Minnesota Department of Transportation
MEMO
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Maplewood, MN 55109

DATE: November 17, 2016

TO: Andrew Lutaya, Final Design Project Manager
Metro District

FROM: Paul Martin, Senior Engineer
Geotechnical Engineering Section
paul.martin@state.mn.us Digitally signed by paul.martin@state.mn.us DN: cn=paul.martin@state.mn.us Date: 2016.11.17 14:06:25 -06'00'

CONCUR: Rich Lamb, Foundations Design/Build Engineer
Geotechnical Engineering Section
RAL

SUBJECT: S.P. 2781-467, Five Noisewalls along TH 94
Located between Cedar Avenue and Franklin Terrace in Minneapolis
Subsurface Investigation & Foundation Recommendations

Project Description

The existing noise walls in this stretch of highway are deteriorating with age and do not meet current design standards. They will be removed and replaced with new, taller noise walls. Based on the scoping drawings, the five walls in the project are designated NW98, NW99, NW100, NW101 and NW103.

The noise walls will be supported with 12x18 inch concrete posts embedded in the ground as shown in Figure 5-297.661 in Mn/DOT's Standard Plans. The chart shown in this figure assumes that the foundation soils have a minimum friction angle of 30° and that the water-table is below the bottom of the embedded post. A 20-foot high structure and 3:1 (H:V) slopes was assumed for the analysis. From the table in the standard plans, the post embedment depth would be about 13 to 14 feet.

Field Investigation and Foundation Conditions

The Foundation Office reviewed the area Geology and the available records of previous subsurface investigations in the area. Foundations field crews performed Cone Penetration Test (CPT) Soundings to evaluate the soil conditions along the proposed noisewall alignments in September and October of 2016. Soundings are typically taken approximately every 150 feet along the length of a proposed noisewall, but our crews were unable to access many locations. Copies of these CPT sounding logs and the logs of selected borings and soundings conducted in 2010 are included with this report along with drawings showing the locations of the explorations.

We completed,

- seven CPT Soundings for NW99,
- ten CPT Sounding for NW100,
- seven CPT Soundings for NW98
- four CPT Soundings for NW101, and
- four CPT Soundings for NW103.

In general, the foundation soils encountered in this area consist predominantly of sand, but also included clay and silt. Soundings C10 and C43 met refusal at depths above the likely bottom-of-post depths.

Foundation Analysis

The foundation soils were determined to have a minimum friction angle greater than 30 degrees. But the posts may extend below ground water at some locations. Some cobbles, boulders or concrete debris might be encountered in the post holes.

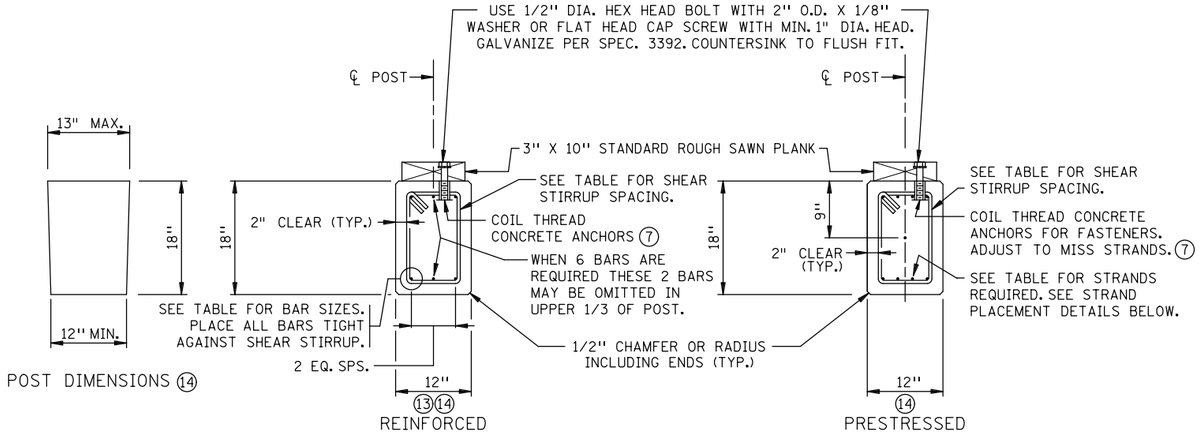
Recommendations

1. We recommend the noisewall support posts be embedded to the depths shown on Figure 5-297.661 in MnDOT's standard plans manual.
2. We recommend the posts be installed in auger holes and backfilled with clean, free draining granular material.
3. We recommend the project plans include a payment method for obstructions in the post holes.
4. Where groundwater is encountered we recommend the contractor use temporary casing to support the sides of the post hole and to prevent undermining of adjacent structures or pavements.

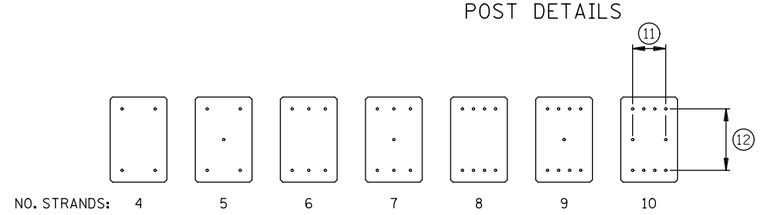
Attachments:

Standard Sheet No. 5-297.661 (2 of 3)
CPT Index Sheet
SPT Index Sheet
Subsurface Exploration Layout Drawings (2 sheets)
NWalls 99 and 98
Subsurface Condition Summary Table
Logs C35-C32, S-11(2010), C30A-C28
Logs C-210(2010), C36, C38, C37A, C40, C41, C43, C44
NWall 100
Subsurface Condition Summary Table
Logs C27-C25, C01A(2010), C24, C216(2010), C-01(2010), C23, C-02(2010), C217(2010), C-04(2010), C21, C-05(2010), C18-C15
NWall 101
Subsurface Condition Summary Table
Logs C14 – C11
NWall 103
Subsurface Condition Summary Table
Logs C10, C09, T05(2010), C06, C02

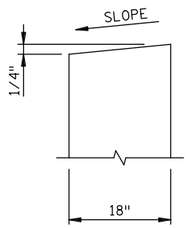
cc: Rachel Broughton, Metro Designer
Timothy Clyne, Metro Materials Engineer
Bradley Skow, Chief Geotechnical Engineer
File



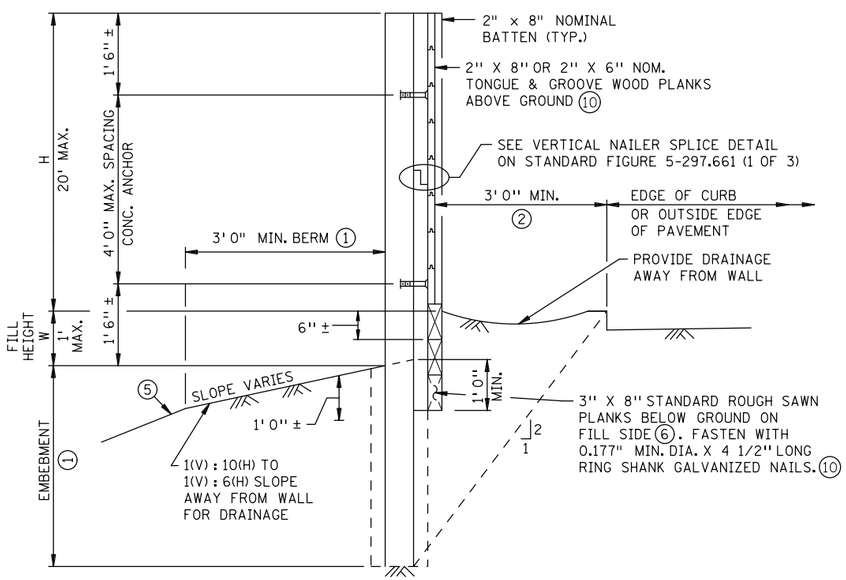
POST DETAILS



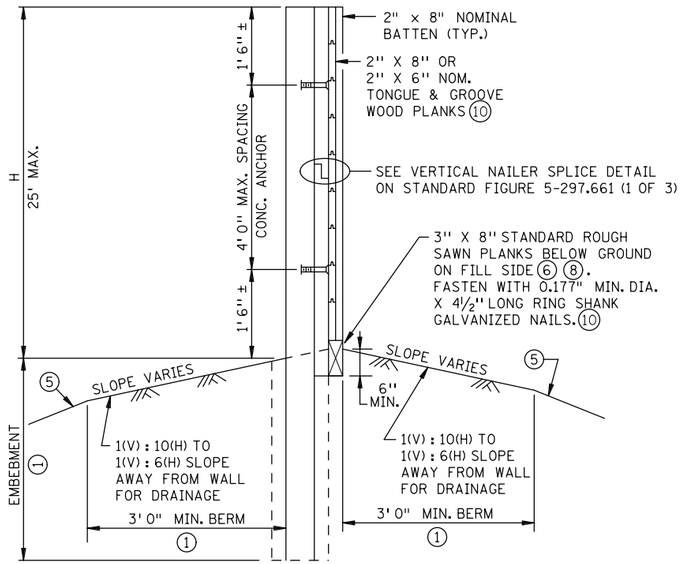
STRAND PLACEMENT DETAILS



TOP OF POST



SECTION AT POST
WITH EARTH FILL
(MAX. FILL RETAINED 1'-0")
(WALL TYPE 1 ONLY)



SECTION AT POST
WITHOUT EARTH FILL
(WALL TYPE 1, 1A, 2 OR 2A)

POST EMBEDMENT TABLE
FILL HEIGHT W = 1 FT. MAXIMUM

"H" WALL HEIGHT (FT.)	POST SPACING (FT.)	POST SIZE (IN.)	REINF. BARS (13)	SHEAR STIRRUP SPACING (IN.) (9)	PRE-STRESSED STRANDS	POST EMBEDMENT (1)			
						LEVEL GROUND	1(V):4(H) SLOPE	1(V):3(H) SLOPE	1(V):2(H) SLOPE
5	8	12 X 18	4 NO. 4	18	4	6'0"	6'0"	7'0"	8'0"
6	8	12 X 18	4 NO. 4	18	4	7'0"	7'0"	7'0"	8'0"
7	8	12 X 18	4 NO. 4	18	4	7'0"	7'0"	8'0"	9'0"
8	8	12 X 18	4 NO. 5	18	4	7'0"	8'0"	8'0"	9'0"
9	8	12 X 18	4 NO. 5	18	4	8'0"	8'0"	8'0"	9'0"
10	8	12 X 18	4 NO. 5	18	4	8'0"	8'0"	9'0"	10'0"
11	8	12 X 18	4 NO. 5	10	4	8'0"	9'0"	9'0"	10'0"
12	8	12 X 18	6 NO. 5	10	4	8'0"	9'0"	9'0"	10'0"
13	8	12 X 18	6 NO. 5	10	4	9'0"	9'0"	10'0"	10'0"
14	8	12 X 18	6 NO. 5	10	4	9'0"	10'0"	10'0"	11'0"
15	8	12 X 18	6 NO. 6	10	4	9'0"	10'0"	10'0"	11'0"
16	8	12 X 18	6 NO. 6	10	4	10'0"	10'0"	11'0"	12'0"
17	8	12 X 18	6 NO. 6	10	4	10'0"	10'0"	11'0"	12'0"
18	8	12 X 18	6 NO. 6	10	4	10'0"	11'0"	11'0"	13'0"
19	8	12 X 18	6 NO. 7	10	5	11'0"	11'0"	12'0"	13'0"
20	8	12 X 18	6 NO. 7	10	6	11'0"	11'0"	12'0"	13'0"
21	8	12 X 18	6 NO. 7	10	6	11'0"	12'0"	12'0"	14'0"
22	8	12 X 18	6 NO. 8	10	7	12'0"	12'0"	13'0"	14'0"
23	8	12 X 18	6 NO. 8	10	8	12'0"	12'0"	13'0"	15'0"
24	8	12 X 18	6 NO. 8	10	9	12'0"	13'0"	14'0"	15'0"
25	8	12 X 18	6 NO. 8	10	10	12'0"	13'0"	14'0"	17'0"

DESIGN CRITERIA:

2012 AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, INCLUDING 2013 INTERIMS.

2012 NATIONAL DESIGN SPECIFICATION (NDS) FOR WALL CONSTRUCTION - LRFD

ϕ = 30° (GRANULAR)
γ = 110 P.C.F.
WIND LOAD = 19 P.S.F.
F_b = 1500 P.S.I. WOOD PLANKING AND BATTEN.
F_b = 1200 P.S.I. ALL OTHER WOOD MEMBERS.

POST DESIGN CRITERIA

NO. OF STRANDS	f'ci (3)	f'c (4)
6 OR LESS	4000 PSI	5500 PSI
7 OR MORE	4000 PSI	6000 PSI

NOTES:

USE OF THIS STANDARD ASSUMES SOIL TESTS AT MAXIMUM 200 FT. INTERVALS AT EACH SITE AND SOILS ENGINEER REVIEWED RESULTS AND CONCURS WITH USE OF THIS STANDARD.

POST EMBEDMENT DEPTH IS BASED ON THE WATER TABLE BEING BELOW THE BOTTOM OF EACH POST, OTHER CONDITIONS REQUIRE A SPECIAL DESIGN.

REFER TO SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.

FOR SLOPES BETWEEN THOSE SHOWN, USE THE POST EMBEDMENT FOR THE STEEPER SLOPE OR USE INTERPOLATION.

FOR SLOPES 1 (V):6(H) OR FLATTER, USE POST EMBEDMENT SHOWN FOR LEVEL GROUND.

REFER TO SPECIAL PROVISIONS FOR REINFORCEMENT OF POSTS LOCATED WITHIN 20 FT. OF THE OUTSIDE EDGE OF A ROADWAY SHOULDER AND POSTS SUPPORTING GLUE LAMINATED RUB RAIL (STANDARD FIGURE 5-297.678). FABRICATOR TO IDENTIFY THESE POSTS WITH PERMANENT MARK ON BOTTOM OF POST.

FOR CONCRETE POSTS WITH THE SAME LENGTH, USE THE LARGEST NUMBER OF PRESTRESSED STRANDS OR REBARS REQUIRED FOR THAT POST LENGTH. USE MIX 3W82 FOR ALL POSTS. REFER TO SPEC. 2462 FOR ADDITIONAL REQUIREMENTS.

USE A MIN. OF 4, ½" DIA. (AREA = 0.153 SQ. IN.) LOW-RELAXATION PRESTRESSED STEEL STRANDS PER SPEC. 3348, WITH 270 KSI ULTIMATE STRENGTH, INITIAL PRESTRESS = 30,900 LBS. PER STRAND. CUT STRANDS FLUSH WITH CONCRETE. COVER ENDS WITH SEALANT PER APPROVED PRODUCTS LIST "BRIDGE - PRESTRESSED BEAMS - CUT STRAND SEALANT."

USE EPOXY COATED GRADE 60 REINFORCING BARS PER SPEC. 3301.

(1) POST EMBEDMENT DEPTH IN THE TABLE IS BASED ON A 3 FT. MIN. BERM IN FRONT OF THE WALL.
(2) WHEN THE CURB LINE IS CLOSER THAN 1(V):2(H) SLOPE, A SPECIAL DESIGN IS REQUIRED.
(3) MINIMUM CONCRETE STRENGTH AT TIME OF PRESTRESS TRANSFER.
(4) MIN. CONCRETE STRENGTH AT WHICH THE POST CAN BE TRANSPORTED AND PLACED.
(5) SEE POST EMBEDMENT TABLES FOR MAXIMUM SLOPE.
(6) SEE SPEC. 3491 FOR ADDITIONAL PRESERVATIVE TREATMENT REQUIREMENTS FOR LUMBER PLACED BELOW GRADE.
(7) PLACE COIL THREAD ANCHORS ON ALTERNATE SIDES OF POST FACE CENTERLINE. MINIMUM FACTORED PULL OUT OF 2.5 KIPS PER ANCHOR. GALVANIZE ANCHORS PER SPEC. 3392 OR ELECTROPLATE PER ASTM B633 SC4 TYPE II. COMPLETELY FILL UNUSED ANCHORS WITH A MnDOT APPROVED/QUALIFIED PRODUCT PER 3372, SILICONE JOINT SEALANT.
(8) FOR WALL TYPE 1A AND 2A, OMIT 3" X 8" PLANKING AT BASE OF WALL AND LEAVE A 2" TO 4" AIRSPACE BETWEEN GROUND AND BOTTOM 2" X 8" PLANK.
(9) USE NO. 3 BARS FOR SHEAR STIRRUPS. PLACE FIRST STIRRUP 3" FROM EACH END.
(10) REFER TO STANDARD FIGURE 5-297.661 (1 OF 3) FOR NAILING PATTERN.
(11) MINIMUM CENTER-TO-CENTER SPACING OF 6", WITH INTERMEDIATE STRANDS PLACED SYMMETRICALLY (TYP. FOR ALL CONFIGURATIONS).
(12) MINIMUM CENTER-TO-CENTER SPACING OF 12", WITH INTERMEDIATE STRANDS PLACED SYMMETRICALLY (TYP. FOR ALL CONFIGURATIONS).
(13) NO REINFORCEMENT SPLICES ALLOWED.
(14) 12" MIN, 13" MAX. TO ALLOW FOR DRAFT OF FORM.

REVISION:

APPROVED: FEBRUARY 16, 2016
Kevin Western
STATE BRIDGE ENGINEER

MINNESOTA DEPARTMENT OF TRANSPORTATION

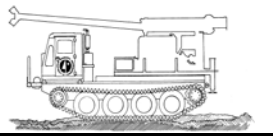
Tom Sorel
STATE DESIGN ENGINEER

REVISED: 8-10-2016
APPROVED: 2-16-2016

WOOD PLANKING NOISE WALL
WITH CONCRETE POSTS

STANDARD PLAN 5-297.661 | 2 OF 3

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)

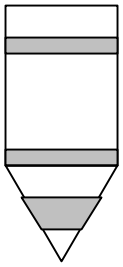
q_T TIP RESISTANCE
The resistance at the cone corrected for water pressure. Data is from cone with 60 degree apex angle and a 10 cm^2 end area.

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.

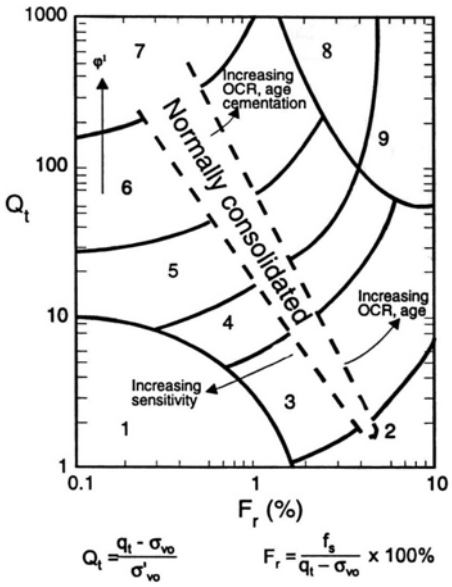
The numbers corresponding to different regions on the charts represent the following soil behavior types:

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

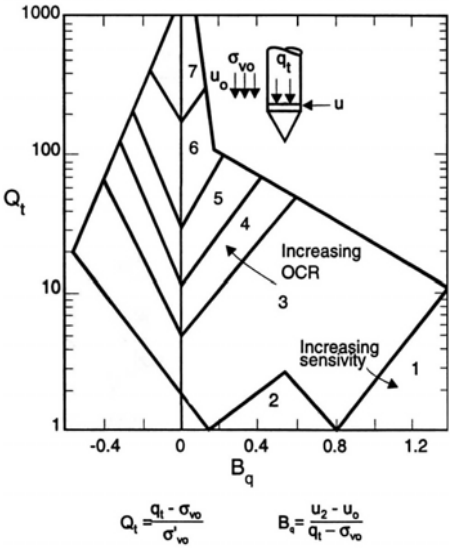
Note that engineering judgment, and comparison with conventional borings is especially important in the proper interpretation of CPT data in certain geo-materials.

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



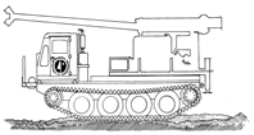
Robertson CPTU 1990
Soil Behavior type based on pore pressure



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

Minnesota Department of Transportation Geotechnical Section

Boring Log Descriptive Terminology (English Units)



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_{60} ..... 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.

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

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
orng ..... 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

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

DRILLING SYMBOLS

Vane Shear Test

WS — Washed Sample (Collected during plug drilling)

Augered

PD — Plug Drilled

Split Tube Sample (SPT N_{60} 2 in. spilt tube with liners)

Thin Wall Sample (3 in. Shelby Tube)

Core Drilled (NV Core Barrel unless otherwise noted)

CS — Continuous Soil Sample

A/J — Augered & Jetted

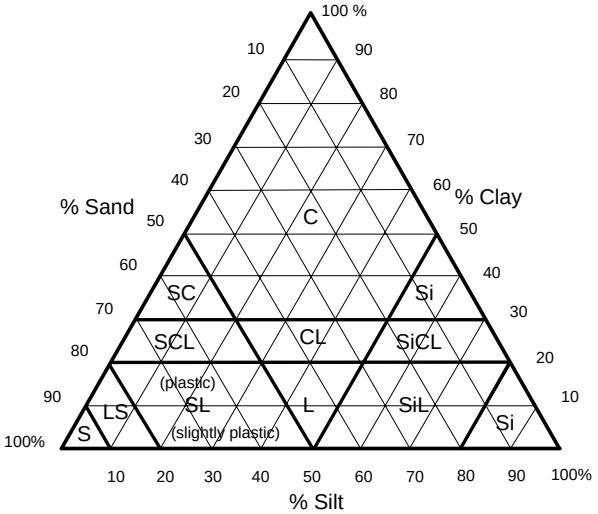
Jet — Jetted

A/P — Augered & Plug Drilled

RELATIVE DENSITY

Compactness - Granular Soils	BPF
very loose	0-4
loose	5-10
medium dense	11-24
dense	25-50
very dense	>50

Mn/DOT Triangular Textural Soil Classification System



SP 2781-467
Five Noise Walls between Cedar Avenue and Franklin Terrace, Minneapolis
Sheet 1 of 2, Walls 99, 100 and 98
Subsurface Information

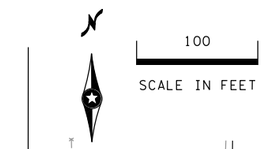
◆ Recent Cone Penetration Test Site

◊ Previous Cone Penetration Test or Boring Site

100
SCALE IN FEET

SP 2781-467
Five Noise Walls between Cedar Avenue and Franklin Terrace, Minneapolis
Sheet 2 of 2, Walls 101 and 103
Subsurface Information

- ◈ Recent Cone Penetration Test Site
- ◊ Previous Cone Penetration Test or Boring Site



Noisewall 99 Summary of Subsurface Conditions

Location	Conditions Encountered	Water	Possible Impacts
c35	Loose sand to near elev. 832, then medium dense sands to termination near elev. 822	No water indicated, but perched layers may be encountered.	Loose sand may tend to collapse.
c34	Dense undefined near surface, generally medium dense to dense sands to termination near elev. 822	No water indicated, but perched layers may be encountered.	Loose sand may tend to collapse.
c33a	Dense undefined near surface, generally medium dense to dense sands to termination near elev. 813	No water indicated, but perched layers may be encountered.	Loose Sand may tend to collapse.
c32	Dense undefined near surface, generally medium dense to dense sands to refusal near elev. 818	No water indicated, but perched layers may be encountered.	Loose Sand may tend to collapse.
s11 (2010)	Medium Dense Sands near surface. Very loose sand near elev. 823 Sand to termination near elev. 812	Water observed while drilling below elev. 815	Loose Sand may tend to collapse. Water elevation could vary
c30a	Generally sand, loose to near elev. 829, then medium dense to dense to refusal near elev. 815 1/2	No water indicated, but perched layers may be encountered.	Loose Sand may tend to collapse.
c29	Generally sand, loose to near elev. 829, then medium dense to dense to termination near elev. 816	No water indicated, but perched layers may be encountered.	Loose Sand may tend to collapse.
c28	Generally sand, mostly medium dense to dense, but very loose near elev. 829. Sounding terminated on refusal near elev. 821 1/2	Water was indicated below elev. 825	Loose Sand may tend to collapse. Water elevation could vary.

Noisewall 98 Summary of Subsurface Conditions

Location	Conditions Encountered	Water	Possible Impacts
c210	Mostly Sands to refusal near elev. 811.1	No water indicated.	
c36	Dense undefined near surface, sands to termination near elev. 818	No water indicated, but perched layers may be encountered.	Loose sand near elevation 830 may tend to collapse.
c38	Dense undefined near surface, generally sands to refusal near elev. 819 Loose between approximate elevations 835 and 827	No water indicated, but perched layers may be encountered.	Loose Sand and soft Sandy Loam near elevation 830 may tend to collapse.
c37a	Mostly sands, but contains sandy loam and silt to termination near elev. 813.5	No water indicated, but perched layers may be encountered.	Soft Sandy Loam near elevation 829 may tend to collapse.
c40	Dense undefined near surface, mostly sands to termination near elev. 813.6. Some silt and clay layers near 818.	No water indicated, but perched layers may be encountered.	
c41	Dense undefined near surface, sands to termination near elev. 814.5	No water indicated.	
c43	Multiple undefined layers may indicated debris or wood in the soil; otherwise generally sands to refusal near elev. 825.4	No water indicated.	Multiple undefined layers may indicated debris or wood in the soil
c44	Undefined layer near elev. 831 may indicated debris or wood in the soil; otherwise generally sands to refusal near elev. 823.7	No water indicated.	Undefined layer near elev. 831 may indicated debris or wood in the soil.

MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

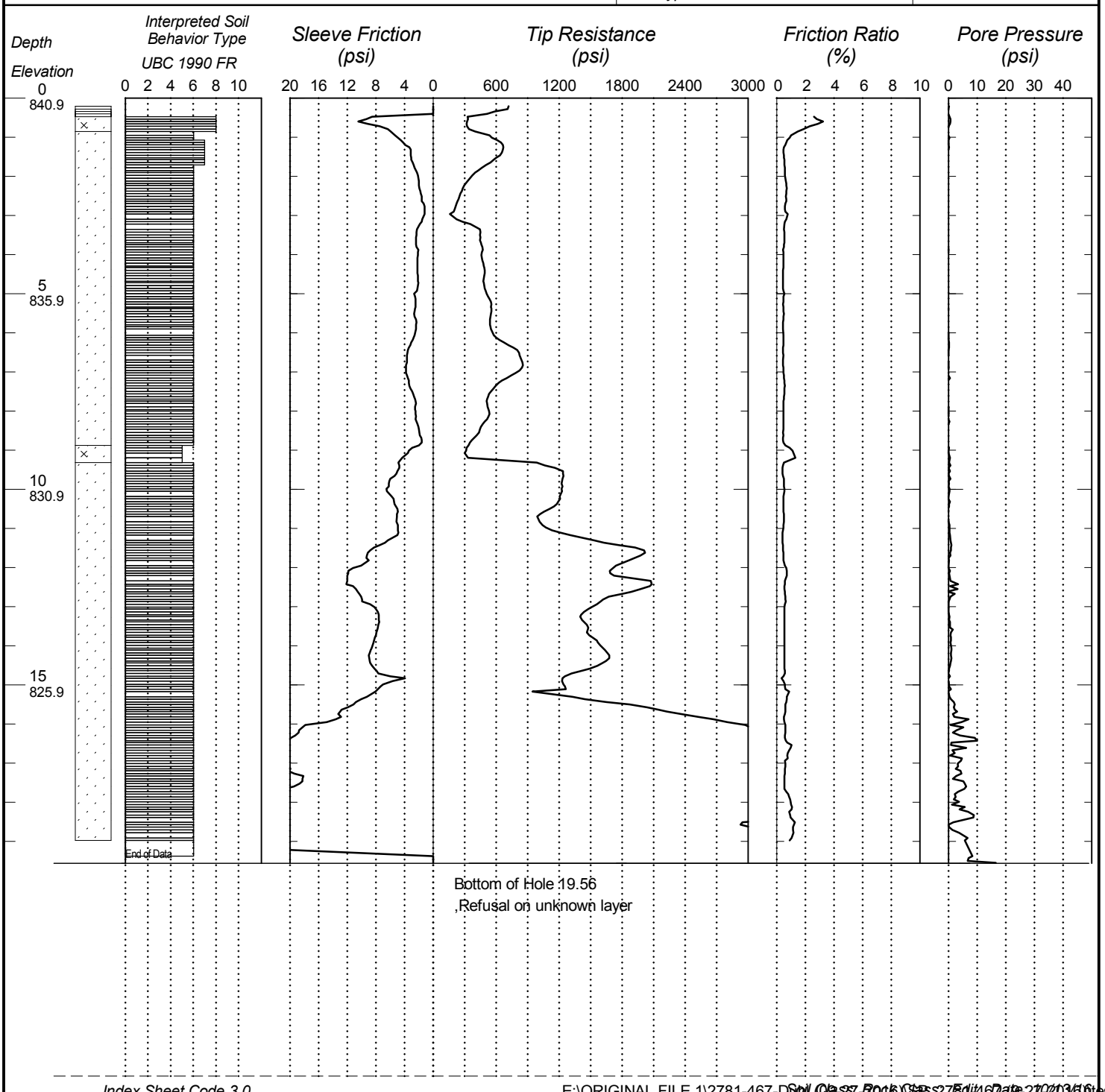
CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 81218

U.S. Customary Units

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
2781-467	**NOISE WALL** 99	**TH 94**	**C35**	**840.9** *(DTM)*

Location **Hennepin Co. Coordinate: X=535269 Y=163987** (ft.)	*CPT Machine* **203094 CPT Truck**	*SHEET 1 of 1*
Latitude (North)=44°57'59.48" *Longitude (West)=93°14'49.48"*	*CPT Operator* **Buhl, Dylan**	*Date Completed*
No Station-Offset Information Available	*Hole Type* **CPT-STD**	**9/21/16**



MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

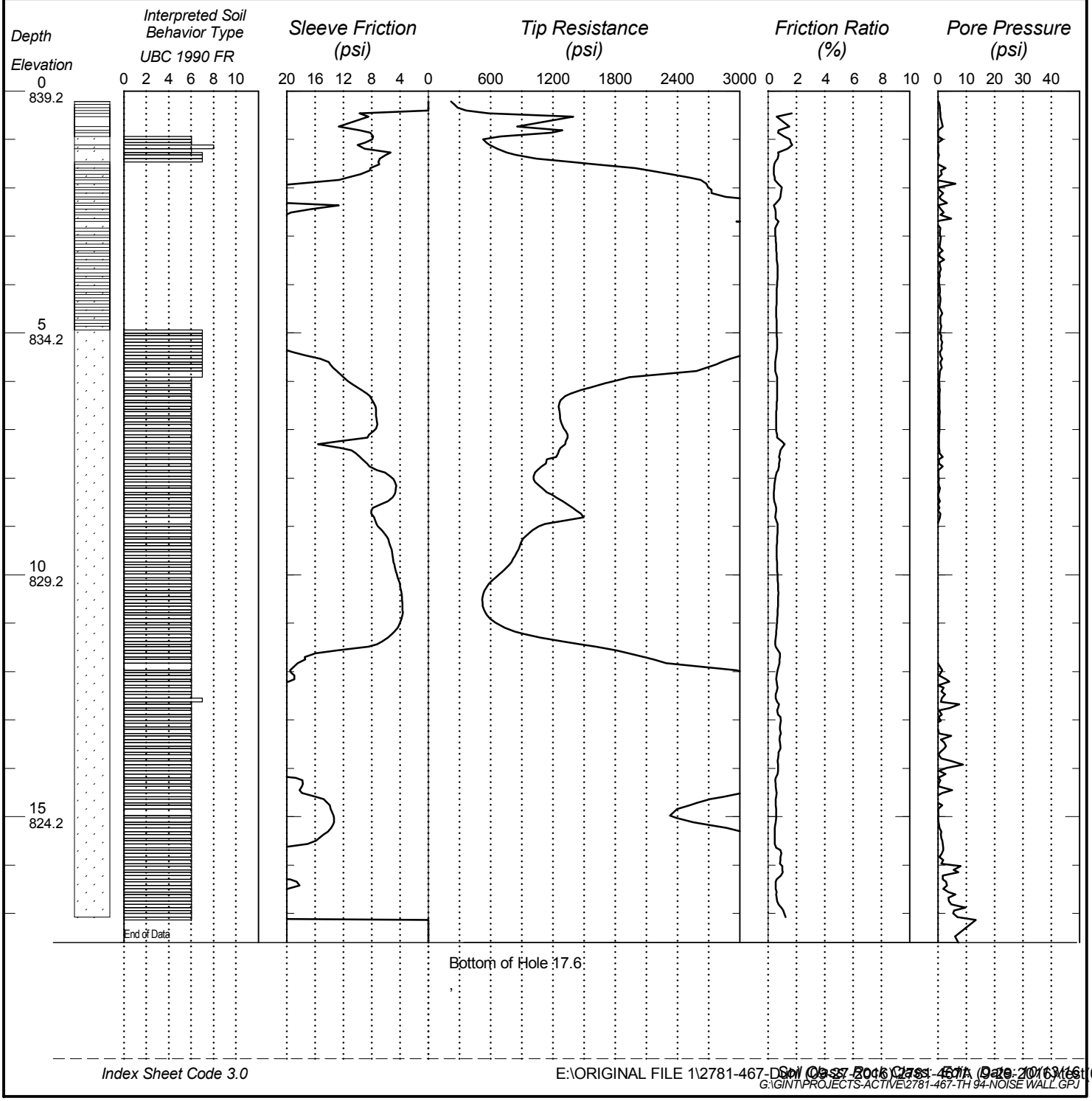
CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 81226

U.S. Customary Units

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
2781-467	**NOISE WALL** 99	**TH 94**	**C34**	**839.2** *(DTM)*

Location		CPT Machine	SHEET 1 of 1
Hennepin Co. Coordinate: X=535279 Y=163889 (ft.)		**203094 CPT Truck**	
Latitude (North)=44°57'58.51" *Longitude (West)=93°14'49.34"*		CPT Operator **Buhl, Dylan**	*Date Completed*
No Station-Offset Information Available		*Hole Type* **CPT-STD**	**9/29/16**



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MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

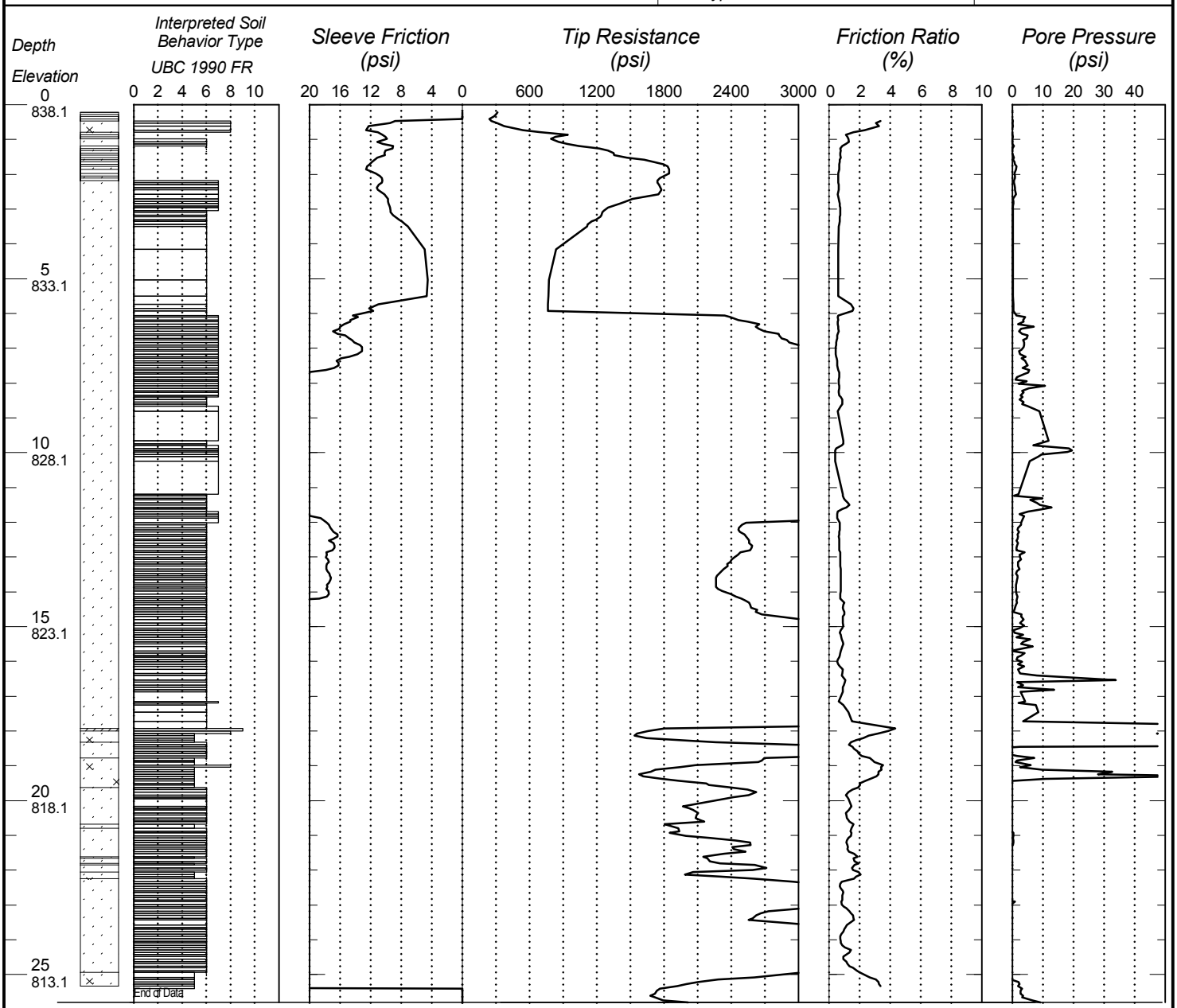
CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 81217

U.S. Customary Units

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
2781-467	**NOISE WALL** 99	**TH 94**	**C33A**	**838.1** *(DTM)*

Location			
Hennepin Co. Coordinate: X=535418 Y=163782 (ft.)	*CPT Machine* **203094 CPT Truck**	*SHEET 1 of 1*
Latitude (North)=44°57'57.45" *Longitude (West)=93°14'47.42"*	*CPT Operator* **Buhl, Dylan**	*Date Completed*
No Station-Offset Information Available	*Hole Type* **CPT-STD**	**9/26/16**



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Soil Classification Chart 2781-467.dat 10/20/16

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MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

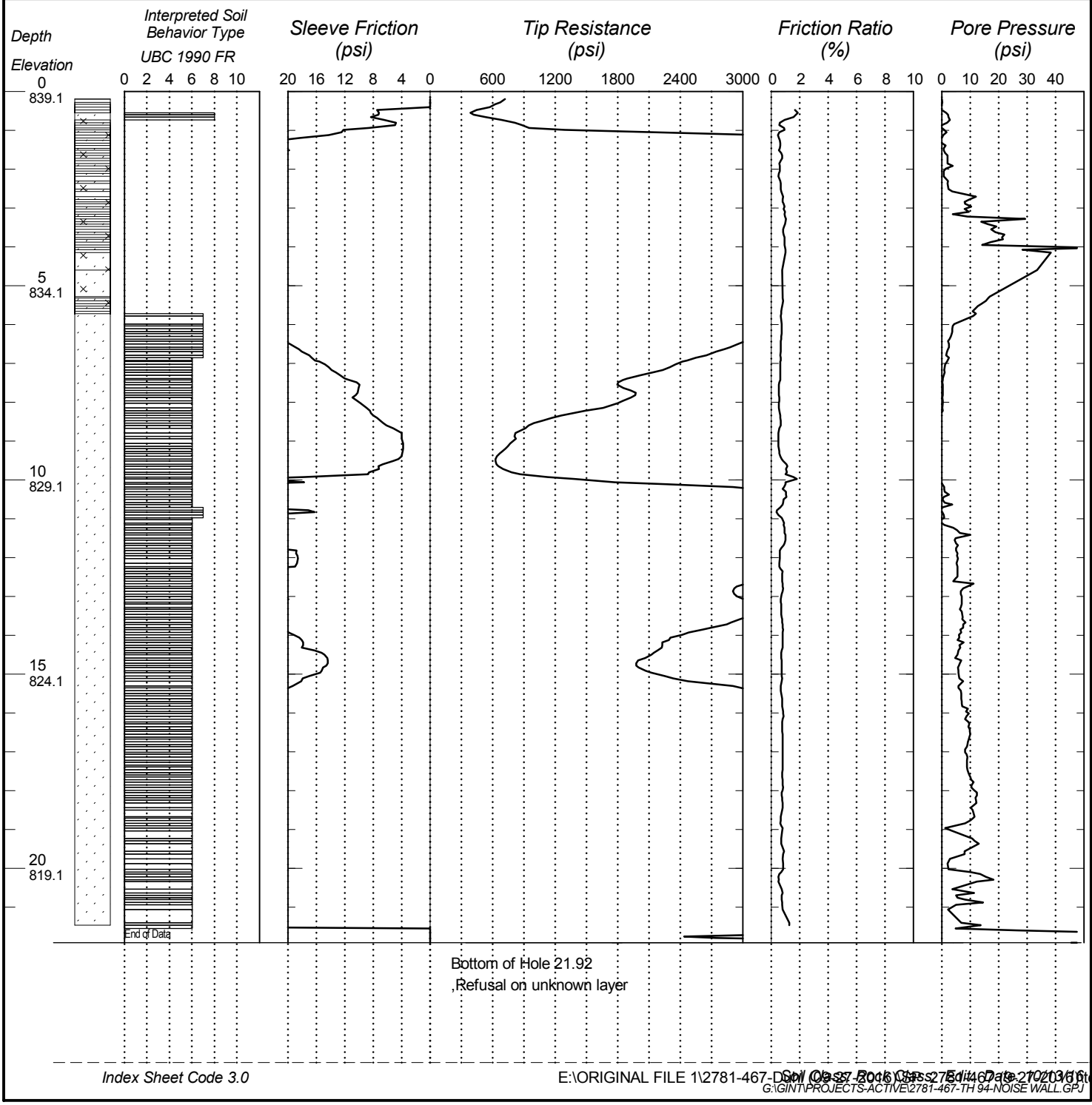
CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 81216

U.S. Customary Units

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
2781-467	**NOISE WALL** 99	**TH 94**	**C32**	**839.1** *(DTM)*

Location		CPT Machine	SHEET 1 of 1
Hennepin Co. Coordinate: X=535516 Y=163685 (ft.)		**203094 CPT Truck**	
Latitude (North)=44°57'56.49" *Longitude (West)=93°14'46.05"*		CPT Operator **Buhl, Dylan**	Date Completed
No Station-Offset Information Available		Hole Type **CPT-STD**	**9/21/16**



Bottom of Hole 21.92
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Index Sheet Code 3.0

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Soil Class-2016.cpt: 2781-467 Date: 10/20/2016 Test(027)

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MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

LABORATORY LOG & TEST RESULTS - SUBSURFACE EXPLORATION

BRAUN INTERTEC

This boring was taken by BRAUN under a consultant contract for Mn/DOT

UNIQUE NUMBER 73835

U.S. Customary Units

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Boring No.	Ground Elevation
2781-415	OH Sign 6 - North	Interstate Highway 94	S-11	843.0 (DTM)

Location: Hennepin Coord:X=535496 Y=163630 (ft.)

Latitude (North)=44°57'55.95" Longitude (West)=93°14'46.33"

No Station-Offset Information Available

Drill Machine 7511

Hammer CME Automatic Calibrated

SHEET 1 of 1

Drilling Completed 6/1/10

DEPTH	Depth / Elev.	Lithology	Classification	Drilling Operation	SPT N60 (%)	MC (%)	COH (psf)	γ (pcf)	Soil / Rock	Other Tests Or Remarks / Formation or Member
	0.9 / 842.1		slpl Sandy Loam w/ G, dk brn, moist, fill							
5			Sand w/ with trace G, dk brn, moist, meddense, fill		14					PID = 0.0 ppm
	8.0 / 835.0									
10			Fine Sand w/ G, brn, moist, meddense, fill		21					PID = 0.0 ppm
	13.0 / 830.0									
15			Loamy Sand, w/ brick debris, dk brn, moist, dense to Vloose, fill		40					PID = 0.0 ppm
20	20.0 / 823.0		Sand w/ trace G, brn, moist, Vloose		4					PID = 0.0 ppm
	23.0 / 820.0									
25			Sand w/ G, lt brn, moist, meddense		24					PID = 0.0 ppm
▼	28.0 / 815.0									
30			Fine Loamy Sand, brn, sat, loose		8					PID = 0.0 ppm
	31.0 / 812.0		Bottom of Hole - 31'.							

Water not observed while drilling.

Boring then grouted.

Index Sheet Code 3.0

Soil Class:P. Martin Rock Class: Edit: Date: 10/13/16

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MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

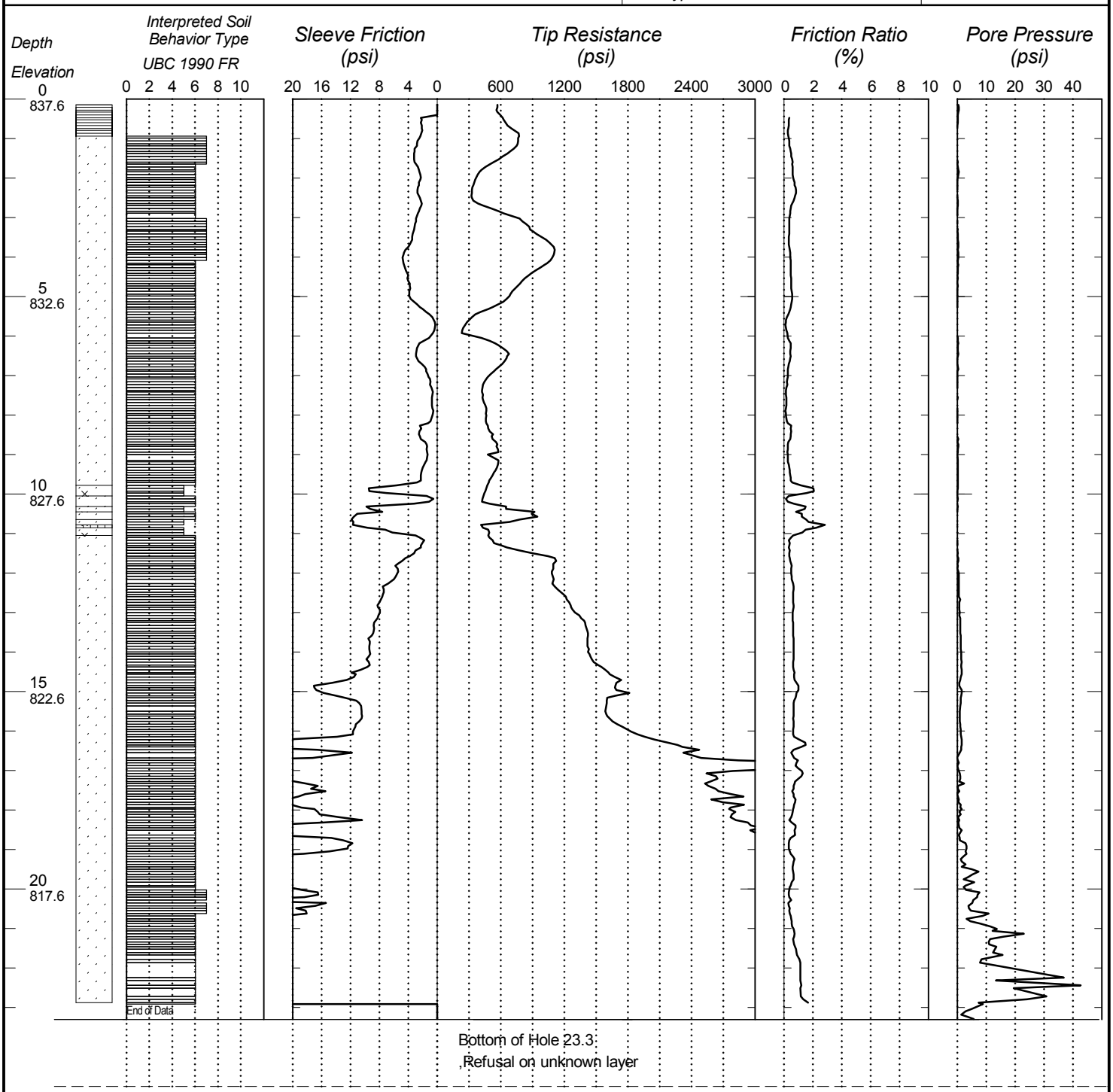
CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 81215

U.S. Customary Units

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
2781-467	**NOISE WALL** 99	**TH 94**	**C30A**	**837.6** *(DTM)*

Location		CPT Machine	SHEET 1 of 1
Hennepin Co. Coordinate: X=535815 Y=163525 (ft.)		**203094 CPT Truck**	
Latitude (North)=44°57'54.91" *Longitude (West)=93°14'41.90"*		CPT Operator **Buhl, Dylan**	Date Completed
No Station-Offset Information Available		Hole Type **CPT-STD**	**9/13/16**



Bottom of Hole 23.3
,Refusal on unknown layer

Index Sheet Code 3.0

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MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

