Pertinent Excerpts from
Dike Stability Investigation Report
Ames Municipal Electric System
Ames, IA
Wenck Associates, Inc
April 2016

Field Investigation Summary (Section 3.0)
Soil Boring Map (Figure 2)
SPT Boring Logs (Appendix C)
CPT Sounding Results (Appendix D)
Soil Sampling Laboratory Test Results (Appendix E)

3.0 Field Investigation

3.1 SOIL BORINGS AND SOUNDINGS

Standard Penetration Test (SPT) soil borings were completed in four locations as shown on Figure 2. Soil sampling was conducted with a split spoon sampler at 2.5-foot intervals to 30 feet, then at 5-ft intervals to the termination depth of each borehole. Soil from each split-spoon was field classified by manual-visual methods and then collected and labeled in containers for laboratory classification. In addition, Shelby Tube samples of cohesive material encountered were collected for potential laboratory testing.

The Cone Penetration Test CPT soundings are performed by pushing a cone-shaped instrument through the subsurface. The instrument measures tip resistance, sleeve friction and pore pressure at approximately 20 cm intervals. The measurements are correlated to a pre-defined range of soil behavior types to produce a relatively high-resolution estimate of the subsurface composition. In this investigation, CPT soundings were completed in eight locations. Four of the locations corresponded with the SPT boring locations. The remaining CPT soundings were performed in independent locations, as shown on Figure 2. Borehole and sounding depths and soil sample types collected are given in Table 1 below:

Table 1: Borehole and Sounding Depths and Soil Sample Types

Borehole ID	Proposed Depth	Completed Depth	Sampling
SPT-1	30	27.5	Split-Spoons, Shelby Tubes
SPT-2	70	60	Split-Spoons, Shelby Tubes
SPT-3	30	30	Split-Spoons, Shelby Tubes
SPT-4	70	70	Split-Spoons, Shelby Tubes
CPT-1	30	30	--
CPT-2	70	65	--
CPT-3	30	31	--
CPT-4	70	70	--
CPT-5	30	41	--
CPT-6	70	71	--
CPT-7	30	31	--
CPT-8	70	71	--

3.2 SUMMARY OF GEOLOGIC AND HYDROGEOLOGIC CONDITIONS

The subsurface materials encountered in the pond dikes during this investigation were consistent throughout the site. Fill material was generally encountered from the surface to approximately 12 feet below the surface. The fill material was composed of dark gray to brown lean clay with trace organics and lenses of sand and fat clay. The fill material was generally underlain by undisturbed sandy lean clay alluvium to a depth of approximately 16-21 feet below top of dike. This material was dark brown in color, medium stiff to stiff, and dry to moist. Course grained alluvium ranging from poorly graded sand with trace gravel to poorly graded sand with silt or trace clay was generally encountered below the sandy lean clay alluvium to the end of the borehole. The sand was brown, fine to coarse grained, loose to medium dense, and wet. The groundwater table was generally encountered between 18 and 22 feet below the top of dike in the course grained alluvium.

Subsurface information collected from the SPT borings was used to create boring logs representing the subsurface conditions encountered at each SPT borehole location. The subsurface geology described above can be referenced on these boring logs which are included in Attachment B.

The subsurface conditions indicated by the CPT soundings corresponding to boreholes SPT-1, SPT-2, SPT-3 and SPT-4 (see Figure2) indicated good agreement with the conditions shown on the SPT boring logs. The CPT soundings at locations CPT-6, CPT-7, and CPT-8 indicated similar subsurface conditions to those encountered in locations 1, 2, 3, and 4. The sounding at location CPT-5 indicated fine-grained material from approximately 23 feet below top of dike to the end of the sounding at approximately 40 feet below top of dike. This differs from the coarse-grained alluvium encountered at this depth interval at other locations. Appendix C contains the SPT sounding logs.

3.3 SOIL SAMPLE TESTING

Soil samples collected during the investigation were reviewed and representative samples were selected for laboratory testing. Selected samples were tested at the Braun Intertec Corporation soils laboratory in Cedar Rapids, IA for the following:

- Atterberg Limit Tests (ASTM D 4318)
- Grain Size Analysis (sieves through #200) (ASTM D 422)
- Tri-Axial Compression Testing, Consolidated-Undrained (ASTM D 4767)

Test results are presented in Appendix D. The test results were used to verify field soil classifications and estimate soil engineering properties. The Atterberg Limit and grain size analysis (index parameter) test results are summarized in the table below:

Table 2: Summary of Index Parameter Test Results

Borehole ID	Sample Depths (ft)	Material Classification	%Sand	%Silt	%Clay	LL	PL	PI
STP-1	18-20	Sandy Lean Clay (CL)	11.7	62.5	25.8	38	17	21
STP-2	8-10	Sandy Lean Clay (CL)	41.4	32.7	25.8	27	12	15
STP-3	16-18	Sandy Lean Clay (CL)	32.9	46.2	20.9	27	17	10
STP-4	11-13	Sandy Lean Clay (CL)	16.0	49.4	34.4	52	22	30

Tri-axial compression tests (consolidated-undrained) were performed on two soil samples from the pond dikes to evaluate the shear strength of the material. The test results were then used to estimate the soil engineering properties described in Section 3.4. The results of the tri-axial compression tests are shown below:

Table 3: Summary of Tri-Axial Compression Test (CU) Results

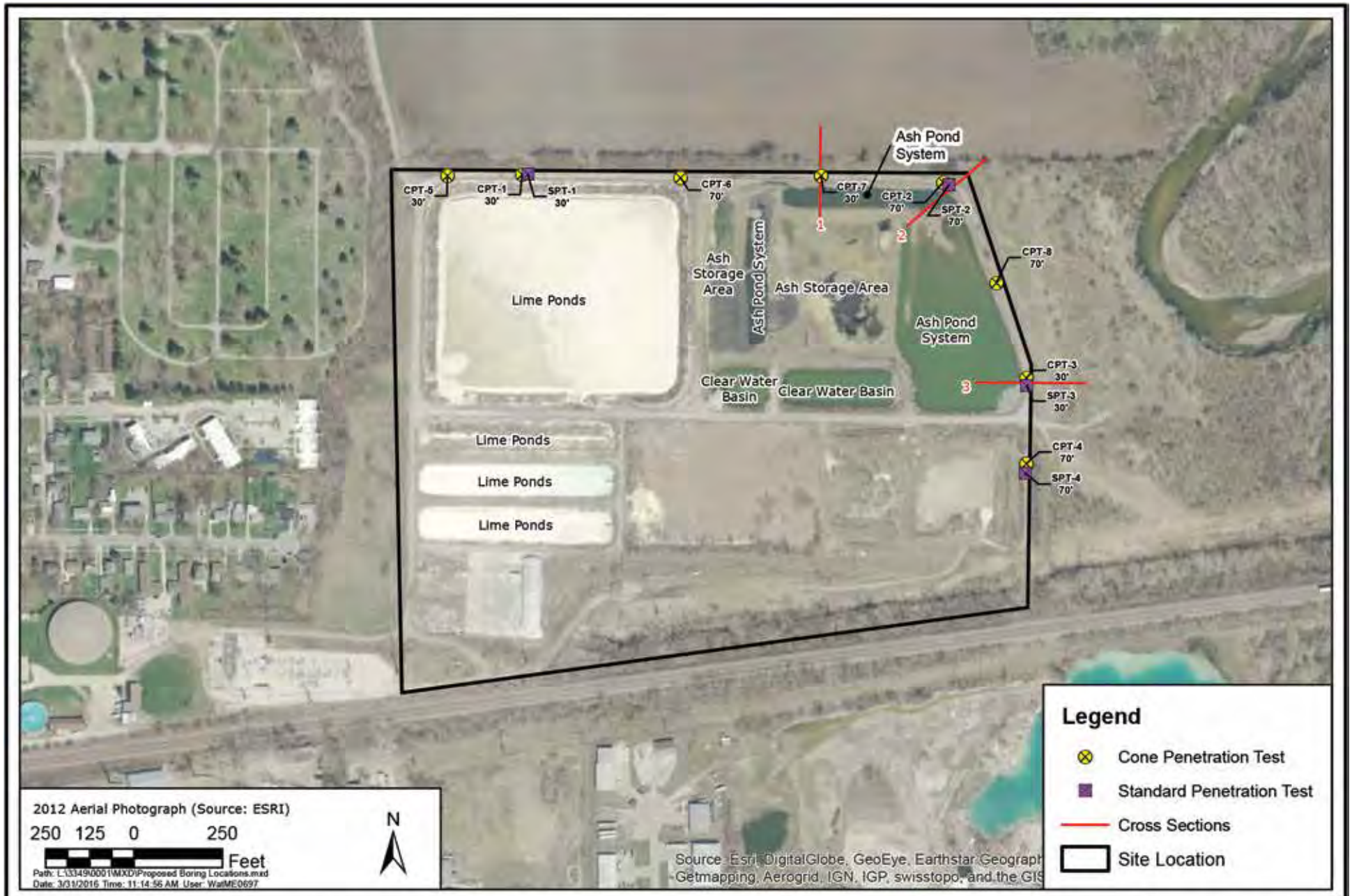
Borehole ID	Sample Depths (ft)	Material Classification	Effective Friction (degrees)	Effective Cohesion (tsf)	Total Friction (degrees)	Total Cohesion (tsf)
STP-2	8-10	Sandy Lean Clay (CL)	28.3	0	26.6	0.23
STP-3	16-18	Sandy Lean Clay (CL)	30.4	0	18.1	0.12

3.4 SOIL ENGINEERING PROPERTIES

Soil engineering properties for the surface impoundment dike materials and native subsoils were estimated from SPT test results collected during the field investigation and the tri-axial compression test results. Effective angle of internal friction was estimated for each soil type from N-values corrected for overburden pressure using a correlation proposed by Peck, Hanson and Thornburn (1974) as given in a publication by T.F. Wolff (1989). These values were compared to the tri-axial compression test results and conservative peak strength values were assigned to each soil type. The table below gives the engineering properties for the main material types found at the site:

Table 4: Soil Engineering Properties

Material Type	Unit Weight (pcf)	Effective Angle of Internal Friction, phi' (Degrees)	Cohesion, c' (psf)
Fill Material	115	30	50
Sandy Lean Clay (CL)	115	28	25
Poorly Graded Sand	110	30	0



AMES MUNICIPAL ELECTRIC SYSTEM

Soil Boring and Cross Section Locations

WENCK ASSOCIATES

Responsive partner. Exceptional outcomes.

MAR 2016

Figure 2

Appendix C

SPT Boring Logs

BRAUN INTERTEC

LOG OF BORING

Braun Project B1510576
Geotechnical Evaluation
Ames Municipal Electric
Ames, Iowa

BORING: **STP-1**

LOCATION: See Attached Sketch

DRILLER: K. Elliott/K. Simpson | METHOD: 3 1/4" HSA, Autohammer | DATE: **11/2/15** | SCALE: **1" = 4.4'**

(See Descriptive Terminology sheet for explanation of abbreviations)

Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	Tests or Notes
0.0	FILL	FILL: Lean Clay trace Organics, with Sand and pockets of Fat Clay, dark gray and brown, dry-to-moist	(7)		
			(9)		
			(8)		
			(8)		
13.0	CL	SANDY LEAN CLAY trace Gravel, dark brown, moist, soft to medium (Alluvium)	(5)		
			(3)		PP= 1.0 tsf
21.0	SP-SC	POORLY GRADED SAND with CLAY trace Gravel, fine- to coarse- grained, brown, moist, very loose to medium (Alluvium)	(5)	▽	
			(2)		
27.5			(13)		
		END OF BORING. Water observed at 22 feet while drilling. Boring then backfilled.			

