.05		

Deviator stress at failure $D\sigma_f$ = 0.42 tsf
Major principal stress at failure σ_1 = 3.30 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	2.72	0.05	0.43
0.01	4.52	0.14	0.72
0.01	5.90	0.23	0.94
0.02	7.03	0.32	1.11
0.02	8.01	0.41	1.27
0.03	8.85	0.51	1.40
0.04	9.60	0.61	1.52
0.04	10.30	0.71	1.63
0.05	10.93	0.81	1.72
0.05	11.51	0.90	1.81
0.08	13.93	1.38	2.18
0.11	16.03	1.86	2.50
0.14	17.89	2.34	2.78
0.16	19.57	2.82	3.02
0.19	21.06	3.30	3.24
0.22	22.55	3.77	3.45
0.25	23.95	4.29	3.64
0.28	25.30	4.78	3.83
0.31	26.61	5.27	4.01
0.33	27.81	5.75	4.17
0.36	29.00	6.21	4.32
0.39	30.05	6.68	4.46
0.41	31.11	7.14	4.59
0.44	32.09	7.63	4.71
0.47	33.09	8.11	4.83
0.50	34.10	8.64	4.95
0.53	34.98	9.11	5.05
0.55	35.85	9.57	5.15
0.61	37.35	10.50	5.31
0.67	38.83	11.49	5.46
0.72	40.12	12.47	5.58
0.78	41.30	13.43	5.68
0.83	42.45	14.40	5.77

Bulge Failure

Prepared by: Jay Date: 12.17.14

Checked by: A. L Date: 12/17/14

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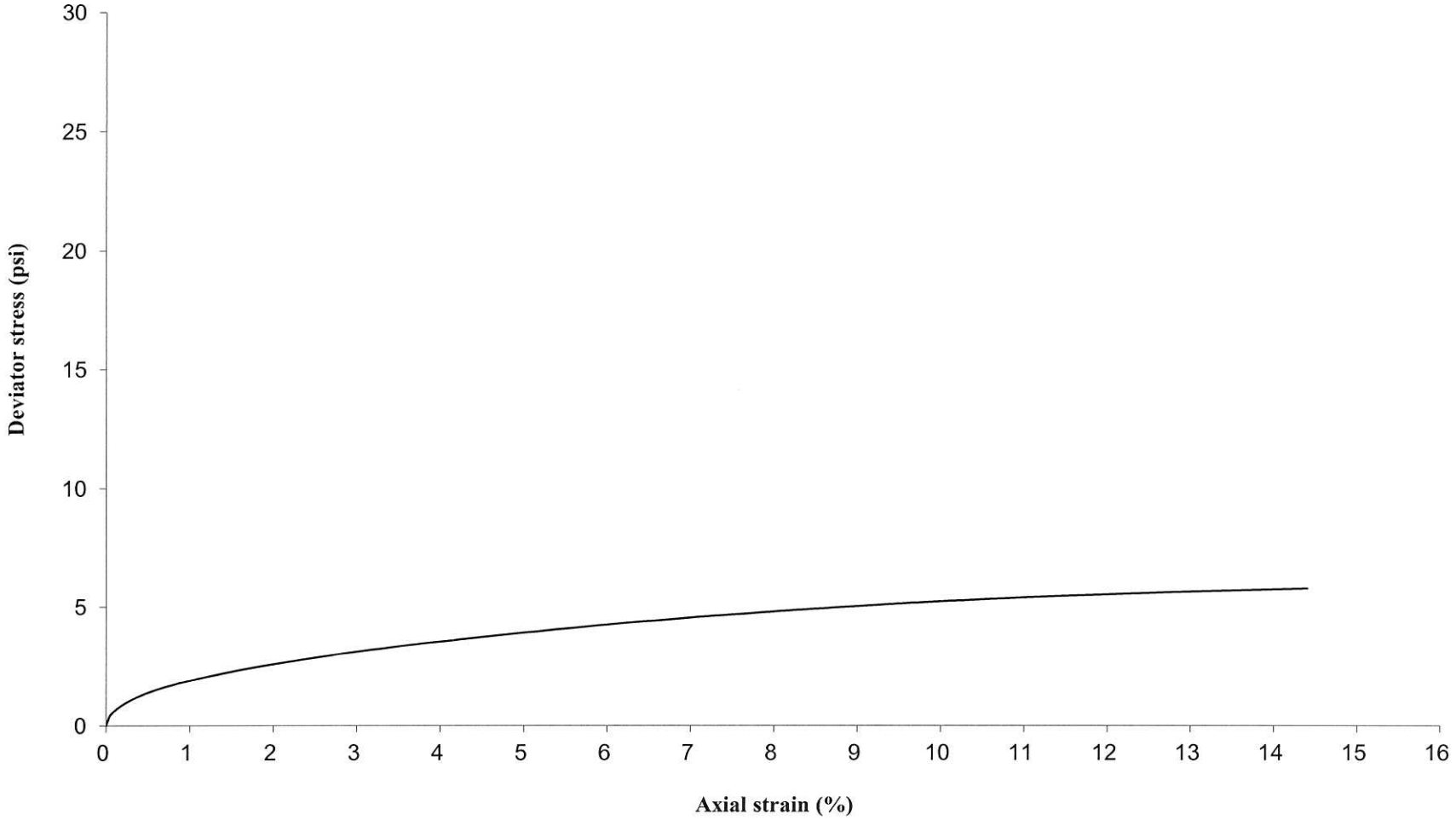
Unconsolidated-Undrained Triaxial Test

Deviator Stress v. Axial Strain

08-ST-01,ST#6 (24.0-26.0ft) @ 40 psi



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UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

AASHTO T 296 / ASTM D 2850-95

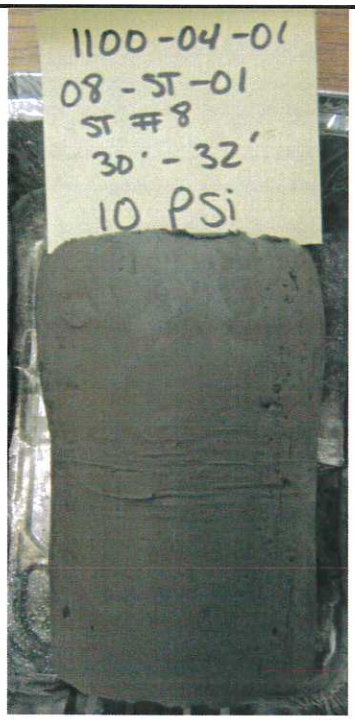
Project: Circle Interchange
Client: AECOM
WEI Job No.: 1100-04-01
Soil Sample ID: 08-ST-01, ST#8 (30.0-32.0ft)
Type/Condition: ST/Undisturbed

Analyst name: M. de los Reyes
Date received: 11/3/2014
Test date: 12/9/2014
Sample description: Soft Gray SILTY CLAY

Initial height h_0 =	5.91	in	Initial water content w =	24.19%	
Initial diameter d_0 =	2.82	in	Initial unit weight γ_w =	129.86	pcf
Initial area A_0 =	6.25	in^2	Initial dry unit weight γ_d =	104.57	pcf
Mass of wet sample and tare M_t =	1272.70	g	Initial void ratio e_0 =	0.659	
Mass of dry sample and tare M_d =	1027.40	g	Initial degree of saturation S_r =	100%	
Mass of tare M_t =	13.30	g			
Mass of sample Ms=	1259.40	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 =	2.09				

Deviator stress at failure $D\sigma_f$ = 0.88 tsf
Major principal stress at failure σ_1 = 1.60 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	5.20	0.11	0.83
0.01	9.49	0.22	1.51
0.02	12.49	0.32	1.99
0.03	15.00	0.43	2.39
0.03	17.23	0.54	2.74
0.04	18.79	0.64	2.99
0.04	20.26	0.73	3.22
0.05	22.10	0.86	3.50
0.06	23.88	0.97	3.78
0.06	24.61	1.03	3.90
0.09	31.25	1.59	4.92
0.12	36.15	2.05	5.66
0.15	41.35	2.62	6.44
0.18	45.70	3.12	7.08
0.22	50.11	3.66	7.72
0.25	54.36	4.21	8.33
0.28	57.67	4.68	8.79
0.31	61.59	5.22	9.34
0.34	64.74	5.72	9.76
0.37	68.08	6.27	10.21
0.40	71.14	6.79	10.61
0.43	74.01	7.31	10.97
0.46	76.68	7.82	11.31
0.49	79.16	8.32	11.61
0.52	81.76	8.88	11.92
0.56	84.12	9.39	12.19
0.58	85.92	9.89	12.38
0.62	88.03	10.43	12.61
0.68	91.55	11.46	12.97
0.74	94.89	12.48	13.28
0.80	98.10	13.56	13.56
0.86	100.80	14.57	13.77
0.92	103.52	15.64	13.97



Bulge Failure

Prepared by: _____ Date: 12.17.14

Checked by: _____ Date: 12/17/14

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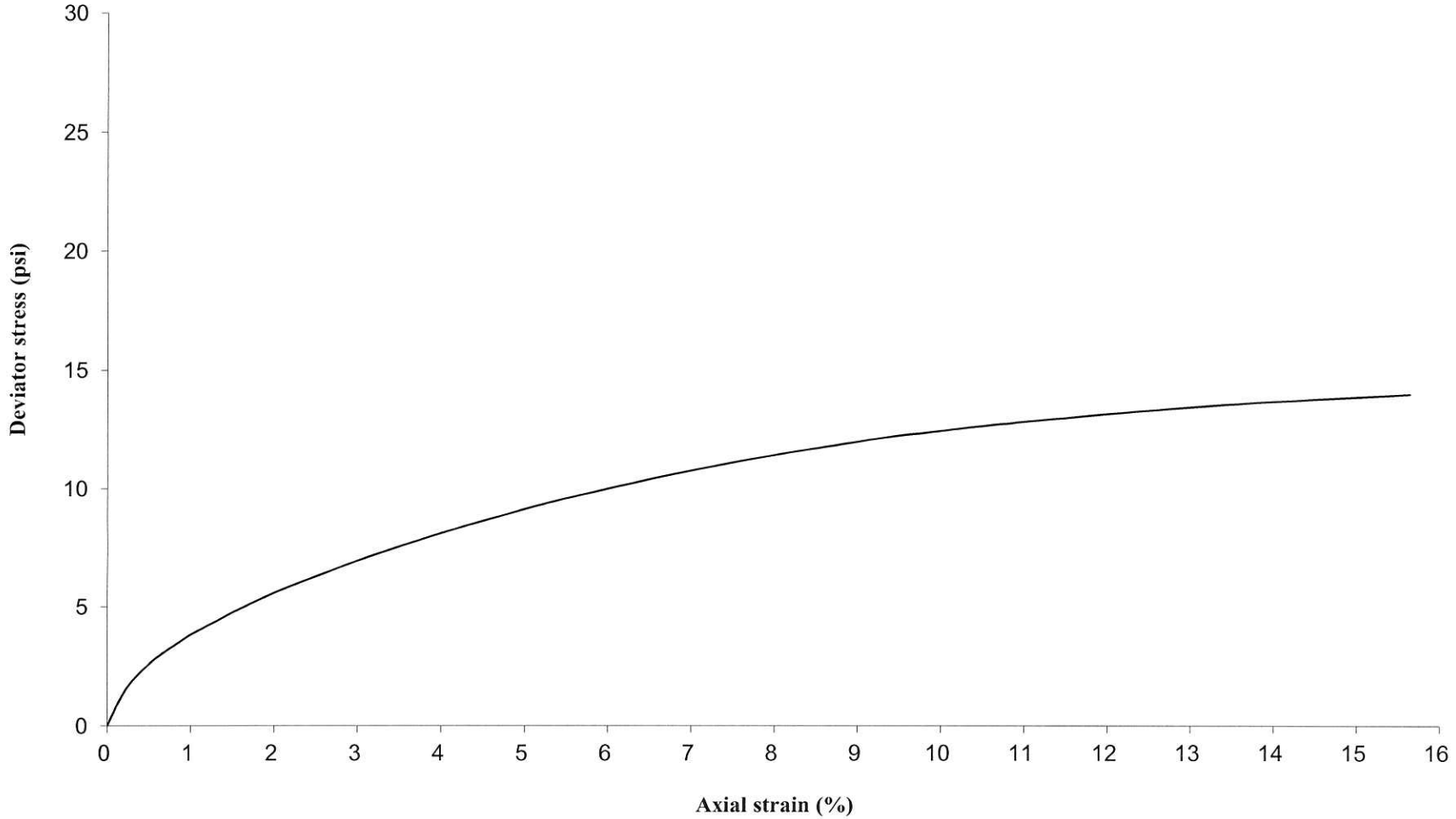
Unconsolidated-Undrained Triaxial Test

Deviator Stress v. Axial Strain

08-ST-01,ST#8 (30.0-32.0ft) @ 10 psi



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UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

AASHTO T 296 / ASTM D 2850-95

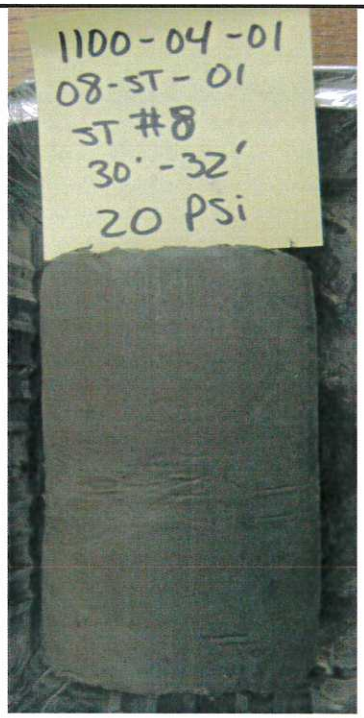
Project: Circle Interchange
Client: AECOM
WEI Job No.: 1100-04-01
Soil Sample ID: 08-ST-01, ST#8 (30.0-32.0ft)
Type/Condition: ST/Undisturbed

Analyst name: M. de los Reyes
Date received: 11/3/2014
Test date: 12/9/2014
Sample description: Soft Gray SILTY CLAY

Initial height h_0 =	5.67 in	Initial water content w =	24.36%
Initial diameter d_0 =	2.84 in	Initial unit weight γ_w =	129.16 pcf
Initial area A_0 =	6.34 in^2	Initial dry unit weight γ_d =	103.86 pcf
Mass of wet sample and tare M_t =	1231.22 g	Initial void ratio e_0 =	0.670
Mass of dry sample and tare M_d =	992.70 g	Initial degree of saturation S_r =	100%
Mass of tare M_t =	13.72 g		
Mass of sample Ms=	1217.50 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 =	1.99		

Deviator stress at failure $D\sigma_f$ = 0.86 tsf
Major principal stress at failure σ_1 = 2.30 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	5.20	0.11	0.82
0.01	9.49	0.23	1.49
0.02	12.49	0.34	1.96
0.03	15.00	0.45	2.36
0.03	17.23	0.57	2.70
0.04	18.79	0.67	2.95
0.04	20.26	0.76	3.17
0.05	22.10	0.89	3.46
0.06	23.88	1.01	3.73
0.06	24.61	1.07	3.84
0.09	31.25	1.66	4.85
0.12	36.15	2.14	5.58
0.15	41.35	2.73	6.35
0.18	45.70	3.25	6.98
0.22	50.11	3.82	7.60
0.25	54.36	4.39	8.20
0.28	57.67	4.88	8.66
0.31	61.59	5.44	9.19
0.34	64.74	5.97	9.61
0.37	68.08	6.54	10.04
0.40	71.14	7.08	10.43
0.43	74.01	7.63	10.79
0.46	76.68	8.16	11.11
0.49	79.16	8.68	11.41
0.52	81.76	9.26	11.71
0.56	84.12	9.79	11.97
0.58	85.92	10.32	12.16
0.62	88.03	10.88	12.38
0.68	91.55	11.95	12.72
0.74	94.89	13.02	13.02
0.80	98.10	14.14	13.29
0.86	100.80	15.19	13.49
0.92	103.52	16.31	13.67



