MEMO

Mailstop 645
1400 Gervais Avenue
Maplewood, MN  55109

DATE:       November 17, 2016

TO:         Andrew Lutaya, Final Design Project Manager
            Metro District

FROM:       Paul Martin, Senior Engineer
            Geotechnical Engineering Section

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

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 Soundings 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
- 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
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 seismic wave travels through soil/rock.

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

SPT 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

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

Robertson CPTU 1990
Soil Behavior Type based on friction ratio

Robertson CPT 1990
Soil Behavior Type based on pore pressure

MRU-1900 (CPT 1.0)

G:\GEOTECH\PUBLIC\FORMS\CPTINDEX.DOC January 30, 2002
**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.

**SOIL/CORE TESTS**

SPT N₆₀........... 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

Consistency - Cohesive Soils

BPF

<table>
<thead>
<tr>
<th>CONSISTENCY</th>
<th>BPF</th>
</tr>
</thead>
<tbody>
<tr>
<td>very soft....</td>
<td>0-1</td>
</tr>
<tr>
<td>soft.........</td>
<td>2-4</td>
</tr>
<tr>
<td>firm.........</td>
<td>5-8</td>
</tr>
<tr>
<td>stiff.........</td>
<td>9-15</td>
</tr>
<tr>
<td>very stiff....</td>
<td>16-30</td>
</tr>
<tr>
<td>hard.........</td>
<td>31-60</td>
</tr>
<tr>
<td>very hard....</td>
<td>&gt; 60</td>
</tr>
</tbody>
</table>

**COLOR**

<table>
<thead>
<tr>
<th>COLOR</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>blk......</td>
<td>Black</td>
</tr>
<tr>
<td>grn......</td>
<td>Green</td>
</tr>
<tr>
<td>orng.....</td>
<td>Orange</td>
</tr>
<tr>
<td>dk......</td>
<td>Dark</td>
</tr>
<tr>
<td>ios......</td>
<td>Iron Oxide Stained</td>
</tr>
</tbody>
</table>

**GRAIN SIZE / PLASTICITY**

<table>
<thead>
<tr>
<th>GRAIN SIZE</th>
<th>PLASTICITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>VF.........</td>
<td>Very Fine</td>
</tr>
<tr>
<td>F..........</td>
<td>Fine</td>
</tr>
<tr>
<td>slp........</td>
<td>Slightly</td>
</tr>
<tr>
<td>Cr..........</td>
<td>Coarse</td>
</tr>
<tr>
<td>Plastic</td>
<td>Plastic</td>
</tr>
</tbody>
</table>

**SOIL/ROCK TERMS**

Mn/DOT Triangular Textural Soil Classification System

**WATER MEASUREMENT**

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AB............</td>
<td>After Bailing</td>
</tr>
<tr>
<td>AC............</td>
<td>After Completion</td>
</tr>
<tr>
<td>AF............</td>
<td>After Flushing</td>
</tr>
<tr>
<td>w/C..........</td>
<td>with Casing</td>
</tr>
<tr>
<td>w/M..........</td>
<td>with Mud</td>
</tr>
<tr>
<td>WSD..........</td>
<td>While Sampling/Drilling</td>
</tr>
<tr>
<td>w/AUG........</td>
<td>with Hollow Stem Auger</td>
</tr>
</tbody>
</table>

**MISCELLANEOUS**

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NA...........</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>w/.........</td>
<td>with</td>
</tr>
<tr>
<td>w/o.........</td>
<td>without out</td>
</tr>
<tr>
<td>sat..........</td>
<td>saturated</td>
</tr>
</tbody>
</table>

**DRILLING OPERATIONS**

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUG..........</td>
<td>Augered</td>
</tr>
<tr>
<td>CD...........</td>
<td>Core Drilled</td>
</tr>
<tr>
<td>DBD..........</td>
<td>Disturbed by Drilling</td>
</tr>
<tr>
<td>DBJ..........</td>
<td>Disturbed by Jetting</td>
</tr>
<tr>
<td>PD...........</td>
<td>Plug Drilled</td>
</tr>
<tr>
<td>ST...........</td>
<td>Split Tube (SPT test)</td>
</tr>
<tr>
<td>TW...........</td>
<td>Thinwall (Shelby Tube)</td>
</tr>
<tr>
<td>WS...........</td>
<td>Wash Sample</td>
</tr>
<tr>
<td>NSR..........</td>
<td>No Sample Retrieved</td>
</tr>
</tbody>
</table>

**RELATIVE DENSITY**

Compactness - Granular Soils

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BPF..........</td>
<td>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 &amp; Cathead system.</td>
</tr>
</tbody>
</table>

**Vane Shear Test**

**Washed Sample** (Collected during plug drilling)

**Augered**

**Plug Drilled**

**Split Tube Sample**

**Core Drilled**

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AU...........</td>
<td>Augered</td>
</tr>
<tr>
<td>JLT..........</td>
<td>Augered &amp; Jetted</td>
</tr>
<tr>
<td>JT...........</td>
<td>Jetted</td>
</tr>
<tr>
<td>AP...........</td>
<td>Augered &amp; Plug Drilled</td>
</tr>
</tbody>
</table>

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

![Mn/DOT Triangular Textural Soil Classification System](image)
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
SP 2781-467
Five Noise Walls between Cedar Avenue and Franklin Terrace, Minneapolis
Sheet 2 of 2, Walls 101 and 103
Subsurface Information

- Recent Core Penetration Test Site
- Previous Core Penetration Test or Boring Site
<table>
<thead>
<tr>
<th>Location</th>
<th>Conditions Encountered</th>
<th>Water</th>
<th>Possible Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>c35</td>
<td>Loose sand to near elev. 832, then medium dense sands to termination near elev. 822</td>
<td>No water indicated, but perched layers may be encountered.</td>
<td>Loose sand may tend to collapse.</td>
</tr>
<tr>
<td>c34</td>
<td>Dense undefined near surface, generally medium dense to dense sands to termination near elev. 822</td>
<td>No water indicated, but perched layers may be encountered.</td>
<td>Loose sand may tend to collapse.</td>
</tr>
<tr>
<td>c33a</td>
<td>Dense undefined near surface, generally medium dense to dense sands to termination near elev. 813</td>
<td>No water indicated, but perched layers may be encountered.</td>
<td>Loose Sand may tend to collapse.</td>
</tr>
<tr>
<td>c32</td>
<td>Dense undefined near surface, generally medium dense to dense sands to refusal near elev. 818</td>
<td>No water indicated, but perched layers may be encountered.</td>
<td>Loose Sand may tend to collapse.</td>
</tr>
<tr>
<td>S11 (2010)</td>
<td>Medium Dense Sands near surface. Very loose sand near elev. 823 Sand to termination near elev. 812</td>
<td>Water observed while drilling below elev. 815</td>
<td>Loose Sand may tend to collapse. Water elevation could vary</td>
</tr>
<tr>
<td>c30a</td>
<td>Generally sand, loose to near elev. 829, then medium dense to dense to refusal near elev. 815 1/2</td>
<td>No water indicated, but perched layers may be encountered.</td>
<td>Loose Sand may tend to collapse.</td>
</tr>
<tr>
<td>c29</td>
<td>Generally sand, loose to near elev. 829, then medium dense to dense to termination near elev. 816</td>
<td>No water indicated, but perched layers may be encountered.</td>
<td>Loose Sand may tend to collapse.</td>
</tr>
<tr>
<td>c28</td>
<td>Generally sand, mostly medium dense to dense, but very loose near elev. 829. Sounding terminated on refusal near elev. 821 1/2</td>
<td>Water was indicated below elev. 825</td>
<td>Loose Sand may tend to collapse. Water elevation could vary.</td>
</tr>
</tbody>
</table>

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

CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 81218

U.S. Customary Units

<table>
<thead>
<tr>
<th>State Project</th>
<th>Bridge No. or Job Desc.</th>
<th>Trunk Highway/Location</th>
<th>Sounding No.</th>
<th>Ground Elevation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2781-467</td>
<td>NOISE WALL</td>
<td>TH 94</td>
<td>C35</td>
<td>840.9 (DTM)</td>
</tr>
</tbody>
</table>

Location

Hennepin Co. Coordinate: X=535269 Y=163987 (ft.)
Latitude (North)=44°57'59.48" Longitude (West)=93°14'49.48"
No Station-Offset Information Available

Location CPT Machine 203094 CPT Truck
CPT Operator Buhl, Dylan
Date Completed 9/21/16

