

**USER NOTES, ABBREVIATIONS AND DEFINITIONS - Additional information available in Geotechnical Manual.**

This boring was made by ordinary and conventional methods and with care deemed adequate for the Department's design purposes. Since this boring was not taken to gather information relating to the construction of the project, the data noted in the field and recorded may not necessarily be the same as that which a contractor would desire. While the Department believes that the information as to the conditions and materials reported is accurate, it does not warrant that the information is necessarily complete. This information has been edited or abridged and may not reveal all the information which might be useful or of interest to the contractor. Consequently, the Department will make available at its offices, the field logs relating to this boring.

Since subsurface conditions outside each borehole are unknown, and soil, rock and water conditions cannot be relied upon to be consistent or uniform, no warrant is made that conditions adjacent to this boring will necessarily be the same as or similar to those shown on this log. Furthermore, the Department will not be responsible for any interpretations, assumptions, projections or interpolations made by contractors, or other users of this log.

Water levels recorded on this log should be used with discretion since the use of drilling fluids in borings may seriously distort the true field conditions. Also, water levels in cohesive soils often take extended periods of time to reach equilibrium and thus reflect their true field level. Water levels can be expected to vary both seasonally and yearly. The absence of notations on this log regarding water does not necessarily mean that this boring was dry or that the contractor will not encounter subsurface water during the course of construction.

- WH** ..... Weight of Hammer
- WR** ..... Weight of Rod
- Mud** ..... Drilling Fluids in Sample
- CS** ..... Continuous Sample

**SOIL/CORE TESTS**

- SPT N<sub>60</sub>** ..... ASTM D1586 Modified Blows per foot with 140 lb. hammer and a standard energy of 210 ft-lbs. This energy represents 60% of the potential energy of the system and is the average energy provided by a Rope & Cathead system.
- MC** ..... Moisture Content
- COH** ..... Cohesion
- γ** ..... Sample Density
- LL** ..... Liquid Limit
- PI** ..... Plasticity Index
- Φ** ..... Phi Angle
- REC** ..... Percent Core Recovered
- RQD** ..... Rock Quality Description (Percent of total core interval consisting of unbroken pieces 4 inches or longer)
- ACL** ..... Average Core Length (Average length of core that is greater than 4 inches long)
- Core Breaks** .... Number of natural core breaks per 2-foot interval.

- very loose ..... 0-4
- loose ..... 5-10
- medium dense ..... 11-24
- dense ..... 25-50
- very dense ..... >50

**Consistency - Cohesive Soils BPF**

- very soft ..... 0-1
- soft ..... 2-4
- firm ..... 5-8
- stiff ..... 9-15
- very stiff ..... 16-30
- hard ..... 31-60
- very hard ..... > 60

**COLOR**

- blk** ..... Black
- grn** ..... Green
- org** ..... Orange
- dk** ..... Dark
- IOS** ..... Iron Oxide Stained
- wht** ..... White
- brn** ..... Brown
- yel** ..... Yellow
- lt** ..... Light

**GRAIN SIZE /PLASTICITY**

- VF** ..... Very Fine
- F** ..... Fine
- Cr** ..... Coarse
- pl** ..... Plastic
- slpl** ..... Slightly Plastic

**SOIL/ROCK TERMS**

- C** ..... Clay
- L** ..... Loam
- S** ..... Sand
- Si** ..... Silt
- G** ..... Gravel (No. 10 Sieve to 3 inches)
- Bldr** ..... Boulder (over 3 inches)
- T** ..... till (unsorted, nonstratified glacial deposits)
- Lmst** ..... Limestone
- Sst** ..... Sandstone
- Dolo** ..... Dolostone
- wx** ..... weathered

**DISCONTINUITY SPACING**

- | Fractures  | Distance     | Bedding   |
|------------|--------------|-----------|
| Very Close | <2 inches    | Very Thin |
| Close      | 2-12 inches  | Thin      |
| Mod. Close | 12-36 inches | Medium    |
| Wide       | >36 inches   | Thick     |

**DRILLING SYMBOLS**

**WATER MEASUREMENT**

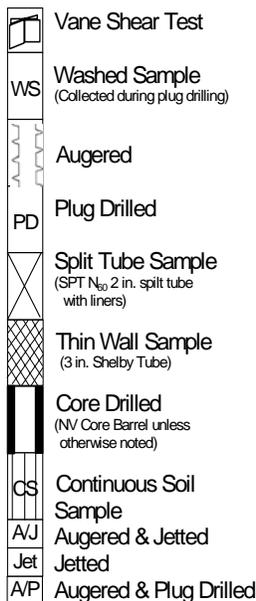
- AB** ..... After Bailing
- AC** ..... After Completion
- AF** ..... After Flushing
- w/C** ..... with Casing
- w/M** ..... with Mud
- WSD** ..... While Sampling/Drilling
- w/AUG** ..... with Hollow Stem Auger

**MISCELLANEOUS**

- NA** ..... Not Applicable
- w/** ..... with
- w/o** ..... with out
- sat** ..... saturated

**DRILLING OPERATIONS**

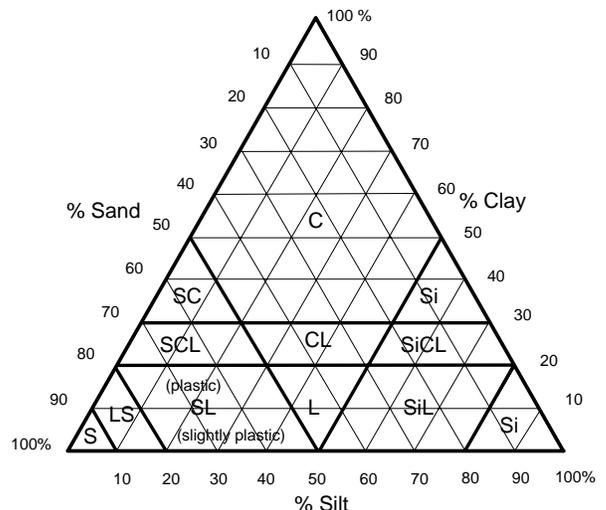
- AUG** ..... Augered
- CD** ..... Core Drilled
- DBD** ..... Disturbed by Drilling
- DBJ** ..... Disturbed by Jetting
- PD** ..... Plug Drilled
- ST** ..... Split Tube (SPT test)
- TW** ..... Thinwall (Shelby Tube)
- WS** ..... Wash Sample
- NSR** ..... No Sample Retrieved
- CS** ..... Continuous Soil Sample
- A/J** ..... Augered & Jetted
- Jet** ..... Jetted
- APV** ..... Augered & Plug Drilled



**RELATIVE DENSITY**

Compactness - Granular Soils BPF

**Mn/DOT Triangular Textural Soil Classification System**



MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION  
 LABORATORY LOG & TEST RESULTS - SUBSURFACE EXPLORATION



**UNIQUE NUMBER 78433**  
 U.S. Customary Units

State Project <b>7108-23</b>		Bridge No. or Job Desc. <b>71004</b>		Trunk Highway/Location <b>MN Trunk Highway 24</b>		Boring No. <b>T01</b>		Ground Elevation <b>991.1 (Surveyed)</b>		
Location Wright Coord:X=458213 Y=260168 (ft.)						Drill Machine <b>205120 CME(LC55) Track</b>		SHEET 1 of 2		
Latitude (North)=45°24'59.91" Longitude (West)=94°02'45.77"						Hammer <b>CME Automatic Calibrated</b>		Drilling Completed <b>4/23/14</b>		
No Station-Offset Information Available										
DEPTH	Depth	Lithology	Classification	Drilling Operation	SPT	MC	COH	γ	Soil	Other Tests
	Elev.				N <sub>60</sub>	(%)	(psf)	(pcf)		Or Remarks
					REC	RQD	ACL	Core Breaks	Rock	Formation or Member
					(%)	(%)	(ft)			
5	7.0 984.1		Loamy Sand with a little Gravel, brown, moist to damp		7	7				
10	12.0 979.1		Sand with a seam of Coarse Sand, light brown and damp		5	4				
15	17.0 974.1		Fine Sand, light brown and damp		17	4				
20	22.0 969.1		Sand with a little Fine Gravel, light brown to brown, damp to moist		10	3				
25	24.5 966.6		Coarse Sand with a little Gravel, brown and moist		22	6				
30	29.5 961.6		Loamy Fine Sand, brown and moist		13	3				
35	32.0 959.1		Sand, brown and moist		22	3				
40	34.5 956.6		Loamy Fine Sand, brown and very moist		21	6				
45	44.5 946.6		Sand with a seam of slightly plastic Silt Loam at 38.5', brown, moist with wet		34	6				
50	52.5 938.6		Loamy Sand with a little Gravel, brown, wet to saturated		42	8				
55	57.0 934.1		Coarse Sand with a little Gravel, brown and saturated		49	9				
60	62.0 929.1		Fine Sand, light brown and saturated		47	4				
65					44	9				
70					44	5				
75					37	20				
80					59	2				
85					58	2				
90					46	14				
					39	20				
					63	23				
					52	17				
					30					
					45	20				
					50/4					
					24					
					27	19				
					50/4					
					81	NSR				
					18	18				
					42	22				
					35	16				
					28					
					28	12				

