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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JOB NO. 11019

March 2012

Geo Services, Inc.
Geotechnical, Environmental and Civil Engineering
An MBE - DBE Firm

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.

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
  % Sand: 16 to 46
  % Silt: 26 to 31
  % Clay: 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 HP-piles 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

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_G). A geotechnical resistance factor (Φ_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 ¼ 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.

TABLE I - SOIL PARAMETERS FOR LATERAL RESISTANCE

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	-

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 water-line, 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 Soils

Relative Density	No. of Blows per foot N
Very Loose	0 to 4
Loose	4 to 10
Medium Dense	10 to 30
Dense	30 to 50
Very Dense	Over 50

Cohesive Soils

Consistency	Unconfined Compressive Strength - qu (tsf)
Very Soft	Less than 0.25
Soft	0.25 - 0.5
Medium Stiff	0.5 - 1.0
Stiff	1.0 - 2.0
Very Stiff	2.0 - 4.0
Hard	Over 4.0

TERMINOLOGY

Streaks are considered to be paper thick. **Lenses** are considered to be less than 2 inches thick. **Layers** are considered to be less than 6 inches thick. **Stratum** are considered to be greater than 6 inches thick.

DRILLING AND SAMPLING SYMBOLS

SS:	Split Spoon 1-3/8" I.D., 2" O.D.	HS:	Housel Sampler
ST:	Shelby Tube 2" O.D., except where noted	WS:	Wash Sample
AS:	Auger Sample	FT:	Fish Tail
DB:	Diamond Bit - NX: BX: AX	RB:	Rock Bit
CB:	Carboloy Bit - NX: BX: AX	WO:	Wash Out
OS:	Osterberg Sampler		

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

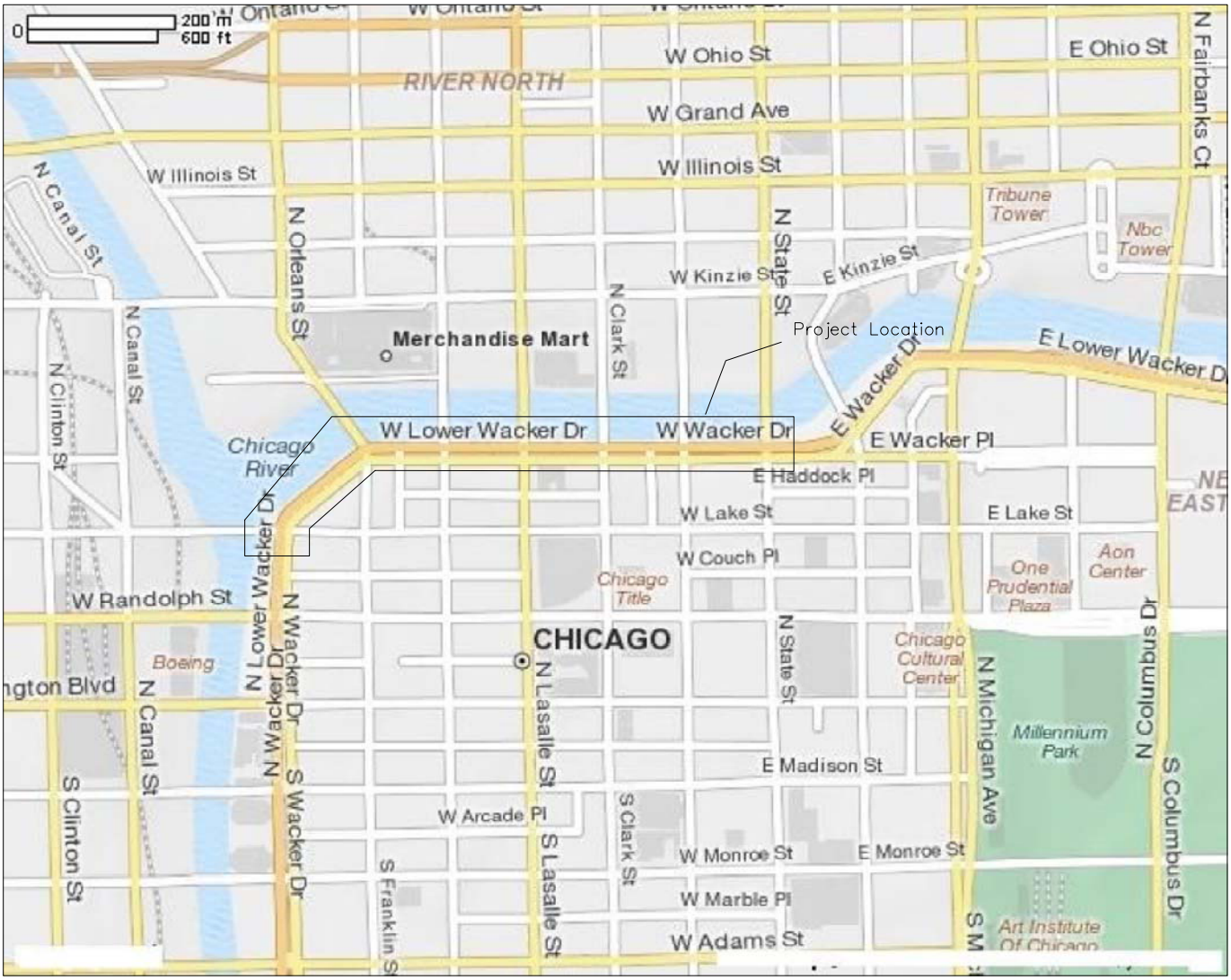
WATER LEVEL MEASUREMENT SYMBOLS

WL:	Water	WD:	While Drilling
WCI:	Wet Cave In	BCR:	Before Casing Removal
DCI:	Dry Cave In	ACR:	After Casing Removal
WS :	While sampling	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

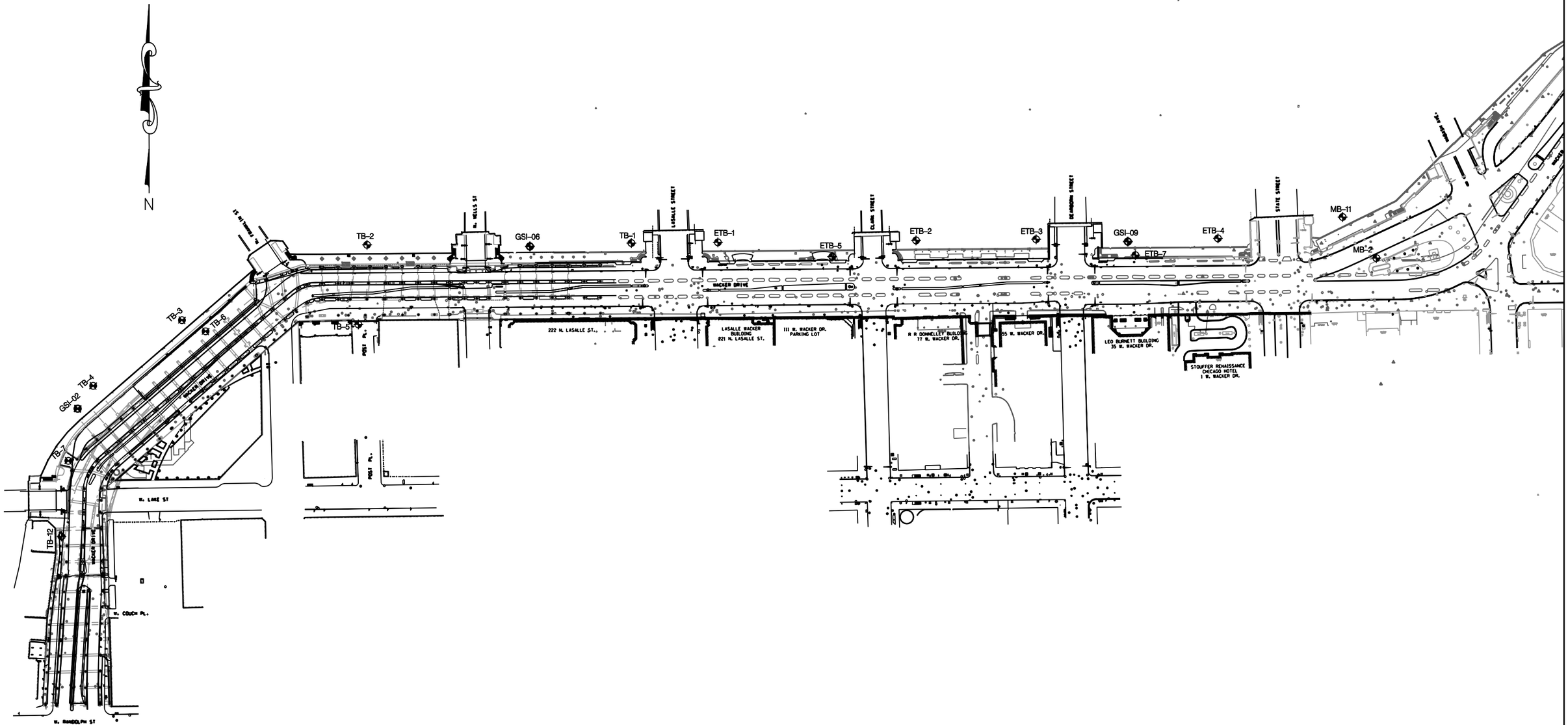
SITE MAP



SITE MAP			
Geotechnical Investigation for the Chicago River Riverwalk State Street to Lake Street Chicago, Illinois	Geo Services, Inc. Geotechnical, Environmental & Civil Engineering 805 Amherst Court, Suite 204 Naperville, Illinois 60565 (630) 355-2838	DRAWN BY	BT
		APPROVED BY	AJP
		DATE	March 17, 2011
		GSI JOB No.	11019
		SCALE	Not To Scale

APPENDIX C

LOCATION DIAGRAM



LEGEND

- TB– EXISTING BORING
- ETB– EXISTING BORING
- MB– EXISTING BORING
- GSI– 2011 GEOSERVICES RIVERWALK BORING

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

REVISIONS

ZONE	REV	DESCRIPTION	DATE	APPROVED

Geotechnical Investigation
For The Proposed
Chicago Riverwalk – State Street to Lake Street
CDOT Project No. E–0–621
Chicago, Illinois

SOIL BORING LOCATION DIAGRAM

SIZE	REV.	GSI Job No.	DRAWN BY	APPROVED BY
B	1	11019	RWC	AJP

SCALE: 1"=200' | DATE: 2–15–2012 | SHEET: 1 OF 1

APPENDIX D

BORING LOGS

Geo Services, Inc.
Geotechnical, Environmental & Civil 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
Client: Sasaki Associates, Inc. — Checked By: AJP

BORING No.: **GSI–02**
Northing 901916
Easting 173896
Barge Deck Elevation: +4.6 CCD

Surface Water Elev.: −1.4 CCD
Groundwater Elev. WD n/a
Groundwater Elev. AB n/a
After Hours:

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				BARGE
−5				
−1.4				
				RIVER
−10				
−15				
−20				
−17.9				
	0			RIVER MUCK–black–very loose
	0			Strong Petroleum Odor.
	0			
	0	–	171	Total Organic Matter=4.6%
−25	0			
	0			RIVER MUCK–black–very loose
	0			Strong Petroleum Odor.
	0			
−23.9	1	–	37	
	0		***101***	
−30	1	0.3B	24	
				Vane Shear @ −31.0'
				Peak Su=0.77tsf
			102	
	ST	0.6B	24	
	0		***96***	LEAN CLAY with Sand–gray–
−35	2	0.3B	23	soft to medium stiff (CL)
				Vane Shear @ −36.0'
				Peak Su=0.56tsf
	0		***93***	
	2			
	2	0.6B	24	
	1		***97***	
−40	2	0.7B	24	
				Vane Shear @ −41.0'
				Peak Su=0.82tsf
	1		***108***	
	3			
	4	0.9B	19	
	3		***100***	
−45	5	0.7B	21	
−40.9				
	3		***102***	
	4			
	5	1.7B	22	LEAN CLAY with Sand–gray–
				stiff to very stiff (CL)
	3		***108***	
	5			
−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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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
Client: Sasaki Associates, Inc.
Checked By: AJP

BORING No.: **GSI–02**
Northing 901916
Easting 173896
Barge Deck Elevation: +4.6 CCD

Surface Water Elev.: –1.4 CCD
Groundwater Elev. WD n/a
Groundwater Elev. AB n/a
After Hours:

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
	2		*115*	LEAN CLAY with Sand–gray–stiff to very stiff (CL)
	4 5	1.5B	17	
	3		*109*	
–55	5 7	1.4B	18	
	3		*107*	
	6 7	2.1B	20	
	4		*106*	
–60	5 9	2.0B	21	
–55.9				
	4		*105*	Clayey SILT–gray–medium dense (ML)
	6 7	1.8B	21	
	4		*100*	
–65	7 7	1.6B	22	
–60.9				
	8			SILT–gray–medium dense (ML)
	8 8	NP	31	
–63.4				
	11			Clayey SILT–gray–medium dense to very dense (ML)
	11 16	4.5+P	11	
	17		*123*	
	26 30	7.4S	12	
	15			
–75	28 35	4.5+P	11	

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
	50/2"			Clayey SILT–gray–medium dense to very dense (ML)
		–	11	
–73.4				
	50/3"			Clayey SAND & FRACTURED ROCK–gray–very dense (GC)
–80		–	11	
	50/2"			
		–	16	
	50/4"			
–85		–	11	
	50/3"			
		–	11	
	50/1"			
–90			NR	
–85.9				
	35			SILT–gray–very dense (ML)
	50/5"			
		NP	19	
	42			
	50/4"			
–95		NP	21	
	45			
	50/3"			
		NP	20	
	50/5"			
–100		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

Geo Services, Inc.
Geotechnical, Environmental & Civil 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
Client: Sasaki Associates, Inc. — Checked By: AJP

BORING No.: **GSI–02**
Northing 901916
Easting 173896
Barge Deck Elevation: *+4.6 CCD*

Surface Water Elev.: *–1.4 CCD*
Groundwater Elev. WD *n/a*
Groundwater Elev. AB *n/a*
After Hours:

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
	38		
	50/3"	NP	20
	35		
SILT–gray–very dense (ML)	50/5"		
–105		NP	22
	39		
	50/3"	NP	21
	50/4"		
–110		NP	22
	50/5"		
–107.9		NP	21
Drillers Observation: Fractured Bedrock			
–108.9	50/1"		
Drillers Observation: Possible Bedrock –115			NR
–111.9			
End Of Boring @ –116.5'			
Rotary Drilling			
CME Automatic Hammer			
35.0' of 4.0"ø Casing Used			
–120			
–125			
–130			
–135			
–140			
–145			
–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

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Geotechnical, Environmental & Civil Engineering
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(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
Client: Sasaki Associates, Inc. — Checked By: AJP

BORING No.: **GSI-06**
Northing 902245
Easting 174815
Barge Deck Elevation: +6.7 CCD

Surface Water Elev.: +0.7 CCD
Groundwater Elev. WD n/a
Groundwater Elev. AB n/a
After Hours:

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	
				BARGE
−5				
+0.7				
				RIVER
−10				
−13.3 −20				
	0			
	0			
	1			
	4	−	101	RIVER MUCK−black−loose Strong Petroleum Odor.
	4			
	2			
	1			
−25	4	−	76	
				RIVER MUCK−black−loose −18.8
	1			
				SILTY SAND & GRAVEL−gray− very loose (A−2)
	1			
	1	NP	17	
				−21.3
	4			
	3			
−30	2	0.25P	25	
				Vane Shear @ −31.0' Peak Su=0.47tsf
	5		97	
	2			
	3	0.3B	24	
			102	
				LEAN CLAY with Sand−gray− soft to medium stiff (CL)
−35	ST	0.7B	22	
				Vane Shear @ −36.0' Peak Su=0.70tsf
	2		103	
	2			
	5	0.8B	21	
	2		99	
	2			
−40	4	0.7B	23	
	1		98	
	3			
	5	0.9B	23	
				−36.3
	2		103	
	4			
−45	5	1.1B	18	
	3		104	
	5			
	5	1.3B	20	LEAN CLAY with Sand−gray− stiff to very stiff (CL)
	3		104	
	4			
−50	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

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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
Client: Sasaki Associates, Inc. — Checked By: AJP

BORING No.: **GSI-06**
Northing 902245
Easting 174815
Barge Deck Elevation: +6.7 CCD

Surface Water Elev.: +0.7 CCD
Groundwater Elev. WD n/a
Groundwater Elev. AB n/a
After Hours:

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
	2		*106*	
	5 7	2.2B	19	
	1		*106*	Sandy SILT-gray- medium dense to dense (ML)
	4 5	1.4B	16	
-55				LEAN CLAY with Sand-gray- stiff to very stiff (CL)
	2		*115*	
	5 6	1.75B	15	
	3		*102*	
	5 8	1.7B	21	
	4		*108*	
	6 10	2.3B	17	
	6		*98*	
	9 11	1.8B	24	
-58.8				
	4		*109*	Silty Sandy CLAY-gray- stiff to very stiff (CL/ML)
	6 8	2.1B	17	
	3		*109*	
	6 7	1.0B	18	
-63.8				
	3			LEAN CLAY with Sand-gray- very stiff (CL)
	6 9	3.25P	18	
-66.3				
	8			SILT-gray-medium dense (ML)
-75	13 16	NP	25	

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				SILT-gray-medium dense (ML) -68.8
	8			
	12 12	NP	19	
	16			Sandy SILT-gray- medium dense to dense (ML)
-80	17 18	NP	14	
	19			
	19 22	NP	16	
	50/5"			
-85		NP	12	
	35			
	43 50/4"	NP	20	
-81.3				
	50/3"			Clayey Sandy SILT with Fractured Rock- gray-very dense (GM/ML)
-90		NP	11	
-83.8				
	32			
	33 37	NP	20	
	40			
	48 50/5"	NP	15	Sandy SILT to Silty SAND-gray- very dense (SM/ML)
-95				
	31			
	39 47	NP	19	
	32			
	50/5"			
-100		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

Geo Services, Inc.
Geotechnical, Environmental & Civil 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
Client: Sasaki Associates, Inc. — Checked By: AJP

BORING No.: **GSI-06**
Northing 902245
Easting 174815
Barge Deck Elevation: +6.7 CCD

Surface Water Elev.: +0.7 CCD
Groundwater Elev. WD n/a
Groundwater Elev. AB n/a
After Hours:

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
	39			
	50/5"	NP	16	Sandy SILT to Silty SAND-gray-very dense (SM/ML)
	27			
	34			
-105	50/4"	NP	19	
-98.8				
	30			SILT-gray-very dense (ML)
	38			
	50/5"	NP	18	
-101.3				
	35			
	35			Sandy SILT-gray-very dense (SM/ML)
-110	50/4"	NP	19	
-103.8				
	50/4"			FRACTURED ROCK-gray-very dense (GP)
-105.3				
		NP	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				
-125				

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
-130			
-135			
-140			
-145			
-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

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Geotechnical, Environmental & Civil Engineering
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(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: 5/23-24/2011
County: Cook
Bored By: DR
Client: Sasaki Associates, Inc.
Checked By: AJP

BORING No.: **GSI-09**
Northing 902255
Easting 176029
Barge Deck Elevation: +6.3 CCD

Surface Water Elev.: +0.3 CCD
Groundwater Elev. WD n/a
Groundwater Elev. AB n/a
After Hours:

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				Total Organic Matter=3.4%
				RIVER MUCK-black-very loose Strong Petroleum Odor.
				BARGE
				-21.7
-5				
+0.3				
				Vane Shear @ -33.5' Peak Su=0.50tsf
				LEAN CLAY with Sand-gray-soft to medium stiff (CL)
-10				
				RIVER
-15				
				Vane Shear @ -41.0' Peak Su=0.69tsf
-20				
				-39.2
-17.7				Lean CLAY with SAND-gray-medium stiff to stiff (CL)
	0			RIVER MUCK-black-very loose Strong Petroleum Odor.
-25	0			

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
	0 0	-	72
	0		
	0 0	-	66
	2		98
-30	2 3	0.3B	22
	2		99
	2 2	0.6B	22
	2		99
-35	2 3	0.3B	23
	1		
	1 2	0.5P	26
	1		99
-40	2 3	0.6B	23
	2		103
	4 6	0.7B	21
	3		108
-45	4 6	0.9B	17
	5		101
	6 6	1.2B	22
	3		107
-50	5 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

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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

BORING No.: **GSI-09**
Northing 902255
Easting 176029
Barge Deck Elevation: +6.3 CCD

Surface Water Elev.: +0.3 CCD
Groundwater Elev. WD n/a
Groundwater Elev. AB n/a
After Hours:

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
	3		*102*	
	4 6	1.25B	22	
	4			SILTY CLAY with Sand-gray- medium dense to very dense (CL/ML)
	6 6	0.75P	22	
-55				
	3		*109*	Lean CLAY with SAND-gray- medium stiff to stiff (CL)
	4 4	0.6B	18	
	3		*106*	
	4 5	0.8B	16	
-60				
	4		*111*	
	5 6	0.9B	16	SILT-gray- dense to very dense (ML)
	3		*108*	
	5 7	1.5B	18	
-65				
	3		*109*	
	6 7	1.9B	18	
	3		*104*	
	4 6	0.5B	23	
-70				
-64.2				
	3		*111*	
	4 11	1.6B	13	SILTY CLAY with Sand-gray- medium dense to very dense (CL/ML)
-66.7				
	15			
	18 15	4.5+P	14	
-75				

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
	16		*116*	
	50/3"	4.3B	13	
	15		*118*	SILTY CLAY with Sand-gray- medium dense to very dense (CL/ML)
	33 35	8.5B	13	
-80				
	50/5"			
		4.5+P	13	
-76.7				
	12			
	37 41	NP	14	
-85				
	21			
	23 20	NP	13	SILT-gray- dense to very dense (ML)
	22			
	24 40	NP	18	
-90				
	36			
	50/4"	NP	20	
-86.2				
Drillers Observation: Cobbles or Boulder. -86.7				
	42			
	50/5"	NP	21	
-95				
	50/3"			SILT-gray-very dense (ML)
		NP	19	
-91.7				
	50/1"			Clayey SAND & GRAVEL-gray- very dense (GC)
-100			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

Geo Services, Inc.
Geotechnical, Environmental & Civil 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: 5/23-24/2011
County: Cook — Bored By: DR
Client: Sasaki Associates, Inc. — Checked By: AJP

BORING No.: **GSI-09**
Northing 902255
Easting 176029
Barge Deck Elevation: *+6.3 CCD*

Surface Water Elev.: *+0.3 CCD*
Groundwater Elev. WD *n/a*
Groundwater Elev. AB *n/a*
After Hours:

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
	50/2"		
Clayey SAND & GRAVEL-gray-very dense (GC)			NR
	50/4"		
-105		NP	11
-99.2			
Drillers Observation: Possible Bedrock			
-101.7			
End Of Boring @ -108.0'			
Rotary Drilling			
CME Automatic Hammer			
35.0' of 4.0"ø Casing Used			
-110			
-115			
-120			
-125			

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
-130			
-135			
-140			
-145			
-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

APPENDIX E

BORING LOGS BY OTHERS

STRUCTURE FOUNDATION
BORING LOG

O'BRIEN & ASSOCIATES, INC.
CONSULTING ENGINEERS
1235 E. DAVIS ST./ARLINGTON HTS., IL 60005
(847)398-1441 * FAX(847) 398-2376

Project Wacker Drive Reconstruction — OBA JOB NO. 99342
City Chicago — Structure No. — Rig CME-55
County Cook — Location — Bored By RG
State Illinois — Date November 19 to 29, 1999 — Checked By DOB

BORING NO. TB-1

Station XX
Offset XX

Ground Surface Elevation +2.0 CCD

Chicago River Elevation −1.5 CCD
Groundwater Elevation –
Groundwater Elevation –

Elev.	Description	Blow Counts	R (in)	Qu (tsf)	W (%)
	Barge				
−1.5	▽ WATER–Chicago River				
−5.0					
−10.0					
−14.5					
	SANDY SILTY CLAY–trace shells–very soft (MUCK) wet	ps			
		ps			
		ps		–	88
		ps			
−20.0		ps		–	42
−19.0					
	SILTY CLAY–trace sand and gravel–gray–soft to medium (CL) wet	ps			
		ps			
		ps		–	25
		ps			
	Vane Shear @ 24.0' c=837 psf	ps			
−25.0		ps		0.25P	23
	Vane Shear @ 26.5' c=837 psf	ps			
		ps			
		ps		–	24
	SILTY CLAY–trace sand and gravel–gray–medium (CL) wet				
		ps			
		ps			
−30.0	Vane Shear @ 30.0' c=755 psf	ps		–	23
−29.0					
	Vane Shear @ 31.5' c=1133 psf	ps			
		ps			
		ps		0.2B	19
	Vane Shear @ 33.0' c=1265 psf				
		ps			
	SILTY CLAY–trace sand and gravel–gray–stiff to very stiff (CL)	ps			
−35.0		ps		0.5P	24
	Vane Shear @ 36.5' c=1316 psf	ps			*94.6*
		ps			
		ps		0.2B	24
		ps			*108.1*
	Vane Shear @ 39.5' c=1674 psf	ps			
−40.0		ps		1.4B	15
	Vane Shear @ 41.5' c=3715 psf	ps			*106.2*
		ps			
		ps		1.2B	17
		ps			*98.4*
	Vane Shear @ 44.5' c=2265 psf	ps			
−45.0		ps		0.6B	21
	Vane Shear @ 46.5' c=2490 psf	ps			*95.5*
		ps			
		ps		0.6B	20
		ps			
	Vane Shear @ 49.5' c=1959 psf	ps			
−50.0		ps		0.5P	24

N–Standard Penetration Test (ASTM D–1586)
R–Recovery in inches
ps–Pushed Spoon

Type Failure
B–Bulge Failure S–Shear Failure
E–Estimated Value P–Penetrometer

Qu–Unconfined Compressive Strength (tsf)
W–Water Content, percent dry weight
NP–Non–Plastic

Unit wt. (pcf) noted in italics above w%

STRUCTURE FOUNDATION
BORING LOG

O'BRIEN & ASSOCIATES, INC.
CONSULTING ENGINEERS
1235 E. DAVIS ST./ARLINGTON HTS., IL 60005
(847)398-1441 * FAX(847) 398-2376

Project Wacker Drive Reconstruction — OBA JOB NO. 99342
City Chicago — Structure No. — Rig CME-55
County Cook — Location — Bored By RH
State Illinois — Date November 19 to 29, 1999 — Checked By DOB

BORING NO. TB-1

Station XX
Offset XX

Chicago River Elevation -1.5 CCD
Groundwater Elevation –
Groundwater Elevation –

	Blow Counts	R (in)	Qu (tsf)	W (%)
Vane Shear @ 51.5' c=1000 psf	ps		*101.7*	
	ps			
	ps		–	20
Vane Shear @ 53.5' c=3715 psf	ps			
	ps			
SILTY CLAY–trace sand and gravel–gray stiff to very stiff (CL) –55.0	ps		2.0P	15
Vane Shear @ 56.5' c=2531 psf	ps		*100.1*	
	ps			
	ps		–	19
Vane Shear @ 59.0' c=2939 psf	ps			
	ps			
–60.0	ps		2.0P	20
	6		*102.3*	
	8			
–65.0	12		2.1B	23
–66.5				
	13			
SILTY CLAY–trace sand and gravel–gray–hard (CL)	45			
–70.0	42		4.5+P	12
Boulder noted from 70' to 71'				
	21			
	36			
–75.0	43		4.5+P	12
SILTY CLAY–trace sand & gravel–gray–hard (CL/ML)				
–71.0				
CLAYEY SILT–trace to some sand & gravel–gray–very dense (ML)				
–80.0				NP 13
–81.5				
SANDY SILT–trace sand and gravel–gray–very dense (ML)				
–85.0				NP 18
–84.0				
Fine to Coarse SAND–gray–very dense (SC)				
–90.0				NP 18
				NP 14
–95.0				NP 23
				NP 18
–96.5				
SILT–gray–very dense (ML)				
–100.0				NP 19

Blow Counts	R (in)	Qu (tsf)	W (%)
50/4"			
50/1"			
	No	Recovery	
50/5"			
36			
50/5"			NP 17
25			
31			
44			
28			
40			
32			
29			
50/5"			
31			
50/4"			
29			
38			
33			

N–Standard Penetration Test (ASTM D–1586)
R–Recovery in inches
ps–Pushed Spoon

Type Failure
B–Bulge Failure S–Shear Failure
E–Estimated Value P–Penetrometer

Qu–Unconfined Compressive Strength (tsf)
W–Water Content, percent dry weight
NP–Non–Plastic

Unit wt. (pcf) noted in italics above w%

STRUCTURE FOUNDATION
BORING LOG

O'BRIEN & ASSOCIATES, INC.
CONSULTING ENGINEERS
1235 E. DAVIS ST./ARLINGTON HTS., IL 60005
(847)398-1441 * FAX(847) 398-2376

Project Wacker Drive Reconstruction — OBA JOB NO. 99342
City Chicago — Structure No. XX — Rig CME-55
County Cook — Location XX — Bored By RH
State Illinois — Date November 19 to 29, 1999 — Checked By DOB

BORING NO. TB-1

Station XX
Offset XX

Chicago River Elevation -1.5 CCD
Groundwater Elevation –
Groundwater Elevation –

Elevation	Description	Blow Counts	R (in)	Qu (tsf)	W (%)
	SILT–gray–very dense (ML)				
-99.0					
		23			
	Fine SAND–gray–very dense (SP)	40			
		40		NP	23
-101.5					
		25			
	SILT–trace sand–gray–very	49			
-105.0	dense (ML)	26		NP	18
-104.0					
		50/1"			
			No	Recovery	
	SILT & FRACTURED ROCK–				
	gray–very dense				
		50/5"			
-110.0				NP	–
-109.0					
	Rotary Drilling–Bedrock				
-111.0					
	SILURIAN SYSTEM, NIAGARAN SERIES, RACINE FOEMATION DOLOMITE				
-115.0	RUN 1 (–113.0' to –123.0'): Gravel seam from –113.0' to –113.5'. Light gray to gray, porous with some 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 horizontal fracture from –116.21' to –117.0'; horizontal fracture at –117.875' and –118.0'; vertical fracture from –118.0' to –119.0'; horizontal fractures at –121.1', –121.54' and –121.92'			ROCK CORE	
-120.0	RECOVERY = 94.7% RQD = 76.4%				
-121.0					
	END OF BORING @ –123.0'				
	Hollow Stem Auger to –63.5'				
	Rotary Drilling Methods to Completion				
-125.0	CME Automatic Hammer				

Elevation	Blow Counts	R (in)	Qu (tsf)	W (%)
-120.0				
-135.0				
-140.0				
-145.0				
-150.0				

N–Standard Penetration Test (ASTM D–1586)
R–Recovery in inches
ps–Pushed Spoon

Type Failure
B–Bulge Failure S–Shear Failure
E–Estimated Value P–Penetrometer

Qu–Unconfined Compressive Strength (tsf)
W–Water Content, percent dry weight
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Project Wacker Drive Reconstruction — OBA JOB NO. 99342
City Chicago — Structure No. — Rig CME-55
County Cook — Location — Bored By RH
State Illinois — Date Nov. 30 to Dec. 14, 1999 — Checked By DOB

BORING NO. TB-2

Station XX
Offset XX

Ground Surface Elevation +2.0 CCD

Elevation	Description	Blow Counts	R (in)	Qu (tsf)	W (%)
	Barge				
−1.5	▽				
	WATER−Chicago River				
−5.0					
−10.0					
−15.0					
−15.0		ps			
	CLAYEY SAND to SANDY CLAY−trace shells−very loose (MUCK)	ps	No	Recovery	
		ps			
−20.0		ps		−	92
		ps			
		ps		−	26
		ps			
−25.0		ps		−	34

Chicago River Elevation −1.5 CCD ▽
Groundwater Elevation − ▼
Groundwater Elevation − ▼

Elevation	Description	Blow Counts	R (in)	Qu (tsf)	W (%)
	CLAYEY SAND to SANDY CLAY−trace shells−very loose (MUCK)	ps			
		ps			
		ps	No	Recovery	
−26.5					
		ps			*94.8*
	SILTY CLAY−trace sand and gravel−gray−medium (CL) wet	ps			
−30.0		ps		0.3B	23
	Vane Shear @ 31.5' c=990 psf	ps			*96.3*
		ps			
		ps		0.2B	23
	Vane Shear @ 34.0' c=954 psf	ps			*98.8*
		ps			
−35.0		ps		0.2B	23
		ps			
		ps			
		ps		0.75P	25
−36.0					
		ps			
	Vane Shear @ 39.5' c=1469 psf	ps			
−40.0		ps		1.25P	22
	SILTY CLAY−trace sand and gravel−gray−stiff (CL) wet	ps			
		ps			
		ps		0.75P	18
		ps			
	Vane Shear @ 44.0' c=1306 psf	ps			
−45.0		ps		0.5P	23
		ps			
	Vane Shear @ 46.5' c=1867 psf	ps			
		ps		0.75P	22
		ps			
	Vane Shear @ 49.5' c=1918 psf	ps			
−50.0		ps		1.0P	24

N−Standard Penetration Test (ASTM D−1586)
R−Recovery in inches
ps−Pushed Spoon

Type Failure
B−Bulge Failure S−Shear Failure
E−Estimated Value P−Penetrometer

Qu−Unconfined Compressive Strength (tsf)
W−Water Content, percent dry weight
NP−Non−Plastic

Unit wt. (pcf) noted in italics above w%

STRUCTURE FOUNDATION
BORING LOG

O'BRIEN & ASSOCIATES, INC.
CONSULTING ENGINEERS
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Project Wacker Drive Reconstruction — OBA JOB NO. 99342
City Chicago — Structure No. — Rig CME-55
County Cook — Location — Bored By RH
State Illinois — Date Nov. 30 to Dec. 14, 1999 — Checked By DOB

BORING NO. TB-2

Station XX
Offset XX

Chicago River Elevation -1.5 CCD
Groundwater Elevation –
Groundwater Elevation –

Elevation	Description	Blow Counts	R (in)	Qu (tsf)	W (%)
	Vane Shear @ 51.0' c=1469 psf	ps			
	SILTY CLAY–trace sand and gravel–gray–stiff (CL)	ps ps ps		0.75P	21
	Vane Shear @ 54.5' c=1123 psf	ps			
-55.0		ps		0.5P	19
-66.5		5		*107.8*	
-60.0		10 12		1.4B	19
		4			
-65.0		5 7		1.25P	26
-66.5		9			
-70.0	SILTY CLAY–trace to some sand and gravel–gray–hard (CL)	12 13		4.5+P	12
		17			
-73.0		30 47		4.5+P	13
	CLAYEY SILT to SILT–trace to some gravel–gray–very dense (ML)	50/4"			
-80.0				–	13
		50/1"			
			No	Recovery	
-81.5		48			
-85.0	SILT to SANDY SILT–gray–very dense (ML)	52/3"		NP	18
		54			
		66/2"		NP	19
		45			
-90.0		55/4"		NP	21
		25			
		79		NP	17
		50/5"			
-95.0				NP	20
		50/1"			
			No	Recovery	
		25			
-100.0		53 24/3"		NP	18

N–Standard Penetration Test (ASTM D–1586)
R–Recovery in inches
ps–Pushed Spoon

Type Failure
B–Bulge Failure S–Shear Failure
E–Estimated Value P–Penetrometer

Qu–Unconfined Compressive Strength (tsf)
W–Water Content, percent dry weight
NP–Non–Plastic

