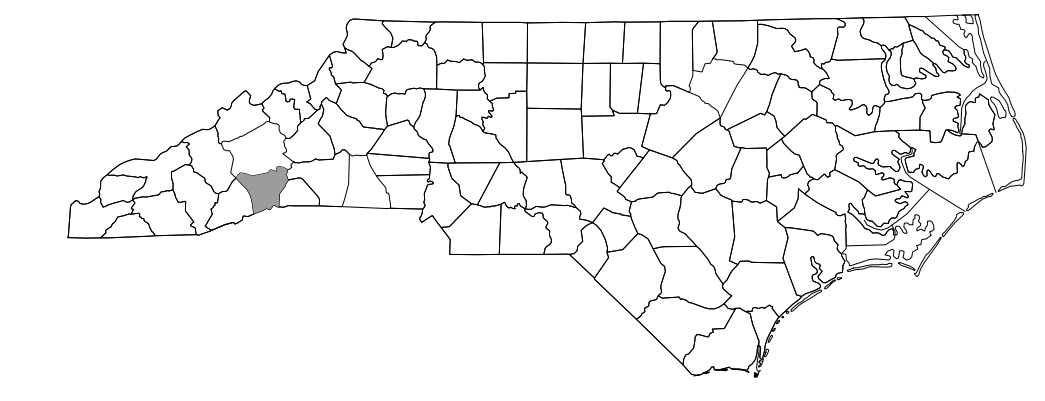


**Project: U-5887**

STATE OF NORTH CAROLINA  
DIVISION OF HIGHWAYS

Project No.	Sheet No.
<b>U-5887</b>	<b>Sig. 1.0</b>

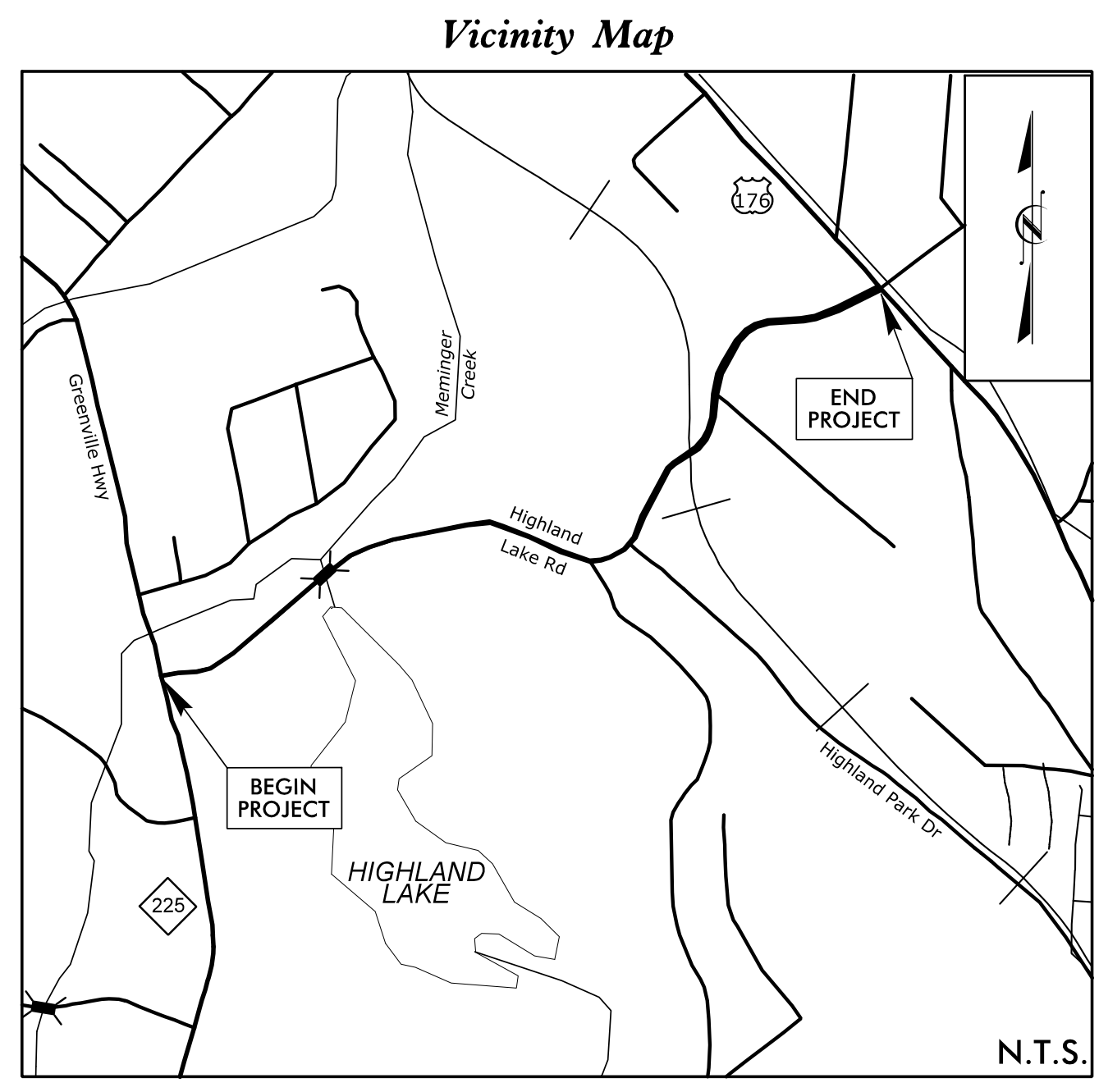


**STV** 100 Years  
 STV Engineers, Inc.  
 900 West Trade St., Suite 715  
 Charlotte, NC 28202  
 (704) 372-1885  
 NC License Number F-0991

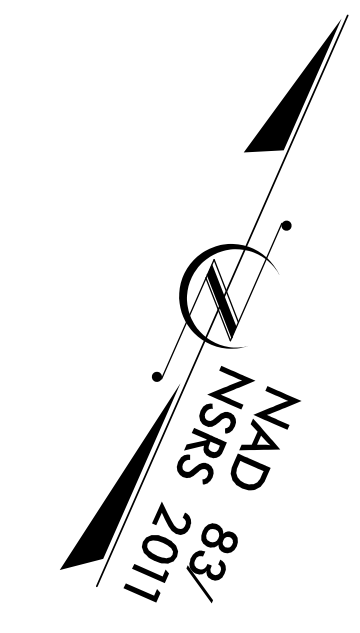
# HENDERSON COUNTY

**LOCATION: SR 1783 (N. HIGHLAND LAKE ROAD)  
 FROM NC 225 (GREENVILLE HIGHWAY)  
 TO US 176 (SPARTANBURG HIGHWAY)**

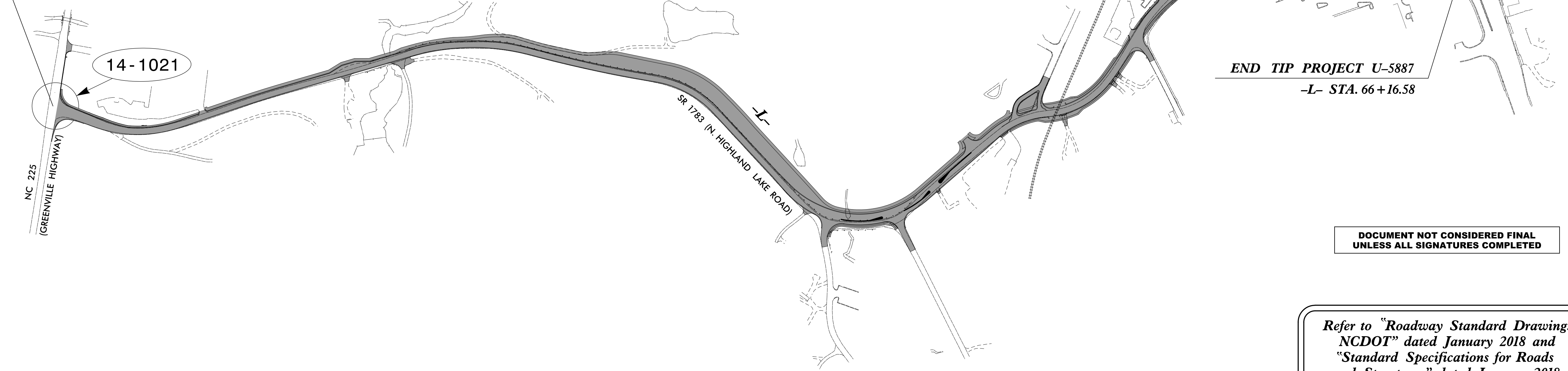
**TYPE OF WORK: TRAFFIC SIGNALS**



XX-XXXX SIGNAL ID NUMBER



**BEGIN TIP PROJECT U-5887**  
 -L- STA. 10+00.00



**END TIP PROJECT U-5887**  
 -L- STA. 66+16.58

DOCUMENT NOT CONSIDERED FINAL  
 UNLESS ALL SIGNATURES COMPLETED

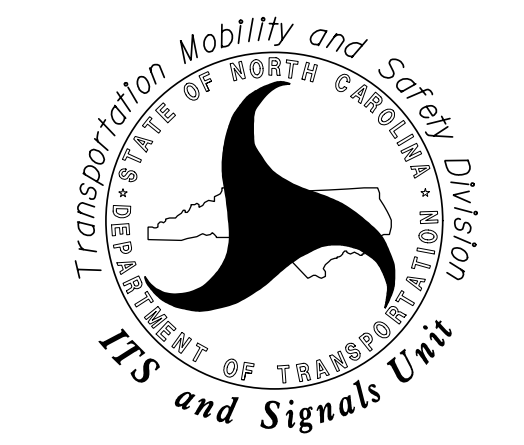
Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.

Sheet #	Reference #	Index of Plans	Location/Description
Sig. 1.0	---	Title Sheet	
Sig. 2.0-2.2	14-1021T	NC 225 (Greenville Highway) at SR 1783 (N. Highland Lake Road) Temporary Signal	
Sig. 3.0-3.3	14-1021	NC 225 (Greenville Highway) at SR 1783 (N. Highland Lake Road)	
Sig. M1-M8	---	Standard Drawings for Metal Poles	
Sig. SP1-SP2	---	2018 Standard Plate Drawings - Revised	

**INTELLIGENT TRANSPORTATION AND SIGNALS UNIT**  
 Contacts:

**Timothy J. Williams, P.E. - Western Region Signals Engineer**  
**Keith M. Mims, P.E. - Signal Equipment Design Engineer**

DIVISION OF HIGHWAYS  
 TRANSPORTATION MOBILITY AND SAFETY  
 DIVISION

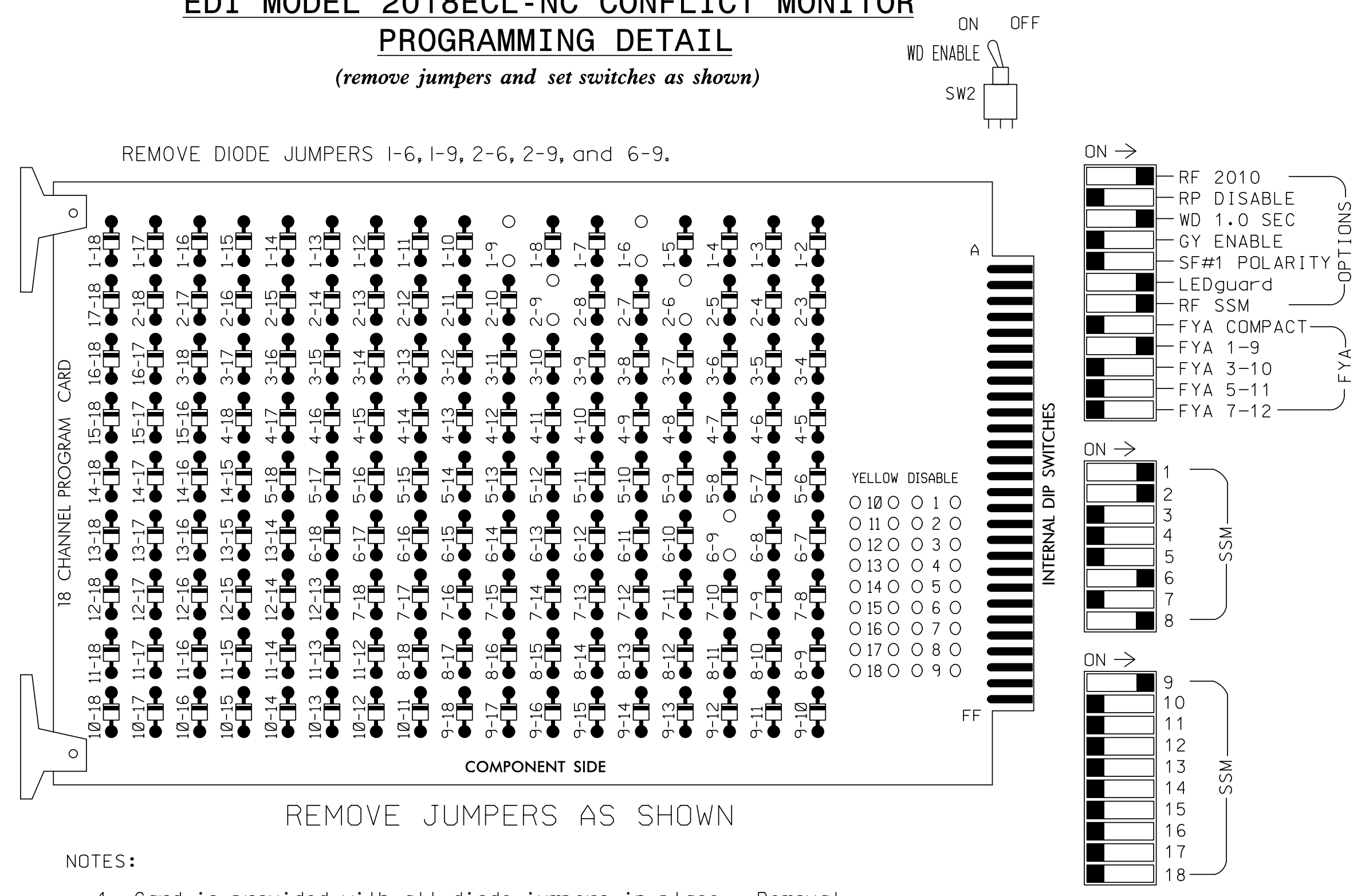






### EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



NOTES:

- Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
- Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
- Ensure that Red Enable is active at all times during normal operation.
- Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.

### NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
- Enable Simultaneous Gap-Out for all Phases.
- Program phases 2 and 6 for Startup In Green.
- Program phases 2 and 6 for Yellow Flash, and overlap 1 as Wag Overlap.

### EQUIPMENT INFORMATION

CONTROLLER.....2070  
 CABINET.....332 w/ AUX  
 SOFTWARE.....ECONOLITE OASIS  
 CABINET MOUNT.....BASE  
 OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE  
 LOAD SWITCHES USED.....S1,S2,S8,S11,AUX S1  
 PHASES USED.....1,2,6,8  
 OVERLAP 'A'.....1+2  
 OVERLAP 'B'.....NOT USED  
 OVERLAP 'C'.....NOT USED  
 OVERLAP 'D'.....NOT USED

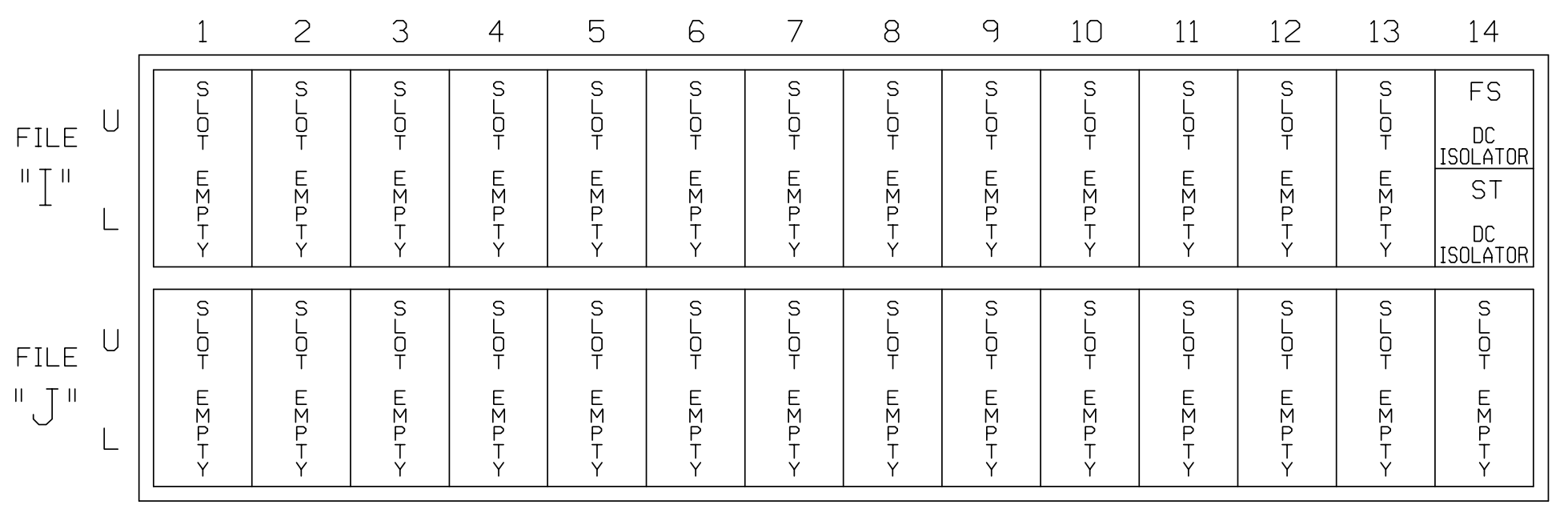
### SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	11	82	21,22	NU	NU	NU	NU	61,62	NU	NU	81,82	NU	11	NU	NU	NU	NU	NU
RED	*	128						134			107							
YELLOW		129						135			108							
GREEN		130						136			109							
RED ARROW													A121					
YELLOW ARROW	126													A122				
FLASHING YELLOW ARROW													A123					
GREEN ARROW	127	127																

NU = Not Used  
 \* Denotes install load resistor. See load resistor installation detail this sheet.  
 ★ See pictorial of head wiring in detail this sheet.

### INPUT FILE POSITION LAYOUT

(front view)

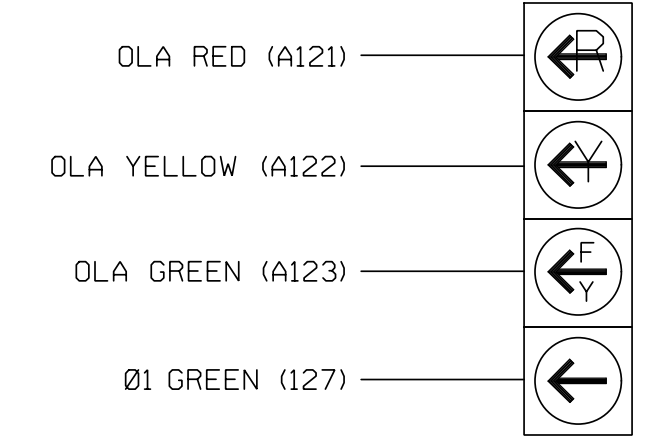


### SPECIAL DETECTOR NOTE

Install a video detection system for vehicle detection. Perform installation according to manufacturer's directions and NCDOT engineer-approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.

### FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)

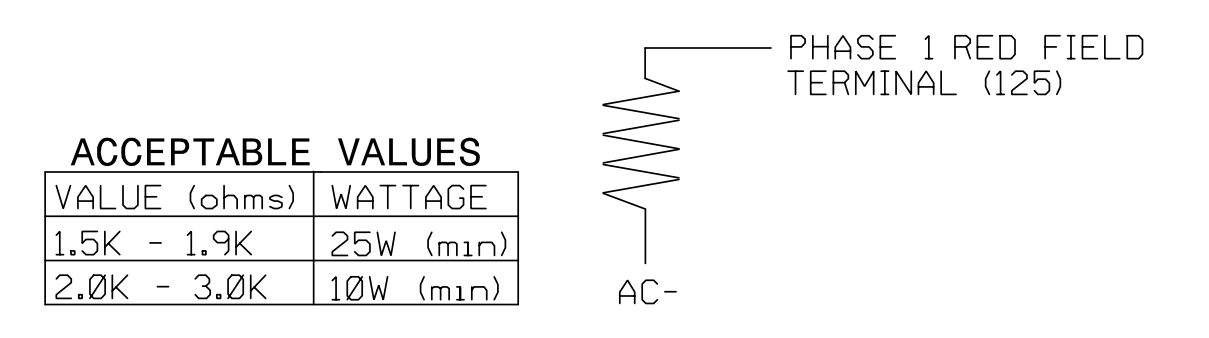


NOTE

The sequence display for signal head 11 requires special logic programming. See sheet 2 for programming instructions.

### LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 14-1021T  
 DESIGNED: JUNE 2019  
 SEALED: 11-19-2019  
 REVISED: N/A



Electrical Detail - Temporary Design - Sheet 1 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL

NC 225 (Greenville Highway) at SR 1783 (N. Highland Lake Road)

Division 14 Henderson County East Flat Rock

PLAN DATE: June 2019 REVIEWED BY: R. Dubnicka

PREPARED BY: J. Trueblood REVIEWED BY: J. Carroll

REVISIONS INIT. DATE

11/19/2019

SIGNATURE DATE

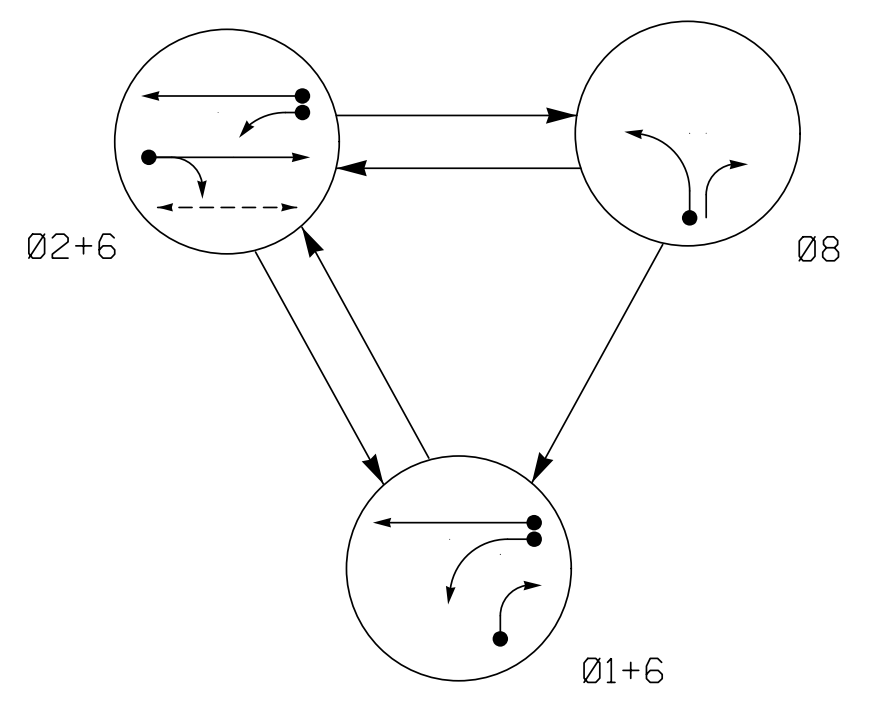
SIG. INVENTORY NO. 14-1021T

11/18/2019 11:18:20 AM C:\Users\jcarroll\OneDrive\Documents\14-1021T\14-1021T.dgn  
 11/18/2019 11:18:20 AM C:\Users\jcarroll\OneDrive\Documents\14-1021T\14-1021T.dgn  
 11/18/2019 11:18:20 AM C:\Users\jcarroll\OneDrive\Documents\14-1021T\14-1021T.dgn





**PHASING DIAGRAM**



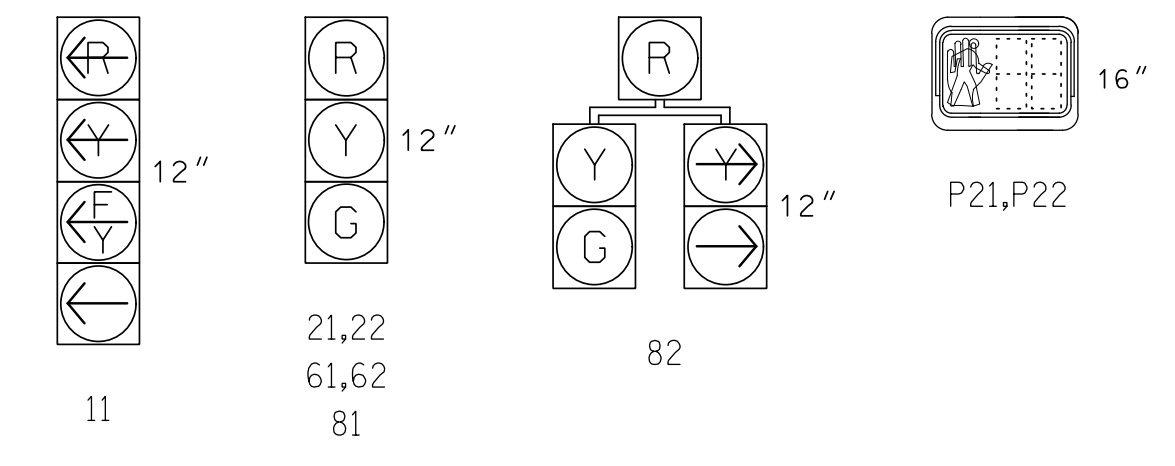
**PHASING DIAGRAM DETECTION LEGEND**

- → DETECTED MOVEMENT
- → UNDETECTED MOVEMENT (OVERLAP)
- ⚡ → UNSIGNALIZED MOVEMENT
- ⚡ → PEDESTRIAN MOVEMENT

**TABLE OF OPERATION**

SIGNAL FACE	PHASE			
	01+6	02+6	08	F HEADL
11	←	←	←	←
21,22	R	G	R	Y
61,62	G	G	R	Y
81	R	R	G	R
82	←	←	←	←
P21,P22	DW	W	DW	DRK

**SIGNAL FACE I.D.**  
All Heads L.E.D.



**OASIS 2070 LOOP & DETECTOR INSTALLATION CHART**

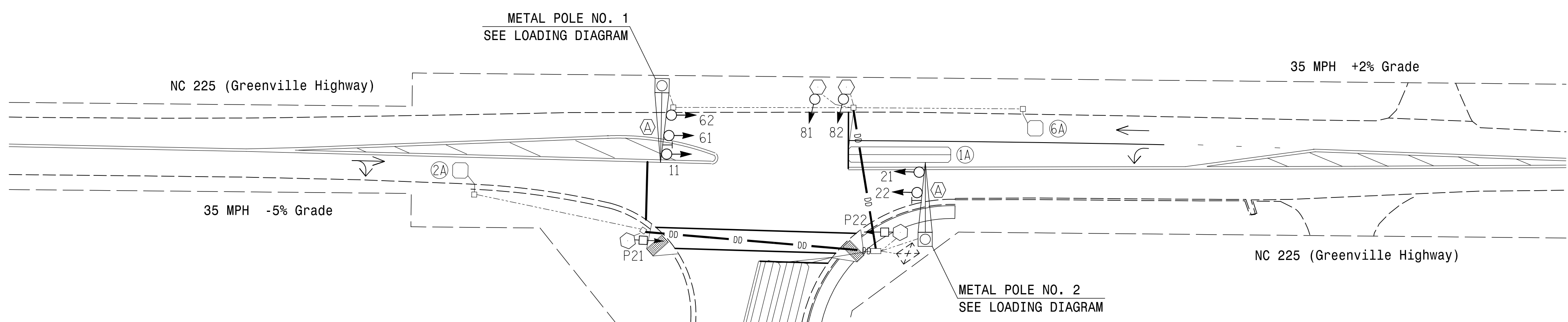
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	DETECTOR PROGRAMMING				SYSTEM LOOP	NEW CARD	
					PHASE	CALLING	EXTENSION	FULL TIME DELAY			
1A	6X40	0	2-4-2	Y	1	Y	Y	-	15	-	Y
1B	6X40	0	2-4-2	Y	6	Y	Y	-	-	-	Y
2A	6X6	70	3	Y	2	Y	Y	-	-	-	Y
6A	6X6	70	3	Y	6	Y	Y	-	-	-	Y
8A	6X40	0	2-4-2	Y	8	Y	Y	-	3	-	Y

**3 Phase Fully Actuated Isolated**

**NOTES**

- Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Phase 1 may be lagged.
- Set all detector units to presence mode.
- Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
- Program pedestrian heads to countdown the flashing "Don't Walk" time only.
- Metal poles with mast arms and pedestrian pedestals shall be BROWN per special provisions.

This plan supersedes the plan signed and sealed on 11/19/2019.

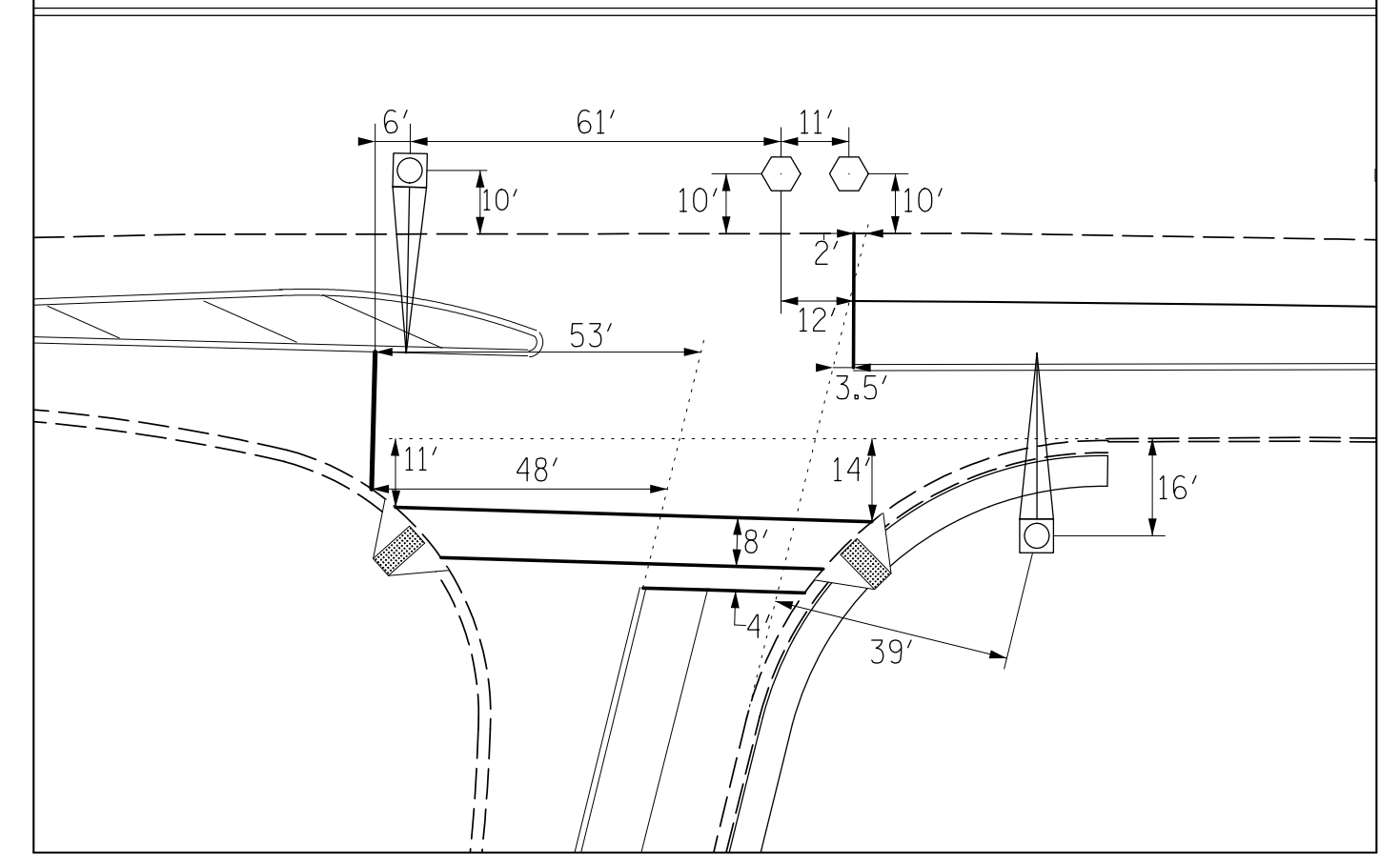


**OASIS 2070 TIMING CHART**

FEATURE	PHASE			
	1	2	6	8
Min Green 1 *	7	10	10	7
Extension 1 *	2.0	3.0	3.0	2.0
Max Green 1 *	20	90	90	30
Yellow Clearance	3.0	4.2	4.2	3.0
Red Clearance	1.8	1.5	1.5	1.8
Red Revert	2.0	2.0	2.0	2.0
Walk 1 *	-	7	-	-
Don't Walk 1	-	16	-	-
Seconds Per Actuation *	-	-	-	-
Max Variable Initial *	-	-	-	-
Time Before Reduction *	-	-	-	-
Time To Reduce *	-	-	-	-
Minimum Gap	-	-	-	-
Recall Mode	-	MIN RECALL	MIN RECALL	-
Vehicle Call Memory	-	YELLOW	YELLOW	-
Dual Entry	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON

\* These values may be field adjusted. Do not adjust Min Green and Extension times for phases 2 and 6 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.

**PROPOSED STOPBAR, CROSSWALK, PEDESTAL, AND MAST ARM LOCATIONS**



**LEGEND**

PROPOSED	EXISTING
○ → Traffic Signal Head	● → N/A
○ → Modified Signal Head	○ → N/A
○ → Pedestrian Signal Head With Push Button & Sign	○ → N/A
□ → Inductive Loop Detector	□ → N/A
□ → Controller & Cabinet	□ → N/A
□ → Junction Box	□ → N/A
□ → Oversize Junction Box	□ → N/A
--- 2-in Underground Conduit	--- 2-in Underground Conduit
N/A → Right of Way	N/A → Right of Way
→ Directional Arrow	→ Directional Arrow
--- Directional Drill	--- Directional Drill
○ → Metal Pole with Mastarm	○ → Metal Pole with Mastarm
○ → Type II Signal Pedestal	○ → Type II Signal Pedestal
N/A → Wheelchair Ramp	○ → Wheelchair Ramp
⊙ → "YIELD TO PEDESTRIAN" Sign (R10-15)	⊙ → "YIELD TO PEDESTRIAN" Sign (R10-15)

**Signal Upgrade - Final Design**

**STV 100 Years**  
STV Engineers, Inc.  
900 West Trade St., Suite 715  
Charlotte, NC 28202  
(704) 372-1885  
NC License Number F-0991

Prepared for:  
TRANSPORTATION MOBILITY AND SAFETY DIVISION  
DEPARTMENT OF TRANSPORTATION  
SIGNAL DESIGN SECTION  
750 N. Greenfield Pkwy, Garner, NC 27529

**NC 225 (Greenville Highway) at SR 1783 (N. Highland Lake Road)**  
Division 14 Henderson County East Flat Rock  
PLAN DATE: June 2019 REVIEWED BY: R. Dubnicka  
PREPARED BY: J. Trueblood REVIEWED BY: J. Carroll

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL  
NORTH CAROLINA PROFESSIONAL ENGINEER  
SEAL 030005  
JUSTIN T. CARROLL  
1/29/2020  
DATE  
SIGNATURE  
1/29/2020  
DATE  
SIG. INVENTORY NO. 14-1021

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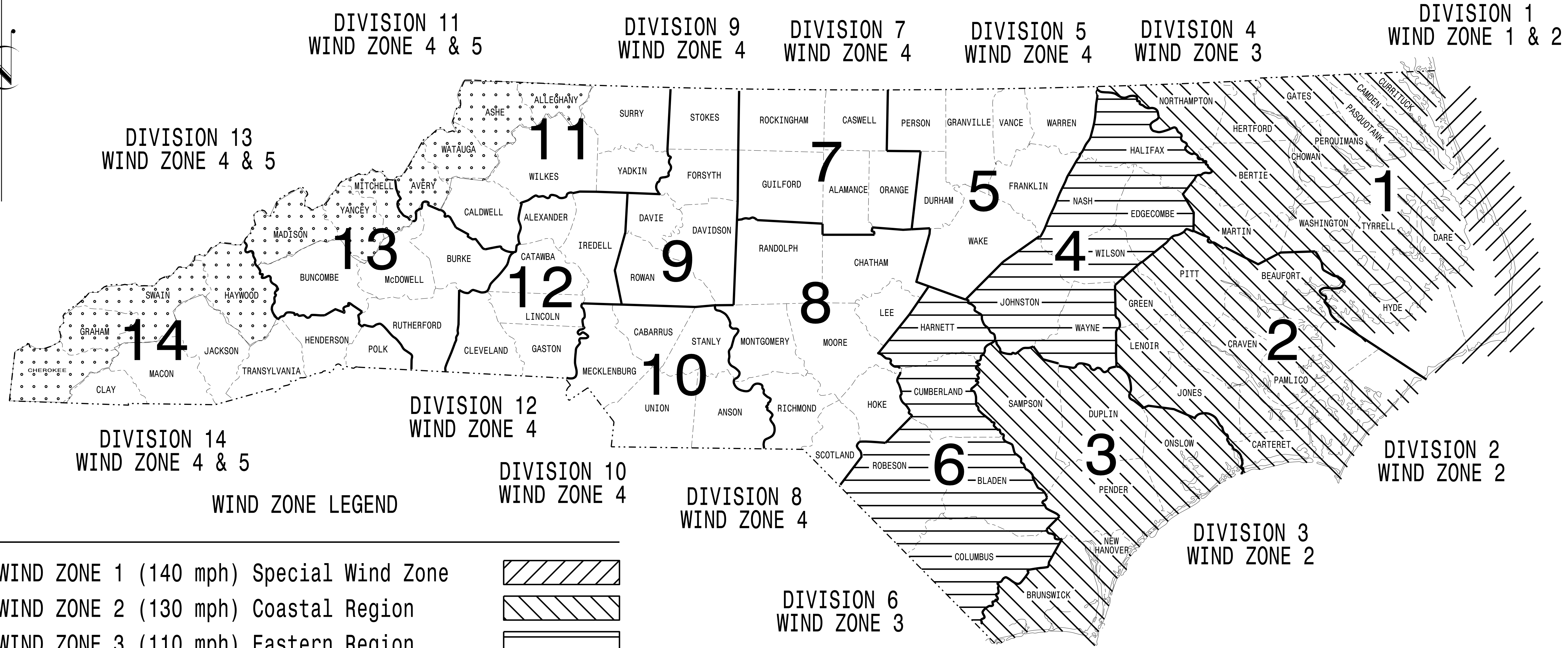
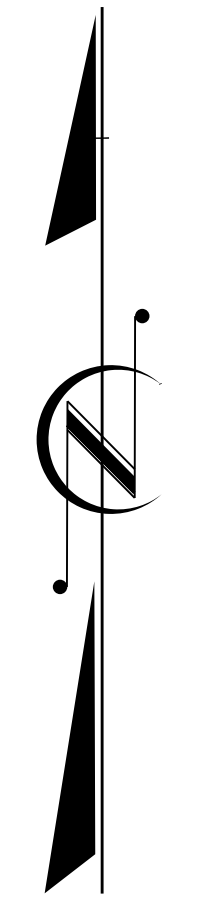


**NCDOT METAL POLE STANDARDS**

# STATE OF NORTH CAROLINA DIVISION OF HIGHWAYS

PROJECT I.D. NO. U-5887	SHEET NO. Sig.M1
----------------------------	---------------------

## STANDARD DRAWINGS FOR ALL METAL POLES



**WIND ZONE LEGEND**

WIND ZONE 1 (140 mph) Special Wind Zone	
WIND ZONE 2 (130 mph) Coastal Region	
WIND ZONE 3 (110 mph) Eastern Region	
WIND ZONE 4 (90 mph) Central & Mtn. Region	
WIND ZONE 5 (120 mph) Special Wind Zone	

<https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx>

Prepared In the Offices of:

750 N. Greenfield Pkwy.  
Garner, NC 27529

Designed in conformance  
with the latest  
2015 Interim to the  
6th Edition 2013  
**AASHTO**  
Standard Specifications for  
Structural Supports for  
Highway Signs, Luminaires,  
and Traffic Signals

**INDEX OF PLANS**

DRAWING NUMBER	DESCRIPTION
Sig. M 1	Statewide Wind Zone Map
Sig. M 2	Typical Fabrication Details-All Metal Poles
Sig. M 3	Typical Fabrication Details-Strain Poles
Sig. M 4	Typical Fabrication Details-Mast Arm Poles
Sig. M 5	Typical Fabrication Details-Mast Arm Connection
Sig. M 6	Typical Fabrication Details-Strain Pole Attachments
Sig. M 7	Construction Details-Foundations
Sig. M 8	Standard Strain Pole Foundation-All Soil Conditions