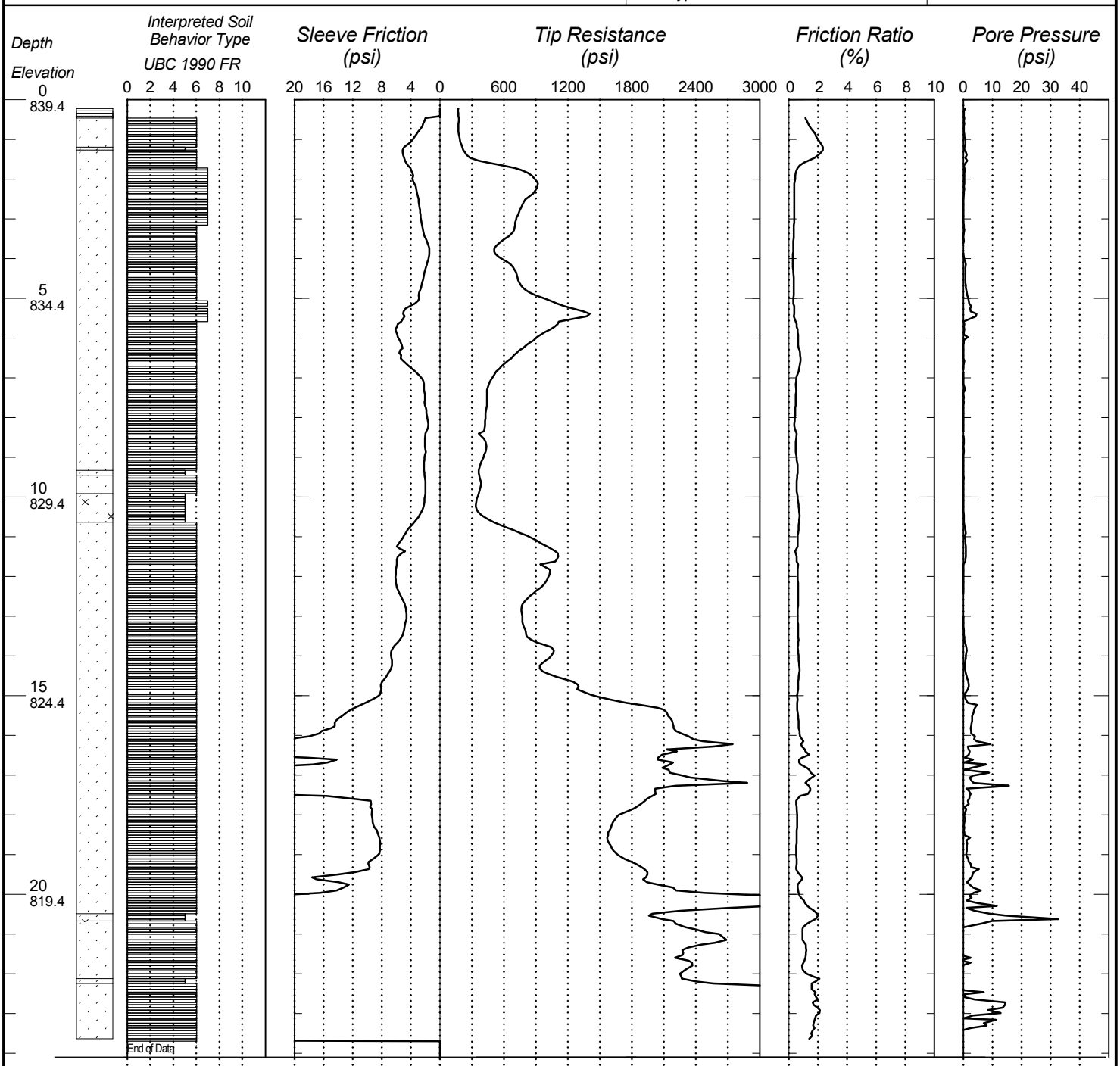
CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 81214

U.S. Customary Units

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
2781-467	**NOISE WALL** 99	**TH 94**	**C29**	**839.4** *(DTM)*

Location		CPT Machine	SHEET 1 of 2
Hennepin Co. Coordinate: X=535923 Y=163489 (ft.)		**203094 CPT Truck**	
Latitude (North)=44°57'54.55" *Longitude (West)=93°14'40.40"*		CPT Operator **Buhl, Dylan**	Date Completed
No Station-Offset Information Available		Hole Type **CPT-STD**	**9/13/16**



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Soil Class-2016.Cpt; 2781-467; Date: 10/20/2016

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MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

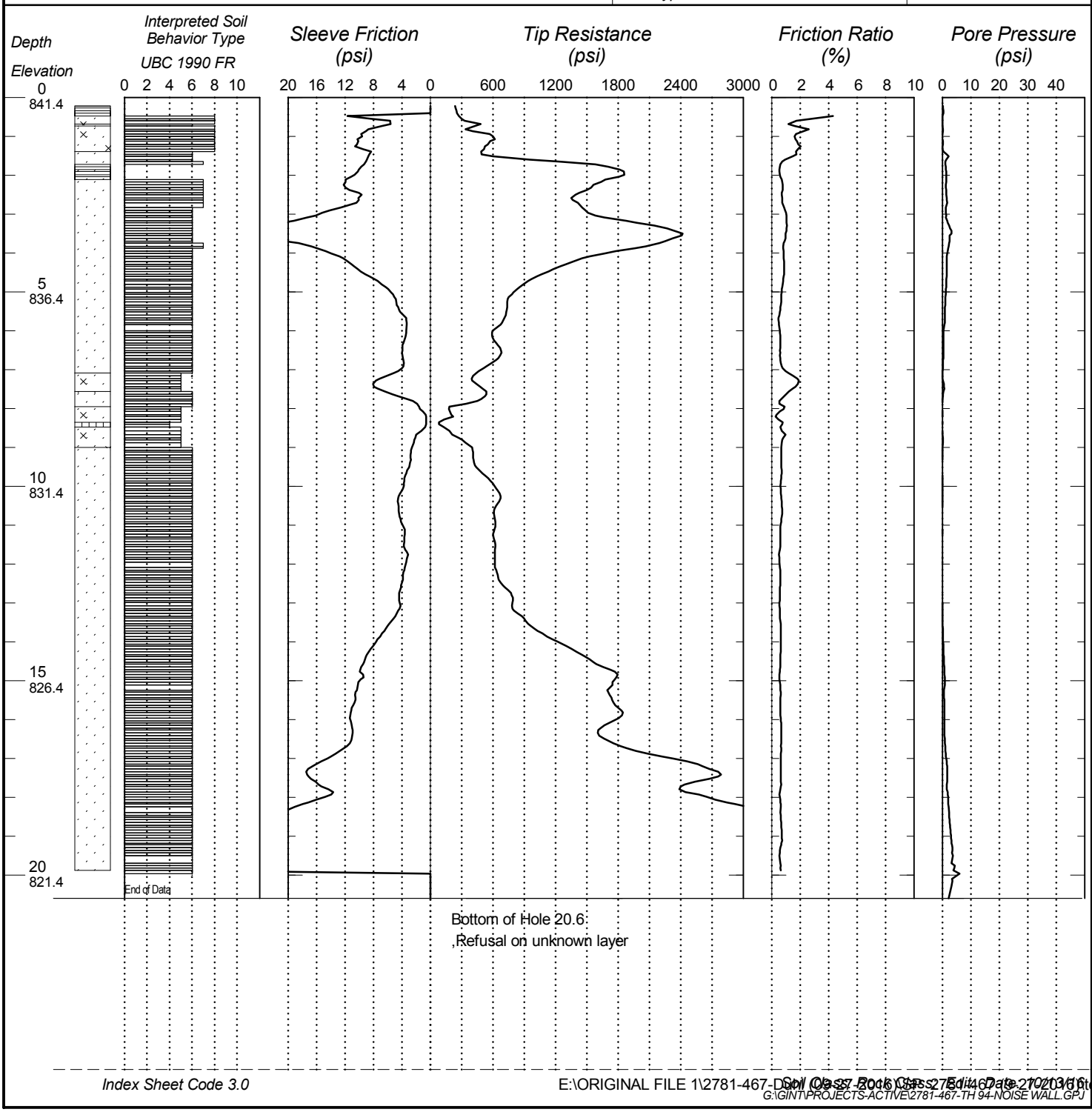
CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 81213

U.S. Customary Units

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
2781-467	**NOISE WALL** 99	**TH 94**	**C28**	**841.4** *(DTM)*

Location		CPT Machine	SHEET 1 of 1
Hennepin Co. Coordinate: X=535991 Y=163462 (ft.)		**203094 CPT Truck**	
Latitude (North)=44°57'54.28" *Longitude (West)=93°14'39.45"*		CPT Operator **Buhl, Dylan**	Date Completed
No Station-Offset Information Available		Hole Type **CPT-STD**	**9/13/16**



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Soil Class-2016.Cls 2781-467 Date 2/2/2017 Test(016)

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MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

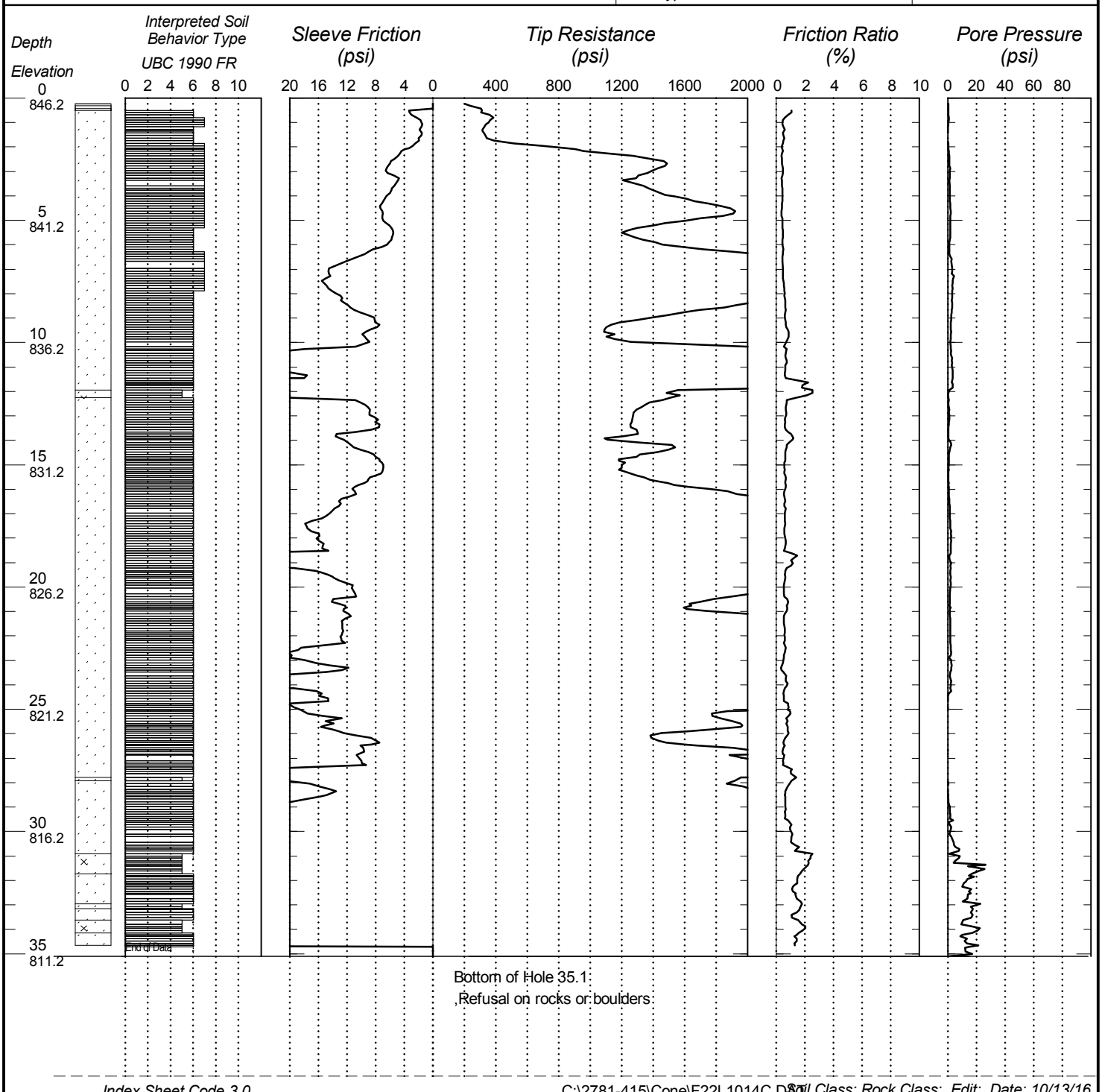
CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 73906

U.S. Customary Units

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
2781-415	**NOISE WALL** 98	**94**	**c210**	**846.2** *(DTM)*

Location		CPT Machine	SHEET 1 of 1
Hennepin Co. Coordinate: X=535948 Y=163202 (ft.)		**205146 CPT Truck (H)**	
Latitude (North)=44°57'51.72" *Longitude (West)=93°14'40.06"*		CPT Operator **Hasselquist**	Date Completed
No Station-Offset Information Available		Hole Type **CPT-STD**	**7/22/10**



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Soil Class: Rock Class: Edit: Date: 10/13/16

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MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

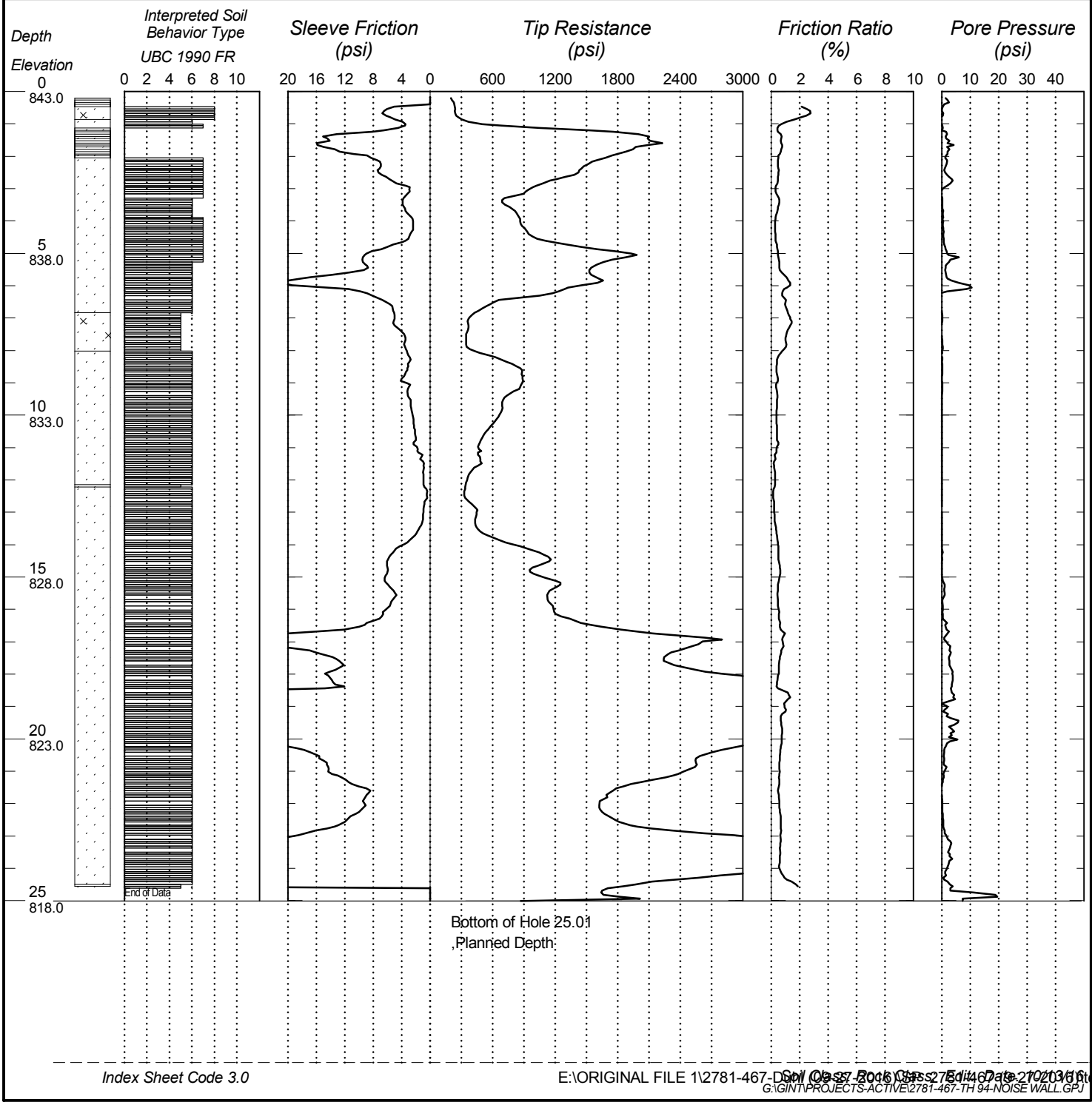
CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 81219

U.S. Customary Units

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
2781-467	**NOISE WALL** 98	**TH 94**	**C36**	**843.0** *(DTM)*

Location			
Hennepin Co. Coordinate: X=536018 Y=163154 (ft.)	*CPT Machine* **203094 CPT Truck**	*SHEET 1 of 1*
Latitude (North)=44°57'51.24" Longitude (West)=93°14'39.08"	*CPT Operator* **Buhl, Dylan**	*Date Completed*
No Station-Offset Information Available	*Hole Type* **CPT-STD**	**9/14/16**



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Soil Class-2016.GPJ 2781-467.GDT 7/20/16 G:\GINT\PROJECTS-ACTIVE\2781-467-TH 94-NOISE WALL.GPJ

MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

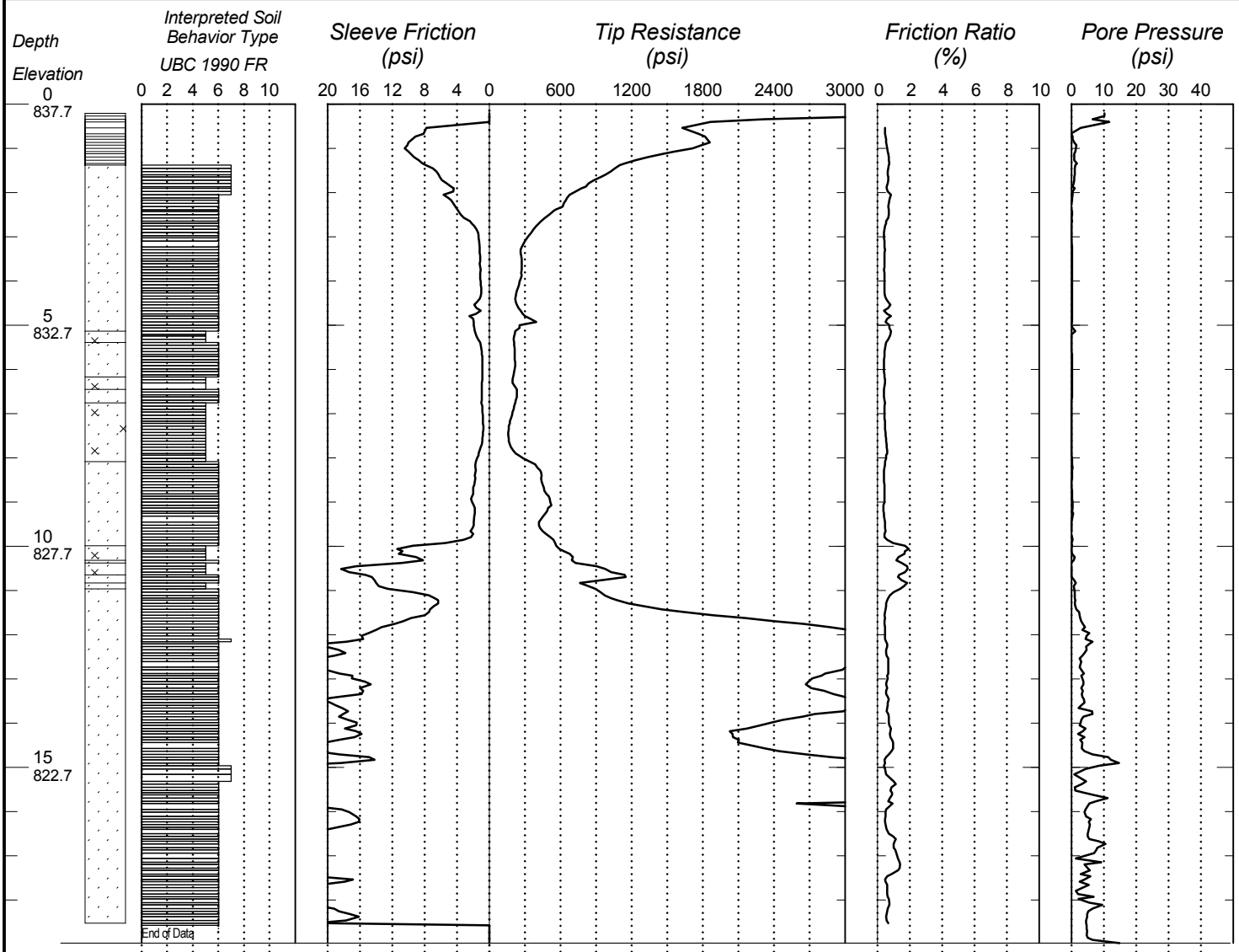
CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 81221

U.S. Customary Units

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
2781-467	**NOISE WALL** 98	**TH 94**	**C38**	**837.7** *(DTM)*

Location			
Hennepin Co. Coordinate: X=536250 Y=163066 (ft.)	*CPT Machine* **203094 CPT Truck**	*SHEET 1 of 1*
Latitude (North)=44°57'50.37" Longitude (West)=93°14'35.86"	*CPT Operator* **Buhl, Dylan**	*Date Completed*
No Station-Offset Information Available	*Hole Type* **CPT-STD**	**9/22/16**



Bottom of Hole 18.98
,Refusal on unknown layer

MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

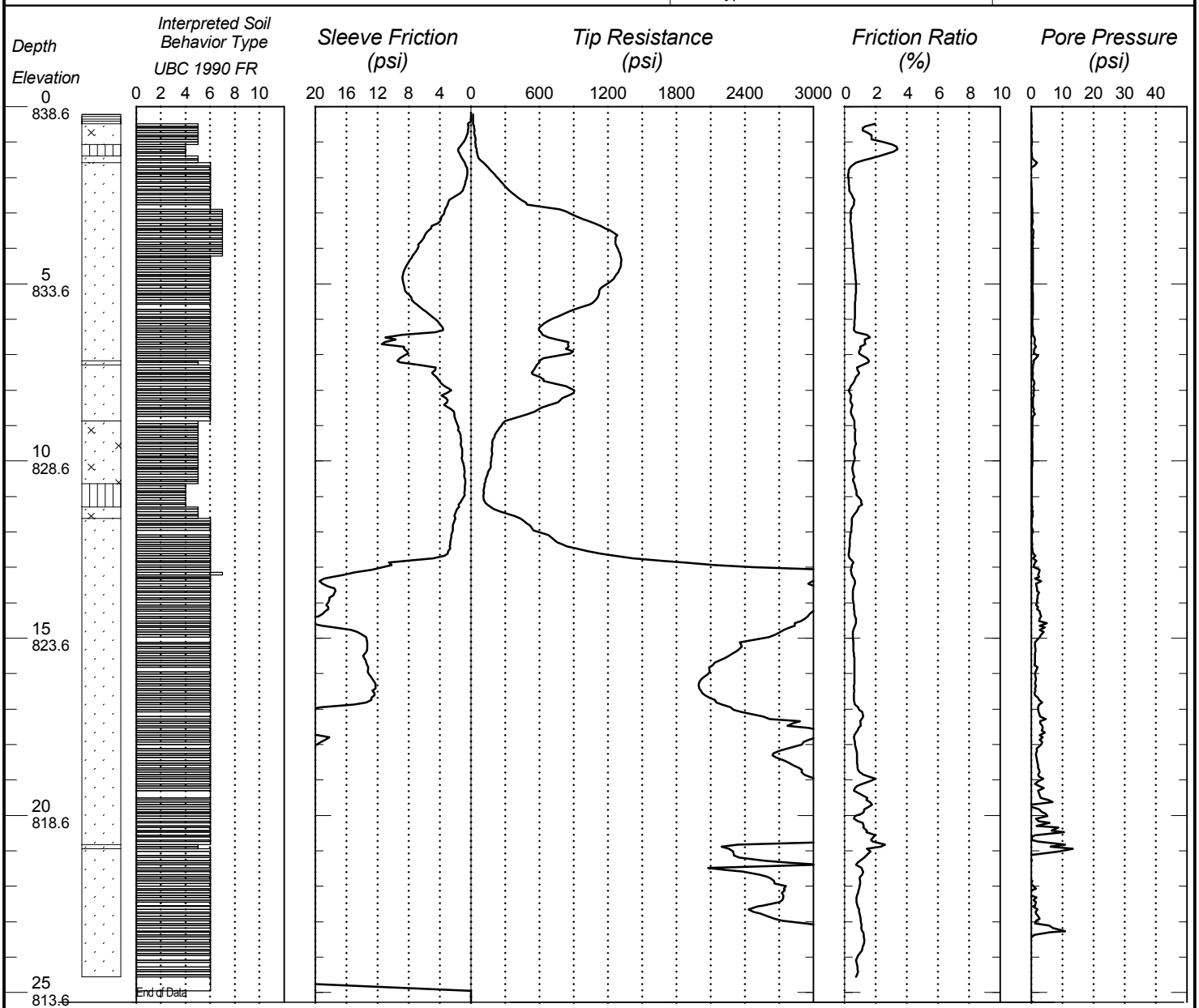
CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 81220

