Minnesota Department of Transportation
Office of Materials & Road Research
1400 Gervais Avenue, Maplewood, MN 55109

Date: May 15, 2018

To: Jerome Adams, Preliminary and Final Design Project Manager
Metro District

From: Paul Martin, Asst. Foundations Engineer
Geotechnical Engineering Section

Paul Martin Digitally signed by Paul Martin
DN: cn=Paul Martin
Date: 2018.05.15 09:59:37 -05'00'

Concur: Rich Lamb, Foundations Engineer
Geotechnical Engineering Section

RAL

Subject: S.P. 6205-39, U.S. 10, Noise Walls 1, 2 and 3
Foundation Investigation and Recommendations

1.0 Project Description

This report provides a foundation investigation and recommendations for three noise walls to be constructed on the south (west) side US Highway 10 located between Ramsey County Highway 96 and T.H. 35W in Arden Hills. With wall stationing running from 12+64 to 14+88, Noise Wall 1 will be an addition onto an existing noise wall.

2.0 Field Investigation and Foundation Conditions

In February and April of 2018 a MnDOT crew conducted 15 Cone Penetration Test (CPT) soundings targeting a 20 to 25-foot exploration depth range and four soundings targeting a 40 to 60-foot exploration depth range. All of the soundings extended below the anticipated bottom of post elevation shown on the attached noisewall tabulations. The deepest soundings also provided information for the design of two overhead sign foundations. Copies of the logs of our explorations and Exploration Location Drawings are included with this report.

The CPT soundings were interpreted for general soil behavior type. No soil samples were taken. The interpreted soil behavior type may not exactly match the soil that is present, but should indicate how it behaves if compared to standard soils. “Undefined” under interpreted soil behavior type means that the CPT programming was unable to determine a soil behavior type based on the available parameters.

The foundation soils encountered along the 3 noisewall alignments were interpreted to consist primarily of relatively soft silt which generally included some sandy or clayey layers. Indications of groundwater were generally observed above the proposed bottom-of-post elevations.

3.0 Foundation Analysis

At some locations the groundwater conditions encountered in the CPTs did not meet the requirements of the Standard Plan. Where groundwater exists in sand layers it is our opinion the noise wall foundations must be installed using special techniques to prevent the loss of ground which would cause settlement and instability. The typical 12x18 inch concrete posts may be used, but the installation techniques and or backfill materials might vary from the Standard.

4.0 Recommendations

Based on the above discussions, we recommend that the noise wall support posts be embedded in soil to the depths shown on Figure 5-297.661 in MnDOT's standard plans manual. As indicated on the right-hand portions of the attached Noise Wall Tabulations, the recommendations for safe installation vary.

Recommendation Group A includes:

1. The use of one section of casing to improve stability and safety at the surface.
2. The possible use of drilling fluid to reduce the infiltration of groundwater and loss of ground that would cause settlement and instability. Note that pumping and retention of drilling fluid and cuttings will be necessary.
3. The use of clear 1 ½-inch crushed rock (Coarse Filter Aggregate, MNDOT Spec. 3149.2.H) or concrete as post backfill.

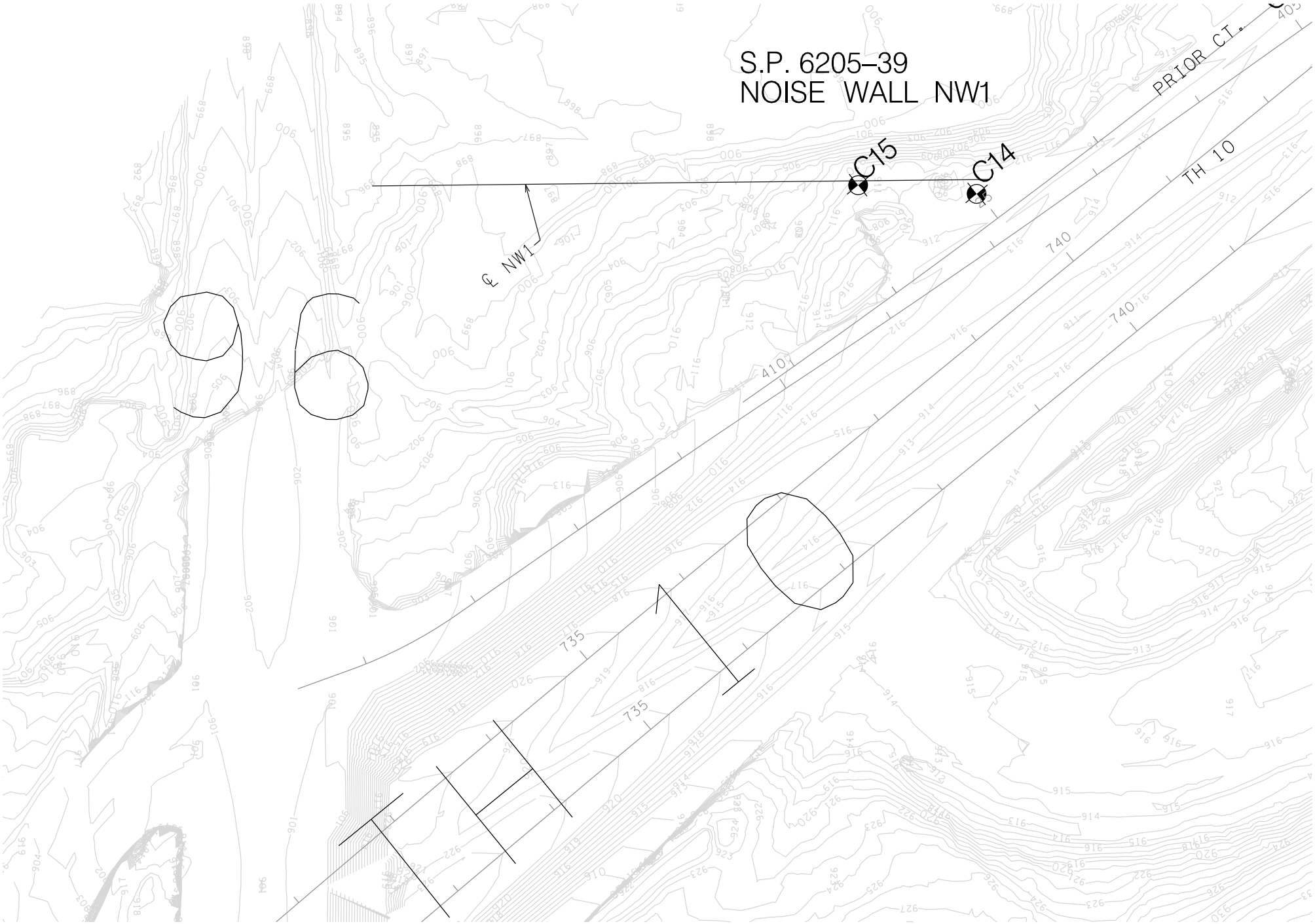
Recommendation Group B includes:

1. Ordinary augered excavation, and
2. Backfill with Fine Filter Aggregate, MNDOT Specification 3149.2.J.2

If you have any questions regarding our recommendations, or require further assistance, please contact this office.

Attachments:
NW1 Exploration Layout Drawing
CPT Logs C14 and C15, Unique Numbers 82924 and 82925
NW1 Noise Wall Tabulation
NW2 Exploration Layout Drawing
CPT Logs C06a through C09a, C10 through C13a and C17
Unique Numbers 82905-82908, 82920-82923, and 82999
NW2 Noise Wall Tabulation
NW3 Exploration Layout Drawing
CPT Logs C01 through C03, C04, C05 and C16, Unique Numbers 82916-82918, 82943, 82919 and 82998
NW3 Noise Wall Tabulation
CPT Index Sheet

CC: Brad Skow, Chief Geotechnical Engineer
Joseph Black, Wall Structural Engineer
Tim Clyne, Metro Materials Engineer


S.P. 6205–39
NOISE WALL NW1
C15
C14
℄ NW1
PRIOR CI.
TH 10
740
740
735
735

DEPARTMENT OF TRANSPORTATION

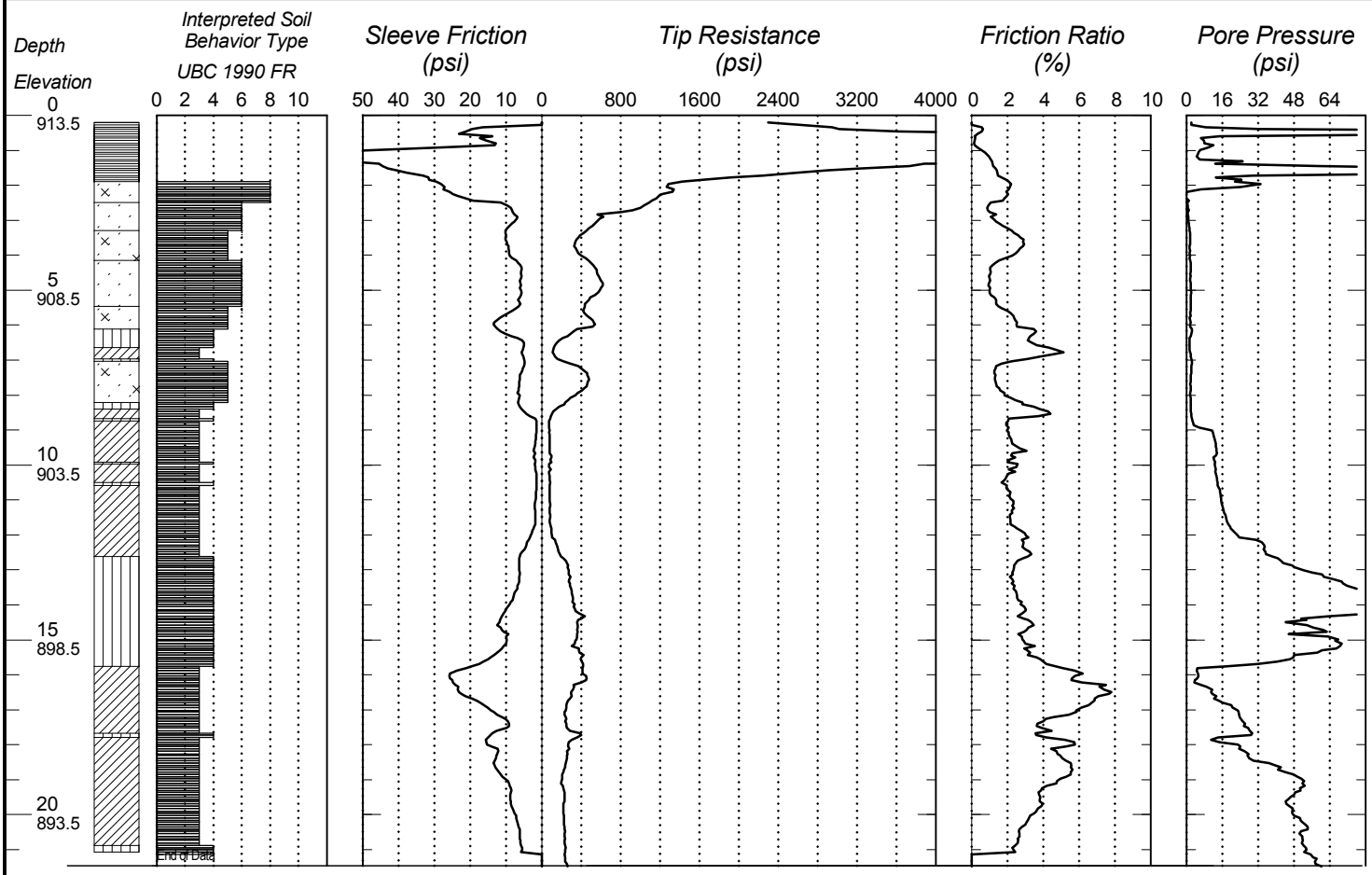
MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 82924

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
6205-39	**NOISE WALL 1**	**TH 10, EB OH SIGNS AND NWALLS**	**c14**	**913.5** *(DTM)*

Location		CPT Machine	SHEET 1 of 1
Ramsey County Coordinate System		**203094 CPT Truck**	
X=552826 Y=205682 *'EB 10, STA 739+74, 90' Lt*		CPT Operator **ODonnel**	Date Completed
Latitude (North)=45°04'50.78" *Longitude (West)=93°10'43.83"*		Hole Type **CPT-STD**	**2/7/18**



Bottom of Hole 21.47

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DEPARTMENT OF TRANSPORTATION

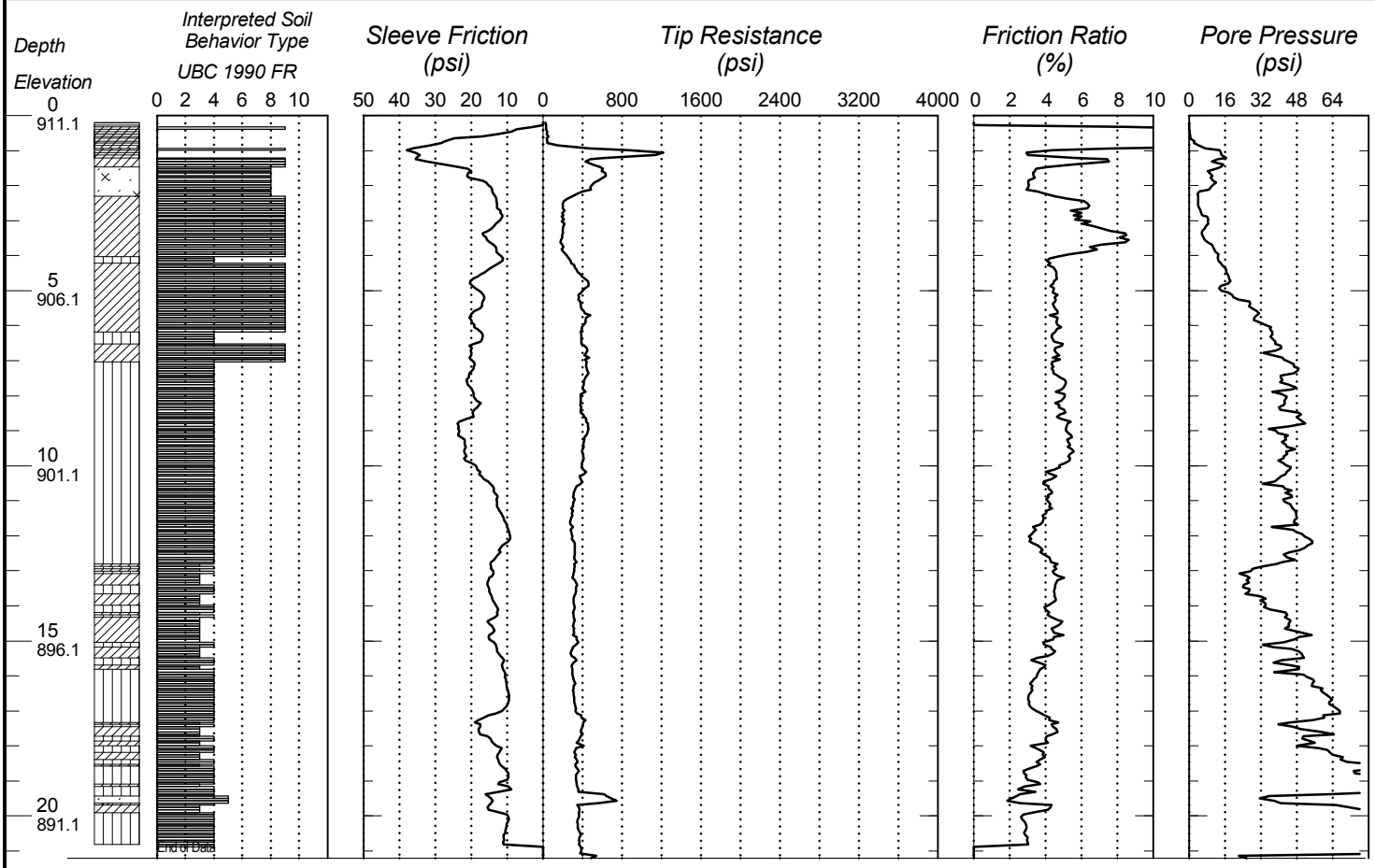
MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 82925

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
6205-39	**NOISE WALL 1**	**TH 10, EB OH SIGNS AND NWALLS**	**c15**	**911.1** *(DTM)*

Location	CPT Machine	SHEET 1 of 1
Ramsey County Coordinate System	**203094 CPT Truck**	
X=552820 Y=205588 *'EB 10, STA 739+05, 155' Lt*	*CPT Operator* **ODonnel**	*Date Completed*
Latitude (North)=45°04'49.85" *Longitude (West)=93°10'43.93"*	*Hole Type* **CPT-STD**	**2/7/18**



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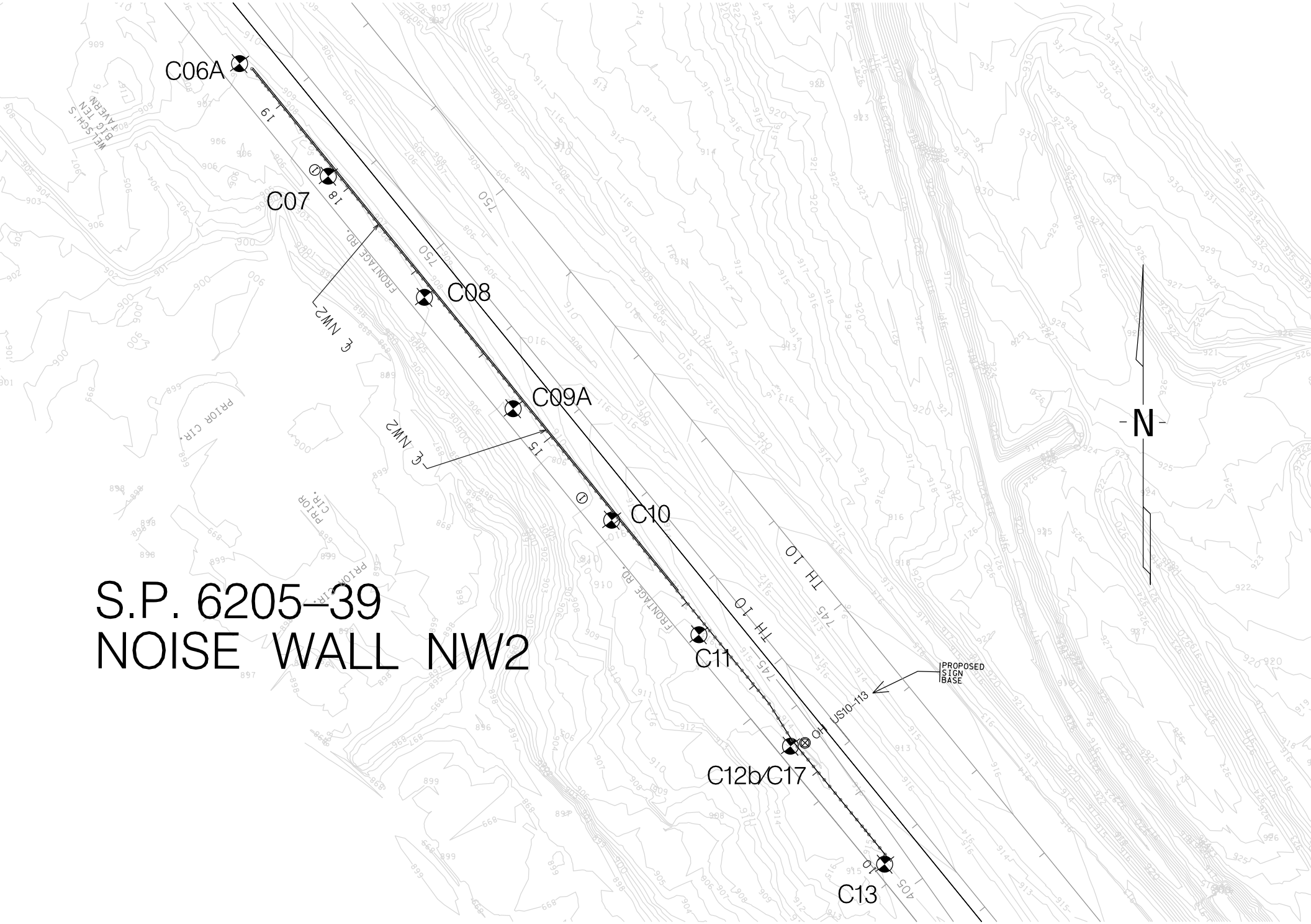
NOISE WALL NW1

POST NO.	WALL STATION (FT.)	GROUND ELEV. LEFT	GROUND ELEV. RIGHT	SLOPE (V:H)	TOP OF POST ELEV.	TOP OF WALL STEP HEIGHT (FT.)	WALL HEIGHT, H (FT.)	POST LENGTH (FT.)	POST EMBED-MENT (FT.)	BOTTOM OF POST ELEV.	CONCRETE BACKFILL MIX 1G52 (CU. YD.)	FINE FILTER AGG. (CU. YD.)	PRE-STRESSED STRANDS (EACH)	NO. REINF. BARS (EACH)	PANEL	TOP OF WALL ELEV.	AIR GAP UNDER WALL? (Y=YES)	LOWER ELEV. OF BOTTOM HORIZONTAL PLANK	2" SPECIAL GAP PLANKS (SQ.FT.)	2" NORMAL PLANKS (SQ.FT.)	TOTAL PLANK AREA (SQ.FT.)	Cone Sounding	
1	12+64.00	903.67	903.67	1: 2	917.00	0	13.33	25	11.67	892	1.5	0	4	6 NO.5	1-2	916.00	Y	904.32	3.21	93.41	96.61	C15	Soils primarily consist of layered sandy loam, clay and silt. Groundwater is interpreted as being below 893, but with the soil layering perched groundwater at higher elevations is possible. Use Recommendation Group A where groundwater is encountered and at Posts 2, 4, and 6 at a minimum. Use Recommendation Group B where groundwater is not encountered.
2	12+72.00	903.99	903.99	1: 2	919.00	2	15.01	28	12.99	891	1.6	0	4	6 NO.6	2-3	918.00	Y	904.77	4.20	105.88	110.07	C15	
3	12+80.00	904.43	904.43	1: 2	921.00	2	16.57	29	12.43	892	1.6	0	4	6 NO.6	3-4	920.00	Y	905.15	3.78	118.76	122.54	C15	
4	12+88.00	904.82	904.82	1: 2	923.00	2	18.18	32	13.82	891	1.7	0	5	6 NO.7	4-5	922.00	Y	905.59	4.17	131.26	135.43	C15	
5	12+96.00	905.26	905.26	1: 2	925.00	2	19.74	33	13.26	892	1.7	0	6	6 NO.7	5-6	924.00	Y	906.21	5.61	142.31	147.92	C15	
6	13+04.00	905.88	905.88	1: 2	927.00	2	21.12	36	14.88	891	1.9	0	7	6 NO.8	6-7	926.00	Y	906.89	6.10	152.88	158.97	C15	
7	13+12.00	906.56	906.56	1: 3	929.00	2	22.44	36	13.56	893	0	1.7	8	6 NO.8	7-8	928.00	Y	907.61	6.44	163.10	169.54	C15	
8	13+20.00	907.28	907.28	1: 3	929.00	0	21.72	35	13.28	894	0	1.7	7	6 NO.8	8-9	928.00	Y	908.38	6.80	156.96	163.76	C15	
9	13+28.00	908.05	908.05	1: 3	929.00	0	20.95	33	12.05	896	0	1.5	6	6 NO.7	9-10	928.00	Y	909.13	6.70	150.93	157.63	C15	
10	13+36.00	908.80	908.80	1: 4	931.00	2	22.20	35	12.8	896	0	1.6	8	6 NO.8	10-11	930.00	Y	910.05	7.99	159.60	167.59	C15	
11	13+44.00	909.72	909.72	1: 4	931.00	0	21.28	34	12.72	897	0	1.6	7	6 NO.8	11-12	930.00	Y	910.45	3.84	156.42	160.26	C15	
12	13+52.00	910.11	910.11	1: 4	931.00	0	20.89	33	12.11	898	0	1.5	6	6 NO.7	12-13	930.00	Y	910.88	4.13	152.96	157.09	C15	
13	13+60.00	910.55	910.55	1: 4	933.00	2	22.45	35	12.55	898	0	1.6	8	6 NO.8	13-14	932.00	Y	911.30	4.02	165.60	169.62	C15	
14	13+68.00	910.97	910.97	1: 4	933.00	0	22.03	35	12.97	898	0	1.6	8	6 NO.8	14-15	932.00	Y	911.64	3.38	162.88	166.27	C15	
15	13+76.00	911.31	911.31	1: 4	933.00	0	21.69	34	12.31	899	0	1.6	7	6 NO.8	15-16	932.00	Y	912.24	5.48	158.07	163.55	C15	
16	13+84.00	911.91	911.91	1: 4	935.00	2	23.09	37	13.91	898	0	1.8	9	6 NO.8	16-17	934.00	Y	912.72	4.51	170.23	174.73	C15	
17	13+92.00	912.39	912.39	1: 5	935.00	0	22.61	35	12.39	900	0	1.6	8	6 NO.8	17-18	934.00	Y	913.12	3.89	167.00	170.89	C15	
18	14+00.00	912.79	912.79	1: 10	935.00	0	22.21	35	12.79	900	0	1.6	8	6 NO.8	18-19	934.00	Y	913.27	1.84	165.82	167.67	C15	
19	14+08.00	912.94	912.94	1: 10	935.00	0	22.06	35	12.94	900	0	1.6	8	6 NO.8	19-20	934.00	Y	913.32	1.02	165.47	166.49	C15	
20	14+16.00	912.98	912.98	1: 10	935.00	0	22.02	35	12.98	900	0	1.6	8	6 NO.8	20-21	934.00	Y	913.32	1.57	165.47	167.04	C15	
21	14+24.00	912.87	912.87	1: 10	935.00	0	22.13	35	12.87	900	0	1.6	8	6 NO.8	21-22	934.00	Y	913.20	3.54	166.37	169.91	C15	
22	14+32.00	912.51	912.51	1: 10	935.00	0	22.49	35	12.51	900	0	1.6	8	6 NO.8	22-23	934.00	Y	912.84	4.16	169.25	173.41	C15	
23	14+40.00	912.07	912.07	1: 10	935.00	2	22.93	35	12.07	900	0	1.5	8	6 NO.8	23-24	932.00	Y	912.41	7.24	156.74	163.99	C14	Soils generally consist of sandy soils over soft to very soft clay and silt. Groundwater is interpreted as being below 904, but perched water at higher elevations is possible. Use Recommendation Group A
24	14+48.00	911.25	911.25	1: 3	933.00	2	21.75	35	13.25	898	0	1.7	7	6 NO.8	24-25	930.00	Y	911.58	20.24	147.32	167.56	C14	
25	14+56.00	908.81	908.81	1: 10	931.00	2	22.19	35	12.81	896	0	1.6	8	6 NO.8	25-26	928.00	Y	910.81	14.04	137.52	151.56	C14	
26	14+64.00	910.48	910.48	1: 10	929.00	2	18.52	30	11.48	899	0	1.4	5	6 NO.7	26-27	926.00	Y	912.25	12.17	110.01	122.18	C14	
27	14+72.00	911.92	911.92	1: 10	927.00	2	15.08	26	10.92	901	0	1.4	4	6 NO.6	27-28	924.00	Y	912.67	4.07	90.61	94.68	C14	
28	14+80.00	912.34	912.34	1: 10	925.00	2	12.66	22	9.34	903	0	1.2	4	6 NO.5	28-29P	922.00	Y	912.75	1.27	74.00	75.27	C14	
29P	14+88.00	912.42	912.42	1: 10	923.00	0	10.58	19	8.42	904	0	1.1	4			922.00							
TOTALS								942			10	35.7	192						155.39	4056.83	4212.22		



S.P. 6205–39
NOISE WALL NW2

DEPARTMENT OF TRANSPORTATION

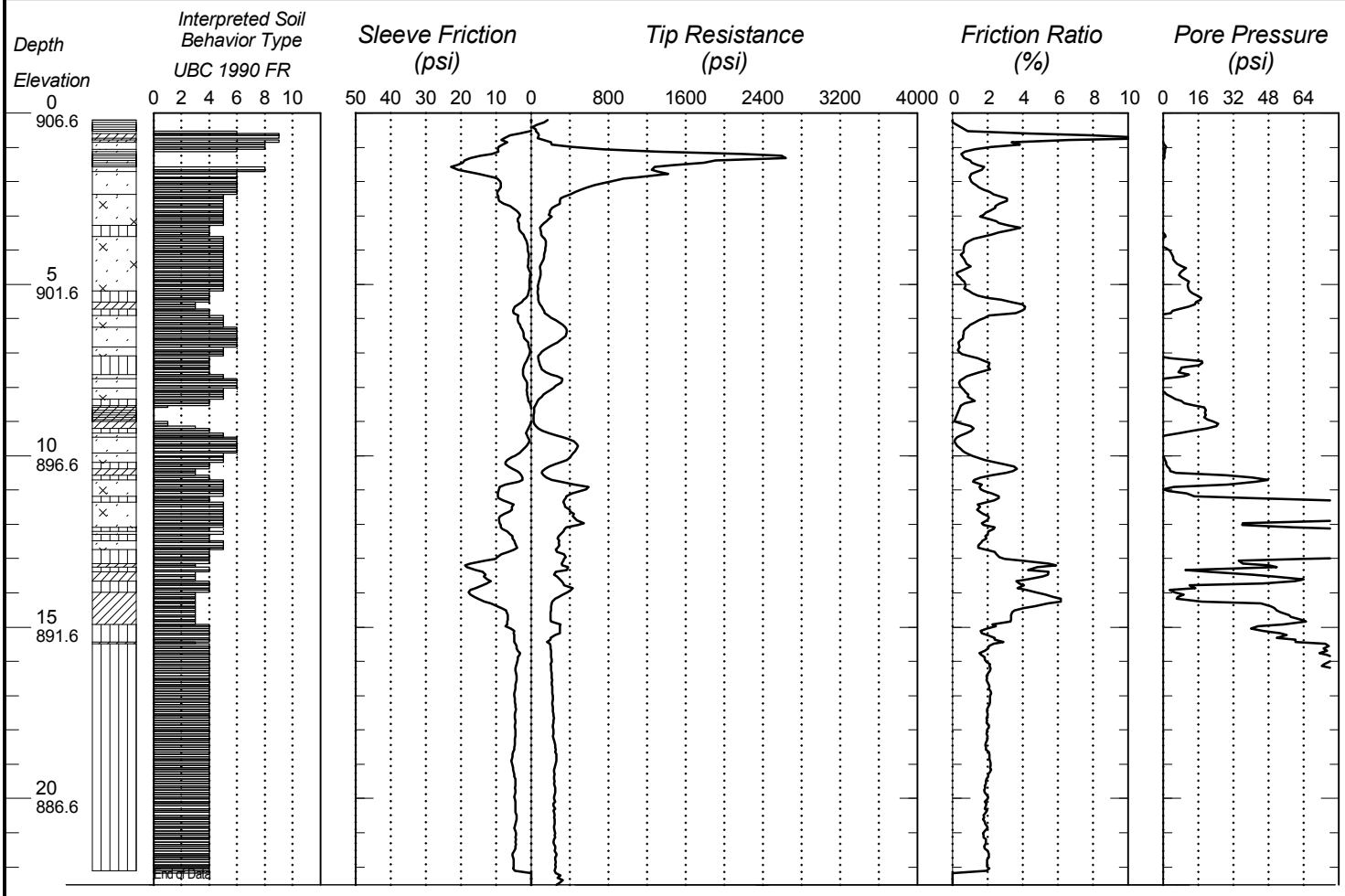
MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 82905

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
6205-39	**NOISE WALL 2**	**TH 10, EB OH SIGNS AND NWALLS**	**C06a**	**906.6** *(DTM)*

Location	CPT Machine	SHEET 1 of 1
Ramsey County Coordinate System	**203094 CPT Truck**	
X=552058 Y=206702 *'EB 10, STA 752+51, 42' Lt*	*CPT Operator* **ODonnel**	*Date Completed*
Latitude (North)=45°05'00.87" Longitude (West)=93°10'54.51"	*Hole Type* **CPT-STD**	**2/1/18**



Bottom of Hole 22.52

DEPARTMENT OF TRANSPORTATION

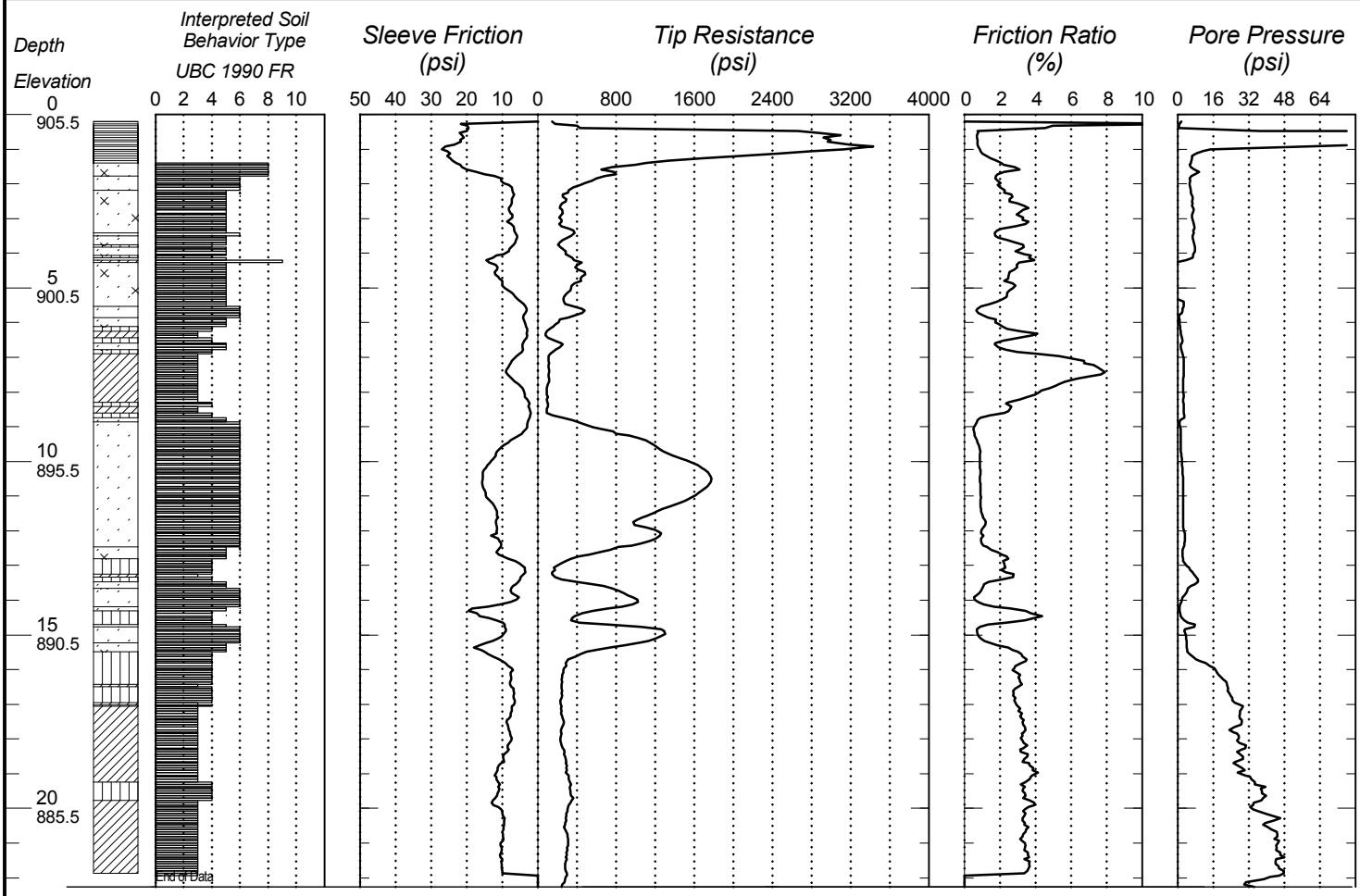
MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 82906

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
6205-39	**NOISE WALL 2**	**TH 10, EB OH SIGNS AND NWALLS**	**C07**	**905.5** *(DTM)*

Location		CPT Machine	SHEET 1 of 1
Ramsey County Coordinate System		**203094 CPT Truck**	
X=552140 Y=206597 *'EB 10, STA 751+17, 44' Lt*		CPT Operator **ODonnel**	Date Completed
Latitude (North)=45°04'59.83" *Longitude (West)=93°10'53.36"*		Hole Type **CPT-STD**	**2/1/18**



Bottom of Hole 22.26

DEPARTMENT OF TRANSPORTATION

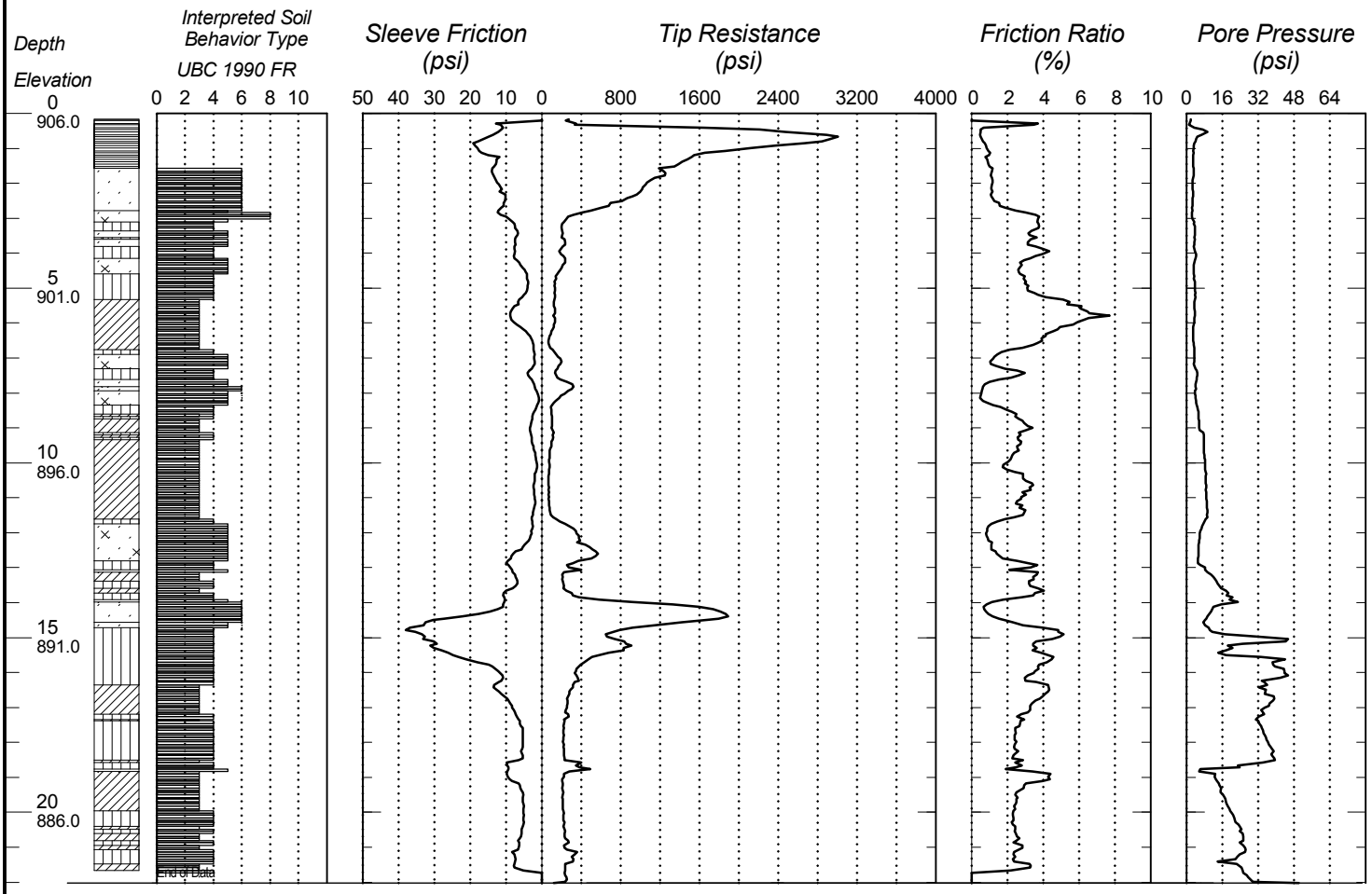
MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 82907

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
6205-39	**NOISE WALL 2**	**TH 10, EB OH SIGNS AND NWALLS**	**C08**	**906.0** *(DTM)*

Location		CPT Machine	SHEET 1 of 1
Ramsey County Coordinate System		**203094 CPT Truck**	
X=552230 Y=206484 *'EB 10, STA 749+72, 46' Lt*		CPT Operator **ODonnel**	Date Completed
Latitude (North)=45°04'58.71" *Longitude (West)=93°10'52.11"*		Hole Type **CPT-STD**	**2/1/18**



Bottom of Hole 22.03

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DEPARTMENT OF TRANSPORTATION

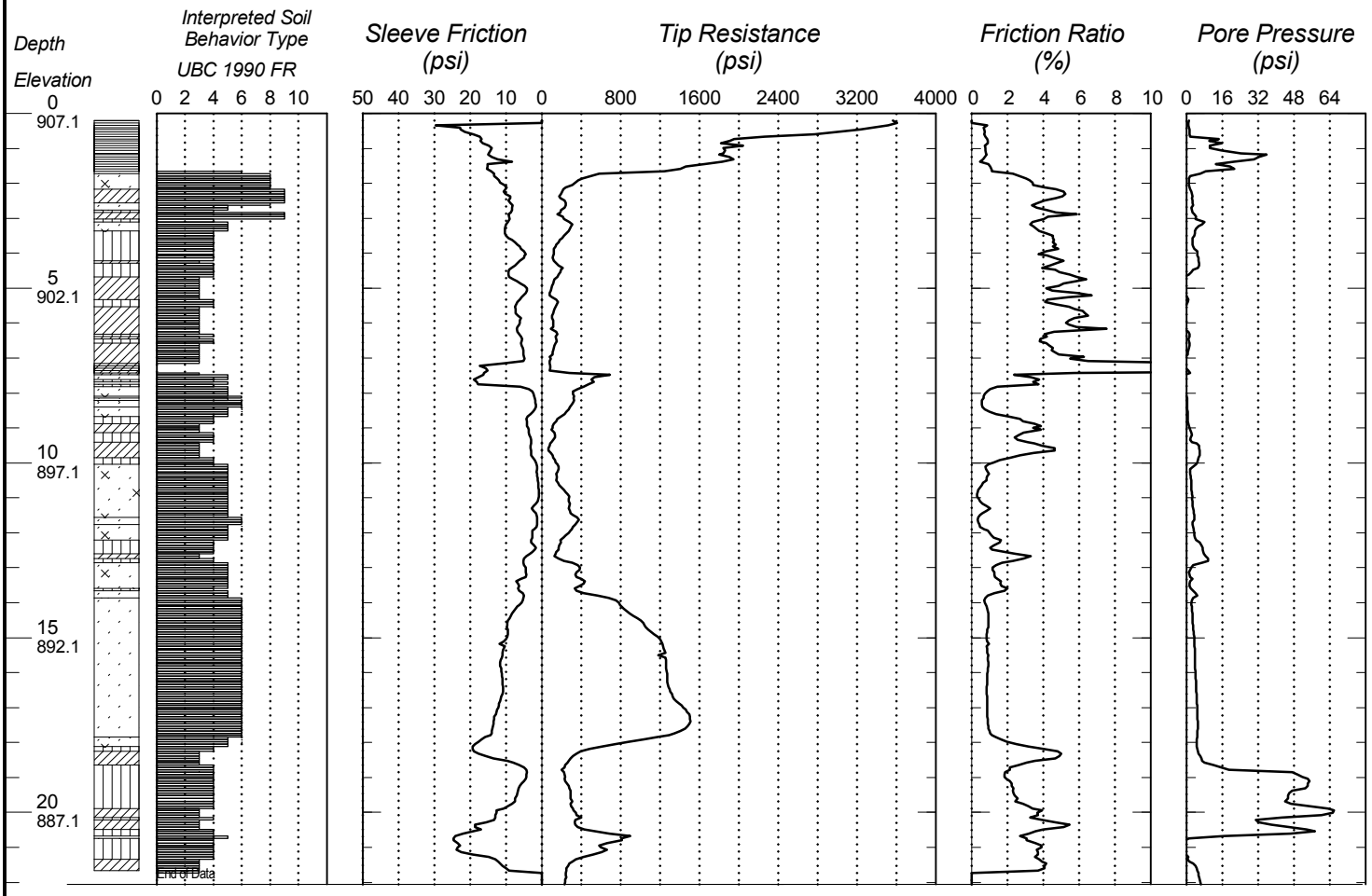
MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 82908

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
6205-39	**NOISE WALL 2**	**TH 10, EB OH SIGNS AND NWALLS**	**C09a**	**907.1** *(DTM)*

Location	CPT Machine	SHEET 1 of 1
Ramsey County Coordinate System	**203094 CPT Truck**	
X=552313 Y=206380 *'EB 10, STA 748+39, 48' Lt*	*CPT Operator* **ODonnel**	*Date Completed*
Latitude (North)=45°04'57.68" Longitude (West)=93°10'50.96"	*Hole Type* **CPT-STD**	**2/1/18**



Bottom of Hole 22.06

DEPARTMENT OF TRANSPORTATION

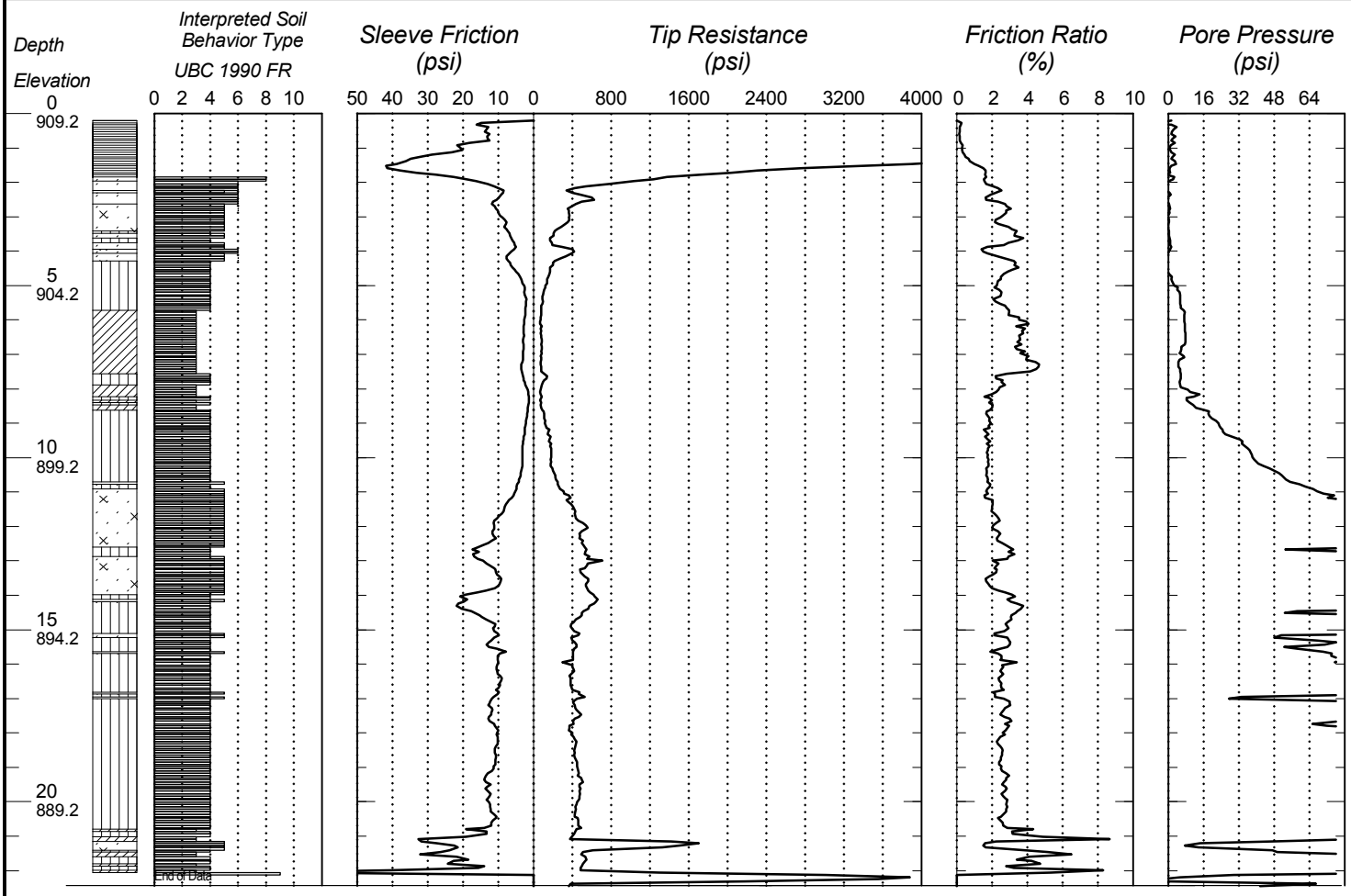
MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 82920

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
6205-39	**NOISE WALL 2**	**TH 10, EB OH SIGNS AND NWALLS**	**c10**	**909.2** *(DTM)*

Location	CPT Machine	SHEET 1 of 1
Ramsey County Coordinate System	**203094 CPT Truck**	
X=552405 Y=206275 *'EB 10, STA 747+00, 42' Lt*	*CPT Operator* **ODonnel**	*Date Completed*
Latitude (North)=45°04'56.65" Longitude (West)=93°10'49.68"	*Hole Type* **CPT-STD**	**2/5/18**



Bottom of Hole 22.44

DEPARTMENT OF TRANSPORTATION

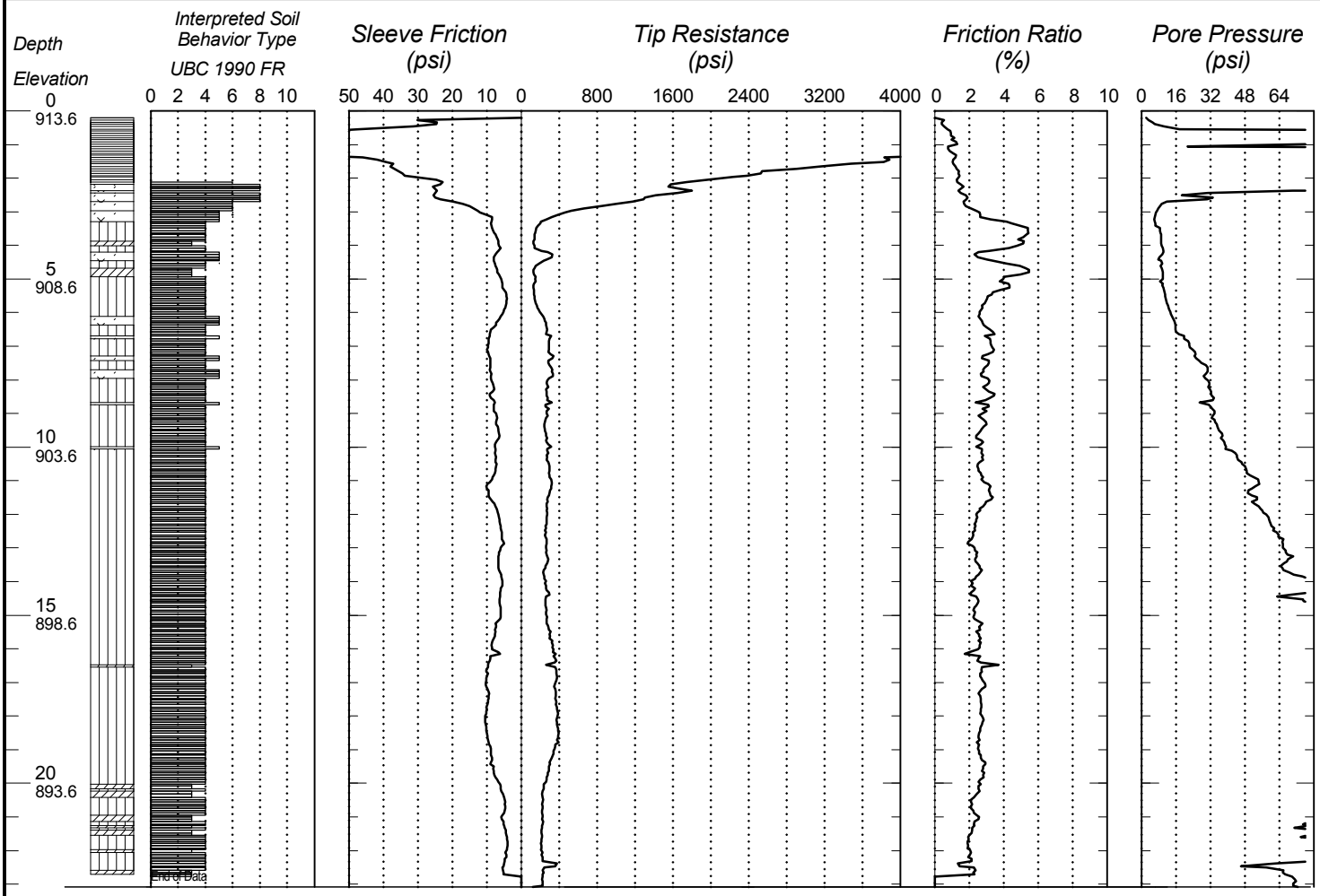
MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 82921

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
6205-39	**NOISE WALL 2**	**TH 10, EB OH SIGNS AND NWALLS**	**c11**	**913.6** *(DTM)*

Location		CPT Machine	SHEET 1 of 1
Ramsey County Coordinate System		**203094 CPT Truck**	
X=552487 Y=206168 *'EB 10, STA 745+66, 46' Lt*		CPT Operator **ODonnel**	Date Completed
Latitude (North)=45°04'55.59" *Longitude (West)=93°10'48.55"*		Hole Type **CPT-STD**	**2/5/18**



Bottom of Hole 23.09

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DEPARTMENT OF TRANSPORTATION

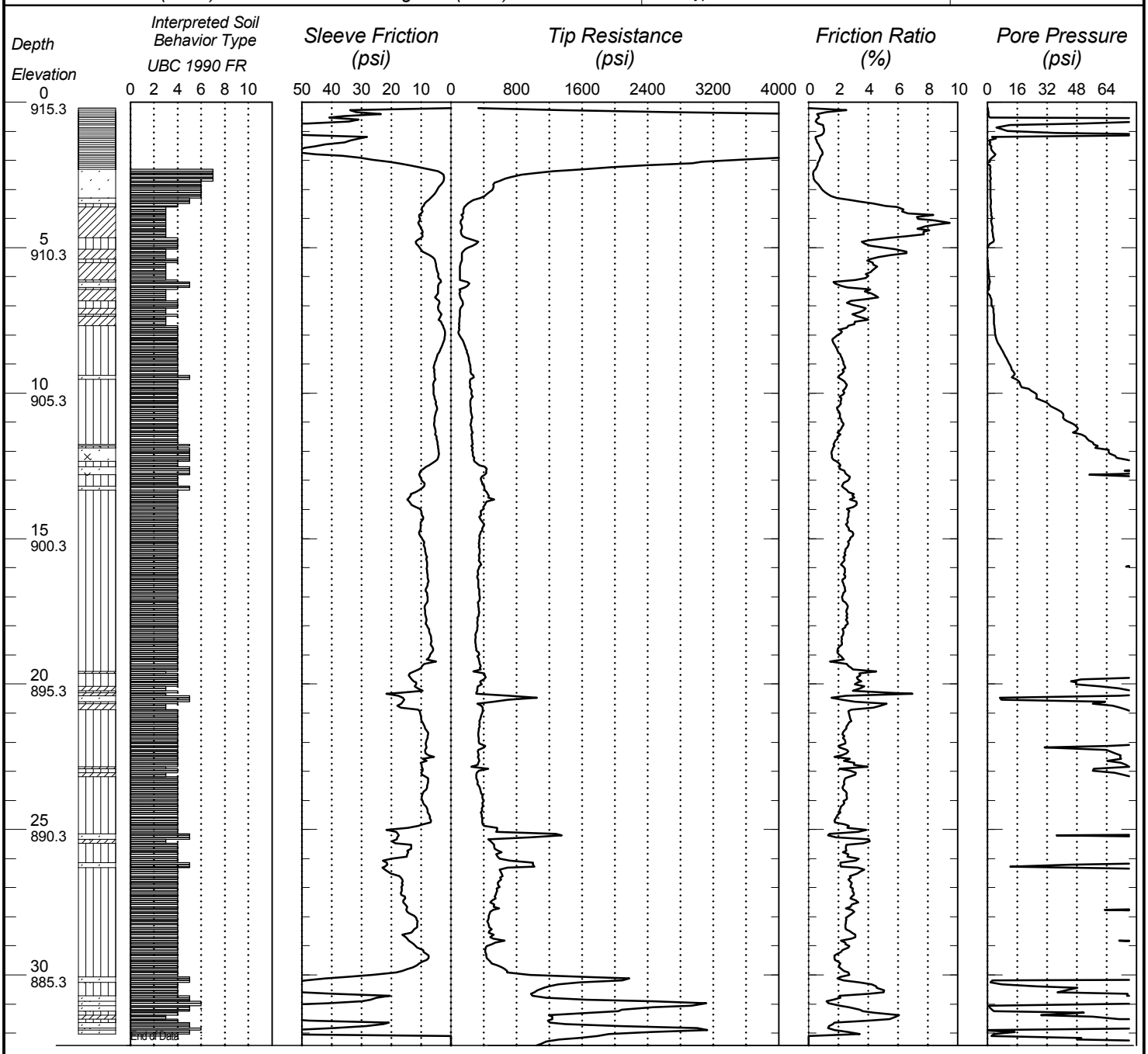
MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 82922

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
6205-39	**NOISE WALL 2**	**TH 10, EB OH SIGNS AND NWALLS**	**c12b**	**915.3** *(DTM)*

Location	CPT Machine	SHEET 1 of 1
Ramsey County Coordinate System	**203094 CPT Truck**	
X=552572 Y=206064 *'EB 10, STA 744+31, 46' Lt*	*CPT Operator* **ODonnel**	*Date Completed*
Latitude (North)=45°04'54.56" Longitude (West)=93°10'47.36"	*Hole Type* **CPT-STD**	**2/5/18**



Bottom of Hole 32.42

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DEPARTMENT OF TRANSPORTATION

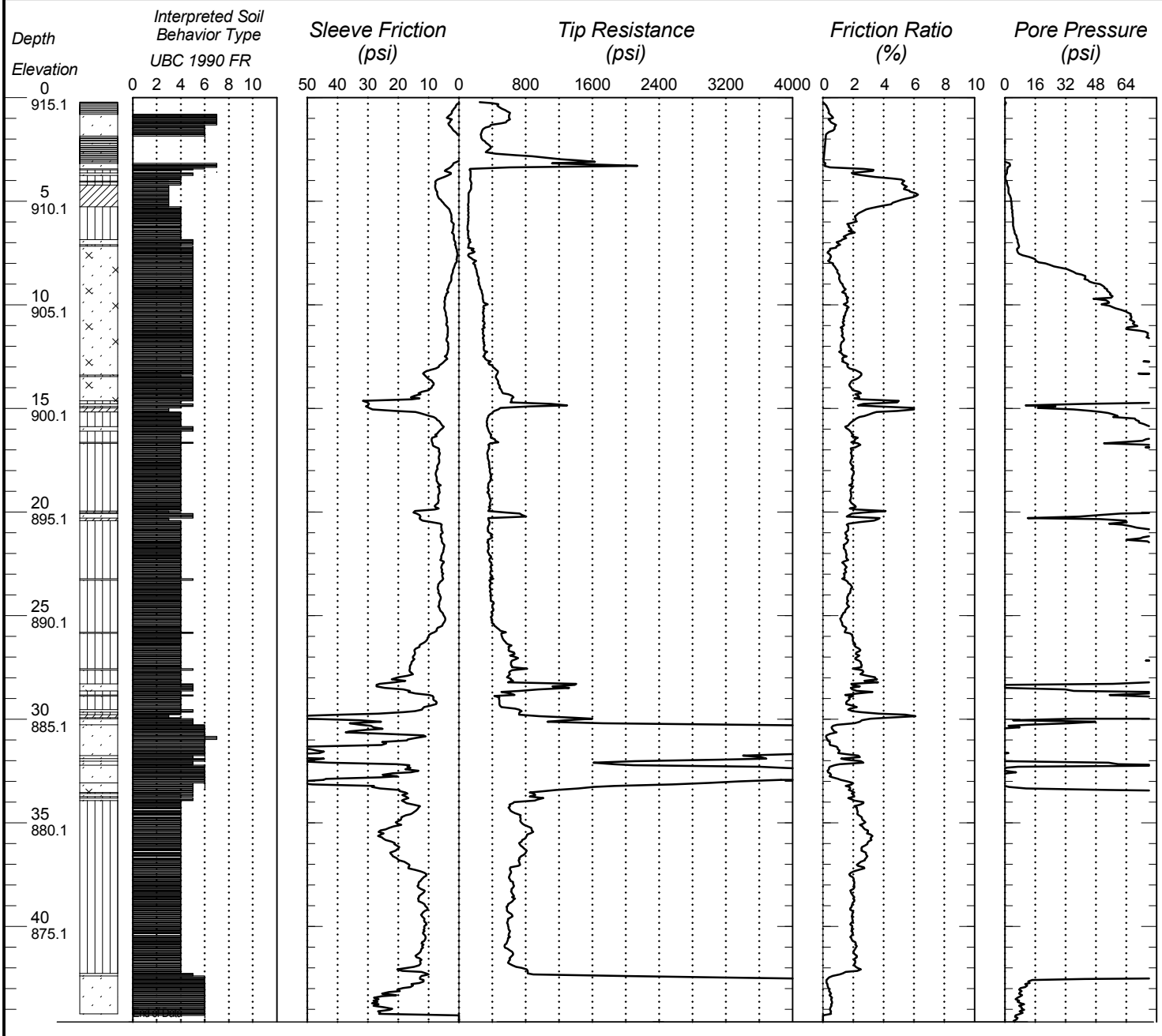
MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 82999

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
6205-39	**OH US10-113**	**TH 10, EB OH SIGNS AND NWALLS**	**c17**	**915.1** *(DTM)*

Location	CPT Machine	SHEET 1 of 1
Ramsey County Coordinate System	**203094 CPT Truck**	
X=552576 Y=206061	CPT Operator **ODonnel**	Date Completed
Latitude (North)=45°04'54.53" *Longitude (West)=93°10'47.31"*	Hole Type **CPT-STD**	**4/12/18**



Bottom of Hole 44.62

G:\GINT\PROJECTS-ACTIVE\6205-39 TH 10 NOISE WALL.GPJ

DEPARTMENT OF TRANSPORTATION

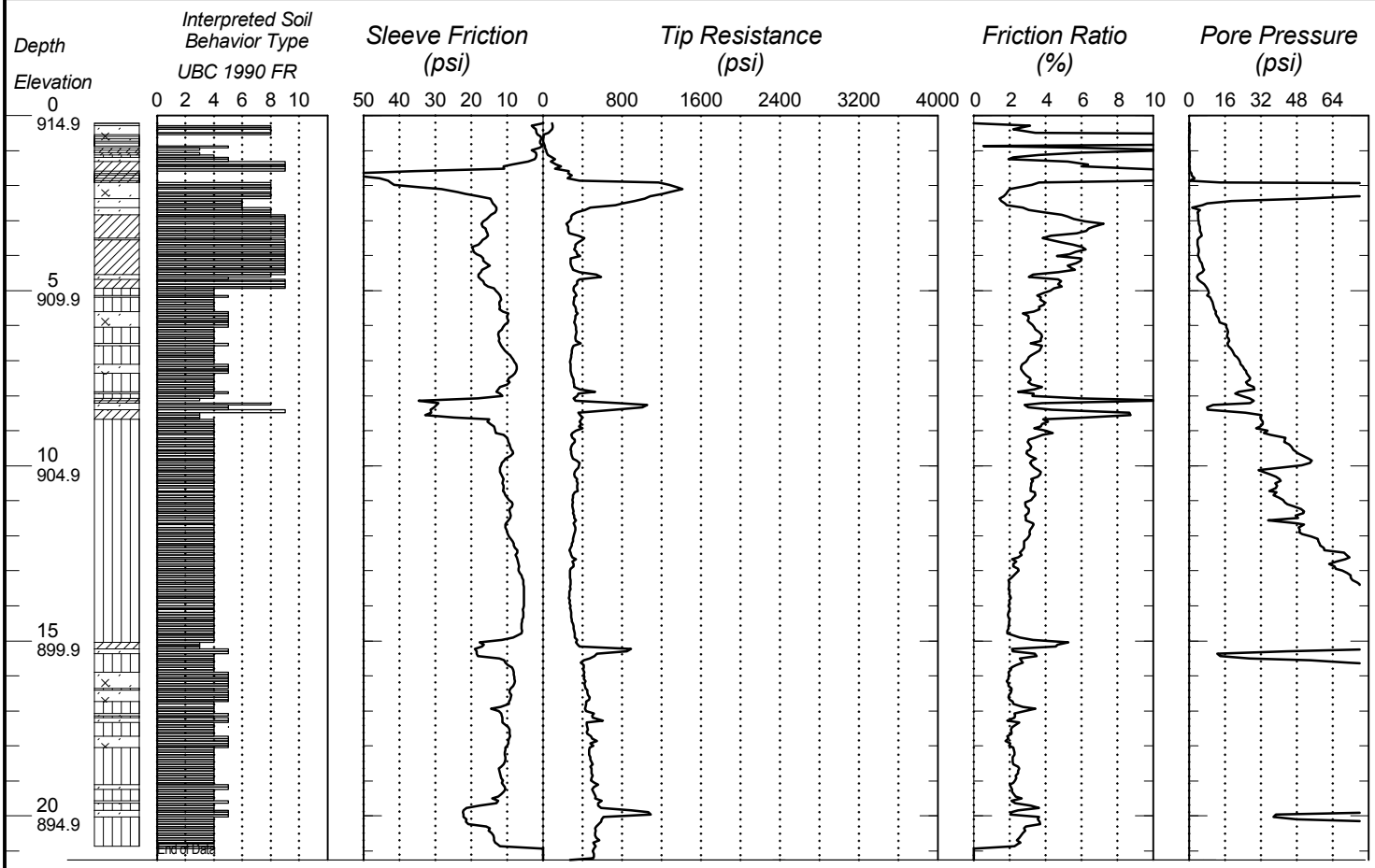
MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 82923

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
6205-39	**NOISE WALL 2**	**TH 10, EB OH SIGNS AND NWALLS**	**c13a**	**914.9** *(DTM)*

Location	CPT Machine	SHEET 1 of 1
Ramsey County Coordinate System	**203094 CPT Truck**	
X=552660 Y=205954 *'EB 10, STA 742+90, 47' Lt*	*CPT Operator* **ODonnel**	*Date Completed*
Latitude (North)=45°04'53.47" *Longitude (West)=93°10'46.14"*	*Hole Type* **CPT-STD**	**2/7/18**



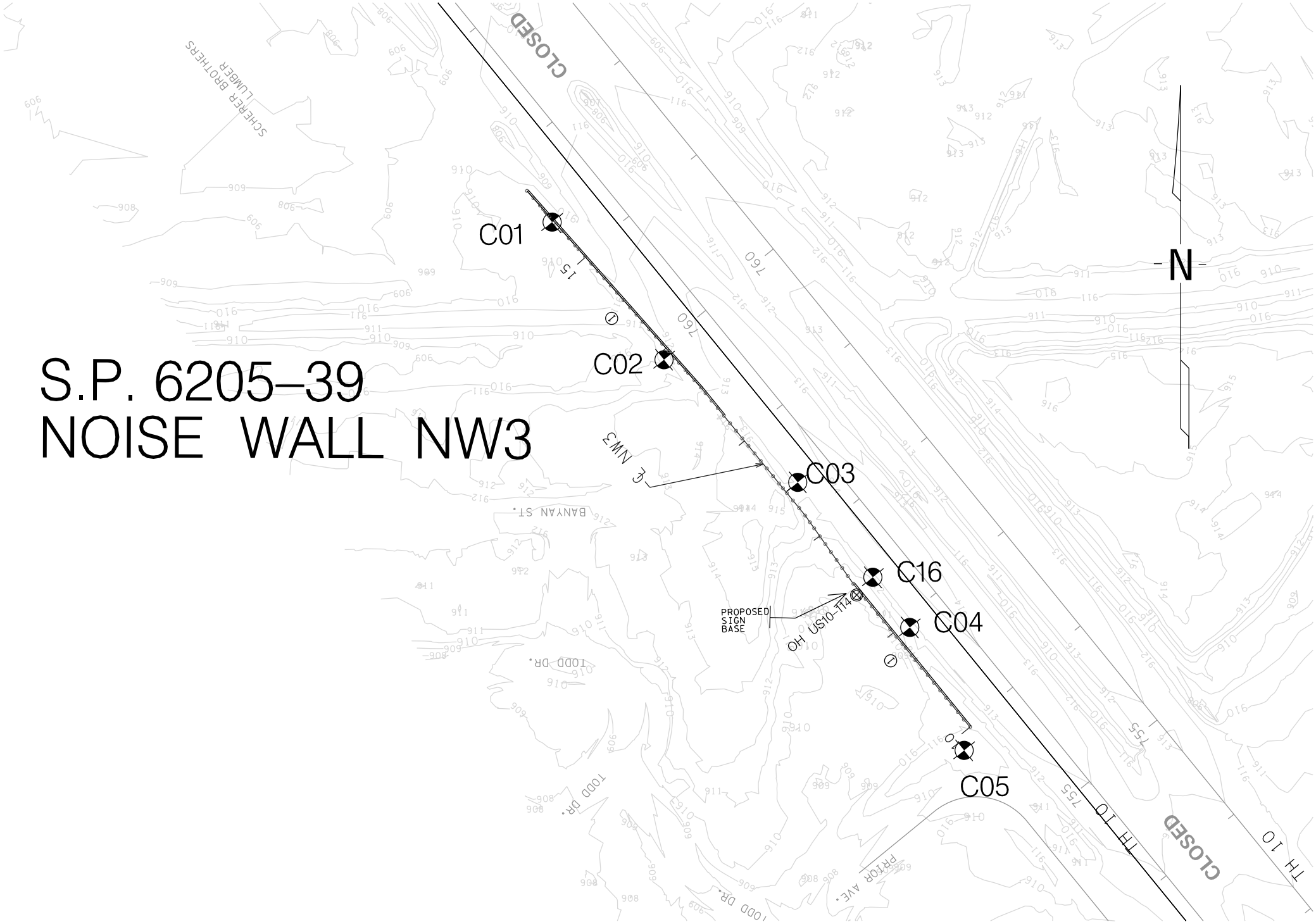
Bottom of Hole 21.26

NOISE WALL NW2

POST NO.	WALL STATION (FT.)	GROUND ELEV. LEFT	GROUND ELEV. RIGHT	SLOPE (V:H)	TOP OF POST ELEV.	TOP OF WALL STEP HEIGHT (FT.)	WALL HEIGHT, H (FT.)	FILL HEIGHT, W (FT.)	POST LENGTH (FT.)	POST EMBED-MENT (FT.)	BOTTOM OF POST ELEV.	CONCRETE BACKFILL MIX 1G52 (CU. YD.)	FINE FILTER AGG. (CU. YD.)	PRE-STRESSED STRANDS (EACH)	PANEL	TOP OF WALL ELEV.	LOWER ELEV. OF BOTTOM HORIZONTAL PLANK	2" SPECIAL GAP PLANKS (SQ.FT.)	2" NORMAL PLANKS (SQ.FT.)	3" PLANKS (SQ.FT.)	TOTAL PLANK AREA (SQ.FT.)	RUBRAIL (LIN FT)	EXCAVATION SPECIAL (CU YD)	Cone Sounding	Soil Conditions and Recommendations
1P	10+00.00	915.03	916.03	1: 3	927.00	0	10.97	1	21	9.03	906	0	1.1	4	1P-2P	926.00	914.03	0.00	85.08	10.67	95.75		1.6	c13a	Loamy soils to 3', then firm, possibly organic clay to 4', firm clay to 5' and silt w/clay and sand seams below. Sand seams might transmit water into excavations. Excavation through ordinary methods could cause loss of ground resulting in settlement and instability. Use Recommendation Group A
2P	10+08.00	915.09	916.09	1: 3	929.00	2	12.91	1	24	10.09	905	0	1.3	4	2P-3P	928.00	914.09	0.00	100.60	10.67	111.27		1.8	c13a	
3P	10+16.00	915.14	916.14	1: 3	931.00	2	14.86	1	26	10.14	905	0	1.3	4	3P-4P	930.00	914.14	0.00	116.20	10.67	126.87		1.8	c13a	
4P	10+24.00	915.20	916.20	1: 3	933.00	2	16.80	1	29	11.2	904	0	1.4	4	4P-5P	932.00	914.20	0.00	84.83	6.67	91.50		2.0	c13a	
5P	10+29.00	915.24	916.24	1: 3	933.00	0	16.76	1	29	11.24	904	0	1.4	4	5P-6P	932.00	914.24	0.00	84.63	6.67	91.30		2.0	c13a	
6P	10+34.00	915.28	916.28	1: 3	935.00	2	18.72	1	32	12.28	903	0	1.6	5	6P-7P	934.00	914.28	0.00	147.08	10.67	157.75		2.2	c13a	
7P	10+42.00	915.33	916.33	1: 3	937.00	2	20.67	1	34	12.33	903	0	1.6	6	7P-8P	936.00	914.33	0.00	162.68	10.67	173.35		2.2	c13a	
8P	10+50.00	915.39	916.39	1: 3	937.00	0	20.61	1	34	12.39	903	0	1.6	6	8P-9P	936.00	914.39	0.00	162.20	10.67	172.87		2.3	c13a	
9P	10+58.00	915.44	916.44	1: 3	937.00	0	20.56	1	34	12.44	903	0	1.6	6	9P-10P	936.00	914.44	0.00	161.80	10.67	172.47		2.3	c13a	
10P	10+66.00	915.48	916.48	1: 3	937.00	0	20.52	1	34	12.48	903	0	1.6	6	10P-11P	936.00	914.48	0.00	161.48	10.67	172.15		2.3	c12b	Loamy soils to 3', then firm, possibly organic clay to 4', firm clay to 5', soft clay to 7' then firm silt w/clay and sand layers below. All soils below 6.5' appeared to be saturated. Due to sand layers ordinary excavation below 909 could cause loss of ground resulting in settlement and instability. Use Recommendation Group A
11P	10+74.00	915.51	916.51	1: 3	937.00	0	20.49	1	34	12.51	903	0	1.6	6	11P-12P	936.00	914.51	0.00	161.24	10.67	171.91		2.3	c12b	
12P	10+82.00	915.53	916.53	1: 3	937.00	0	20.47	1	34	12.53	903	0	1.6	6	12P-13P	936.00	914.53	0.00	161.08	10.67	171.75		2.3	c12b	
13P	10+90.00	915.55	916.55	1: 3	937.00	0	20.45	1	34	12.55	903	0	1.6	6	13P-14P	936.00	914.55	0.00	160.92	10.67	171.59		2.3	c12b	
14P	10+98.00	915.56	916.56	1: 3	937.00	0	20.44	1	34	12.56	903	0	1.6	6	14P-15P	936.00	914.56	0.00	160.84	10.67	171.51		2.3	c12b	
15P	11+06.00	915.58	916.58	1: 3	937.00	0	20.42	1	34	12.58	903	0	1.6	6	15P-16P	936.00	914.58	0.00	160.68	10.67	171.35		2.3	c12b	
16P	11+14.00	915.60	916.60	1: 3	937.00	0	20.40	1	34	12.6	903	0	1.6	6	16P-17P	936.00	914.57	0.00	160.76	10.67	171.43		2.3	c12b	
17P	11+22.00	915.57	916.57	1: 3	937.00	0	20.43	1	34	12.57	903	0	1.6	6	17P-18P	936.00	914.55	0.00	160.92	10.67	171.59		2.3	c12b	
18P	11+30.00	915.55	916.55	1: 3	937.00	0	20.45	1	34	12.55	903	0	1.6	6	18P-19P	936.00	914.52	0.00	161.16	10.67	171.83		2.3	c12b	
19P	11+38.00	915.52	916.52	1: 3	937.00	0	20.48	1	34	12.52	903	0	1.6	6	19P-20P	936.00	914.34	0.00	162.60	10.67	173.27		2.3	c12b	
20P	11+46.00	915.34	916.34	1: 3	937.00	0	20.66	1	34	12.34	903	0	1.6	6	20P-21P	936.00	914.16	0.00	164.04	10.67	174.71		2.2	c12b	
21P	11+54.00	915.16	916.16	1: 3	937.00	0	20.84	1	34	12.16	903	0	1.5	6	21P-22P	936.00	914.02	0.00	165.16	10.67	175.83		2.2	c12b	
22P	11+62.00	915.02	916.02	1: 3	937.00	0	20.98	1	34	12.02	903	0	1.5	6	22P-23P	936.00	913.87	0.00	166.36	10.67	177.03		2.2	c12b	
23P	11+70.00	914.87	915.87	1: 3	937.00	0	21.13	1	36	13.87	901	0	1.8	7	23P-24P	936.00	913.72	0.00	167.56	10.67	178.23		2.5	c12b	
24P	11+78.00	914.72	915.72	1: 3	937.00	0	21.28	1	36	13.72	901	0	1.7	7	24P-25P	936.00	913.72	0.00	162.22	16.00	178.22		2.5	c12b	
25P	11+86.00	915.57	915.57	1: 3	937.00	0	21.43	0	35	13.57	902	0	1.7	7	25P-26P	936.00	915.90	1.86	160.78	0.00	162.64		2.5	c12b	
26P	11+94.00	915.42	915.42	1: 3	937.00	0	21.58	0	35	13.42	902	0	1.7	7	26P-27P	936.00	915.75	1.86	161.98	0.00	163.84		2.4	c12b	
27P	12+02.00	915.27	915.27	1: 3	937.00	0	21.73	0	35	13.27	902	0	1.7	7	27P-28P	936.00	915.60	1.86	163.18	0.00	165.04		2.4	c11	Loamy soils to 3', then firm silt w/clay and sand layers below. All soils below 3' appeared to be saturated. Due to sand layers ordinary excavation below 909 could cause loss of ground resulting in settlement and instability. Use Recommendation Group A
28P	12+10.00	915.12	915.12	1: 3	937.00	0	21.88	0	35	13.12	902	0	1.7	7	28P-29P	936.00	915.45	1.94	164.38	0.00	166.32		2.4	c11	
29P	12+18.00	914.96	914.96	1: 3	937.00	0	22.04	0	36	13.96	901	0	1.8	8	29P-30P	936.00	915.29	1.94	165.66	0.00	167.60		2.5	c11	
30P	12+26.00	914.80	914.80	1: 3	937.00	0	22.20	0	36	13.8	901	0	1.7	8	30P-31P	936.00	915.13	1.94	166.94	0.00	168.88		2.5	c11	
31P	12+34.00	914.64	914.64	1: 3	937.00	0	22.36	0	36	13.64	901	0	1.7	8	31P-32P	936.00	914.97	1.86	168.22	0.00	170.08		2.5	c11	
32P	12+42.00	914.49	914.49	1: 3	937.00	2	22.51	0	36	13.49	901	0	1.7	8	32P-33P	934.00	914.82	1.94	153.42	0.00	155.36		2.5	c11	
33P	12+50.00	914.33	914.33	1: 3	935.00	0	20.67	0	33	12.33	902	0	1.6	6	33P-34P	934.00	914.66	1.62	154.70	0.00	156.32		2.2	c11	
34P	12+58.00	914.21	914.21	1: 3	935.00	0	20.79	0	33	12.21	902	0	1.5	6	34P-35P	934.00	914.54	1.30	155.66	0.00	156.96		2.2	c11	
35P	12+66.00	914.13	914.13	1: 3	935.00	0	20.87	0	33	12.13	902	0	1.5	6	35P-36P	934.00	914.46	1.38	156.30	0.00	157.68		2.2	c11	
36P	12+74.00	914.04	914.04	1: 3	935.00	0	20.96	0	33	12.04	902	0	1.5	6	36P-37P	934.00	914.37	1.38	157.02	0.00	158.40		2.2	c11	
37P	12+82.00	913.95	913.95	1: 3	935.00	0	21.05	0	35	13.95	900	0	1.8	7	37P-38P	934.00	914.28	1.38	157.74	0.00	159.12		2.5	c11	
38P	12+90.00	913.86	913.86	1: 3	935.00	0	21.14	0	35	13.86	900	0	1.8	7	38P-39P	934.00	914.19	1.46	158.46	0.00	159.92		2.5	c11	
39P	12+98.00	913.76	913.76	1: 3	935.00	0	21.24	0	35	13.76	900	0	1.7	7	39P-40P	934.00	914.17	1.30	158.62	0.00	159.92		2.5	c11	
40P	13+06.00	913.84	913.84	1: 3	935.00	0	21.16	0	35	13.84	900	0	1.7	7	40P-41P	934.00	914.17	0.66	158.62	0.00	159.28		2.5	c11	
41P	13+14.00	913.84	913.84	1: 3	935.00	0	21.16	0	35	13.84	900	0	1.7	7	41P-42P	934.00	914.17	3.94	158.62	0.00	162.56	8	2.5	c11	
42P	13+22.00	913.43	913.43	1: 3	935.00	0	21.57	0	35	13.43	900	0	1.7	7	42P-43P	934.00	913.76	1.62	161.90	0.00	163.52	8	2.4	c11	
43P	13+30.00	913.31	913.31	1: 3	935.00	0	21.69	0	35	13.31	900	0	1.7	7	43P-44P	934.00	913.64	1.62	162.86	0.00	164.48	8	2.4	c11	
44P	13+38.00	913.19	913.19	1: 3	935.00	0	21.81	0	35	13.19	900	0	1.7	7	44P-45P	934.00	913.52	1.70	163.82	0.00	165.52	8	2.4	c10	Loamy soils to 4', then soft silt and clay to 9', and firm silt w/ clay and sand seams below. All soils below 8' appeared to be saturated, but generally fine-grained. Excavation below groundwater could cause loss of ground resulting in settlement and instability. Use Recommendation Group B. If groundwater is observed use Recommendation Group A
45P	13+46.00	913.06	913.06	1: 3	935.00	0	21.94	0	35	13.06	900	0	1.6	7	45P-46P	934.00	913.39	1.70	164.86	0.00	166.56	8	2.4	c10	
46P	13+54.00	912.93	912.93	1: 3	935.00	0	22.07	0	36	13.93	899	0	1.8	8	46P-47P	934.00	913.26	1.70	165.90	0.00	167.60	8	2.5	c10	
47P	13+62.00	912.80	912.80	1: 2	935.00	0	22.20	0	38	15.8	897	2	0	8	47P-48P	934.00	913.13	1.70	166.94	0.00	168.64	8	2.9	c10	
48P	13+70.00	912.67	912.67	1: 2	935.00	0	22.33	0	38	15.67	897	2	0	8	48P-49P	934.00	913.00	1.70	167.98	0.00	169.68	8	2.8	c10	
49P	13+78.00	912.54	912.54	1: 2	935.00	0	22.46	0	38	15.54	897	2	0	8	49P-50P	934.00	912.87	1.70	169.02	0.00	170.72	8	2.8	c10	
50P	13+86.00	912.41	912.41	1: 2	935.00	2	22.59	0	38	15.41	897	1.9	0	8	50P-51P	932.00	912.74	1.70	154.06	0.00	155.76	8	2.8	c10	
51P	13+94.00	912.28	912.28	1: 2	933.00	0	20.72	0	35	14.28	898	1.8	0	6	51P-52P	932.00	912.61	1.70	155.10	0.00	156.80	8	2.6	c10	
52P	14+02.00	912.15	912.15	1: 2	933.00	0	20.85	0	35	14.15	898	1.8	0	6	52P-53P	932.00	912.48	1.70	156.14	0.00	157.84	8	2.6	c10	
53P	14+10.00	912.02	912.02	1: 2	933.00	0	20.98	0	35	14.02	898	1.8	0	6	53P-54P	932.00	912.35	1.70	157.18	0.00	158.88	8	2.5	c10	
54P	14+18.00	911.89	911.89	1: 2	933.00	0	21.11	0	36	14.89	897	1.9	0	7	54P-55P	932.00	912.22	2.74	158.22	0.00	160.96	8	2.7	c10	
55P	14+26.00	911.63	911.63	1: 2	933.00	0	21.37	0	36	14.63	897	1.8	0	7	55P-56P	932.00	911.96	0.82	160.30	0.00	161.12	8	2.7	c10	
56P	14+34.00	911.61	911.61	1: 2	933.00	0	21.39	0	36	14.61	897	1.8	0	7	56P-57P	932.00	911.94	1.86	160.46	0.00	162.32	8	2.7	c10	
57P	14+42.00	911.46	911.46	1: 2	933.00	0	21.54	0	36	14.46	897	1.8	0	7	57P-58P	932.00	911.79	1.78	161.66	0.00	163.44	8	2.6	c10	
58P	14+50.00	911.32	911.32	1: 2	933.00	0	21.68	0	36	14.32	897	1.8	0	7	58P-59P	932.00	911.65	1.86	162.78	0.00	164.64	8	2.6	c10	
59P	14+58.00	911.17	911.17	1: 2	933.00	0	21.83	0	36	14.17	897	1.8	0	7	59P-60P	932.00	911.50	1.94	163.98	0.00	165.92	8	2.6	c10	
60P	14+66.00	911.01	911.01	1: 2	933.00	0	21.99	0	36	14.01	897	1.8	0	7	60P-61P	932.00	911.34	1.94	165.26	0.00	167.20	8	2.5	c10	

NOISE WALL NW2

POST NO.	WALL STATION (FT.)	GROUND ELEV. LEFT	GROUND ELEV. RIGHT	SLOPE (V:H)	TOP OF POST ELEV.	TOP OF WALL STEP HEIGHT (FT.)	WALL HEIGHT, H (FT.)	FILL HEIGHT, W (FT.)	POST LENGTH (FT.)	POST EMBED-MENT (FT.)	BOTTOM OF POST ELEV.	CONCRETE BACKFILL MIX 1G52 (CU. YD.)	FINE FILTER AGG. (CU. YD.)	PRE-STRESSED STRANDS (EACH)	PANEL	TOP OF WALL ELEV.	LOWER ELEV. OF BOTTOM HORIZONTAL PLANK	2" SPECIAL GAP PLANKS (SQ.FT.)	2" NORMAL PLANKS (SQ.FT.)	3" PLANKS (SQ.FT.)	TOTAL PLANK AREA (SQ.FT.)	RUBRAIL (LIN FT)	EXCAVATION SPECIAL (CU YD)	Cone Sounding	Soil Conditions and Recommendations
61P	14+74.00	910.85	910.85	1: 2	933.00	0	22.15	0	38	15.85	895	2	0	8	61P-62P	932.00	911.18	2.02	166.54	0.00	168.56	8	2.9	c09a	Loamy soils to 2', then soft to very soft possibly organic silt and clay to 7.5', firm silt w/ soft clay seams to 10' and then sands to 18'. All soils below 9' appeared to be saturated. Additional layers of perched groundwater may also exist. Ordinary excavation below 898 could cause loss of ground resulting in settlement and instability. Use Recommendation Group A
62P	14+82.00	910.68	910.68	1: 2	933.00	0	22.32	0	38	15.68	895	2	0	8	62P-63P	932.00	911.01	0.66	167.90	0.00	168.56	8	2.9	c09a	
63P	14+90.00	910.68	910.68	1: 2	933.00	0	22.32	0	38	15.68	895	2	0	8	63P-64P	932.00	911.01	3.30	167.90	0.00	171.20	8	2.9	c09a	
64P	14+98.00	910.35	910.35	1: 2	933.00	2	22.65	0	38	15.35	895	1.9	0	8	64P-65P	930.00	910.68	1.94	154.54	0.00	156.48	8	2.8	c09a	
65P	15+06.00	910.19	910.19	1: 2	931.00	0	20.81	0	35	14.19	896	1.8	0	6	65P-66P	930.00	910.52	2.02	155.82	0.00	157.84	8	2.6	c09a	
66P	15+14.00	910.02	910.02	1: 3	931.00	0	20.98	0	33	12.02	898	0	1.5	6	66P-67P	930.00	910.35	1.94	157.18	0.00	159.12	8	2.2	c09a	
67P	15+22.00	909.86	909.86	1: 3	931.00	0	21.14	0	35	13.86	896	0	1.8	7	67P-68P	930.00	910.19	2.02	158.46	0.00	160.48	8	2.5	c09a	
68P	15+30.00	909.69	909.69	1: 3	931.00	0	21.31	0	35	13.69	896	0	1.7	7	68P-69P	930.00	910.02	1.94	159.82	0.00	161.76	8	2.5	c09a	
69P	15+38.00	909.53	909.53	1: 3	931.00	0	21.47	0	35	13.53	896	0	1.7	7	69P-70P	930.00	909.86	2.02	161.10	0.00	163.12	8	2.5	c09a	
70P	15+46.00	909.36	909.36	1: 3	931.00	0	21.64	0	35	13.36	896	0	1.7	7	70P-71P	930.00	909.69	1.78	162.46	0.00	164.24	8	2.4	c09a	
71P	15+54.00	909.22	909.22	1: 3	931.00	0	21.78	0	35	13.22	896	0	1.7	7	71P-72P	930.00	909.55	1.70	163.58	0.00	165.28	8	2.4	c09a	
72P	15+62.00	909.09	909.09	1: 3	931.00	0	21.91	0	35	13.09	896	0	1.7	7	72P-73P	930.00	909.42	1.70	164.62	0.00	166.32	8	2.4	c09a	
73P	15+70.00	908.96	908.96	1: 3	931.00	0	22.04	0	36	13.96	895	0	1.8	8	73P-74P	930.00	909.29	1.62	165.66	0.00	167.28	8	2.5	c09a	
74P	15+78.00	908.84	908.84	1: 3	931.00	0	22.16	0	36	13.84	895	0	1.7	8	74P-75P	930.00	909.17	1.70	166.62	0.00	168.32	8	2.5	c09a	
75P	15+86.00	908.71	908.71	1: 3	931.00	0	22.29	0	36	13.71	895	0	1.7	8	75P-76P	930.00	909.04	1.62	167.66	0.00	169.28	8	2.5	c09a	
76P	15+94.00	908.59	908.59	1: 3	931.00	0	22.41	0	36	13.59	895	0	1.7	8	76P-77P	930.00	908.92	1.46	168.62	0.00	170.08	8	2.5	c09a	
77P	16+02.00	908.49	908.49	1: 3	931.00	2	22.51	0	36	13.49	895	0	1.7	8	77P-78P	928.00	908.82	1.38	153.42	0.00	154.80	8	2.5	c09a	
78P	16+10.00	908.40	908.40	1: 3	929.00	0	20.60	0	33	12.4	896	0	1.6	6	78P-79P	928.00	908.73	1.38	154.14	0.00	155.52	8	2.3	c08	Loamy and sandy soils to 3', then soft silt to 4.5', soft possibly organic clay to 6', then soft to firm silt and clay layers with sand seams and layers below. All soils below 3' appeared to be saturated. The soils appear loamy enough that Recommendation Group B may be used. If groundwater is encountered use Recommendation Group A.
79P	16+18.00	908.31	908.31	1: 3	929.00	0	20.69	0	33	12.31	896	0	1.6	6	79P-80P	928.00	908.64	1.30	154.86	0.00	156.16	8	2.2	c08	
80P	16+26.00	908.23	908.23	1: 3	929.00	0	20.77	0	33	12.23	896	0	1.5	6	80P-81P	928.00	908.56	1.22	155.50	0.00	156.72	8	2.2	c08	
81P	16+34.00	908.16	908.16	1: 3	929.00	0	20.84	0	33	12.16	896	0	1.5	6	81P-82P	928.00	908.49	1.30	156.06	0.00	157.36	8	2.2	c08	
82P	16+42.00	908.08	908.08	1: 3	929.00	0	20.92	0	33	12.08	896	0	1.5	6	82P-83P	928.00	908.41	1.22	156.70	0.00	157.92	8	2.2	c08	
83P	16+50.00	908.01	908.01	1: 3	929.00	0	20.99	0	33	12.01	896	0	1.5	6	83P-84P	928.00	908.34	1.14	157.26	0.00	158.40	8	2.2	c08	
84P	16+58.00	907.95	907.95	1: 3	929.00	0	21.05	0	35	13.95	894	0	1.8	7	84P-85P	928.00	908.28	1.14	157.74	0.00	158.88	8	2.5	c08	
85P	16+66.00	907.89	907.89	1: 3	929.00	0	21.11	0	35	13.89	894	0	1.8	7	85P-86P	928.00	908.22	0.98	158.22	0.00	159.20	8	2.5	c08	
86P	16+74.00	907.85	907.85	1: 3	929.00	0	21.15	0	35	13.85	894	0	1.7	7	86P-87P	928.00	908.18	1.06	158.54	0.00	159.60	8	2.5	c08	
87P	16+82.00	907.80	907.80	1: 3	929.00	0	21.20	0	35	13.8	894	0	1.7	7	87P-88P	928.00	908.13	0.98	158.94	0.00	159.92	8	2.5	c08	
88P	16+90.00	907.76	907.76	1: 3	929.00	0	21.24	0	35	13.76	894	0	1.7	7	88P-89P	928.00	908.09	0.98	159.26	0.00	160.24	8	2.5	c08	
89P	16+98.00	907.72	907.72	1: 3	929.00	0	21.28	0	35	13.72	894	0	1.7	7	89P-90P	928.00	908.05	1.78	159.58	0.00	161.36	8	2.5	c08	
90P	17+06.00	907.58	907.58	1: 3	929.00	0	21.42	0	35	13.58	894	0	1.7	7	90P-91P	928.00	908.01	1.46	159.90	0.00	161.36	8	2.5	c08	
91P	17+14.00	907.68	907.68	1: 3	929.00	0	21.32	0	35	13.68	894	0	1.7	7	91P-92P	928.00	908.01	0.74	159.90	0.00	160.64	8	2.5	c08	
92P	17+22.00	907.67	907.67	1: 3	929.00	0	21.33	0	35	13.67	894	0	1.7	7	92P-93P	928.00	908.00	1.22	159.98	0.00	161.20	8	2.5	c08	
93P	17+30.00	907.60	907.60	1: 3	929.00	0	21.40	0	35	13.6	894	0	1.7	7	93P-94P	928.00	907.98	1.06	160.14	0.00	161.20	8	2.5	c08	
94P	17+38.00	907.65	907.65	1: 3	929.00	0	21.35	0	35	13.65	894	0	1.7	7	94P-95P	928.00	907.98	0.74	160.14	0.00	160.88	8	2.5	c08	
95P	17+46.00	907.64	907.64	1: 3	929.00	0	21.36	0	35	13.64	894	0	1.7	7	95P-96P	928.00	907.97	0.74	160.22	0.00	160.96	8	2.5	c08	
96P	17+54.00	907.63	907.63	1: 3	929.00	0	21.37	0	35	13.63	894	0	1.7	7	96P-97P	928.00	907.97	0.74	160.22	0.00	160.96	8	2.5	c07	Layered loamy and sandy soils to 6', then soft to very soft possibly organic silt and clay to 8.5', firm silt w/ then sands with silty layers to 15.5'. All soils below 9' appeared to be saturated. Some layers of perched groundwater are likely. Ordinary excavation below 897 could cause loss of ground resulting in settlement and instability. Use Recommendation Group A.
97P	17+62.00	907.64	907.64	1: 3	929.00	0	21.36	0	35	13.64	894	0	1.7	7	97P-98P	928.00	907.98	0.74	160.14	0.00	160.88	8	2.5	c07	
98P	17+70.00	907.65	907.65	1: 3	929.00	0	21.35	0	35	13.65	894	0	1.7	7	98P-99P	928.00	907.99	0.74	160.06	0.00	160.80	8	2.5	c07	
99P	17+78.00	907.66	907.66	1: 3	929.00	0	21.34	0	35	13.66	894	0	1.7	7	99P-100P	928.00	907.99	0.66	160.06	0.00	160.72	8	2.5	c07	
100P	17+86.00	907.66	907.66	1: 3	929.00	0	21.34	0	35	13.66	894	0	1.7	7	100P-101P	928.00	908.00	0.74	159.98	0.00	160.72	8	2.5	c07	
101P	17+94.00	907.67	907.67	1: 3	929.00	0	21.33	0	35	13.67	894	0	1.7	7	101P-102P	928.00	908.00	0.66	159.98	0.00	160.64	8	2.5	c07	
102P	18+02.00	907.67	907.67	1: 3	929.00	0	21.33	0	35	13.67	894	0	1.7	7	102P-103P	928.00	908.03	0.90	159.74	0.00	160.64	8	2.5	c07	
103P	18+10.00	907.70	907.70	1: 3	929.00	0	21.30	0	35	13.7	894	0	1.7	7	103P-104P	928.00	908.06	0.90	159.50	0.00	160.40	8	2.5	c07	
104P	18+18.00	907.73	907.73	1: 3	929.00	0	21.27	0	35	13.73	894	0	1.7	7	104P-105P	928.00	908.10	0.98	159.18	0.00	160.16	8	2.5	c07	
105P	18+26.00	907.77	907.77	1: 3	929.00	0	21.23	0	35	13.77	894	0	1.7	7	105P-1066	928.00	908.14	0.98	158.86	0.00	159.84	8	2.5	c07	
1066	18+34.00	907.81	907.81	1: 3	929.00	0	21.19	0	35	13.81	894	0	1.7	7	1066-107P	928.00	908.16	0.62	119.02	0.00	119.64	8	2.5	c07	
107P	18+40.00	907.83	907.83	1: 3	929.00	0	21.17	0	35	13.83	894	0	1.7	7	107P-108P	928.00	908.19	0.68	118.84	0.00	119.52	6	2.5	c07	
108P	18+46.00	907.86	907.86	1: 3	929.00	0	21.14	0	35	13.86	894	0	1.8	7	108P-109P	928.00	908.23	0.98	158.14	0.00	159.12	6	2.5	c07	
109P	18+54.00	907.90	907.90	1: 3	929.00	0	21.10	0	35	13.9	894	0	1.8	7	109P-110P	928.00	908.28	1.06	157.74	0.00	158.80	8	2.5	c07	
110P	18+62.00	907.95	907.95	1: 3	929.00	0	21.05	0	35	13.95	894	0	1.8	7	110P-111P	928.00	908.36	1.30	157.10	0.00	158.40	8	2.5	c07	
111P	18+70.00	908.03	908.03	1: 3	929.00	0	20.97	0	33	12.03	896	0	1.5	6	111P-112P	928.00	908.43	1.22	156.54	0.00	157.76	8	2.2	c07	
112P	18+78.00	908.10	908.10	1: 3	929.00	0	20.90	0	33	12.1	896	0	1.5	6	112P-113P	928.00	908.50	1.22	155.98	0.00	157.20	8	2.2	c07	
113P	18+86.00	908.17	908.17	1: 3	929.00	0	20.83	0	33	12.17	896	0	1.5	6	113P-114P	928.00	908.58	1.30	155.34	0.00	156.64	8	2.2	c07	
114P	18+94.00	908.25	908.25	1: 3	929.00	0	20.75	0	33	12.25	896	0	1.5	6	114P-115P	928.00	908.58	0.66	155.34	0.00	156.00	8	2.2	c06a	Layered loamy and sandy soils with clay seams and layers to 13', then very soft possibly organic clay to 14.5', then layered loamy and sandy soils with clay seams and layers to 15'. All soils below 10' appeared to be saturated. Some layers of perched groundwater are likely. Ordinary excavation below 896 could cause loss of ground resulting in settlement and instability. Use Recommendation Group B
115P	19+02.00	908.25	908.25	1: 3	929.00	0	20.75	0	33	12.25	896	0	1.5	6	115P-116P	928.00	908.79	2.34	153.66	0.00	156.00	8	2.2	c06a	
116P	19+10.00	908.46	908.46	1: 3	929.00	2	20.54	0	33	12.46	896	0	1.6	6	116P-117P	926.00	908.94	1.86	136.46	0.00	138.32	4.5	2.3	c06a	
117P	19+18.00	908.61	908.61	1: 3	927.00	2	18.39	0	31	12.61	896	0	1.6	5	117P-118P	924.00	909.02	0.65	59.91	0.00	60.56	4.5	2.3	c06a	
118P	19+22.00	908.69	908.69	1: 3	925.00	0	16.31	0	28	11.69	897	0	1.5	4	118P-119P	924.00	909.11	0.86	74.44	0.00	75.30	8	2.1	c06a	
119P	19+27.00	908.78	908.78	1: 3	925.00	2	16.22	0	28	11.78	897	0	1.5	4	119P-120P	922.00	909.22	1.54	102.22	0.00	103.76	8	2.1	c06a	
120P	19+35.00	908.89	908.89	1: 3	923.00	2	14.11	0	25	10.89	898	0	1.4	4	120P-121P	920.00	909.32	1.46	85.42	0.00	86.88	8	2.0	c06a	
121P	19+43.00	908.99	908.99	1: 3	921.00		12.01	0	23	10.99	898	0	1.4	4									2.0	c06a	
TOTALS									4139			35.7	166.5	797				140.221	18493.334	253.35	18886.90	629	291.4		


S.P. 6205–39
NOISE WALL NW3
C01
C02
C03
C16
C04
C05
N
CLOSED
TH 10
PROPOSED SIGN BASE
OH US10–T14
℄ NW3
BANYAN ST.
TODD DR.
PRIOR AVE.
SCHEERER BROTHERS LUMBER

DEPARTMENT OF TRANSPORTATION

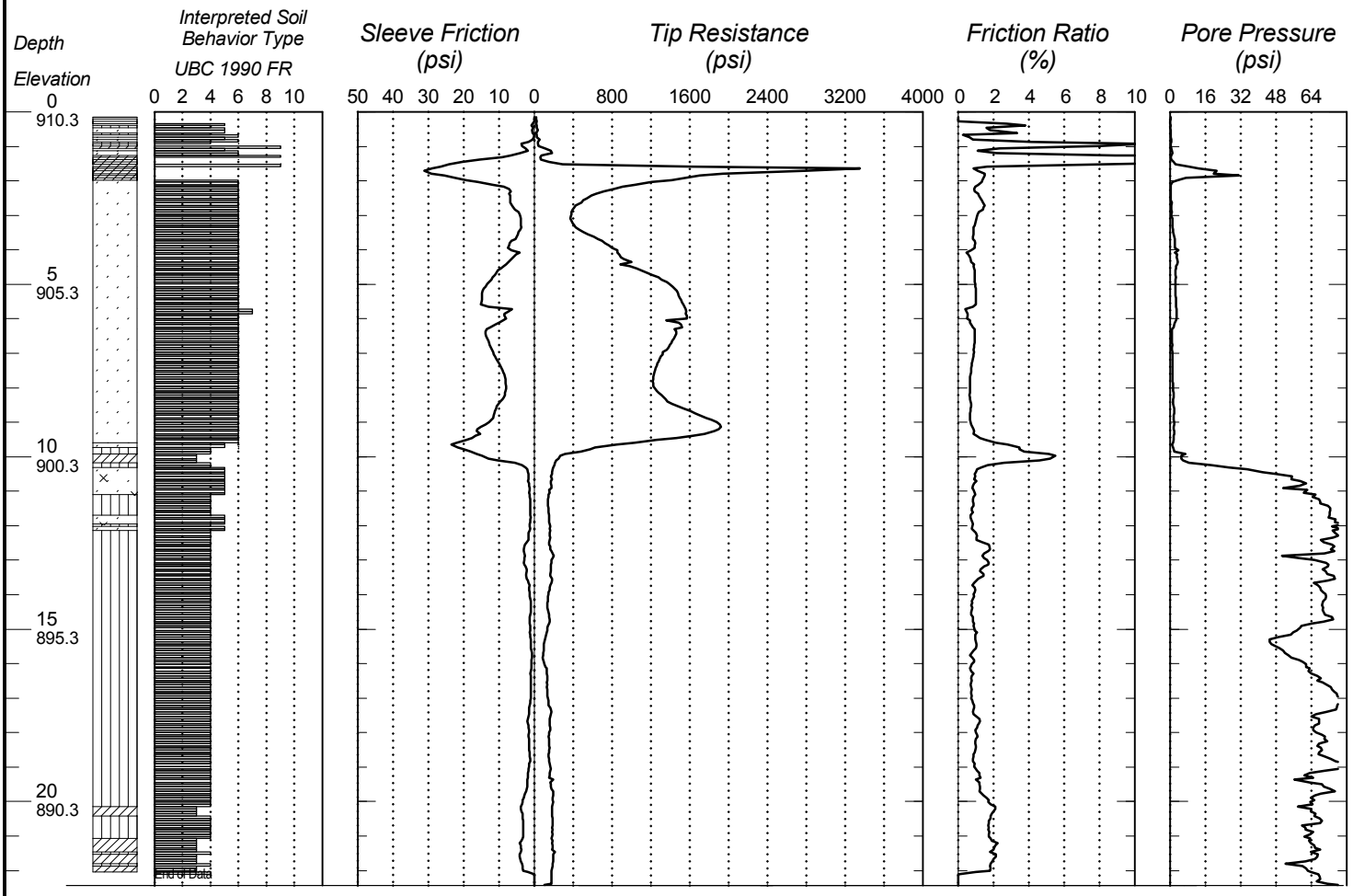
MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 82916

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
6205-39	**NOISE WALL 3**	**TH 10, EB OH SIGNS AND NWALLS**	**c01**	**910.3** *(DTM)*

Location	CPT Machine	SHEET 1 of 1
Ramsey County Coordinate System	**203094 CPT Truck**	
X=551490 Y=207382 *'EB 10, STA 761+36, 52' Lt*	*CPT Operator* **ODonnel**	*Date Completed*
Latitude (North)=45°05'07.60" Longitude (West)=93°11'02.39"	*Hole Type* **CPT-STD**	**2/7/18**



Bottom of Hole 22.43

DEPARTMENT OF TRANSPORTATION

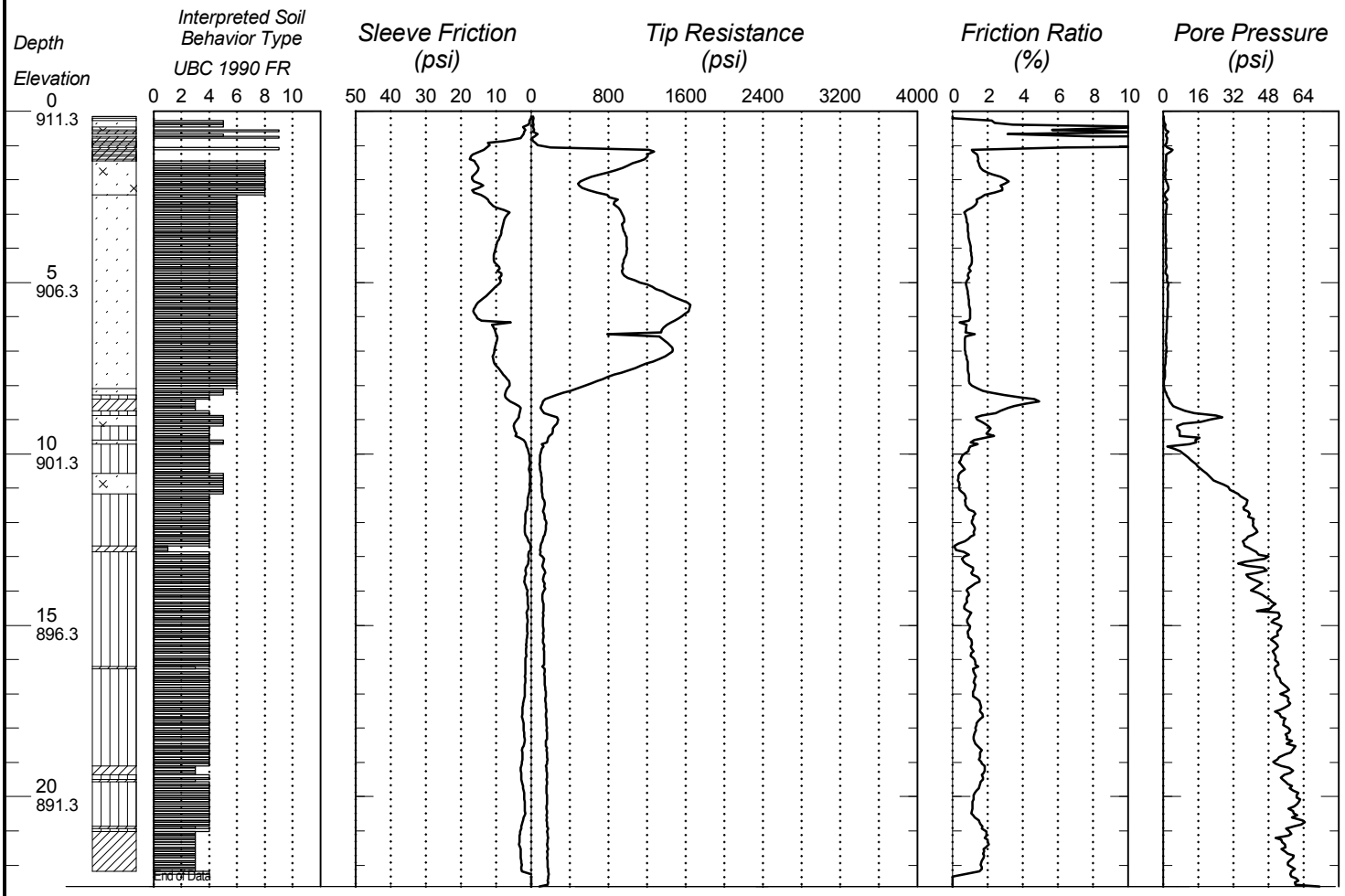
MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 82917

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
6205-39	**NOISE WALL 3**	**TH 10, EB OH SIGNS AND NWALLS**	**c02**	**911.3** *(DTM)*

Location		CPT Machine	SHEET 1 of 1
Ramsey County Coordinate System		**203094 CPT Truck**	
X=551583 Y=207269 *'EB 10, STA 759+90, 52' Lt*		CPT Operator **ODonnel**	Date Completed
Latitude (North)=45°05'06.48" *Longitude (West)=93°11'01.11"*		Hole Type **CPT-STD**	**2/7/18**



Bottom of Hole 22.62

DEPARTMENT OF TRANSPORTATION

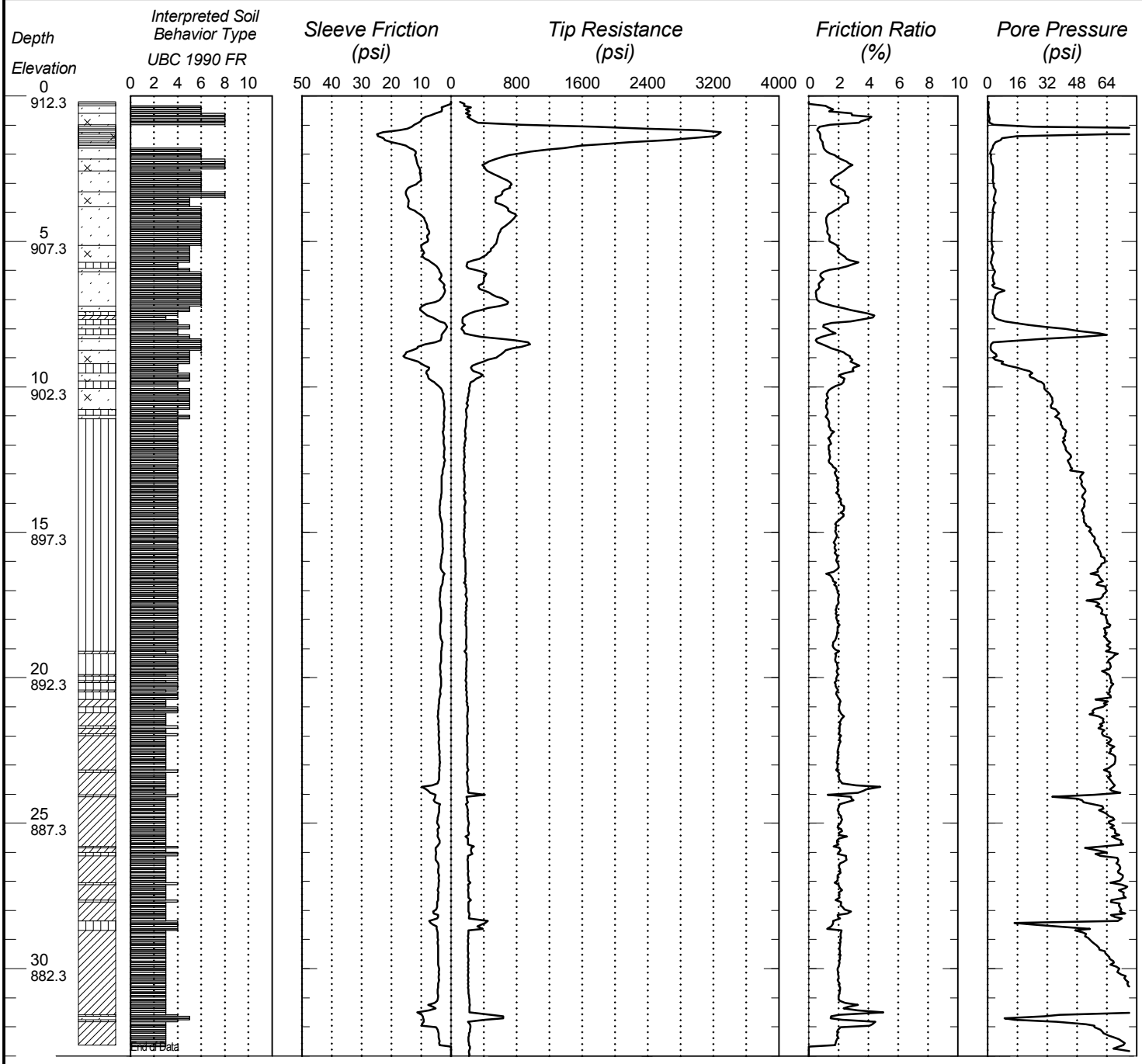
MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 82918

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
6205-39	**NOISE WALL 3**	**TH 10, EB OH SIGNS AND NWALLS**	**c03**	**912.3** *(DTM)*

Location	CPT Machine	SHEET 1 of 1
Ramsey County Coordinate System	**203094 CPT Truck**	
X=551693 Y=207168 *'EB 10, STA 758+42, 31' Lt*	*CPT Operator* **ODonnel**	*Date Completed*
Latitude (North)=45°05'05.48" Longitude (West)=93°10'59.58"	*Hole Type* **CPT-STD**	**2/7/18**



Bottom of Hole 33.01

G:\GINT\PROJECTS-ACTIVE\6205-39 TH 10 NOISE WALL.GPJ

DEPARTMENT OF TRANSPORTATION

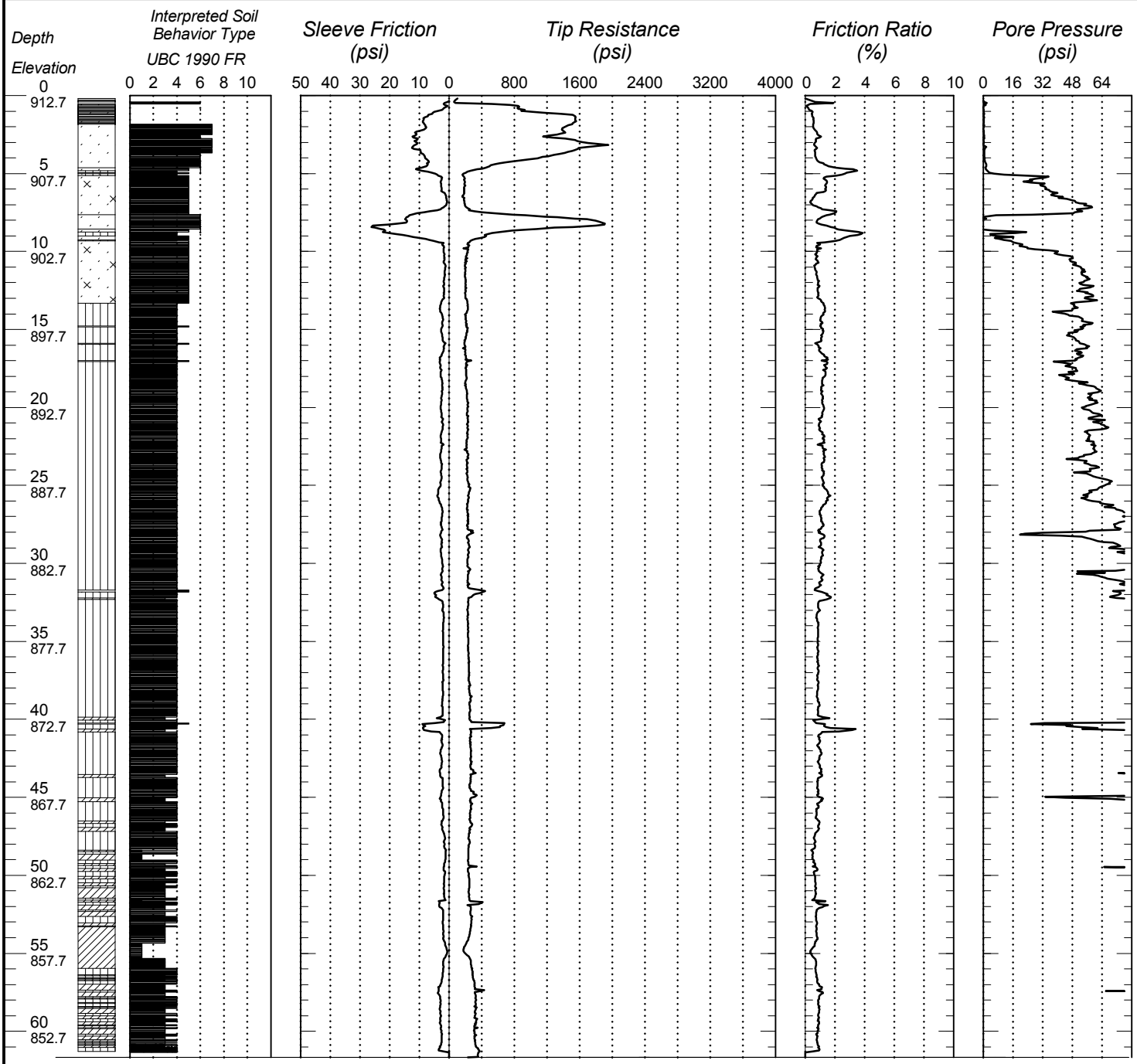
MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 82998

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
6205-39	**OH US10-114**	**TH 10, EB OH SIGNS AND NWALLS**	**c16**	**912.7** *(DTM)*

Location	CPT Machine	SHEET 1 of 1
Ramsey County Coordinate System	**203094 CPT Truck**	
X=551762 Y=207088	*CPT Operator* **ODonnel**	*Date Completed*
Latitude (North)=45°05'04.69" *Longitude (West)=93°10'58.62"*	*Hole Type* **CPT-STD**	**4/12/18**



Bottom of Hole 61.68

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DEPARTMENT OF TRANSPORTATION

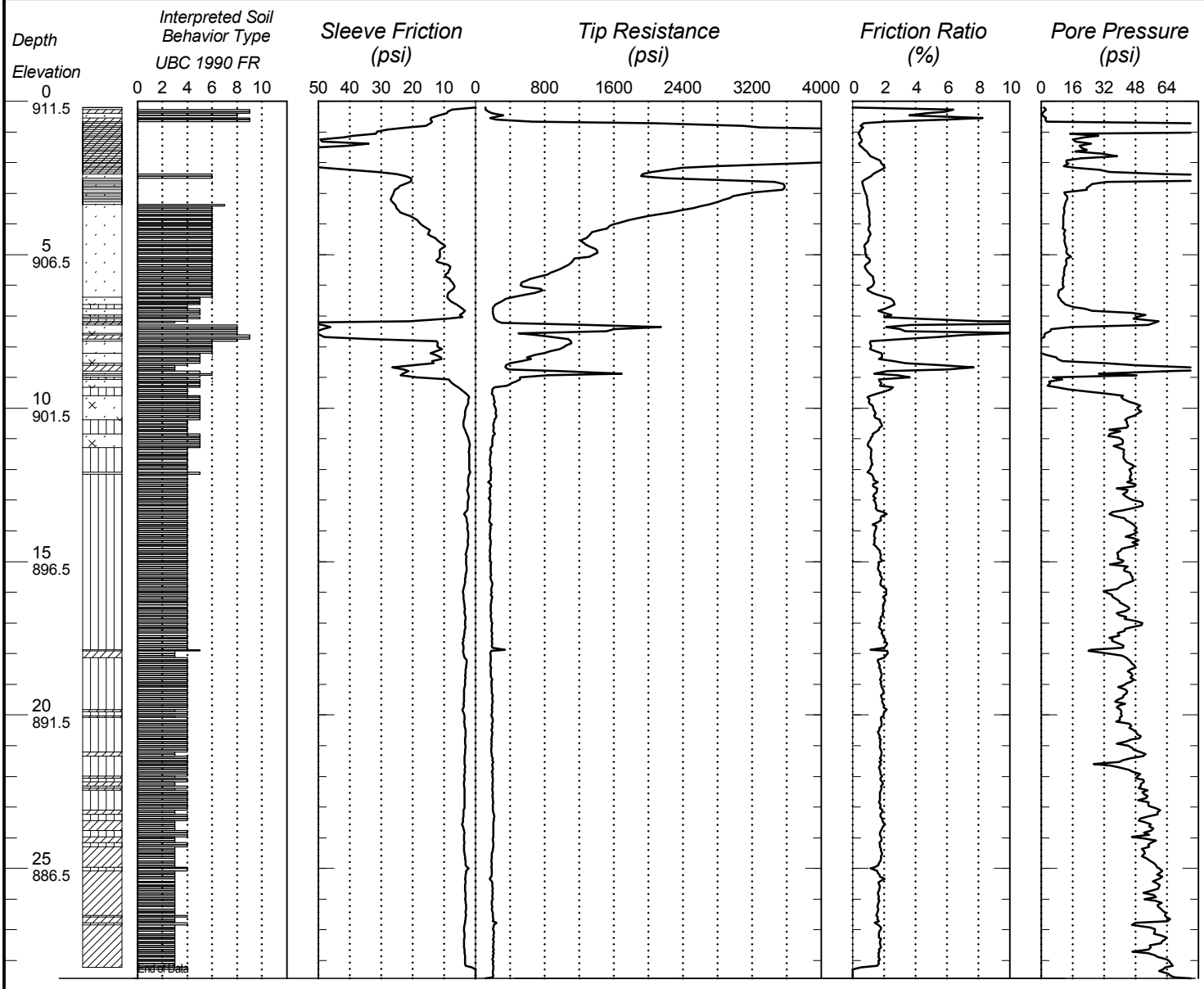
MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 82943

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
6205-39	**NOISE WALL 3**	**TH 10, EB OH SIGNS AND NWALLS**	**c04**	**911.5** *(DTM)*

Location			
Ramsey County Coordinate System	CPT Machine **203094 CPT Truck**	*SHEET 1 of 1*
X=551785 Y=207049 *'EB 10, STA 756+92, 35' Lt*	CPT Operator **O'Donnel, Pat**	*Date Completed*
Latitude (North)=45°05'04.30" Longitude (West)=93°10'58.30"	Hole Type **CPT-STD**	**2/20/18**



Bottom of Hole 28.59

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DEPARTMENT OF TRANSPORTATION

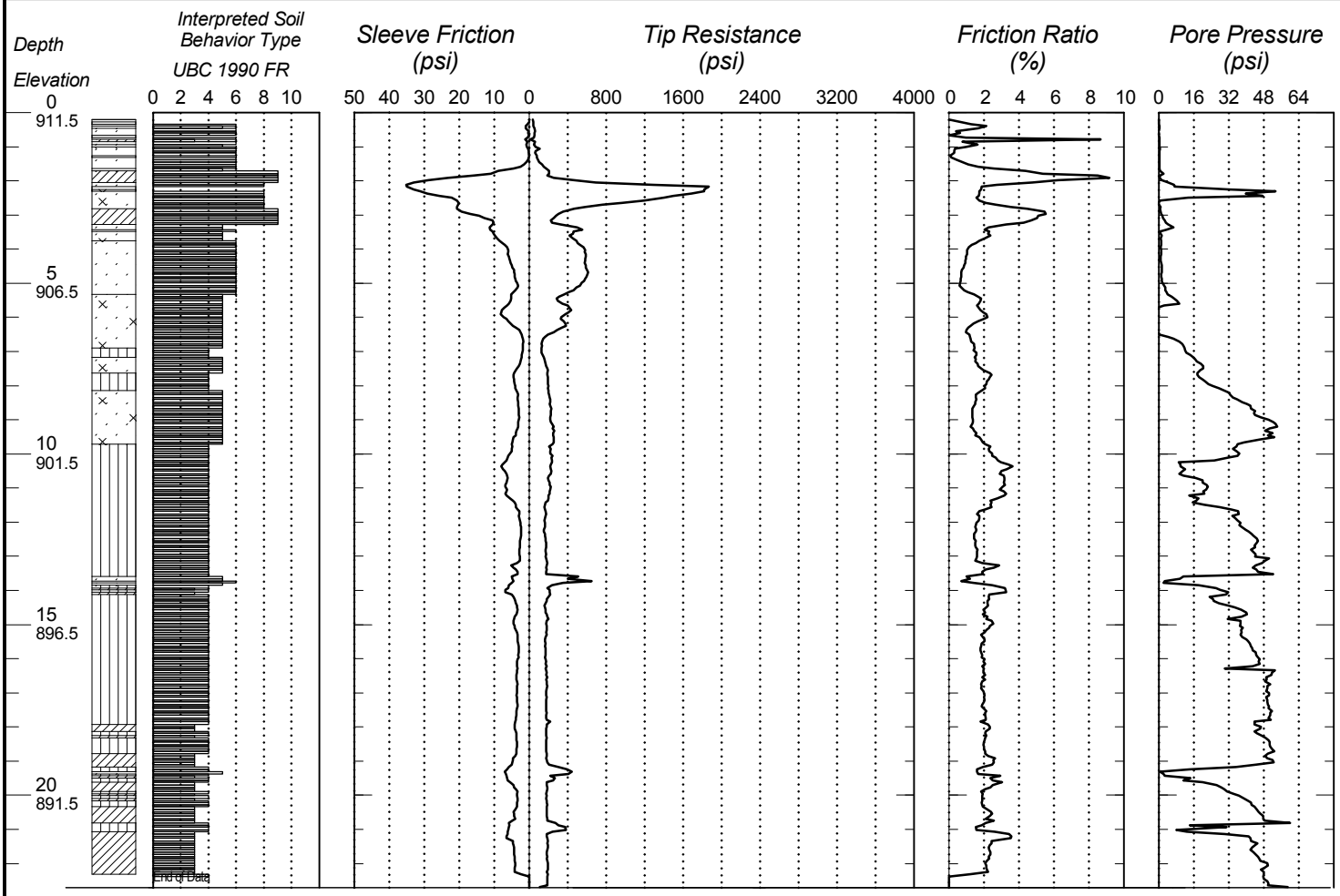
MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 82919

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
6205-39	**NOISE WALL 3**	**TH 10, EB OH SIGNS AND NWALLS**	**c05**	**911.5** *(DTM)*

Location	CPT Machine	SHEET 1 of 1
Ramsey County Coordinate System	**203094 CPT Truck**	
X=551829 Y=206948 *'EB 10, STA 755+85, 64' Lt*	*CPT Operator* **ODonnel**	*Date Completed*
Latitude (North)=45°05'03.30" Longitude (West)=93°10'57.68"	*Hole Type* **CPT-STD**	**2/7/18**



Bottom of Hole 22.7

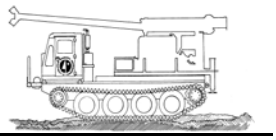
NOISE WALL NW3

POST NO.	WALL STATION (NW3)	GROUND ELEV. LEFT	GROUND ELEV. RIGHT	SLOPE (V:H)	TOP OF POST ELEV.	TOP OF WALL STEP HEIGHT (FT)	WALL HEIGHT (FT)	POST LENGTH (FT)	POST EMBED-MENT (FT)	BOTTOM OF POST ELEV. (FT)	FINE FILTER AGG. (CU YD)	PRE-STRESSED STRANDS (EACH)	PANEL	TOP OF WALL ELEV. (FT)	LOWER ELEV. OF BOTTOM HORIZONTAL PLANK	2" SPECIAL GAP PLANKS (SQ FT)	2" NORMAL PLANKS (SQ FT)	TOTAL PLANK AREA (SQ FT)	RUBRAIL (LIN FT)	EXCAVATION SPECIAL (CU YD)	Cone Sounding	Soil Conditions and Recommendations
1P	10+00.00	912.21	912.21	1: 4	924.00	0	11.79	21	9.21	903	1.2	4	1P-2P	923.00	912.66	1.62	82.70	84.32	8	1.7	c05	Layered sands and clays to 10', then soft silt with seams and layers of sand and clay below. Soils below 6.5' appeared to be saturated. Groundwater will be perched on fine-grained soils near elevation 906. Ordinary excavation below 905 could cause loss of ground resulting in settlement and instability. Use Recommendation Group A
2P	10+08.00	912.33	912.33	1: 4	926.00	2	13.67	24	10.33	902	1.3	4	2P-3P	925.00	912.81	1.86	97.50	99.36	8	1.9	c05	
3P	10+16.00	912.48	912.48	1: 4	928.00	2	15.52	26	10.48	902	1.3	4	3P-4P	927.00	912.99	2.10	112.06	114.16	8	1.9	c05	
4P	10+24.00	912.66	912.66	1: 4	930.00	2	17.34	29	11.66	901	1.5	4	4P-5P	929.00	913.17	1.84	110.79	112.63	8	2.1	c05	
5P	10+31.00	912.84	912.84	1: 4	932.00	2	19.16	31	11.84	901	1.5	6	5P-6P	931.00	913.17	5.30	142.62	147.92	8	2.2	c05	
6P	10+39.00	912.26	912.26	1: 4	934.00	2	21.74	34	12.26	900	1.5	7	6P-7P	933.00	912.62	0.90	163.02	163.92	8	2.2	c05	
7P	10+47.00	912.29	912.29	1: 4	934.00	0	21.71	34	12.29	900	1.6	7	7P-8P	933.00	912.65	0.90	162.78	163.68	8	2.2	c04	Sands to 7', then layered soft clay and silt with seams and layers of sand to 11' and silt with clay layers and sand seams below. Soils below 10' appeared to be saturated. Ordinary excavation into waterbearing sands could cause loss of ground resulting in settlement and instability. Use Recommendation Group B
8P	10+55.00	912.32	912.32	1: 4	934.00	0	21.68	34	12.32	900	1.6	7	8P-9P	933.00	912.68	0.90	162.54	163.44	8	2.2	c04	
9P	10+63.00	912.35	912.35	1: 4	934.00	0	21.65	34	12.35	900	1.6	7	9P-10P	933.00	912.71	0.90	162.30	163.20	8	2.2	c04	
10P	10+71.00	912.38	912.38	1: 4	934.00	0	21.62	34	12.38	900	1.6	7	10P-11P	933.00	912.73	0.51	101.34	101.85	5	2.3	c04	
11P	10+76.00	912.40	912.40	1: 4	934.00	0	21.6	34	12.4	900	1.6	7	11P-12P	933.00	912.76	0.90	161.90	162.80	8	2.3	c04	
12P	10+84.00	912.43	912.43	1: 4	934.00	0	21.57	34	12.43	900	1.6	7	12P-13P	933.00	912.77	0.37	80.91	81.28	3	2.3	c04	
13P	10+88.00	912.44	912.44	1: 4	934.00	0	21.56	34	12.44	900	1.6	7	13P-14P	933.00	912.79	0.82	161.66	162.48	8	2.3	c04	
14P	10+96.00	912.46	912.46	1: 4	934.00	0	21.54	34	12.46	900	1.6	7	14P-15P	933.00	912.81	0.82	161.50	162.32	8	2.3	c04	
15P	11+04.00	912.48	912.48	1: 4	934.00	0	21.52	34	12.48	900	1.6	7	15P-16P	933.00	912.83	0.82	161.34	162.16	8	2.3	c04	
16P	11+12.00	912.50	912.50	1: 4	934.00	0	21.5	34	12.5	900	1.6	7	16P-17P	933.00	912.84	0.74	161.26	162.00	8	2.3	c04	
17P	11+20.00	912.51	912.51	1: 4	934.00	0	21.49	34	12.51	900	1.6	7	17P-18P	933.00	912.84	0.66	161.26	161.92	8	2.3	c04	
18P	11+28.00	912.51	912.51	1: 4	934.00	0	21.49	34	12.51	900	1.6	7	18P-19P	933.00	912.85	0.74	161.18	161.92	8	2.3	c16	Sandy soils to 13' with silt containing with seams of clay and sand below. Groundwater will be perched on fine-grained soils near an elevation of 905. Ordinary excavation into groundwater could cause loss of ground resulting in settlement and instability. Use Recommendation Group B
19P	11+36.00	912.52	912.52	1: 4	934.00	0	21.48	34	12.52	900	1.6	7	19P-20P	933.00	912.86	0.74	161.10	161.84	8	2.3	c16	
20P	11+44.00	912.53	912.53	1: 4	934.00	0	21.47	34	12.53	900	1.6	7	20P-21P	933.00	912.88	0.82	160.94	161.76	8	2.3	c16	
21P	11+52.00	912.55	912.55	1: 4	934.00	0	21.45	34	12.55	900	1.6	7	21P-22P	933.00	912.94	1.14	160.46	161.60		2.3	c16	
22P	11+60.00	912.61	912.61	1: 4	934.00	0	21.39	34	12.61	900	1.6	7	22P-23P	933.00	912.99	1.06	160.06	161.12		2.3	c16	
23P	11+68.00	912.66	912.66	1: 4	934.00	0	21.34	34	12.66	900	1.6	7	23P-24P	933.00	913.05	1.14	159.58	160.72		2.3	c16	
24P	11+76.00	912.72	912.72	1: 4	934.00	0	21.28	34	12.72	900	1.6	7	24P-25P	933.00	913.10	1.06	159.18	160.24		2.3	c16	
25P	11+84.00	912.77	912.77	1: 4	934.00	0	21.23	34	12.77	900	1.6	7	25P-26P	933.00	913.15	1.06	158.78	159.84		2.3	c16	
26P	11+92.00	912.82	912.82	1: 4	934.00	0	21.18	34	12.82	900	1.6	7	26P-27P	933.00	913.20	1.06	158.38	159.44		2.3	c16	
27P	12+00.00	912.87	912.87	1: 4	934.00	0	21.13	34	12.87	900	1.6	7	27P-28P	933.00	913.25	1.06	157.98	159.04		2.3	c03	Sandy soils with silty and clayey layers to 11' with silt containing seams of clay and sand below. Soils below 6' appeared to be saturated. Groundwater will be perched on fine-grained soils near an elevation of 906. Ordinary excavation below 906 could cause loss of ground resulting in settlement and instability. Use Recommendation Group A
28P	12+08.00	912.92	912.92	1: 4	934.00	0	21.08	34	12.92	900	1.6	7	28P-29P	933.00	913.28	0.68	118.30	118.98		2.3	c03	
29P	12+14.00	912.95	912.95	1: 4	934.00	0	21.05	34	12.95	900	1.6	7	29P-30P	933.00	913.81	4.15	129.93	134.09		2.4	c03	
30P	12+20.77	913.48	913.48	1: 4	934.00	0	20.52	33	12.48	901	1.6	6	30P-31P	933.00	914.30	4.58	149.58	154.16		2.3	c03	
31P	12+28.77	913.97	913.97	1: 10	934.00	0	20.03	32	11.97	902	1.5	6	31P-32P	933.00	914.32	0.82	149.42	150.24		2.2	c03	
32P	12+36.77	913.99	913.99	1: 10	934.00	0	20.01	32	11.99	902	1.5	6	32P-33P	933.00	914.32	0.90	149.42	150.32		2.2	c03	
33P	12+44.77	913.96	913.96	1: 10	934.00	0	20.04	32	11.96	902	1.5	6	33P-34P	933.00	914.29	0.51	93.54	94.05		2.2	c03	
34P	12+49.77	913.94	913.94	1: 10	934.00	0	20.06	32	11.94	902	1.5	6	34P-35P	933.00	914.27	0.52	93.63	94.15		2.2	c03	
35P	12+54.77	913.92	913.92	1: 10	934.00	0	20.08	32	11.92	902	1.5	6	35P-36P	933.00	914.25	0.90	149.98	150.88		2.2	c03	
36P	12+62.77	913.89	913.89	1: 10	934.00	0	20.11	32	11.89	902	1.5	6	36P-37P	933.00	914.22	0.98	150.22	151.20		2.2	c03	
37P	12+70.77	913.85	913.85	1: 10	934.00	0	20.15	32	11.85	902	1.5	6	37P-38P	933.00	914.18	0.90	150.54	151.44		2.2	c03	
38P	12+78.77	913.82	913.82	1: 10	934.00	0	20.18	32	11.82	902	1.5	6	38P-39P	933.00	914.15	0.90	150.78	151.68		2.1	c03	
39P	12+86.77	913.79	913.79	1: 10	934.00	0	20.21	32	11.79	902	1.5	6	39P-40P	933.00	914.12	0.90	151.02	151.92		2.1	c03	
40P	12+94.77	913.76	913.76	1: 10	934.00	0	20.24	32	11.76	902	1.5	6	40P-41P	933.00	914.09	0.98	151.26	152.24		2.1	c03	
41P	13+02.77	913.72	913.72	1: 10	934.00	0	20.28	32	11.72	902	1.5	6	41P-42P	933.00	914.05	1.38	151.58	152.96		2.1	c03	
42P	13+10.77	913.63	913.63	1: 10	934.00	0	20.37	32	11.63	902	1.5	6	42P-43P	933.00	913.96	1.38	152.30	153.68		2.1	c03	
43P	13+18.77	913.54	913.54	1: 10	934.00	0	20.46	32	11.54	902	1.5	6	43P-44P	933.00	913.87	1.46	153.02	154.48		2.1	c03	

NOISE WALL NW3

POST NO.	WALL STATION (NW3)	GROUND ELEV. LEFT	GROUND ELEV. RIGHT	SLOPE (V:H)	TOP OF POST ELEV.	TOP OF WALL STEP HEIGHT (FT)	WALL HEIGHT (FT)	POST LENGTH (FT)	POST EMBED-MENT (FT)	BOTTOM OF POST ELEV. (FT)	FINE FILTER AGG. (CU YD)	PRE-STRESSED STRANDS (EACH)	PANEL	TOP OF WALL ELEV. (FT)	LOWER ELEV. OF BOTTOM HORIZONTAL PLANK	2" SPECIAL GAP PLANKS (SQ FT)	2" NORMAL PLANKS (SQ FT)	TOTAL PLANK AREA (SQ FT)	RUBRAIL (LIN FT)	EXCAVATION SPECIAL (CU YD)	Cone Sounding	Soil Conditions and Recommendations
44P	13+26.77	913.44	913.44	1: 10	934.00	0	20.56	32	11.44	902	1.4	6	44P-45P	933.00	913.77	1.46	153.82	155.28	8	2.1	c02	
45P	13+34.77	913.34	913.34	1: 10	934.00	0	20.66	32	11.34	902	1.4	6	45P-46P	933.00	913.67	0.98	154.62	155.60	8	2.1	c02	
46P	13+42.77	913.30	913.30	1: 10	934.00	0	20.7	32	11.3	902	1.4	6	46P-47P	933.00	913.63	0.90	154.94	155.84	8	2.1	c02	
47P	13+50.77	913.27	913.27	1: 10	934.00	0	20.73	32	11.27	902	1.4	6	47P-48P	933.00	913.60	0.61	115.74	116.36	6	2.0	c02	
48P	13+56.74	913.25	913.25	1: 4	934.00	0	20.75	33	12.25	901	1.5	6	48P-49P	933.00	913.58	1.06	155.34	156.40	8	2.2	c02	
49P	13+64.74	913.20	913.20	1: 4	934.00	0	20.80	33	12.20	901	1.5	6	49P-50P	933.00	913.53	0.90	155.74	156.64	8	2.2	c02	
50P	13+72.74	913.17	913.17	1: 4	934.00	0	20.83	33	12.17	901	1.5	6	50P-52P	933.00	913.50	0.40	58.49	58.89	3	2.2	c02	
51P	13+75.74	913.12	913.12	1: 4	934.00	0	20.88	33	12.12	901	1.5	6	51P-53P	933.00	913.45	0.66	156.38	157.04	8	2.2	c02	
52P	13+83.74	913.12	913.12	1: 4	934.00	0	20.88	33	12.12	901	1.5	6	52P-53P	933.00	913.45	0.61	97.74	98.35	5	2.2	c02	Sandy soils with a few silty and clayey layers to 11', silt containing layers and seams of clay and sand below. Groundwater will be perched on fine-grained soils near an elevation of 905. Ordinary excavation below 905 could cause loss of ground resulting in settlement and instability. Use Recommendation Group A
53P	13+88.74	913.08	913.08	1: 4	934.00	0	20.92	33	12.08	901	1.5	6	53P-54P	933.00	913.41	0.98	156.70	157.68	8	2.2	c02	
54P	13+96.74	913.04	913.04	1: 4	934.00	0	20.96	33	12.04	901	1.5	6	54P-55P	933.00	913.37	1.06	157.02	158.08	8	2.2	c02	
55P	14+04.74	912.99	912.99	1: 4	934.00	0	21.01	34	12.99	900	1.6	7	55P-56P	933.00	913.32	1.38	157.42	158.80	8	2.4	c02	
56P	14+12.74	912.90	912.90	1: 4	934.00	0	21.1	34	12.9	900	1.6	7	56P-57P	933.00	913.23	1.14	158.14	159.28	8	2.3	c02	
57P	14+20.74	912.84	912.84	1: 4	934.00	0	21.16	34	12.84	900	1.6	7	57P-58P	933.00	913.17	1.46	158.62	160.08	8	2.3	c02	
58P	14+28.74	912.74	912.74	1: 4	934.00	0	21.26	34	12.74	900	1.6	7	58P-59P	933.00	913.07	1.30	159.42	160.72	8	2.3	c02	
59P	14+36.74	912.66	912.66	1: 4	934.00	0	21.34	34	12.66	900	1.6	7	59P-60P	933.00	912.99	1.30	160.06	161.36	8	2.3	c02	
60P	14+44.74	912.58	912.58	1: 4	934.00	0	21.42	34	12.58	900	1.6	7	60P-61P	933.00	912.91	1.30	160.70	162.00	8	2.3	c02	
61P	14+52.74	912.50	912.50	1: 4	934.00	0	21.5	34	12.5	900	1.6	7	61P-62P	933.00	912.83	1.38	161.34	162.72	8	2.3	c02	
62P	14+60.74	912.41	912.41	1: 4	934.00	0	21.59	34	12.41	900	1.6	7	62P-63P	933.00	912.74	1.30	162.06	163.36	8	2.3	c02	
63P	14+68.74	912.33	912.33	1: 4	934.00	0	21.67	34	12.33	900	1.6	7	63P-64P	933.00	912.66	1.30	162.70	164.00	8	2.2	c01	Sandy soils with a few silty and clayey layers to 11', silt containing layers and seams of clay and sand below. Soils below 9.5' appeared to be saturated. Groundwater will be perched on fine-grained soils near an elevation of 901. Ordinary excavation below 901 could cause loss of ground resulting in settlement and instability. Use Recommendation Group A if groundwater is encountered. Recommendation Group B may be used where no groundwater exists.
64P	14+76.74	912.25	912.25	1: 4	934.00	0	21.75	34	12.25	900	1.5	7	64P-65P	933.00	912.58	1.30	163.34	164.64	8	2.2	c01	
65P	14+84.74	912.17	912.17	1: 4	934.00	0	21.83	34	12.17	900	1.5	7	65P-66P	933.00	912.50	1.14	163.98	165.12	8	2.2	c01	
66P	14+92.74	912.11	912.11	1: 4	934.00	2	21.89	34	12.11	900	1.5	7	66P-67P	931.00	912.44	1.22	148.46	149.68	8	2.2	c01	
67P	15+00.74	912.04	912.04	1: 4	932.00	0	19.96	31	11.04	901	1.4	6	67P-68P	931.00	912.37	1.38	149.02	150.40	8	2.0	c01	
68P	15+08.74	911.95	911.95	1: 4	932.00	0	20.05	33	12.95	899	1.6	6	68P-69P	931.00	912.28	0.53	74.87	75.40	4	2.4	c01	
69P	15+12.74	911.90	911.90	1: 4	932.00	0	20.1	33	12.9	899	1.6	6	69P-70P	931.00	912.23	1.38	150.14	151.52	8	2.3	c01	
70P	15+20.74	911.81	911.81	1: 4	932.00	2	20.19	33	12.81	899	1.6	6	70P-71P	929.00	912.14	1.46	134.86	136.32	8	2.3	c01	
71P	15+28.74	911.71	911.71	1: 4	930.00	2	18.29	30	11.71	900	1.5	5	71P-72P	927.00	912.04	1.46	119.66	121.12	8	2.1	c01	
72P	15+36.74	911.61	911.61	1: 4	928.00	2	16.39	27	10.61	901	1.3	4	72P-73P	925.00	911.94	1.46	104.46	105.92	8	1.9	c01	
73P	15+44.74	911.51	911.51	1: 4	926.00	2	14.49	25	10.51	901	1.3	4	73P-74P	923.00	911.84	1.54	89.26	90.80	8	1.9	c01	
74P	15+52.74	911.40	911.40	1: 4	924.00	2	12.6	22	9.4	902	1.2	4	74P-75P	921.00	911.73	0.53	37.07	37.60	4	1.7	c01	
75P	15+56.74	911.35	911.35	1: 4	922.00	0	10.65	20	9.35	902	1.2	4	75P-76P	921.00	911.68	1.46	74.54	76.00	8	1.7	c01	
76P	15+64.74	911.25	911.25	1: 4	922.00	2	10.75	20	9.25	902	1.2	4	76P-77P	919.00	911.58	1.62	59.34	60.96	8	1.7	c01	
77P	15+72.74	911.13	911.13	1: 4	920.00		8.87	17	8.13	903	1	4		919.00						1.5	c01	
TOTALS								2454			116.1	477				92.02	10615.37	10707.38	398	167.5		

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.

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)

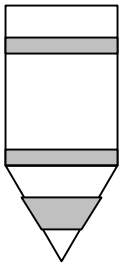
q_T TIP RESISTANCE
The resistance at the cone corrected for water pressure. Data is from cone with 60 degree apex angle and a 10 cm^2 end area.

f_s SLEEVE FRICTION RESISTANCE
The resistance along the sleeve of the penetrometer.

FR Friction Ratio
Ratio of sleeve friction over corrected tip resistance.
FR = fs/qt

V_s Shear Wave Velocity
A measure of the speed at which a siesmic 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.



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.

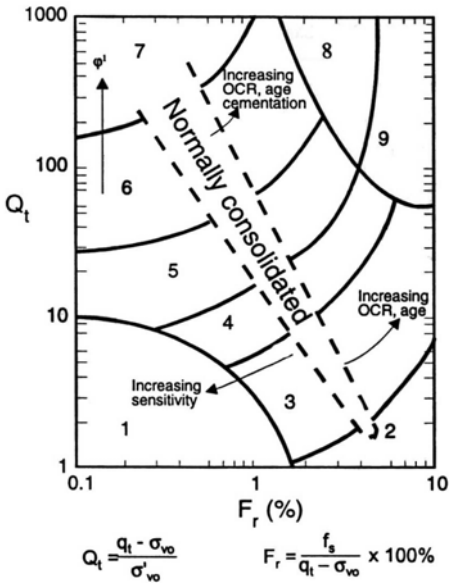
The numbers corresponding to different regions on the charts represent the following soil behavior types:

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.

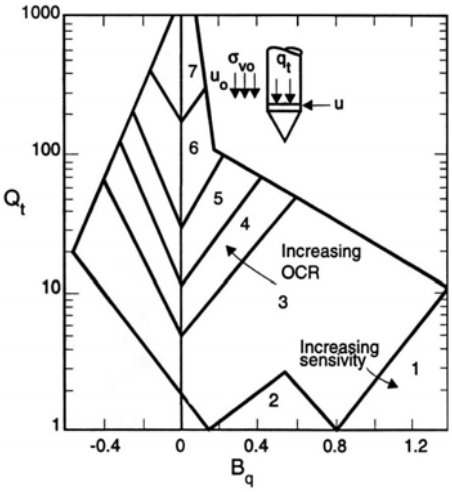
The following charts are used to provide a Soil Behavior Type for the CPT Data.

Robertson CPT 1990
Soil Behavior type based on friction ratio



$$Q_t = \frac{q_t - \sigma_{vo}}{\sigma'_{vo}} \qquad F_r = \frac{f_s}{q_t - \sigma_{vo}} \times 100\%$$

Robertson CPTU 1990
Soil Behavior type based on pore pressure



$$Q_t = \frac{q_t - \sigma_{vo}}{\sigma'_{vo}} \qquad B_q = \frac{u_2 - u_o}{q_t - \sigma_{vo}}$$

where ...
Q_T ..... normalized cone resistance
B_q ..... pore pressure ratio
F_r ..... Normalized friction ratio
σ_{vo} ..... overburden pressure
σ'_{vo} ..... effective over burden pressure
u_2 ..... measured pore pressure
u_0 ..... equilibrium pore pressure