Unit wt. (pcf) noted in italics above w%

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Sh 3 of 3

Project Wacker Drive Reconstruction — OBA JOB NO. 99342
City Chicago — Structure No. — Rig CME-55
County Cook — Location — Bored By RH
State Illinois — Date Nov. 30 to Dec. 14, 1999 — Checked By DOB

BORING NO. TB-2

Station XX
Offset XX

Chicago River Elevation -1.5 CCD
Groundwater Elevation –
Groundwater Elevation –

Elevation	Blow Counts	R (in)	Qu (tsf)	W (%)
SANDY SILT to SILTY SAND–gray–very dense (ML)	23 55 22	/4"	NP	23
	25 35 40	No	Recovery	
	30 70	/3"	NP	16
-107.0	50	/1"		
Fractured Rock *-108.0*				
-110.0				
Rotary Drilling–Bedrock				
-111.0				
END OF BORING @ -113.0'				
Hollow Stem Augers to -63.5'				
Rotary Drilling methods to Completion				
CME Automatic Hammer				
-115.0				
-120.0				
-125.0				

Elevation	Blow Counts	R (in)	Qu (tsf)	W (%)
-120.0				
-135.0				
-140.0				
-145.0				
-150.0				

N–Standard Penetration Test (ASTM D–1586)
R–Recovery in inches
ps–Pushed Spoon

Type Failure
B–Bulge Failure S–Shear Failure
E–Estimated Value P–Penetrometer

Qu–Unconfined Compressive Strength (tsf)
W–Water Content, percent dry weight
NP–Non–Plastic

Unit wt. (pcf) noted in italics above w%

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Project Wacker Drive Reconstruction — OBA JOB NO. 99342
City Chicago — Structure No. — Rig CME-55
County Cook — Location — Bored By RH
State Illinois — Date December 9 to 12, 1999 — Checked By DOB

BORING NO. TB-3

Station XX
Offset XX

Ground Surface Elevation +2.0 CCD

Chicago River Elevation −1.5 CCD
Groundwater Elevation −
Groundwater Elevation −

Elev.	Description	Blow Counts	R (in)	Qu (tsf)	W (%)
	Barge				
	▽ −1.5				
	WATER−Chicago River				
−5.0					
−10.0					
−15.0					
−19.0					
	SANDY SILTY CLAY−trace shell−black−very soft (MUCK) wet	ps			
		ps			
		ps	No	Recovery	
		ps			
−25.0		ps		−	139
	SANDY SILTY CLAY−trace shell−black−very soft (MUCK) wet	ps			
		ps			
		ps		−	128
−26.5					
	SILTY CLAY−trace sand and gravel−gray−medium (CL) wet	ps			
−30.0		ps		−	25
	Vane Shear @ 31.5' c=837 psf	ps			
		ps		<0.25P	28
		ps			
−35.0	Vane Shear @ 34.5' c=934 psf	ps		0.5P	25
		ps		*95.9*	
	Vane Shear @ 37.5' c=944 psf	ps		0.6B	24
−36.5					
	SILTY CLAY−trace sand and gravel−gray−medium to stiff (CL)	ps		*112.5*	
−40.0	Vane Shear @ 39.5' c=969 psf	ps		0.8B	17
		ps		*102.0*	
		ps		1.0B	22
	Vane Shear @ 44.0' c=949 psf	ps		*110.4*	
−45.0		ps		0.9B	19
−45.0					
	SILTY CLAY−trace sand and gravel−gray−stiff to very stiff (CL)	ps		*110.0*	
−50.0		ps		1.3B	22

N−Standard Penetration Test (ASTM D−1586)
R−Recovery in inches
ps−Pushed Spoon

Type Failure
B−Bulge Failure S−Shear Failure
E−Estimated Value P−Penetrometer

Qu−Unconfined Compressive Strength (tsf)
W−Water Content, percent dry weight
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Project Wacker Drive Reconstruction — OBA JOB NO. 99342
City Chicago — Structure No. — Rig CME-55
County Cook — Location — Bored By RH
State Illinois — Date December 9 to 12, 1999 — Checked By DOB

BORING NO. TB-3

Station XX
Offset XX

Chicago River Elevation -1.5 CCD
Groundwater Elevation –
Groundwater Elevation –

Elevation	Description	Blow Counts	R (in)	Qu (tsf)	W (%)
		6		*110.3*	
		6 7		1.2B	18
-55.0	SILTY CLAY–trace sand and gravel–gray–stiff to very stiff (CL)				
		4		*109.4*	
		7 10		2.0B	18
-60.0					
-61.5		11			
	Well Graded SAND and GRAVEL–trace clay–dark gray–medium (GW/GC)	12 16		NP	10
-65.0					
-66.5		16		*124.1*	
	SILTY CLAY–trace sand and gravel–gray–hard (CL)	19 22		5.9B	12
-70.0					
		21		*127.5*	
		27 50/4"		10.5S @14%	12
-73.0 -75.0					

Elevation	Description	Blow Counts	R (in)	Qu (tsf)	W (%)
		50/3"			
	CLAYEY SAND and GRAVEL–some cobbles–very dense (GW/GC) Possible Boulder @ 78.5'			NP	11
		50/1"			
-80.0			No	Recovery	
-79.0		50/5"			
	SILT CLAY to CLAYEY SILT–some gravel and fractured rock–very dense (CL/ML)			4.5+P	8
		43			
-85.0		50/4"		–	9
		50/5"			
				NP	9
-86.5		50/5"			
-90.0	Well–Graded SAND and GRAVEL–trace clay–gray–very dense (GW/GC)			NP	9
-89.0		34			
	SILT–trace sand–gray–very dense (ML)	50/5"		NP	20
		43			
-95.0		50/5"		NP	19
		31			
		50/5"		NP	19
		37			
-98.0 -100.0		50/5"		NP	18

N–Standard Penetration Test (ASTM D–1586)
R–Recovery in inches
ps–Pushed Spoon

Type Failure
B–Bulge Failure S–Shear Failure
E–Estimated Value P–Penetrometer

Qu–Unconfined Compressive Strength (tsf)
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Project Wacker Drive Reconstruction — OBA JOB NO. 99342
City Chicago — Structure No. — Rig CME-55
County Cook — Location — Bored By RH
State Illinois — Date December 9 to 12, 1999 — Checked By DOB

BORING NO. TB-3

Station XX
Offset XX

Chicago River Elevation -1.5 CCD
Groundwater Elevation –
Groundwater Elevation –

Elevation	Description	Blow Counts	R (in)	Qu (tsf)	W (%)
	SANDY SILT to SILTY SAND–very dense–gray (SM/ML)	50/5"			
				NP	17
		50/1"			
-105.0				NP	14
-104.0		50/0"			
	Fractured Rock				
-106.0					
	Rotary Drilling–Bedrock				
-108.0 -110.0					
	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%	ROCK CORE			
-115.0					
-118.0 -120.0					
	END OF BORING @ -120.0' Hollow Stem Auger to -63.5' Rotary Drilling Methods to Completion CME Automatic Hammer				
-125.0					

Elevation	Blow Counts	R (in)	Qu (tsf)	W (%)
-120.0				
-135.0				
-140.0				
-145.0				
-150.0				

N–Standard Penetration Test (ASTM D–1586)
R–Recovery in inches

Type Failure
B–Bulge Failure S–Shear Failure
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Qu–Unconfined Compressive Strength (tsf)
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Project Wacker Drive Reconstruction — OBA JOB NO. 99342
City Chicago — Structure No. — Rig CME-55
County Cook — Location — Bored By RH
State Illinois — Date December 6 to 7, 1999 — Checked By DOB

BORING NO. TB-4

Station XX
Offset XX

Ground Surface Elevation +2.0 CCD

Chicago River Elevation −1.5 CCD
Groundwater Elevation −
Groundwater Elevation −

Elev.	Description	Blow Counts	R (in)	Qu (tsf)	W (%)
	Barge				
−1.5	▽				
	WATER−Chicago River				
−5.0					
−10.0					
−18.0					
−20.0					
	CLAYEY SAND−trace shells−very loose (MUCK) wet				
		ps			
−25.0		ps		−	61
		ps			
		ps			
−26.5					
	SILTY CLAY−trace sand and gravel−gray−medium (CL) wet				
−30.0					
	Vane Shear @ 32.0' c=786 psf				
	Vane Shear @ 33.5' c=995 psf				
−34.0					
	Vane Shear @ 37.0' c=1949 psf				
	SILTY CLAY−trace sand and gravel−gray−stiff to very stiff (CL)				
−40.0					
	Vane Shear @ 44.5' c=1653 psf				
−45.0					
	Vane Shear @ 47.0' c=1867 psf				
	Vane Shear @ 50.0' c=2408 psf				
−50.0					

Elev.	Blow Counts	R (in)	Qu (tsf)	W (%)
	ps			
	ps			
	ps	No	Recovery	
	ps			*94.5*
	ps			
−30.0	ps		0.6B	24
	ps			*94.5*
	ps			
	ps		0.6B	24
	ps			*93.9*
	ps			
−35.0	ps		0.8B	24
	ps			*96.8*
	ps			
	ps		0.9B	21
	ps			*112.4*
	ps			
−40.0	ps		1.2B	17
	ps			*106.3*
	ps			
	ps		1.1B	17
	ps			*99.8*
	ps			
−45.0	ps		1.2B	22
	ps			*103.5*
	ps			
	ps		1.7B	22
	ps			
	ps			
−50.0	ps		1.0P	21

N−Standard Penetration Test (ASTM D−1586)
R−Recovery in inches
ps−Pushed Spoon

Type Failure
B−Bulge Failure S−Shear Failure
E−Estimated Value P−Penetrometer

Qu−Unconfined Compressive Strength (tsf)
W−Water Content, percent dry weight
NP−Non−Plastic

Unit wt. (pcf) noted in italics above w%

STRUCTURE FOUNDATION
BORING LOG

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Project Wacker Drive Reconstruction — OBA JOB NO. 99342
City Chicago — Structure No. — Rig CME-55
County Cook — Location — Bored By RH
State Illinois — Date December 6 to 7, 1999 — Checked By DOB

BORING NO. TB-4

Station XX
Offset XX

Chicago River Elevation -1.5 CCD
Groundwater Elevation –
Groundwater Elevation –

Elevation	Blow Counts	R (in)	Qu (tsf)	W (%)
	ps			*98.1*
	ps ps		0.8B	21
	ps			*104.4*
SILTY CLAY–trace sand and gravel–gray–stiff to very stiff (CL)	ps ps		1.5B	20
–55.0				
	ps			*100.5*
	ps ps		1.4B	21
	ps			*96.3*
	ps ps		2.9B	20
–60.0				
	8			*94.3*
	12 15		1.8B	22
–65.0				
	14			
	20 22		–	12
–66.5				
CLAYEY SILT–trace sand and gravel–gray–dense (ML)				
–70.0				
	29			*118.8*
	50/4"		4.8S	12
SILTY CLAY to CLAYEY SILT–trace sand and gravel–gray–hard (CL/ML)				
–73.0 –75.0				

Elevation	Blow Counts	R (in)	Qu (tsf)	W (%)
	50/1"			
		No	Recovery	
	50/4"			
SILTY SAND and GRAVEL–trace clay–gray–very dense (GM)			NP	9
–80.0				
Possible Boulder or Cobble @ 76.0' and 86.5'	50/4"			
			NP	9
	50/4"			
–85.0			NP	11
	50/1"			
		No	Recovery	
–86.5				
	33			
SILT–trace sand–gray–very dense (ML)	50/5"			
–90.0			NP	17
	46			
	50/4"			
			NP	20
	50/6"			
			NP	22
–95.0				
–94.0				
	38			*102.9*
CLAYEY SILT–trace sand–gray–very dense (ML)	48 44		4.2S	18
	27			*107.2*
	33 40		4.5S	20
–100.0				

N–Standard Penetration Test (ASTM D–1586)
R–Recovery in inches
ps–Pushed Spoon

Type Failure
B–Bulge Failure S–Shear Failure
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Qu–Unconfined Compressive Strength (tsf)
W–Water Content, percent dry weight
NP–Non–Plastic

Unit wt. (pcf) noted in italics above w%

STRUCTURE FOUNDATION
BORING LOG

O'BRIEN & ASSOCIATES, INC.
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Project Wacker Drive Reconstruction — OBA JOB NO. 99312
City Chicago — Structure No. — Rig CME-55
County Cook — Location — Bored By RH
State Illinois — Date December 6 to 7, 1999 — Checked By DOB

BORING NO. TB-4

Station XX
Offset XX

Chicago River Elevation -1.5 CCD
Groundwater Elevation –
Groundwater Elevation –

Elevation	Blow Counts	R (in)	Qu (tsf)	W (%)
	50/1"			
		No Recovery		
	24			
	39			
-105.0 SILT-trace sand-gray-very dense (ML)	37		NP	22
Possible Fractured Rock, Boulder or Cobbles @ -101.0' and -106.0'	50/1"			
		No Recovery		
	36			
	50			
-110.0			NP	16
-109.0				
Fractured Rock-Driller's Note	50/1"			
-110.0				
Solid Rock-Driller's Note				
-112.0				
END OF BORING @ -112.0' -115.0				
Hollow Stem Augers to -68.5'				
Rotary Drilling Methods to Completion				
CME Automatic Hammer				
-120.0				
-125.0				

Elevation	Blow Counts	R (in)	Qu (tsf)	W (%)
-120.0				
-135.0				
-140.0				
-145.0				
-150.0				

N-Standard Penetration Test (ASTM D-1586)
R-Recovery in inches
ps-Pushed Spoon

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

Qu-Unconfined Compressive Strength (tsf)
W-Water Content, percent dry weight
NP-Non-Plastic

Unit wt. (pcf) noted in italics above w%

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STRUCTURE FOUNDATION BORING LOG

Project Wacker Drive Reconstruction — OBA JOB NO. 99342
City Chicago — Structure No. — Rig CME-55
County Cook — Location — Bored By RH
State Illinois — Date January 25 to January 31, 2000 — Checked By DOB

BORING NO. TB-5

Station XX
Offset XX

Surface Water Elev. N/A
Groundwater Elevation
Groundwater Elevation After Hours

Elevation	Description	Blow Counts	R (in)	Qu (tsf)	W (%)
+4.75 CCD	Ground Surface Elevation				
	9" ASPHALT, 6" CONCRETE				
+3.5					
	SAND-trace to some gravel (Fill)			NP	7
+1.25					
	SILTY CLAY with BRICK (Fill)	3			
		2 3		NP	24
-0.25 -5.0					
	SILTY CLAY-trace sand & gravel-mottled brown & gray-medium stiff to very stiff (CL)	2			13.8
		3 4		2.2B	27
		2			17.0
		2 3		0.9B	23
-10.0					
-6.25		2			21.8
	SILTY CLAY-trace sand & gravel-gray-soft to medium stiff (CL)	2 2		0.6B	23
		1			06.5
		2 1		0.6B	19
-15.0					
		1			00.1
		2 2		0.6B	21
		1			97.4
		2 1		0.7B	23
-20.0					
		1			08.6
		1 2		0.4B	21
-25.0					

Elevation	Description	Blow Counts	R (in)	Qu (tsf)	W (%)
	SILTY CLAY-trace sand & gravel-gray-soft to medium stiff (CL)				
		2			02.4
		2 4		0.75B	23
-30.0					
		1			04.7
		3 4		0.5B	23
-35.0					
		3			02.8
		4 6		0.4B	24
-40.0					
		3			03.2
		4 6		0.6B	24
-45.0					
		3			06.6
		4 6		1.1B	22
-50.0					

N-Standard Penetration Test (ASTM D-1586)
R-Recovery in inches

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

Qu-Unconfined Compressive Strength (tsf)
W-Water Content, percent dry weight
NP-Non-Plastic

Unit wt. (pcf) noted in italics above w%

O'BRIEN & ASSOCIATES, INC.
CONSULTING ENGINEERS
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(847)398-1441 * FAX(847) 398-2376

STRUCTURE FOUNDATION BORING LOG

Project Wacker Drive Reconstruction — OBA JOB NO. 99342
City Chicago — Structure No. — Rig CME-55
County Cook — Location — Bored By RH
State Illinois — Date January 25 to January 31, 2000 — Checked By DOB

BORING NO. TB-5

Station XX
Offset XX

Surface Water Elev. N/A
Groundwater Elevation
Groundwater Elevation After Hours

Elevation	Blow Counts	R (in)	Qu (tsf)	W (%)	Description
					SILTY CLAY–trace sand & gravel–gray–soft to medium stiff (CL)
	2			*97.7*	
	3 4		0.8B	25	
–55.0					
–52.25					
					SILTY CLAY–trace sand & gravel–gray–very stiff (CL)
	6			*104.1*	
	6 8		2.1B	23	
–60.0					
–62.75					
	6			*96.0*	
	8 11		2.4B	24	
–65.0					
–64.75					
	6	Pressure Meter Test			CLAYEY SILT–trace sand & gravel–gray–medium dense (ML)
	6 7		NP	24	
–70.0					
	14			*125.3*	
	22 34		5.8B	12	SILTY CLAY to CLAYEY SILT–trace to some sand & gravel–gray–hard (CL/ML)
	17	Pressure Meter Test			
	38 45 4"		4.5+P	12	
–75.0					

Elevation	Blow Counts	R (in)	Qu (tsf)	W (%)	Description
	34			*128.2*	
	50/5"		11.9S @8.4%	11	SILTY CLAY to CLAYEY SILT–trace to some sand & gravel–gray–hard (CL/ML)
	33			*121.9*	
	50 2"	Pressure Meter Test	7.0B	12	
–80.0					
	50/4"				
			NR		
–77.75					
	50				
		Pressure Meter Test	NP	14	SILT–trace fine sand–gray–very dense (ML)
–85.0					
	50/5"				
			NP	17	
–83.75					
	50				
			NP	19	Fine SAND–trace silt–gray–very dense (SP/SM)
–90.0					
–86.25					
	50/5"				
			NP	21	SILT–trace fine sand–gray–very dense (ML)
–88.75					
	50/5"				
			NP	18	Fine SANDY SILT to SILTY Fine SAND–gray–very dense (SM/ML)
–95.0					
–91.25					
	34				
	46 20/3"		NP	24	SILT–trace fine sand–gray–very dense (ML)
	37				
	50/5"				
–100.0			NP	20	

N–Standard Penetration Test (ASTM D–1586)
R–Recovery in inches

Type Failure: B–Bulge Failure, S–Shear Failure, E–Estimated Value, P–Penetrometer

Qu–Unconfined Compressive Strength (tsf)
W–Water Content, percent dry weight
NP–Non–Plastic

Unit wt. (pcf) noted in italics above w%

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STRUCTURE FOUNDATION BORING LOG

Project Wacker Drive Reconstruction — OBA JOB NO. 99342
City Chicago — Structure No. — Rig CME-55
County Cook — Location — Bored By RH
State Illinois — Date January 25 to January 31, 2000 — Checked By DOB

BORING NO. TB-5

Station XX
Offset XX

Surface Water Elev. N/A
Groundwater Elevation
Groundwater Elevation
After Hours

	Blow Counts	R (in)	Qu (tsf)	W (%)
SILT-trace fine sand-gray-very dense (ML)				
-96.25	45			
Fine SANDY SILT to SILTY Fine SAND-gray-very dense (SM/ML)	50/5"		NP	17
-98.75	35			
SILT-trace fine sand-gray-very dense (ML)	49			
-105.0	50/4"		NP	23
	50/1"			
			NR	
-103.75	28			
CLAYEY SILT to SILTY CLAY-some sand gravel & fractured stone-gray-very dense (CL/GC)	50/1"			
-110.0			2.0P	14
	50/1"			
			NR	
-109.25	50/2"			
BEDROCK Rotary Drilling				
-115.0			NP	16
SILURIAN SYSTEM, NIAGARAN SERIES, RACINE FORMATION DOLOMITE				
RUN 1 (-116.0' to -121.0') Light gray mottled gray with horizontal bedding, Moderately porous with few small vugs, fossiliferous, stylolitic. Horizontal fractures at -117.08', -117.95' and -118.0'. Vertical fracture with intersecting horizontal fracture from -118.0' to -118.68'. Horizontal fractures at -119.40', -119.68' & -120.37'. RECOVERY=96.0% RQD=75.2%	ROCK CORE			
-120.0				
-116.25				
END OF BORING @ -121.0' Rotary Drilling Methods CME Automatic Hammer				
-125.0				

	Blow Counts	R (in)	Qu (tsf)	W (%)
-130.0				
-135.0				
-140.0				
-145.0				
-150.0				

N-Standard Penetration Test (ASTM D-1586)
R-Recovery in inches

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

Qu-Unconfined Compressive Strength (tsf)
W-Water Content, percent dry weight
NP-Non-Plastic

Unit wt. (pcf) noted in italics above w%

STRUCTURE FOUNDATION
BORING LOG

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Project Wacker Drive Reconstruction — OBA JOB NO. 99342
City Chicago — Structure No. — Rig CME-55
County Cook — Location — Bored By RH
State Illinois — Date December 29, 1999 — Checked By DOB

BORING NO. TB-6

Station XX
Offset XX

Surface Water Elev. N/A
Groundwater Elevation XX
Groundwater Elevation XX
After Hours

Elevation	Description	Blow Counts	R (in)	Qu (tsf)	W (%)
+8.2 CCD	Ground Surface Elevation				
+7.4	5" ASPHALT, 7" CONCRETE				
	Fine SAND–trace gravel & clay–brown & gray			NP	15
+4.7		2			93.1
	SILTY CLAY–trace sand & gravel–brown mottled gray–very stiff (CL)	3 7		3.0B	24
−5.0		2			97.3
		5 8		3.3B	23
		3			100.2
		4 5		2.5B	22
−10.0					
−2.8		2			93.8
	SILTY CLAY–trace sand & gravel–gray–soft to medium stiff (CL)	2 4		0.8B	21
		1			98.1
		1 2		0.8B	22
−15.0					
		1			95.8
		1 2		0.5B	22
		1			100.5
		2 2		0.4B	22
−20.0					
		1			99.2
		2 2		0.7B	23
−25.0					
	SILTY CLAY–trace sand & gravel–gray–soft to medium stiff (CL)	3			
		4 2		NR	
−30.0					
		1			101.8
		3 3		0.7B	24
		2			100.2
		3 4		0.3B	25
−35.0					
		1			98.6
		2 2		0.3B	24
−40.0					
−35.3		3			113.5
	SILTY CLAY–trace sand & gravel–gray–stiff (CL)	6 8		1.1B	17
−45.0					
		4			106.3
		5 8		1.5B	22
−50.0					

N–Standard Penetration Test (ASTM D–1586)
R–Recovery in inches

Type Failure
B–Bulge Failure S–Shear Failure
E–Estimated Value P–Penetrometer

Qu–Unconfined Compressive Strength (tsf)
W–Water Content, percent dry weight
NP–Non–Plastic

Unit wt. (pcf) noted in italics above w%

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Project Wacker Drive Reconstruction — OBA JOB NO. 99342
City Chicago — Structure No. — Rig CME-55
County Cook — Location — Bored By RH
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BORING NO. TB-6

Station XX
Offset XX

Surface Water Elev. N/A
Groundwater Elevation XX
Groundwater Elevation XX
After Hours

Elev.	Blow Counts	R (in)	Qu (tsf)	W (%)	Description
					SILTY CLAY–trace sand & gravel–gray–stiff (CL)
	4		112.2		
	7				
−55.0	9		1.5B	18	
	6				
	8				
−60.0	12		1.0P	22	
−55.3	9		114.4		
	11				CLAYEY SILT to SILTY CLAY–trace sand & gravel–gray–medium dense (ML/CL)
−65.0	15		2.3B	16	
−57.8	9				CLAYEY SILT–trace sand & gravel–gray–medium dense (ML)
	11				
	18		NP	22	
−60.3	10		119.6		
	13				SILTY CLAY–trace to some sand & gravel–gray–very stiff to hard (CL)
−70.0	17		3.6B	13	
	16	Pressure Meter Test			
	25				
	33		4.5+P	10	
	21		118.3		
	34				
−75.0	43		4.0S @13%	13	

Elev.	Blow Counts	R (in)	Qu (tsf)	W (%)	Description
	23	Pressure Meter Test	122.9		SILTY CLAY–trace to some sand & gravel–gray–very stiff to hard (CL)
	50/3"		8.3S @11%	12	
−70.3	50/3"				
−80.0			4.25P	11	CLAYEY SILT to SILTY CLAY–trace to some sand & gravel–gray–very dense (ML/CL)
−72.8	50/5"	Pressure Meter Test			
			NP	9.2	CLAYEY SILT–trace to some sand, gravel & fractured stone–gray–very dense (ML)
	50/6"				
−85.0			NP	9	
	50/3"	Pressure Meter Test			
			NP	11	
	50/0"				
−90.0			NR		Drillers Note: No recovery from −88.5' to −90.0', & −91.0' to −92.5'. Possible boulder or heavy cobbles.
	50/0"				
			NR		
−85.3	50/5"				
−95.0			NP	19	SILT–trace fine sand–gray–very dense (ML)
	44				
	50/4"		NP	19	
	40				
−100.0	50/5"		NP	19	

N–Standard Penetration Test (ASTM D-1586)
R–Recovery in inches

Type Failure
B–Bulge Failure S–Shear Failure
E–Estimated Value P–Penetrometer

Qu–Unconfined Compressive Strength (tsf)
W–Water Content, percent dry weight
NP–Non-Plastic

Unit wt. (pcf) noted in italics above w%

STRUCTURE FOUNDATION
BORING LOG

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Project Wacker Drive Reconstruction — OBA JOB NO. 99342
City Chicago — Structure No. — Rig CME-55
County Cook — Location — Bored By RH
State Illinois — Date December 29, 1999 — Checked By DOB

BORING NO. TB-6

Station XX
Offset XX

Surface Water Elev. N/A
Groundwater Elevation XX
Groundwater Elevation XX
After Hours

Elevation	Description	Blow Counts	R (in)	Qu (tsf)	W (%)
	SILT-trace fine sand-gray-very dense (ML)	50/5"			
				NP	17
		38			
		59			
-105.0		50/5"		NP	17
		50/1"			
	Drillers Note: No recovery from -106.0' to -107.5', & -111.0' to -112.5'. Possible boulder or heavy cobbles.			NR	
		38			
-110.0		50/6"		NP	17
		50/1"			
				NR	
-104.8					
	Apparent Bedrock Rotary Drilling				
-106.8 -115.0				-	
	END OF BORING @ -115.0' Rotary Drilling Methods CME Automatic Hammer				
-120.0					
-125.0					

Elevation	Blow Counts	R (in)	Qu (tsf)	W (%)
-130.0				
-135.0				
-140.0				
-145.0				
-150.0				

N-Standard Penetration Test (ASTM D-1586)
R-Recovery in inches

Type Failure
B-Bulge Failure
E-Estimated Value

Qu-Unconfined Compressive Strength (tsf)
W-Water Content, percent dry weight
NP-Non-Plastic

Unit wt. (pcf) noted in italics above w%

STRUCTURE FOUNDATION
BORING LOG

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Project Wacker Drive Reconstruction — OBA JOB NO. 99342
City Chicago — Structure No. XX — Rig CME-55
County Cook — Location XX — Bored By RH
State Illinois — Date February 5 to February 10, 2000 — Checked By DOB

BORING NO. TB-7

Station XX
Offset XX

Surface Water Elev. N/A
Groundwater Elevation XX
Groundwater Elevation XX After Hours

Ground Surface Elevation +19.75 CCD	Blow Counts	R (in)	Qu (tsf)	W (%)
30" CONCRETE (Upper Wacker Drive)				
+17.25				
Void				
-5.0				
-10.0				
-15.0				
+4.25				
5" ASPHALT, 7" CONCRETE (Lower Wacker Drive) +3.25	2			
SAND & GRAVEL-trace asphalt (Fill) +2.25	4 6		NP	5
SILTY SAND & GRAVEL w/ CRUSHED STONE (Fill)	20			
-20.0	13 10		NP	8
	1			
	1 1		NR	
-3.75				
SILTY CLAY-trace sand & gravel-gray-medium stiff (CL)	2			
-25.0	2 6		0.75P	26
SILTY CLAY-trace sand & gravel-gray-medium stiff (CL)	1			
	2 2		0.5P	24
-8.75				
	2			*117.7*
SILTY CLAY to CLAYEY SILT-trace to some sand, gravel & shells-dark brown-stiff to very stiff (CL/ML)	3			
-30.0	3		2.1B	15
-13.75				
	1			
SILTY CLAY-trace sand & gravel-gray-very soft to soft (CL)	2			
-35.0	2		.025P	23
	1			
	2 2		0.5P	24
	1			
	1			
-40.0	2		0.25P	24
	2			
	2			
-45.0	3		0.25P	26
	1			
	3			
-50.0	2		0.25P	25

N-Standard Penetration Test (ASTM D-1586)
R-Recovery in inches

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

Qu-Unconfined Compressive Strength (tsf)
W-Water Content, percent dry weight
NP-Non-Plastic

Unit wt. (pcf) noted in italics above w%

STRUCTURE FOUNDATION
BORING LOG

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Project Wacker Drive Reconstruction — OBA JOB NO. 99342
City Chicago — Structure No. XX — Rig CME-55
County Cook — Location XX — Bored By XX
State Illinois — Date February 5 to February 10, 2000 — Checked By DOB

BORING NO. TB-7

Station XX
Offset XX

Surface Water Elev. N/A
Groundwater Elevation XX
Groundwater Elevation XX After Hours

Elev.	Blow Counts	R (in)	Qu (tsf)	W (%)	Description
					SILTY CLAY–trace sand & gravel–gray–very soft to soft (CL)
	3			*112.8*	
	5				
−55.0	7		0.9B	17	
					SILTY CLAY–trace sand & gravel–gray–medium stiff to stiff (CL)
	3			*100.7*	
	5				
−60.0	6		1.2B	23	
	4			*107.2*	
	8				
−65.0	7		1.4B	22	
	4			*105.0*	
	4				
−70.0	6		0.6B	22	
	7			*115.5*	
	9				
−75.0	13		1.1B	15	
−33.75					
−55.0					
−60.0					
−65.0					
−70.0					
−75.0					

Elev.	Blow Counts	R (in)	Qu (tsf)	W (%)	Description
					SILTY CLAY–trace sand & gravel–gray–medium stiff to stiff (CL)
	5			*101.2*	
	6				
−80.0	7		1.3B	26	
	9			*125.8*	
	14		1.75S		SILTY CLAY to CLAYEY SILT–trace to some sand & gravel–gray–stiff (CL/ML)
−85.0	17		@14.1%	11	
	18				
	21				SILTY CLAY–trace to some sand & gravel–gray–hard (CL)
−90.0	29		4.5+P	12	
	50/4"				CLAYEY SILT–some sand & gravel–gray–very dense (ML)
−95.0			NP	14	
	50/1"				
			NR		
	50/5"				SILTY CLAY–trace to some sand & gravel w/ silt streaks–gray–hard (CL)
−100.0			4.5+P	9	
−63.75					
−68.75					
−72.25					
−78.75					

N–Standard Penetration Test (ASTM D–1586)
R–Recovery in inches

Type Failure
B–Bulge Failure S–Shear Failure
E–Estimated Value P–Penetrometer

Qu–Unconfined Compressive Strength (tsf)
W–Water Content, percent dry weight
NP–Non–Plastic

Unit wt. (pcf) noted in italics above w%

STRUCTURE FOUNDATION
BORING LOG

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Project Wacker Drive Reconstruction — OBA JOB NO. 99312
City Chicago — Structure No. XX — Rig CME-55
County Cook — Location XX — Bored By RH
State Illinois — Date February 5 to February 10, 2000 — Checked By DOB

BORING NO. TB-7

Station XX
Offset XX

Surface Water Elev. N/A
Groundwater Elevation XX
Groundwater Elevation XX
After Hours

Elevation	Blow Counts	R (in)	Qu (tsf)	W (%)	Description
					SILTY CLAY-trace to some sand & gravel w/silt streaks-gray-hard (CL)
-81.25					
	50/6"				
			NP	20	SILT-trace fine sand-gray-very dense (ML)
-105.0	50/6"		NP	20	
	50/1"		NR		
	37				
-110.0	40 23/4"		NP	19	
	46				
	50/5"		NP	20	
	29				
-115.0	50/6"		NP	22	
	50/1"				
			NR		
	28				
-120.0	27 45		NP	22	
-101.25					
	50/2"				
			NP	21	SANDY SILT-trace to some gravel & fractured rock-gray-very dense (ML/SM)
	32				
-125.0	50/5"		NP	19	

Elevation	Blow Counts	R (in)	Qu (tsf)	W (%)	Description
	50/1"				SANDY SILT-trace to some gravel & fractured rock-gray-very dense (ML/SM)
-107.25			NR		BEDROCK Rotary Drilling
-108.25					SILURIAN SYSTEM, NIAGARAN SERIES, RACINE FORMATION DOLOMITE Run 1 (-128.0' to -137.0') Light gray to gray with horizontal bedding, porous & vuggy, fossiliferous & stylolitic, weathered. Highly fractured to -128.45. Vertical fracture with intersecting horizontal fractures from -128.92 to -129.28 & from -129.51 to -130.70. Horizontal fractures at -131.0' and -131.55'. Horizontal fracture with thin clay parting at -132.17. Vertical fracture from -132.4' to -132.85'. Horizontal fractures at -132.85', -133.68', -134.01', -134.35' and -134.62'. Highly fractured from -134.95' to -135.20.
-130.0					ROCK CORE
-135.0					
-117.25					RECOVERY=80.0% RQD=31.1%
					END OF BORING @ -137.0' Rotary Drilling Methods CME Automatic Hammer
-140.0					
-145.0					
-150.0					

N-Standard Penetration Test (ASTM D-1586)
R-Recovery in inches

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

Qu-Unconfined Compressive Strength (tsf)
W-Water Content, percent dry weight
NP-Non-Plastic

Unit wt. (pcf) noted in italics above w%

STRUCTURE FOUNDATION
BORING LOG

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Project Wacker Drive Reconstruction — OBA JOB NO. 99342
City Chicago — Structure No. XX — Rig CME-55
County Cook — Location XX — Bored By RH
State Illinois — Date January 25 to January 31, 2000 — Checked By DOB

BORING NO. TB-12

Station XX
Offset XX

Surface Water Elev. N/A
Groundwater Elevation XX
Groundwater Elevation XX
After Hours

Ground Surface Elevation +20.0 CCD

Elevation	Description	Blow Counts	R (in)	Qu (tsf)	W (%)
	31.0" CONCRETE				
+17.4					
	VOID				
-5.0					
-10.0					
-15.0					
+2.9					
	3.75" ASPHALT, 8.0" CONCRETE				
+2.0		1			96.1
	SILTY CLAY-trace sand & gravel-brown & gray-stiff to very stiff (CL)	3 5		2.8S @11.3%	23
-20.0		2			97.9
		3 4		1.7B	25
		3			100.6
-25.0		3 5		1.75B	23
	SILTY CLAY-trace sand & gravel-brown & gray-stiff (CL)	1			98.3
		2 3		1.25B	24
-8.5					
		1			103.5
	SILTY CLAY-trace sand & gravel-gray-soft to medium stiff (CL)	2 4		0.75B	22
-30.0					
		2			
-35.0		1 2			21
		2			107.0
		2 1		0.6B	21
		2			
-40.0		2 4			23
		1			105.0
-45.0		2 3		0.75B	23
		3			106.4
-50.0		3 5		0.7B	24