**NCDOT CONTACTS:**

**MOBILITY AND SAFETY DIVISION - ITS AND SIGNALS UNIT**

---

M.M. MCDIARMID, P.E. - STATE ITS AND SIGNALS ENGINEER  
 J.P. GALLOWAY, P.E. - STATE SIGNALS ENGINEER  
 D.C. SARKAR, P.E. - ITS AND SIGNALS SENIOR STRUCTURAL ENGINEER

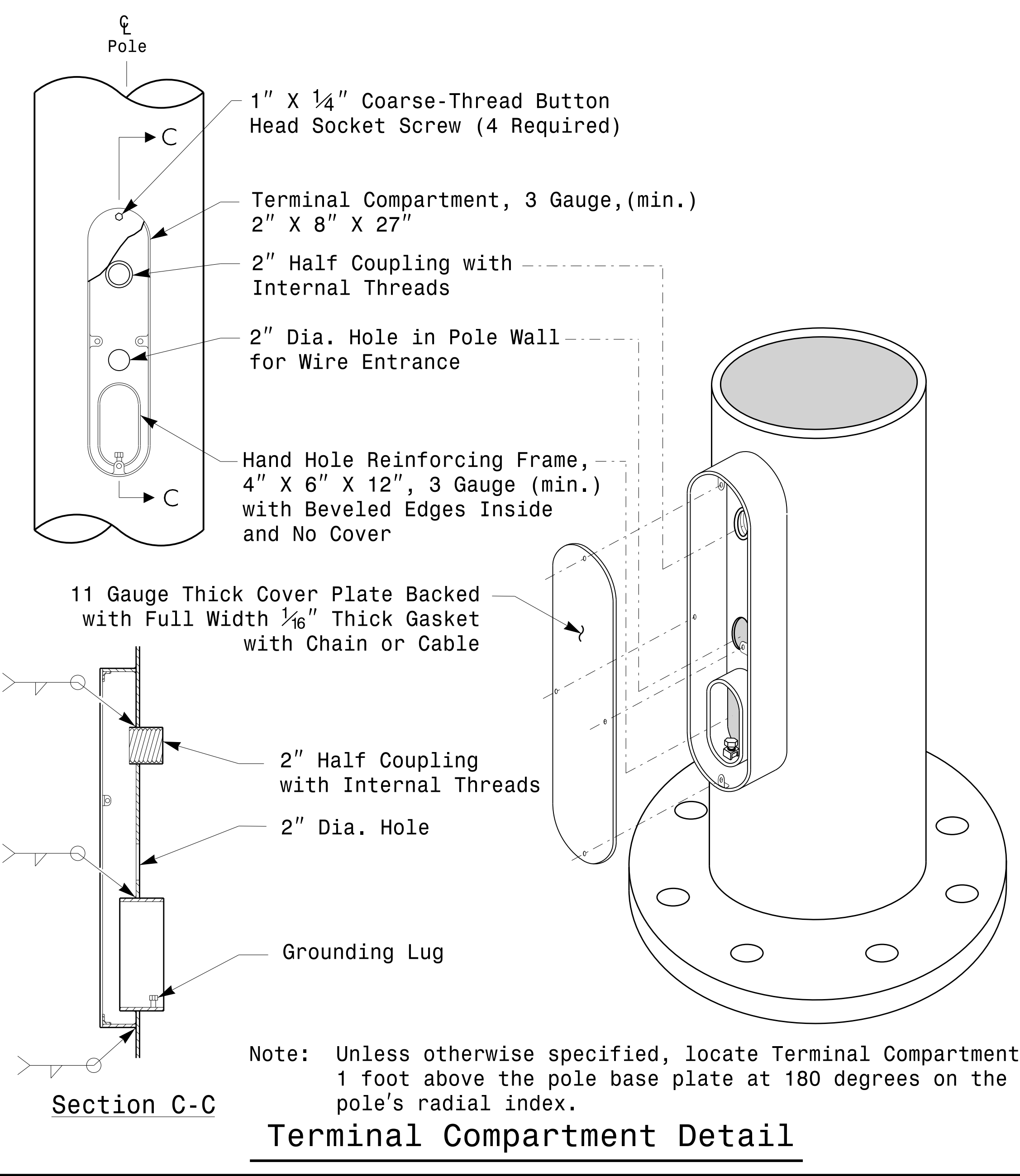
SEAL

DocuSigned by:  
Debesh C. Sarkar  
DATE: 10/11/2017



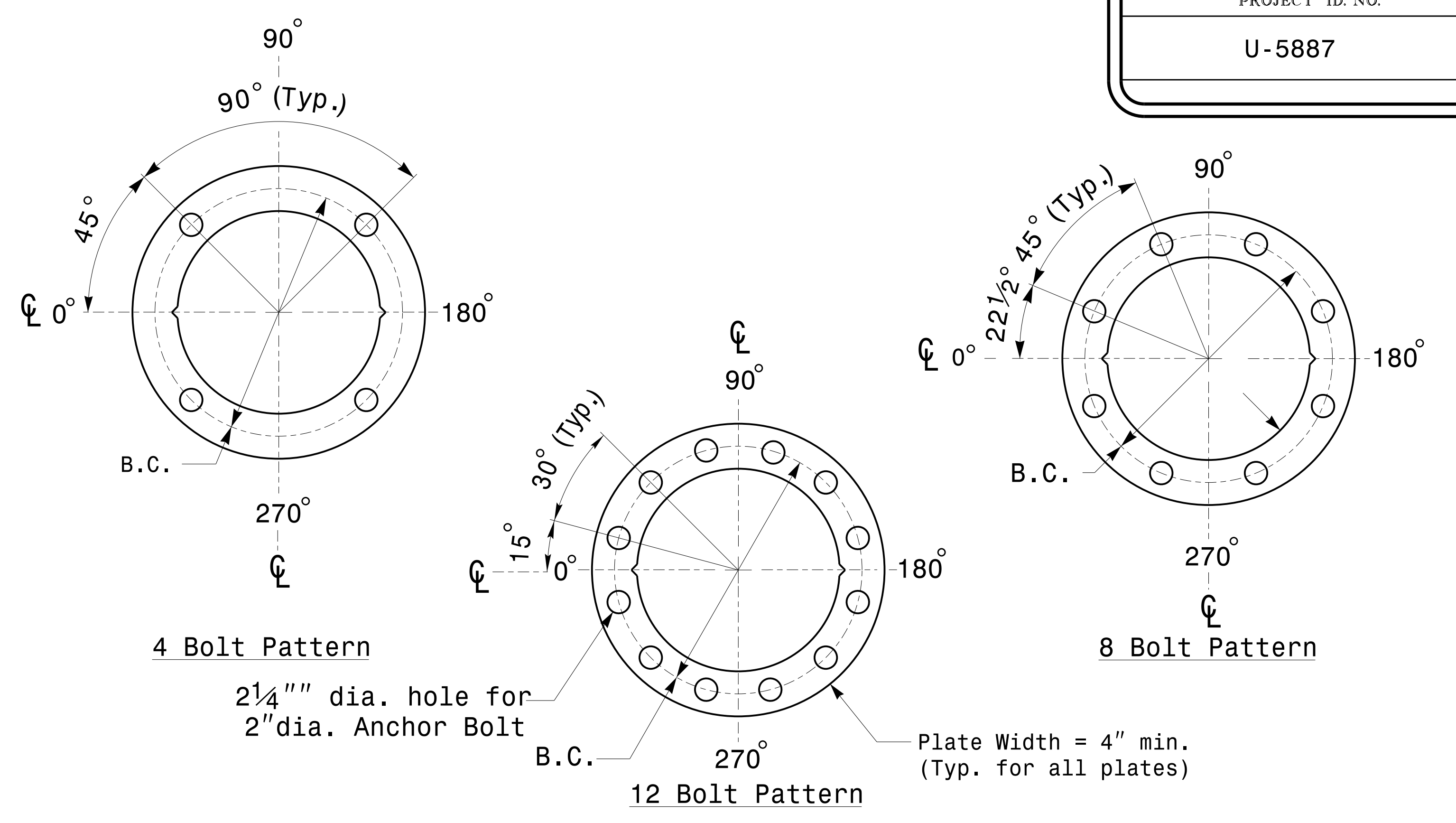
PROJECT ID. NO.	SHEET NO.
U-5887	Sig.M2

Fabrication Details – All Metal Poles



Note: Unless otherwise specified, locate Terminal Compartment 1 foot above the pole base plate at 180 degrees on the pole's radial index.

**Terminal Compartment Detail**



Construct Templates and Plates from 1/4" min. thick Steel. Galvanizing is not required.

**Base Plate Template and Anchor Bolt Lock Plate Details**

MFG _____	MFG. DATE: MM/YY _____
SHAFT D/T/L/Y _____	_____
ARM-A D/T/L/Y _____	_____
ARM-B D/T/L/Y _____	_____
A.B. DIA./B.C./L/Y _____	_____
NCDOT SIG. INV. NO. _____	_____
NCDOT POLE NO. _____	_____

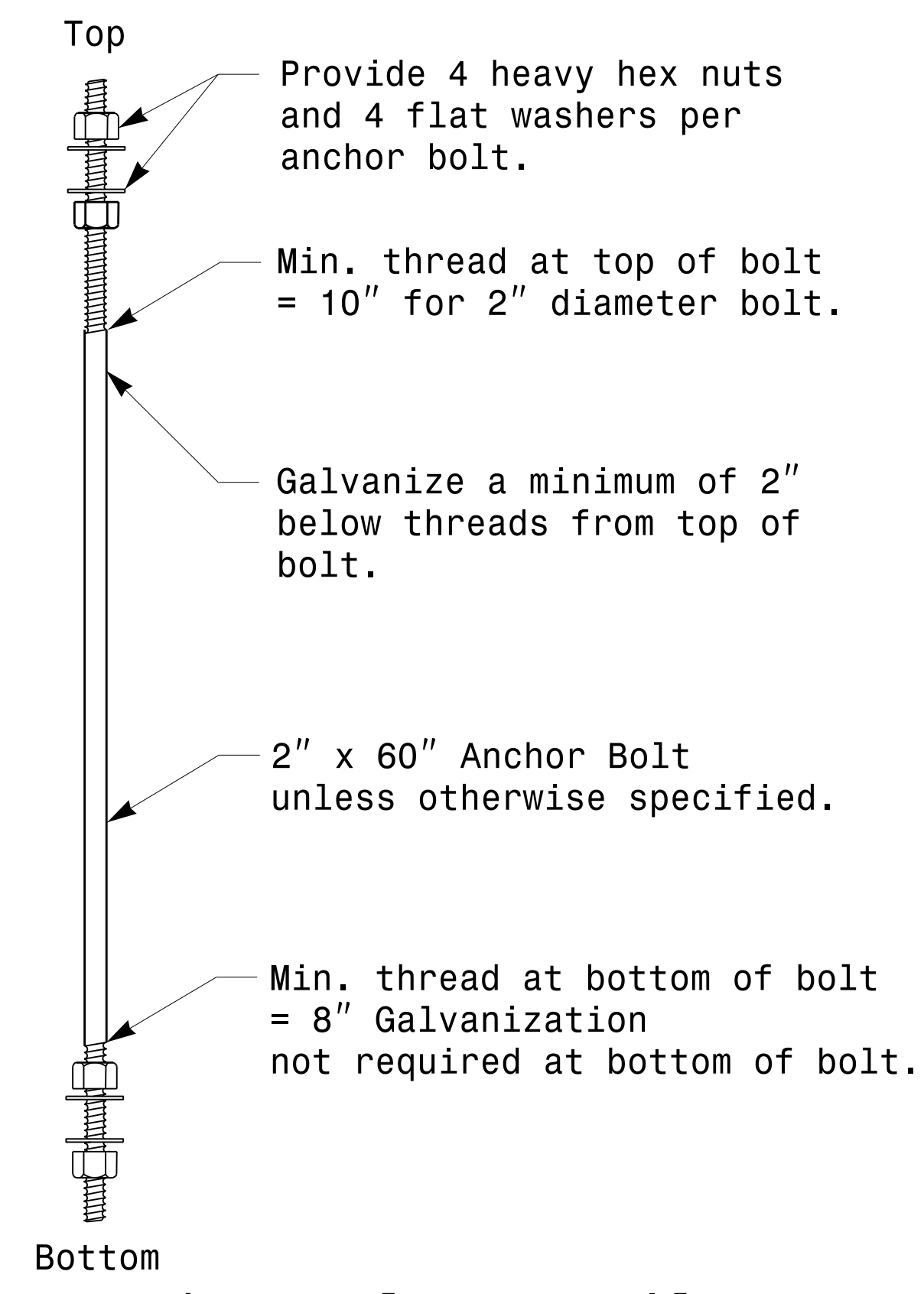
Shaft I.D. Tag  
(Provide on Shaft of Strain Poles and Mast Arm Poles Shaft)

- Notes:
- 1) D= Diameter, T= Thickness, L= Length, Y= Yield Strength
  - 2) A.B. = Anchor Bolt
  - 3) B.C. = Bolt Circle of Anchor Bolts
  - 4) If Custom Design, use "NCDOT STANDARD" line for Signal Inv. Number and pole I.D. number
  - 5) See drawing M3 and M4 for mounting positions of I.D. tags.

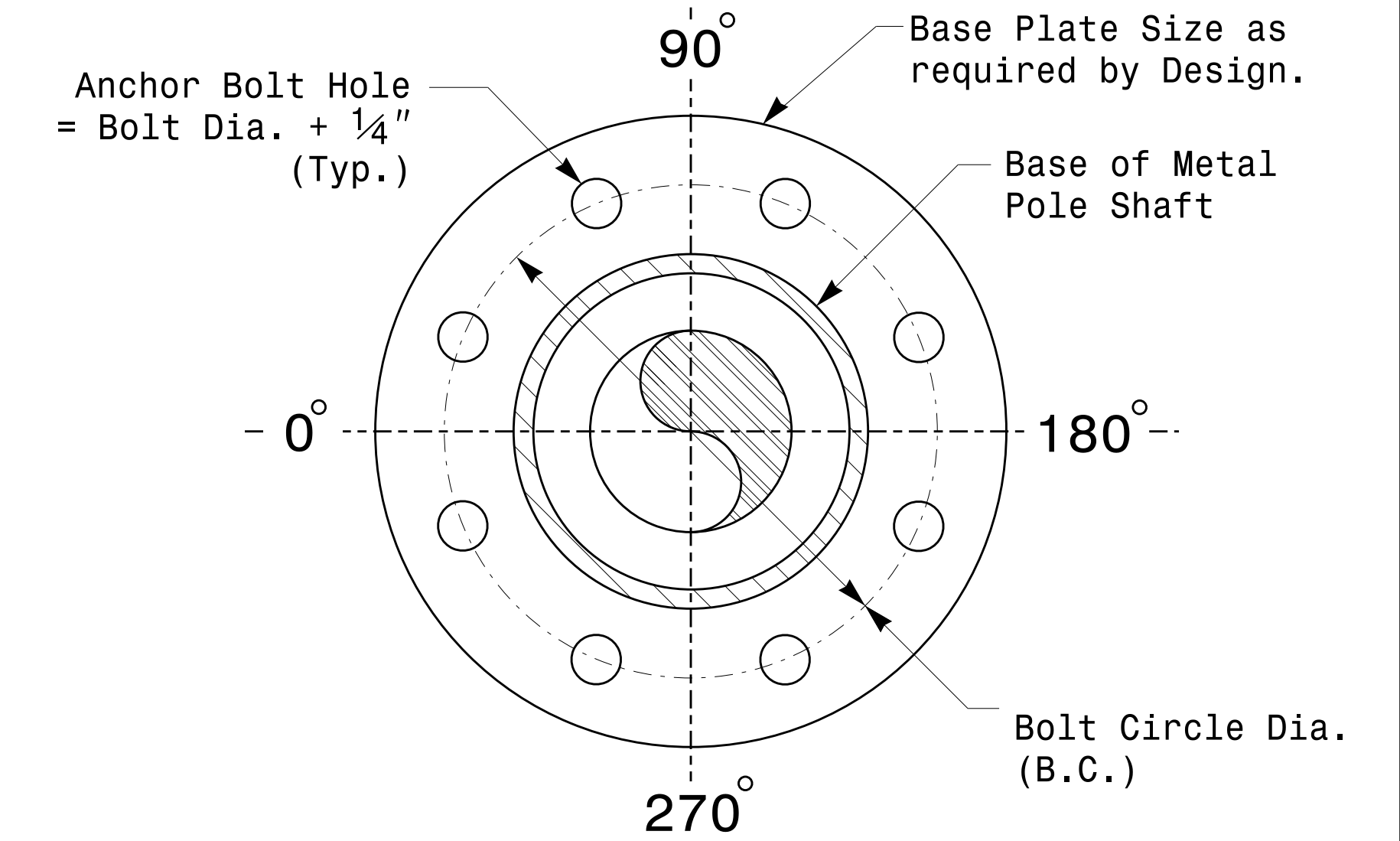
**Identification Tag Details**

MFG _____	MFG. DATE:MM/YY _____
SECTION D/T/L/Y _____	_____
NCDOT SIG. INV. NO. _____	_____
NCDOT POLE NO. _____	_____

Arm I.D. Tag  
(Provide on each section of a multi-section mast arm.)



**Anchor Bolt Detail**



Note: Base plate may be circular, octagonal, square or rectangular in shape.

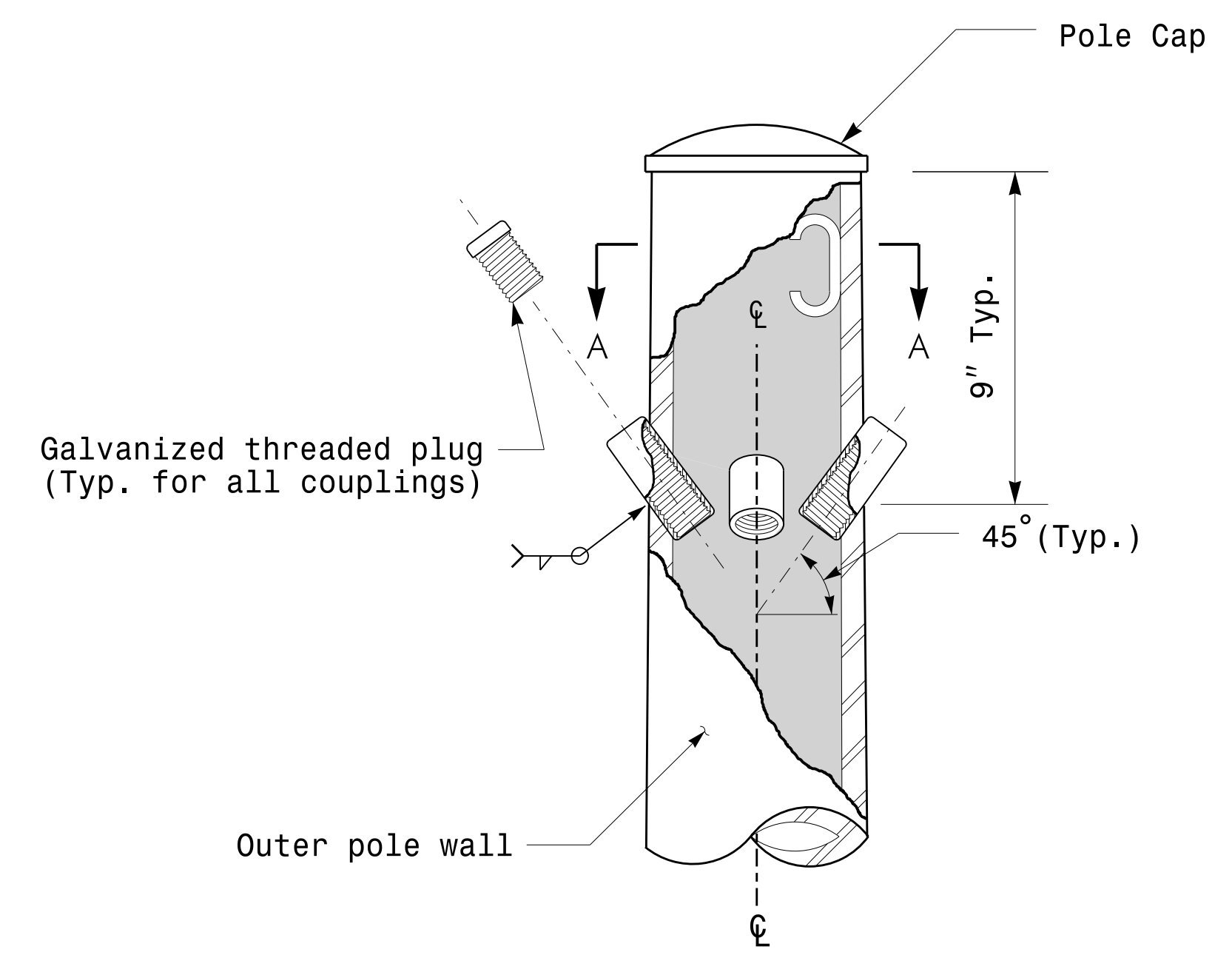
**Typical Base Plate Detail**

	Typical Fabrication Details For All Metal Poles		
	PLAN DATE: OCTOBER 2017 DESIGNED BY: C.F. ANDREWS	PREPARED BY: N. BITTING REVIEWED BY: D.C. SARKAR	
SCALE: 0 NONE	Signature: <i>Dibesh C. Sarkar</i> DATE: 10/11/2017		

