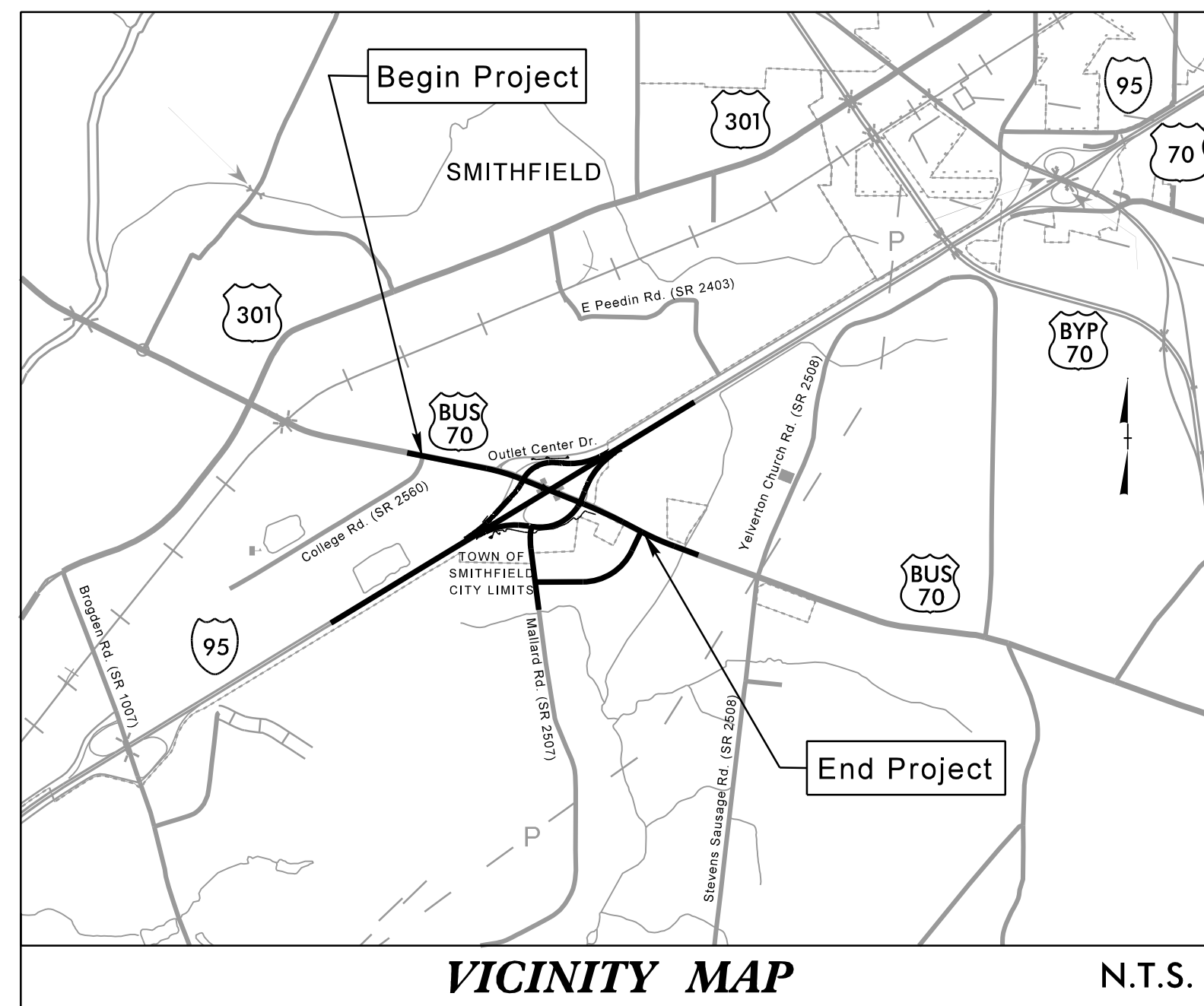


STATE OF NORTH CAROLINA  
DIVISION OF HIGHWAYS

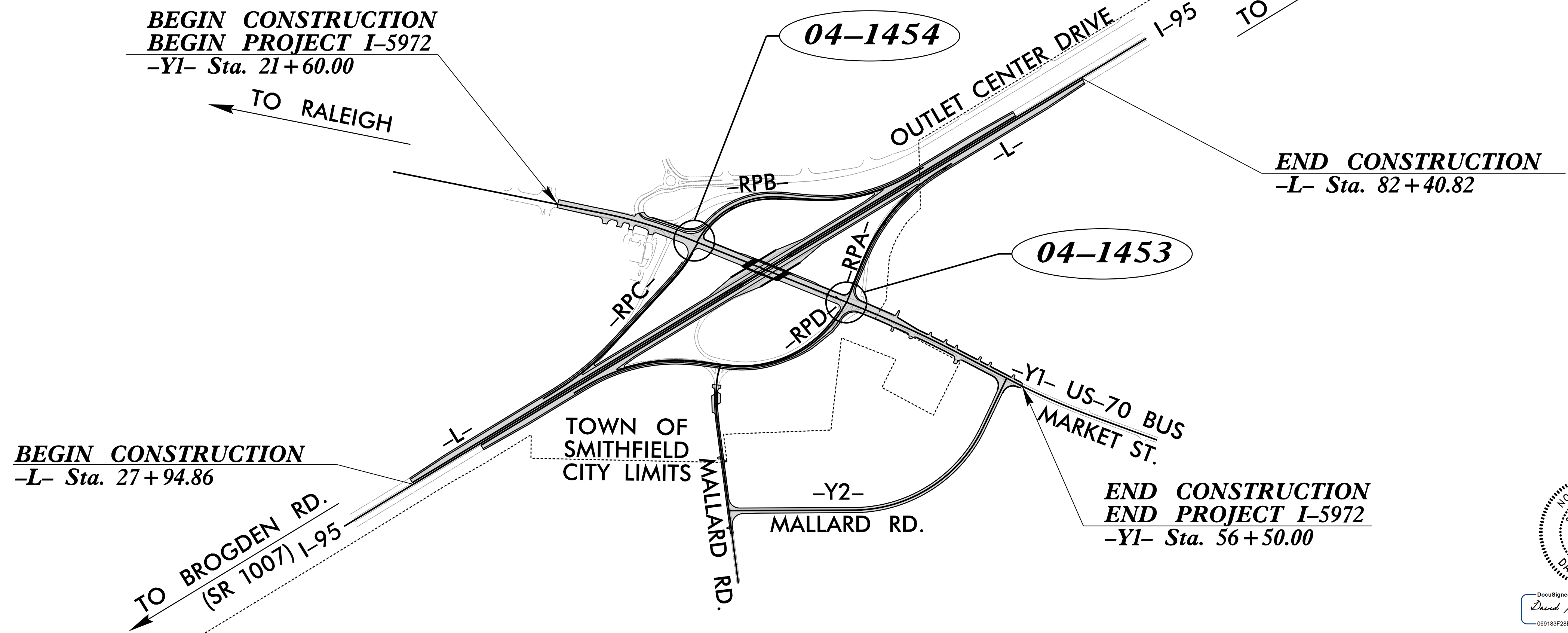
# JOHNSTON COUNTY

**LOCATION: I-95 AND US-70 BUSINESS, (E. MARKET STREET), EXIT 95 INTERCHANGE  
FROM OUTLET CENTER DR. TO WEST OF YELVERTON GROVE RD.  
TYPE OF WORK: TRAFFIC SIGNALS AND SIGNAL COMMUNICATIONS**



**TIP PROJECT: I-5972**

**CONTRACT: C203991**



**DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED**

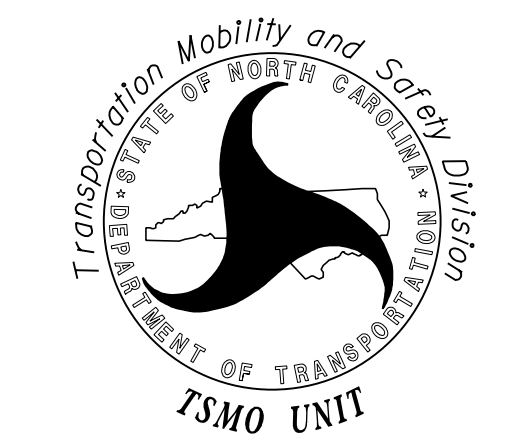
**Index of Plans**

Sheet #	Reference #	Location/Description
Sig. 1	-----	Title Sheet
Sig. 1.1	-----	Standard Plate Sheets
Sig. 2.0-7.1	04-1453	US 70 Business at I-95 NB Ramps
Sig. 8.0-8.1	04-1454	US 70 Business at I-95 SB Ramps
Sig. M1-M8	N/A	Standard Drawings for Metal Poles
SCP. 1-11	N/A	Signal Communication Plans

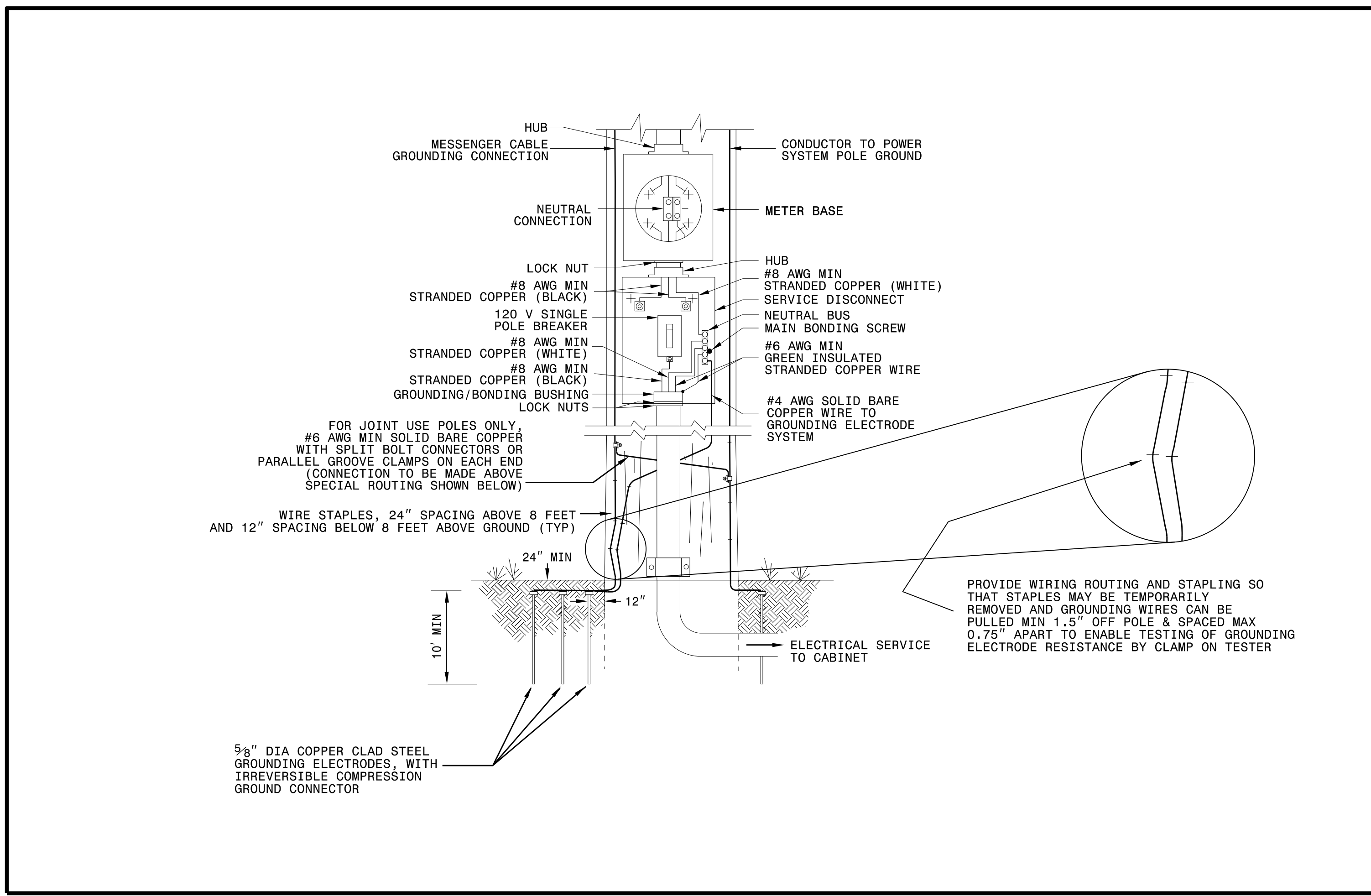
**INTELLIGENT TRANSPORTATION AND SIGNALS UNIT**

Contacts:  
  
**Zachary Little, P.E.** - Eastern Region Signals Engineer  
**D. Todd Joyce, P.E.** - Signal Equipment Design Review Engineer  
**Gregory A. Green** - Signal Communications Project Engineer

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



9/19/2023 R:\Traffic\Signals\Design\Signals\I5972\_Sig\_1.tsh.dgn dsedr5



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

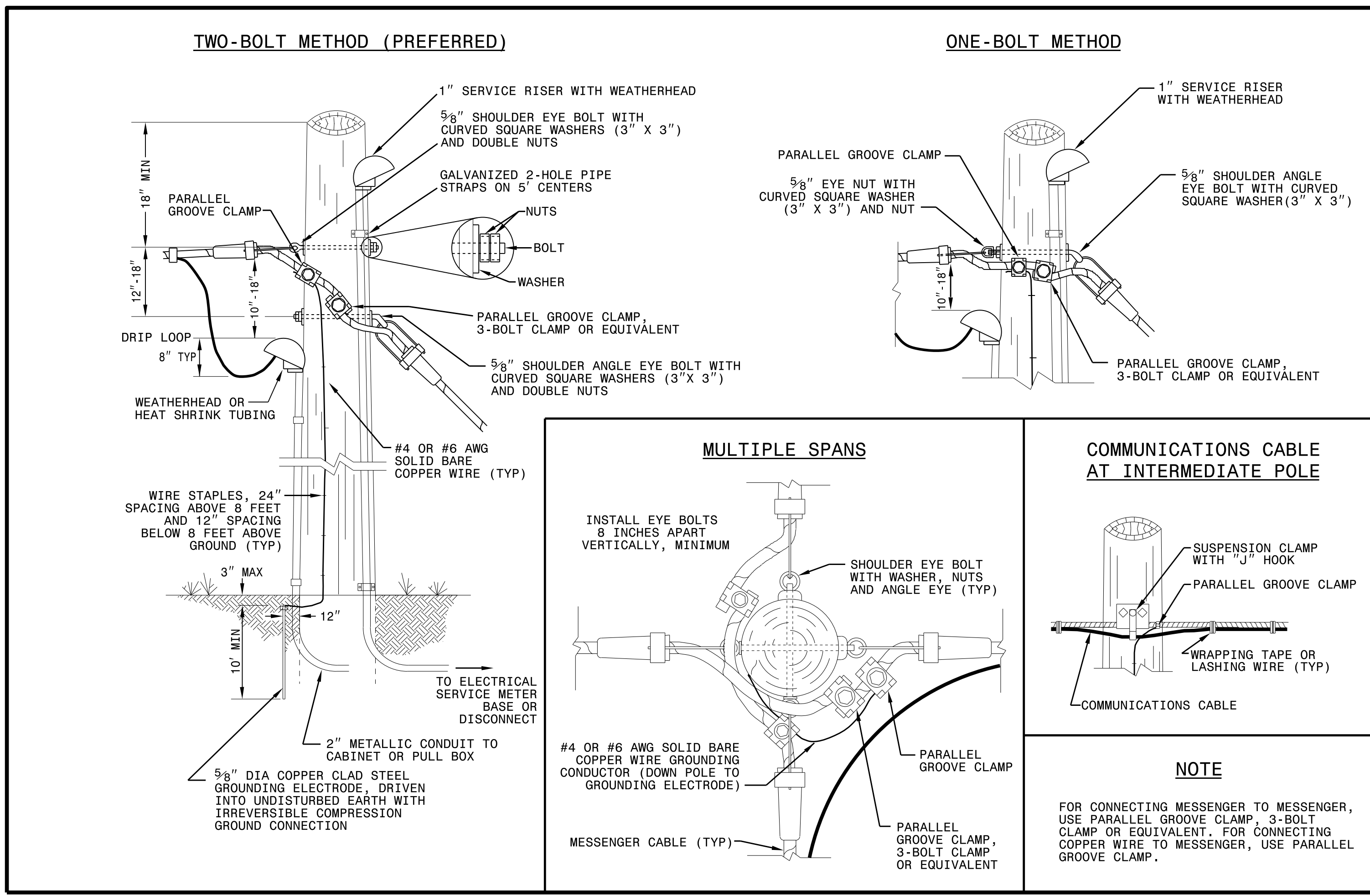
ENGLISH STANDARD DRAWING FOR

**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

DocuSigned by:  
*Mohd Aslami*

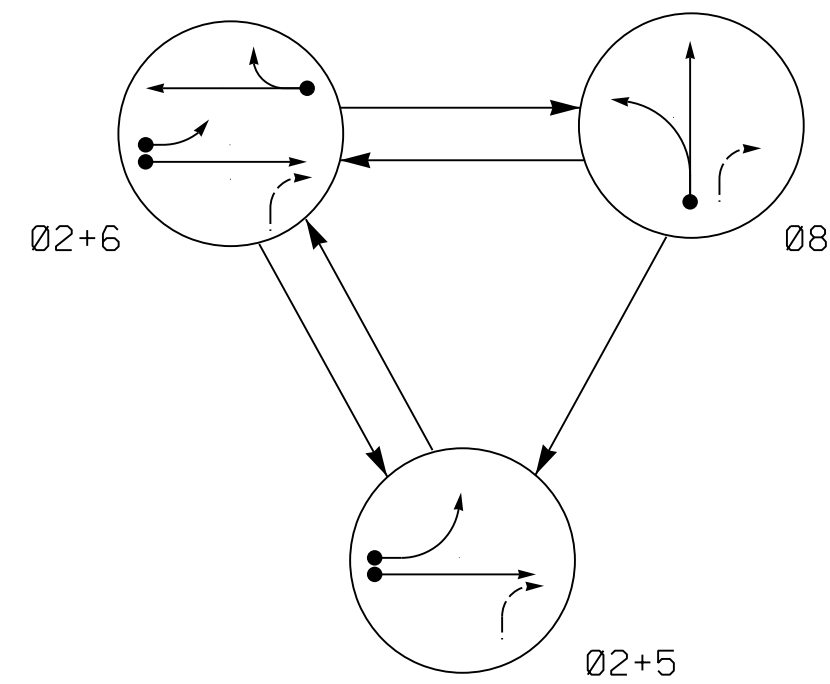
10/11/2017

DATE

750 N. Greenfield Parkway  
Garner, NC 27529

11-0CT-2017\_08:56  
U:\2018\_S14\_Drawing\Plate\_Sheets\2018\_Plate\_Sheet.dgn  
r:\rough

PHASING DIAGRAM



SIGNAL FACE	PHASE			
	02+5	02+6	08	FLASH
21,22	G	G	R	Y
51	-	F	R	Y
61,62	R	G	R	Y
81,82	R	R	G	R

MAXTIME DETECTOR INSTALLATION CHART										
DETECTOR					PROGRAMMING					
ZONE	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL CALL	DELAY DURING GREEN
2A	6X6	70	*	*	2	-	-	X	X	*
5A	6X40	0	*	*	5	15.0	-	X	X	*
6A	6X6	70	*	*	2	-	-	X	X	*
8A	6X40	0	*	*	8	-	-	X	X	*

\* VIDEO DETECTION ZONE

3 Phase Fully Actuated (Isolated)

NOTES

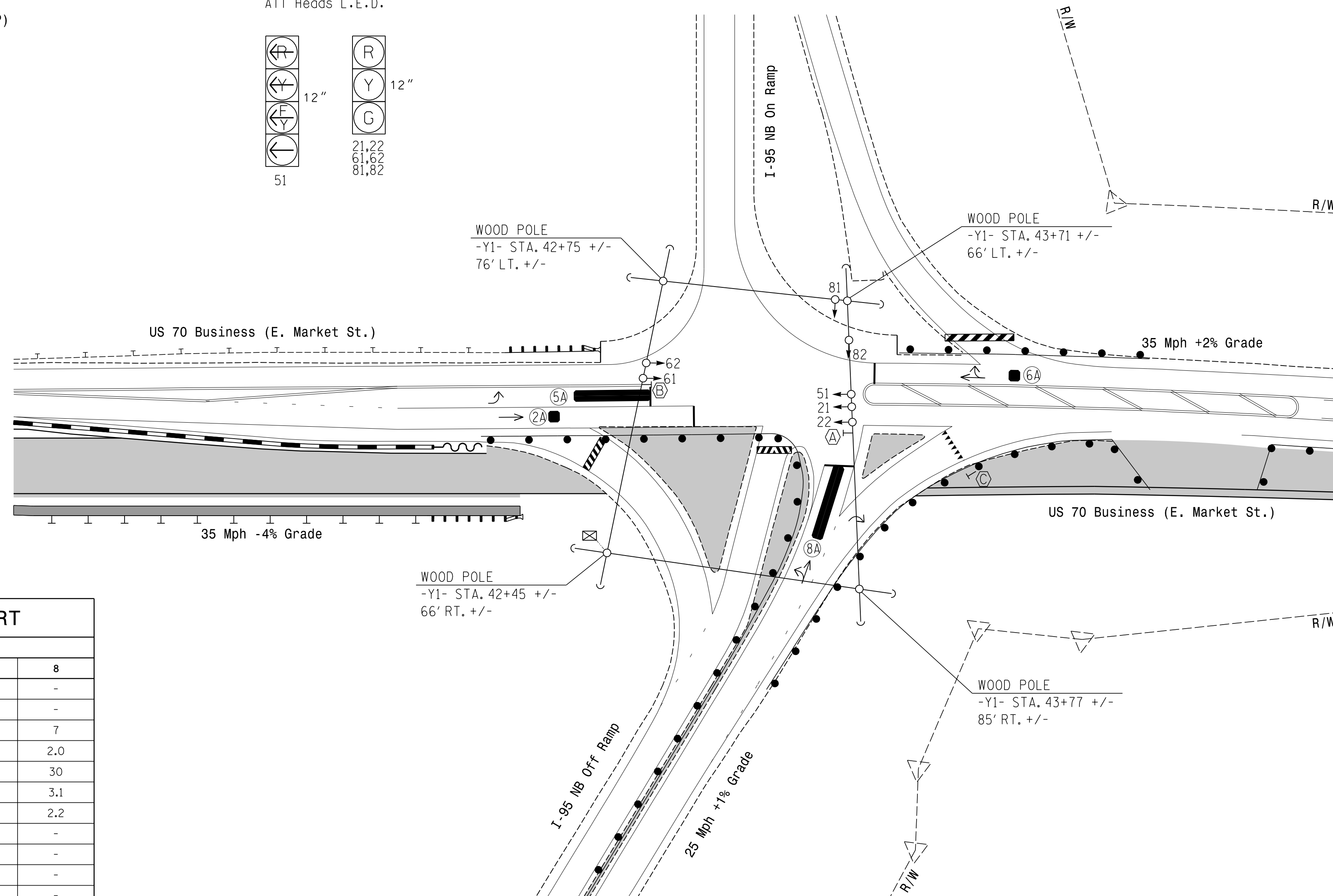
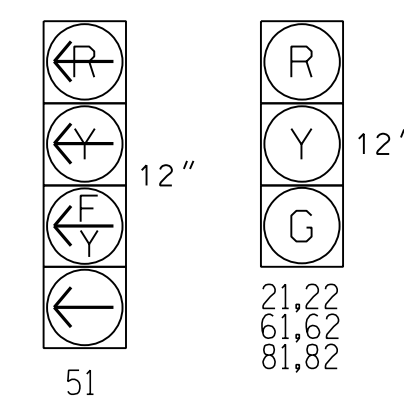
1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 5 may be lagged.
4. Set all detector units to presence mode.
5. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
6. See TMP for pavement marking details.
7. This intersection uses video detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.

PHASING DIAGRAM DETECTION LEGEND

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

SIGNAL FACE I.D.

All Heads L.E.D.



FEATURE	PHASE			
	2	5	6	8
Walk *	-	-	-	-
Ped Clear *	-	-	-	-
Min Green	10	7	10	7
Passage *	3.0	2.0	3.0	2.0
Max I *	60	20	60	30
Yellow Change	4.1	3.0	4.1	3.1
Red Clear	2.4	1.4	2.4	2.2
Added Initial *	-	-	-	-
Maximum Initial *	-	-	-	-
Time Before Reduction *	-	-	-	-
Time To Reduce *	-	-	-	-
Minimum Gap	-	-	-	-
Non Lock Detector	-	X	-	X
Vehicle Recall	MIN RECALL	-	MIN RECALL	-
Dual Entry	-	-	-	-

\* These values may be field adjusted. Do not adjust Min Green and Passage 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                           | ○ N/A    |
| ○ Pedestrian Signal Head With Push Button & Sign | ○ N/A    |
| ○ Signal Pole with Guy                           | ○ N/A    |
| ○ Signal Pole with Sidewalk Guy                  | ○ N/A    |
| ○ Inductive Loop Detector                        | ○ N/A    |
| ○ Controller & Cabinet                           | ○ N/A    |
| ○ Junction Box                                   | ○ N/A    |
| ○ 2-in Underground Conduit                       | ○ N/A    |
| ○ Right of Way                                   | ○ N/A    |
| ○ Directional Arrow                              | ○ N/A    |
| ○ No Right Turn Sign (R3-1)                      | ○ A      |
| ○ No Left Turn Sign (R3-2)                       | ○ B      |
| ○ "YIELD" Sign (R1-2)                            | ○ C      |
| ○ Construction Zone Drums                        | ○ N/A    |
| ○ Construction Zone                              | ○ N/A    |
| ○ Video Detection Area                           | ○ N/A    |
| ○ Barricades                                     | ○ N/A    |
| ○ Portable Concrete Barrier                      | ○ N/A    |

New Location - Temp Design 1 - TMP Phase II Steps 1-2

**RK&K**  
 P: (919) 878-9560  
 8801 Six Forks Road Suite 700 | Raleigh, North Carolina 27615-2965  
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 Engineers | Construction Managers | Planners | Scientists  
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Prepared for the Offices of:  
  
 TRANSPORTATION MOBILITY AND SAFETY DIVISION  
 STATE OF NORTH CAROLINA  
 SIGNAL DESIGN SECTION

**US 70 Business (E. Market St.)  
 at  
 I-95 NB Ramps**

Division 04 Johnston County Smithfield  
 PLAN DATE: September 2023 REVIEWED BY: DT Sears  
 PREPARED BY: WP Erickson-Jones REVIEWED BY:

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

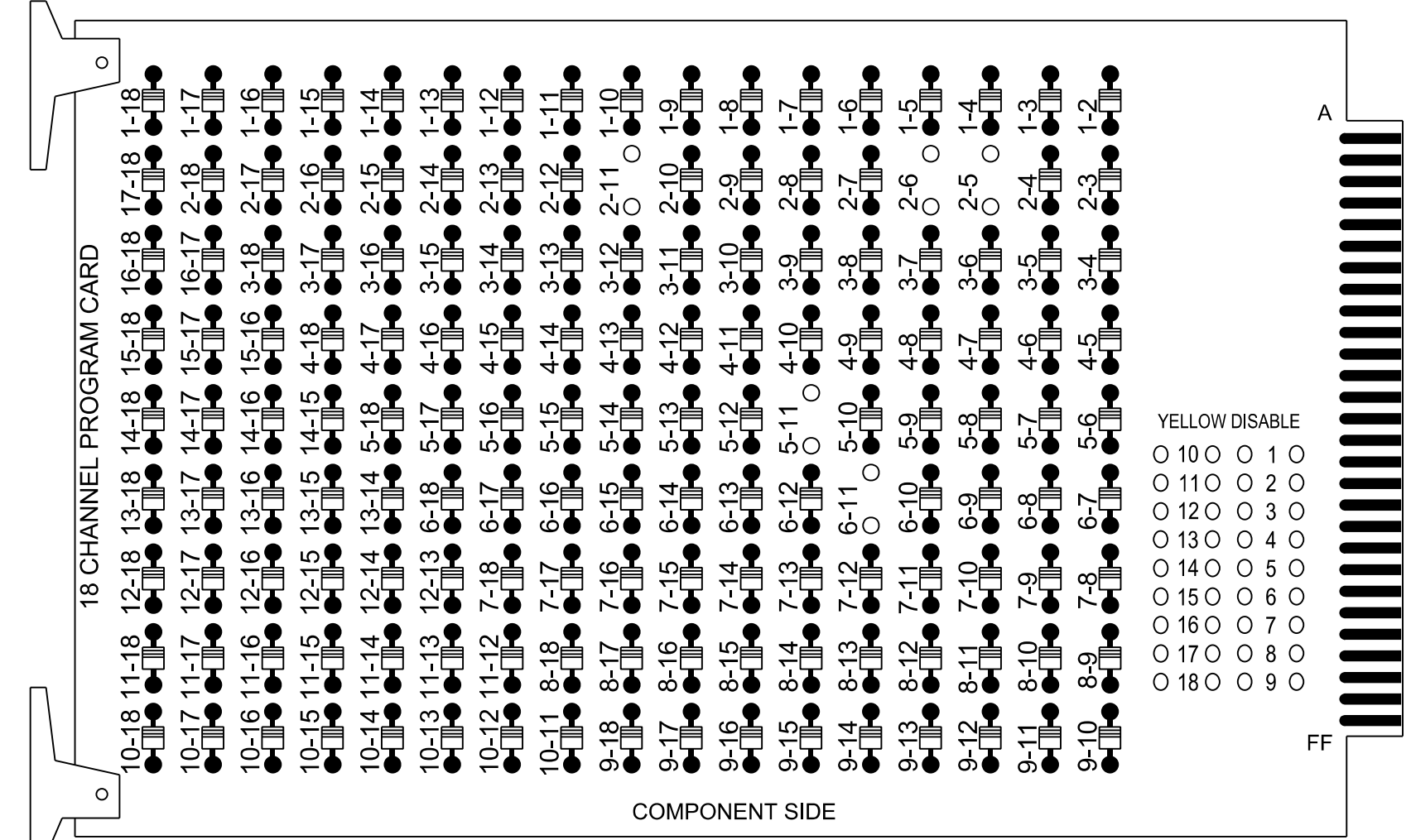
SEAL  
 NORTH CAROLINA PROFESSIONAL ENGINEER  
 SEAL 044558  
 DAVID T. SEARS

DocuSigned by:  
 David T. Sears  
 9/19/2023  
 SIGNATURE DATE  
 SIG. INVENTORY NO. 04-145311

### 18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

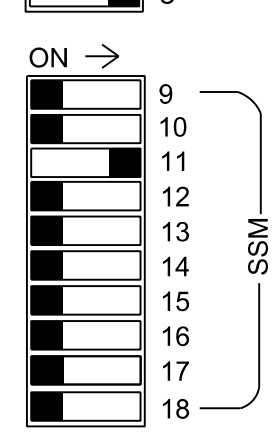
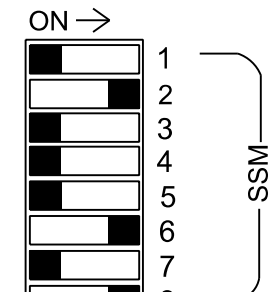
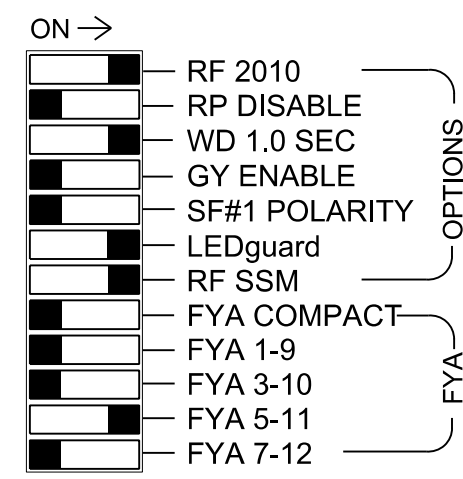
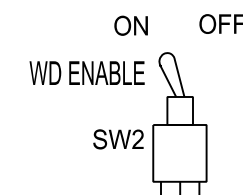
REMOVE DIODE JUMPERS 2-5, 2-6, 2-11, 5-11 AND 6-11.



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 the Red Enable is active at all times during normal operation.
- Integrate monitor with Ethernet network in cabinet.



■ = 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 plan.
- Program controller to start up in phase 2 Green No Walk and 6 Green No Walk.
- If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.

### EQUIPMENT INFORMATION

Controller.....2070LX  
 Cabinet.....332 w/ Aux  
 Software.....Q-Free MAXTIME  
 Cabinet Mount.....Base  
 Output File Positions.....18 With Aux. Output File  
 Load Switches Used.....S2,S7,S8,S11,AUX S4  
 Phases Used.....2,5,6,8  
 Overlap "1".....NOT USED  
 Overlap "2".....NOT USED  
 Overlap "3".....\*  
 Overlap "4".....NOT USED

\*See overlap programming detail on this sheet

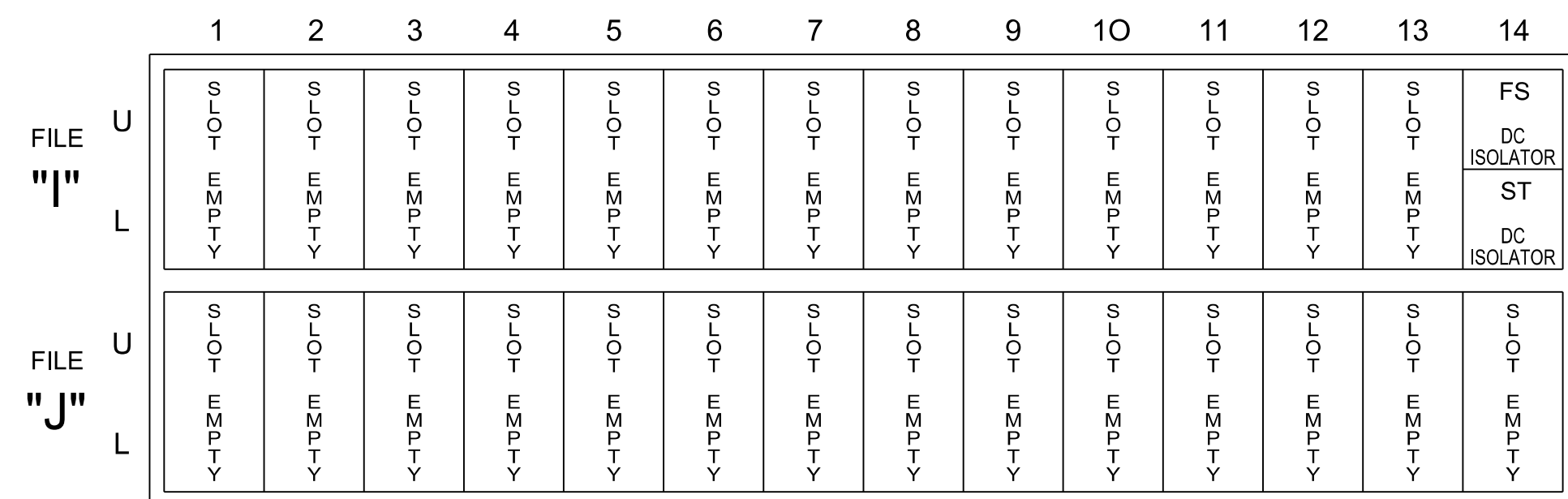
### SIGNAL HEAD HOOK-UP CHART

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	
GMU 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	OL1	OL2	SPARE	OL3	OL4	SPARE	
SIGNAL HEAD NO.	NU	21,22	NU	NU	NU	NU	51	61,62	NU	NU	81,82	NU	NU	NU	NU	51	NU	NU	
RED		128						134		107									
YELLOW		129					*	135		108									
GREEN		130						136		109									
RED ARROW																		A114	
YELLOW ARROW																			A115
FLASHING YELLOW ARROW																			A116
GREEN ARROW								133											

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

### INPUT FILE POSITION LAYOUT

(front view)



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

FS = FLASH SENSE  
 ST = STOP TIME

### OVERLAP PROGRAMMING

Front Panel  
 Main Menu > Controller > Overlap > Overlap Parameters/Overlap Timings

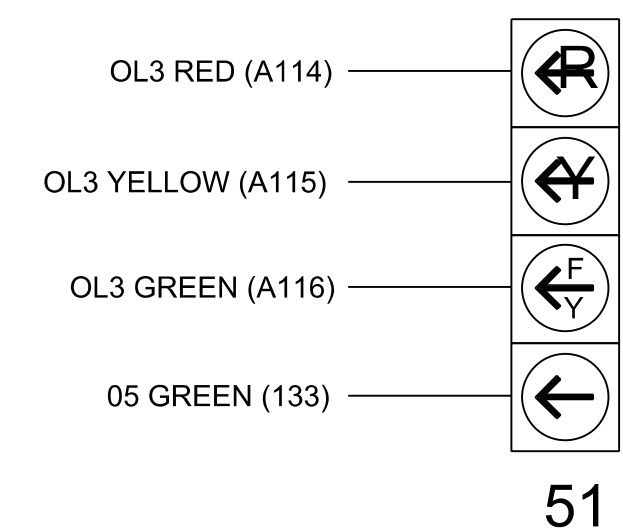
Web Interface  
 Home > Controller > Overlap Configuration > Overlaps

Overlap Plan 1

Overlap	1	2	3	4
Type	OFF	OFF	FYA 4 - Section	OFF
Included Phases	-	-	6	-
Modifier Phases	-	-	5	-
Modifier Overlaps	-	-	-	-
Trail Green	-	-	0	-
Trail Yellow	-	-	0.0	-
Trail Red	-	-	0.0	-

### FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)

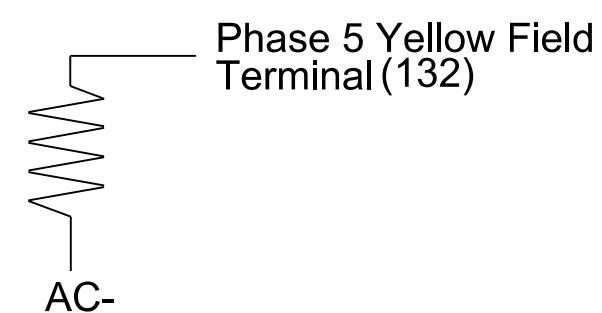


THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 04-1453T1  
 DESIGNED: September 2023  
 SEALED: September 19, 2023  
 REVISED: N/A

### LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

ACCEPTABLE VALUES	
Value (ohms)	Wattage
1.5K - 1.9K	25W (min)
2.0K - 3.0K	10W (min)



### SPECIAL DETECTOR NOTE

Install a video detection system for vehicle detection for zones 2A, 5A, 6A and 8A. Perform installation according to manufacturer's directions and NCDOT engineer -approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.