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BRAUN INTERTEC

LOG OF BORING

Braun Project B1510576
Geotechnical Evaluation
Ames Municipal Electric
Ames, Iowa

BORING: **STP-2**

LOCATION: See Attached Sketch

DRILLER: K. Elliott/K. Simpson | METHOD: 3 1/4" HSA, Autohammer | DATE: **11/4/15** | SCALE: **1" = 4.4'**

Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	Tests or Notes
0.0	FILL	FILL: Lean Clay trace Organics, with Sand and pockets of Fat Clay, dark brown and gray, dry-to-moist	(12) (9) (11)		
10.5	CL	SANDY LEAN CLAY trace Organics, dark brown, dry-to-moist, medium to rather stiff (Alluvium)	(10) (7)		
16.0	SP	POORLY GRADED SAND trace Gravel, fine- to coarse-grained, brown, dry-to-wet, very loose to medium (Alluvium)	(3) (6) (13)	▽	
27.0	SP-SM	POORLY GRADED SAND with SILT trace Gravel, fine- to medium- grained, brown-gray, wet, medium (Alluvium)	(12) (13)		

(See Descriptive Terminology sheet for explanation of abbreviations)

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Braun Project B1510576
Geotechnical Evaluation
Ames Municipal Electric
Ames, Iowa

BORING: **STP-2 (cont.)**

LOCATION: See Attached Sketch

DRILLER: K. Elliott/K. Simpson | METHOD: 3 1/4" HSA, Autohammer | DATE: **11/4/15** | SCALE: **1" = 4.4'**

Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	Tests or Notes
35.0		POORLY GRADED SAND with SILT trace Gravel, fine- to medium- grained, brown-gray, wet, medium (Alluvium) *(continued)*	(19)		
41.0	SP	POORLY GRADED SAND with Gravel, fine- to coarse- grained, gray, dry-to-wet, medium to dense (Alluvium)	(15)		
			(20)		
			(53)		
60.0		END OF BORING. Water observed at 20 feet while drilling. Boring then backfilled.			

(See Descriptive Terminology sheet for explanation of abbreviations)

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BRAUN INTERTEC

LOG OF BORING

Braun Project B1510576
Geotechnical Evaluation
Ames Municipal Electric
Ames, Iowa

BORING: **STP-3**

LOCATION: See Attached Sketch

DRILLER: K. Elliott/K. Simpson | METHOD: 3 1/4" HSA, Autohammer | DATE: **11/3/15** | SCALE: **1" = 4.4'**

(See Descriptive Terminology sheet for explanation of abbreviations)

Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	Tests or Notes
0.0	FILL	FILL: Lean Clay trace Organics, with Sand and pockets of Fat Clay, dark gray and brown, dry-to-moist	(7)		
			(10)		
			(12)		
11.0			(11)		
	CL	SANDY LEAN CLAY trace Organics, dark brown, moist, medium to stiff (Alluvium)	(14)		
			(8)		
18.0					
	SP-SC	POORLY GRADED SAND with CLAY trace Gravel, fine- to coarse- grained, brown, wet, very loose to medium (Alluvium)	(3)	▽	
			(6)		
			(6)		
			(12)		
30.0			(17)		
		END OF BORING. Water observed at 19 feet while drilling. Boring then backfilled.			

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BRAUN INTERTEC

LOG OF BORING

Braun Project B1510576
Geotechnical Evaluation
Ames Municipal Electric
Ames, Iowa

BORING: **STP-4**

LOCATION: See Attached Sketch

DRILLER: K. Elliott/K. Simpson | METHOD: 3 1/4" HSA, Autohammer | DATE: **11/3/15** | SCALE: **1" = 4.4'**

(See Descriptive Terminology sheet for explanation of abbreviations)

Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	Tests or Notes
0.0	FILL	FILL: Lean Clay trace Organics, with Sand and pockets of Fat Clay, dark brown and gray, moist	(4)		
			(8)		
			(9)		
8.5	CL	SANDY LEAN CLAY trace Organics, dark brown to brown gray, moist, medium to rather stiff (Alluvium)	(9)		
					PP=2.0 tsf
			(9)		
			(7)	▽	
19.0	SP-SM	POORLY GRADED SAND with SILT trace Gravel, fine- to medium- grained, gray, wet, loose (Alluvium)	(6)		
			(6)		
			(8)		
26.0	SP	POORLY GRADED SAND with Gravel, fine- to coarse- grained, gray, wet, loose to medium (Alluvium)	(14)		
			(14)		
			(11)		

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BRAUN INTERTEC

LOG OF BORING

Braun Project B1510576
Geotechnical Evaluation
Ames Municipal Electric
Ames, Iowa

BORING: **STP-4 (cont.)**

LOCATION: See Attached Sketch

DRILLER: K. Elliott/K. Simpson | METHOD: 3 1/4" HSA, Autohammer | DATE: **11/3/15** | SCALE: **1" = 4.4'**

Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	Tests or Notes
35.0		POORLY GRADED SAND with Gravel, fine- to coarse- grained, gray, wet, loose to medium (Alluvium) *(continued)*			
			(17)		
			(14)		
			(18)		
			(18)		
			(9)		
			(22)		
70.0			(18)		

(See Descriptive Terminology sheet for explanation of abbreviations)

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BRAUN INTERTEC

LOG OF BORING

Braun Project B1510576
Geotechnical Evaluation
Ames Municipal Electric
Ames, Iowa

BORING: **STP-4 (cont.)**

LOCATION: See Attached Sketch

DRILLER: K. Elliott/K. Simpson | METHOD: 3 1/4" HSA, Autohammer | DATE: **11/3/15** | SCALE: **1" = 4.4'**

Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	Tests or Notes
70.0		END OF BORING.			
		Water observed at 18 feet while drilling.			
		Boring then backfilled.			

(See Descriptive Terminology sheet for explanation of abbreviations)

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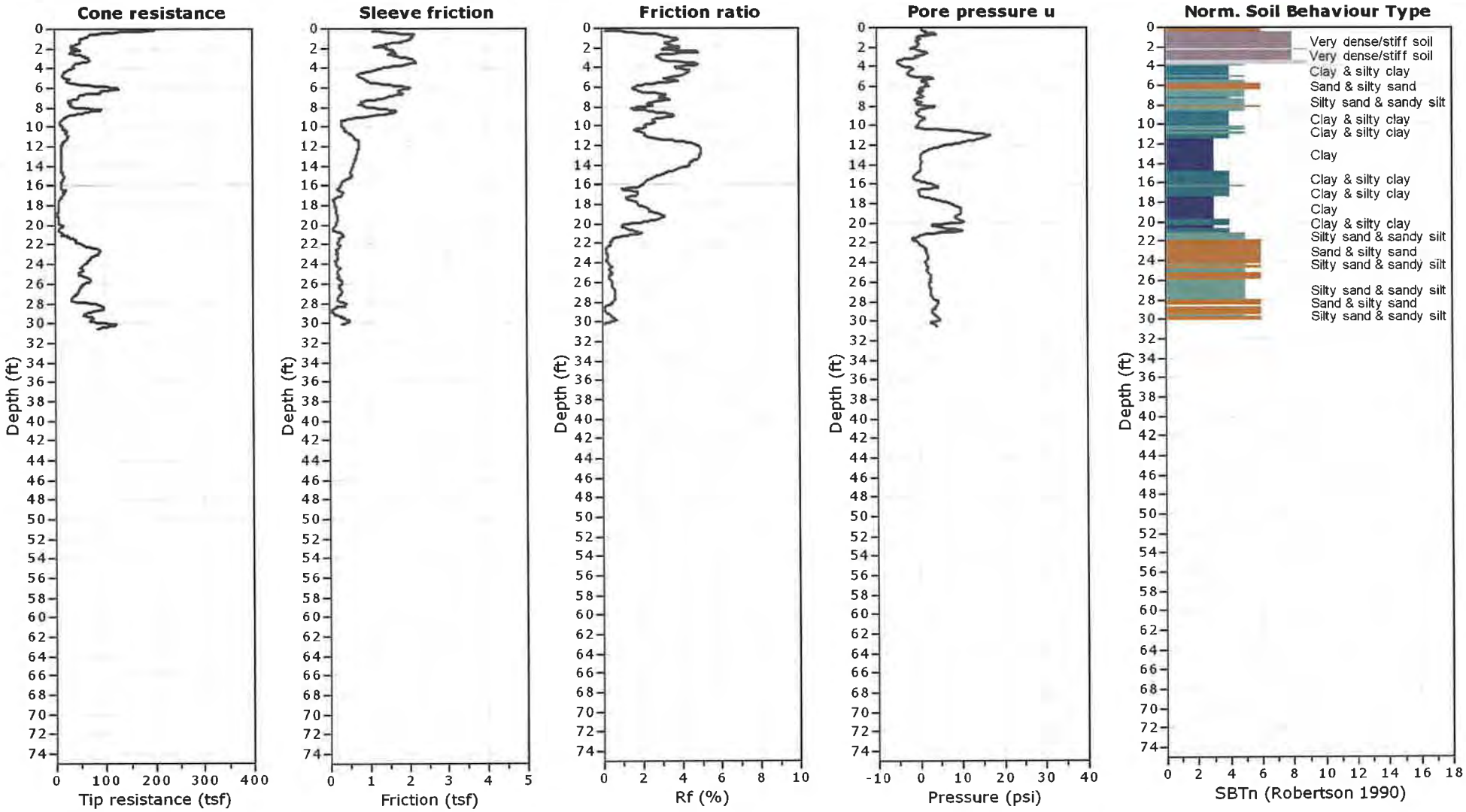
Appendix D

CPT Sounding Results

Braun Intertec Corporation
11001 Hampshire Ave S
Minneapolis, MN 55438
952-995-2000

CPT: CPT-1
Total depth: 30.56 ft, Date: 11/5/2015
Cone Type: SCPTu
Cone Operator: Holmbo

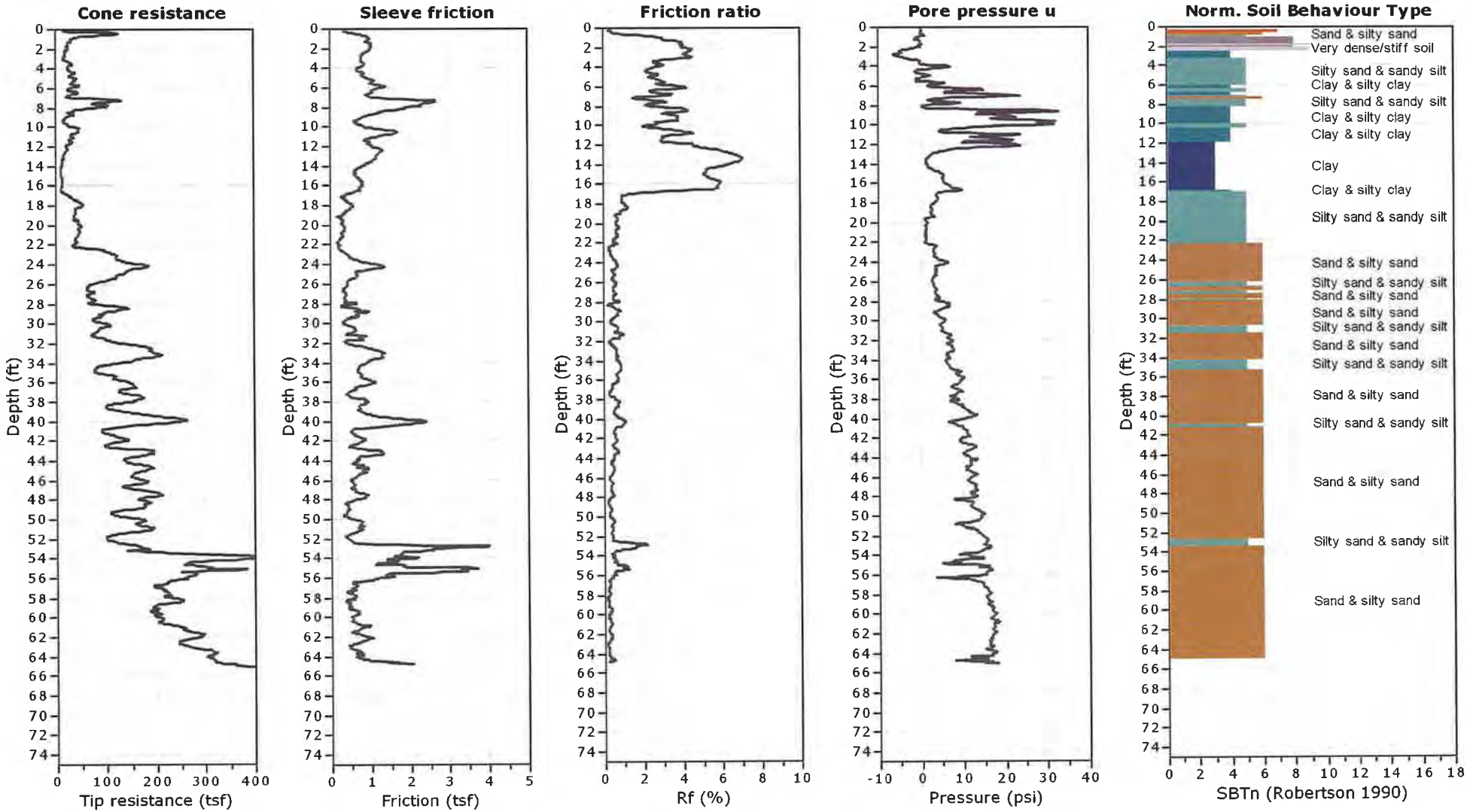
Project: Ames Municipal Electrical System
Location: Ames, IA **Project Number: B1510576**