Index Sheet Code 3.0

<table>
<thead>
<tr>
<th>Depth Elevation</th>
<th>Interpreted Soil Behavior Type</th>
<th>Sleeve Friction (psi)</th>
<th>Tip Resistance (psi)</th>
<th>Friction Ratio (%)</th>
<th>Pore Pressure (psi)</th>
</tr>
</thead>
<tbody>
<tr>
<td>840.9</td>
<td>UBC 1990 FR</td>
<td>0</td>
<td>20</td>
<td>600</td>
<td>0</td>
</tr>
<tr>
<td>835.9</td>
<td></td>
<td>16</td>
<td>12</td>
<td>1200</td>
<td>2</td>
</tr>
<tr>
<td>830.9</td>
<td></td>
<td>12</td>
<td>8</td>
<td>1800</td>
<td>4</td>
</tr>
<tr>
<td>825.9</td>
<td></td>
<td>4</td>
<td>0</td>
<td>2400</td>
<td>6</td>
</tr>
<tr>
<td>820.9</td>
<td></td>
<td></td>
<td></td>
<td>3000</td>
<td>8</td>
</tr>
<tr>
<td>815.9</td>
<td></td>
<td></td>
<td></td>
<td>3600</td>
<td>10</td>
</tr>
<tr>
<td>810.9</td>
<td></td>
<td></td>
<td></td>
<td>4200</td>
<td>10</td>
</tr>
<tr>
<td>805.9</td>
<td></td>
<td></td>
<td></td>
<td>4800</td>
<td>20</td>
</tr>
<tr>
<td>800.9</td>
<td></td>
<td></td>
<td></td>
<td>5400</td>
<td>30</td>
</tr>
<tr>
<td>795.9</td>
<td></td>
<td></td>
<td></td>
<td>6000</td>
<td>40</td>
</tr>
</tbody>
</table>

Bottom of Hole 39.56
Refusal on unknown layer

No Station-Offset Information Available

Location CPT Machine 203094 CPT Truck
CPT Operator Buhl, Dylan
Date Completed 9/21/16

Index Sheet Code 3.0

E:\ORIGINAL FILE 1\2781-467\CPT-STD\2781-467-Duhl (09-27-2016)\test(028)_PD.DAT

G:\GINT\PROJECTS-ACTIVE\2781-467-TH 94-NOISE WALL.GPJ

CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 81218

U.S. Customary Units

<table>
<thead>
<tr>
<th>State Project</th>
<th>Bridge No. or Job Desc.</th>
<th>Trunk Highway/Location</th>
<th>Sounding No.</th>
<th>Ground Elevation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2781-467</td>
<td>NOISE WALL</td>
<td>TH 94</td>
<td>C35</td>
<td>840.9 (DTM)</td>
</tr>
</tbody>
</table>

Location

Hennepin Co. Coordinate: X=535269 Y=163987 (ft.)
Latitude (North)=44°57'59.48" Longitude (West)=93°14'49.48"
No Station-Offset Information Available

Location CPT Machine 203094 CPT Truck
CPT Operator Buhl, Dylan
Date Completed 9/21/16

Index Sheet Code 3.0

<table>
<thead>
<tr>
<th>Depth Elevation</th>
<th>Interpreted Soil Behavior Type</th>
<th>Sleeve Friction (psi)</th>
<th>Tip Resistance (psi)</th>
<th>Friction Ratio (%)</th>
<th>Pore Pressure (psi)</th>
</tr>
</thead>
<tbody>
<tr>
<td>840.9</td>
<td>UBC 1990 FR</td>
<td>0</td>
<td>20</td>
<td>600</td>
<td>0</td>
</tr>
<tr>
<td>835.9</td>
<td></td>
<td>16</td>
<td>12</td>
<td>1200</td>
<td>2</td>
</tr>
<tr>
<td>830.9</td>
<td></td>
<td>12</td>
<td>8</td>
<td>1800</td>
<td>4</td>
</tr>
<tr>
<td>825.9</td>
<td></td>
<td>4</td>
<td>0</td>
<td>2400</td>
<td>6</td>
</tr>
<tr>
<td>820.9</td>
<td></td>
<td></td>
<td></td>
<td>3000</td>
<td>8</td>
</tr>
<tr>
<td>815.9</td>
<td></td>
<td></td>
<td></td>
<td>3600</td>
<td>10</td>
</tr>
<tr>
<td>810.9</td>
<td></td>
<td></td>
<td></td>
<td>4200</td>
<td>10</td>
</tr>
<tr>
<td>805.9</td>
<td></td>
<td></td>
<td></td>
<td>4800</td>
<td>20</td>
</tr>
<tr>
<td>800.9</td>
<td></td>
<td></td>
<td></td>
<td>5400</td>
<td>30</td>
</tr>
<tr>
<td>795.9</td>
<td></td>
<td></td>
<td></td>
<td>6000</td>
<td>40</td>
</tr>
</tbody>
</table>

Bottom of Hole 39.56
Refusal on unknown layer

No Station-Offset Information Available

Location CPT Machine 203094 CPT Truck
CPT Operator Buhl, Dylan
Date Completed 9/21/16

Index Sheet Code 3.0

E:\ORIGINAL FILE 1\2781-467\CPT-STD\2781-467-Duhl (09-27-2016)\test(028)_PD.DAT

G:\GINT\PROJECTS-ACTIVE\2781-467-TH 94-NOISE WALL.GPJ
<table>
<thead>
<tr>
<th>Depth</th>
<th>Interpreted Soil Behavior Type</th>
<th>Sleeve Friction (psi)</th>
<th>Tip Resistance (psi)</th>
<th>Friction Ratio (%)</th>
<th>Pore Pressure (psi)</th>
</tr>
</thead>
<tbody>
<tr>
<td>838.1</td>
<td>UBC 1990 FR</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>833.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>828.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>823.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>818.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>813.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Bottom of Hole 25.8:
Planned Depth: 25.8.
MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

CONC PENETRATION TEST RESULTS

UNIQUE NUMBER 81216

U.S. Customary Units

State Project
2781-467

Bridge No. or Job Desc.
NOISE WALL

Trunk Highway/Location
TH 94

Sounding No.
C32

Ground Elevation
839.1 (DTM)

Location
Hennepin Co. Coordinate: X=535516 Y=163685 (ft.)

Latitude (North)=44°57'56.49"
Longitude (West)=93°14'46.05"

CPT Machine
203094 CPT Truck

CPT Operator
Buhl, Dylan

Date Completed
9/21/16

CPT-STD

Hole Type

No Station-Offset Information Available

No Station-Offset Information Available

Interpreted Soil Behavior Type
UBC 1990 FR

Sleeve Friction (psi)

Tip Resistance (psi)

Friction Ratio (%)

Pore Pressure (psi)

Depth Elevation
839.1
5 834.1
10 829.1
15 824.1
20 819.1

Bottom of Hole 21.92

Refusal on unknown layer

Index Sheet Code 3.0
**UNIQUE NUMBER 73835**

**U.S. Customary Units**

<table>
<thead>
<tr>
<th>Depth</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.9</td>
<td>silt Sandy Loam w/ G, dk brn, moist, fill</td>
</tr>
<tr>
<td>5</td>
<td>Sand w/ trace G, dk brn, moist, meddense, fill</td>
</tr>
<tr>
<td>10</td>
<td>Fine Sand w/ G, brn, moist, meddense, fill</td>
</tr>
<tr>
<td>15</td>
<td>Loamy Sand, w/ brick debris, dk brn, moist, dense to Vloose, fill</td>
</tr>
<tr>
<td>20</td>
<td>Sand w/ trace G, brn, moist, Vloose</td>
</tr>
<tr>
<td>25</td>
<td>Sand w/ G, lt brn, moist, meddense</td>
</tr>
<tr>
<td>30</td>
<td>Fine Loamy Sand, brn, sat, loose</td>
</tr>
<tr>
<td>31.0</td>
<td>Bottom of Hole - 31'. Water not observed while drilling. Boring then grouted.</td>
</tr>
</tbody>
</table>

**State Project** 2781-415  
**Bridge No. or Job Desc.** OH Sign 6 - North  
**Trunk Highway/Location** Interstate Highway 94  
**Boring No.** S-11  
**Ground Elevation** 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** S-11  
**Hammer** CME Automatic Calibrated  
**Drilling Completed** 6/1/10

**Soil Class:** P  
**Rock Class:**  
**Editor:** 10/13/16

**Formation or Member**
## Cone Penetration Test Results

**Unique Number:** 81215  
**U.S. Customary Units**

<table>
<thead>
<tr>
<th>State Project</th>
<th>Bridge No. or Job Desc.</th>
<th>Trunk Highway/Location</th>
<th>Sounding No.</th>
<th>Ground Elevation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2781-467</td>
<td>NOISE WALL 99</td>
<td>TH 94</td>
<td>C30A</td>
<td>837.6 (DTM)</td>
</tr>
</tbody>
</table>

**Location:**
- Hennepin Co. Coordinate: X=535815 Y=163525 (ft.)
- Latitude (North)=44°57'54.91"  Longitude (West)=93°14'41.90"
- No Station-Offset Information Available

**CPT Machine:** 203094 CPT Truck  
**CPT Operator:** Buhl, Dylan  
**Hole Type:** CPT-STD  
**Date Completed:** 9/13/16

### Interpreted Soil Behavior Type

<table>
<thead>
<tr>
<th>Depth (ft.)</th>
<th>UBC 1990 FR</th>
</tr>
</thead>
<tbody>
<tr>
<td>837.6</td>
<td></td>
</tr>
<tr>
<td>832.6</td>
<td></td>
</tr>
<tr>
<td>827.6</td>
<td></td>
</tr>
<tr>
<td>822.6</td>
<td></td>
</tr>
<tr>
<td>817.6</td>
<td></td>
</tr>
</tbody>
</table>

