# GEOTECHNICAL REPORT

CHICAGO RIVERWALK

**State Street to Lake Street** 

CDOT Project No. E-0-621

Chicago, Illinois

## **PRIME CONSULTANT**

Mr. Steve Hamwey

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## STRUCTURAL ENGINEER:

Mr. Kurt Naus

Alfred Benesch & Co. 205 N. Michigan Ave. Suite 2400 Chicago, IL 60601 (312)565-0450

**Prepared by:** 

Geo Services, Inc. 805 Amherst Court Suite 204 Naperville, Illinois 60565 (630) 305-9186

**JOB NO. 11019** 

March 2012





October 10, 2011 Revised March 8, 2012

Sasaki Associates, Inc. 64 Pleasant Street Watertown, MA 02472

Attention: Mr. Steve Hamwey

Project Number 11019

Re: Geotechnical Report Chicago Riverwalk – State Street to Lake Street CDOT Project No. E-0-621 Chicago, Illinois

Dear Mr. Hamwey:

Please find enclosed the results of the geotechnical investigation for the Chicago Riverwalk from State Street to Lake Street in Chicago, IL (CDOT Project No. E-0-621). This report has been based upon information obtained in three (3) soil borings performed by Geo Services, Inc. and numerous soil borings performed by others in previous years for the Wacker Drive Reconstruction Project.

If there are any questions with regard to the information submitted in this report, or if we can be of further assistance to you in any way, please do not hesitate to contact us.

Very truly yours,

Geo Services Inc.

h Kt

Andrew J. Ptak, P.E. Office Manager

Dixon O'Brien, P.E. Vice President

enc.

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## **SECTION 01: INTRODUCTION**

The following report presents the results of the geotechnical exploration completed for the Chicago Riverwalk project in Chicago, IL. The project consists of extending out the existing riverwalk further into the river from approximately State Street on the east to Lake Street on the west. The report is prepared on the basis of three (3) soil borings performed by Geo Services, Inc. (GSI) for this project as well as numerous soil borings performed by others for the Wacker Drive Reconstruction project.

## SECTION 02: PROJECT BACKGROUND

The project consists of extending out the existing riverwalk further into the river from approximately State Street on the east to Lake Street on the west. Concepts under consideration for the project include building out a deck on a deep foundation system and a structurally supported slab or driving sheet-piling and filling in the claimed land for the deck and having the deck supported by the sheet-piling and existing dock wall.

## SECTION 03: SUBSURFACE INVESTIGATION PROCEDURES

As part of the preparation for this drilling work in the river, GSI submitted and obtained permission from the US Army Corps of Engineers (USACOE) and Illinois Department of Natural Resources (INDR) to perform the soil boring work on the Chicago River. GSI also submitted boring locations to the City of Chicago Department of Underground Coordination (OUC) for existing utility review. After receiving permission from all of these entities to proceed with the drilling work, GSI obtained a Harbor Permit from the Chicago Department of Transportation (CDOT) and cleared existing utilities using the Chicago One-Call System (DIGGER).

Soil borings were performed by Geo Services, Inc. with a Mobile B-57 truck mounted drill rig which was situated on top of a subcontracted barge in May and June, 2011. The top of barge was approximately 6 feet above the existing river level at the time of drilling.

The barge was transported to borehole locations by use of a tugboat and secured through the use of steel spuds free-falling to the river bottom and below. The borings were advanced by rotary drilling techniques.

Boring locations were located by estimating right-angles and measurements from nearby streets and elevations were determined with City of Chicago (CCD) datum elevation and measurements from the top of the existing riverwalk (Elevations at riverwalk deck vary from +5.4 to +6.4 CCD).

The majority of representative samples were obtained by employing split spoon sampling procedures in accordance with ASTM D-1586. Split spoon sampling involves driving a 2.0-inch outside diameter split-barrel sampler into the soil with a 140-pound weight falling freely through a distance of 30 inches. Blow counts are recorded in 6" intervals, and the blow counts are recorded on the boring logs. The number of blows required to advance the sampler the last 12

inches is termed the Standard Penetration Resistance (N). The N value is an indication of the relative density of the soil.

Select samples were obtained by employing Shelby Tube sampling in accordance with ASTM D-1587 alternating with vane shear testing in accordance with ASTM D-2573 in "soft" soils. Shelby tube sampling involves driving a thin-walled sampler apparatus into the soil by means of a continuous, rapid downward motion, without rotation. The drill rig's hydraulic ram was used as the driving force to obtain samples. Vane shear testing involves using a vane and an applied torque in cohesive soils, bringing the sample to failure. Values for the maximum and remolded data were recorded. All samples obtained in the field, either thru split spoon or Shelby tube sampling, were sealed and returned to our laboratory for further examination and testing.

## SECTION 04: LABORATORY PROCEDURES

The general laboratory-testing program consisted of performing water content testing per ASTM D-2216, unconfined compression testing with an IDOT-modified Rimac machine and a calibrated penetrometer testing on the cohesive samples recovered. Water content tests were performed on non-cohesive samples. Select samples were tested for dry unit weight. These tests were performed upon representative portions of the samples obtained in the field. The results of all the above stated testing performed, along with a visual classification of the material based upon both a textural analysis and the Unified Soil Classification System, are indicated on the boring logs included in Appendix C.

In addition, Atterberg limits (ASTM D-4318), particle size distribution (ASTM D-422), unconfined compression testing (ASTM D-2166) and organic content by wet combustion (AASHTO T-194) were performed on select samples. These tests were performed upon representative portions of the samples obtained in the field.

## SECTION 05: SOIL AND GROUNDWATER CONDITIONS

There are five (5) general types of stratum considered to be present in the boring logs. Isolated pockets of material may have been present on the logs and thus may not be representative of the surrounding area. Estimates of approximate strata depths have been noted and are recorded in City of Chicago Datum (CCD).

**RIVER MUCK:** From bottom of river elevation (-13 to -18 CCD) to a bottom elevation ranging from -21 to -24 CCD, the stratigraphy consists of very soft, organic river muck with very low soil strengths (less than 0.25 tsf) and high moisture contents (37 to 171%). The Standard Penetration Test values (SPT) ranged from N=0-7. Organic content testing indicated organic content tests ranging from 3.4 to 4.6%; although it should be noted that since the samples were completely submerged, the organic content test will not pick up on non-decayed organic matter so the actual organic content of the river muck is likely higher.

A strong, petroleum odor was also noted at each of the borings locations performed for this project.

**SOFT TO MEDIUM STIFF CLAY:** To a bottom elevation of -36 to -41 CCD, the stratigraphy consists of soft to medium stiff, gray clay. The SPT values ranged from N=2-10. Compressive strengths were determined using a calibrated hand penetrometer, an IDOT-modified Rimac machine or vane shear, and values varied from 0.25 to 0.9 tsf. This data also matches up with high moisture contents, generally in the low to mid 20's. Due to the low strengths, Shelby Tube sampling and vane shear testing were performed in this stratum.

- Soft to medium stiff clay
- Shelby tube sampling and vane shear testing performed
- Unconfined compressive strength values remained below 1 tsf
- Insitu vane shear testing peak, undrained shear strength values ranged from 950 to 1650 pounds per square foot (psf)
- Moisture content varied from generally in the low-to-mid 20's
- Liquid Limit: 34 to 38
- Plastic Limit: 18 to 22
- Grain Size Distribution
  Gravel: 0 to 2

0.02
16 to 46
26 to 31
27 to 52

• Dry Density: 93 to108 pcf (range)

**MEDIUM STIFF TO VERY STIFF CLAY:** To a bottom elevation of -56 to -66 CCD, the stratigraphy consists of medium stiff to very stiff, gray clay. The SPT values ranged from N=8-20 blows/ft. Penetrometer readings ranged from 0.6 tsf to 2.3 tsf. Stratum properties include:

- Medium stiff to very stiff clay
- Moisture content varied from 15% to 24%, generally in the high teens
- Unconfined compressive strengths usually fell within the range of 0.6 tsf and 2.3 tsf
- Dry Density: 98-115 pcf (range)

**MEDIUM DENSE SILTY CLAY LOAM TO SILT:** To a bottom elevation of -63 to -70 CCD, the stratigraphy consists of medium dense silty clay loam to silt. The SPT values ranged from N=13-29 blows/ft. Stratum properties include:

- Medium dense
- Moisture content varied from 13% to 31%, generally in the high teens
- Dry Density: 100-111 pcf (range)

**HARD CLAY TO CLAYEY SILT (HARDPAN):** To a bottom elevation of -76 to -82 CCD, the stratigraphy consists of hard lean clay to clayey silt "hardpan". The SPT values ranged from N=27 blows per foot to greater than 50 blows for 2 inches. Note that this stratum was not present at boring GSI-06. Pressuremeter testing was conducted in this stratum at a select number of the borings performed by others in the late 1990's. Those borings were ETB-7, TB-5, TB-6. MB-2. Results are included in the lab testing section of the Attachments to this report.

Stratum properties include:

- Hard
- Moisture content varied from 11% to 14%, generally in the low teens
- Dry Density: 116-125 pcf (range)

**VERY DENSE SILTY/SANDY/CLAYEY LOAM TO SILT:** To a bottom elevation of -99 to -108 CCD, the stratigraphy consists of very dense silty/sandy/clayey loam to silt. The SPT values ranged from N=33 to greater than 50 blows/ft. Moisture content ranged from approximately 8% to the 21%. Stratum properties include

- Very dense
- Moisture content varied from 8% to 21%, generally in the high teens

**DOLOMITIC LIMESTONE BEDROCK**: Bedrock was encountered at elevations ranging from - 99 to -108 CCD and consists of dolomitic limestone bedrock.

**GROUNDWATER:** The Chicago River water level varied from -1 to +1 during the time of our drilling operations in late May/early June 2011. The Chicago River typically fluctuates from +2 to -2 CCD.

### **SECTION 06: DEEP FOUNDATION RECOMMENDATIONS**

Due to the underlying river muck and soil soils present at and below the existing river bottom, we do not recommend filling in the area below the new riverwalk for a slab-on-grade deck due to excessive settlement that will occur due to these very soft to medium stiff, compressible soils that exist to approximately -40 feet CCD as well as inducing downdrag forces on any deep foundation system installed to support the riverwalk.

Also due to the underlying granular nature of the bearing soils below elevation -56 to -66, a driven pile system is considered a more economical deep foundation alternative to drilled caissons due the likely need for extended temporary and permanent casing that will be needed to maintain borehole stability as well as possible need for tremie placement of concrete. We understand that beneath the existing bridges, Caisson foundations will be necessary to do clearance issues with piling equipment for construction. Therefore, Caisson recommendations are also included in this report.

#### Driven Pile Recommendations

A deep foundation alternative of driven steel displacement pipe piles or non-displacement HPpiles are recommended for foundation support for the bridge structure. Based on the results of the borings and type of structure, and loading, piles may be used for the support of the new riverwalk deck.

Pile capacities and lengths were calculated to the piles' Maximum Nominal Required Bearing and are presented in Appendices F & G. Selection of the H-pile should be based on economic and construction considerations. We anticipate hard driving to occur below Elevation -70 CCD

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due to very dense soil conditions and recommend the use of driving shoes for piles driven below this elevation.

As per the IDOT Design Guide AGMU Memo 10.2, dated May 2010, the Washington State DOT (WSDOT) formula has replaced the FHWA Gates Formula as the standard method of construction verification. A modified IDOT static method was used to develop the SGR pile design tables. Nominal required bearing was calculated from LRFD skin-friction (with pile type correction factors) and end-bearing calculations. A value of 1.04 is used for Bias Factor Ratio (I<sub>G</sub>). A geotechnical resistance factor ( $\Phi_G$ ) of 0.55 was used in calculations for the factored resistance available (FRA). Pile lengths were picked with respect to the loadings and geometry of the proposed structures. An automatic hammer was used for drilling operations; a hammer efficiency (ER) of 73% was used in calculations.

When Steel H-piles are used, the Steel H-piles shall be according to AASHTO M270 Grade 50.

In lieu of the hammer selection criteria and use of the FHWA Modified Gates formula specified in Section 512 of the Standard Specification, the Contractor shall conduct a wave equation analysis to establish the driving criteria at all pile foundations which specify a Nominal Required Bearing above 600 kips. The analysis and calculations shall be submitted to the Engineer for approval.

The pile design tables and charts, provided in Appendices F and G, are estimates and test piles should be used for final pile length selections. We recommend that a minimum of one test pile be performed each 750-ft of lineal length along the project alignment. The piles should be driven until satisfactory driving resistance is developed in accordance with an appropriate pile driving formula. The test piles shall be driven to 110 percent of the Nominal Required Bearing indicated in the pile data information. The pile size and capacity selected should be based on economic considerations and the loads imposed on the structures.

For the new piles, we estimate settlements of <sup>1</sup>/<sub>4</sub> inch (in addition to the elastic compression of the pile itself) if no new fill is placed.

#### Caisson Recommendations at Underbridge Locations

Due to the lower overhead clearance tolerances for construction at the underbridge locations, caissons may be an economical foundation selection over driven piles.

The foundations at the underbridge locations may be constructed using a foundation system of caissons based at an elevation of -70 to -72 CCD in the silty clay to clayey silt "hardpan" stratum encountered at this elevation. Pressuremeter testing (PMT) of the hardpan soils performed by others in 1999 at borings TB-5, TB-6, ETB-7, and MB-2 was reviewed in determining a recommended factored bearing resistance for this project. This PMT data can be found in Appendix J of this report.

After review of the PMT testing in concert with our 2011 performed borings, a factored bearing resistance of 23 ksf is recommended for design. An experienced, geotechnical engineer should

be present during excavation to determine allowable bearing. Based on the anticipated design factored loads (vertical loading in the range of 300 to 400 kips) and the design shaft diameters of 3 to 4-feet diameter, belling of the caissons will be required.

Based on the estimated bearing pressures, the consistency of the soils encountered and the magnitude of the loads expected and the elastic modulus measured in the 1999 PMT testing, we estimate a maximum settlement of ½ inch for the caisson foundations supported on the hardpan stratum described above. Differential settlements would be dependent on the adjacent loads but is typically 1/2 to 2/3 of the total settlement. It should be noted that these settlement values are for soil compression only and that elastic compression of the Caisson concrete should be added to these values.

Also, boring GSI-06 near Wells Street indicates that the bearing stratum at Wells Street consists of a very silty/sandy non-cohesive soil stratum. Also, the stratigraphy on the western portion of the project has potential water-bearing sand/silt strata immediately beneath the hardpan stratum. In order to prevent possible hydrostatic blow-in and loss of support during construction, we recommend that all of the caissons for this project be constructed using slurry and the concrete be placed by tremie concreting methods.

To prevent the soft surficial sediment soils and underlying soft clay strata into the caisson shaft and water inflow from Chicago River, we recommend that a temporary and/or permanent steel casing be employed at the surface during construction. The temporary or permanent casing should be extended to a minimum elevation of -40 CCD. At the underbridge locations at Dearborn Street, LaSalle Street and Wells Street, the boring information indicates a granular stratum just above the hardpan strata exists and contractor should have enough casing to extend to -70 to -72 CCD if the caissons are not installed under slurry for any reason.

A minimum caisson shaft diameter of 2 1/2 feet is recommended. The caisson bell should have a base angle of at least 60 degrees (from horizontal) and the bell diameter should not exceed 3 times the shaft diameter. Caisson concrete may be placed by the free fall method into the clean and dry shaft excavations as long as concrete does not hit the sides of the shaft or the rebar cage during placement. Concrete slump should be in the range of 5 to 7 inches.

Because the caisson technician will likely not be lowered into the excavation to observe the base of the caisson excavation directly due to safety concerns, it will be necessary to oversize the bell area by 15% or 1 foot, whichever is smaller.

We strongly recommend that an experienced soil engineer be present during all phases of caisson construction to observe that the excavations have reached a suitable bearing stratum as recommended in the design. The caisson base should be kept as high into the bearing "hardpan" stratum as possible due to underlying silt/sand strata beneath the could cause "blow-in" of the base during construction.

The caisson design and construction procedures should be reviewed with the contractor selected for this work prior to the start of construction. If you wish, we would be pleased to review the plans and specifications for the foundation work once they are prepared so that we may have the opportunity to comment on the effects of the soil and groundwater conditions on the site.

## SECTION 07: LATERAL SOIL PROPERTIES

Table I contains a summary of lateral soil parameters to be used for design of deep foundations and any sheet-pile walls.

Material (Elevation, ft CCD)	Unit Weight (pcf)	Drained Friction Angle (°)	Undrained Cohesion (psf)	Adhesion (psf)	Lateral Modulus of Subgrade Reaction (pci)	Strain
New Stone Embankment FILL	130	36	-	-	125	-
River MUCK (-13 to -24)	90	0	0	250	0	-
Soft to Medium Stiff CLAY (-24 to -40)	115	22	1,300	650	100	0.02
Medium Stiff to Very Stiff CLAY (-40 to -65)	120	26	2,000	700	200	0.01
Medium Dense Silty Clay LOAM to SILT (-65 to -70)	125	32	-	-	60	-
Hard Silty CLAY to Clayey SILT Hardpan (-70 to -80)	130	0	11,500	2,850	800	
Very Dense Silty/Sandy LOAM or Clay LOAM/SILT (-80 to -108)	130	36	-	-	800	-

#### **TABLE I - SOIL PARAMETERS FOR LATERAL RESISTANCE**

## SECTION 08: GENERAL CONSTRUCTION CONSIDERATIONS

We understand the new riverwalk will be supported by the driven sheetpiling and driven H-piles but there still will be a need to fill in behind the new sheet-pile wall with new fill. This new fill will settle quite a bit (possibly as much as a few feet) due to the existing surficial river muck and underlying soft clay but we understand that since the slab will be a structurally supported slab, settlement is not a concern for the deck. No leveling or removal of the river muck should be required prior to filling.

However, it should be noted that due to this settlement, some additional structural issues will need to be addressed during design. Downdrag will affect both the sheetpile wall and the driven H-piles due to settlement of the river muck and soft clay to an estimated elevation of -30 CCD. Table I of this report contains adhesion values to use for estimation of downdrag forces for sheetpile and H-pile design. The pile design charts and tables in the Appendices to this report have already been calculated to take into account downdrag to -30 CCD.

With regards to the type of embankment fill material, below the water-line we would recommend using an open-graded material such as an IDOT CA-01 or CA-05 gradation. Above the waterline, the gradation of the material may be CA-01, 05, 06 or 07. Compaction/consolidation of the fill below the water-line can be accomplished by using a vibrating H-pile to consolidate the fill in lifts after placement. Above the water-line, conventional equipment may be used for compaction. As far as compaction criteria for specification, since it is not essential for this new embankment to not settle but is still desired to limit consolidation of the new embankment and provide fairly uniform lateral support for the sheet-pile wall, we would recommend that the acceptable criteria be limited to ensuring compaction in lifts no greater than 5 feet below the water table and 1.5 feet above the water-table and compacted to the satisfaction of the Engineer.

We understand that horizontal ties will be used to stabilize the new sheet pile wall. The ties will need to be sleeved to prevent the ties from being bent and damaged from the embankment settlement that will occur behind the sheet-pile wall. We recommend using a minimum 12-inch diameter PVC casing to protect the ties from settlement of the new embankment fill. Also, we understand that there may be isolated instances when it may be required to use battered H-piles in lieu of horizontal ties due to existing structures and openings. The soil parameter values provided in Table I can be used to determine battered H-pile lengths needed based on loading parameters. GSI can assist in this design work also once the design progresses to the point where these locations are better determined.

During excavation for the proposed improvements, movement of adjacent soils into the excavation should be prevented. All excavations should be performed in accordance with the latest Occupational Safety and Health Administration (OSHA) requirements. Allowances should be made for any surcharge loads adjacent to the retaining structures.

From the IDOT Standard Specifications for Roadway and Bridge Construction, excavation for structures should be in compliance with Section 502.

## SECTION 09: GENERAL QUALIFICATIONS

The analysis and recommendations presented in this report are based upon the data obtained from our soil borings performed at the indicated locations. This report does not reflect any variations that may occur between borings or across the site. In addition, the soil samples cannot be relied on to accurately reflect the strata variations that usually exist between sampling locations. The nature and extent of such variations may not become evident until construction. If variations appear evident, it will be necessary to reevaluate the recommendations of the report. In addition, it is recommended that Geo Services Inc. be retained to perform construction observation and thereby provide a complete professional geotechnical engineering service through the observational method.

This report has been prepared for the exclusive use of our client for specific application to the project discussed and has been prepared in accordance with generally accepted geotechnical engineering practices. No other warranties, either expressed or implied, are intended or made. In the event that any changes in the nature, design or location of the project as outlined in this report are planned, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and the conclusions of this report modified or verified in writing by the geotechnical engineer. Also note that Geo Services Inc. is not responsible for any claims, damages, or liability associated with any other party's interpretation of this report's subsurface data or reuse of the report's subsurface data or engineering analyses without the express written authorization of Geo Services Inc.

## **APPENDIX A**

## **GENERAL NOTES**

#### **GENERAL NOTES**

#### **CLASSIFICATION**

Unified Soil Classification System used for soil classification.

Cohesionless Sc	<u>bils</u>	
Relative	No. of Blows	<b>TERMINOLOGY</b>
<u>Density</u>	<u>per foot N</u>	
-		Streaks are considered to be paper thick.
Very Loose	0 to 4	Lenses are considered to be less than 2
Loose	4 to 10	inches thick. Layers are considered to
Medium Dense	10 to 30	be less than 6 inches thick. Stratum are
Dense	30 to 50	considered to be greater than 6 inches thick
Very Dense	Over 50	-
Cohesive Soils		
	Unconfined Compressive	
<u>Consistency</u>	<u>Strength - qu (tsf)</u>	
Very Soft	Less than 0.25	
Soft	0.25 - 0.5	
Medium Stiff	0.5 - 1.0	
Stiff	1.0 - 2.0	

#### DRILLING AND SAMPLING SYMBOLS

- SS: Split Spoon 1-3/8" I.D., 2" O.D.
- ST: Shelby Tube 2" O.D., except where noted

2.0 - 4.0

Over 4.0

AS: Auger Sample

Very Stiff

Hard

- DB: Diamond Bit NX: BX: AX
- CB: Carboloy Bit NX: BX: AX
- OS: Osterberg Sampler

HS: Housel Sampler WS: Wash Sample FT: Fish Tail RB: Rock Bit WO: Wash Out

Standard "N" Penetration: Blows per foot of a 140 lb. hammer falling 30" on a 2" O.D. Split Spoon

#### WATER LEVEL MEASUREMENT SYMBOLS

WL:	Water
WCI:	Wet Cave In
DCI:	Dry Cave In
WS :	While sampling

- WD: While Drilling
- BCR: Before Casing Removal
- ACR: After Casing Removal
- AB: After Boring

Water levels indicated on the boring logs are the levels measured in the boring at the times indicated. In pervious soils, the indicated elevations are considered reliable ground water levels. In impervious soils, the accurate determination of ground water elevations is not possible in even several days observation, and additional evidence on ground water elevations must be sought.

**APPENDIX B** 

SITE MAP



## **APPENDIX C**

## **LOCATION DIAGRAM**



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		MB-11 MB-2		
	PER REMISSIONCE INCLUDING	Geotechnical Inves	stigation	• U I
	ç	CDUT Project No. Chicago, Illin SOIL BORING LOCATIC	L-U-621 ois DN DIAGRAM	
SIZE B	REV. 1	GSI Job No. 11019	DRAWN BY APPRO	OVED BY AJP
SCALE:	1"=200'	DATE: 2-15-2012	SHEET: 1 OF 1	

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APPENDIX D

**BORING LOGS** 

Geo Services, Inc. Geotechnical, Environmental & Givil Engineering 805 Amherst Court, Suite 204 Naperville, Illinois 60565 (630) 355-2838

## STRUCTURE FOUNDATION BORING LOG

Project: Geotechnical Investigation For The Chicago River Riverwalk GSI Job No.: 11019 Location: Wacker Drive & The Chicago River from State Street to Lake Street, Chicago, Illinois\_ Date: 5/31-6/1/2011 County: Cook Bored By: DR Checked By: AJP Client: Sasaki Associates, Inc. DEP В U М D В U М BORING No.: GSI-02 Surface Water Elev.: -1.4 CCD Ĉ 0 Ē Ċ S 0 L O 0 1 1 Northing <u>901916</u> Groundwater Elev. WD n/aV T Ŵ T Ŵ S T S T S Ŝ Easting \_173896 Н Groundwater Elev. AB <u>n/a</u> Н Qu  $\nabla$ Qu (ft) (/6" (tsf) (%) (ft) /6" (tsf) (%) Barge Deck Elevation: +4.6 CCD After  $\bigtriangledown$ Hours: 0 0 43 0 RIVER MUCK-black-very loose 0 Strong Petroleum Odor. BARGE 0 0 -23.937 0 101 1 0.3B 30 1 24 Vane Shear @ -31.0' -1.4Peak Su=0.77tsf 102 ST 0.6B 24 LEAN CLAY with Sand-gray-0 96 soft to medium stiff (CL) 1 10 2 0.3B 23 35 Vane Shear @ -36.0' Peak Su=0.56tsf 0 93 RIVER 2 0.6B 2 24 97 2 0.7B 2 24 40 Vane Shear @ -41.0' Peak Su=0.82tsf 108 1 3 0.9B 19 4 3 100 3 0.7B 21 5 -40.93 102 4 -17.95 1.7B 22 LEAN CLAY with Sand-gray-0 stiff to very stiff (CL) RIVER MUCK-black-very loose 0 Strong Petroleum Odor. 0 108 0 171 5 Total Organic Matter=4.6% 25 0 50 6 1.5B 20

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer) ST-Shelby Tube Sample VS=Vane Shear Test The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206) The Unit Dry Weight (pcf) is noted in italics above moist (%) NR-No Recovery

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## STRUCTURE FOUNDATION BORING LOG

Project: Geotechnical Investigation For The Chicago River Riverwalk GSI Job No.: 11019 Location: Wacker Drive & The Chicago River from State Street to Lake Street, Chicago, Illinois\_ Date: 5/31-6/1/2011 County: Cook Bored By: DR Checked By: AJP Client: Sasaki Associates, Inc. DEP В U М D В U М BORING No.: GSI-02 Surface Water Elev.: -1.4 CCD Ĉ 0 Ē Ċ S 0 L O 0 Т 1 Northing <u>901916</u> Groundwater Elev. WD n/aV T Ŵ T Ŵ S T S T S Ŝ Easting <u>173896</u> Н Groundwater Elev. AB <u>n/a</u> Н Qu  $\nabla$ Qu (ft) (/6" (tsf) (%) (ft) /6" (tsf) (%) Barge Deck Elevation: +4.6 CCD After  $\bigtriangledown$ Hours: 115 Clayey SILT-gray-2 50/2 medium dense to very dense (ML) 4 5 1.5B 17 11 -73.4LEAN CLAY with Sand-gray-109 50/ stiff to very stiff (CL) 5 -80 7 1.4B 18 11 107 3 50/2 6 2.1B 20 16 7 Clayey SAND & FRACTURED ROCK-**106** gray-very dense (GC) 50/4 4 5 9 2.0B 21 -85 11 -60-55.9 105 4 50/ 6 <u>1.8</u>B 7 21 11 Clayey SILT-graymedium dense (ML) 4 100 50 7 7 1.6B 22 -90 NR -85.9 -60.98 35 SILT-gray-medium dense (ML) 8 50/5 NP 19 8 NP 31 -63.411 42 SILT-gray-very dense (ML) 50/4 11 70 NP 21 16 4.5+P 11 -95 Clayey SILT-gray-17 123 45 medium dense to very dense (ML) 26 50/3 30 7.4S 12 NP 20 15 50/ 28 75 35 4.5+P 100 11 NP 20

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer) ST-Shelby Tube Sample VS=Vane Shear Test The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206) The Unit Dry Weight (pcf) is noted in italics above moist (%) NR-No Recovery

Page: <u>2 of 3</u>

Geo Services, Inc. Geotechnical, Environmental & Civil Engineering 805 Amherst Court, Saite 204 Naperville, Illinois 60565 (630) 355-2838

