

Project: R-2566BA

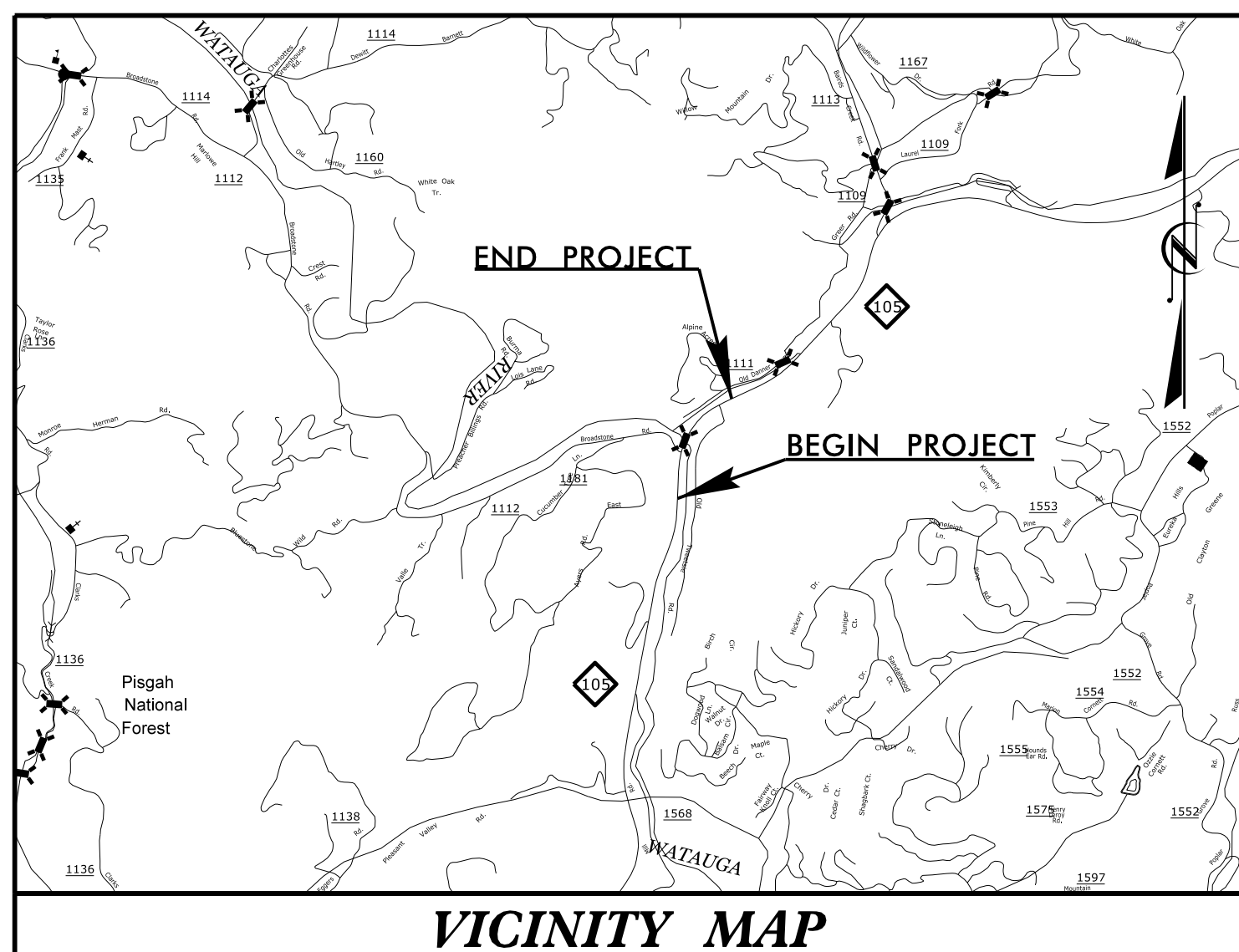
Project No.	Sheet No.
R-2566BA	Fig. 1.0

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

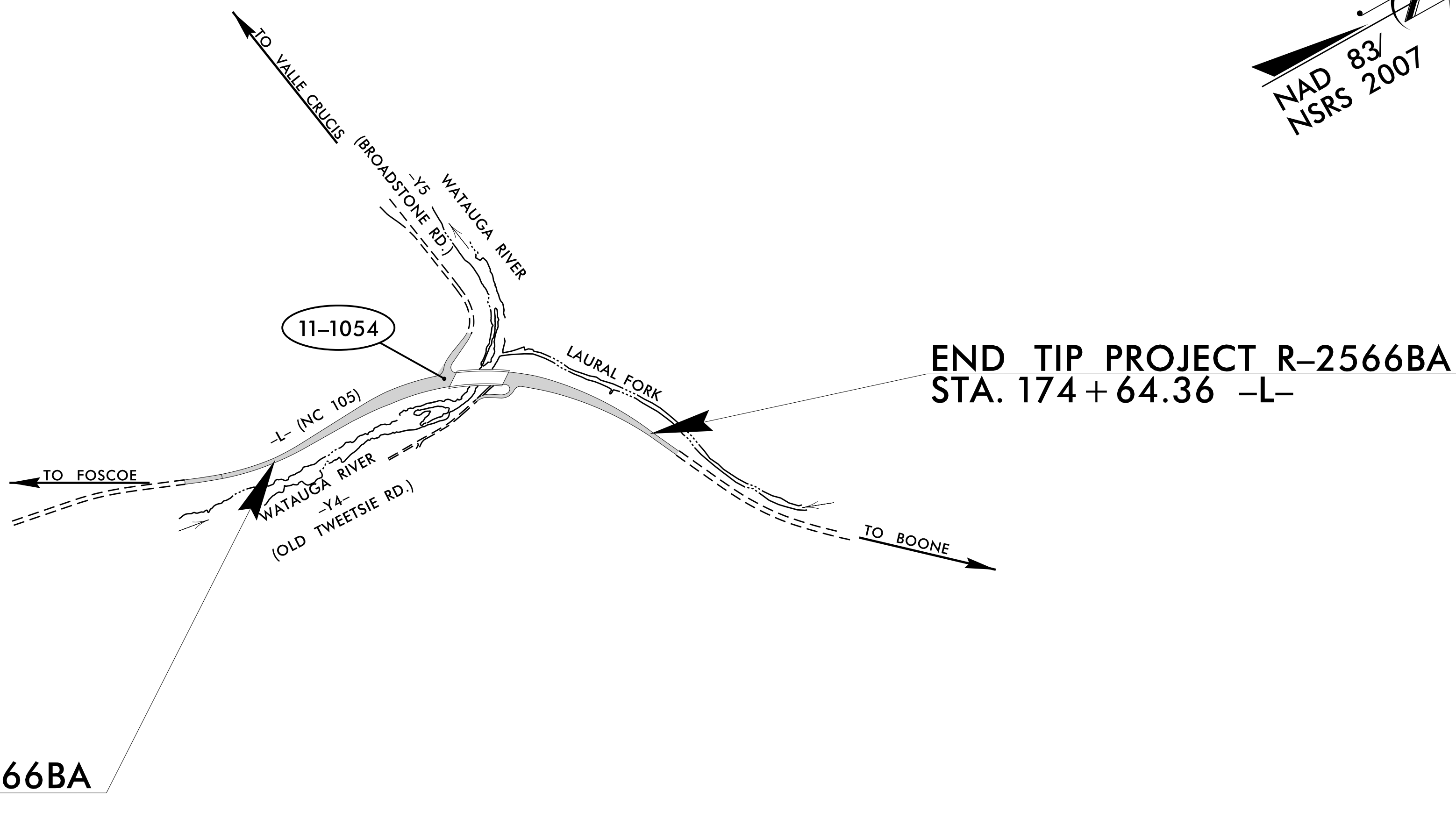
WATAUGA COUNTY

LOCATION: NC 105 AT SR 1112 (BROADSTONE RD.) IN BOONE

TYPE OF WORK: TRAFFIC SIGNALS



VICINITY MAP



BEGIN TIP PROJECT R-2566BA
STA. 151+99.39 -L-

END TIP PROJECT R-2566BA
STA. 174+64.36 -L-

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

Index of Plans

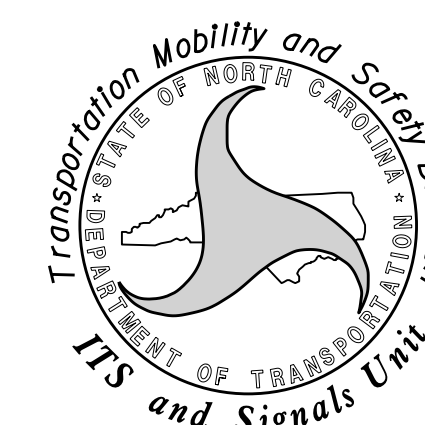
Sheet #	Reference #	Location/Description
Sig. 1.0	-----	Title Sheet
Sig. 2.0-7.1	11-1054	NC 105 at SR 1112 (Broadstone Rd.)
Sig. 8.0	-----	Revised Standard Drawings
Sig. M1-M8	-----	Metal Pole Standard Drawings

INTELLIGENT TRANSPORTATION AND SIGNALS UNIT

Contacts:

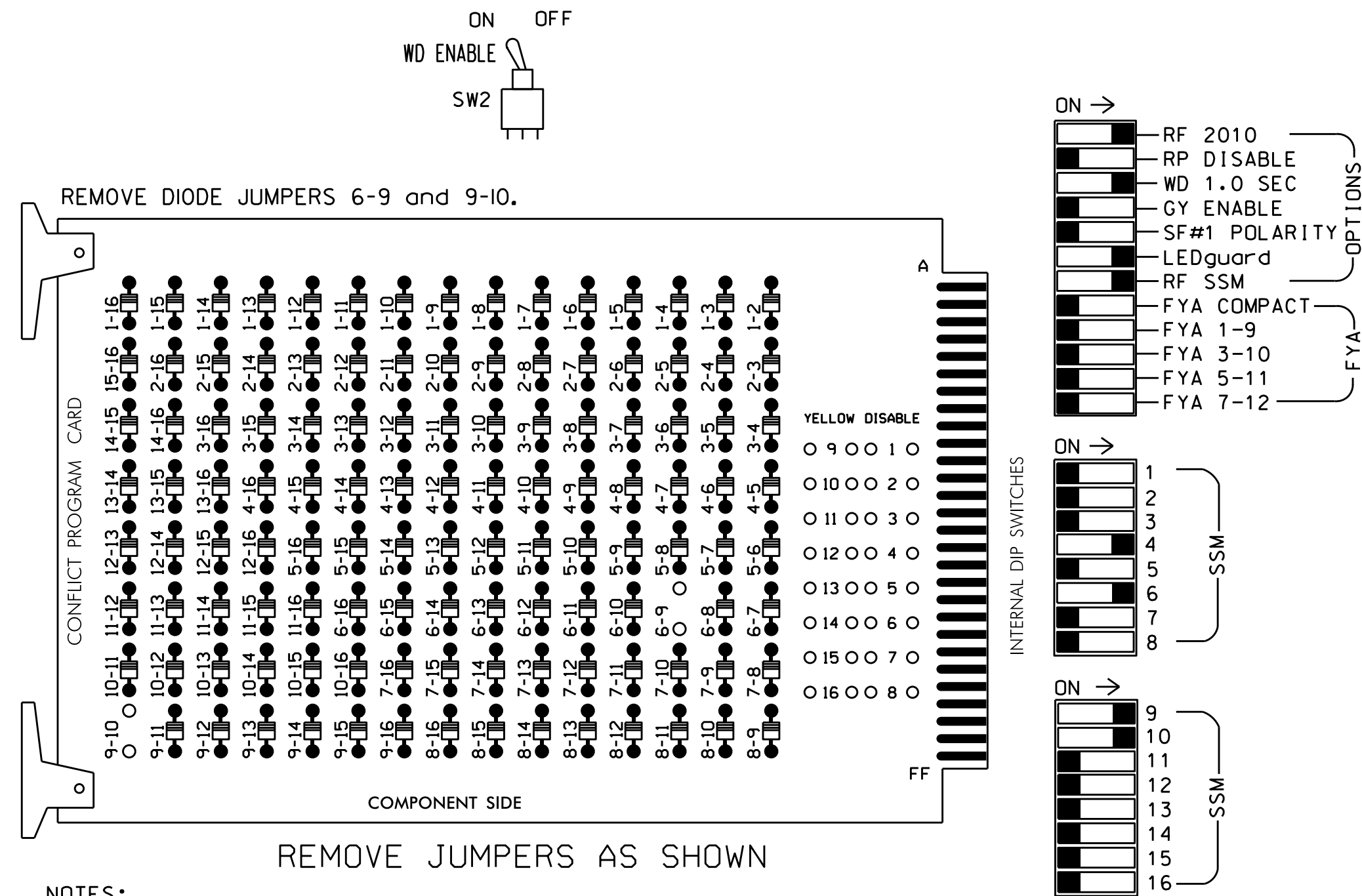
Timothy J. Williams, PE - Western Region Signals Engineer
Keith Mims, PE - Signal Equipment Design Engineer
Neil Avery - Intelligent Transportation Systems Engineer

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



EDI MODEL 2010ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



NOTES:

- Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
- Make sure jumpers SEL2-SEL5 are present on the monitor board.

NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
- Return controller to Factory Defaults before programming per this electrical detail.
- Ensure that Red Enable is active at all times during normal operation. To prevent Red Failures on unused monitor channels, tie unused red monitor inputs 1,2,3, 5,7,8,11,12,13,14,15 & 16 to load switch AC+ per the cabinet manufacturer's instructions.
- Enable Simultaneous Gap-Out for all phases.
- Program phases 2 and 6 for Start Up In Green.
- Program phase 6 for Yellow Flash.

SIGNAL HEAD HOOK-UP CHART

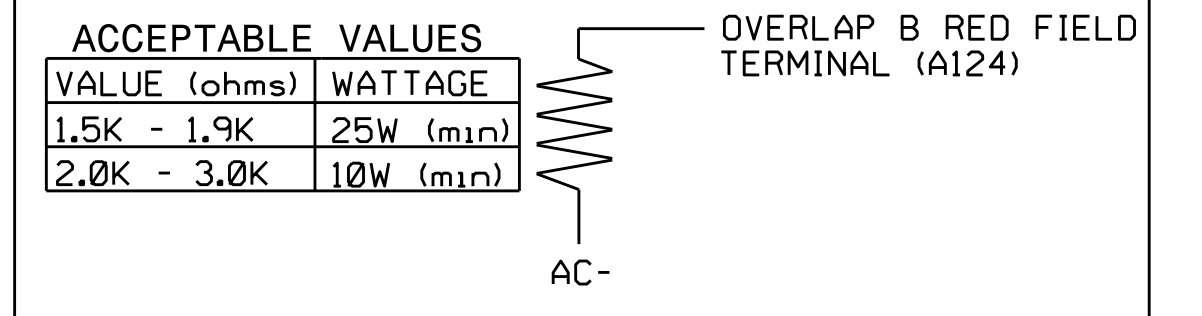
LOAD SWITCH NO.	S1	S2	S2P	S3	S4	S4P	S5	S6	S6P	S7	S8	S8P	S9	S10	S11	S12	S13	S14
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	9	10	11	12	13	14
SIGNAL HEAD NO.	NU	NC	NU	NC	41,42	NU	NC	61,62	NU	NU	NU	NU	21,22	21,42	NU	NU	NU	NU
RED					101			134					A121	*				
YELLOW					102			135					A122					
GREEN					103			136					A123					
RED ARROW																		
YELLOW ARROW														A125				
GREEN ARROW														A126				

NU = Not Used
 NC = No Connection
 * Denotes install load resistor. See load resistor installation detail this sheet.

EQUIPMENT INFORMATION

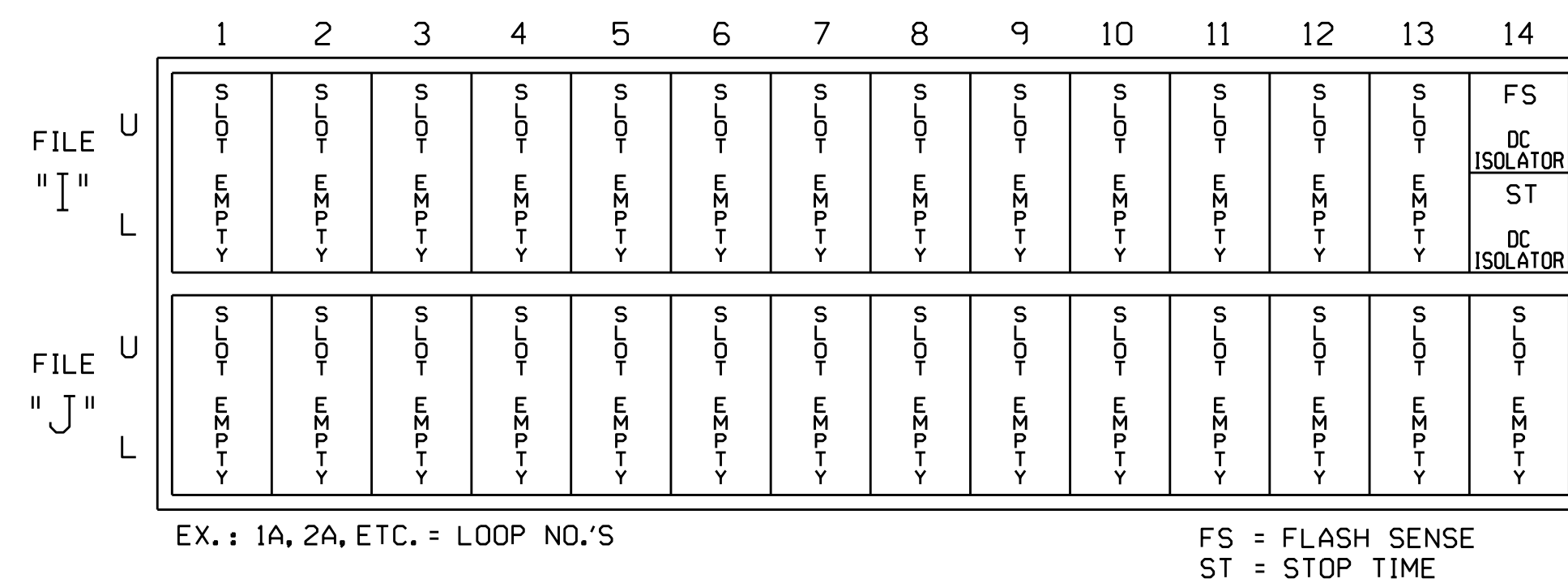
CONTROLLER.....2070
 CABINET332
 SOFTWAREECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS..18 (12-STD, 6-AUX)
 LOAD SWITCHES USED....S4,S6,S9,S10
 PHASES USED.....2,3,4,5,6
 OVERLAP A.....2+3
 OVERLAP B.....3+5
 OVERLAP C.....NOT USED
 OVERLAP B.....NOT USED

LOAD RESISTOR INSTALLATION DETAIL



INPUT FILE POSITION LAYOUT

(front view)



SPECIAL DETECTOR NOTE

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

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 - GREEN
SELECT VEHICLE OVERLAP OPTIONS: (Y/N)
FLASH YELLOW IN CONTROLLER FLASH?...Y
GREEN EXTENSION (0-255 SEC).....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
    
```

PRESS '+'

```

PAGE 1: VEHICLE OVERLAP 'B' SETTINGS
PHASE:          :12345678910111213141516
VEH OVL PARENTS: : X X
VEH OVL NOT VEH: :
VEH OVL NOT PED: :
VEH OVL GRN EXT: :
STARTUP COLOR:  - RED - YELLOW - GREEN
FLASH COLORS:   - RED - YELLOW - GREEN
SELECT VEHICLE OVERLAP OPTIONS: (Y/N)
FLASH YELLOW IN CONTROLLER FLASH?...N
GREEN EXTENSION (0-255 SEC).....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
    