U.S. Customary Units

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
2781-467	**NOISE WALL** 98	**TH 94**	**C37A**	**838.6** *(DTM)*

Location		CPT Machine	SHEET 1 of 1
Hennepin Co. Coordinate: X=536384 Y=163064 (ft.)		**203094 CPT Truck**	
Latitude (North)=44°57'50.35" *Longitude (West)=93°14'34.00"*		CPT Operator **Buhl, Dylan**	Date Completed
No Station-Offset Information Available		Hole Type **CPT-STD**	**9/26/16**



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MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

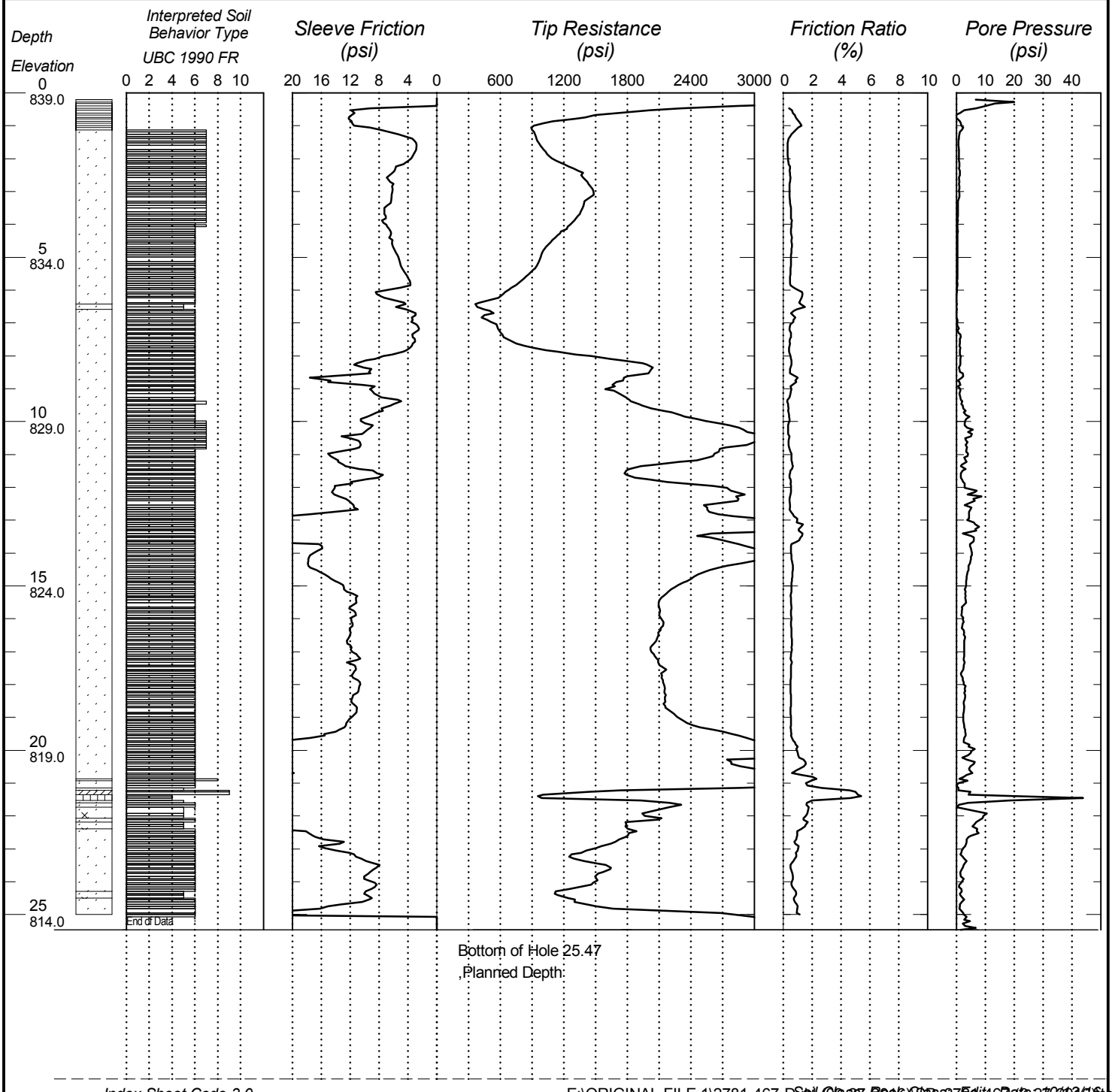
CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 81222

U.S. Customary Units

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
2781-467	**NOISE WALL** 98	**TH 94**	**C40**	**839.0** *(DTM)*

Location			
Hennepin Co. Coordinate: X=536479 Y=163063 (ft.)	*CPT Machine* **203094 CPT Truck**	*SHEET 1 of 1*
Latitude (North)=44°57'50.34" *Longitude (West)=93°14'32.67"*	*CPT Operator* **Buhl, Dylan**	*Date Completed*
No Station-Offset Information Available	*Hole Type* **CPT-STD**	**9/22/16**



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Soil Class-2016.cla; 2781-467.dat; Date 2/2/2016; Test(031)

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MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

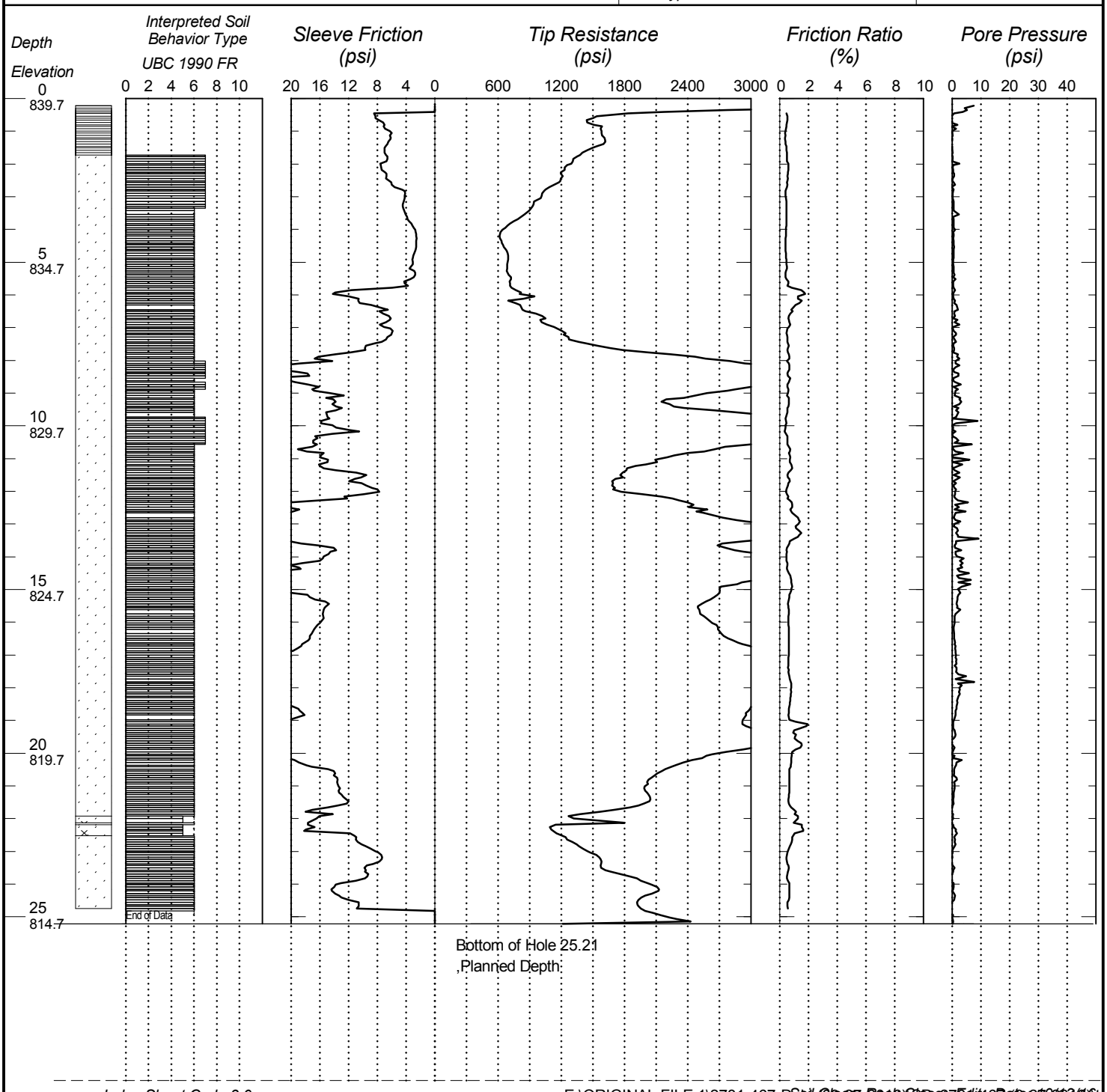
CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 81223

U.S. Customary Units

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
2781-467	**NOISE WALL** 98	**TH 94**	**C41**	**839.7** *(DTM)*

Location		CPT Machine	SHEET 1 of 1
Hennepin Co. Coordinate: X=536551 Y=163058 (ft.)		**203094 CPT Truck**	
Latitude (North)=44°57'50.29" *Longitude (West)=93°14'31.68"*		CPT Operator **Buhl, Dylan**	Date Completed
No Station-Offset Information Available		Hole Type **CPT-STD**	**9/27/16**



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Soil Classification Chart 2781-467.gdt 10/20/16 Date 10/20/16 Test(038)

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MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

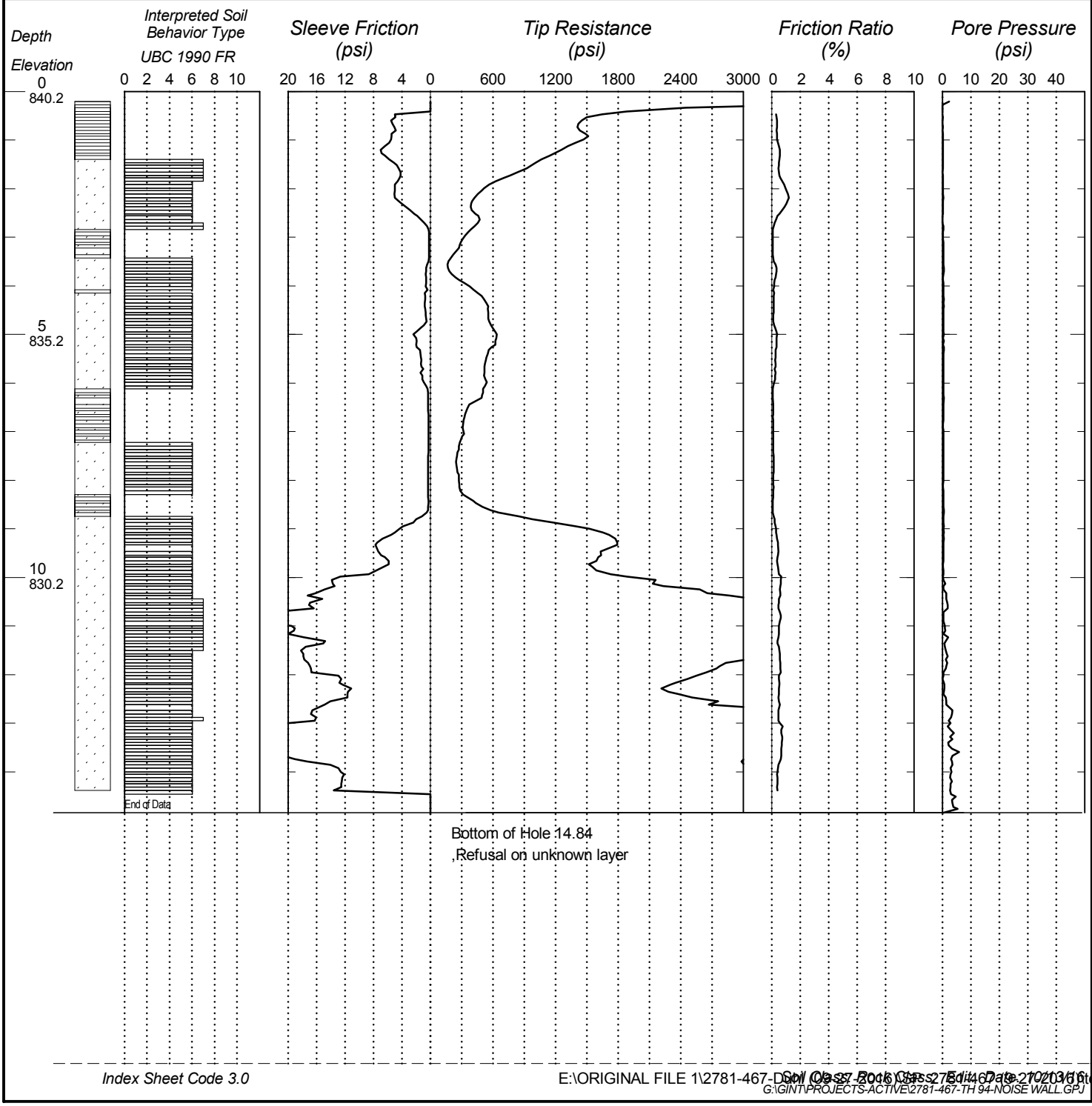
CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 81224

U.S. Customary Units

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
2781-467	**NOISE WALL** 98	**TH 94**	**C43**	**840.2** *(DTM)*

Location			
Hennepin Co. Coordinate: X=536727 Y=163065 (ft.)	*CPT Machine* **203094 CPT Truck**	*SHEET 1 of 1*
Latitude (North)=44°57'50.35" Longitude (West)=93°14'29.23"	*CPT Operator* **Buhl, Dylan**	*Date Completed*
No Station-Offset Information Available	*Hole Type* **CPT-STD**	**9/26/16**



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MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

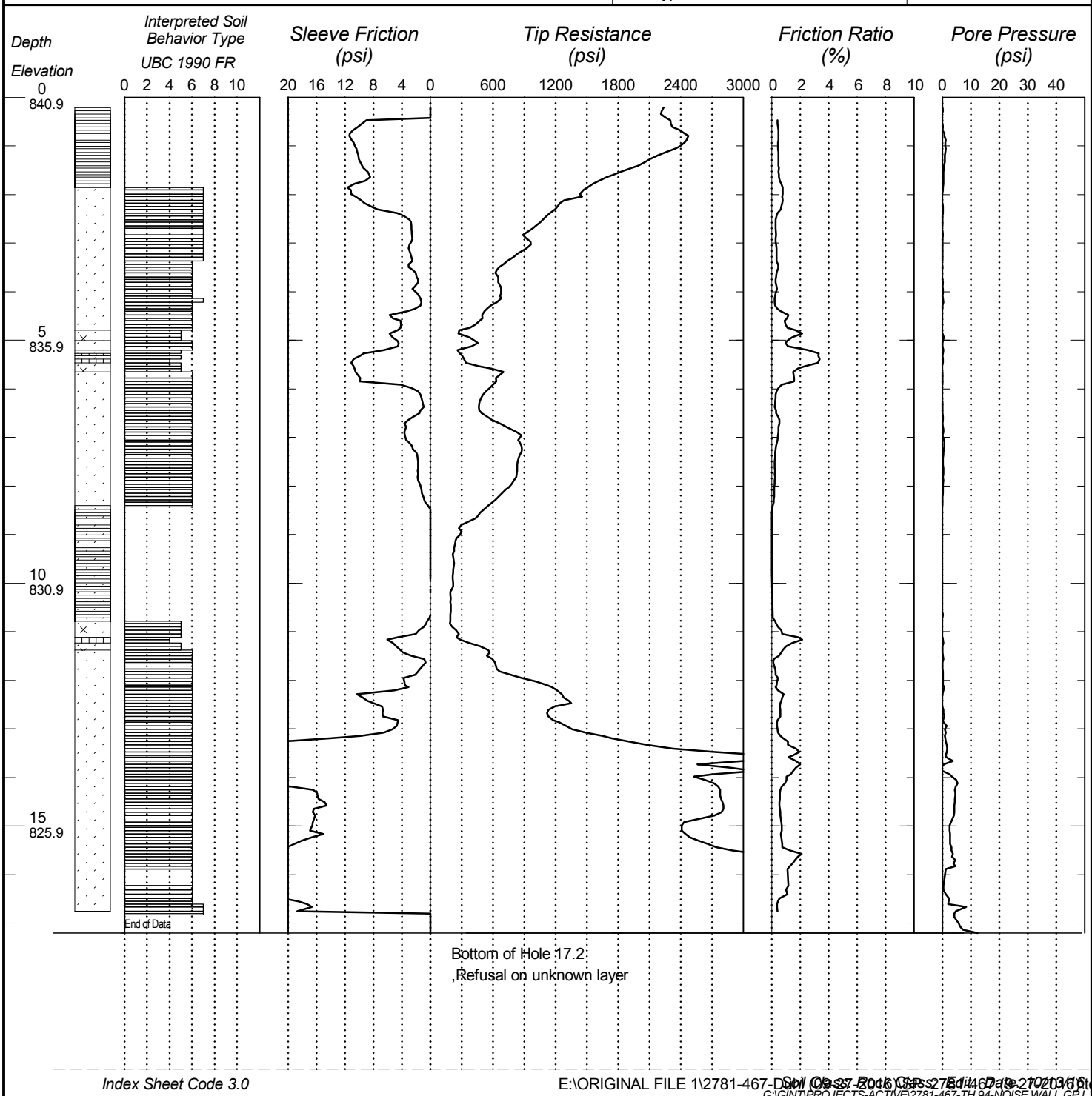
CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 81225

U.S. Customary Units

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
2781-467	**NOISE WALL** 98	**TH 94**	**C44**	**840.9** *(DTM)*

Location			
Hennepin Co. Coordinate: X=536835 Y=163064 (ft.)	*CPT Machine* **203094 CPT Truck**	*SHEET 1 of 1*
Latitude (North)=44°57'50.34" *Longitude (West)=93°14'27.73"*	*CPT Operator* **Buhl, Dylan**	*Date Completed*
No Station-Offset Information Available	*Hole Type* **CPT-STD**	**9/26/16**



Index Sheet Code 3.0

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Soil Class-2016.GPJ 2781.46Date 2/2/2016 Test(037)

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Noisewall 100 Summary of Subsurface Conditions

Location	Conditions Encountered	Water	Possible Impacts
c27	Mostly medium dense to dense sands to termination near elev. 816 1/2. Loose sand near elev. 829	No water indicated, but perched layers may be encountered.	Loose sand may tend to collapse. Water elevation may vary.
c26	Loose undefined near surface, generally medium dense to dense sands to refusal near elev. 817	No water indicated, but perched layers may be encountered.	Loose sand may tend to collapse. Water elevation may vary.
c25	Mostly medium dense to dense sands to termination near elev. 815. Loose sand near elev. 829	No water indicated, but perched layers may be encountered.	Loose Sand may tend to collapse.
c-01a (2010)	Generally very stiff Sandy Loam to near elev. 809. Loose sand near elev. 808 then very dense sandy loam to termination near elev. 793	Water measured below elev. 809 during drilling.	Loose Sand may tend to collapse. Water elevation could vary
c24	Loose to medium dense Sands to near elev. 831 1/2. Dense sand to termination near elev. 817	No water indicated, but perched layers may be encountered.	Loose Sand may tend to collapse. Water elevation could vary
c216 (2010)	Generally sand, loose to near elev. 826, then dense to refusal near elev. 815	No water indicated, but perched layers may be encountered.	Loose Sand may tend to collapse.
c-01 (2010)	Generally sand and sandy loam,medium dense to near elev. 815, then very dense and hard to termination near elev. 795	Water measured below elev. 803 during drilling.	
c23	Generally sand, mostly medium dense to dense. Clay layer and possible debris with very loose undefined near elev. 832, loose to near elev. 829. Sounding terminated on refusal near elev. 823	No water indicated, but perched layers may be encountered.	Loose Sand may tend to collapse. Water elevation could vary. Undefined could be fill gravel or wood
c-02 (2010)	Generally sand or sandy loam, mostly medium dense to dense to near elev 814, very dense below. Terminated near elev. 801	Water measured below elev. 814.5 during drilling.	Water elevation could vary.
c217 (2010)	Undefined near surface. Generally sands, mostly medium dense to dense, but soft silt layer near elev. 827. Sounding terminated on refusal near elev. 811	No water indicated, but perched layers may be encountered.	Loose soils may tend to collapse. Perched water could be troublesome.
c-04 (2010)	Generally sand and sandy loam, medium dense to very dense. Boring terminated near elev. 804	Water measured below elev. 807.5 during drilling.	Loose Sand may tend to collapse. Water elevation could vary.
c21	Undefined and loose near elev. 838. Generally sand, mostly medium dense to dense. Sounding terminated near elev. 818	No water indicated, but perched layers may be encountered.	Undefined could be debris in fill. Water elevation could vary.
c-05	Generally sand, mostly medium dense to dense. Very dense sandy loam below elev. 811. Boring terminated near elev. 803.	No water was observed while drilling.	
c18	Generally sand, mostly medium dense to dense, but loose near elev. 831-837. Sounding terminated on refusal near elev. 815 1/2	No water indicated, but perched layers may be encountered.	Loose Sand may tend to collapse. Water elevation could vary.
c17	Dense undefined near surface. Generally sand, mostly medium dense to dense, but very loose near elev. 836. Sounding terminated on refusal near elev. 821 1/2	No water indicated, but perched layers may be encountered.	Loose Sand may tend to collapse. Water elevation could vary.
c16	Dense undefined near surface. Generally sand, mostly medium dense, but loose near elev. 831. Sounding terminated near elev. 813	No water indicated, but perched layers may be encountered.	Loose Sand may tend to collapse. Water elevation could vary.
c15	Dense undefined near surface. Generally sand, mostly medium dense, but loose near elev. 833. Sounding terminated near elev. 813.5	No water indicated, but perched layers may be encountered.	Loose Sand may tend to collapse. Water elevation could vary.

MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

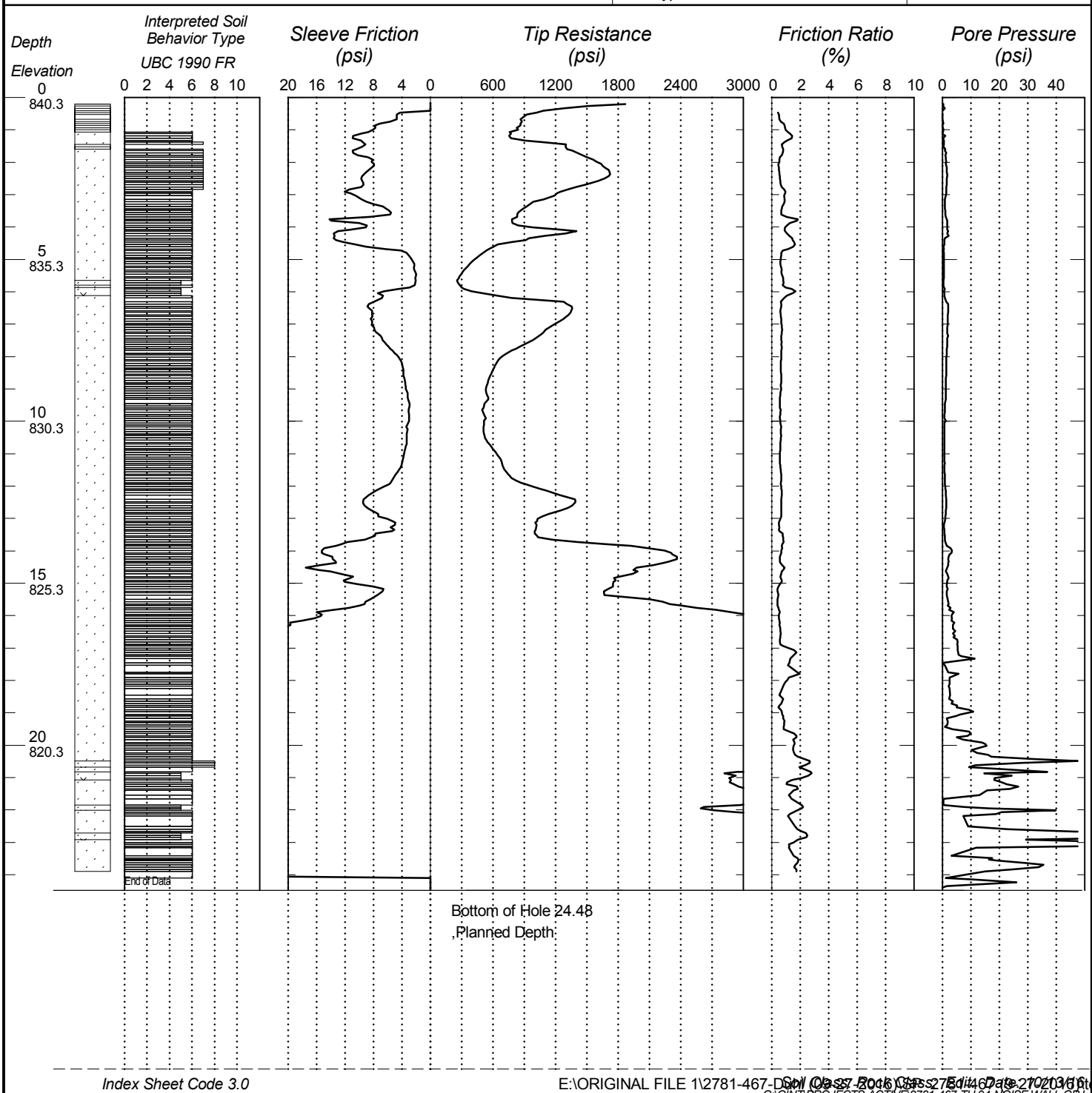
CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 81212

U.S. Customary Units

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
2781-467	**NOISE WALL** 100	**TH 94**	**C27**	**840.3** *(DTM)*

Location			
Hennepin Co. Coordinate: X=536115 Y=163400 (ft.)	*CPT Machine* **203094 CPT Truck**	*SHEET 1 of 1*
Latitude (North)=44°57'53.67" Longitude (West)=93°14'37.73"	*CPT Operator* **Buhl, Dylan**	*Date Completed*
No Station-Offset Information Available	*Hole Type* **CPT-STD**	**9/27/16**



Index Sheet Code 3.0

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MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

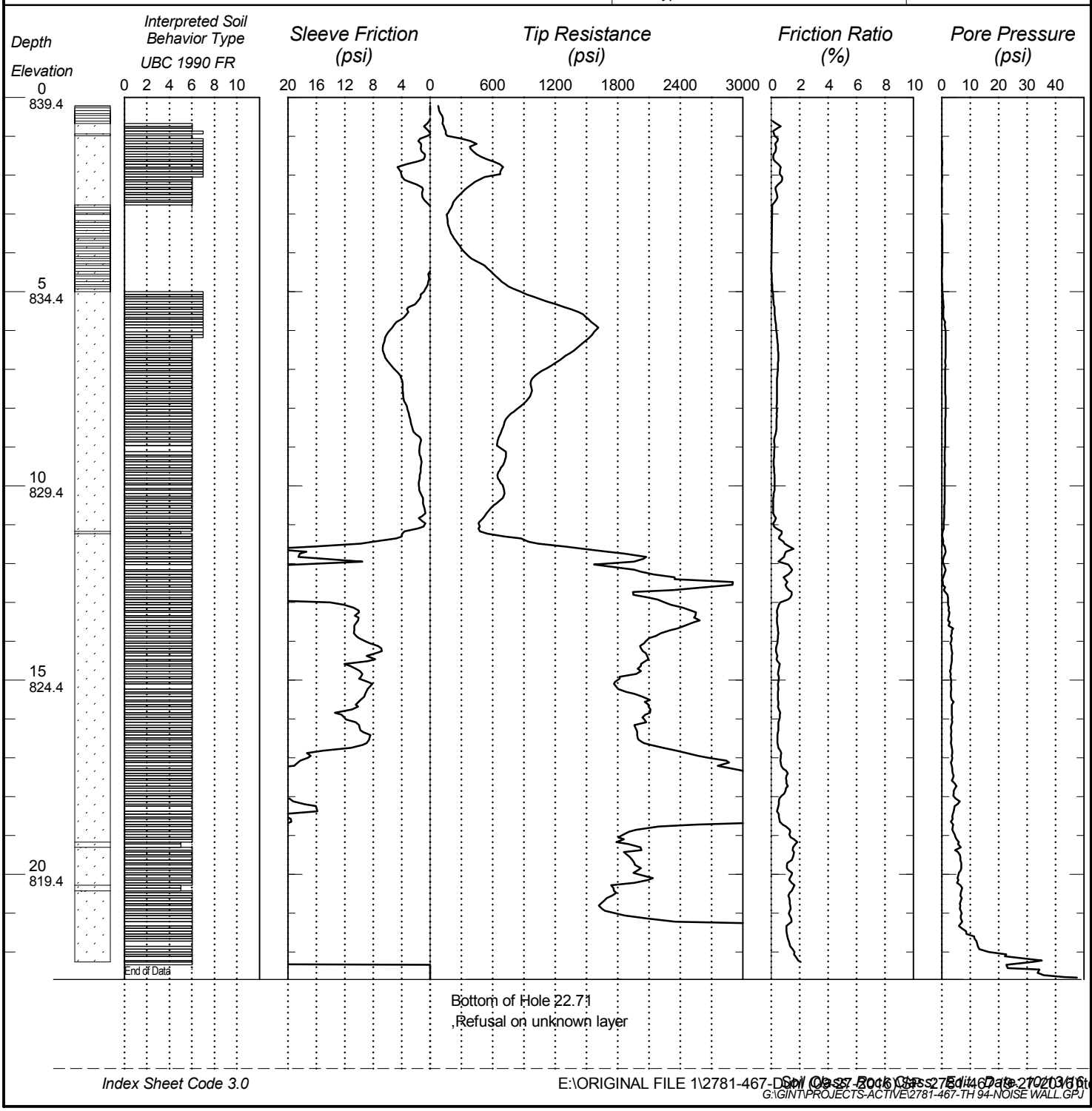
CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 81211

U.S. Customary Units

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
2781-467	**NOISE WALL** 100	**TH 94**	**C26**	**839.4** *(DTM)*

Location **Hennepin Co. Coordinate: X=536179 Y=163383** (ft.)	*CPT Machine* **203094 CPT Truck**	*SHEET 1 of 1*
Latitude (North)=44°57'53.50" *Longitude (West)=93°14'36.84"*	*CPT Operator* **Buhl, Dylan**	*Date Completed*
No Station-Offset Information Available	*Hole Type* **CPT-STD**	**9/27/16**



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Soil Class 2016 Class 2781-467 Date 2/2/2016 test(040)

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MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

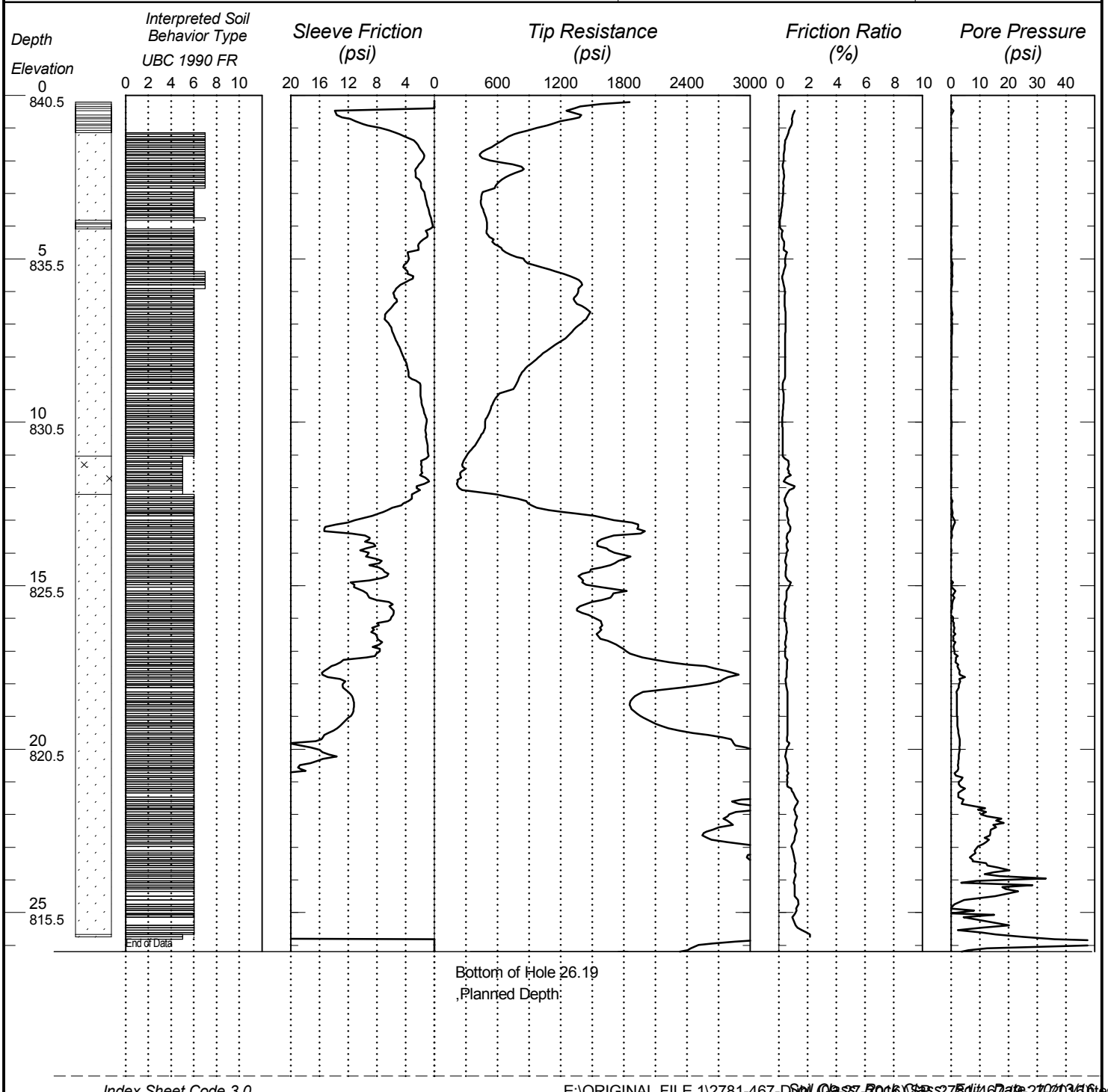
CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 81210

U.S. Customary Units

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
2781-467	**NOISE WALL** 100	**TH 94**	**C25**	**840.5** *(DTM)*

Location			
Hennepin Co. Coordinate: X=536308 Y=163352 (ft.)	*CPT Machine* **203094 CPT Truck**	*SHEET 1 of 1*
Latitude (North)=44°57'53.19" *Longitude (West)=93°14'35.05"*	*CPT Operator* **Buhl, Dylan**	*Date Completed*
No Station-Offset Information Available	*Hole Type* **CPT-STD**	**9/21/16**



Index Sheet Code 3.0

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MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

LABORATORY LOG & TEST RESULTS - SUBSURFACE EXPLORATION

BRAUN INTERTEC

This boring was taken by BRAUN under a consultant contract for Mn/DOT

UNIQUE NUMBER 73814

U.S. Customary Units

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Boring No.	Ground Elevation
2781-415	RETAINING WALL	Interstate Highway 94	C-01A	823.0 (DTM)

Location: Hennepin Coord:X=536327 Y=163280 (ft.)

Latitude (North)=44°57'52.48" Longitude (West)=93°14'34.78"

No Station-Offset Information Available

Drill Machine: 7514

Hammer: CME Automatic Calibrated

SHEET 1 of 1

Drilling Completed: 6/23/10

DEPTH	Depth / Elev.	Lithology	Classification	Drilling Operation	SPT N60 (%) / REC (%)	MC (%) / RQD (%)	COH (psf) / ACL (ft)	γ (pcf) / Core Breaks	Soil / Rock	Other Tests Or Remarks / Formation or Member
	0.5 822.5		BIT, 5 1/2"							
	1.1 821.9		CONC, 8"							
	2.0 821.0		slpl Sandy Loam w/ G, brn, moist, wet		15					
5	6.0 817.0		slpl Fine Sandy Loam w/ a little G, red-brn, moist, meddense		28					
10	14.0 809.0		nonpl Fine Sandy Loam w/ a little G, brn, moist, dense to Vdense		38 51 36					
15	18.0 805.0		Fine Sand w/ trace of G, brn, sat, Vloose		4					
20			nonpl Sandy Loam w/ G, gry-brn, moist, Vdense		10 19 50/.3					
25					27 50/.4					
30	30.2 792.8		with layer of Sand at 29 1/2' Bottom of Hole - 30.17'.		33 50/.2					

Water measured at 19' while sampling and/or drilling

Boring then grouted.

Index Sheet Code 3.0

Soil Class:P. Martin Rock Class: Edit: Date: 10/13/16

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MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

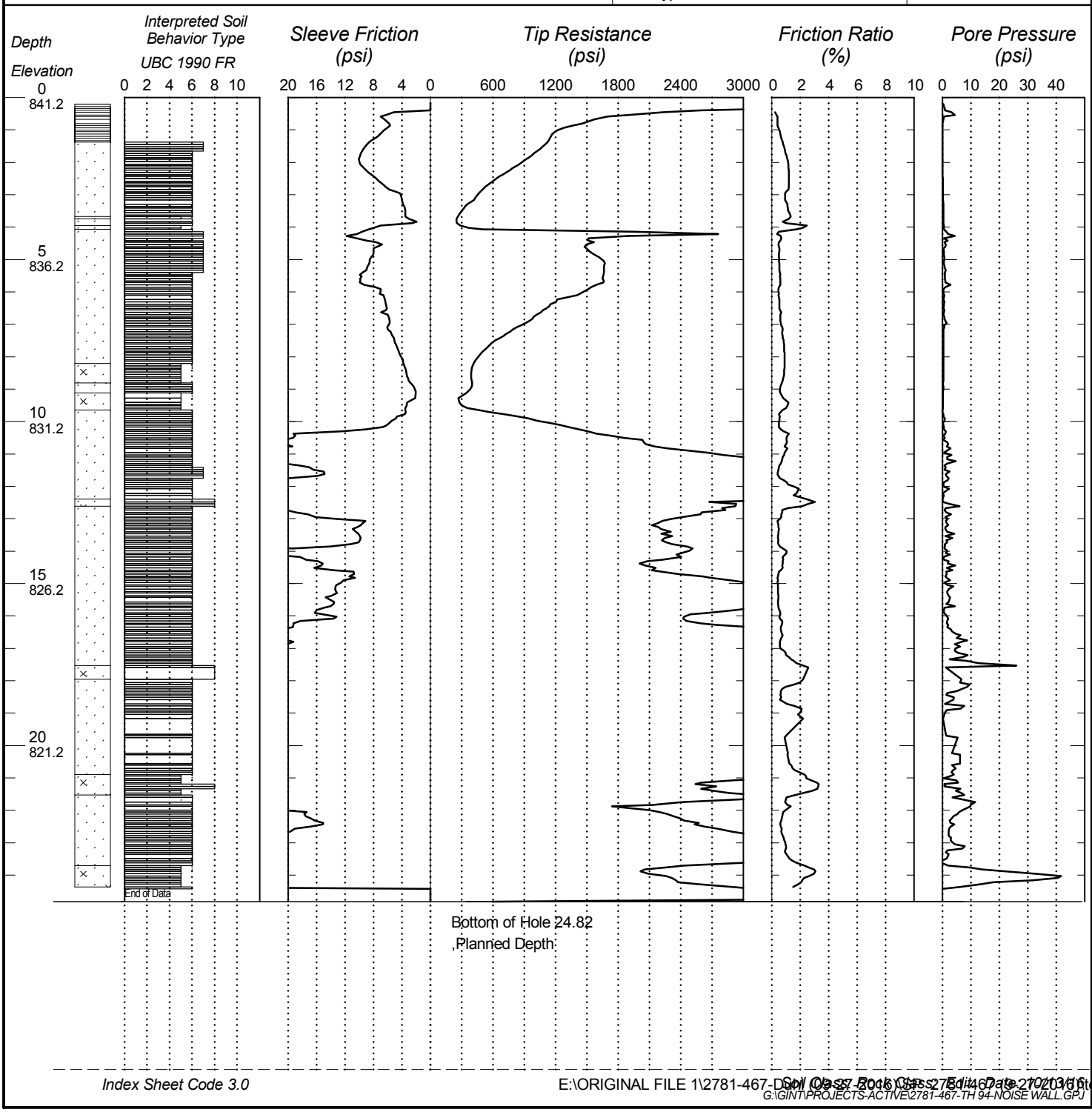
CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 81209

U.S. Customary Units

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
2781-467	**NOISE WALL** 100	**TH 94**	**C24**	**841.2** *(DTM)*

Location			
Hennepin Co. Coordinate: X=536385 Y=163335 (ft.)	*CPT Machine* **203094 CPT Truck**	*SHEET 1 of 1*
Latitude (North)=44°57'53.02" Longitude (West)=93°14'33.98"	*CPT Operator* **Buhl, Dylan**	*Date Completed*
No Station-Offset Information Available	*Hole Type* **CPT-STD**	**9/21/16**



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MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

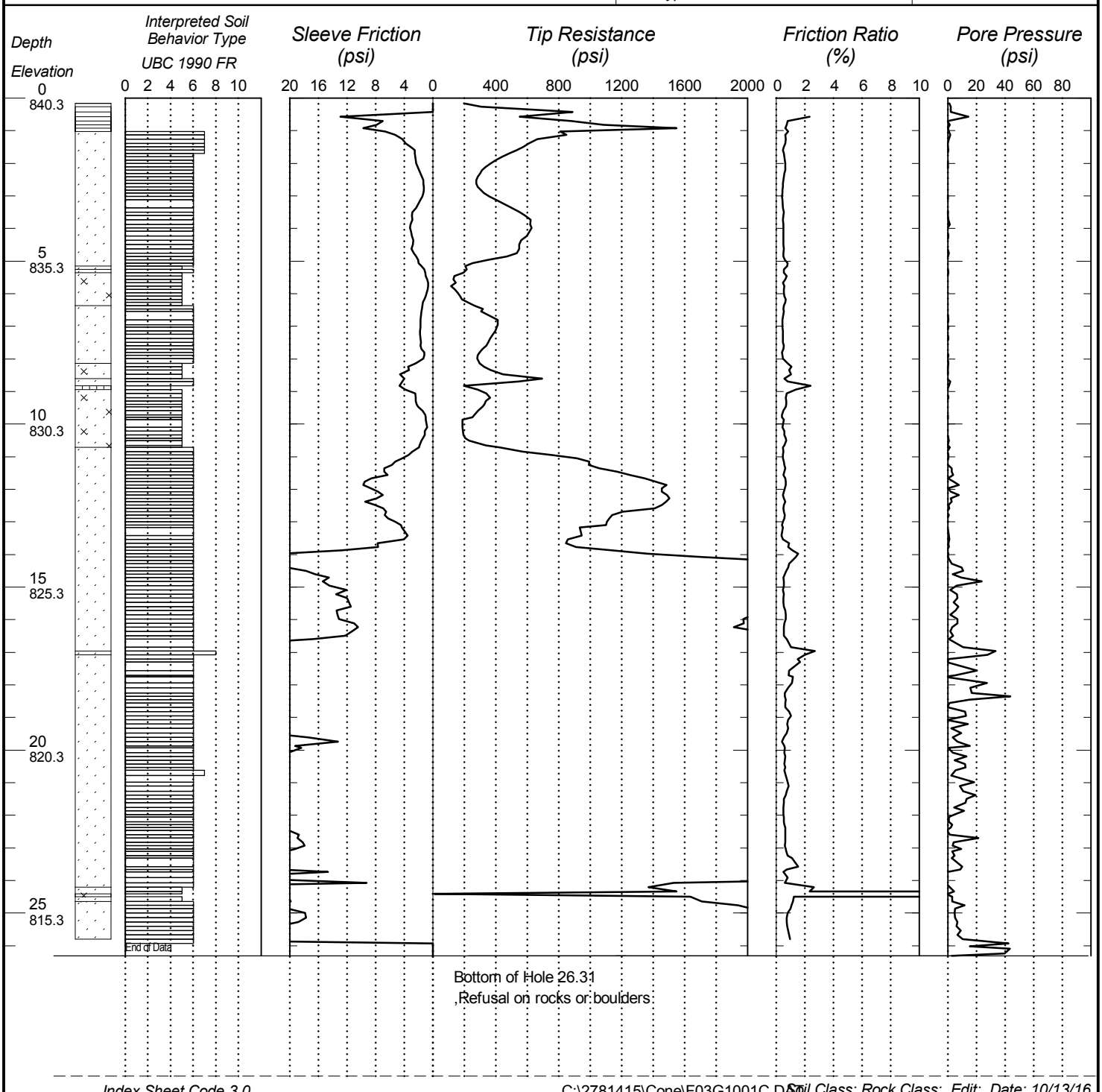
CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 73972

U.S. Customary Units

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
2781-415	**NOISE WALL** 100	**94**	**c216**	**840.3** *(DTM)*

Location **Hennepin Co. Coordinate: X=536480 Y=163321** (ft.)	*CPT Machine* **205146 CPT Truck (H)**	*SHEET 1 of 1*
Latitude (North)=44°57'52.88" *Longitude (West)=93°14'32.66"*	*CPT Operator* **Hasselquist**	*Date Completed*
No Station-Offset Information Available	*Hole Type* **CPT-STD**	**8/3/10**



Index Sheet Code 3.0

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Soil Class: Rock Class: Edit: Date: 10/13/16

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MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

LABORATORY LOG & TEST RESULTS - SUBSURFACE EXPLORATION

BRAUN INTERTEC

This boring was taken by BRAUN under a consultant contract for Mn/DOT

UNIQUE NUMBER 73813

U.S. Customary Units

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Boring No.	Ground Elevation
2781-415	RETAINING WALL	Interstate Highway 94	C-01	824.9 (DTM)

Location: Hennepin Coord:X=536473 Y=163259 (ft.)

