

**Project: BR-0041**

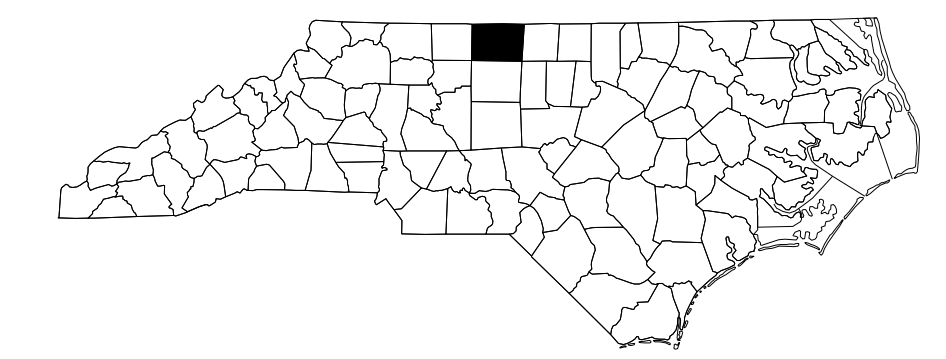
**CONTRACT: C204793**

STATE OF NORTH CAROLINA  
DIVISION OF HIGHWAYS

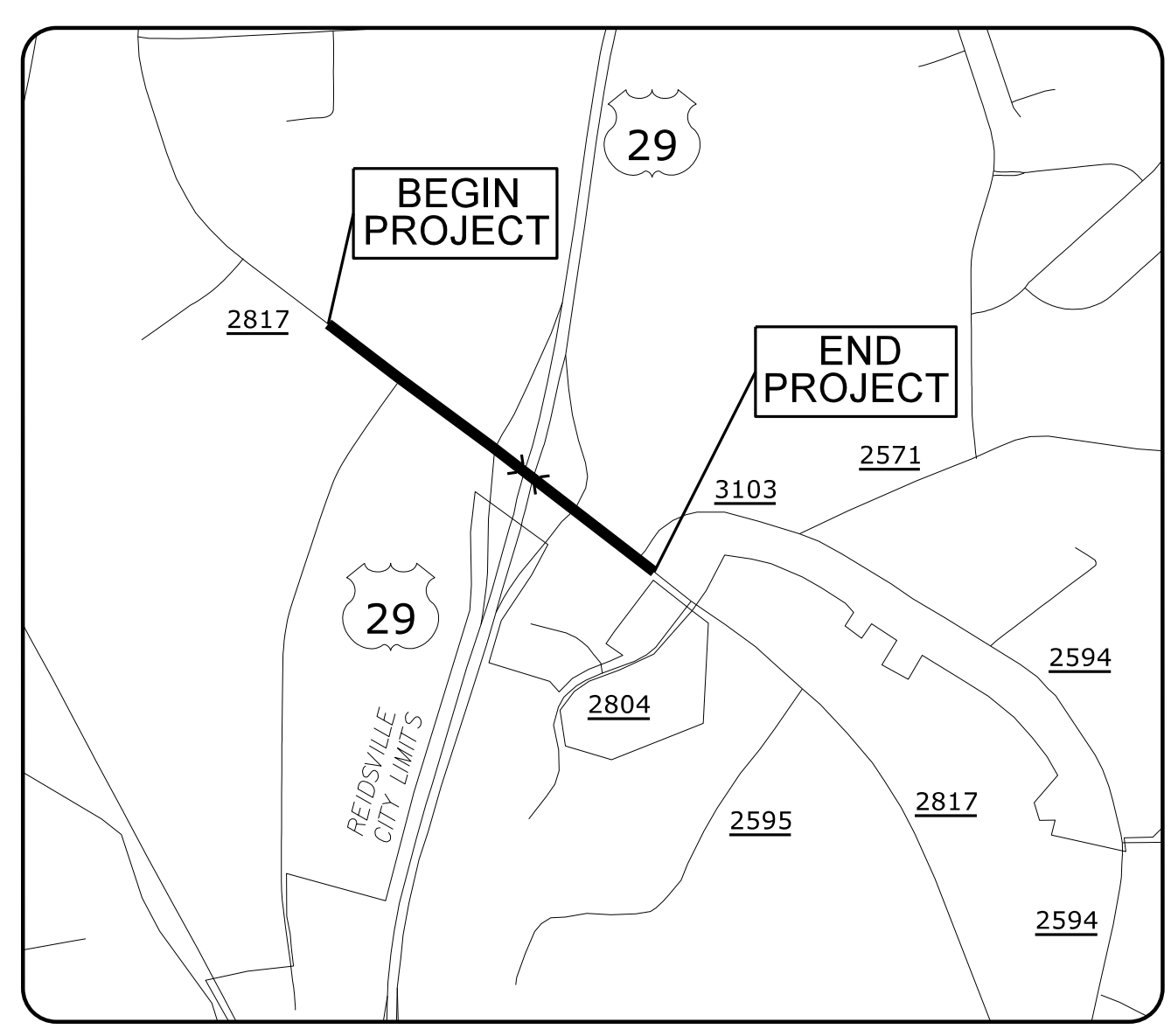
# ROCKINGHAM COUNTY

**LOCATION: SR 2817 (BARNES STREET) WEST OF WATLINGTON INDUSTRIAL DRIVE TO WEST OF SR 2804 (ROCKINGHAM DRIVE)**

**TYPE OF WORK: TRAFFIC SIGNALS AND SIGNAL COMMUNICATIONS**

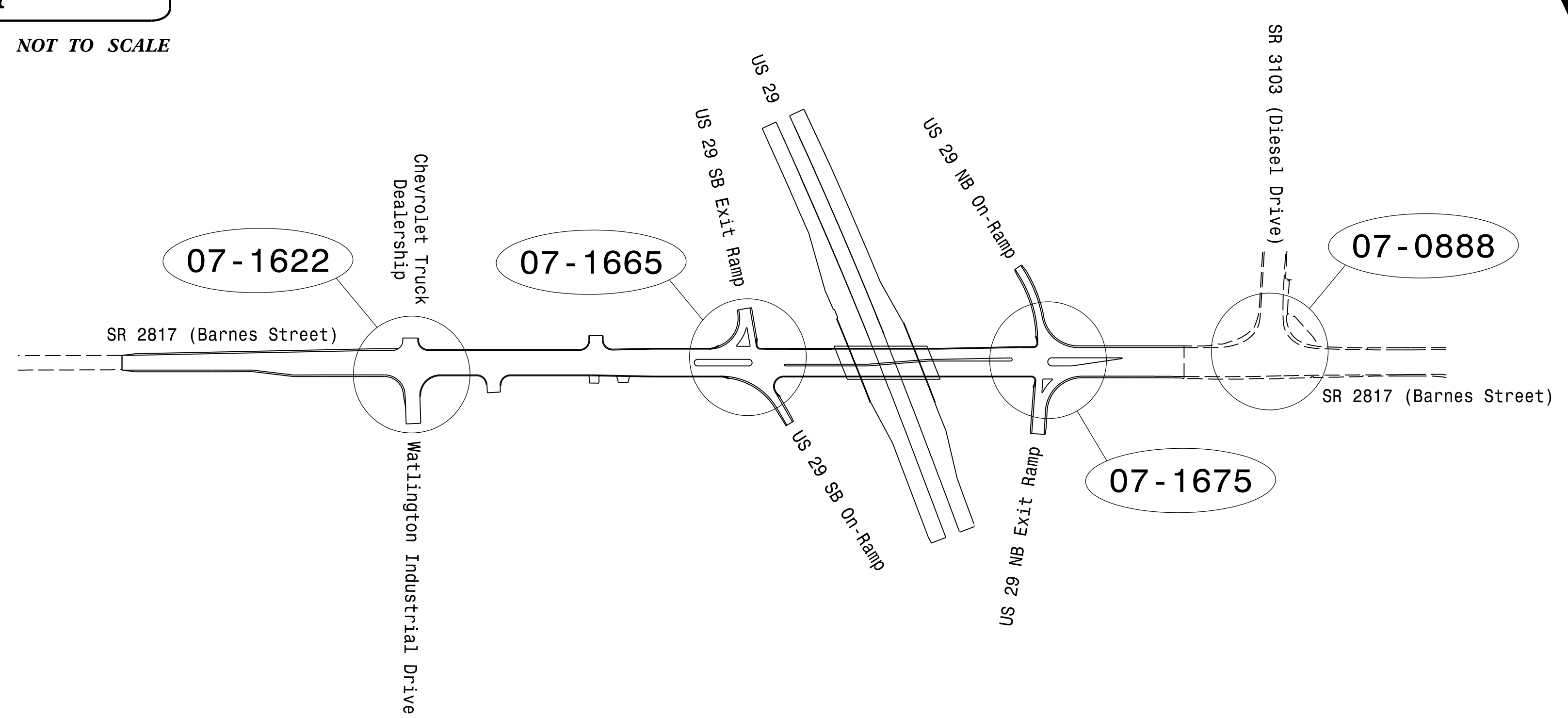


DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED



**VICINITY MAP**

NOT TO SCALE



**AECOM**  
NC Firm License No.: F-0342  
5438 Wade Park Boulevard  
Suite 200 Raleigh, NC 27607  
Phone: 919-461-1100

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

Index of Plans		
Sheet #	Reference #	Location/Description
Sig. 1.0	N/A	Project Titlesheet
Sig. 1.1 - 1.2	N/A	2018 Standard Plate Sheets
Sig. 2.0 - 4.2	07-1622	SR 2817 (Barnes Street) at Watlington Industrial Drive
Sig. 5.0 - 8.4	07-1665	SR 2817 (Barnes Street) at US 29 SB Ramps
Sig. 9.0 - 12.4	07-1675	SR 2817 (Barnes Street) at US 29 NB Ramps
Sig. 13.0 - 14.1	07-0888	SR 2817 (Barnes Street) at SR 3103 (Diesel Drive)
Sig. M1 - M8	N/A	Standard Metal Pole Sheets
SCP 1 - 8	N/A	Signal Communication Plans and Splice Details

**NCDOT TRANSPORTATION SYSTEMS  
MANAGEMENT & OPERATIONS UNIT**

Contacts:  
**Robert J. Ziemba, PE, CPM - Central Region Signals Engineer**  
**Keith M. Mims, PE - Signal Equipment Design Engineer**  
**Gregory A. Green - Signal Communications Project Engineer**

**AECOM**  
Contact:  
**Hemang M. Surti, PE - NC Signals & ITS Lead**

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

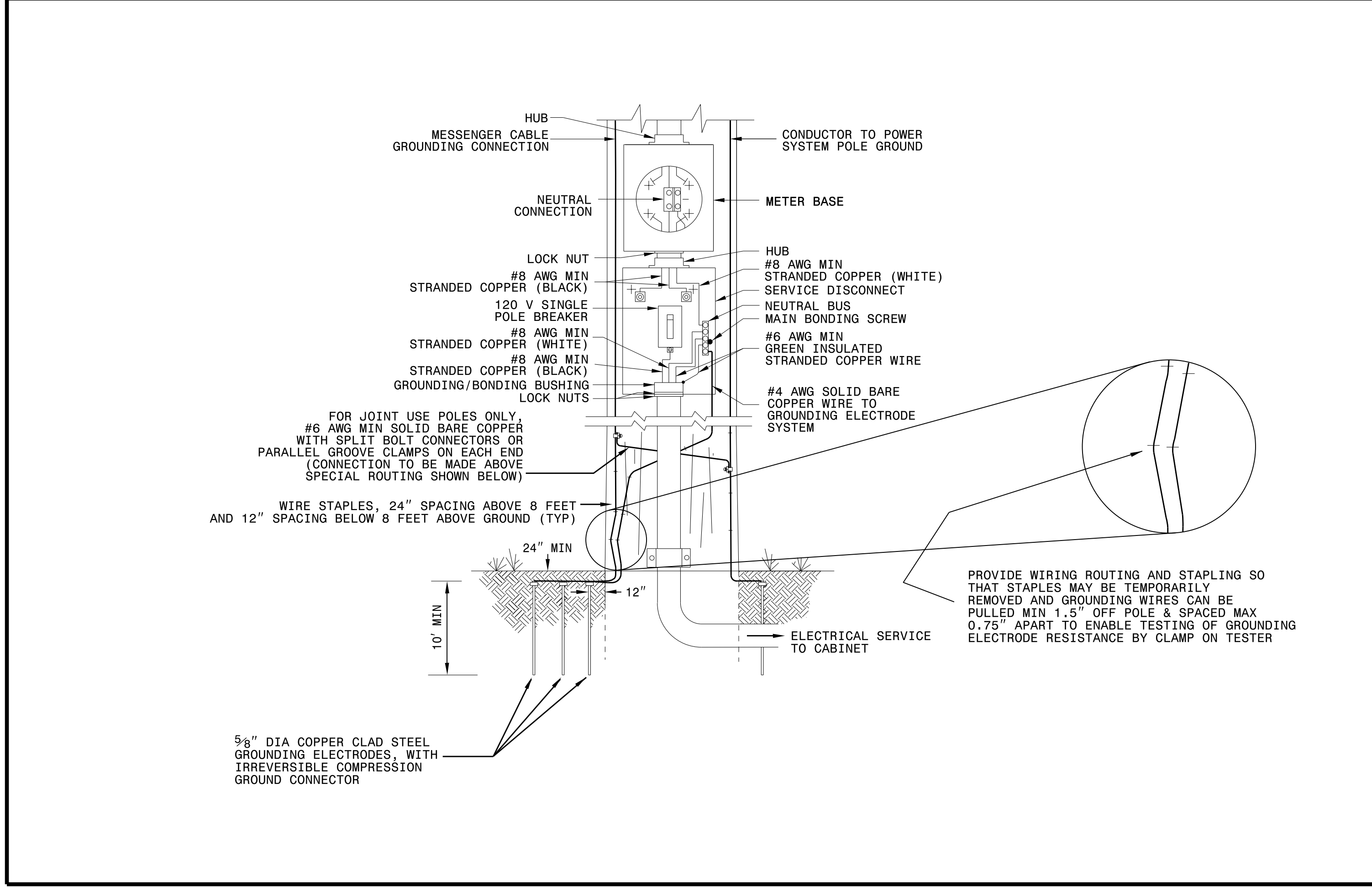
750 N. Greenfield Parkway, Garner, NC 27529

3/10/2023  
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michael.leavenworth

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

ENGLISH STANDARD DRAWING FOR  
**ELECTRICAL SERVICE GROUNDING**  
GROUNDING AND BONDING

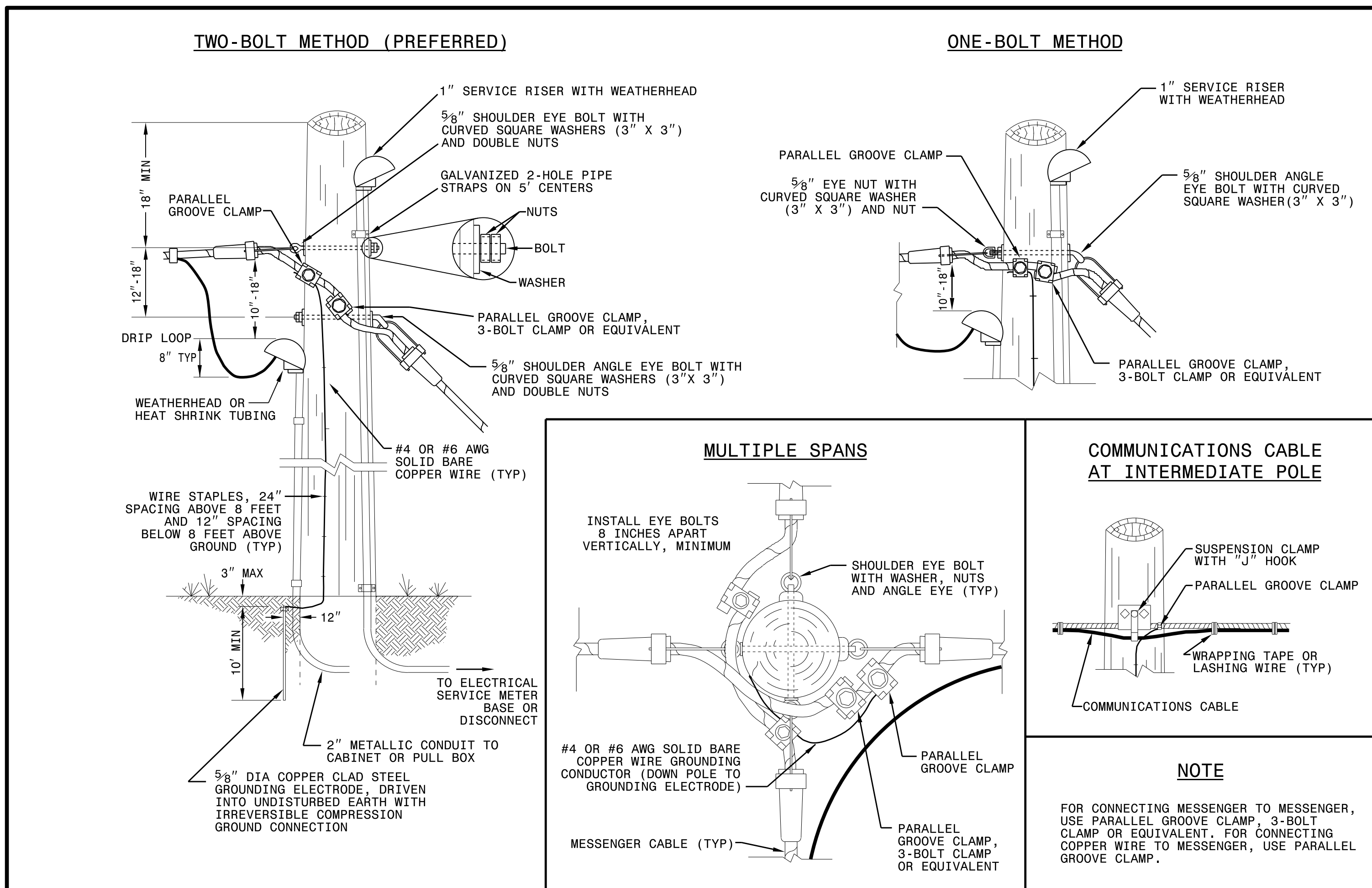
SHEET 1 OF 1  
**1700D01**



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

ENGLISH STANDARD DRAWING FOR  
**WOOD POLES**  
METHODS OF ATTACHMENT AND GROUNDING

SHEET 1 OF 1  
**1720D01**



DOCUMENT NOT CONSIDERED  
FINAL UNLESS ALL  
SIGNATURES COMPLETED

See Plate for Title

Prepared in the Offices of:

SEAL

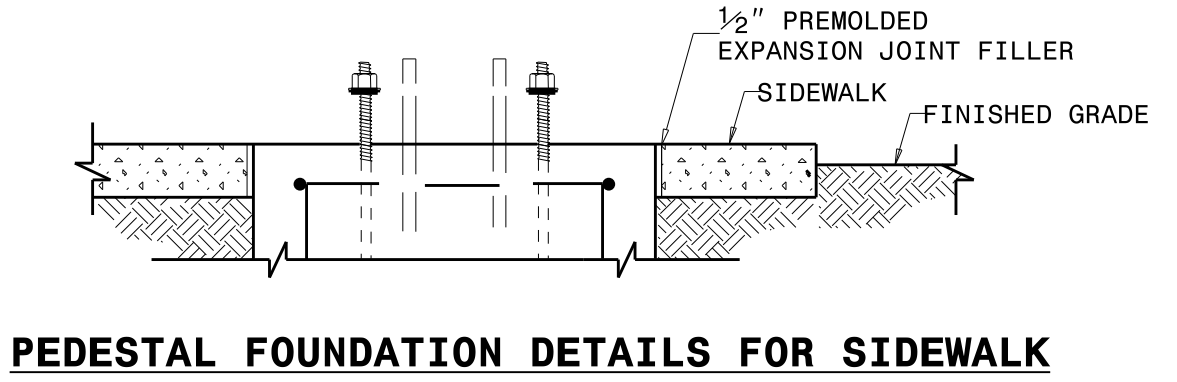
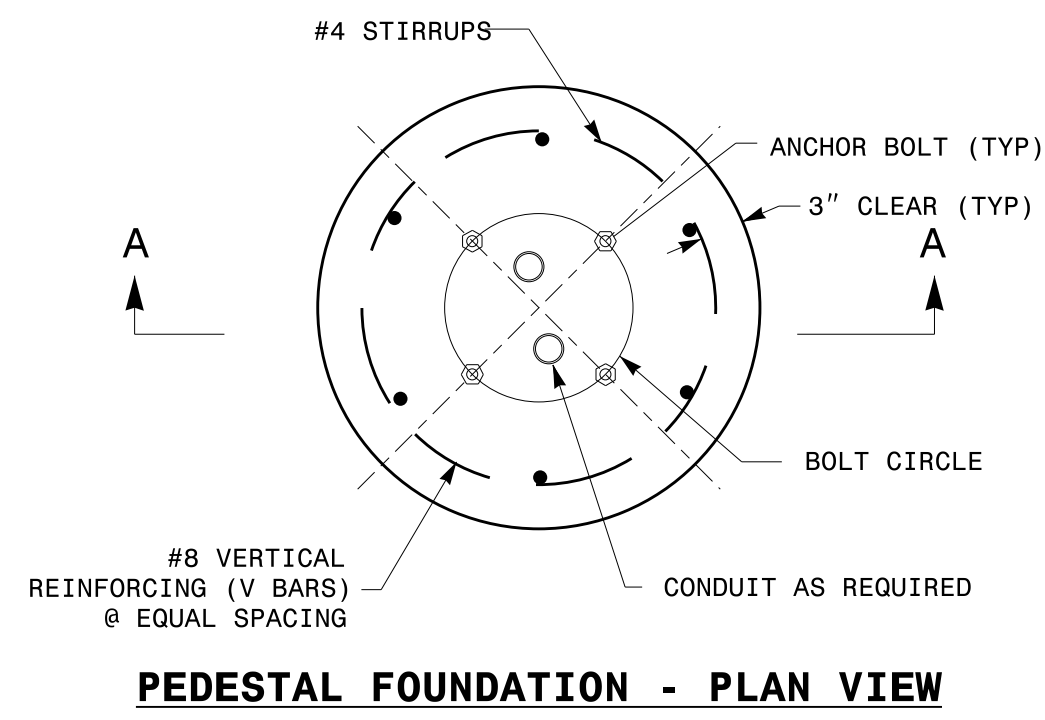
DocuSigned by:  
*Mohd Aslami*

750 N. Greenfield Parkway  
Garner, NC 27529

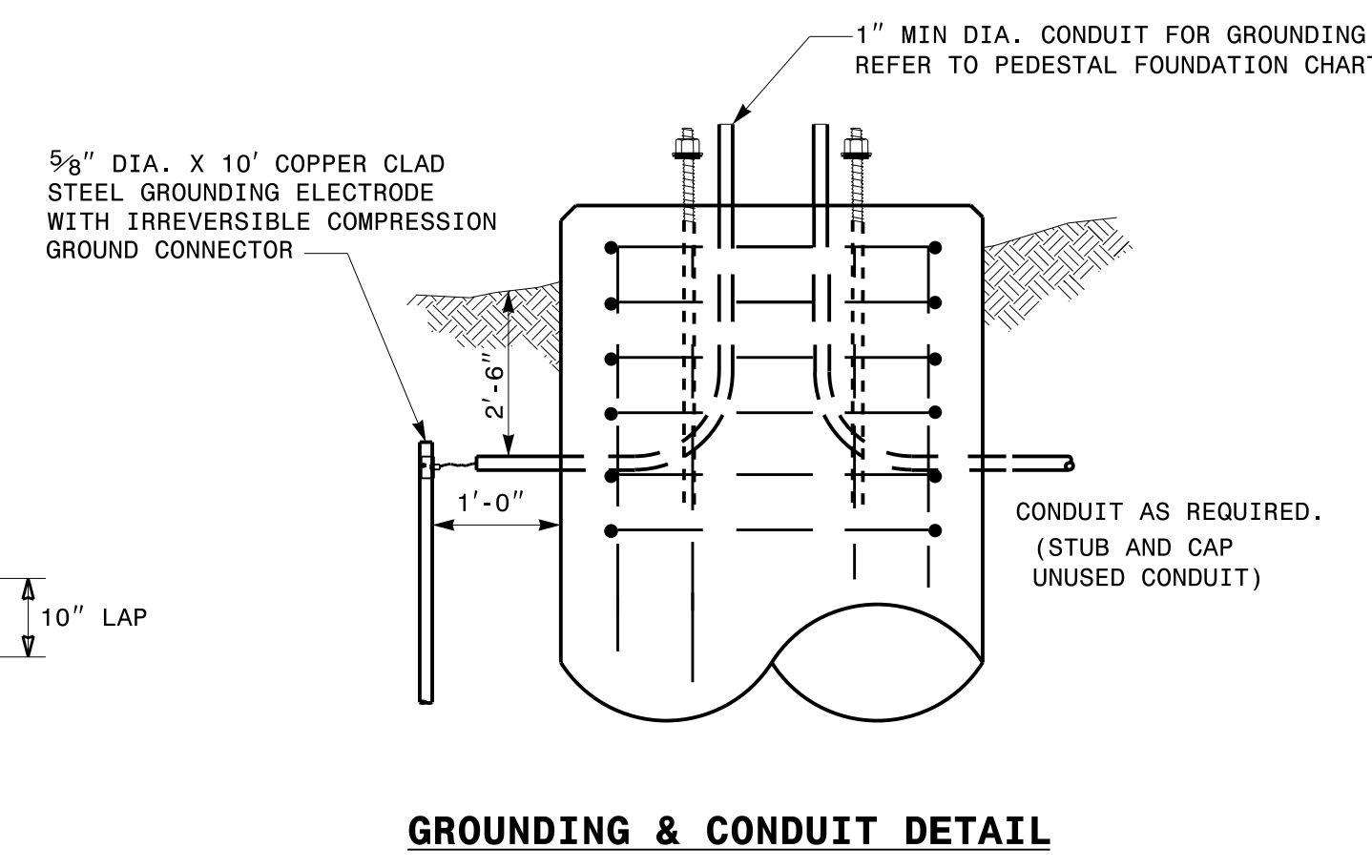
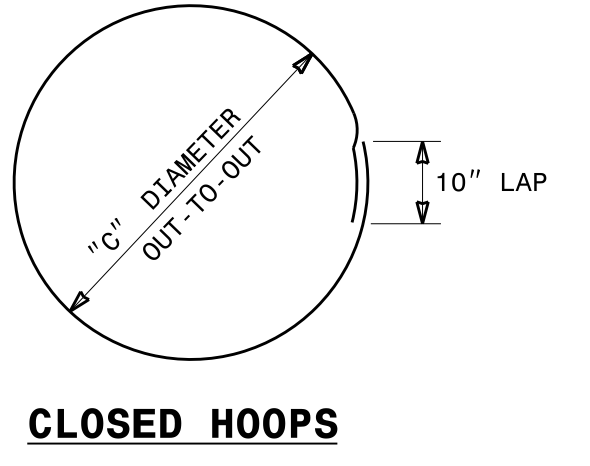
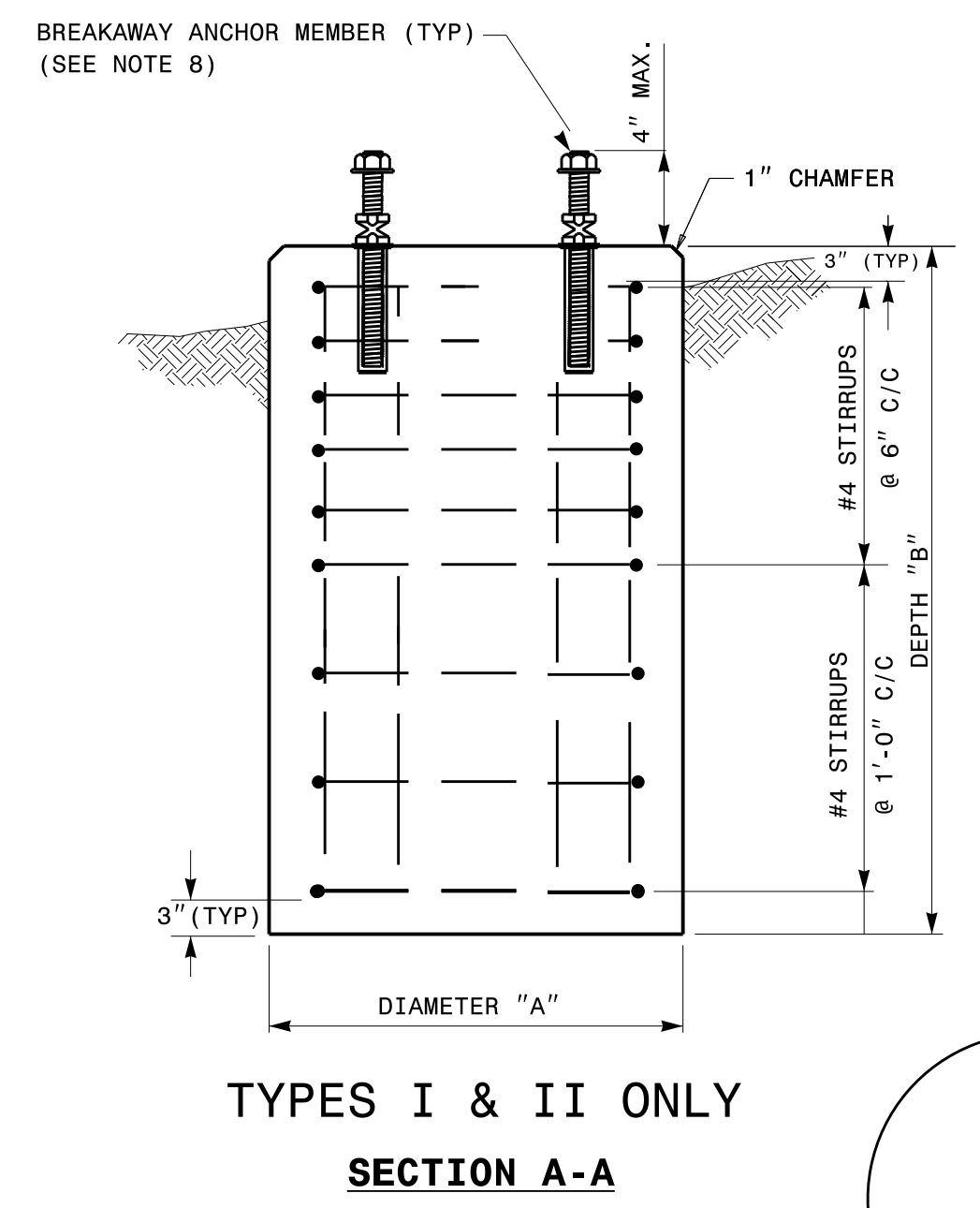
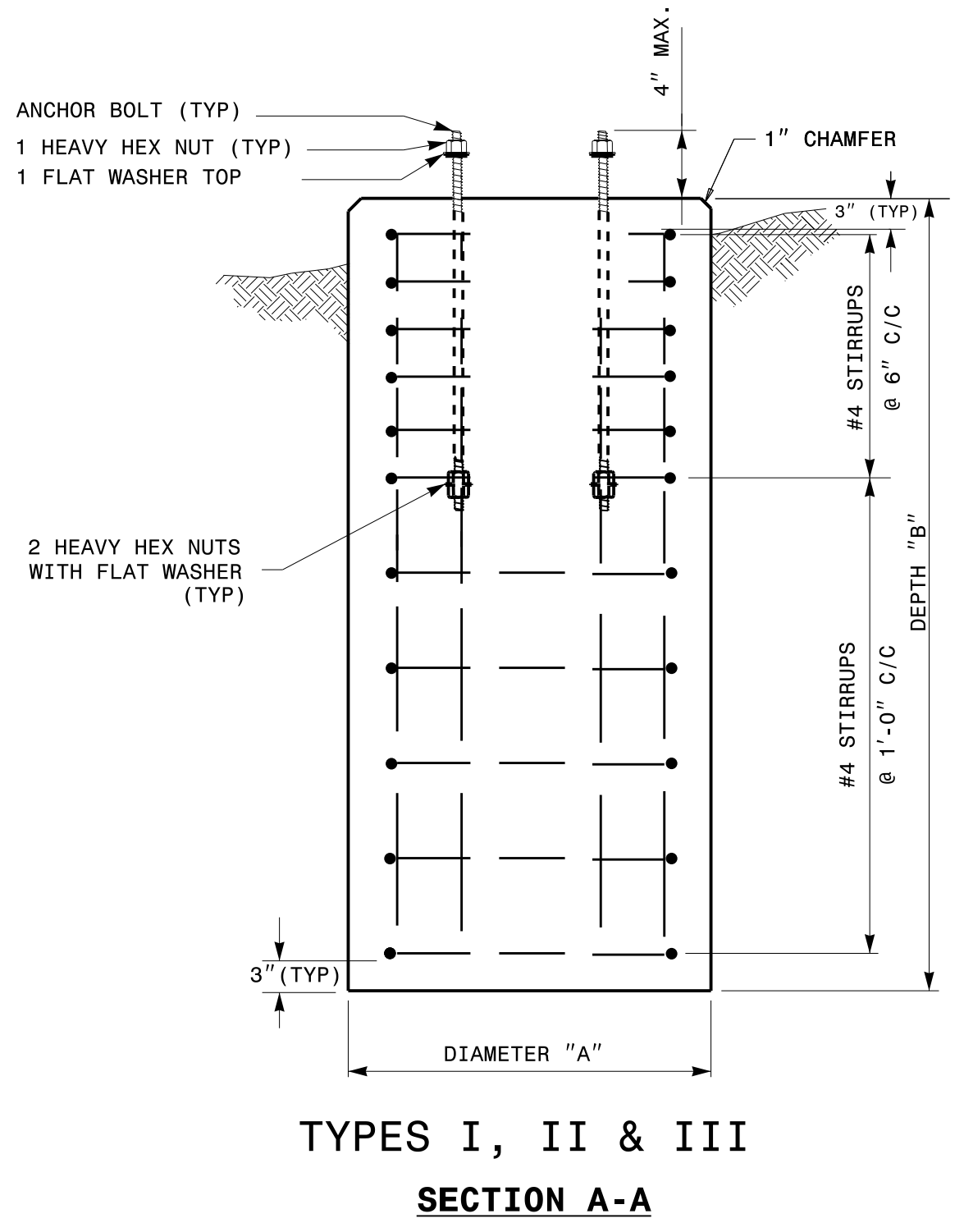
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DATE