rough drilling 64.0'-66.5'  
smooth drilling



MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION  
 LABORATORY LOG & TEST RESULTS - SUBSURFACE EXPLORATION



**UNIQUE NUMBER 78434**  
 U.S. Customary Units

State Project <b>7108-23</b>		Bridge No. or Job Desc. <b>71004</b>		Trunk Highway/Location <b>MN Trunk Highway 24</b>		Boring No. <b>T02</b>		Ground Elevation <b>967.6</b> (Surveyed)		
Location Wright Coord:X=458295 Y=260221 (ft.)						Drill Machine <b>205120 CME(LC55) Track</b>		SHEET 1 of 2		
Latitude (North)=45°25'00.44" Longitude (West)=94°02'44.62"						Hammer <b>CME Automatic Calibrated</b>		Drilling Completed <b>4/9/14</b>		
No Station-Offset Information Available										
DEPTH	Depth	Lithology	Classification	Drilling Operation	SPT	MC	COH	γ	Soil	Other Tests
	Elev.				N <sub>60</sub>	(%)	(psf)	(pcf)		Or Remarks
					REC	RQD	ACL	Core		Formation
					(%)	(%)	(ft)	Breaks		or Member
5			Loamy Sand to Sand with a layer of Coarse Sand at 4.5', browns with light brown, moist		28	8				
	9.0				8	6				
	958.6				6	10				
10			Loamy Sand and Gravel, brown and moist		21	8				
	11.5				12	4				
	956.1				16	4				
15			Sand, brown to gray-brown, damp		22	4				
	19.0				38	2				
	948.6		Sand with a little Gravel, light brown and damp		36	13				
	21.5				68	13				
	946.1		Sand and Gravel, brown and wet		42	23				
25					33	21				
	27.0				44	23				
	940.6		layers of Sand and Loamy Sand, browns and saturated		77	22				
					55	21				
					72	24				
30					30	17				
	42.5				30	15				
	925.1				21	NSR				
40										
			Coarse Sand with a little Gravel, gray-browns and saturated							
					25	20				
50										
55										

MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION  
 LABORATORY LOG & TEST RESULTS - SUBSURFACE EXPLORATION



**UNIQUE NUMBER 78434**  
 U.S. Customary Units

Mn/DOT GEOTECHNICAL SECTION - LOG & TEST RESULTS

SHEET 2 of 2

State Project <b>7108-23</b>	Bridge No. or Job Desc. <b>71004</b>	Trunk Highway/Location <b>MN Trunk Highway 24</b>	Boring No. <b>T02</b>	Ground Elevation <b>967.6</b> (Surveyed)
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DEPTH	Depth	Lithology	Classification	Drilling Operation	SPT	MC	COH	γ	Soil	Other Tests
	Elev.				N <sub>60</sub>	(%)	(psf)	(pcf)		Or Remarks
					REC	RQD	ACL	Core	Rock	Formation
					(%)	(%)	(ft)	Breaks		or Member
	56.0 911.6			PD						
60			Loamy Fine Sand, light gray and saturated	⊗	61	NSR				rough drilling 59.5'-60.5'
				PD						
65				⊗	89	17				
	66.0 901.6			PD						
70				⊗	67	12				
			plastic Sandy Loam with pebbles, gray and moist	PD						
75				⊗	77	13				
				PD						
80				⊗	60	14				
	81.0 886.6			PD						
85				⊗	42 50/5	17				
			Loamy Fine Sand, gray-brown and wet	PD						
90				⊗	67	16				
				PD						
95				⊗						
	94.0 873.6			PD						
			plastic Sandy Loam with a few pebbles, gray and very moist							
	99.5 868.1		Bottom of Hole - 99.5	⊗	65	14				

Water measured at 22.3' with auger

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 LABORATORY LOG & TEST RESULTS - SUBSURFACE EXPLORATION



**UNIQUE NUMBER 78435**  
 U.S. Customary Units

State Project <b>7108-23</b>		Bridge No. or Job Desc. <b>71004</b>		Trunk Highway/Location <b>MN Trunk Highway 24</b>		Boring No. <b>T03</b>		Ground Elevation <b>957.9 (Surveyed)</b>		
Location Wright Coord:X=458371 Y=260258 (ft.)						Drill Machine <b>205120 CME(LC55) Track</b>		SHEET 1 of 2		
Latitude (North)=45°25'00.81" Longitude (West)=94°02'43.56"						Hammer <b>CME Automatic Calibrated</b>		Drilling Completed <b>4/11/14</b>		
No Station-Offset Information Available										
DEPTH	Depth	Lithology	Classification	Drilling Operation	SPT	MC	COH	γ	Soil	Other Tests
	Elev.				N <sub>60</sub>	(%)	(psf)	(pcf)		Or Remarks
					REC (%)	RQD (%)	ACL (ft)	Core Breaks	Rock	Formation or Member
	4.0 953.9		Loamy Sand with a little Gravel, dark brown and very moist		9	15				
5	7.5 950.4		Sand, brown and moist		6	5				
	9.0 948.9		Silty Clay Loam, light gray and moist		12	28				
10	11.5 946.4		Sand with a little Gravel, brown and moist		18	5				
					28	22				
15			Sand, brown and saturated		50	21				
				PD						
20	20.5 937.4			PD	19	24				
				PD						
25			Coarse Sand, brown and saturated		23	17				
				PD						
				PD	23	18				
				PD						
				PD	26	17				
				PD						
30	28.0 929.9		Fine Sand, light gray and saturated		53	24				high Silt content
				PD						
				PD	56	26				
				PD						
35	35.5 922.4			PD	62	23				
				PD						
40			Coarse Sand and Gravel, gray-brown and saturated		17	16				
				PD						
				PD	15	18				
				PD						
				PD	14	17				
				PD						
45	45.5 912.4		Coarse Sand, gray-brown and saturated		16	17				
				PD						
				PD	26	20				
				PD						
				PD	17					
	48.5 909.4		Coarse Sand and Gravel, gray and very moist		10	15				
50	49.5 908.4				50/3					
			Sandy Clay Loam with a few pebbles, a few traces of Loamy Sand and Loamy Coarse Sand 58.0'-59.5'; gray and very moist	PD						
55										

MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION  
 LABORATORY LOG & TEST RESULTS - SUBSURFACE EXPLORATION



**UNIQUE NUMBER 78435**  
 U.S. Customary Units

Mn/DOT GEOTECHNICAL SECTION - LOG & TEST RESULTS

SHEET 2 of 2

State Project <b>7108-23</b>		Bridge No. or Job Desc. <b>71004</b>		Trunk Highway/Location <b>MN Trunk Highway 24</b>		Boring No. <b>T03</b>		Ground Elevation <b>957.9 (Surveyed)</b>		
DEPTH	Depth	Lithology	Classification	Drilling Operation	SPT	MC	COH	γ	Soil	Other Tests
	Elev.				N <sub>60</sub>	(%)	(psf)	(pcf)		Or Remarks
					REC	RQD	ACL	Core	Rock	Formation
					(%)	(%)	(ft)	Breaks		or Member
60		Sandy Clay Loam with a few pebbles, a few traces of Loamy Sand and Loamy Coarse Sand 58.0'-59.5'; gray and very moist (continued)		PD						
				⊗	30	14				
65				⊗	40	27				
				⊗	31	16				
70				⊗	57	15				
73.5	884.4	Loamy Sand, gray and wet		⊗	57	15				
75	76.0			⊗	53	13				
76.0	881.9	plastic Sandy Loam with pebbles, gray and moist		PD						
80				⊗	53	13				
				⊗	65	14				
85				⊗	40	13				
				⊗	45	14				
90				⊗	55	13				
				⊗	55	13				
100				⊗	55	13				

Bottom of Hole - 104.5'  
 Water measured at 12.8' with auger

MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION  
 LABORATORY LOG & TEST RESULTS - SUBSURFACE EXPLORATION



**UNIQUE NUMBER 78436**  
 U.S. Customary Units

State Project <b>7108-23</b>		Bridge No. or Job Desc. <b>71004</b>		Trunk Highway/Location <b>MN Trunk Highway 24</b>		Boring No. <b>T04</b>		Ground Elevation <b>958.8 (Surveyed)</b>		
Location Wright Coord:X=458457 Y=260302 (ft.)						Drill Machine <b>205120 CME(LC55) Track</b>		SHEET 1 of 2		
Latitude (North)=45°25'01.24" Longitude (West)=94°02'42.36"						Hammer <b>CME Automatic Calibrated</b>		Drilling Completed <b>4/17/14</b>		
No Station-Offset Information Available										
DEPTH	Depth	Lithology	Classification	Drilling Operation	SPT	MC	COH	γ	Soil	Other Tests
	Elev.				N60	(%)	(psf)	(pcf)		Or Remarks
					REC	RQD	ACL	Core Breaks		Formation or Member
					(%)	(%)	(ft)			
	4.5		Loamy Sand with a seam of plastic Sandy Loam on top, dark brown to brown, moist		17	10				
5	954.3				12	6				
			Fine Sand, light brown, moist to very moist		6	10				
10	949.3				7	4				
	12.0		Coarse Sand with a little Gravel, light brown and moist		12	5				
	946.8				12	5				
	14.5		Sand and Gravel with a thin seam of Loamy Sand, light brown with dark brown, damp		12	4				
15	944.3				12	4				
	17.0		Coarse Sand with a little Gravel, light brown and moist		15	20				
▼	941.8				6	27				
	20.5		Fine Sand, light brown and wet		27	16				
	938.3				32	21				
	25.5		Loamy Coarse Sand and Gravel with a trace and pockets of Loamy Sand and organic slightly plastic Loam at 20.5', brown with dark brown and black, wet	PD	38	24				
	933.3			PD	27	22				
				PD	23	22				
				PD	36	23				
				PD	16	24				
				PD	15	17				
				PD	10	15				
				PD	12	21				
	38.0			PD	20	12				
	920.8			PD	12	21				
				PD	10	15				
				PD	12	21				
				PD	10	15				
	48.0			PD	12	21				
	910.8			PD	10	15				
	50.2			PD	12	21				
	908.6			PD	10	15				
				PD	12	21				
				PD	10	15				
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				PD	10	15				
				PD	12</					

MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION  
 LABORATORY LOG & TEST RESULTS - SUBSURFACE EXPLORATION



**UNIQUE NUMBER 78436**  
 U.S. Customary Units

Mn/DOT GEOTECHNICAL SECTION - LOG & TEST RESULTS

SHEET 2 of 2

State Project <b>7108-23</b>	Bridge No. or Job Desc. <b>71004</b>	Trunk Highway/Location <b>MN Trunk Highway 24</b>	Boring No. <b>T04</b>	Ground Elevation <b>958.8</b> (Surveyed)
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DEPTH	Depth Elev.	Lithology	Classification	Drilling Operation	SPT N <sub>60</sub>	MC (%)	COH (psf)	γ (pcf)	Soil Rock	Other Tests Or Remarks
					REC (%)	RQD (%)	ACL (ft)	Core Breaks		Formation or Member
	57.0 901.8		Fine Sand with a thin seam of Clay Loam, gray and saturated <i>(continued)</i>	PD						
60				⊗	46	14				
				PD						
65				⊗	62	16				
			plastic Sandy Loam with pebbles, gray and very moist	PD						
70				⊗	59	12				
				PD						
75				⊗	19 28 50/5	18				
	77.0 881.8			PD						
80			Loamy Sand with a little Gravel, light gray and wet	⊗	49	16				
	82.0 876.8			PD						
85				⊗	57	13				
				PD						
90				⊗	45	14				
				PD						
95			plastic Sandy Loam with some pebbles and seams of Sandy Clay Loam, gray and moist	⊗	43	13				
				PD						
100				⊗	40	17				
				PD						
105	105.0 853.8			⊗	55	14				

Bottom of Hole - 105.0'  
 Water measured at 18.1' with auger

MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION  
 LABORATORY LOG & TEST RESULTS - SUBSURFACE EXPLORATION



**UNIQUE NUMBER 78487**  
 U.S. Customary Units

State Project <b>7108-23</b>		Bridge No. or Job Desc. <b>71004</b>		Trunk Highway/Location <b>MN Trunk Highway 24</b>		Boring No. <b>T05</b>		Ground Elevation <b>951.2 (Surveyed)</b>		
Location Wright Coord:X=459295 Y=260659 (ft.)						Drill Machine <b>205120 CME(LC55) Track</b>		SHEET 1 of 2		
Latitude (North)=45°25'04.78" Longitude (West)=94°02'30.62"						Hammer <b>CME Automatic Calibrated</b>		Drilling Completed <b>5/14/14</b>		
No Station-Offset Information Available										
DEPTH	Depth	Lithology	Classification	Drilling Operation	SPT	MC	COH	γ	Soil	Other Tests
	Elev.				N <sub>60</sub>	(%)	(psf)	(pcf)		Or Remarks
					REC	RQD	ACL	Core		Formation
					(%)	(%)	(ft)	Breaks		or Member
4.0	947.2		Sand with some Gravel and a thin seam of slightly plastic Sandy Loam, brown and moist		32	12				
5					37	9				
9.0	942.2		Fine Sand with some Gravel, dark brown and moist		36	13				
10					7	12				
15			Loamy Fine Sand, gray-browns, moist to wet		4	13				
16.5	934.7				7	18				
20					11	15				
25			Sand and Gravel, dark brown to brown to light brown, wet to saturated		19	14				
30				PD	14	15				
37.5	913.7				36	N/A				
40				PD	22	19				
45			Sand with some Gravel 43.0'-44.0', light gray-brown and saturated		22	18				
50				PD	22	18				
51.0	900.2				18	19				
55			Coarse Sand, light brown and saturated		17	20				
56.0	895.2			PD	18	21				
60			Sand with a little Gravel, light gray-brown and saturated		19	20				
65				PD	36	22				
66.0	885.2				25	21				
70			Coarse Sand and Gravel, brown and saturated		26	18				
71.0	880.2			PD	48	N/A				
75			Sand, light gray-brown and saturated		47	21				
80				PD	19	16				
					63	19				layered drilling rough and smooth 70'
				PD	27	20				

MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION  
 LABORATORY LOG & TEST RESULTS - SUBSURFACE EXPLORATION



**UNIQUE NUMBER 78487**  
 U.S. Customary Units

Mn/DOT GEOTECHNICAL SECTION - LOG & TEST RESULTS

SHEET 2 of 2

State Project <b>7108-23</b>		Bridge No. or Job Desc. <b>71004</b>		Trunk Highway/Location <b>MN Trunk Highway 24</b>		Boring No. <b>T05</b>		Ground Elevation <b>951.2 (Surveyed)</b>		
DEPTH	Depth	Lithology	Classification	Drilling Operation	SPT	MC	COH	γ	Soil	Other Tests
	Elev.				N <sub>60</sub>	(%)	(psf)	(pcf)		Or Remarks
					REC (%)	RQD (%)	ACL (ft)	Core Breaks	Rock	Formation or Member
	81.0 870.2			PD						
85			Loamy Coarse Sand and Gravel, gray and saturated	⊗	21	17				
				⊗	29	N/A				
90	91.0 860.2			PD						
			Sandy Clay Loam with some pebbles and a few thin seams of Sand, gray and very moist	⊗	32	16				
95				⊗	29	15				very hard at 95.1'-96', boulder? softer 96'
100				⊗	15					
105	104.0 847.2			PD						
			Clay Loam with a few pebbles, dark gray and moist	⊗	32	15				
110				⊗	50/4					
115	114.1 837.1			PD						hard drilling at 114.1'
				WS		N/A				
120				PD	50/5	14				little softer 117.5' harder rough 119' smooth 119.5'
125				⊗						
			Loamy Sand and Gravel with layers containing boulders and cobbles, gray-brown and very moist	⊗	30					rougher drilling 123.5' 124.5'
130				⊗	50/2	13				
135				PD						hard rough drilling the soft and smooth 132'
140	139.6 811.6			PD	50/2	10				hard 138.6'
	141.1		BOULDER; biotite and hornblende bearing GRANITE; very hard; light gray	⊗	83	83	N/A			Boulder 1.25' cored
	141.1		No Sample Recovered; Driller indicates Cobbles	WS						rougher drilling/cobbles 141'
	141.1		Approximate Top of Bedrock							REFORMATORY
145	142.5 808.7		GRANODIORITE; generally fresh with slight weathering; medium to coarse grained; wide jointed; sub vertical biotite foliation present (trachytoid foliation); quartz rich zones, veins, and blebs are common; hard to very hard; white and black.	⊗						GRANODIORITE
				⊗	50/1					smoother but harder 146'
150	152.1 799.1			⊗	84	84	N/A			

MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION  
 LABORATORY LOG & TEST RESULTS - SUBSURFACE EXPLORATION



**UNIQUE NUMBER 78747**  
 U.S. Customary Units

State Project <b>7108-23</b>		Bridge No. or Job Desc. <b>71004</b>		Trunk Highway/Location <b>MN Trunk Highway 24</b>		Boring No. <b>T06</b>		Ground Elevation <b>940.0 (Field Est.)</b>		
Location Wright Coord:X=458641 Y=260382 (ft.)						Drill Machine <b>211328 CPT Track</b>			SHEET 1 of 2	
Latitude (North)=45°25'02.03" Longitude (West)=94°02'39.78"						Hammer <b>CME Automatic Calibrated</b>			Drilling Completed <b>7/2/14</b>	
No Station-Offset Information Available										
DEPTH	Depth	Lithology	Classification	Drilling Operation	SPT	MC	COH	γ	Soil	Other Tests
	Elev.				N60	(%)	(psf)	(pcf)		Or Remarks
					REC	RQD	ACL	Core Breaks	Rock	Formation or Member
					(%)	(%)	(ft)			
	3.0 937.0	Air								
5	8.0 932.0	Water								
10	13.5 926.5	Coarse Sand with a little Gravel, brown and saturated			9	13				
15	18.5 921.5	Sand with a little Gravel, brown and saturated			5 27 50/.5	17				
20	21.0 919.0	Coarse Sand with a little Gravel, brown and saturated			10	17				
25	23.5 916.5	Sand with a little Gravel, brown and saturated			13	NSR				
30		Sand, brown and saturated			10	19				
					8	20				
					12	18				
					13	19				
					13	19				
					13	17				
					19	-81				
					19	20				
					17	17				
					17	18				
50				20	19					
55				21	20					
60	57.0 883.0	Sand with a little Gravel and a seam of Coarse Sand, light gray and saturated			40	19				
65	62.0 878.0	Sand and Gravel, light gray and saturated			60	N/A				
70	67.0 873.0	Sand, light gray and saturated								

MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION  
 LABORATORY LOG & TEST RESULTS - SUBSURFACE EXPLORATION



**UNIQUE NUMBER 78747**  
 U.S. Customary Units

Mn/DOT GEOTECHNICAL SECTION - LOG & TEST RESULTS

SHEET 2 of 2

State Project <b>7108-23</b>		Bridge No. or Job Desc. <b>71004</b>		Trunk Highway/Location <b>MN Trunk Highway 24</b>		Boring No. <b>T06</b>		Ground Elevation <b>940.0 (Field Est.)</b>	
DEPTH	Depth	Lithology	Classification	Drilling Operation	SPT	MC	COH	γ	Other Tests Or Remarks
	Elev.				N <sub>60</sub>	(%)	(psf)	(pcf)	
					REC (%)	RQD (%)	ACL (ft)	Core Breaks	Formation or Member
	72.0 868.0		Sand, light gray and saturated ( <i>continued</i> )	⊗	33	21			
75			Coarse Sand and Gravel, gray and saturated	⊗	18	19			
	77.0 863.0		Loamy Fine Sand & Gravel with a few stone pieces, gray and saturated	⊗	25	12			
80			Gravel, gray and saturated	⊗	9 19 50/3	N/A			
	82.0 858.0		Sand and Gravel with stone chips and pieces, gray and saturated	⊗	50/2	NSR			
85				⊗	54	N/A			
	87.0 853.0			⊗	21 35 50/4	NSR			
90			Coarse Sand and Gravel, dark gray and saturated	⊗	78	16			
	104.0 836.0			⊗	60	22			
105			Loamy Fine Sand, gray and saturated	⊗	64	25			
	114.0 826.0			⊗					
110									
115									
120									
125									
	129.5 810.5		Bottom of Hole - 129.5'						
			Water level assumed to be at saturated granular layer						

MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION  
 LABORATORY LOG & TEST RESULTS - SUBSURFACE EXPLORATION



**UNIQUE NUMBER 78748**  
 U.S. Customary Units

State Project <b>7108-23</b>		Bridge No. or Job Desc. <b>71004</b>		Trunk Highway/Location <b>MN Trunk Highway 24</b>		Boring No. <b>T07</b>		Ground Elevation <b>939.8 (Hand Leveled)</b>		
Location Wright Coord: X=458814 Y=260476 (ft.)						Drill Machine <b>211304 CME Fat Tire</b>			SHEET 1 of 2	
Latitude (North)=45°25'02.97" Longitude (West)=94°02'37.35"						Hammer <b>CME Automatic Calibrated</b>			Drilling Completed <b>7/2/14</b>	
No Station-Offset Information Available										
DEPTH	Depth	Lithology	Classification	Drilling Operation	SPT	MC	COH	γ	Soil	Other Tests
	Elev.				N60	(%)	(psf)	(pcf)		Or Remarks
					REC	RQD	ACL	Core Breaks		Formation or Member
					(%)	(%)	(ft)			
	3.0 936.8	Air								
5		Water								
10	10.0 929.8									
15					11	17				
20					7	17				
25					9	18				
					6	21				
					6	20				
					10	18				
					8	18				
					8	19				
					10	15				
					8	19				
					9	19				
40	42.5 897.3				11	19				
45	45.0 894.8	Loamy Sand, gray and saturated			8	21				
50					11	18				
					16	22				
55	56.0 883.8				16	18				
60	61.0 878.8				14	18				
65	66.0 873.8				15	19				
70	71.0 868.8				18	N/A				
75	76.0 863.8				28	21				
80										

MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION  
 LABORATORY LOG & TEST RESULTS - SUBSURFACE EXPLORATION



**UNIQUE NUMBER 78748**  
 U.S. Customary Units

Mn/DOT GEOTECHNICAL SECTION - LOG & TEST RESULTS

SHEET 2 of 2

State Project <b>7108-23</b>	Bridge No. or Job Desc. <b>71004</b>	Trunk Highway/Location <b>MN Trunk Highway 24</b>	Boring No. <b>T07</b>	Ground Elevation <b>939.8 (Hand Leveled)</b>
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DEPTH	Depth Elev.	Lithology	Classification	Drilling Operation	SPT	MC	COH	γ	Soil Rock	Other Tests Or Remarks
					N <sub>60</sub>	(%)	(psf)	(pcf)		REC
					(%)	(%)	(ft)			
85			Sand, gray-browns and saturated (continued)	PD	43	NSR				
90	90.0 849.8		Loamy Coarse Sand and Gravel, dark brown and saturated	PD	58	19				
95	96.0 843.8		Silt, light gray and wet	PD	25 29 50/5	12				hard drilling at 95.5' softer and rough drilling 96' high Very Fine Sand content
105	104.0 835.8		Loamy Coarse Sand and Gravel, dark gray and saturated	PD	47	16				rougher drilling 110'
115	114.0 825.8		Gravel with some Sand, gray and saturated	PD	15 40 50/5	N/A				smooth drilling 114'
125	127.0 812.8		Residual Soil; very fine grained kaolinite clay with medium to very coarse grained sand-predominately angular quartz grains; biotite mica common; gray. Approximate Top of Bedrock	WS	32 50/4	33				started plugging more 127'
135	129.0 810.8		GRANODIORITE; light gray and black.	WS	50/0.0	NSR				hard drilling at 129.0' REFORMATORY GRANODIORITE softer smoother 131.6' harder smoother 132.2' rougher hard drilling 133.5' softer 137' harder 137.5 rough hard 138' smooth hard 139.5' very hard 142'
140	143.0 796.8		Bottom of Hole - 129.0' No water encountered or measured during drilling							

MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION  
 LABORATORY LOG & TEST RESULTS - SUBSURFACE EXPLORATION



**UNIQUE NUMBER 78749**  
 U.S. Customary Units

State Project <b>7108-23</b>		Bridge No. or Job Desc. <b>71004</b>		Trunk Highway/Location <b>MN Trunk Highway 24</b>		Boring No. <b>T08</b>		Ground Elevation <b>939.6 (Hand Leveled)</b>		
Location Wright Coord: X=458954 Y=260553 (ft.)						Drill Machine <b>211304 CME Fat Tire</b>			SHEET 1 of 2	
Latitude (North)=45°25'03.72" Longitude (West)=94°02'35.40"						Hammer <b>CME Automatic Calibrated</b>			Drilling Completed <b>7/17/14</b>	
No Station-Offset Information Available										
DEPTH	Depth	Lithology	Classification	Drilling Operation	SPT	MC	COH	γ	Soil	Other Tests
	Elev.				N <sub>60</sub>	(%)	(psf)	(pcf)		Or Remarks
					REC	RQD	ACL	Core Breaks	Rock	Formation or Member
					(%)	(%)	(ft)			
3.0	936.6	Air								
5		Water								
10.0	929.6									
15					9	20				
20					1	24				
25					9	23				
30					3	22				
35					8	24				
40					8	23				
45					8	23				
50					7	23				
55					7	22				
60					8	22				
65					7	21				
70					12	21				
52.0	887.6				15	21				
57.0	882.6				33	21				
64.5	875.1				17	22				
					7	20				
					7	17				
					8	N/A				
					1	21				
					10	21				

MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION  
 LABORATORY LOG & TEST RESULTS - SUBSURFACE EXPLORATION



**UNIQUE NUMBER 78749**  
 U.S. Customary Units

Mn/DOT GEOTECHNICAL SECTION - LOG & TEST RESULTS

SHEET 2 of 2

State Project <b>7108-23</b>	Bridge No. or Job Desc. <b>71004</b>	Trunk Highway/Location <b>MN Trunk Highway 24</b>	Boring No. <b>T08</b>	Ground Elevation <b>939.6 (Hand Levelled)</b>
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DEPTH	Depth Elev.	Lithology	Classification	Drilling Operation	SPT	MC	COH	γ	Soil Rock	Other Tests Or Remarks
					N <sub>60</sub>	(%)	(psf)	(pcf)		REC (%)
75	77.0 862.6	Loamy Sand and Gravel, gray and saturated (continued)		PD	15	17				
80	82.0 857.6	Gravel with some Sand, gray and saturated		PD	14	N/A				
85	87.0 852.6	Loamy Sand and Gravel, gray and saturated		PD	54	17				
90		Gravel with some Sand, gray and saturated		PD	50/1	NSR				rough drilling at 88.5' layered 89.5'
95			PD	37	N/A				smooth drilling at 90.0' rough drilling at 91.0'	
100	98.5 841.1	slightly plastic Sandy Loam with a few pebbles, gray and moist		PD	18 37 50/5	12				Gravel layer 97.5'-98.5'
105	104.0 835.6		PD							
110		Loamy Sand and Gravel, gray and saturated		PD	62	15				
115	114.0 825.6	Loamy Sand, gray and saturated		PD						layered Sand & Gravel seams 113'
120			PD	64	19					
125	124.5 815.1	Approximate Top of Bedrock		PD						got hard 124.5'
130	131.6 808.0	GRANODIORITE; generally fresh with slight weathering; medium to coarse grained; moderate to wide jointing; very coarse grained plagioclase and quartz vein from 124.5' to 127.6'; biotite common with trachtyoid foliation; quartz rich zones, veins and blebs common; hard to very hard; white and black.			99	91	1.52	3		REFORMATORY GRANODIORITE
					93	93	1.40	4		core bit got stuck in rock 131.6'