### Sleeve Friction (psi)

<table>
<thead>
<tr>
<th>Depth (ft.)</th>
<th>0</th>
<th>2</th>
<th>4</th>
<th>6</th>
<th>8</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>837.6</td>
<td>20</td>
<td>16</td>
<td>12</td>
<td>8</td>
<td>4</td>
<td>0</td>
</tr>
</tbody>
</table>

### Tip Resistance (psi)

<table>
<thead>
<tr>
<th>Depth (ft.)</th>
<th>600</th>
<th>1200</th>
<th>1800</th>
<th>2400</th>
</tr>
</thead>
<tbody>
<tr>
<td>837.6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Friction Ratio (%)

<table>
<thead>
<tr>
<th>Depth (ft.)</th>
<th>3000</th>
<th>0</th>
<th>2</th>
<th>4</th>
<th>6</th>
<th>8</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>837.6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Pore Pressure (psi)

<table>
<thead>
<tr>
<th>Depth (ft.)</th>
<th>0</th>
<th>10</th>
<th>20</th>
<th>30</th>
<th>40</th>
</tr>
</thead>
<tbody>
<tr>
<td>837.6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Index Sheet Code:** 3.0

---

![Graph](image-url)
## Cone Penetration Test Results

**Unique Number:** 81213

**State Project:** 2781-467

**Bridge No. or Job Desc.:** NOISE WALL

**Trunk Highway/Location:** TH 94

**Sounding No.:** C28

**Ground Elevation:** 841.4 (DTM)

### Location Information

- **Hennepin Co. Coordinate:** X=535991, Y=163462 (ft.)
- **Latitude (North):** 44°57'54.28"
- **Longitude (West):** 93°14'39.45"

### Cone Penetration Test Data

<table>
<thead>
<tr>
<th>Depth (Elevation)</th>
<th>Interpreted Soil Behavior Type</th>
<th>Sleeve Friction (psi)</th>
<th>Tip Resistance (psi)</th>
<th>Friction Ratio (%)</th>
<th>Pore Pressure (psi)</th>
</tr>
</thead>
<tbody>
<tr>
<td>841.4</td>
<td><strong>UBC 1990 FR</strong></td>
<td>20 16 12 8 4 0</td>
<td>600 1200 1800 2400</td>
<td>3000</td>
<td>0 2 4 6 8 10</td>
</tr>
<tr>
<td>5</td>
<td><strong>Sleeve Friction</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>836.4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td><strong>Tip Resistance</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>831.4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td><strong>Friction Ratio</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>826.4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td><strong>Pore Pressure</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>821.4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Bottom of Hole:** 20.6
- **Refusal on unknown layer**

### Additional Information

- **Location:** TH 94
- **Trunk Highway/Location:** TH 94
- **Sounding No.:** C28
- **Ground Elevation:** 841.4 (DTM)
- **Hole Type:** CPT-STD
- **Date Completed:** 9/13/16
- **CPT Operator:** Buhl, Dylan
## Cone Penetration Test Results

**Unique Number:** 81219  
**State Project:** 2781-467  
**Bridge No. or Job Desc.:** Noise Wall  
**Trunk Highway/Location:** TH 94  
**Sounding No.:** C36  
**Ground Elevation:** 843.0 (DTM)

### Location
- **Hennepin Co. Coordinate:** X=536018, Y=163154 (ft.)
- **Latitude (North):** 44°57'51.24"  
- **Longitude (West):** 93°14'39.08"  
- **No Station-Offset Information Available**

<table>
<thead>
<tr>
<th>Depth (ft.)</th>
<th>Depth (m)</th>
<th>Soil Type</th>
<th>Behavior Type</th>
<th>Tip Resistance (psi)</th>
<th>Sleeve Friction (psi)</th>
<th>Friction Ratio (%)</th>
<th>Pore Pressure (psi)</th>
</tr>
</thead>
<tbody>
<tr>
<td>843.0</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>838.0</td>
<td>1.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>833.0</td>
<td>1.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>828.0</td>
<td>1.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>823.0</td>
<td>1.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>818.0</td>
<td>1.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Date Completed:** 9/14/16  
**CPT Machine:** 203094 CPT Truck  
**CPT Operator:** Buhl, Dylan  
**Hole Type:** CPT-STD  

**Published by:**  
**Date:** 10/13/16  
**Index Sheet Code:** 3.0  
**Source:** E:\ORIGINAL FILE 12781-467-TH 94-NOISE WALL.GPJ
**State Project:** 2781-467  
**Bridge No. or Job Desc.:** NOISE WALL 98  
**Trunk Highway/Location:** TH 94  
**Sounding No.:** C38  
**Ground Elevation:** 837.7 (DTM)

**Location:** Hennepin Co. Coordinate: X=536250 Y=163066  
**Latitude (North) = 44°57'50.37"**  
**Longitude (West) = 93°14'35.86"**  
**No Station-Offset Information Available**  

**CPT Machine:** 203094 CPT Truck  
**CPT Operator:** Buhl, Dylan  
**Date Completed:** 9/22/16

### Cone Penetration Test Results

<table>
<thead>
<tr>
<th>Depth Elevation (ft)</th>
<th>Interpreted Soil Behavior Type</th>
<th>Sleeve Friction (psi)</th>
<th>Tip Resistance (psi)</th>
<th>Friction Ratio (%)</th>
<th>Pore Pressure (psi)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>UBC 1990 FR</td>
<td>0</td>
<td>600</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>16</td>
<td>1200</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>10</td>
<td></td>
<td>8</td>
<td>1800</td>
<td>4</td>
<td>20</td>
</tr>
<tr>
<td>15</td>
<td></td>
<td>4</td>
<td>2400</td>
<td>8</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0</td>
<td>3000</td>
<td>10</td>
<td>40</td>
</tr>
</tbody>
</table>

**Bottom of Hole 38.98:** Refusal on unknown layer

**Index Sheet Code:** 3.0

**Hennepin Co. Coordinate:** X=536250 Y=163066

**Latitude (North):** 44°57'50.37"

**Longitude (West):** 93°14'35.86"
### Cone Penetration Test Results

**Unique Number:** 81223

**U.S. Customary Units**

<table>
<thead>
<tr>
<th>Depth (ft)</th>
<th>Interpreted Soil Behavior Type</th>
<th>Sleeve Friction (psi)</th>
<th>Tip Resistance (psi)</th>
<th>Friction Ratio (%)</th>
<th>Pore Pressure (psi)</th>
</tr>
</thead>
<tbody>
<tr>
<td>839.7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>834.7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>830.7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>826.7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>822.7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>818.7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>814.7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Location Information:**
- **Location:** Hennepin Co. Coordinate: X=53651, Y=163058
- **Latitude (North):** 44°57'50.29"
- **Longitude (West):** 93°14'31.68"
- **Cone Penetration Test Machine:** 203094 CPT Truck
- **CPT Operator:** Buhl, Dylan
- **Date Completed:** 9/27/16

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

**No Station-Offset Information Available**
MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 81224

U.S. Customary Units

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

Location: Hennepin Co. Coordinate: X=536727 Y=163065 (ft.)
Latitude (North)=44°57'50.35" Longitude (West)=93°14'29.23"

CPT Machine: 203094 CPT Truck
CPT Operator: Buhl, Dylan
Date Completed: 9/26/16

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

CONE PENETRATION TEST RESULTS

Interpreted Soil Behavior Type
UBC 1990 FR

Sleeve Friction (psi)
Tip Resistance (psi)
Friction Ratio (%)
Pore Pressure (psi)

Depth Elevation

840.2
835.2
830.2
825.2
820.2
815.2
810.2
805.2
800.2
795.2
790.2
785.2
780.2
775.2
770.2
765.2
760.2
755.2
750.2
745.2
740.2
735.2
730.2
725.2
720.2
715.2
710.2
705.2
700.2
695.2
690.2
685.2
680.2
675.2
670.2
665.2
660.2
655.2
650.2
645.2
640.2
635.2
630.2
625.2
620.2
615.2
610.2
605.2
600.2
595.2
590.2
585.2
580.2
575.2
570.2
565.2
560.2
555.2
550.2
545.2
540.2
535.2
530.2
525.2
520.2
515.2
510.2
505.2
500.2
495.2
490.2
485.2
480.2
475.2
470.2
465.2
460.2
455.2
450.2
445.2
440.2
435.2
430.2
425.2
420.2
415.2
410.2
405.2
400.2
395.2
390.2
385.2
380.2
375.2
370.2
365.2
360.2
355.2
350.2
345.2
340.2
335.2
330.2
325.2
320.2
315.2
310.2
305.2
300.2
295.2
290.2
285.2
280.2
275.2
270.2
265.2
260.2
255.2
250.2
245.2
240.2
235.2
230.2
225.2
220.2
215.2
210.2
205.2
200.2
195.2
190.2
185.2
180.2
175.2
170.2
165.2
160.2
155.2
150.2
145.2
140.2
135.2
130.2
125.2
120.2
115.2
110.2
105.2
100.2
95.2
90.2
85.2
80.2
75.2
70.2
65.2
60.2
55.2
50.2
45.2
40.2
35.2
30.2
25.2
20.2
15.2
10.2
5.2
0.2