Bulge Failure

Prepared by: _____ Date: 12.17.14

Checked by: _____ Date: 12/17/14

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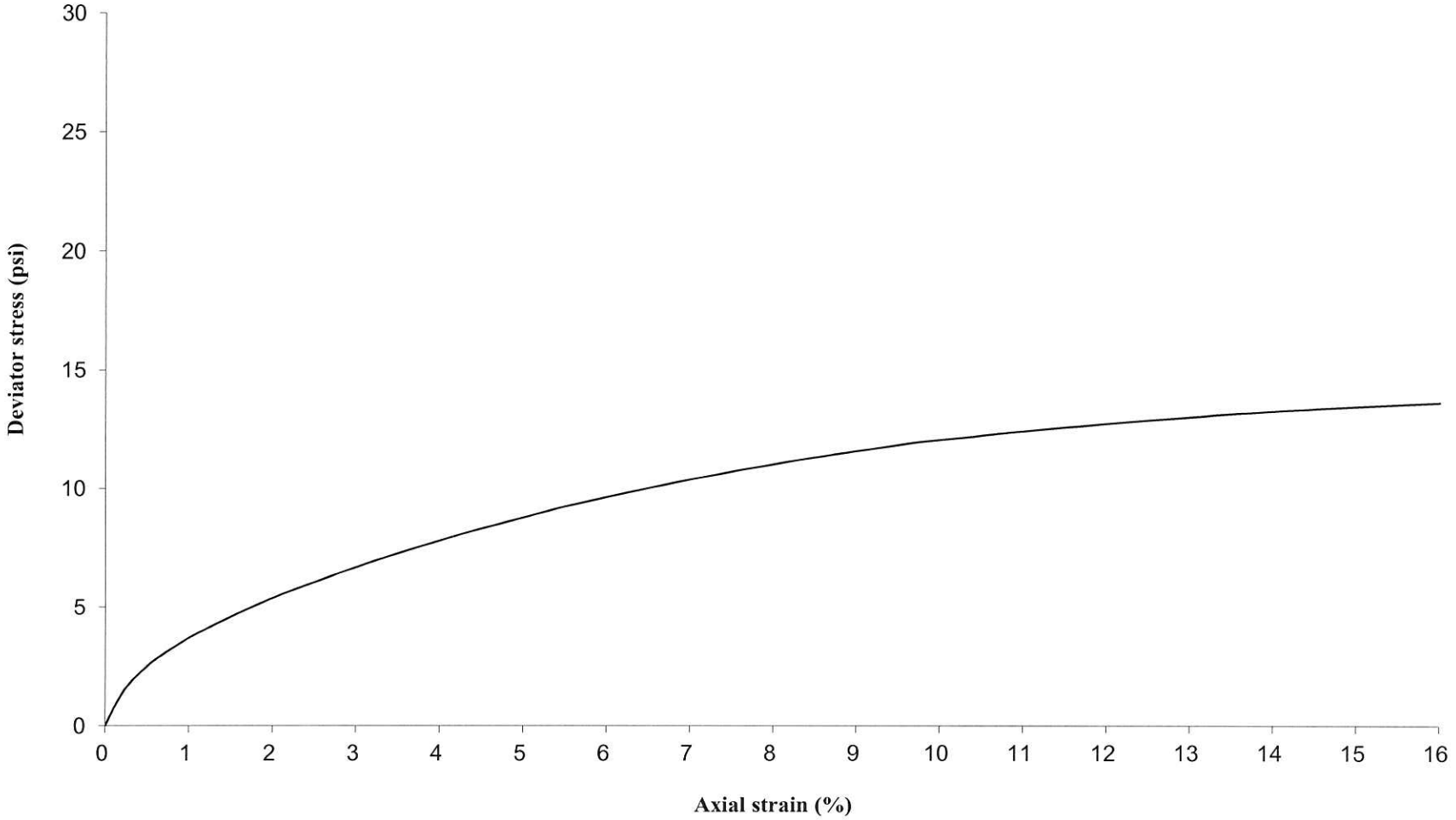
Unconsolidated-Undrained Triaxial Test

Deviator Stress v. Axial Strain

08-ST-01,ST#8 (30.0-32.0ft) @ 20 psi



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UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

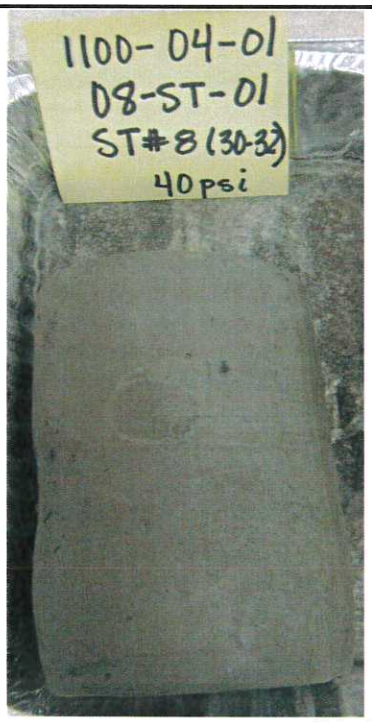
AASHTO T 296 / ASTM D 2850-95

Project: Circle Interchange
Client: AECOM
WEI Job No.: 1100-04-01
Soil Sample ID: 08-ST-01, ST#8 (30.0-32.0ft)
Type/Condition: ST/Undisturbed

Analyst name: M. de los Reyes
Date received: 11/3/2014
Test date: 12/10/2014
Sample description: Soft Gray SILTY CLAY

Initial height h_0 =	5.74 in	Initial water content w =	23.83%
Initial diameter d_0 =	2.85 in	Initial unit weight γ_w =	128.85 pcf
Initial area A_0 =	6.39 in^2	Initial dry unit weight γ_d =	104.06 pcf
Mass of wet sample and tare M_t =	1252.67 g	Initial void ratio e_0 =	0.667
Mass of dry sample and tare M_d =	1014.20 g	Initial degree of saturation S_r =	99%
Mass of tare M_t =	13.47 g		
Mass of sample Ms=	1239.20 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 =	2.01		
		Deviator stress at failure $D\sigma_f$ =	**0.86 tsf**
		Major principal stress at failure σ_1 =	**3.74 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	5.20	0.11	0.81
0.01	9.49	0.22	1.48
0.02	12.49	0.33	1.95
0.03	15.00	0.45	2.34
0.03	17.23	0.56	2.68
0.04	18.79	0.66	2.92
0.04	20.26	0.75	3.15
0.05	22.10	0.88	3.43
0.06	23.88	1.00	3.70
0.06	24.61	1.06	3.81
0.09	31.25	1.64	4.81
0.12	36.15	2.12	5.54
0.15	41.35	2.70	6.30
0.18	45.70	3.21	6.92
0.22	50.11	3.77	7.55
0.25	54.36	4.34	8.14
0.28	57.67	4.82	8.59
0.31	61.59	5.38	9.12
0.34	64.74	5.90	9.54
0.37	68.08	6.46	9.97
0.40	71.14	7.00	10.36
0.43	74.01	7.54	10.71
0.46	76.68	8.06	11.04
0.49	79.16	8.58	11.33
0.52	81.76	9.15	11.63
0.56	84.12	9.68	11.89
0.58	85.92	10.20	12.08
0.62	88.03	10.75	12.30
0.68	91.55	11.81	12.64
0.74	94.89	12.86	12.94
0.80	98.10	13.97	13.21
0.86	100.80	15.01	13.41
0.92	103.52	16.12	13.59



Bulge Failure

Prepared by: _____ Date: 12.17.14

Checked by: _____ Date: 12/17/14

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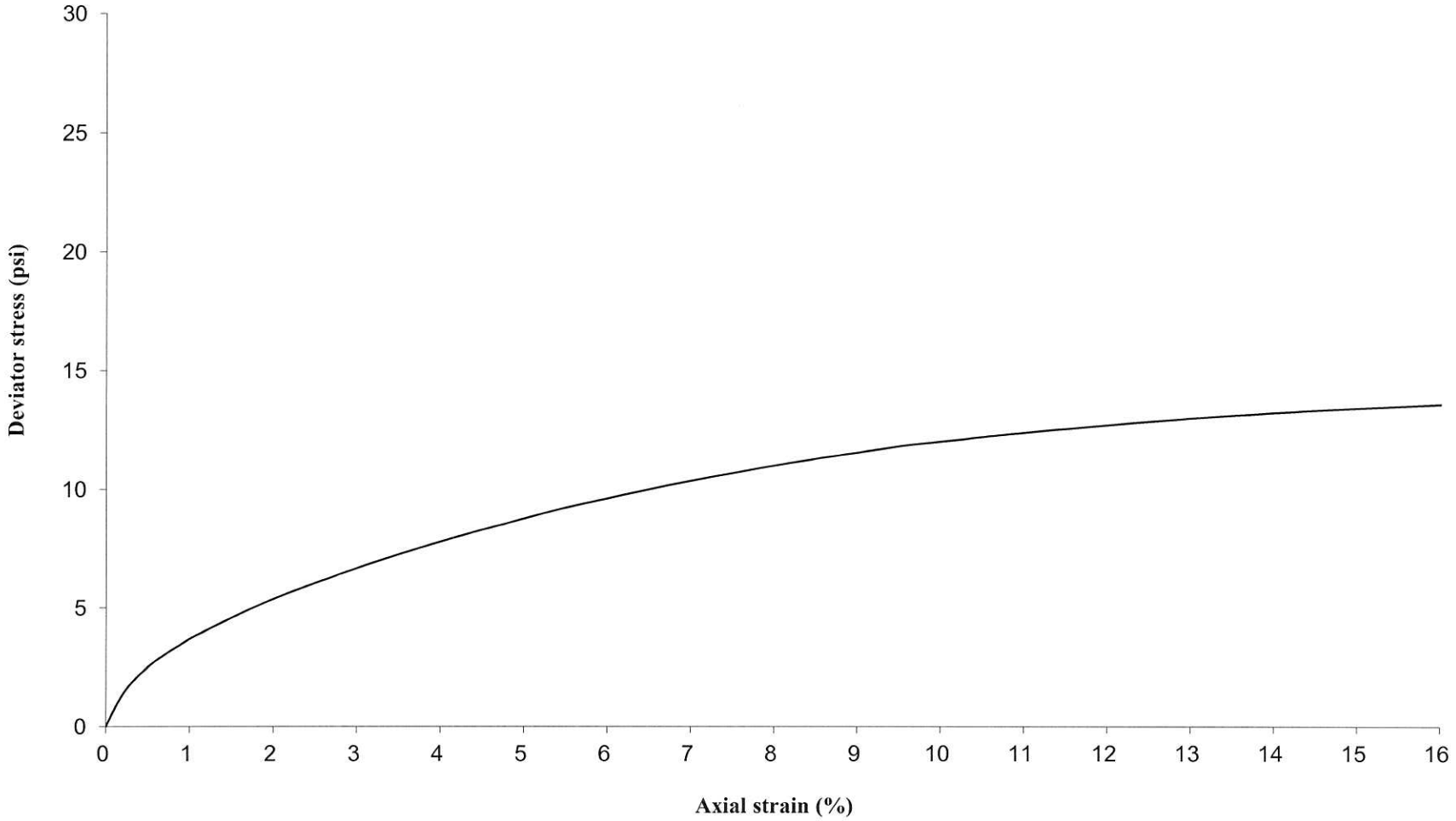
Unconsolidated-Undrained Triaxial Test

Deviator Stress v. Axial Strain

08-ST-01,ST#8 (30.0-32.0ft) @ 40 psi



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UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

AASHTO T 296 / ASTM D 2850-95

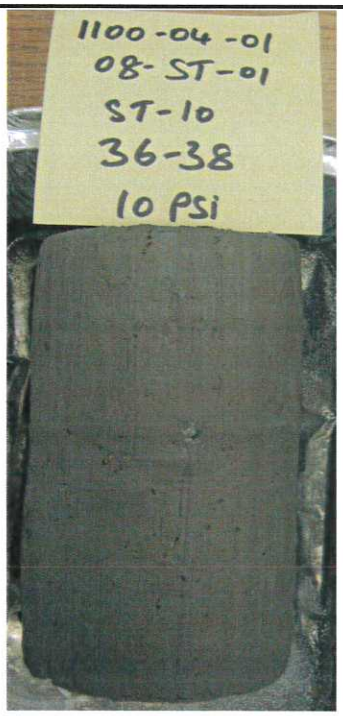
Project: Circle Interchange
Client: AECOM
WEI Job No.: 1100-04-01
Soil Sample ID: 08-ST-01 ST#10 (36.0-38.0ft)
Type/Condition: ST/Undisturbed

Analyst name: A. Mohammed
Date received: 11/3/2014
Test date: 12/12/2014
Sample description: Soft Gray SILTY CLAY

Initial height h_0 =	5.88 in	Initial water content w =	24.70%
Initial diameter d_0 =	2.84 in	Initial unit weight γ_w =	128.21 pcf
Initial area A_0 =	6.32 in^2	Initial dry unit weight γ_d =	102.81 pcf
Mass of wet sample and tare M_t =	1263.86 g	Initial void ratio e_0 =	0.687
Mass of dry sample and tare M_d =	1016.20 g	Initial degree of saturation S_r =	100%
Mass of tare M_t =	13.66 g		
Mass of sample Ms=	1250.20 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 =	2.07		

Deviator stress at failure $D\sigma_f$ = 1.00 tsf
Major principal stress at failure σ_1 = 1.72 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	12.40	0.08	1.96
0.01	20.05	0.17	3.17
0.02	22.62	0.26	3.57
0.02	24.72	0.35	3.90
0.03	26.55	0.44	4.18
0.03	28.07	0.54	4.42
0.04	29.62	0.64	4.66
0.04	30.94	0.74	4.86
0.05	32.15	0.83	5.04
0.05	33.63	0.92	5.27
0.08	40.90	1.40	6.38
0.11	47.00	1.86	7.30
0.14	52.00	2.31	8.04
0.16	56.78	2.76	8.73
0.19	60.65	3.22	9.29
0.22	64.19	3.68	9.78
0.24	67.46	4.15	10.23
0.27	70.45	4.62	10.63
0.30	73.08	5.09	10.97
0.33	76.27	5.55	11.40
0.35	79.39	6.02	11.80
0.38	80.49	6.50	11.91
0.41	82.10	6.98	12.08
0.44	84.27	7.46	12.34
0.47	85.89	7.94	12.51
0.50	87.51	8.47	12.67
0.52	90.47	8.93	13.03
0.55	92.33	9.39	13.23
0.61	92.85	10.32	13.17
0.66	95.54	11.25	13.41
0.72	99.18	12.17	13.78
0.77	99.70	13.09	13.71
0.82	101.77	14.02	13.84



Bulge Failure

Prepared by: Jay Date: 12.17.14

Checked by: A. M Date: 12/17/14

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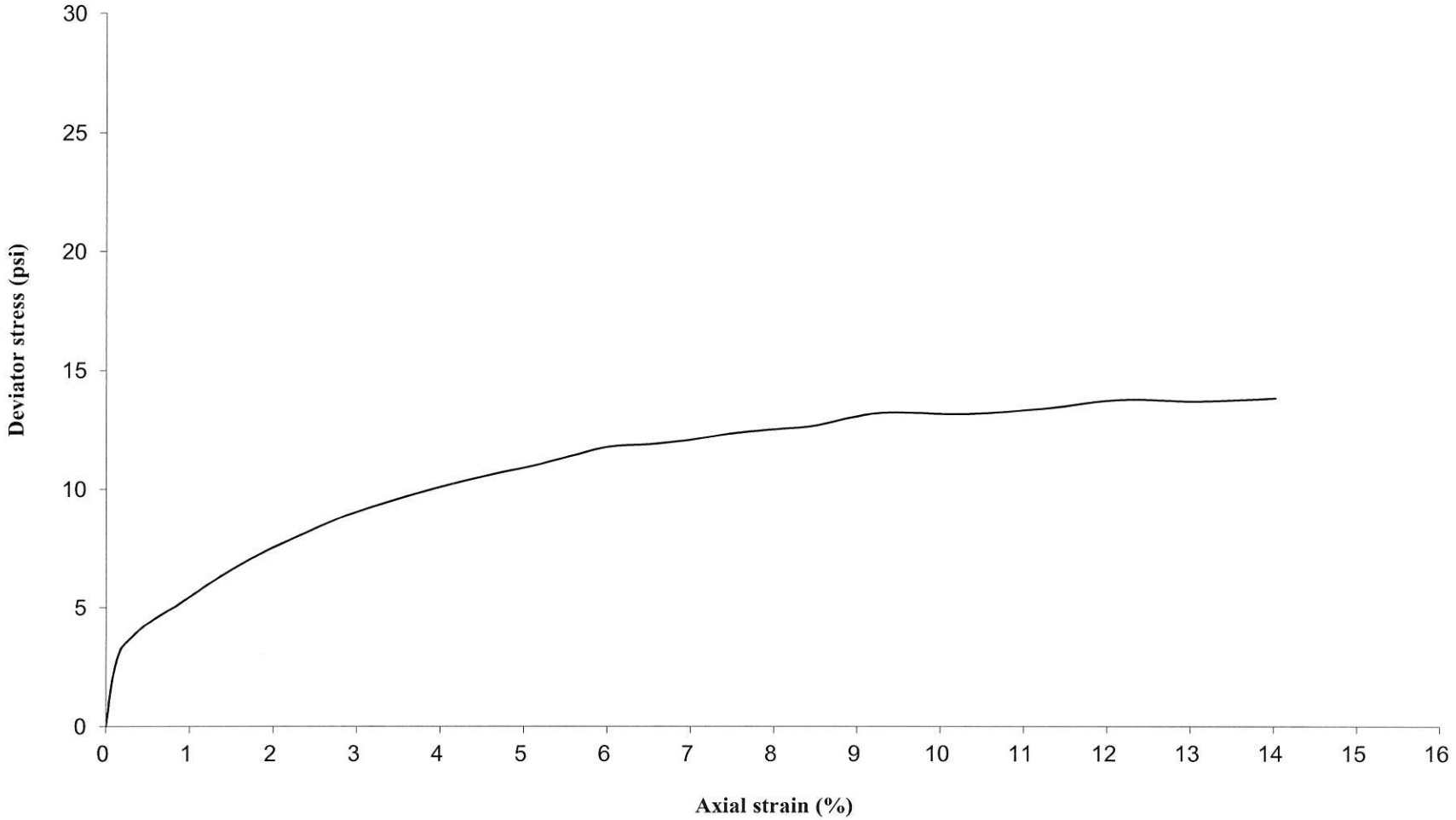
Unconsolidated-Undrained Triaxial Test