Bottom of Hole - 131.6'  
 Water measured at 3.0' with auger

MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION  
 LABORATORY LOG & TEST RESULTS - SUBSURFACE EXPLORATION



**UNIQUE NUMBER 78750**  
 U.S. Customary Units

State Project <b>7108-23</b>		Bridge No. or Job Desc. <b>71004</b>		Trunk Highway/Location <b>MN Trunk Highway 24</b>		Boring No. <b>T09</b>		Ground Elevation <b>937.4 (Hand Leveled)</b>		
Location Wright Coord:X=459102 Y=260639 (ft.)						Drill Machine <b>211304 CME Fat Tire</b>			SHEET 1 of 2	
Latitude (North)=45°25'04.58" Longitude (West)=94°02'33.32"						Hammer <b>CME Automatic Calibrated</b>			Drilling Completed <b>7/24/14</b>	
No Station-Offset Information Available										
DEPTH	Depth	Lithology	Classification	Drilling Operation	SPT	MC	COH	γ	Soil	Other Tests
	Elev.				N60	(%)	(psf)	(pcf)		Or Remarks
					REC	RQD	ACL	Core Breaks	Rock	Formation or Member
					(%)	(%)	(ft)			
	3.0 934.4	Air								
5		Water								
	9.0 928.4									
10										
15					18	16				
					11	18				
20					7	19				
					10	19				
25		Coarse Sand with a little Gravel, a few seams and a layer of Sand; gray and saturated			8	NSR				
					8	20				
30				PD	8	20				
				PD	13	20				
35				PD	16	19				
				PD	8	19				
40				PD	15	18				
				PD	19	22				
43.5 45	893.9			PD	12	19				
				PD	18	20				
50		Sand, gray and saturated		PD	14	21				
54.0 55	883.4			PD						
60					13	21				
65		Coarse Sand and Gravel, gray and saturated		PD						
70					16	17				
74.0 75				PD						

MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION  
 LABORATORY LOG & TEST RESULTS - SUBSURFACE EXPLORATION



**UNIQUE NUMBER 78750**  
 U.S. Customary Units

Mn/DOT GEOTECHNICAL SECTION - LOG & TEST RESULTS

SHEET 2 of 2

State Project <b>7108-23</b>		Bridge No. or Job Desc. <b>71004</b>		Trunk Highway/Location <b>MN Trunk Highway 24</b>		Boring No. <b>T09</b>		Ground Elevation <b>937.4 (Hand Leveled)</b>		
DEPTH	Depth	Lithology	Classification	Drilling Operation	SPT	MC	COH	γ	Soil	Other Tests Or Remarks
	Elev.				N <sub>60</sub>	(%)	(psf)	(pcf)		REC
	863.4		Sand, gray and saturated	PD						
80				⊗	30	21				
				PD						
85			Sand, gray and saturated (continued)							
90				⊗	12	22				
				PD						
95	94.0 843.4									
100				⊗	48 50/5	13				
			Loamy Sand and Gravel with a few stone pieces, gray and saturated	WS						
105										
110				⊗	48 50/5	NSR				
				PD						
115	115.0 822.4		Approximate Top of Bedrock							
120						N/A				REFORMATORY GRANODIORITE
					100	100	0.96		2	
									4	
125			GRANODIORITE; generally fresh with slight weathering; medium to coarse grained; wide jointed; sub vertical biotite foliation present to approximately 127'; trachytoid foliation; quartz rich zones, veins, & blebs common; hard to very hard; white and black.		100	95	1.59		3	
									2	
130					100	77	1.31		3	
									2	
135					67	53	1.32		N/A	Geologist's Note: Poor recovery at 132' to 137' was due to new driller learning coring methods.
									1	
140	140.5 796.9		Bottom of Hole - 140.5'		100	58	0.97		2	

MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION  
 LABORATORY LOG & TEST RESULTS - SUBSURFACE EXPLORATION



**UNIQUE NUMBER 78956**  
 U.S. Customary Units

State Project <b>7108-23</b>		Bridge No. or Job Desc. <b>71004</b>		Trunk Highway/Location <b>MN Trunk Highway 24</b>			Boring No. <b>T10</b>		Ground Elevation <b>955.0 (DTM)</b>	
Location Wright Coord: X=458496 Y=260326 (ft.) Latitude (North)=45°25'01.47" Longitude (West)=94°02'41.81" No Station-Offset Information Available						Drill Machine <b>207184 CME 850 Track</b>			SHEET 1 of 2	
						Hammer <b>CME Automatic Calibrated</b>			Drilling Completed <b>9/25/14</b>	
DEPTH	Depth	Lithology	Classification	Drilling Operation	SPT N <sub>60</sub>	MC (%)	COH (psf)	γ (pcf)	Soil	Other Tests Or Remarks
	Elev.				REC (%)	RQD (%)	ACL (ft)	Core Breaks		Rock
5										
10										
15										
20										
25										
30										
35										
40										
45			The purpose of this boring was to start sampling where nearby boring T04 terminated and to continue to bedrock depth. Refer to T04 (Unique Number 78436) for more information in this zone.	PD						
50										
55										
60										
65										
70										
75										
80										
85										
90										

MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION  
 LABORATORY LOG & TEST RESULTS - SUBSURFACE EXPLORATION



**UNIQUE NUMBER 78956**  
 U.S. Customary Units

Mn/DOT GEOTECHNICAL SECTION - LOG & TEST RESULTS

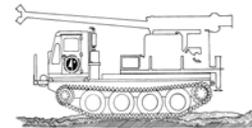
SHEET 2 of 2

State Project <b>7108-23</b>	Bridge No. or Job Desc. <b>71004</b>	Trunk Highway/Location <b>MN Trunk Highway 24</b>	Boring No. <b>T10</b>	Ground Elevation <b>955.0 (DTM)</b>
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DEPTH	Depth Elev.	Lithology	Classification	Drilling Operation	SPT	MC	COH	γ	Soil Rock	Other Tests Or Remarks
					N <sub>60</sub>	(%)	(psf)	(pcf)		REC (%)
95										
100			The purpose of this boring was to start sampling where nearby boring T04 terminated and to continue to bedrock depth. Refer to T04 (Unique Number 78436) for more information in this zone. (continued)	PD						
105										
110	112.0 843.0		Sandy Clay with some pebbles, gray and moist	X	23 50/5	17				
115	118.0 837.0		Loamy Fine Sand and Gravel with a seam of Loamy Fine Sand on top, light grays and wet	PD						
120	124.0 831.0		Loamy Sand with some Gravel, light gray and saturated	X	47 50/5	20				rough drilling at 124.0'
125				PD						
130				X	94	17				
135										
140	138.0 817.0		Loamy Sand, light gray and saturated	PD						
145				X	30 36 50/3	19				
150	150.5 804.5		Approximate Top of Bedrock	PD						
155			GRANODIORITE; generally fresh with zones of slight weathering; medium to coarse grained; moderately jointed; hard to very hard; quartz rich veins common; mostly grey speckled black and white		80	74	1.23	3		REFORMATORY GRAY GRANODIORITE
160			Hornblende band 1 inch thick at 157 feet and highly fractured between 157 and 161 feet with greenish discoloration between 158 and 160 feet		78	24	0.40	1		
165			6 inch thick hornblende band at 164 feet		97	88	1.46	1		
167.1	167.1 787.9		Bottom of Hole - 167.1' Water measured at 26.0' with auger							



# Minnesota Department of Transportation Geotechnical Section



## Cone Penetration Test Index Sheet 1.0 (CPT 1.0)

### USER NOTES, ABBREVIATIONS AND DEFINITIONS

This Index sheet accompanies Cone Penetration Test Data. Please refer to the Boring Log Descriptive Terminology Sheet for information relevant to conventional boring logs.

This Cone Penetration Test (CPT) Sounding follows ASTM D 5778 and was made by ordinary and conventional methods and with care deemed adequate for the Department's design purposes. Since this sounding was not taken to gather information relating to the construction of the project, the data noted in the field and recorded may not necessarily be the same as that which a contractor would desire. While the Department believes that the information as to the conditions and materials reported is accurate, it does not warrant that the information is necessarily complete. This information has been edited or abridged and may not reveal all the information which might be useful or of interest to the contractor. Consequently, the Department will make available at its offices, the field logs relating to this sounding.

Since subsurface conditions outside each CPT Sounding are unknown, and soil, rock and water conditions cannot be relied upon to be consistent or uniform, no warrant is made that conditions adjacent to this sounding will necessarily be the same as or similar to those shown on this log. Furthermore, the Department will not be responsible for any interpretations, assumptions, projections or interpolations made by contractors, or other users of this log.