Bottom of Hole 14.84
Refusal on unknown layer
<table>
<thead>
<tr>
<th>Location</th>
<th>Conditions Encountered</th>
<th>Water</th>
<th>Possible Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>c27</td>
<td>Mostly medium dense to dense sands to termination near elev. 816 1/2. Loose sand near elev. 829</td>
<td>No water indicated, but perched layers may be encountered.</td>
<td>Loose sand may tend to collapse. Water elevation may vary.</td>
</tr>
<tr>
<td>c26</td>
<td>Loose undefined near surface, generally medium dense to dense sands to refusal near elev. 817</td>
<td>No water indicated, but perched layers may be encountered.</td>
<td>Loose sand may tend to collapse. Water elevation may vary.</td>
</tr>
<tr>
<td>c25</td>
<td>Mostly medium dense to dense sands to termination near elev. 815. Loose sand near elev. 829</td>
<td>No water indicated, but perched layers may be encountered.</td>
<td>Loose Sand may tend to collapse.</td>
</tr>
<tr>
<td>c-01a</td>
<td>Generally very stiff Sandy Loam to near elev. 809. Loose sand near elev. 808 then very dense sandy loam to termination near elev. 793</td>
<td>Water measured below elev. 809 during drilling.</td>
<td>Loose Sand may tend to collapse. Water elevation could vary</td>
</tr>
<tr>
<td>c24</td>
<td>Loose to medium dense Sands to near elev. 831 1/2. Dense sand to termination near elev. 817</td>
<td>No water indicated, but perched layers may be encountered.</td>
<td>Loose Sand may tend to collapse. Water elevation could vary</td>
</tr>
<tr>
<td>c216</td>
<td>Generally sand, loose to near elev. 826, then dense to refusal near elev. 815</td>
<td>No water indicated, but perched layers may be encountered.</td>
<td>Loose Sand may tend to collapse.</td>
</tr>
<tr>
<td>c-01</td>
<td>Generally sand and sandy loam, medium dense to near elev. 815, then very dense and hard to termination near elev. 795</td>
<td>Water measured below elev. 803 during drilling.</td>
<td></td>
</tr>
<tr>
<td>c23</td>
<td>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</td>
<td>No water indicated, but perched layers may be encountered.</td>
<td>Loose Sand may tend to collapse. Water elevation could vary. Undefined could be fill gravel or wood</td>
</tr>
<tr>
<td>c-02</td>
<td>Generally sand or sandy loam, mostly medium dense to dense to near elev 814, very dense below. Terminated near elev. 801</td>
<td>Water measured below elev. 814.5 during drilling.</td>
<td>Water elevation could vary.</td>
</tr>
<tr>
<td>c217</td>
<td>Undefined near surface. Generally sands, mostly medium dense to dense, but soft silt layer near elev. 827. Sounding terminated on refusal near elev. 811</td>
<td>No water indicated, but perched layers may be encountered.</td>
<td>Loose soils may tend to collapse. Perched water could be troublesome.</td>
</tr>
<tr>
<td>c-04</td>
<td>Generally sand and sandy loam, medium dense to very dense. Boring terminated near elev. 804</td>
<td>Water measured below elev. 807.5 during drilling.</td>
<td>Loose Sand may tend to collapse. Water elevation could vary.</td>
</tr>
<tr>
<td>c21</td>
<td>Undefined and loose near elev. 838. Generally sand, mostly medium dense to dense. Sounding terminated near elev. 818</td>
<td>No water indicated, but perched layers may be encountered.</td>
<td>Undefined could be debris in fill. Water elevation could vary.</td>
</tr>
<tr>
<td>c-05</td>
<td>Generally sand, mostly medium dense to dense. Very dense sandy loam below elev. 811. Boring terminated near elev. 803.</td>
<td>No water was observed while drilling.</td>
<td></td>
</tr>
<tr>
<td>c18</td>
<td>Generally sand, mostly medium dense to dense, but loose near elev. 831-837. Sounding terminated on refusal near elev. 815 1/2</td>
<td>No water indicated, but perched layers may be encountered.</td>
<td>Loose Sand may tend to collapse. Water elevation could vary.</td>
</tr>
<tr>
<td>c17</td>
<td>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</td>
<td>No water indicated, but perched layers may be encountered.</td>
<td>Loose Sand may tend to collapse. Water elevation could vary.</td>
</tr>
<tr>
<td>c16</td>
<td>Dense undefined near surface. Generally sand, mostly medium dense, but loose near elev. 831. Sounding terminated near elev. 813</td>
<td>No water indicated, but perched layers may be encountered.</td>
<td>Loose Sand may tend to collapse. Water elevation could vary.</td>
</tr>
<tr>
<td>c15</td>
<td>Dense undefined near surface. Generally sand, mostly medium dense, but loose near elev. 833. Sounding terminated near elev. 813.5</td>
<td>No water indicated, but perched layers may be encountered.</td>
<td>Loose Sand may tend to collapse. Water elevation could vary.</td>
</tr>
</tbody>
</table>
### Cone Penetration Test Results

**Unique Number:** 81212

**State Project:** 2781-467

**Bridge No. or Job Desc.:** NOISE WALL

**Trunk Highway/Location:** TH 94

**Sounding No.:** C27

**Ground Elevation:** 840.3 (DTM)

**Location:**
- **Hennepin Co. Coordinate:** X=536115 Y=163400 (ft.)
- **Latitude (North):** 44°57'53.67"
- **Longitude (West):** 93°14'37.73"

**No Station-Offset Information Available**

<table>
<thead>
<tr>
<th>Depth Elevation</th>
<th>Interpreted Soil Behavior Type</th>
<th>Sleeves Friction (psi)</th>
<th>Tip Resistance (psi)</th>
<th>Friction Ratio (%)</th>
<th>Pore Pressure (psi)</th>
</tr>
</thead>
<tbody>
<tr>
<td>840.3</td>
<td>UBC 1990 FR</td>
<td>20</td>
<td>16</td>
<td>12</td>
<td>4</td>
</tr>
<tr>
<td>835.3</td>
<td></td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>830.3</td>
<td></td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>825.3</td>
<td></td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>820.3</td>
<td></td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>815.3</td>
<td></td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

**Bottom of Hole:** 24.48 ft.

**Planned Depth:**

**Location CPT Machine:** 203094 CPT Truck

**CPT Operator:** Buhl, Dylan

**Date Completed:** 9/27/16

**Index Sheet Code:** 3.0
## Cone Penetration Test Results

**Unique Number:** 81211

**U.S. Customary Units**

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

### Coordinates
- **Hennepin Co. Coordinate:** X=536179, Y=163383 (ft.)
- **Latitude (North):** 44°57'53.50"
- **Longitude (West):** 93°14'36.84"

### Test Information
- **CPT Machine:** 203094 CPT Truck
- **CPT Operator:** Buhl, Dylan
- **Hole Type:** CPT-STD
- **Date Completed:** 9/27/16

### Soil Properties

<table>
<thead>
<tr>
<th>Depth (Elevation)</th>
<th>Interpreted Soil Behavior Type</th>
<th>UBC 1990 FR</th>
<th>Sleeve Friction (psi)</th>
<th>Tip Resistance (psi)</th>
<th>Friction Ratio (%)</th>
<th>Pore Pressure (psi)</th>
</tr>
</thead>
<tbody>
<tr>
<td>839.4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>834.4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>829.4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>824.4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Notes
- **Bottom of Hole:** 22.71'
- **Refusal on unknown layer**

### Additional Information
- **G:\GINT\PROJECTS-ACTIVE\2781-467-TH94-NOISE WALL.GPJ**
- **E:\ORIGINAL FILE 1\2781-467-Duhl (09-27-2016)\SP 2781-467 (9-27-2016)\test(040)_PD.DAT**

---

**Index Sheet Code:** 3.0

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

**UNIQUE NUMBER 73814**

**U.S. Customary Units**

<table>
<thead>
<tr>
<th>State Project</th>
<th>Bridge No. or Job Desc.</th>
<th>Trunk Highway/Location</th>
<th>Boring No.</th>
<th>Ground Elevation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2781-415</td>
<td>RETAINING WALL</td>
<td>Interstate Highway 94</td>
<td>C-01A</td>
<td>823.0 (DTM)</td>
</tr>
</tbody>
</table>

### 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**

<table>
<thead>
<tr>
<th>DEPTH</th>
<th>Depth (ft.)</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5</td>
<td>822.5</td>
<td>BIT, 5 1/2&quot;</td>
</tr>
<tr>
<td>1.1</td>
<td>821.9</td>
<td>CONC, 8&quot;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>slpl Sandy Loam w/ G, brn, moist, wet</td>
</tr>
<tr>
<td>2.0</td>
<td>821.0</td>
<td>slpl Fine Sandy Loam w/ a little G, red-brn, moist, meddensed</td>
</tr>
<tr>
<td>5.0</td>
<td>817.0</td>
<td>nonpl Fine Sandy Loam w/ a little G, brn, moist, dense to Vdense</td>
</tr>
<tr>
<td>10.0</td>
<td>809.0</td>
<td>Fine Sand w/ trace of G, brn, sat, Vloose</td>
</tr>
<tr>
<td>15.0</td>
<td>805.0</td>
<td>nonpl Sandy Loam w/ G, gry-brn, moist, Vdense</td>
</tr>
<tr>
<td>30.2</td>
<td>792.8</td>
<td>with layer of Sand at 29 1/2'</td>
</tr>
</tbody>
</table>

**Bottom of Hole - 30.17'**

Water measured at 19' while sampling and/or drilling

Boring then grouted.