Deviator Stress v. Axial Strain

08-ST-01,ST#10 (36.0-38.0ft) @ 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: 08-ST-01, ST#10 (36.0-38.0ft)
Type/Condition: ST/Undisturbed

Analyst name: A. Mohammed
Date received: 11/3/2014
Test date: 12/12/2014
Sample description: Soft Gray SILTY CLAY

Initial height h_0 =	5.89	in	Initial water content w =	23.92%	
Initial diameter d_0 =	2.83	in	Initial unit weight γ_w =	130.11	pcf
Initial area A_0 =	6.29	in^2	Initial dry unit weight γ_d =	104.99	pcf
Mass of wet sample and tare M_t =	1277.35	g	Initial void ratio e_0 =	0.652	
Mass of dry sample and tare M_d =	1033.40	g	Initial degree of saturation S_r =	100%	
Mass of tare M_t =	13.65	g			
Mass of sample Ms=	1263.70	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 =	2.08				

Deviator stress at failure $D\sigma_f$ = 0.95 tsf
Major principal stress at failure σ_1 = 2.39 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	1.60	0.07	0.25
0.01	7.85	0.16	1.25
0.01	15.95	0.25	2.53
0.02	19.57	0.34	3.10
0.03	21.56	0.43	3.42
0.03	23.03	0.53	3.64
0.04	24.35	0.63	3.85
0.04	25.60	0.72	4.04
0.05	27.02	0.82	4.26
0.05	28.41	0.91	4.48
0.08	33.84	1.38	5.31
0.11	39.50	1.83	6.17
0.13	44.47	2.28	6.91
0.16	48.63	2.73	7.53
0.19	51.44	3.19	7.92
0.21	55.00	3.65	8.43
0.24	58.63	4.13	8.94
0.27	61.86	4.61	9.39
0.30	65.10	5.08	9.83
0.33	68.40	5.56	10.28
0.35	70.85	6.03	10.59
0.38	72.18	6.50	10.74
0.41	74.20	6.97	10.98
0.44	76.61	7.45	11.28
0.47	78.72	7.93	11.53
0.50	81.01	8.44	11.80
0.52	83.52	8.90	12.10
0.55	84.80	9.35	12.23
0.60	86.72	10.27	12.38
0.66	89.75	11.21	12.68
0.71	93.21	12.13	13.03
0.77	94.12	13.05	13.02
0.82	96.01	13.99	13.14

Bulge Failure

Prepared by: Jay Date: 12.17.14

Checked by: AL Date: 12/17/14

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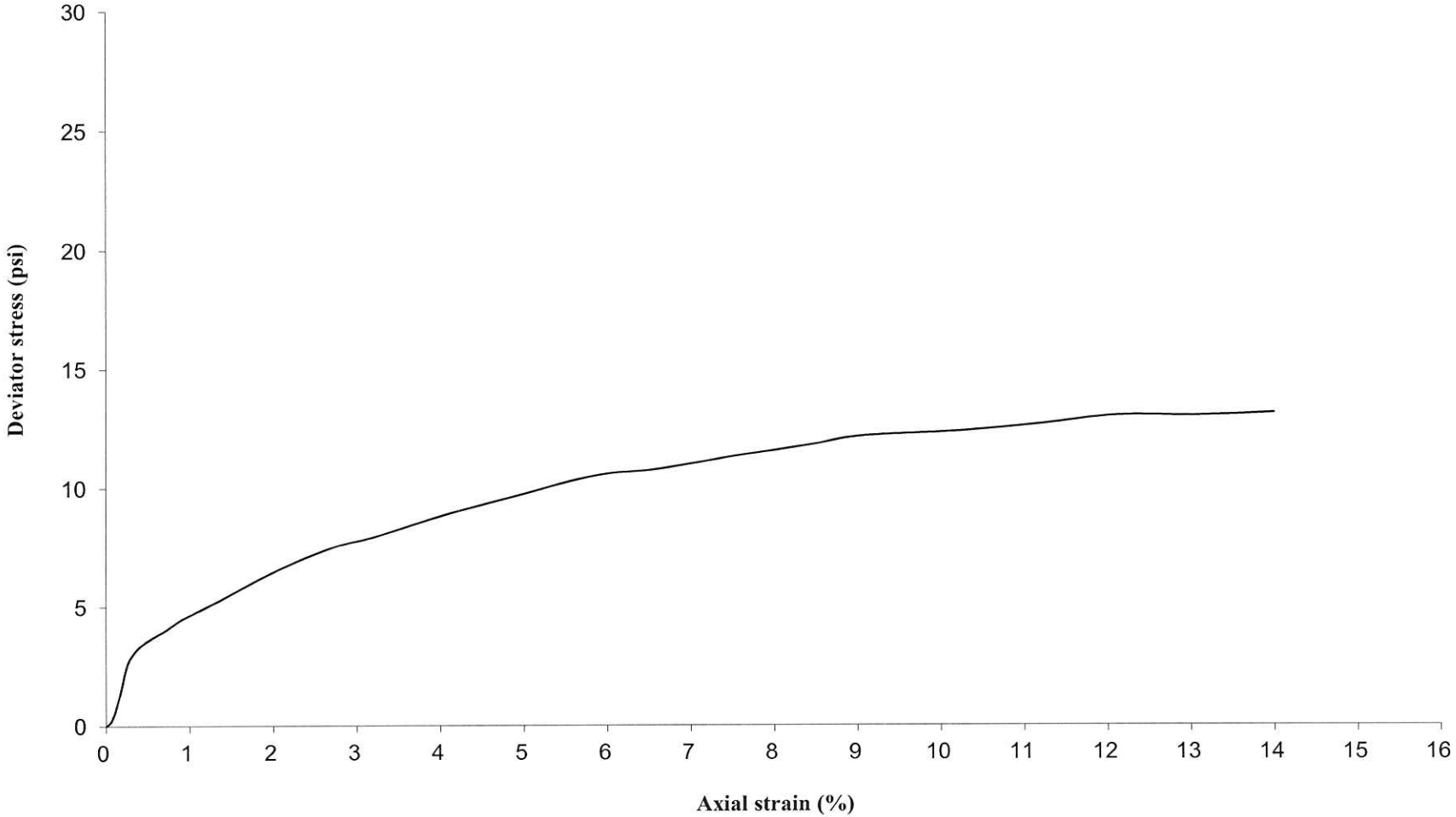
Unconsolidated-Undrained Triaxial Test

Deviator Stress v. Axial Strain

08-ST-01,ST#10 (36.0-38.0ft) @ 20 psi



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UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

AASHTO T 296 / ASTM D 2850-95

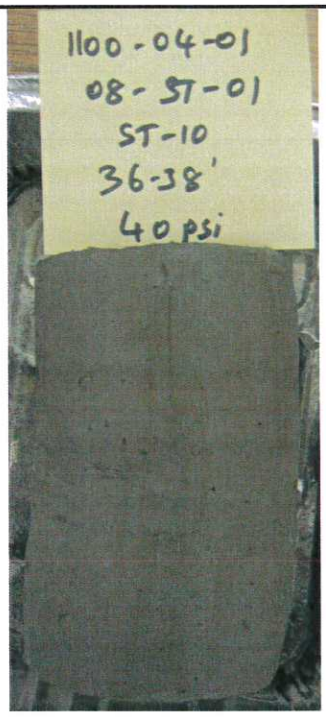
Project: Circle Interchnage
Client: AECOM
WEI Job No.: 1100-04-01
Soil Sample ID: 08-ST-01, ST#10 (36.0-38.0ft)
Type/Condition: ST/Undisturbed

Analyst name: A. Mohammed
Date received: 11/3/2014
Test date: 12/12/2014
Sample description: Soft Gray SILTY CLAY

Initial height h_0 =	5.88 in	Initial water content w =	22.81%
Initial diameter d_0 =	2.85 in	Initial unit weight γ_w =	129.67 pcf
Initial area A_0 =	6.36 in^2	Initial dry unit weight γ_d =	105.58 pcf
Mass of wet sample and tare M_i =	1286.16 g	Initial void ratio e_0 =	0.643
Mass of dry sample and tare M_d =	1049.70 g	Initial degree of saturation S_r =	99%
Mass of tare M_t =	13.26 g		
Mass of sample Ms=	1272.90 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 =	2.07		

Deviator stress at failure $D\sigma_f$ = 0.90 tsf
Major principal stress at failure σ_1 = 3.78 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	7.23	0.09	1.14
0.01	13.62	0.19	2.14
0.02	16.27	0.29	2.55
0.02	18.19	0.38	2.85
0.03	19.63	0.47	3.07
0.03	20.96	0.57	3.28
0.04	22.18	0.66	3.47
0.04	23.30	0.75	3.64
0.05	24.48	0.85	3.82
0.06	25.51	0.95	3.97
0.08	30.56	1.40	4.74
0.11	35.52	1.86	5.48
0.14	40.09	2.31	6.16
0.16	43.81	2.78	6.70
0.19	45.64	3.24	6.95
0.22	49.07	3.70	7.43
0.25	52.61	4.18	7.93
0.27	54.98	4.66	8.25
0.30	58.29	5.13	8.70
0.33	61.88	5.60	9.19
0.36	64.62	6.09	9.55
0.39	64.87	6.56	9.54
0.41	67.70	7.03	9.90
0.44	70.24	7.51	10.22
0.47	71.69	7.99	10.38
0.50	74.58	8.49	10.74
0.53	77.63	8.95	11.12
0.55	79.42	9.42	11.32
0.61	81.30	10.33	11.47
0.66	83.95	11.27	11.72
0.72	88.89	12.19	12.28
0.77	88.41	13.13	12.08
0.83	92.18	14.07	12.46



Bulge Failure

Prepared by: Jay Date: 12.17.14

Checked by: A-L Date: 12/17/14

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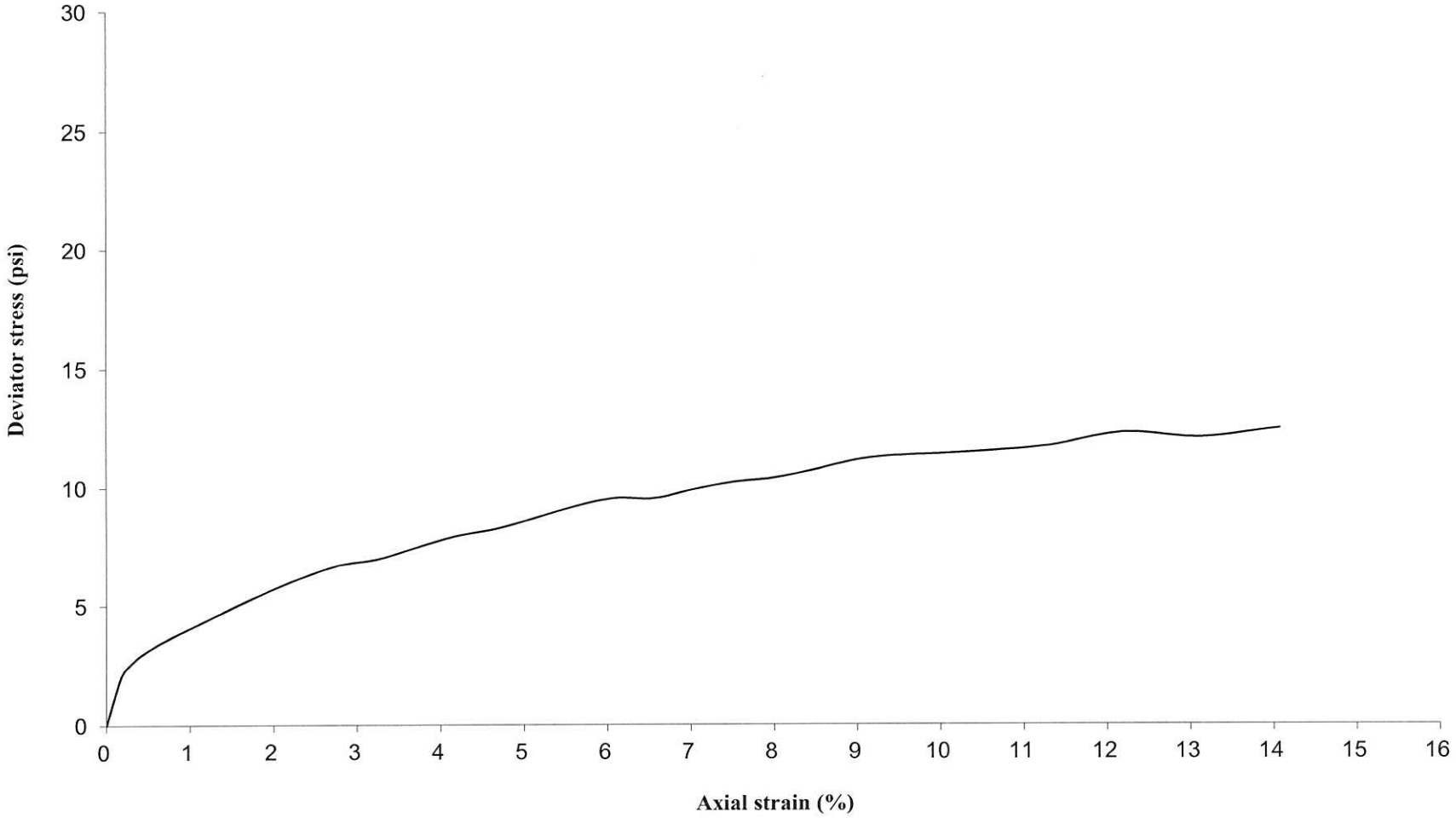
Unconsolidated-Undrained Triaxial Test

Deviator Stress v. Axial Strain

08-ST-01,ST#10 (36.0-38.0ft) @ 40 psi



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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: 08-ST-01, ST#12 (42.0-44.0ft)
Type/Condition: ST/Undisturbed
Liquid Limit (%): NA
Plastic Limit (%): NA

Analyst name: A. Mohammed
Date received: 11/3/2014
Test date: 12/11/2014
Sample description: Gray Silty Clay

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

Average initial height h_0 =	6.01	in
Average initial diameter d_0 =	2.87	in
Height to diameter ratio=	2.09	
Mass of wet sample =	1330.30	g
Mass of dry sample and tare =	1111.90	g
Mass of tare =	13.60	g
Specific gravity =	2.76	(estimated)

Initial water content w =	21.12%	(specimen)
Initial unit weight g =	130.41	pcf
Initial dry unit weight g_d =	107.67	pcf
Initial void ratio e_0 =	0.60	
Initial degree of saturation S_r =	97%	
Average Rate of Strain=	1%/min	
Unconfined compressive strength q_u =	0.39	tsf
Shear Strength=	0.20	tsf

Displacement (in) Δh	Force (lbs) F	Strain (%) e	Stress (tsf) s
0.00	0.00	0.00	0.00
0.03	5.19	0.50	0.06
0.06	8.30	1.00	0.09
0.09	10.37	1.50	0.11
0.12	14.52	2.00	0.16
0.15	16.59	2.50	0.18
0.18	20.74	3.00	0.22
0.21	20.74	3.49	0.22
0.24	22.81	3.99	0.24
0.27	24.89	4.49	0.26
0.30	26.96	4.99	0.29
0.35	26.96	5.82	0.28
0.40	29.04	6.66	0.30
0.45	31.11	7.49	0.32
0.50	33.18	8.32	0.34
0.55	33.18	9.15	0.34
0.60	35.26	9.99	0.35
0.65	35.26	10.82	0.35
0.70	37.33	11.65	0.37
0.80	38.37	13.31	0.37
0.90	41.48	14.98	0.39

NOTES:

Prepared by: Jay Date: 12.16.14

Checked by: A.L. Date: 12/16/14

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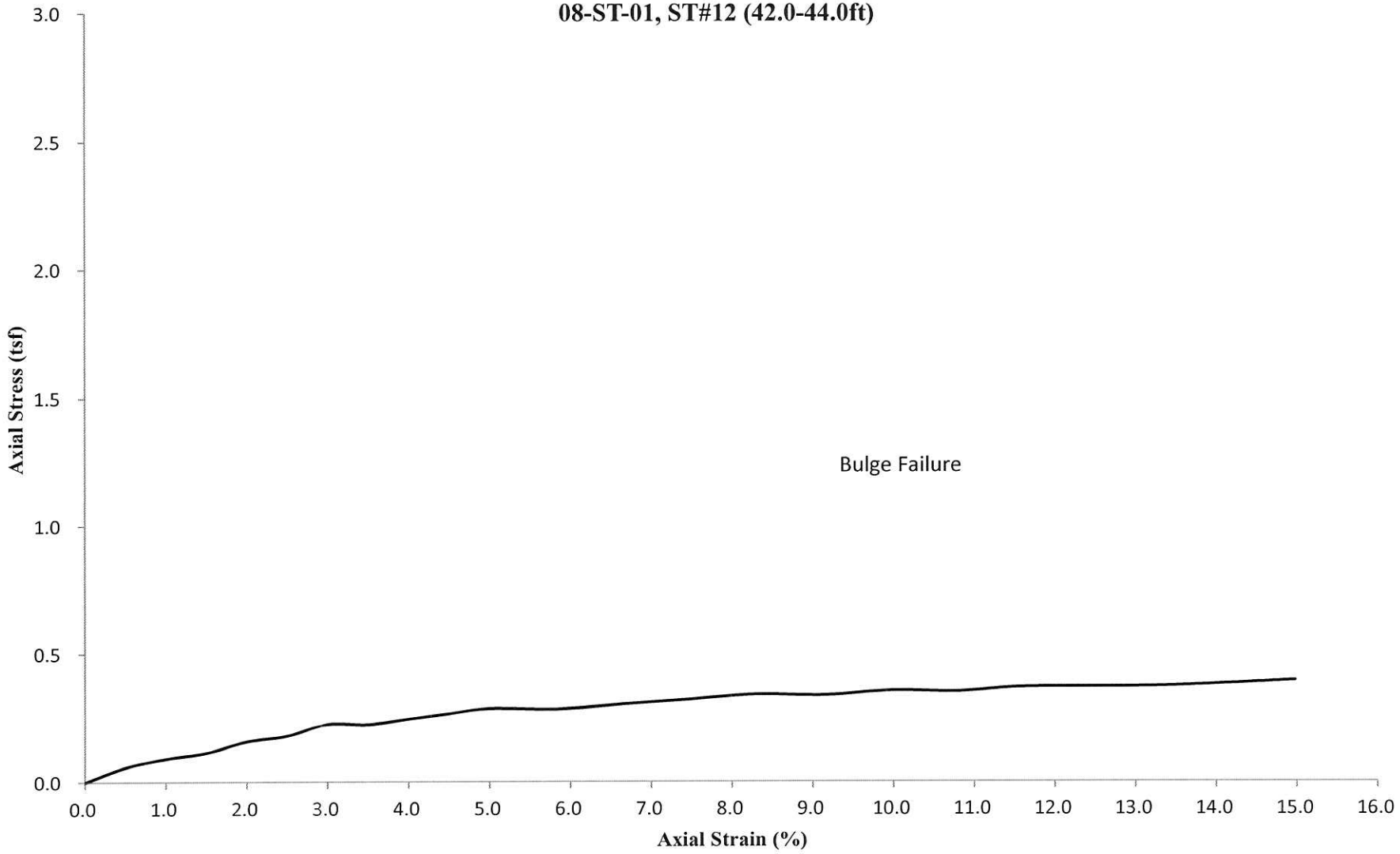
Unconfined Axial Stress v. Axial Strain
08-ST-01, ST#12 (42.0-44.0ft)



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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: 08-ST-01, ST#13 (45.0-47.0ft)
Type/Condition: ST/Undisturbed
Liquid Limit (%): NA
Plastic Limit (%): NA

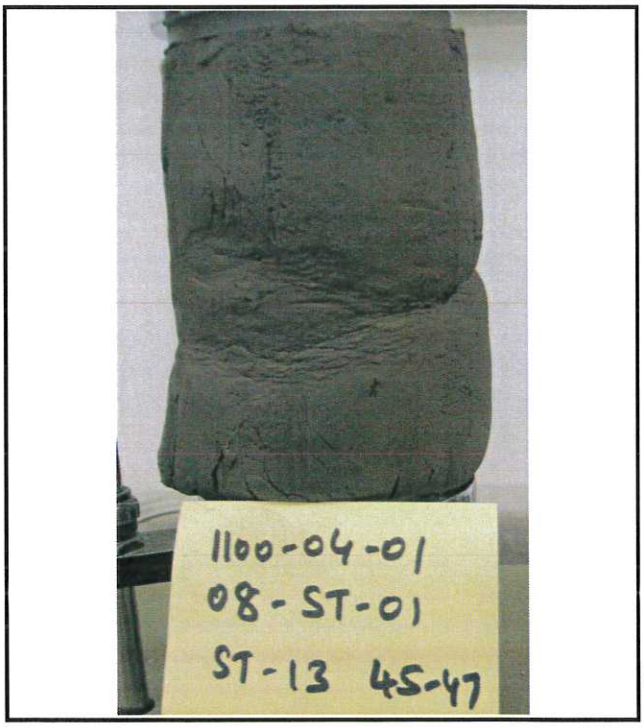
Analyst name: A. Mohammed
Date received: 11/3/2014
Test date: 12/11/2014
Sample description: Gray Silty Clay

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

Average initial height h_0 =	5.97	in
Average initial diameter d_0 =	2.87	in
Height to diameter ratio=	2.08	
Mass of wet sample =	1285.70	g
Mass of dry sample and tare =	1039.10	g
Mass of tare =	13.75	g
Specific gravity =	2.76	(estimated)

Initial water content w =	25.39%	(specimen)
Initial unit weight g =	126.90	pcf
Initial dry unit weight g_d =	101.20	pcf
Initial void ratio e_0 =	0.70	
Initial degree of saturation S_r =	100%	
Average Rate of Strain=	1%/min	
Unconfined compressive strength q_u =	0.19	tsf
Shear Strength=	0.09	tsf

Displacement (in) Δh	Force (lbs) F	Strain (%) e	Stress (tsf) s
0.00	0.00	0.00	0.00
0.03	3.11	0.50	0.03
0.06	4.15	1.00	0.05
0.09	6.22	1.51	0.07
0.12	7.26	2.01	0.08
0.15	8.30	2.51	0.09
0.18	9.33	3.01	0.10
0.21	10.37	3.51	0.11
0.24	10.37	4.02	0.11
0.27	11.41	4.52	0.12
0.30	12.44	5.02	0.13
0.35	13.48	5.86	0.14
0.40	14.52	6.69	0.15
0.45	14.52	7.53	0.15
0.50	15.56	8.37	0.16
0.55	16.59	9.21	0.17
0.60	17.63	10.04	0.18
0.65	17.63	10.88	0.18
0.70	17.63	11.72	0.17
0.80	18.67	13.39	0.18
0.90	19.70	15.06	0.19



NOTES:

Prepared by: Tony Date: 12.16.14

Checked by: A.H. Date: 12/16/14

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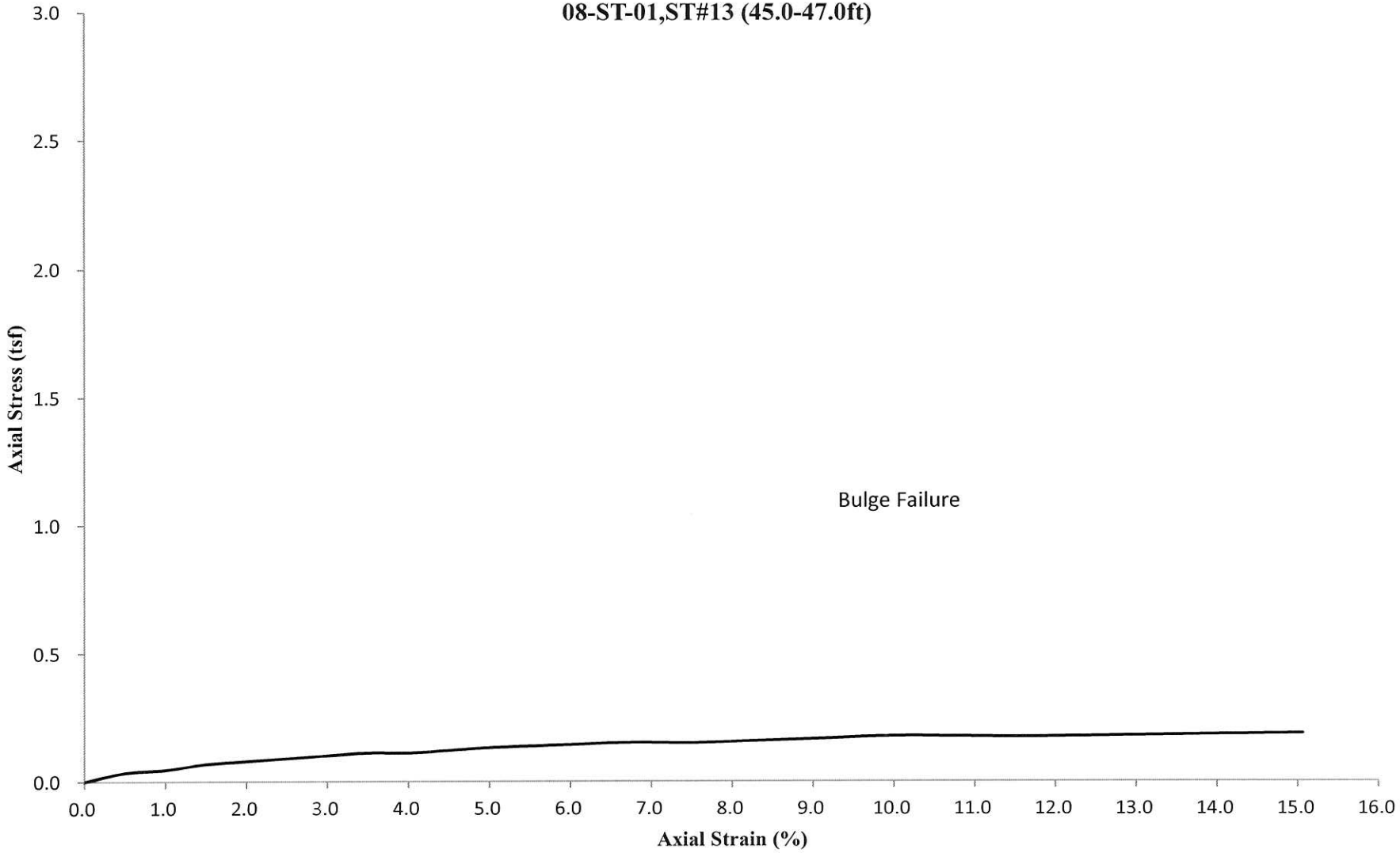
Unconfined Axial Stress v. Axial Strain
08-ST-01,ST#13 (45.0-47.0ft)



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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: 08-ST-01, ST#14 (48.0-50.0ft)
Type/Condition: ST/Undisturbed
Liquid Limit (%): NA
Plastic Limit (%): NA

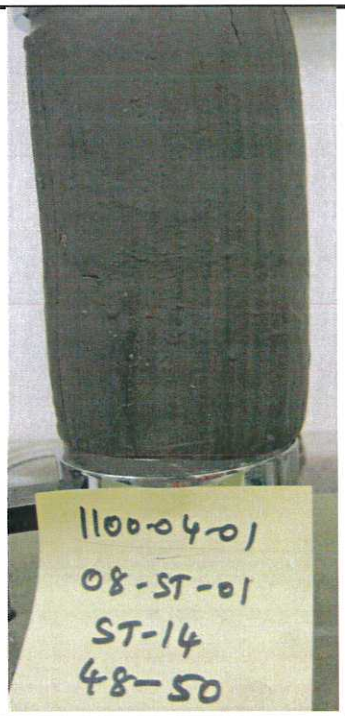
Analyst name: A. Mohammed
Date received: 11/3/2014
Test date: 12/11/2014
Sample description: Gray Silty Clay

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

Average initial height h_0 =	6.01	in
Average initial diameter d_0 =	2.86	in
Height to diameter ratio=	2.10	
Mass of wet sample =	1358.00	g
Mass of dry sample and tare =	1153.70	g
Mass of tare =	13.58	g
Specific gravity =	2.76	(estimated)

Initial water content w =	19.11%	(specimen)
Initial unit weight g =	133.54	pcf
Initial dry unit weight g_d =	112.11	pcf
Initial void ratio e_0 =	0.54	
Initial degree of saturation S_r =	98%	
Average Rate of Strain=	1%/min	
Unconfined compressive strength q_u =	3.31	tsf
Shear Strength=	1.66	tsf

Displacement (in) Δh	Force (lbs) F	Strain (%) e	Stress (tsf) s
0.00	0.00	0.00	0.00
0.03	51.85	0.50	0.58
0.06	80.89	1.00	0.89
0.09	107.85	1.50	1.19
0.12	124.44	2.00	1.36
0.15	141.03	2.49	1.54
0.18	158.87	2.99	1.72
0.21	170.07	3.49	1.83
0.24	173.18	3.99	1.86
0.27	188.73	4.49	2.01
0.30	192.88	4.99	2.05
0.35	209.47	5.82	2.20
0.40	221.92	6.65	2.31
0.45	248.88	7.48	2.57
0.50	255.10	8.32	2.61
0.55	279.99	9.15	2.84
0.60	300.73	9.98	3.02
0.65	300.73	10.81	3.00
0.70	311.10	11.64	3.07
0.80	325.62	13.31	3.15
0.90	348.43	14.97	3.31



NOTES:

Prepared by: Lowy Date: 12.16.14

Checked by: A.F. Date: 12/16/14

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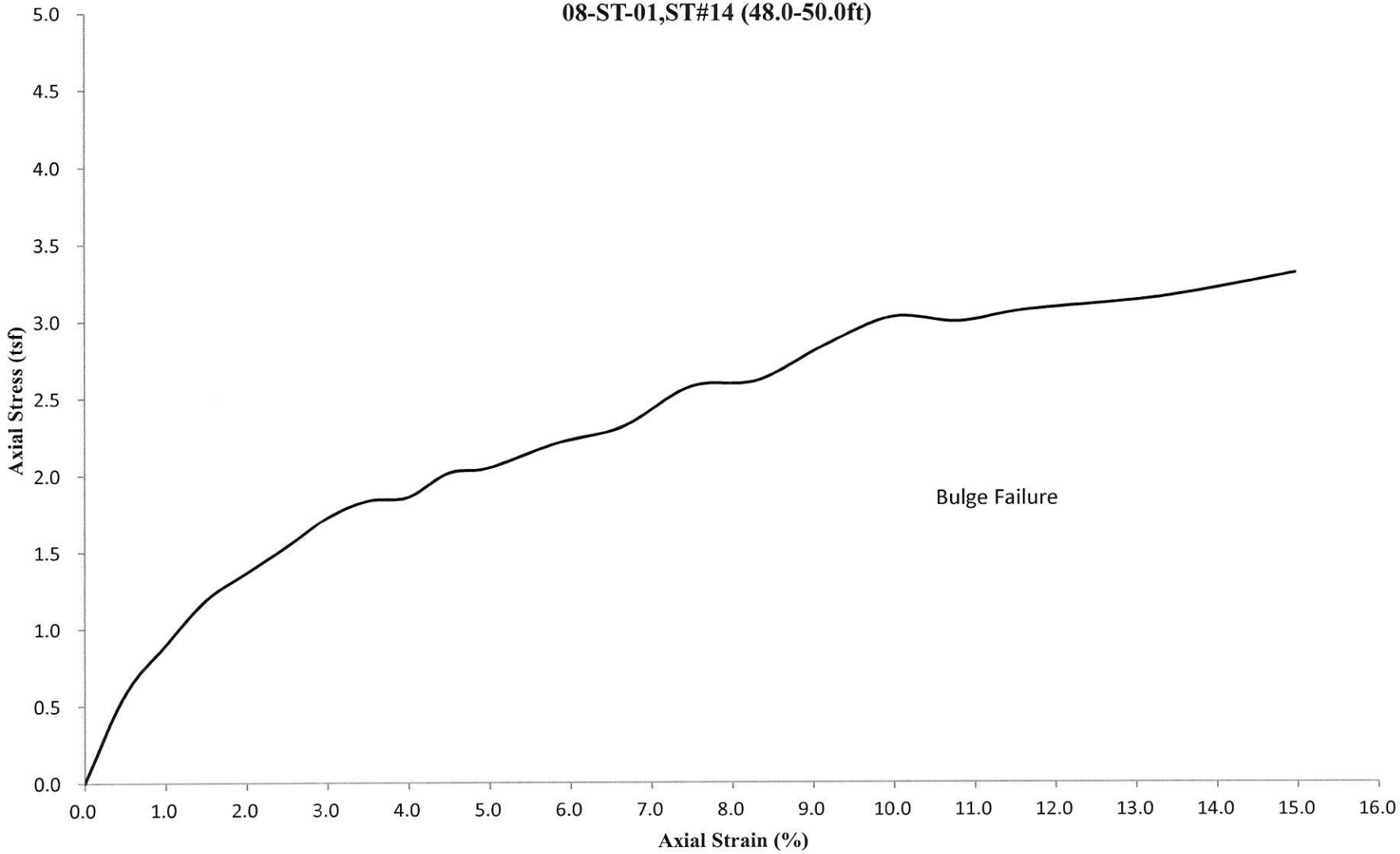
Unconfined Axial Stress v. Axial Strain
08-ST-01,ST#14 (48.0-50.0ft)



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ONE-DIMENSIONAL CONSOLIDATION TEST
AASHTO T 216 / ASTM D 2435

Project: Circle Interchange
Client: AECOM
Soil Sample ID: Boring 08-ST-01, ST#11, 39' to 41'
Sample Description: Gray CLAY with trace gravel (CL)