Water pressure measurements and subsequent interpreted water levels shown on this log should be used with discretion since they represent dynamic conditions. Dynamic Pore water pressure measurements may deviate substantially from hydrostatic conditions, especially in cohesive soils. In cohesive soils, water pressures often take extended periods of time to reach equilibrium and thus reflect their true field level. Water levels can be expected to vary both seasonally and yearly. The absence of notations on this log regarding water does not necessarily mean that this boring was dry or that the contractor will not encounter subsurface water during the course of construction.

Ratio of sleeve friction over corrected tip resistance.

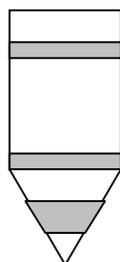
$$FR = f_s/q_t$$

### V<sub>s</sub> Shear Wave Velocity

A measure of the speed at which a seismic wave travels through soil/rock.

### PORE WATER MEASUREMENTS

Pore water measurements reported on CPT Log are representative of water pressures measured at the U2 location, just behind the cone tip, prior to the sleeve, as shown in the figure below. These measurements are considered to be dynamic water pressures due to the local disturbance caused by the cone tip. Dynamic water pressure decay and Static water pressure measurements are reported on a Pore Water Pressure Dissipation Graph.



U2

### SBT SOIL BEHAVIOR TYPE

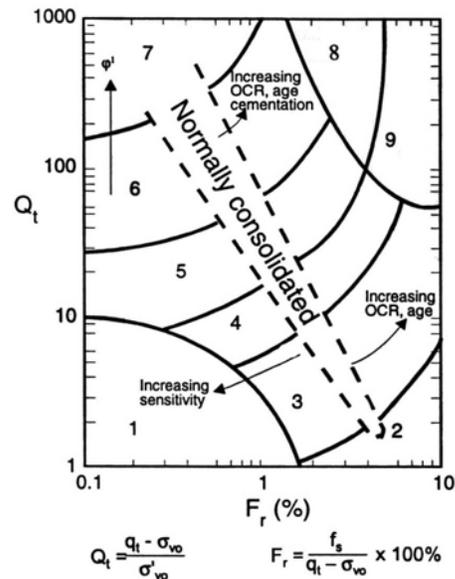
Soil Classification methods for the Cone Penetration Test are based on correlation charts developed from observations of CPT data and conventional borings. Please note that these classification charts are meant to provide a guide to Soil Behavior Type and should not be used to infer a soil classification based on grain size distribution.

The numbers corresponding to different regions on the charts represent the following soil behavior types:

1. Sensitive, Fine Grained
2. Organic Soils - Peats
3. Clays - Clay to Silty Clay
4. Silt Mixtures - Clayey Silt to Silty Clay
5. Sand Mixtures - Silty Sand to Sandy Silt
6. Sands - Clean Sand to Silty Sand
7. Gravelly Sand to Sand
8. Very Stiff Sand to Clayey Sand
9. Very Stiff, Fine Grained

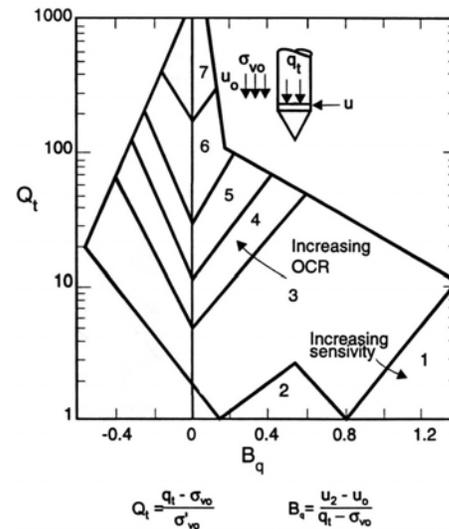
Note that engineering judgment, and comparison with conventional borings is especially important in the proper interpretation of CPT data in certain geo-materials.

The following charts are used to provide a Soil Behavior Type for the CPT Data.



Robertson CPTU 1990

Soil Behavior type based on pore pressure



where ...

- QT..... normalized cone resistance
- Bq..... pore pressure ratio
- Fr..... Normalized friction ratio
- sigma\_vo..... overburden pressure
- sigma'\_vo..... effective over burden pressure
- u2..... measured pore pressure
- u0..... equilibrium pore pressure

### CPT Terminology

- CPT.....Cone Penetration Test
- CPTU.....Cone Penetration Test with Pore Pressure measurements
- SCPTU.....Cone Penetration Test with Pore Pressure and Seismic measurements
- Piezocone...Common name for CPTU test

(Note: This test is not related to the Dynamic Cone Penetrometer DCP)

### q<sub>t</sub> TIP RESISTANCE

The resistance at the cone corrected for water pressure. Data is from cone with 60 degree apex angle and a 10 cm<sup>2</sup> end area.

### f<sub>s</sub> SLEEVE FRICTION RESISTANCE

The resistance along the sleeve of the penetrometer.

