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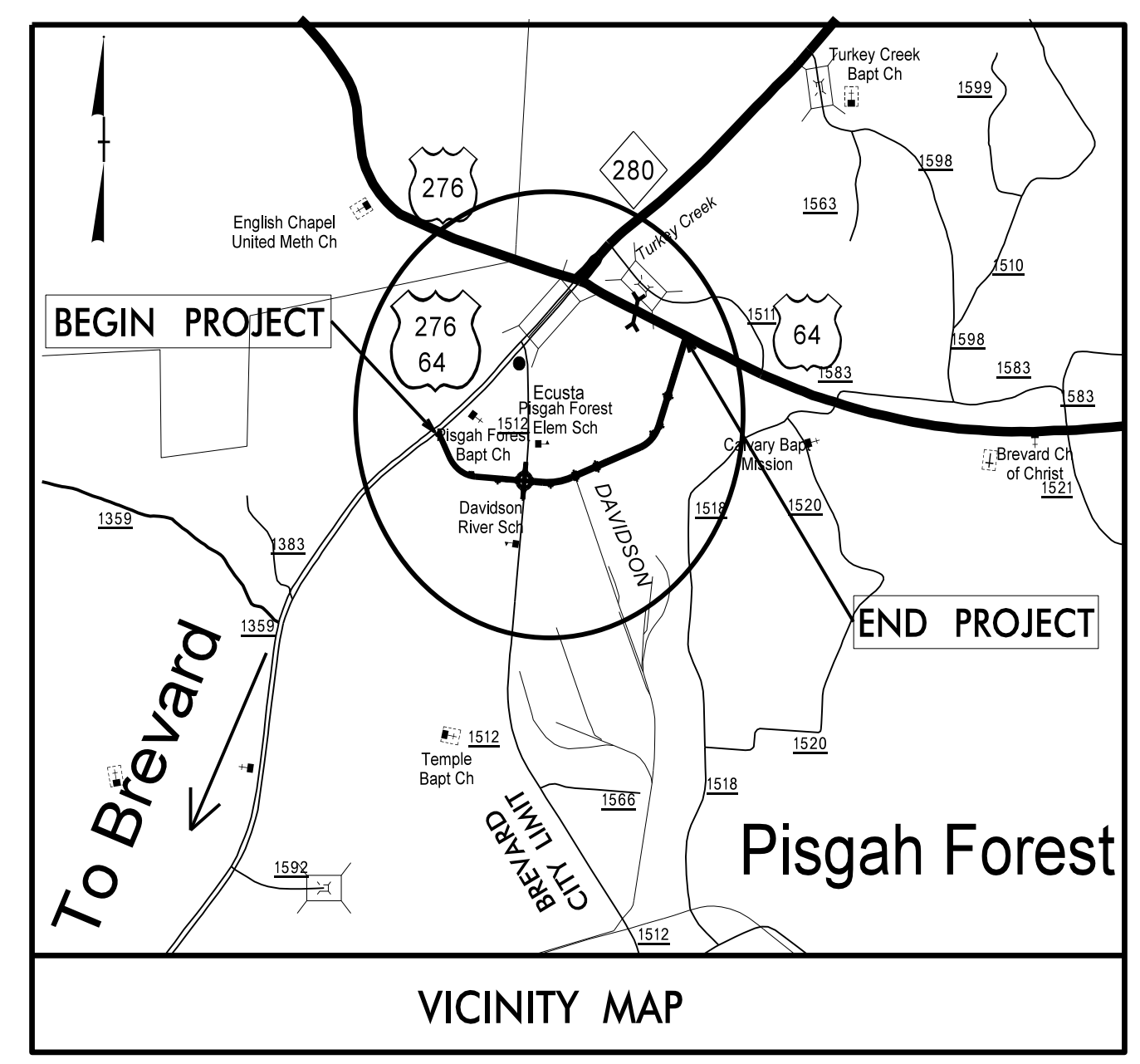
STATE OF NORTH CAROLINA  
DIVISION OF HIGHWAYS

# TRANSYLVANIA COUNTY

LOCATION: US 64/276 TO US 64, CITY OF BREVARD

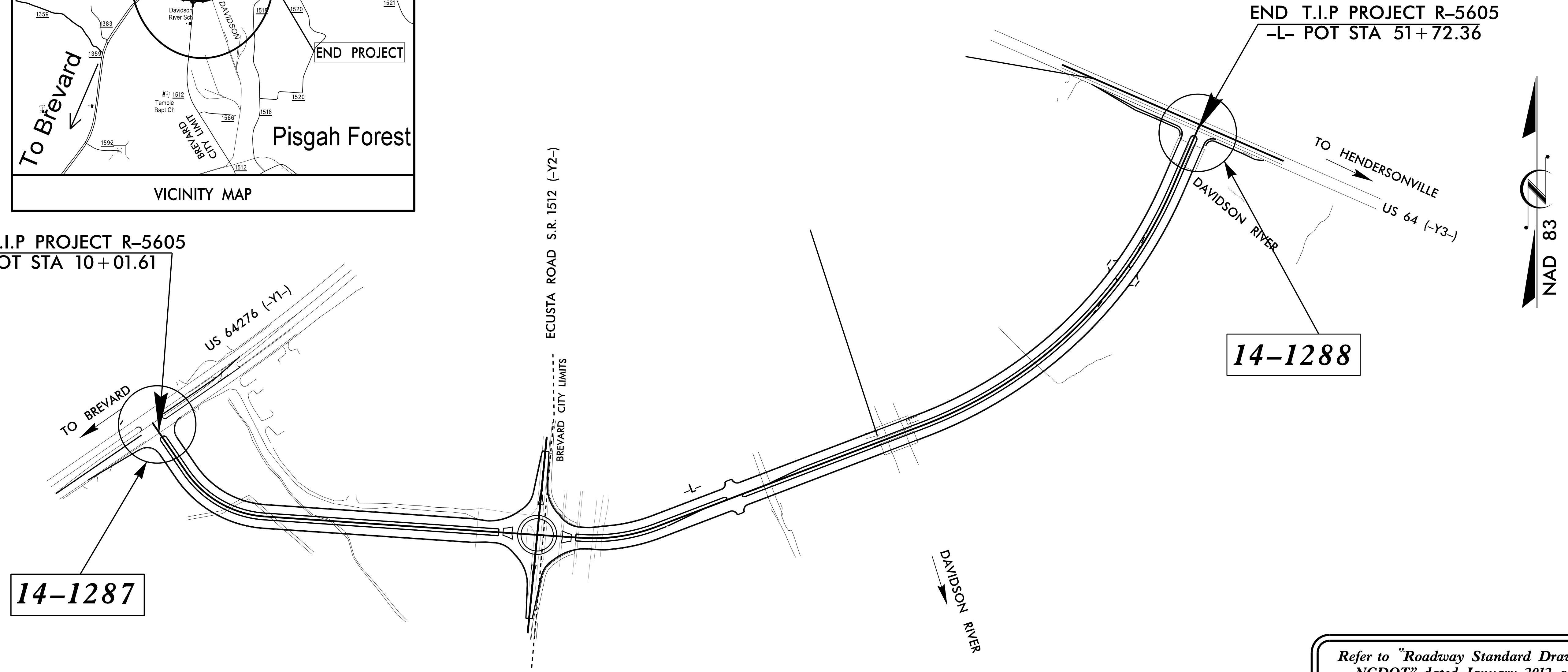
TYPE OF WORK: TRAFFIC SIGNALS

Project: R-5605



BEGIN T.I.P. PROJECT R-5605  
-L- POT STA 10+01.61

END T.I.P. PROJECT R-5605  
-L- POT STA 51+72.36



Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.

Sheet #	Reference #	Location/Description
Sig. 1.0	-----	Title Sheet
Sig. 2.0 - 2.4	14-1287	US 64 - 276 (Asheville Highway) at Davidson River Village Connector
Sig. 3.0 - 3.4	14-1288	US 64 (Hendersonville Highway) at Davidson River Village Connector / Store Entrance
Sig. M1 - M9	MP Standards	Standard Drawings for Metal Poles
Sep. 1	System Plan	Wireless Communications Plans

**INTELLIGENT TRANSPORTATION AND SIGNALS UNIT**  
Contacts:  
Gregory A. Fuller, PE-Intelligent Transportation System Engineer  
Timothy J. Williams, PE-Western Region Signals Engineer  
George C. Brown, PE-Signal Equipment Design Engineer

Prepared In the Office of:  
DIVISION OF HIGHWAYS  
TRANSPORTATION MOBILITY AND SAFETY  
DIVISION

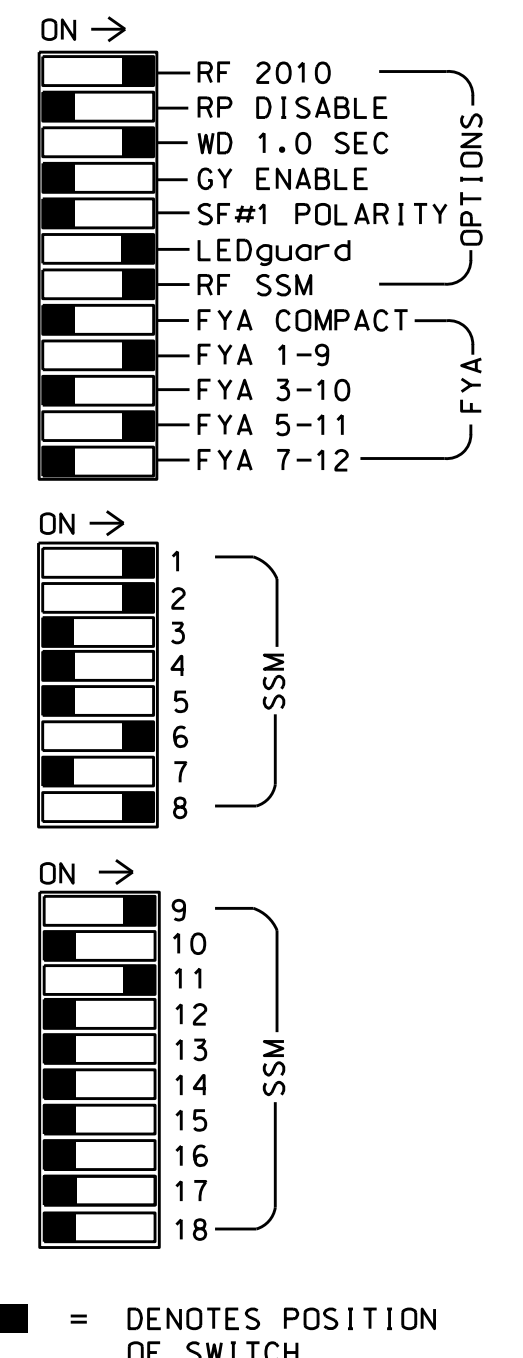
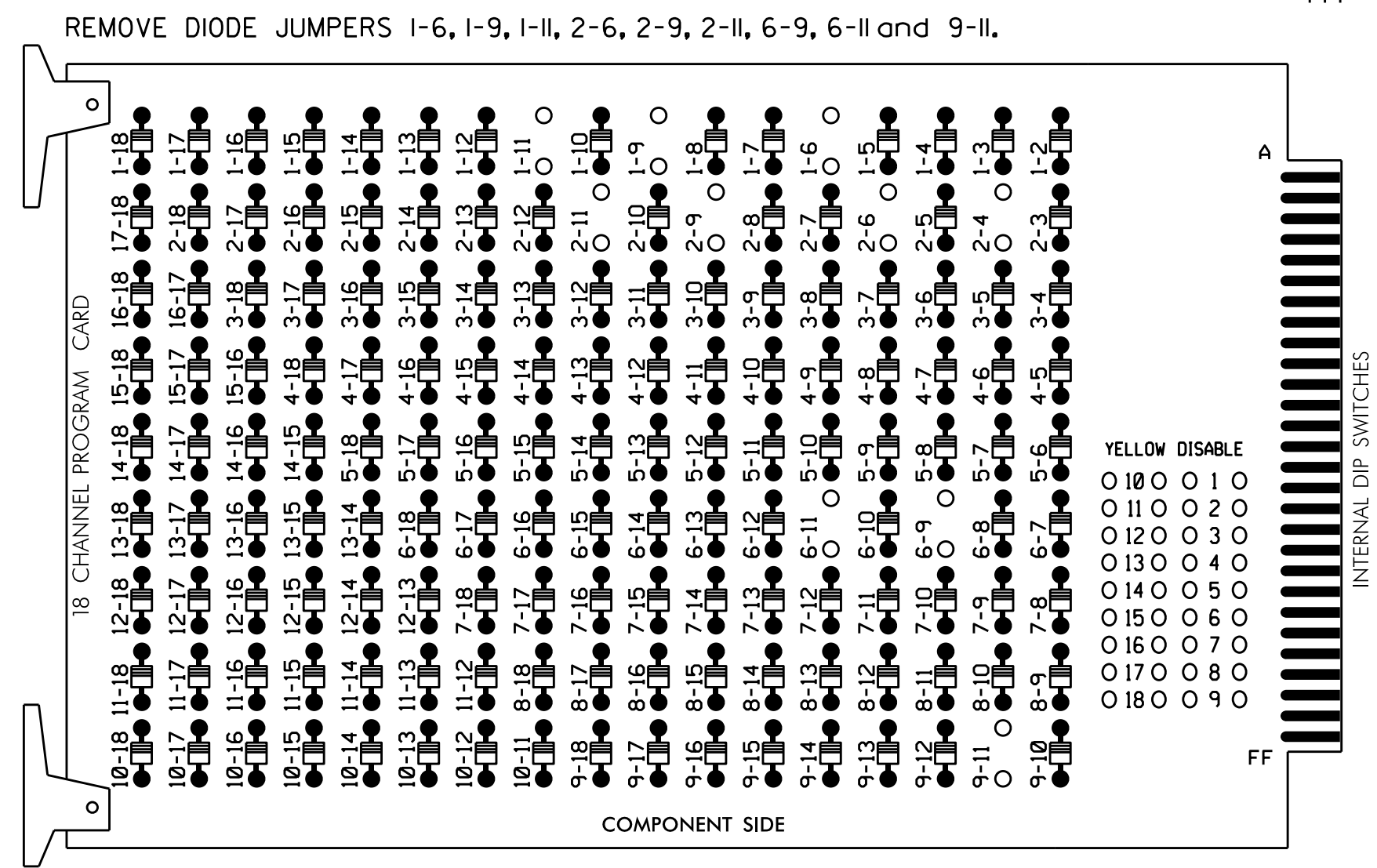
750 N. Greenfield Parkway, Garner, NC 27529

02-OCT-2015 08:33  
R:\p01\10\Signals\Design\T:\t\sheet\R-5605\_tsh\_20151001.dgn



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

(remove jumpers and set switches as shown)



**NOTES:**

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

**NOTES**

1. 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.
2. Enable Simultaneous Gap-Out for all phases.
3. Program phases 2 and 6 for Variable Initial and Gap Reduction.
4. Program phases 2 and 6 for Start Up In Green.
5. Program phases 2 and 6 for Yellow Flash, and overlap 1 as Wag Overlaps.
6. The cabinet and controller are part of the US 64 / 276 Brevard Closed Loop System.

**EQUIPMENT INFORMATION**

CONTROLLER.....2070L  
 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,AUX S4  
 PHASES USED.....1,2,6,8  
 OVERLAP "A".....1+2  
 OVERLAP "B".....NOT USED  
 OVERLAP "C".....6  
 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	22,23	NU	NU	NU	NU	61,62	NU	NU	23	81,82	NU	11	NU	NU	21	NU
RED	*	128						134				107						
YELLOW		129						135				108						
GREEN		130						136				109						
RED ARROW													A121				A114	
YELLOW ARROW	126										108		A122				A115	
FLASHING YELLOW ARROW													A123				A116	
GREEN ARROW	127	127									109							

NU = Not Used

\* Denotes install load resistor. See load resistor installation detail this sheet.

★ See pictorial of head wiring in detail below.

**INPUT FILE POSITION LAYOUT**

(front view)

FILE	U	1	2	3	4	5	6	7	8	9	10	11	12	13	14
"I"	U	∅ 1 1A	∅ 2/SYS 2A/S01	∅ 2C 2C	∅ 10/S	∅ 10/S	∅ 10/S	∅ 10/S	∅ 10/S	∅ 10/S	∅ 10/S	∅ 10/S	∅ 10/S	∅ 10/S	∅ 10/S
	L	NOT USED	∅ 2/SYS 2B/S02	NOT USED	∅ 10/S	∅ 10/S	∅ 10/S	∅ 10/S	∅ 10/S	∅ 10/S	∅ 10/S	∅ 10/S	∅ 10/S	∅ 10/S	∅ 10/S
"J"	U	∅ 6/SYS 6A/S03	∅ 6/SYS 6A/S03	∅ 8 8A	∅ 10/S	∅ 10/S	∅ 10/S	∅ 10/S	∅ 10/S	∅ 10/S	∅ 10/S	∅ 10/S	∅ 10/S	∅ 10/S	∅ 10/S
	L	∅ 6/SYS 6B/S04	∅ 6/SYS 6B/S04	∅ 1 1B	∅ 10/S	∅ 10/S	∅ 10/S	∅ 10/S	∅ 10/S	∅ 10/S	∅ 10/S	∅ 10/S	∅ 10/S	∅ 10/S	∅ 10/S

EX.: 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE  
 ST = STOP TIME

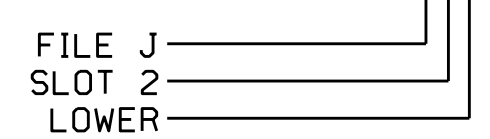
⊗ Wired Input - Do not populate slot with detector card

**INPUT FILE CONNECTION & PROGRAMMING CHART**

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
1A <sup>1</sup>	TB2-1,2	I1U	56	18	1	1	Y	Y			15
	-	J4U	48	10	26	6	Y	Y	Y		3
1B	TB5-11,12	J6L	46	8	18	1	Y	Y			15
	2A/S01	TB2-5,6	I2U	39	1	2	2/SYS	Y	Y		
2C	2B/S02	TB2-7,8	I2L	43	5	12	2/SYS	Y	Y		
	TB2-9,10	I3U	63	25	32	2	Y	Y	Y		3
6A/S03	TB3-5,6	J2U	40	2	6	6/SYS	Y	Y			
	6B/S04	TB3-7,8	J2L	44	6	16	6/SYS	Y	Y		
8A	TB5-9,10	J6U	42	4	8	8	Y	Y			

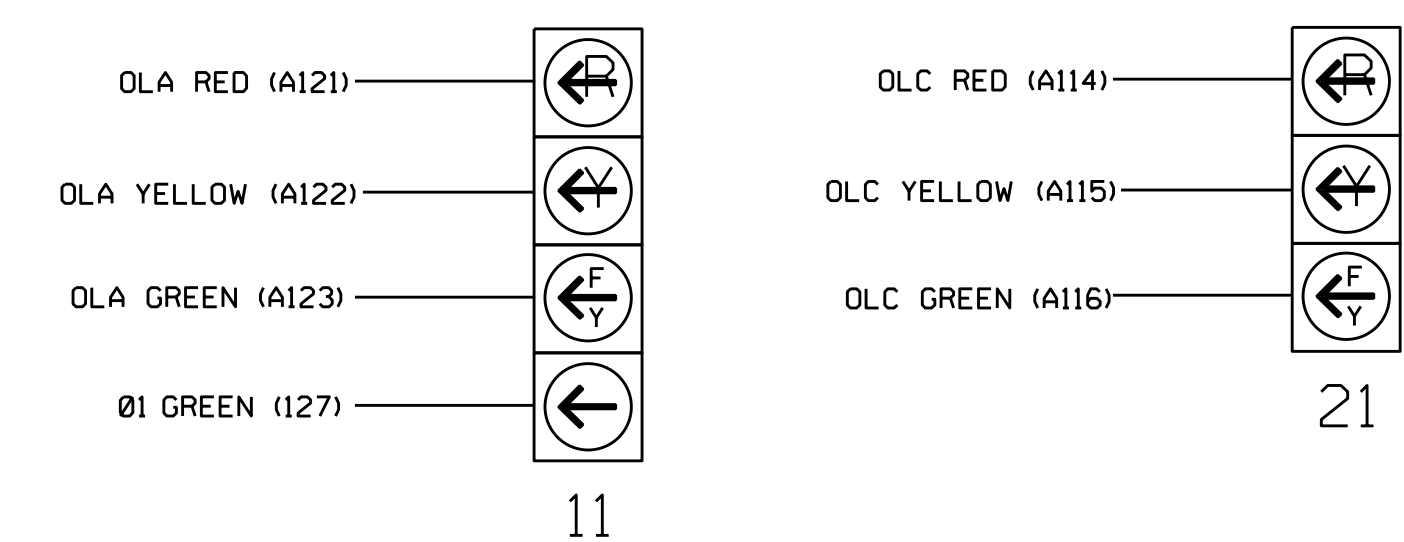
<sup>1</sup>Add jumper from I1-W to J4-W, on rear of input file.

