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

Memo

Date: March 12, 2024

To: Eric Peterson, Project Manager
Metro District

From: Chelsey Brummer, Senior Engineer
Geotechnical Section

Chelsey Brummer
Digitally signed by Chelsey Brummer
Date: 2024.03.12 09:57:04 -05'00'

Concur: Joe Nietfeld, Principal Engineer
Geotechnical Section

Digitally signed by Joe Nietfeld
Date: 2024.03.12 10:00:43 -05'00'

Subject: S.P. 8825-1126 Metro Wide Overhead Signs
Foundations Analysis and Design Recommendations Report

1.0 Project Description

This letter provides a foundation analysis and recommendations for the replacement of 15 overhead signs in the metro district. All signs except OH I35W-576 and OH I35W-578 will be cantilever signs with either design D posts or monotube posts. OH I35W-576 and -578 will be overhead head bridge signs with design D posts.

2.0 Field Investigation and Foundation Conditions

Seventeen Cone Penetration Tests (CPT Soundings) were advanced in February and March 2024 at the locations the overhead signs will be placed by MnDOT staff. One historic CPT Sounding was advanced in July 2019 where one of the posts for OH I494-508 will be placed. A copy of the CPT Sounding results is attached to this report.

Interstate 35W (I35W): control section 6284 & 2783

Nine CPT Soundings were taken along I35W and I35W entrance/exit ramps. The soundings generally consist of loose to dense sand with layers of firm clay and silt. CPT Soundings c101, c103 and c103a varied from the general characteristics, and encountered dense to very dense sand with refusal depths between 5 and 23 feet. The CPT Soundings for OH I35W-577 and 578 encountered shallow refusal, however nearby historic CPT Soundings and Standard Penetration Tests (SPT Borings) indicate the presence of large cobbles and boulders near the proposed overhead sign location. See Section 3.3 below for construction considerations for boulder removal. Rock sockets are not needed.

The soundings were terminated between 4 and 49 feet. No groundwater was measured during subsurface investigation.

Interstate 94 (I94): control section 2786, 6282, &6283

Six CPT Soundings were taken along I94. The soundings generally consist of dense to very dense sand. Sounding c105 encountered a 12-foot layer of firm clay from 13-26 feet and sounding c107a encountered hard clay from 9 to 14 feet. The CPT Sounding for OH I94-844 encountered shallow refusal, however nearby historic CPT Soundings and Standard Penetration Tests (SPT Borings) indicate the presence of

large cobbles and boulders near the proposed overhead sign location. See Section 3.3 below for construction considerations for boulder removal. Rock sockets are not needed.

The soundings were terminated between 15 and 49 feet. No groundwater was measured during subsurface investigation.

Minnesota 62 (MN 62): control section 2763

One sounding was taken on MN 62 near Eden Prairie, MN. The sounding encountered 30 feet of medium dense to dense sand and sandy soils on top of alternating layers of hard to very hard clay and silt and dense sand.

The sounding was terminated at 49 feet. No groundwater was measured subsurface investigation.

Minnesota 100 (MN 100): control section 2733

Five CPT Soundings were taken along MN 100. The soundings generally encountered loose to dense sand. CPT soundings c111, c111a, c112 and c112a encountered shallow refusal between 11 and 29 feet. The MnDOT Geology unit was consulted and after examining nearby wells, they determined that it was highly unlikely that bedrock was encountered. Generally, the area shows very dense sand and gravel and very hard clay with many occurrences of cobbles and boulders. Based on the CPT sounding refusal and known geological stratigraphy in the area, we anticipate boulders will be encountered during drilled shaft construction along TH 100. See Section 3.3 below for construction considerations for boulder removal. Rock sockets are not needed.

The soundings were terminated between 16 and 47 feet. No groundwater was measured during subsurface investigation.

Minnesota 101 (MN 101): control section 2738

Three CPT Soundings were taken along MN 101. The soundings generally encountered stiff to firm clay and silt. Sounding c114 terminated in dense to very dense sand near 49 feet and sounding c115 encountered dense to very dense sandy soils from 39 to 45 feet.

The soundings were terminated at 49 feet. No groundwater was measured during subsurface investigation.

Interstate 494: control section 2785

Two CPT Soundings were taken along I494. The soundings generally encountered medium dense sandy soils and firm silt and clay. Sounding c116 terminated in dense sand at 25 feet and sounding c117 terminated in firm clay at 49 feet. The CPT Sounding for OH I494-508 encountered shallow refusal, however nearby historic CPT Soundings and Standard Penetration Tests (SPT Borings) indicate the presence of large cobbles and boulders near the proposed overhead sign location. See Section 3.3 below for construction considerations for boulder removal. Rock sockets are not needed.

No groundwater was measure during subsurface investigation.

3.0 Foundation Analysis

Based on review of preliminary plans, the proposed overhead signs will be new construction. See table 1 for a summary of overhead sign numbers and structure type.

The foundation analysis consisted of verifying that the foundation soil properties met the minimum values as required by MnDOT standard plan 5-297.763 for design D signs and standard plan 5-297.746 for monotube signs. The standards assume for granular soils the foundations soils have a friction angle of

30°, a unit weight of 125pcf, a maximum coefficient of friction of 0.70 and for cohesive soils a minimum shear strength of 1ksf and a unit weight of 125±10 pcf. Groundwater elevation is required to be at least 1.5 ft below finished grade for drilled shafts.

Based on review of the existing subsurface conditions at the proposed overhead sign footing locations, it has been determined that generally the soils **meet** the minimum requirements of the standard plans except OH MN101-013. A special analysis for this sign is described in Section 3.1. Groundwater was not measured during the subsurface investigation. If groundwater is encountered within 1.5 feet of the surface, this office should be contacted for a revised design.

Table 1. Summary of Overhead Signs

OH Sign	Point	Trunk Highway	Post Type	Shaft Diameter	Shaft Depth	Special Considerations	nearby SPT borings
OH I35W-576	c100	I-35W	6	4'-3"	29'	Perm. Casing Required	W6E1 Unique ID 57996/57997
OH I35W-576	c101	I-35W	6E	4'-3"	29'		
OH I35W-577	c102	I-35W	4E	3'-6"	23'	Shallow CPT Refusal-possible boulders	W6E1 Unique ID 57996/57997
OH I35W-578	c103	I-35W Ramp	monotube	3'-0"	15'-6"	Shallow CPT Refusal- possible boulders	T-2 Unique ID 3178
OH I35W-578	c104	I-35W Ramp	monotube	3'-0"	15'-6"		
OH I94-842	c105	I-94	4E	3'-6"	23'		
OH I94-843	c106	I-94	4E	3'-6"	23'		
OH I94-844	c107	I-94	2E	3'-6"	23'	Shallow CPT Refusal-possible boulders	S27-2 Unique ID 2282
OH I94-844	c108	I-94	changed to cantilever sign see sounding c107				
OH MN62-092	c109	TH 62	5E	4'-3"	29'		
OH MN100-144	c110	TH 100	5E	4'-3"	29'		
OH MN100-145	c111	TH 100	5E	4'-3"	29'	Shallow CPT Refusal-possible boulders	T-7 Unique ID 000545
OH MN100-148	c112	TH 100	6E	4'-3"	29'	Shallow CPT Refusal-possible boulders	

OH MN101-013	c113	TH 101/I-94	monotube	3'-0"	22'	Low unit weight Requires 22' shaft	
OH MN101-014	c114	TH 101	monotube	3'-0"	15'-6"		
OH MN101-015	c115	TH 101	monotube	3'-0"	15'-6"		
OH I494-508	c116	I-494/Flying Cloud Drive	6/6E	4'-3"	29'	Shallow CPT Refusal-possible boulders Perm. Casing Required	c21/21a-Unique ID 84289/84290
OH I494-526	c117	I-494	6E	4'-3"	29'		

3.1 Special Design Considerations

We performed a special design for OH MN 101-013 due to soft clay and silt encountered that **do not** meet the minimum requirements for unit weight based on standard plan 5-297.746. The soils near the proposed location show soft to firm clay and silt with a unit weight of 110-115 pcf. MnDOT Bridge Office staff provided us service and extreme event II limit state loads for the overhead sign below:

Table 2. OH MN 101-013 loads.

Limit State	Vertical (kips)	Horizontal (kips)	Mx (ft-lbs)
Service Limit State	7.2	2.57	47,741
Extreme Event II	7.92	6.406	119,022

3.1.1 Geotechnical Strength Limit State with Extreme Event II Limit State loads

We modeled the shaft in Lpile 2022.12.07 and used the Soft Clay p-y curve to model the upper (0-18') of soft clay and silt and Stiff Clay w/o free water to model the lower stiff clay. The Lpile analysis shows that a shaft length of 22 feet is stable and the deflection curve crosses zero for the second time. Also, after 22 feet an increase in shaft length does not decrease the deflection.

3.1.2 Horizontal movement at the top of the shaft at the Service Limit State.

For the service limit state, we calculated the horizontal movement at the top of the shaft with a length of 22 feet to be less than 0.l in. which meets the maximum lateral movement criteria of 1 in. for this structure.

3.1.3 Permanent Casing Requirements

OH I35W-576 and OH I494-508 require a 6-foot permanent casing to ensure that existing gas and water utilities within 10 feet of the proposed shaft are not impacted during construction.

3.2 Settlement

We estimated the settlement of the new overhead sign based on the following assumptions:

A. The final grade at the overhead sign will not be raised.
B. Drilled shafts are constructed to the depth recommended in table 1.
C. The service limit state vertical load is 7.2 kips or less.

We evaluated the settlement using the program Settle3 for all the overhead signs and determined that all signs will meet the minimum requirement of 1 inch or less of settlement.

3.3 Construction considerations

For OH MN100-145, 148, OH I494-508, OH I35W-577 and 578, and OH I94-844 cobbles and boulders will likely be encountered during drilled shaft excavation. Modified single-helix augers, coring and/or impact hammers tooling may be needed to remove the cobbles and boulders. Also cobble mixtures where the soil matrix is loose and granular, may be susceptible to caving and sloughing, and usually require temporary casing to stabilize the drilled shaft side walls. MnDOT and the contractor should incorporate the extra tooling, temporary casing, and time required to remove the cobbles and boulders into the schedule and bid for this project.

4.0 Foundation Recommendations

Based on the existing conditions along with an analysis of the project soils, we recommend that:

1. The overhead signs be constructed in accordance with MnDOT standard plan 5-297.763 for design D signs and 5-297.746 for monotube signs.

2. OH MN101-013 be constructed in accordance with MnDOT standard plan 5-297.746 but have a shaft depth of 22 feet.

3. OH I35W-576 and OH I494-508 be constructed per MnDOT standard plan 5-297.763 but include a 6-foot permanent casing for utility protection.

4. The contractor is notified of the subsurface conditions for this site, specifically the cobbles and boulders that will likely be encountered during drilled shaft excavation for OH MN100-145, 148, OH I494-508, OH I35W-577 and 578, and OH I94-844. At a minimum, this Foundation Analysis and Design Report should be put in the reference information documents (RID) for the project.

5. This office be contacted for revised foundation recommendations if the foundation soils differ from those described in this report or if groundwater is encountered within 1.5 feet of finished grade.

Attachments: CPT Location Plan
OH Sign Cross Section View
CPT Index
CPT Sounding Logs

cc: Shelly Pederson (Metro District Soils Engineer)
Dave Van Deusen (Metro District Materials Engineer)
Lars Impola (Metro District Traffic Engineer)
Brad Skow (Geotechnical Unit Manager)
Jason Hedeen (Geotechnical Asset Manager)

Fulham St

MN 36 Service Road

c100

35W SB

35W NB

6284

c101

c101a

CPT Investigation Plan

STATE PROJ. NO. 8825-1126 (TH 35W) SHEET NO. 1 OF 15 SHEETS

alnut St.

280 SB

c102a

c102b

c102

35W SB

35W NB

6284

280 NB to 36 EB

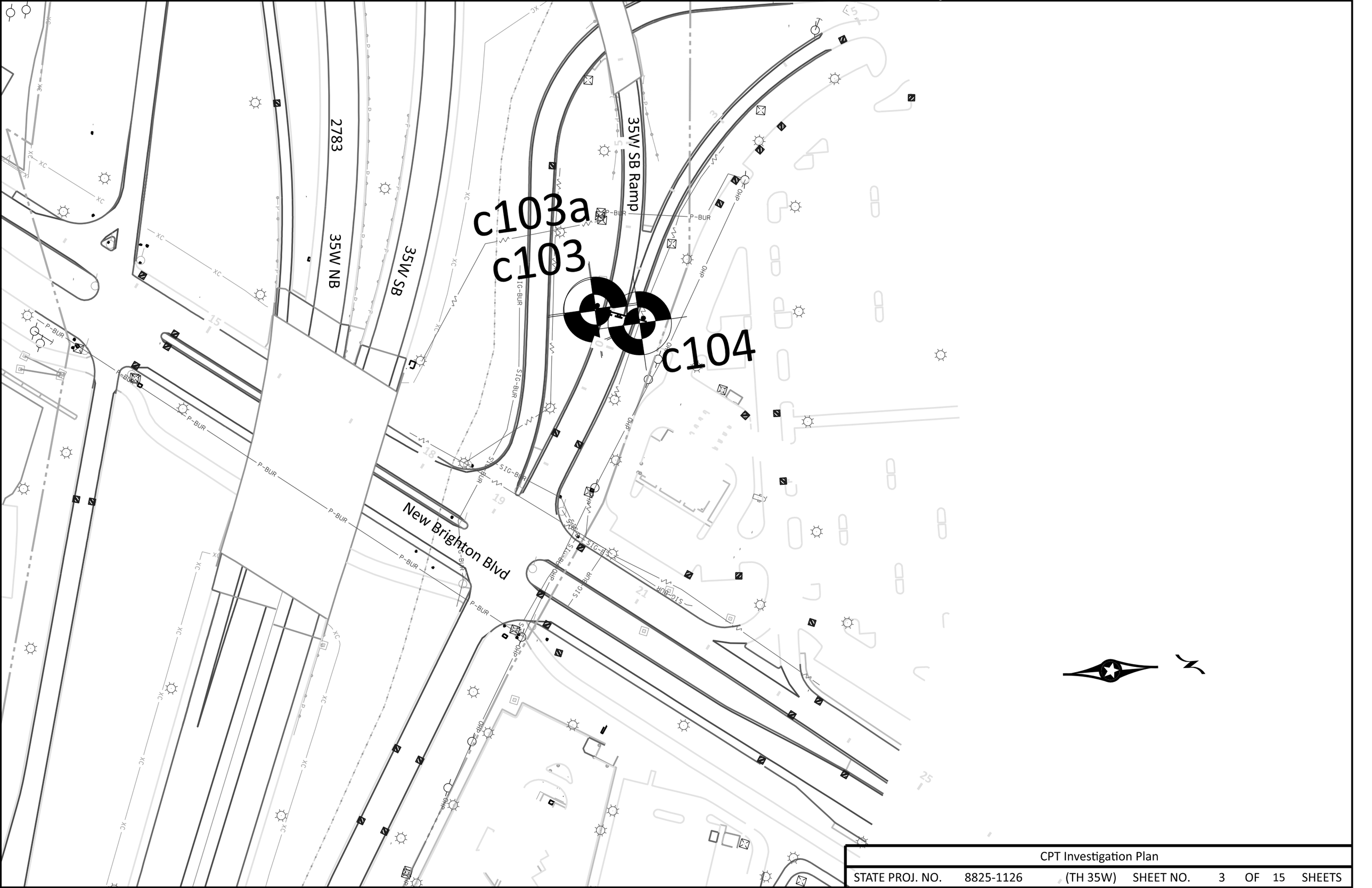
6241

Br. 62853

TH 36 EB

CPT Investigation Plan

STATE PROJ. NO. 8825-1126 (TH 35W) SHEET NO. 2 OF 15 SHEETS



CPT Investigation Plan

STATE PROJ. NO.	8825-1126	(TH 35W)	SHEET NO.	3	OF	15	SHEETS

Beard Ave N

67th Ave N

c105

1175

1180

1185

94 WB

94 EB

2786

66th Ave N

Beard Ave N

CPT Investigation Plan

STATE PROJ. NO. 8825-1126 (TH 94) SHEET NO. 4 OF 15 SHEETS

St Anthony Ave

C106

205

209

94 WB

6282

94 EB

Concordia Ave

Chatsworth St N

CPT Investigation Plan

STATE PROJ. NO.	8825-1126	(TH 94)	SHEET NO.	5	OF	15	SHEETS

c108a

c108

c107

c107a

94 WB

94 EB

9th St E

CPT Investigation Plan

STATE PROJ. NO. 8825-1126 (TH 94) SHEET NO. 6 OF 15 SHEETS

TH62

TH 212 WB

2763

TH 212 EB

2773

TH62

c109

CPT Investigation Plan

STATE PROJ. NO. 8825-1126 (TH 62) SHEET NO. 7 OF 15 SHEETS

W 66TH ST

W 65th St

TH 100 SB

TH 100 NB

2733

c110

EQUATION:
STA 106+38.90 AH =
STA 106+38.90 BK

EQUATION:
STA 108+58.10 AH =
STA 108+56.03 BK

Sherwood Ave

W 65th St

CPT Investigation Plan							
STATE PROJ. NO.	8825-1126	(TH 100)	SHEET NO.	8	OF	15	SHEETS

