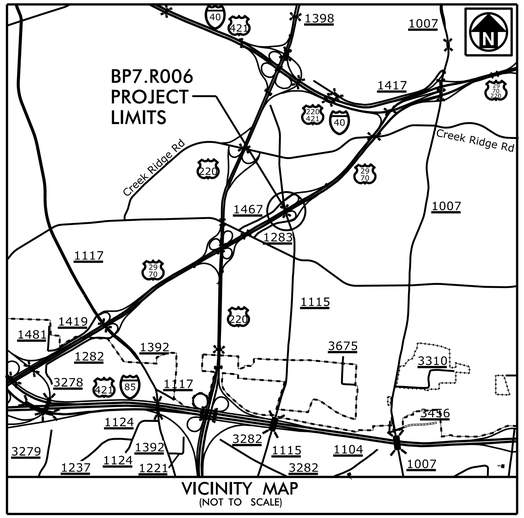
09/08/99

TIP PROJECT: BP7.R006

CONTRACT:



STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

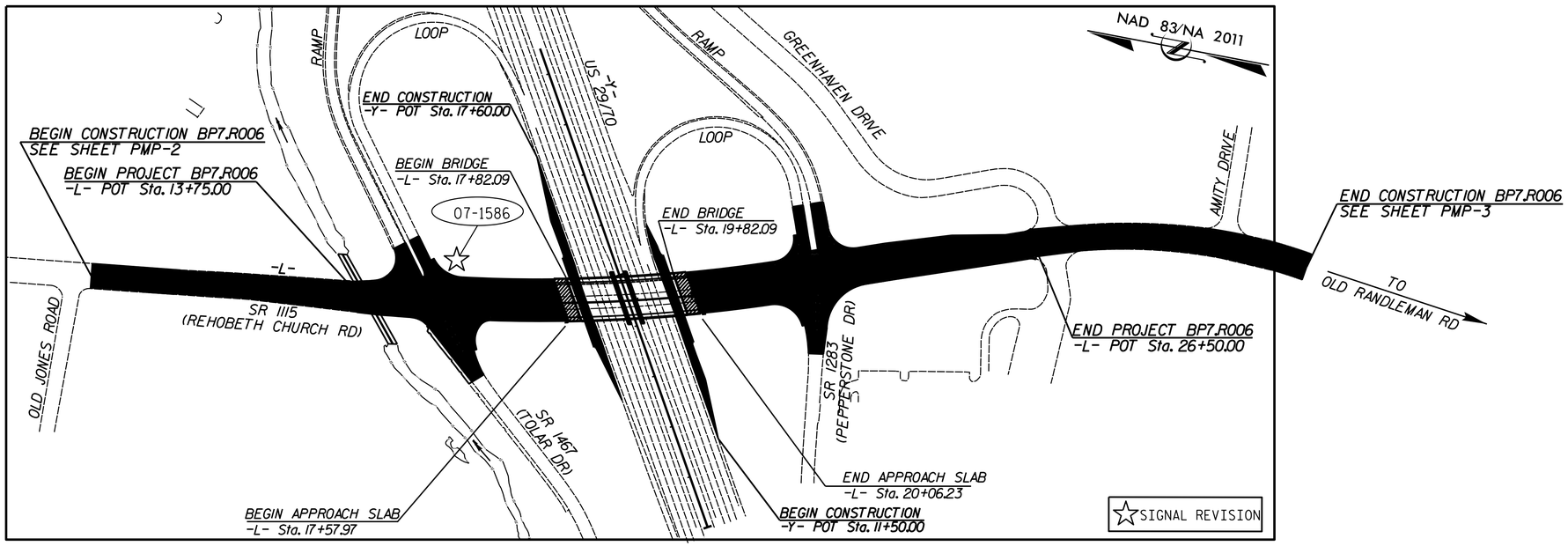
GUILFORD COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	BP7.R006	1	

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
BP7.R006.1		PE
BP7.R006.2		ROW
BP7.R006.3		CONSTRUCTION

LOCATION: BRIDGE NO. 225 OVER US 29/70 ON SR 1115 (REHOBETH CHURCH ROAD) IN GREENSBORO

TYPE OF WORK: GRADING, PAVING, DRAINAGE, SIGNAL, ITS AND STRUCTURE



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

CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD II.

Index of Plans

Sheet #	*Reference #*	*Location/Description*
Sig. 1.0	---------	*Title Sheet*
Sig. 1.1–1.2	---------	*Std. Plate Sheets*
Sig. 2.0–4.1	*07–2026*	*SR 1115 (Rehobeth Church Road) at I–85 Bus. SB Ramp/SR 1467 (Tolar Drive)*
Sig. M1–M8	---------	*Std. Metal Pole Sheets*
SCP 1–11	---------	*Signal Communication Plan*

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

750 N. Greenfield Parkway, Garner, NC 27529

TRANSPORTATION SYSTEMS MANAGEMENT AND OPERATIONS UNIT

NCDOT Contacts:

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Keith Mims, PE – Signal Equipment Design Engineer
Gregg Green – Signal Communication Project Engineer

MOTT MACDONALD
7621 Purfoy Rd Suite 115
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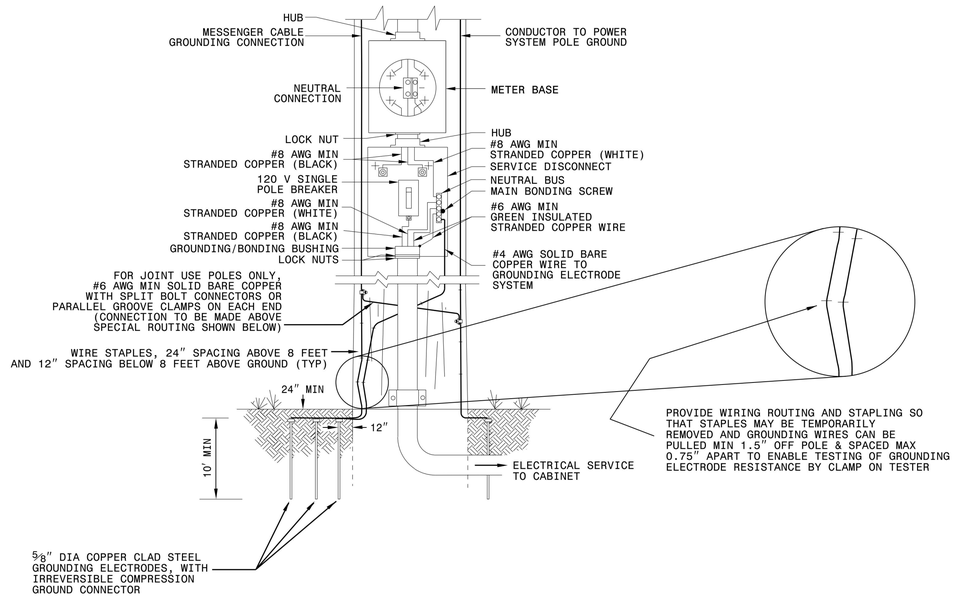
www.mottmac.com
License No. F-0669

Rusty Thompson, PE – Mott MacDonald Project Manager
Neil Avery – Senior Specialist ITS

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

$$$$SYSTIME$$$$ $$$$DGN$$$$ $$$$USERNAME$$$$ $$$$LEVEL$$$$ $$$$MDD$$$$

PROJECT NO.	SHEET NO.
BP7.R006	Sig. 1.1



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

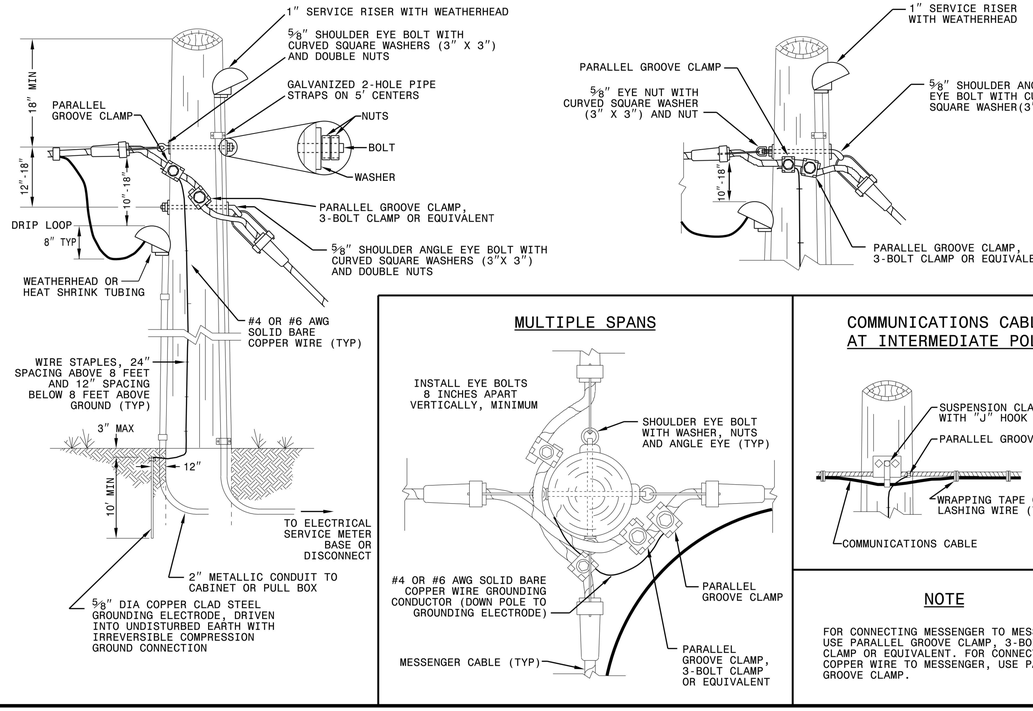
ENGLISH STANDARD DRAWING FOR

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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See Plate for Title

Prepared in the Offices of:

Transportation Mobility and Safety Division
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
ITS & Signals Unit

750 N. Greenfield Parkway
Garner, NC 27529

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 032108 ENGINEER MOHD A. ASLAMI

DocuSigned by: Mohd Aslami
5D9BDBA6DBB6495...

10/11/2017
DATE

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U:\Traffic\Std Drawings\Plate Sheets\2018_Plate Sheet .dgn
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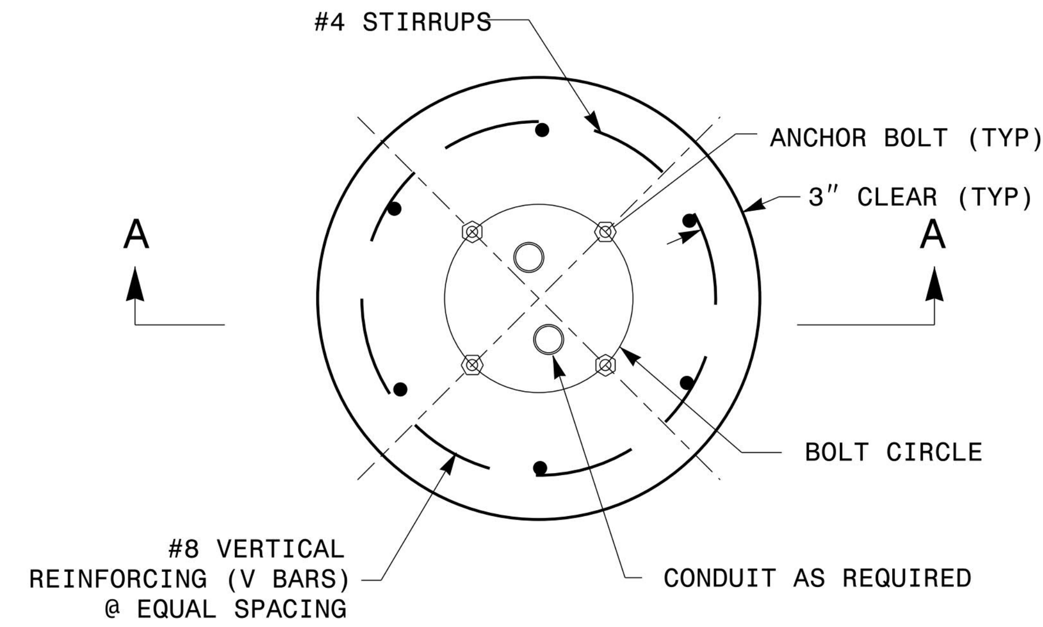
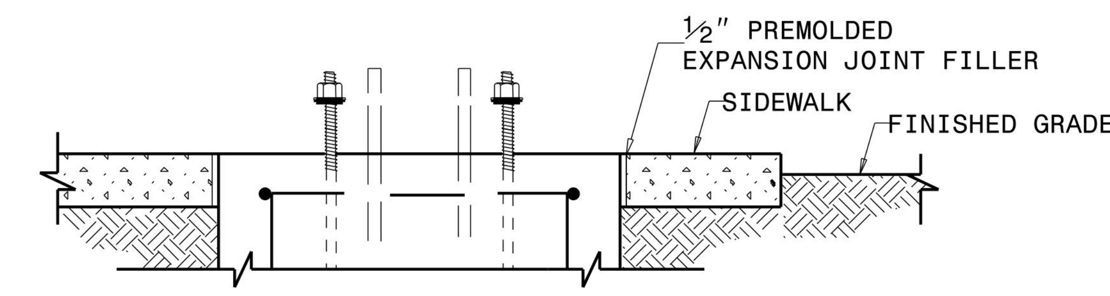
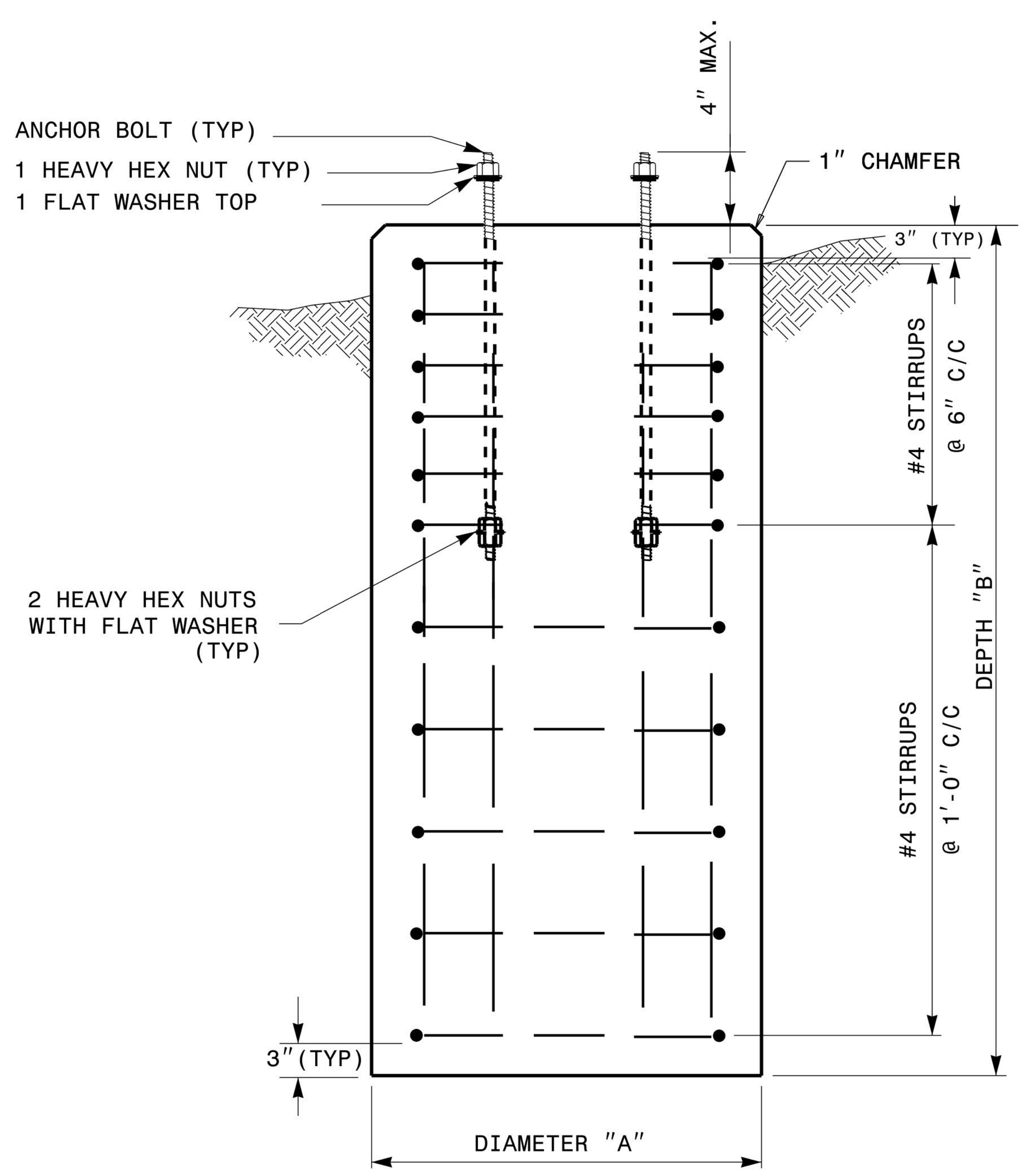


PEDESTAL FOUNDATION - PLAN VIEW

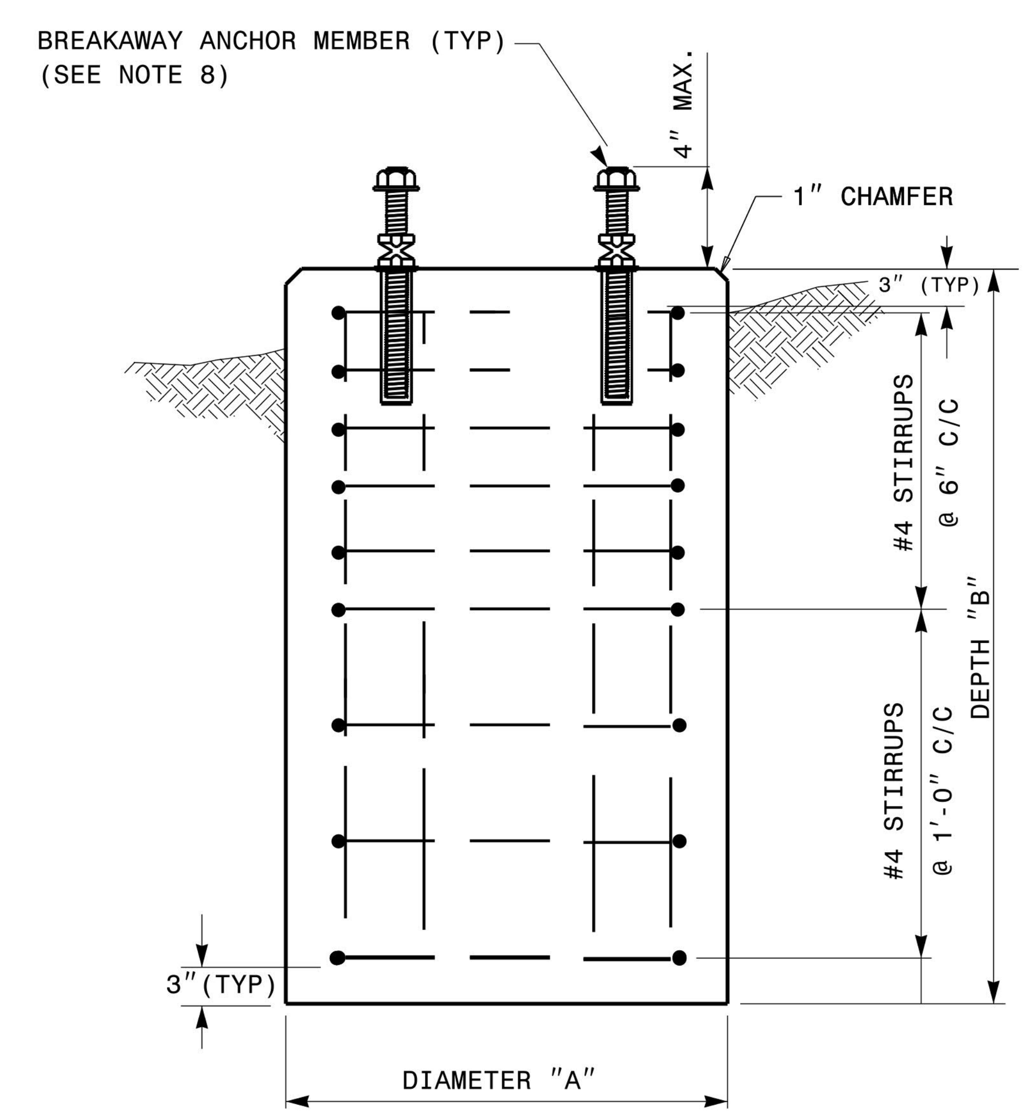


PEDESTAL FOUNDATION DETAILS FOR SIDEWALK



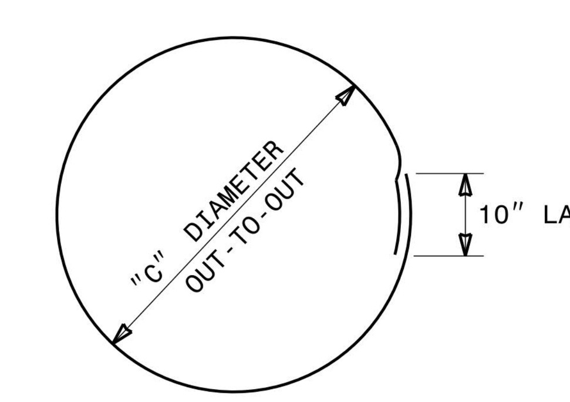
TYPES I, II & III

SECTION A-A



TYPES I & II ONLY

SECTION A-A

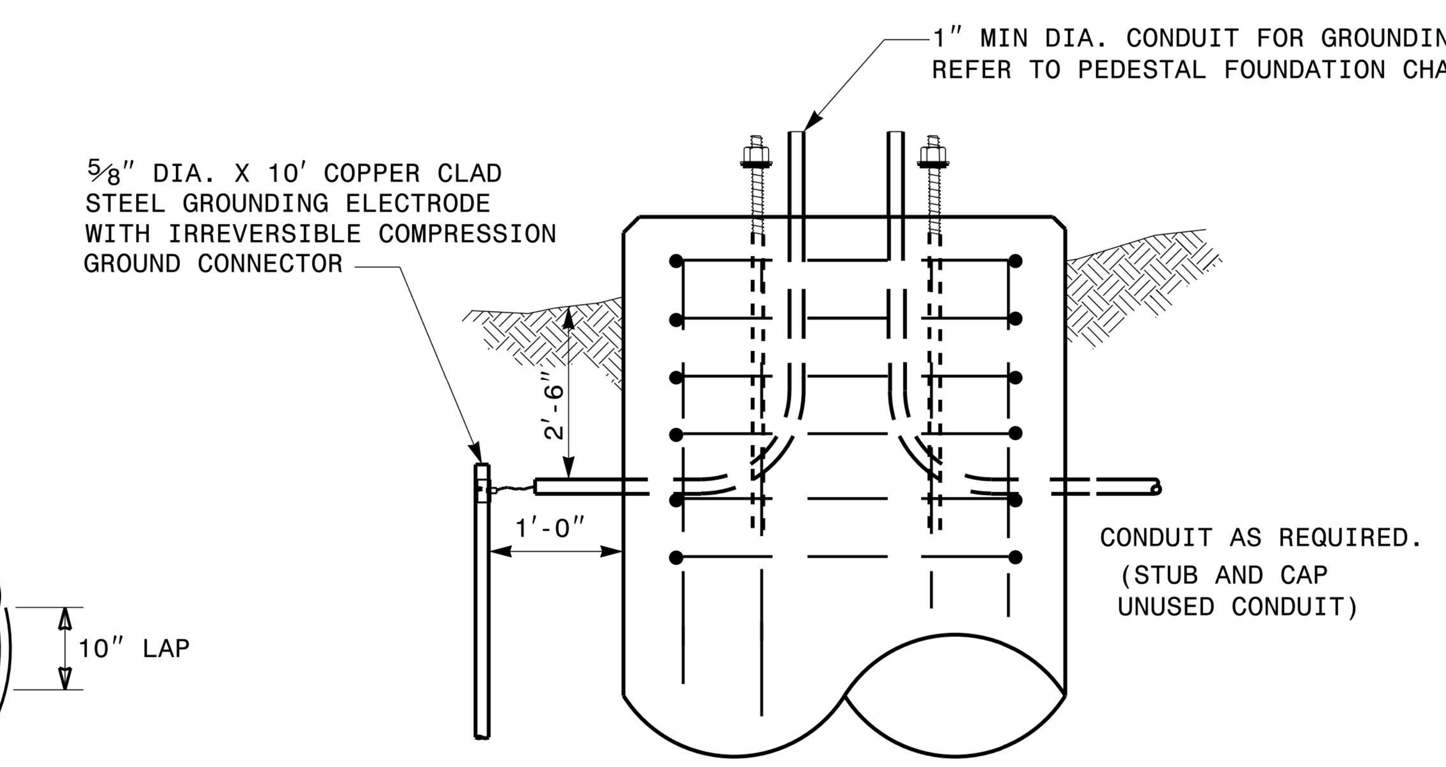


CLOSED HOOPS

NOTES:

1. CAST FOUNDATION AGAINST UNDISTURBED SOIL WHEREVER CONDITIONS PERMIT. IN UNSTABLE SOIL, CAST-IN-PLACE TUBE FORMS ARE ALLOWED WITH APPROVAL.
2. COMPLY WITH APPLICABLE PROVISIONS OF SECTION 825 FOR CONCRETE CONSTRUCTION.
3. USE CLASS "A" CONCRETE THAT MEETS THE REQUIREMENTS OF SECTION 1000 WITH A COMPRESSION STRENGTH AT 28 DAYS OF F'c= 3000 PSI (MIN.).
4. USE ASTM GRADE 60 DEFORMED BARS FOR ALL REINFORCING STEEL.
5. 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.
6. MAINTAIN AT LEAST 3" COVER ON ALL REINFORCEMENT.
7. ORIENT CONDUIT AS REQUIRED BY THE DESIGN OR AS DICTATED BY FIELD CONDITIONS.
8. USE ADHESIVE ANCHOR FOR THREADED COUPLING INSERT. FOR TYPE I MINIMUM DEPTH NECESSARY IS 0'-4½" AND FOR TYPE II MINIMUM DEPTH NECESSARY IS 0'-6⅝". FOLLOW MANUFACTURER'S INSTALLATION INSTRUCTIONS.