INPUT FILE POSITION LEGEND: J2L



**FYA SIGNAL WIRING DETAIL**

(wire signal heads as shown)



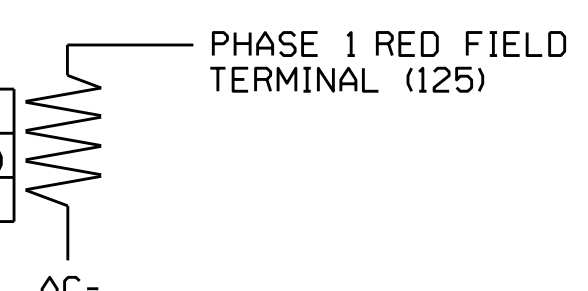
**NOTE**

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

**LOAD RESISTOR INSTALLATION DETAIL**

(install resistor as shown below)

ACCEPTABLE VALUES	
VALUE (ohms)	WATTAGE
1.5K - 1.9K	25W (min)
2.0K - 3.0K	10W (min)



NOTE: The purpose of this resistor is to load the channel red monitor input in order for the Signal Sequence Monitor to use the full signal sequence monitoring capability on channels that do not use the red display in the field.

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 14-1287  
 DESIGNED: September 2015  
 SEALED: 9/29/2015  
 REVISED: N/A

Electrical Detail - Sheet 1 of 2

Electrical and Programming Details for: **US 64-276 (Asheville Highway) at Davidson River Village Connector**

Division 14 Transylvania County near Brevard

PLAN DATE: September 2015 REVIEWED BY: GCB

PREPARED BY: C. Strickland REVIEWED BY:

REVISIONS: \_\_\_\_\_ INIT. DATE

Seal of George C. Brown, Professional Engineer, License No. 022013, State of North Carolina.

Discussed by: *George C. Brown* 9/30/2015

750 N. Greenfield Pkwy, Garner, NC 27529

SIG. INVENTORY NO. 14-1287

30-SEP-2015 11:34  
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 C:\Users\cstrickland





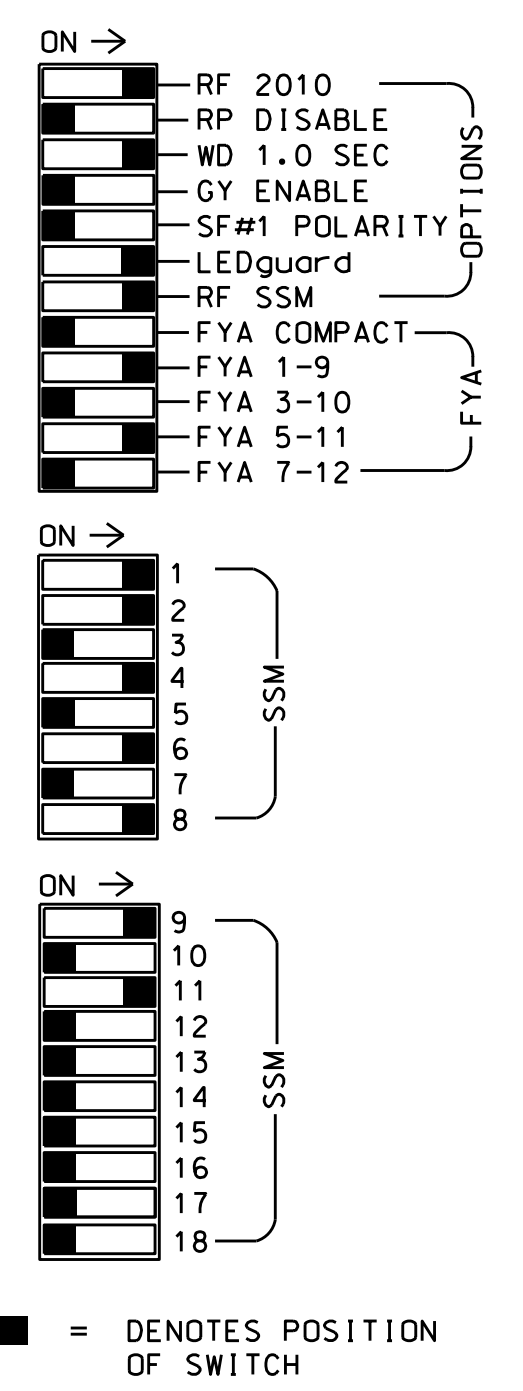
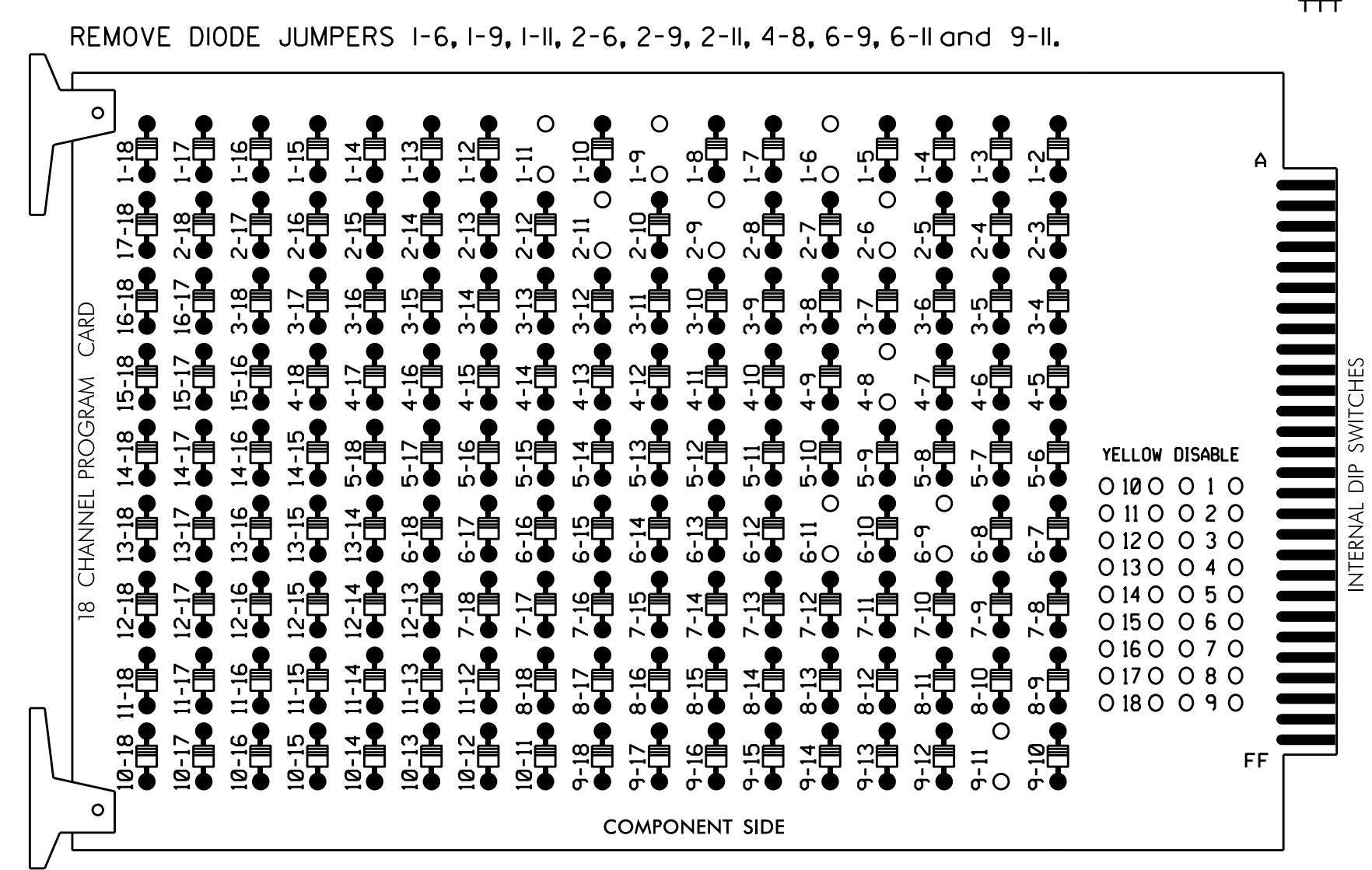






**EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL**

(remove jumpers and set switches as shown)



**NOTES:**

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

**NOTES**

1. 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.
2. Program phases 4 and 8 for Dual Entry.
3. Enable Simultaneous Gap-Out for all phases.
4. Program phases 2 and 6 for Variable Initial and Gap Reduction.
5. Program phases 2 and 6 for Start Up In Green.
6. Program phases 2 and 6 for Yellow Flash, and overlap 1 as Wag Overlaps.
7. The cabinet and controller are part of the Wireless System.

**EQUIPMENT INFORMATION**

CONTROLLER.....2070L  
 CABINET.....332 /W/ AUX  
 SOFTWARE.....ECONOLITE OASIS  
 CABINET MOUNT.....BASE  
 OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE  
 LOAD SWITCHES USED.....S1,S2,S5,S8,S11,AUX S1,AUX S4  
 PHASES USED.....1,2,4,6,8  
 OVERLAP "A".....1+2  
 OVERLAP "B".....NOT USED  
 OVERLAP "C".....6  
 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	22,23	NU	NU	41,42	NU	NU	61,62	NU	NU	81,82	NU	11★	NU	NU	21★	NU
RED	*	128				101			134			107						
YELLOW		129				102			135			108						
GREEN		130				103			136			109						
RED ARROW													A121					A114
YELLOW ARROW		126											A122					A115
FLASHING YELLOW ARROW													A123					A116
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 below.

**INPUT FILE POSITION LAYOUT**

(front view)

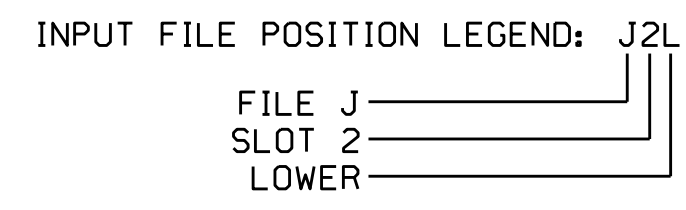
FILE	1	2	3	4	5	6	7	8	9	10	11	12	13	14
U	∅ 1	∅ 2	-O-S	-O-S	-O-S	∅ 4	∅ 4	-O-S	-O-S	-O-S	-O-S	-O-S	-O-S	FS
L	1A	2A				4A	4C							DC ISOLATOR
U	NOT USED	∅ 2	-O-S	-O-S	-O-S	∅ 4	NOT USED	-O-S	-O-S	-O-S	-O-S	-O-S	-O-S	ST
L		2B				4B								DC ISOLATOR
U	S	∅ 6	-O-S	-O-S	-O-S	∅ 8	-O-S	-O-S	-O-S	-O-S	-O-S	-O-S	-O-S	S
L		6A				8A								T
U	-O-S	NOT USED	-O-S	-O-S	-O-S	∅ 1	-O-S	-O-S	-O-S	-O-S	-O-S	-O-S	-O-S	-O-S
L						1B								

EX.: 1A, 2A, ETC. = LOOP NO.'S  
 FS = FLASH SENSE  
 ST = STOP TIME  
 ⊗ Wired Input - Do not populate slot with detector card

**INPUT FILE CONNECTION & PROGRAMMING CHART**

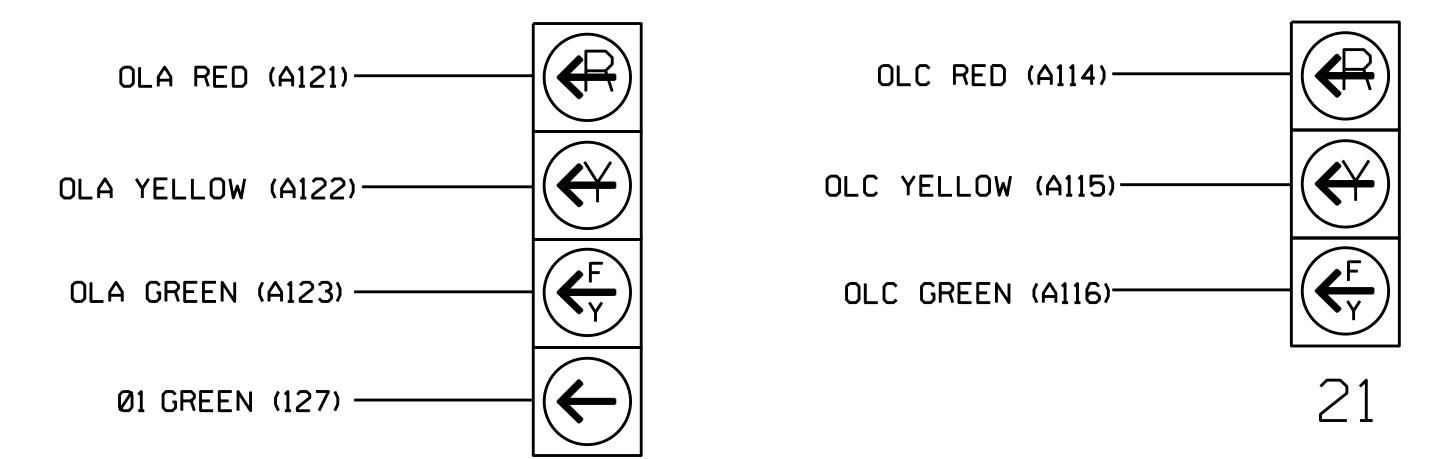
LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
1A <sup>1</sup>	TB2-1,2	I1U	56	18	1	1	Y	Y	Y		15
	-	J4U	48	10	26	6	Y	Y	Y		3
1B	TB5-11,12	J6L	46	8	18	1	Y	Y	Y		15
2A	TB2-5,6	I2U	39	1	2	2	Y	Y			
2B	TB2-7,8	I2L	43	5	12	2	Y	Y	Y		3
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			3
4B	TB4-11,12	I6L	45	7	14	4	Y	Y			10
4C	TB6-1,2	I7U	65	27	34	4	Y	Y			15
6A	TB3-5,6	J2U	40	2	6	6	Y	Y			
8A	TB5-9,10	J6U	42	4	8	8	Y	Y			

<sup>1</sup>Add jumper from I1-W to J4-W, on rear of input file.



**FYA SIGNAL WIRING DETAIL**

(wire signal heads as shown)

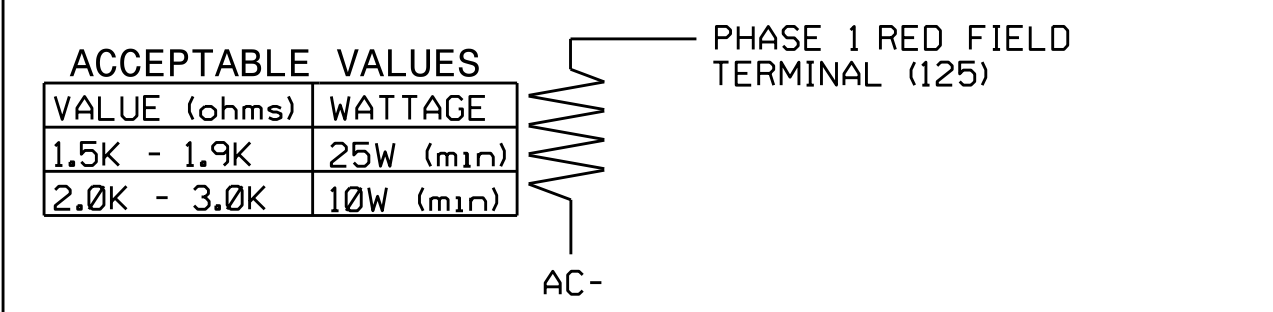


**NOTE**

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

**LOAD RESISTOR INSTALLATION DETAIL**

(install resistor as shown below)



NOTE: The purpose of this resistor is to load the channel red monitor input in order for the Signal Sequence Monitor to use the full signal sequence monitoring capability on channels that do not use the red display in the field.

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 14-1288  
 DESIGNED: September 2015  
 SEALED: 9/29/2015  
 REVISED: N/A

Electrical Detail - Sheet 1 of 2

Electrical and Programming Details for: US 64 (Hendersonville Highway) at Davidson River Village Connector / Store Entrance

Prepared in the Offices of: Transylvania Mobility and Safety Solutions, Signal Management System

Division 14 Transylvania County near Brevard

PLAN DATE: September 2015 REVIEWED BY: GCB

PREPARED BY: C. Strickland REVIEWED BY:

REVISIONS: INIT. DATE

Seal: GEORGE C. BROWN, ENGINEER, No. 022013

Designed by: George C. Brown, 9/30/2015

750 N. Greenfield Pkwy, Garner, NC 27529

SIG. INVENTORY NO. 14-1288

30-565-2015\_09-18  
 S:\PROJECTS\15\_Signal\work\hgr\oups\51g\_Maps\Strickland\1288\_sml\_e\_xxx.dgn  
 GCB:TRC:KJL:and

### LOGICAL I/O PROCESSOR PROGRAMMING DETAIL TO PRODUCE SPECIAL FYA-PPLT SIGNAL SEQUENCE

(program controller as shown below)

- From Main Menu press '2' (PHASE CONTROL), then '1' (PHASE CONTROL FUNCTIONS). Scroll to the bottom of the menu and Enable ACT Logic Commands 1, 2 and 3.
- From Main Menu press '6' (OUTPUTS), then '3' (LOGICAL I/O PROCESSOR).

```

LOGICAL I/O COMMAND #1 (+/-COMMAND#)
IF ACTIVE PHASE #1 IS ON
AND RED CLEAR ON PHASE #1 IS ON

      ↓
      SCROLL DOWN

THEN:
SET OUTPUT ASSIGNMENT #50 ON
SET OUTPUT ASSIGNMENT #51 OFF
  
```

NOTE: Logic for Phase 1 RED Clear when transitioning from Phase 1 to Phase 2 (Head 11).

PRESS '+'

```

LOGICAL I/O COMMAND #2 (+/-COMMAND#)
IF ACTIVE PHASE #1 IS ON

      ↓
      SCROLL DOWN

THEN:
SET OUTPUT ASSIGNMENT #52 OFF
  
```

NOTE: Logic for Switching Flashing Yellow Arrow OFF during Phase 1 (Head 11).

PRESS '+'

```

LOGICAL I/O COMMAND #3 (+/-COMMAND#)
IF YELLOW ON PHASE #1 IS ON

      ↓
      SCROLL DOWN

THEN:
SET OUTPUT ASSIGNMENT #51 ON
  
```

NOTE: Logic for Yellow Arrow Clearance from Phase 1 (Head 11).

LOGIC I/O PROCESSOR PROGRAMMING COMPLETE

#### OUTPUT REFERENCE SCHEDULE

OUTPUT 50 = Overlap A Red  
OUTPUT 51 = Overlap A Yellow  
OUTPUT 52 = Overlap A Green

### OVERLAP PROGRAMMING DETAIL

(program controller as shown below)

From Main Menu press '8' (OVERLAPS), then '1' (VEHICLE OVERLAP SETTINGS).

```

PAGE 1: VEHICLE OVERLAP 'A' SETTINGS
PHASE:      12345678910111213141516
VEH OVL PARENTS: XX
VEH OVL NOT VEH:
VEH OVL NOT PED:
VEH OVL GRN EXT:
STARTUP COLOR: - RED - YELLOW - GREEN
FLASH COLORS: - RED - YELLOW X GREEN
SELECT VEHICLE OVERLAP OPTIONS: (Y/N)
FLASH YELLOW IN CONTROLLER FLASH?...Y
GREEN EXTENSION (0-255 SEC)...0.0
YELLOW CLEAR (0=PARENT,3-25.5 SEC)...0.0
RED CLEAR (0=PARENT,0.1-25.5 SEC)...0.0
OUTPUT AS PHASE # (0=NONE, 1-16)...0
  
```

← NOTICE GREEN FLASH

PRESS '+' TWICE

```

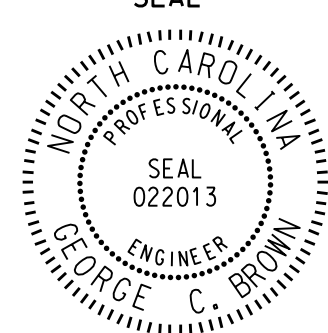
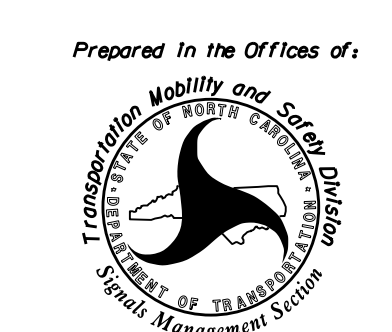
PAGE 1: VEHICLE OVERLAP 'C' SETTINGS
PHASE:      12345678910111213141516
VEH OVL PARENTS: X
VEH OVL NOT VEH:
VEH OVL NOT PED:
VEH OVL GRN EXT:
STARTUP COLOR: - RED - YELLOW - GREEN
FLASH COLORS: - RED - YELLOW X GREEN
SELECT VEHICLE OVERLAP OPTIONS: (Y/N)
FLASH YELLOW IN CONTROLLER FLASH?...Y
GREEN EXTENSION (0-255 SEC)...0.0
YELLOW CLEAR (0=PARENT,3-25.5 SEC)...0.0
RED CLEAR (0=PARENT,0.1-25.5 SEC)...0.0
OUTPUT AS PHASE # (0=NONE, 1-16)...0
  