c111a

c111

W 60th St

W Frontage Rd

TH 100 SB

TH 100 NB

2733

E Frontage Rd

Benton Ave

W 60th St

VALLEY VIEW RD

CPT Investigation Plan

STATE PROJ. NO. 8825-1126 (TH) SHEET NO. 9 OF 15 SHEETS

c112a
c112

Normandale Ct

Yvonne Terrace

W FRONTAGE RD

TH 100 SB

TH 100 NB

2733

E FRONTAGE RD

Wind Rd

South View Ln

CPT Investigation Plan

STATE PROJ. NO. 8825-1126 (TH) SHEET NO. 10 OF 15 SHEETS

Industrial Blvd

94 EB Exit Ramp

94 WB On Ramp

C113

Main St

TH 101

2738

TH 101 SB

TH 101 NB

94 EB On Ramp

94 EB

94 WB

94 WB Exit Ramp

2780

CPT Investigation Plan

STATE PROJ. NO. 8825-1126 (TH) SHEET NO. 11 OF 15 SHEETS

S Diamond Lake Rd

TH 101 SB

TH 101 NB

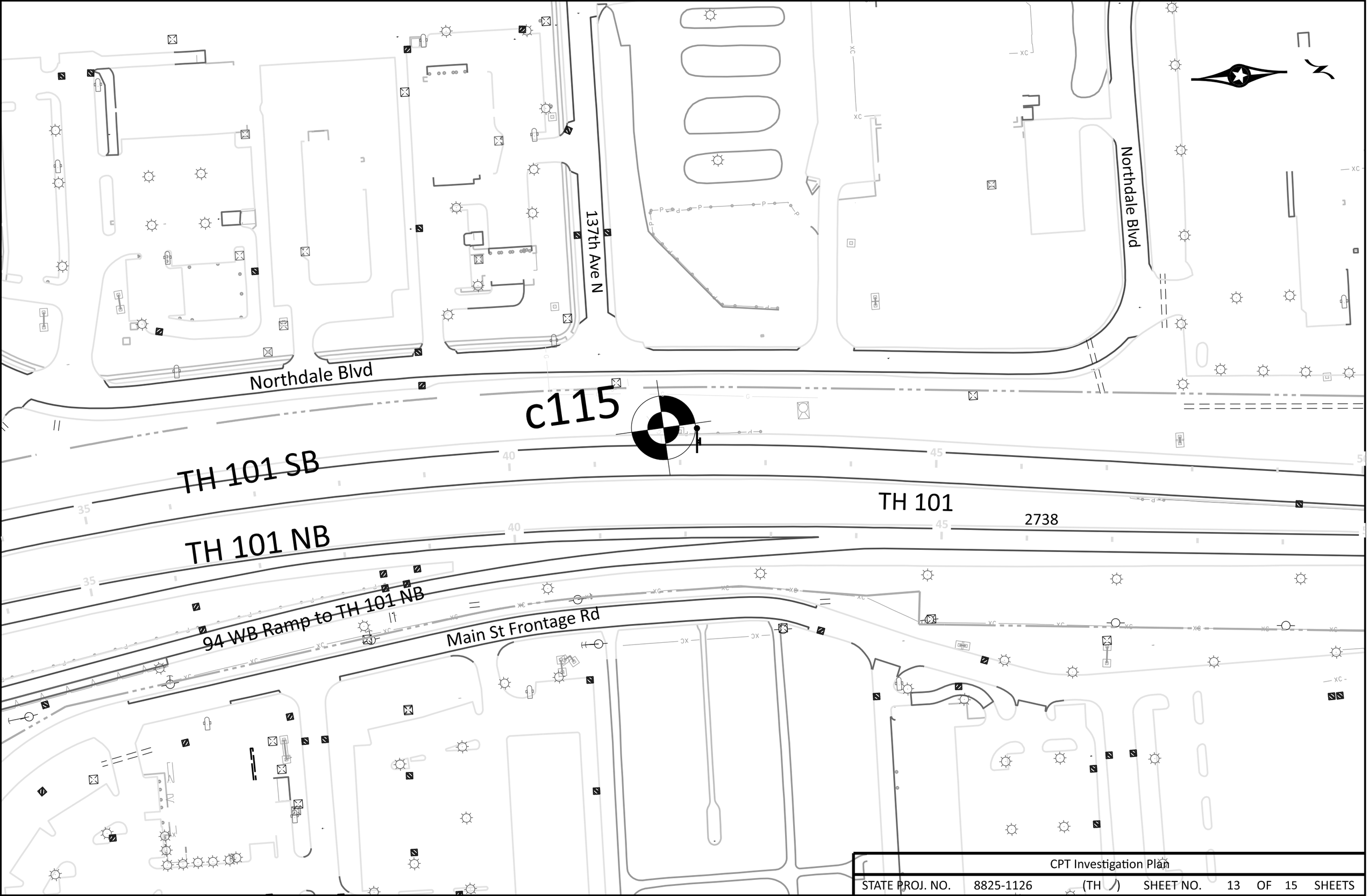
c114

TH 101

2738

CPT Investigation Plan

STATE PROJ. NO. 8825-1126 (TH) SHEET NO. 12 OF 15 SHEETS



CPT Investigation Plan

STATE PROJ. NO. 8825-1126 (TH) SHEET NO. 13 OF 15 SHEETS

TOWN CTR PL

LEONA ROAD

TECHNOLOGY DRIVE

FLYING CLOUD DRIVE

c116

C21a

I-494

P-BUR

OHP

SIG-BUR

P-BI

CPT Investigation Plan

STATE PROJ. NO. SP 8825-1126 (TH 494) SHEET NO. 14 OF 15 SHEETS

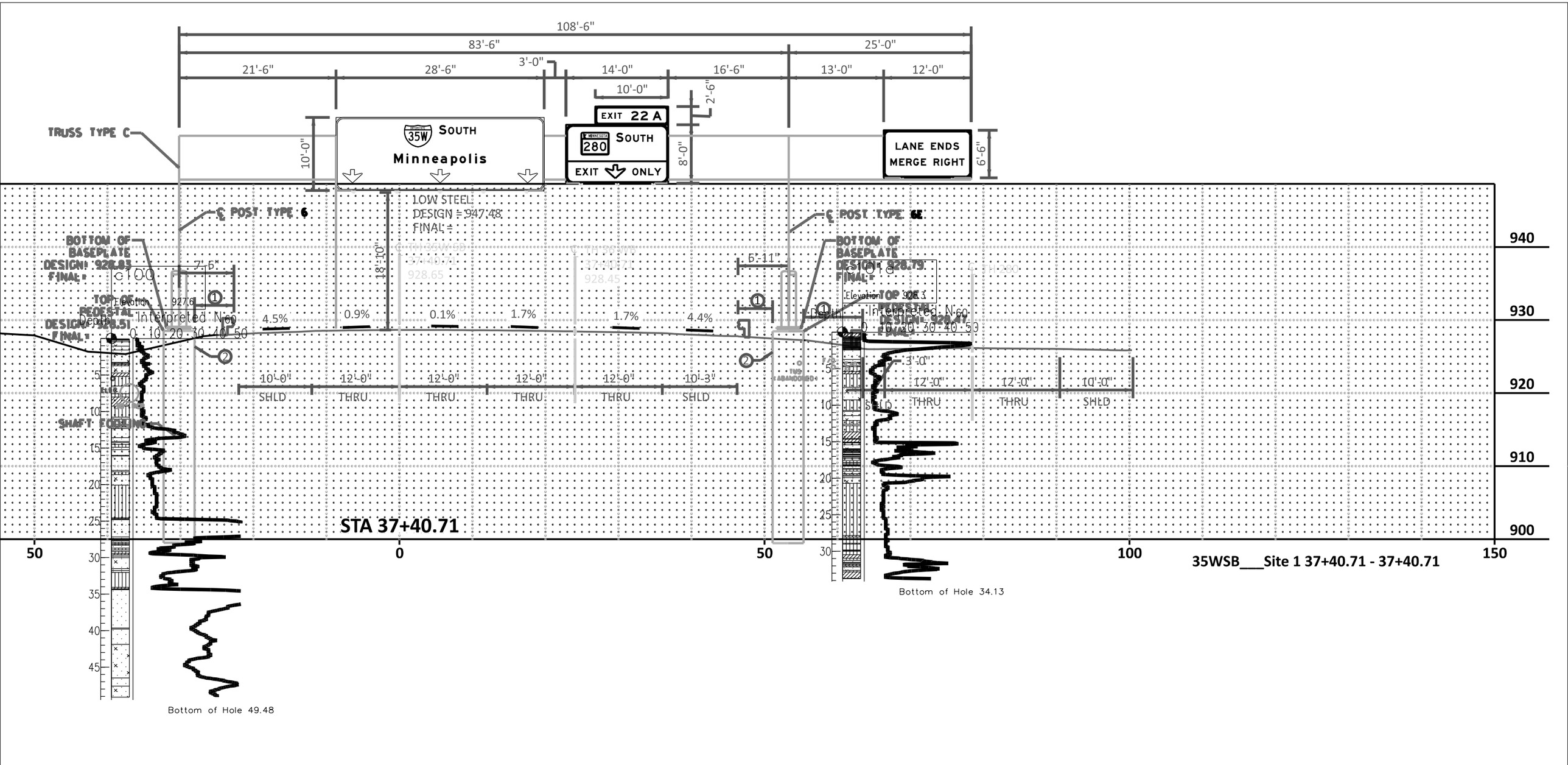
C117

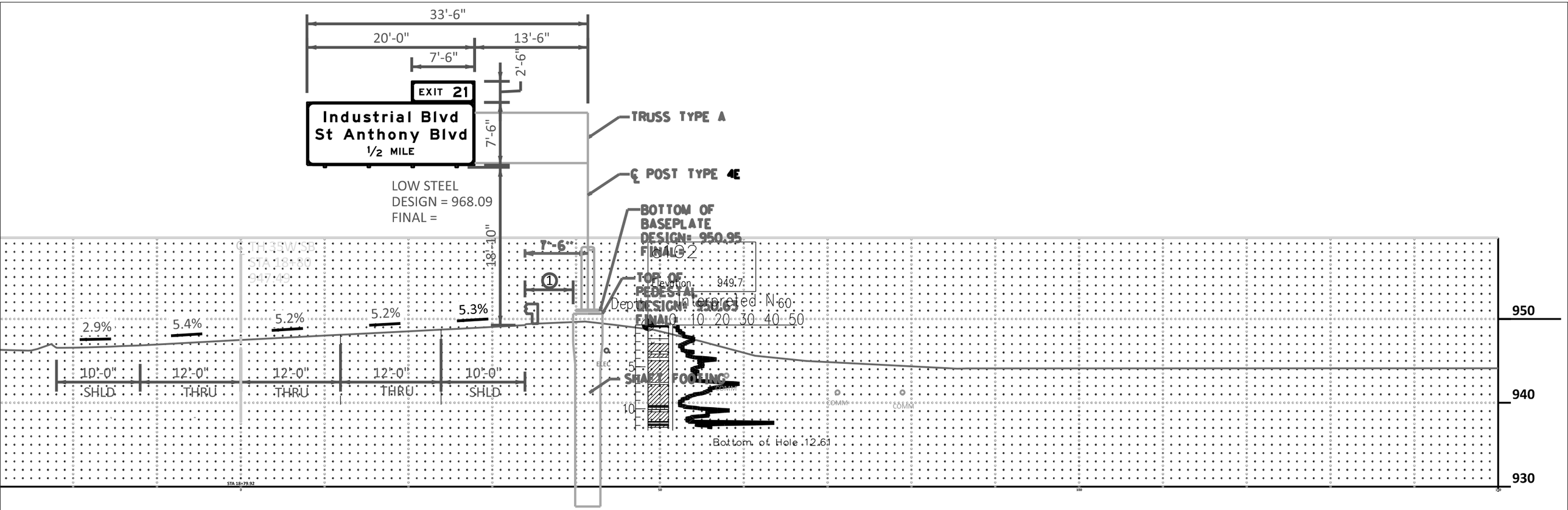
TH 494 WB

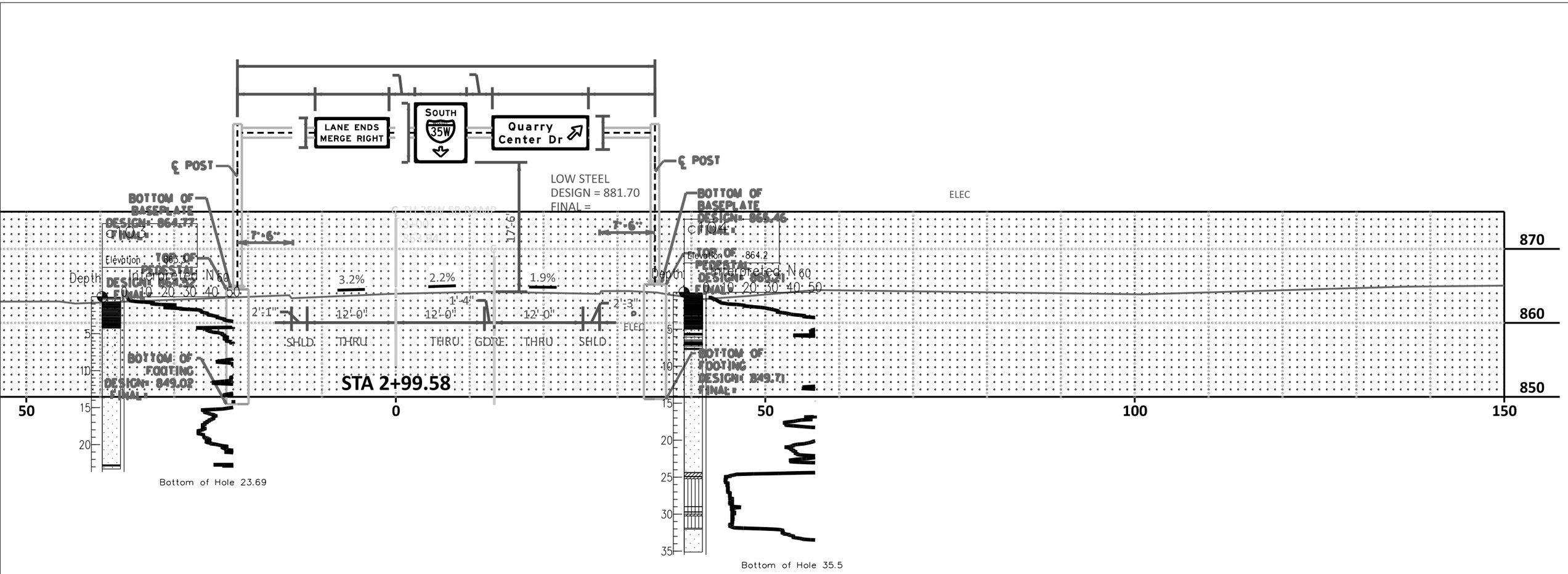
TH 494 EB

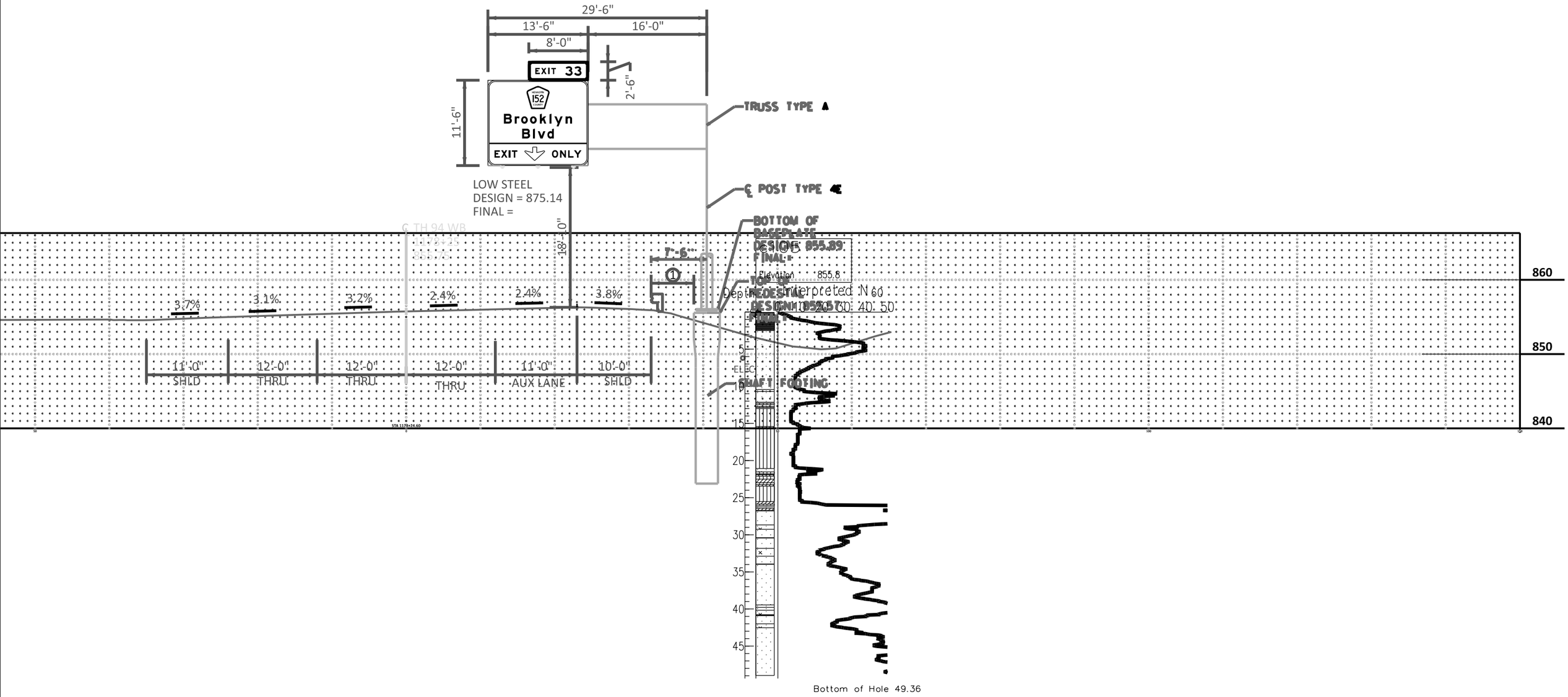
CPT Investigation Plan

STATE PROJ. NO. SP 8825-1126 (TH 494) SHEET NO. 15 OF 15 SHEETS

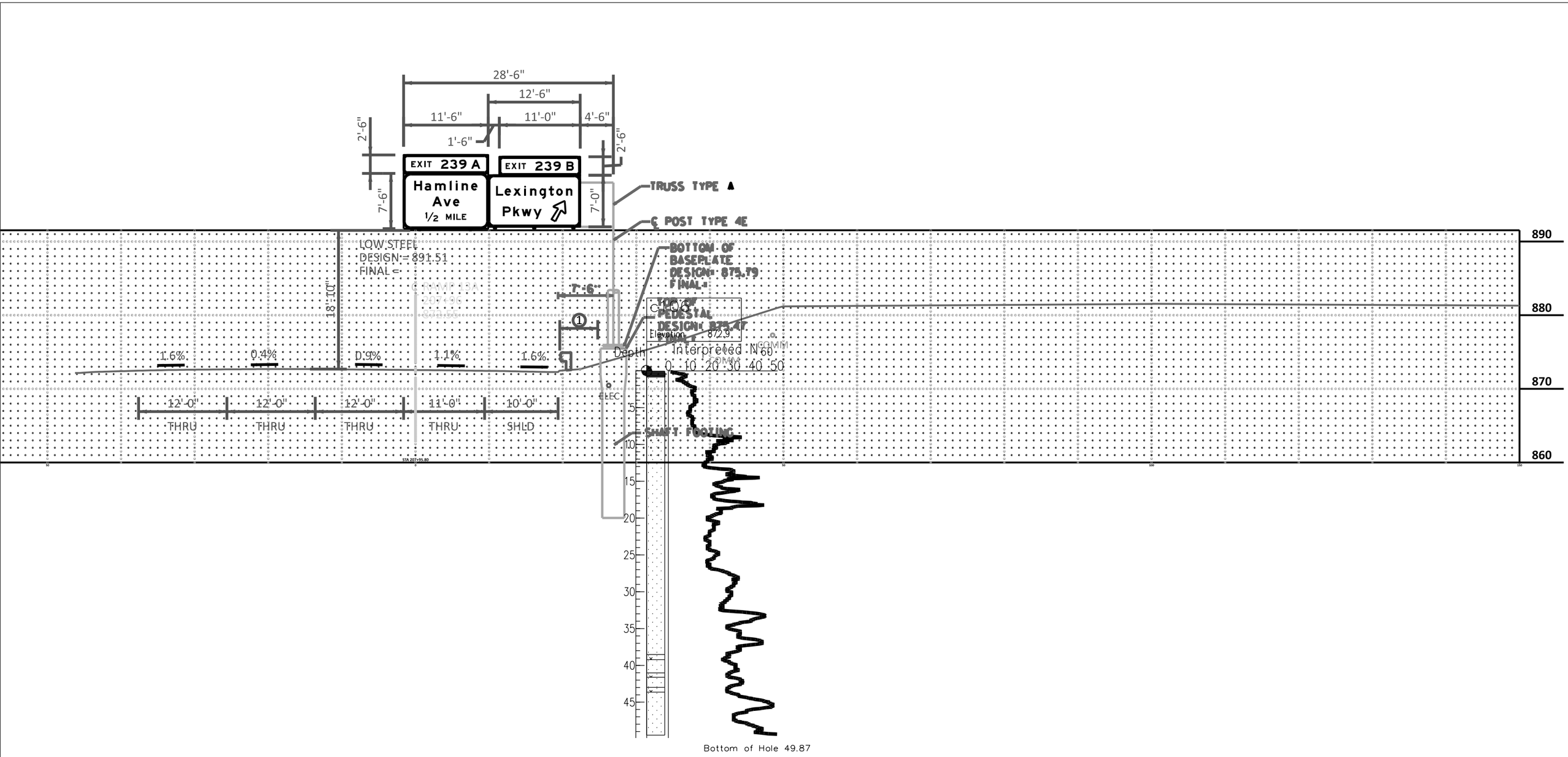

108'-6"
83'-6"
25'-0"
21'-6"
28'-6"
3'-0"
14'-0"
16'-6"
13'-0"
12'-0"
10'-0"
2'-6"
TRUSS TYPE C
10'-0"
35W SOUTH
Minneapolis
EXIT 22 A
MINNESOTA 280 SOUTH
EXIT ONLY
8'-0"
LANE ENDS
MERGE RIGHT
6'-6"
LOW STEEL
DESIGN = 947.48
FINAL =
℄ POST TYPE 6
BOTTOM OF BASEPLATE
DESIGN: 928.83
FINAL =
7'-5"
c to c
TOP OF PEDESTAL
DESIGN: 928.51
FINAL =
18'-10"
Elevation
Depth
927.6
Interpreted N60
0 10 20 30 40 50
4.5%
0.9%
0.1%
1.7%
1.7%
4.4%
10'-0"
12'-0"
12'-0"
12'-0"
12'-0"
10'-3"
SHLD
THRU
THRU
THRU
THRU
SHLD
SHAFT FOOTING
ELEV
STA 37+40.71
℄ POST TYPE 6E
6'-11"
TWO ABANDONED
BOTTOM OF BASEPLATE
DESIGN: 928.79
FINAL =
c to c
TOP OF PEDESTAL
DESIGN: 928.47
FINAL =
Elevation
Depth
928.3
Interpreted N60
0 10 20 30 40 50
3'-0"
12'-0"
12'-0"
10'-0"
SHLD
THRU
THRU
SHLD
940
930
920
910
900
50
0
50
100
150
35WSB___Site 1 37+40.71 - 37+40.71
Bottom of Hole 49.48
Bottom of Hole 34.13

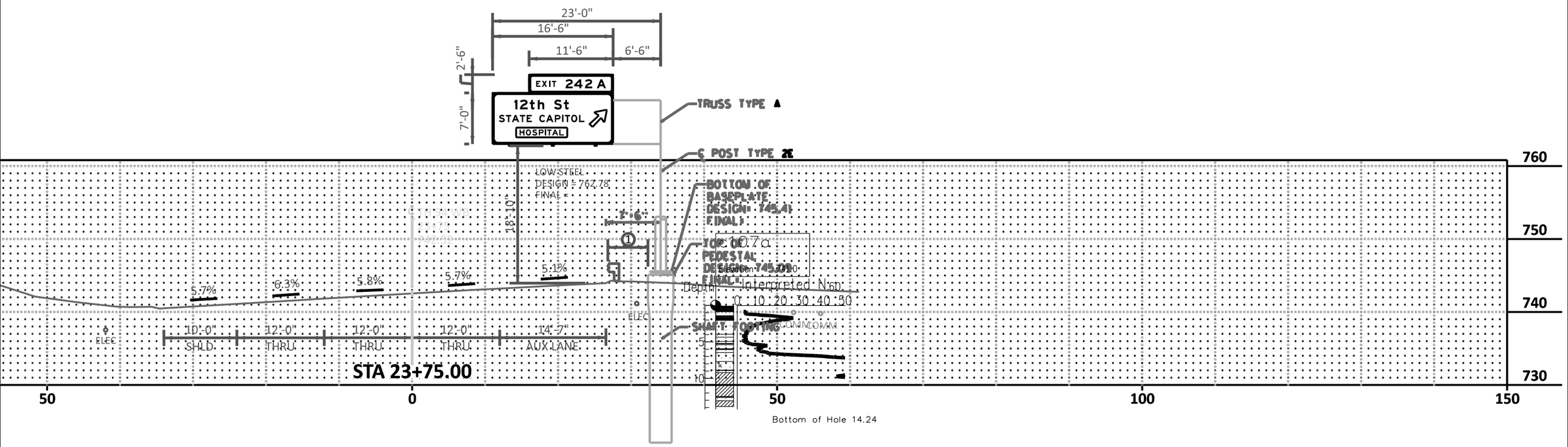

33'-6"
20'-0"
13'-6"
7'-6"
2'-6"
EXIT 21
Industrial Blvd
St Anthony Blvd
1/2 MILE
7'-6"
TRUSS TYPE A
℄ POST TYPE 4E
LOW STEEL
DESIGN = 968.09
FINAL =
BOTTOM OF
BASEPLATE
DESIGN= 950.95
FINAL=
TOP OF
PEDESTAL
DESIGN= 950.63
FINAL=
18'-10"
1'-6"
1
CL 52
STA 18+50
547.6
2.9%
5.4%
5.2%
5.2%
5.3%
10'-0"
SHLD
12'-0"
THRU
12'-0"
THRU
12'-0"
THRU
10'-0"
SHLD
Elevation
949.7
Interpreted N60
0 10 20 30 40 50
5
10
SHAFT FOOTING
ELEC
COMM
COMM
Bottom of Hole 12.61
STA 18+29.92
950
940
930
0
50
100
150


LANE ENDS
MERGE RIGHT
SOUTH
35W
Quarry
Center Dr
℄ POST
℄ POST
LOW STEEL
DESIGN = 881.70
FINAL =
ELEC
BOTTOM OF
BASEPLATE
DESIGN= 864.77
FINAL=
BOTTOM OF
BASEPLATE
DESIGN= 865.46
FINAL=
7'-6"
7'-6"
17'-9"
Elevation
Depth
Interpreted N 60
10 20 30 40 50
TOP OF
PEDESTAL
DESIGN= 864.32
FINAL=
Elevation 864.2
TOP OF
PEDESTAL
DESIGN= 864.1
FINAL=
3.2%
2.2%
1.9%
2'-1"
12'-0"
12'-0"
1'-4"
12'-0"
2'-3"
SHLD.
THRU
THRU
GORE
THRU
SHLD.
ELEC
BOTTOM OF
FOOTING
DESIGN= 849.02
FINAL=
BOTTOM OF
FOOTING
DESIGN= 849.71
FINAL=
STA 2+99.58
870
860
850
50
0
50
100
150
5
10
15
20
25
30
35
Bottom of Hole 23.69
Bottom of Hole 35.5

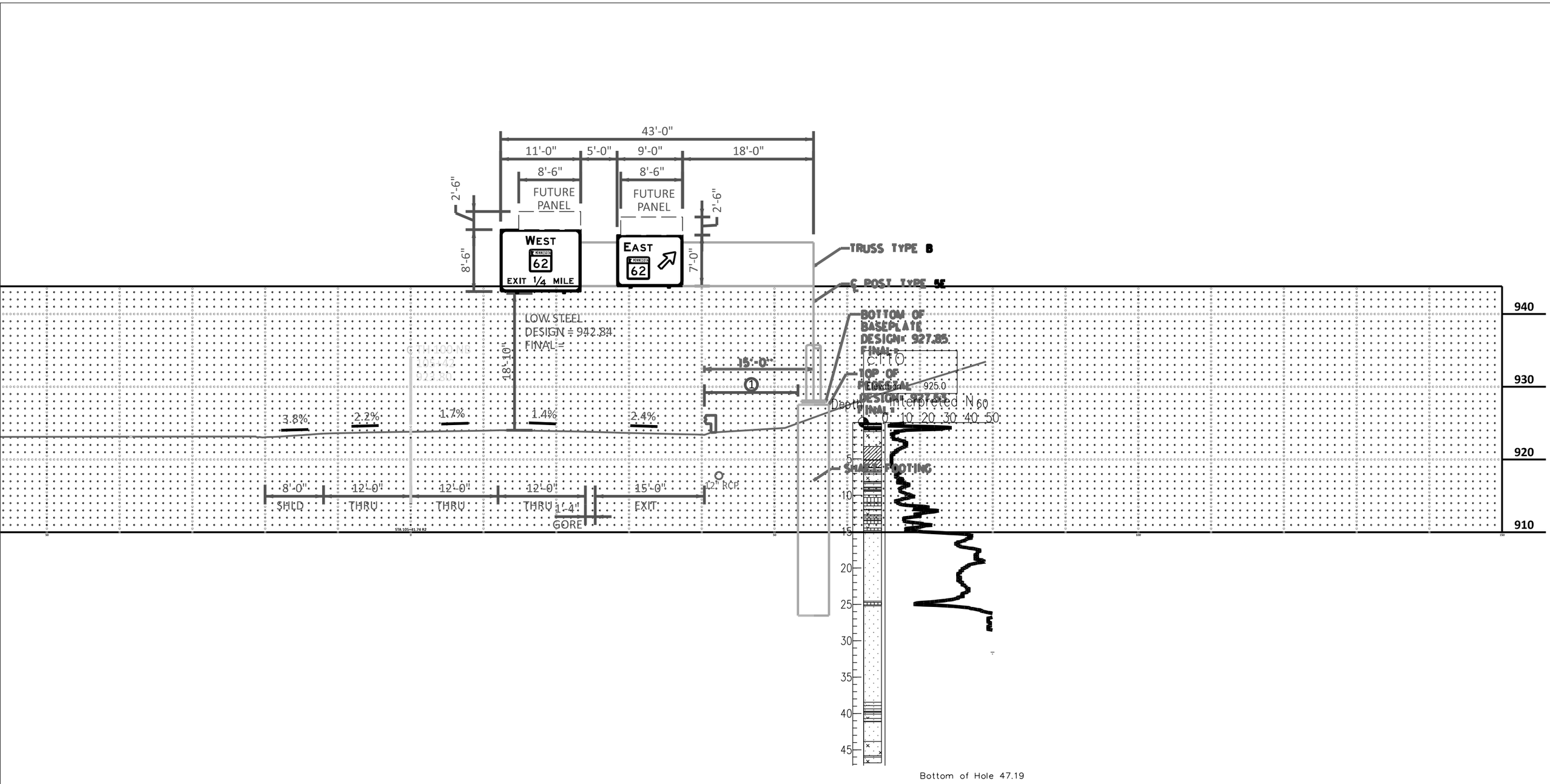


Bottom of Hole 49.36

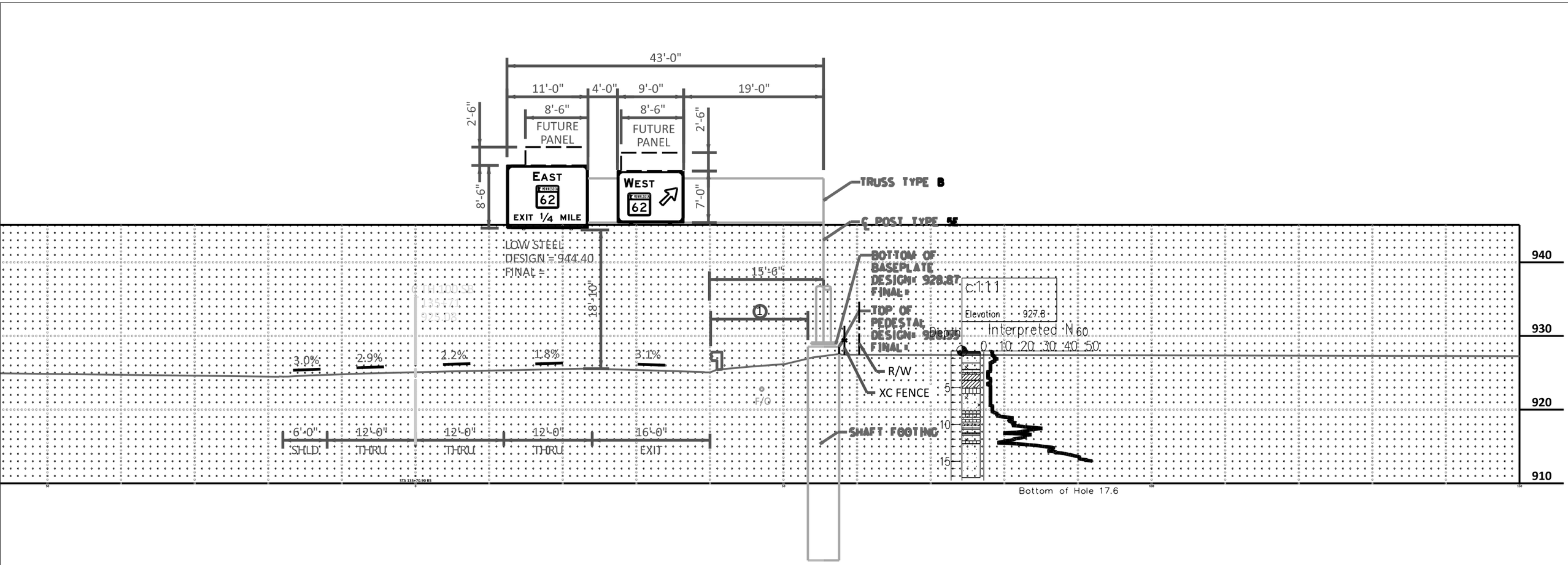

28'-6"
12'-6"
11'-6"
11'-0"
4'-6"
1'-6"
2'-6"
2'-6"
EXIT 239 A
EXIT 239 B
Hamline Ave
1/2 MILE
Lexington Pkwy
7'-6"
7'-0"
TRUSS TYPE A
℄ POST TYPE 4E
LOW STEEL
DESIGN = 891.51
FINAL =
BOTTOM OF BASEPLATE
DESIGN= 875.79
FINAL=
TOP OF PEDESTAL
DESIGN= 875.47
FINAL=
18'-10"
7'-6"
1
Elevation
872.9
Depth
Interpreted N 60
0 10 20 30 40 50
1.6%
0.4%
0.9%
1.1%
1.6%
12'-0"
12'-0"
12'-0"
11'-0"
10'-0"
THRU
THRU
THRU
THRU
SHLD
ELEC
SHAFT FOOLING
890
880
870
860
5
10
15
20
25
30
35
40
45
Bottom of Hole 49.87

