

Memo

Date: April 5, 2018

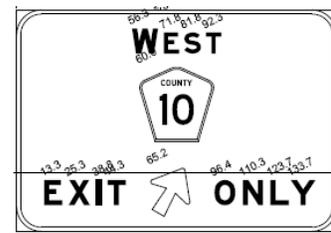
To: Eric Peterson, North Area Signing Engineer
Metro District Traffic Engineering

From: Rich Lamb, Foundations Engineer
Geotechnical Engineering Section

Subject: SP 0207-105 TH 65 Overhead Sign (OH MN65-010)
Located at the intersection of TH 65 and CSAH 10 in Coon Rapids
Foundation Analysis and Design Recommendations

1.0 Project Description

This report summarizes results of a subsurface investigation and foundation analysis and provides foundation recommendations for the construction of an overhead sign (OH MN65-010) located on southbound TH 65 at the exit to CSAH 10 westbound in Coon Rapids.



- All spread footings have an allowable design bearing pressure of 1 ¼ tons per square foot
- The drilled shafts have an allowable design lateral bearing pressure of 250 lbs. per square foot per foot of depth

These requirements will be met in all but the weakest mineral type soils and therefore represent a very conservative design. Having said that, and in lieu of new foundation designs, we proceeded to check the foundation soils to see if they met these requirements.

For this sign location, we determined that both the spread footing and drilled shaft standard foundation sizes/depth will be adequate for safely supported the overhead sign.

4.0 Foundation Recommendations

Based on review of the existing subsurface conditions and proposed construction, we recommend the following:

1. The proposed overhead sign structure should be supported with either a spread footing or drilled shaft foundation as detailed on the attached Standard Overhead Sign Supports Interim Design B sheet ST-3.
2. This office should be contacted if soils different than those described in this report are encountered during construction of the sign foundation.

Attachments:

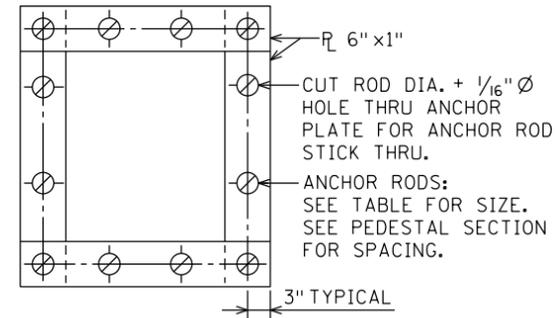
Boring Plan
OH Sign Foundation Detail Sheet
SPT Boring Log

cc:

Brad Skow
T. Clyne

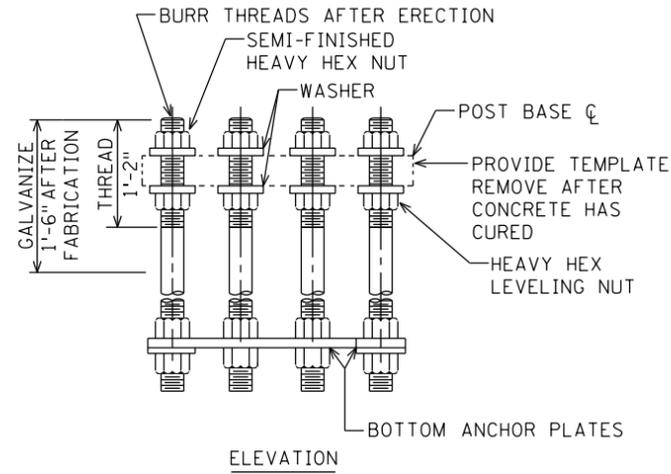


PLOTTED/REVISED: 5/9/2012

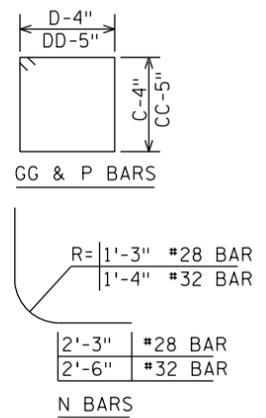


NOTE: ANCHOR PLATES SHOWN TYPICAL FOR ALL ANCHOR ROD SPACING.