```

← NOTICE GREEN FLASH

OVERLAP PROGRAMMING COMPLETE

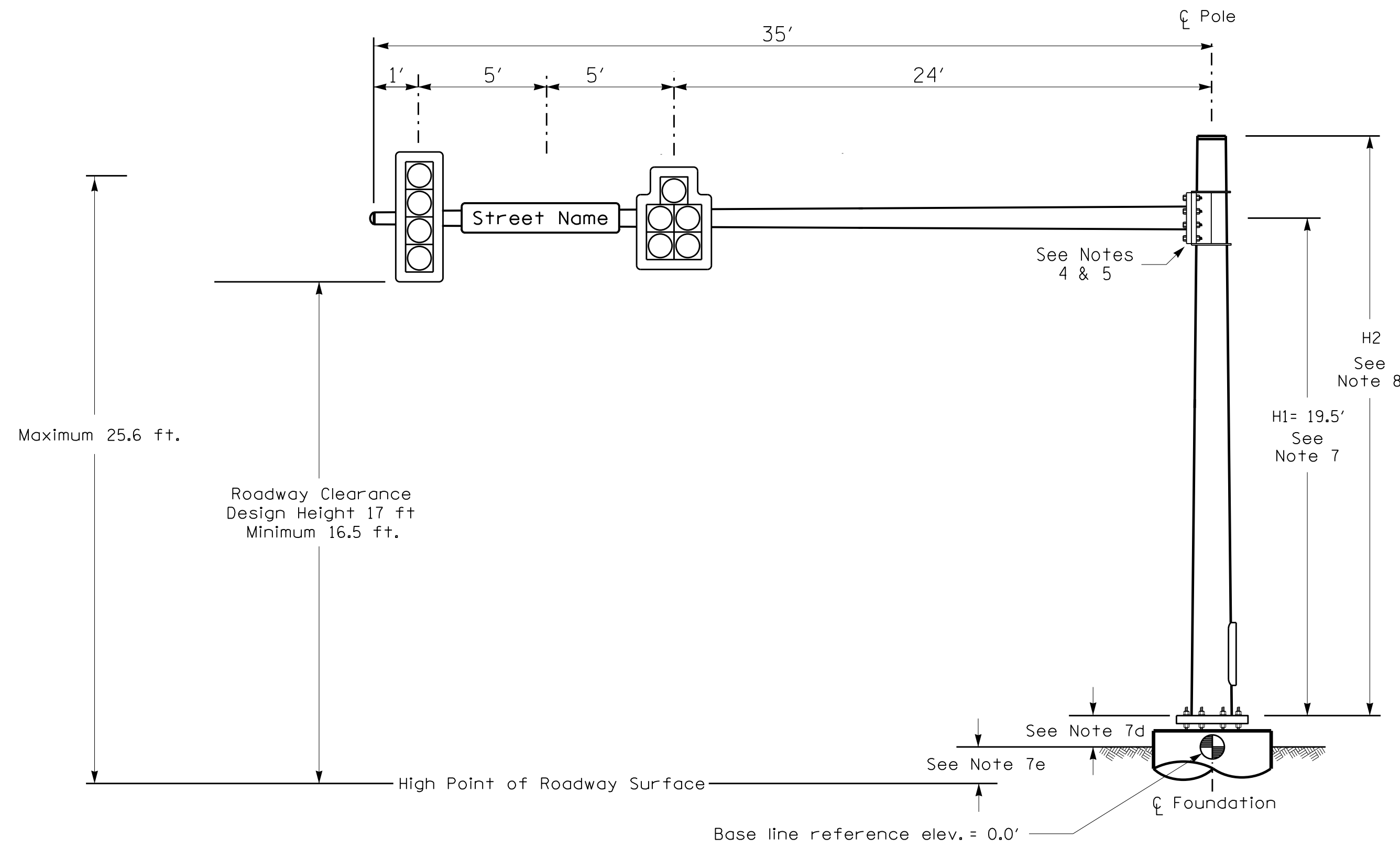
THIS ELECTRICAL DETAIL IS FOR  
THE SIGNAL DESIGN: 14-1288  
DESIGNED: September 2015  
SEALED: 9/29/2015  
REVISED: N/A

Electrical Detail - Sheet 2 of 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:	<b>US 64 (Hendersonville Highway)</b> at <b>Davidson River Village Connector / Store Entrance</b>	SEAL 
	Division 14 Transylvania County near Brevard PLAN DATE: September 2015 REVIEWED BY: GCB PREPARED BY: C. Strickland REVIEWED BY:	Documented by: <b>George C. Brown</b> 9/30/2015 <small>F12001ED08E8434</small> DATE
REVISIONS      INIT.      DATE		SIG. INVENTORY NO. 14-1288

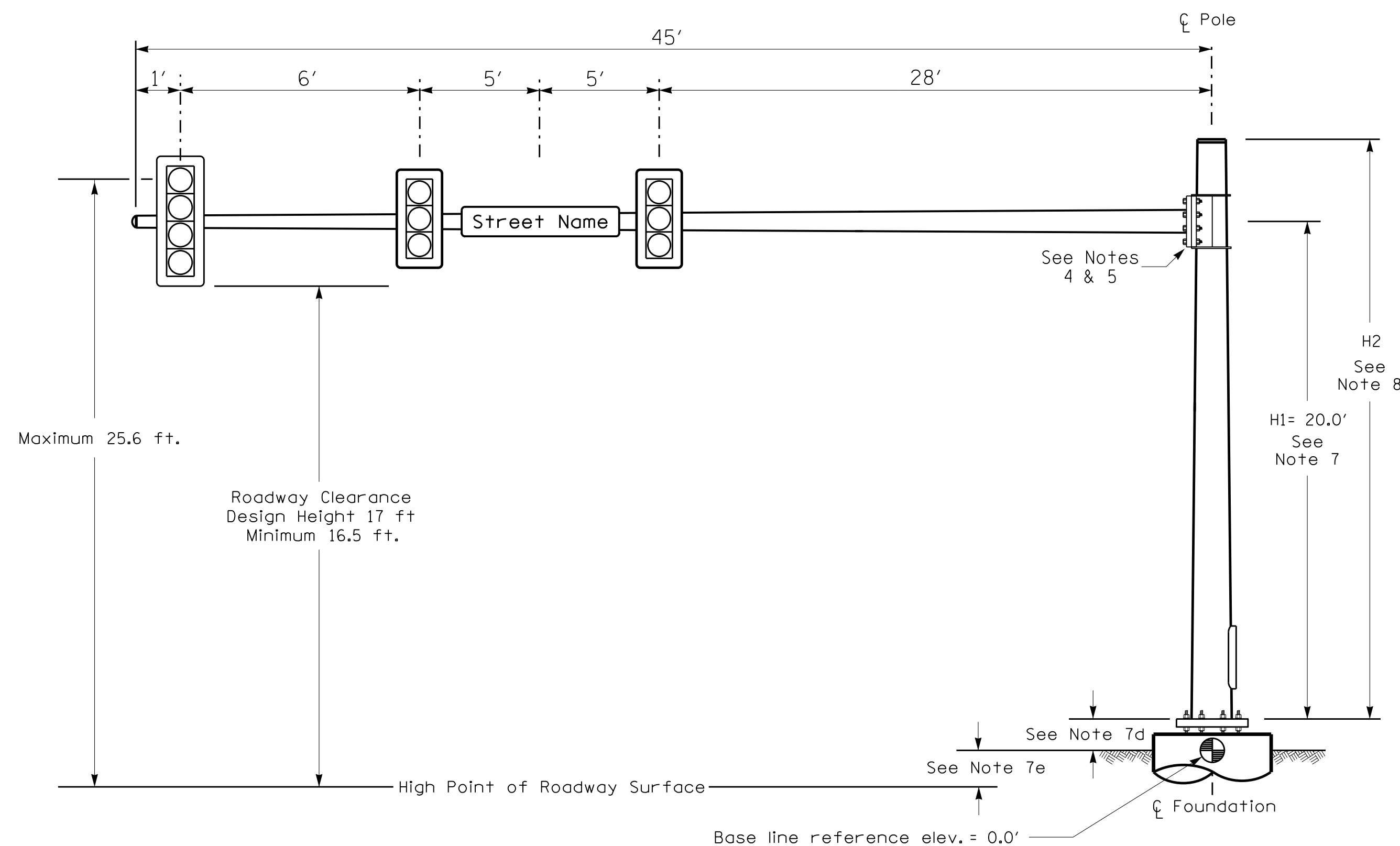


**Design Loading for METAL POLE NO. 5**



Elevation View

**Design Loading for METAL POLE NO. 6**



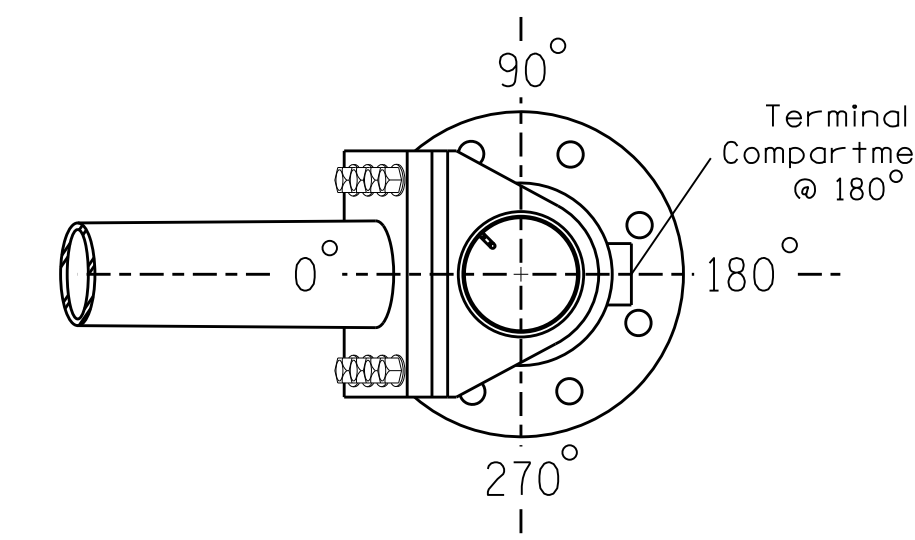
Elevation View

**SPECIAL NOTE**

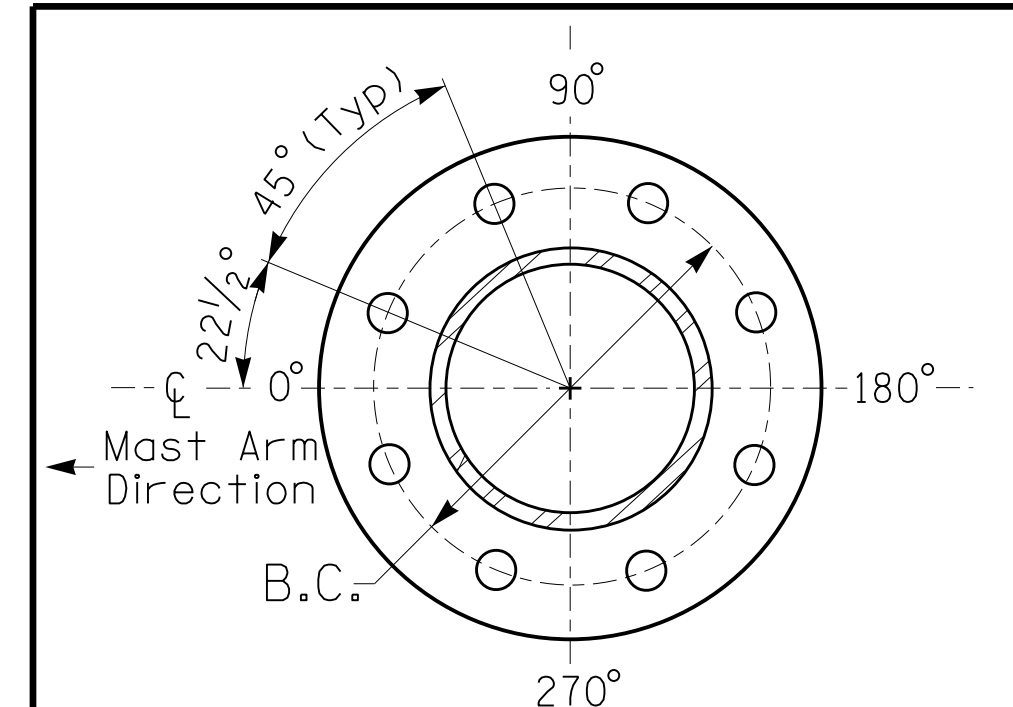
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

**Elevation Data for Mast Arm Attachment (H1)**

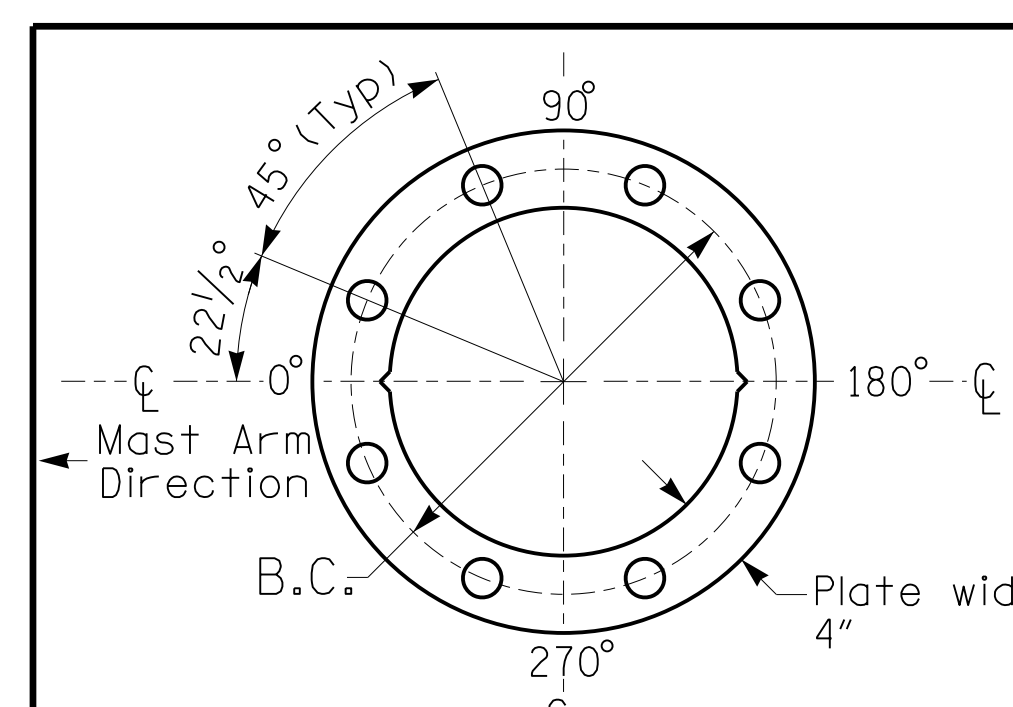
Elevation Differences for:	Pole 5	Pole 6
Baseline reference point at $\phi$ Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	+0.2 ft.	+0.4 ft.
Elevation difference at Edge of travelway or face of curb	0.0 ft.	+0.4 ft.



POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL For 8 Bolt Base Plate

**MAST ARM LOADING SCHEDULE**

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	RIGID MOUNTED SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE	9.3 S.F.	25.5" W X 52.5" L	60 LBS
	RIGID MOUNTED SIGNAL HEAD 12"-4 SECTION-WITH BACKPLATE	11.5 S.F.	25.5" W X 66.0" L	74 LBS
	RIGID MOUNTED SIGNAL HEAD 12"-5 SECTION-WITH BACKPLATE	16.3 S.F.	42.0" W X 56.0" L	103 LBS
	STREET NAME SIGN RIGID MOUNTED	16.0 S.F.	24.0" W X 96.0" L	36 LBS

**NOTES**

**DESIGN REFERENCE MATERIAL**

- Design the traffic signal structure and foundation in accordance with:
  - The 5th Edition 2009 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
  - The 2012 NCDOT "Standard Specifications for Roads and Structures." The latest addenda to the specifications can be found in the traffic signal project special provisions.
  - The 2012 NCDOT Roadway Standard Drawings.
  - The traffic signal project plans and special provisions.
  - The NCDOT "Metal Pole Standards" located at the following NCDOT website: <https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx>

**DESIGN REQUIREMENTS**

- Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
- Design all signal supports using stress ratios that do not exceed 0.9.
- The camber design for the mast arm deflection should provide an appearance of a low pitched arch where the tip or the free end of the mast arm does not deflect below horizontal when fully loaded.
- A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements.
- Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
- The mast arm attachment height (H1) shown is based on the following design assumptions:
  - Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
  - Signal heads are rigidly mounted and vertically centered on the mast arm.
  - The roadway clearance height for design is as shown in the elevation views.
  - The top of the pole base plate is 0.75 feet above the ground elevation.
  - Refer to the Elevation Data Chart for the elevation differences between the proposed foundation ground level and the high point of the roadway.
- The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
  - Mast arm attachment height (H1) plus 2 feet, or
  - H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
- If pole location adjustments are required, the contractor must gain approval from the Engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signal Design Section Senior Structural Engineer for assistance at (919) 773-2800.
- The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
- The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

NCDOT Wind Zone 4 (90 mph)

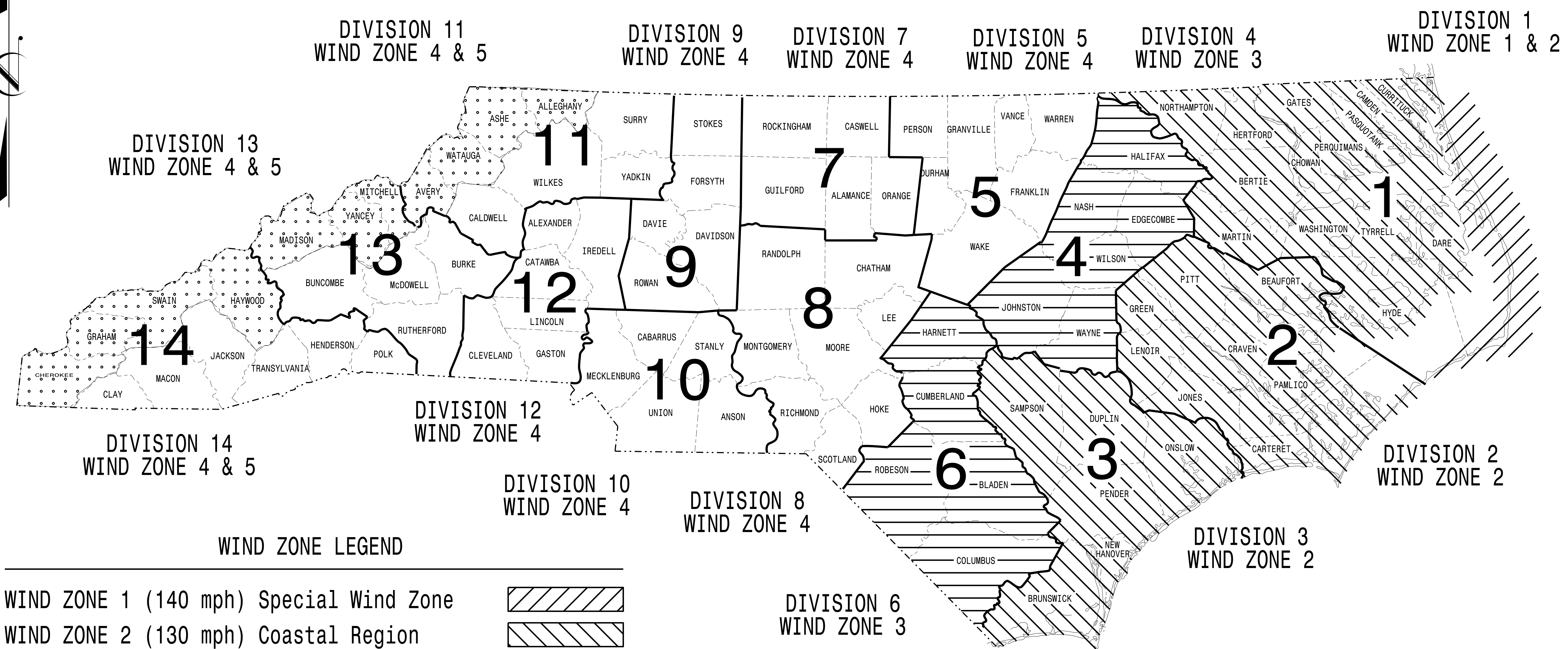
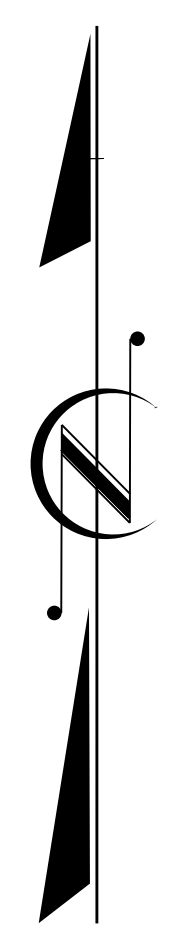
<p>Prepared in the Offices of: TRANSPORTATION MOBILITY AND SAFETY DIVISION DIVISION OF TRANSPORTATION Signal Design Section 750 N. Greenfield Pkwy, Garner, NC 27529</p>	<p>US 64 (Hendersonville Highway) at Davidson River Village Connector / Store Entrance</p>		<p>SEAL NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 024393 TIMOTHY J. WILLIAMS</p>
	<p>Division 14 Transylvania County Near Brevard</p> <p>PLAN DATE: September 2015 REVIEWED BY: T. Williams</p> <p>PREPARED BY: M. Mahbooba REVIEWED BY:</p>	<p>REVISIONS</p> <p>INIT. DATE</p>	

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 mmhbooba

# STATE OF NORTH CAROLINA DIVISION OF HIGHWAYS

## STANDARD DRAWINGS FOR METAL POLES

**NCDOT METAL POLE STANDARDS**



**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  
2012 Interim to the  
5th Edition 2009  
**AASHTO**  
Standard Specifications for  
Structural Supports for  
Highway Signs, Luminaires,  
and Traffic Signals