Electrical Detail - Temp Design 1 - TMP Phase II Steps 1-2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for the Offices of:

750 N. Greenfield Pkwy, Garner, NC 27529

**US 70 Business (E. Market St.)**  
 at  
**I-95 NB Ramps**

Division 04 Johnston County Smithfield

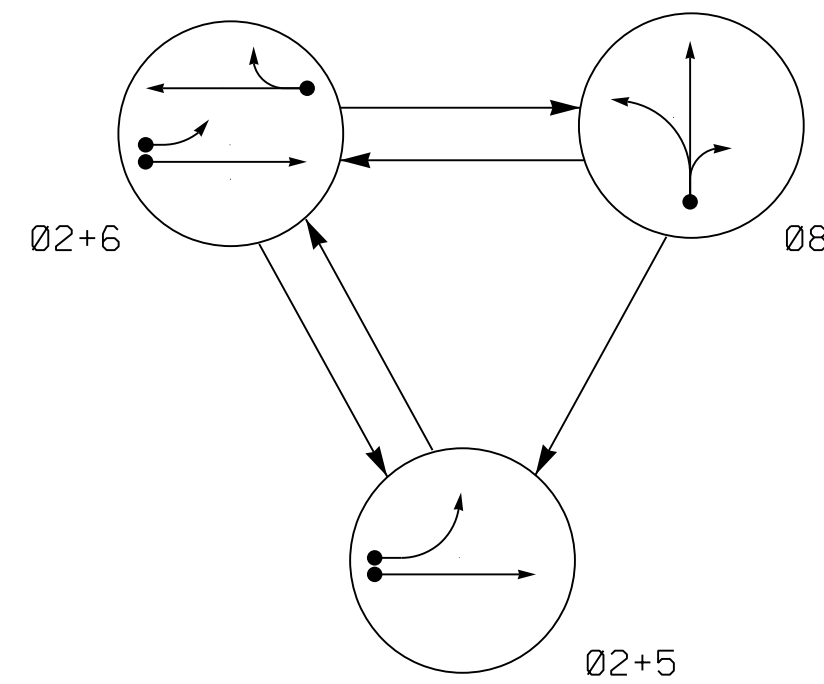
PLAN DATE: September 2023 REVIEWED BY: DT Sears

PREPARED BY: WP Erickson-Jones REVIEWED BY:

SEAL

9/19/2023

PHASING DIAGRAM



SIGNAL FACE	PHASE			
	02+5	02+6	08	FLASH
21,22	G	G	R	Y
51	-	F	R	Y
61,62	R	G	R	Y
81,82	R	R	G	R

MAXTIME DETECTOR INSTALLATION CHART											
DETECTOR					PROGRAMMING						
ZONE	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	URNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL CALL	DELAY DURING GREEN	NEW CARD
2A	6X6	70	*	*	2	-	-	X	X	-	*
5A	6X40	0	*	*	5	15.0	-	X	X	-	*
6A	6X6	70	*	*	6	-	-	X	X	-	*
8A	6X40	0	*	*	8	10.0	-	X	X	-	*

\* VIDEO DETECTION ZONE

3 Phase Fully Actuated (Isolated)

NOTES

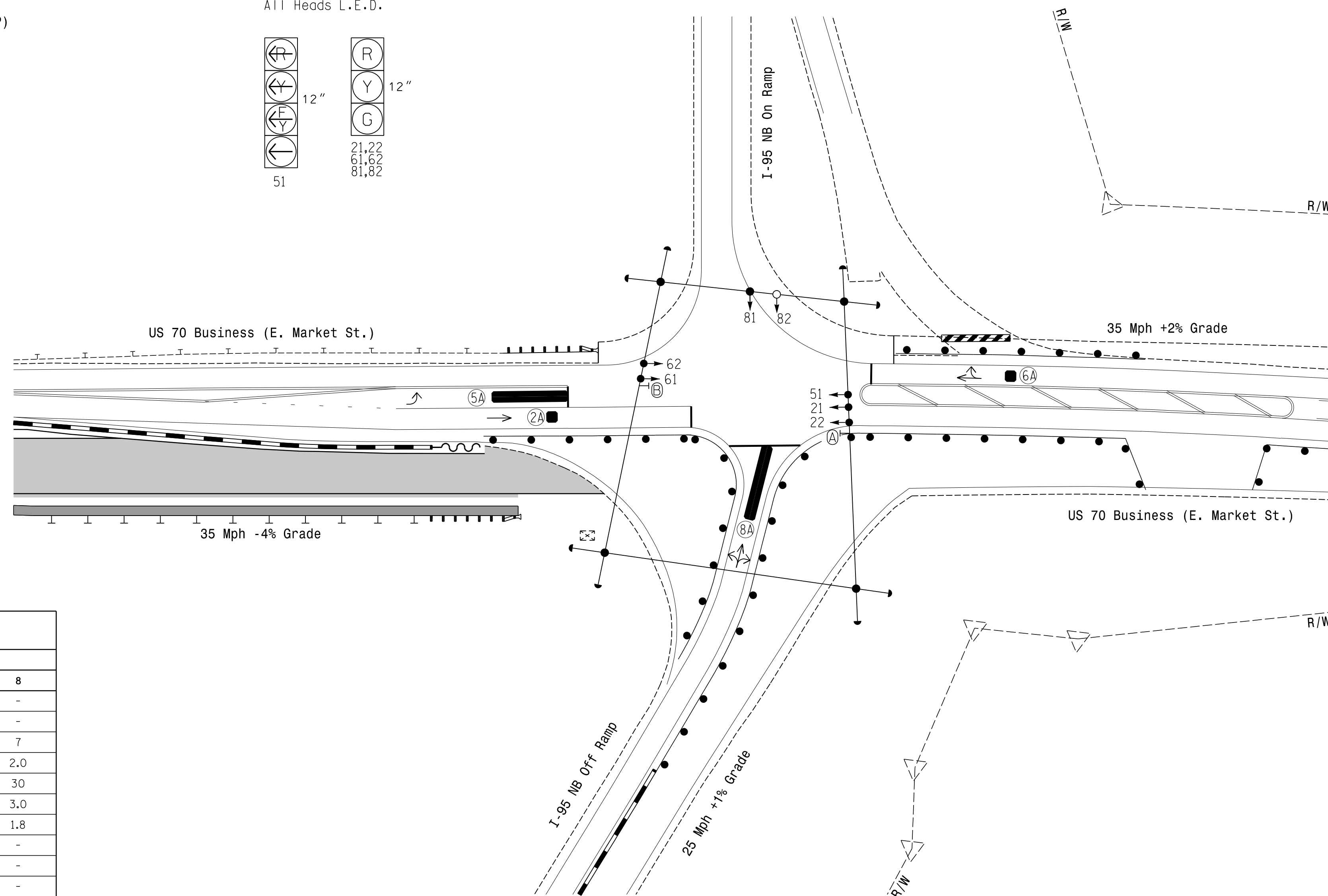
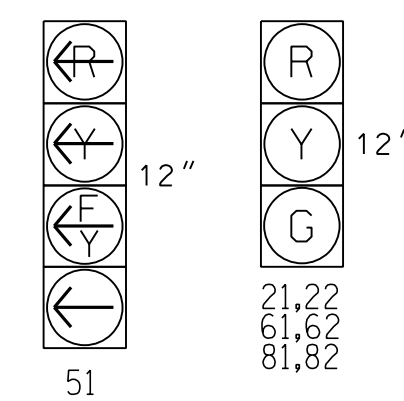
1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 5 may be lagged.
4. Reposition existing signal head numbered 81.
5. Set all detector units to presence mode.
6. See TMP for pavement marking details.
7. This intersection uses video detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.

PHASING DIAGRAM DETECTION LEGEND

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

SIGNAL FACE I.D.

All Heads L.E.D.



FEATURE	PHASE			
	2	5	6	8
Walk *	-	-	-	-
Ped Clear *	-	-	-	-
Min Green	10	7	10	7
Passage *	3.0	2.0	3.0	2.0
Max 1 *	60	20	60	30
Yellow Change	4.1	3.0	4.1	3.0
Red Clear	3.1	2.6	3.1	1.8
Added Initial *	-	-	-	-
Maximum Initial *	-	-	-	-
Time Before Reduction *	-	-	-	-
Time To Reduce *	-	-	-	-
Minimum Gap	-	-	-	-
Non Lock Detector	-	X	-	X
Vehicle Recall	MIN RECALL	-	MIN RECALL	-
Dual Entry	-	-	-	-

\* These values may be field adjusted. Do not adjust Min Green and Passage 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                         | - → N/A                         |
| ⊥ Sign   | ⊥ Sign                          |
| ⊥ Pedestrian Signal Head With Push Button & Sign | ⊥ Pedestrian Signal Head        |
| ○ Signal Pole with Guy                           | ● Signal Pole with Guy          |
| ⊥ Signal Pole with Sidewalk Guy                  | ⊥ Signal Pole with Sidewalk Guy |
| ⊥ Inductive Loop Detector                        | ⊥ Inductive Loop Detector       |
| ⊥ Controller & Cabinet                           | ⊥ Controller & Cabinet          |
| ⊥ Junction Box                                   | ⊥ Junction Box                  |
| ⊥ 2-in Underground Conduit                       | ⊥ 2-in Underground Conduit      |
| N/A Right of Way                                 | - - - Right of Way              |
| → Directional Arrow                              | → Directional Arrow             |
| (A) No Right Turn Sign (R3-1)                    | (A) No Right Turn Sign (R3-1)   |
| (B) No Left Turn Sign (R3-2)                     | (B) No Left Turn Sign (R3-2)    |
| Construction Zone Drums                          | Construction Zone Drums         |
| Construction Zone                                | Construction Zone               |
| Video Detection Area                             | Video Detection Area            |
| Barricades                                       | Barricades                      |
| Portable Concrete Barrier                        | Portable Concrete Barrier       |

New Location - Temp Design 2 - TMP Phase II Step 3

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Prepared for the Offices of:  
  
 750 N. Greenfield Pkwy, Garner, NC 27529

**US 70 Business (E. Market St.) at I-95 NB Ramps**  
 Division 04 Johnston County Smithfield  
 PLAN DATE: September 2023 REVIEWED BY: DT Sears  
 PREPARED BY: WP Erickson-Jones REVIEWED BY:  
 REVISIONS: INIT. DATE

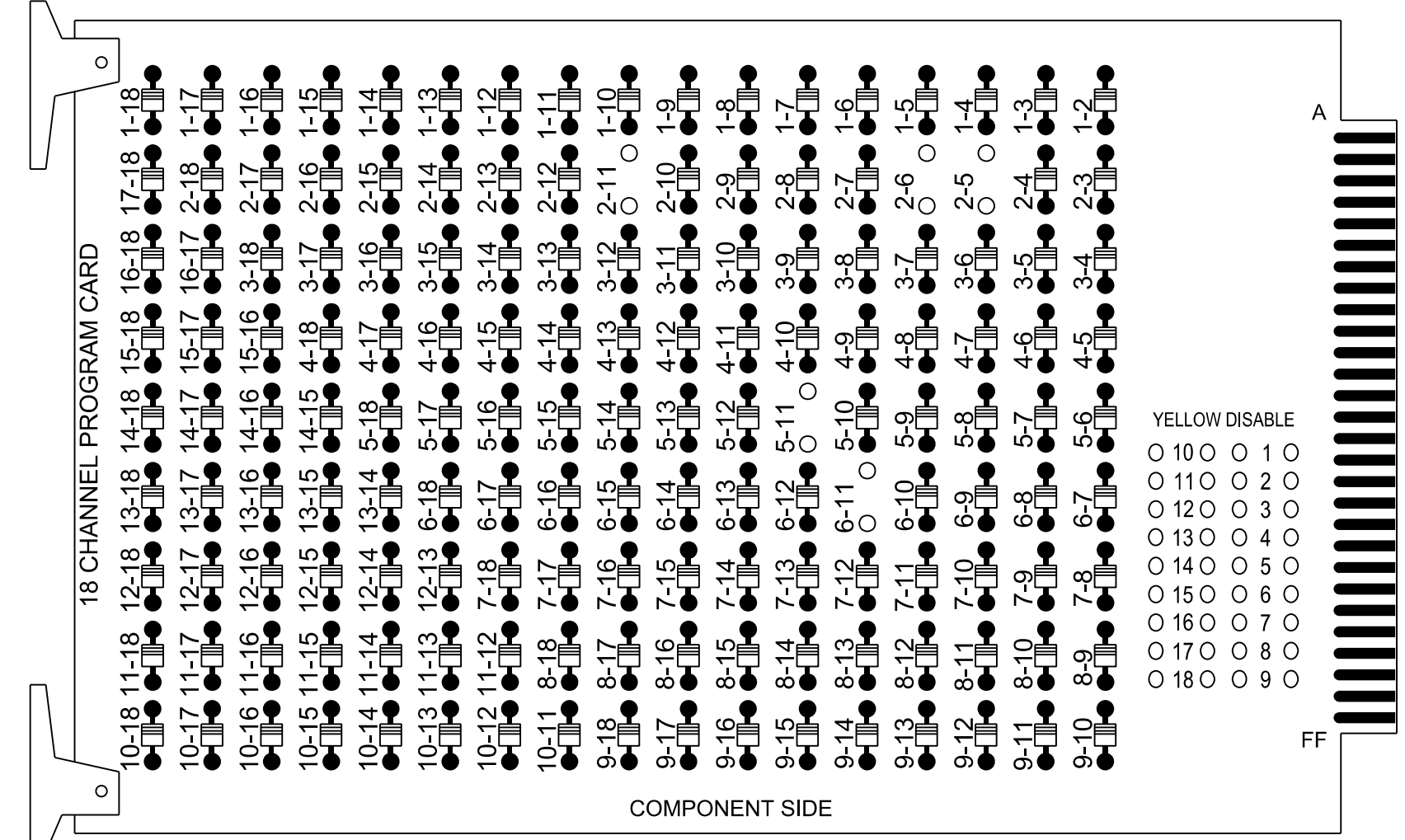
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL  
 NORTH CAROLINA PROFESSIONAL ENGINEER  
 SEAL 044558  
 DAVID T. SEARS  
 Documented by: David J. Sears 9/19/2023  
 SIGNATURE DATE  
 SIG. INVENTORY NO. 04-145312

### 18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

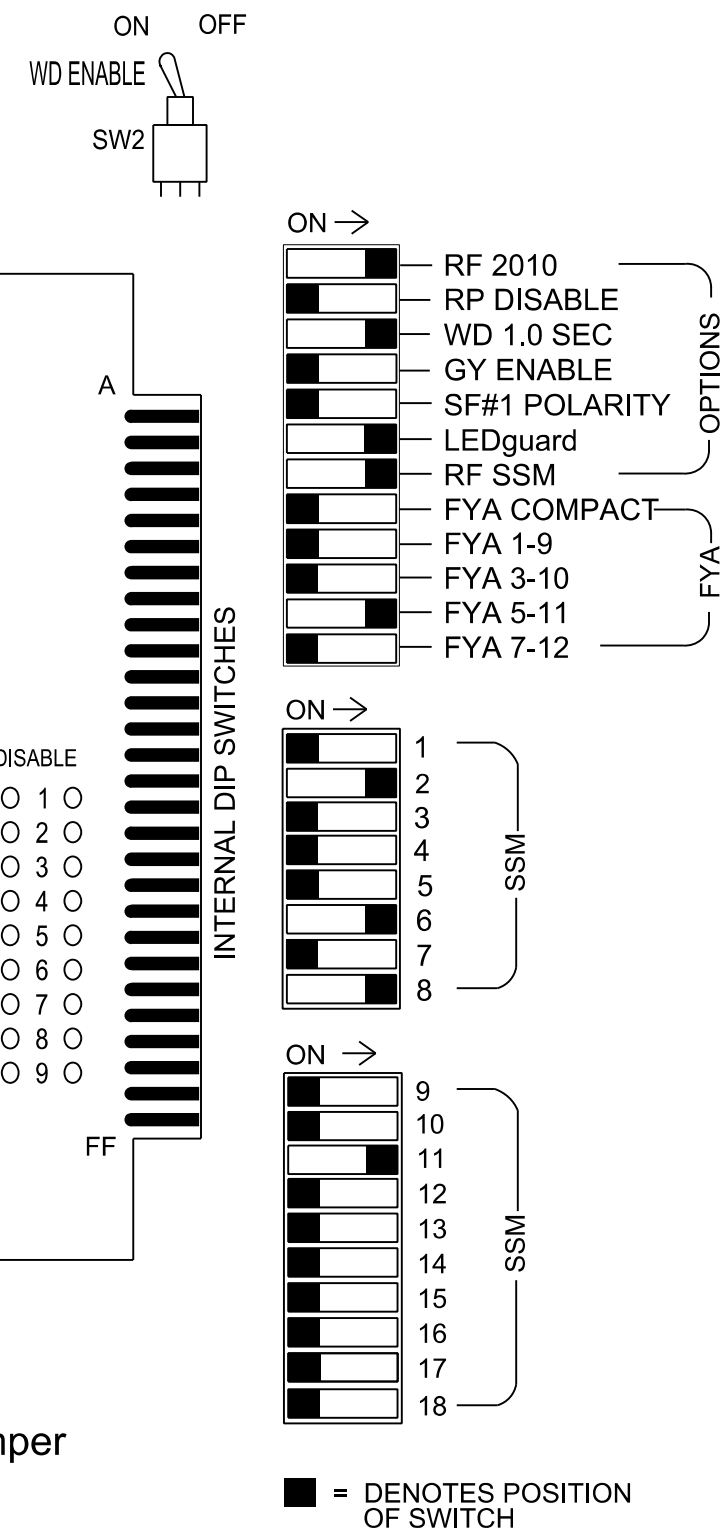
REMOVE DIODE JUMPERS 2-5, 2-6, 2-11, 5-11 AND 6-11.



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 the Red Enable is active at all times during normal operation.
- Integrate monitor with Ethernet network in cabinet.



### 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 plan.
- Program controller to start up in phase 2 Green No Walk and 6 Green No Walk.
- If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.

### EQUIPMENT INFORMATION

Controller.....2070LX  
 Cabinet.....332 w/ Aux  
 Software.....Q-Free MAXTIME  
 Cabinet Mount.....Base  
 Output File Positions.....18 With Aux. Output File  
 Load Switches Used.....S2,S7,S8,S11,AUX S4  
 Phases Used.....2,5,6,8  
 Overlap "1".....NOT USED  
 Overlap "2".....NOT USED  
 Overlap "3".....\*  
 Overlap "4".....NOT USED

\*See overlap programming detail on this sheet

### 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	
GMU 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	OL1	OL2	SPARE	OL3	OL4	SPARE	
SIGNAL HEAD NO.	NU	21,22	NU	NU	NU	NU	51	61,62	NU	NU	81,82	NU	NU	NU	NU	51	NU	NU	
RED		128						134		107									
YELLOW		129					*	135		108									
GREEN		130						136		109									
RED ARROW																		A114	
YELLOW ARROW																			A115
FLASHING YELLOW ARROW																			A116
GREEN ARROW								133											

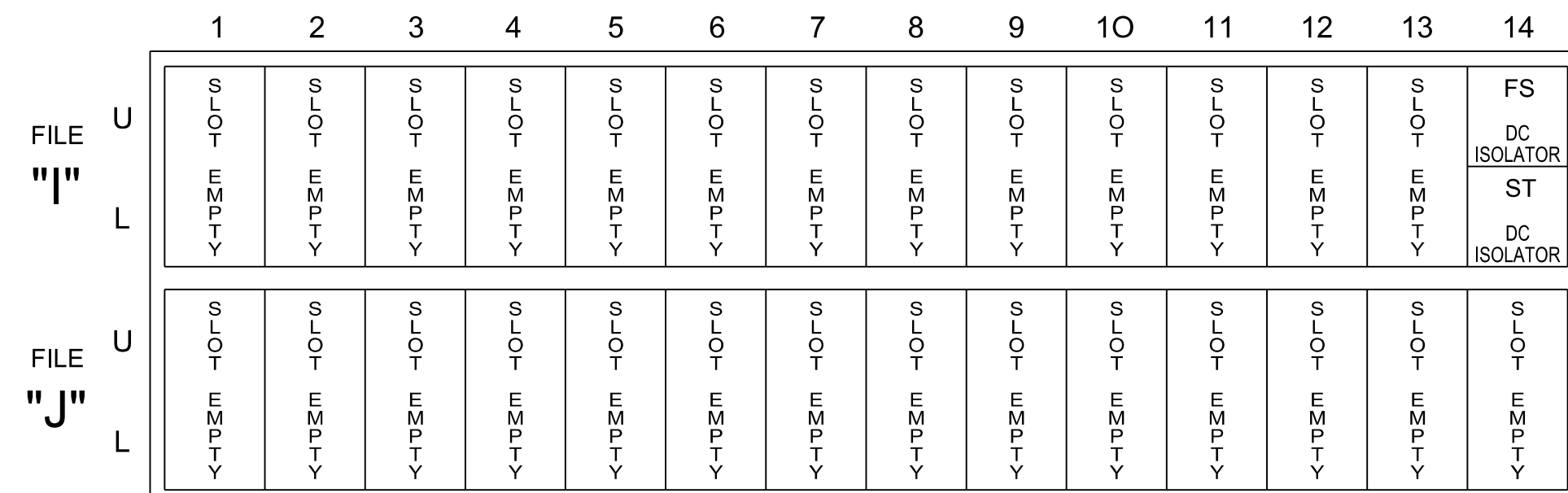
NU = Not Used

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

\*See pictorial of head wiring in detail this sheet.

### INPUT FILE POSITION LAYOUT

(front view)



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

FS = FLASH SENSE  
 ST = STOP TIME

### OVERLAP PROGRAMMING

Front Panel  
 Main Menu > Controller > Overlap > Overlap Parameters/Overlap Timings

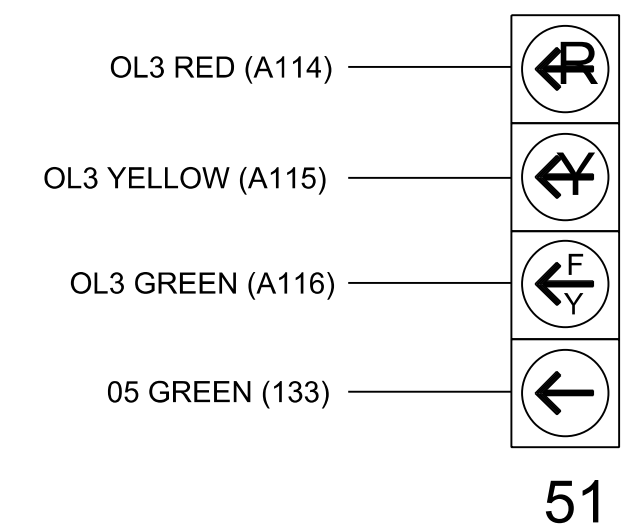
Web Interface  
 Home > Controller > Overlap Configuration > Overlaps

Overlap Plan 1

Overlap	1	2	3	4
Type	OFF	OFF	FYA 4 - Section	OFF
Included Phases	-	-	6	-
Modifier Phases	-	-	5	-
Modifier Overlaps	-	-	-	-
Trail Green	-	-	0	-
Trail Yellow	-	-	0.0	-
Trail Red	-	-	0.0	-

### FYA SIGNAL WIRING DETAIL

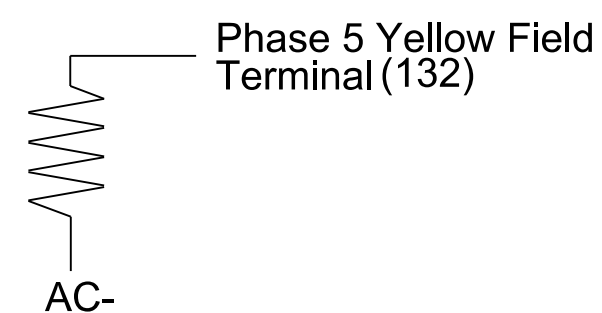
(wire signal heads as shown)



### LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

ACCEPTABLE VALUES	
Value (ohms)	Wattage
1.5K - 1.9K	25W (min)
2.0K - 3.0K	10W (min)



### SPECIAL DETECTOR NOTE

Install a video detection system for vehicle detection for zones 2A, 5A, 6A and 8A. Perform installation according to manufacturer's directions and NCDOT engineer -approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.

Electrical Detail - Temp Design 2 - TMP Phase II Step 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:  
 Prepared for the Offices of:  
  
 Mobility and Safety Division  
 750 N. Greenfield Pkwy, Garner, NC 27529

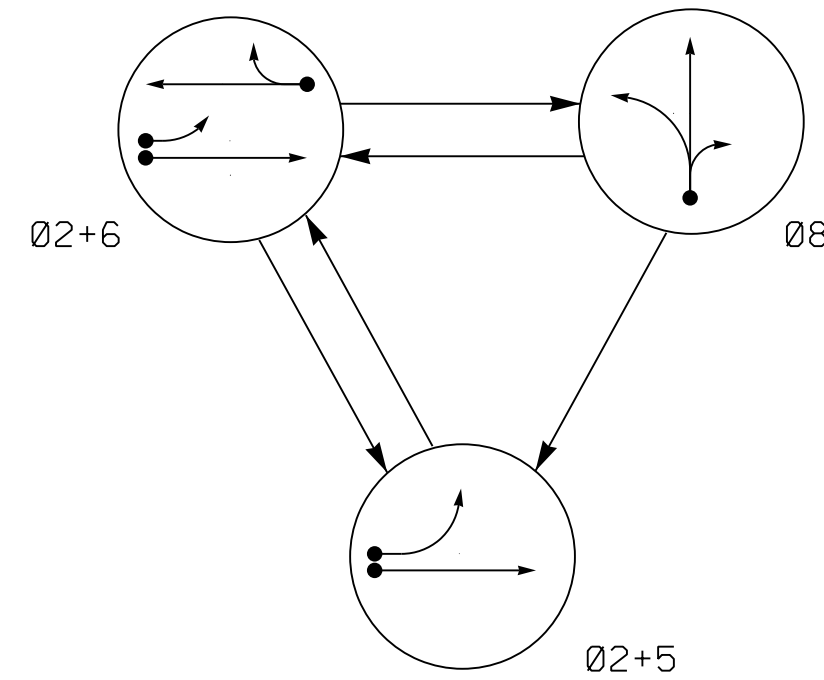
**US 70 Business (E. Market St.) at I-95 NB Ramps**

Division 04 Johnston County Smithfield  
 PLAN DATE: September 2023 REVIEWED BY: DT Sears  
 PREPARED BY: WP Erickson-Jones REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL  
  
 David T. Sears  
 9/19/2023  
 SIGNATURE DATE  
 SIG. INVENTORY NO. 04-1453T2

PHASING DIAGRAM



SIGNAL FACE	PHASE			
	02+5	02+6	08	FLASH
21,22	G	G	R	Y
51	←	←	←	←
61,62	R	G	R	Y
81,82	R	R	G	R

MAXTIME DETECTOR INSTALLATION CHART											
DETECTOR						PROGRAMMING					
ZONE	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	NEW CARD
2A	6X6	70	*	*	2	-	-	X	-	X	*
5A	6X40	0	*	*	5	15.0	-	X	-	X	*
6A	6X6	70	*	*	6	-	-	X	-	X	*
8A	6X40	0	*	*	8	10.0	-	X	-	X	*

\* VIDEO DETECTION ZONE

3 Phase Fully Actuated (Isolated)

NOTES

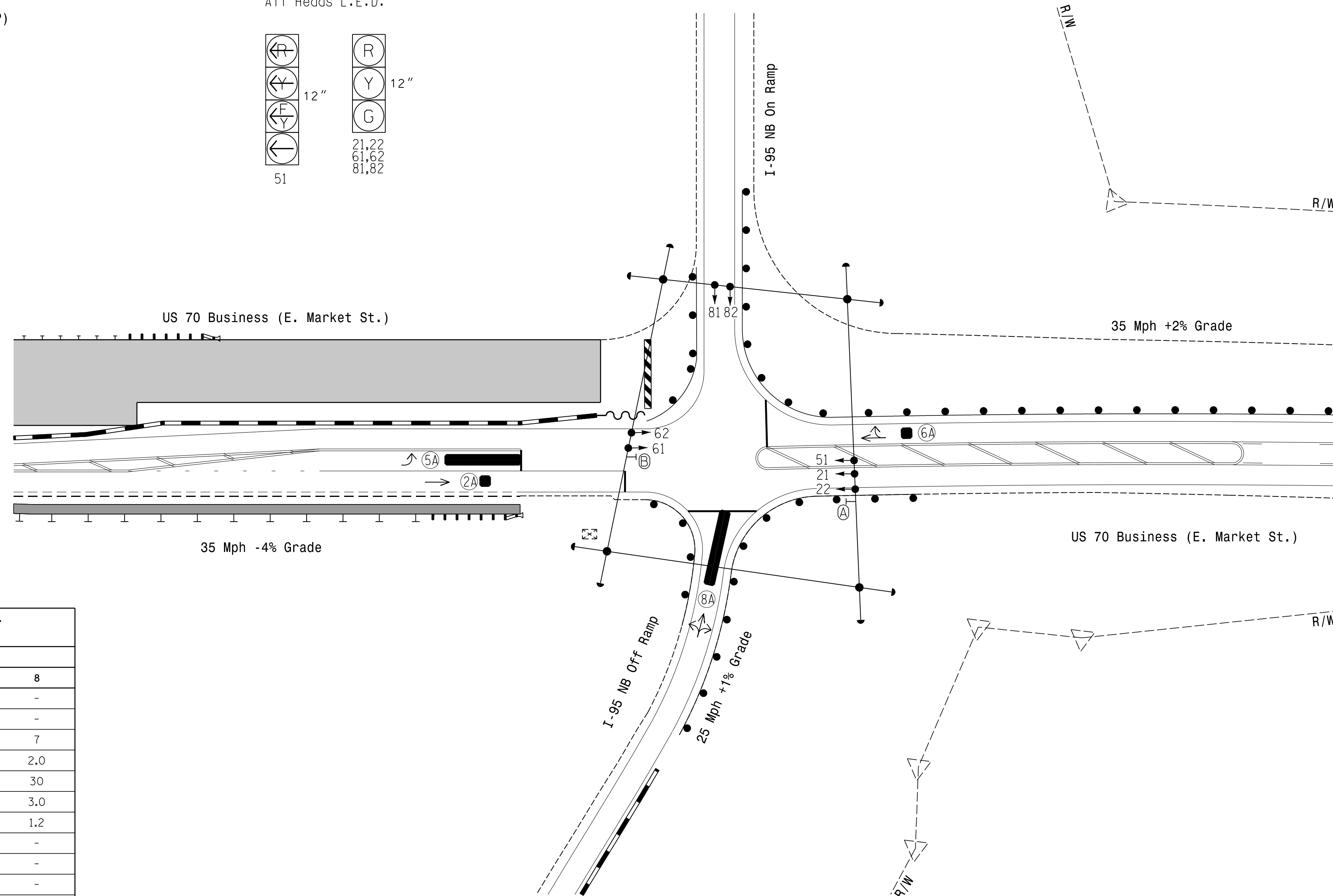
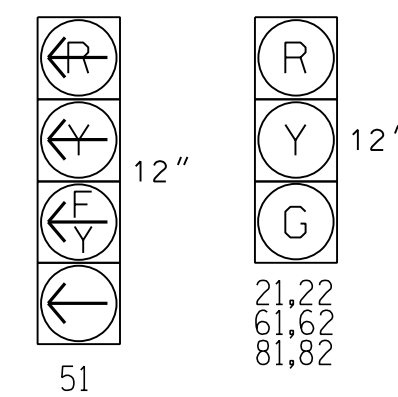
1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 5 may be lagged.
4. Reposition existing signal heads numbered 21,22,51,61,62,81, and 82.
5. Set all detector units to presence mode.
6. See TMP for pavement marking details.
7. This intersection uses video detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.

PHASING DIAGRAM DETECTION LEGEND

- ←● DETECTED MOVEMENT
- ← UNDETECTED MOVEMENT (OVERLAP)
- ← UN SIGNALIZED MOVEMENT
- ← PEDESTRIAN MOVEMENT

SIGNAL FACE I.D.

All Heads L.E.D.



FEATURE	PHASE			
	2	5	6	8
Walk *	-	-	-	-
Ped Clear *	-	-	-	-
Min Green	10	7	10	7
Passage *	3.0	2.0	3.0	2.0
Max 1 *	60	20	60	30
Yellow Change	4.1	3.0	4.1	3.0
Red Clear	2.6	3.3	2.6	1.2
Added Initial *	-	-	-	-
Maximum Initial *	-	-	-	-
Time Before Reduction *	-	-	-	-
Time To Reduce *	-	-	-	-
Minimum Gap	-	-	-	-
Non Lock Detector	-	X	-	X
Vehicle Recall	MIN RECALL	-	MIN RECALL	-
Dual Entry	-	-	-	-

\* These values may be field adjusted. Do not adjust Min Green and Passage 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                           | 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                         | 2-in Underground Conduit        |
| N/A Right of Way                                 | --- Right of Way                |
| → Directional Arrow                              | →                               |
| (A) No Right Turn Sign (R3-1)                    | (A)                             |
| (B) No Left Turn Sign (R3-2)                     | (B)                             |
| Construction Zone Drums                          | Construction Zone Drums         |
| Construction Zone                                | Construction Zone               |
| Video Detection Area                             | Video Detection Area            |
| Barricades                                       | Barricades                      |
| Portable Concrete Barrier                        | Portable Concrete Barrier       |

New Location - Temp Design 3 - TMP Phase III Steps 1-2

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  
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 8801 Six Forks Road Suite 700 | Raleigh, North Carolina 27615-2965  
 NC License No. F-0112  
 Engineers | Construction Managers | Planners | Scientists  
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**US 70 Business (E. Market St.)  
 at  
 I-95 NB Ramps**

Division 04 Johnston County Smithfield  
 PLAN DATE: September 2023 REVIEWED BY: DT Sears  
 PREPARED BY: WP Erickson-Jones REVIEWED BY:

REVISIONS	INIT.	DATE

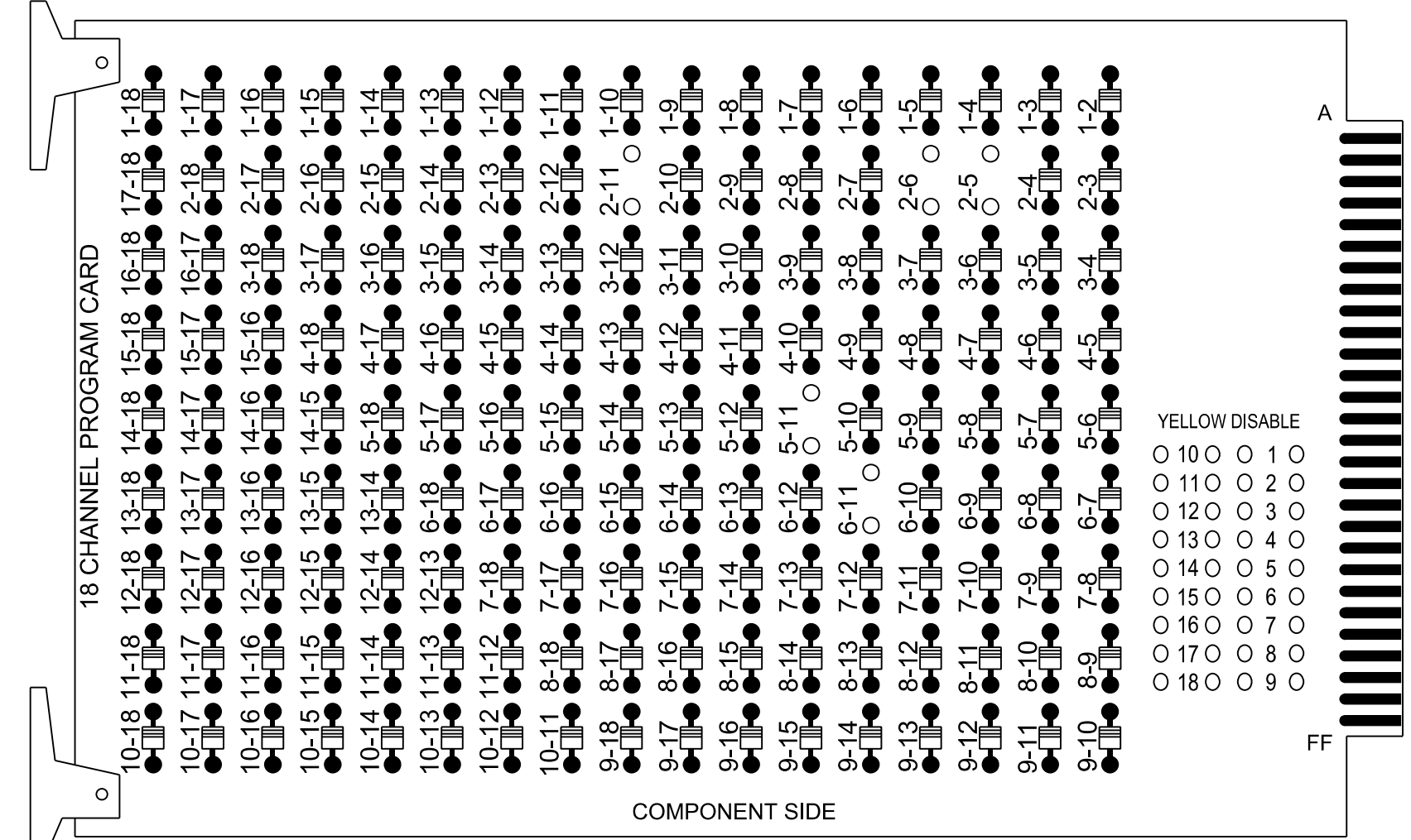
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Seal: NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 044558  
 DAVID T. SEARS  
 9/19/2023  
 DATE  
 SIGNATURE  
 DATE  
 SIG. INVENTORY NO. 04-145313

### 18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 2-5, 2-6, 2-11, 5-11 AND 6-11.



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 the Red Enable is active at all times during normal operation.
- Integrate monitor with Ethernet network in cabinet.

### 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 plan.
- Program controller to start up in phase 2 Green No Walk and 6 Green No Walk.
- If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.

### 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	
GMU 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	OL1	OL2	SPARE	OL3	OL4	SPARE	
SIGNAL HEAD NO.	NU	21,22	NU	NU	NU	NU	51	61,62	NU	NU	81,82	NU	NU	NU	NU	51	NU	NU	
RED		128						134		107									
YELLOW		129					*	135		108									
GREEN		130						136		109									
RED ARROW																		A114	
YELLOW ARROW																			A115
FLASHING YELLOW ARROW																			A116
GREEN ARROW								133											

NU = Not Used

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

\* See pictorial of head wiring in detail this sheet.

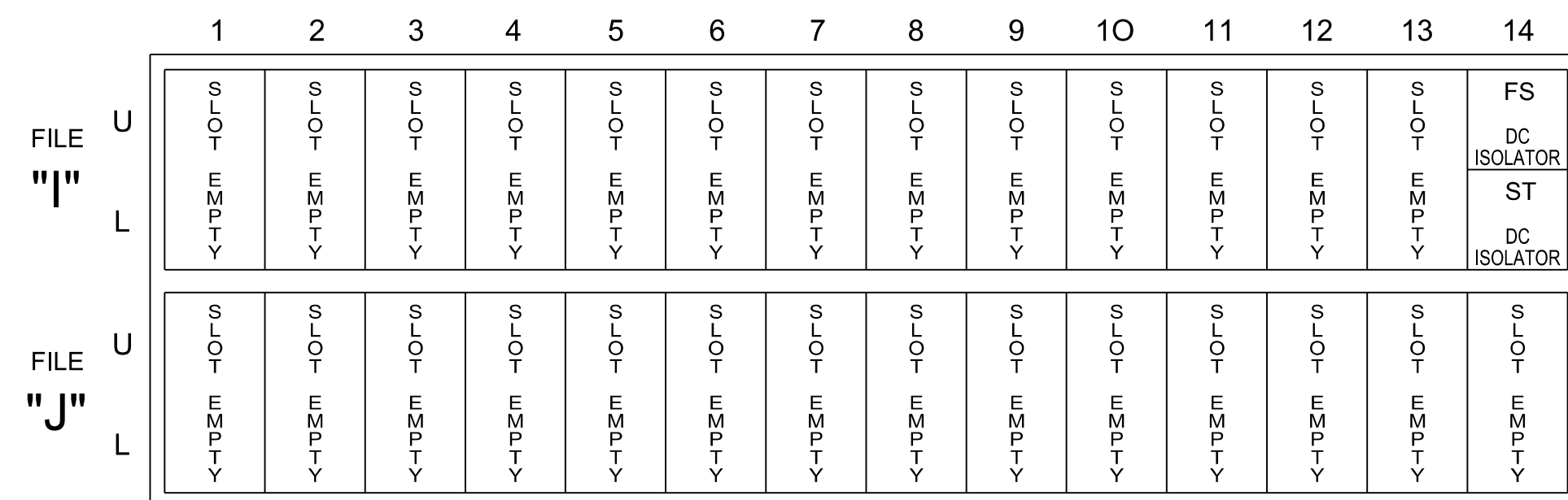
### EQUIPMENT INFORMATION

Controller.....2070LX  
 Cabinet.....332 w/ Aux  
 Software.....Q-Free MAXTIME  
 Cabinet Mount.....Base  
 Output File Positions.....18 With Aux. Output File  
 Load Switches Used.....S2,S7,S8,S11,AUX S4  
 Phases Used.....2,5,6,8  
 Overlap "1".....NOT USED  
 Overlap "2".....NOT USED  
 Overlap "3".....\*  
 Overlap "4".....NOT USED

\*See overlap programming detail on this sheet

### INPUT FILE POSITION LAYOUT

(front view)



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

FS = FLASH SENSE  
 ST = STOP TIME

### OVERLAP PROGRAMMING

Front Panel  
 Main Menu > Controller > Overlap > Overlap Parameters/Overlap Timings

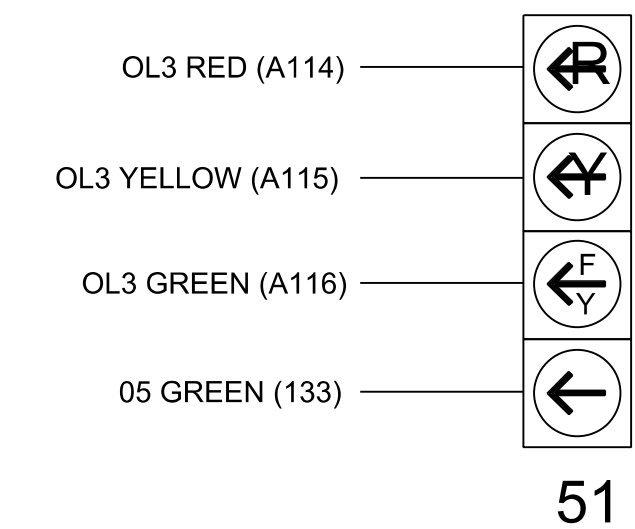
Web Interface  
 Home > Controller > Overlap Configuration > Overlaps

Overlap Plan 1

Overlap	1	2	3	4
Type	OFF	OFF	FYA 4 - Section	OFF
Included Phases	-	-	6	-
Modifier Phases	-	-	5	-
Modifier Overlaps	-	-	-	-
Trail Green	-	-	0	-
Trail Yellow	-	-	0.0	-
Trail Red	-	-	0.0	-

### FYA SIGNAL WIRING DETAIL

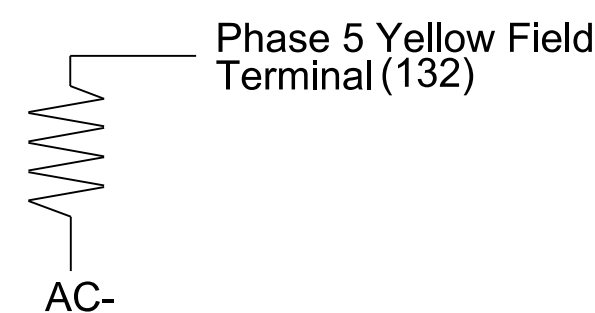
(wire signal heads as shown)



### LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

ACCEPTABLE VALUES	
Value (ohms)	Wattage
1.5K - 1.9K	25W (min)
2.0K - 3.0K	10W (min)



### SPECIAL DETECTOR NOTE

Install a video detection system for vehicle detection for zones 2A, 5A, 6A and 8A. Perform installation according to manufacturer's directions and NCDOT engineer -approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.