## STRUCTURE FOUNDATION BORING LOG

Project: Costophnics Investigation For T		ione			worwalk	<u>()</u>	~~ ^		11/	010
Location: Wacker Drive & The Chicago P	Date: 5/31_6/1/201				<u>011</u>					
County Cook	iver i	rom	State	: 30	eet to Lake Street, Chicago, minois	_ Date: _ <u></u>			<u>0/1/2011</u>	
Client: Sangki Appendiaten Inc.						- Check	r Dy. kod I			
BORING No · GSI-02	D	В	U	М	Surface Water Flev: _1 / CCD		D	B	U	M
Northing 901916	E P		C S	0	Groundwater Elev. WD $m/a$		E P		C S	
Easting 173896	P T H	Ŵ		Ś	Groundwater Elev. AB $m/a$		Т	Ŵ		Ś
Barga Dook Elevation:	(ft)	(/6")	Qu (tsf)	(%)	After Hours:		(ft)	(/6")	Qu (tsf)	(%)
		/ ~ /	(101)	(/0)	Arter Hours:			<u> </u>	(101)	(/0)
						-				
		38 50/3	"				-			
			NP	20		-				
						-				
	—	35					-			
SILT—gray—very dense (ML)		50/5	9 <b>7</b>			-				
	<u>–105</u>		NP	22		<u> </u>	<u>130</u>			
		1				_				
	_	39	99							
		pu/3	NP	21		-				
						-				
		50 /4	"				_			
	110			22		_	1 7 5			
	<u>– 110</u>		NP	22		-	135			
						-				
		<u>50/5</u>					-			
-107.9			NP	21		-				
Drillers Observation: Fractured Bedrock -108.9						-				
		50/1	"			_				
Drillers Observation: Possible Bedrock	<u>–115</u>			NR			140			
							_			
-111.9						_				
End Of Boring @ -116.5'						-				
Rotary Drilling CME Automatic Hammer	_					_	_			
35.0' of 4.0"Ø Casing Used						_	_			
						-				
-	<u>-120</u>						145			
						-				
	_						$\neg$			<u> </u>
						-				
						-				
							$\neg$			
	_					-				
- The Unconfined Compressive Strength (UCS) Failure Mo	<u>-125</u> de is in	ndicate	ed by (	I B−Bul	┃ ge, S-Shear, P-Penetrometer) ST-Shelby Tube	 Sample	<u>150</u> <sub>VS=</sub>	=Vane	Shear	Test

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer) ST-Shelby Tube Sample VS=Vane Shear Test The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206) The Unit Dry Weight (pcf) is noted in italics above moist (%) NR-No Recovery Geo Services, Inc. Geotechnical, Environmental & Givil Engineering 805 Amherst Court, Suite 204 Naperville, Illinois 60565 (630) 355-2838

## STRUCTURE FOUNDATION BORING LOG

Project: Geotechnical Investigation For The Chicago River Riverwalk GSI Job No.: 11019 Location: Wacker Drive & The Chicago River from State Street to Lake Street, Chicago, Illinois\_ Date: 5/26-27/2011 County: Cook Bored By: DR Checked By: AJP Client: Sasaki Associates, Inc. DEP В U М D В U М BORING No.: GSI-06 Surface Water Elev.: +0.7 CCD Ĉ 0 Ē Ċ S 0 L O 0 1 Northing 902245 Groundwater Elev. WD n/aV T Ŵ T Ŵ S T S T Easting <u>17481</u>5 S Groundwater Elev. AB <u>n/a</u> Ŝ Н Н Qu  $\nabla$ Qu (ft) (/6" (tsf) (%) (ft) /6" (tsf) (%) Barge Deck Elevation: +6.7 CCD After Hours:  $\bigtriangledown$ RIVER MUCK-black-loose -18.8 1 SILTY SAND & GRAVEL-gray-1 very loose (A-2)NP 17 BARGE 1 -21.33 0.25P 25 30 2 Vane Shear @ -31.0' +0.7Peak Su=0.47tsf 5 97 2 0.3B 3 24 102 LEAN CLAY with Sand-graysoft to medium stiff (CL) 10 ST 0.7B 22 35 Vane Shear @ -36.0' Peak Su=0.70tsf 2 103 RIVER 2 0.8B 21 5 2 99 2 0.7B 4 23 40 98 1 3 0.9B 5 23 -36.3103 4 -13.3 - 201.1B 18 -45 5 0 0 LEAN CLAY with Sand-gray-1 104 101 stiff to very stiff (CL) 4 5 RIVER MUCK-black-loose 5 1.3B 20 Strong Petroleum Odor. 4 2 104 4 1 25 50 4 76 6 1.8B 22

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer) ST-Shelby Tube Sample VS=Vane Shear Test The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206) The Unit Dry Weight (pcf) is noted in italics above moist (%) NR-No Recovery

Page: <u>1 of 3</u>

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## STRUCTURE FOUNDATION BORING LOG

Project: Geotechnical Investigation For The Chicago River Riverwalk GSI Job No.: 11019 Location: Wacker Drive & The Chicago River from State Street to Lake Street, Chicago, Illinois Date: 5/26-27/2011 County: Cook Bored By: DR Checked By: AJP Client: Sasaki Associates, Inc. DEP В U М D В U М BORING No.: GSI-06 Surface Water Elev.: +0.7 CCD Ĉ 0 Ē Ĉ 0 L O 0 1 1 Northing 902245 Groundwater Elev. WD n/aV T Ŵ T Ŵ S T S T Easting <u>17481</u>5 S Groundwater Elev. AB n/aŜ Н Н Qu  $\nabla$ Qu (ft) (/6" (tsf) (%) (ft) /6" (tsf) (%) Barge Deck Elevation: +6.7 CCD After Hours:  $\bigtriangledown$ SILT-gray-medium dense (ML) -68.8 2 106 8 5 12 2.2B 19 NP 19 7 12 Sandy SILT-gray-106 medium dense to dense (ML) 16 4 17 1.4B -80 NP 5 16 18 14 LEAN CLAY with Sand-graystiff to very stiff (CL) 2 19 115 5 19 1.75B 15 22 NP 16 6 102 50/5 3 5 8 1.7B 21 .85 NP 12 60 108 35 4 6 43 50/4<mark>"</mark> NP 2.3B 20 10 17 -81.36 98 50/3 Clayey Sandy SILT with Fractured Rock-. 9 gray-very dense (GM/ML) 1.8B 24 -90 NP -6511 11 -83.8 -58.8109 4 32 Silty Sandy CLAY-gray-6 33 stiff to very stiff (CL/ML) NP 20 8 2.1B 17 37 109 40 3 6 48 Sandy SILT to Silty SAND-gray-<u>-70</u> 1.0B 18 <u>-95 50/5" NP</u> 15 7 very dense (SM/ML) -63.8 3 31 LEAN CLAY with Sand-gray-6 39 very stiff (CL) 9 3.25P 18 47 NP 19 -66.38 32 SILT-gray-medium dense (ML) 13 50/5 75 16 NP 100 25 NP 18

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer) ST-Shelby Tube Sample VS=Vane Shear Test The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206) The Unit Dry Weight (pcf) is noted in italics above moist (%) NR-No Recovery

Page: <u>2 of 3</u>

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## STRUCTURE FOUNDATION BORING LOG

Project: Geotechnical Investigation For The Chicago River Riverwalk GSI Job No.: 11019 Location: Wacker Drive & The Chicago River from State Street to Lake Street, Chicago, Illinois\_ Date: 5/26-27/2011 County: Cook Bored By: DR Checked By: AJP Client: Sasaki Associates, Inc. DEP В U М D В U М BORING No.: GSI-06 Surface Water Elev.: +0.7 CCD Ĉ 0 Ē P Ċ S 0 L O 0 1 1 Northing 902245 Groundwater Elev. WD n/aV Ś T T Ŵ T Ŵ S T Easting <u>17481</u>5 S Ŝ Н Groundwater Elev. AB <u>n/a</u> Н Qu  $\nabla$ Qu (ft) (/6" (tsf) (%) (ft) /6") (tsf) (%) Barge Deck Elevation: +6.7 CCD After  $\bigtriangledown$ Hours: 39 50/5 Sandy SILT to Silty SAND-gray-NP 16 very dense (SM/ML) 27 34 -105 130 50/4"NP 19 -98.830 SILT-gray-very dense (ML) 38 50/5 NP 18 -101.3 35 Sandy SILT-gray-very dense 35 <u>-110 50/4</u>" NP (SM/ML)19 -103.8 FRACTURED ROCK-gray-50/4 very dense (GP) -105.3<u>N</u>Ρ 8 Drillers Observation: Possible Bedrock -108.3-115 End Of Boring @ -115.0' Rotary Drilling CME Automatic Hammer 32.0' of 4.0"ø Casing Used 120 145 125 150

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer) ST-Shelby Tube Sample VS=Vane Shear Test The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206) The Unit Dry Weight (pcf) is noted in italics above moist (%) NR-No Recovery

Page: <u>3 of 3</u>

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## STRUCTURE FOUNDATION BORING LOG

Project: Geotechnical Investigation For The Chicago River Riverwalk GSI Job No.: 11019 Location: Wacker Drive & The Chicago River from State Street to Lake Street, Chicago, Illinois\_ Date: 5/23-24/2011 County: Cook Bored By: DR Checked By: AJP Client: Sasaki Associates, Inc. DEP В U М D В U М BORING No.: GSI-09 Surface Water Elev.: +0.3 CCD Ĉ 0 Ē Ċ S 0 L O 0 1 1 Northing 902255 Groundwater Elev. WD n/aV T Ŵ T Ŵ S T S T Easting <u>1760</u>29 S Groundwater Elev. AB <u>n/a</u> Ŝ Н Н Qu  $\nabla$ Qu (ft) (/6" (tsf) (%) (ft) /6" (tsf) (%) Barge Deck Elevation: +6.3 CCD After Hours:  $\mathbf{\nabla}$ 0 Total Organic Matter=3.4% 72 0 RIVER MUCK-black-very loose 0 Strong Petroleum Odor. 0 66 BARGE 0 -21.798 2 0.3B 22 30 3 +0.32 99 2 2 0.6B 22 Vane Shear @ -33.5' Peak Su=0.50tsf 2 99 LEAN CLAY with Sand-gray-2 soft to medium stiff (CL) 10 3 0.3B 23 35 RIVER 1 0.5P 26 2 99 2 0.6B 3 23 40 Vane Shear @ -41.0' Peak Su=0.69tsf 103 2 4 0.7B 21 6 3 108 4 17 -45 0.9B 6 -39.25 101 6 Lean CLAY with SAND-gray-6 1.2B 22 medium stiff to stiff (CL) -17.7 107 RIVER MUCK-black-very loose 5 Strong Petroleum Odor. 25 0 50 8 1.4B 19

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer) ST-Shelby Tube Sample VS=Vane Shear Test The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206) The Unit Dry Weight (pcf) is noted in italics above moist (%) NR-No Recovery

Page: <u>1 of 3</u>

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## STRUCTURE FOUNDATION BORING LOG

Project: Geotechnical Investigation For The Chicago River Riverwalk GSI Job No.: 11019 Location: Wacker Drive & The Chicago River from State Street to Lake Street, Chicago, Illinois\_ Date: 5/23-24/2011 County: Cook Bored By: DR Client: Sasaki Associates, Inc. Checked By: AJP DEP В U М D В U М BORING No.: GSI-09 Surface Water Elev.: +0.3 CCD Ċ S 0 Ē Ĉ 0 L O 0 1 1 Northing 902255 Groundwater Elev. WD n/aV T Ŵ T Ŵ S T S T S Ŝ Easting \_176029 Н Groundwater Elev. AB <u>n/a</u> Н Qu  $\nabla$ Qu (ft) (/6" (tsf) (%) (ft) /6" (tsf) (%) Barge Deck Elevation: +6.3 CCD After  $\bigtriangledown$ Hours: 3 102 16 116 4 50/3 1.25B 22 4.3B 13 6 SILTY CLAY with Sand-graymedium dense to very dense (CL/ML) 15 118 6 33 0.75P 22 -80 35 8.5B 6 13 Lean CLAY with SAND-gray-109 <u>50/</u>5 3 medium stiff to stiff (CL) 4 0.6B 18 4.5+P 13 4 -76.7 106 3 12 37 4 60 5 0.8B 16 -85 41 NΡ 14 21 4 111 SILT-gray-5 23 dense to very dense (ML) NP 0.9B 16 20 6 13 3 108 22 5 24 1.5B NP 7 18 90 40 18 109 36 3 50/4 6 NP 20 7 1.9B 18 -86.2Drillers Observation: Cobbles or Boulder.-86.7 104 3 42 50/5 4 -70 0.5B NP 6 23 -95 21 -64.2 SILT-gray-very dense (ML) 3 50/ 11: SILTY CLAY with Sand-gray-4 medium dense to very dense (CL/ML) 11 1.6B 13 NP 19 <u>-91.7</u> -66.7Clayey SAND & GRAVEL-gray-15 50/ 18 very dense (GC) 75 15 4.5+P 100 14 NR

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer) ST-Shelby Tube Sample VS=Vane Shear Test The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206) The Unit Dry Weight (pcf) is noted in italics above moist (%) NR-No Recovery

Page: <u>2 of 3</u>

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## STRUCTURE FOUNDATION BORING LOG

Project: Geotechnical Investigation For The Chicago River Riverwalk GSI Job No.: 11019 Location: Wacker Drive & The Chicago River from State Street to Lake Street, Chicago, Illinois\_ Date: 5/23-24/2011 County: Cook Bored By: DR Checked By: AJP Client: Sasaki Associates, Inc. DEP В U М D В U М BORING No.: GSI-09 Surface Water Elev.: +0.3 CCD Ċ S 0 Ē P Ċ S 0 L O 0 1 1 Northing 902255 Groundwater Elev. WD n/aV Ś T T Ŵ T Ŵ S T Easting \_176029 S S Н Groundwater Elev. AB <u>n/a</u> Н Qu  $\nabla$ Qu (ft) (/6") (tsf) (%) (ft) /6") (tsf) (%) Barge Deck Elevation: +6.3 CCD After  $\mathbf{\nabla}$ Hours: 50/: Clayey SAND & GRAVEL-gray-NR very dense (GC) 50/4 <u>–105</u> NP 130 11 -99.2Drillers Observation: Possible Bedrock -101.7End Of Boring @ -108.0' Rotary Drilling CME Automatic Hammer -110 35.0' of 4.0"¢ Casing Used 120 145 125 150

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer) ST-Shelby Tube Sample VS=Vane Shear Test The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206) The Unit Dry Weight (pcf) is noted in italics above moist (%) NR-No Recovery

Page: <u>3 of 3</u>

## APPENDIX E

## **BORING LOGS BY OTHERS**

						STR		REF	οU	ND.	ATION	1
						ROK	ING	LUG				
O'BRIEN & ASSOCIATES, II CONSULTING ENGINEER 1235 E. DAVIS ST. / ARUNOTON HTS., IL 6000 (BAT/1962-144) - EXPRESSION - 3776	NC. S₅							Sh _1		_ of	3	
Project Wacker Drive Recon	struction						C	)BA JO	ЪΒΙ	NO.	99342	
City Chicago		Str	ucti	ure No	•		F	Rig <u>C</u>	ME-	-55	PC	_
State <u>Illinois</u>		[ [	Date	e <u>Nov</u>	em	ber 19 to 29, 1999	<u> </u>	Checke	d B	ly	DOB	_
	2_1		<b>—</b>	i	<u> </u>							-
Station XX Offset XX		Blow Counts	R (in)	Qu (tsf)	W (%)	Chicago River Elevation —1. Groundwater Elevation — Groundwater Elevation —	5 CCD	¥	Blow Counts	R (in)	Qu (tsf)	w (%)
Ground Surface Elevation +2	.0 CCD											
Barge												
						Vane Shear @ 26.5' c=8	37 psf		ps bs			
									ps ps		_	24
	.5 ——					SILTY CLAY—trace sand and aravel—aray—medium (CL) we	t					
<i>*</i>		1							ps			
WATER-Chicago River	-5.0	-					,	-30.0	ps ps		_	23
						Vane Shear @ 30.0 c=7						
							77	<u> </u>	DS			
		-					55 ps	·	ps ps		0.2B	10
						Vana Shaar @ 33.0' a-1'	265 5				0.20	
		-					200 ps		l ns			
		-				SILTY CLAY—trace sand and gravel—gray—stiff to very stif	f		ps		0.50	
	-10.0					(CL)		- <u>35.0</u>	ps 		0.5P	24
							74.0				g	4.6
						Vane Shear @ 36.5 c=1.	516 ps	† <u> </u>	ps			
									ps		0.2B	24
									1			
						Vane Shear @ 39.5' c=10	674 ps	f	ps ps		70	8.1
	-15.0							-40.0	ps		1.4B	15
<b> </b>									1			
-1	4.5	D.S.			-	Vane Shear @ 41.5' c=3	715 ps	f —	ps ps		10	6.2
		ps							ps		1.2B	17
SANDY SILTY CLAY-trace shells-very soft (MUCK) wet		ps		_	88							
		ps							ps		9	8.4
	-20.0	ps ps		_	42	Vane Shear @ 44.5' c=2	265 ps	of -45.0	ps ps		0.6B	21
1	90 —	-										
<u>,</u>		ps				Vane Shear @ 46.5' c=2	490 ps	sf —	ps		9	5.5
SILTY CLAY-trace sand and		ps ps		_	25				ps ps		0.6B	20
gravel-gray-soft to medium (CL) wet		-							ľ			
		ps							ps			
Vane Shear @ 24.0' c=837 p	osf -25.0	ps ps		0.25P	23	Vane Shear @ 49.5' c=1	959 ps -	f -50.0	ps ps		0.5P	24
N-Standard Penetration Test (ASTM D-158 R-Recovery in inches ps-Pushed Spoon	6) Type Fail B-Bulge E-Estimo	ure Failur ated \	e /alue	S-Shear P-Pene	Fail	Qu-Unconfined Compressive Stre ure W-Water Content, percent dry w eter NP-Non-Plastic	ngth (tsf eight	f) Unit italio	wt. cs ab	(pcf) ove w	noted in 1%	<u></u>

						STRUCT	URE F	OU	ND	ATION	1
OBA						DORINO	200				
O'BRIEN & ASSOCIATES, INC CONSULTING ENGINEERS 1235 E. DAVIS ST./ARUNGTON HTS., IL 60005 (847)398-1441 + FAX(847) 398-2376	1 ~•						Sh _	2	_ of		_
Project <u>Wacker Drive Reconstr</u>	uction						OBA J	OB_	NO.	<u>99342</u>	
City <u>Chicago</u> County Cook		Str Loc	ucti atio	ure No on	•—		_Rig _( Bored	<u>CME</u> By	-55	, RH	_
State Illinois			Date	Nov	emt	per 19 to 29. 1999	Checke	ed E	}y	DOB	_
BORING NO. TB- Station XX Offset XX	-1	Blow Counts	R (in)	Qu (tsf)	W (%)	Chicago River Elevation –1.5 CC Groundwater Elevation – Groundwater Elevation –	D V	Blow Counts	R (in)	Qu (tsf)	W (%)
		-						$\vdash$			
				10	1 7	SILTY CLAY—trace sand & gravel—gray—hard (CL/ML)		1			
Vane Shear @ 51.5' c=1000 ps <sup>.</sup>	f	ps ps			1.1	-71.0		╞			
		ps		_	20			┢	$\left  \right $		
Vane Shear © 53.5' c=3715 ps	f										
SILTY CLAY-trace cand and		ps ps						50	/4″		-
gravel-gray stiff to very stiff	- <u>55.0</u>	ps		2.0P	15	CLAYEY SILI—trace to some sand & gravel—gray—very dense	-80.0	1		NP	13
						(ML)					
Vane Shear @ 56.5' c=2531 ps	f —	ps ps		10	0.1			50	/1"		-
		ps		_	19			1	No	Recov	ery
						-81.5		-			
Vane Shear @ 59.0' c=2939 ps	f	ps				SANDY SILT-trace sand and		50	/5"		
	-60.0	ps ps		2.0P	20	gravel—gray—very dense (ML)	-85.0			NP	18
						-84 0		-			
								36	/= "		
		1				Fine to Coarse SAND—arav—verv		150	/5	NP	17
						dense (SC)					
		6		10	2.3			25			
	-65.0	8 12		2.1B	23		-90.0	31		NP	18
				2.1.0	20						
								28			
								40		ND	14
								52			14
-66.5		17						20			
SILTY CLAY-trace sand and		45						50	/5"		<u> </u>
gravei—gray—nara (UL)	- /0.0	42	-	4.5+P	12		-95.0	-	$\vdash$	NP	23
Boulder noted from 70' to 71'		]						],,			
								50	/4"		
					$\vdash$			$\vdash$	$ \mid$	NP	18
						-96.5					
		21 36	-			SILT—gray—very dense (ML)		29 38			-
N-Standard Donotration Test (ACTU D. 4500)	-75.0	43		4.5+P	12	Quelloconfined Compression Observed	-100.0	33		NP	19
R-Recovery in inches ps-Pushed Spoon	B-Bulge E-Estimo	ure Failur Ited N	re Value	S-Shear P-Pene	r Failu trome	ure W-Water Content, percent dry weight ter NP-Non-Plastic	itali	ι wτ. cs ab	(pct) ove v	v%	

						STRUC	CTURE F	ΟU	ND,	ATION	1
						BORIN	ig log				
O'BRIEN & ASSOCIATES INC								_		_	
CONSULTING ENGINEERS 1235 E. DAVIS ST./ARLINGTON HTS., IL 60005	•						Sh	3	_ of		_
(847)398-1441 * FAX(847) 398-2376 Project Wacker Drive Reconstr	uction						OBA JO	ו אר	NO	99342	
City' Chicago		Str	ucti	ure No	. <u>X</u>	Х	RigC	ME-	-55	<u>рн</u>	
State Illinois		[	Date	e <u>Nov</u>	eml	ber 19 to 29, 1999		d B	y j	DOB	_
BORING NO. TB-	- 1										<u> </u>
Station XX	<u> </u>	llow ounts	R	Qu	w	Groundwater Elevation –1.5 Groundwater Elevation –		Blow	R	Qu	w
		۳S	(in)	(tsf)	(%)	Groundwater Elevation –	V	۳S	(in)	(tsf)	(%)
SILT-gray-very dense (ML)											
-99.0		23									
Fine SAND-gray-very dense (SP)		40 40		NP	23						
_101 5											
101.5		25									
SILT—trace sand—gray—very dense (ML)	- <u>105.0</u>	49 26		NP	18		- <u>120.0</u>				
-104.0											
		50	/1"					1			
			No	Recov	ery						
SILT & FRACTURED ROCK— gray—very dense											
		50	/5"								
	- <u>110.0</u>	1		NP	_		- <u>135.0</u>				
-109.0								1			
Rotary Drilling-Bedrock		-									
		1						1			
SILURIAN SYSTEM, NIAGARAN SERIES	S,				<b></b>						
RACINE FOEMATION DOLOMITE											
Gravel seam from -113.0' to -113.5'.	– <u>115.0</u>						<u> </u>				-
vugs. Horizontal fractures at -113.75' and 114.21'; vertical fracture with											
intersecting horizontal fracture from -114.21' to -114.625'; tight vertical											
fracture at -115.75'; tight vertical fracture with intersecting weathered			R(	CK							
-117.0'; horizontal fracture at -117.875'			C	ORE	-						
-118.0' to -119.0'; horizontal fractures at -121.1', -121.54' and -121.92'	120.0						145.0				
$\begin{array}{rcl} \text{RECOVERY} &=& 94.7\% \\ \text{RECOVERY} &=& 76.4\% \end{array}$	-120.0	1					- <u>1+5.0</u>	$\vdash$			
NUU = /0.4%											
-121.0		<u> </u>	<b></b>								
END OF BORING @ -123.0' Hollow Stem Auger to -63.5'											
Rotary Drilling Methods to Completi CME Automatic Hammer	ion -125.0						-150.0				
N-Standard Penetration Test (ASTM D-1586) R-Recovery in inches ps-Pushed Spoon	Type Fail B-Bulge E-Estimo	ure Failui Ited `	re Value	S-Shea P-Pene	r Failı trome	Qu-Unconfined Compressive Strengt ure W-Water Content, percent dry weigh eter NP-Non-Plastic	h (tsf) Unit nt itali	wt. cs ab	(pcf) ove w	noted in %	

						STRUCT	URE	FO	U١	١D	ATION	1
<b>BA</b>						BORING	LUC	2				
O'BRIEN & ASSOCIATES, INC CONSULTING ENGINEERS 1235 E. DAVIS ST. ARLINGTON HTS., IL 60005 (BAT)396-1441 - EARCAT (SPEC)							Sh	_1		. of	3	
Project Wacker Drive Reconstr	ruction						OBA	JOE	3 N	10.	99342	
City Chicago		Stri		ure No	·		Rig		E-	-55		_
State Illinois			Date	e <u>Nov</u>	. 3	0 to Dec. 14, 1999	Chec	ked	, В	у .	DOB	_
BORING NO. TR-	-2		<b>—</b>		<u> </u>			_				<u> </u>
Station XX Offset XX		Blow Dunts	R	Qu	w	Chicago River Elevation —1.5 CC Groundwater Elevation — Groundwater Elevation —			ounts	R	Qu	W
Ground Surface Elevation $\pm 2.0$		۳ö	(in)	(tsr)	(%)				'Ğ (	(in)	(tsr)	(%)
Barge									1			
barge						CLATET SAND to SANDT CLAY-trace shells-very loose		-	s			
						(MUCK)			s		Recov	
											Necov	
						-26.	5	⊢,			ç	4.8
WATER-Chicago River						SILTY CLAY—trace sand and			s		0.70	0.7
	- <u>5.0</u>						<u> </u>	).0 p	s		0.58	23
							. —				ç	6.3
						Vane Shear © 31.5' c=990 ps	sf ·		s			
								F	s	$\neg$	0.2B	23
								$\exists$				
						. Vane Shear @ 34.0 c=954 p:	st		s			0.0
	<u>    10.0                               </u>						- <u>35</u>	.0 F	s	_	0.2B	23
								$\Box_{}$				
								۱ ۲	s			┢
							<u> </u>	٩ ا	s		0.75P	25
							<u>v</u> .					
						Vane Shear @ 39.5' c=1469 r		4 7	s			$\vdash$
	-15.0						-40	.0 F	s		1.25P	22
						SILTY CLAY—trace sand and						
-15.0	o —					gravel—gray—stiff (CL) wet		۲ ۲	s s	$\neg$		┝
		ps						F	s		0.75P	18
CLAYEY SAND to SANDY CLAY-trace shells-very loose		ps	No	Recov	ery							
(MUCK)		ps ps				Vane Shear @ 44.0' c=1306 r		۲ ۲	s s	_		-
	-20.0	ps		-	92		-45	.0 F	s		0.5P	23
		ps ps				Vane Shear @ 46.5' c=1867 p	osf ·		)s )s	_		-
		ps		_	26			ļ	s	$ \downarrow$	<u>0.75P</u>	22
		ps				Vane Shear © 49.5' c=1918 r	osf		s s	-		┝
	-25.0	ps		-	34		-50.		s		1.0P	24
N-Standard Penetration Test (ASTM D-1586) R-Recovery in inches ps-Pushed Spoon	Type Fail B-Bulge E-Estimo	ure Failur Ited \	∙e ∕alue	S-Shear P-Penet	Fail	Qu-Unconfined Compressive Strength ( ure W-Water Content, percent dry weight ster NP-Non-Plastic	tsf)	Jnit w italics	t. (p abo	pcf) ve w	noted in %	