Latitude (North)=44°57'52.27" Longitude (West)=93°14'32.75"

No Station-Offset Information Available

Drill Machine 7514

Hammer CME Automatic Calibrated

SHEET 1 of 1

Drilling Completed 6/15/10

DEPTH	Depth / Elev.	Lithology	Classification	Drilling Operation	SPT N60 / REC (%)	MC (%) / RQD (%)	COH (psf) / ACL (ft)	γ (pcf) / Core Breaks	Soil / Rock	Other Tests Or Remarks / Formation or Member
	0.4 824.5		BIT, 5" CONC, 9 1/2"							
	1.3 823.7		AGG, dk brn, moist							
	2.0 822.9				14					
5			Sand w/trace G, brn, moist, meddense		16					
					15					
10	10.0 814.9				40					
			pl Sandy Loam w/ G and bldrs, brn, moist, hard		47					
	14.0 810.9				16 21 50/.6					
15			slpl Fine Sandy Loam w/ G and bldrs, brn, moist to wet, Vdense							
					25/.6 50/.5					
20										
▼	22.0 802.9									
			Fine Sand w/ G, brn, sat, Vdense		8/.6 11/.6 50/.4					
25										
	27.0 797.9									
			slpl Fine Sandy Loam w/ G, brn, sat, Vdense							
	29.7 795.2		Bottom of Hole - 29.7'. Water measured at 24' while sampling and/or drilling Boring then grouted.		50/.2					

Index Sheet Code 3.0

Soil Class:P. Martin Rock Class: Edit: Date: 10/13/16

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MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

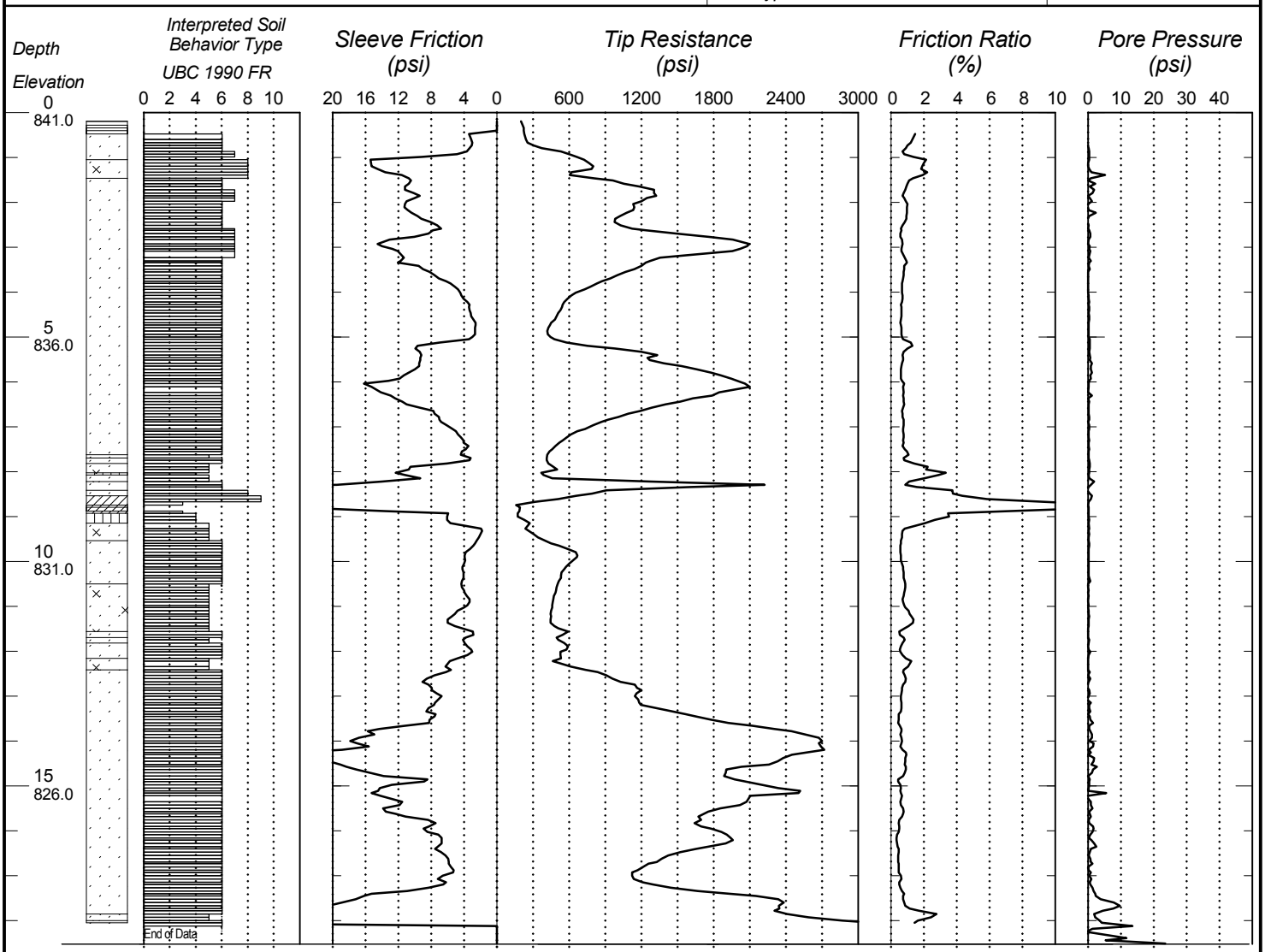
CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 81208

U.S. Customary Units

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
2781-467	**NOISE WALL** 100	**TH 94**	**C23**	**841.0** *(DTM)*

Location	CPT Machine	SHEET 1 of 1
Hennepin Co. Coordinate: X=536588 Y=163289 (ft.)	**203094 CPT Truck**	
Latitude (North)=44°57'52.57" Longitude (West)=93°14'31.15"	*CPT Operator* **Buhl, Dylan**	*Date Completed*
No Station-Offset Information Available	*Hole Type* **CPT-STD**	**9/27/16**



Bottom of Hole 18.52
,Refusal on unknown layer

MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

LABORATORY LOG & TEST RESULTS - SUBSURFACE EXPLORATION

BRAUN INTERTEC

This boring was taken by BRAUN under a consultant contract for Mn/DOT

UNIQUE NUMBER 73815

U.S. Customary Units

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Boring No.	Ground Elevation
2781-415	RETAINING WALL	Interstate Highway 94	C-02	831.4 (DTM)

Location: Hennepin Coord:X=536623 Y=163258 (ft.)
Latitude (North)=44°57'52.26" Longitude (West)=93°14'30.67"
No Station-Offset Information Available

Drill Machine 7514
Hammer CME Automatic Calibrated

SHEET 1 of 1
Drilling Completed 6/15/10

DEPTH	Depth / Elev.	Lithology	Classification	Drilling Operation	SPT N60 / REC (%)	MC (%) / RQD (%)	COH (psf) / ACL (ft)	γ (pcf) / Core Breaks	Soil / Rock	Other Tests Or Remarks / Formation or Member
	0.5 830.9		BIT, 5 1/2" CONC, 9"							
	1.2 830.2		slpl Sandy Loam w/ G, dk brn, moist, meddense							
	2.0 829.4		Sand and Gravel, brn, moist, meddense		21					
5					21					
	7.0 824.4		Fine Sand w/ G, brn, moist, meddense		24					
10					16					
	14.0 817.4				24	NSR				
15			slpl Fine Sandy Loam w/ G, brn, moist, dense		36					
▼	17.0 814.4		Fine Loamy Sand w/ G, brn, sat, Vdense							
20					25/.6 50/.3					
	21.0 810.4		slpl Fine Sandy Loam w/G, brn, sat, Vdense							
25					17/.6 50/.8					
	27.0 804.4		Sand and Gravel, lt brn, sat, Vdense							
30	30.3 801.1		Bottom of Hole - 30.3'. Water measured at 24' while sampling and/or drilling Boring then grouted.		27/.6 50/.4					

Index Sheet Code 3.0

Soil Class:P. Martin Rock Class: Edit: Date: 10/13/16

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MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

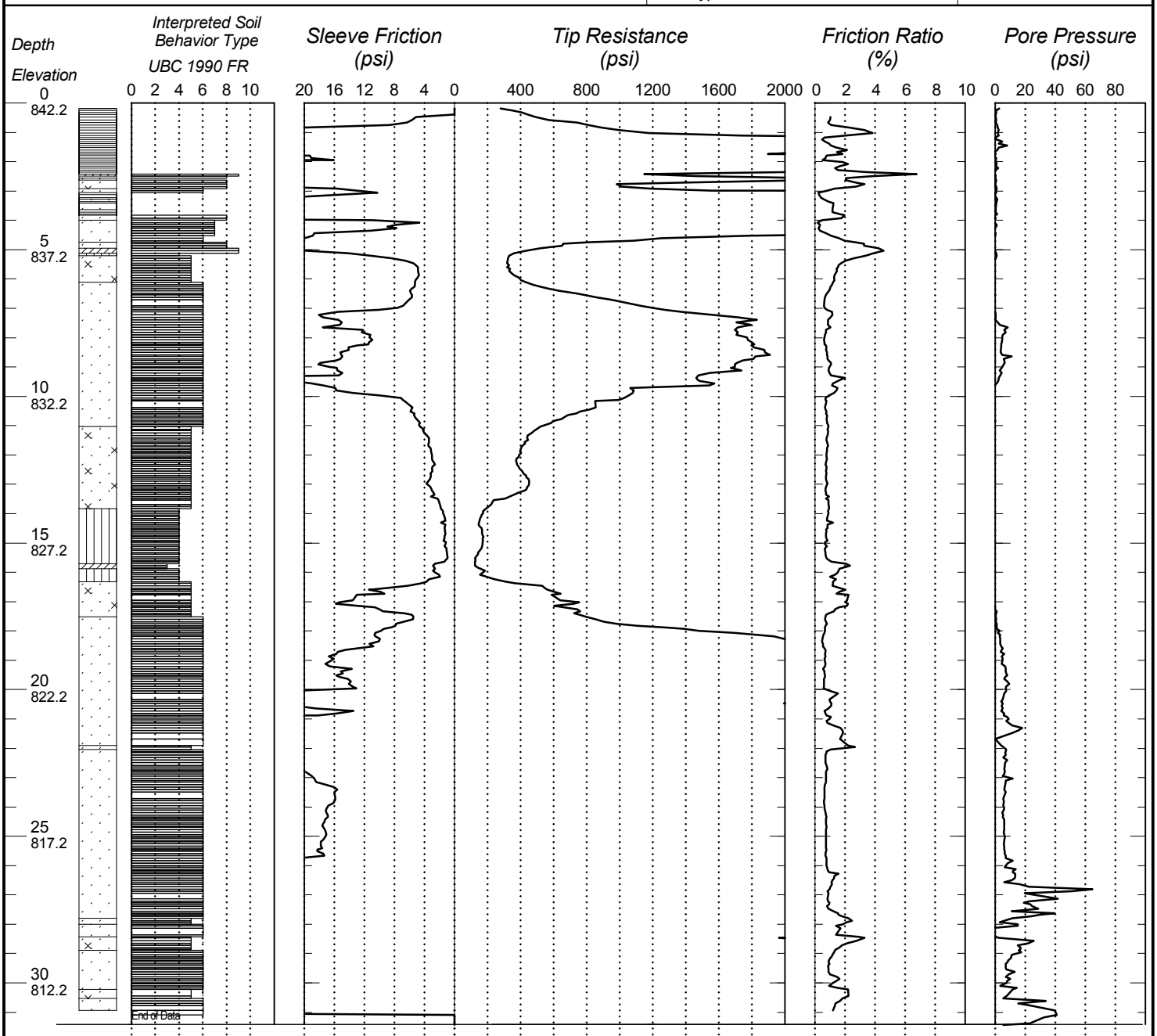
CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 73973

U.S. Customary Units

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
2781-415	**NOISE WALL** 100	**94**	**c217**	**842.2** *(DTM)*

Location		CPT Machine	SHEET 1 of 1
Hennepin Co. Coordinate: X=536658 Y=163297 (ft.)		**205146 CPT Truck (H)**	
Latitude (North)=44°57'52.64" *Longitude (West)=93°14'30.18"*		CPT Operator **Hasselquist**	Date Completed
No Station-Offset Information Available		Hole Type **CPT-STD**	**8/3/10**



Bottom of Hole 31.42
,Refusal on rocks or boulders

Index Sheet Code 3.0

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Soil Class: Rock Class: Edit: Date: 10/13/16

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MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

LABORATORY LOG & TEST RESULTS - SUBSURFACE EXPLORATION

BRAUN INTERTEC

This boring was taken by BRAUN under a consultant contract for Mn/DOT

UNIQUE NUMBER 73816

U.S. Customary Units

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Boring No.	Ground Elevation
2781-415	RETAINING WALL	Interstate Highway 94	C-04	834.4 (DTM)

Location: Hennepin Coord:X=536773 Y=163255 (ft.)

Latitude (North)=44°57'52.23" Longitude (West)=93°14'28.58"

No Station-Offset Information Available

Drill Machine: 7514

Hammer: CME Automatic Calibrated

SHEET 1 of 1

Drilling Completed: 6/15/10

DEPTH	Depth / Elev.	Lithology	Classification	Drilling Operation	SPT N60 (%) / REC (%)	MC (%) / RQD (%)	COH (psf) / ACL (ft)	γ (pcf) / Core Breaks	Soil / Rock	Other Tests Or Remarks / Formation or Member
	0.4 834.0		BIT, 5" CONC, 9"							
	1.2 833.2		slpl Sandy Loam w/ G, dk brn, moist							Hammer Efficiency = 83%
	2.0 832.4				29					
5			Sand and Gravel, brn, moist, dense to meddense		18					
					15					
	9.0 825.4									
10	11.0 823.4		Sand w/ a little G, brn, moist, meddense		14					
			Sand w/ G, brn, moist, meddense		20					
	14.0 820.4									
15			slpl Fine Sandy Loam w/ G, brn, moist, Vdense		71					
	17.0 817.4									
20			pl Fine Sandy Loam w/ G and layers of Sand, brn, wet, hard to Vhard		38					
25					70					
▼	27.0 807.4									
			Sand and Gravel, yel-brn, sat, Vdense							
30	30.3 804.1		Bottom of Hole - 30.3'. No water encountered or measured during drilling Boring then grouted.		36/.6 50/.4					

Index Sheet Code 3.0

Soil Class:P. Martin Rock Class: Edit: Date: 10/13/16

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MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

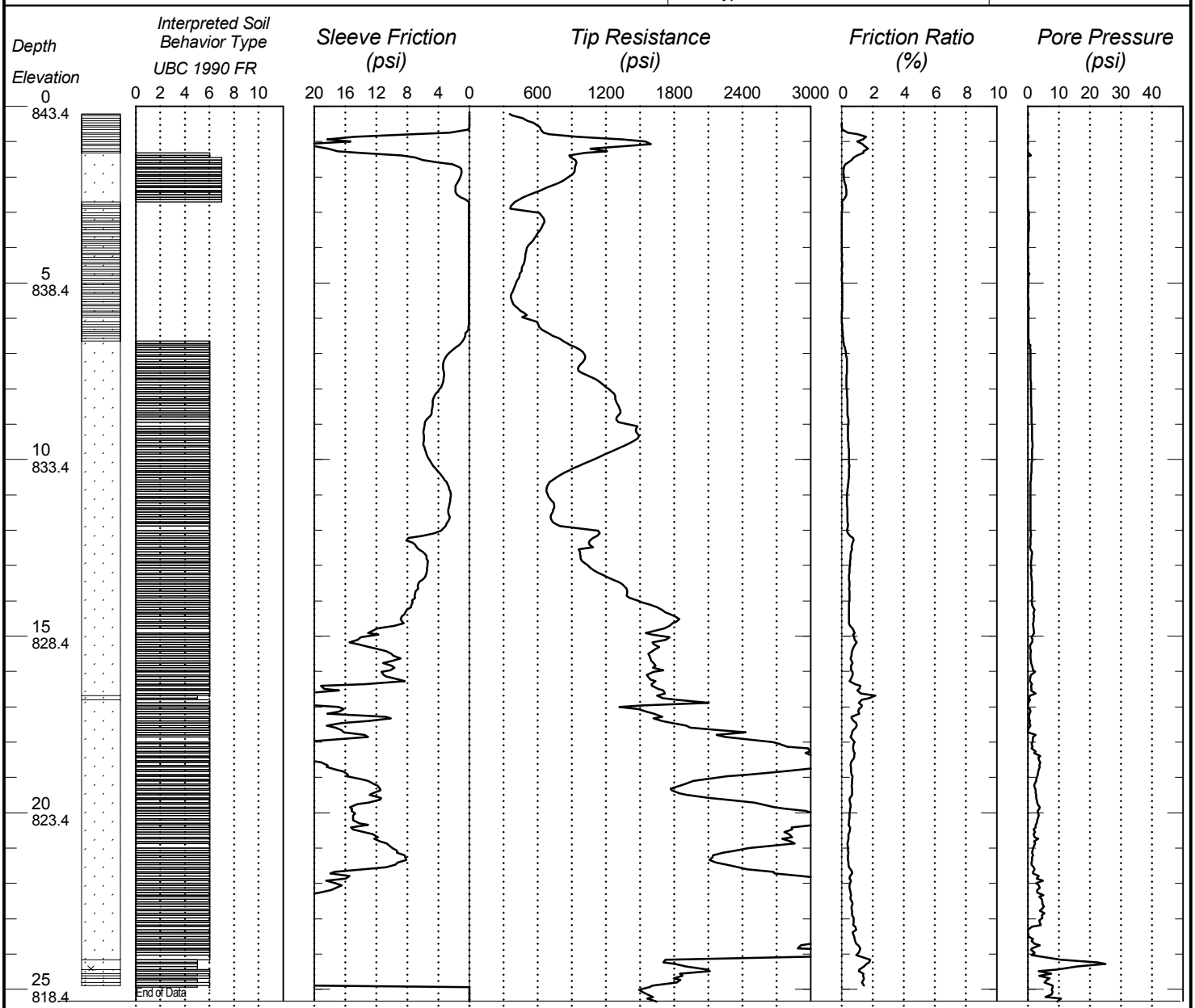
CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 81207

U.S. Customary Units

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
2781-467	**NOISE WALL** 100	**TH 94**	**C21**	**843.4** *(DTM)*

Location		CPT Machine	SHEET 1 of 1
Hennepin Co. Coordinate: X=536838 Y=163293 (ft.)		**203094 CPT Truck**	
Latitude (North)=44°57'52.60" *Longitude (West)=93°14'27.68"*		CPT Operator **Buhl, Dylan**	Date Completed
No Station-Offset Information Available		Hole Type **CPT-STD**	**9/13/16**



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Soil Classification Chart 2781-467.dat 9/13/16 Test(019)

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MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

LABORATORY LOG & TEST RESULTS - SUBSURFACE EXPLORATION

BRAUN INTERTEC

This boring was taken by BRAUN under a consultant contract for Mn/DOT

UNIQUE NUMBER 73817

U.S. Customary Units

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Boring No.	Ground Elevation
2781-415	RETAINING WALL	Interstate Highway 94	C-05	832.8 (DTM)

Location: Hennepin Coord:X=536907 Y=163242 (ft.)

Latitude (North)=44°57'52.10" Longitude (West)=93°14'26.72"

No Station-Offset Information Available

Drill Machine 7514

Hammer CME Automatic Calibrated

SHEET 1 of 1

Drilling Completed 6/15/10

DEPTH	Depth / Elev.	Lithology	Classification	Drilling Operation	SPT N60 (%) / REC (%)	MC (%) / RQD (%)	COH (psf) / ACL (ft)	γ (pcf) / Core Breaks	Soil / Rock	Other Tests Or Remarks / Formation or Member
	0.2 832.6		BIT, 2 3/4" CONC, 9"							
	1.0 831.8		Loamy Sand w/ G, brn, moist, meddense		27					
	2.0 830.8		Fine Sand w/ a little G, brn, moist, meddense		14					
5	7.0 825.8		Fine Sand w/ G, brn, moist, meddense		22					
10	12.0 820.8		Sand and Gravel, brn, moist, dense		24 49					
	14.0 818.8		Fine Sand and Gravel, lt brn, moist, dense		32					
15	17.0 815.8		Fine Sand w/ G, brn, sat, Vdense		64					
20	22.0 810.8		slpl Fine Sandy Loam w/ G, brn, moist, Vdense		21/.6 50/.6					
25	29.8 803.1		Bottom of Hole - 29 3/4'. Water not observed while drilling. Boring backfilled with soil cuttings.		50/.3					

Index Sheet Code 3.0

Soil Class:P. Martin Rock Class: Edit: Date: 10/13/16

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MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

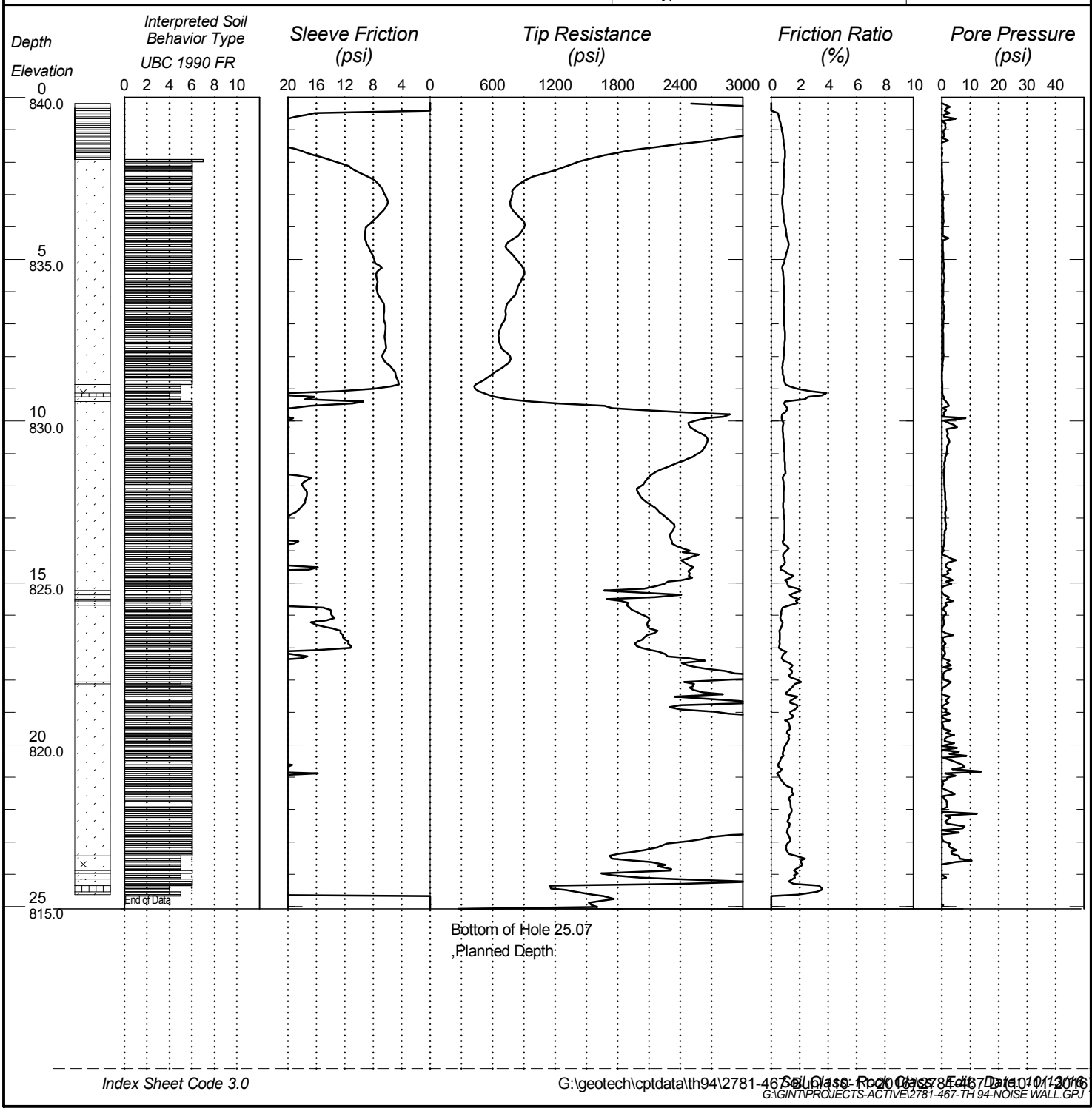
CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 81277

U.S. Customary Units

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
2781-467	**NOISE WALL** 100	**TH 94**	**C18**	**840.0** *(DTM)*

Location		CPT Machine	SHEET 1 of 1
Hennepin Co. Coordinate: X=537291 Y=163305 (ft.)		**203094 CPT Truck**	
Latitude (North)=44°57'52.71" *Longitude (West)=93°14'21.38"*		CPT Operator **Buhl, Dylan**	Date Completed
No Station-Offset Information Available		Hole Type **CPT-STD**	**10/11/16**



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MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

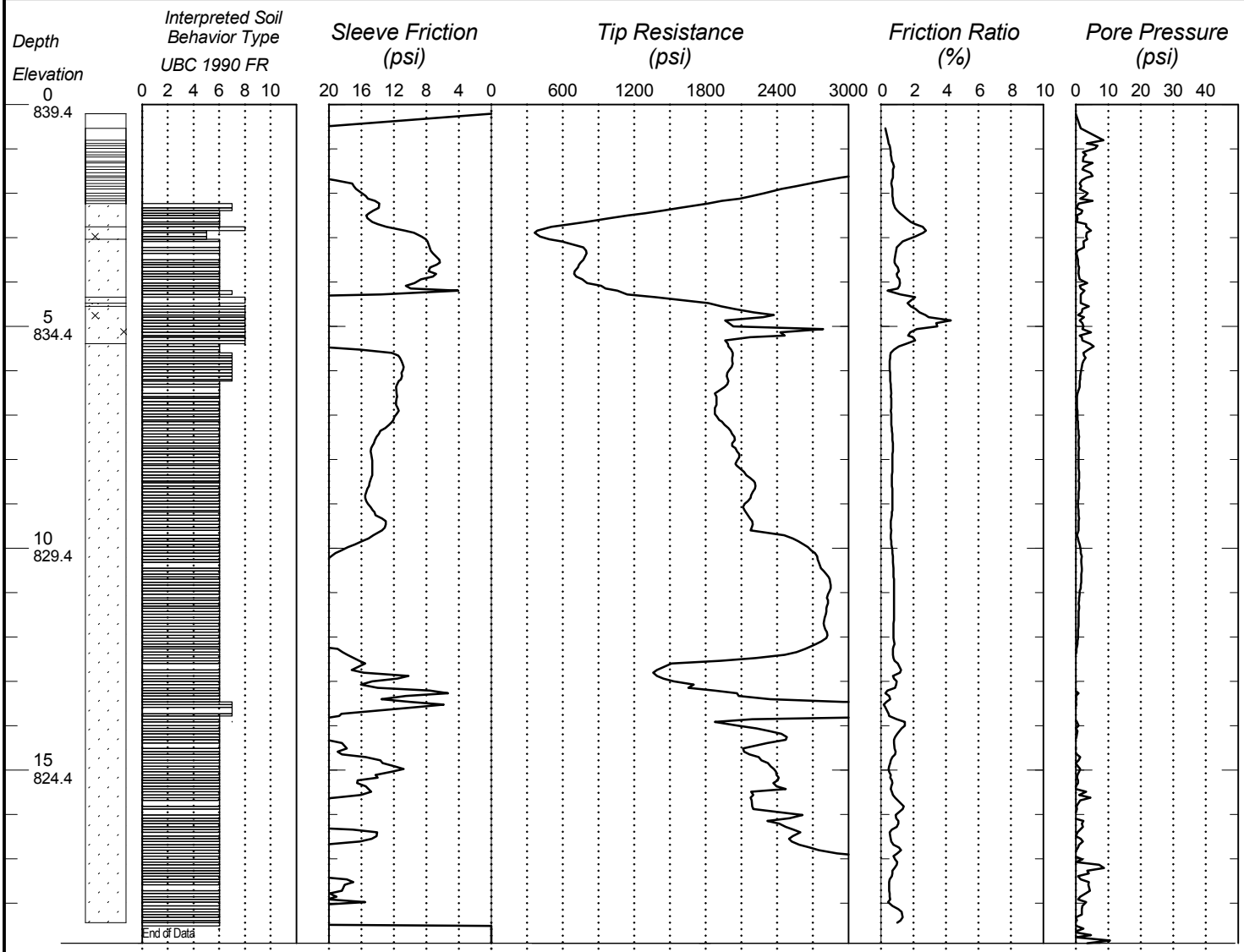
CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 81206