### FR Friction Ratio

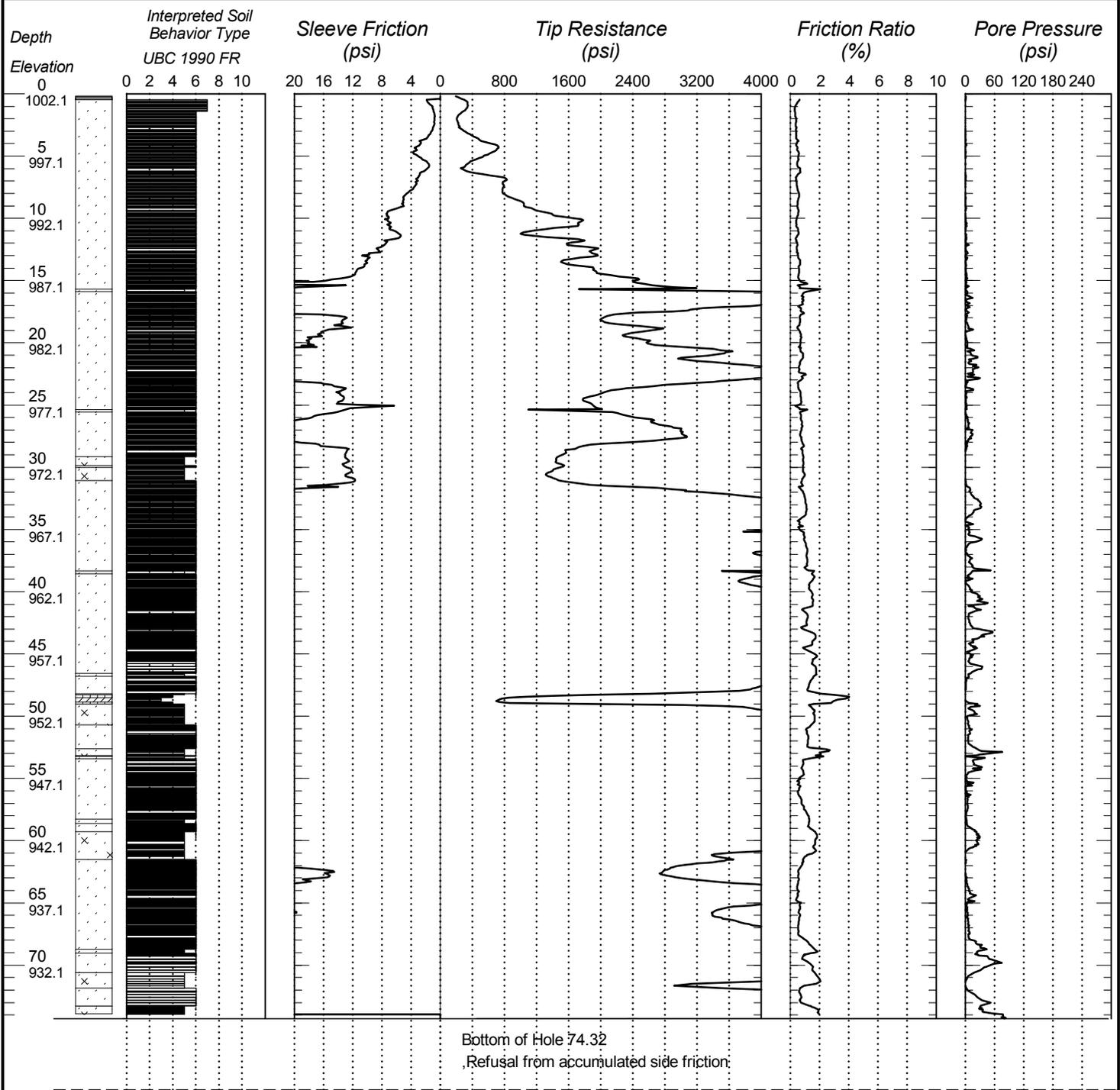
### Robertson CPT 1990

Soil Behavior type based on friction ratio



**CONE PENETRATION TEST RESULTS**  
**UNIQUE NUMBER 78758**  
 U.S. Customary Units

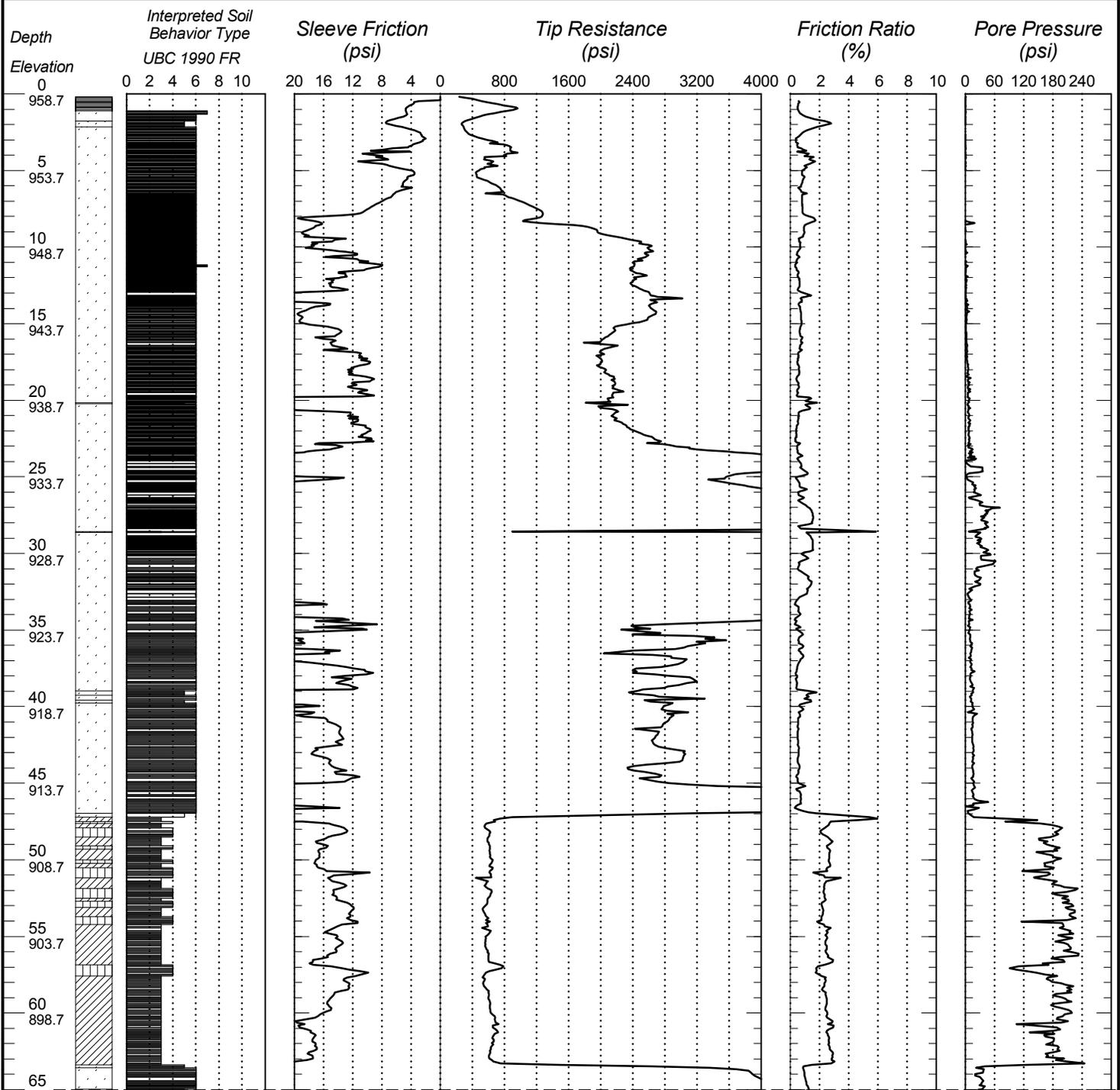
State Project <b>7108-23</b>	Bridge No. or Job Desc. <b>BRIDGE ABUTMENT</b>	Trunk Highway/Location <b>24</b>	Sounding No. <b>s01</b>	Ground Elevation <b>1002.1 (GeoXH(DC))</b>
Location <b>Wright Co. Coordinate: X=458180 Y=260100</b> (ft.)		CPT Machine <b>205146 CPT Truck (H)</b>	SHEET 1 of 1	
Latitude (North)=45°24'59.24" Longitude (West)=94°02'46.23"		CPT Operator <b>Hasselquist</b>	Date Completed	
No Station-Offset Information Available		Hole Type <b>CPT-SEISMIC</b>	<b>8/15/14</b>	





**CONE PENETRATION TEST RESULTS**  
**UNIQUE NUMBER 78759**  
 U.S. Customary Units

State Project <b>7108-23</b>	Bridge No. or Job Desc. <b>BRIDGE PIER</b>	Trunk Highway/Location <b>24</b>	Sounding No. <b>s02</b>	Ground Elevation <b>958.7</b> (GeoXH(DC))
Location <b>Wright Co. Coordinate: X=458355 Y=260258</b> (ft.)		CPT Machine <b>205146 CPT Truck (H)</b>	SHEET 1 of 2	
Latitude (North)=45°25'00.8" Longitude (West)=94°02'43.78"		CPT Operator <b>Hasselquist</b>	Date Completed	
No Station-Offset Information Available		Hole Type <b>CPT-SEISMIC</b>	<b>8/14/14</b>	



Index Sheet Code 3.0

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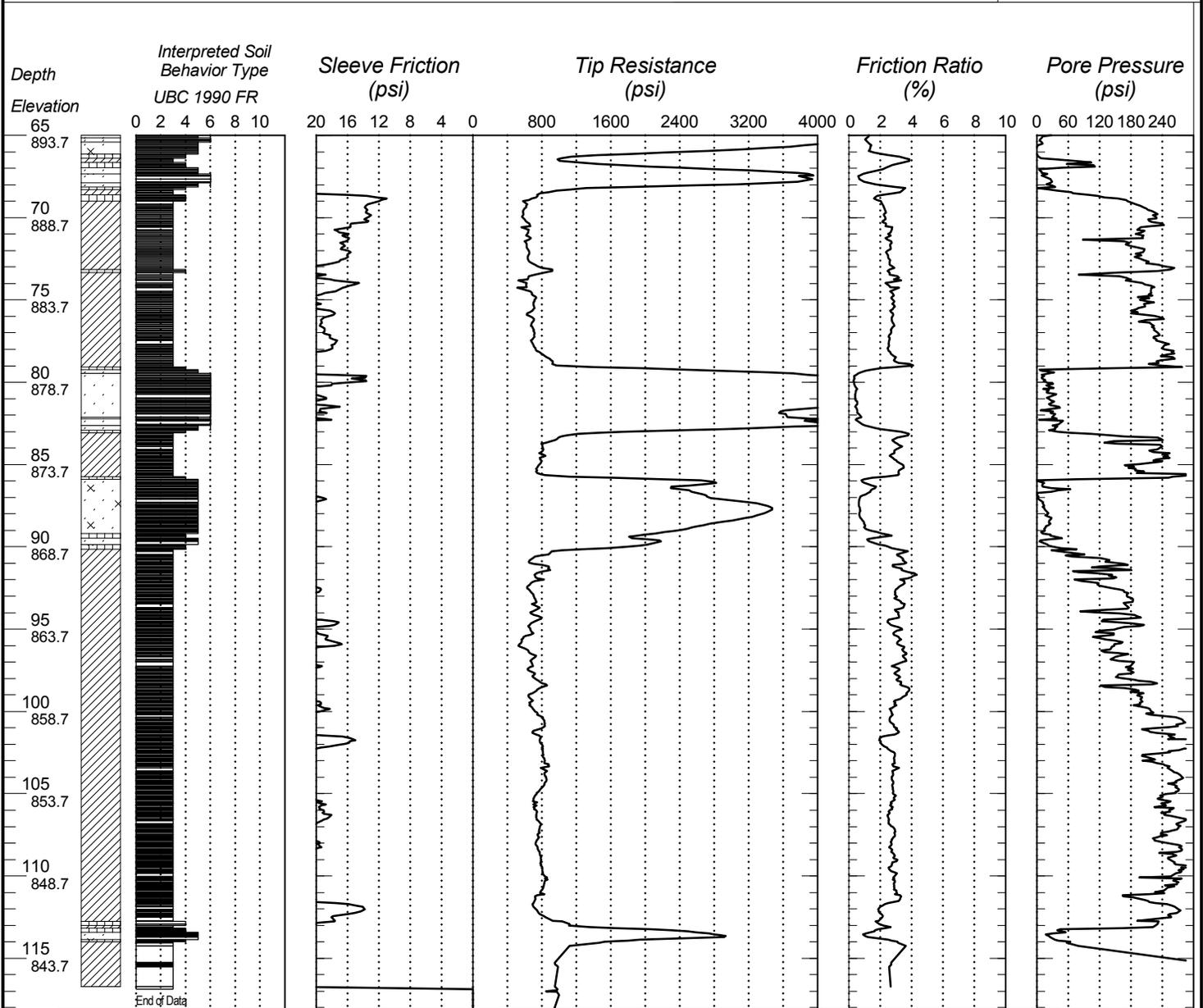


**CONE PENETRATION TEST RESULTS**  
**UNIQUE NUMBER 78759**  
 U.S. Customary Units

State Project <b>7108-23</b>	Bridge No. or Job Desc. <b>BRIDGE PIER</b>	Trunk Highway/Location <b>24</b>	Sounding No. <b>s02</b>	Ground Elevation <b>958.7</b> (GeoXH(DC))
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Mn/DOT GEOTECHNICAL SECTION - CONE PENETRATION TEST RESULTS