						STRUCT BORING	URE I	FOU	ND	ΑΤΙΟΝ	1
OBA							200				
O'BRIEN & ASSOCIATES, INC CONSULTING ENGINEERS 1235 E. DAWS ST./ARUNGTON HTS., IL 60005 (847)398–1441 + FAK487) 398–2376							Sh _	2	_ 01	- 3	
Project <u>Wacker Drive Reconstr</u>	uction	<u></u>		N			_OBA .	IOB	NO.	<u>99342</u>	2
County Cook	i	Loc	atic	on	·		_Rig _Bored	By	<u>-55</u>	RH	_
		D	ατε	· <u>Nov</u>	. 30	0 to Dec. 14, 1999	_Спеск	ea E	sy	DOB	
BORING NO. <u>TB-</u> Station <u>XX</u> Offset <u>XX</u>	<u>·2</u>	Blow Counts	R (in)	Qu (tsf)	₩ (%)	Chicago River Elevation –1.5 CG Groundwater Elevation – Groundwater Elevation –		Blow Counts	R (in)	Qu (tsf)	W (%
		_						-			
Vane Shear @ 51.0' c=1469 ps		DS									
SILTY CLAY-trace sand and		ps ps		0.75P	21						
gravel-gray-stiff (CL)						Some gravel-gray-very dense					
		ps						50	/4"		
Vane Shear @ 54.5' c=1123 ps	f - <u>55.0</u>	ps ps		0.5P	19		-80.0	<u>_</u>		_	13
									14.19		
										Deres	
66 5									NO	Recov	/ery
-00.5		5		10	7.8	-07.3	, 	48			
	-60.0	10 12		1.4B	19	SILT to SANDY SILT-gray-very	-85.0	52	/3"	NP	18
	_					dense (ML)	_	-			
		_					_	54 66	/2"		
								-		NP	19
		4					_				
	-65.0	5 7		1 25P	26		_90.0	55	/4"	NP	2.
		Ť		1.201	20			-			
								25			
								-/' <sup>9</sup>		NP	17
-66.5											
		9 12						<u> 50</u>	/5"		┢
SILTY CLAY-trace to some sand	-70.0	13		4.5+P	12		- <u>95.0</u>	) 		NP	20
ana gravor gray nara (OE)								50	/1"		
								-	No	Recov	/ers
								-			Γ
		17						25			
	-75.0	47		4.5+P	13	Our Upgerfined Ormanic Star U.	-100.0	24	/3"	NP	18
N-standard renetration lest (ASIM D-1586) R-Recovery in inches ps-Pushed Spoon	B-Bulge F	re Failur ted V	e (alue	S-Shear P-Penet	Failu	ure W-Water Content, percent dry weight ter NP-Non-Plastic	(ist) Un ita	n wt. lics at	(pct) ove v	v%	

						STR		οŪ	ND	ATION	1
						BOF	KING LOG				
	۹.										
O'BRIEN & ASSOCIATES, INC CONSULTING ENGINEERS							Sh	3	_ of	3	
(847)398-1441 * FAX(847) 398-2376											
Project <u>Wacker Drive Reconstr</u> City' <u>Chicago</u>	ruction	Str	ucti	ure No	•		0BA_J( Rig0	)В I 2ME-	NO. -55	99342	
County <u>Cook</u> State Illinois		Loc [	catio Date	on e Nov	. 30	0 to Dec. 14, 1999	Bored Checke	By d B	y.	RH DOB	
	2				_	ŕ		_	· ·		_
Station XX	-Z	ow ints	R	Qu	w	Chicago River Elevation —1 Groundwater Elevation —	.5 CCD	ow ints	R	Qu	l "
Offset <u>XX</u>		ක්ල්	(in)	(tsf)	(%)	Groundwater Elevation —	Ý	ο Β	(in)	(tsf)	(%)
		23									
SANDY SILT to SILTY SAND-gray-very dense (ML)		55	/ / "		0.7						
		22,	<u>74</u>	NP	23						
		25									
	_105.0	35 40	No	Recov	erv		_120.0				
	<u>-105.0</u>	10		110001	<u>, ,</u>		- <u>120.0</u>				
		30									
		70	/3"	NP	16						
-107.0		50	/1"								
Fractured Rock -108.0	-110.0						- <u>135.0</u>				
Rotary Drilling—Bedrock											
<u>–111.0</u> END OF BORING @ –113.0'											
Hollow Stem Augers to -63.5' Rotary Drilling methods to Complet	ion										
CME Automatic Hammer	-115.0						-140.0				
								1			
								╞			
								$\vdash$	$\left  \right $		
	100.0						145.0				
	- <u>120.0</u>						- <u>145.0</u>	$\vdash$			
											ĺ
									$\vdash$		1
	-125.0						-150.0				
N-Standard Penetration Test (ASTM D-1586) R-Recovery in inches ps-Pushed Spoon	Type Failu B-Bulge E-Estimo	ure Failur Ited N	re Value	S-Shear P-Pene	· Failu trome	Qu-Unconfined Compressive Str ure W-Water Content, percent dry ter NP-Non-Plastic	ength (tsf) Unit weight itali	wt. cs ab	(pcf) ove w	noted in %	

E-Estimated value P-F

						STRUCTU	JRE F	ΟU	ND	ATION	1
OBA						DOKING	LUG				
O'BRIEN & ASSOCIATES, INC CONSULTING ENGINEERS 1235 E. DAVIS ST./ARLINGTON HTS., IL 60005 (847)398-1414 • FAK4647) 398-2376	•						Sh _1		_ 01	- <u>3</u>	_
Project <u>Wacker Drive Reconst</u>	ruction					(	OBA JO	ЪΒΙ	NO.	<u>99342</u>	. <u> </u>
City <u>Chicago</u> County Cook		_Stri Loc	ucti atio	ure Na on	». <u> </u>		Rig <u>C</u> Bored	<u>:МЕ-</u> Ву	-55	5 RH	
State Illinois		_ [	Date	e Dec	em	ber 9 to 12, 1999 (	Checke	ďВ	y	DOB	_
BORING NO. TB- Station XX Offset XX	-3	Blow Counts	R (in)	Qu (tsf)	W (%)	Chicago River Elevation —1.5 CCD Groundwater Elevation — Groundwater Elevation —		Blow Counts	R (in)	Qu (tsf)	W (%)
Ground Surface Elevation +2.0	CCD										
Barge						SANDY SILTY CLAY-trace					
						shell-black-very soft (MUCK)		ps			
						Wei		ps ps		_	128
-1.5						-26	.5				
								ps			
WATER-Chicago River	-5.0					SILTY CLAY—trace sand and	-30.0	ps ps		_	25
						Vane Shear @ 31.5' c=837 psf		ps			
								ps ps		<0.25F	28
										(0120)	
							_	ps			
	_10_0					Vane Shear @ 34.5' c=934 psi	f	ps ps		0 5P	25
	<u>-10.0</u>						<u>-33.0</u>	-		0.01	23
								ps		9	5.9
								ps		0.00	
						Vane Shear @ 37.5' c=944 psi	f	103		0.68	24
						-36.5				11	2 6
						Vane Shear @ 39.5' c=969 psi	f	ps			~
	- <u>15.0</u>						-40.0	ps		0.8B	17
						SILTY CLAY—trace sand and					
						gravel—gray—medium to stiff (CL)		ps		//	2.0
	_							ps		1.0B	22
					-	Vane Shear © 44.0' c=949 pst	f	ps ps		11	0.4
	-20.0						-45.0	ps		0.9B	19
	<u> </u>							1			
		ps ps	┣─		_	_ 15 0		$\vdash$			┣
shell-black-very soft (MUCK)		ps	No	Recov	ery						
wet						gravel-gray-stiff to very stiff					
		ps				(CL)		ps ps		11	0.0
	-25.0	ps ps			139	-	-50.0	ps		1.3B	22
N-Standard Penetration Test (ASTM D-1586) R-Recovery in inches ps-Pushed Spoon	Type Fail B-Bulge E-Estimo	ure Failur ated N	re Value	S-Shea P-Pene	r Fail trome	Qu-Unconfined Compressive Strength (ts w-Water Content, percent dry weight ster NP-Non-Plastic	f) Unit itali	wt. cs ab	(pcf) ove v	noted in v%	
						STRUCT	URE F	OU	ND	ATION	1
---	-----------------------	----------------	------------	---------------	----------	---	-------------------	-----------------	----------------	-----------------	------------
OBA						BOKING	LUG				
O'BRIEN & ASSOCIATES, INC CONSULTING ENGINEERS 1235 E. DAVIS ST. ARLINGTON HTS., IL 60005 (847)398–1414 • FAKA67) 398–2376							Sh	2	_ of		
Project Wacker Drive Reconstr	uction						OBA J	ов і	NO.	99342	<u>,</u>
City Chicago		Str	ucti	ure No	·		_Rig (	<u>ME-</u>	-55	) RH	
State Illinois			)ate	e Dec	eml	per 9 to 12, 1999	Checke	ed B	}y	DOB	
BORING NO TR-	.3							1			Г
Station XX Offset XX		Blow Counts	R (in)	Qu (tsf)	W (%)	Chicago River Elevation —1.5 CC Groundwater Elevation — Groundwater Elevation —		Blow Counts	R (in)	Qu (tsf)	۷ (۶)
											┢
								]	/7"		
						CLAYEY SAND and GRAVEL—some cobbles—very		<u>130</u>			┢
						dense (GW/GC) Possible Boulder @ 78.5'		-		NP	<u> </u> 1
						6 / 0.0		1			
SILTY CLAY trace cand and		6 6		11	0.3			50	/1"		┢
gravel-gray-stiff to very stiff	- <u>55.0</u>	7		1.2B	18		-80.0	1	No	Recov	<u>/er</u>
(CL)						-79.0	, —	1			
						SILT CLAY to CLAYEY SILT-some		50	/5"		╞
						gravel and fractured rock-very				4.5+P	
						dense (CL/ML)		-			
		4		10	9.4			43	( . "		L
	-60.0	10		2.0B	18		-85.0	150,	4	_	
											Γ
								50	/5"		
										NP	
											t
-61.5		11				-86.6	5	50	/5"		
Well Graded SAND and GRAVEL—trace clay—dark	0.5	12			10	Well-Graded SAND and GRAVEL-trace clay-gray-very					Γ
gray—medium (GW/GC)	-65.0	16		NP .	10	dense (GW/GC)	-90.0	+		NP	┢
						-89.0	)				
						SILT-trace sand-gray-very		50	/5"		t
						dense (ML)		$\vdash$		NP	2
-66.5								1			
SILTY CLAY—trace sand and		16 19		12	4.1			<u>43</u> 50	/5"		┢
gravel—gray—hard (CL)	-70.0	22		5.9B	12		-95.0			NP	1
								<u>31</u>	/5"		┢
								Ľ	Ľ	NP	1
								{			
		21		12	7.5			37	/ - "		┡
-73.0	-75.0	27 50	4"	10.5S @14%	12	-98.0	-100.0	150	¥5″	NP	18
N-Standard Penetration Test (ASTM D-1586) R-Recovery in inches	Type Failu B-Bulge	ure Failur	e /alua	S-Shear	Failu	Qu-Unconfined Compressive Strength ( W-Water Content, percent dry weight	tsf) Uni itali	: wt. cs ab	(pcf) ove v	n³oted in v%	

						STRU	CTURE F	OU	ND	ATION	1
						BORI	NG LOG				
O'BRIEN & ASSOCIATES, INC. CONSULTING ENGINEERS 1235 E. DAVS ST./ARUNGTON HTS., IL 60005 12405 - MIL & EXPOS							Sh	3	_ of	3	
Project Wacker Drive Reconstr	uction						OBA J	DR I	NO.	99342	,
City' Chicago		Str	ucti	ure No	·			ME-	-55		
State Illinois			Date	e <u>Dec</u>	eml	ber 9 to 12. 1999	Checke	d B	y j	DOB	_
BORING NO. TR-	3										1
Station XX Offset XX		Blow Counts	R (in)	Qu (tsf)	W (%)	Chicago River Elevation —1.5 Groundwater Elevation — Groundwater Elevation —		Blow Counts	R (in)	Qu (tsf)	W (%)
SANDY SILT to SILTY SAND-very		50	/5"								
dense-gray (SM/ML)				NP	17			-			
		50	/1"								
	-105.0			NP	14		-120.0				
-104.0								-			
Fractured Rock		50	/0"								
-106.0											
Rotary Drilling-Bedrock											
-108.0	-110.0						- <u>135.0</u>				
SLURIAN SYSTEM, NIAGARAN SERIES, RACINE FORMATION DOLOMITE											
RUN 1 (-110.0' to -120.0'): Light gray to gray, porous with few small vugs, fossiliferous, stylolitic. Horizontal fractures throughout											
RECOVERY = 100% RQD = 85%											
	- <u>115.0</u>		R	CK	~		<u> </u>				
			C(	JKF	-			1			
									$\vdash$		$\vdash$
								-	$\vdash$		
	-120.0						- <u>145.0</u>		$\left  \right $		-
Hollow Stem Auger to -63.5' Rotary Drilling Methods to Completi	on										
CME Automatic Hammer											
											İ
	-125.0						-150.0				
N-Standard Penetration Test (ASTM D-1586)	Type Faile B-Bulge	ure Egilur	-	S-Shea	r Eaili	Qu-Unconfined Compressive Streng	ith (tsf) Unit	wt.	(pcf)	noted in	

						STRUCT	JRE	FOL	JND	ATION	1
						BORING	LÖĞ				
O'BRIEN & ASSOCIATES, INC CONSULTING ENGINEERS 1235 E. DAVIS ST./ARLINGTON HTS., IL 60005 (647)398-1441 * FAX(847) 398-2376	•						Sh	1	_ °	f <u>3</u>	_
Project Wacker Drive Reconstr	ruction						OBA	JOB	NO.	99342	
City Chicago		Str	ucti	ure No	•		Rig		-5		_
State Illinois			Date	e <u>Dec</u>	em	ber 6 to 7, 1999	Chec	ked	Зу	DOB	_
BORING NO. TB-	-4		<u> </u>		<u> </u>				1	<u> </u>	<u> </u>
Station XX	<u> </u>	low unts	R	Qu	w	Chicago River Elevation —1.5 CC Groundwater Elevation —			S R	Qu	w
		۳ŝ	(in)	(tsf)	(%)	Groundwater Elevation —	•	7 @?	3 (in)	(tsf)	(%)
Ground Surface Elevation +2.0	CCD							_	+		
Barge						CLAYEY SAND-trace					
						shells-very loose (MUCK) wet	-	<u>ps</u> ps	5 5		┝
								ps	s No	Recov	ery
						-26.5	5 —				
										9	4.5
WATER-Chicago River	-5.0					SILTY CLAY—trace sand and argument of the second seco	-30	.0 ps	5	0.6B	24
						······································	-	_			
										5	4.5
						Vane Shear @ 32.0' c=786 ps	f		5	0.68	24
							-				
						Vane Shear @ 33.5' c=995 ps	f -		5	9	3.9
	10 0								5		
	-10.0						- <u>35</u> .		<u>}</u>	0.68	24
						-34.0	)				6.8
						Varia Charm @ 77.0' a 1040 a	-		5		
						vane snear @ 57.0 c=1949 p	-	ps	5 	0.9B	21
						SILTY CLAY-trace sand and		ps ps	5		2.4
	-15.0					gravel-gray-stiff to very stiff	-40.	0 ps	s	1.2B	17
							-				
					┣	•	-	ps	8	10	6.3
								ps	ŝ	1.1B	17
								_			
								ps	3	5	9.8
-18.0	-20.0					Vane Shear @ 44.5' c=1653 p	sf - 45.	0 ps	5	1 2B	22
						1		1	$\uparrow$		
CLAYEY SAND-trace									5	10	3.5
initial tory loose (moon) wet						Vane Shear @ 47.0' c=1867 p:	- sf		ŝ	1 70	
			-		-	4	-		╢	<u>  1.78</u>	22
		]					-	7,,			
		ps ps							<u>,</u>		
N-Standard Penetration Test (ASTM D-1586)	-25.0	ps ure		_	61	Qu-Unconfined Compressive Strength (†	-50.0	) ps	s (pef)	1.0P	21
R-Recovery in inches ps-Pushed Spoon	B-Bulge E-Estimo	Failur ted \	re Value	S-Shea P-Pene	- Fail trome	ure W-Water Content, percent dry weight ster NP-Non-Plastic	ii ii	alics a	bove	w%	

								FOL	JND	ATION	1
OBA						DOKING	200	,			
O'BRIEN & ASSOCIATES, INC CONSULTING ENGINEERS 1235 E. DAVS ST./ARUNOTON HTS., IL 60005 (847)398–1441 • FAX(847) 398–2376							Sh	2	_ °	f <u>3</u>	
Project <u>Wacker Drive Reconstr</u>	uction						OBA	JOB	NO.	<u>99342</u>	2
City <u>Chicago</u> County <u>Cook</u>	l	Stru Loco	atic	ure No on	·		Rig Bore	<u>CME</u> d By	5:	<u></u>	_
State <u>Illinois</u>		D	ate	<u>Dec</u>	emt	<u>ber 6 to 7, 1999</u>	Chec	ked	By	DOB	
BORING NO. TB- Station XX Offset XX	• <b>4</b>	Blow Counts	R (in)	Qu (tsf)	₩ (%)	Chicago River Elevation —1.5 CCl Groundwater Elevation — Groundwater Elevation —		Blow	R (in)	Qu (tsf)	W (%)
		-							+		
		DS		g	8.1				)/1"		
		ps		0.8B	21				No	Recov	erv
				0.00							
		ps		10	4.4		-	50	<u>)</u> /4'	,	
SILTY CLAY-trace sand and gravel-grav-stiff to very stiff	-55.0	ps ps		1.5B	20	SILTY SAND and GRAVEL—trace	-80	.0		NP	9
(CL)						Possible Boulder or Cobble @	-				
		ps		10	0.5	76.0' and 86.5'		50	<u>)/4'</u>	,	
		ps		1.4B	21					NP	9
		ps ps		9	6.3			50	)∕4'	, 	
	-60.0	ps		2.9B	20		-85	.0		NP	11
							-				
		_					-	50	<u>)/1"</u>		
		_						1	No	Recov	/ery
						-86.5		╡			
		8 12		9	4.3	SILT-trace sand-gray-very		<u> </u>	5 )/5'	, 1	
	-65.0	15		1.8B	22	dense (ML)	<u>-90</u>	.0	+	NP	17
								50	0/4"		
							-		+		20
-66.5		14					-	50	) /6'	,	
CLAYEY SILT—trace sand and gravel—gray—dense (ML)	_70 0	20 22		_	12		_95			NP	22
	<u>, , , , , , , , , , , , , , , , , , , </u>						<u> </u>		$\top$		
						-94.0	-	38	3	10	2.9
						CLAYEY SILT—trace sand—gray—very dense (ML)		48 44	3 F	4.2S	18
SILIY CLAY to CLAYEY SILT-trace sand and		29	/ 4 78	11	8.8			<u>_27</u>	7	10	7.2
gravel—gray—hard (CL/ML) <u> </u>	-75.0	50	/ 4"	4.8S	12		<u>    100                               </u>	.0 40		4.55	20
N-Standard Penetration Test (ASTM D-1586) R-Recovery in inches ps-Pushed Spoon	Type Failur B-Bulge F E-Estimat	re ailure ed V	e alue	S-Shear P-Penet	Failu trome	Qu-Unconfined Compressive Strength (t ure W-Water Content, percent dry weight ter NP-Non-Plastic	sf) l i	Jnit wt. talics a	(pcf) bove	noted in w%	

						STRUC	FURE F	ΟU	ND.	ATION	1
						ROKINC	5 LUG				
O'BRIEN & ASSOCIATES, INC. CONSULTING ENGINEERS							Sh	3	_ of	3	
(847)398–1441 * FAX(847) 398–2376	1									00710	
City Chicago	lction	Str	uct	ure No	•		_08A_0		NO. -55	99312	_
State <u>Illinois</u>		LOC [	Dat	on eec	eml	ber 6 to 7. 1999	_Bored _Checke	ву ed Е	3y	DOB	_
BORING NO TR-	4	_	-	<u> </u>				-			1
Station XX Offset XX	<b>-</b>	Blow Counts	R (in)	Qu (tsf)	W (%)	Chicago River Elevation —1.5 C Groundwater Elevation — Groundwater Elevation —		Blow Counts	R (in)	Qu (tsf)	W (%)
								$\vdash$			
		50.	/ <sub>1</sub> "					-			
				Recov	arv						
				INECOV				┢			
		24									
SILT—trace sand—gray—very dense (ML) -	- <u>105.0</u>	39 37		NP	22		- <u>120.0</u>				
Possible Fractured Rock, Boulder		50	/1"								
or Cobbles @ -101.0 and -106.0			No	Recov	ery			-			
		36						1			
-	- <u>110.0</u>	50		NP	16		- <u>135.0</u>				
-109.0								{			
Fractured Rock-Driller's Note		50	/1"					┣			
Solid Rock-Driller's Note							_	1			
								1			
-112.0											
END OF BORING @ -112.0' . Hollow Stem Augers to -68.5'	- <u>115.0</u>						<u>–140.(</u>				
Rotary Drilling Methods to Completic CME Automatic Hammer	on —							1			
								┢			
			$\vdash$					┢			
								-			
	120.0						145.0				
	<u>120.0</u>						- <u>145.0</u>				
								$\left[ \right]$			
								F			1
									Ц		
	-125.0						<u>     150.</u> 0				
N-Standard Penetration Test (ASTM D-1586) R-Recovery in inches ps-Pushed Spoon	Type Failu B-Bulge E-Estimo	ure Failui Ited `	re Value	S-Shear P-Pene	- Failı trome	Qu-Unconfined Compressive Strength ure W-Water Content, percent dry weight ster NP-Non-Plastic	(tsf) Uni ital	t wt. cs ab	(pcf) ove w	noted in 1%	

OBA							STRUCT BORING	URE F	ΟU	ND	ATION	1
O'BRIEN & ASSOCI CONSULTING EN 1235 E. DAVIS ST./ARLINGTON (847)398-1441 * FAX(847)	, GINES, 51NEE 115., IL 600 398–2376	INC. RS						Sh	1	_ of	: _3	
Project <u>Wacker Drive Re</u> City <u>Chicago</u> County <u>Cook</u> State <u>Illinois</u>	constru	liction	Str Loc	ucti atio Date	ure No on eJan		y 25 to January 31, 2000	OBA JO Rig <u>(</u> Bored Checke	DB <u>CME</u> By ed E	NO. <u>- 55</u> }y	99342 RH DOB	2
BORING NO. Station Offset	TB-:	5	Blow Counts	R (in)	Qu (tsf)	W (%)	Surface Water Elev. N/A Groundwater Elevation Groundwater Elevation After Hours	¥	Blow Counts	R (in)	Qu (tsf)	W (%)
Ground Surface Elevation	+4.75	CCD										
9" ASPHALT, 6" CONCRETE	+3.5		1				SILTY CLAY trace cand & gravel		1			
SAND—trace to some gravel (Fill)					NP	7	gray-soft to medium stiff (CL)					
SILTY CLAY with BRICK (Fill)	+1.25		3					_	2		10	2.4
	-0.25	-5.0	23		NP	24		-30.0	24		0.75B	23
SILTY CLAY-trace sand & g mottled brown & gray- medium stiff to very stiff ((	jravel-		2		9	3.8						
	52)		4		2.2B	27						
			$\frac{2}{2}$		9	7.0					10	4.7
	-	-10.0	$\frac{2}{3}$		0.9B	23		-35.0	4		0.5B	23
SILTY CLAY-trace sand & g grav-soft to medium stiff (	-0.25		2		S O GP	1.8						
					0.00							1.2 0
	-	-15.0	1 2 1		0.6B	<b>0.0</b> 19		-40.0	3 4 6		0.4B	24
					10	0.1						
			2		0.6B	21		_				
			1		9	7.4			<u>3</u>		10	3.2
	-	-20.0			0.7B	23		<u>    45.0                                </u>	6		0.6B	24
				-		0.0			$\frac{3}{4}$			10.0
N-Standard Penetration Test (ASTM [ R-Recovery in inches		-25.0 Type Fail B-Bulge	<u>  2</u> ure Failur	re	U.4B S-Shear	<mark>r 21</mark> r Failu	Qu-Unconfined Compressive Strength ( wre W-Water Content, percent dry weight	-50.0 (tsf) Unit itali	<b>6</b> : wt. cs ab	(pcf) ove w	i 1.18 noted in v%	122

B-Bulge Failure S-Shear Failure E-Estimated Value P-Penetrometer

W-Water Content, percent dry weight NP-Non-Plastic

OBA						STRUCT BORING	URE I LOG	OU	ND.	ATION	1
O'BRIEN & ASSOCIATES CONSULTING ENGINEI 1235 E. DAVIS ST./ARLINGTON HTS., IL 6 (847)398-1441 * FAX(847) 398-237	, INC. ERS 0005 6						Sh _	2	_ of	3	_
Project Wacker Drive Reconstru	uction	<u>C1</u>	1				OBA U	OB	NO.	<u>99342</u>	2
County Cook		Loc	atio	on	·		_Bored	By	<u>-55</u>	RH	
State <u>Illinois</u>		. L	Jate	e <u>Jan</u>	uar	y 25 to January 31, 2000	_Check	ed E	Зy	DOR	_
BORING NO. TB- Station XX Offset XX	5	Blow Counts	R (in)	Qu (tsf)	W (%)	Surface Water Elev. N/A Groundwater Elevation Groundwater Elevation After Hours	V V	Blow Counts	R (in)	Qu (tsf)	¥ (%)
								34		12	8.2
SILTY CLAY—trace sand & gravel— gray—soft to medium stiff (CL)						SILTY CLAY to CLAYEY SILT—trace some sand & gravel—gray—hard (CL/ML)	e to	50	/5"	11.9S @8.4%	11
								33		12	1.9
		2		9	7.7		_	2"	ressure ter, Te	7.0B	12
	- <u>55.0</u>	3		0.8B	25		<u>-80.(</u>	) 50	⊲ ∕4"		
								1		NR	
-52.2	5					-77	.75				
SILTY CLAY—trace sand & gravel— gray—very stiff (CL)								50	e set		
		6		10	4.1	SILT—trace fine sand— gray—very dense (ML)			rressur eter, Te	NP	14
	-60.0	6 8		2.1B	23		-85.0	5	, M		
							_	-			
								50,	/5"		
										NP	17
						-83	.75	-			
		6		9	6.0			50			
	-65.0	0 11		2.4B	24	gray—very dense (SP/SM)	-90.0	,		NP	19
						-86	.25 —	+			
						SILT-trace fine sand-arav-		50,	/5"		
-62.7	5		$\nabla \nabla$			very dense (ML)		1		NP	21
CLAYEY SILT—trace sand & gravel—		6 6	lre Jest			-88	.75				
-64.7	5	7	Pressi leter	NP	24	Fine SANDY SILT to		50	/5"		
	-70.0		Ř	40	5 9	SILTY Fine SAND-gray- very dense (SM/ML)	-95.0	<u></u>	Ц	NP	18
SILTY CLAY to CLAYEY SILT-trace t	to	22			0.3		.25 _				
some sana & gravei—gray—nara (CL/ML)		34		5.8B	12	SII T-trace fine sand-aray-		<u>34</u> 46			
			×,			very dense (ML)	_	20	/3"	NP	24
		<u>1/</u> 38	essure er Tes		-						
		<u>45</u> 4″	Met.	4.5+P	12			<u>37</u> 50	/5"		$\square$
N Standard Depotentian Test (ACTU D 4500)	-75.0	<u> </u>	$\sim$				-100.0	<u></u>		NP	20
R-Recovery in inches	B-Bulge E-Estima	Failur ted \	re Value	S-Shear P-Penet	r Faili trome	ure W-Water Content, percent dry weight eter NP-Non-Plastic	ita	ic wt. lics ab	(pct) ove w	™ ™	

OBA					STRUC BORING	TURE F G LOG	OUN	NDA		1
O'BRIEN & ASSOCIATES, IN CONSULTING ENGINEERS	IC. S					Sh _	3	of	_3	
(847)398-1441 * FAX(847) 398-2376										
Project <u>Wacker Drive Reconstructi</u>	on Si	ruct	ure No	<u> </u>		_OBA_J(	DB N	10. <u>9</u>	99342	<u>}</u>
County Cook		cati	ion			Bored	By		RH	_
State Illinois		Dat	e <u>Jan</u>	uar	y 25 to January 31, 2000	_Спеске	аву	- /	DOR	—
BORING NO. TB-5 Station Offset	Blow	Counts (ii)	Qu (tsf)	W (%)	Surface Water Elev. N/A Groundwater Elevation Groundwater Elevation After Hours	$\mathbf{\nabla}$	Blow Counts	R in)	Qu (tsf)	₩ (%)
SILT—trace fine sand—gray— very dense (ML) — <b>96.25</b>										
Fine SANDY SILT to SILTY Fine SAND-gray-		5 0/5'	NP	17						
-98.75										
SILT—trace fine sand—gray— — very dense (ML) —10	3 4 5 0 5	5 9 0/4'	" NP	23		-130.0				
			,,							
_							1			
	+									
-103.75	$\square_{2}$	8								
CLAYEY SILT to SILTY CLAY-	5	0/1	" 2 OP	14		_135.0				
stone-gray-very dense (CL/GC)			2.01			<u>-155.0</u>				
-	5	0/1	"							
_			NR							
_										
-109.25	<u> </u>	0/2	,,				1			
BEDROCK Rotary Drilling — <u>11</u> 1	5.0		NP	16		-140.0				
	$\neg$						$\left  \right $			
SILURIAN SYSTEM, NIAGARAN SERIES, RACINE FORMATION DOLOMITE	1		•	•			1			
RUN 1 (-116.0' to -121.0') Light gray mottled gray with horizontal bedding, Moderately porous with few small vugs, fossiliferous, stylolitic.		R	OCK							
Horizontal fractures at -117.08', -117.95' and -118.0'. Vertical fracture with intersecting horizontal fracture from -118.0' to -118.68'. Horizontal fractures-120 at -119.40'119.68' & -120.37'	0.0	С	ORE			-145.0				
RECOVERY=96.0% RQD=75.2% -116.25							1			
END OF BORING @ -121.0'	-									
Kotary Drilling Methods CME Automatic Hammer							]			
–							1			
–										
-125 N-Standard Penetration Test (ASTM D-1586) Type P-Recovery in inches	5.0	luro	<u> </u>		Qu-Unconfined Compressive Strength	-150.0 (tsf) Unit	wt. (p	ocf) r	Poted in	