Braun Intertec Corporation
11001 Hampshire Ave S
Minneapolis, MN 55438
952-995-2000

CPT: CPT-2
Total depth: 65.11 ft, Date: 11/5/2015
Cone Type: SCPTu
Cone Operator: Holmbo

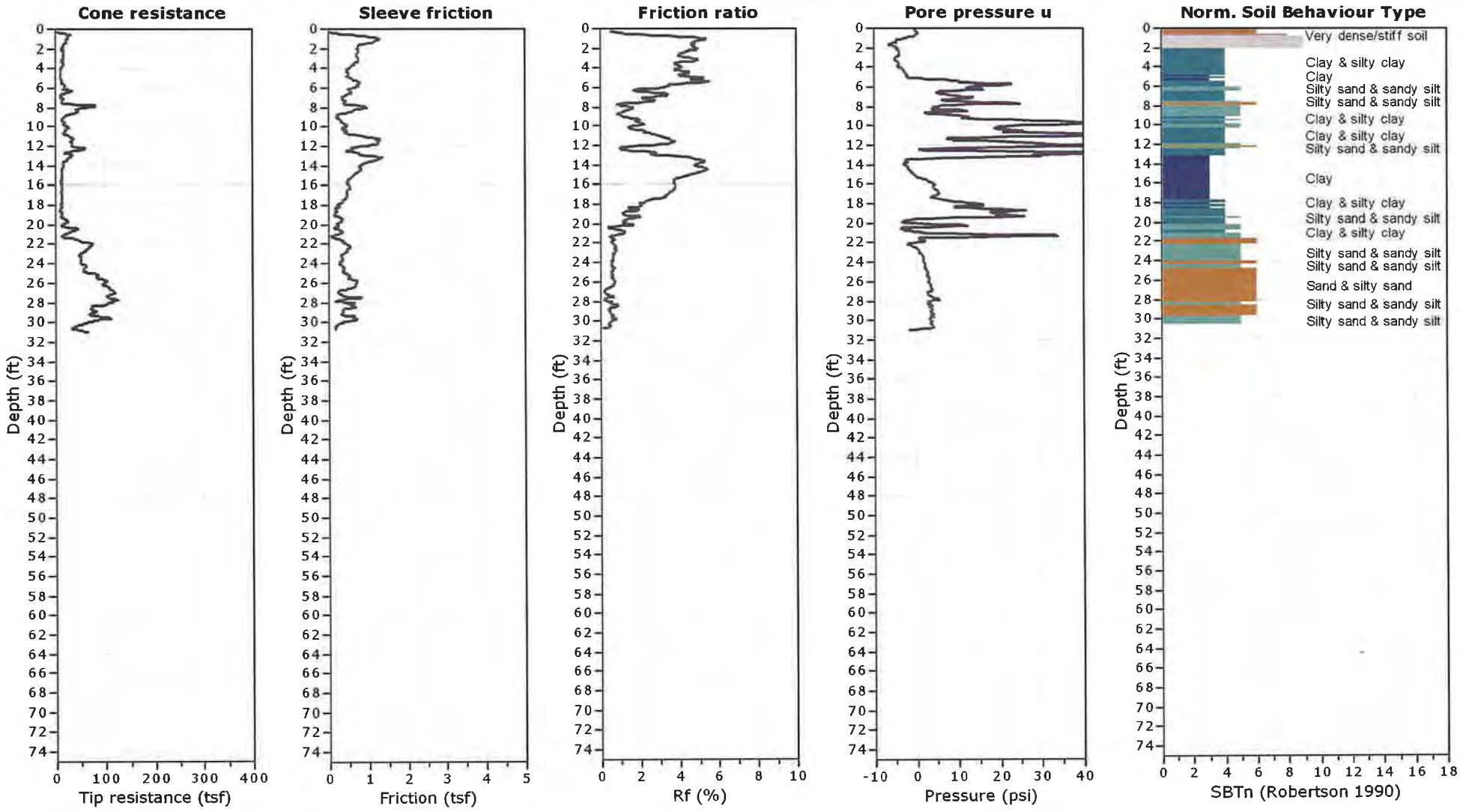
Project: Ames Municipal Electrical System
Location: Ames, IA **Project Number: B1510576**



Braun Intertec Corporation
11001 Hampshire Ave S
Minneapolis, MN 55438
952-995-2000

CPT: CPT-3
Total depth: 31.04 ft, Date: 11/5/2015
Cone Type: SCPTu
Cone Operator: Holmbo

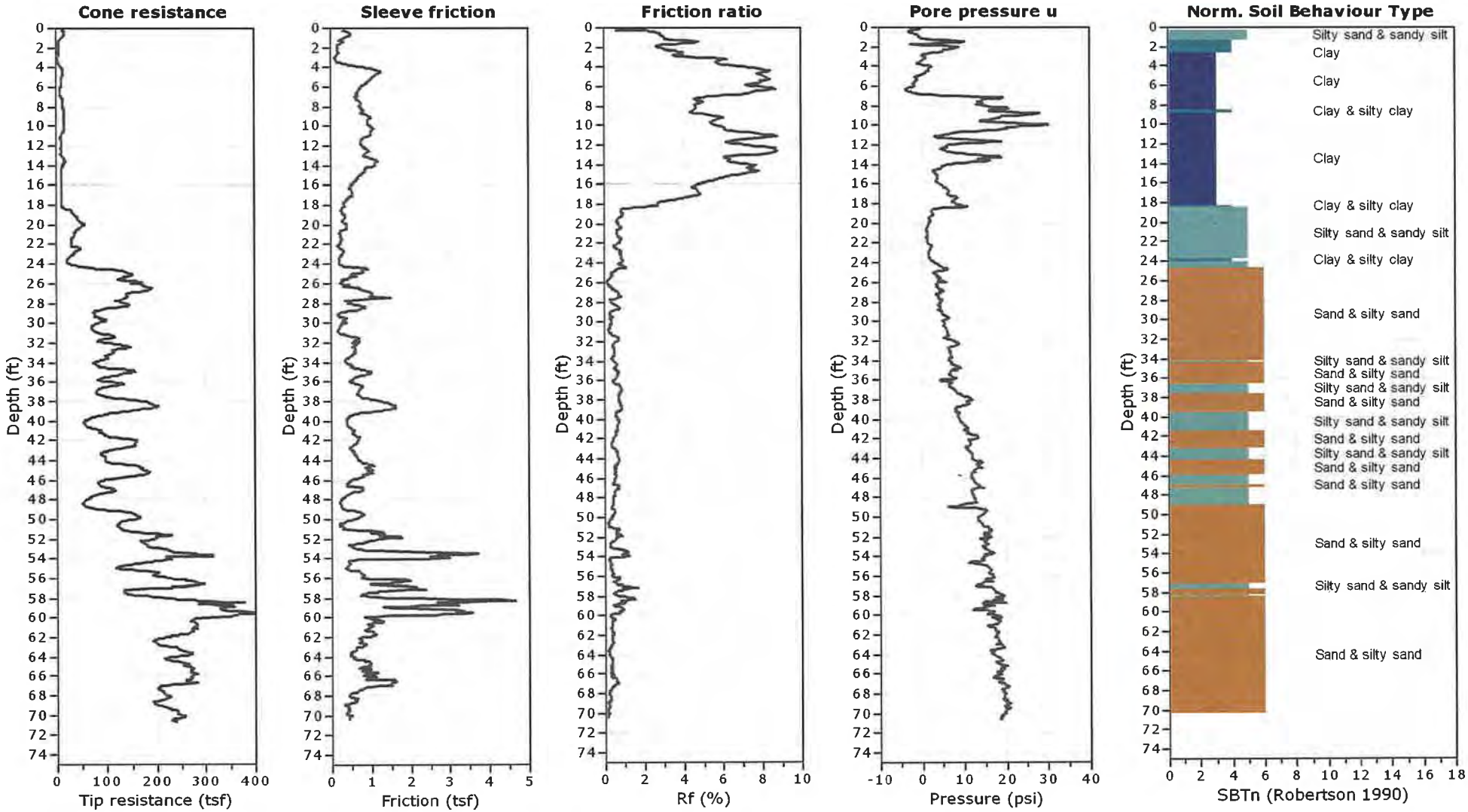
Project: Ames Municipal Electrical System
Location: Ames, IA **Project Number: B1510576**



Braun Intertec Corporation
11001 Hampshire Ave S
Minneapolis, MN 55438
952-995-2000

CPT: CPT-4
Total depth: 70.67 ft, Date: 11/5/2015
Cone Type: SCPTu
Cone Operator: Holmbo