U.S. Customary Units

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
2781-467	**NOISE WALL** 100	**TH 94**	**C17**	**839.4** *(DTM)*

Location			
Hennepin Co. Coordinate: X=537427 Y=163305 (ft.)	*CPT Machine* **203094 CPT Truck**	*SHEET 1 of 1*
Latitude (North)=44°57'52.71" Longitude (West)=93°14'19.48"	*CPT Operator* **Buhl, Dylan**	*Date Completed*
No Station-Offset Information Available	*Hole Type* **CPT-STD**	**9/14/16**



Bottom of Hole 18.9
,Refusal on unknown layer

MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

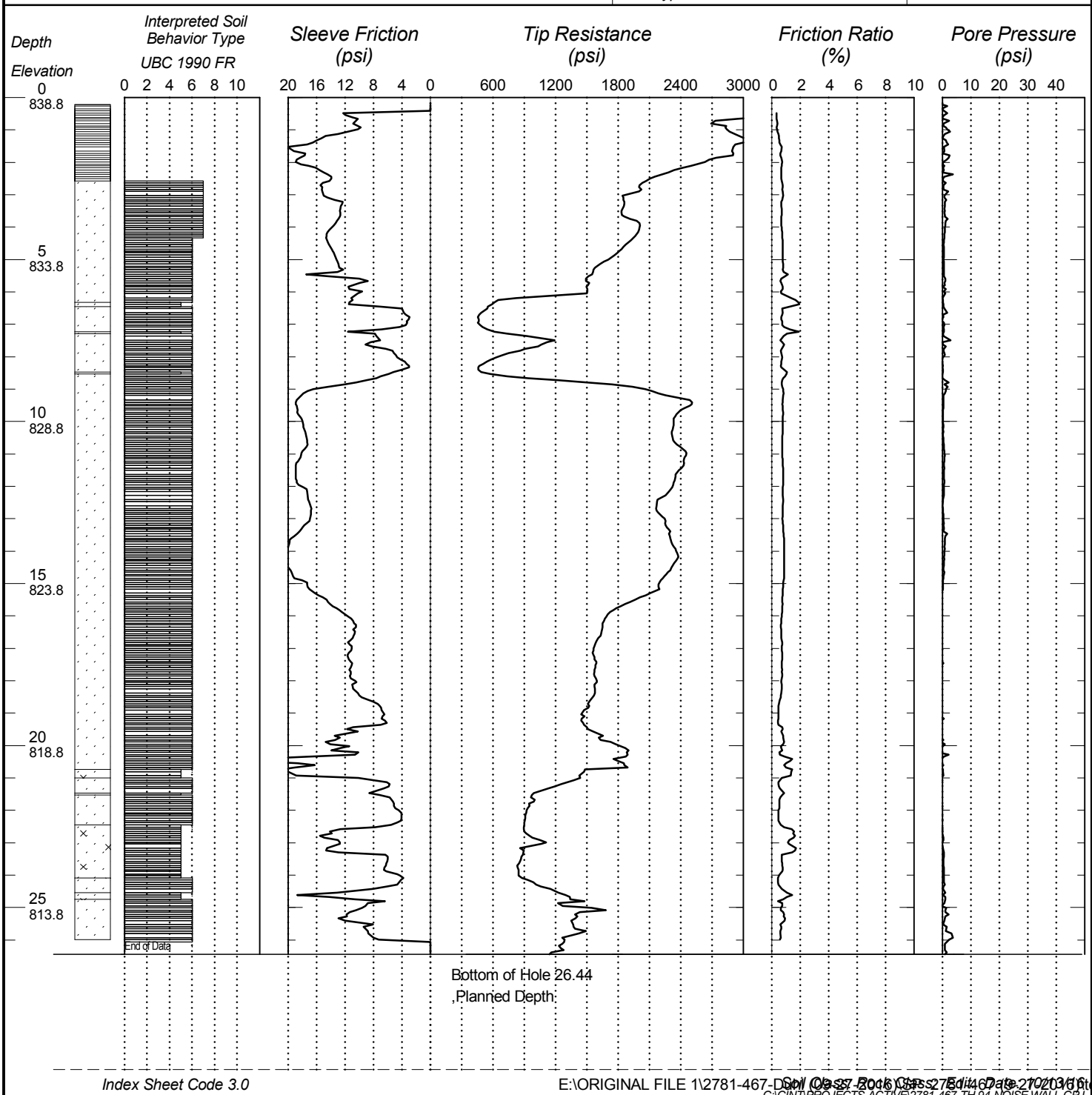
CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 81205

U.S. Customary Units

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
2781-467	**NOISE WALL** 100	**TH 94**	**C16**	**838.8** *(DTM)*

Location			
Hennepin Co. Coordinate: X=537550 Y=163301 (ft.)	*CPT Machine* **203094 CPT Truck**	*SHEET 1 of 1*
Latitude (North)=44°57'52.67" Longitude (West)=93°14'17.77"	*CPT Operator* **Buhl, Dylan**	*Date Completed*
No Station-Offset Information Available	*Hole Type* **CPT-STD**	**9/22/16**



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MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

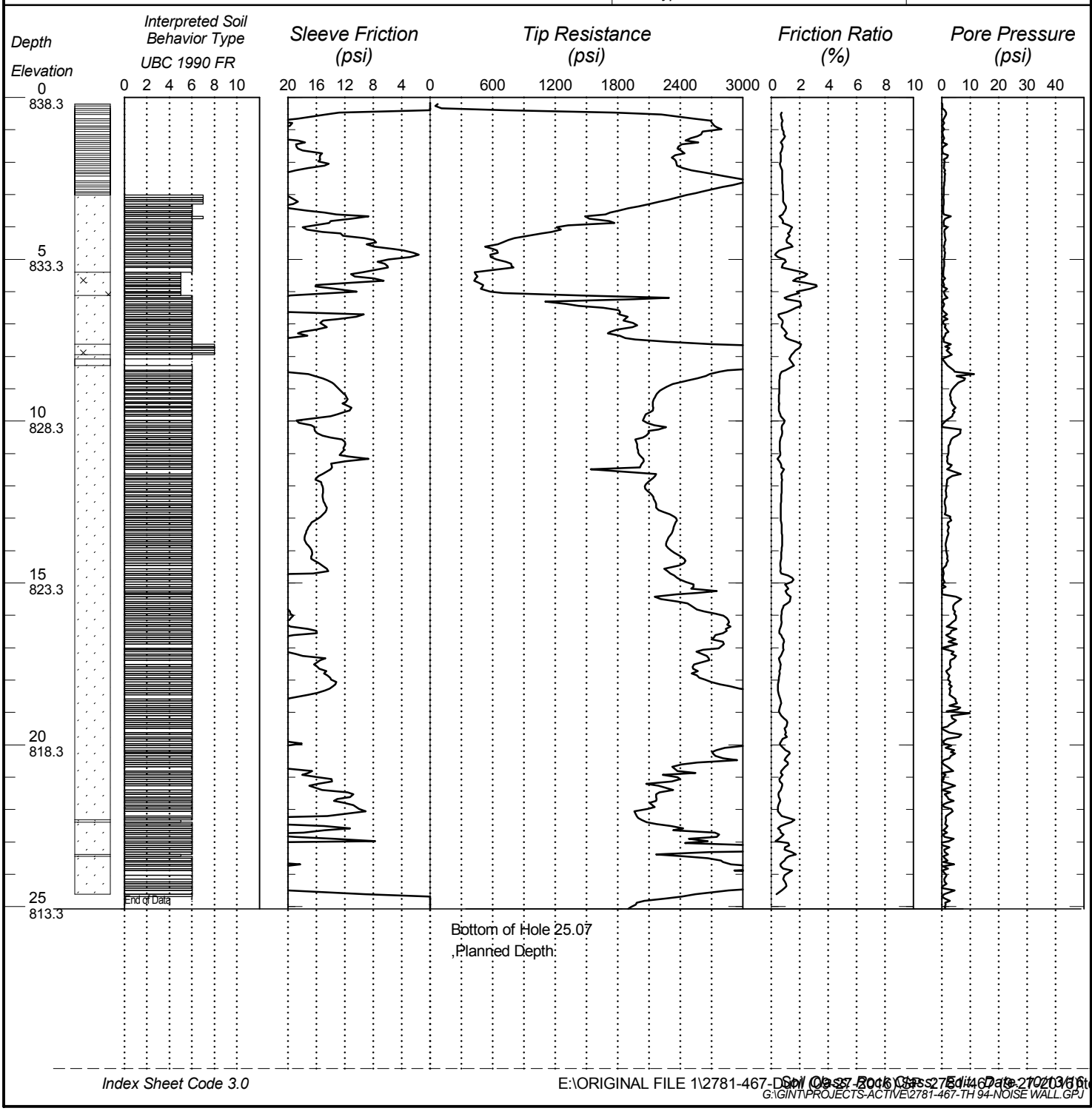
CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 81204

U.S. Customary Units

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
2781-467	**NOISE WALL** 100	**TH 94**	**C15**	**838.3** *(DTM)*

Location		CPT Machine	SHEET 1 of 1
Hennepin Co. Coordinate: X=537675 Y=163301 (ft.)		**203094 CPT Truck**	
Latitude (North)=44°57'52.67" *Longitude (West)=93°14'16.04"*		CPT Operator **Buhl, Dylan**	Date Completed
No Station-Offset Information Available		Hole Type **CPT-STD**	**9/14/16**



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Noisewall 101 Summary of Subsurface Conditions

Location	Conditions Encountered	Water	Possible Impacts
c14	Dense undefined near surface. Mostly medium dense to dense sands to termination near elev. 813 1/2. Loose sand near elev. 831	No water indicated, but perched layers may be encountered.	Loose sand may tend to collapse. Water elevation may vary.
c13	Dense undefined near surface, generally medium dense to dense sands to refusal near elev. 820. Loose sand near elev. 831.	No water indicated, but perched layers may be encountered.	Loose sand may tend to collapse. Water elevation may vary.
c12	Undefined near surface. Loose to medium dense to near 828, then very dense sands to termination near elev. 816.5.	No water indicated, but perched layers may be encountered.	Loose sand may tend to collapse. Water elevation may vary.
c11	Generally loose to medium dense sands to near elev. 833. Very dense sand layers 826 to 833 and 819-823, then firm clay loam to termination near elev. 812	No water indicated, but perched layers may be encountered.	Loose Sand may tend to collapse. Water elevation could vary

Noisewall 103 Summary of Subsurface Conditions

Location	Conditions Encountered	Water	Possible Impacts
c10	Dense undefined near surface. Generally medium dense to dense sands to refusal near elev. 834 1/2.	No water indicated, but perched layers may be encountered.	Water elevation could vary
c09	Loose to medium dense to near 831, then very dense sands to refusal near elev. 820 1/2.	No water indicated, but perched layers may be encountered.	Loose sand may tend to collapse. Water elevation may vary.
T05 (2010)	Sand and Gravel to near elev. 819, then reworked clayey Shale near elev. 808, then Shale bedrock and Limestone bedrock below elev. 790.	No water indicated, but perched layers may be encountered.	Boring located in exit gore, below noise wall.
c06	Generally loose Sand to near elev. 828, then medium dense to dense sands to refusal near elev. 819. Very soft undefined near elev. 828.	No water indicated, but perched layers may be encountered.	Loose sand may tend to collapse. Water elevation may vary.
c02	Dense undefined near surface. Mostly layered Sandy Loam, Clay and Silt to near elev. 810'm, then Clay with a few Silt layers to termination near elev. 796 1/2. Soft Clay near elev. 813 to 816.	No water indicated, but perched layers may be encountered.	Soils might be fill and could contain debris.

MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

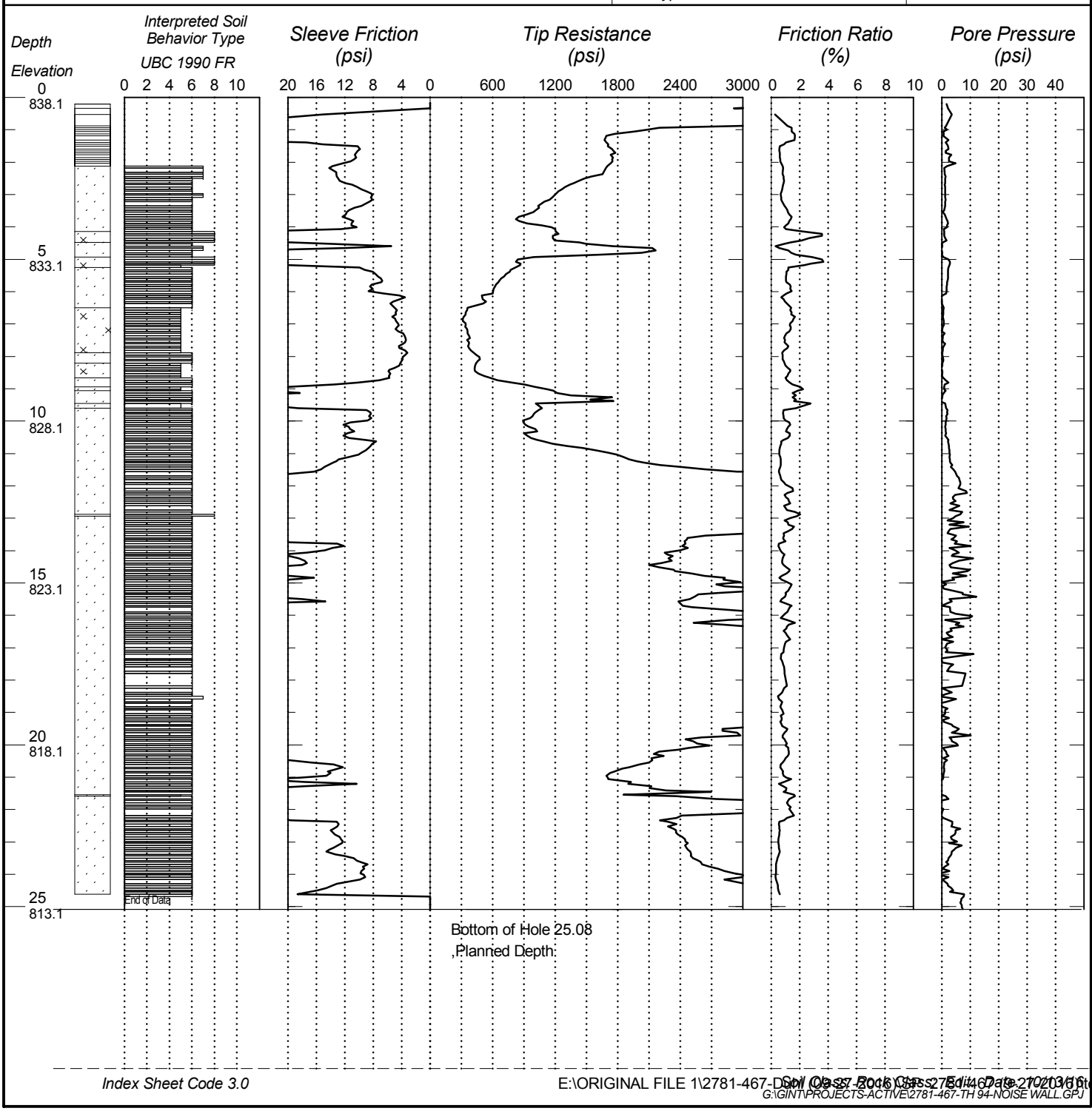
CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 81203

U.S. Customary Units

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
2781-467	**NOISE WALL** 101	**TH 94**	**C14**	**838.1** *(DTM)*

Location **Hennepin Co. Coordinate: X=537772 Y=163272** (ft.)	*CPT Machine* **203094 CPT Truck**	*SHEET 1 of 1*
Latitude (North)=44°57'52.38" *Longitude (West)=93°14'14.69"*	*CPT Operator* **Buhl, Dylan**	*Date Completed*
No Station-Offset Information Available	*Hole Type* **CPT-STD**	**9/13/16**



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Soil Class-2016.Cls 2781-467.dat 9/20/2016 Test(010)

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MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

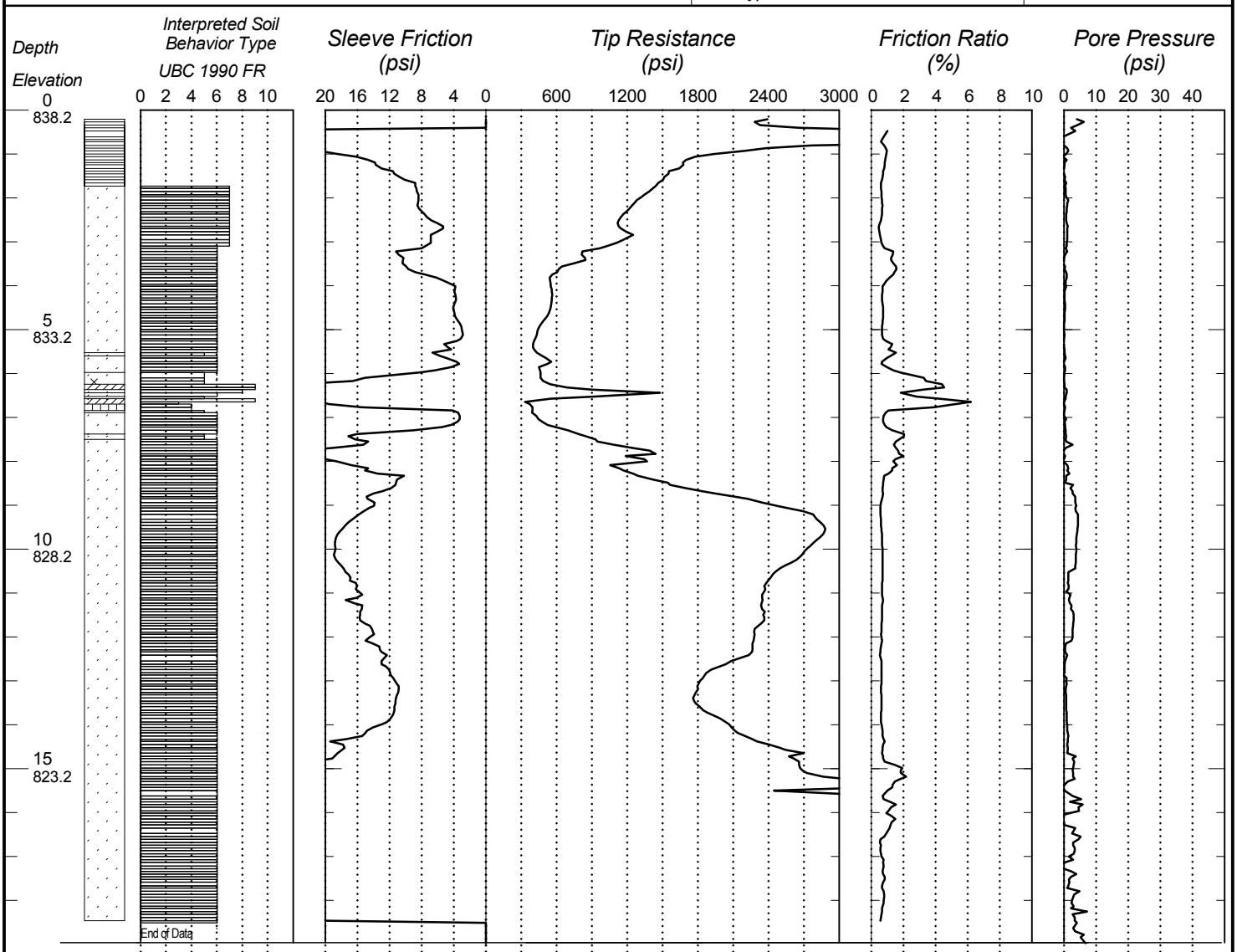
CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 81202

U.S. Customary Units

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
2781-467	**NOISE WALL** 101	**TH 94**	**C13**	**838.2** *(DTM)*

Location	CPT Machine	SHEET 1 of 1
Hennepin Co. Coordinate: X=537844 Y=163277 (ft.)	**203094 CPT Truck**	
Latitude (North)=44°57'52.43" Longitude (West)=93°14'13.68"	CPT Operator **Buhl, Dylan**	Date Completed
No Station-Offset Information Available	Hole Type **CPT-STD**	**9/13/16**



Bottom of Hole 18.97
,Refusal on unknown layer

MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

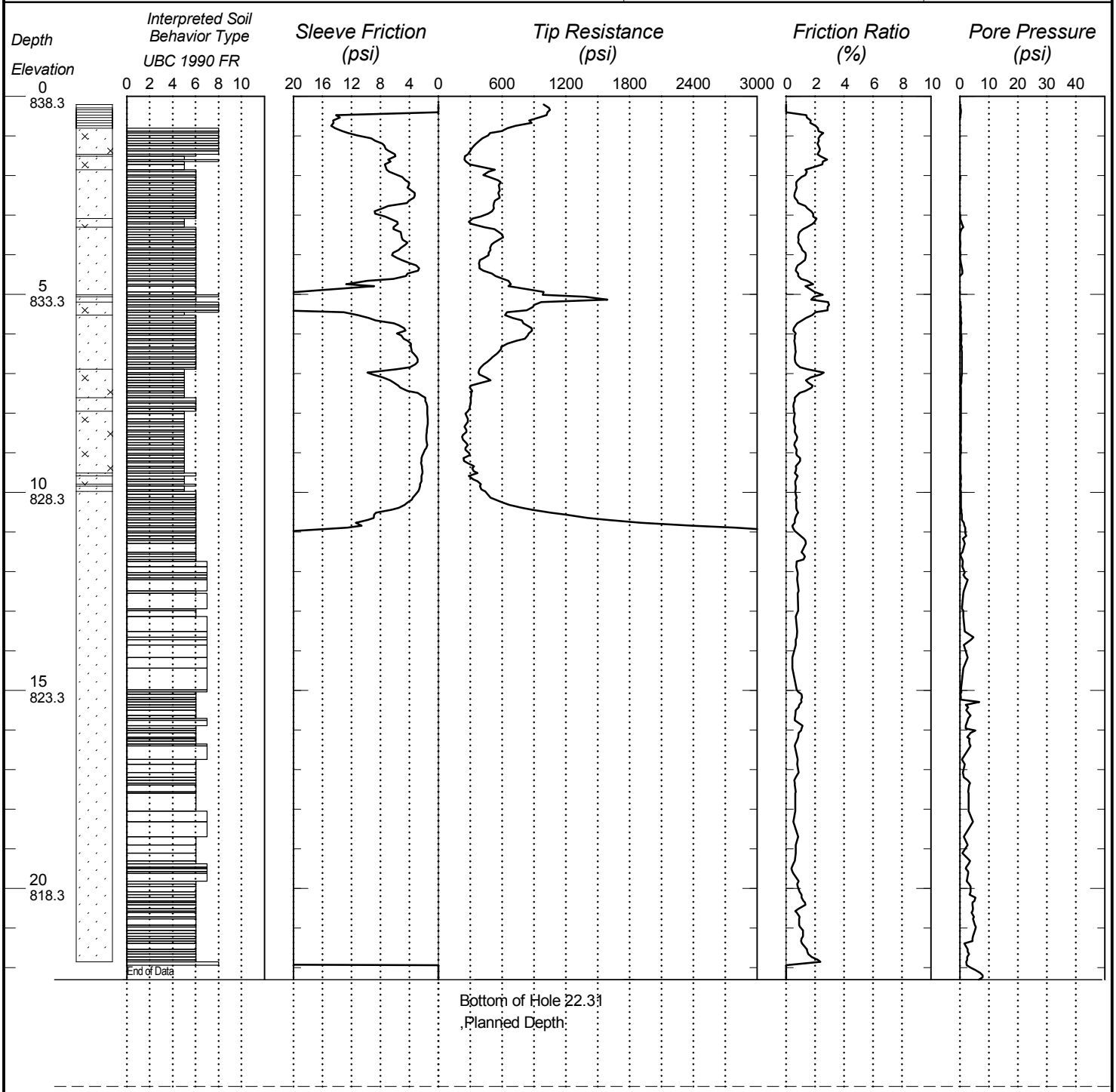
CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 81276

U.S. Customary Units

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
2781-467	**NOISE WALL** 101	**TH 94**	**C12**	**838.3** *(DTM)*

Location **Hennepin Co. Coordinate: X=537956 Y=163288** (ft.)	*CPT Machine* **203094 CPT Truck**	*SHEET 1 of 1*
Latitude (North)=44°57'52.53" *Longitude (West)=93°14'12.13"*	*CPT Operator* **Buhl, Dylan**	*Date Completed*
No Station-Offset Information Available	*Hole Type* **CPT-STD**	**10/6/16**



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Soil Class - Rock Class 8 Edit 7 Date 10/13/2016

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MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