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- NOTES:**
- CAST FOUNDATION AGAINST UNDISTURBED SOIL WHEREVER CONDITIONS PERMIT. IN UNSTABLE SOIL, CAST-IN-PLACE TUBE FORMS ARE ALLOWED WITH APPROVAL.
  - COMPLY WITH APPLICABLE PROVISIONS OF SECTION 825 FOR CONCRETE CONSTRUCTION.
  - USE CLASS "A" CONCRETE THAT MEETS THE REQUIREMENTS OF SECTION 1000 WITH A COMPRESSION STRENGTH AT 28 DAYS OF  $F'c = 3000$  PSI (MIN.).
  - USE ASTM GRADE 60 DEFORMED BARS FOR ALL REINFORCING STEEL.
  - GRADE IS ASSUMED TO BE (8H:1V) OR FLATTER. FOUNDATION SIZE AND DEPTHS ARE BASED ON THE FOLLOWING SOIL DESIGN PARAMETERS:
    - A. SANDY TYPE SOIL
    - B. NO GROUND WATER WITHIN 5'-0" OF SURFACE ELEVATION
    - C. WIND SPEED NOT TO EXCEED 140 MPH
 IF ACTUAL CONDITIONS VARY SUBSTANTIALLY FROM THOSE ASSUMED, THE FOUNDATION DEPTH MAY BE ADJUSTED. IN THIS CASE, CONTACT THE ENGINEER.
  - MAINTAIN AT LEAST 3" COVER ON ALL REINFORCEMENT.
  - ORIENT CONDUIT AS REQUIRED BY THE DESIGN OR AS DICTATED BY FIELD CONDITIONS.
  - USE ADHESIVE ANCHOR FOR THREADED COUPLING INSERT. FOR TYPE I MINIMUM DEPTH NECESSARY IS 0'-4 1/2" AND FOR TYPE II MINIMUM DEPTH NECESSARY IS 0'-6 5/8". FOLLOW MANUFACTURER'S INSTALLATION INSTRUCTIONS.



PEDESTAL FOUNDATION TYPE AND SIZE							
TYPE	PEDESTAL DESCRIPTION	SIZE			ANCHOR BOLT		INSTALL GROUNDING SYSTEM (YES/NO)
		DIAMETER "A" FT	DEPTH "B" FT	CONCRETE VOLUME CY	DIAMETER (MIN.) IN	LENGTH FT-IN	
I	PEDESTRIAN PUSHBUTTON	2'-0"	3'-6"	.41	1/2	1'-6"	NO
II	NORMAL-DUTY	2'-0"	5'-0"	.58	3/4	2'-0"	YES
III	HEAVY-DUTY	2'-6"	7'-0"	1.27	1	4'-0"	YES

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

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

ENGLISH STANDARD DRAWING FOR  
**PEDESTALS**  
 FOUNDATIONS

SHEET 1 OF 1  
**1743D01**

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DOCUMENT NOT CONSIDERED  
 FINAL UNLESS ALL  
 SIGNATURES COMPLETED

See Plate for Title

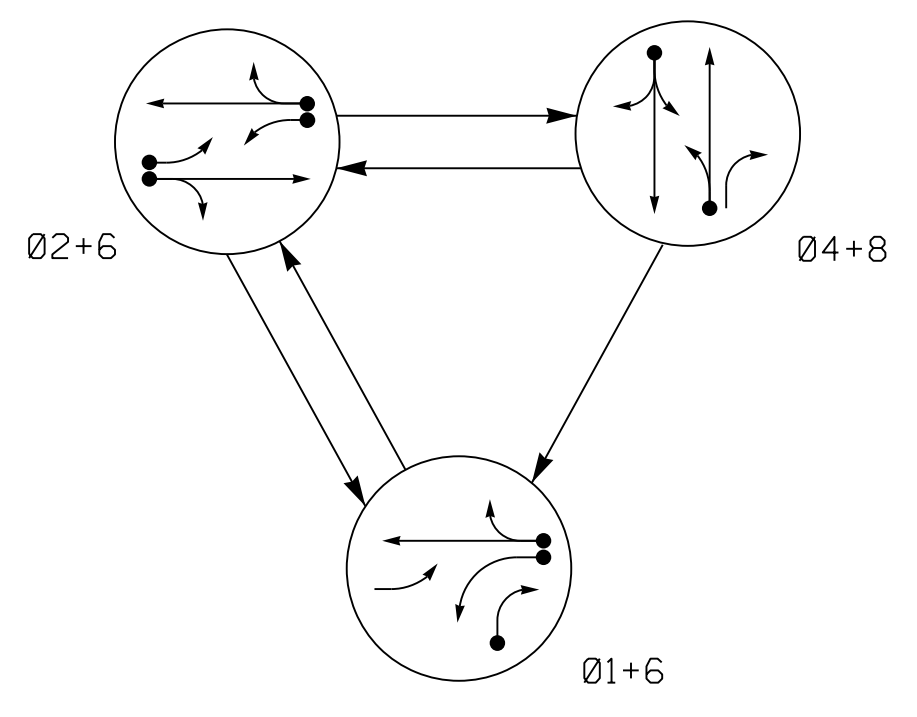
Prepared in the Offices of:

750 N. Greenfield Parkway  
 Garner, NC 27529

SEAL  
 NORTH CAROLINA  
 PROFESSIONAL  
 SEAL  
 028094  
 ENGINEER  
 DEBESH C. SARKAR

Disc Signed by: *Debes C. Sarkar* 10/11/2017  
 DATE

**PHASING DIAGRAM**



SIGNAL FACE	PHASE			
	01+6	02+6	04+8	F L H S
11	←	←	←	←
21	←	←	←	←
22, 23	R	G	R	Y
41, 42	R	R	G	R
61, 62	G	G	R	Y
81, 82	R	R	G	R
83	←	←	←	←

MAXTIME DETECTOR INSTALLATION CHART													
ZONE	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING								
					CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	QUEUE	CALL	PASSAGE 2	SYSTEM LOOP
1A*	6X40	0	*	*	1	15	-	X	-	X	-	-	*
1B*	6X40	0	*	*	1	15	-	X	-	X	-	-	*
1C*	6X6	0	*	*	1	15	-	X	-	X	-	-	*
2A*	6X6	300	*	*	2	-	-	X	X	X	-	-	*
2B*	6X40	0	*	*	2	-	-	X	-	X	X	-	*
4A*	6X40	0	*	*	4	10	-	X	-	X	-	-	*
6A*	6X6	300	*	*	6	-	-	X	X	X	-	-	*
8A*	6X40	0	*	*	8	3	-	X	-	X	-	-	*

3 Phase Fully Actuated  
 NC 87/SR 2817 (Barnes Street) CLS  
 Signal System #: D07-10\_Reidsville

**NOTES**

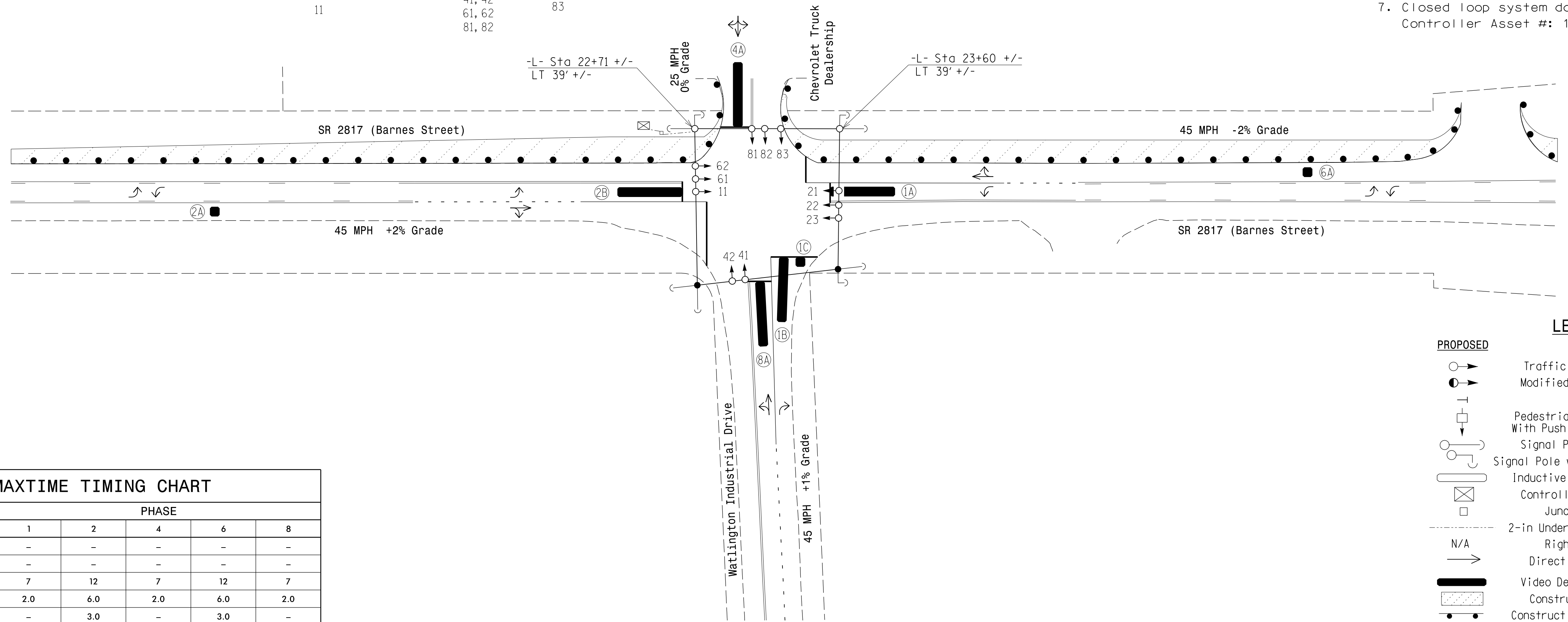
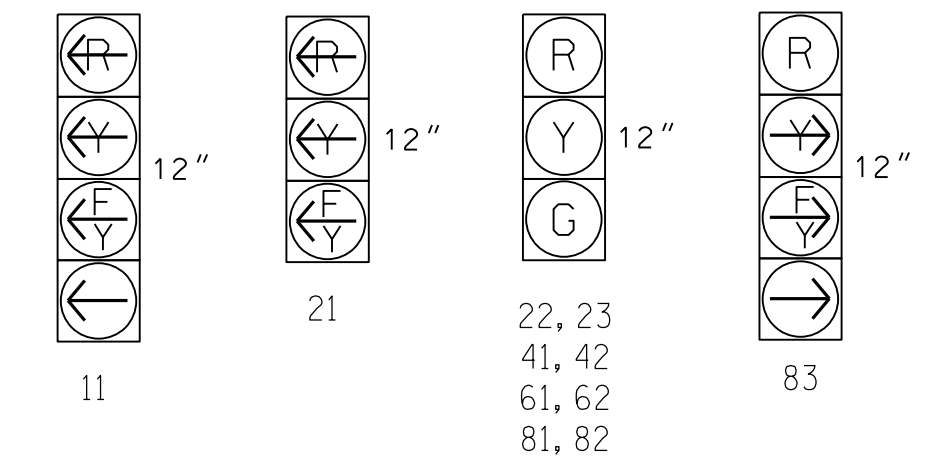
- Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Phase 1 may be lagged.
- Set all detector units to presence mode.
- Locate new cabinet so as not to obstruct distance of vehicles turning right on red.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- Closed loop system data: Controller Asset #: 1622.

**PHASING DIAGRAM DETECTION LEGEND**

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

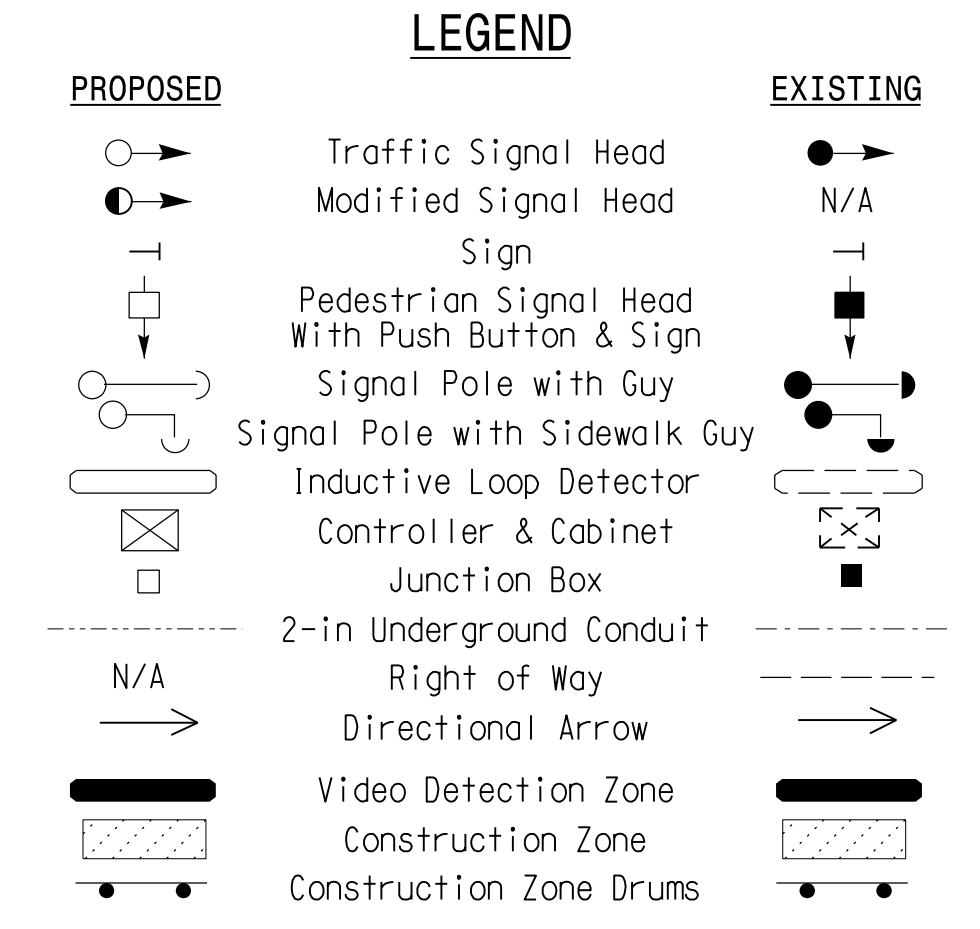
**SIGNAL FACE I.D.**

All Heads L.E.D.