ANCHOR PLATE PLAN

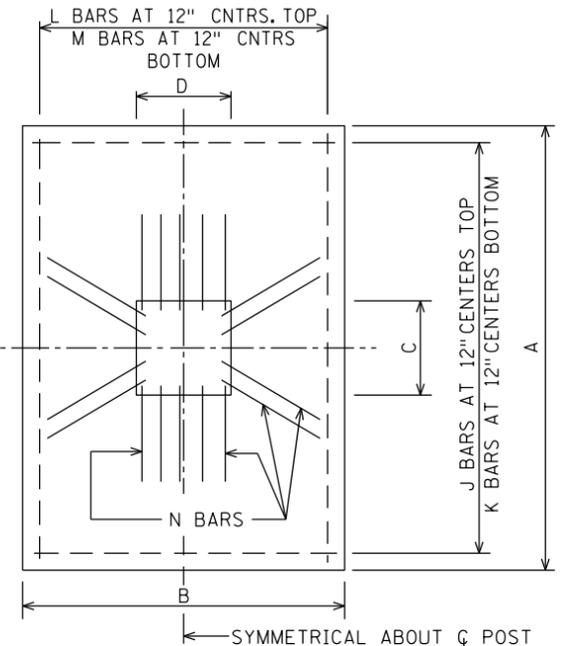


ANCHOR ROD DETAILS



J, K, L, M, FF AND HH ARE STRAIGHT BARS
BAR BENDING DIAGRAMS

SYMMETRICAL ABOUT ϕ SIGN TRUSS



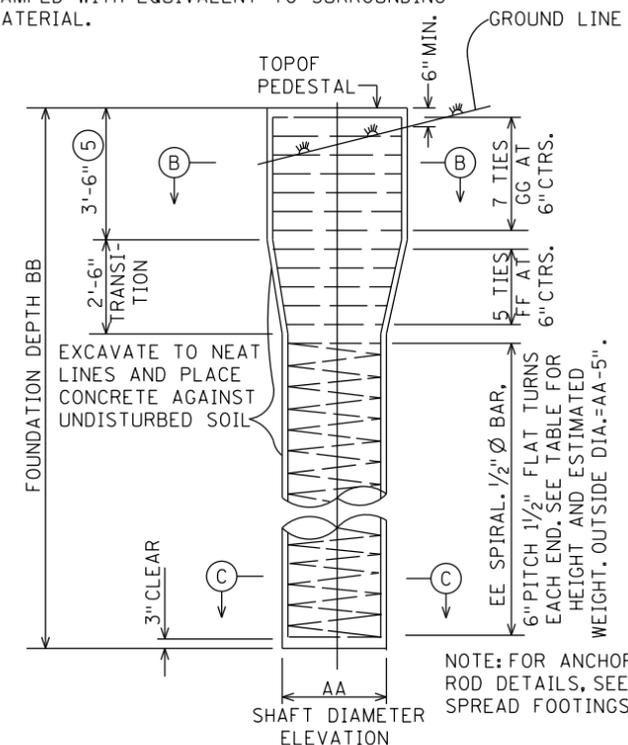
SPECIFIC NOTES:

- ① G IS IN FEET. ROUND UP TO WHOLE NUMBER. E.G. G=4.10/2G=8.2 NO. REQ'D=9.
- ② G AND R ARE IN FEET.
- ③ BEND AS REQUIRED TO FORM A CLOSED LOOP.
- ④ FOR STRUCTURE STEEL SEE SPREAD FOOTING.
- ⑤ MUST BE FORMED A MIN. OF 6" BELOW THE GROUND SURFACE. THE SOIL EXCAVATED FOR FORMING SHALL BE BACKFILLED AND TAMPED TO EQUIVALENT COMPACTION AS SURROUNDING MATERIAL.
- ⑥ SPECIAL LARGE RADIUS BENDS ARE REQUIRED. SEE "BAR BENDING DIAGRAMS" FOR SIZES OF RADII.