**INDEX OF PLANS**

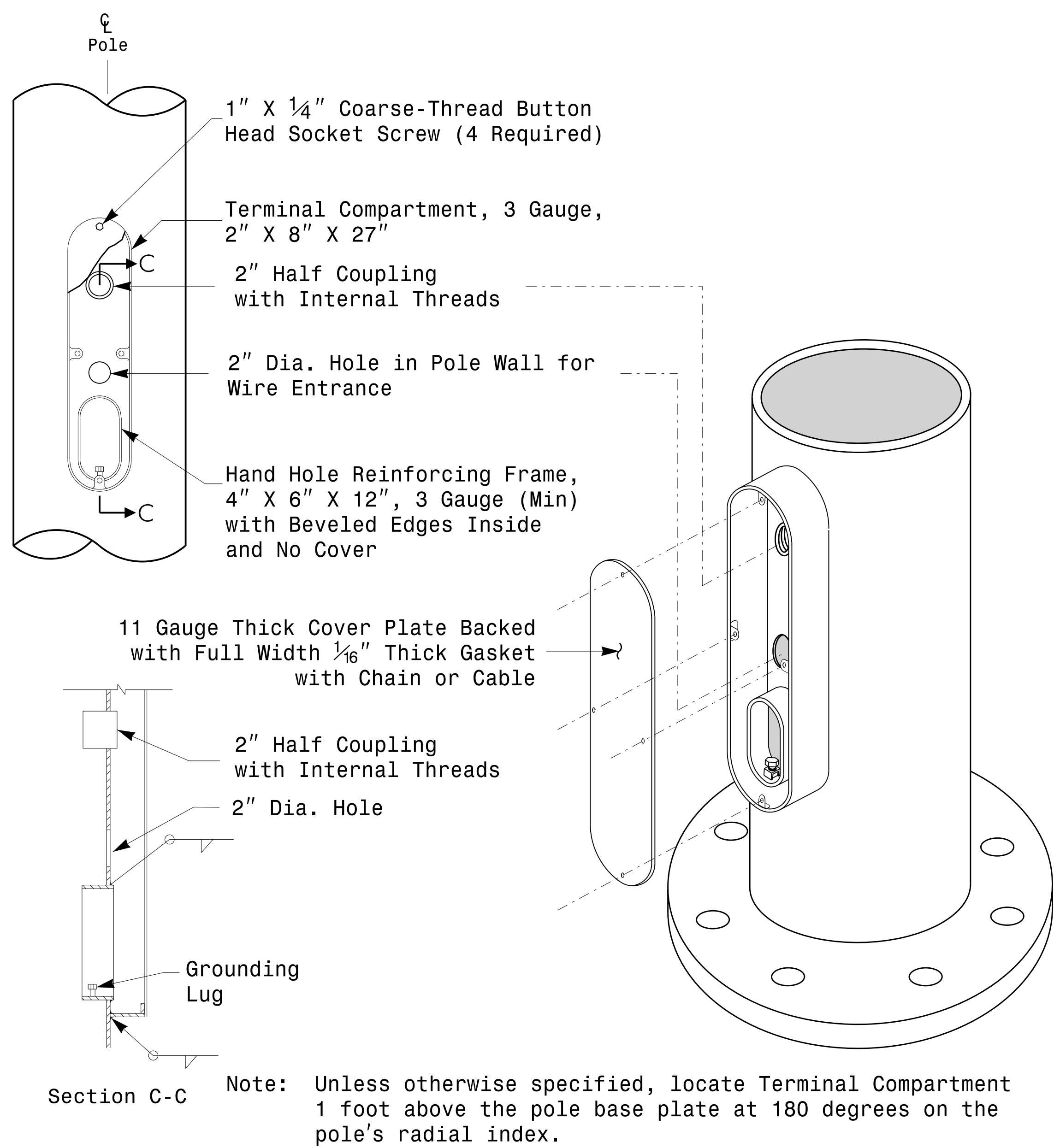
DRAWING NUMBER	DESCRIPTION
M 1	Title Sheet
M 2	Fabrication Details - All Poles
M 3	Fabrication Details - Strain Poles
M 4,5	Fabrication Details - Mast Arm Poles
M 6	Construction Details - Strain Poles
M 7	Construction Details - Foundations
M 8,9	Standard Strain Pole Foundations

**NCDOT CONTACTS:**  
**MOBILITY AND SAFETY DIVISION - ITS AND SIGNALS UNIT**

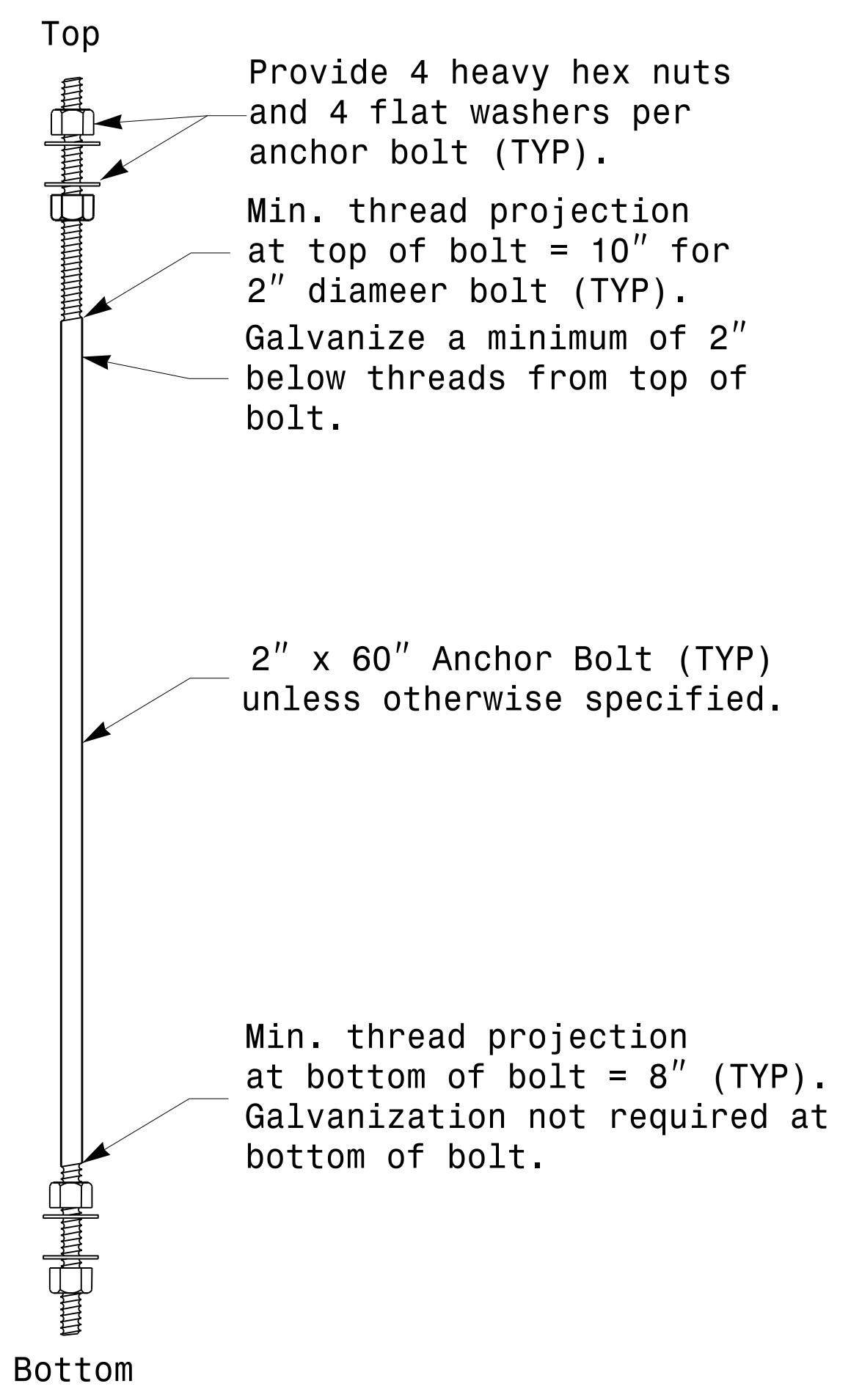
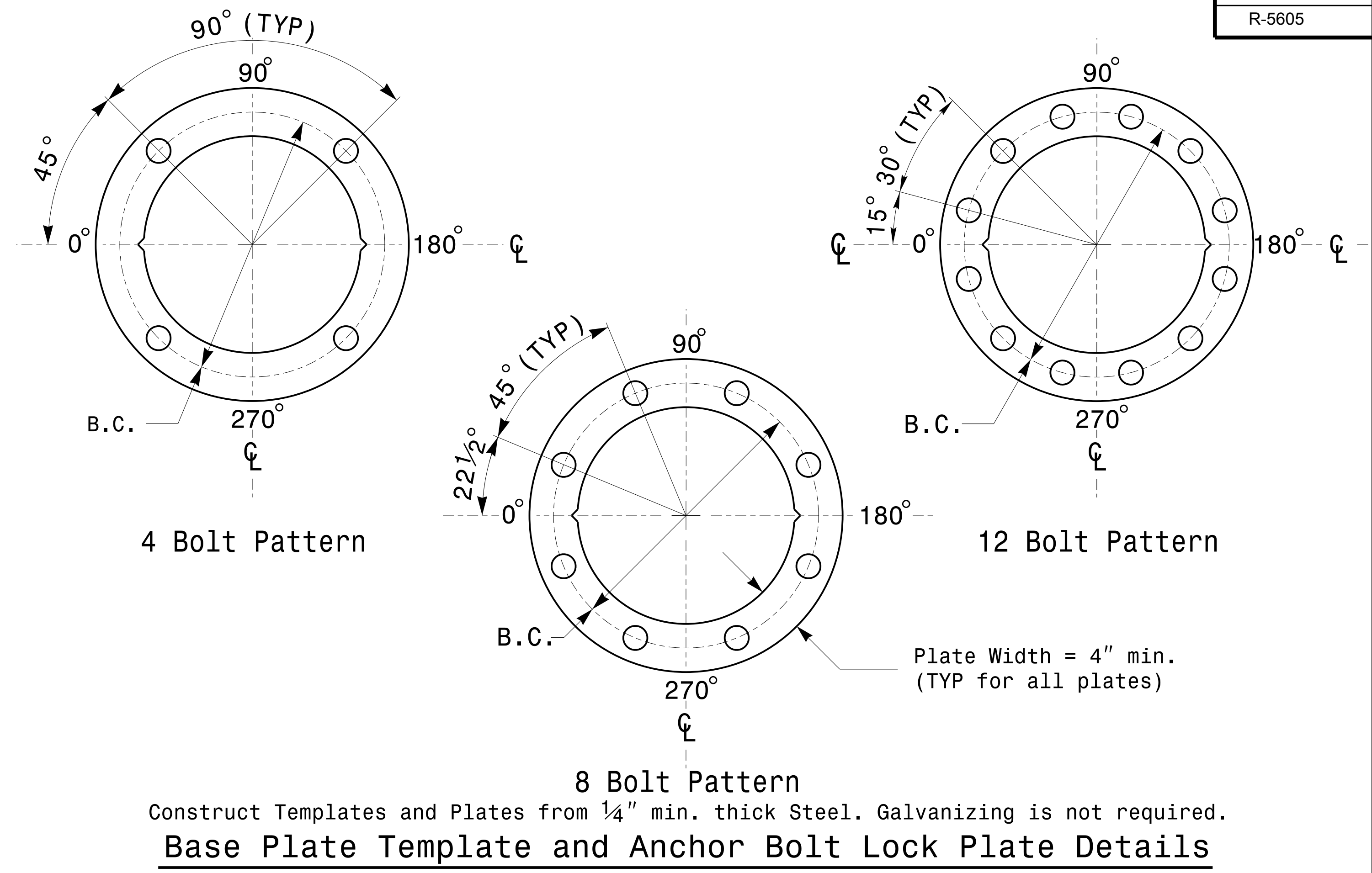
**G. A. FULLER, P.E. - STATE ITS AND SIGNALS ENGINEER**  
**G. G. MURR, JR., P.E. - STATE SIGNALS ENGINEER**  
**D.C. SARKAR, P.E. - ITS AND SIGNALS SENIOR STRUCTURAL ENGINEER**  
**C.F. ANDREWS - ITS AND SIGNALS JOURNEY STRUCTURAL ENGINEER**

SEAL

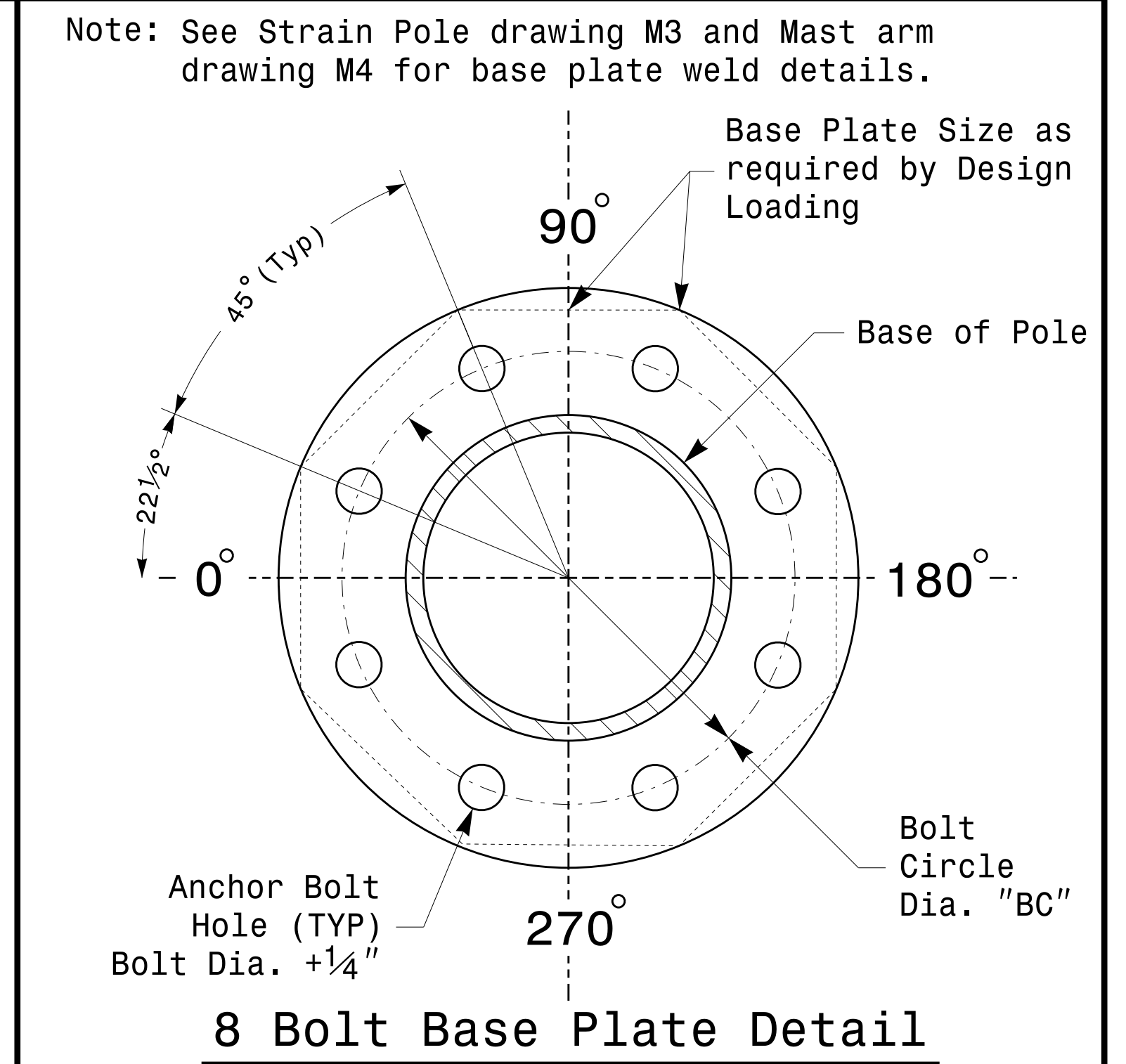
Designed by: *Debesh C. Sarkar*  
DATE: 8/26/2014



**Terminal Compartment Detail**



**Anchor Bolt Detail**



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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 STANDARD _____	

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

- 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 pole I.D. number and Signal Inv. Number.
  - 5) See drawing M4 for mounting positions of I.D. tags.

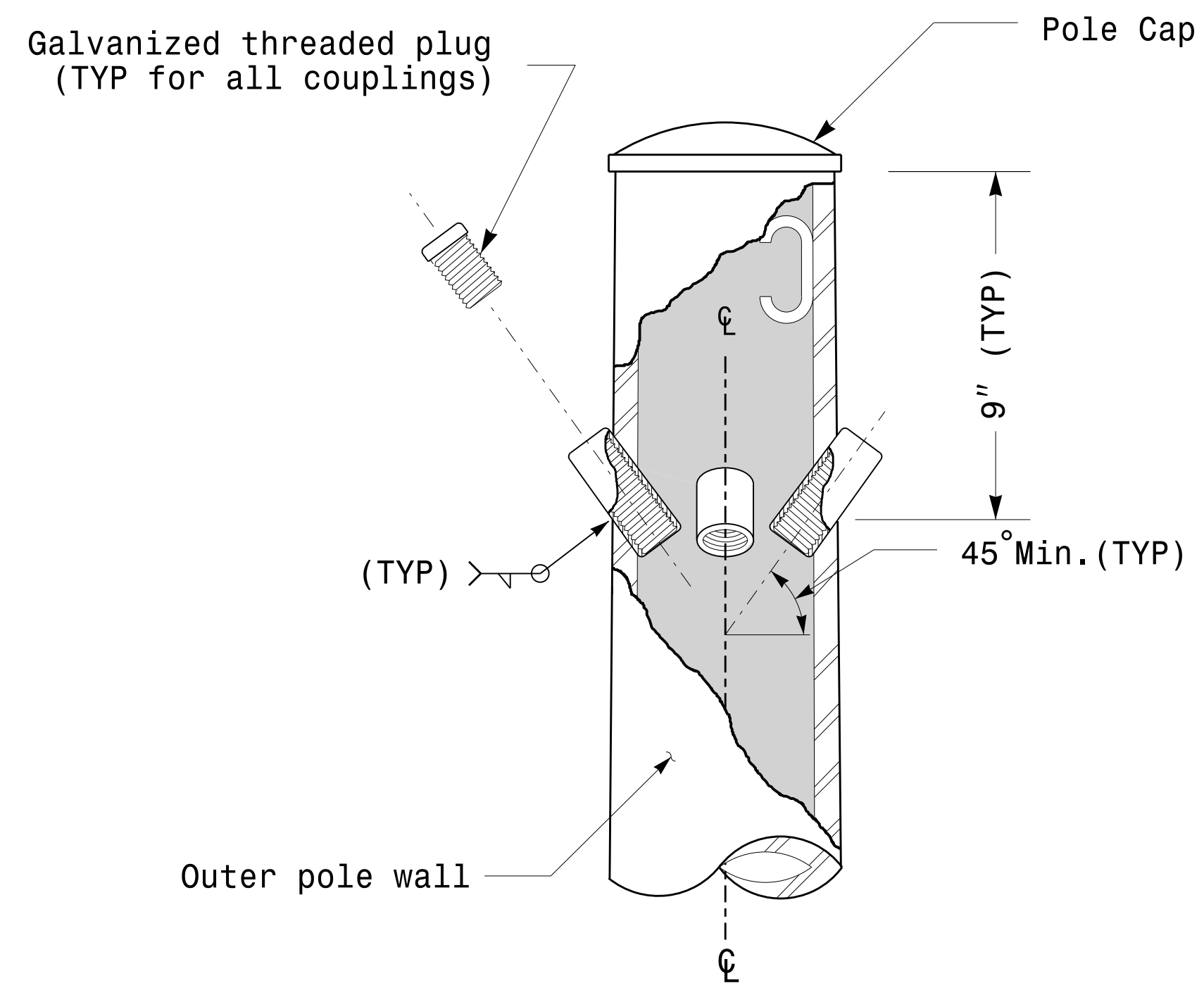
**Identification Tag Details**

MFG _____	MFG. DATE: MM/YY _____
SECTION D/T/L/Y _____	
NCDOT STANDARD _____	

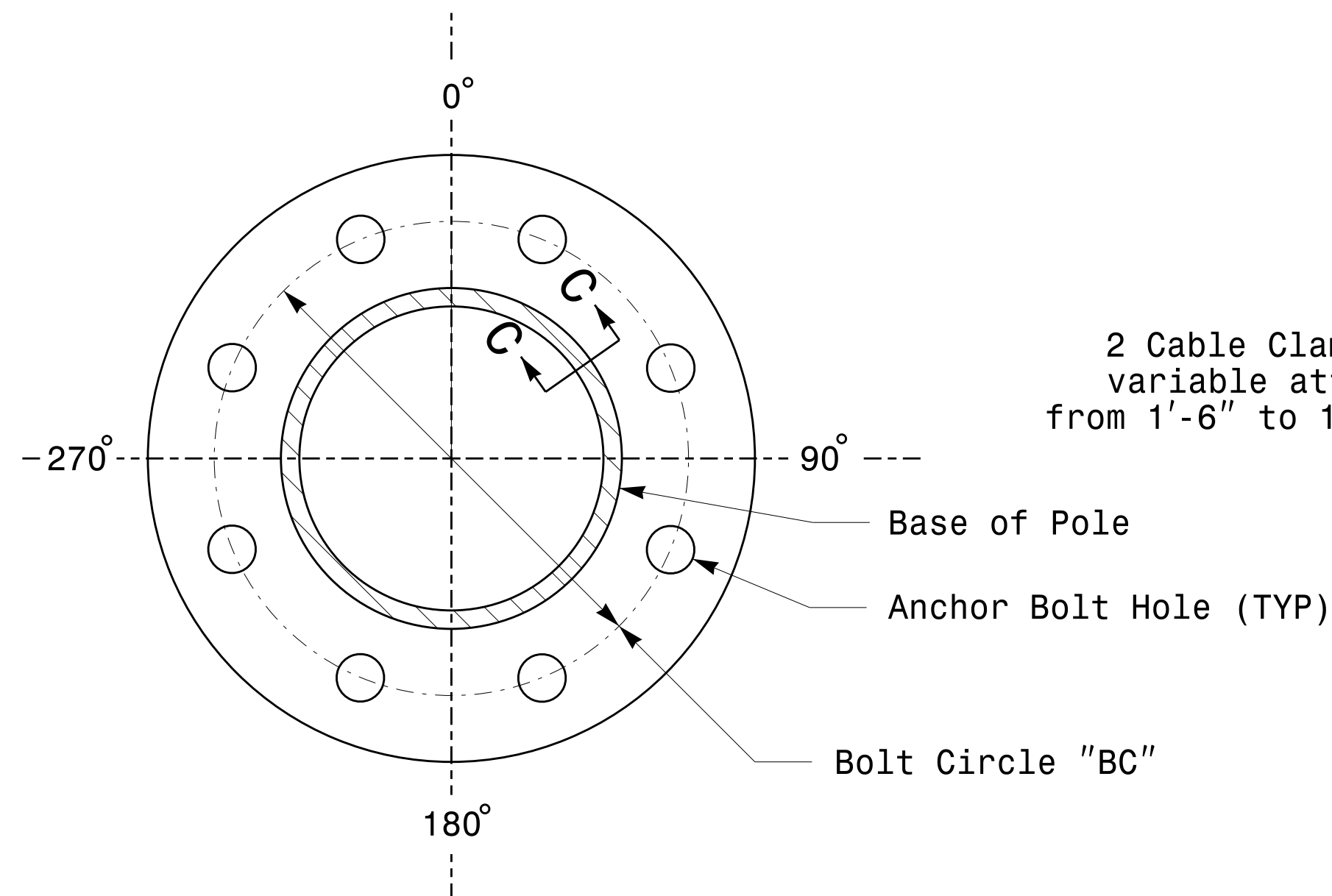
**Arm I.D. Tag**  
(Provide on each section of a multi-section mast arm)

	<b>Typical Fabrication Details Common To All Metal Poles</b>		
	PLAN DATE: AUGUST 2013 PREPARED BY: N. BITTING	DESIGNED BY: C.F. ANDREWS REVIEWED BY: D.C. SARKAR	
SCALE: NONE	750 N. Greenfield Pkwy, Garner, NC 27529		DocuSign by: Dinesh C. Sarkar 8/26/2014 DATE SIG. INVENTORY NO.