Tested by: M. Snider
Prepared by: M. Snider
Test date: 1/8/2015
WEI: 1100-04-01

Initial sample height =	1.002 in	Ring diameter =	2.495 in
Initial sample mass =	163.22 g	Ring mass =	109.57 g
Initial water content =	25.37%	Initial sample and ring mass =	272.79 g
Initial dry unit weight =	101.26 pcf	Tare mass =	71.58 g
Initial void ratio =	0.713	Final ring and sample mass =	267.91 g
Initial degree of saturation =	98.90%	Mass of wet sample and tare =	229.44 g
		Mass of dry sample and tare =	201.77 g
Final sample mass =	157.86 g	Initial dial reading =	0.01000 in
Final dry sample mass =	130.19 g	Final dial reading =	0.10757 in
Final water content =	21.25%	LL=	n.a. %
Final dry unit weight =	112.18 pcf	PL=	n.a. %
Final void ratio =	0.546	% Sand=	n.a. %
Final degree of saturation =	100.00%	% Silt=	n.a. %
Estimated specific gravity =	2.78	% Clay=	n.a. %
		In-Situ Vertical Effective Stress =	3400 psf

Compression and Swelling Indices

Compression index C_c =	0.182	**Preconsolidation pressure,s_C**	
Field corrected C_c =	0.219	Casagrande Method =	3586 psf
Swelling index C_s =	0.051	**Over-Consolidation Ratio (OCR) =**	1.05

Load number	Vertical stress	Dial reading	System deflection	Vertical strain	Void ratio	C_v	Cae	Elapsed time
	psf	in	in	%		ft^2/day	%	min
1	100.0	0.00988	0.00010	0.00	0.713	N/A	N/A	1245
2	200.0	0.01152	0.00023	0.17	0.710	0.0635	0.07	2775
3	500.0	0.01982	0.00058	1.04	0.695	0.0811	0.10	1788
4	1000.0	0.02901	0.00090	1.99	0.679	0.0809	0.10	1410
5	2000.0	0.04280	0.00135	3.41	0.655	0.0851	0.16	1440
6	4000.0	0.06159	0.00193	5.34	0.622	0.0814	0.26	1344
7	8000.0	0.08722	0.00253	7.96	0.577	0.0889	0.32	3270
8	16000.0	0.11708	0.00324	11.01	0.525	0.0832	0.43	1944
9	32000.0	0.14821	0.00413	14.21	0.470	0.1154	0.37	1440
10	8000.0	0.14412	0.00295	13.68	0.479	N/A	N/A	1440
11	2000.0	0.12727	0.00198	11.90	0.509	N/A	N/A	1440
11	500.0	0.10982	0.00123	10.08	0.540	N/A	N/A	3240

Prepared by: Jay Date: 01.07.15

Checked by: M L Date: 1/7/15

AASHTO R18

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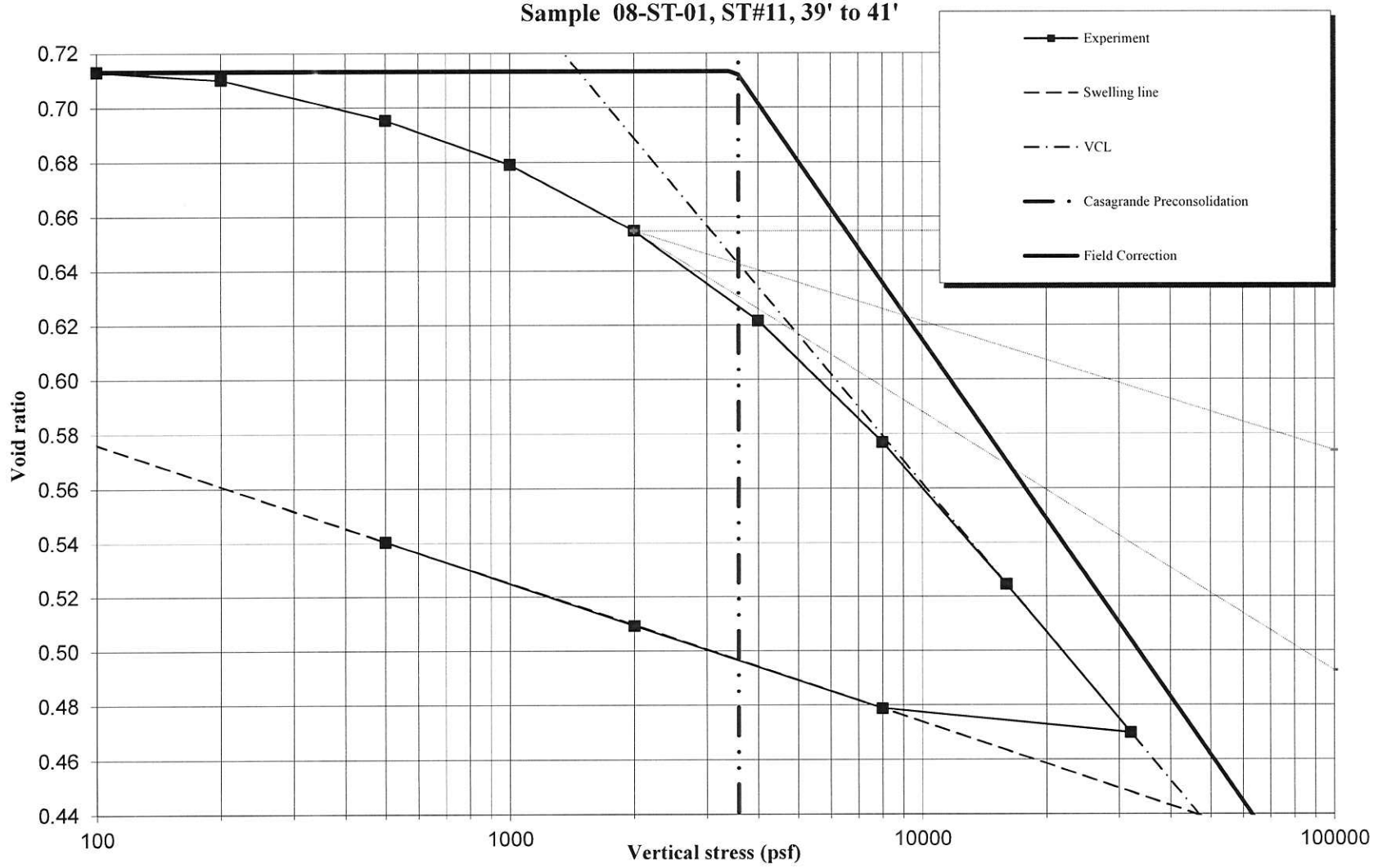
CONSOLIDATION CURVE

Sample 08-ST-01, ST#11, 39' to 41'



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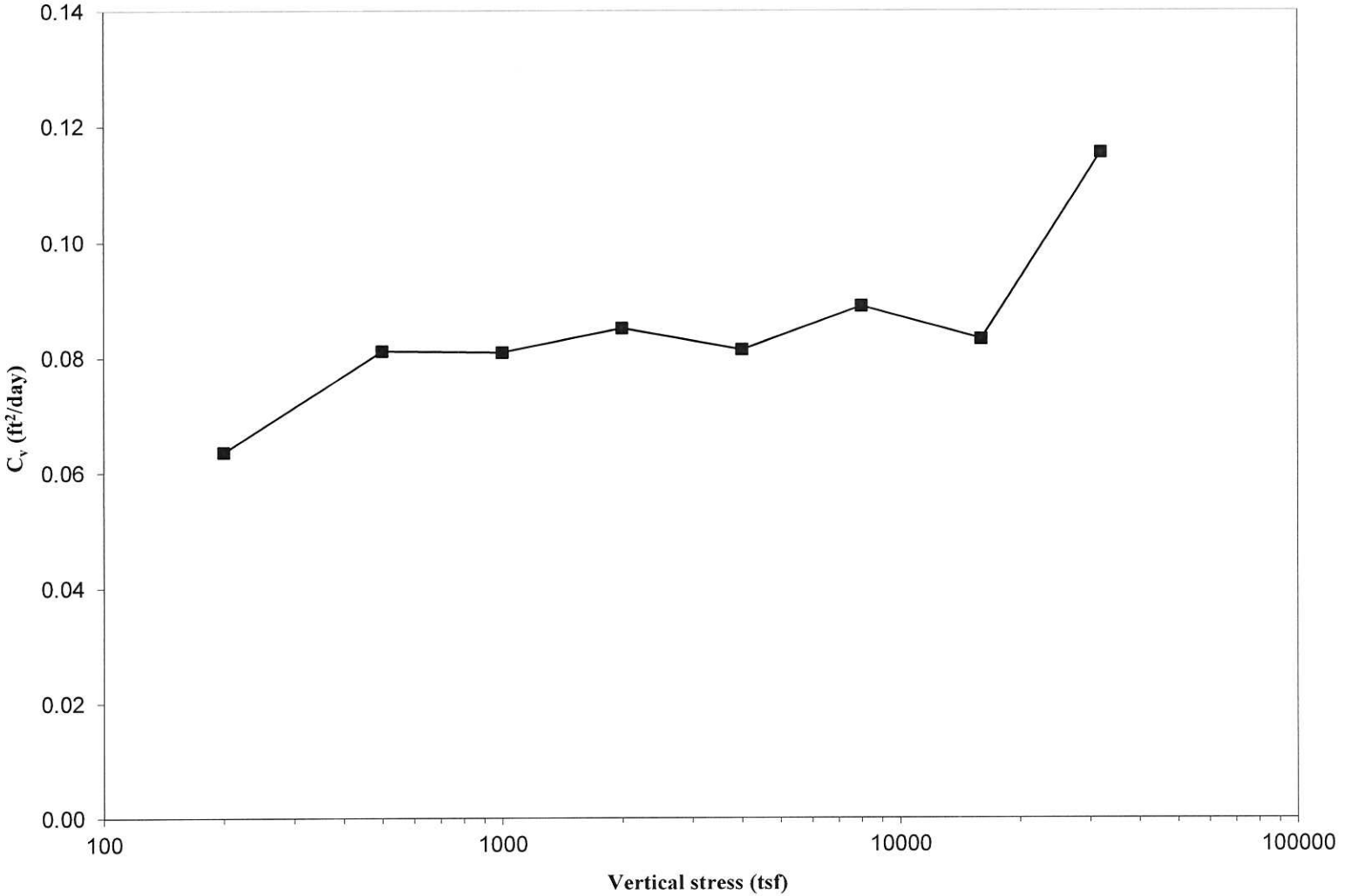
CONSOLIDATION COEFFICIENT (C_v) vs. VERTICAL STRESS

Sample 08-ST-01, ST#11, 39' to 41'



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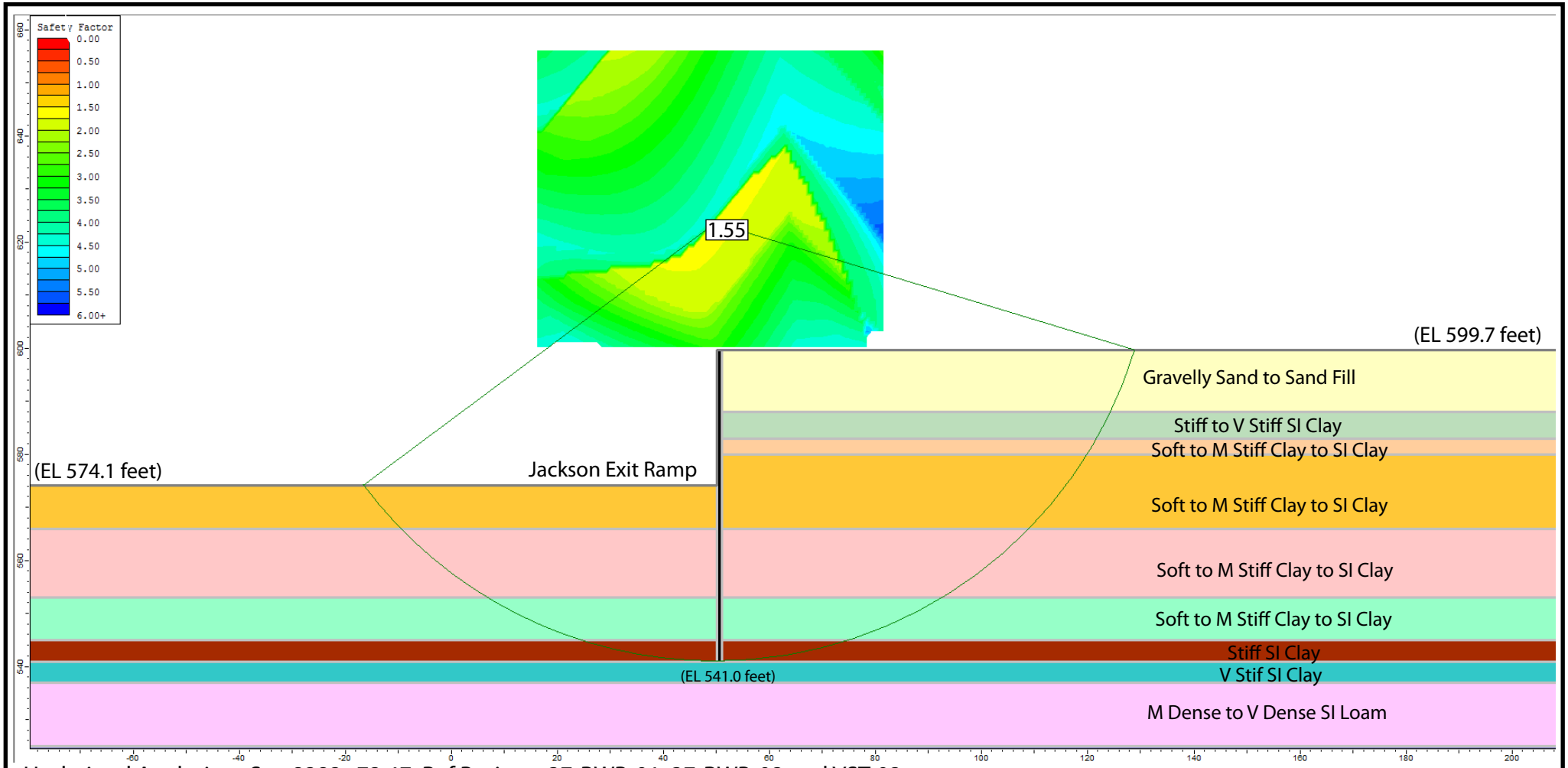
APPENDIX C



Undrained Analysis at Sta. 8282+72.47, Ref Borings: 37-RWB-01, 37-RWB-02 and VST-02

Layer ID	Description	Total Unit Weight (pcf)	Undrained Cohesion (psf)	Undrained Friction Angle (degrees)
1	Gravelly Sand to Sand Fill	120	0	30
2	Stiff to V Stiff SI Clay	120	1500	0
3	Soft to M Stiff Clay to SI Clay	120	600	0
4	Soft to M Stiff Clay to SI Clay	120	530	0
5	Soft to M Stiff Clay to SI Clay	120	750	0
6	Soft to M Stiff Clay to SI Clay	120	910	0
7	Stiff SI Clay	125	1300	0
8	V Stif SI Clay	125	2100	0
9	M Dense to V Dense SI Loam	125	0	35

GLOBAL STABILITY: CIRCLE INTERCHANGE RECONSTRUCTION, RETAINING WALL 37, SN 016-1826, COOK COUNTY, ILLINOIS

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

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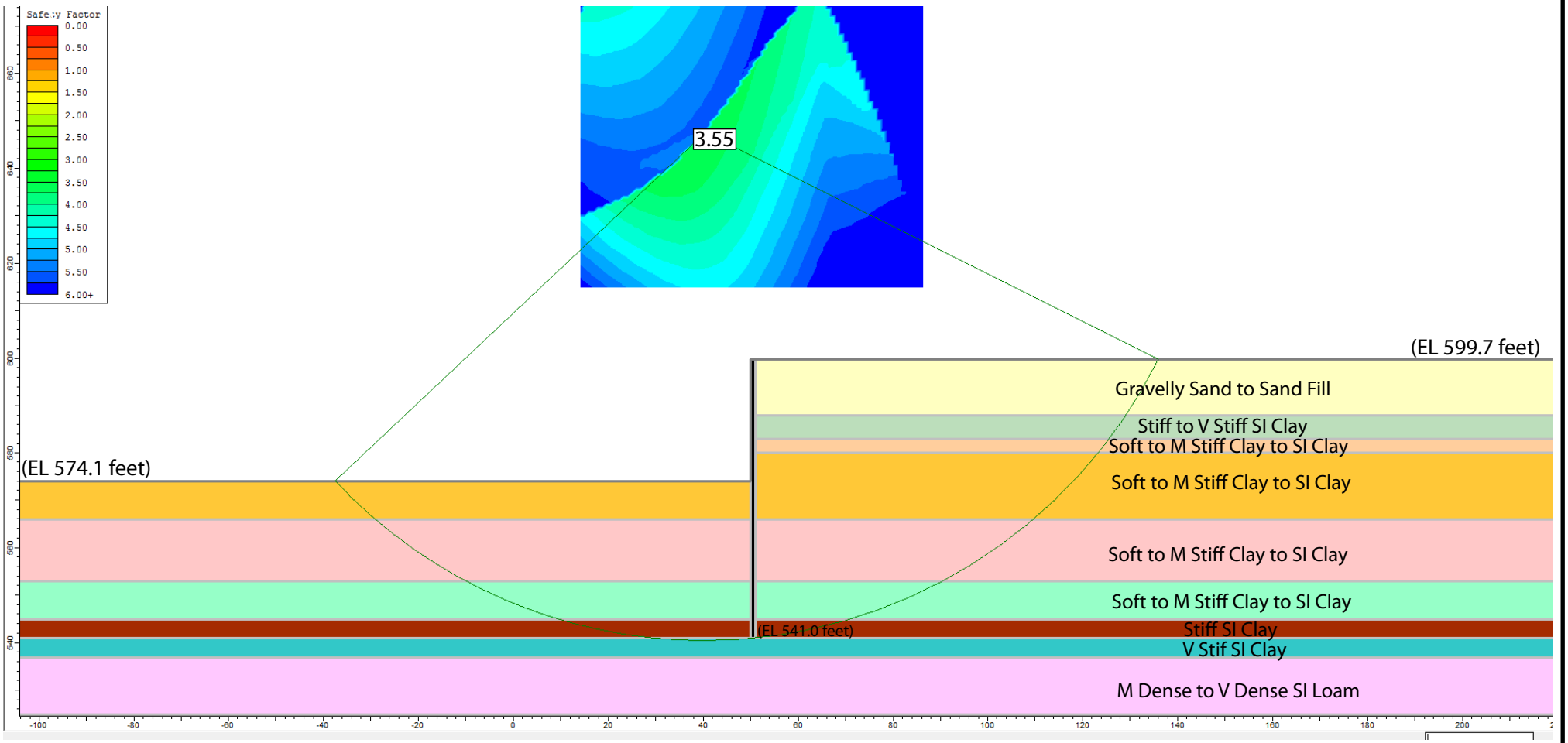
FOR AECOM | 1100-04-01