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	½	1'-6"	NO
II	NORMAL-DUTY	2'-0"	5'-0"	.58	¾	2'-0"	YES
III	HEAVY-DUTY	2'-6"	7'-0"	1.27	1	4'-0"	YES

REINFORCING STEEL SCHEDULE

TYPE	V-BAR				STIRRUP								TOTAL STEEL WEIGHT LBS
						QUANTITY							
						VERTICAL SPACING							
	SIZE #	QTY	LENGTH	WEIGHT LBS	SIZE #	ON 6" CENTERS	ON 12" CENTERS	TOTAL	LENGTH	DIAMETER "C" FT	OVERLAP MIN.	WEIGHT LBS	
I	8	6	3'-0"	56	4	0	4	4	5'-7"	1'-6"	0'-10"	15	71
II	8	6	4'-6"	86	4	5	3	8	5'-7"	1'-6"	0'-10"	30	116
III	8	6	6'-6"	122	4	7	4	11	7'-2"	2'-0"	0'-10"	53	175

1-18

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

ENGLISH STANDARD DRAWING FOR
PEDESTALS
FOUNDATIONS

SHEET 1 OF 1

1743D01

See Plate for Title

Prepared in the Offices of:

Transportation Mobility and Safety Division
ITS & Signals Unit

750 N. Greenfield Parkway
Garner, NC 27529

SEAL

NORTH CAROLINA PROFESSIONAL ENGINEER
SEAL 028094
DEBESH C. SARKAR

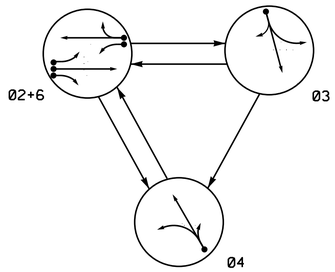
DocuSigned by:
Debesh C. Sarkar
44E8E32E147E4C4...

10/11/2017
DATE

DOCUMENT NOT CONSIDERED
FINAL UNLESS ALL
SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
BP7.R006	Sig. 2.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

TABLE OF OPERATION				
SIGNAL FACE	PHASE 02+6	PHASE 03	PHASE 04	FLASH
21,22,23	G	R	R	Y
31	R	G	R	R
32,33	R	G	R	R
41	R	R	G	R
42	R	R	G	R
61,62,63	G	R	R	Y

SIGNAL FACE I.D.

All Heads L.E.D.

LOOP & DETECTOR UNIT INSTALLATION CHART

NAZTEC APOGEE SOFTWARE 2070 CONTROLLER

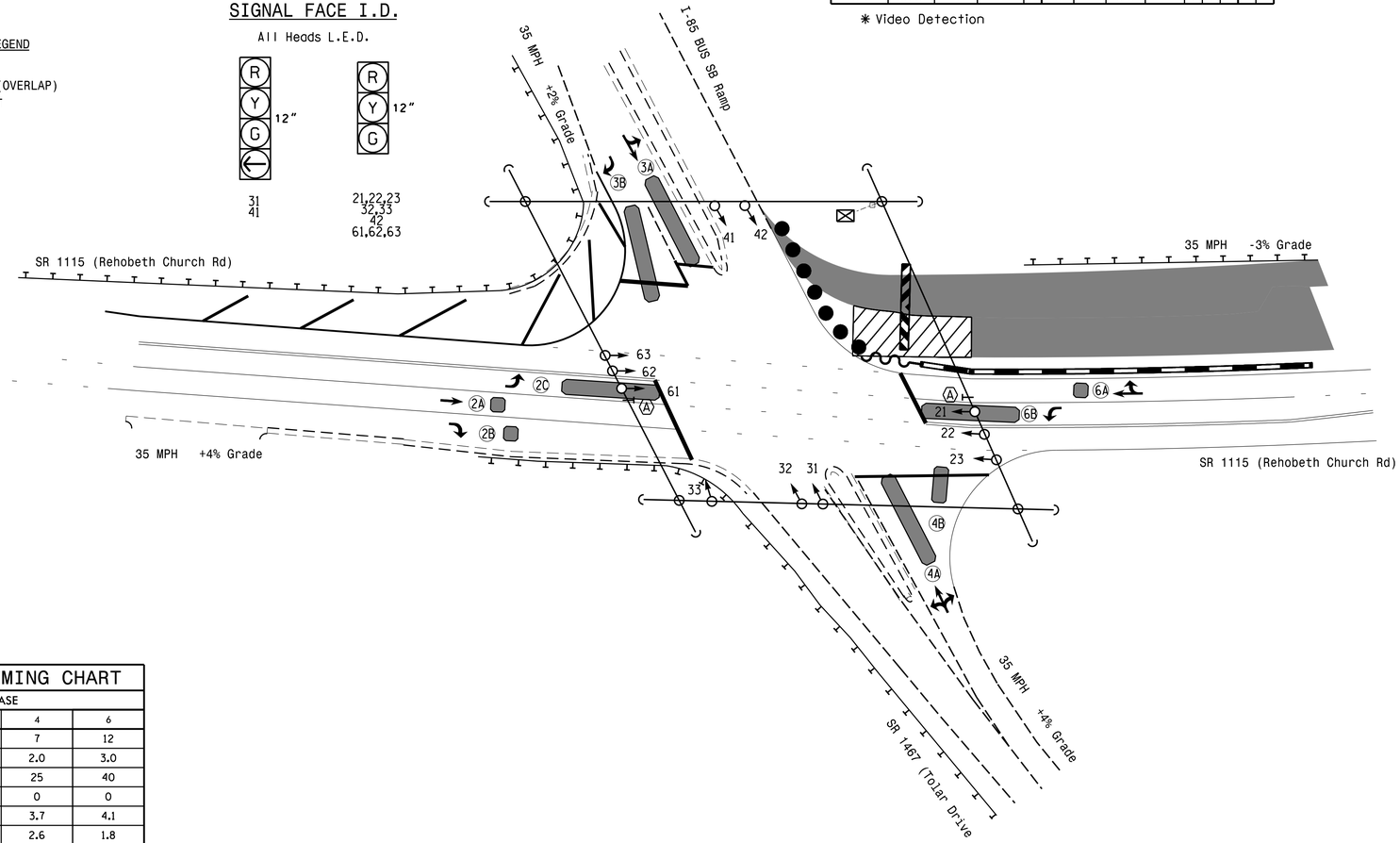
INDUCTIVE LOOPS					DETECTOR PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	SWITCH (PHASE)	DELAY TIME	STRETCH TIME	CALLING	EXTENSION	ADDED INIT.	SYSTEM LOOP	NEW CARD
2A	6X6	70	*	*	2	-	-	-	Y	Y	-	-	-
2B	6X6	70	*	*	2	-	-	-	Y	Y	-	-	-
2C	6X40	0	*	*	2	-	5.0	-	Y	Y	-	-	-
3A	6X40	0	*	*	3	-	3.0	-	Y	Y	-	-	-
3B	6X40	+5	*	*	3	-	15.0	-	Y	Y	-	-	-
4A	6X40	0	*	*	4	-	3.0	-	Y	Y	-	-	-
4B	6X15	+5	*	*	4	-	15.0	-	Y	Y	-	-	-
6A	6X6	70	*	*	6	-	-	-	Y	Y	-	-	-
6B	6X40	0	*	*	6	-	5.0	-	Y	Y	-	-	-

* Video Detection

3 Phase
Fully Actuated
(Greensboro Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Abandon all existing loops.
4. Set all detector units to presence mode.
5. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
6. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
7. This intersection uses video detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.
8. Program all signal heads for the same approach to flash concurrently during flashing operation.



NAZTEC APOGEE 2070 TIMING CHART

FEATURE	PHASE 2	PHASE 3	PHASE 4	PHASE 6
Min Green *	12	7	7	12
Gap, Extension *	3.0	2.0	2.0	3.0
Maximum Green 1 *	40	25	25	40
Maximum Green 2 *	0	0	0	0
Yellow Clear	3.6	3.6	3.7	4.1
Red Clear	1.7	2.6	2.6	1.8
Walk *	-	-	-	-
Pedestrian Clear	-	-	-	-
Added Initial *	-	-	-	-
Maximum Initial *	-	-	-	-
Time Before Reduction *	-	-	-	-
Time To Reduce *	-	-	-	-
Minimum Gap	-	-	-	-
Recall Mode	MIN RECALL	-	-	MIN RECALL
Lock Calls	YES	NO	NO	YES
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.

LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Video Detection Zone	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
	Construction Zone Drums	
	Construction Zone	
A	"Left Turn Yield on Green" Sign (R10-12)	A

Signal Upgrade - Temporary 1

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MOTT MACDONALD
7621 Purfoy Road
Suite 115
Fuquay-Varina, NC 27526
www.mottmac.com
License No. F-0669

Prepared for the Offices of:
Transportation Mobility and Safety Division
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signal Design Section
750 N.Greenfield Pkwy.Garner,NC 27529

SCALE 0 30 1" = 30'

SR 1115 (Rehobeth Church Road) at I-85 Bus. SB Ramp/ SR 1467 (Tolar Drive)

Division 7 Guilford Co. Greensboro

PLAN DATE:	January 2023	REVIEWED BY:	BAL
PREPARED BY:	INA	REVIEWED BY:	RWT

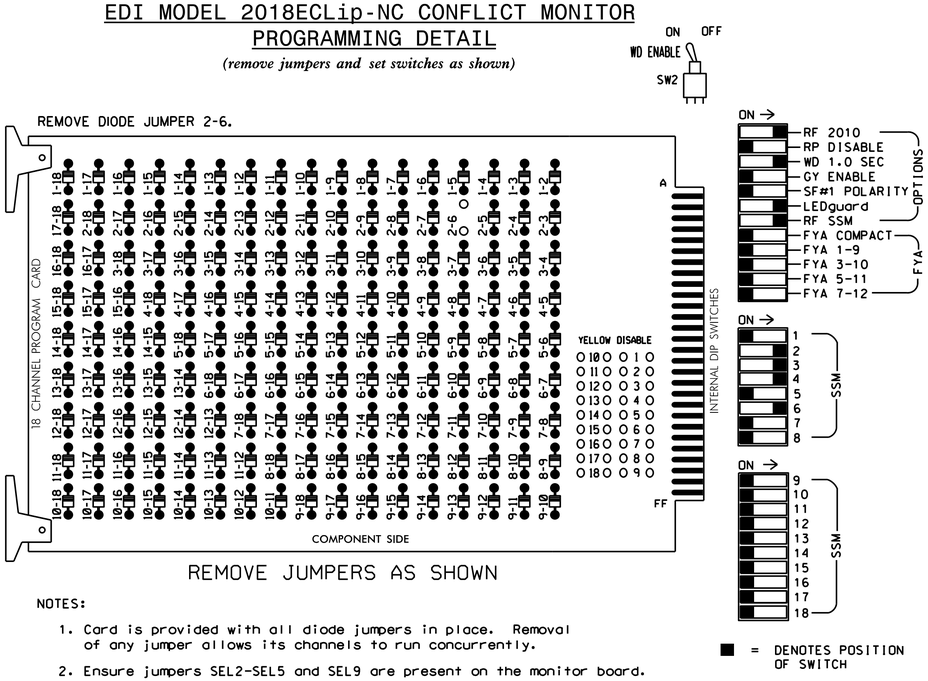
REVISIONS	INIT.	DATE

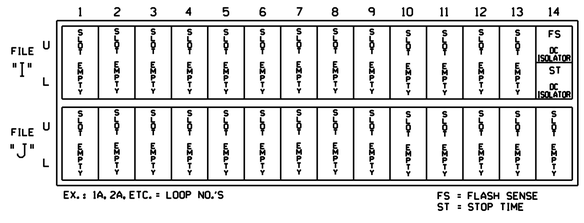
SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 032711 RUSSELL W. THOMPSON

SIGNATURE DATE

SIG. INVENTORY NO. 07-2026TI

$$$$$$SYSTIME$$$$$$
$$$$$$SYSDOW$$$$$$
$$$$$$USERNAME$$$$$$





PROJECT REFERENCE NO.	SHEET NO.
BP7.R006	Sig. 2.1

EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE JUMPERS AS SHOWN

■ = DENOTES POSITION OF SWITCH

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. Ensure Conflict Monitor Ethernet port is connected to a Switch port located within the cabinet.

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. Initialize database in Naztec 2070 local software (Apogee) as FULL-CALTRANS. This initialization should be done prior to programming controller.
3. Initialize I/O "C1-C11-ABC IO Mode" to USER (MM 1-8-6). Then set "Init 2A" to MODE 5 (MM 1-8-9-3).
4. Program phases 2 and 6 for Start Up In Green.
5. Program "Start Up Flash" for 0 sec. The conflict monitor will govern start-up flash time.
6. Ensure "Local Flash Start" feature is set to "DRK".
7. Program controller to provide a 1 second delay on the Flash Sense/Local Flash input. Use the following logic statement to provide this functionality:

FROM MAIN MENU->1->8->7 (I/O LOGIC)

Result Src.Fcn	TimeOp Time
I208 = 01208	DLY 1

8. The cabinet and controller are part of the City of Greensboro Signal System.

EQUIPMENT INFORMATION

CONTROLLER..............2070
CABINET.................332
SOFTWARE................NAZTEC APOGEE
CABINET MOUNT...........BASE
OUTPUT FILE POSITIONS...12
LOAD SWITCHES USED......S2,S4,S5,S8
PHASES USED.............2,3,4,6
OVERLAPS................NONE

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4		S5		S6	S7	S8	S9	S10	S11	S12
CMU CHANNEL NO.	1	2	13	3		4		14	5	6	15	7	8	16
PHASE	1	2	2 PED	3		4		4 PED	5	6	6 PED	7	8	8 PED
SIGNAL HEAD NO.	NU	21,22 23	NU	31	32,33	41	42	NU	NU	61,62 63	NU	NU	NU	NU
RED		128		116	116	101	101			134				
YELLOW		129		117	117	102	102			135				
GREEN		130		118	118	103	103			136				
RED ARROW														
YELLOW ARROW														
GREEN ARROW				118		103								
✋														
🚶														

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
	L														ST DC ISOLATOR
FILE "J"	U	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L														

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

FS = FLASH SENSE
ST = STOP TIME

SPECIAL DETECTOR NOTE

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-2026T1
DESIGNED: January 2023
SEALED: 1-18-2023
REVISED:

Electrical Detail

MOTT MACDONALD
7621 Purfoy Road
Suite 115
Fuquay-Varina, NC 27526
www.mottmac.com
License No. F-0669

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for the Offices of:
Transportation Mobility and Safety Division
Signal Design Section
750 N.Greenfield Pkwy.Garner.NC 27529

SR 1115 (Rehobeth Church Road)
at I-85 Bus. SB Ramp/
SR 1467 (Tolar Drive)

Division 7 Guilford County Greensboro

PLAN DATE:	November 2021	REVIEWED BY:	BAL
PREPARED BY:	INA	REVIEWED BY:	RWT

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
032711
RUSSELL W. THOMPSON

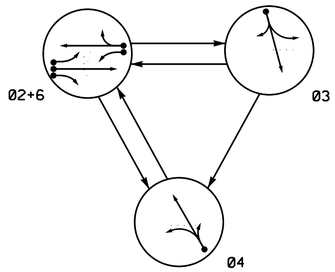
DATE

SIG. INVENTORY NO. 07-2026TI

$$$$SYSTIME$$$$
$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

PROJECT REFERENCE NO.	SHEET NO.
BP7.R006	Sig. 3.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

TABLE OF OPERATION				
SIGNAL FACE	PHASE 02+6	PHASE 03	PHASE 04	FLASH
21,22,23	G	R	R	Y
31	R	G	R	R
32,33	R	G	R	R
41	R	R	G	R
42	R	R	G	R
61,62,63	G	R	R	Y

SIGNAL FACE I.D.

All Heads L.E.D.

LOOP & DETECTOR UNIT INSTALLATION CHART

NAZTEC APOGEE SOFTWARE 2070 CONTROLLER

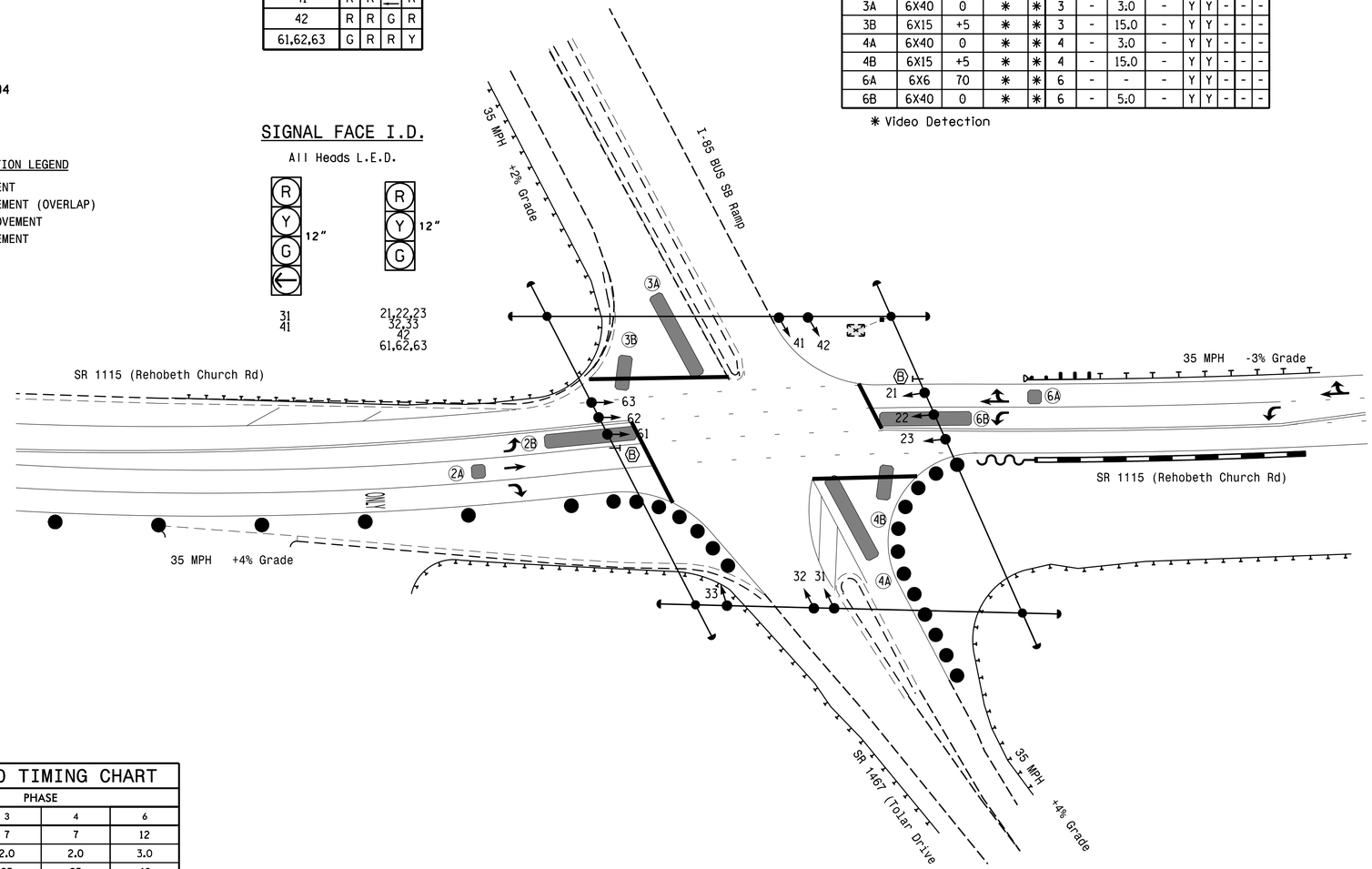
INDUCTIVE LOOPS						DETECTOR PROGRAMMING								
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	SWITCH (PHASE)	DELAY TIME	STRETCH TIME	CALLING	EXTENSION	ADDED INIT.	SYSTEM LOOP	NEW CARD
2A	6X6	70	*	*	2	-	-	-	Y	Y	-	-	-
2B	6X6	0	*	*	2	-	5.0	-	Y	Y	-	-	-
3A	6X40	0	*	*	3	-	3.0	-	Y	Y	-	-	-
3B	6X15	+5	*	*	3	-	15.0	-	Y	Y	-	-	-
4A	6X40	0	*	*	4	-	3.0	-	Y	Y	-	-	-
4B	6X15	+5	*	*	4	-	15.0	-	Y	Y	-	-	-
6A	6X6	70	*	*	6	-	-	-	Y	Y	-	-	-
6B	6X40	0	*	*	6	-	5.0	-	Y	Y	-	-	-

* Video Detection

3 Phase
Fully Actuated
(Greensboro Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Abandon all existing loops.
4. Set all detector units to presence mode.
5. Reposition heads 21.22.23.41.42. 61.62. and 63.
6. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
7. This intersection uses video detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.
8. Program all signal heads for the same approach to flash concurrently during flashing operation.



NAZTEC APOGEE 2070 TIMING CHART

FEATURE	PHASE 2	PHASE 3	PHASE 4	PHASE 6
Min Green *	12	7	7	12
Gap, Extension *	3.0	2.0	2.0	3.0
Maximum Green 1 *	40	25	25	40
Maximum Green 2 *	0	0	0	0
Yellow Clear	3.6	3.6	3.7	4.1
Red Clear	1.6	2.2	2.1	1.7
Walk *	-	-	-	-
Pedestrian Clear	-	-	-	-
Added Initial *	-	-	-	-
Maximum Initial *	-	-	-	-
Time Before Reduction *	-	-	-	-
Time To Reduce *	-	-	-	-
Minimum Gap	-	-	-	-
Recall Mode	MIN RECALL	-	-	MIN RECALL
Lock Calls	YES	NO	NO	YES
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.

LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Video Detection Zone	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
	Construction Zone Drums	
	Construction Zone	
Ⓐ	"Left Turn Yield on Green" Sign (R10-12)	Ⓐ

Signal Upgrade - Temporary 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

MOTT MACDONALD
7621 Purfoy Road
Suite 115
Fuquay-Varina, NC 27526
www.mottmac.com
License No. F-0669

Prepared For the Offices of:
Transportation Mobility and Safety Division
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signal Design Section
750 N.Greenfield Pkwy.Garner,NC 27529

SCALE 0 30 1" = 30'

SR 1115 (Rehobeth Church Road) at I-85 Bus. SB Ramp/ SR 1467 (Tolar Drive)

Division 7 Guilford Co. Greensboro

PLAN DATE:	January 2023	REVIEWED BY:	BAL
PREPARED BY:	INA	REVIEWED BY:	RWT

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 032711 RUSSELL W. THOMPSON

SIGNATURE DATE

SIG. INVENTORY NO. 07-2026T2

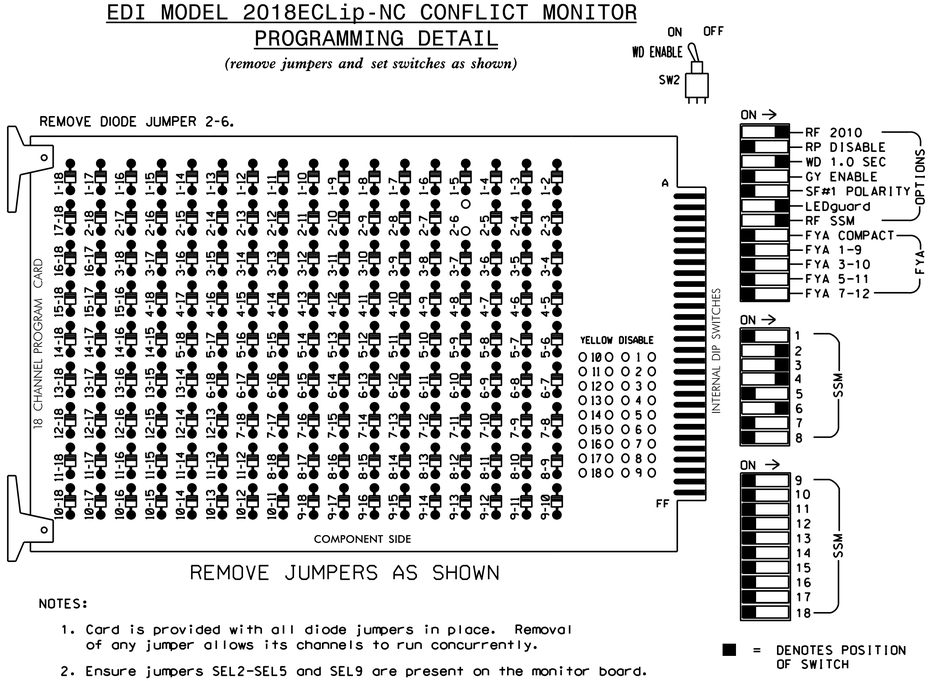
$$$$USERNAME$$$$
$$$$DATE$$$$
$$$$TIME$$$$

PROJECT REFERENCE NO.	SHEET NO.
BP7.R006	Sig. 3.1

EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPER 2-6.