**Drill Machine:** 7514

**Hammer:** CME Automatic Calibrated

**Completed:** 6/23/10

**Other Tests Or Remarks**

- **SPT No.**
- **MC (%)**
- **COH (psf)**
- **γ (pcf)**
- **Soil**
- **Formation or Member**

**Drilling Operation**

- **REC (%)**
- **ROD (%)**
- **ACL (ft)**
- **Core Breaks**
- **Rock**

**Index Sheet Code:** 3.0

**Soil Class:** P. Martin

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

**G:GINT/PROJECTS-CLOSE-OUT/2781-415.GPJ**
MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 73972

U.S. Customary Units

State Project: 2781-415
Bridge No. or Job Desc: NOISE WALL
Trunk Highway/Location: 100

Sounding No.: c216
Ground Elevation: 840.3 (DTM)

Location: Hennepin Co. Coordinate: X=536480, Y=163321 (ft.)
Latitude (North) = 44°57'52.88"
Longitude (West) = 93°14'32.66"

No Station-Offset Information Available

CPT Machine: 205146 CPT Truck (H)
CPT Operator: Hasselquist
Date Completed: 8/3/10
Hole Type: CPT-STD

Depth
Elevation
Sleeve Friction (psi)
Tip Resistance (psi)
Friction Ratio (%)
Pore Pressure (psi)

Index Sheet Code: 3.0

C:\2781415\Cone\F03G1001C.DAT

UNIQUE NUMBER 73972

U.S. Customary Units

State Project: 2781-415
Bridge No. or Job Desc: NOISE WALL
Trunk Highway/Location: 100

Sounding No.: c216
Ground Elevation: 840.3 (DTM)

Location: Hennepin Co. Coordinate: X=536480, Y=163321 (ft.)
Latitude (North) = 44°57'52.88"
Longitude (West) = 93°14'32.66"

No Station-Offset Information Available

CPT Machine: 205146 CPT Truck (H)
CPT Operator: Hasselquist
Date Completed: 8/3/10
Hole Type: CPT-STD

Depth
Elevation
Sleeve Friction (psi)
Tip Resistance (psi)
Friction Ratio (%)
Pore Pressure (psi)

Index Sheet Code: 3.0

C:\2781415\Cone\F03G1001C.DAT

UNIQUE NUMBER 73972

U.S. Customary Units

State Project: 2781-415
Bridge No. or Job Desc: NOISE WALL
Trunk Highway/Location: 100

Sounding No.: c216
Ground Elevation: 840.3 (DTM)

Location: Hennepin Co. Coordinate: X=536480, Y=163321 (ft.)
Latitude (North) = 44°57'52.88"
Longitude (West) = 93°14'32.66"

No Station-Offset Information Available

CPT Machine: 205146 CPT Truck (H)
CPT Operator: Hasselquist
Date Completed: 8/3/10
Hole Type: CPT-STD

Depth
Elevation
Sleeve Friction (psi)
Tip Resistance (psi)
Friction Ratio (%)
Pore Pressure (psi)

Index Sheet Code: 3.0

C:\2781415\Cone\F03G1001C.DAT
# MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

## LABORATORY LOG & TEST RESULTS - SUBSURFACE EXPLORATION

### UNIQUE NUMBER 73813

**U.S. Customary Units**

<table>
<thead>
<tr>
<th>State Project</th>
<th>Bridge No. or Job Desc.</th>
<th>Trunk Highway/Location</th>
<th>Boring No.</th>
<th>Ground Elevation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2781-415</td>
<td>RETAINING WALL</td>
<td>Interstate Highway 94</td>
<td>C-01</td>
<td>824.9 (DTM)</td>
</tr>
</tbody>
</table>

**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

<table>
<thead>
<tr>
<th>Depth</th>
<th>Elevation</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.4</td>
<td>824.5</td>
<td>BIT, 5&quot; CONC, 9 1/2&quot;</td>
</tr>
<tr>
<td>1.3</td>
<td>823.7</td>
<td>AGG, dk brn, moist</td>
</tr>
<tr>
<td>2.0</td>
<td>822.9</td>
<td>Sand w/trace G, brn, moist, meddense</td>
</tr>
<tr>
<td>10.0</td>
<td>814.9</td>
<td>pl Sandy Loam w/ G and bldr, brn, moist, hard</td>
</tr>
<tr>
<td>14.0</td>
<td>810.9</td>
<td>sp Fine Sandy Loam w/ G and bldr, brn, moist to wet, Vdense</td>
</tr>
<tr>
<td>22.0</td>
<td>802.9</td>
<td>Fine Sand w/ G, brn, sat, Vdense</td>
</tr>
<tr>
<td>27.0</td>
<td>797.9</td>
<td>sp Fine Sandy Loam w/ G, brn, sat, Vdense</td>
</tr>
</tbody>
</table>

**Drilling**
- Machine: 7514
- Hammer: CME Automatic Calibrated
- Completed: 6/15/10

**Soil Class & Rock Class**
- MC: 14%  MC: 16%  MC: 15%  MC: 14%  MC: 15%
- COH: 25/6  COH: 50/5  COH: 50/5  COH: 50/5  COH: 50/5
- γ: 60  γ: 60  γ: 60  γ: 60  γ: 60
- Formation or Member

**Other Tests or Remarks**
- Bottom of Hole - 29.7'. Water measured at 24' while sampling and/or drilling.
- Boring then grouted.

---

**Index Sheet Code**: 3.0

---

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

G:\GINT\PROJECTS-CLOSE-OUT\781-415.GPJ
<table>
<thead>
<tr>
<th>Depth (ft)</th>
<th>Interpreted Soil Behavior Type</th>
<th>Sleeve Friction (psi)</th>
<th>Tip Resistance (psi)</th>
<th>Friction Ratio (%)</th>
<th>Pore Pressure (psi)</th>
</tr>
</thead>
<tbody>
<tr>
<td>841.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>836.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>831.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>826.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>821.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Bottom of Hole 18.52**
*Refusal on unknown layer*

**Location**
- Hennepin Co. Coordinate: X=536588, Y=163289 (ft.)
- Latitude (North)=44°57'52.57"
- Longitude (West)=93°14'31.15"

**Ground Elevation**
- 841.0 (DTM)

**CPT Machine**
- 203094 CPT Truck

**CPT Operator**
- Buhl, Dylan

**Date Completed**
- 9/27/16

**No Station-Offset Information Available**

**Soil Class: Rock Class:**

**Date:** 10/13/16

---

**Index Sheet Code:** 3.0
**MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION**

**LABORATORY LOG & TEST RESULTS - SUBSURFACE EXPLORATION**

**UNIQUE NUMBER 73815**

**U.S. Customary Units**

<table>
<thead>
<tr>
<th>State Project</th>
<th>Bridge No. or Job Desc.</th>
<th>Trunk Highway/Location</th>
<th>Boring No.</th>
<th>Ground Elevation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2781-415</td>
<td>RETAINING WALL</td>
<td>Interstate Highway 94</td>
<td>C-02</td>
<td>831.4 (DTM)</td>
</tr>
</tbody>
</table>

**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**

<table>
<thead>
<tr>
<th>Depth</th>
<th>Elev.</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5</td>
<td>830.9</td>
<td>BIT, 5 1/2&quot;</td>
</tr>
<tr>
<td>1.2</td>
<td>830.2</td>
<td>CONC, 9&quot;</td>
</tr>
<tr>
<td>2.0</td>
<td>829.4</td>
<td>slpl Sandy Loam w/ G, dk bm, moist, meddense</td>
</tr>
<tr>
<td>5</td>
<td>824.4</td>
<td>Sand and Gravel, bm, moist, meddense</td>
</tr>
<tr>
<td>7.0</td>
<td>824.4</td>
<td>Fine Sand w/ G, bm, moist, meddense</td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>817.4</td>
<td>slpl Fine Sandy Loam w/ G, bm, moist, dense</td>
</tr>
<tr>
<td>17.0</td>
<td>814.4</td>
<td>Fine Loamy Sand w/ G, bm, sat, Vdense</td>
</tr>
<tr>
<td>21.0</td>
<td>810.4</td>
<td>slpl Fine Sandy Loam w/G, bm, sat, Vdense</td>
</tr>
<tr>
<td>25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>27.0</td>
<td>804.4</td>
<td>Sand and Gravel, It bm, sat, Vdense</td>
</tr>
<tr>
<td>30.3</td>
<td>801.1</td>
<td>Bottom of Hole - 30.3'. Water measured at 24' while sampling and/or drilling. Boring then grouted.</td>
</tr>
</tbody>
</table>