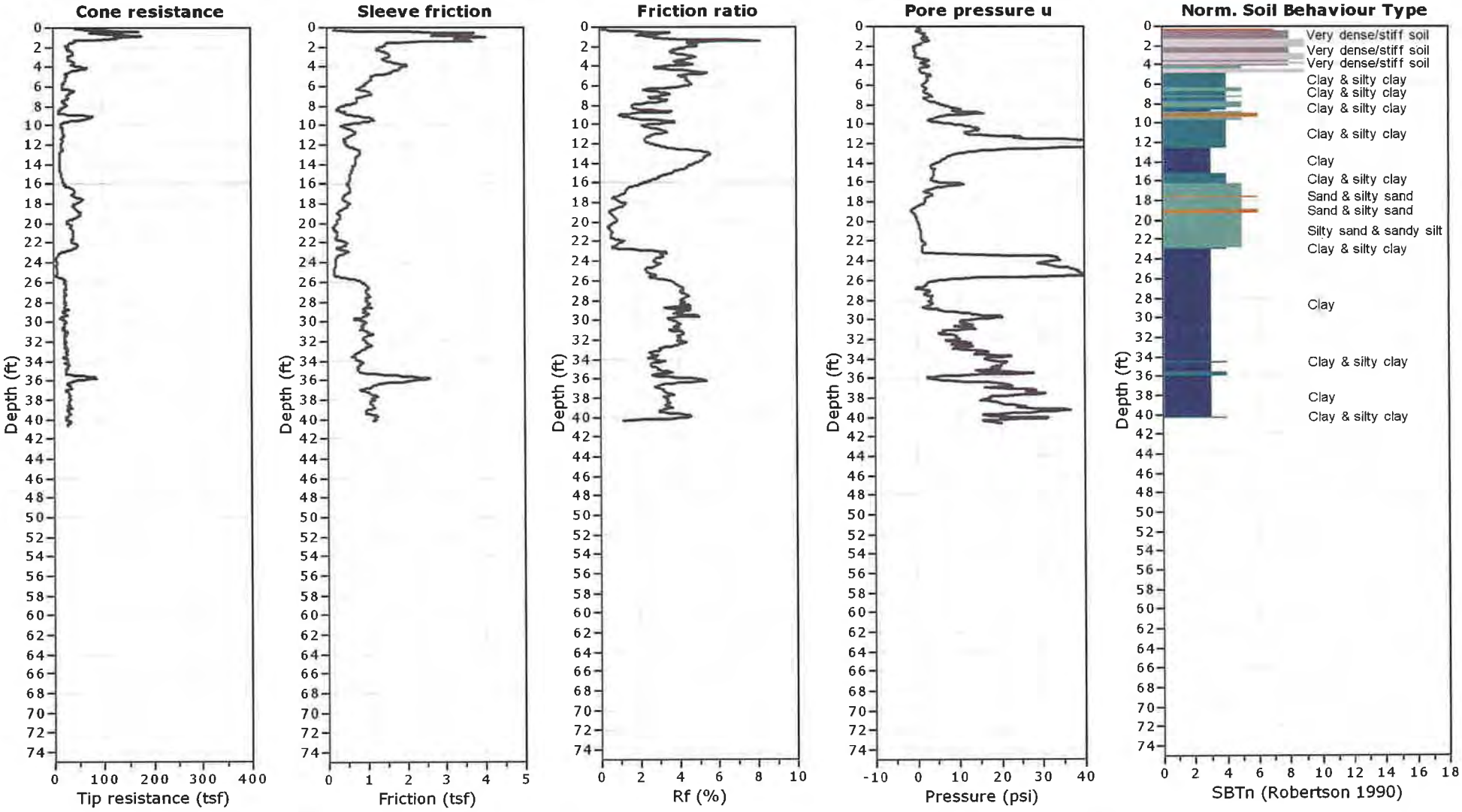
Project: Ames Municipal Electrical System
Location: Ames, IA **Project Number: B1510576**



Braun Intertec Corporation
11001 Hampshire Ave S
Minneapolis, MN 55438
952-995-2000

CPT: CPT-5
Total depth: 40.58 ft, Date: 11/5/2015
Cone Type: SCPTu
Cone Operator: Holmbo

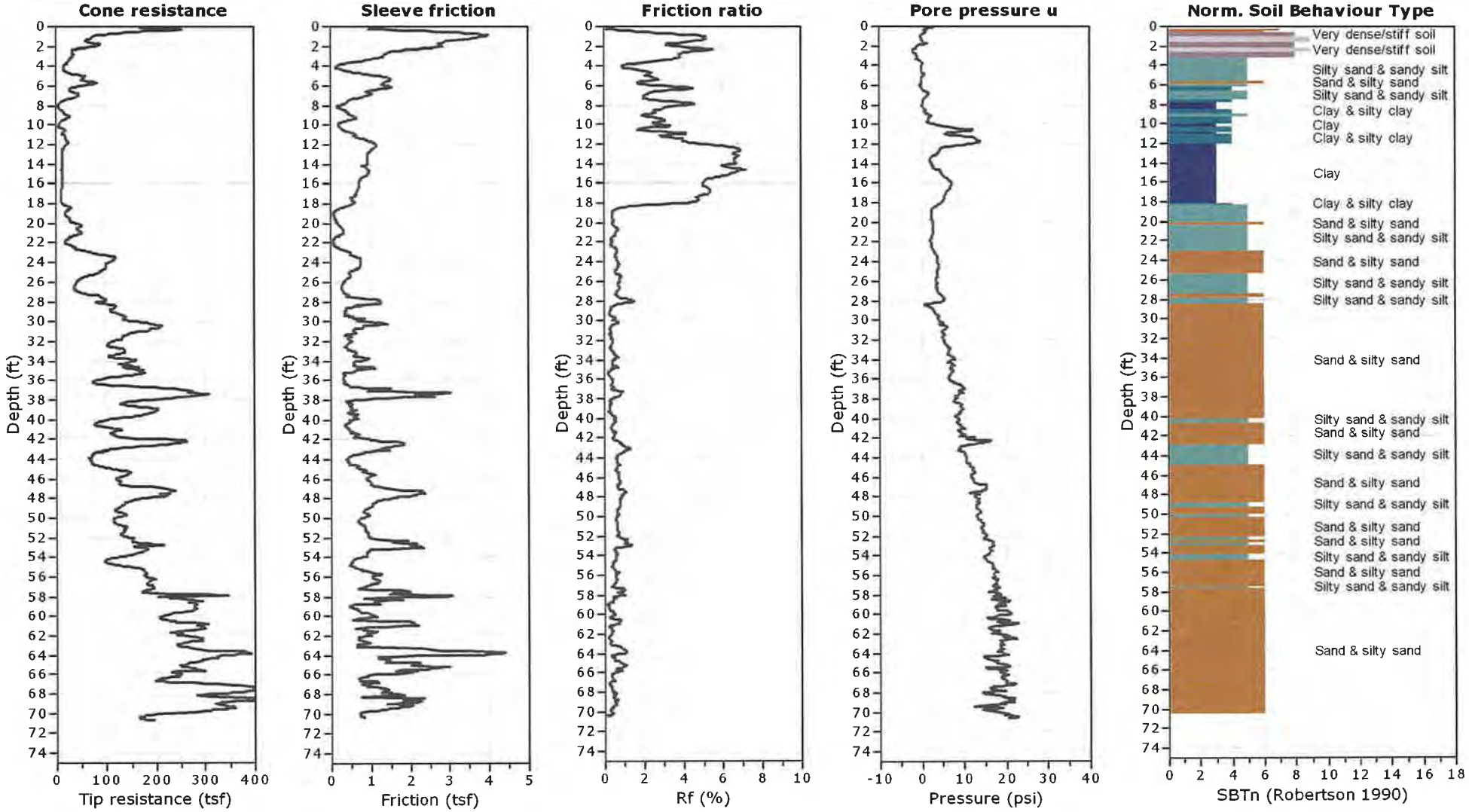
Project: Ames Municipal Electrical System
Location: Ames, IA **Project Number: B1510576**



Braun Intertec Corporation
11001 Hampshire Ave S
Minneapolis, MN 55438
952-995-2000

CPT: CPT-6
Total depth: 70.62 ft, Date: 11/5/2015
Cone Type: SCPTu
Cone Operator: Holmbo

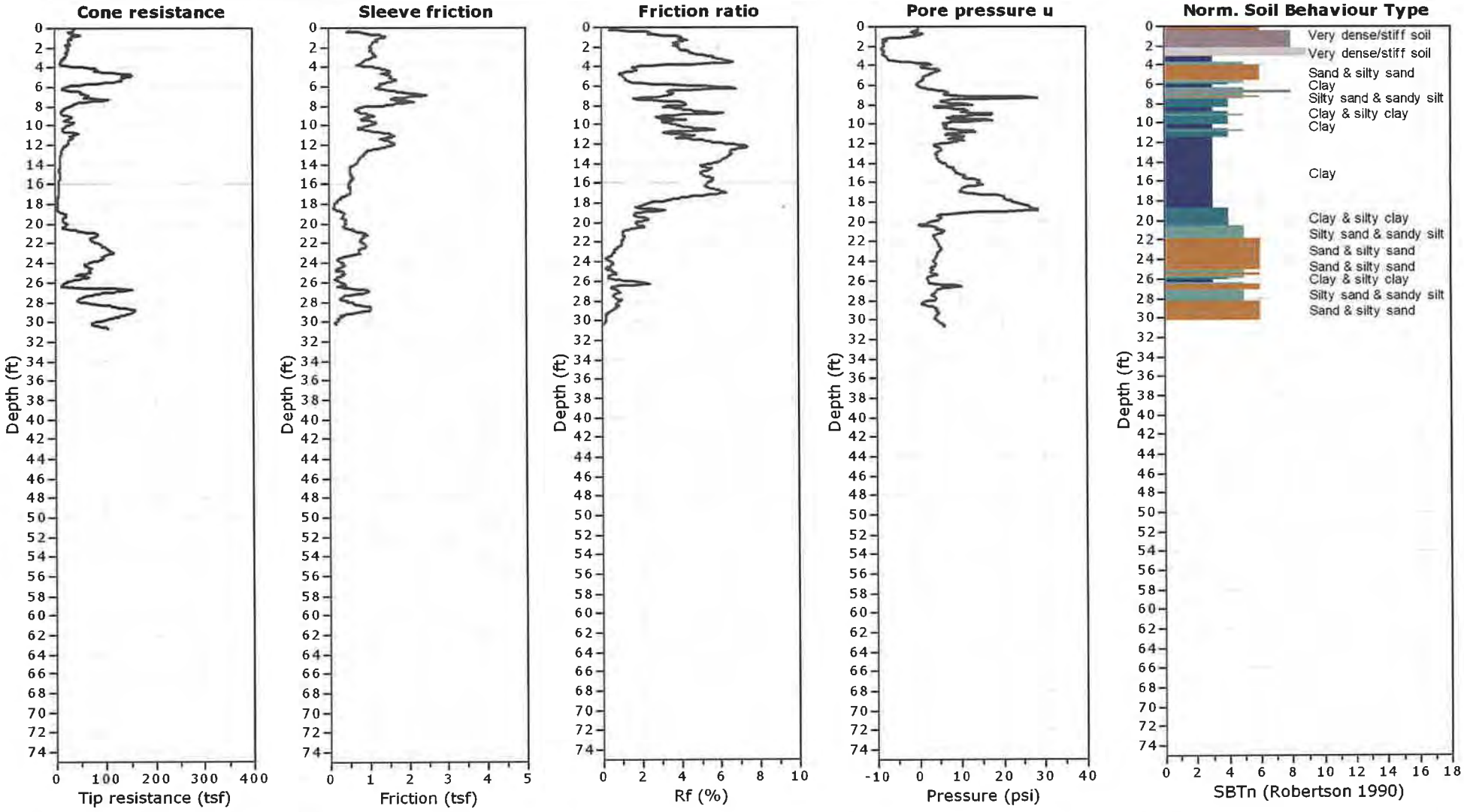
Project: Ames Municipal Electrical System
Location: Ames, IA **Project Number: B1510576**



Braun Intertec Corporation
11001 Hampshire Ave S
Minneapolis, MN 55438
952-995-2000

CPT: CPT-7
Total depth: 30.67 ft, Date: 11/5/2015
Cone Type: SCPTu
Cone Operator: Holmbo