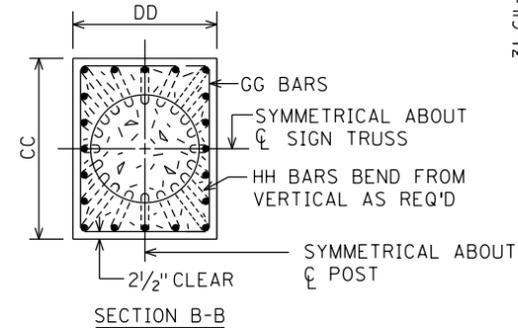
GENERAL NOTES:

1. SEE THE FORMAT SHEET FOR FOOTING LOCATIONS. POST DESIGNATIONS, TOP OF PEDESTAL ELEVATIONS AND BOTTOM OF FOOTING ELEVATIONS.
2. ALL CONCRETE SHALL CONFORM TO CONCRETE MIX 3Y43 (MNDOT 2461).
3. ALL BAR DIMENSIONS ARE OUT TO OUT OF BARS.
4. ALL SPREAD FOOTINGS HAVE AN ALLOWABLE DESIGN BEARING PRESSURE OF 1 1/4 T PER SQUARE FOOT.
5. DRILLED SHAFTS SHALL BE USED ONLY WHEN SPECIFIED IN THE CONTRACT PLANS.
6. THE DRILLED SHAFTS HAVE AN ALLOWABLE DESIGN LATERAL BEARING PRESSURE OF 250 LBS. PER SQ. FT. PER FOOT OF DEPTH.
7. UNLESS OTHERWISE NOTED, ALL REINFORCEMENT BARS SHALL BE EPOXY COATED IN ACCORDANCE WITH MMNDOT3301. SPIRAL BARS AND J, K, L, & M BARS NEED NOT BE EPOXY COATED.
8. THE FOLLOWING TORQUE VALUES SHALL BE USED WHEN INSTALLING ALL ANCHOR NUTS FOR OVERHEAD SIGN STRUCTURES:
ANCHOR
BOLT DIAMETER TORQUE (FT./LBS.)
2 1/4" 375
2 1/2" 450
THE CONTRACTOR SHALL BURR THE THREADS OF THE ANCHOR BOLTS IN ACCORDANCE WITH MNDOT 2402.3H AFTER TORQUEING NUTS.

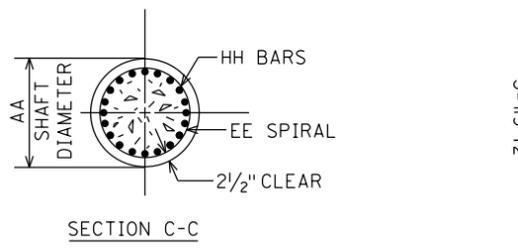
NOTE ⑤: MUST BE FORMED A MINIMUM OF 6" BELOW THE GROUND SURFACE. THE EXCAVATED AREA FOR FORMING SHALL BE BACKFILLED AND TAMPED WITH EQUIVALENT TO SURROUNDING MATERIAL.