**Drill Machine** 7514
- Hammer: CME Automatic Calibrated
- Completed: 6/15/10

**DRILLING DATA**
- REC: 21
- RQD: 21
- ACL: 24
- Core Breaks: 24
- Rock: NSR

**Other Tests or Remarks**

**Soil Class:** P  
**Rock Class:**  
**REMARKS:**
- This boring was taken by BRAUN under a consultant contract for Mn/DOT.
- Soil Class: P  
- Martin Rock Class:  
- Date: 10/13/16

**Index Sheet Code:** 3.0

**G:\GIN\PROJECTS-CLOSE-OUT\2781-415.GPJ**
MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION
LABORATORY LOG & TEST RESULTS - SUBSURFACE EXPLORATION

UNIQUE NUMBER 73816
U.S. Customary Units

<table>
<thead>
<tr>
<th>State Project</th>
<th>Bridge No. or Job Desc.</th>
<th>Trunk Highway/Location</th>
<th>Boring No.</th>
<th>Ground Elevation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2781-415</td>
<td>RETAINING WALL</td>
<td>Interstate Highway 94</td>
<td>C-04</td>
<td>834.4 (DTM)</td>
</tr>
</tbody>
</table>

**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

---

<table>
<thead>
<tr>
<th>Depth (ft.)</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.4</td>
<td>BIT, 5&quot;</td>
</tr>
<tr>
<td>1.2</td>
<td>CONC, 9&quot;</td>
</tr>
<tr>
<td></td>
<td>spl Sandy Loam w/ G, dk brn, moist</td>
</tr>
<tr>
<td>2.0</td>
<td>Sand and Gravel, brn, moist, dense to meddense</td>
</tr>
<tr>
<td>2.5</td>
<td>Sand w/ a little G, brn, moist, meddense</td>
</tr>
<tr>
<td>3.0</td>
<td>Sand w/ G, brn, moist, meddense</td>
</tr>
<tr>
<td>4.0</td>
<td>spl Fine Sandy Loam w/ G, brn, moist, Vdense</td>
</tr>
<tr>
<td>5.0</td>
<td>pl Fine Sandy Loam w/ G and layers of Sand, brn, wet, hard to Vhard</td>
</tr>
<tr>
<td>6.0</td>
<td>Sand and Gravel, yel-brn, sat, Vdense</td>
</tr>
</tbody>
</table>

Bottom of Hole - 30.3'. No water encountered or measured during drilling. Boring then grouted.

**Hammer Efficiency** = 83%
MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 81207

U.S. Customary Units

<table>
<thead>
<tr>
<th>State Project</th>
<th>Bridge No. or Job Desc.</th>
<th>Trunk Highway/Location</th>
<th>Sounding No.</th>
<th>Ground Elevation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2781-467</td>
<td>NOISE WALL</td>
<td>TH 94</td>
<td>C21</td>
<td>843.4 (DTM)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Location</th>
<th>Hennepin Co. Coordinate: X=536838 Y=163293 (ft.)</th>
<th>CPT Machine</th>
<th>DATE COMPLETED</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Latitude (North)=44°57’52.60” Longitude (West)=93°14’27.68”</td>
<td>203094 CPT Truck</td>
<td>9/13/16</td>
</tr>
</tbody>
</table>

No Station-Offset Information Available

<table>
<thead>
<tr>
<th>Depth (ft.)</th>
<th>Interpreted Soil Behavior Type</th>
<th>Sleeve Friction (psi)</th>
<th>Tip Resistance (psi)</th>
<th>Friction Ratio (%)</th>
<th>Pore Pressure (psi)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>UBC 1990 FR</td>
<td>20 16 12 8 4 0</td>
<td>600 1200 1800 2400</td>
<td>3000</td>
<td>0 2 4 6 8 10 0 10 20 30 40</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Bottom of Hole 25.34
Planned Depth:

Index Sheet Code 3.0
## Soil Log

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

### Lithology

<table>
<thead>
<tr>
<th>Depth (ft)</th>
<th>Soil Type</th>
<th>Classification</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0 - 0.2</td>
<td>Loamy Sand w/ G, brn, moist, meddense</td>
<td>BIT, 2 3/4&quot;</td>
<td>CONC. 9&quot;</td>
</tr>
<tr>
<td>1.0 - 2.0</td>
<td>Fine Sand w/ a little G, brn, moist, meddense</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.0 - 7.0</td>
<td>Fine Sand w/ G, brn, moist, meddense</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.0 - 12.0</td>
<td>Sand and Gravel, brn, moist, dense</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.0 - 14.0</td>
<td>Fine Sand and Gravel, lt brn, moist, dense</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14.0 - 15.0</td>
<td>Fine Sand w/ G, brn, sat, Vdense</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15.0 - 17.0</td>
<td>Fine Sand w/ G, brn, sat, Vdense</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17.0 - 20.0</td>
<td>Fine Sand w/ G, brn, sat, Vdense</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20.0 - 22.0</td>
<td>Fine Sand w/ G, brn, sat, Vdense</td>
<td></td>
<td></td>
</tr>
<tr>
<td>22.0 - 25.0</td>
<td>Fine Sand w/ G, brn, sat, Vdense</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25.0 - 29.8</td>
<td>Fine Sandy Loam w/ G, brn, moist, Vdense</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 29.8 | Bottom of Hole - 29 3/4' | Water not observed while drilling.  
Boring backfilled with soil cuttings. |

### Other Tests Or Remarks
- Soil Class: P  
- Martin Rock Class: 
- Date: 10/13/16
## Cone Penetration Test Results

### UNIQUE NUMBER 81277

**U.S. Customary Units**

<table>
<thead>
<tr>
<th>State Project</th>
<th>Bridge No. or Job Desc.</th>
<th>Trunk Highway/Location</th>
<th>Sounding No.</th>
<th>Ground Elevation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2781-467</td>
<td>NOISE WALL</td>
<td>TH 94</td>
<td>C18</td>
<td>840.0 (DTM)</td>
</tr>
</tbody>
</table>

**Location**

- Hennepin Co. Coordinate: X=537291 Y=163305 (ft.)
- Latitude (North)=44°57'52.71" Longitude (West)=93°14'21.38"
- No Station-Offset Information Available

**CPT Machine** 203094 CPT Truck

**CPT Operator** Buhl, Dylan

**Date Completed** 10/11/16

### Depth Elevation

<table>
<thead>
<tr>
<th>Depth Elevation</th>
<th>Interpreted Soil Behavior Type</th>
<th>UBC 1990 FR</th>
<th>Sleeve Friction (psi)</th>
<th>Tip Resistance (psi)</th>
<th>Friction Ratio (%)</th>
<th>Pore Pressure (psi)</th>
</tr>
</thead>
<tbody>
<tr>
<td>840.0</td>
<td></td>
<td></td>
<td>20 16 12 8 4 0</td>
<td>600 1200 1800 2400</td>
<td>3000</td>
<td>0 2 4 6 8 10</td>
</tr>
<tr>
<td>835.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0 10 20 30 40</td>
</tr>
<tr>
<td>830.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>825.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>820.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>815.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>810.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>805.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Bottom of Hole 25.07**, Planned Depth:

- **Index Sheet Code 3.0**

---

G:\geotech\cptdata\th94\2781-467-Buhl (10-11-2016)\2781-467 D (10-11-2016)\test(053)_PD.DAT

G:\GINT\PROJECTS-ACTIVE\2781-467-TH 94-NOISE WALL.GPJ
MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 81206

U.S. Customary Units

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

Location
Hennepin Co. Coordinate: X=537427 Y=163305 (ft.)
Latitude (North)=44°57'52.71" Longitude (West)=93°14'19.48"

No Station-Offset Information Available

CPT Machine 203094 CPT Truck
CPT Operator Buhl, Dylan
Date Completed 9/14/16

Hole Type CPT-STD

Interpreted Soil Behavior Type
UBC 1990 FR

Sleeve Friction (psi)
Tip Resistance (psi)
Friction Ratio (%)
Pore Pressure (psi)

Depth Elevation
839.4
834.4
829.4
824.4

Index Sheet Code 3.0

Bottom of Hole 18.9:
Refusal on unknown layer
CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 81205

U.S. Customary Units

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

Location: Hennepin Co. Coordinate: X=537550 Y=163301 (ft.)
Latitude (North)=44°57'52.67" Longitude (West)=93°14'17.77"

CPT Machine: 203094 CPT Truck
CPT Operator: Buhl, Dylan
Hole Type: CPT-STD
Date Completed: 9/22/16