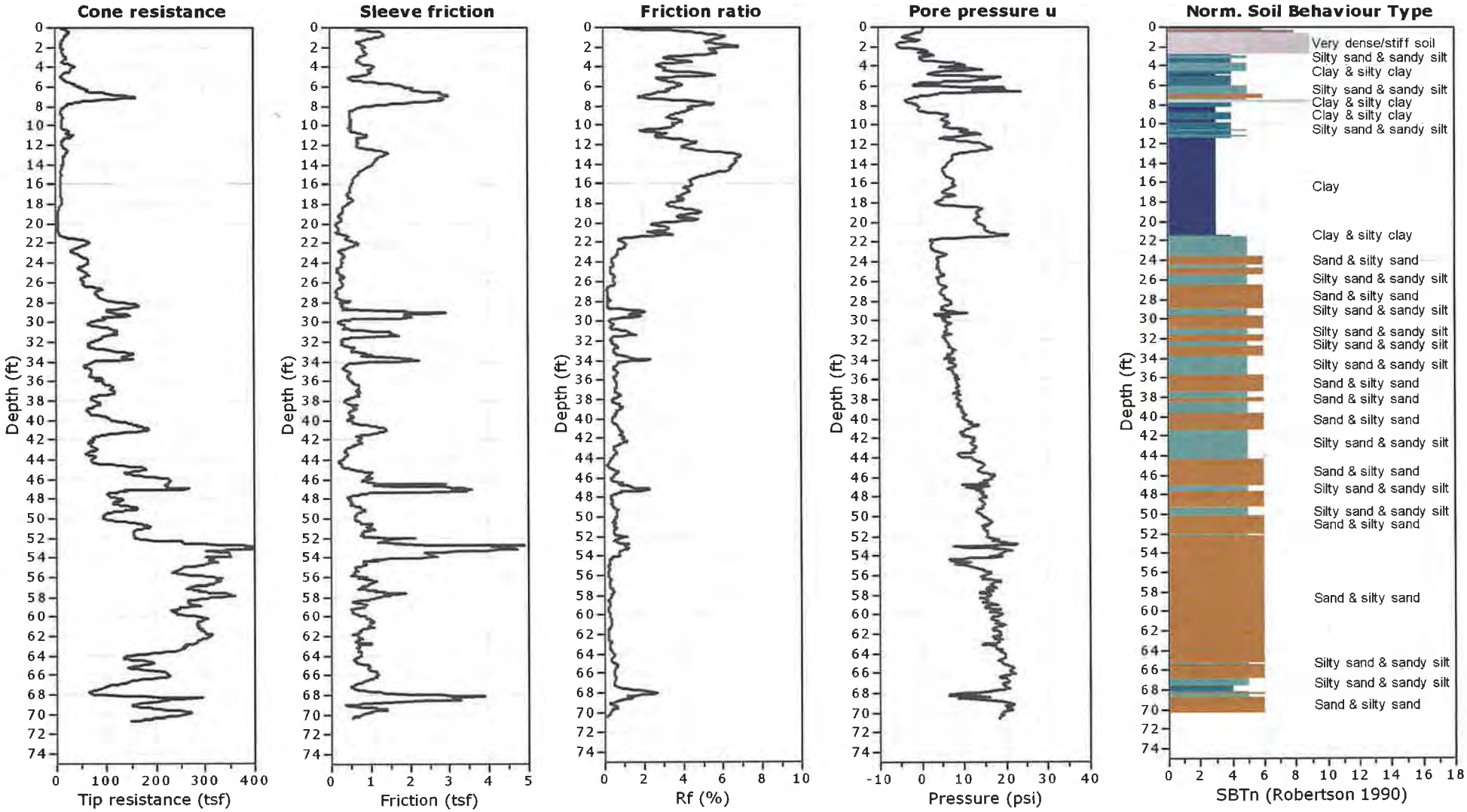
Project: Ames Municipal Electrical System
Location: Ames, IA Project Number: B1510576



Braun Intertec Corporation
11001 Hampshire Ave S
Minneapolis, MN 55438
952-995-2000

CPT: CPT-8
Total depth: 70.62 ft, Date: 11/5/2015
Cone Type: SCPTu
Cone Operator: Holmbo

Project: Ames Municipal Electrical System
Location: Ames, IA **Project Number: B1510576**



Appendix E

Soil Sample Laboratory Test Results

Braun Intertec Corporation
5915 4th Street SW, Suite 100
Cedar Rapids, IA 52404
Phone: 319.365.0961

Material Test Report

Report No: MAT:W15-011214-S1
Issue No: 1

Client: Jason Warne
Wenck Associates, Inc.
1800 Pioneer Creek Center
Maple Plain, MN, 55359
Project: B1510576
Ames Municipal Electric System
200 E. 5th St.
Ames, IA, 50010
TR: Jeremy Elkin, jelkin@braunintertec.com

Jeremy Elkin
Operations Supervisor
Date of Issue: 1/15/2016

Sample Details

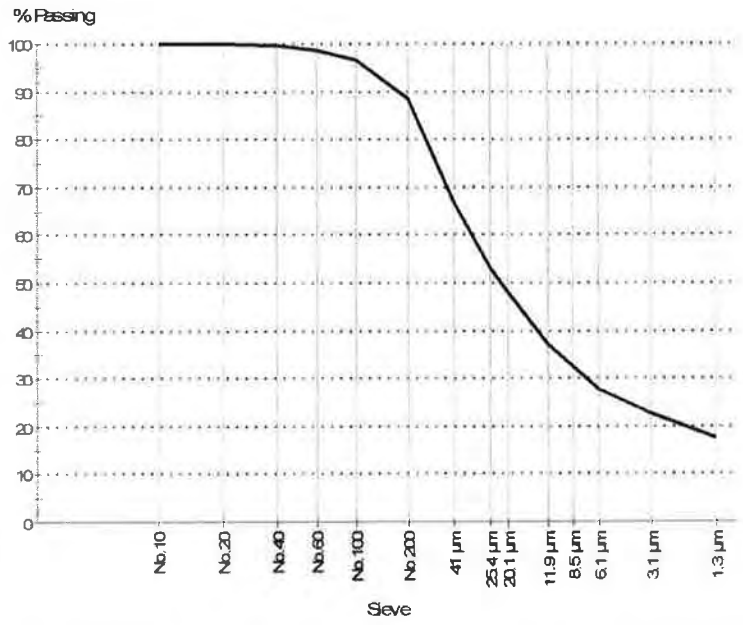
Sample ID: W15-011214-S1
Alternate Sample ID: STP-1 (18-20)
Sampled By:
Sampling Method:
Date Sampled:
Date Submitted:
Specification: General Gradation
Source:
Material Type:
Sample Location:

Atterberg Limit:

Liquid Limit: 38
Plastic Limit: 17
Plasticity Index: 21
Linear Shrinkage (%): N/A

Sample Description:

Particle Size Distribution



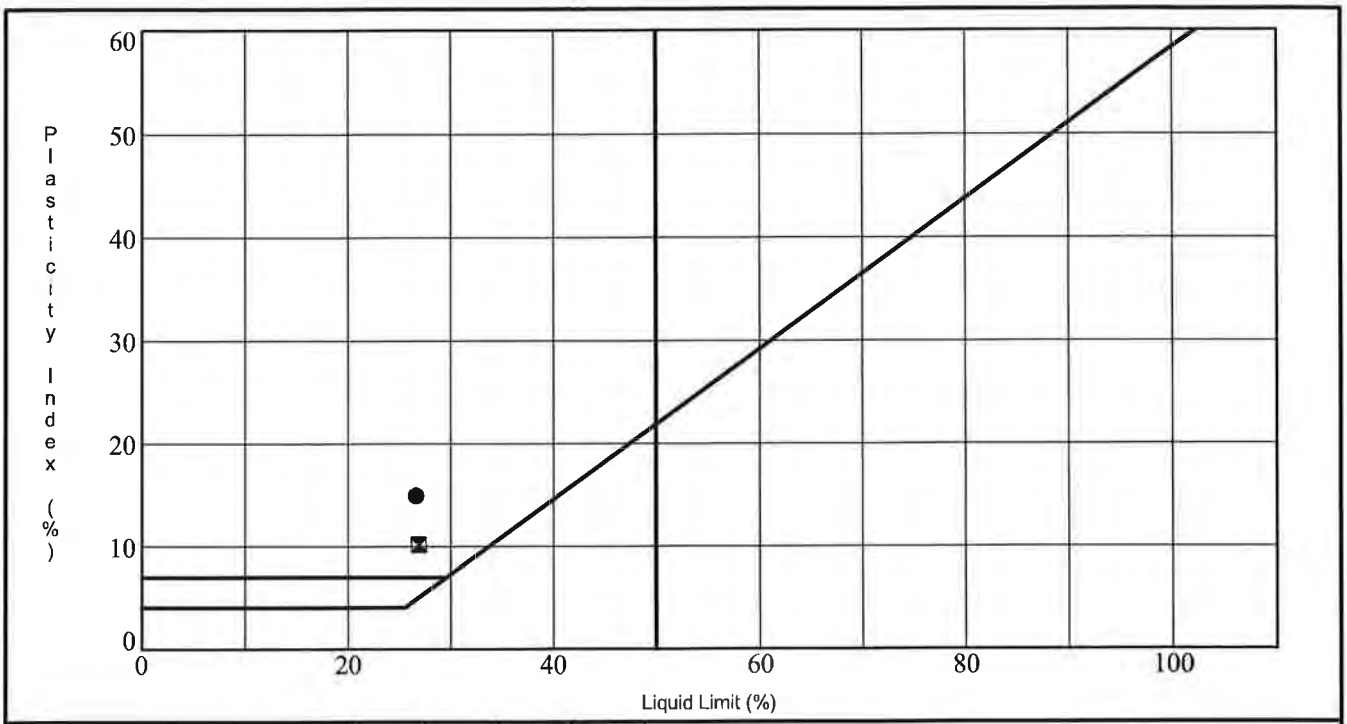
COBBLES	GRAVEL		SAND			FINES	
(0.0%)	Coarse (0.0%)	Fine (0.0%)	Coarse (0.0%)	Medium (0.3%)	Fine (11.4%)	Silt (62.5%)	Clay (25.8%)

Grading: ASTM D 422 - 07

Drying by: Oven
Date Tested: 1/15/2016

Sieve Size	% Passing	Limits
No.10 (2.0mm)	100	
No.20 (850µm)	100	
No.40 (425µm)	100	
No.60 (250µm)	99	
No.100 (150µm)	97	
No.200 (75µm)	88	
41.0 µm	66.9	
25.4 µm	53.1	
20.1 µm	47.9	
11.9 µm	37.1	
8.5 µm	32.4	
6.1 µm	27.6	
3.1 µm	22.8	
1.3 µm	17.4	

D85: 0.0682 **D60:** 0.0323 **D50:** 0.0221
D30: 0.0072 **D15:** 0.0009 **D10:** 0.0004



	Specimen Identification		LL	PL	PI	Fines	Classification
●	STP-2	8.0'-10.0'	27	12	15	59	SANDY LEAN CLAY(CL)
⊠	STP-3	16.0'-18.0'	27	17	10	67	SANDY LEAN CLAY(CL)