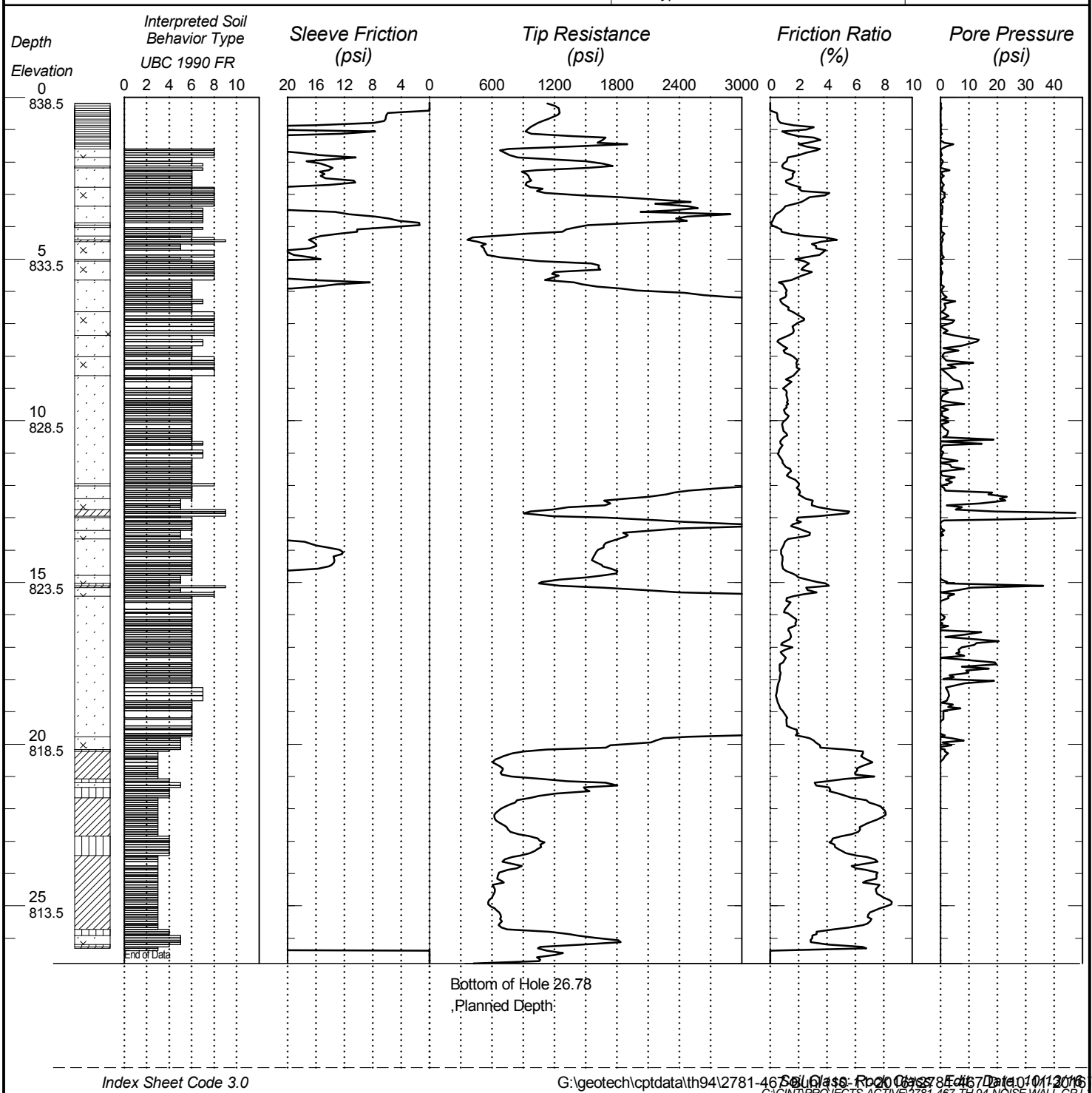
CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 81275

U.S. Customary Units

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
2781-467	**NOISE WALL** 101	**TH 94**	**C11**	**838.5** *(DTM)*

Location		CPT Machine	SHEET 1 of 1
Hennepin Co. Coordinate: X=538036 Y=163289 (ft.)		**203094 CPT Truck**	
Latitude (North)=44°57'52.54" *Longitude (West)=93°14'11.01"*		CPT Operator **Buhl, Dylan**	Date Completed
No Station-Offset Information Available		Hole Type **CPT-STD**	**10/6/16**



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MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

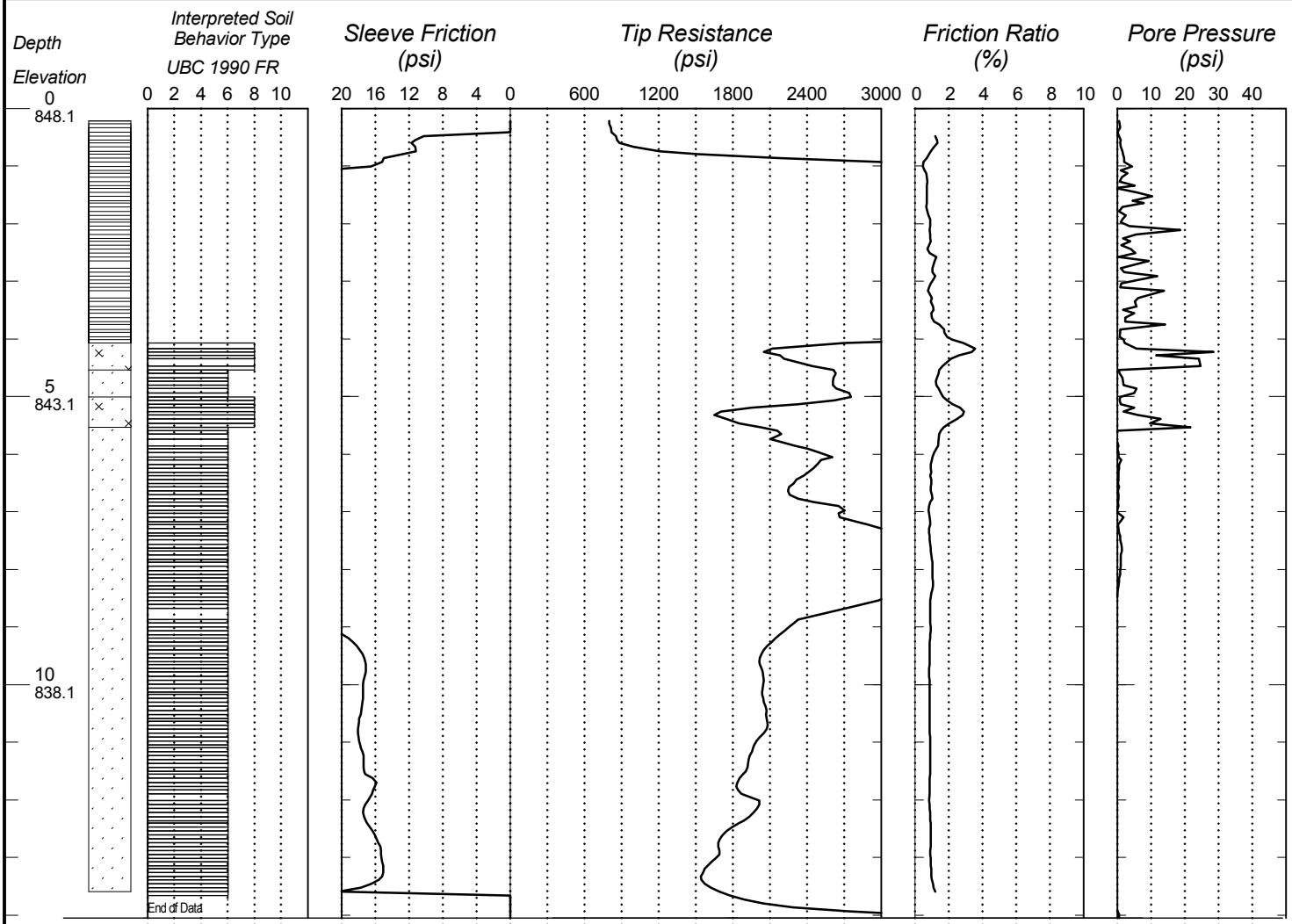
CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 81201

U.S. Customary Units

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
2781-467	**NOISE WALL** 103	**TH 94**	**C10**	**848.1** *(DTM)*

Location			
Hennepin Co. Coordinate: X=538763 Y=163317 (ft.)	*CPT Machine* **203094 CPT Truck**	*SHEET 1 of 1*
Latitude (North)=44°57'52.80" *Longitude (West)=93°14'00.90"*	*CPT Operator* **Buhl, Dylan**	*Date Completed*
No Station-Offset Information Available	*Hole Type* **CPT-STD**	**9/13/16**



Bottom of Hole 14.05
,Refusal on unknown layer

Index Sheet Code 3.0

MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

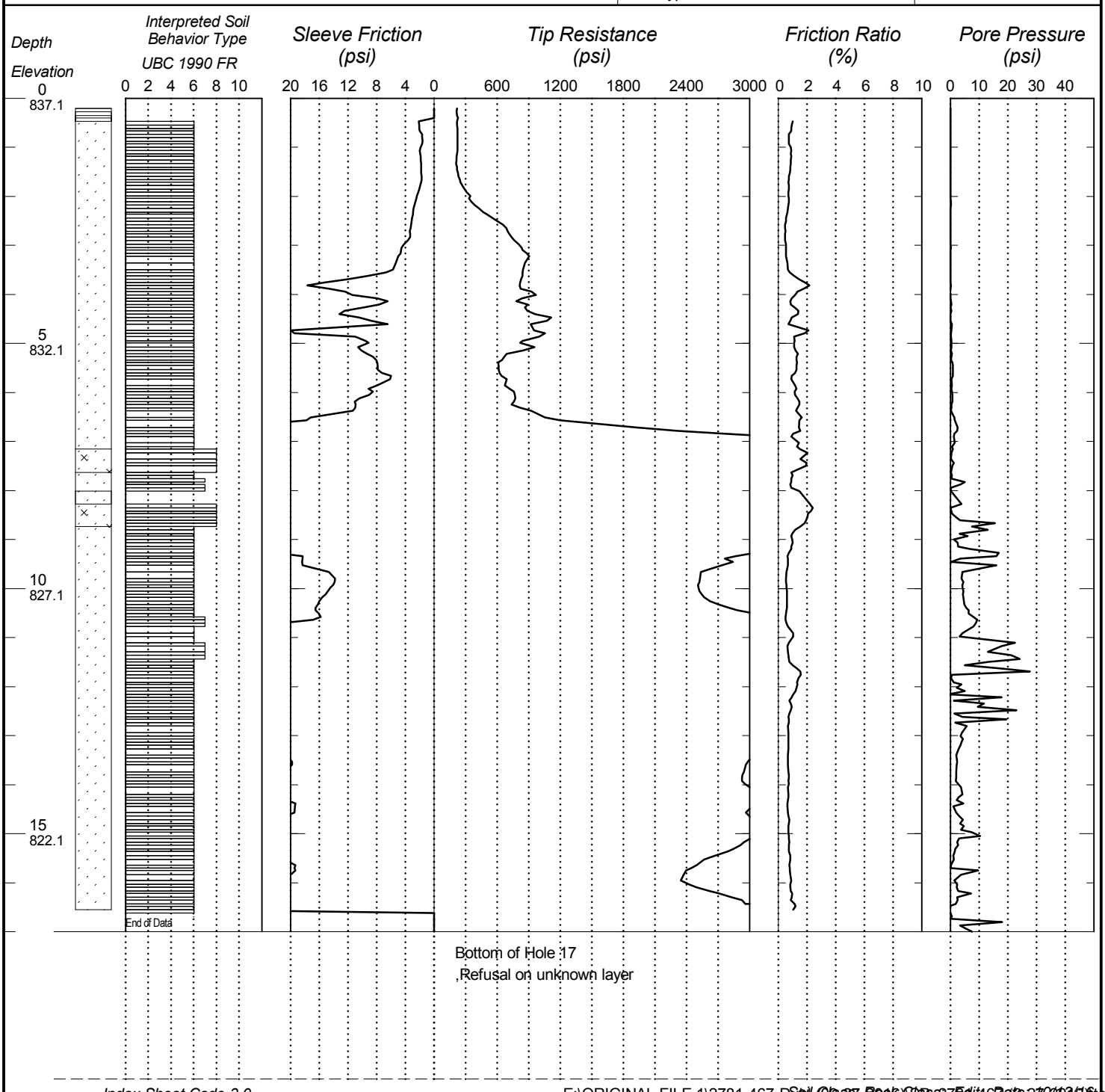
CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 81200

U.S. Customary Units

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
2781-467	**NOISE WALL** 103	**TH 94**	**C09**	**837.1** *(DTM)*

Location		CPT Machine	SHEET 1 of 1
Hennepin Co. Coordinate: X=538886 Y=163350 (ft.)		**203094 CPT Truck**	
Latitude (North)=44°57'53.13" *Longitude (West)=93°13'59.19"*		CPT Operator **Buhl, Dylan**	Date Completed
No Station-Offset Information Available		Hole Type **CPT-STD**	**9/13/16**



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Soil Classification Chart 2781-467 Date 7/20/2016 Test(007)

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MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

LABORATORY LOG & TEST RESULTS - SUBSURFACE EXPLORATION

UNIQUE NUMBER 74085

U.S. Customary Units

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Boring No.	Ground Elevation
2781-415	OH Sign 8 - North	Interstate Highway 94	T05	826.2 (GeoXH(DC))

Location: Hennepin Coord:X=539035 Y=163279 (ft.)

Latitude (North)=44°57'52.43" Longitude (West)=93°13'57.13"

No Station-Offset Information Available

Drill Machine: 207184 CME 850 Track

Hammer: CME Automatic Calibrated

SHEET 1 of 2

Drilling Completed: 9/21/10

DEPTH	Depth / Elev.	Lithology	Classification	Drilling Operation	SPT N_{60} / REC (%)	MC (%) / RQD (%)	COH (psf) / ACL (ft)	γ (pcf) / Core Breaks	Soil / Rock	Other Tests Or Remarks / Formation or Member
5			Sand and Gravel with a thin seam of Sandy Clay Loam, dark brown and moist		9	7				
	7.0 819.2									hard drilling
10			reworked clayey Shale with Limestone pebbles; structureless; very stiff (difficult to cut open split tube samples); dark greenish-gray with gray (Limestone)		16	N/A				
15					20	16				
					22	N/A				
			Top of bedrock	PD						
	18.0 808.2									DECORAH SHALE
20			WEATHERED SHALE, very soft, fissil to blocky, greenish-gray		28	N/A				
	22.0 804.2			PD						
			SHALE; generally fresh; soft; blocky; dark greenish-gray: limestone bed (0.1') approx at 35.5 ft: hard; dark gray		38	N/A				
25										

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(Continued Next Page)

Soil Class:DSB Rock Class: CRH Edit: Date: 8/31/16

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MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

LABORATORY LOG & TEST RESULTS - SUBSURFACE EXPLORATION

UNIQUE NUMBER 74085

U.S. Customary Units

Mn/DOT GEOTECHNICAL SECTION - LOG & TEST RESULTS *SHEET 2 of 2*

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Boring No.	Ground Elevation
2781-415	**OH Sign 8 - North**	**Interstate Highway 94**	**T05**	**826.2** *(GeoXH(DC))*

DEPTH	Depth / Elev.	Lithology	Classification	Drilling Operation	SPT N_{60} (%) REC	MC (%) RQD	COH (psf) ACL (ft)	γ (pcf) Core Breaks	Soil / Rock	Other Tests Or Remarks / Formation or Member
30			SHALE; generally fresh; soft; blocky; dark greenish-gray: limestone bed (0.1') approx at 35.5 ft: hard; dark gray *(continued)*	PD	27	N/A				harder drilling 32.5'-33.5'
				PD						
35					25	NA				
	36.1 / 790.1		LIMESTONE; generally fresh with some weathering (discoloration) in joints: hard: thin bedded; occ thin whispy argillaceous zones; thin shale layer at 37.4'; bentonite bed (`0.05') at 38.3'; calcite & pyrite-lined void at 38.7'; hard; thin bedded; lt to dk		100	100	0.75	5		PLATTEVILLE FORMATION Carimona Member
	39.0 / 787.2									Magnolia Member
40								2		
			LIMESTONE; fresh; fossiliferous; hardground at the top; hard; medium to thick bedded; light olive gray		100	100	2.50	1		
45	45.8 / 780.4		Bottom of Hole - 45.8'							

No water encountered or measured during drilling

Soil Class:DSB Rock Class: CRH Edit: Date: 8/31/16

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MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

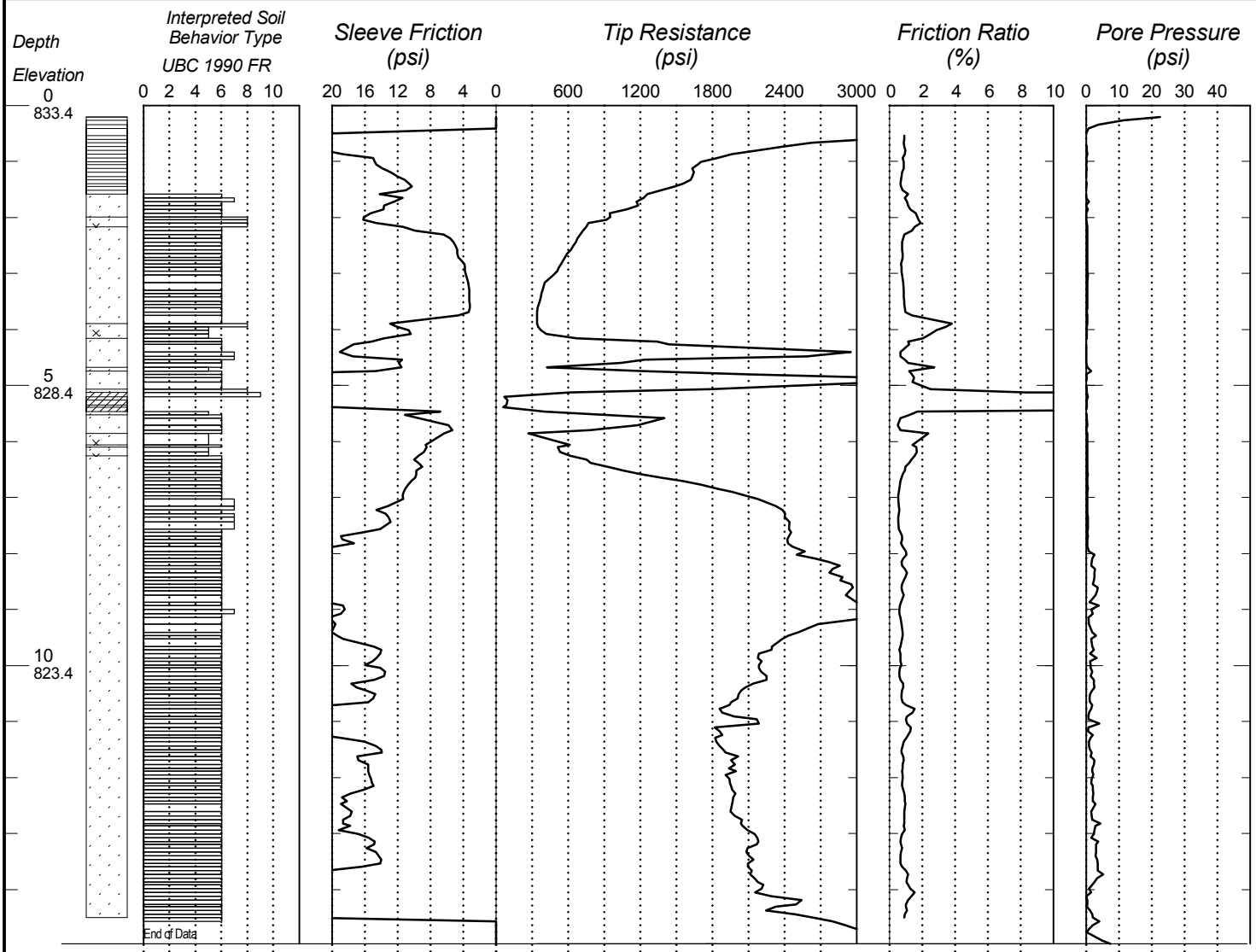
CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 81199

U.S. Customary Units

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
2781-467	**NOISE WALL** 103	**TH 94**	**C06**	**833.4** *(DTM)*

Location **Hennepin Co. Coordinate: X=539334 Y=163359** (ft.)	*CPT Machine* **203094 CPT Truck**	*SHEET 1 of 1*
Latitude (North)=44°57'53.21" *Longitude (West)=93°13'52.96"*	*CPT Operator* **Buhl, Dylan**	*Date Completed*
No Station-Offset Information Available	*Hole Type* **CPT-STD**	**9/13/16**



Bottom of Hole 14.97
,Refusal on unknown layer

MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

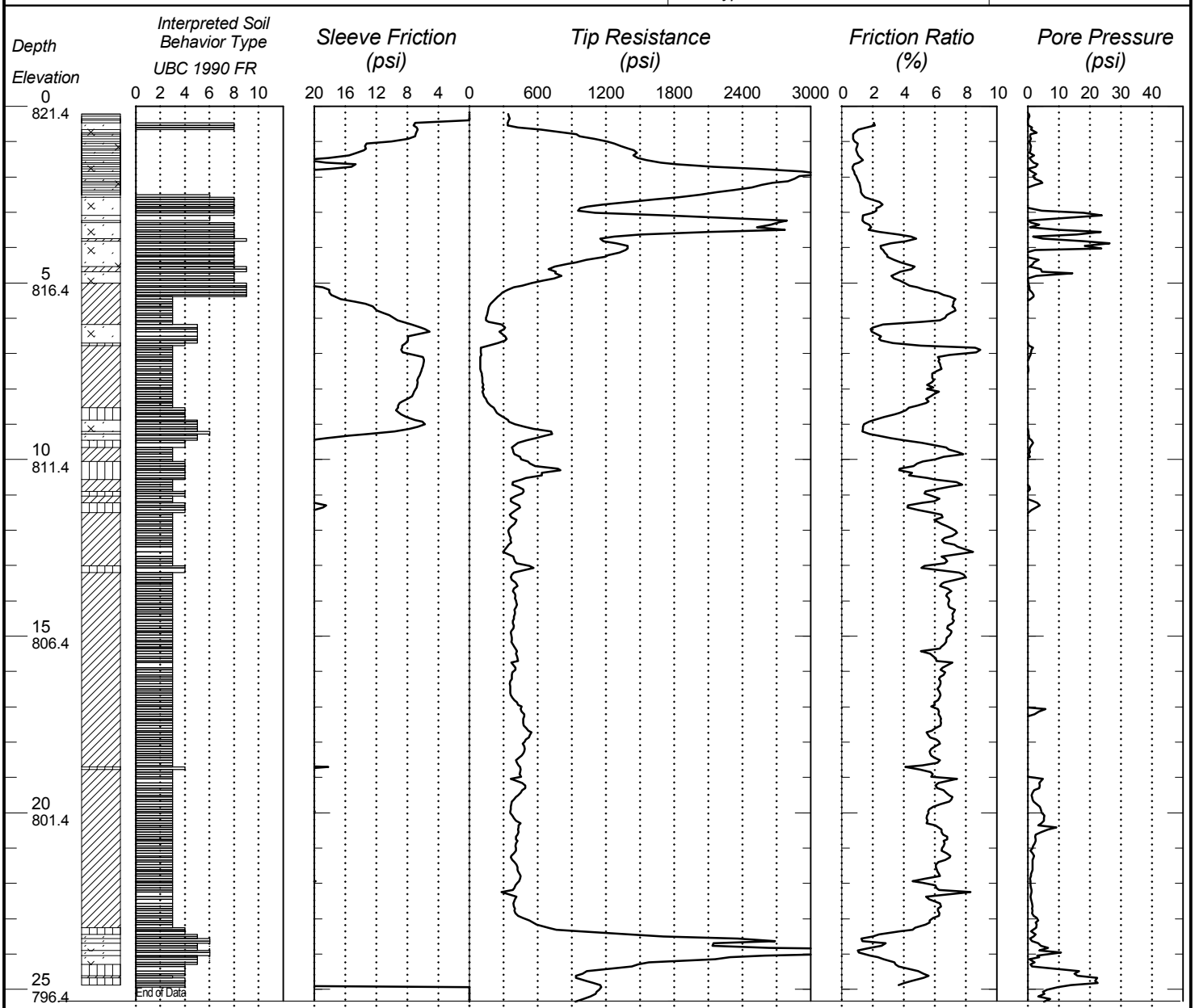
CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 81198

U.S. Customary Units

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
2781-467	**NOISE WALL** 103	**TH 94**	**C02**	**821.4** *(DTM)*

Location		CPT Machine	SHEET 1 of 1
Hennepin Co. Coordinate: X=539750 Y=163379 (ft.)		**203094 CPT Truck**	
Latitude (North)=44°57'53.40" *Longitude (West)=93°13'47.17"*		CPT Operator **Buhl, Dylan**	Date Completed
No Station-Offset Information Available		Hole Type **CPT-STD**	**9/13/16**



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