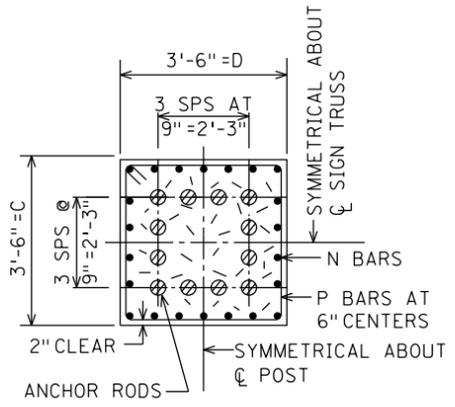
DRILLED SHAFT



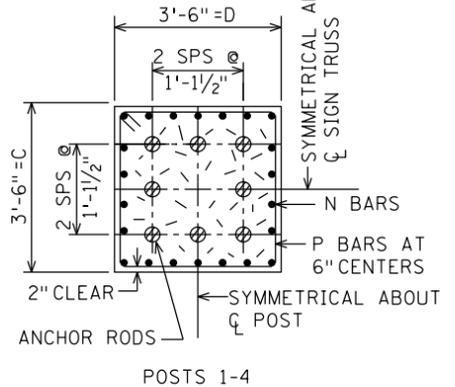
SECTION B-B



SECTION C-C

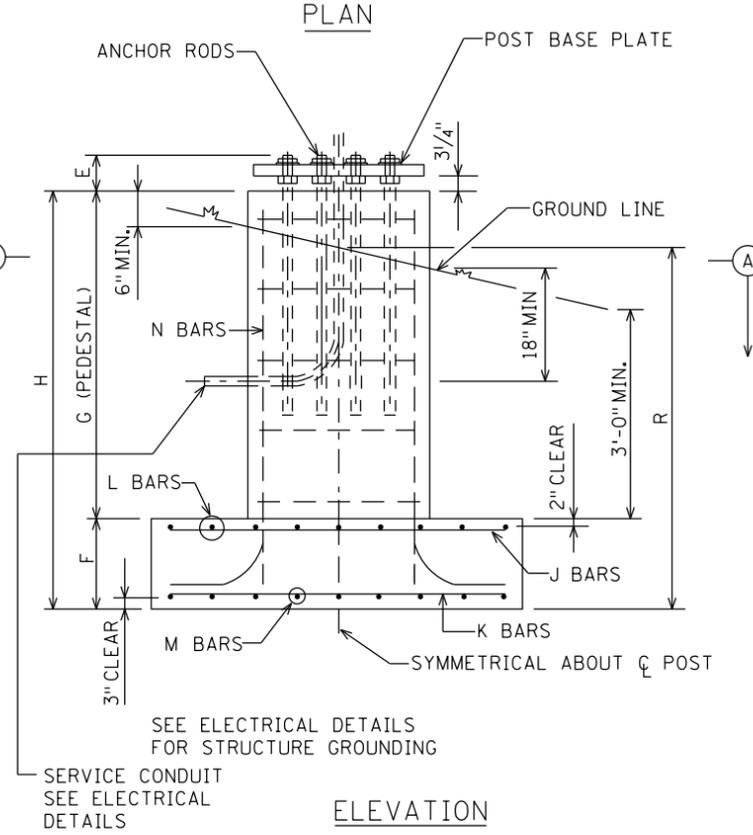


POSTS 5-7



POSTS 1-4

PEDESTAL CROSS SECTIONS A-A



ELEVATION
SPREAD FOOTINGS

POST NO.	DIMENSIONS				REINFORCING BARS				ESTIMATED QUANTITIES ④		SUMMARY OF ESTIMATED QUANTITIES			
	AA	BB	CC	DD	EE	FF ③	GG	HH	CONCRETE CY	REIN. STEEL LBS.	CONCRETE CY ②	REIN. STEEL LBS. ②	ANCH. ASSM. LBS	ST. EXC. C.Y. ②
1-4	3'-0" \emptyset	23'-0"	3'-6"	3'-6"	16'-6" x 197 LBS.	5 #16x 14'-1"	7 #16x 14'-1"	20 #28x 22'-7"	6.9	1910	9.3 + 0.46 G	945 + 98G	781	7.4 R
5-7	4'-0" \emptyset	29'-0"	4'-0"	4'-0"	22'-6" x 362 LBS.	5 #16x 16'-1"	7 #16x 16'-1"	24 #32x 28'-7"	14.1	3490	16.7 + 0.46 G	2333 + 133G	1320	12.1 R