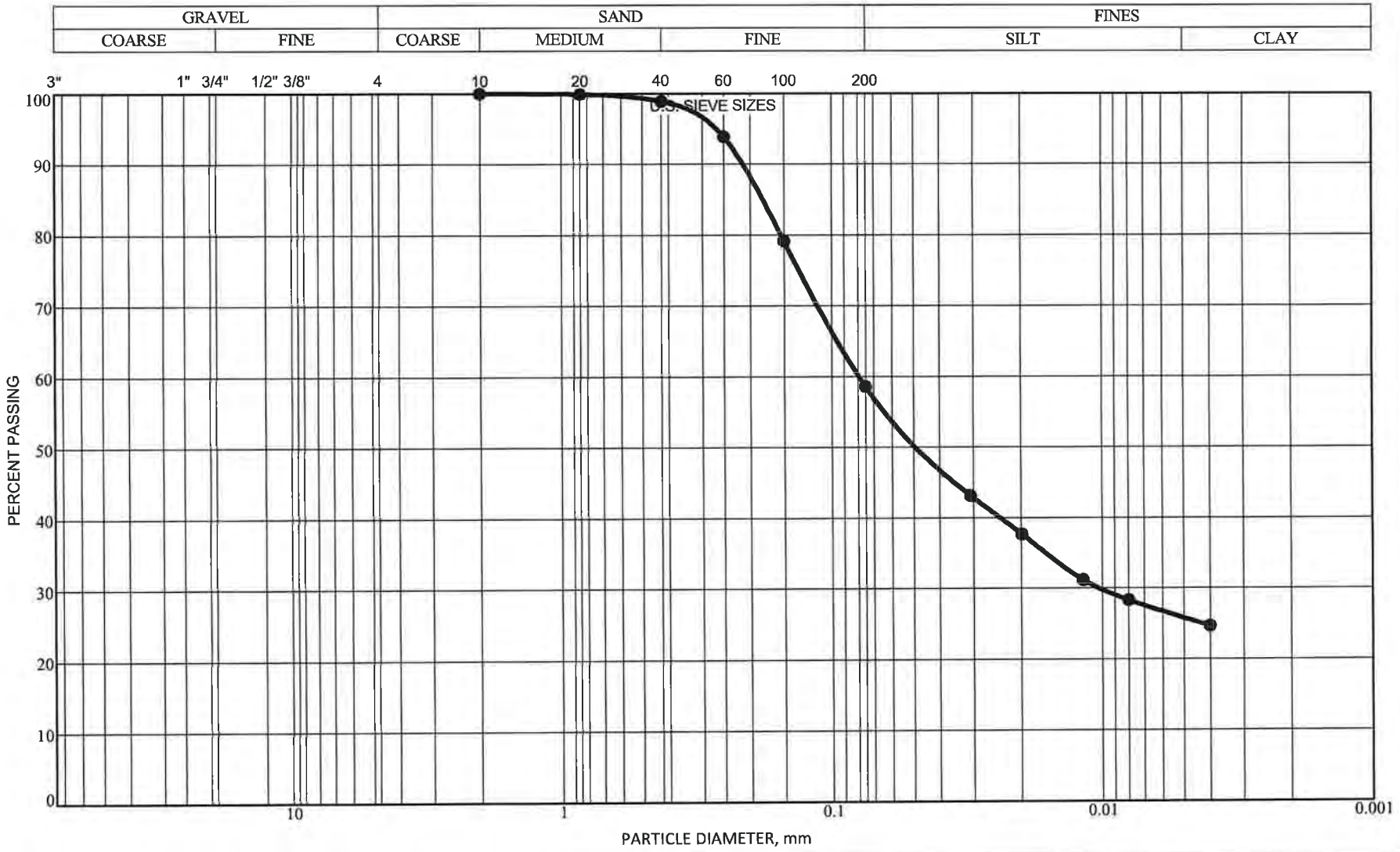
Braun Project B1510576
Ames Municipal Electric System
200 E. 5th St.
Ames, IA

ATTERBERG LIMITS RESULTS

BRAUN INTERTEC

ATTERBERG LIMITS N:\GINT\PROJECTS\X-GEOLAB\1-GINT FILES\AX PROJECTS GEO LAB\2015\B1510576.GPJ BRAUN_V8_CURRENT.GDT 12/22/15 15:38

GRAIN SIZE ACCUMULATION CURVE (ASTM)



BRAUN INTERTEC

Braun Project B1510576
Ames Municipal Electric System
200 E. 5th St.
Ames, IA

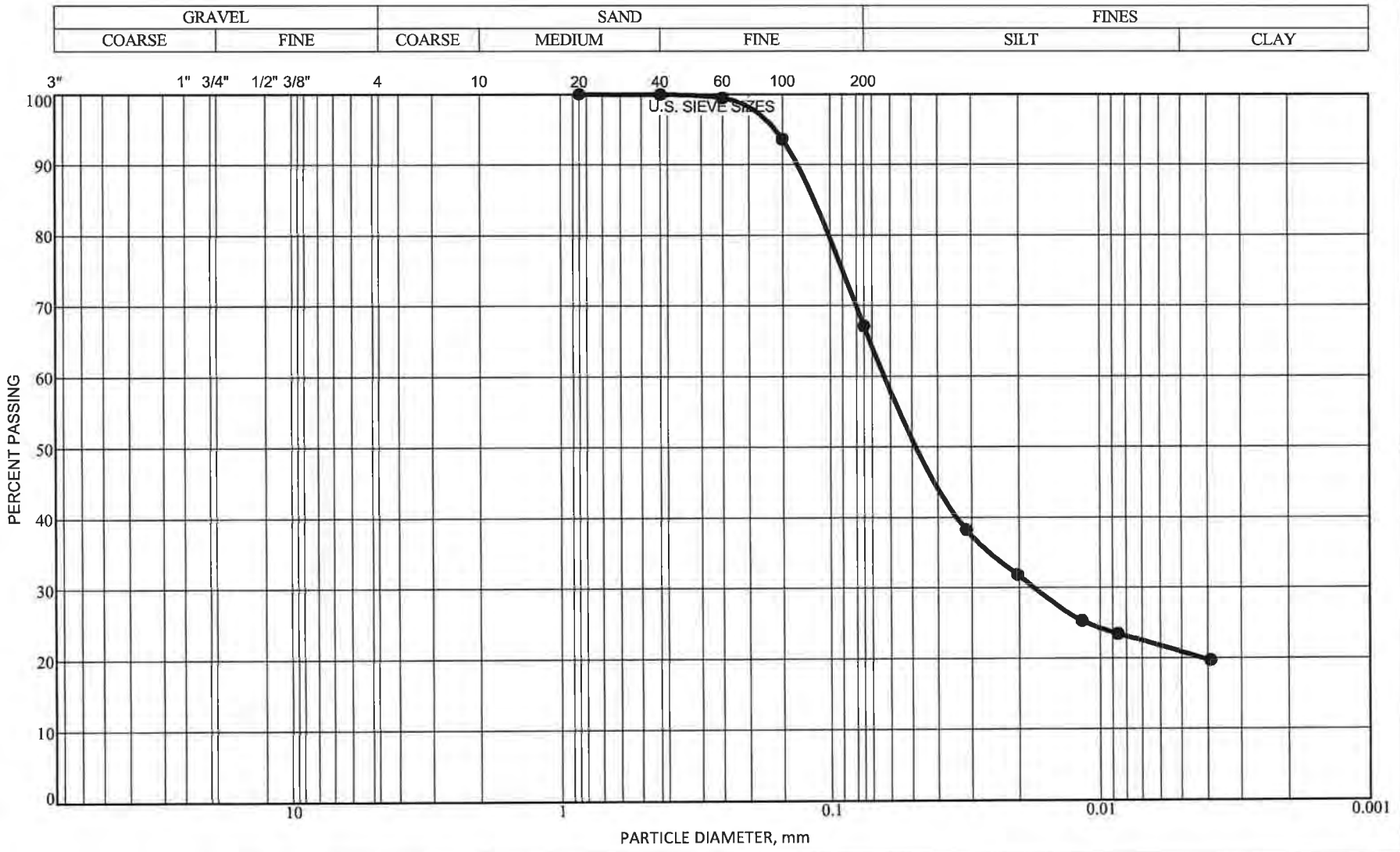
BORING: STP-2 DEPTH: 8.0'-10.0'

GRAVEL	0.0%
SAND	41.4%
SILT	32.7%
CLAY	25.8%
D60=0.079	Cu=
D30=0.010	Cc=
D10=	

CLASSIFICATION:
SANDY LEAN CLAY(CL)

GS ASTM N:\GINT\PROJECTS\X-GEOLAB\1-GINT FILES\AX PROJECTS GEO LAB\2015\B1510576.GPJ BRAUN_V8_CURRENT.GDT 12/22/15 15:38

GRAIN SIZE ACCUMULATION CURVE (ASTM)



Braun Project B1510576
Ames Municipal Electric System
200 E. 5th St.
Ames, IA

BORING: STP-3 DEPTH: 16.0'-18.0'

GRAVEL	0.0%
SAND	32.9%
SILT	46.2%
CLAY	20.9%
D60=0.061	Cu=
D30=0.017	Cc=
D10=	

CLASSIFICATION:
SANDY LEAN CLAY(CL)

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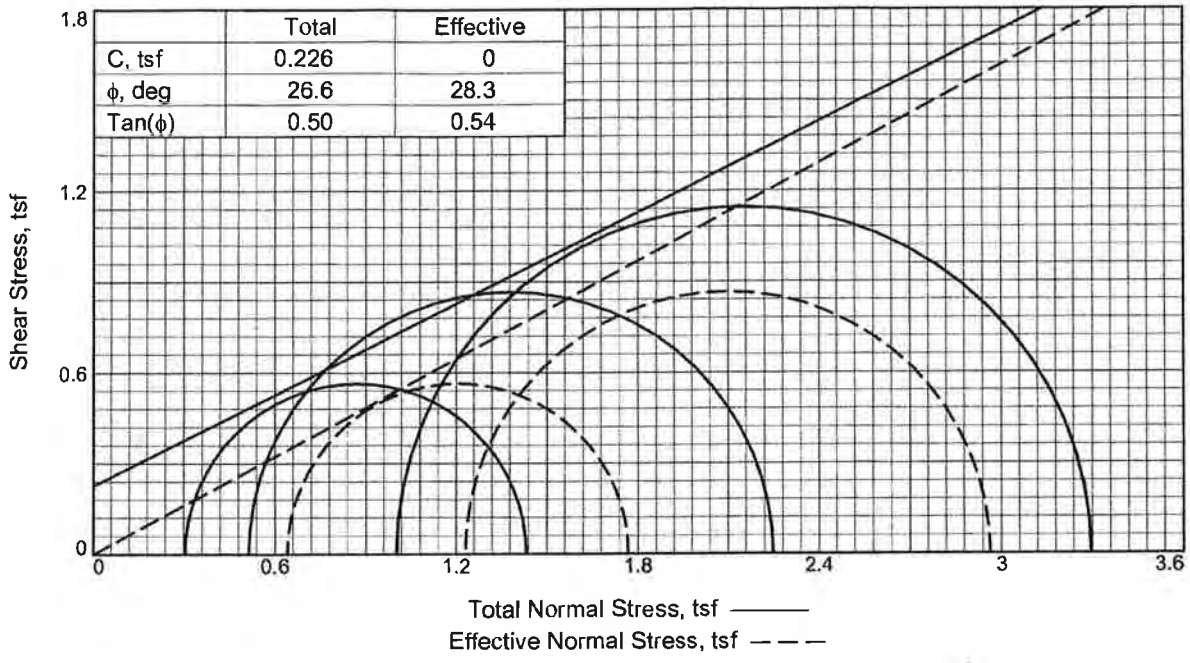
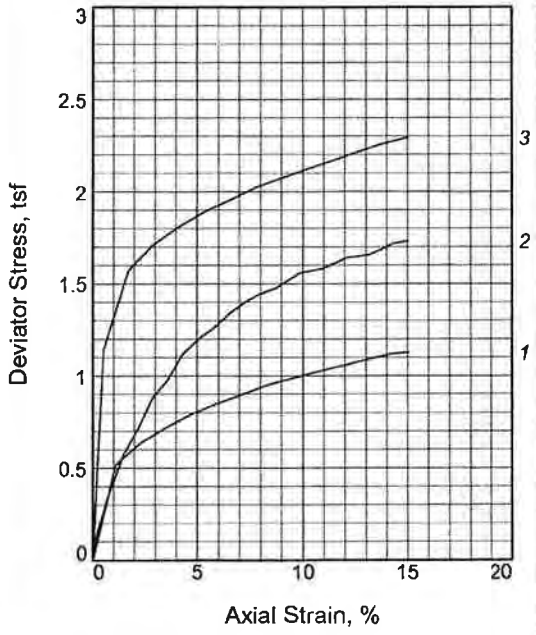




Sample No.		1	2	3
Initial	Water Content, %	19.1	13.6	15.8
	Dry Density, pcf	108.7	117.2	113.8
	Saturation, %	93.5	83.7	88.9
	Void Ratio	0.5502	0.4380	0.4810
	Diameter, in.	1.418	1.420	1.407
	Height, in.	2.795	2.794	2.790
At Test	Water Content, %	20.1	15.7	17.5
	Dry Density, pcf	109.3	118.5	114.4
	Saturation, %	100.0	100.0	100.0
	Void Ratio	0.5419	0.4226	0.4731
	Diameter, in.	1.415	1.415	1.404
	Height, in.	2.790	2.784	2.785
Pore Pressure Parameter B		1.0	1.0	1.0
Consolidation Pressure, tsf		0.31	0.52	1.00
Back Pressure, tsf		6.82	6.62	6.13
Cell Pressure, tsf		7.13	7.14	7.13
Peak Deviator Stress, tsf		1.13	1.73	2.29
Total Pore Pr., tsf		6.49	5.90	6.13
Ultimate Deviator Stress, tsf		1.13	1.73	2.29
Total Pore Pr., tsf		6.49	5.90	6.13
Maj. Eff. Stress at Ultimate, tsf		1.77	2.96	3.30
Min. Eff. Stress at Ultimate, tsf		0.64	1.23	1.00

Type of Test: CU with Pore Pressures

Sample Type: Thinwall

Description: SANDY LEAN CLAY, brown (CL)

Assumed Specific Gravity= 2.70

Remarks: Rate of strain is 0.001 in/min. Failure criteria is based on the ultimate stress which occurs at 15% strain. Samples were saturated for 10 days and consolidated for 3 days.