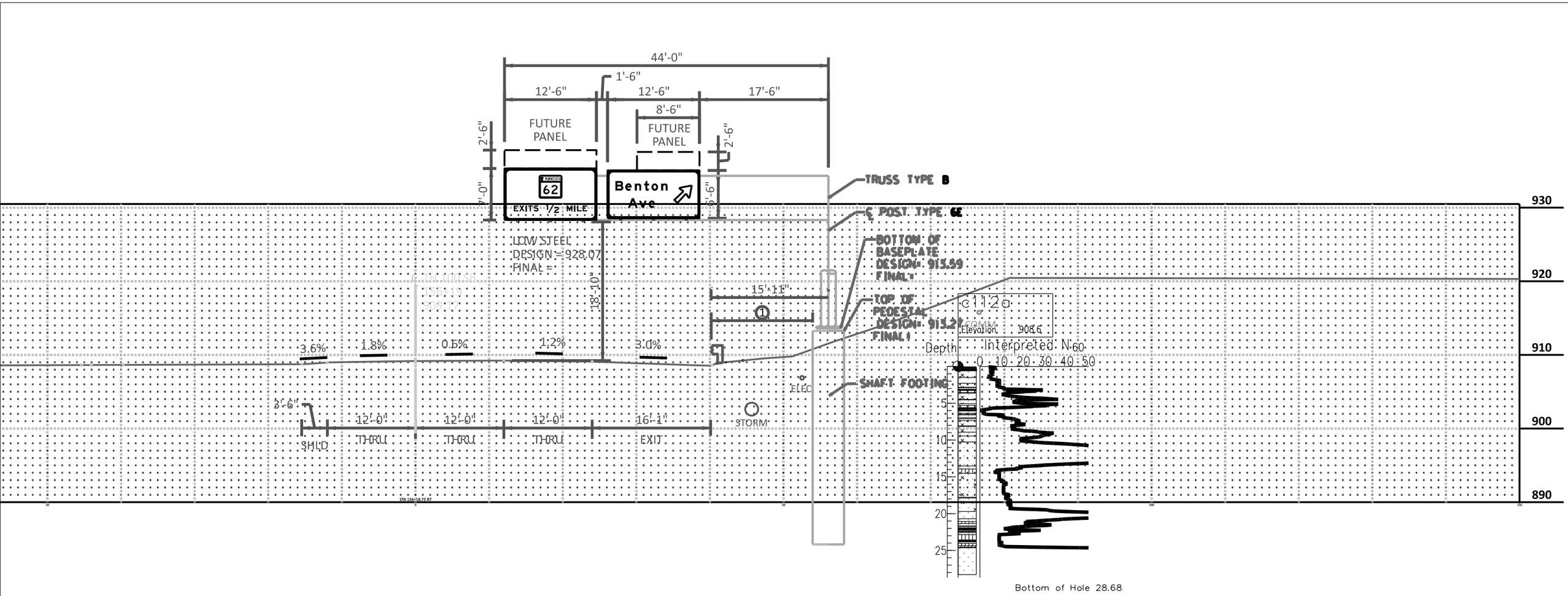

23'-0"
16'-6"
11'-6"
6'-6"
2'-6"
7'-0"
EXIT 242 A
12th St
STATE CAPITOL
HOSPITAL
TRUSS TYPE A
℄ POST TYPE 2E
LOW STEEL
DESIGN = 762.78
FINAL =
18'-10"
BOTTOM OF
BASEPLATE
DESIGN= 745.41
FINAL=
TOP OF
PEDESTAL
DESIGN= 745.29
FINAL=
Elevation
Depth
Interpreted N60
0 10 20 30 40 50
SHAFT FOOTING
5.7%
6.3%
5.8%
5.7%
5.1%
ELEC
10'-0"
SHLD
12'-0"
THRU
12'-0"
THRU
12'-0"
THRU
14'-7"
AUX LANE
STA 23+75.00
760
750
740
730
50
0
50
100
150
Bottom of Hole 14.24

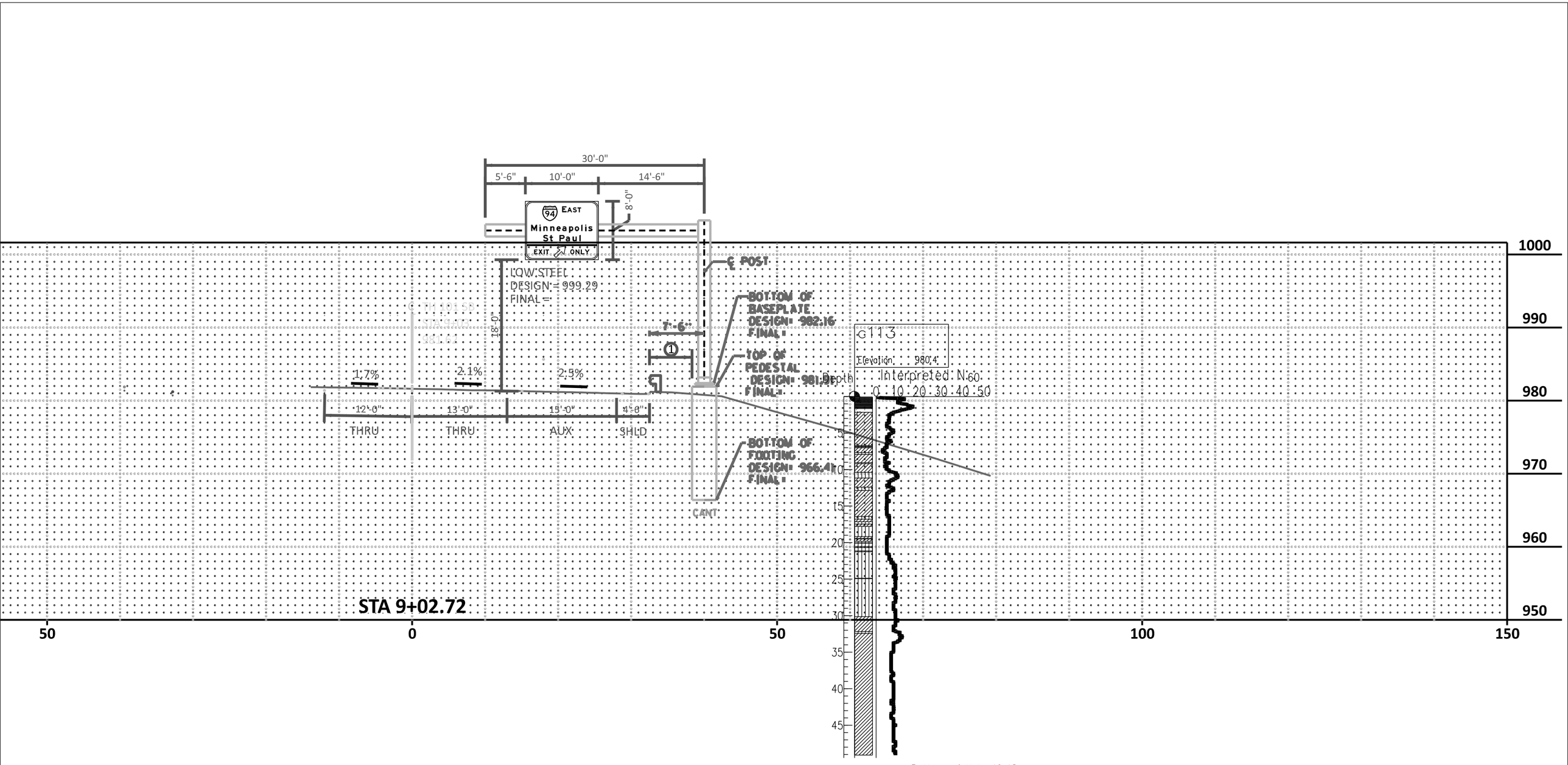
33'-0"
10'-6"
2'-6"
11'-0"
9'-0"
2'-6"
2'-6"
8'-6"
7'-0"
EXIT 105 B
NORTH
169
1/4 MILE
EXIT 105 A
SOUTH
169
TRUSS TYPE A
LOW STEEL
DESIGN = 941.29
FINAL =
18'-10"
P. POST TYPE SE
BOTTOM OF
BASEPLATE
DESIGN: 922.15
FINAL = c109
7'-6"
TOP OF
PEDESTAL
DESIGN: 921.65
FINAL =
Elevation: 920.4
Interpreted N 60
0 10 20 30 40 50
1:4%
1.5%
4.2%
6.2%
10'-0"
SHLD
12'-0"
THRU
12'-0"
THRU
14'-3"
EXIT
SHAFT TO BE DRILLED
FILL
COMM
940
930
920
910
900
5
10
15
20
25
30
35
40
45
Bottom of Hole 49.62

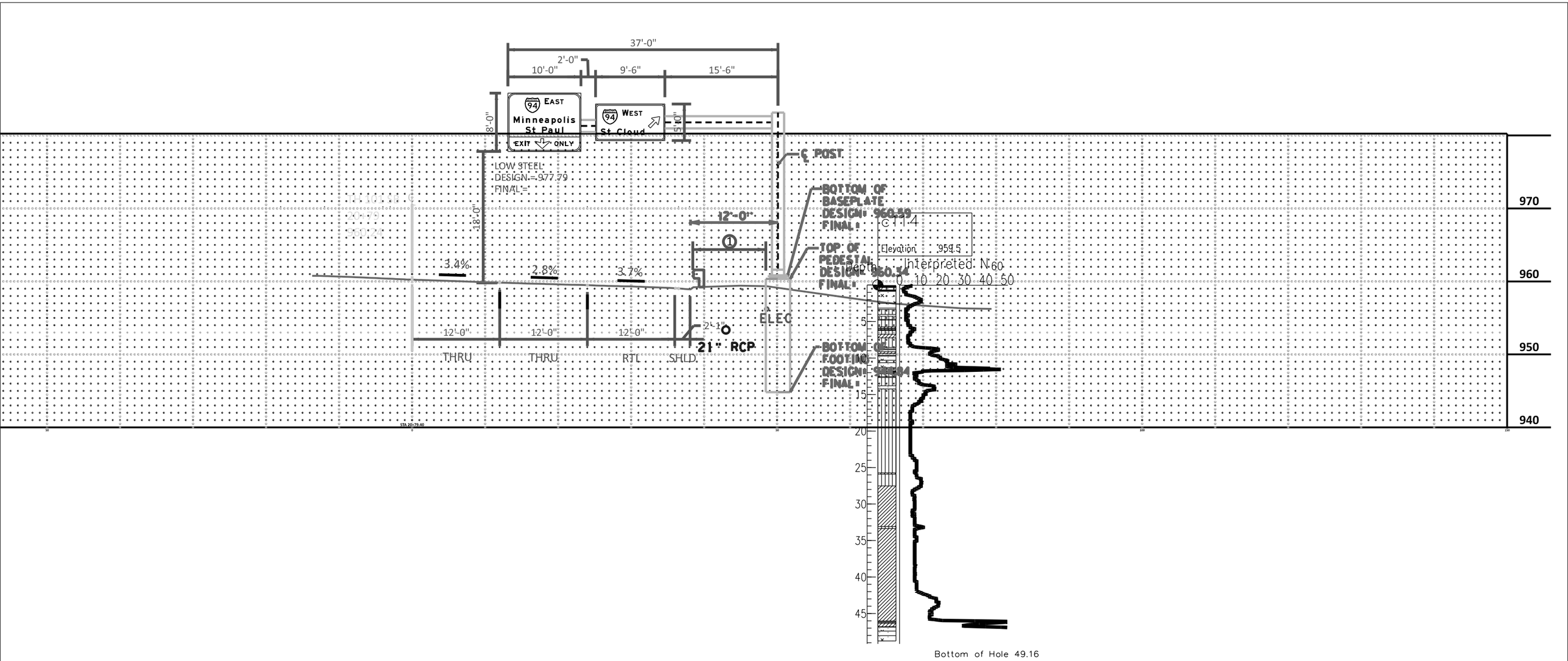


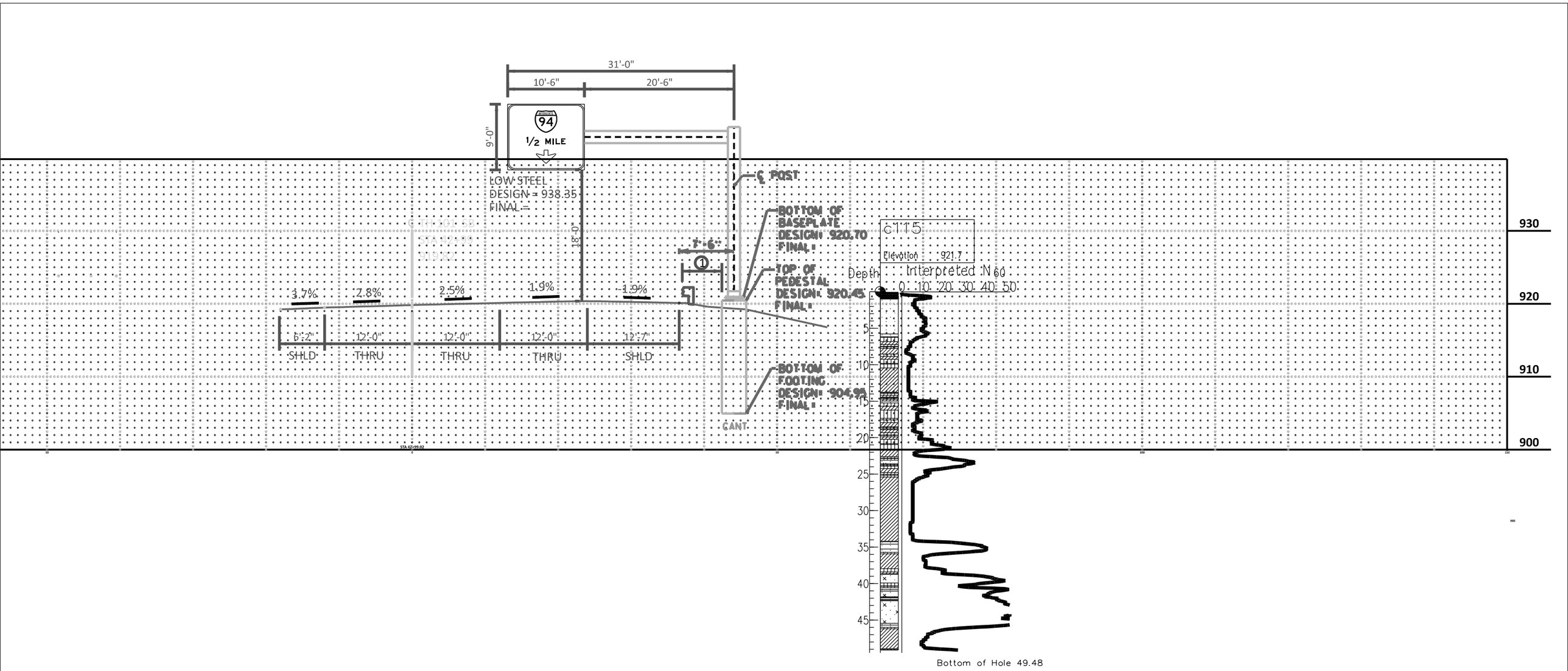
Bottom of Hole 47.19

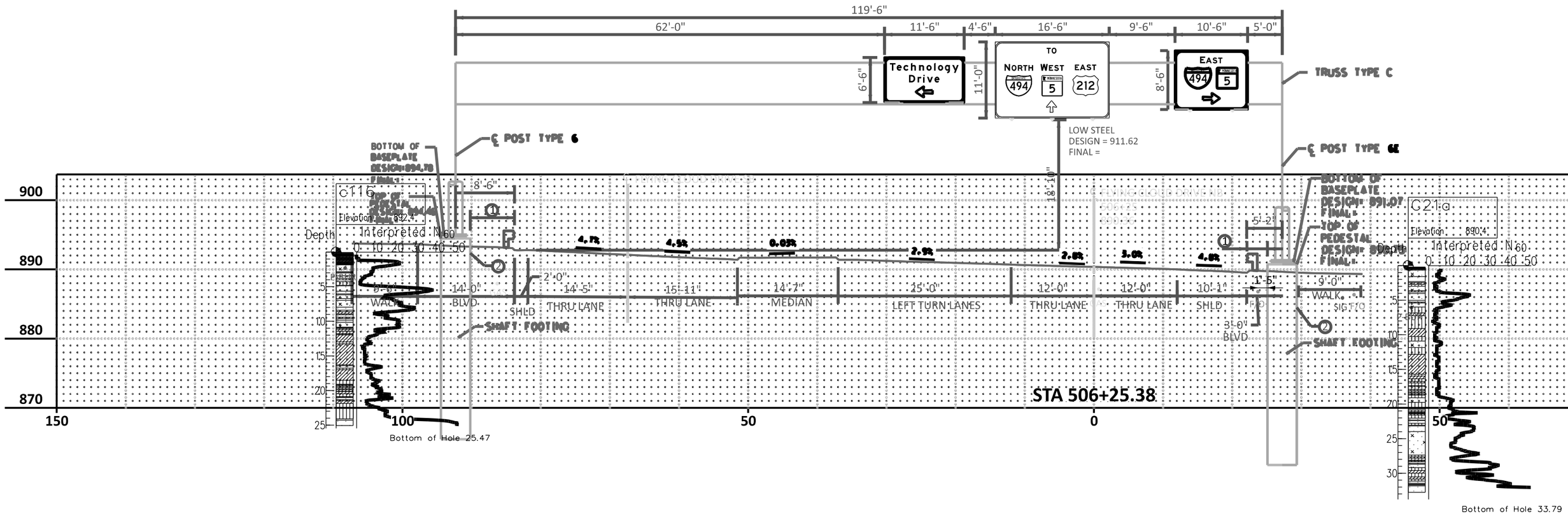

43'-0"
11'-0"
4'-0"
9'-0"
19'-0"
2'-6"
8'-6"
FUTURE PANEL
8'-6"
FUTURE PANEL
2'-6"
8'-6"
EAST
62
EXIT 1/4 MILE
WEST
62
7'-0"
TRUSS TYPE B
℄ POST TYPE SE
LOW STEEL
DESIGN = 944.40
FINAL =
18'-10"
15'-6"
1
BOTTOM OF BASEPLATE
DESIGN = 928.87
FINAL =
TOP OF PEDESTAL
DESIGN = 928.37
FINAL =
R/W
XC FENCE
SHAFT FOOTING
3.0%
2.9%
2.2%
1.8%
3.1%
6'-0"
SHLD
12'-0"
THRU
12'-0"
THRU
12'-0"
THRU
16'-0"
EXIT
F/G
STA 135+70.90 RS
C-111
Elevation 927.8
Interpreted N 60
Depth
0 10 20 30 40 50
5
10
15
Bottom of Hole 17.6
940
930
920
910

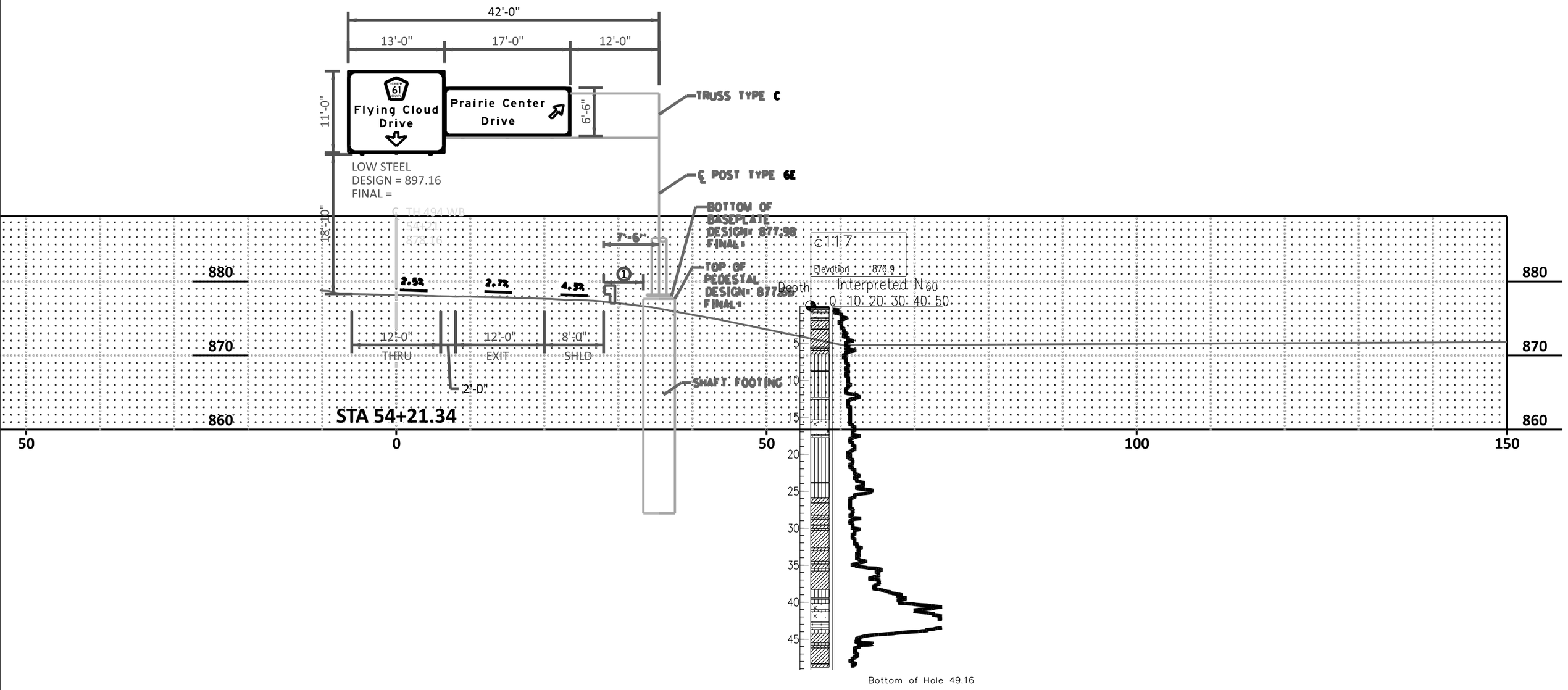

44'-0"
1'-6"
12'-6"
12'-6"
17'-6"
8'-6"
FUTURE PANEL
FUTURE PANEL
2'-6"
2'-6"
7'-0"
5'-6"
62
EXITS 1/2 MILE
Benton Ave
TRUSS TYPE B
℄ POST TYPE GE
BOTTOM OF BASEPLATE DESIGN: 915.59 FINAL:
TOP OF PEDESTAL DESIGN: 913.29 FINAL:
LOW STEEL DESIGN = 928.07 FINAL =
18'-10"
15'-11"
1
3.6%
1.8%
0.6%
1.2%
3.0%
ELEC
STORM
SHAFT FOOTING
3'-6"
12'-0"
12'-0"
12'-0"
16'-1"
SHLD
THRU
THRU
THRU
EXIT
STA 136+18.72 RT
930
920
910
900
890
Depth
Interpreted N-60
0 10 20 30 40 50
5
10
15
20
25
Bottom of Hole 28.68


30'-0"
5'-6"
10'-0"
14'-6"
8'-0"
EAST
94
Minneapolis
St Paul
EXIT ONLY
℄ POST
LOW STEEL
DESIGN = 999.29
FINAL =
BOTTOM OF
BASEPLATE
DESIGN= 982.16
FINAL =
TOP OF
PEDESTAL
DESIGN= 981.96
FINAL =
BOTTOM OF
FOOTING
DESIGN= 966.46
FINAL =
18'-0"
7'-6"
1
1.7%
2.1%
2.5%
12'-0"
13'-0"
15'-0"
4'-6"
THRU
THRU
AUX
SHLD
CANT
STA 9+02.72
C113
Elevation 980.4
Depth
Interpreted N-60
0 10 20 30 40 50
5
10
15
20
25
30
35
40
45
1000
990
980
970
960
950
50
0
50
100
150
Bottom of Hole 49.48

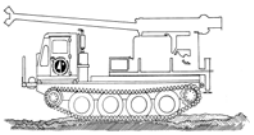

37'-0"
2'-0"
10'-0"
9'-6"
15'-6"
8'-0"
5'-10"
94 EAST
Minneapolis
St Paul
EXIT ONLY
94 WEST
St Cloud
℄ POST
LOW STEEL
DESIGN: 977.79
FINAL:
18'-0"
12'-0"
1
BOTTOM OF
BASEPLATE
DESIGN: 960.29
FINAL:
TOP OF
PEDESTAL
DESIGN: 960.54
FINAL:
3.4%
2.8%
3.7%
12'-0"
12'-0"
12'-0"
2'-1"
21" RCP
THRU
THRU
RTL
SHLD.
ELEC
BOTTOM OF
FOOTING
DESIGN: 944.04
FINAL:
STA 20+79.40
970
960
950
940
C114
Elevation 959.5
Depth Interpreted N60
0 10 20 30 40 50
5
10
15
20
25
30
35
40
45
Bottom of Hole 49.16


31'-0"
10'-6"
20'-6"
INTERSTATE
94
1/2 MILE
9'-0"
LOW STEEL
DESIGN = 938.35
FINAL =
18'-0"
℄ POST
BOTTOM OF
BASEPLATE
DESIGN: 920.70
FINAL:
TOP OF
PEDESTAL
DESIGN: 920.45
FINAL:
BOTTOM OF
FOOTING
DESIGN: 904.95
FINAL:
1'-6"
1
3.7%
2.8%
2.5%
1.9%
1.9%
6'-2"
12'-0"
12'-0"
12'-0"
12'-7"
SHLD
THRU
THRU
THRU
SHLD
CANT.
STA 42+99.02
C115
Elevation 921.7
Depth
Interpreted N 60
0 10 20 30 40 50
5
10
15
20
25
30
35
40
45
Bottom of Hole 49.48
930
920
910
900


119'-6"
62'-0"
11'-6"
4'-6"
16'-6"
9'-6"
10'-6"
5'-0"
6'-6"
11'-0"
8'-6"
Technology Drive
TO
NORTH
WEST
EAST
494
5
212
EAST
494
5
TRUSS TYPE C
LOW STEEL
DESIGN = 911.62
FINAL =
℄ POST TYPE 6
℄ POST TYPE 6E
BOTTOM OF BASEPLATE DESIGN=894.78 FINAL=
TOP OF PEDESTAL DESIGN=894.48 FINAL=
BOTTOM OF BASEPLATE DESIGN= 891.07 FINAL=
TOP OF PEDESTAL DESIGN= 890.77 FINAL=
C116
Elevation: 892.4
Depth
Interpreted N-60
0 10 20 30 40 50
C21a
Elevation: 890.4
Depth
Interpreted N-60
0 10 20 30 40 50
900
890
880
870
150
100
50
0
50
8'-6"
9'-8"
WALK
14'-0"
BLVD
2'-0"
SHLD
14'-5"
THRU LANE
15'-11"
THRU LANE
14'-7"
MEDIAN
15'-0"
LEFT TURN LANES
12'-0"
THRU LANE
12'-0"
THRU LANE
10'-1"
SHLD
3'-0"
BLVD
5'-2"
1'-5"
9'-0"
WALK
SIG FTG
4.7%
4.5%
0.0%
2.5%
2.0%
3.0%
4.0%
SHAFT FOOTING
SHAFT FOOTING
STA 506+25.38
Bottom of Hole 25.47
Bottom of Hole 33.79


42'-0"
13'-0"
17'-0"
12'-0"
11'-0"
6'-6"
Flying Cloud Drive
Prairie Center Drive
TRUSS TYPE C
℄ POST TYPE GE
LOW STEEL
DESIGN = 897.16
FINAL =
BOTTOM OF BASEPLATE
DESIGN: 877.98
FINAL:
TOP OF PEDESTAL
DESIGN: 877.88
FINAL:
7'-6"
2.5%
2.7%
4.3%
12'-0"
THRU
12'-0"
EXIT
8'-0"
SHLD
2'-0"
SHAFT FOOTING
STA 54+21.34
880
870
860
50
0
50
100
150
Elevation 876.9
Depth
Interpreted N60
0 10 20 30 40 50
5
10
15
20
25
30
35
40
45
Bottom of Hole 49.16

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)

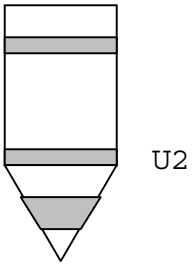
q_T TIP RESISTANCE
The resistance at the cone corrected for water pressure. Data is from cone with 60 degree apex angle and a 10 cm^2 end area.

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.

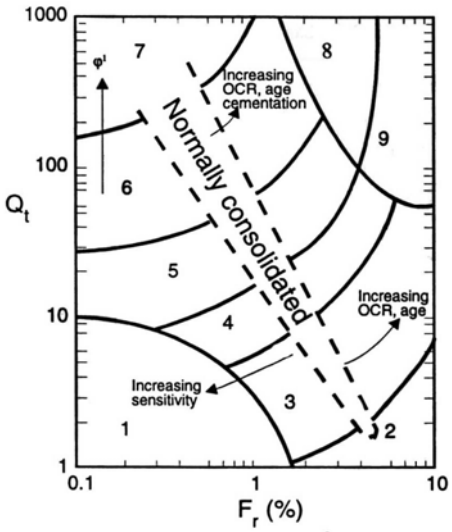
The numbers corresponding to different regions on the charts represent the following soil behavior types:

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

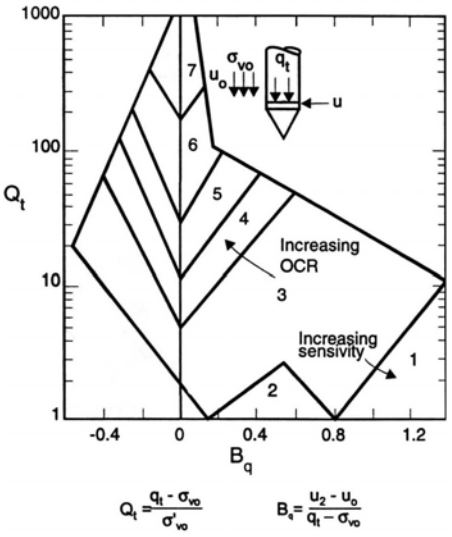
Note that engineering judgment, and comparison with conventional borings is especially important in the proper interpretation of CPT data in certain geo-materials.

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

DEPARTMENT OF TRANSPORTATION

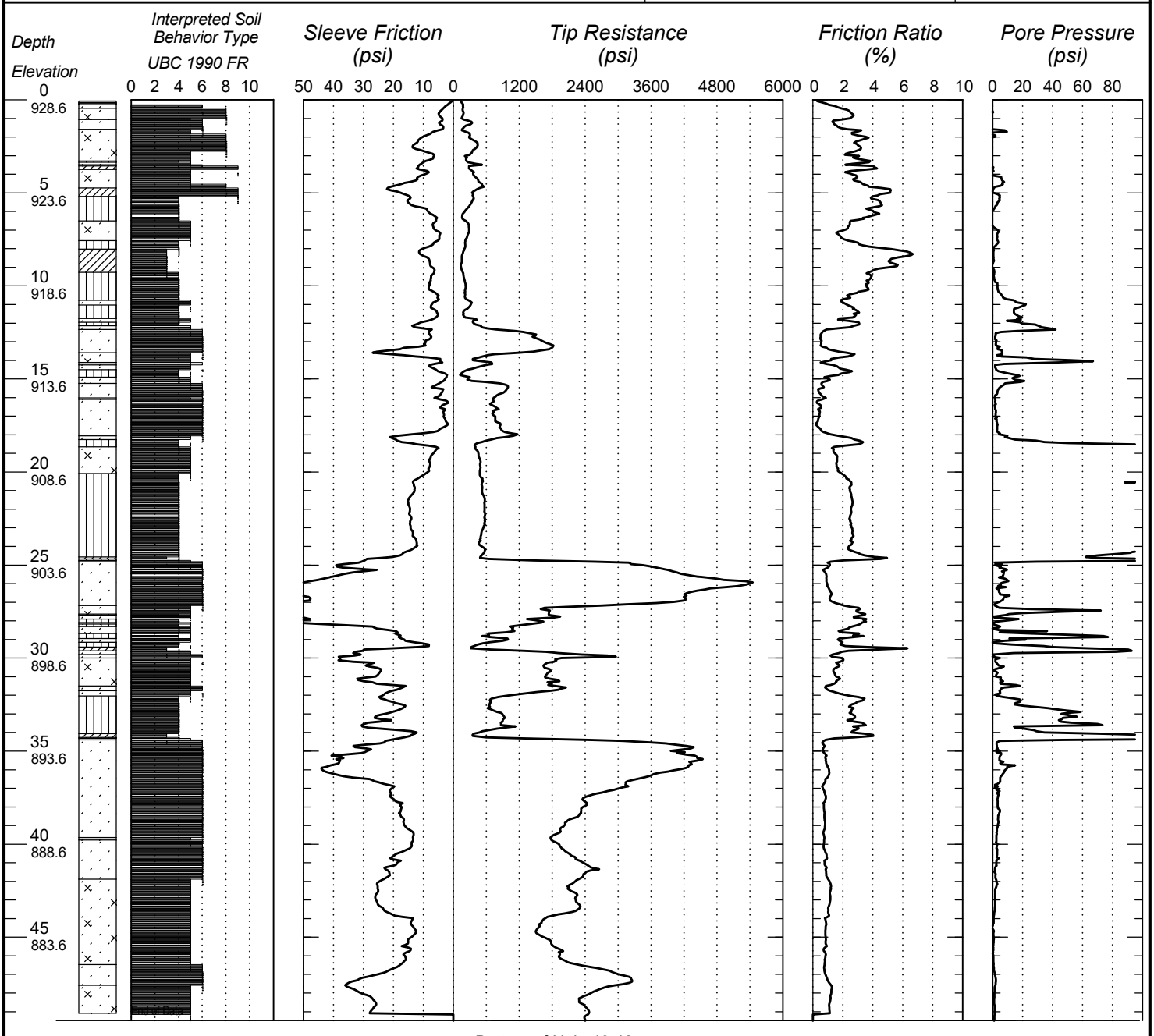
MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 89241

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
8825-1126	**Overhead Sign**	**94 ramp to brooklyn blvd**	**c100**	**928.6** *(GeoXH(DC))*

Location	CPT Machine	
Ramsey County Coordinate System	**219328 CPT Western Star**	*SHEET 1 of 1*
X=548494 Y=180025	*CPT Operator* **ODonnel**	*Date Completed*
Latitude (North)=45.010436° Longitude (West)=-93.195842°	*Hole Type* **CPT-STD**	**3/4/2024**



Bottom of Hole 49.48

DEPARTMENT OF TRANSPORTATION

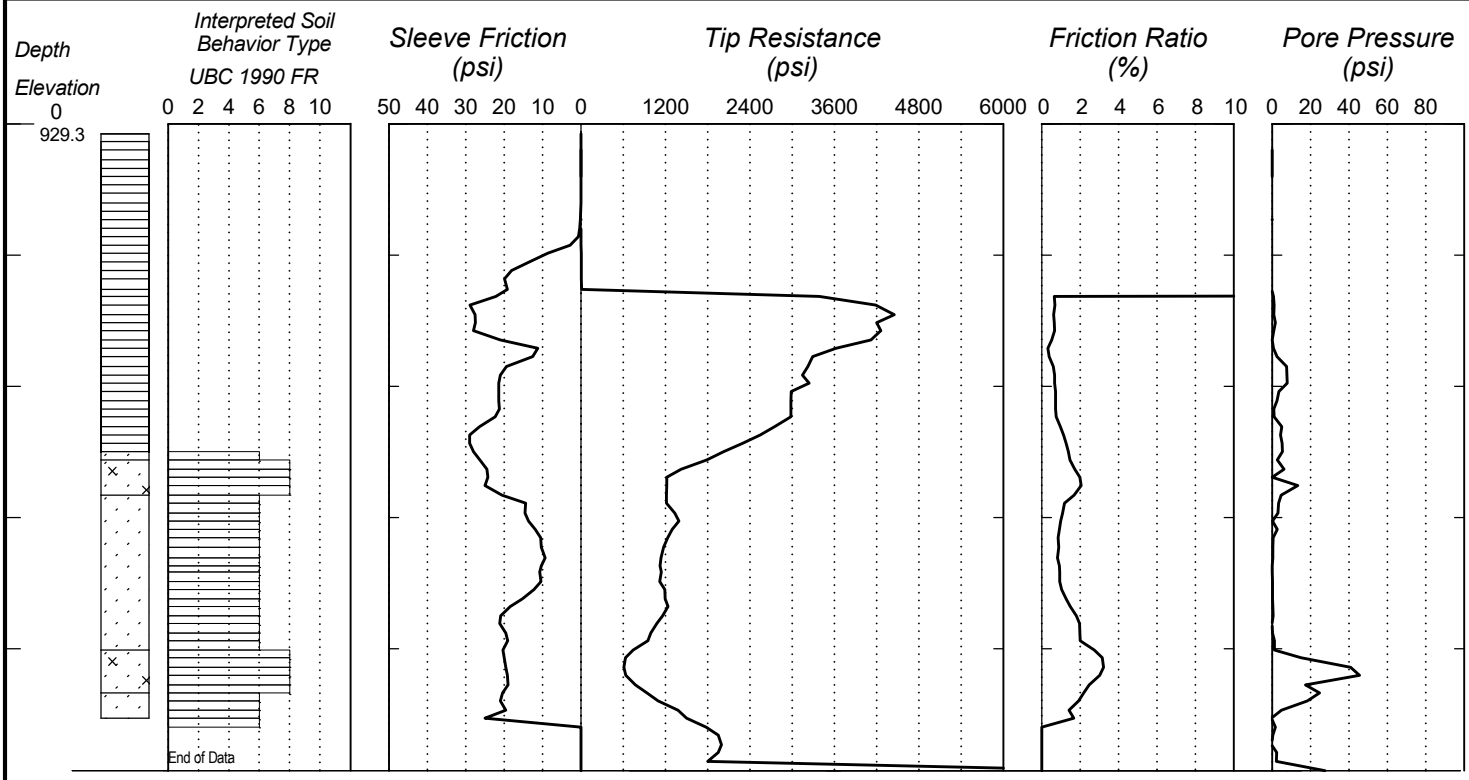
MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 89264

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
8825-1126	**Overhead Sign**	**94 ramp to brooklyn blvd**	**c101**	**929.3** *(GeoXH(DC))*

Location	CPT Machine	SHEET 1 of 1
Ramsey County Coordinate System **X=548510 Y=179957** *Latitude (North)=45.010250° Longitude (West)=-93.195781°*	CPT Operator **ODonnel** Hole Type **CPT-STD**	Date Completed **3/7/2024**



Bottom of Hole 4.93

DEPARTMENT OF TRANSPORTATION

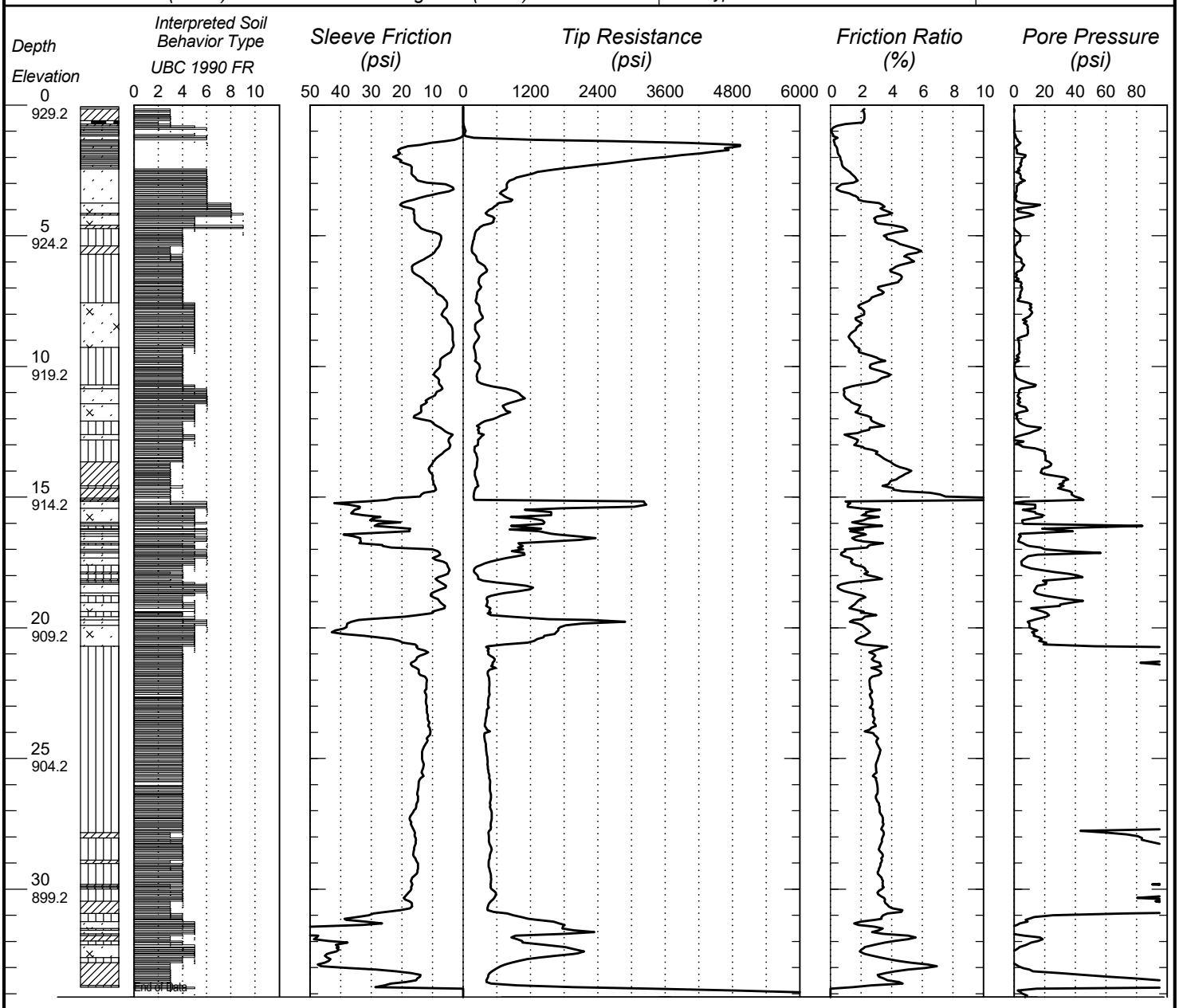
MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 89265

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
8825-1126	**Overhead Sign**	**94 ramp to brooklyn blvd**	**c101a**	**929.2** *(GeoXH(DC))*

Location	CPT Machine	SHEET 1 of 1
Ramsey County Coordinate System	**219328 CPT Western Star**	
X=548505 Y=179958	CPT Operator **ODonnel**	Date Completed
Latitude (North)=45.010253° Longitude (West)=-93.195800°	Hole Type **CPT-STD**	**3/7/2024**



Bottom of Hole 34.13

DEPARTMENT OF TRANSPORTATION

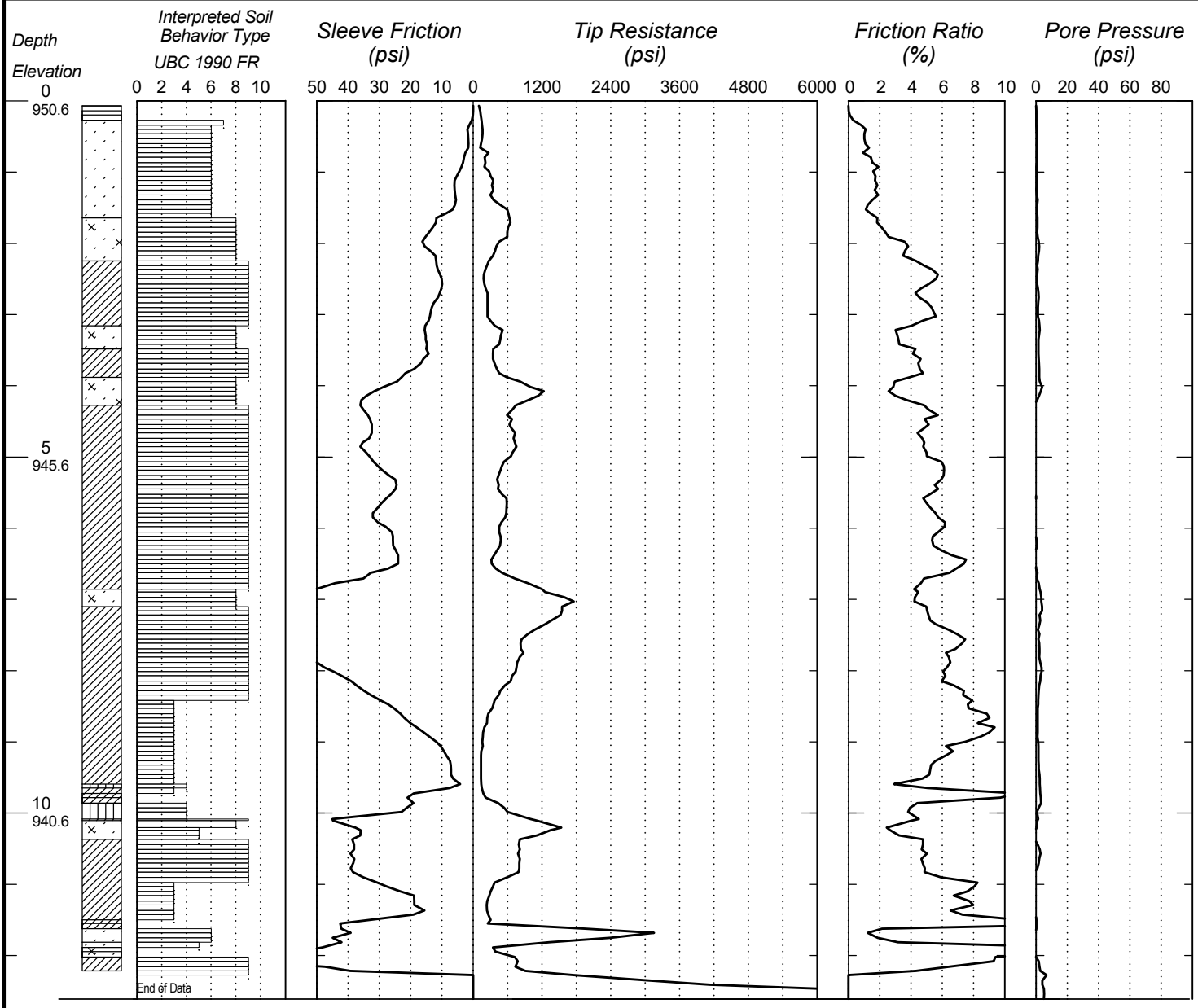
MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 89242

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
8825-1126	**Overhead Sign**	**94 ramp to brooklyn blvd**	**c102**	**950.6** *(GeoXH(DC))*

Location	CPT Machine	SHEET 1 of 1
Ramsey County Coordinate System	**219328 CPT Western Star**	
X=546767 Y=179663	CPT Operator **ODonnel**	Date Completed
Latitude (North)=45.009453° Longitude (West)=-93.202522°	Hole Type **CPT-STD**	**3/4/2024**



Bottom of Hole 12.61

DEPARTMENT OF TRANSPORTATION

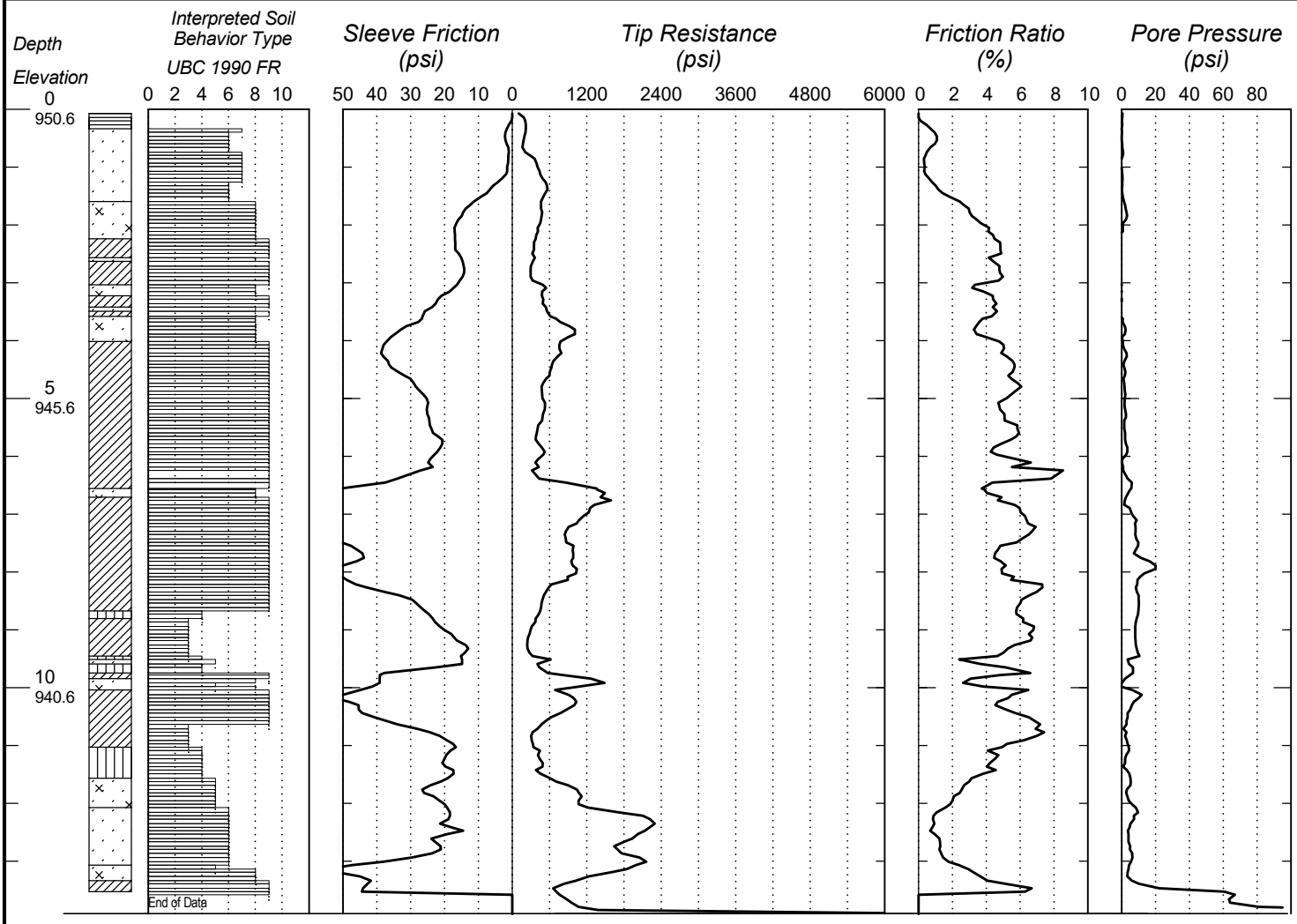
MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 89243

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
8825-1126	**Overhead Sign**	**94 ramp to brooklyn blvd**	**c102a**	**950.6** *(GeoXH(DC))*

Location	CPT Machine	SHEET 1 of 1
Ramsey County Coordinate System	**219328 CPT Western Star**	
X=546763 Y=179658	*CPT Operator* **ODonnel**	*Date Completed*
Latitude (North)=45.009439° Longitude (West)=-93.202539°	*Hole Type* **CPT-STD**	**3/4/2024**



Bottom of Hole 13.91

DEPARTMENT OF TRANSPORTATION

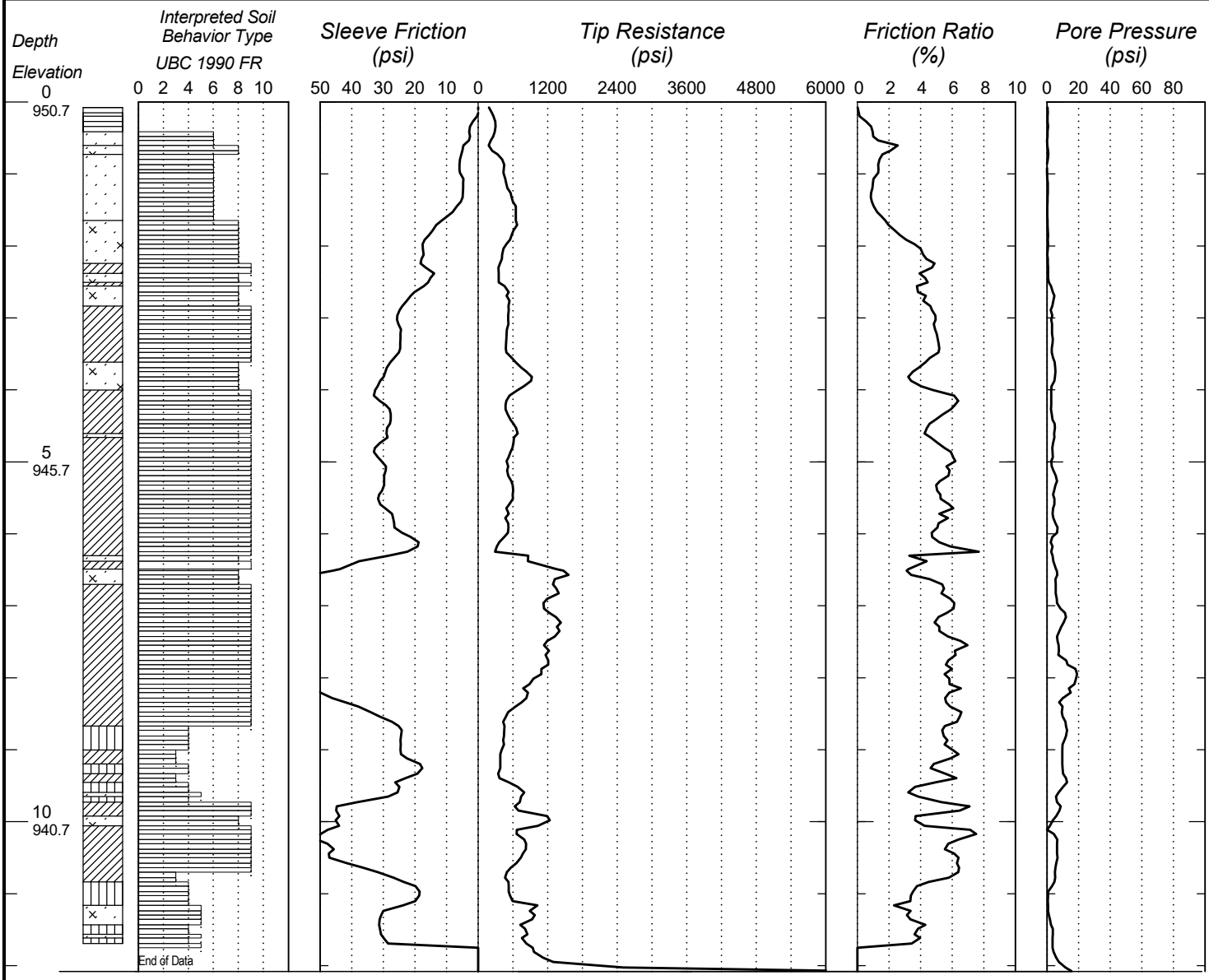
MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 89244

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
8825-1126	**Overhead Sign**	**94 ramp to brooklyn blvd**	**c102b**	**950.7** *(GeoXH(DC))*

Location	CPT Machine	Sheet
Ramsey County Coordinate System **X=546761 Y=179657** *Latitude (North)=45.009436° Longitude (West)=-93.202547°*	**219328 CPT Western Star** CPT Operator **ODonnel** Hole Type **CPT-STD**	*SHEET 1 of 1* Date Completed **3/4/2024**



Bottom of Hole 12.08

DEPARTMENT OF TRANSPORTATION

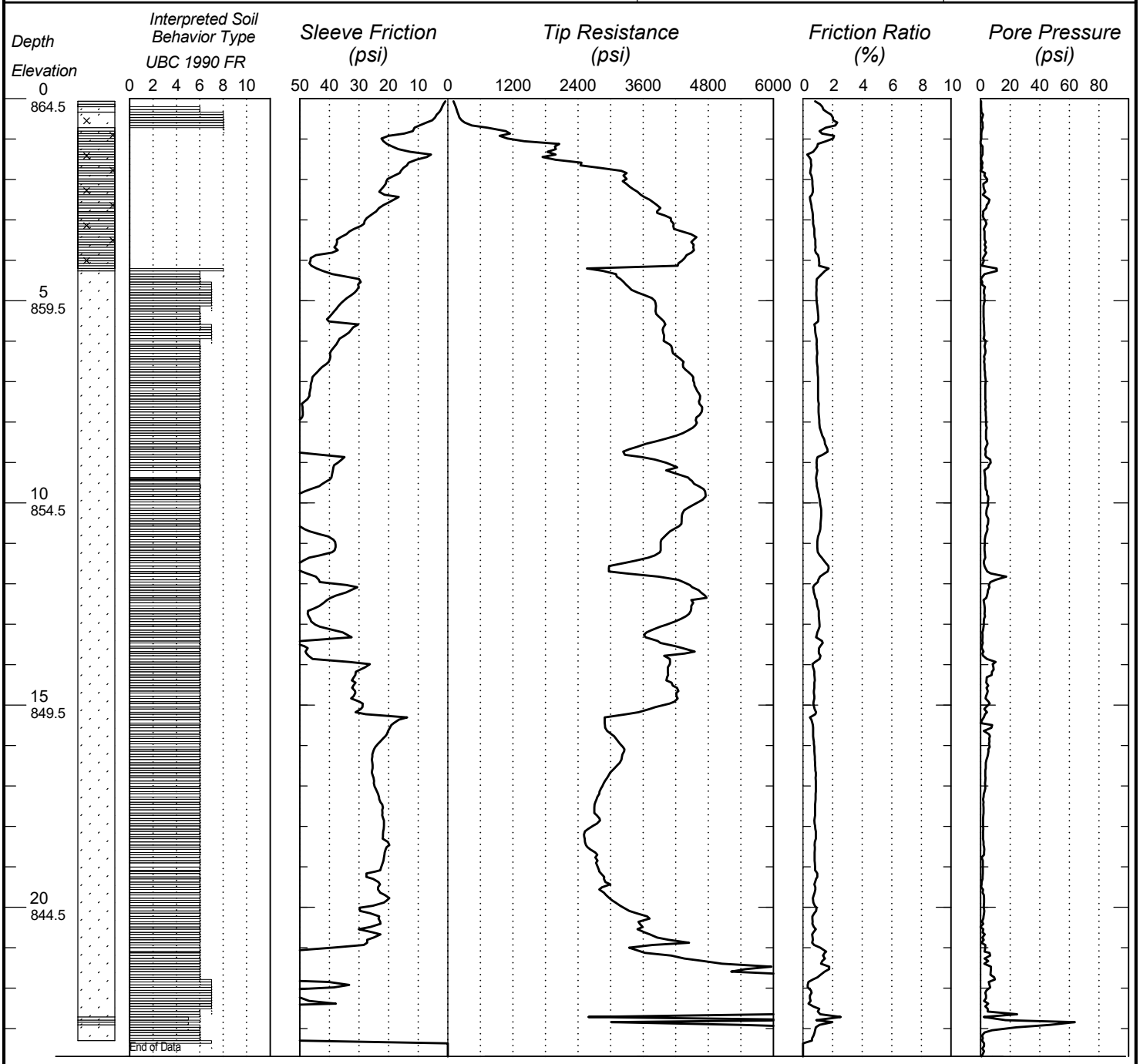
MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 89245

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
8825-1126	**Overhead Sign**	**94 ramp to brooklyn blvd**	**c103**	**864.5** *(GeoXH(DC))*

Location	CPT Machine	SHEET 1 of 1
Hennepin County Coordinate System	**219328 CPT Western Star**	
X=539483 Y=177327	CPT Operator **ODonnel**	Date Completed
Latitude (North)=45.003089° Longitude (West)=-93.230703°	Hole Type **CPT-STD**	**3/4/2024**



Bottom of Hole 23.69

DEPARTMENT OF TRANSPORTATION

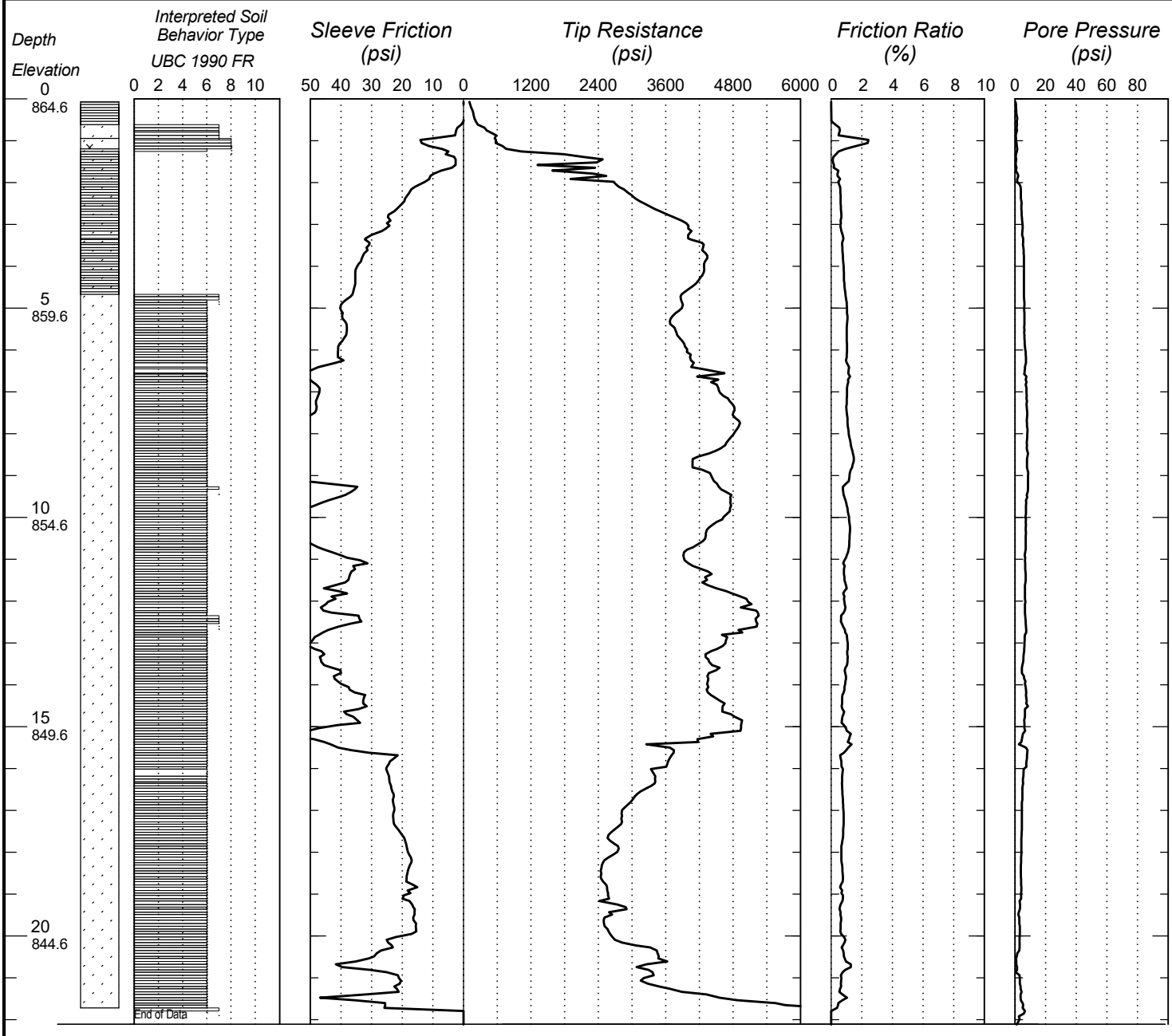
MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 89246

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
8825-1126	**Overhead Sign**	**94 ramp to brooklyn blvd**	**c103a**	**864.6** *(GeoXH(DC))*

Location	CPT Machine	SHEET 1 of 1
Hennepin County Coordinate System **X=539480 Y=177328** *Latitude (North)=45.003092° Longitude (West)=-93.230711°*	**219328 CPT Western Star** CPT Operator **ODonnel** Hole Type **CPT-STD**	Date Completed **3/4/2024**



Bottom of Hole 22.11

DEPARTMENT OF TRANSPORTATION

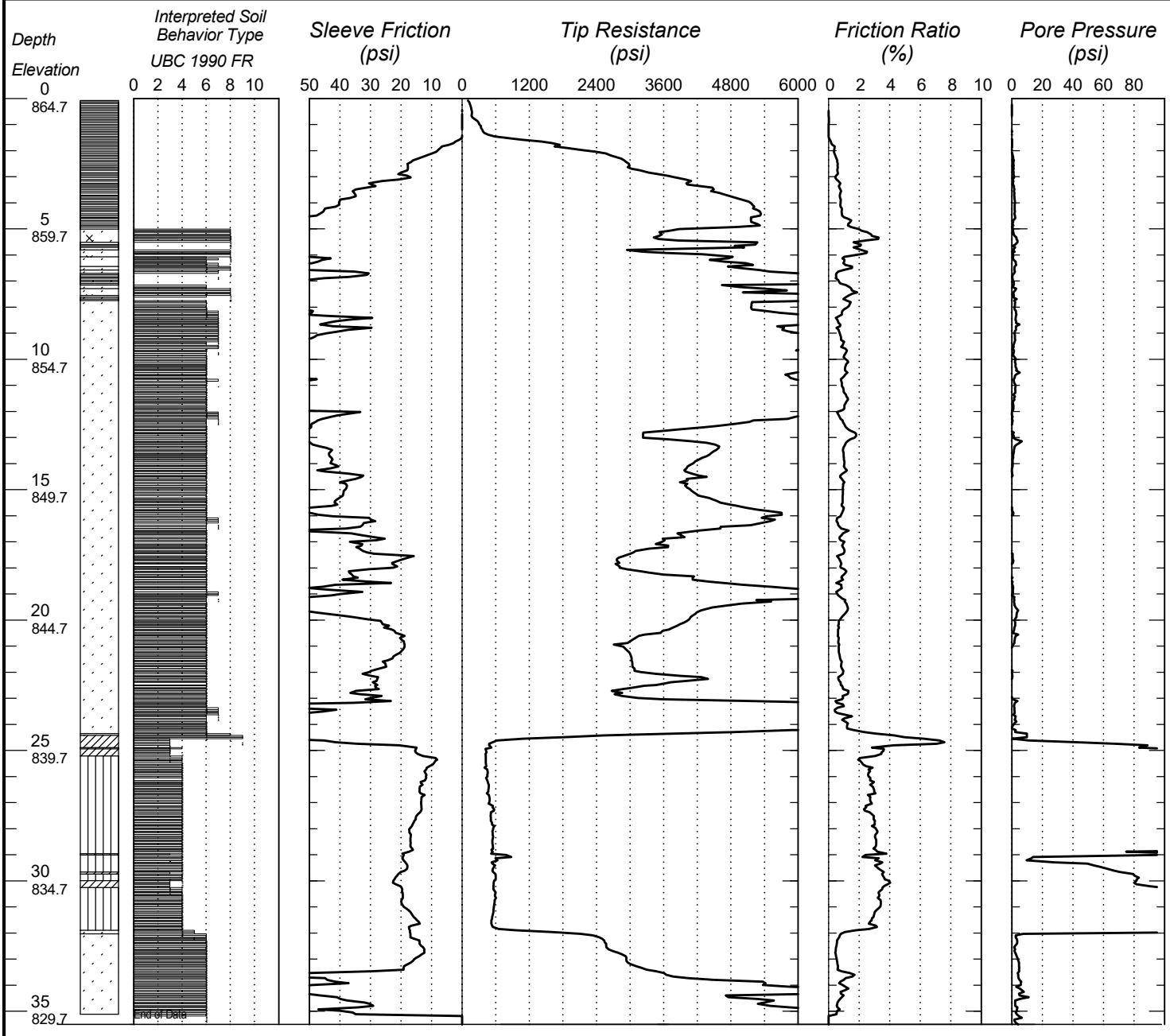
MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 89247

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
8825-1126	**Overhead Sign**	**94 ramp to brooklyn blvd**	**c104**	**864.7** *(GeoXH(DC))*

Location	CPT Machine	SHEET 1 of 1
Hennepin County Coordinate System	**219328 CPT Western Star**	
X=539501 Y=177379	CPT Operator **ODonnel**	Date Completed
Latitude (North)=45.003231° Longitude (West)=-93.230631°	Hole Type **CPT-STD**	**3/4/2024**



Bottom of Hole 35.5

DEPARTMENT OF TRANSPORTATION

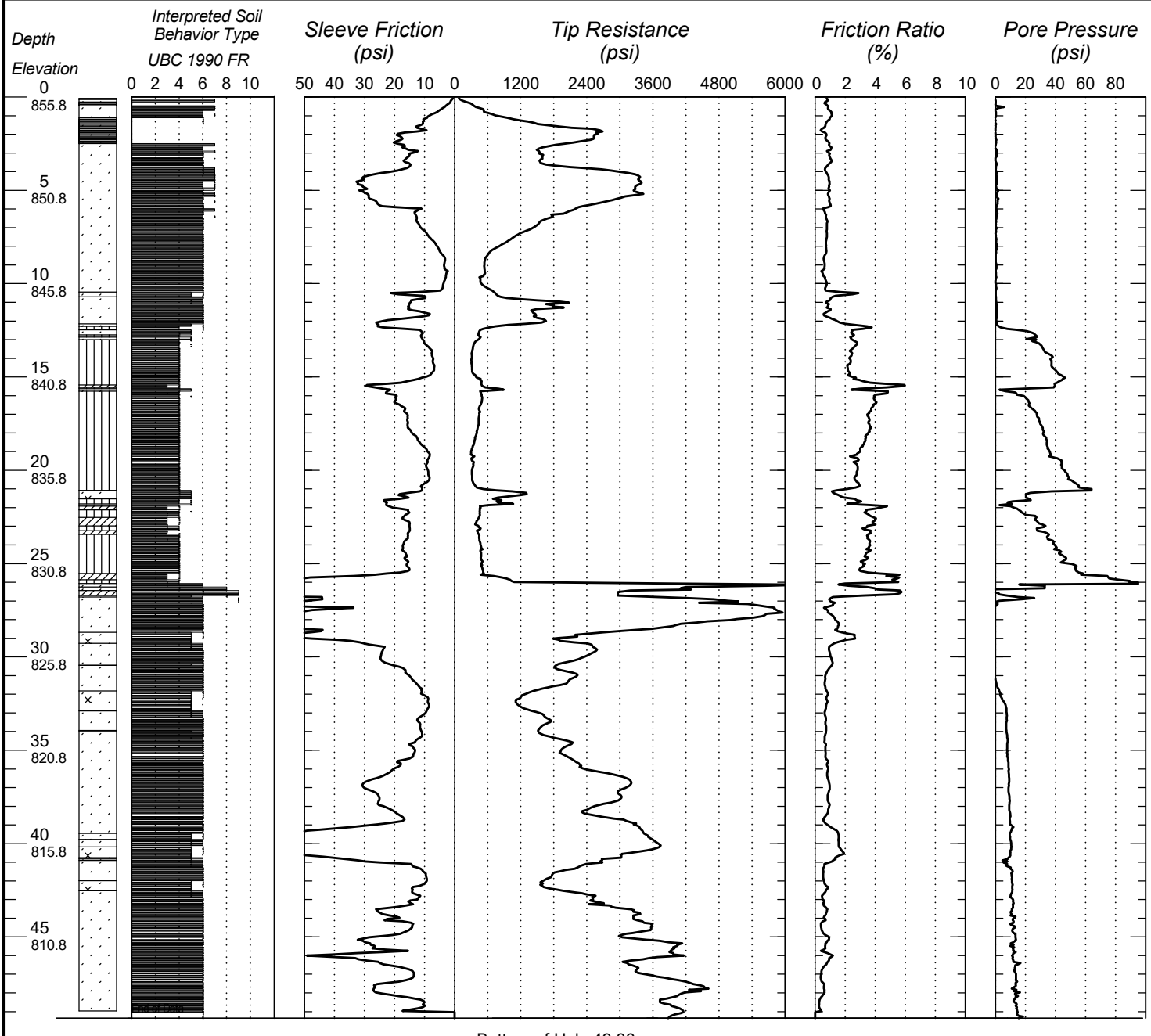
MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 89248

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
8825-1126	**Overhead Sign**	**94 ramp to brooklyn blvd**	**c105**	**855.8** *(DTM)*

Location	CPT Machine	SHEET 1 of 1
Hennepin County Coordinate System	**219328 CPT Western Star**	
X=515232 Y=203795	CPT Operator **ODonnel**	Date Completed
Latitude (North)=45.075764° Longitude (West)=-93.324375°	Hole Type **CPT-STD**	**3/4/2024**



Bottom of Hole 49.36

DEPARTMENT OF TRANSPORTATION

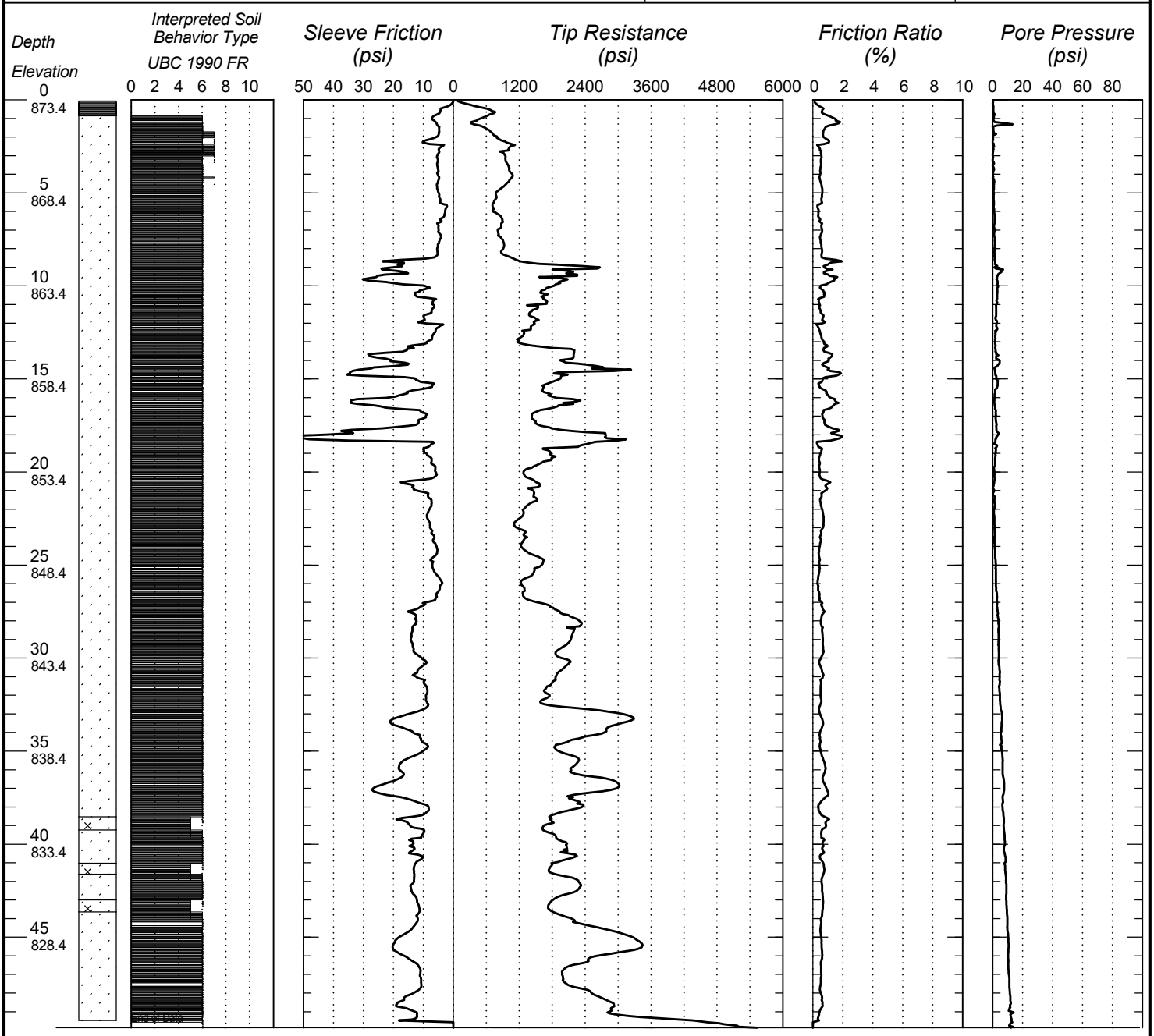
MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 89249

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
8825-1126	**Overhead Sign**	**94 ramp to brooklyn blvd**	**c106**	**873.4** *(GeoXH(DC))*

Location	CPT Machine	SHEET 1 of 1
Ramsey County Coordinate System	**219328 CPT Western Star**	
X=562608 Y=158731	*CPT Operator* **ODonnel**	*Date Completed*
Latitude (North)=44.951933° Longitude (West)=-93.141519°	*Hole Type* **CPT-STD**	**3/5/2024**



Bottom of Hole 49.87

DEPARTMENT OF TRANSPORTATION

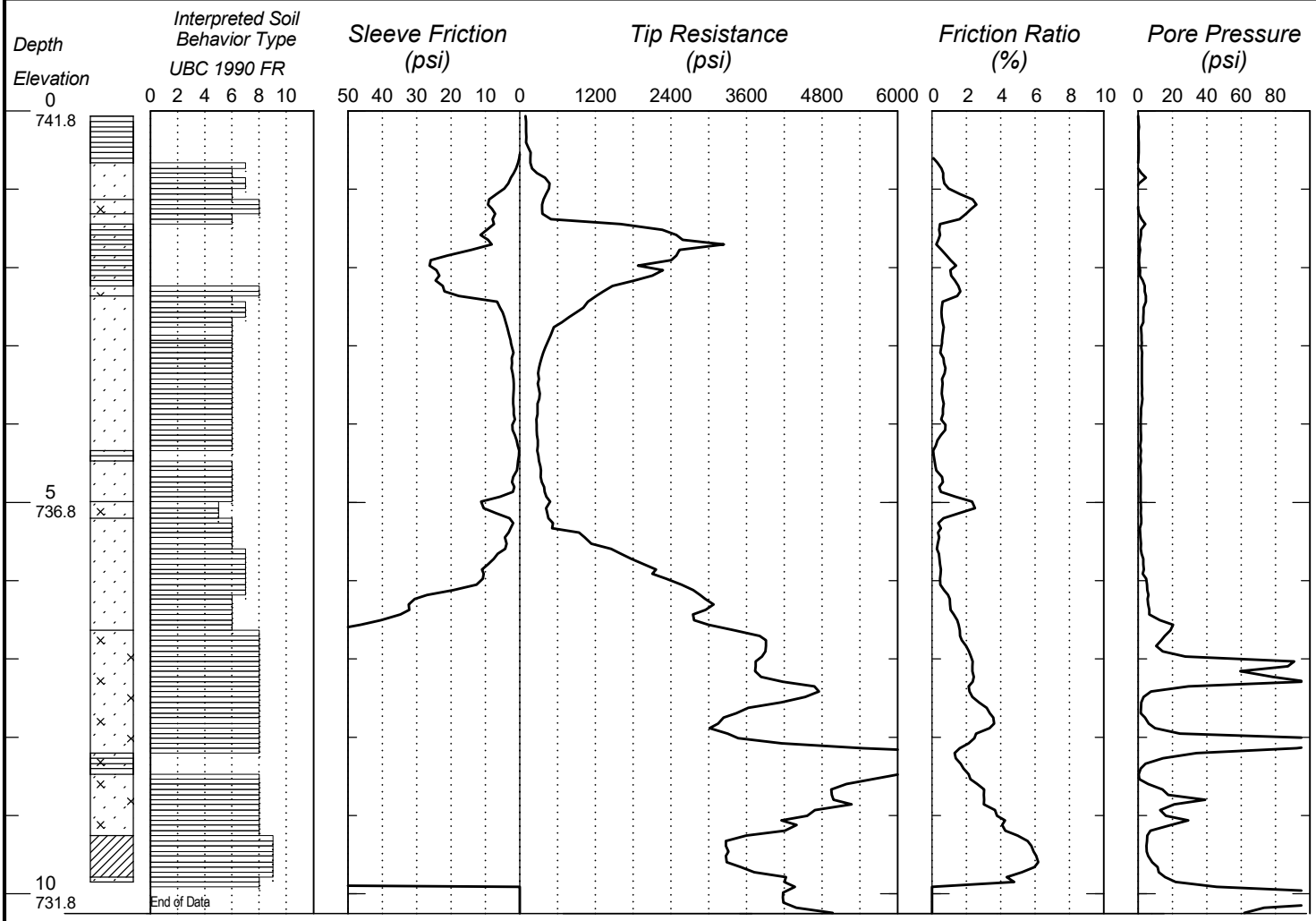
MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 89250

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
8825-1126	**Overhead Sign**	**94 ramp to brooklyn blvd**	**c107**	**741.8** *(GeoXH(DC))*

Location	CPT Machine	SHEET 1 of 1
Ramsey County Coordinate System	**219328 CPT Western Star**	
X=575840 Y=159618	*CPT Operator* **ODonnel**	*Date Completed*
Latitude (North)=44.954244° Longitude (West)=-93.090403°	*Hole Type* **CPT-STD**	**3/5/2024**



Bottom of Hole 10.25

DEPARTMENT OF TRANSPORTATION

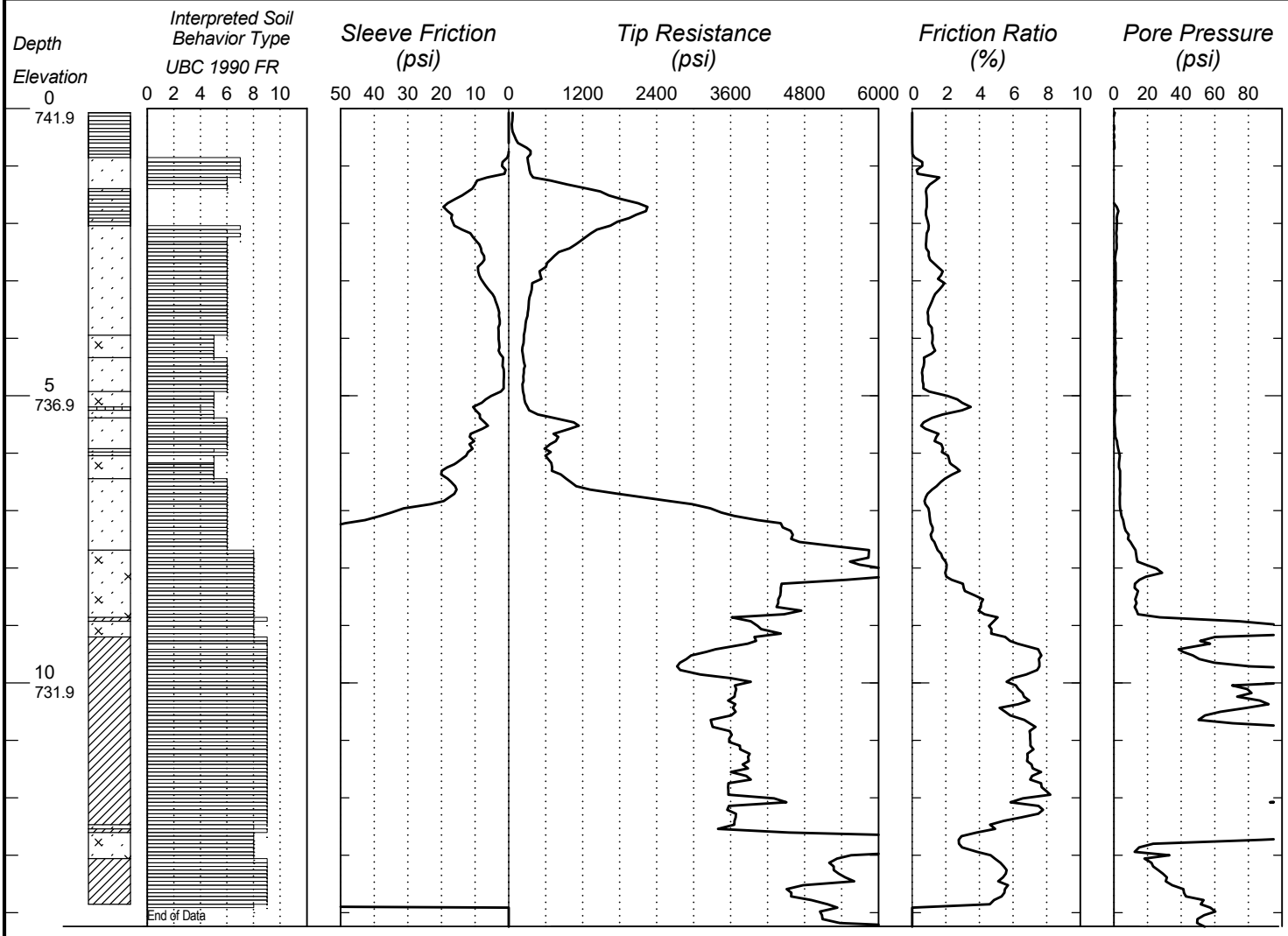
MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 89251

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
8825-1126	**Overhead Sign**	**94 ramp to brooklyn blvd**	**c107a**	**741.9** *(GeoXH(DC))*

Location	CPT Machine	SHEET 1 of 1
Ramsey County Coordinate System	**219328 CPT Western Star**	
X=575843 Y=159617	*CPT Operator* **ODonnel**	*Date Completed*
Latitude (North)=44.954242° Longitude (West)=-93.090392°	*Hole Type* **CPT-STD**	**3/5/2024**



Bottom of Hole 14.24

DEPARTMENT OF TRANSPORTATION

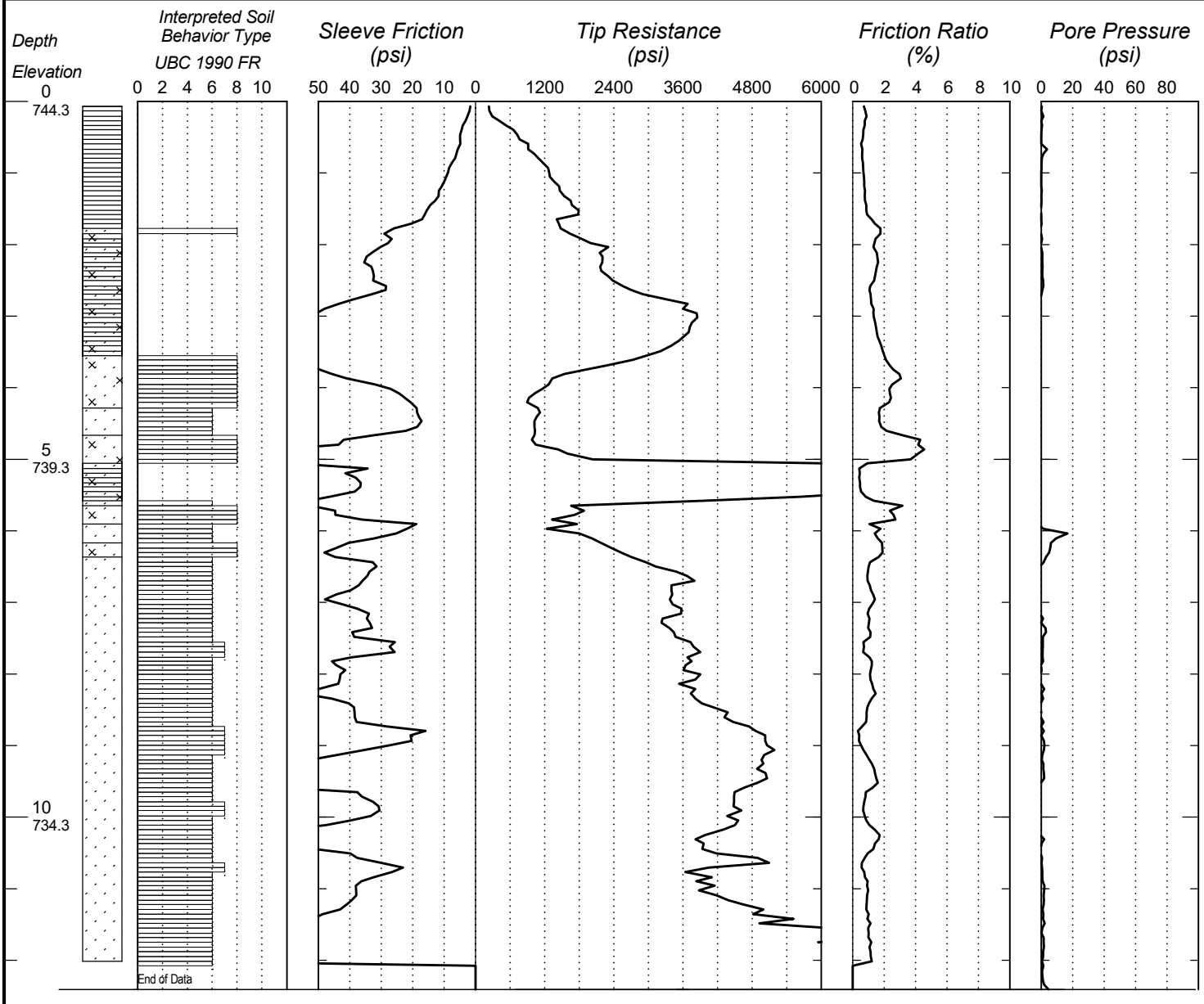
MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 89252

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
8825-1126	**Overhead Sign**	**94 ramp to brooklyn blvd**	**c108**	**744.3** *(GeoXH(DC))*

Location	CPT Machine	
Ramsey County Coordinate System	**219328 CPT Western Star**	*SHEET 1 of 1*
X=575867 Y=159691	*CPT Operator* **ODonnel**	*Date Completed*
Latitude (North)=44.954444° Longitude (West)=-93.090294°	*Hole Type* **CPT-STD**	**3/5/2024**



Bottom of Hole 12.41

DEPARTMENT OF TRANSPORTATION

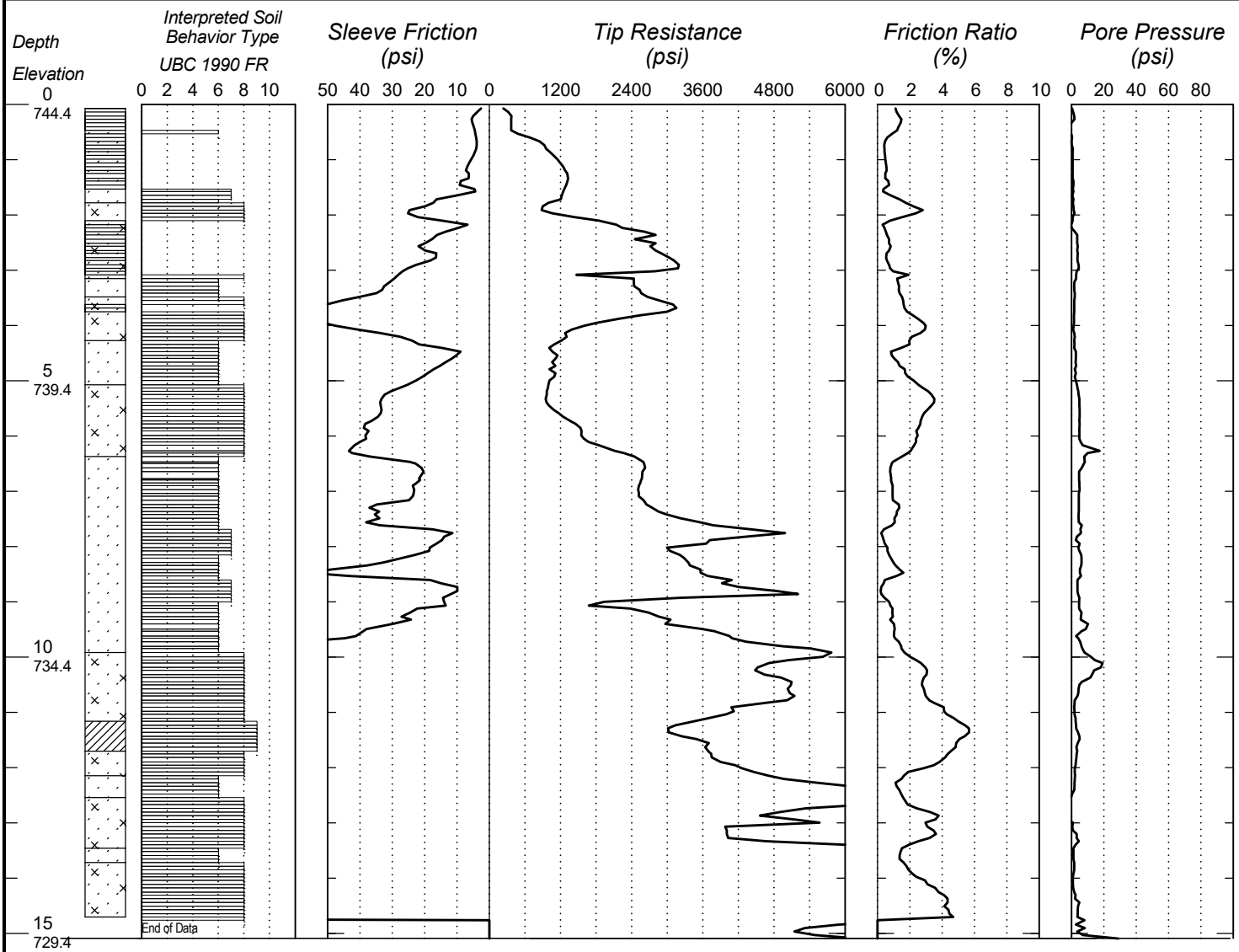
MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 89253

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
8825-1126	**Overhead Sign**	**94 ramp to brooklyn blvd**	**c108a**	**744.4** *(GeoXH(DC))*

Location	CPT Machine	SHEET 1 of 1
Ramsey County Coordinate System	**219328 CPT Western Star**	
X=575863 Y=159695	CPT Operator **ODonnel**	Date Completed
Latitude (North)=44.954456° Longitude (West)=-93.090311°	Hole Type **CPT-STD**	**3/5/2024**



Bottom of Hole 15.09

DEPARTMENT OF TRANSPORTATION

MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

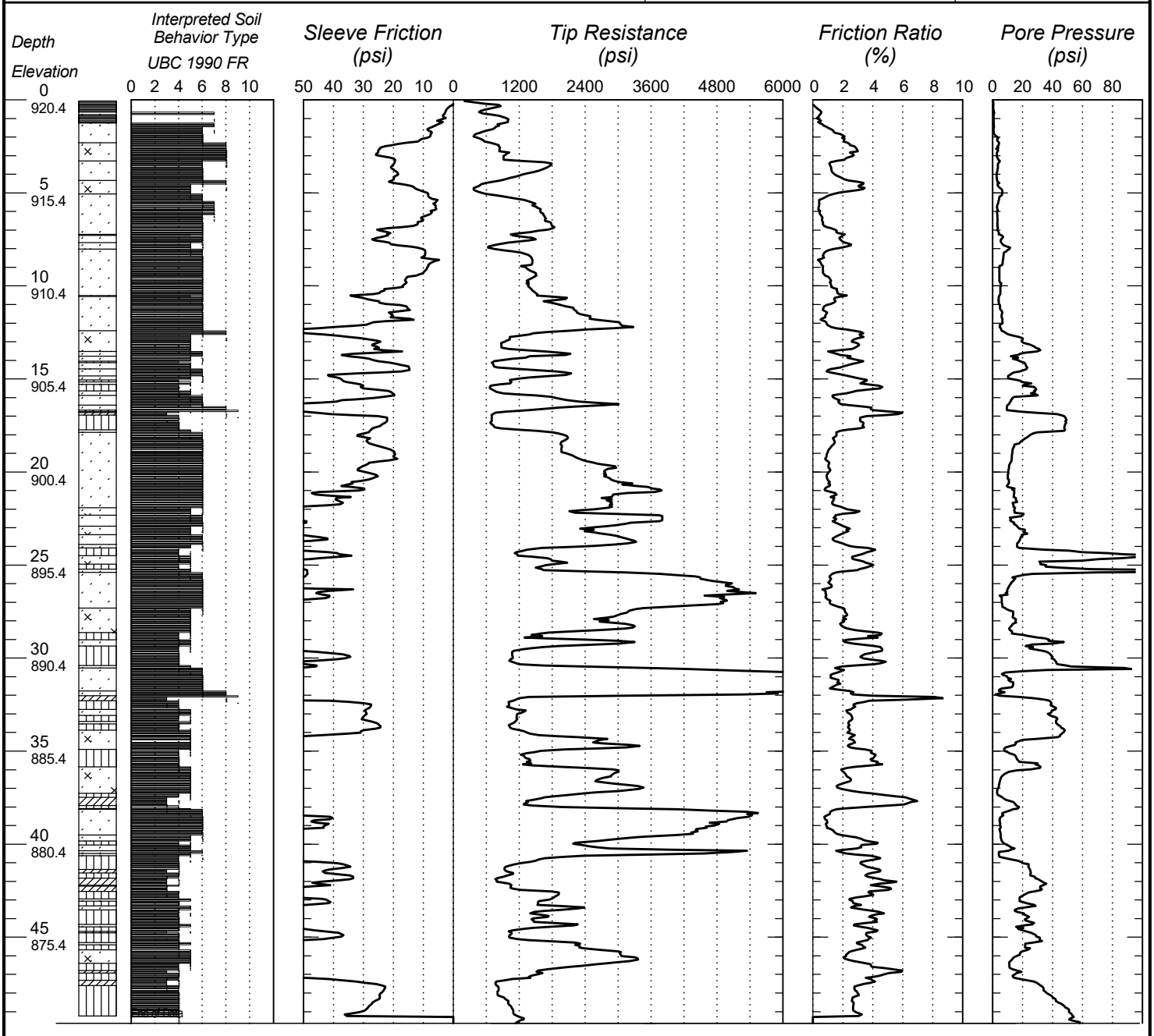
CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 89223

(MDH H400284)

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
8825-1126	**Overhead Sign**	**94 ramp to brooklyn blvd**	**c109**	**920.4** *(DTM)*

Location	CPT Machine	
Hennepin County Coordinate System	**219328 CPT Western Star**	*SHEET 1 of 1*
X=494943 Y=136017	*CPT Operator* **ODonnel**	*Date Completed*
Latitude (North)=44.889892° Longitude (West)=-93.402844°	*Hole Type* **CPT-STD**	**2/28/2024**



Bottom of Hole 49.62

DEPARTMENT OF TRANSPORTATION

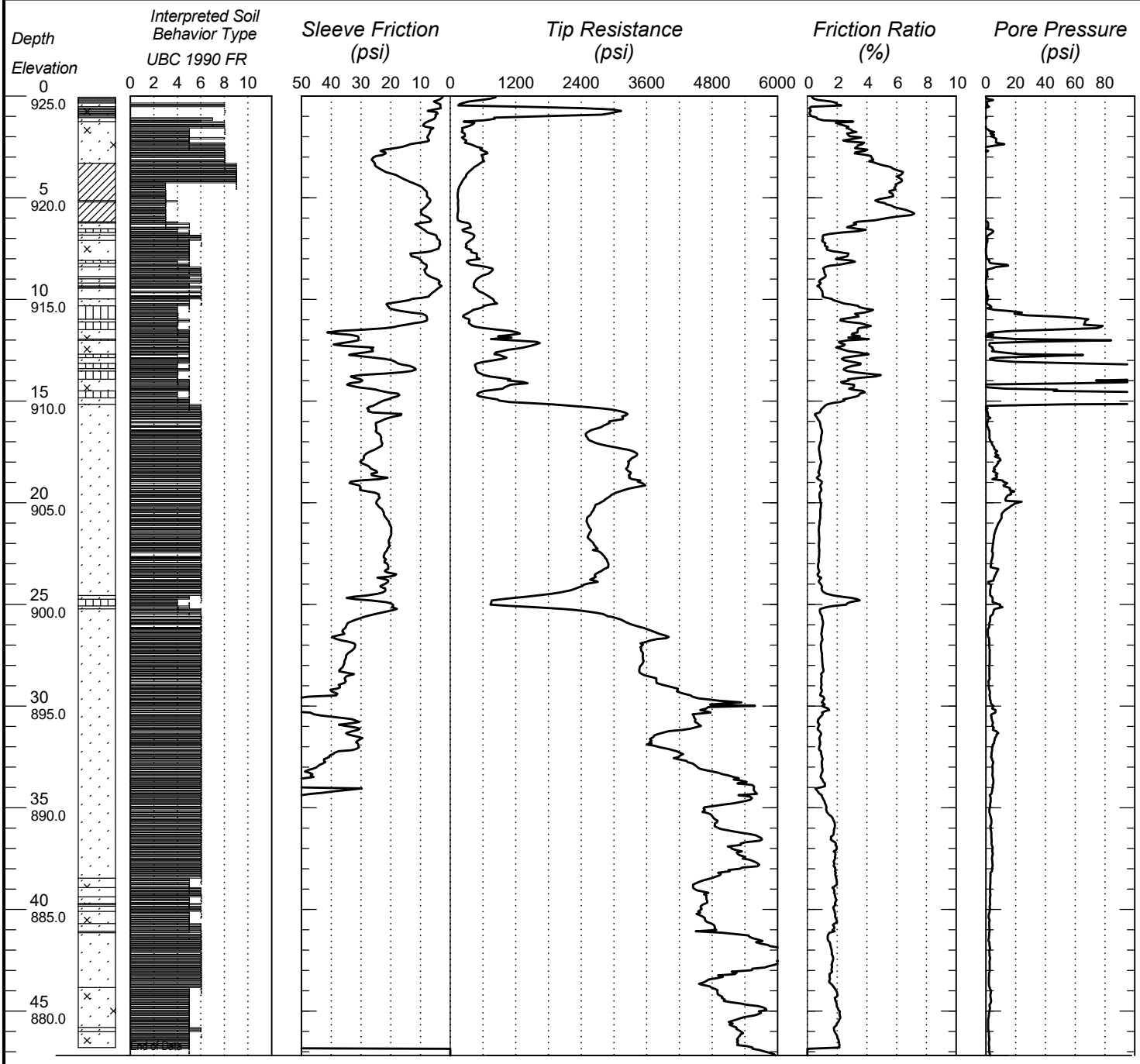
MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 89224

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
8825-1126	**Overhead Sign**	**94 ramp to brooklyn blvd**	**c110**	**925.0** *(GeoXH(DC))*

Location	CPT Machine	SHEET 1 of 1
Hennepin County Coordinate System	**219328 CPT Western Star**	
X=508671 Y=134527	CPT Operator **ODonnel**	Date Completed
Latitude (North)=44.885803° Longitude (West)=-93.349883°	Hole Type **CPT-STD**	**2/29/2024**



Bottom of Hole 47.19

DEPARTMENT OF TRANSPORTATION

MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

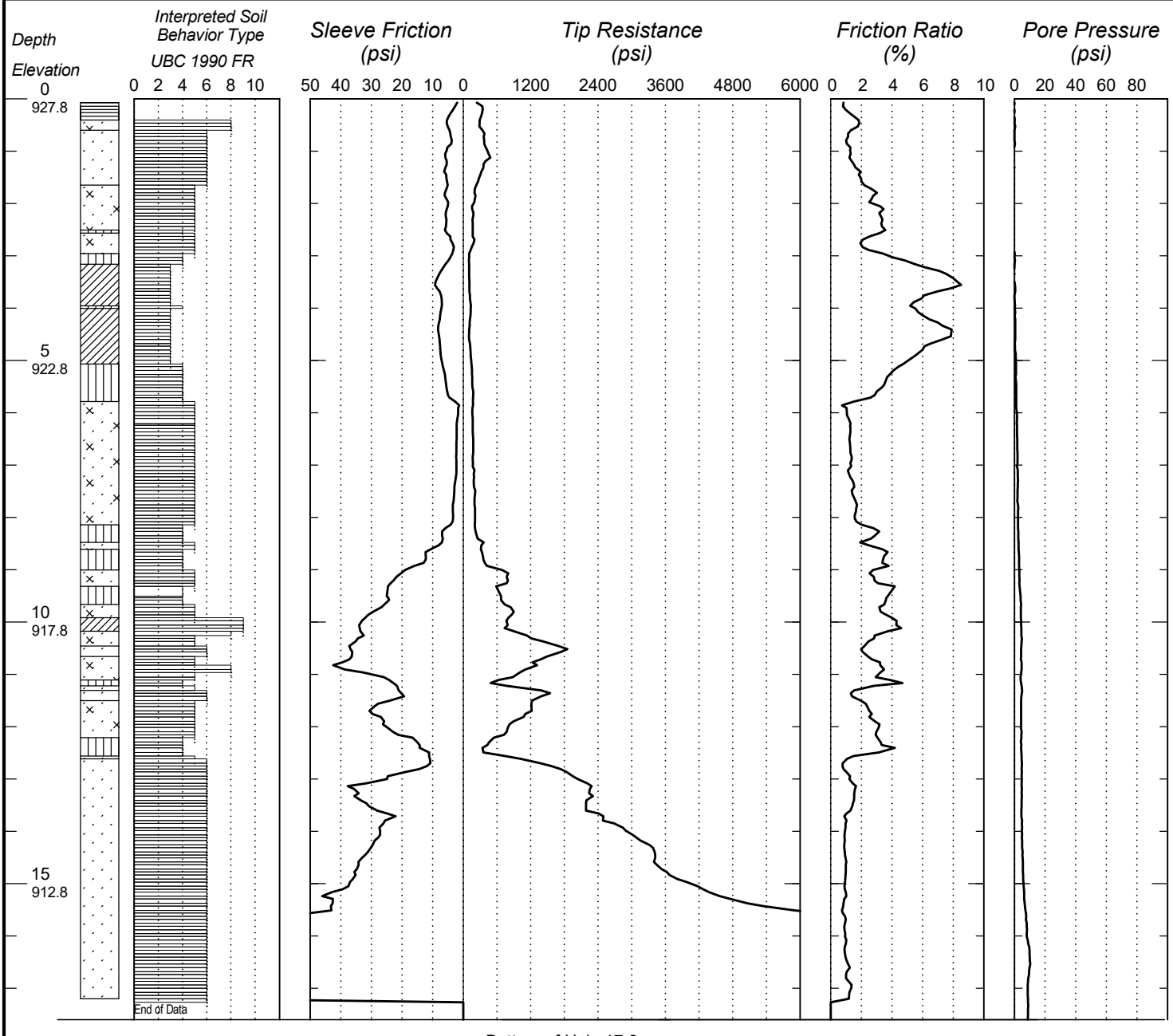
CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 89225

(MDH H400285)

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
8825-1126	**Overhead Sign**	**94 ramp to brooklyn blvd**	**c111**	**927.8** *(GeoXH(DC))*

Location	CPT Machine	SHEET 1 of 1
Hennepin County Coordinate System **X=508557 Y=137469** *Latitude (North)=44.893869° Longitude (West)=-93.350317°*	**219328 CPT Western Star** CPT Operator **ODonnel** Hole Type **CPT-STD**	Date Completed **2/29/2024**



Bottom of Hole 17.6

DEPARTMENT OF TRANSPORTATION

MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

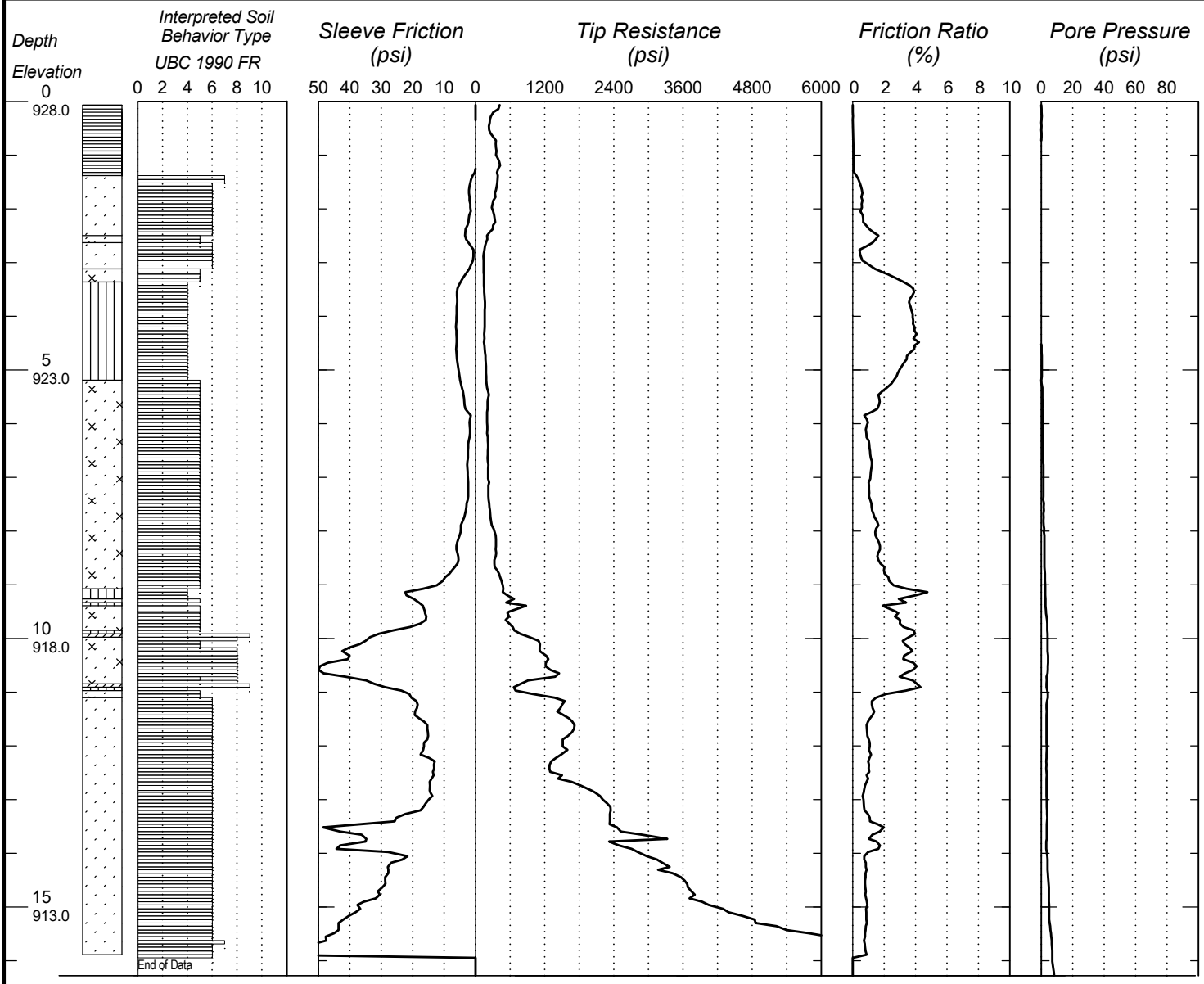
CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 89226

(MDH H400285)

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
8825-1126	**Overhead Sign**	**94 ramp to brooklyn blvd**	**c111a**	**928.0** *(GeoXH(DC))*

Location	CPT Machine	
Hennepin County Coordinate System	**219328 CPT Western Star**	*SHEET 1 of 1*
X=508557 Y=137466	*CPT Operator* **ODonnel**	*Date Completed*
Latitude (North)=44.893861° Longitude (West)=-93.350317°	*Hole Type* **CPT-STD**	**2/29/2024**



Bottom of Hole 16.28

DEPARTMENT OF TRANSPORTATION

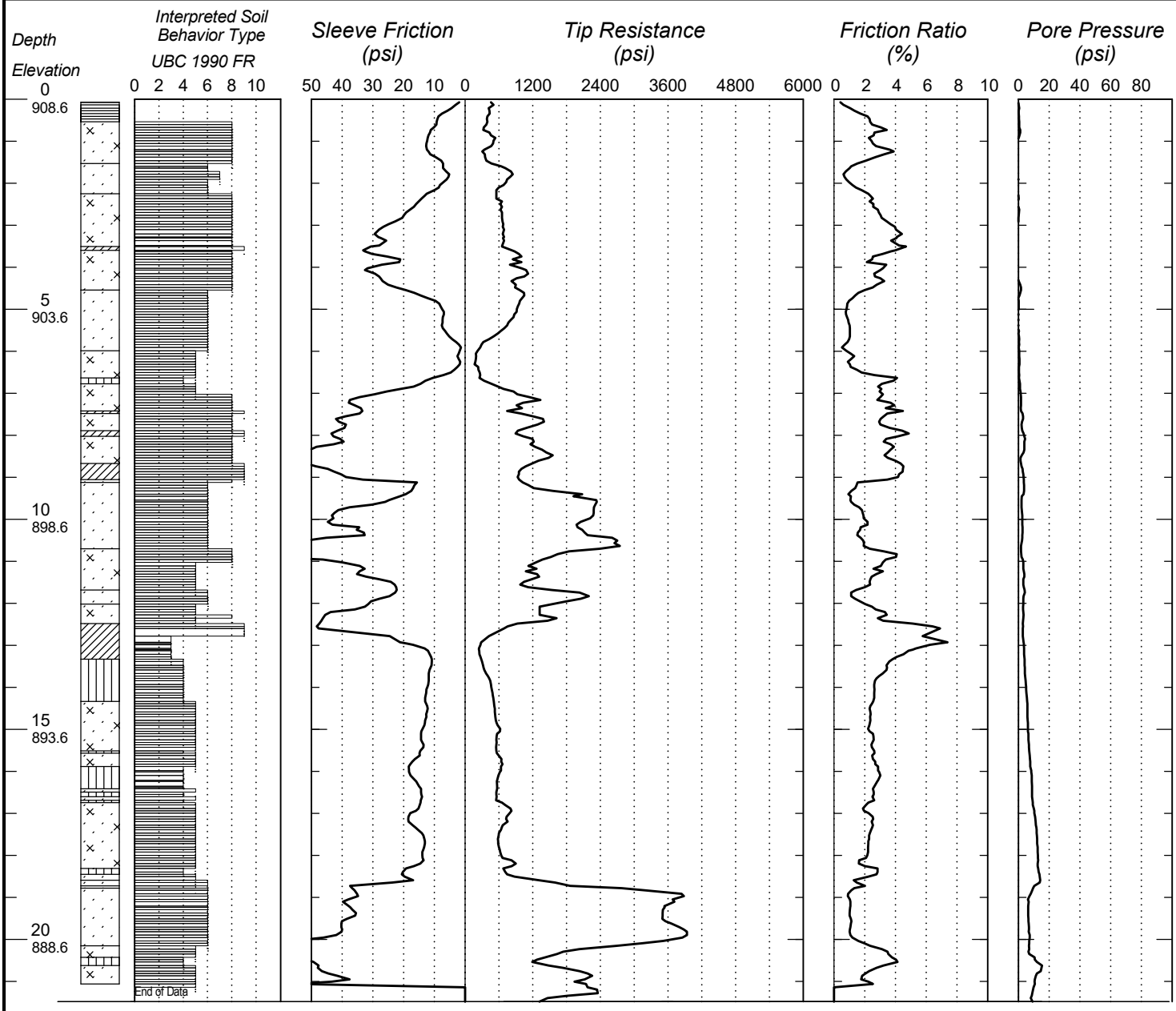
MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 89227

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
8825-1126	**Overhead Sign**	**94 ramp to brooklyn blvd**	**c112**	**908.6** *(DTM)*

Location	CPT Machine	SHEET 1 of 1
Hennepin County Coordinate System	**219328 CPT Western Star**	
X=508595 Y=139499	CPT Operator **ODonnel**	Date Completed
Latitude (North)=44.899439° Longitude (West)=-93.350167°	Hole Type **CPT-STD**	**2/29/2024**



Bottom of Hole 21.48

DEPARTMENT OF TRANSPORTATION

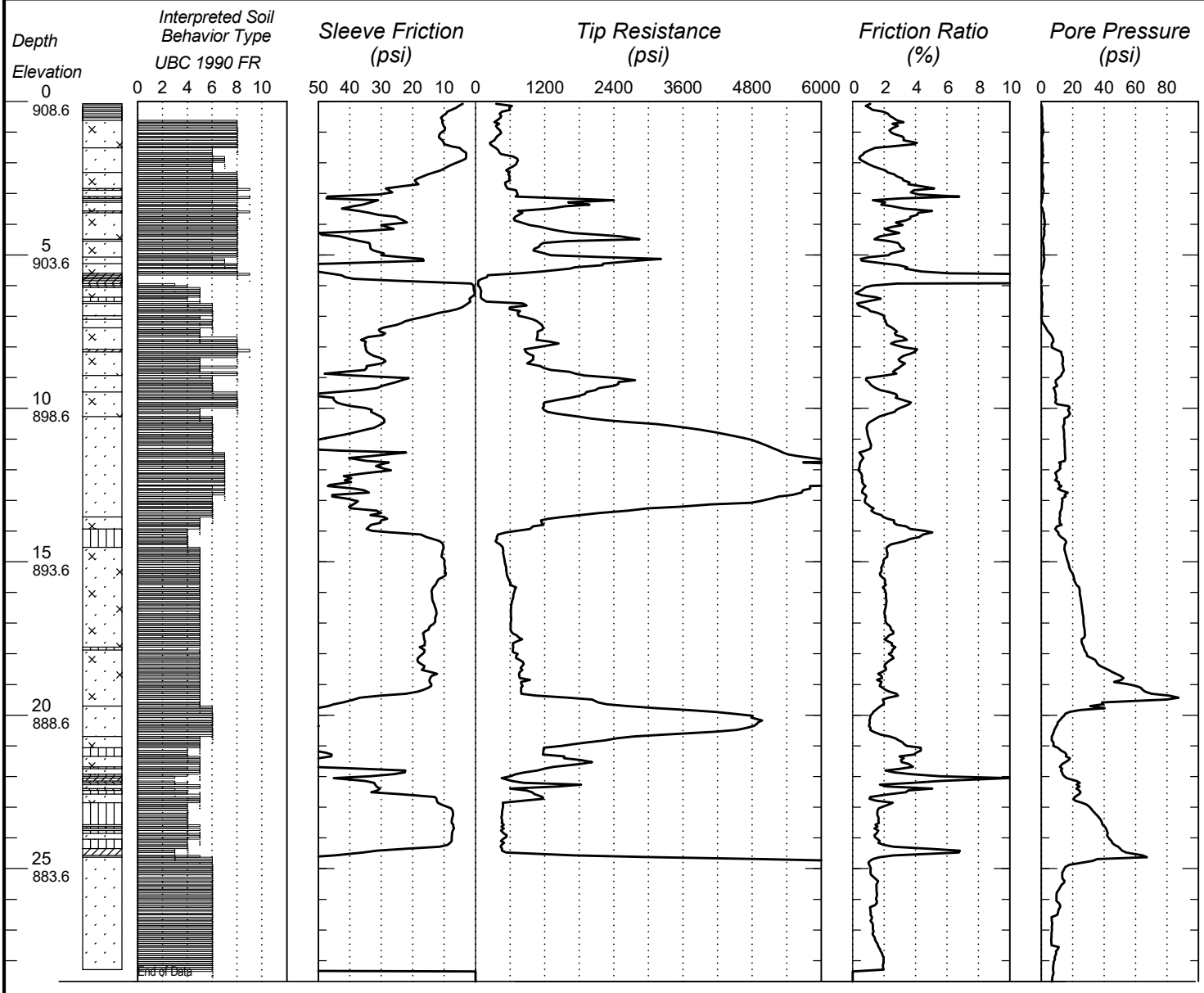
MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 89228

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
8825-1126	**Overhead Sign**	**94 ramp to brooklyn blvd**	**c112a**	**908.6** *(DTM)*

Location	CPT Machine	SHEET 1 of 1
Hennepin County Coordinate System	**219328 CPT Western Star**	
X=508594 Y=139496	CPT Operator **ODonnel**	Date Completed
Latitude (North)=44.899431° Longitude (West)=-93.350169°	Hole Type **CPT-STD**	**2/29/2024**



Bottom of Hole 28.68

DEPARTMENT OF TRANSPORTATION

MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

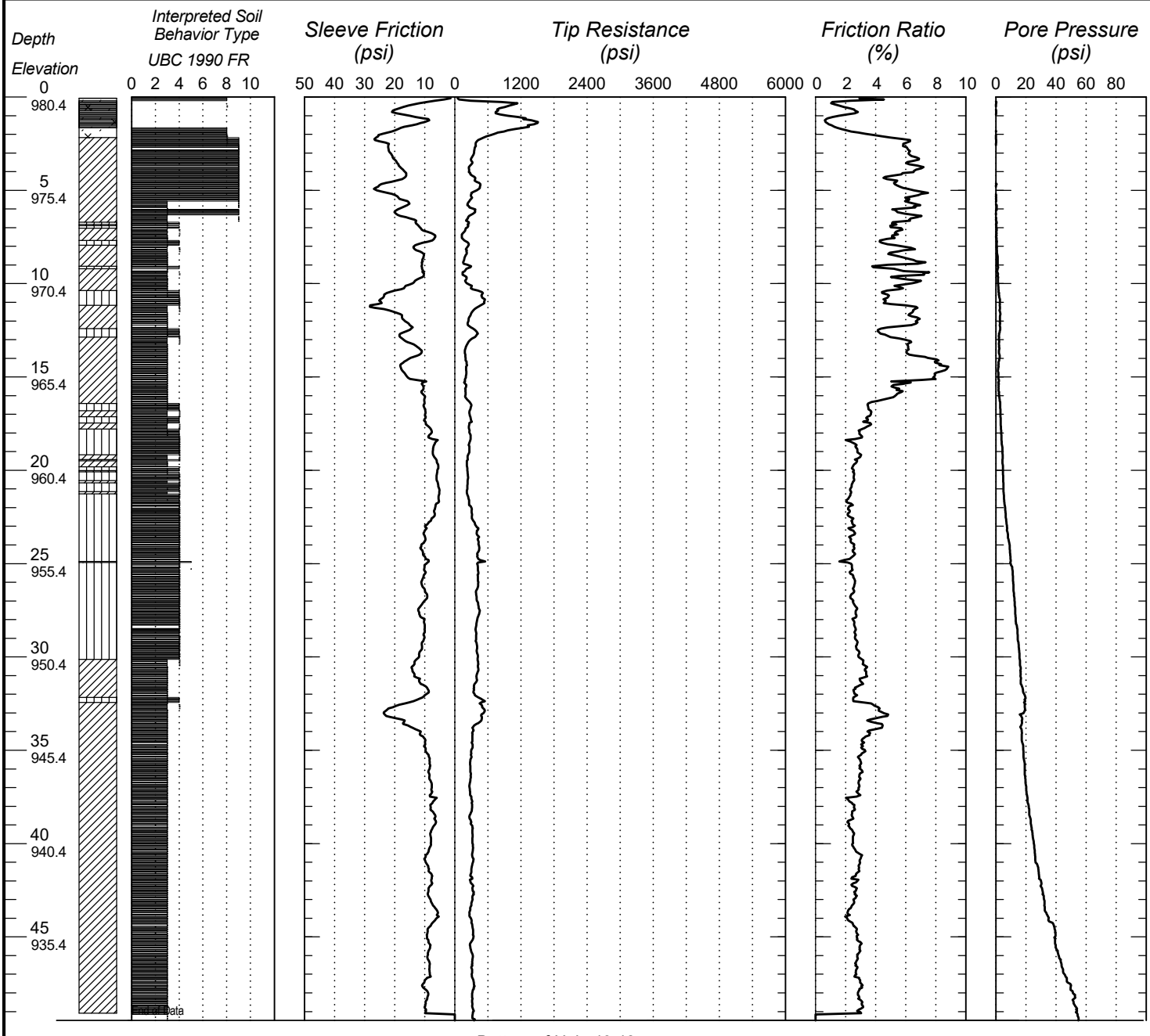
CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 89229

(MDH H400295)

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
8825-1126	**Overhead Sign**	**94 ramp to brooklyn blvd**	**c113**	**980.4** *(DTM)*

Location	CPT Machine	Sheet
Hennepin County Coordinate System **X=456318 Y=247095** *Latitude (North)=45.194406° Longitude (West)=-93.552764°*	**219328 CPT Western Star** CPT Operator **ODonnel** Hole Type **CPT-STD**	*SHEET 1 of 1* Date Completed **2/29/2024**



Bottom of Hole 49.48

DEPARTMENT OF TRANSPORTATION

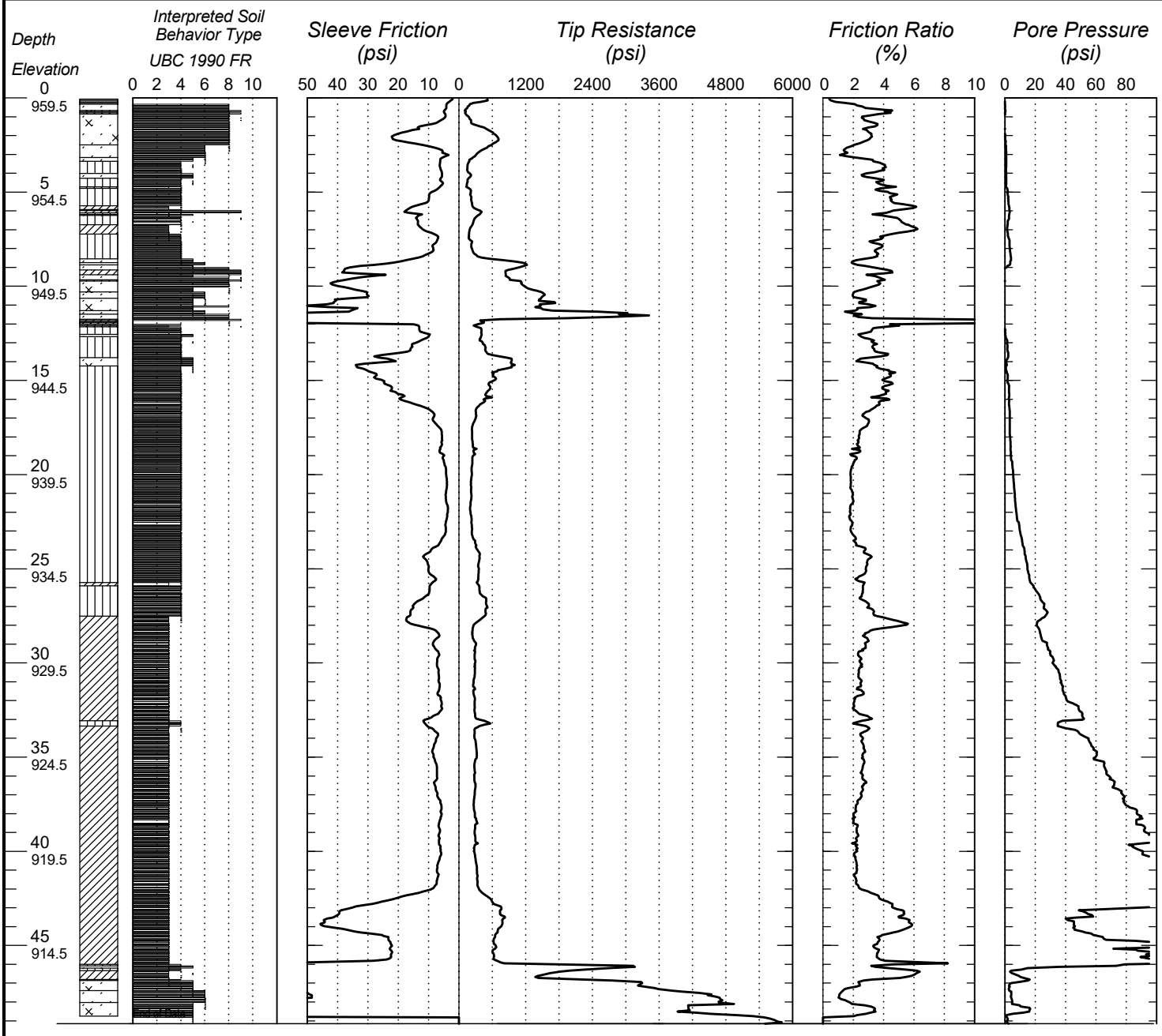
MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 89230

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
8825-1126	**Overhead Sign**	**94 ramp to brooklyn blvd**	**c114**	**959.5** *(DTM)*

Location	CPT Machine	SHEET 1 of 1
Hennepin County Coordinate System	**219328 CPT Western Star**	
X=456372 Y=248280	CPT Operator **ODonnel**	Date Completed
Latitude (North)=45.197656° Longitude (West)=-93.552561°	Hole Type **CPT-STD**	**2/29/2024**



Bottom of Hole 49.16

DEPARTMENT OF TRANSPORTATION

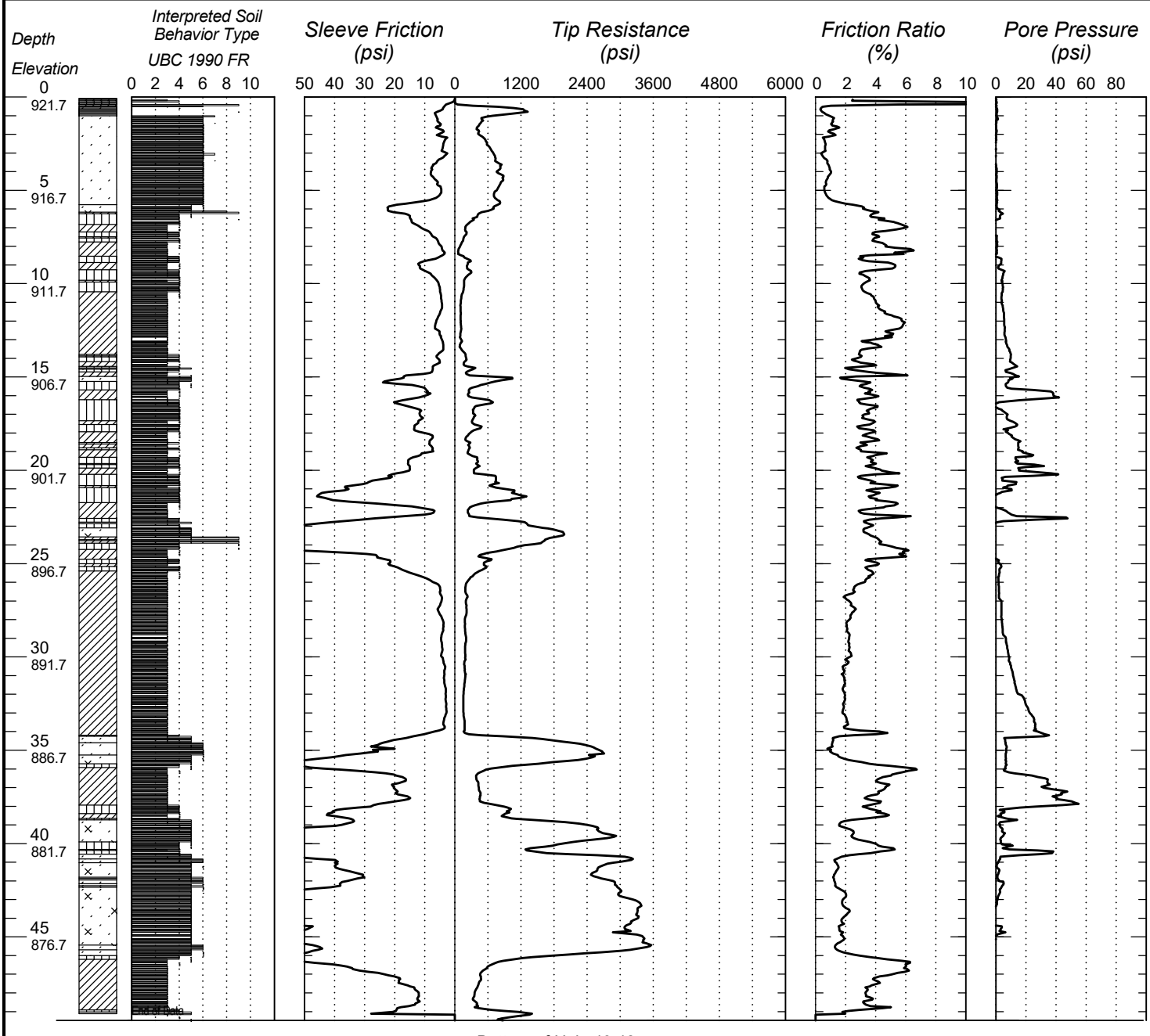
MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 89231

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
8825-1126	**Overhead Sign**	**94 ramp to brooklyn blvd**	**c115**	**921.7** *(DTM)*

Location	CPT Machine	SHEET 1 of 1
Hennepin County Coordinate System	**219328 CPT Western Star**	
X=456110 Y=250363	CPT Operator **ODonnel**	Date Completed
Latitude (North)=45.203367° Longitude (West)=-93.553597°	Hole Type **CPT-STD**	**2/29/2024**



Bottom of Hole 49.48

DEPARTMENT OF TRANSPORTATION

MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

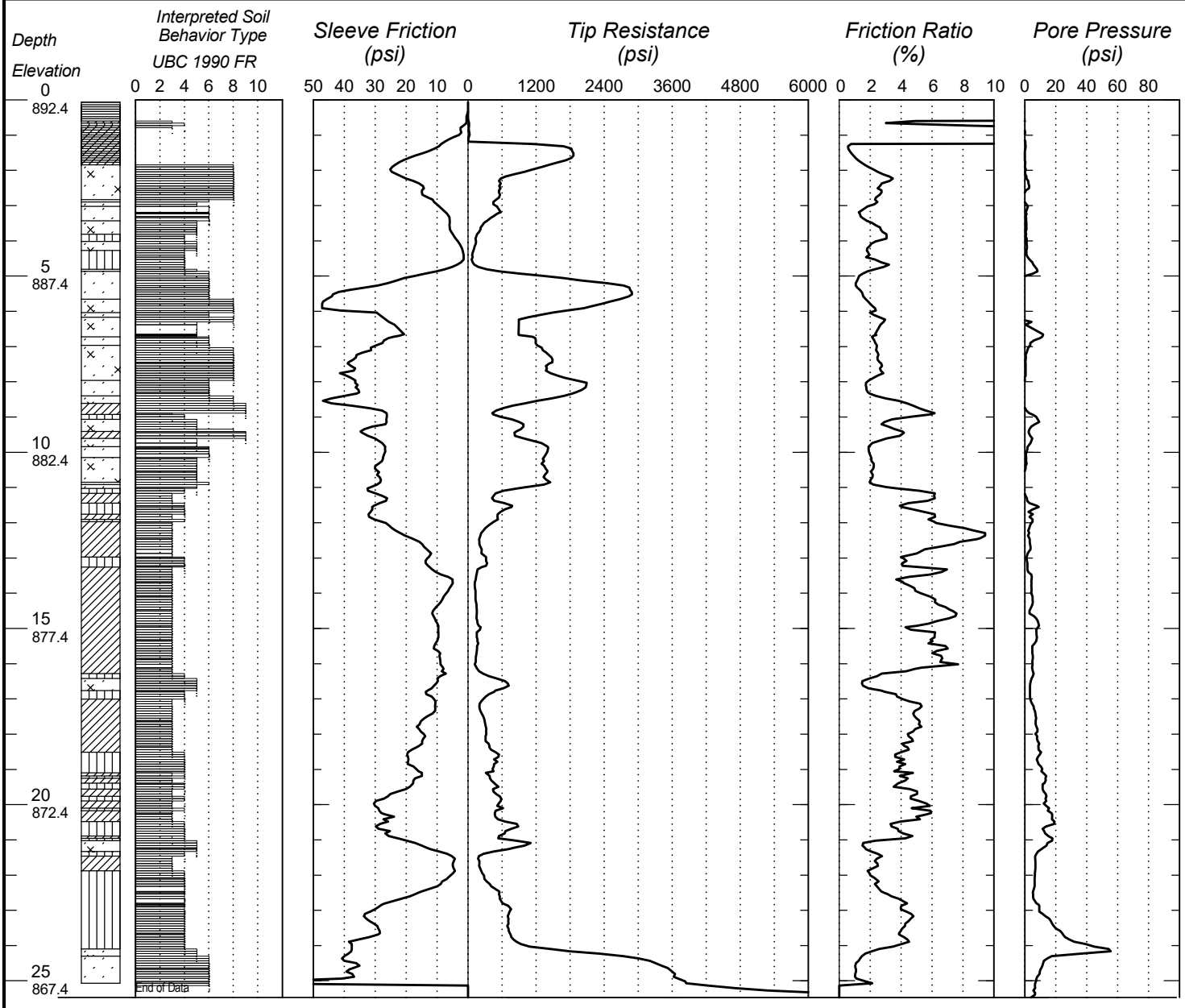
CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 89232

(MDH H400283)

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
8825-1126	**Overhead Sign**	**94 ramp to brooklyn blvd**	**c116**	**892.4** *(DTM)*

Location	CPT Machine	SHEET 1 of 1
Hennepin County Coordinate System	**219328 CPT Western Star**	
X=489006 Y=125472	CPT Operator **ODonnel**	Date Completed
Latitude (North)=44.860964° Longitude (West)=-93.425731°	Hole Type **CPT-STD**	**2/28/2024**



Bottom of Hole 25.47

DEPARTMENT OF TRANSPORTATION

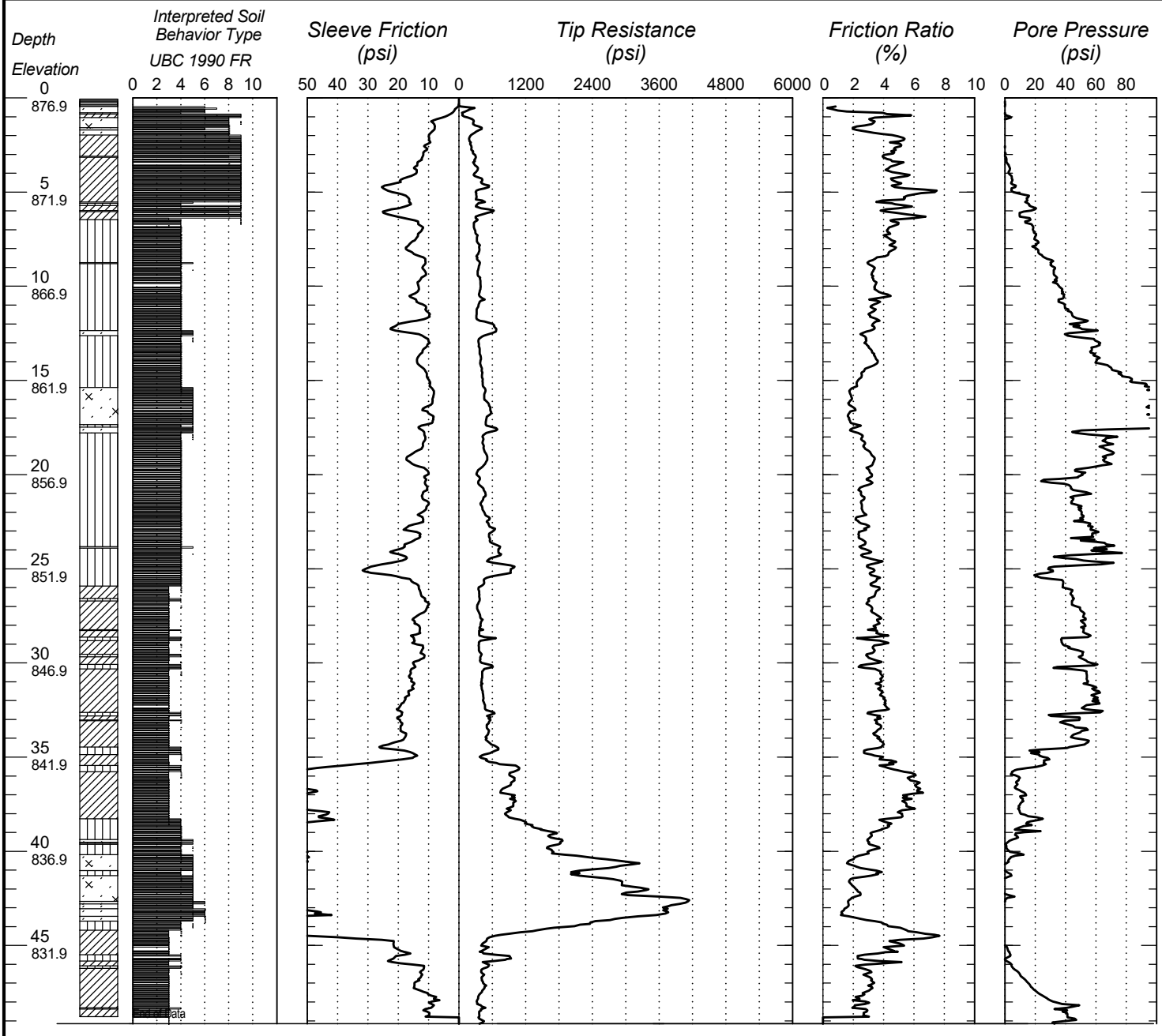
MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 89233

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
8825-1126	**Overhead Sign**	**94 ramp to brooklyn blvd**	**c117**	**876.9** *(DTM)*

Location	CPT Machine	SHEET 1 of 1
Hennepin County Coordinate System **X=491645 Y=125043** *Latitude (North)=44.859792° Longitude (West)=-93.415550°*	**219328 CPT Western Star** CPT Operator **ODonnel** Hole Type **CPT-STD**	Date Completed **2/28/2024**



Bottom of Hole 49.16

DEPARTMENT OF TRANSPORTATION

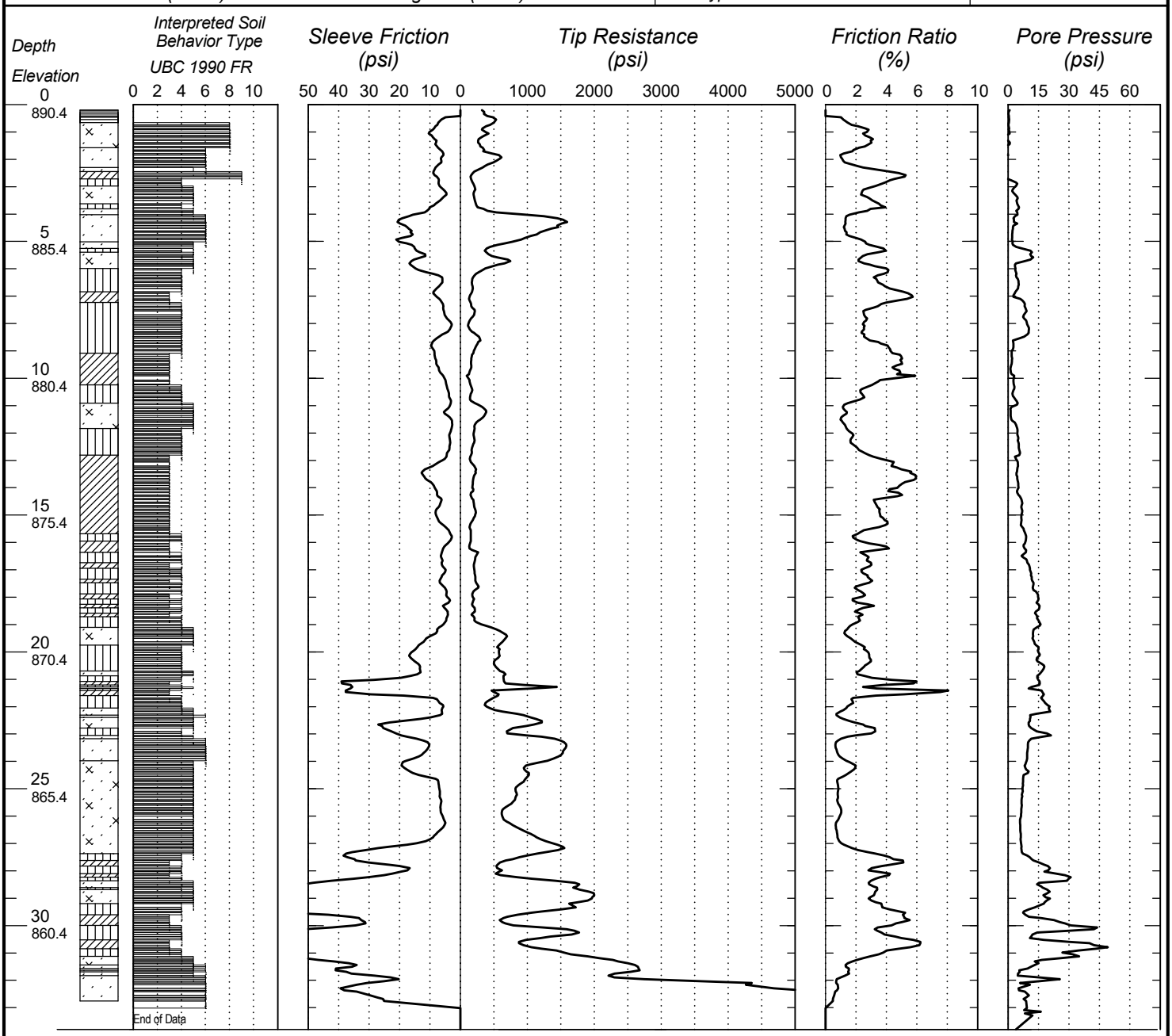
MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 84290

State Project	Bridge No. or Job Desc.	Trunk Highway/Location	Sounding No.	Ground Elevation
8825-706	**Overhead Sign**		**C21a**	**890.4** *(DTM)*

Location	CPT Machine	Sheet
Scott County Coordinate System **X=471785 Y=241845** *Latitude (North)=44°51'39.37" Longitude (West)=93°25'31.69"*	**203094 CPT Truck** CPT Operator **ODonnel** Hole Type **CPT-STD**	*SHEET 1 of 1* Date Completed **7/30/19**



Bottom of Hole 33.79

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