POST NO.	ANCHOR RODS						J REIN. BARS		K REIN. BARS		L REIN. BARS		M REIN. BARS		⑥ N REIN. BARS		P REIN. BARS ①										
	A	B	C	D	E	F	NO. REQ'D	DIA.	LENGTH	NO. REQ'D	SIZE	LENGTH	NO. REQ'D	SIZE	LENGTH	NO. REQ'D	SIZE	LENGTH	NO. REQ'D	SIZE	LENGTH						
1-4	14'-0"	9'-0"	3'-6"	3'-6"	8 1/2"	2'-0"	8	2 1/4"	3'-10 1/2"	14	#13	8'-6"	14	#19	8'-6"	10	#16	13'-6"	10	#22	13'-6"	20	#28	H + 2'-6"	2G	#16	14'-3"
5-7	18'-0"	12'-6"	3'-6"	3'-6"	9"	2'-0"	12	2 1/2"	4'-0"	19	#13	12'-0"	19	#19	12'-0"	13	#19	17'-6"	13	#32	17'-6"	24	#32	H + 2'-9"	2G	#16	14'-3"

STANDARD OVERHEAD SIGN SUPPORTS
INTERIM DESIGN B

FOUNDATIONS AND
ANCHOR RODS

DRAWING ST-3

DISTRICT #: METRO
PLOT NAME: ST DRAWINGS STD#4
PATH & FILENAME: IP_PWP-dj139380VST DRAWINGS STD#4.dgn

Minnesota Department of Transportation

Geotechnical Engineering Section

BORING LOG DESCRIPTIVE TERMINOLOGY

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 related 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 of 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.

DRILLING OPERATIONS

AUG	Augered
CD	Core Drilled
DBD	Disturbed by Drilling
DBJ	Disturbed by Jetting
PD	Plug Drilled
ST	Split Tube (SPT Test)
TW	Thinwall (3" Shelby Tube)
WS	Wash Sample
AB	After Bailing
NSR	No Sample Retrieved
WH	Weight of Hammer
WR	Weight of Rod
Mud	Drilling Fluids in Sample
CS	Continuous Sample

SOIL / ROCK 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
COH	..... Cohesion (equivalent to 1/2 Unconfined Compression Strength)
γ	..... Sample Unit Weight
LL	..... Liquid Limit
PI	..... Plasticity Index
φ	..... Angle of Internal Friction
REC	..... Percent Core Recovered
RQD	..... Rock Quality Description
ACL	..... Average Core Length (Average length of core that is greater than 4" long)
Core Breaks	..... Number of natural core breaks per 2 foot interval

DISCONTINUITY SPACING

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

RELATIVE DENSITY

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

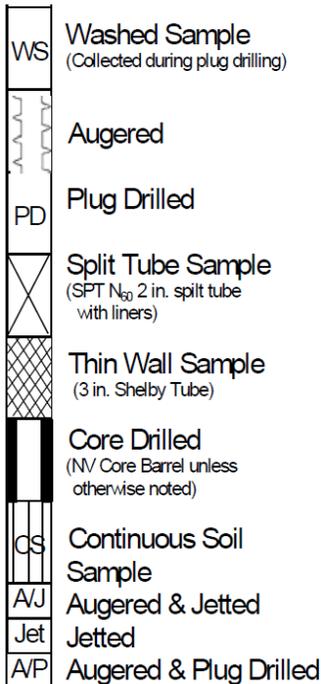
Consistency - Cohesive Soils	BPF
very soft	..... 0-1
soft	..... 2-4
firm	..... 5-8
stiff	..... 9-15
very stiff	..... 16-30
hard	..... 31-60
very hard	..... > 60

GRAIN SIZE / PLASTICITY

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

SOIL / ROCK TERMS

C	... Clay	Lmst	... Limestone
L	... Loam	Sst	... Sandstone
S	... Sand	Dolo	... Dolostone
Si	... Silt	wx	... weathered
G	... Gravel (No. 10 Sieve to 3")		
Bldr	... Boulder (>3" dia.)		
T	... Till (unsorted, non stratified glacial deposits)		



MnDOT Triangular Textural Classification System