B-Bulge Failure S-Shear Failure E-Estimated Value P-Penetrometer

W-Water Content, percent dry weight NP-Non-Plastic

						STRUCT BORING	URE I LOG	-0U	IND	ATION	1
OBA											
O'BRIEN & ASSOCIATES, ID CONSULTING ENGINEER 1235 E. DAVIS ST./ARLINGTON HTS., IL 6000: (847)398-1441 • FAX(847) 398-2376	NC. S						Sh _	1	_ of	<u> </u>	_
Project <u>Wacker Drive Recons</u>	truction	<u> </u>	<u> </u>				_OBA J	OB	NQ.	<u>99342</u>	
City <u>Chicago</u> County <u>Cook</u>		Stri Loc	ucti atic	ure No on	·		Rig Bored	<u>СМЕ</u> Ву	-55	RH	
State Illinois		_ [	Date	e Dec	eml	ber 29, 1999	Check	ed E	Зy	DOB	_
BORING NO. TB Station XX Offset XX	-6	Blow Counts	R (in)	Qu (tsf)	W (%)	Surface Water Elev. N/A Groundwater Elevation XX Groundwater Elevation XX		Blow	R (in)	Qu (tsf)	W (%)
Ground Surface Elevation +8.2	CCD	Ū				Arter Hours	V				
5" ASPHALT, 7" CONCRETE +7.4	4 —					SILTY CLAY—trace sand & gravel- aray—soft to medium stiff (CL)					
Fine SAND—trace gravel & clay— brown & gray		-			15	<b>5</b> - <b>7</b> - <b>1</b>					
+4.7	,				13						
		2		g	3.1			3			
brown mottled gray-very stiff (CL	) – <u>5.0</u>	7		3.0B	24		-30.0	$\frac{1}{2}$		NR	
		2		9	7.3					10	1.8
		8		3.3B	23			3		0.7B	24
		3		10	0.2			$\frac{2}{3}$		10	0.2
	-10.0	5		2.5B	22		- <u>35.0</u>	) 4		0.3B	25
-2.8	·	2		9	3.8						
SILTY CLAY—trace sand & gravel-		2 4		0.8B	21						
gray—soft to medium stiff (CL)											
		1		g	8.1			1		9	8.6
	-15.0	2		0.8B	22		-40.0	) 2	-	0.3B	24
				g	5.8						
		1		0.50	22						
				0.56	22	95					
		1		10	0.5	-35	.o 	3		11	3.6
	-20.0	2 2		0.4B	22	SILIY CLAY—trace sand & gravel-  gray—stiff (CL)	- - <u>45.</u> 0	6 ) 8		<u>1.1B</u>	17
								-			
							_	1			
				_							
		1		9	9.2					10	10.3
	-25.0	2		0.7B	23	Ou Uncerfined Compressive Strength (	-50.0	8	(ncf)	1.5B	22

			_		_			FOU	JND	ATION	1
OBA						DONING		,			
O'BRIEN & ASSOCIATES, IN CONSULTING ENGINEERS 1235 E. DAVIS ST. (ARUNGTON HTS., IL 60005 (847)398-1441 * EX(847) 398-276	C.						Sh	2	_ o <sup>.</sup>	f <u>3</u>	
Project Wacker Drive Reconstr	uction						OBA	JOB	NO.	99342	2
City Chicago		Stri	ucti atie	ure No on	•		Rig		2-55	5 RH	_
State Illinois			ate	e Dec	em	ber 29, 1999	Chec	ked	Ву	DOB	_
BORING NO. TB-	-6			<u> </u>	<u> </u>	Surface Water Fley, N/A			-		$\mathbf{r}$
Station XX Offset XX		Blow Counts	R (in)	Qu (tsf)	W (%)	Groundwater Elevation XX Groundwater Elevation XX After Hours			stuno) (in)	Qu (tsf)	W (%)
									-		
SILTY CLAY—trace sand & gravel— gray—stiff (CL)						SILTY CLAY—trace to some sand & gravel—gray—very stiff to hard (CL)		$\frac{2}{50}$	ŝure <b>2</b> Sure 25	<b>1</b> 2 8.35	<b>2.</b> 8
						-70.	<u>3</u>		L Pres Meter	011%	
	- <u>55.0</u>	4 7 9		1.5B	<b>2.2</b> 18	CLAYEY SILT to SILTY CLAY-trace to some sand & gravel-gray- very dense (MI /CL)	-80	.0	)/3	4.25P	11
						-72.	8 -				
						CLAYEY SILT-trace to some sand	-	5			
						gravel & fractured stone-gray-	,		ter, Te	NP	<u>9.2</u>
						very dense (ML)			Me		
		6						50	<u>) /6"</u>		
	-60.0	12		1.0P	22		<u>-85</u>	.0		NP	9
							-	_			
		1						<u>5</u>	<b>,</b> 🕅	<u> </u>	
									essure er, Tes	NP	11
-55.3	2							_	S Pri		
		9		11	4.4			50	$\mathbf{b}^{\mathbf{a}}$		
CLAYEY SILT to SILTY CLAY—trace sand & gravel—gray—medium dense	-65.0	11 15		2.3B	16	Drillers Note:	-90	.0		NR	
(ML/CL)	,					No recovery from -88.5' to -90.0', & -91.0' to -92.5'.					
-57.6	·	9				Possible boulder or heavy cobbles	·	50	0/0"		
CLAYEY SILI—trace sand & gravel—gray—medium dense	,	11 18		NP	22			_		NR	
(ML)									+		
-60.3	<u>}</u>	10		11	9.6	<b>-8</b> 5.	3		Ŋ∕5"		
	7000	13		7 00	4 7	SILT-trace fine sand-			1		
SILIY CLAY—trace to some sand & gravel—gray—very stiff to hard (CL)	- 70.0	1/		3.68	13	gray-very dense (ML)	- <u>95</u>	.0		NP	19
		16 25	ئۆچۈ ئۆچۈ				-	44	1 \/4"		┢
		33	essure er, Tee	4.5+P	10				1	NP	19
			Met.					_			
		21	$\sim$	11	8.3			4			
	-75.0	54 43		4.0S	13		_100	.0	15″	NP	19
N-Standard Penetration Test (ASTM D-1586) R-Recovery in inches	Type Failu B-Bulge E-Estimo	ure Failur Ited V	e ′alue	S-Shear P-Penel	- Faili trome	Qu-Unconfined Compressive Strength ( W-Water Content, percent dry weight ter NP-Non-Plastic	tsf) l i	Jnit wt. talics c	(pcf) bove	n³oted in w%	

_						STRU( BORIN	CTURE F NG LOG	OUN	DATIO	N
O'BRIEN & ASSOCIATES, IN CONSULTING ENGINEERS 1235 E. DAVS ST./ARUNGTON HTS., IL 60005	C.						Sh	3	of <u>3</u>	
Project <u>Wacker Drive Reconstr</u> City <u>Chicago</u> County <u>Cook</u> State <u>Illinois</u>	uction	Stri Loc [	ucti atic Date	ure No on eec		ber 29, 1999	OBA J( Rig <u>(</u> Bored Checke	DB NO C <u>ME-</u> By d By	D. <u>9934</u> 55 RH DOB	2
BORING NO. TB- Station XX Offset XX	·6	Blow Counts	R (in)	Qu (tsf)	W (%)	Surface Water Elev. N/A Groundwater Elevation XX Groundwater Elevation XX After Hours	₩ ₩	Blow Counts	R Qu ) (tsf)	W (%)
SILT—trace fine sand— gray—very dense (ML)		50	/5"	NP	17					
		<u>38</u> 59 50	/5"	NP	17					
Drillers Note: No recovery from -106.0' to		50	/1"	NR						
-107.5', & -111.0' to -112.5'. Possible boulder or heavy cobbles.		<u>38</u> 50,	76"	NP	17		- <u>135.C</u>	-		
-104.	  8	50	/1"	NR						
Apparent Bedrock Rotary Drilling — <b>106.8</b>				_			-140.0			
END OF BORING @ -115.0' Rotary Drilling Methods CME Automatic Hammer										
-	- <u>120.0</u>						- <u>145.0</u>			
– N-Standard Penetration Test (ASTM D-1586) R-Recovery in inches	-125.0 Type Failu B-Bulge F	re	e			Qu-Unconfined Compressive Streng W-Water Content, percent dry weig	—150.0 th (tsf) Unit ht itali	: wt. (pr cs abov	of) noted e w%	in

Project       Macker Drive       Structure No. 200         Project       Wacker Drive       Structure No. 200         Project       Wacker Drive       Structure No. 200         Project       Structure No. 200       One structure No. 200         Project       Wacker Drive       Structure No. 200         BORING_NO. 1B - 7       Structure No. 200       One structure No. 200         Project       Structure No. 200       S							STRUCT BORING	URE F	OU	ND.	ΑΤΙΟΝ	1
DRIFN EATSTEATES, INC.     Shof3	OBA						20					
Project City Dicage         Opticage Dicage         Opticage Dicage         Opticate Dicage         Opticate End Dicage         Opticate End Dicage         Opticate End Dicage         Opticate End Dicage         Opticate End Dicage         Opticate End Dicage         Opticate End End Dicage         Opticate End End Dicage         Opticate End End Dicage         Opticate End End End End End Dicage         Opticate End End End End End End End End End End	O'BRIEN & ASSOCIATE CONSULTING ENGINI 1235 E. DAVIS ST./ARLINGTON HTS., IL (847)398-1441 * FAX(847) 398-2	S, INC. EERS 60005 376						Sh _	1	_ of	3	_
Unity	Project <u>Wacker Drive Reco</u>	onstruction	<u></u>		N			OBA J	OB	NO.	<u>99342</u>	
Statie       Ultinois       Date       February 16 to February 10, 2000       Checked By       DOB         BORING NO. TB-7 Station       Station       Stat	County <u>Cook</u>		Loc	atio	ure No on <u>XX</u>	· <u> </u>	X	_Rig _( _Bored	By_	-55	RH	_
BORING NO. TB-7 Station       Table Station       Table Station <thtable< td=""><td>State <u>Illinois</u></td><td></td><td>- [</td><td>Date</td><td>e <u>Feb</u></td><td>rua</td><td>ry 5 to February 10, 2000</td><td>_Checke</td><td>ed E</td><td>3y</td><td>DOB</td><td></td></thtable<>	State <u>Illinois</u>		- [	Date	e <u>Feb</u>	rua	ry 5 to February 10, 2000	_Checke	ed E	3y	DOB	
Ground Surface Elevation +19.75 CCD	BORING NO. 1 Station X Offset X	<b>B-7</b>	Blow Counts	R (in)	Qu (tsf)	W (%)	Surface Water Elev. N/A Groundwater Elevation XX Groundwater Elevation XX After Hours	V	Blow Counts	R (in)	Qu (tsf)	W (%)
30° CONCRETE (Upper Wacker Drive)         +17.25         Void         -5.0         -5.0         -5.0         -5.0         -5.0         -10.0         -10.0         -10.0         -10.0         -10.0         -11.0         -12.0         -13.75         -10.0 <td>Ground Surface Elevation +</td> <td>19.75 CCD</td> <td></td> <td></td> <td></td> <td>-</td> <td></td> <td></td> <td>-</td> <td></td> <td></td> <td></td>	Ground Surface Elevation +	19.75 CCD				-			-			
+17.25       -2       0.5P       2       0.5P       2       177         Void       -5.0       -5.0       -5.0       -3.0.0       3       2.1B       1         -5.0       -5.0       -5.0       -3.0.0       3       2.1B       1         -10.0       -10.0       -10.0       -13.75       -3.0.0       3       2.1B       1         -10.0       -10.0       -13.75       -1       -13.75       -1       -10.0	30" CONCRETE (Upper Wacker Drive)						SILTY CLAY—trace sand & gravel- gray—medium stiff (CL)		1			
Void	+	-17.25						_	2		0.5P	24
-5.0 -5.0	Void						-8.2	75				
-5.0 -5.0							SILTY CLAY to CLAYEY SILT_trace		2		11	7.7
		- <u>5.0</u>					to some sand, gravel & shells-	-30.0	3		2.1B	15
							(CL/ML)					
-10.0 -20.0 -2												
-10.0     -13.75     1       -10.0     -10.0     -10.0       SILTY CLAY-trace sand & gravel-     -35.0     2       -10.0     -10.0     -35.0     2       SILTY CLAY-trace sand & gravel-     -35.0     2       -10.0     -10.0     -10.0     -35.0       SILTY CLAY-trace sand & gravel-     -35.0     2       -10.0     -10.0     -10.0       -10.0     -10.0     -10.0       -10.0     -10.0     -10.0       -10.0     -10.0     -10.0       -10.0     -10.0     -10.0       -10.0     -10.0     -10.0       -10.0     -10.0     -10.0       -10.0     -10.0     -10.0       -10.0     -20.0     -10.0       SILTY SAND & GRAVEL w/     -20.0       -10.0     -20.0     -20.0       -11.0     -20.0     -45.0       -20.0     10.0     NP       -10.0     -20.0     -45.0       -10.0     -20.0     -45.0       -10.0     -20.0     -45.0       -10.0     -20.0     -45.0       -10.0     -20.0     -45.0       -10.0     -20.0     -45.0       -10.0     -20.0     -45.0												
-10.0     -10.0     -10.0     -35.0     2     .025P     2       gray-very soft to soft (CL)     -35.0     2     .025P     2       -11.0     -11.0     -11.0     -11.0     -11.0     -11.0     -11.0       -10.0     -11.0     -11.0     -11.0     -11.0     -11.0     -11.0       -11.0     -11.0     -11.0     -11.0     -11.0     -11.0     -11.0       -11.0     -11.0     -11.0     -11.0     -11.0     -11.0     -11.0       -11.0     +4.25     -11.0     -11.0     -11.0     -11.0     -11.0       SILTY SAND & CRAVEL trace aspholt     4     -11.0     -20.0     -20.0     -20.0     -20.0       -11.0     -20.0     10     NP     8     -45.0     3     0.25P       -11.0     -20.0     -20.0     -20.0     -20.0     -20.0     -20.0     -20.0       -11.0     -20.0     -20.0     -20.0 <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td>-13</td><td>.75</td><td></td><td></td><td></td><td></td></t<>							-13	.75				
-10.0       -10.0       -35.0       2       .025P       2         gray-very soft to soft (CL)       -35.0       2       .025P       2         -1       -2       0.5P       2       -2       0.5P       2         -1       -2       0.5P       2       -2       0.5P       2         -1       -1       -2       0.25P       2       -2       0.5P       2         5" ASPHALT, 7" CONCRETE       -40.0       2       0.25P       2       -40.0       2       0.25P       2         SAND & GRAVEL-trace asphalt       4       -4									$\frac{1}{2}$			_
		-10.0					SILTY CLAY—trace sand & gravel- gray—very soft to soft (CL)	- 35.0	2		.025P	23
15.0    15.0      15.0    15.0      15.0    15.0      15.0    15.0      15.0    15.0      15.0    15.0      15.0    15.0      15.0    15.0      15.0    15.0      15.0    15.0      15.0    15.0      15.0    10.0       2     0.25P 2       SAND & GRAVEL-trace asphalt								_				
									$\frac{1}{2}$			
									2		0.5P	24
-15.0       -15.0         +4.25       -40.0       2       0.25P         5" ASPHALT, 7" CONCRETE       -40.0       2       0.25P         SAND & GRAVEL-trace aspholt       4       -40.0       2       0.25P         SAND & GRAVEL-trace aspholt       4       -40.0       2       0.25P         SILTY SAND & GRAVEL w/       -20.0       -20.0       -20.0       -20.0       -20.0         -20.0       10       NP       8       -45.0       3       0.25P       2         SILTY SAND & GRAVEL w/       -1       -1       NR       -45.0       3       0.25P       2         -1       NR       -20.0       10       NP       8       -45.0       3       0.25P       2         SILTY CLAY-trace sand & gravel-       2       -2       -3       -50.0       2       0.25P												
-15.0       -40.0       2       0.25P       2         5" ASPHALT, 7" CONCRETE       -40.0       2       0.25P       2         SAND & GRAVEL-trace asphalt       4       -40.0       2       0.25P       2         SAND & GRAVEL-trace asphalt       4       -40.0       2       0.25P       2         SILTY SAND & GRAVEL w/       -20									11			
+4.25         5" ASPHALT, 7" CONCRETE (Lower Wacker Drive) +3.25         SAND & GRAVEL -trace asphalt         4         (Fill) +2.25         6       NP         SILTY SAND & GRAVEL w/ CRUSHED STONE (Fill)         20         -20.0       10         NP       8         -20.0       10         NP       8         -45.0       3         0.25P 2t         1       NR         -1       NR         -25.0       6         0       0.75P 26         N-Standard Penetration Test (ASIM D-1586)       Tage Failure		-15.0						-40.0	2		0.25P	24
3 ASTRALI, 7 CONCRETE       4         (Lower Wacker Drive)       +3.25       2         SND & GRAVEL-trace asphalt       4         (Fill)       +2.25       6         SILTY SAND & GRAVEL w/		-4.25						_	-			
SAND & GRAVEL-trace asphalt (Fill)       4 +2.25       6 +2.25       NP       5 +2.25         SILTY SAND & GRAVEL w/ CRUSHED STONE (Fill)       20 -13       -200       10       NP       8 -45.0       -45.0       3       0.25P       2/2         -20.0       10       NP       8       -45.0       3       0.25P       2/2         -1       1       NR       -45.0       3       0.25P       2/2         -1       1       NR       -45.0       3       0.25P       2/2         SILTY CLAY-trace sand & gravel- gray-medium stiff (CL)       -25.0       6       0.75P       26       -50.0       2       0.25P       2/2	(Lower Wacker Drive) +	3.25	2				-					
SILTY SAND & GRAVEL w/ CRUSHED STONE (Fill)	SAND & GRAVEL—trace asphal (Fill)	t • <i>2.25</i>	4		NP	5						
CRUSHED STONE (Fill)	SILTY SAND & GRAVEL w/											
-20.0 10 NP 8 -20.0 10 NP 8 -45.0 3 0.25P 24 -45.0 3 0.25P 24 -5.0 0 2 0.25P 24 -5.0 0 0 0 0.25P 24 -5.0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	CRUSHED STONE (Fill)		20						2			
-3.75     -		-20.0	13			ß		-45 0	23		0.250	26
-3.75     -3.75       SILTY CLAY-trace sand & gravel-     2       gray-medium stiff (CL)     -25.0       -25.0     6       0.75P     26       0u-Unconfined Compressive Strength (1st)     Unit wt (ncf) noted in									Ť		0.201	
-3.75       1       NR			1									
-3.75     -3.75       SILTY CLAY-trace sand & gravel-     2       gray-medium stiff (CL)     2       -25.0     6       0.75P 26     -50.0       N-Standard Penetration Test (ASTM D-1586)     Type Failure			1				]		1			
-3.75							1					
Signal - 25.0     2     3     3       N-Standard Penetration Test (ASTM D-1586)     Type Failure     Ou-Unconfined Compressive Strength (tsf)     Unit wt (pcf) noted in		-3.75							<b>-</b>			
U         -ZOJU   6          U./5P[26]         -50JU   2          0.25P[25]           N-Standard Penetration Test (ASTM D-1586)         Type Failure         Ou-Unconfined Compressive Strength (tsf)         Unit wt (ocf) noted in	gray-medium stiff (CL)		2		0 755		1		3	Η	0.055	<u> </u>
	N-Standard Penetration Test (ASTM D-1	<u>—25.0</u> 586) <u>Type Fail</u>	ure ure		<u>10.75P</u>	-26	Qu-Unconfined Compressive Strength (	<u>-50.0</u> (tsf) Uni	<u>2</u> t wt.	(pcf)	U.25P	25

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OBA									2 0 1 11		-				
O'BRIEN & ASSOCIATES, IN CONSULTING ENGINEER 1235 E. DAVIS ST./ARLINGTON HTS., IL 6000E (847)398-1441 * FAX(847) 398-2376	NC. S									Sł	ם_ ו	2	_ of	3	_
Project <u>Wacker Drive Reconst</u>	ruction									OB	A JC	DB_I	٧Q.	<u>99342</u>	
City <u>Chicago</u> County <u>Cook</u>		Strı Loc	ucti atic	ure No on <u>XX</u>	. <u>X</u>	X				Rig Bor	ed I	: <u>м</u> - Ву	-55	XX	_
State <u>Illinois</u>		D	)ate	e <u>Febr</u>	ruar	y 5	to Feb	ruary 10	0, 2000	Che	ecke	d B	У	DOB	
BORING NO. TB- Station Offset XX XX	-7	Blow Counts	R (in)	Qu (tsf)	W (%)	Surf Grou Grou Afte	ace Wat Indwater Indwater r	ter Elev. r Elevatic r Elevatic Hours	N/A on XX on XX		$\mathbf{\tilde{v}}$	Blow Counts	R (in)	Qu (tsf)	W (%)
	_														
SILTY CLAY—trace sand & gravel— gray—very soft to soft (CL)						SILTY gray-	′CLAY– -medium	trace sa n stiff to	nd & grav stiff (CL)	el					
<u>-33.</u>	75	.3		11	2.8							5		10	1.2
	-55.0	5 7		0.9B	17						30.0	6		1.3B	26
SILTY CLAY—trace sand & gravel— gray—medium stiff to stiff (CL)	- <u>35.0</u>	,		0.00	17					_ <u>_</u>				1.00	20
										-					
		3		10	0.7				-0	53.75		9		12	5.8
	-60.0	5 6		1.2B	23	SILTY to so	CLAY	to CLAYE id & gra	Y SILT—tro vel—gray—	 בפ – 3	35.0	14 17		1.75S @14.1%	11
						stiff	(CL/ML)	)			_				
										_					
										_	_				
									-6	5 <b>8.75</b>					
		4		10	7.2	SILTY	CLAY-	trace to	some	_		18 21			
	-65.0	7		1.4B	22	sana	& grav	ei-gray-	nara (CL)	-9	0.0	29		4.5+P	12
										_					
									-2	72.25					
		,		10	5 0	gray-	-very de	-some s ense (ML)	ana & gra )	ivei – _		50	/ , "		
		4			0.0					_		50,	4		
	- /0.0	6		0.6B	22					<u> </u>	95.0			NP	14
										_		50	/1"		
										_					
										×0~-					
	_	7		11	5.5	SILTY	CLAY-	trace to	some san	( <b>8.75</b> d & _		50	⁄5"		
	-75.0	9 13		1.1B	15	grave (CL)	el w/ sil	It streaks	s-gray-ha	rd —10	0.0			4.5+P	9
N-Standard Penetration Test (ASTM D-1586) R-Recovery in inches	Type Failu B-Bulge f	ire ailur	e /alue	S-Shear	Failu	ure	Qu-Uncon W-Water (	fined Compr Content, per Plastic	essive Strengt cent dry weig	h (tsf) nt	Unit italio	wt. ( cs ab	(pcf) ove w	noted in 1%	

						STRUCTU	JRE F	ΟU	ND	ΔΤΙΟΝ	١
						BORING	LOG				
O'BRIEN & ASSOCIA' CONSULTING ENGI 1235 E. DAVIS ST./ARLINGTON HTS (647)398-1441 * FAX(847) 39	TES, INC. NEERS 5., il. 60005 8–2376						Sh _	3	_ of		
Project Wacker Drive Re	construction						OBA J	ЭΒ	NO.	99312	
City' <u>Chicago</u>		Str	uct	ure No	. <u>X</u>	X	Rig (	<u>ME</u>	-55		
State <u>Illinois</u>			Date	e <u>Feb</u>	rua	ry 5 to February 10, 2000	Borea Checke	ву ed E	By ∫	DOB	_
	TD_7		-		-						
Station		ts				Groundwater Elev. N/A	$\nabla$	st		•	
Offset	XX	ВS	(in)	(tsf)	(%)	Groundwater Elevation XX After Hours	$\mathbf{V}$	щŝ	(in)	(tsf)	(%)
	d 0										
w/silt streaks-gray-hard (CL)	a & gravel	-				SANDY SILT-trace to some gravel		{			
		50	<u>6"</u>			& fractured rock-gray-very dense		50	/1"		
SILT-trace fine sand- arav-verv dense (ML)				NP	20	(ML/ SM) -107 BEDROCK	.25	-		NR	
			F			Rotary Drilling -108	8.25				1
						SILURIAN SYSTEM, NIAGARAN SERIE RACINE FORMATION DOLOMITE	:S,	-			
	-105.0	050	6"	NP	20	Run 1 (-128.0' to -137.0') Light gray to gray with horizontal	-130.0	)			
		-				fossiliferous & stylolitic, weathered		]			
						Highly fractured to -128.45. Vertic  fracture with intersecting horizonto	201 21		R(	CK	·
		50	/1"	NR		fractures from -128.92 to -129.2 & from -129.51 to -130.70.	8		$\cap$	) RF	-
		50	<u> </u>		$\vdash$	Horizontal fractures at -131.0' and	d —	1			-
		]				thin clay parting at -132.17.		1			
		40			$\vdash$	Vertical fracture from -132.4' to		1			
	- <u>110.0</u>	)23	<u>/4"</u>	NP	19	-132.85', -133.68', -134.01',	- <u>135.</u> 0				
						fractured from -134.62. Highly		1			
		46	V= "			-135.20. RECOVERY=80.0% RQD=31.1%		1			
		150,		NP	20		17.25	$\vdash$			1
						Rotary Drilling Methods		1			
		29				CME Automatic Hammer		1			
		50	6"								
	– <u>115.0</u>			NP	22		<u>–140.(</u>	2			
		1_	 /					1			
	_	50	<u>/1"</u>		┝		_	{			
				NR				1			
		-						4			1
		28						1			
	-120 0	27	_	NP	22		-145 0	-			
	120.0							1			1
	-101.25	50	/2"					$\frac{1}{2}$			1
SANDY SILT-trace to some	gravel	Ť			<b>_</b>			1			
(ML/SM)	uense	+	$\vdash$		21			1			
		]						1			
		<u>32</u> 50	/5"		┝			1			
N. Stendard Desitering T. J. (ACT) 2	-125.0	<u>)</u>	1	NP	19		-150.0	1			
R-Recovery in inches	– 1386) Type Fai B-Bulge E-Estim	iure Failu ated	re Value	S-Shear P-Pene	r Fail trome	uu-Uncontinea Compressive Strength (t ure W-Water Content, percent dry weight ster NP-Non-Plastic	st) Uni itali	: wt. cs ab	(pct) ove w	noted in %	

						STRUCT BORING	URE I LOG	OU	ND	ATION	1
OBA						201110					
O'BRIEN & ASSOCIATES, IN CONSULTING ENGINEER 1235 E. DAVIS ST./ARLINGTON HTS., IL 60005 (847)398-1441 * FAX(847) 398-2376	IC. S						Sh _	1	_ of	4	
Project Wacker Drive Reconst	ruction	<u></u>				V	OBA U	OB	NO.	<u>99342</u>	2
County Cook		Loc	atio	ure No on <u>XX</u>	· <u> </u>	X	Bored	By	<u>-55</u>	RH	_
State Illinois		. L	Jate	e <u>Jan</u>	uar	y 25 to January 31, 2000	_спеск	ea E	5y	DOB	
BORING NO. <u>TB</u> - Station <u>XX</u> Offset <u>XX</u>	-12	Blow Counts	R (in)	Qu (tsf)	W (%)	Surface Water Elev. N/A Groundwater Elevation XX Groundwater Elevation XX After Hours	¥	Blow Counts	R (in)	Qu (tsf)	W (%)
Ground Surface Elevation +20.	0 CCD	_						+			
31.0" CONCRETE						SILTY CLAY—trace sand & gravel— brown & gray—stiff (CL)				g	8.3
+17.	4							3		1.25B	24
VOID						-8.5				10	3.6
	- <u>5.0</u>					SILTY CLAY—trace sand & gravel— gray—soft to medium stiff (CL)	-30.0	2		0.75B	22
							_				
	-10.0						- 35.0	<u> </u>			21
										10	7.0
								2		0.6B	21
								2			
	-15.0						-40.0	) 4			23
+2.9 3 75" ASPHALT, 8.0" CONCRETE											
+2.0	,	1		ę	6. i						
SILTY CLAY—trace sand & gravel— brown & aray—stiff to very stiff		3 5		2.8S @11.3%	23			1		10	5.0
(CL)	-20.0						-45.0	) 3		0.75B	23
		2		9	7.9						
		3 4		1.7B	25						
		3 5		1 750	0.6						10.4
N-Standard Penetration Test (ASTM D-1586)	-ZO.U	ר ב ure		LI./2R	23		-30.0	<u> </u>	(pof)	U./B	<u> </u> 24

					STRUCT BORING	URE	FC G	DUI	ND,	ATION	
OBA					20						
O'BRIEN & ASSOCIATES, IN CONSULTING ENGINEER 1235 E. DAVIS ST./ARLINGTON HTS., IL 60005 (847)398-1441 * FAX(847) 398-2376	NC. S					Sh	_2		_ of	_4	_
Project Wacker Drive Reconst	ruction					_OBA	JO	B١	٥١.	<u>99342</u>	
City <u>Chicago</u> County <u>Cook</u>	Stru Loc	ation	e No. XX	<u>X</u>	X	_Rig _Bore	CN d B	<u>ИЕ-</u> Зу	-55	XX	
State <u>Illinois</u>	D	ate	Janu	uary	y 25 to January 31, 2000	Chec	ked	B	У	DOB	_
BORING NO. TB- Station Offset		R (in) (	Qu (tsf)	W (%)	Surface Water Elev. N/A Groundwater Elevation XX Groundwater Elevation XX After Hours			Blow Counts	R (in)	Qu (tsf)	W (%)
							_	_			
SILTY CLAY—trace sand & gravel— gray—soft to medium stiff (CL)					SILTY CLAY—trace sand & gravel- gray—medium stiff to very stiff (CL)						
-33.	5			, ,							
SILTY CLAY-trace sand & gravel-	3	+	12	1.5			Ⅎ	3 6	_	ę	9.1
gray-medium stiff to very stiff	- <u>55.0</u> 6	1.	25B	16		<u>-80</u>	0.0	7	_	1.7B	25
							$\neg$				
			1	5	-63	.5	_				
	5				SILT-trace fine sand-			6			
	-60.0 8	1	.5B	19	gray—medium dense (ML)	- <u>85</u>	5.0	6	_	NP	27
							$\neg$				
			1 1	05	-68	.5		1 7		c	<u> </u>
	4				CLAYEY SILT-trace fine sand		_	18			0.0
	-65.0 8	1	.6B	21	& gravel-gray-dense (CL/ML)	<u>-90</u>	0.0	26	_	1.5B	23
							_				
			10	2 9	-73	.5 —					
	3	+	- 10	<u></u> 2	SILTY CLAY-some sand			<u>აა</u> 48			-
	-70.0 6		).8B	23	& gravel-gray-hard (CL)	-95	5.0	19	/2"	4.5+P	15
									/_,"		
								<u>50</u>	/2		-
							7		_	_	9
					-78	.5 —					
	3	+	11	1.6	CLAYEY SILT-trace fine sand-			<u>30</u> 50	/5"	<u>11</u> 3.2S@	1.5
	-75.0 9	2	2.1B	20	gray-very dense (CL/ML)	<u>–100</u>	0.0		-	9.9%	18
R-Recovery in inches	⊤ype ⊦ailure B-Bulge Failure E-Estimated V	e S alue P	-Shear -Penetr	Failu	ure W-Water Content, percent dry weight ter NP-Non-Plastic	(IST)	unit italics	wt. ( s abo	pct) ove w	noted in %	

Subscription         Structure Note           Project         Vacker PLY-Reported and Structure Note         OBA JOB NO. 99312 OBA JOB NO. 99312 County Cook           Project         Vacker PLY-Reported and County Cook         Structure No. XX         Reg Cole - Spinon           Station         XX         Structure No. XX         Bered By NH           Station         XX         Reg Cole - Spinon         Structure No. XX           Station         XX         Reg NH         Structure No. XX           Station         Structure No. XX         Reg NH         Structure No. XX           Station         Structure No. XX         Reg NH         Structure No. XX							STRUCTU BORING	IRE F	ΟU	ND.	ΑΤΙΟΝ	1	
Sh or _4	OBA						Dorardo	200					
Project     Wacker Drive Reconstruction     OBA JOB NO.99312       City     Chicago     Structure No. XX     Rig     CME-55       Station     The Control of XX     Date     Bord By     DOB       BORING NO. TB-12     E     Rig     Curronwoter Elev. N/A     Chicago     Chicago       Station     XX     Rig     Curronwoter Elev. N/A     Chicago     Chicago       Offset     XX     Rig     Curronwoter Elev. N/A     View Recention XX     View Recention XX       CLAYEY SUT-trace fine sand- gray-very dense (CL/ML)     50/11     Sufface Water Elev. N/A     View Recention XX       SUT-trace fine sand- gray-very dense (ML)     50/12     NP     2       SUT-trace fine sand- gray-very dense (ML)     50/21     NP     100.03 Water Lass       -005.025/22     NP     10     COBBLES & BOULDERS     -130.0       SUT-trace fine sand- gray-very dense (ML)     -105.025/22     NP     10     -110.0       22     NP     16     -112.6     -110.0     -110.0       34     SUT-trace fine sand- gray-very dense (ML)     -105.0     NR     -110.0       350/5     NP     16     -110.0     -110.0     -110.0       42     Station Table of the sand- gray-very dense (ML)     -100.0     NR     -110.0	O'BRIEN & ASSOCIATES, I CONSULTING ENGINEER 1235 E. DAVIS ST./ARLINGTON HTS., IL GOOG (427)789-1441 * EAV(824) 780-2705	NC. SS						Sh	3	_ of	_4		
City       Chicago       Structure No. XX       Rig Gook       Bored By       RH         Station       TB - 12 Station       Date       January 25 to January 31, 2000       Checked By       DB         BORING NO. TB-12 Offset       Station       TB - 12 Station       Station	Project Wacker Drive Recons	truction						OBA JO	ЭΒ	NO.	99312		
State $\frac{NOL}{MOL}$ $\frac{NOL}{NP}$ $\frac{NOL}{NL}$ $\frac{NOL}{NP$	Citý <u>Chicago</u>		Str	ucti	ure No	). <u>X</u>	X	Rig <u>(</u> Bored		-55	RH	_	
BORING NO. TB-12 Offset XX         Image: Surface Water Elev. N/A Groundwater Elevation XX         Image: Surface Water Elev. N/A Groundwater Elevation XX           0.01         Image: Surface Water Elevation XX         Image: Surface Water Elevation XX         Image: Surface Water Elevation XX           0.01         Image: Surface Water Elevation XX         Image: Surface Water Elevation XX         Image: Surface Water Elevation XX           0.01         Image: Surface Water Elevation XX         Image: Surface Water Elevation XX         Image: Surface Water Elevation XX           0.01         Image: Surface Water Elevation XX         Image: Surface Water Elevation XX         Image: Surface Water Elevation XX           0.01         Image: Surface Water Elevation XX         Image: Surface Water Elevation XX         Image: Surface Water Elevation XX           0.01         Surface Water Elevation XX         Image: Surface Water Elevation XX         Image: Surface Water Elevation XX           0.01         Surface Water Elevation XX         Image: Surface Water Elevation XX         Image: Surface Water Elevation XX           0.01         Surface Water Elevation XX         Image: Surface Water Elevation XX         Image: Surface Water Elevation XX           0.01         Surface Water Elevation XX         Image: Surface Water Elevation XX         Image: Surface Water Elevation XX           0.01         Surface Water Elevation Image: Surface Water Elevation XX <td< td=""><td>State Illinois</td><td></td><td></td><td>Date</td><td></td><td>uar</td><td>y 25 to January 31, 2000</td><td>Checke</td><td>ed E</td><td>}y</td><td>DOB</td><td>_</td></td<>	State Illinois			Date		uar	y 25 to January 31, 2000	Checke	ed E	}y	DOB	_	
Station       XX       XX <th c<="" td=""><td>BORING NO. TB</td><td>-12</td><td></td><td></td><td></td><td></td><td>Surface Water Fley, N/A</td><td></td><td></td><td></td><td></td><td><u> </u></td></th>	<td>BORING NO. TB</td> <td>-12</td> <td></td> <td></td> <td></td> <td></td> <td>Surface Water Fley, N/A</td> <td></td> <td></td> <td></td> <td></td> <td><u> </u></td>	BORING NO. TB	-12					Surface Water Fley, N/A					<u> </u>
CLAYEY SLT-trace fine sand- gray-very dense (CL/ML)       SILT-trace fine sand- gray-very dense (ML)       43         -83.5       -83.5         -83.6       -108.5         SILT-trace fine sand- gray-very dense (ML)       -106.5         SILT-trace fine sand- gray-very dense (ML)       -105.0         22       -111.0         -105.0       25/21         50/5       NP         16       -111.0         -111.0       -111.0	Station XX Offset XX		Blow Counts	R (in)	Qu (tsf)	W (%)	Groundwater Elevation XX Groundwater Elevation XX After Hours	$\mathbf{V}$	Blow Counts	R (in)	Qu (tsf)	W (%)	
CLAFE 1 SLI - trace fine sond- gray-very dense (CL/ML)         50/11         SILT-trace fine sond- gray-very dense (ML)         43           -83.5         34         -108.5         50/11           SILT-trace fine sond- gray-very dense (ML)         -108.6         50/11           SILT-trace fine sond- gray-very dense (ML)         -108.6         50/11           SILT-trace fine sond- gray-very dense (ML)         -105.0         22/2         NP           -105.0         22/2         NP         17         COBBLES & BOULDERS         -130.0           -101.0         -105.0         22/2         NP         17         COBBLES & BOULDERS         -130.0           -101.0         -105.0         22/2         NP         17         COBBLES & BOULDERS         -130.0           -101.0         -105.0         22/2         NP         16         -112.6         N           -110.0         NP         20         Kractures forsillingfractured Rock         -112.6         N           -110.0         NP         20         Light gray mottled gray with -135.0         -135.0           -110.0         NP         20         Iractures at -134.5.0         -135.0           -110.0         NP         20         Iracture at -134.5.0         -135.0 <td></td> <td><math>\vdash</math></td>												$\vdash$	
-B3.5         NR         -108.5           34         -108.5         50/3         NP         2           SILT-trace fine sand- gray-very dense (ML)         -105.0         25/2         NP         17         COBBLES & BOULDERS         -130.0         N           22         -105.0         25/2         NP         17         COBBLES & BOULDERS         -130.0         N           34         -105.0         25/2         NP         18         -111.0         -12.5           34         -105.0         25/2         NP         18         -112.5         N           -105.0         25/2         NP         18         -112.5         N         N           -10.0         NP         20         Ight gray mottled gray with -135.0         -135.0         N         N         N         N         N         -135.0         N	gray-very dense (CL/ML)		50	/1"			SILT-trace fine sand- aray-very dense (ML)		], ]				
			50	//			gruy very dense (mL)		50	/3"		$\vdash$	
						NR					NP	20	
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	-83.	.5					-108	.5	1				
SIL - Traces time sand- gray-very dense (ML)       -105.0 25/2*       NP       17       COBBLES & BOULDERS       -130.0       N         22			<u>34</u> 41						50	/1″		$\vdash$	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	SILT—trace fine sand— gray—very dense (ML)	– <u>105.0</u>	25	/2"	NP	17	COBBLES & BOULDERS	- <u>130.0</u>				NR	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $							Drillers Note: 100.0% Water Loss — <b>—111</b>	.0 —					
$\begin{array}{c c c c c c c c c c c c c c c c c c c $			22	/5"			Rotary Drilling-Fractured Rock						
$\begin{array}{c c c c c c c c c c c c c c c c c c c $			50		NP	16	-112	.5					
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$							Rotary Drilling—Apparent Bedrock		4				
$\begin{array}{c c c c c c c c c c c c c c c c c c c $			34				SILURIAN SYSTEM, NIAGARAN SERIES RACINE FORMATION DOLOMITE	s, <u> </u>	1				
$\begin{array}{c c c c c c c c c c c c c c c c c c c $		-110.0	50	/5″	NP	20	Run 1 (-133.0' to -143.0') Light aray mottled aray with	-135.0	5				
$\begin{array}{c c c c c c c c c c c c c c c c c c c $							horizontal bedding. Porous with sor						
$\begin{array}{c c c c c c c c c c c c c c c c c c c $			41				& fractures. Fossiliferous. Transvers	se	-				
$\begin{array}{c c c c c c c c c c c c c c c c c c c $			50	/5'		20	fractures at -134.25', -135.1',		]				
30horizontal fractures from $-136.9'$ to $-138.2'$ . Weathered horizontal fracture $138.2'$ . Weathered horizontal fracture $138.7'$ . Weathered horizontal fracture with thin clay parting at $-139.75'$ . $-140.0'$ $-140.25'$ , $-140.5'$ & $-140.8'$ . Horizontal fracture with $0.25''$ clay parting at $-141.5'$ . Horizontal fractures at $-142.2'$ & $-142.5'$ $-142.5' = -142.5'$ RCOVERY = $100.0%$ ROD = $70.4%$ $-120.0$ NP RCOVERY = $100.0%$ ROD = $70.4%$ $-120.0$ NR Follacement in some vugs. Porous with some vugs. Prite represent in some vugs. Prite represent in some vugs. Prite represent in some vugs. Prite represent in the source of $-143.0'$ to $-148.8'$ . Horizontal fracture with intersecting Horizontal fractures from $-143.0'$ to $-148.8'$ . Horizontal fracture some $-144.1'$ . Vertical fracture with intersecting Horizontal fractures from $-144.5'$ to $-146.1', -146.2', -147.5' & -148.0'.Vertical fractures from -148.6'Horizontal fractures from -148.6'.Horizontal fractures from -148.6'.Horizontal fractures from -144.5' to-145.0'. Horizontal fractures from -144.5'.Horizontal fractures from -148.6'.Horizontal fractures from -148.6'.Horizontal fractures from -148.6'.Horizontal fractures from -148.6'.$						20	-135.2', -135.8', -136.2' & -136.4 Vertical fracture with intersecting	5′. <u> </u>					
$\begin{array}{c c c c c c c c c c c c c c c c c c c $			30				horizontal fractures from -136.9'	_	7				
$\begin{array}{c c c c c c c c c c c c c c c c c c c $			50	/5'			-138.9'. Weathered horizontal fract	ure	1				
-140.25', -140.5' & -140.8'. $-140.25', -140.5' & -140.8'.$ $-140.25', -140.5' & -140.8'.$ $-140.25', -140.5' & -140.8'.$ $-140.25', -140.5' & -140.8'.$ $-140.25', -140.5' & -142.5'$ $-140.25', -140.5' & -142.5'$ $-140.25', -140.5' & -142.5'$ $-140.25', -140.5' & -142.5'$ $-140.25', -140.5' & -142.5'$ $-140.25', -140.5' & -142.5'$ $-140.25', -140.5' & -142.5'$ $-140.2' & -142.5'$ $-120.0$ $-12$		– <u>115.0</u>			NP	19	Horizontal fractures at -140.0',	<u>–140.0</u>	7				
$\begin{array}{c c c c c c c c c c c c c c c c c c c $							-140.25', -140.5' & -140.8'. Horizontal fracture with 0.25" clay		1				
$\begin{array}{c c c c c c c c c c c c c c c c c c c $			<u>33</u> 46				parting at -141.5'. Horizontal		-				
Run $2 (-143.0' \text{ to } -153.0')$ Light gray with horizontal bedding. Porous with some vugs. Pyrite Porous with some vugs. $-120.0$ NR Fossiliferous & stylolitic. Vertical fracture with intersecting horizontal fracture from $-143.0'$ to $-148.8'$ . Horizontal fracture at $-144.1'$ . Vertical fracture sfrom $-144.5'$ to $-145.0'$ . Horizontal fractures at $-145.0'$ . Horizontal fractures at $-145.0'$ . Horizontal fractures at $-145.0'$ . Horizontal fractures from $-148.6'$ . 			21	/2"	NP	21	$\frac{1142.2}{\text{RECOVERY}} \approx 100.0\%$						
50/1"       Light gray with horizontal bedding.         -120.0       NR         -120.0       NR         Fossiliferous & stylolitic. Vertical       -145.0         fracture with intersecting horizontal       fracture with intersecting horizontal         32       Horizontal fracture at -144.1'.         45       Vertical fracture with intersecting         23/2'       NP         22       horizontal fractures from -144.5' to         -145.0'.       Horizontal fractures from -144.6'         -145.0'.       Horizontal fractures from -148.6'         -145.0'.       Horizontal fractures from -148.6'         -145.0'.       Horizontal fractures from -148.6'         -145.0'.       NP         20       continued on following page							Run 2 (-143.0' to -153.0')						
-120.0       NR       replacement in some vugs.       -145.0         Fossiliferous & stylolitic. Vertical       -145.0         fracture with intersecting horizontal       fracture with intersecting horizontal         32       Horizontal fracture at -144.1'.         45       Vertical fracture with intersecting         23/2'       NP       22 horizontal fractures from -144.5' to         -145.0'.       Horizontal fractures at         -146.1', -146.2', -147.5' & -148.0'.         27       horizontal fracture with intersecting         -125.0       37/5'         NP       20 continued on following page		50	/1"				Light gray with horizontal bedding. Porous with some vugs. Pyrite						
32       fracture with intersecting horizontal fracture from -143.0' to -148.8'.         45       Horizontal fracture at -144.1'.         23/2'       NP         22       horizontal fracture with intersecting         -145.0'.       Horizontal fractures from -144.5' to         -146.1', -146.2', -147.5' & -148.0'.         Vertical fracture with intersecting         -146.1', -146.2', -147.5' & -148.0'.         Vertical fractures from -148.6'         -125.0       37/5'         NP       20 continued on following page		-120.0				NR	replacement in some vugs. Fossiliferous & stylolitic. Vertical	-145.0					
32       Horizontal fracture at -144.1'.         45       Vertical fracture with intersecting         23/2' NP       22 horizontal fractures from -144.5' to         -145.0'. Horizontal fractures at       -146.1', -146.2', -147.5' & -148.0'.         27       horizontal fracture with intersecting         36       to -149.1'.         -125.0       37/5' NP							fracture with intersecting horizontal		-				
45       23/2" NP       22 horizontal fractures with intersecting         -145.0'. Horizontal fractures from -144.5' to         -145.1', -146.1', -146.2', -147.5' & -148.0'.         -27       -146.1', -146.2', -147.5' & -148.0'.         -145.0       Horizontal fractures with intersecting         -145.0       -145.1', -146.2', -147.5' & -148.0'.         -146.1', -146.1', -146.2', -147.5' & -148.0'.       -146.1', -146.2', -147.5' & -148.0'.         -125.0       37/5' NP       20 continued on following page			32				Horizontal fracture at -144.1'.		1				
-145.0'. Horizontal fractures at -146.1', -146.2', -147.5' & -148.0'. -146.1', -146.2', -147.5' & -148.0'. -146.1', -146.2', -147.5' & -148.0'. Vertical fracture with intersecting horizontal fractures from -148.6' -125.0 37/5' NP 20 continued on following page -150.0			45 23	/2'	NP	22	horizontal fractures from -144.5' t	o	-				
27Vertical fracture with intersecting27horizontal fractures from -148.6'36to -149.1'125.037/5'NP20 continued on following page							—145.0'. Horizontal fractures at —146.1', —146.2', —147.5' & —148.0	)'. <u> </u>	1				
36to -149.1'. -125.0 37/5' NP 20 continued on following page -150.0			27				Vertical fracture with intersecting						
		_125.0	36	/=,"	NP	20	to $-149.1$ '.	_150_0	]				
N-Standard Penetration Test (ASTM D-1586) Type Failure Qu-Unconfined Compressive Strength (tsf) Unit wt. (pcf) noted in	N-Standard Penetration Test (ASTM D-1586)	Type Failu	ure	V C		120	Qu-Unconfined Compressive Strength (ts	f) Unit	t wt.	(pcf)	noted in	<u> </u>	

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OBA										
O'BRIEN & ASSOCIATES, IN CONSULTING ENGINEER 1235 E. DAVIS ST./ARLINGTON HTS., IL 60005 (847)398-1441 * FAX(847) 398-2376	NC. S						Sh	<u>4                                    </u>	of <u>4</u>	
Project <u>Wacker Drive Reconst</u>	ruction						OBA JO	DB_NC	). <u>9931</u> 2	2
City <u>Chicago</u> County <u>Cook</u>		Struct ocati	ure No on <u>XX</u>	). <u>X</u>	X		Rig <u>C</u> Bored	<u>МЕ-5</u> Ву	<u></u>	_
State <u>Illinois</u>		Dat	e Jan	uar	y 25 to January	y 31, 2000	Checke	d By	DOB	
BORING NO. TB- Station XX Offset XX	<u>-12</u>	Counts (ii)	Qu (tsf)	W (%)	Surface Water El Groundwater Elex Groundwater Elex After Hou	ev. N/A vation XX vation XX rs	$\mathbf{\nabla}$	Blow Counts (iu)	Qu (tsf)	W (%)
Horizontal fractures at -149.3'	150.1'							$\left  \right $	+	+
Horizontal fractures at -149.3', -' & -150.6'. Vertical fracture from -151.3' to -151.75'. Horizontal fractures at -151.9' & -152.3'. RECOVERY = 100.0% RQD = 71.25% -133 End Of Boring @ -153.0' Rotary Drilling Methods CME Automatic Hammer 135' of Casing Used	- <u>105.0</u> - <u>110.0</u>									
	- <u>115.0</u> - <u>115.0</u> - <u>115.0</u> - <u>120.0</u> - <u>120.0</u>									
N-Standard Penetration Test (ASTM D-1586)	—125.0 Type Failur	e			Qu-Unconfined C	Compressive Strer	-150.0 ngth (tsf) Unit	wt. (pc	f) noted in	1
R-Recovery in inches	B-Buige F E-Estimate	allure ed Value	s-Shea P-Pene	r Faili trome	ter NP-Non-Plastic	., percent dry we	ngnt italio	s above	W 76	

O'BRIEN & ASSOCIATES INC					LUC	,			
CONSULTING ENGINEERS 1235 E. DAVIS ST./ARLINGTON HTS., IL 60005 (847)398-1441 * FAX(847) 398-2376					Sh	1	c	f _2_	
Project <u>Wacker Drive Reconstruction</u> City <u>Chicago</u> Stru County <u>Cook</u> Loc State <u>Illinois</u>	ucti atic Dat	ure No. on eOct		to 28, 1999	OBA Rig Bore Chec	JOB CMI d By ked	NO <u>= - 5</u> By	. <u>99279</u> 5 <u>RH</u> DOB	)
BORING NO. ETB-1	R (in)	Qu (tsf)	₩ (%)	Chicago River Elevation –1.5 CC Groundwater Elevation – Groundwater Elevation –		Blow	R (in)	Qu (tsf)	W (%)
Boring Surface Elevation +2.0 CCD									
Barge				SILTY CLAY—trace sand and gravel—gray—soft to medium			1	10	0.0
				(CL) wet			4	0.6B	23
WATER-Chicago River				Vane Shear @ 29.0' c=532 ps	- sf		s s	< 0FF	07
_ <u>5.0</u>					<u>-30</u> -	<u>.0 p</u>	s	<.25E	
				Vane Shear @ 31.5' c=522 ps	f -	p p	s s s	0.5P	24
				Vane Shear @ 34.0' c=602 ps			s		94.0
- <u>10.0</u>					- <u>35</u>	.0 p	s	0.4B	24
				Vane Shear @ 36.0' c=556 ps	sf — -		s s s	0.9B	<b>9.0</b> 22
-11.5				-36.5					
				Vane Shear @ 39.0' c=1429 p	sf—	⊐₽	s	11	10.9
(MUCK)-trace to someps shells-black to dark gray15.0 ps very loose (ML/SM) wet		NP	56	Vane Shear @ 40.0' c=1184 p	- <u>40</u>	р .0 р	s s	1.0B	15
Petroleum Ödorps ps					-	p p	s s		
ps		NP	36	SILTY CLAY-trace sand and gravel-gray-stiff (CL)			s		
Organic SILTY CLAYps (MUCK)-some sand-black tops dark gray-very soft (OL) -20.0 ps		<.25E	52		-45	.0	4 6 8	1.7B	22
					_		s		
	No	Recov	ery			P P	s s		
-21.5       SILTY CLAY-trace sand, brick       and rubber-dark gray to       7							4	10	0.6
gray-very soft (CL/OL) <u>-23.0</u> -25.0 9 N-Standard Penetration Test (ASTM D-1586) Type Failure		<.25E	25	Qu-Unconfined Compressive Strength (t	–50.0	Dit wt	7 . (pcf	1.6B	21

OBA					STRUCTU BORING	JRE F LOG	OUI	ND,	ATION	1
O'BRIEN & ASSOCIATES CONSULTING ENGINEJ 1235 E. DAVIS ST./ARLINGTON HTS., IL 6 (847)398-1441 * FAX(847) 398-237	, INC. ERS 10005 6					Sh _2	2	_ of	2	_
Project <u>Wacker Drive Reconst</u>	ruction					OBA JO		٥٥.	<u>99279</u>	·
City Chicago County Cook	St Lo	catio	on	·		Bored	By	-55	RH	
State <u>Illinois</u>		Date	e <u>Oct</u>	. 26	5 to 28, 1999	Спеске	aв	У	DOR	—
BORING NO. ETE Station XX Offset XX	<b>3−1</b>	R (in)	Qu (tsf)	W (%)	Chicago River Elevation -1.5 CCI Groundwater Elevation - Groundwater Elevation -	$\sim$	Blow Counts	R (in)	Qu (tsf)	W (%)
					SILTY CLAY—trace sand and gravel—gray—hard (CL)					
					-75.0					
		5	10	6.4	SANDY SILT—trace to some clay—gray—very dense (ML)		<u>58</u>	/ ^ "		
SILTY CLAY—trace sand and gravel—gray—stiff to very stiff	- <u>55.0</u> 1	1	1.4B	16		-80.0	50	/4	NP	12
(CL)					-79.0		50	/5"		
					SILTY TO CLAYEY SAND and GRAVEL—argy—very dense				NP	12
					(GM-GC)					
			10	6.1			50	/2"		
	-60.0 15	5	3.6B	19		-85.0			NP	8
		-					50	<u>/4'</u>		
		+							NP	11
								/		
		5		2.8	with Fractured Stone @ 88.5'		50	/31		
-63.0	-65.0 9	<u>)</u>	2.3B	15	-88.0	-90.0		_	NP	8
SILTY CLAY-trace to some sand					END OF BORING at -90.0' Hollow Stem Augers					
and gravel—gray—very stiff (CL/ML)					CME Automatic Hammer					
		+								
		5	11	6.0		_				
	-70.0 12	9	3.0S	12		-95.0				
60.0										
SAND LAYER-Driller's										
Observation										Ц
SILTY CLAY-trace sand and	14	<u> </u>	11	5.8			$\left  \right $			$\square$
gravel-gray-hara (UL)	-75.0 25	5	8.7B	12	Au-Inconfined Compressive Strength (1	-100.0		(nof)	noted :-	
R-Recovery in inches PS-Pushed Spoon	B-Bulge Fail E-Estimated	ure Value	S-Shear P-Pene	r Failu trome	ire W-Water Content, percent dry weight ter NP-Non-Plastic	italia	with ( cs abo	ove w	10.eu m 1%	

OBA						STRUCTURE FOUNDATION BORING LOG
O'BRIEN & ASSOCIATES, CONSULTING ENGINEE 1235 E. DAVIS ST./ARLINGTON HTS., IL 60	INC. ERS					Sh <u>1</u> of <u>2</u>
(847)398-1441 * FAX(847) 398-2376 Project Wacker Drive Reconst	ruction					OBA JOB NO 99279
City <u>Chicago</u>	uction	Str	ucti	ure No	••	Rig <u>CME-55</u>
State <u>Illinois</u>			atio	on > <u>Oct</u>	28	Bored By RH <u>B to 30, 1999</u> Checked By DOB
	ງ_ງ		-	r		
Station XX Offset XX	<u> </u>	Blow Counts	R (in)	Qu (tsf)	w (%)	Chicago River Elevation -1.5 CCD Groundwater Elevation - Groundwater Elevation -
Boring Surface Elevation +2.0	CCD					
Barge						SANDY SILT-trace to some organics, trace clay-black to
						dark gray-very loose (OL) wet ps
						ps NP 5
<u></u> <u>1.5</u>						Vane Shear @ 28.0' c=5 psf
					-	ps
WATER-Chicago River	- <u>5.0</u>					- <u>30.0 ps</u> NP 39
						Vane Shear @ 30.5' c=66 psf —
						ps
						PSNP56
						-31.5
						ps
	-10.0					gravel-gray-medium (CL) Wet -35.0 ps 0.5P 25
						Vane Shear @ 36.5' c=740 ps 99.5
						ps 0.9B 23
						-36.5
						Vane Shear @ 39.0' c=1857 ps 102.0
	-15.0					ps 40.0 ps1.0B 19
		-				
						Vane Shear @ 41.5' c=1082 psps106
						ps ps 1.4B 18
						gravel-gray-stiff to very stiff
						$\begin{array}{ c c c c c c c c c c c c c c c c c c c$
	-20.0					Vane Shear @ 44.5' c=2082 psfps980 98 20
-19.0		ps				Vane Shear @ 46.5' $c=1776$ ps 96.
CLAYEY SILT (MUCK)—trace		ps ps	No	Recov	erv	
snells, some sand-black-very soft (OL) wet				1.000		
Petroleum Odor		ps				$  - _{DS}     g_{6.}$
	-25.0	ps		< 25F	104	Vane Shear @ 49.5' c=1490 psf ps 1 28 22
N-Standard Penetration Test (ASTM D-1586) R-Recovery in inches PS-Pushed Spoon	Type Fail B-Bulge F-Estime	ure Failur ated N	re Value	S-Shear P-Penel	r Faili	Qu-Unconfined Compressive Strength (tsf) Unit wt. (pcf) noted in ure W-Water Content, percent dry weight italics above w% ster NP-Non-Plastic

OBA						STRUCTI BORING	JRE F LOG	ΟU	ND	ATION	1
O'BRIEN & ASSOCIATES, CONSULTING ENGINEI 1235 E. DAVIS ST./ARLINGTON HTS., IL 6 (847)398-1441 * FAX(847) 398-237	$, INC. ERS _{6}^{0005}$						Sh	2	_ of	2	_
Project <u>Wacker Drive Reconst</u>	ruction						OBA J	DB_	NQ.	<u>99279</u>	
City <u>Chicago</u> County Cook		Str	ucti atio	ure No on	·· <u> </u>		Rig <u>(</u> Bored	<u>By</u>	-55	RH	
State Illinois			)ate	Oct	. 28	3 to 30, 1999	Checke	dĒ	}y	DOB	_
BORING NO. ETE Station XX Offset XX	3-2	Blow Counts	R (in)	Qu (tsf)	W (%)	Chicago River Elevation –1.5 CC Groundwater Elevation – Groundwater Elevation –		Blow Counts	R (in)	Qu (tsf)	W (%)
		DS		9	4.7	SILTY CLAY-trace to some sand		15		11	3.2
SILTY CLAY-trace cand and		ps ps		0.7B	24	hard (CL/ML)		18 25		8.8B	13
gravel-gray-medium to very stiff (CL) wet		6		10	2.1			14 20		10	5.5
	- <u>55.0</u>	6		0.68	19		<u>-80.0</u>			<u>.38</u> 11	18
								23		0.65	15
-56.5						-81.5		3/		9.05	15
SILTY CLAY-trace sand and gravel-gray-stiff to very stiff	-60.0	2 5 3		10 2.0B	<b>8.9</b> 16	SANDY SILT—gray—very dense (ML)	-85.0	24 26		NP	19
						-84.0		53	/7'	,	
						Fine SILTY SAND-trace gravel-gray-very dense (SP)				NP	17
		7		9	5.2		_	54_	<i>(</i> 6"		
	-65.0	14		1.6B	24	-88.0	-90.0			NP	19
						Hollow Stem Augers CME Automatic Hammer					
	_						_				
-66.5		12		11	3.6						
and gravel-gray-very stiff to hard (CL/ML)	-70.0	16 23		3.5S	11		-95.0				
	-75.0	14 21 34		<b>11</b> 5.8B	<b>1.0</b>		 100.0				
N-Standard Penetration Test (ASTM D-1586) R-Recovery in inches PS-Pushed Spoon	Type Faili B-Bulge E-Estima	ure Failur Ited N	re Value	S-Shear P-Penet	r Failı trome	Qu-Unconfined Compressive Strength (t ure W-Water Content, percent dry weight ter NP-Non-Plastic	sf) Unit itali	wt. cs ab	(pcf) ove v	noted in v%	-

OBA						STRUCTURE FOUNDATION
	MC					
CONSULTING ENGINEE	INC. RS					Sh <u>1</u> of <u>3</u>
1235 E. DAVIS ST./ARLINGTON HTS., IL 60 (847)398–1441 * FAX(847) 398–2376	005					
Project <u>Wacker Drive Reconstr</u> City Chicago	ruction	Str	ucti	ure No	).	OBA JOB NO. <u>99279</u> Rig CME-55
County <u>Cook</u> State Illinois		Loc	atio Date	on_ ∋_Nov	·. 1	to 2, 1999 Checked By DOB
	2_3	- 			-	
Station XX Offset XX		Blow Counts	R (in)	Qu (tsf)	w (%)	Chicago River Elevation −1.5 CCD Groundwater Elevation − Groundwater Elevation − W M R Qu W (m) (tsf) (%)
Boring Surface Elevation +2.0	CCD					
Barge						See Previous Column
						WOOD ps ps
					-	psNP 109
						-26.5
WATER-Chicago River						SILTY CLAY-trace sand and
	- <u>5.0</u>				$\vdash$	gravel—gray—soft to medium <u>30.0 5 0.38 25</u> (CL) wet
						Vane Shear @ 31.5' c=454 ps 91.8
						ps 0.3B 24
						ps
	-10.0					Vane Shear @ 34.5' c=765 psfPS 
						Vane Shear @ 36.55' c=776 ps 93.3
						ps 0.3B 23
	15 0					Vane Shear @ 39.5' c=704 psfpsps
	<u>-15.0</u>					
						$\begin{array}{c c} -39.0 \\ \hline \\ \hline \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ $
						ps ps 0.4B 19
-16.0						
Organic SILTY CLAY to CLAYEY SILT (MUCK)—trace to some		ps ps	┣		┣	Vane Shear @ 43.6" c=1796 psf ps 112.7
shells-very soft (OL) wet Petroleum Odor	-20.0	ps		<.25E	89	SILTY CLAY-trace sand and <u>45.0 ps</u> 0.9B 16
		1				
		ps ps				Vane Shear @ 46.8' c=2531 ps ps 700.2
		ps	-	<.25E	<u>104</u>	ps0.4B_19
		DS				
	-25.0	ps ps		<.25E	74	Vane Shear @ 50.0' c=1857 psf ps 0.9B 20
N-Standard Penetration Test (ASTM D-1586) R-Recovery in inches PS-Pushed Spoon	Type Fail B—Bulge E—Estimo	ure Failur ated \	re Value	S-Shear P-Pene	r Faili trome	Qu-Unconfined Compressive Strength (tsf) Unit wt. (pcf) noted in ure W-Water Content, percent dry weight italics above w% eter NP-Non-Plastic

OBA						STRUCT BORING	URE F LOG	ΟU	ND	ATION	1
O'BRIEN & ASSOCIATES, CONSULTING ENGINEE 1235 E. DAVIS ST./ARLINGTON HTS., IL 60 (847)398-1441 * FAX(847) 398-2370	INC. ERS						Sh	2	_ 01	- 3	
Project <u>Wacker Drive Reconstr</u> City <u>Chicago</u> County <u>Cook</u> State <u>Illinois</u>	ruction	Str Loc	ucti atio	ure No on ªNov	<sup>).</sup>	to 2, 1999	OBA J( Rig ( Bored Checke	DB <u>CME</u> By ed E	NO. <u>- 55</u> 3y	99279 RH DOB	)
BORING NO. ETE Station XX Offset XX	8-3	Blow Counts	R (in)	Qu (tsf)	W (%)	Chicago River Elevation –1.5 CC Groundwater Elevation – Groundwater Elevation –		Blow Counts	R (in)	Qu (tsf)	W (%)
Vane Shear @ 51.5' c=2470 psf		ps ps		9 0 5 P	6.8	SILTY CLAY-trace to some sand and gravel-gray-very stiff to hard (CL)					
SILIY CLAY—trace sand and gravel—gray—stiff to very stiff (CL)		ps ps ps		11	0.5			24 26		11	4.9
Vane Shear @ 55.0' c=3408 psf	- <u>55.0</u>	ps -		0.68	16	- <b>79.0</b> CLAYEY SILT to SILTY CLAY-trace sand and	<u>-80.0</u> 	- 16 23		7.2B	13 22.1
		4		10	8.7	gravel-gray-dense (ML/CL) -81.5 SILT-trace sand-gray-dense to		27 25 15		2.05	23
	<u>-60.0</u>	4		2.0B	16	very dense (ML)	- <u>85.0</u> 	18 50	/6"	4.5+P	18
		5		10	2.7	-86.5 CLAYEY SILT-trace sand and		50	/9"	NP 10	22 7.6
	-65.0	11		1.7B	19	gravel-gray-very dense (ML) -89.0 SILT-trace sand and gravel-very	<u>-90.0</u>	50	/7"	<u>303S</u>	18
-66.5	_	3		8	9.5	dense (ML)		50	/8"	NP	21
Sand-gray-medium (ML)	-70.0	67		0.9B	25		<u>    95.0                                </u>	50	/7"	NP	23
				11	6 1	-96.5			/6"	NP	20
and gravel-gray-very stiff to hard (CL) N-Standard Penetration Test (ASTM D-1586) R-Recovery in inches	-75.0 Type Fail B-Bulge	18 23 ure Failur		<b>3.9B</b>	13 Failu	SIL IY SAND-gray-very dense (ML) Qu-Unconfined Compressive Strength ( W-Water Content, percent dry weight	—100.0 tsf) Unit itali	: wt. cs ab	(pcf)	NP noted in v%	14

OBA						STRUCTURE FOUNDATION BORING LOG	1
O'BRIEN & ASSOCIATES, CONSULTING ENGINEE 1235 E. DAVIS ST./ARLINGTON HTS., IL 60 (847)398-1441 * FAX(847) 398-2376	INC. ERS					Sh <u>3</u> of <u>3</u>	
Project <u>Wacker Drive Reconstr</u>	uction	Str	ucti	ure No		OBA_JOB_NO. <u>99279</u> 	)
County Cook State Illinois			atio	on	·	Bored By RH to 2 1999 Checked By DOB	_
	7	- ·			· ·		—
Station XX Offset XX		Blow Counts	R (in)	Qu (tsf)	W (%)	Chicago River Elevation -1.5 CCD Groundwater Elevation - Groundwater Elevation -	W (%)
							+
BEDROCK-ROTARY DRILLING							
		-					
-101.0							
SILURIAN SEYSTEM, NIAGRAN SERIES RACINE FORMATION, DOLOMITE	s,						
RUN 1: (-103.0' to -113.0'): Light gray, weathered, porous, occasional stylolitic, trace pyrite with vugs-	- <u>105.C</u> lly	2					
throughout with occasional tight horizontal and vertical fractures; some tight clay partings and chert			R	OCK			
RECOVERY = 100%	_		С	ORE			
RQD = 75%	-110.0					-135.0	
						<u></u>	┢
-111.0							
END OF BORING at —113.0' Rotary Drilling			-				┢
CME Automatic Hammer	- <u>115.0</u>					- <u>140.0</u>	┢
							┢
							┢
	-120 0					-145.0	Γ
							$\square$
		1					╞
-	-125.0	1					
R-Recovery in inches PS-Pushed Spoon	B-Bulge E-Estimo	ure Failur ated N	re Value	S-Shear P-Penet	Fail	ure W-Water Content, percent dry weight italics above w% ster NP-Non-Plastic	

OBRIEN & ASSOCIATES. INC. CONSULTING ENGINEERS       Sh 1_ of _3_         123 E. Lews TARADOV HIS, Le Good (http://de.tail / FARDOV HIS, 2006)       Structure No. 	OBA						STRUCTURE FOUNDATION BORING LOG
Project (Try Chicago County Cook Station Millinois       OBA JOB NO. 39279 Structure No. Location Date November 9 to 11, 1999       OBA JOB NO. 39279 Bord By Mater-Chicago River Chicago River Develop Offset XX         Borling Surface Elevation Offset XX       Image: Structure No. Station XX       Image: Structure No. Date November 9 to 11, 1999       Chicago River Elevation Croundwater Elevation Producter Producter Elevation Producter Producter Elevation Producter Producter Prod	O'BRIEN & ASSOCIATES, CONSULTING ENGINEE 1235 E. DAVIS ST./ARLINGTON HTS., IL 60 (847)398-1441 * FAX(847) 398-2376	INC. ERS					Sh <u>1</u> of <u>3</u>
City         Chicago         Structure No.         Rig Code         Rig CME-55           BORING NO. ETB-4 Station         Date         November 9 to 11, 1999         Checked By         D08           Boring Surface Elevation         XX         Egg (n) (us) (x) (us) (x)         Station          Fig (n) (us) (x)         Fig (n) (us) (x)           Boring Surface Elevation         +2.0 CCD         Image: Cont. From Previous Page             Fig (n) (us) (x)         Fig (n) (us) (x) <t< td=""><td>Project Wacker Drive Reconst</td><td>ruction</td><td></td><td></td><td></td><td></td><td>OBA JOB NO. 99279</td></t<>	Project Wacker Drive Reconst	ruction					OBA JOB NO. 99279
County         Locoumber         9 to 11, 1999         Dote         Dote           BORINC NO.         ETB-4 Station         Image: State	City Chicago		Str	ucti	ure No	•	Rig CME-55
BORING NO.ETB-4 Station OffsetOfficing River Elevation Coundwater Elevation Coundwater Elevation Coundwater Elevation Coundwater Elevation Coundwater Elevation Coundwater Elevation Coundwater Elevation Coundwater Elevation PSOfficial Strate PSBoring Surface Elevation Hard Barge-1.5CCDCont. From Previous Page PS-24.5psWater-Chicago River-5.0SILTY CLAY-trace sand and gravel-gray-medium (CL) wet-30.0ps0.382-10.0-10.0-10.0Vane Shear @ 34.5' c=740 psf-35.0ps0.482-10.0-10.0-10.0-10.0-26.5ps0.5P2-10.0-10.0-10.0-20.0ps0.382-10.0-15.0-20.0ps0.5P2-10.0-10.0-20.0ps0.5P2-10.0-10.0-20.0ps0.5P2-10.0-10.0-20.0ps0.5P2-10.0-10.0-20.0ps0.5P2-10.0-20.0ps0.5P2ps0.5P-10.0-20.0ps0.5P2ps0.5P-10.0-10.0-20.0ps0.5P2ps-10.0-20.0ps0.5P2ps0.5P-10.0-10.0-10.0-10.0-10.0ps0.5P-10.0-10.0-10.0-10.0-10.0ps<	State Illinois		[	Date	e <u>Nov</u>	em	ber 9 to 11, 1999 Checked By DOB
BURING NO. <u>LIB-4</u> Station Offset $\frac{XX}{XX}$ $\frac{3}{2}$ $\frac{3}{6}$ $\frac{3}{6$							
Boring Surface Elevation         +2.0 CCD         Cont. From Previous Page         ps	BURING NU. <u>EIE</u> Station <u>XX</u> Offset <u>XX</u>	<u>3-4</u>	Blow Counts	R (in)	Qu (tsf)	W (%)	Chicago River Elevation -1.5 CCD Groundwater Elevation - Groundwater Elevation -
Barge 	Boring Surface Elevation +2.0	CCD	<u> </u>				
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	Barge						Cont. From Previous Page
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $							-24.5 ps
Water-Chicago River       -5.0       Vane Shear $@$ 29.5' c=413 psf       ps       98       0.38 2         Water-Chicago River       -5.0       SLTY CLAY-trace sand and gravel-gray-medium (CL) wet       -30.0 Ps       0.38 2         -10.0       -10.0       -10.0       -10.0       -10.0       -10.0       -10.0         -10.0       -10.0       -10.0       -10.0       -10.0       -10.0       -10.0       -10.0         -10.0							Ps 0.5P 23
Water - Chicago River       -5.0       Vane Shear @ 29.5' c=413 psf       ps $g_{ps}$ -5.0       -5.0							
Water-Chicago River       -5.0       SILTY CLAY-trace sand and gravel-gray-medium (CL) wet       -30.0       ps       0.3B       2         -5.0							Vane Shear @ 29.5' c=413 psfpsps92.4
- <u>16.5</u> Organic CLAYEY SILTY SAND (MUCX)-dark gray to black-very soft (cl.) wet Strong Petroleum Odor - <u>16.5</u> Organic CLAYEY SILTY SAND (MUCX)-dark gray to black-very soft (cl.) wet Strong Petroleum Odor - <u>16.5</u> Organic CLAYEY SILTY SAND (MUCX)-dark gray to black-very soft (cl.) wet Strong Petroleum Odor - <u>16.5</u> Organic CLAYEY SILTY SAND (MUCX)-dark gray to black-very soft (cl.) wet - <u>16.5</u> - <u>17.5</u> - <u></u>	Water—Chicago River						SILTY CLAY-trace sand and
-10.0       -10.0 <td< td=""><td></td><td>-<u>5.0</u></td><td></td><td></td><td></td><td></td><td>gravel-gray-medium (CL) wet <u>-30.0 P3 0.3B 23</u></td></td<>		- <u>5.0</u>					gravel-gray-medium (CL) wet <u>-30.0 P3 0.3B 23</u>
-10.0       -10.0 <td< td=""><td></td><td></td><td>1</td><td></td><td></td><td></td><td></td></td<>			1				
-10.0       -10.0 <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td>Vane Shear @ 31.5' c=709 psfpspsps</td></td<>							Vane Shear @ 31.5' c=709 psfpspsps
-10.0 -1			1				ps 0.4B 23
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$							
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $			1				
-15.0 $-15.0$ $-15.$		-10.0					Vane Shear @ 34.5' c=740 psfps 0.5P 23
-15.0       -36.5       -36.5       -36.5         -15.0       -15.0       -36.5       -36.5       -36.5         -15.0       -15.0       -15.0       -36.5       -40.0 ps       0.58 2         -15.0       -15.0       -15.0       -40.0 ps       0.58 2         -15.0       -15.0       -15.0       -15.0       -15.0       -15.0         -15.0       -15.0       -15.0       -15.0       -15.0       -15.0         -15.0       -15.0       -15.0       -15.0       -15.0       -15.0         -15.0       -15.0       -15.0       -15.0       -15.0       -15.0       -15.0         -15.0       -15.0       -15.0       -15.0       -15.0       -15.0       -15.0       -15.0         -15.0       -15.0       -15.0       -15.0       -15.0       -15.0       -15.0       -15.0         -15.0							95.
							Vane Shear @ 36.5 c=/45 pst
-15.0       -15.0 <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td>-36.5</td></td<>							-36.5
-15.0       -15.0       -40.0       ps       0.5B       2         -15.0       -16.5 <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>ps 96.0</td>							ps 96.0
-16.5 Organic CLAYEY SILTY SAND (MUCK)-dark gray to black-very soft (OL) wet Strong Petroleum Odor $-20.0 \text{ ps} \text{ No } \text{Recovery} \\ -20.0 \text{ ps} \text{ No } \text{Recovery} \\ -95 \\ -95 \\ -95 \\ -95 \\ -74 \\ -95 \\ -95 \\ -74 \\ -95 \\ -95 \\ -74 \\ -95 \\ -75 \\ -$		-15.0					vane Snear @ 39.5 c=1/55 psr -40.0 ps 0.5B 22
-16.5Vane Shear ( $O$ 41.5' c=1786 psf $ps$ Organic CLAYEY SILTY SAND (MUCK)-dark gray to black-very soft (OL) wet $ps$ $ps$ $ps$ $-20.0$ ps No Recovery Strong Petroleum Odor $-20.0$ ps No Recovery $ps$ $-20.0$ ps No Recovery $ps$ $vane$ Shear ( $O$ 45.0' c=1755 psf $-45.0$ ps $0.75P 1$ $gravel-gray-stiff to very stiff(CL)pspspsps-20.0 ps No Recoveryps-20.0 ps No Recoverypsvane Shear (O 45.0' c=1755 psfps0.7B 1psps-74pspspsps-74pspspspsps-74ps$			-				
$\begin{array}{c c c c c c c c c c c c c c c c c c c $							Vane Shear @ 41.5' c=1786 psf
$\begin{array}{c c c c c c c c c c c c c c c c c c c $			-				
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $							SILTY CLAY-trace sand and
Organic CLAYEY SILTY SAND (MUCK)-dark gray to black-very soft (OL) wet Strong Petroleum Odor $ps$ $-20.0 ps$ No Recovery $ps$ $-20.0 ps$ No Recovery $ps$ $-20.0 ps$ No Recovery $ps$ $-20.0 ps$ No Recovery $ps$ $-20.0 ps$ No Recovery $-20.0 p$	-16.5						
black-very soft (OL) wet Strong Petroleum Odor -20.0  ps  No Recovery ps p	Organic CLAYEY SILTY SAND (MUCK)—dark arav to		ps		_		
Vane Shear @ 46.5' c=2286 psf $ps$ $ps$ $ps$ $ps$ $ps$ $0.7B$ 1 ps $ps$ $ps$ $ps$ $ps$ $ps$ $0.7B$ 1 ps $ps$ $ps$ $ps$ $0.7B$ 1 ps $ps$ $ps$ $0.7B$ 1 ps $ps$ $ps$ $0.7B$ 1 ps $ps$ $0.7B$ 1 ps $ps$ $0.7B$ 1 ps $ps$ $0.7B$ 1 ps $0.7B$ 1	black-very soft (OL) wet	-20.0	ps	No	Recov	ery	Vane Shear @ 45.0' c=1755 psf
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	Strong Fetroleum Odor		1				
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$			ps ps	$\vdash$			Vane Shear @ 46.5' c=2286 psf ps 97.
$\begin{array}{c c c c c c c c c c c c c c c c c c c $			ps		_	74	рs 0.7В 19
DS Vane Shear @ 49.5' c=2919 psf DS			ps				
-2500  ps = -700  while shear a +3.5 c -2.75 ps = 5000  ps = 12000  ps		-25.0	ps ps		_	70	Vane Shear @ 49.5' c=2919 psf ps ps 2 OP
N-Standard Penetration Test (ASTM D-1586) Type Failure Qu-Unconfined Compressive Strength (tsf) Unit wt. (pcf) noted in	N-Standard Penetration Test (ASTM D-1586)	Type Fail	ure		C_ C+ -		Qu-Unconfined Compressive Strength (tsf) Unit wt. (pcf) noted in

OBA					_	STRUCT	URE F LOG	οŪ	ND	ATION	1
O'BRIEN & ASSOCIATES, CONSULTING ENGINEE 1235 E. DAVIS ST./ARLINGTON HTS., IL 60	INC. RS						Sh	2	_ 01	3	
(847)398-1441 * FAX(847) 398-2376 Project <u>Wacker Drive Reconstr</u> City <u>Chicago</u> County <u>Cook</u> State Illinois	uction	Stru	ucti atio	ure No	·	per 9 to 11 1999	OBA J( Rig <u>(</u> Bored	DB C <u>ME</u> By	NO. 55	99279	)
				× <u>- 110 v</u>	enn	Jei 9 (0 11, 1999			, y	000	
BORING NO. ETB Station XX Offset XX	<u>-4</u>	Blow Counts	R (in)	Qu (tsf)	₩ (%)	Chicago River Elevation —1.5 CC Groundwater Elevation — Groundwater Elevation —		Blow Counts	R (in)	Qu (tsf)	W (%)
								╞			
Vane Shear @ 52.5' c=2510 psf				1.0P	24	some sand and gravel-gray-dense to very dense (ML)	_				
				11	0.6			19			
Vane Shear @ 54.5' c=3633 psf	- <u>55.0</u>			1.5P	16		-80.0	29		_	16
SILTY CLAY—trace and gravel—gray—very stiff (CL)								30	/="		
								150	/5	_	9
						-81.5		1			
		5 9		11	0.2	SILTY CLAY—some sand and gravel—gray—hard (CL/ML)		21 50			
	<u>–60.0</u>	12		2.5B	16		- <u>85.0</u>	┢		4.5+P	<u>10</u>
						-84.0		23			
						SILT with Sand Seam @ 97.0'—gray—very dense (ML)		37		NP	20
		8		11	2.9			20	/ӡ"		_
	-65.0	14		3.0B	17		-90.0	1		NP	23
								50			
						04 5	_			NP	20
		8		12	4.6	-91.5		50	/2"		
	-70.0	14 13		2.6B	13	FRACTURED STONE and SILTY CLAY-gray-very dense	-95.0	-		_	8
								50	/1"		
								1		NR	-
-71.5						-96.5					
CLAYEY SILT to SILT-trace to some sand and		15 20				SILIY CLAY—some sand and gravel—gray—hard (CL/ML)		150	/1"		
graver-gray-aense (ML) N-Standard Penetration Test (ASTM D-1586) R-Recovery in inches	— /5.0 Type Failu B—Bulge	ure Failur	L re		12	Qu-Unconfined Compressive Strength ( ure W-Water Content percent dry weight	<u>-100.0</u> tsf) Unit	: wt.	(pcf)	<u>4.5+</u> P noted in 1%	<u>10</u>

OBA						STRUCT BORING	URE F LOG	TOU	ND	ATION	1
O'BRIEN & ASSOCIATES, J CONSULTING ENGINEE 1235 E. DAVIS ST./ARLINGTON HTS., IL 600 (847)398-1441 * FAX(847) 398-2376	INC. RS						Sh _	3	_ of		
Project <u>Wacker Drive Reconstru</u> City <u>Chicago</u>	uction	Str	ucti	ure No	•		_OBA_J _Rig	OB CME	NO. - 55	<u>99279</u>	)
County <u>Cook</u> State <u>Illinois</u>		Loc [	atio Date	on_ ∋ <u>Nov</u>	eml	ber 9 to 11, 1999	Bored Checke	By ed E	By [	RH DOB	
BORING NO. ETB Station XX Offset XX	<b>-4</b>	Blow Counts	R (in)	Qu (tsf)	W (%)	Chicago River Elevation –1.5 CC Groundwater Elevation – Groundwater Elevation –		Blow Counts	R (in)	Qu (tsf)	W (%)
SILT—trace sand—gray—very dense		<u>35</u> 15,	71"	NP	16						
-103.0 -	-105.0	50	/5"	NP	15		-120.0				
ROTARY DRILLING-BEDROCK -105.0											
SILURIAN SYSTEM, NIAGRAN SERIES, RACINE FORMATION DOLOMITE											
RUN 1 (-107.0' to -118.0'): Light gray, weathered, porous, occasionall stylolitic, fossiliferous with vugs and trace pyrite-few tight horizontal and vertical fractures; weathered horizintal fractures throughout; fractured from -112.6' to -112.8' and -114.8' to -116.1'; several tigh clay partings; 0.25" clay parting at -117.1';	- <u>110.0</u> y 		R C	ock ore	-		- <u>135.(</u> 				
RECOVERY = 102.4% RQD = 38%	- <u>115.0</u> 						- <u>140.</u> 				
END OF BORING © 118.0' Rotary Drilling CME Automatic Hammer	120.0										
	- <u>120.0</u>						- <u>145.(</u> 				
- N-Standard Penetration Test (ASTM D-1586) R-Recovery in inches	-125.0 Type Failu	ure		S-Sheri	Eail	Qu-Unconfined Compressive Strength (	-150.0	t wt.	(pcf)	noted in	