No Station-Offset Information Available

Interpreted Soil Behavior Type

UBC 1990 FR

Sleeve Friction (psi)
Tip Resistance (psi)
Friction Ratio (%)
Pore Pressure (psi)

Depth
Elevation

0 2 4 6 8 10
838.8
833.8
833.8
828.8
823.8
818.8
813.8
808.8

Index Sheet Code 3.0

MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

SHEET 1 of 1

Loc 0 (09-27-2016) Geo 2781-467 TH 94 Noise Wall GP

Station 0 (09-27-2016) Geo 2781-467 TH 94 Noise Wall GP

Pore Pressure

Sleeve Friction

Tip Resistance

Friction Ratio

Index Sheet Code 3.0

Index Sheet Code 3.0
## Cone Penetration Test Results

**Unique Number:** 81204

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

### Location

- **Hennepin Co. Coordinate:** X=537675, Y=163301 (ft.)
- **Latitude (North):** 44°57'52.67"  
- **Longitude (West):** 93°14'16.04"

### No Station-Offset Information Available

<table>
<thead>
<tr>
<th>Depth</th>
<th>Soil Class</th>
<th>Rock Class</th>
<th>Behavior Type</th>
<th>UBC 1990 FR</th>
</tr>
</thead>
<tbody>
<tr>
<td>838.3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>C15</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>833.3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>828.3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>823.3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>818.3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Cone Penetration Data

<table>
<thead>
<tr>
<th>Depth</th>
<th>Sleeve Friction (psi)</th>
<th>Tip Resistance (psi)</th>
<th>Friction Ratio (%)</th>
<th>Pore Pressure (psi)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Bottom of Hole:** 25.07
- **Planned Depth:**

---

**CPT Machine:** 203094 CPT Truck  
**CPT Operator:** Buhl, Dylan  
**Date Completed:** 9/14/16  
**Location CPT Machine:** 9/14/16  
**CPT-STD**

---

**U.S. Customary Units**

---

**Index Sheet Code:** 3.0  
**Lat/Long:**  
**Hennepin Co. Coordinate:** X=537675, Y=163301  
**Latitude (North):** 44°57'52.67"  
**Longitude (West):** 93°14'16.04"

---

**MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION**
### Noisewall 101 Summary of Subsurface Conditions

<table>
<thead>
<tr>
<th>Location</th>
<th>Conditions Encountered</th>
<th>Water</th>
<th>Possible Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>c14</td>
<td>Dense undefined near surface. Mostly medium dense to dense sands to termination near elev. 813 1/2. Loose sand near elev. 831</td>
<td>No water indicated, but perched layers may be encountered.</td>
<td>Loose sand may tend to collapse. Water elevation may vary.</td>
</tr>
<tr>
<td>c13</td>
<td>Dense undefined near surface, generally medium dense to dense sands to refusal near elev. 820. Loose sand near elev. 831.</td>
<td>No water indicated, but perched layers may be encountered.</td>
<td>Loose sand may tend to collapse. Water elevation may vary.</td>
</tr>
<tr>
<td>c12</td>
<td>Undefined near surface. Loose to medium dense to near 828, then very dense sands to termination near elev. 816.5.</td>
<td>No water indicated, but perched layers may be encountered.</td>
<td>Loose sand may tend to collapse. Water elevation may vary.</td>
</tr>
<tr>
<td>c11</td>
<td>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</td>
<td>No water indicated, but perched layers may be encountered.</td>
<td>Loose Sand may tend to collapse. Water elevation could vary</td>
</tr>
</tbody>
</table>

### Noisewall 103 Summary of Subsurface Conditions

<table>
<thead>
<tr>
<th>Location</th>
<th>Conditions Encountered</th>
<th>Water</th>
<th>Possible Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>c10</td>
<td>Dense undefined near surface. Generally medium dense to dense sands to refusal near elev. 834 1/2.</td>
<td>No water indicated, but perched layers may be encountered.</td>
<td>Water elevation could vary</td>
</tr>
<tr>
<td>c09</td>
<td>Loose to medium dense to near 831, then very dense sands to refusal near elev. 820 1/2.</td>
<td>No water indicated, but perched layers may be encountered.</td>
<td>Loose sand may tend to collapse. Water elevation may vary.</td>
</tr>
<tr>
<td>T05</td>
<td>Sand and Gravel to near elev. 819, then reworked clayey Shale near elev. 808, then Shale bedrock and Limestone bedrock below elev. 790.</td>
<td>No water indicated, but perched layers may be encountered.</td>
<td>Boring located in exit gore, below noise wall.</td>
</tr>
<tr>
<td>c06</td>
<td>Generally loose Sand to near elev. 828, then medium dense to dense sands to refusal near elev. 819. Very soft undefined near elev. 828.</td>
<td>No water indicated, but perched layers may be encountered.</td>
<td>Loose sand may tend to collapse. Water elevation may vary.</td>
</tr>
<tr>
<td>c02</td>
<td>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.</td>
<td>No water indicated, but perched layers may be encountered.</td>
<td>Soils might be fill and could contain debris.</td>
</tr>
</tbody>
</table>
## Cone Penetration Test Results

**Unique Number:** 81203

**U.S. Customary Units**

<table>
<thead>
<tr>
<th>Depth</th>
<th>Interpreted Soil Behavior Type</th>
<th>Sleeve Friction (psi)</th>
<th>Tip Resistance (psi)</th>
<th>Friction Ratio (%)</th>
<th>Pore Pressure (psi)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elevation</td>
<td>UBC 1990 FR</td>
<td>0 2 4 6 8 10</td>
<td>20 16 12 8 4 0</td>
<td>600</td>
<td>1200</td>
</tr>
<tr>
<td>838.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>833.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>831.8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>828.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>823.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>818.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>813.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **State Project:** 2781-467
- **Bridge No. or Job Desc.:** NOISE WALL 101
- **Trunk Highway/Location:** TH 94
- **Sounding No.:** C14
- **Ground Elevation:** 838.1 (DTM)
- **Location:** Hennepin Co. Coordinate: X=537772 Y=163272 (ft.)
  - Latitude (North)=44°57'52.38"
  - Longitude (West)=93°14'14.69"
- **CPT Machine:** 203094 CPT Truck
- **CPT Operator:** Buhl, Dylan
- **Date Completed:** 9/13/16
- **Hole Type:** CPT-STD
- **No Station-Offset Information Available**

---

**Index Sheet Code:** 3.0

---

**MINNESOTA DEPARTMENT OF TRANSPORTATION - GEO TECHNICAL SECTION**

**UNIQUE NUMBER 81203**

**Bridge No. or Job Desc.:** NOISE WALL 101

**Trunk Highway/Location:** TH 94

**Ground Elevation:** 838.1 (DTM)

**Location:** Hennepin Co. Coordinate: X=537772 Y=163272 (ft.)
  - Latitude (North)=44°57'52.38"
  - Longitude (West)=93°14'14.69"

**CPT Machine:** 203094 CPT Truck

**CPT Operator:** Buhl, Dylan

**Date Completed:** 9/13/16

**Hole Type:** CPT-STD

**No Station-Offset Information Available**

---

**U.S. Customary Units**

<table>
<thead>
<tr>
<th>Depth</th>
<th>Interpreted Soil Behavior Type</th>
<th>Sleeve Friction (psi)</th>
<th>Tip Resistance (psi)</th>
<th>Friction Ratio (%)</th>
<th>Pore Pressure (psi)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elevation</td>
<td>UBC 1990 FR</td>
<td>0 2 4 6 8 10</td>
<td>20 16 12 8 4 0</td>
<td>600</td>
<td>1200</td>
</tr>
<tr>
<td>838.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>833.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>831.8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>828.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>823.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>818.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>813.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 81202

U.S. Customary Units

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

Location: Hennepin Co. Coordinate: X=537844 Y=163277 (ft.)
Latitude (North)=44°57'52.43" Longitude (West)=93°14'13.68"
No Station-Offset Information Available

CPT Machine: 203094 CPT Truck
CPT Operator: Buhl, Dylan
Date Completed: 9/13/16

Hole Type: CPT-STD

Depth Elevation

<table>
<thead>
<tr>
<th>Depth</th>
<th>Interpreted Soil Behavior Type</th>
<th>Sleeve Friction (psi)</th>
<th>Tip Resistance (psi)</th>
<th>Friction Ratio (%)</th>
<th>Pore Pressure (psi)</th>
</tr>
</thead>
<tbody>
<tr>
<td>838.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>833.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>828.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>823.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>822.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>821.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>820.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>819.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>818.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
</tbody>
</table>

Bottom of Hole 38.97, Refusal on unknown layer
MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

CONE PENETRATION TEST RESULTS

UNIQUE NUMBER 81276

U.S. Customary Units

<table>
<thead>
<tr>
<th>State Project</th>
<th>Bridge No. or Job Desc.</th>
<th>Trunk Highway/Location</th>
<th>Sounding No.</th>
<th>Ground Elevation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2781-467</td>
<td>NOISE WALL</td>
<td>TH 94</td>
<td>C12</td>
<td>838.3 (DTM)</td>
</tr>
</tbody>
</table>