```

OVERLAP PROGRAMMING COMPLETE

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 11-1054T1
 DESIGNED: April 2019
 SEALED: 05-16-19
 REVISED: N/A

Electrical Detail - Temp. Design - Phase IA

Electrical and Programming Details For: **NC 105 at SR 1112 (Broadstone Rd.)**

Division 11 Watauga County Boone

PLAN DATE: May 2019 REVIEWED BY:

PREPARED BY: James Peterson REVIEWED BY:

REVISIONS INIT. DATE

750 N. Greenfield Pkwy, Garner, NC 27529

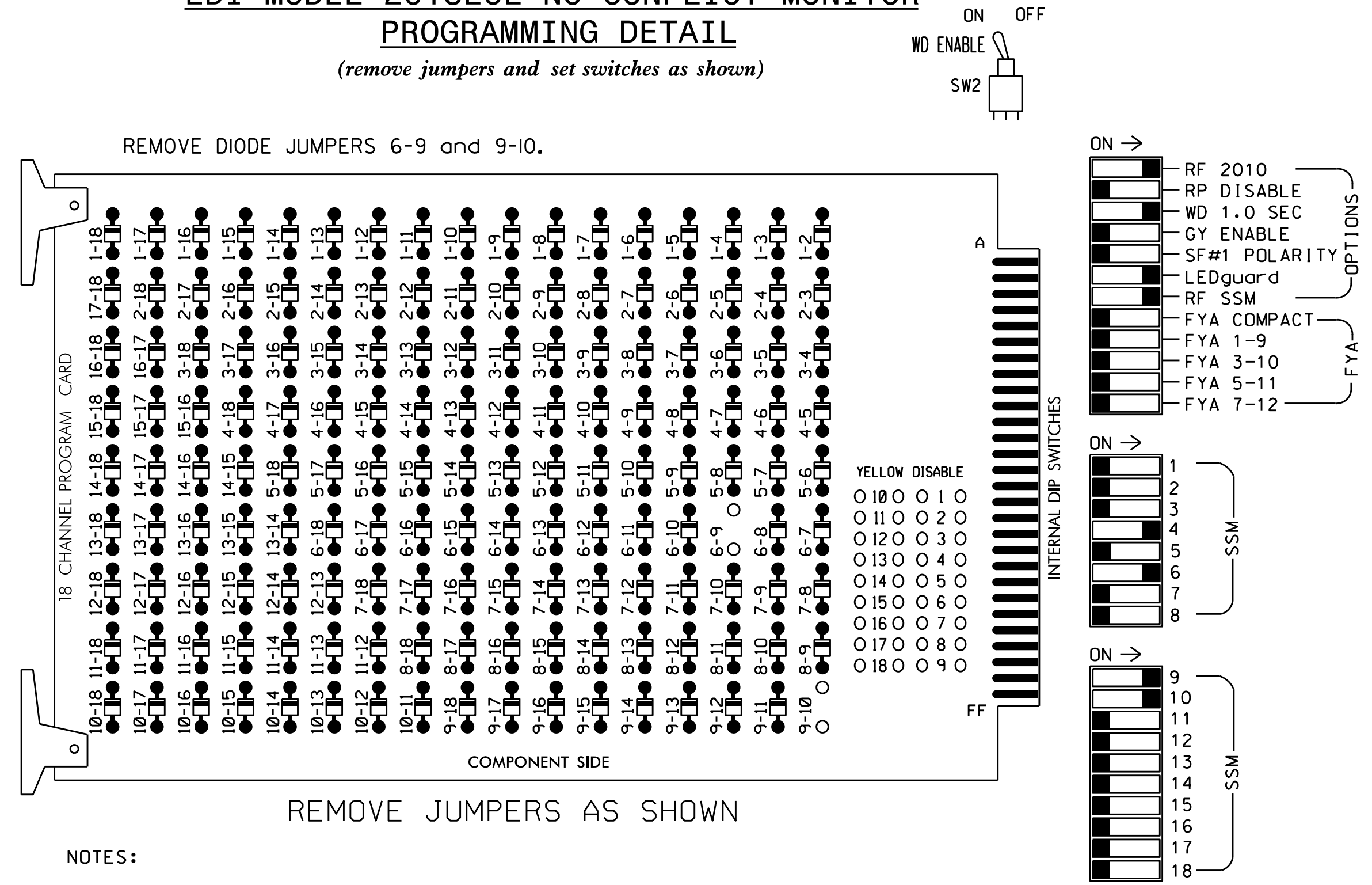
SEAL: RYAN W. HOUGH, PROFESSIONAL ENGINEER, No. 036833

SIGNATURE: Ryan W. Hough DATE: 5/30/2019

SIG. INVENTORY NO. 11-1054T1

**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 Startup In Green.
4. Program phase 6 for Yellow Flash.

EQUIPMENT INFORMATION

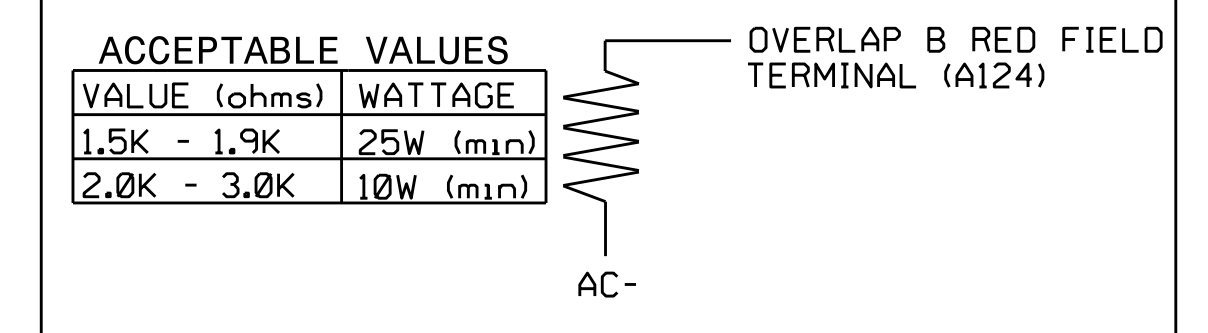
CONTROLLER.....2070
CABINET332
SOFTWAREECONOLITE OASIS
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS..18 (12-STD, 6-AUX)
LOAD SWITCHES USED.....S5,S8,AUX S1,AUX S2
PHASES USED.....2,3,4,5,6
OVERLAP A.....2+3
OVERLAP B.....3+5
OVERLAP C.....NOT USED
OVERLAP B.....NOT USED

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.	NU	NC	NU	NC	41,42	NU	NC	61,62	NU	NU	NU	NU	21,22	21,42	NU	NU	NU	NU
RED					101			134					A121	*				
YELLOW					102			135					A122					
GREEN					103			136					A123					
RED ARROW																		
YELLOW ARROW																		A125
GREEN ARROW																		A126

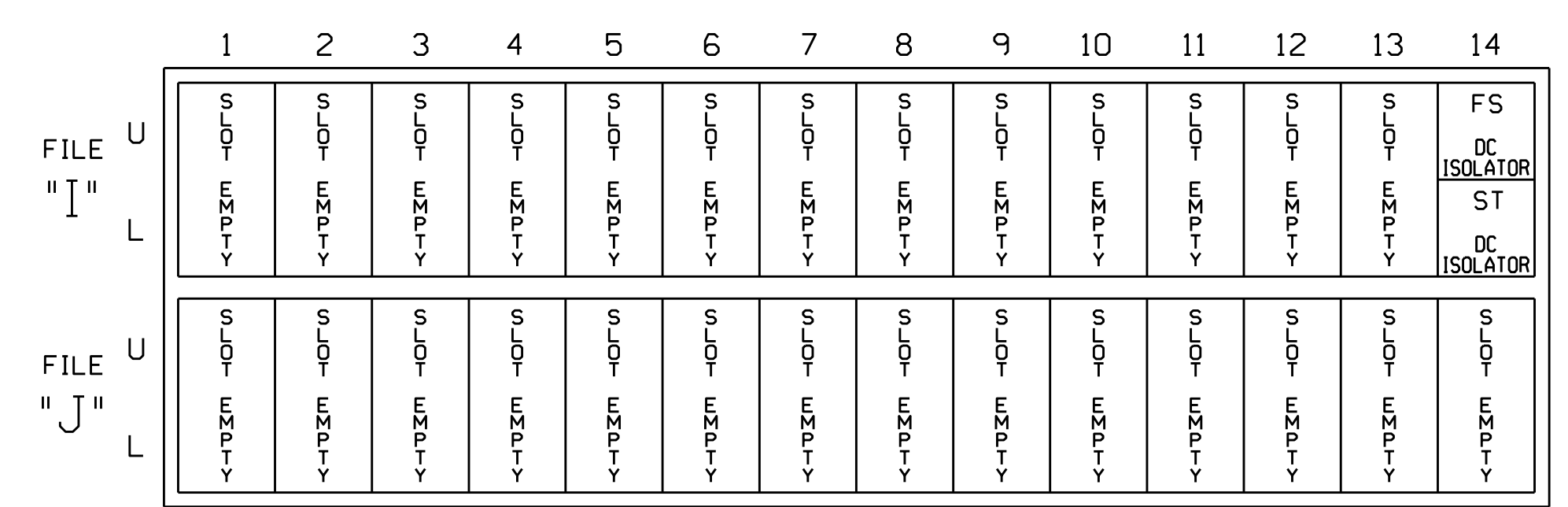
NU = Not Used
NC = No Connection
* Denotes install load resistor. See load resistor installation detail this sheet.

**LOAD RESISTOR
INSTALLATION DETAIL**



INPUT FILE POSITION LAYOUT

(front view)



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

FS = FLASH SENSE
ST = STOP TIME

SPECIAL DETECTOR NOTE

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

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 - GREEN
SELECT VEHICLE OVERLAP OPTIONS: (Y/N)
FLASH YELLOW IN CONTROLLER FLASH?...Y
GREEN EXTENSION (0-255 SEC).....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

PRESS '+'

PAGE 1: VEHICLE OVERLAP 'B' SETTINGS
PHASE: :12345678910111213141516
VEH OVL PARENTS: : X X
VEH OVL NOT VEH: :
VEH OVL NOT PED: :
VEH OVL GRN EXT: :
STARTUP COLOR: - RED - YELLOW - GREEN
FLASH COLORS: - RED - YELLOW - GREEN
SELECT VEHICLE OVERLAP OPTIONS: (Y/N)
FLASH YELLOW IN CONTROLLER FLASH?...N
GREEN EXTENSION (0-255 SEC).....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

OVERLAP PROGRAMMING COMPLETE

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 11-1054T2
DESIGNED: April 2019
SEALED: 05-16-19
REVISED: N/A

Electrical Detail - Temp. Design - Phase IB

Prepared In the Offices of:
WATAUGA COUNTY DEPARTMENT OF TRANSPORTATION & SIGNAL MANAGEMENT

750 N. Greenfield Pkwy, Garner, NC 27529

NC 105 at SR 1112 (Broadstone Rd.)

Division 11 Watauga County Boone

PLAN DATE: May 2019 REVIEWED BY:

PREPARED BY: James Peterson REVIEWED BY:

REVISIONS INIT. DATE

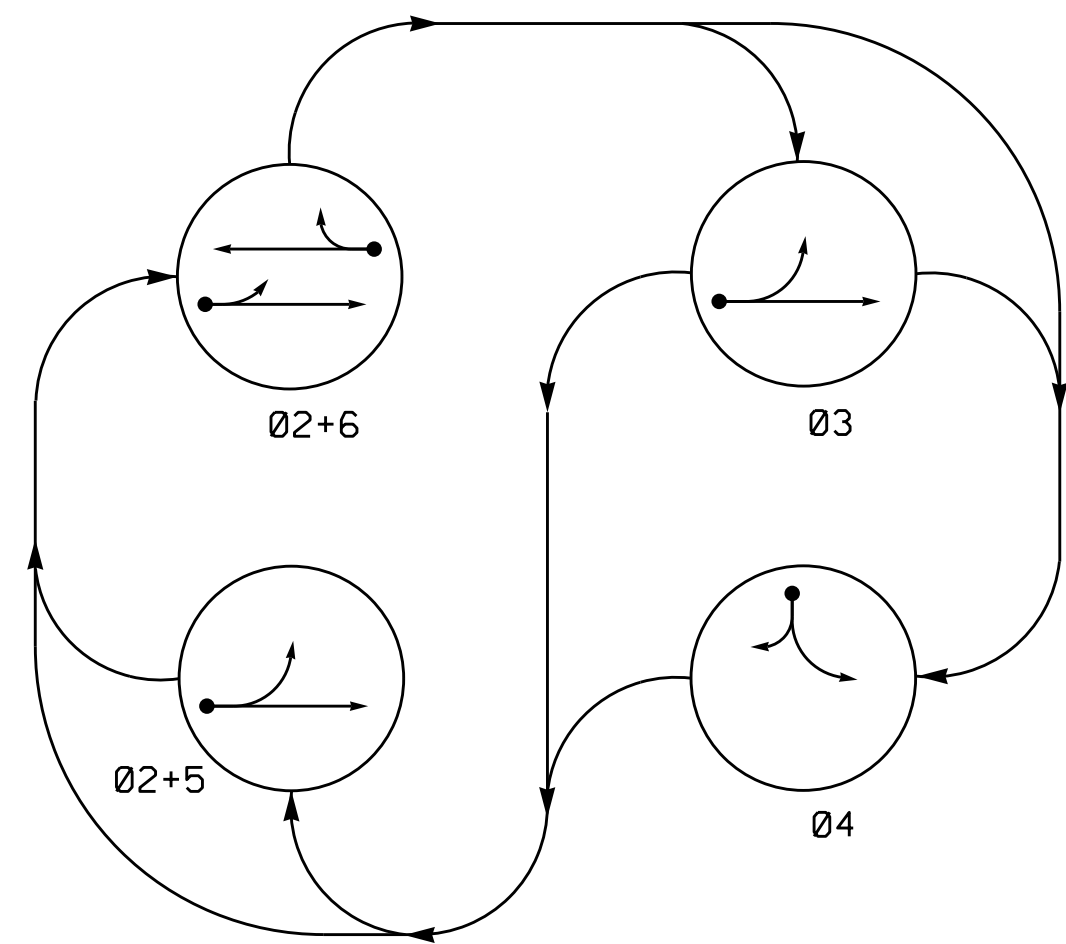
DocuSigned by: Ryan W. Hough 5/30/2019

SEAL
RYAN W. HOUGH
ENGINEER
036833

SIG. INVENTORY NO. 11-1054T2

3D-MAY-2019 09:54
x:\11054T2\enr\elec\wxc.dgn
J.Peterson

PHASING DIAGRAM



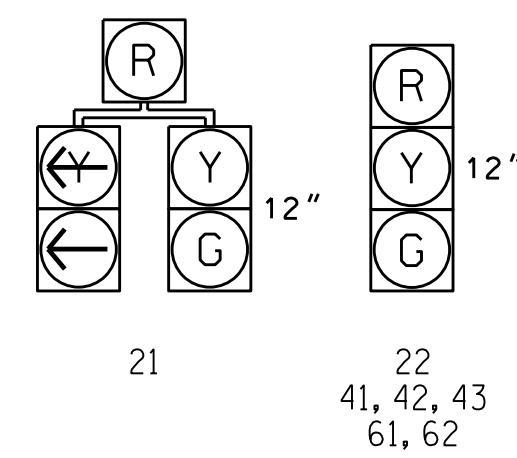
PHASING DIAGRAM DETECTION LEGEND

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

SIGNAL FACE	PHASE				
	Ø2+5	Ø2+6	Ø3	Ø4	FLASH
21	G	G	R	Y	
22	G	G	R	Y	
41, 42, 43	R	R	R	G	R
61, 62	R	G	R	R	Y

SIGNAL FACE I.D.

All Heads L.E.D.



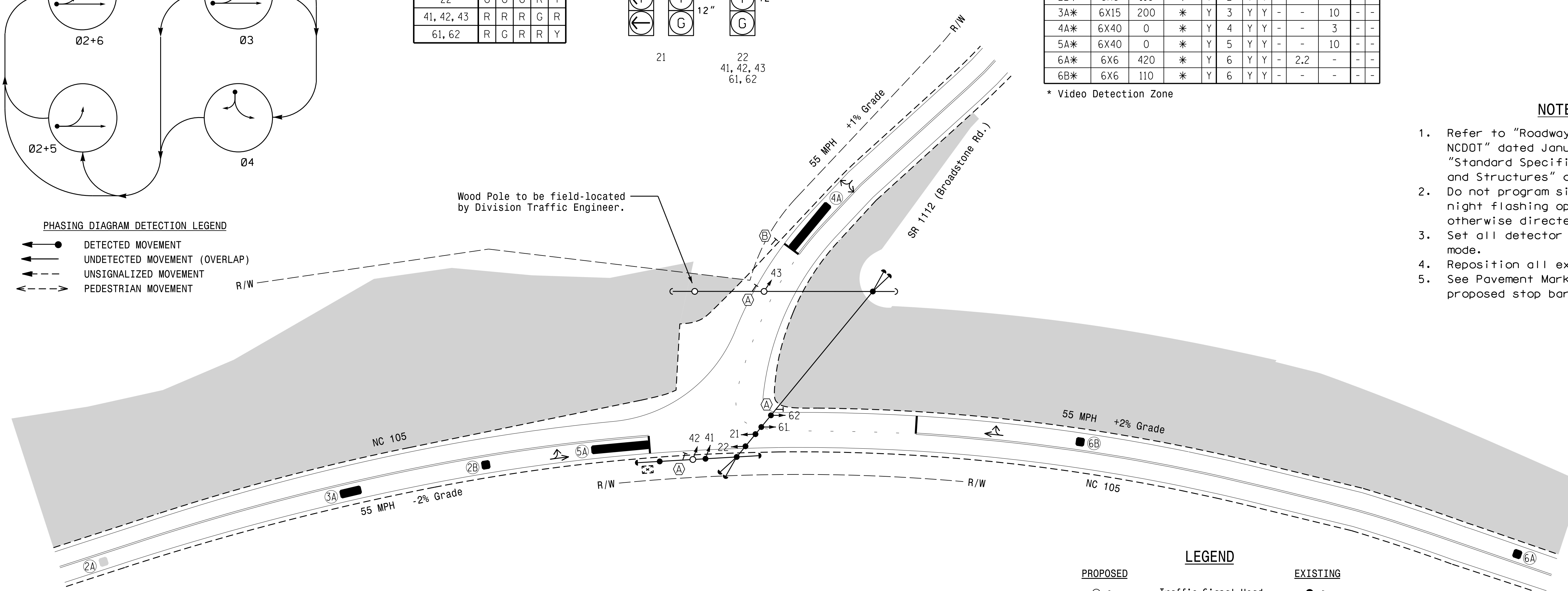
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	DETECTOR PROGRAMMING				SYSTEM LOOP	NEW CARD	
					PHASE	CALLING	EXTENSION	FULL TIME DELAY			
2A*	6X6	420	*	-	2	Y	Y	-	2.2	-	-
2B*	6X6	110	*	Y	2	Y	Y	-	-	-	-
3A*	6X15	200	*	Y	3	Y	Y	-	-	10	-
4A*	6X40	0	*	Y	4	Y	Y	-	-	3	-
5A*	6X40	0	*	Y	5	Y	Y	-	-	10	-
6A*	6X6	420	*	Y	6	Y	Y	-	2.2	-	-
6B*	6X6	110	*	Y	6	Y	Y	-	-	-	-

* Video Detection Zone

3 Phase Fully Actuated Isolated

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Set all detector units to presence mode.
- Reposition all existing signal heads.
- See Pavement Marking Plans for proposed stop bar locations.



OASIS 2070 TIMING CHART

FEATURE	PHASE				
	2	3	4	5	6
Min Green 1 *	14	7	7	7	14
Extension 1 *	2.0	2.0	2.0	2.0	2.0
Max Green 1 *	60	25	25	15	60
Yellow Clearance	5.4	5.4	3.0	3.0	5.4
Red Clearance	2.1	3.4	4.1	3.4	2.1
Red Revert	2.0	2.0	2.0	2.0	2.0
Walk 1 *	-	-	-	-	-
Don't Walk 1	-	-	-	-	-
Seconds Per Actuation *	-	-	-	-	-
Max Variable Initial *	-	-	-	-	-
Time Before Reduction *	-	-	-	-	-
Time To Reduce *	-	-	-	-	-
Minimum Gap	-	-	-	-	-
Recall Mode	MIN RECALL	-	-	-	MIN RECALL
Vehicle Call Memory	YELLOW	-	-	-	YELLOW
Dual Entry	-	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON	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

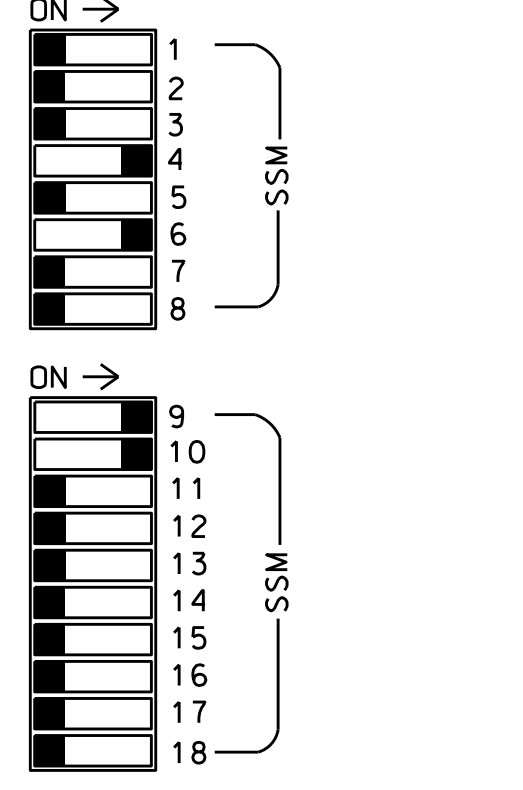
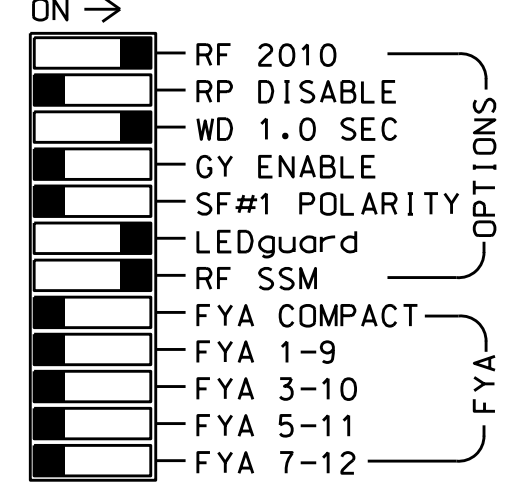
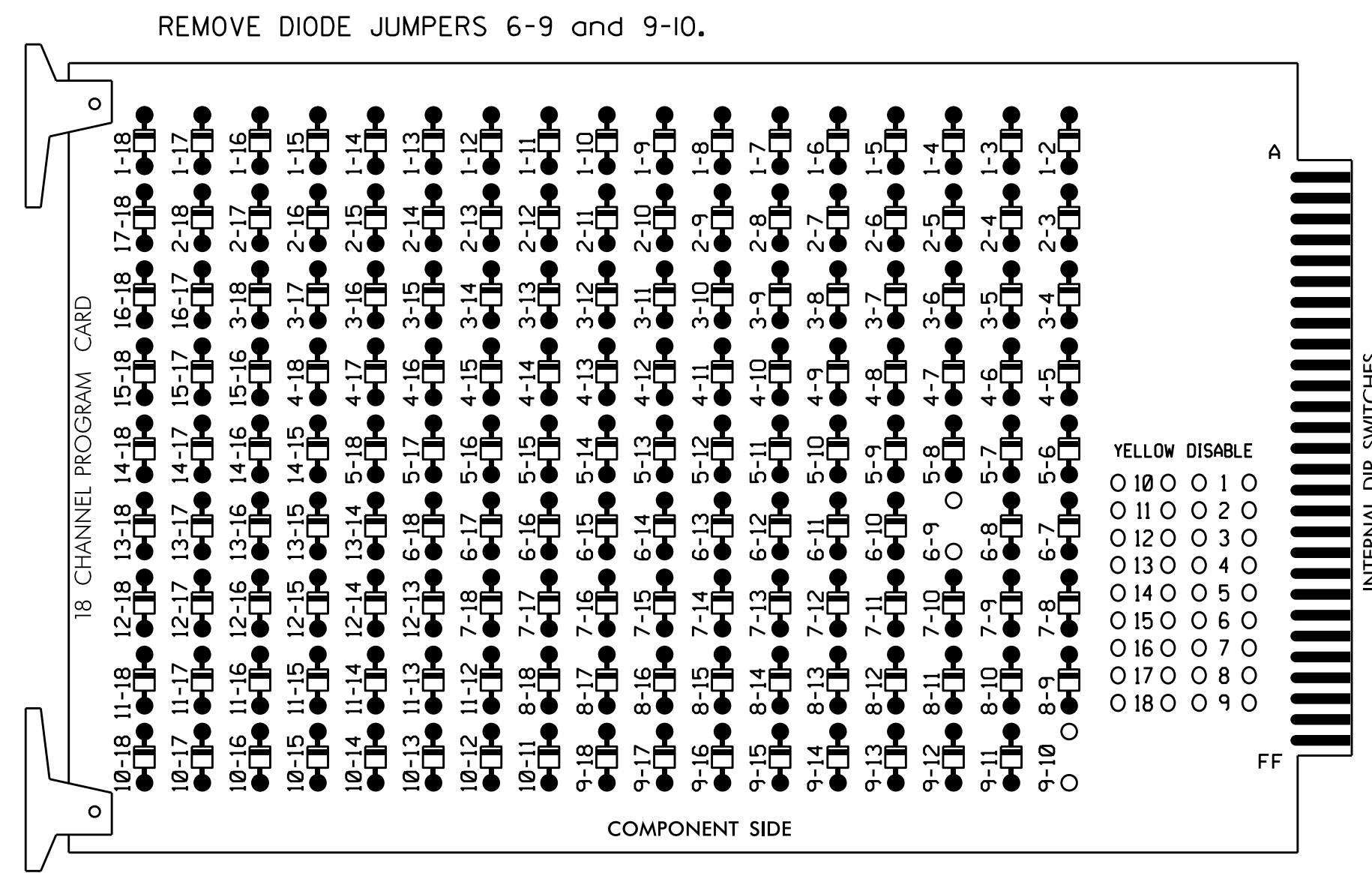
- | PROPOSED | EXISTING |
|--|-----------------------------------|
| ○ → Traffic Signal Head | ● → N/A |
| ● → Modified Signal Head | — Sign |
| ⊥ Pedestrian Signal Head With Push Button & Sign | ⊥ Sign |
| ○ ⊥ Signal Pole with Guy | ● ⊥ Signal Pole with Sidewalk Guy |
| ⊥ ⊥ Signal Pole with Sidewalk Guy | ⊥ ⊥ Inductive Loop Detector |
| ⊠ Inductive Loop Detector | ⊠ Controller & Cabinet |
| □ Junction Box | □ Junction Box |
| — 2-in Underground Conduit | — 2-in Underground Conduit |
| N/A Right of Way | N/A Right of Way |
| → Directional Arrow | → Directional Arrow |
| ■ Video Detection Zone | ■ Construction Zone |
| ■ Construction Zone | N/A |
| Ⓐ "NO TURN ON RED" Sign (R10-11) | Ⓐ "NO TURN ON RED" Sign (R10-11) |
| Ⓑ "STOP HERE ON RED" Sign (R10-6) | Ⓑ "STOP HERE ON RED" Sign (R10-6) |

Signal Upgrade - Temporary Design - Phase II

	<p>NC 105 at SR 1112 (Broadstone Rd.)</p>		
	<p>Division 11 Watauga County Boone</p>	<p>PLANNED BY: R.N. Zinser</p>	
<p>750 N. Greenfield Hwy, Garner, NC 27529</p>	<p>SCALE: 1" = 40'</p>	<p>DATE: 5/16/2019</p>	<p>INVENTORY NO. II-1054T3</p>

PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE JUMPERS AS SHOWN

NOTES:

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

NOTES

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

EQUIPMENT INFORMATION

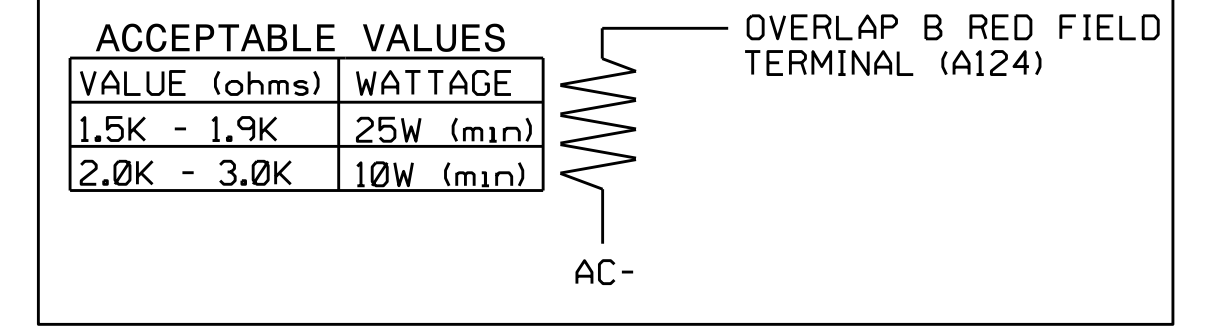
CONTROLLER.....2070
 CABINET332
 SOFTWAREECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS..18 (12-STD, 6-AUX)
 LOAD SWITCHES USED.....S5,S8,AUX S1,AUX S2
 PHASES USED.....2,3,4,5,6
 OVERLAP A.....2+3
 OVERLAP B.....3+5
 OVERLAP C.....NOT USED
 OVERLAP B.....NOT USED

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.	NU	NC	NU	NC	41,42 43	NU	NC	61,62	NU	NU	NU	NU	21,22	21	NU	NU	NU	NU
RED					101			134					A121	*				
YELLOW					102			135					A122					
GREEN					103			136					A123					
RED ARROW																		
YELLOW ARROW														A125				
GREEN ARROW															A126			

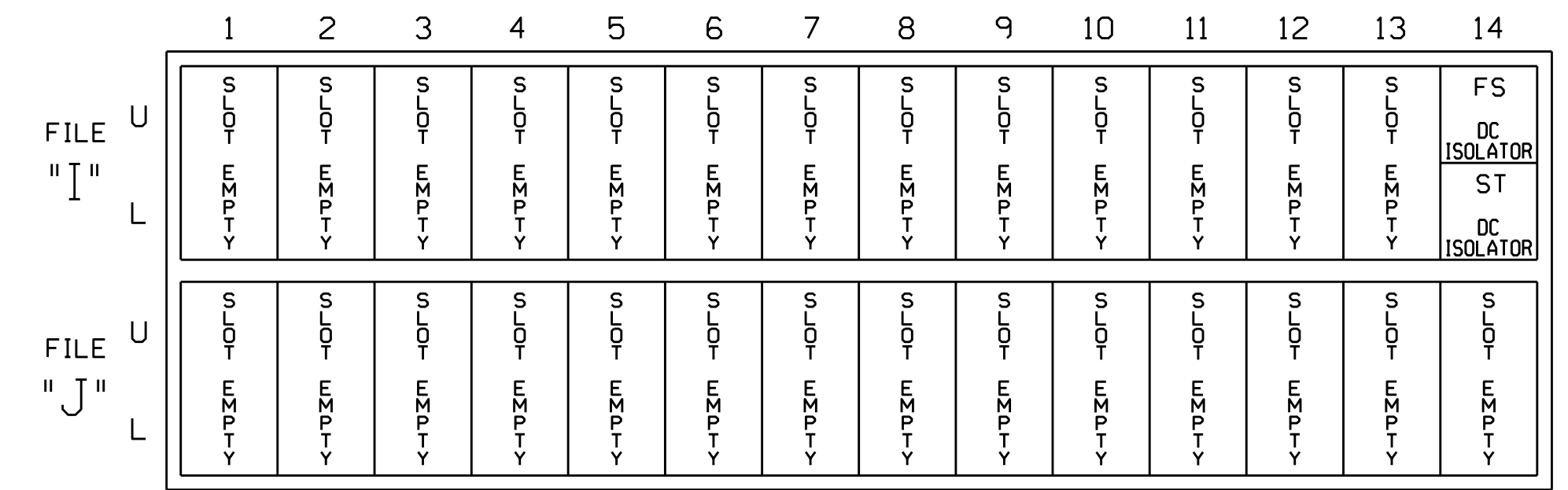
NU = Not Used
 NC = No Connection
 * Denotes install load resistor. See load resistor installation detail this sheet.

LOAD RESISTOR INSTALLATION DETAIL



INPUT FILE POSITION LAYOUT

(front view)



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

FS = FLASH SENSE
 ST = STOP TIME

SPECIAL DETECTOR NOTE

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

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 - GREEN
 SELECT VEHICLE OVERLAP OPTIONS: (Y/N)
 FLASH YELLOW IN CONTROLLER FLASH?...Y
 GREEN EXTENSION (0-255 SEC).....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

PRESS '+'

PAGE 1: VEHICLE OVERLAP 'B' SETTINGS
 PHASE: |12345678910111213141516
 VEH OVL PARENTS: | X X
 VEH OVL NOT VEH: |
 VEH OVL NOT PED: |
 VEH OVL GRN EXT: |
 STARTUP COLOR: - RED - YELLOW - GREEN
 FLASH COLORS: - RED - YELLOW - GREEN
 SELECT VEHICLE OVERLAP OPTIONS: (Y/N)
 FLASH YELLOW IN CONTROLLER FLASH?...N
 GREEN EXTENSION (0-255 SEC).....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

OVERLAP PROGRAMMING COMPLETE

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 11-1054T3
 DESIGNED: April 2019
 SEALED: 05-16-19
 REVISED: N/A

Electrical Detail - Temp. Design - Phase II

Electrical and Programming Details For: **NC 105 at SR 1112 (Broadstone Rd.)**

Division 11 Watauga County Boone

PLAN DATE: May 2019 REVIEWED BY:

PREPARED BY: James Peterson REVIEWED BY:

REVISIONS: INIT. DATE

750 N. Greenfield Pkwy, Garner, NC 27529

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL: RYAN W. HOUGH, PROFESSIONAL ENGINEER, No. 036833

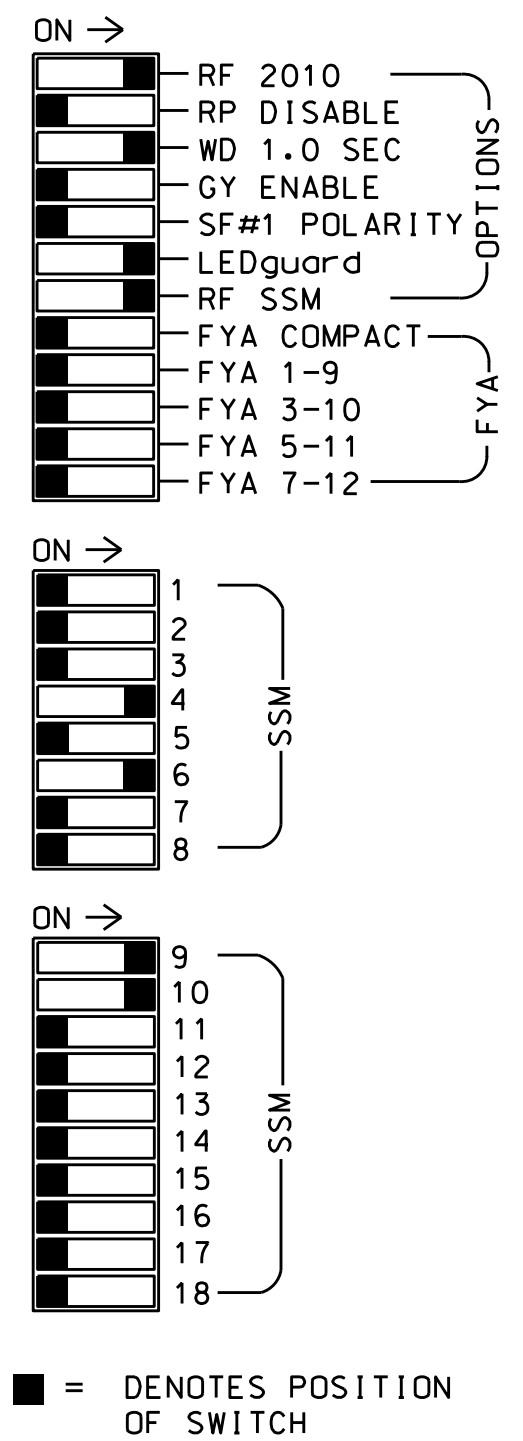
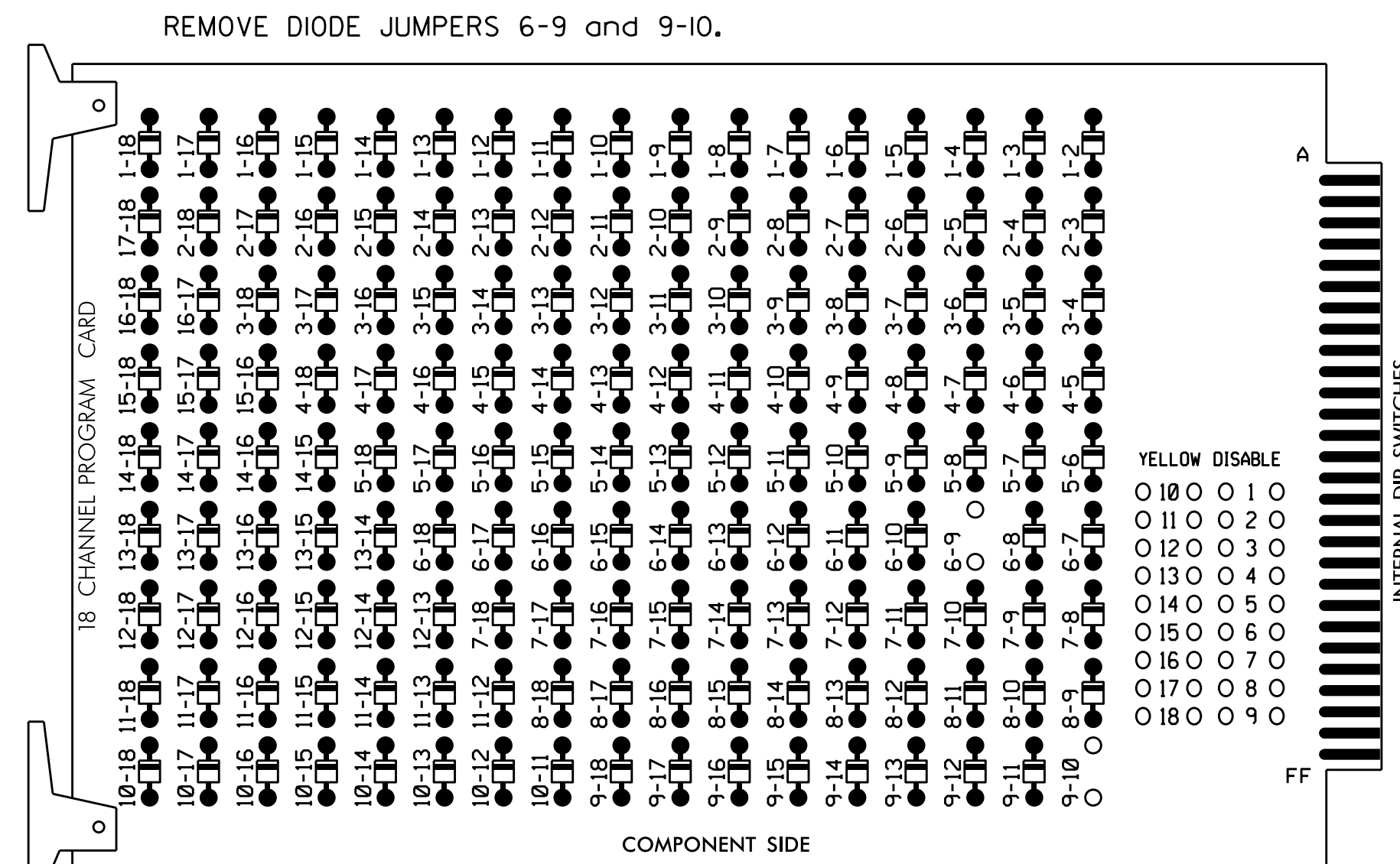
DocuSigned by: Ryan W. Hough 6/4/2019

SIG. INVENTORY NO. 11-1054T3

04-1016-2019_09:21
 *11064 Lem. ete_c_20190530.dgn
 J. Peterson

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

(remove jumpers and set switches as shown)



NOTES:

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

■ = DENOTES POSITION OF SWITCH

NOTES

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

EQUIPMENT INFORMATION

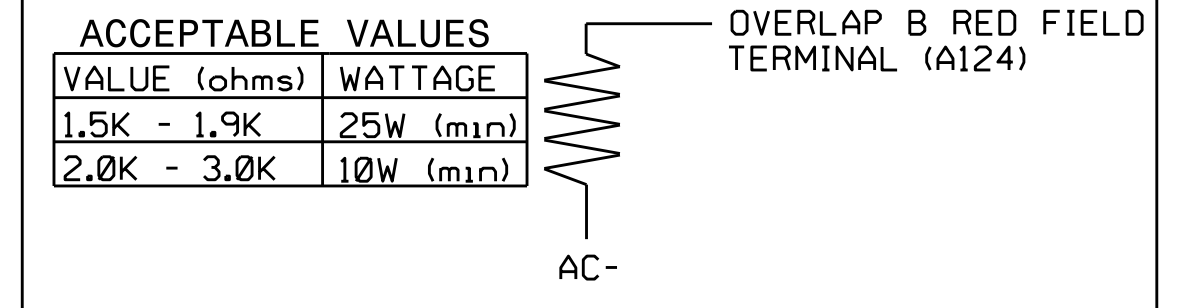
CONTROLLER.....2070
 CABINET332
 SOFTWAREECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS..18 (12-STD, 6-AUX)
 LOAD SWITCHES USED.....S5,S8,AUX S1,AUX S2
 PHASES USED.....2,3,4,5,6
 OVERLAP A.....2+3
 OVERLAP B.....3+5
 OVERLAP C.....NOT USED
 OVERLAP B.....NOT USED

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.	NU	NC	NU	NC	41,42	62	NU	NC	61,62	NU	NU	NU	21,22	21,42	NU	NU	NU	NU
RED					101				134				A121	*				
YELLOW					102				135				A122					
GREEN					103				136				A123					
RED ARROW																		
YELLOW ARROW					102													A125
GREEN ARROW					103													A126

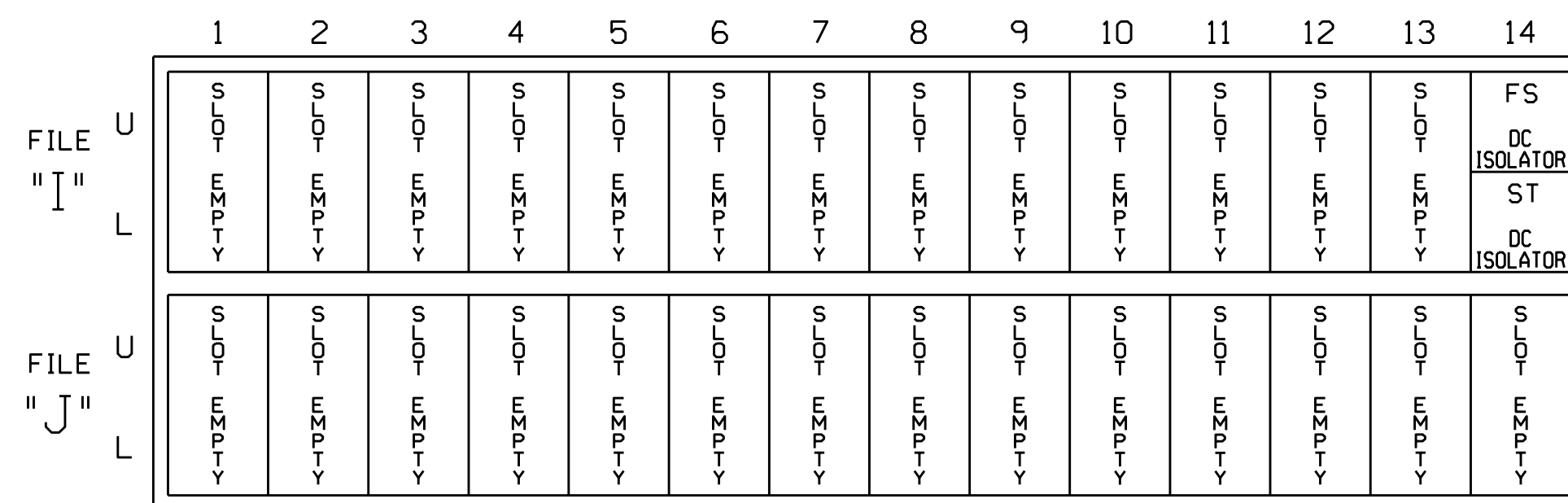
NU = Not Used
 NC = No Connection
 * Denotes install load resistor. See load resistor installation detail this sheet.

**LOAD RESISTOR
INSTALLATION DETAIL**



INPUT FILE POSITION LAYOUT

(front view)



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

FS = FLASH SENSE
 ST = STOP TIME

SPECIAL DETECTOR NOTE

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

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: : X
 STARTUP COLOR: - RED - YELLOW - GREEN
 FLASH COLORS: - RED - YELLOW - GREEN
 SELECT VEHICLE OVERLAP OPTIONS: (Y/N)
 FLASH YELLOW IN CONTROLLER FLASH?...Y
 GREEN EXTENSION (0-255 SEC).....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

PRESS '+'

PAGE 1: VEHICLE OVERLAP 'B' SETTINGS
 PHASE: :12345678910111213141516
 VEH OVL PARENTS: : X X
 VEH OVL NOT VEH: :
 VEH OVL NOT PED: :
 VEH OVL GRN EXT: :
 STARTUP COLOR: - RED - YELLOW - GREEN
 FLASH COLORS: - RED - YELLOW - GREEN
 SELECT VEHICLE OVERLAP OPTIONS: (Y/N)
 FLASH YELLOW IN CONTROLLER FLASH?...N
 GREEN EXTENSION (0-255 SEC).....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

OVERLAP PROGRAMMING COMPLETE

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 11-1054T4
 DESIGNED: April 2019
 SEALED: 05-16-19
 REVISED: N/A

Electrical Detail - Temp. Design - Phase III

Division 11 Watauga County Boone

NC 105 at SR 1112 (Broadstone Rd.)

PLAN DATE: May 2019 REVIEWED BY:

PREPARED BY: James Peterson REVIEWED BY:

REVISIONS INIT. DATE

DocuSigned by: Ryan W. Hough 5/30/2019

750 N. Greenfield Pkwy, Garner, NC 27529

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL

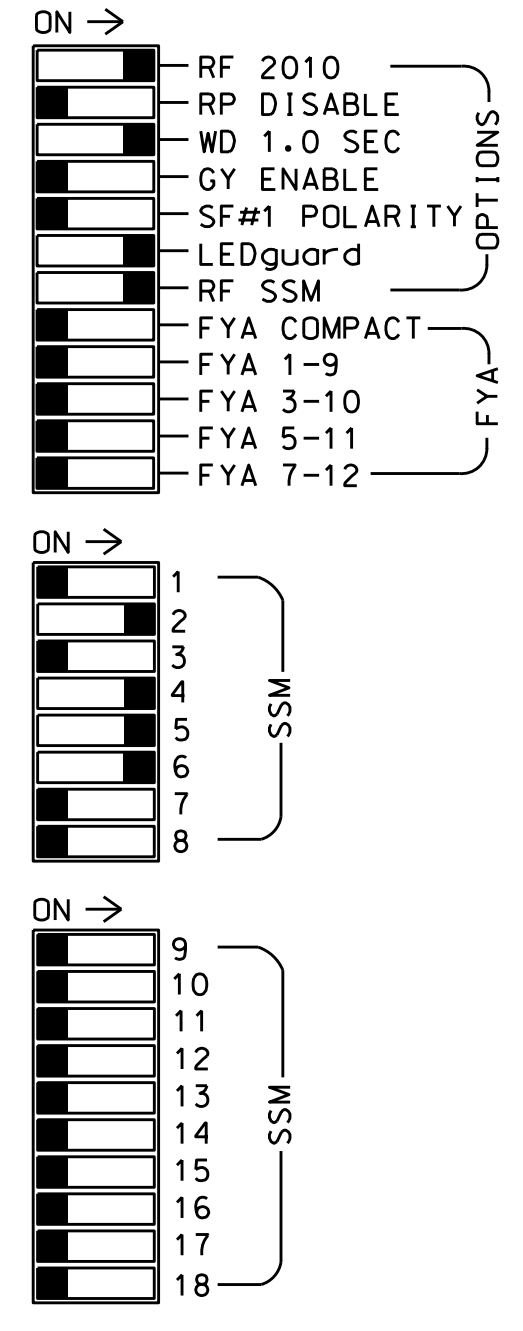
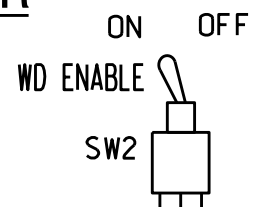
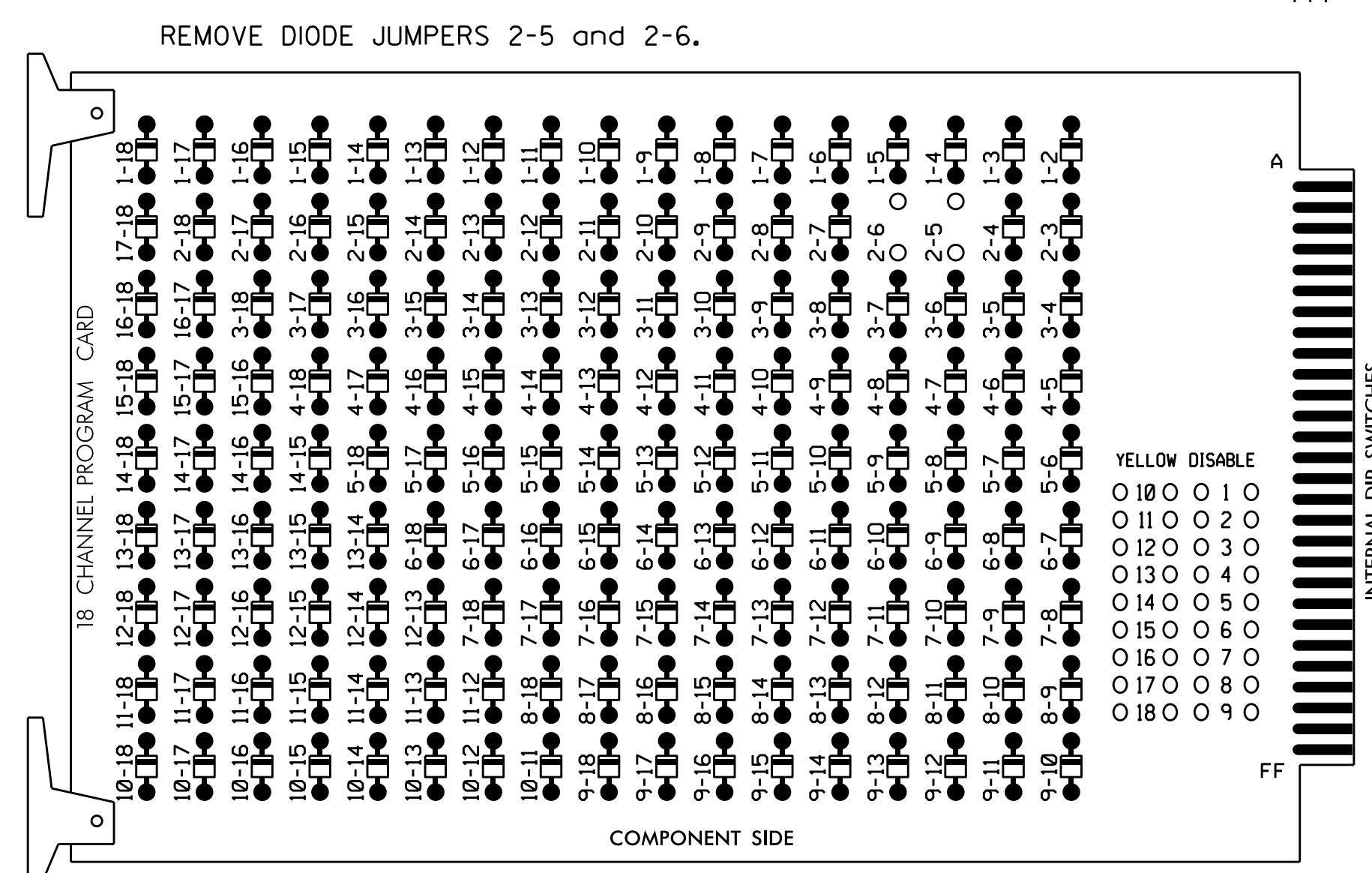
RYAN W. HOUGH ENGINEER

SIG. INVENTORY NO. 11-1054T4

3D-MAY-2019 09:56
 x:\11054T4\enr\elec\wxc.dgn
 J. Peterson

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches 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. 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. Return controller to Factory Defaults before programming per this electrical detail.
3. Enable Simultaneous Gap-Out for all Phases.
4. Program phases 2 and 6 for Startup In Green.
5. Program phases 2 and 6 for Yellow Flash.

EQUIPMENT INFORMATION

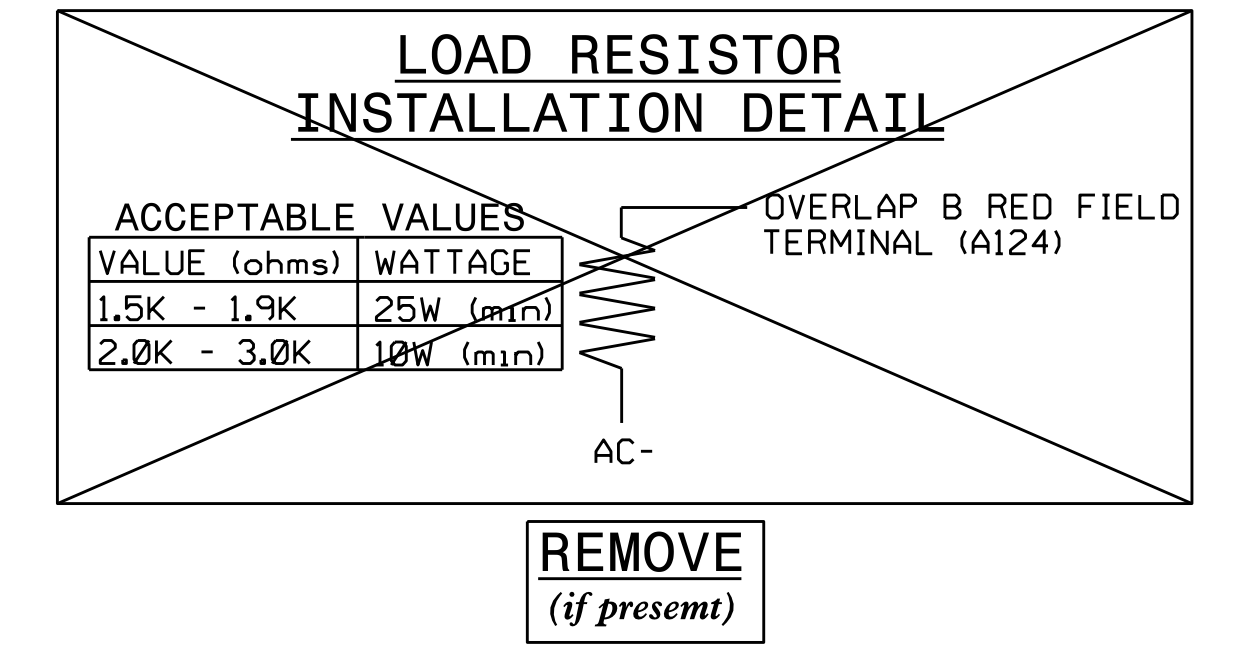
CONTROLLER.....2070
 CABINET.....332 W/ AUX
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
 LOAD SWITCHES USED.....S2,S5,S7,S8
 PHASES USED.....2,4,5,6
 OVERLAP 'A'.....NOT USED
 OVERLAP 'B'.....NOT USED
 OVERLAP 'C'.....NOT USED
 OVERLAP 'D'.....NOT USED

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	NU	21,22	NU	NU	41,42	62	NU	42	51	61,62	NU	NU	NU	NU	NU	NU	NU	NU
RED		128			101					134								
YELLOW		129			102					135								
GREEN		130			103					136								
RED ARROW										131								
YELLOW ARROW						102		132	132									
GREEN ARROW						103		133	133									

NU = Not Used

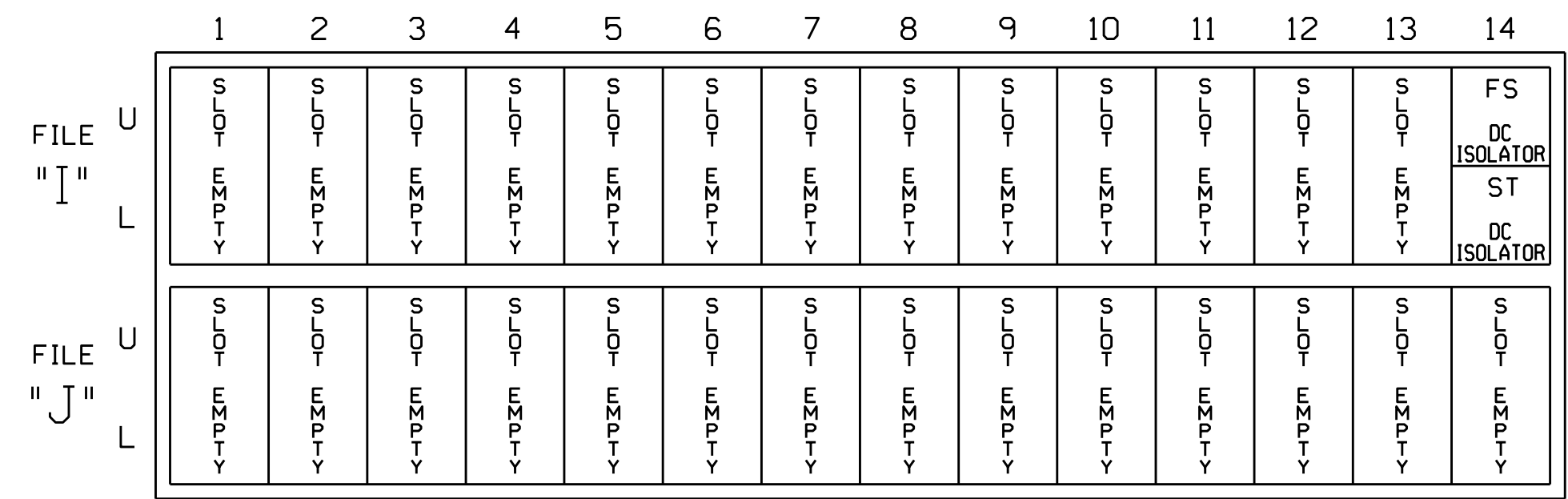
LOAD RESISTOR INSTALLATION DETAIL



REMOVE (if present)

INPUT FILE POSITION LAYOUT

(front view)



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

FS = FLASH SENSE
 ST = STOP TIME

SPECIAL DETECTOR NOTE

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

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 11-1054T5
 DESIGNED: April 2019
 SEALED: 05-16-19
 REVISED: N/A

Electrical Detail - Temp. Design - Phase IV

ELLECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared In the Offices of:

750 N. Greenfield Pkwy, Garner, NC 27529

NC 105 at SR 1112 (Broadstone Rd.)

Division 11 Watauga County Boone

PLAN DATE: May 2019 REVIEWED BY:

PREPARED BY: James Peterson REVIEWED BY:

REVISIONS INIT. DATE

DocuSigned by: Ryan W. Hough 5/30/2019

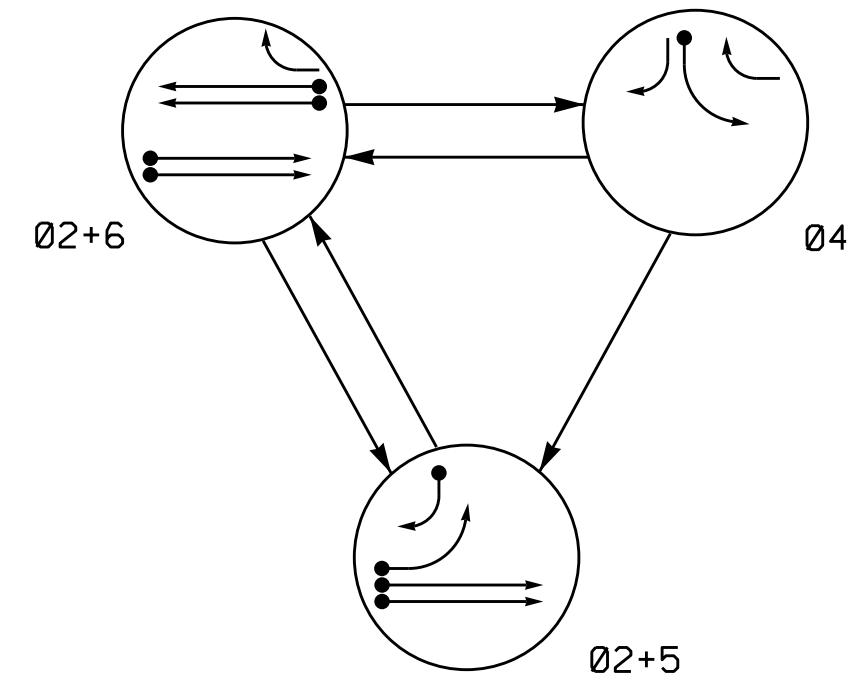
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL

SIG. INVENTORY NO. 11-1054T5

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 JPeterson

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

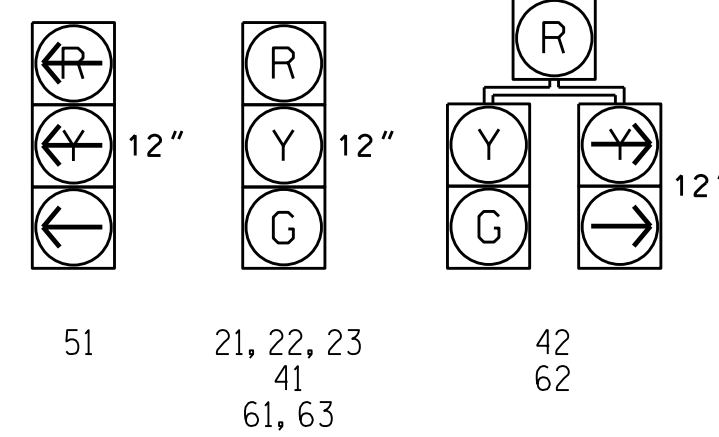
- ←●→ DETECTED MOVEMENT
- ←→ UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- ←- - - PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE			
	Ø 2+5	Ø 2+6	Ø 4	FLASH
21, 22, 23	G	G	R	Y
41	R	R	G	R
42	R	R	G	R
51	-	-	-	-
61, 63	R	G	R	Y
62	R	G	-	Y

SIGNAL FACE I.D.

All Heads L.E.D.



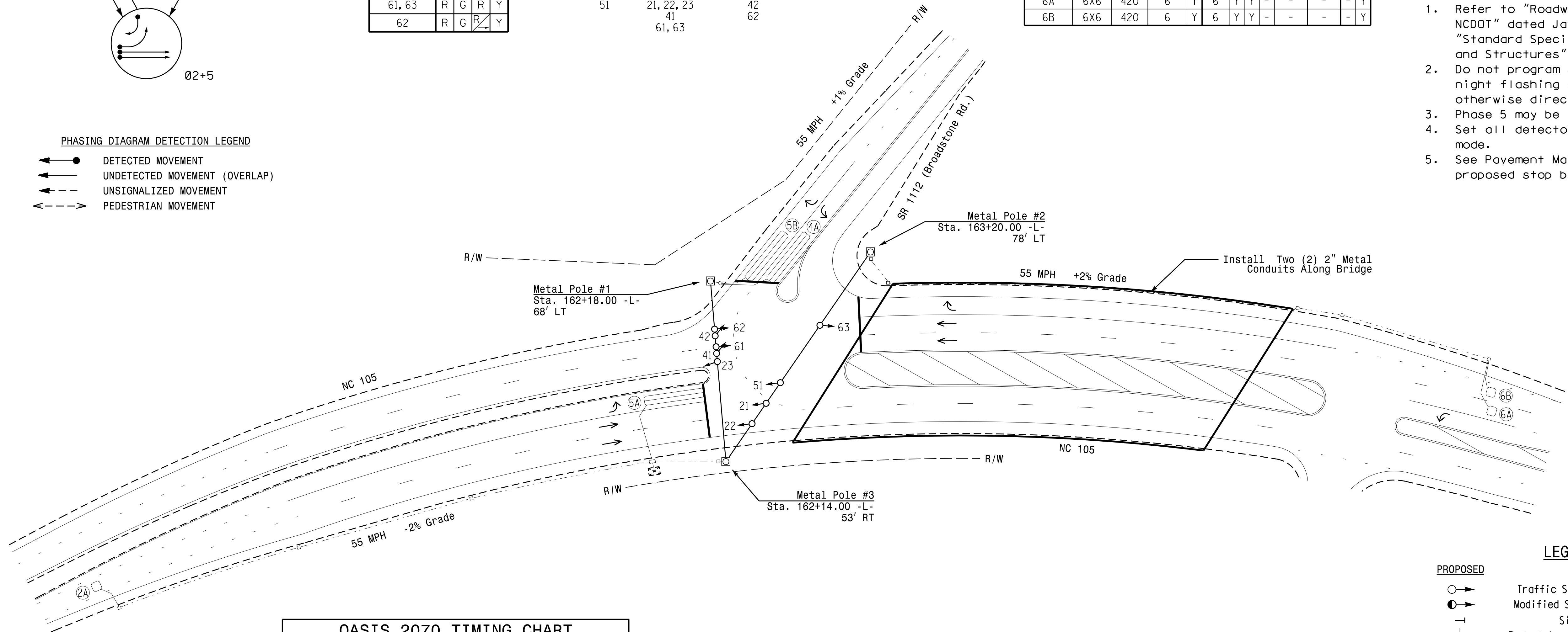
OASIS 2070 LOOP & DETECTOR INSTALLATION CHART

LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	DETECTOR PROGRAMMING				SYSTEM LOOP	NEW CARD	
					PHASE	CALLING	EXTENSION	FULL TIME DELAY			
2A	6X6	420	6	Y	2	Y	Y	-	-	-	Y
4A	6X40	0	2-4-2	Y	4	Y	Y	-	-	3	Y
5A	6X40	0	2-4-2	Y	5	Y	Y	-	-	-	Y
5B	6X40	0	2-4-2	Y	5	Y	Y	-	-	15	Y
6A	6X6	420	6	Y	6	Y	Y	-	-	-	Y
6B	6X6	420	6	Y	6	Y	Y	-	-	-	Y

3 Phase Fully Actuated Isolated

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Phase 5 may be lagged.
- Set all detector units to presence mode.
- See Pavement Marking Plans for proposed stop bar locations.



OASIS 2070 TIMING CHART

FEATURE	PHASE			
	2	4	5	6
Min Green 1 *	14	7	7	14
Extension 1 *	6.0	2.0	2.0	6.0
Max Green 1 *	90	25	15	90
Yellow Clearance	5.4	3.0	3.0	5.4
Red Clearance	1.2	3.2	3.1	1.2
Red Revert	2.0	2.0	2.0	2.0
Walk 1 *	-	-	-	-
Don't Walk 1	-	-	-	-
Seconds Per Actuation *	2.5	-	-	1.5
Max Variable Initial *	46	-	-	46
Time Before Reduction *	15	-	-	15
Time To Reduce *	30	-	-	30
Minimum Gap	3.4	-	-	3.4
Recall Mode	MIN RECALL	-	-	MIN RECALL
Vehicle Call Memory	YELLOW	-	-	YELLOW
Dual Entry	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON

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

LEGEND

- | | | | |
|--|--|--|--|
| | PROPOSED Traffic Signal Head | | EXISTING Traffic Signal Head |
| | PROPOSED Modified Signal Head | | EXISTING Modified Signal Head |
| | PROPOSED Pedestrian Signal Head | | EXISTING Pedestrian Signal Head |
| | PROPOSED Signal Pole with Guy | | EXISTING Signal Pole with Guy |
| | PROPOSED Signal Pole with Sidewalk Guy | | EXISTING Signal Pole with Sidewalk Guy |
| | PROPOSED Inductive Loop Detector | | EXISTING Inductive Loop Detector |
| | PROPOSED Controller & Cabinet | | EXISTING Controller & Cabinet |
| | PROPOSED Junction Box | | EXISTING Junction Box |
| | PROPOSED 2-in Underground Conduit | | EXISTING 2-in Underground Conduit |
| | PROPOSED Right of Way | | EXISTING Right of Way |
| | PROPOSED Directional Arrow | | EXISTING Directional Arrow |
| | PROPOSED Metal Strain Pole | | EXISTING Metal Strain Pole |

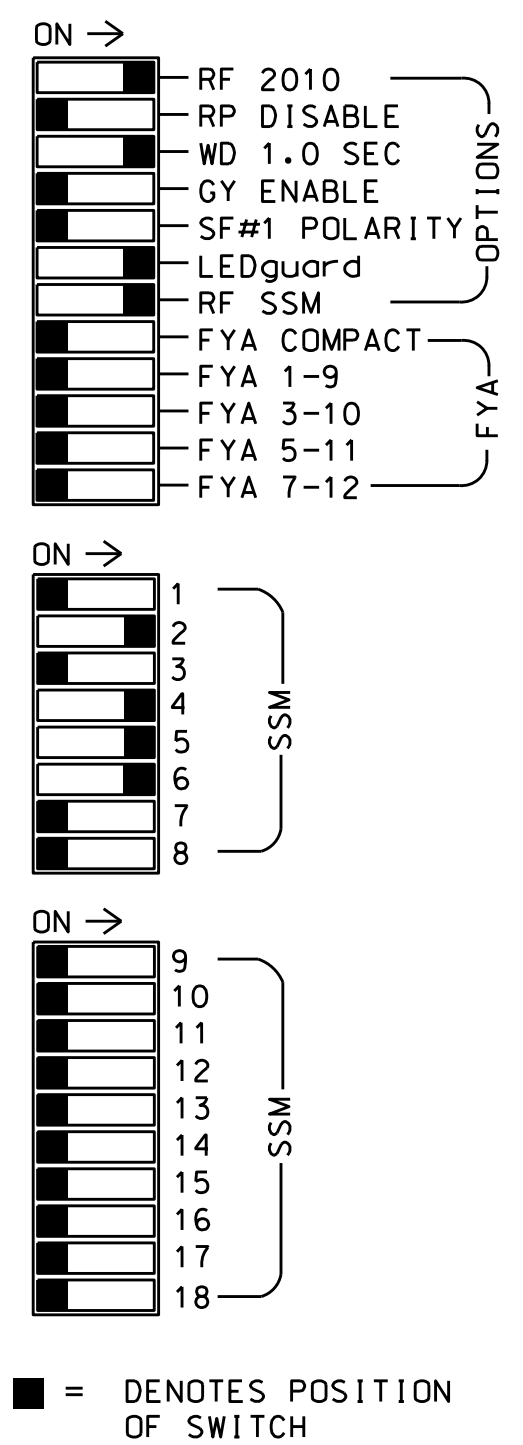
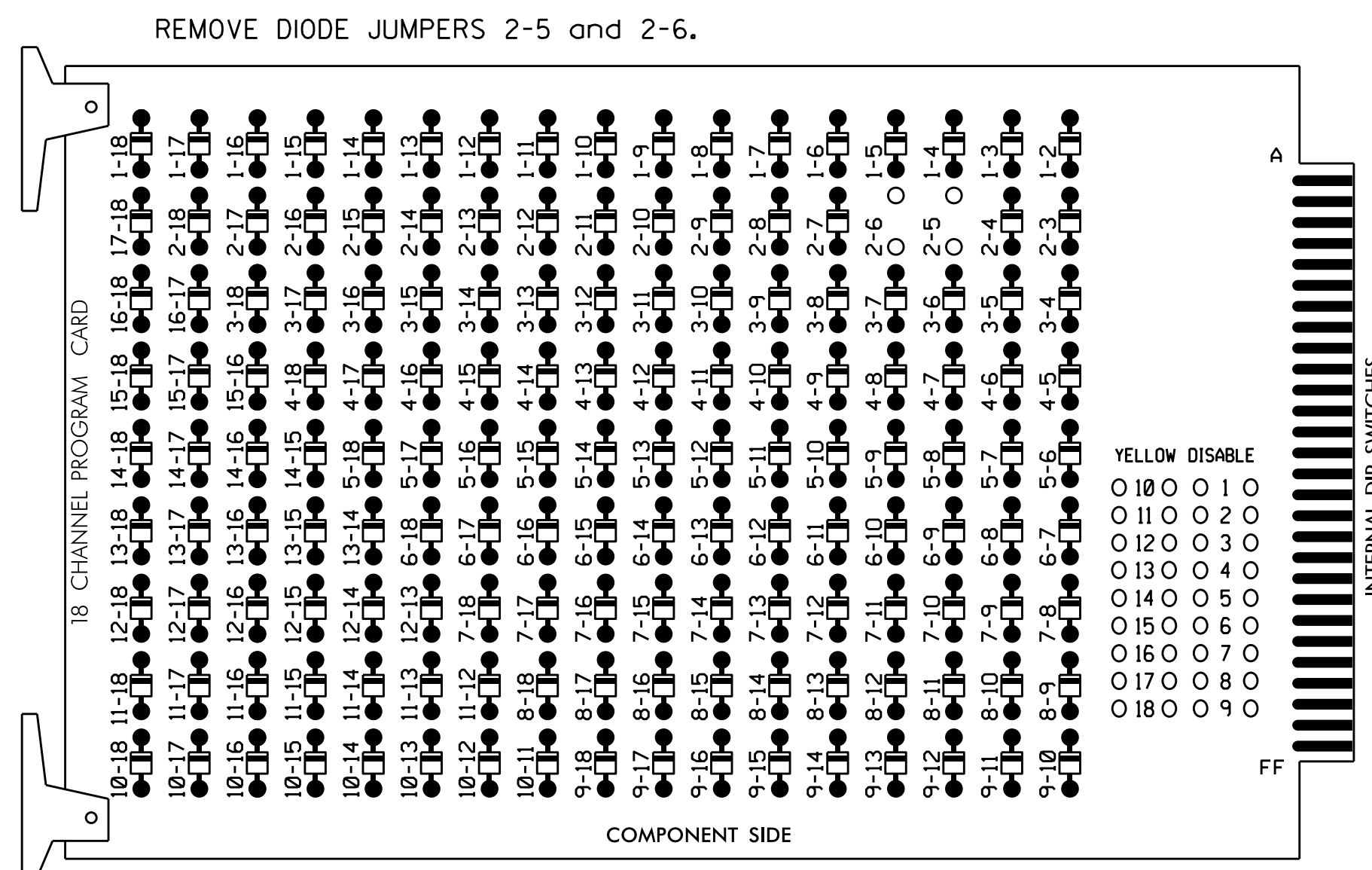
Signal Upgrade - Final Design

	<p>NC 105 at SR 1112 (Camp Broadstone Rd.)</p>		<p>SEAL NORTH CAROLINA PROFESSIONAL ENGINEER RICHARD N. ZINSER 043914</p>								
	<p>Division 11 Watauga County Boone</p> <p>PLAN DATE: April 2019 REVIEWED BY: T.J. Williams</p> <p>PREPARED BY: R.N. Zinser REVIEWED BY:</p>	<p>750 N. Greenfield Pkwy, Garner, NC 27529</p> <p>SCALE: 1" = 40'</p>									
<p>REVISIONS</p> <table border="1"> <thead> <tr> <th>NO.</th> <th>DESCRIPTION</th> <th>INIT.</th> <th>DATE</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>		NO.	DESCRIPTION	INIT.	DATE					<p>DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED</p> <p>DATE: 5/16/2019</p> <p>SIG. INVENTORY NO. 11-1054</p>	
NO.	DESCRIPTION	INIT.	DATE								

16-MAY-2019 10:11 S:\IT\55\JMT\S\Signal\ek5\Signal - Sect\on\Western Reg\on\40\lv-11\WR-2566_BA\11-1054\11-1054.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 Startup In Green.
5. Program phases 2 and 6 for Yellow Flash.

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.	NU	21,22 23	NU	NU	41,42 62	NU	42	51	61,62 63	NU	NU	NU	NU	NU	NU	NU	NU	NU
RED		128			101							134						
YELLOW		129			102							135						
GREEN		130			103							136						
RED ARROW												131						
YELLOW ARROW						102		132	132									
GREEN ARROW						103		133	133									

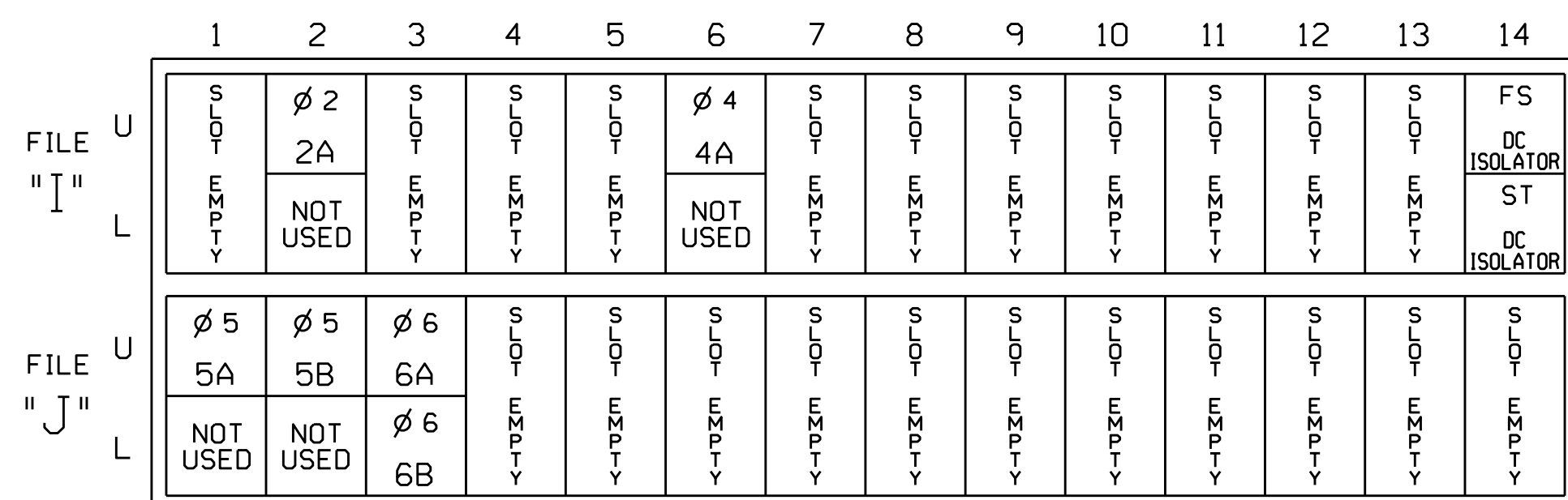
NU = Not Used

EQUIPMENT INFORMATION

CONTROLLER.....2070
 CABINET.....332 W/ AUX
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
 LOAD SWITCHES USED.....S2,S5,S7,S8
 PHASES USED.....2,4,5,6
 OVERLAP 'A'.....NOT USED
 OVERLAP 'B'.....NOT USED
 OVERLAP 'C'.....NOT USED
 OVERLAP 'D'.....NOT USED

INPUT FILE POSITION LAYOUT

(front view)



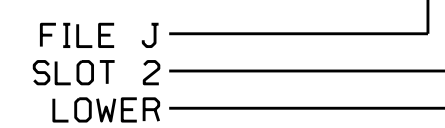
EX.: 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE
 ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
2A	TB2-5,6	I2U	39	1	2	2	Y	Y			
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			3
5A	TB3-1,2	J1U	55	17	5	5	Y	Y			
5B	TB3-5,6	J2U	40	2	6	5	Y	Y			15
6A	TB3-9,10	J3U	64	26	36	6	Y	Y			
6B	TB3-11,12	J3L	77	39	46	6	Y	Y			

INPUT FILE POSITION LEGEND: J2L



THIS ELECTRICAL DETAIL IS FOR
 THE SIGNAL DESIGN: 11-1054
 DESIGNED: April 2019
 SEALED: 05-16-19
 REVISED: N/A

Electrical Detail - Final Design

Electrical and Programming Details For:

Prepared In the Offices of:

750 N. Greenfield Pkwy, Garner, NC 27529

NC 105
 at
 SR 1112 (Camp Broadstone Rd.)

Division 11 Watauga County Boone

PLAN DATE: May 2019 REVIEWED BY:

PREPARED BY: James Peterson REVIEWED BY:

REVISIONS INIT. DATE

DocuSigned by: Ryan W. Hough 5/30/2019

SEAL

SEAL

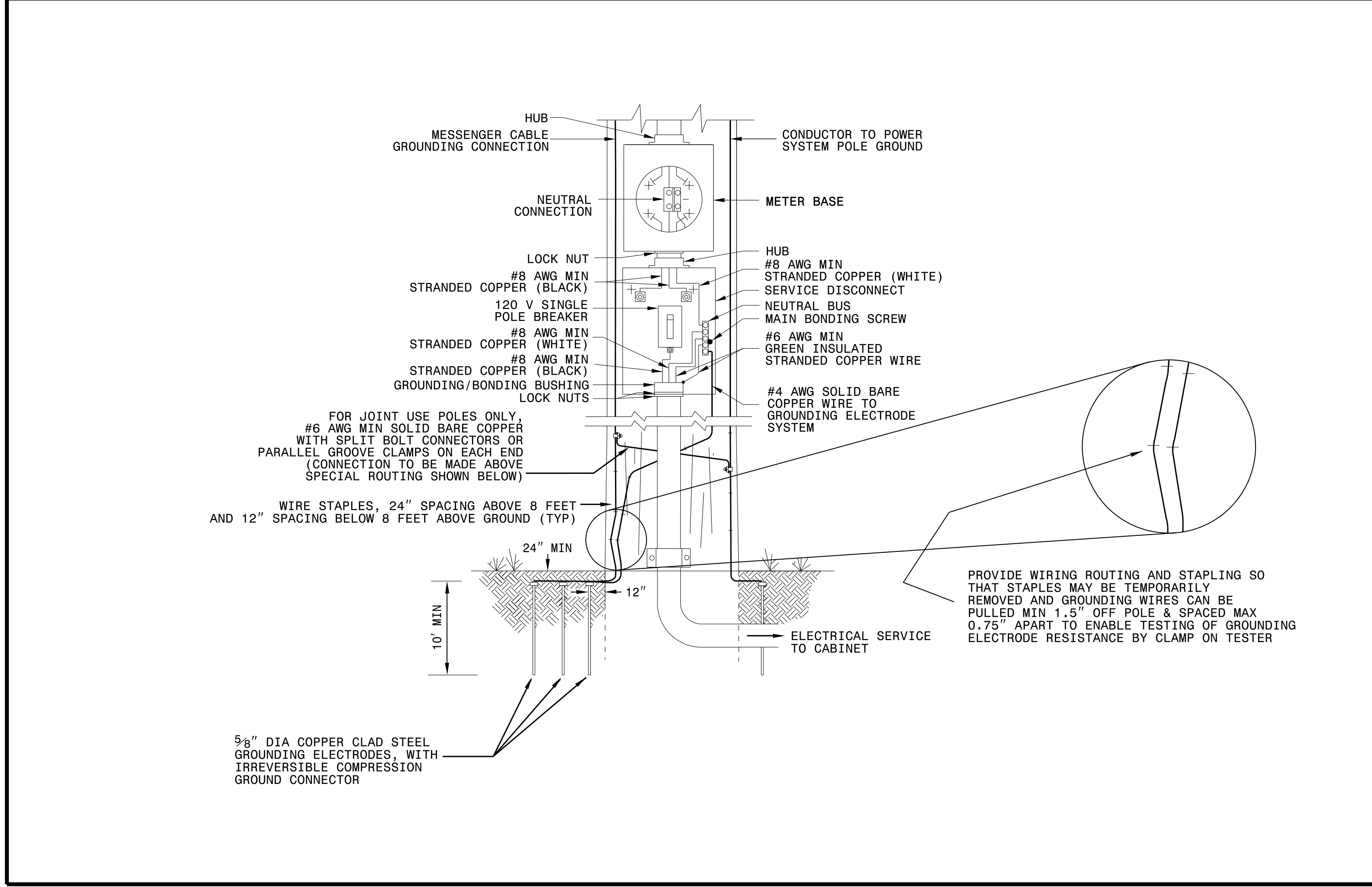
SEAL

SIG. INVENTORY NO. 11-1054

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

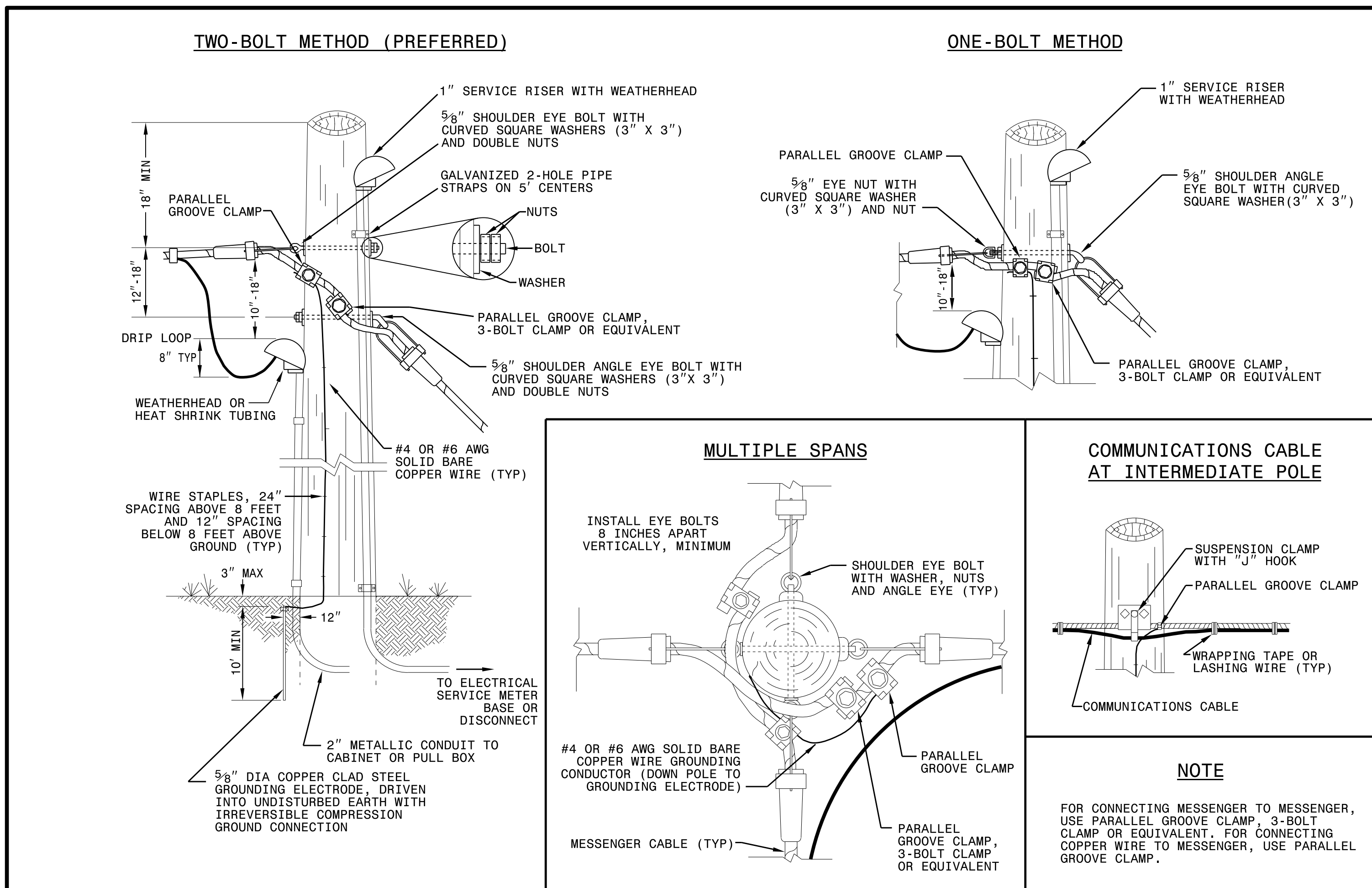
SHEET 1 OF 1
1700D01



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



DOCUMENT NOT CONSIDERED
FINAL UNLESS ALL
SIGNATURES COMPLETED

See Plate for Title

Prepared in the Offices of:

SEAL
NORTH CAROLINA
PROFESSIONAL
SEAL
032108
ENGINEER
MOHD A. ASLAMI

DocuSigned by:
Mohd Aslami
10/11/2017
DATE

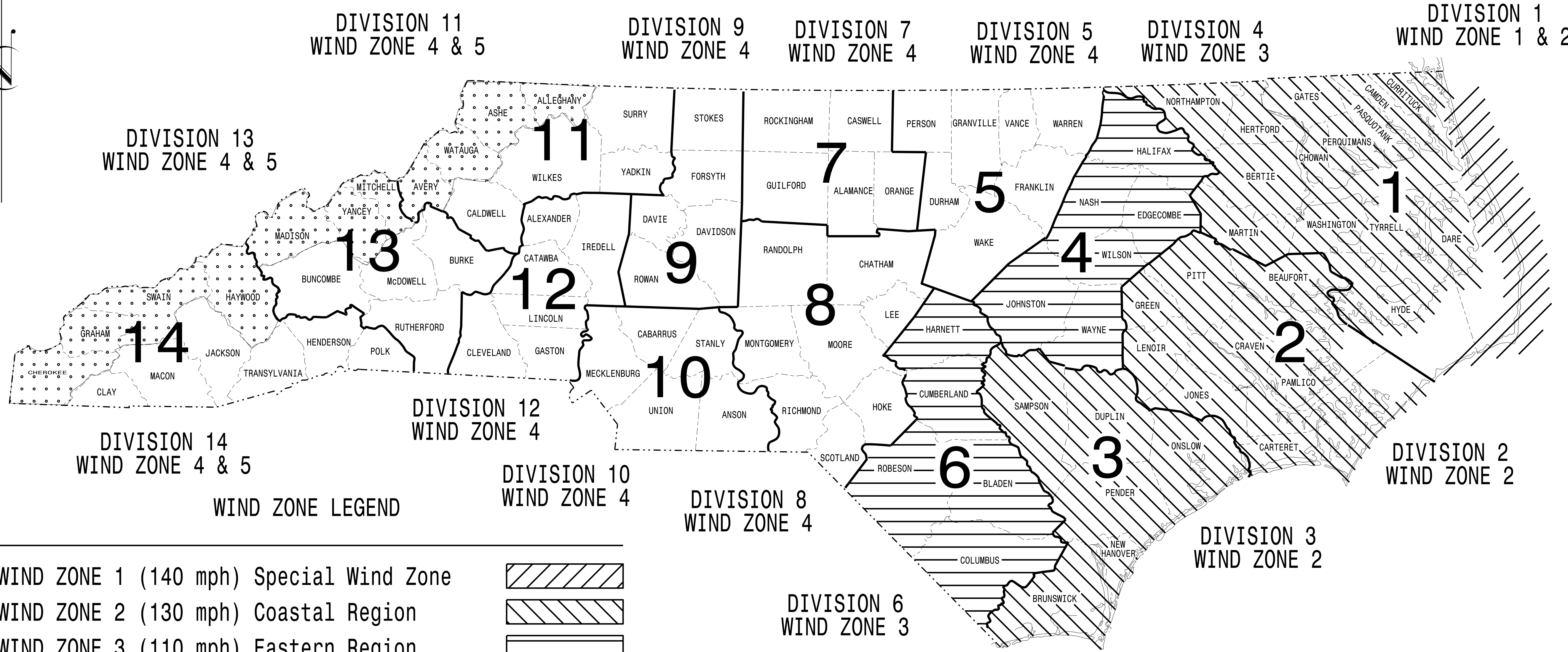
750 N. Greenfield Parkway
Garner, NC 27529

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STATE OF NORTH CAROLINA DIVISION OF HIGHWAYS

PROJECT I.D. NO. R-2566BA	SHEET NO. Sig.M1
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STANDARD DRAWINGS FOR ALL METAL POLES



WIND ZONE LEGEND

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

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

Prepared In the Offices of:

750 N. Greenfield Pkwy.
Garner, NC 27529

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

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

NCDOT CONTACTS:

MOBILITY AND SAFETY DIVISION - ITS AND SIGNALS UNIT

M.M. MC DIARMID, P.E. - STATE ITS AND SIGNALS ENGINEER

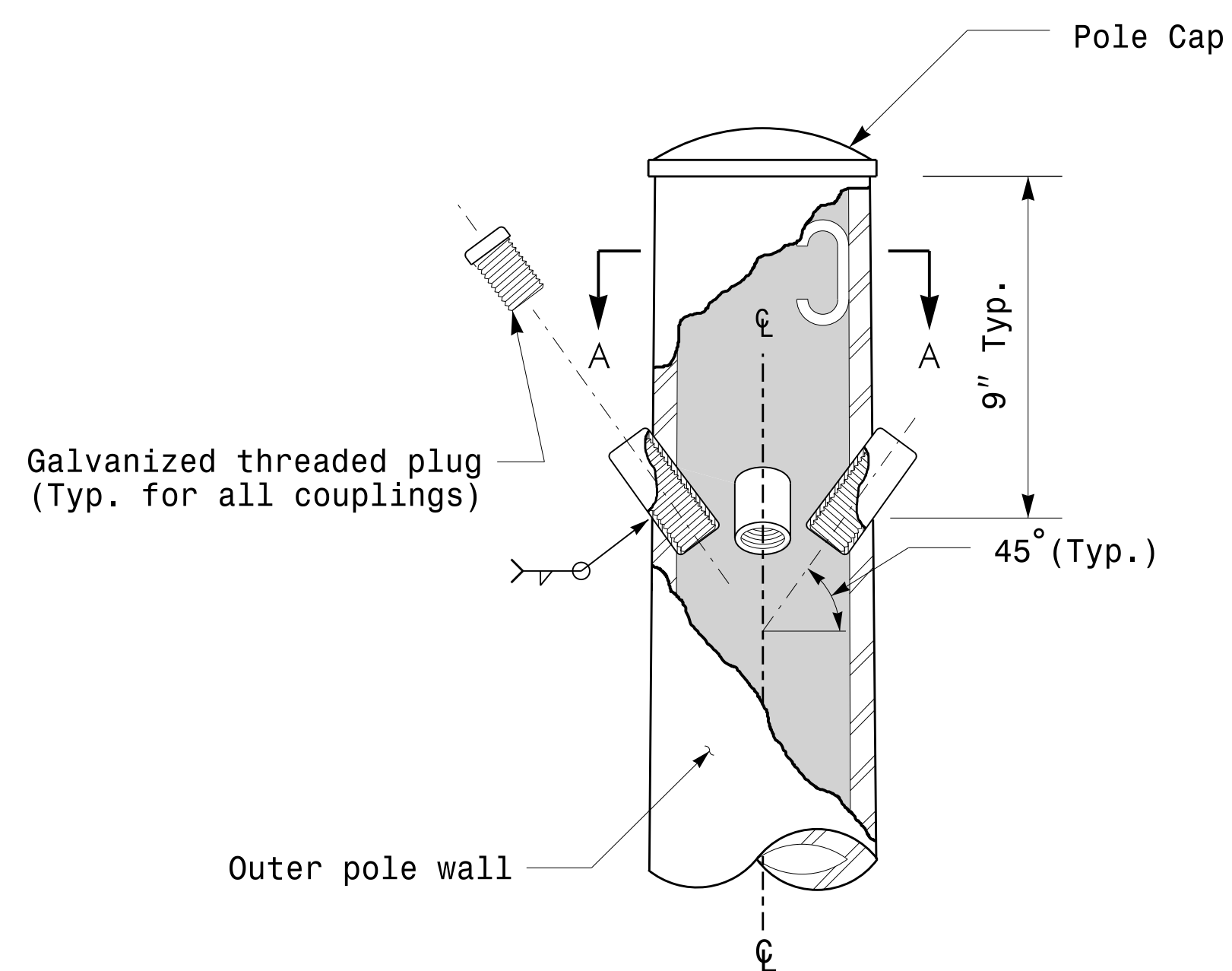
J.P. GALLOWAY, P.E. - STATE SIGNALS ENGINEER

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

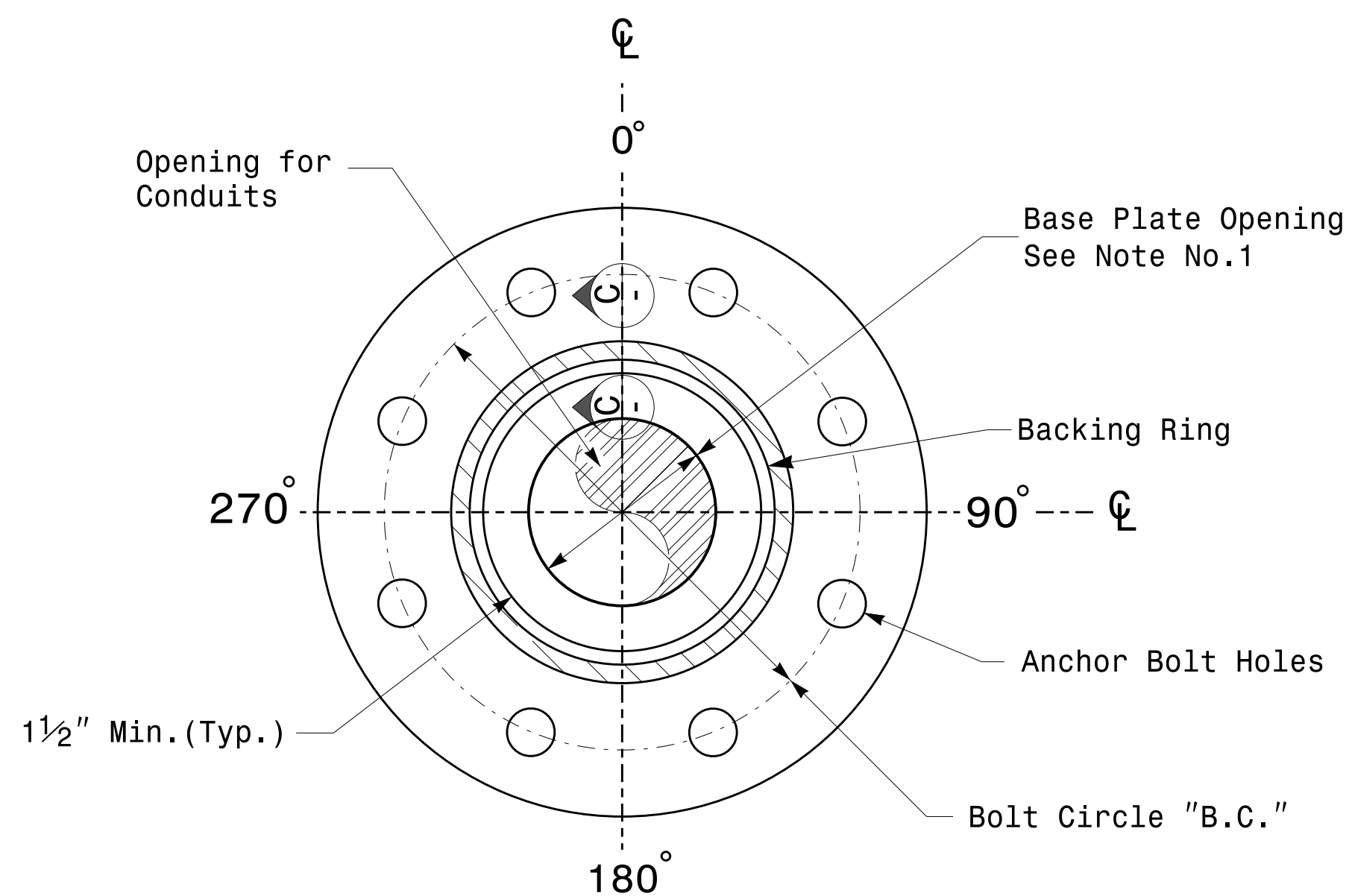
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DocuSigned by:
Debesh C. Sarkar
DATE 10/11/2017

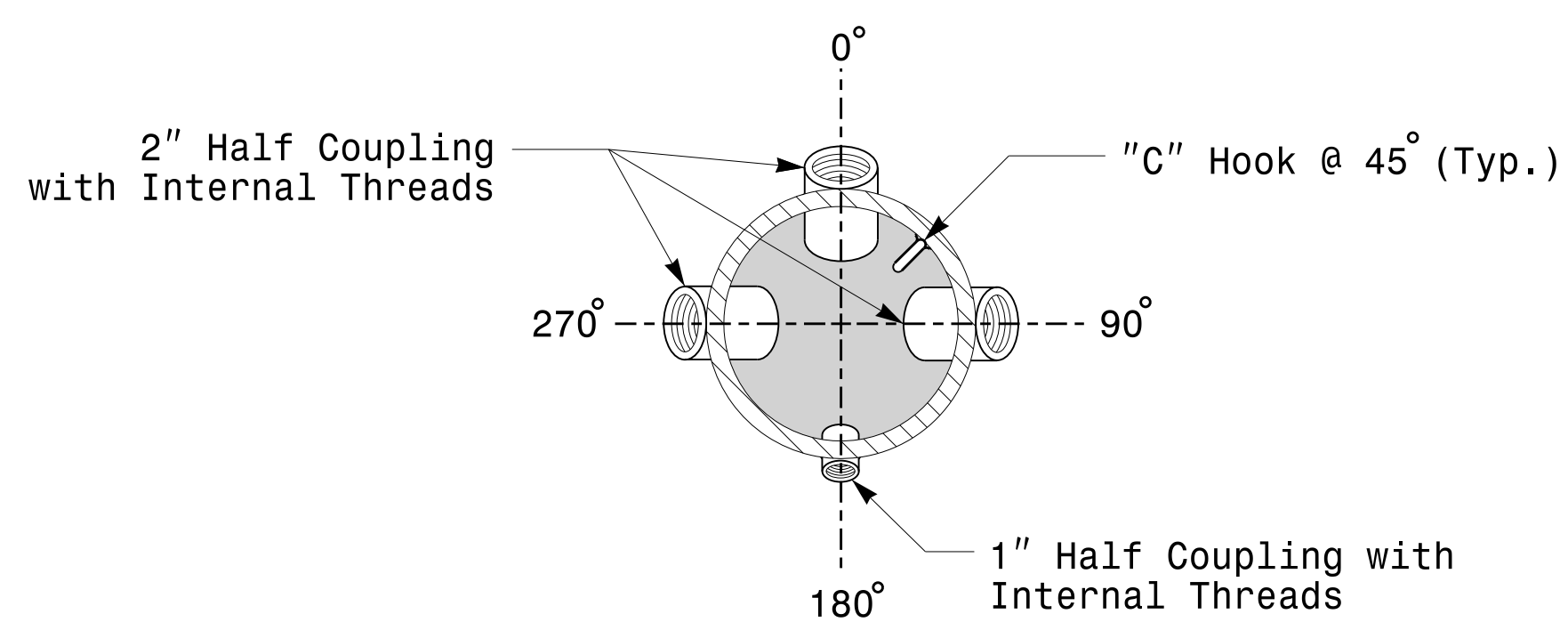
Note:
 1. Opening in pole base plate shall be equal to pole base inside diameter minus 3 1/2" but shall not be less than 8 1/2".



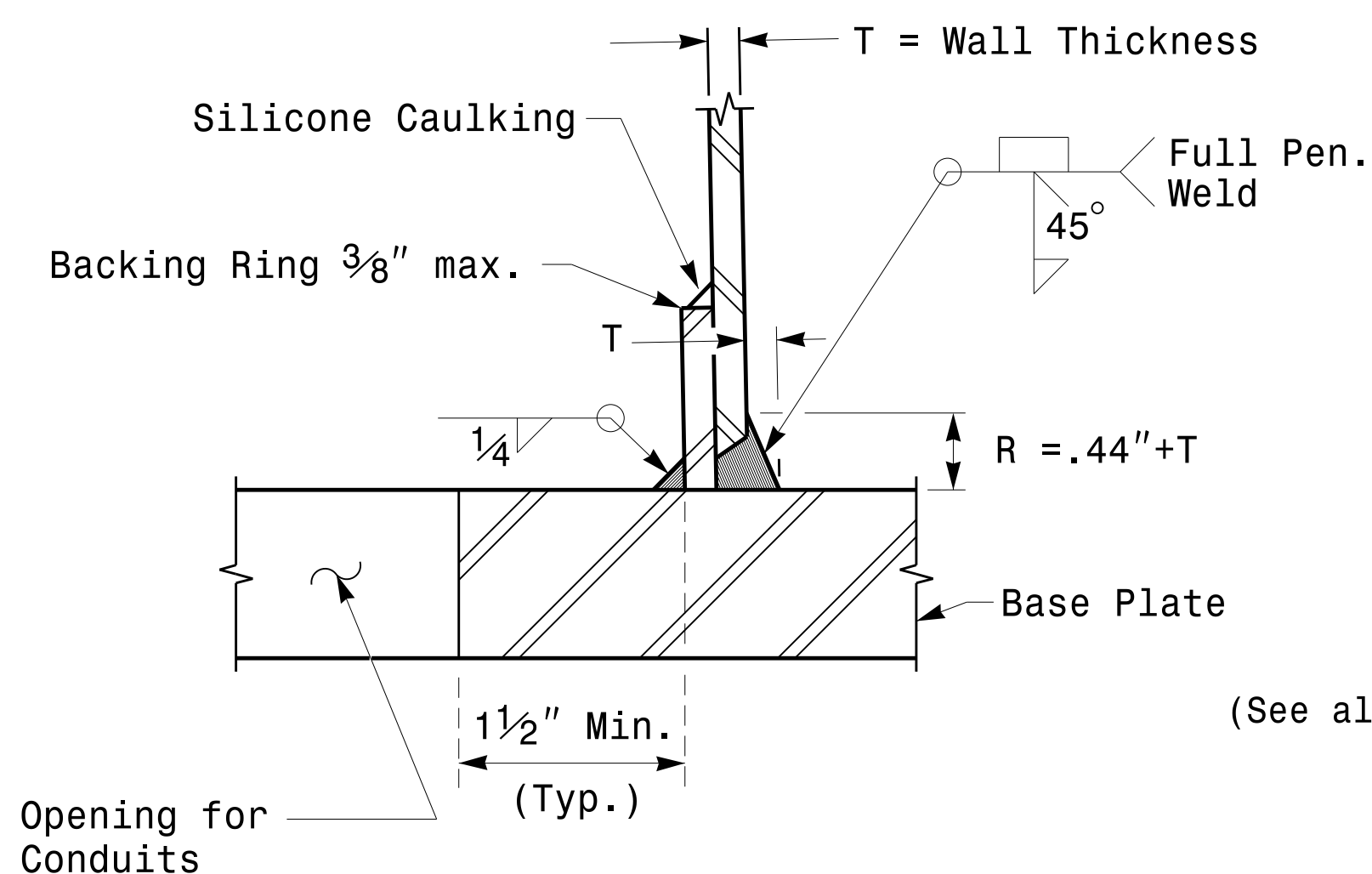
Cable Entrances at Top of Pole



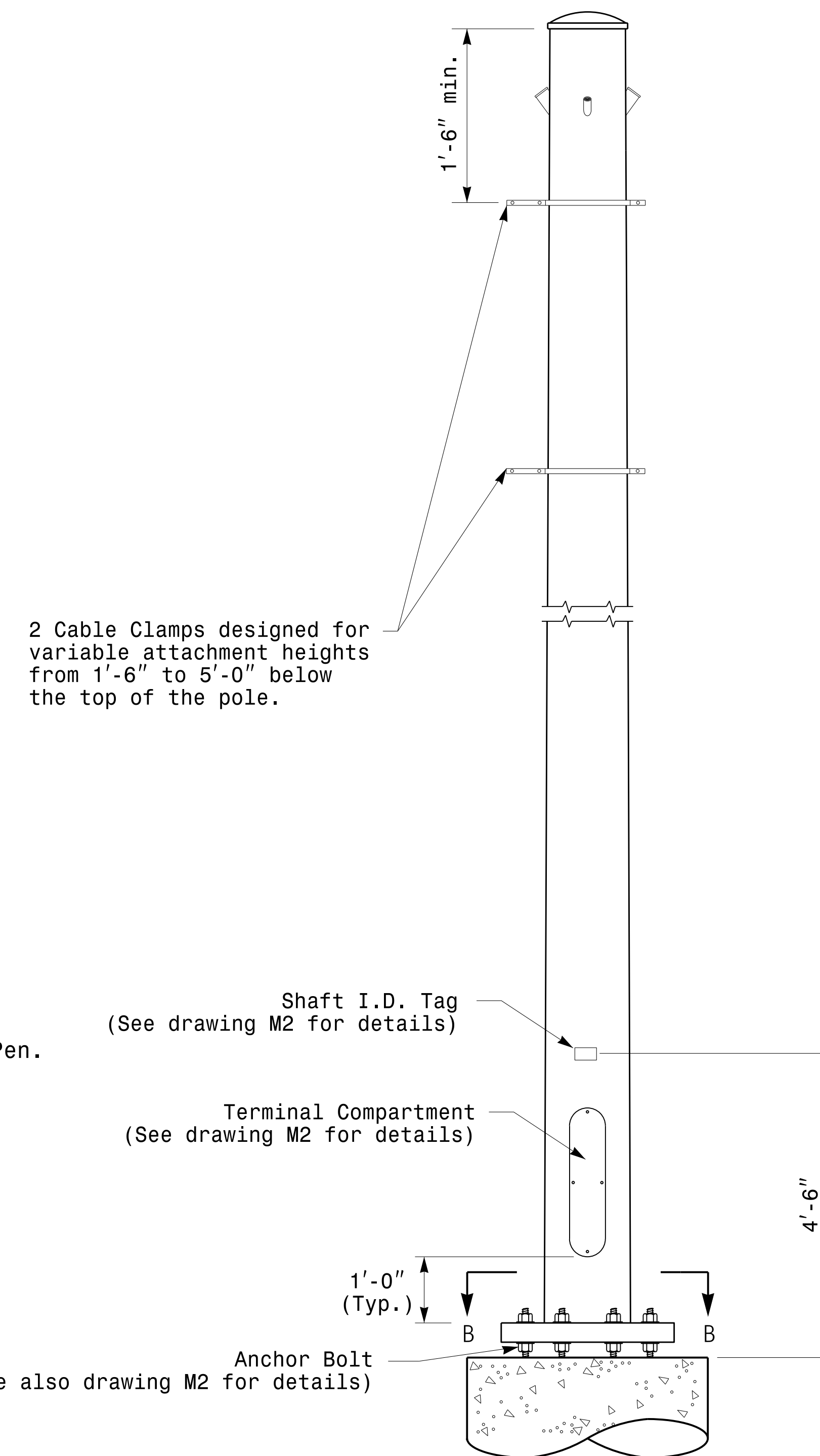
Section B-B Pole Base Plate Details (8 and 12 Bolt Pattern)



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



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



Monotube Strain Pole

Prepared in the Offices of:

 750 N. Greenleaf Pkwy, Garner, NC 27529

SCALE: 0 NONE

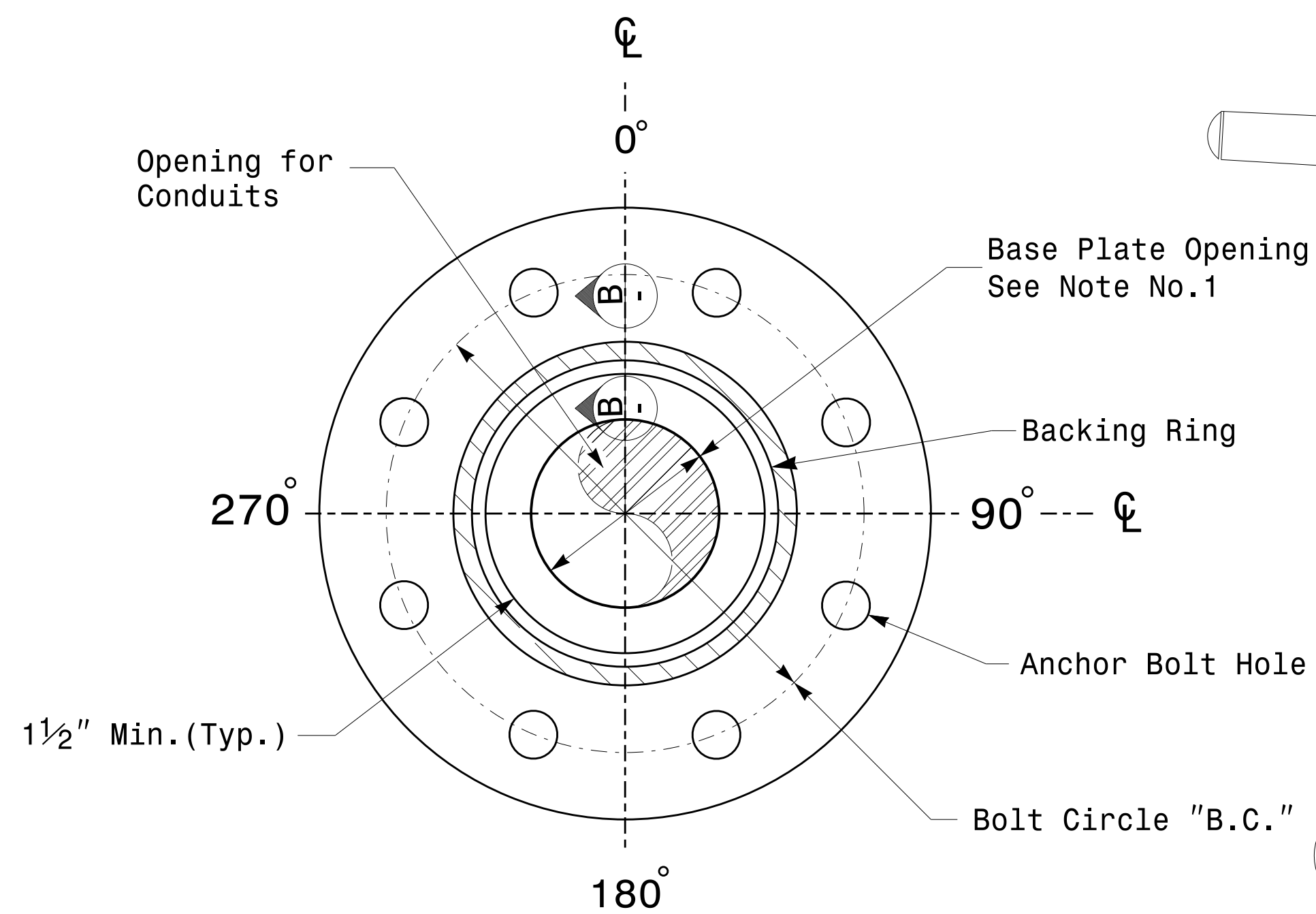
Typical Fabrication Details For Strain Poles			
PLAN DATE: OCTOBER 2017	DESIGNED BY: K.C. DURIGON		
PREPARED BY: N. BITTING	REVIEWED BY: D.C. SARKAR		
REVISIONS	INIT.	DATE	

SEAL

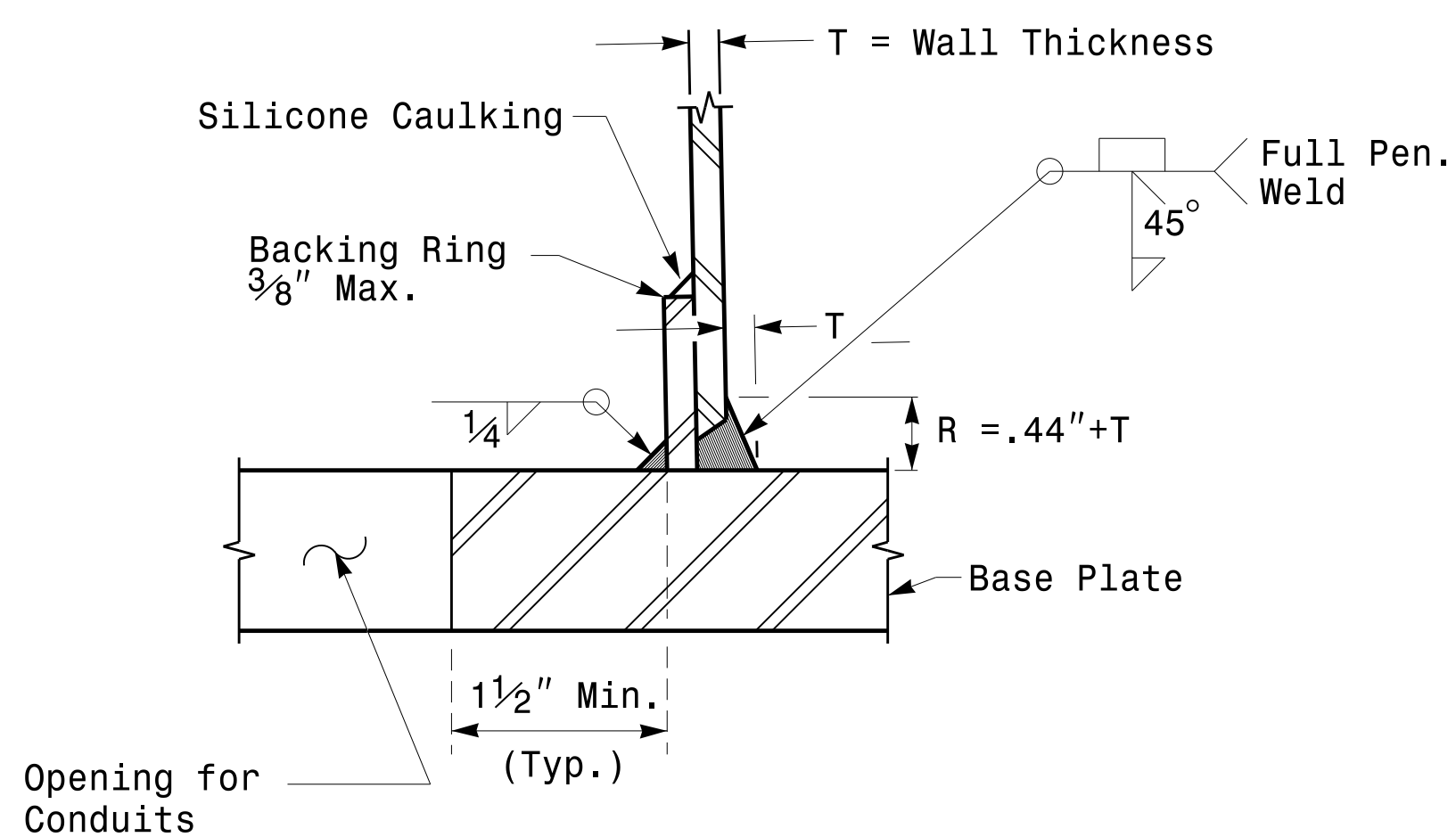
 DocuSigned by: *Dibesh C. Sarkar*
 44EB87816FA4F49E
 10/11/2017
 DATE

Fabrication Details – Strain Poles

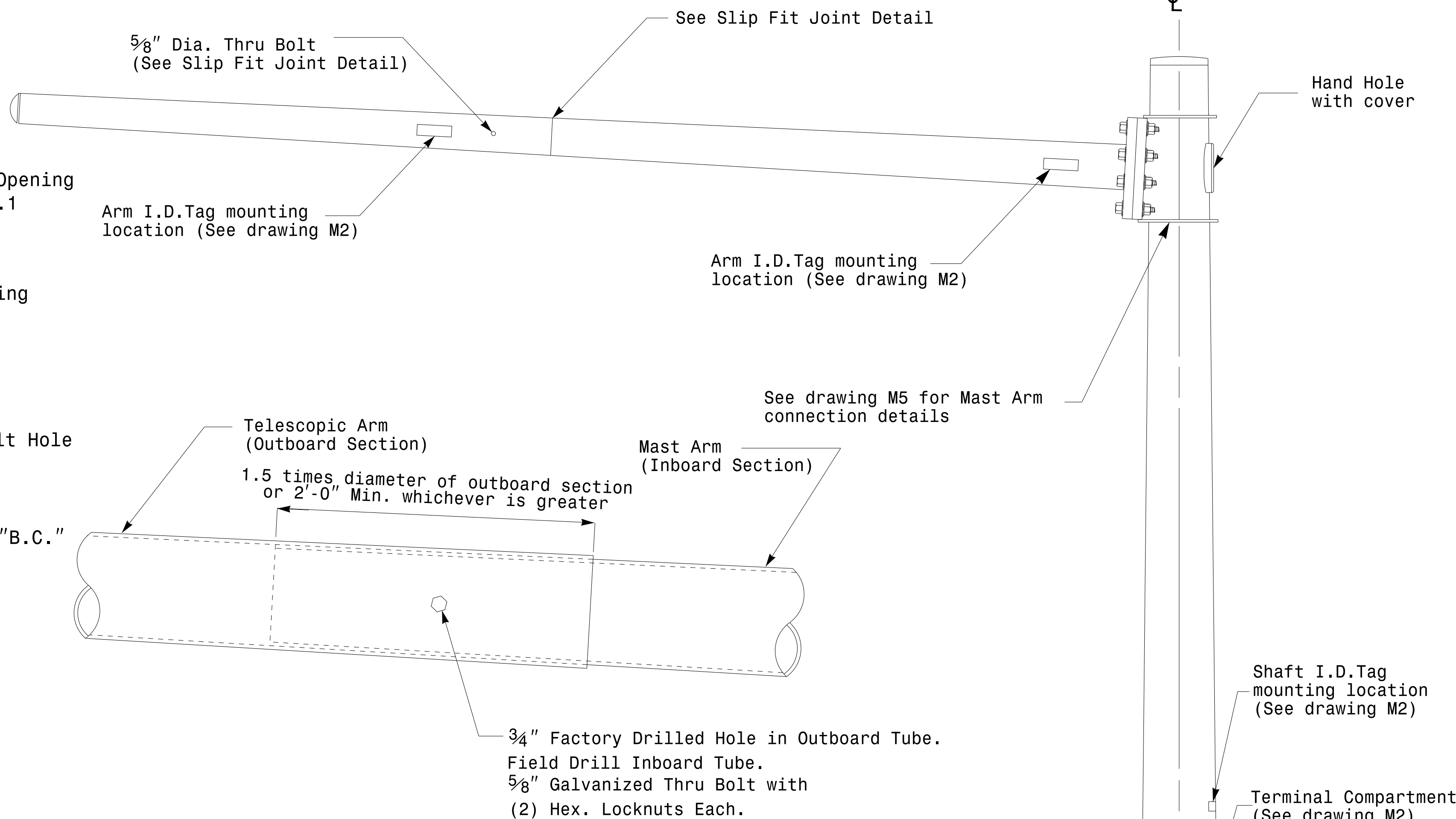
Note:
 1. Opening in pole base plate shall be equal to pole base inside diameter minus 3 1/2" but shall not be less than 8 1/2".



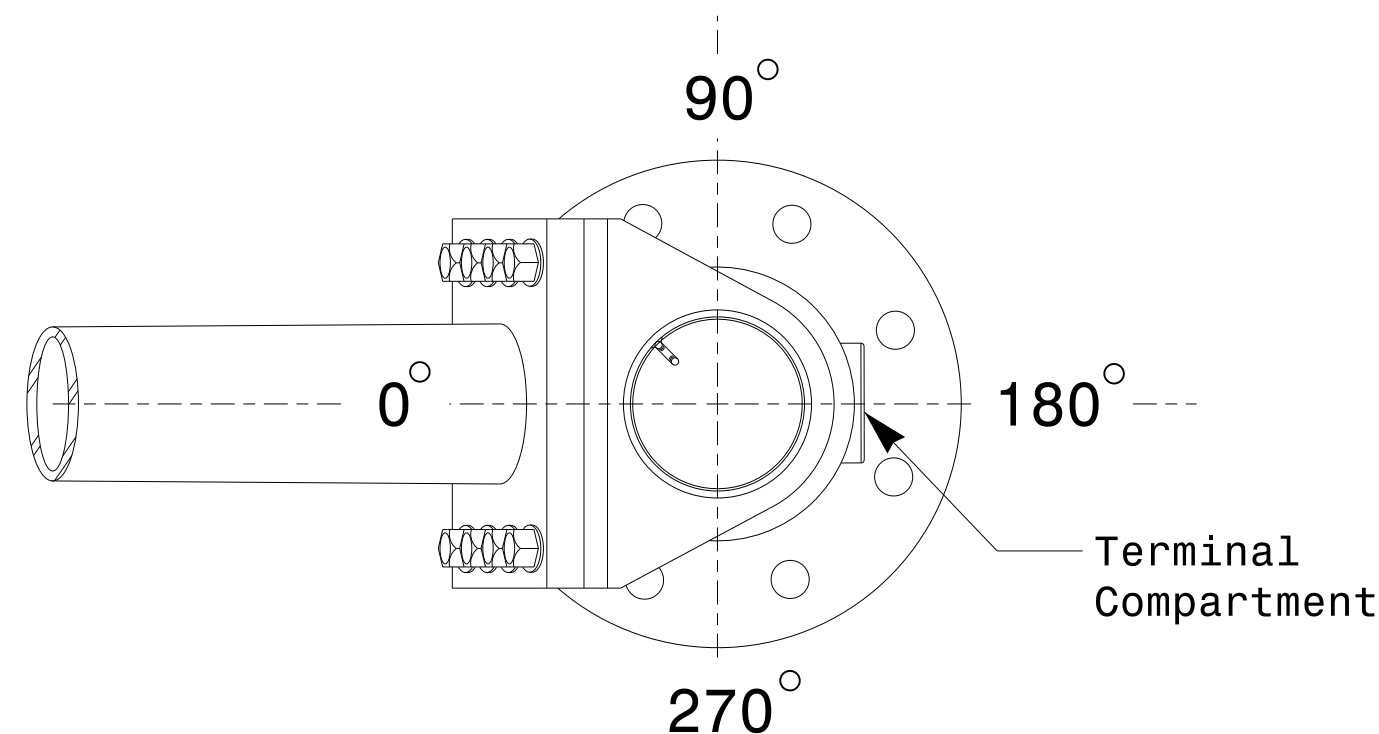
Section A-A
Pole Base Plate Details



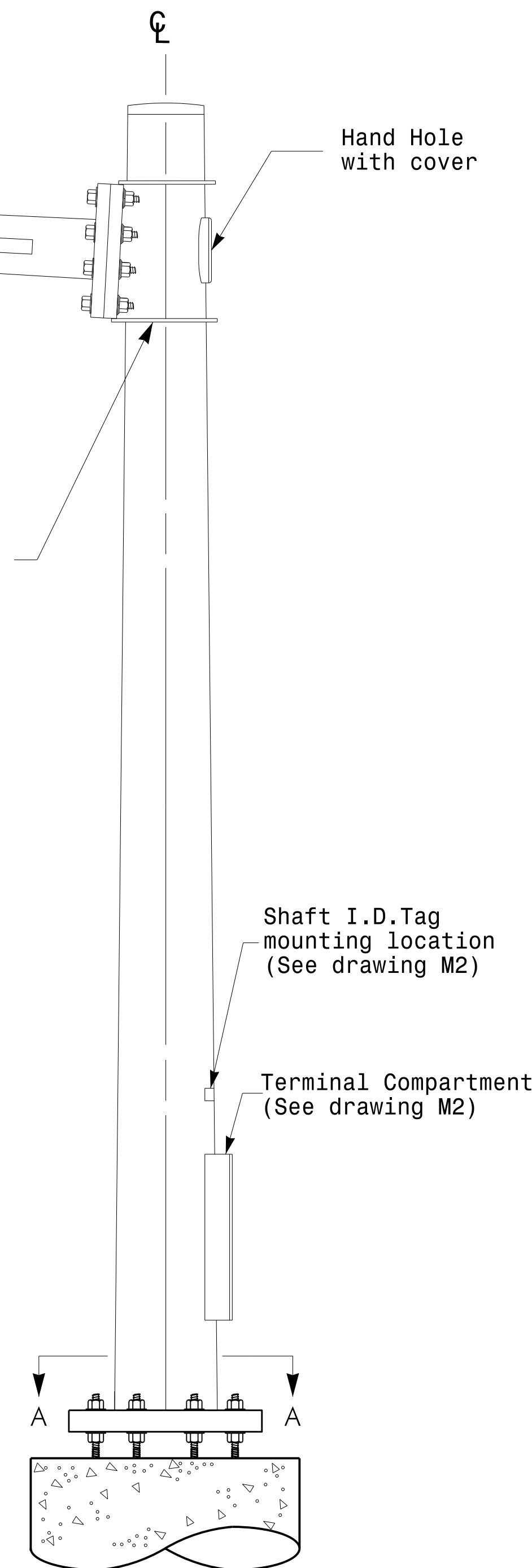
Section B-B
 (Pole Attachment to Base Plate)
Full-Penetration Groove Weld Detail



Slip Fit Joint Detail for Mast Arm



Mast Arm Radial Orientation



Mast Arm Pole

Fabrication Details – Mast Arm Poles

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

11-OCT-2017 08:33
 P:\S604115\SIGNALS\Signal Design Section\Eastern Region\M4 Sheets\2016\2014_Sig_M4_Std_Fabrication_Details-Mast_Arm_Poles.dgn
 P:\S604115\SIGNALS\Signal Design Section

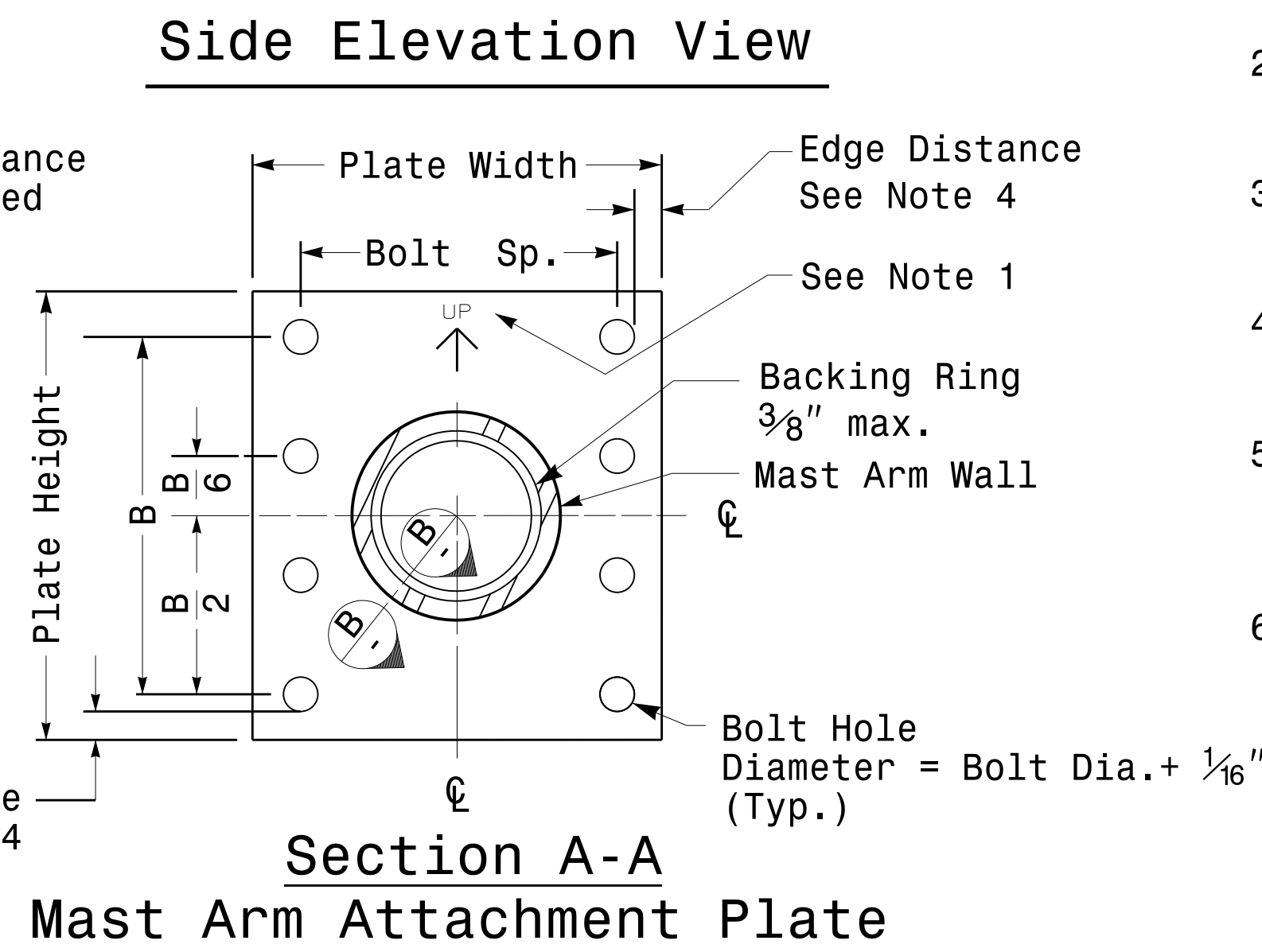
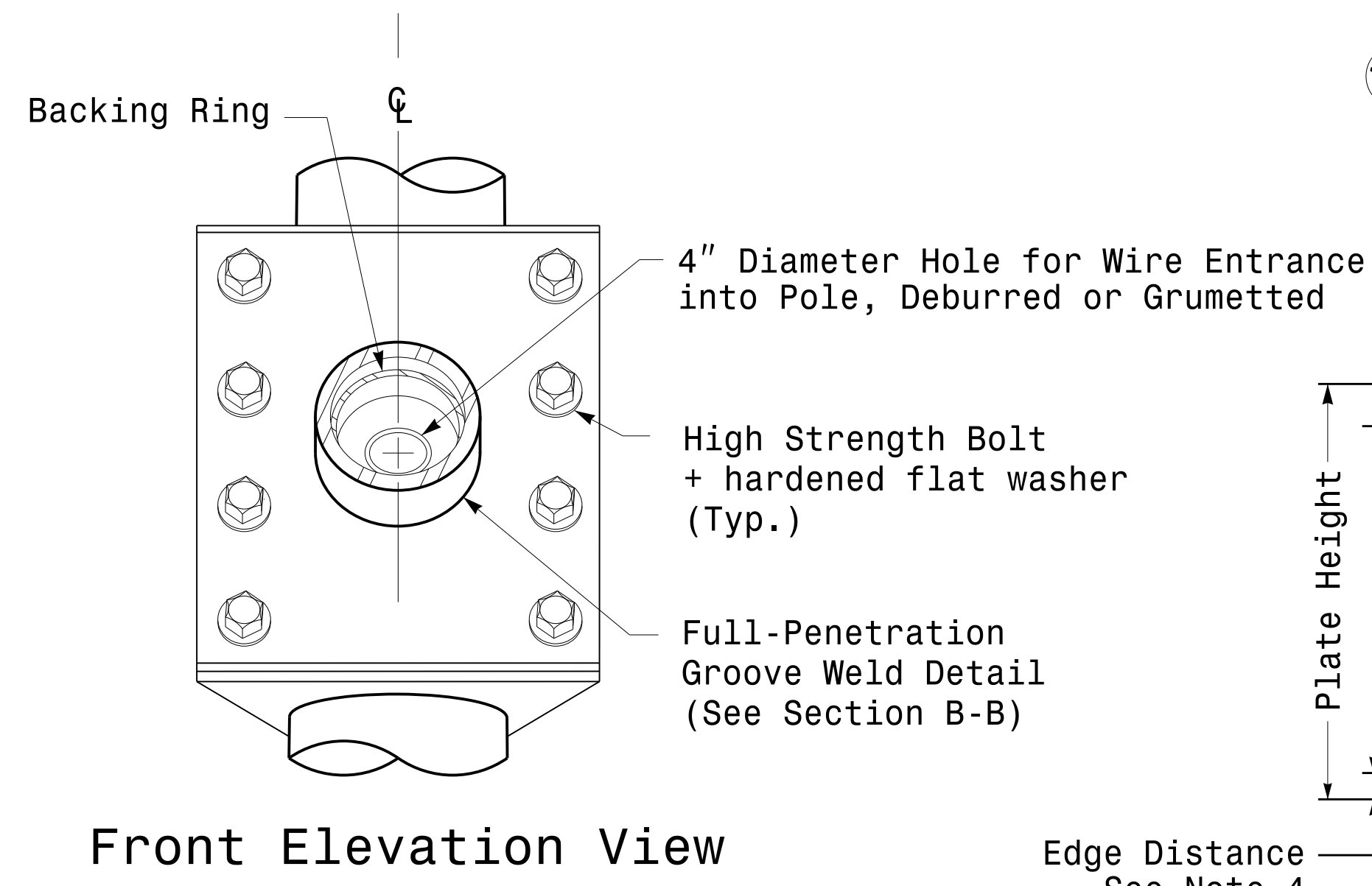
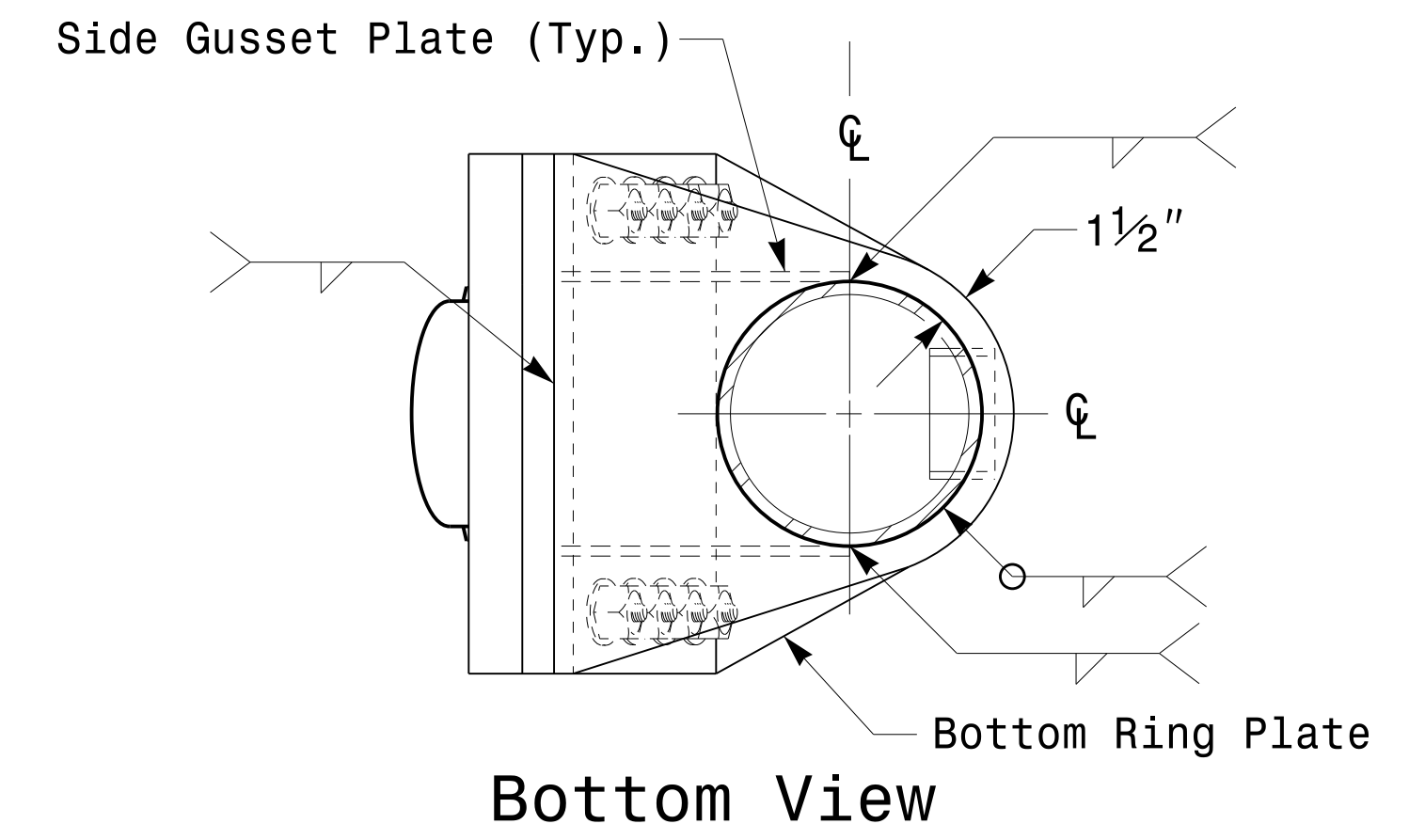
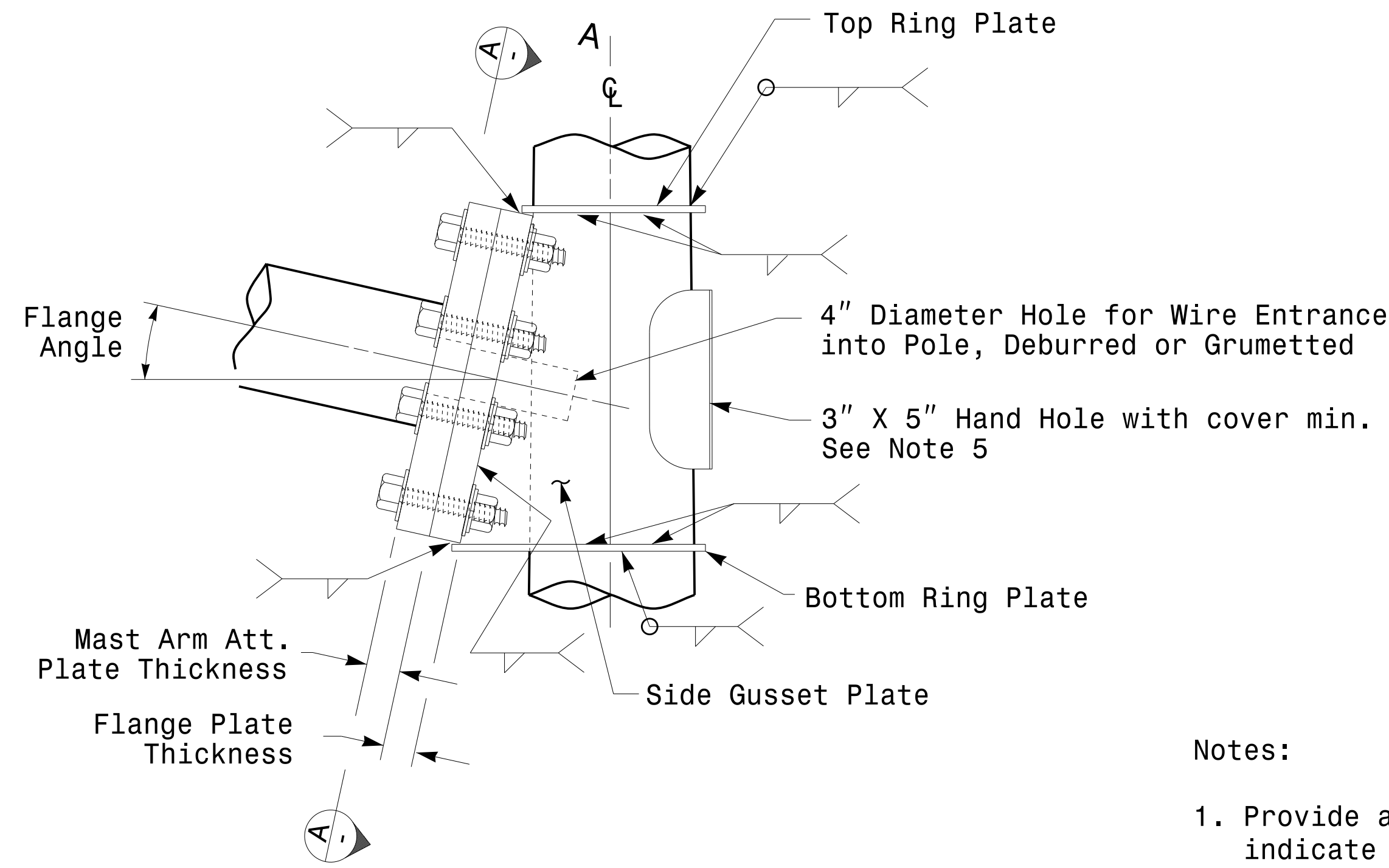
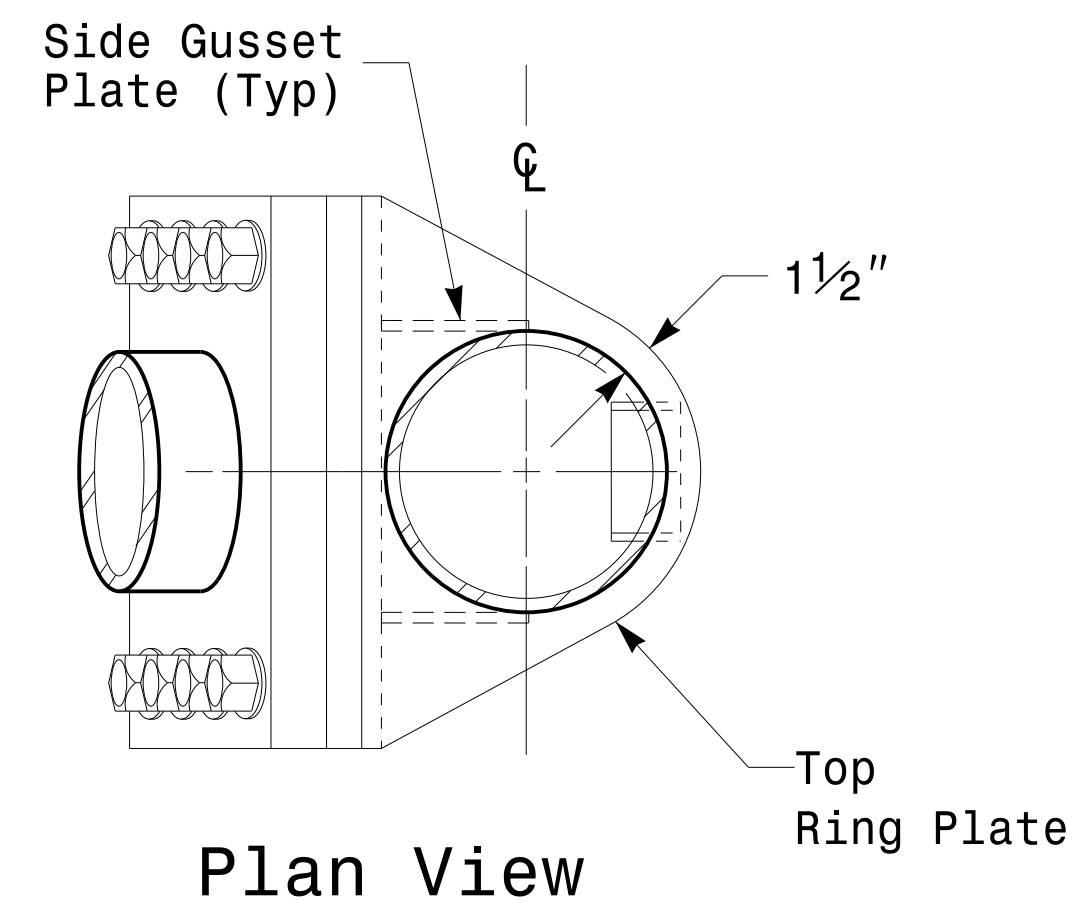
Welded Ring Stiffened Mast Arm Connection

PROJECT ID. NO.

SHEET NO.

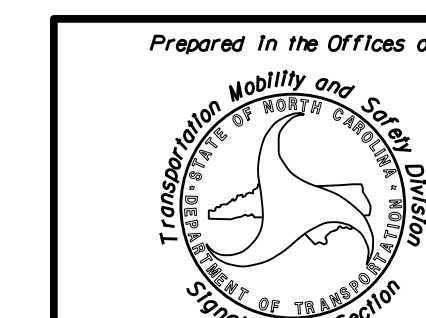
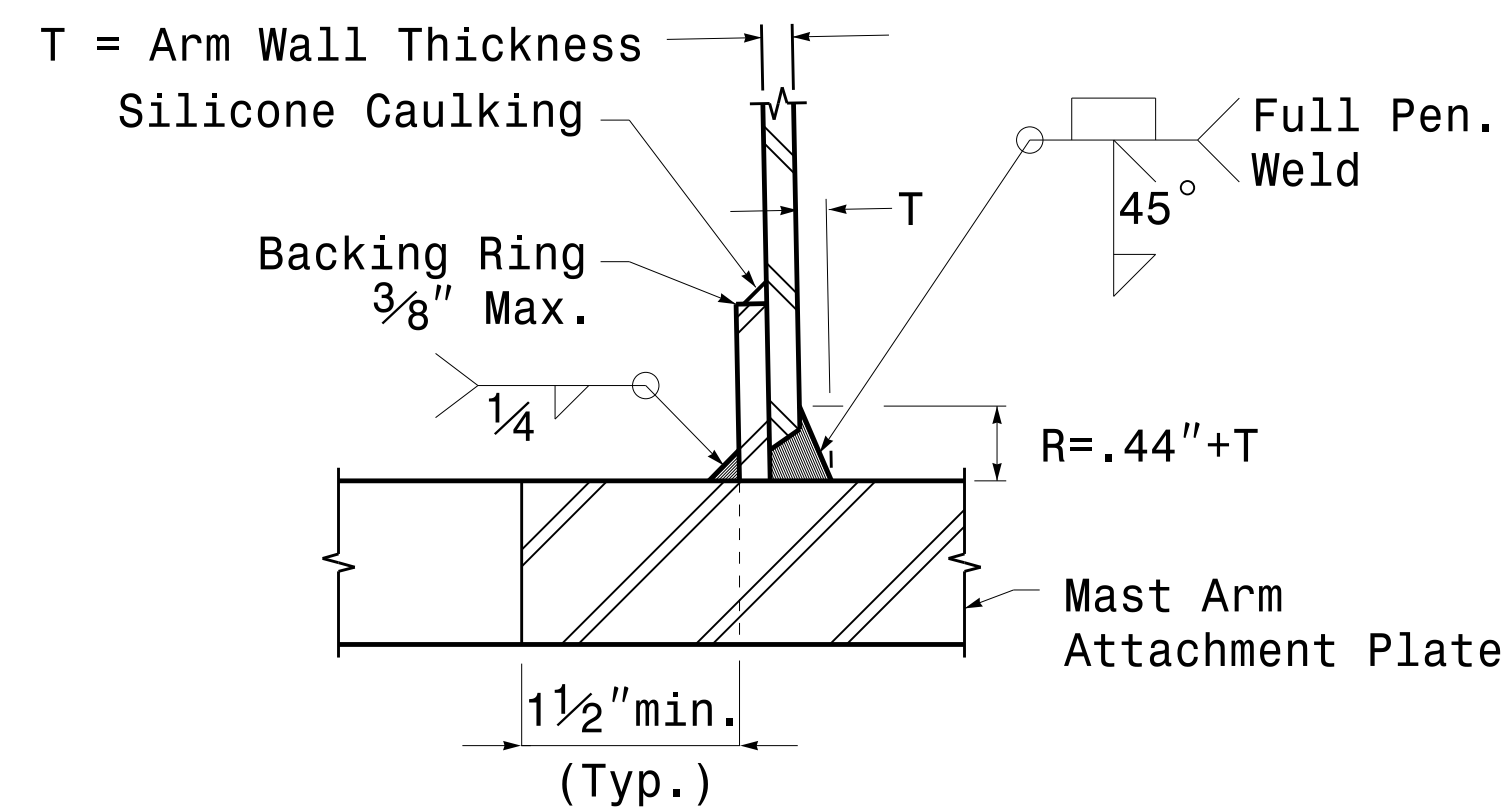
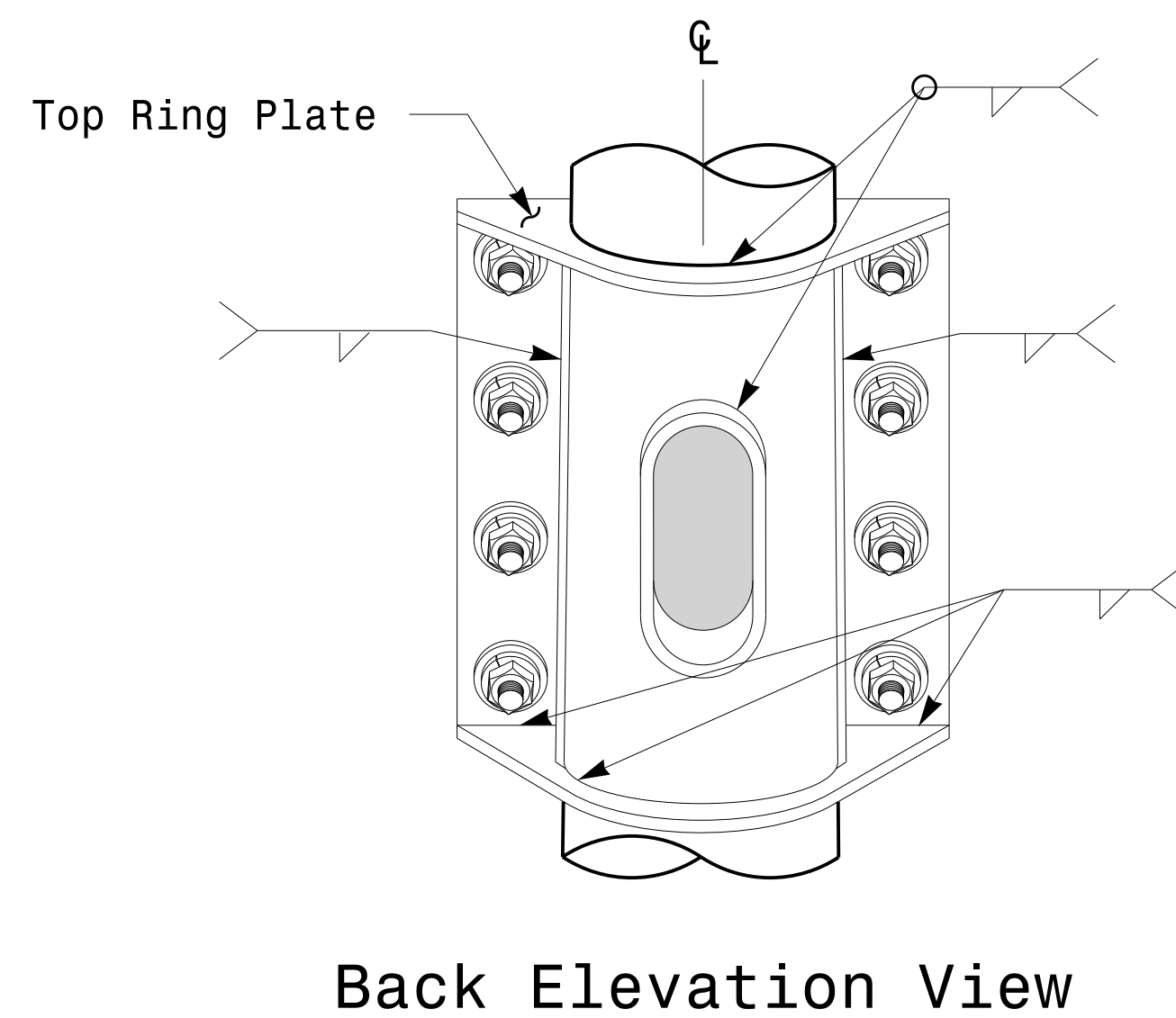
R-2566BA

Sig.M5



Notes:

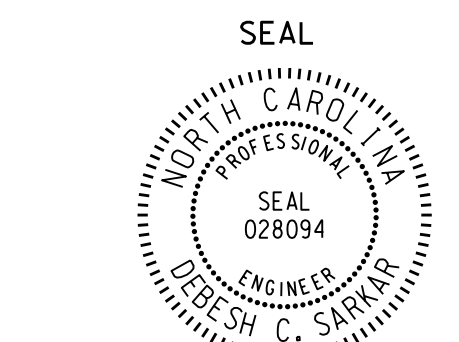
1. Provide a permanent means of identification above the mast arm to indicate proper attachment orientation of the mast arm.
2. Designer will determine the size of all structural components, plates, fasteners, and welds shown unless they are already specified.