N-Standard Penetration Test (ASTM D-1586)
R-Recovery in inches

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

Qu-Unconfined Compressive Strength (tsf)
W-Water Content, percent dry weight
NP-Non-Plastic

Unit wt. (pcf) noted in italics above w%

STRUCTURE FOUNDATION
BORING LOG

O'BRIEN & ASSOCIATES, INC.
CONSULTING ENGINEERS
1235 E. DAVIS ST./ARLINGTON HTS., IL 60005
(847)398-1441 * FAX(847) 398-2376

Project Wacker Drive Reconstruction — OBA JOB NO. 99342
City Chicago — Structure No. XX — Rig CME-55
County Cook — Location XX — Bored By XX
State Illinois — Date January 25 to January 31, 2000 — Checked By DOB

BORING NO. TB-12

Station XX
Offset XX

Surface Water Elev. N/A
Groundwater Elevation XX
Groundwater Elevation XX
After Hours

Elev.	Description	Blow Counts	R (in)	Qu (tsf)	W (%)
	SILTY CLAY–trace sand & gravel–gray–soft to medium stiff (CL)				
–33.5		3		12	21.5
–55.0	SILTY CLAY–trace sand & gravel–gray–medium stiff to very stiff (CL)	3 6		1.25B	16
		2		11	15.1
–60.0		5 8		1.5B	19
		2		11	10.5
–65.0		4 8		1.6B	21
		2		10	2.2
–70.0		3 6		0.8B	23
		3		11	1.6
–75.0		4 9		2.1B	20
–80.0	SILTY CLAY–trace sand & gravel–gray–medium stiff to very stiff (CL)	3 6 7		1.7B	25
–63.5		4			
–85.0	SILT–trace fine sand–gray–medium dense (ML)	6 6		NP	27
–68.5		13			98.8
–90.0	CLAYEY SILT–trace fine sand & gravel–gray–dense (CL/ML)	18 26		1.5B	23
–73.5		33			
–95.0	SILTY CLAY–some sand & gravel–gray–hard (CL)	48 19	/2"	4.5+P	15
		50	/2"		
				–	9
–78.5		30			11 1.5
–100.0	CLAYEY SILT–trace fine sand–gray–very dense (CL/ML)	50	/5"	3.2S@ 9.9%	18

N–Standard Penetration Test (ASTM D–1586)
R–Recovery in inches

Type Failure
B–Bulge Failure S–Shear Failure
E–Estimated Value P–Penetrometer

Qu–Unconfined Compressive Strength (tsf)
W–Water Content, percent dry weight
NP–Non–Plastic

Unit wt. (pcf) noted in italics above w%

STRUCTURE FOUNDATION
BORING LOG

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Project Wacker Drive Reconstruction — OBA JOB NO. 99312
City Chicago — Structure No. XX — Rig CME-55
County Cook — Location XX — Bored By RH
State Illinois — Date January 25 to January 31, 2000 — Checked By DOB

BORING NO. TB-12

Station XX
Offset XX

Surface Water Elev. N/A
Groundwater Elevation XX
Groundwater Elevation XX
After Hours

Elevation	Blow Counts	R (in)	Qu (tsf)	W (%)	Description
					CLAYEY SILT-trace fine sand-gray-very dense (CL/ML)
	50/1"				
				NR	
-83.5					
	34				
	41				
-105.0	25/2"		NP	17	SILT-trace fine sand-gray-very dense (ML)
	22				
	50/5"		NP	16	
	34				
-110.0	50/5"		NP	20	
	41				
	50/5"		NP	20	
	30				
-115.0	50/5"		NP	19	
	33				
	46				
	21/2"		NP	21	
	50/1"				
-120.0				NR	
	32				
	45				
	23/2"		NP	22	
	27				
	36				
-125.0	37/5"		NP	20	

Elevation	Blow Counts	R (in)	Qu (tsf)	W (%)	Description
	43				SILT-trace fine sand-gray-very dense (ML)
	50/3"		NP	20	
-108.5					
	50/1"				
-130.0				NR	COBBLES & BOULDERS
					Drillers Note: 100.0% Water Loss
-111.0					
					Rotary Drilling-Fractured Rock
-112.5					
					Rotary Drilling-Apparent Bedrock
					SILURIAN SYSTEM, NIAGARAN SERIES, RACINE FORMATION DOLOMITE
					Run 1 (-133.0' to -143.0')
-135.0					Light gray mottled gray with horizontal bedding. Porous with some vugs. Pyrite replacement in some vugs & fractures. Fossiliferous. Transverse fracture at -133.5'. Horizontal fractures at -134.25', -135.1', -135.2', -135.8', -136.2' & -136.6'. Vertical fracture with intersecting horizontal fractures from -136.9' to -138.2'. Horizontal fracture at -138.9'. Weathered horizontal fracture with thin clay parting at -139.75'.
-140.0					Horizontal fractures at -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'
					RECOVERY = 100.0%
					RQD = 70.4%
					Run 2 (-143.0' to -153.0')
-145.0					Light gray with horizontal bedding. Porous with some vugs. Pyrite replacement in some vugs. Fossiliferous & stylolitic. Vertical fracture with intersecting horizontal fracture from -143.0' to -148.8'. Horizontal fracture at -144.1'. Vertical fracture with intersecting horizontal fractures from -144.5' to -145.0'. Horizontal fractures at -146.1', -146.2', -147.5' & -148.0'. Vertical fracture with intersecting horizontal fractures from -148.6' to -149.1'.
-150.0					continued on following page

N-Standard Penetration Test (ASTM D-1586)
R-Recovery in inches

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

Qu-Unconfined Compressive Strength (tsf)
W-Water Content, percent dry weight
NP-Non-Plastic

Unit wt. (pcf) noted in italics above w%

STRUCTURE FOUNDATION
BORING LOG

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Project Wacker Drive Reconstruction — OBA JOB NO. 99312
City Chicago — Structure No. XX — Rig CME-55
County Cook — Location XX — Bored By RH
State Illinois — Date January 25 to January 31, 2000 — Checked By DOB

BORING NO. TB-12

Station XX
Offset XX

Surface Water Elev. N/A
Groundwater Elevation XX
Groundwater Elevation XX
After Hours

Blow Counts	R (in)	Qu (tsf)	W (%)

Horizontal fractures at −149.3', −150.1' & −150.6'. Vertical fracture from −151.3' to −151.75'. Horizontal fractures at −151.9' & −152.3'.
RECOVERY = 100.0%
RQD = 71.25%

−133.0

End Of Boring @ −153.0'
Rotary Drilling Methods
CME Automatic Hammer
135' of Casing Used

−105.0
−110.0
−115.0
−120.0
−125.0
−130.0
−135.0
−140.0
−145.0
−150.0

N−Standard Penetration Test (ASTM D−1586)
R−Recovery in inches

Type Failure
B−Bulge Failure S−Shear Failure
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Qu−Unconfined Compressive Strength (tsf)
W−Water Content, percent dry weight
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Unit wt. (pcf) noted in italics above w%

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STRUCTURE FOUNDATION BORING LOG

Project Wacker Drive Reconstruction — OBA JOB NO. 99279
City Chicago — Structure No. — Rig CME-55
County Cook — Location — Bored By RH
State Illinois — Date Oct 26 to 28, 1999 — Checked By DOB

BORING NO. ETB-1

Station XX
Offset XX

Chicago River Elevation −1.5 CCD
Groundwater Elevation –
Groundwater Elevation –

Boring Surface Elevation +2.0 CCD

Elevation	Description	Blow Counts	R (in)	Qu (tsf)	W (%)
	Barge				
−1.5	▽				
	WATER–Chicago River				
−5.0					
−10.0					
−11.5					
	SANDY SILT to SILTY SAND (MUCK)–trace to some shells–black to dark gray very loose (ML/SM) wet Petroleum Odor	ps			
		ps			
−15.0		ps		NP	56
		ps			
		ps			
		ps		NP	36
−16.5					
	Organic SILTY CLAY (MUCK)–some sand–black to dark gray–very soft (OL)	ps			
		ps			
−20.0		ps		<.25E	52
		1			
		2	No	Recovery	
		1			
−21.5					
	SILTY CLAY–trace sand, brick and rubber–dark gray to gray–very soft (CL/OL)	6			
−23.0		7			
−25.0		9		<.25E	25
	SILTY CLAY–trace sand and gravel–gray–soft to medium (CL) wet	1			100.0
		2			
		4		0.6B	23
	Vane Shear @ 29.0' c=532 psf	ps			
		ps			
−30.0		ps		<.25E	27
	Vane Shear @ 31.5' c=522 psf	ps			
		ps			
		ps		0.5P	24
	Vane Shear @ 34.0' c=602 psf	ps			94.0
		ps			
−35.0		ps		0.4B	24
	Vane Shear @ 36.0' c=556 psf	ps			99.0
		ps			
		ps		0.9B	22
−36.5					
	Vane Shear @ 39.0' c=1429 psf	ps			110.9
		ps			
−40.0		ps		1.0B	15
	Vane Shear @ 40.0' c=1184 psf	ps			
		ps			
	SILTY CLAY–trace sand and gravel–gray–stiff (CL)	ps			
		4			97.1
		6			
−45.0		8		1.7B	22
		ps			
		ps			
		ps			
		4			100.6
		6			
−50.0		7		1.6B	21

N–Standard Penetration Test (ASTM D–1586)
R–Recovery in inches
PS–Pushed Spoon

Type Failure
B–Bulge Failure
E–Estimated Value
S–Shear Failure
P–Penetrometer

Qu–Unconfined Compressive Strength (tsf)
W–Water Content, percent dry weight
NP–Non–Plastic

Unit wt. (pcf) noted in italics above w%

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STRUCTURE FOUNDATION BORING LOG

Project Wacker Drive Reconstruction
City Chicago
County Cook
State Illinois
Structure No.
Location
Date Oct. 26 to 28, 1999
OBA JOB NO. 99279
Rig CME-55
Bored By RH
Checked By DOB

BORING NO. ETB-1

Station XX
Offset XX

Chicago River Elevation -1.5 CCD
Groundwater Elevation –
Groundwater Elevation –

		Blow Counts	R (in)	Qu (tsf)	W (%)
SILTY CLAY–trace sand and gravel–gray–stiff to very stiff (CL)		5		*106.4*	
		7 11		1.4B	16
	-55.0				
		6		*106.1*	
		12 15		3.6B	19
	-60.0				
		3		*112.8*	
	-63.0	6 9		2.3B	15
	-65.0				
SILTY CLAY–trace to some sand and gravel–gray–very stiff (CL/ML)		6		*116.0*	
		9 12		3.0S	12
	-70.0				
	-69.0				
SAND LAYER–Driller's Observation					
	-71.5				
SILTY CLAY–trace sand and gravel–gray–hard (CL)		14		*115.8*	
		16 25		8.7B	12
	-75.0				

		Blow Counts	R (in)	Qu (tsf)	W (%)
SILTY CLAY–trace sand and gravel–gray–hard (CL)					
	-75.0				
SANDY SILT–trace to some clay–gray–very dense (ML)		58			
		50/4"			
	-80.0			NP	12
	-79.0				
		50/5"			
SILTY TO CLAYEY SAND and GRAVEL–gray–very dense (GM-GC)				NP	12
		50/2"			
	-85.0			NP	8
		50/4"			
				NP	11
with Fractured Stone @ 88.5'		50/3"			
	-88.0				
	-90.0			NP	8
END OF BORING at -90.0' Hollow Stem Augers CME Automatic Hammer					
	-95.0				
	-100.0				

N–Standard Penetration Test (ASTM D–1586)
R–Recovery in inches
PS–Pushed Spoon

Type Failure
B–Bulge Failure S–Shear Failure
E–Estimated Value P–Penetrometer

Qu–Unconfined Compressive Strength (tsf)
W–Water Content, percent dry weight
NP–Non–Plastic

Unit wt. (pcf) noted in italics above w%

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STRUCTURE FOUNDATION BORING LOG

Project Wacker Drive Reconstruction — OBA JOB NO. 99279
City Chicago — Structure No. — Rig CME-55
County Cook — Location — Bored By RH
State Illinois — Date Oct 28 to 30, 1999 — Checked By DOB

BORING NO. ETB-2

Station XX
Offset XX

Boring Surface Elevation +2.0 CCD

Chicago River Elevation -1.5 CCD
Groundwater Elevation –
Groundwater Elevation –

Elev.	Description	Blow Counts	R (in)	Qu (tsf)	W (%)
	Barge				
-1.5	▽ WATER–Chicago River				
-5.0					
-10.0					
-15.0					
-19.0					
	Organic SILTY CLAY to CLAYEY SILT (MUCK)–trace shells, some sand–black–very soft (OL) wet Petroleum Odor	ps			
		ps	No	Recovery	
		ps			
-25.0		ps		<.25E	104
	SANDY SILT–trace to some organics, trace clay–black to dark gray–very loose (OL) wet Petroleum Odor	ps			
		ps			
		ps		NP	51
	Vane Shear @ 28.0' c=5 psf				
		ps			
-30.0		ps			
		ps		NP	39
	Vane Shear @ 30.5' c=66 psf				
		ps			
		ps			
		ps		NP	56
-31.5					
		ps			
	SILTY CLAY–trace sand and gravel–gray–medium (CL) Wet	ps			
-35.0		ps		0.5P	25
		ps			*99.7*
	Vane Shear @ 36.5' c=740 psf	ps			
		ps		0.9B	23
-36.5					
		ps			*102.5*
	Vane Shear @ 39.0' c=1857 psf	ps			
-40.0		ps		1.0B	19
		ps			*106.3*
	Vane Shear @ 41.5' c=1082 psf	ps			
		ps		1.4B	18
	SILTY CLAY–trace sand and gravel–gray–stiff to very stiff (CL)				
		ps			*98.5*
	Vane Shear @ 44.5' c=2082 psf	ps			
-45.0		ps		0.9B	20
		ps			*96.1*
	Vane Shear @ 46.5' c=1776 psf	ps			
		ps		0.6B	22
		ps			*96.7*
	Vane Shear @ 49.5' c=1490 psf	ps			
-50.0		ps		1.2B	22

N–Standard Penetration Test (ASTM D-1586) R–Recovery in inches PS–Pushed Spoon
Type Failure B–Bulge Failure S–Shear Failure E–Estimated Value P–Penetrometer
Qu–Unconfined Compressive Strength (tsf) W–Water Content, percent dry weight NP–Non–Plastic
Unit wt. (pcf) noted in italics above w%

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STRUCTURE FOUNDATION BORING LOG

Project Wacker Drive Reconstruction
City Chicago
County Cook
State Illinois
Structure No.
Location
Date Oct. 28 to 30, 1999
OBA JOB NO. 99279
Rig CME-55
Bored By RH
Checked By DOB

BORING NO. ETB-2

Station XX
Offset XX

Chicago River Elevation -1.5 CCD
Groundwater Elevation –
Groundwater Elevation –

Elev.	Blow Counts	R (in)	Qu (tsf)	W (%)	Description
	ps			*94.7*	
	ps				
	ps		0.7B	24	
	6			*102.1*	SILTY CLAY–trace sand and gravel–gray–medium to very stiff (CL) wet
	7				
-55.0	6		0.6B	19	
-56.5					
	2			*108.9*	
	5				SILTY CLAY–trace sand and gravel–gray–stiff to very stiff (CL)
-60.0	3		2.0B	16	
	7			*95.2*	
	15				
-65.0	14		1.6B	24	
-66.5					
	12			*113.6*	
	16				SILTY CLAY–trace to some sand and gravel–gray–very stiff to hard (CL/ML)
-70.0	23		3.5S	11	
	14			*111.0*	
	21				
-75.0	34		5.8B	12	
	15			*113.2*	SILTY CLAY–trace to some sand and gravel–gray–very stiff to hard (CL/ML)
	18				
	25		8.8B	13	
	14			*105.5*	
	20				
-80.0	34		3.3B	18	
	14			*115.4*	
	23				
	37		9.6S	15	
-81.5					
	24				SANDY SILT–gray–very dense (ML)
	26				
-85.0			NP	19	
-84.0					
	53/7"				Fine SILTY SAND–trace gravel–gray–very dense (SP)
			NP	17	
	54/6"				
-88.0					
-90.0			NP	19	
-95.0					END OF BORING at -90.0' Hollow Stem Augers CME Automatic Hammer
-100.0					

N–Standard Penetration Test (ASTM D–1586)
R–Recovery in inches
PS–Pushed Spoon

Type Failure
B–Bulge Failure S–Shear Failure
E–Estimated Value P–Penetrometer

Qu–Unconfined Compressive Strength (tsf)
W–Water Content, percent dry weight
NP–Non–Plastic

Unit wt. (pcf) noted in italics above w%

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STRUCTURE FOUNDATION BORING LOG

Project Wacker Drive Reconstruction — OBA JOB NO. 99279
City Chicago — Structure No. — Rig CME-55
County Cook — Location — Bored By RH
State Illinois — Date Nov. 1 to 2, 1999 — Checked By DOB

BORING NO. ETB-3

Station XX
Offset XX

Boring Surface Elevation +2.0 CCD

Chicago River Elevation −1.5 CCD
Groundwater Elevation −
Groundwater Elevation −

Elevation	Description	Blow Counts	R (in)	Qu (tsf)	W (%)
	Barge				
−1.5	▽ WATER−Chicago River				
−5.0					
−10.0					
−15.0					
−16.0					
	Organic SILTY CLAY to CLAYEY SILT (MUCK)−trace to some shells−very soft (OL) wet Petroleum Odor	ps			
−20.0		ps		<.25E	89
		ps			
		ps		<.25E	104
		ps			
−25.0		ps		<.25E	74
	See Previous Column				
−24.0		ps			
	WOOD	ps			
		ps		NP	109
−26.5					
		3			97.8
	SILTY CLAY−trace sand and gravel−gray−soft to medium (CL) wet	4			
−30.0		3		0.3B	25
	Vane Shear @ 31.5' c=454 psf	ps			91.8
		ps			
		ps		0.3B	24
		ps			
	Vane Shear @ 34.5' c=765 psf	ps			
−35.0		ps		<.25P	26
	Vane Shear @ 36.55' c=776 psf	ps			93.3
		ps			
		ps		0.3B	23
		ps			99.3
	Vane Shear @ 39.5' c=704 psf	ps			
−40.0		ps		0.9B	21
−39.0					
	Vane Shear @ 41.5' c=1408 psf	ps			112.6
		ps			
		ps		0.4B	19
	Vane Shear @ 43.6' c=1796 psf	ps			112.7
	SILTY CLAY−trace sand and gravel−gray−stiff to very stiff (CL) wet	ps			
−45.0		ps		0.9B	16
		ps			100.2
	Vane Shear @ 46.8' c=2531 psf	ps			
		ps		0.4B	19
		ps			102.0
	Vane Shear @ 50.0' c=1857 psf	ps			
−50.0		ps		0.9B	20

N−Standard Penetration Test (ASTM D−1586)
R−Recovery in inches
PS−Pushed Spoon

Type Failure
B−Bulge Failure
E−Estimated Value
S−Shear Failure
P−Penetrometer

Qu−Unconfined Compressive Strength (tsf)
W−Water Content, percent dry weight
NP−Non−Plastic

Unit wt. (pcf) noted in italics above w%

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STRUCTURE FOUNDATION
BORING LOG

Project Wacker Drive Reconstruction — OBA JOB NO. 99279
City Chicago — Structure No. — Rig CME-55
County Cook — Location — Bored By RH
State Illinois — Date Nov. 1 to 2, 1999 — Checked By DOB

BORING NO. ETB-3

Station XX
Offset XX

Chicago River Elevation -1.5 CCD
Groundwater Elevation –
Groundwater Elevation –

Elev.	Description	Blow Counts	R (in)	Qu (tsf)	W (%)
	Vane Shear @ 51.5' c=2470 psf	ps			*96.8*
		ps			
	SILTY CLAY–trace sand and gravel–gray–stiff to very stiff (CL)	ps		0.5B	22
		ps			*110.5*
		ps			
-55.0	Vane Shear @ 55.0' c=3408 psf	ps		0.6B	16
		4			*108.7*
		6			
-60.0		4		2.0B	16
		5			*102.7*
		8			
-65.0		11		1.7B	19
-66.5					
	CLAYEY SILT–trace sand–gray–medium (ML)	3			*89.5*
		6			
-70.0		7		0.9B	25
-71.5					
	SILTY CLAY–trace to some sand and gravel–gray–very stiff to hard (CL)	11			*116.1*
		18			
-75.0		23		3.9B	13
	SILTY CLAY–trace to some sand and gravel–gray–very stiff to hard (CL)				
		24			*114.9*
		26			
-80.0		–		7.2B	13
-79.0					
		16			*102.1*
	CLAYEY SILT to SILTY CLAY–trace sand and gravel–gray–dense (ML/CL)	23			
		27		2.0S	23
-81.5					
		25			
	SILT–trace sand–gray–dense to very dense (ML)	15			
-85.0		18		4.5+P	18
		50/6"			
				NP	22
-86.5					
		50/9"			*107.6*
	CLAYEY SILT–trace sand and gravel–gray–very dense (ML)				
-90.0				303S	18
-89.0					
		50/7"			
	SILT–trace sand and gravel–very dense (ML)				
				NP	21
		50/8"			
-95.0				NP	23
		50/7"			
				NP	20
-96.5					
	SILTY SAND–gray–very dense (ML)	50/6"			
-100.0				NP	14

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PS–Pushed Spoon

Type Failure
B–Bulge Failure
E–Estimated Value
S–Shear Failure
P–Penetrometer

Qu–Unconfined Compressive Strength (tsf)
W–Water Content, percent dry weight
NP–Non-Plastic

Unit wt. (pcf) noted in italics above w%

O'BRIEN & ASSOCIATES, INC.
CONSULTING ENGINEERS
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(847)398-1441 * FAX(847) 398-2376

STRUCTURE FOUNDATION BORING LOG

Project Wacker Drive Reconstruction
City Chicago
County Cook
State Illinois
Structure No.
Location
Date Nov. 1 to 2, 1999
OBA JOB NO. 99279
Rig CME-55
Bored By RH
Checked By DOB

BORING NO. ETB-3

Station XX
Offset XX

Chicago River Elevation -1.5 CCD
Groundwater Elevation -
Groundwater Elevation -

Blow Counts	R (in)	Qu (tsf)	W (%)

BEDROCK-ROTARY DRILLING

-101.0

SILURIAN SEYSTEM, NIAGRAN SERIES, RACINE FORMATION, DOLOMITE

-105.0

RUN 1: (-103.0' to -113.0'): Light gray, weathered, porous, occasionally stylolitic, trace pyrite with vugs- Weathered horizontal fractures throughout with occasional tight horizontal and vertical fractures; some tight clay partings and chert inclusions noted.

RECOVERY = 100%
RQD = 75%

ROCK CORE

-110.0

-111.0

END OF BORING at -113.0'
Rotary Drilling
CME Automatic Hammer

-115.0

-120.0

-125.0

-120.0

-135.0

-140.0

-145.0

-150.0

N-Standard Penetration Test (ASTM D-1586)
R-Recovery in inches
PS-Pushed Spoon

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

Qu-Unconfined Compressive Strength (tsf)
W-Water Content, percent dry weight
NP-Non-Plastic

Unit wt. (pcf) noted in italics above w%

O'BRIEN & ASSOCIATES, INC.
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STRUCTURE FOUNDATION BORING LOG

Project Wacker Drive Reconstruction — OBA JOB NO. 99279
City Chicago — Structure No. — Rig CME-55
County Cook — Location — Bored By RH
State Illinois — Date November 9 to 11, 1999 — Checked By DOB

BORING NO. ETB-4

Station XX
Offset XX

Boring Surface Elevation +2.0 CCD

Chicago River Elevation −1.5 CCD
Groundwater Elevation −
Groundwater Elevation −

Elev.	Description	Blow Counts	R (in)	Qu (tsf)	W (%)
	Barge				
−1.5	▽				
	Water−Chicago River				
−5.0					
−10.0					
−15.0					
−16.5					
	Organic CLAYEY SILTY SAND (MUCK)−dark gray to black−very soft (OL) wet Strong Petroleum Odor	ps			
−20.0		ps	No	Recovery	
		ps			
		ps		−	74
		ps			
−25.0		ps		−	70
	Cont. From Previous Page				
−24.5		ps			
		ps		0.5P	23
	Vane Shear @ 29.5' c=413 psf	ps			92.4
	SILTY CLAY−trace sand and gravel−gray−medium (CL) wet	ps		0.3B	23
−30.0		ps			93.1
	Vane Shear @ 31.5' c=709 psf	ps		0.4B	23
		ps			
	Vane Shear @ 34.5' c=740 psf	ps		0.5P	23
−35.0		ps			95.5
	Vane Shear @ 36.5' c=745 psf	ps		0.3B	25
−36.5		ps			96.0
	Vane Shear @ 39.5' c=1755 psf	ps		0.5B	22
−40.0		ps			
	Vane Shear @ 41.5' c=1786 psf	ps		0.75P	19
	SILTY CLAY−trace sand and gravel−gray−stiff to very stiff (CL)	ps			98.0
	Vane Shear @ 45.0' c=1755 psf	ps		0.8B	20
−45.0		ps			97.1
	Vane Shear @ 46.5' c=2286 psf	ps		0.7B	19
		ps			X
	Vane Shear @ 49.5' c=2919 psf	ps		2.0B	20
−50.0		ps			

N−Standard Penetration Test (ASTM D−1586)
R−Recovery in inches
Type Failure: B−Bulge Failure, E−Estimated Value, S−Shear Failure, P−Penetrometer
Qu−Unconfined Compressive Strength (tsf)
W−Water Content, percent dry weight
NP−Non−Plastic
Unit wt. (pcf) noted in italics above w%

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STRUCTURE FOUNDATION BORING LOG

Project Wacker Drive Reconstruction — OBA JOB NO. 99279
City Chicago — Structure No. — Rig CME-55
County Cook — Location — Bored By RH
State Illinois — Date November 9 to 11, 1999 — Checked By DOB

BORING NO. ETB-4

Station XX
Offset XX

Chicago River Elevation -1.5 CCD
Groundwater Elevation –
Groundwater Elevation –

Elevation	Blow Counts	R (in)	Qu (tsf)	W (%)	Description
					Vane Shear @ 52.5' c=2510 psf
			1.0P	24	
				110.6	
					Vane Shear @ 54.5' c=3633 psf
-55.0			1.5P	16	
					SILTY CLAY–trace and gravel–gray–very stiff (CL)
	5			*110.2*	
	9				
-60.0	12		2.5B	16	
	8			*112.9*	
	11				
-65.0	14		3.0B	17	
	8			*124.6*	
	14				
-70.0	13		2.6B	13	
-71.5					
	15				CLAYEY SILT to SILT–trace to some sand and gravel–gray–dense (ML)
	20				
-75.0	25		–	12	
					CLAYEY SILT to SILT–trace to some sand and gravel–gray–dense to very dense (ML)
	19				
	31				
-80.0	29		–	16	
	30				
	50/5"		–	9	
-81.5					
	21				SILTY CLAY–some sand and gravel–gray–hard (CL/ML)
	50				
-85.0			4.5+P	10	
-84.0					
	23				SILT with Sand Seam @ 97.0'–gray–very dense (ML)
	37				
			NP	20	
	20				
	50/3"				
-90.0			NP	23	
	25				
	50				
			NP	20	
-91.5					
	50/2"				
					FRACTURED STONE and SILTY CLAY–gray–very dense
-95.0			–	8	
	50/1"				
			NR	–	
-96.5					
	50/1"				SILTY CLAY–some sand and gravel–gray–hard (CL/ML)
-100.0			4.5+P	10	

N–Standard Penetration Test (ASTM D–1586)
R–Recovery in inches

Type Failure
B–Bulge Failure
E–Estimated Value
S–Shear Failure
P–Penetrometer

Qu–Unconfined Compressive Strength (tsf)
W–Water Content, percent dry weight
NP–Non–Plastic

Unit wt. (pcf) noted in italics above w%

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STRUCTURE FOUNDATION BORING LOG

Project Wacker Drive Reconstruction — OBA JOB NO. 99279
City Chicago — Structure No. — Rig CME-55
County Cook — Location — Bored By RH
State Illinois — Date November 9 to 11, 1999 — Checked By DOB

BORING NO. ETB-4

Station XX
Offset XX

Chicago River Elevation -1.5 CCD
Groundwater Elevation –
Groundwater Elevation –

Elevation	Description	Blow Counts	R (in)	Qu (tsf)	W (%)
	SILT–trace sand–gray–very dense	35			
		15/1"		NP	16
		50/5"			
–103.0				NP	15
–105.0					
	ROTARY DRILLING–BEDROCK				
–105.0					
	SILURIAN SYSTEM, NIAGRAN SERIES, RACINE FORMATION DOLOMITE				
–110.0					
	RUN 1 (–107.0' to –118.0'): Light gray, weathered, porous, occasionally 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 tight clay partings; 0.25" clay parting at –117.1';	ROCK CORE			
–115.0	RECOVERY = 102.4% RQD = 38%				
–116.0					
	END OF BORING @ 118.0' Rotary Drilling CME Automatic Hammer				
–120.0					
–125.0					

Elevation	Blow Counts	R (in)	Qu (tsf)	W (%)
–120.0				
–135.0				
–140.0				
–145.0				
–150.0				

N–Standard Penetration Test (ASTM D–1586)
R–Recovery in inches

Type Failure
B–Bulge Failure S–Shear Failure
E–Estimated Value P–Penetrometer

Qu–Unconfined Compressive Strength (tsf)
W–Water Content, percent dry weight
NP–Non–Plastic

Unit wt. (pcf) noted in italics above w%

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STRUCTURE FOUNDATION BORING LOG

Project Wacker Drive Reconstruction — OBA JOB NO. 99279
City Chicago — Structure No. — Rig CME-55
County Cook — Location — Bored By RH
State Illinois — Date Oct. 18 to 21, 1999 — Checked By DOB

BORING NO. ETB-5

Station XX
Offset XX

Surface Water Elevation N/A
Groundwater Elevation –
Groundwater Elevation –
After Hours

Ground Surface Elevation +22.7 CCD	Blow Counts	R (in)	Qu (tsf)	W (%)
19.25" CONCRETE– Upper Wacker Drive Deck *+21.1*				
Air Space				
–5.0				
–10.0				
–15.0				
+7.2				
15.0" CONCRETE–Lower Wacker Drive Pavement *+5.7*				
	3			
Fine SAND–brown–very loose (SP) FILL *+4.2*	2 1		NP	4
	1			
SILTY CLAY–trace sand, gravel, & brick–brown & gray–medium (CL) APPARENT FILL, Wet	2 1		0.75P	27
–20.0 *+2.2*				
	1			*97.0*
SILTY CLAY–trace sand & gravel–brown & gray–stiff (CL) Wet	2 3		1.2B	28
–0.8				
SILTY CLAY–trace sand & gravel–gray–very soft to medium (CL) Wet	1			*92.9*
–25.0	1 2		0.4B	27

	Blow Counts	R (in)	Qu (tsf)	W (%)
	1			
	0 1	No	Recovery	
	1			
SILTY CLAY–trace sand & gravel–gray–very soft to soft (CL) Wet –30.0	0 2		0.25P	26
	1			
	0 0		0.5P	24
	0			
–35.0	1 1		<.25P	30
–13.3				
	1			
Sand Seam Noted	3 3		0.75P	18
SILTY CLAY–trace sand & gravel–gray–very soft to medium (CL) Wet	1			
–40.0	2 2		0.5P	20
	2			*103.7*
–45.0	2 3		0.9B	22
	1			
–50.0	2 3		0.25P	25

N–Standard Penetration Test (ASTM D–1586)
R–Recovery in inches

Type Failure
B–Bulge Failure S–Shear Failure
E–Estimated Value P–Penetrometer

Qu–Unconfined Compressive Strength (tsf)
W–Water Content, percent dry weight
NP–Non–Plastic

Unit wt. (pcf) noted in italics above w%

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STRUCTURE FOUNDATION
METRIC BORING LOG

Project Wacker Drive Reconstruction — OBA JOB NO. 99279
City Chicago — Structure No. — Rig CME-55
County Cook — Location — Bored By RH
State Illinois — Date Oct. 18 to 21, 1999 — Checked By DOB

BORING NO. ETB-5

Station XX
Offset XX

Surface Water Elev. N/A
Groundwater Elevation –
Groundwater Elevation –
After Hours

Elevation	Blow Counts	R (in)	Qu (tsf)	W (%)
SILTY CLAY–trace sand & gravel–gray–very soft to medium (CL) Wet				
	2			*101.5*
	3			
–55.0	3		<0.25P	32
–34.3				
SILTY CLAY–trace sand & gravel–gray–stiff to hard (CL)				
	3		*110.0*	
	6			
–60.0	7		1.6B	17
	4		*114.3*	
	7			
–65.0	10		2.1B	16
	4		*101.3*	
	6			
–70.0	8		1.4B	23
	4		*114.4*	
	6			
–75.0	7		1.5B	15
	10			*101.5*
	28			
–80.0	31		2.9B	19
	7			*101.3*
	10			
	12		2.6B	23
–85.0				
	5			*101.3*
	9			
	12		2.9B	24
–90.0				
	11			*112.8*
	12			
	16		4.5B	16
–71.8				
–95.0				
SILTY CLAY to CLAYEY SILT–trace sand & gravel–gray–hard (CL/ML)	35			
	50/5"		4.5+P	14
–75.8				
	36			
SILT–gray–very dense (ML)	50/4"		NP	16
–100.0				

N–Standard Penetration Test (ASTM D–1586)
R–Recovery in inches

Type Failure
B–Bulge Failure S–Shear Failure
E–Estimated Value P–Penetrometer

Qu–Unconfined Compressive Strength (tsf)
W–Water Content, percent dry weight
NP–Non–Plastic

Unit wt. (pcf) noted in italics above w%

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STRUCTURE FOUNDATION BORING LOG

Project Wacker Drive Reconstruction — OBA JOB NO. 99279
City Chicago — Structure No. — Rig CME-55
County Cook — Location — Bored By RH
State Illinois — Date Oct. 18 to 21, 1999 — Checked By DOB

BORING NO. ETB-5

Station XX
Offset XX

Surface Water Elev. N/A
Groundwater Elevation –
Groundwater Elevation –
After Hours

Elevation	Blow Counts	R (in)	Qu (tsf)	W (%)
SILT-gray-very dense (ML)				
-78.3	38			
	50		NP	18
	39			
	50/4"		NP	18
-105.0				
SILTY SAND to SANDY SILT-gray-very dense (SM-ML)	50		NP	18
	32			
	50/4"		NP	18
-110.0				
	30			
	50		NP	20
	34			
	50		NP	17
-115.0				
	36			
	50/5"		NP	17
	29			
	50/2"		NP	18
-97.3 -120.0				
SILT with Fractured Rock-trace clay-gray-very dense	50/1"	No	Recovery	
	41			
	50		NP	9
-125.0				

SEE PREVIOUS COLUMN -103.3

ROTARY DRILLING-BEDROCK -105.3

SILURIAN SYSTEM, NIAGRAN SERIES, RACINE FORMATION DOLOMITE

RUN 1: (-128.0' to -133.0'): Light gray, weathered, porous, occassionally stylolitic, vuggy with trace pyrite-weathered horiz. fractures throughout with a few tight horizontal and vertical fractures; clay parting at -130.4' -130.0