OBA						STRUCT BORING	URE F LOG	οŪ	ND	ATION	1
O'BRIEN & ASSOCIATES, CONSULTING ENGINEE 1235 E. DAVIS ST./ARLINGTON HTS., IL 600 (847)398-1441 * FAX(847) 398-2376	INC. RS						Sh _1	1	_ of	3	
Project <u>Wacker Drive Reconstr</u> City <u>Chicago</u> County <u>Cook</u> State <u>Illinois</u>	uction	Stri Loc	ucti atic Dat	ure No on :e	) . 18	3 to 21, 1999	OBA J( Rig <u>(</u> Bored Checke	DB   C <u>ME-</u> By d B	NO. <u>- 55</u> 3y	99279 RH DOB	
BORING NO. ETB Station XX Offset XX	-5	Blow Counts	R (in)	Qu (tsf)	W (%)	Surface Water Elevation N/A Groundwater Elevation – Groundwater Elevation – After Hours	<b>∀</b>	Blow Counts	R (in)	Qu (tsf)	W (%)
Ground Surface Elevation +22.7 19.25" CONCRETE- Upper Wacker Drive Deck +21.1											
								0	No	Recov	ery
Air Space	- <u>5.0</u>					SILTY CLAY—trace sand & gravel—gray—very soft to soft (CL) Wet	-30.0	1 0 2		0.25P	26
								1 0 0		0.5P	24
								0		< 25P	30
						-13.3					
						SILTY CLAY-trace sand & gravel-gray-very soft to medium (CL) Wet		3		0.75P	18
+7.2	-15.0						-40.0	2		0.5P	20
15.0" CONCRETE-Lower Wacker Drive Pavement +5.7		3									
loose (SP) FILL +4.2		2 1 1		NP	4			2		10	3.7
& brick-brown & gray-medium (CL) APPARENT FILL, Wet +2.2	-20.0	2		0.75P	27		-45.0	23		0.9B	22
SILTY CLAY—trace sand & gravel— brown & gray—stiff (CL) Wet		1 2 3		1.2B	7.0 28						
-0.8 SILTY CLAY-trace sand & gravel- gray-very soft to medium (CL) We	t	1		9 0 4 R	<b>2.9</b>			1 2 3		0 25P	25
N-Standard Penetration Test (ASTM D-1586) R-Recovery in inches	Type Fail B-Bulge E-Estimo	ure Failur Ited \	re Value	S-Shear P-Pene	r Faili trome	Qu-Unconfined Compressive Strength ( ure W-Water Content, percent dry weight ter NP-Non-Plastic	(tsf) Unit itali	wt. cs ab	(pcf) ove v	noted in v%	120

OBA						STRUCT METRIC	URE I BORI	FOU NG	IND LO	ATION G	1
O'BRIEN & ASSOCIATES, CONSULTING ENGINER 1235 E. DAVIS ST./ARLINGTON HTS., IL 60 (847)398-1441 * FAX(847) 398-2376	INC. ERS						Sh _	2	_ of	- 3	
Project <u>Wacker Drive Reconstr</u> City <u>Chicago</u> County <u>Cook</u> State <u>Illinois</u>	ruction	Str Loc	ucti catio Date	ure No on e <u>Oct</u>		3 to 21, 1999	OBA Rig Bored Check	OB <u>CME</u> By ed E	NO. <u>-55</u> 3y	99279 RH DOB	) 
BORING NO. ETE Station XX Offset XX	<u>-5</u>	Blow Counts	R (in)	Qu (tsf)	W (%)	Surface Water Elev. N/A Groundwater Elevation – Groundwater Elevation – After Hours	¥	Blow Counts	R (in)	Qu (tsf)	W (%)
SILTY CLAY—trace sand & gravel— gray—very soft to medium (Cl ) Wet		2						10		10	1.5
	- <u>55.0</u>	3		<0.25F	32	SILTY CLAY-trace sand & gravel	<u>–80.(</u> 	28	, ,	2.9B	19
-34.3						gray—stiff to hard (CL)		10 12		2.6B	23
	-60.0	3 6 7		<b>11</b> 1.6B	<b>0.0</b> 17		-85.0	)			
								5 9 12	) )	10 2.9B	<b>1.</b> 3
SILTY CLAY-trace sand & gravel- gray-stiff to hard (CL)	-65.0	4 7 10		<b>11</b> 2.1B	<b>4.3</b> 16		-90.0	- - )			
								11	1	<b>11</b> 4 58	<b>2.8</b>
		4		10	1.3	-71.8	_	-		1.00	
	<u>-70.0</u>	8		1.4B	23	SILTY CLAY to CLAYEY SILT- trace sand & gravel-gray-	<u>-95.(</u>	35	1/5"		
		4		11	4.4	hard (CL/ML) — <b>75.8</b>		36	0/5	4.5+P	14
N-Standard Penetration Test (ASTM D-1586) R-Recovery in inches	-75.0 Type Fail B-Bulge	6 7 ure Failur	re	1.5B	15 Failu	SILT-gray-very dense (ML) Qu-Unconfined Compressive Strength ( w-Water Content, percent dry weight	—100.0	5C ) it wt. lics at	(pcf)	NP noted in v%	16

OBA					STRUCT BORING	URE LOC	FOL ;	IND	ATION	1
O'BRIEN & ASSOCIATES, CONSULTING ENGINEE 1235 E. DAVIS ST./ARLINGTON HTS., IL 600 (847)398-1441 * FAX(847) 398-2376	INC. RS					Sh	3	01	- 3	
Project Wacker Drive Reconstru- City Chicago County Cook	uction Stru Loce	uctu atio	ire No	·		OBA Rig Bore	JOB CME d By	NO. - <u>-55</u>	99279 RH	)
	U	ate	<u></u>	. 18	3 to 21, 1999	_Cnec	кеа	БУ	DOB	—
BORING NO. ETB Station XX Offset XX		R (in)	Qu (tsf)	₩ (%)	Surface Water Elev. N/A Groundwater Elevation – Groundwater Elevation – After Hours		Z Blow	R (in)	Qu (tsf)	W (%)
SILT-gray-very dense (ML) -78.3					SEE PREVIOUS COLUMN -103	.3				
	50 		NP	18	ROTARY DRILLING-BEDROCK					
		/ 4 "			-105 SILURIAN SYSTEM, NIAGRAN SERIE RACINE FORMATION DOLOMITE	5.3 ES,				<u> </u>
-	50/ _ <u>105.0</u>	/4	NP	18	RUN 1: (-128.0' to -133.0'): Light gray, weathered, porous, occassionally stylolitic, vuggy	- <u>130</u>	).0	R	OCK	
SILTY SAND to SANDY SILT- gray-very dense (SM-ML)	50	_	NP	18	horiz. fractures throughout with a few tight horizontal and vertic fractures; clay parting at -130.4	al .		C	ORE	
					RECOVERY = 100% RQD = 349	<u>-110</u>	.3	-		-
	<u> </u>	/4"		10	END OF BORING at -133.0' Rotary Drilling CME Automatic Hammer					
				10		- <u>150</u>				
	50		NP	20						
	_ <u>115.0</u>	_	NP	17		- <u>14(</u>	0.0			
	<u>36</u>	/5"		17						
			NP	17						
-97.3 -	29 50/ -120.0	′2"	NP	18		- <u>145</u>	.0			
		/1"								
SILT with Fractured Rock—trace clay—gray—very dense		No	Recov	ery						
- N-Standard Penetration Test (ASTM D-1586) R-Recovery in inches	-125.0		NP S-Shear	<b>9</b>	Qu-Unconfined Compressive Strength ( ure W-Water Content, percent dry weight	-150	.0 Jnit wt. talies o	(pcf)	noted in v%	

OBA						STRUCT BORING	URE F LOG	OU	ND	ATION	1
O'BRIEN & ASSOCIAT CONSULTING ENGIN 1235 E. DAVIS ST./ARLINGTON HTS., (847)398-1441 * FAX(R47) 308	<b>ES, INC.</b> <b>NEERS</b> , IL 60005 -2376						Sh _	1	_ 01	f <u>3</u>	_
Project <u>Wacker Drive Recon</u> City <u>Chicago</u> County <u>Cook</u>	nstruction	Str	ucti atic	ure No on <u>XX</u>	. <u>X</u>	X	_OBA J _Rig _( _Bored	OB CME· By	NO. 55	99279	
		- '	Jai	e <u>reb</u>	rua	ry 4 to March 8, 2000		90 D	у		—
BORING NO. E Station XX Offset XX		Blow Counts	R (in)	Qu (tsf)	W (%)	Surface Water Elev. N/A Groundwater Elevation XX Groundwater Elevation XX After Hours	$\mathbf{V}$	Blow Counts	R (in)	Qu (tsf)	W (%)
Ground Surface Elevation +2	<u>21.2 CCD</u>	<u> </u>			$\vdash$	CLAYEY SAND, GRAVEL &		+			
2' CONCRETE (Upper Level)	19 2 —					CINDERS-very loose (Fill) -4.8 CLAYEY Fine SAND-trace gravel-	· _	1			
VOID						gray—loose (SC)	_	3		NP	19
								0			
	- <u>5.0</u>					gray—very soft (CL) Wet	<u> </u>			<0.25F	32
								W			
	_						_	<u>1н</u> 1		,0.25P	28
								  1  1			
	<u>–10.0</u>						<u> </u>	1		<0.25F	28
							_	1			
	_					-16	.8			<0.25F	27
						SILTY CLAY—trace sand & gravel— gray—very soft (CL)		1			
+:	– <u>15.0</u> 5.45 —						<u>-40.0</u>			<0.25F	25
8" ASPHALT, 9" CONCRETE (Lower Level) + 2	4.2						_				
Fine SAND—trace gravel— brown—very loose (Fill)		2 1 1		NP	x						
	_20_0	1						0		<0.255	- 23
				NP N	$ ^{\uparrow}$		- <u>+</u> 5.0			<u>ku.25</u> F	22
		1 1 1			NR	SILTY CLAY—trace sand & gravel— gray—medium stiff to stiff (CL)					
	2.3										
CLAYEY SAND, GRAVEL & CINDERS-very loose (Fill)	-25.0	3 1 2		NP	36		-50.0	1 1 3		0.5P	24
N-Standard Penetration Test (ASTM D-15 R-Recovery in inches	86) Type Fail B-Bulge F-Estime	ure Failur	re	S-Shear	r Fail	Qu-Unconfined Compressive Strength ( ure W-Water Content, percent dry weight	tsf) Uni ital	t wt. ics ab	(pcf) ove w	noted in w%	<u> </u>

OBA					STRUCT BORING	URE LOC	FOL G	IND	ATION	1
O'BRIEN & ASSOCIATES CONSULTING ENGINE 1235 E. DAVIS ST./ARLINGTON HTS., IL (847)398-1441 * FAX(847) 398-23	S, INC. EERS $_{60005}^{60005}$					Sh	2	_ 0'	<sup>±</sup> _3	
Project <u>Wacker Drive Reconst</u> City <u>Chicago</u> County <u>Cook</u>	ruction St	ructic	ure No on <u>XX</u>	. <u>X</u>	X	_OBA _Rig _Bore	JOB <u>CME</u> d By	NO. 	99279	)
				rua	ry 4 to March 8, 2000		kea i	зу —	DOB	— —
BORING NO. EIE Station XX Offset XX		R Conuts	Qu (tsf)	W (%)	Surface Water Elev. N/A Groundwater Elevation XX Groundwater Elevation XX After Hours			R (in)	Qu (tsf)	W (%)
SILTY CLAY—trace sand & gravel— gray—medium stiff to stiff (CL)					SILTY CLAY—trace sand & gravel- gray—medium stiff to stiff (CL)					
	0						4		11	6.3
	- <u>55.0</u> 2		0.5P	21		<u>–80</u>	0.0 9		1.1B	16
					-62	.3 —				
			0.6B	<b>2.3</b>	SILTY CLAY to CLAYEY SILT with Streaks—trace sand & gravel— gray—stiff (CL/ML)	Silt -85	13 .0 17	;	1.25B	25
					-67	.3 —				
	4 5 -65.0 6		0.6B	3.3 18	SILT—trace fine sand—gray—mediu dense (ML)		5 9 .0 14		NP	22
								e st		
					-72	.3 —		Rressure Meter, Te	40	
	-7007	+		7.8	SILTY CLAY-trace to some sand	&		5	6.9S @9.9%	10.4
			0.00	22	gravel—gray—hard (CL)	-90			49	
							<u>50</u> 6'	> Pressure X	10.6S @9.9%	10.7 [ 11
	4		12	0.8			20			<u> </u>
N-Standard Penetration Test (ASTM D-1586) R-Recovery in inches	-75.07 Type Failure B-Bulge Fail	ure	1.0B	16	Qu-Unconfined Compressive Strength ( yre W-Water Content percent dry weight)	<b>.8</b> 100	0.0 35 Unit wt.	(pcf)	4.5+P	12

OBA					STRUC BORING	TURE F G LOG	OUNE	οτιον	١
O'BRIEN & ASSOCIATES, II CONSULTING ENGINEER 1235 E. DAVIS ST./ARLINGTON HTS., IL 6000	NC. S					Sh	3 <u></u> c	f <u>3</u>	_
(847)398-1441 * FAX(847) 398-2376	tion							00070	
City' Chicago	<u>str_</u>	uct	ure No	. X	X	_OBA_JO RigO	ME-5	. <u>99275</u> 5	<u> </u>
County Cook	Loo	catio Date	on <u>XX</u> P Feb	rua	ry 4 to March 8 2000		By d By	RH	_
		Dutt		ruu			u Dy		-
BORING NO. <u>ETB</u> — Station XX Offset XX		R (in)	Qu (tsf)	W (%)	Surface Water Elev. N/A Groundwater Elevation XX Groundwater Elevation XX After Hours	$\mathbf{V}$	Blow Counts (u)	Qu (tsf)	W (%)
SILTY CLAY to CLAYEY SILT—some sand & gravel—gray—very dense (ML/CL)		e •			Rotary Drilling Methods 75.0' of Casing CME Automatic Hammer				
-81.8 CLAYEY SILT-trace sand-argy-very	6"	A Pressu Meter T	4.5+P	12		_			
dense (ML)	24 50 05.0	6"	4.5+P	16		- <u>130.0</u>			
SILT—trace fine sand—gray—very dense (ML)	<u> </u>								
-	5	A Pressur Meter Te	4.0P	18					
	50 10.0	6"	NP	20		- <u>135.0</u>			
-	50	)/1"							
-			NP	21					
 _ <u>1</u>	41 50 15.0	0/5"	NP	21		<u> </u>			
-94.8 CLAYEY SAND & GRAVEL-gray-very		0/6"							
dense (SC)			NP	9		_			
SANDY CLAYEY SILT—trace — gravel—gray—very dense (ML) — <u>12</u>	50 20.0	)/6"	NP	12		- <u>145.0</u>			
-99.8 BOULDERS, COBBLES & FRACTURED ROCK -100 B	50	/1"							
Apparent Bedrock- Rotary Drilling				NR					
-102.8 END OF BORING @ -124.0' -12	25.0					-150.0			
N-Standard Penetration Test (ASTM D-1586) Typ R-Recovery in inches B-E C'DDICNL & ACCOCIATEC INC	e Failure Bulge Failu Estimated	re Value	S-Shear P-Penet	- Faili trome	Qu-Unconfined Compressive Strength ure W-Water Content, percent dry weight tter NP-Non-Plastic	(tsf) Unit itali	: wt. (pcf cs above	) noted in w%	

						STRUCT BORING	URE LOG	FOL	JND	ATION	1
O'BRIEN & ASSOCIATES CONSULTING ENGINE	S, INC. ERS						Sh	1	_ 0'	f <u>3</u>	
(847)398–1441 * FAX(847) 398–23	76										
Project <u>Wacker Drive Reconst</u>	ruction	Stru	icti	ire No	<u>x</u>	X	OBA Rig	JOB CMF	NO.	<u>99312</u>	<u> </u>
County Cook			atic	n XX		6 to March 20, 2000	Bore	d By	<u></u> .		_
		- L	Juie		CIT	0 to March 20, 2000	-	veu i	Jy		—
BORING NO. MB Station Offset XX XX	-2	Blow Counts	R (in)	Qu (tsf)	W (%)	Surface Water Elev. N/A Groundwater Elevation XX Groundwater Elevation XX After Hours		Blow	R (in)	Qu (tsf)	W (%)
Ground Surface Elevation +22.	9 CCD	$\square$	_			SILTY SAND GRAVEL & WOOD-		_			
4.5' CONCRETE (Upper Level)		1				very loose (Fill) $-3.1$	-				
						Fine SAND—trace gravel— brown—very loose	-	2			
						(Fill) -5 1	-	1		NP	15
		1				SILTY SAND & GRAVEL-					
+18.	4					trace wood & glass—very loose (Fill)		1			
VOID	- <u>5.0</u>						-30	.0 1	-	NP	12
		1				-8.1	-				
						SILTY CLAY-trace sand &	-	1			
		$\left  \right $				gravel—gray—very soft to soft (CL)	)	1	-	0.25P	26
								1			
	-10.0						-35	00		<0.25F	26
		1									
							-				
							-	1		0.5P	24
		1									
								1			$\left  \right $
	-15.0						-40	01	-	0.5P	24
		1					-				
						-19.	1 -				
+5.4 4" ASPHALT, 6" CONCRETE						SANDY CLAYEY SILT to SANDY SIL	TY -				
$\frac{(\text{Lower Level})}{(\text{Lower Level})} + 4.6$						CLAY—trace gravel—gray—very loos (CL/ML)	e —				
rine Sand-trace gravel-brown-ve loose (Fill)	' <sup>y</sup>				$\vdash$	· · ···-/		1	+		
	-20.0	1		NP	10		-45	01	-	1.75P	15
+1.9						-23.	1				
Miscellaneous CONCRETE Rotary Drilling						SILTY CLAY-trace sand &					
Notary Drining		$\left  \right $				gravel—gray—soft (CL)	-	$\neg$			
-0.6							-				
SILTY SAND, GRAVEL & WOOD- very loose (Fill)		$\begin{bmatrix} 1 \\ 1 \end{bmatrix}$			┝			1	+		
	-25.0 Type Fail	1 ure		NP	32	Qu-Unconfined Compressive Strenath (†	-50.0	) 1 Init wt.	(pcf)	0.5P	23

						STRUCT BORING	URE F LOG	OU	ND.	ATION	1
O'BRIEN & ASSOCIATE CONSULTING ENGINE 1235 E. DAVIS ST./ARLINGTON HTS., IL (847)398-1441 * FAX(847) 398-2.	<b>S, INC</b> . E <b>ERS</b> 60005 376						Sh	2	_ of	3	_
Project Wacker Drive Reconst	ruction						OBA JO	ов і	NO.	99312	
City Chicago		Str	uctu	ire No	. <u>X</u>	X	_Rig _C	ME-	-55		_
State Illinois		LOC	atic Date	Mar	ch	6 to March 20, 2000	_Borea Checke	ьу ed B	y	DOB	
							-		-		
BORING NO. <u>MB</u> Station <u>XX</u> Offset <u>XX</u>	<u>-2</u>	Blow Counts	R (in)	Qu (tsf)	W (%)	Surface Water Elev. N/A Groundwater Elevation XX Groundwater Elevation XX After Hours	$\mathbf{\nabla}$	Blow Counts	R (in)	Qu (tsf)	W (%)
SILTY CLAY—trace sand & gravel—gray—soft (CL)						SILTY CLAY—trace sand & gravel—gray—stiff to very stiff (CL)					
		0 1						5			4.4
	- <u>55.0</u>	1		0.5P	21		-80.0	5		2.0B	16
										11	2.0
		1						9			
	<u>–60.0</u>	1		0.25P	22		<u>–85.0</u>	10		2.7B	17
-40.	  							-			
		2		11	5.9			5		11	0.9
SILTY CLAY-trace sand &	-65.0	4		1.25B	18		-90.0	9		2.0B	18
gravel-gray-stiff to very stiff						-68	.1 —	$\left  \right $			
						SILT with Sand Streaks-		17	$\bigotimes$		
						trace gravel-gray-dense (ML)		15	sure Test	4.25P	15
									> Prês Metei		
						-70	.6		$\otimes$		
		9				SILTY SANDY GRAVEL-		24			
	-70.0	11		1.75P	17	gruy-very dense (GM)	-95.0	42		NP	5
						-73	.1	1			
						SILTY CLAY-trace to some send	&	31	ې ۲	7.59	9.3
						gravel-gray-hard (CL)	<u>س</u>	40	er, Te	912.7%	12
								$\left  \right $	≪ Pr Met		
		7		11	7.3			16	$\sim$	13	3.6
	-75.0	9  11		2.7R	17	-77.	<b>1</b> -100.0	25  40		9.3B	12
N-Standard Penetration Test (ASTM D-1586)	Type Failu	ure Failur	<u> </u>	S Shore	- Fail	Qu-Unconfined Compressive Strength (	tsf) Unit	wt.	(pcf)	noted in	· ~
						STRUCTU BORING	JRE LOC	FC ;	DUN	DATIO	Ν
--	---------------------	-----------------	--	-------------	------------	---	--------------------	------------	-----------------------	------------------	----------
O'BRIEN & ASSOCIATES, CONSULTING ENGINER 1235 E. DAVIS ST./ARLINGTON HTS., IL 60 (847)398-1441 * FAX(847) 398-2376	ERS						Sh	3	'	of <u>3</u>	
Project <u>Wacker Drive Reconstru</u>	uction						OBA	JO	B NO	). <u>9931</u> :	2
City' Chicago		Stru	uctu	ire No	. <u>X</u>	X	Rig Boro		$\frac{1E-5}{10}$	55	—
State Illinois		LUC D	ate	e Mar	ch	6 to March 20, 2000	Chec	kec	IBy	DOB	
									-		
BORING NO. <u>MB-</u> Station <u>XX</u> Offset <u>XX</u>	· <u>2</u>	Blow Counts	R (in)	Qu (tsf)	W (%)	Surface Water Elev. N/A Groundwater Elevation XX Groundwater Elevation XX After Hours			Blow Counts (u)	Qu (tsf)	W (%)
SILTY CLAY to CLAYEY SILT-trace			~~~~			CLAYEY SILT to SILTY CLAY—some sand, gravel & fractured rock —10	) <i>3.1</i>				
(CL/ML)	-	<u>50</u> 5"	$\bigotimes_{i}$			BOULDERS & COBBLES	-	+	<u>50/4</u>	17	+
			essur er Te	4.5+P	12						NR
			∑ Pri			-105	.1	_			
	-					DOLOMITE BEDROCK Rotary Drilling	•				
						107.1					
-	-105.0					SILURIAN SYSTEM NIAGARAN SERIE	<u>–130</u> 'S	<u>, o</u>			_
-85.1		<u>50</u> 5"	🗙 Prêsŝure 🗙	4.5+P	10	RACINE FORMATION DOLOMITE Run 2 (-130.0' to -140.0') Light gray to gray with horizontal bedding, lightly weathered, porous with some vugs, fossiliiferous & stylolottic. Horizontal fractures @ -130.25'131.0' & -131.5'.					
CLAYEY SILT—some sand & gravel—gray—very dense (ML) -	- <u>110.0</u>	50	/3"		11	Vertical fracture with intersecting horizontal fractures from -131.5' -132.0' & from -132.42' to -133.25' Horizontal fractures @	to - <u>135</u>	5.0	F		<
		50	/4"			–133.58', –133.92', –134.08' & –134.75'. Transverse fracture from –135.0' to –135.5'. Weathered			Ĺ	, ORE	-
					11	horizontal fractures @ -136.42' & -136.58'. Horizontal fractures @ -136.96', -137.5', -137.79', -138.02' + -130.375'					
		50	/1"			PECOVERY = 100.0%					
-	-115.0				8	$\frac{RQD}{RQD} = 59.0\% -117.1$	-140	<u>.0</u>		1	
		50	/7"			END OF BORING @ -140.0' Rotary Drilling Methods					
-94.1	-	30	/3			CME Automatic Hammer	-	_			
Dolomite Boulder Botary Drilling	_	_	_		11			_			
_06.1			<i>,</i> ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,								
Run 1 (-119.0' to -125.0') Dolomite Boulder from -119.0' to _ -119.5',	120.0	50	/1"		INR		- <u>145</u>	5.0			
CLAYEY SILT to SILTY CLAY with some sand, gravel & fractured rock from —119.5' to —122.5',			R(	ЭСК	6						
Dolomite Boulder from -122.5' to -123.0',	_		С	ORE							
CLAYEY SILT to SILTY CLAY with some sand, gravel & fractured rock from -123.0' to -125.0' -102.1- N-Standard Penetration Test (ASTM D-1586)	125.0 Type Failu	re			6	Qu-Unconfined Compressive Strength (t	—150 sf)	.0 Jnit	wt. (pc	f) noted in	n

O'BRIEN & ASSOCIATES, INC.