Drained Analysis at Sta. 8282+72.47, Ref Borings: 37-RWB-01, 37-RWB-02 and VST-02

Layer ID	Description	Total Unit Weight (pcf)	Drained Cohesion (psf)	Drained Friction Angle (degrees)
1	Gravelly Sand to Sand Fill	120	0	30
2	Stiff to V Stiff SI Clay	120	100	30
3	Soft to M Stiff Clay to SI Clay	120	0	28
4	Soft to M Stiff Clay to SI Clay	120	0	26
5	Soft to M Stiff Clay to SI Clay	120	0	26
6	Soft to M Stiff Clay to SI Clay	120	0	26
7	Stiff SI Clay	125	80	29
8	V Stif SI Clay	125	100	30
9	M Dense to V Dense SI Loam	125	0	35

GLOBAL STABILITY: CIRCLE INTERCHANGE RECONSTRUCTION, RETAINING WALL 37, SN 016-1826, COOK COUNTY, ILLINOIS

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

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APPENDIX D

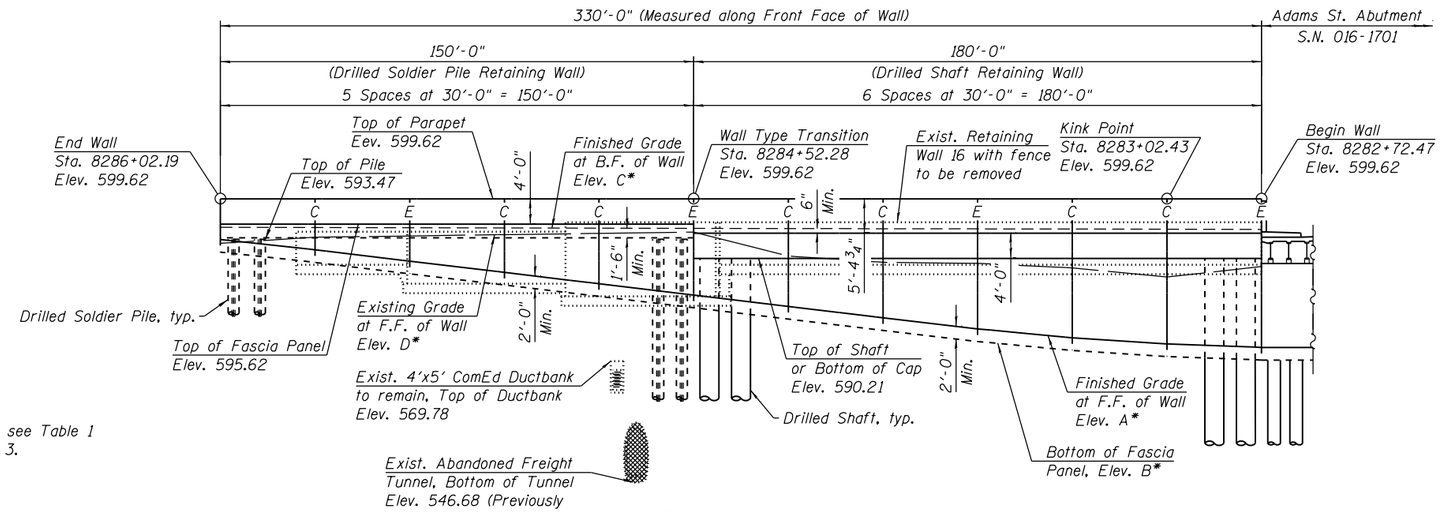
Bench Mark: Set "X" on east barrier wall of I-90 at ℄ of Adams Street. Elev. 581.17.

Existing Structure: Existing Retaining Wall 16. Constructed in 1957 under F.A.I. Route 2, Section 0101.6-2P. Cast-in-place concrete retaining wall on spread footing that measures 330'-0" from Adams Street south to Jackson Boulevard. Maximum height from top of wall to bottom of footing measures 13'-3". The existing retaining wall is to be removed and replaced.

Traffic on Jackson Exit Ramp will be detoured during construction.

No Salvage.

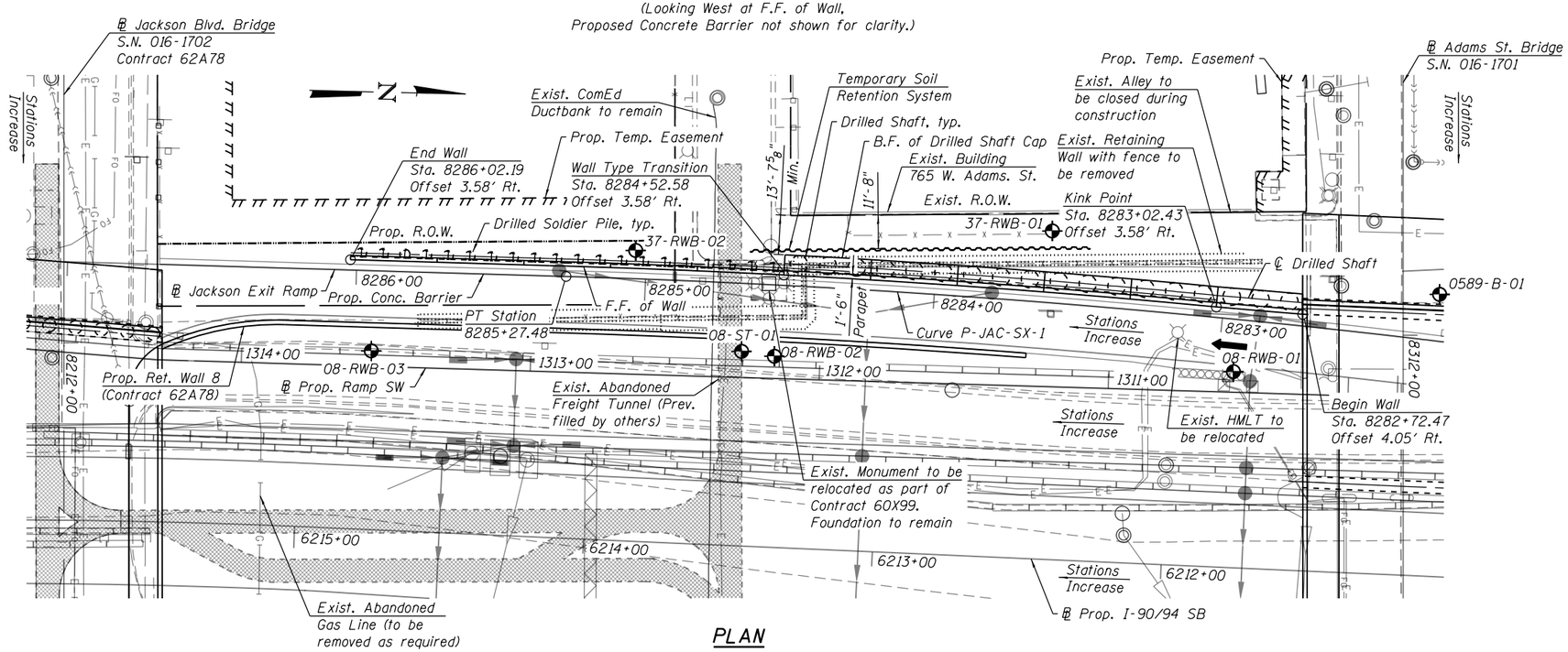
Notes:
1.) Wall offsets are measured from the ℄ of Jackson Exit Ramp to the front face of cast-in-place fascia panels.
2.) C denotes Construction Joint
3.) E denotes Expansion Joint
4.) F.F. denotes Front Face.
5.) B.F. denotes Back Face.
6.) Wall to be built along straight chords between kink points.
7.) Soldier Pile section, shaft diameter, spacing and tip elevation to be determined during final design.
8.) Proposed drainage information shown is conceptual and will be determined during final design.
9.) Soldier piles shall be spaced to avoid Existing ComEd Ductbank. Clearance requirements will be coordinated with ComEd during final design.



* For elevations, see Table 1 on Sheet 3 of 3.

ELEVATION

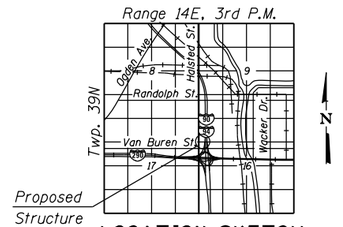
(Looking West at F.F. of Wall, Proposed Concrete Barrier not shown for clarity.)



PLAN

CURVE DATA

(Jackson Exit Ramp)
Prop. Curve P-JAC-SX-1
P.I. Sta. = 8283+78.27
Δ = 5° 01' 56"
D = 1° 41' 07"
R = 3,400.00'
T = 149.40'
L = 298.61'
E = 3.28'
e = 2.00%
T.R. = NA
S.E. Run = NA
P.C. Sta. = 8282+28.87
P.T. Sta. = 8285+27.48



LOCATION SKETCH

HIGHWAY CLASSIFICATION

Jackson Exit Ramp
Functional Class: Interstate
ADT: 2,900 (2012); 4,000 (2040)
ADTT: 0 (2012); 0 (2040)
DHV: 410 (2040)
Design Speed: 30 m.p.h.
Posted Speed: 30 m.p.h.
One-Way Traffic
Directional Distribution: 100%

DESIGN SPECIFICATIONS

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

DESIGN STRESSES

FIELD UNITS

f'c = 7,000 psi (Drilled Shafts)**
f'c = 3,500 psi (All other concrete)
fy = 60,000 psi (Reinforcement)

SOLDIER PILES

fy = 50,000 psi (AASHTO M270 Gr. 50)

** Final concrete strength will be determined during final design

WALL DEFLECTION CRITERIA:

Maximum total lateral wall deflection at top of wall: 1 inch.

SUGGESTED SEQUENCE OF CONSTRUCTION

1.) Install temporary soil retention system along alley.
2.) Remove portion of Existing Retaining Wall 16 that is in conflict with the proposed drilled shafts.
3.) Drill shafts and install soldier piles.
4.) Remove portion of Existing Retaining Wall 16 in front of the proposed wall and excavate to install timber lagging.
5.) Construct concrete fascia panels, cap, and parapet.

LEGEND:

Ex. Chain Link Fence	— X — X —	Soil Boring	⊕
Combined Sewer	→→→→→→→→	Existing Catch Basin	○
Electric	——E——	Proposed Catch Basin	●
Ex. Storm Sewer	——▷—▷——	Existing Manhole	◎
Prop. Storm Sewer	——▶—▶——	Proposed Manhole	◉
Ex. ITS Cable	— — — —	Proposed Inlet	▬
Ex. Gas Line	——G——		
Ex. Fiber Optic	——FO——		

GENERAL PLAN
RETAINING WALL 37 ALONG JACKSON EXIT RAMP
F.A.I. RTE. 90/94 (KENNEDY EXPRESSWAY)
SECTION 2014-015 R&B-R
COOK COUNTY
STATION 8282+72.47 TO STATION 8286+02.19
STRUCTURE NO. 016-1826

USER NAME = wjcolletti	DESIGNED - WJC	REVISED -	
	CHECKED - JM/MDS	REVISED -	
PLOT SCALE = 48.0000 ' / in.	DRAWN - WJC	REVISED -	
PLOT DATE = 11/29/2017	CHECKED - JM/MDS	REVISED -	

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STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

SHEET NO. 1 OF 3 SHEETS

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
90/94	2014-015 R&B-R	COOK	3	1
		CONTRACT NO. 60X94		
	ILLINOIS FED. AID PROJECT			

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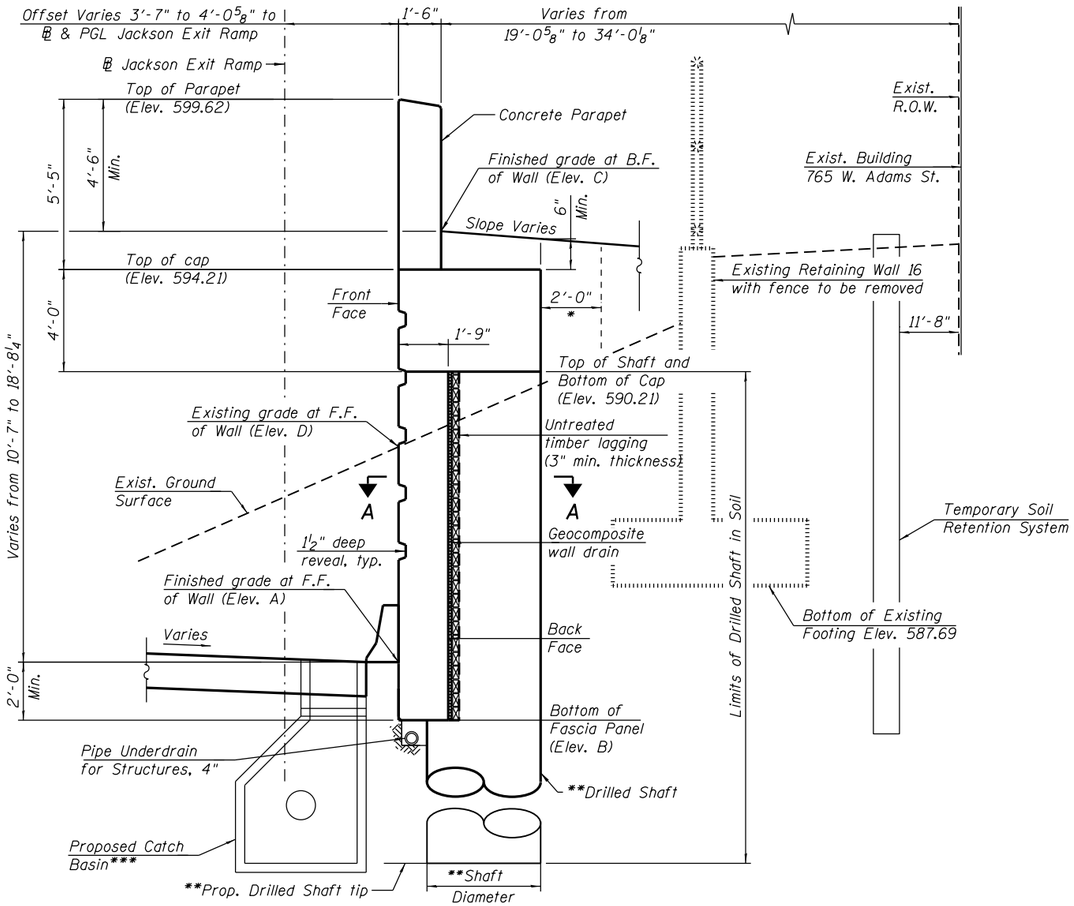
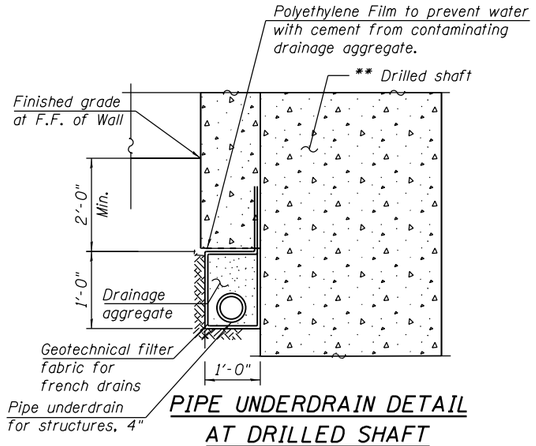
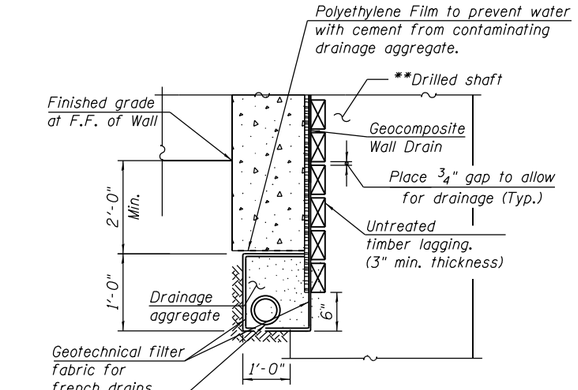