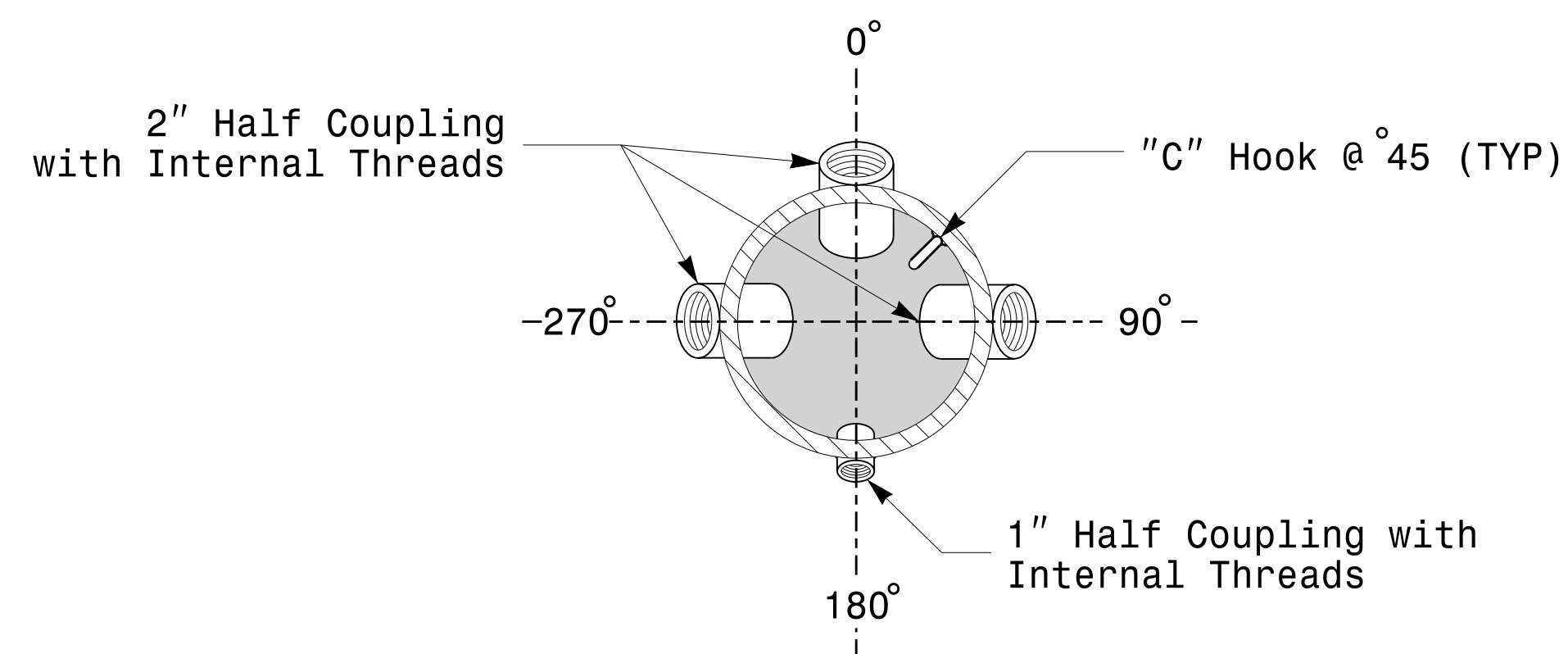
**Fabrication Details – All Poles**



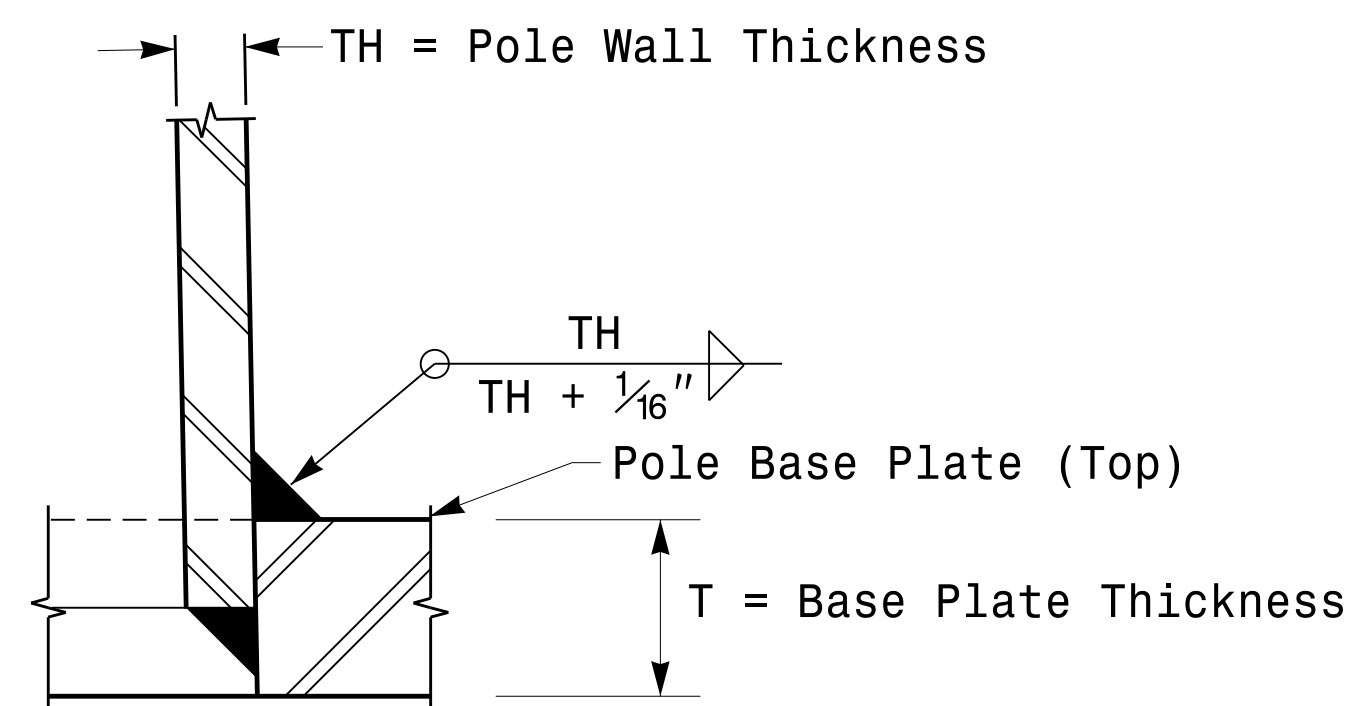
Cable Entrances at Top of Pole



Section B-B  
(See drawing M2)  
Pole Base Plate

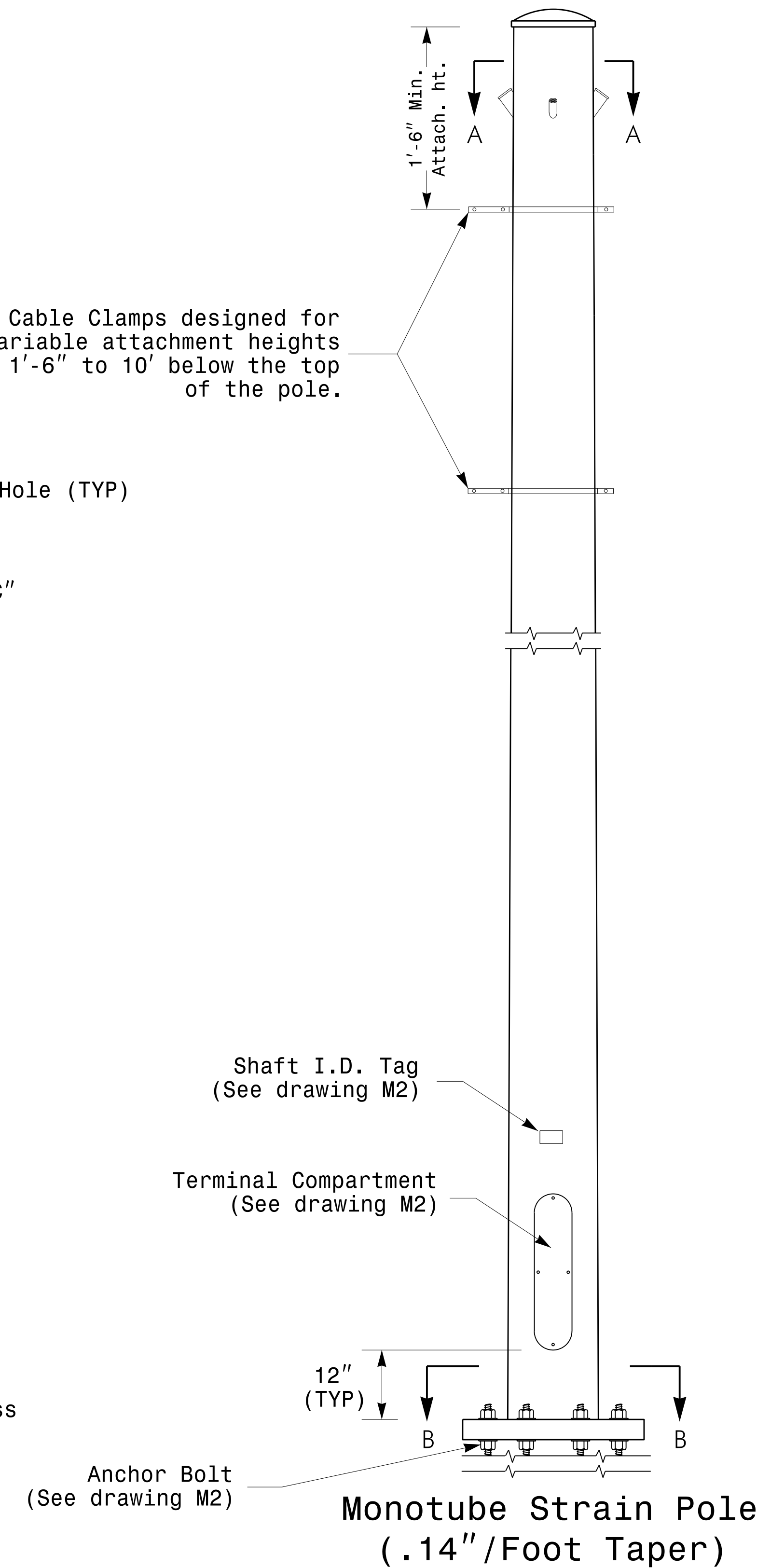


Section A-A  
Radial Orientation for Factory Installed Accessories at Top of Pole



Section C-C  
Socket Connection Weld Detail

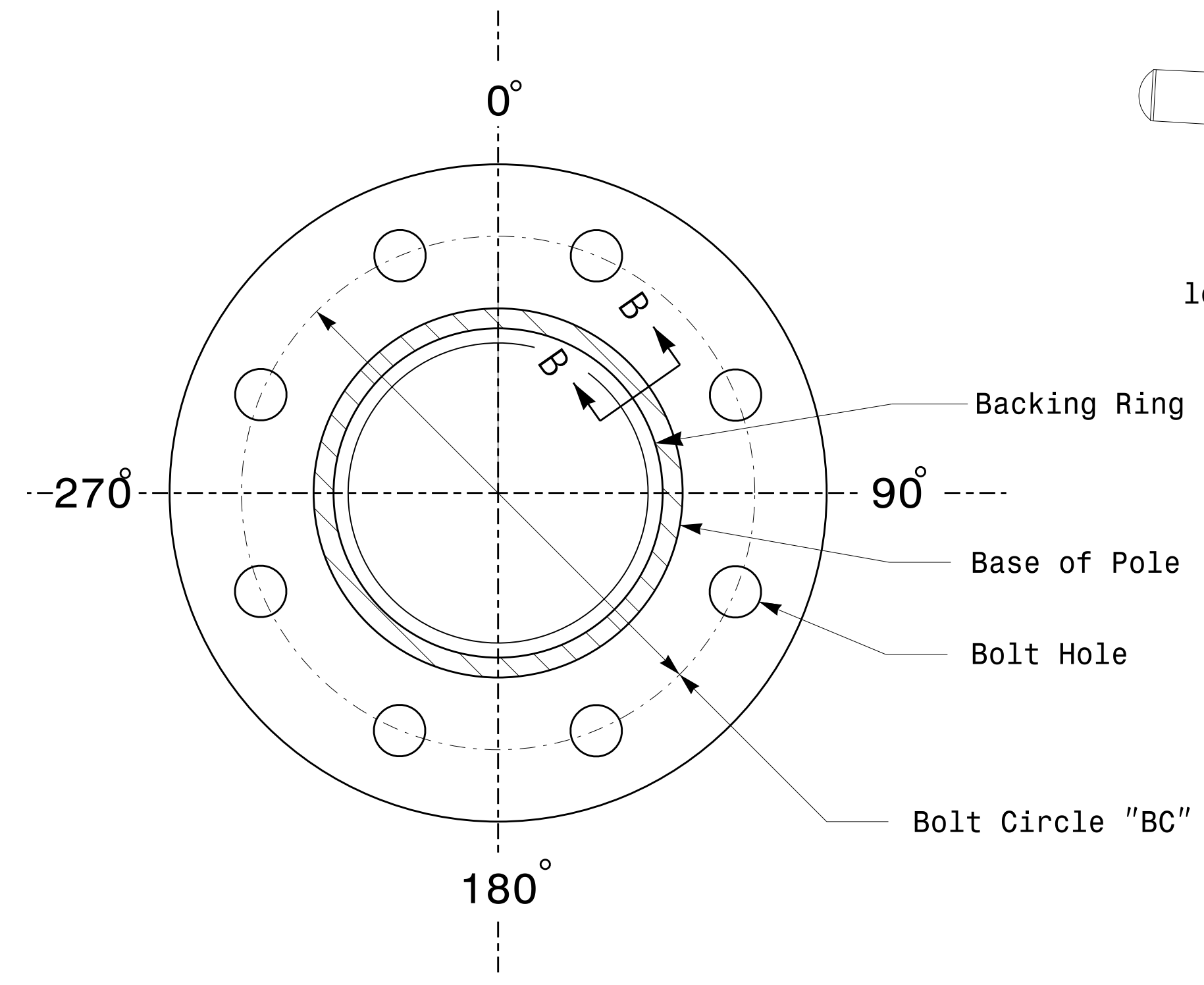
2 Cable Clamps designed for variable attachment heights from 1'-6" to 10' below the top of the pole.



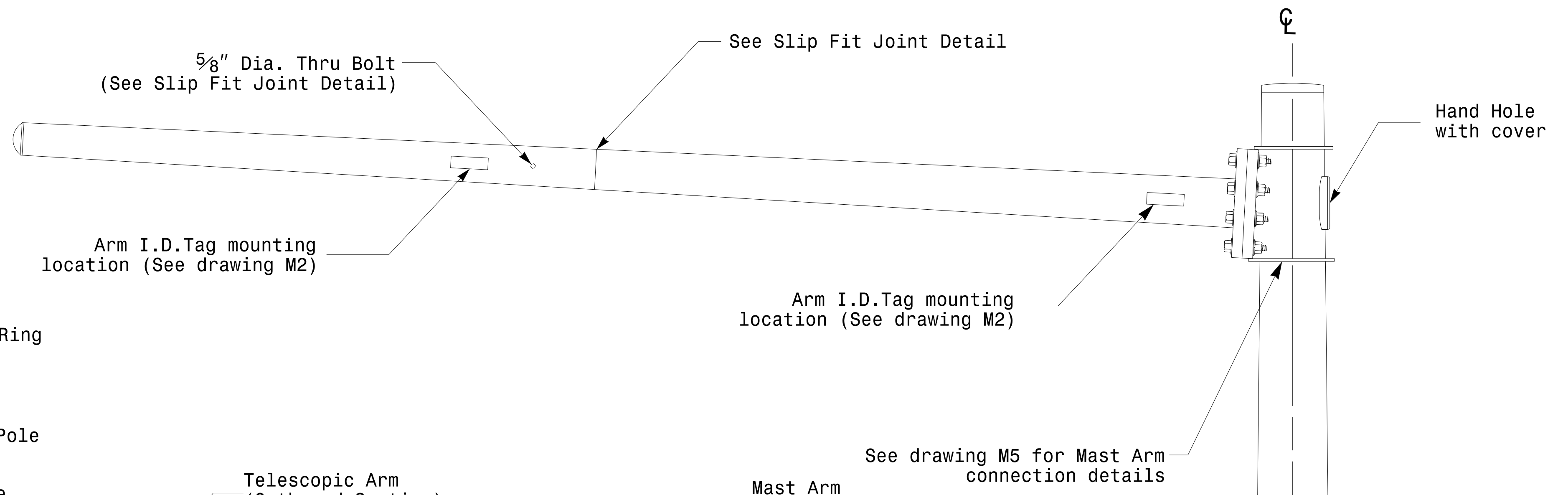
<p>750 N. Greenfield Pkwy, Garner, NC 27529</p>	<p>Typical Fabrication Details For Strain Poles</p>		
	<p>PLAN DATE: AUGUST 2013</p> <p>PREPARED BY: N. BITTING</p>	<p>DESIGNED BY: C.F. ANDREWS</p> <p>REVIEWED BY: D.C. SARKAR</p>	
<p>SCALE: 0 NA NONE</p>	<p>REVISIONS</p>	<p>INIT. DATE</p>	<p>SIG. INVENTORY NO.</p>

Fabrication Details – Strain Poles

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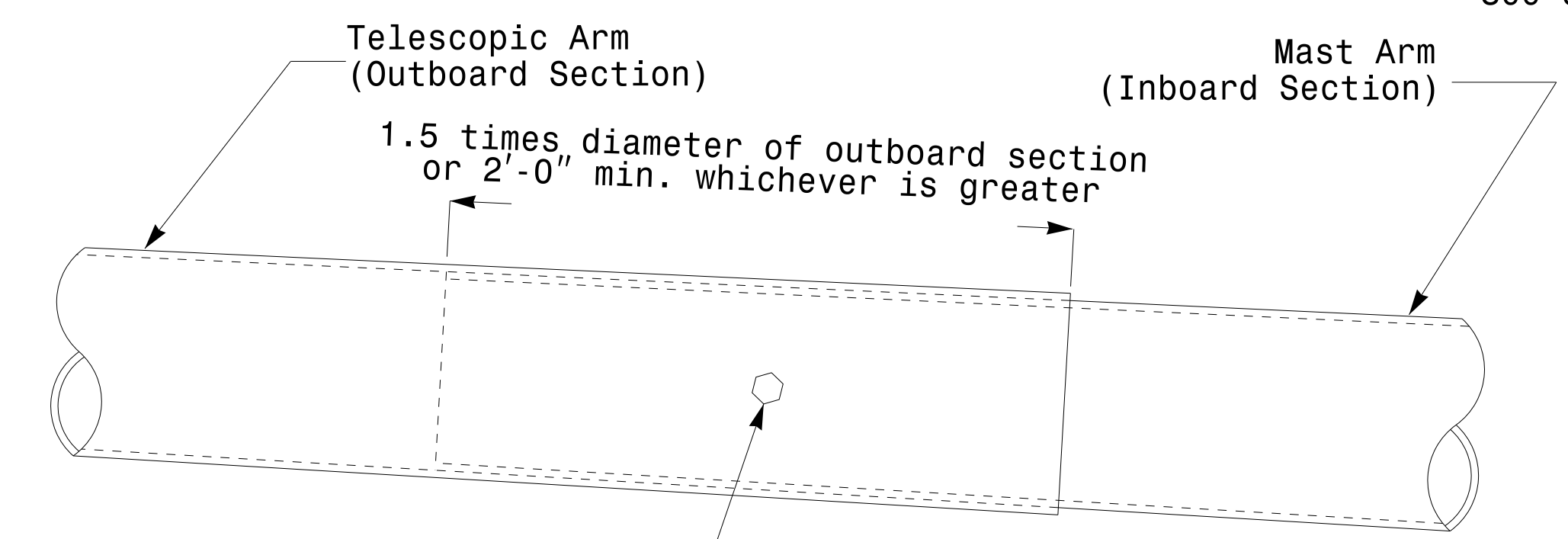