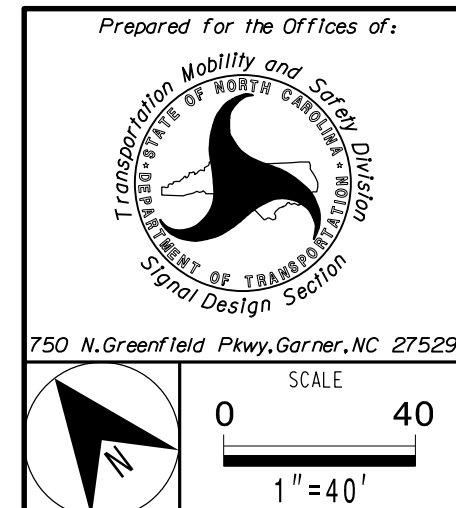


FEATURE	PHASE				
	1	2	4	6	8
Walk *	-	-	-	-	-
Ped Clear *	-	-	-	-	-
Min Green	7	12	7	12	7
Passage *	2.0	6.0	2.0	6.0	2.0
Passage 2 *	-	3.0	-	3.0	-
Max 1 *	15	90	25	90	35
Yellow Change	3.0	4.7	4.4	4.7	4.4
Red Clear	2.4	1.0	2.1	1.0	1.0
Added Initial *	-	2.5	-	2.5	-
Maximum Initial *	-	34	-	34	-
Time Before Reduction *	-	20	-	20	-
Time To Reduce *	-	30	-	30	-
Minimum Gap	-	3.0	-	3.0	-
Advance Walk	-	-	-	-	-
Non Lock Detector	X	-	X	-	X
Vehicle Recall	-	MIN RECALL	-	MIN RECALL	-
Dual Entry	-	-	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.

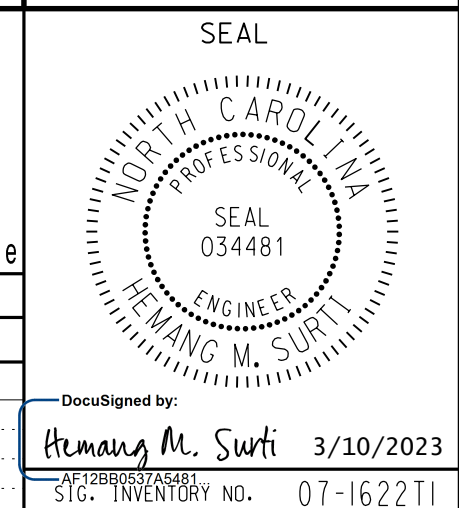


**Signal Upgrade - Temp Design 1 (TMP Phase I)**



SR 2817 (Barnes Street) at Watlington Industrial Drive	
Division 7	Rockingham County Reidsville
PLAN DATE: Jan 2023	REVIEWED BY: H.M. Surti
PREPARED BY: M.D. Tindal	REVIEWED BY:
REVISIONS	INIT. DATE

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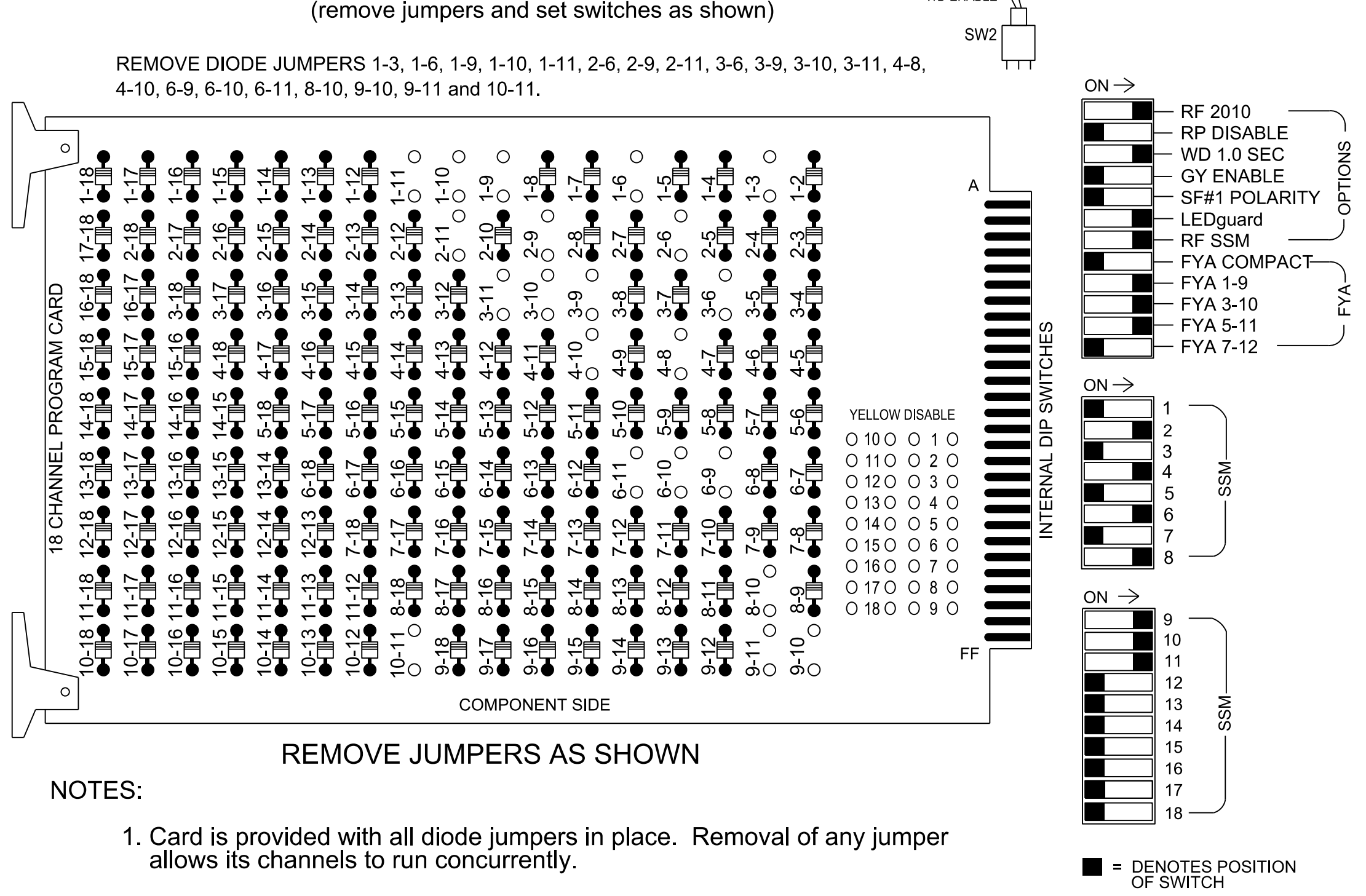


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 n:\chael.covenaugh



### 18 CHANNEL CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



**NOTES:**

- Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
- Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
- Ensure that the Red Enable is active at all times during normal operation.
- 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 plan.
- Program phases 4 and 8 for Dual Entry.
- Program controller to start up in phase 2 Green No Walk and 6 Green No Walk.
- If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
- The cabinet and controller are part of NC 87/ SR 2817 (Barnes Street) Closed Loop System. Signal System #: D07-10 Reidsville.

### EQUIPMENT INFORMATION

Controller.....2070LX  
 Cabinet.....332 w/ Aux  
 Software.....Q-Free MAXTIME  
 Cabinet Mount.....BASE  
 Output File Positions.....18 With Aux. Output File  
 Load Switches Used.....S1, S2, S4, S5, S8, S11, AUX S1, AUX S2, AUX S4  
 Phases Used.....1, 2, 4, 6, 8  
 Overlap "1".....\*  
 Overlap "2".....\*  
 Overlap "3".....\*  
 Overlap "4".....NOT USED

\*See overlap programming detail on sheet 2

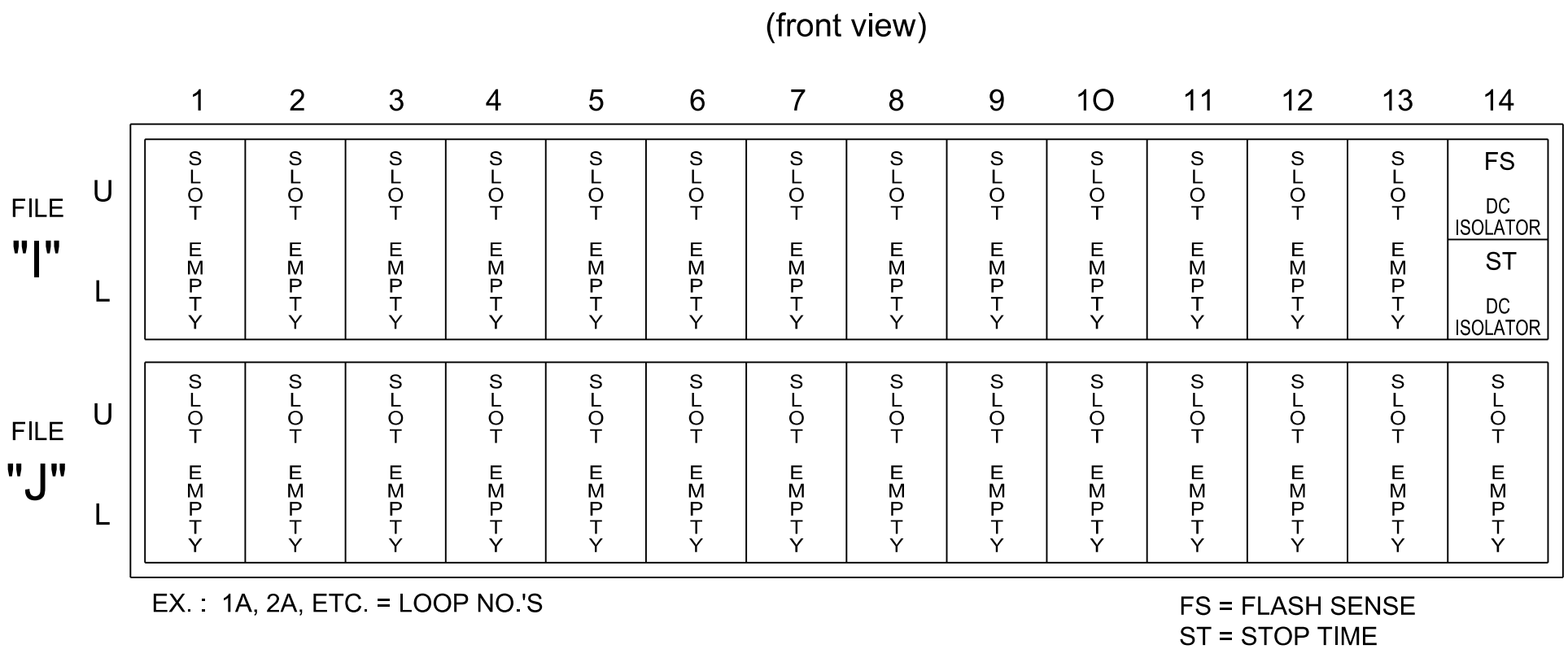
### SIGNAL HEAD HOOK-UP CHART

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	1	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	11*	22,23	NU	83*	41,42	NU	NU	61,62	NU	NU	81,82	NU	11*	83*	NU	21*	NU	NU
RED		128			101			134			107			A124				
YELLOW	*	129		*	102			135			108							
GREEN		130			103			136			109							
RED ARROW													A121			A114		
YELLOW ARROW													A122	A125		A115		
FLASHING YELLOW ARROW													A123	A126		A116		
GREEN ARROW	127				118													

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)

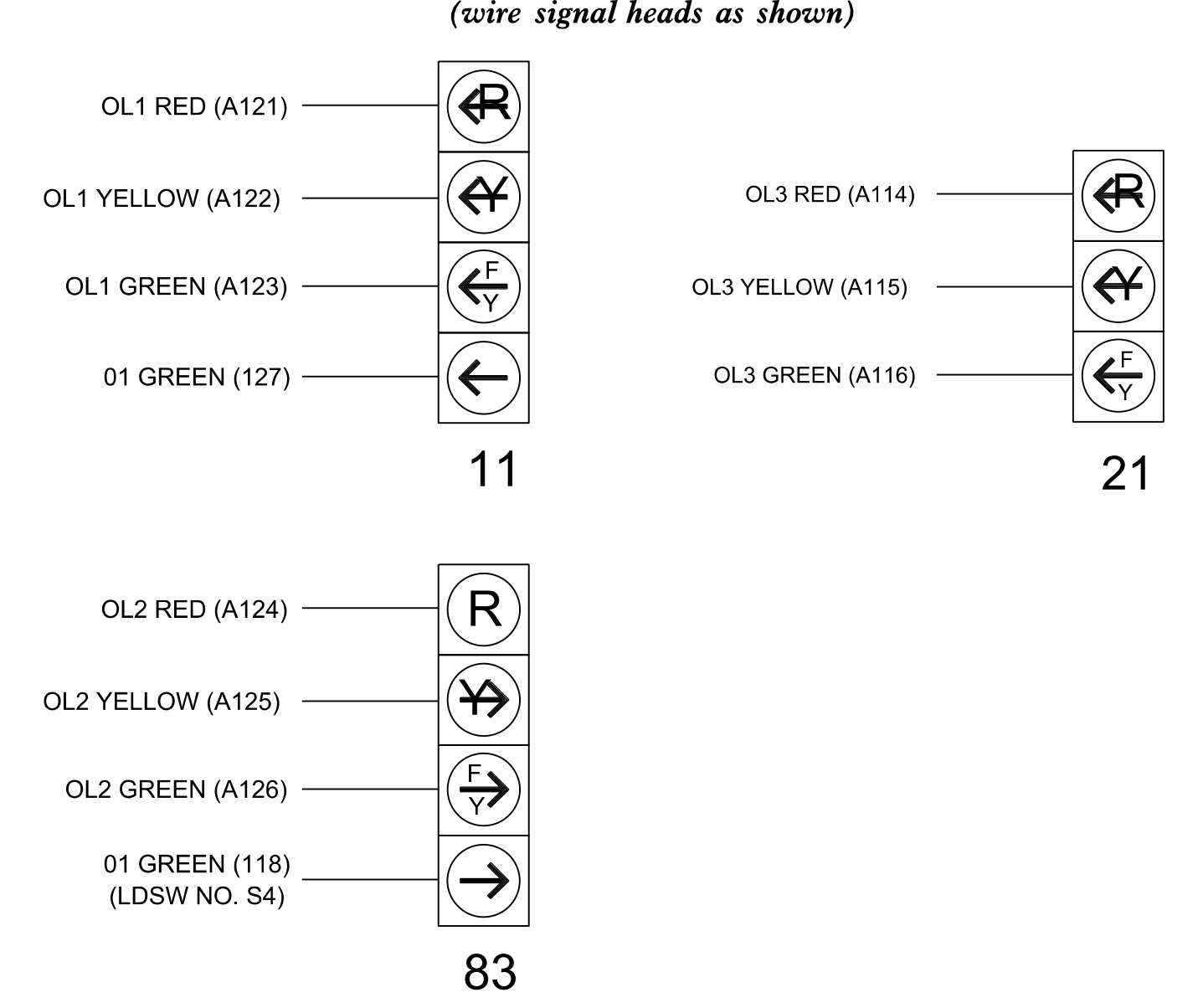


### SPECIAL DETECTOR NOTE

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.