Location

Hennepin Co. Coordinate: X=537956 Y=163288 (ft.)
Latitude (North)=44°57'52.53" Longitude (West)=93°14'12.13"

No Station-Offset Information Available

CONE PENETRATION TEST RESULTS

<table>
<thead>
<tr>
<th>Depth (ft)</th>
<th>Interpreted Soil Behavior Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>UBC 1990 FR</td>
</tr>
<tr>
<td>5</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Elevation</th>
<th>Sleeve Friction (psi)</th>
<th>Tip Resistance (psi)</th>
<th>Friction Ratio (%)</th>
<th>Pore Pressure (psi)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>20 16 12 8 4 0 0 2 4 6 8 10</td>
<td>600 1200 1800 2400 3000</td>
<td>0 2 4 6 8 10</td>
<td>0 10 20 30 40</td>
</tr>
</tbody>
</table>

Index Sheet Code 3.0

Bottom of Hole 22.31
Planned Depth

SHEET 1 of 1

CPT Machine: 203094 CPT Truck
CPT Operator: Buhl, Dylan
Date Completed: 10/6/16

Latitude (North)=44°57'52.53"
Longitude (West)=93°14'12.13"

Hennepin Co. Coordinate: X=537956 Y=163288

No Station-Offset Information Available

MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION

Hennepin Co. Coordinate: X=537956 Y=163288
Latitude (North)=44°57'52.53" Longitude (West)=93°14'12.13"

No Station-Offset Information Available
### Cone Penetration Test Results

**Unique Number:** 81201

**U.S. Customary Units**

<table>
<thead>
<tr>
<th>Depth Elevation</th>
<th>Interpreted Soil Behavior Type</th>
<th>Sleeve Friction (psi)</th>
<th>Tip Resistance (psi)</th>
<th>Friction Ratio (%)</th>
<th>Pore Pressure (psi)</th>
</tr>
</thead>
<tbody>
<tr>
<td>848.1</td>
<td>UBC 1990 FR</td>
<td>20 16 12 8 4 0</td>
<td>600 1200 1800 2400</td>
<td>3000</td>
<td>0 2 4 6 8 10</td>
</tr>
<tr>
<td>843.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>838.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Location:**
- **Hennepin Co. Coordinate:** X=538763 Y=163317 (ft.)
- **Latitude (North):** 44°57'52.80"
- **Longitude (West):** 93°14'00.90"

**Additional Information:**
- **No Station-Offset Information Available**
- **CPT Machine:** 203094 CPT Truck
- **CPT Operator:** Buhl, Dylan
- **Date Completed:** 9/13/16

**Notes:**
- Bottom of Hole 34.05
- Refusal on unknown layer

---

**Index Sheet Code:** 3.0

---

**File Path:** E:\ORIGINAL FILE 1\2781-467\G:\GINT\PROJECTS-ACTIVE\2781-467-TH 94-NOISE WALL.GPJ
**CONE PENETRATION TEST RESULTS**

**UNIQUE NUMBER 81200**

U.S. Customary Units

<table>
<thead>
<tr>
<th>State Project</th>
<th>Bridge No. or Job Desc.</th>
<th>Trunk Highway/Location</th>
<th>Sounding No.</th>
<th>Ground Elevation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2781-467</td>
<td>NOISE WALL</td>
<td>TH 94</td>
<td>C09</td>
<td>837.1 (DTM)</td>
</tr>
</tbody>
</table>

**Location**

- Hennepin Co. Coordinate: X=538886 Y=163350 (ft.)
- Latitude (North)=44°57'53.13" Longitude (West)=93°13'59.19"
- No Station-Offset Information Available

**CPT Machine** 203094 CPT Truck

**CPT Operator** Buhl, Dylan

**Date Completed** 9/13/16

<table>
<thead>
<tr>
<th>Depth (ft.)</th>
<th>Interpreted Soil Behavior Type</th>
<th>UBC 1990 FR</th>
<th>Sleeve Friction (psi)</th>
<th>Tip Resistance (psi)</th>
<th>Friction Ratio (%)</th>
<th>Pore Pressure (psi)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Index Sheet Code** 3.0

**Minerals**

- Bottom of Hole 37
- Refusal on unknown layer

**Latitude (North)=44°57'53.13" Longitude (West)=93°13'59.19"

**CPT Machine** 203094 CPT Truck

**CPT Operator** Buhl, Dylan

**Date Completed** 9/13/16

**Remarks**

- No Station-Offset Information Available

**Location**

- Hennepin Co. Coordinate: X=538886 Y=163350 (ft.)
## UNIQUE NUMBER 74085

### U.S. Customary Units

<table>
<thead>
<tr>
<th>Depth (ft.)</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
</tr>
<tr>
<td>7.0</td>
<td>Sand and Gravel with a thin seam of Sandy Clay Loam, dark brown and moist</td>
</tr>
<tr>
<td>819.2</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td></td>
</tr>
<tr>
<td>18.0</td>
<td>Top of bedrock</td>
</tr>
<tr>
<td>808.2</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>WEATHERED SHALE, very soft, fissil to blocky, greenish-gray</td>
</tr>
<tr>
<td>22.0</td>
<td>SHALE; generally fresh; soft; blocky; dark greenish-gray; limestone bed (0.1') approx at 35.5 ft; hard; dark gray</td>
</tr>
<tr>
<td>804.2</td>
<td></td>
</tr>
</tbody>
</table>

### Drilling Operation

- **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**

### Geotechnical Data

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

### Soil and Rock Classification

- **Depth**: 0-819.2 ft.
- **Soil Class**: DSB
- **Rock Class**: CRH

### Laboratory Log & Test Results

<table>
<thead>
<tr>
<th>Depth (ft.)</th>
<th>SPT N</th>
<th>MC (%)</th>
<th>COH (psf)</th>
<th>γ (pcf)</th>
<th>Soil Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.0</td>
<td>9</td>
<td>7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22.0</td>
<td>22</td>
<td>N/A</td>
<td></td>
<td></td>
<td>DECORAH SHALE</td>
</tr>
</tbody>
</table>

**Drill Machine**: 207184 CME 850 Track
**Hammer**: CME Automatic Calibrated
**Completed**: 9/21/10

---

*MINNESOTA DEPARTMENT OF TRANSPORTATION - GEOTECHNICAL SECTION*

*LABORATORY LOG & TEST RESULTS - SUBSURFACE EXPLORATION*

*G:\GINT\PROJECTS-CLOSE-OUT\2781-415.GPJ*
**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**

<table>
<thead>
<tr>
<th>Depth</th>
<th>Soil</th>
<th>Classification</th>
<th>Lithology</th>
<th>RQD</th>
<th>Core</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>36.1</td>
<td>PD</td>
<td>N/A</td>
<td>shale</td>
<td>27</td>
<td>N/A</td>
<td>32.5' - 33.5' harder drilling</td>
</tr>
<tr>
<td>39.0</td>
<td>PD</td>
<td>N/A</td>
<td>limestone</td>
<td>25</td>
<td>NA</td>
<td>38.3', calcite &amp; pyrite-lined void</td>
</tr>
<tr>
<td>45.8</td>
<td>PD</td>
<td>N/A</td>
<td>limestone</td>
<td>100</td>
<td>100</td>
<td>2.50</td>
</tr>
</tbody>
</table>

**State Project**

2781-415

**Bridge No. or Job Desc.**

OH Sign 8 - North

**Trunk Highway/Location**

Interstate Highway 94

**Boring No.**

T05

**Ground Elevation**

826.2

**Other Tests Or Remarks**

No water encountered or measured during drilling

---

**Soil Class:** DSB

**Rock Class:** CRH

**Edit:** Date: 8/31/16

**G:\GINT\PROJECTS-CLOSE-OUT\2781-415.GPJ**
## Cone Penetration Test Results

### Unique Number 81199

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

### Location

- **Hennepin Co. Coordinate:** X=539334 Y=163359 (ft.)
- **Latitude (North):** 44°57'53.21"  
- **Longitude (West):** 93°13'52.96"  
- **No Station-Offset Information Available**

### Soil Class and Rock Class

- **Edit:**  
- **Date:** 10/13/16

### Soil Behavior Type

- **Interpreted Soil Behavior Type:** UBC 1990 FR

### Depth and Elevation

<table>
<thead>
<tr>
<th>Depth</th>
<th>Elevation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>833.4</td>
</tr>
<tr>
<td>5</td>
<td>828.4</td>
</tr>
<tr>
<td>10</td>
<td>823.4</td>
</tr>
</tbody>
</table>

### sleeve friction, tip resistance, friction ratio, and pore pressure

<table>
<thead>
<tr>
<th>Depth</th>
<th>Sleeve Friction (psi)</th>
<th>Tip Resistance (psi)</th>
<th>Friction Ratio (%)</th>
<th>Pore Pressure (psi)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Bottom of Hole (ft.):** 34.97

**Refusal on unknown layer**