TYPICAL CROSS SECTION - DRILLED SHAFT WALL

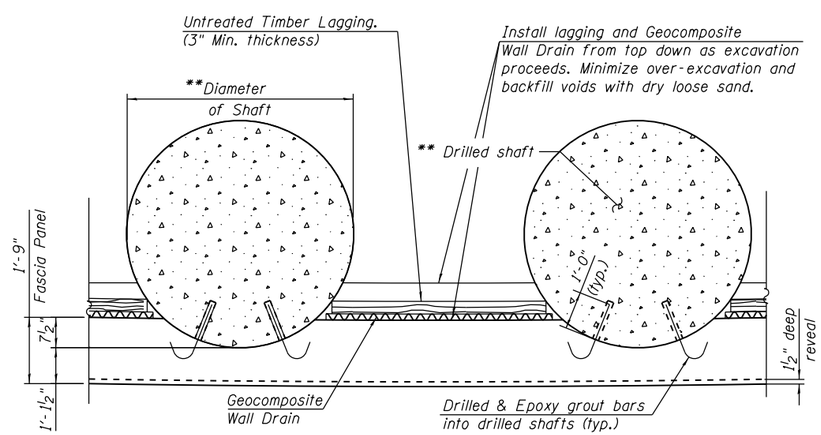
(Looking Upstation)
(Sta. 8282+72.47 to Sta. 8284+52.28)



PIPE UNDERDRAIN DETAIL AT DRILLED SHAFT

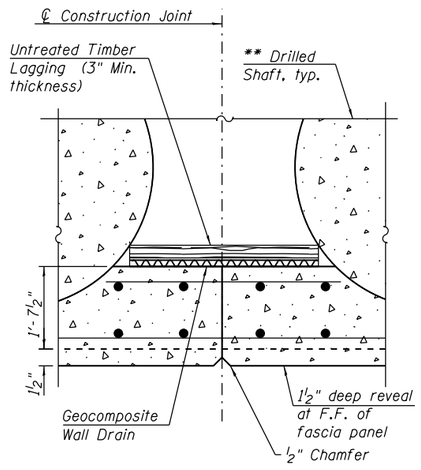


PIPE UNDERDRAIN DETAIL BETWEEN DRILLED SHAFTS

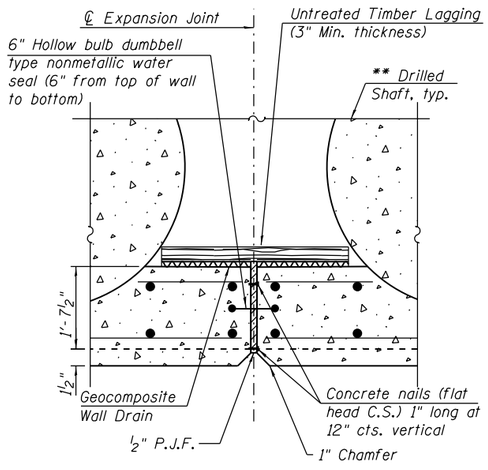


SECTION A-A

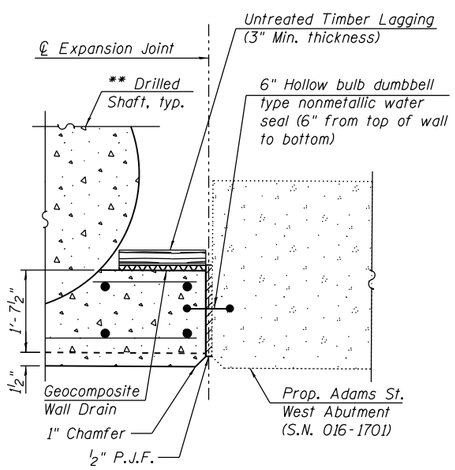
(Shaft Reinforcement not shown for clarity)



CONSTRUCTION JOINT DETAILS



EXPANSION JOINT DETAILS



EXPANSION JOINT DETAILS

* Limits of Structure Excavation

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

*** Size, location, and invert elevations of catch basin shall be determined in final design.

LEGEND:

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

DRILLED SHAFT WALL DETAILS
RETAINING WALL 37 ALONG JACKSON EXIT RAMP
F.A.I. RTE. 90/94 (KENNEDY EXPRESSWAY)
SECTION 2014-015 R&B-R
COOK COUNTY
STATION 8282+72.47 TO STATION 8286+02.19
STRUCTURE NO. 016-1826

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USER NAME = wjcolletti	DESIGNED - WJC	REVISED -
	CHECKED - JM/MDS	REVISED -
PLOT SCALE = 0.17 ' / in.	DRAWN - WJC	REVISED -
PLOT DATE = 11/29/2017	CHECKED - JM/MDS	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

SHEET NO. 2 OF 3 SHEETS

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
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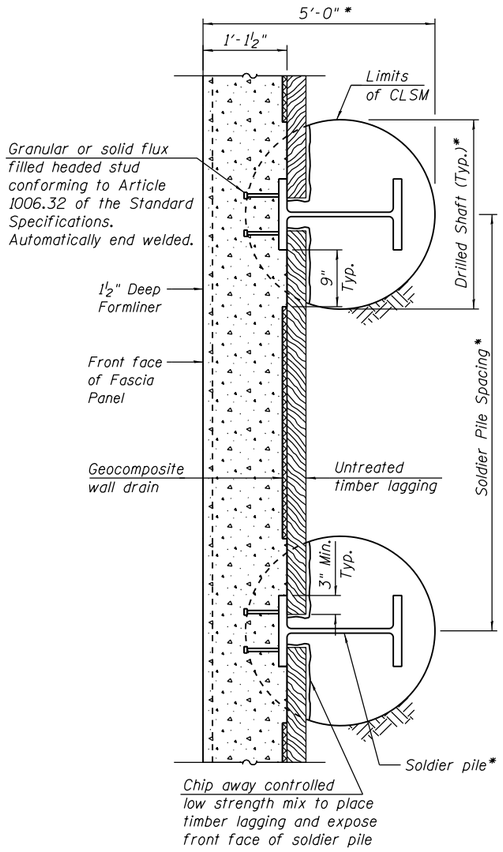
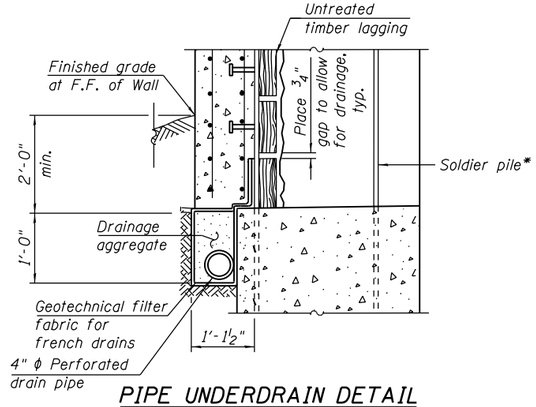
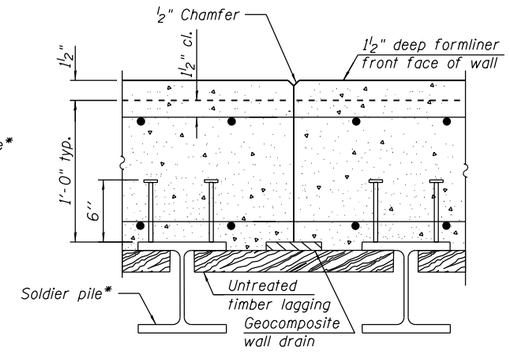
		CONTRACT NO. 60X94		
		ILLINOIS FED. AID PROJECT		



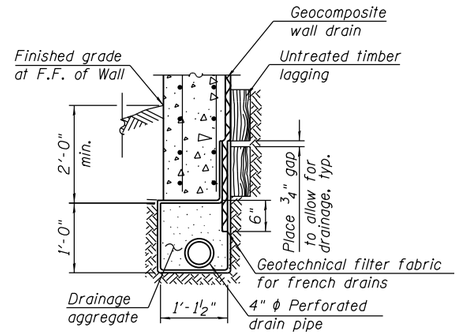
SECTION B-B



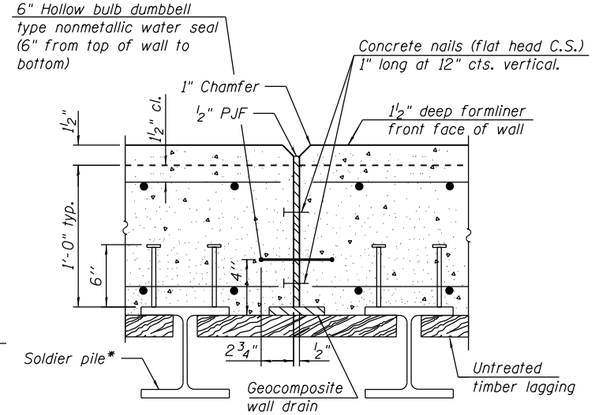
PIPE UNDERDRAIN DETAIL AT SOLDIER PILE



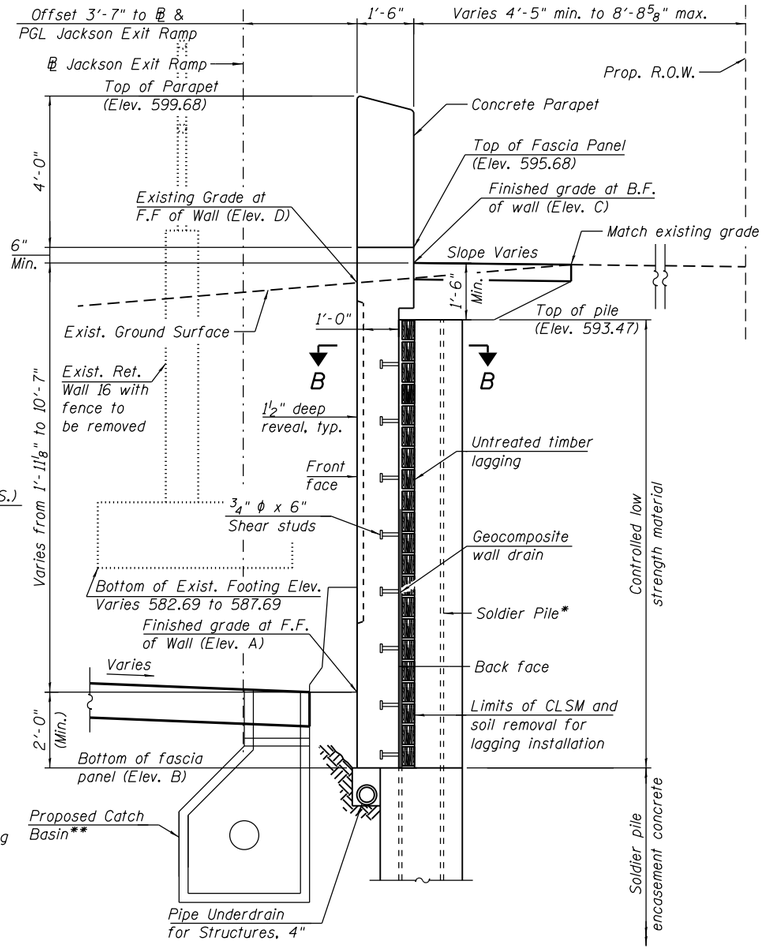
CONSTRUCTION JOINT DETAILS



PIPE UNDERDRAIN DETAIL BETWEEN SOLDIER PILES



EXPANSION JOINT DETAILS



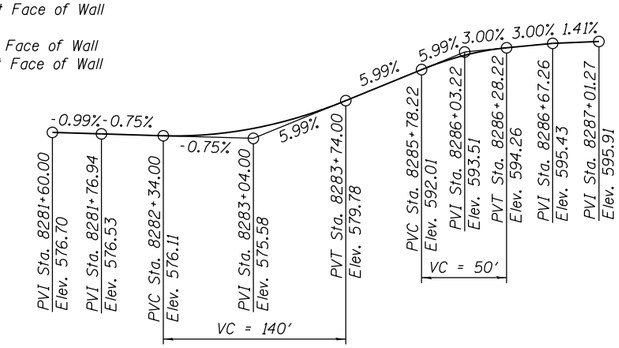
TYPICAL CROSS SECTION - SOLDIER PILE WALL

(Looking upstation)
(Sta. 8284+52.28 to Sta. 8286+02.19

TABLE 1 - WALL ELEVATIONS

	Station	Offset	Elevation A	Elevation B	Elevation C	Elevation D	Wall Type
	8282+72.47	4.05' Rt.	576.10	574.10	594.79	588.91	
	8283+02.43	3.58' Rt.	576.64	574.64	594.82	587.25	
	8283+32.40	3.58' Rt.	577.62	575.62	594.85	588.70	Drilled
	8283+62.37	3.58' Rt.	579.03	577.03	594.88	589.41	Shafts
	8283+92.34	3.58' Rt.	580.80	578.80	594.91	589.58	Wall
	8284+22.31	3.58' Rt.	582.59	580.59	594.94	590.58	
*	8284+52.28	3.58' Rt.	584.39	582.39	594.97	594.37	
**	8284+52.28	3.58' Rt.	584.39	582.39	594.97	594.37	
	8284+82.24	3.58' Rt.	586.18	584.18	595.00	594.16	Drilled
	8285+12.21	3.58' Rt.	587.98	585.98	595.03	593.97	Soldier
	8285+42.19	3.58' Rt.	589.77	587.77	595.06	593.76	Pile
	8285+72.19	3.58' Rt.	591.57	589.57	595.09	593.56	Wall
	8286+02.19	3.58' Rt.	593.20	591.20	595.12	592.58	

Elevation A- Finished Grade at Front Face of Wall
Elevation B- Bottom of Fascia Panel
Elevation C- Finished Grade at Back Face of Wall
Elevation D- Existing Grade at Front Face of Wall
* Elevations just to the right of joint
** Elevations just to the left of joint



PROFILE GRADE

(℄ Jackson Exit Ramp)

* Soldier Pile section, shaft diameter, spacing, and tip elevation to be determined during final design.

** Size, location, and invert elevations of catch basin shall be determined in final design.

DRILLED SOLDIER PILE WALL DETAILS
RETAINING WALL 37 ALONG JACKSON EXIT RAMP
F.A.I. RTE. 90/94 (KENNEDY EXPRESSWAY)
SECTION 2014-015 R&B-R
COOK COUNTY
STATION 8282+72.47 TO STATION 8286+02.19
STRUCTURE NO. 016-1826

USER NAME = wjcolletti	DESIGNED - WJC	REVISED -	
	CHECKED - JM/MDS	REVISED -	
PLOT SCALE = 0.2 '/ in.	DRAWN - WJC	REVISED -	
PLOT DATE = 11/29/2017	CHECKED - JM/MDS	REVISED -	

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DEPARTMENT OF TRANSPORTATION

SHEET NO. 3 OF 3 SHEETS

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
90/94	2014-015 R&B-R	COOK	3	3
		CONTRACT NO. 60X94		
	ILLINOIS FED. AID PROJECT			

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APPENDIX E

Wang Engineering
1145 North Main Street
Lombard, Illinois 60148
Phone: (630)-953-9928

Revised 11/7/2018

Date: 10/17/2017 Sheet: 1 of 6
Calculation By: NSB Approved By: M. Seyhan MS
Project Number: 1100-04-01 Client Name: AECOM
Project Name: Circle Interchange

Retaining Wall 37
SN 016-1826

Ground Movement Estimates

Purpose: To estimate the surface ground movement at Arkadia Tower (765 W Adams Street) located west of Wall 37.

Reference: (1) Clough, W and O'Rourke T (1990) Construction induced movement of in-situ walls
(2) Ou, C.Y, Hsieh, P.F, and Chew D.C (1993) "Characteristics of ground Surface Settlements during Excavation" "Canadian Geotechnical Journal" V.30, P 758 - 767
(3) Wang, J.H, Xu Z.H and Wang W.D (2010) Wall and Ground movements due to Deep excavations in Shanghai Soft Soils" Journal of Geotech & Geoenvironmental Engineering P985-994

Assumptions: Arkardia Tower (Based on TSL dated 9/18/2017

Station	Away from Wall (feet)	Height of Wall (feet)
8282+73	~ 30	18.65
8283+60	~ 20	15.81
8284+52	~ 13' 7 5/8" (13.64 feet)	10.54

There is an existing wall and will be removed.