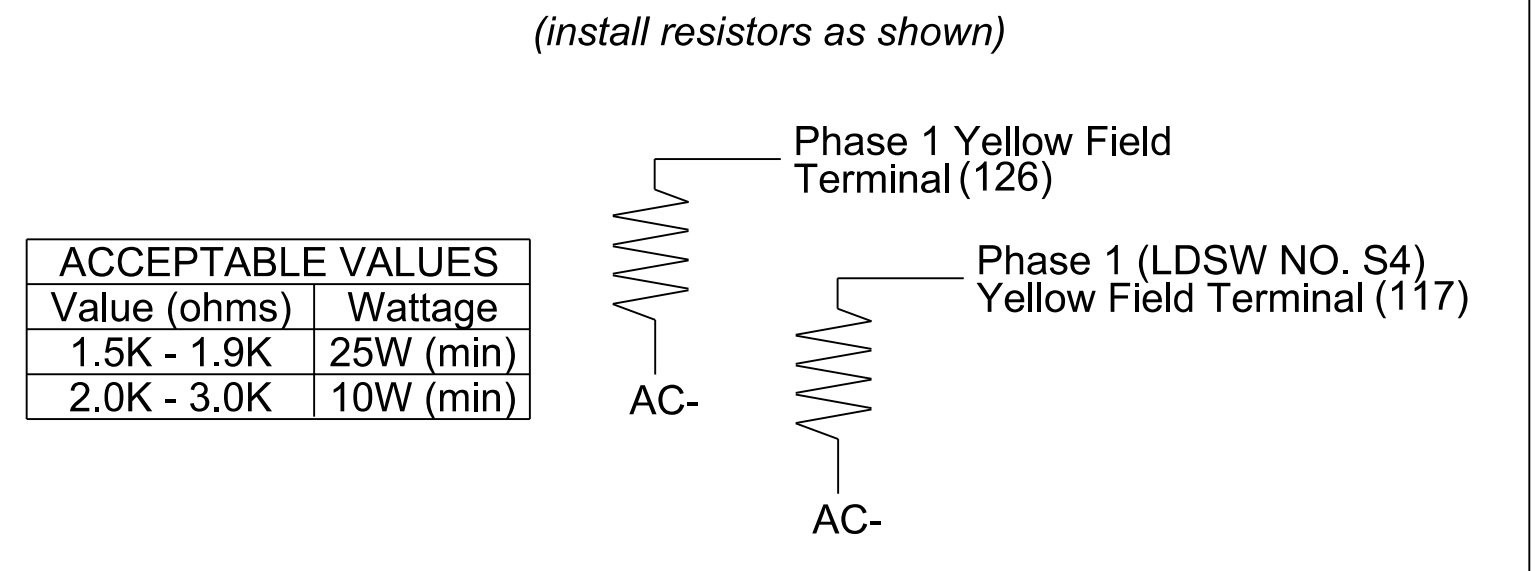
### FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



### LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 07-1622T1  
 DESIGNED: Jan 2023  
 SEALED: 3/10/2023  
 REVISED:



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

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL

Prepared for the Offices of:  
 Transportation Mobility and Safety Division  
 UNIVERSITY OF NORTH CAROLINA  
 SCHOOL OF TRANSPORTATION AND INFRASTRUCTURE MANAGEMENT

750 N. Greenfield Pkwy, Garner, NC 27529

SR 2817 (Barnes Street)  
 at  
 Watlington Industrial Drive

Division 7 Rockingham County Reidsville

PLAN DATE: January 2023 REVIEWED BY: H M Surti

PREPARED BY: A Ravipati REVIEWED BY:

REVISIONS	INIT.	DATE

DocuSigned by:  
 Hemang M. Surti 3/10/2023  
 AECOM0224481

SIG. INVENTORY NO. 07-1622T1

3/10/2023 9:46:58 AM \*\*\*aecom-nc-pw-bent1 ley-com-ae-com-ds21\_na\_2020\0\documents\60581577-NCDDT-SMU-BR-0041-#300-CAD-0154910-CAD#70-NCDDT-TIP#31gnal(s)desi-gh-HE-ec-tri-cal-Detail.s\_2022MAXTIME\_3-10-23#071622T1-sm.e\_2022XXXX.dgn

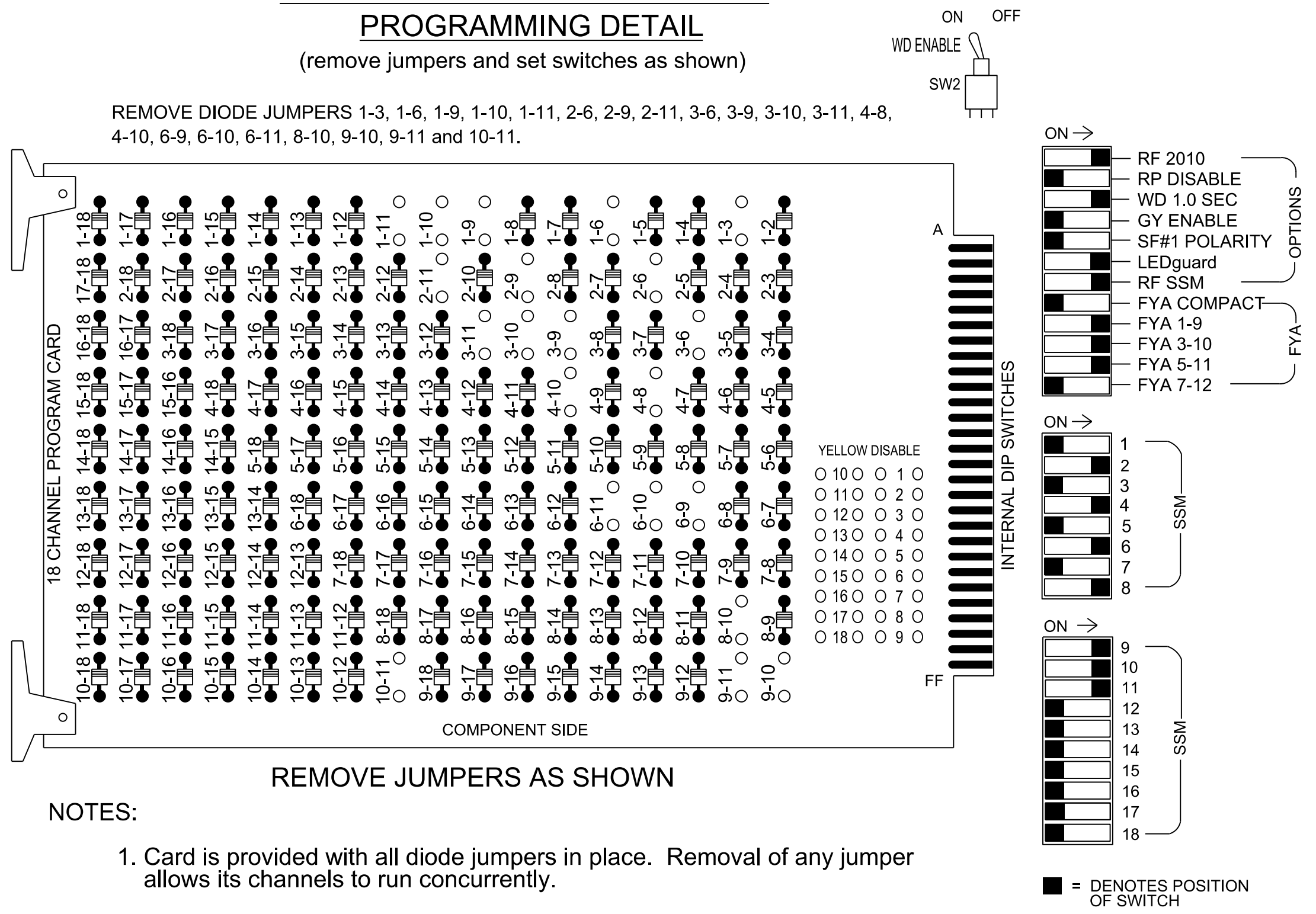






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(remove jumpers and set switches as shown)



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\*See overlap programming detail on sheet 2

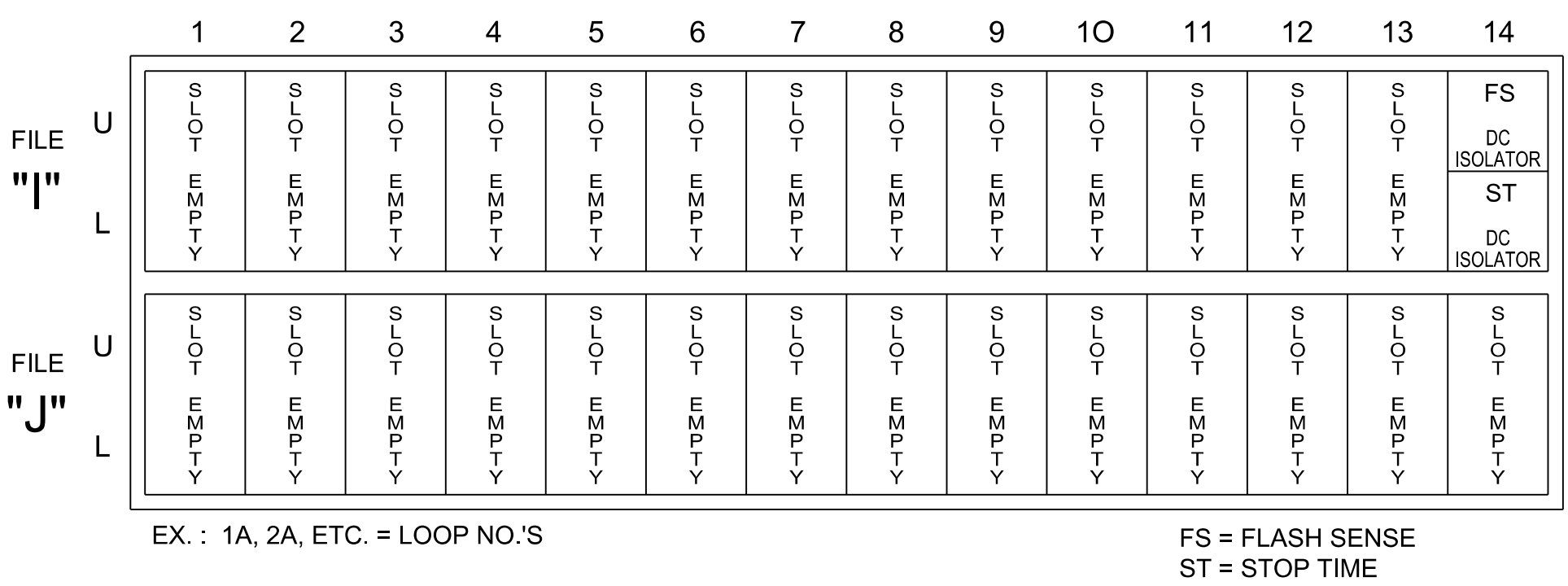
### SIGNAL HEAD HOOK-UP CHART

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	1	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	11*	22,23	NU	83*	41,42	NU	NU	61,62	NU	NU	81,82	NU	11*	83*	NU	21*	NU	NU
RED		128			101			134			107			A124				
YELLOW	*	129		*	102			135			108							
GREEN		130			103			136			109							
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### INPUT FILE POSITION LAYOUT

(front view)

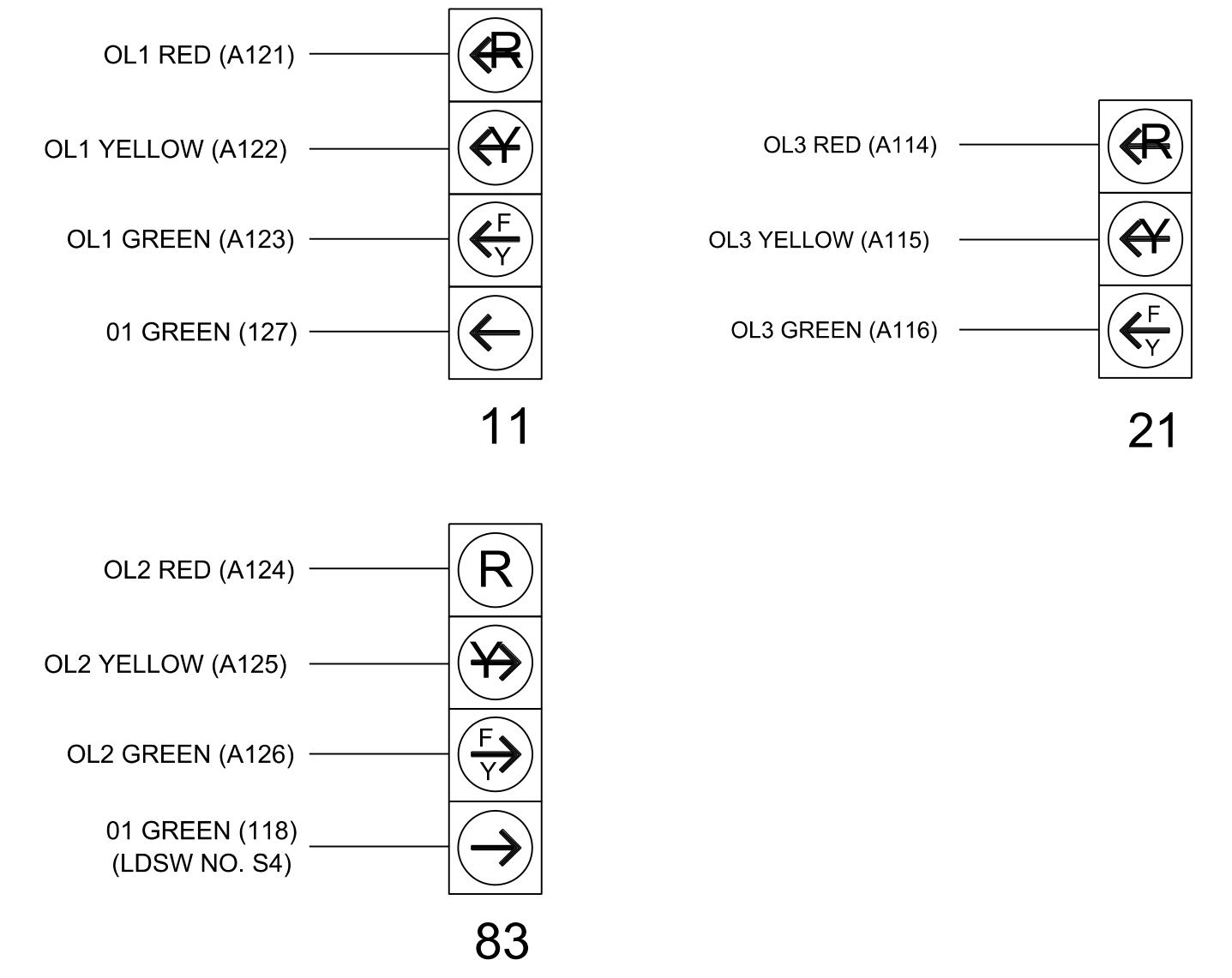


EX. : 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE  
 ST = STOP TIME

### FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)

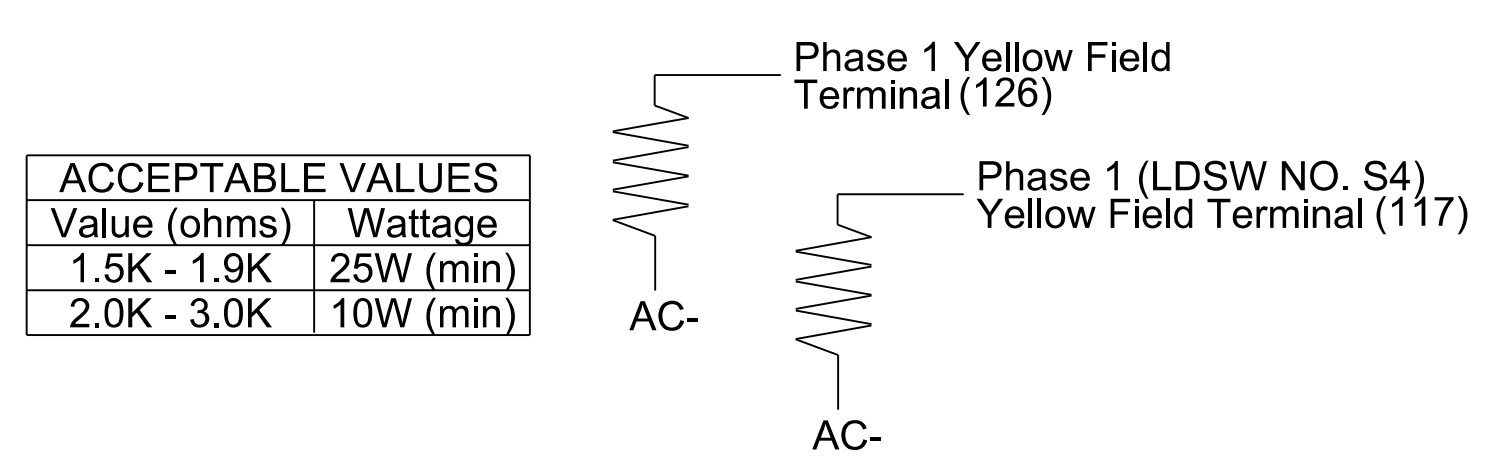


### SPECIAL DETECTOR NOTE

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.

### LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)



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

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 07-1622T2  
 DESIGNED: Jan 2023  
 SEALED: 3/10/2023  
 REVISED:



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

Electrical and Programming Details For:  
**SR 2817 (Barnes Street) at Watlington Industrial Drive**

Prepared for the Offices of:

Division 7 Rockingham County Reidsville

PLAN DATE: January 2023 REVIEWED BY: H M Surti  
 PREPARED BY: A Ravipti REVIEWED BY:

REVISIONS	INIT.	DATE

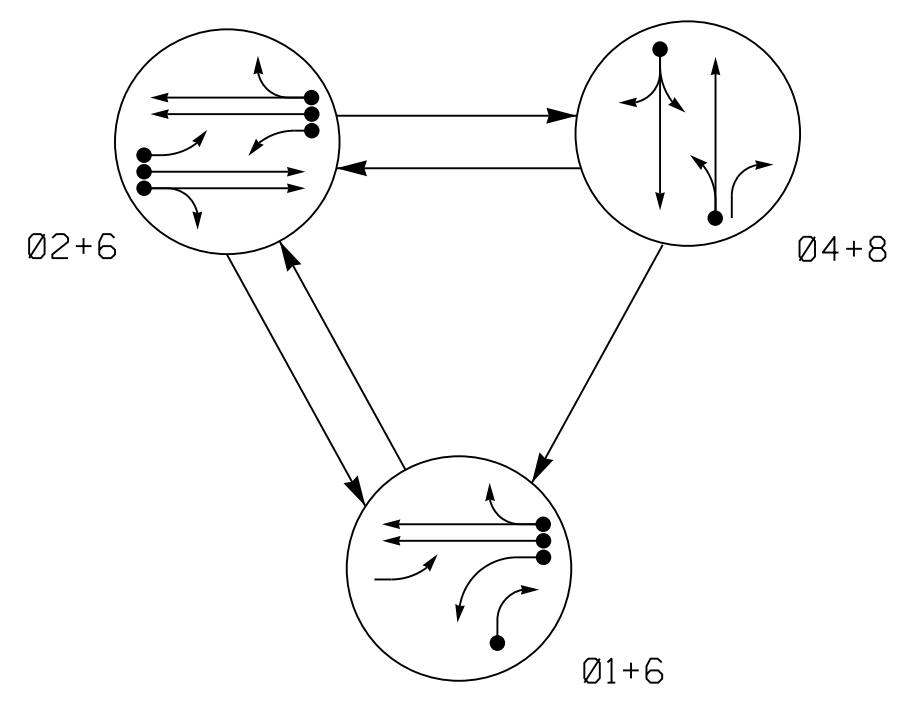
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**Hemang M. Surti** 3/10/2023  
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 SEAL  
 STATE OF NORTH CAROLINA  
 PROFESSIONAL ENGINEER  
 HEMANG M. SURTI  
 No. 034481  
 SIG. INVENTORY NO. 07-1622T2

3/10/2023  
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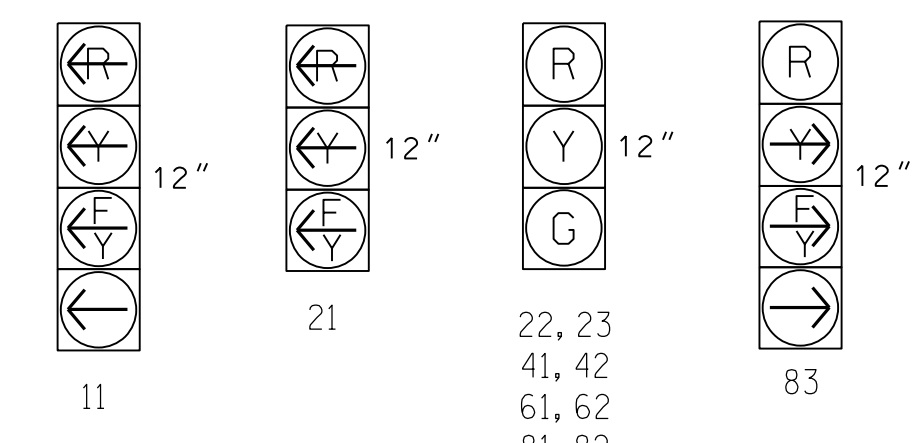
**PHASING DIAGRAM**



SIGNAL FACE	PHASE			
	01+6	02+6	04+8	FLHS
11	←	←	←	←
21	←	←	←	←
22, 23	R	G	R	Y
41, 42	R	R	G	R
61, 62	G	G	R	Y
81, 82	R	R	G	R
83	→	→	→	→

**SIGNAL FACE I.D.**

All Heads L.E.D.



**PHASING DIAGRAM DETECTION LEGEND**

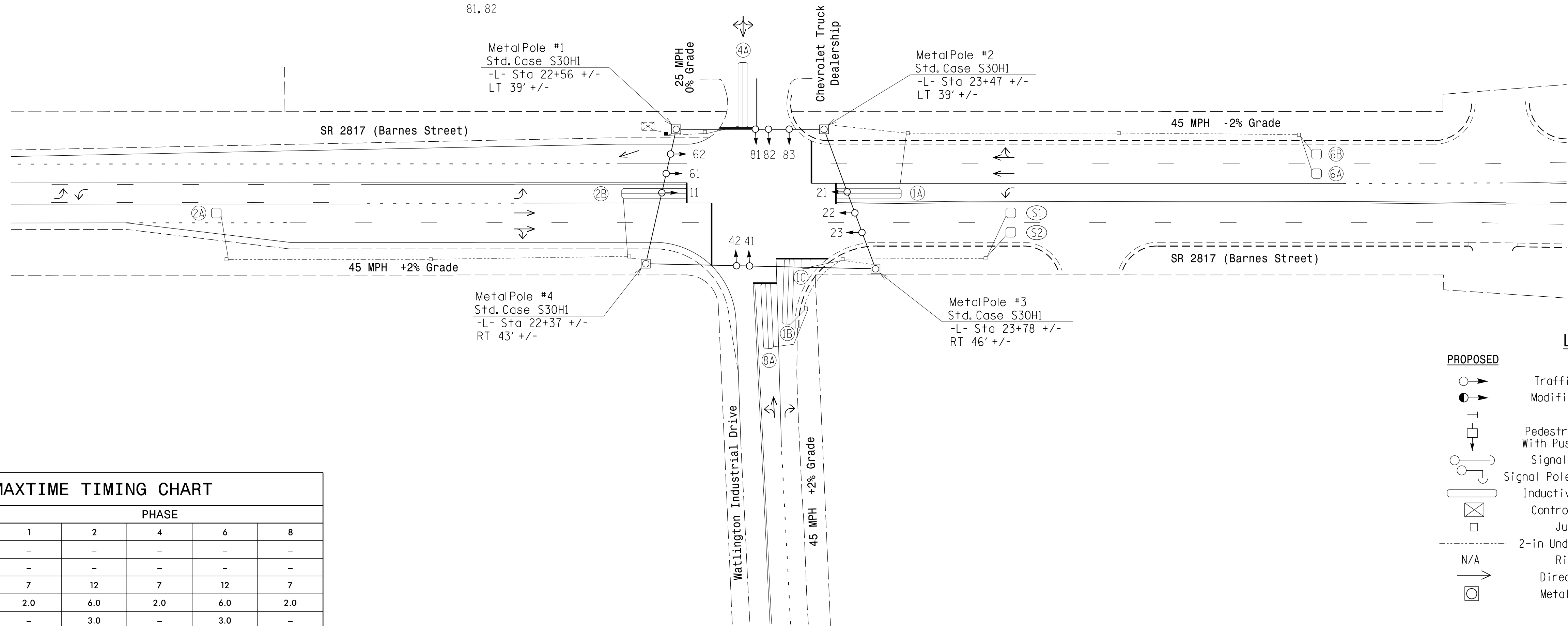
- ← ● DETECTED MOVEMENT
- ← ○ UNDETECTED MOVEMENT (OVERLAP)
- ← - - UNSIGNALIZED MOVEMENT
- ← - - - PEDESTRIAN MOVEMENT

MAXTIME DETECTOR INSTALLATION CHART															
DETECTOR					PROGRAMMING										
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	INITIAL	ADDED	QUEUE	CALL	PASSAGE 2	SYSTEM LOOP	NEW CARD
1A	6X40	0	2-4-2	X	1	15	-	X	-	-	X	-	-	X	-
1B	6X40	0	2-4-2	X	6	-	-	X	-	-	X	X	-	X	-
1C	6X6	0	5	X	1	15	-	X	-	-	X	-	-	X	-
2A	6X6	300	5	X	2	-	-	X	X	-	X	-	-	X	-
2B	6X40	0	2-4-2	X	2	-	-	X	-	-	X	X	-	X	-
4A	6X40	0	2-4-2	X	4	10	-	X	-	-	X	-	-	X	-
6A	6X6	300	5	X	6	-	-	X	X	-	X	-	-	X	-
6B	6X6	300	5	X	6	-	-	X	X	-	X	-	-	X	-
8A	6X40	0	2-4-2	X	8	3	-	X	-	-	X	-	-	X	-
S1	6X6	+180	5	X	-	-	-	-	-	-	-	-	-	X	X
S2	6X6	+180	5	X	-	-	-	-	-	-	-	-	-	X	X

3 Phase Fully Actuated  
 NC 87/SR 2817 (Barnes Street) CLS  
 Signal System #: D07-10\_Reidsville

**NOTES**

- Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Phase 1 may be lagged.
- Set all detector units to presence mode.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- Closed loop system data: Controller Asset #: 1622.

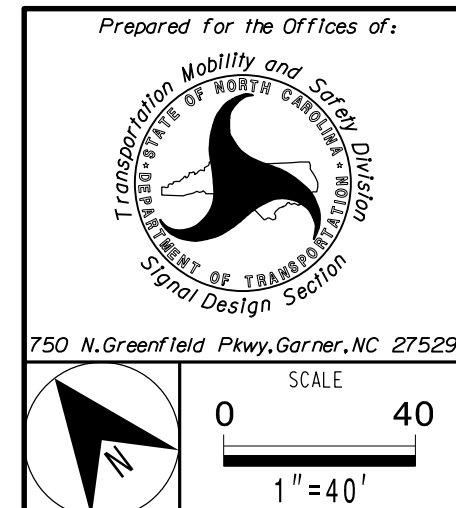


FEATURE	PHASE				
	1	2	4	6	8
Walk *	-	-	-	-	-
Ped Clear *	-	-	-	-	-
Min Green	7	12	7	12	7
Passage *	2.0	6.0	2.0	6.0	2.0
Passage 2 *	-	3.0	-	3.0	-
Max 1 *	20	90	25	90	35
Yellow Change	3.0	4.7	4.3	4.7	4.3
Red Clear	2.4	1.0	2.2	1.0	1.1
Added Initial *	-	1.5	-	1.5	-
Maximum Initial *	-	34	-	34	-
Time Before Reduction *	-	20	-	20	-
Time To Reduce *	-	30	-	30	-
Minimum Gap	-	3.0	-	3.0	-
Advance Walk	-	-	-	-	-
Non Lock Detector	X	-	X	-	X
Vehicle Recall	-	MIN RECALL	-	MIN RECALL	-
Dual Entry	-	-	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.

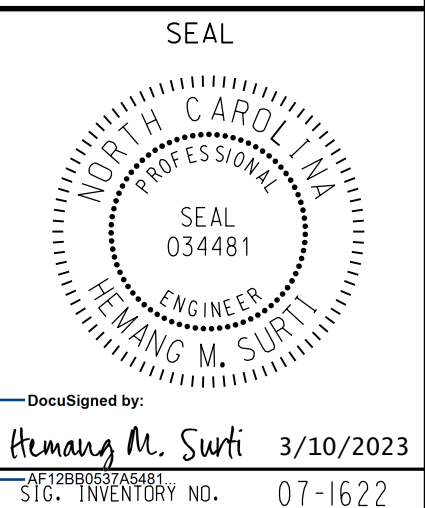
PROPOSED		EXISTING	
○ →	Traffic Signal Head	● →	N/A
● →	Modified Signal Head	+	Sign
⊥	Pedestrian Signal Head	⊥	Signal Pole with Guy
⊥	Signal Pole with Guy	⊥	Signal Pole with Sidewalk Guy
⊥	Signal Pole with Sidewalk Guy	⊥	Inductive Loop Detector
⊥	Inductive Loop Detector	⊥	Controller & Cabinet
⊥	Controller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

Signal Upgrade - Final Design



SR 2817 (Barnes Street) at Watlington Industrial Drive		
Division 7	Rockingham County	Reidsville
PLAN DATE: Jan 2023	REVIEWED BY: H.M. Surti	
PREPARED BY: M.D. Tindal	REVIEWED BY:	
REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



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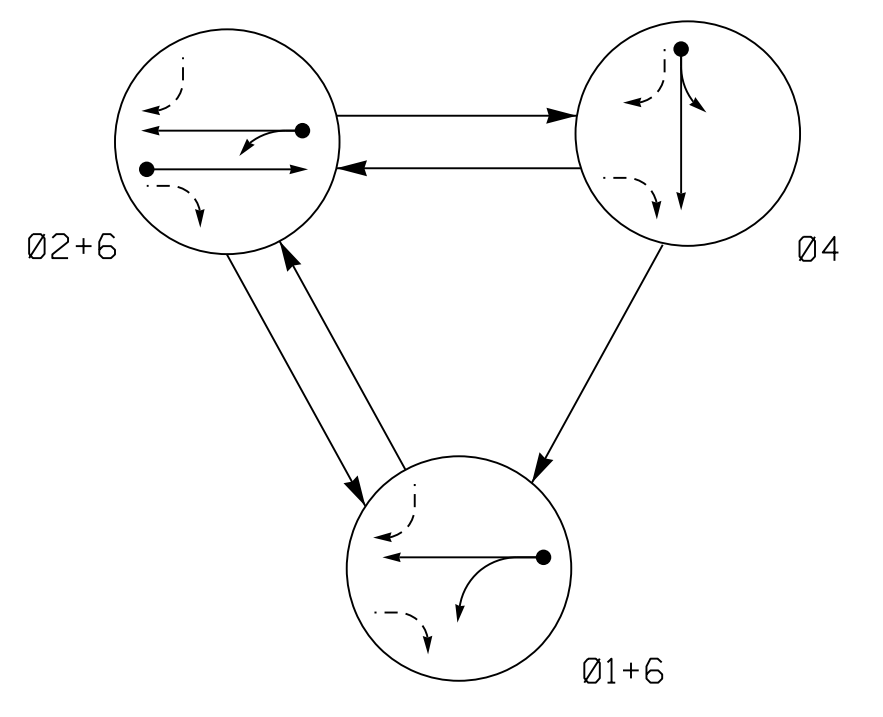








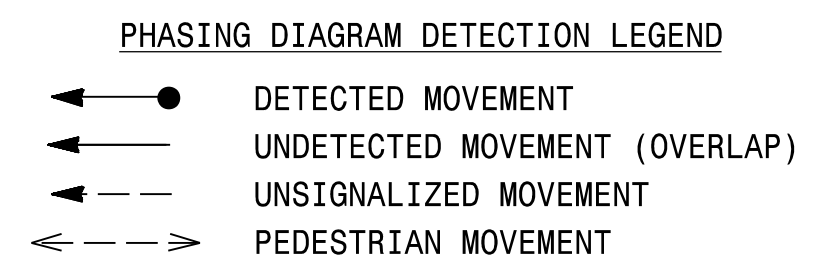
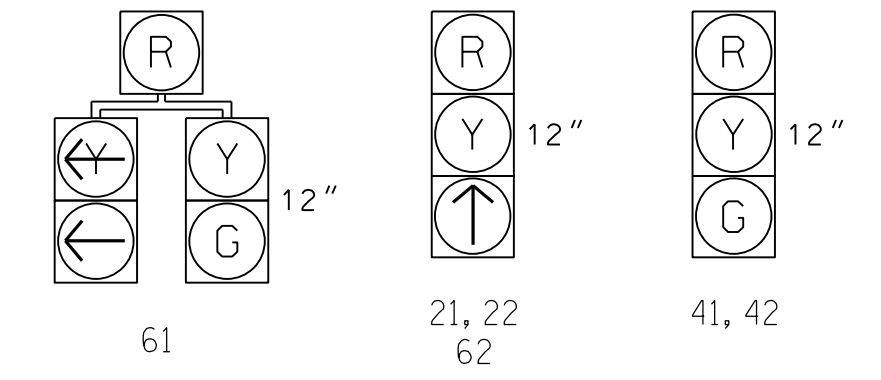
**PHASING DIAGRAM**



SIGNAL FACE	PHASE			
	Ø 1 + 6	Ø 2 + 6	Ø 4	FLASH
21, 22	R	↑	R	Y
41, 42	R	R	G	R
61	↑	G	R	Y
62	↑	↑	R	Y

**SIGNAL FACE I.D.**

All Heads L.E.D.