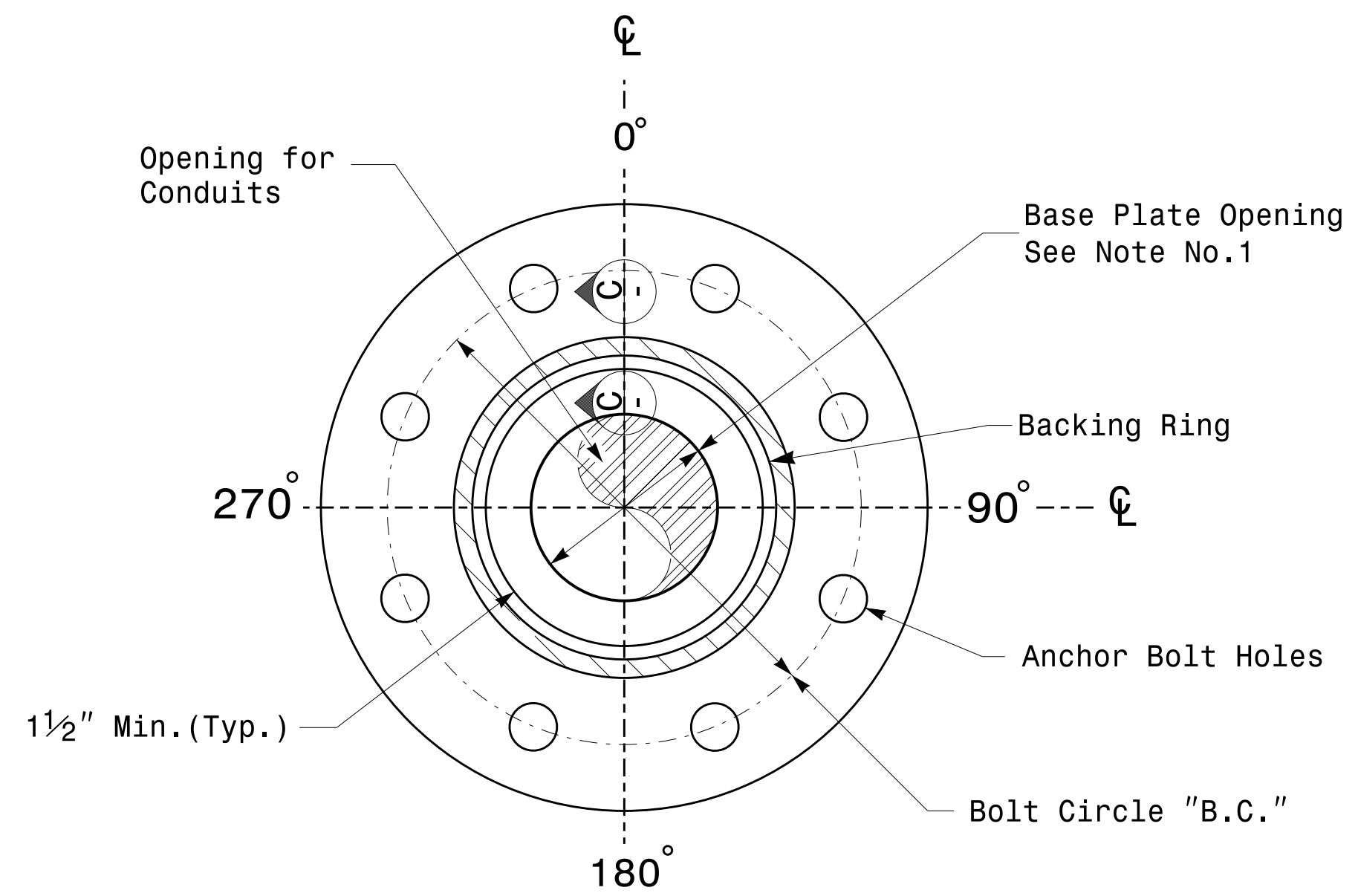
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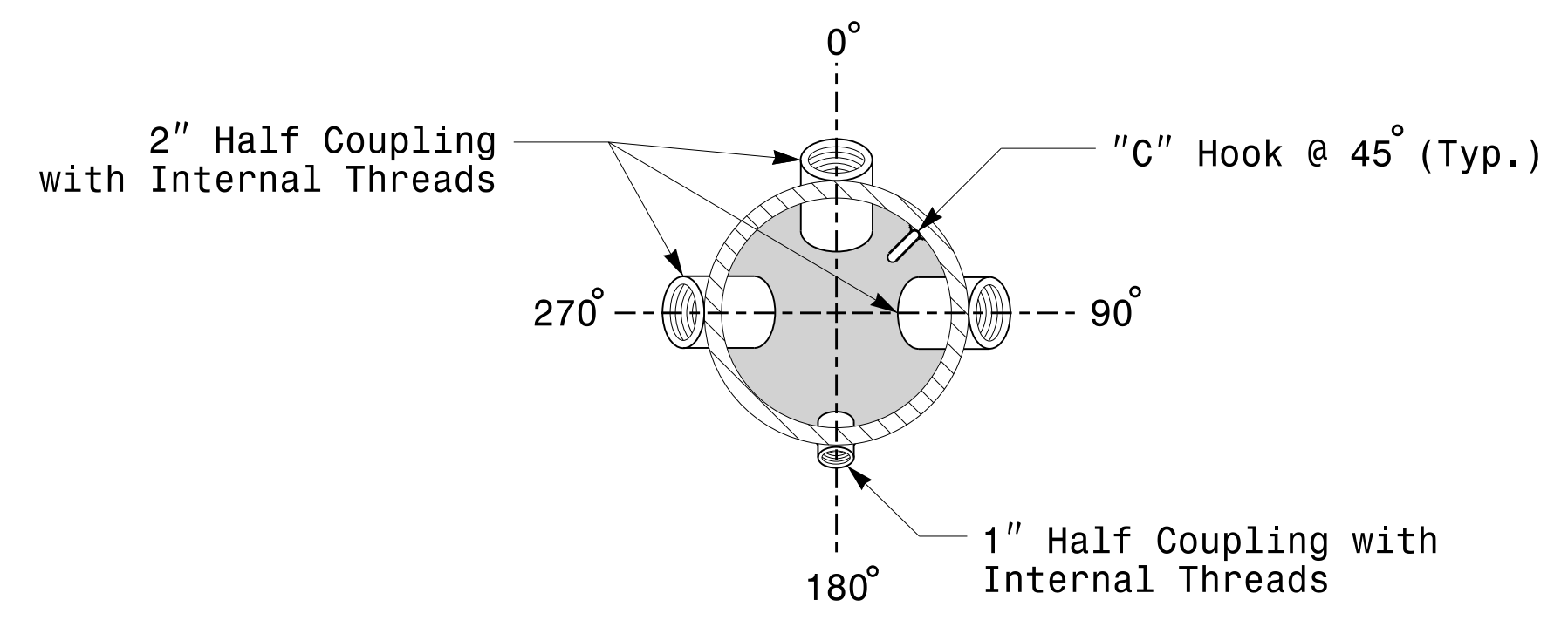
Note:  
 1. Opening in pole base plate shall be equal to pole base inside diameter minus 3 1/2" but shall not be less than 8 1/2".



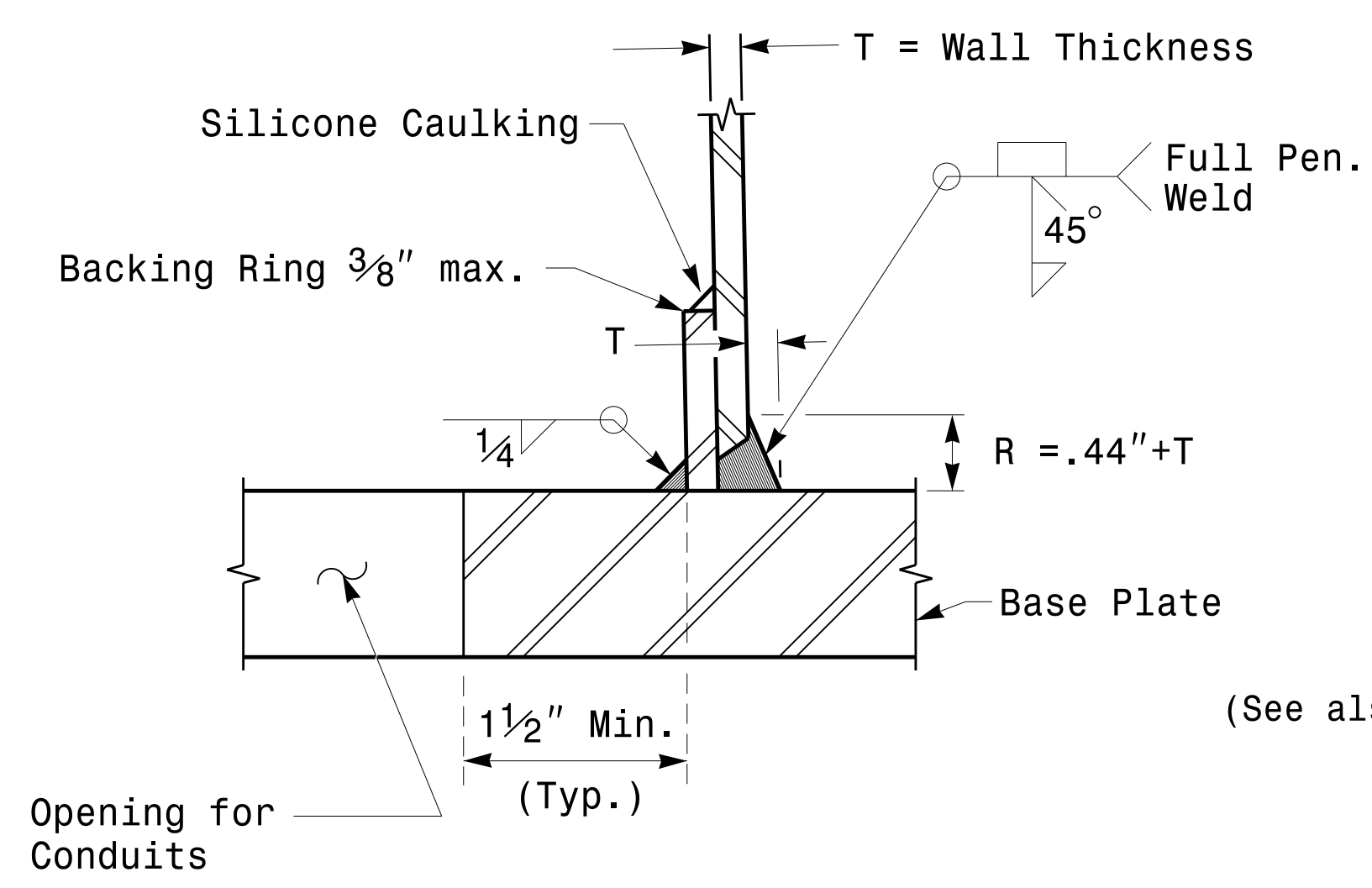
Cable Entrances at Top of Pole



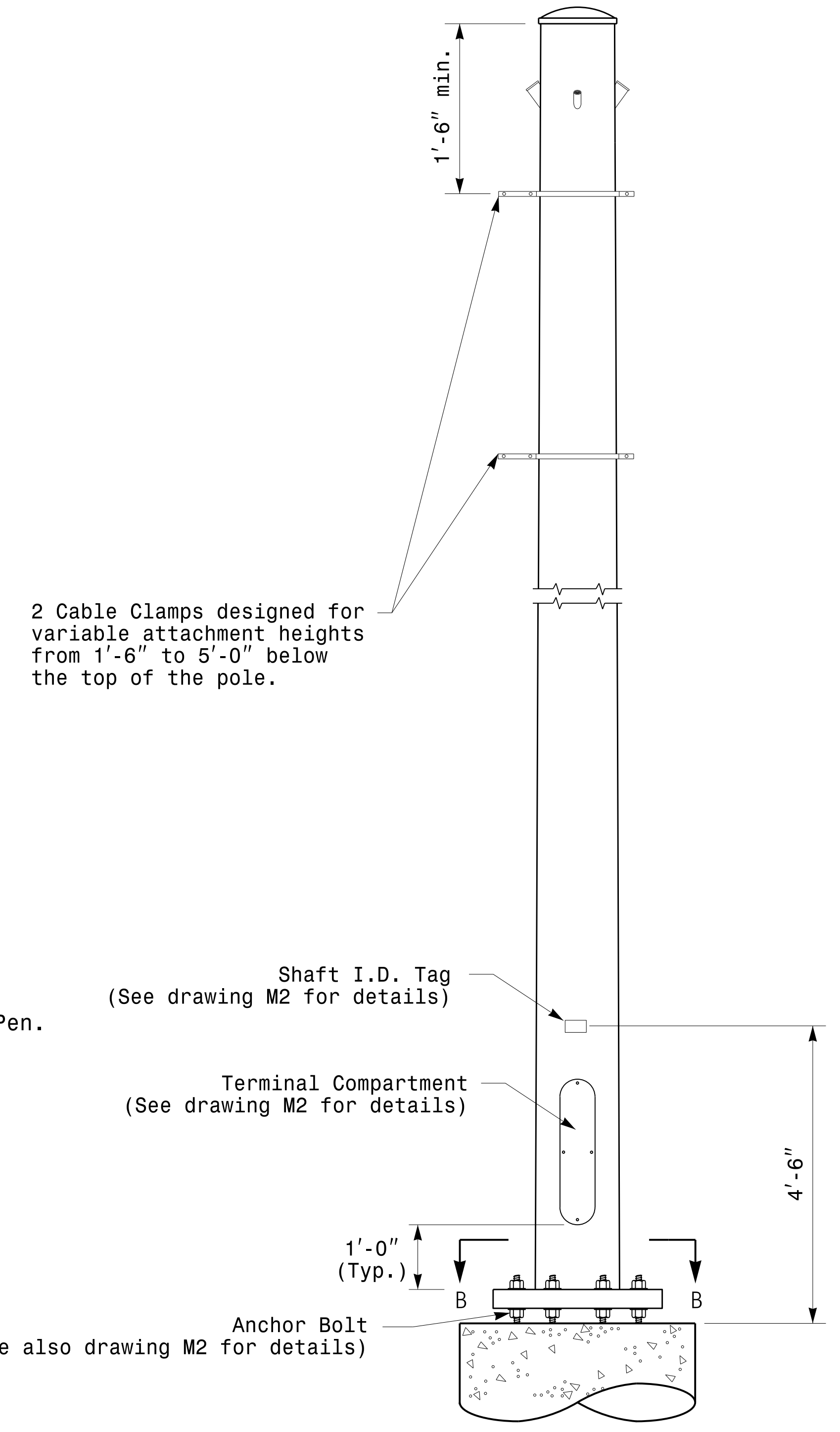
Section B-B  
Pole Base Plate Details  
(8 and 12 Bolt Pattern)



Section A-A  
Radial Orientation for Factory Installed  
Accessories at Top of Pole



Section C-C  
(Pole Attachment to Base Plate)  
Full-Penetration  
Groove Weld Detail



Monotube Strain Pole

Prepared in the Offices of:  
  
 750 N. Greenleaf Pkwy, Garner, NC 27529

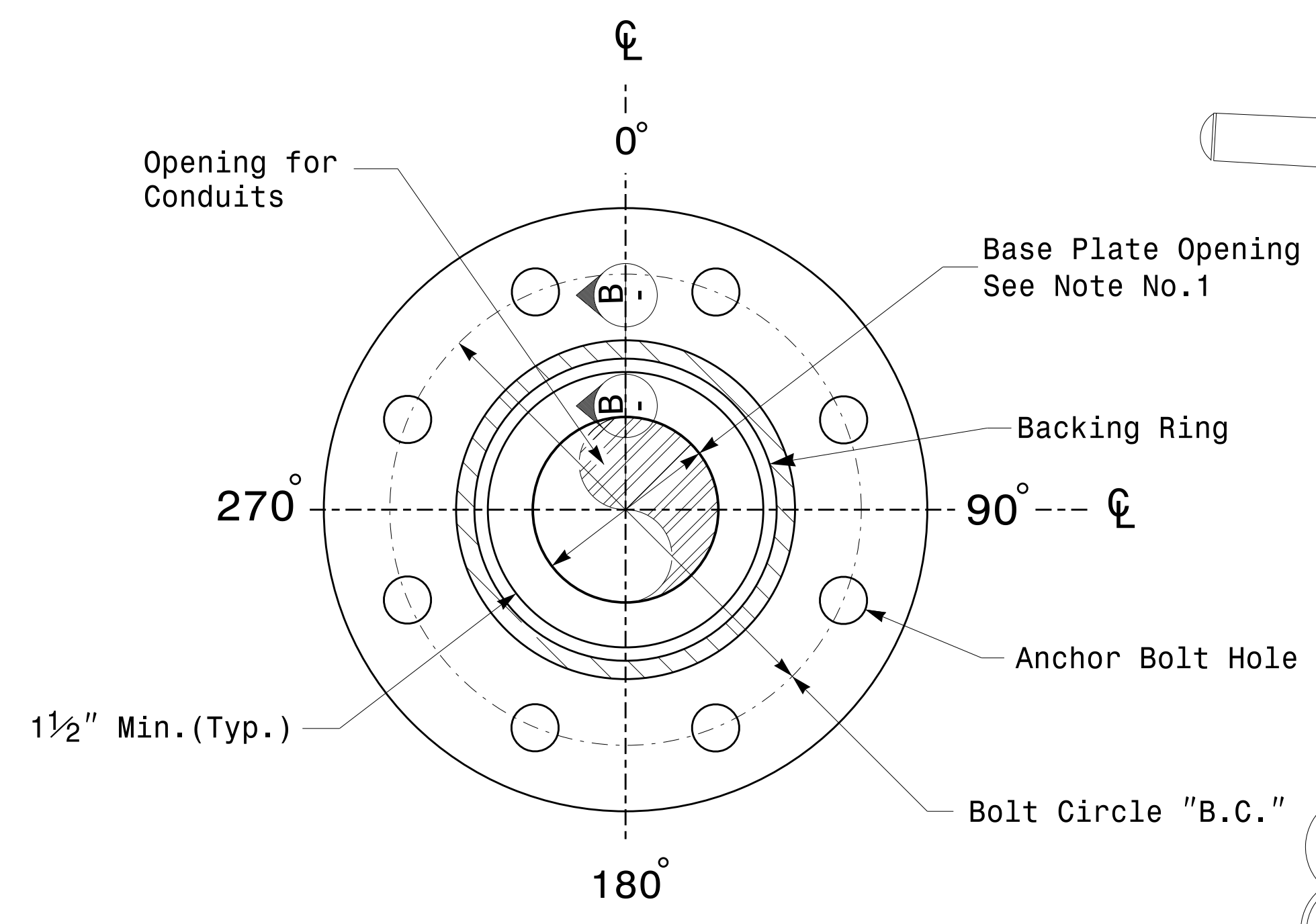
Typical Fabrication Details For Strain Poles			
PLAN DATE:	OCTOBER 2017	DESIGNED BY:	K.C. DURIGON
PREPARED BY:	N. BITTING	REVIEWED BY:	D.C. SARKAR
REVISIONS	INIT.	DATE	