Figure CU Triax ASTM D 4767

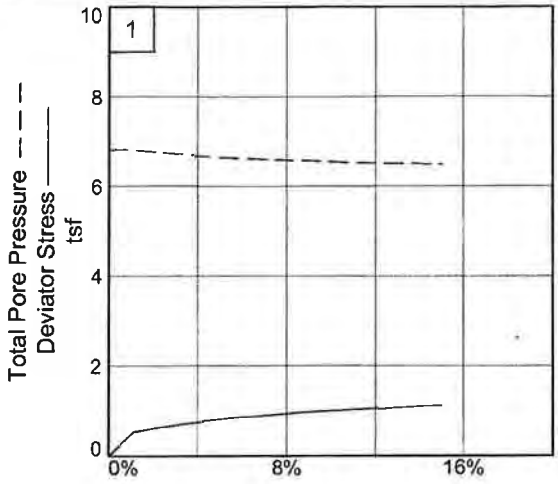
Client: Wenck Associates, Inc.

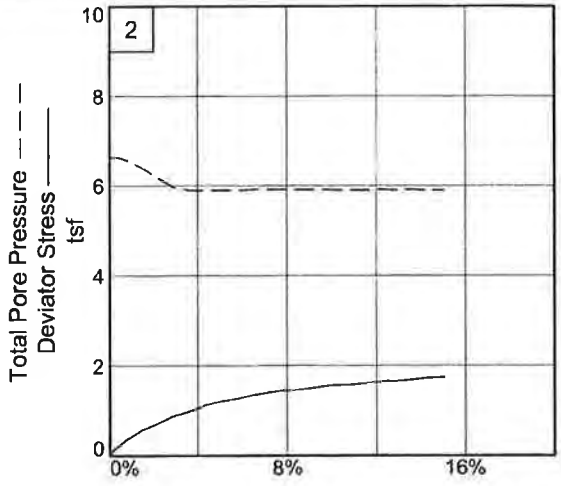
Project: Ames Municipal Electric System
200 E. 5th St., Ames, IA

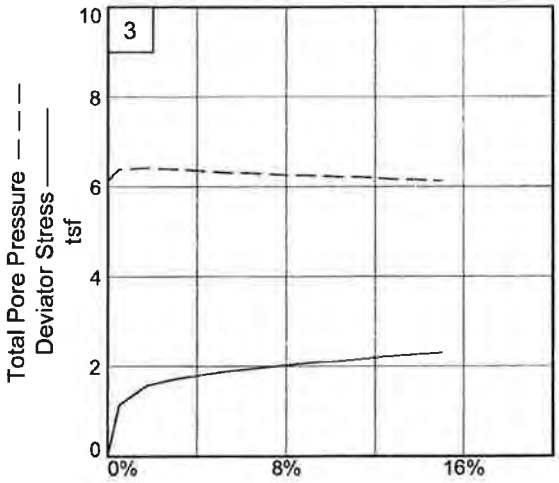
Sample Number: STP-2 **Depth:** 8-10'

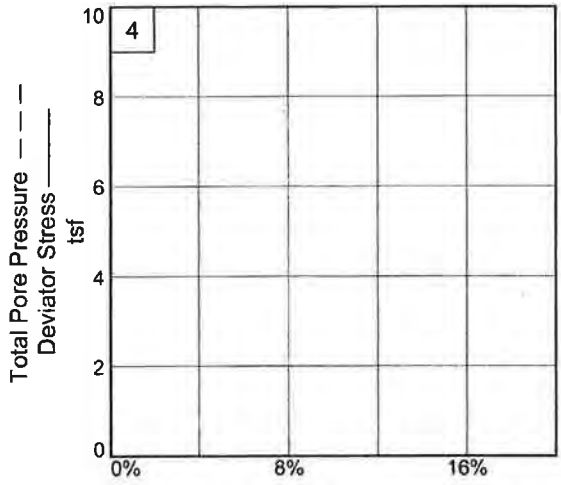
Proj. No.: B1510576 **Date Sampled:**

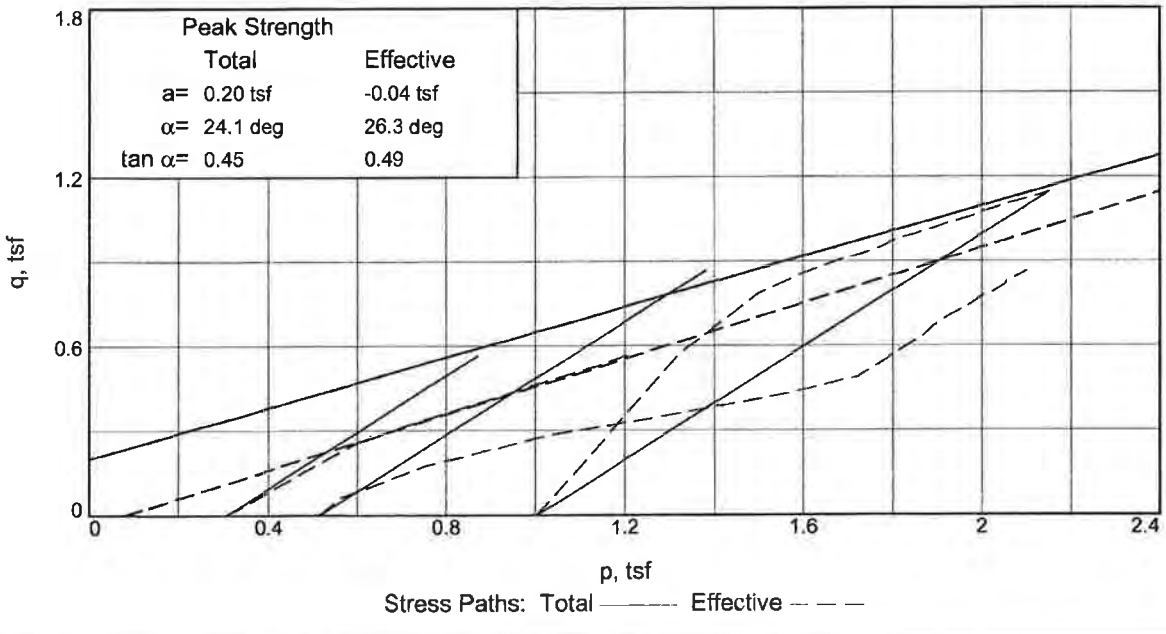
BRAUN INTERTEC





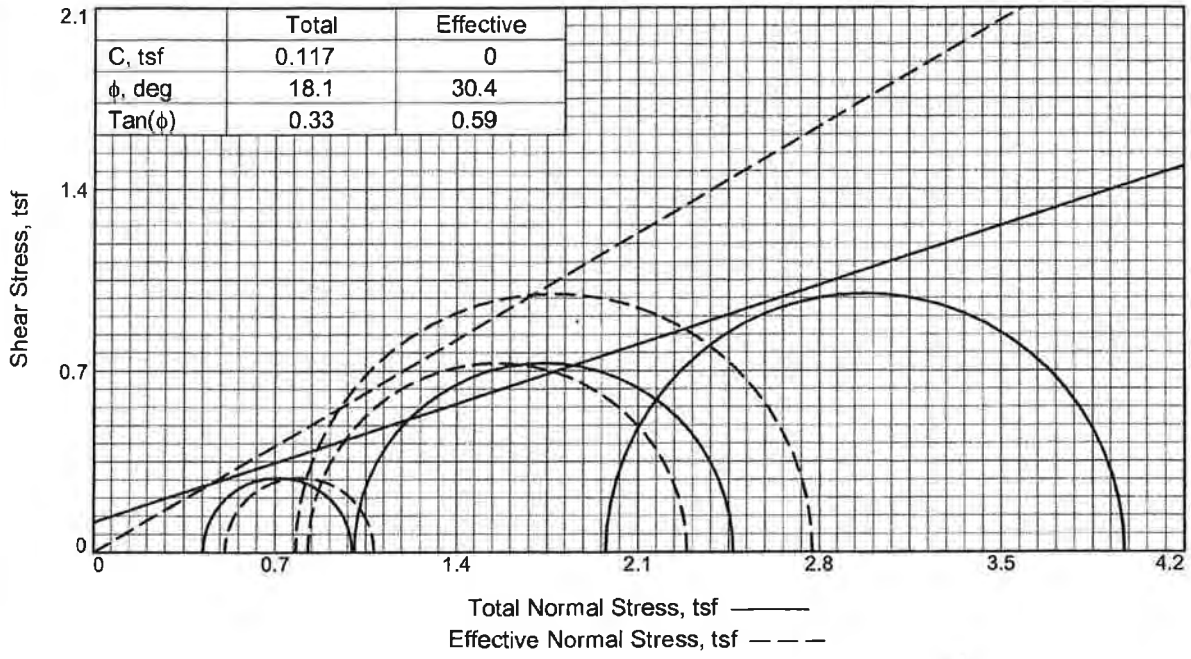


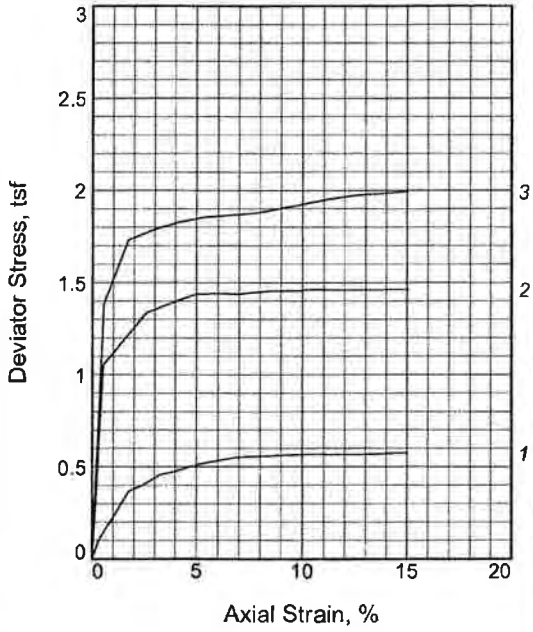




Client: Wenck Associates, Inc.
Project: Ames Municipal Electric System
Depth: 8-10' **Sample Number:** STP-2
Project No.: B1510576 **Figure** _____