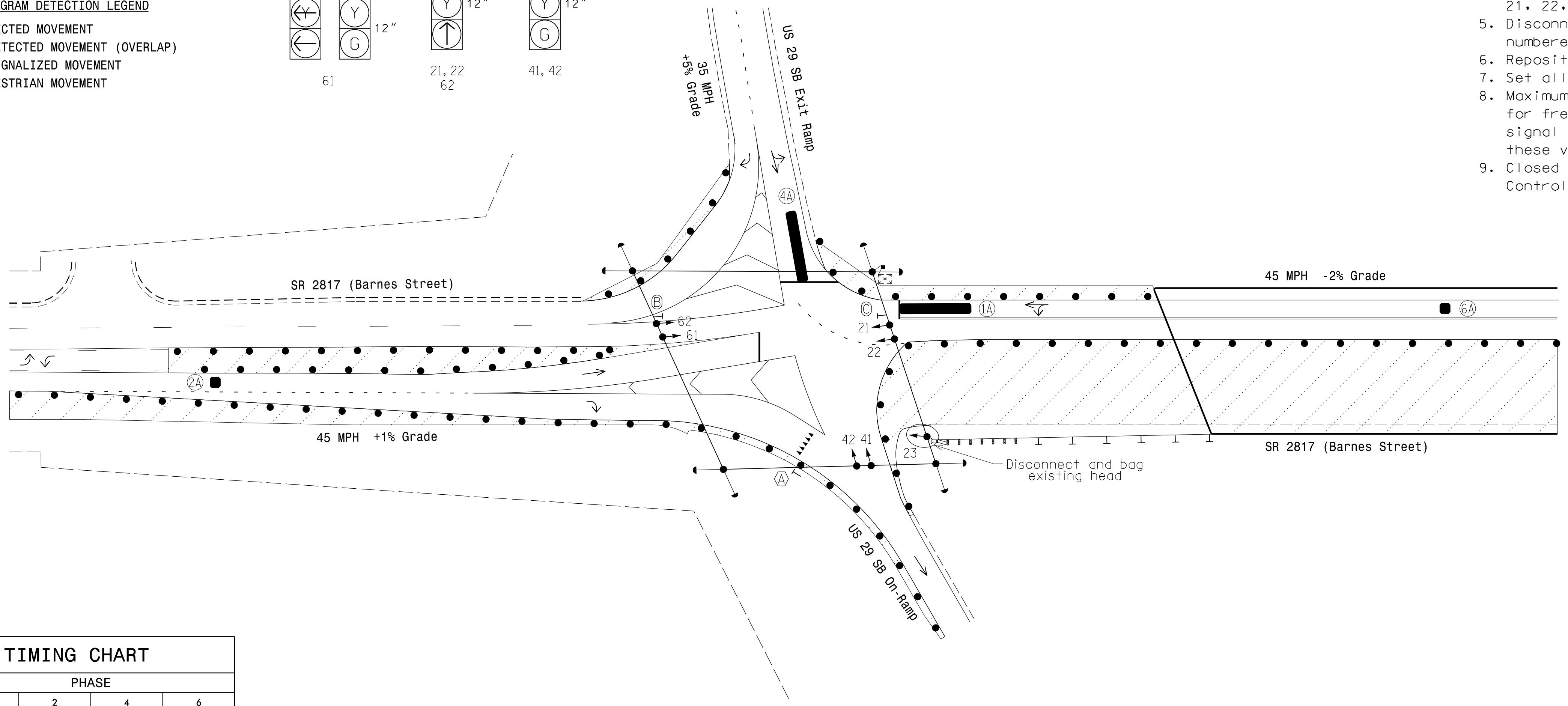
MAXTIME DETECTOR INSTALLATION CHART													
ZONE	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING								
					CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	QUEUE	CALL	PASSAGE 2	SYSTEM LOOP
1A*	6X40	0	*	*	1	10	-	X	-	-	X	-	*
2A*	6X6	300	*	*	2	-	-	X	X	-	X	-	*
4A*	6X40	0	*	*	4	-	-	X	-	-	X	-	*
6A*	6X6	300	*	*	6	-	-	X	X	-	X	-	*

\* Video Detection Zone

**3 Phase Fully Actuated**  
**NC 87/SR 2817 (Barnes Street) CLS**  
**Signal System #: D07-10\_Reidsville**

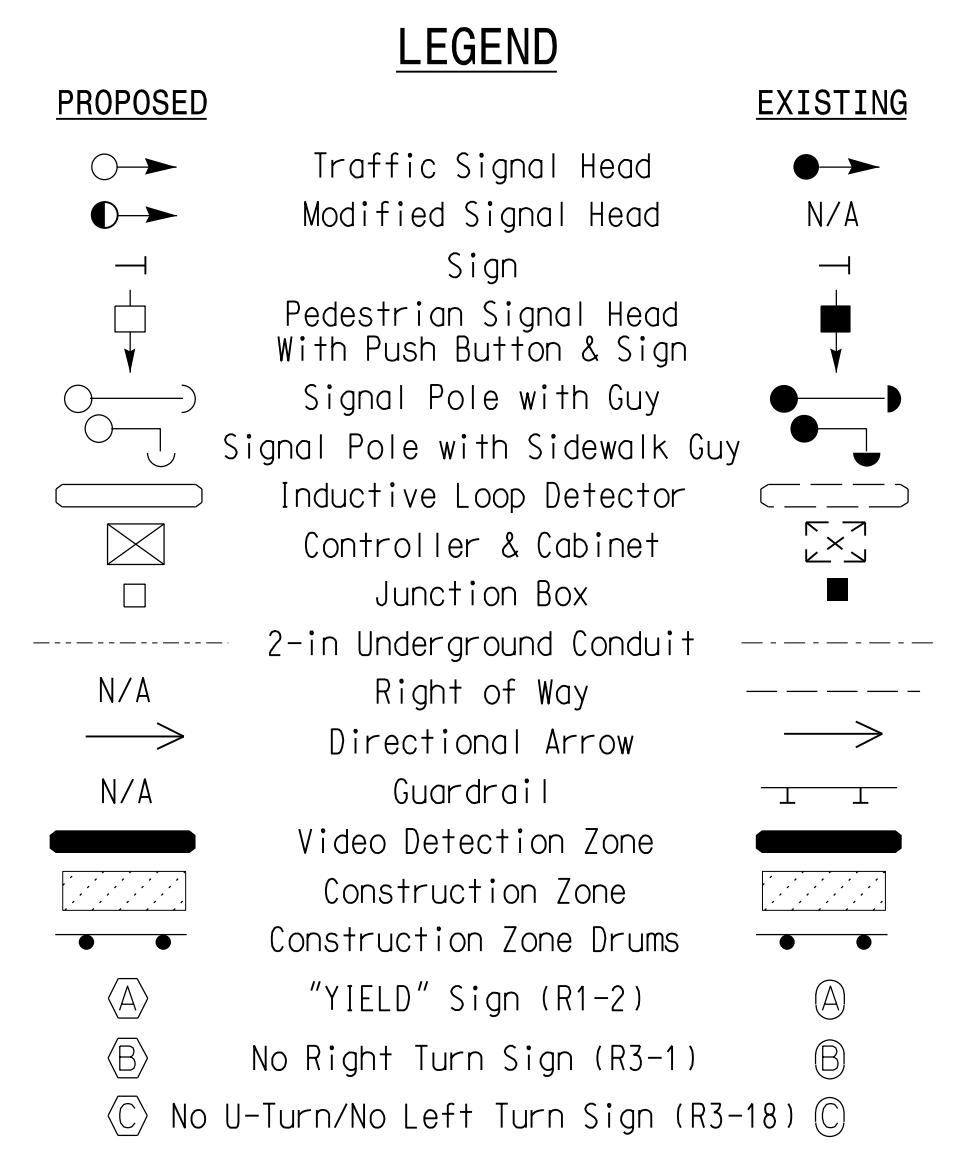
**NOTES**

- Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Phase 1 may be lagged.
- Reposition existing signal heads numbered 21, 22, 61, and 62.
- Disconnect and bag existing signal head numbered 23.
- Reposition existing signs (B) and (C).
- Set all detector units to presence mode.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- Closed loop system data: Controller Asset #: 1665.

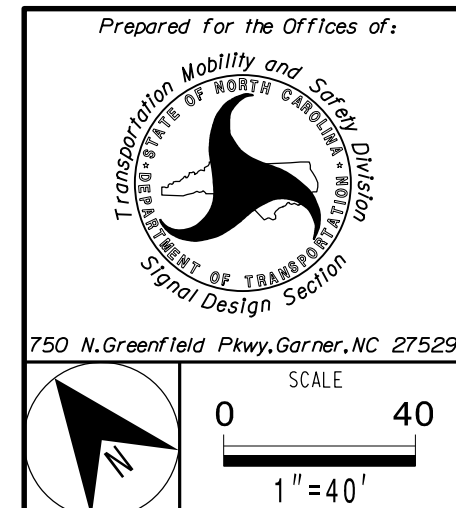


FEATURE	PHASE			
	1	2	4	6
Walk *	-	-	-	-
Ped Clear *	-	-	-	-
Min Green	7	12	7	12
Passage *	2.0	6.0	2.0	6.0
Passage 2 *	-	-	-	-
Max 1 *	20	90	30	90
Yellow Change	3.0	4.4	3.6	4.7
Red Clear	1.6	1.0	1.2	1.0
Added Initial *	-	2.5	-	2.5
Maximum Initial *	-	34	-	34
Time Before Reduction *	-	20	-	20
Time To Reduce *	-	30	-	30
Minimum Gap	-	3.0	-	3.0
Advance Walk	-	-	-	-
Non Lock Detector	X	-	X	-
Vehicle Recall	-	MIN RECALL	-	MIN RECALL
Dual Entry	-	-	-	-

\* These values may be field adjusted. Do not adjust Min Green and 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 - Temp Design 2 (TMP Phase II)**



<b>SR 2817 (Barnes Street) at US 29 SB Ramps</b>		
Division 7	Rockingham County	Reidsville
PLAN DATE: Jan 2023	REVIEWED BY: H.M. Surti	
PREPARED BY: M.D. Tindal	REVIEWED BY:	
REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL

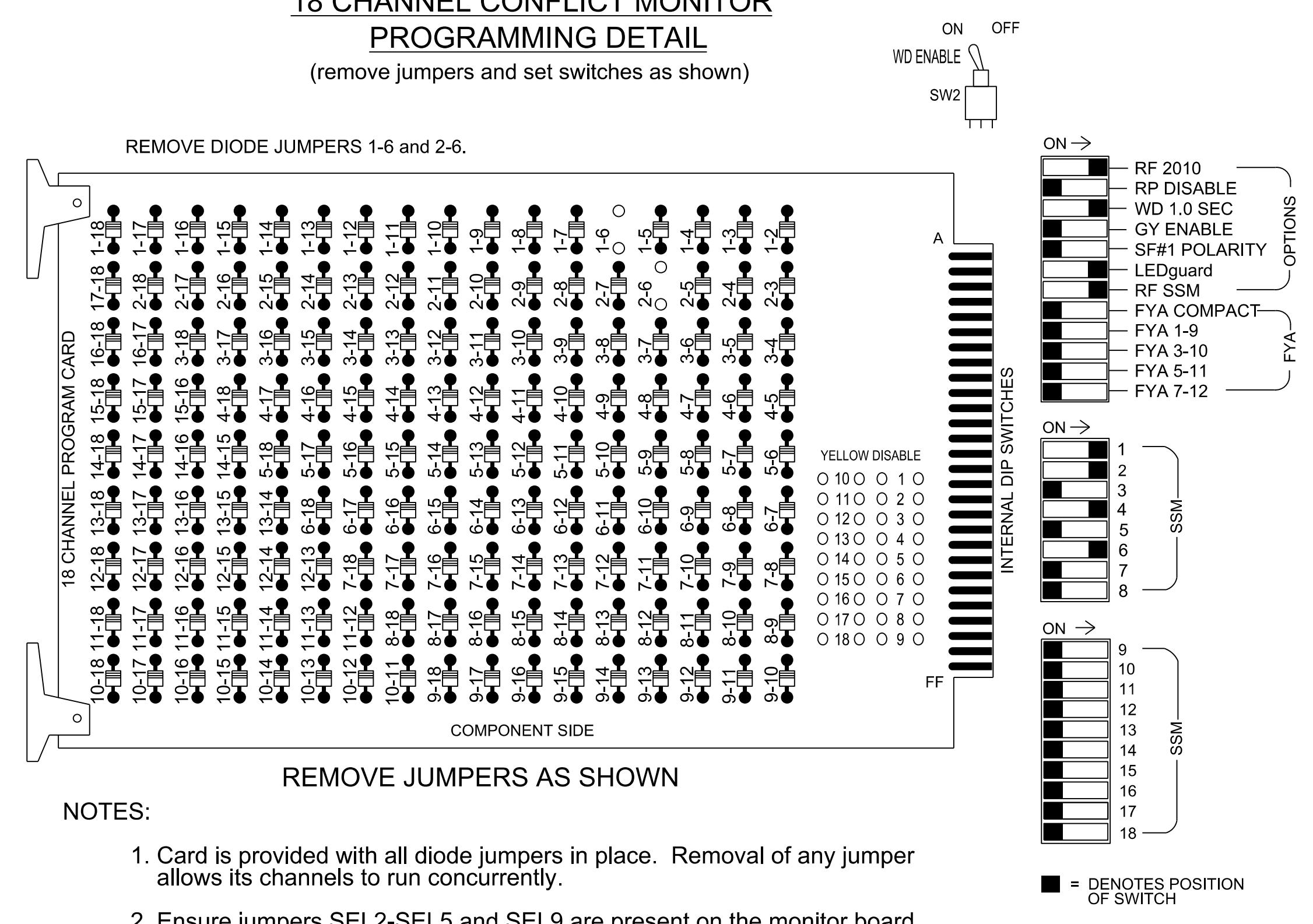
HEAVY M. Surti 3/10/2023

STG: INVENTORY NO. 07-1665T2

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### 18 CHANNEL CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



**NOTES:**

- Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
- Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
- Ensure that the Red Enable is active at all times during normal operation.
- 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 plan.
- Return controller to Factory Defaults before programming per this electrical detail.
- Program controller to start up in phase 2 Green No Walk and 6 Green No Walk.
- If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
- The cabinet and controller are part of NC 87/ SR 2817 (Barnes Street) Closed Loop System. Signal System #: D07-10 Reidsville.

### EQUIPMENT INFORMATION

Controller.....2070LX  
 Cabinet.....332 w/ Aux  
 Software.....Q-Free MAXTIME  
 Cabinet Mount.....BASE  
 Output File Positions.....18 With Aux. Output File  
 Load Switches Used.....S1, S2, S5, S8  
 Phases Used.....1, 2, 4, 6  
 Overlap "1".....NOT USED  
 Overlap "2".....NOT USED  
 Overlap "3".....NOT USED  
 Overlap "4".....NOT USED

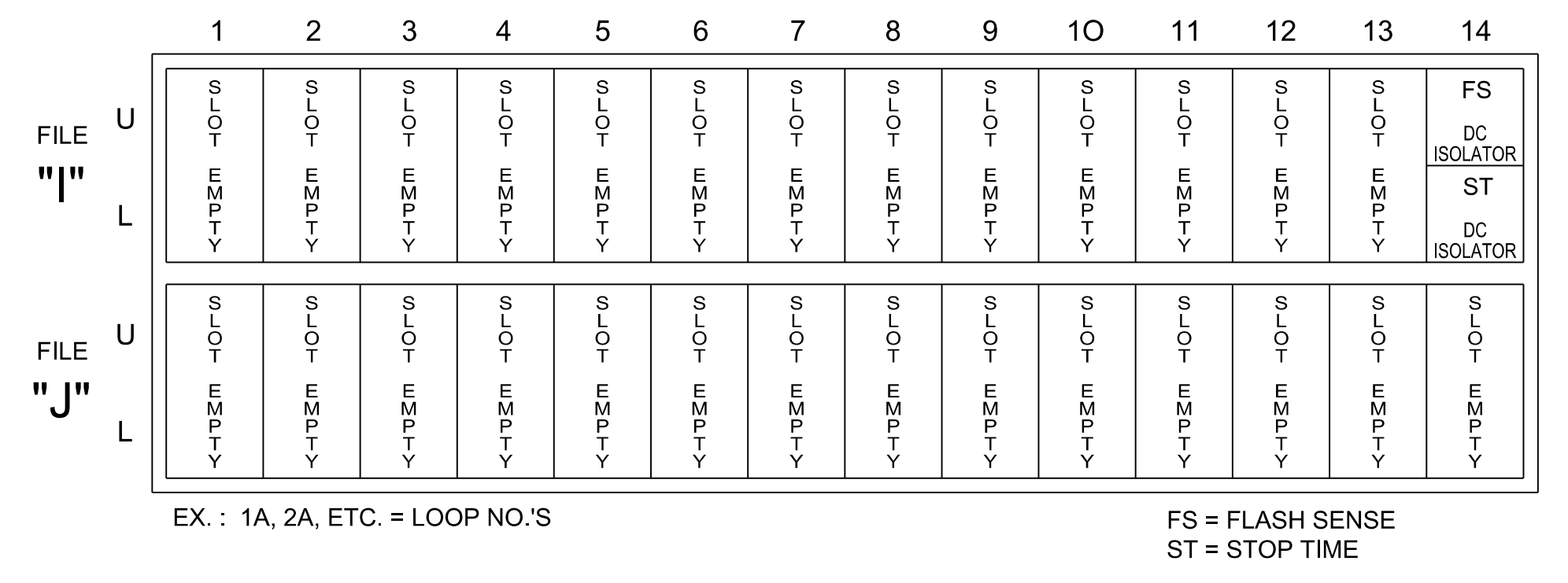
### SIGNAL HEAD HOOK-UP CHART

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	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	61	21,22	NU	NU	41,42	NU	NU	61	62	NU	NU	NU	NU	NU	NU	NU	NU	NU
RED	*	128			101			134	134									
YELLOW		129			102			135	135									
GREEN					103			136										
RED ARROW																		
YELLOW ARROW	126																	
GREEN ARROW	127	130						136										

NU = Not Used  
 \* Denotes install load resistor. See load resistor installation detail this sheet.