ROCK CORE

RECOVERY = 100% RQD = 34% -110.3

END OF BORING at -133.0'
Rotary Drilling
CME Automatic Hammer

-135.0 -140.0 -145.0 -150.0

N-Standard Penetration Test (ASTM D-1586)
R-Recovery in inches

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

Qu-Unconfined Compressive Strength (tsf)
W-Water Content, percent dry weight
NP-Non-Plastic

Unit wt. (pcf) noted in italics above w%

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STRUCTURE FOUNDATION BORING LOG

Project Wacker Drive Reconstruction — OBA JOB NO. 99279
City Chicago — Structure No. XX — Rig CME-55
County Cook — Location XX — Bored By RH
State Illinois — Date February 4 to March 8, 2000 — Checked By DOB

BORING NO. ETB-7

Station XX
Offset XX

Ground Surface Elevation +21.2 CCD

Elevation	Description	Blow Counts	R (in)	Qu (tsf)	W (%)
	2' CONCRETE (Upper Level)				
+19.2					
	VOID				
-5.0					
-10.0					
-15.0					
+5.45					
	8" ASPHALT, 9" CONCRETE (Lower Level)				
+4.2		2			
	Fine SAND-trace gravel-brown-very loose (Fill)	1 1		NP	X
		1			
-20.0		1 1		NP	X
		1			
		1 1			NR
-2.3					
	CLAYEY SAND, GRAVEL & CINDERS-very loose (Fill)	3			
-25.0		1 2		NP	36

Surface Water Elev. N/A
Groundwater Elevation XX
Groundwater Elevation XX After Hours

Elevation	Description	Blow Counts	R (in)	Qu (tsf)	W (%)
	CLAYEY SAND, GRAVEL & CINDERS-very loose (Fill)				
-4.8		1			
	CLAYEY Fine SAND-trace gravel-gray-loose (SC)	2 3		NP	19
-7.3					
		0			
	SILTY CLAY-trace sand & gravel-gray-very soft (CL) Wet	1 1		<0.25P	32
-30.0					
		W			
		0 H		,0.25P	28
		1			
-35.0		1 1		<0.25P	28
		1			
		0 1		<0.25P	27
-16.8					
	SILTY CLAY-trace sand & gravel-gray-very soft (CL)	1			
-40.0		1 1		<0.25P	25
		0			
-45.0		1 2		<0.25P	23
-24.8					
	SILTY CLAY-trace sand & gravel-gray-medium stiff to stiff (CL)				
		1			
-50.0		1 3		0.5P	24

N-Standard Penetration Test (ASTM D-1586)
R-Recovery in inches
Type Failure: B-Bulge Failure, E-Estimated Value, S-Shear Failure, P-Penetrometer
Qu-Unconfined Compressive Strength (tsf)
W-Water Content, percent dry weight
NP-Non-Plastic
Unit wt. (pcf) noted in italics above w%

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STRUCTURE FOUNDATION
BORING LOG

Project Wacker Drive Reconstruction
City Chicago
County Cook
State Illinois
Structure No. XX
Location XX
Date February 4 to March 8, 2000
OBA JOB NO. 99279
Rig CME-55
Bored By RH
Checked By DOB

BORING NO. ETB-7

Station XX
Offset XX

Surface Water Elev. N/A
Groundwater Elevation XX
Groundwater Elevation XX
After Hours

Elev.	Blow Counts	R (in)	Qu (tsf)	W (%)	Soil Description
	0				SILTY CLAY-trace sand & gravel-gray-medium stiff to stiff (CL)
	1				
-55.0	2		0.5P	21	
	1		*102.5*		
-60.0	2 5		0.6B	25	
	4		*103.3*		
-65.0	5 6		0.6B	18	
	3		*107.8*		
-70.0	5 7		0.8B	22	
	4		*120.8*		
-75.0	4 7		1.0B	16	
	4				SILTY CLAY-trace sand & gravel-gray-medium stiff to stiff (CL)
-80.0	8 9		1.1B	16	
-62.3					
	7			*99.6*	
-85.0	13 17		1.25B	25	SILTY CLAY to CLAYEY SILT with Silt Streaks-trace sand & gravel-gray-stiff (CL/ML)
-67.3					
	5				
-90.0	9 14		NP	22	SILT-trace fine sand-gray-medium dense (ML)
-72.3					
	7			*130.4*	
-95.0	13 23		6.9S @9.9%	10	SILTY CLAY-trace to some sand & gravel-gray-hard (CL)
	25			*126.7*	
	50 6"		10.6S @9.9%	11	
	20				
-78.8	29 35		4.5+P	12	
-100.0					

Pressure Meter Test

N-Standard Penetration Test (ASTM D-1586)
R-Recovery in inches

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

Qu-Unconfined Compressive Strength (tsf)
W-Water Content, percent dry weight
NP-Non-Plastic

Unit wt. (pcf) noted in italics above w%

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STRUCTURE FOUNDATION BORING LOG

Project Wacker Drive Reconstruction — OBA JOB NO. 99279
City Chicago — Structure No. XX — Rig CME-55
County Cook — Location XX — Bored By RH
State Illinois — Date February 4 to March 8, 2000 — Checked By DOB

BORING NO. ETB-7

Station XX
Offset XX

Surface Water Elev. N/A
Groundwater Elevation XX
Groundwater Elevation XX
After Hours

Elevation	Blow Counts	R (in)	Qu (tsf)	W (%)
SILTY CLAY to CLAYEY SILT-some sand & gravel-gray-very dense (ML/CL)	38 50 6"	Pressure Meter Test	4.5+P	12
-81.8				
CLAYEY SILT-trace sand-gray-very dense (ML)	24 50/6"		4.5+P	16
-83.8 -105.0				
SILT-trace fine sand-gray-very dense (ML)	33 50 5"	Pressure Meter Test	4.0P	18
	50/6"			
-110.0			NP	20
	50/1"			
			NP	21
	41 50/5"			
-115.0			NP	21
-94.8				
CLAYEY SAND & GRAVEL-gray-very dense (SC)	50/6"		NP	9
-97.3				
SANDY CLAYEY SILT-trace gravel-gray-very dense (ML)	50/6"			
-120.0			NP	12
-99.8				
BOULDERS, COBBLES & FRACTURED ROCK	50/1"			
-100.8				
Apparent Bedrock-Rotary Drilling				NR
-102.8				
END OF BORING @ -124.0'				
-125.0				

Rotary Drilling Methods
75.0' of Casing
CME Automatic Hammer

-130.0
-135.0
-140.0
-145.0
-150.0

N-Standard Penetration Test (ASTM D-1586)
R-Recovery in inches
Type Failure: B-Bulge Failure, E-Estimated Value, S-Shear Failure, P-Penetrometer
Qu-Unconfined Compressive Strength (tsf)
W-Water Content, percent dry weight
NP-Non-Plastic
Unit wt. (pcf) noted in italics above w%

O'BRIEN & ASSOCIATES, INC.
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STRUCTURE FOUNDATION BORING LOG

Project Wacker Drive Reconstruction — OBA JOB NO. 99312
City Chicago — Structure No. XX — Rig CME-55
County Cook — Location XX — Bored By RH
State Illinois — Date March 6 to March 20, 2000 — Checked By DOB

BORING NO. MB-2

Station XX
Offset XX

Surface Water Elev. N/A
Groundwater Elevation XX
Groundwater Elevation XX After Hours

Ground Surface Elevation +22.9 CCD	Blow Counts	R (in)	Qu (tsf)	W (%)
4.5' CONCRETE (Upper Level)				
+18.4				
VOID				
-5.0				
-10.0				
-15.0				
+5.4				
4" ASPHALT, 6" CONCRETE (Lower Level) +4.6				
Fine SAND-trace gravel-brown-very loose (Fill)	1			
	1			
-20.0	1		NP	10
+1.9				
Miscellaneous CONCRETE Rotary Drilling				
-0.6				
SILTY SAND, GRAVEL & WOOD-very loose (Fill)	1			
	1			
-25.0	1		NP	32

	Blow Counts	R (in)	Qu (tsf)	W (%)
SILTY SAND, GRAVEL & WOOD-very loose (Fill) -3.1				
	1			
Fine SAND-trace gravel-brown-very loose (Fill)	2			
	1		NP	15
-5.1				
SILTY SAND & GRAVEL-trace wood & glass-very loose (Fill)	1			
	1			
-30.0	1		NP	12
-8.1				
	1			
SILTY CLAY-trace sand & gravel-gray-very soft to soft (CL)	1			
	1		0.25P	26
	0			
	1			
-35.0	0		<0.25P	26
	0			
	0			
	1		0.5P	24
	0			
	1			
-40.0	1		0.5P	24
-19.1				
SANDY CLAYEY SILT to SANDY SILTY CLAY-trace gravel-gray-very loose (CL/ML)	1			
	2			
-45.0	1		1.75P	15
-23.1				
SILTY CLAY-trace sand & gravel-gray-soft (CL)				
	0			
	1			
-50.0	1		0.5P	23

N-Standard Penetration Test (ASTM D-1586)
R-Recovery in inches
Type Failure: B-Bulge Failure, S-Shear Failure, E-Estimated Value, P-Penetrometer
Qu-Unconfined Compressive Strength (tsf)
W-Water Content, percent dry weight
NP-Non-Plastic
Unit wt. (pcf) noted in italics above w%

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STRUCTURE FOUNDATION
BORING LOG

Project Wacker Drive Reconstruction — OBA JOB NO. 99312
City Chicago — Structure No. XX — Rig CME-55
County Cook — Location XX — Bored By RH
State Illinois — Date March 6 to March 20, 2000 — Checked By DOB

BORING NO. MB-2

Station XX
Offset XX

Surface Water Elev. N/A
Groundwater Elevation XX
Groundwater Elevation XX
After Hours

Elev.	Blow Counts	R (in)	Qu (tsf)	W (%)	Description
	0				SILTY CLAY-trace sand & gravel-gray-soft (CL)
	1				
-55.0	1		0.5P	21	
	1				
	1				
-60.0	1		0.25P	22	
-40.6					
	2		*115.9*		
	3				
-65.0	4		1.25B	18	
					SILTY CLAY-trace sand & gravel-gray-stiff to very stiff (CL)
	8				
	9				
-70.0	11		1.75P	17	
	7		*117.3*		
	9				
-75.0	11		2.7B	17	
	5				SILTY CLAY-trace sand & gravel-gray-stiff to very stiff (CL)
	5		*114.4*		
-80.0	5		2.0B	16	
	5		*112.0*		
-85.0	9 10		2.7B	17	
	5		*110.9*		
	6				
-90.0	9		2.0B	18	
-68.1					
	17				SILT with Sand Streaks-trace gravel-gray-dense (ML)
	15				
	19	Pressure Meter Test	4.25P	15	
-70.6					
	7				SILTY SANDY GRAVEL-gray-very dense (GM)
	24				
-95.0	42		NP	5	
-73.1					
	31		*129.3*		
	34	Pressure Meter Test	7.5S @12.7%	12	SILTY CLAY-trace to some sand & gravel-gray-hard (CL)
	40				
	16		*133.6*		
-77.1	25				
-100.0	40		9.3B	12	

N-Standard Penetration Test (ASTM D-1586)
R-Recovery in inches

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

Qu-Unconfined Compressive Strength (tsf)
W-Water Content, percent dry weight
NP-Non-Plastic

Unit wt. (pcf) noted in italics above w%

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STRUCTURE FOUNDATION BORING LOG

Project Wacker Drive Reconstruction
City Chicago
County Cook
State Illinois
Structure No. XX
Location XX
Date March 6 to March 20, 2000
OBA JOB NO. 99312
Rig CME-55
Bored By RH
Checked By DOB

BORING NO. MB-2

Station XX
Offset XX

Surface Water Elev. N/A
Groundwater Elevation XX
Groundwater Elevation XX
After Hours

Elevation	Description	Blow Counts	R (in)	Qu (tsf)	W (%)
	SILTY CLAY to CLAYEY SILT-trace to some sand & gravel-gray-hard (CL/ML)	50/5"	Pressure Meter Test	4.5+P	12
-105.0					
		50/5"	Pressure Meter Test	4.5+P	10
-85.1	CLAYEY SILT-some sand & gravel-gray-very dense (ML)	50/3"			
-110.0					11
		50/4"			
					11
		50/1"			
-115.0					8
		50/3"			
-94.1					11
	Dolomite Boulder Rotary Drilling	50/1"			NR
-96.1	Run 1 (-119.0' to -125.0') Dolomite Boulder from -119.0' to -119.5', CLAYEY SILT to SILTY CLAY with some sand, gravel & fractured rock from -119.5' to -122.5', Dolomite Boulder from -122.5' to -123.0', CLAYEY SILT to SILTY CLAY with some sand, gravel & fractured rock from -123.0' to -125.0' *-102.1*		ROCK CORE		6
-120.0					
					6
-125.0					

Elevation	Description	Blow Counts	R (in)	Qu (tsf)	W (%)
	CLAYEY SILT to SILTY CLAY-some sand, gravel & fractured rock *-103.1*				
	BOULDERS & COBBLES	50/4"			
					NR
-105.1	DOLOMITE BEDROCK Rotary Drilling				
-107.1 -130.0					
	SILURIAN SYSTEM, NIAGARAN SERIES, 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'. Vertical fracture with intersecting horizontal fractures from -131.5' to -132.0' & from -132.42' to -133.25'. Horizontal fractures @ -133.58', -133.92', -134.08' & -134.75'. Transverse fracture from -135.0' to -135.5'. Weathered horizontal fractures @ -136.42' & -136.58'. Horizontal fractures @ -136.96', -137.5', -137.79', -138.0', -138.92' & -139.375'. RECOVERY = 100.0% RQD = 59.0%			ROCK CORE	
-135.0					
-117.1 -140.0					
	END OF BORING @ -140.0' Rotary Drilling Methods 75' of Casing Used CME Automatic Hammer				
-145.0					
-150.0					

N-Standard Penetration Test (ASTM D-1586)
R-Recovery in inches

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

Qu-Unconfined Compressive Strength (tsf)
W-Water Content, percent dry weight
NP-Non-Plastic

Unit wt. (pcf) noted in italics above w%

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STRUCTURE FOUNDATION BORING LOG

Project Wacker Drive Reconstruction — OBA JOB NO. 99312
City Chicago — Structure No. — Rig CME-55
County Cook — Location — Bored By RH
State Illinois — Date November 12 to 14, 1999 — Checked By DOB

BORING NO. MB-11

Station XX
Offset XX

Ground Surface Elevation +2.0 CCD

Chicago River Elevation -1.5 CCD
Groundwater Elevation –
Groundwater Elevation –

Elev.	Description	Blow Counts	R (in)	Qu (tsf)	W (%)
	Barge				
-1.5	▽ WATER–Chicago River				
-5.0					
-10.0					
-15.0					
-16.5					
	SILTY SANDY CLAY–trace gravel and shells–very soft (MUCK)	ps			
-20.0		ps		X	88
		ps			
		ps		X	83
		ps			
-25.0		ps		X	81
	SILTY SANDY CLAY–trace gravel and shells–very soft (MUCK)	ps			
		ps			
		ps		<0.25E	91
-26.0					
	CLAYEY SILTY SAND–very loose (Apparent River Sediment)	ps			
-30.0		ps		NP	23
-29.0					
	SILTY CLAY–trace sand and gravel–gray–medium (CL) wet	ps			
		ps		–	25
	Vane Shear @ 34.5' c=653 psf	ps			
-35.0		ps		0.5P	26
	Vane Shear @ 36.5' c=765 psf	ps			
		ps		0.29P	26
	Vane Shear @ 39.5' c=709 psf	ps			
-40.0		ps		–	26
	Vane Shear @ 41.5' c=949 psf	ps			
		ps	No	Recovery	
-41.5					
		ps			*103.8*
	Vane Shear @ 44.5' c=1174 psf	ps			
-45.0		ps		1.0B	18
	Vane Shear @ 46.5' c=1235 psf	ps			*103.2*
		ps			
		ps		0.8B	20
	SILTY CLAY–trace sand and gravel–gray–stiff to very stiff (CL) wet	ps			*99.9*
	Vane Shear @ 49.5' c=3449 psf	ps			
-50.0		ps		1.2B	20

N–Standard Penetration Test (ASTM D-1586)
R–Recovery in inches

Type Failure
B–Bulge Failure S–Shear Failure
E–Estimated Value P–Penetrometer

Qu–Unconfined Compressive Strength (tsf)
W–Water Content, percent dry weight
NP–Non-Plastic

Unit wt. (pcf) noted in italics above w%

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STRUCTURE FOUNDATION BORING LOG

Project Wacker Drive Reconstruction — OBA JOB NO. 99312
City Chicago — Structure No. — Rig CME-55
County Cook — Location — Bored By RH
State Illinois — Date November 12 to 14, 1999 — Checked By DOB

BORING NO. MB-11

Station XX
Offset XX

Chicago River Elevation −1.5 CCD
Groundwater Elevation –
Groundwater Elevation –

	Blow Counts	R (in)	Qu (tsf)	W (%)
	ps			*98.6*
	ps			
	ps		1.0B	22
	ps			*105.8*
SILTY CLAY–trace sand and gravel–gray–stiff to very stiff (CL)	ps			
−55.0	ps		1.4B	15
	ps			*111.3*
	ps			
	ps		1.0B	15
	4			*109.5*
	6			
−60.0	9		2.3B	15
	9			
	7			
−65.0	10		1.75P	20
	7			
	9			
−70.0	11		–	18
−71.5				
SILTY CLAY–trace to some sand and gravel–gray–hard (CL/ML)	19			
	20			
−75.0	22		–	11
SILTY CLAY–trace to some sand and gravel–gray–hard (CL/ML)				
	25			*113.9*
	25	/3"		
−80.0			6.0B	13
−79.0				
	50	/4"		
CLAYEY SILT–trace sand and gravel–gray–very dense (ML)				NP 12
−81.5				
	50	/3"		
SILTY CLAY–some sand and gravel–gray–hard (CL/ML)				
−85.0			4.5+P	10
	50	/6"		*133.2*
			5.6S	10
	27			
	23	/7"		
−90.0			4.5+P	11
	50	/1"		
		No	Recovery	
	50	/5"		
−95.0			4.5+P	9
	50	/4"		
			4.5+P	9
	50	/4"		
−100.0			4.5+P	11

N–Standard Penetration Test (ASTM D–1586)
R–Recovery in inches

Type Failure
B–Bulge Failure S–Shear Failure
E–Estimated Value P–Penetrometer

Qu–Unconfined Compressive Strength (tsf)
W–Water Content, percent dry weight
NP–Non–Plastic

Unit wt. (pcf) noted in italics above w%

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STRUCTURE FOUNDATION BORING LOG

Sh 3 of 3

Project Wacker Drive Reconstruction — OBA JOB NO. 99312
City Chicago — Structure No. — Rig CME-55
County Cook — Location — Bored By RH
State Illinois — Date November 12 to 14, 1999 — Checked By DOB

BORING NO. MB-11

Station XX
Offset XX

Chicago River Elevation -1.5 CCD
Groundwater Elevation -
Groundwater Elevation -

Elevation	Blow Counts	R (in)	Qu (tsf)	W (%)
	50/1"			
SILTY CLAY-some sand, gravel and fractured stone-gray-very dense (CL/ML)		No	Recovery	
	50/1"			
-105.0			-	9
-104.0	50/0"			
BEDROCK-Driller's Observation				
-106.0				
SILURIAN SYSTEM, NIAGRAN SERIES, DOLOMITE				
-110.0				
RUN 1 (-108.0' to -118.0'): Light gray, weathered, porous, fossiliferous, 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'	ROCK CORE			
RECOVERY = 100% RQD = 59%				
-115.0				
-116.0				
END OF BORING @ -118.0' Hollow Stem Augers & Rotary Drilling Methods 60.0' of Casing CME Automatic Hammer				
-120.0				
-125.0				

Elevation	Blow Counts	R (in)	Qu (tsf)	W (%)
-120.0				
-135.0				
-140.0				
-145.0				
-150.0				

N-Standard Penetration Test (ASTM D-1586)
R-Recovery in inches

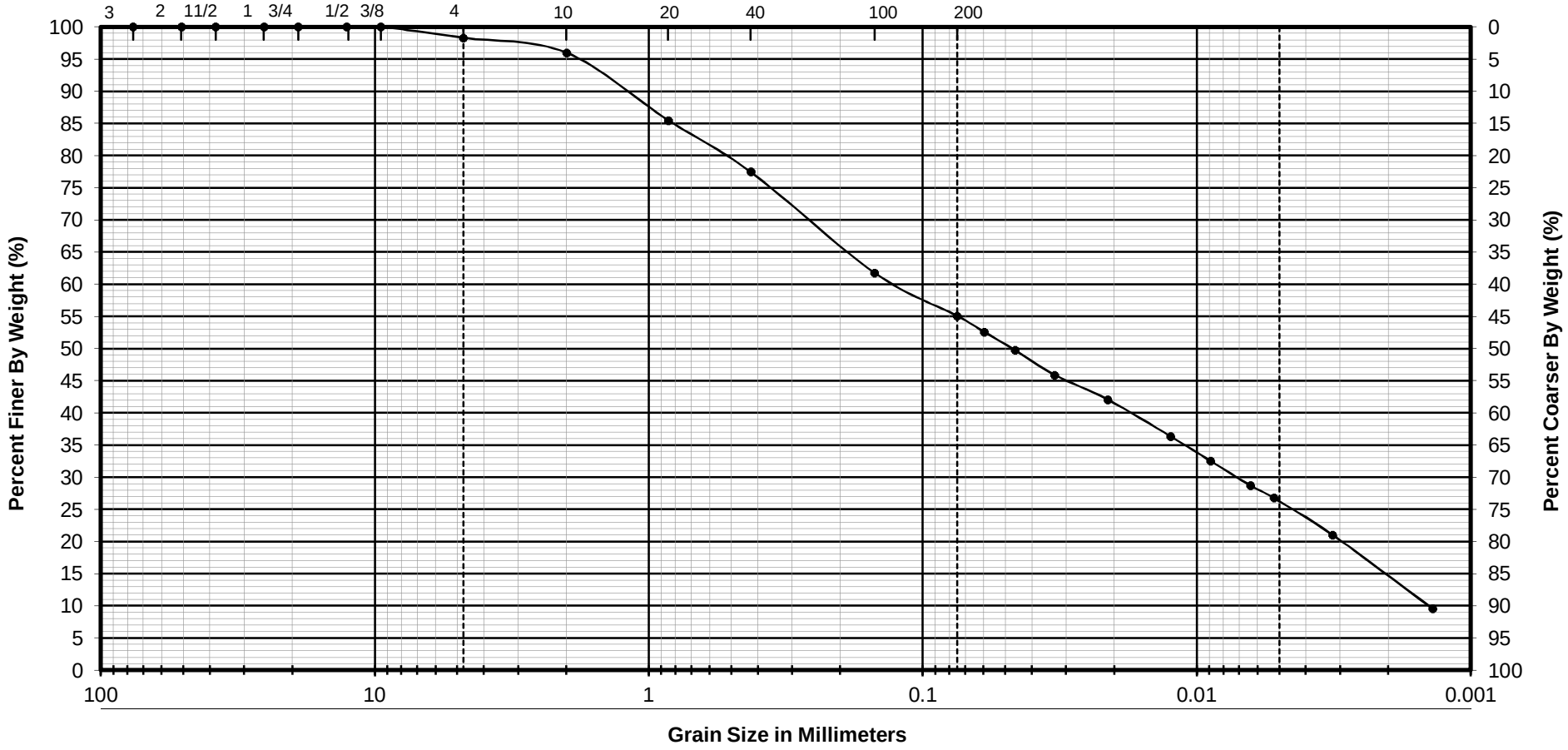
Type Failure
B-Bulge Failure S-Shear Failure
E-Estimated Value P-Penetrometer

Qu-Unconfined Compressive Strength (tsf)
W-Water Content, percent dry weight
NP-Non-Plastic

Unit wt. (pcf) noted in italics above w%

APPENDIX F

LAB DATA



GRAVEL	SAND			SILT	CLAY
	COARSE	MEDIUM	FINE		

Boring No.	GSI-02	CLASSIFICATION-ASTM D 2487		PARTICLE SIZE ANALYSIS-ASTM D 422
Sample No.	2	SANDY LEAN CLAY (CL)		The Chicago River Walk
Depth	24.5'-26.5'			Wacker Dr. - State St. to Lake St.
Liquid Limit	36	dark gray		Chicago, Illinois
Plastic Limit	22			
Plasticity Index	14			
Test By	NOB	% Gravel	1.7	
Date	6/27/11	% Sand	43.2	
Reviewed By	AJP	% Silt	26.4	
Job No	11019	% Clay	28.7	

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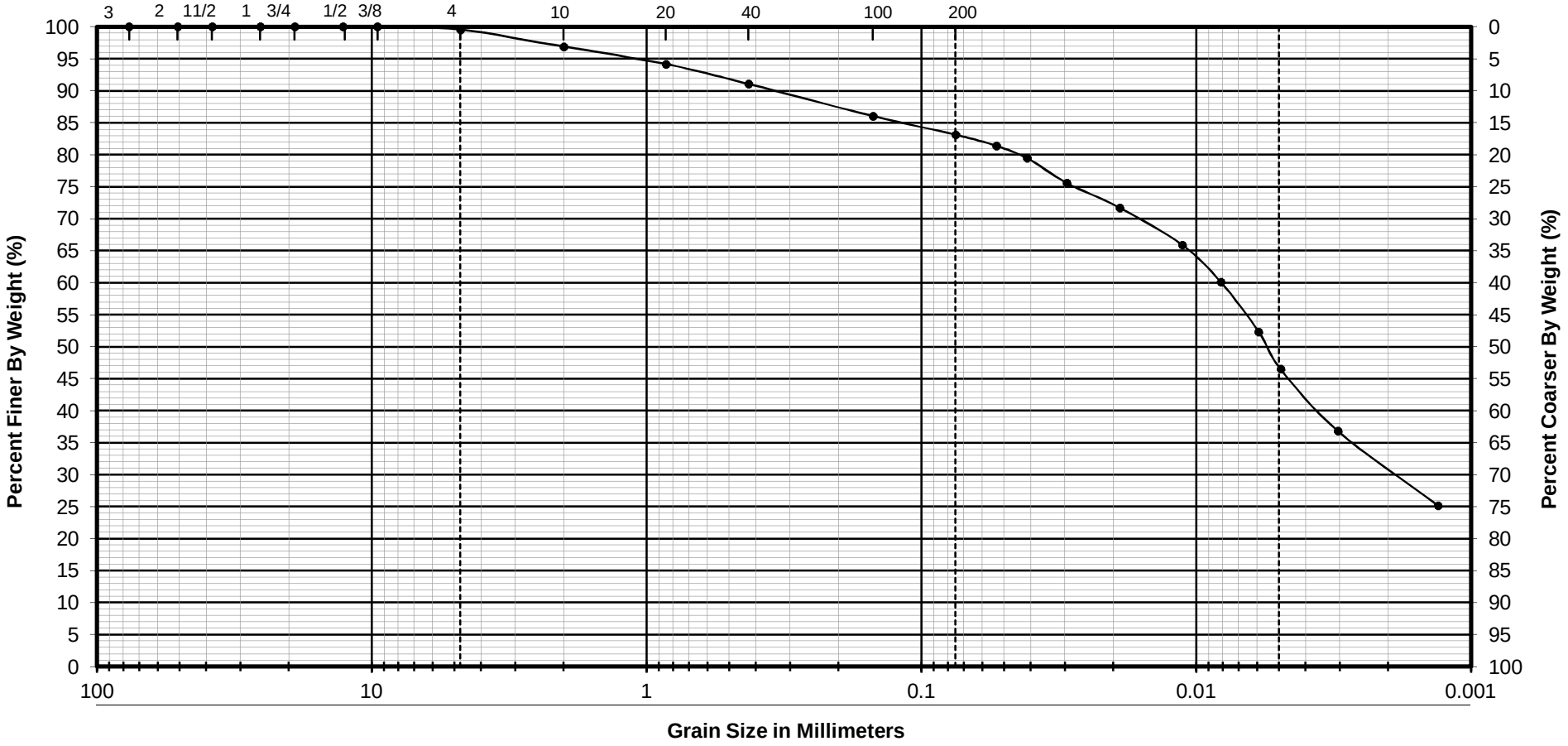

GRAVEL	SAND			SILT	CLAY
	COARSE	MEDIUM	FINE		

Boring No.	GSI-02	CLASSIFICATION-ASTM D 2487	PARTICLE SIZE ANALYSIS-ASTM D 422
Sample No.	5	LEAN CLAY with SAND (CL)	The Chicago River Walk
Depth	31.0'-33.0'	gray	Wacker Dr. - State St. to Lake St.
Liquid Limit	38		Chicago, Illinois
Plastic Limit	18		
Plasticity Index	20		
Test By	NOB	% Gravel 0.4	
Date	6/27/11	% Sand 16.4	
Reviewed By	AJP	% Silt 30.8	
Job No	11019	% Clay 52.3	

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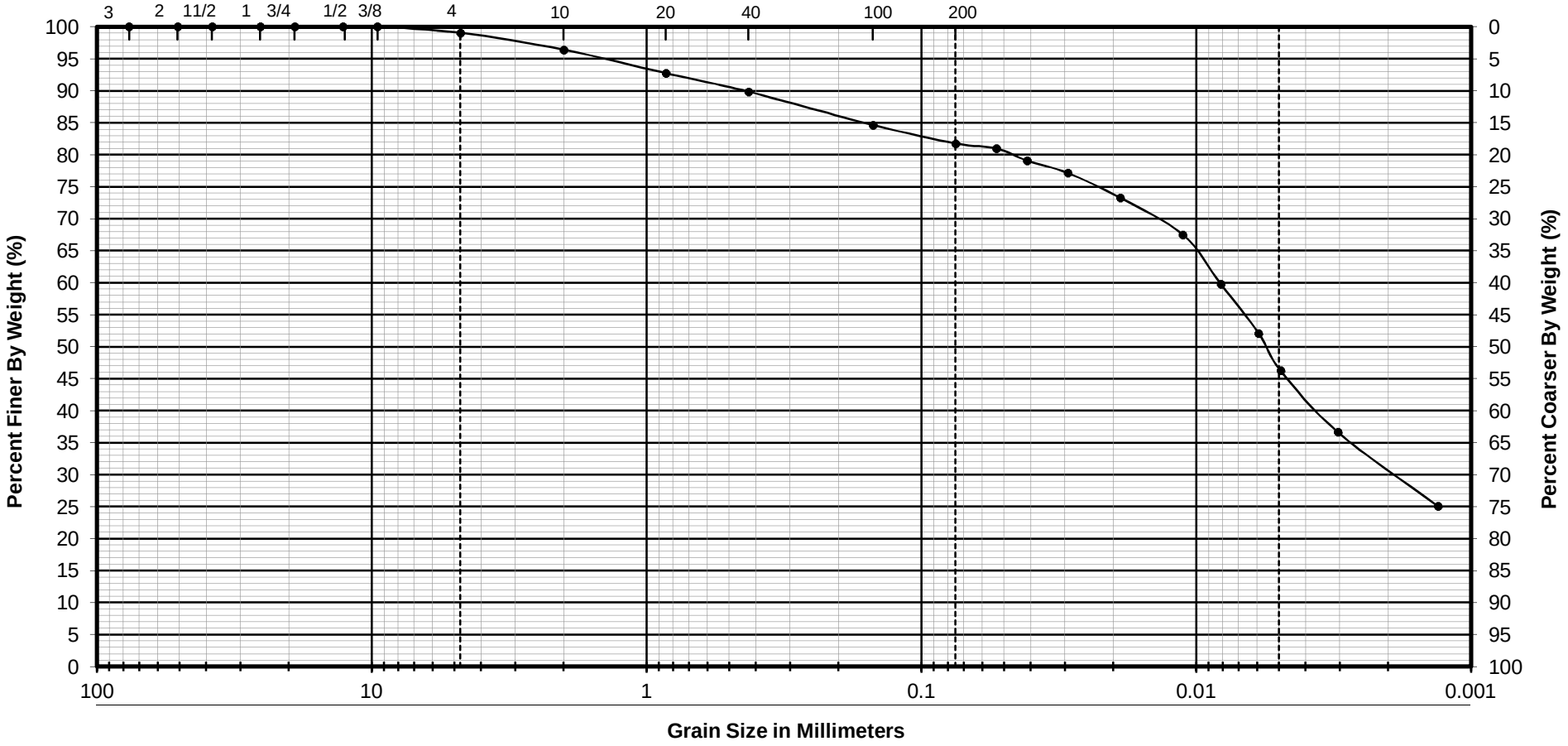

GRAVEL	SAND			SILT	CLAY
	COARSE	MEDIUM	FINE		

Boring No.	GSI-06	CLASSIFICATION-ASTM D 2487	PARTICLE SIZE ANALYSIS-ASTM D 422
Sample No.	6	LEAN CLAY with SAND (CL)	The Chicago River Walk
Depth	33.0'-35.0'	gray	Wacker Dr. - State St. to Lake St.
Liquid Limit	37		Chicago, Illinois
Plastic Limit	18		
Plasticity Index	19		
Test By	NOB	% Gravel 0.9	
Date	6/27/11	% Sand 17.3	
Reviewed By	AJP	% Silt 29.7	
Job No	11019	% Clay 52.1	

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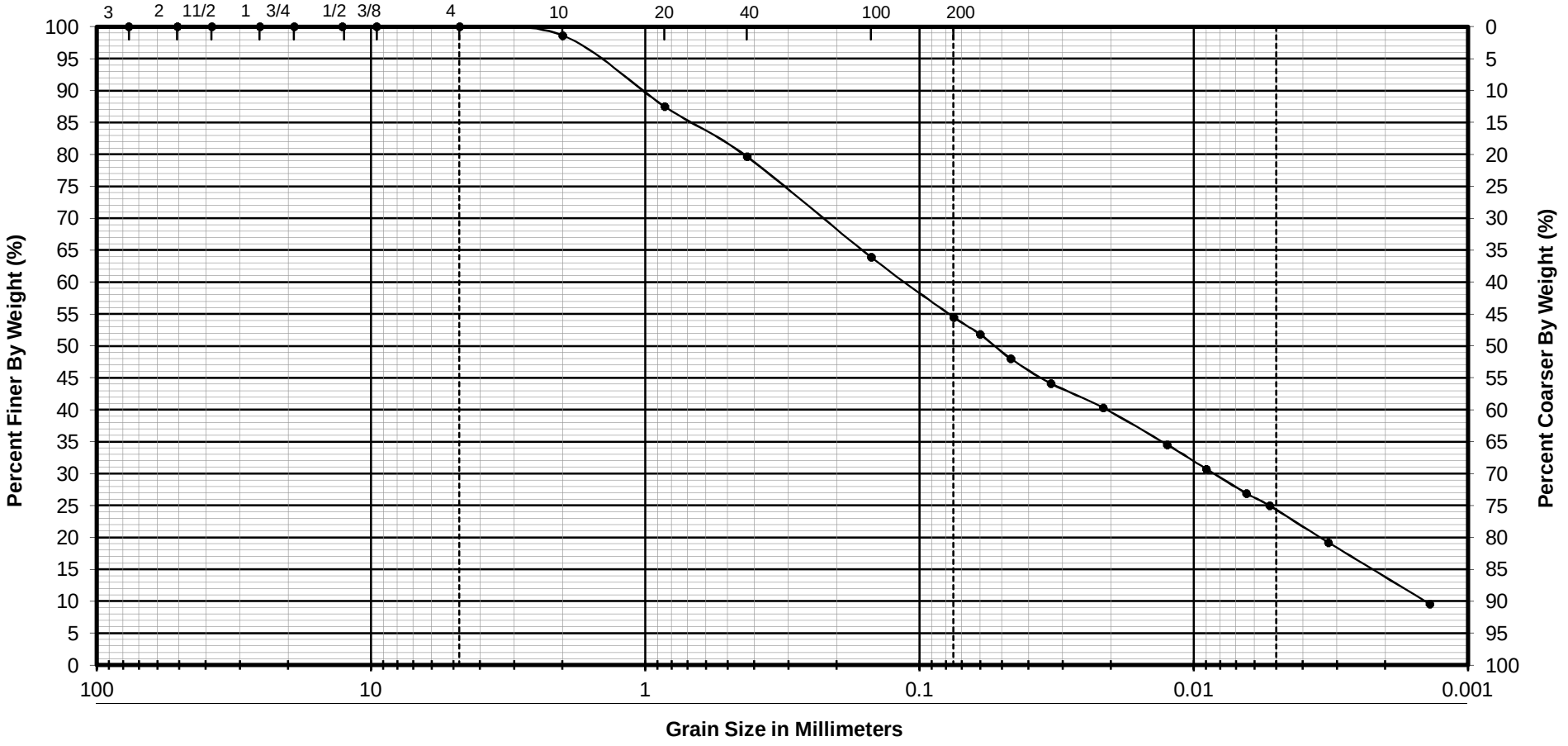

GRAVEL	SAND			SILT	CLAY
	COARSE	MEDIUM	FINE		

Boring No.	GSI-09	CLASSIFICATION-ASTM D 2487	PARTICLE SIZE ANALYSIS-ASTM D 422
Sample No.	2	SANDY LEAN CLAY (CL)	The Chicago River Walk
Depth	24.5'-26.5'	dark gray	Wacker Dr. - State St. to Lake St.
Liquid Limit	34		Chicago, Illinois
Plastic Limit	22		
Plasticity Index	12		
Test By	NOB	% Gravel 0.0	
Date	6/27/11	% Sand 45.5	
Reviewed By	AJP	% Silt 27.6	
Job No	11019	% Clay 26.9	

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Organic Matter in Soils by Wet Combustion
AASHTO T 194

Project Name The Chicago River Walk
Wacker Drive from State St. to Lake St.
Location Chicago, Illinois

Date 6/30/11
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

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UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOIL - ASTM D 2166

Project Name: The Chicago River Walk — Job No.: 11019
Location: State St. to Lake St., Chicago, Illinois — Date: 6/24/11
Boring No: GSI-02 — Sample No: 5 — Depth: 31.0'-33.0'

Description of Sample: LEAN CLAY with SAND (CL)-gray

Water Content:		Sample Data:			
Tare No	1	Initial Diameter (in)	2.78		
Tare Wt. (g)	15.7	Initial Area (sq. in)	6.07		
Wet Wt. + Tare (g)	1407	Initial Height (in)	6.9	15% Strain (in) =	1.04
Dry Wt. + Tare (g)	1137.1	Initial Volume (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 Weight (pcf)	102.0	Liquid Limit	38
		Wet Unit Weight (pcf)	126.5	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	0.041	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

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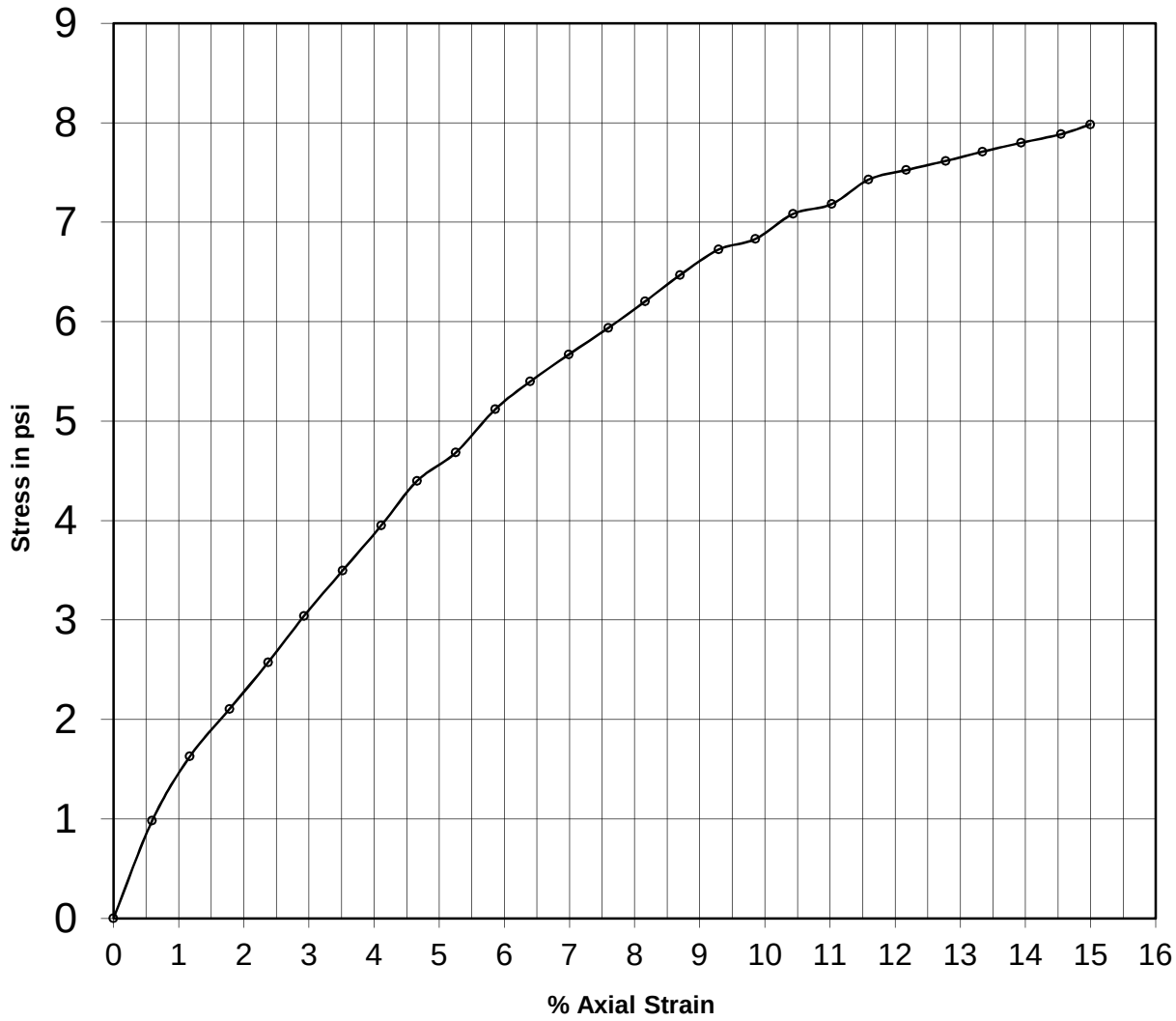
UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOIL - ASTM D 2166

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

Stress-Strain Curve



GEO SERVICES
Consulting Engineers
1235 E. Davis Street
Arlington Heights, Illinois 60005
Phone: (847) 253-3845 Fax: (847) 253-0482

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOIL - ASTM D 2166

Project Name: The Chicago River Walk | Job No.: 11019
Location: State St. to Lake St., Chicago, Illinois | Date: 6/24/11
Boring No: GSI-06 | Sample No: 6 | Depth: 33.0'-35.0'

Description of Sample: LEAN CLAY with SAND (CL)-gray

Water Content:		Sample Data:			
Tare No	2	Initial Diameter (in)	2.89		
Tare Wt. (g)	15.7	Initial Area (sq. in)	6.56		
Wet Wt. + Tare (g)	1499.3	Initial Height (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 Weight (g)	1483.9		
Moisture Content (%)	22.0	Dry Unit Weight (pcf)	102.3	Liquid Limit	37
		Wet Unit Weight (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

GEO SERVICES
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1235 E. Davis Street
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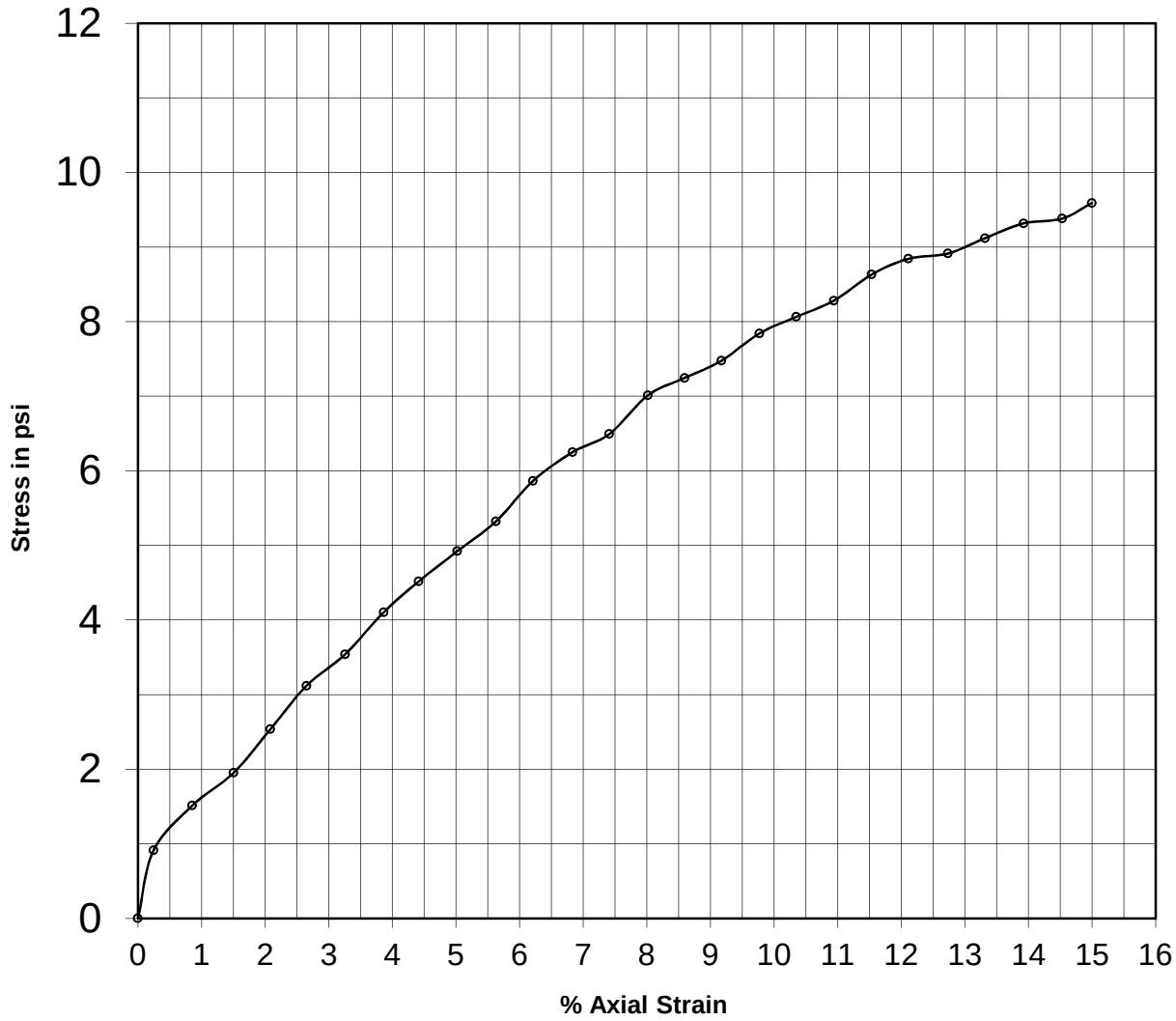
Phone: (847) 253-3845 Fax: (847) 253-0482

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOIL - ASTM D 2166

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

Stress-Strain Curve



APPENDIX G

INSITU VANE SHEAR RESULTS

Geo Services, Inc.
Geotechnical, Environmental and Civil Engineering
An M&E - DBE Firm

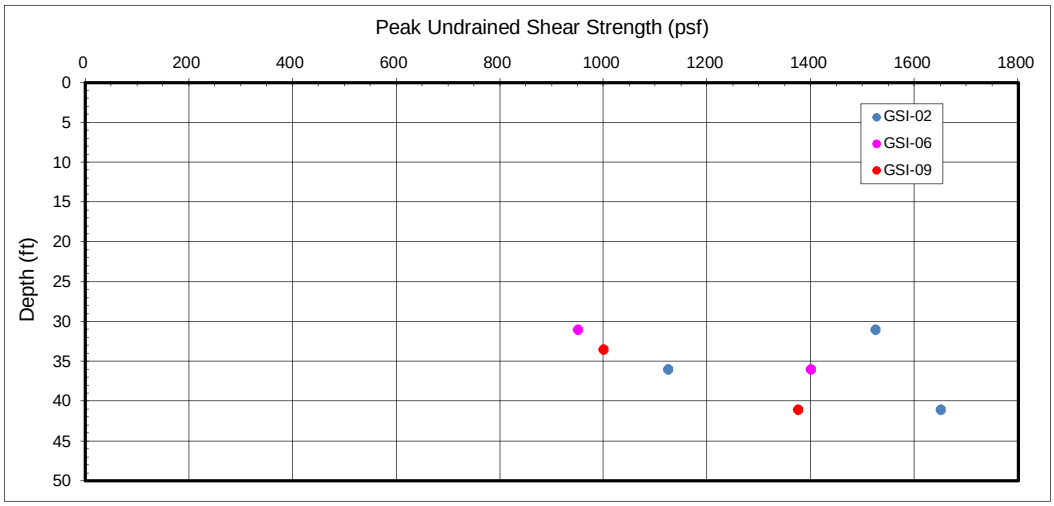
1235 E. Davis Street
Arlington Heights, IL 60005
(847) 253-3845

PROJECT: CHICAGO RIVER RIVERWALK
GSI JOB NUMBER: 11019
OPERATOR: DR
DATE OF TEST: MAY 23-31, 2011
TOP OF BARGE DECK ELEVATIOI +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

BORING NO.	VANE TIP DEPTH (ft)	VANE*	a (in)	PEAK S_u (tsf)	PEAK S_u (psf)	a (in)	REMOLDED S_u (tsf)	REMOLDED S_u (psf)	SENSITIVITY PEAK/REM.	APPROX. VANE TIP ELEVATION (CCD)
GSI-02	31.0	1.0	2.92	0.77	1525	1.17	0.31	625	2.4	-26.4
	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



APPENDIX H

PILE DESIGN TABLES

Pile Design Table for Riverwalk utilizing Boring #GSI-02

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)
Metal Shell 12"Φ w/.179" walls		
244	31	57
Metal Shell 12"Φ w/.25" walls		
295	59	60
Metal Shell 14"Φ w/.25" walls		
363	79	60
Metal Shell 14"Φ w/.312" walls		
363	79	60
Steel HP 8 X 36		
193	84	72
214	96	75
235	107	77
253	117	80
267	125	82
282	133	85
Steel HP 10 X 42		
188	76	67
214	91	70
240	105	72
266	120	75
292	134	77
319	148	80

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)
Steel HP 10 X 57		
194	79	67
221	94	70
247	108	72
273	123	75
300	137	77
326	152	80
352	166	82
378	181	85
404	195	87
429	209	90
Steel HP 12 X 53		
204	80	65
225	91	67
256	109	70
288	126	72
319	143	75
350	160	77
381	177	80
413	195	82
Steel HP 12 X 63		
209	82	65
232	95	67
263	112	70
295	130	72
327	147	75
359	165	77
390	182	80
422	199	82

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)
Steel HP 14 X 73		
212	78	60
233	90	62
248	98	65
274	113	67
312	133	70
349	154	72
387	175	75
425	195	77
462	216	80
500	237	82
537	257	85
Steel HP 14 X 89		
215	80	60
238	92	62
254	101	65
282	117	67
320	137	70
358	158	72
396	179	75
434	200	77
472	221	80
510	242	82
548	263	85
601	292	87
654	321	90
Steel HP 14 X 102		
218	81	60
241	94	62

Pile Design Table for Riverwalk utilizing Boring #GSI-06

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)
Metal Shell 12"Φ w/.179" walls		
244	31	57
Metal Shell 12"Φ w/.25" walls		
295	59	60
Metal Shell 14"Φ w/.25" walls		
363	79	60
Metal Shell 14"Φ w/.312" walls		
363	79	60
Steel HP 8 X 36		
193	84	72
214	96	75
235	107	77
253	117	80
267	125	82
282	133	85
Steel HP 10 X 42		
188	76	67
214	91	70
240	105	72
266	120	75
292	134	77
319	148	80

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)
Steel HP 10 X 57		
194	79	67
221	94	70
247	108	72
273	123	75
300	137	77
326	152	80
352	166	82
378	181	85
404	195	87
Steel HP 12 X 53		
204	80	65
225	91	67
256	109	70
288	126	72
319	143	75
350	160	77
381	177	80
413	195	82
Steel HP 12 X 63		
209	82	65
232	95	67
263	112	70
295	130	72
327	147	75
359	165	77
390	182	80
422	199	82
454	217	85

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)
Steel HP 14 X 73		
212	78	60
233	90	62
248	98	65
274	113	67
312	133	70
349	154	72
387	175	75
425	195	77
462	216	80
500	237	82
537	257	85
Steel HP 14 X 89		
215	80	60
238	92	62
254	101	65
282	117	67
320	137	70
358	158	72
396	179	75
434	200	77
472	221	80
510	242	82
548	263	85
601	292	87
Steel HP 14 X 102		
218	81	60
241	94	62
258	103	65

Pile Design Table for Riverwalk utilizing Boring #GSI-09

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)
Metal Shell 12"Φ w/.179" walls		
244	31	57
Metal Shell 12"Φ w/.25" walls		
295	59	60
Metal Shell 14"Φ w/.25" walls		
363	79	60
Metal Shell 14"Φ w/.312" walls		
363	79	60
Steel HP 8 X 36		
193	84	72
214	96	75
235	107	77
253	117	80
267	125	82
282	133	85
Steel HP 10 X 42		
188	76	67
214	91	70
240	105	72
266	120	75
292	134	77
319	148	80

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)
Steel HP 10 X 57		
194	79	67
221	94	70
247	108	72
273	123	75
300	137	77
326	152	80
352	166	82
378	181	85
404	195	87
Steel HP 12 X 53		
204	80	65
225	91	67
256	109	70
288	126	72
319	143	75
350	160	77
381	177	80
413	195	82
Steel HP 12 X 63		
209	82	65
232	95	67
263	112	70
295	130	72
327	147	75
359	165	77
390	182	80
422	199	82
454	217	85

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)
Steel HP 14 X 73		
212	78	60
233	90	62
248	98	65
274	113	67
312	133	70
349	154	72
387	175	75
425	195	77
462	216	80
500	237	82
537	257	85
Steel HP 14 X 89		
215	80	60
238	92	62
254	101	65
282	117	67
320	137	70
358	158	72
396	179	75
434	200	77
472	221	80
510	242	82
548	263	85
601	292	87
Steel HP 14 X 102		
218	81	60
241	94	62
258	103	65

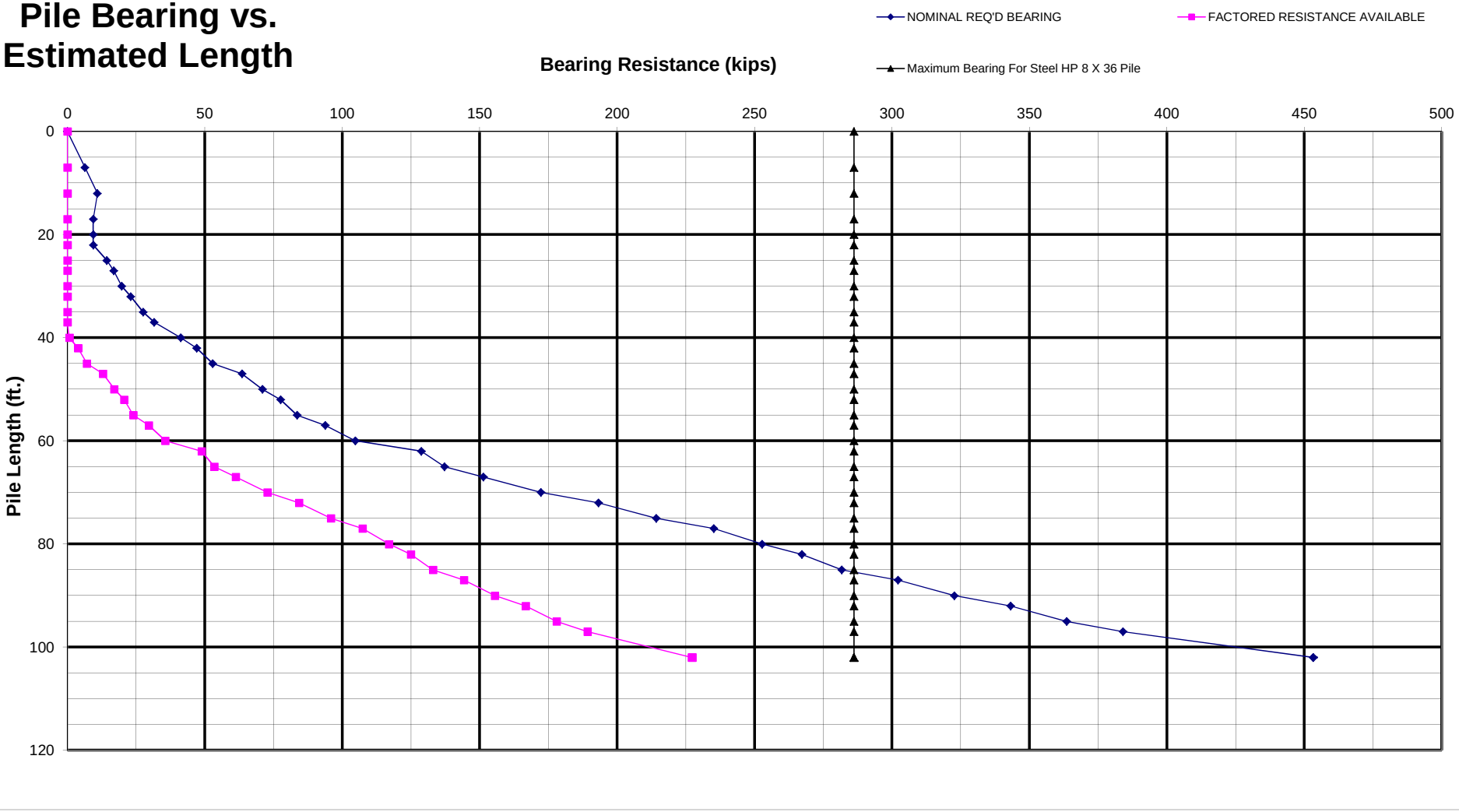
APPENDIX I

PILE CHARTS

FOR

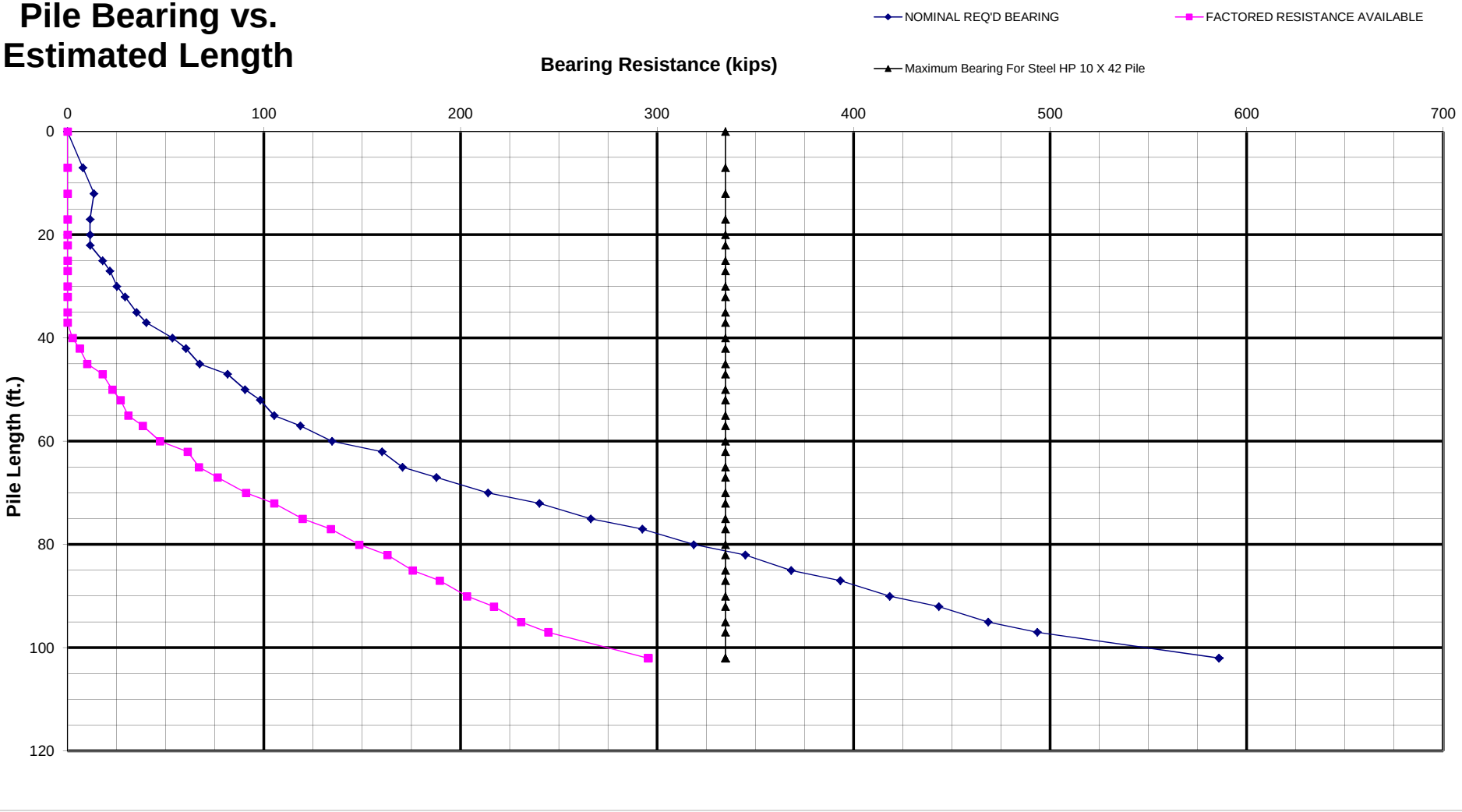
HP 8, 10, 12, 14, 12” AND 14” PIPE PILES

Pile Bearing vs. Estimated Length

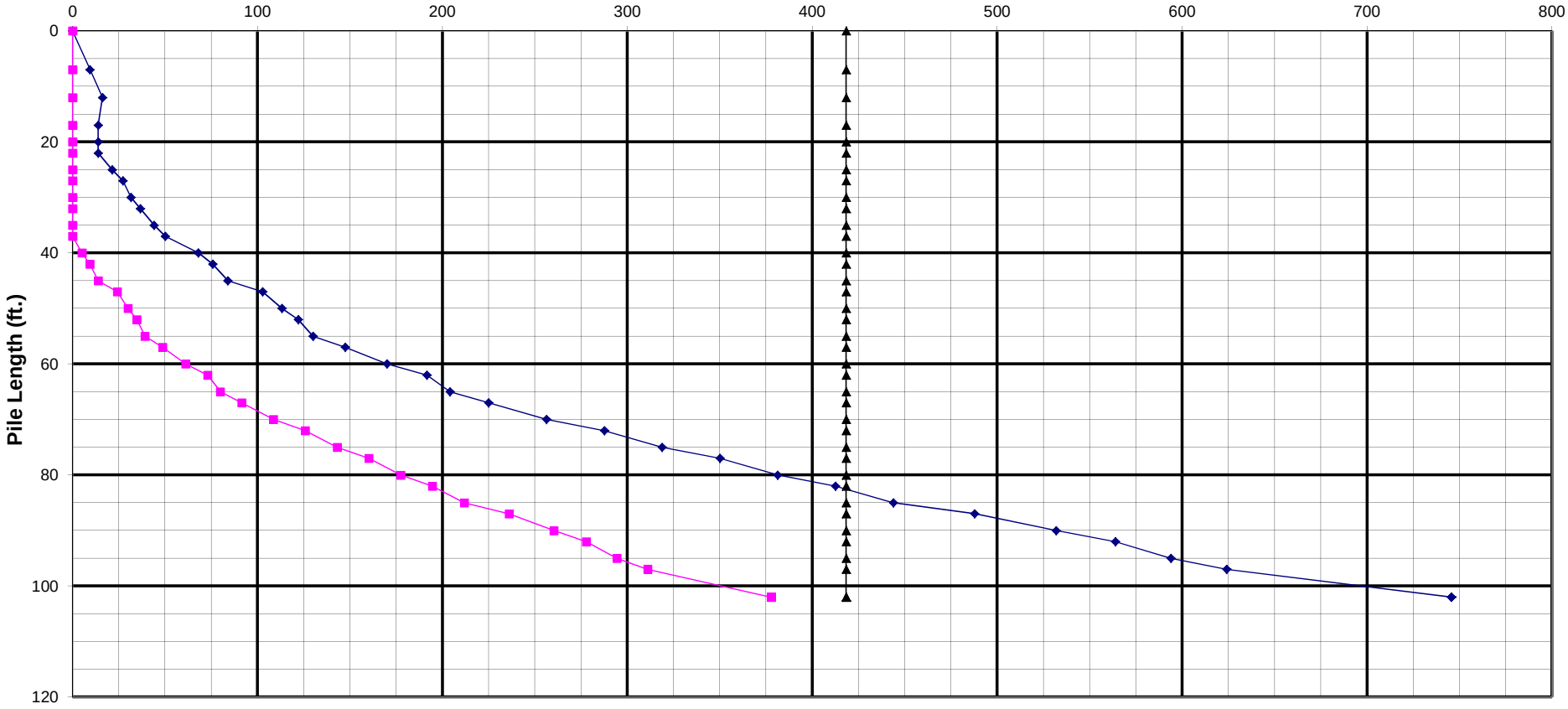


BORING GSI-02

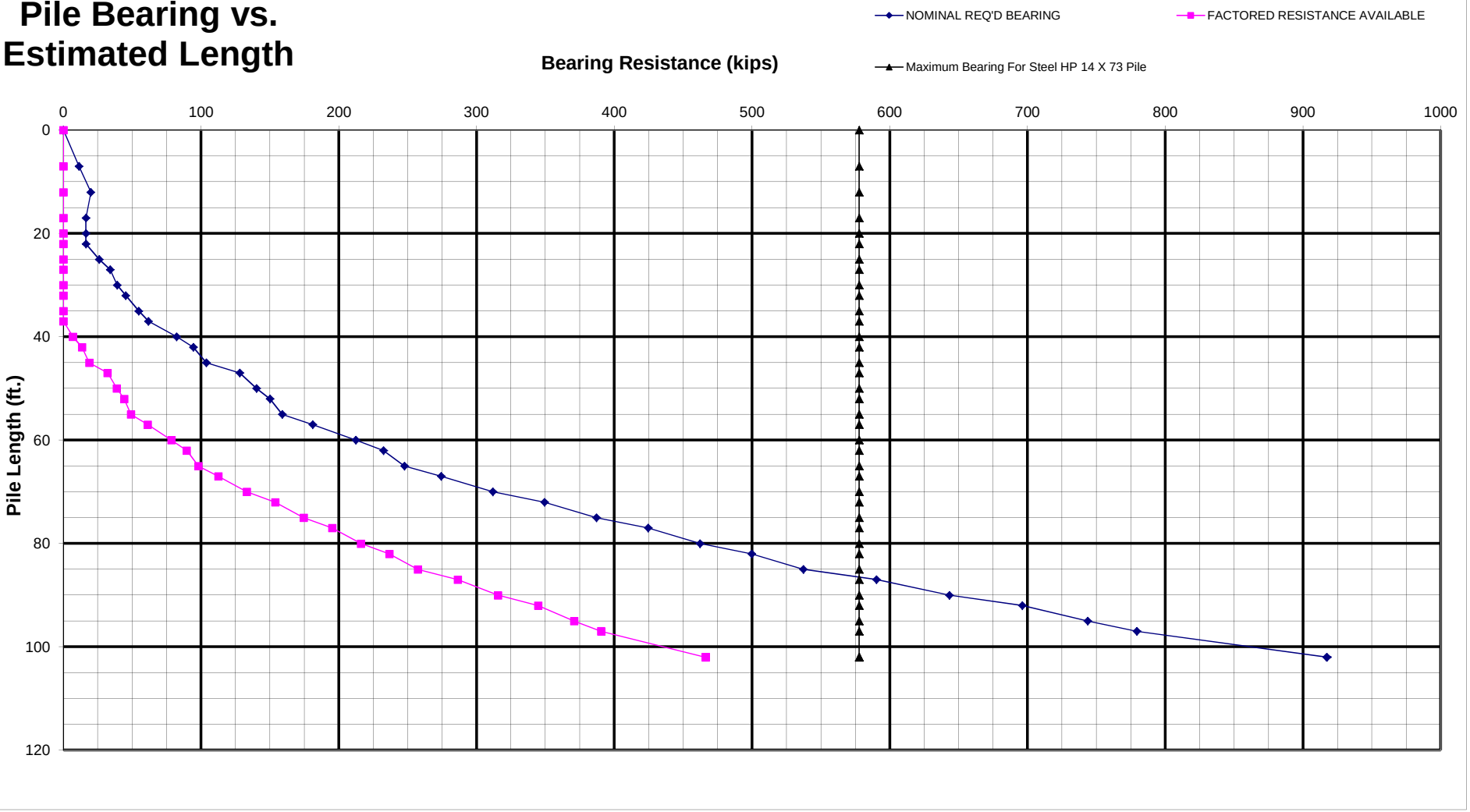
Pile Bearing vs. Estimated Length



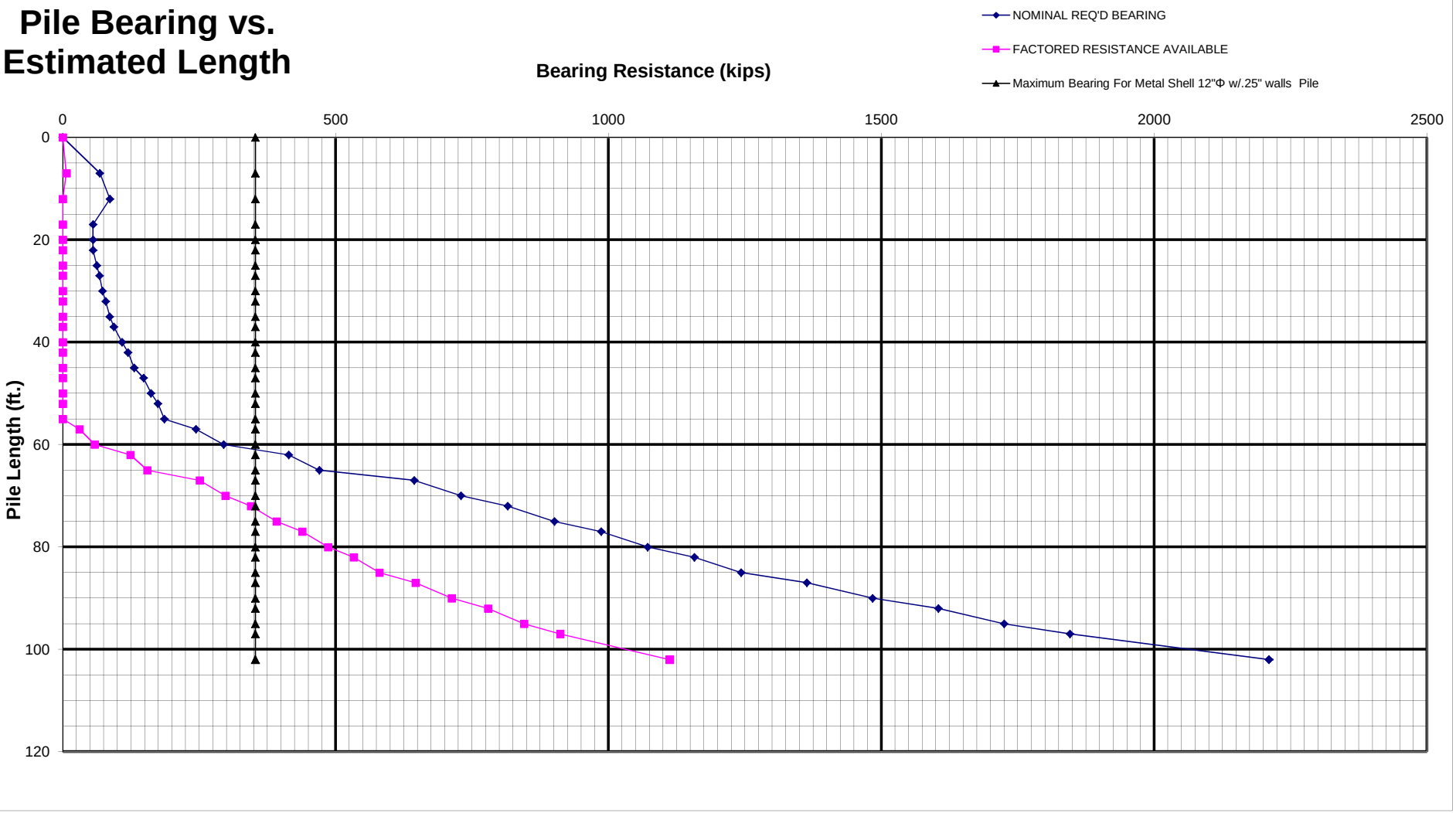
Pile Bearing vs. Estimated Length



Pile Bearing vs. Estimated Length

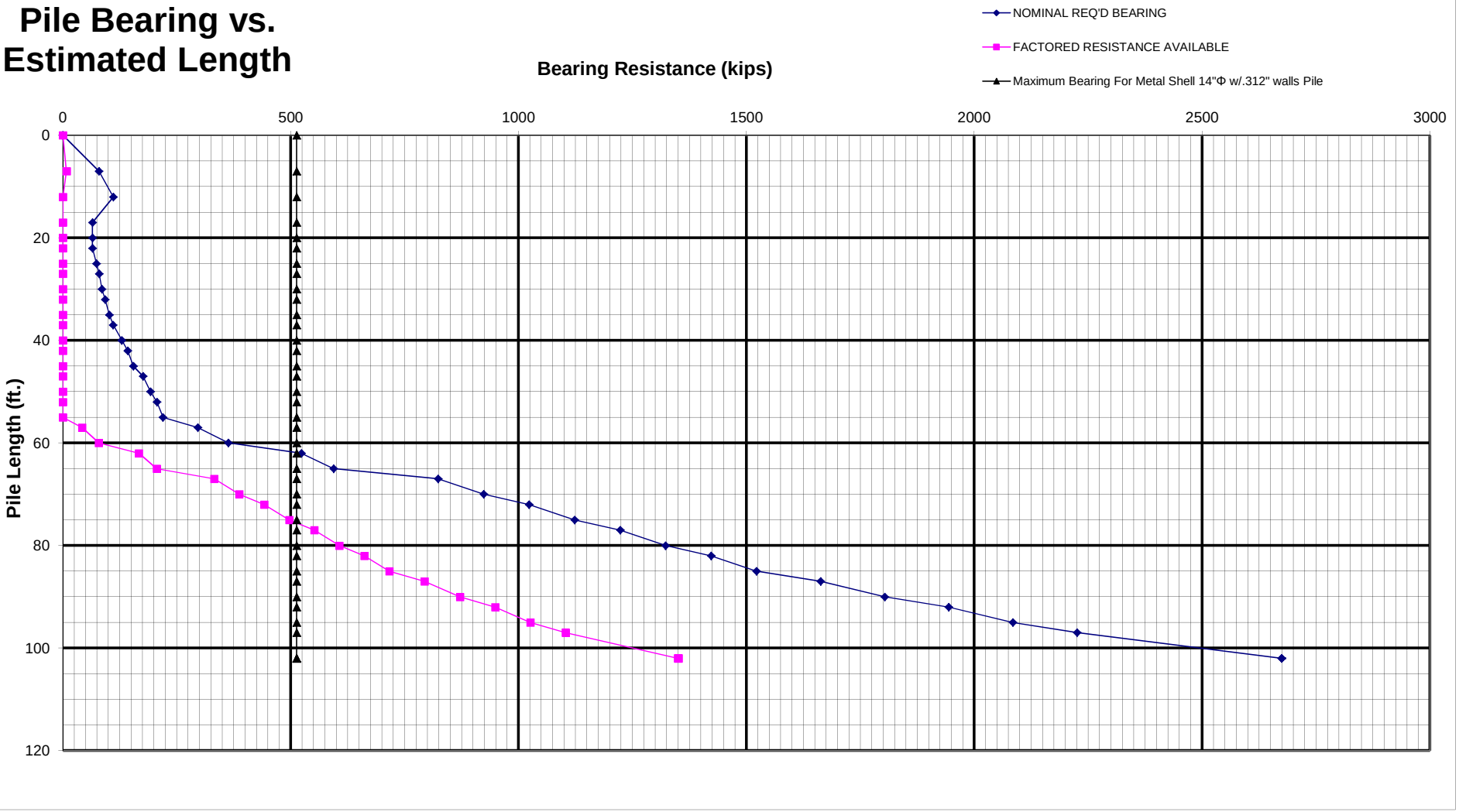


Pile Bearing vs. Estimated Length



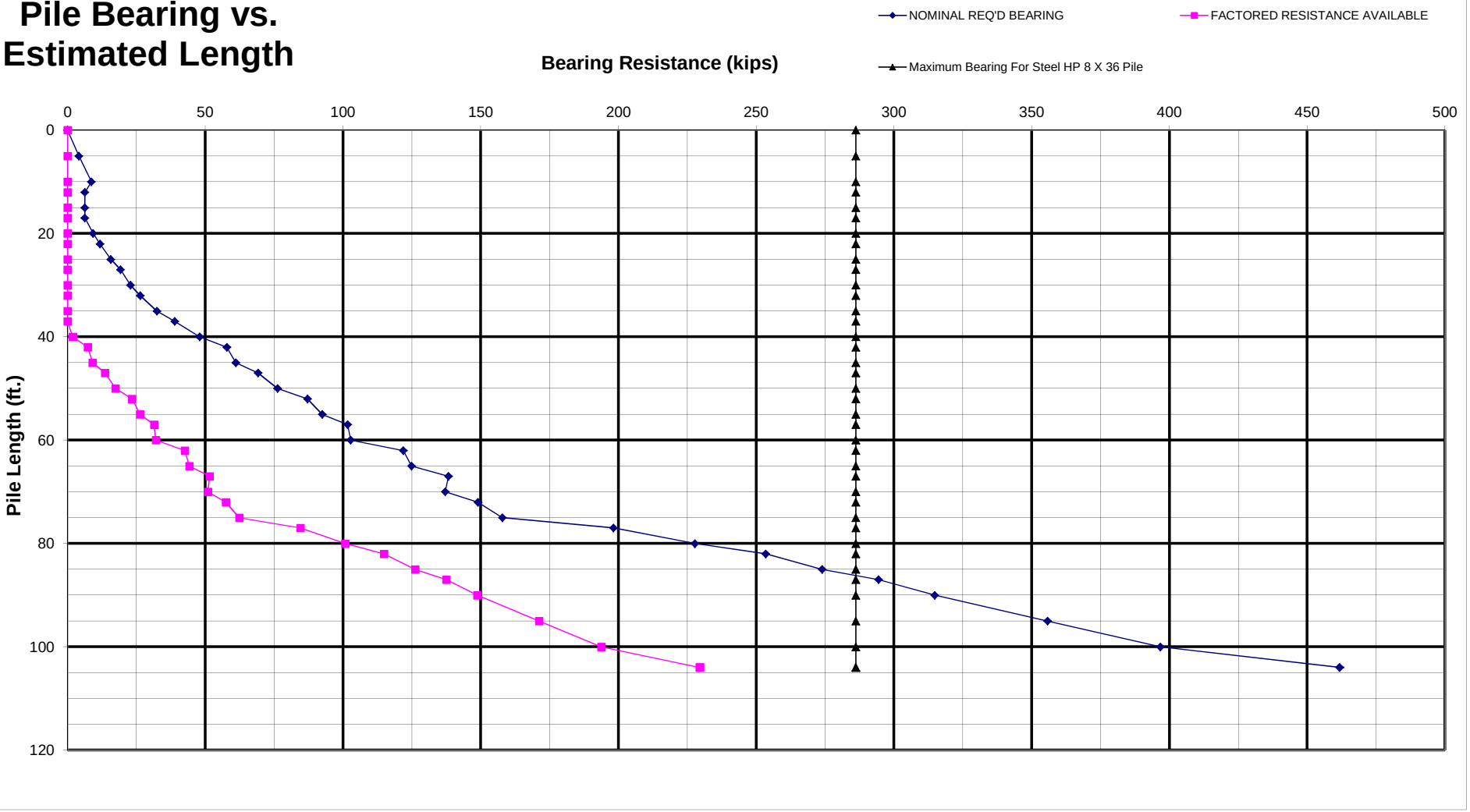
BORING GSI-02

Pile Bearing vs. Estimated Length

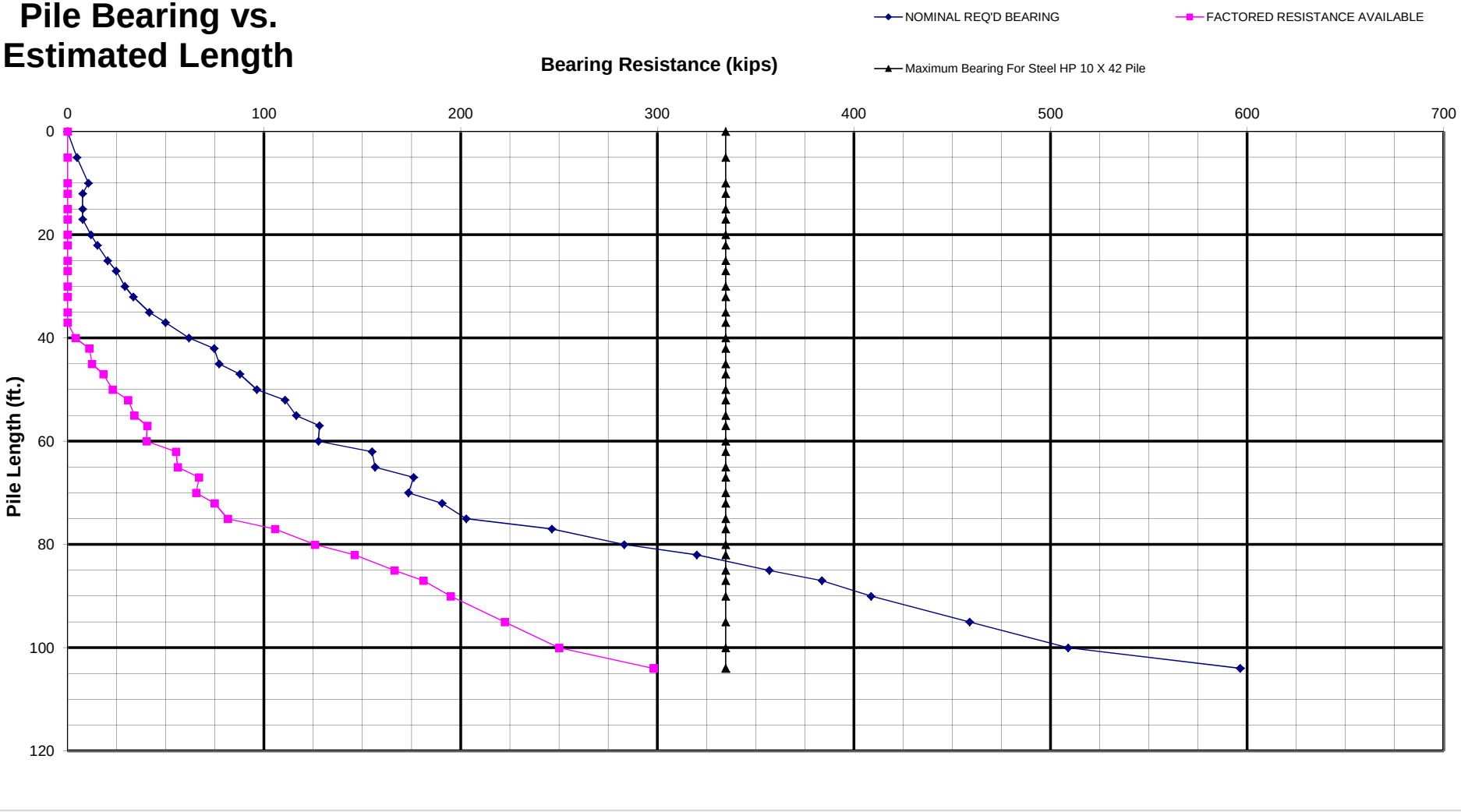


BORING GSI-02

Pile Bearing vs. Estimated Length

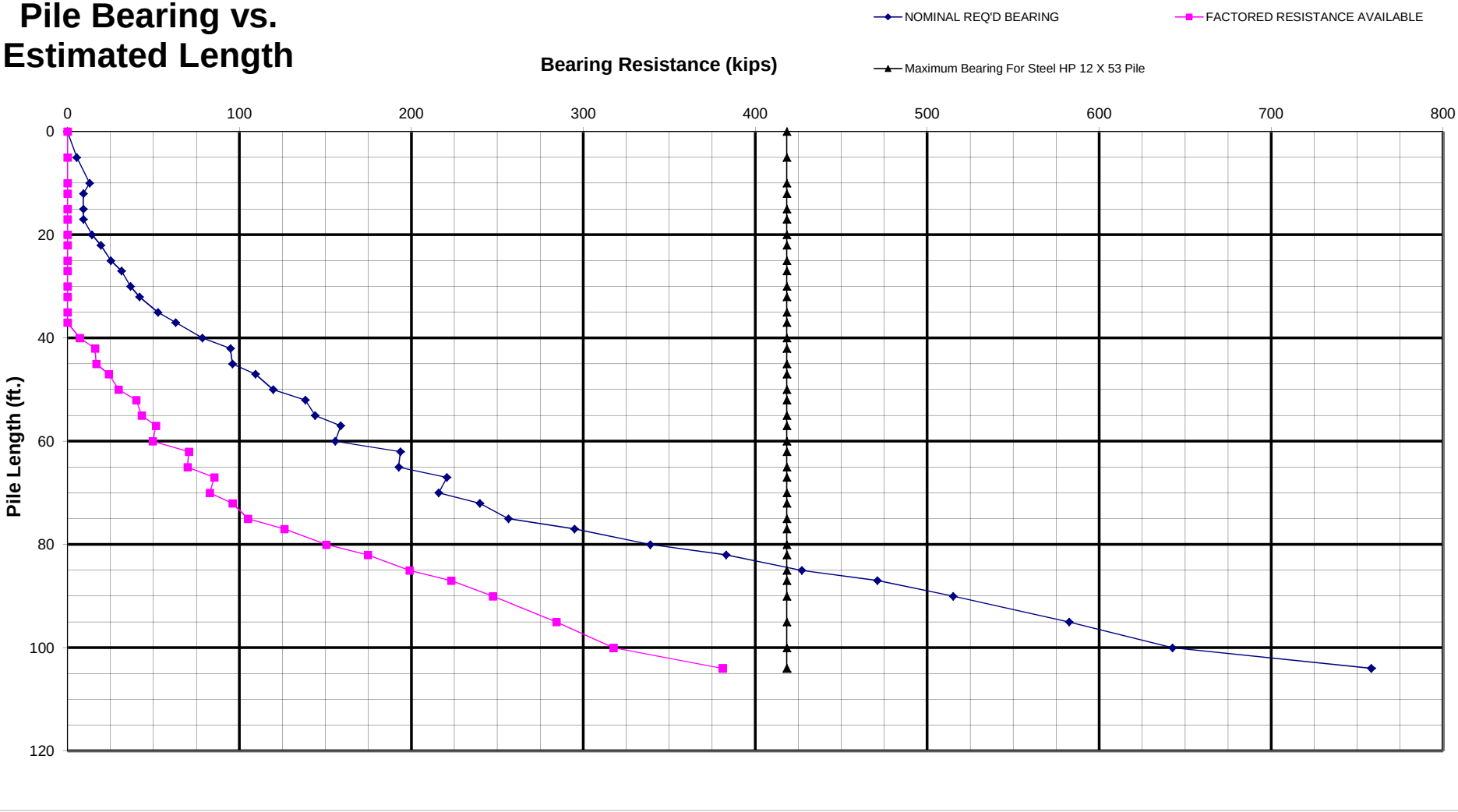


Pile Bearing vs. Estimated Length

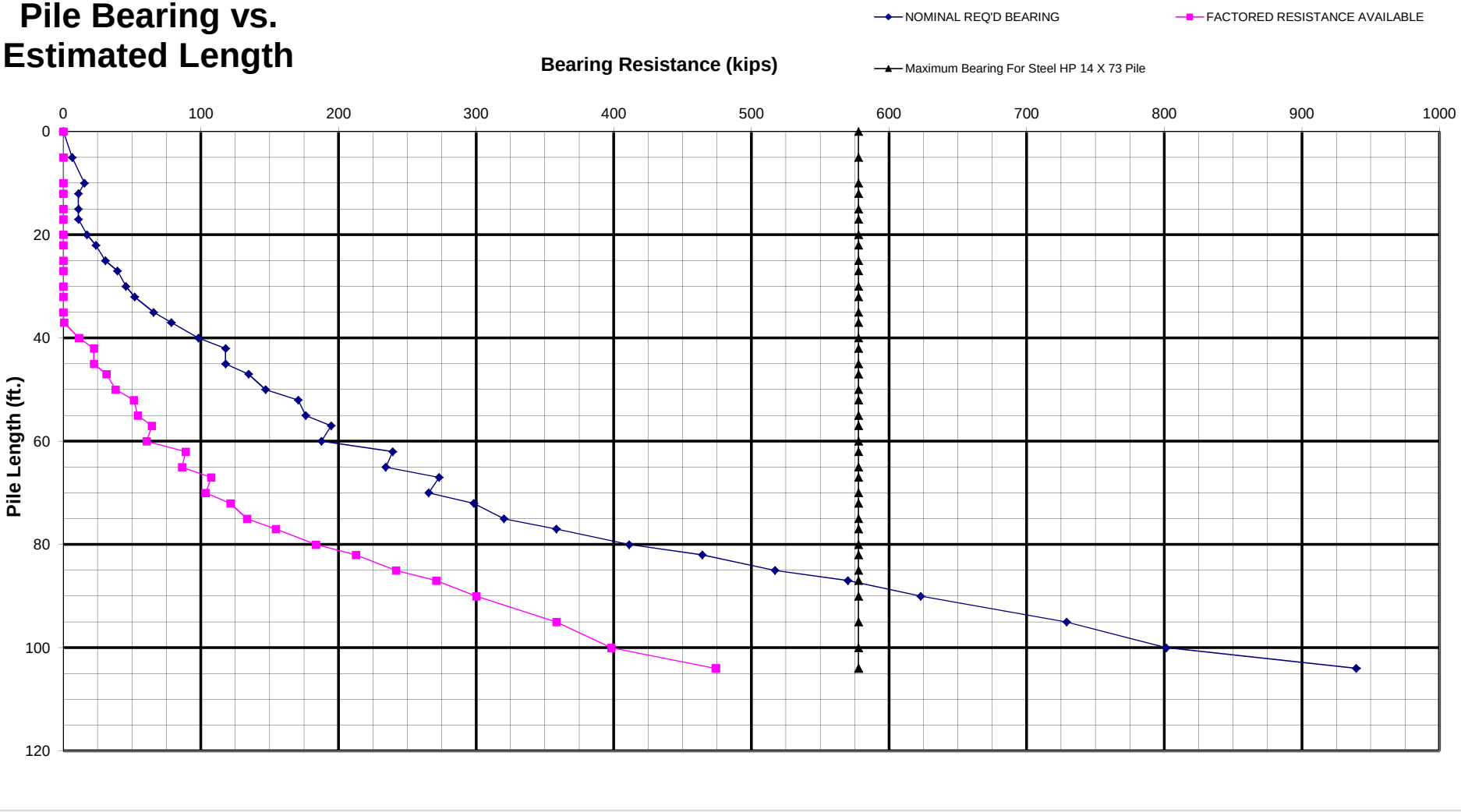


BORING GSI-06

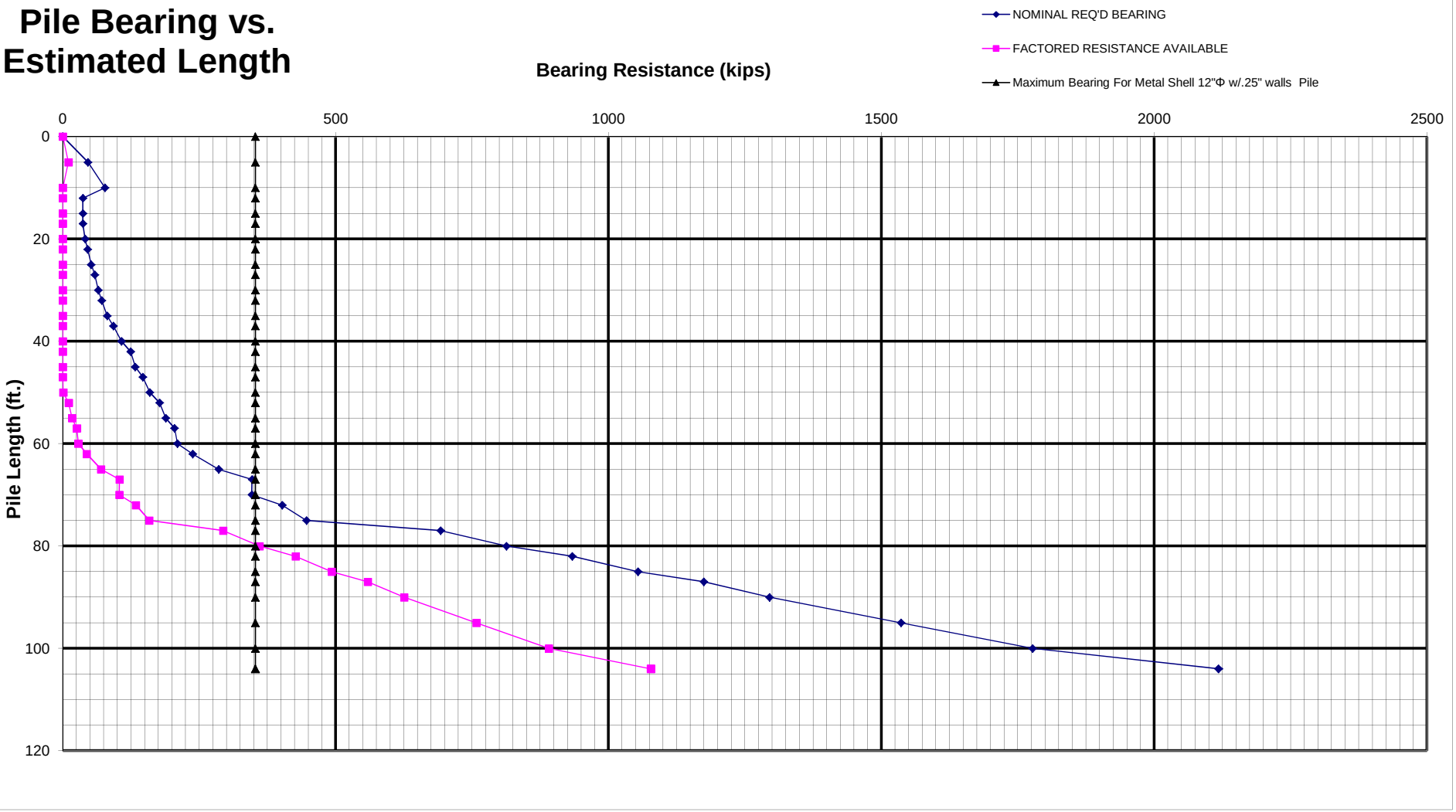
Pile Bearing vs. Estimated Length



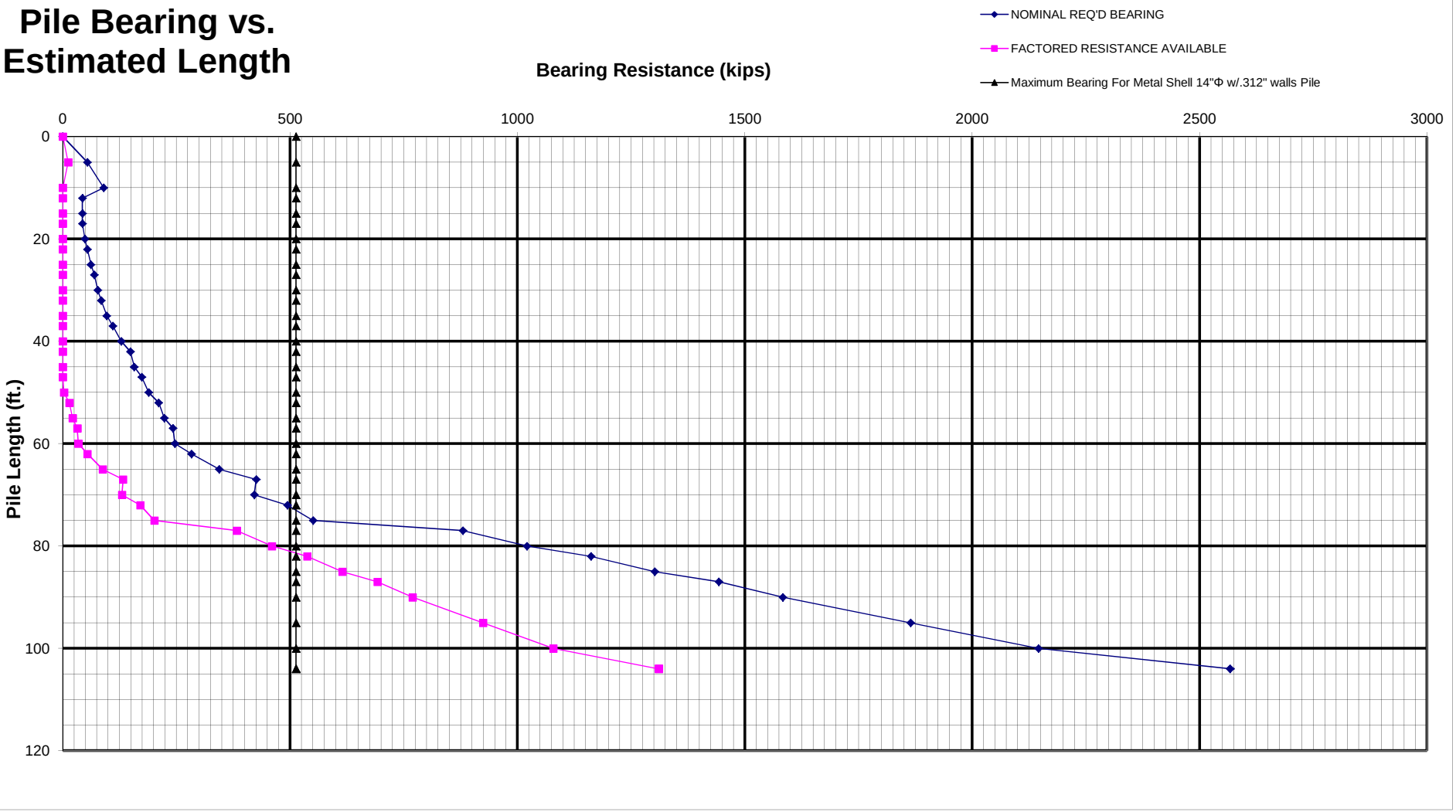
Pile Bearing vs. Estimated Length



Pile Bearing vs. Estimated Length

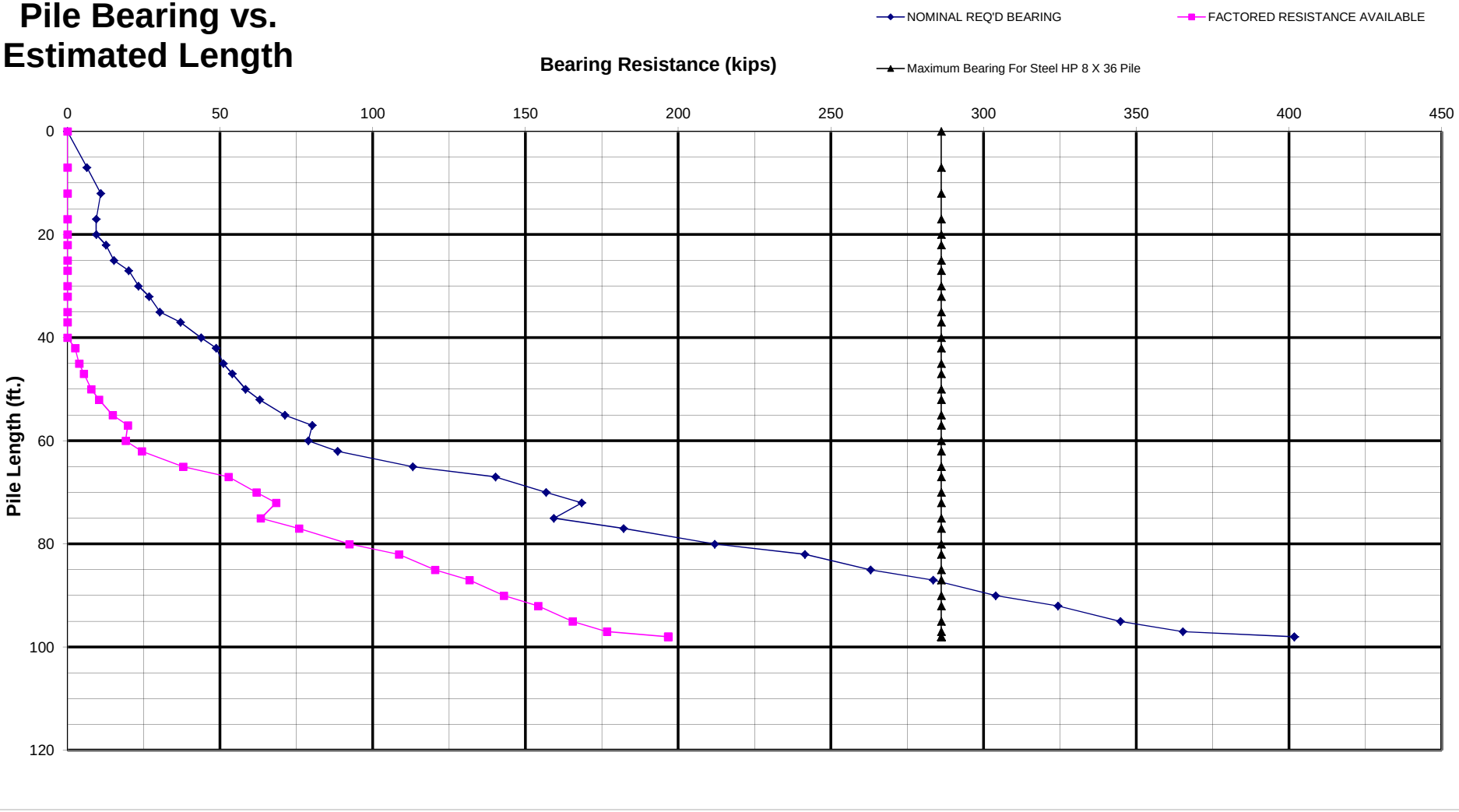


Pile Bearing vs. Estimated Length

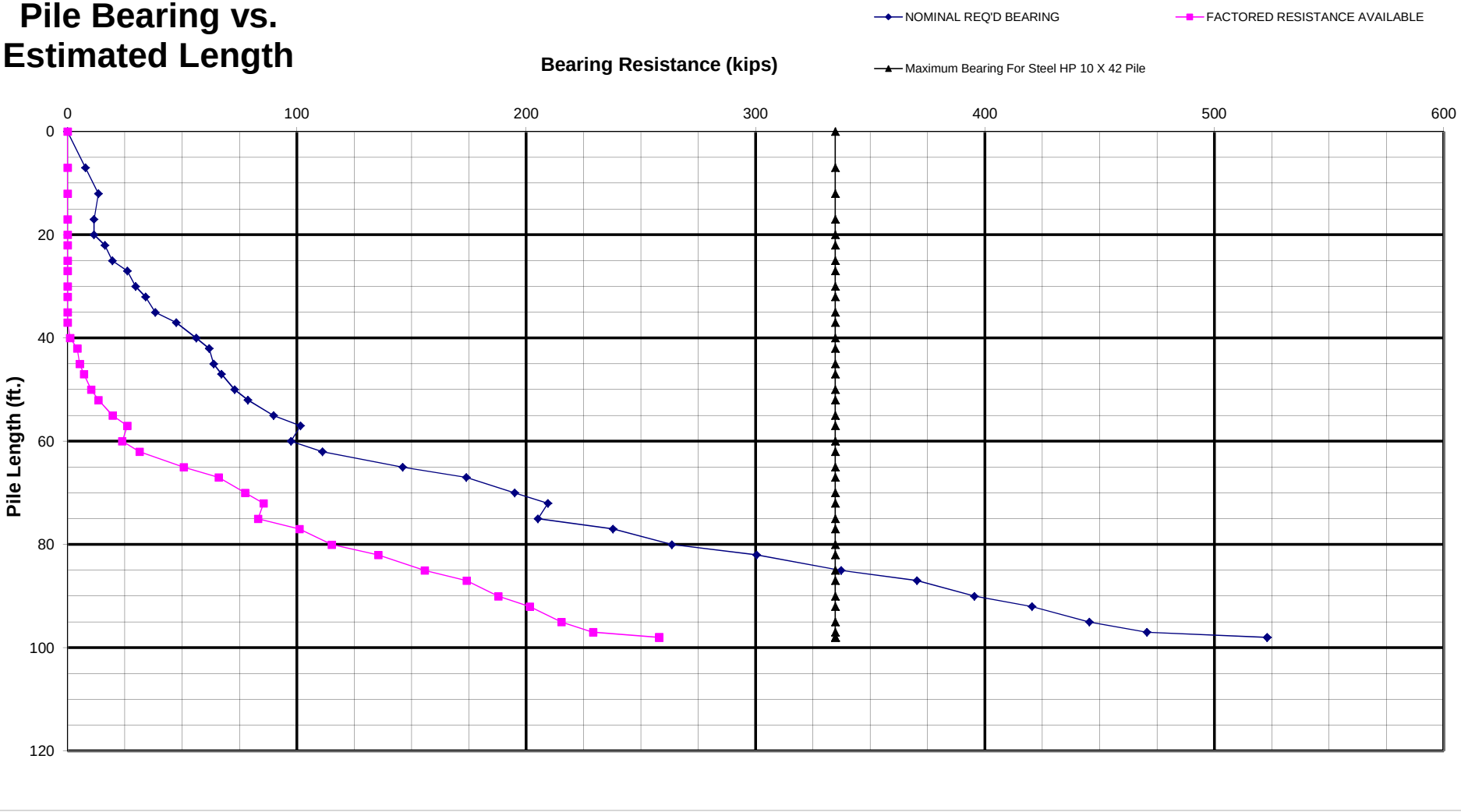


BORING GSI-06

Pile Bearing vs. Estimated Length

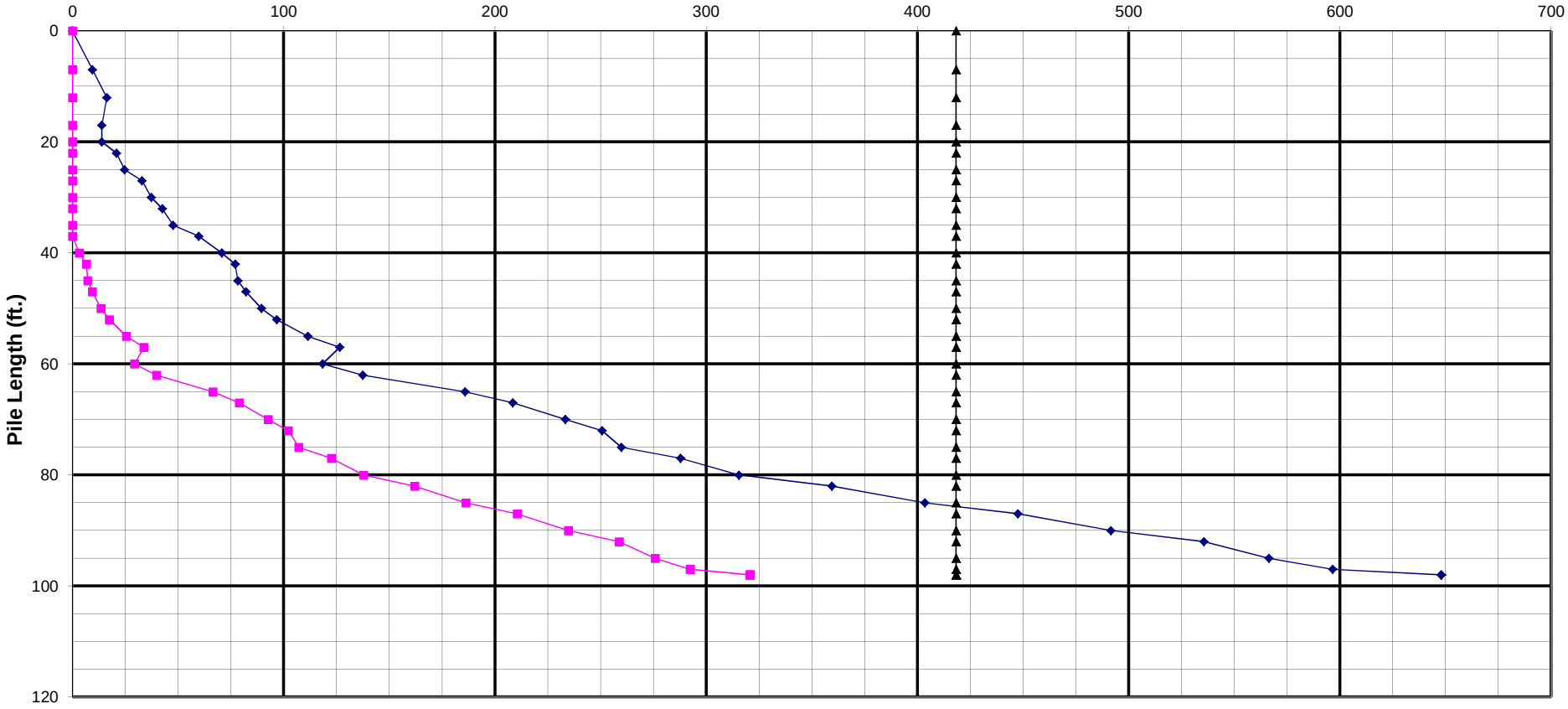


Pile Bearing vs. Estimated Length

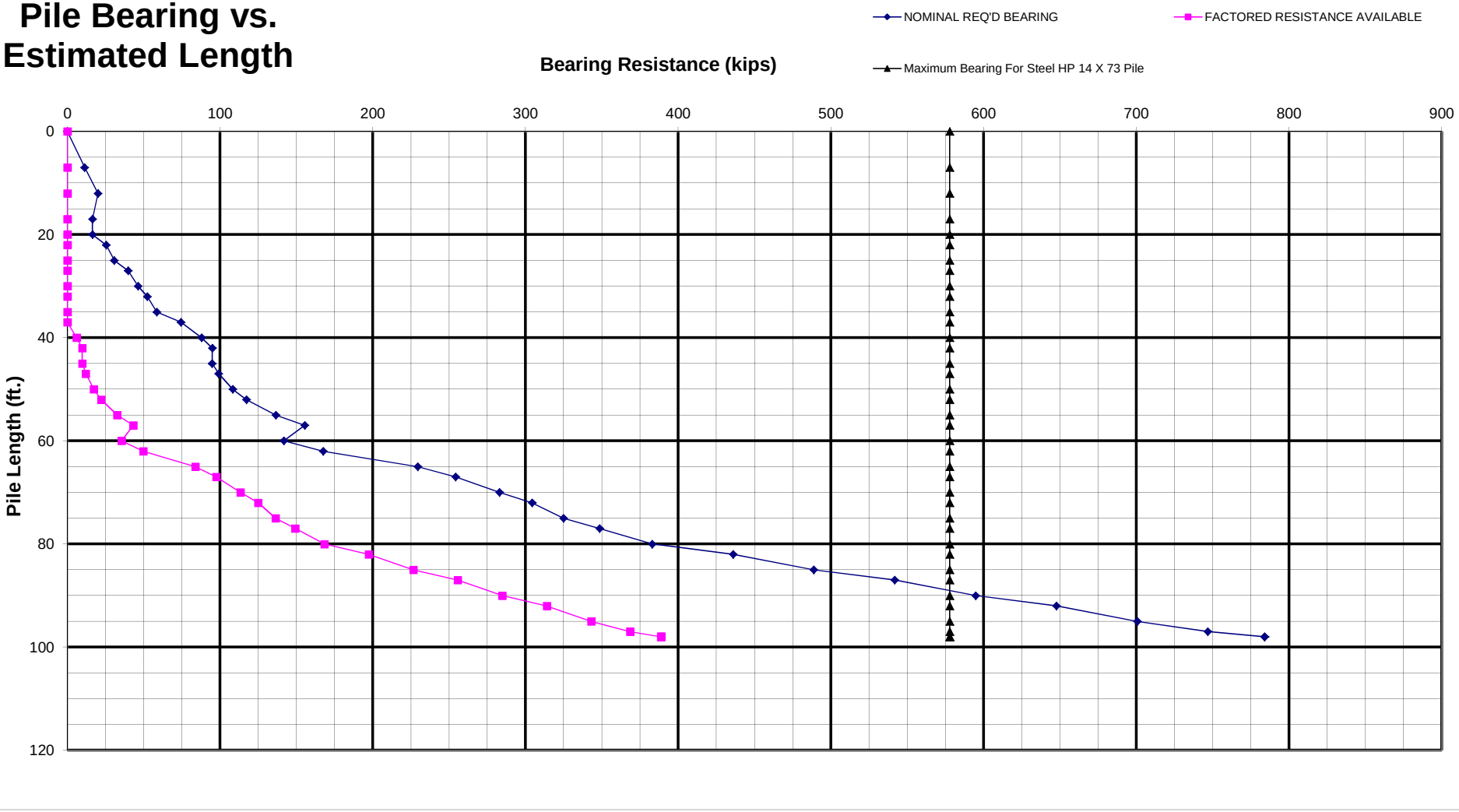


BORING GSI-09

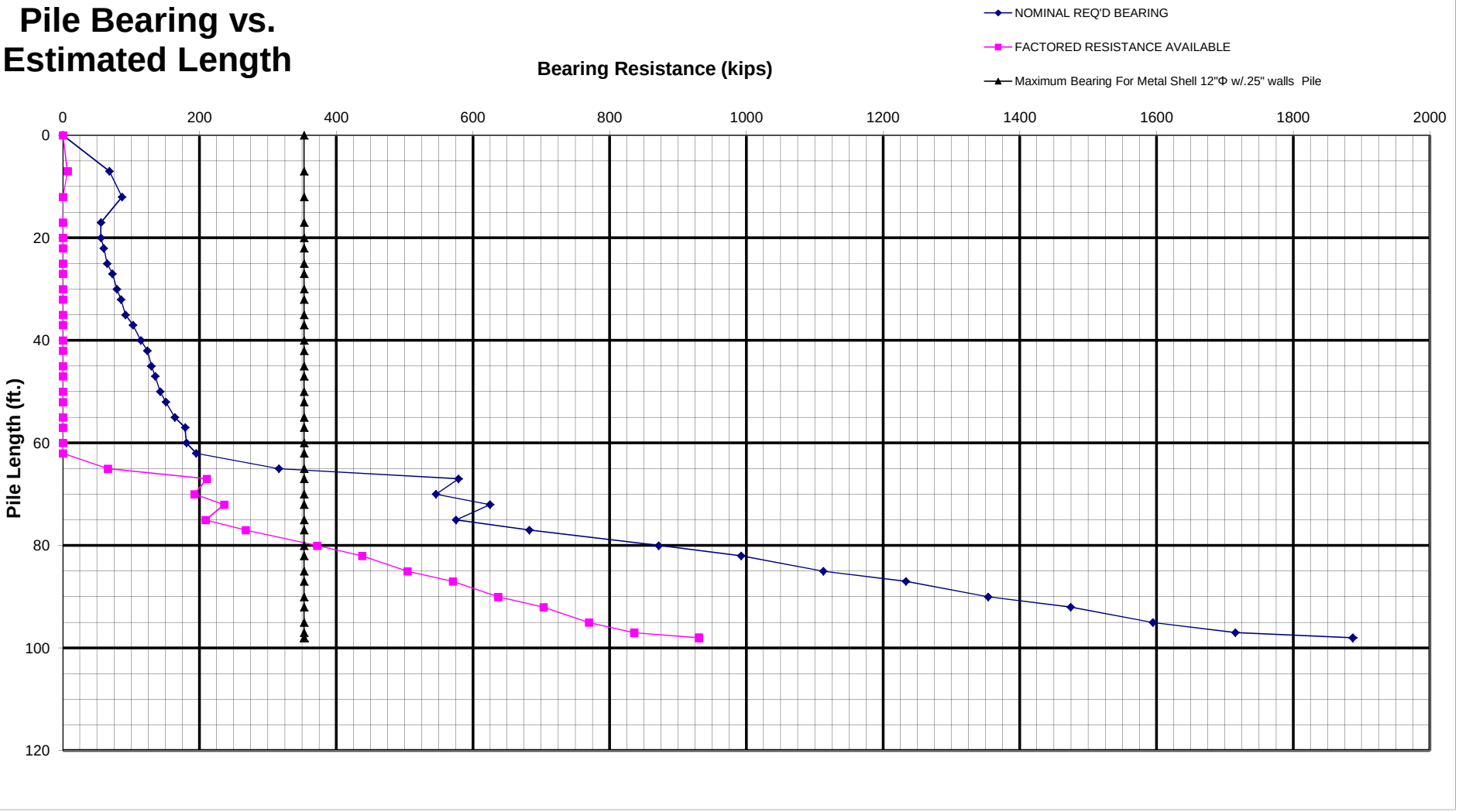
Pile Bearing vs. Estimated Length



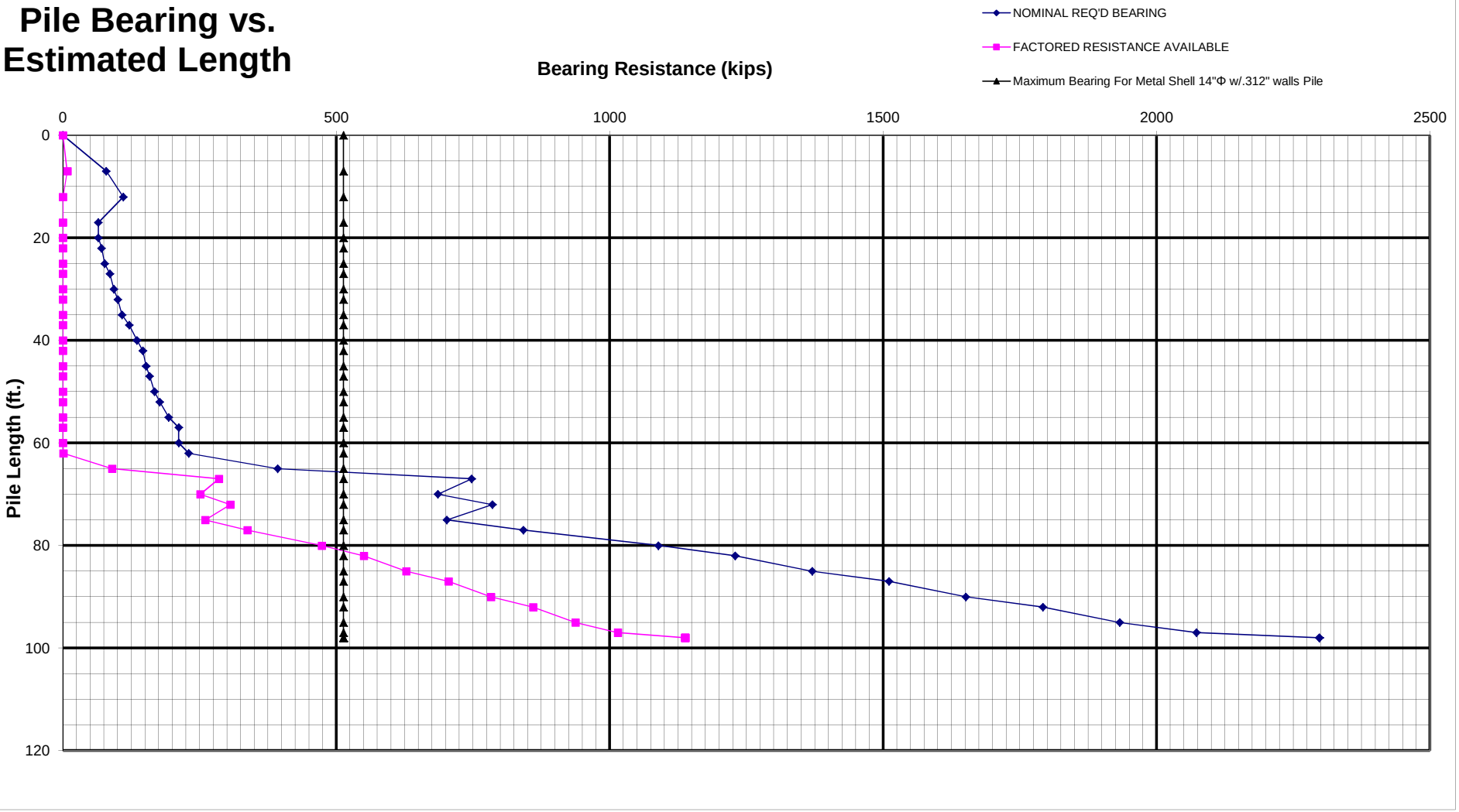
Pile Bearing vs. Estimated Length



Pile Bearing vs. Estimated Length



Pile Bearing vs. Estimated Length

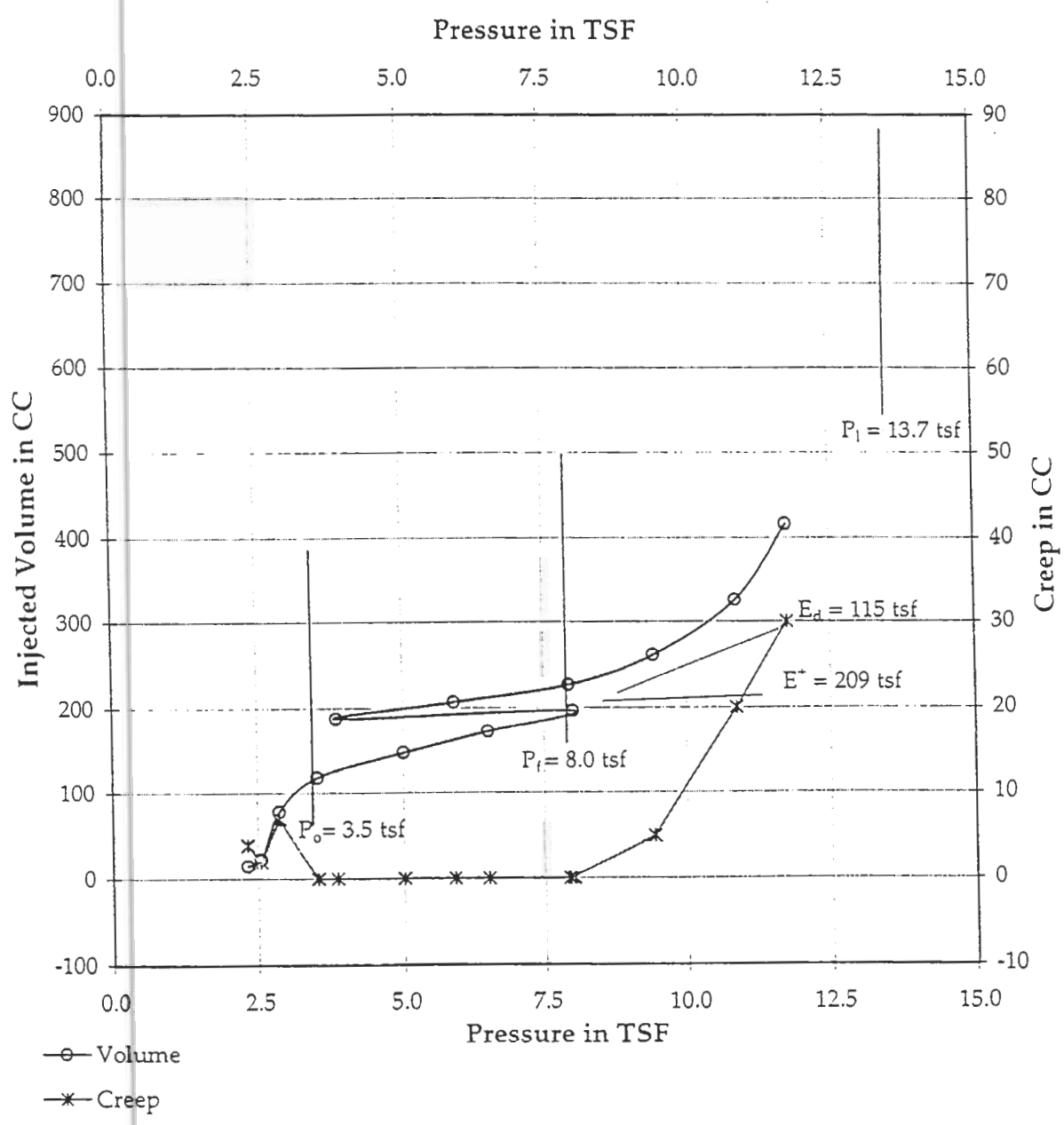


APPENDIX J

INSITU PRESSUREMETER TEST RESULTS (BY OTHERS)

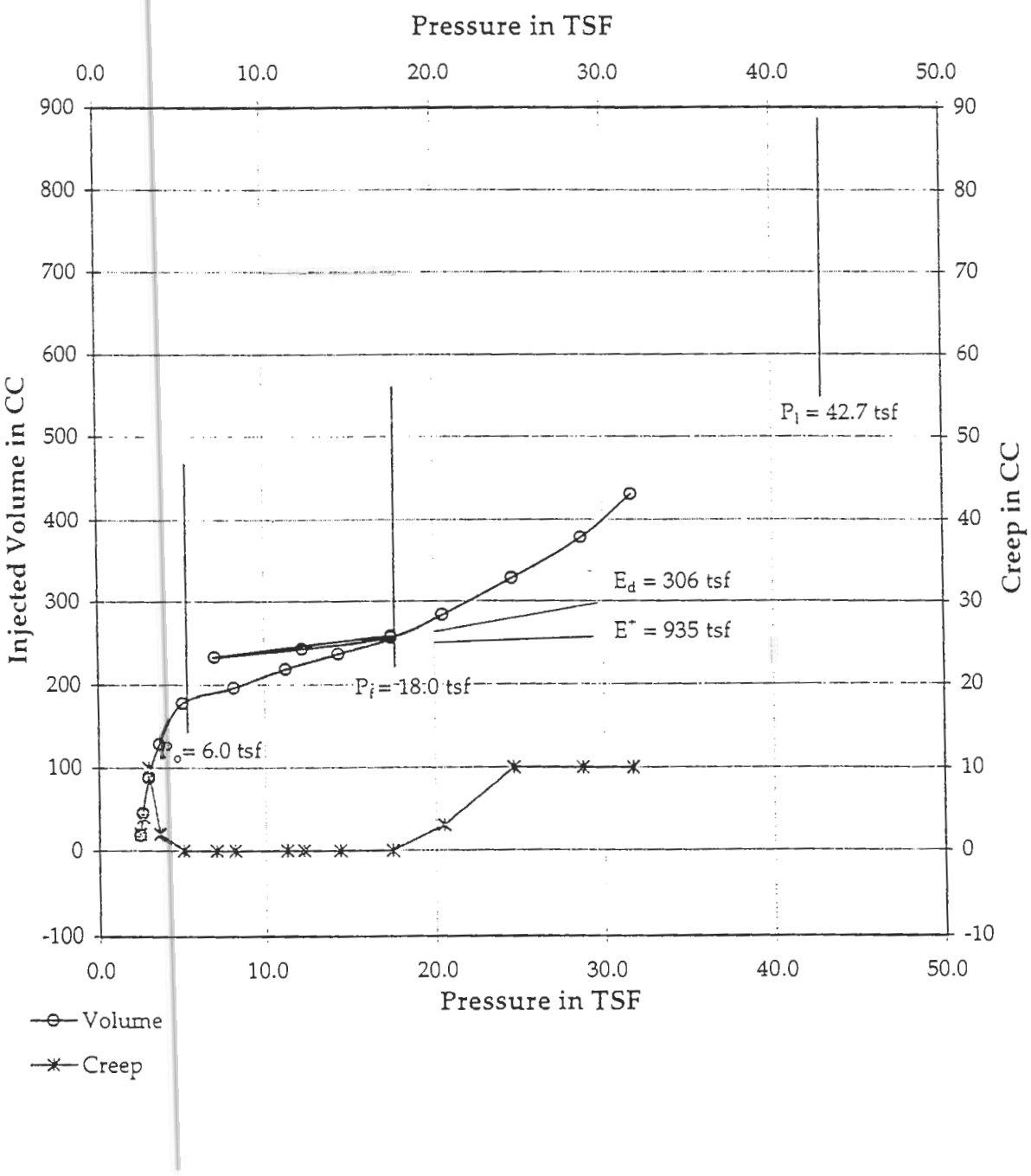
Pressuremeter Data Reduction (BX)

STS Job Number: 30922 Date: 1-26-00
Boring No. 5 (TB-5)
Test Depth: 67.5-70.0 Feet



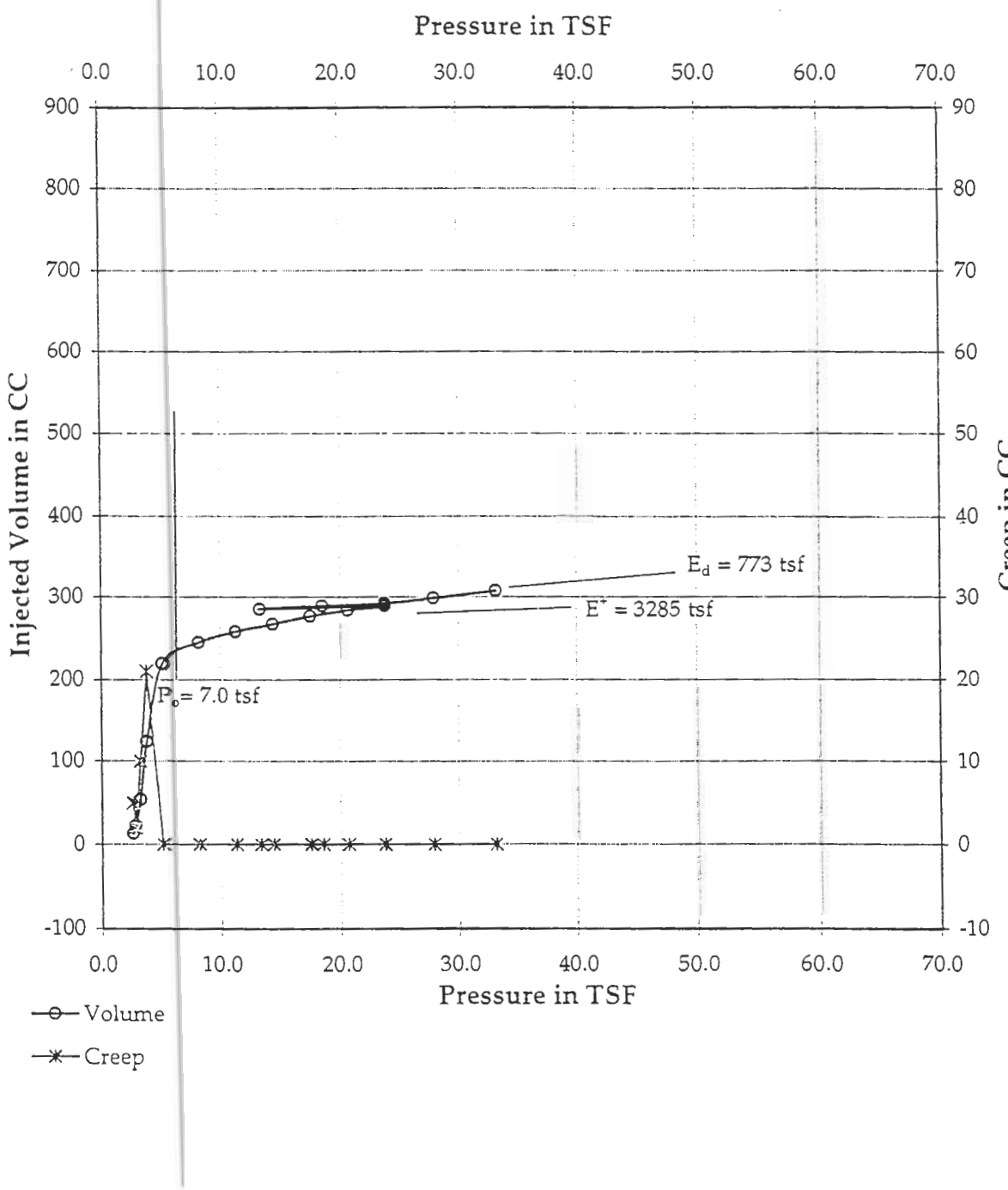
Pressuremeter Data Reduction (BX)

STS Job Number: 30922 Date: 1-26-00
Boring No. 5 (TB-5)
Test Depth: 72.5-75.0 Feet



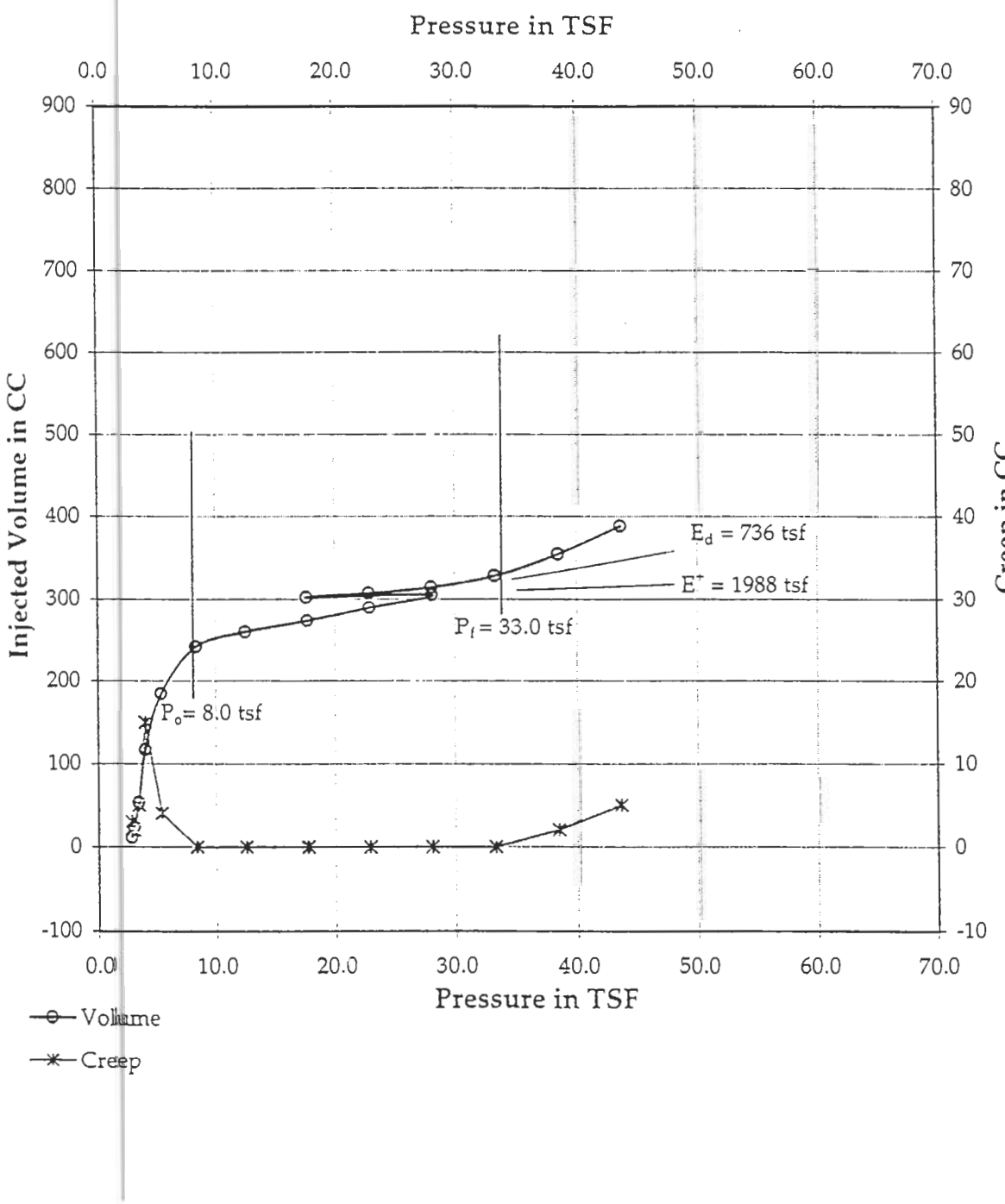
Pressuremeter Data Reduction (BX)

STS Job Number: 30922 Date: 1-27-00
Boring No. 5 (TB-5)
Test Depth: 77.5-80.0 Feet



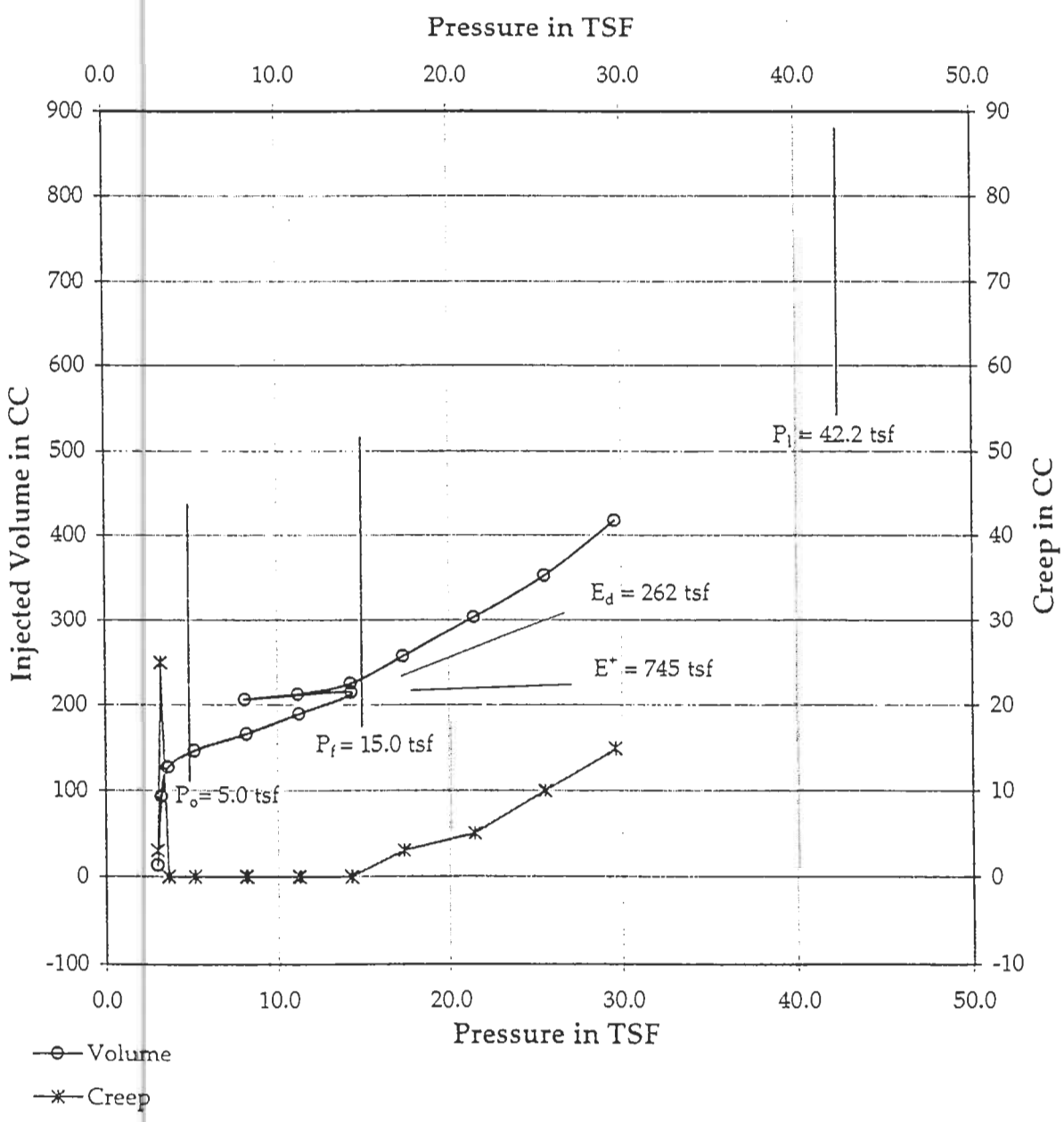
Pressuremeter Data Reduction (BX)

STS Job Number: 30922 Date: 1-26-00
Boring No. 5 (TB-5)
Test Depth: 82.5-85.0 Feet



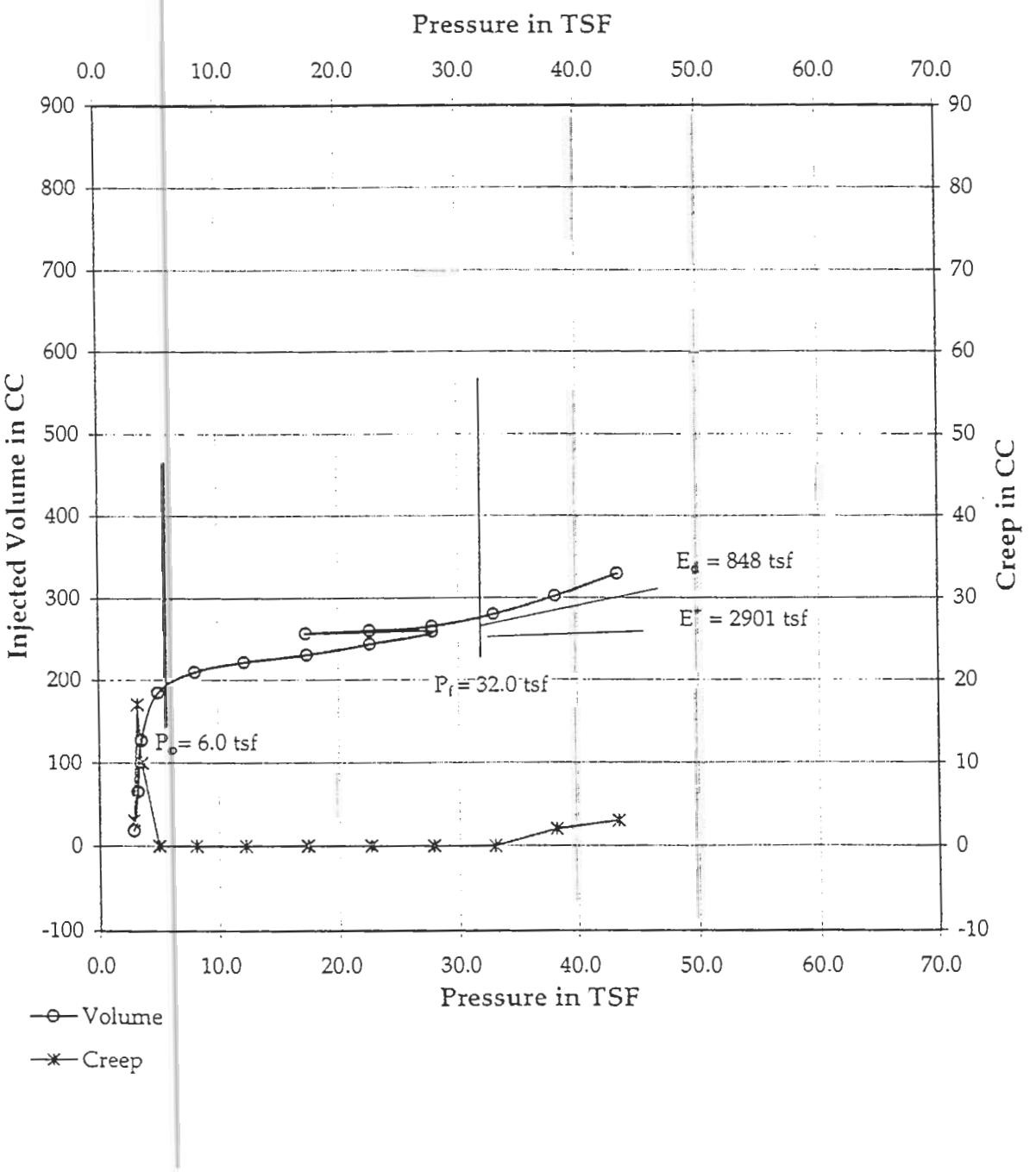
Pressuremeter Data Reduction (BX)

STS Job Number: 30922 Date: 2-2-00
Boring No. 6 (TB-6)
Test Depth: 71.0-73.5 Feet (-64 CCD)



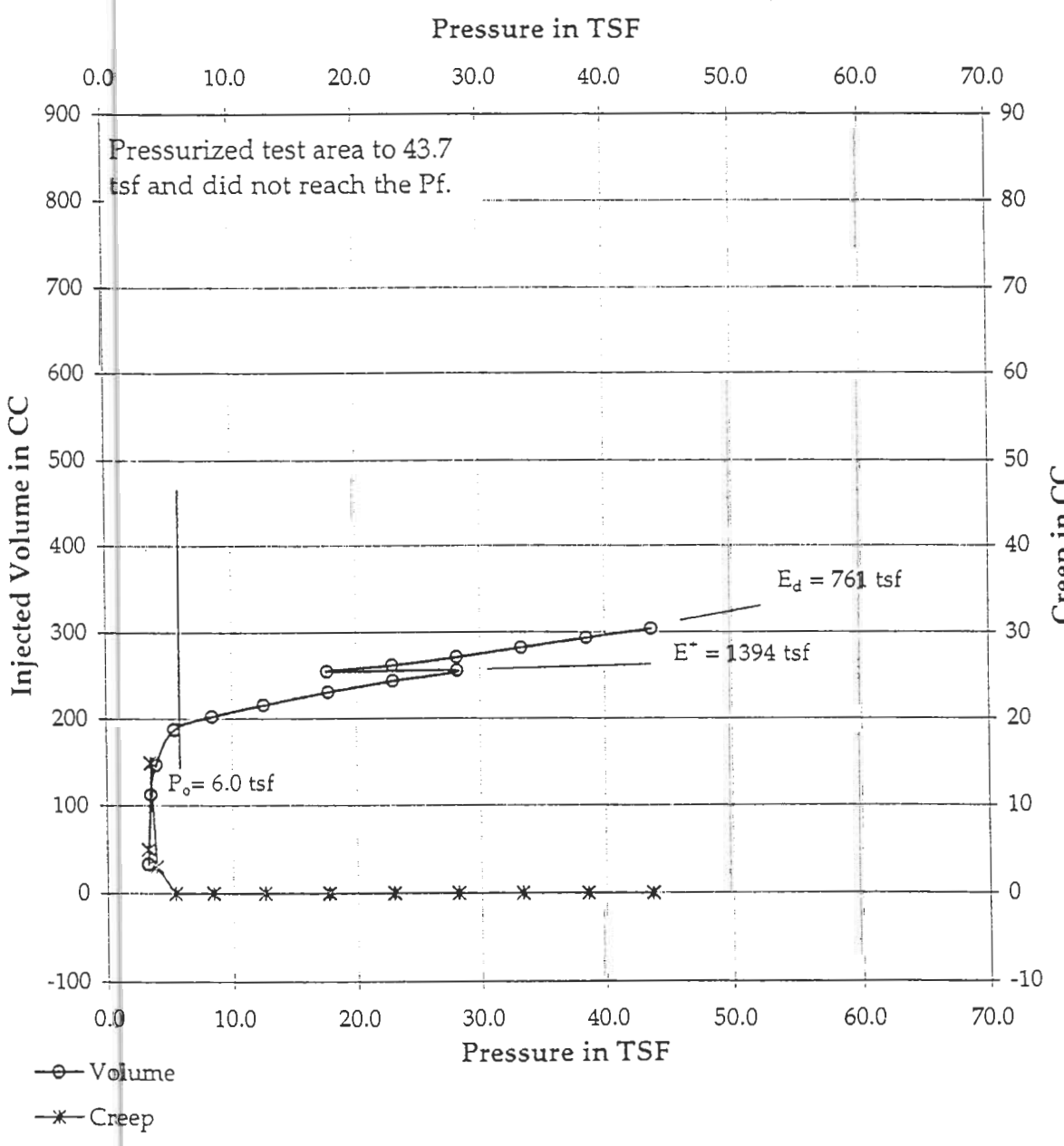
Pressuremeter Data Reduction (BX)

STS Job Number: 30922 Date: 2-2-00
Boring No. 6 (TB-6)
Test Depth: 76.0-78.5 Feet (-69 CCD)



Pressuremeter Data Reduction (BX)

STS Job Number: 30922 Date: 2-2-00
Boring No. 6 (TB-6)
Test Depth: 81.0-83.5 Feet (-74 CCD)



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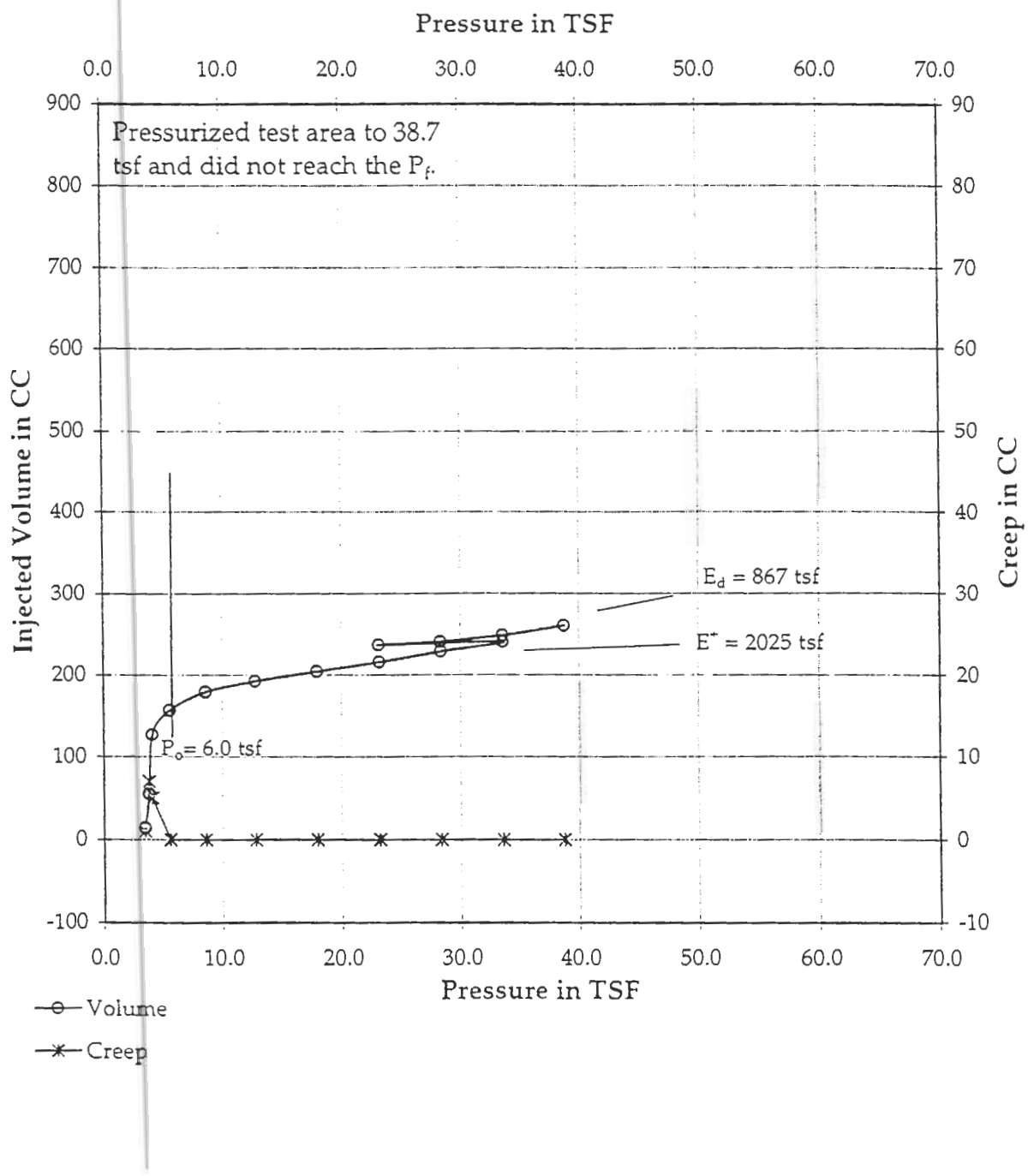
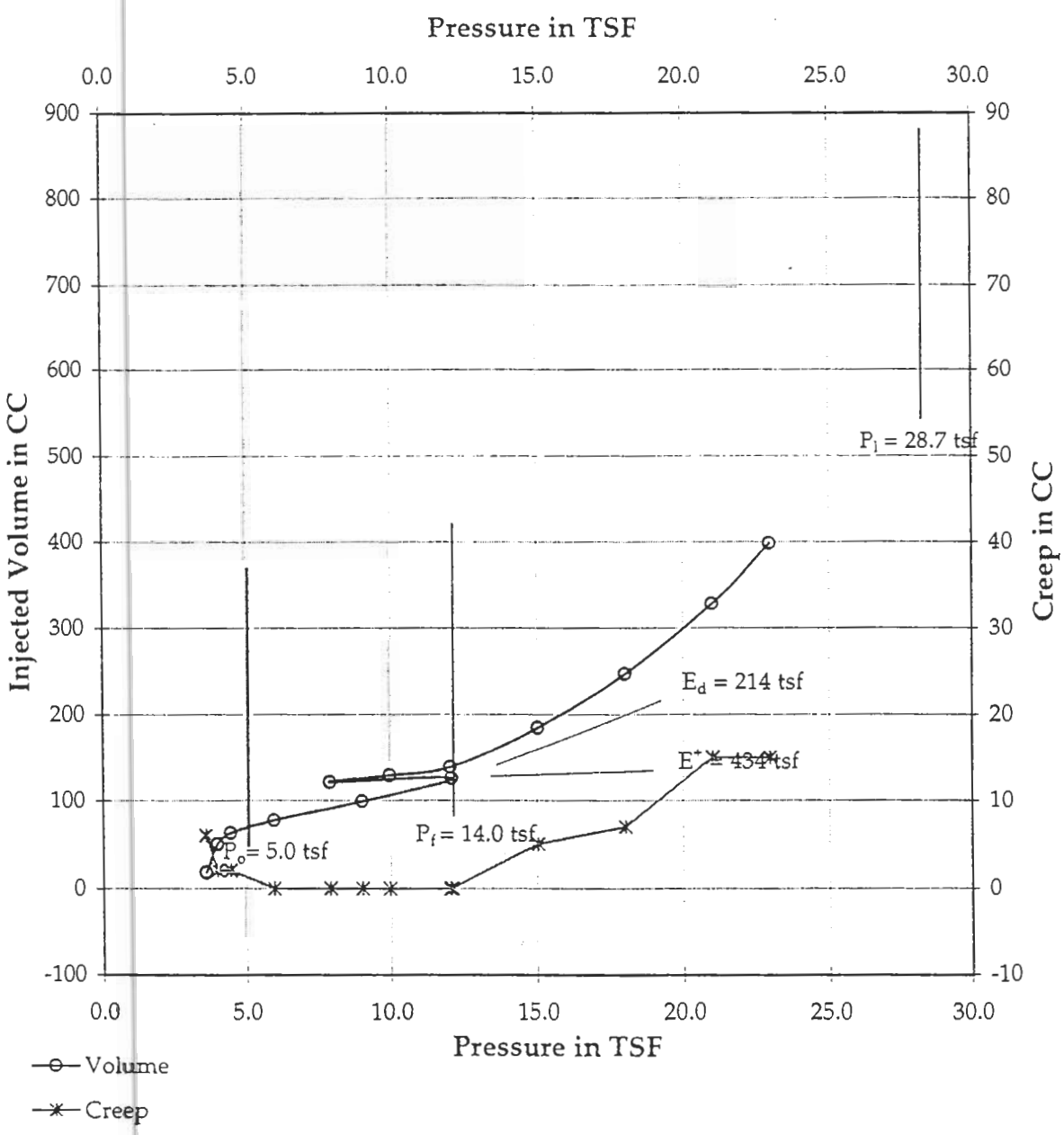
Pressuremeter Data Reduction (BX)

STS Job Number: 30922 Date: 2-2-00
Boring No. 6 (TB-6)
Test Depth: 86.0-88.5 Feet (-79 CCD)



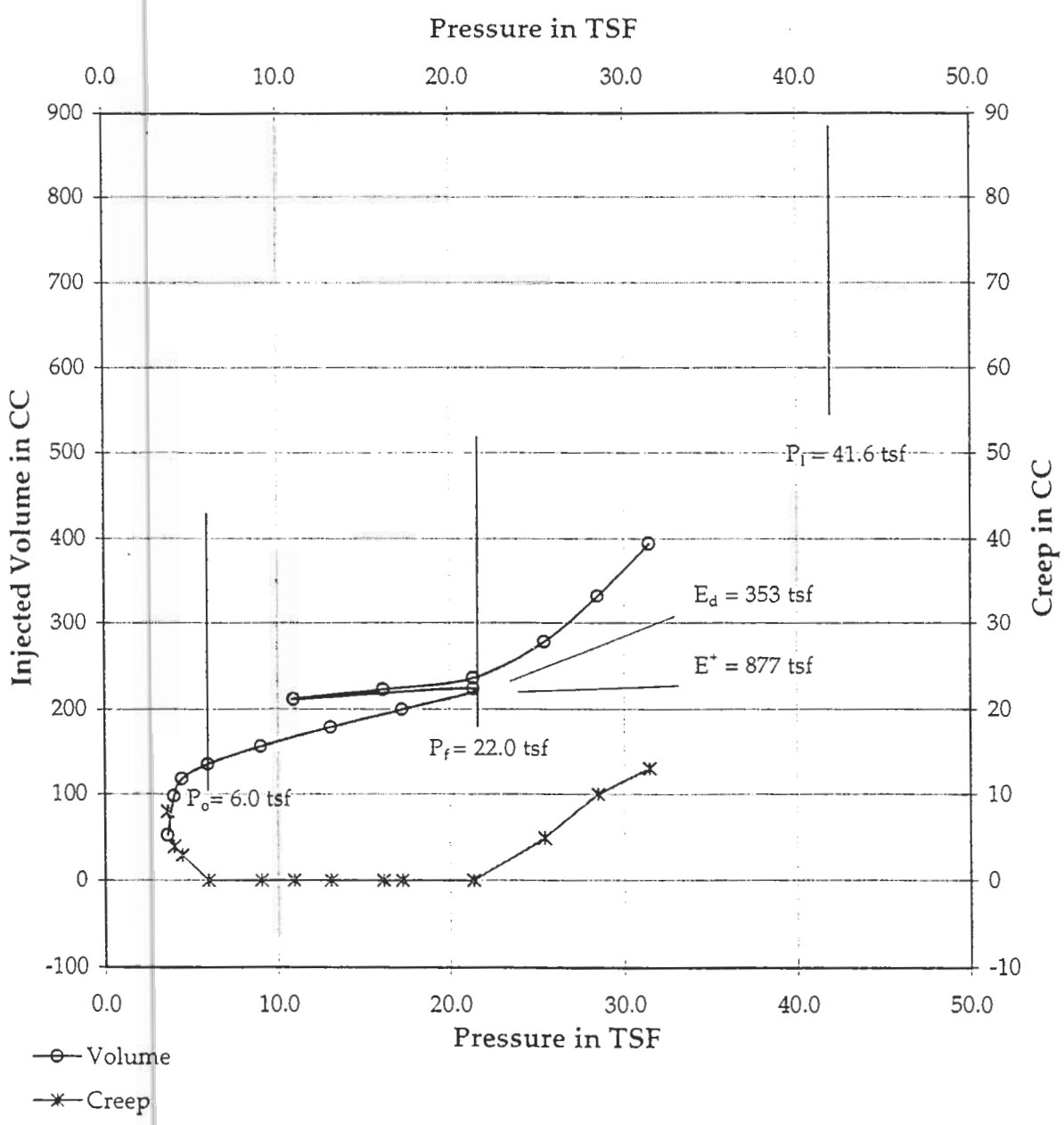
Pressuremeter Data Reduction (BX)

STS Job Number: 30922 Date: 3-7-00
Boring No. 7 (ETB-7)
Test Depth: 91.0-93.5 Feet (-70 CCD)



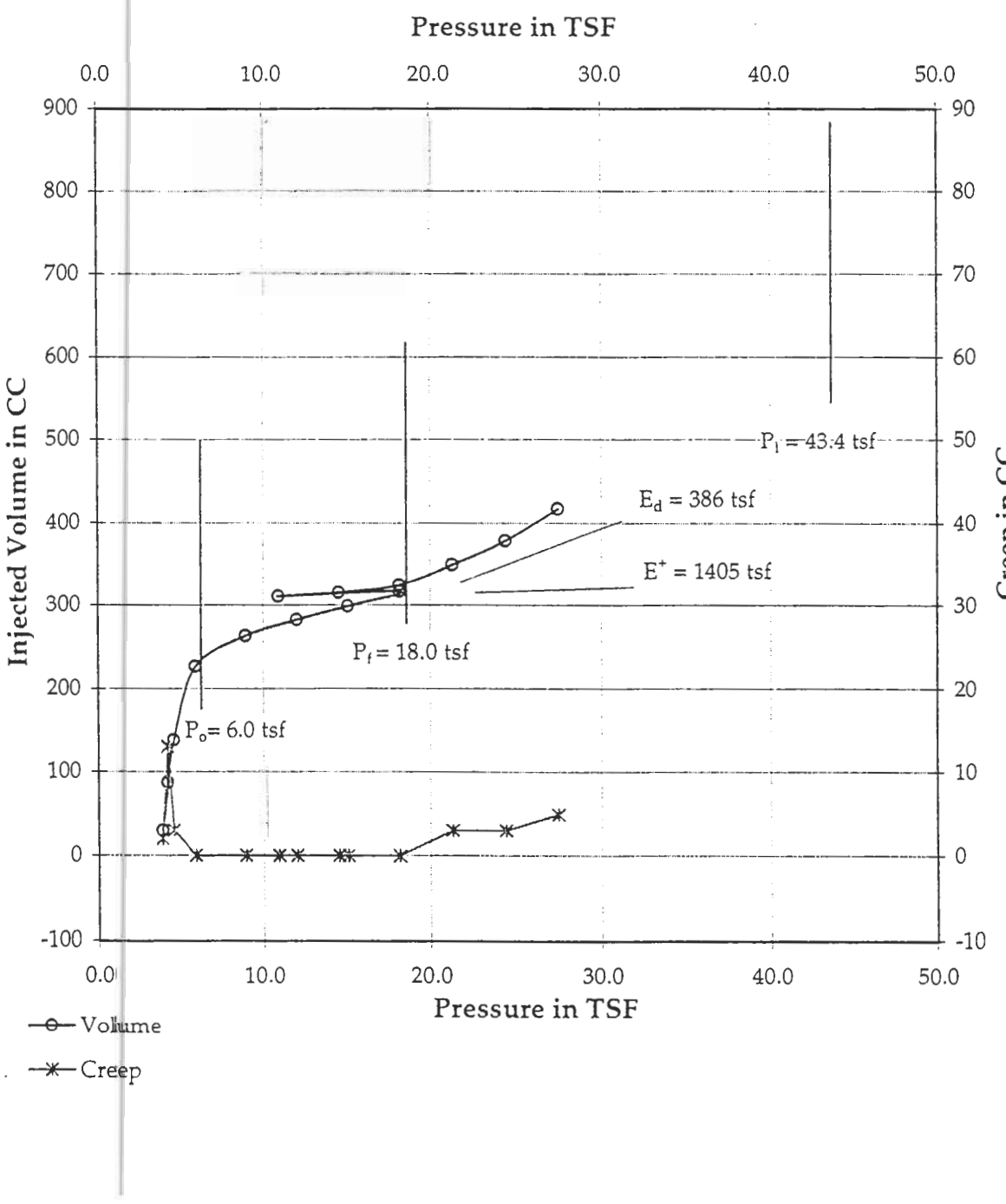
Pressuremeter Data Reduction (BX)

STS Job Number: 30922 Date: 3-7-00
Boring No. 7 (ETB-7)
Test Depth: 96.0-98.5 Feet (-75 CCD)



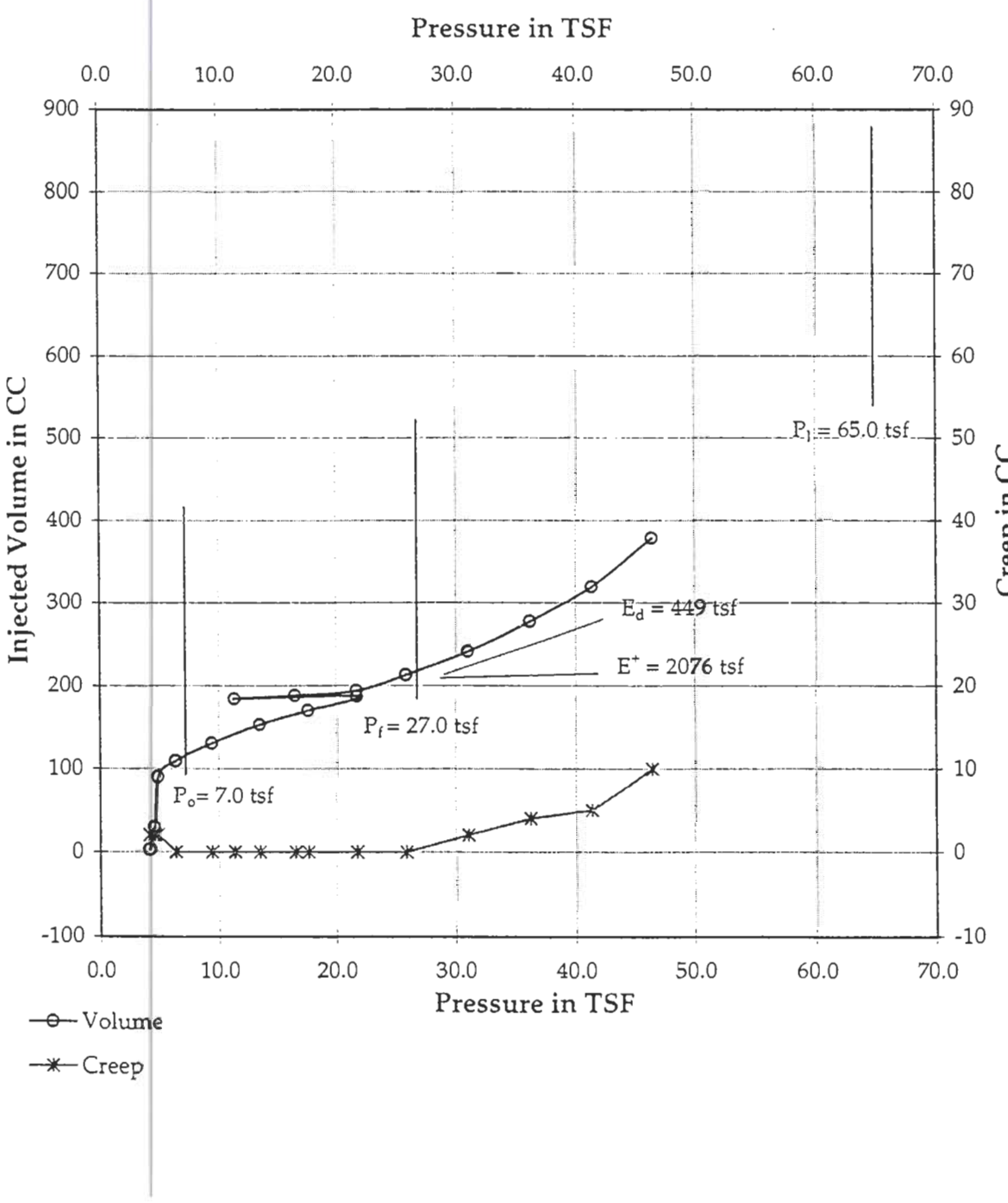
Pressuremeter Data Reduction (BX)

STS Job Number: 30922 Date: 3-7-00
Boring No. 7 (ETB-7)
Test Depth: 101.0-103.5 Feet (-80 CCD)



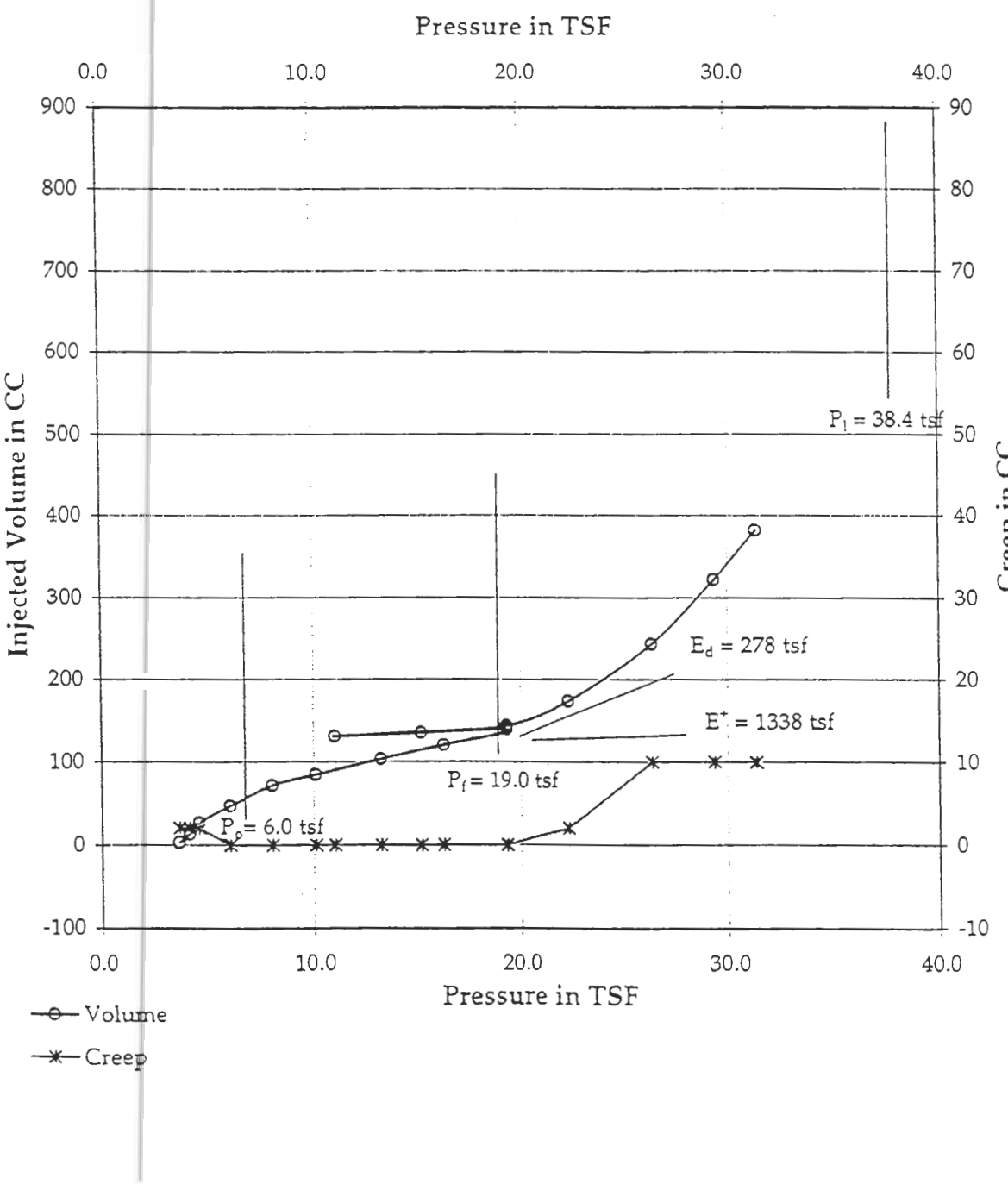
Pressuremeter Data Reduction (BX)

STS Job Number: 30922 Date: 3-7-00
Boring No. 7 (ETB-7)
Test Depth: 106.0-108.5 Feet (-85 CCD)



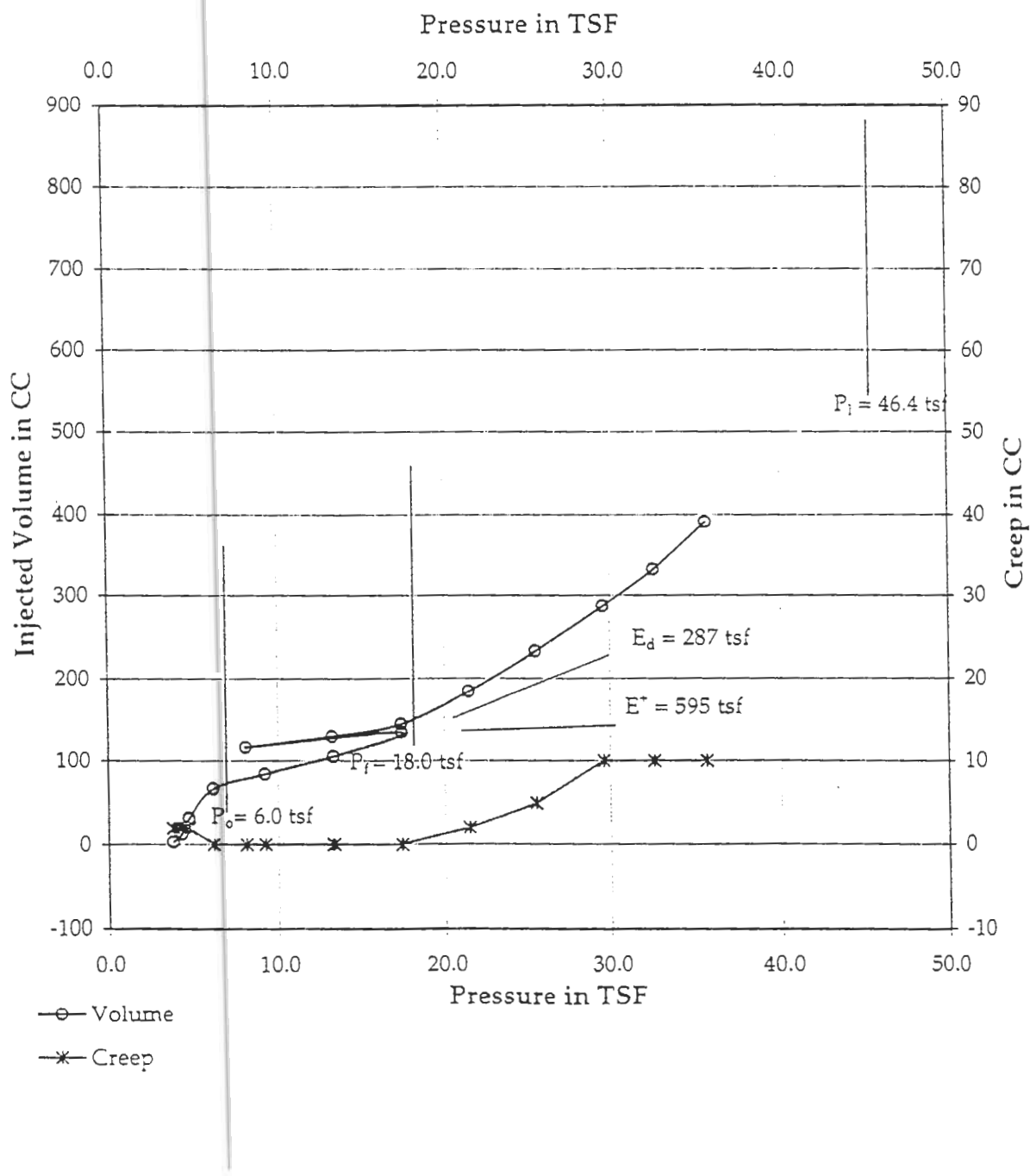
Pressuremeter Data Reduction (BX)

STS Job Number: 30922 Date: 3-17-00
Boring No. 2 (MW-2)
Test Depth: 91.0-93.5 Feet



Pressuremeter Data Reduction (BX)

STS Job Number: 30922 Date: 3-17-00
Boring No. 2 (MB-2)
Test Depth: 96.0-98.5 Feet



Pressuremeter Data Reduction (BX)

STS Job Number: 30922 Date: 3-17-00
Boring No. 2 (MB-2)
Test Depth: 101.0-103.5 Feet