SEAL  
  
 DocuSigned by:  
 Debesh C. Sarkar  
 44EB87816FA74F9E  
 10/11/2017  
 DATE

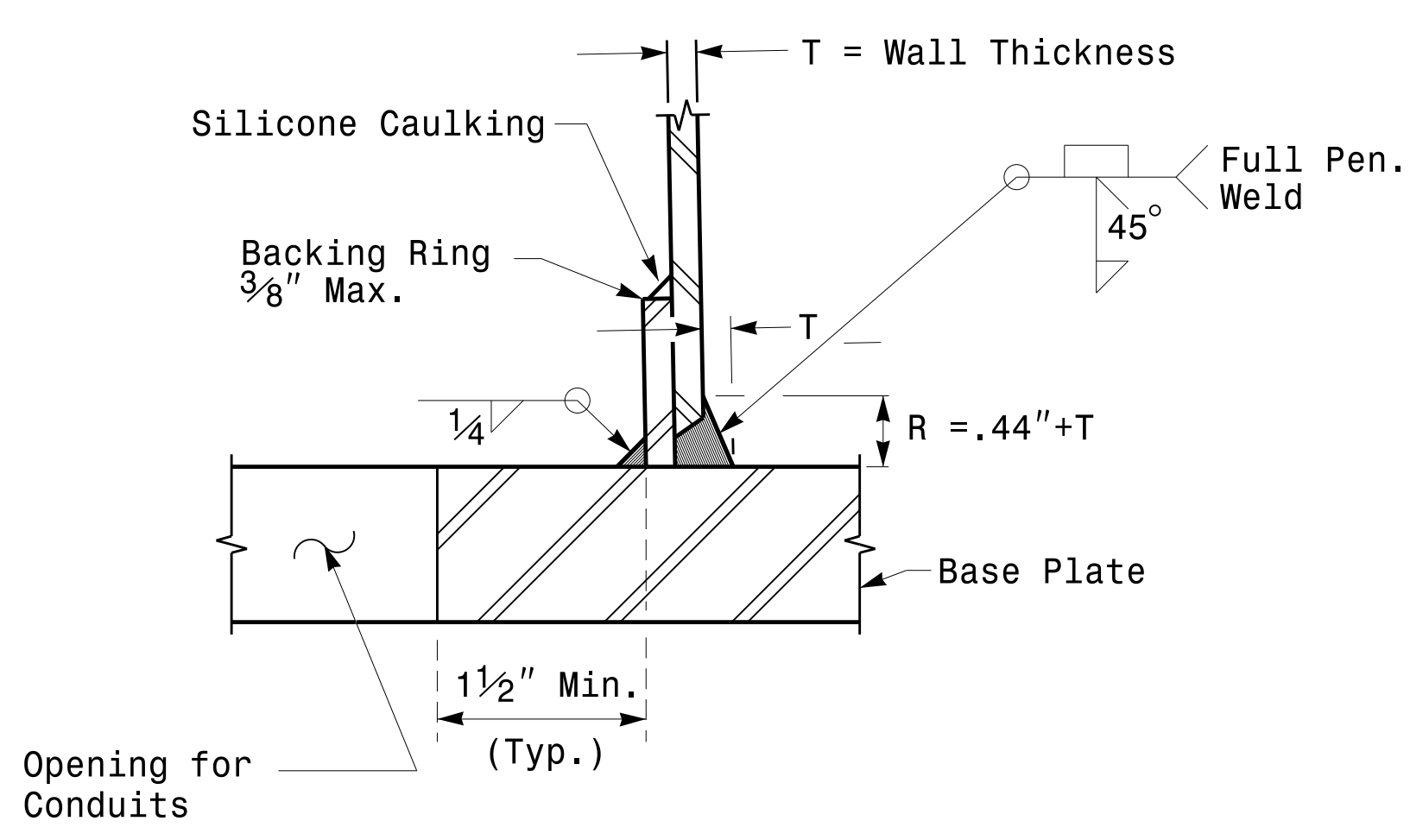
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 PLOT: User

**Fabrication Details – Strain Poles**

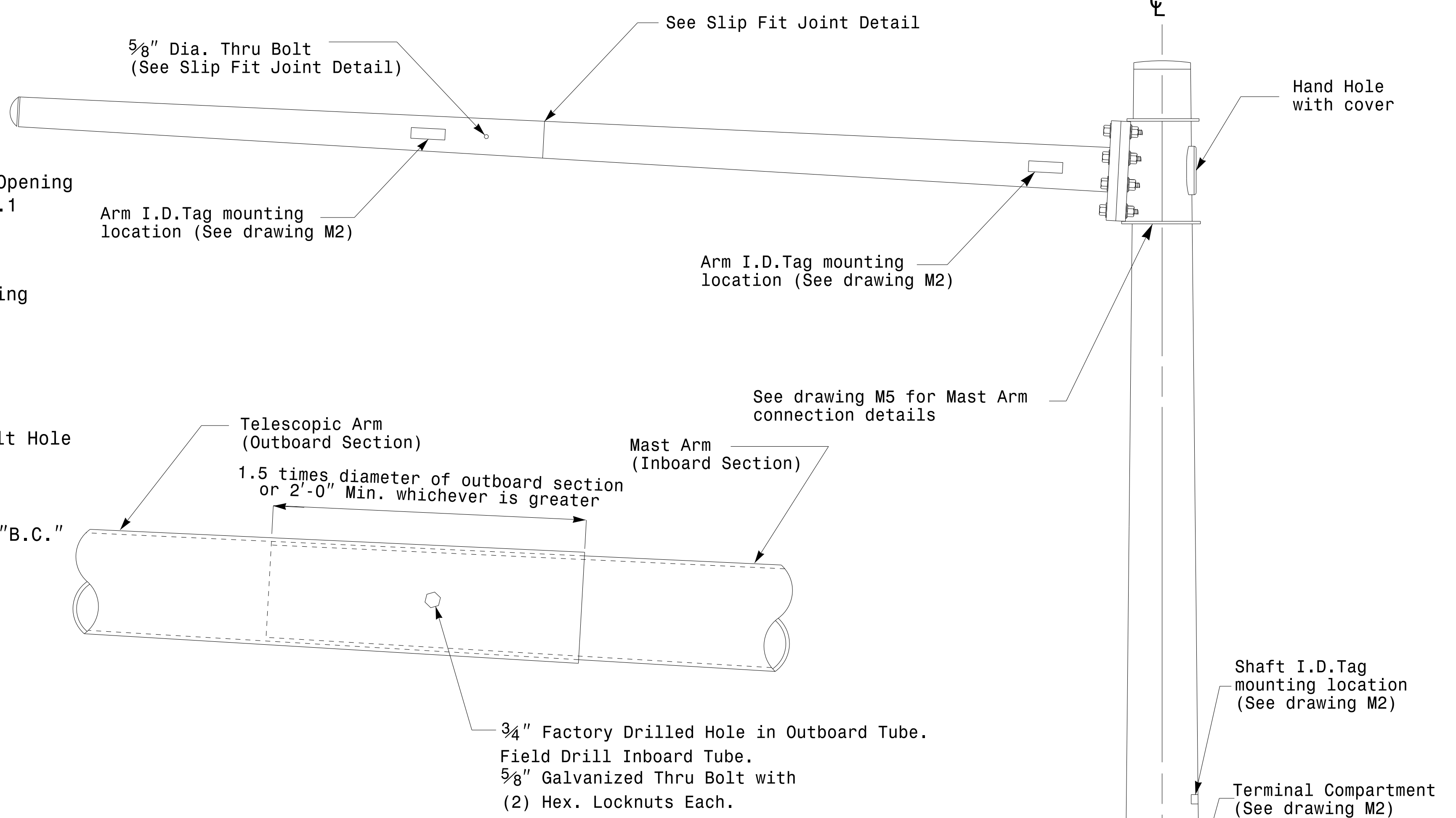
Note:  
 1. Opening in pole base plate shall be equal to pole base inside diameter minus 3 1/2" but shall not be less than 8 1/2".



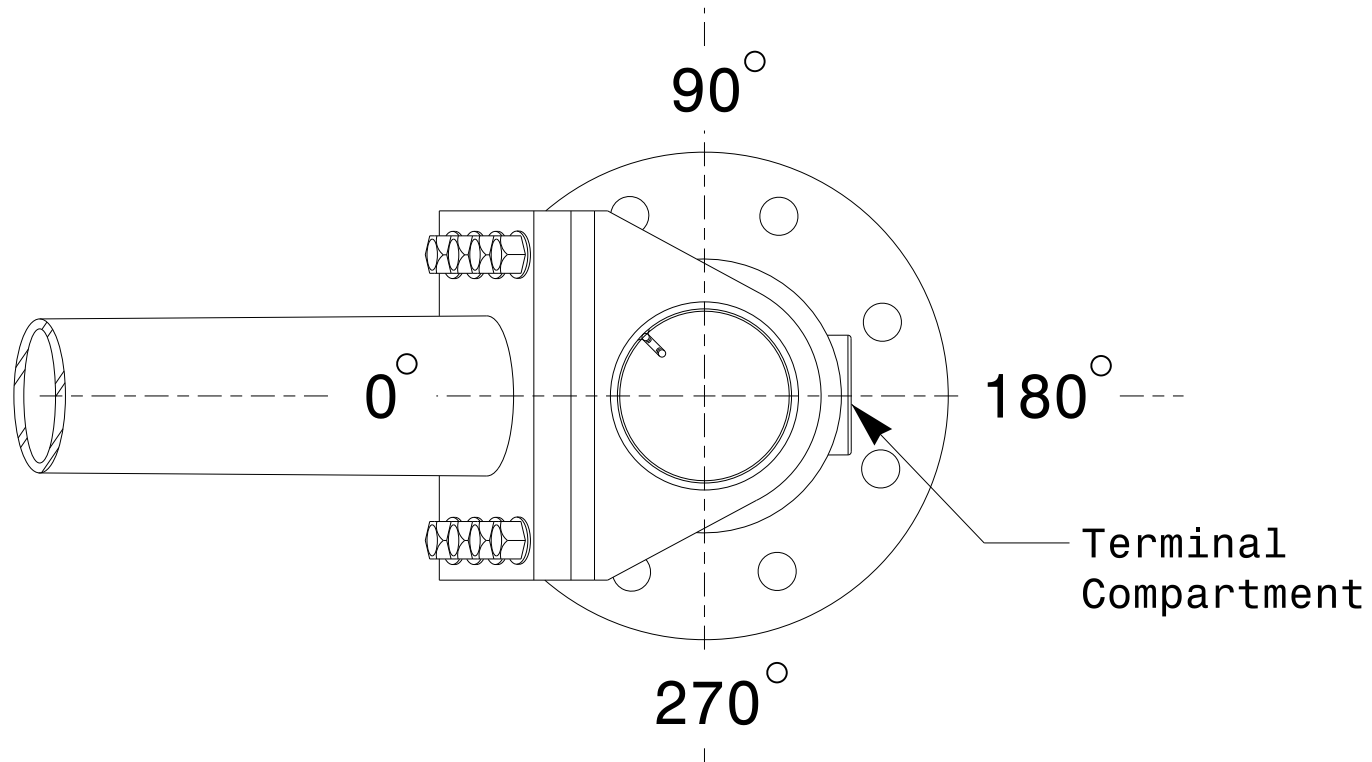
**Section A-A**  
**Pole Base Plate Details**



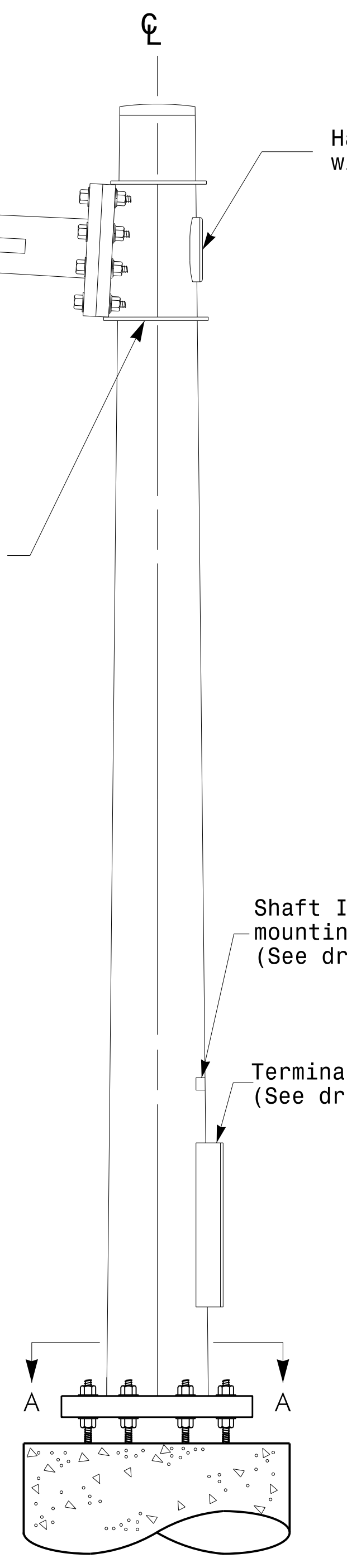
**Section B-B**  
 (Pole Attachment to Base Plate)  
**Full-Penetration Groove Weld Detail**



**Slip Fit Joint Detail for Mast Arm**



**Mast Arm Radial Orientation**



**Mast Arm Pole**

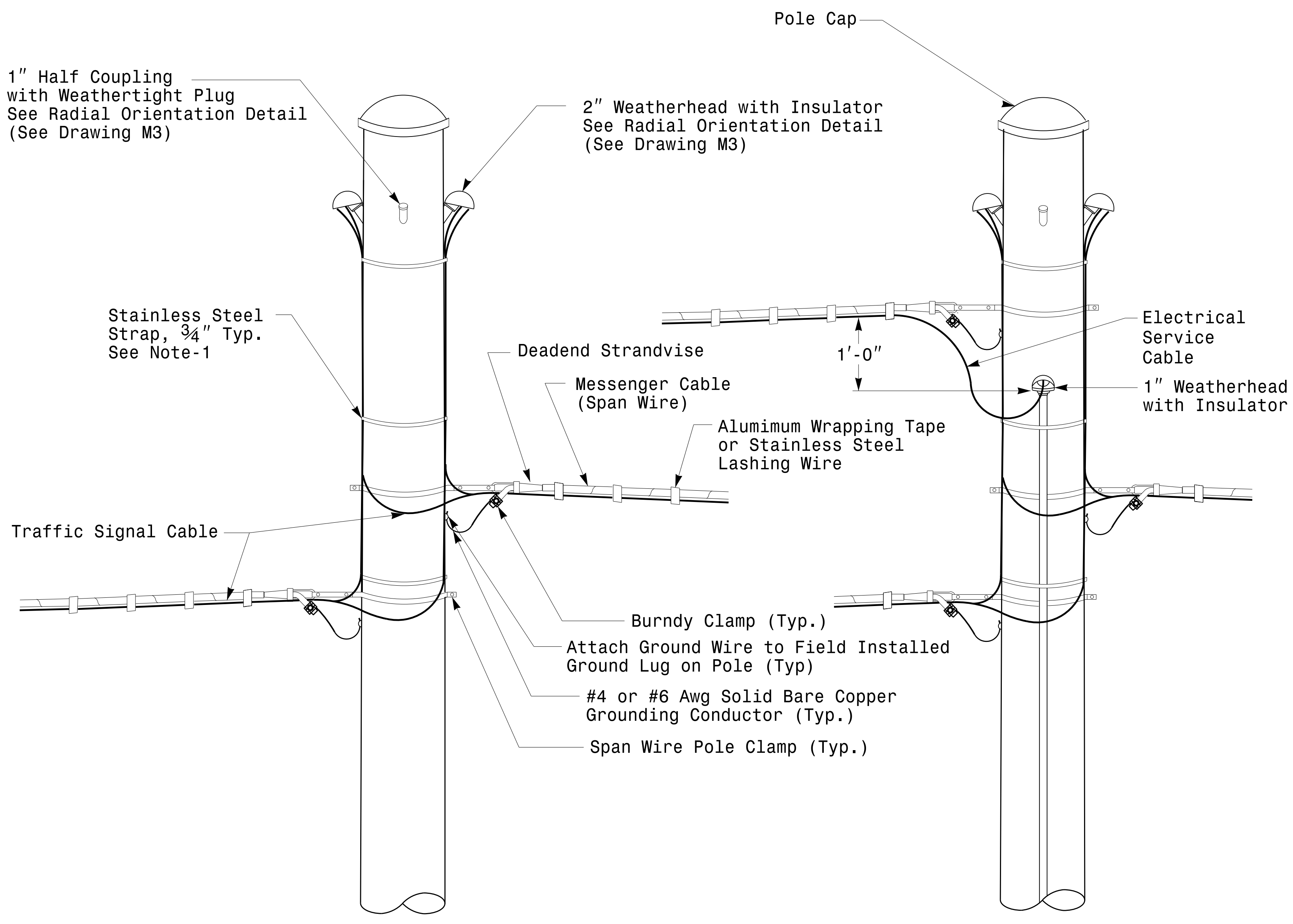
**Fabrication Details – Mast Arm Poles**

11-OCT-2017 08:33 136504115 Signal&Signal Design Section Eastern Region\MSD\2016\2014\_Sig\_M4\_Std\_Fabrication\_Details\Mast\_Arm\_Poles.dgn

	Typical Fabrication Details For Mast Arm Poles		SEAL 
	PLAN DATE: OCTOBER 2017 PREPARED BY: N. BITTING	DESIGNED BY: K.C. DURIGON REVIEWED BY: D.C. SARKAR	
SCALE: 0 NA NONE	DocuSigned by: 		10/11/2017 DATE