REMOVE JUMPERS 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. Ensure Conflict Monitor Ethernet port is connected to a Switch port located within the cabinet.

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. Initialize database in Naztec 2070 local software (Apogee) as FULL-CALTRANS. This initialization should be done prior to programming controller.
3. Initialize I/O "C1-C11-ABC IO Mode" to USER (MM 1-8-6). Then set "Init 2A" to MODE 5 (MM 1-8-9-3).
4. Program phases 2 and 6 for Start Up In Green.
5. Program "Start Up Flash" for 0 sec. The conflict monitor will govern start-up flash time.
6. Ensure "Local Flash Start" feature is set to "DRK".
7. Program controller to provide a 1 second delay on the Flash Sense/Local Flash input. Use the following logic statement to provide this functionality:

FROM MAIN MENU->1->8->7 (I/O LOGIC)

```
Result Src.Fcn  ≈  TimeOp Time
I208   =  OI208 ≈  DLY       1
```

8. The cabinet and controller are part of the City of Greensboro Signal System.

EQUIPMENT INFORMATION

CONTROLLER..............2070
CABINET.................332
SOFTWARE................NAZTEC APOGEE
CABINET MOUNT...........BASE
OUTPUT FILE POSITIONS...12
LOAD SWITCHES USED......S2,S4,S5,S8
PHASES USED.............2,3,4,6
OVERLAPS................NONE

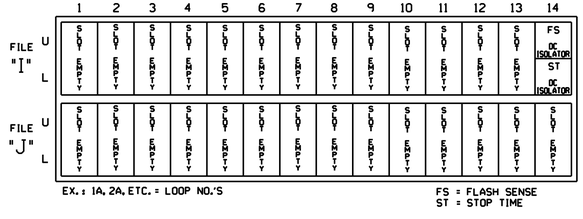
SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4		S5		S6	S7	S8	S9	S10	S11	S12
CMU CHANNEL NO.	1	2	13	3		4		14	5	6	15	7	8	16
PHASE	1	2	2 PED	3		4		4 PED	5	6	6 PED	7	8	8 PED
SIGNAL HEAD NO.	NU	21,22 23	NU	31	32,33	41	42	NU	NU	61,62 63	NU	NU	NU	NU
RED		128		116	116	101	101			134				
YELLOW		129		117	117	102	102			135				
GREEN		130		118	118	103	103			136				
RED ARROW														
YELLOW ARROW														
GREEN ARROW				118		103								
✋														
🚶														

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)



FILE		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
	L														ST DC ISOLATOR
FILE "J"	U	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L														

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

FS = FLASH SENSE
ST = STOP TIME

SPECIAL DETECTOR NOTE

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-2026T2
DESIGNED: January 2023
SEALED: 1-18-2023
REVISED:

Electrical Detail

MOTT
MACDONALD
7621 Purfoy Road
Suite 115
Fuquay-Varina, NC 27526
www.mottmac.com
License No. F-0669

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for the Offices of:

Transportation Mobility and Safety Division
Signal Design Section

750 N.Greenfield Pkwy,Garner,NC 27529

SR 1115 (Rehobeth Church Road)
at I-85 Bus. SB Ramp/
SR 1467 (Tolar Drive)

Division 7 Guilford County Greensboro

PLAN DATE:	Janaury 2023	REVIEWED BY:	BAL
PREPARED BY:	INA	REVIEWED BY:	RWT

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL

SEAL 032711
RUSSELL W. THOMPSON

DATE

SIG. INVENTORY NO. 07-2026T2

$$$$$$SYSTIME$$$$$$
$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

PROJECT REFERENCE NO.	SHEET NO.
BP7.R006	Sig. 4.0

PHASING DIAGRAM

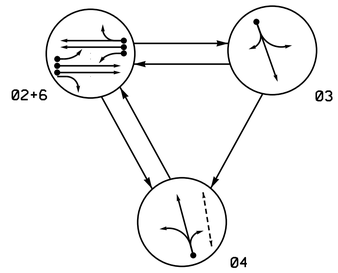


TABLE OF OPERATION				
SIGNAL FACE	PHASE 02+6	03	04	FLASH
21,22,23	G	R	R	Y
31	R	G	R	R
32,33	R	G	R	R
41	R	R	G	R
42	R	R	G	R
61,62,63	G	R	R	Y
P41,P42	DW	DW	W	DRK

PHASING DIAGRAM DETECTION LEGEND

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

SIGNAL FACE I.D.

All Heads L.E.D.

LOOP & DETECTOR UNIT INSTALLATION CHART

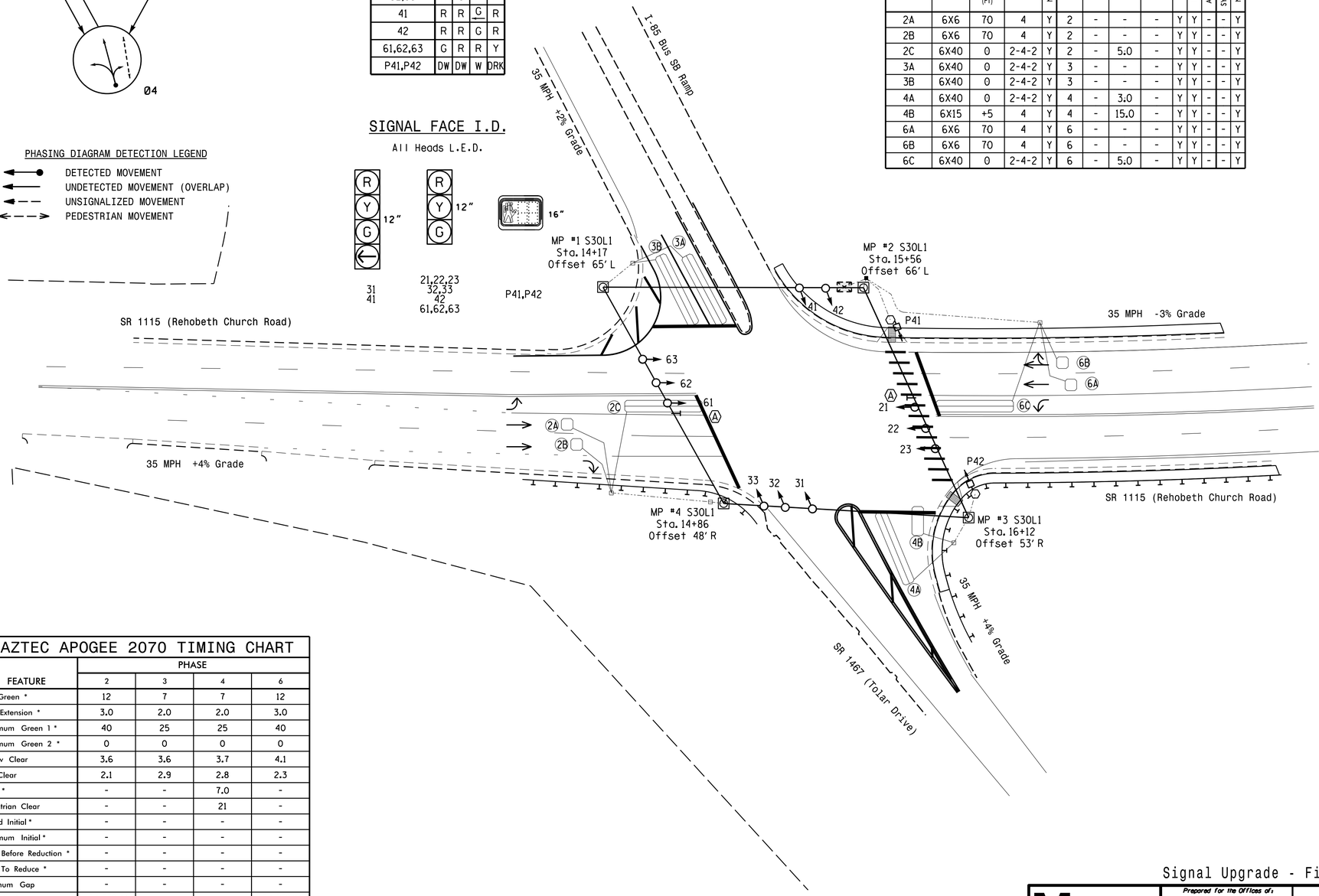
NAZTEC APOGEE SOFTWARE 2070 CONTROLLER

INDUCTIVE LOOPS					DETECTOR PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	SWITCH (PHASE)	DELAY TIME	STRETCH TIME	CALLING	EXTENSION	ADDED INIT.	SYSTEM LOOP	NEW CARD
2A	6X6	70	4	Y	2	-	-	-	Y	Y	-	-	Y
2B	6X6	70	4	Y	2	-	-	-	Y	Y	-	-	Y
2C	6X40	0	2-4-2	Y	2	-	5.0	-	Y	Y	-	-	Y
3A	6X40	0	2-4-2	Y	3	-	-	-	Y	Y	-	-	Y
3B	6X40	0	2-4-2	Y	3	-	-	-	Y	Y	-	-	Y
4A	6X40	0	2-4-2	Y	4	-	3.0	-	Y	Y	-	-	Y
4B	6X15	+5	4	Y	4	-	15.0	-	Y	Y	-	-	Y
6A	6X6	70	4	Y	6	-	-	-	Y	Y	-	-	Y
6B	6X6	70	4	Y	6	-	-	-	Y	Y	-	-	Y
6C	6X40	0	2-4-2	Y	6	-	5.0	-	Y	Y	-	-	Y

3 Phase
Fully Acutated
(Greensboro Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Set all detector units to presence mode.
4. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
5. Program all signal heads for the same approach to flash concurrently during flashing operation.
6. For MP#4 remove and replace guardrail (See Roadway Pay Item)



LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
	Metal Strain Pole	
	Type II Signal Pedestal	
	"Left Turn Yield on Green" Sign (R10-12)	

NAZTEC APOGEE 2070 TIMING CHART

FEATURE	PHASE 2	3	4	6
Min Green *	12	7	7	12
Gap, Extension *	3.0	2.0	2.0	3.0
Maximum Green 1 *	40	25	25	40
Maximum Green 2 *	0	0	0	0
Yellow Clear	3.6	3.6	3.7	4.1
Red Clear	2.1	2.9	2.8	2.3
Walk *	-	-	7.0	-
Pedestrian Clear	-	-	21	-
Added Initial *	-	-	-	-
Maximum Initial *	-	-	-	-
Time Before Reduction *	-	-	-	-
Time To Reduce *	-	-	-	-
Minimum Gap	-	-	-	-
Recall Mode	MIN RECALL	-	-	MIN RECALL
Lock Calls	YES	NO	NO	YES
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.

$$$$SYSTIME$$$$
$$$$SYSDATE$$$$
$$$$USERNAME$$$$

Signal Upgrade - Final Design

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

MOTT MACDONALD
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License No. F-0669

Prepared for the Offices of:
Transportation Mobility and Safety Division
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signal Design Section
750 N.Greenfield Pkwy.Garner,NC 27529

SR 1115 (Rehobeth Church Road)
at I-85 Bus. SB Ramp/
SR 1467 (Tolar Drive)

Division 7 Guilford Co Greensboro

PLAN DATE: January 2023 REVIEWED BY: INA
PREPARED BY: BAL REVIEWED BY: RWT

SCALE 0 30 1"=30'

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 032711 ENGINEER RUSSELL W. THOMPSON

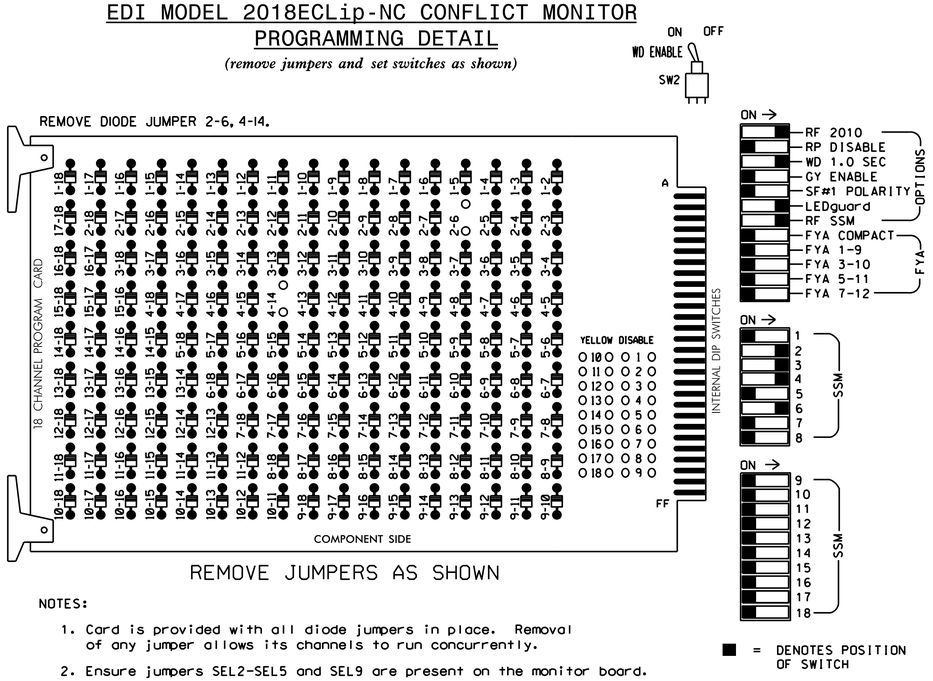
SIGNATURE DATE

SIG. INVENTORY NO. 07-2026

PROJECT REFERENCE NO.	SHEET NO.
BP7.R006	Sig. 4.1

EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE JUMPERS AS SHOWN

■ = DENOTES POSITION OF SWITCH

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. Ensure Conflict Monitor Ethernet port is connected to a Switch port located within the cabinet.

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. Initialize database in Naztec 2070 local software (Apogee) as FULL-CALTRANS. This initialization should be done prior to programming controller.
3. Initialize I/O "C1-C11-ABC IO Mode" to USER (MM 1-8-6). Then set "Init 2A" to MODE 5 (MM 1-8-9-3).
4. Program phases 2 and 6 for Start Up In Green.
5. Program "Start Up Flash" for 0 sec. The conflict monitor will govern start-up flash time.
6. Ensure "Local Flash Start" feature is set to "DRK".
7. Program controller to provide a 1 second delay on the Flash Sense/Local Flash input. Use the following logic statement to provide this functionality:

FROM MAIN MENU->1->8->7 (I/O LOGIC)

Result	Src.Fcn		TimeOp	Time
I208	=	01208	DLY	1

8. The cabinet and controller are part of the City of Greensboro Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070
CABINET.....332
SOFTWARE.....NAZTEC APOGEE
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...12
LOAD SWITCHES USED.....S2,S4,S5,S6,S8
PHASES USED.....2,3,4,4 PED,6
OVERLAPS.....NONE

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4		S5		S6	S7	S8	S9	S10	S11	S12
CMU CHANNEL NO.	1	2	13	3		4		14	5	6	15	7	8	16
PHASE	1	2	2 PED	3		4		4 PED	5	6	6 PED	7	8	8 PED
SIGNAL HEAD NO.	NU	21,22, 23	NU	31	32,33	41	42	P41, P42	NU	61,62, 63	NU	NU	NU	NU
RED		128		116	116	101	101			134				
YELLOW		129		117	117	102	102			135				
GREEN		130		118	118	103	103			136				
RED ARROW														
YELLOW ARROW														
GREEN ARROW				118		103								
✋								104						
🚶								106						

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	SLOT EMPTY	ø2 2A	ø2 2C	SLOT EMPTY	ø3 3A	ø4 4A	SLOT EMPTY	SLOT EMPTY	NOT USED	SLOT EMPTY	SLOT EMPTY	NOT USED	SLOT EMPTY	FS DC ISOLATOR
	L		ø2 2B	NOT USED		NOT USED	ø4 4B			ø3 3B			ø4 PED DC ISOLATOR		ST DC ISOLATOR
FILE "J"	U	SLOT EMPTY	ø6 6A	ø6 6C	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L		ø6 6B	NOT USED											

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	CALL PHASE	SWITCH	DELAY TIME	EXTEND TIME	CALL	EXTEND	ADDED INIT.
2A	TB2-5,6	I2U	39	2	2				X	X	
2B	TB2-7,8	I2L	43	3	2				X	X	
2C	TB2-9,10	I3U	63	4	2		5.0		X	X	
3A	TB4-5,6	I5U	58	7	3				X	X	
4A	TB4-9,10	I6U	41	8	4		3.0		X	X	
4B	TB4-11,12	I6L	45	9	4		15.0		X	X	
3A	TB6-11,12	I9L	62	14	3				X	X	
6A	TB3-5,6	J2U	40	16	6				X	X	
6B	TB3-7,8	J2L	44	17	6				X	X	
6C	TB3-9,10	J3U	64	18	6		5.0		X	X	
PED PUSH BUTTONS											
P41,P42	TB8-5,6	I12L	69	PED 4	4 PED						

NOTE:

INSTALL DC ISOLATOR IN INPUT FILE SLOT I12.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

* System detector only. Remove the vehicle phase assigned to this detector in the default programming.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-2026
DESIGNED: January 2023
SEALED: 1-18-2023
REVISED:

Electrical Detail

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

MOTT MACDONALD
7621 Purfoy Road
Suite 115
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www.mottmac.com
License No. F-0669

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Transportation Mobility and Safety Division
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signal Design Section
750 N.Greenfield Pkwy.Garner,NC 27529

SR 1115 (Rehobeth Church Road) at I-85 Bus. SB Ramp/ SR 1467 (Tolar Drive)

Division 7 | Guilford County | Greensboro

PLAN DATE:	January 2023	REVIEWED BY:	BAL
PREPARED BY:	INA	REVIEWED BY:	RWT

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 032711 ENGINEER RUSSELL W. THOMPSON

DATE

SIG. INVENTORY NO. 07-2026

$$$$SYSTIME$$$$
$$$$USERNAME$$$$

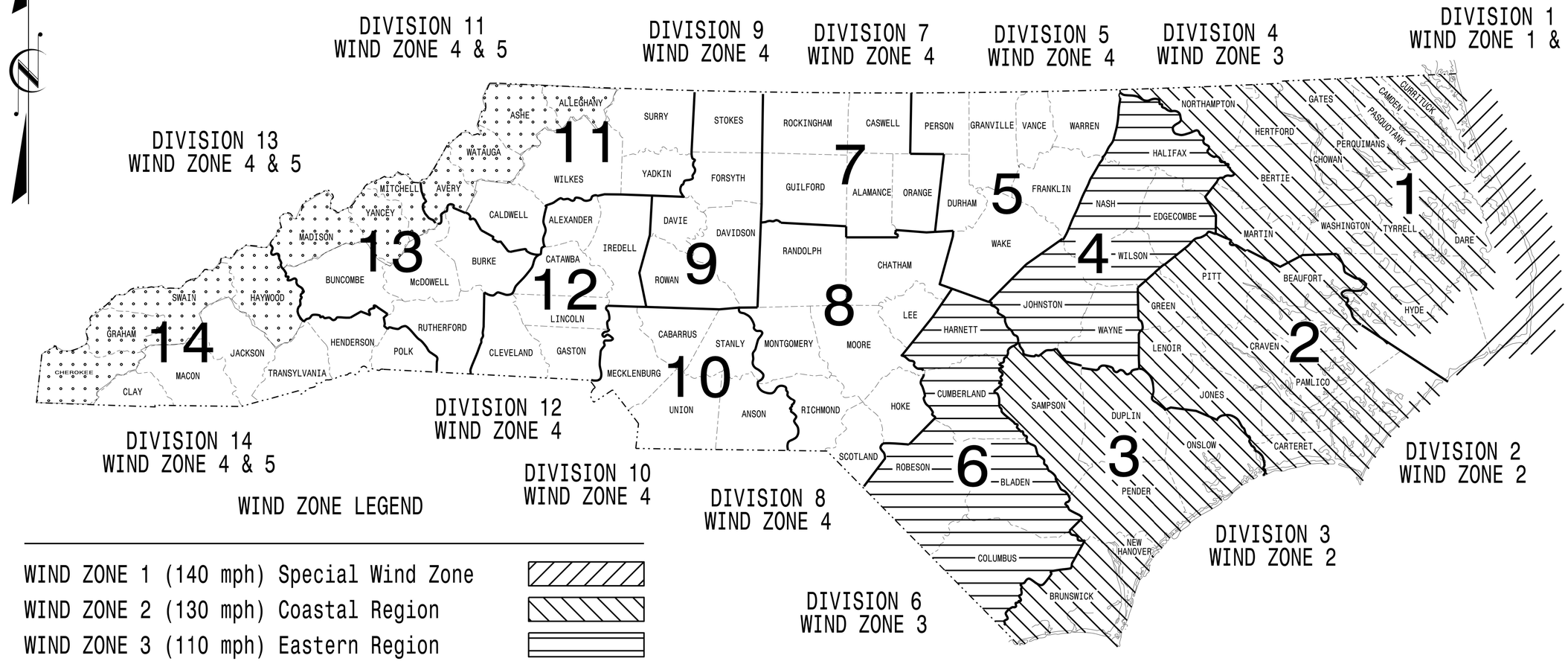
POLE STANDARDS

NCDOT METAL POLES

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

PROJECT I.D. NO.	SHEET NO.
BP7.R006	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:

Transportation Mobility and Safety Division
Signal Design Section
STATE OF NORTH CAROLINA · DEPARTMENT OF TRANSPORTATION

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

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

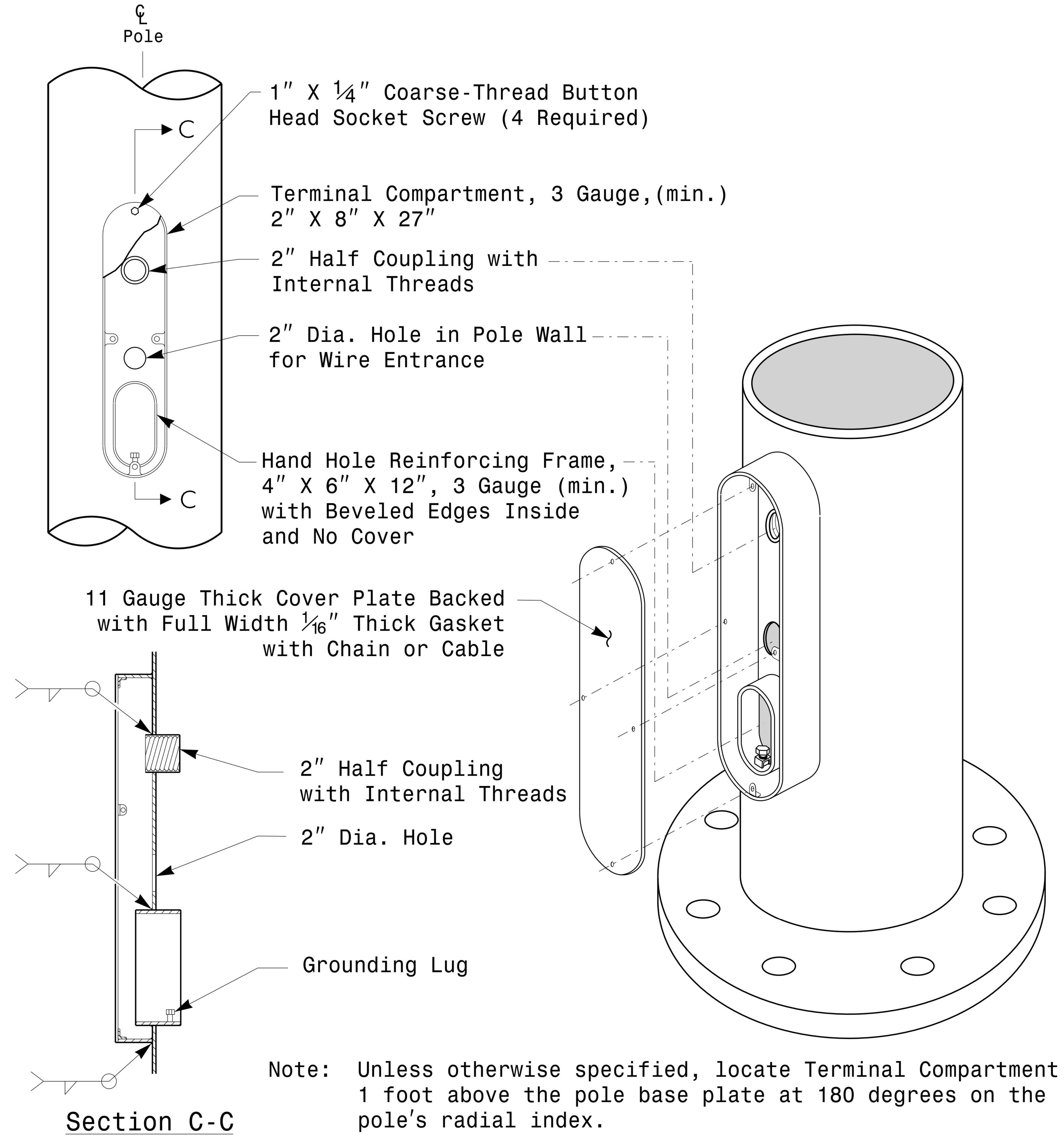
NORTH CAROLINA PROFESSIONAL SEAL 028094 ENGINEER DEBESH C. SARKAR

DocuSigned by: Debesh C. Sarkar 44EBE3...
SIGNATURE

10/11/2017
DATE

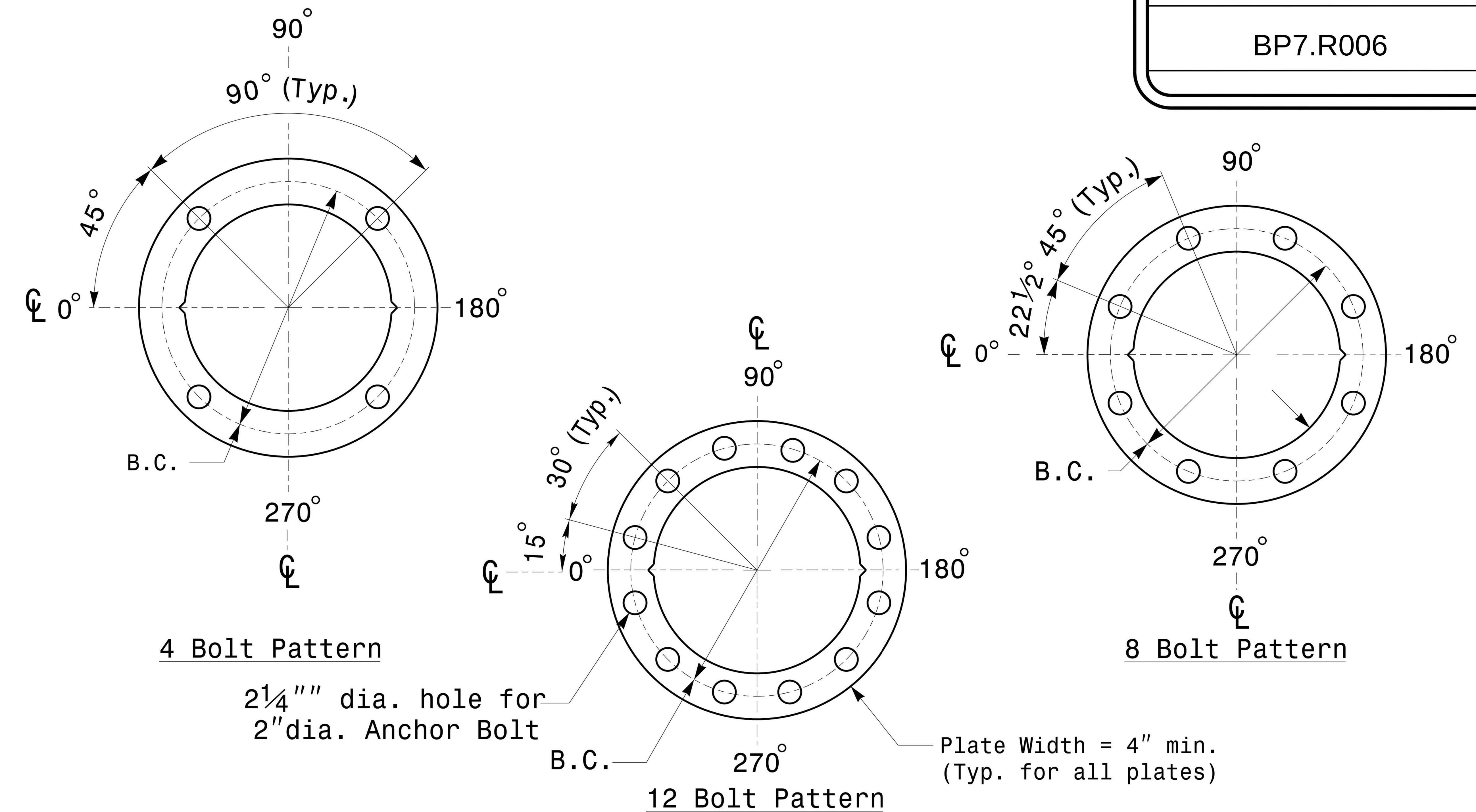
PROJECT ID. NO.	SHEET NO.
BP7.R006	Sig.M2