Section A-A  
(See drawing M 2)  
**Pole Base Plate**



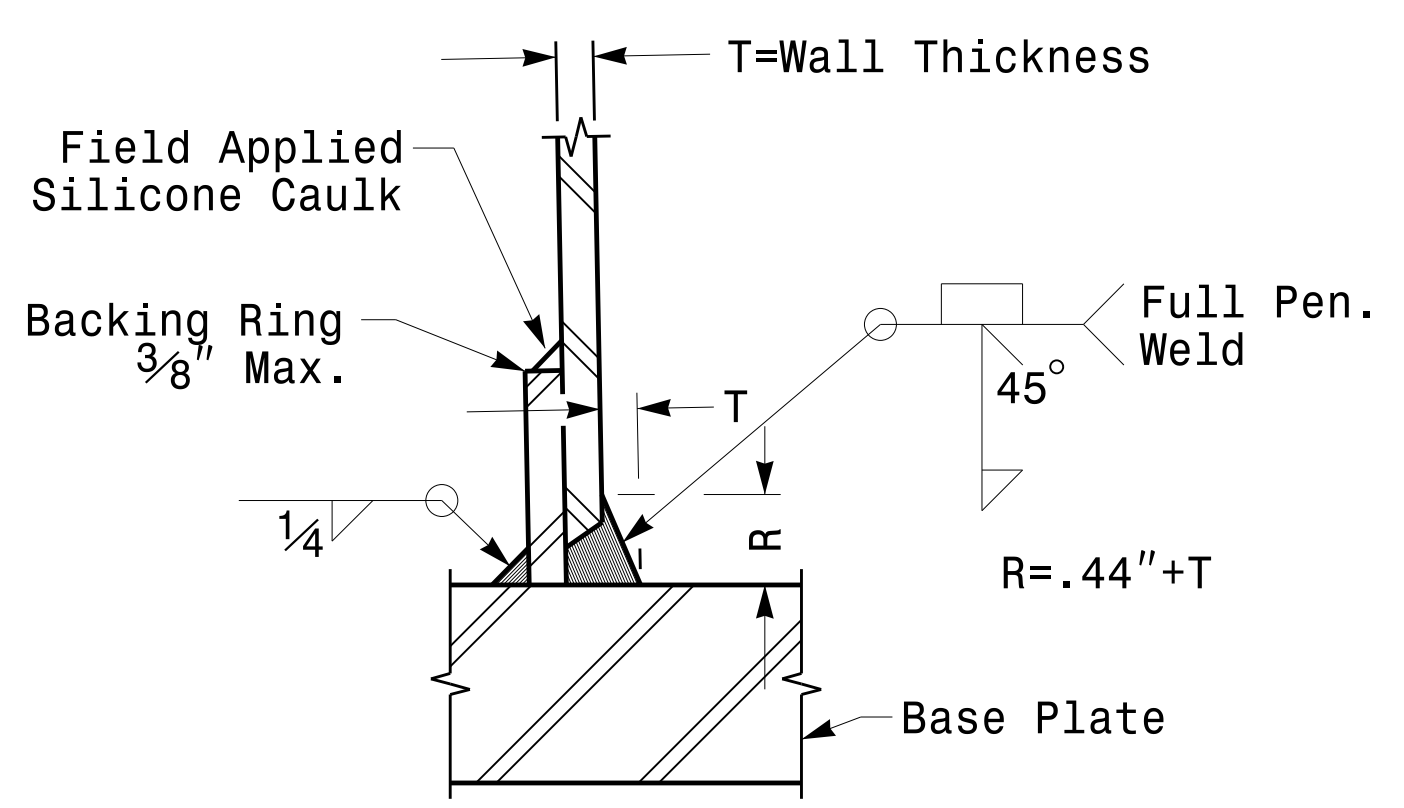
3/4" Factory Drilled Hole in Outboard Tube.  
Field Drill Inboard Tube.  
5/8" Galvanized Thru Stud with  
(2) Hex. Locknuts Each.

**Slip Fit Joint Detail for Mast Arm**

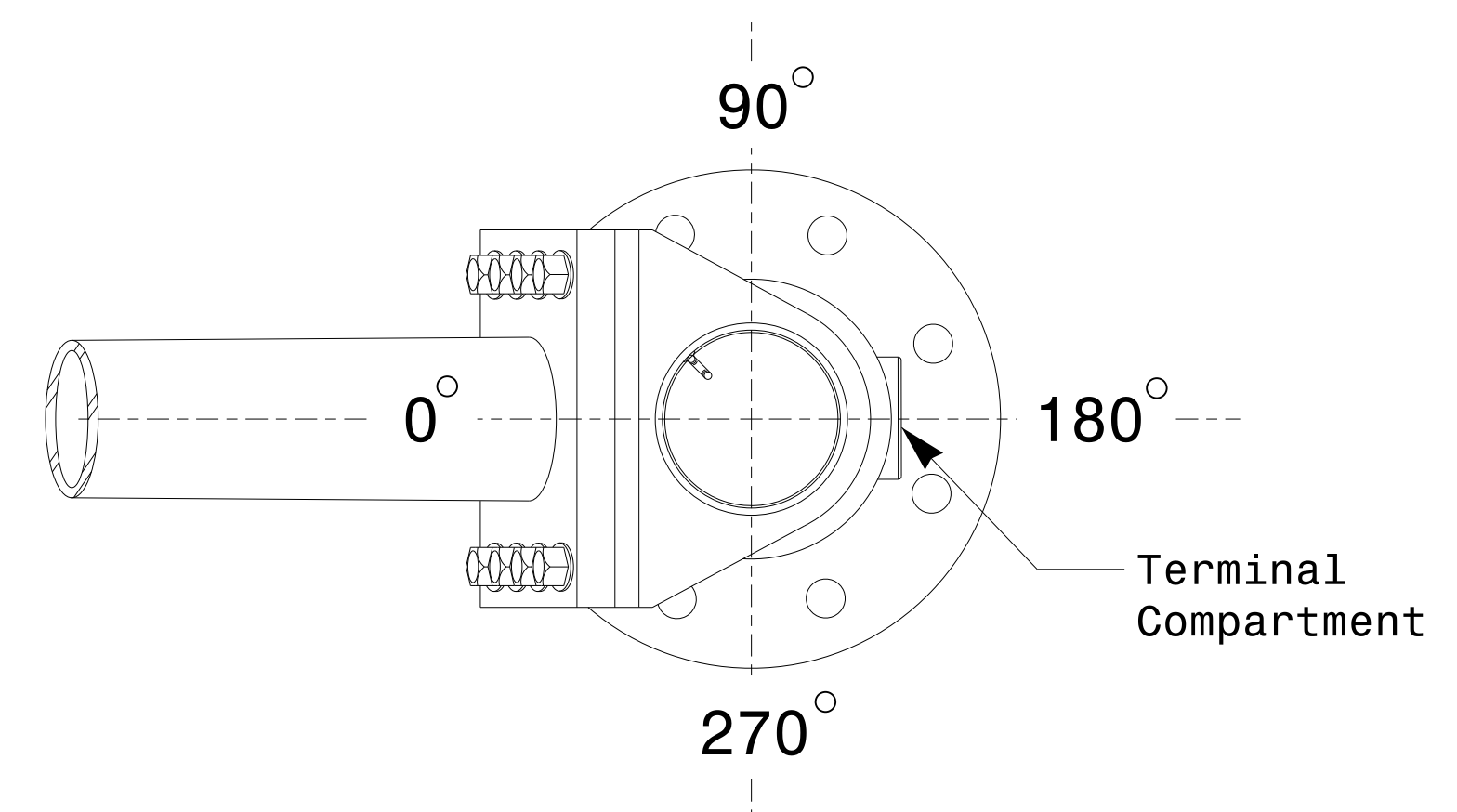


Shaft I.D.Tag mounting location (See drawing M2)  
Terminal Compartment (See drawing M2)

Monotube Mast Arm Pole  
(.14in./ft. taper)



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



**Mast Arm Radial Orientation**

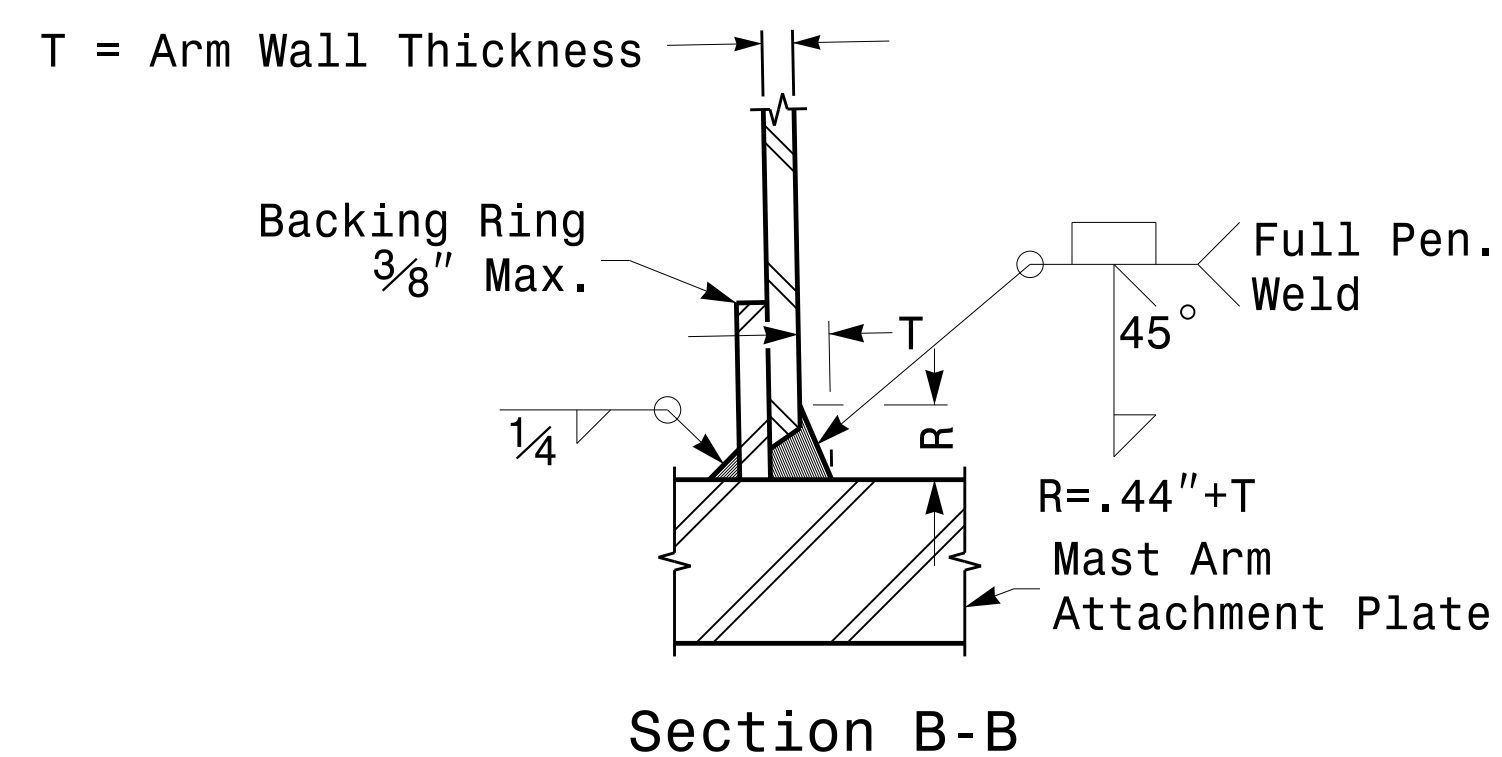
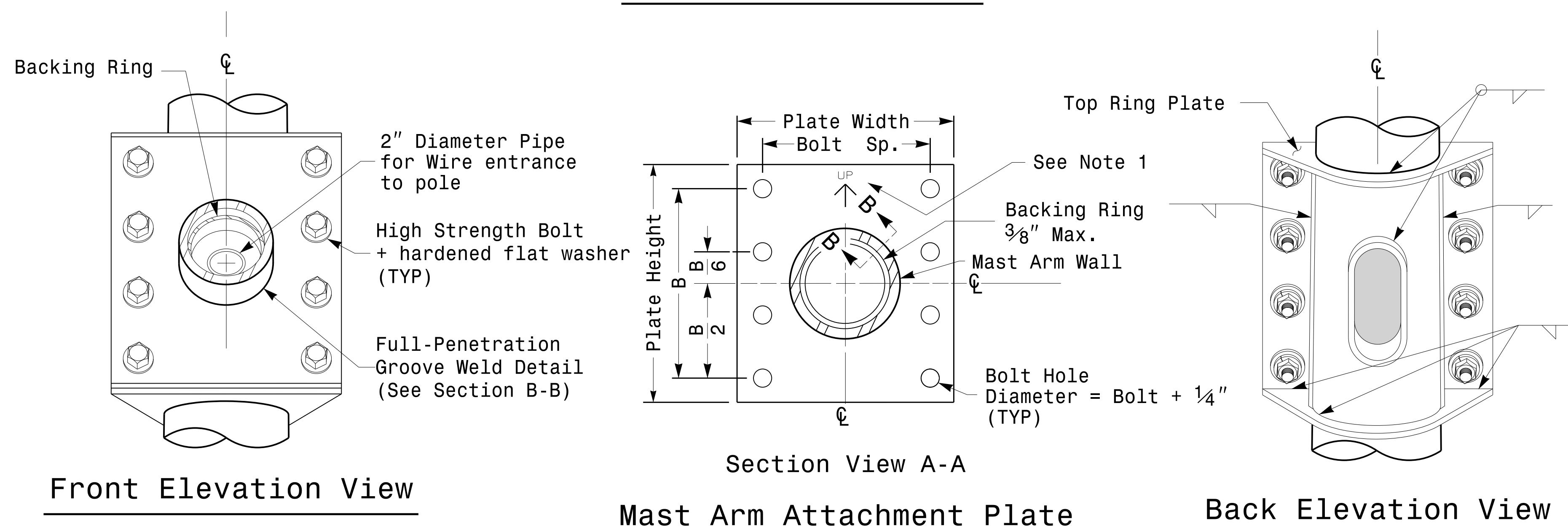
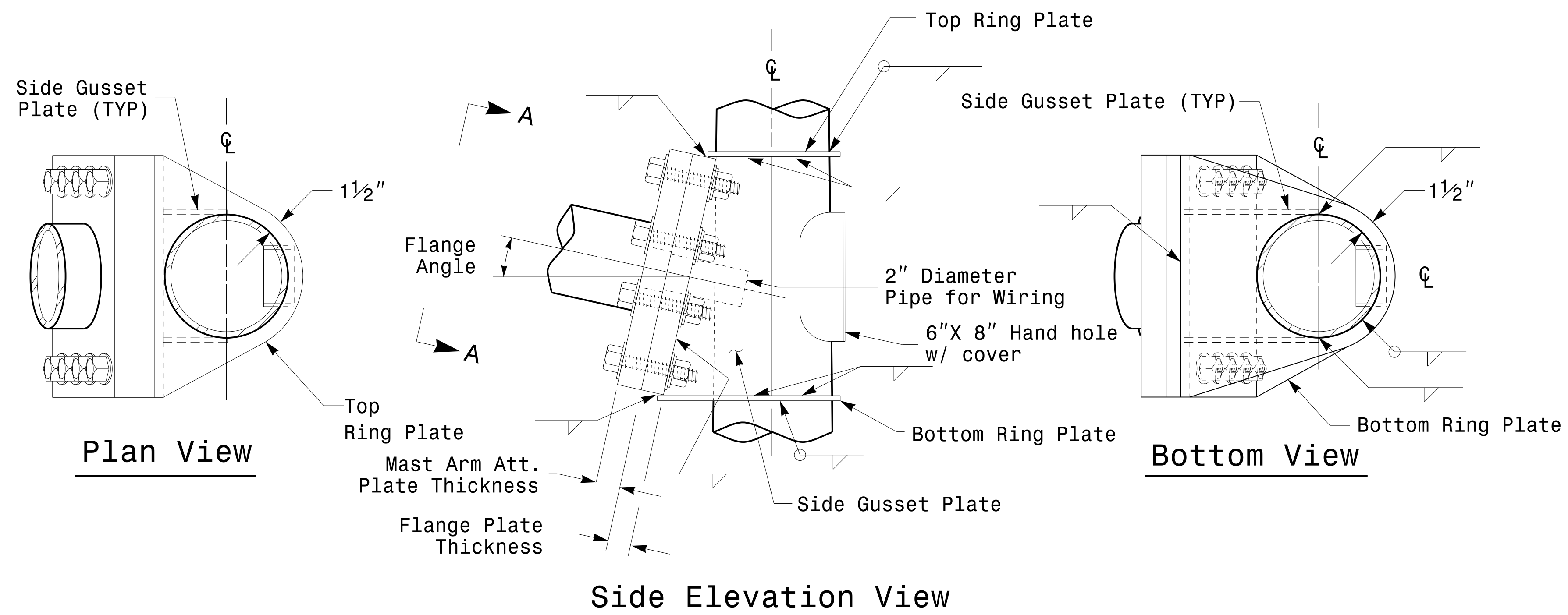
	<p>Typical Fabrication Details for Mast Arm Poles</p>		
	<p>PLAN DATE: AUGUST 2013 PREPARED BY: N. BITTING</p>	<p>DESIGNED BY: C.F. ANDREWS REVIEWED BY: D.C. SARKAR</p>	
<p>750 N. Greenfield Pkwy, Garner, NC 27529</p>	<p>SCALE: 0 NA NONE</p>	<p>REVISIONS</p>	<p>SIG. INVENTORY NO.</p>

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**Fabrication Details – Mast Arm Poles**



# Welded Ring Stiffened Mast Arm Connection



**Full-Penetration Groove Weld Detail**

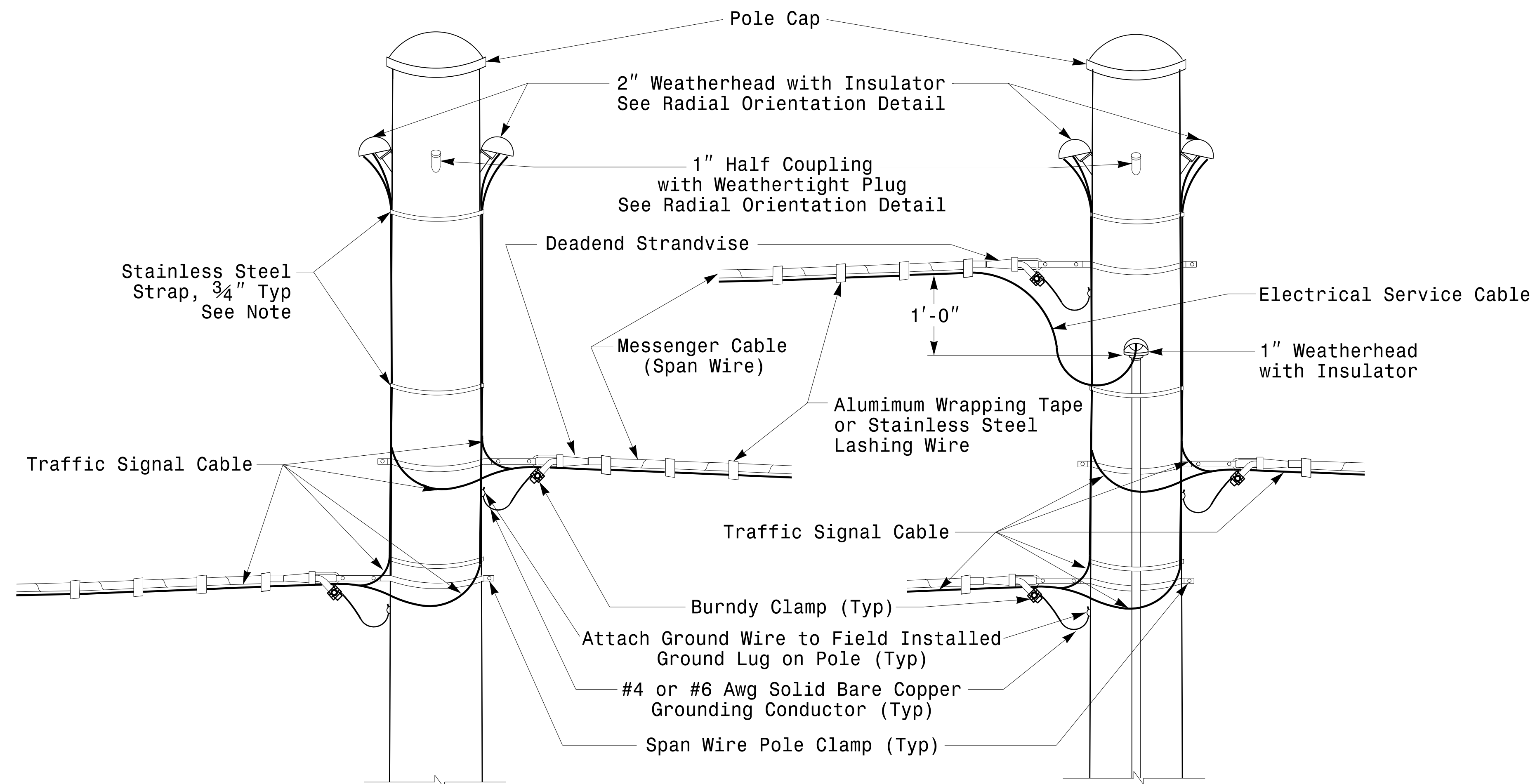
**Notes:**

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. Designer is responsible for providing appropriate drainage points.