Wang Engineering
1145 North Main Street
Lombard, Illinois 60148
Phone: (630)-953-9928

Revised 11/7/2018

Date: 10/17/2017 Sheet: 2 of 6
Calculation By: NSB Approved By: JS
Project Number: 1100-04-01 Client Name: AECOM
Project Name: Circle Interchange
RW 37, SN016-1826

Notations: δ_{hm} = Max lateral displacement of wall
δ_v = ground surface settlement
δ_{vm} = Max. ground surface settlement.

Design Criteria: Max δ_{hm} is 1.0% of the wall height

Stations	(TSE) Max δ_{hm} (Inches)	Max δ_{hm} (1%) (inches)	Max δ_{hm} 0.5%
8282+73	1.0	2.24	1.12
8283+60	1.0	1.90	0.95
8284+52	1.0	1.27	0.63

Evaluations:

From Figure 6.14, using a ratio $\frac{\delta_{vm}}{\delta_{hm}} = 1.0$

Station	Max inches	Max δ_{vm} (1%)	δ_{vm} (0.5%)	(d/H)
8282+73	1.0	2.24	1.12	1.61
8283+60	1.0	1.90	0.95	1.27
8284+52	1.0	1.27	0.63	1.29

Station	(d/H)	Method 1 ($\frac{\delta_v}{\delta_{vm}}$) (Clough and O'Rourke 1990)	Method 2 ($\frac{\delta_v}{\delta_{vm}}$) (Kung et al (2007)
8282+73	1.61	0.30	0.32
8283+60	1.27	0.56	0.58
8284+52	1.29	0.57	0.59

Wang Engineering
1145 North Main Street
Lombard, Illinois 60148
Phone: (630)-953-9928

Date: 11/7/2018 Sheet: 3 of 6
Calculation By: NSB Approved By:
Project Number: 1100-04-01 Client Name: AECOM
Project Name: Circle Interchange, RW37
SN 016-J1826

For Deflection Criteria 1 inch (CTSL dated 11/29/2017)

Station	Method 1 (Clough and O'Rourke)	Method 2 (Kung et al 2007)
8282+73	0.3x1 = 0.31	0.32x1 = 0.32
8282+60	0.56x1 = 0.56	0.58x1 = 0.58
8284+52	0.57x1 = 0.57	0.59x1 = 0.59

Conclusions:

Based on our evaluations, the maximum ground settlement of the Arkardia Tower range from 0.3 to 0.6 inches using both methods (Clough and O'Rourke, Kung et al, 2007). Since the Arkardia Tower is supported on deep foundations, there may not be a damaging effect on the general structure. However, any other structure walls, buried utilities and slab-on-grades should be considered in design to ensure specific deformations limits are not exceeded.

4/6

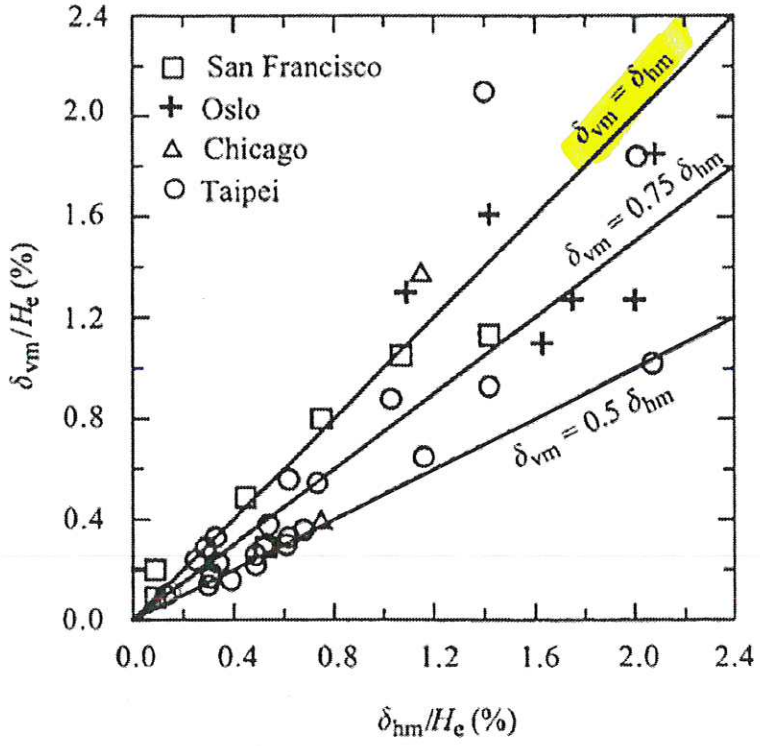


Figure 6.14 Maximum ground surface settlement and lateral wall deflection (Ou *et al.*, 1993).

OU, C.-Y., HSIEH, P.-G., AND CHIOU, D.-C., 1993, Characteristics of ground surface settlement during excavation: Canadian Geotechnical Journal, v. 30, p. 758-767.

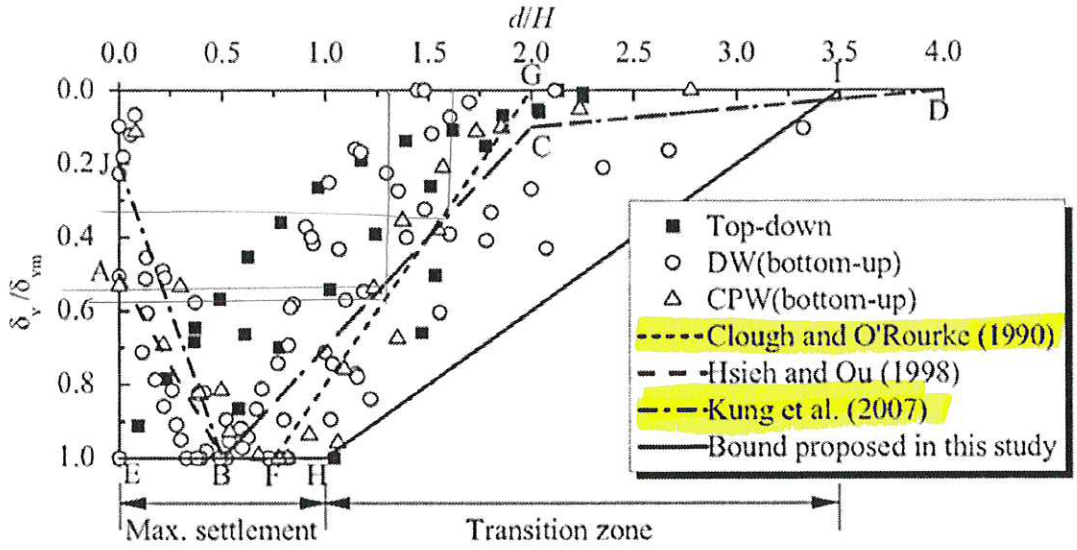


Fig. 11. Relationship between ground settlement normalized by maximum settlement and normalized distance from wall

WANG, J., XU, Z., AND WANG, W., 2009, Wall and ground movements due to deep excavations in Shanghai soft soils Journal of Geotechnical and Geoenvironmental Engineering, v. 136, p. 985-994.

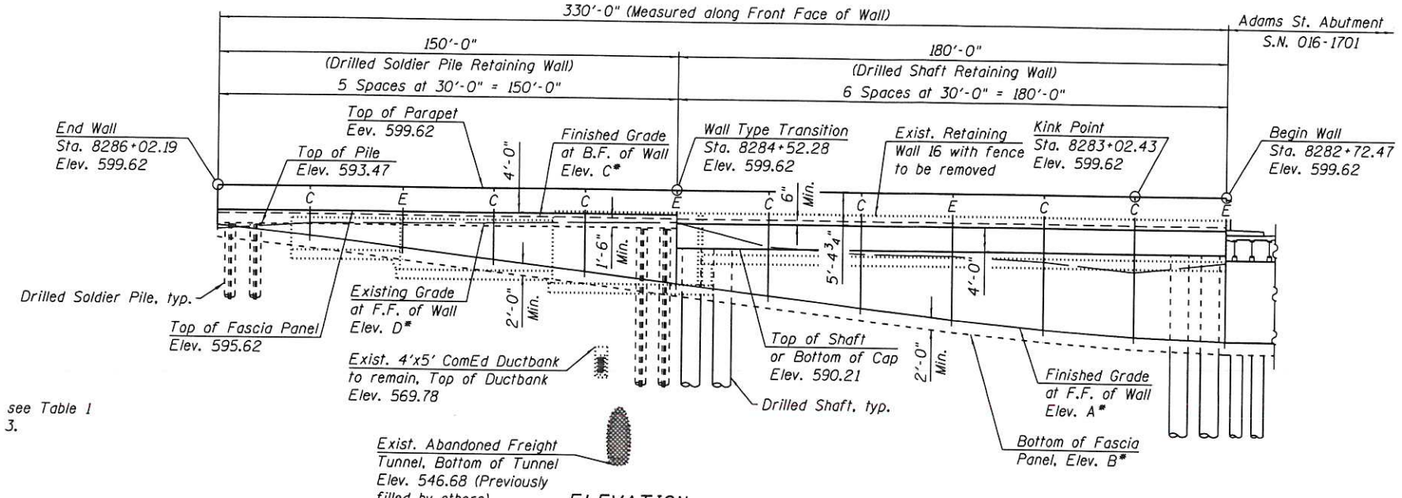
Bench Mark: Set "X" on east barrier wall of I-90 at ℄ of Adams Street. Elev. 581.17.

Existing Structure: Existing Retaining Wall 16. Constructed in 1957 under F.A.I. Route 2, Section 0101.6-2P. Cast-in-place concrete retaining wall on spread footing that measures 330'-0" from Adams Street south to Jackson Boulevard. Maximum height from top of wall to bottom of footing measures 13'-3". The existing retaining wall is to be removed and replaced.

Traffic on Jackson Exit Ramp will be detoured during construction.

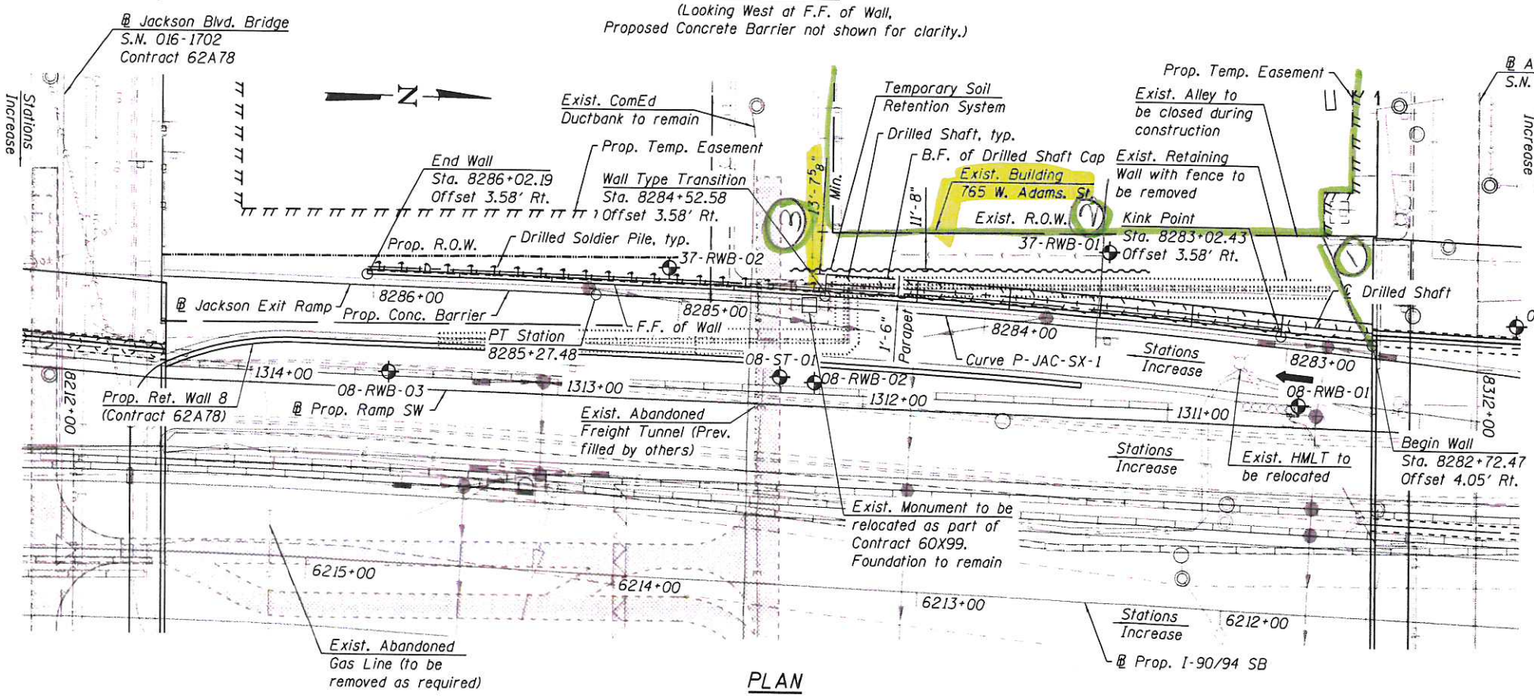
No Salvage.

Notes:
1.) Wall offsets are measured from the ℄ of Jackson Exit Ramp to the front face of cast-in-place fascia panels.
2.) C denotes Construction Joint
3.) E denotes Expansion Joint
4.) F.F. denotes Front Face.
5.) B.F. denotes Back Face.
6.) Wall to be built along straight chords between kink points.
7.) Soldier Pile section, shaft diameter, spacing and tip elevation to be determined during final design.
8.) Proposed drainage information shown is conceptual and will be determined during final design.
9.) Soldier piles shall be spaced to avoid Existing ComEd Ductbank. Clearance requirements will be coordinated with ComEd during final design.



* For elevations, see Table 1 on Sheet 3 of 3.

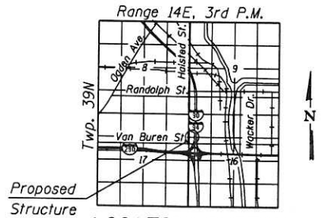
ELEVATION
(Looking West at F.F. of Wall,
Proposed Concrete Barrier not shown for clarity.)



PLAN

CURVE DATA

(Jackson Exit Ramp)
Prop. Curve P-JAC-SX-1
P.I. Sta. = 8283+78.27
Δ = 5° 01' 56"
D = 1° 41' 07"
R = 3,400.00'
T = 149.40'
L = 298.61'
E = 3.28'
e = 2.00%
T.R. = NA
S.E. Run = NA
P.C. Sta. = 8282+28.87
P.T. Sta. = 8285+27.48



Proposed Structure

LOCATION SKETCH

HIGHWAY CLASSIFICATION

Jackson Exit Ramp
Functional Class: Interstate
ADT: 2,900 (2012); 4,000 (2040)
ADTT: 0 (2012); 0 (2040)
DHV: 410 (2040)
Design Speed: 30 m.p.h.
Posted Speed: 30 m.p.h.
One-Way Traffic
Directional Distribution: 100%

DESIGN SPECIFICATIONS

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

DESIGN STRESSES

FIELD UNITS

f'c = 7,000 psi (Drilled Shafts)**
f'c = 3,500 psi (All other concrete)
fy = 60,000 psi (Reinforcement)

SOLDIER PILES

fy = 50,000 psi (AASHTO M270 Gr. 50)

** Final concrete strength will be determined during final design

WALL DEFLECTION CRITERIA:

Maximum total lateral wall deflection at top of wall: 1 inch.

SUGGESTED SEQUENCE OF CONSTRUCTION

1.) Install temporary soil retention system along alley.
2.) Remove portion of Existing Retaining Wall 16 that is in conflict with the proposed drilled shafts.
3.) Drill shafts and install soldier piles.
4.) Remove portion of Existing Retaining Wall 16 in front of the proposed wall and excavate to install timber lagging.
5.) Construct concrete fascia panels, cap, and parapet.

LEGEND:

Ex. Chain Link Fence	— X — X —	Soil Boring	⌖
Combined Sewer	→→→→→→→	Existing Catch Basin	○
Electric	——E——	Proposed Catch Basin	●
Ex. Storm Sewer	——→—→—→	Existing Manhole	◎
Prop. Storm Sewer	——→—→—→	Proposed Manhole	◉
Ex. ITS Cable	— — — — —	Proposed Inlet	▬
Ex. Gas Line	——G——		
Ex. Fiber Optic	——FO——		

GENERAL PLAN
RETAINING WALL 37 ALONG JACKSON EXIT RAMP
F.A.I. RTE. 90/94 (KENNEDY EXPRESSWAY)
SECTION 2014-015 R&B-R
COOK COUNTY
STATION 8282+72.47 TO STATION 8286+02.19
STRUCTURE NO. 016-1826

TranSystems

USER NAME = wjcolletti	DESIGNED - WJC	REVISED -	
	CHECKED - JM/MDS	REVISED -	
PLOT SCALE = 48.0000 '/ in.	DRAWN - WJC	REVISED -	
PLOT DATE = 11/29/2017	CHECKED - JM/MDS	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

SHEET NO. 1 OF 3 SHEETS

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
90/94	2014-015 R&B-R	COOK	3	1
		CONTRACT NO.	60X94	
		ILLINOIS FED. AID PROJECT		

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