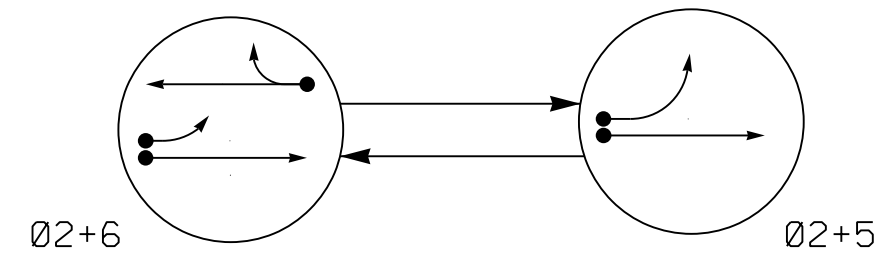
Electrical Detail - Temp Design 3 - TMP Phase III Steps 1-2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR: Prepared for the Offices of: 	US 70 Business (E. Market St.) at I-95 NB Ramps		SEAL 
	Division 04 Johnston County Smithfield PLAN DATE: September 2023 REVIEWED BY: DT Sears PREPARED BY: WP Erickson-Jones REVIEWED BY:	REVISIONS INIT. DATE _____ _____	
750 N. Greenfield Pkwy, Garner, NC 27529 www.rk.com Responsive People   Creative Solutions		Documented by: David J. Sears 9/19/2023 SIGNATURE DATE _____ _____ SIG. INVENTORY NO. 04-1453T3	



PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

TABLE OF OPERATION

SIGNAL FACE	PHASE		
	02+5	02+6	FLASH
21,22	G	G	Y
51	←	←	←
61,62	R	G	Y

MAXTIME DETECTOR INSTALLATION CHART

ZONE	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING						
					CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL CALL	CALL	DELAY DURING GREEN
2A	6X6	70	*	*	2	-	-	X	X	-	*
5A	6X40	0	*	*	5	15.0	-	X	X	-	*
6A	6X6	70	*	*	6	-	-	X	X	-	*

\* VIDEO DETECTION ZONE

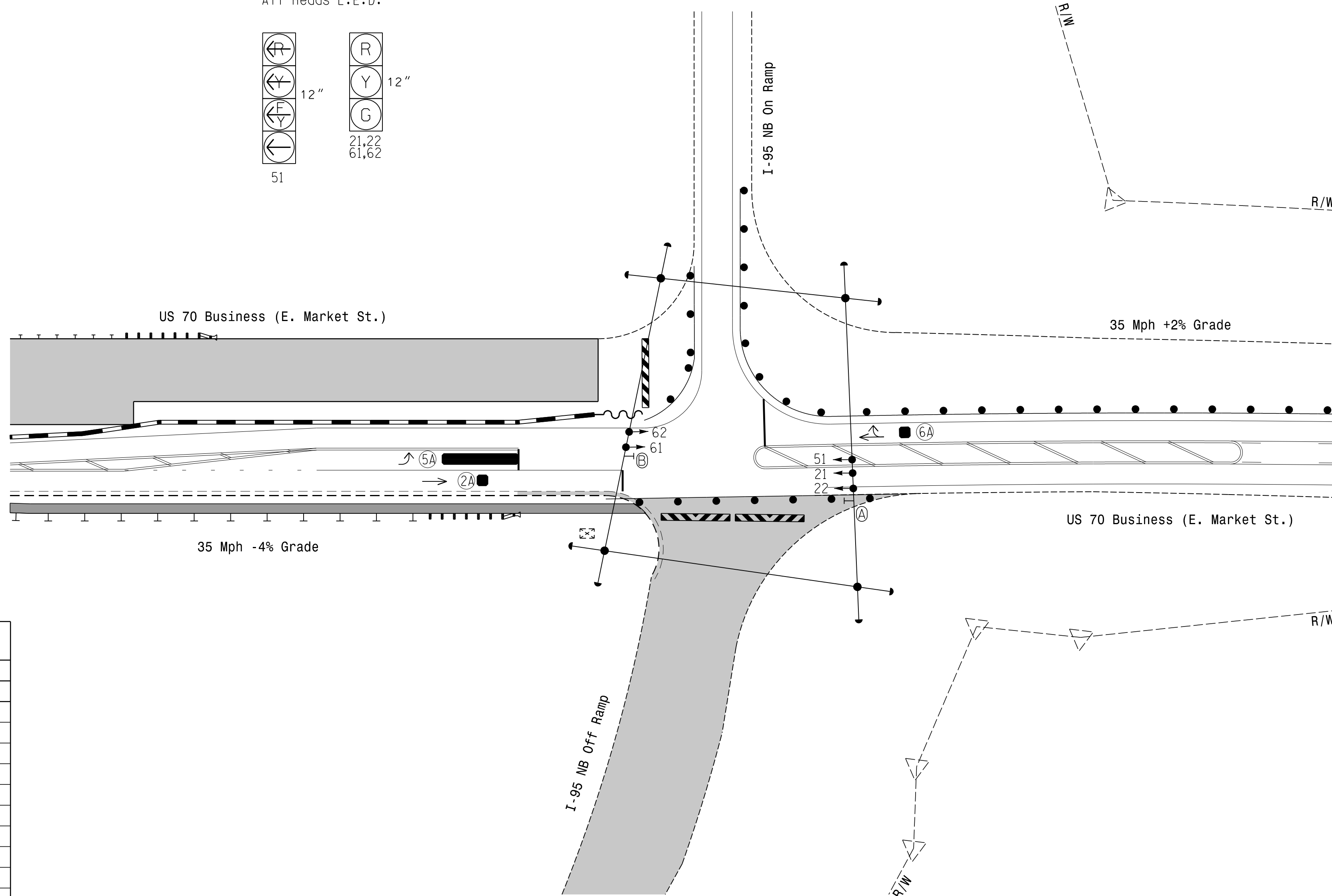
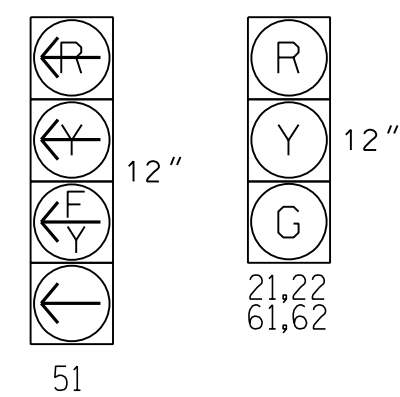
2 Phase Fully Actuated (Isolated)

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. Remove existing signal heads numbered 81 and 82.
4. Set all detector units to presence mode.
5. See TMP for pavement marking details.
6. This intersection uses video detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.

SIGNAL FACE I.D.

All Heads L.E.D.



MAXTIME TIMING CHART

FEATURE	PHASE		
	2	5	6
Walk *	-	-	-
Ped Clear *	-	-	-
Min Green	10	7	10
Passage *	3.0	2.0	3.0
Max 1 *	60	20	60
Yellow Change	4.1	3.0	4.1
Red Clear	2.6	3.3	2.6
Added Initial *	-	-	-
Maximum Initial *	-	-	-
Time Before Reduction *	-	-	-
Time To Reduce *	-	-	-
Minimum Gap	-	-	-
Non Lock Detector	-	X	-
Vehicle Recall	MIN RECALL	-	MIN RECALL
Dual Entry	-	-	-

\* These values may be field adjusted. Do not adjust Min Green and Passage 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                           | ○ → N/A                           |
| ⊥ → Sign   | ⊥ → N/A                           |
| ⊥ → Pedestrian Signal Head With Push Button & Sign | ⊥ → N/A                           |
| ○ → Signal Pole with Guy                           | ● → Signal Pole with Sidewalk Guy |
| ⊥ → Signal Pole with Sidewalk Guy                  | ⊥ → Inductive Loop Detector       |
| ⊥ → Inductive Loop Detector                        | ⊥ → Controller & Cabinet          |
| ⊥ → Controller & Cabinet                           | ⊥ → Junction Box                  |
| ⊥ → Junction Box                                   | ⊥ → 2-in Underground Conduit      |
| ⊥ → 2-in Underground Conduit                       | ⊥ → Right of Way                  |
| → → Directional Arrow                              | → → Directional Arrow             |
| ⊙ → No Right Turn Sign (R3-1)                      | ⊙ → No Right Turn Sign (R3-1)     |
| ⊙ → No Left Turn Sign (R3-2)                       | ⊙ → No Left Turn Sign (R3-2)      |
| ▬ → Construction Zone Drums                        | ▬ → Construction Zone Drums       |
| ▬ → Construction Zone                              | ▬ → Construction Zone             |
| ▬ → Video Detection Area                           | ▬ → Video Detection Area          |
| ▬ → Barricades                                     | ▬ → Barricades                    |
| ▬ → Portable Concrete Barrier                      | ▬ → Portable Concrete Barrier     |

New Location - Temp Design 4 - TMP Phase III Step 3

Prepared for the Offices of:

TRANSPORTATION MOBILITY AND SAFETY DIVISION  
DEPARTMENT OF TRANSPORTATION  
Signal Design Section

**US 70 Business (E. Market St.)  
at  
I-95 NB Ramps**

Division 04 Johnston County Smithfield  
PLAN DATE: September 2023 REVIEWED BY: DT Sears  
PREPARED BY: WP Erickson-Jones REVIEWED BY:

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Seal of David T. Sears, Professional Engineer, No. 044558

REVISIONS	INIT.	DATE

Scale: 0 40  
1" = 40'

9/19/2023 R:\Projects\I-95\I-95\04\145314.dgn dsccars

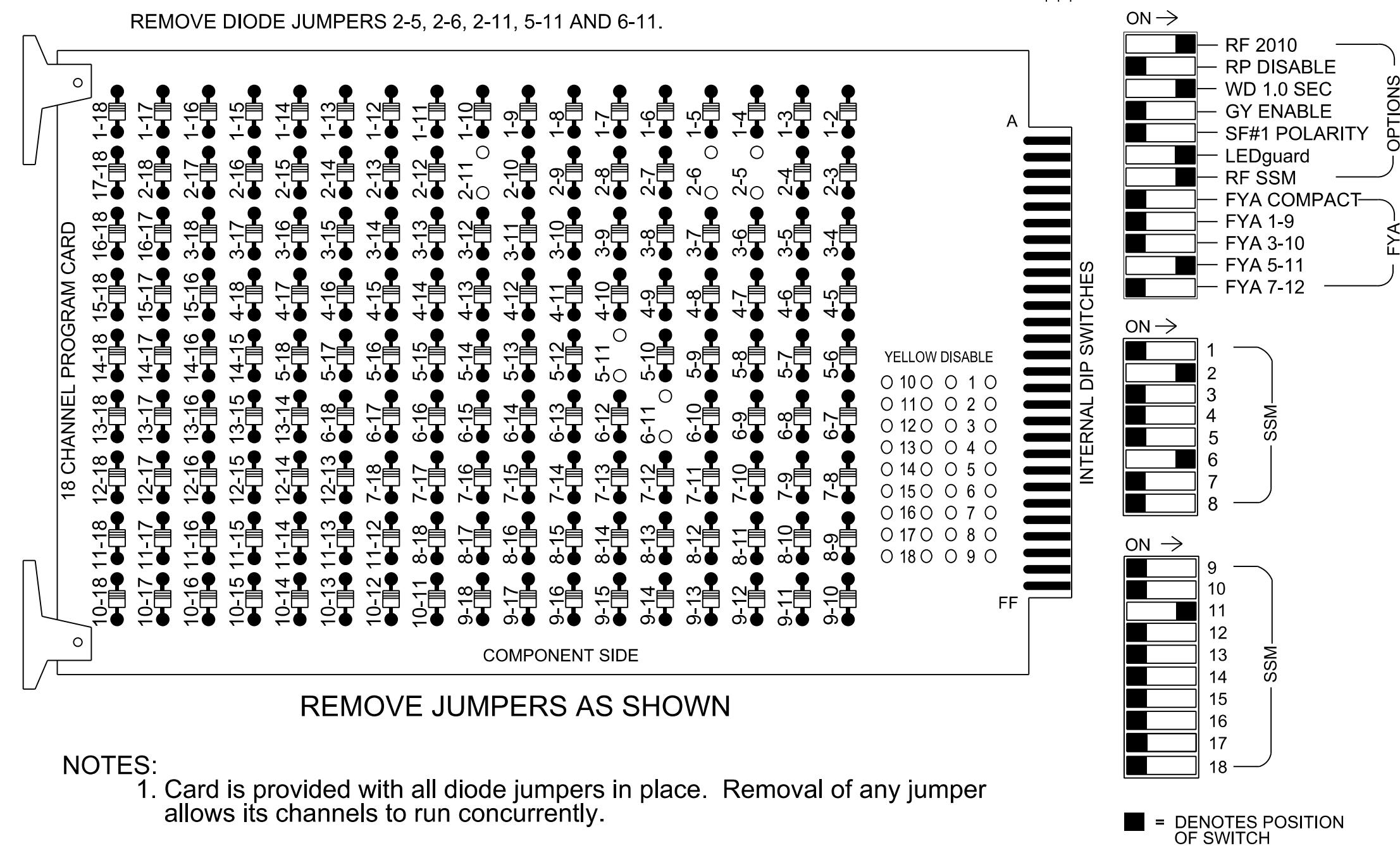
**RK&K**  
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750 N. Greenfield Pkwy, Garner, NC 27529

DocuSigned by:  
David T. Sears  
044558  
SIGNATURE DATE  
9/19/2023  
SIG. INVENTORY NO. 04-145314

### 18 CHANNEL IP 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 the Red Enable is active at all times during normal operation.
  - Integrate monitor with Ethernet network in cabinet.

### 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 plan.
- Program controller to start up in phase 2 Green No Walk and 6 Green No Walk.
- If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.

### 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	
GMU 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	OL1	OL2	SPARE	OL3	OL4	SPARE	
SIGNAL HEAD NO.	NU	21,22	NU	NU	NU	NU	51	61,62	NU	NU	NU	NU	NU	NU	NU	51	NU	NU	
RED		128						134											
YELLOW		129					*	135											
GREEN		130						136											
RED ARROW																		A114	
YELLOW ARROW																			A115
FLASHING YELLOW ARROW																			A116
GREEN ARROW								133											

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

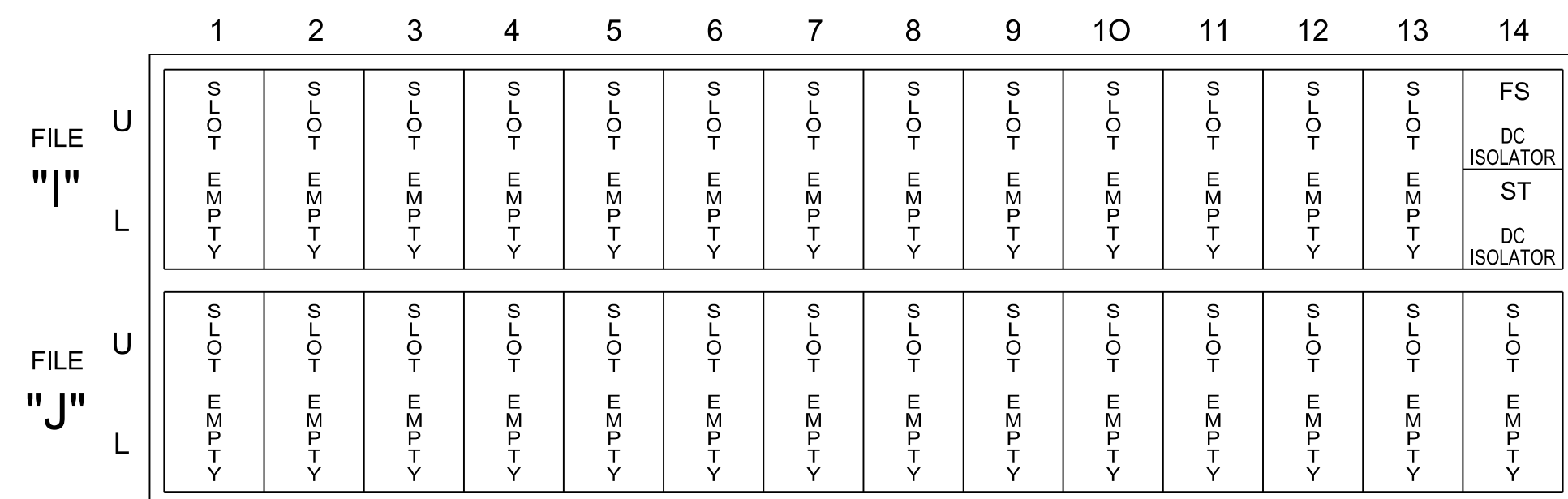
### EQUIPMENT INFORMATION

Controller.....2070LX  
 Cabinet.....332 w/ Aux  
 Software.....Q-Free MAXTIME  
 Cabinet Mount.....Base  
 Output File Positions.....18 With Aux. Output File  
 Load Switches Used.....S2,S7,S8,AUX S4  
 Phases Used.....2,5,6  
 Overlap "1".....NOT USED  
 Overlap "2".....NOT USED  
 Overlap "3".....\*  
 Overlap "4".....NOT USED

\*See overlap programming detail on this sheet

### INPUT FILE POSITION LAYOUT

(front view)



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

FS = FLASH SENSE  
 ST = STOP TIME

### OVERLAP PROGRAMMING

Front Panel  
 Main Menu > Controller > Overlap > Overlap Parameters/Overlap Timings

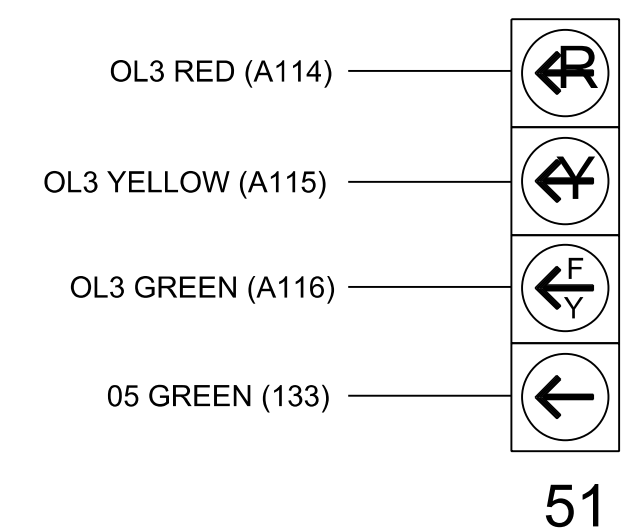
Web Interface  
 Home > Controller > Overlap Configuration > Overlaps

Overlap Plan 1

Overlap	1	2	3	4
Type	OFF	OFF	FYA 4 - Section	OFF
Included Phases	-	-	6	-
Modifier Phases	-	-	5	-
Modifier Overlaps	-	-	-	-
Trail Green	-	-	0	-
Trail Yellow	-	-	0.0	-
Trail Red	-	-	0.0	-

### FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)

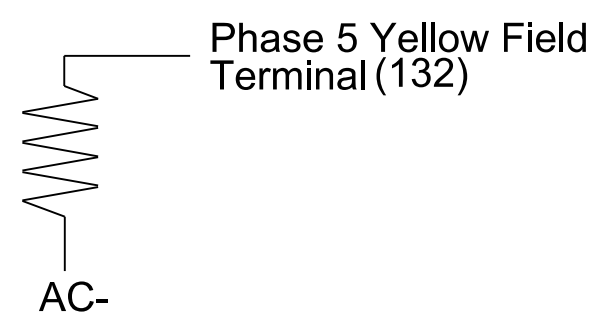


THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 04-1453T4  
 DESIGNED: September 2023  
 SEALED: September 19, 2023  
 REVISED: N/A

### LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

ACCEPTABLE VALUES	
Value (ohms)	Wattage
1.5K - 1.9K	25W (min)
2.0K - 3.0K	10W (min)



### SPECIAL DETECTOR NOTE

Install a video detection system for vehicle detection for zones 2A, 5A and 6A. Perform installation according to manufacturer's directions and NCDOT engineer -approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.

Electrical Detail - Temp Design 4 - TMP Phase III Step 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

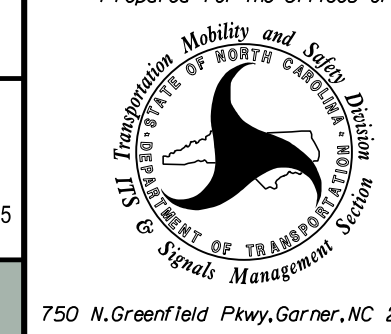
Electrical and Programming Details For: **US 70 Business (E. Market St.) at I-95 NB Ramps**

Division 04 Johnston County Smithfield  
 PLAN DATE: September 2023 REVIEWED BY: DT Sears  
 PREPARED BY: WP Erickson-Jones REVIEWED BY:

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

Seal: NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 044558 DAVID T. SEARS  
 9/19/2023  
 SIG. INVENTORY NO. 04-1453T4

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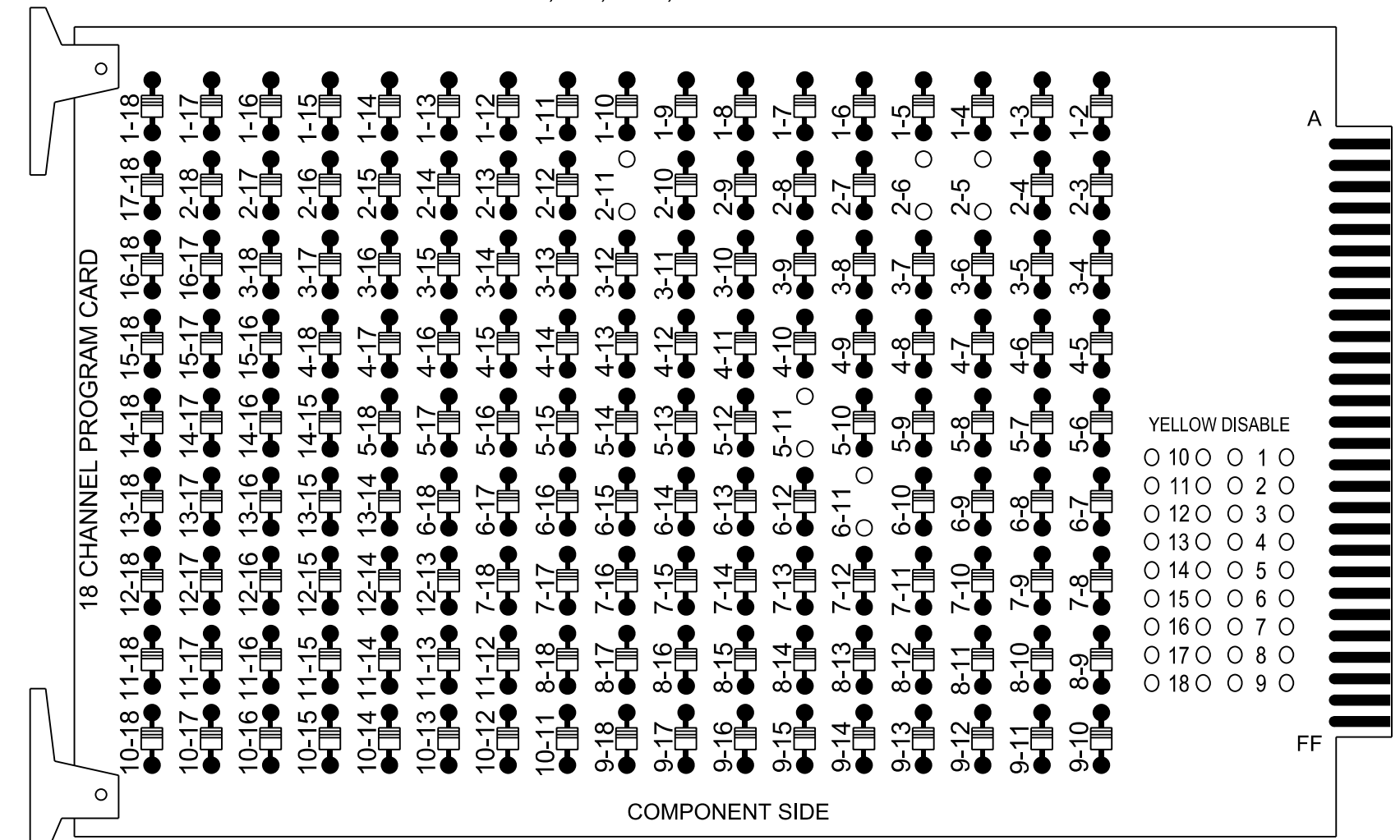




### 18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

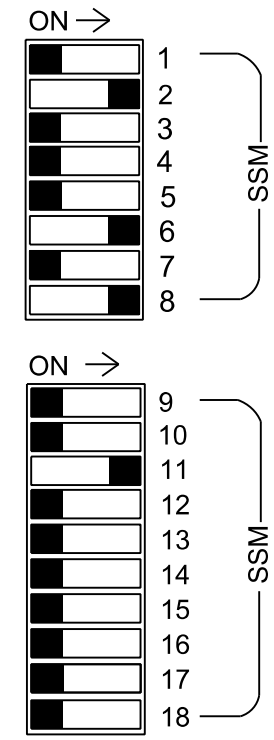
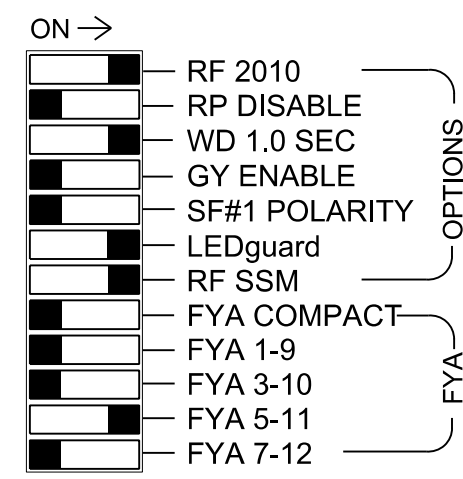
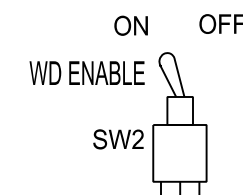
REMOVE DIODE JUMPERS 2-5, 2-6, 2-11, 5-11 AND 6-11.



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 the Red Enable is active at all times during normal operation.
- Integrate monitor with Ethernet network in cabinet.



■ = 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 plan.
- Program controller to start up in phase 2 Green No Walk and 6 Green No Walk.
- If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.

### 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
GMU 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	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	NU	21,22	NU	NU	NU	NU	51	61,62	NU	NU	81,82	NU	NU	NU	NU	51	NU	NU
RED		128						134		107								
YELLOW		129					*	135		108								
GREEN		130						136		109								
RED ARROW																		A114
YELLOW ARROW																		A115
FLASHING YELLOW ARROW																		A116
GREEN ARROW								133										

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

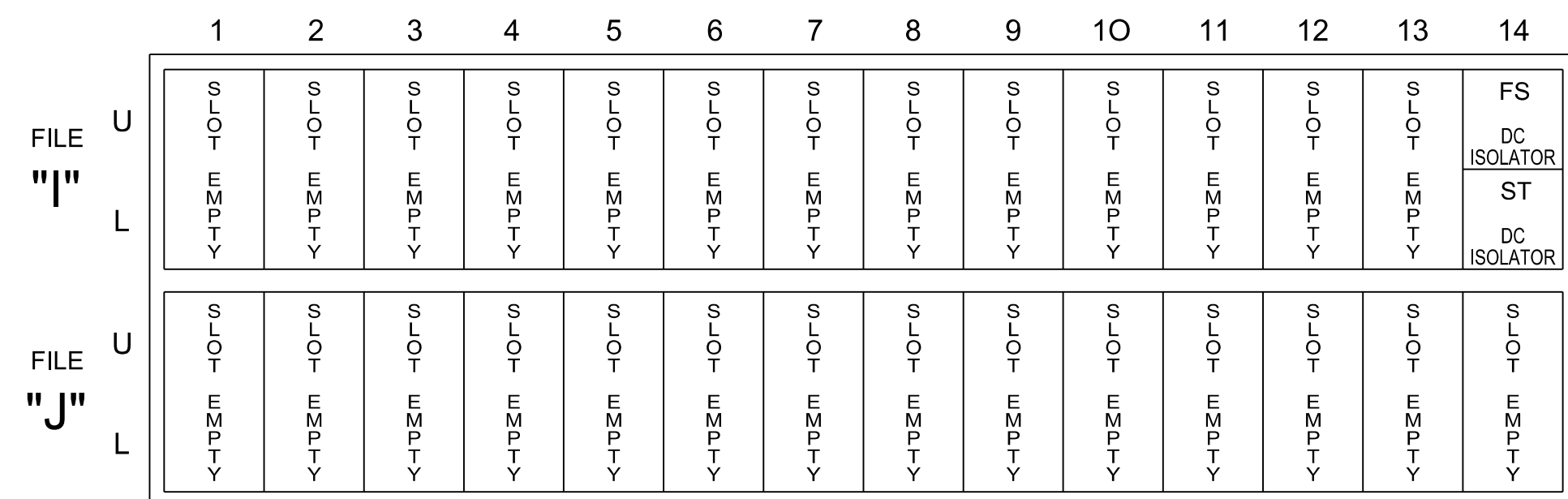
### EQUIPMENT INFORMATION

Controller.....2070LX  
 Cabinet.....332 w/ Aux  
 Software.....Q-Free MAXTIME  
 Cabinet Mount.....Base  
 Output File Positions.....18 With Aux. Output File  
 Load Switches Used.....S2,S7,S8,S11,AUX S4  
 Phases Used.....2,5,6,8  
 Overlap "1".....NOT USED  
 Overlap "2".....NOT USED  
 Overlap "3".....\*  
 Overlap "4".....NOT USED

\*See overlap programming detail on this sheet

### INPUT FILE POSITION LAYOUT

(front view)



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

FS = FLASH SENSE  
 ST = STOP TIME

### OVERLAP PROGRAMMING

Front Panel  
 Main Menu > Controller > Overlap > Overlap Parameters/Overlap Timings

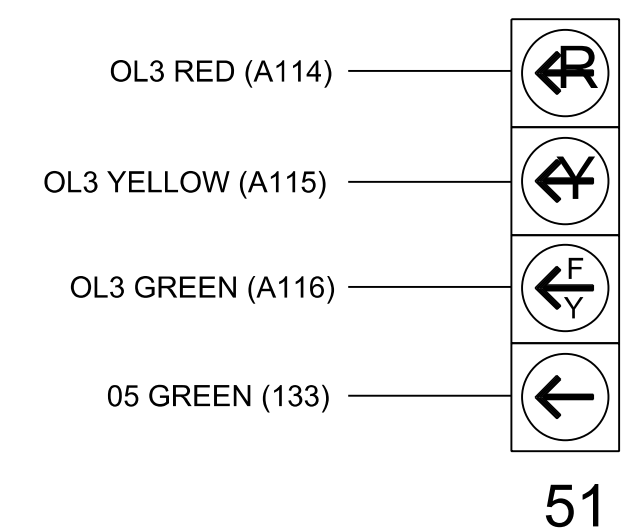
Web Interface  
 Home > Controller > Overlap Configuration > Overlaps

Overlap Plan 1

Overlap	1	2	3	4
Type	OFF	OFF	FYA 4 - Section	OFF
Included Phases	-	-	6	-
Modifier Phases	-	-	5	-
Modifier Overlaps	-	-	-	-
Trail Green	-	-	0	-
Trail Yellow	-	-	0.0	-
Trail Red	-	-	0.0	-

### FYA SIGNAL WIRING DETAIL

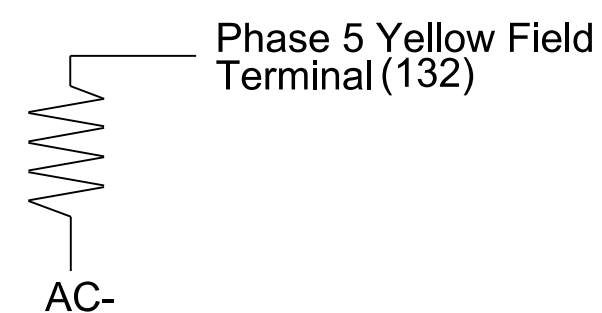
(wire signal heads as shown)



### LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

ACCEPTABLE VALUES	
Value (ohms)	Wattage
1.5K - 1.9K	25W (min)
2.0K - 3.0K	10W (min)



### SPECIAL DETECTOR NOTE

Install a video detection system for vehicle detection for zones 2A, 5A, 6A, 8A, 8B and 8C. Perform installation according to manufacturer's directions and NCDOT engineer -approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.

Electrical Detail - Temp Design 5 - TMP Phase III Step 4

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:  
 Prepared for the Offices of:  
  
 Mobility and Safety Division  
 750 N. Greenfield Pkwy, Garner, NC 27529

US 70 Business (E. Market St.)  
 at  
 I-95 NB Ramps

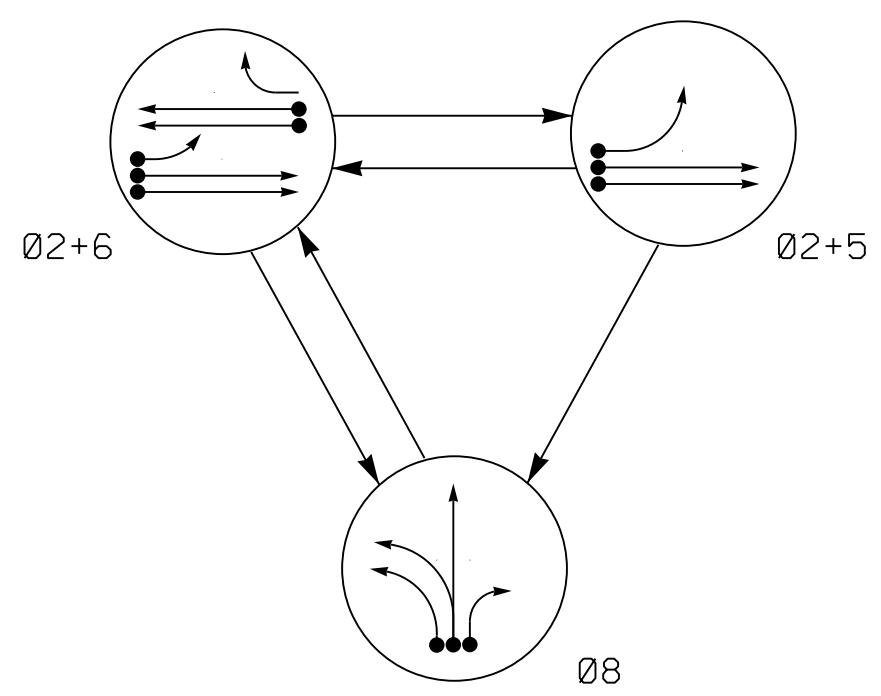
Division 04 Johnston County Smithfield  
 PLAN DATE: September 2023 REVIEWED BY: DT Sears  
 PREPARED BY: WP Erickson-Jones REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL  
 NORTH CAROLINA PROFESSIONAL ENGINEER  
 SEAL 044558  
 DAVID T. SEARS  
 9/19/2023

**RK&K**  
 P: (919) 878-9560  
 8801 Six Forks Road Suite 700 | Raleigh, North Carolina 27615-2965  
 NC License No. F-0112  
 Engineers | Construction Managers | Planners | Scientists  
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**PHASING DIAGRAM**



**PHASING DIAGRAM DETECTION LEGEND**

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

**TABLE OF OPERATION**

SIGNAL FACE	PHASE			
	02+5	02+6	08	FLASH
21,22	G	G	R	Y
51	←	←	←	←
61,62	R	G	R	Y
81	←	←	←	←
82	R	R	G	R
83	R	R	G	R

**MAXTIME DETECTOR INSTALLATION CHART**

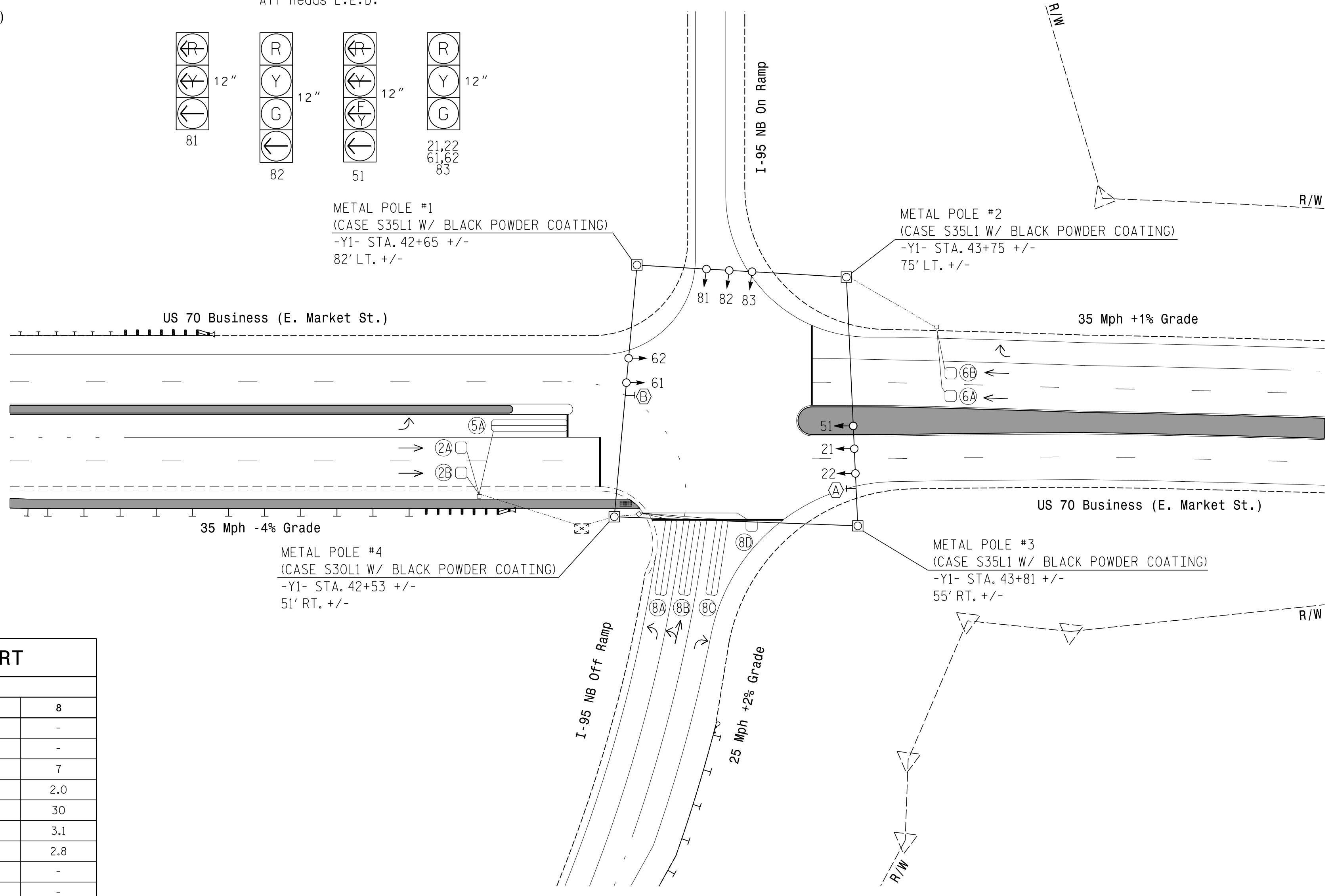
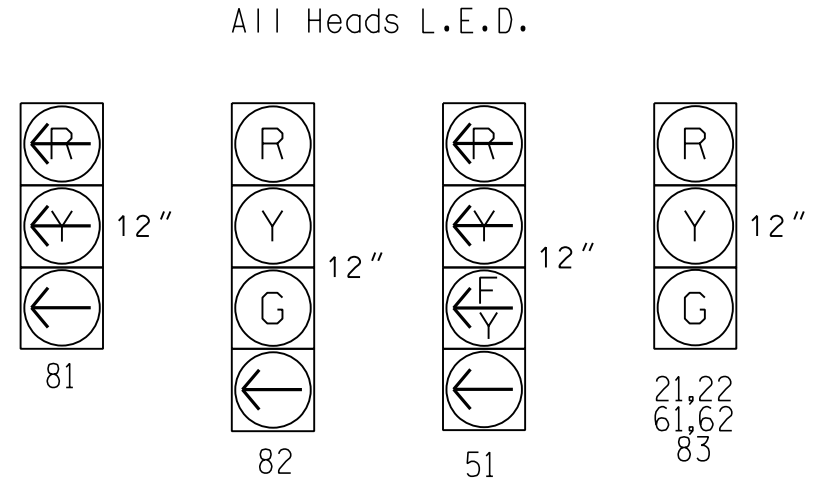
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING						
					CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND INITIAL	CALL	DELAY DURING GREEN	NEW CARD
2A	6X6	70	3	X	2	-	-	X	X	X	X
2B	6X6	70	3	X	2	-	-	X	X	X	X
5A	6X40	0	2-4-2	X	5	15.0	-	X	X	X	X
6A	6X6	70	5	X	6	-	-	X	X	X	X
6B	6X6	70	5	X	6	-	-	X	X	X	X
8A	6X40	0	2-4-2	X	8	-	-	X	X	X	X
8B	6X40	0	2-4-2	X	8	-	-	X	X	X	X
8C	6X40	0	2-4-2	X	8	15.0	-	X	X	X	X
8D	6X6	0	3	X	8	15.0	-	X	X	X	X

**3 Phase Actuated (D04-07\_Smithfield Signal System)**

**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 stop bar details.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
- Closed loop system data: Controller Asset #1453.

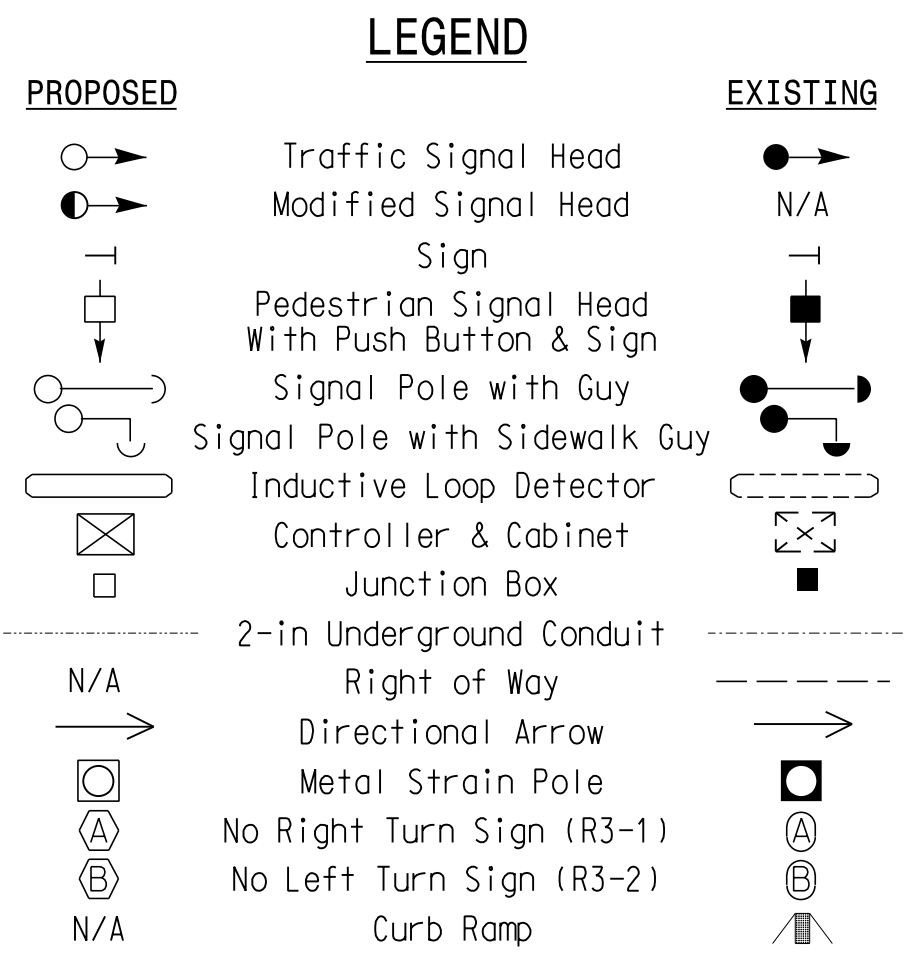
**SIGNAL FACE I.D.**



**MAXTIME TIMING CHART**

FEATURE	PHASE			
	2	5	6	8
Walk *	-	-	-	-
Ped Clear *	-	-	-	-
Min Green	10	7	10	7
Passage *	3.0	2.0	3.0	2.0
Max I *	60	20	60	30
Yellow Change	4.1	3.0	4.1	3.1
Red Clear	2.6	3.2	2.6	2.8
Added Initial *	-	-	-	-
Maximum Initial *	-	-	-	-
Time Before Reduction *	-	-	-	-
Time To Reduce *	-	-	-	-
Minimum Gap	-	-	-	-
Non Lock Detector	-	X	-	X
Vehicle Recall	MIN RECALL	-	MIN RECALL	-
Dual Entry	-	-	-	-

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



**New Location - Final Design**

**US 70 Business (E. Market St.) at I-95 NB Ramps**

Division 04 Johnston County Smithfield  
 PLAN DATE: September 2023 REVIEWED BY: DT Sears  
 PREPARED BY: WP Erickson-Jones REVIEWED BY:

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Seal of David J. Sears, Professional Engineer, License No. 044558, State of North Carolina.