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 ¼″ 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.	________

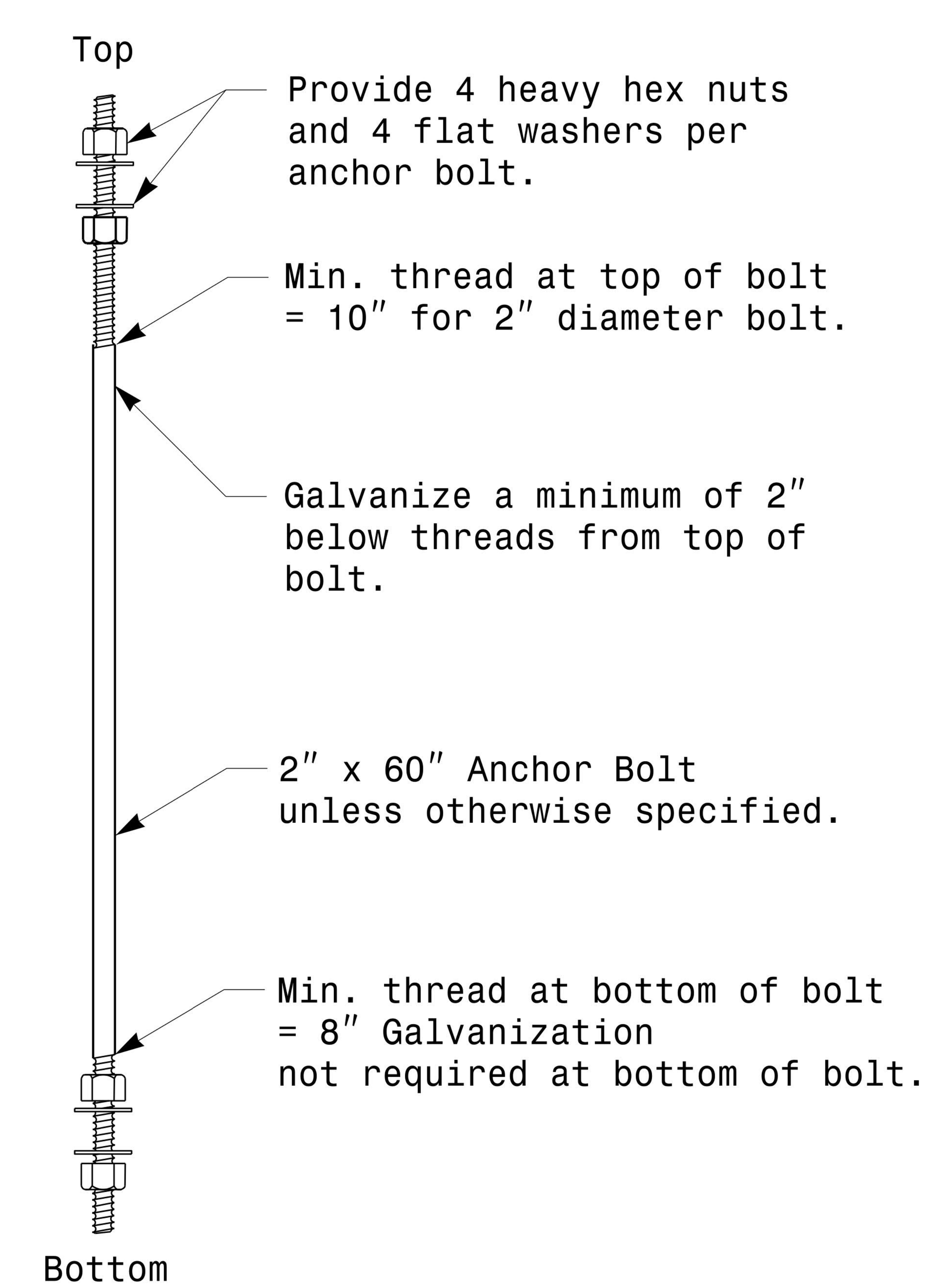
Shaft I.D. Tag
(Provide on Shaft of Strain Poles and Mast Arm Poles Shaft)

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

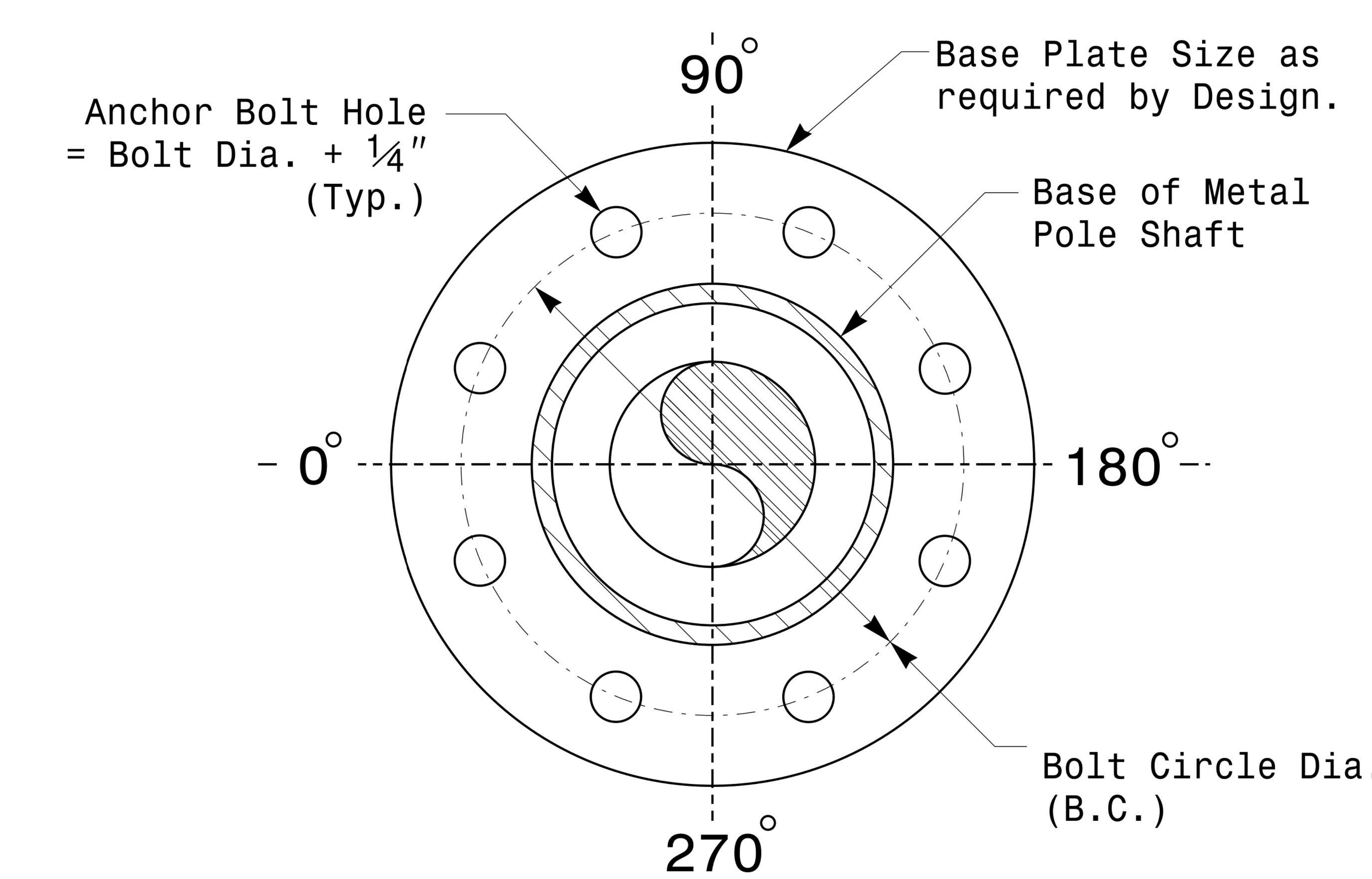
Arm I.D. Tag
(Provide on each section of a multi-section mast arm.)

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



Anchor Bolt Detail



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

Typical Base Plate Detail

Prepared in the Offices of: Transportation Mobility and Safety Division, Signal Design Section
750 N.Greenfield Pkwy.Garner,NC 27529

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 NA — NONE

REVISIONS | INIT. | DATE

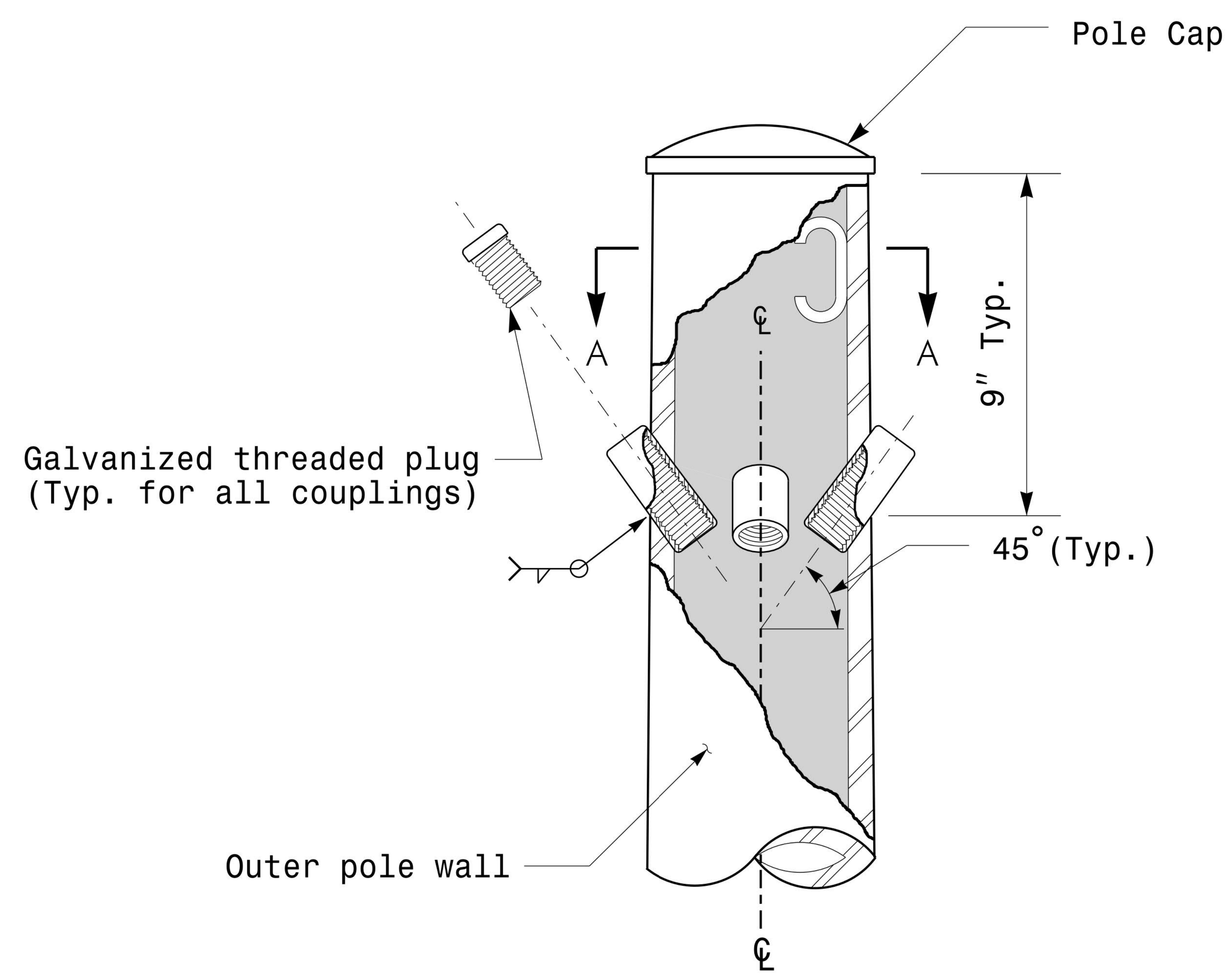
SEAL: North Carolina Professional Engineer, Seal 028094, Debesh C. Sarkar

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

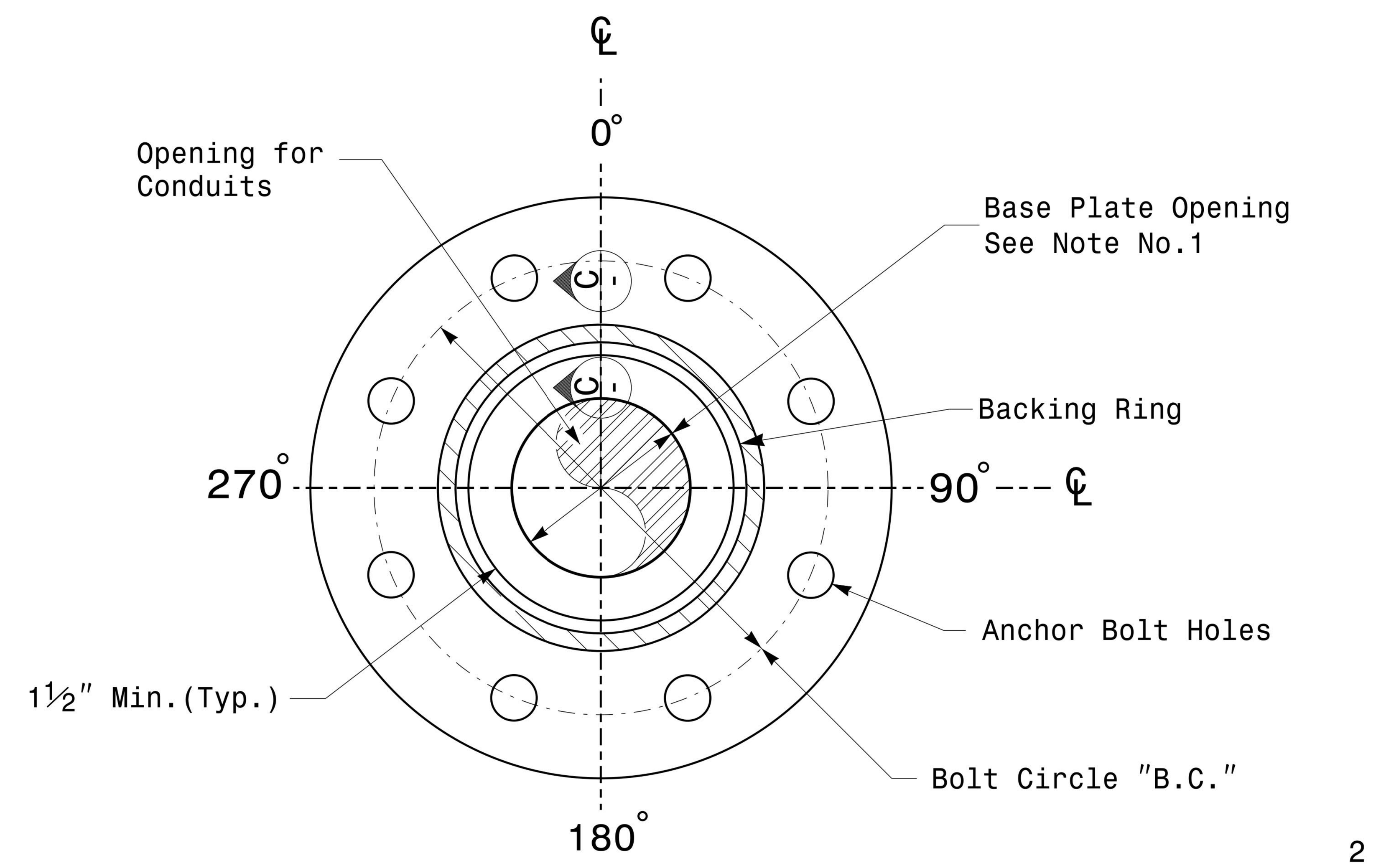
PROJECT ID. NO.	SHEET NO.
BP7.R006	Sig.M3

Fabrication Details – Strain Poles

Note:
1. Opening in pole base plate shall be equal to pole base inside diameter minus 3½″ but shall not be less than 8½″.

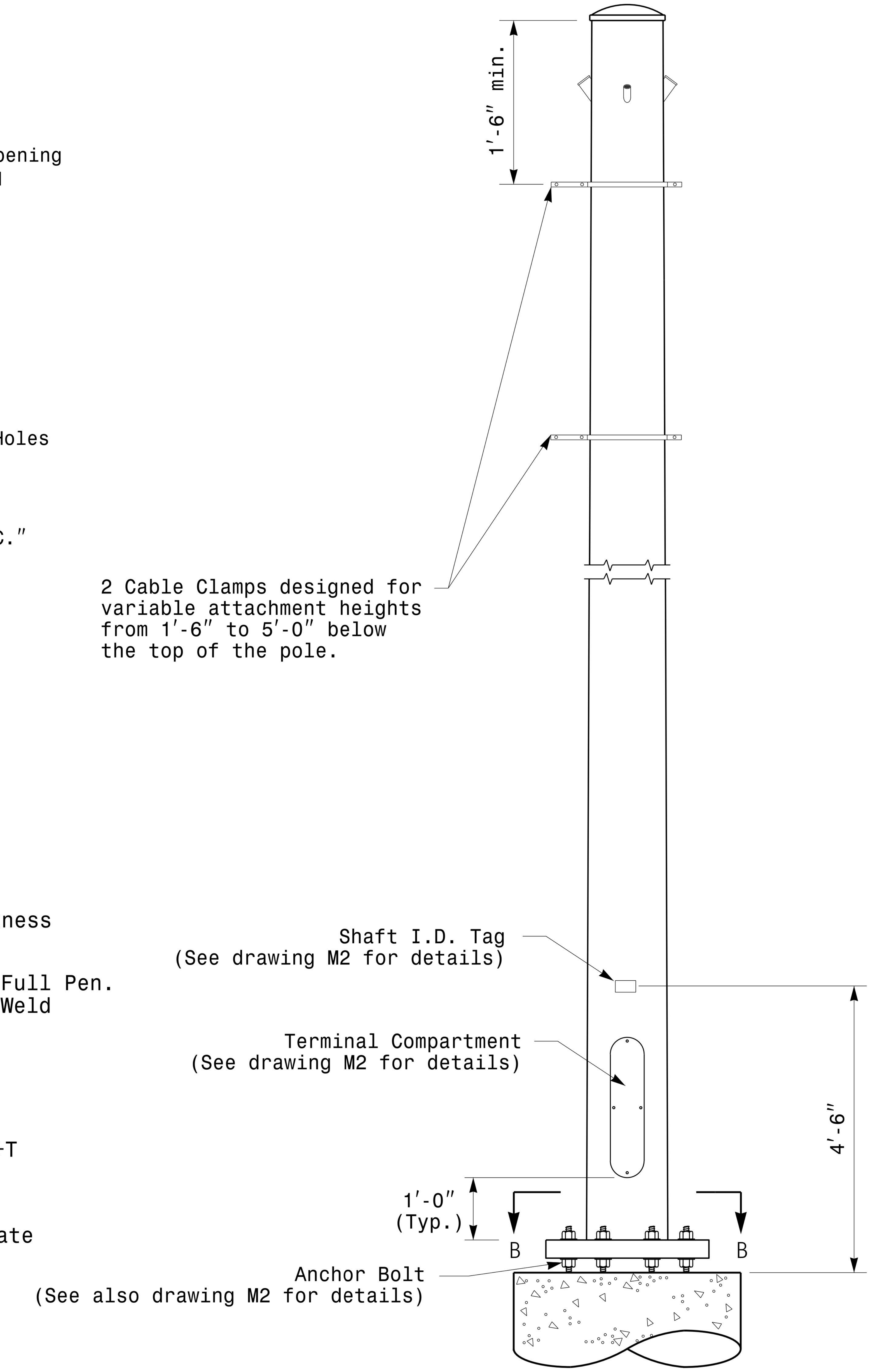


Cable Entrances at Top of Pole

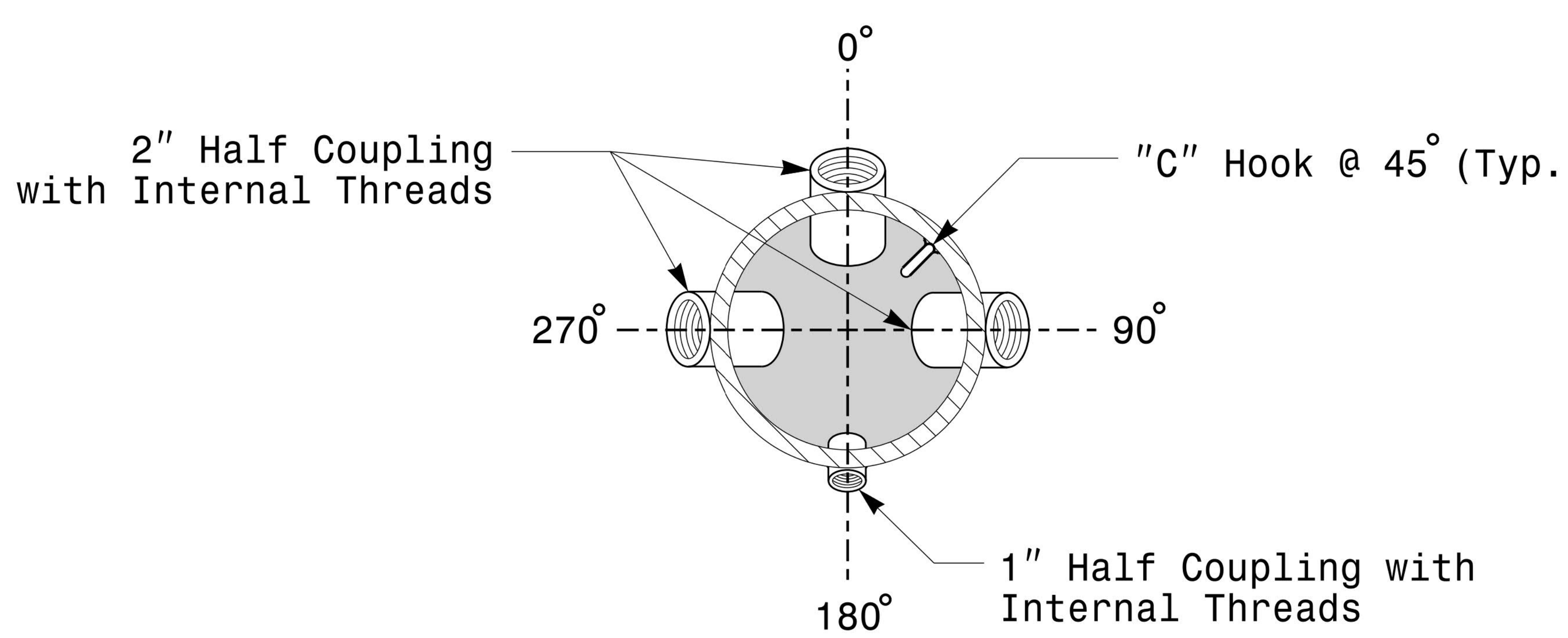


Section B-B

Pole Base Plate Details (8 and 12 Bolt Pattern)