	<p>Fabrication Details For Mast Arm Connection To Pole</p>	
	<p>PLAN DATE: AUGUST 2013</p>	<p>DESIGNED BY: C.F. ANDREWS</p>
<p>PREPARED BY: N. BITTING</p>	<p>REVIEWED BY: D.C. SARKAR</p>	<p>DocuSign by: D. C. SARKAR</p>
<p>SCALE: 0 NA NONE</p>	<p>REVISIONS</p>	<p>INIT. DATE</p>
<p>SIG. INVENTORY NO.</p>	<p>8/26/2014</p>	<p>DATE</p>

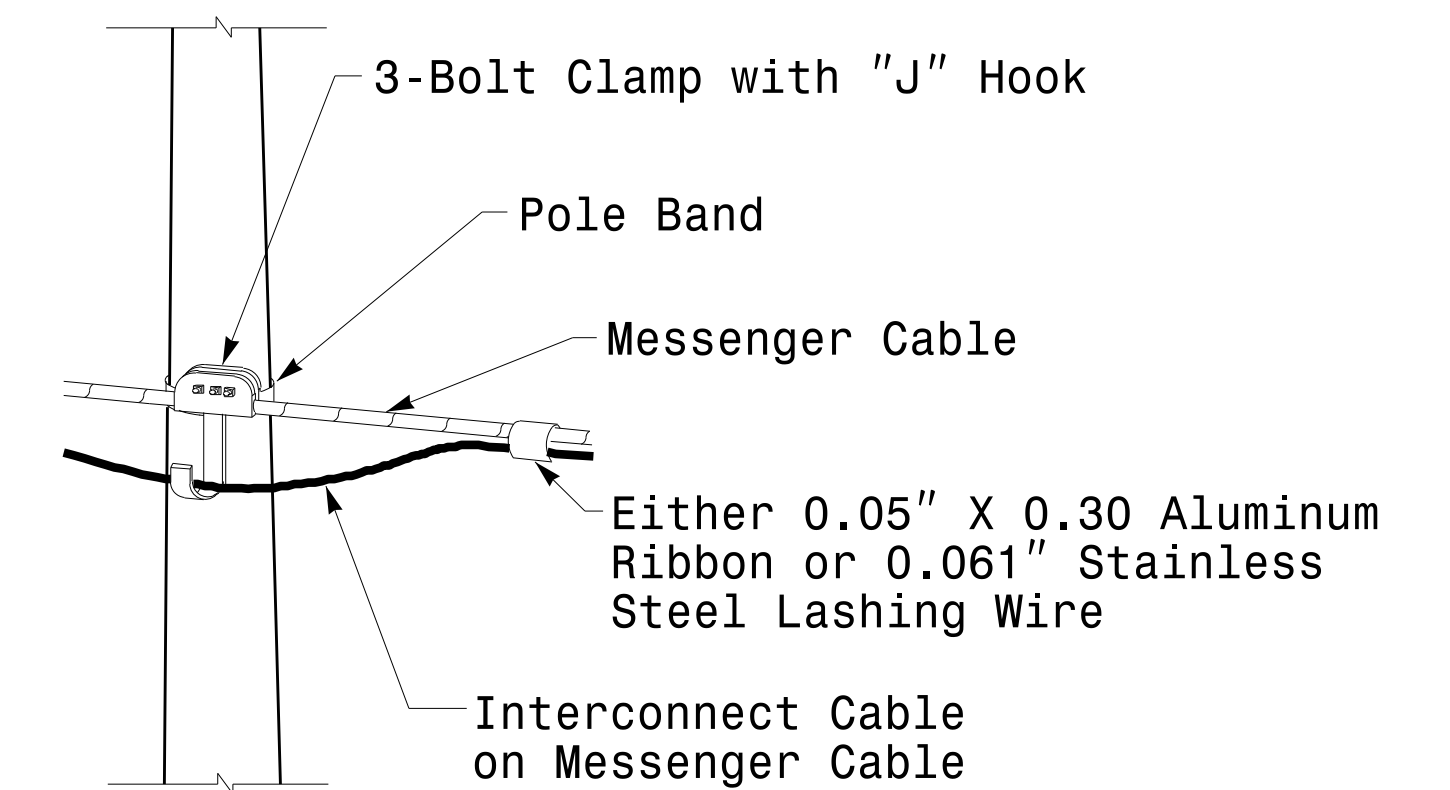
06-10-2014 08:47  
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**Fabrication Details – Mast Arm Poles**

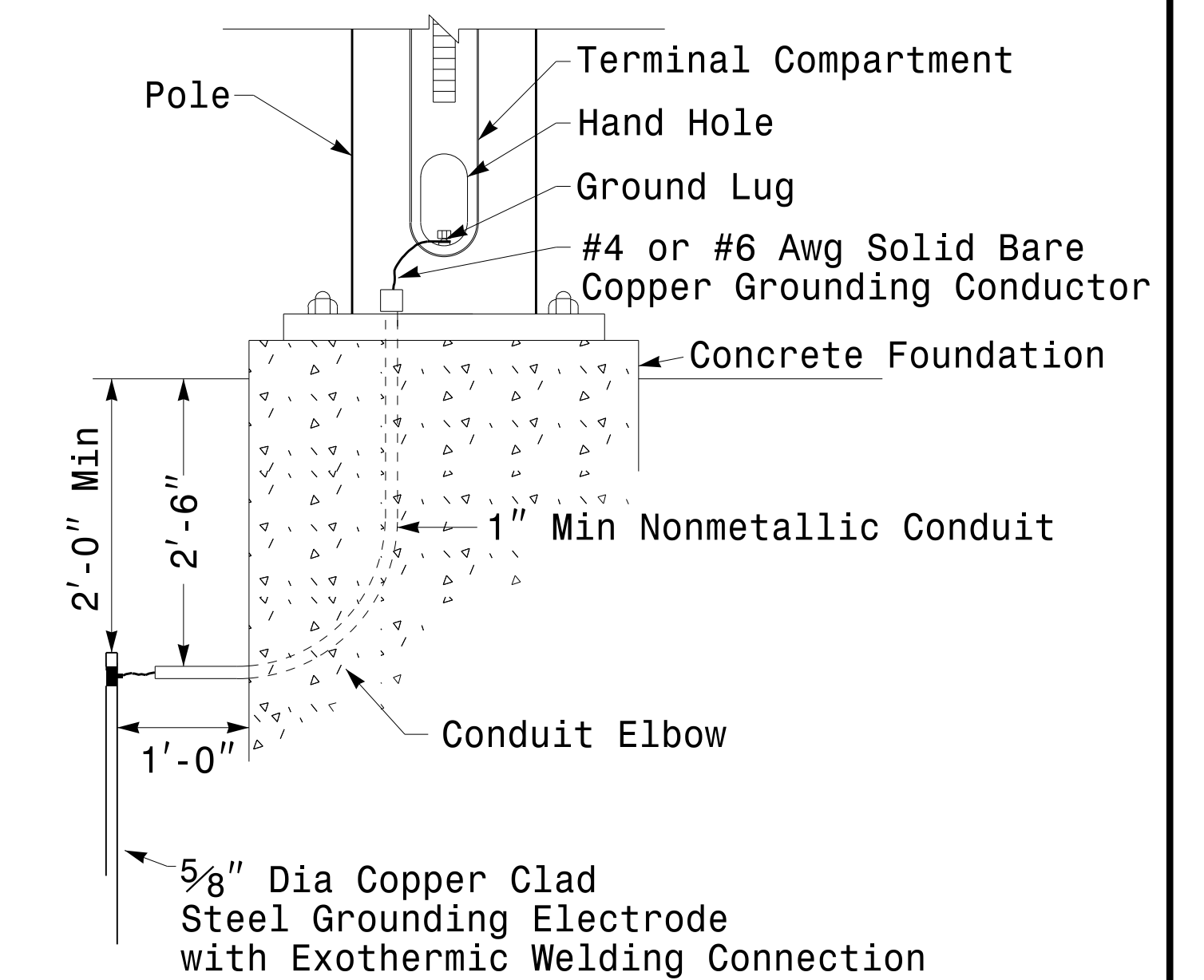


### Strain Pole Attachments

Note: 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 36"



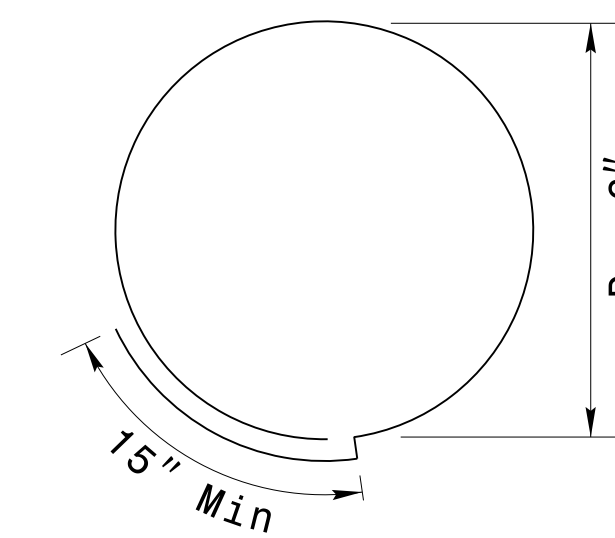
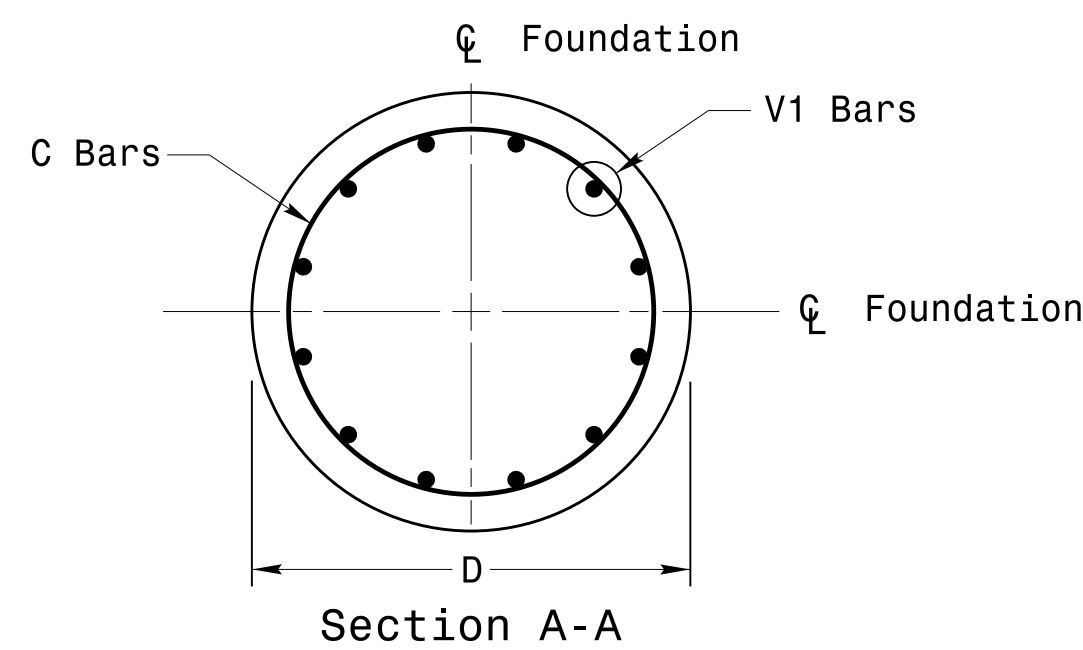
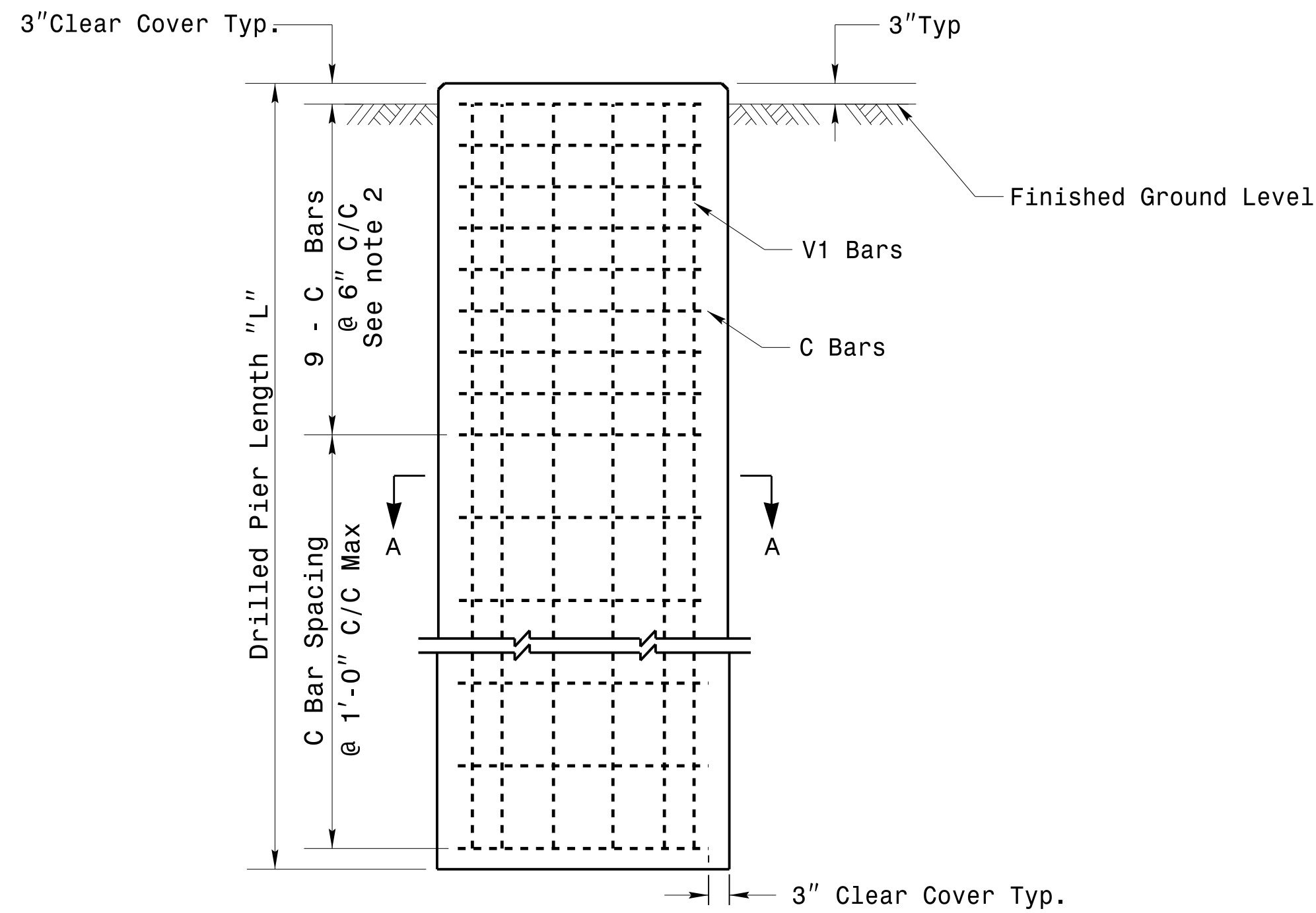
### Attachment of Cable to Intermediate Metal Pole



### Metal Pole Grounding Detail

	<b>Construction Details Strain Poles</b>		
	PLAN DATE: AUGUST 2013 PREPARED BY: N. BITTING	REVIEWED BY: C.F. ANDREWS REVIEWED BY: D.C. SARKAR	
SCALE: 0 NA NONE	REVISIONS:	INIT. DATE:	SIG. INVENTORY NO.:

### Reinforcing Steel Bars



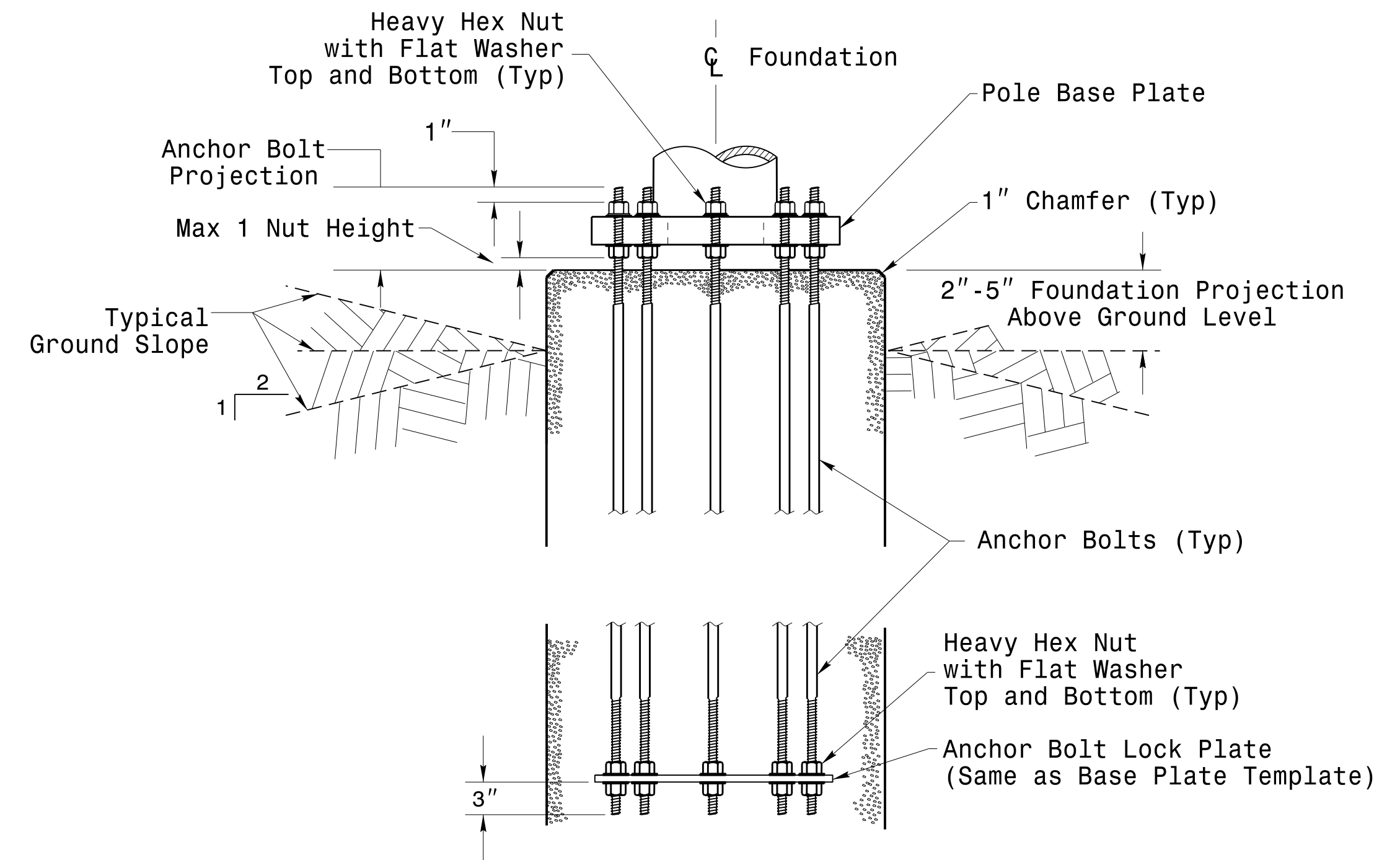
Typical "C" Bars

Shaft Dia (in.)	Conc. Volume (cu. yds.)	Bar Name	MIN.	Size	Type	Length
48"	.465 x L	V1	***	#8	STR.	**
		C	*	#4	CIR.	12'-6"