Braun Intertec





Sample No.		1	2	3
Initial	Water Content, %	24.7	20.5	22.3
	Dry Density, pcf	100.9	103.4	102.9
	Saturation, %	99.3	87.7	94.3
	Void Ratio	0.6713	0.6303	0.6374
	Diameter, in.	1.429	1.380	1.413
	Height, in.	2.775	2.799	2.790
At Test	Water Content, %	24.5	23.0	23.0
	Dry Density, pcf	101.4	103.9	104.1
	Saturation, %	100.0	100.0	100.0
	Void Ratio	0.6623	0.6216	0.6198
	Diameter, in.	1.426	1.378	1.408
	Height, in.	2.770	2.794	2.780
Pore Pressure Parameter B		1.0	1.0	1.0
Consolidation Pressure, tsf		0.43	1.00	1.98
Back Pressure, tsf		6.73	6.13	5.15
Cell Pressure, tsf		7.16	7.13	7.13
Peak Deviator Stress, tsf		0.57	1.46	1.99
Total Pore Pr., tsf		6.65	6.31	6.35
Ultimate Deviator Stress, tsf		0.57	1.46	1.99
Total Pore Pr., tsf		6.65	6.31	6.35
Maj. Eff. Stress at Ultimate, tsf		1.08	2.29	2.77
Min. Eff. Stress at Ultimate, tsf		0.51	0.83	0.78

Type of Test:
CU with Pore Pressures

Sample Type: Thinwall

Description: LEAN CLAY, brown (CL)

Assumed Specific Gravity= 2.70

Remarks: Rate of strain is 0.001 in/min. Failure criteria is based on the ultimate stress which occurs at 15% strain. Samples were saturated for 10 days and consolidated for 3 days.

Figure CU Triax ASTM D 4767

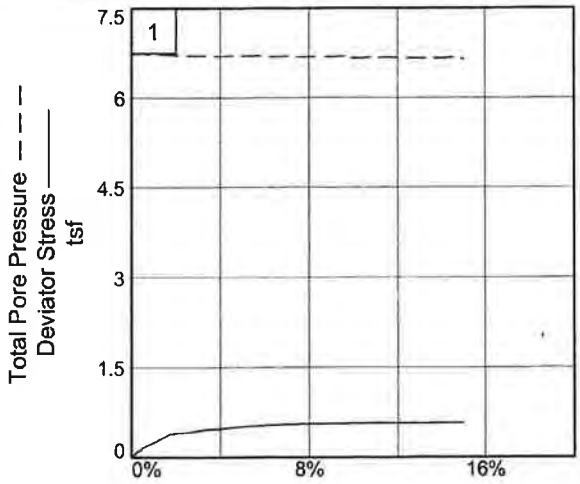
Client: Wenck Associates, Inc.

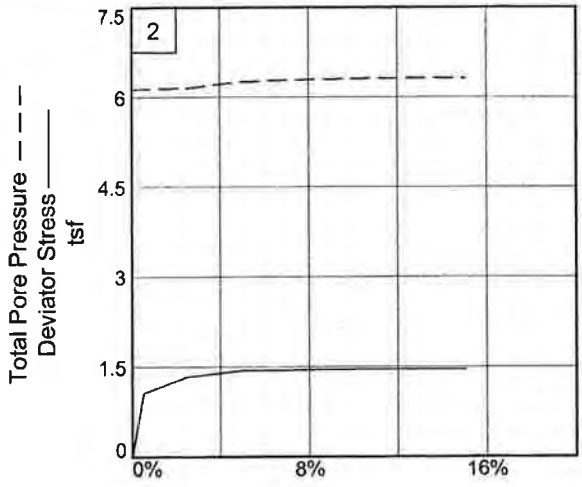
Project: Ames Municipal Electric System
200 E. 5th St., Ames, IA

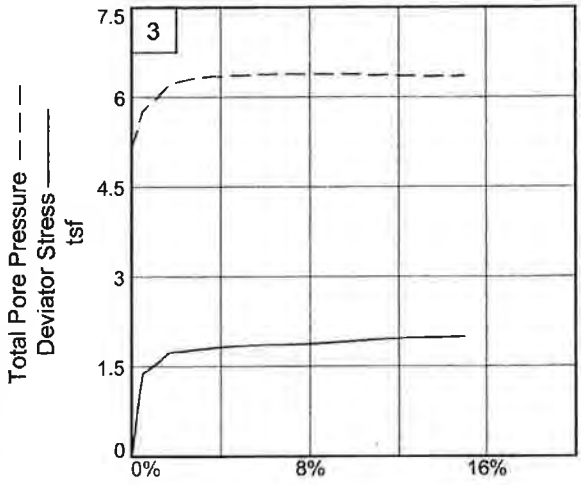
Sample Number: STP-3 **Depth:** 16-18'

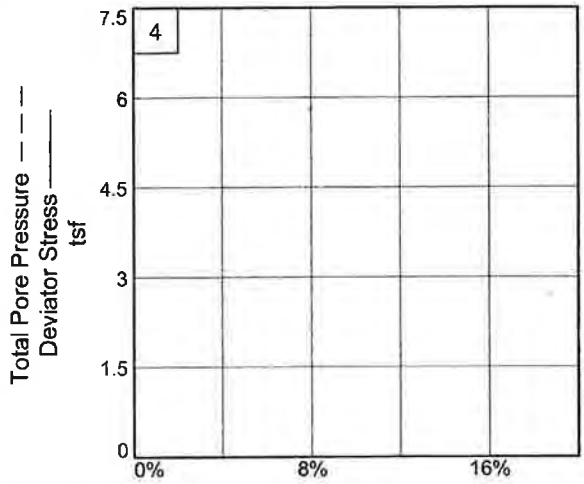
Proj. No.: B1510576 **Date Sampled:**

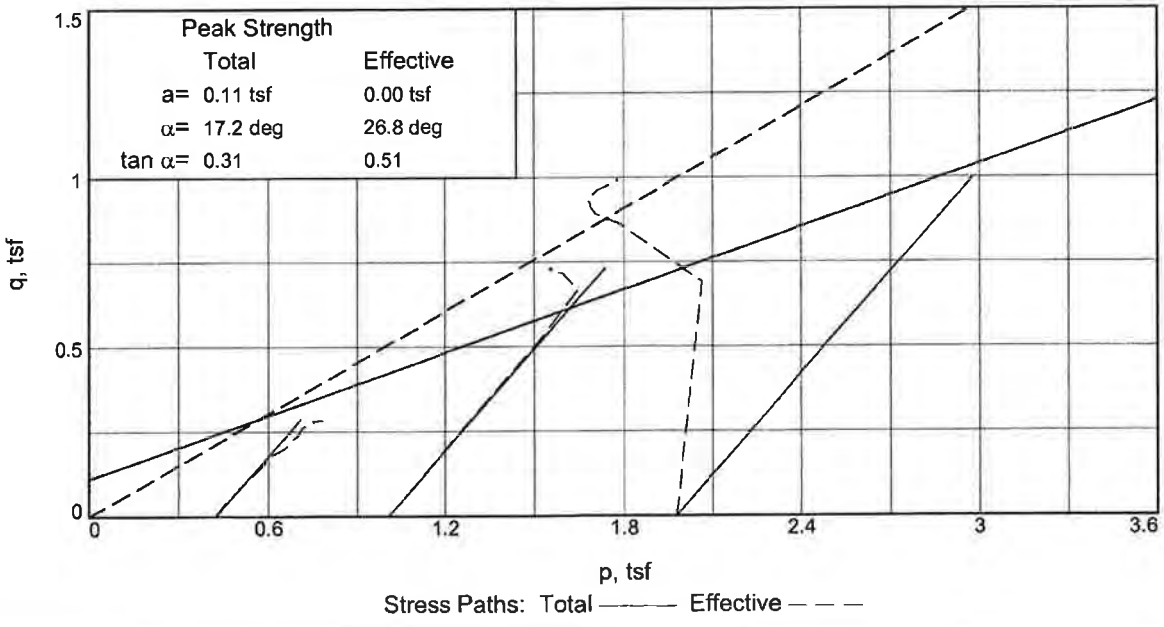
BRAUN INTERTEC











Client: Wenck Associates, Inc.
Project: Ames Municipal Electric System
Depth: 16-18' **Sample Number:** STP-3
Project No.: B1510576 **Figure** _____

Braun Intertec

Braun Intertec Corporation
5915 4th Street SW, Suite 100
Cedar Rapids, IA 52404
Phone: 319.365.0961

Material Test Report

Report No: MAT:W15-011214-S2
Issue No: 1

Client: Jason Warne
Wenck Associates, Inc.
1800 Pioneer Creek Center
Maple Plain, MN, 55359
Project: B1510576
Ames Municipal Electric System
200 E. 5th St.
Ames, IA, 50010
TR: Jeremy Elkin, jelkin@braunintertec.com

Jeremy Elkin
Operations Supervisor
Date of Issue: 1/15/2016

Sample Details

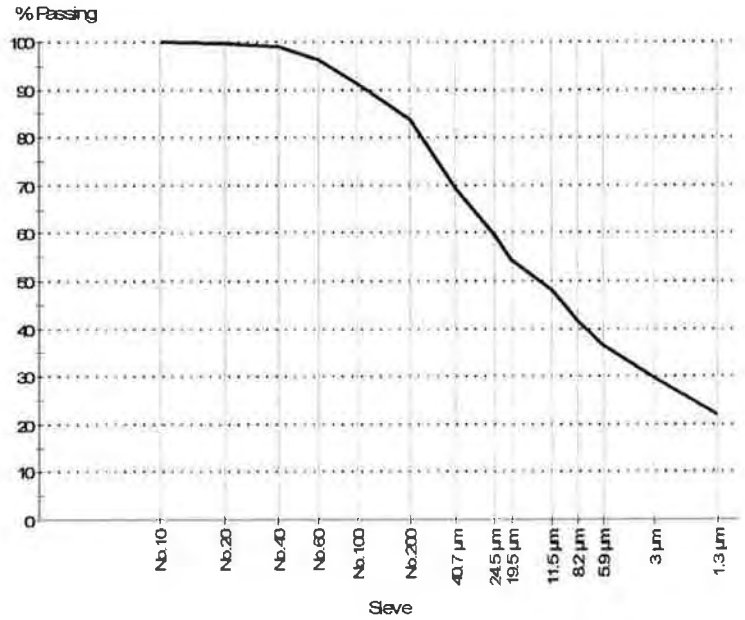
Sample ID: W15-011214-S2
Alternate Sample ID: STP-4 (11-13)
Sampled By:
Sampling Method:
Date Sampled:
Date Submitted:
Specification: General Gradation
Source:
Material Type:
Sample Location:

Other Test Results

Description	Method	Result	Limits
Dispersion device	ASTM D 422 - 07		
Dispersion time (min)			
Shape			
Hardness			
Liquid Limit	ASTM D 4318 - 05	52	
Method		Method A	
Plastic Limit		22	
Plasticity Index		30	
Sample history		Oven-dried	
Date Tested		1/15/2016	

Particle Size Distribution

Method: ASTM D 422 - 07
Drying by: Oven
Date Tested: 1/15/2016



Sieve Size	% Passing	Limits
No.10 (2.0mm)	100	
No.20 (850µm)	100	
No.40 (425µm)	99	
No.60 (250µm)	96	
No.100 (150µm)	91	
No.200 (75µm)	84	
40.7 µm	69.1	
24.5 µm	59.9	
19.5 µm	54.4	
11.5 µm	48.1	
8.2 µm	41.7	
5.9 µm	36.5	
3.0 µm	29.6	
1.3 µm	22.1	

Comments

N/A