E-Estimated Value P-Penetrometer NP-Non-Plastic

OBA						STRUCTURE FOUNDATION BORING LOG
O'BRIEN & ASSOCIA CONSULTING ENG	TES, INC. INEERS					Sh <u>1</u> of <u>3</u>
(847)398–1441 * FAX(847) 3	98-2376					
Project <u>Wacker Drive Re</u>	construction	Str	ucti	uro No	<u></u>	OBA JOB NO. <u>99312</u>
County Cook			atio	on <u></u>	<u> </u>	Bored By RH
State <u>Illinois</u>		- '	Date	e <u>Nov</u>	/em	ber 12 to 14, 1999 Checked By DOB
BORING NO. Station Offset	<b>MB-11</b> XX XX	Blow Counts	R (in)	Qu (tsf)	W (%)	Chicago River Elevation -1.5 CCD Groundwater Elevation - Groundwater Elevation -
Ground Surface Elevation	+2.0 CCD	_			-	
Barge						SILTY SANDY CLAY-trace
	_				-	gravel and shells-very soft
						ps <0.25E 91
	-1.5					-26.0
<u>_</u>						CLAYEY SILTY SAND-very
WATER-Chicago River	-5.0					Sediment) –30.0 ps NP 23
						ps
		-				SILTY CLAY-trace sand and
					$\vdash$	gravel-gray-medium (CL) wet
						Vane Shear @ 34.5' c=653 psf $-ps$
	<u>–10.0</u>				-	<u>–35.0 ps 0.5P 26</u>
		-				Vane Shear @ 36.5' c=765 psf
						ps 0.29P 26
						ps
	-15.0					Vane Shear @ 39.5' c=709 psfPs26
		-				
						Vane Shear @ 41.5' $c=949$ psf $ps$
						ps No Recovery
					$\square$	
	-/0.0	ns				
SILTY SANDY CLAY-trace		ps		v		Vane Shear @ 44.5' c=1174 psf
(MUCK)	-20.0	lps		<u> </u>	100	
		ps ps			$\vdash$	Vane Shear @ 46.5' c=1235 psfpsps
		ps		X	83	SILTY CLAY-trace sand and ps 0.8B 20
		1				gravel-gray-stiff to very stiff
		ps ps			-	) / / / / / / / / / / / / / / / / / / /
	-25.0	ps		Х	81	-50.0 ps 1.2B 20
N-Standard Penetration Test (ASTM D R-Recovery in inches	-1586) Type Fail B-Bulge E-Estime	lure Failui ated `	re Value	S-Shea P-Pene	r Fail trome	Qu-Unconfined Compressive Strength (tsf) Unit wt. (pcf) noted in ure W-Water Content, percent dry weight italics above w% eter NP-Non-Plastic

OBA						STRUCTU BORING	JRE F LOG	ΟU	ND	ATION	1
O'BRIEN & ASSOCIATES, CONSULTING ENGINER 1235 E. DAVIS ST./ARLINGTON HTS., IL 60 (847)398-1441 * FAX(847) 398-2370	, INC. ERS						Sh _2	2	_ 01	- 3	_
Project <u>Wacker Drive Reconst</u>	ruction	Str	ucti	ure No	1.		OBA JO	DB I	NO.	<u>99312</u>	
County Cook State Illinois		Loc	atio ate	on e Nov	remt	per 12 to 14, 1999	Bored Checke	By d B	y	RH DOB	_
	_11	r	-					_			_
Station XX Offset XX		Blow Counts	R (in)	Qu (tsf)	W (%)	Chicago River Elevation —1.5 CCI Groundwater Elevation — Groundwater Elevation —		Blow Counts	R (in)	Qu (tsf)	W (%)
		_									
		ps		9	8.6						
		ps ps		1.0B	22	SILTY CLAY-trace to some sand and gravel-gray-hard (CL/ML)					
				10	5 0						12 0
SILTY CLAY-trace sand and		ps ps		1 40	15			25	/3"	6 0P	17
gravel—gray—stiff to very stiff (CL)	- <u>55.0</u>	ps		1.4D	15	- 70 0	<u>-80.0</u>	$\left[ - \right]$		0.08	13
		ps		11	1.3	CLAYEY SILT-trace sand and		50	/4"		
		ps ps		1.0B	15	gravel—gray—very dense (ML)				NP	12
				10	0.5	-81.5			/		
		4			15	SILTY CLAY-some sand and		150	/3	4 5 1 0	10
	<u>-60.0</u>	9		2.38	15	gravel-gray-hard (CL/ML)	<u>-85.0</u>			4.3+P	10
								50	/6"	13	3.2
										5.6S	10
		9		1 750				27	/7"	4 5 1 0	11
	-65.0	10		1.75P	20		-90.0	-		4.3+P	
								50	/1"		
									No	Recov	ery
									<i>(_</i> )		
		79						50	/5″		
	- 70.0	11		_	18		-95.0	-		4.5+P	9
								50	/4"		
										4.5+P	9
-71.5											
SILTY CLAY—trace to some sand and gravel—gray—hard (CL/ML)		19 20						50	/4"	. –	
N-Standard Penetration Test (ASTM D-1586) R-Recovery in inches	-75.0 Type Failu B-Bulge	<mark>22</mark> Jre Failur	e.	S-Shear	11	Qu-Unconfined Compressive Strength (t w-Water Content percent dry weight	-100.0 sf) Unit	wt.	(pcf)	<mark>4.5+P</mark> noted in	11

OBA						STRUCTURE FOUNDATION BORING LOG
O'BRIEN & ASSOCIATES, CONSULTING ENGINEE 1235 E. DAVIS ST./ARLINGTON HTS., IL 60 (847)398-1441 * FAX(847) 398-2376	INC. RS <sup>005</sup>					Sh <u>3</u> of <u>3</u>
Project <u>Wacker Drive Reconstr</u> City <u>Chicago</u> County <u>Cook</u> State <u>Illinois</u>	uction	Stri Loc	ucti atio	ure No on e <u>Nov</u>		OBA JOB NO. <u>99312</u> Rig <u>CME-55</u> Bored By <u>RH</u> ber 12 to 14, 1999 Checked By <u>DOB</u>
BORING NO. MB- Station Offset	<u>-11</u>	Blow Counts	R (in)	Qu (tsf)	₩ (%)	Chicago River Elevation -1.5 CCD Groundwater Elevation - Groundwater Elevation -
SILTY CLAY—some sand, gravel and fractured stone—gray—very dense (CL/ML)		50	/1" No /1"	Recov	ery	
<b>-104.0</b> BEDROCK-Driller's Observation	– <u>105.0</u> –	50	/0"	_	9	
-106.0 SILURIAN SYSTEM, NIAGRAN SERIES, DOLOMITE RUN 1 (-108.0' to -118.0'): Light						
occasionally stylolitic, vuggy with trace pyrite-weathered horizontal and vertical fractures with weathered horizontal fractures throughout; fractured from -111.8' to -112.1' and -113.6' to -113.8' RECOVERY = 100%			R	OCK ORE		
RQD = 59%	- <u>115.0</u> 					
–776.0 END OF BORING © –118.0' Hollow Stem Augers & Rotary Drilling Methods 60.0' of Casing CME Automatic Hammer						- <u>145.0</u>
- N-Standard Penetration Test (ASTM D-1586) R-Recovery in inches	-125.0 Type Faile B-Bulge	ure Failur	e /alus	S-Shear	Failu	Qu-Unconfined Compressive Strength (tsf) ure W-Water Content, percent dry weight italics above w%

**APPENDIX F** 

LAB DATA



CDAVE		SAND		ент	
GRAVEL	COARSE	MEDIUM	FINE	51L I	CLAT

Boring No.	GSI-02	CLASSIFICATION-ASTM D 2487	PARTICLE SIZE ANALYSIS-ASTM D 422
Sample No.	2		
Depth	24.5'-26.5'	SANDT LEAN CLAT (CL)	The Chicago River Walk
Liquid Limit	36	dark gray	Wacker Dr State St. to Lake St.
Plastic Limit	22		Chicago, Illinois
Plasticity Index	14		
Test By	NOB	% Gravel 1.7	Geo Services, Inc.
Date	6/27/11	% Sand 43.2	Geotechnical, Environmental and Civil Engineering
Reviewed By	AJP	% Silt 26.4	1235 E. Davis St., Arlington Heights, IL 60005
Job No	11019	% Clay 28.7	Phone 847-253-3845 • Fax 847-253-0482



		SAND		CII T		
GRAVEL	COARSE	MEDIUM	FINE	31L I	CLAT	

Boring No.	GSI-02	CLASSIFICATION-ASTM D 2487	PARTICLE SIZE ANALYSIS-ASTM D 422
Sample No.	5		
Depth	31.0'-33.0'	LEAN CLAY WITH SAND (CL)	The Chicago River Walk
Liquid Limit	38	gray	Wacker Dr State St. to Lake St.
Plastic Limit	18		Chicago, Illinois
Plasticity Index	20		
Test By	NOB	% Gravel 0.4	Geo Services, Inc.
Date	6/27/11	% Sand 16.4	Geotechnical, Environmental and Civil Engineering
Reviewed By	AJP	% Silt 30.8	1235 E. Davis St., Arlington Heights, IL 60005
Job No	11019	% Clay 52.3	Phone 847-253-3845 • Fax 847-253-0482



		SAND			CLAY
GRAVEL	COARSE	MEDIUM	FINE	31L I	CLAT

Boring No.	GSI-06	CLASSIFICATION-ASTM D 2487	PARTICLE SIZE ANALYSIS-ASTM D 422
Sample No.	6		
Depth	33.0'-35.0'	LEAN CLAY WITH SAND (CL)	The Chicago River Walk
Liquid Limit	37	gray	Wacker Dr State St. to Lake St.
Plastic Limit	18	]	Chicago, Illinois
Plasticity Index	19	]	
Test By	NOB	% Gravel 0.9	Geo Services, Inc.
Date	6/27/11	% Sand 17.3	Geotechnical, Environmental and Civil Engineering
Reviewed By	AJP	% Silt 29.7	1235 E. Davis St., Arlington Heights, IL 60005
Job No	11019	% Clay 52.1	Phone 847-253-3845 • Fax 847-253-0482



		SAND		SII T	CLAY
GRAVEL	COARSE	MEDIUM	FINE	SILI	CLAT

Boring No.	GSI-09	CLASSIFICATION-ASTM D 2487	PARTICLE SIZE ANALYSIS-ASTM D 422
Sample No.	2		
Depth	24.5'-26.5'	SANDT LEAN CLAT (CL)	The Chicago River Walk
Liquid Limit	34	dark gray	Wacker Dr State St. to Lake St.
Plastic Limit	22	]	Chicago, Illinois
Plasticity Index	12	]	
Test By	NOB	% Gravel 0.0	Geo Services, Inc.
Date	6/27/11	% Sand 45.5	Geotechnical, Environmental and Civil Engineering
Reviewed By	AJP	% Silt 27.6	1235 E. Davis St., Arlington Heights, IL 60005
Job No	11019	% Clay 26.9	Phone 847-253-3845 • Fax 847-253-0482



### 1235 E. DAVIS STREET ARLINGTON HEIGHTS, IL 60005 (847) 253-3845 FAXES (847) 253-0482

### Organic Matter in Soils by Wet Combustion AASHTO T 194

Project Name	The Chicago River Walk	Date	6/30/11
V	Nacker Drive from State St. to Lake St.		
Location (	Chicago, Illinois	Job No	11019
_			

Sample Location	GSI-02	GSI-06	GSI-09			
Sample No	2	2	2			
Depth	24.5'-26.5'	20.5'-22.0'	24.5'-26.5'			
Total Organic Matter						
%	4.6	7.2	3.4			

Comments: -

Performed by: JE

Project Name	The Chica		Job No. <u>11019</u>			
Location	State St.	to Lake St., Chicago, III	nois Dopth	21 0' 22 0'	Date 6/24/11	
Bonny No GSI-02		Sample No 5	Deptin_	31.0-33.0		
Description of Sample	LEAN CL	AY with SAND (CL)-gra	y			
Water Content:		Sa	ample Data:			
Tare No	1	Initial D	iameter (in)	2.78		
Tare Wt. (g)	15.7	Initial A	rea (sq. in)	6.07		
Wet Wt. + Tare (g)	1407	Initia	I Height (in)	6.9	15% Strain (in) =	1.04
Dry Wt. + Tare (g)	1137.1	Initial Volu	ume (cu. In)	41.94	Height/Dia. Ratio	2.49
Wet Wt Tare (g)	1391.3		_		Ave. Rate of % Strain /min.	1.16
Dry Wt Tare (g)	1121.4	Sample	Weight (g)	1393.0		
Moisture Content (%)	24.1	Dry Unit V	Veight (pcf)	102.0	Liquid Limit	38
		Wet Unit V	Veight (pcf)	126.5	Plastic Limit	18

### Test Data

						Compressive	Compressive	Shear
Elapsed Time	Axial Load	Strain	Axial	Axial Strain	Corrected Area	Stress	Strength	Strength
(min)	(lb)	(0.001 in)	Strain	%	(sq. in.)	Qu (psi)	Qu (tsf)	Qu (tsf)
0	0	0	0	0	0	0	0	0
0.5	6	0.041	0.0059	0.59	6.11	0.98	0.07	0.04
1	10	0.081	0.0117	1.17	6.14	1.63	0.12	0.06
1.5	13	0.123	0.0178	1.78	6.18	2.10	0.15	0.08
2	16	0.164	0.0237	2.37	6.22	2.57	0.19	0.09
2.5	19	0.202	0.0292	2.92	6.25	3.04	0.22	0.11
3	22	0.243	0.0352	3.52	6.29	3.50	0.25	0.13
3.5	25	0.284	0.0411	4.11	6.33	3.95	0.28	0.14
4	28	0.322	0.0466	4.66	6.37	4.40	0.32	0.16
4.5	30	0.363	0.0525	5.25	6.41	4.68	0.34	0.17
5	33	0.405	0.0586	5.86	6.45	5.12	0.37	0.18
5.5	35	0.442	0.0640	6.40	6.48	5.40	0.39	0.19
6	37	0.483	0.0699	6.99	6.53	5.67	0.41	0.20
6.5	39	0.525	0.0760	7.60	6.57	5.94	0.43	0.21
7	41	0.564	0.0816	8.16	6.61	6.20	0.45	0.22
7.5	43	0.601	0.0870	8.70	6.65	6.47	0.47	0.23
8	45	0.642	0.0929	9.29	6.69	6.72	0.48	0.24
8.5	46	0.681	0.0986	9.86	6.73	6.83	0.49	0.25
9	48	0.721	0.1043	10.43	6.78	7.08	0.51	0.25
9.5	49	0.762	0.1103	11.03	6.82	7.18	0.52	0.26
10	51	0.801	0.1159	11.59	6.87	7.43	0.53	0.27
10.5	52	0.841	0.1217	12.17	6.91	7.52	0.54	0.27
11	53	0.883	0.1278	12.78	6.96	7.62	0.55	0.27
11.5	54	0.922	0.1334	13.34	7.00	7.71	0.56	0.28
12	55	0.963	0.1394	13.94	7.05	7.80	0.56	0.28
12.5	56	1.005	0.1454	14.54	7.10	7.88	0.57	0.28
13	57	1.036	0.1500	15.00	7.14	7.98	0.57	0.29

Failure Conditions/Remarks: Bulge = 0.57 Qu tsf @ 15.00% strain, Test By: Natalie O'Brien

	Project Name	The Chicago River Walk			Job No.	11019	
	Location	State St. to Lake St., Chic	cago, Illino	is	Date	6/24/11	
Boring No	GSI-02	Sample No	5	Depth 31.0'-33.0'	_		-
Descriptior	n of Sample	LEAN CLAY with SAND (	CL)-gray				

#### **Stress-Strain Curve**



Project Name Location	The Chicago River V State St. to Lake St.	22 0' 25 0'	Job No. <u>11019</u> Date <u>6/24/11</u>			
Boning No GSI-00	Sample No	0	Depin_	33.0-35.0		
Description of Sample	LEAN CLAY with SA	ND (CL)-gray				
Water Content:		Samp	le Data:			
Tare No	2	Initial Diam	eter (in)	2.89		
Tare Wt. (g)	15.7	Initial Area	(sq. in)	6.56		
Wet Wt. + Tare (g)	1499.3	Initial He	ight (in)	6.9	15% Strain (in) =	1.04
Dry Wt. + Tare (g)	1232.1	Initial Volume	(cu. In)	45.33	Height/Dia. Ratio	2.39
Wet Wt Tare (g)	1483.6		-		Ave. Rate of % Strain /min.	1.15
Dry Wt Tare (g)	1216.4	Sample We	eight (g)	1483.9	-	
Moisture Content (%)	22.0	Dry Unit Weig	ht (pcf)	102.3	Liquid Limit	37
		Wet Unit Weig	ht (pcf)	124.7	Plastic Limit	18

### Test Data

Elapsed Time (min)	Axial Load (lb)	Strain (0.001 in)	Axial Strain	Axial Strain %	Corrected Area (sq. in.)	Compressive Stress Qu (psi)	Compressive Strength Qu (tsf)	Shear Strength Qu (tsf)
0	0	0	0	0	0	0	0	0
0.5	6	0.017	0.0025	0.25	6 58	0.91	0.07	0.03
1	10	0.059	0.0085	0.85	6.62	1.51	0.11	0.05
1.5	13	0.104	0.0151	1.51	6.66	1.95	0.14	0.07
2	17	0.144	0.0208	2.08	6.70	2.54	0.18	0.09
2.5	21	0.183	0.0265	2.65	6.74	3.12	0.22	0.11
3	24	0.225	0.0326	3.26	6.78	3.54	0.25	0.13
3.5	28	0.267	0.0386	3.86	6.82	4.10	0.30	0.15
4	31	0.305	0.0441	4.41	6.86	4.52	0.33	0.16
4.5	34	0.347	0.0502	5.02	6.91	4.92	0.35	0.18
5	37	0.389	0.0563	5.63	6.95	5.32	0.38	0.19
5.5	41	0.429	0.0621	6.21	6.99	5.86	0.42	0.21
6	44	0.472	0.0683	6.83	7.04	6.25	0.45	0.22
6.5	46	0.512	0.0741	7.41	7.08	6.49	0.47	0.23
7	50	0.554	0.0802	8.02	7.13	7.01	0.50	0.25
7.5	52	0.594	0.0860	8.60	7.18	7.25	0.52	0.26
8	54	0.634	0.0918	9.18	7.22	7.48	0.54	0.27
8.5	57	0.675	0.0977	9.77	7.27	7.84	0.56	0.28
9	59	0.715	0.1035	10.35	7.32	8.06	0.58	0.29
9.5	61	0.756	0.1094	10.94	7.37	8.28	0.60	0.30
10	64	0.797	0.1153	11.53	7.41	8.63	0.62	0.31
10.5	66	0.837	0.1211	12.11	7.46	8.84	0.64	0.32
11	67	0.880	0.1274	12.74	7.52	8.91	0.64	0.32
11.5	69	0.920	0.1331	13.31	7.57	9.12	0.66	0.33
12	71	0.962	0.1392	13.92	7.62	9.32	0.67	0.34
12.5	72	1.004	0.1453	14.53	7.67	9.38	0.68	0.34
13	74	1.036	0.1500	15.00	7.72	9.59	0.69	0.35

Failure Conditions/Remarks: Bulge = 0.69 Qu tsf @ 15.00% strain, Test By: Natalie O'Brien

	Project Name	The Chicago River Walk			Job No.	11019	
	Location	State St. to Lake St., Chic	ago, Illinois		Date	6/24/11	
Boring No	GSI-06	Sample No	6	Depth 33.0'-35.0'	-		_
Descriptior	n of Sample	LEAN CLAY with SAND (	CL)-gray				

#### **Stress-Strain Curve**



# **APPENDIX G**

# **INSITU VANE SHEAR RESULTS**



1235 E. Davis Street Arlington Heights, IL 60005 (847) 253-3845

PROJECT:CHICAGO RIVER RIVERWALKGSI JOB NUMBER:11019OPERATOR:DRDATE OF TEST:MAY 23-31, 2011TOP OF BARGE DECK ELEVATIOL+5 to +7 Feet CCD (Estimated)DATA REDUCTION: RWC

#### \*VANE SIZE

2.0 = SMALL (11CM X 5CM) VANE

1.0 = MEDIUM (13CM X 6.5 CM) VANE

0.5 = LARGE (17.2CM X 8CM) VANE

VANE CONSTANT, K=1.0134

#### VANE SHEAR RESULTS

	VANE TIP									APPROX. VANE TIP
BORING	DEPTH	VANE	а	PEA	$\mathbf{K} \mathbf{S}_u$	a	REMOI	LDED $S_u$	SENSITIVITY	ELEVATION
NO.	(ft)		(in)	(tsf)	(psf)	(in)	(tsf)	(psf)	PEAK/REM.	(CCD)
GSI-02	31.0	1.0	2.92	0.77	1525	1 17	0.31	625	2.4	-26.4
001 02	36.0	1.0	2.13	0.56	1125	0.89	0.23	475	2.4	-31.4
	41.0	1.0	3.12	0.82	1650	2.20	0.58	1150	1.4	-36.4
GSI-06	31.0	0.5	3.59	0.47	950	n/a	_	_		-24.3
	36.0	1.0	2.66	0.70	1400	1.90	0.50	1000	1.4	-29.3
GSI-09	33.5	0.5	3.80	0.50	1000	n/a	_	_	_	-27.2
	41.0	1.0	2.62	0.69	1375	1.79	0.47	950	1.4	-34.7

	Peak Undrained Shear Strength (psf)													
	0	20	00	400	600	800	1000	1200	1400	1600	1800			
	0		<u>  · · · ·</u>							GSI-02				
	5 -									• GSI-06				
	10 -									• GSI-09				
	15 -	-												
(ft)	20 -	-												
pth	25 -													
طّ	30 -	-					•			•				
	35 -	-					•	•						
	40 -	-							•					
	45 -													
	50													

APPENDIX H
PILE DESIGN TABLES

### Pile Design Table for Riverwalk utilizing Boring #GSI-02

	Nominal	Factored	Estimated		Nominal	Factored	Estimated		Nominal	Factored	Estimated
	Required	Resistance	Pile		Required	Resistance	Pile		Required	Resistance	Pile
	Bearing	Available	Length		Bearing	Available	Length		Bearing	Available	Length
	(Kips)	(Kips)	(Ft.)	_	(Kips)	(Kips)	(Ft.)		(Kips)	(Kips)	(Ft.)
Metal S	Shell 12"Ф	w/.179" wa	ls	Steel	HP 10 X 57			Steel I	HP 14 X 73		
	244	31	57		194	79	67		212	78	60
Metal S	Shell 12"Ф	w/.25" walls	S		221	94	70		233	90	62
	295	59	60		247	108	72		248	98	65
Metal S	Shell 14"Ф	w/.25" walls	S		273	123	75		274	113	67
	363	79	60		300	137	77		312	133	70
Metal S	Shell 14"Ф	w/.312" wa	ls		326	152	80		349	154	72
	363	79	60		352	166	82		387	175	75
Steel H	IP 8 X 36				378	181	85		425	195	77
	193	84	72		404	195	87		462	216	80
	214	96	75		429	209	90		500	237	82
	235	107	77	Steel	HP 12 X 53				537	257	85
	253	117	80		204	80	65	Steel I	HP 14 X 89		
	267	125	82		225	91	67		215	80	60
	282	133	85		256	109	70		238	92	62
Steel H	IP 10 X 42				288	126	72		254	101	65
	188	76	67		319	143	75		282	117	67
	214	91	70		350	160	77		320	137	70
	240	105	72		381	177	80		358	158	72
	266	120	75		413	195	82		396	179	75
	292	134	77	Steel	HP 12 X 63				434	200	77
	319	148	80		209	82	65		472	221	80
					232	95	67		510	242	82
					263	112	70		548	263	85
					295	130	72		601	292	87
					327	147	75		654	321	90
					359	165	77	Steel I	HP 14 X 10	2	
					390	182	80		218	81	60
				I	422	199	82		241	94	62

### Pile Design Table for Riverwalk utilizing Boring #GSI-06

	Nominal	Factored	Estimated		Nominal	Factored	Estimated		Nominal	Factored	Estimated
	Required	Resistance	Pile		Required	Resistance	Pile		Required	Resistance	Pile
	Bearing	Available	Length		Bearing	Available	Length		Bearing	Available	Length
	(Kips)	(Kips)	(Ft.)		(Kips)	(Kips)	(Ft.)		(Kips)	(Kips)	(Ft.)
Metal S	Shell 12"Ф	w/.179" wa	ls	Steel I	HP 10 X 57			Steel I	HP 14 X 73		
	244	31	57		194	79	67		212	78	60
Metal S	Shell 12"Ф	<sup>,</sup> w/.25" wall:	S		221	94	70		233	90	62
	295	59	60		247	108	72		248	98	65
Metal S	Shell 14"Ф	w/.25" wall	S		273	123	75		274	113	67
	363	79	60		300	137	77		312	133	70
Metal S	Shell 14"Φ	w/.312" wa	ls		326	152	80		349	154	72
	363	79	60		352	166	82		387	175	75
Steel H	IP 8 X 36				378	181	85		425	195	77
	193	84	72		404	195	87		462	216	80
	214	96	75	Steel I	HP 12 X 53				500	237	82
	235	107	77		204	80	65		537	257	85
	253	117	80		225	91	67	Steel I	HP 14 X 89		
	267	125	82		256	109	70		215	80	60
	282	133	85		288	126	72		238	92	62
Steel H	IP 10 X 42				319	143	75		254	101	65
	188	76	67		350	160	77		282	117	67
	214	91	70		381	177	80		320	137	70
	240	105	72		413	195	82		358	158	72
	266	120	75	Steel I	HP 12 X 63				396	179	75
	292	134	77		209	82	65		434	200	77
	319	148	80		232	95	67		472	221	80
					263	112	70		510	242	82
					295	130	72		548	263	85
					327	147	75		601	292	87
					359	165	77	Steel I	HP 14 X 102	2	
					390	182	80		218	81	60
					422	199	82		241	94	62
					454	217	85		258	103	65

### Pile Design Table for Riverwalk utilizing Boring #GSI-09

	Nominal	Factored	Estimated		Nominal	Factored	Estimated		Nominal	Factored	Estimated
	Required	Resistance	Pile		Required	Resistance	Pile		Required	Resistance	Pile
	Bearing	Available	Length		Bearing	Available	Length		Bearing	Available	Length
	(Kips)	(Kips)	(Ft.)	_	(Kips)	(Kips)	(Ft.)		(Kips)	(Kips)	(Ft.)
Metal Shell 12"Φ w/.179" walls				Steel	HP 10 X 57			Steel I	HP 14 X 73		
	244	31	57		194	79	67		212	78	60
Metal Shell 12"Φ w/.25" walls					221	94	70		233	90	62
	295	59	60		247	108	72		248	98	65
Metal Shell 14"Φ w/.25" walls					273	123	75		274	113	67
	363	79	60		300	137	77		312	133	70
Metal Shell 14"Φ w/.312" walls				326	152	80		349	154	72	
	363	79	60		352	166	82		387	175	75
Steel H	IP 8 X 36				378	181	85		425	195	77
	193	84	72		404	195	87		462	216	80
	214	96	75	Steel	HP 12 X 53				500	237	82
	235	107	77		204	80	65		537	257	85
	253	117	80		225	91	67	Steel I	HP 14 X 89		
	267	125	82		256	109	70		215	80	60
	282	133	85		288	126	72		238	92	62
Steel HP 10 X 42				319	143	75		254	101	65	
	188	76	67		350	160	77		282	117	67
	214	91	70		381	177	80		320	137	70
	240	105	72		413	195	82		358	158	72
	266	120	75	Steel	HP 12 X 63				396	179	75
	292	134	77		209	82	65		434	200	77
	319	148	80		232	95	67		472	221	80
					263	112	70		510	242	82
					295	130	72		548	263	85
					327	147	75		601	292	87
					359	165	77	Steel I	Steel HP 14 X 102		
					390	182	80		218	81	60
					422	199	82		241	94	62
					454	217	85		258	103	65

### **APPENDIX I**

# **PILE CHARTS**

# FOR

# HP 8, 10, 12, 14, 12" AND 14" PIPE PILES




































APPENDIX J

INSITU PRESSUREMETER TEST RESULTS (BY OTHERS)

STS Job Number: 30922

Boring No. 5 (TG-5)

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Pressuremeter Data Reduction (BX)

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Date: 1-26-00



Pressuremeter Data Reduction (BX)

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STS Job Number: 30922 Boring No. 5 (TB-S) Test Depth: 72,5-75.0 Feet

Date: 1-26-00



Pressuremeter Data Reduction (BX)

STS Job Number: 30922 Boring No. 5 (TC-5) Test Depth: 77.5-80.0 Feet

> Pressure in TSF · 0.0 30.0 40.0 10.0 20.0 50.0 60.0 70.0 900 90 800 80 700 70 600 60 50 Creep in CC 40  $E_d = 773 \text{ tsf}$ 30  $E^{+} = 3285 \text{ tsf}$ Θ 200 20 P = 7.0 tsf 100 10 A E 0 0 -100 -- -10 30.0 0.0 40.0 10.0 20.0 50.0 60.0 70.0 Pressure in TSF <del>— — V</del>olume

Date: 1-27-00

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Pressuremeter Data Reduction (BX)

STS Job Number: 30922 Boring No. 5 (TG-S) Test Depth: 82.5-85.0 Feet

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Date: 1-26-00



#### Pressuremeter Data Reduction (BX)

 STS Job Number: 30922
 Date: 2-2-00

 Boring No. 6
 (TB-6)

 Test Depth: 71.0-73.5 Feet (-64 ccb)



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Pressuremeter Data Reduction (BX)

 STS Job Number: 30922
 Date: 2-2-00

 Boring No. 6
 (T&-G)

 Test Depth: 76.0-78.5 Feet
 (-G9CCD)



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#### Pressuremeter Data Reduction (BX)



Pressuremeter Data Reduction (BX)

 STS Job Number: 30922
 Date: 2-2-00

 Boring No. 6 (T0-6)
 Test Depth: 86.0-88.5 Feet (-79 CCD)





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#### Pressuremeter Data Reduction (BX)

 STS Job Number: 30922
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 Boring No. 7
 (ETB-7)

 Test Depth: 96.0-98.5 Feet
 (-75 <</td>



Date: 3-7-00

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Pressuremeter Data Reduction (BX)

STS Job Number: 30922 Boring No. 2 (M8-2) Test Depth: 96.0-98.5 Feet



Date: 3-17-00

Pressuremeter Data Reduction (BX)

STS Job Number: 30922 Boring No. 2 (MB-2) Test Depth: 101.0-103.5 Feet

> Pressure in TSF 0.0 10.0 30.0 20.0 40.0 50.0 60.0 70.0 900 90 800 80 700 70 600 60 Injected Volume in CC 500 50 Creep in CC 400 40 30 300 Q  $E_d = 757 \text{ tsf}$ 200 20 -2466-tsf  $P_{if} = 34.0 \text{ tsf}$  $P_{o}=7.0$  tsf 100 10 0 0 -100 --10 0.0 40.0 10.0 20.0 30.0 50.0 60.0 70.0 Pressure in TSF <del>--O-</del> Volume <del>- \* -</del> Creep

Date: 3-17-00