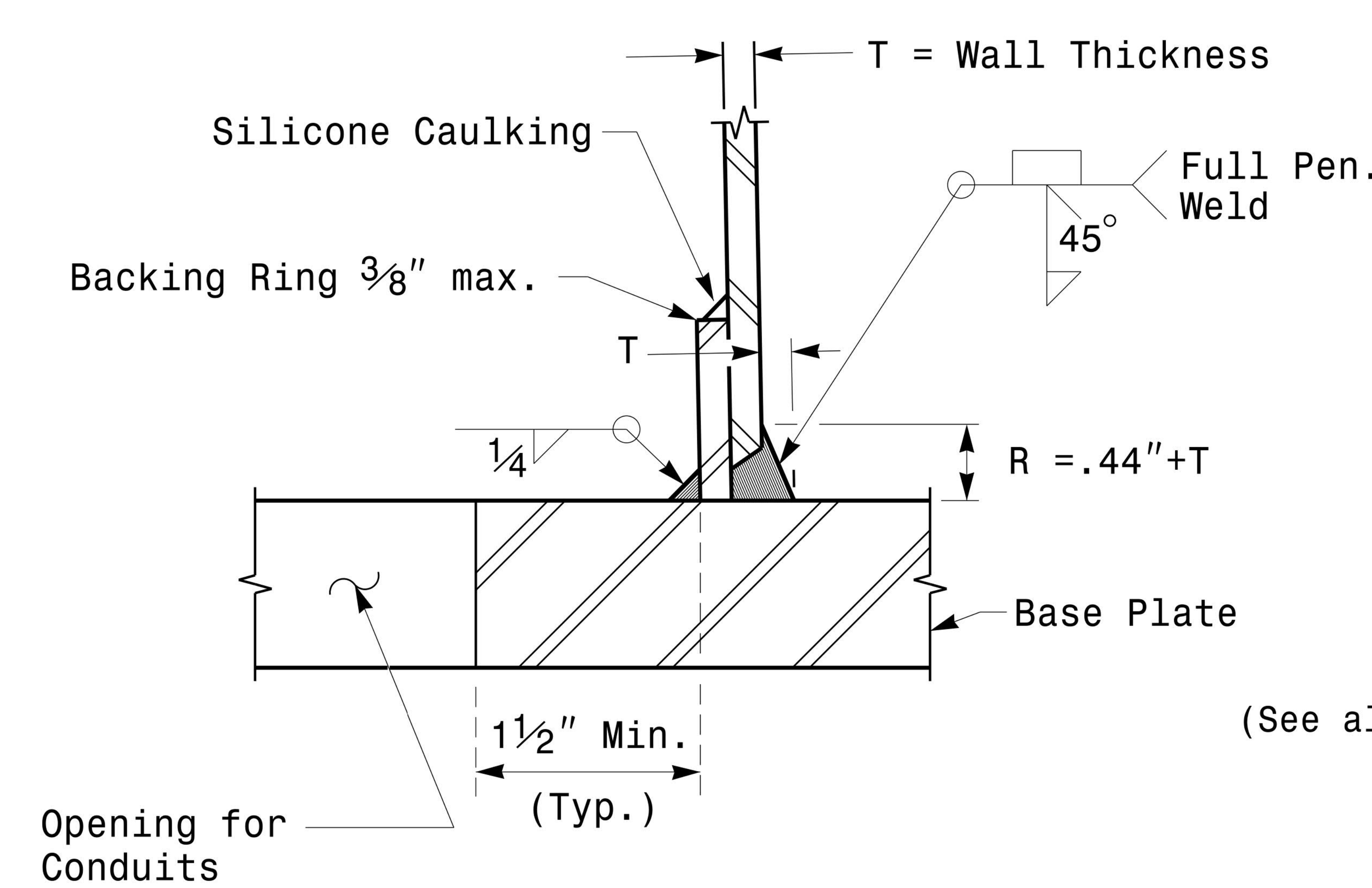


Monotube Strain Pole



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

Prepared in the Offices of:
Transportation Mobility and Safety Division
Signal Design Section
750 N.Greenfield 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

SCALE: 0 NA — NONE

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 028094 ENGINEER DEBESH C. SARKAR

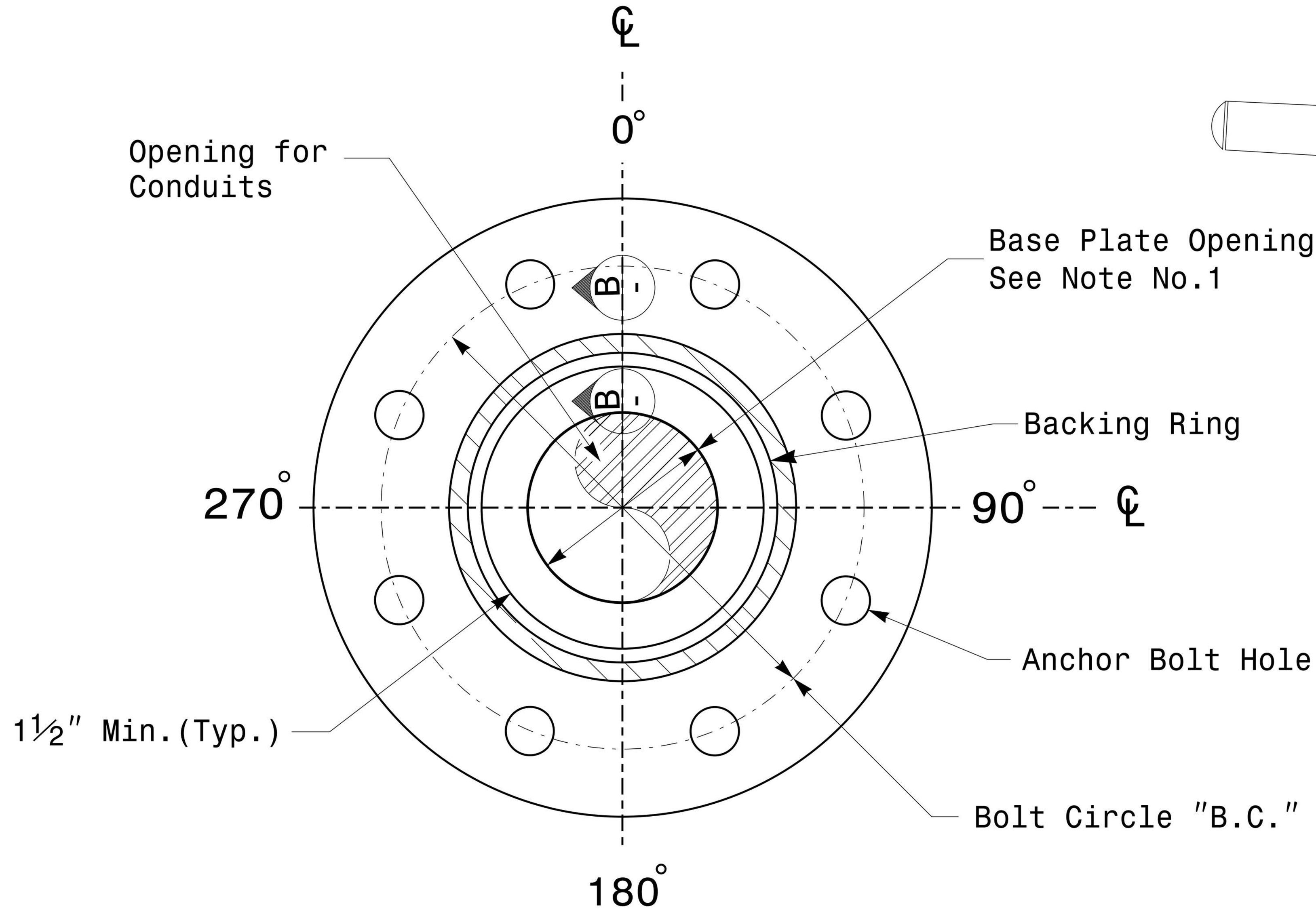
DocuSigned by: Debesh C. Sarkar
SIGNATURE
10/11/2017
DATE

11-OCT-2017 08:25
S:*ITS&SU*ITS Signals*Signal Design Section*Eastern Region*M Sheets*2016*2014 Sig.M3 Std. Fabrication Details-Strain Poles.dgn

PROJECT ID. NO.	SHEET NO.
BP7.R006	Sig.M4

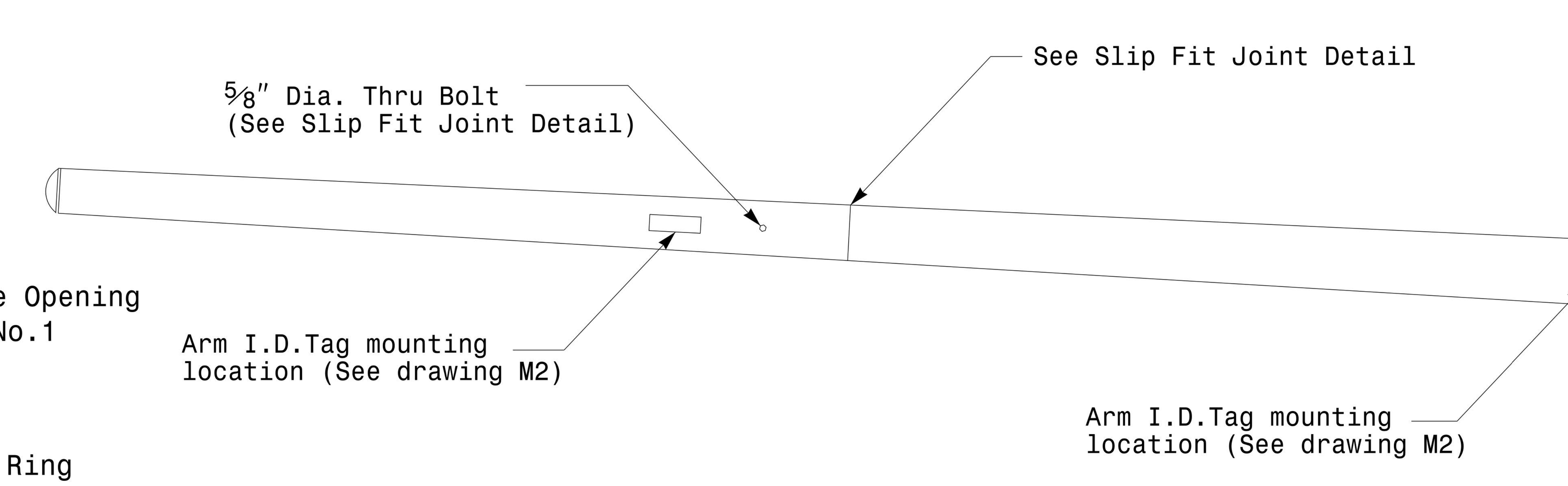
Fabrication Details – Mast Arm Poles

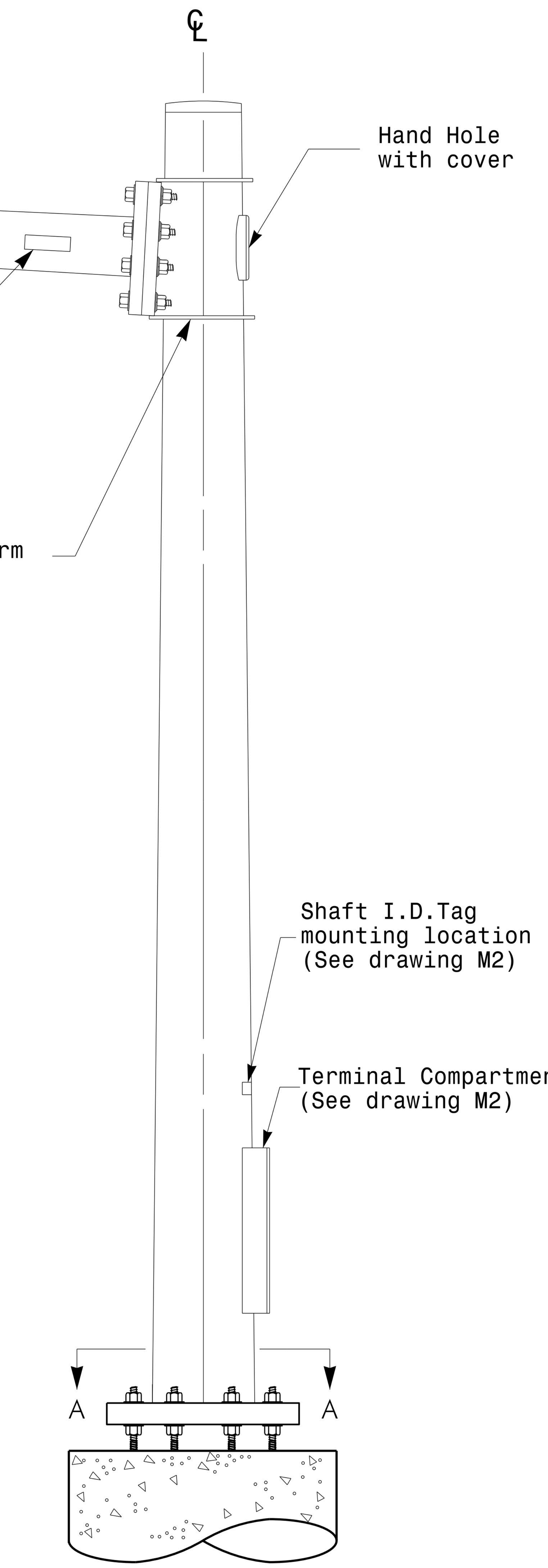
Note:
1. Opening in pole base plate shall be equal to pole base inside diameter minus 3½″ but shall not be less than 8½″.



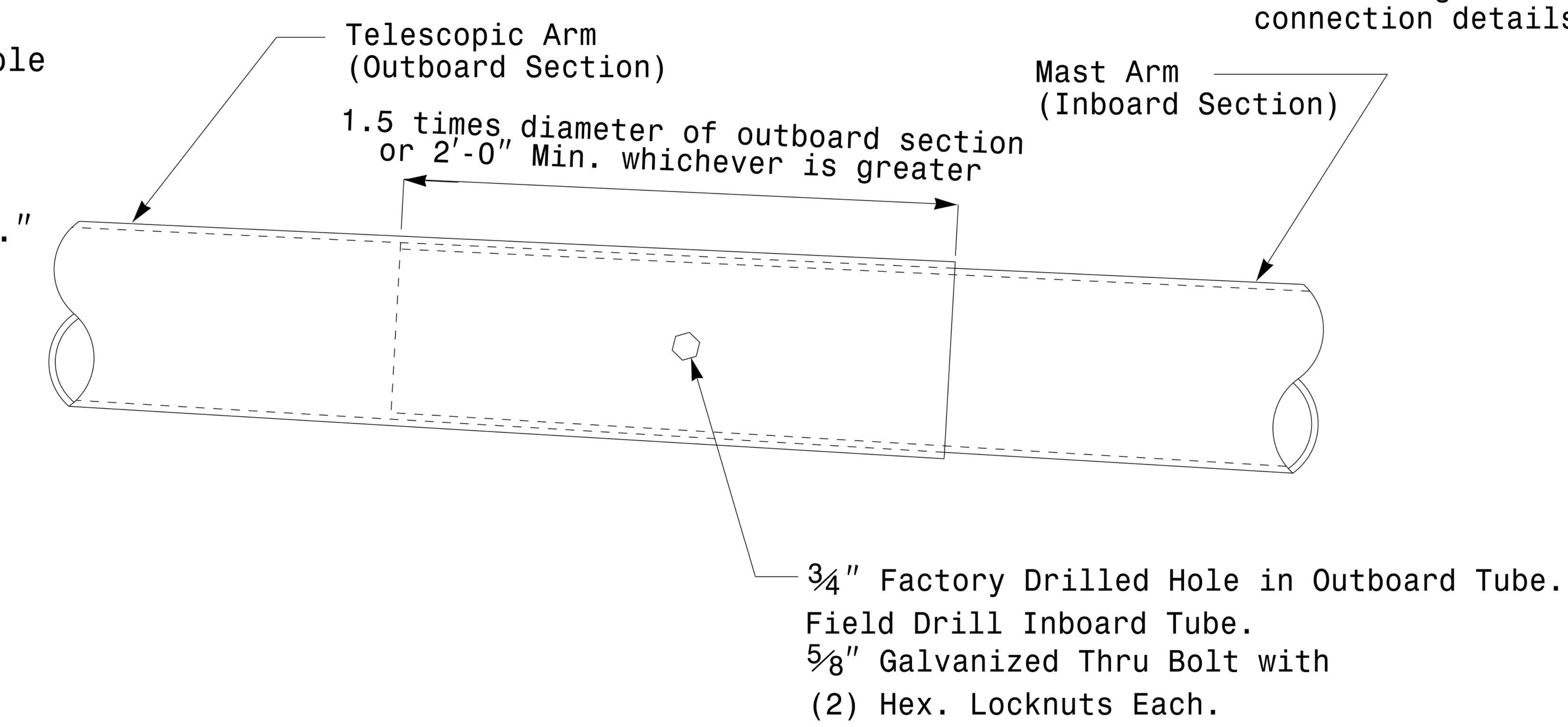
Section A-A

Pole Base Plate Details

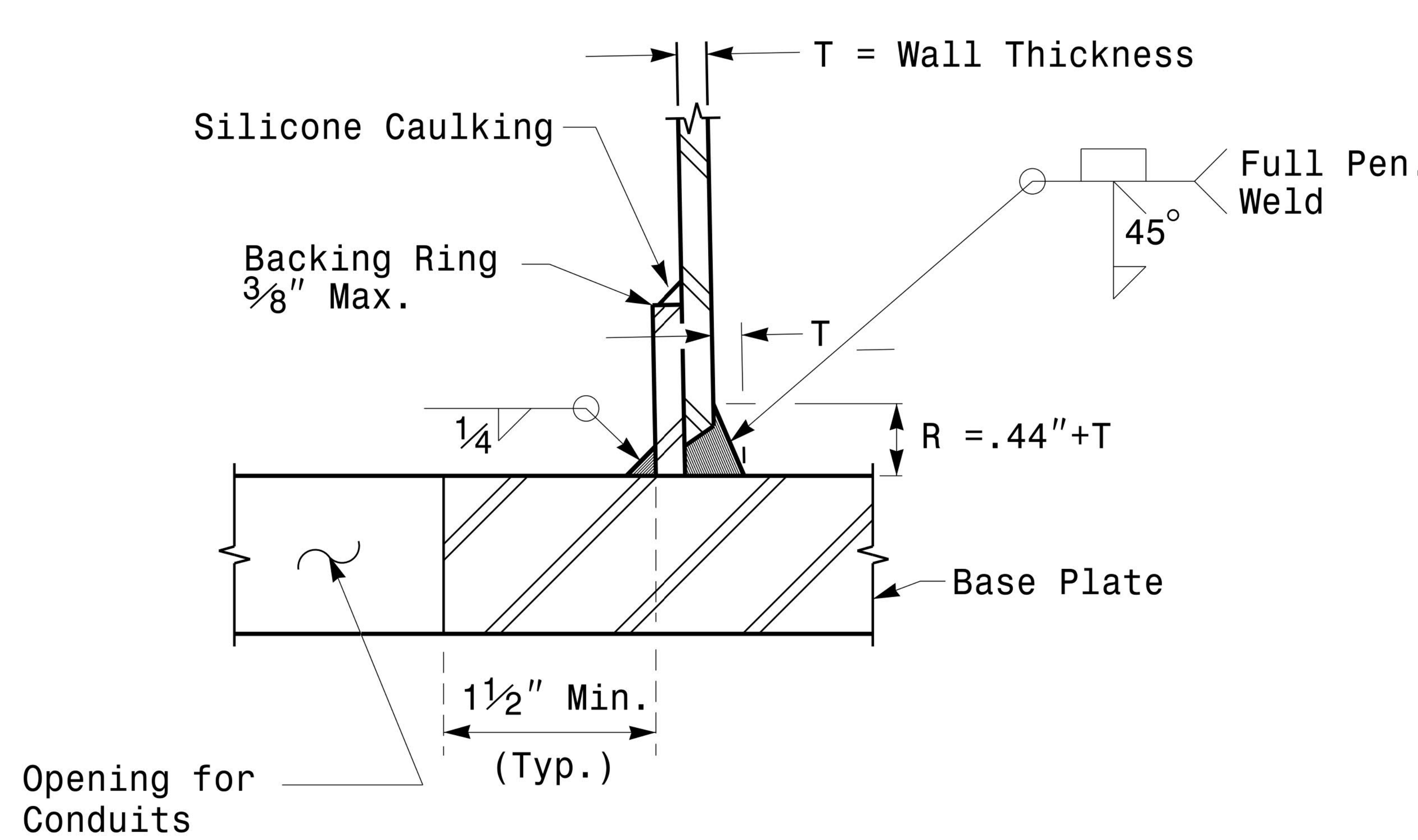




Mast Arm Pole



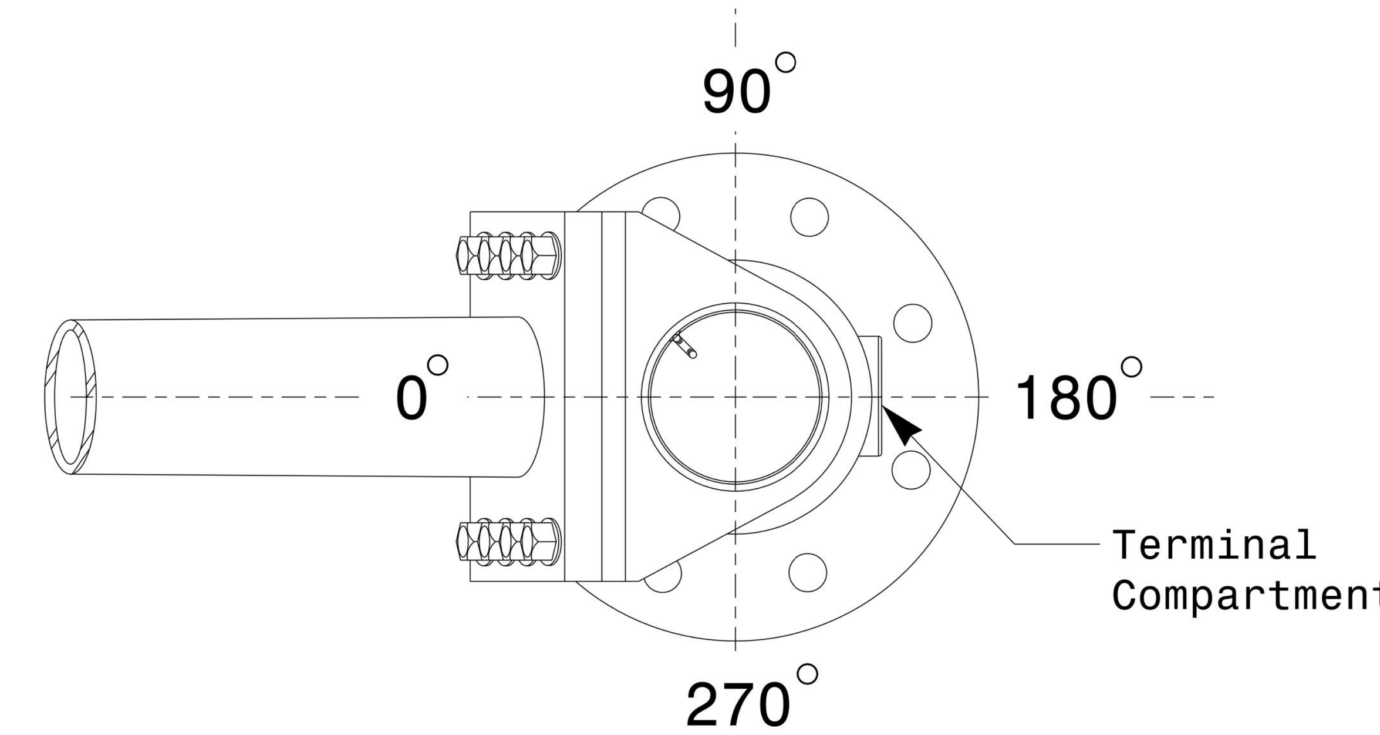
Slip Fit Joint Detail for Mast Arm



Section B-B

(Pole Attachment to Base Plate)

Full-Penetration Groove Weld Detail



Mast Arm Radial Orientation

Prepared In the Offices of:
Transportation Mobility and Safety Division
Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