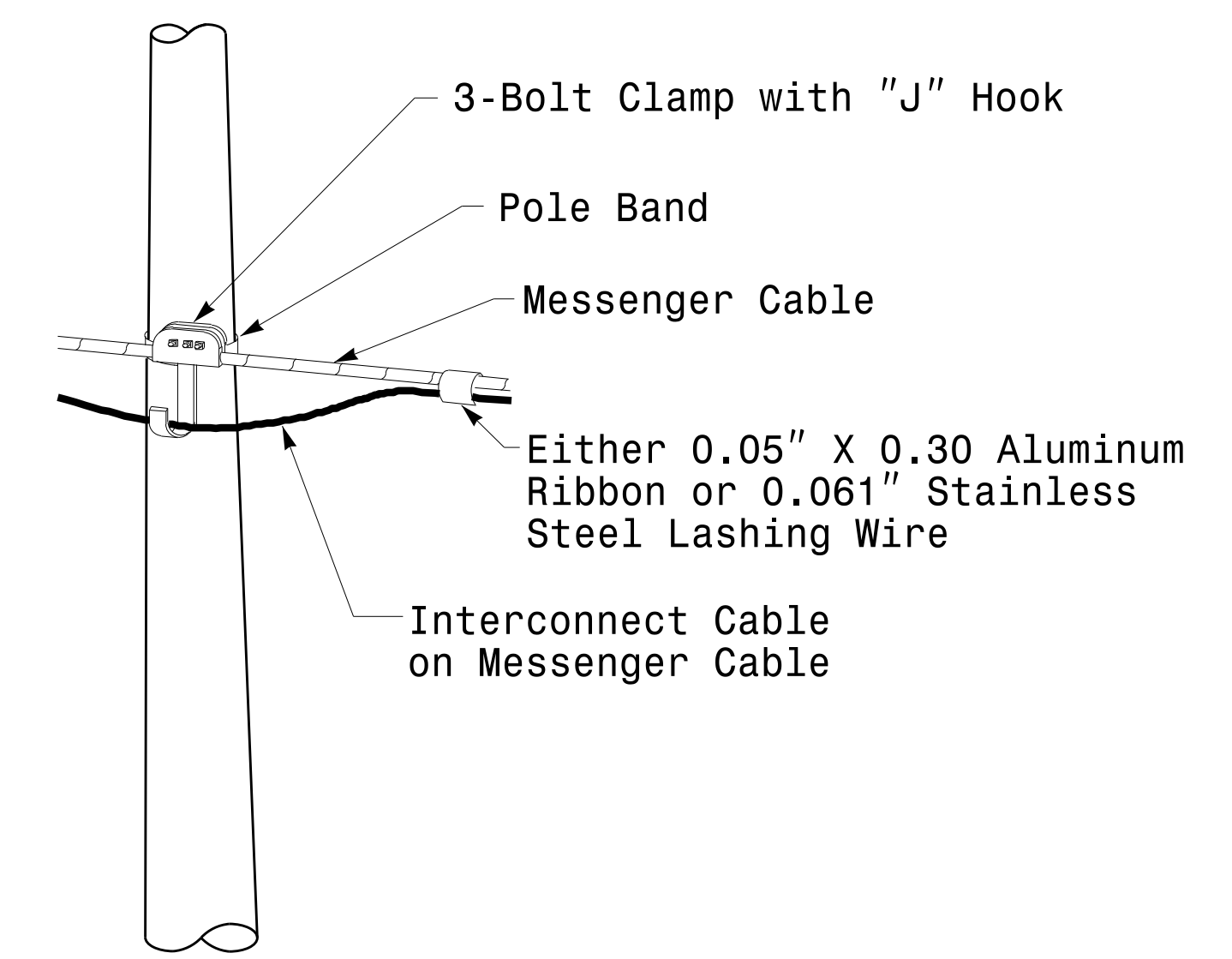




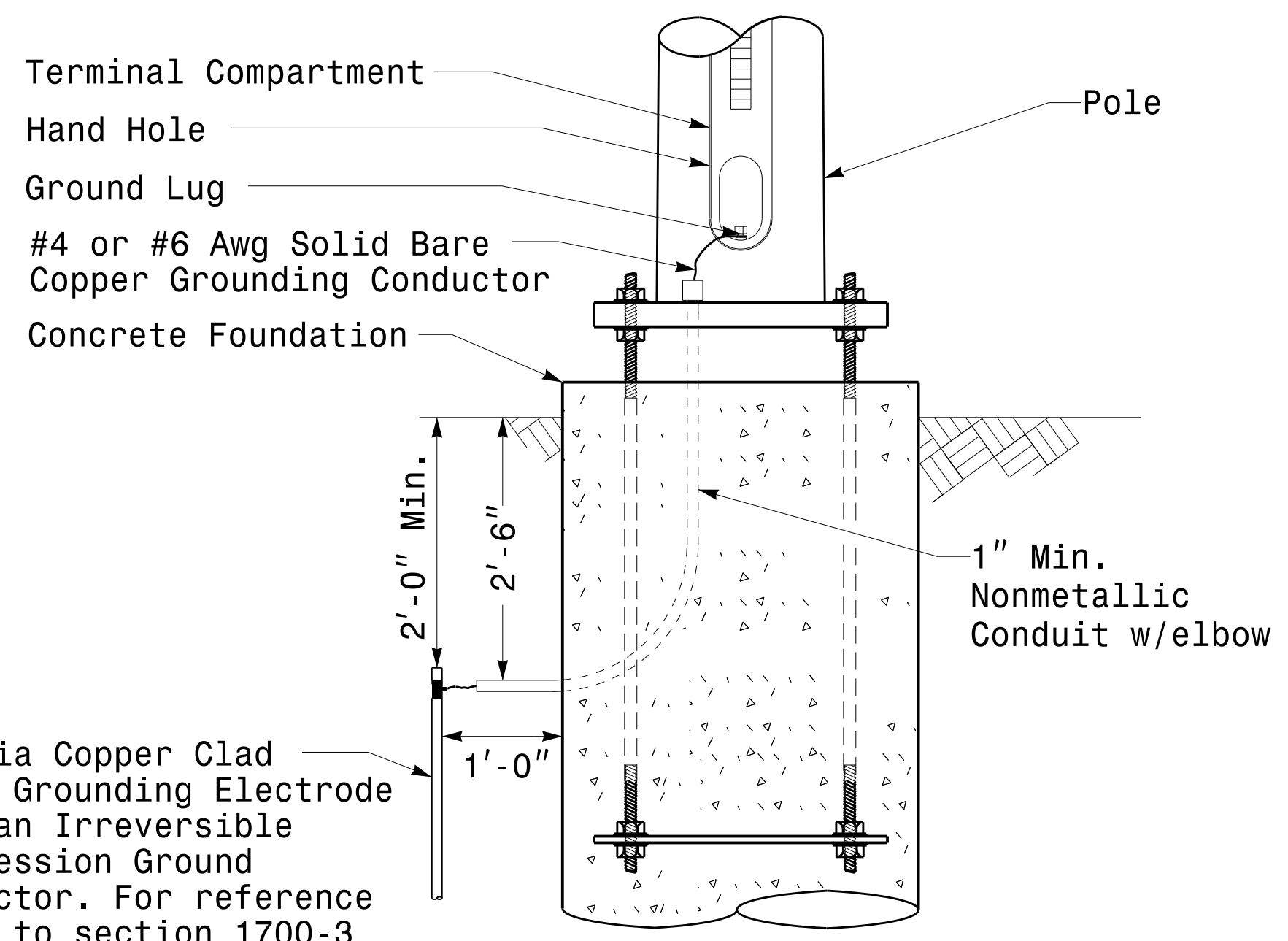
**Strain Pole Attachments**

**NOTE:**

1. Strap all signal cables to the side of the pole with 3/4" stainless steel straps when the distance between the spanwire attachment clamp and the weatherheads exceeds 3'-0".
2. Provide minimum two spanwire pole clamps per pole.
3. It is prohibited to attach two span wires at one pole clamp.
4. For general requirements refer to NCDOT Standard Specifications for Roadway and Structures, January 2018.



**Attachment of Cable to Intermediate Metal Pole**



5/8" Dia Copper Clad Steel Grounding Electrode with an Irreversible Compression Ground Connector. For reference refer to section 1700-3 K and L for electrical grounding and bonding requirements, See Note 4.

**Metal Pole Grounding Detail For Strain Pole and Mast Arm**

Prepared in the Offices of:

750 N. Greenfield Pkwy, Garner, NC 27529

SCALE: 0 NA NONE

Typical Fabrication Details For Strain Pole Attachments			
PLAN DATE: OCTOBER 2017	DESIGNED BY: C.F. ANDREWS		
PREPARED BY: N. BITTING	REVIEWED BY: D.C. SARKAR		
REVISIONS	INIT.	DATE	

SEAL

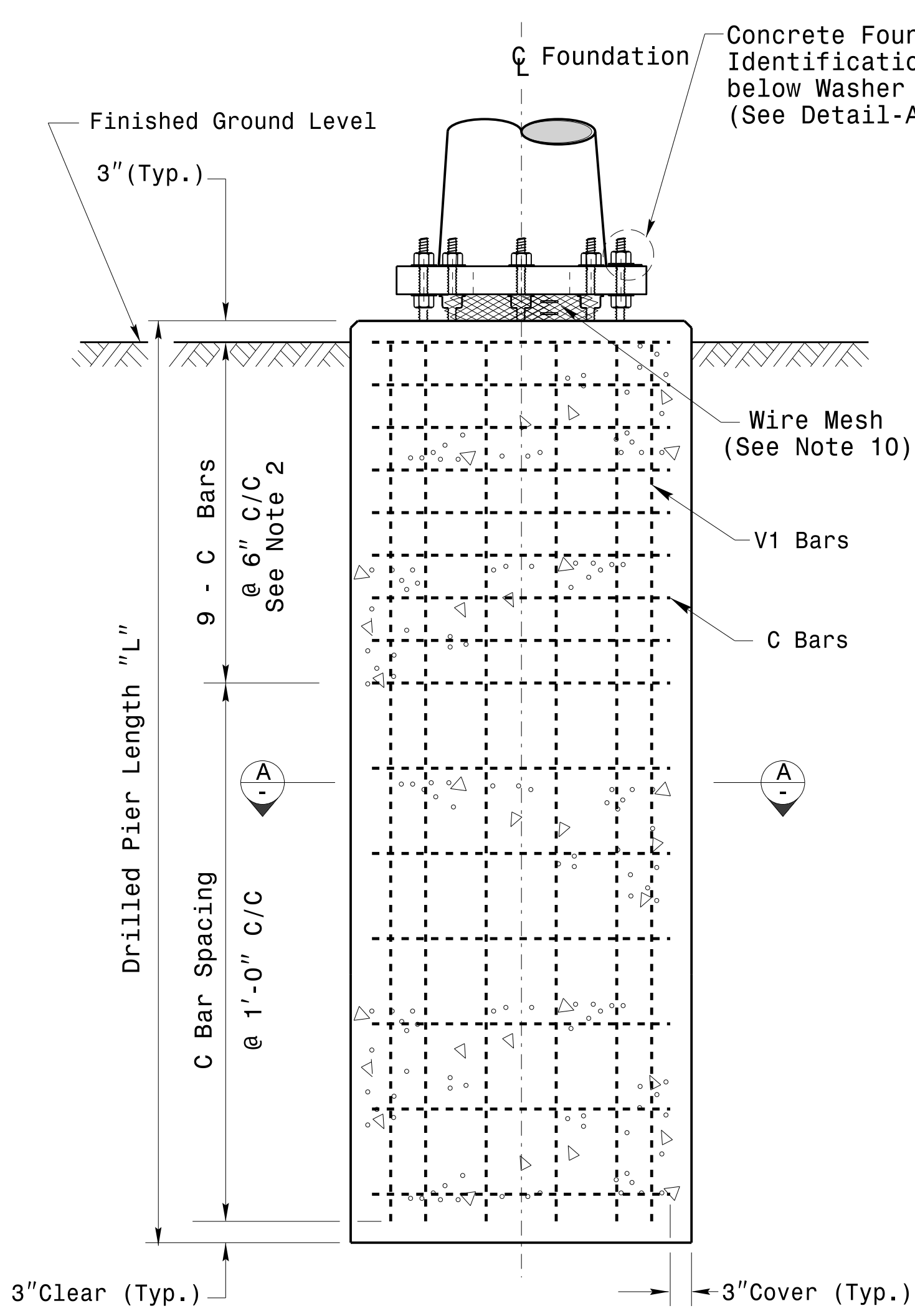
DocuSigned by: D. C. Sarkar

10/11/2017

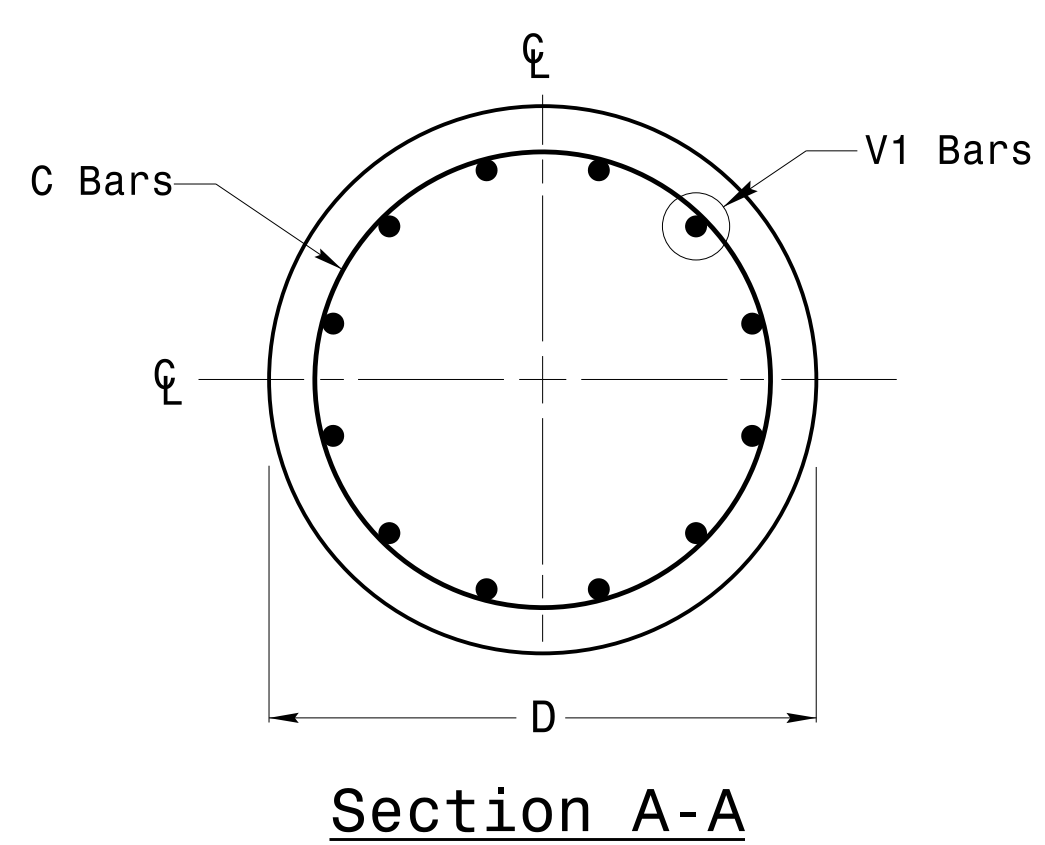
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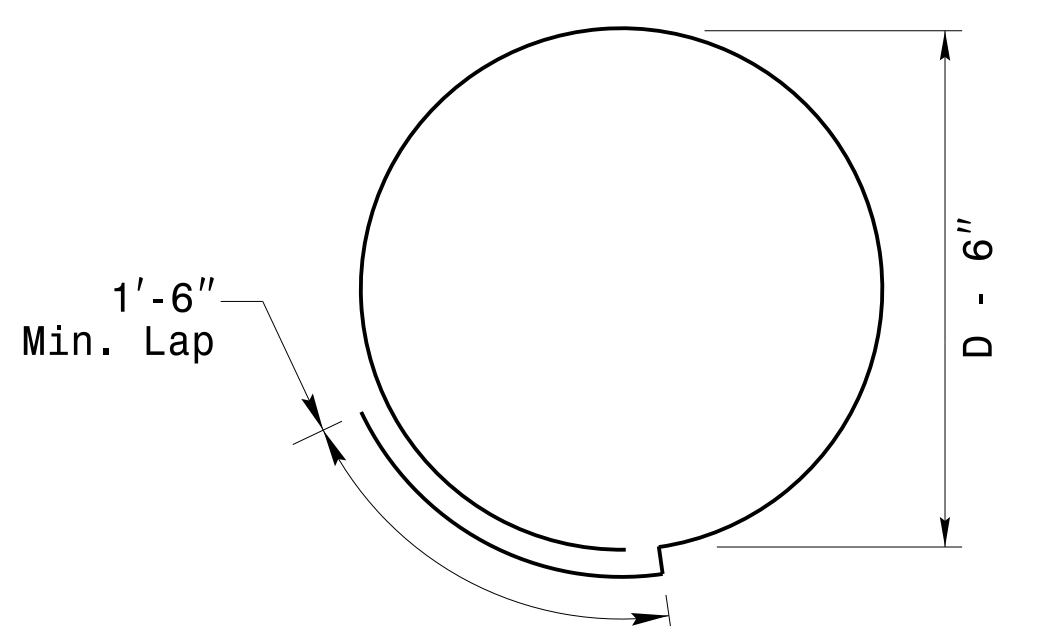




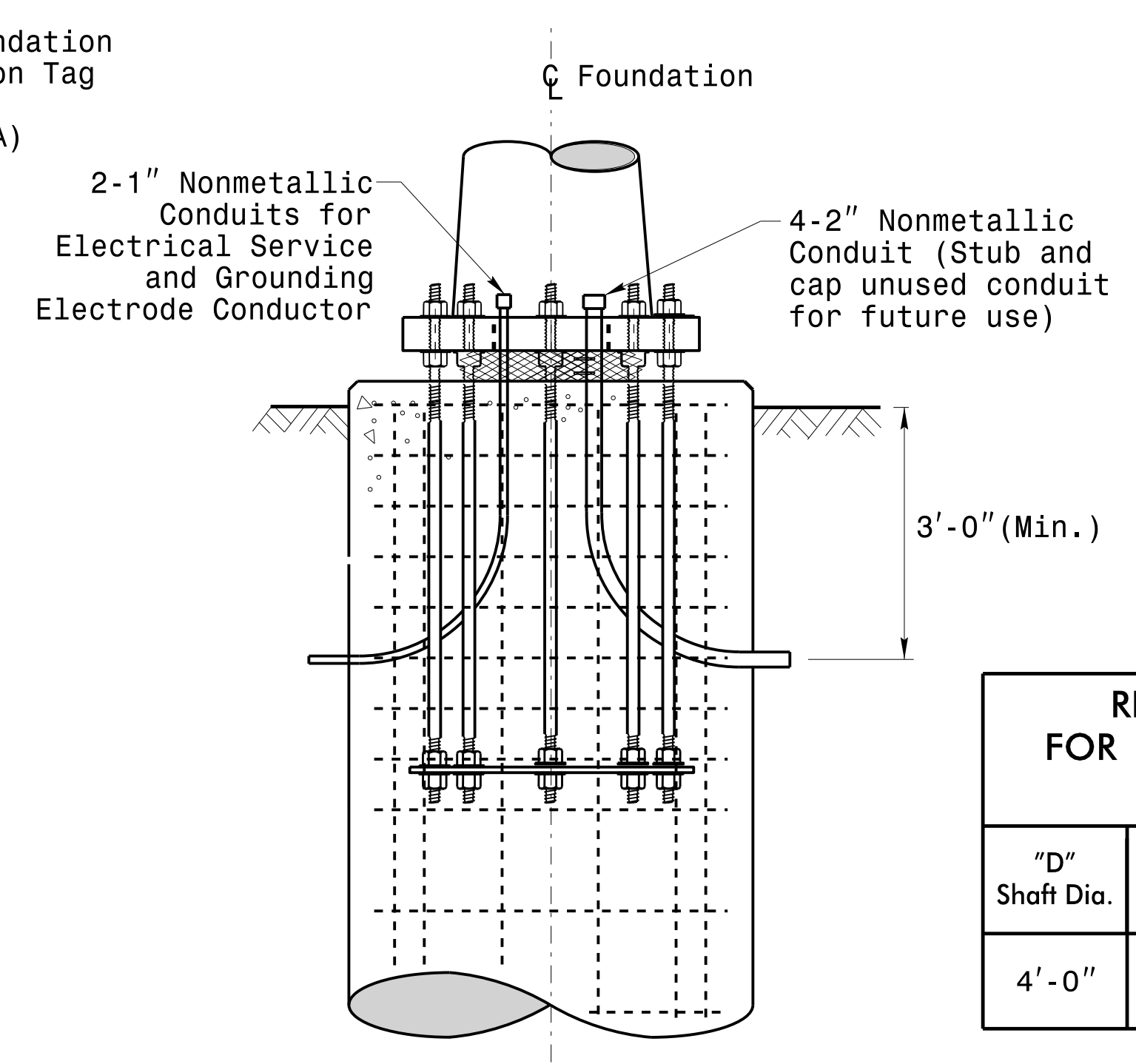
**Concrete Shaft Elevation**



**Section A-A**



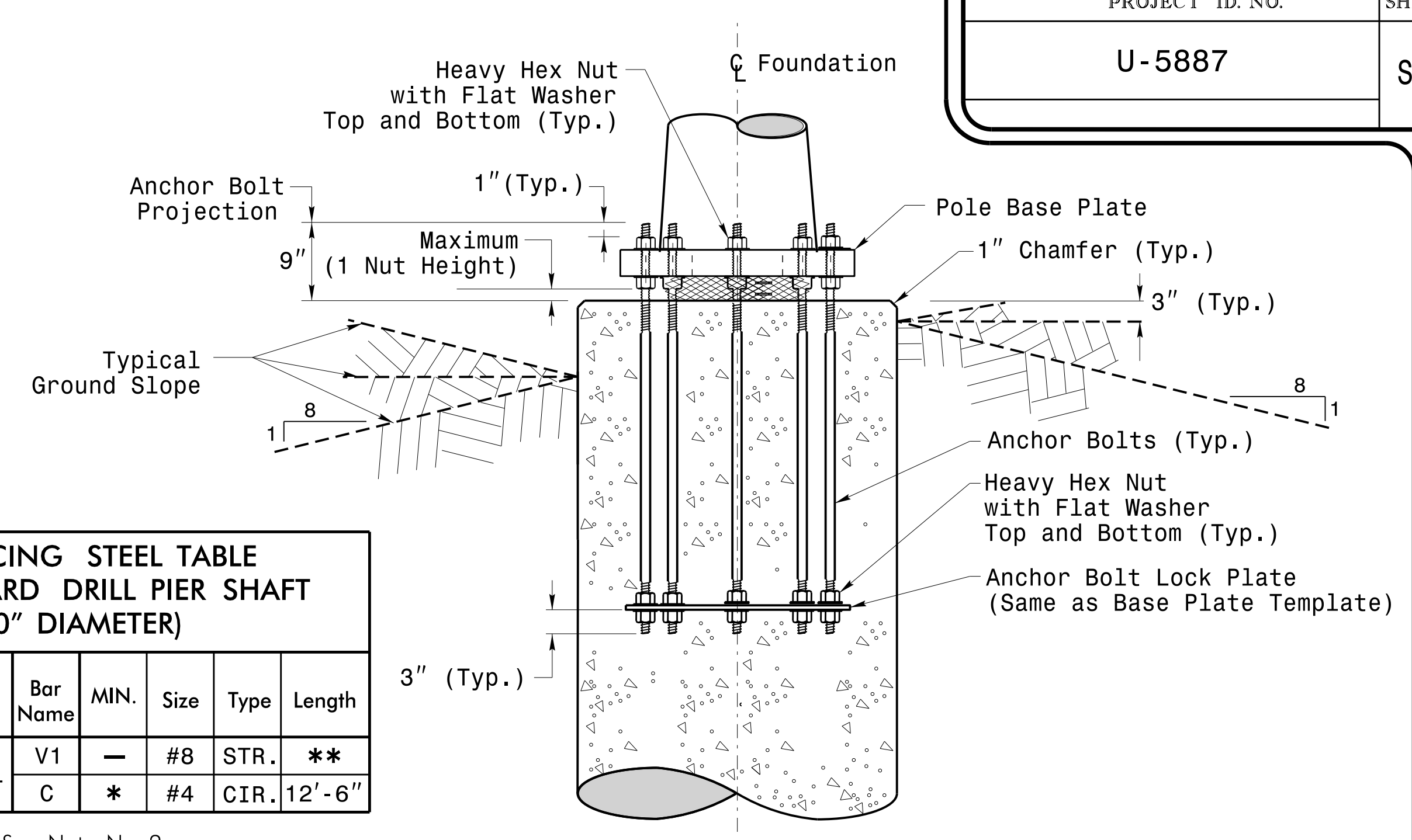
**Typical "C" Bar Detail**



**Typical Foundation Conduit Details**

"D" Shaft Dia.	Conc. Volume (cu. yds.)	Bar Name	MIN.	Size	Type	Length
4'-0"	.465 x L	V1	-	#8	STR.	**
		C	*	#4	CIR.	12'-6"

\* See Note No. 2  
 \*\* See Note No. 3

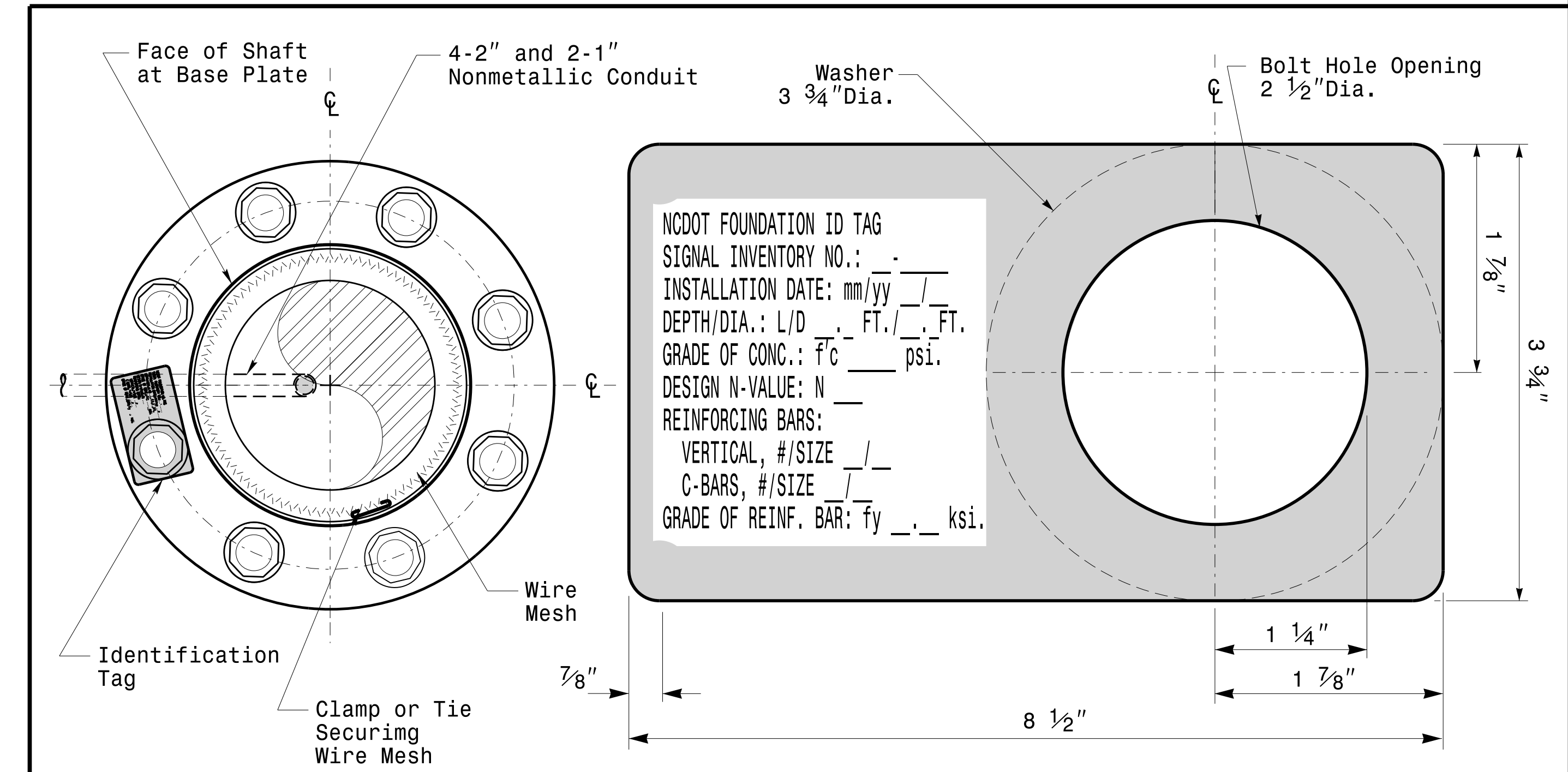


**Typical Foundation Anchor Bolt Details**

(Reinforcing Cage Not Shown for Clarity)

**General Notes:**

1. If actual subsurface conditions differ significantly from boring data contact the Engineer before excavating or placing concrete.
2. Circular tie reinforcing rings may be vertically adjusted by +/-3" at a depth between 2'-0" and 3'-0" to facilitate the installation of electrical conduit entering in the cage.
3. For standard foundations, see sheet Sig. M8 for details. Vertical reinforcing bars (V1) may be horizontally adjusted by +/-3" to facilitate the installation of electrical conduit entering into the cage.
4. Provide 2" to 5" foundation projection above ground level depending on the ground slope.
5. Unless otherwise shown, foundation designs are based on non-sloping level ground surfaces with slope ratios of 8:1 (H:V) or flatter. If actual ground line slopes are steeper contact the Engineer before excavating or placing concrete.
6. Construct foundations in accordance with NCDOT Standard Provisions SP09 R005- Foundations and Anchor Rod Assemblies for Metal Poles. All applicable 2018 NCDOT Standard Specifications are referenced in this provision. Refer to the NCDOT Resources/Specifications page located on the Connect NCDOT website.  
[https://connect.ncdot.gov/resources/Specifications and Special Provisions.aspx](https://connect.ncdot.gov/resources/Specifications%20and%20Special%20Provisions.aspx)
7. Use air entrained AA concrete mix with a compression strength of f'c=4500 psi.(min.) after 28 days.
8. Use ASTM A615 grade 60 deformed bars for all reinforcing steel. Maintain at least 3" cover on all reinforcement.
9. Locate the Identification Tag on the top of the base plate, directly above the conduit's entry point.
10. Provide two layers of galvanized welded 23 gauge (0.25) 6" wide 4 mesh wire around pipes under the base plate and secure it with ties if necessary.
11. Preferred location for the I.D. Tag is as shown in Detail-A; directly above the conduit entering the foundation.



**Concrete Foundation Identification Tag Details**

D = Diameter  
 L = Length/Depth  
 mm = Month  
 yy = Year

**Detail-A**

<p>750 N. Greenfield Pkwy, Garner, NC 27529</p>	<p>Construction Details For Foundations</p>		
	<p>PLAN DATE: OCTOBER 2018</p> <p>DESIGNED BY: C.B. COGDILL</p> <p>PREPARED BY: N. BITTING</p> <p>REVIEWED BY: D.C. SARKAR</p>	<p>REV. NO.</p> <p>COMMENTS</p> <p>INIT.</p> <p>DATE</p>	

**Construction Details - Foundations**

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 PLOT DATE



# SOIL CONDITION

PROJECT ID. NO.	SHEET NO.
U-5887	Sig.M8

		STANDARD STRAIN POLES					STANDARD FOUNDATIONS 48" Diameter Drilled Pier Length (L) - Feet							Reinforcement				
Case No.	Pole Height (Ft.)	Base Plate BC (In.)	Reactions at the Pole Base			Clay				Sand			Longitudinal		Stirrups			
			Axial (kip)	Shear (kip)	Moment (ft-kip)	Medium N-Value 4-8	Stiff N-Value 9-15	Very Stiff N-Value 16-30	Hard N-Value >30	Loose N-Value 4-10	Medium N-Value 11-30	Dense N-Value >30	Bar Size (#)	Quantity (ea.)	Bar Size (#)	Spacing (in.)		
WIND ZONE 1	LIGHT	S26L3	26	25	2	11	270	19	13	10	8	17	14.5	12.5	8	12	4	12
		S30L3	30	25	2	11	300	19.5	13.5	10	8	17.5	15	13	8	14	4	12
		S35L3	35	25	3	11	320	20	13.5	10.5	8	17.5	15	13	8	14	4	12
	HEAVY	S30H3	30	29	3	16	450	24.5	16	12	9	21	17.5	15	8	16	4	6
		S35H3	35	29	4	16	515	26	17	12.5	9.5	22	18.5	16	8	16	4	6
WIND ZONE 2	LIGHT	S26L2	26	23	2	10	245	18	12.5	9.5	8	16.5	14	12	8	12	4	12
		S30L2	30	23	2	10	270	18.5	12.5	10	8	16.5	14	12.5	8	12	4	12
		S35L2	35	23	3	10	300	19.5	13	10	8	17	14.5	13	8	12	4	12
	HEAVY	S30H2	30	29	3	15	415	23	15.5	11.5	9	20	17	14.5	8	16	4	6
		S35H2	35	29	4	15	475	25	16.5	12	9.5	21	17.5	15.5	8	16	4	6
WIND ZONE 3	LIGHT	S26L2	26	23	2	10	245	18	12.5	9.5	8	16.5	14	12	8	12	4	12
		S30L2	30	23	2	10	270	18.5	12.5	10	8	16.5	14	12.5	8	12	4	12
		S35L2	35	23	3	10	300	19.5	13	10	8	17	14.5	13	8	12	4	12
	HEAVY	S30H2	30	29	3	15	415	23	15.5	11.5	9	20	17	14.5	8	16	4	6
		S35H2	35	29	4	15	475	25	16.5	12	9.5	21	17.5	15.5	8	16	4	6
WIND ZONE 4	LIGHT	S26L1	26	22	2	8	190	16	11.5	8.5	8	15	12.5	11	8	12	4	12
		S30L1	30	22	2	8	205	16.5	11.5	9	8	15	13	11.5	8	12	4	12
		S35L1	35	22	3	8	230	17	12	9	8	15.5	13.5	11.5	8	12	4	12
	HEAVY	S30H1	30	25	3	12	320	20.5	13.5	10.5	8	18	15	13.5	8	16	4	6
		S35H1	35	25	4	12	350	21	14	10.5	8.5	18.5	15.5	13.5	8	16	4	6
WIND ZONE 5	LIGHT	S26L2	26	23	2	10	245	18	12.5	9.5	8	16.5	14	12	8	12	4	12
		S30L2	30	23	2	10	270	18.5	12.5	10	8	16.5	14	12.5	8	12	4	12
		S35L2	35	23	3	10	300	19.5	13	10	8	17	14.5	13	8	12	4	12
	HEAVY	S30H2	30	29	3	15	415	23	15.5	11.5	9	20	17	14.5	8	16	4	6
		S35H2	35	29	4	15	475	25	16.5	12	9.5	21	17.5	15.5	8	16	4	6

**General Notes:**

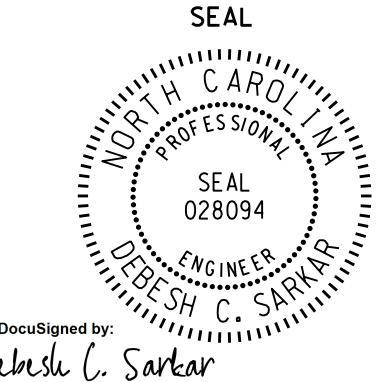
1. Values shown in the "Reactions at the Pole Base" column represent the minimum acceptable capacity allowed for design using a design CSR of 1.00.
2. Use chairs and spacers to maintain proper clearance.
3. For foundation, always use air-entrain concrete mix.

**Foundation Selection:**

1. Perform a standard penetration test at each proposed foundation site to determine "N" value.
2. Select the appropriate wind zone from M 1 drawing.
3. Select the soil type (Clay or Sand) that best describes the soil characteristics.
4. Get the appropriate standard pole case number from the plans or from the Engineer.
5. Select the appropriate column under "Standard Foundations" based on soil type and "N" value. Select the appropriate row based on the pole load case.
6. The foundation depth is the value shown in the "Standard Foundations" category where the column and the row intersect.
7. Use Construction Procedures and Design Methods prescribed by FHWA-NHI-10-016 for Reference Drilled Shafts.

Standard Strain Pole Foundation-All Soil Condition

48" Dia. Foundations Concrete Volume (cubic yards) = (0.465) x Drilled Pier Length



**Standard Strain Pole Foundation for All Soil Conditions**

PLAN DATE: OCTOBER 2017    DESIGNED BY: C. B. COGDILL  
 PREPARED BY: N. BITTING    REVIEWED BY: D. C. SARKAR

10/11/2017  
DATE

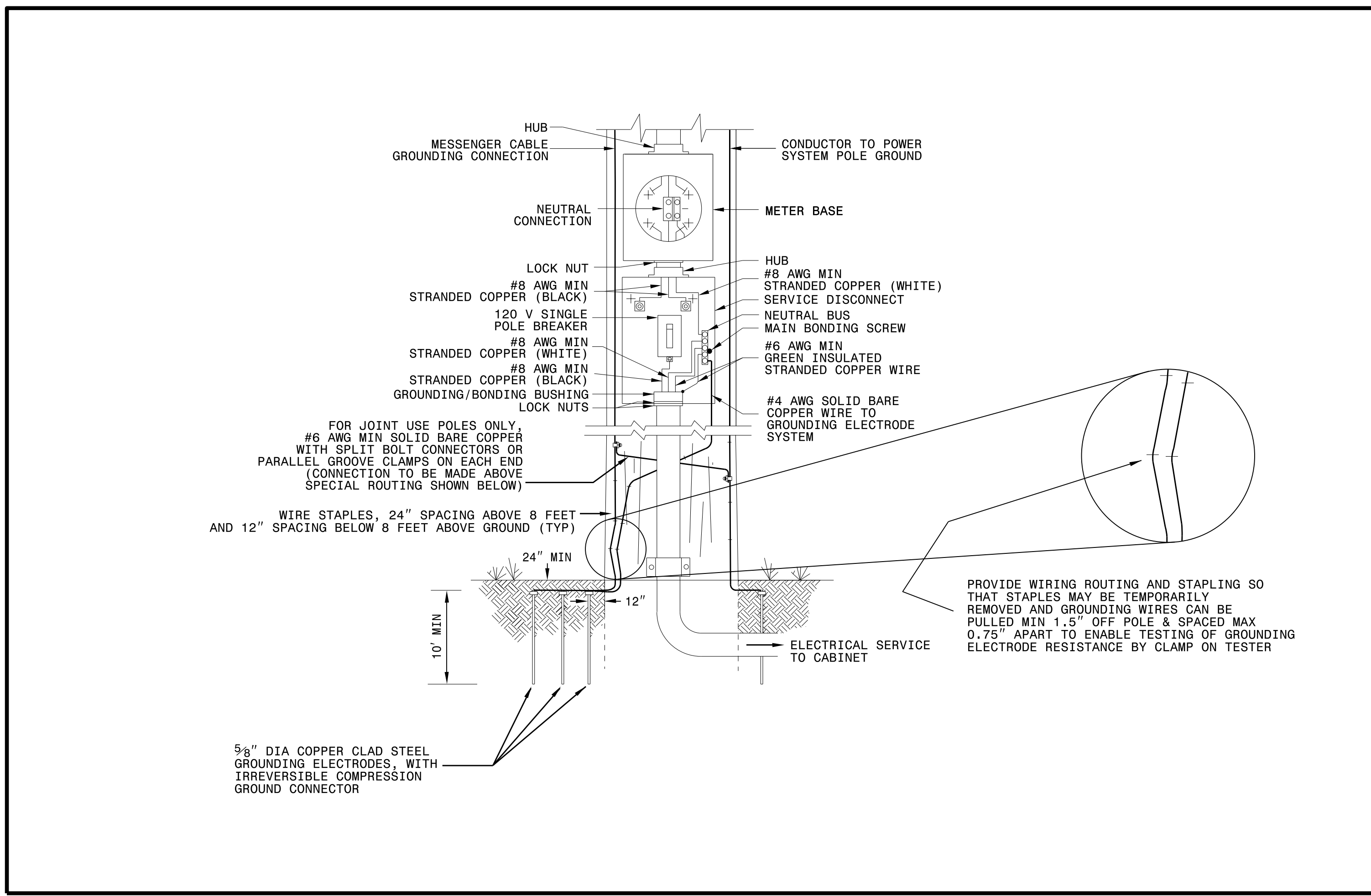
REVISIONS

NO.	DATE	DESCRIPTION
1	7/12/2015	Changed "Foundation Depth" to "Drilled Pier Length" in Conc. Egn.

SCALE: 0 NA NONE

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1-18 STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.

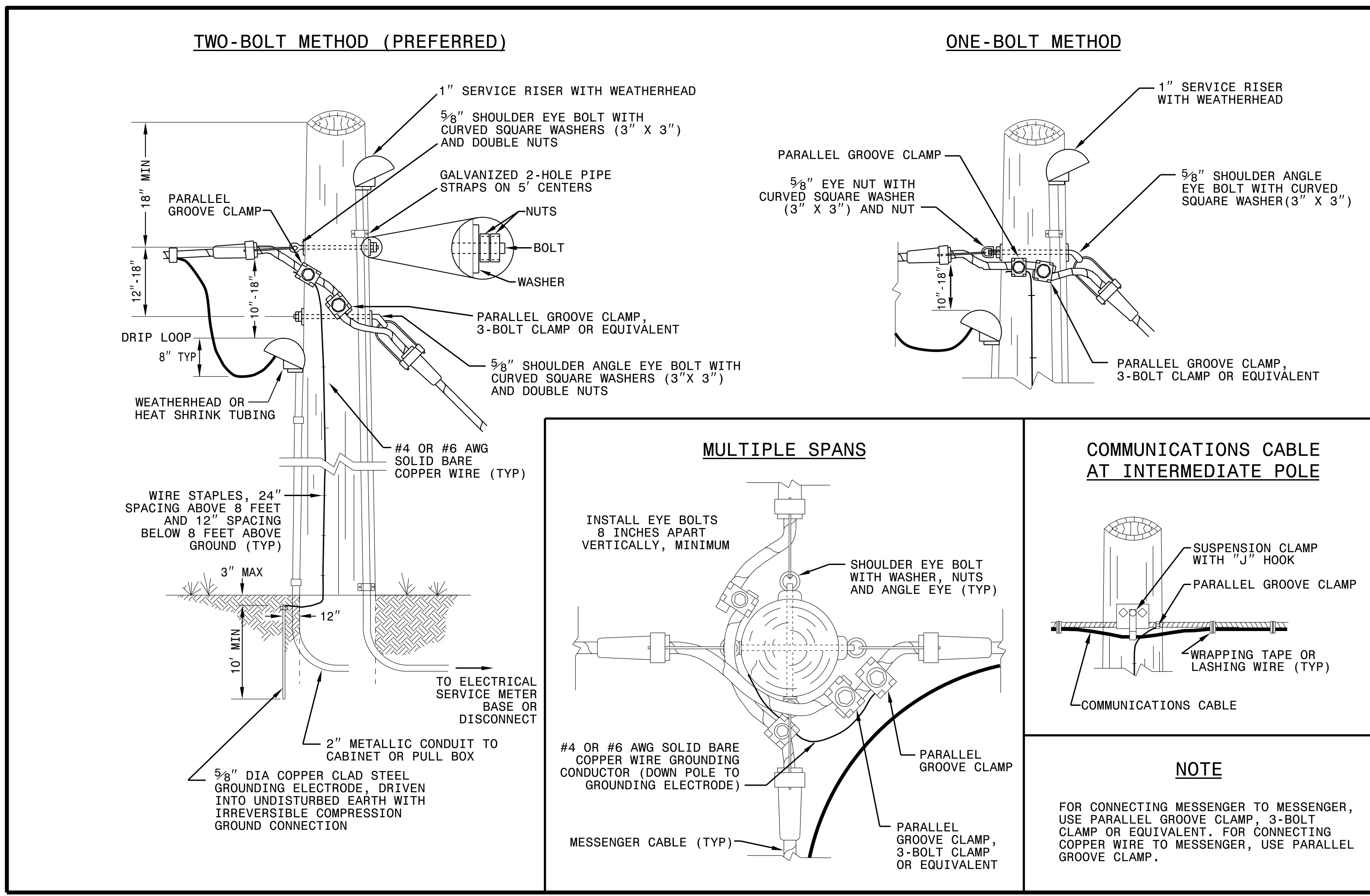
ENGLISH STANDARD DRAWING FOR

**ELECTRICAL SERVICE GROUNDING**

GROUNDING AND BONDING

SHEET 1 OF 1

**1700D01**



1-18 STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.

ENGLISH STANDARD DRAWING FOR

**WOOD POLES**

METHODS OF ATTACHMENT AND GROUNDING

SHEET 1 OF 1

**1720D01**

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SIGNATURES COMPLETED

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Prepared in the Offices of:

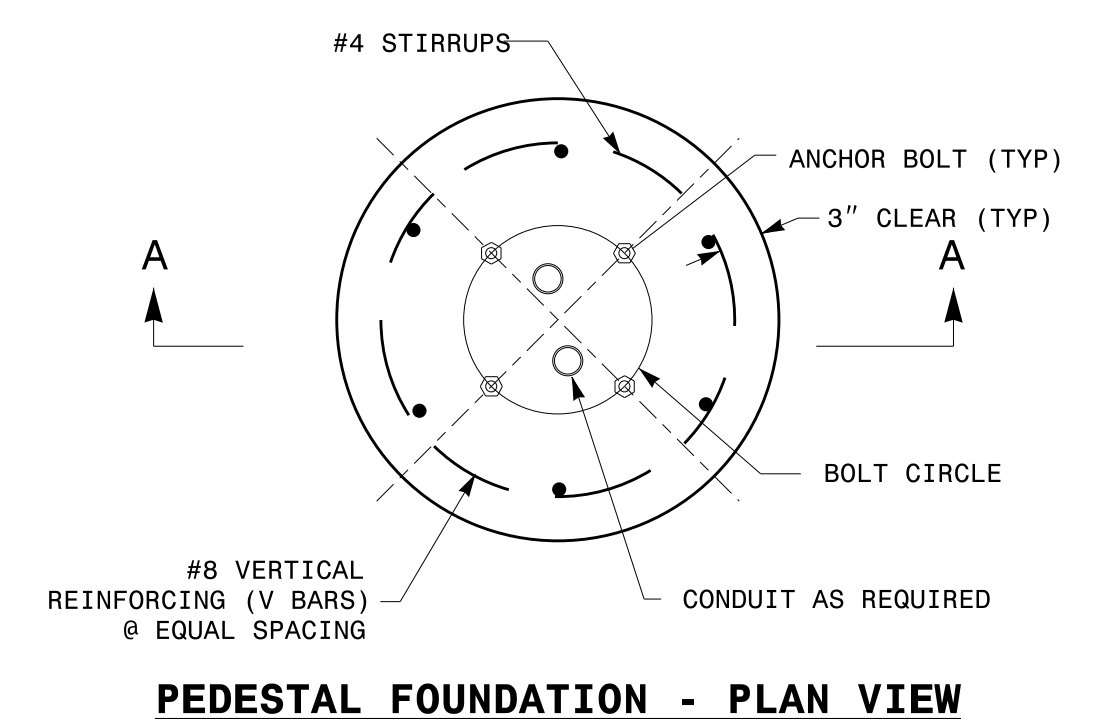
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Garner, NC 27529

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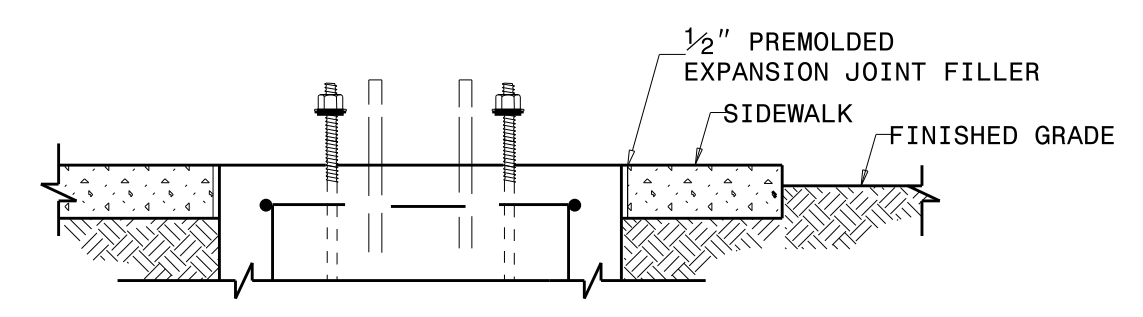
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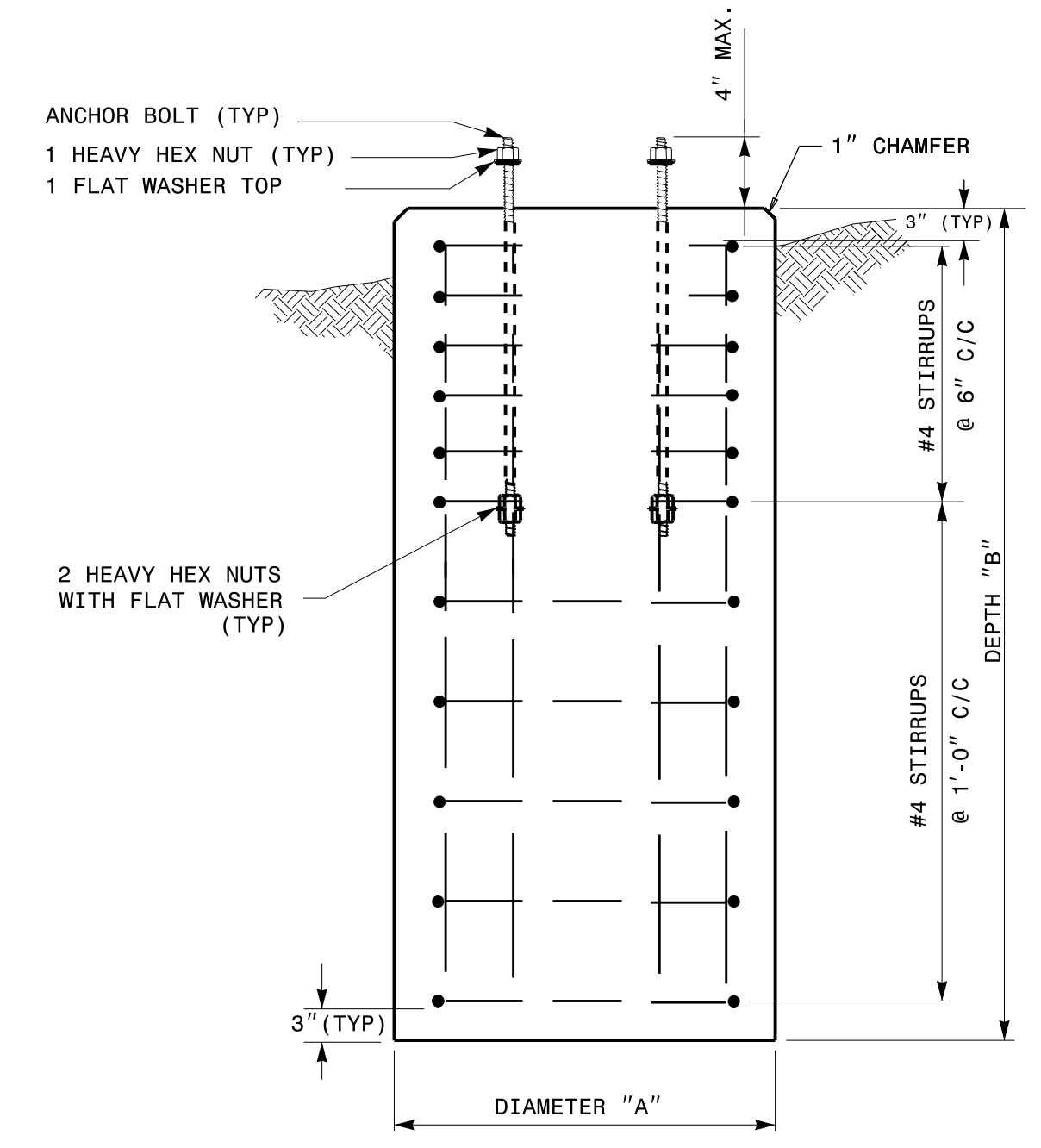
**PEDESTAL FOUNDATION - PLAN VIEW**



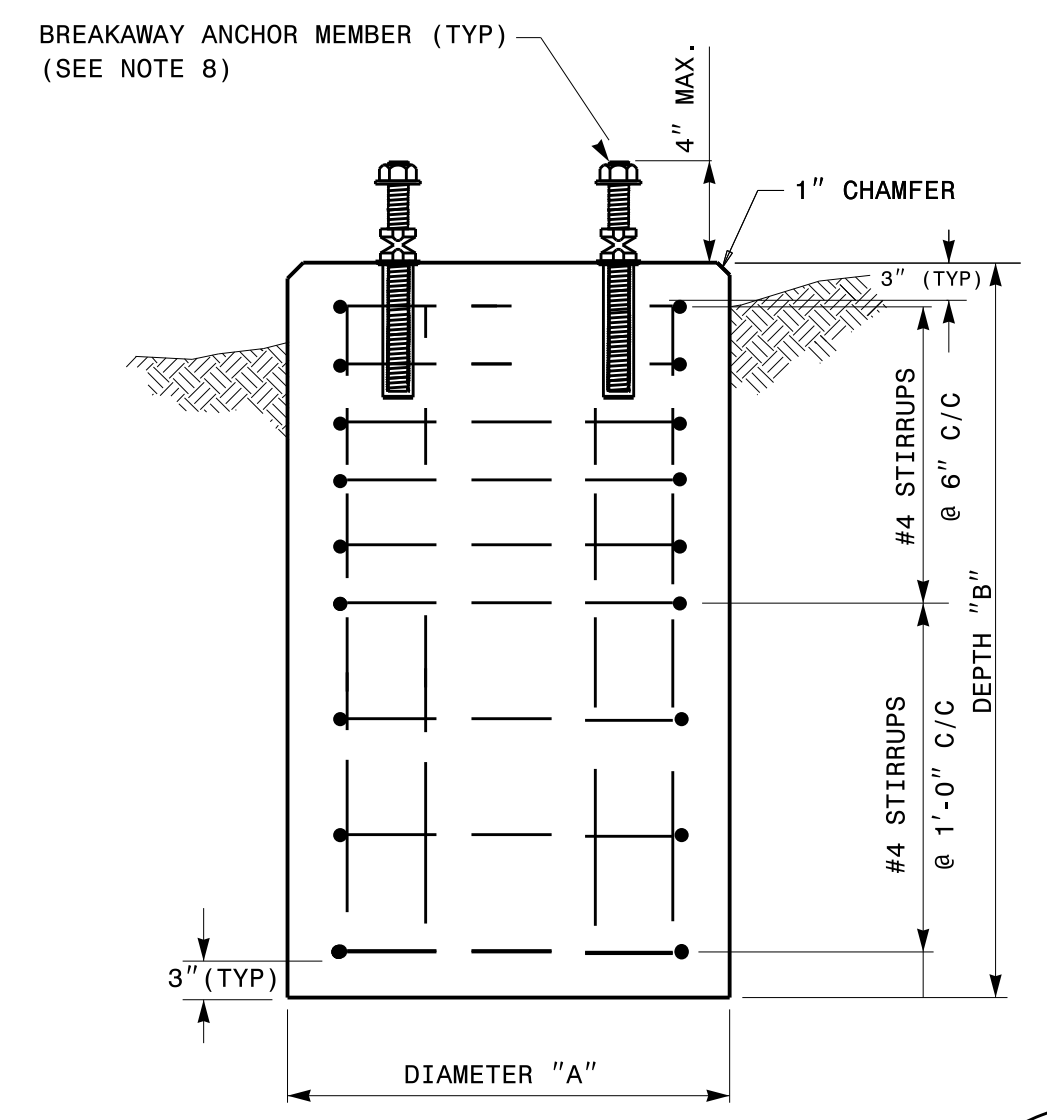
**PEDESTAL FOUNDATION DETAILS FOR SIDEWALK**

**NOTES:**

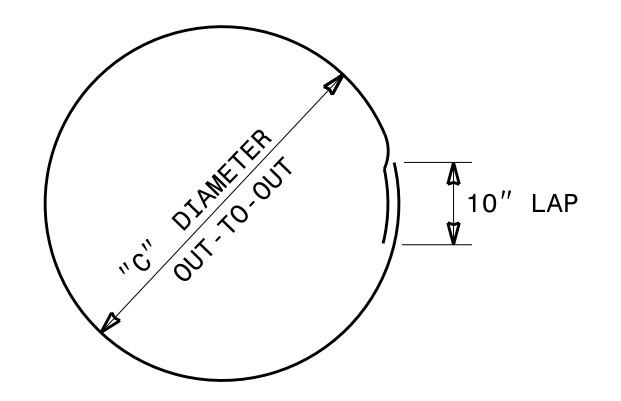
- CAST FOUNDATION AGAINST UNDISTURBED SOIL WHEREVER CONDITIONS PERMIT. IN UNSTABLE SOIL, CAST-IN-PLACE TUBE FORMS ARE ALLOWED WITH APPROVAL.
- COMPLY WITH APPLICABLE PROVISIONS OF SECTION 825 FOR CONCRETE CONSTRUCTION.
- USE CLASS "A" CONCRETE THAT MEETS THE REQUIREMENTS OF SECTION 1000 WITH A COMPRESSION STRENGTH AT 28 DAYS OF  $F'c = 3000$  PSI (MIN.).
- USE ASTM GRADE 60 DEFORMED BARS FOR ALL REINFORCING STEEL.
- GRADE IS ASSUMED TO BE (8H:1V) OR FLATTER. FOUNDATION SIZE AND DEPTHS ARE BASED ON THE FOLLOWING SOIL DESIGN PARAMETERS:
  - A. SANDY TYPE SOIL
  - B. NO GROUND WATER WITHIN 5'-0" OF SURFACE ELEVATION
  - C. WIND SPEED NOT TO EXCEED 140 MPH
 IF ACTUAL CONDITIONS VARY SUBSTANTIALLY FROM THOSE ASSUMED, THE FOUNDATION DEPTH MAY BE ADJUSTED. IN THIS CASE, CONTACT THE ENGINEER.
- MAINTAIN AT LEAST 3" COVER ON ALL REINFORCEMENT.
- ORIENT CONDUIT AS REQUIRED BY THE DESIGN OR AS DICTATED BY FIELD CONDITIONS.
- USE ADHESIVE ANCHOR FOR THREADED COUPLING INSERT. FOR TYPE I MINIMUM DEPTH NECESSARY IS 0'-4 1/2" AND FOR TYPE II MINIMUM DEPTH NECESSARY IS 0'-6 5/8". FOLLOW MANUFACTURER'S INSTALLATION INSTRUCTIONS.



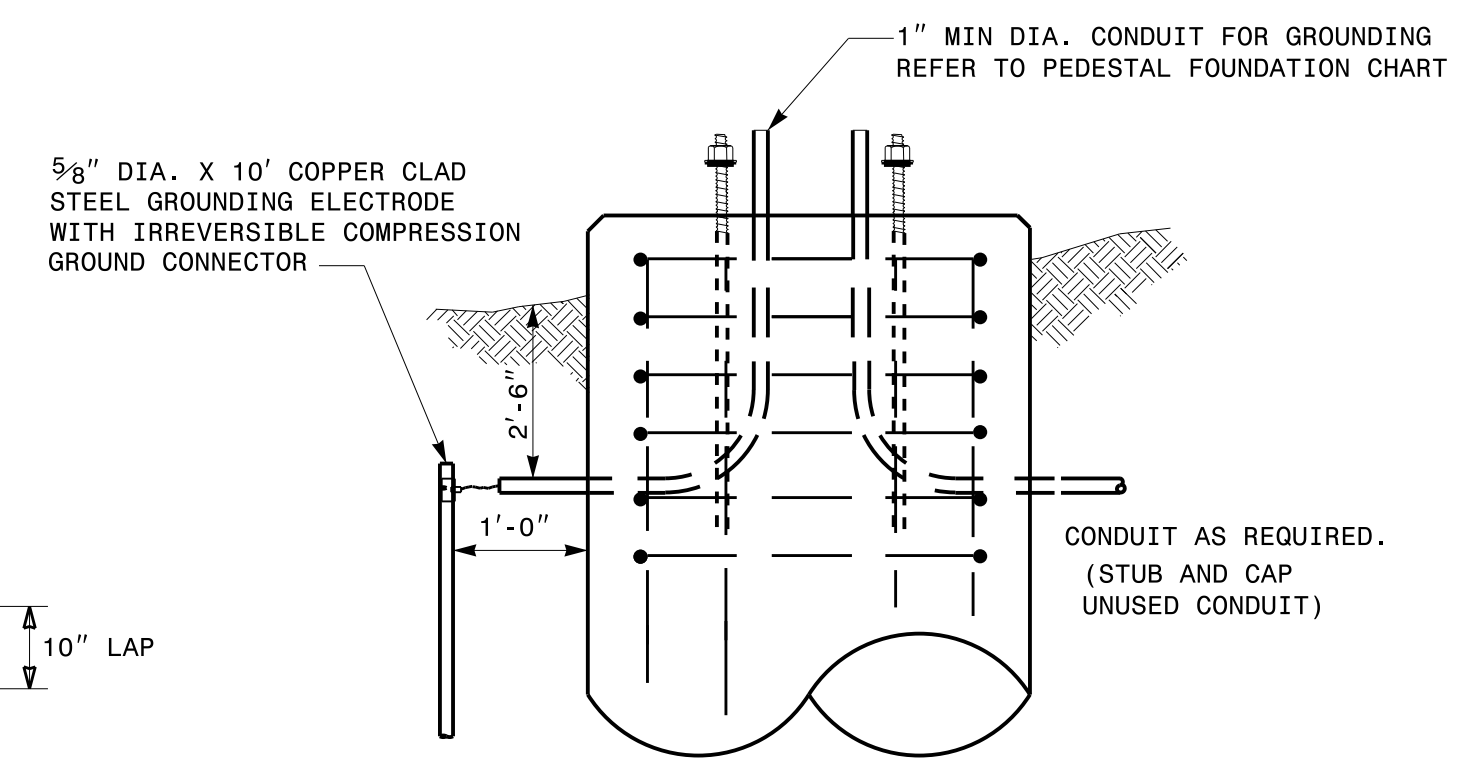
**TYPES I, II & III SECTION A-A**



**TYPES I & II ONLY SECTION A-A**



**CLOSED HOOPS**



**GROUNDING & CONDUIT DETAIL**

PEDESTAL FOUNDATION TYPE AND SIZE							
TYPE	PEDESTAL DESCRIPTION	SIZE			ANCHOR BOLT		INSTALL GROUNDING SYSTEM (YES/NO)
		DIAMETER "A" FT	DEPTH "B" FT	CONCRETE VOLUME CY	DIAMETER (MIN.) IN	LENGTH FT-IN	
I	PEDESTRIAN PUSHBUTTON	2'-0"	3'-6"	.41	1/2	1'-6"	NO
II	NORMAL-DUTY	2'-0"	5'-0"	.58	3/4	2'-0"	YES
III	HEAVY-DUTY	2'-6"	7'-0"	1.27	1	4'-0"	YES

REINFORCING STEEL SCHEDULE												
TYPE	V-BAR				STIRRUP							
	SIZE #	QTY	LENGTH	WEIGHT LBS	QUANTITY			LENGTH	DIAMETER "C" FT	OVERLAP MIN.	WEIGHT LBS	TOTAL STEEL WEIGHT LBS
					VERTICAL ON 6" CENTERS	SPACING ON 12" CENTERS	TOTAL					
I	8	6	3'-0"	56	4	0	4	4	5'-7"	1'-6"	0'-10"	71
II	8	6	4'-6"	86	4	5	3	8	5'-7"	1'-6"	0'-10"	116
III	8	6	6'-6"	122	4	7	4	11	7'-2"	2'-0"	0'-10"	175

STATE OF NORTH CAROLINA  
 DEPT. OF TRANSPORTATION  
 DIVISION OF HIGHWAYS  
 RALEIGH, N.C.

ENGLISH STANDARD DRAWING FOR  
**PEDESTALS**  
 FOUNDATIONS

SHEET 1 OF 1  
**1743D01**

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