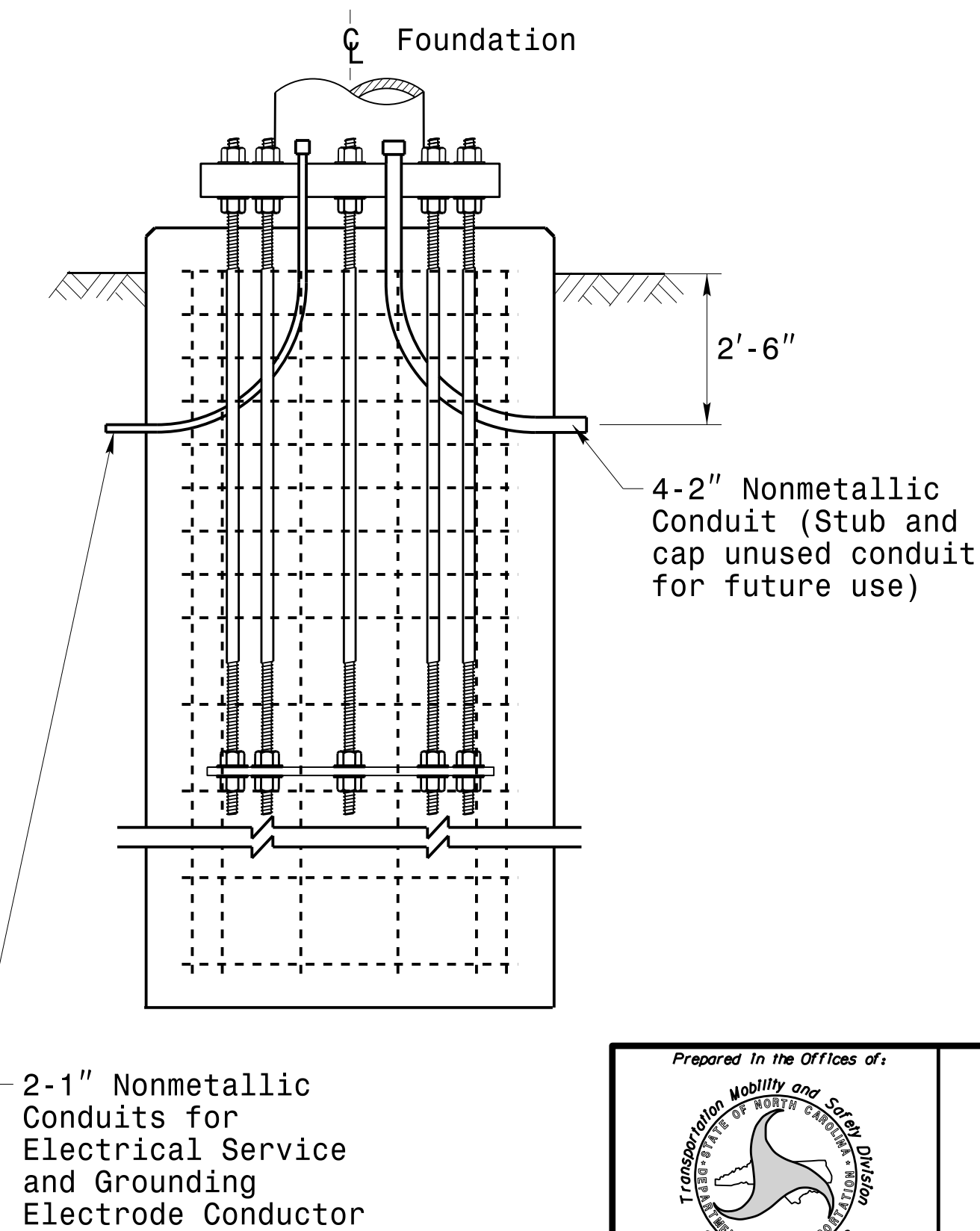
\* See Note No. 1  
 \*\* See Note No. 3  
 \*\*\* See Note No. 4

### Typical Foundation Anchor Bolt Details

(Reinforcing Cage Not Shown for Clarity)



### Typical Foundation Conduit Details



### Notes

- The number of C-bars is based on foundation depth and/or as required. For standard foundations, see sheets M 8 and M 9 for details.
- 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.
- The length of V1-bars is based on foundation depth. For standard foundations, see sheets M 8 and M 9 for details. Vertical reinforcing bars (V1) may be horizontally adjusted by +/- 3" to facilitate the installation of electrical conduit entering into the cage.
- Provide vertical reinforcement as required per design. See sheets M 8 and M9 for details.

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**Construction Details - Foundations**

	<b>Construction Details Foundations</b>	
	PLAN DATE: AUGUST 2013 PREPARED BY: N. BITTING	DESIGNED BY: K.C. DURIGON REVIEWED BY: D.C. SARKAR
SCALE: 0 NA NONE	REVISIONS: _____ INITI. DATE: _____	DocuSign by: <i>Dinesh C. Sarkar</i> 448632614764CA 8/26/2014 DATE SIG. INVENTORY NO.

# SATURATED 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	Bar Size (#)	Spacing (in.)
WIND ZONE 1	LIGHT	S26L3	26	25	2	11	270	19	13	9	8	17	14.5	12.5	8	13	4	12
		S30L3	30	25	2	11	300	20	13.5	9	8	17.5	15	13	8	14	4	12
		S35L3	35	25	3	11	320	20	13.5	9.5	8	17.5	15	13	8	15	4	12
	HEAVY	S30H3	30	29	3	16	450	24.5	17	13	11	21	17.5	15	8	18	4	12
		S35H3	35	29	4	16	515	26	17.5	12	8.5	22	18.5	16	8	20	4	12
WIND ZONE 2	LIGHT	S26L2	26	23	2	10	245	18	12.5	8.5	8	16.5	14	12	8	13	4	12
		S30L2	30	23	2	10	270	19	12.5	9	8	16.5	14	12.5	8	13	4	12
		S35L2	35	23	3	10	300	19.5	13	9	8	17	14.5	13	8	14	4	12
	HEAVY	S30H2	30	29	3	15	415	25.5	15.5	11	8	20	17	14.5	8	17	4	12
		S35H2	35	29	4	15	475	25	16.5	11.5	8	21	17.5	15.5	8	19	4	12
WIND ZONE 3	LIGHT	S26L2	26	23	2	10	245	18	12.5	8.5	8	16.5	14	12	8	13	4	12
		S30L2	30	23	2	10	270	19	12.5	9	8	16.5	14	12.5	8	13	4	12
		S35L2	35	23	3	10	300	19.5	13	9	8	17	14.5	13	8	14	4	12
	HEAVY	S30H2	30	29	3	15	415	25.5	15.5	11	8	20	17	14.5	8	17	4	12
		S35H2	35	29	4	15	475	25	16.5	11.5	8	21	17.5	15.5	8	19	4	12
WIND ZONE 4	LIGHT	S26L1	26	22	2	8	190	16	11	8	8	15	12.5	11	8	12	4	12
		S30L1	30	22	2	8	205	16.5	11.5	8	8	15	13	11.5	8	12	4	12
		S35L1	35	22	3	8	230	17	12	8	8	15.5	13.5	11.5	8	12	4	12
	HEAVY	S30H1	30	25	3	12	320	20.5	14	9.5	8	18	15	13.5	8	15	4	12
		S35H1	35	25	4	12	350	21	14.5	10	8	18.5	15.5	13.5	8	16	4	12
WIND ZONE 5	LIGHT	S26L2	26	23	2	10	245	18	12.5	8.5	8	16.5	14	12	8	13	4	12
		S30L2	30	23	2	10	270	19	12.5	9	8	16.5	14	12.5	8	13	4	12
		S35L2	35	23	3	10	300	19.5	13	9	8	17	14.5	13	8	14	4	12
	HEAVY	S30H2	30	29	3	15	415	25.5	15.5	11	8	20	17	14.5	8	17	4	12
		S35H2	35	29	4	15	475	25	16.5	11.5	8	21	17.5	15.5	8	19	4	12

### Fabrication Design 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.
- Min. base plate thickness (T) is 2.0 inches.


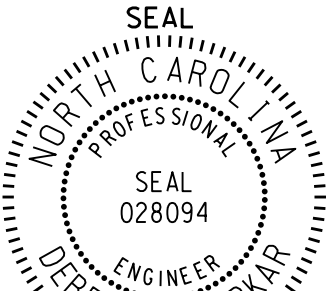
### Foundation Selection:

- 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 in the chart based on soil type and "N" value. Select the appropriate row based on the pole load case.  
The foundation depth is the value where the column and the row intersect.
- Reference Drilled Shafts: Construction Procedures and Design Methods, FHWA -IF-99-025

- S30H1 - Hard Clay-Stirrup Spacing: 6 in. c/c
- S30H2 - Hard Clay-Stirrup Spacing: 6 in. c/c
- S30H3 - Hard Clay-Stirrup Spacing: 6 in. c/c
- Dense Sand-Stirrup Spacing: 6 in. c/c
- S35H1 - Hard Clay - Stirrup Spacing: 6 in. c/c
- S35H2 - Very Stiff Clay-Stirrup Spacing: 6 in. c/c
- Hard Clay- Stirrup Spacing: 6 in. c/c
- Dense Sand- Stirrup Spacing: 6 in. c/c
- S35H3 - Very Stiff Clay-Stirrup Spacing: 6 in. c/c
- Dense Sand-Stirrup Spacing: 6 in. c/c

48" Dia. Foundations Concrete Volume (cubic yards) = (0.465) x Foundation Depth

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	<b>Standard Strain Pole Foundation for Saturated Soil Condition</b>	
750 N. Greenfield Pkwy, Garner, NC 27529	PLAN DATE: SEPTEMBER 2013    DESIGNED BY: C.B. COGDILL PREPARED BY: N. BITTING    REVIEWED BY: D. SARKAR	REVISIONS:    INIT.    DATE _____ _____ _____
SCALE: 0 NA None		DocuSigned by: Debesh C. Sarkar 3/26/2014 44EBE32E147E4C4...

Standard Strain Pole Foundation - Saturated Soil Condition

# DRY 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	Bar Size (#)	Spacing (in.)
WIND ZONE 1	LIGHT	S26L3	26	25	2	11	270	18	12.5	9	8	14.5	11	10	8	13	4	12
		S30L3	30	25	2	11	300	18.5	13	9	8	15	11.5	10	8	14	4	12
		S35L3	35	25	3	11	320	19	13.5	9.5	8	15	11.5	10.5	8	15	4	12
	HEAVY	S30H3	30	29	3	16	450	23	16	11	8	17.5	13.5	11.5	8	18	4	12
		S35H3	35	29	4	16	515	24.5	16.5	12	8.5	18.5	14	12	8	20	4	12
WIND ZONE 2	LIGHT	S26L2	26	23	2	10	245	17	12	8.5	8	14	11	9.5	8	13	4	12
		S30L2	30	23	2	10	270	18	12.5	8.5	8	14.5	11	10	8	13	4	12
		S35L2	35	23	3	10	300	18.5	13	9	8	14.5	11.5	10	8	14	4	12
	HEAVY	S30H2	30	29	3	15	415	22	15	10.5	8	17	13	11.5	8	17	4	12
		S35H2	35	29	4	15	475	23.5	16	11.5	8	18	13.5	12	8	19	4	12
WIND ZONE 3	LIGHT	S26L2	26	23	2	10	245	17	12	8.5	8	14	11	9.5	8	13	4	12
		S30L2	30	23	2	10	270	18	12.5	8.5	8	14.5	11	10	8	13	4	12
		S35L2	35	23	3	10	300	18.5	13	9	8	14.5	11.5	10	8	14	4	12
	HEAVY	S30H2	30	29	3	15	415	22	15	10.5	8	17	13	11.5	8	17	4	12
		S35H2	35	29	4	15	475	23.5	16	11.5	8	18	13.5	12	8	19	4	12
WIND ZONE 4	LIGHT	S26L1	26	22	2	8	190	15.5	10.5	8	8	13	10	9	8	12	4	12
		S30L1	30	22	2	8	205	15.5	11	8	8	13	10	9	8	12	4	12
		S35L1	35	22	3	8	230	16.5	11.5	8	8	13.5	10.5	9	8	12	4	12
	HEAVY	S30H1	30	25	3	12	320	19.5	13.5	9.5	8	15	12	10.5	8	15	4	12
		S35H1	35	25	4	12	350	20	14	10	8	15.5	12	10.5	8	15	4	12
WIND ZONE 5	LIGHT	S26L2	26	23	2	10	245	17	12	8.5	8	14	11	9.5	8	13	4	12
		S30L2	30	23	2	10	270	18	12.5	8.5	8	14.5	11	10	8	13	4	12
		S35L2	35	23	3	10	300	18.5	13	9	8	14.5	11.5	10	8	14	4	12
	HEAVY	S30H2	30	29	3	15	415	22	15	10.5	8	17	13	11.5	8	17	4	12
		S35H2	35	29	4	15	475	23.5	16	11.5	8	18	13.5	12	8	19	4	12

### Fabrication Design Notes:


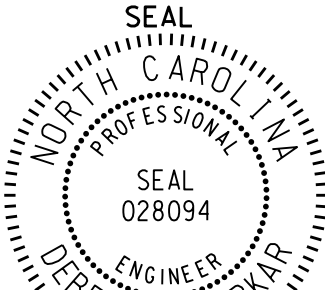
- Values shown in the "Reactions at the Pole Base" column represent the minimum acceptable capacity allowed for design using a design CSR of 1.00.
- Min. base plate thickness (T) is 2.0 inches.

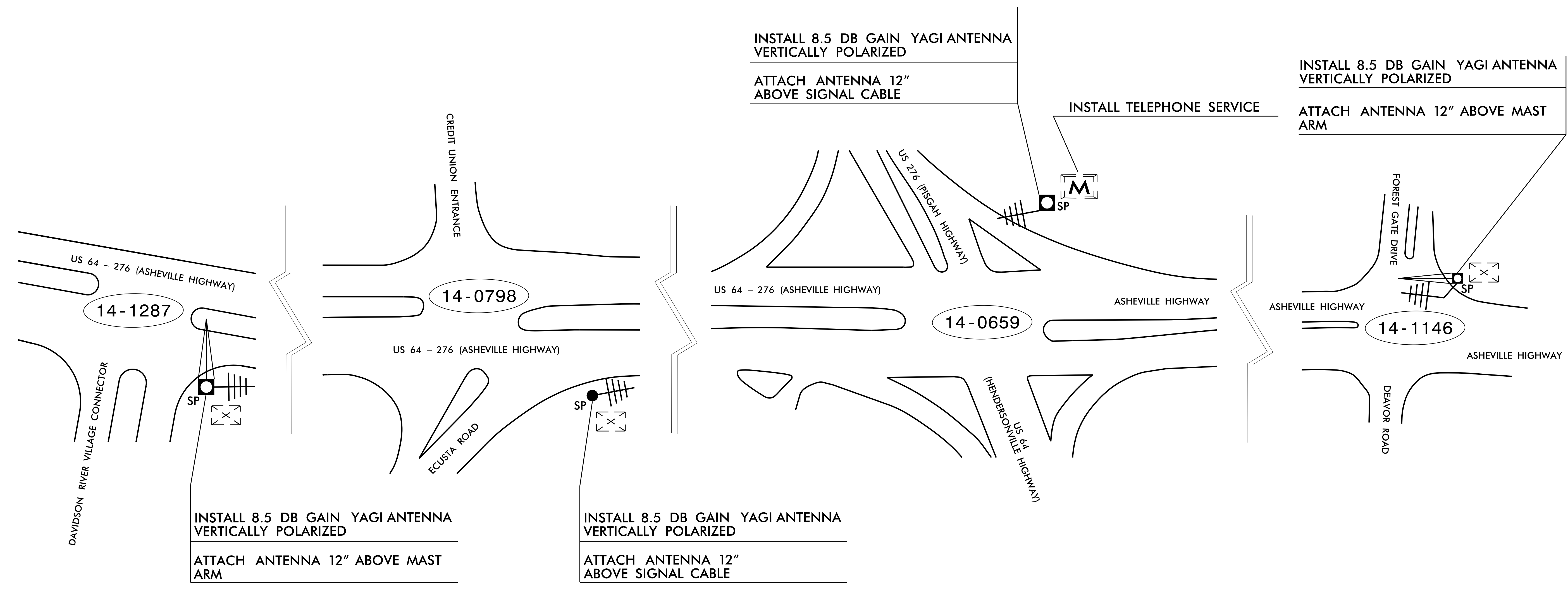
### Foundation Selection:

- 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 in the chart based on soil type and "N" value. Select the appropriate row based on the pole load case.  
The foundation depth is the value where the column and the row intersect.
- Reference Drilled Shafts: Construction Procedures and Design Methods, FHWA -IF-99-025

- S30H1 - Hard Clay-Stirrup Spacing: 6 in. c/c  
- Dense Sand-Stirrup Spacing: 6 in. c/c
- S30H2 - Very Stiff Clay: Stirrup Spacing: 6 in. c/c  
- Hard Clay: Stirrup Spacing: 6 in. c/c  
- Medium Clay: Stirrup Spacing: 6 in. c/c  
- Dense Sand: Stirrup Spacing: 6 in. c/c
- S30H3 - Very Stiff Clay: Stirrup Spacing: 6 in. c/c  
- Hard Clay: Stirrup Spacing: 6 in. c/c  
- Medium Clay: Stirrup Spacing: 6 in. c/c  
- Dense Sand: Stirrup Spacing: 6 in. c/c
- S35H1 - Hard Clay: tirrup Spacing: 6 in. c/c  
- Dense Sand: Stirrup Spacing: 6 in. c/c
- S35H2 - Very Stiff Clay: Stirrup Spacing: 6 in. c/c  
- Hard Clay: Stirrup Spacing: 6 in. c/c  
- Medium Clay: Stirrup Spacing: 6 in. c/c  
- Dense Sand: Stirrup Spacing: 6 in. c/c
- S35H3 - Very Stiff Clay: Stirrup Spacing: 6 in. c/c  
- Hard Clay: Stirrup Spacing: 6 in. c/c  
- Medium Clay: Stirrup Spacing: 6 in. c/c  
- Dense Sand: Stirrup Spacing: 6 in. c/c

48" Dia. Foundations Concrete Volume (cubic yards) = (0.465) x Foundation Depth

	<p><b>Standard Strain Pole Foundation for Dry Soil Condition</b></p> <p>PLAN DATE: SEPTEMBER 2013    DESIGNED BY: C.B. COGDILL                  PREPARED BY: N. BITTING    REVIEWED BY: D. SARKAR</p>	
SCALE: 0 NA None	REVISIONS:    INIT.    DATE	DocuSigned by: Deborah C. Sarkar 3/26/2014 44EBE32E147E4C4...



**NOTES FOR WIRELESS COMMUNICATIONS:**

1. INSTALL COAXIAL CABLE:
  - A. ON WOOD POLES, REQUIRING A NEW RIGID GALVANIZED STEEL RISER, INSTALL A 2" RISER WITH WEATHERHEAD AND ROUTE THE COAXIAL CABLE TO THE ANTENNA.
  - B. ON METAL POLES WITH MAST ARMS, RUN COAXIAL CABLE UP THROUGH THE POLE AND OUT THE MAST ARM; FIELD DRILL A 1/2" HOLE UP THROUGH THE BOTTOM OF MAST ARM FOR INSTALLATION OF THE COAXIAL CABLE TO THE ANTENNA.
  - C. ON METAL STRAIN POLES, RUN COAXIAL CABLE UP THROUGH THE POLE AND OUT THE WEATHERHEAD AND ROUTE THE COAXIAL CABLE TO THE ANTENNA.
  - D. BETWEEN THE POINT OF EXITING THE RISER, METAL POLE OR MAST ARM AND THE ANTENNA, SECURE THE COAXIAL CABLE TO THE STRUCTURE USING 3/4" STAINLESS STEEL STRAPS EVERY 12".
2. IF AN EXISTING 2" SPARE RIGID GALVANIZED STEEL RISER IS AVAILABLE, INSTALL THE COAXIAL CABLE IN THE SPARE RISER.
3. INSTALL WIRELESS ANTENNA ON POLE WITH RF WARNING SIGN.  
(NOTE: RF WARNING SIGN NOT REQUIRED WHEN ANTENNA IS INSTALLED ON AN NCDOT-OWNED POLE.)
4. MAINTAIN PROPER CLEARANCE FROM ALL UTILITIES PER THE NATIONAL ELECTRICAL SAFETY CODE.
5. INSTALL WIRELESS SERIAL RADIO MODEM WITH EXTERIOR DISCONNECT SWITCH LOCATED ON CABINET.  
(NOTE: RF ANTENNA DISCONNECT SWITCH AND DECAL ARE NOT REQUIRED WHEN THE ANTENNA IS INSTALLED ON AN NCDOT-OWNED POLE.)
6. REFERENCE "WIRELESS RADIO ANTENNA TYPICAL DETAILS."

**LEGEND**

	YAGI ANTENNA (DOUBLE) FOR REPEATER OPERATION
	YAGI ANTENNA (SINGLE)
	OMNI ANTENNA
	EXISTING CONTROLLER AND CABINET
	EXISTING MASTER CONTROLLER AND CABINET
	SIGNAL INVENTORY NUMBER
	NEW METAL POLE W/MAST ARM
	EXISTING WOOD POLE
	NEW METAL POLE
	SIGNAL POLE
	EXISTING METAL POLE
	NEW OVERSIZED JUNCTION BOX
	EXISTING OVERSIZED JUNCTION BOX
	EXISTING CONDUIT
	EXISTING COMMUNICATIONS CABLE

	<b>WIRELESS COMMUNICATIONS PLANS</b>	
	DIVISION 14 TRANSYLVANIA	
Prepared in the Offices of: 	PLAN DATE: SEPTEMBER 2015 PREPARED BY: A. J. SKUCE REVISIONS:	DocuSigned by: BREVARD REVIEWED BY: <i>Mel Avery</i> REVIEWED BY: 09F05084CBED3443 INIT. DATE:
750 N. Greenfield Pkwy., Garner, NC 27529 SCALE: NA 	SEAL GREGORY A. FULLER PROFESSIONAL ENGINEER STATE OF NORTH CAROLINA License No. 023919 DATE: 9/24/2015 CADD Filename:	