SCALE
0 NA
NONE

Typical Fabrication Details
For
Mast Arm Poles

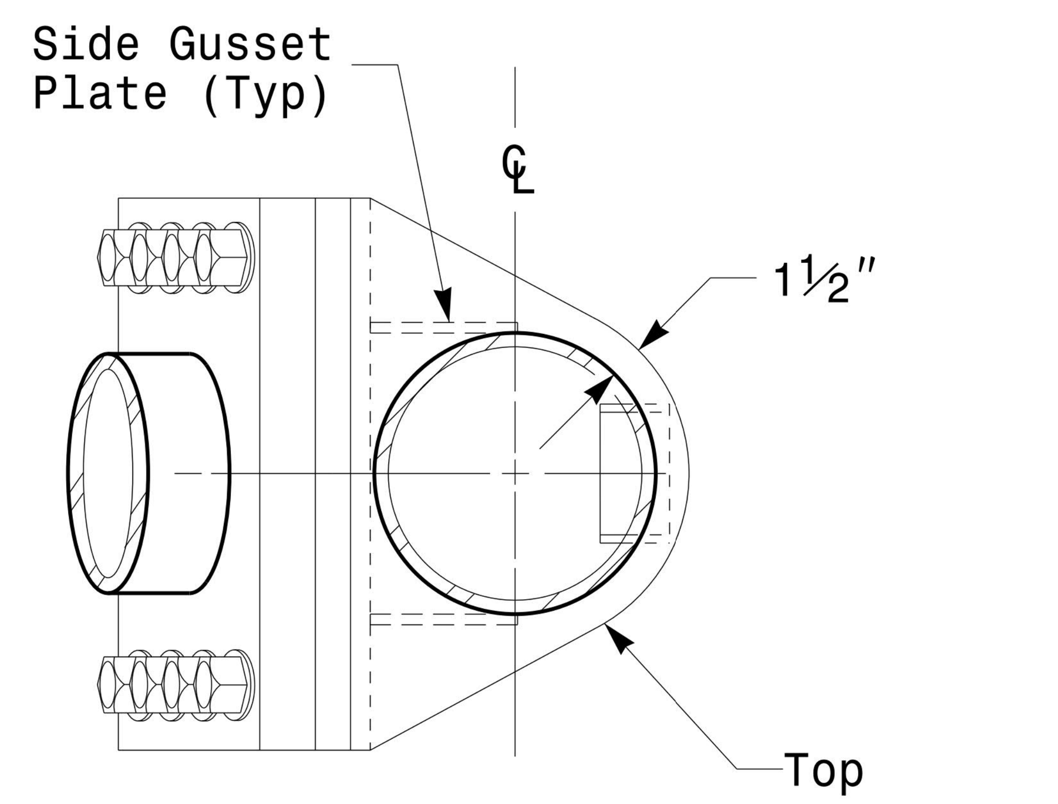
PLAN DATE:	OCTOBER 2017	DESIGNED BY:	K.C.DURIGON
PREPARED BY:	N. BITTING	REVIEWED BY:	D.C. SARKAR

REVISIONS	INIT.	DATE

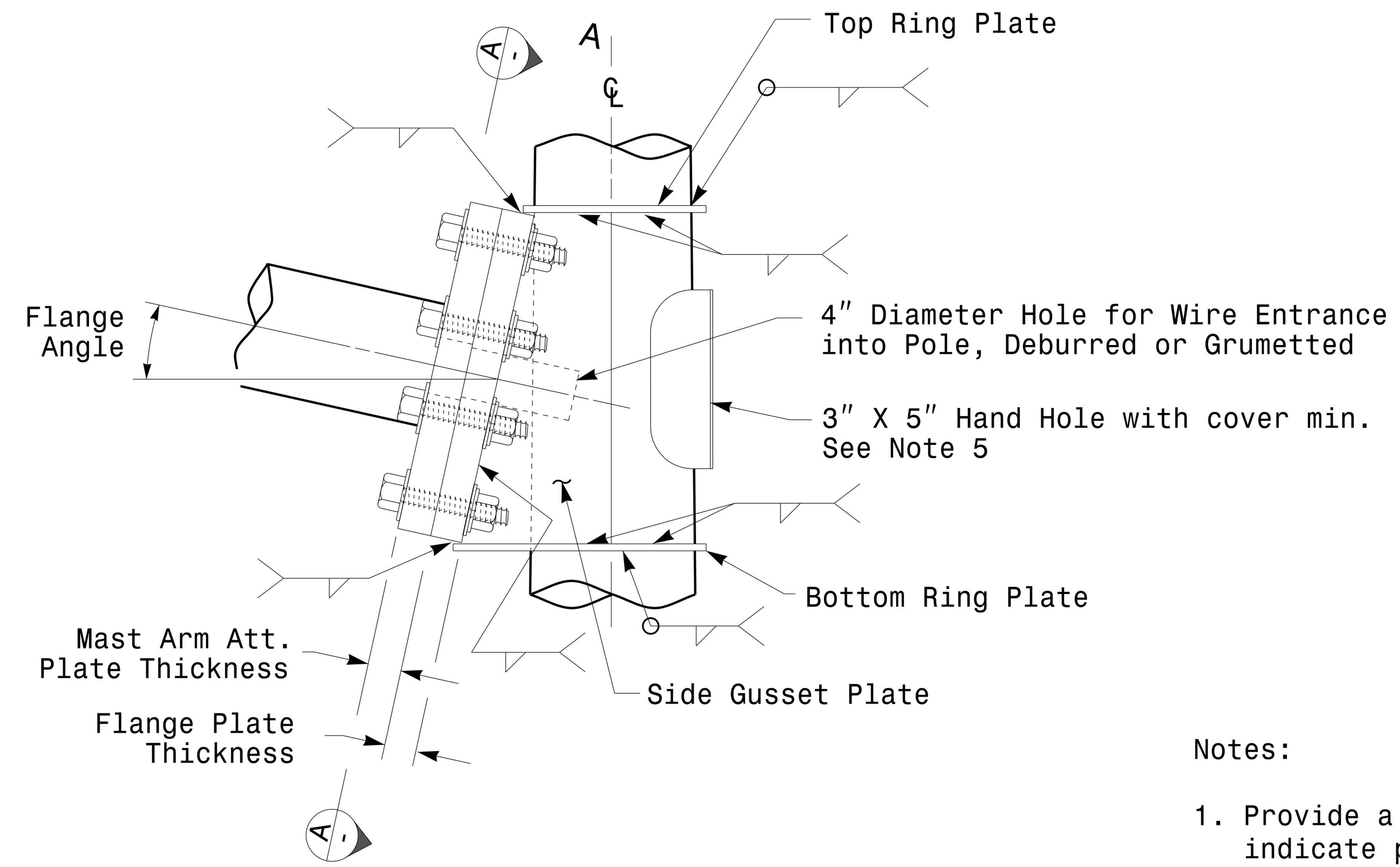
SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 028094 DEBESH C. SARKAR

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

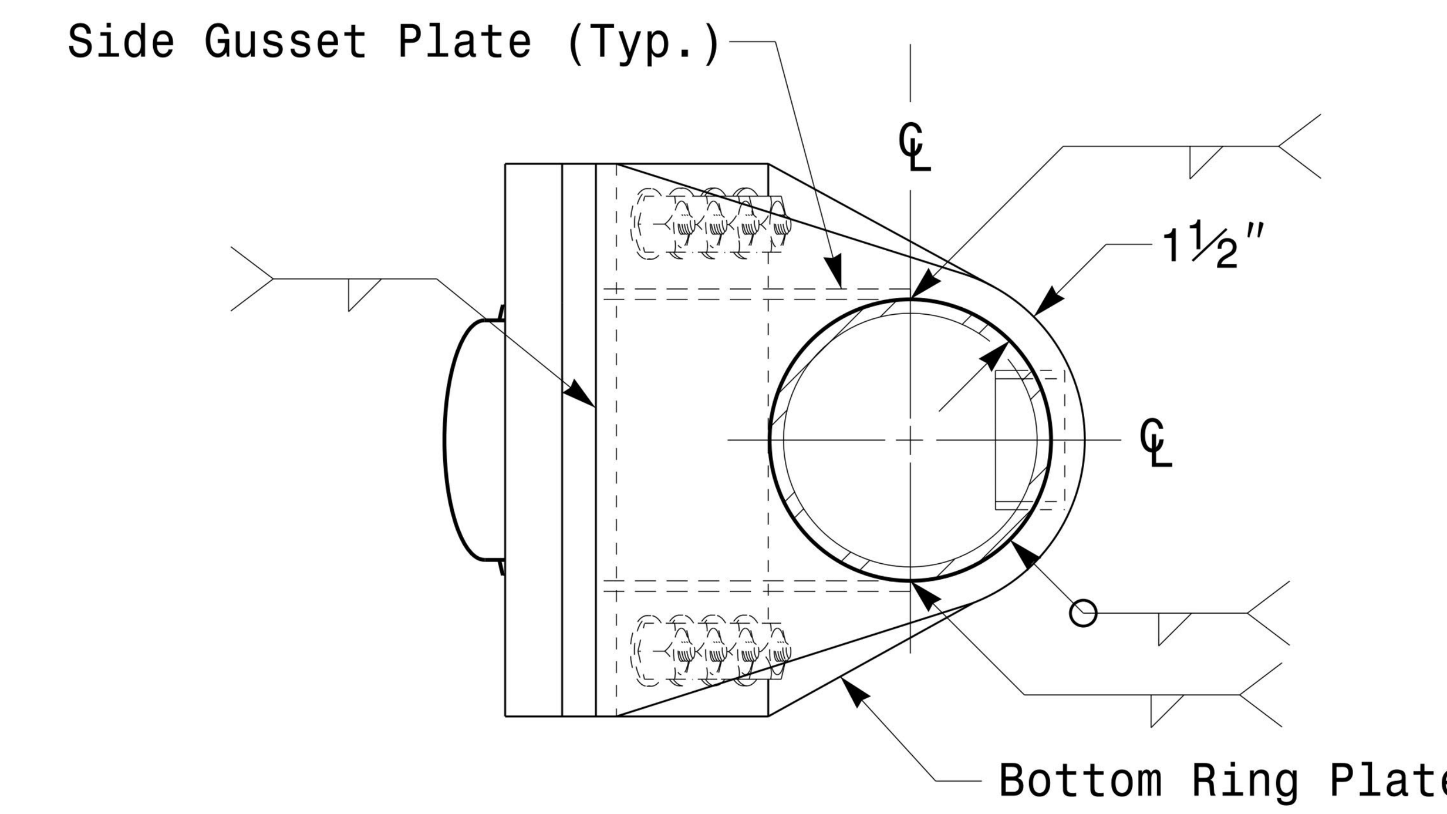
Welded Ring Stiffened Mast Arm Connection



Plan View



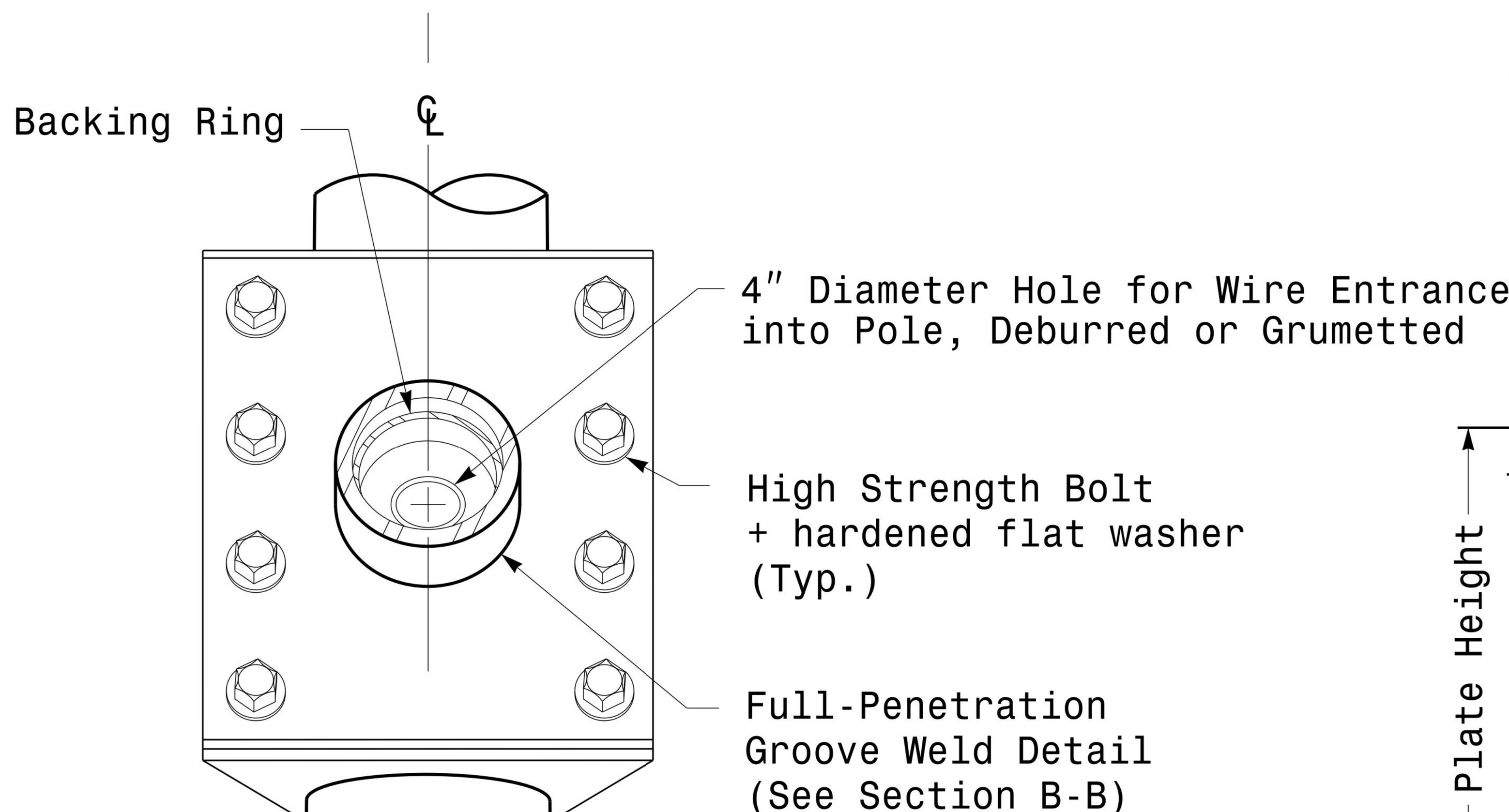
Side Elevation View



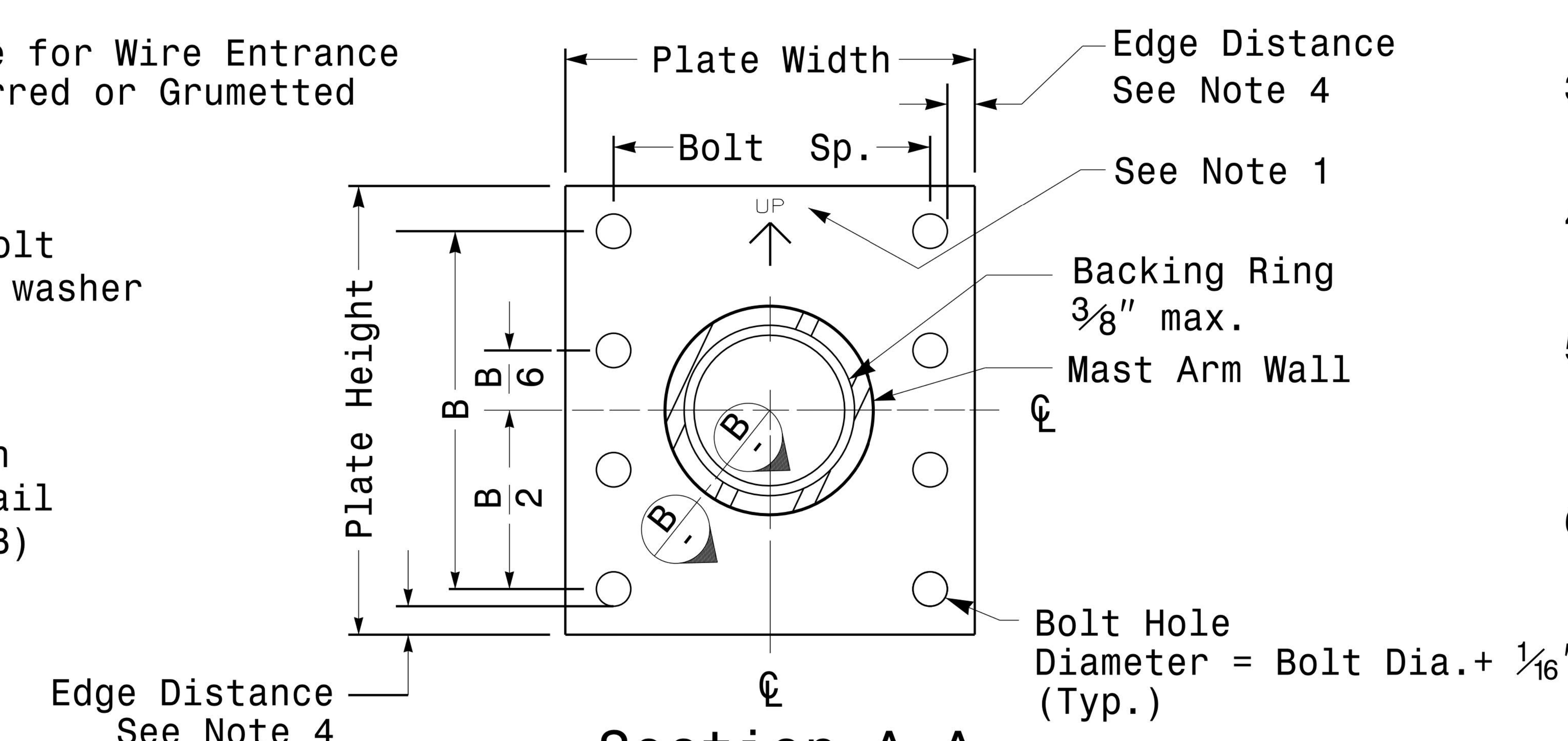
Bottom View

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 reguired 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.

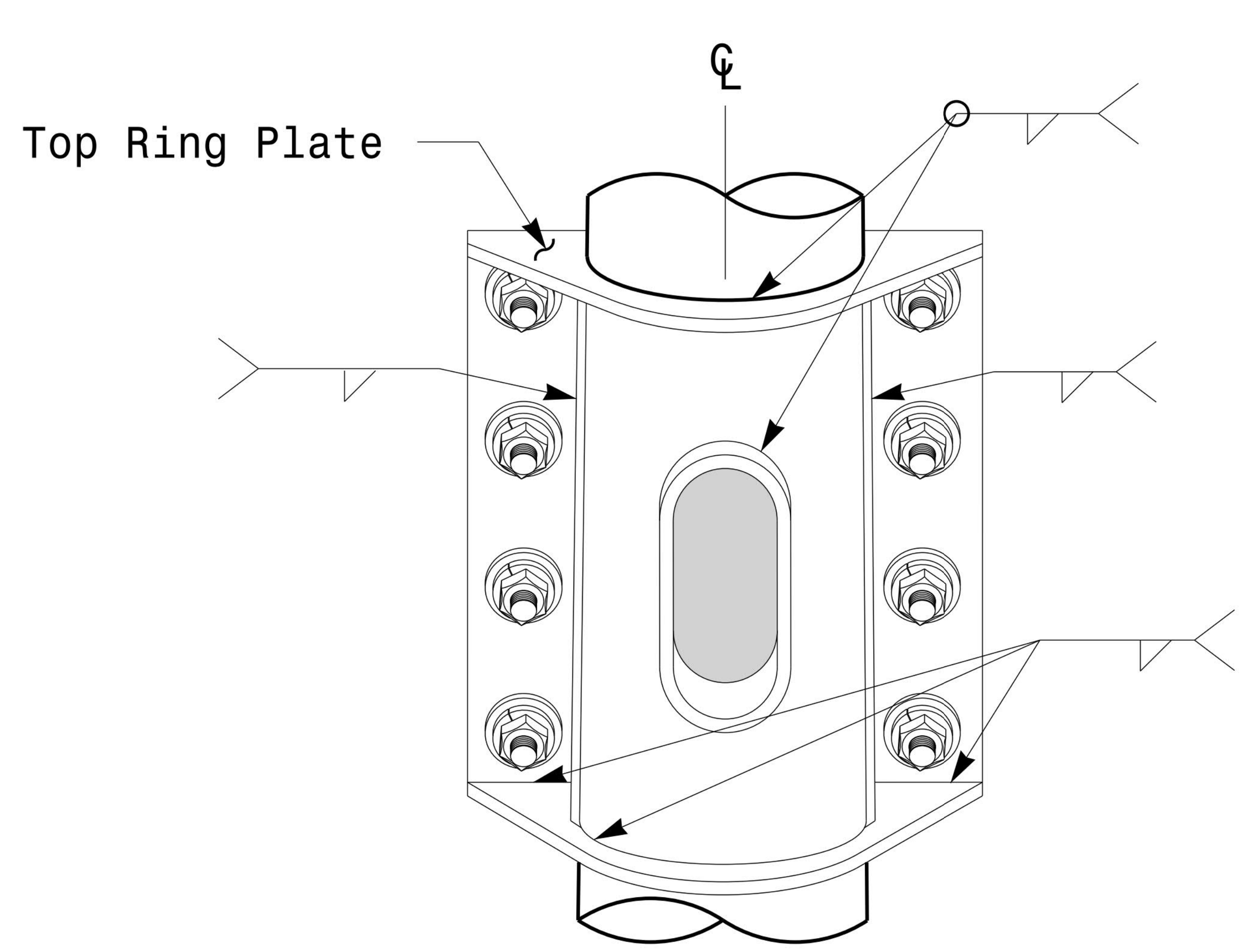


Front Elevation View

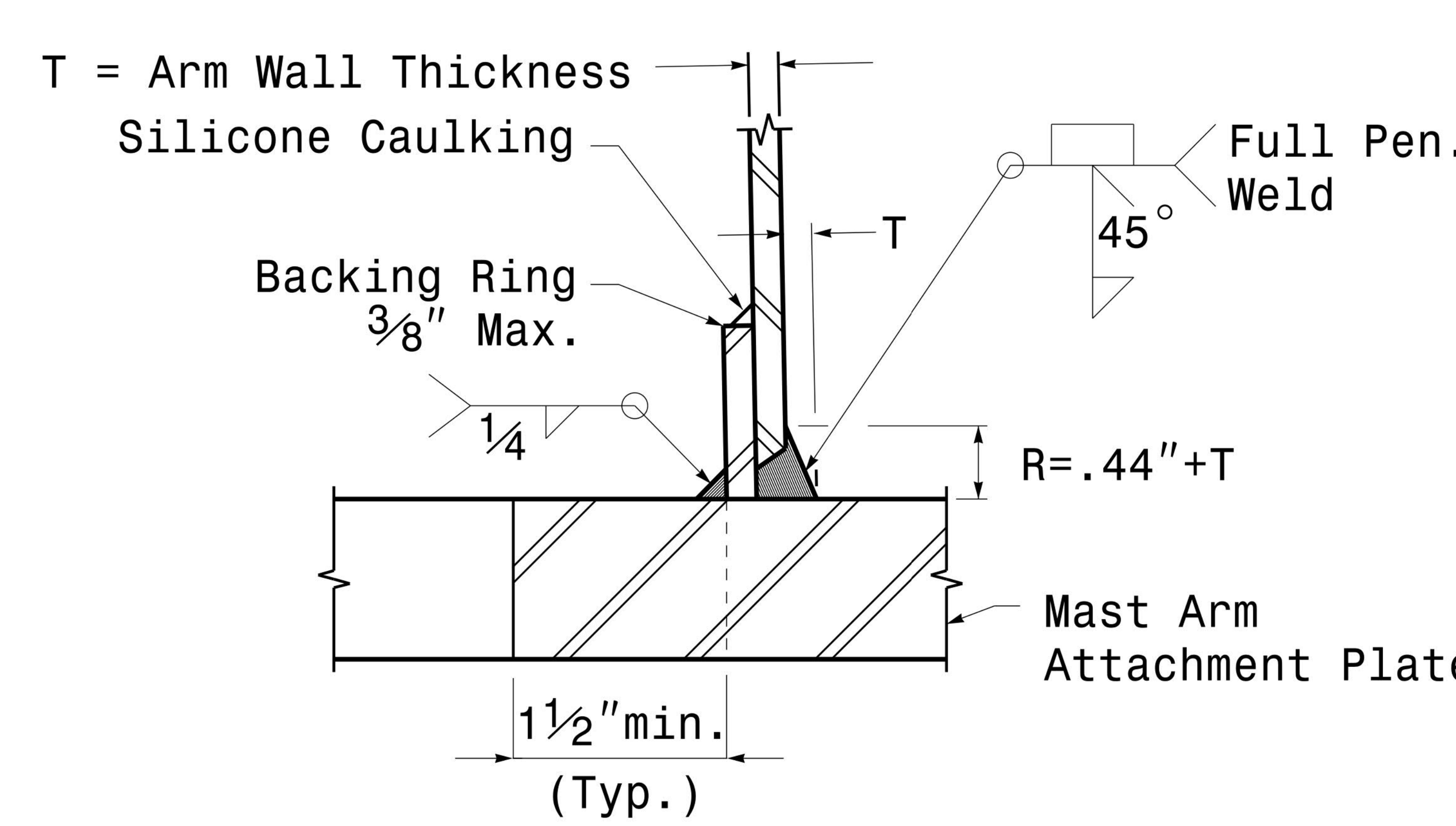


Section A-A

Mast Arm Attachment Plate



Back Elevation View



Section B-B

Full-Penetration Groove Weld Detail

Fabrication Details – Mast Arm Connection

PROJECT ID. NO.	SHEET NO.
BP7.R006	Sig.M5

Prepared In the Offices of: Transportation Mobility and Safety Division, Signal Design Section, 750 N.Greenfield Pkwy.Garner,NC 27529

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

SCALE 0 NA NONE

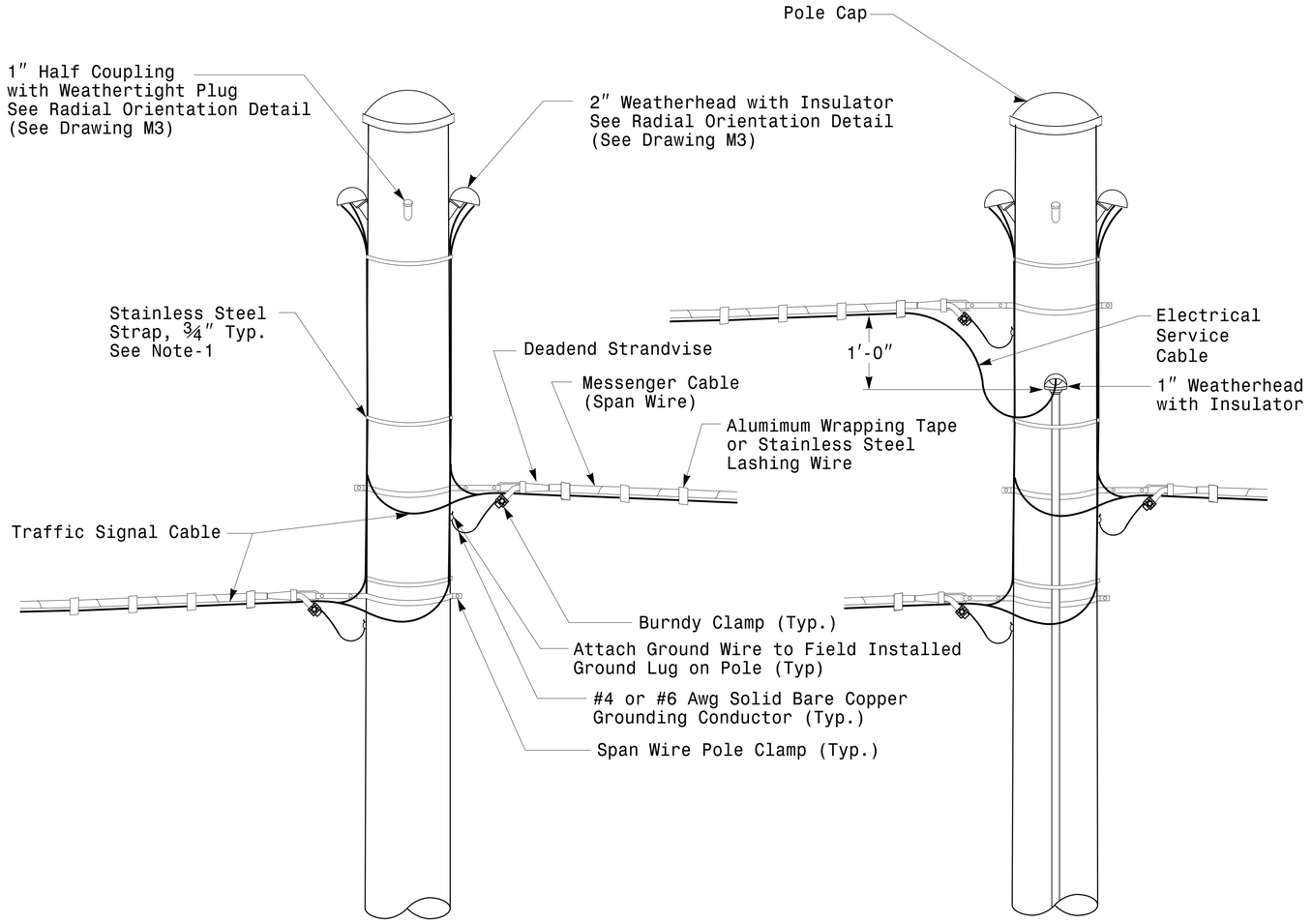
SEAL: NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 028094 DEBESH C. SARKAR

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

11-OCT-2017 08:35 S:\ITS&SU\ITS Signals\Signal Design Section\Eastern Region\M Sheets\2016\2014 Sig.M5 Std. Connection Fabrication Details-Mast Arm Poles.dgn

PROJECT ID. NO.	SHEET NO.
BP7.R006	Sig.M6

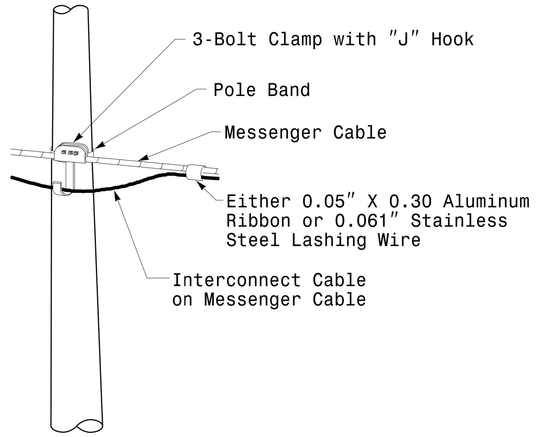
Fabrication Details – Strain Pole Attachments



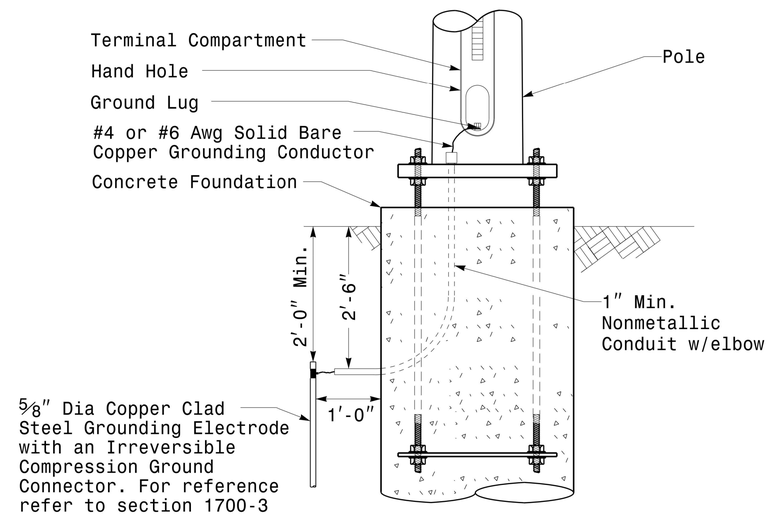
Strain Pole Attachments

NOTE:

1. Strap all signal cables to the side of the pole with ¾″ 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

Prepared in the Offices of:
Transportation Mobility and Safety Division
Signal Design Section
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
NORTH CAROLINA PROFESSIONAL SEAL 028094 ENGINEER DEBASH C. SARKAR

DocuSigned by: Debash C. Sarkar
SIGNATURE

10/11/2017
DATE

11-OCT-2017 08:36
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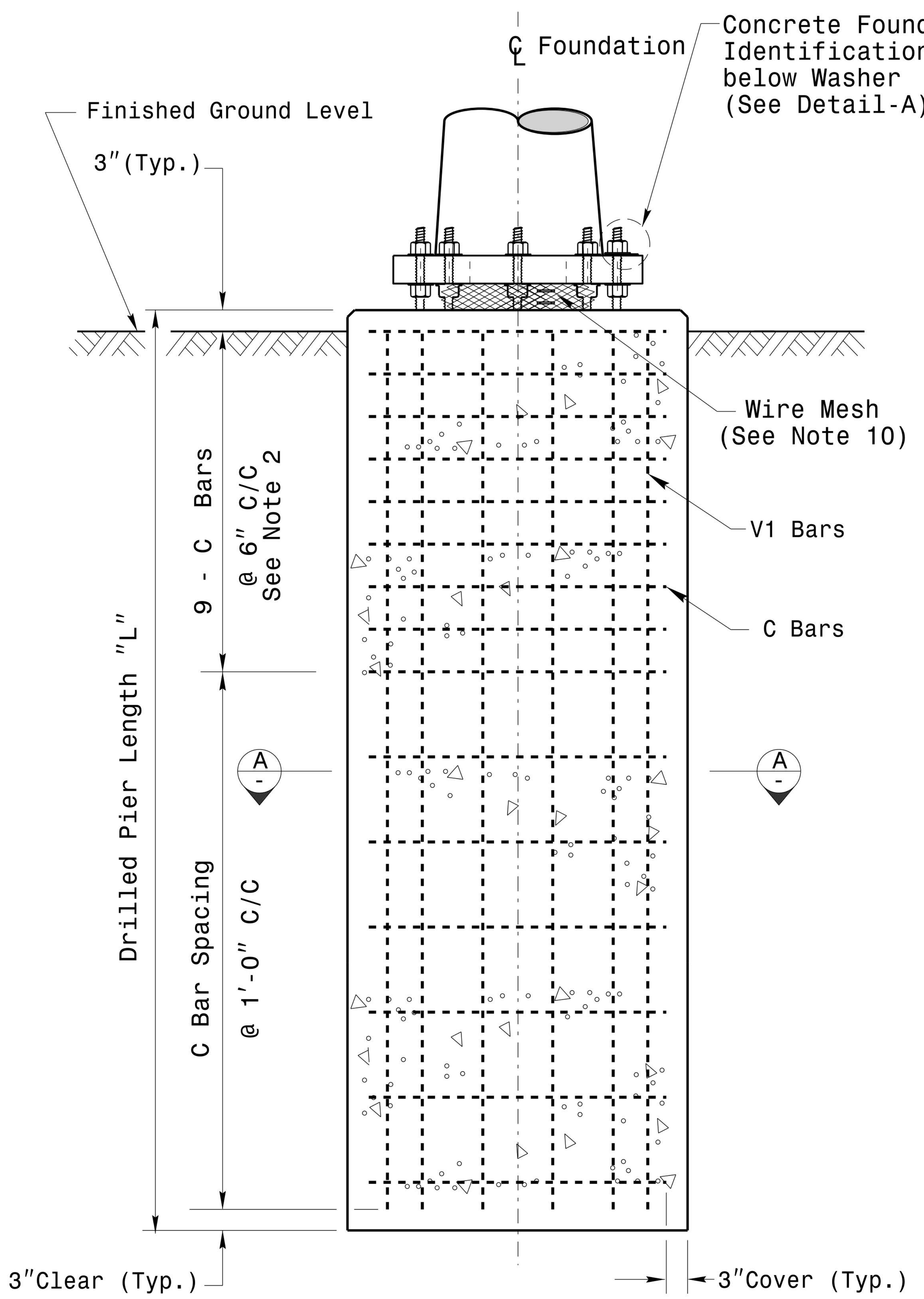
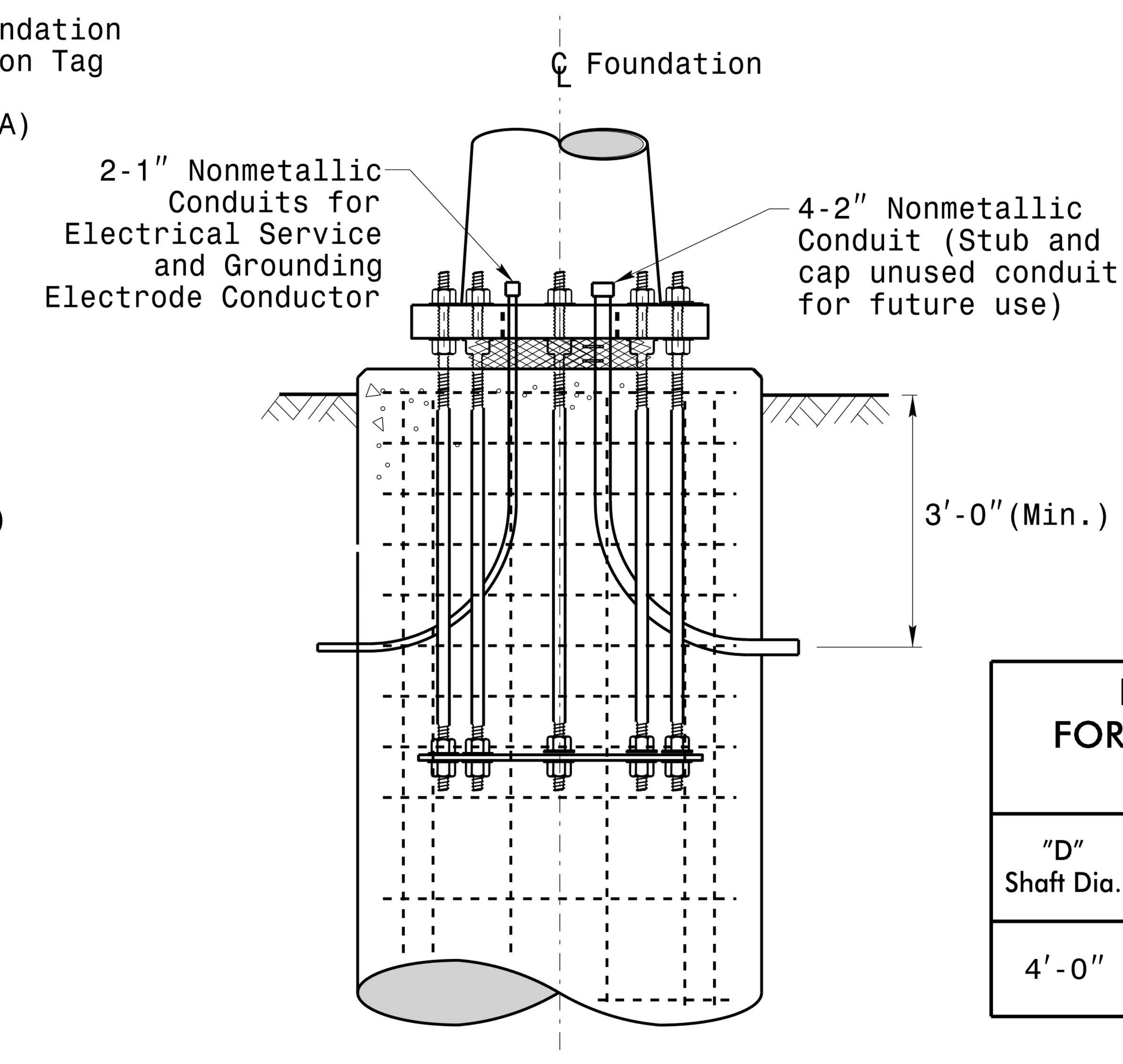
PROJECT ID. NO.	SHEET NO.
BP7.R006	Sig.M7

Construction Details – Foundations



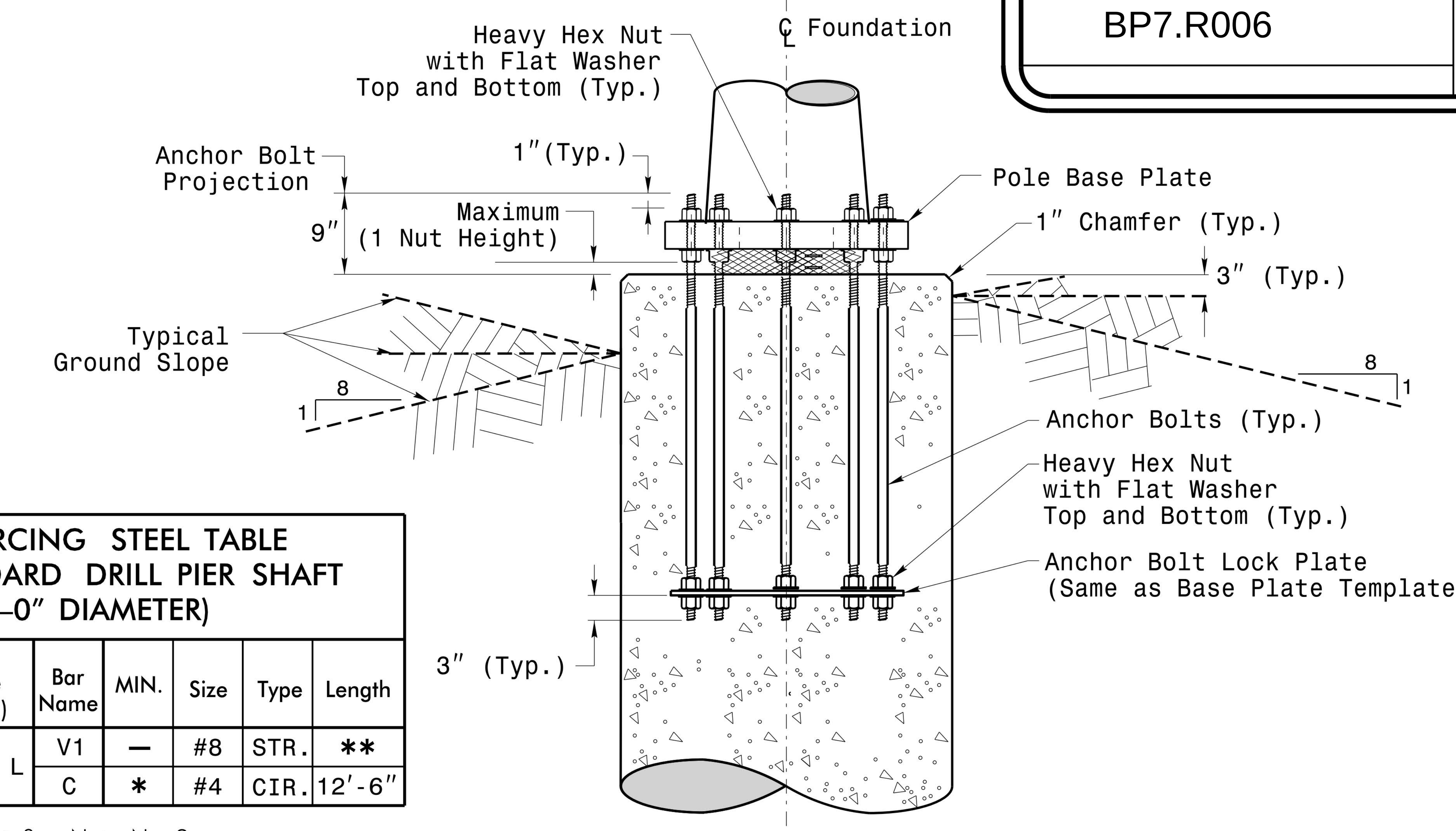
Concrete Shaft Elevation



Typical Foundation Conduit Details

REINFORCING STEEL TABLE FOR STANDARD DRILL PIER SHAFT (4′–0″ DIAMETER)						
"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



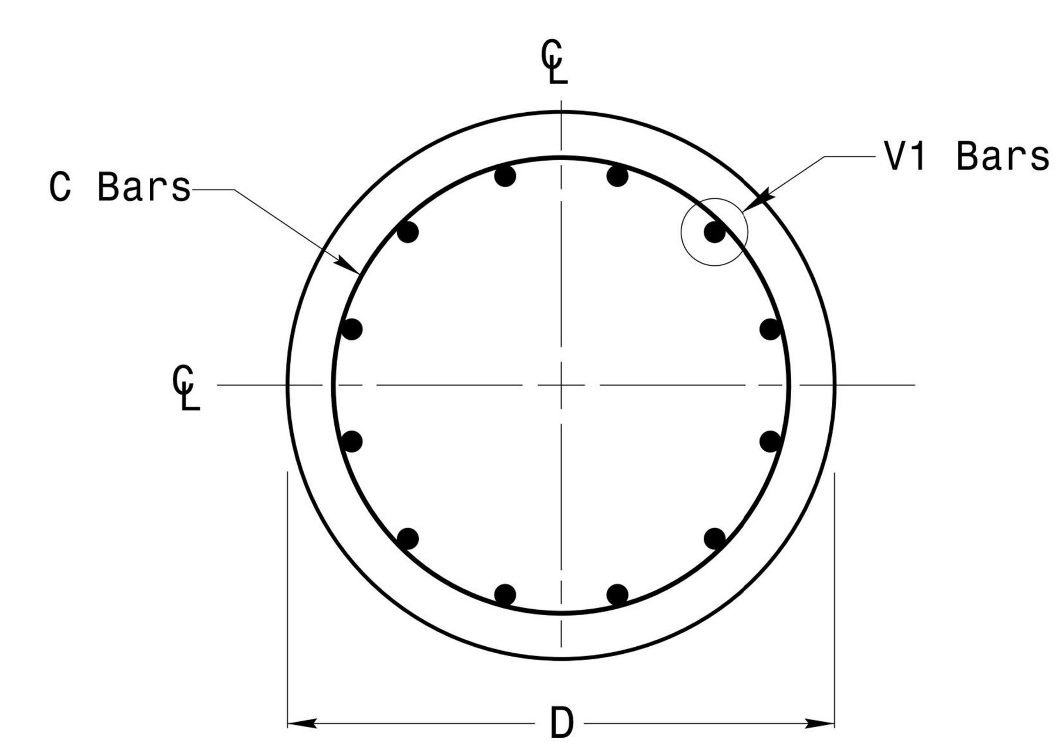
Typical Foundation Anchor Bolt Details

(Reinforcing Cage Not Shown for Clarity)

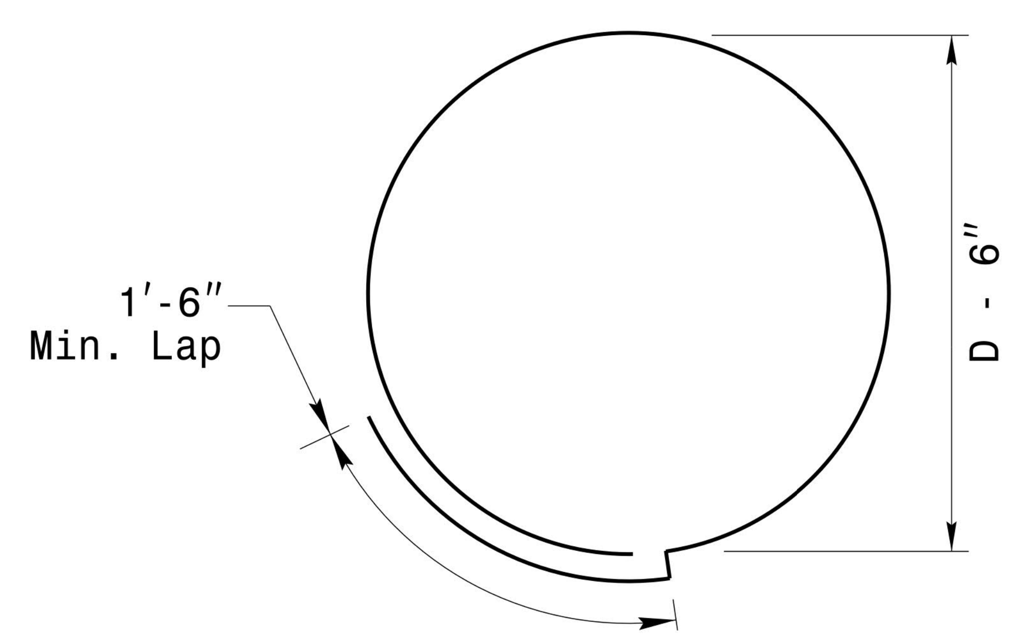
General Notes:

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.

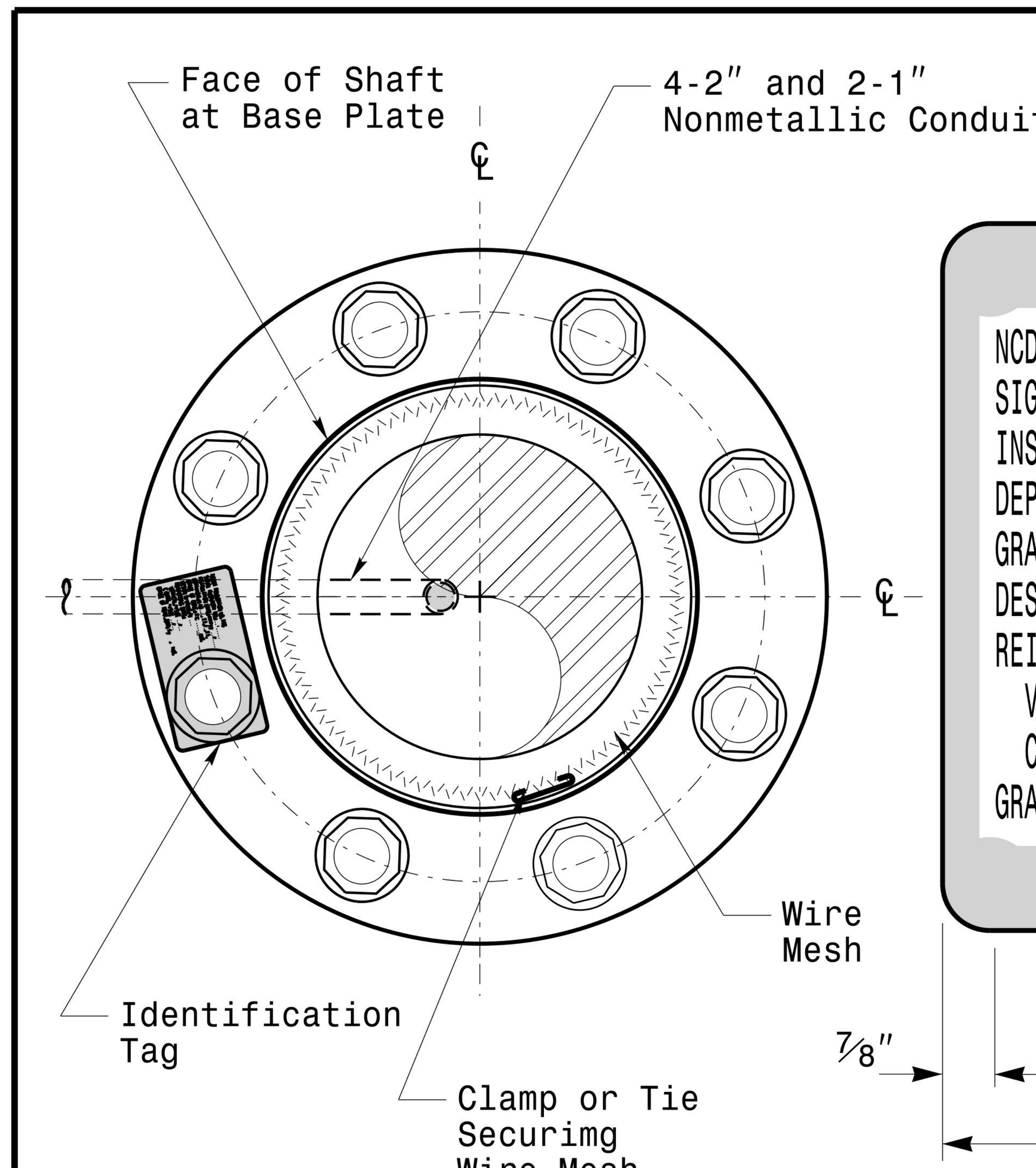
   https://connect.ncdot.gov/resources/Specifications and Special Provisions.aspx
7. Use air entrained AA concrete mix with a compression strength of f′c=4500 psi.(min.) after 28 days.
8. Use ASTM A615 grade 60 deformed bars for all reinforcing steel. Maintain at least 3″ cover on all reinforcement.
9. 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.



Section A-A

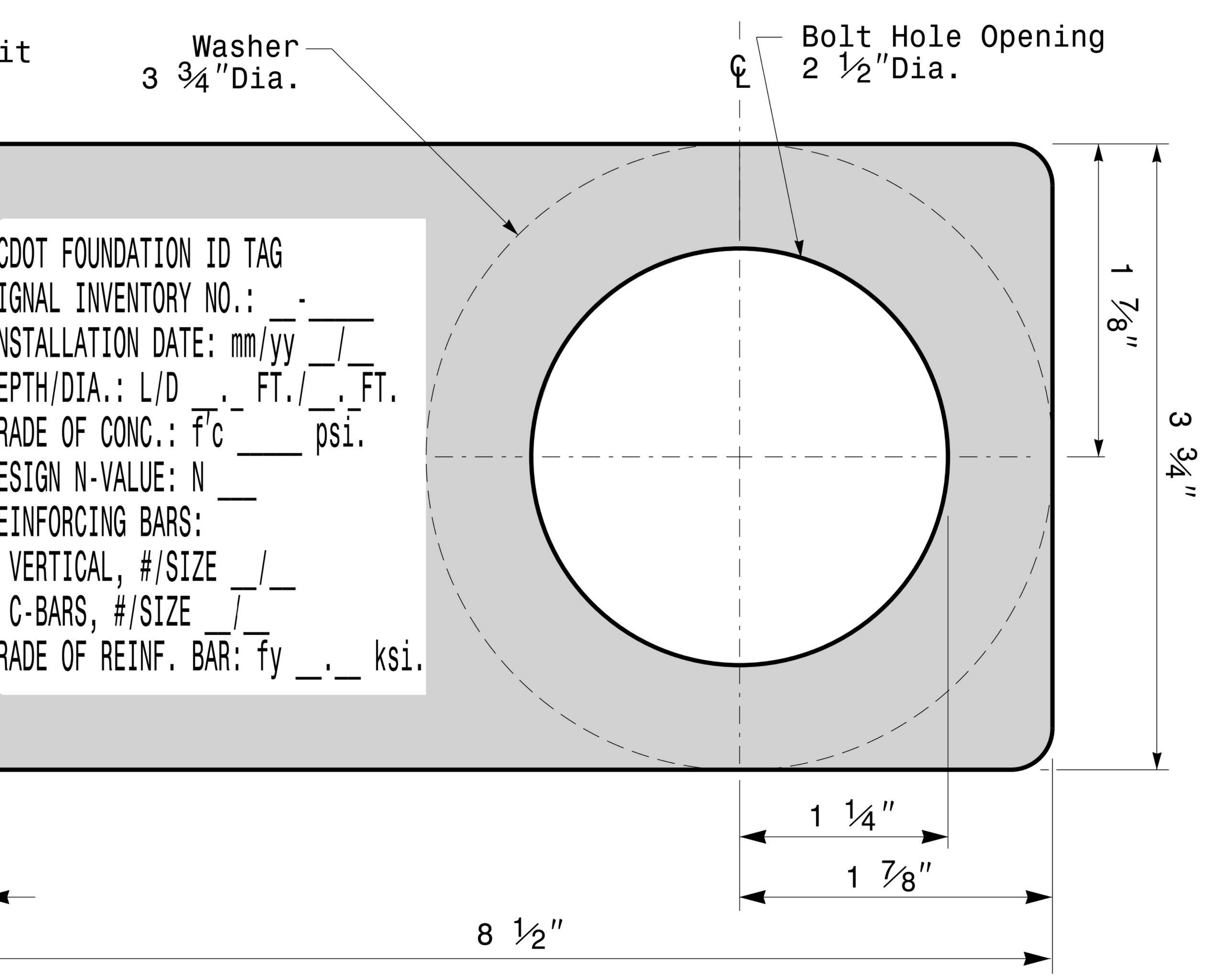


Typical "C" Bar Detail



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

Detail-A



Concrete Foundation Identification Tag Details

Prepared in the Offices of: Transportation Mobility and Safety Division, Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

Construction Details For Foundations

PLAN DATE:	OCTOBER 2018	DESIGNED BY:	C.B.COGDELL
PREPARED BY:	N. BITTING	REVIEWED BY:	D.C. SARKAR

REV. NO.	COMMENTS	INIT.	DATE
1	Revised Foundation Tag Details	N.B.	5/11/2015

SCALE: 0 NA — NONE

SEAL: North Carolina Professional Engineer Seal 028094 Debesh C. Sarkar

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

PROJECT ID. NO.	SHEET NO.
BP7.R006	Sig.M8

SOIL CONDITION

Wind Zone	Load	STANDARD STRAIN POLES: Case No.	Pole Height (Ft.)	Base Plate BC (In.)	Reactions at the Pole Base: Axial (kip)	Shear (kip)	Moment (ft–kip)	STANDARD FOUNDATIONS 48″ Diameter Drilled Pier Length (L) – Feet: Clay Medium N–Value 4–8	Clay Stiff N–Value 9–15	Clay Very Stiff N–Value 16–30	Clay Hard N–Value >30	Sand Loose N–Value 4–10	Sand Medium N–Value 11–30	Sand Dense N–Value >30	Reinforcement: Longitudinal Bar Size (#)	Longitudinal Quantity (ea.)	Stirrups Bar Size (#)	Stirrups 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

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

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

Prepared in the Offices of: Transportation Mobility and Safety Division, Signal Design Section, 750 N.Greenfield Pkwy,Garner,NC 27529

Standard Strain Pole Foundation for All Soil Conditions

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

REVISIONS: Changed "Foundation Depth" to "Drilled Pier Length" in Conc. Eqn. — INIT. N.B. — DATE 7/12/2015

SCALE: 0 NA — NONE

SEAL: NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 028094 DEBESH C. SARKAR

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

PROJECT REFERENCE NO.	SHEET NO.
BP7.R006	SCP 1

1. FEEDER CONDUCTORS
2. INSTALL ETHERNET CABLE
3. EXISTING ETHERNET (OR COAX) CABLE
4. INSTALL SMFO CABLE
5. EXISTING SMFO CABLE
6. INSTALL FIBER OPTIC DROP CABLE
7. INSTALL TRACER WIRE
8. TRENCH
9. INSTALL PVC CONDUIT
10. INSTALL RIGID, GALVANIZED STEEL CONDUIT
11. INSTALL RIGID, GALVANIZED STEEL RISER WITH WEATHERHEAD
12. INSTALL RIGID, GALVANIZED STEEL RISER WITH FIBER OPTIC CABLE SEAL
13. INSTALL OUTER–DUCT POLYETHYLENE CONDUIT
14. INSTALL POLYETHYLENE CONDUIT
15. DIRECTIONAL DRILL CONDUIT
16. BORE AND JACK CONDUIT
17. INSTALL CABLE(S) IN EXISTING CONDUIT
18. INSTALL CABLE(S) IN NEW CONDUIT
19. INSTALL CABLE(S) IN EXISTING RISER
20. INSTALL CABLE(S) IN NEW RISER
21. INSTALL CABLE(S) IN EXISTING CONDUIT STUB–OUTS
22. INSTALL NEW CONDUIT INTO EXISTING CABINET BASE (USE EXISTING CONDUIT STUB–OUTS WHEN AVAILABLE)
23. INSTALL NEW RISER INTO EXISTING CABINET BASE (USE EXISTING CONDUIT STUB–OUTS WHEN AVAILABLE)
24. INSTALL NEW CONDUIT INTO EXISTING POLE MOUNTED CABINET
25. INSTALL NEW RISER INTO EXISTING POLE MOUNTED CABINET
26. INSTALL NEW ETHERNET EDGE SWITCH
27. INSTALL NEW FIBER OPTIC TRANSCEIVER
28. INSTALL INTERCONNECT CENTER, PATCH PANEL, JUMPERS AND FUSION SPLICE CABLE IN CABINET
29. INSTALL UNDERGROUND SPLICE ENCLOSURE
30. INSTALL AERIAL SPLICE ENCLOSURE
31. MODIFY EXISTING INTERCONNECT CENTER /SPLICE ENCLOSURE
32. INSTALL POLE MOUNTED SPLICE CABINET
33. INSTALL BASE MOUNTED SPLICE CABINET
34. INSTALL CABINET FOUNDATION
35. INSTALL CCTV CAMERA POLE MOUNTED CABINET
36. INSTALL CCTV CAMERA ASSEMBLY
37. INSTALL CCTV CAMERA WOOD POLE
38. INSTALL CCTV CAMERA METAL POLE AND FOUNDATION
39. INSTALL JUNCTION BOX
40A. INSTALL OVERSIZED JUNCTION BOX
40B. INSTALL SPECIAL OVERSIZED JUNCTION BOX (36" x 24" x 24")
41. REMOVE EXISTING JUNCTION BOX
42. INSTALL WOOD POLE
43. REMOVE EXISTING WOOD POLE
44. INSTALL AERIAL GUY ASSEMBLY
45. INSTALL STANDARD GUY ASSEMBLY
46. INSTALL SIDEWALK GUY ASSEMBLY
47. INSTALL MESSENGER CABLE
48A. REMOVE EXISTING COMMUNICATIONS AND MESSENGER CABLE
48B. REMOVE EXISTING COMMUNICATIONS CABLE
49. BACK PULL EXISTING COMMUNICATIONS CABLE
50. INSTALL CELL MODEM AND ANTENNA
51. INSTALL CABLE STORAGE RACKS (SNOW SHOES) AND STORE 100 FEET OF CABLE
52A. INSTALL DELINEATOR MARKER
52B. INSTALL JUNCTION BOX MARKER
53A. STORE 20 FEET OF COMMUNICATIONS CABLE
53B. STORE 50 FEET OF EACH COMMUNICATIONS CABLE
54. LASH CABLE(S) TO EXISTING COMMUNICATIONS CABLE
55. LASH CABLE(S) TO EXISTING MESSENGER CABLE
56. LASH CABLE(S) TO NEW MESSENGER CABLE
57. MODIFY EXISTING ELECTRICAL SERVICE
58. INSTALL NEW ELECTRICAL SERVICE
59. INSTALL NEW EQUIPMENT CABINET DISCONNECT
60. BOND TRACER WIRE TO EQUIPMENT GROUND BUS
61. DO NOT BOND TRACER WIRE TO EQUIPMENT GROUND BUS
62. BOND RISER AND MESSENGER CABLE TO POLE GROUND
63. BOND RISER TO POLE GROUND
64. BOND MESSENGER CABLE TO POLE GROUND
65. INSTALL HEAT SHRINK TUBING RETROFIT KIT
66. INSTALL MOLDABLE DUCT SEAL
67. SLACK SPAN

LEGEND

- FO — NEW FIBER OPTIC COMMUNICATIONS CABLE
- EXI — EXISTING COMMUNICATIONS CABLE
- REM — EXISTING COMMUNICATIONS CABLE TO BE REMOVED
- NEW AERIAL GUY ASSEMBLY
- NEW CONDUIT
- EXISTING CONDUIT
- DD — NEW DIRECTIONAL DRILLED CONDUIT

NEW		EXISTING
	OVERSIZED JUNCTION BOX	
	WOOD POLE	
S	AERIAL SPLICE ENCLOSURE	S
S	UNDERGROUND SPLICE ENCLOSURE	S
	METAL POLE	
	CCTV ASSEMBLY	
	STANDARD GUY ASSEMBLY	
	SIDEWALK GUY ASSEMBLY	
	CABLE STORAGE RACKS (SNOW SHOES)	
	SIGNAL/EQUIPMENT CABINET	
S	SPLICE CABINET	S
	FLAT PANEL ANTENNA (SINGLE)	
	YAGI ANTENNA (DOUBLE) FOR REPEATER OPERATION	
	YAGI ANTENNA (SINGLE)	
	OMNI ANTENNA	
SP	SIGNAL POLE	SP
XX–XXXX	SIGNAL INVENTORY NUMBER	XX–XXXX
	ELECTRICAL SERVICE EQUIPMENT	

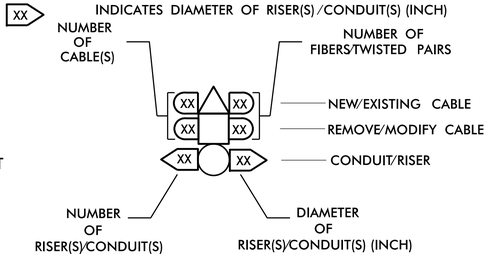
ATTACHMENT POINT:

- XX"/SS / YYY — DISTANCE ABOVE (IN)/ATTACHMENT POINT REFERENCE POINT
- YYY / XX"/SS — REFERENCE POINT DISTANCE BELOW (IN)/ATTACHMENT POINT

"SS" REFERENCE LOCATION	
FS =	FRONT SIDE OF POLE
BS =	BACK SIDE OF POLE

CONSTRUCTION NOTE SYMBOLOGY KEY

- XX — INDICATES NUMBER OF CABLES, LOOPS, ETC.
- XX — INDICATES NUMBER OF FIBERS PER CABLE, TWISTED PAIRS PER CABLE, ETC.
- XX — INDICATES NUMBER OF RISER(S)/CONDUIT(S)
- XX — INDICATES DIAMETER OF RISER(S)/CONDUIT(S) (INCH)



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Prepared for the Offices of:

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION — Integrated Mobility and Safety Division — Intelligent Transportation Systems Section

750 N. Greenfield Pkwy., Garner, NC 27529

CONSTRUCTION NOTES

Division 07 Guilford Co. Greensboro

PLAN DATE:	January 2023	REVIEWED BY:	RW Thompson
PREPARED BY:	IN Avery	REVIEWED BY:	

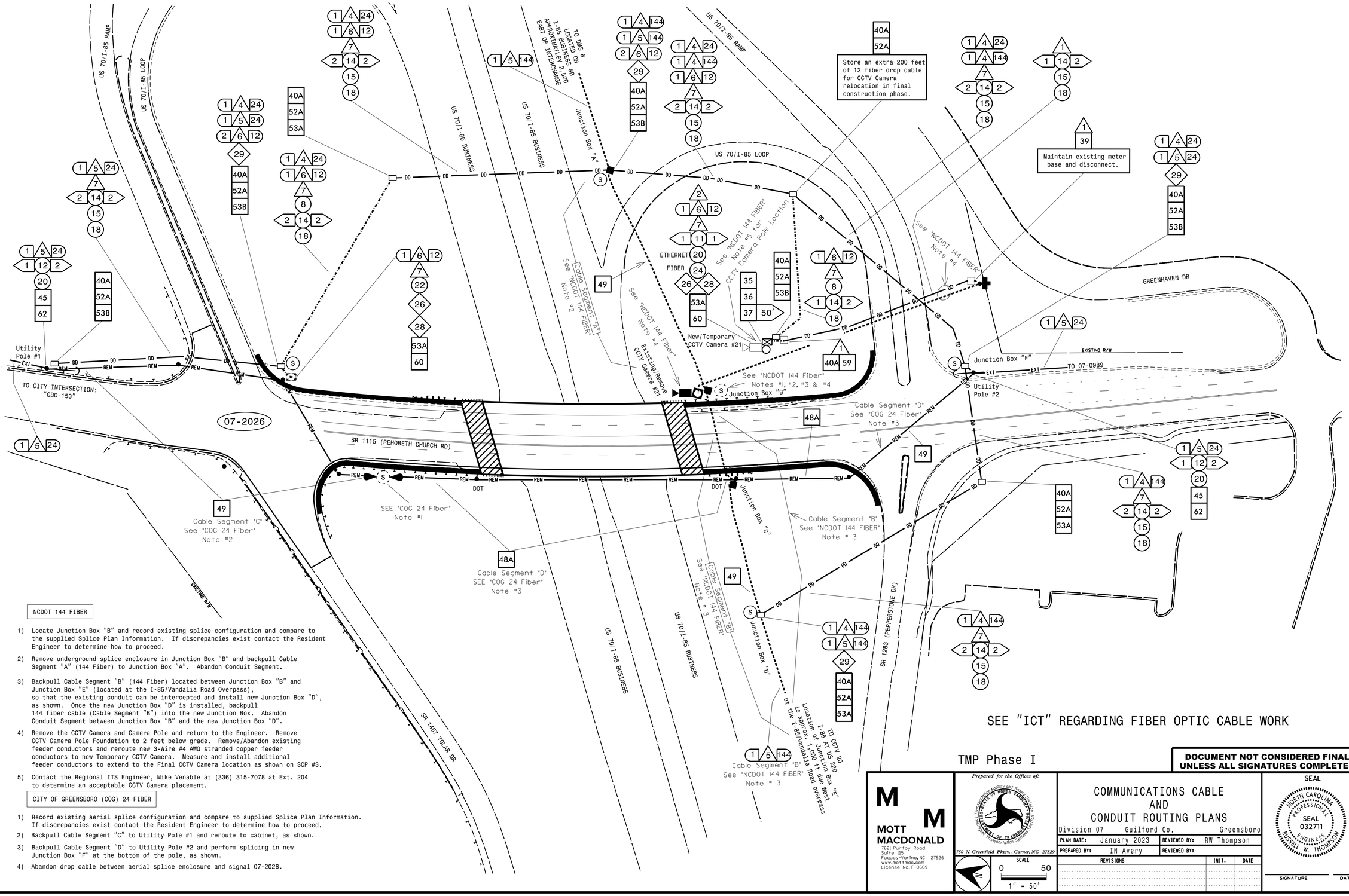
REVISIONS	INIT.	DATE

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 032711 ENGINEER RUSSELL W. THOMPSON

SIGNATURE DATE

PROJECT REFERENCE NO.	SHEET NO.
BP7.R006	SCP 2



NCDOT 144 FIBER

1) Locate Junction Box "B" and record existing splice configuration and compare to the supplied Splice Plan Information. If discrepancies exist contact the Resident Engineer to determine how to proceed.
2) Remove underground splice enclosure in Junction Box "B" and backpull Cable Segment "A" (144 Fiber) to Junction Box "A". Abandon Conduit Segment.
3) Backpull Cable Segment "B" (144 Fiber) located between Junction Box "B" and Junction Box "E" (located at the I-85/Vandalia Road Overpass), so that the existing conduit can be intercepted and install new Junction Box "D", as shown. Once the new Junction Box "D" is installed, backpull 144 fiber cable (Cable Segment "B") into the new Junction Box. Abandon Conduit Segment between Junction Box "B" and the new Junction Box "D".
4) Remove the CCTV Camera and Camera Pole and return to the Engineer. Remove CCTV Camera Pole Foundation to 2 feet below grade. Remove/Abandon existing feeder conductors and reroute new 3-Wire #4 AWG stranded copper feeder conductors to new Temporary CCTV Camera. Measure and install additional feeder conductors to extend to the Final CCTV Camera location as shown on SCP #3.
5) Contact the Regional ITS Engineer, Mike Venable at (336) 315-7078 at Ext. 204 to determine an acceptable CCTV Camera placement.

CITY OF GREENSBORO (COG) 24 FIBER

1) Record existing aerial splice configuration and compare to supplied Splice Plan Information. If discrepancies exist contact the Resident Engineer to determine how to proceed.
2) Backpull Cable Segment "C" to Utility Pole #1 and reroute to cabinet, as shown.
3) Backpull Cable Segment "D" to Utility Pole #2 and perform splicing in new Junction Box "F" at the bottom of the pole, as shown.
4) Abandon drop cable between aerial splice enclosure and signal 07-2026.

TMP Phase I

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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION — Transportation Mobility and Safety Division — Work Zone Traffic Control Unit

750 N. Greenfield Pkwy., Garner, NC 27529

SCALE 0 50 — 1" = 50'

COMMUNICATIONS CABLE AND CONDUIT ROUTING PLANS

Division 07 Guilford Co. Greensboro

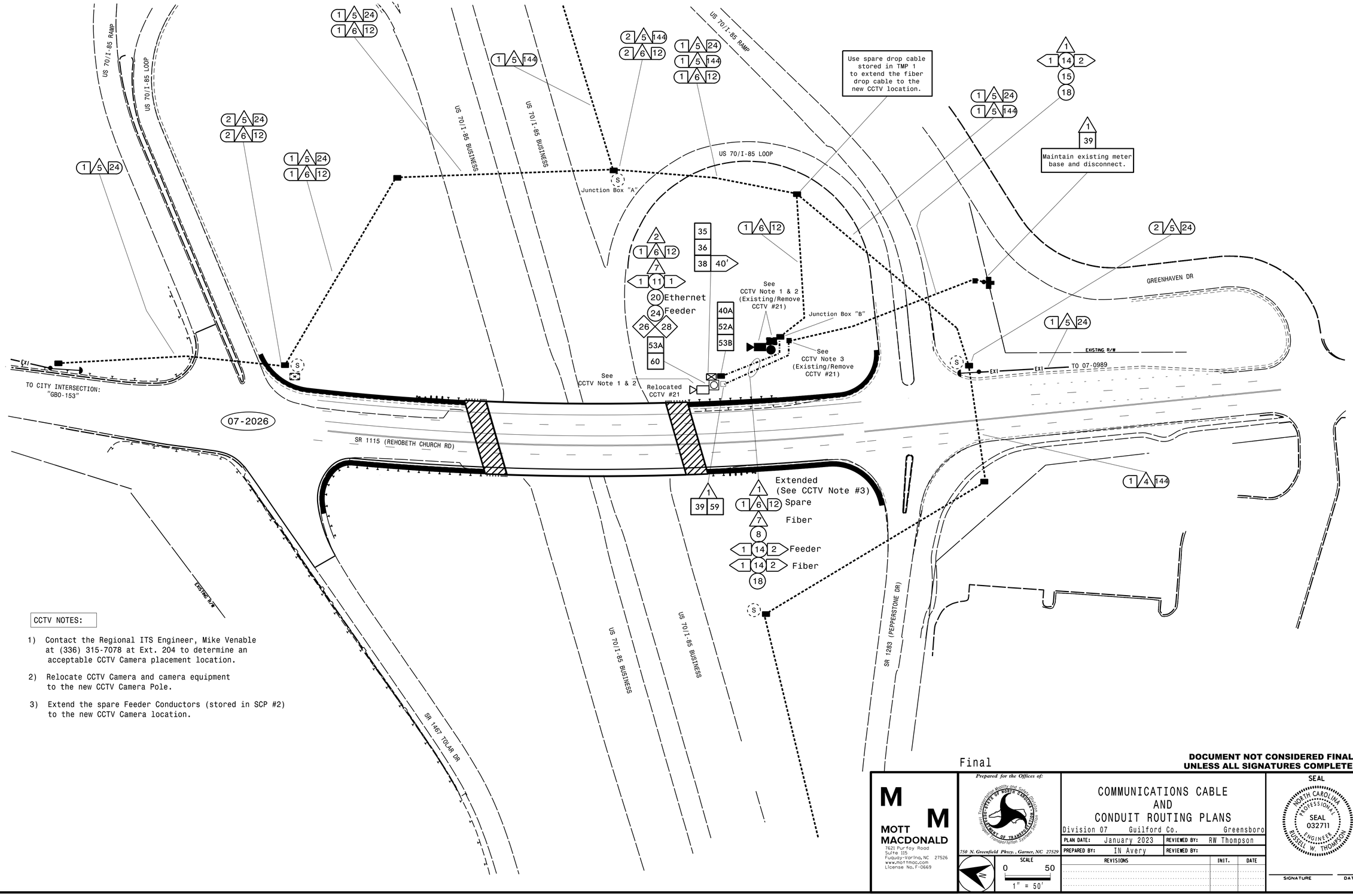
PLAN DATE:	January 2023	REVIEWED BY:	RW Thompson
PREPARED BY:	IN Avery	REVIEWED BY:	

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 032711 RUSSELL W. THOMPSON

SIGNATURE DATE

PROJECT REFERENCE NO.	SHEET NO.
BP7.R006	SCP 3



CCTV NOTES:

1) Contact the Regional ITS Engineer, Mike Venable at (336) 315-7078 at Ext. 204 to determine an acceptable CCTV Camera placement location.

2) Relocate CCTV Camera and camera equipment to the new CCTV Camera Pole.

3) Extend the spare Feeder Conductors (stored in SCP #2) to the new CCTV Camera location.

Final

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Prepared for the Offices of:

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION — Transportation Mobility and Safety Division — Intelligent Transportation Systems Section

750 N. Greenfield Pkwy., Garner, NC 27529

SCALE 0 50 1" = 50'

COMMUNICATIONS CABLE AND CONDUIT ROUTING PLANS

Division 07 Guilford Co. Greensboro

PLAN DATE:	January 2023	REVIEWED BY:	RW Thompson
PREPARED BY:	IN Avery	REVIEWED BY:	

REVISIONS	INIT.	DATE

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NORTH CAROLINA PROFESSIONAL SEAL 032711 ENGINEER RUSSELL W. THOMPSON

SIGNATURE DATE