3. Fabricator is responsible for providing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



**Typical Fabrication Details
For
Mast Arm Connection To Pole**

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

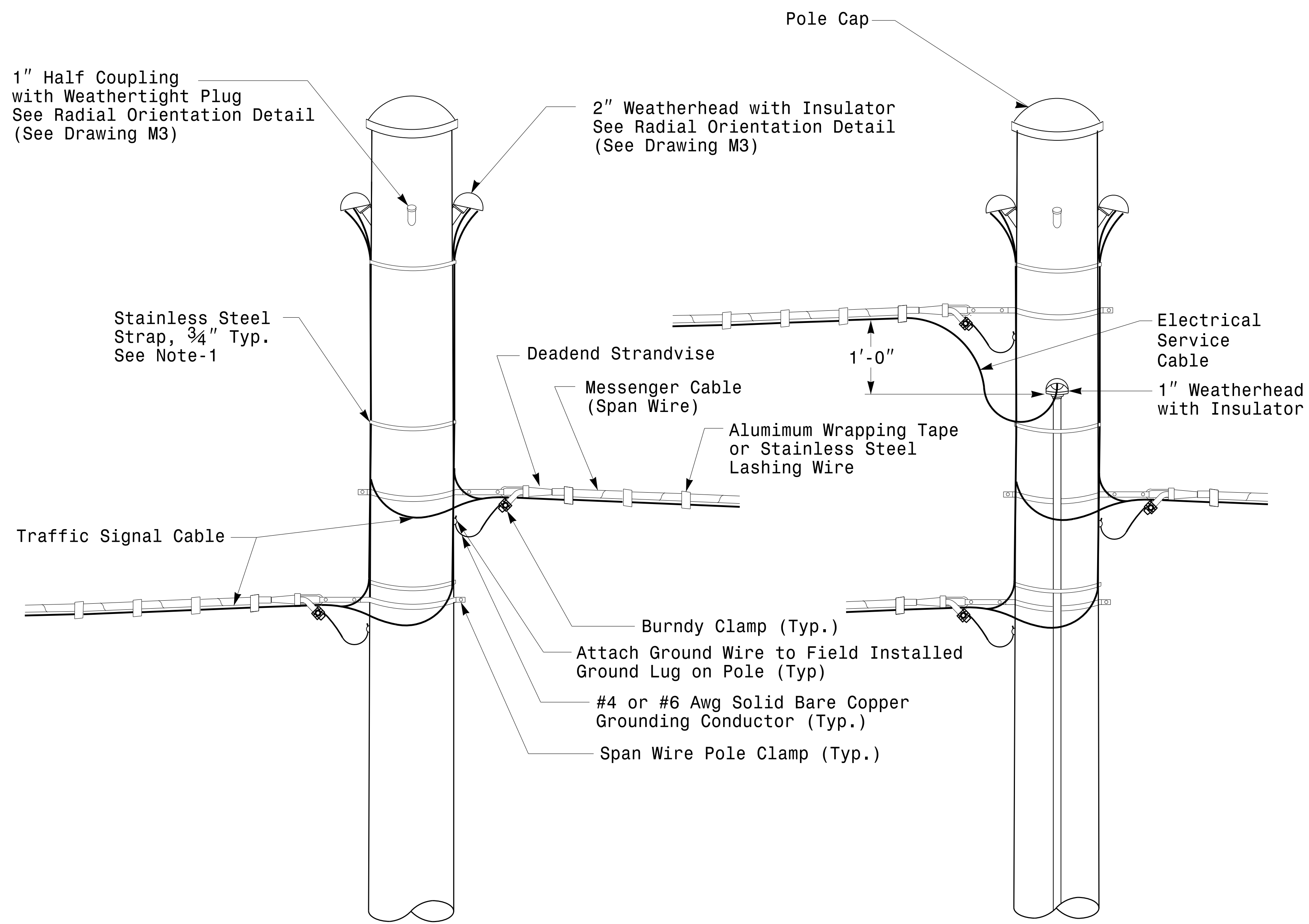
750 N. Greenfield Pkwy, Garner, NC 27529
SCALE: 0 = NA
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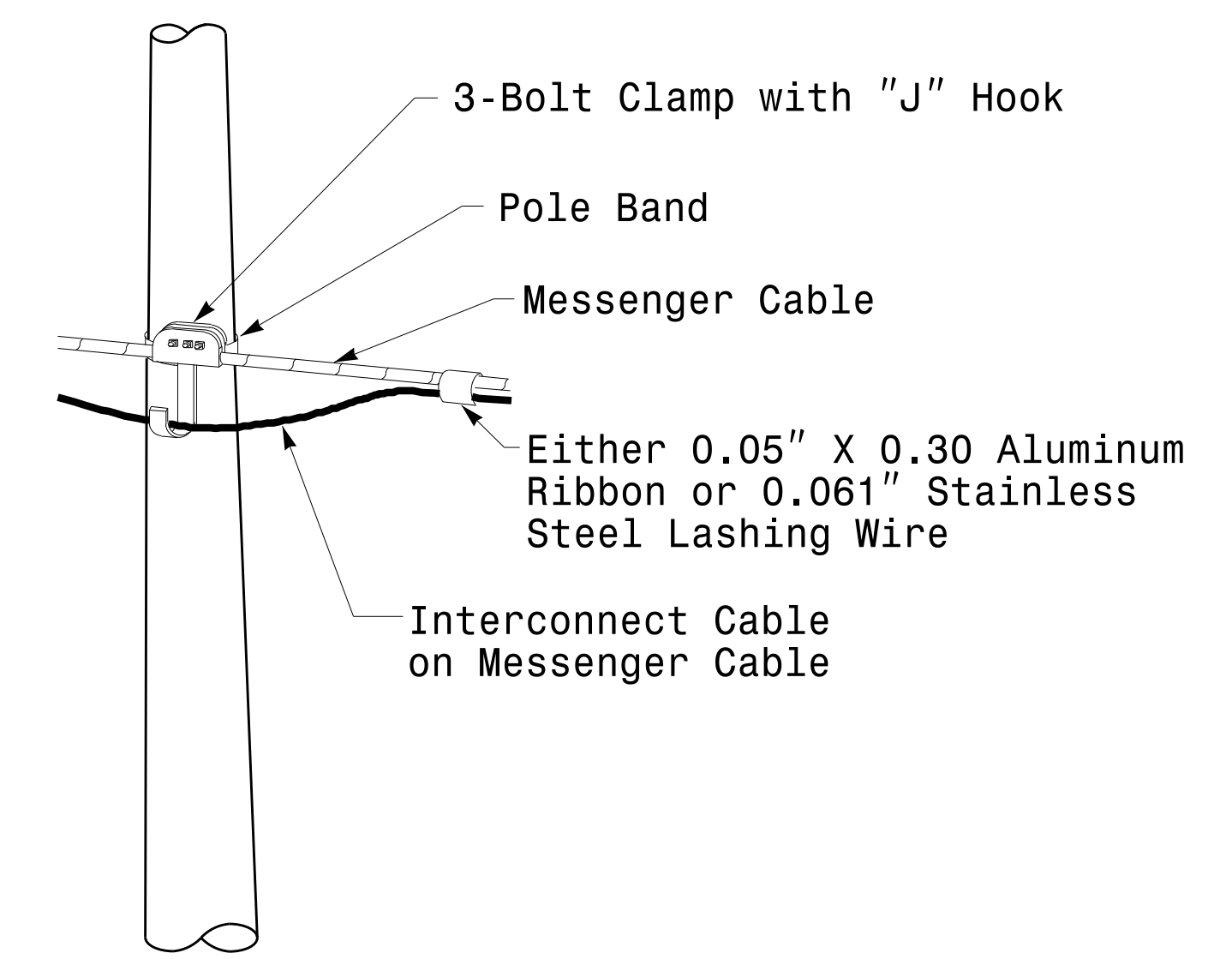
Discussed by: Dibesh C. Sarkar 10/11/2017
DATE

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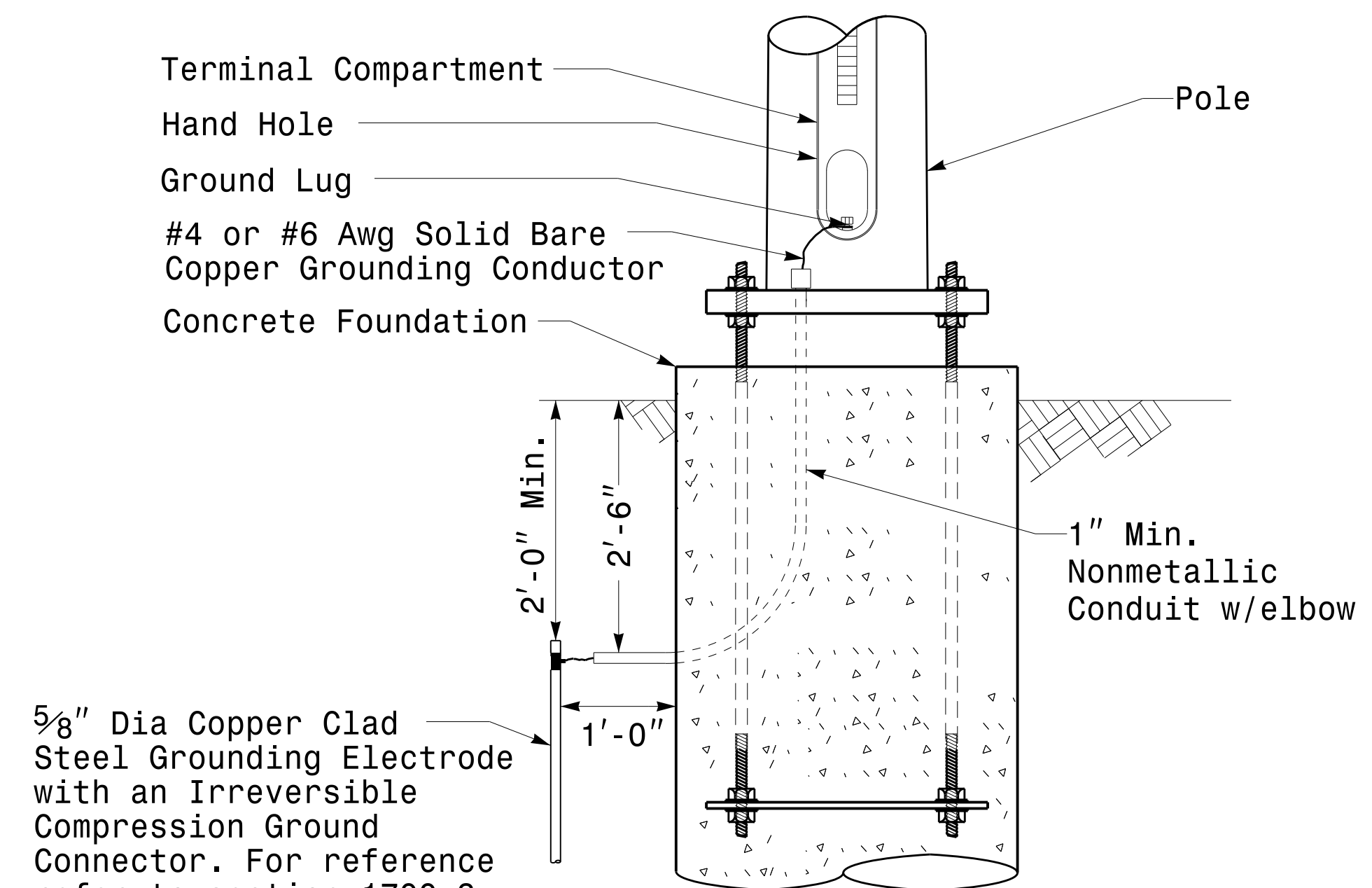
Fabrication Details – Mast Arm Connection



Strain Pole Attachments



Attachment of Cable to Intermediate Metal Pole



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

Metal Pole Grounding Detail For Strain Pole and Mast Arm

NOTE:

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

11-0CT-2017-08:36 136504115 StrainPole.dgn Design Section Eastern Region 11/16/2014 Sig.M6 Std. Fabrication Detail: Strain Poles.dgn

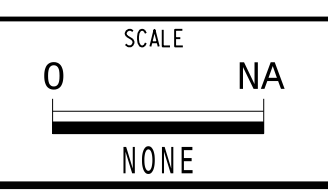
Prepared in the Offices of:

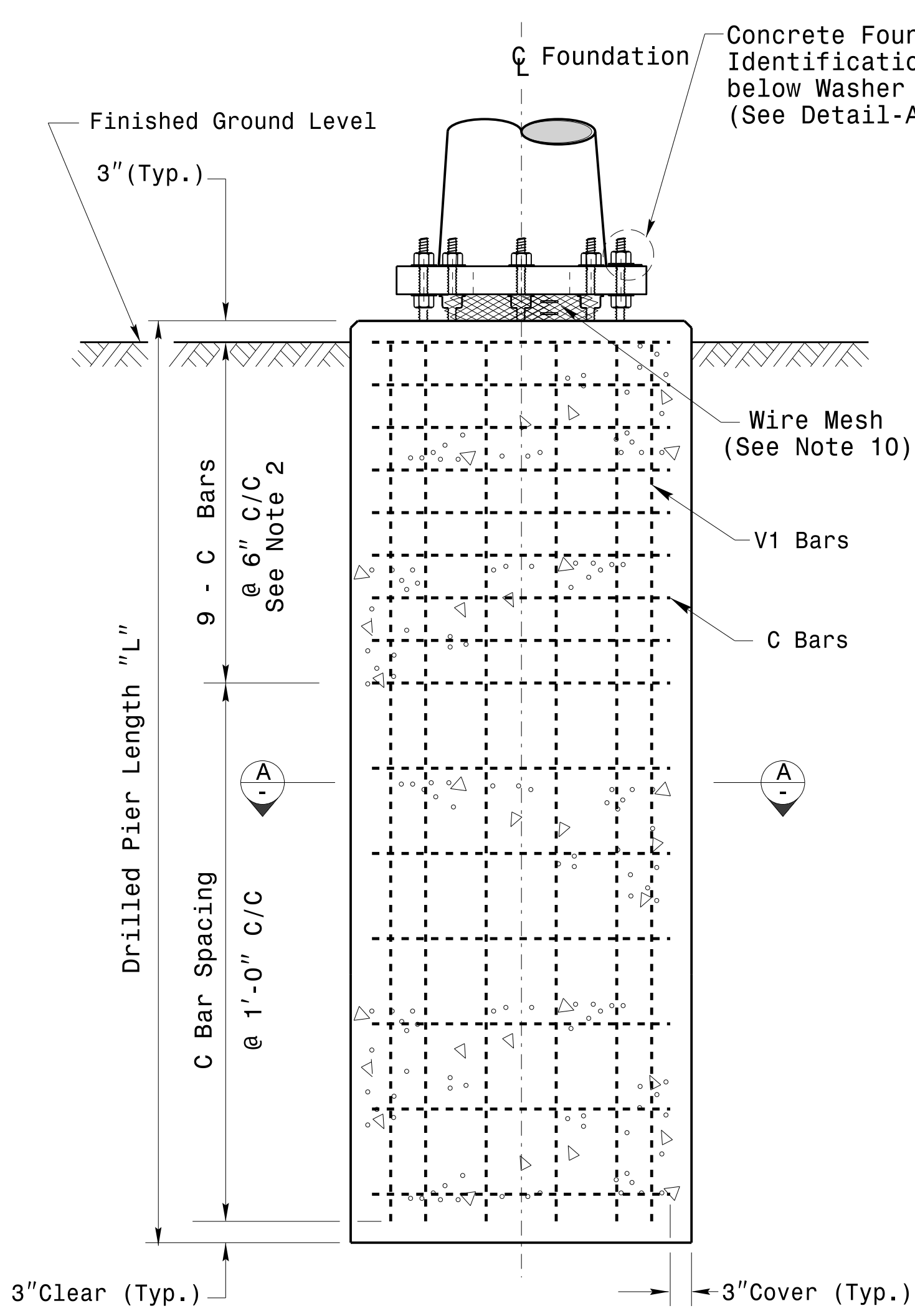
750 N. Greenfield Pkwy, Garner, NC 27529

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

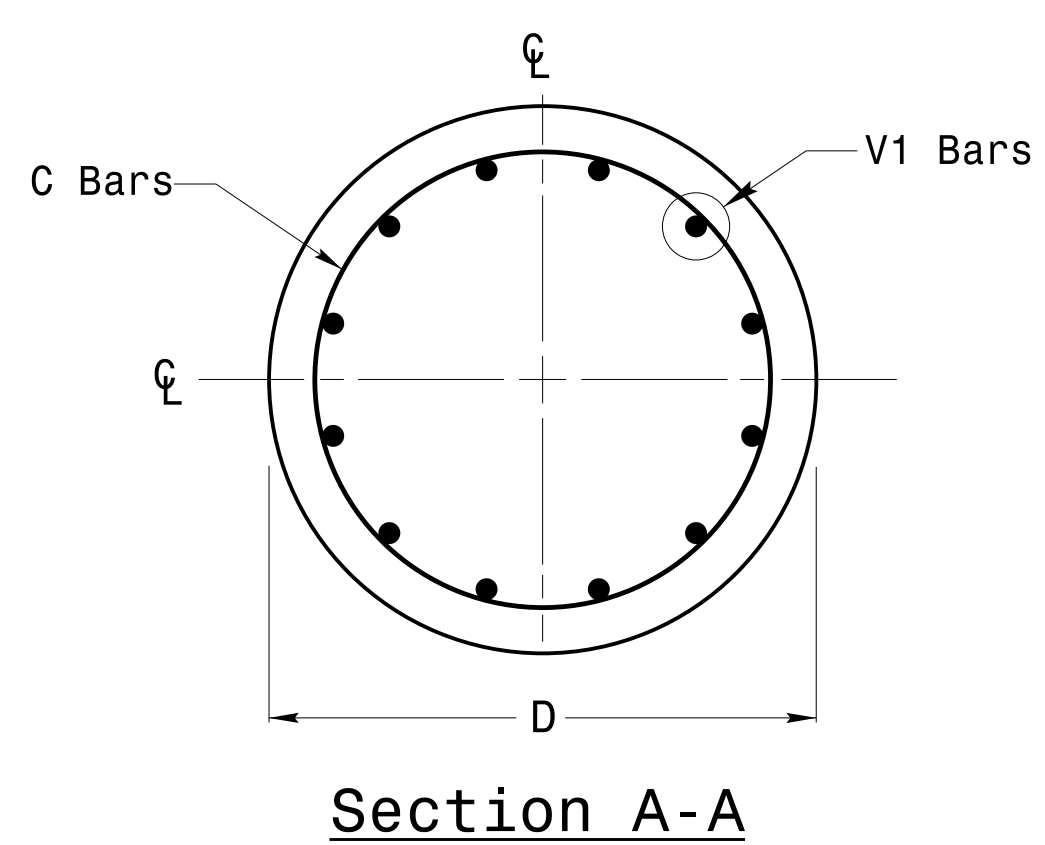
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DocuSigned by: D. C. Sarkar
DATE: 10/11/2017

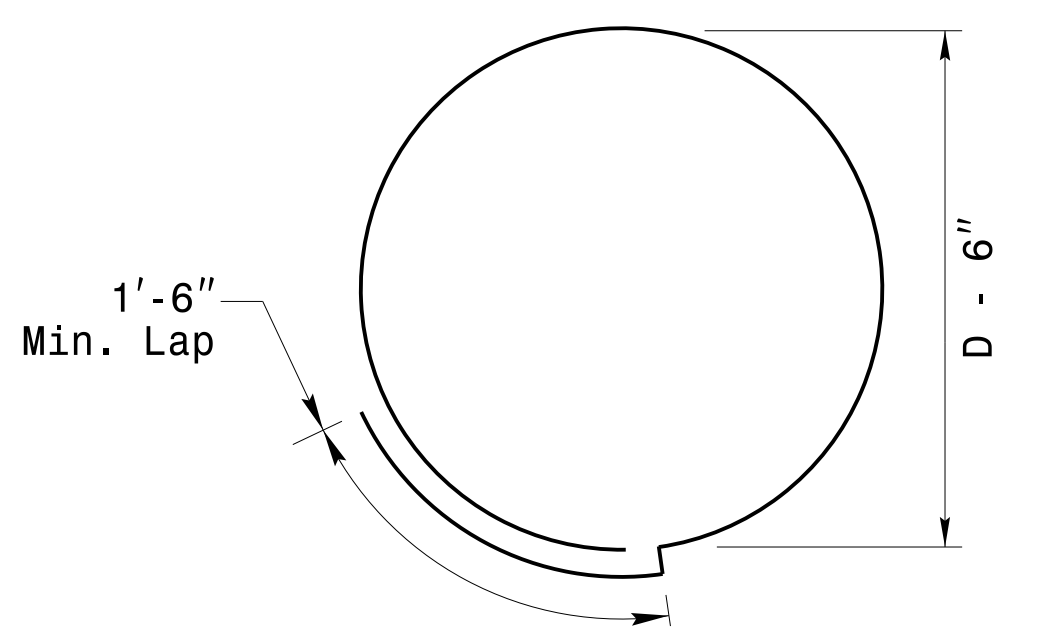




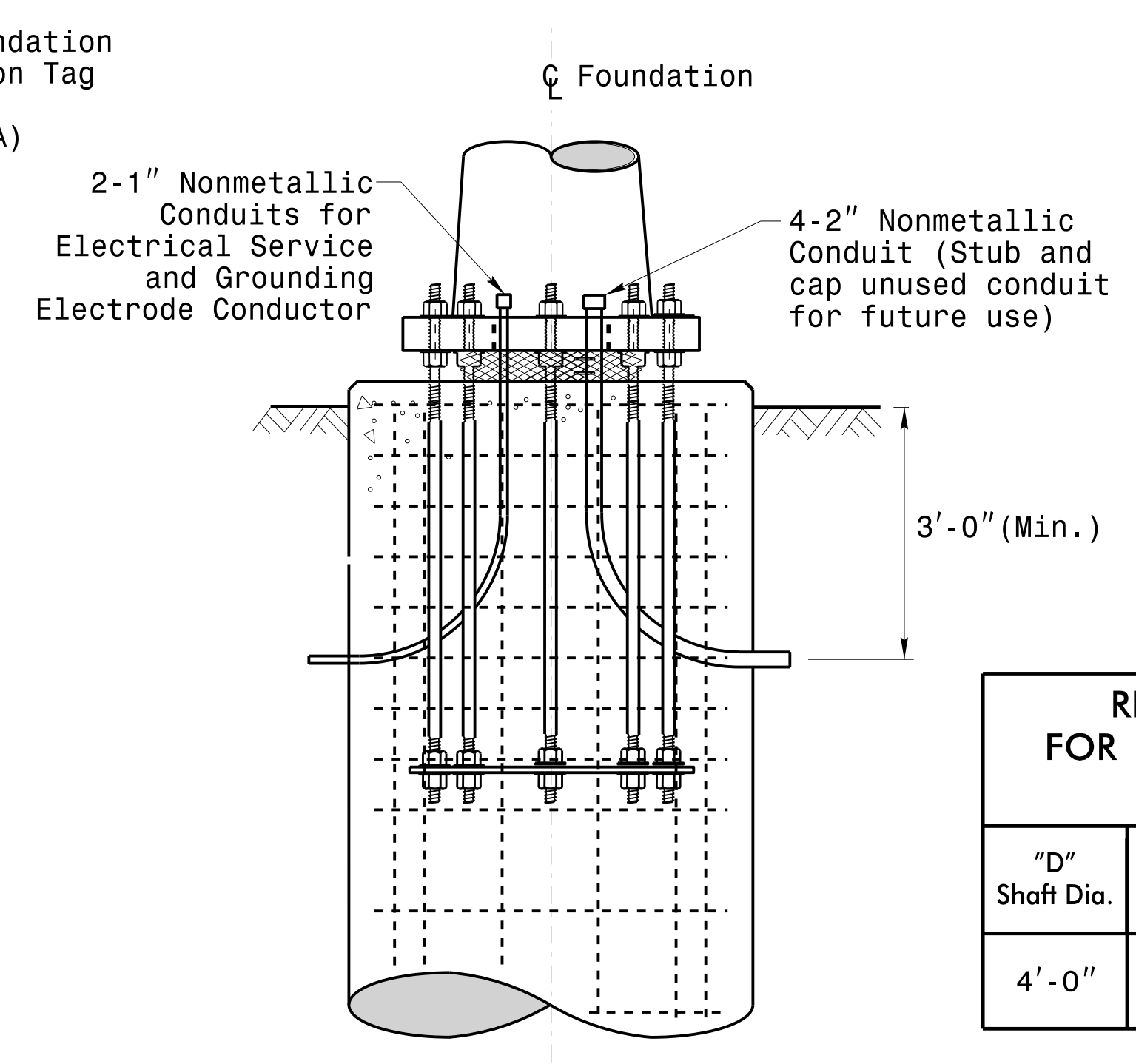
Concrete Shaft Elevation



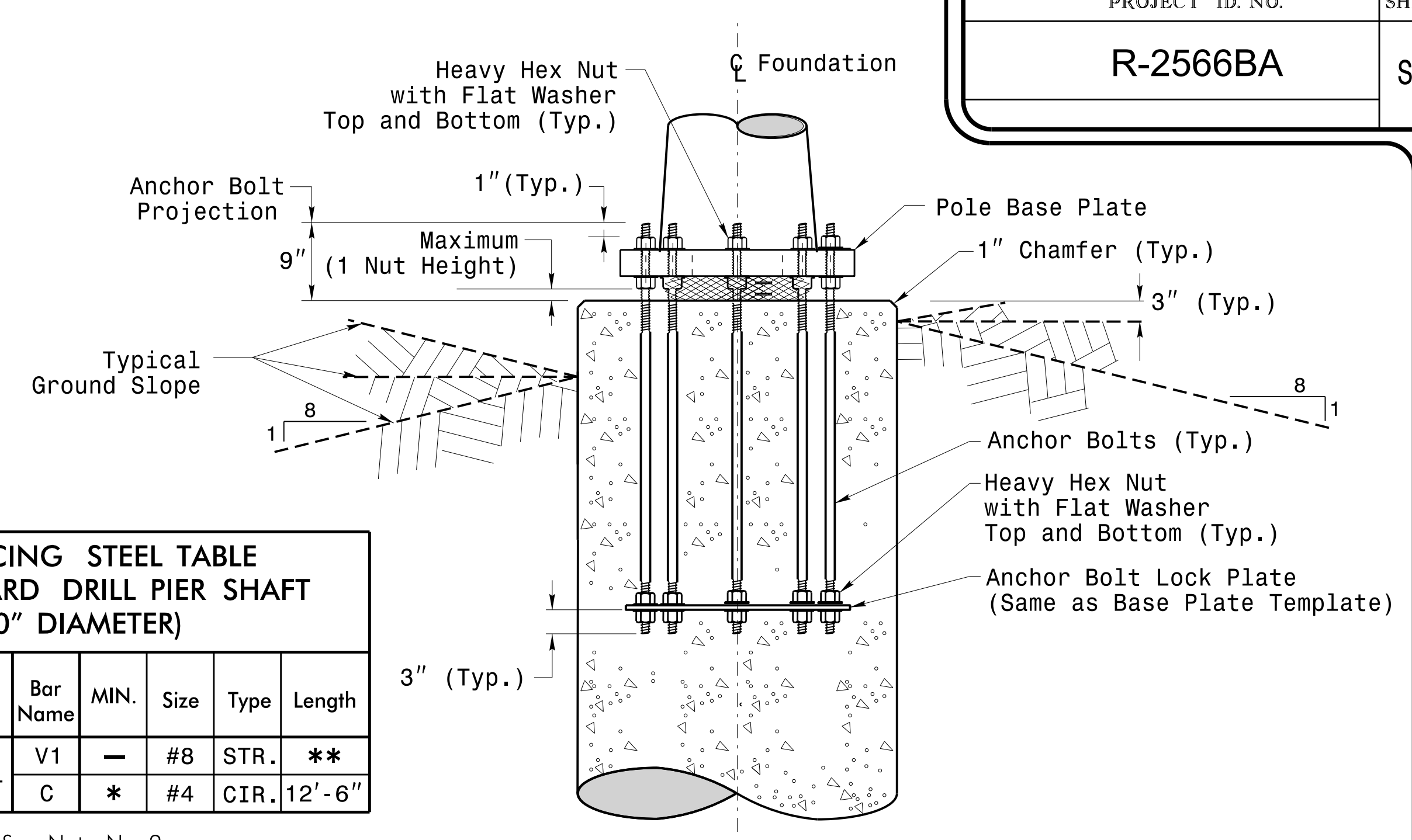
Section A-A



Typical "C" Bar Detail



Typical Foundation Conduit Details



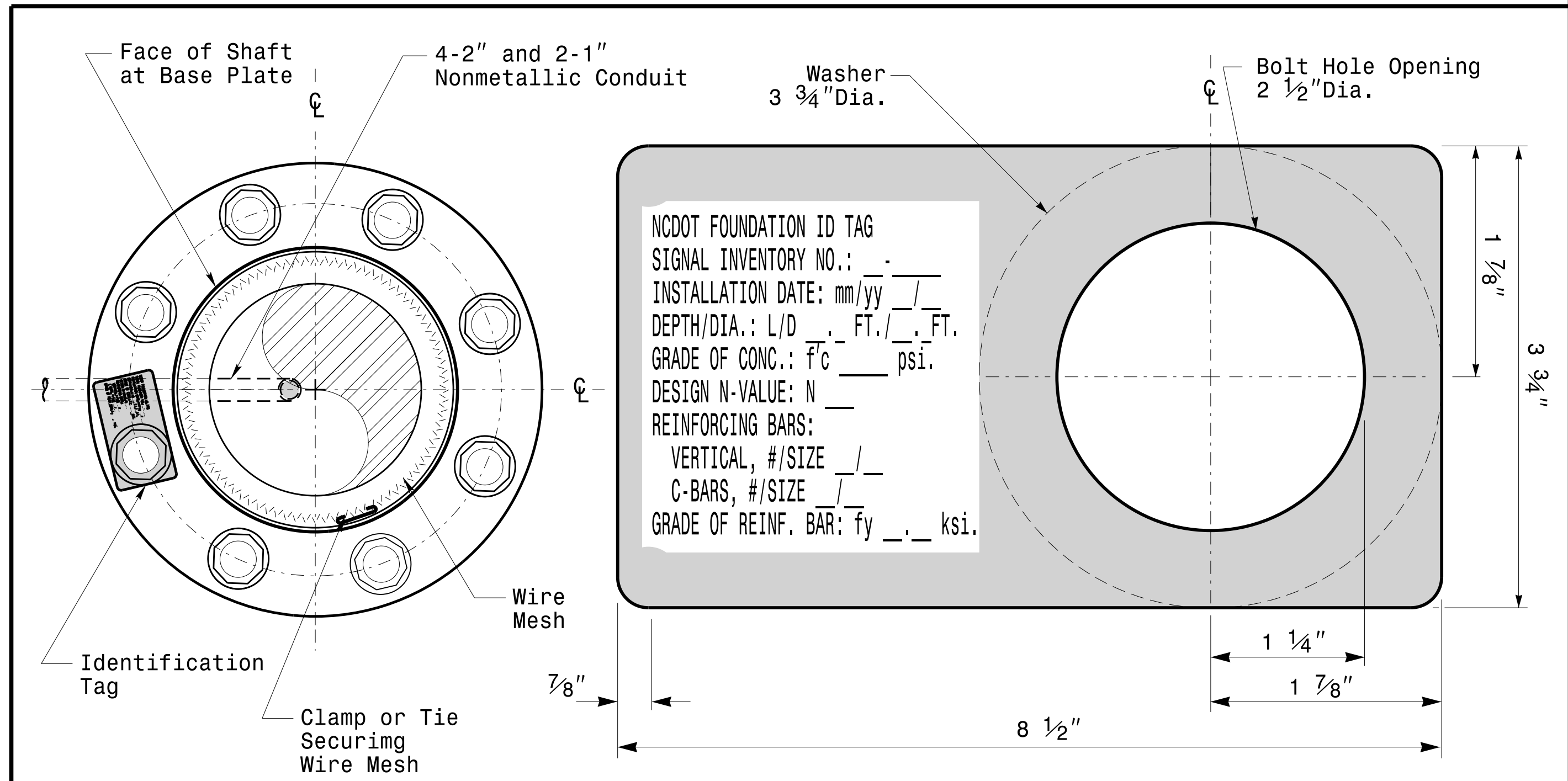
Typical Foundation Anchor Bolt Details
(Reinforcing Cage Not Shown for Clarity)

"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

General Notes:

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



Concrete Foundation Identification Tag Details

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

Detail-A

	Construction Details For Foundations		
	PLAN DATE: OCTOBER 2018 PREPARED BY: N. BITTING	DESIGNED BY: C.B. COGDILL REVIEWED BY: D.C. SARKAR	
750 N. Greenfield Pkwy, Garner, NC 27529	REV. NO. 1 COMMENTS: Revised Foundation Tag Details	INIT. N.B. DATE: 5/11/2015	SEAL D. C. SARKAR DATE: 10/11/2017

Construction Details - Foundations

11-001-2017-08:33T 13560W115 510n1s45:gnal Design Section Eastern Region 04/16/2014 Sig.M7 Std. Construction Detail (s-Strain Poles.dgn) P21

SOIL CONDITION

PROJECT ID. NO.	SHEET NO.
R-2566BA	Sig.M8

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

General Notes:

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

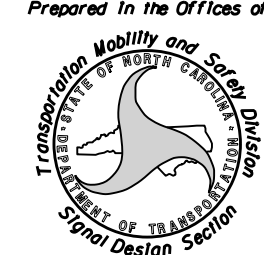
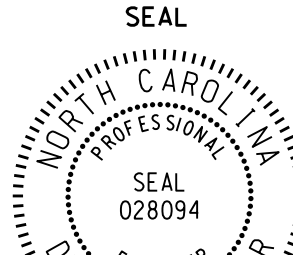
Foundation Selection:

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

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

Standard Strain Pole Foundation-All Soil Condition

I:\Projects\2017_08-10_Signals\2017_08-10_Signals\Design\Section\Eastern Region\MM_Sheets\2016\2014_Sig.M8_Std_Strain Pole Found-Saturated Soil_Condition.dgn

	<p>Standard Strain Pole Foundation for All Soil Conditions</p> <p>PLAN DATE: OCTOBER 2017 DESIGNED BY: C.B. COGDILL PREPARED BY: N. BITTING REVIEWED BY: D.C. SARKAR</p>									
SCALE: 0 NA NONE	REVISIONS: <table border="1" style="font-size: x-small; border-collapse: collapse;"> <tr> <th>NO.</th> <th>DATE</th> <th>INIT.</th> <th>DESCRIPTION</th> </tr> <tr> <td>1</td> <td>7/12/2015</td> <td>N.B.</td> <td>Changed "Foundation Depth" to "Drilled Pier Length" in Conc. Egn.</td> </tr> </table>	NO.	DATE	INIT.	DESCRIPTION	1	7/12/2015	N.B.	Changed "Foundation Depth" to "Drilled Pier Length" in Conc. Egn.	Documented by: <i>D. C. SARKAR</i> DATE: 10/11/2017
NO.	DATE	INIT.	DESCRIPTION							
1	7/12/2015	N.B.	Changed "Foundation Depth" to "Drilled Pier Length" in Conc. Egn.							