

CONTRACT: U-2581BA

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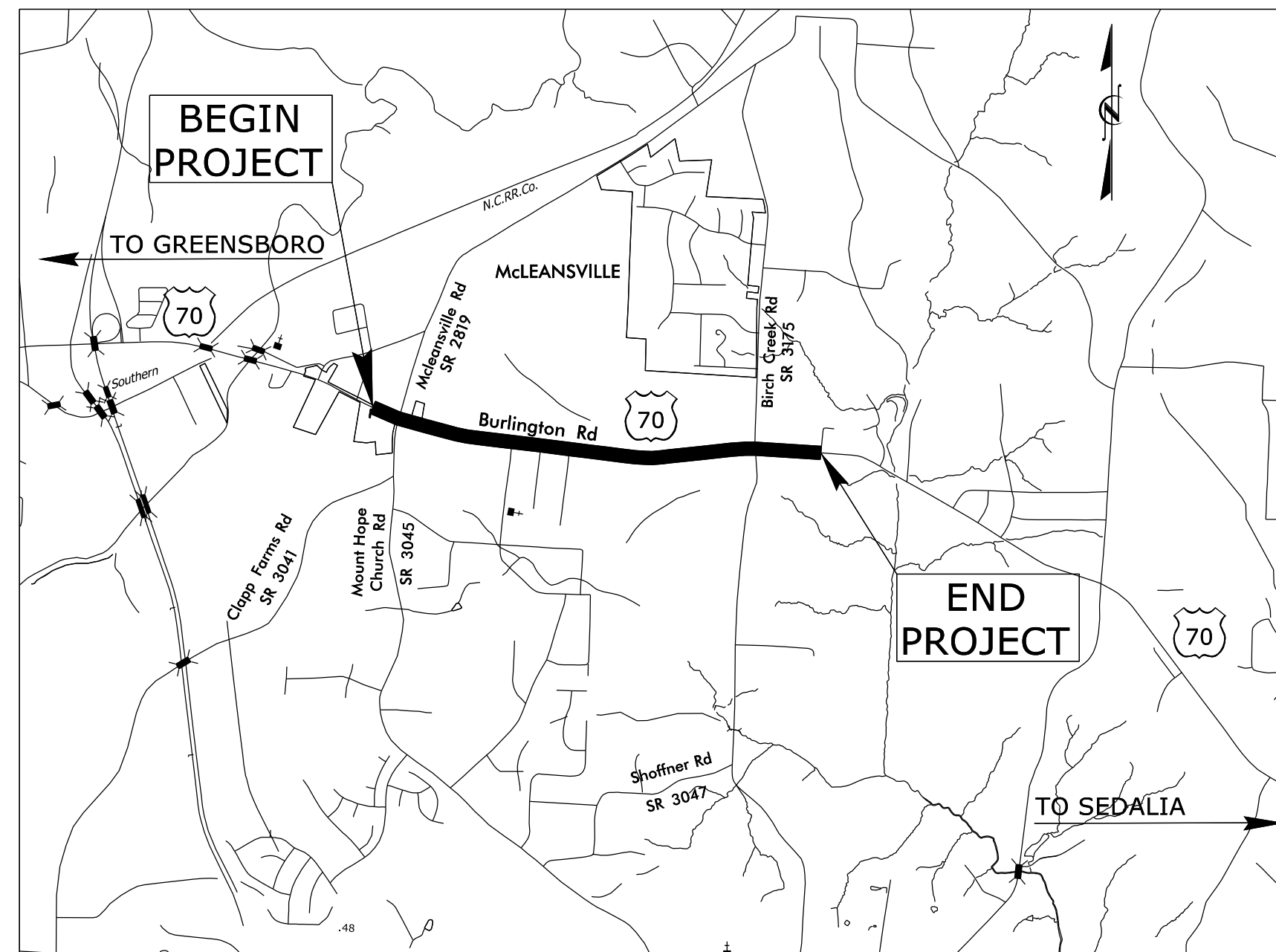
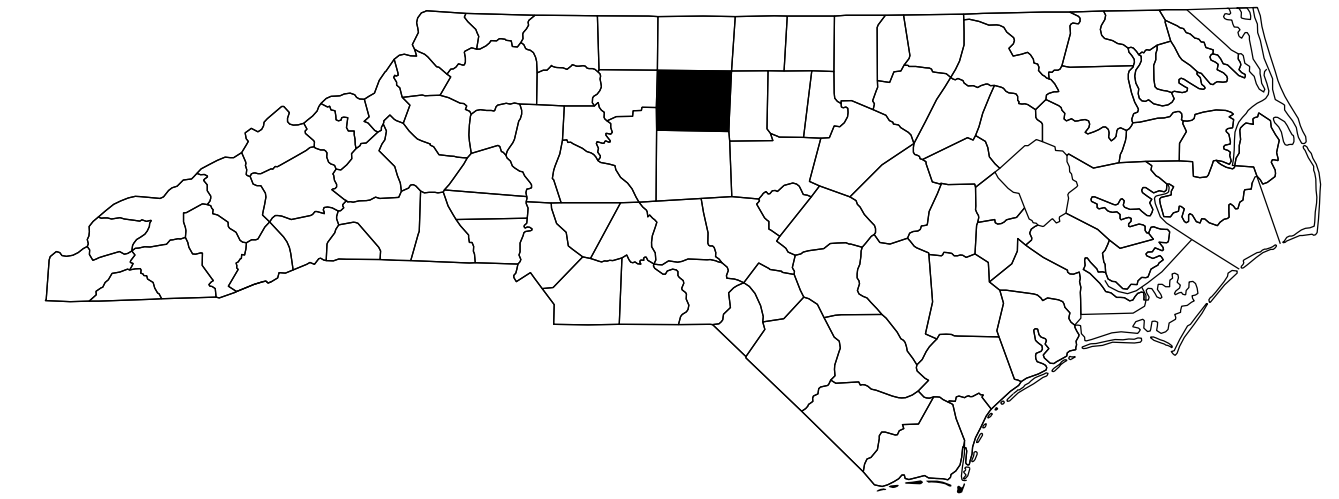
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

Project No.	Sheet No.
U-2581BA	Sig. 1.0

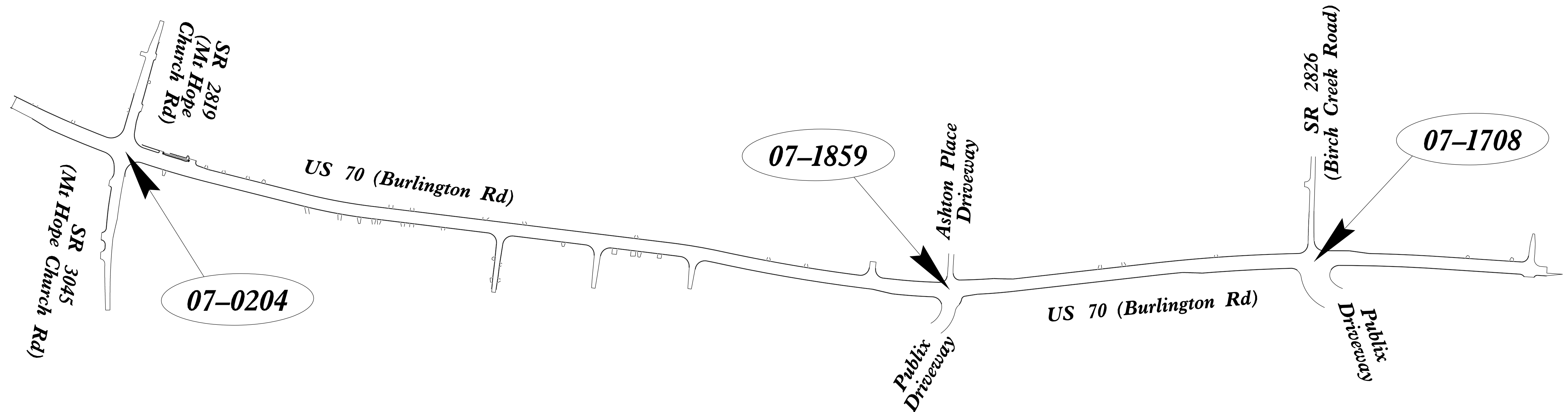
GUILFORD COUNTY

LOCATION: US 70 (BURLINGTON ROAD) FROM WEST OF SR 3045 (MT. HOPE CHURCH ROAD) SR 2819 (MCLEANSVILLE ROAD) TO JUST EAST OF SR 2826 (BIRCH CREEK ROAD)

TYPE OF WORK: TRAFFIC SIGNALS AND SIGNAL COMMUNICATIONS



VICINITY MAP



DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

INDEX OF PLANS		
Sheet #	Reference #	Location /Description
Sig. 1.0	-----	Title Sheet
Sig. 2.0-4.4	07-0204	US 70 (Burlington Rd) at SR 3045/2819 (Mt Hope Church Rd)
Sig. 5.0-5.3	07-1859	US 70 (Burlington Rd) at Publix and Ashton Place
Sig. 6.0-8.4	07-1708	US 70 (Burlington Rd) at SR 2826 (Birch Creek Rd)
Sig. 9.0	-----	Plate Sheet
Sig. MI-M8	-----	MI-M8 Standard Metal Pole Details
SCP. 1-3	-----	Signal Communication Plans

LEGEND

##-#### SIGNAL INVENTORY NUMBER

INTELLIGENT TRANSPORTATION AND SIGNALS UNIT


Contacts:

Robert J. Ziembra, PE – Central Region Signals Engineer

Todd Joyce, PE – Signal Equipment Design Engineer

Neil Avery – Intelligent Transportation Systems Engineer

Prepared for the North Carolina Department of Transportation
In the Office of:



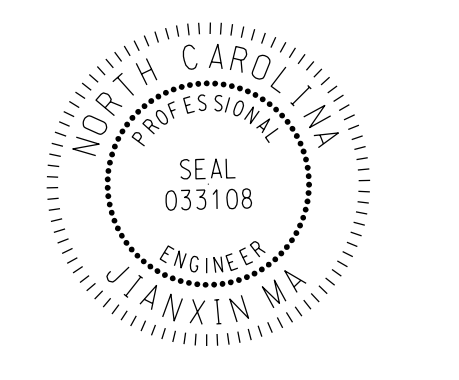
VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606
919.829.0329

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

JAMES GOODNIGHT, PE
PROJECT ENGINEER

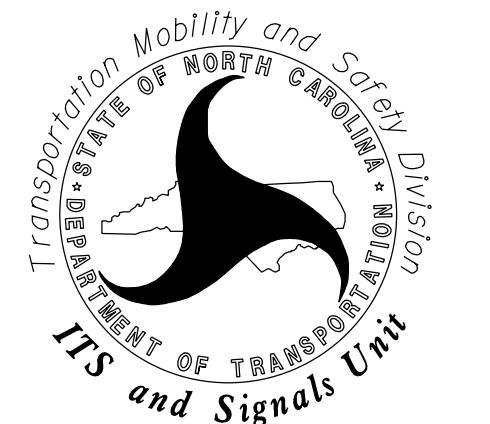
JIANXIN MA, PE PTOE
PROJECT DESIGN ENGINEER

SEAL



Decoded by: Jianxin Ma 10/15/2019
SIGNATURE DATE

DIVISION OF HIGHWAYS
TRANSPORTATION MOBILITY
AND SAFETY DIVISION



750 N. Greenfield Parkway, Garner, NC 27529

6 Phase Fully Actuated (Isolated)

PHASING DIAGRAM

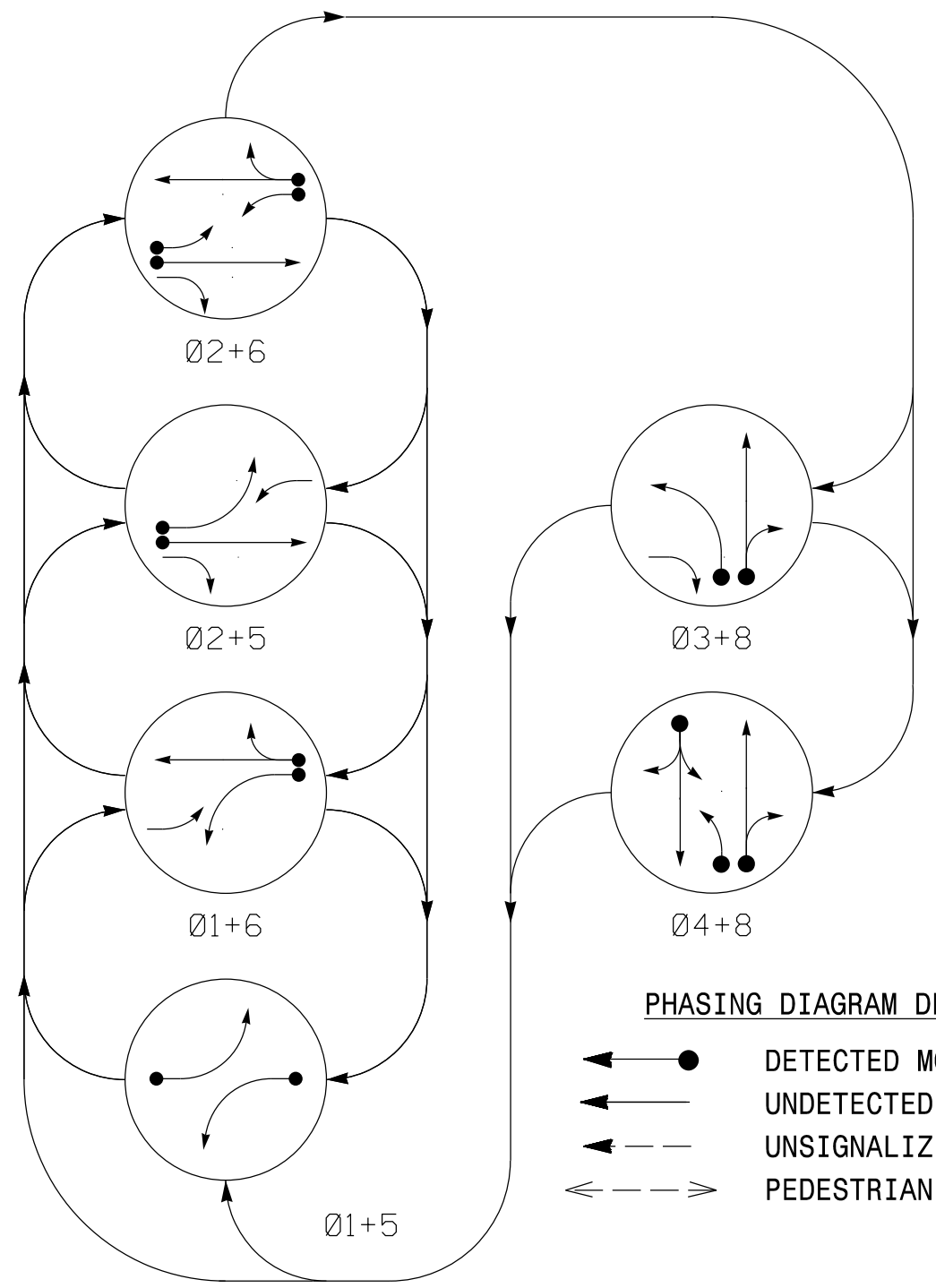
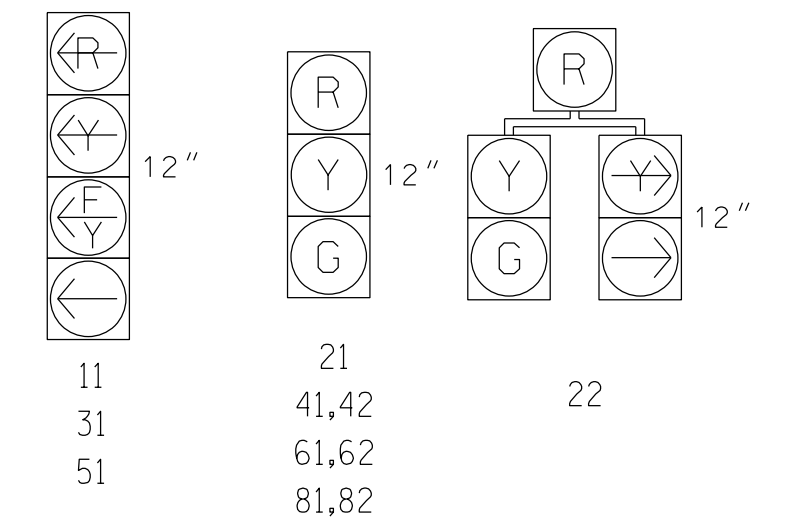


TABLE OF OPERATION

SIGNAL FACE	PHASE							
	Ø 1 + 5	Ø 1 + 6	Ø 2 + 5	Ø 2 + 6	Ø 3 + 8	Ø 4 + 8	F	H
11	←	←	←	←	←	←	←	←
21	R	R	G	G	R	R	Y	Y
22	R	R	R	G	R	R	Y	Y
31	←	←	←	←	←	←	←	←
41,42	R	R	R	R	R	G	R	R
51	←	←	←	←	←	←	←	←
61, 62	R	G	R	G	R	R	Y	Y
81,82	R	R	R	R	G	G	R	R

SIGNAL FACE I.D.
All Heads L.E.D.



ASC/3 DETECTOR INSTALLATION CHART

ZONE	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING							
					PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
1A*	6X40	0	*	*	1	Yes	-	15	-	S	-	-
2A*	6X6	300	*	*	2	Yes	-	-	-	X	N	-
3A*	6X40	0	*	*	3	Yes	-	15	-	S	-	-
4A*	6X40	0	*	*	4	Yes	-	5	-	S	-	-
5A*	6X40	0	*	*	5	Yes	-	15	-	S	-	-
6A*	6X6	300	*	*	2	Yes	-	3	-	G	-	-
8A*	6X40	0	*	*	8	Yes	-	10	-	S	-	-
8B*	6X6	0	*	*	8	Yes	-	15	-	S	-	-

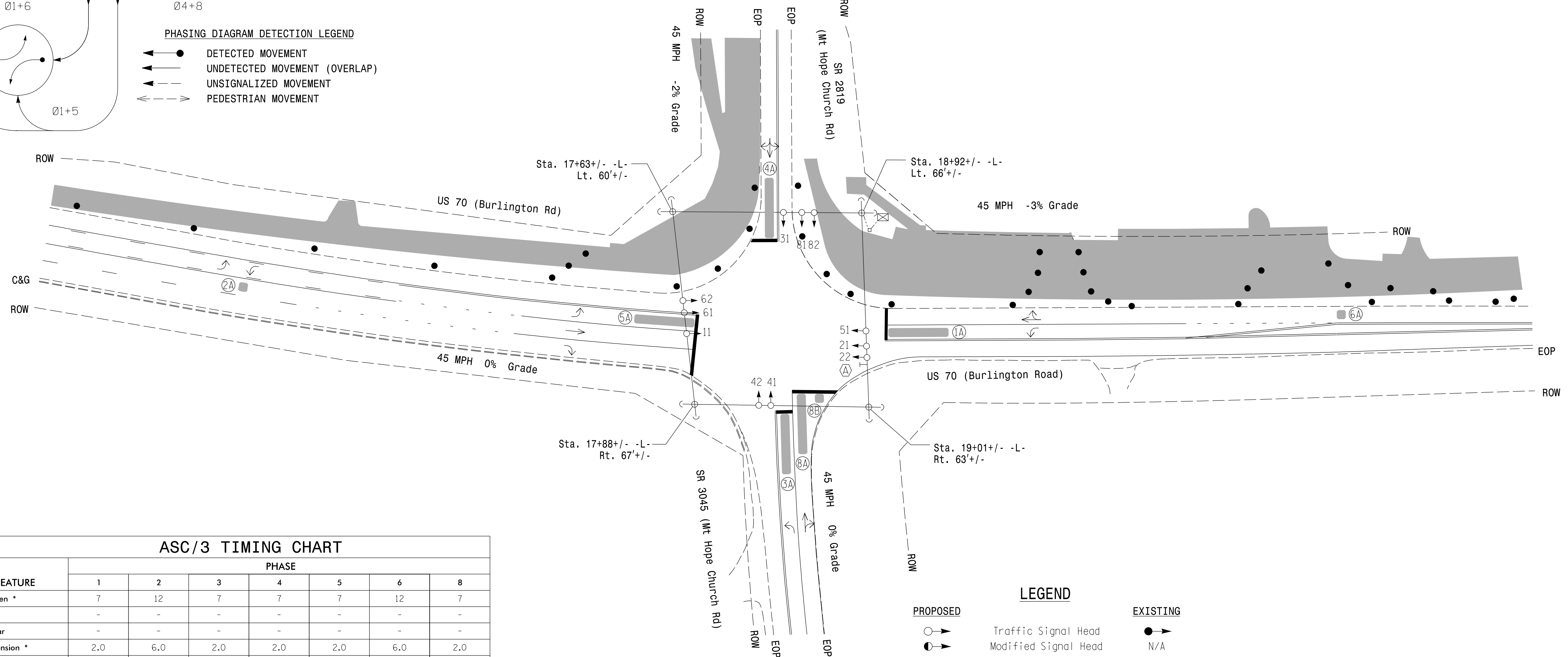
* Video Detection Zone

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 1 and/or phase 5 may be lagged.
4. Omit phase 3 during phase 4 on.
5. Set all detector units to presence mode.
6. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
7. Incorporate Video Detection system for vehicle detection.
8. Provide the Engineer with the Manufacturer's approved Video Detection locations and mounting heights to obtain detection zones as shown.

PHASING DIAGRAM DETECTION LEGEND

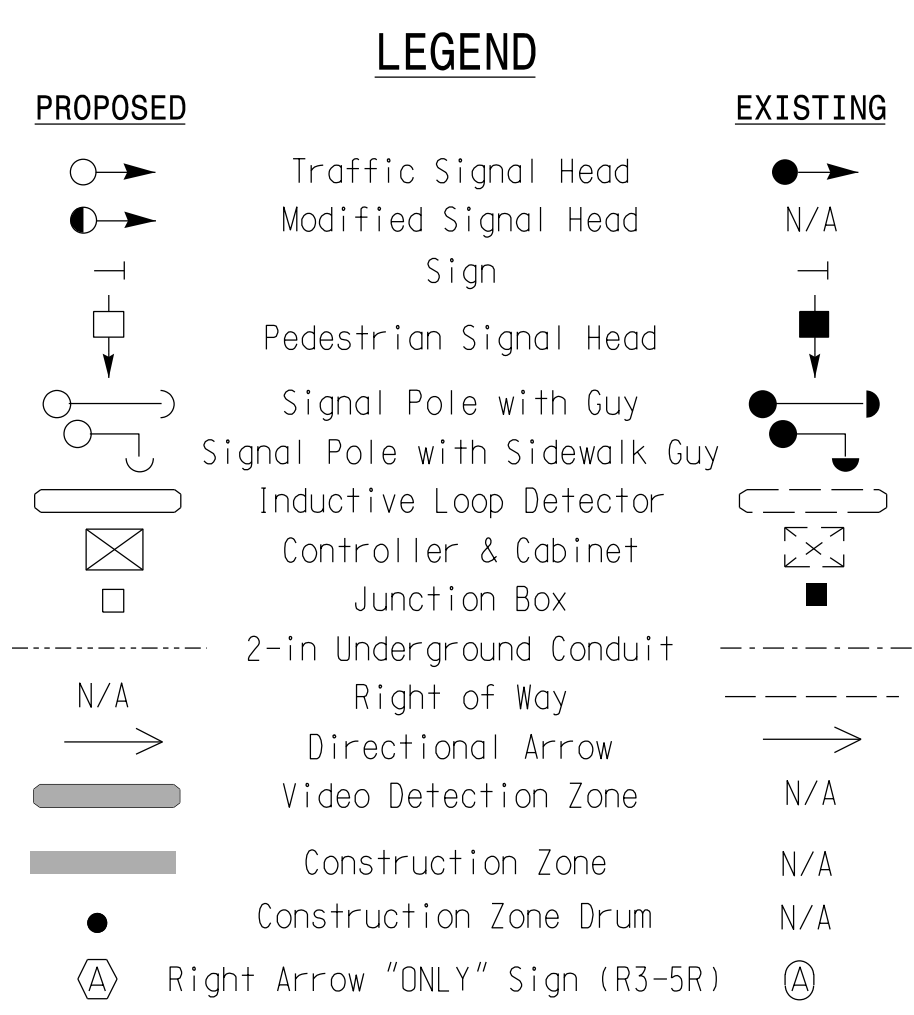
- ← ● DETECTED MOVEMENT
- ← ○ UNDETECTED MOVEMENT (OVERLAP)
- ← ○ UNSIGNALIZED MOVEMENT
- ← ○ PEDESTRIAN MOVEMENT



ASC/3 TIMING CHART

FEATURE	PHASE							
	1	2	3	4	5	6	8	
Min Green *	7	12	7	4	7	12	7	
Walk *	-	-	-	-	-	-	-	
Ped Clear	-	-	-	-	-	-	-	
Veh. Extension *	2.0	6.0	2.0	2.0	2.0	6.0	2.0	
Max I *	20	120	15	30	20	120	30	
Yellow	3.0	4.8	3.0	4.7	3.0	4.8	4.5	
Red Clear	2.9	1.3	2.3	1.5	2.1	1.3	1.0	
Actuations B4 Add *	-	-	-	-	-	-	-	
Seconds / Actuation *	-	1.5	-	-	-	1.5	-	
Max Initial *	-	34	-	-	-	34	-	
Time Before Reduction *	-	15	-	-	-	15	-	
Time To Reduce *	-	60	-	-	-	60	-	
Minimum Gap	-	3.0	-	-	-	3.0	-	
Locking Detector	-	X	-	-	-	X	-	
Recall Position	-	VEH RECALL	-	-	-	VEH RECALL	-	
Dual Entry	-	-	-	X	-	-	X	
Simultaneous Gap	X	X	X	X	X	X	X	

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



Signal Upgrade-Temporary Design 1 (TMP Phase I)

Prepared For the Offices of:

 750 N. Greenfield Pkwy, Garner, NC 27529

US 70 (Burlington Rd) at SR 3045/2819 (Mt Hope Church Rd)
 Greensboro, Guilford County, NC

Division 7
 PLAN DATE: September 2019
 PREPARED BY: J. Ma
 REVISIONS: _____
 SCALE: 1"=40'

REVIEWED BY: M. L. Stygles
 DATE: 9/9/2019
 SIGNATURE: _____
 DATE: _____

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

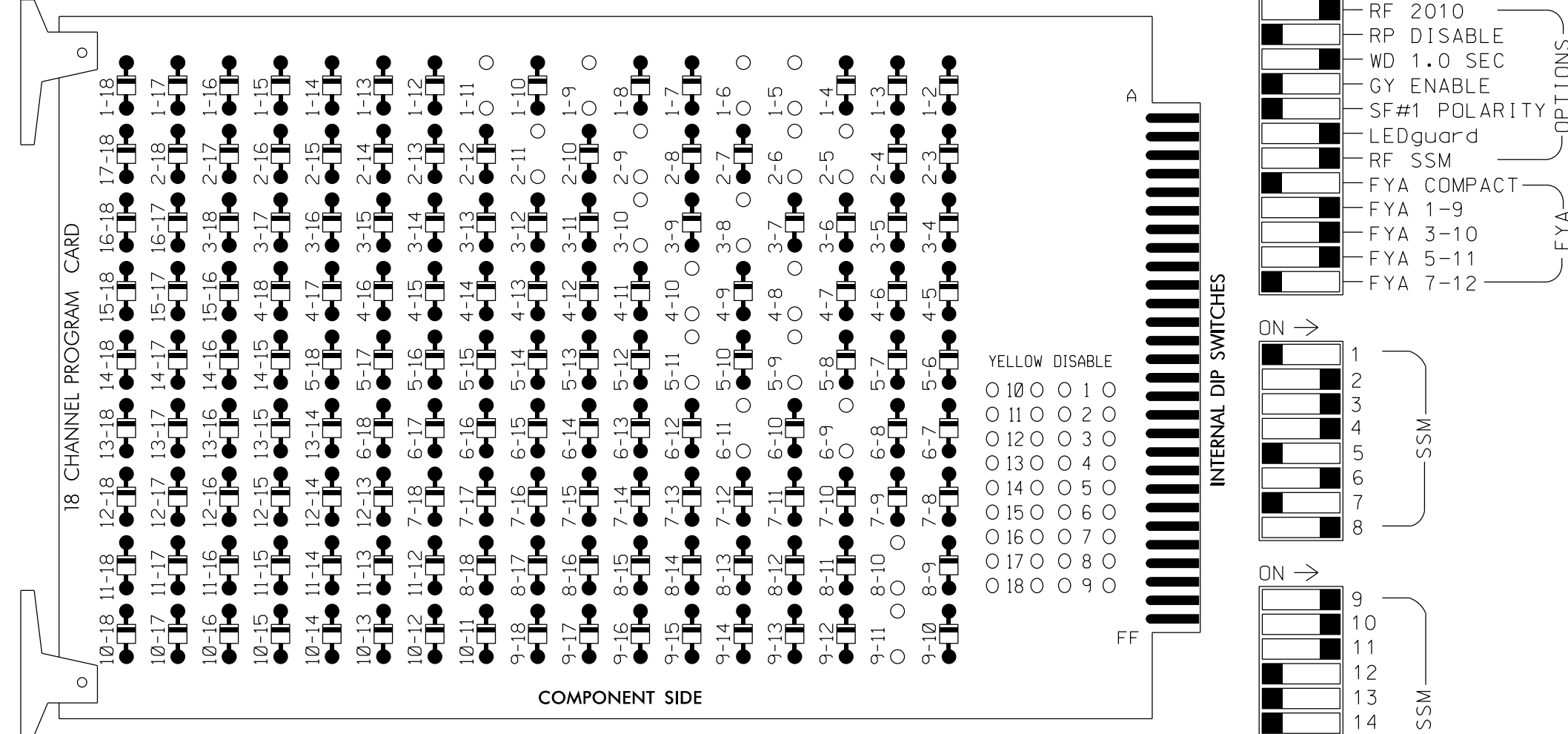
SEAL
 NORTH CAROLINA PROFESSIONAL ENGINEER
 SEAL 033108
 J. Ma
 827E1953081444F
 9/9/2019
 SIG. INVENTORY NO. 07-0204T1



EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 1-5, 1-6, 1-9, 1-11, 2-5, 2-6, 2-9, 2-11, 3-8, 3-10, 4-8, 4-10, 5-9, 5-11, 6-9, 6-11, 8-10, AND 9-11.



REMOVE JUMPERS AS SHOWN

NOTES:

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

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Program phases 4 and 8 for Dual Entry.
3. Program controller to start up in phase 2 Green and 6 Green.

EQUIPMENT INFORMATION

CONTROLLER.....2070LX
 CABINET.....332 W/AUX
 SOFTWARE.....ECONOLITE ASC/3-2070
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
 LOAD SWITCHES USED.....S1,S2,S4,S5,S7,S8,S11,
 AUX S1,AUX S2,AUX S4
 PHASES USED.....1,2,3,4,5,6,8
 OVERLAP "A".....*
 OVERLAP "B".....*
 OVERLAP "C".....*
 OVERLAP "D".....NOT USED

* See overlap programming detail on sheet 2

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	11*	21,22	NU	31*	22	41,42	NU	51*	61,62	NU	NU	81,82	NU	11*	31*	NU	51*	NU
RED		128		*	101			134		107								
YELLOW	*	129			102		*	135		108								
GREEN		130			103			136		109								
RED ARROW													A121	A124		A114		
YELLOW ARROW					117								A122	A125		A115		
FLASHING YELLOW ARROW													A123	A126		A116		
GREEN ARROW	127			118	118			133										

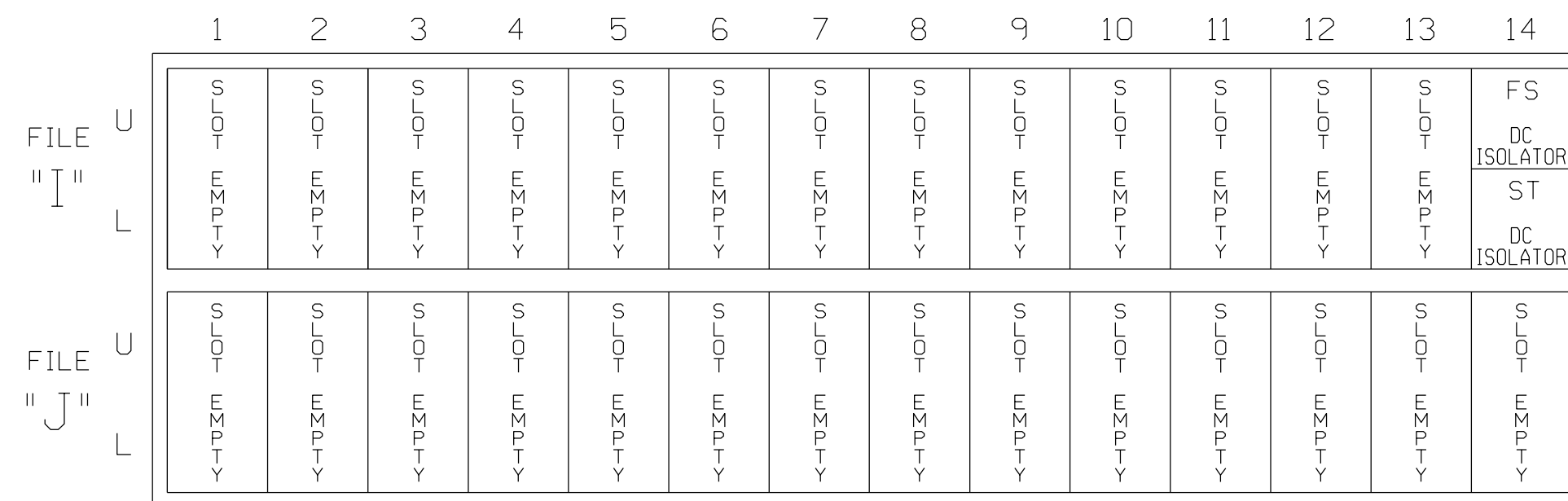
NU = Not Used

* 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

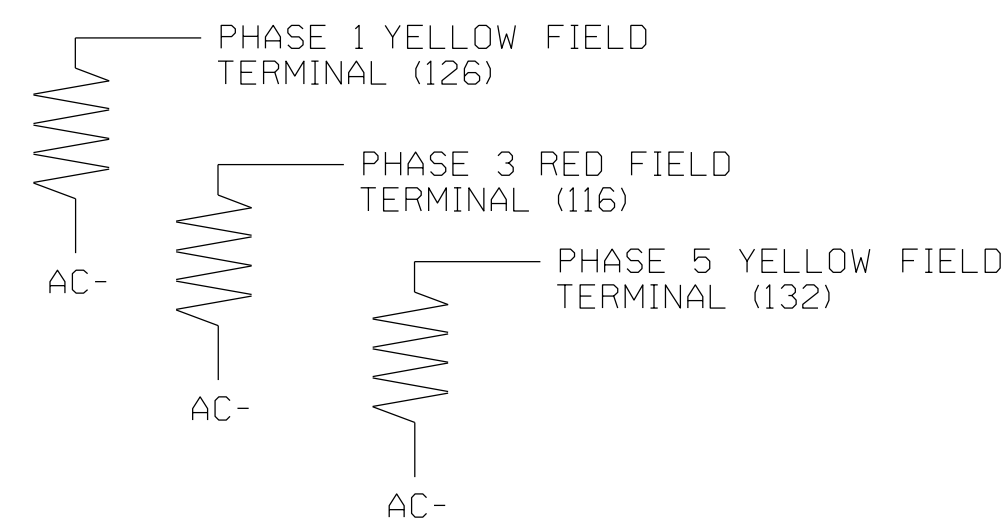
FS = FLASH SENSE
 ST = STOP TIME

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown below)

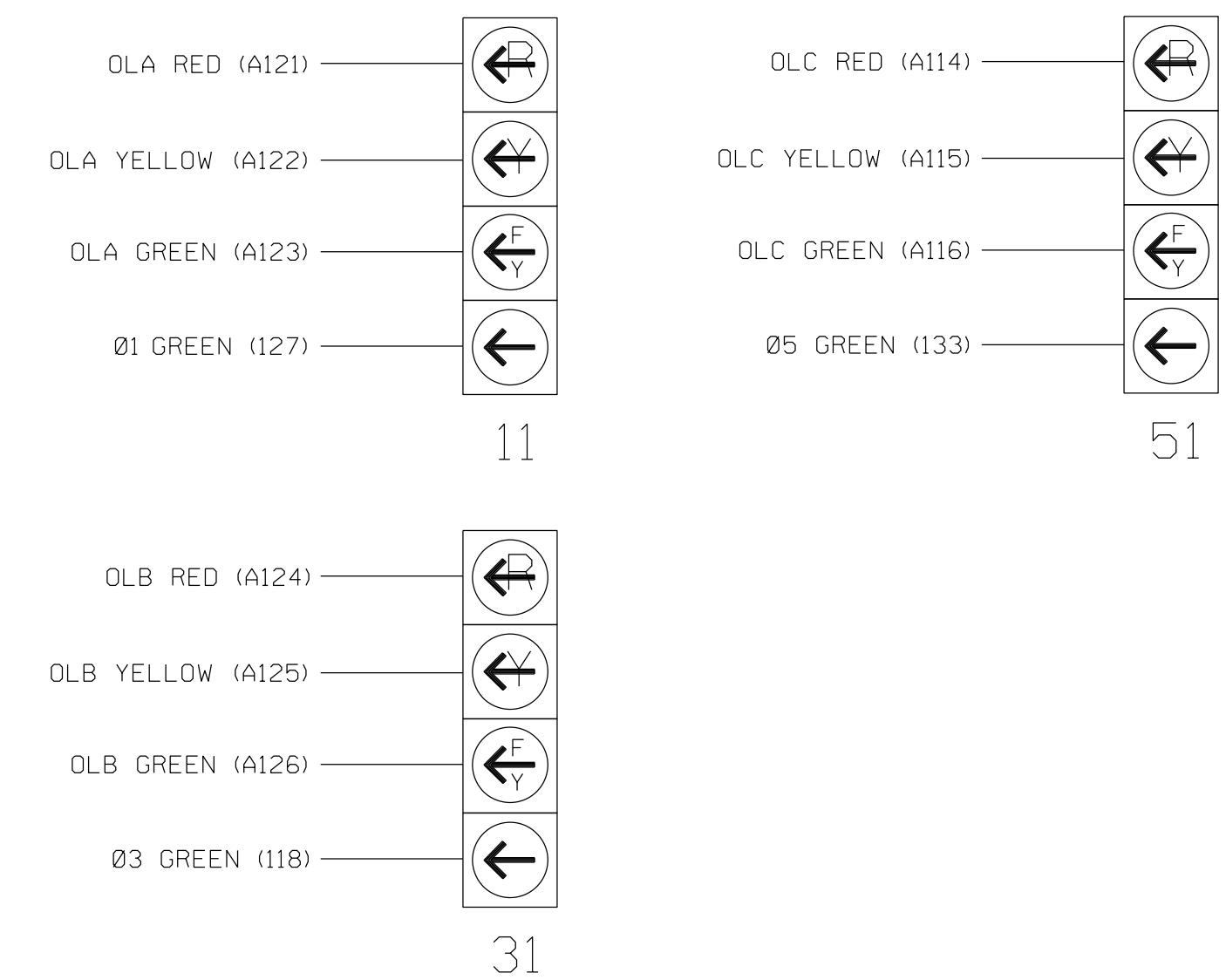
ACCEPTABLE VALUES

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



FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



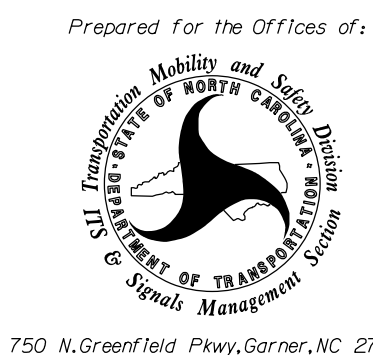
SPECIAL DETECTOR NOTE

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

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 07-0204T1
 DESIGNED: September 2019
 SEALED: 09/09/2019
 REVISED: N/A

Electrical Detail-Temporary Design 1 (TMP Phase I)-Sheet 1 of 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:



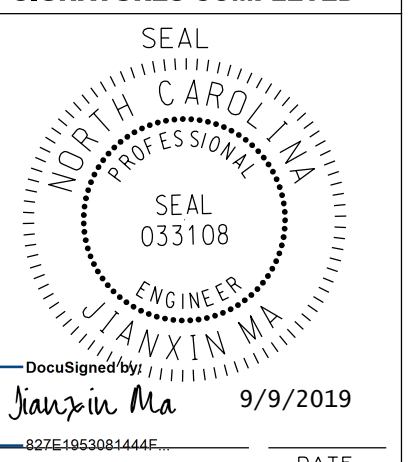
US 70 (Burlington Road)
 at
 SR 3045/2819
 (Mt. Hope Church Road)

Division 7 Guilford County Greensboro
 PLAN DATE: September 2019 REVIEWED BY: M.L. Stygles
 PREPARED BY: J. Ma REVIEWED BY:

REVISIONS	INIT.	DATE



DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



SIG. INVENTORY NO. 07-0204T1

ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select 2. CONTROLLER
2. From CONTROLLER Submenu select 2. VEHICLE OVERLAPS

OVERLAP A

Select TMG VEH OVLP [A] and 'PPLT FYA'

TMG VEH OVLP... [A] TYPE:	PPLT FYA
PROTECTED LEFT TURN....	PHASE 1
OPPOSING THROUGH.....	PHASE 2
FLASHING ARROW OUTPUT.....CH9 ISOLATE	
DELAY START OF: FYA..0.0 CLEARANCE..0.0	
ACTION PLAN SF BIT DISABLE..... 0	

Toggle Once

OVERLAP B

Select TMG VEH OVLP [B] and 'PPLT FYA'

TMG VEH OVLP... [B] TYPE:	PPLT FYA
PROTECTED LEFT TURN....	PHASE 3
OPPOSING THROUGH.....	PHASE 4
FLASHING ARROW OUTPUT.....CH10 ISOLATE	
DELAY START OF: FYA..0.0 CLEARANCE..0.0	
ACTION PLAN SF BIT DISABLE..... 0	

Toggle Once

OVERLAP C

Select TMG VEH OVLP [C] and 'PPLT FYA'

TMG VEH OVLP... [C] TYPE:	PPLT FYA
PROTECTED LEFT TURN....	PHASE 5
OPPOSING THROUGH.....	PHASE 6
FLASHING ARROW OUTPUT.....CH11 ISOLATE	
DELAY START OF: FYA..0.0 CLEARANCE..0.0	
ACTION PLAN SF BIT DISABLE..... 0	

END PROGRAMMING

FLASHER CIRCUIT MODIFICATION DETAIL

IN ORDER TO INSURE THAT SIGNALS FLASH CONCURRENTLY ON THE SAME APPROACH, MAKE THE FOLLOWING FLASHER CIRCUIT CHANGES:

1. ON REAR OF PDA - REMOVE WIRE FROM TERM. T2-4 AND TERMINATE ON T2-2.
2. ON REAR OF PDA - REMOVE WIRE FROM TERM. T2-5 AND TERMINATE ON T2-3.
3. REMOVE FLASHER UNIT 2.

THE CHANGES LISTED ABOVE TIES ALL PHASES AND OVERLAPS TO FLASHER UNIT 1.

ECONOLITE ASC/3-2070 BACKUP PROTECTION ENABLE PROGRAMMING

(program controller as shown)

1. From Main Menu select 1. CONFIGURATION
2. From CONFIGURATION Submenu select 1. CONTROLLER SEQ
3. From CONTROLLER SEQUENCE Submenu select 3. BACKUP PREVENT PHASES

Follow programming as shown below. On the 'ENABLE BACKUP PREVENT' screen move cursor to the appropriate field and press 'YES/NO' on the controller keypad to toggle field value between 'X', 'B', 'C' and 'OFF'.

ENABLE BACKUP PREVENT																
TMG/BKUP	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6
1
2
3
4	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.
5
6
7
8
9
10
11
12
13
14
15
16

END PROGRAMMING

NOTES

1. 'X' inhibits the controller from servicing the 'BACKUP' (column) phase when the 'TIMING' (row) phase is active or next.

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 07-0204T1
DESIGNED: September 2019
SEALED: 09/09/2019
REVISED: N/A

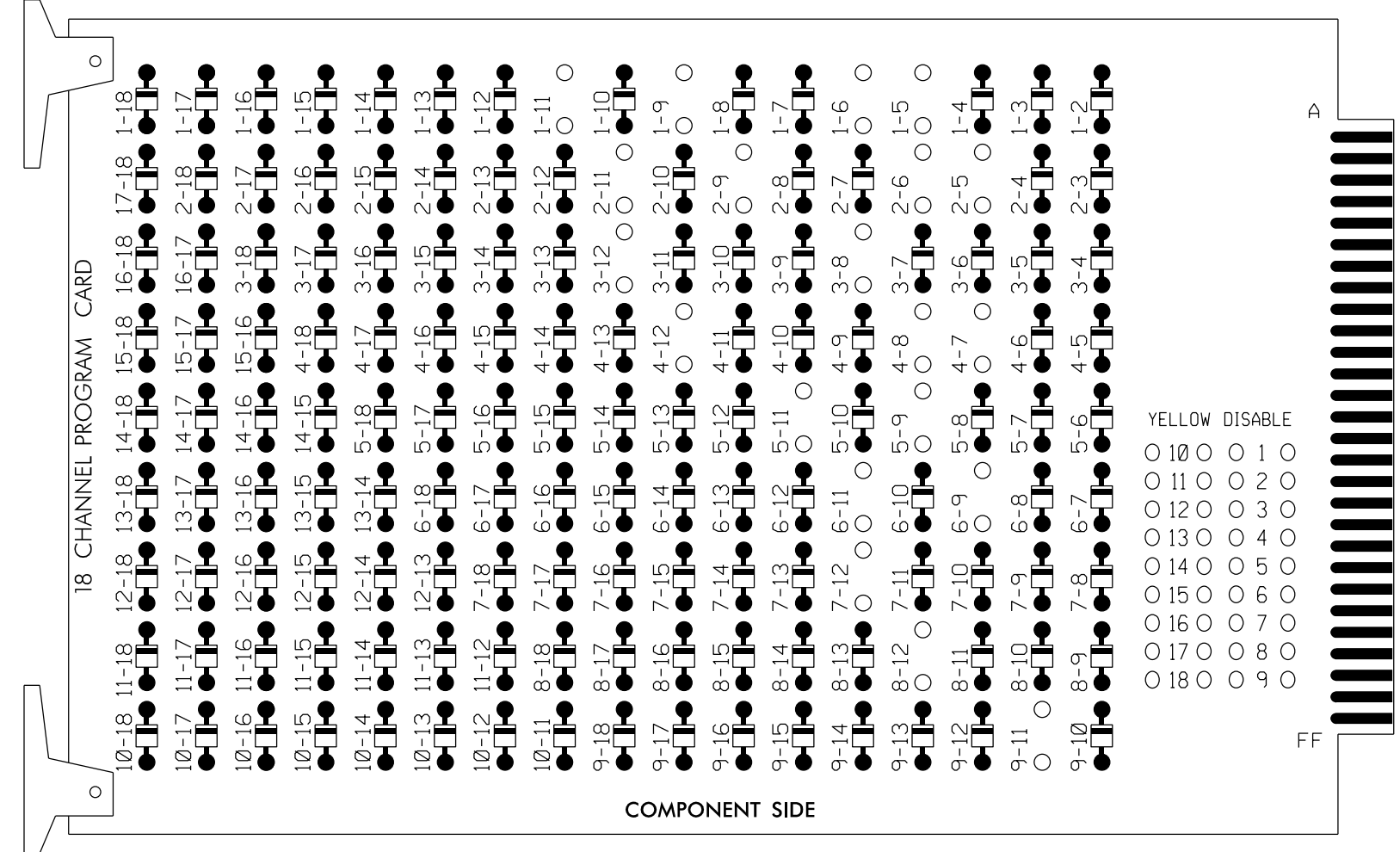


Electrical Detail-Temporary Design 1 (TMP Phase I)-Sheet 2 of 2

<p>ELECTRICAL AND PROGRAMMING DETAILS FOR:</p> <p>Prepared for the Offices of:</p> <p>750 N. Greenfield Pkwy, Garner, NC 27529</p>	<p>US 70 (Burlington Road) at SR 3045/2819 (Mt. Hope Church Road)</p> <p>Division 7 Guilford County Greensboro</p> <p>PLAN DATE: September 2019 REVIEWED BY: M.L. Stygles</p> <p>PREPARED BY: J. Ma REVIEWED BY:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>REVISIONS</th> <th>INIT.</th> <th>DATE</th> </tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> </tbody> </table>	REVISIONS	INIT.	DATE										<p>DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED</p> <p>SEAL</p> <p>DocuSign by J. Ma 9/9/2019 027E1655001044P</p> <p>SIG. INVENTORY NO. 07-0204T1</p>
REVISIONS	INIT.	DATE												

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL
(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 1-5, 1-6, 1-9, 1-11, 2-5, 2-6, 2-9, 2-11, 3-8, 3-12, 4-7, 4-8, 4-12, 5-9, 5-11, 6-9, 6-11, 7-12, 8-12, AND 9-11.



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 Red Enable is active at all times during normal operation.
- Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.

■ = DENOTES POSITION OF SWITCH

NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
- Program phases 4 and 8 for Dual Entry.
- Program controller to start up in phase 2 Green and 6 Green.

EQUIPMENT INFORMATION

CONTROLLER.....2070LX
 CABINET.....332 W/AUX
 SOFTWARE.....ECONDLITE ASC/3-2070
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
 LOAD SWITCHES USED.....S1,S2,S4,S5,S7,S8,S10,S11,
 AUXS1,AUXS4,AUXS5
 PHASES USED.....1,2,3,4,5,6,7,8
 OVERLAP "A".....*
 OVERLAP "B".....NOT USED
 OVERLAP "C".....*
 OVERLAP "D".....*
 * See overlap programming detail on sheet 2

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	11	21,22	NU	81,22	41,42	NU	51	42	61,62	NU	71	62	81,82	NU	11	51	71	NU
RED		128		*	101			*	134		*	107						
YELLOW	*	129			102				135			108						
GREEN		130			103				136			109						
RED ARROW													A121			A114	A101	
YELLOW ARROW					117				132			123		A122		A115	A102	
FLASHING YELLOW ARROW														A123		A116	A103	
GREEN ARROW	127						133	133			124	124						

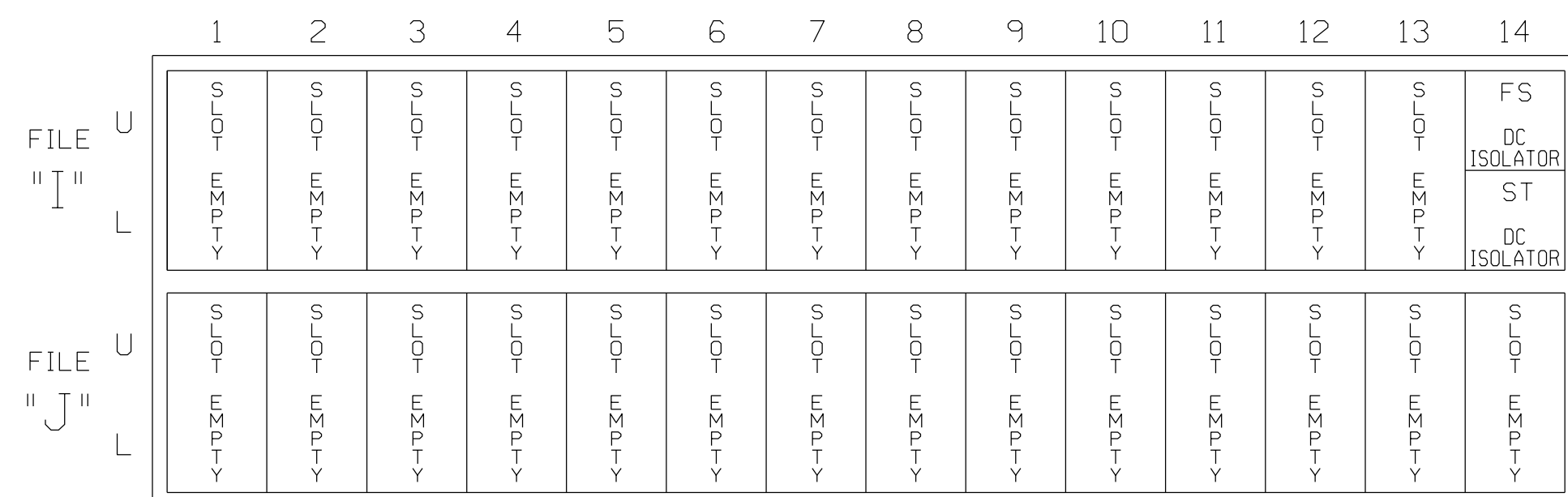
NU = Not Used

* 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

SPECIAL DETECTOR NOTE

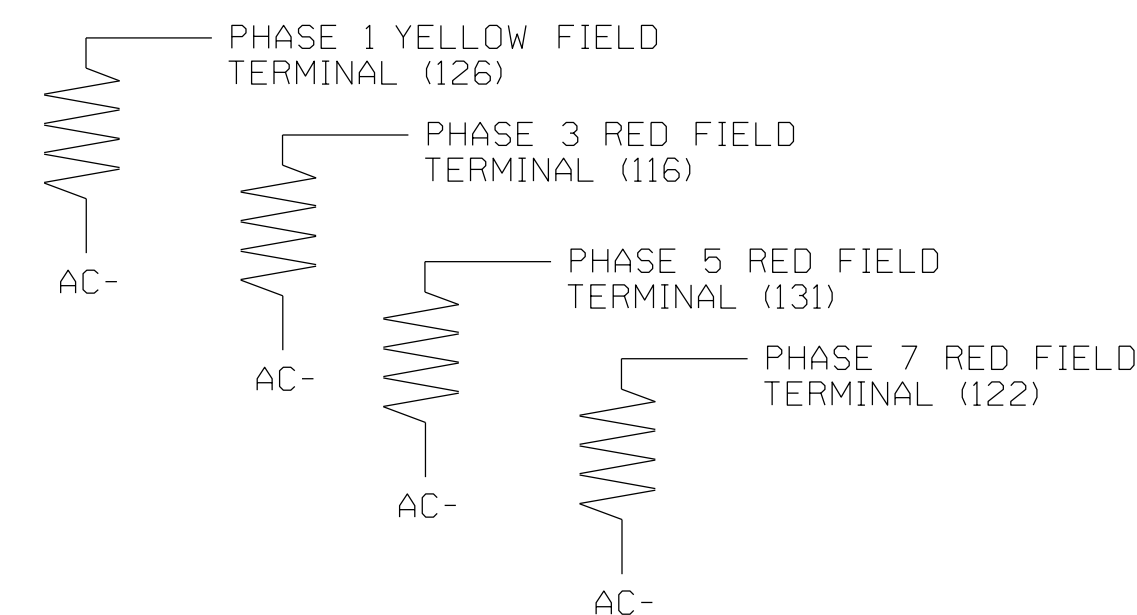
Install a video detection system for vehicle detection. Perform installation according to manufacturer's directions and NCDOT engineer-approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown below)

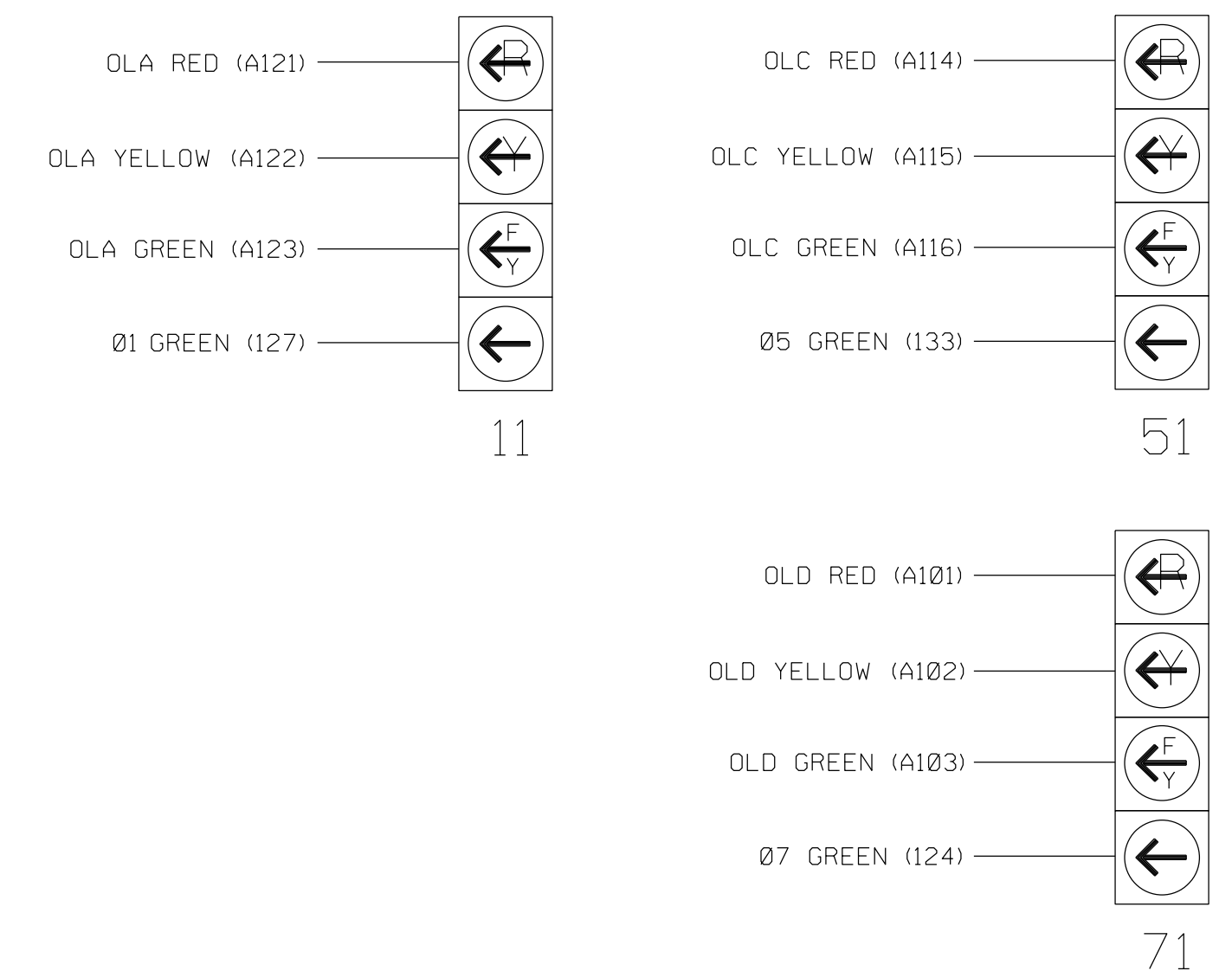
ACCEPTABLE VALUES

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



FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)

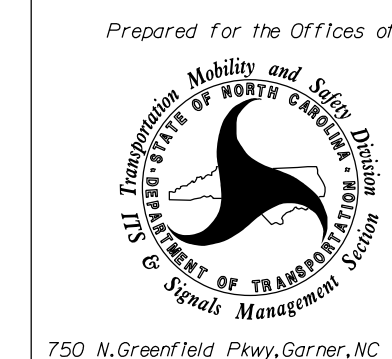


THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 07-0204T2
 DESIGNED: September 2019
 SEALED: 09/09/2019
 REVISED: N/A

Electrical Detail-Temporary Design 2 (TMP Phase II)-Sheet 1 of 3

ELECTRICAL AND PROGRAMMING DETAILS FOR:

US 70 (Burlington Road)
 at
 SR 3045/2819
 (Mt. Hope Church Road)



750 N.Greenfield Pkwy, Garner, NC 27529

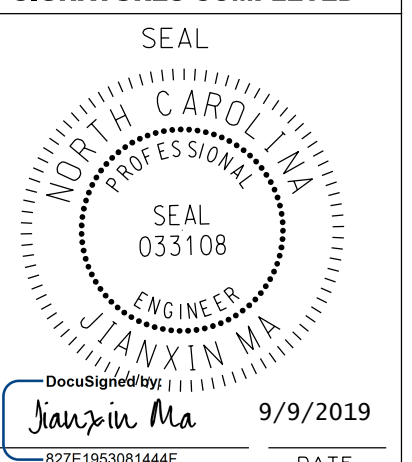
Division 7 Guilford County Greensboro

PLAN DATE: September 2019 REVIEWED BY: M.L. Stygles

PREPARED BY: J. Ma REVIEWED BY:

REVISIONS INIT. DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



9/9/2019 DATE

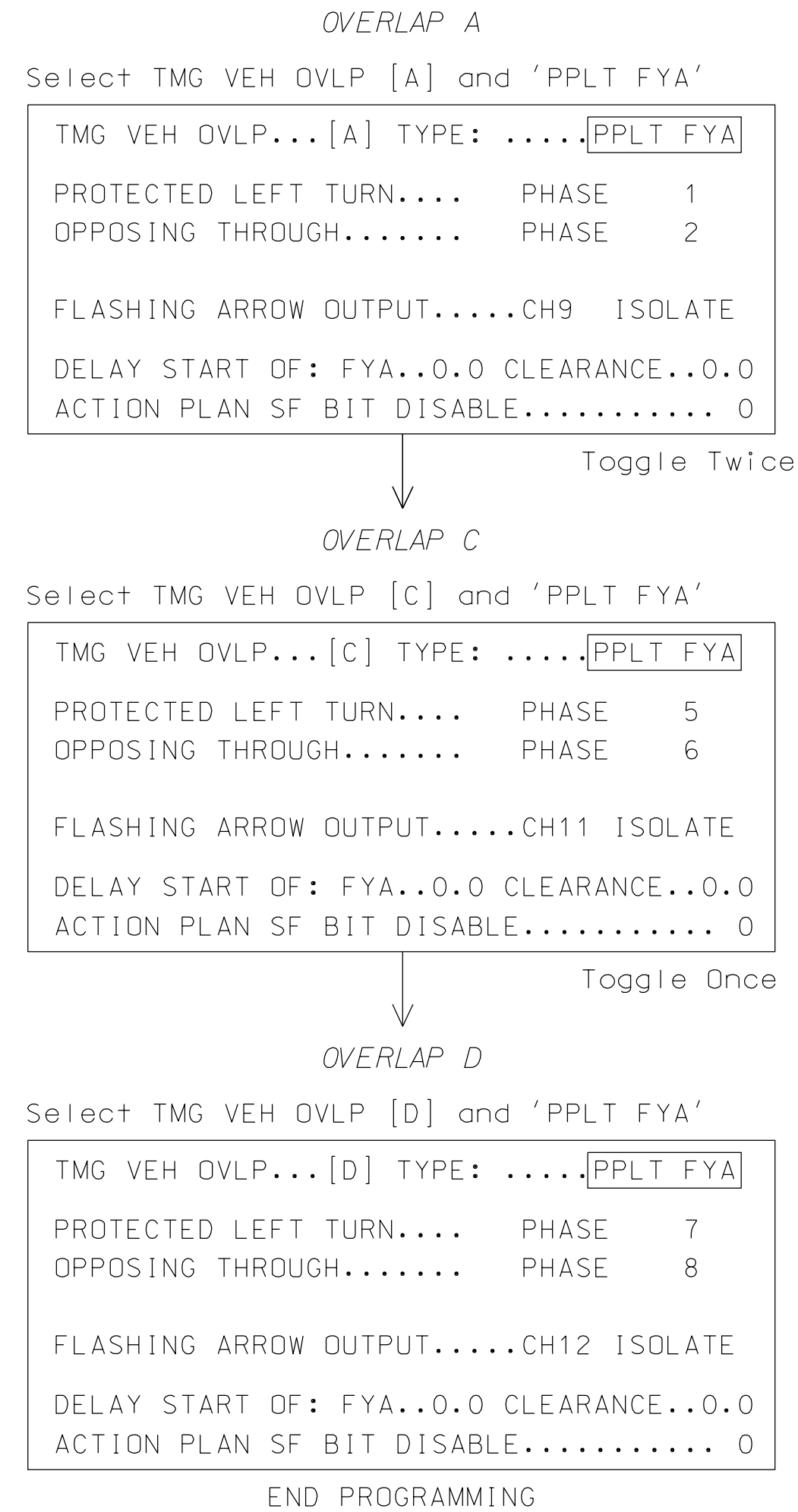
SIG. INVENTORY NO. 07-0204T2



ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select 2. CONTROLLER
2. From CONTROLLER Submenu select 2. VEHICLE OVERLAPS



ECONOLITE ASC/3-2070 BACKUP PROTECTION ENABLE PROGRAMMING

(program controller as shown)

1. From Main Menu select 1. CONFIGURATION
2. From CONFIGURATION Submenu select 1. CONTROLLER SEQ
3. From CONTROLLER SEQUENCE Submenu select 3. BACKUP PREVENT PHASES

Follow programming as shown below. On the 'ENABLE BACKUP PREVENT' screen move cursor to the appropriate field and press 'YES/NO' on the controller keypad to toggle field value between 'X', 'B', 'C' and 'OFF'.

ENABLE BACKUP PREVENT																
TMG/BKUP	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6
1
2
3
4
5
6
7
8	X	.	.	.	.	.	.	.	.	.
9
10
11
12
13
14
15
16

END PROGRAMMING

NOTES

1. 'X' inhibits the controller from servicing the 'BACKUP' (column) phase when the 'TIMING' (row) phase is active or next.

FLASHER CIRCUIT MODIFICATION DETAIL

IN ORDER TO ENSURE THAT SIGNALS FLASH CONCURRENTLY ON THE SAME APPROACH, MAKE THE FOLLOWING FLASHER CIRCUIT CHANGES:

1. ON REAR OF PDA - REMOVE WIRE FROM TERM. T2-4 AND TERMINATE ON T2-2.
2. ON REAR OF PDA - REMOVE WIRE FROM TERM. T2-5 AND TERMINATE ON T2-3.
3. REMOVE FLASHER UNIT 2.

THE CHANGES LISTED ABOVE TIES ALL PHASES AND OVERLAPS TO FLASHER UNIT 1.

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 07-0204T2
DESIGNED: September 2019
SEALED: 09/09/2019
REVISED: N/A



Electrical Detail-Temporary Design 2 (TMP Phase II)-Sheet 2 of 3

<p style="font-size: small;">ELECTRICAL AND PROGRAMMING DETAILS FOR:</p> <p style="font-size: x-small;">Prepared for the Offices of:</p> <p style="font-size: x-small;">750 N. Greenfield Pkwy, Garner, NC 27529</p>	<p>US 70 (Burlington Road) at SR 3045/2819 (Mt. Hope Church Road)</p> <p style="font-size: x-small;">Division 7 Guilford County Greensboro</p> <p>PLAN DATE: September 2019 REVIEWED BY: M.L. Stygles</p> <p>PREPARED BY: J. Ma REVIEWED BY:</p> <table border="1" style="width: 100%; border-collapse: collapse; font-size: x-small;"> <tr> <th>REVISIONS</th> <th>INIT.</th> <th>DATE</th> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> </table>	REVISIONS	INIT.	DATE				<p style="text-align: center; font-size: small;">SEAL</p> <p style="font-size: x-small;">DocuSigned by: Jianxin Ma 9/9/2019 827E1953081444F DATE</p> <p style="font-size: x-small;">SIG. INVENTORY NO. 07-0204T2</p>
REVISIONS	INIT.	DATE						

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ECONOLITE ASC/3-2070 CONTROLLER SEQUENCE PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select 1. CONFIGURATION
2. From CONFIGURATION Submenu select 1. CONTROLLER SEQ
3. From CONTROLLER SEQUENCE Submenu select 1. PHASE RING SEQUENCE AND ASSIGNMENT

Move the cursor to the SEQUENCE COMMANDS field, toggle to select "C" mode, enter phases in desired sequence.

```

CONTROLLER SEQUENCE [ 1 ]
SEQUENCE COMMANDS . HW ALT SEQ ENA.          NO
      01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16
BC-   C  C  C  C  C  C  C  C  C  C  C  C  C  C  C  C
R1-   1  2  4  3  .  .  .  .  .  .  .  .  .  .  .  .
R2-   5  6  7  8  .  .  .  .  .  .  .  .  .  .  .  .
R3-   .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
R4-   .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .

R1-R4=RING 1-4, DATA ENTRY, PHASES 1-16
BC=BARRIER CONTROL, VALUES: B,C
B=CURRENT GROUP RING BARRIER
C=COMPATIBILITY PROGRAMMED BY MAIN MENU 1-1-2

```

END SEQUENCE AND ASSIGNMENT PROGRAMMING

1. From Main Menu select 1. CONFIGURATION
2. From CONFIGURATION Submenu select 1. CONTROLLER SEQ
3. From CONTROLLER SEQUENCE Submenu select 2. PHASE COMPATIBILITY

Program phase compatibility as shown below to ensure phases 3 and 7 cannot run concurrently.

```

PHASE COMPATIBILITY
      6 5 4 3 2 1 0 9 8 7 6 5 4 3 2
1 . . . . . X X . . .
2 . . . . . . X X . . .
3 . . . . . X . . . . .
4 . . . . . X X . . .
5 . . . . . . . . . . .
6 . . . . . . . . . . .
7 . . . . . . . . . . .
8 . . . . . . . . . . .
9 . . . . . . . . . . .
10 . . . . . . . . . . .
11 . . . . . . . . . . .
12 . . . . . . . . . . .
13 . . . . . . . . . . .
14 . . . . . . . . . . .
15 . . . . . . . . . . .

```

END COMPATIBILITY PROGRAMMING

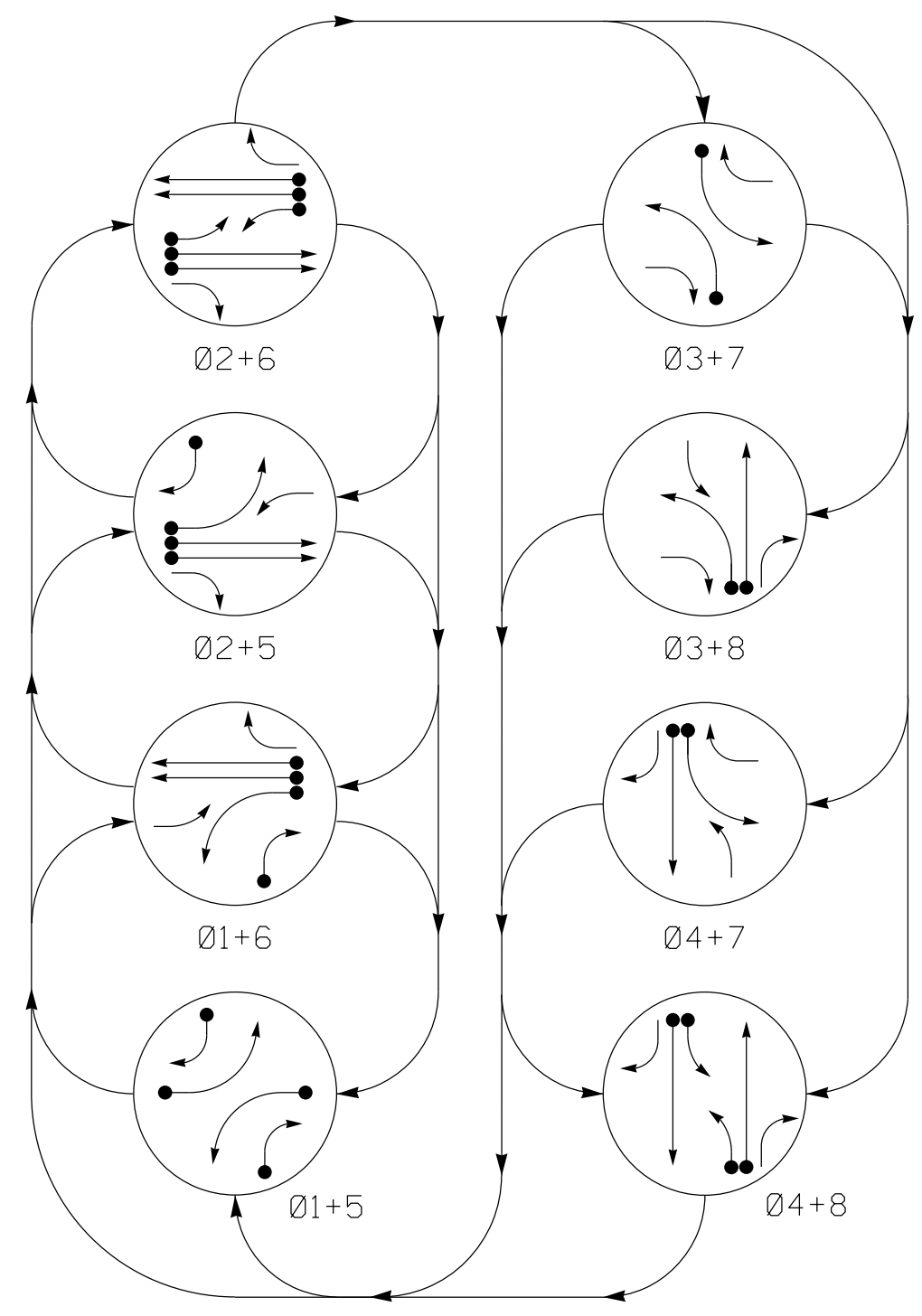
THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-0204T2
DESIGNED: September 2019
SEALED: 09/09/2019
REVISED: N/A



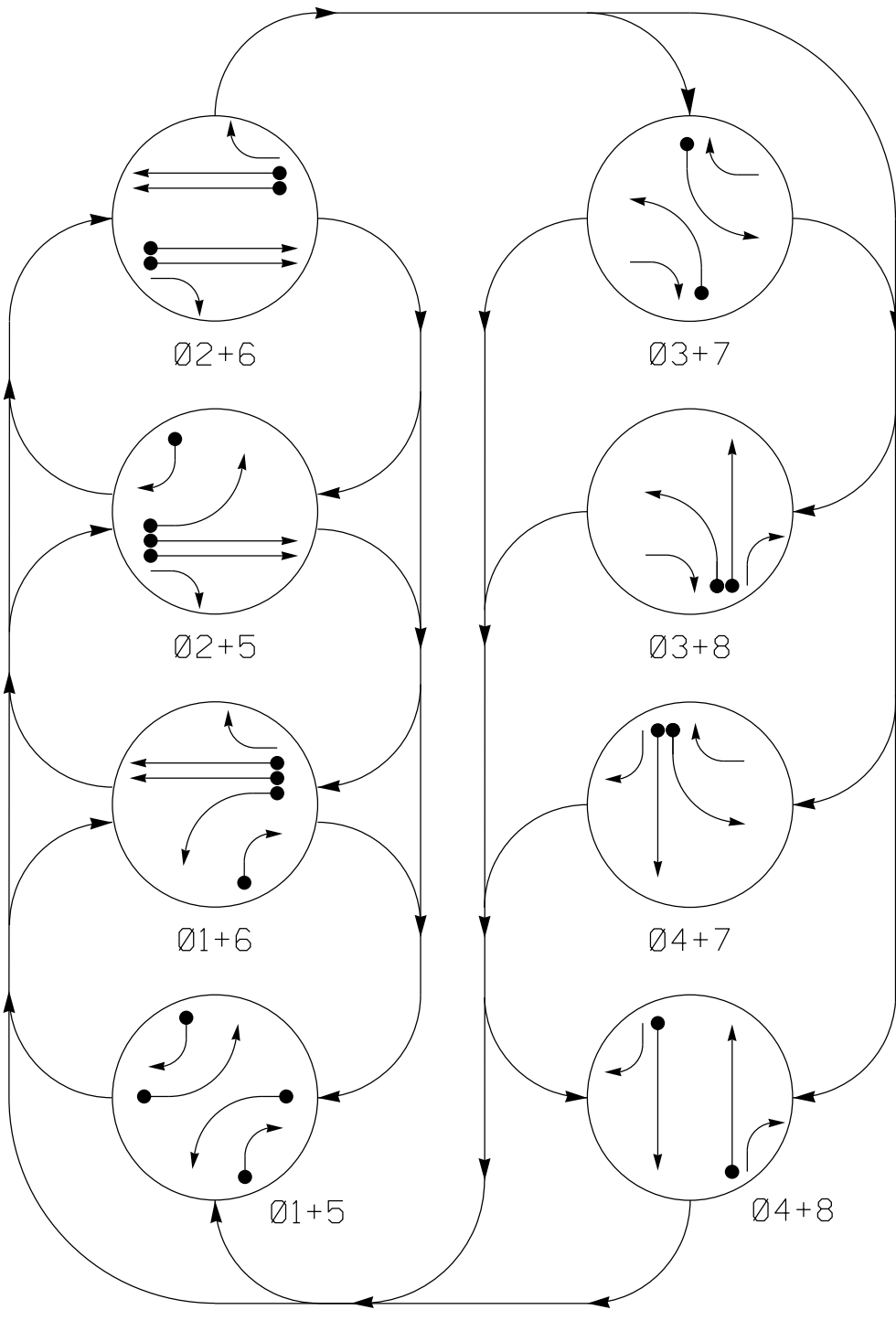
Electrical Detail-Temporary Design 2 (TMP Phase II)-Sheet 3 of 3

<p>ELECTRICAL AND PROGRAMMING DETAILS FOR:</p> <p style="font-size: small;">Prepared for the Offices of:</p> <p style="font-size: x-small;">750 N. Greenfield Pkwy, Garner, NC 27529</p>	<p>US 70 (Burlington Road) at SR 3045/2819 (Mt. Hope Church Road)</p> <p>Division 7 Guilford County Greensboro</p> <p>PLAN DATE: September 2019 REVIEWED BY: M.L. Stygles</p> <p>PREPARED BY: J. Ma REVIEWED BY:</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; border-bottom: 1px solid black;">REVISIONS</td> <td style="width: 25%; border-bottom: 1px solid black;">INIT.</td> <td style="width: 25%; border-bottom: 1px solid black;">DATE</td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> </table>	REVISIONS	INIT.	DATE				<p style="text-align: center; font-size: x-small;">DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED</p> <p style="text-align: center;">SEAL</p> <p style="text-align: center; font-size: x-small;">Documented by: Jianxin Ma 9/9/2019</p> <p style="text-align: center; font-size: x-small;">DATE</p> <p style="text-align: center; font-size: x-small;">SIG. INVENTORY NO. 07-0204T2</p>
REVISIONS	INIT.	DATE						

DEFAULT PHASING DIAGRAM



ALTERNATE PHASING DIAGRAM



SIGNAL FACE	PHASE								FLUSH
	01+5	01+6	02+5	02+6	03+7	03+8	04+7	04+8	
11	←	←	←	←	←	←	←	←	Y
21	R	R	G	G	R	R	R	R	Y
22	R	R	G	G	R	R	R	R	Y
31	←	←	←	←	←	←	←	←	Y
41	R	R	R	R	R	R	G	G	R
42	R	R	R	R	R	R	G	G	R
51	←	←	←	←	←	←	←	←	Y
61	R	G	R	G	R	R	R	R	Y
62	R	G	R	G	R	R	R	R	Y
71	←	←	←	←	←	←	←	←	Y
81	R	R	R	R	R	R	G	G	R
82	R	R	R	R	R	R	G	G	R

SIGNAL FACE	PHASE								FLUSH
	01+5	01+6	02+5	02+6	03+7	03+8	04+7	04+8	
11	←	←	←	←	←	←	←	←	Y
21	R	R	G	G	R	R	R	R	Y
22	R	R	G	G	R	R	R	R	Y
31	←	←	←	←	←	←	←	←	Y
41	R	R	R	R	R	R	G	G	R
42	R	R	R	R	R	R	G	G	R
51	←	←	←	←	←	←	←	←	Y
61	R	G	R	G	R	R	R	R	Y
62	R	G	R	G	R	R	R	R	Y
71	←	←	←	←	←	←	←	←	Y
81	R	R	R	R	R	R	G	G	R
82	R	R	R	R	R	R	G	G	R

ASC/3 DETECTOR INSTALLATION CHART														
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING							TYPE	SYSTEM LOOP	NEW CARD
					PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	PHASE	NEW LOOP			
1A	6X40	0	2-4-2	X	1	Yes	-	15*	-	S	-	X		
					6#	Yes	-	3	-	G	-	X		
1B	6X40	0	2-4-2	X	1	Yes	-	15	-	S	-	X		
2A	6X6	300	6	X	2	Yes	-	-	X	N	-	X		
2B	6X6	300	6	X	2	Yes	-	-	X	N	-	X		
3A	6X40	0	2-4-2	X	3	Yes	-	15*	-	S	-	X		
					8#	Yes	-	3	-	S	-	X		
4A	6X40	0	2-4-2	X	4	Yes	-	-	-	S	-	X		
5A	6X40	0	2-4-2	X	5	Yes	-	15*	-	S	-	X		
					2#	Yes	-	3	-	G	-	X		
5B	6X40	0	2-4-2	X	5	Yes	-	15	-	S	-	X		
6A	6X6	300	4	X	6	Yes	-	-	X	N	-	X		
6B	6X6	300	4	X	6	Yes	-	-	X	N	-	X		
7A	6X40	0	2-4-2	X	7	Yes	-	15*	-	S	-	X		
					4#	Yes	-	3	-	S	-	X		
8A	6X40	0	2-4-2	X	8	Yes	-	-	-	S	-	X		

* Reduce delay to 3 seconds during Alternate Phasing Operation.
Disable phase call for loop(s) during Alternate Phasing Operation.

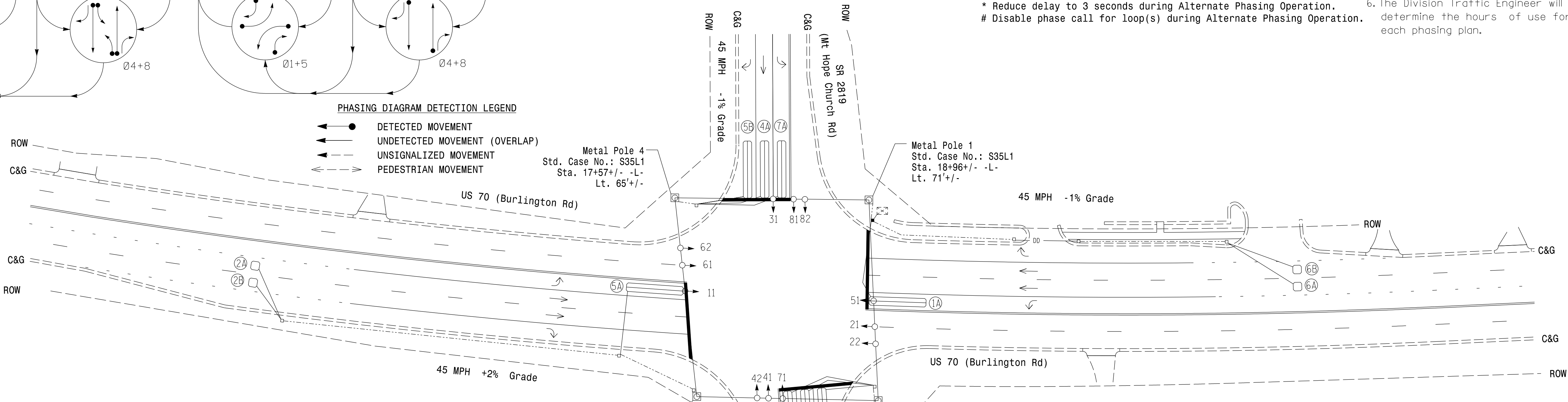
8 Phase Fully Actuated (Isolated)

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 1 and/or phase 5 may be lagged.
- 4. Phase 3 and/or phase 7 may be lagged.
- 5. Set all detector units to presence mode.
- 6. The Division Traffic Engineer will determine the hours of use for each phasing plan.

PHASING DIAGRAM DETECTION LEGEND

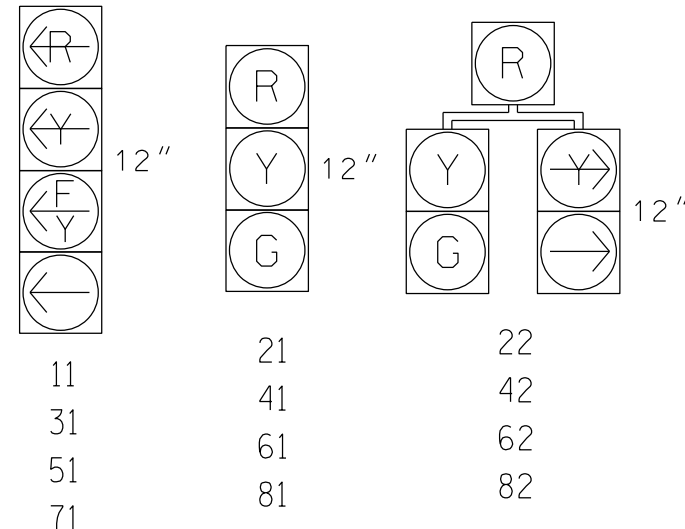
- DETECTED MOVEMENT
- ← UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- ⇌ PEDESTRIAN MOVEMENT



FEATURE	PHASE							
	1	2	3	4	5	6	7	8
Min Green *	7	12	7	7	7	12	7	7
Walk *	-	-	-	-	-	-	-	-
Ped Clear	-	-	-	-	-	-	-	-
Veh. Extension *	2.0	6.0	2.0	2.0	2.0	6.0	2.0	2.0
Max 1 *	20	120	15	30	20	120	15	30
Yellow	3.0	4.6	3.0	4.6	3.0	4.6	3.0	4.6
Red Clear	2.8	1.8	2.9	1.7	3.1	1.8	3.1	1.7
Actuations B4 Add *	-	-	-	-	-	-	-	-
Seconds / Actuation *	-	1.5	-	-	-	1.5	-	-
Max Initial *	-	34	-	-	-	34	-	-
Time Before Reduction *	-	15	-	-	-	15	-	-
Time To Reduce *	-	60	-	-	-	60	-	-
Minimum Gap	-	3.0	-	-	-	3.0	-	-
Locking Detector	-	X	-	-	-	X	-	-
Recall Position	-	VEH RECALL	-	-	-	VEH RECALL	-	-
Dual Entry	-	-	-	X	-	-	-	X
Simultaneous Gap	X	X	X	X	X	X	X	X

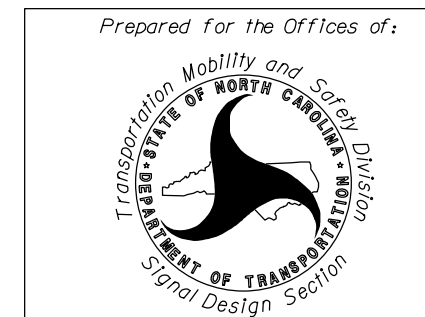
* These values may be field adjusted. Do not adjust Min Green and Extension times for phases 2 and 6 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.

SIGNAL FACE I.D.
All Heads L.E.D.

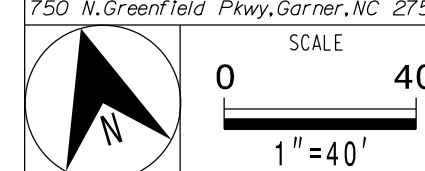


LEGEND		
PROPOSED		EXISTING
○	Traffic Signal Head	●
◐	Modified Signal Head	N/A
⊥	Sign	⊥
⊥	Pedestrian Signal Head	⊥
○	Signal Pole with Guy	○
□	Signal Pole with Sidewalk Guy	□
○	Metal Strain Pole	○
⊠	Inductive Loop Detector	⊠
⊠	Controller & Cabinet	⊠
⊠	Junction Box	⊠
---	2-in Underground Conduit	---
- - -	Directional Drill	N/A
- - -	Right of Way	- - -
→	Directional Arrow	→

Signal Upgrade-Final Design



US 70 (Burlington Rd) at SR 3045/2819 (Mt Hope Church Rd)			
Division 7	Guilford County	Greensboro	
PLAN DATE: September 2019	REVIEWED BY: M. Stygles		
PREPARED BY: J. Ma	REVIEWED BY:		
REVISIONS	INIT.	DATE	

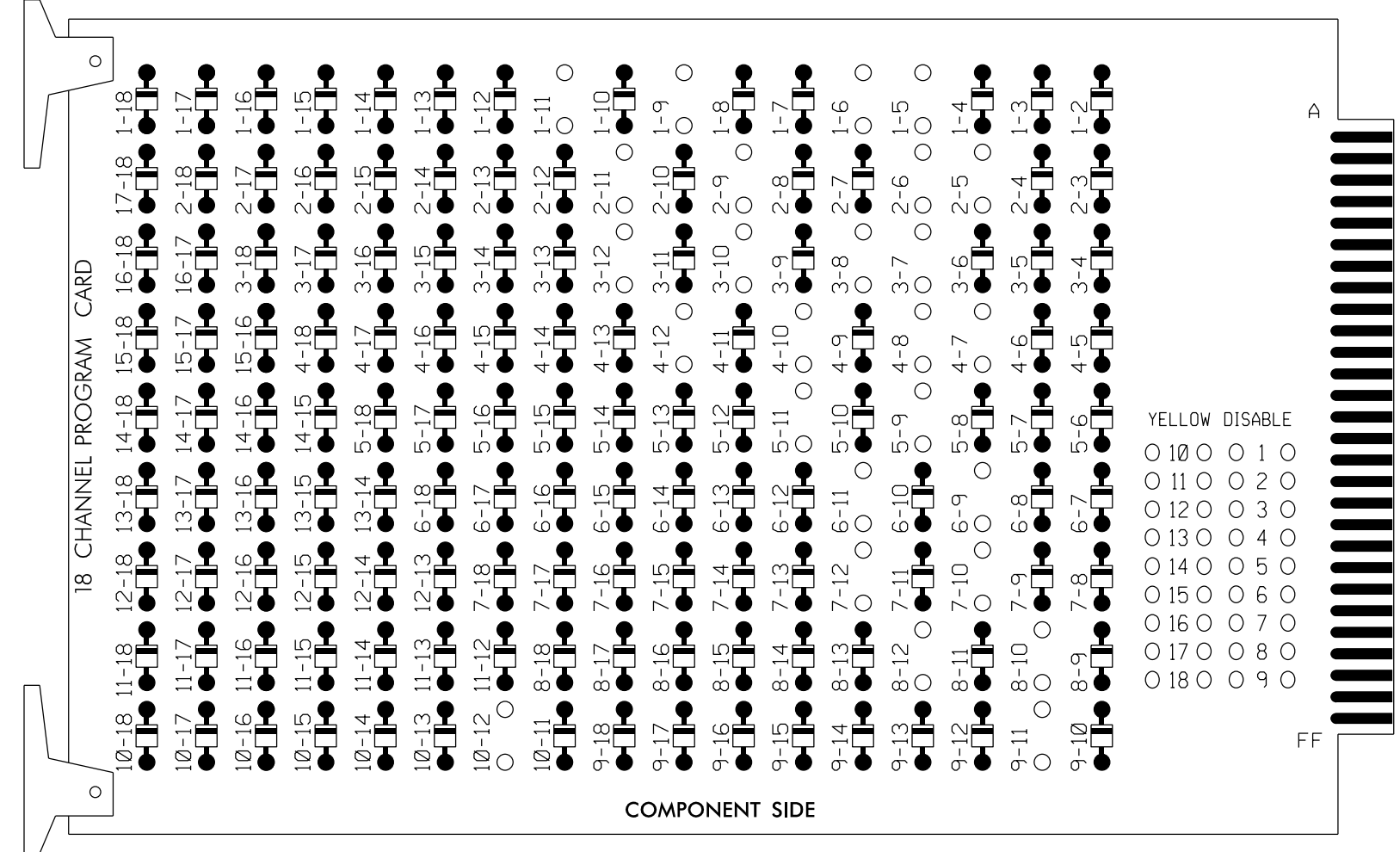


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SEAL NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 033108 J. MA
SIG. INVENTORY NO. 07-0204

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 1-5, 1-6, 1-9, 1-11, 2-5, 2-6, 2-9, 2-11, 3-7, 3-8, 3-10, 3-12, 4-7, 4-8, 4-10, 4-12, 5-9, 5-11, 6-9, 6-11, 7-10, 7-12, 8-10, 8-12, 9-11, AND 10-12.



REMOVE JUMPERS AS SHOWN

NOTES:

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

■ = DENOTES POSITION OF SWITCH

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Program phases 4 and 8 for Dual Entry.
3. Program controller to start up in phase 2 Green and 6 Green.

EQUIPMENT INFORMATION

CONTROLLER.....2070LX
 CABINET.....332 W/AUX
 SOFTWARE.....ECONOLITE ASC/3-2070
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
 LOAD SWITCHES USED.....S1,S2,S4,S5,S7,S8,S10,S11,
 AUX S1,AUX S2,AUX S4,AUX S5
 PHASES USED.....1,2,3,4,5,6,7,8
 OVERLAP "A".....*
 OVERLAP "B".....*
 OVERLAP "C".....*
 OVERLAP "D".....*

* See overlap programming detail on sheet 2

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6					
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18					
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE					
SIGNAL HEAD NO.	11★	82	21,22	NU	31★	22	41,42	NU	51★	42	61,62	NU	71★	62	81,82	NU	11★	31★	NU	51★	71★	NU	
RED		*	128		*	101		*	134		*	107											
YELLOW			129			102			135			108											
GREEN			130			103			136			109											
RED ARROW																	A121	A124		A114	A101		
YELLOW ARROW			126			117			132			123					A122	A125		A115	A102		
FLASHING YELLOW ARROW																	A123	A126		A116	A103		
GREEN ARROW	127	127				118	118		133	133		124	124										

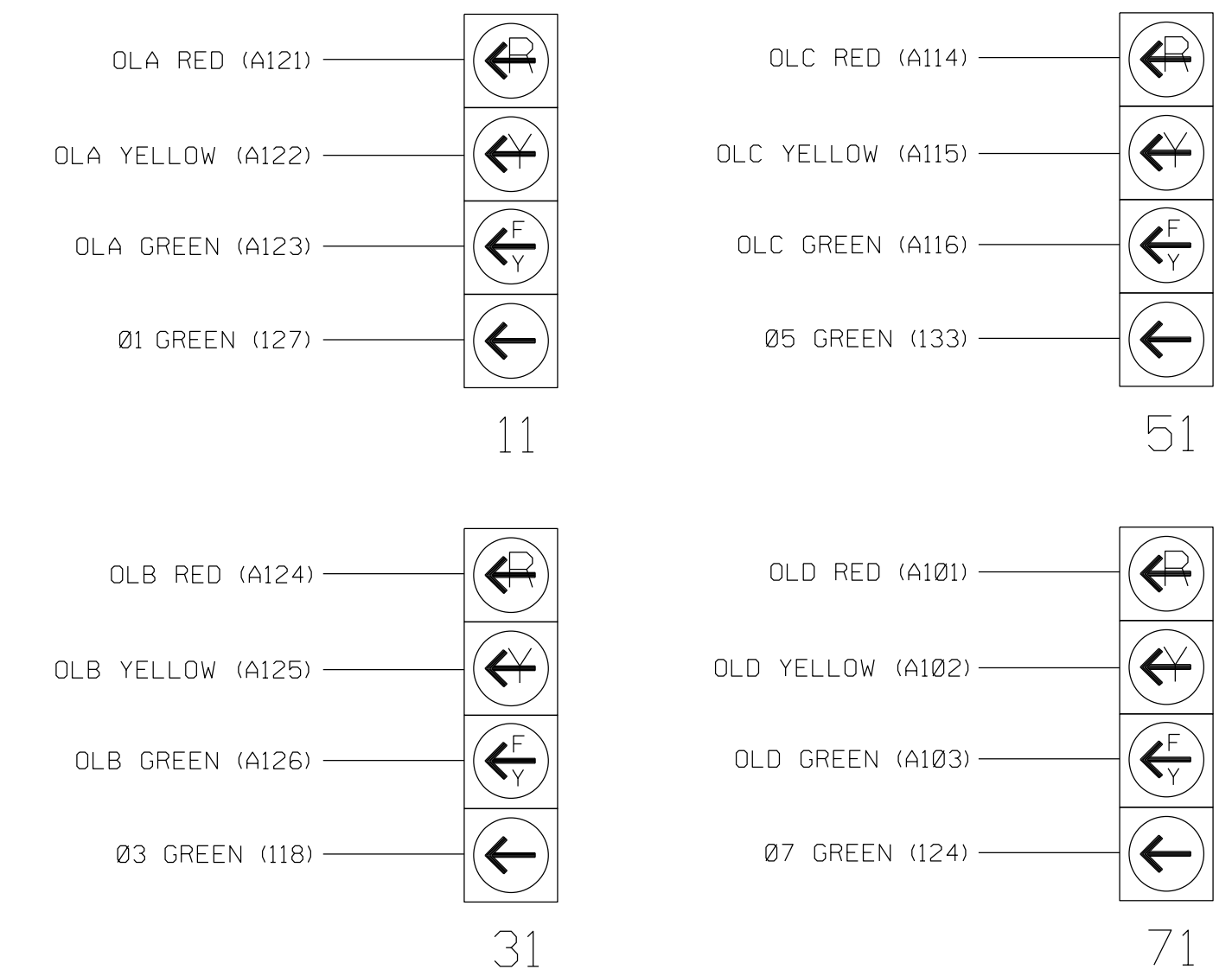
NU = Not Used

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

★ See pictorial of head wiring in detail this sheet.

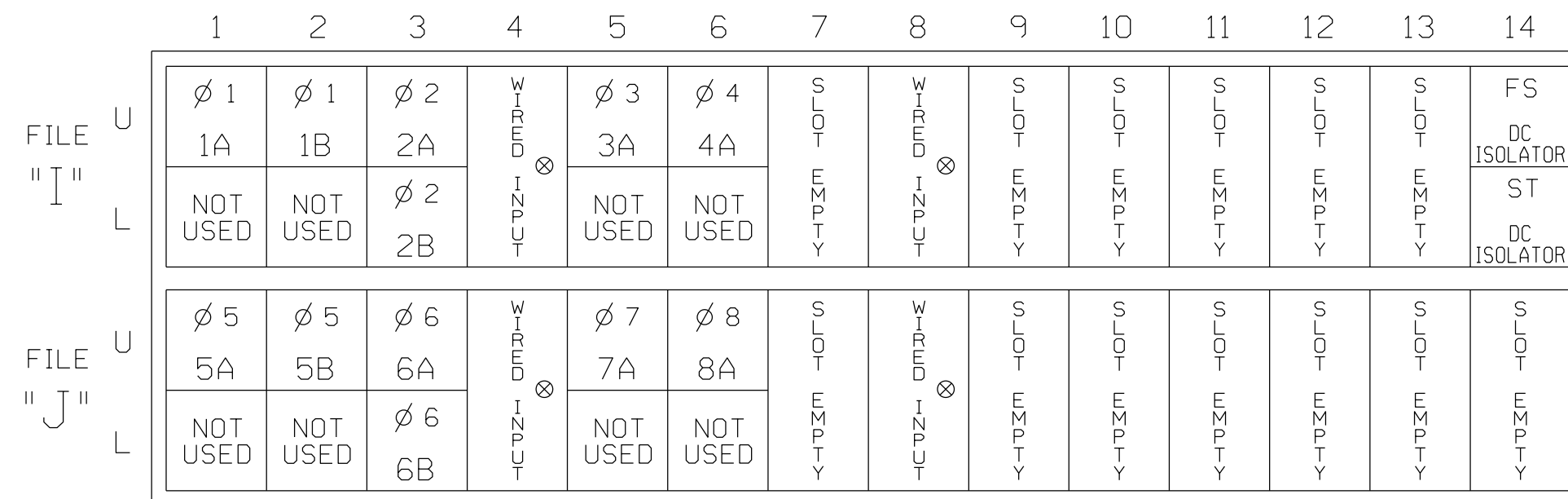
FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



INPUT FILE POSITION LAYOUT

(front view)



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

FS = FLASH SENSE
 ST = STOP TIME

⊗ Wired Input - Do not populate slot with detector card

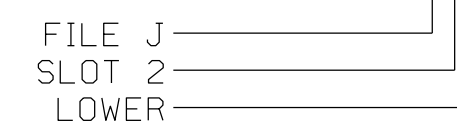
INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND TIME	DELAY TIME	ADDED INITIAL	DETECTOR TYPE
1A ¹	TB2-1,2	I1U	56	1★	1	YES		15		S
	-	J4U	48	26★	6	YES		3		G
1B	TB2-5,6	I2U	39	2	1	YES		15		S
2A	TB2-9,10	I3U	63	32	2	YES			X	N
2B	TB2-11,12	I3L	76	42	2	YES			X	N
3A ²	TB4-5,6	I5U	58	3★	3	YES		15		S
	-	J8U	50	28★	8	YES		3		S
4A	TB4-9,10	I6U	41	4	4	YES				S
5A ³	TB3-1,2	J1U	55	5★	5	YES		15		S
	-	I4U	47	22★	2	YES		3		G
5B	TB3-5,6	J2U	40	6	5	YES		15		S
6A	TB3-9,10	J3U	64	36	6	YES			X	N
6B	TB3-11,12	J3L	77	46	6	YES			X	N
7A ⁴	TB5-5,6	J5U	57	7★	7	YES		15		S
	-	I8U	49	24★	4	YES		3		S
8A	TB5-9,10	J6U	42	8	8	YES				S

- 1 Add jumper from I1-W to J4-W, on rear of input file.
- 2 Add jumper from I5-W to J8-W, on rear of input file.
- 3 Add jumper from J1-W to I4-W, on rear of input file.
- 4 Add jumper from J5-W to I8-W, on rear of input file.

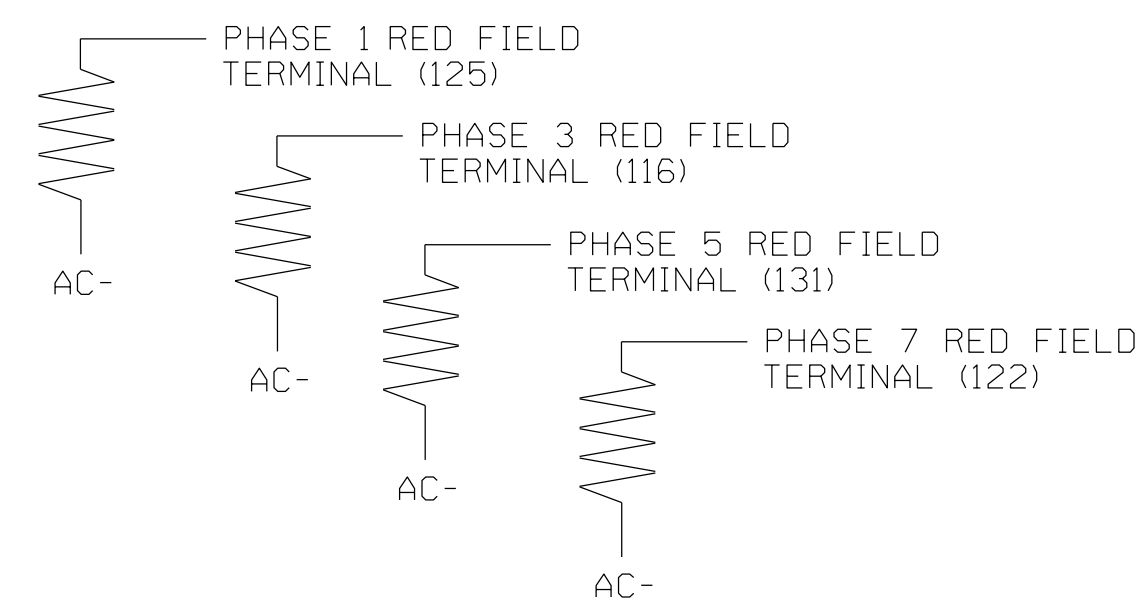
★ For the detectors to work as shown on the signal design plan, see the Vehicle Detector Setup Programming Detail for Alternate Phasing on sheet(s) x.

INPUT FILE POSITION LEGEND: J2L



LOAD RESISTOR INSTALLATION DETAIL

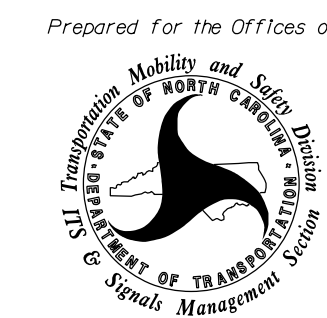
VALUE (ohms)	WATTAGE
1.5K - 1.9K	25W (min)
2.0K - 3.0K	10W (min)



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 07-0204
 DESIGNED: September 2019
 SEALED: 10/16/2019
 REVISED: N/A

Electrical Detail-Final Design-Sheet 1 of 4

ELECTRICAL AND PROGRAMMING DETAILS FOR:



750 N. Greenfield Pkwy, Garner, NC 27529

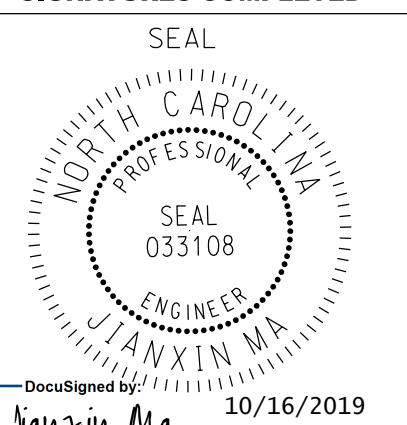
US 70 (Burlington Road)
 at
 SR 3045/2819
 (Mt. Hope Church Road)

Division 7 Guilford County Greensboro
 PLAN DATE: September 2019 REVIEWED BY: M.L. Stygles
 PREPARED BY: J. Ma REVIEWED BY:

REVISIONS	INIT.	DATE



DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



10/16/2019

SIG. INVENTORY NO. 07-0204

ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select 2. CONTROLLER
2. From CONTROLLER Submenu select 2. VEHICLE OVERLAPS

OVERLAP A

Select TMG VEH OVLP [A] and 'PPLT FYA'

TMG VEH OVLP...[A] TYPE:PPLT FYA
 PROTECTED LEFT TURN.... PHASE 1
 OPPOSING THROUGH..... PHASE 2

 FLASHING ARROW OUTPUT.....CH9 ISOLATE
 DELAY START OF: FYA..0.0 CLEARANCE..0.0
 ACTION PLAN SF BIT DISABLE..... 1

← NOTICE ACTION PLAN SF BIT "1"

Toggle Once

OVERLAP B

Select TMG VEH OVLP [B] and 'PPLT FYA'

TMG VEH OVLP...[B] TYPE:PPLT FYA
 PROTECTED LEFT TURN.... PHASE 3
 OPPOSING THROUGH..... PHASE 4

 FLASHING ARROW OUTPUT.....CH10 ISOLATE
 DELAY START OF: FYA..0.0 CLEARANCE..0.0
 ACTION PLAN SF BIT DISABLE..... 3

← NOTICE ACTION PLAN SF BIT "3"

Toggle Once

OVERLAP C

Select TMG VEH OVLP [C] and 'PPLT FYA'

TMG VEH OVLP...[C] TYPE:PPLT FYA
 PROTECTED LEFT TURN.... PHASE 5
 OPPOSING THROUGH..... PHASE 6

 FLASHING ARROW OUTPUT.....CH11 ISOLATE
 DELAY START OF: FYA..0.0 CLEARANCE..0.0
 ACTION PLAN SF BIT DISABLE..... 5

← NOTICE ACTION PLAN SF BIT "5"

Toggle Once

OVERLAP D

Select TMG VEH OVLP [D] and 'PPLT FYA'

TMG VEH OVLP...[D] TYPE:PPLT FYA
 PROTECTED LEFT TURN.... PHASE 7
 OPPOSING THROUGH..... PHASE 8

 FLASHING ARROW OUTPUT.....CH12 ISOLATE
 DELAY START OF: FYA..0.0 CLEARANCE..0.0
 ACTION PLAN SF BIT DISABLE..... 7

← NOTICE ACTION PLAN SF BIT "7"

END PROGRAMMING

FLASHER CIRCUIT MODIFICATION DETAIL

IN ORDER TO ENSURE THAT SIGNALS FLASH CONCURRENTLY ON THE SAME APPROACH, MAKE THE FOLLOWING FLASHER CIRCUIT CHANGES:

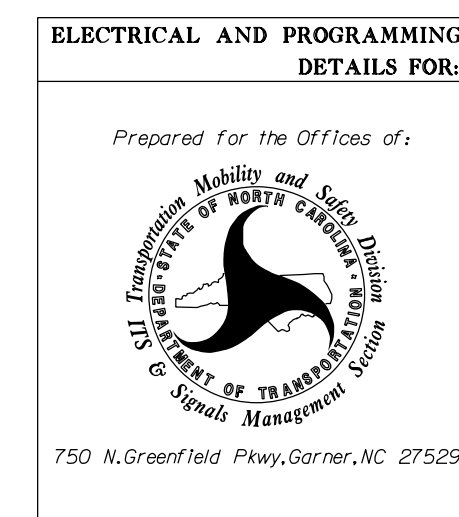
1. ON REAR OF PDA - REMOVE WIRE FROM TERM. T2-4 AND TERMINATE ON T2-2.
2. ON REAR OF PDA - REMOVE WIRE FROM TERM. T2-5 AND TERMINATE ON T2-3.
3. REMOVE FLASHER UNIT 2.

THE CHANGES LISTED ABOVE TIES ALL PHASES AND OVERLAPS TO FLASHER UNIT 1.

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 07-0204
 DESIGNED: September 2019
 SEALED: 10/16/2019
 REVISED: N/A



Electrical Detail-Final Design-Sheet 2 of 4



US 70 (Burlington Road)		
at		
SR 3045/2819		
(Mt. Hope Church Road)		
Division 7	Guilford County	Greensboro
PLAN DATE: September 2019	REVIEWED BY: M.L. Stygles	
PREPARED BY: J. Ma	REVIEWED BY:	
REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL

NORTH CAROLINA PROFESSIONAL ENGINEERS SEAL 033108

DocuSigned by: *J. Ma* 10/16/2019

DATE

SIG. INVENTORY NO. 07-0204

ECONOLITE ASC/3-2070 VEHICLE DETECTOR SETUP PROGRAMMING DETAIL FOR ALTERNATE PHASING LOOPS 1A, 5A, 3A, 7A

(program controller as shown)

IMPORTANT!

Program detectors per the input file connection and programming chart shown on sheet 1 before proceeding.

- From Main Menu select **8. UTILITIES**
- From UTILITIES Submenu select **1. COPY/CLEAR**
- Copy from DETECTOR PLAN "1" to DETECTOR PLAN "2".

```

COPY / CLEAR UTILITY
FROM          TO
PHASE TIMING... > PHASE TIMING...
TIMING PLAN... > TIMING PLAN...
PH DET OPT PLAN. > PH DET OPT PLAN.
DETECTOR PLAN... 1 > DETECTOR PLAN... 2
TOGGLE TO SELECT A "FROM" AND A "TO"
THEN PRESS ENTER
    
```

- From Main Menu select **6. DETECTORS**
- From DETECTOR Submenu select **2. VEHICLE DETECTOR SETUP**
- Place cursor in VEH DET PLAN [] position and enter "2".

- Place cursor in VEH DETECTOR [] position and enter "1".
- Set delay time to "0".

```

VEH DETECTOR [ 1]  VEH DET PLAN [ 2]
TYPE: S-STANDARD
TS2 DETECTOR..... ECPI LOG..... NO
DET PH - 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
1 1
EXTEND TIME... 0.0 DELAY TIME... 3.0
USE ADDED INITIAL . CROSS SWITCH PH.. 0
LOCK IN..... NONE NTCIP VOL . OR OCC .
PMT QUEUE DELAY. NO
    
```

- Place cursor in VEH DETECTOR [] position and enter "26".
- Set assigned phase to "0".

```

VEH DETECTOR [26]  VEH DET PLAN [ 2]
TYPE: G-GREEN EXTENSION/DELAY
TS2 DETECTOR..... ECPI LOG..... NO
DET PH - 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
26 0
EXTEND TIME... 0.0 DELAY TIME... 3.0
USE ADDED INITIAL . CROSS SWITCH PH.. 0
LOCK IN..... NONE NTCIP VOL . OR OCC .
PMT QUEUE DELAY. NO
    
```

- Place cursor in VEH DETECTOR [] position and enter "5".
- Set delay time to "0".

```

VEH DETECTOR [ 5]  VEH DET PLAN [ 2]
TYPE: S-STANDARD
TS2 DETECTOR..... ECPI LOG..... NO
DET PH - 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
5 5
EXTEND TIME... 0.0 DELAY TIME... 3.0
USE ADDED INITIAL . CROSS SWITCH PH.. 0
LOCK IN..... NONE NTCIP VOL . OR OCC .
PMT QUEUE DELAY. NO
    
```

- Place cursor in VEH DETECTOR [] position and enter "22".
- Set assigned phase to "0".

```

VEH DETECTOR [22]  VEH DET PLAN [ 2]
TYPE: G-GREEN EXTENSION/DELAY
TS2 DETECTOR..... ECPI LOG..... NO
DET PH - 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
22 0
EXTEND TIME... 0.0 DELAY TIME... 3.0
USE ADDED INITIAL . CROSS SWITCH PH.. 0
LOCK IN..... NONE NTCIP VOL . OR OCC .
PMT QUEUE DELAY. NO
    
```

- Place cursor in VEH DETECTOR [] position and enter "3".
- Set delay time to "0".

```

VEH DETECTOR [ 3]  VEH DET PLAN [ 2]
TYPE: S-STANDARD
TS2 DETECTOR..... ECPI LOG..... NO
DET PH - 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
3 3
EXTEND TIME... 0.0 DELAY TIME... 3.0
USE ADDED INITIAL . CROSS SWITCH PH.. 0
LOCK IN..... NONE NTCIP VOL . OR OCC .
PMT QUEUE DELAY. NO
    
```

- Place cursor in VEH DETECTOR [] position and enter "28".
- Set assigned phase to "0".

```

VEH DETECTOR [28]  VEH DET PLAN [ 2]
TYPE: G-GREEN EXTENSION/DELAY
TS2 DETECTOR..... ECPI LOG..... NO
DET PH - 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
28 0
EXTEND TIME... 0.0 DELAY TIME... 3.0
USE ADDED INITIAL . CROSS SWITCH PH.. 0
LOCK IN..... NONE NTCIP VOL . OR OCC .
PMT QUEUE DELAY. NO
    
```

- Place cursor in VEH DETECTOR [] position and enter "7".
- Set delay time to "0".

```

VEH DETECTOR [ 7]  VEH DET PLAN [ 2]
TYPE: S-STANDARD
TS2 DETECTOR..... ECPI LOG..... NO
DET PH - 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
7 7
EXTEND TIME... 0.0 DELAY TIME... 3.0
USE ADDED INITIAL . CROSS SWITCH PH.. 0
LOCK IN..... NONE NTCIP VOL . OR OCC .
PMT QUEUE DELAY. NO
    
```

- Place cursor in VEH DETECTOR [] position and enter "24".
- Set assigned phase to "0".

```

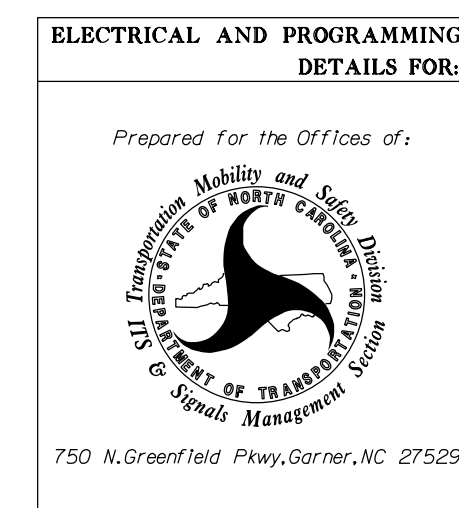
VEH DETECTOR [24]  VEH DET PLAN [ 2]
TYPE: G-GREEN EXTENSION/DELAY
TS2 DETECTOR..... ECPI LOG..... NO
DET PH - 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
24 0
EXTEND TIME... 0.0 DELAY TIME... 3.0
USE ADDED INITIAL . CROSS SWITCH PH.. 0
LOCK IN..... NONE NTCIP VOL . OR OCC .
PMT QUEUE DELAY. NO
    
```

END PROGRAMMING



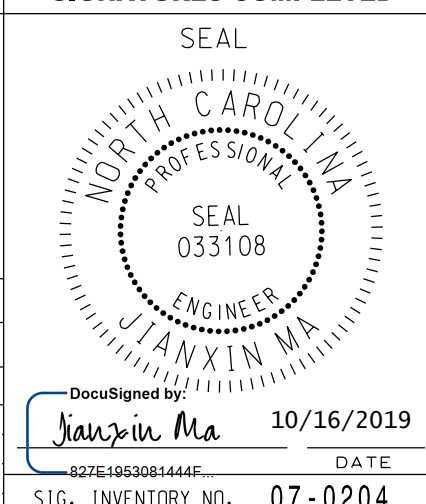
VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606
P: 919-829-0328

Electrical Detail-Final Design-Sheet 3 of 4



ELECTRICAL AND PROGRAMMING DETAILS FOR:		
US 70 (Burlington Road) at SR 3045/2819 (Mt. Hope Church Road)		
Division 7	Guilford County	Greensboro
PLAN DATE: September 2019	REVIEWED BY: M.L. Stygles	
PREPARED BY: J. Ma	REVIEWED BY:	
REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 07-0204
DESIGNED: September 2019
SEALED: 10/16/2019
REVISED: N/A

DocuSigned by: J. Ma
10/16/2019
DATE
SIG. INVENTORY NO. 07-0204

ECONOLITE ASC/3-2070 ACTION PLAN PROGRAMMING DETAIL

ALTERNATE PHASING ACTIVATION DETAIL

TO RUN ALT. PHASING DURING FREE RUN - PROGRAM CHANGES (SHOWN BELOW) IN A TIME BASED ACTION PLAN. SCHEDULE A DAY PLAN THAT INCLUDES THE ACTION PLAN PROGRAMMED TO SELECT VEH DET PLAN 2 AND ENABLE SF BITS 1, 3, 5, and 7.

TO RUN ALT. PHASING DURING COORDINATION - SELECT THE TIME BASED ACTION PLAN THAT IS PROGRAMMED TO SELECT VEH DET PLAN 2 AND ENABLE SF BITS 1, 3, 5, and 7.

PHASING	VEH DET PLAN	SF BITS ENABLED
ACTIONS REQUIRED TO RUN <u>DEFAULT PHASING</u>	1	NONE
ACTIONS REQUIRED TO RUN <u>ALTERNATE PHASING</u>	2	1, 3, 5, 7

IMPORTANT: IF ALT. PHASING IS USED DURING FREE RUN AND COORDINATION, DO NOT OPERATE TIME OF DAY EVENTS CONCURRENTLY WITH COORDINATION PLAN EVENTS IN THE EVENT SCHEDULER. (EX. FREE RUN EVENT SHOULD END BEFORE COORDINATION PLAN EVENT STARTS AND VICE-VERSA).

ALTERNATE PHASING CHANGE SUMMARY

THE FOLLOWING IS A SUMMARY OF WHAT TAKES PLACE WHEN SF BITS 1, 3, 5, AND 7 AND VEH DET PLAN 2 ACTIVATE TO CALL THE "ALTERNATE PHASING":

- SF BITS 1,3,5,7: Modifies overlap parent phases for heads 11, 31, 51, and 71 to run protected turns only.
- VEH DET PLAN 2: Disables phase 6 call on loop 1A and reduces delay time for phase 1 call on loop 1A to 3 seconds.

Disables phase 8 call on loop 3A and reduces delay time for phase 3 call on loop 3A to 3 seconds.

Disables phase 2 call on loop 5A and reduces delay time for phase 5 call on loop 5A to 3 seconds.

Disables phase 4 call on loop 7A and reduces delay time for phase 7 call on loop 7A to 3 seconds.

1. From Main Menu select 5. TIME BASE
2. From TIME BASE Submenu select 2. ACTION PLAN

```

ACTION PLAN...[ 1]
PATTERN.....AUTO   SYS OVERRIDE.... NO
TIMING PLAN..... 0   SEQUENCE..... 0
VEH DETECTOR PLAN.. 2   DET LOG.....NONE
FLASH..... --      RED REST..... NO
VEH DET DIAG PLN... 0   PED DET DIAG PLN..0
DIMMING ENABLE.. NO   PRIORITY RETURN. NO
PED PR RETURN.. NO   QUEUE DELAY..... NO
PMT COND DELAY NO

  PHASE  1  2  3  4  5  6  7  8  9  0  1  2  3  4  5  6
PED RCL  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
WALK 2   .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
VEX 2    .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
VEH RCL  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
MAX RCL  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
MAX 2    .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
  PHASE  1  2  3  4  5  6  7  8  9  0  1  2  3  4  5  6
MAX 3    .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
CS INH   .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
OMIT     .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
SPC FCT  X  .  X  .  X  .  X  .  X  .  (1-8)
AUX FCT  .  .  .  (1-3)

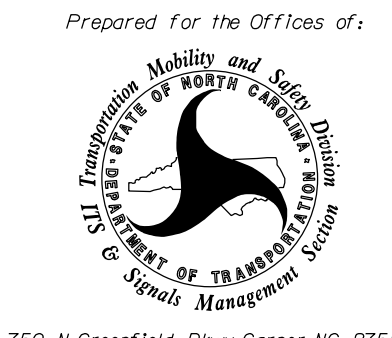
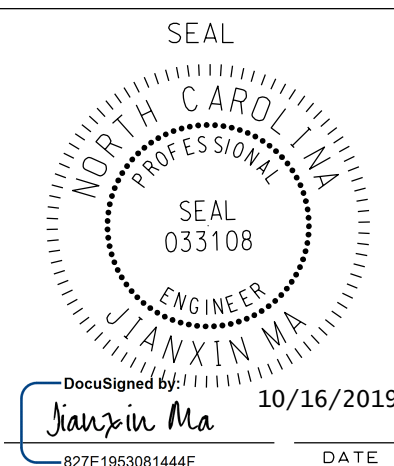
  1  2  3  4  5  6  7  8  9  0  1  2  3  4  5
LP 1-15  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 16-30 .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 31-45 .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 46-60 .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 61-75 .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 76-90 .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 91-100 .  .  .  .  .  .  .  .  .  .  .  .  .  .  .

```

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-0204
DESIGNED: September 2019
SEALED: 10/16/2019
REVISED: N/A



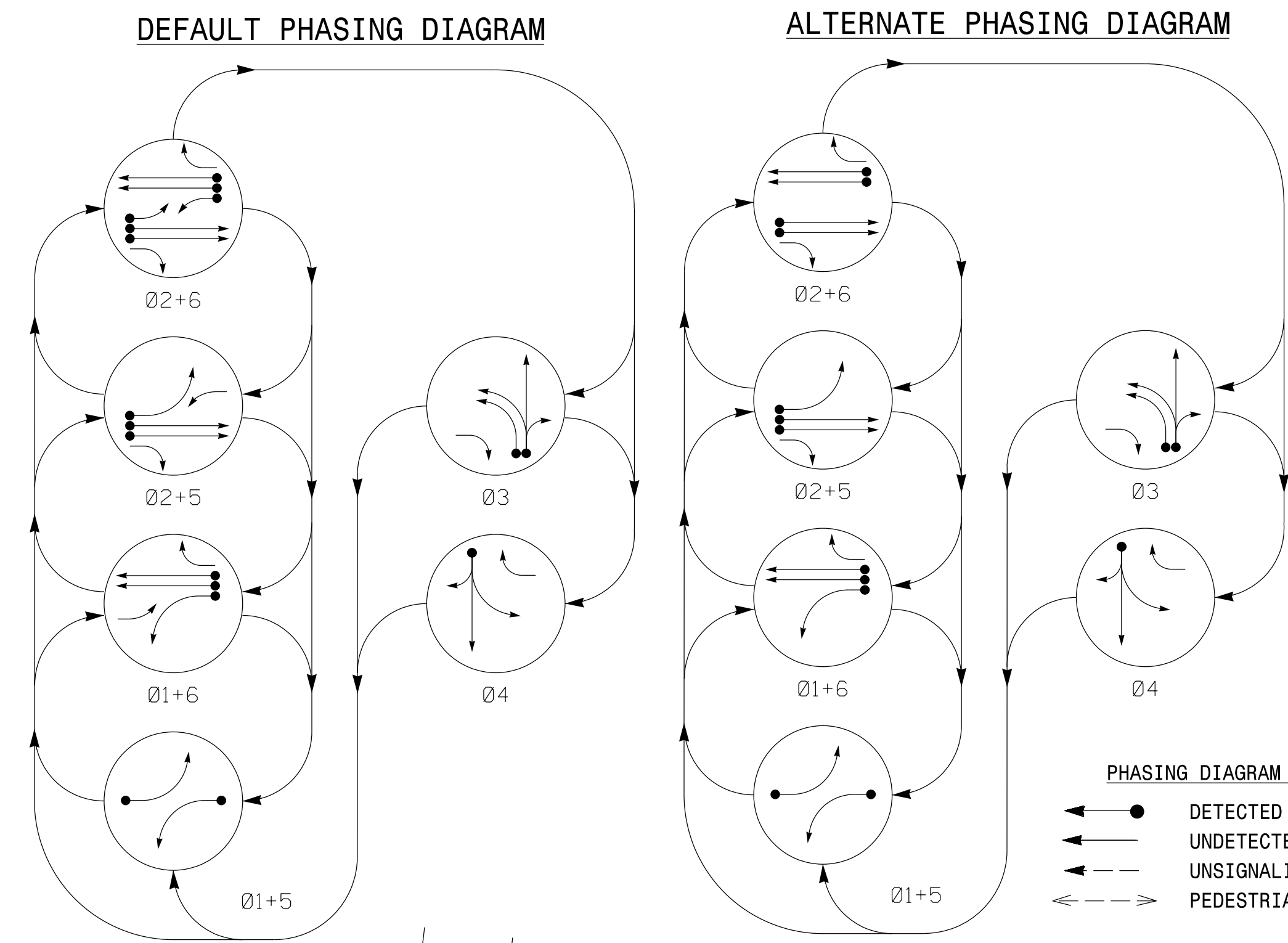
Electrical Detail-Final Design-Sheet 4 of 4

	<p>US 70 (Burlington Road) at SR 3045/2819 (Mt. Hope Church Road)</p> <p>Division 7 Guilford County Greensboro</p> <p>PLAN DATE: September 2019 REVIEWED BY: M.L. Stygles</p> <p>PREPARED BY: J. Ma REVIEWED BY:</p>	<p>DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED</p> <p>SEAL</p>  <p>DocuSigned by: <i>Jianxin Ma</i> 10/16/2019</p> <p>SIG. INVENTORY NO. 07-0204</p>						
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 80%;">REVISIONS</th> <th style="width: 10%;">INIT.</th> <th style="width: 10%;">DATE</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>			REVISIONS	INIT.	DATE			
REVISIONS	INIT.	DATE						

6 Phase Fully Actuated (US 70 (Burlington Rd.) Closed Loop System) Signal System #: 10712

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 1 and/or phase 5 may be lagged.
4. The order of phase 3 and 4 may be reversed.
5. Set all detector units to presence mode.
6. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
7. The Division Traffic Engineer will determine the hours of use for each phasing plan.
8. Maximum times show in timing chart are for free-run operation only. Coordinated signals system timing values supersede these values.
9. Closed loop system data: Master Asset #: 10712. Controller Asset #: 1859.

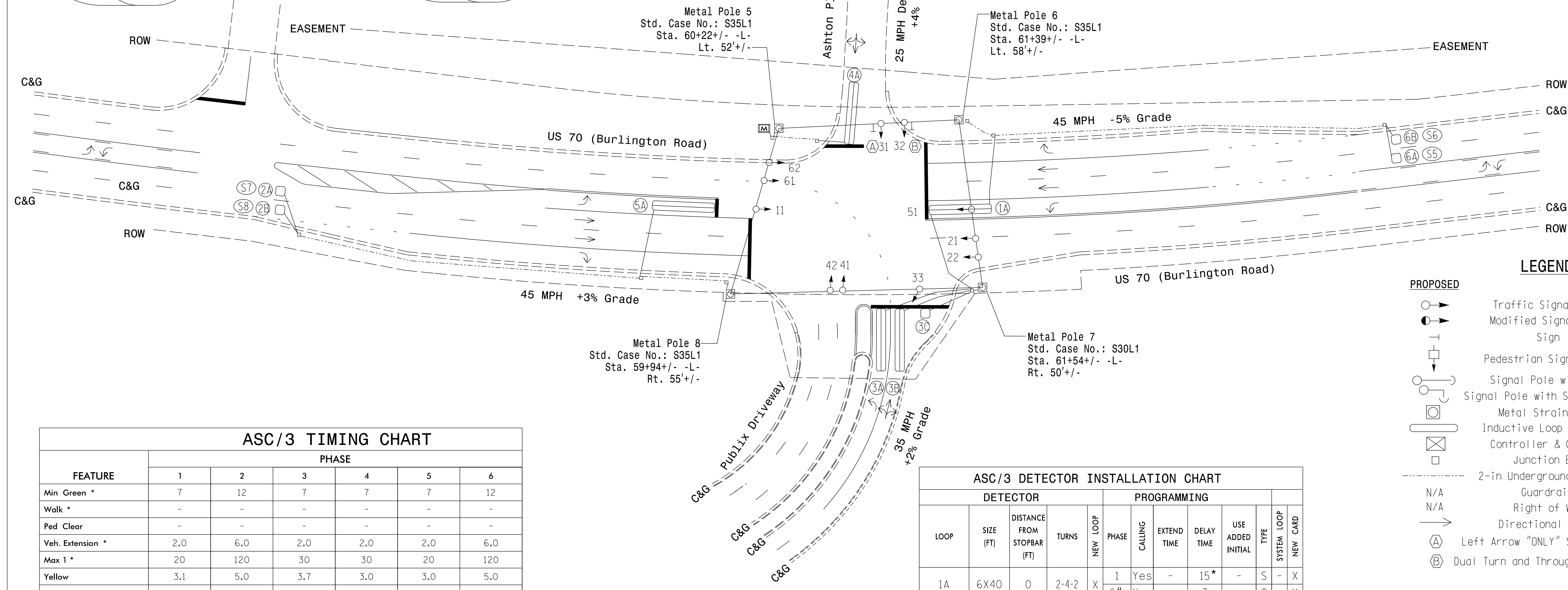
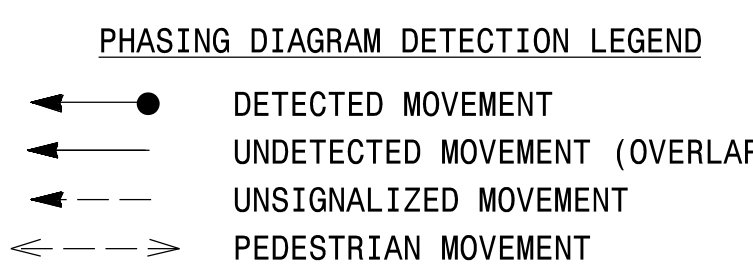
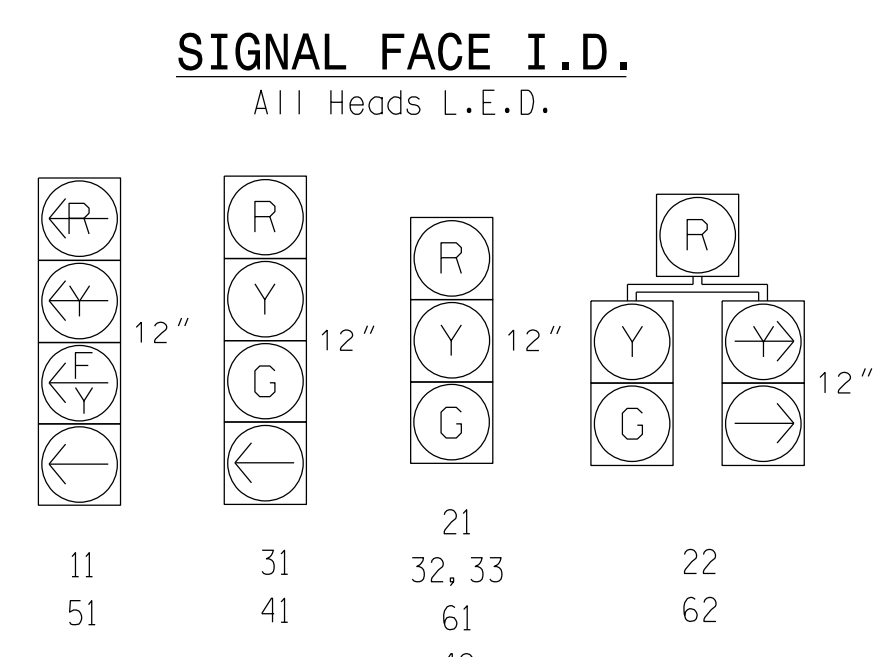


DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE					
	Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3	Ø4
11	←	←	←	←	←	←
21	R	R	G	G	R	R
22	R	R	G	G	R	R
31	R	R	R	R	G	R
32, 33	R	R	R	R	G	R
41	R	R	R	R	R	G
42	R	R	R	R	R	G
51	←	←	←	←	←	←
61	R	G	R	G	R	R
62	R	G	R	G	R	R

ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE					
	Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3	Ø4
11	←	←	←	←	←	←
21	R	R	G	G	R	R
22	R	R	G	G	R	R
31	R	R	R	R	G	R
32, 33	R	R	R	R	G	R
41	R	R	R	R	R	G
42	R	R	R	R	R	G
51	←	←	←	←	←	←
61	R	G	R	G	R	R
62	R	G	R	G	R	R

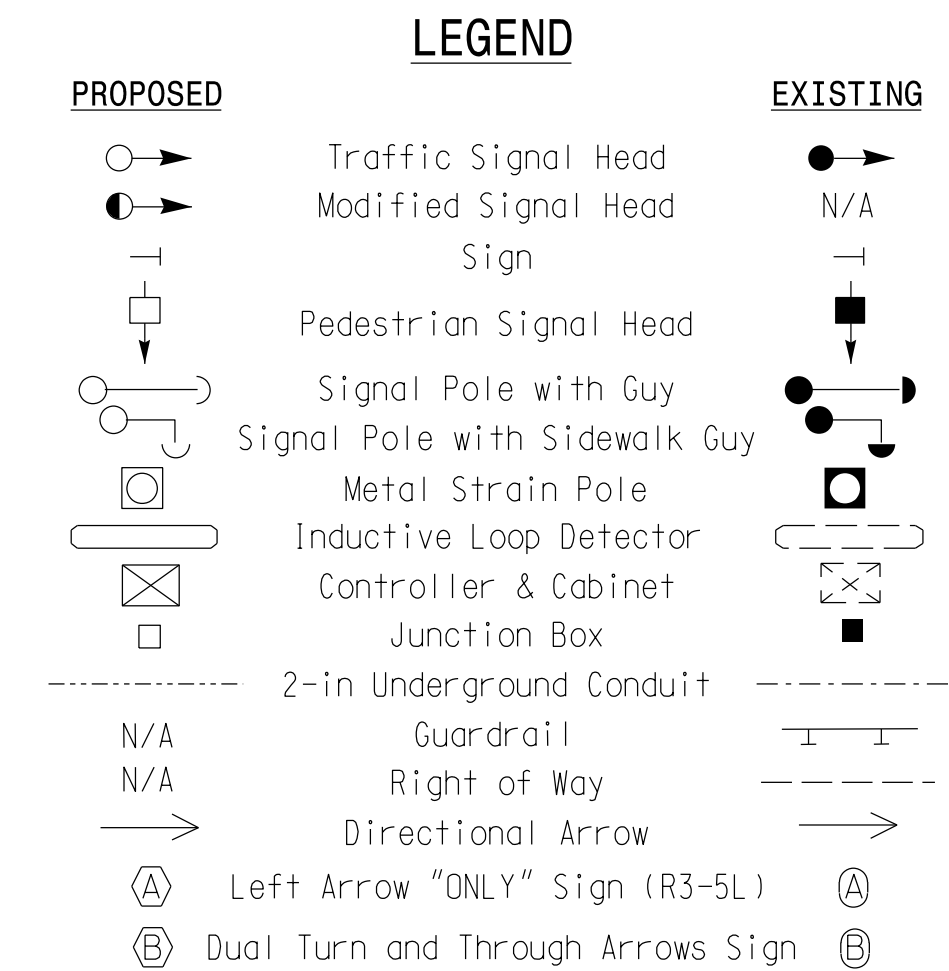


ASC/3 TIMING CHART

FEATURE	PHASE					
	1	2	3	4	5	6
Min Green *	7	12	7	7	7	12
Walk *	-	-	-	-	-	-
Ped Clear	-	-	-	-	-	-
Veh. Extension *	2.0	6.0	2.0	2.0	2.0	6.0
Max 1 *	20	120	30	30	20	120
Yellow	3.1	5.0	3.7	3.0	3.0	5.0
Red Clear	2.4	2.0	2.4	2.6	3.3	2.0
Actuations B4 Add *	-	-	-	-	-	-
Seconds / Actuation *	-	2.5	-	-	-	2.5
Max Initial *	-	34	-	-	-	34
Time Before Reduction *	-	15	-	-	-	15
Time To Reduce *	-	60	-	-	-	60
Minimum Gap	-	3.0	-	-	-	3.0
Locking Detector	-	X	-	-	-	X
Recall Position	-	VEH RECALL	-	-	-	VEH RECALL
Dual Entry	-	-	-	-	-	-
Simultaneous Gap	X	X	X	X	X	X

ASC/3 DETECTOR INSTALLATION CHART

LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING							
					PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	LOOP	NEW CARD
1A	6X40	0	2-4-2	X	1	Yes	-	15*	-	S	-	X
					6#	Yes	-	3	-	G	-	X
2A/S7	6X6	300	5	X	2	Yes	-	-	X	N	X	X
2B/S8	6X6	300	5	X	2	Yes	-	-	X	N	X	X
3A	6X40	0	2-4-2	X	3	Yes	-	-	-	S	-	X
3B	6X40	0	2-4-2	X	3	Yes	-	5	-	S	-	X
3C	6X6	0	5	X	3	Yes	-	15	-	S	-	X
4A	6X40	0	2-4-2	X	4	Yes	-	5	-	S	-	X
5A	6X40	0	2-4-2	X	5	Yes	-	15*	-	S	-	X
					2#	Yes	-	3	-	G	-	X
6A/S5	6X6	300	5	X	6	Yes	-	-	X	N	X	X
6B/S6	6X6	300	5	X	6	Yes	-	-	X	N	X	X



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

* Reduce delay to 3 seconds during Alternate Phasing Operation.
Disable phase call for loop(s) during Alternate Phasing Operation.

New Installation

Prepared for the Offices of:

US 70 (Burlington Rd) at Publix and Ashton Place

Division 7 Guilford County McLeansville
 PLAN DATE: September 2019 REVIEWED BY: M. Stygles
 PREPARED BY: J. Ma REVIEWED BY: J. Ma

SCALE: 1" = 40'

REVISIONS: _____ INIT. DATE

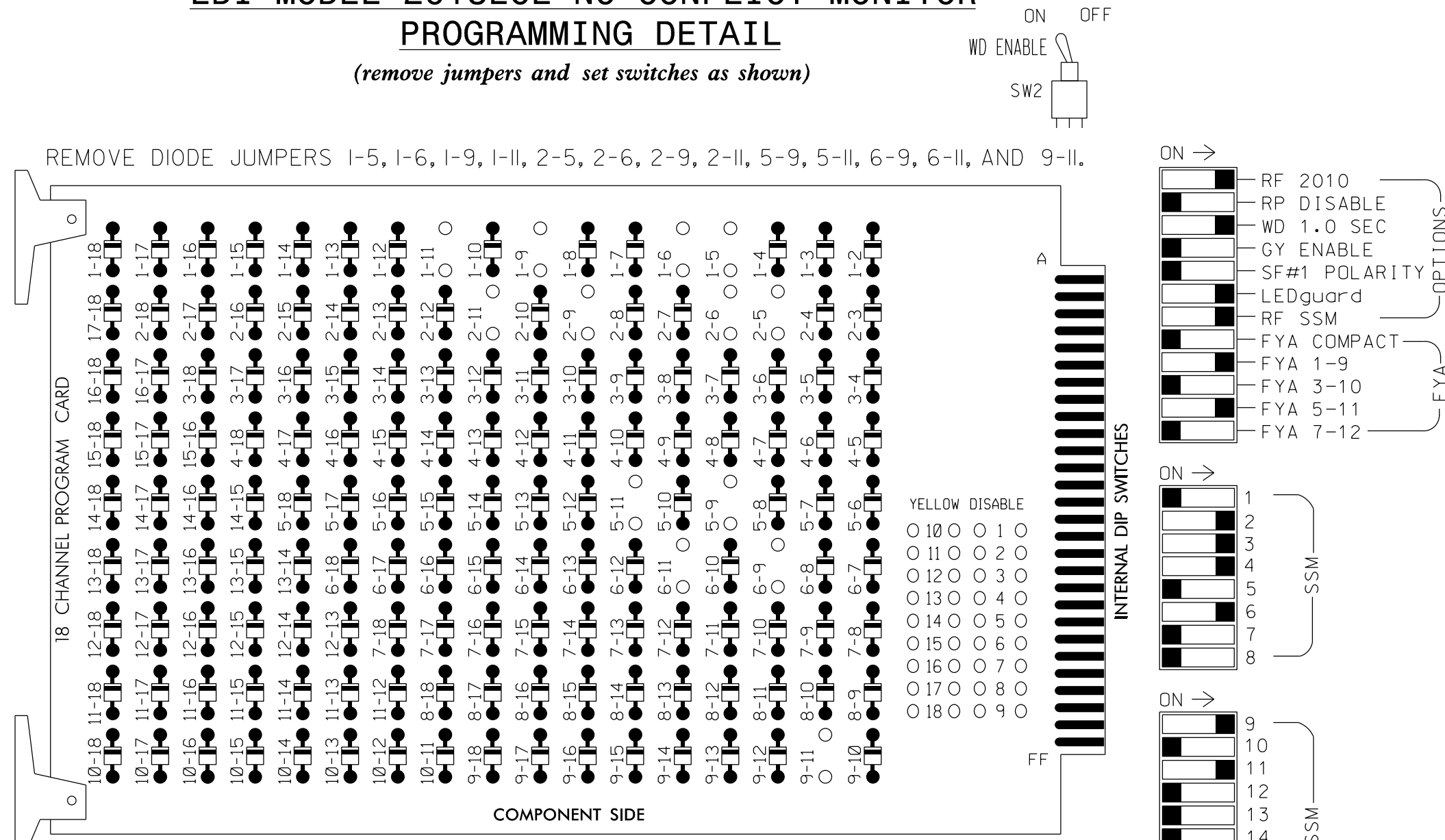
SEAL: 033108
 DATE: 10/16/2019
 SIG. INVENTORY NO. 07-1859

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE JUMPERS AS SHOWN

NOTES:

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

■ = DENOTES POSITION OF SWITCH

NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
- Program controller to start up in phase 2 Green and 6 Green.
- The cabinet and controller are part of the US 70 (Burlington Road) Closed Loop system.

EQUIPMENT INFORMATION

CONTROLLER.....2070LX
 CABINET.....332 W/AUX
 SOFTWARE.....ECONOLITE ASC/3-2070
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
 LOAD SWITCHES USED.....S1,S2,S4,S5,S7,S8,
 AUX S1,AUX S4
 PHASES USED.....1,2,3,4,5,6
 OVERLAP "A".....*
 OVERLAP "B".....NOT USED
 OVERLAP "C".....*
 OVERLAP "D".....NOT USED
 * See overlap programming detail on sheet 2

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	
CNU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18	
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE	
SIGNAL HEAD NO.	11*	21,22	NU	31, 32,33	22	41	42	62	NU	51*	61,62	NU	NU	NU	NU	11*	NU	51*	NU
RED	128		116	116	101	101					134								
YELLOW	* 129		117	117	102	102				*	135								
GREEN		130	118	118	103	103					136								
RED ARROW																A121		A114	
YELLOW ARROW						117		102								A122		A115	
FLASHING YELLOW ARROW																A123		A116	
GREEN ARROW	127			118	118	103	103	133											

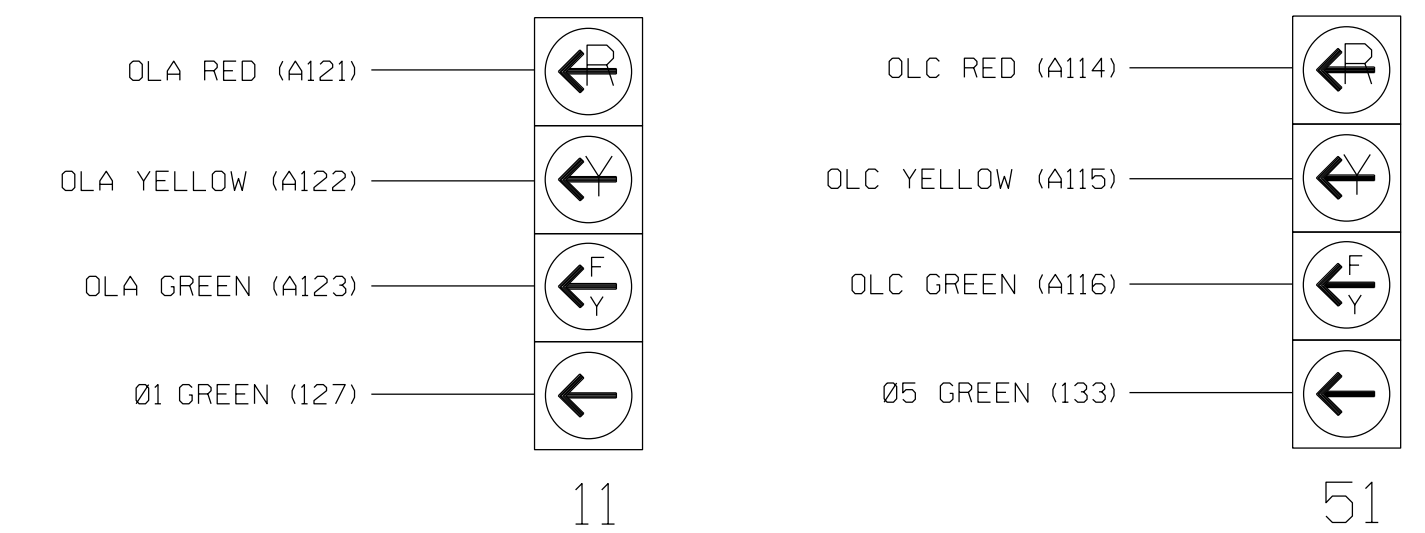
NU = Not Used

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

★ See pictorial of head wiring in detail this sheet.

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



INPUT FILE POSITION LAYOUT

(front view)

FILE "I"	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Ø 1	Ø 2/SYS	Ø 3	Ø 4	Ø 5	Ø 6/SYS	Ø 7	Ø 8	Ø 9	Ø 10	Ø 11	Ø 12	Ø 13	Ø 14	FS
1A	2A/S7		4A											DC ISOLATOR
NOT USED	Ø 2/SYS	Ø 3	Ø 4	Ø 5	Ø 6/SYS	Ø 7	Ø 8	Ø 9	Ø 10	Ø 11	Ø 12	Ø 13	Ø 14	DC ISOLATOR
	2B/S8		NOT USED											
FILE "J"	Ø 5	Ø 6/SYS	Ø 7	Ø 8	Ø 9	Ø 10	Ø 11	Ø 12	Ø 13	Ø 14	Ø 15	Ø 16	Ø 17	Ø 18
5A	6A/S5		3A	3C										
NOT USED	Ø 6/SYS	Ø 7	Ø 8	Ø 9	Ø 10	Ø 11	Ø 12	Ø 13	Ø 14	Ø 15	Ø 16	Ø 17	Ø 18	
	6B/S6		3B	NOT USED										

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

FS = FLASH SENSE
 ST = STOP TIME

⊗ Wired Input - Do not populate slot with detector card

INPUT FILE CONNECTION & PROGRAMMING CHART

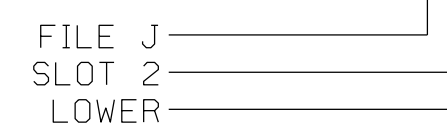
LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND TIME	DELAY TIME	ADDED INITIAL	DETECTOR TYPE
1A ¹	TB2-1,2	I1U	56	1 ★	1	YES		15		S
	-	J4U	48	26 ★	6	YES		3		G
2A/S7	TB2-5,6	I2U	39	2	2/SYS	YES			X	N
2B/S8	TB2-7,8	I2L	43	12	2/SYS	YES			X	N
3A	TB5-9,10	J6U	42	8	3	YES				S
3B	TB5-11,12	J6L	46	18	3	YES		5		S
3C	TB7-1,2	J7U	66	38	3	YES		15		S
4A	TB4-9,10	I6U	41	4	4	YES		5		S
5A ²	TB3-1,2	J1U	55	5 ★	5	YES		15		S
	-	I4U	47	22 ★	2	YES		3		G
6A/S5	TB3-5,6	J2U	40	6	6/SYS	YES			X	N
6B/S6	TB3-7,8	J2L	44	16	6/SYS	YES			X	N

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

²Add jumper from J1-W to I4-W, on rear of input file.

★ For the detectors to work as shown on the signal design plan, see the Vehicle Detector Setup Programming Detail for Alternate Phasing on sheet 2.

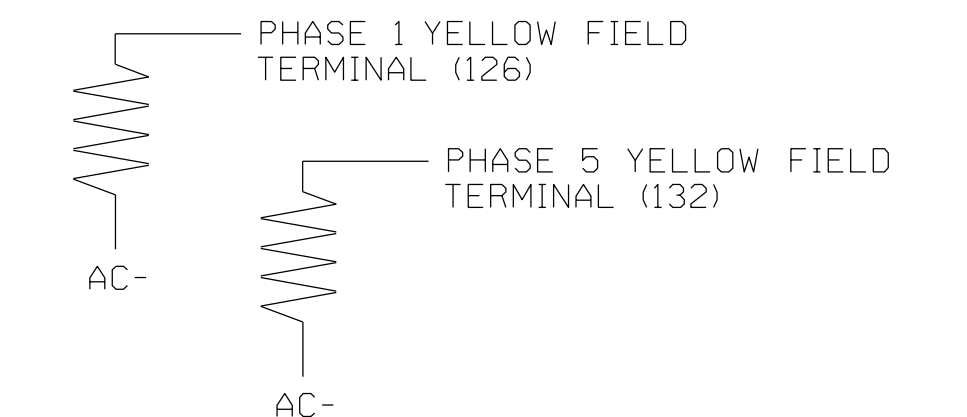
INPUT FILE POSITION LEGEND: J2L



LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown below)

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

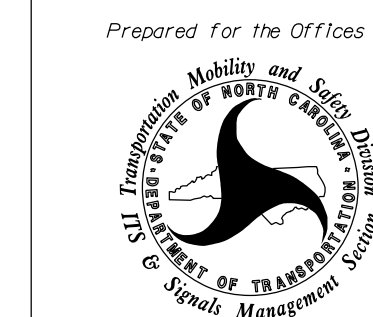


THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 07-1859
 DESIGNED: September 2019
 SEALED: 10/16/2019
 REVISED: N/A

Electrical Detail-Sheet 1 of 3

ELECTRICAL AND PROGRAMMING DETAILS FOR:

US 70 (Burlington Road)
 at
 Publix and Ashton Place



750 N. Greenfield Pkwy, Garner, NC 27529

Division 7 Guilford County McLeansville
 PLAN DATE: September 2019 REVIEWED BY: M.L. Stygles
 PREPARED BY: J. Ma REVIEWED BY:

REVISIONS	INIT.	DATE



VHB Engineering NC, P.C. (C-3705)
 940 Main Campus Drive, Suite 500
 Raleigh, NC 27606
 P: 919-829-0328

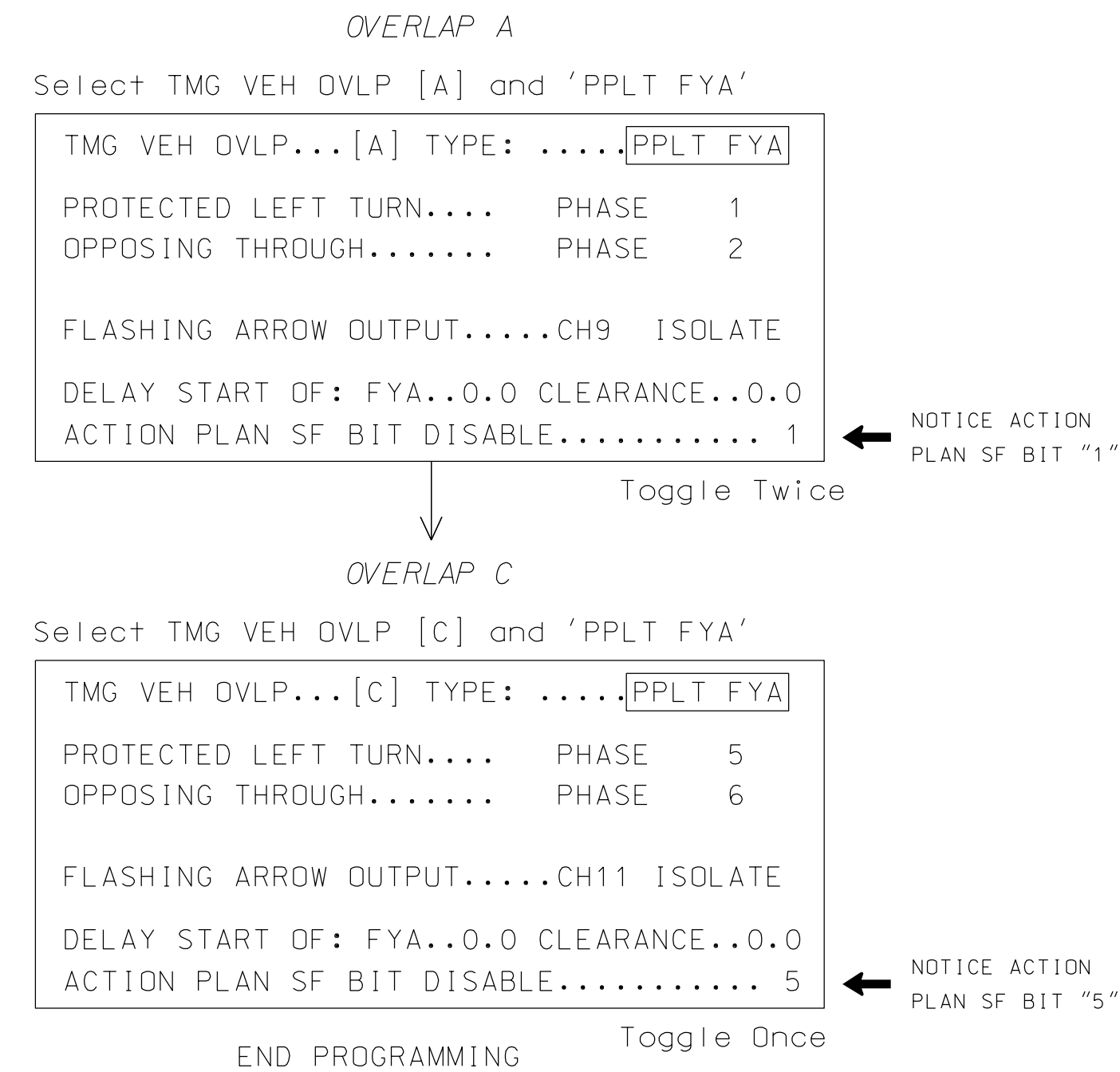
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
 NORTH CAROLINA PROFESSIONAL ENGINEER
 SEAL 033108
 J. Ma
 10/16/2019
 DATE
 8276463081444F
 SIG. INVENTORY NO. 07-1859

ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

(program controller as shown)

- From Main Menu select 2. CONTROLLER
- From CONTROLLER Submenu select 2. VEHICLE OVERLAPS



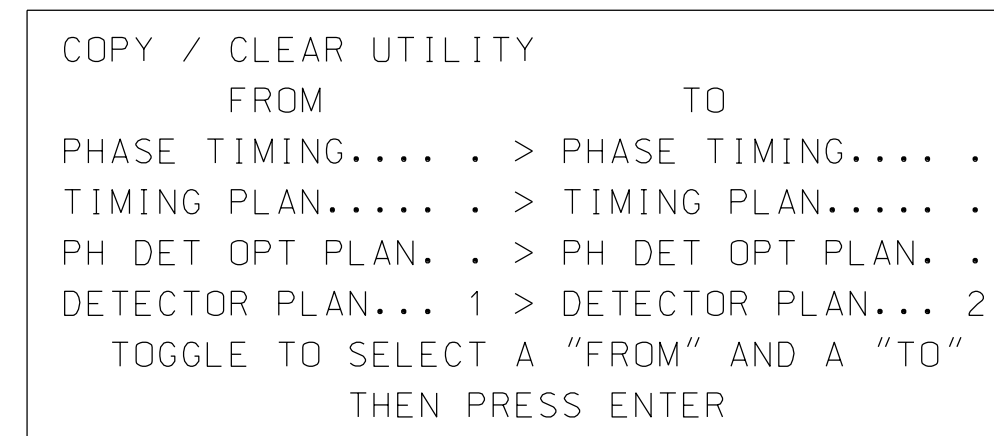
ECONOLITE ASC/3-2070 VEHICLE DETECTOR SETUP PROGRAMMING DETAIL FOR ALTERNATE PHASING LOOPS 1A, 5A

(program controller as shown)

IMPORTANT!

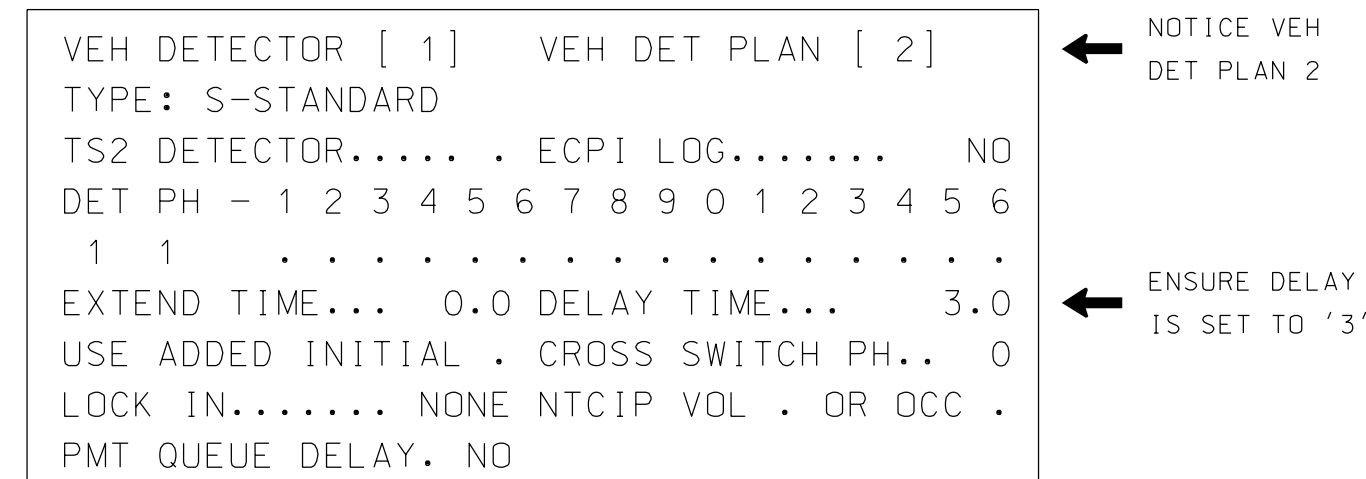
Program detectors per the input file connection and programming chart shown on sheet 1 before proceeding.

- From Main Menu select 8. UTILITIES
- From UTILITIES Submenu select 1. COPY/CLEAR
- Copy from DETECTOR PLAN "1" to DETECTOR PLAN "2".

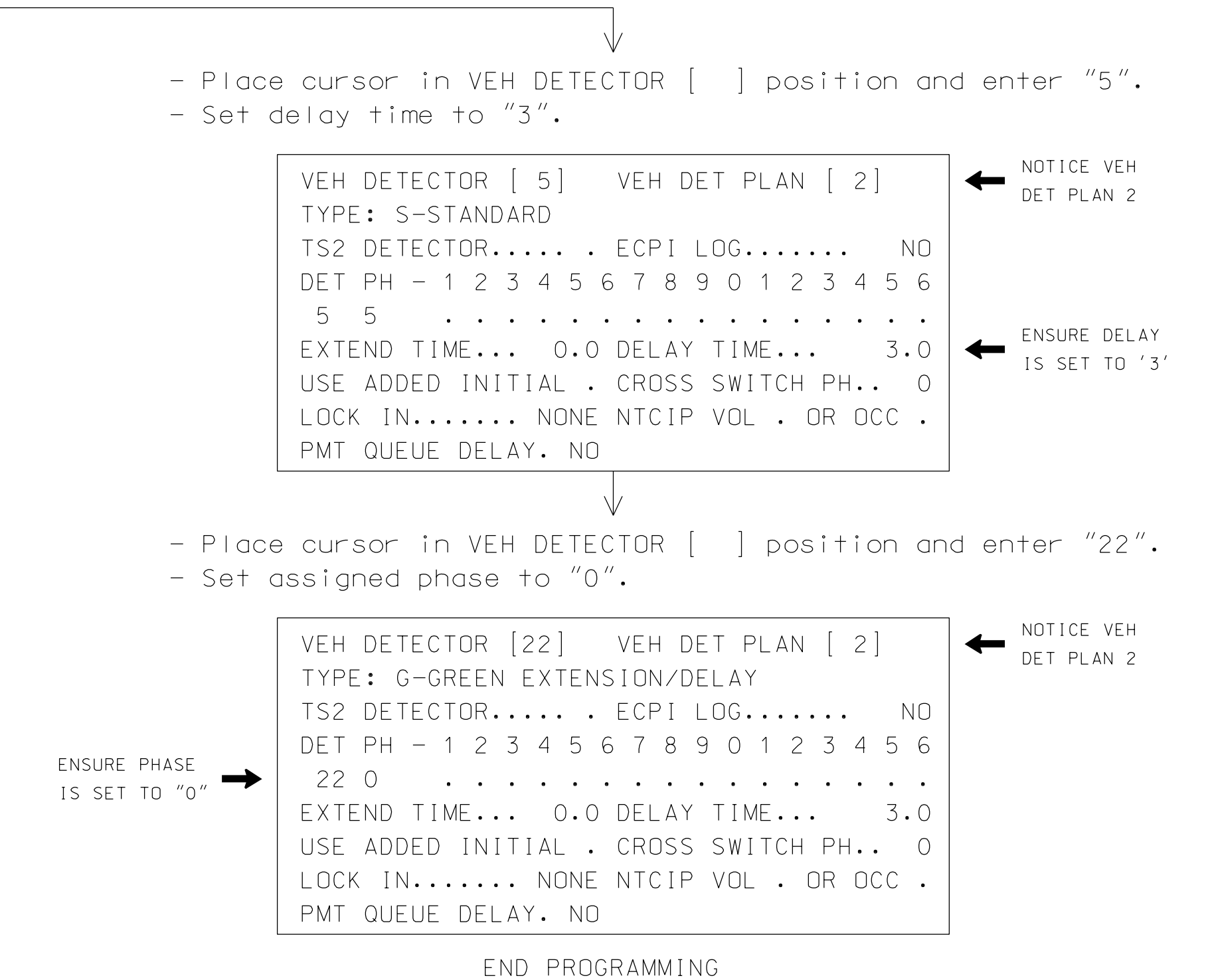
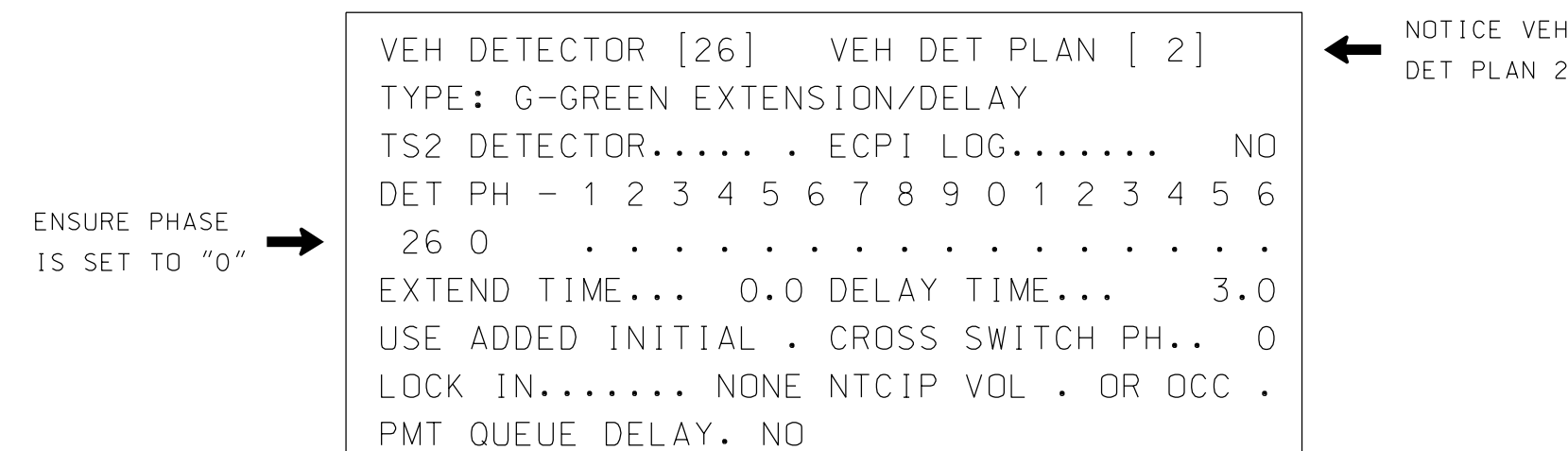


- From Main Menu select 6. DETECTORS
- From DETECTOR Submenu select 2. VEHICLE DETECTOR SETUP
- Place cursor in VEH DET PLAN [] position and enter "2".

- Place cursor in VEH DETECTOR [] position and enter "1".
- Set delay time to "3".

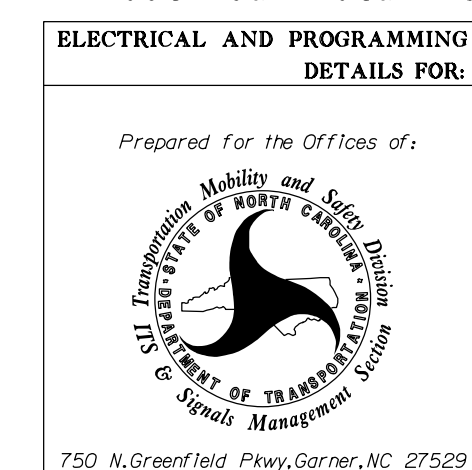


- Place cursor in VEH DETECTOR [] position and enter "26".
- Set assigned phase to "0".



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 07-1859
DESIGNED: September 2019
SEALED: 10/16/2019
REVISED: N/A

Electrical Detail-Sheet 2 of 3



**US 70 (Burlington Road)
at
Publix and Ashton Place**

Division 7 Guilford County McLeansville

PLAN DATE: September 2019 REVIEWED BY: M.L. Stygles

PREPARED BY: J. Ma REVIEWED BY:

REVISIONS	INIT.	DATE

10/16/2019

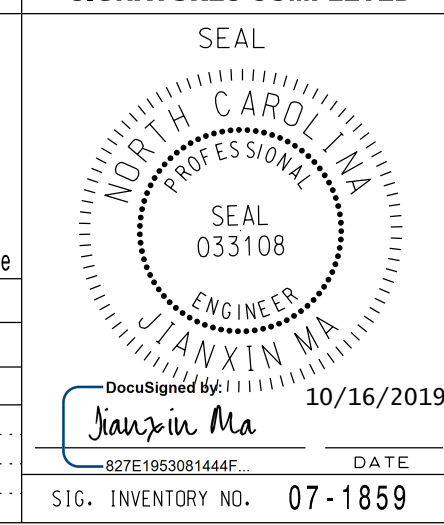
827E1953081444F DATE

SIG. INVENTORY NO. 07-1859



VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606
P: 919-829-0328

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



ECONOLITE ASC/3-2070 ACTION PLAN PROGRAMMING DETAIL

1. From Main Menu select 5. TIME BASE
2. From TIME BASE Submenu select 2. ACTION PLAN

ACTION PLAN...[1]	
PATTERN.....AUTO	SYS OVERRIDE.... NO
TIMING PLAN..... 0	SEQUENCE..... 0
VEH DETECTOR PLAN.. 2	DET LOG.....NONE
FLASH..... --	RED REST..... NO
VEH DET DIAG PLN... 0	PED DET DIAG PLN..0
DIMMING ENABLE.. NO	PRIORITY RETURN. NO
PED PR RETURN.. NO	QUEUE DELAY..... NO
PMT COND DELAY NO	
PHASE	1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
PED RCL	. . . . .
WALK 2	. . . . .
VEX 2	. . . . .
VEH RCL	. . . . .
MAX RCL	. . . . .
MAX 2	. . . . .
PHASE	1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
MAX 3	. . . . .
CS INH	. . . . .
OMIT	. . . . .
SPC FCT	X . . . X . . . (1-8)
AUX FCT	. . . (1-3)
	1 2 3 4 5 6 7 8 9 0 1 2 3 4 5
LP 1-15	. . . . .
LP 16-30	. . . . .
LP 31-45	. . . . .
LP 46-60	. . . . .
LP 61-75	. . . . .
LP 76-90	. . . . .
LP 91-100	. . . . .

ALTERNATE PHASING ACTIVATION DETAIL

TO RUN ALT. PHASING DURING FREE RUN - PROGRAM CHANGES (SHOWN BELOW) IN A TIME BASED ACTION PLAN. SCHEDULE A DAY PLAN THAT INCLUDES THE ACTION PLAN PROGRAMMED TO SELECT VEH DET PLAN 2 AND ENABLE SF BITS 1 AND 5.

TO RUN ALT. PHASING DURING COORDINATION - SELECT THE TIME BASED ACTION PLAN THAT IS PROGRAMMED TO SELECT VEH DET PLAN 2 AND ENABLE SF BITS 1 AND 5.

PHASING	VEH DET PLAN	SF BITS ENABLED
ACTIONS REQUIRED TO RUN <u>DEFAULT PHASING</u>	1	NONE
ACTIONS REQUIRED TO RUN <u>ALTERNATE PHASING</u>	2	1, 5

IMPORTANT: IF ALT. PHASING IS USED DURING FREE RUN AND COORDINATION, DO NOT OPERATE TIME OF DAY EVENTS CONCURRENTLY WITH COORDINATION PLAN EVENTS IN THE EVENT SCHEDULER. (EX. FREE RUN EVENT SHOULD END BEFORE COORDINATION PLAN EVENT STARTS AND VICE-VERSA).

ALTERNATE PHASING CHANGE SUMMARY

THE FOLLOWING IS A SUMMARY OF WHAT TAKES PLACE WHEN SF BITS 1 AND 5 AND VEH DET PLAN 2 ACTIVATE TO CALL THE "ALTERNATE PHASING":

- SF BITS 1,5: Modifies overlap parent phases for heads 11 and 51 to run protected turns only.
- VEH DET PLAN 2: Disables phase 6 call on loop 1A and reduces delay time for phase 1 call on loop 1A to 3 seconds.
Disables phase 2 call on loop 5A and reduces delay time for phase 5 call on loop 5A to 3 seconds.

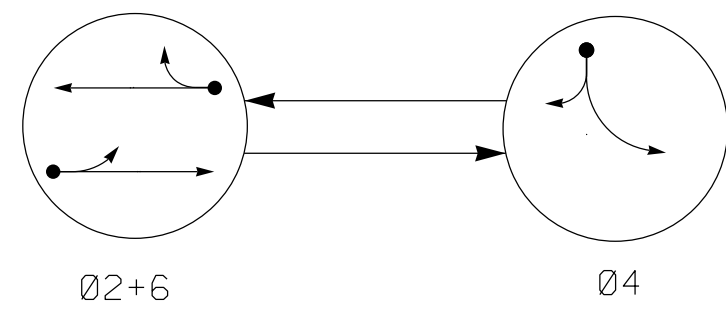
THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-1859
DESIGNED: September 2019
SEALED: 10/16/2019
REVISED: N/A



Electrical Detail-Sheet 3 of 3

ELECTRICAL AND PROGRAMMING DETAILS FOR: Prepared for the Offices of: 750 N. Greenfield Pkwy, Garner, NC 27529	US 70 (Burlington Road) at Publix and Ashton Place Division 7 Guilford County McLeansville PLAN DATE: September 2019 REVIEWED BY: M.L. Stygles PREPARED BY: J. Ma REVIEWED BY:	DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED SEAL 10/16/2019 J. Ma 827E1953081444F DATE SIG. INVENTORY NO. 07-1859
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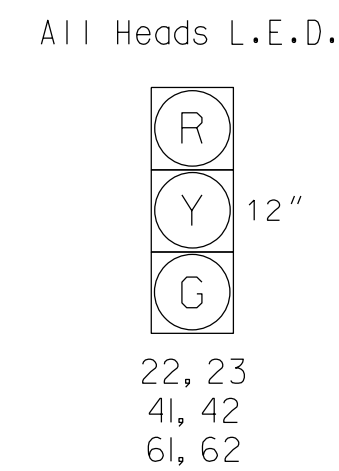
PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND
 ● DETECTED MOVEMENT
 ◄ UNDETECTED MOVEMENT (OVERLAP)
 - - - UNSIGNALIZED MOVEMENT
 ◄ - - - PEDESTRIAN MOVEMENT

SIGNAL FACE	PHASE		
	Ø2+6	Ø4	FLASH
22, 23	G	R	Y
41, 42	R	G	R
61, 62	G	R	Y

SIGNAL FACE I.D.



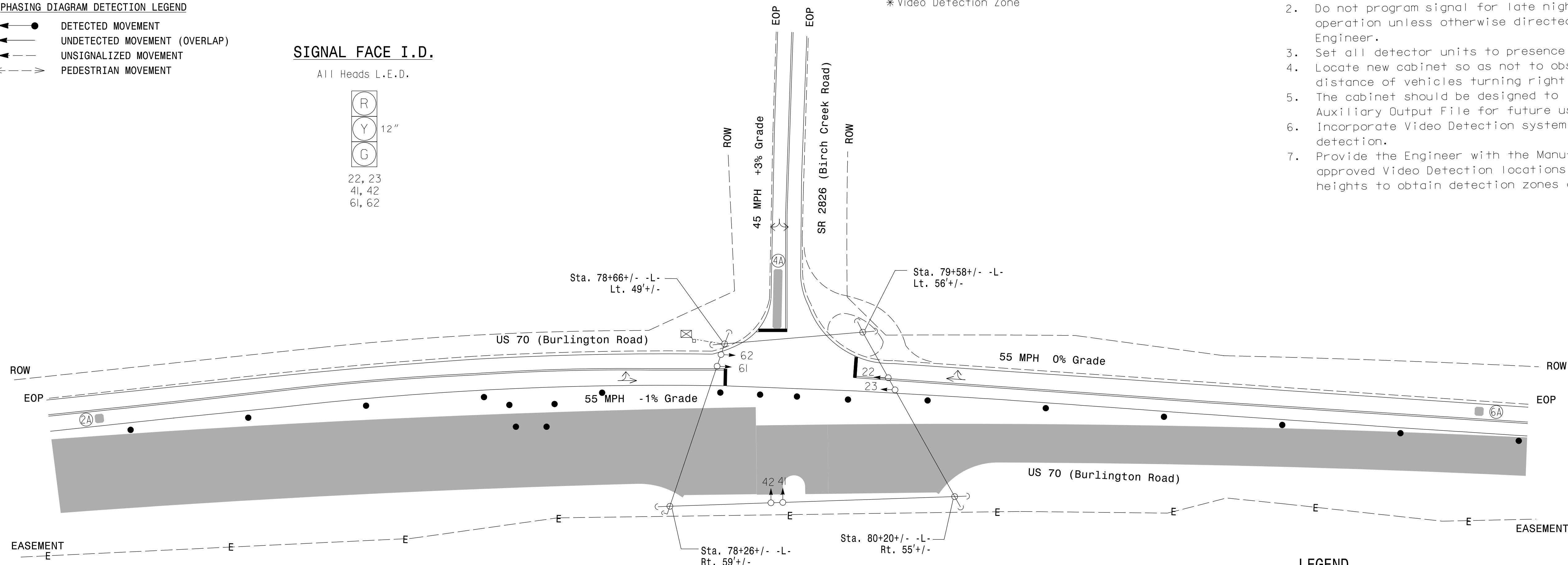
ASC/3 DETECTOR INSTALLATION CHART												
DETECTOR					PROGRAMMING							
ZONE	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
2A*	6X6	420	*	*	2	Yes	-	-	X	N	-	-
4A*	6X40	0	*	*	4	Yes	-	5	-	S	-	-
6A*	6X6	420	*	*	6	Yes	-	-	X	N	-	-

* Video Detection Zone

2 Phase Fully Actuated (Isolated)

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Set all detector units to presence mode.
- Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
- The cabinet should be designed to include an Auxiliary Output File for future use.
- Incorporate Video Detection system for vehicle detection.
- Provide the Engineer with the Manufacturer's approved Video Detection locations and mounting heights to obtain detection zones as shown.



ASC/3 TIMING CHART			
FEATURE	PHASE		
	2	4	6
Min Green *	14	7	14
Walk *	-	-	-
Ped Clear	-	-	-
Veh. Extension *	6.0	2.0	6.0
Max 1 *	90	30	90
Yellow	5.3	3.0	5.2
Red Clear	1.0	1.6	1.0
Actions B4 Add *	-	-	-
Seconds / Actuation *	2.5	-	2.5
Max Initial *	46	-	46
Time Before Reduction *	15	-	15
Time To Reduce *	30	-	30
Minimum Gap	3.4	-	3.4
Locking Detector	X	-	X
Recall Position	VEH RECALL	-	VEH RECALL
Dual Entry	-	-	-
Simultaneous Gap	X	X	X

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

LEGEND	
PROPOSED	EXISTING
○ → Traffic Signal Head	● → N/A
◐ → Modified Signal Head	- - - N/A
⊥ Sign	⊥ Sign
○ ⊥ Pedestrian Signal Head	● ⊥ 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
□ Junction Box	□ Junction Box
- - - 2-in Underground Conduit	- - - 2-in Underground Conduit
- - - Right of Way	- - - Right of Way
→ Directional Arrow	→ Directional Arrow
▬ Video Detection Zone	N/A
▬ Construction Zone	N/A
● Construction Zone Drum	N/A

Signal Upgrade-Temporary Design 1 (TMP Phase I)

750 N. Greenfield Pkwy, Garner, NC 27529

US 70 (Burlington Road) at SR 2826 (Birch Creek Road)

Division 7 Guilford County McLeansville

PLAN DATE: September 2019 REVIEWED BY: M. L. Stygles

PREPARED BY: J. Ma REVIEWED BY:

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

9/9/2019

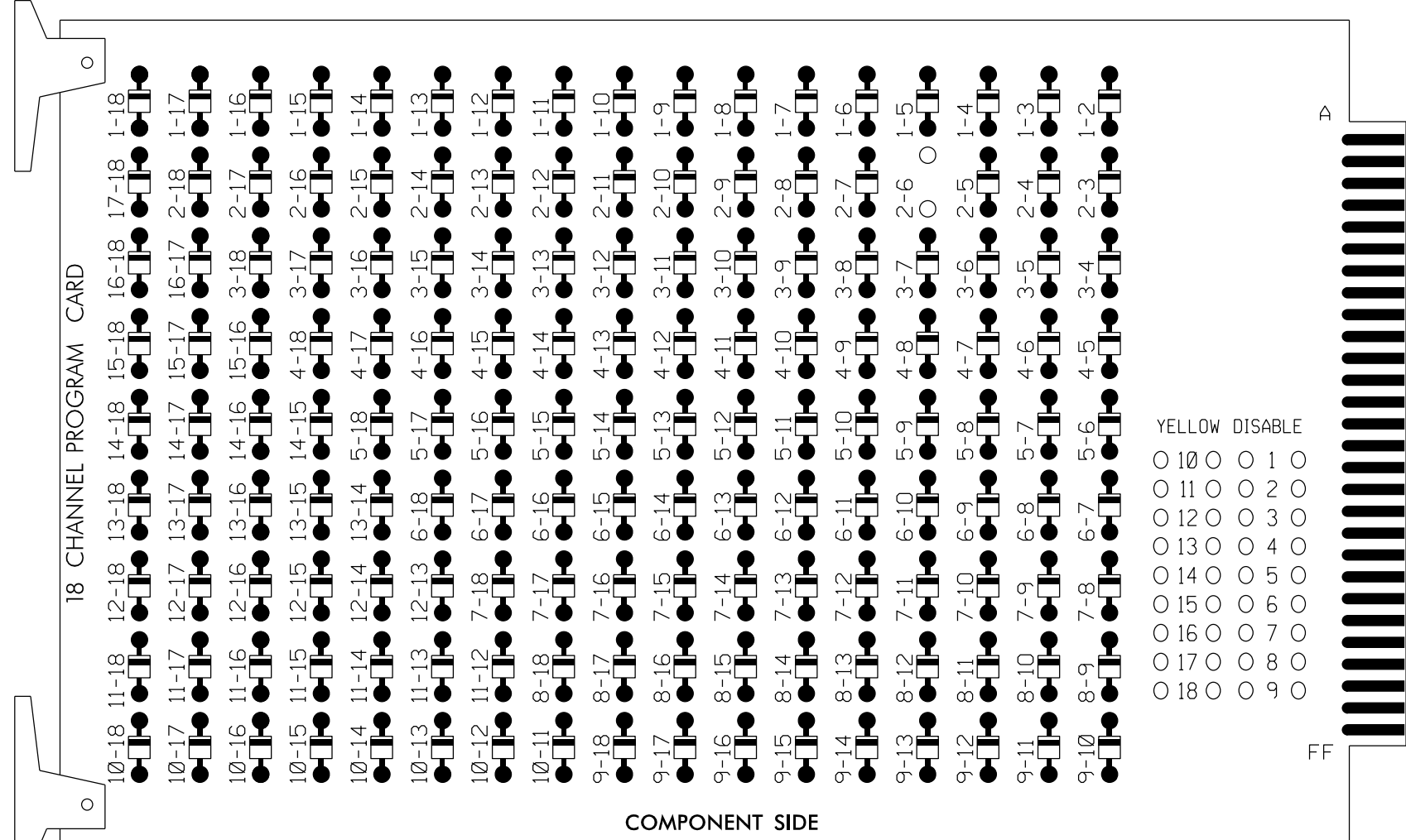
SIG. INVENTORY NO. 07-170811



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

(remove jumpers and set switches as shown)

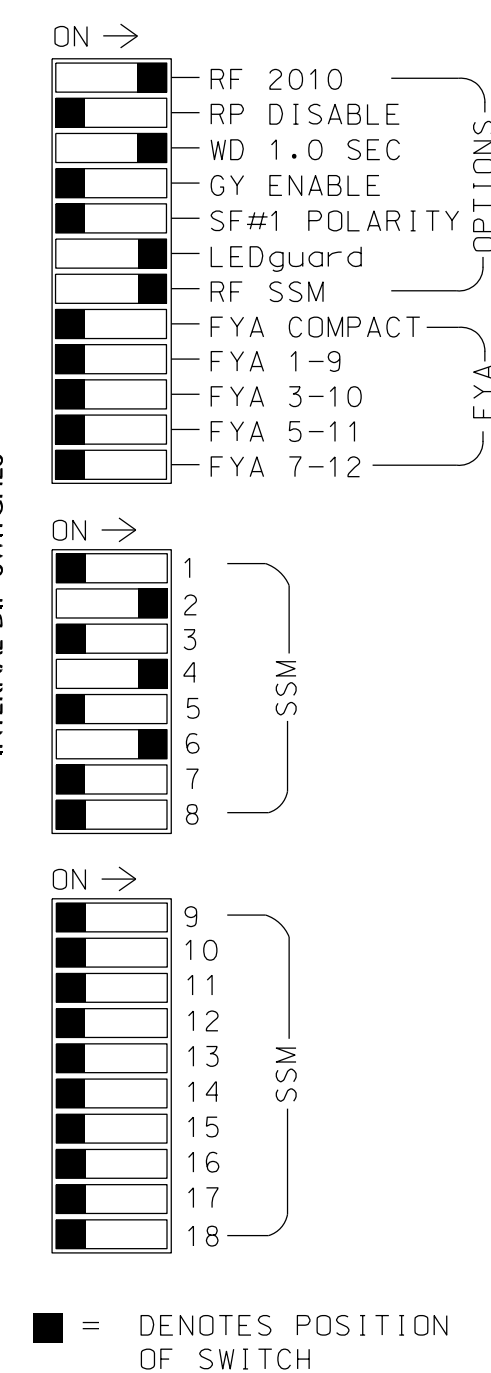
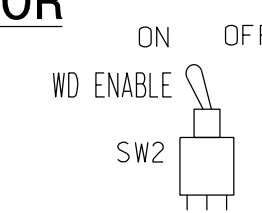
REMOVE DIODE JUMPERS 2-6.



REMOVE JUMPERS AS SHOWN

NOTES:

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



NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Program controller to start up in phase 2 Green and 6 Green.

EQUIPMENT INFORMATION

CONTROLLER.....2070LX
 CABINET.....332 W/ AUX
 SOFTWARE.....ECONOLITE ASC/3-2070
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
 LOAD SWITCHES USED.....S2,S5,S8
 PHASES USED.....2,4,6
 OVERLAP "A".....NOT USED
 OVERLAP "B".....NOT USED
 OVERLAP "C".....NOT USED
 OVERLAP "D".....NOT USED

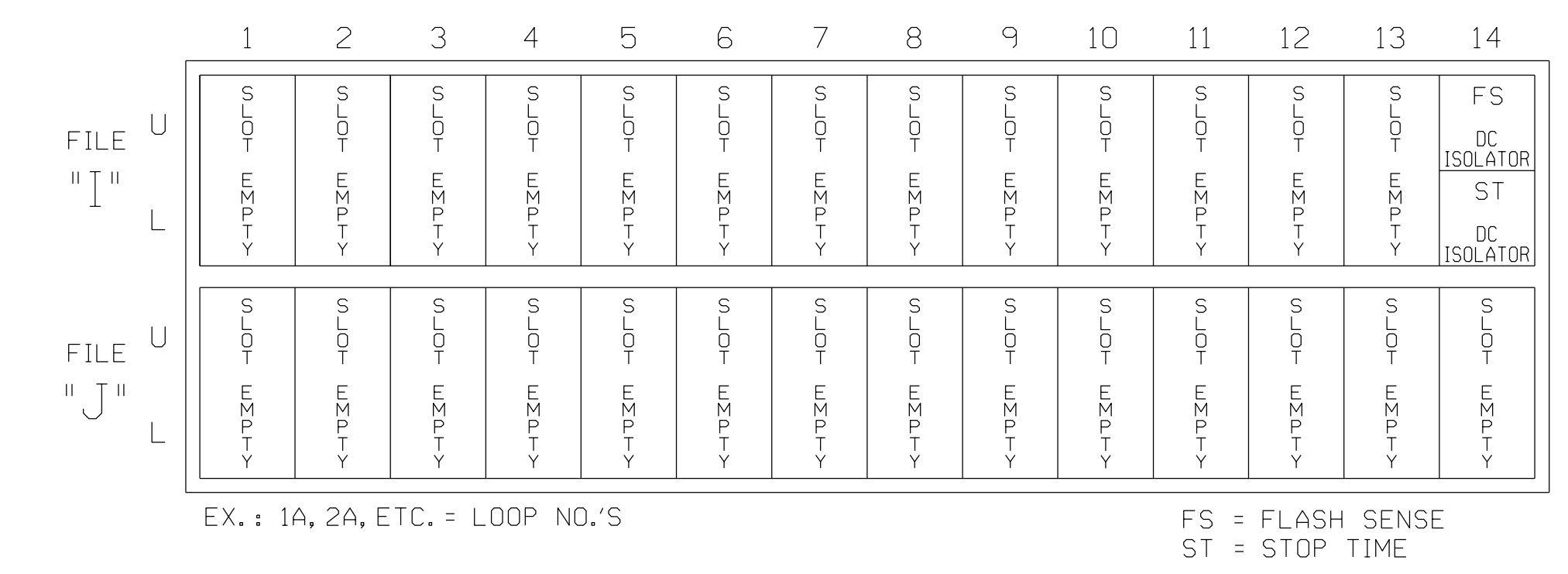
SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	NU	22,23	NU	NU	41,42	NU	NU	61,62	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU
RED		128			101			134										
YELLOW		129			102			135										
GREEN		130			103			136										
RED ARROW																		
YELLOW ARROW																		
FLASHING YELLOW ARROW																		
GREEN ARROW																		

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)



SPECIAL DETECTOR NOTE

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

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 07-1708T1
 DESIGNED: September 2019
 SEALED: 09/09/2019
 REVISED:



Electrical Detail-Temporary Design 1 (TMP Phase I)

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for the Offices of:

 750 N. Greenfield Pkwy, Garner, NC 27529

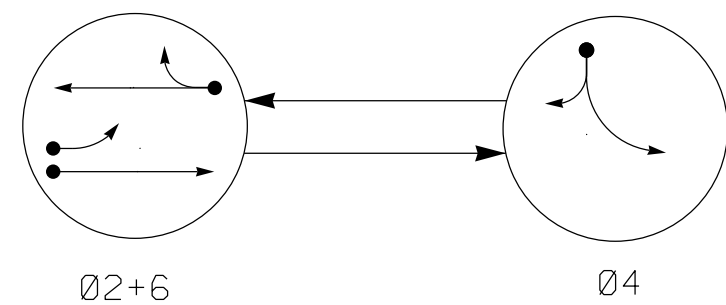
US 70 (Burlington Rd) at SR 2826 (Birch Creek Rd)

Division 7 Guilford County McLeansville
 PLAN DATE: September 2019 REVIEWED BY: M.L. Stygles
 PREPARED BY: J. Ma REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
 NORTH CAROLINA PROFESSIONAL ENGINEER
 SEAL 033108
 J. Ma
 9/9/2019
 827E1953081444F
 DATE
 SIG. INVENTORY NO. 07-1708T1

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

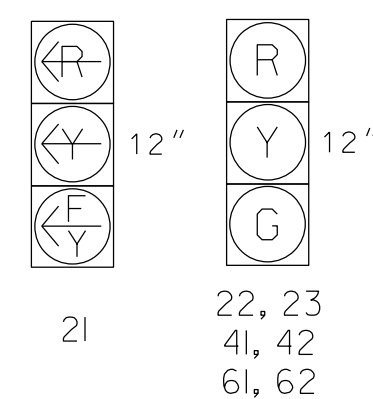
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- ⇄ PEDESTRIAN MOVEMENT

TABLE OF OPERATION

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

SIGNAL FACE I.D.

All Heads L.E.D.



ASC/3 DETECTOR INSTALLATION CHART

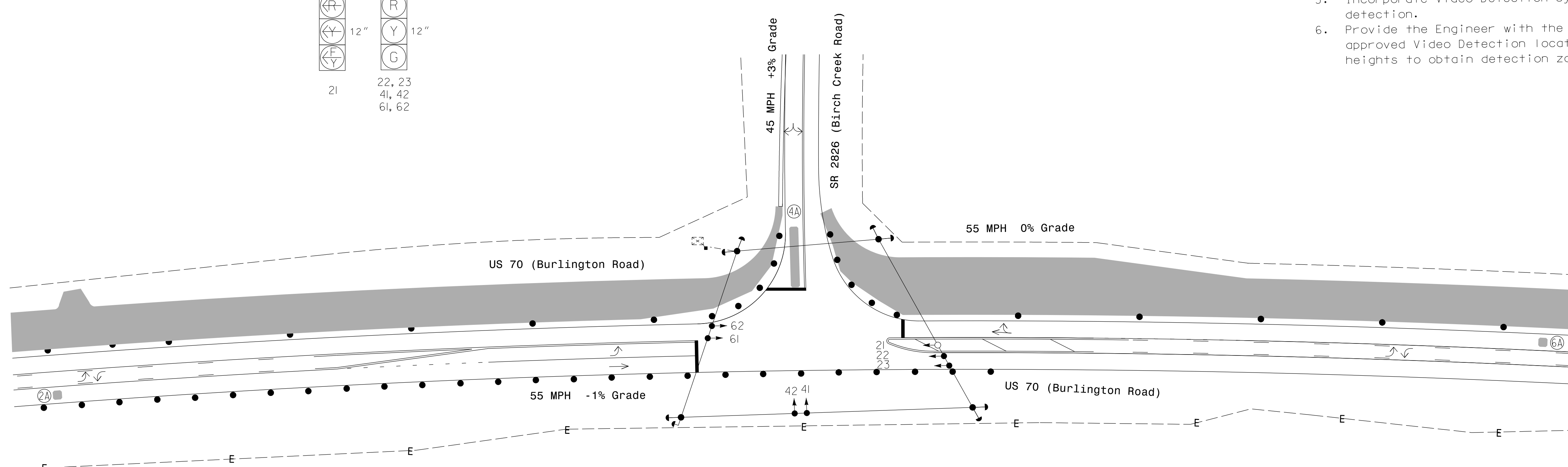
ZONE	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING						
					PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
2A*	6X6	420	*	*	2	Yes	-	-	X	N	-
4A*	6X40	0	*	*	4	Yes	-	5	-	S	-
6A*	6X6	420	*	*	6	Yes	-	-	X	N	-

* 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. Set all detector units to presence mode.
4. Reposition all existing signal heads.
5. Incorporate Video Detection system for vehicle detection.
6. Provide the Engineer with the Manufacturer's approved Video Detection locations and mounting heights to obtain detection zones as shown.



ASC/3 TIMING CHART

FEATURE	PHASE		
	2	4	6
Min Green *	14	7	14
Walk *	-	-	-
Ped Clear	-	-	-
Veh. Extension *	6.0	2.0	6.0
Max I *	90	30	90
Yellow	5.3	3.0	5.2
Red Clear	1.2	2.1	1.0
Actuations B4 Add *	-	-	-
Seconds /Actuation *	2.5	-	2.5
Max Initial *	46	-	46
Time Before Reduction *	15	-	15
Time To Reduce *	30	-	30
Minimum Gap	3.4	-	3.4
Locking Detector	X	-	X
Recall Position	VEH RECALL	-	VEH RECALL
Dual Entry	-	-	-
Simultaneous Gap	X	X	X

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

LEGEND

PROPOSED	EXISTING
○ → Traffic Signal Head	● → N/A
○ → Modified Signal Head	○ → N/A
□ → Sign	□ → N/A
□ → Pedestrian Signal Head	□ → 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	--- 2-in Underground Conduit
N/A Right of Way	N/A Right of Way
→ Directional Arrow	→ Directional Arrow
▬ Video Detection Zone	N/A
▬ Construction Zone	N/A
● Construction Zone Drum	N/A

Signal Upgrade-Temporary Design 2 (TMP Phase II)

750 N. Greenfield Pkwy, Garner, NC 27529

US 70 (Burlington Road) at SR 2826 (Birch Creek Road)

Division 7 Guilford County McLeansville

PLAN DATE: September 2019 REVIEWED BY: M. L. Stygles

PREPARED BY: J. Ma REVIEWED BY:

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

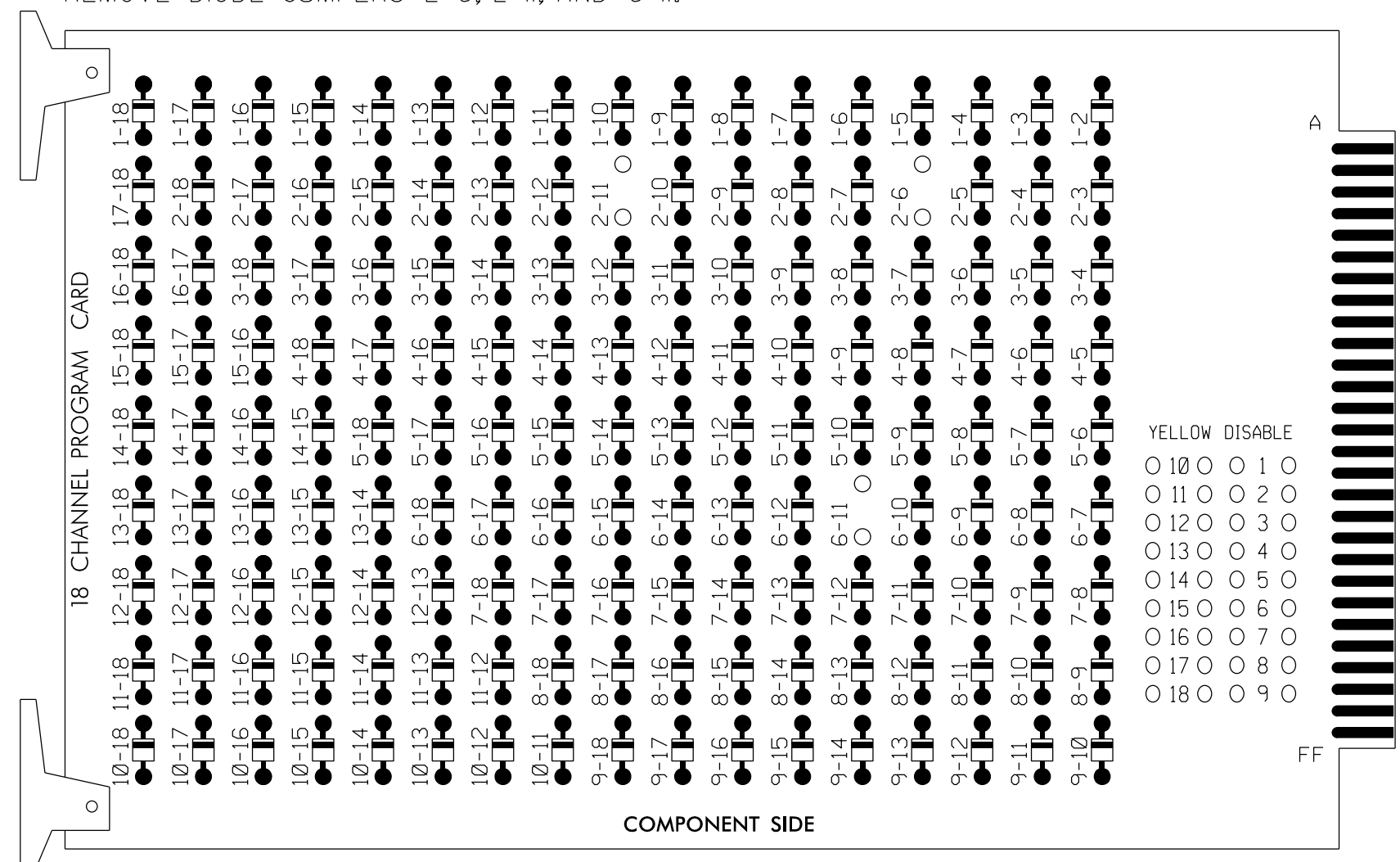
SEAL

9/9/2019

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

(remove jumpers and set switches as shown)

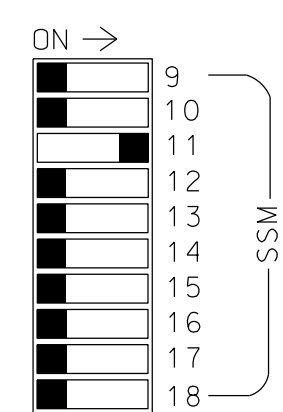
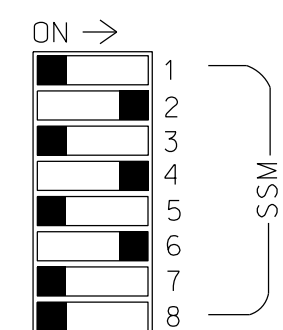
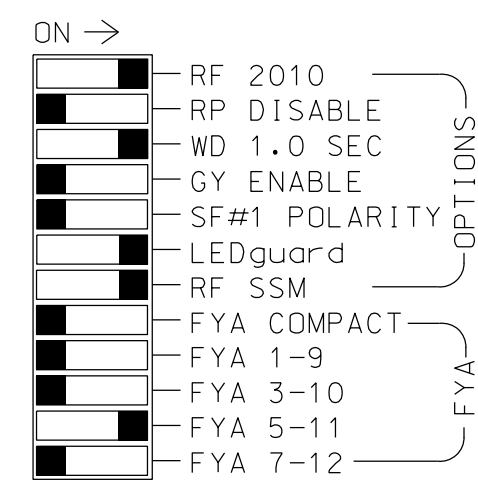
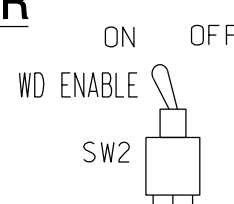
REMOVE DIODE JUMPERS 2-6, 2-II, AND 6-II.



REMOVE JUMPERS AS SHOWN

NOTES:

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



■ = DENOTES POSITION OF SWITCH

NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
- Program controller to start up in phase 2 Green and 6 Green.

EQUIPMENT INFORMATION

CONTROLLER.....2070LX
 CABINET.....332 W/ AUX
 SOFTWARE.....ECONOLITE ASC/3-2070
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
 LOAD SWITCHES USED.....S2,S5,S8,AUX S4
 PHASES USED.....2,4,6
 OVERLAP "A".....NOT USED
 OVERLAP "B".....NOT USED
 OVERLAP "C".....*
 OVERLAP "D".....NOT USED

* See overlap programming detail on this sheet

SIGNAL HEAD HOOK-UP CHART

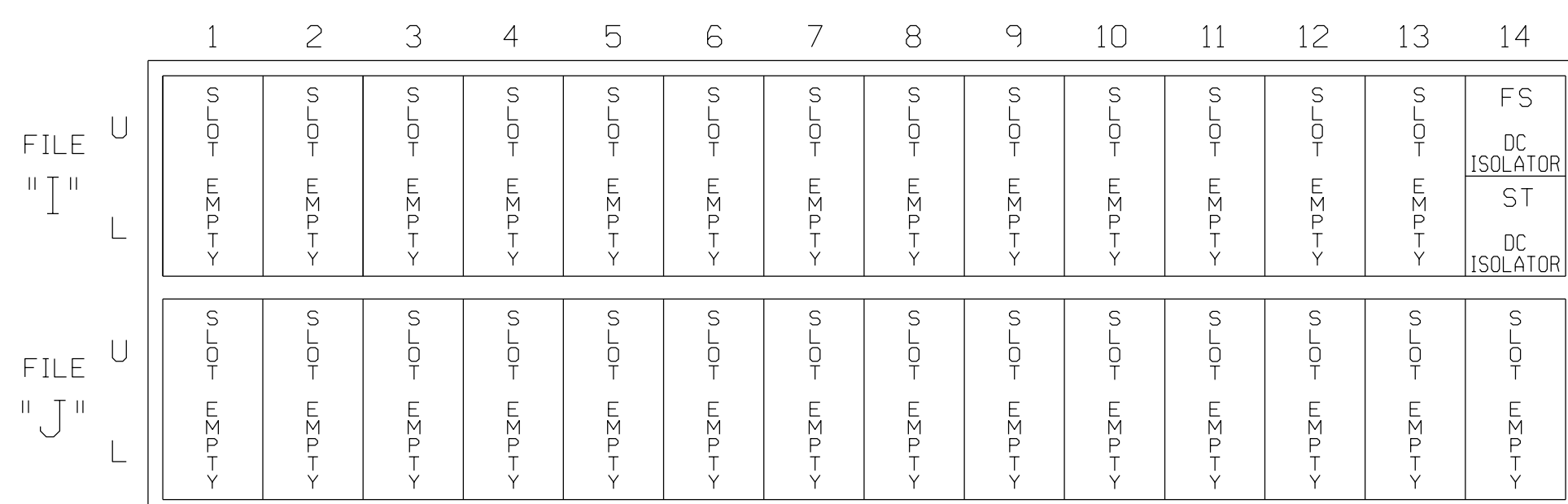
LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6	
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18	
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE	
SIGNAL HEAD NO.	NU	22,23	NU	NU	41,42	NU	NU	61,62	NU	NU	NU	NU	NU	NU	NU	21	NU	NU	
RED		128			101			134											
YELLOW		129			102			135											
GREEN		130			103			136											
RED ARROW																		A114	
YELLOW ARROW																			A115
FLASHING YELLOW ARROW																			A116
GREEN ARROW																			

NU = Not Used

* 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

SPECIAL DETECTOR NOTE

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

ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

(program controller as shown)

- From Main Menu select **2. CONTROLLER**
- From CONTROLLER Submenu select **2. VEHICLE OVERLAPS**

OVERLAP C

Select TMG VEH OVLP [C] and 'OTHER/ECONOLITE'

```

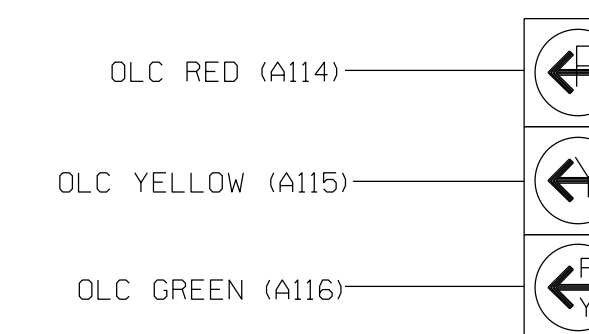
TMG VEH OVLP...[C] TYPE:OTHER/ECONOLITE
  PHASES 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
INCLUDED . . . . . X . . . . .
PROTECT . . . . .
PED PRTC . . . . .
NOT OVLP . . . . .
FLSH GRN . . . . . 1 . . . . .
LAG X PH . . . . .
LAG 2 PH . . . . .

LAG GRN 0.0 YEL 0.0 RED 0.0 ADV GRN 0.0
    
```

END PROGRAMMING

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



21

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 07-1708T2
 DESIGNED: September 2019
 SEALED: 09/09/2019
 REVISED:



Electrical Detail-Temporary Design 2 (TMP Phase II)

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for the Offices of:

750 N. Greenfield Pkwy, Garner, NC 27529

US 70 (Burlington Rd) at SR 2826(Birch Creek Rd)	
Division 7	Guilford County McLeansville
PLAN DATE: September 2019	REVIEWED BY: M.L. Stygles
PREPARED BY: J. Ma	REVIEWED BY:
REVISIONS	INIT. DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL

DESIGNED BY: J. Ma 9/9/2019

DATE: 9/9/2019

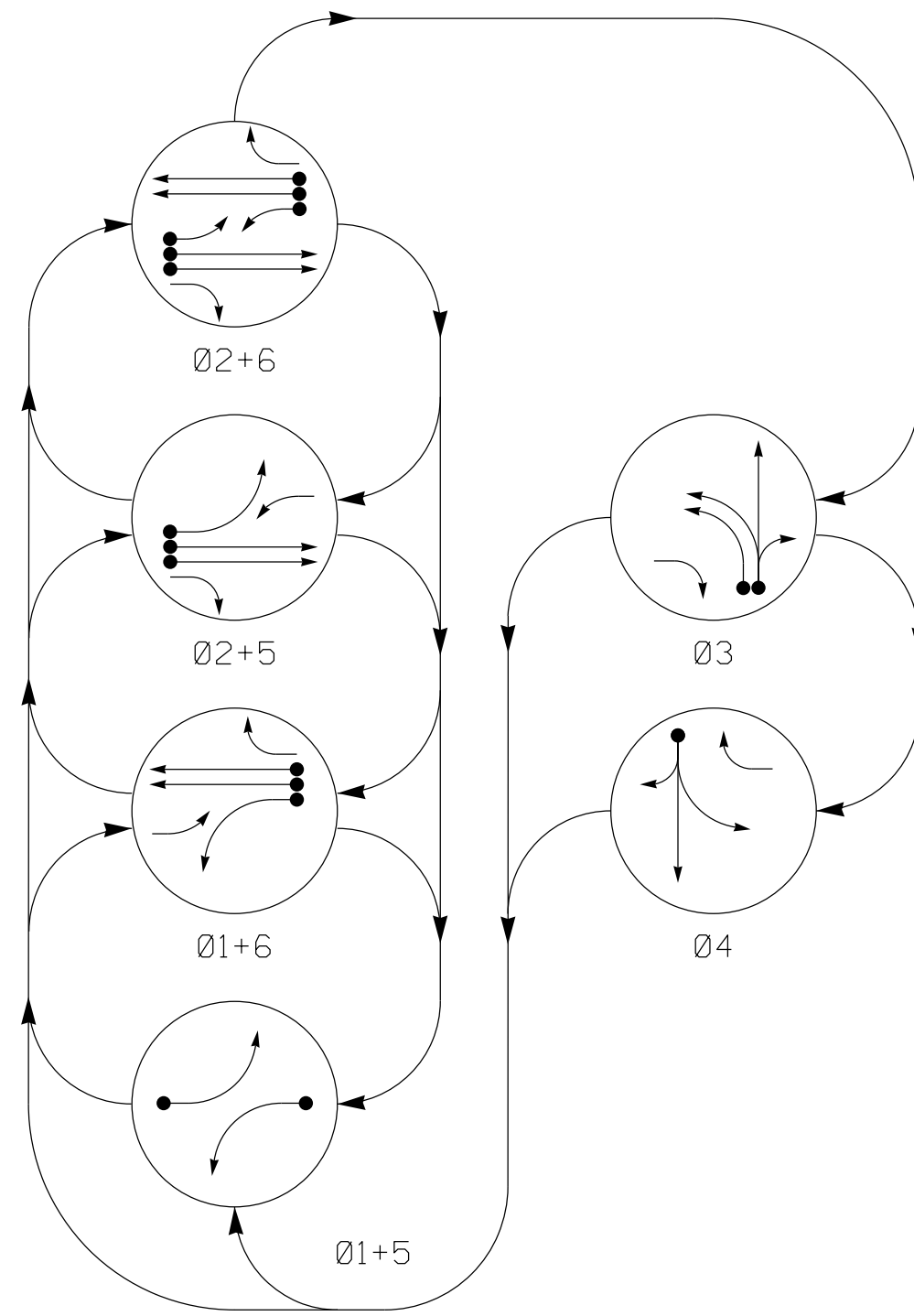
SIG. INVENTORY NO. 07-1708T2

6 Phase Fully Actuated (US 70 (Burlington Rd.) Closed Loop System) Signal System #: 10712

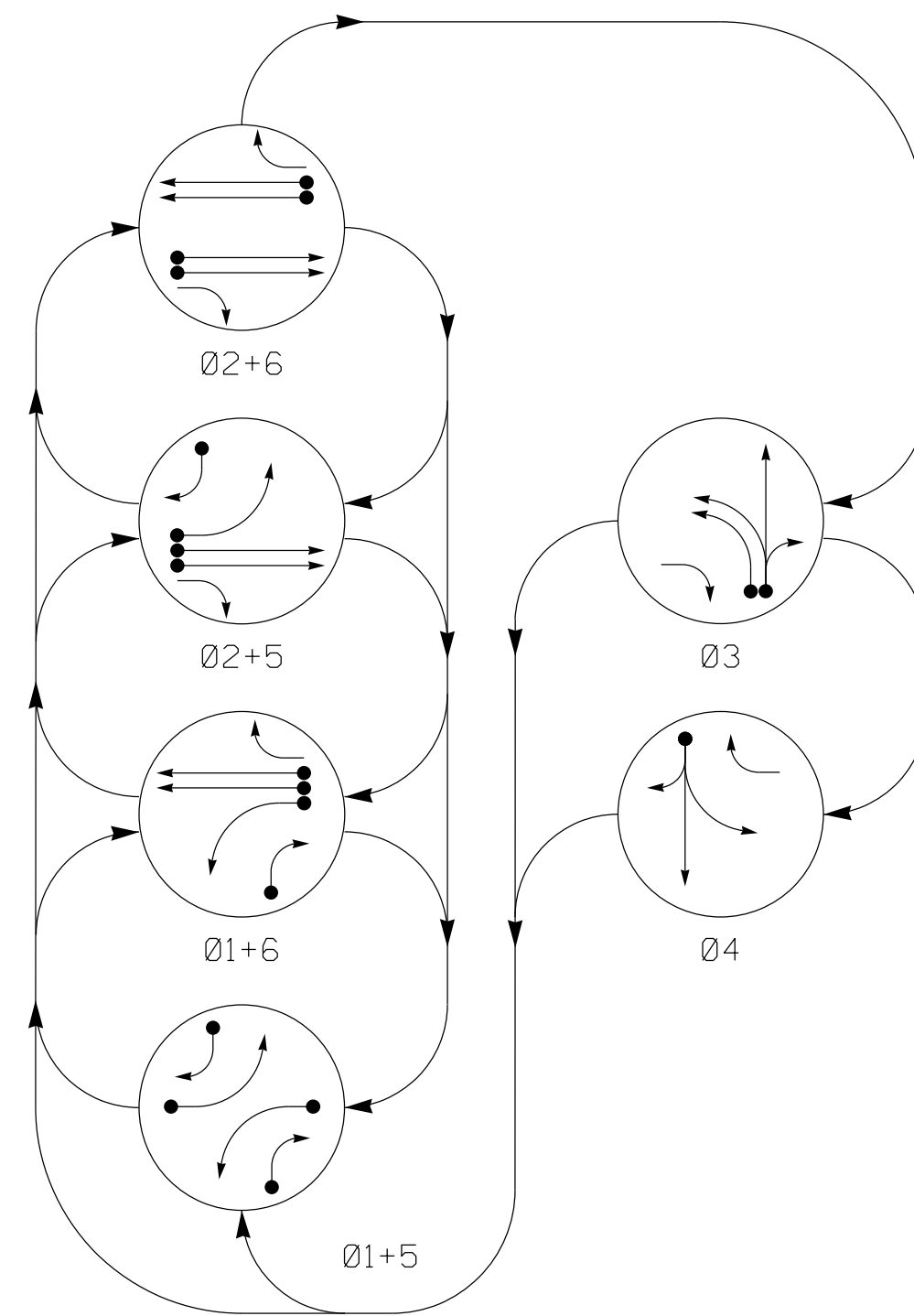
NOTES

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 1 and/or phase 5 may be lagged.
4. The order of phase 3 and 4 may be reversed.
5. Set all detector units to presence mode.
6. The Division Traffic Engineer will determine the hours of use for each phasing plan.
7. Maximum times show in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
8. Closed loop system data: Conroller Asset#: 1708.

DEFAULT PHASING DIAGRAM



ALTERNATE PHASING DIAGRAM



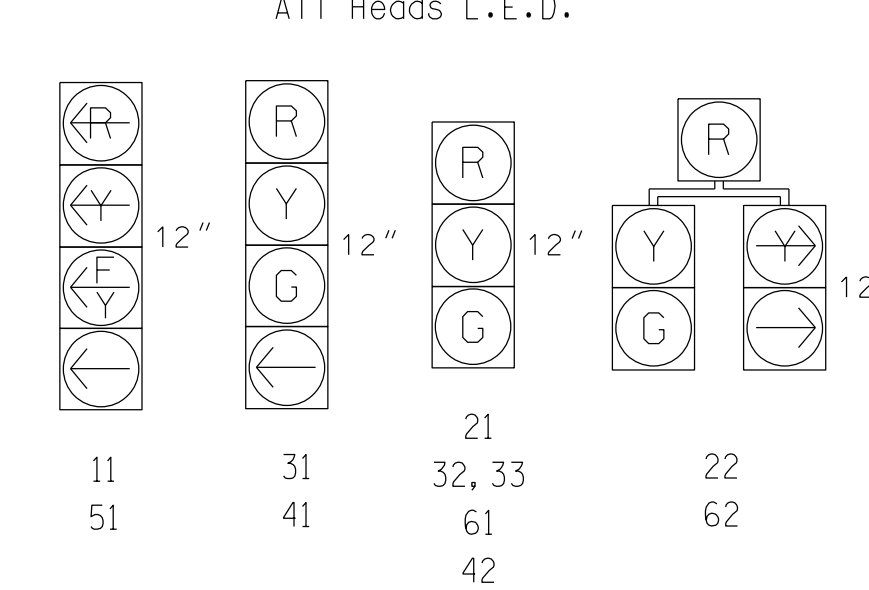
DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE					
	Ø 1+5	Ø 1+6	Ø 2+5	Ø 2+6	Ø 3	Ø 4
11	←	←	←	←	←	←
21	R	R	G	G	R	R
22	R	R	G	G	R	R
31	R	R	R	R	G	R
32, 33	R	R	R	R	G	R
41	R	R	R	R	G	R
42	R	R	R	R	G	R
51	←	←	←	←	←	←
61	R	G	R	G	R	R
62	R	G	R	G	R	R

ALTERNATE PHASING TABLE OF OPERATION

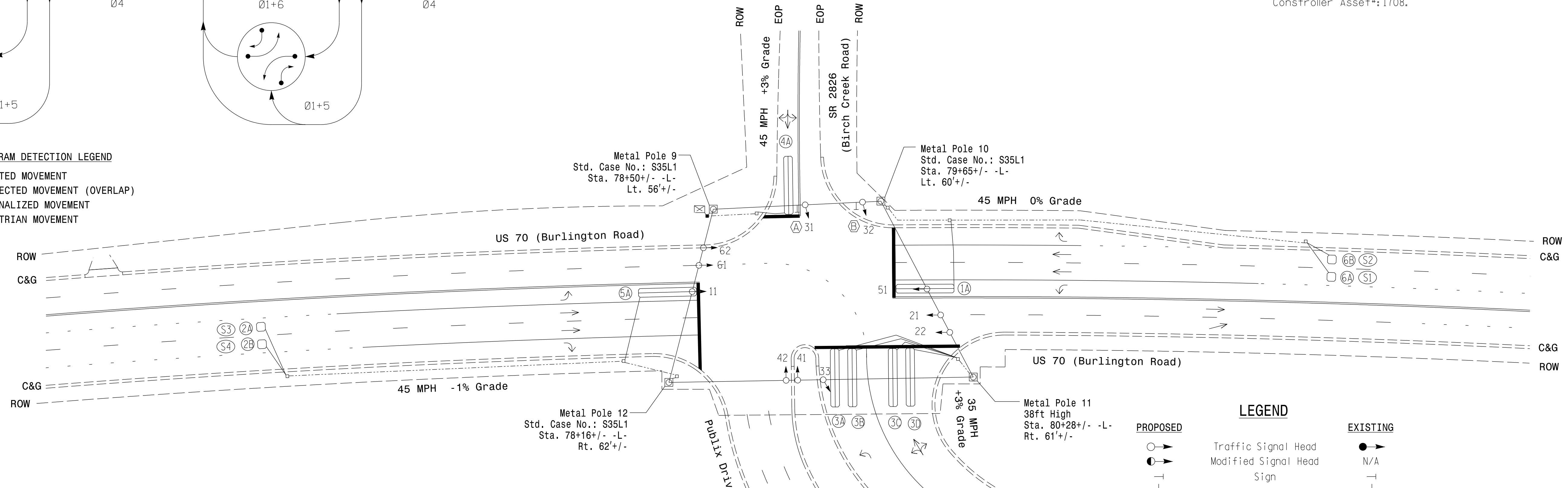
SIGNAL FACE	PHASE					
	Ø 1+5	Ø 1+6	Ø 2+5	Ø 2+6	Ø 3	Ø 4
11	←	←	←	←	←	←
21	R	R	G	G	R	R
22	R	R	G	G	R	R
31	R	R	R	R	G	R
32, 33	R	R	R	R	G	R
41	R	R	R	R	G	R
42	R	R	R	R	G	R
51	←	←	←	←	←	←
61	R	G	R	G	R	R
62	R	G	R	G	R	R

SIGNAL FACE I.D.



PHASING DIAGRAM DETECTION LEGEND

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



ASC/3 TIMING CHART

FEATURE	PHASE					
	1	2	3	4	5	6
Min Green *	7	12	7	7	7	12
Walk *	-	-	-	-	-	-
Ped Clear	-	-	-	-	-	-
Veh. Extension *	2.0	6.0	2.0	2.0	2.0	6.0
Max I *	20	120	30	30	20	120
Yellow	3.0	4.6	4.3	4.3	3.0	4.6
Red Clear	2.9	2.1	2.4	2.0	3.1	2.1
Actuations B4 Add *	-	-	-	-	-	-
Seconds / Actuation *	-	2.5	-	-	-	2.5
Max Initial *	-	34	-	-	-	34
Time Before Reduction *	-	15	-	-	-	15
Time To Reduce *	-	60	-	-	-	60
Minimum Gap	-	3.0	-	-	-	3.0
Locking Detector	-	X	-	-	-	X
Recall Position	-	VEH RECALL	-	-	-	VEH RECALL
Dual Entry	-	-	-	-	-	-
Simultaneous Gap	X	X	X	X	X	X

ASC/3 DETECTOR INSTALLATION CHART

LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING							
					PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE		
1A	6X40	0	2-4-2	X	1	Yes	-	15*	-	S	-	X
2A/S3	6X6	300	5	X	2	Yes	-	3	-	G	-	X
2B/S4	6X6	300	5	X	2	Yes	-	-	X	N	X	X
3A	6X40	0	2-4-2	X	3	Yes	-	-	-	S	-	X
3B	6X40	0	2-4-2	X	3	Yes	-	-	-	S	-	X
3C	6X40	0	2-4-2	X	3	Yes	-	-	-	S	-	X
3D	6X40	0	2-4-2	X	3	Yes	-	-	-	S	-	X
4A	6X40	0	2-4-2	X	4	Yes	-	5	-	S	-	X
5A	6X40	0	2-4-2	X	5	Yes	-	15*	-	S	-	X
6A/S1	6X6	300	5	X	6	Yes	-	3	-	G	-	X
6B/S2	6X6	300	5	X	6	Yes	-	-	X	N	X	X

* Reduce delay to 3 seconds during Alternate Phasing Operation.
Disable phase call for loop(s) during Alternate Phasing Operation.

LEGEND

- | PROPOSED | EXISTING |
|---------------------------------------|----------|
| ○ → Traffic Signal Head | ● → N/A |
| ○ → Modified Signal Head | ○ → N/A |
| ○ → Sign | ○ → N/A |
| ○ → Pedestrian Signal Head | ○ → N/A |
| ○ → Signal Pole with Guy | ○ → N/A |
| ○ → Signal Pole with Sidewalk Guy | ○ → N/A |
| ○ → Metal Strain Pole | ○ → 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 |
| ○ → Left Arrow "ONLY" Sign (R3-5L) | ○ → N/A |
| ○ → Dual Turn and Through Arrows Sign | ○ → N/A |

Signal Upgrade-Final Design

Prepared for the Offices of: **US 70 (Burlington Rd) at SR 2826 (Birch Creek Rd) and Public Driveway**

Division 7 Guilford County McLeansville
 PLAN DATE: September 2019 REVIEWED BY: M. Stygles
 PREPARED BY: J. Ma REVIEWED BY: J. Ma

SCALE: 1" = 40'

REVISIONS: _____ INIT. DATE

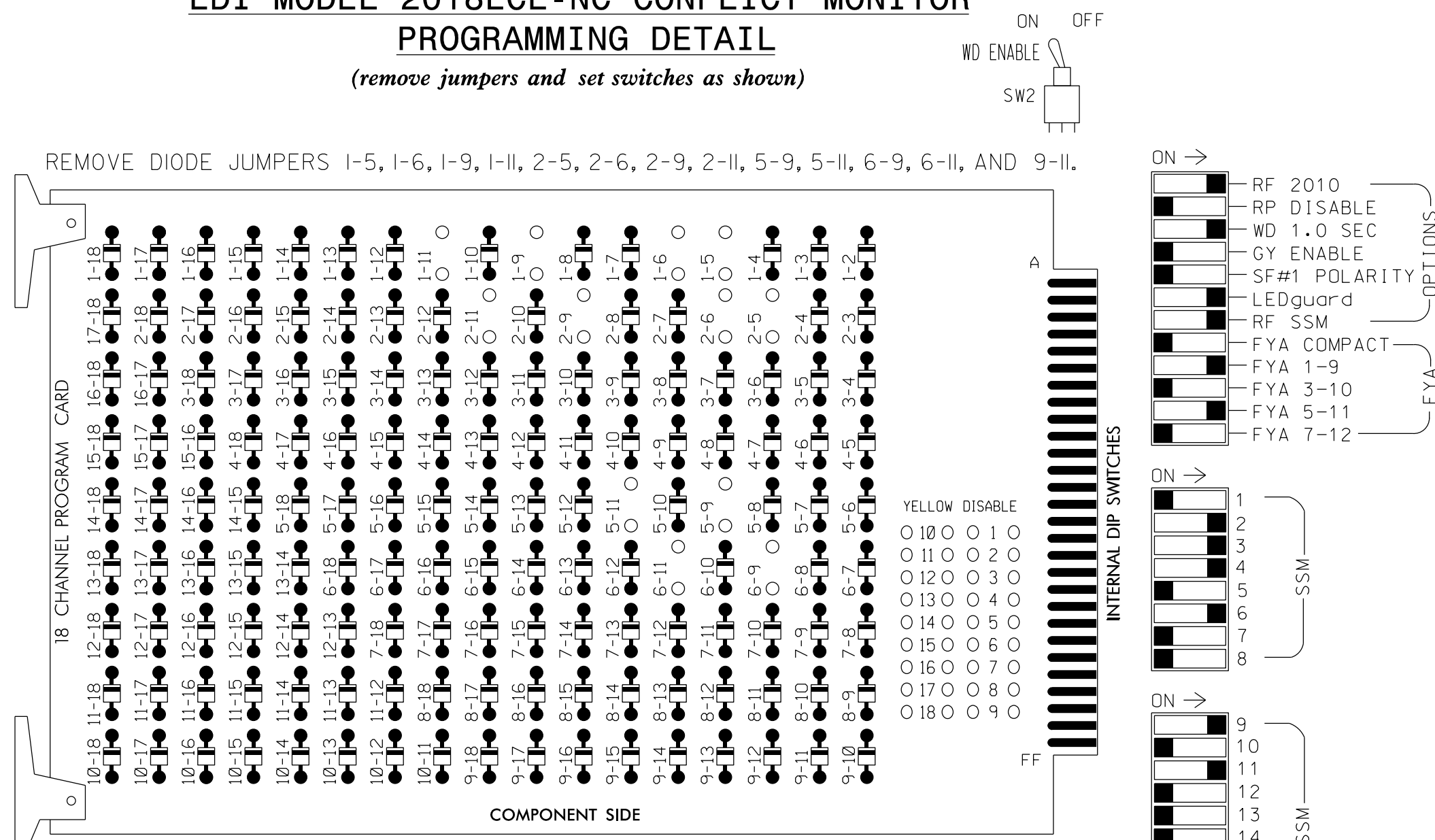
DocuSign: 10/16/2019

SIG. INVENTORY NO. 07-1708



EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



NOTES:

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

NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
- Program controller to start up in phase 2 Green and 6 Green.
- The cabinet and controller are part of the US 70 (Burlington Road) Closed Loop system.

EQUIPMENT INFORMATION

CONTROLLER.....2070LX
 CABINET.....332 W/AUX
 SOFTWARE.....ECONOLITE ASC/3-2070
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
 LOAD SWITCHES USED.....S1,S2,S4,S5,S7,S8,
 AUX S1,AUX S4
 PHASES USED.....1,2,3,4,5,6
 OVERLAP "A".....*
 OVERLAP "B".....NOT USED
 OVERLAP "C".....*
 OVERLAP "D".....NOT USED
 * See overlap programming detail on sheet 2

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6	
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18	
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE	
SIGNAL HEAD NO.	11*	21,22	NU	31, 32,33	22	41	42	62	NU	51*	61,62	NU	NU	NU	11*	NU	NU	51*	NU
RED		128		116	116	101	101				134								
YELLOW	*	129		117	117	102	102		*	135									
GREEN		130		118	118	103	103				136								
RED ARROW													A121					A114	
YELLOW ARROW						117		102					A122					A115	
FLASHING YELLOW ARROW													A123					A116	
GREEN ARROW	127			118	118	103	103	133											

NU = Not Used
 * Denotes install load resistor. See Load Resistor Installation Detail this sheet.
 * See 4-Sect. FYA-PPLT Signal Wiring Detail below.

INPUT FILE POSITION LAYOUT

(front view)

FILE "I"	1	2	3	4	5	6	7	8	9	10	11	12	13	14
∅ 1	∅ 2/SYS	∅ 2A/S3	∅ 2/SYS	∅ 2/SYS	∅ 2/SYS	∅ 4A	∅ 2/SYS	∅ 2/SYS	∅ 2/SYS	∅ 2/SYS	∅ 2/SYS	∅ 2/SYS	∅ 2/SYS	FS
NOT USED	∅ 2/SYS	2B/S4	∅ 2/SYS	∅ 2/SYS	∅ 2/SYS	NOT USED	∅ 2/SYS	∅ 2/SYS	∅ 2/SYS	∅ 2/SYS	∅ 2/SYS	∅ 2/SYS	∅ 2/SYS	DC ISOLATOR
FILE "J"	∅ 5A	∅ 6/SYS	∅ 6/SYS	∅ 6/SYS	∅ 6/SYS	∅ 3	∅ 3	∅ 3	∅ 3	∅ 3	∅ 3	∅ 3	∅ 3	DC ISOLATOR
NOT USED	∅ 6/SYS	6B/S2	∅ 6/SYS	∅ 6/SYS	∅ 6/SYS	3A	3C	3B	3D	∅ 3	∅ 3	∅ 3	∅ 3	∅ 3

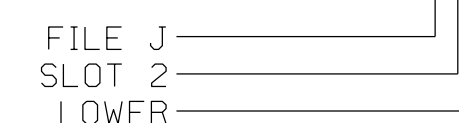
EX.: 1A, 2A, ETC. = LOOP NO.'S
 FS = FLASH SENSE
 ST = STOP TIME
 ⊗ Wired Input - Do not populate slot with detector card

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND TIME	DELAY TIME	ADDED INITIAL	DETECTOR TYPE
1A ¹	TB2-1,2	I1U	56	1*	1	YES		15		S
		J4U	48	26*	6	YES		3		G
2A/S3	TB2-5,6	I2U	39	2	2/SYS	YES			X	N
2B/S4	TB2-7,8	I2L	43	12	2/SYS	YES			X	N
3A	TB5-9,10	J6U	42	8	3	YES				S
3B	TB5-11,12	J6L	46	18	3	YES				S
3C	TB7-1,2	J7U	66	38	3	YES				S
3D	TB7-3,4	J7L	79	48	3	YES				S
4A	TB4-9,10	I6U	41	4	4	YES		5		S
5A ²	TB3-1,2	J1U	55	5*	5	YES		15		S
		I4U	47	22*	2	YES		3		G
6A/S1	TB3-5,6	J2U	40	6	6/SYS	YES			X	N
6B/S2	TB3-7,8	J2L	44	16	6/SYS	YES			X	N

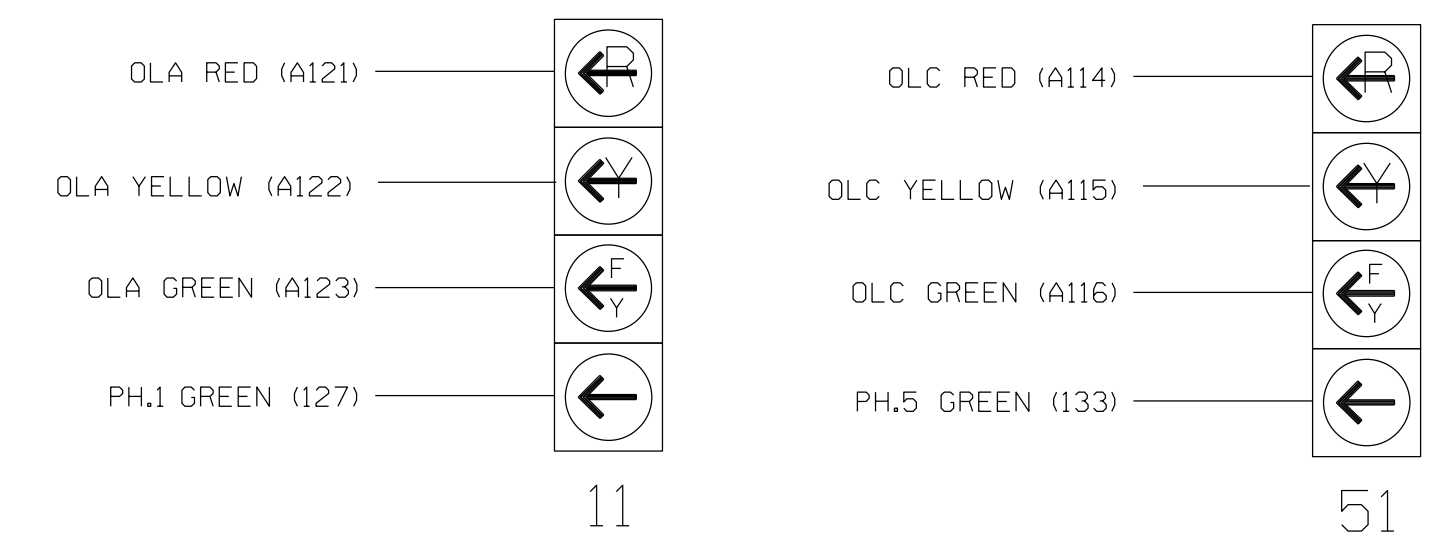
- Add jumper from I1-W to J4-W, on rear of input file.
 - Add jumper from J1-W to I4-W, on rear of input file.
- * For the detectors to work as shown on the signal design plan, see the Vehicle Detector Setup Programming Detail for Alternate Phasing on sheet 2.

INPUT FILE POSITION LEGEND: J2L



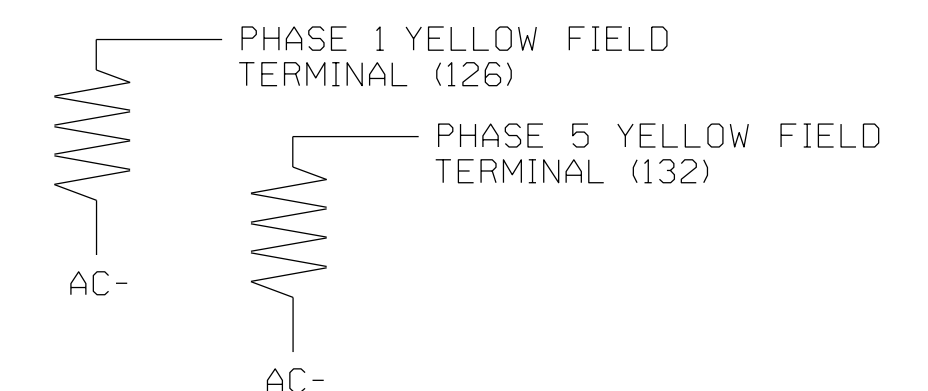
FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



LOAD RESISTOR INSTALLATION DETAIL

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



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 07-1708
 DESIGNED: September 2019
 SEALED: 10/16/2019
 REVISED: N/A

Electrical Detail-Final Upgrade (Sheet 1 of 3)

ELECTRICAL AND PROGRAMMING DETAILS FOR:

US 70 (Burlington Rd) at SR 2826 (Birch Creek Rd) and Public Driveway

Division 7 Gullford County McLeansville

PLAN DATE: September 2019 REVIEWED BY: M.L. Stygles

PREPARED BY: J. Ma REVIEWED BY:

REVISIONS: INIT. DATE

10/16/2019

750 N. Greenfield Pkwy, Garner, NC 27529

SEAL NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 033108 J. Ma

827E1953081444F

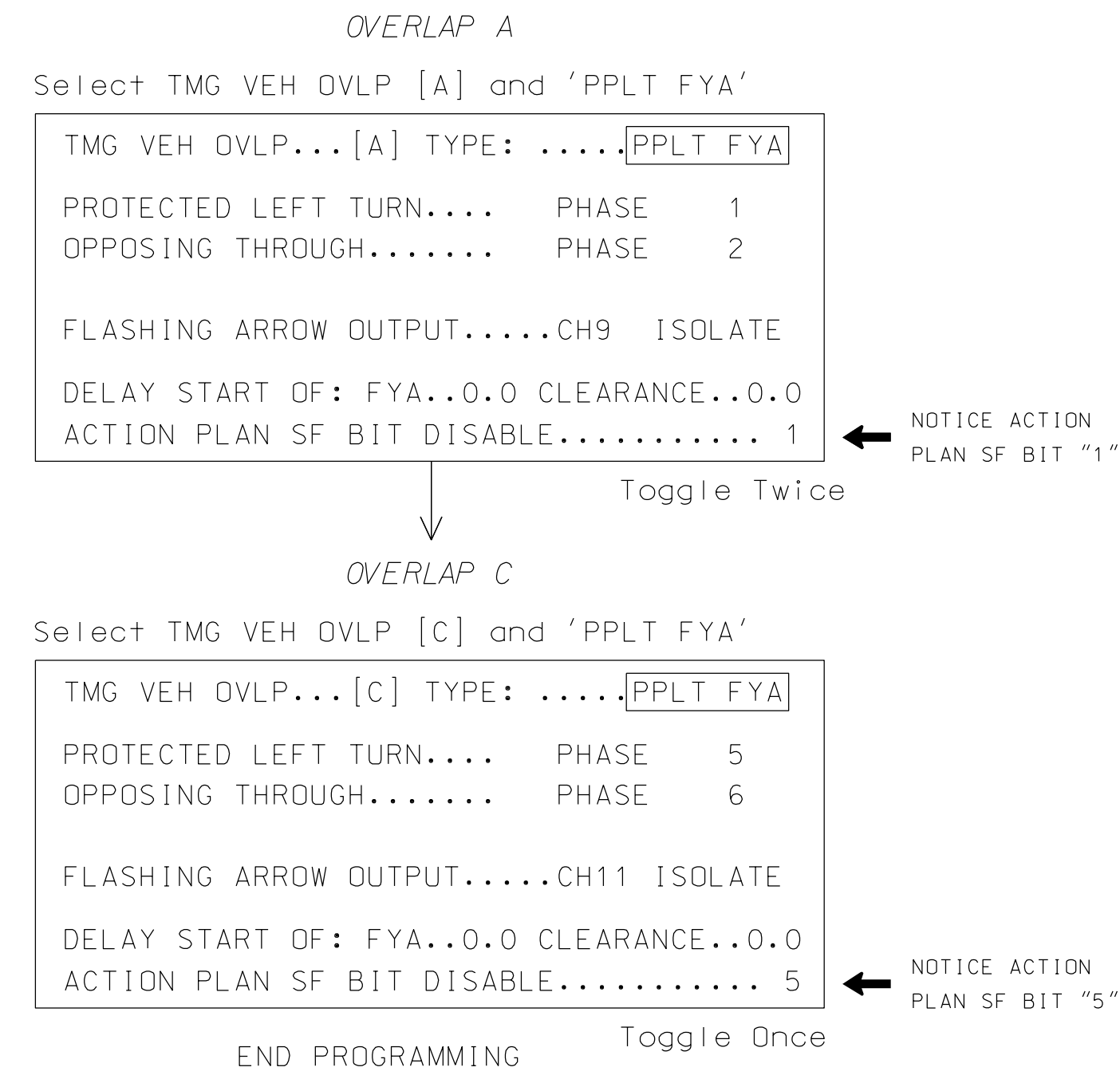
SIG. INVENTORY NO. 07-1708



ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select 2. CONTROLLER
2. From CONTROLLER Submenu select 2. VEHICLE OVERLAPS



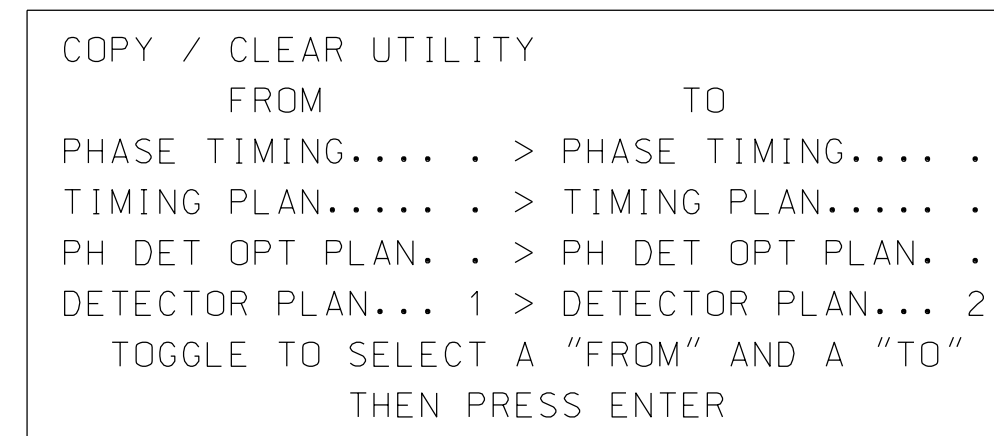
ECONOLITE ASC/3-2070 VEHICLE DETECTOR SETUP PROGRAMMING DETAIL FOR ALTERNATE PHASING LOOPS 1A, 5A

(program controller as shown)

IMPORTANT!

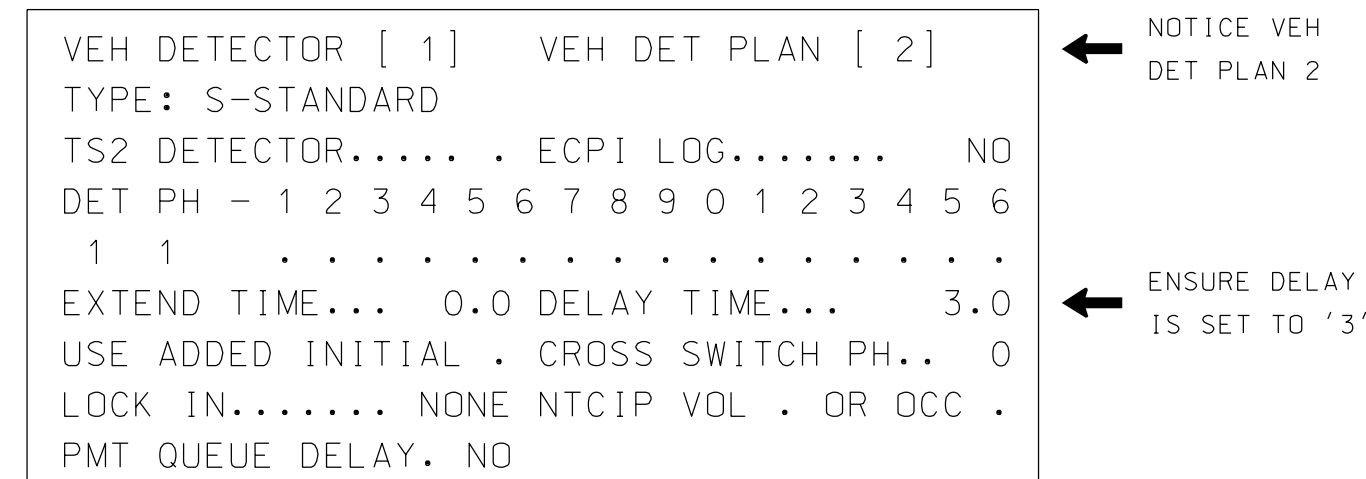
Program detectors per the input file connection and programming chart shown on sheet 1 before proceeding.

1. From Main Menu select 8. UTILITIES
2. From UTILITIES Submenu select 1. COPY/CLEAR
3. Copy from DETECTOR PLAN "1" to DETECTOR PLAN "2".

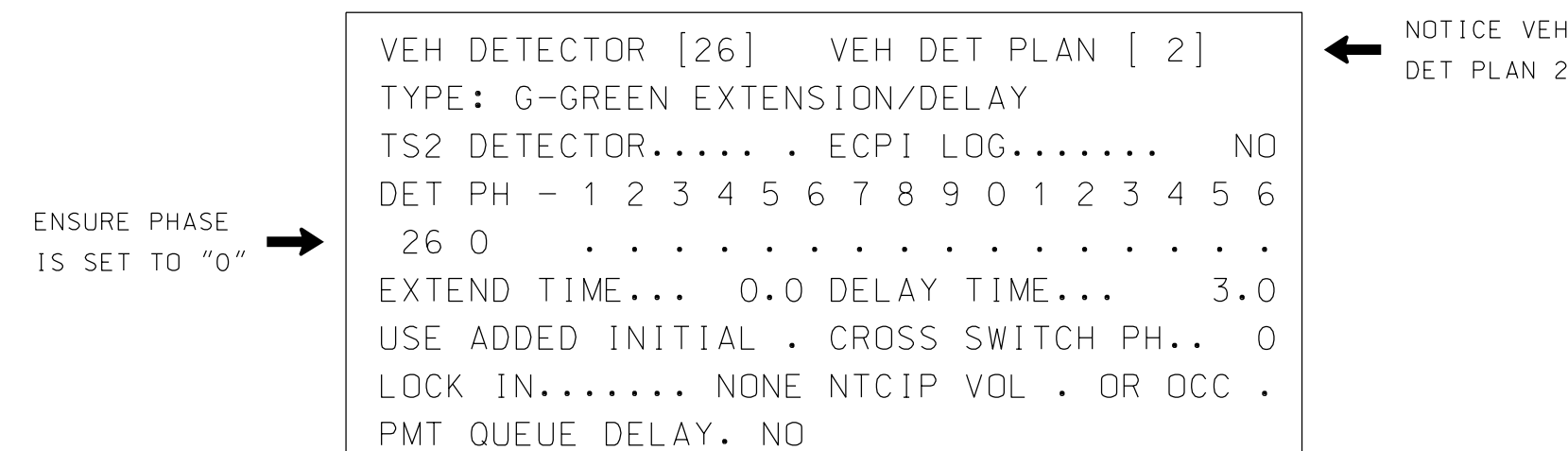


4. From Main Menu select 6. DETECTORS
5. From DETECTOR Submenu select 2. VEHICLE DETECTOR SETUP
6. Place cursor in VEH DET PLAN [] position and enter "2".

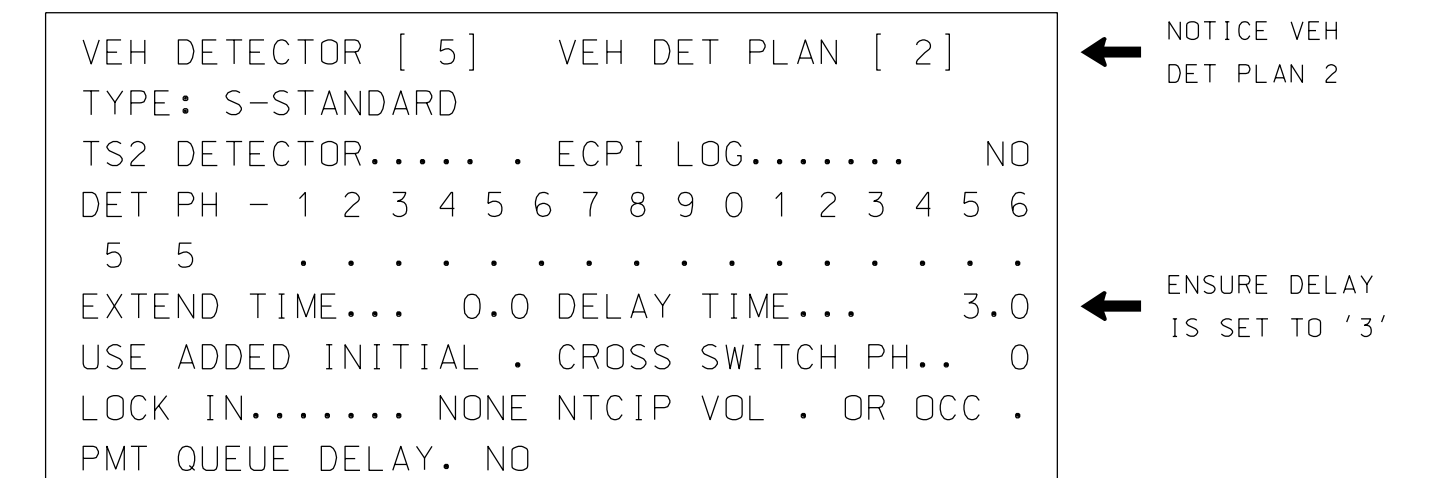
- Place cursor in VEH DETECTOR [] position and enter "1".
- Set delay time to "3".



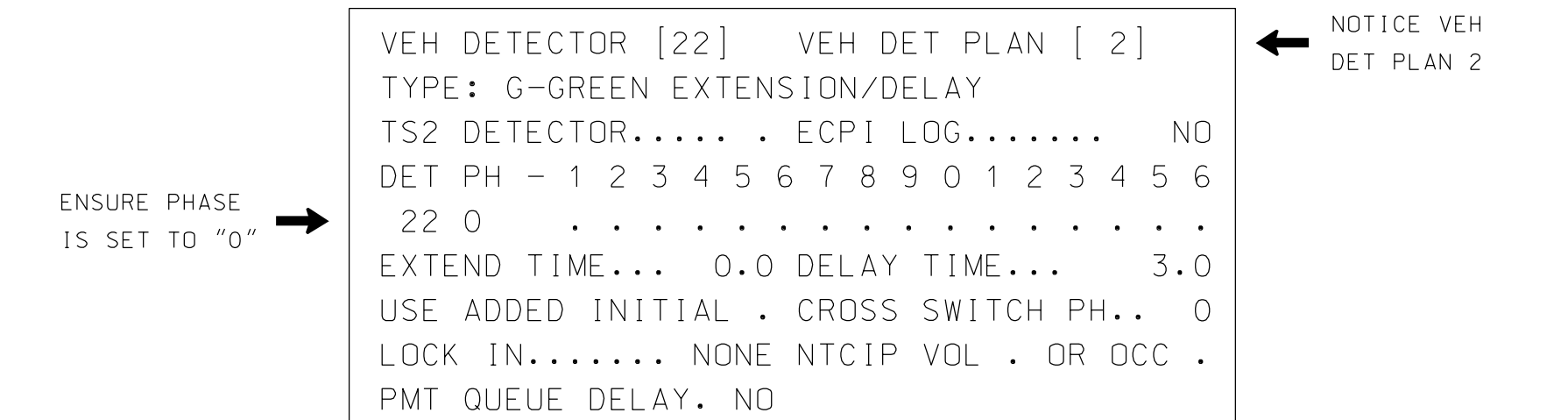
- Place cursor in VEH DETECTOR [] position and enter "26".
- Set assigned phase to "0".



- Place cursor in VEH DETECTOR [] position and enter "5".
- Set delay time to "3".



- Place cursor in VEH DETECTOR [] position and enter "22".
- Set assigned phase to "0".



END PROGRAMMING

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 07-1708
DESIGNED: September 2019
SEALED: 10/16/2019
REVISED: N/A



Electrical Detail-Final Upgrade (Sheet 2 of 3)

<p>ELECTRICAL AND PROGRAMMING DETAILS FOR:</p> <p>Prepared for the Offices of:</p> <p>750 N. Greenfield Pkwy, Garner, NC 27529</p>	<p>US 70 (Burlington Rd) at SR 2826 (Birch Creek Rd) and Publix Driveway</p> <p>Division 7 Guilford County McLeansville</p> <p>PLAN DATE: September 2019 REVIEWED BY: M.L. Stygles</p> <p>PREPARED BY: J. Ma REVIEWED BY:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>REVISIONS</th> <th>INIT.</th> <th>DATE</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>	REVISIONS	INIT.	DATE				<p>DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED</p> <p>SEAL</p> <p>DocuSigned By: <i>M.L. Stygles</i> 10/16/2019</p> <p>SIG. INVENTORY NO. 07-1708</p>
REVISIONS	INIT.	DATE						

ECONOLITE ASC/3-2070 ACTION PLAN PROGRAMMING DETAIL

1. From Main Menu select 5. TIME BASE
2. From TIME BASE Submenu select 2. ACTION PLAN

ACTION PLAN...[1]	
PATTERN.....AUTO	SYS OVERRIDE.... NO
TIMING PLAN..... 0	SEQUENCE..... 0
VEH DETECTOR PLAN.. 2	DET LOG.....NONE
FLASH..... --	RED REST..... NO
VEH DET DIAG PLN... 0	PED DET DIAG PLN..0
DIMMING ENABLE.. NO	PRIORITY RETURN. NO
PED PR RETURN.. NO	QUEUE DELAY..... NO
PMT COND DELAY NO	
PHASE	1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
PED RCL	. . . . .
WALK 2	. . . . .
VEX 2	. . . . .
VEH RCL	. . . . .
MAX RCL	. . . . .
MAX 2	. . . . .
PHASE	1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
MAX 3	. . . . .
CS INH	. . . . .
OMIT	. . . . .
SPC FCT	X . . . X . . . (1-8)
AUX FCT	. . . (1-3)
	1 2 3 4 5 6 7 8 9 0 1 2 3 4 5
LP 1-15	. . . . .
LP 16-30	. . . . .
LP 31-45	. . . . .
LP 46-60	. . . . .
LP 61-75	. . . . .
LP 76-90	. . . . .
LP 91-100	. . . . .

ALTERNATE PHASING ACTIVATION DETAIL

TO RUN ALT. PHASING DURING FREE RUN - PROGRAM CHANGES (SHOWN BELOW) IN A TIME BASED ACTION PLAN. SCHEDULE A DAY PLAN THAT INCLUDES THE ACTION PLAN PROGRAMMED TO SELECT VEH DET PLAN 2 AND ENABLE SF BITS 1 AND 5.

TO RUN ALT. PHASING DURING COORDINATION - SELECT THE TIME BASED ACTION PLAN THAT IS PROGRAMMED TO SELECT VEH DET PLAN 2 AND ENABLE SF BITS 1 AND 5.

PHASING	VEH DET PLAN	SF BITS ENABLED
ACTIONS REQUIRED TO RUN <u>DEFAULT PHASING</u>	1	NONE
ACTIONS REQUIRED TO RUN <u>ALTERNATE PHASING</u>	2	1, 5

IMPORTANT: IF ALT. PHASING IS USED DURING FREE RUN AND COORDINATION, DO NOT OPERATE TIME OF DAY EVENTS CONCURRENTLY WITH COORDINATION PLAN EVENTS IN THE EVENT SCHEDULER. (EX. FREE RUN EVENT SHOULD END BEFORE COORDINATION PLAN EVENT STARTS AND VICE-VERSA).

ALTERNATE PHASING CHANGE SUMMARY

THE FOLLOWING IS A SUMMARY OF WHAT TAKES PLACE WHEN SF BITS 1 AND 5 AND VEH DET PLAN 2 ACTIVATE TO CALL THE "ALTERNATE PHASING":

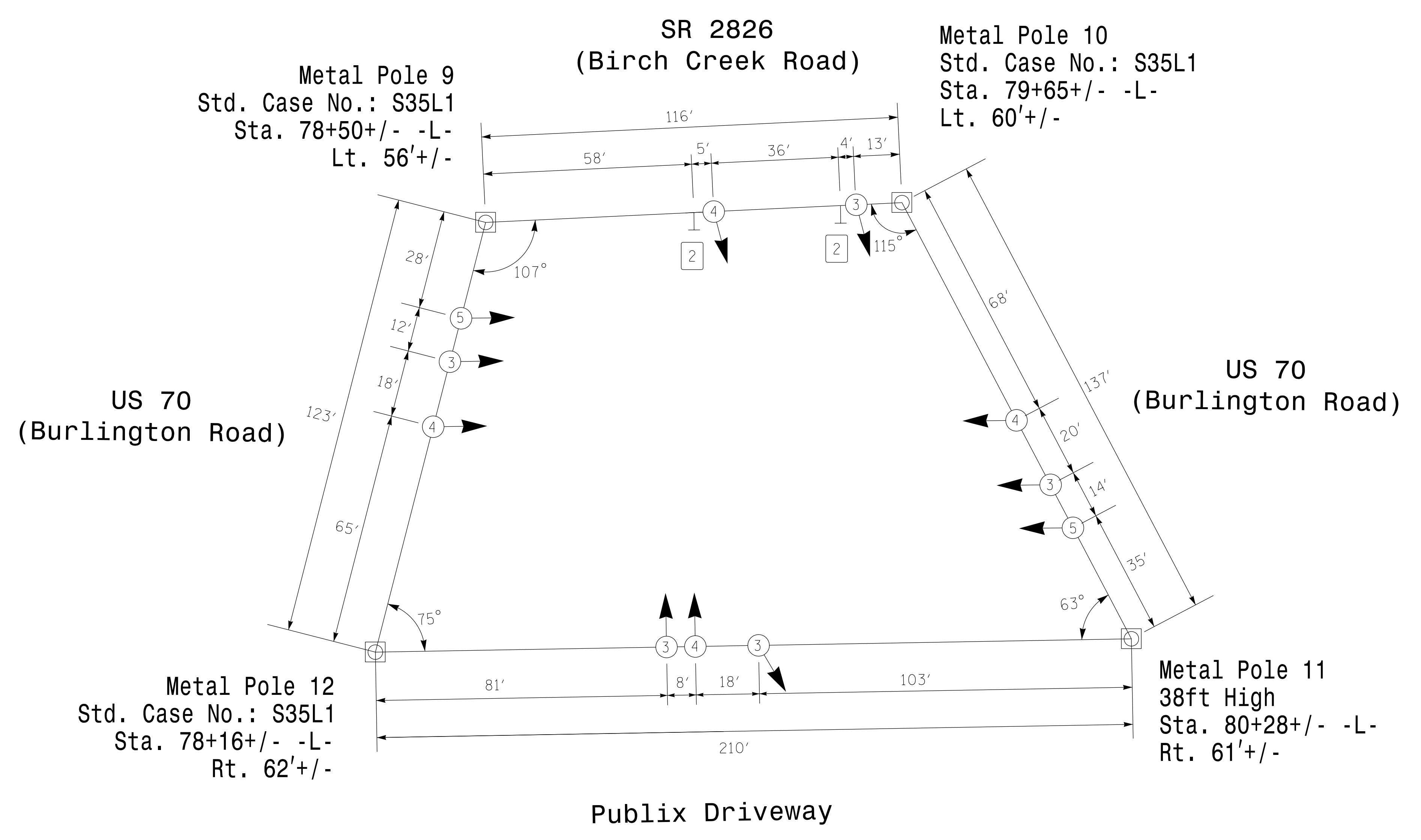
- SF BITS 1,5: Modifies overlap parent phases for heads 11 and 51 to run protected turns only.
- VEH DET PLAN 2: Disables phase 6 call on loop 1A and reduces delay time for phase 1 call on loop 1A to 3 seconds.
Disables phase 2 call on loop 5A and reduces delay time for phase 5 call on loop 5A to 3 seconds.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-1708
DESIGNED: September 2019
SEALED: 10/16/2019
REVISED: N/A



Electrical Detail-Final Upgrade (Sheet 3 of 3)

<p>ELECTRICAL AND PROGRAMMING DETAILS FOR:</p> <p>Prepared for the Offices of:</p> <p>750 N. Greenfield Pkwy, Garner, NC 27529</p>	<p>US 70 (Burlington Rd) at SR 2826 (Birch Creek Rd) and Publix Driveway</p> <p>Division 7 Guilford County McLeansville</p> <p>PLAN DATE: September 2019 REVIEWED BY: M.L. Stygles</p> <p>PREPARED BY: J. Ma REVIEWED BY:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>REVISIONS</th> <th>INIT.</th> <th>DATE</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>	REVISIONS	INIT.	DATE				<p>DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED</p> <p>SEAL</p> <p>10/16/2019</p> <p>Signature: <i>Juan Ma</i></p> <p>827E1953081444F DATE</p> <p>SIG. INVENTORY NO. 07-1708</p>
REVISIONS	INIT.	DATE						



SPANWIRE LOADING SCHEDULE					
SYMBOL	LOADING	DESCRIPTION	AREA	SIZE	WEIGHT
← 5		RIGID MOUNTED SIGNAL HEAD 12"-5 SECTION-WITH BACKPLATE	16.3 S.F.	42.0" W X 56.0" L	103 LBS
← 3		RIGID MOUNTED SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE	9.3 S.F.	25.5" W X 52.5" L	60 LBS
← 4		RIGID MOUNTED SIGNAL HEAD 12"-4 SECTION-WITH BACKPLATE	11.5 S.F.	25.5" W X 66.0" L	74 LBS
—		SIGN RIGID MOUNTED	7.5 S.F.	30.0" W X 36.0" L	14 LBS

NOTES

DESIGN REFERENCE MATERIAL

- Design the traffic signal structure and foundation in accordance with:
 - The 6th Edition 2013 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
 - The 2018 NCDOT "Standard Specifications for Roads and Structures." The latest addenda to the specifications can be found in the traffic signal project special provisions.
 - The 2018 NCDOT Roadway Standard Drawings.
 - The traffic signal project plans and special provisions.
 - The NCDOT "Metal Pole Standards" located at the following NCDOT website: <https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx>

DESIGN REQUIREMENTS

- Design the traffic signal structure using the loading conditions shown in the plan view. These are anticipated worst case "design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
- Design all signal supports using stress ratios that do not exceed 0.9.
- Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
- The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

The pole fabricator shall verify that the pole case number and pole height indicated in the plan will support the required loading.



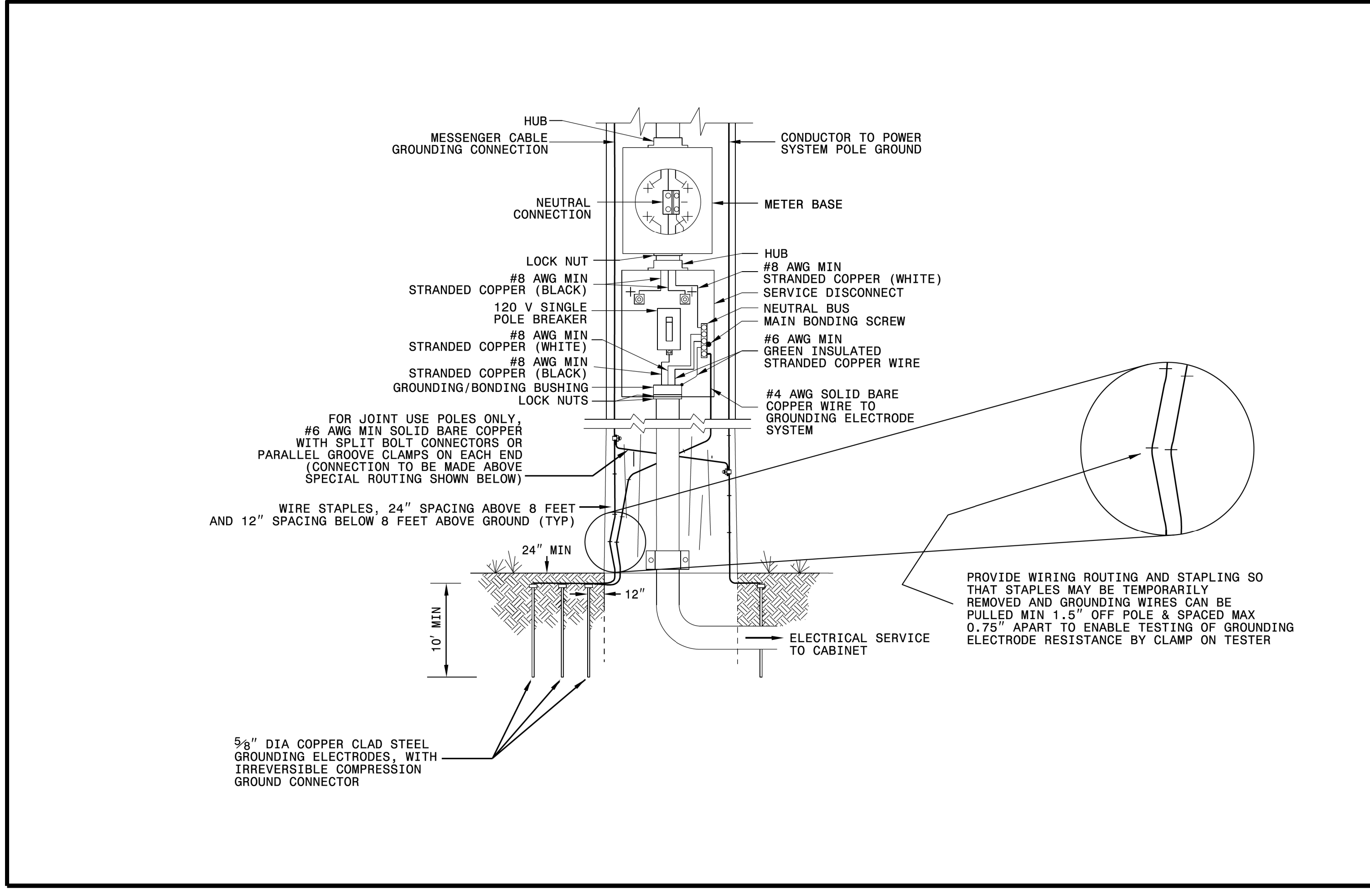
NCDOT Wind Zone 4 (90 mph)

 Prepared for the Offices of: 750 N. Greenfield Pkwy, Garner, NC 27529	US 70 (Burlington Rd) at SR 2826 (Birch Creek Rd) and Publix Driveway		SEAL J. Ma 10/17/2019
	Division 7 Guilford County Greensboro PLAN DATE: October 2019 REVIEWED BY: M. Stygles PREPARED BY: J. Ma REVIEWED BY:	REVISIONS INIT. DATE		DocuSign 10/17/2019 DATE SIG. INVENTORY NO. 07-1708

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

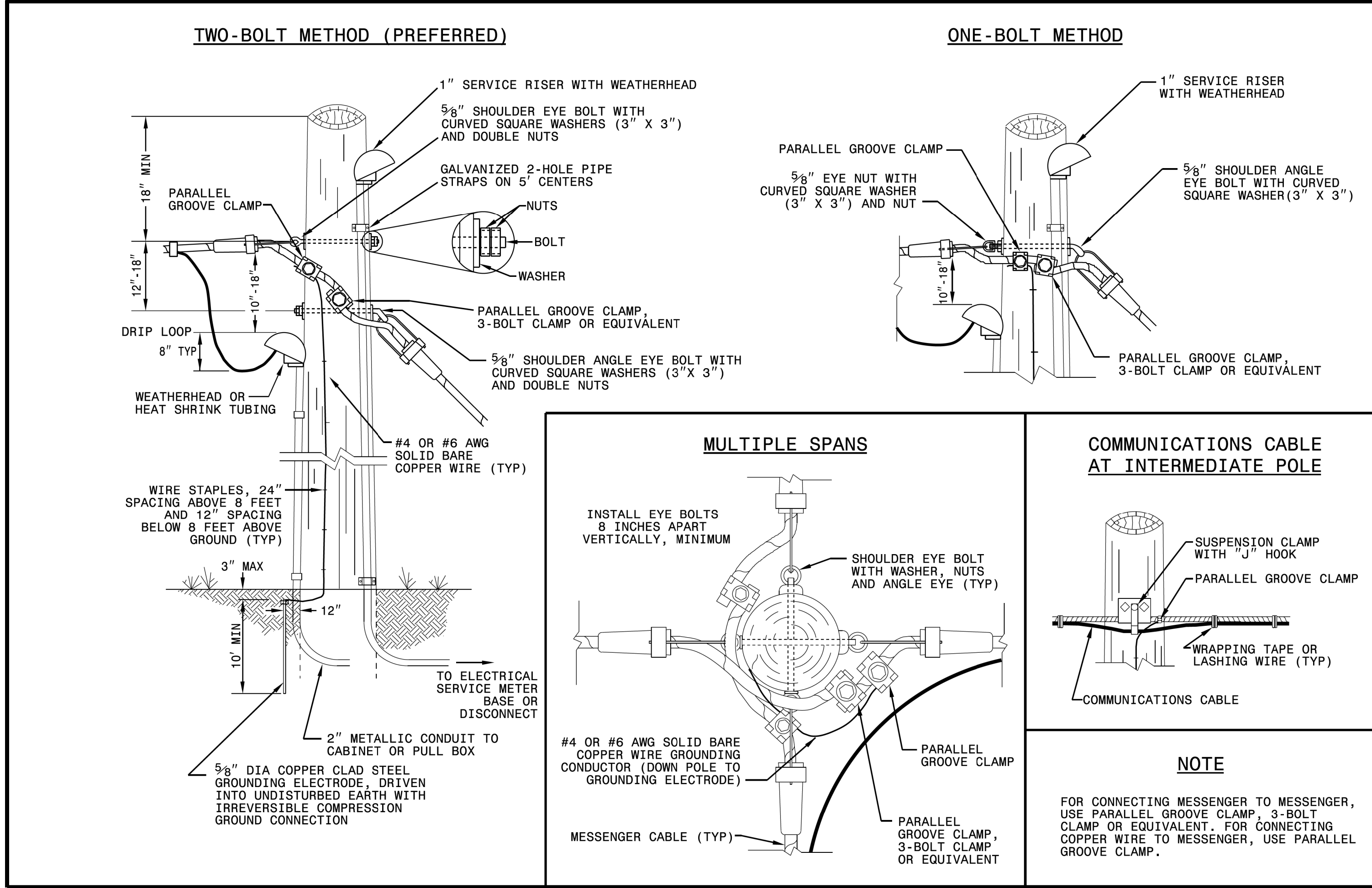


11-DOT-2017-08456
U-2018 Std Drawings/Plate Sheets/2018_Plate_Sheet_4.dgn
r.mhough

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

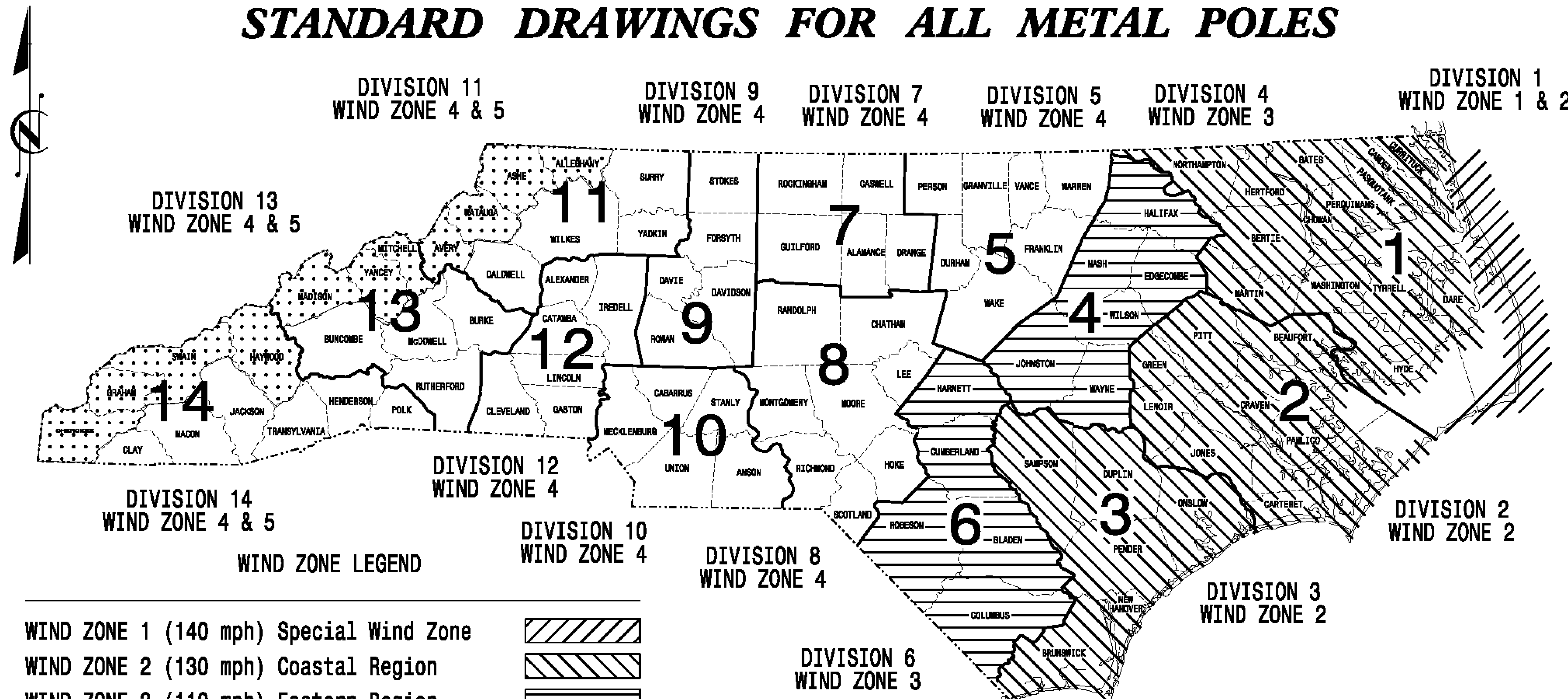
See Plate for Title

<p>Prepared in the Offices of:</p> <p>750 N. Greenfield Parkway Garner, NC 27529</p>	<p>SEAL</p> <p>DocuSigned by: <i>Mohd Aslami</i> 10/11/2017 DATE</p>
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STATE OF NORTH CAROLINA DIVISION OF HIGHWAYS

PROJECT ID. NO. U-2581BA	SHEET NO. Sig.M1
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STANDARD DRAWINGS FOR ALL METAL POLES



<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

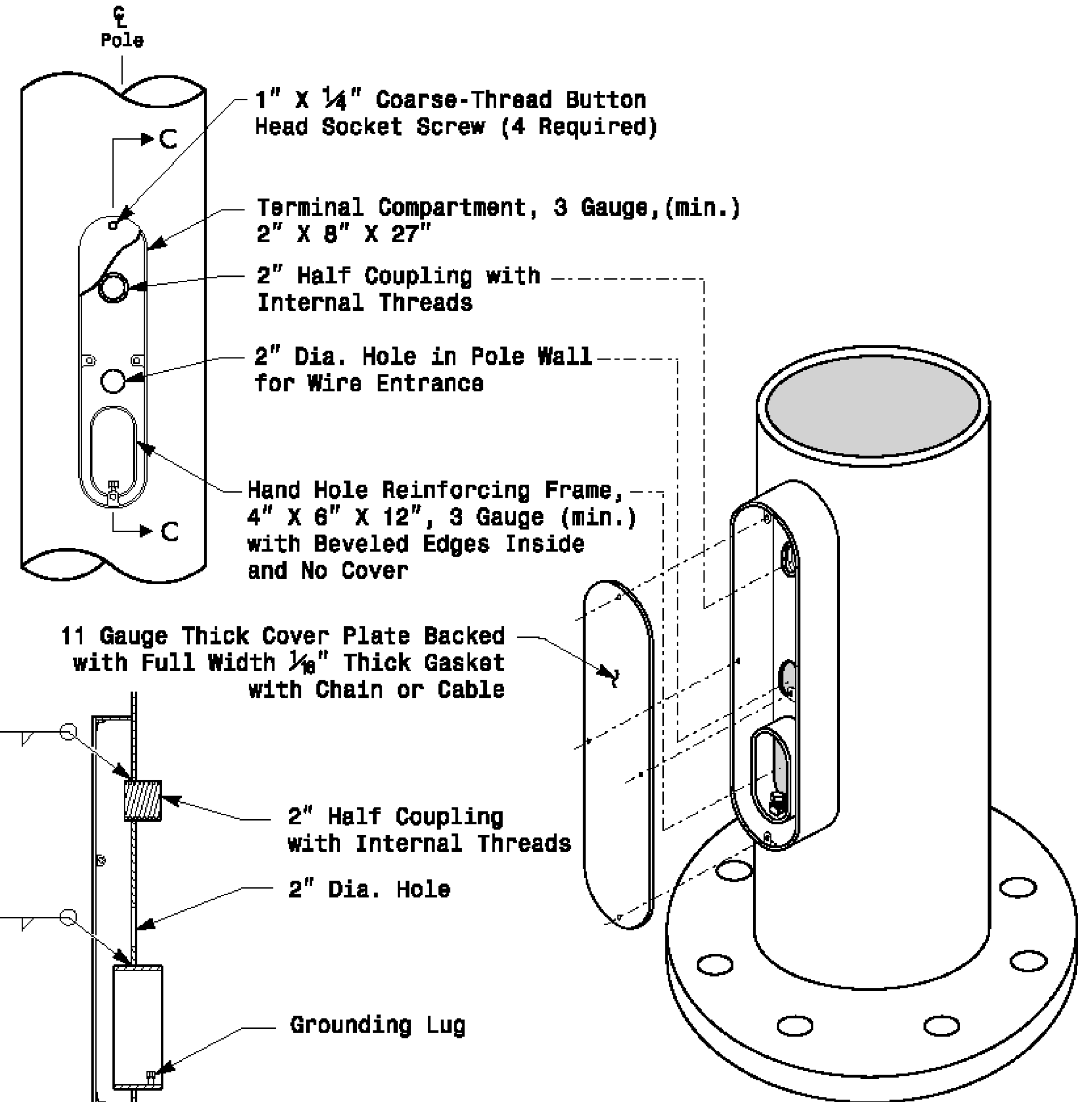
M.M. MCDIARMID, P.E. - STATE ITS AND SIGNALS ENGINEER

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

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

SEAL

10/11/2017
DATE



Section C-C

Note: Unless otherwise specified, locate Terminal Compartment 1 foot above the pole base plate at 180 degrees on the pole's radial index.

Terminal Compartment Detail

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

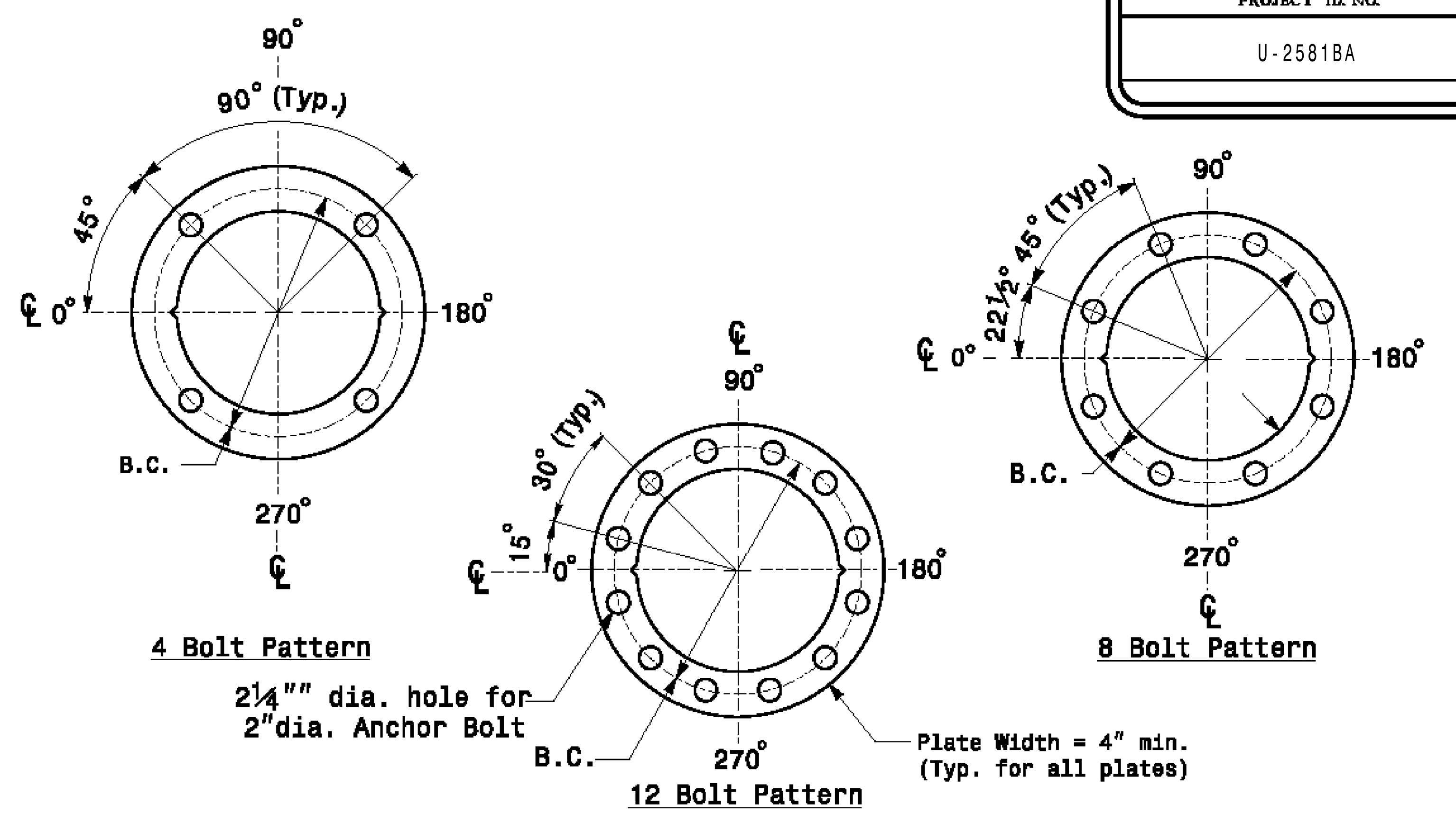
Shaft I.D. Tag
(Provide on Shaft of Strain Poles and Mast Arm Poles Shaft)

- Notes:
- 1) D= Diameter, T= Thickness, L= Length, Y= Yield Strength
 - 2) A.B. = Anchor Bolt
 - 3) B.C. = Bolt Circle of Anchor Bolts
 - 4) If Custom Design, use "NCDOT STANDARD" line for Signal Inv. Number and pole I.D. number
 - 5) See drawing M3 and M4 for mounting positions of I.D. tags.

Identification Tag Details

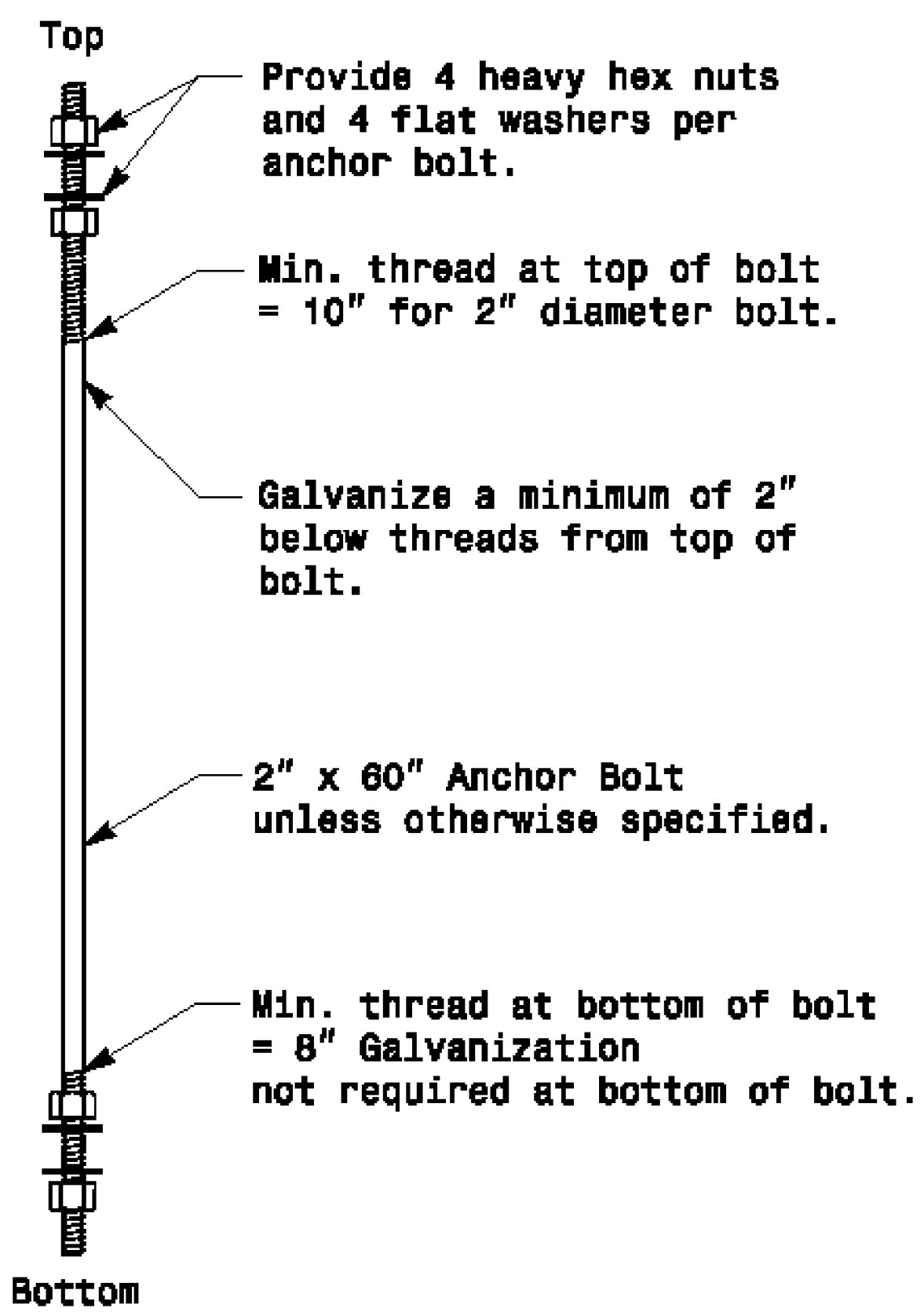
MFG _____	MFG. DATE: MM/YY _____
SECTION D/T/L/Y _____	
NCDOT SIG. INV. NO. _____	
NCDOT POLE NO. _____	

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

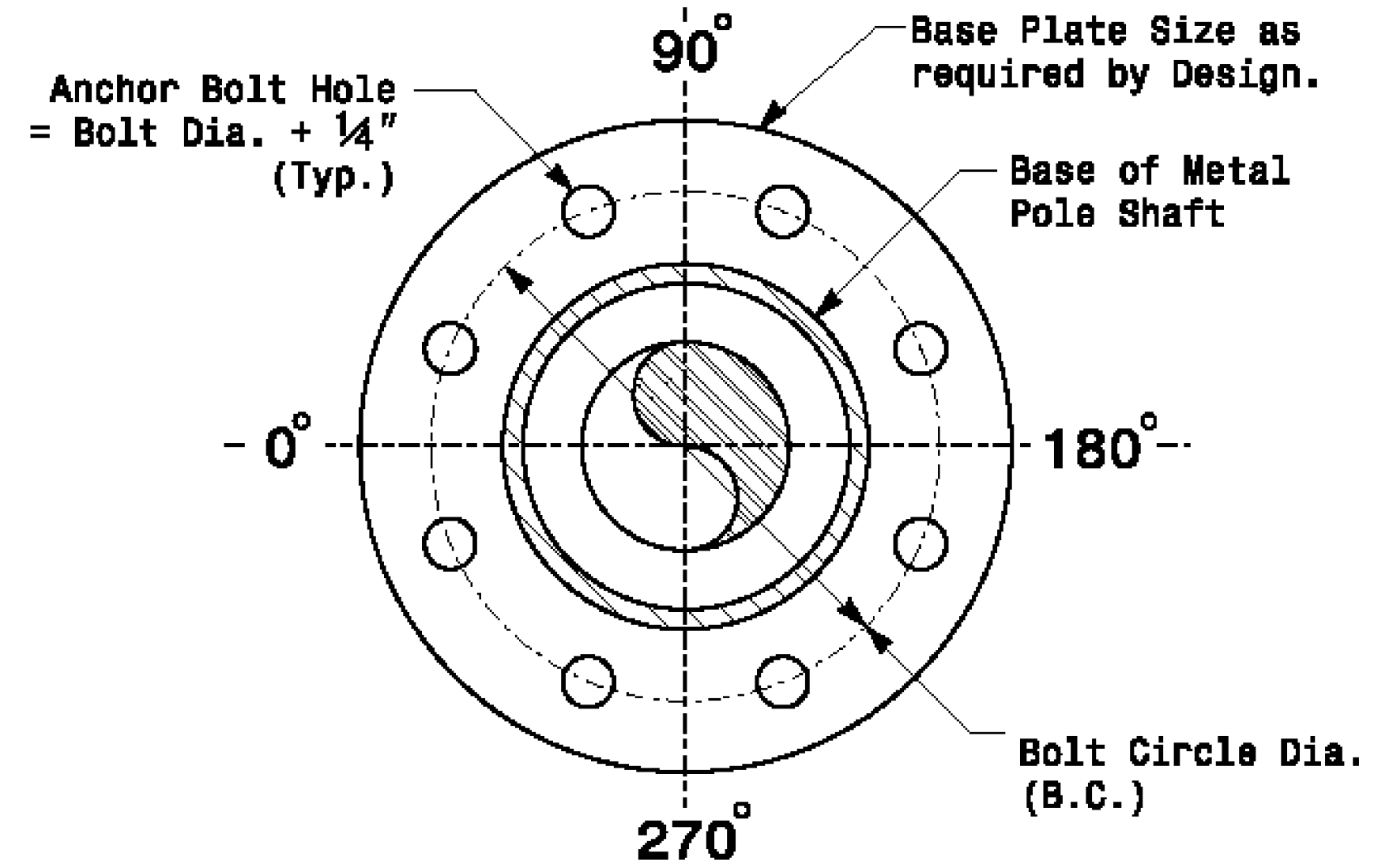


Construct Templates and Plates from 1/4" min. thick Steel. Galvanizing is not required.

Base Plate Template and Anchor Bolt Lock Plate Details

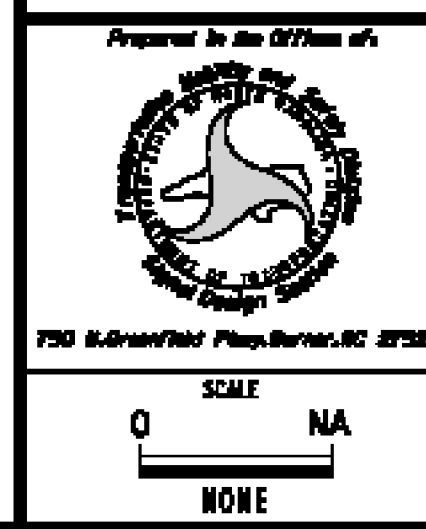


Anchor Bolt Detail

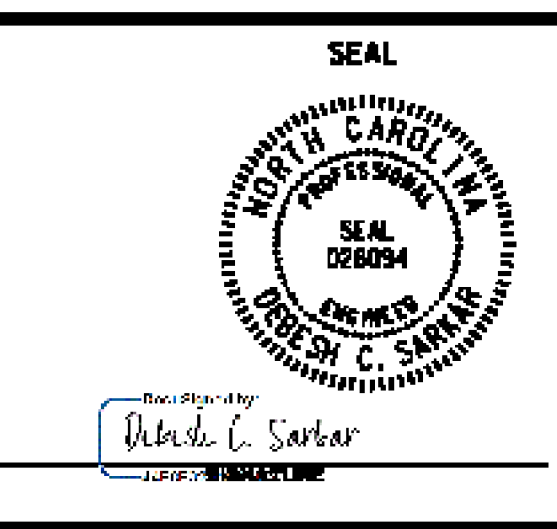


Note: Base plate may be circular, octagonal, square or rectangular in shape.

Typical Base Plate Detail

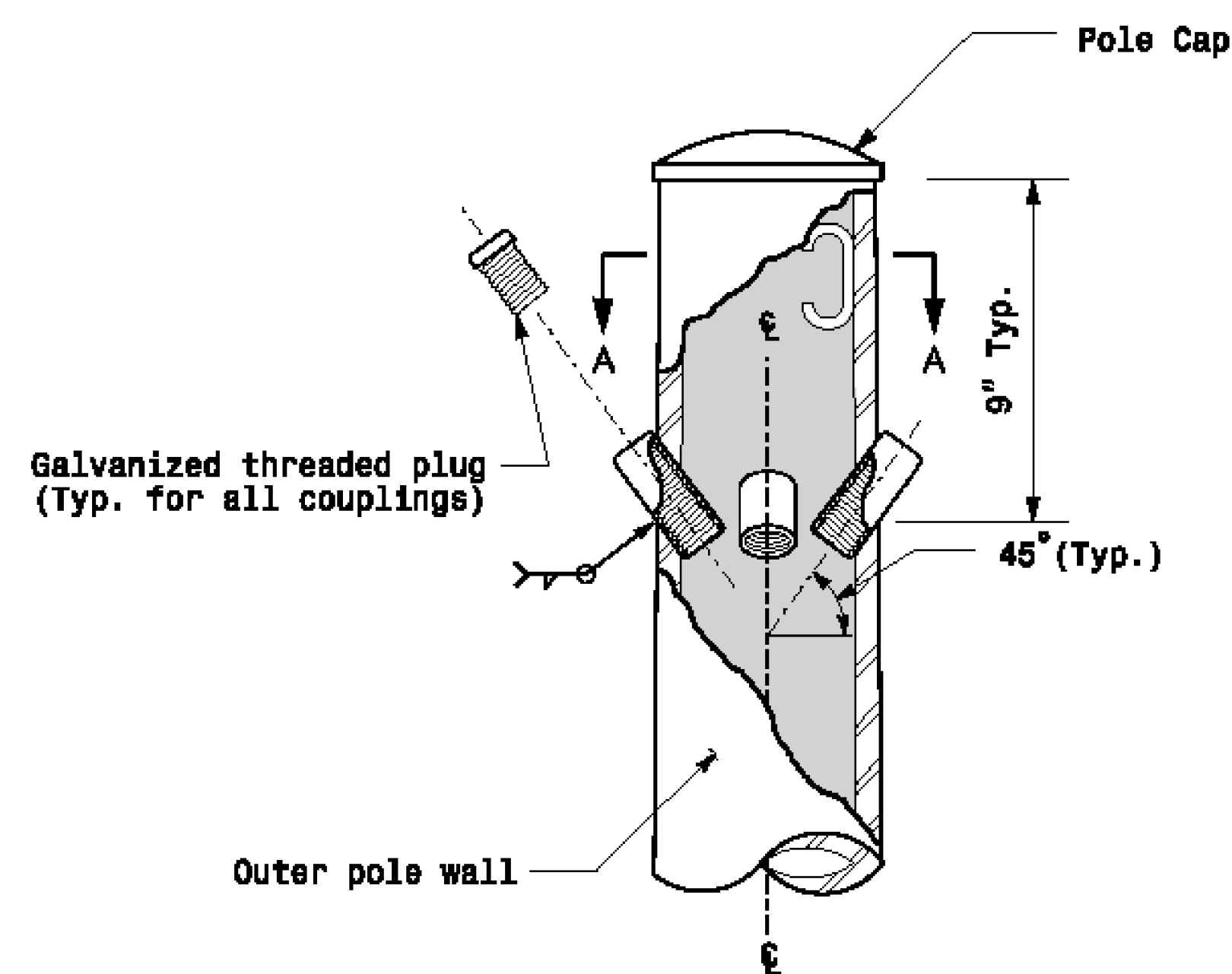


Typical Fabrication Details For All Metal Poles	
PLAN DATE: OCTOBER 2017	DESIGNED BY: C. F. ANDREWS
PREPARED BY: N. BITTING	REVIEWED BY: D. C. BARKAR
REVISIONS	INIT. DATE

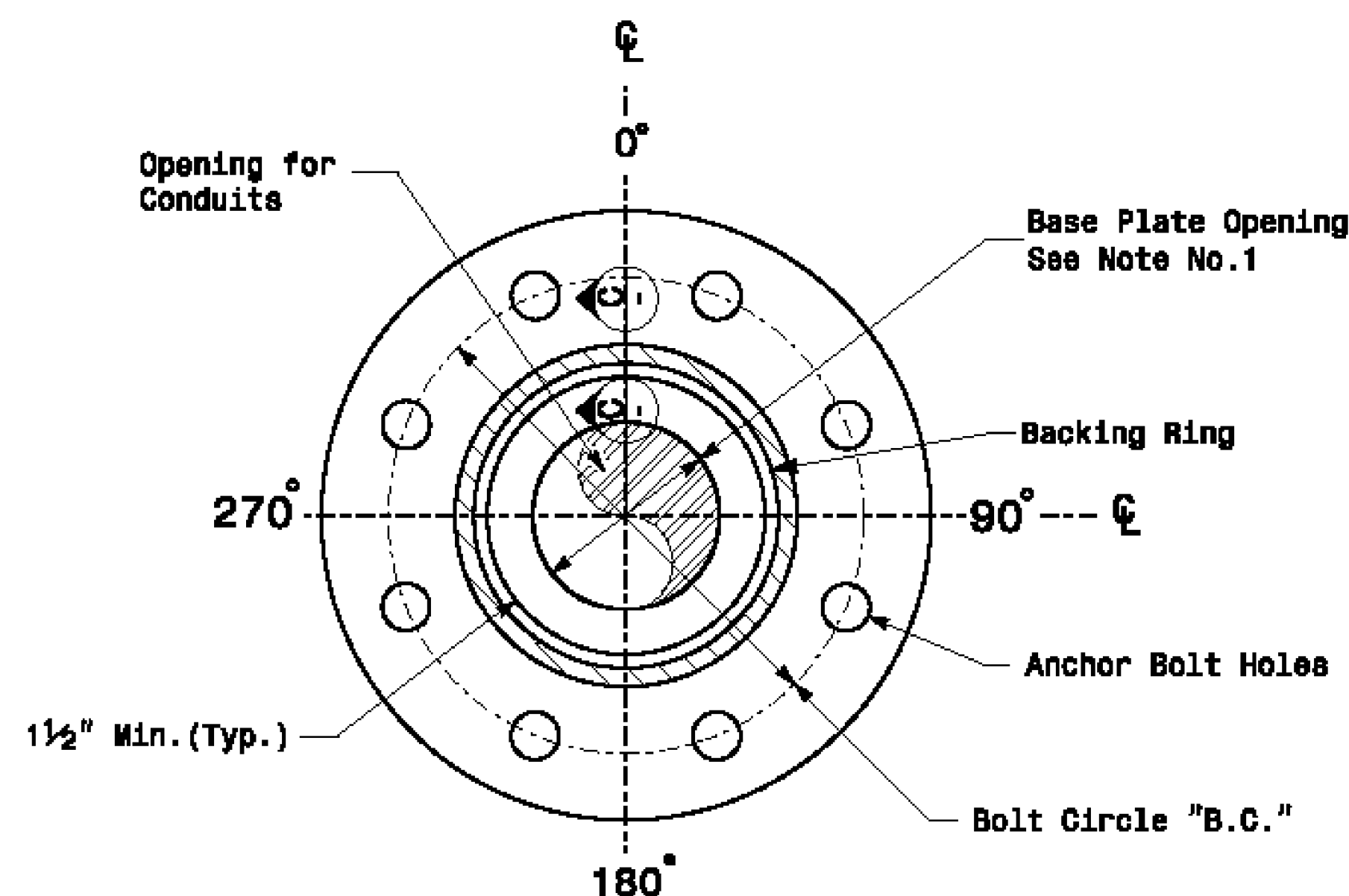


11-0617-2017 08:30 514 15264115 5100 15451001 Section SectionEastern SectionSheet01(2014 514 152 514 Fabrication Detail 15-11) Poles.dgn

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".

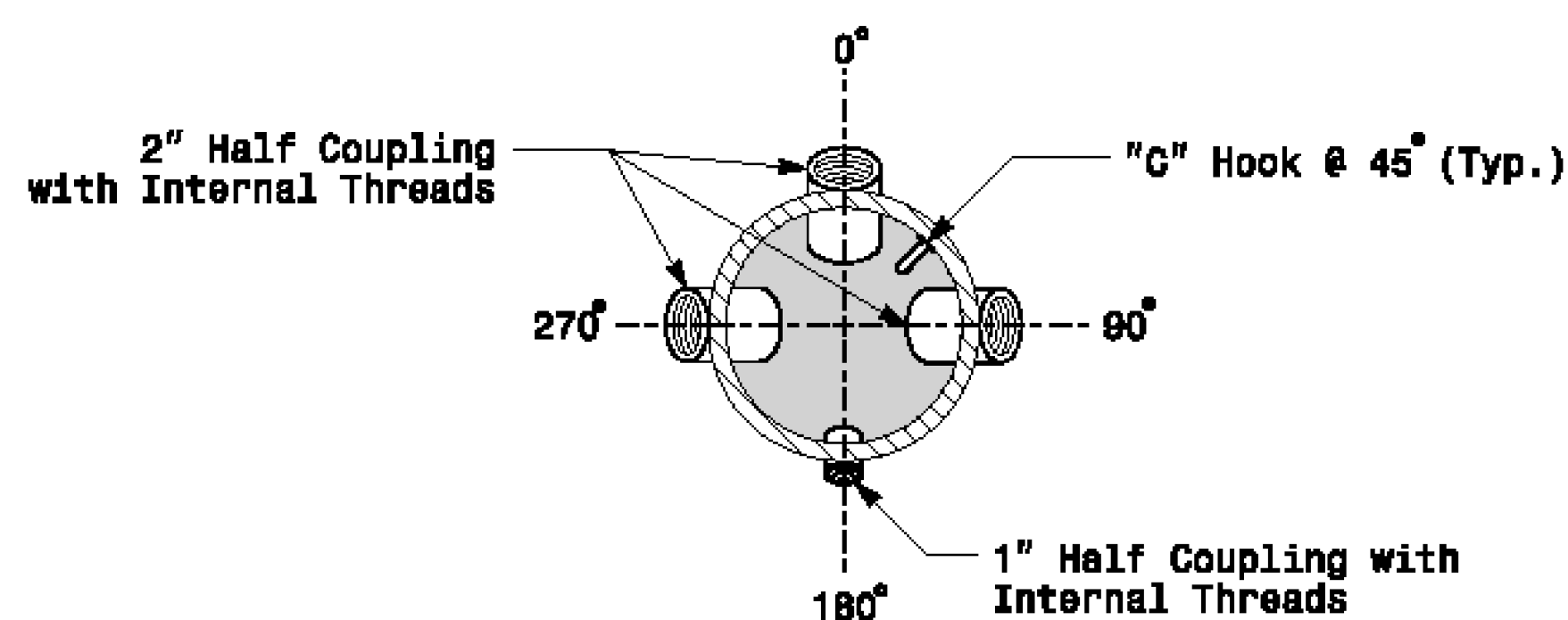


Cable Entrances at Top of Pole

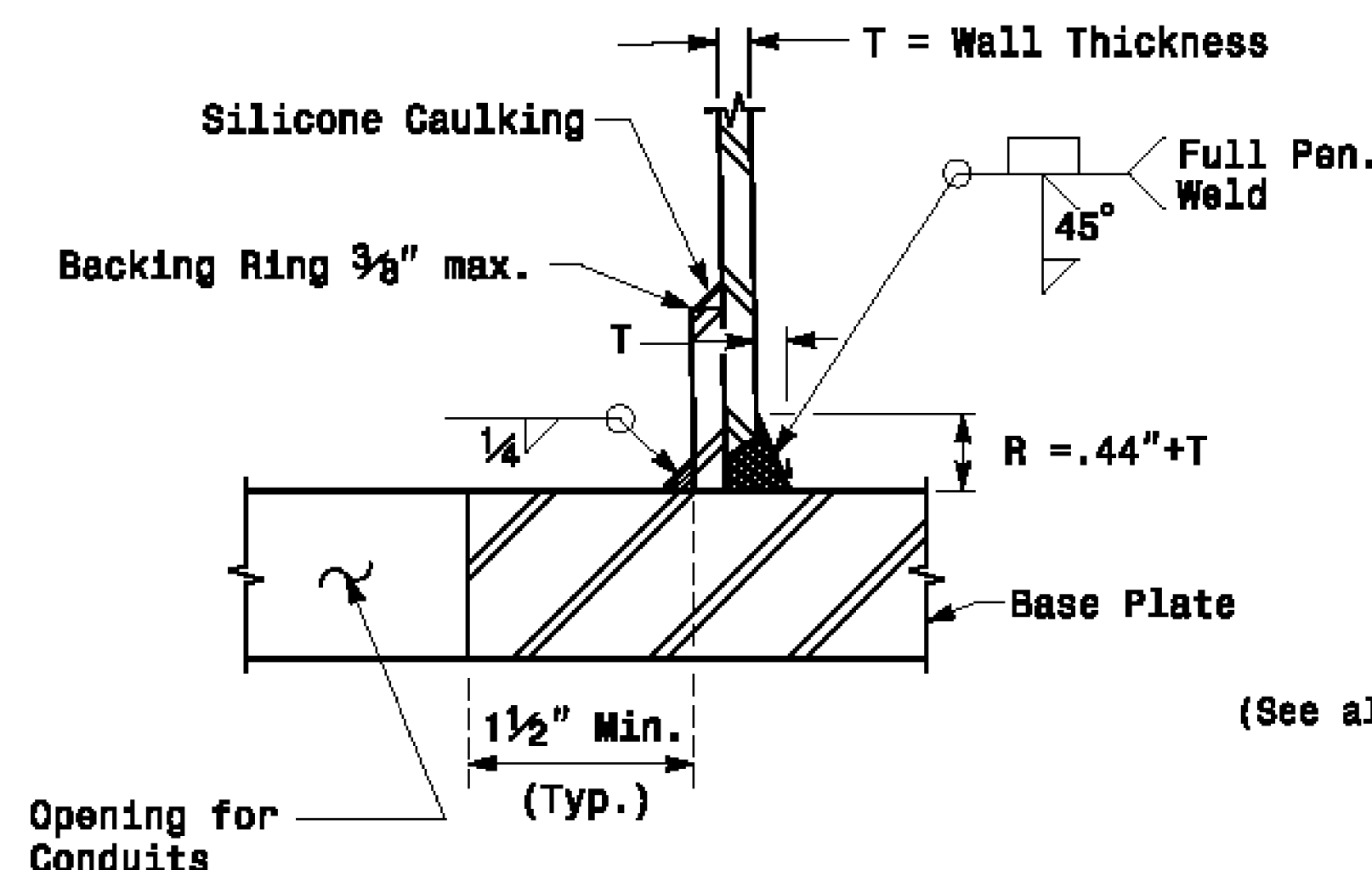


**Section B-B
Pole Base Plate Details
(8 and 12 Bolt Pattern)**

2 Cable Clamps designed for variable attachment heights from 1'-6" to 5'-0" below the top of the pole.



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



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

Shaft I.D. Tag (See drawing M2 for details)

Terminal Compartment (See drawing M2 for details)

Anchor Bolt (See also drawing M2 for details)

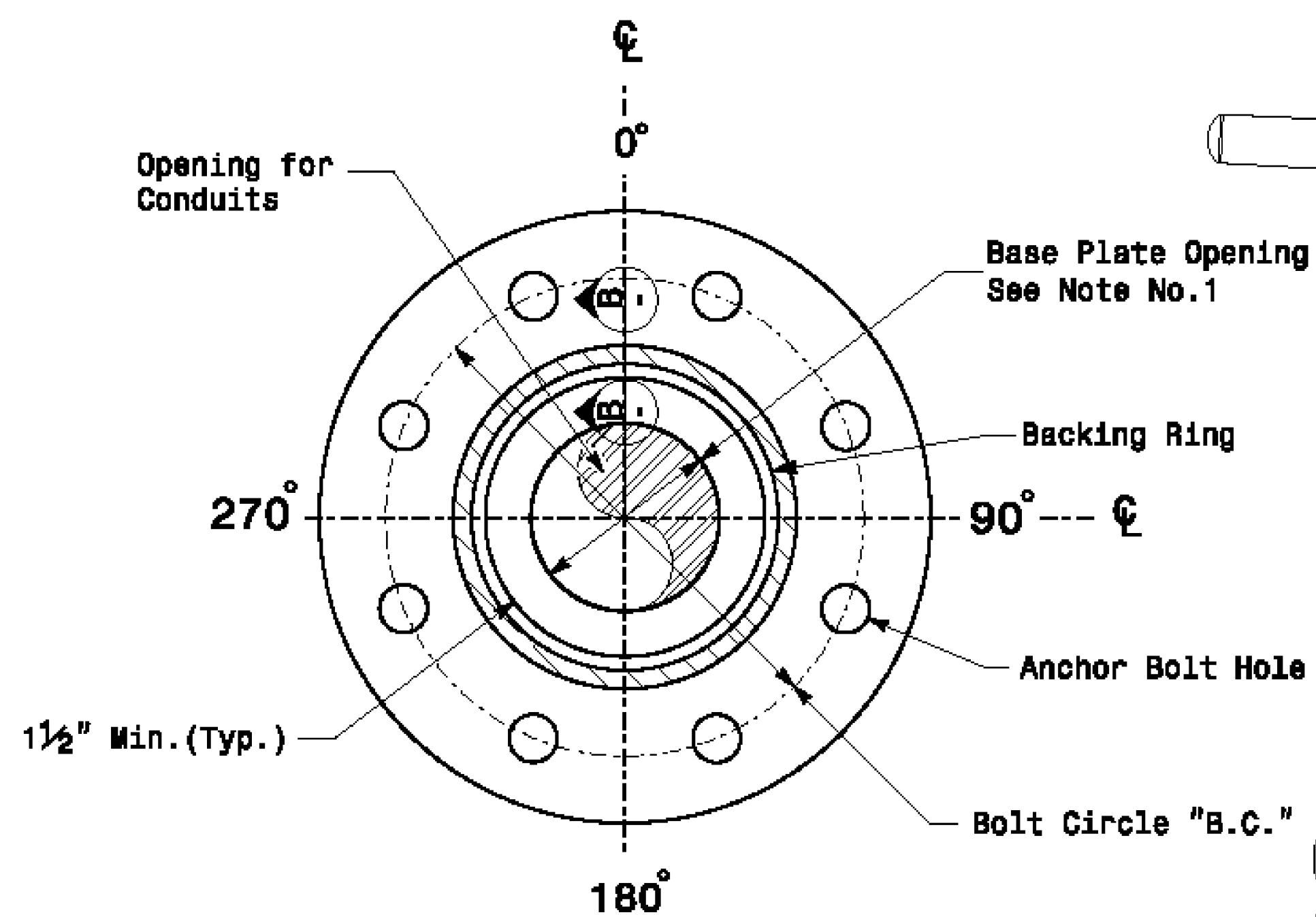
Monotube Strain Pole

	Typical Fabrication Details For Strain Poles		
	PLAN DATE: OCTOBER 2017 PREPARED BY: N. BITTING	DESIGNED BY: K.C. DURIGON REVIEWED BY: D.C. SARKAR	
SCALE: NONE	REVISIONS:	IMIT. DATE:	DATE: 10/11/2017

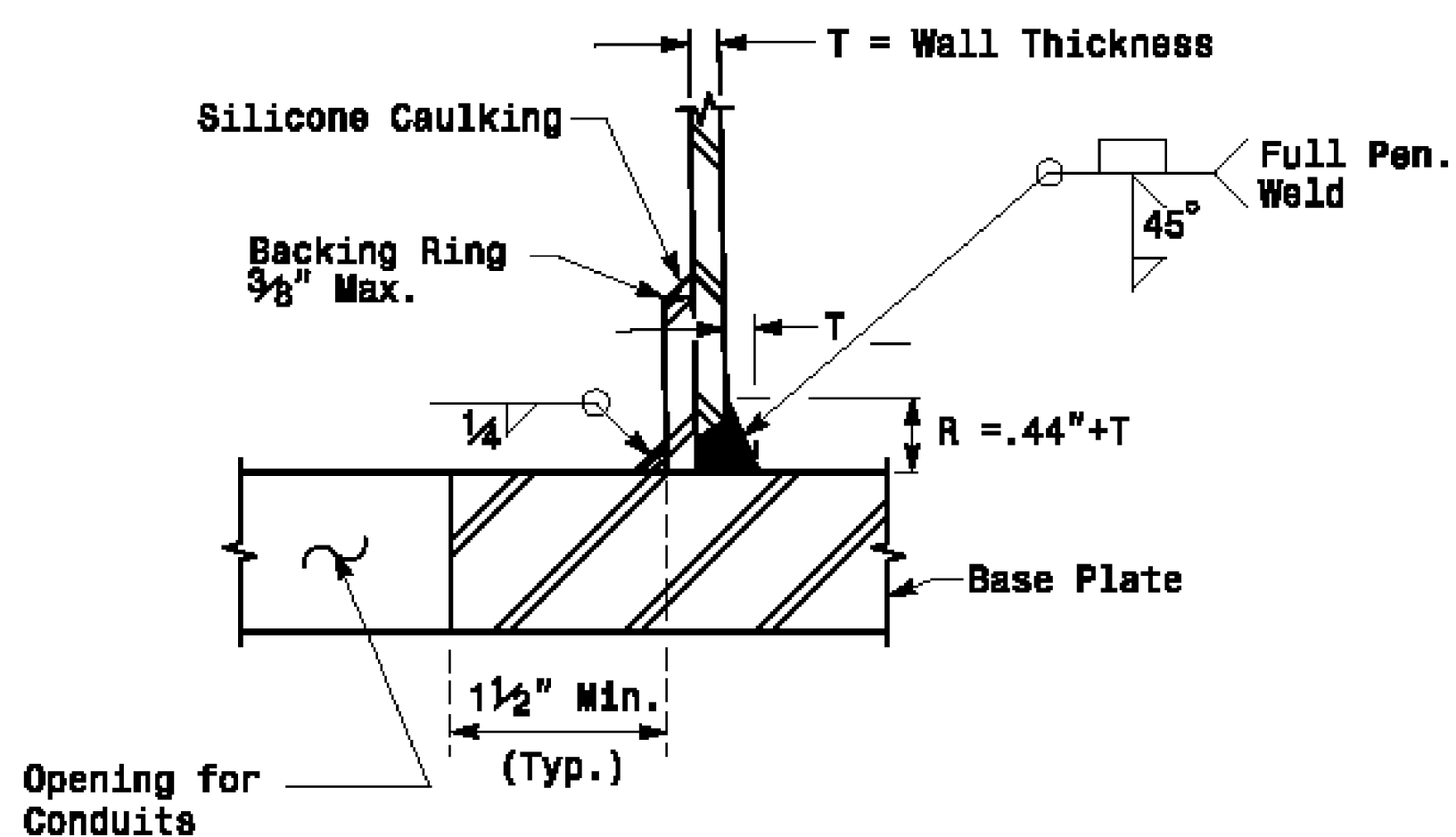
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D:\Users\N.Bitting

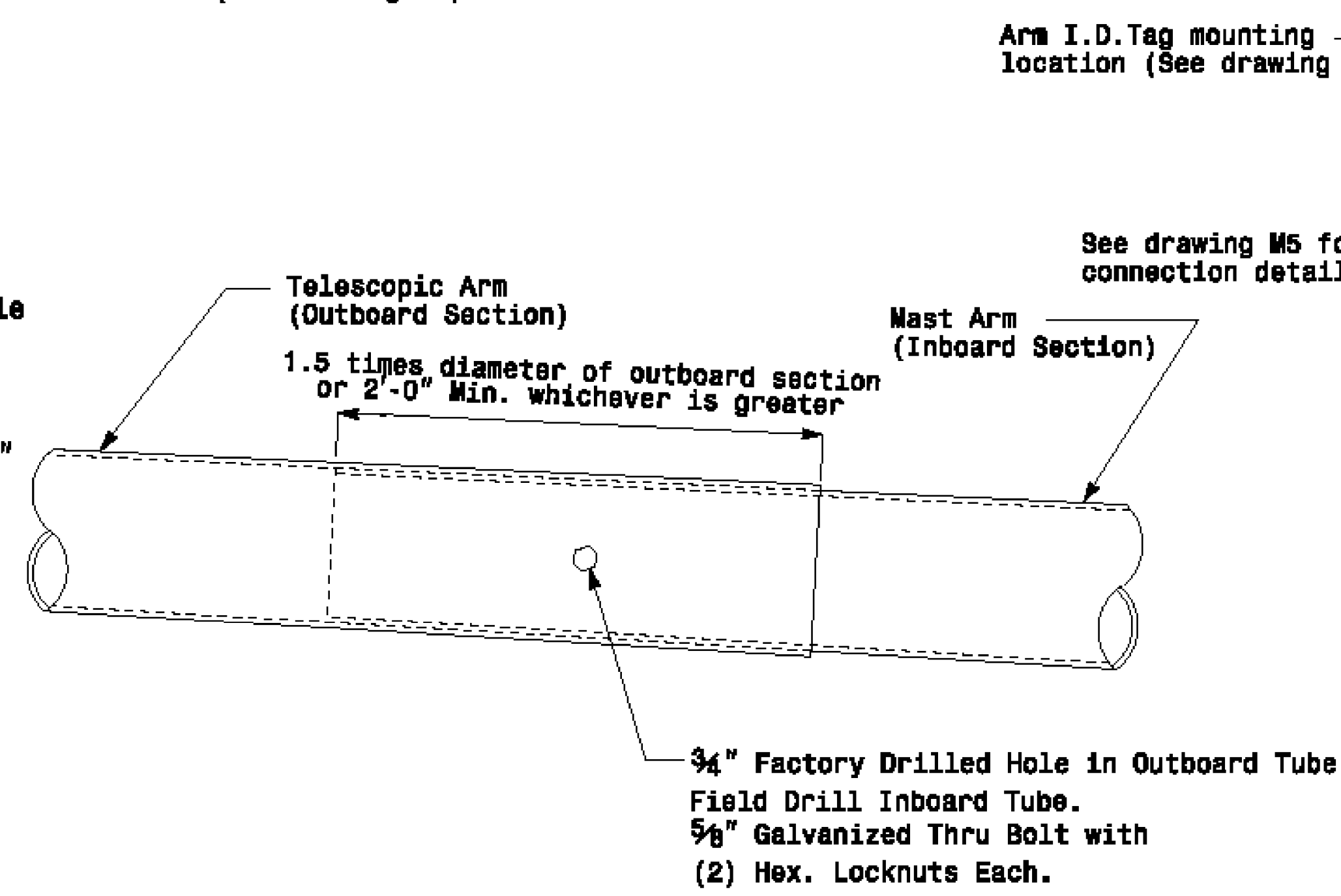
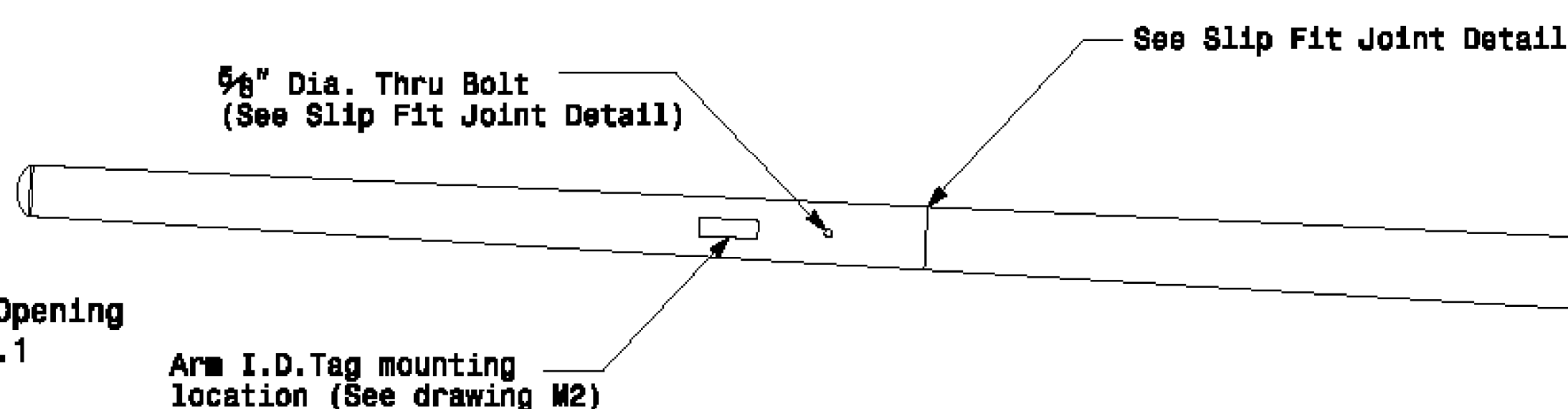
Note:
 1. Opening in pole base plate shall be equal to pole base inside diameter minus 3 1/2" but shall not be less than 8 1/2".



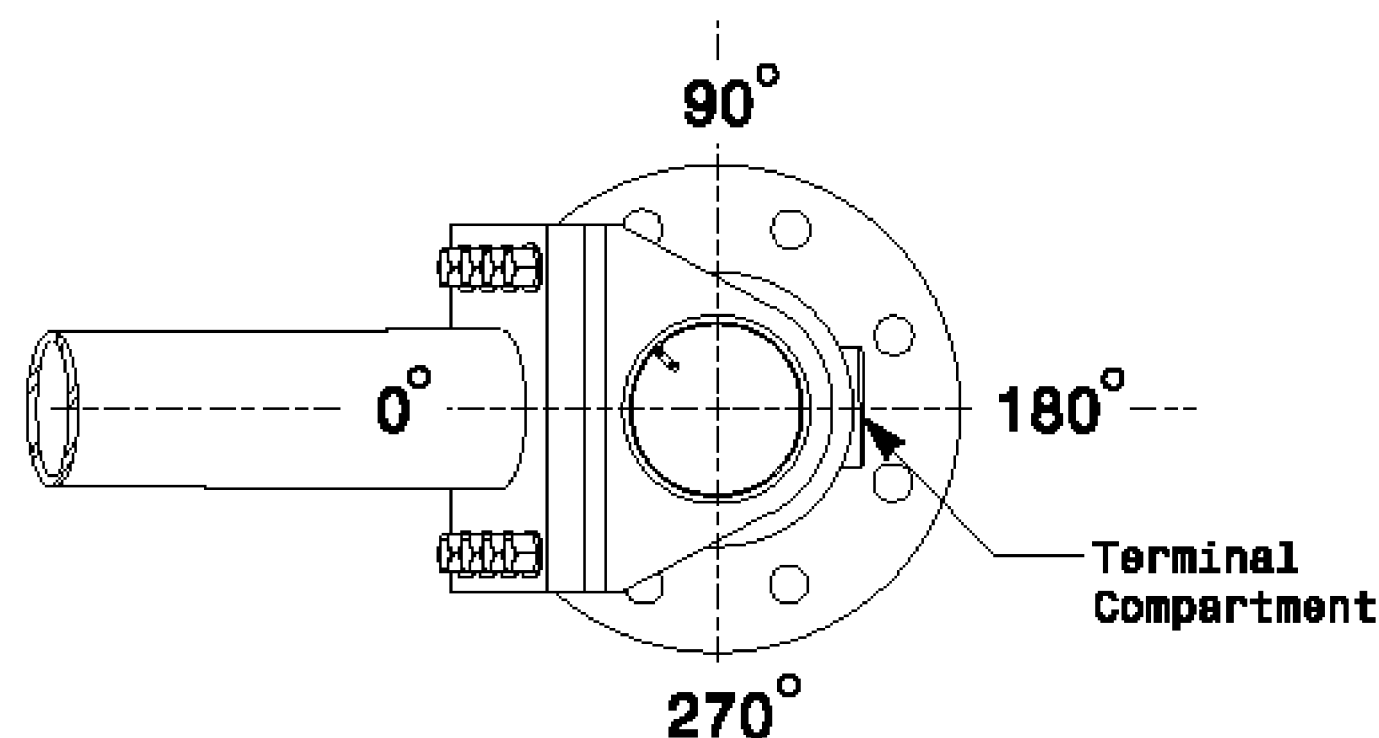
Section A-A
Pole Base Plate Details



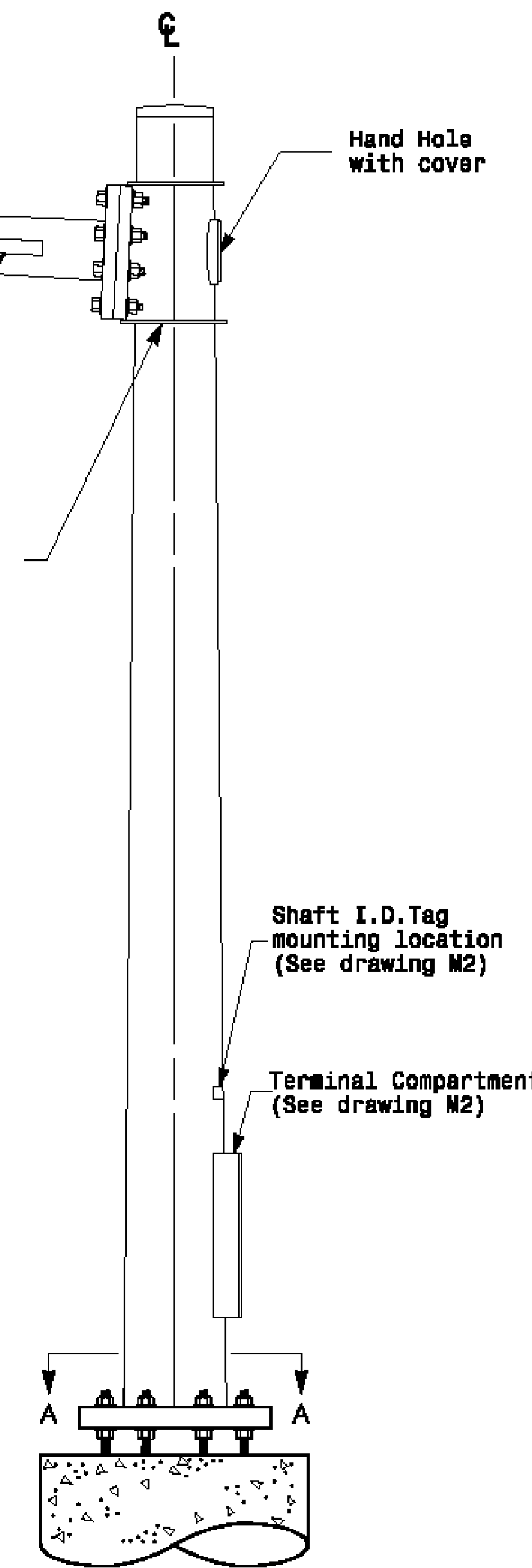
Section B-B
 (Pole Attachment to Base Plate)
Full-Penetration Groove Weld Detail



Slip Fit Joint Detail for Mast Arm



Mast Arm Radial Orientation

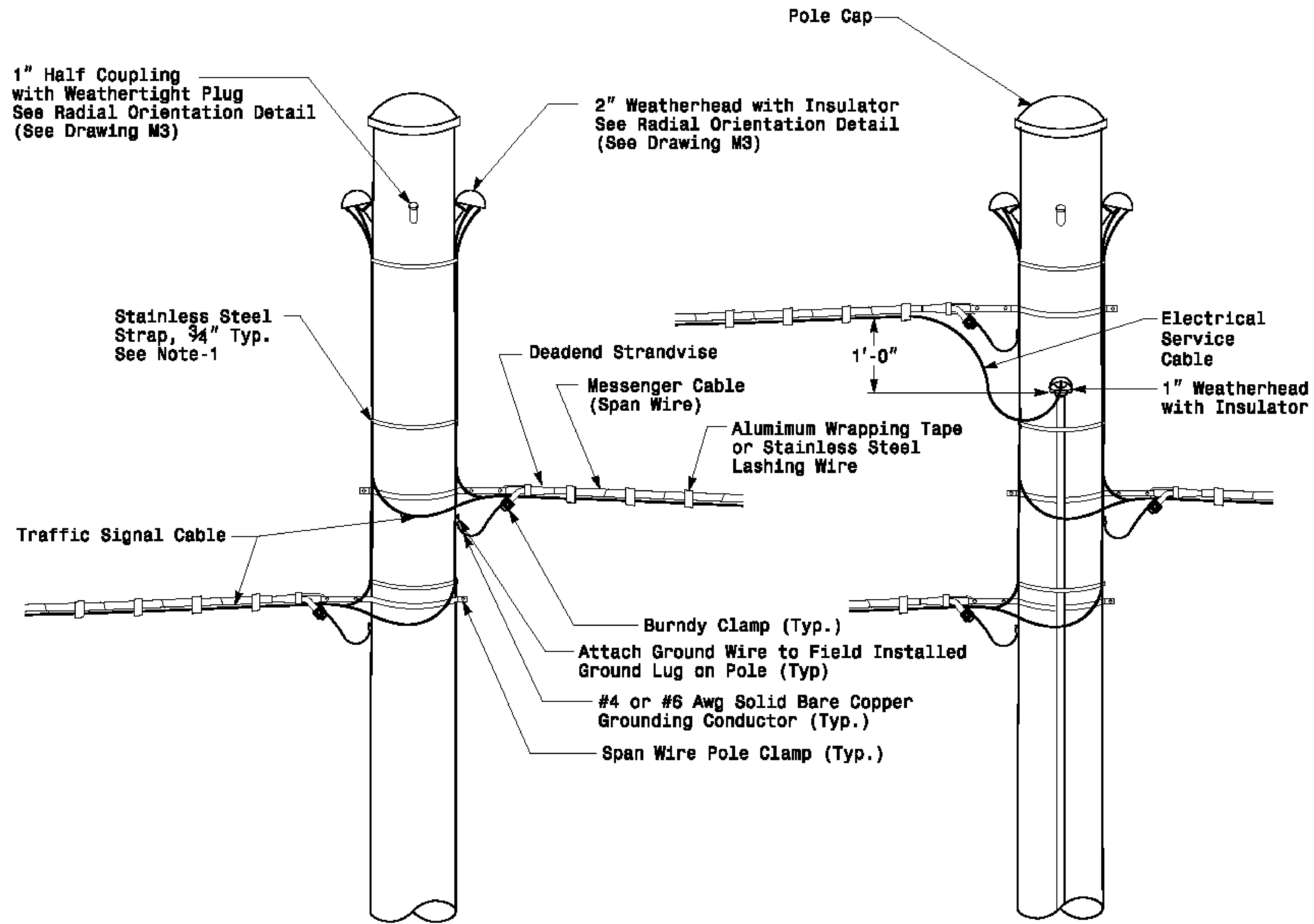


Mast Arm Pole

	Typical Fabrication Details For Mast Arm Poles		SEAL 	
	PLAN DATE: OCTOBER 2017 DESIGNED BY: K.C. DURIGON	PREPARED BY: N. BITTING REVIEWED BY: D.C. BARKAR		REVISIONS INIT. DATE
	SCALE: 0 NA NONE	DATE: 10/11/2017		DATE

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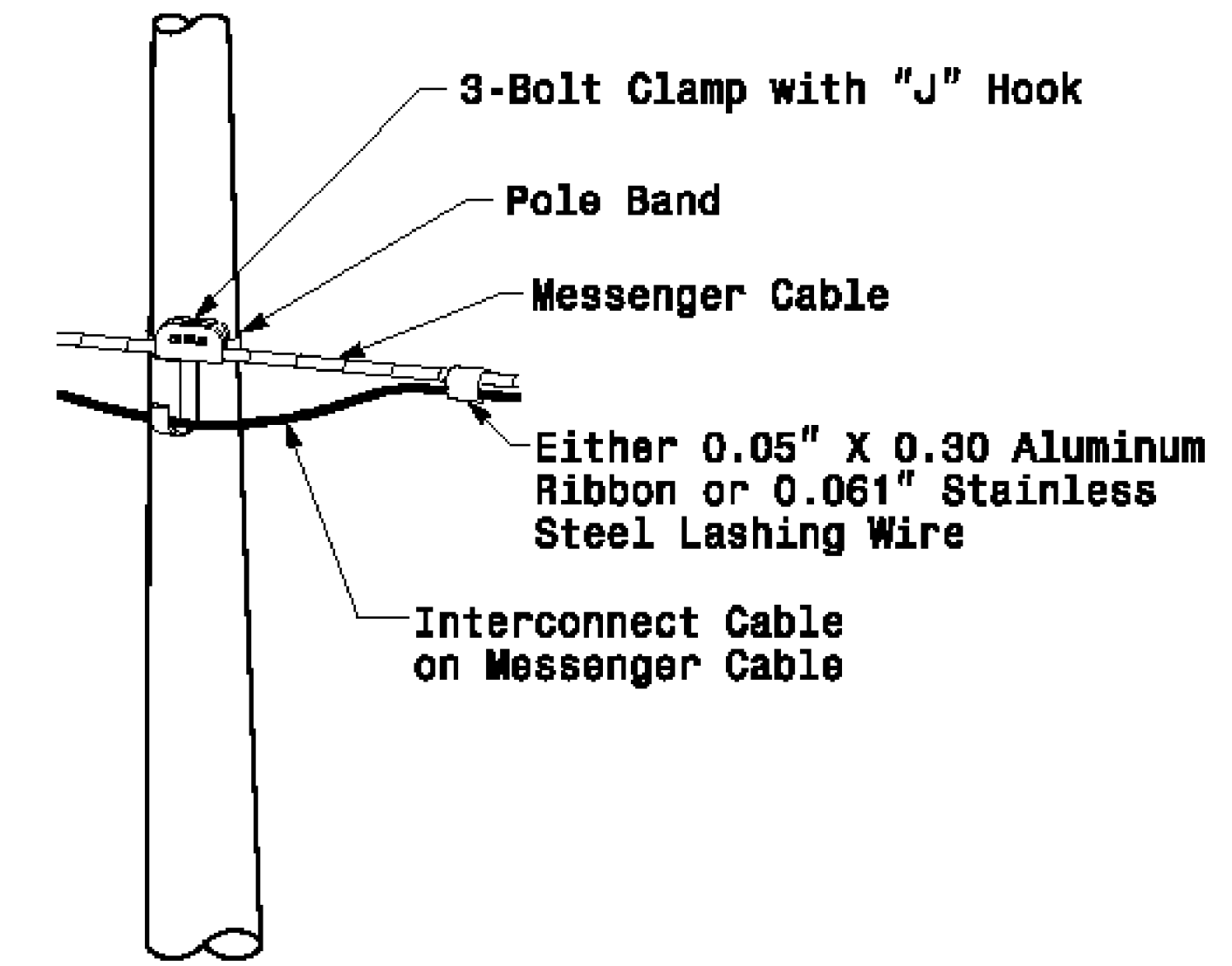
Fabrication Details - Mast Arm Poles



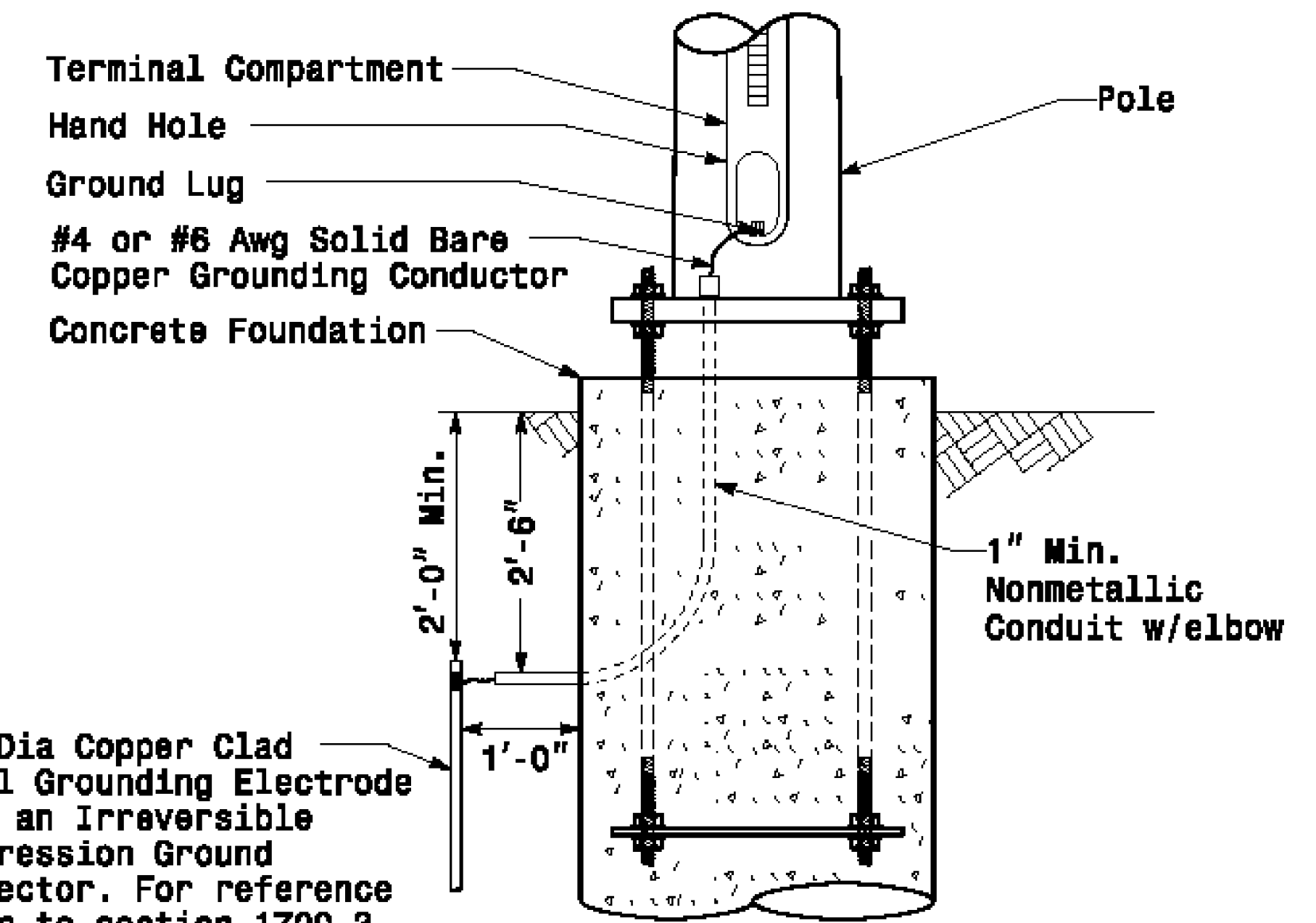
Strain Pole Attachments

NOTE:

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



Attachment of Cable to Intermediate Metal Pole



Metal Pole Grounding Detail For Strain Pole and Mast Arm



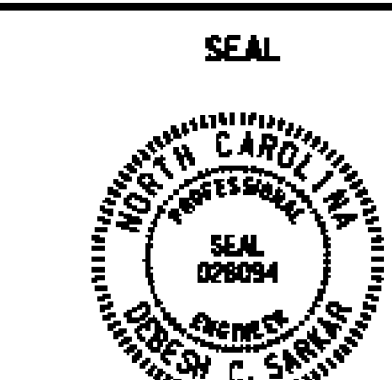
730 Alameda Blvd., Durham, NC 27709

Typical Fabrication Details For Strain Pole Attachments

PLAN DATE: OCTOBER 2017 DESIGNED BY: G.F. ANDREWS
 PREPARED BY: H. BITTING REVIEWED BY: D.G. SARKAR

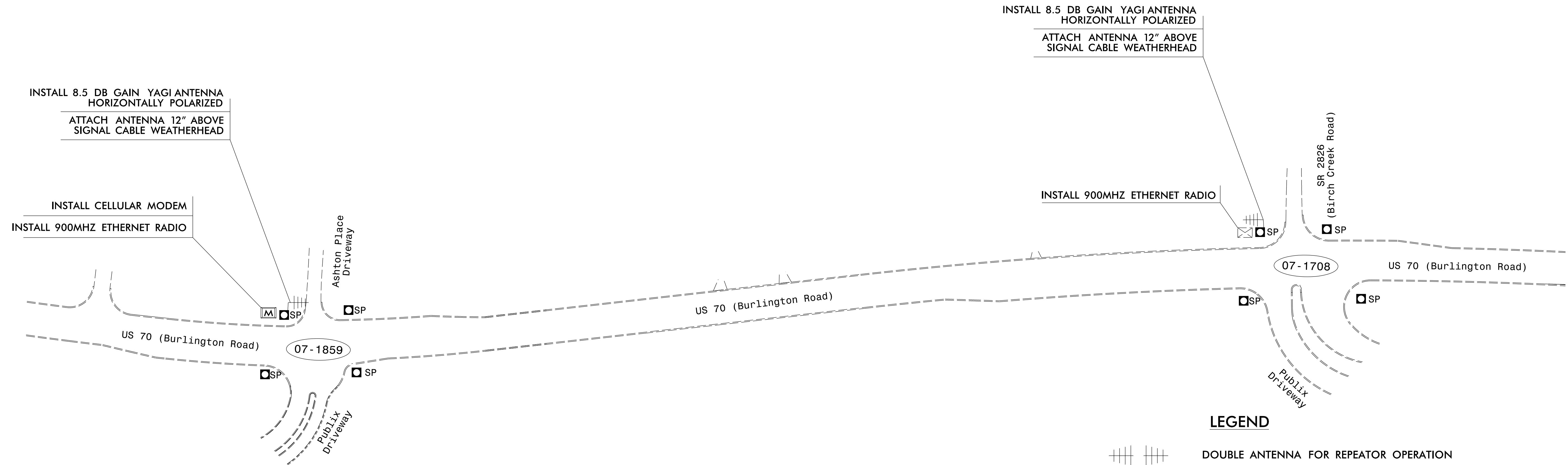
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REVISIONS	INIT.	DATE



Signature: D.G. Sarkar
 DATE: 10/11/2017

11-061-2017-09:36
 51# 15201415 510no1s451one1 1beaton Section Section Eastern RegionM Sheen20162014 51q M6 Std. Fabrication Detail s-Strain Poles.dgn



NOTES FOR WIRELESS COMMUNICATIONS:

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

LEGEND

- DOUBLE ANTENNA FOR REPEATOR OPERATION
- SINGLE ANTENNA
- EXISTING CONTROLLER AND CABINET
- NEW CONTROLLER AND CABINET
- EXISTING MASTER CONTROLLER AND CABINET
- XX-XXXX SIGNAL INVENTORY NUMBER
- NEW METAL POLE W/MAST ARM
- EXISTING METAL POLE W/MAST ARM
- NEW METAL POLE
- EXISTING METAL POLE
- SP SIGNAL POLE
- EXISTING CONDUIT
- NEW JUNCTION BOX
- EXISTING JUNCTION BOX



Wireless Communication Plan

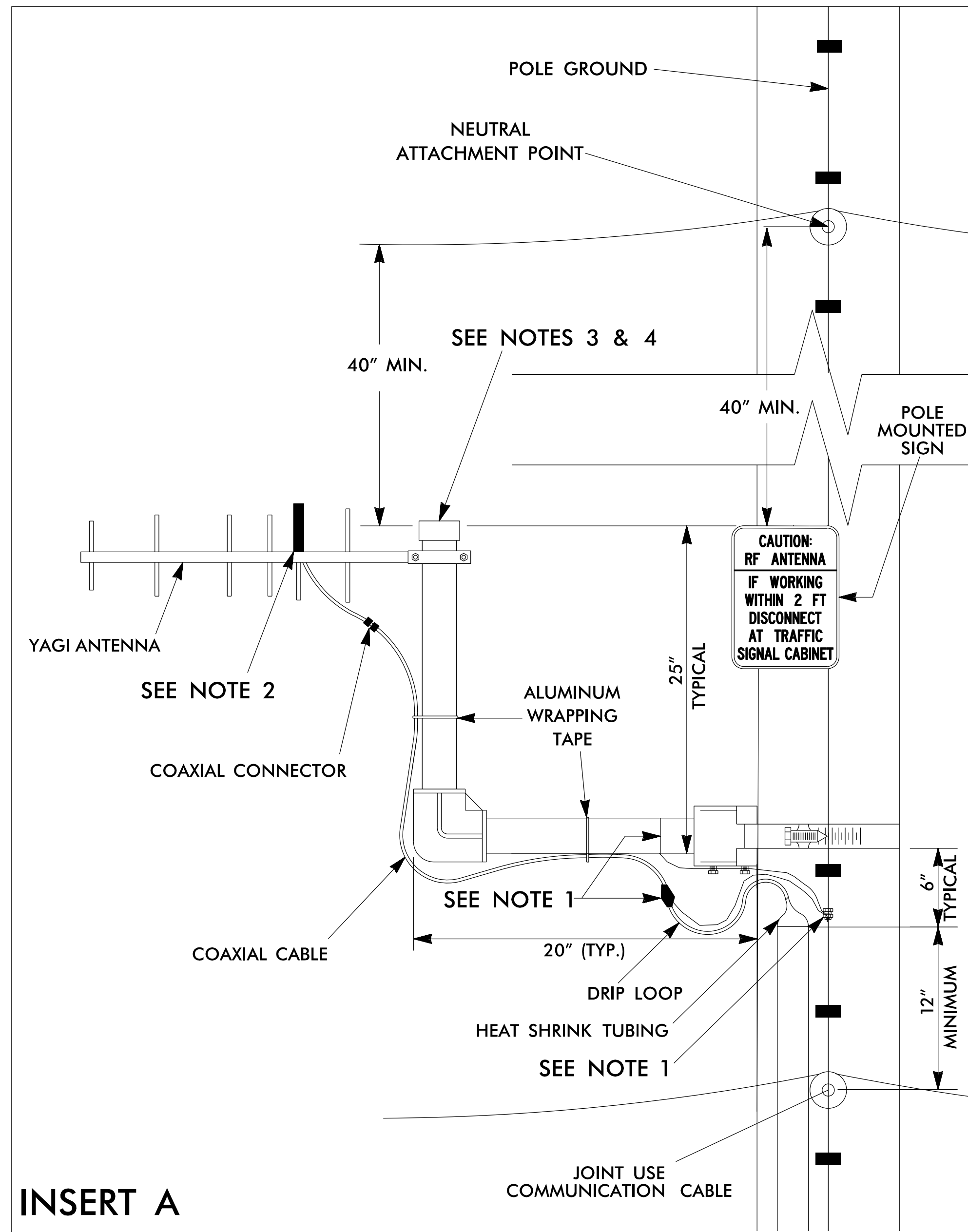
US 70 (Burlington Rd)

Division 7 Guilford County Greensboro PLAN DATE: September 2019 REVIEWED BY: M. Stygles PREPARED BY: J. Ma REVIEWED BY:		SEAL NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 033108 JIANXIN MA 9/9/2019
REVISIONS _____ _____ _____	INIT. DATE _____ _____ _____	

Prepared for the Offices of:

 750 N. Greenfield Pkwy, Garner, NC 27529

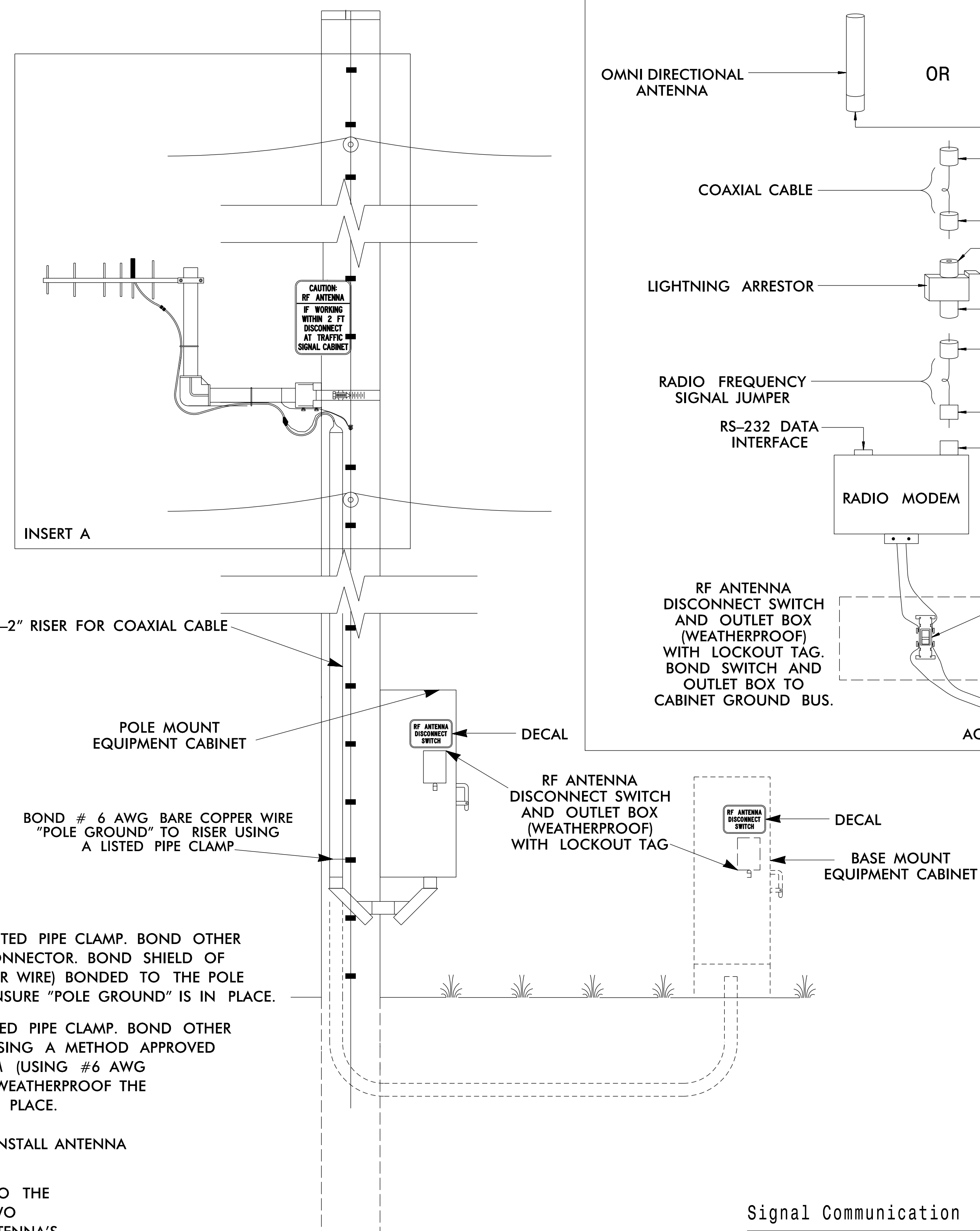
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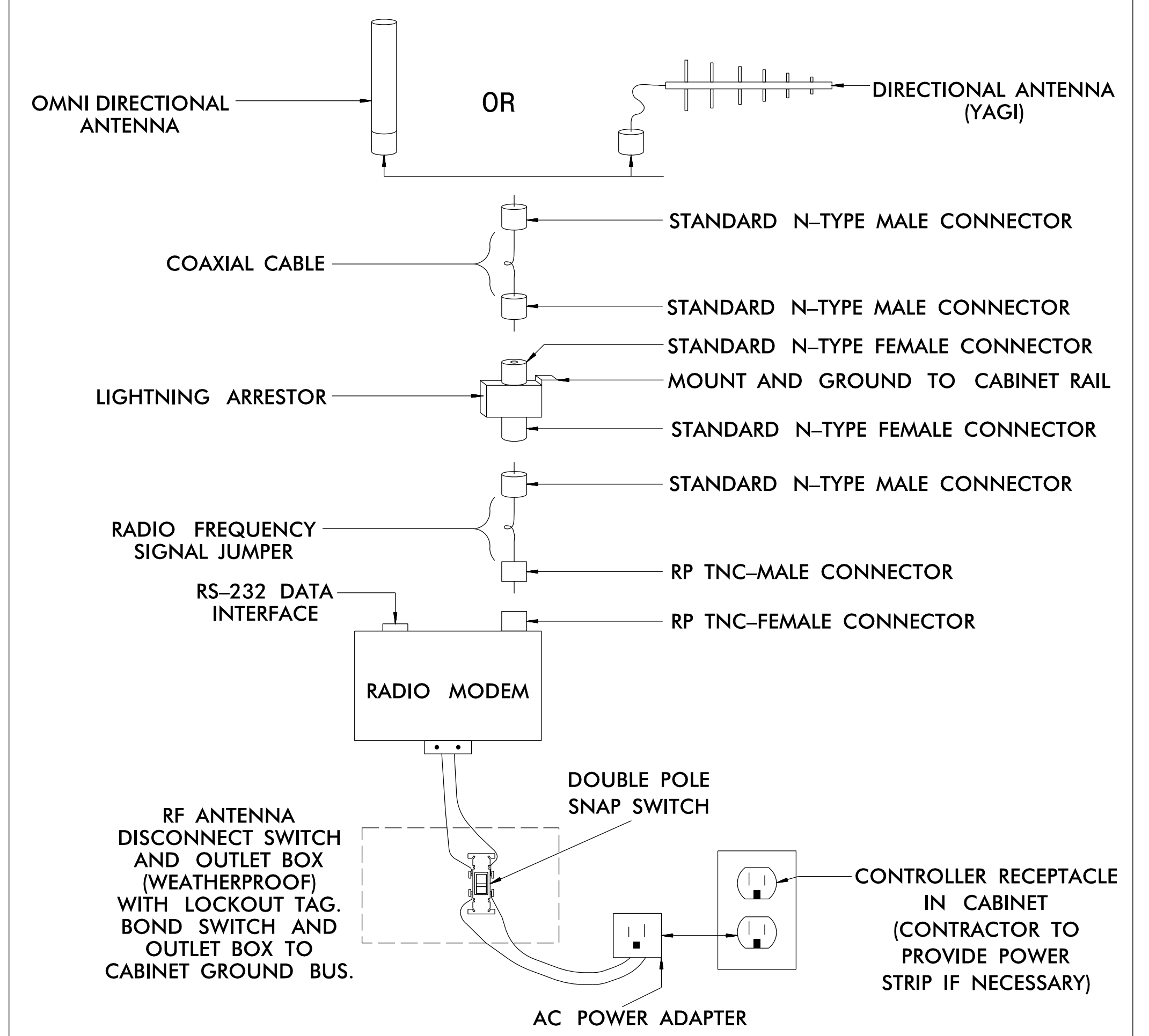
INSERT A

NOTES

- WOOD POLE — BOND # 6 AWG SOLID BARE COPPER WIRE TO ANTENNA SUPPORT USING LISTED PIPE CLAMP. BOND OTHER END OF # 6 AWG SOLID BARE COPPER WIRE TO THE POLE GROUND USING A SPLIT BOLT CONNECTOR. BOND SHIELD OF COAXIAL CABLE WITH AN APPROVED GROUNDING SYSTEM (USING #6 AWG STRANDED COPPER WIRE) BONDED TO THE POLE GROUND. WEATHERPROOF THE CONNECTION ONCE THE GROUNDING SYSTEM IS INSTALLED. ENSURE "POLE GROUND" IS IN PLACE.
 METAL POLE — BOND # 6 AWG SOLID BARE COPPER WIRE TO ANTENNA SUPPORT USING LISTED PIPE CLAMP. BOND OTHER END OF # 6 AWG SOLID BARE COPPER WIRE TO THE POLE OR EXISTING SYSTEM GROUND USING A METHOD APPROVED BY THE ENGINEER. BOND SHIELD OF COAXIAL CABLE WITH AN APPROVED GROUNDING SYSTEM (USING #6 AWG STRANDED COPPER WIRE) BONDED TO THE POLE BY A METHOD APPROVED BY THE ENGINEER. WEATHERPROOF THE CONNECTION ONCE THE GROUNDING SYSTEM IS INSTALLED. ENSURE "SYSTEM GROUND" IS IN PLACE.
- YAGI ANTENNA SHOWN IN VERTICAL POLARIZATION POSITION FOR CLARIFICATION. TYPICALLY INSTALL ANTENNA IN HORIZONTAL POLARIZATION POSITION.
- TO CONSERVE VERTICAL SPACING ON THE POLE (JOINT-USE OR SIGNAL POLE) WITH REGARDS TO THE SURROUNDING UTILITIES, INSTALL THE ANTENNA MOUNTING HARDWARE USING ONE OF THE TWO METHODS LISTED BELOW: (ENSURE THAT THE MOUNTING METHOD DOES NOT DEGRADE THE ANTENNA'S SIGNAL INTEGRITY)
 - ROTATE THE VERTICAL SUPPORT ARM 90 DEGREES SUCH THAT THE ANTENNA IS AT THE SAME HEIGHT AS THE HORIZONTAL SUPPORT ARM.
 - ELIMINATE THE VERTICAL SUPPORT ARM AND MOUNT THE ANTENNA TO THE HORIZONTAL SUPPORT ARM.
 - ANTENNA, ANTENNA SUPPORT ARM, AND SIGN TO MAINTAIN A 40" SEPARATION FROM NEUTRAL /POWER AND 12" FROM OTHER UTILITIES.
- INSTALL AN END CAP TO SEAL THE EXPOSED END OF THE MOUNTING PIPE.



ANTENNA AND COAXIAL CABLE CONNECTION SCHEMATIC



Signal Communication

Prepared for the Offices of: 750 N. Greenfield Pkwy, Garner, NC 27529	US 70 (Burlington Rd) Wireless Radio Antenna Typical Details		DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED SEAL SEAL 033108 JIANXIN MA 9/9/2019
	Division 7 Guilford County Greensboro PLAN DATE: September 2019 REVIEWED BY: M. Stygles PREPARED BY: J. Ma REVIEWED BY:	REVISIONS INIT. DATE	