SIG. INVENTORY NO. 04-1453

SCALE 0 40  
1" = 40'

9/19/2023 R:\Projects\I-95\I-95\Drawings\Signal\I-95\I-95\_Sig\_7.0.dwg DT Sears







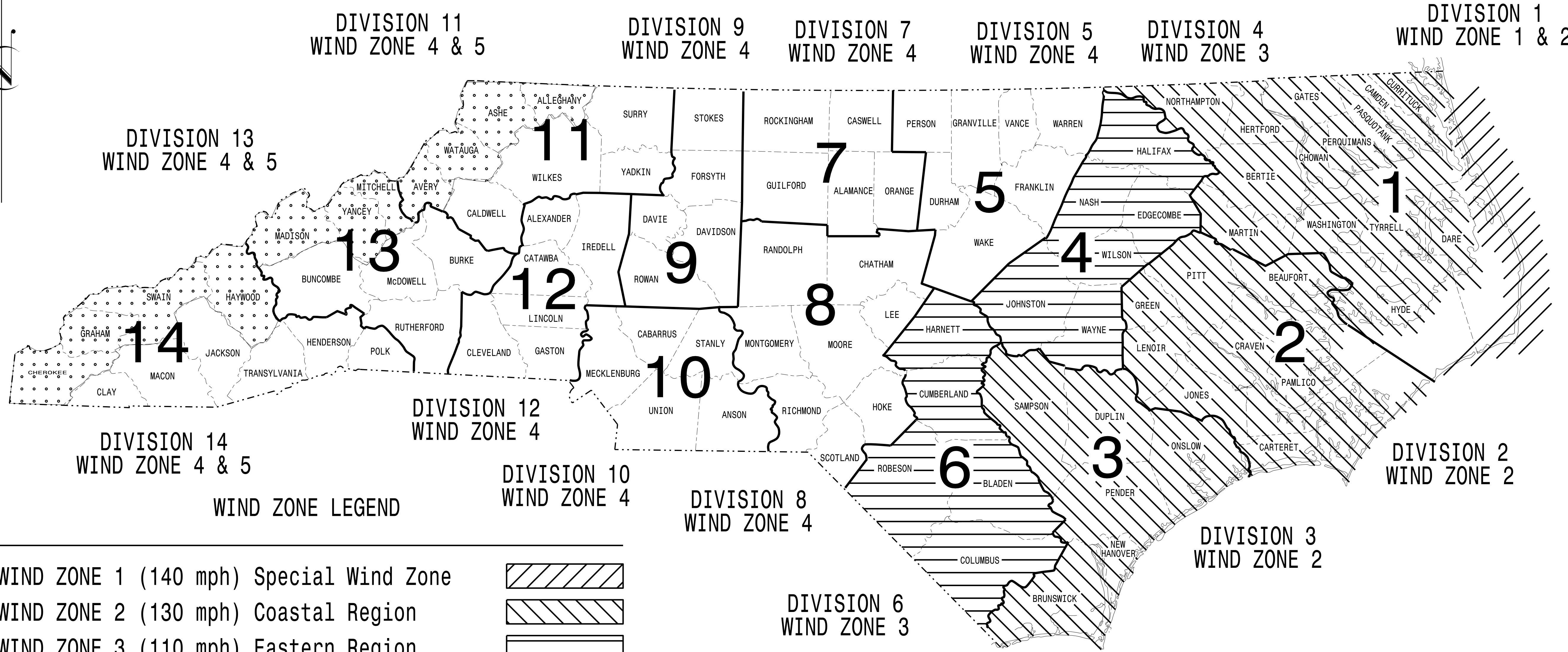
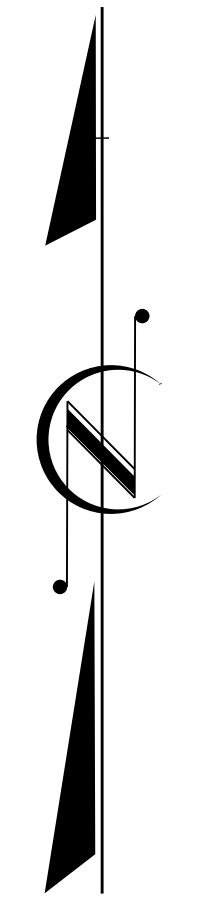


**NC DOT METAL POLE STANDARDS**

# STATE OF NORTH CAROLINA DIVISION OF HIGHWAYS

PROJECT I.D. NO. I-5972	SHEET NO. Sig.M1
----------------------------	---------------------

## STANDARD DRAWINGS FOR ALL METAL POLES



**WIND ZONE LEGEND**

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

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

Prepared In the Offices of:

750 N. Greenfield Pkwy.  
Garner, NC 27529

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

**INDEX OF PLANS**

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

**NC DOT CONTACTS:**

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

---

**M.M. MCDIARMID, P.E. - STATE ITS AND SIGNALS ENGINEER**

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

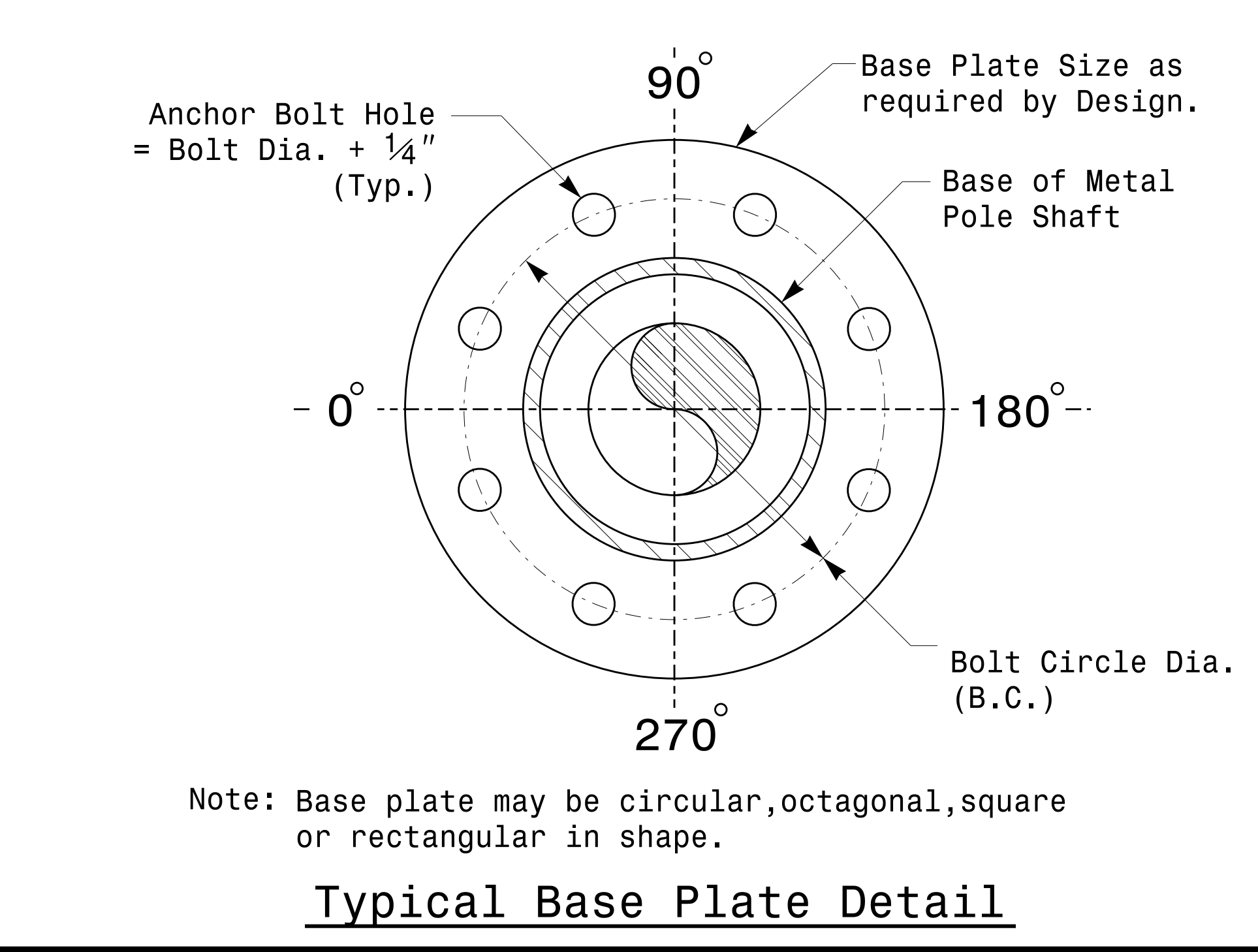
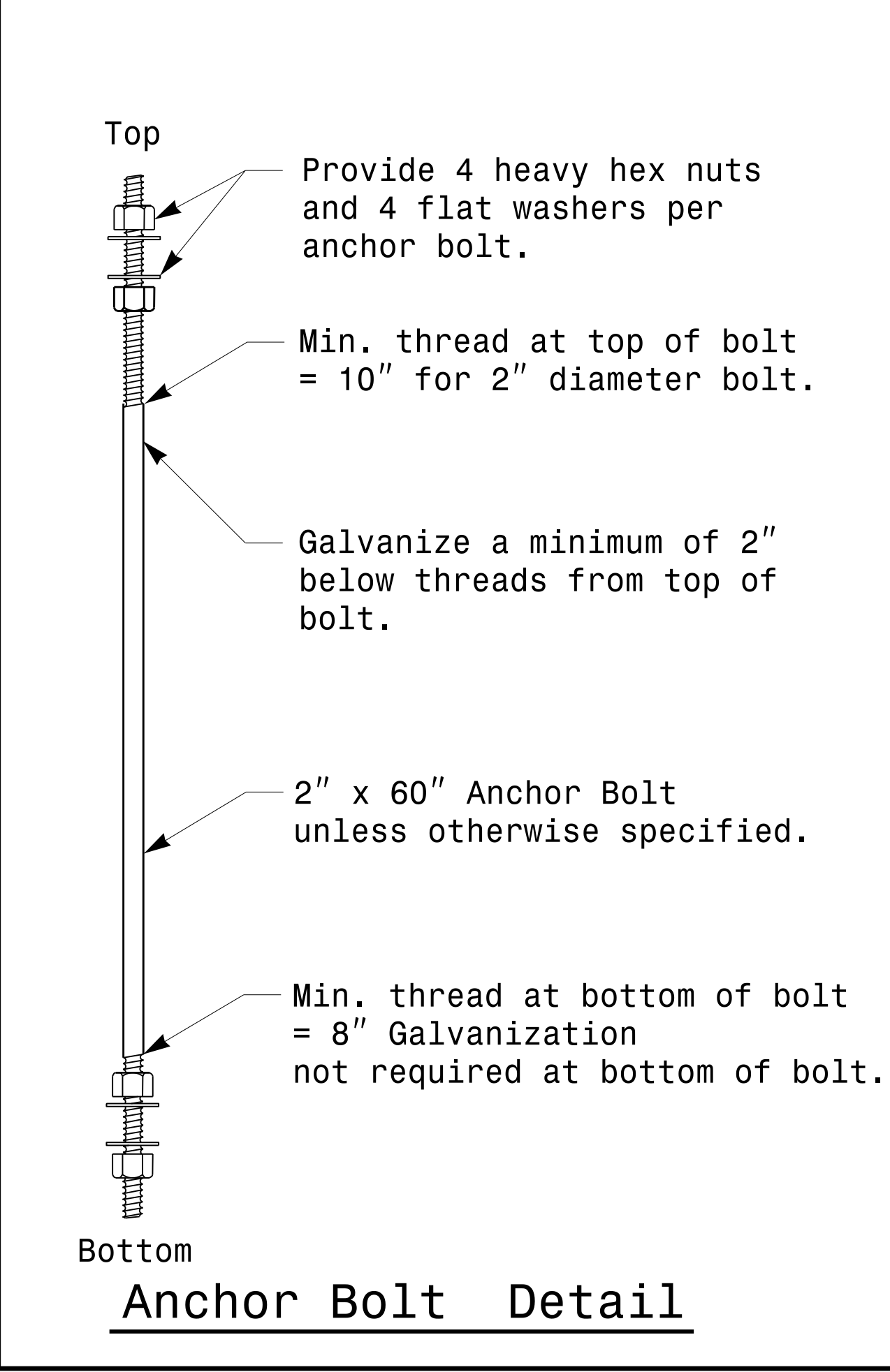
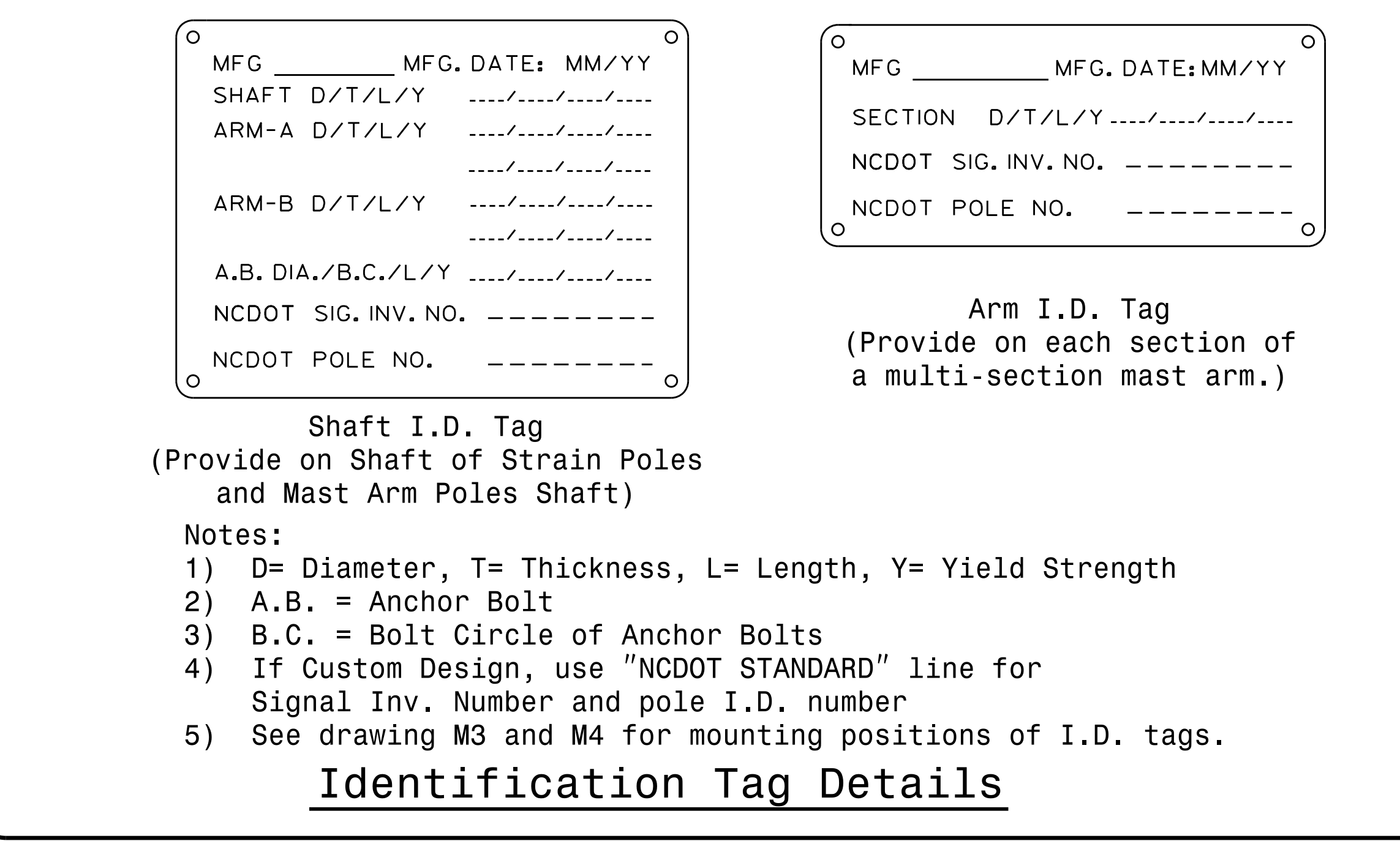
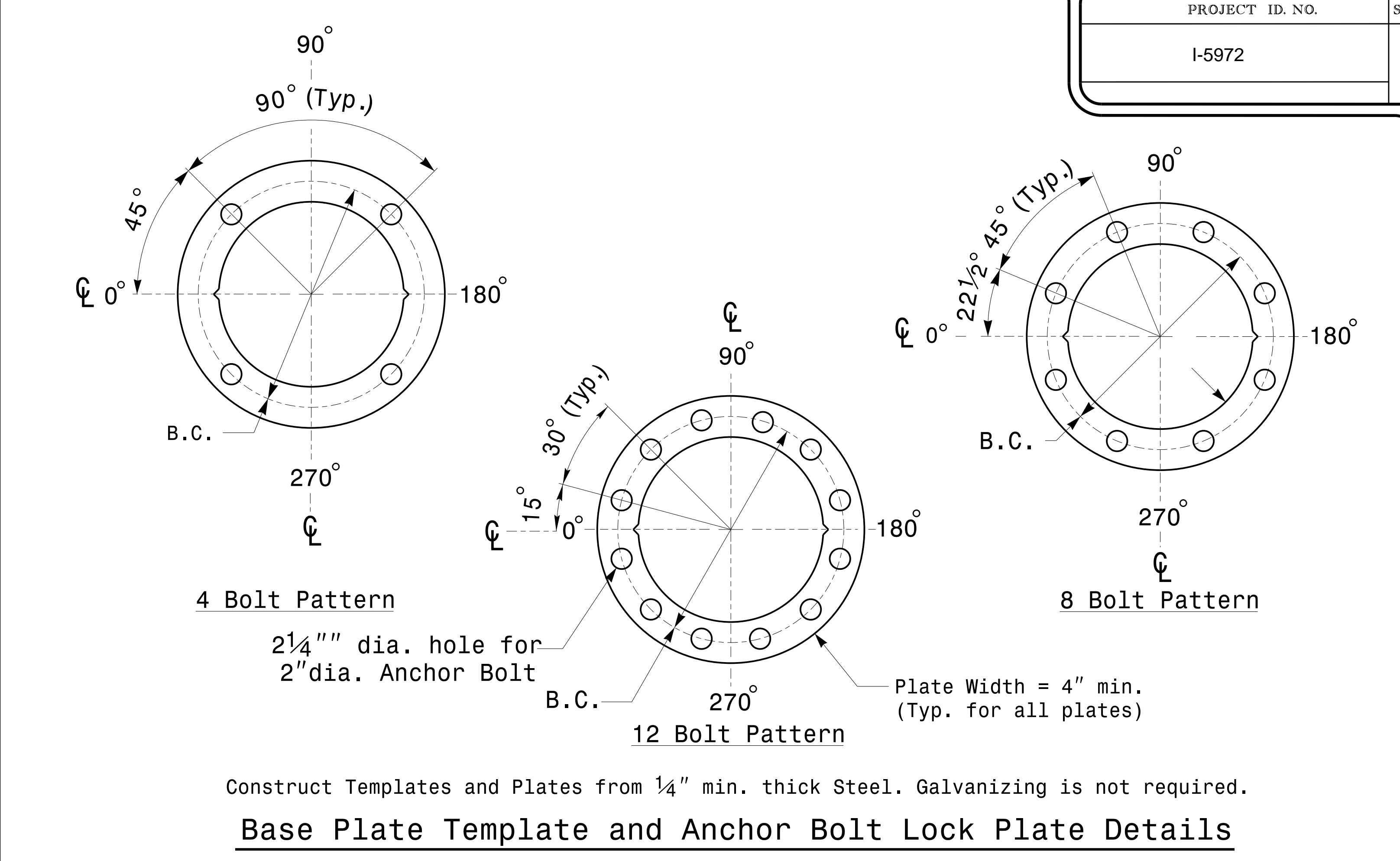
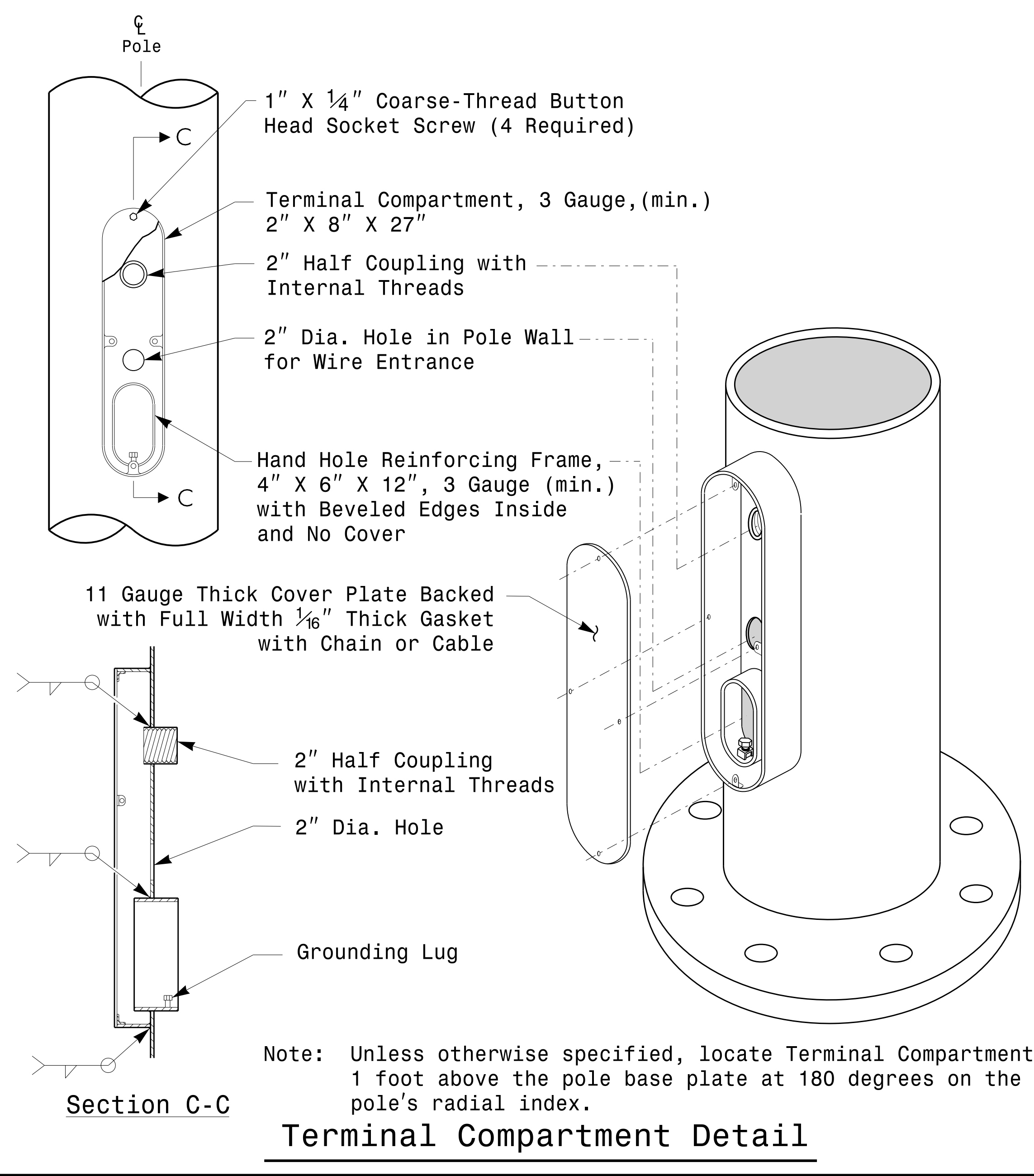
**D.C. SARKAR, P.E. - ITS AND SIGNALS SENIOR STRUCTURAL ENGINEER**

SEAL

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

PROJECT ID. NO.	SHEET NO.
I-5972	Sig.M2

Fabrication Details – All Metal Poles



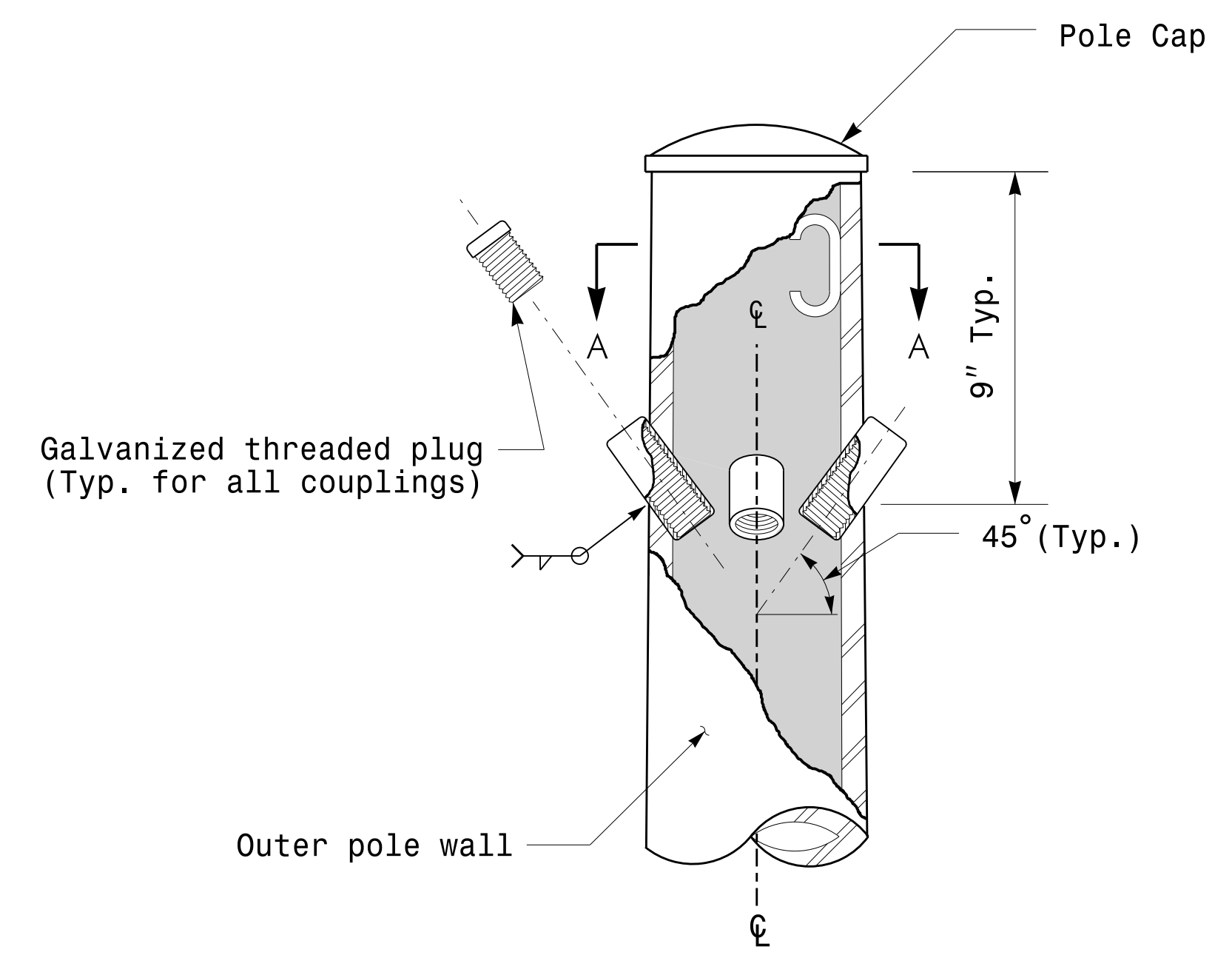
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	<p>PLAN DATE: OCTOBER 2017</p> <p>PREPARED BY: N. BITTING</p>	<p>DESIGNED BY: C.F. ANDREWS</p> <p>REVIEWED BY: D.C. SARKAR</p>	

SCALE: 0 NA NONE

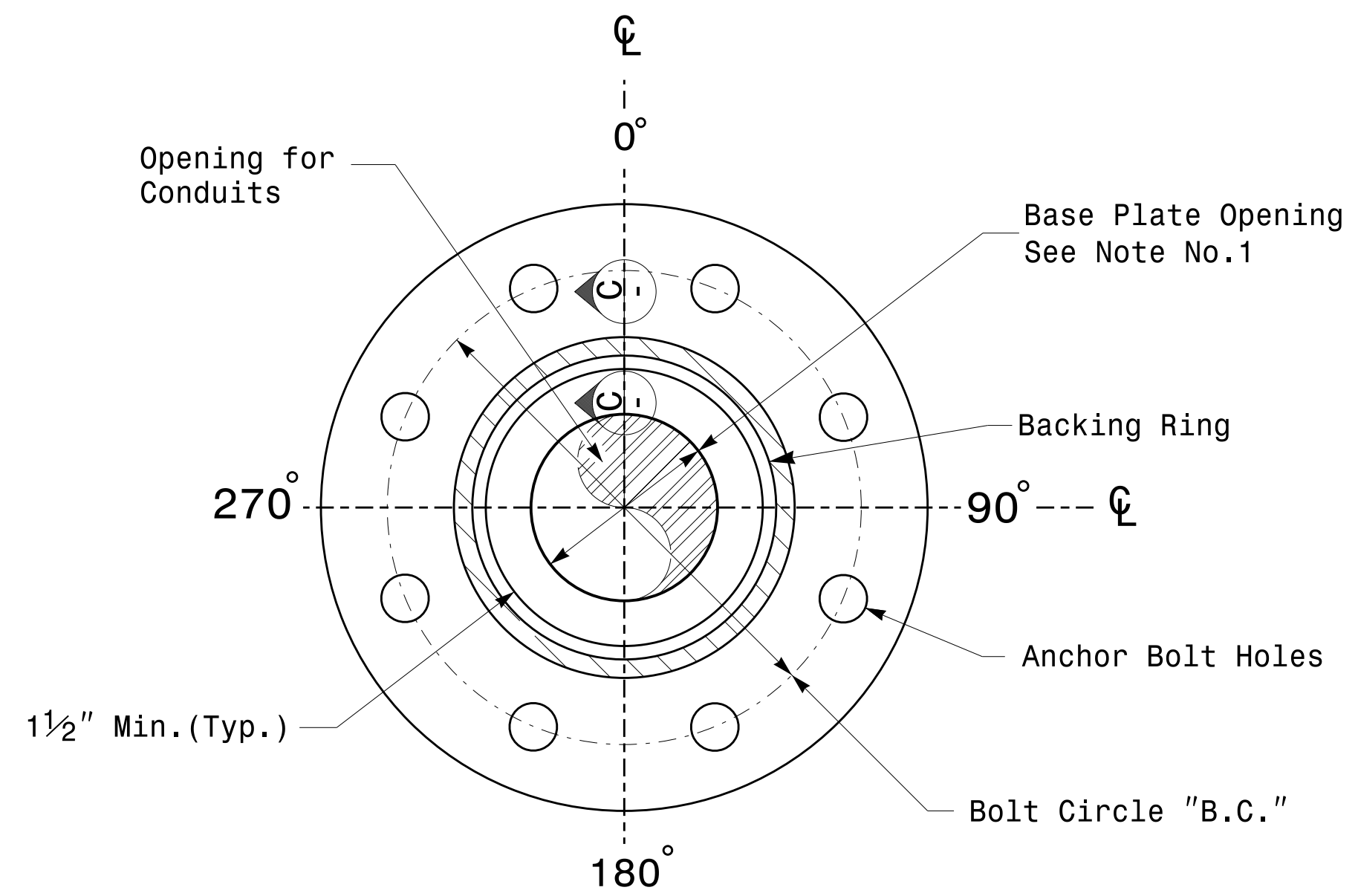
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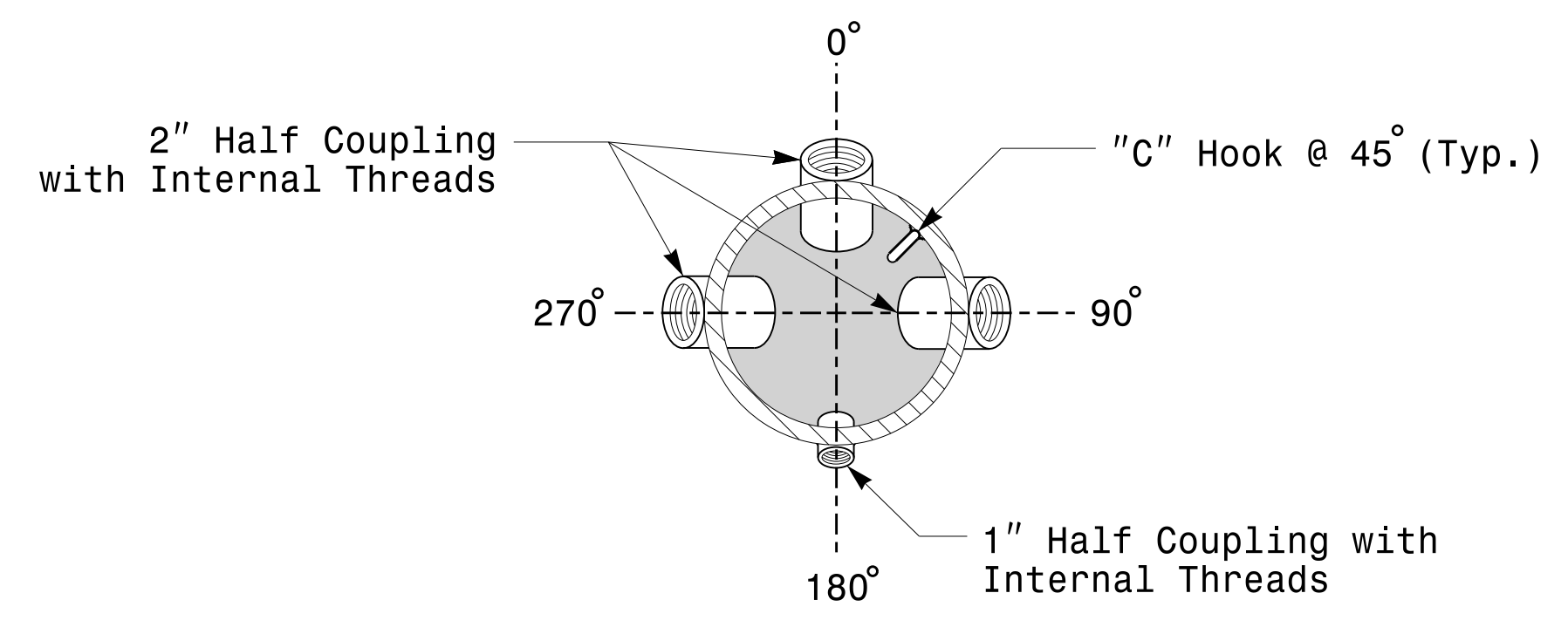
Note:  
 1. Opening in pole base plate shall be equal to pole base inside diameter minus 3 1/2" but shall not be less than 8 1/2".



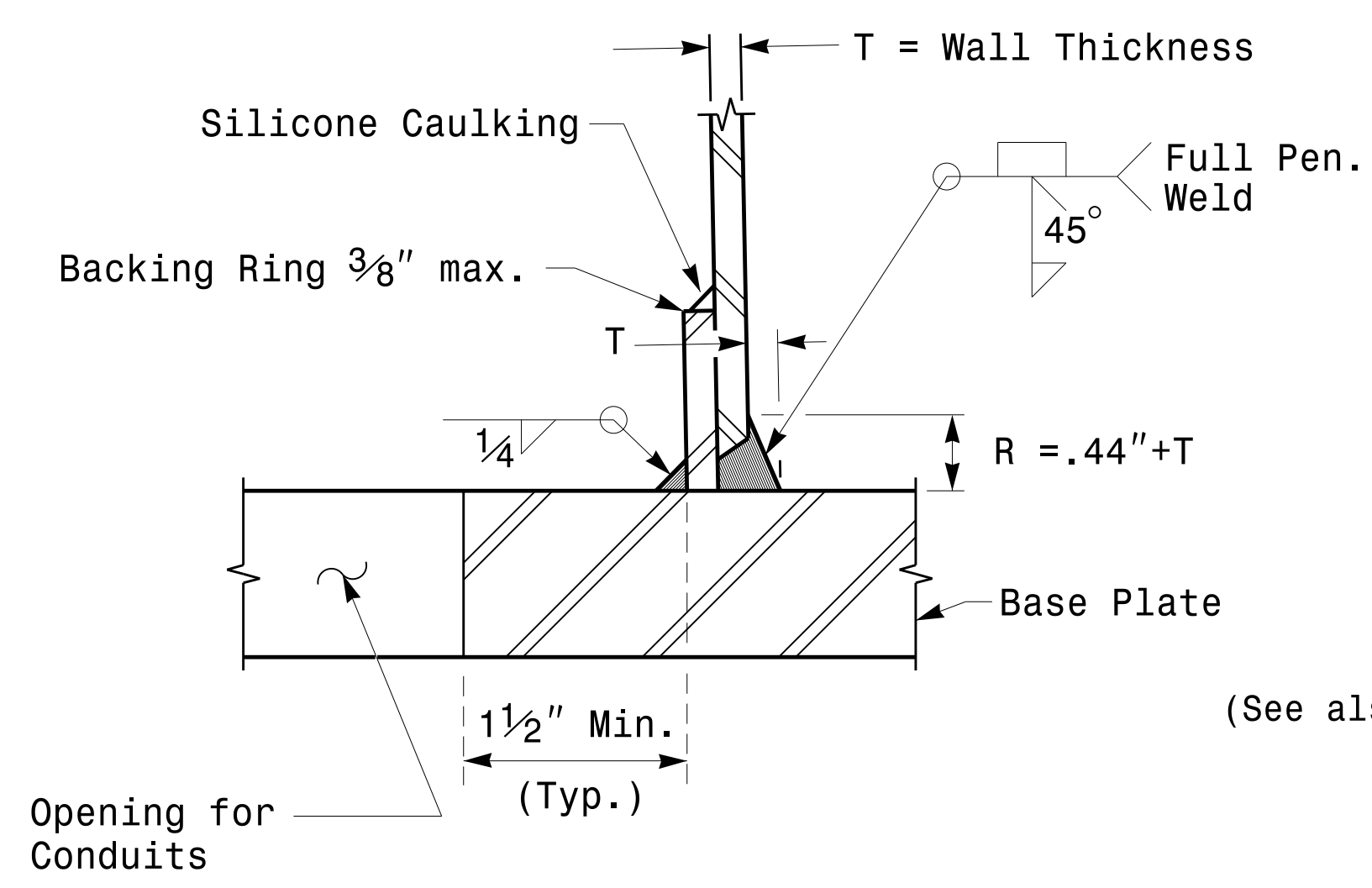
Cable Entrances at Top of Pole



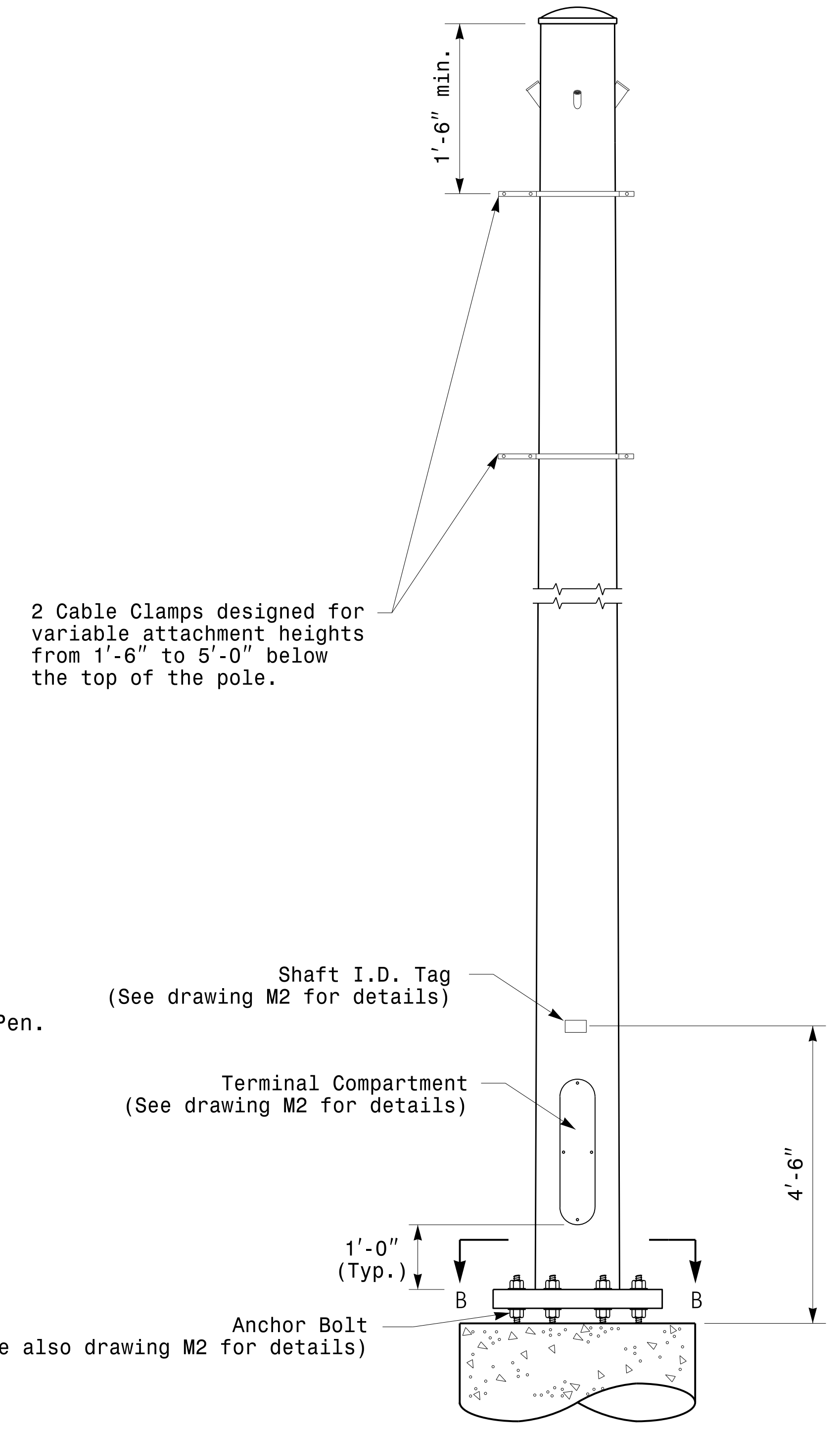
Section B-B  
Pole Base Plate Details  
(8 and 12 Bolt Pattern)



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



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



Monotube Strain Pole

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

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

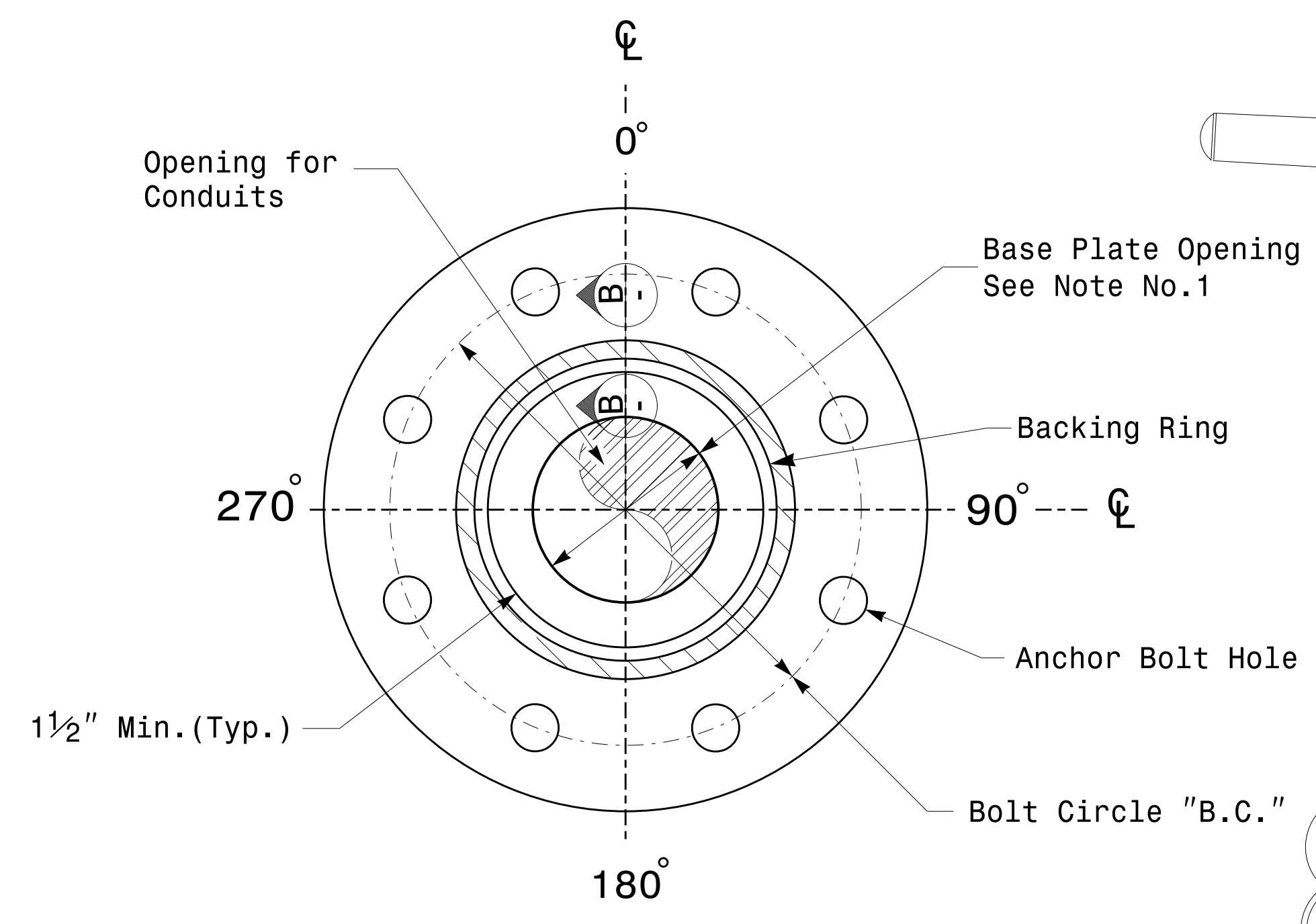
SEAL  
  
 DocuSigned by:  
 Debesh C. Sarkar  
 44EB87816FA4FURE  
 10/11/2017  
 DATE

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 11/11/2017

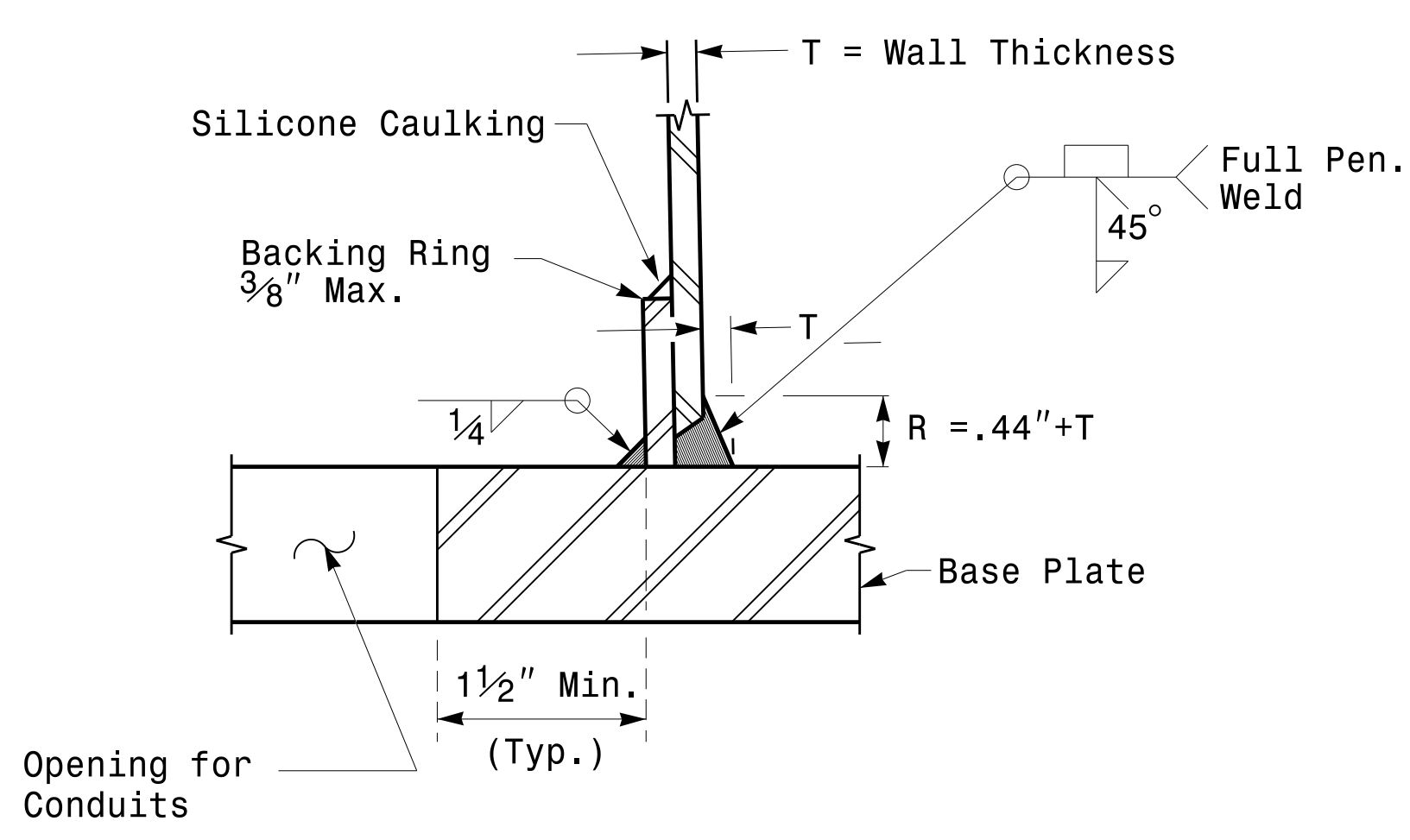
**Fabrication Details – Strain Poles**

PROJECT ID. NO.	SHEET NO.
I-5972	Sig.M4

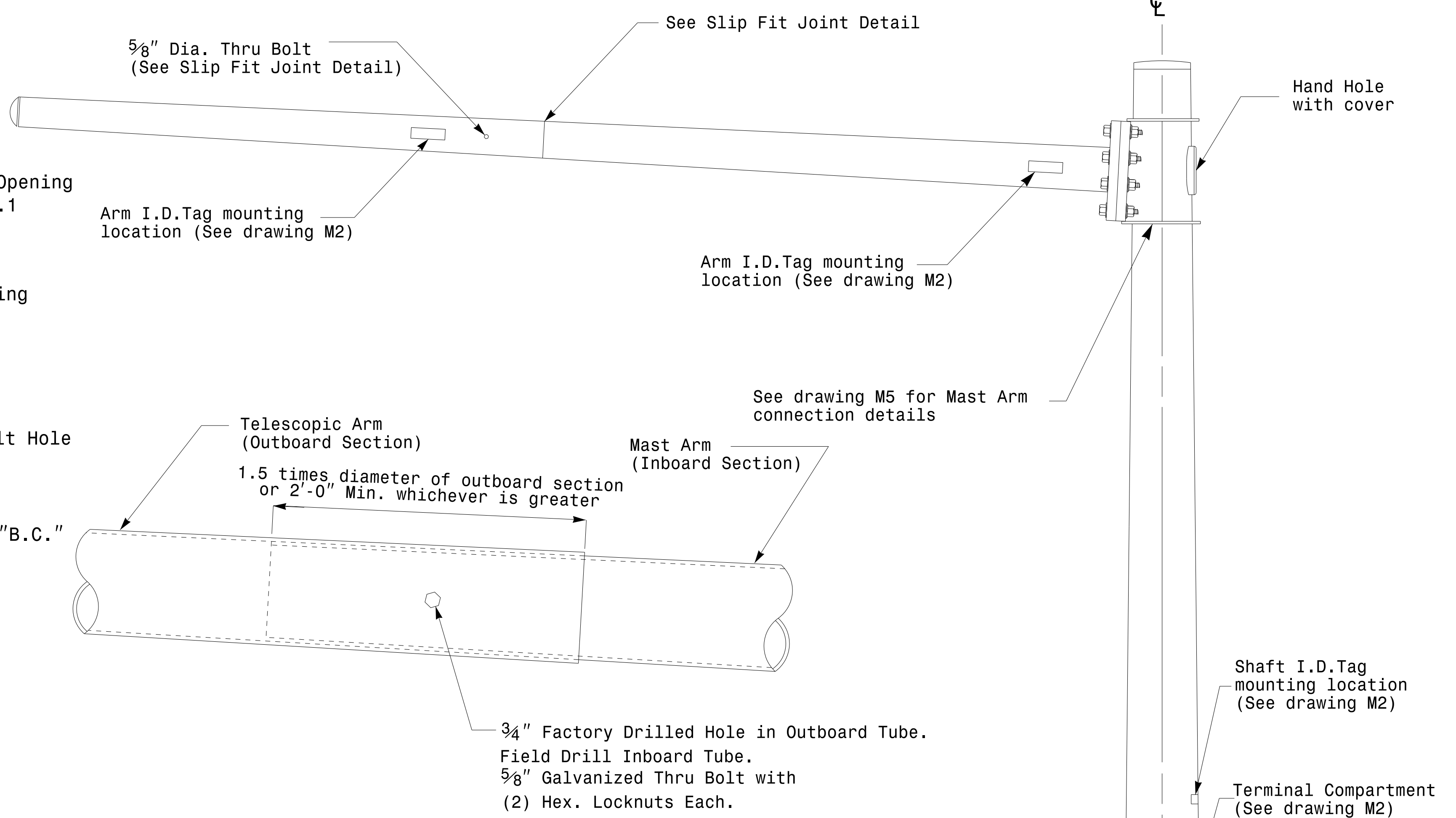
Note:  
 1. Opening in pole base plate shall be equal to pole base inside diameter minus 3 1/2" but shall not be less than 8 1/2".



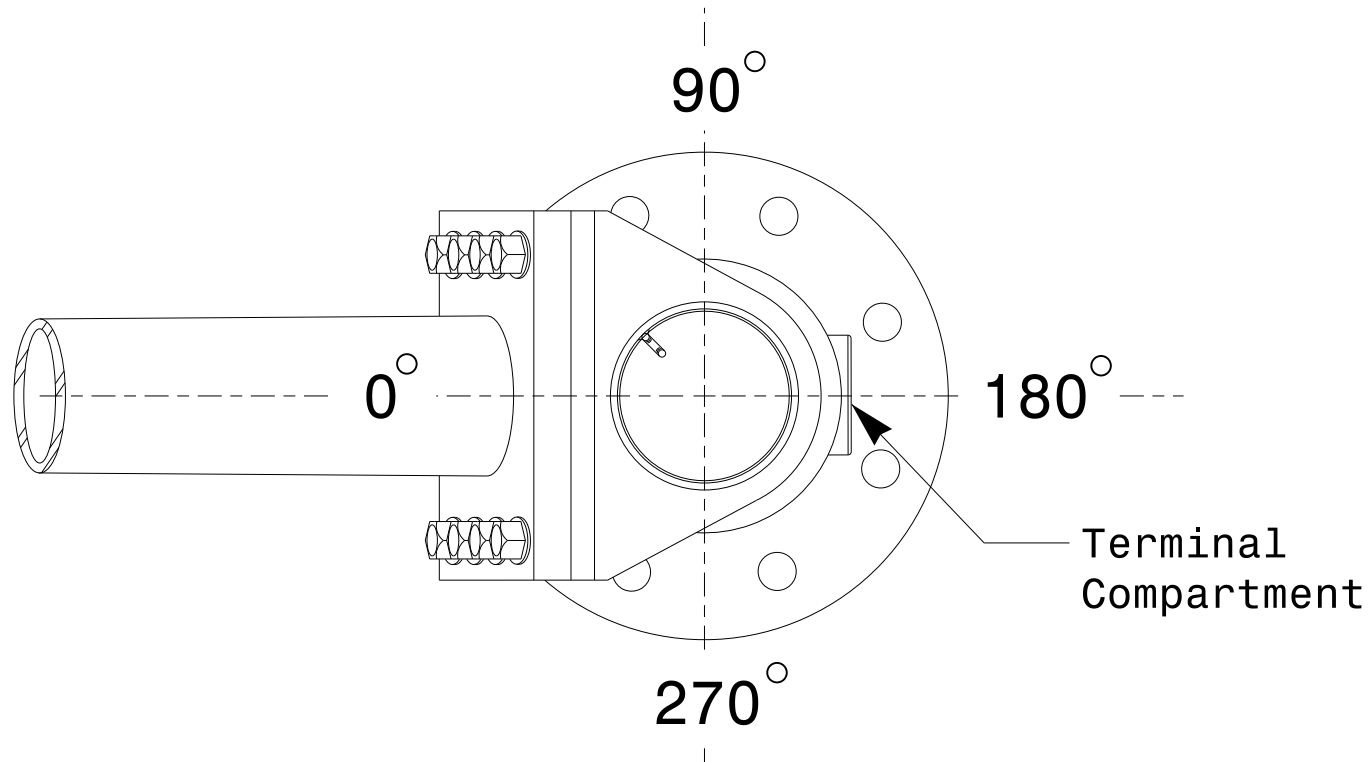
**Section A-A**  
**Pole Base Plate Details**



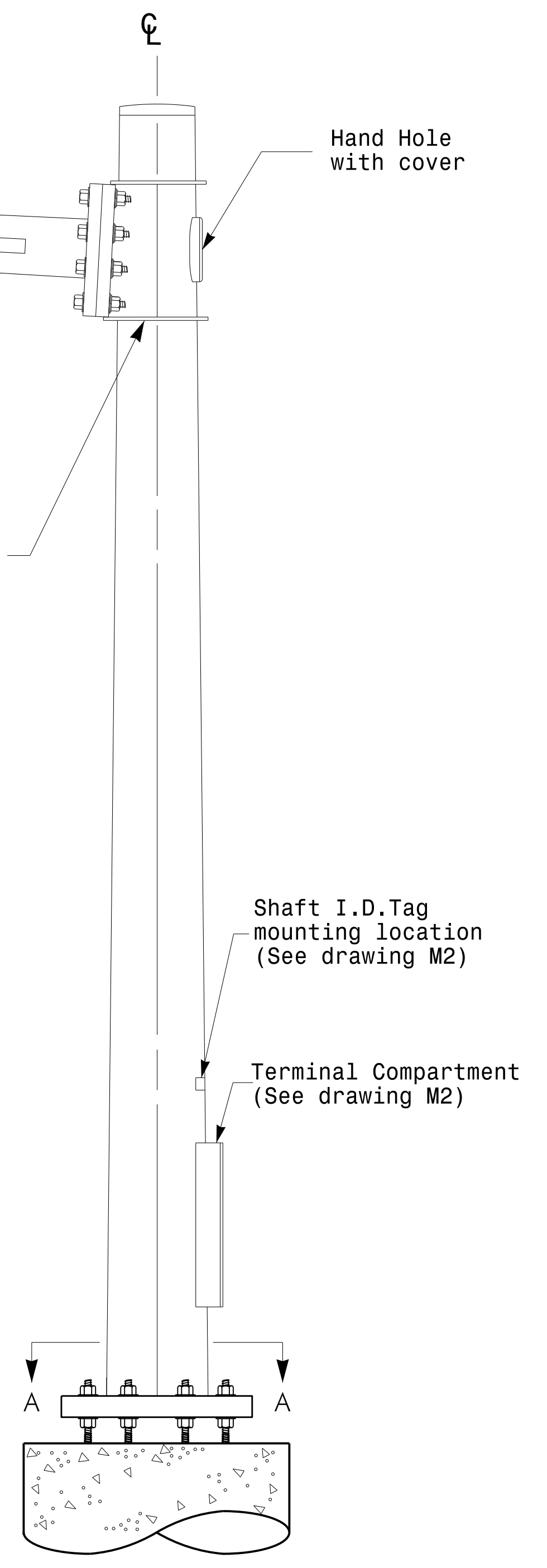
**Section B-B**  
 (Pole Attachment to Base Plate)  
**Full-Penetration Groove Weld Detail**



**Slip Fit Joint Detail for Mast Arm**



**Mast Arm Radial Orientation**



**Mast Arm Pole**

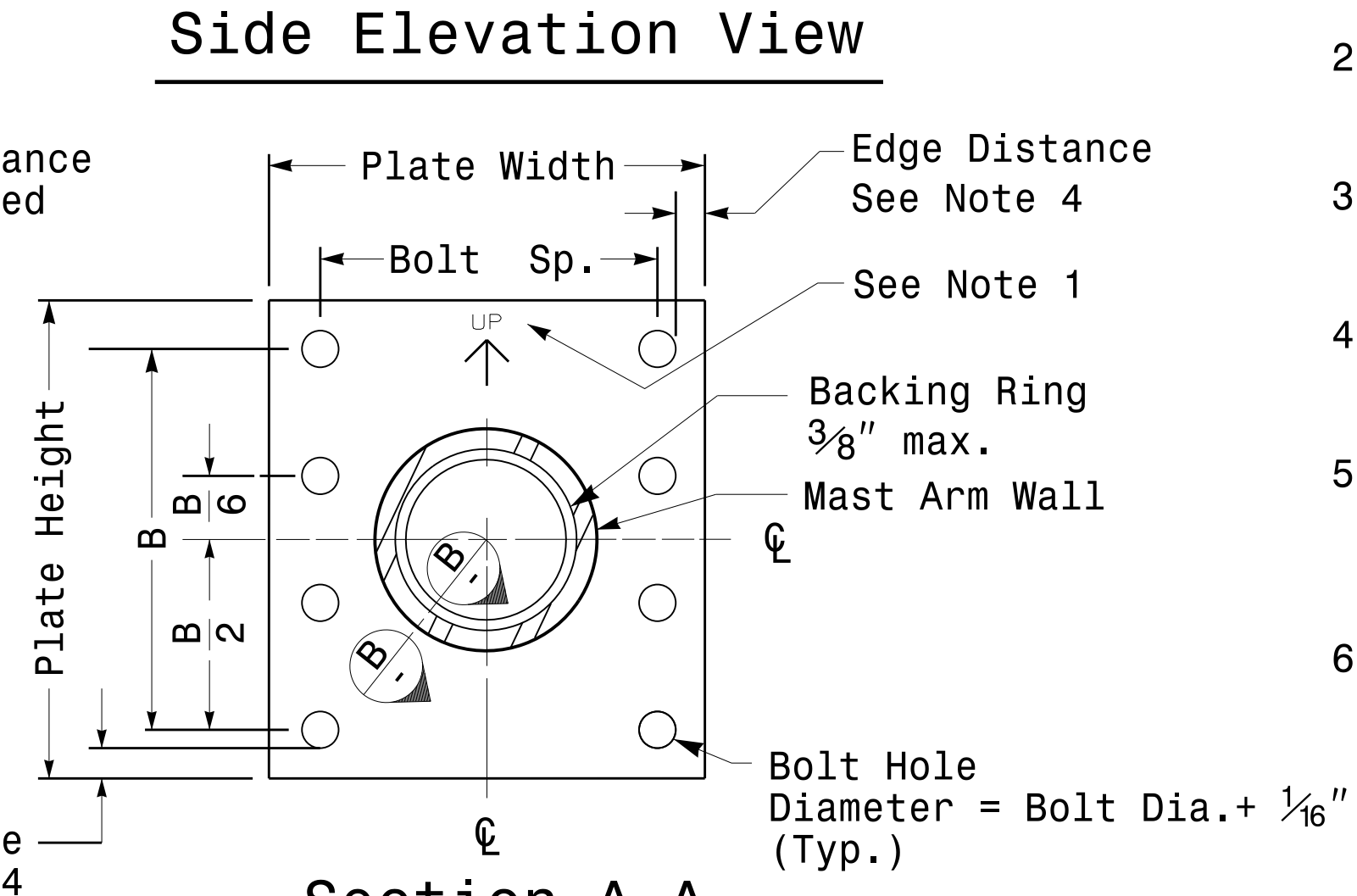
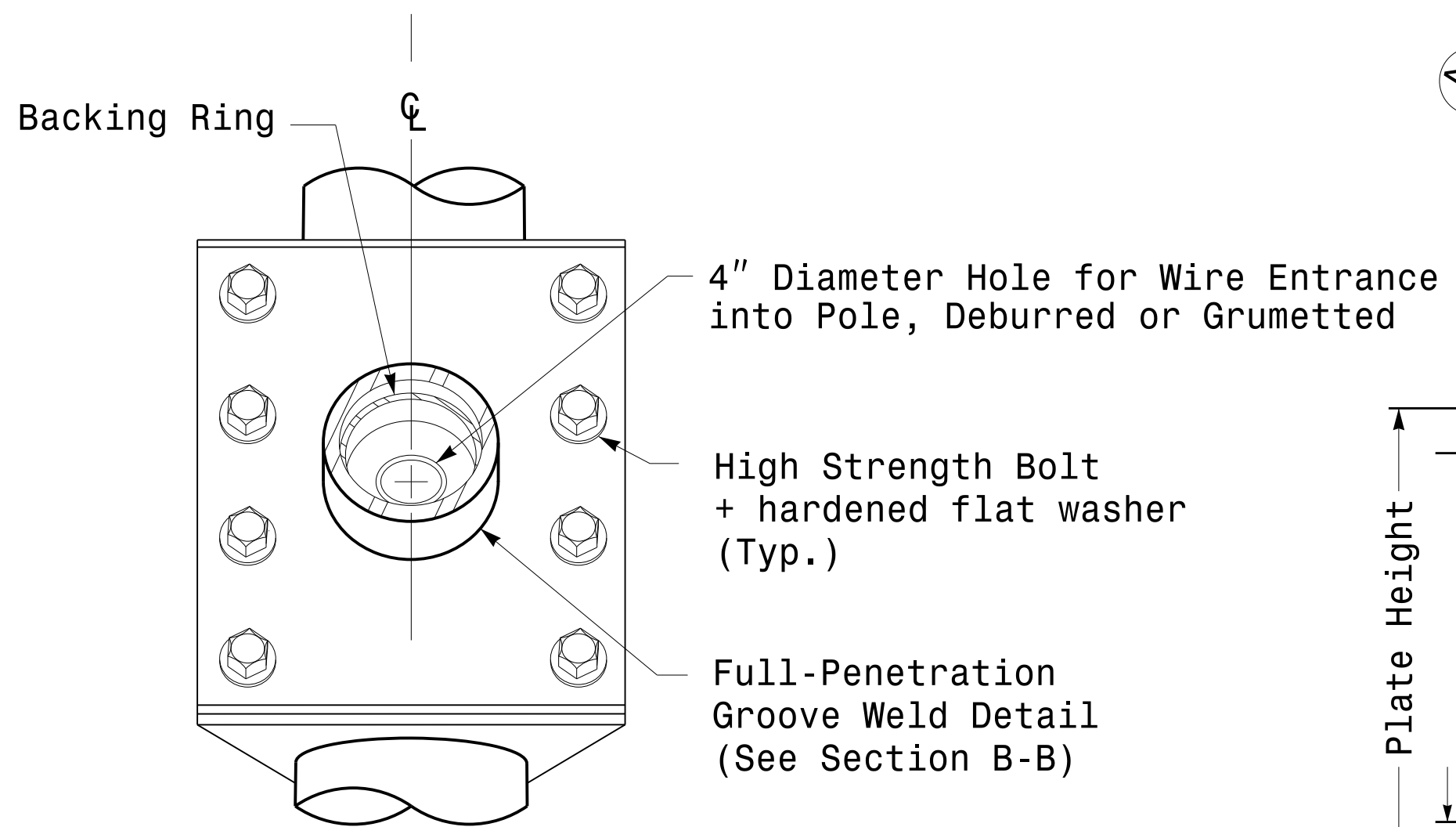
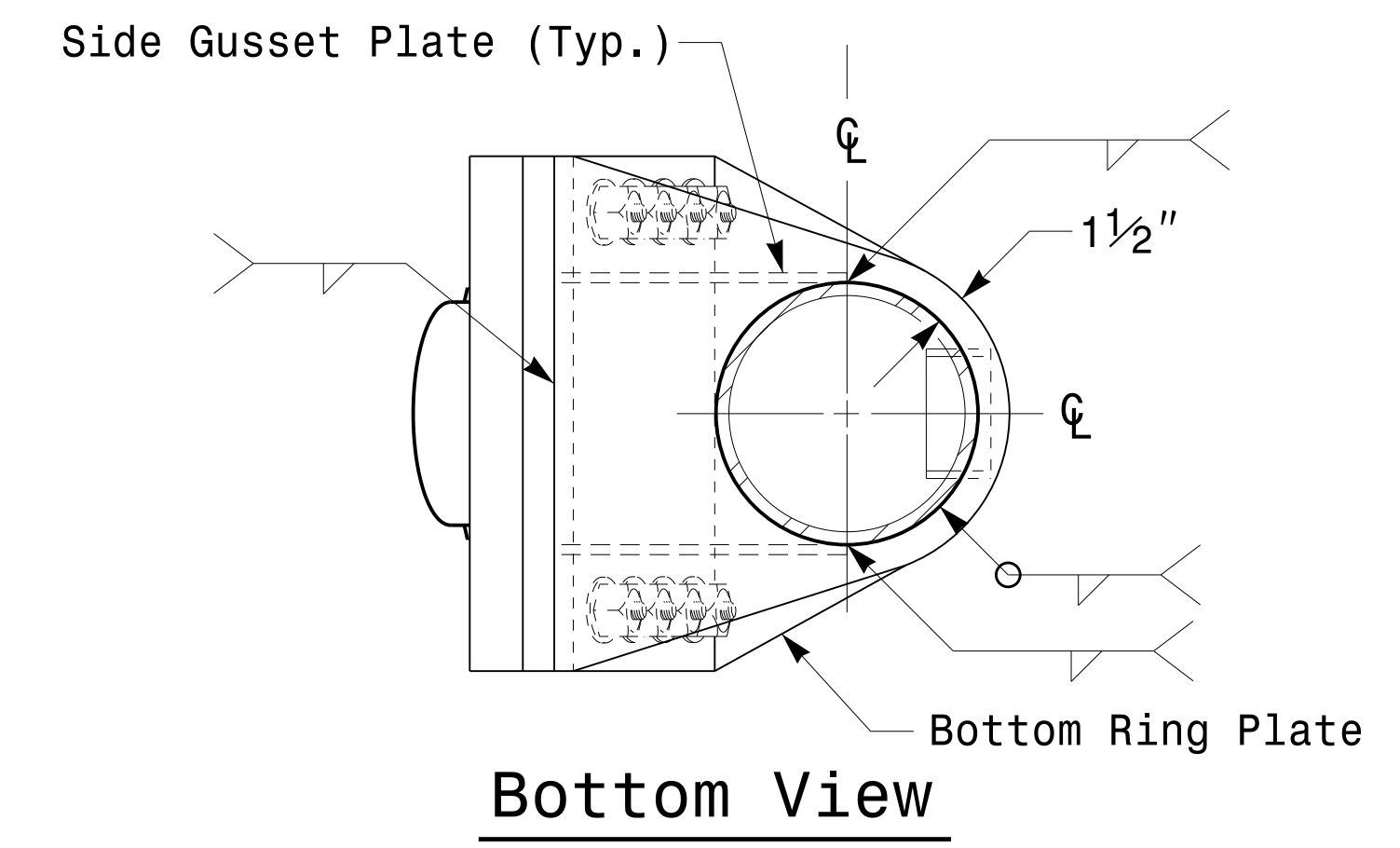
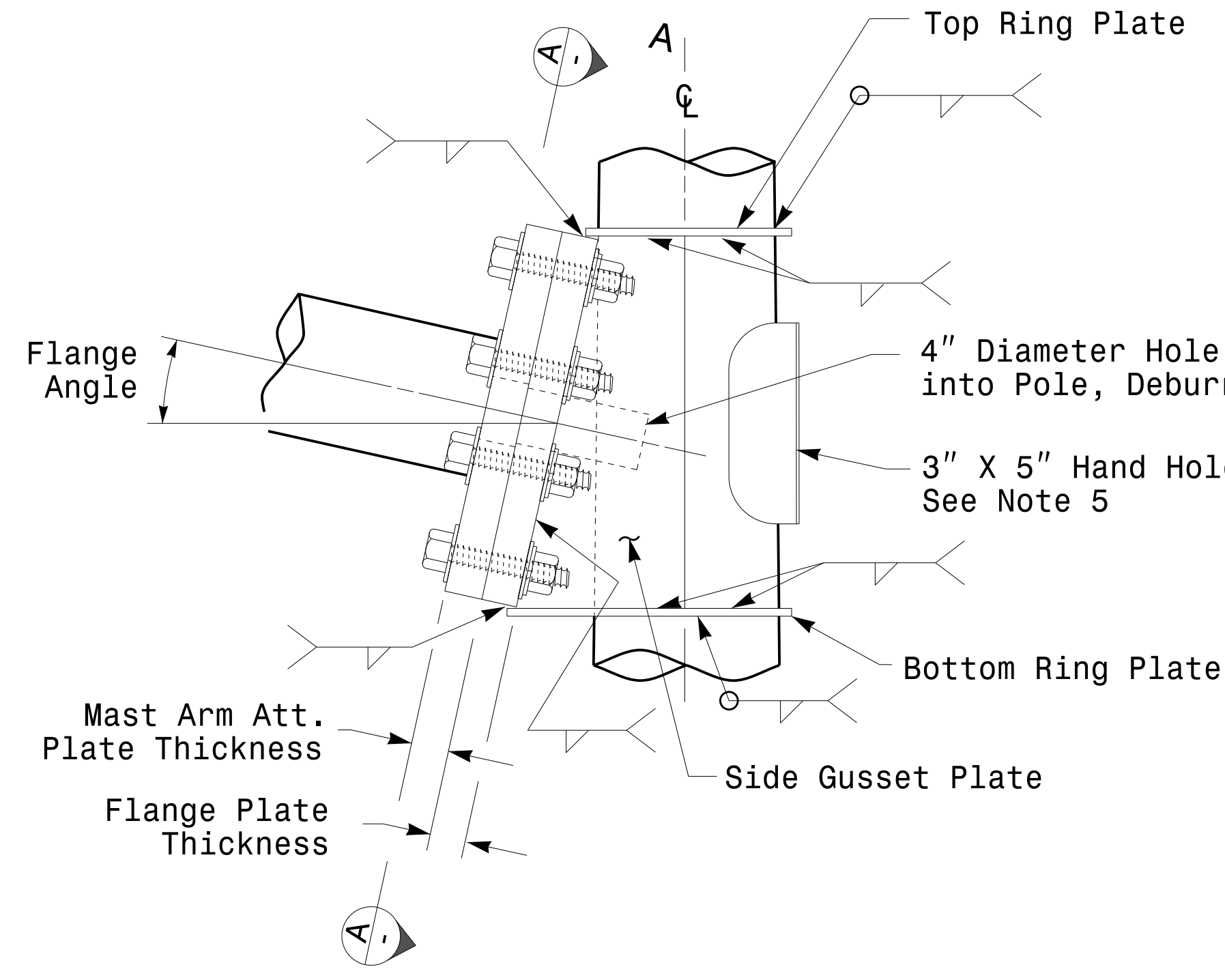
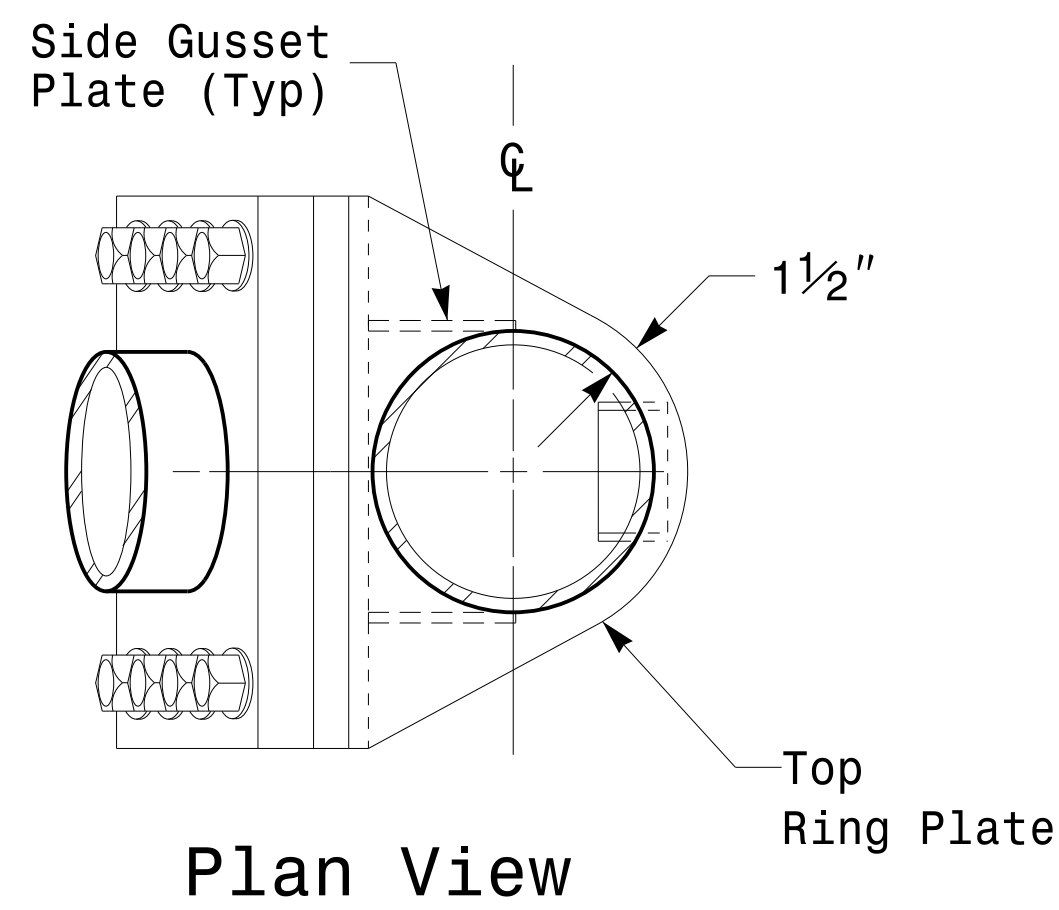
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 P:\2017

**Fabrication Details - Mast Arm Poles**

Prepared in the Offices of:  750 N. Greenfield Pkwy, Garner, NC 27529	<b>Typical Fabrication Details For Mast Arm Poles</b>		SEAL  D. C. SARKAR
	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		10/11/2017 DATE

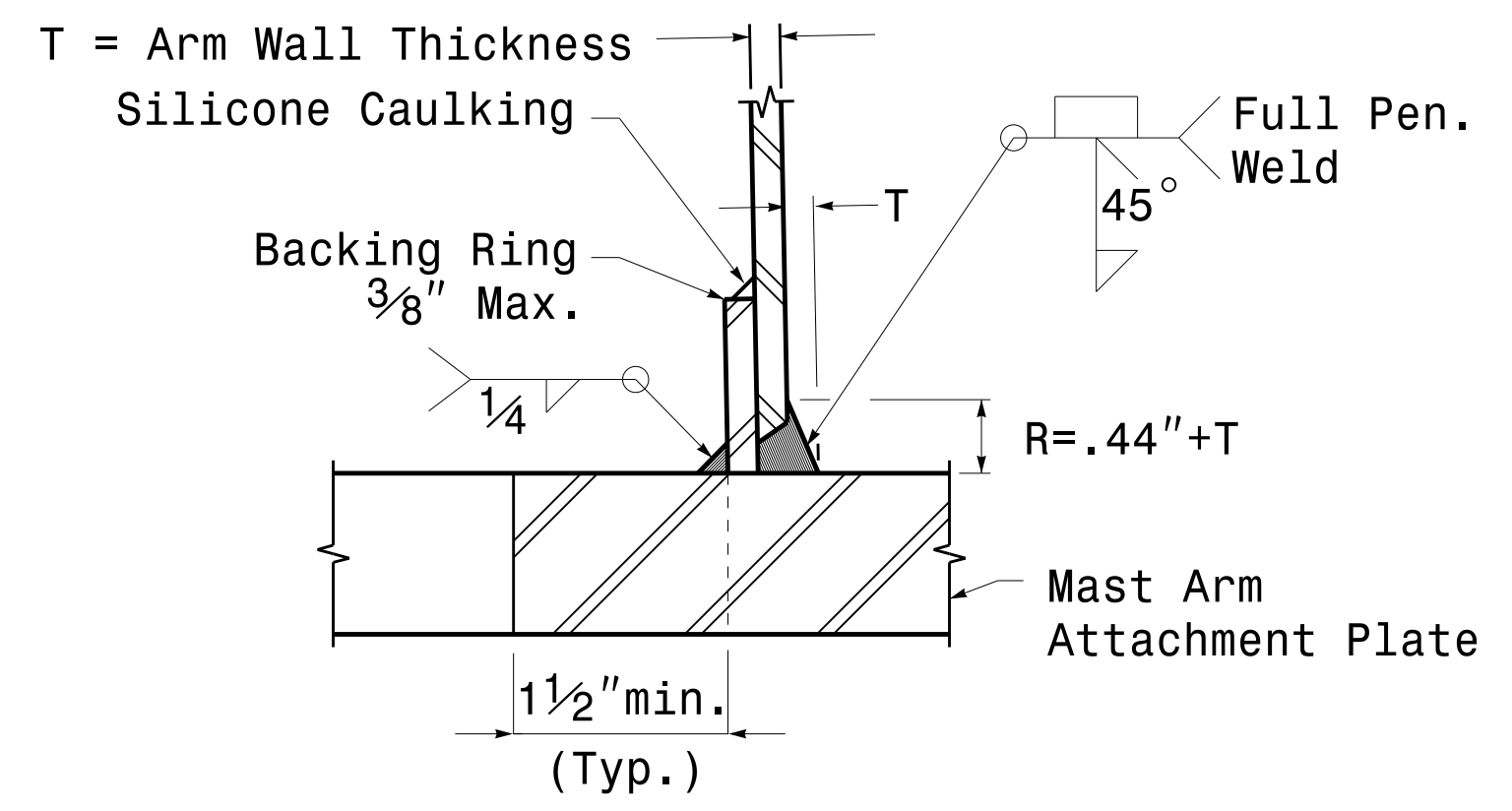
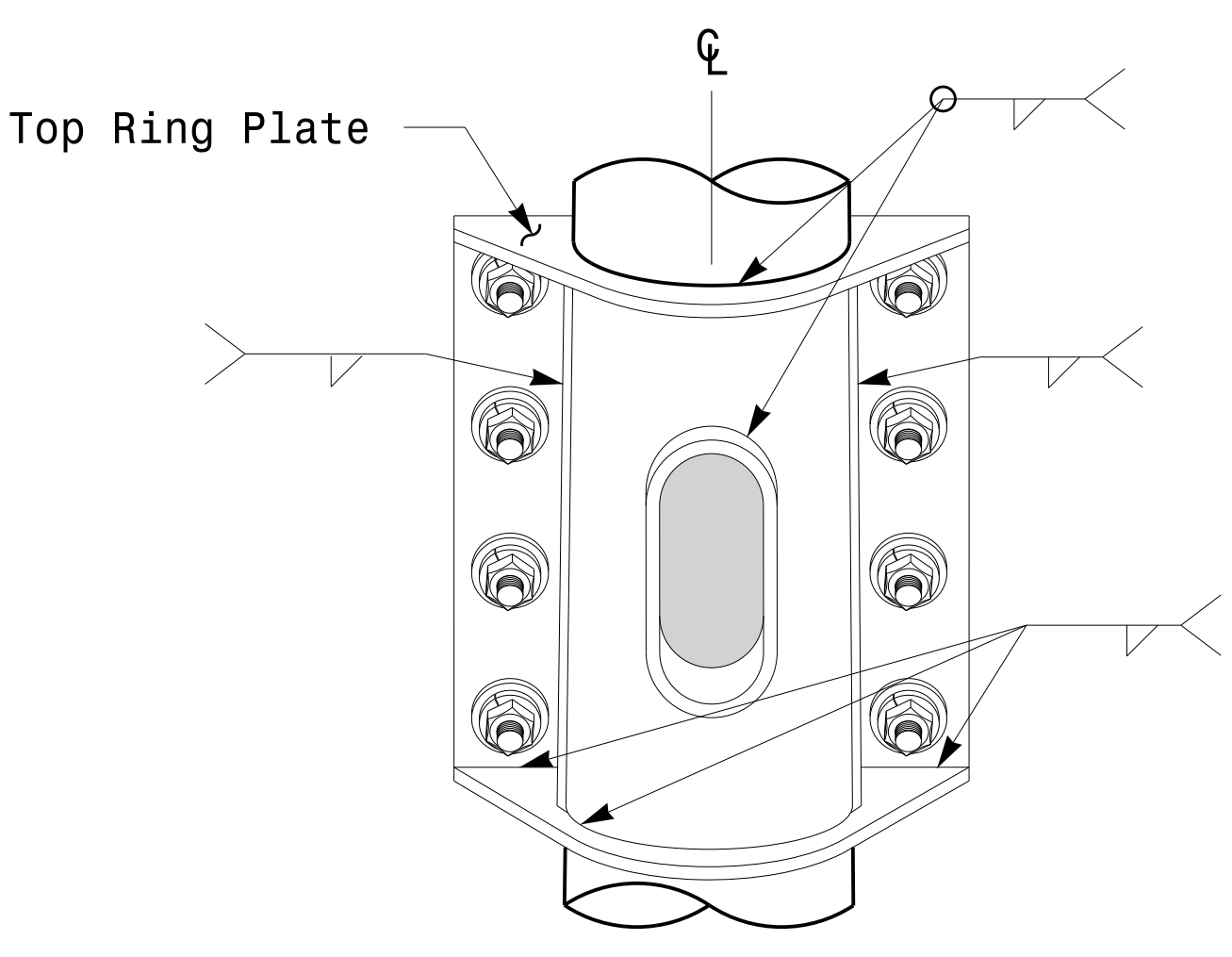
# Welded Ring Stiffened Mast Arm Connection

PROJECT ID. NO.	SHEET NO.
I-5972	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.



Prepared in the Offices of:

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

SEAL

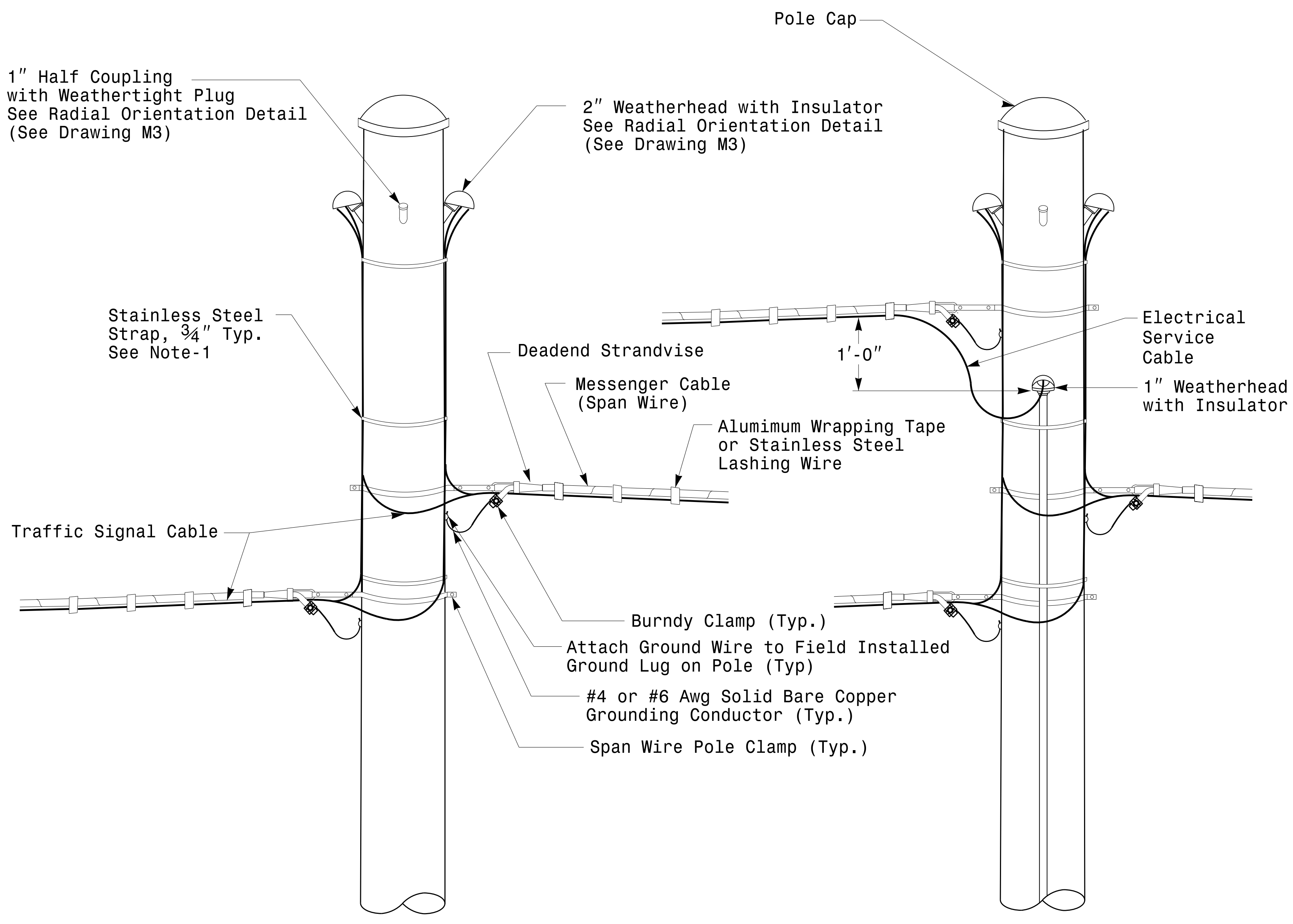
Discussed by: D.C. Sarkar

10/11/2017

DATE

11-001-2017-08135  
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D.C. SARKAR

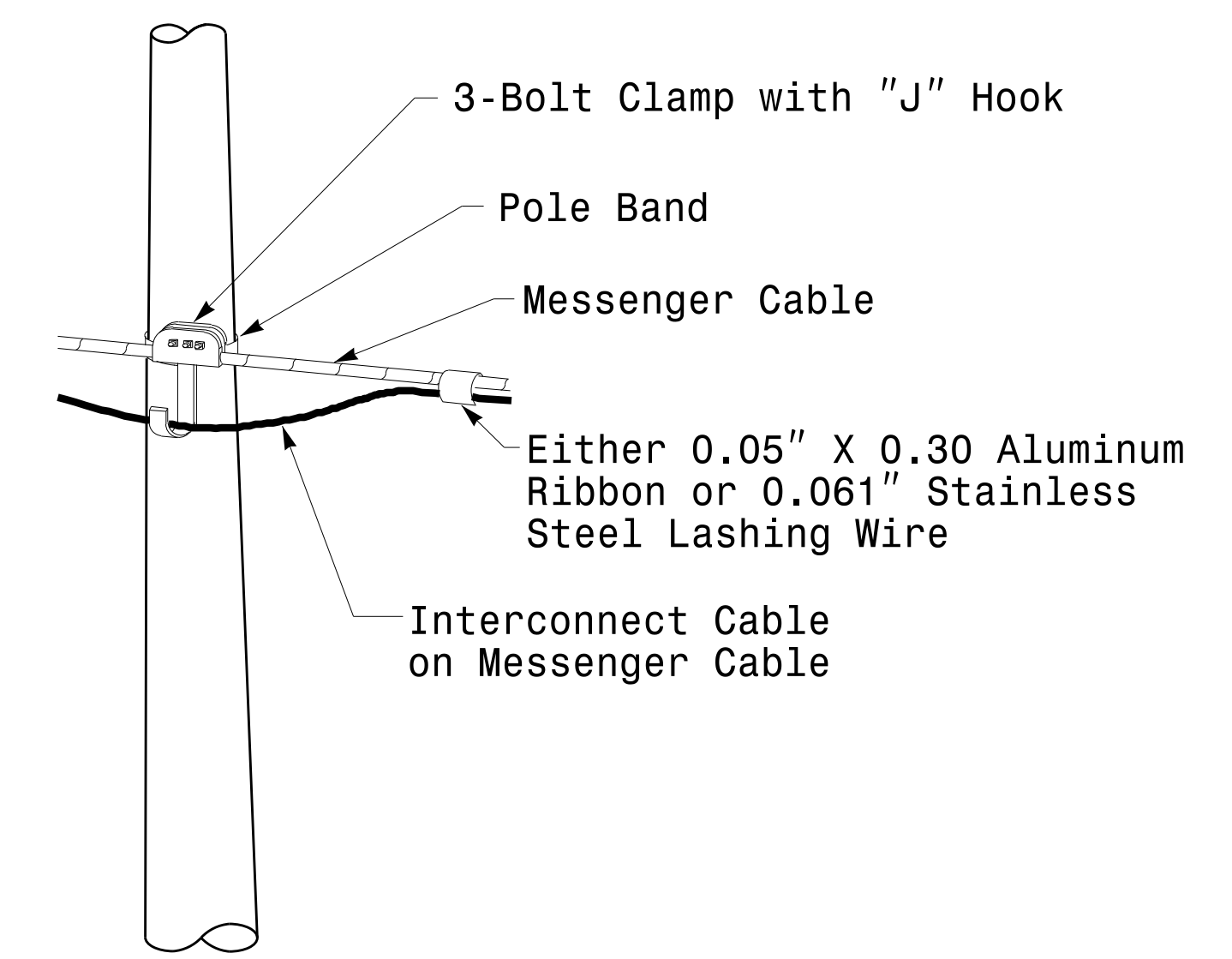
Fabrication Details - Mast Arm Connection



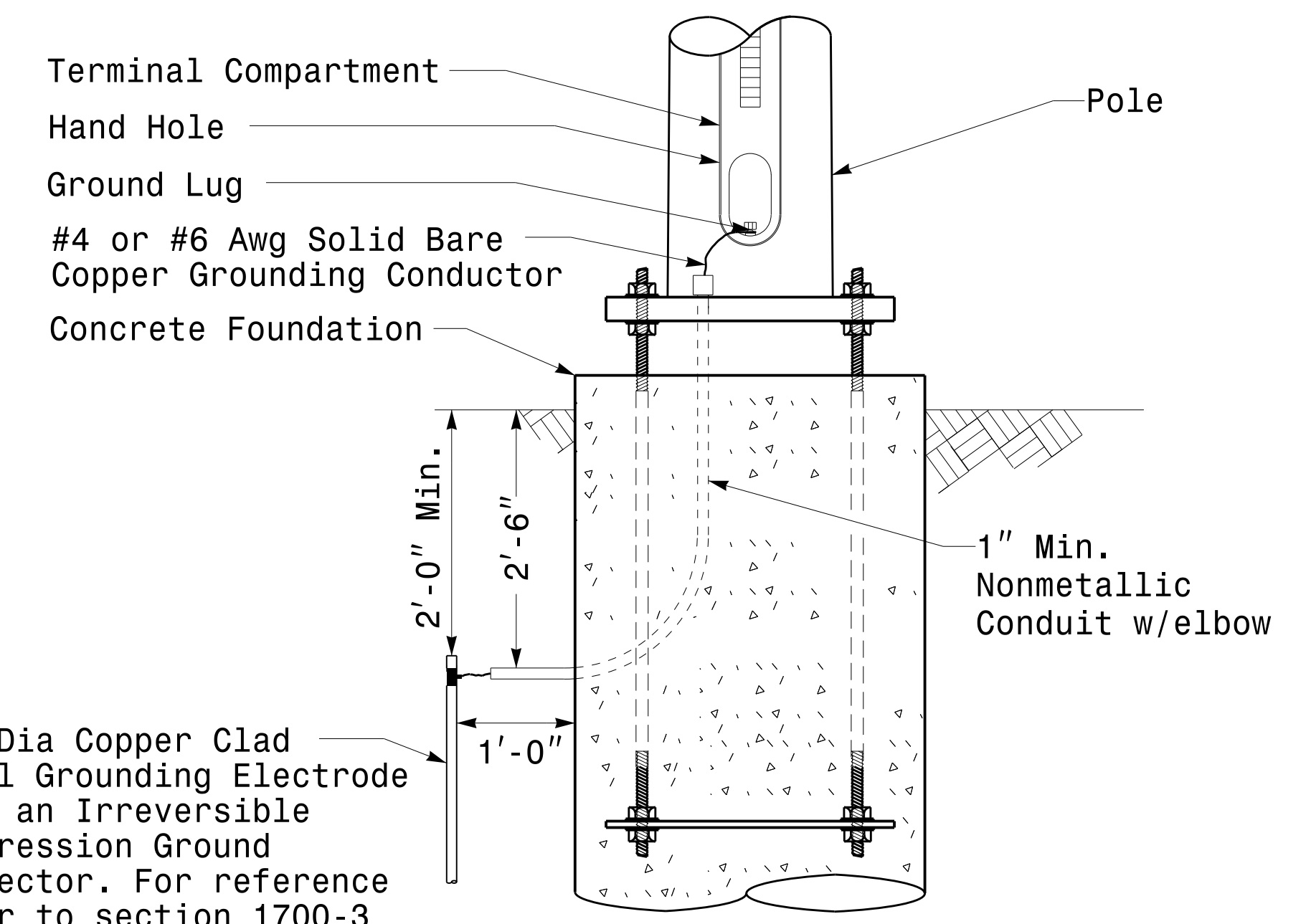
**Strain Pole Attachments**

**NOTE:**

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



**Attachment of Cable to Intermediate Metal Pole**



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

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

Prepared in the Offices of:

750 N. Greenfield Pkwy, Garner, NC 27529

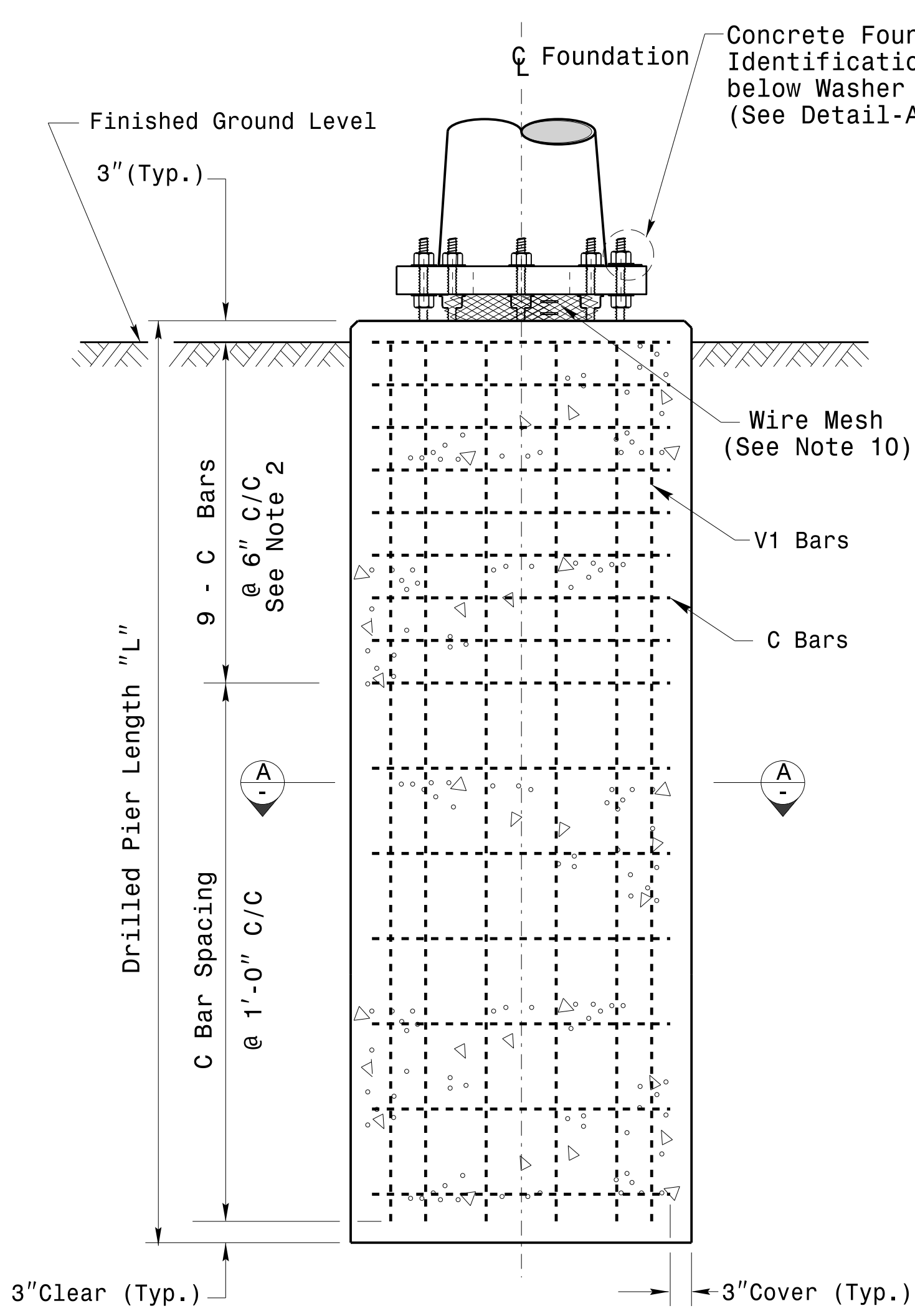
SCALE: 0 NA NONE

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

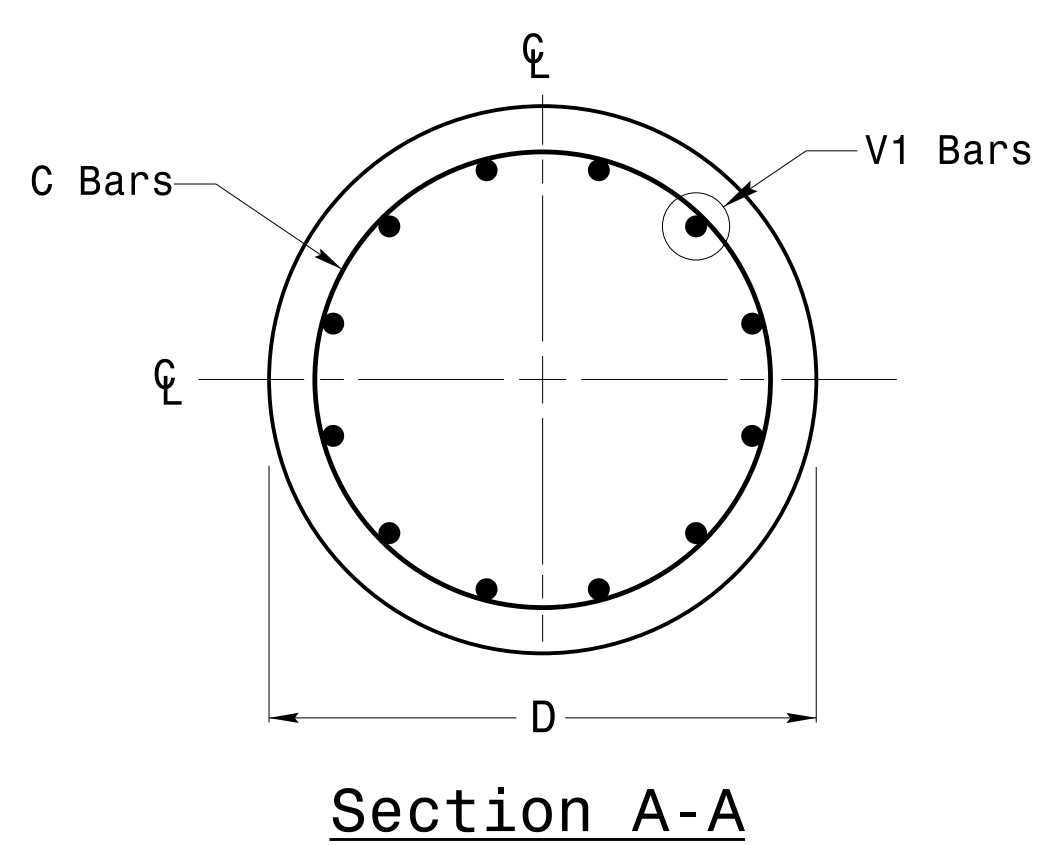
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DocuSigned by: D. C. Sarkar  
DATE: 10/11/2017

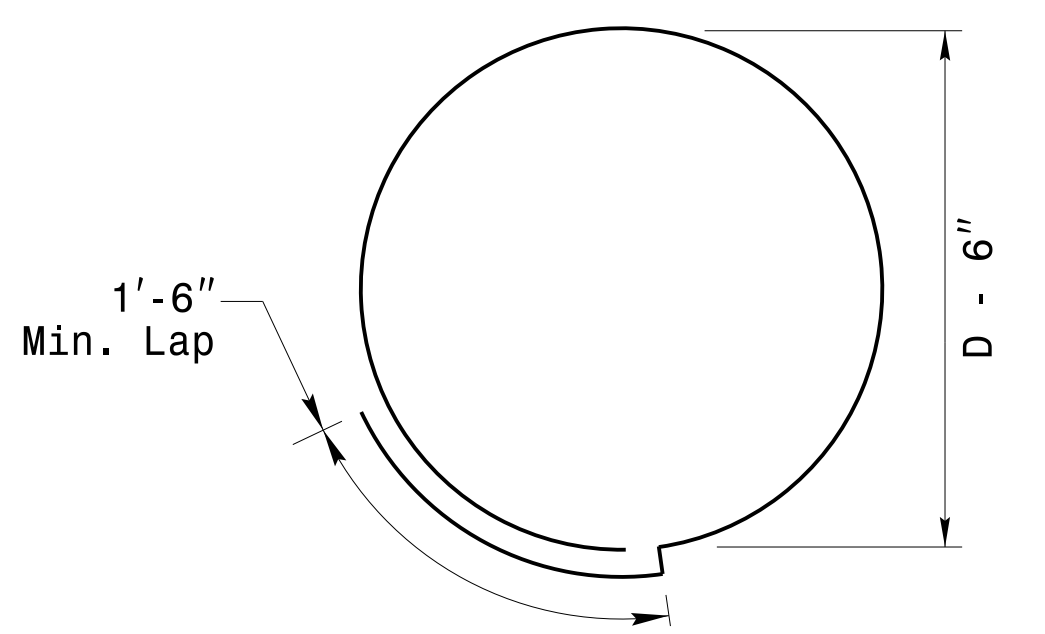
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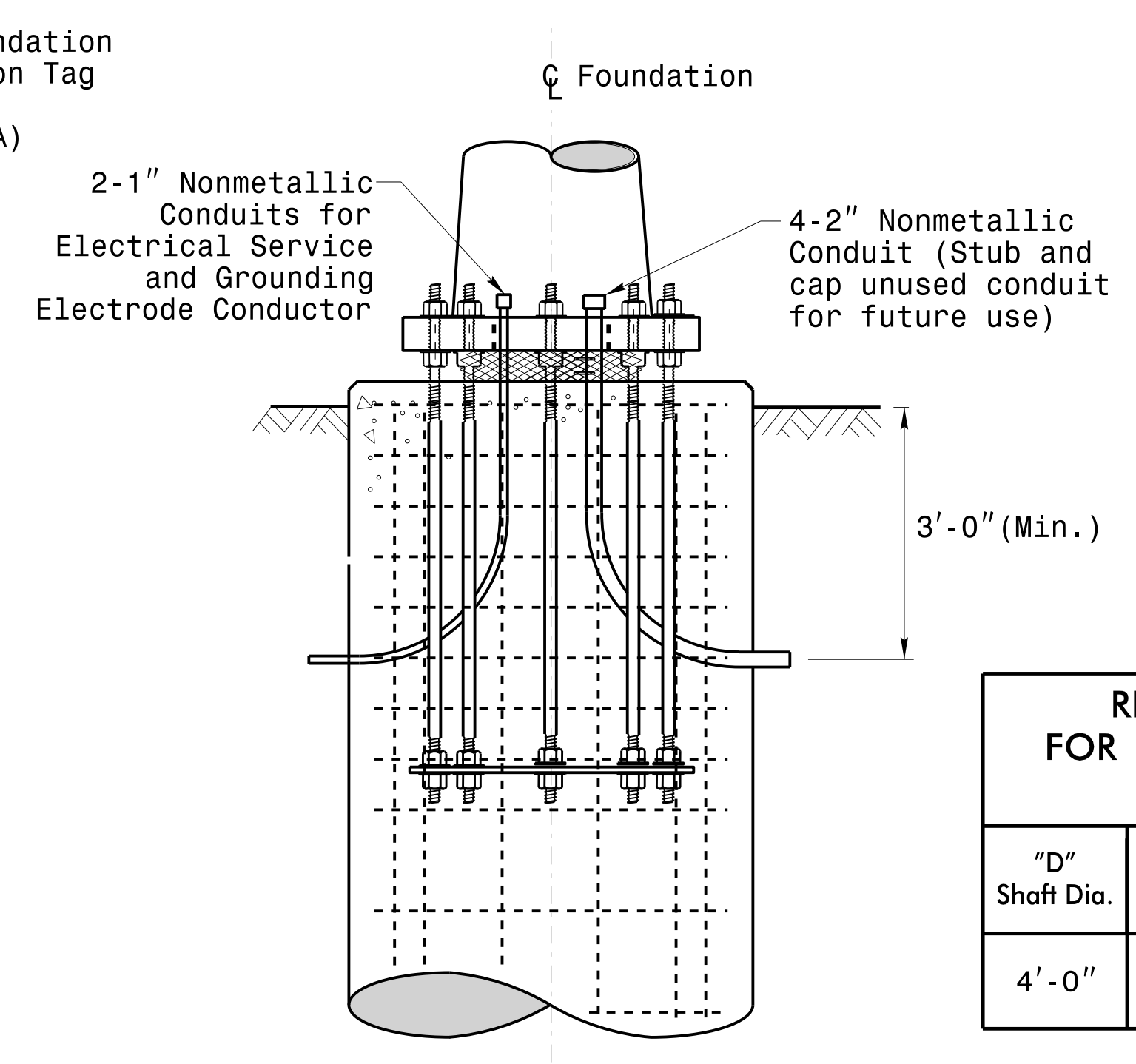
**Concrete Shaft Elevation**



**Section A-A**



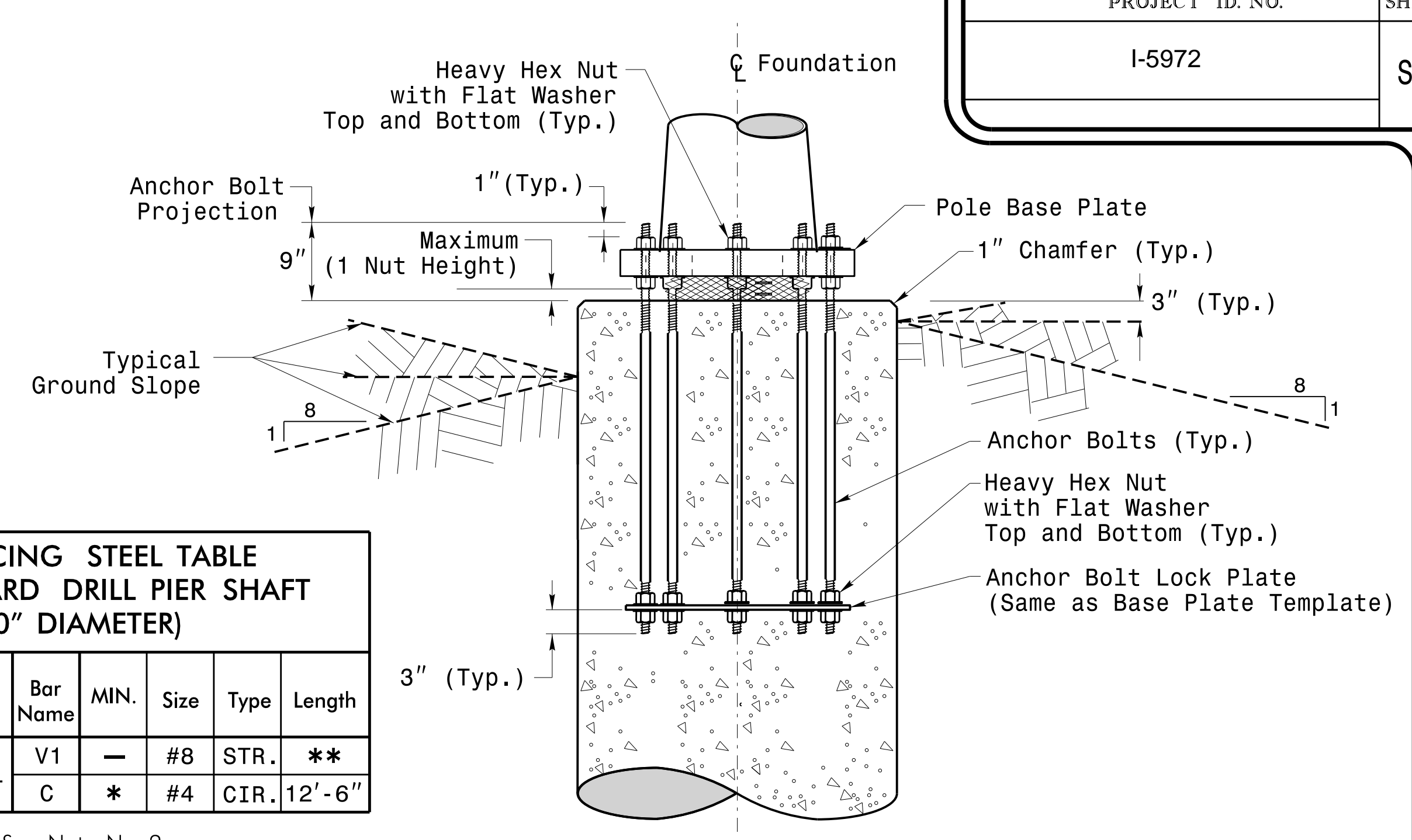
**Typical "C" Bar Detail**



**Typical Foundation Conduit Details**

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

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

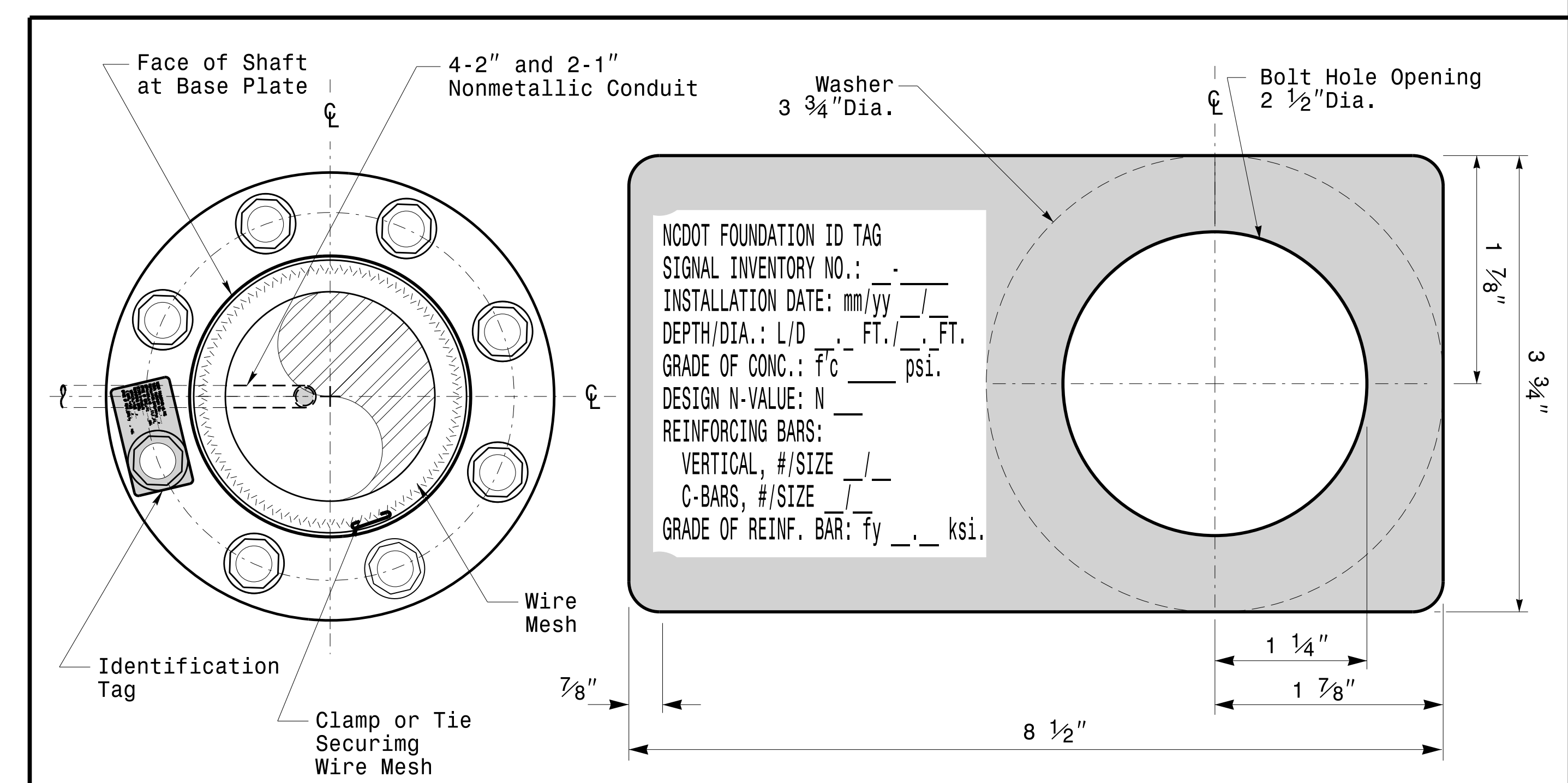


**Typical Foundation Anchor Bolt Details**

(Reinforcing Cage Not Shown for Clarity)

**General Notes:**

- If actual subsurface conditions differ significantly from boring data contact the Engineer before excavating or placing concrete.
- 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.
- 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.
- Provide 2" to 5" foundation projection above ground level depending on the ground slope.
- 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.
- 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>
- Use air entrained AA concrete mix with a compression strength of f'c=4500 psi.(min.) after 28 days.
- Use ASTM A615 grade 60 deformed bars for all reinforcing steel. Maintain at least 3" cover on all reinforcement.
- Locate the Identification Tag on the top of the base plate, directly above the conduit's entry point.
- 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.
- Preferred location for the I.D. Tag is as shown in Detail-A; directly above the conduit entering the foundation.



**Concrete Foundation Identification Tag Details**

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

**Detail-A**

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

**Construction Details - Foundations**

11-001-2017-08:37  
 I:\5601115-51\Signal\Signal Design\Section\Eastern Region\MM Sheets\2016\2014\_Sig\_M7\_S1d\_Construction\_Detail\Is-Strain\_Poles.dgn  
 PLOT

# SOIL CONDITION

PROJECT ID. NO.	SHEET NO.
I-5972	Sig.M8

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

**General Notes:**

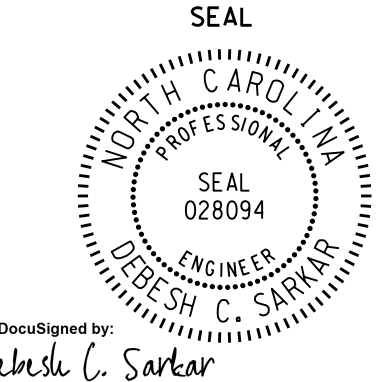
1. Values shown in the "Reactions at the Pole Base" column represent the minimum acceptable capacity allowed for design using a design CSR of 1.00.
2. Use chairs and spacers to maintain proper clearance.
3. For foundation, always use air-entrain concrete mix.

**Foundation Selection:**

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

**Standard Strain Pole Foundation-All Soil Condition**

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



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

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

10/11/2017  
DATE

REVISIONS

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

SCALE: 0 NA NONE

I:\Projects\2017\_08-10\Sigsbee\15 Signal\Signal Design Section\Eastern Region\M Sheets\2016\2014 Sig.M8 Std. Strain Pole Found.-Saturated Soil -Cond111en.dgn



- 1 INSTALL COAX CABLE
- 2 INSTALL ETHERNET CABLE
- 3 INSTALL 3-WIRE COPPER FEEDER CONDUCTORS
- 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 NEW 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

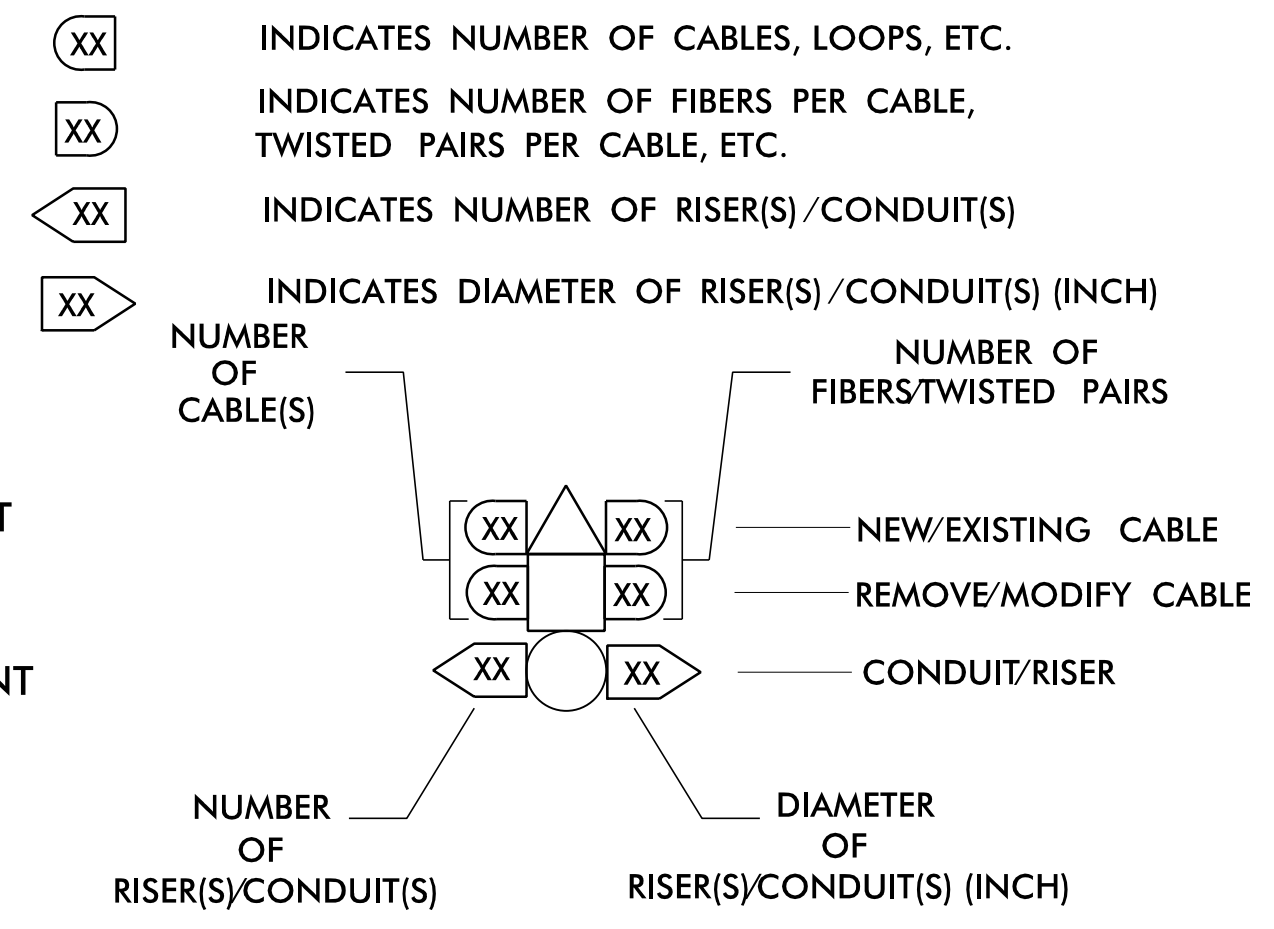
- 34 INSTALL CABINET FOUNDATION
- 35 INSTALL CCTV CAMERA POLE MOUNTED CABINET
- 36 INSTALL CCTV CAMERA ASSEMBLY
- 37 INSTALL CCTV CAMERA WOOD POLE
- 38 INSTALL CCTV CAMERA METAL POLE AND FOUNDATION
- 39 INSTALL JUNCTION BOX
- 40A INSTALL OVERSIZED JUNCTION BOX
- 40B INSTALL SPECIAL OVERSIZED JUNCTION 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
- 52 INSTALL DELINEATOR 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**

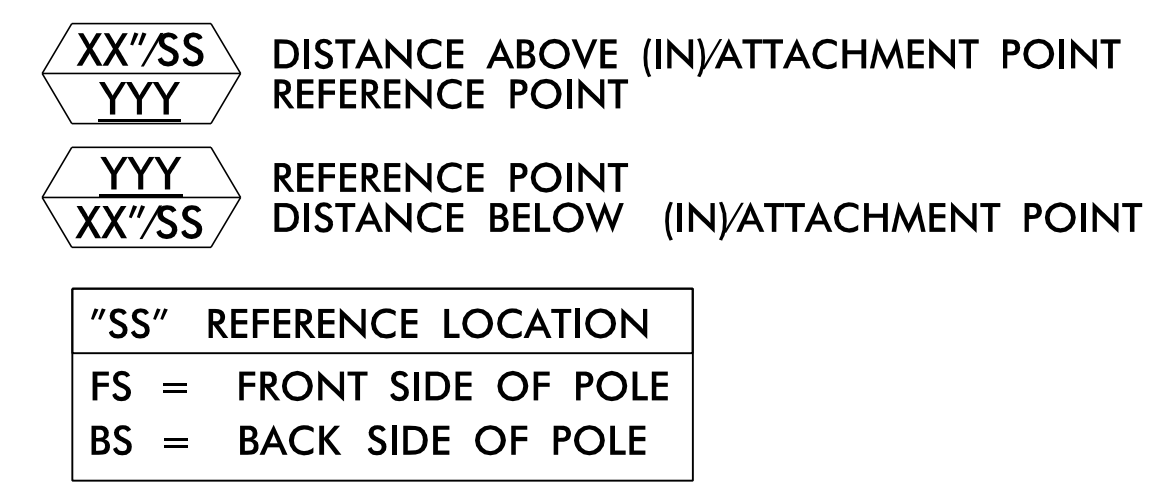
	NEW FIBER OPTIC COMMUNICATIONS CABLE
	EXISTING COMMUNICATIONS CABLE
	EXISTING COMMUNICATIONS CABLE TO BE REMOVED
	NEW AERIAL GUY ASSEMBLY
	NEW CONDUIT
	EXISTING CONDUIT
	NEW DIRECTIONAL DRILLED CONDUIT

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

**CONSTRUCTION NOTE SYMBOLOGY KEY**

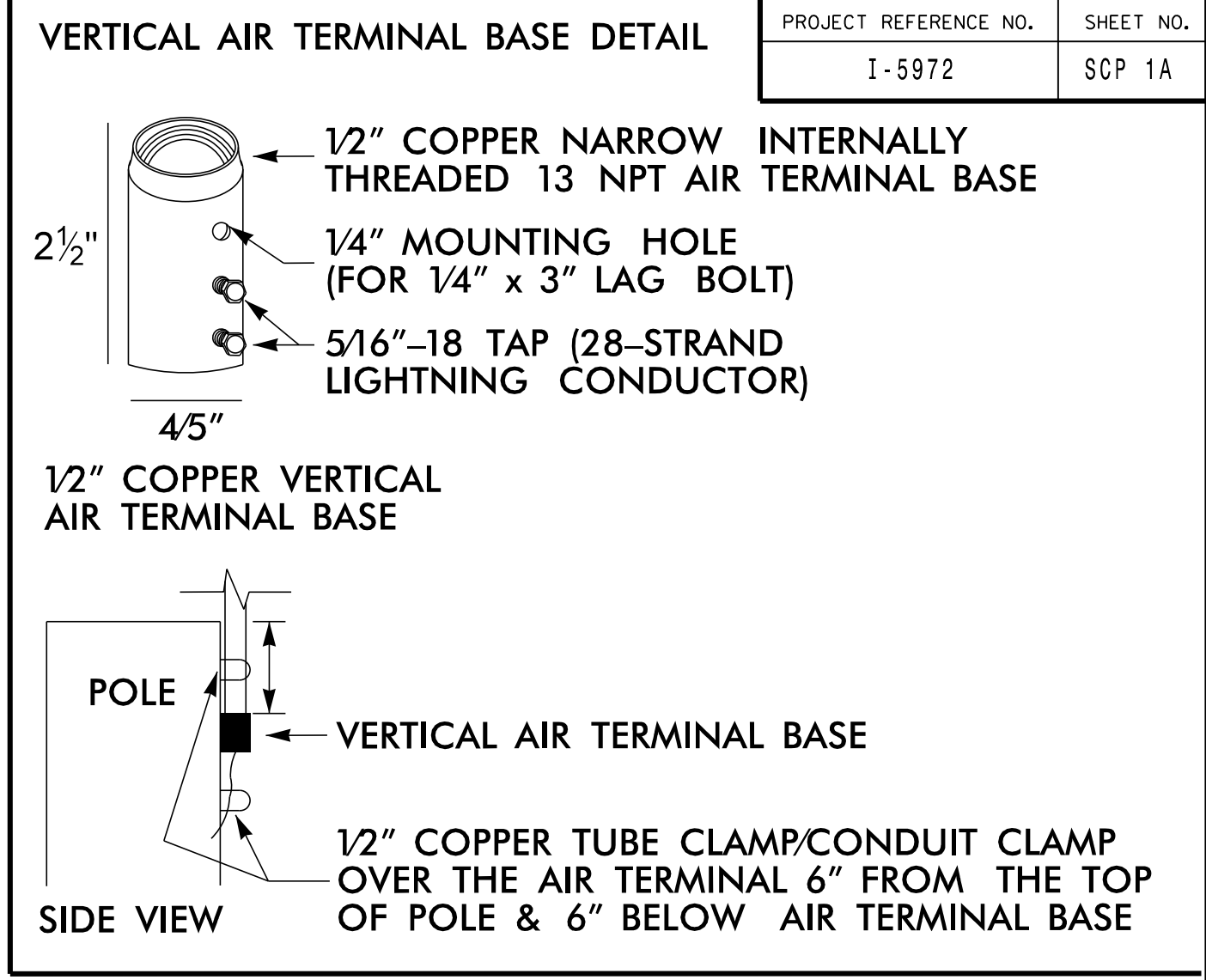
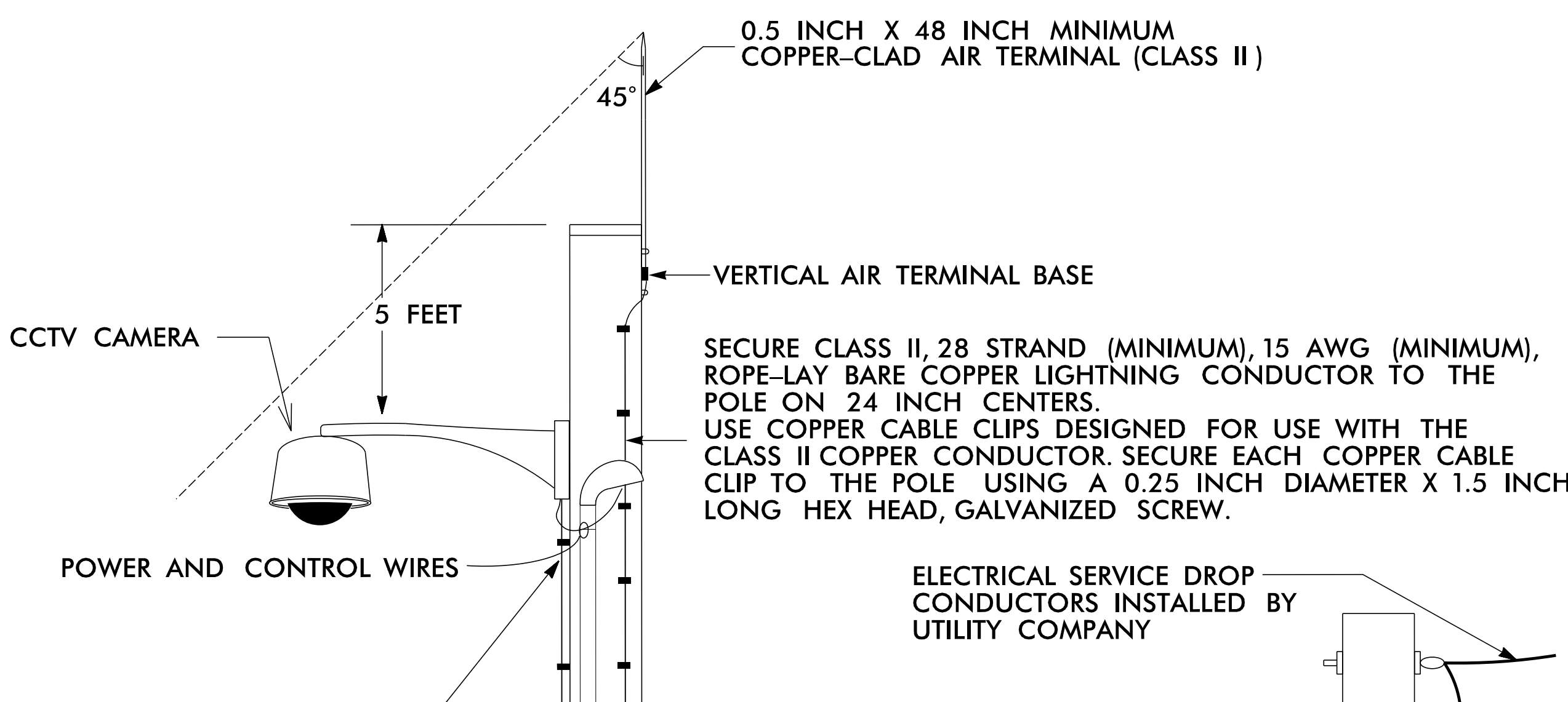
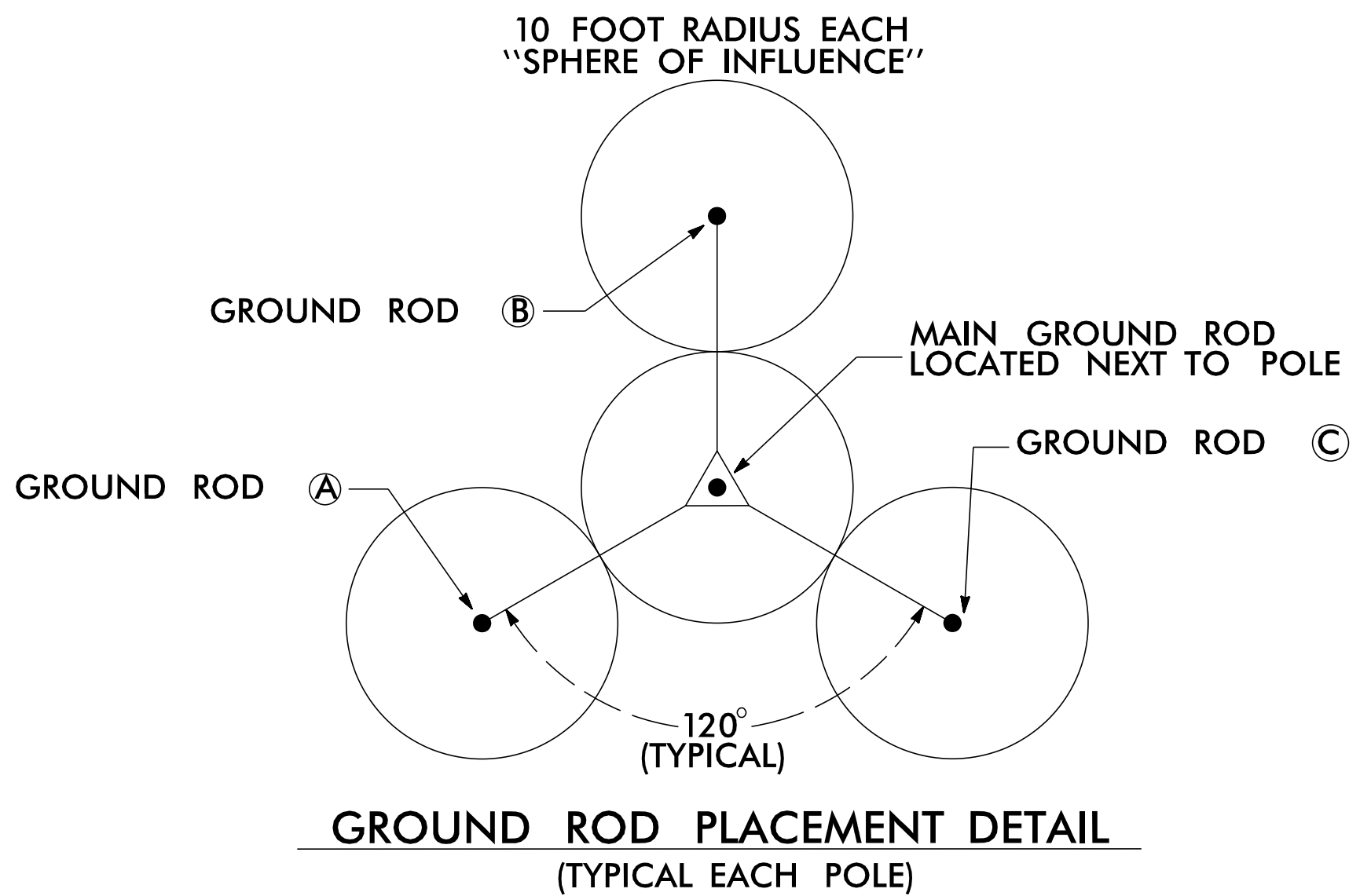


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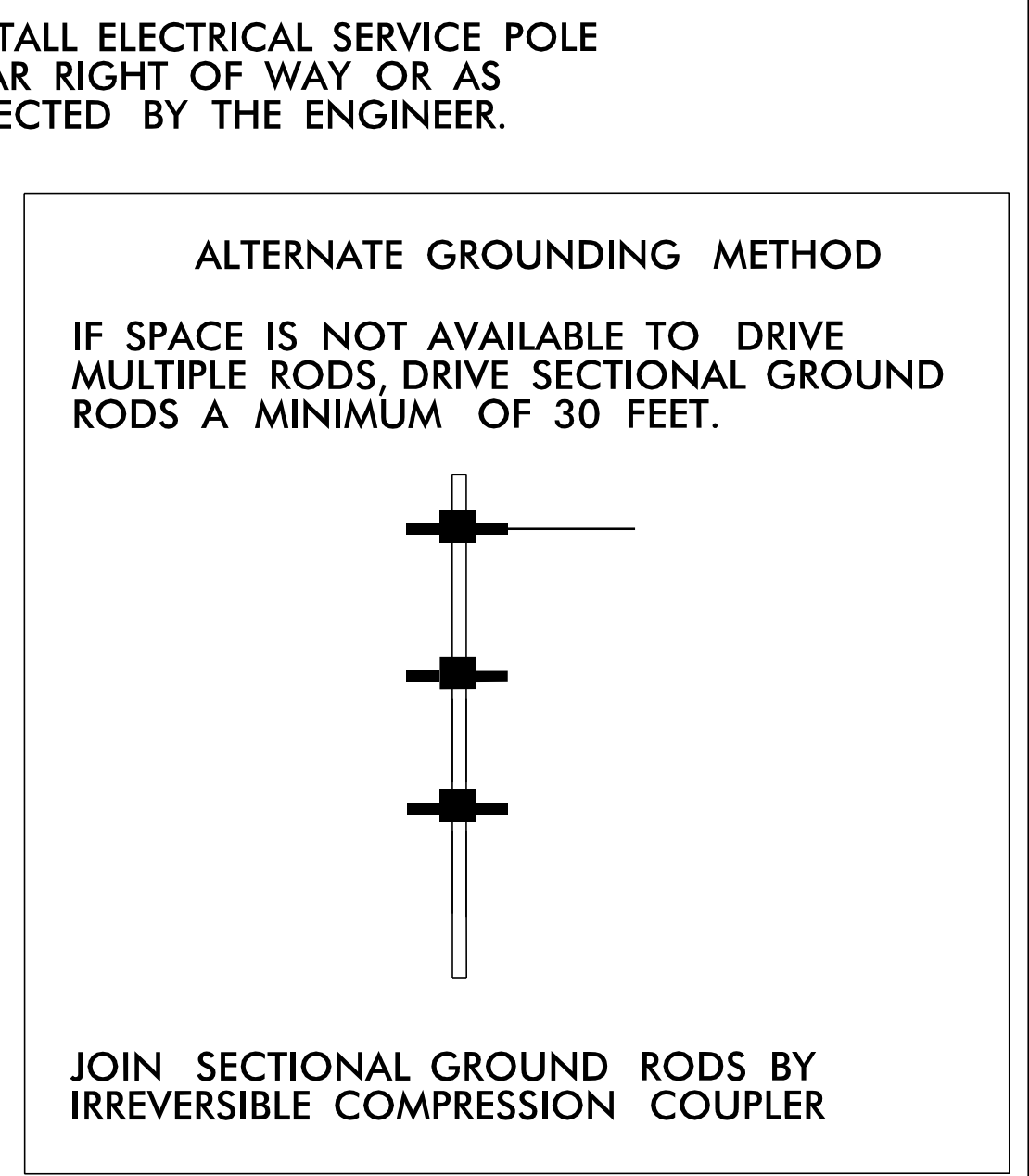
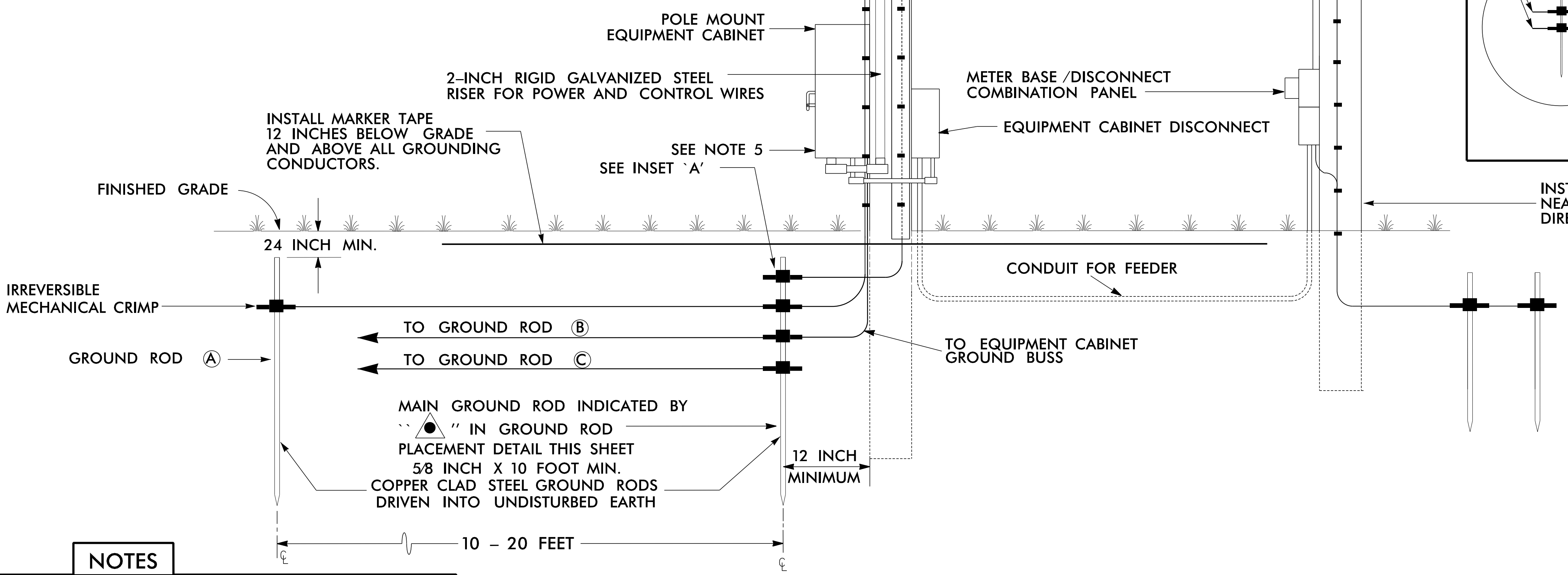
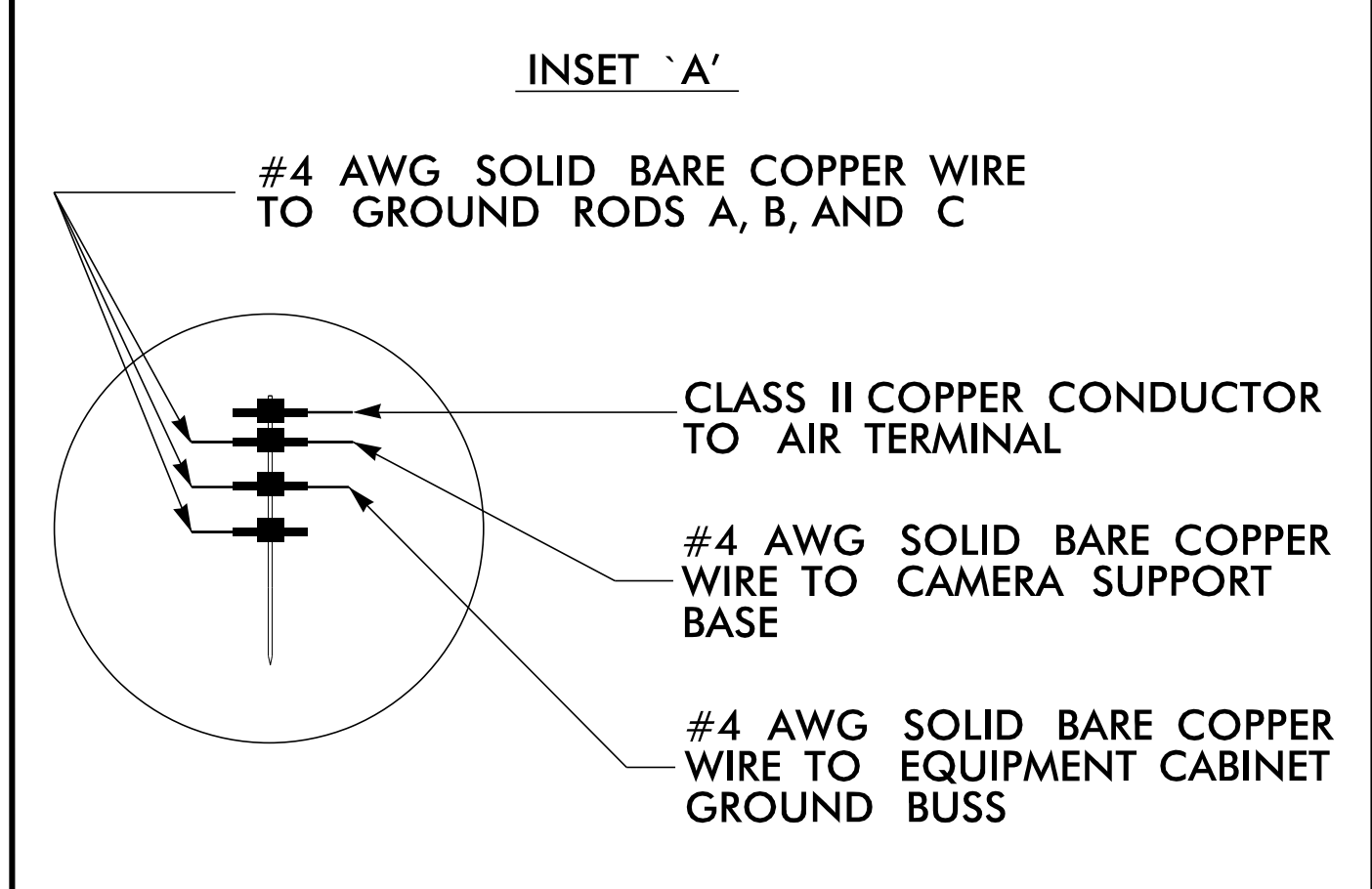
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Prepared for the Offices of:  
  
 I-5972  
 Signal Communications Plans  
 Division 4 Johnston County Smithfield  
 PLAN DATE: September 2023 REVIEWED BY: DT Sears  
 PREPARED BY: WP Erickson-Jones REVIEWED BY:  
 REVISIONS INIT. DATE  
 NTS  
 DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED  
 SEAL NORTH CAROLINA PROFESSIONAL ENGINEERS SEAL 044558 DAVID T. SEARS  
 Documented by: David J. Sears 9/19/2023  
 SIGNATURE DATE  
 CADD Filename:



BOND #4 AWG SOLID BARE COPPER WIRE TO CAMERA SUPPORT BASE BY AN ALUMINUM TO COPPER #2 - #14 AWG LUG. ATTACH TO CAMERA BASE WITH A STAINLESS STEEL SELF TAPPING SCREW. REMOVE PAINT OR PROTECTIVE COATING WHERE ATTACHING LUG ONLY.

INSTALL 2-INCH PVC U-GUARD OVER COPPER CONDUCTOR FROM GROUND LEVEL TO 10 FEET (MINIMUM) ABOVE THE GROUND.



**NOTES**

- BOND CLASS II, 28 STRAND (MINIMUM), 15 AWG (MINIMUM) ROPE-LAY BARE COPPER CONDUCTOR TO THE MAIN GROUND ROD BY AN IRREVERSIBLE MECHANICAL CRIMP. MAINTAIN MAXIMUM HORIZONTAL SEPARATION BETWEEN COPPER CONDUCTOR AND RISER.
- ALL CONNECTIONS TO GROUND RODS SHOULD BE MADE WITH AN IRREVERSIBLE MECHANICAL CRIMP METHOD.
- REFER TO STANDARD DRAWING 1700.02 FOR ALTERNATE GROUND ROD INSTALLATION METHOD AS APPROVED BY THE ENGINEER.
- INSTALL MARKER TAPE DIRECTLY ABOVE ALL GROUNDING ELECTRODES AND CONDUCTORS AT A DEPTH OF 12 INCHES.
- REMOVE BONDING JUMPER BETWEEN EQUIPMENT CABINET GROUND BUSS AND NEUTRAL BUSS.

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Prepared for the Offices of:  
 Transportation, Mobility and Safe Interchange  
 NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
 750 N. Greenfield Pkwy., Garner, NC 27529

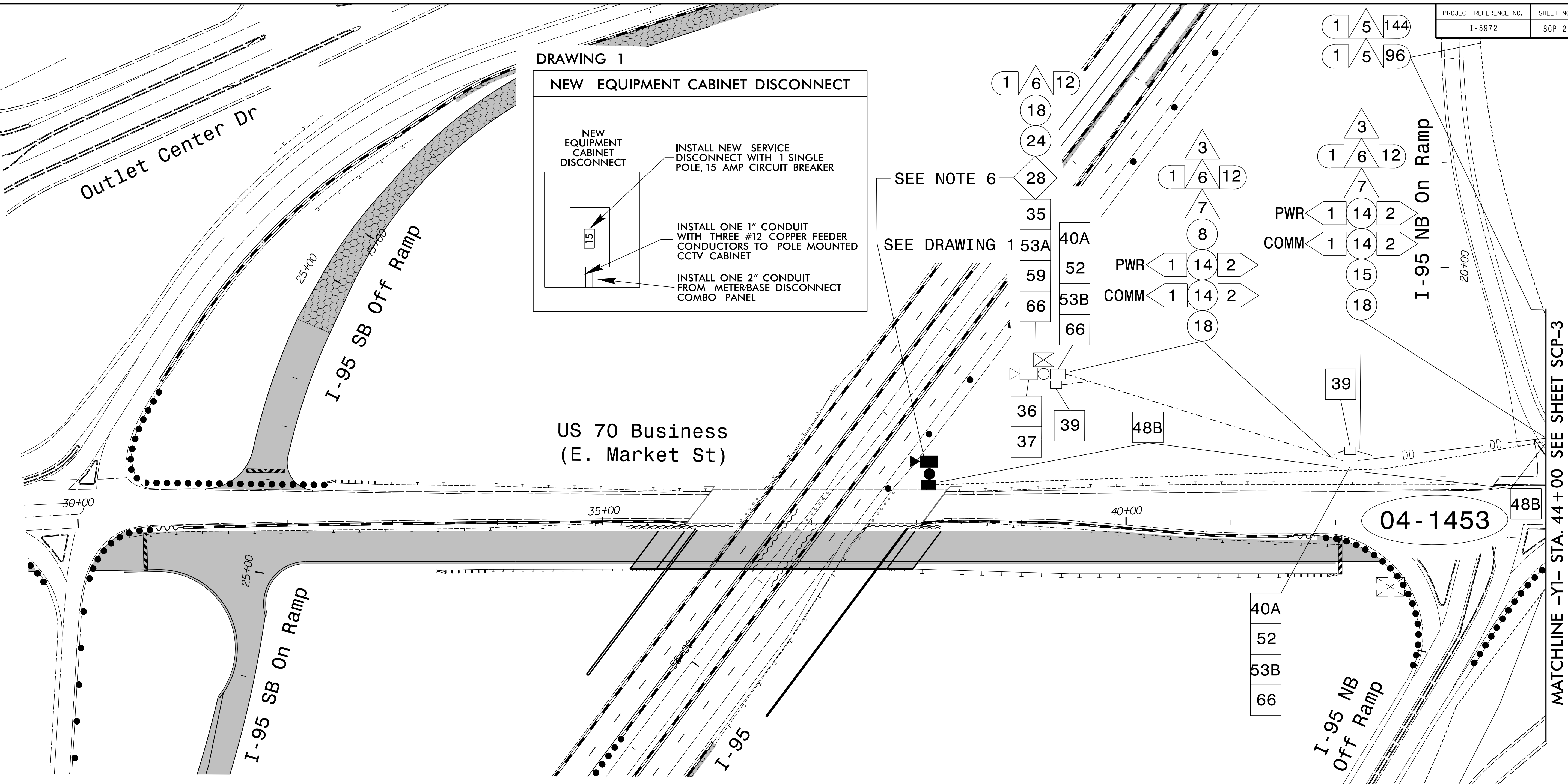
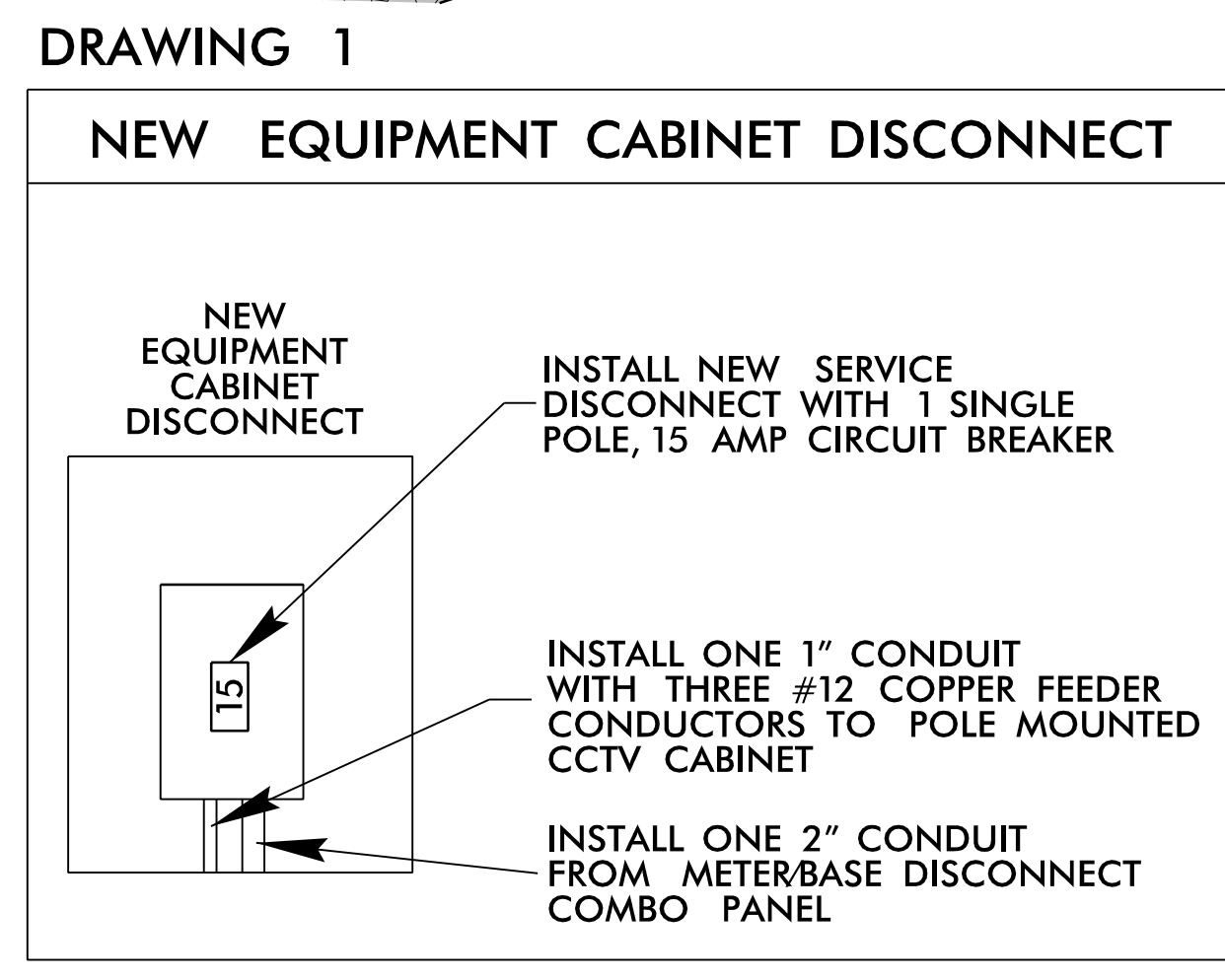
**CCTV CAMERA INSTALLATION FOR WOOD POLES WITH UNDERGROUND ELECTRICAL SERVICE & EQUIPMENT CABINET DISCONNECT TYPICAL DETAIL**

DIVISION 04 Johnston County Smithfield  
 PLAN DATE: September 2023 REVIEWED BY: WPERickson-Jones  
 PREPARED BY: DTSears REVIEWED BY:

REVISIONS	INIT.	DATE

SCALE: N/A

SEAL  
 NORTH CAROLINA PROFESSIONAL ENGINEER  
 SEAL 044558  
 DAVID T. SEARS  
 9/19/2023  
 CADD Filename:



- NOTES:**
- FIVE (5) DAYS PRIOR TO BEGINNING WORK ON THE SIGNAL SYSTEM/CCTV INSTALLATION, CONTACT THE DIVISION TRAFFIC ENGINEER AT (252)640-6502 TO ARRANGE FOR THE DIVISION TO PROGRAM THE NEW FIELD ETHERNET SWITCHES WITH THE NECESSARY NETWORK CONFIGURATION DATA, INCLUDING BUT NOT LIMITED TO: THE PROJECT IP ADDRESS, DEFAULT GATEWAY, SUBNET MASK AND VLAN ID INFORMATION. NOTIFY THE DIVISION TRAFFIC ENGINEER AFTER ALL WORK IS PERFORMED TO ENSURE THAT ALL FIBER CIRCUITS ARE FUNCTIONING PROPERLY. WORK IS NOT COMPLETE UNTIL THE SIGNAL SYSTEM IS BACK UP AND OPERATIONAL.
  - CONTRACTOR TO RECORD EXISTING SPLICE ARRANGEMENT FOR COMPARISON TO THE SUPPLIED SPLICE DETAILS. IF DISCREPANCIES EXIST, CONTACT THE DIVISION ENGINEER TO DETERMINE HOW TO PROCEED WITH RESPLICING. PROVIDE AS-BUILT PLANS TO THE ENGINEER IF FINAL SPLICE ARRANGEMENT DIFFERS FROM THE SUPPLIED SPLICE DETAILS.
  - THE FINAL LOCATION OF ALL ITS DEVICES MUST BE VERIFIED BY THE INCIDENT MANAGEMENT ENGINEER (252)640-6506 PRIOR TO INSTALLATION.
  - INSTALL CCTV CAMERA 45' ABOVE GRADE.
  - OVER SIZED JUNCTION BOXES TO BE PLACED AT LEAST 25' FROM MSE WALL.
  - RELOCATE EXISTING ETHERNET SWITCH AND CELL MODEM TO THE NEW CCTV CABINET. RETURN EXISTING CCTV CAMERA AND CABINET TO DIVISION 4. DISPOSE OF THE EXISTING CCTV POLE. RETURN EXISTING CELL MODEM TO DIVISION 4 AFTER FIBER COMMUNICATIONS ARE OBTAINED.

**RK&K**

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 www.rk.com

Engineers | Construction Managers | Planners | Scientists  
 Responsive People | Creative Solutions

Prepared for the Offices of:

750 N. Greenfield Pkwy., Garner, NC 27529

I-5972  
**Signal Communications Plans**  
 TMP Phase I Steps 2 & 3

Division 4 Johnston County Smithfield  
 PLAN DATE: September 2023 REVIEWED BY: DT Sears  
 PREPARED BY: WP Erickson-Jones REVIEWED BY:

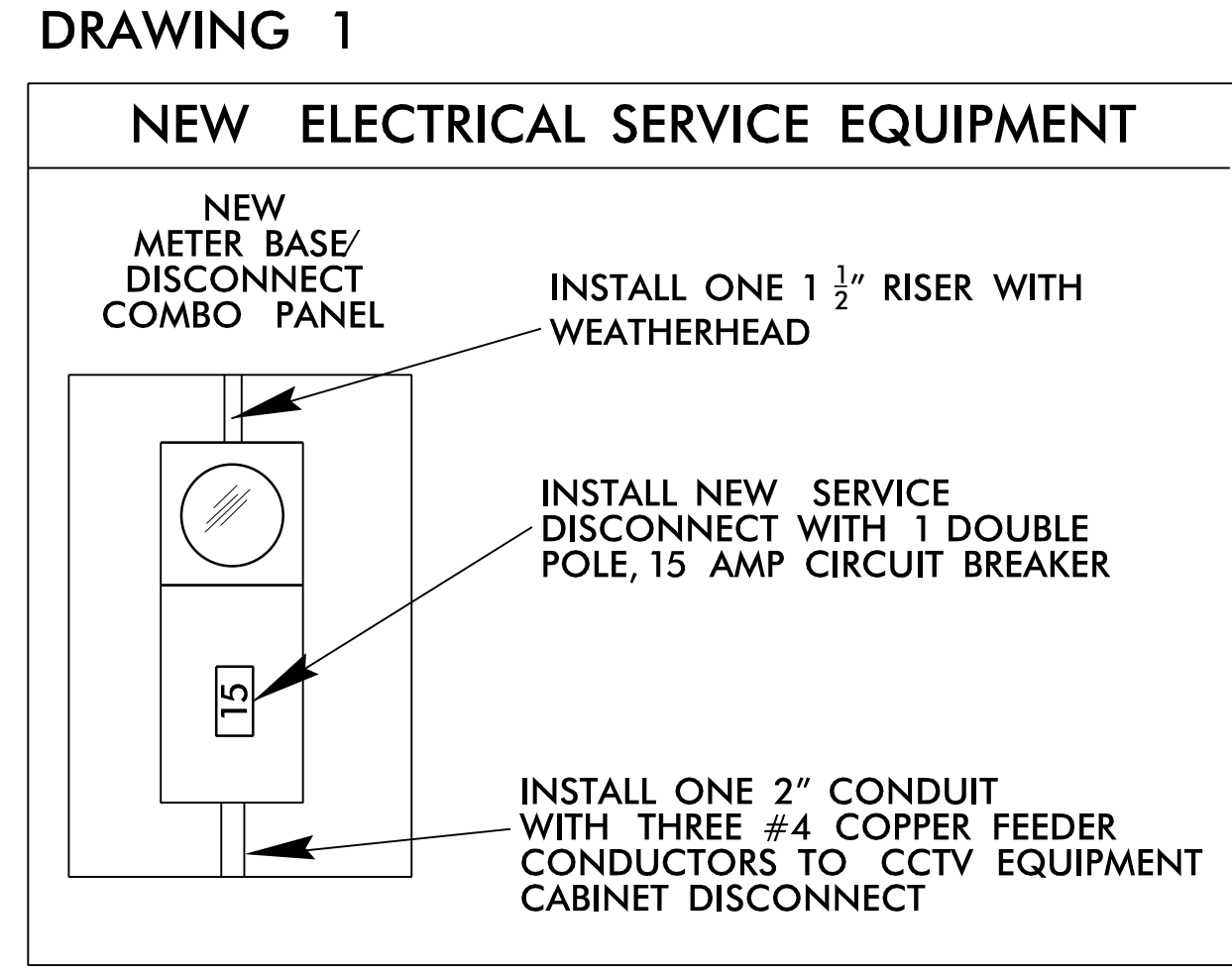
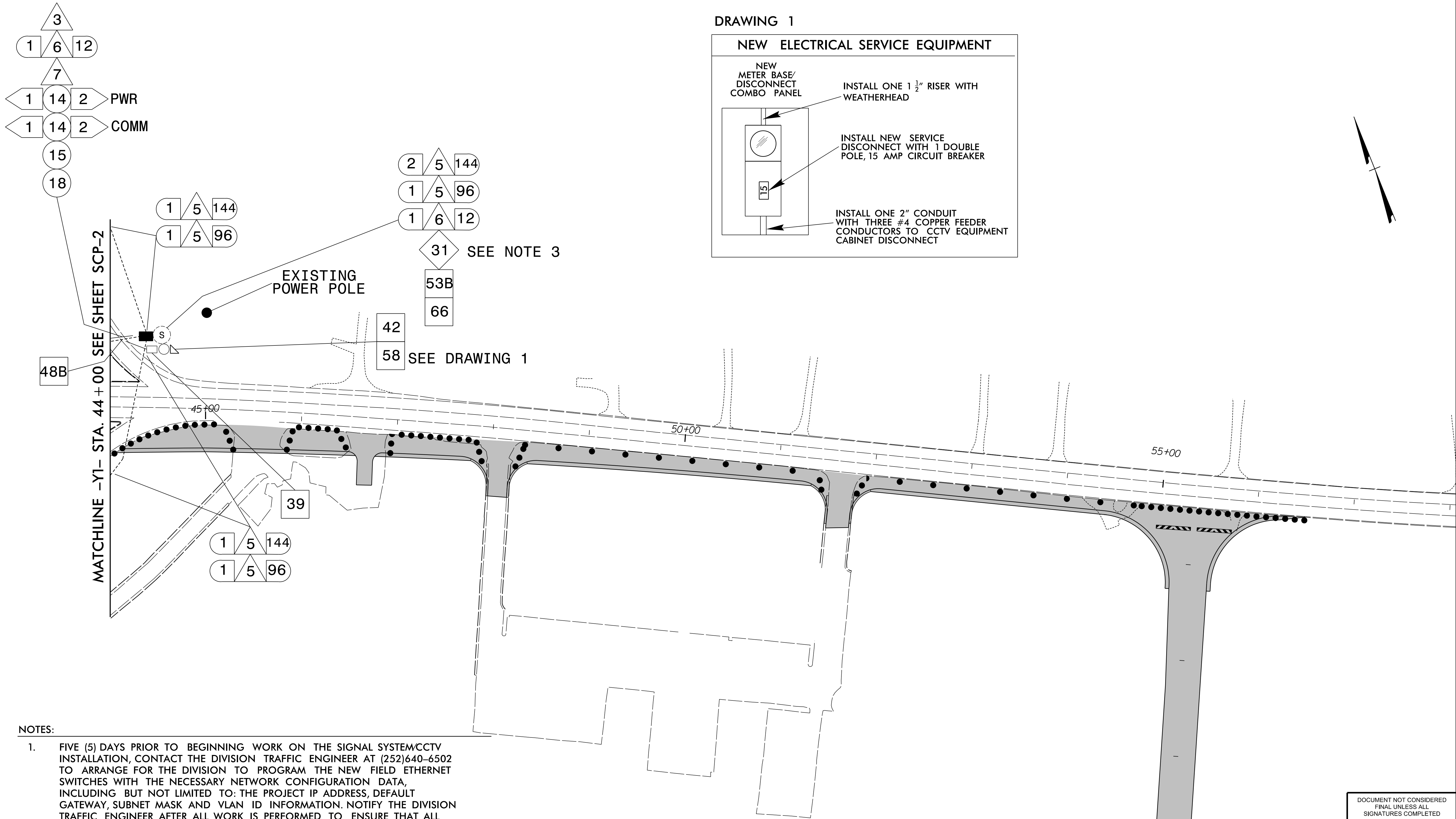
REVISIONS	INIT.	DATE

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SEAL  
 NORTH CAROLINA PROFESSIONAL ENGINEER  
 SEAL 044558  
 DAVID T. SEARS

Discussed by: David J. Sears 9/19/2023  
 SIGNATURE DATE  
 CADD Filename:

MATCHLINE -Y1- STA. 44+00 SEE SHEET SCP-3



- NOTES:**
- FIVE (5) DAYS PRIOR TO BEGINNING WORK ON THE SIGNAL SYSTEM/CCTV INSTALLATION, CONTACT THE DIVISION TRAFFIC ENGINEER AT (252)640-6502 TO ARRANGE FOR THE DIVISION TO PROGRAM THE NEW FIELD ETHERNET SWITCHES WITH THE NECESSARY NETWORK CONFIGURATION DATA, INCLUDING BUT NOT LIMITED TO: THE PROJECT IP ADDRESS, DEFAULT GATEWAY, SUBNET MASK AND VLAN ID INFORMATION. NOTIFY THE DIVISION TRAFFIC ENGINEER AFTER ALL WORK IS PERFORMED TO ENSURE THAT ALL FIBER CIRCUITS ARE FUNCTIONING PROPERLY. WORK IS NOT COMPLETE UNTIL THE SIGNAL SYSTEM IS BACK UP AND OPERATIONAL.
  - CONTRACTOR TO RECORD EXISTING SPLICE ARRANGEMENT FOR COMPARISON TO THE SUPPLIED SPLICE DETAILS. IF DISCREPANCIES EXIST, CONTACT THE DIVISION ENGINEER TO DETERMINE HOW TO PROCEED WITH RESPLICING. PROVIDE AS-BUILT PLANS TO THE ENGINEER IF FINAL SPLICE ARRANGEMENT DIFFERS FROM THE SUPPLIED SPLICE DETAILS.
  - MODIFY SPLICE ENCLOSURE AND SPLICE INTO 144-FIBER CABLE USING ORANGE BUFFER TUBE FIBER 1 AND 2. DO NOT CUT 96-FIBER TRUNK CABLE.

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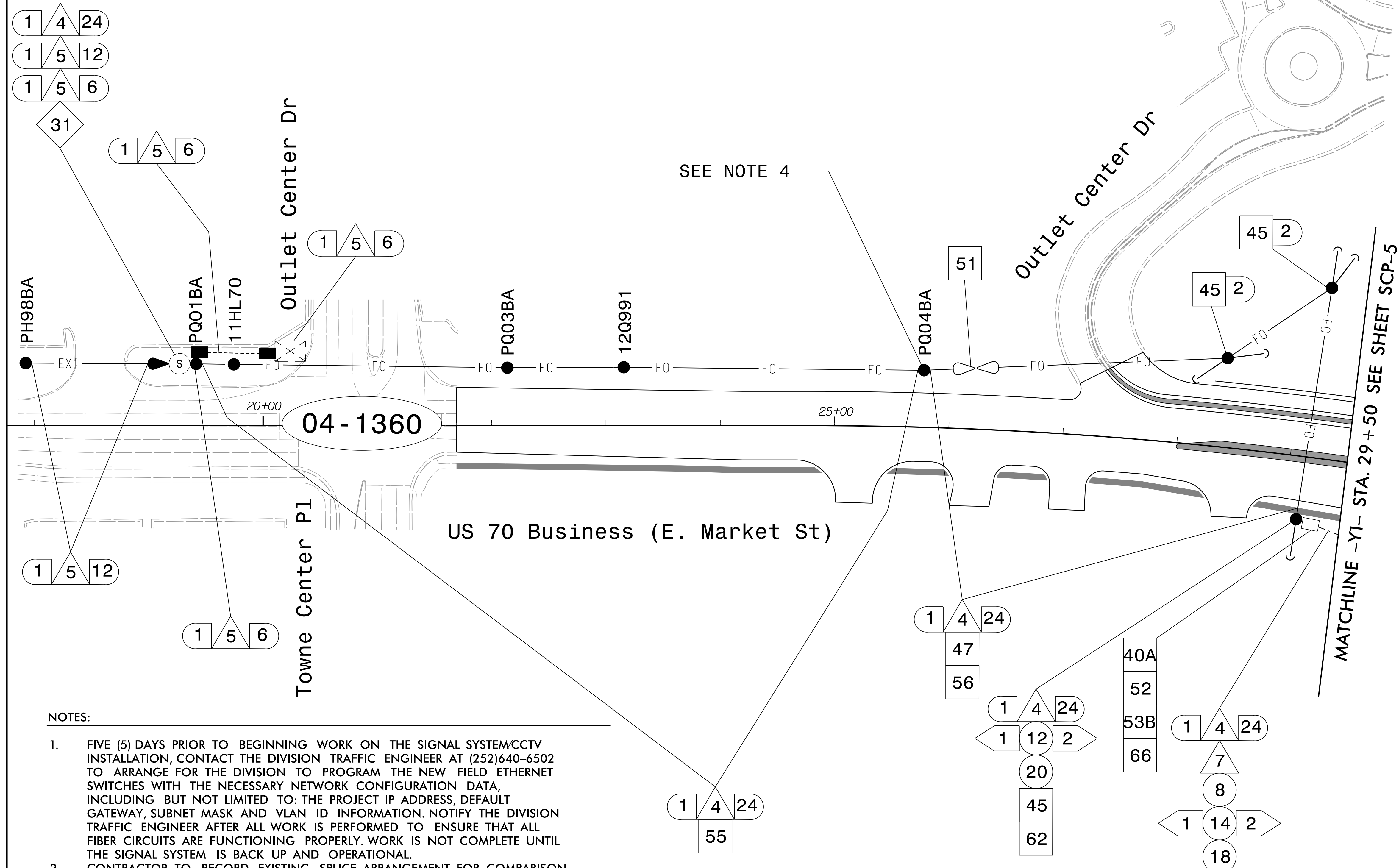
Prepared for the Offices of:  
  
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I-5972  
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 PLAN DATE: September 2023 REVIEWED BY: DT Sears  
 PREPARED BY: WP Erickson-Jones REVIEWED BY:

REVISIONS	INIT.	DATE

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 NORTH CAROLINA PROFESSIONAL ENGINEER  
 SEAL 044558  
 DAVID T. SEARS  
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 CADD Filename:



**NOTES:**

1. FIVE (5) DAYS PRIOR TO BEGINNING WORK ON THE SIGNAL SYSTEM/CCTV INSTALLATION, CONTACT THE DIVISION TRAFFIC ENGINEER AT (252)640-6502 TO ARRANGE FOR THE DIVISION TO PROGRAM THE NEW FIELD ETHERNET SWITCHES WITH THE NECESSARY NETWORK CONFIGURATION DATA, INCLUDING BUT NOT LIMITED TO: THE PROJECT IP ADDRESS, DEFAULT GATEWAY, SUBNET MASK AND VLAN ID INFORMATION. NOTIFY THE DIVISION TRAFFIC ENGINEER AFTER ALL WORK IS PERFORMED TO ENSURE THAT ALL FIBER CIRCUITS ARE FUNCTIONING PROPERLY. WORK IS NOT COMPLETE UNTIL THE SIGNAL SYSTEM IS BACK UP AND OPERATIONAL.
2. CONTRACTOR TO RECORD EXISTING SPLICE ARRANGEMENT FOR COMPARISON TO THE SUPPLIED SPLICE DETAILS. IF DISCREPANCIES EXIST, CONTACT THE DIVISION ENGINEER TO DETERMINE HOW TO PROCEED WITH RESPLICING. PROVIDE AS-BUILT PLANS TO THE ENGINEER IF FINAL SPLICE ARRANGEMENT DIFFERS FROM THE SUPPLIED SPLICE DETAILS.
3. ALL NEW NCDOT FIBER ATTACHMENTS ARE 40" BELOW NEUTRAL, FRONT SIDE OF POLE, UNLESS OTHERWISE NOTED.
4. ABANDON IN PLACE THE EXISTING 12-FIBER CABLE BETWEEN EXISTING SPLICE ENCLOSURE AT 04-1360 AND POLE 'PQ04BA'. CUT AND DISPOSE OF 12-FIBER CABLE NOT ATTACHED TO MESSENGER CABLE (HANGING FROM POLE PQ04BA AND COILED ON GROUND).

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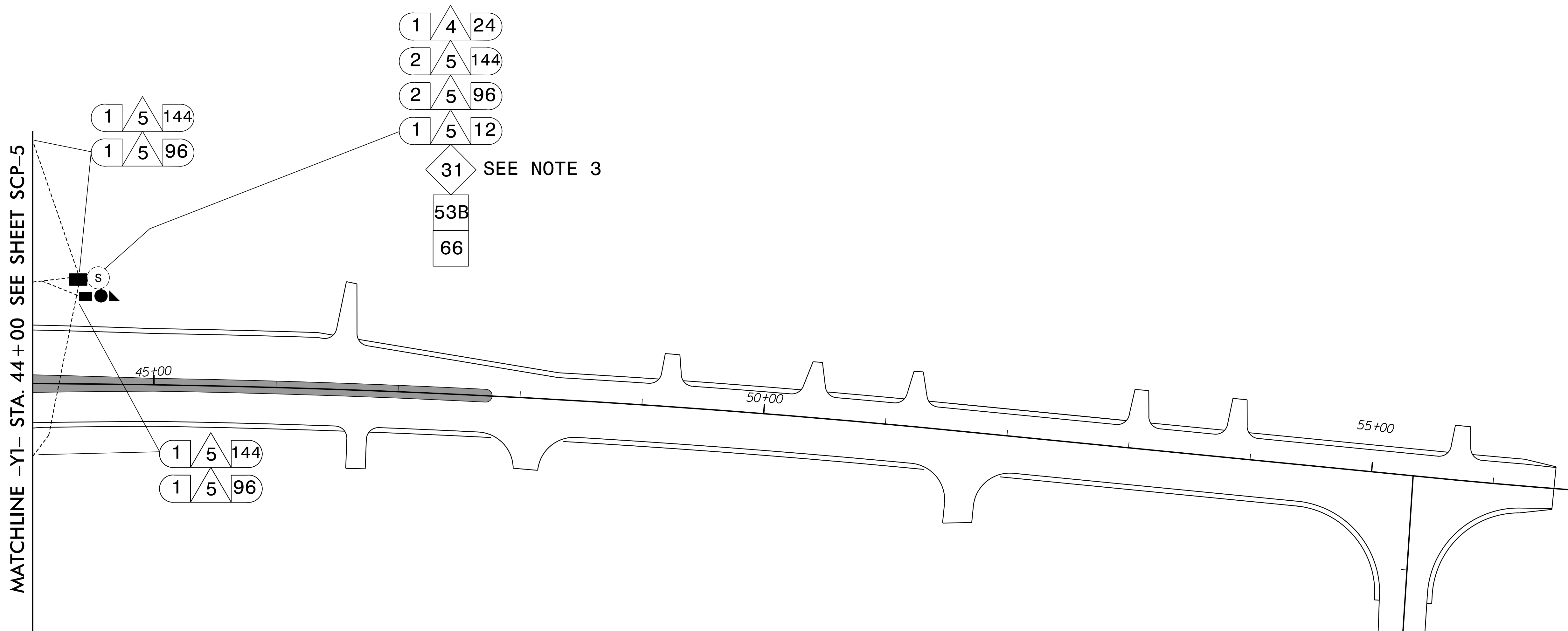
Prepared for the Offices of:  
  
 750 N. Greenfield Pkwy., Garner, NC 27529

I-5972  
 Signal Communications Plans  
 TMP Phase IV Steps 1 & 2  
 Division 4 Johnston County Smithfield  
 PLAN DATE: September 2023 REVIEWED BY: DT Sears  
 PREPARED BY: WP Erickson-Jones REVIEWED BY:  
 REVISIONS INIT. DATE  
 \_\_\_\_\_  
 \_\_\_\_\_

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL  
 NORTH CAROLINA PROFESSIONAL ENGINEER  
 SEAL 044558  
 DAVID T. SEARS  
 9/19/2023  
 SIGNATURE DATE  
 CADD Filename:





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- MODIFY SPLICE ENCLOSURE AND SPLICE INTO 144-FIBER CABLE USING ORANGE BUFFER TUBE FIBER 1 AND 2. DO NOT CUT 60-FIBER TRUNK CABLE.

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SEAL  
 NORTH CAROLINA  
 PROFESSIONAL  
 SEAL  
 044558  
 ENGINEER  
 DAVID T. SEARS  
 DocuSigned by:  
 David T. Sears 9/19/2023  
 CADD Filename:

- 1 INSTALL COAX CABLE
- 2 INSTALL ETHERNET CABLE
- 3 INSTALL 3-WIRE COPPER FEEDER CONDUCTORS
- 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 NEW 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

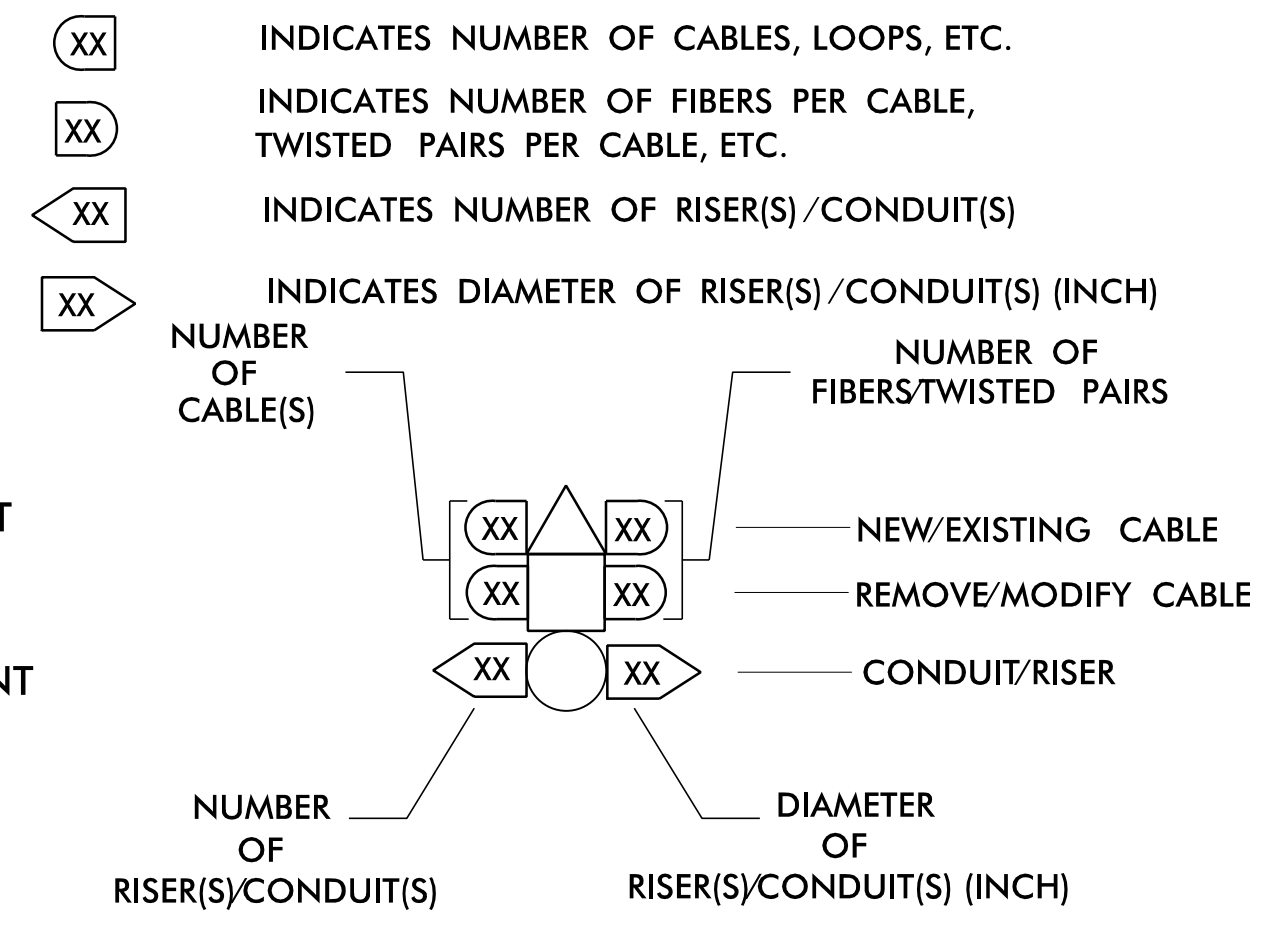
- 34 INSTALL CABINET FOUNDATION
- 35 INSTALL CCTV CAMERA POLE MOUNTED CABINET
- 36 INSTALL CCTV CAMERA ASSEMBLY
- 37 INSTALL CCTV CAMERA WOOD POLE
- 38 INSTALL CCTV CAMERA METAL POLE AND FOUNDATION
- 39 INSTALL JUNCTION BOX
- 40A INSTALL OVERSIZED JUNCTION BOX
- 40B INSTALL SPECIAL OVERSIZED JUNCTION 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**

	NEW FIBER OPTIC COMMUNICATIONS CABLE
	EXISTING COMMUNICATIONS CABLE
	EXISTING COMMUNICATIONS CABLE TO BE REMOVED
	NEW AERIAL GUY ASSEMBLY
	NEW CONDUIT
	EXISTING CONDUIT
	NEW DIRECTIONAL DRILLED CONDUIT

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

**CONSTRUCTION NOTE SYMBOLOGY KEY**



**ATTACHMENT POINT:**

YYY DISTANCE ABOVE (IN)/ATTACHMENT POINT REFERENCE POINT

REFERENCE POINT DISTANCE BELOW (IN)/ATTACHMENT POINT

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

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Prepared for the Offices of:  
**STATE OF NORTH CAROLINA**  
Department of Transportation

**I-5972**  
Signal Communications Plans

Division 4 Johnston County Smithfield  
PLAN DATE: February 2022 REVIEWED BY: DT Sears  
PREPARED BY: WP Erickson-Jones REVIEWED BY:

REVISIONS	INIT.	DATE

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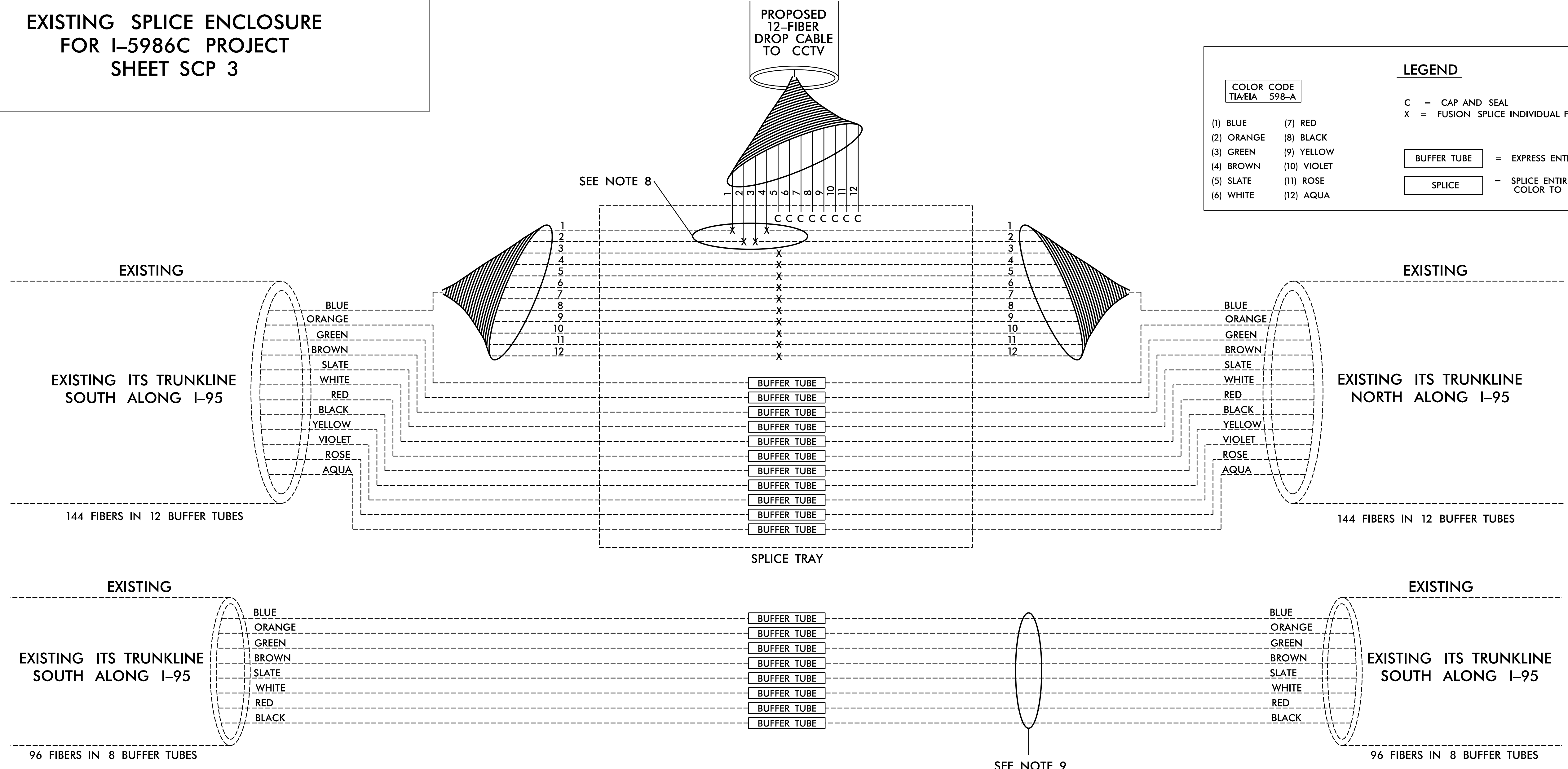
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EXISTING SPLICE ENCLOSURE  
FOR I-5986C PROJECT  
SHEET SCP 3

FIBER OPTIC CABLE



COLOR CODE  
TIA/EIA 598-A

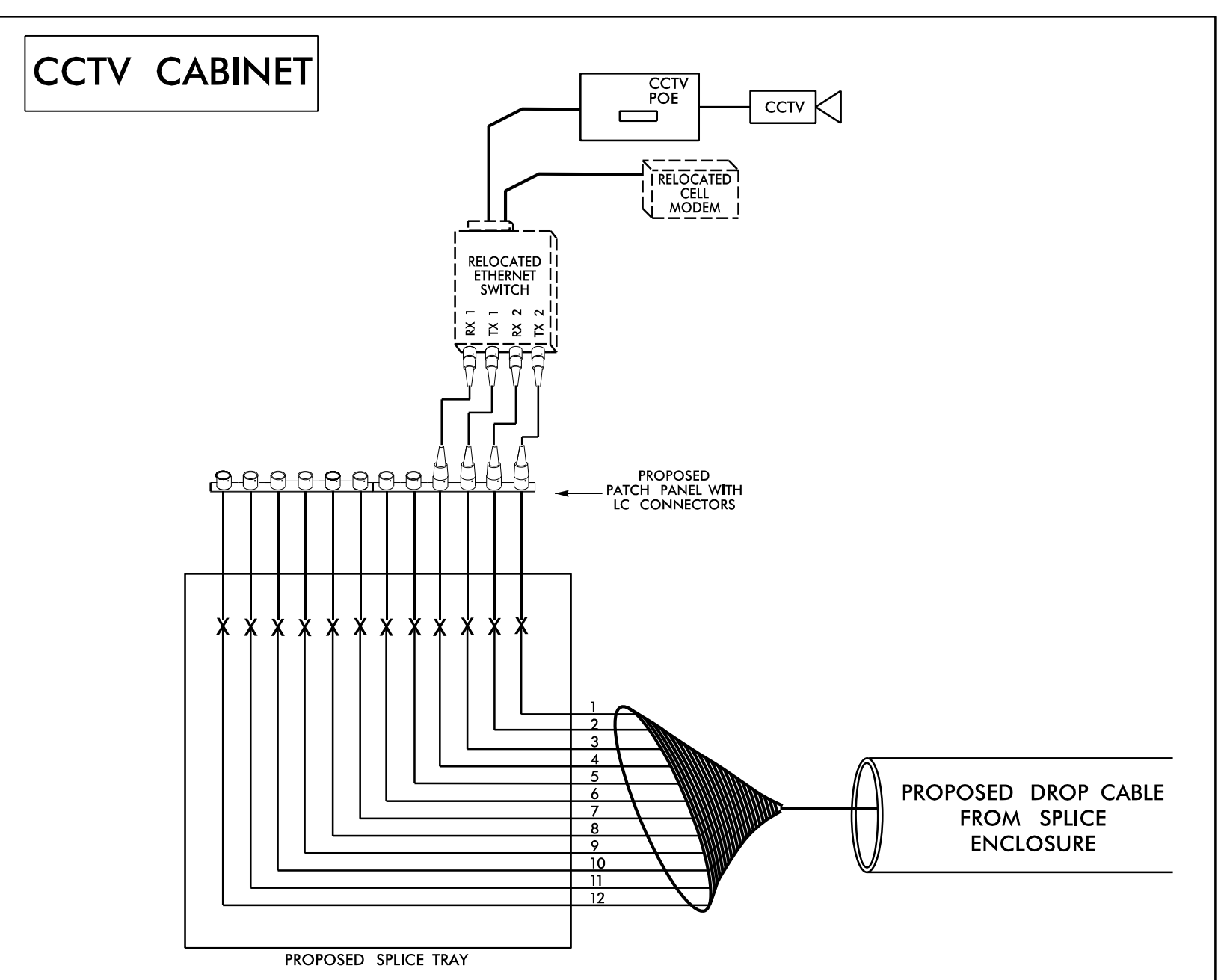
(1) BLUE	(7) RED
(2) ORANGE	(8) BLACK
(3) GREEN	(9) YELLOW
(4) BROWN	(10) VIOLET
(5) SLATE	(11) ROSE
(6) WHITE	(12) AQUA

LEGEND

C = CAP AND SEAL  
X = FUSION SPLICE INDIVIDUAL FIBER

= EXPRESS ENTIRE BUFFER TUBE

= SPLICE ENTIRE BUFFER TUBE COLOR TO COLOR



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  - FIBER INTERCONNECT CENTER RACKS ARE SCHEMATIC ONLY, ACTUAL EQUIPMENT FORM MAY VARY.
  - UNUSED FIBERS LEFT COILED AND STORED IN SPLICE TRAY.
  - UNUSED BUFFER TUBES LEFT COILED AND STORED IN SPLICE TRAY.
  - ETHERNET SWITCH TERMINATION CONFIGURATIONS ARE GENERIC. CONTRACTOR IS RESPONSIBLE FOR DETERMINING /ENSURING PROPER TERMINATION.
  - INCLUDE ON THE COVER OF EACH SPLICE TRAY THE FOLLOWING:  
(1) SPLICE  
(2) DATE  
(3) COMPANY NAME  
(4) NAME OF INDIVIDUAL PERFORMING THE SPLICING
- PRIOR TO INSTALLING THE COVER ON THE SPLICE TRAY, TAKE A DIGITAL PHOTOGRAPH SHOWING THE SPLICE TRAY AND INFORMATION SHOWN ABOVE (1-4) AND SUBMIT PHOTOGRAPH ALONG WITH OTRD TEST RESULTS TO THE ENGINEER.
- SPLICE PROPOSED CCTV DROP FIBERS TO SAME LOCATION AS EXISTING DROP CABLE TO BE REMOVED IF DIFFERENT THAN SPLICE SHOWN HERE.
  - DO NOT CUT EXISTING 96-FIBER TRUNK CABLE IN THIS JUNCTION BOX.

SEE NOTE 9

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	<b>SPLICE DETAILS</b>	
	Division 04 Johnston Co. Smithfield PLAN DATE: September 2023 REVIEWED BY: DT Sears PREPARED BY: WP Erickson-Jones REVIEWED BY:	SCALE: N/A REVISIONS: _____ INIT. DATE: _____ SIGNATURE: _____ DATE: _____ CADD Filename: _____

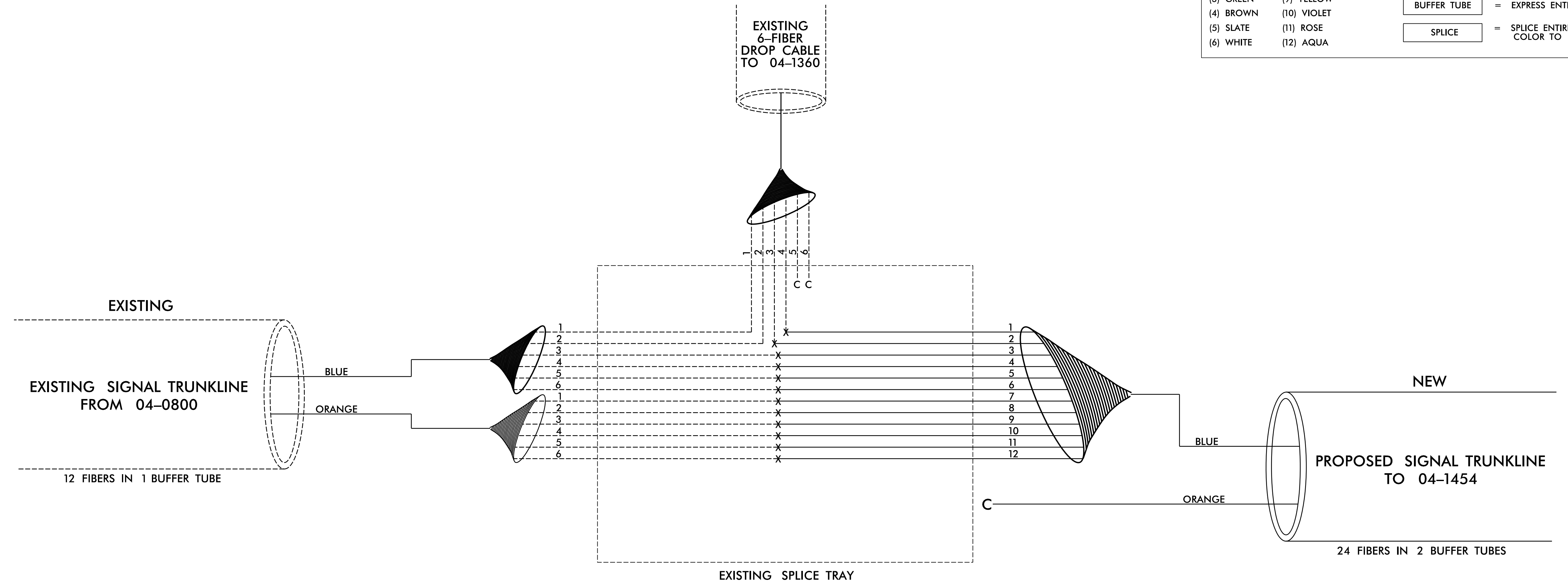
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# FIBER OPTIC CABLE

**SPLICE ENCLOSURE  
FOR SIGNAL INVENTORY # 04-1360  
SHEET SCP 4**

COLOR CODE TIA/EIA 598-A		LEGEND	
(1) BLUE	(7) RED	C = CAP AND SEAL	
(2) ORANGE	(8) BLACK	X = FUSION SPLICE INDIVIDUAL FIBER	
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(5) SLATE	(11) ROSE		
(6) WHITE	(12) AQUA		



**NOTES:**

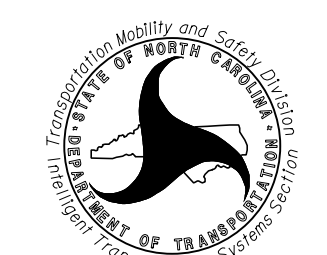
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(1) SPLICE  
(2) DATE  
(3) COMPANY NAME  
(4) NAME OF INDIVIDUAL PERFORMING THE SPLICING

PRIOR TO INSTALLING THE COVER ON THE SPLICE TRAY, TAKE A DIGITAL PHOTOGRAPH SHOWING THE SPLICE TRAY AND INFORMATION SHOWN ABOVE (1-4) AND SUBMIT PHOTOGRAPH ALONG WITH OTDR TEST RESULTS TO THE ENGINEER.

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 SCALE  
 N/A

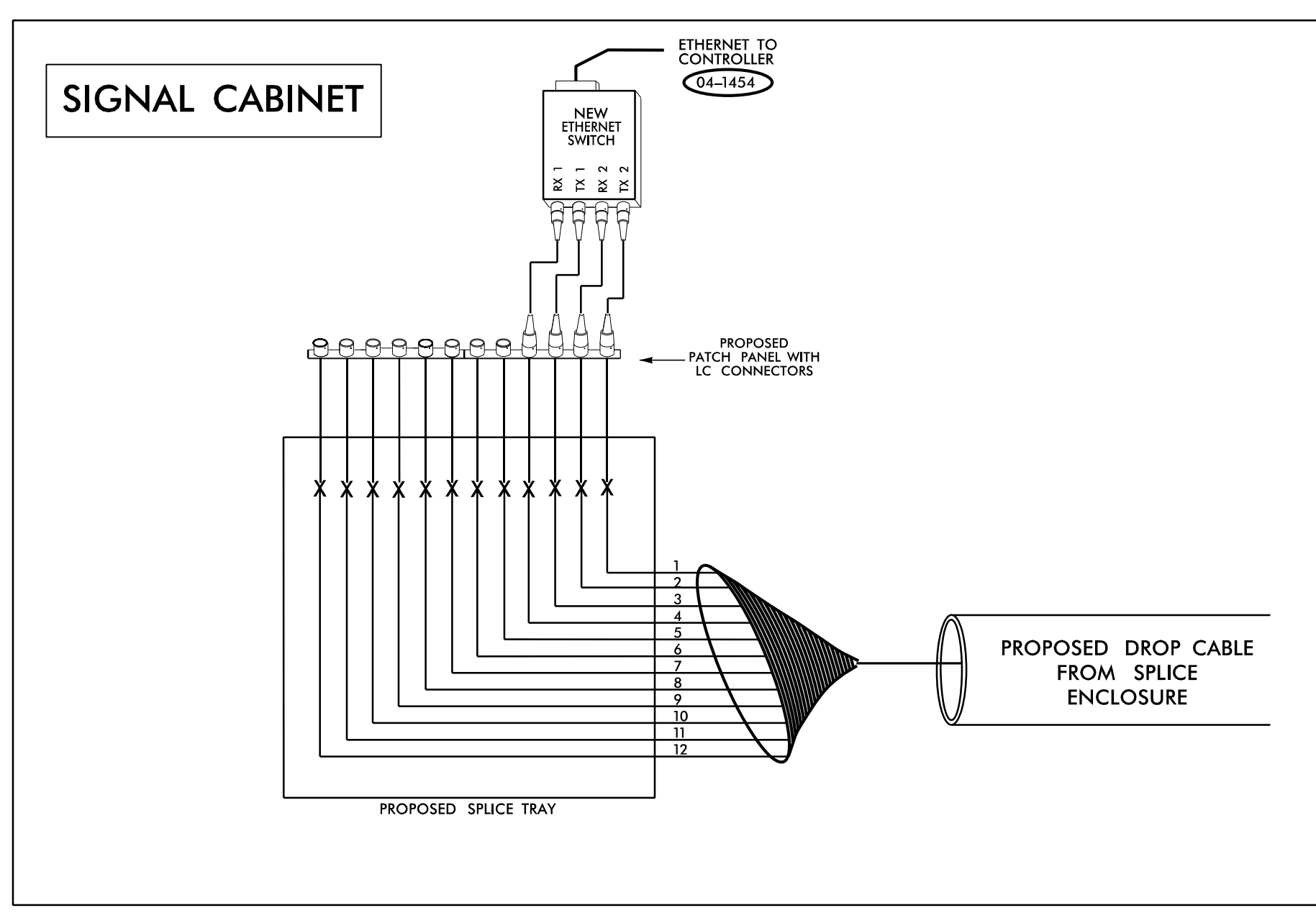
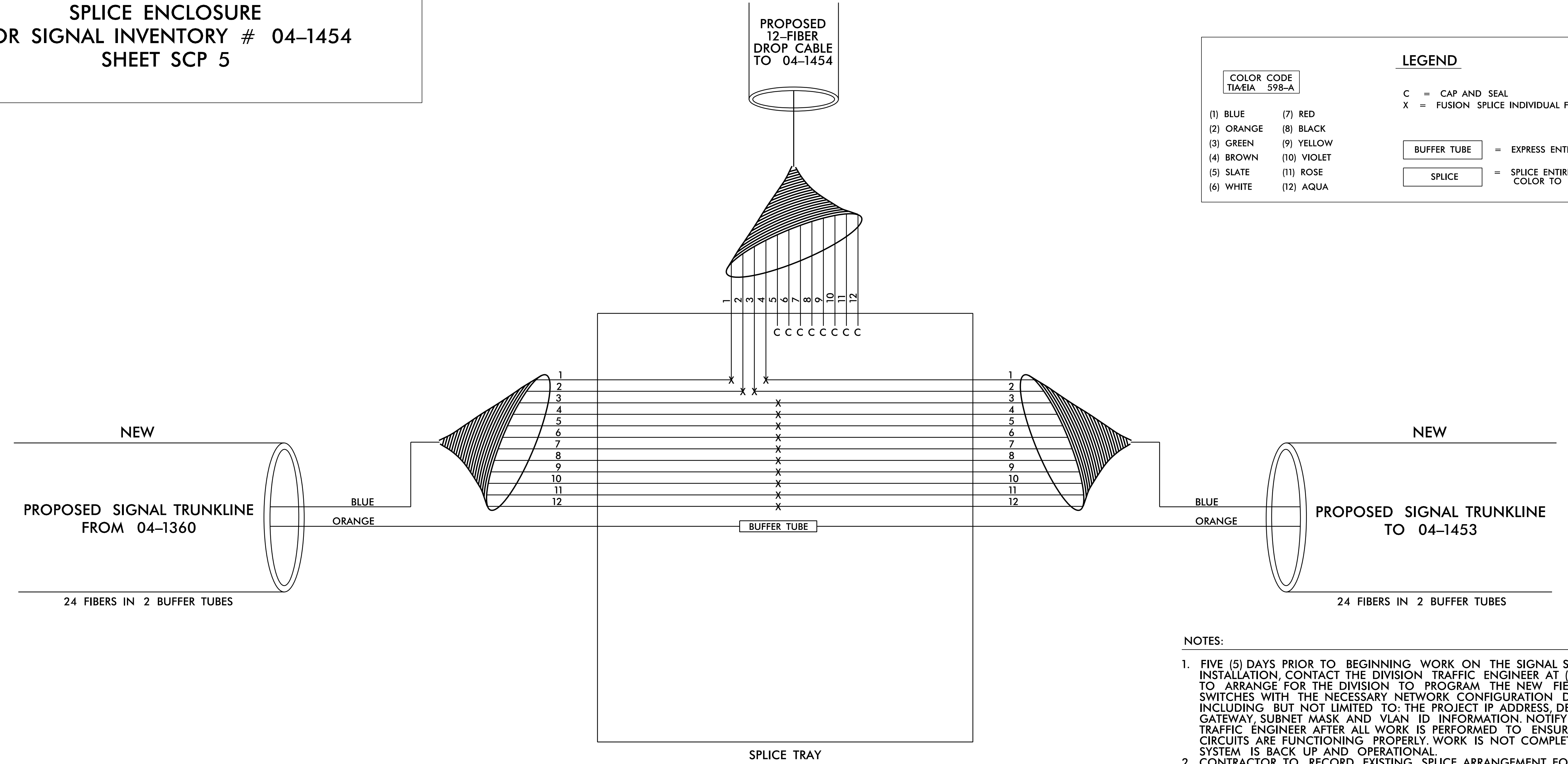
SPLICE DETAILS			
Division 04	Johnston Co.	Smithfield	
PLAN DATE: September 2023	REVIEWED BY: DT Sears		
PREPARED BY: WP Erickson-Jones	REVIEWED BY:		
REVISIONS	INIT.	DATE	

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 NORTH CAROLINA  
 PROFESSIONAL  
 SEAL  
 044558  
 ENGINEER  
 DAVID T. SEARS  
 DocuSigned by:  
 David T. Sears  
 9/19/2023  
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# FIBER OPTIC CABLE

**SPLICE ENCLOSURE  
FOR SIGNAL INVENTORY # 04-1454  
SHEET SCP 5**


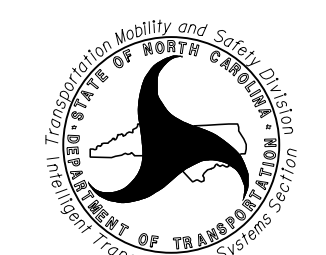

COLOR CODE TIA/EIA 598-A		LEGEND	
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	SCALE N/A	REVISIONS _____ INIT. DATE _____ _____	DocuSigned by: David T. Sears 9/19/2023 _____ SIGNATURE DATE CADD Filename:	

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