SHEET 2 of 2

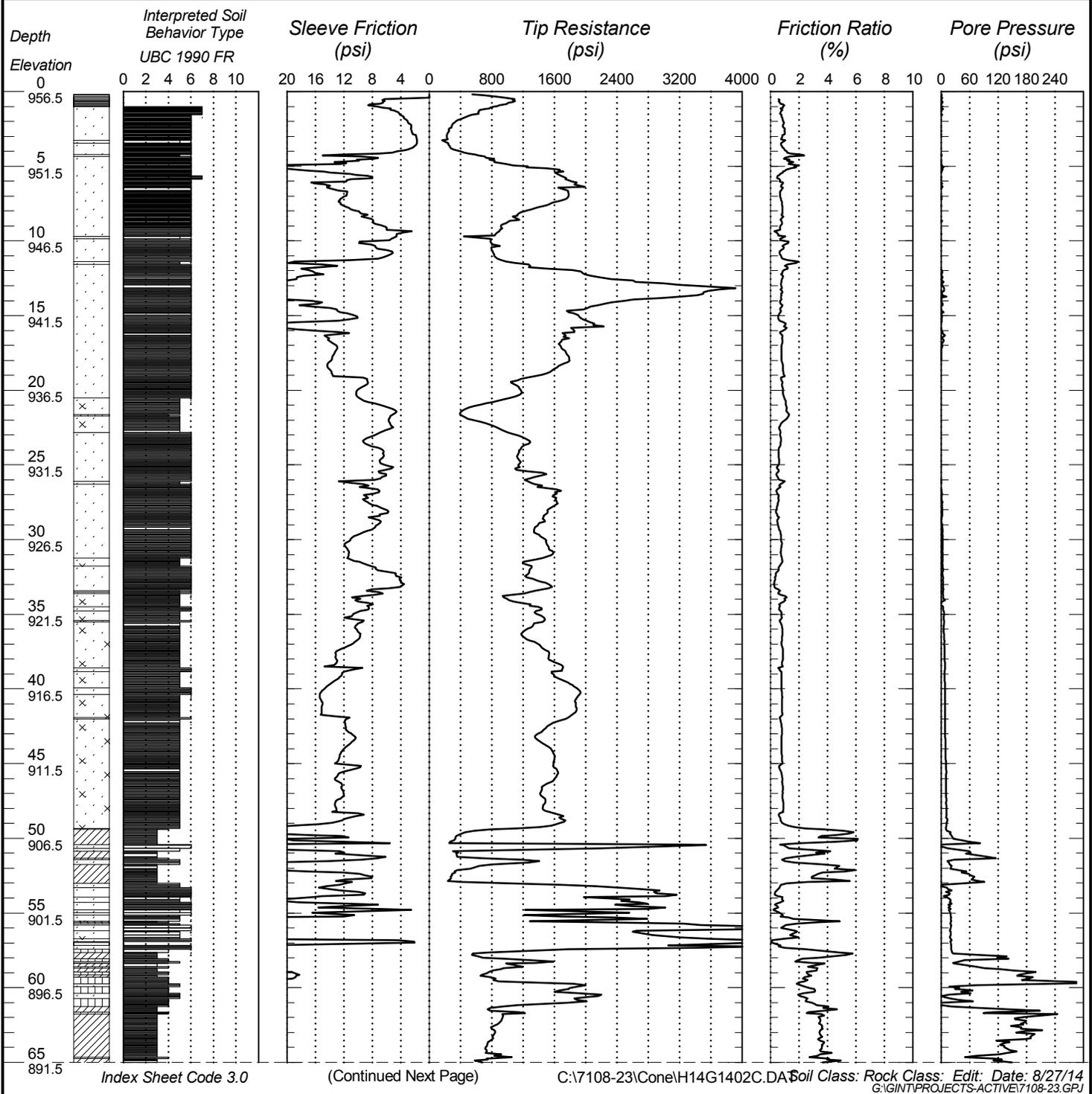


Bottom of Hole 118.15  
 , Refusal from accumulated side friction:



**CONE PENETRATION TEST RESULTS**  
**UNIQUE NUMBER 78760**  
 U.S. Customary Units

State Project <b>7108-23</b>	Bridge No. or Job Desc. <b>BRIDGE PIER</b>	Trunk Highway/Location <b>24</b>	Sounding No. <b>s03</b>	Ground Elevation <b>956.5</b> (GeoXH(DC))
Location <b>Wright Co. Coordinate: X=458469 Y=260315</b> (ft.)		CPT Machine <b>205146 CPT Truck (H)</b>	SHEET 1 of 2	
Latitude (North)=45°25'01.37" Longitude (West)=94°02'42.18"		CPT Operator <b>Hasselquist</b>	Date Completed	
No Station-Offset Information Available		Hole Type <b>CPT-SEISMIC/PWP-DISS</b>	<b>8/14/14</b>	



Index Sheet Code 3.0

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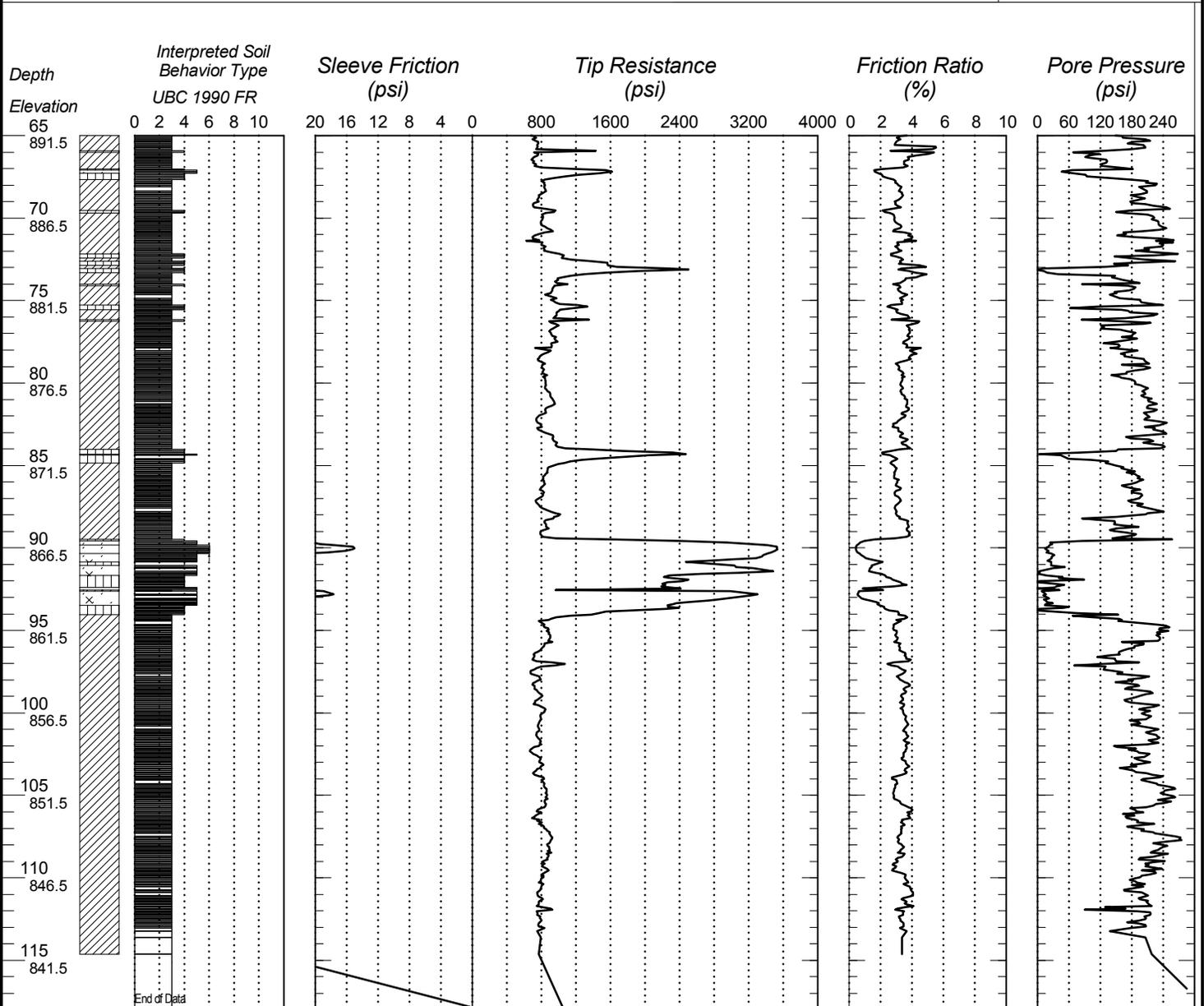


**CONE PENETRATION TEST RESULTS**  
**UNIQUE NUMBER 78760**  
 U.S. Customary Units

State Project <b>7108-23</b>	Bridge No. or Job Desc. <b>BRIDGE PIER</b>	Trunk Highway/Location <b>24</b>	Sounding No. <b>s03</b>	Ground Elevation <b>956.5</b> (GeoXH(DC))
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Mn/DOT GEOTECHNICAL SECTION - CONE PENETRATION TEST RESULTS

SHEET 2 of 2



Bottom of Hole 117.93  
 Refusal from accumulated side friction: