

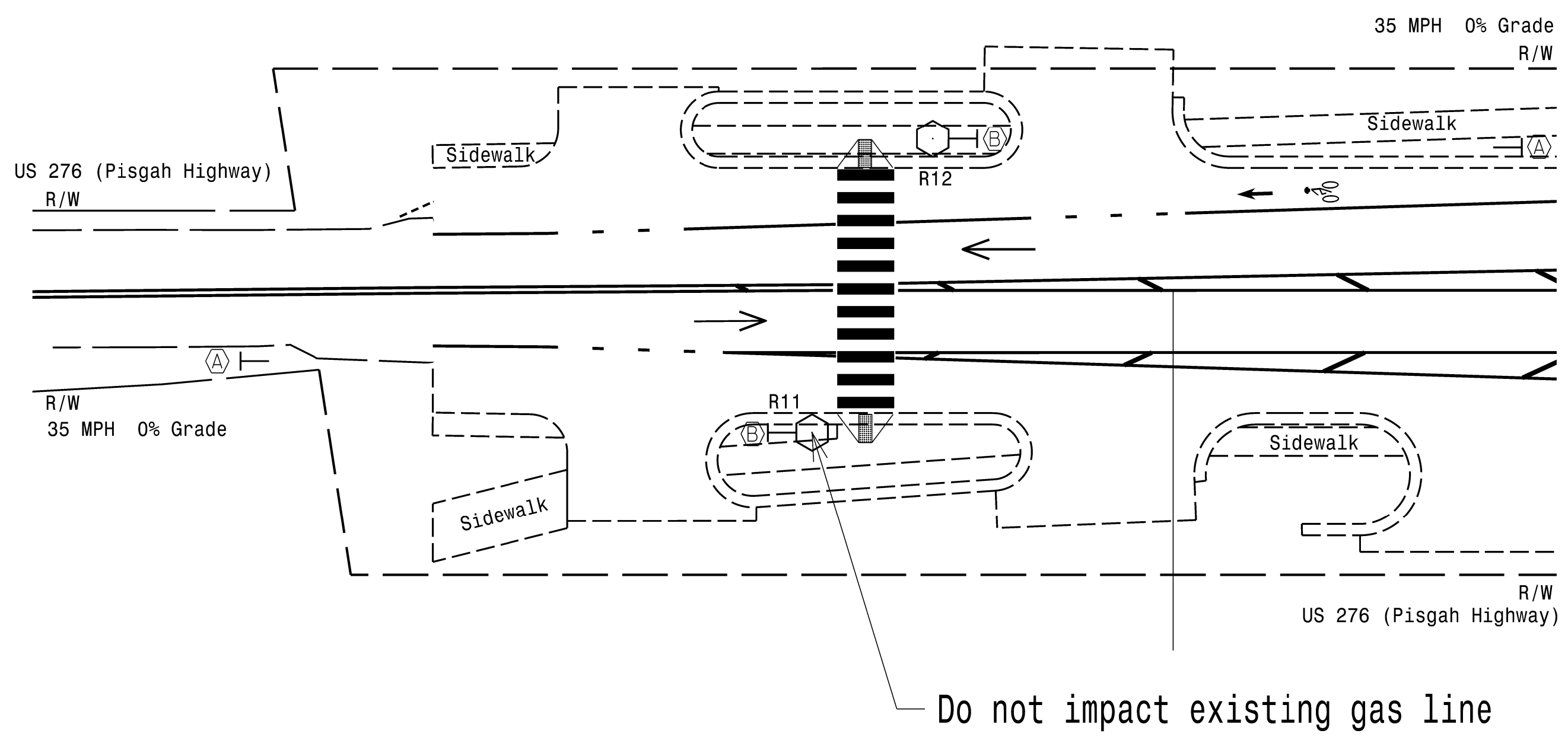
TIMING CHART	
FEATURE	RRFB GROUP
	R11/2
RRFB Flash Time	20

Notes:  
1. These values may be field adjusted. Do not adjust RRFB Flash times lower than what is shown.

Semi-Actuated Rectangular Rapid Flashing Beacon (RRFB) Isolated

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Align the front face of the pedestrian push button assembly parallel with the crosswalk.
3. The distance to the pushbutton from the edge of the sidewalk should be no greater than 18".
4. The pay item for Rectangular Rapid Flashing Beacon (RRFB) shall include, but not be limited to the signs, pushbuttons, flashing beacons, solar panel, battery, controller assembly, and all incidentals related to the installation of the RRFB.



SIGNS

- |  |                 |
|--|-----------------|
| <b>PROPOSED</b>  | <b>EXISTING</b> |
| (A) Pedestrian Warning Sign (W11-2) w/ "AHEAD" Plaque (W16-9P) | (A)             |
| (B) RRFB w/ Left Arrow (See Fig. 1)                            | (B)             |

LEGEND

- |                 |                 |
|-----------------|-----------------|
| <b>PROPOSED</b> | <b>EXISTING</b> |
| ○               | ○               |
| →               | →               |
| →               | →               |
| →               | →               |
- Sign  
Type II Signal Pedestal  
Curb Ramp  
Directional Arrow  
Right of Way



Prepared For the Offices of:

750 N. Greenfield Pkwy, Garner, NC 27524

US 276 (Pisgah Highway) at Driveways

Division 14 Transylvania County Brevard

PLAN DATE: April 2023 REVIEWED BY: S.G. Haynie

PREPARED BY: P. Koloski REVIEWED BY:

REVISIONS	INIT.	DATE
Note Change	SGH	8/1/23

SEAL

Signature: Steven G. Haynie DATE: 4/28/2023

DocuSign

Sig Inventory No. 14-0528

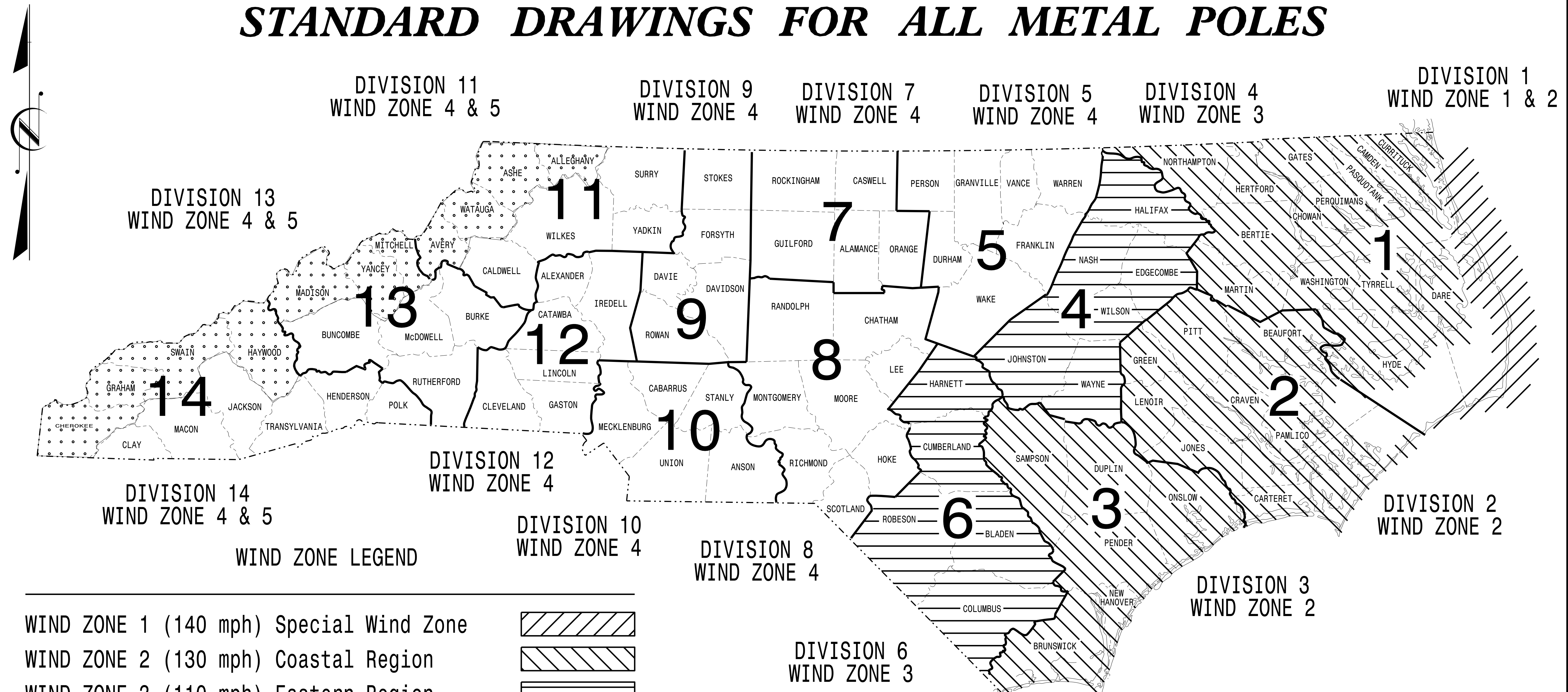
8/1/2023 9:50:10 AM X:\P103\0049021\_R-5799\_US\_64-276\_Intersection\_Design\Design\Traffic\Signs\0049021\_R-5799\_US\_64-276\_Intersection\_Design\Signs\0049021\_R-5799\_US\_64-276\_Intersection\_Design.dgn



# STATE OF NORTH CAROLINA DIVISION OF HIGHWAYS

PROJECT I.D. NO.	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

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

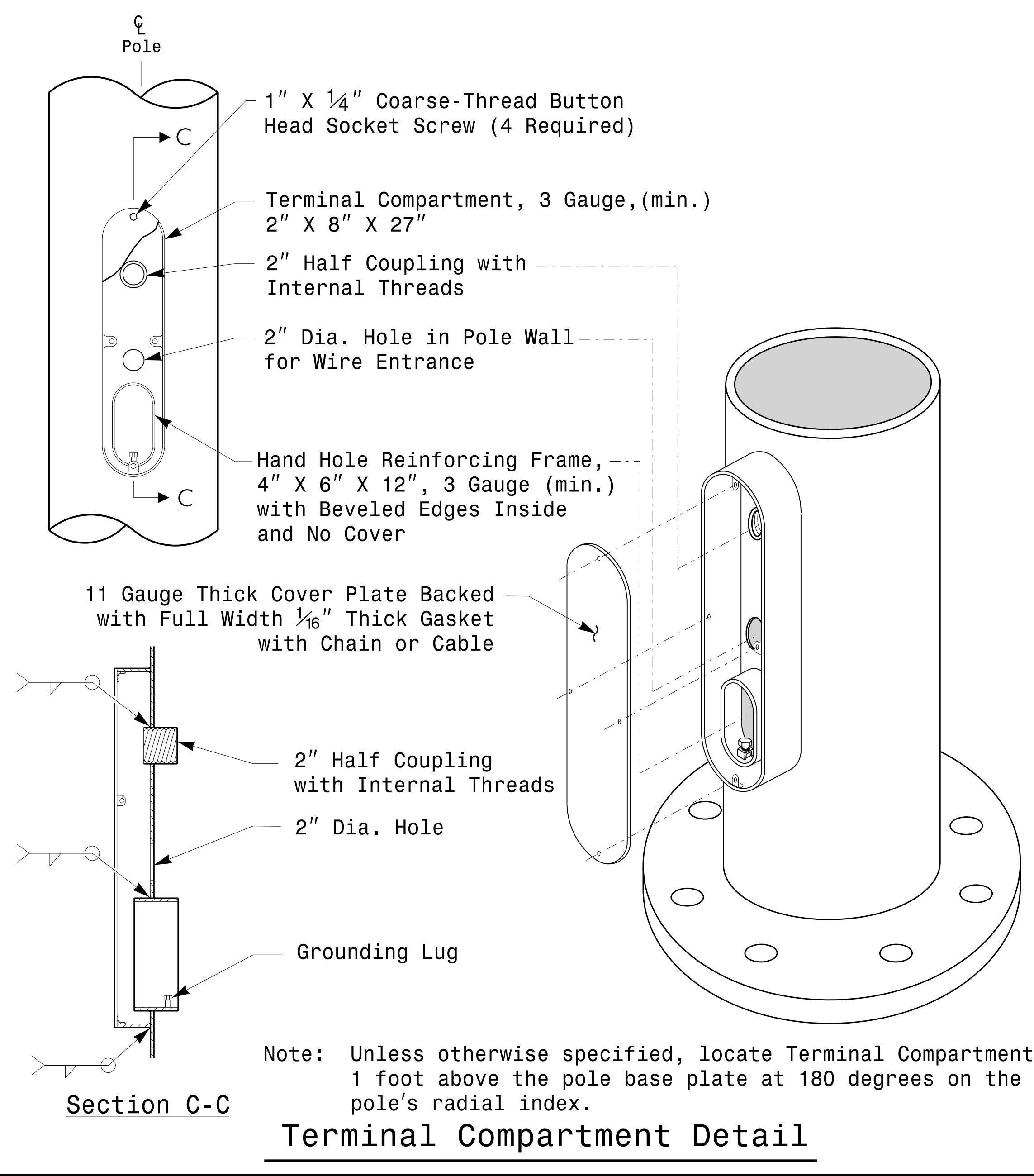
J.P. GALLOWAY, P.E. - STATE SIGNALS ENGINEER

D.C. SARKAR, P.E. - ITS AND SIGNALS SENIOR STRUCTURAL ENGINEER

SEAL

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



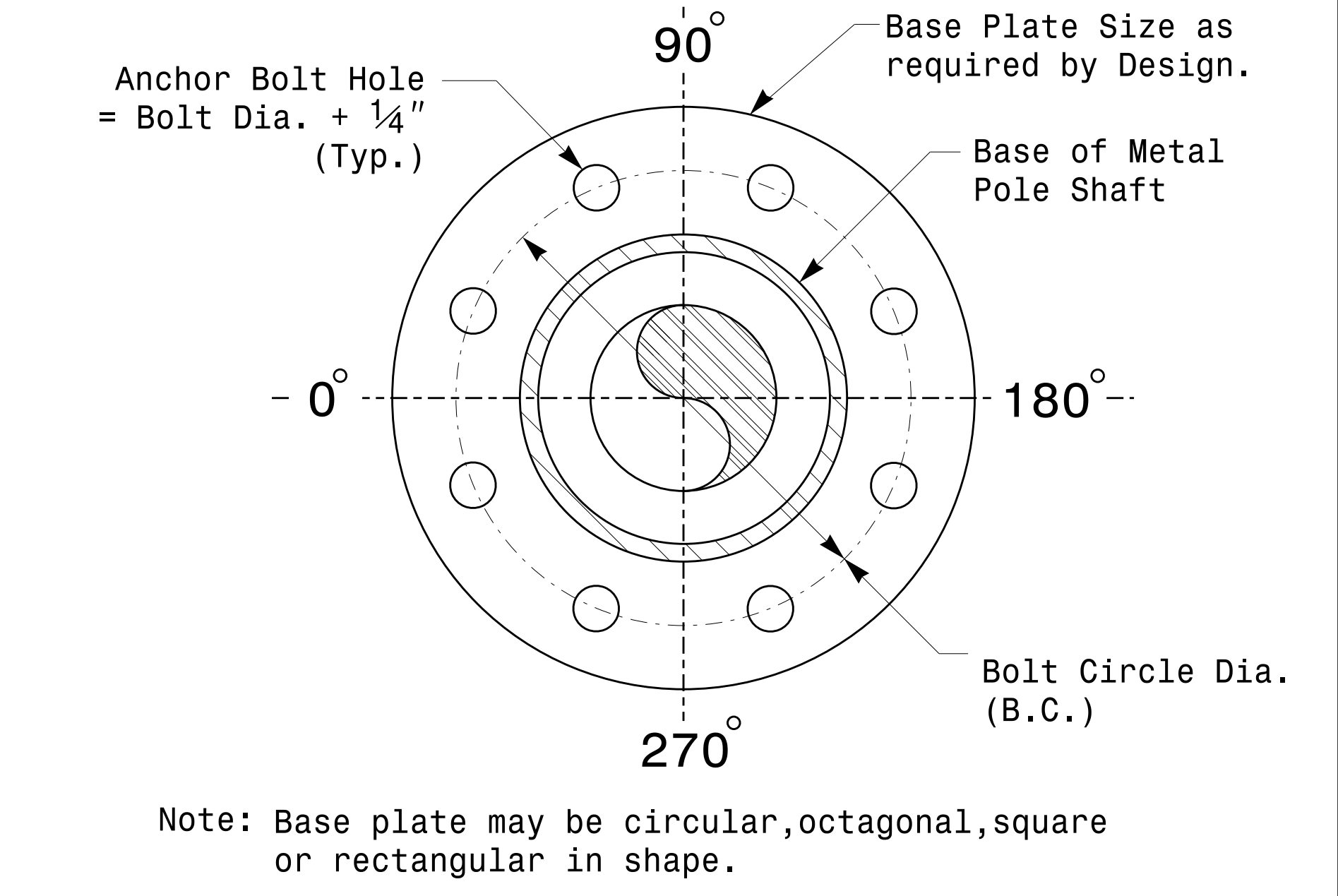
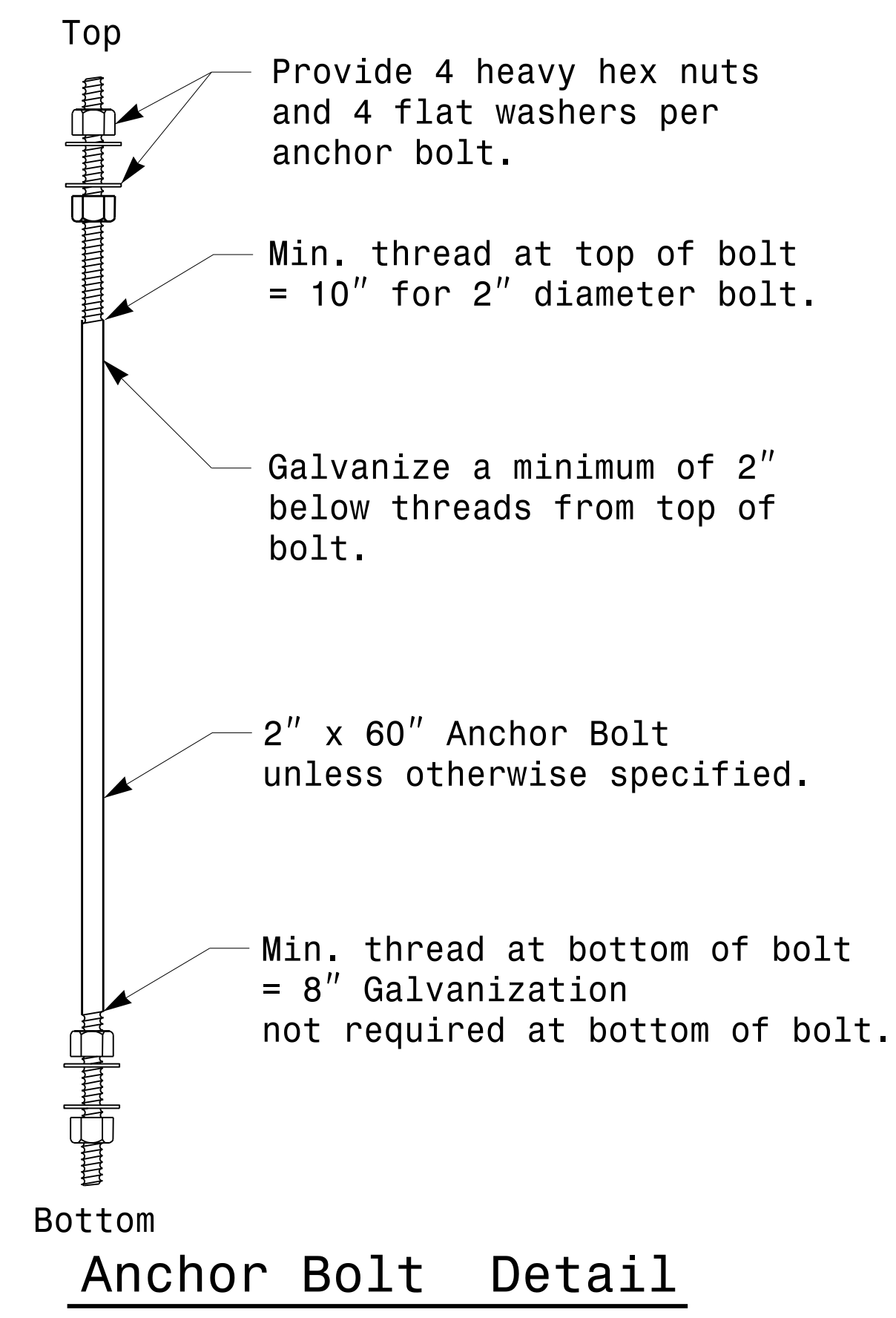
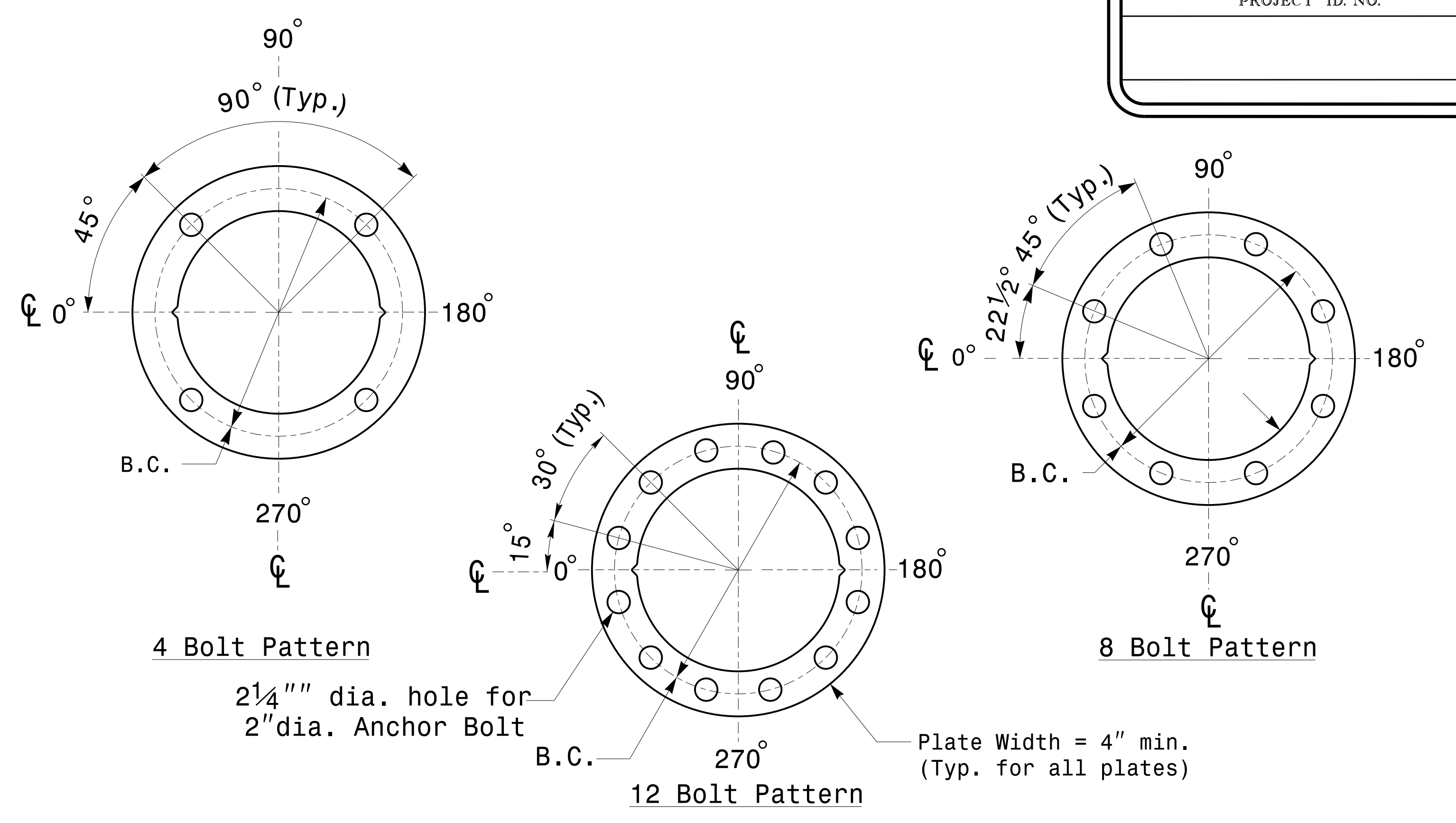


MFG	_____	MFG. DATE: MM/YY	_____
SHAFT	D/T/L/Y	_____	_____
ARM-A	D/T/L/Y	_____	_____
ARM-B	D/T/L/Y	_____	_____
A.B. DIA./B.C./L/Y	_____	_____	_____
NCDOT SIG. INV. NO.	_____	_____	_____
NCDOT POLE NO.	_____	_____	_____

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**

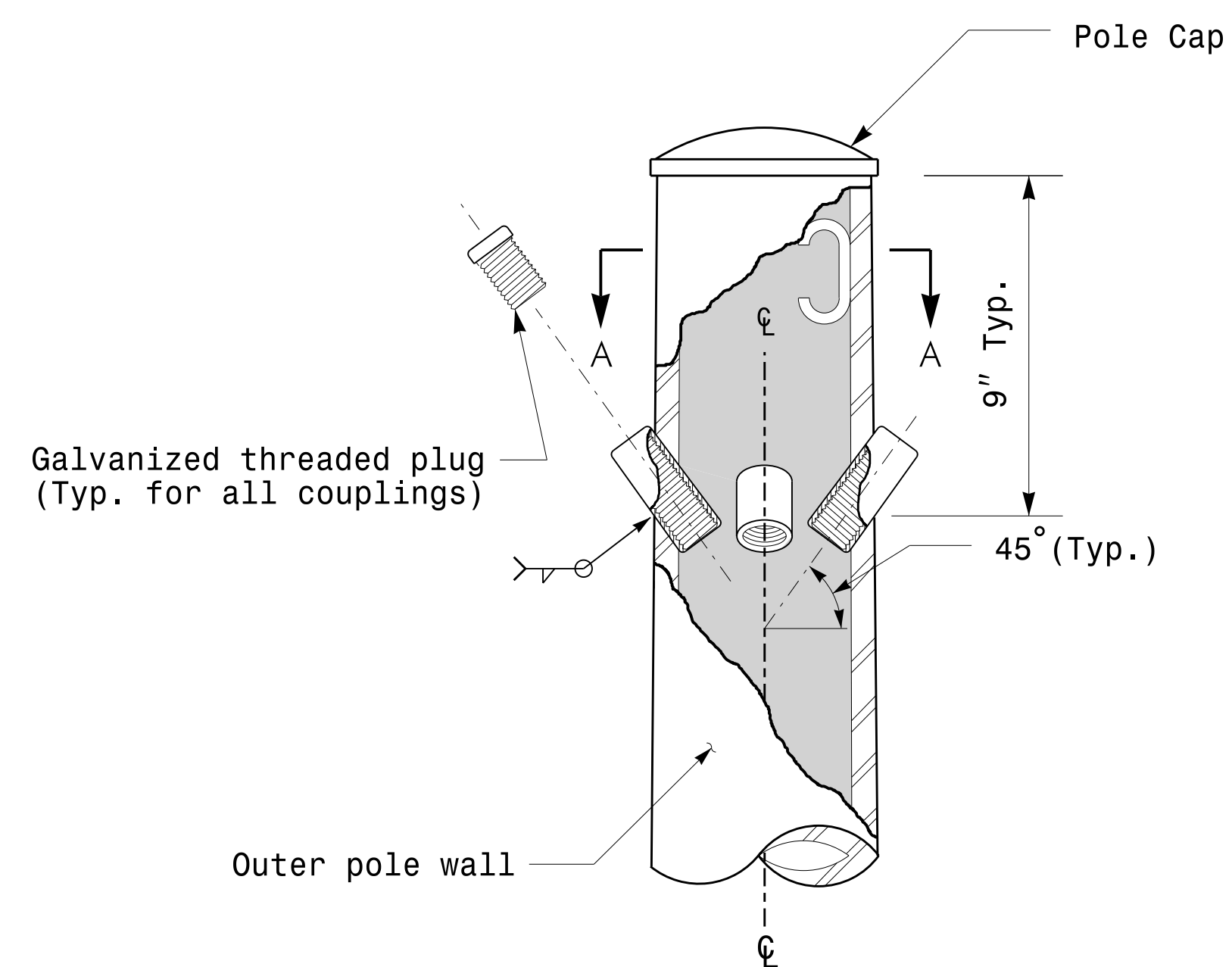


	<b>Typical Fabrication Details For All Metal Poles</b>		
	PLAN DATE: OCTOBER 2017 DESIGNED BY: C.F. ANDREWS	PREPARED BY: N. BITTING REVIEWED BY: D.C. SARKAR	
SCALE: NONE	DocuSign by: <i>D. C. SARKAR</i> 4456328 SIGNATURE		10/11/2017 DATE

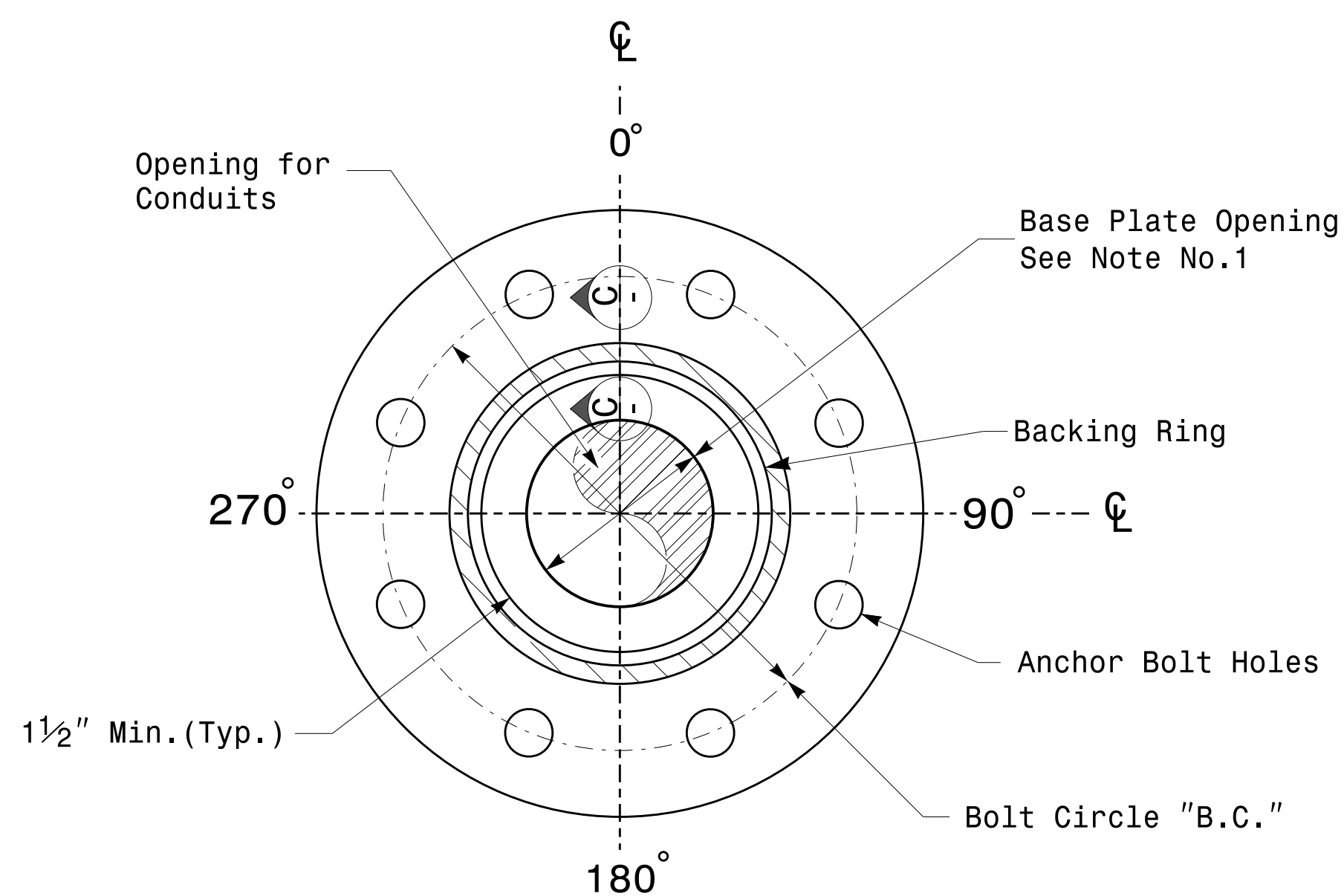
11-01-2017 08:30 136504115 Signal&Sgnl Design Section Eastern Region M3 Sheets 2016 2014 Sig.M2 Std. Fabrication Detail is All Poles.dgn

**Fabrication Details – All Metal Poles**

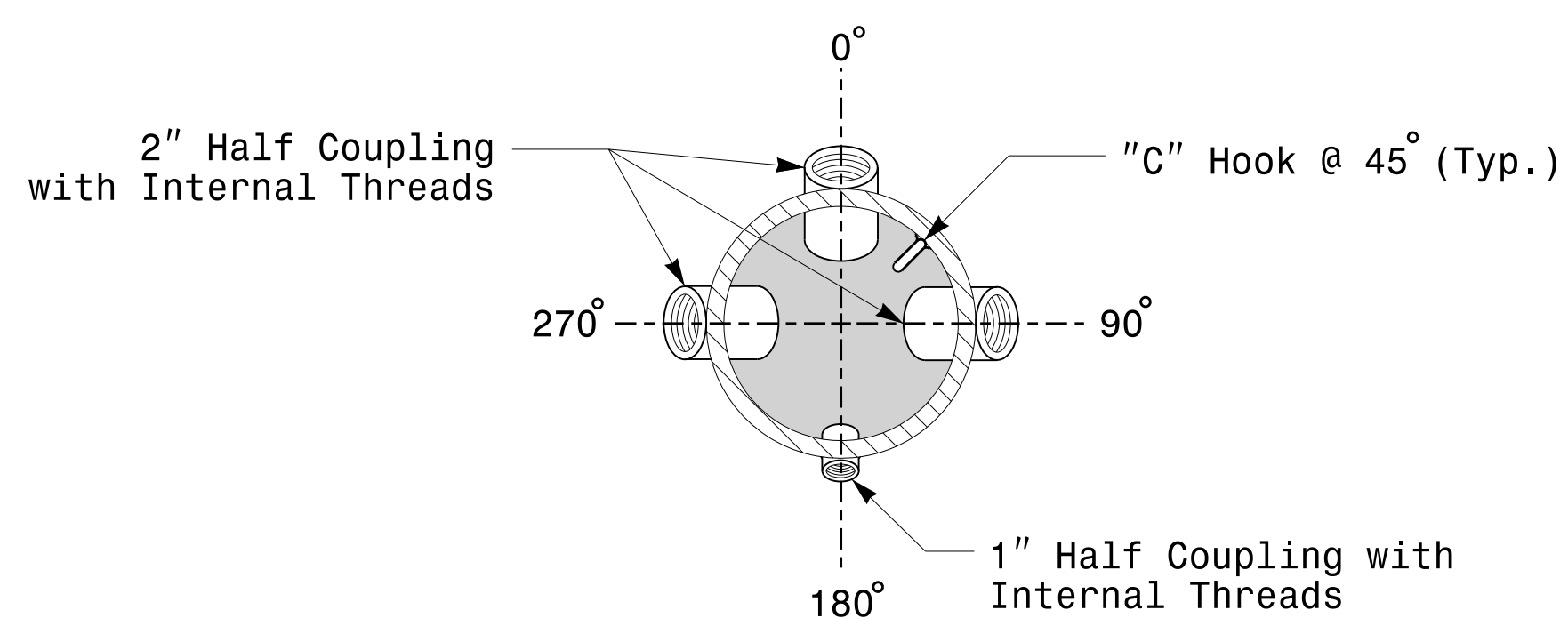
Note:  
 1. Opening in pole base plate shall be equal to pole base inside diameter minus 3 1/2" but shall not be less than 8 1/2".



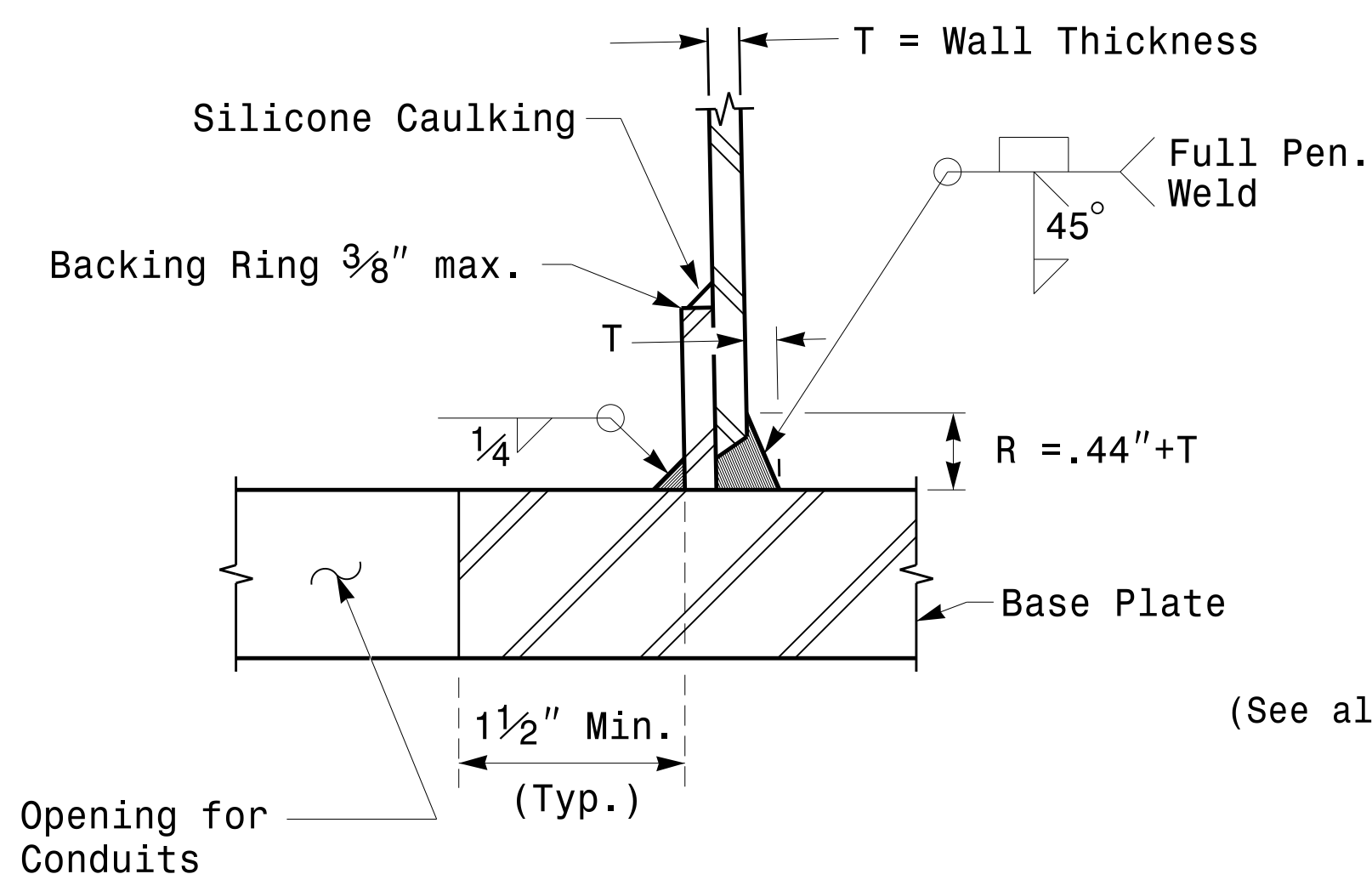
Cable Entrances at Top of Pole



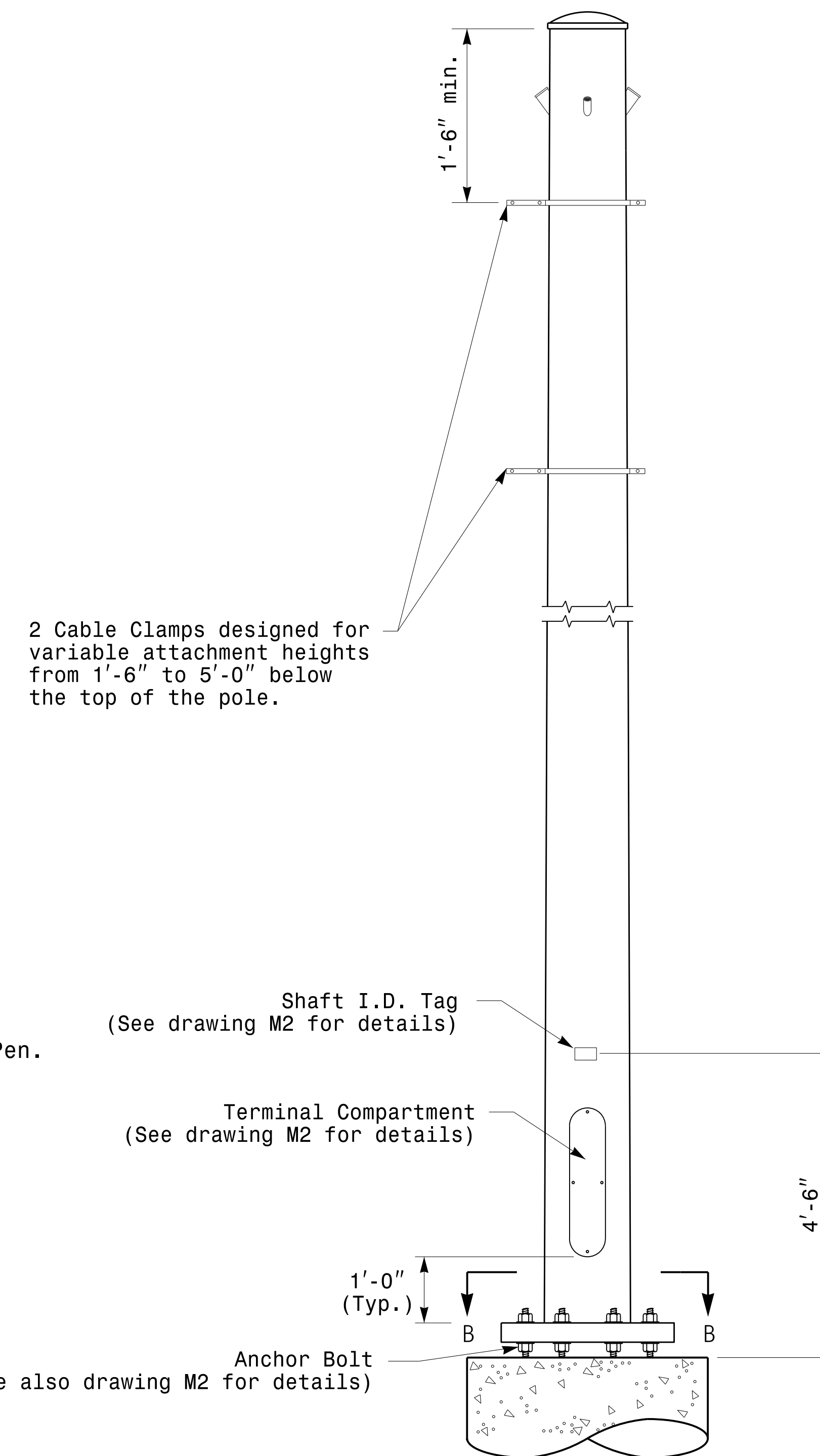
Section B-B  
Pole Base Plate Details  
(8 and 12 Bolt Pattern)



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

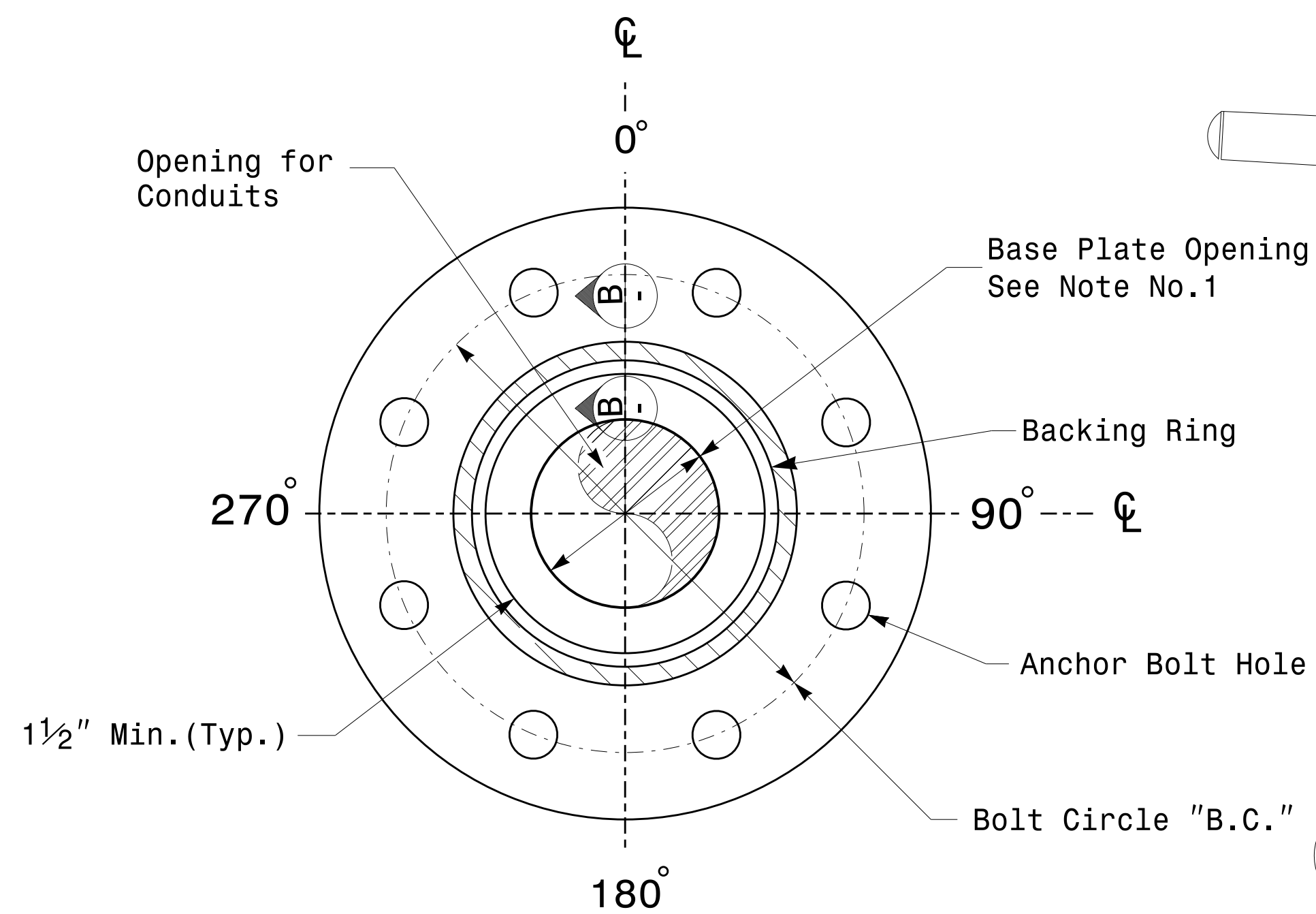
SEAL  
  
 DocuSigned by: Debesh C. Sarkar  
 44EB87816FA4F49E

10/11/2017  
 DATE

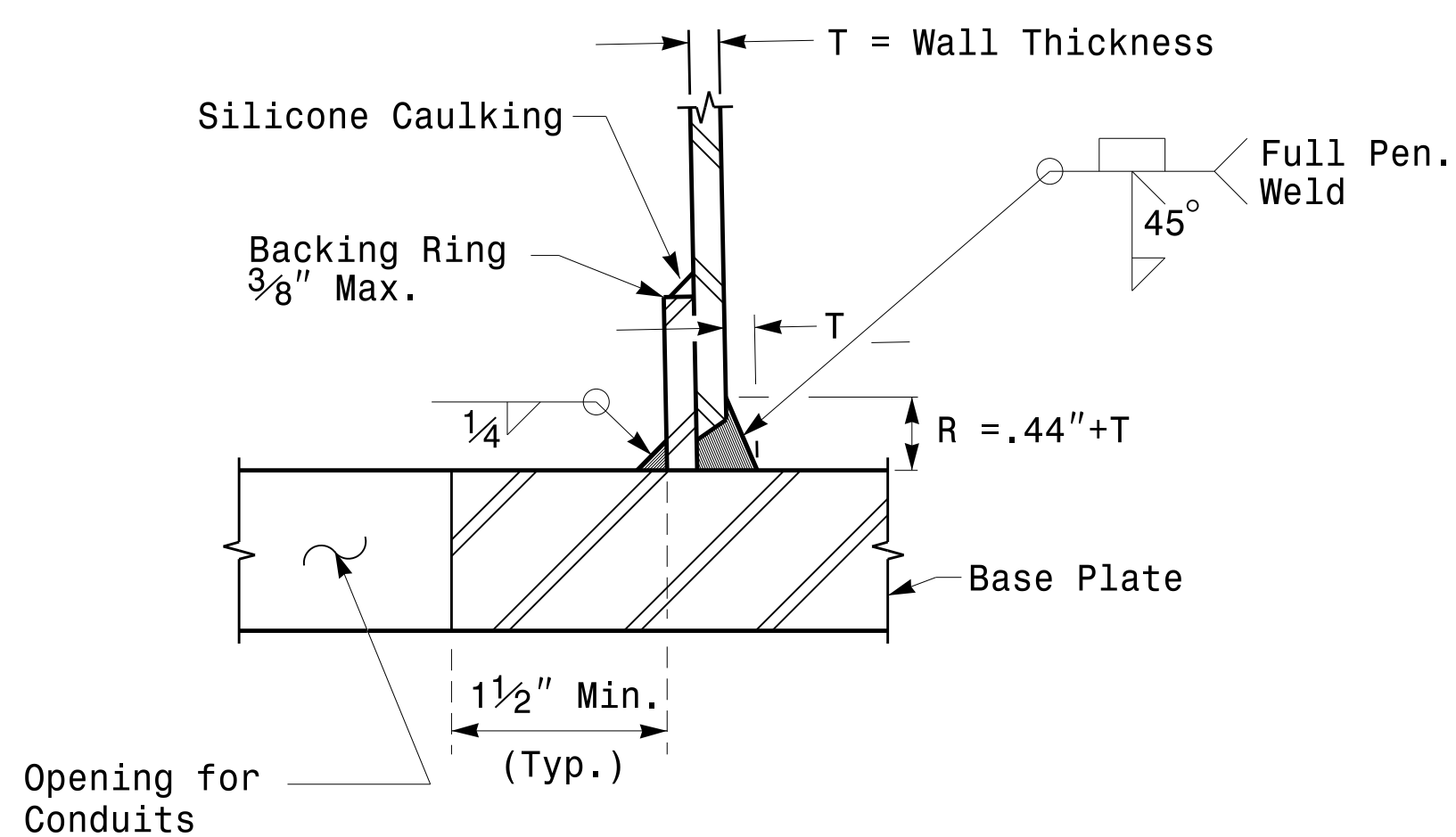
Fabrication Details – Strain Poles



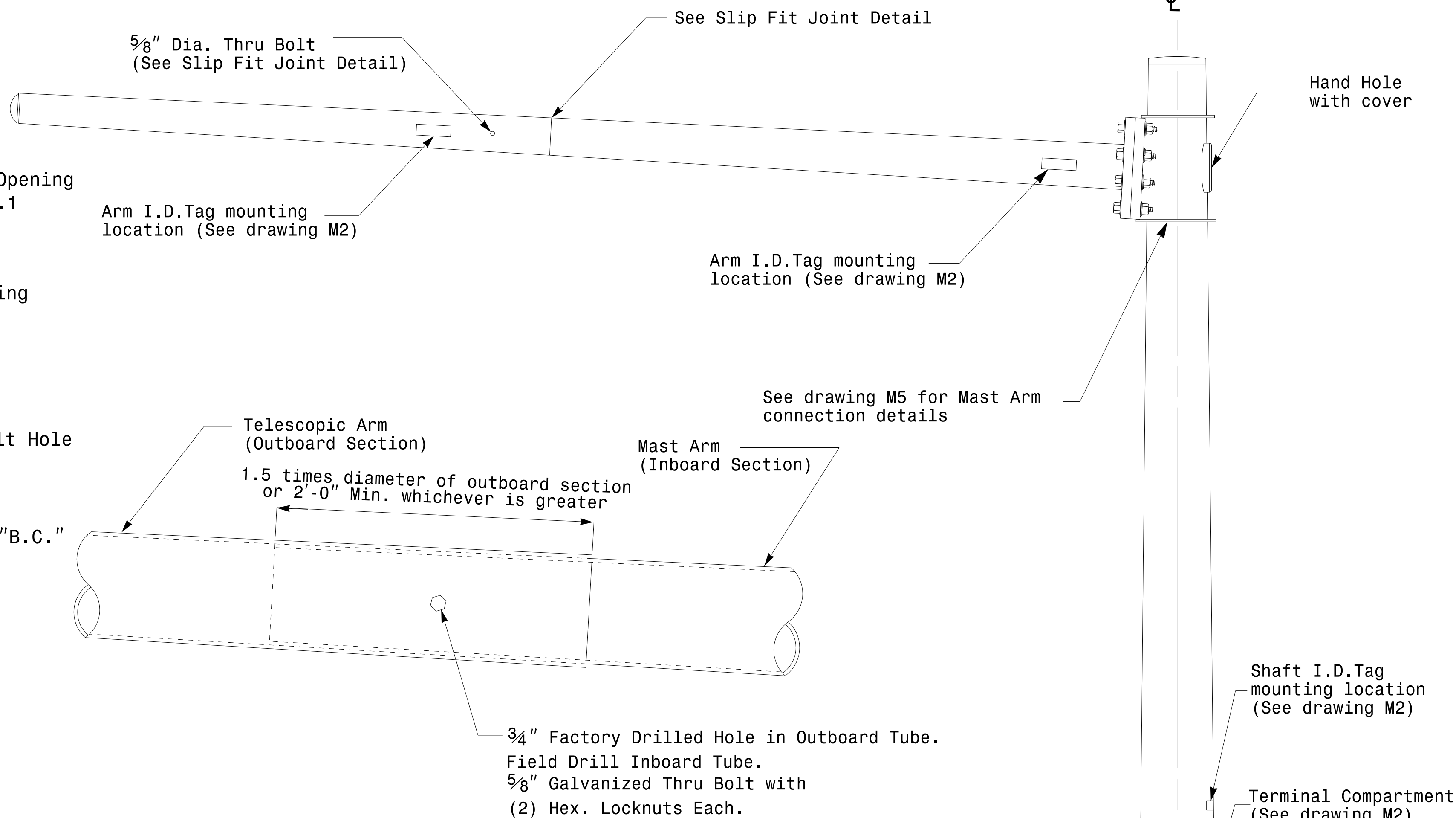
Note:  
1. Opening in pole base plate shall be equal to pole base inside diameter minus 3 1/2" but shall not be less than 8 1/2".



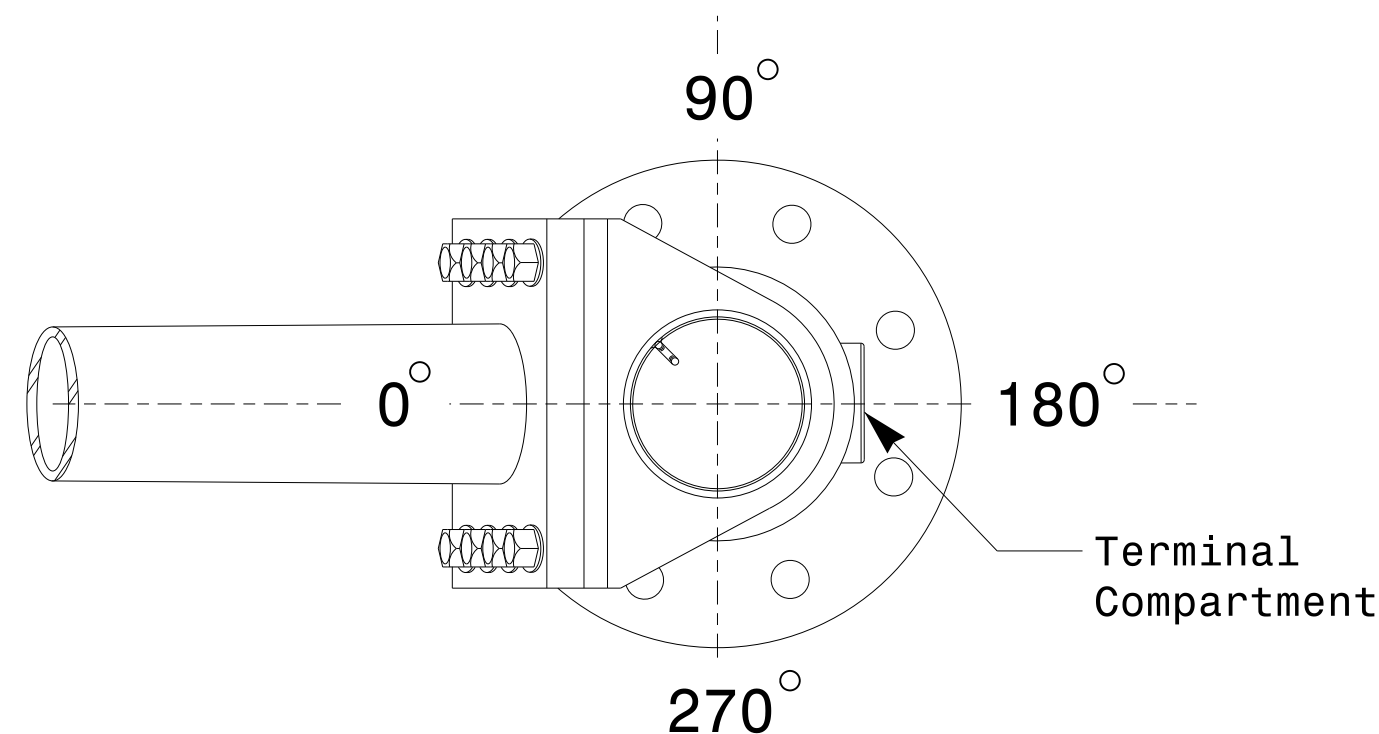
Section A-A  
Pole Base Plate Details



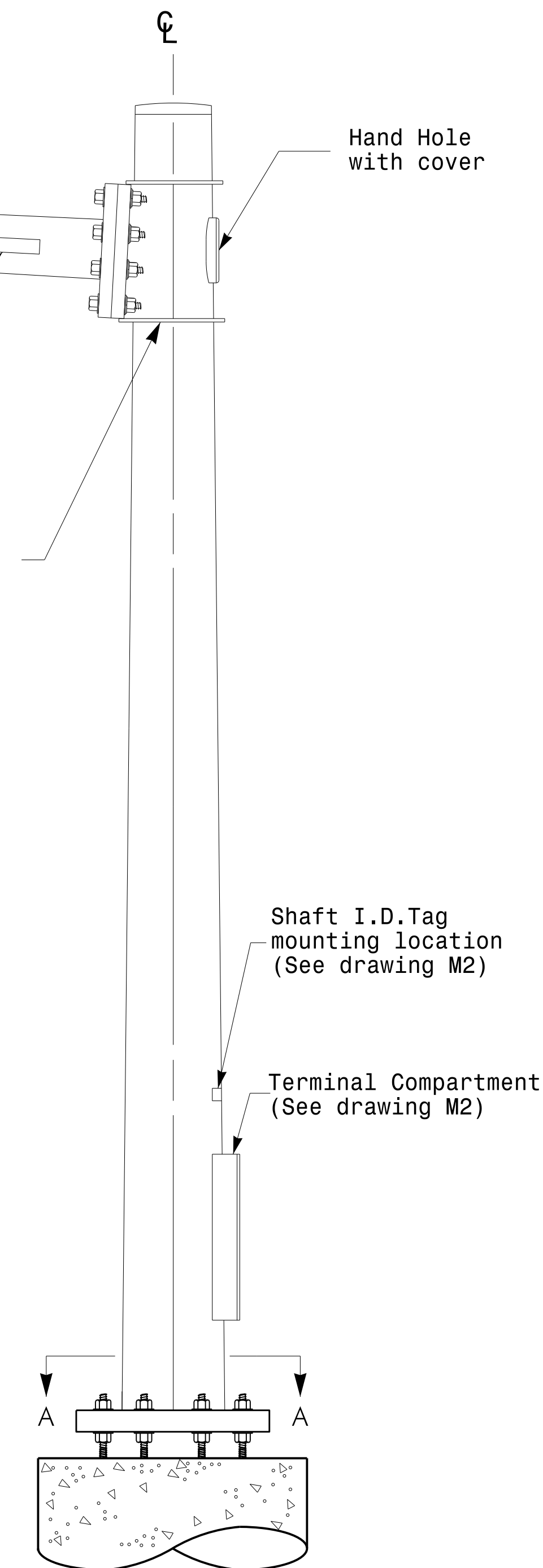
Section B-B  
(Pole Attachment to Base Plate)  
Full-Penetration Groove Weld Detail



Slip Fit Joint Detail for Mast Arm



Mast Arm Radial Orientation



Mast Arm Pole

<p>Prepared in the Offices of:</p> <p>750 N. Greenfield Pkwy, Garner, NC 27529</p>	<p>Typical Fabrication Details For Mast Arm Poles</p>		<p>SEAL</p>
	<p>PLAN DATE: OCTOBER 2017</p>	<p>DESIGNED BY: K.C. DURIGON</p>	
<p>SCALE: 0 NA NONE</p>	<p>PREPARED BY: N. BITTING</p>	<p>REVIEWED BY: D.C. SARKAR</p>	<p>10/11/2017</p>
<p>REVISIONS</p>	<p>INIT.</p>	<p>DATE</p>	<p>DATE</p>

11-OCT-2017 08:33 136504115 Signal&Signal Design Section Eastern Region\m4 Sheets\2016\2014 Sig.M4 Std. Fabrication Detail - Mast Arm Poles.dgn

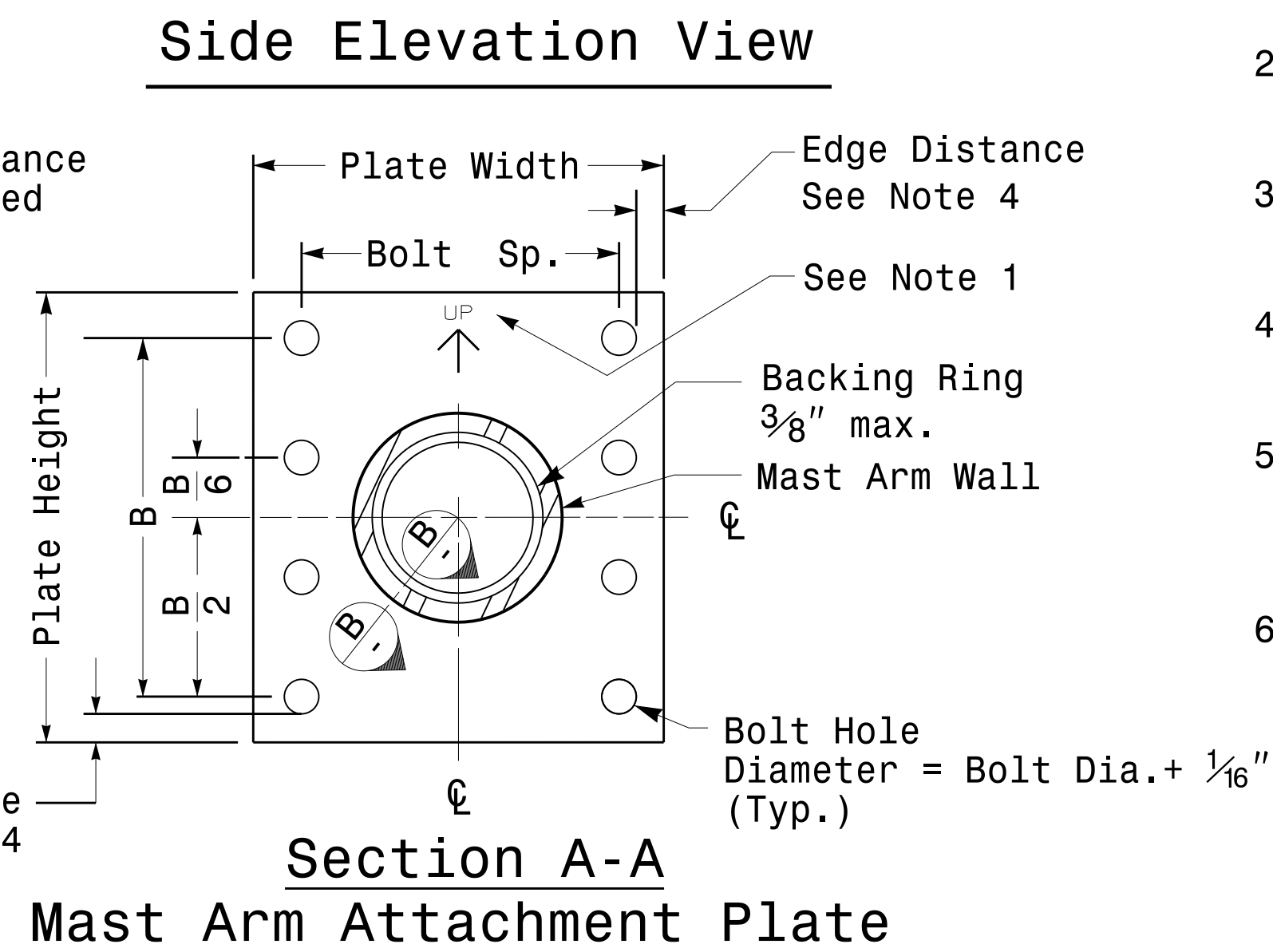
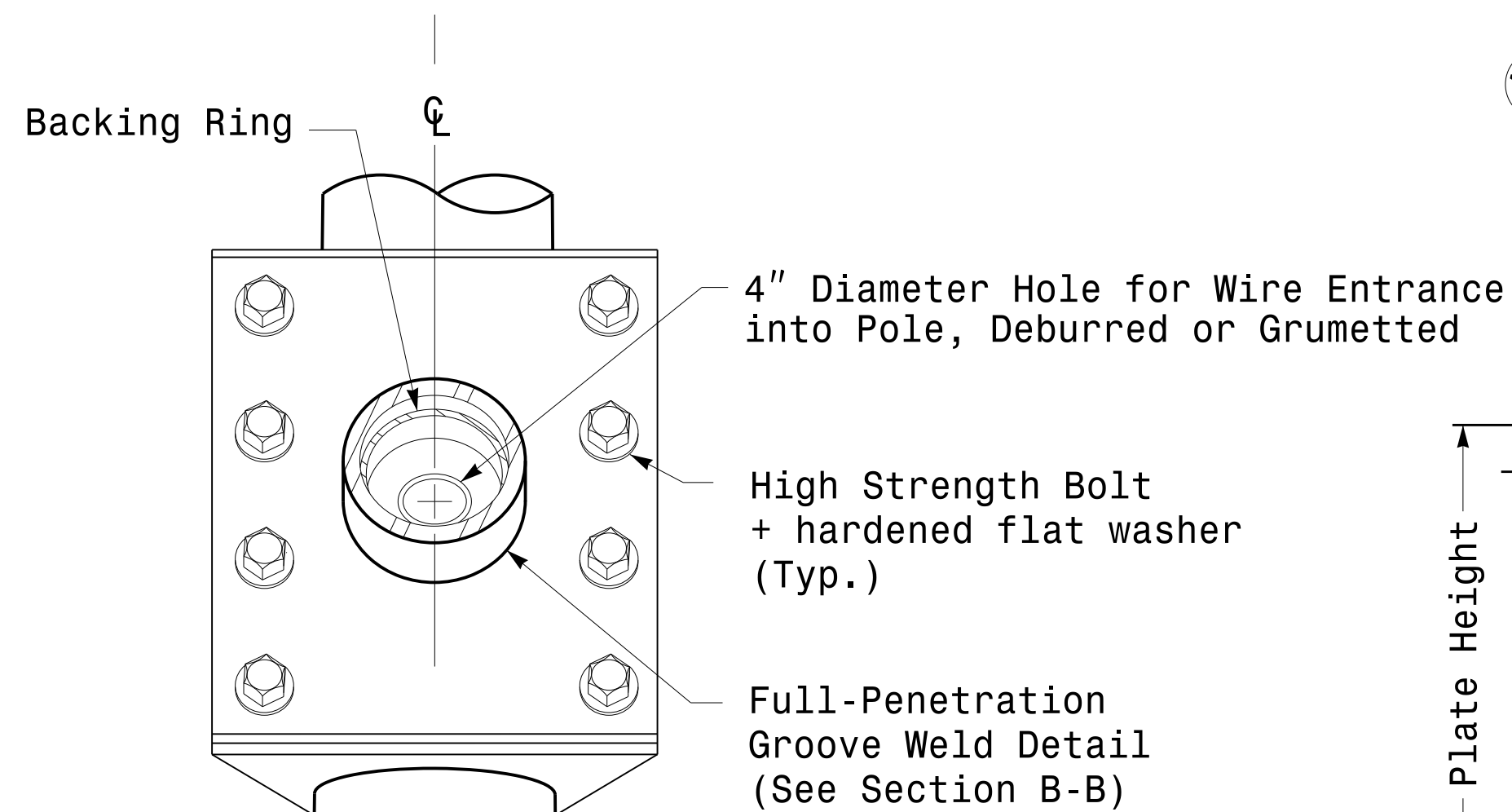
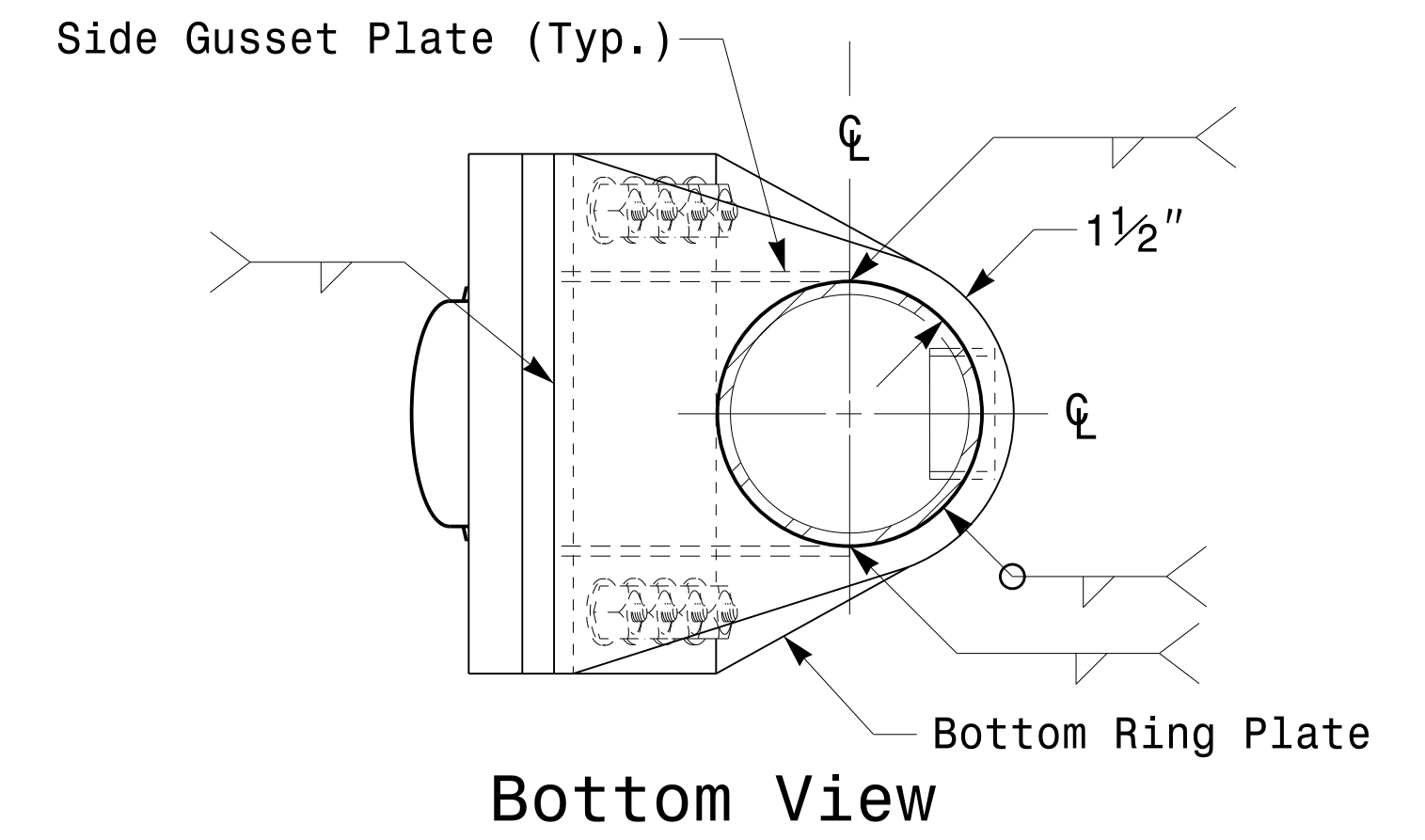
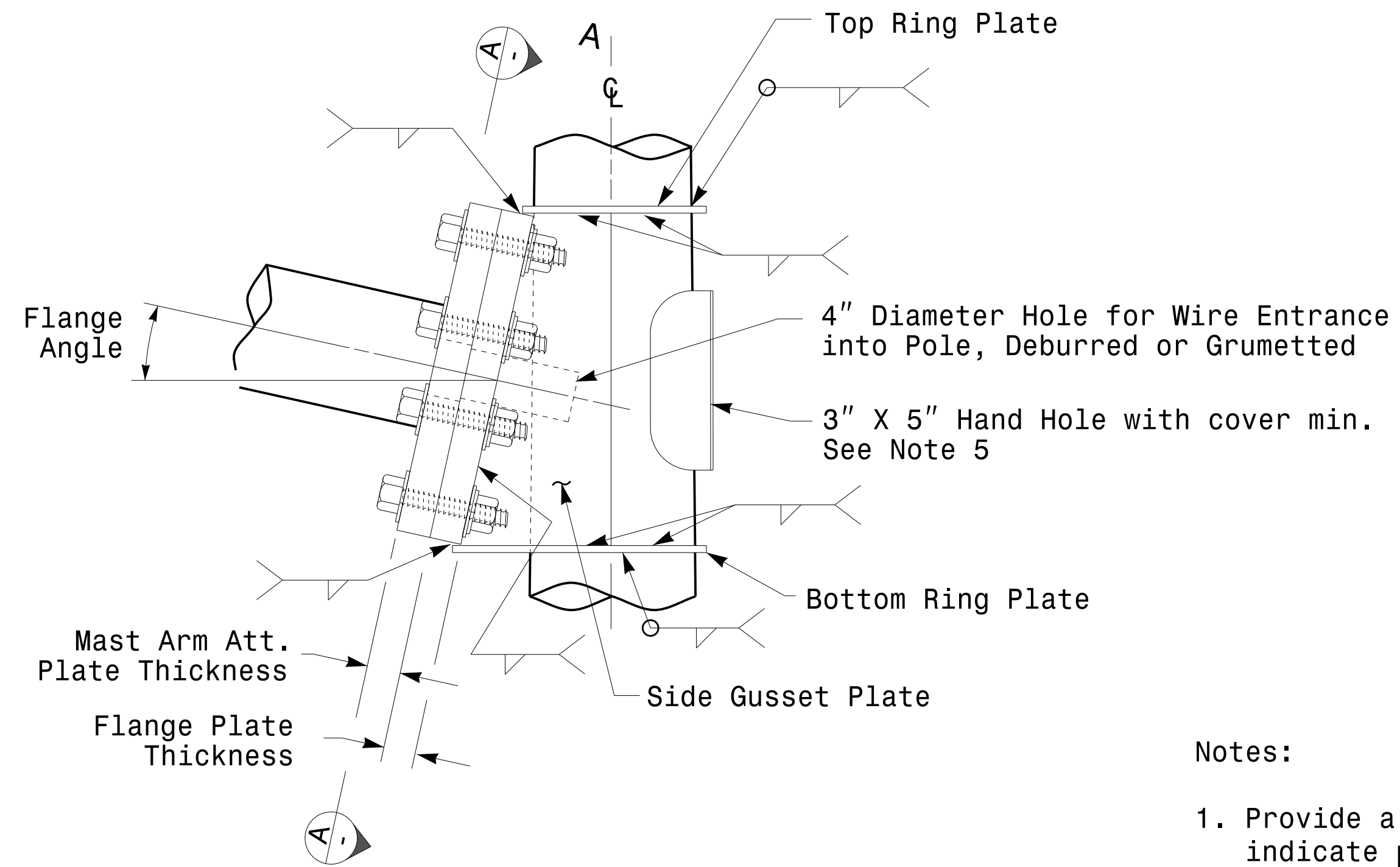
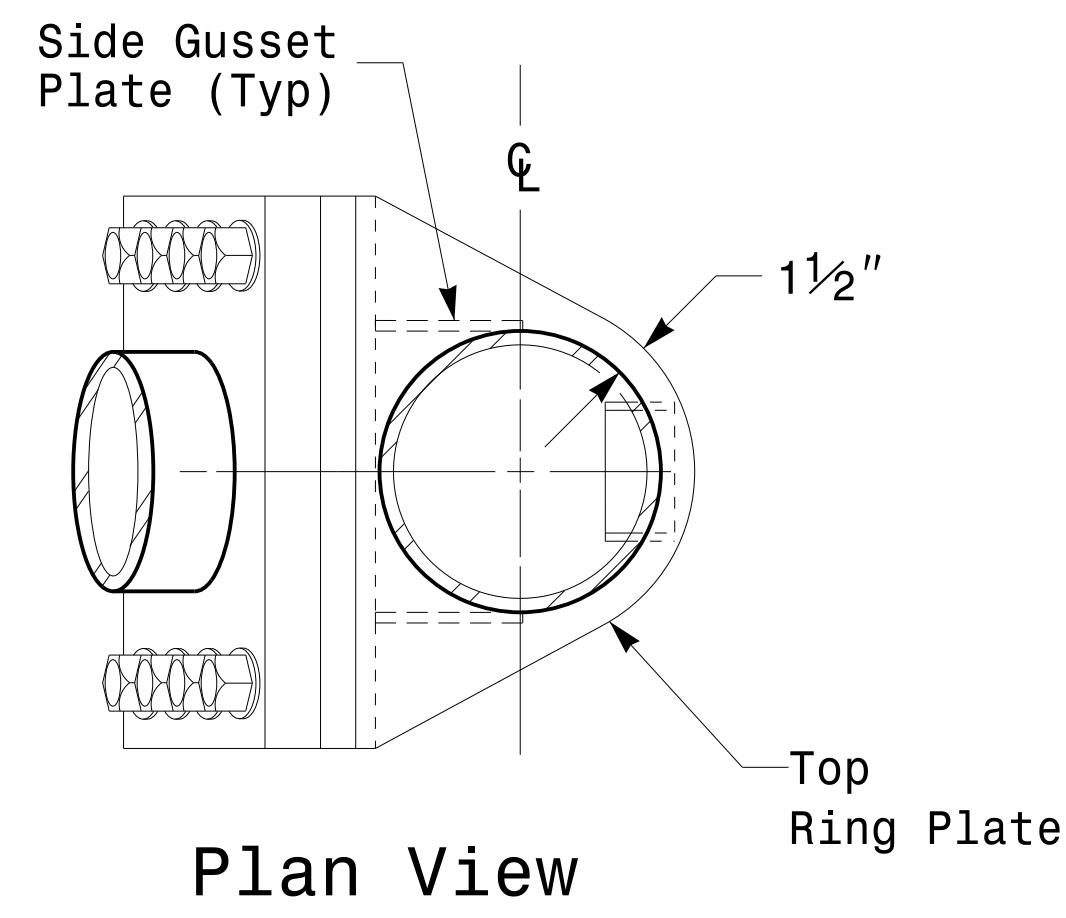
Fabrication Details - Mast Arm Poles

# Welded Ring Stiffened Mast Arm Connection

PROJECT ID. NO.

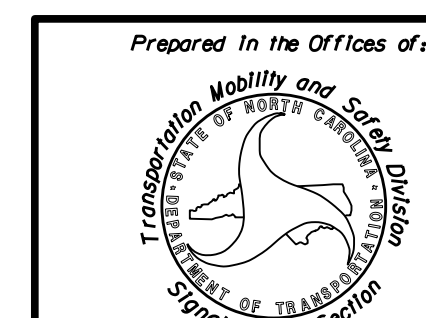
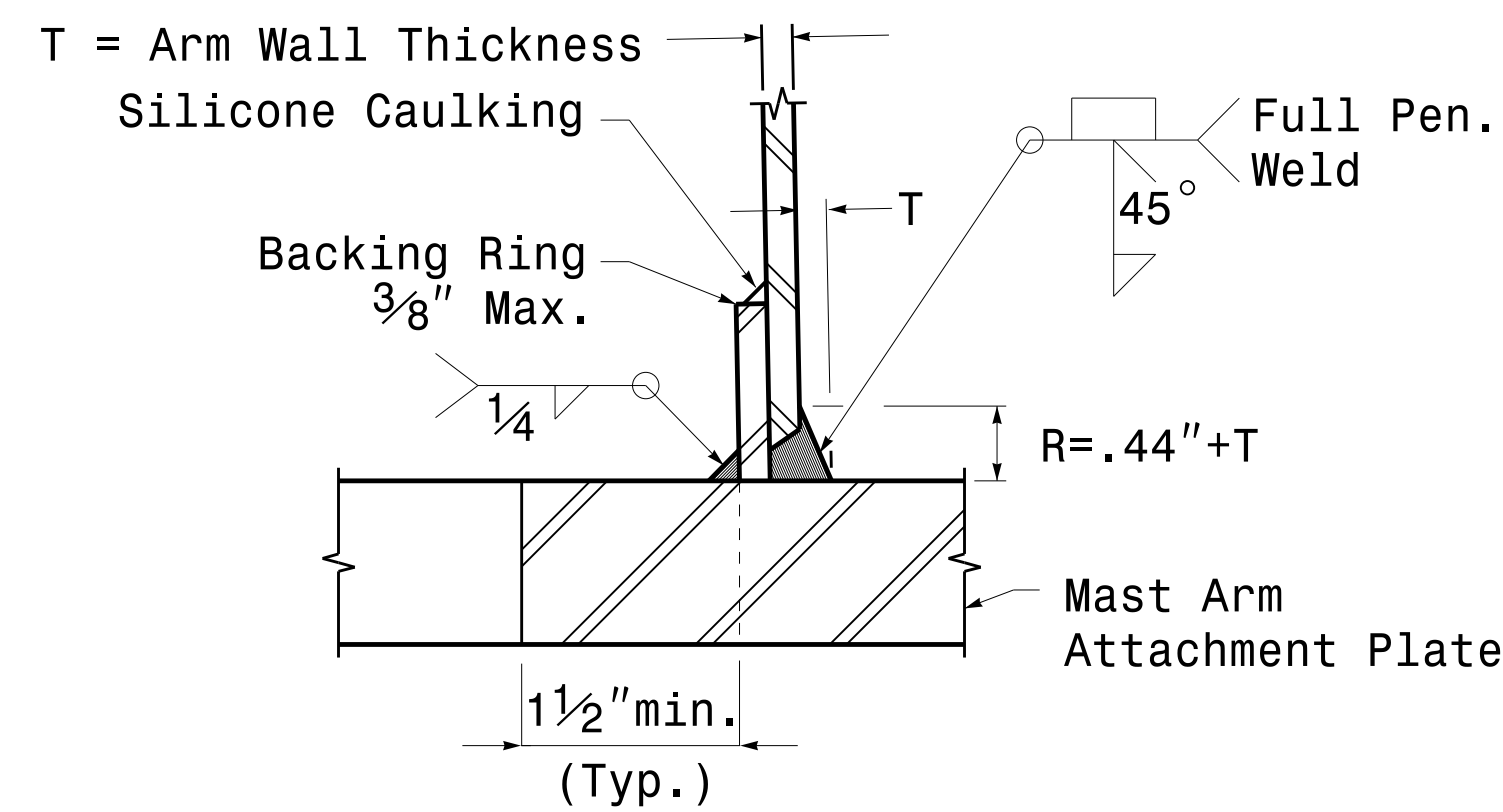
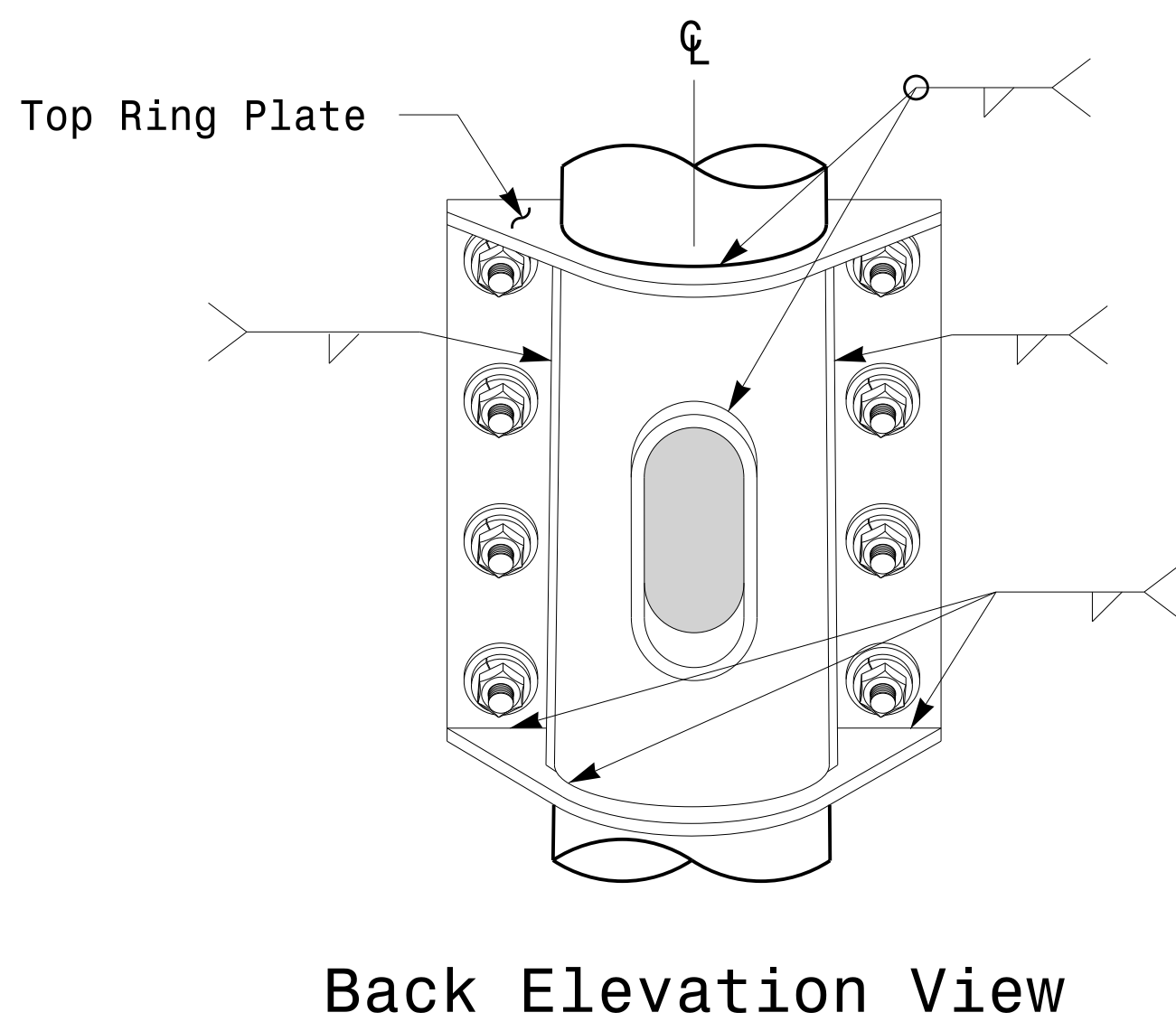
SHEET NO.

Sig.M5



**Notes:**

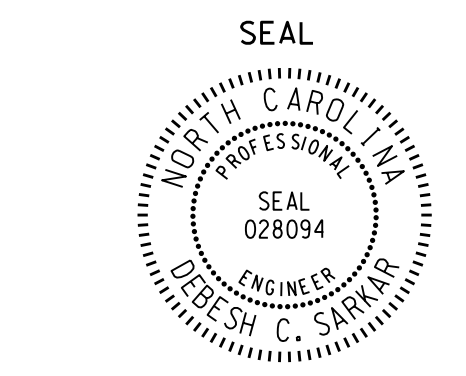
1. Provide a permanent means of identification above the mast arm to indicate proper attachment orientation of the mast arm.
2. Designer will determine the size of all structural components, plates, fasteners, and welds shown unless they are already specified.
3. Fabricator is responsible for providing appropriate holes at drainage points to drain galvanizing materials.
4. For minimum edge distance follow AISC Table J3.4 and J3.5. For nominal bolt hole size use Table J3.3.
5. Provide upper handhole as necessary when shaft extensions are required for luminaire arms or camera. For poles without luminaires/camera, wiring can be done through the top of pole.
6. Allowable range of flange tilt angle will vary from 0° to as required.



Typical Fabrication Details For Mast Arm Connection To Pole

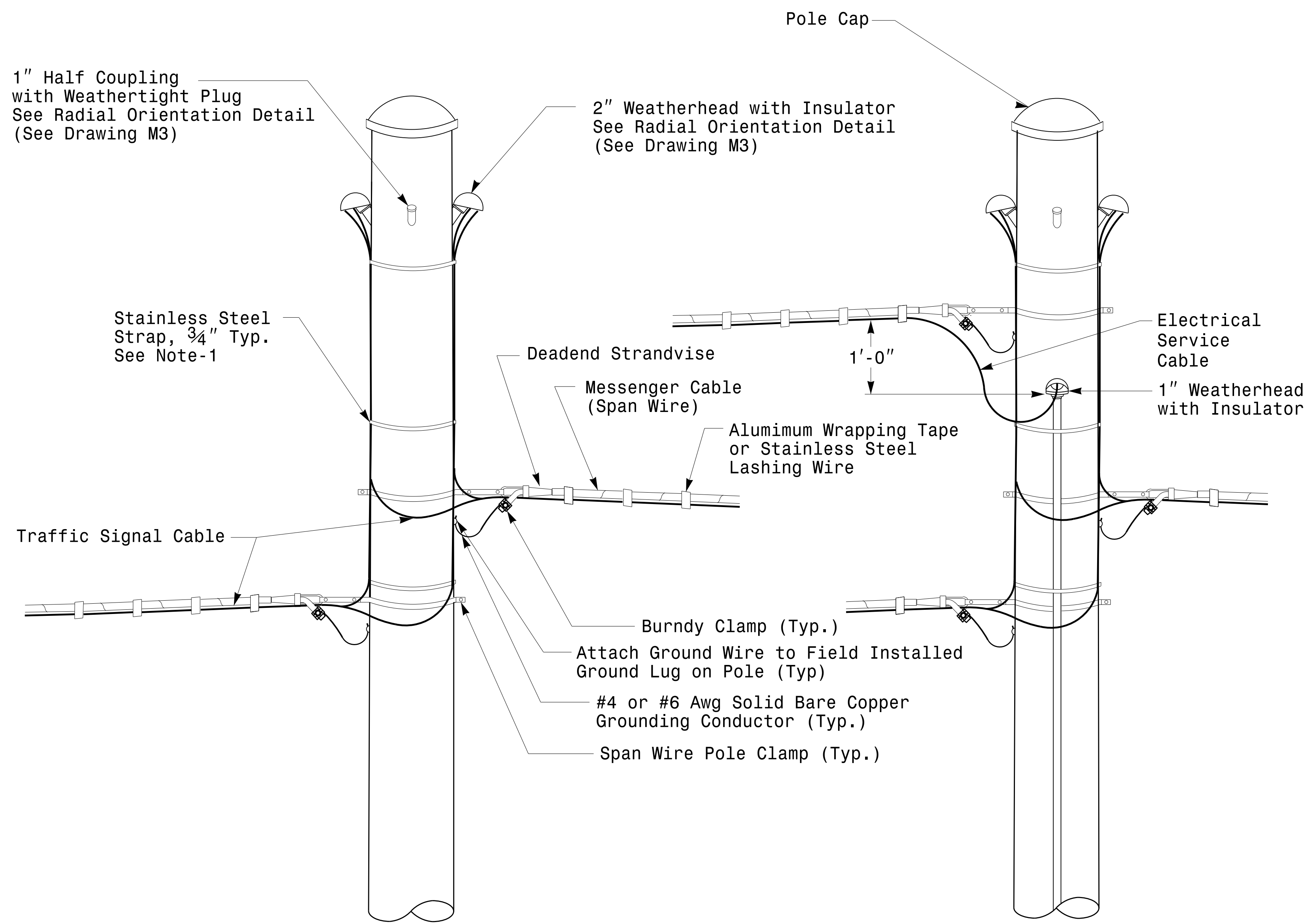
PLAN DATE: OCTOBER 2017 DESIGNED BY: C.F. ANDREWS  
 PREPARED BY: N. BITTING REVIEWED BY: D.C. SARKAR

REVISIONS	INIT.	DATE



Designed by: *Dibesh C. Sarkar*  
 DATE: 10/11/2017

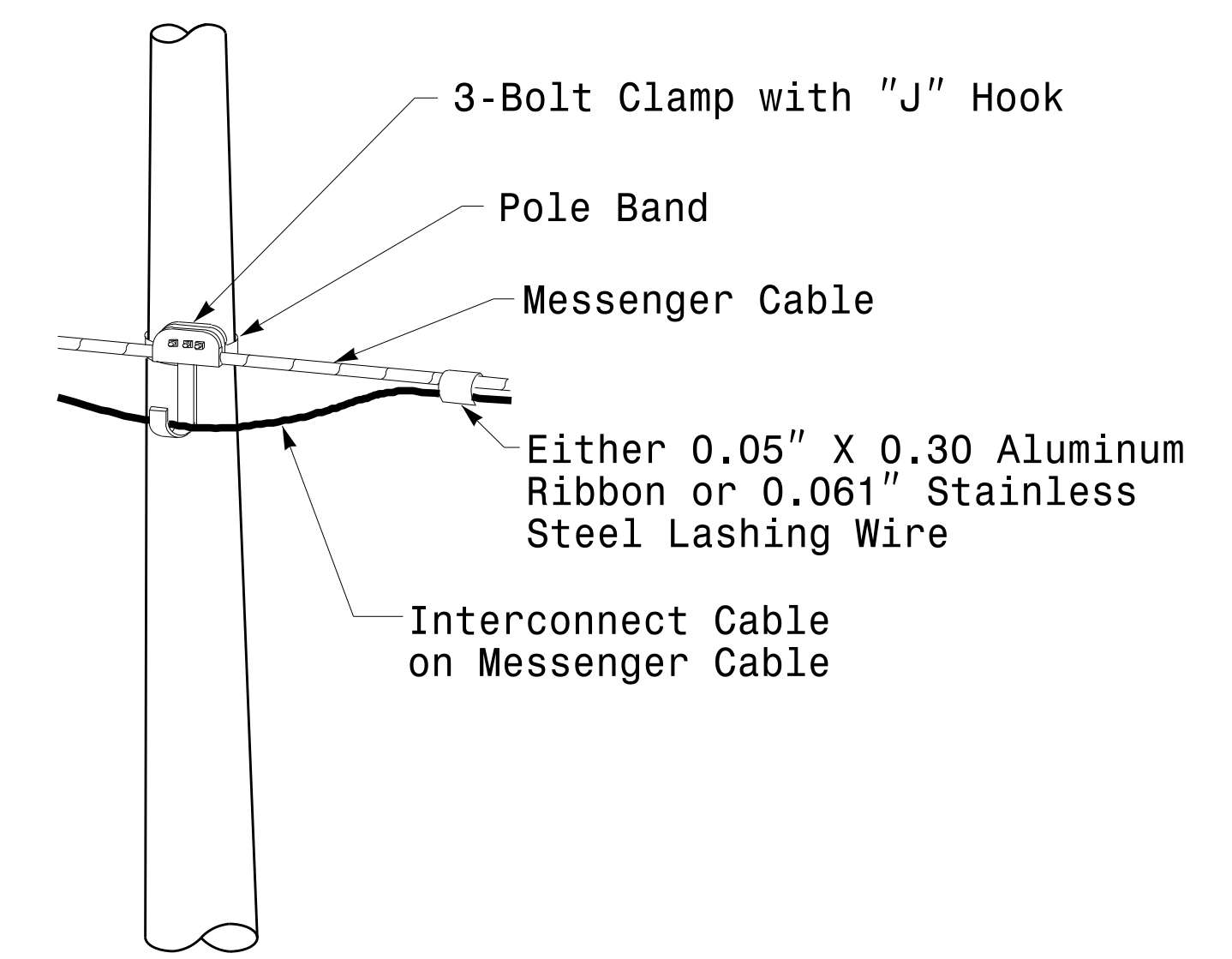




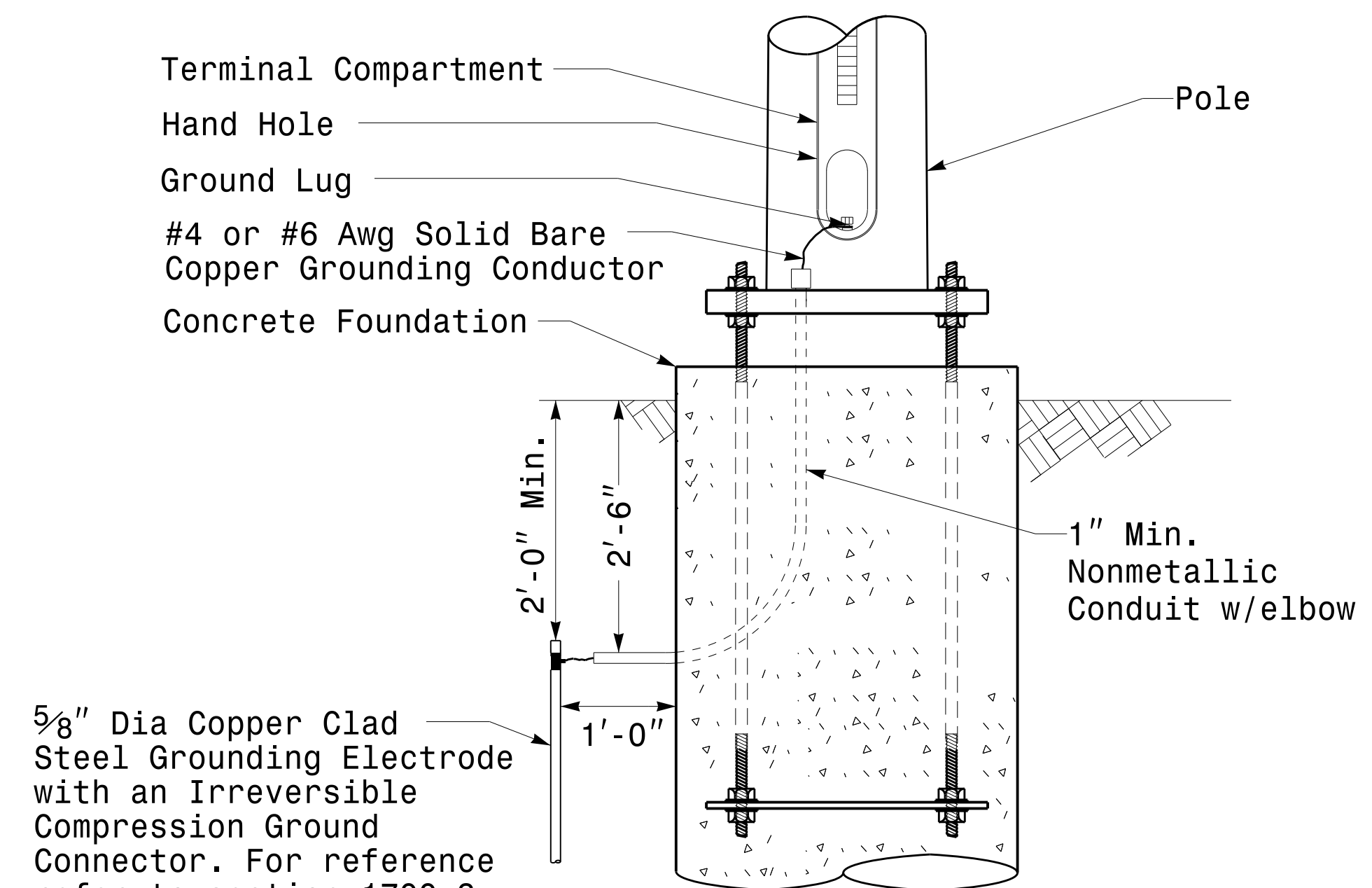
**Strain Pole Attachments**

**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**

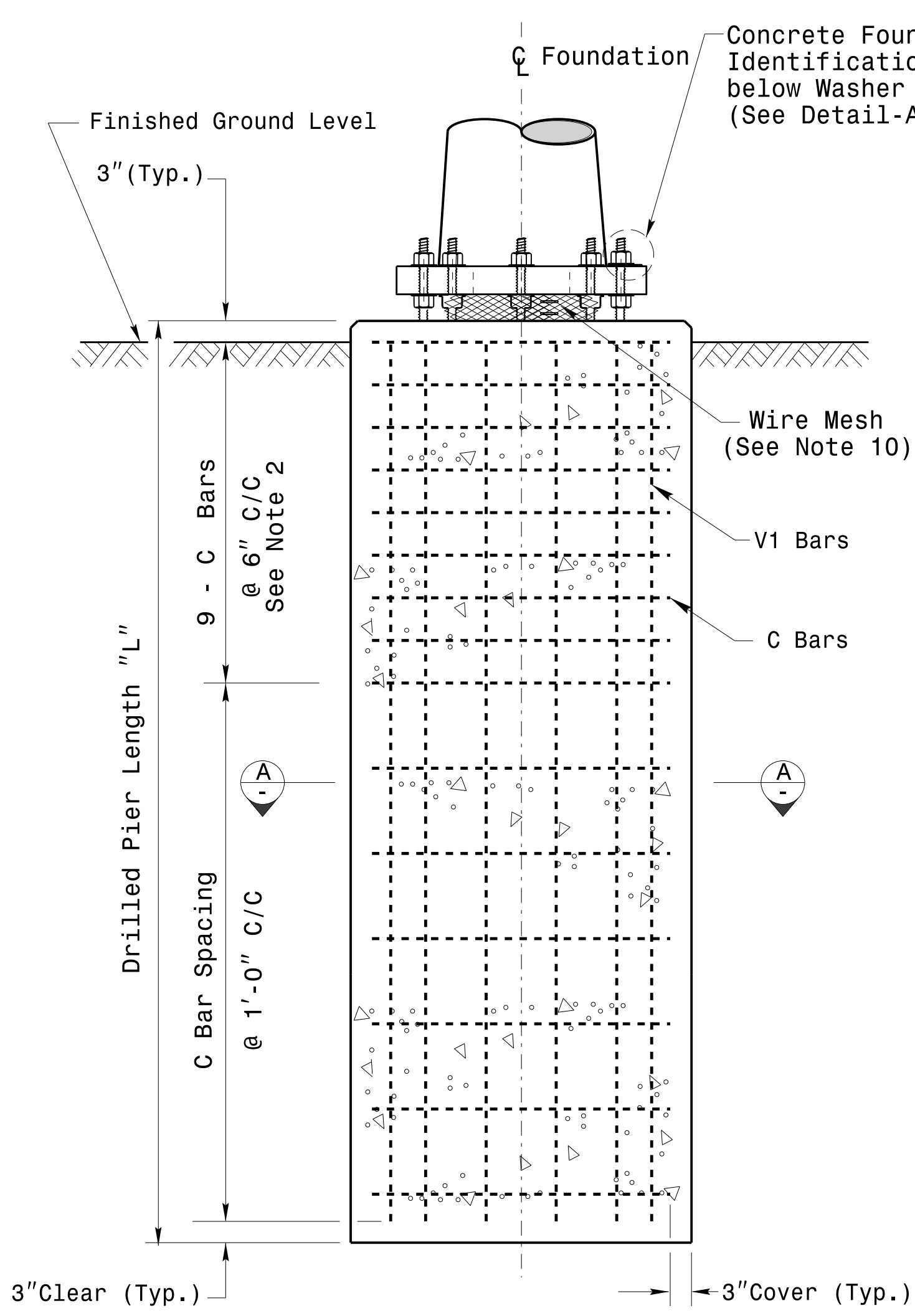


**Metal Pole Grounding Detail For Strain Pole and Mast Arm**

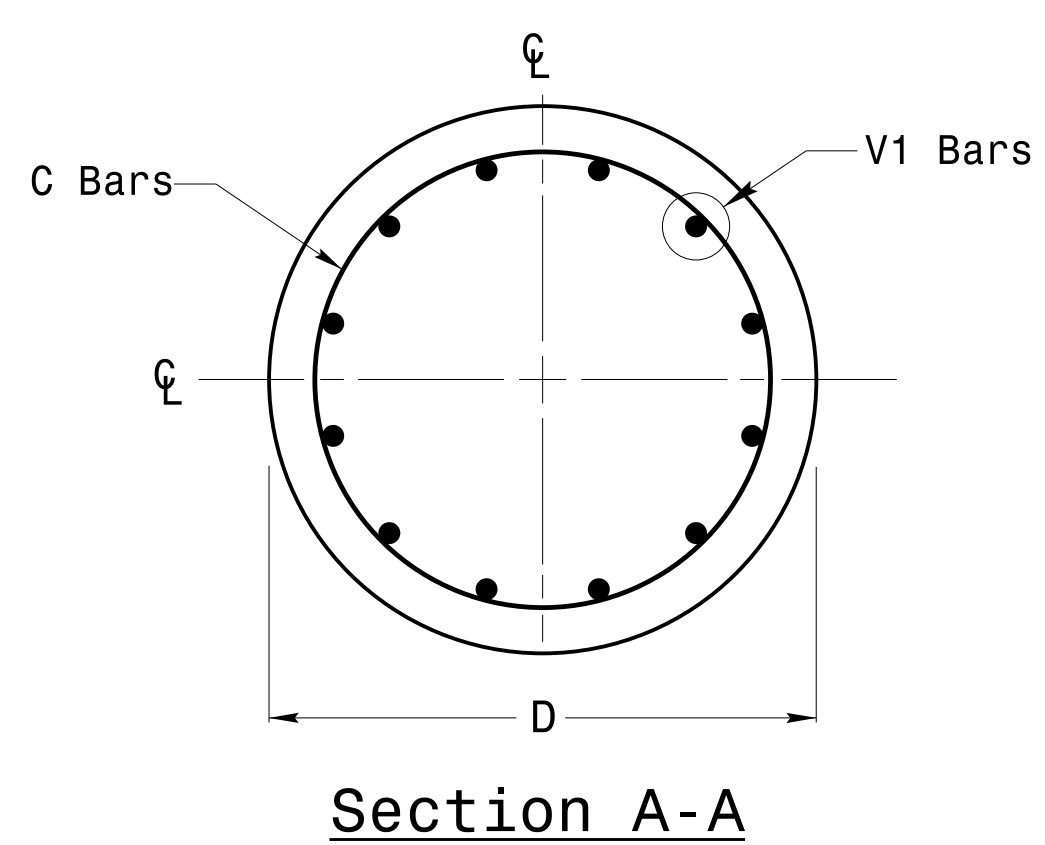
11-0CT-2017-08:36 136504115 StrainPole.dgn Design Section Eastern Region\m\ Sheets\2016\2014\_Sig.M6\_Std\_Fabrication\_Details-Strain\_Poles.dgn

	<p>Typical Fabrication Details For Strain Pole Attachments</p>		
	<p>PLAN DATE: OCTOBER 2017</p>	<p>DESIGNED BY: C.F. ANDREWS</p>	
<p>750 N. Greenfield Pkwy, Garner, NC 27529</p>	<p>SCALE: 0 NA NONE</p>	<p>REVISIONS</p>	<p>INIT. DATE</p>
		<p>DocuSigned by: D. Sarkar</p>	<p>10/11/2017</p>

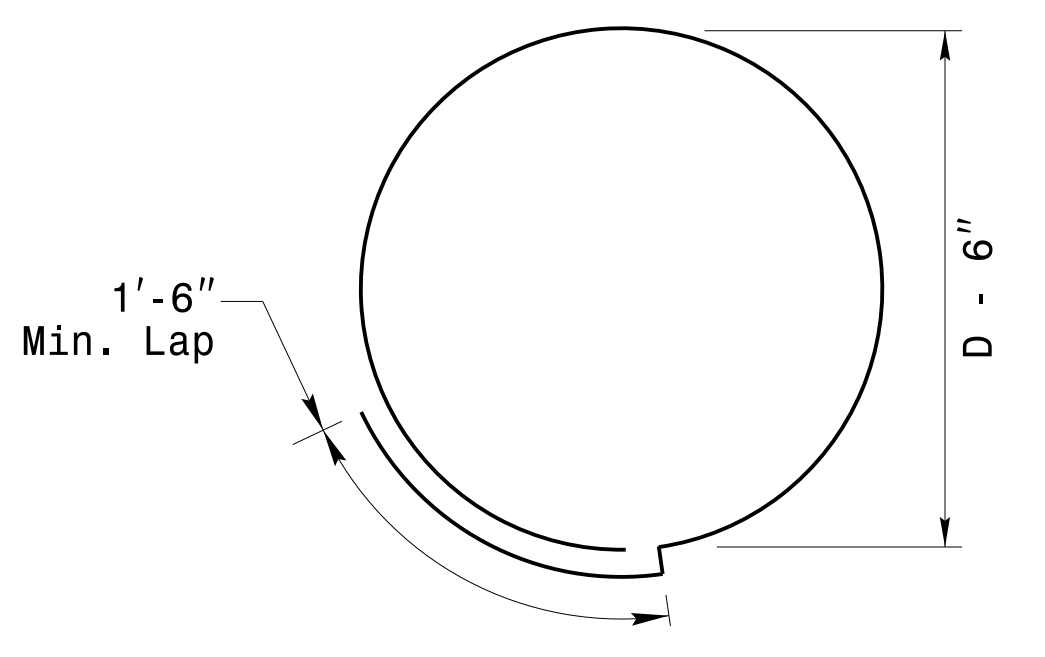




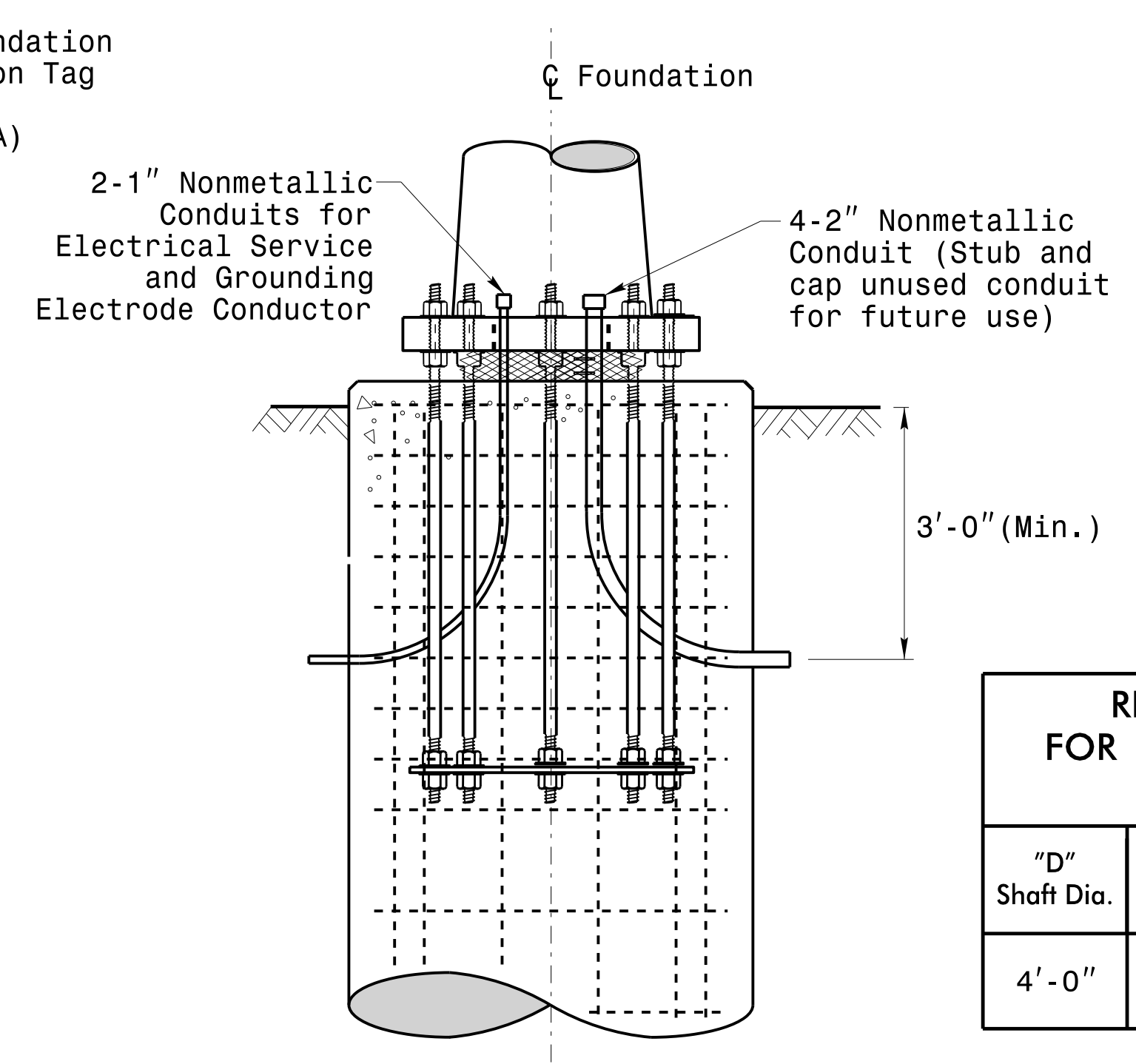
Concrete Shaft Elevation



Section A-A



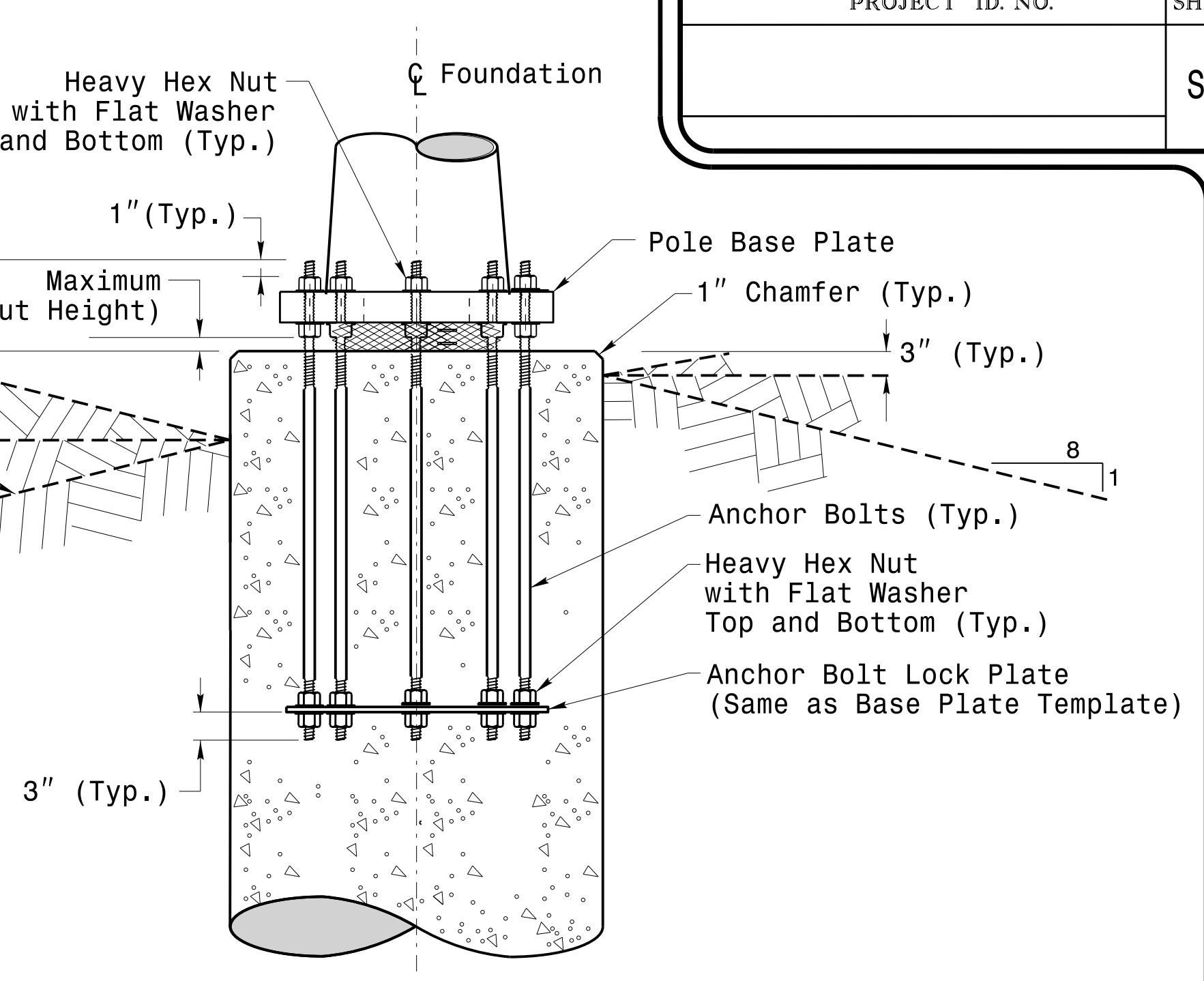
Typical "C" Bar Detail



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"

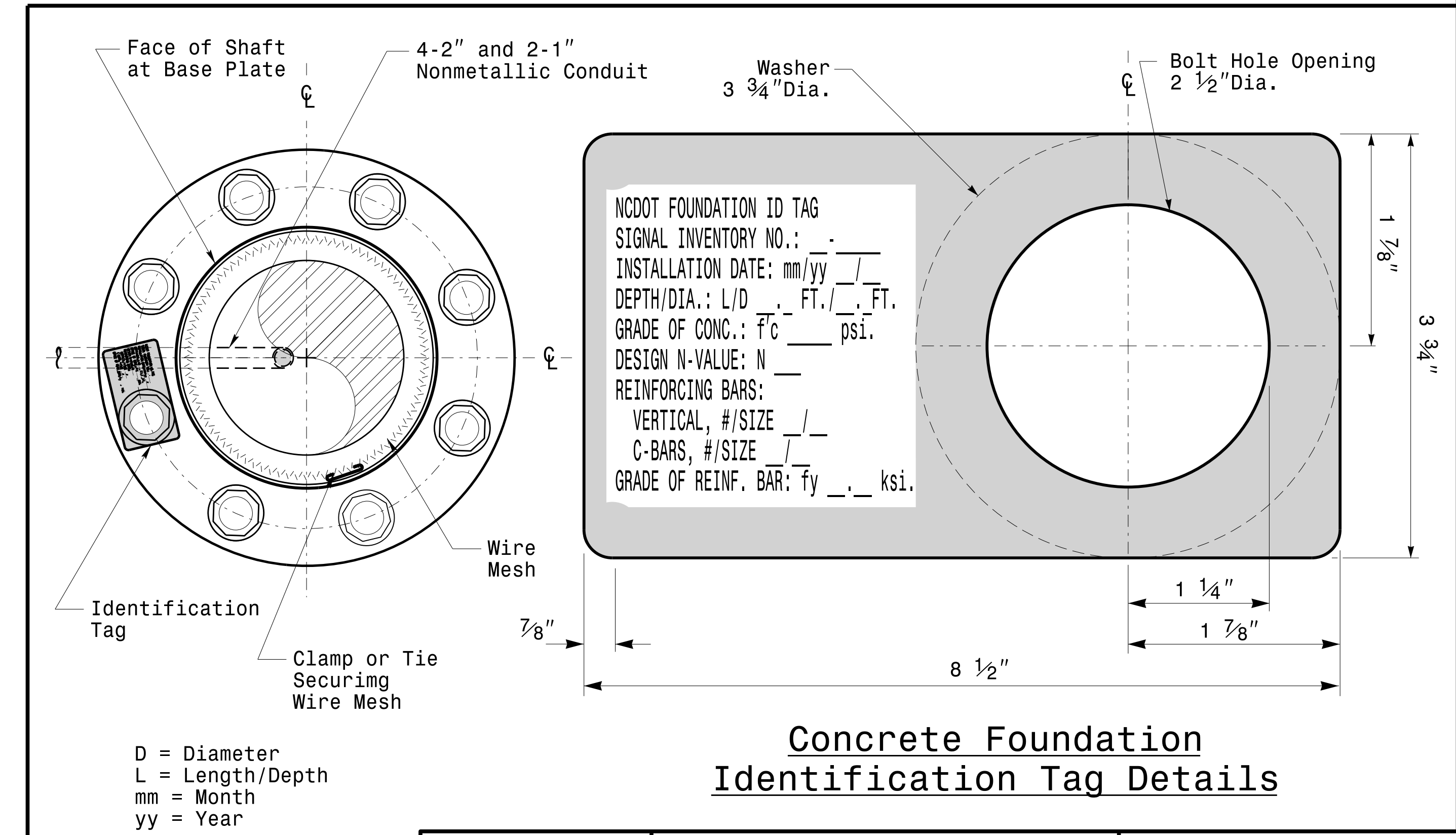
\* See Note No. 2  
 \*\* See Note No. 3



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

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. 1</p> <p>COMMENTS: Revised Foundation Tag Details</p>	
<p>SCALE: NONE</p>		<p>DocuSigned by: D. C. SARKAR</p> <p>10/11/2017</p>	

11-001-2017\_08:37  
 11-001-2017\_08:37  
 11-001-2017\_08:37  
 11-001-2017\_08:37



# SOIL CONDITION

		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:**

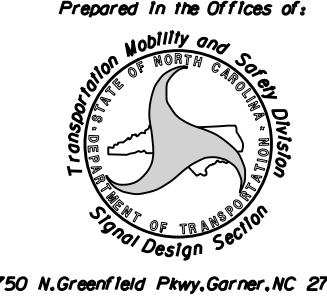
- Values shown in the "Reactions at the Pole Base" column represent the minimum acceptable capacity allowed for design using a design CSR of 1.00.
- Use chairs and spacers to maintain proper clearance.
- For foundation, always use air-entrain concrete mix.

**Foundation Selection:**

- Perform a standard penetration test at each proposed foundation site to determine "N" value.
- Select the appropriate wind zone from M 1 drawing.
- Select the soil type (Clay or Sand) that best describes the soil characteristics.
- Get the appropriate standard pole case number from the plans or from the Engineer.
- Select the appropriate column under "Standard Foundations" based on soil type and "N" value. Select the appropriate row based on the pole load case.
- The foundation depth is the value shown in the "Standard Foundations" category where the column and the row intersect.
- 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

	<p><b>Standard Strain Pole Foundation for All Soil Conditions</b></p>							
	PLAN DATE: OCTOBER 2017 PREPARED BY: N. BITTING	DESIGNED BY: C.B. COGDILL REVIEWED BY: D.C. SARKAR						
SCALE: 0 NA NONE	REVISIONS: <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>NO.</th> <th>DATE</th> <th>INIT.</th> </tr> <tr> <td>1</td> <td>7/12/2015</td> <td>N.B.</td> </tr> </table>	NO.	DATE	INIT.	1	7/12/2015	N.B.	SEAL Dated: 10/11/2017 DATE
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