### INPUT FILE POSITION LAYOUT

(front view)

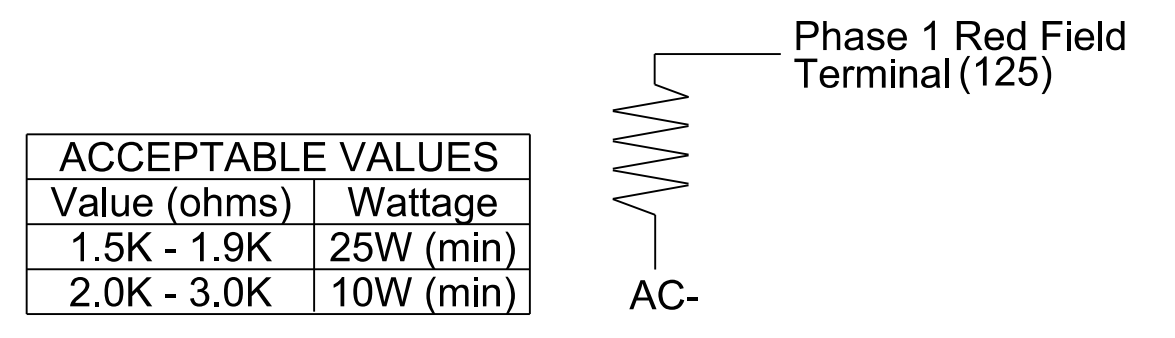


### SPECIAL DETECTOR NOTE

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.

### LOAD RESISTOR INSTALLATION DETAIL

(install resistor as shown)



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 07-1665T2  
 DESIGNED: Jan 2023  
 SEALED: 3/10/2023  
 REVISED:

Temporary Design 2 (TMP Phase II)  
 Electrical Detail

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

SR 2817 (Barnes Street)  
 at  
 US 29 SB Ramps

Division 7 Rockingham County Reidsville

PLAN DATE: January 2023 REVIEWED BY: H M Surti

PREPARED BY: A Ravipati REVIEWED BY:

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

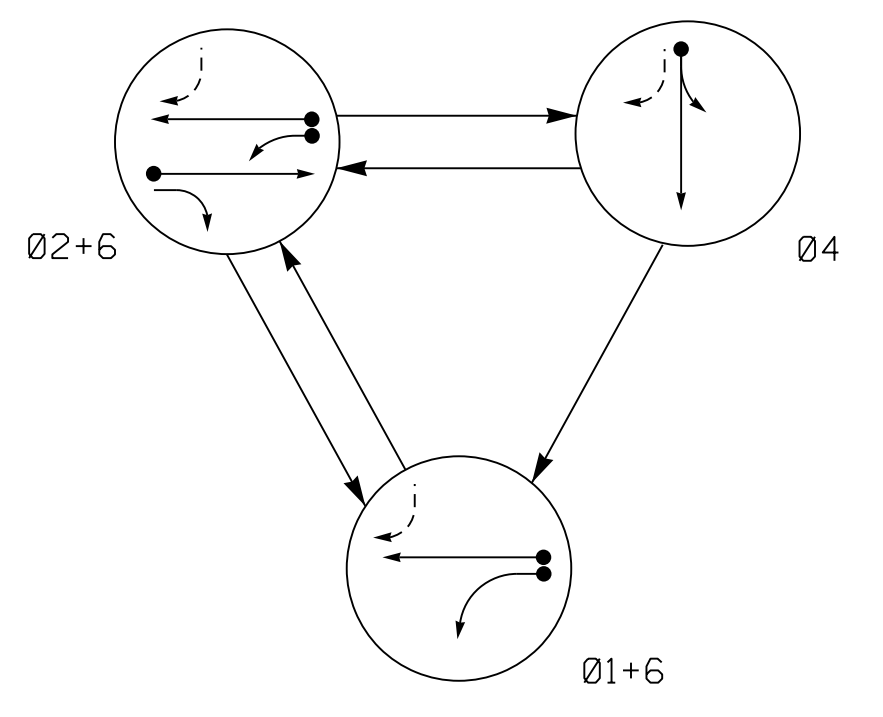
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 Hemanth M. Surti 3/10/2023  
 SIG. INVENTORY NO. 07-1665T2

**AECOM**  
 NC Firm License No.: F-0342  
 5438 Wade Park Boulevard  
 Suite 200, Raleigh, NC 27607  
 Phone: 919-461-1100

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 m:chael.covenough



**PHASING DIAGRAM**



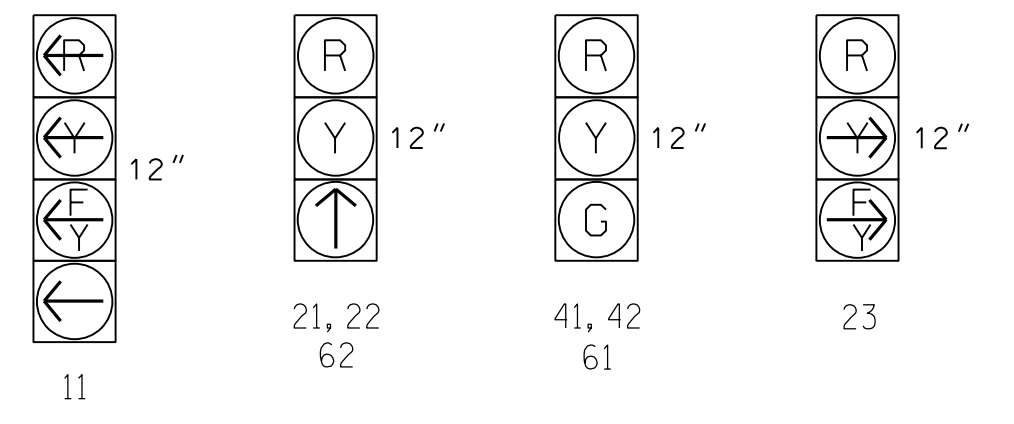
SIGNAL FACE	PHASE			
	Ø 1 + 6	Ø 2 + 6	Ø 4	FLASH
11	←	→	↔	Y
21, 22	R	↑	R	Y
23	R	↖	R	Y
41, 42	R	R	G	R
61	G	G	R	Y
62	↑	↑	R	Y

**SIGNAL FACE I.D.**

All Heads L.E.D.

**PHASING DIAGRAM DETECTION LEGEND**

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



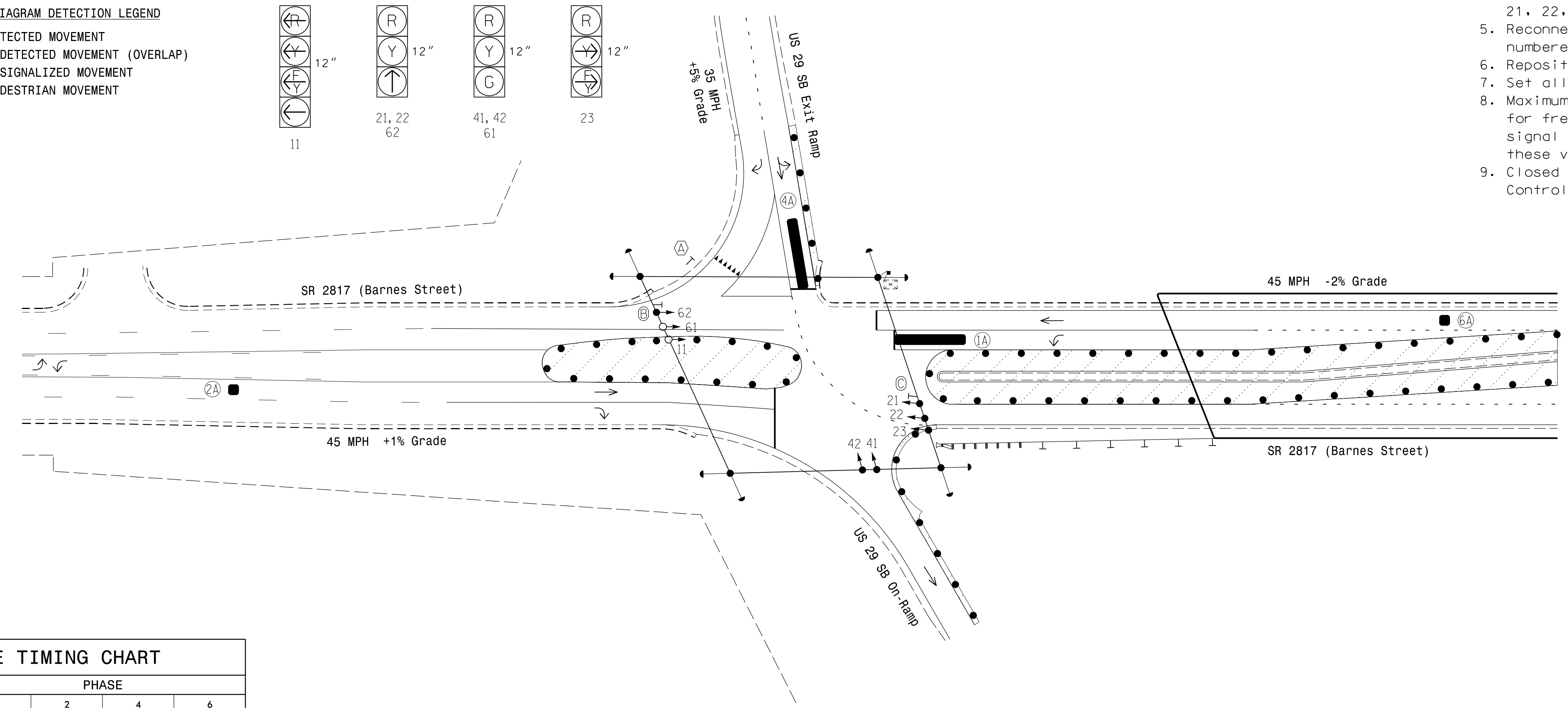
MAXTIME DETECTOR INSTALLATION CHART														
DETECTOR					PROGRAMMING									
ZONE	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	QUEUE	CALL	PASSAGE 2	SYSTEM LOOP	NEW CARD
1A*	6X40	0	*	*	1	15	-	X	-	-	X	-	-	*
2A*	6X6	300	*	*	2	-	-	X	X	-	X	X	-	*
4A*	6X40	0	*	*	4	-	-	X	-	-	X	-	-	*
6A*	6X6	300	*	*	6	-	-	X	X	-	X	-	-	*

\* Video Detection Zone

**3 Phase Fully Actuated NC 87/SR 2817 (Barnes Street) CLS Signal System #: D07-10\_Reidsville**

**NOTES**

- Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Phase 1 may be lagged.
- Reposition existing signal heads numbered 21, 22, 23, and 62.
- Reconnect and unbag existing signal head numbered 23.
- Reposition existing signs (B) and (C).
- Set all detector units to presence mode.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- Closed loop system data: Controller Asset #: 1665.



FEATURE	PHASE			
	1	2	4	6
Walk *	-	-	-	-
Ped Clear *	-	-	-	-
Min Green	7	12	7	12
Passage *	2.0	6.0	2.0	6.0
Passage 2 *	-	-	-	3.0
Max I *	20	90	30	90
Yellow Change	3.0	4.4	3.6	4.7
Red Clear	2.0	1.1	2.5	1.0
Added Initial *	-	2.5	-	2.5
Maximum Initial *	-	34	-	34
Time Before Reduction *	-	20	-	20
Time To Reduce *	-	30	-	30
Minimum Gap	-	3.0	-	3.0
Advance Walk	-	-	-	-
Non Lock Detector	X	-	X	-
Vehicle Recall	-	MIN RECALL	-	MIN RECALL
Dual Entry	-	-	-	-

\* These values may be field adjusted. Do not adjust Min Green and 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.

PROPOSED		EXISTING	
○→	Traffic Signal Head	●→	N/A
○→	Modified Signal Head	○→	N/A
□→	Signal Pole with Sidewalk Guy	□→	N/A
□→	Signal Pole with Sidewalk Guy	□→	N/A
□	Inductive Loop Detector	□	N/A
□	Controller & Cabinet	□	N/A
□	Junction Box	□	N/A
- - -	2-in Underground Conduit	- - -	N/A
N/A	Right of Way	- - -	N/A
→	Directional Arrow	→	N/A
N/A	Guardrail	— — —	N/A
▨	Video Detection Zone	▨	N/A
▨	Construction Zone	▨	N/A
▨	Construction Zone Drums	▨	N/A
(A)	"YIELD" Sign (R1-2)	(A)	N/A
(B)	No Right Turn Sign (R3-1)	(B)	N/A
(C)	No U-Turn/No Left Turn Sign (R3-18)	(C)	N/A

**Signal Upgrade - Temp Design 3 (TMP Phase III)**

**AECOM**  
 NC Firm License No.: F-0342  
 5438 Wade Park Boulevard  
 Suite 200 Raleigh, NC 27607  
 Phone: 919-461-1100

Prepared for the Offices of:  
 TRANSPORTATION MOBILITY AND SAFETY DIVISION  
 NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
 SIGNAL DESIGN SECTION

**SR 2817 (Barnes Street) at US 29 SB Ramps**

Division 7 Rockingham County Reidsville

PLAN DATE: Jan 2023 REVIEWED BY: H.M. Surti

PREPARED BY: M.D. Tindal REVIEWED BY:

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

SCALE: 0 40  
1" = 40'

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL

MDP H. CAROLINA PROFESSIONAL ENGINEER  
 SEAL 034481  
 HEWANG M. SURTI

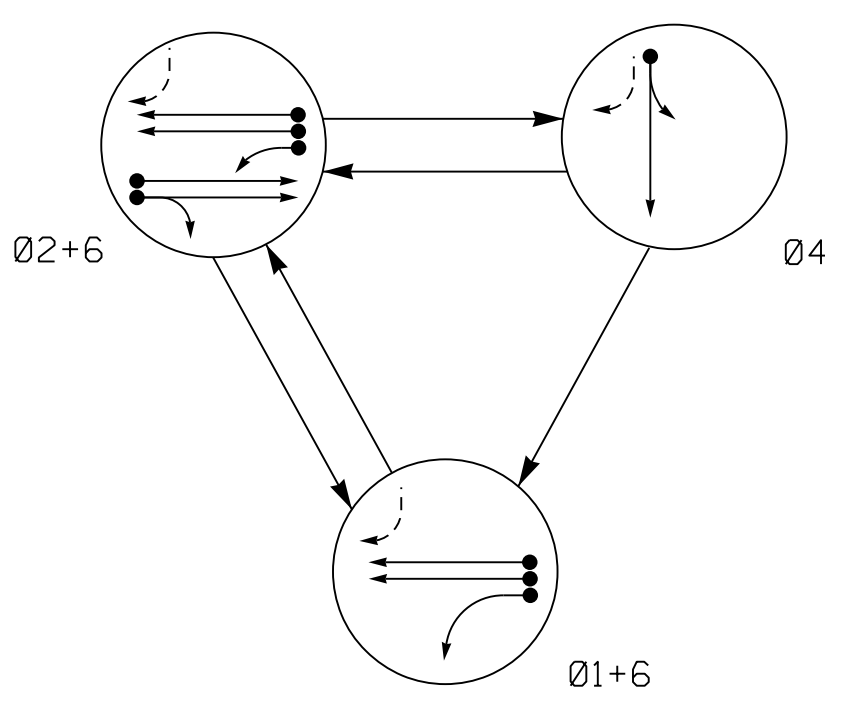
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**DEFAULT PHASING DIAGRAM**

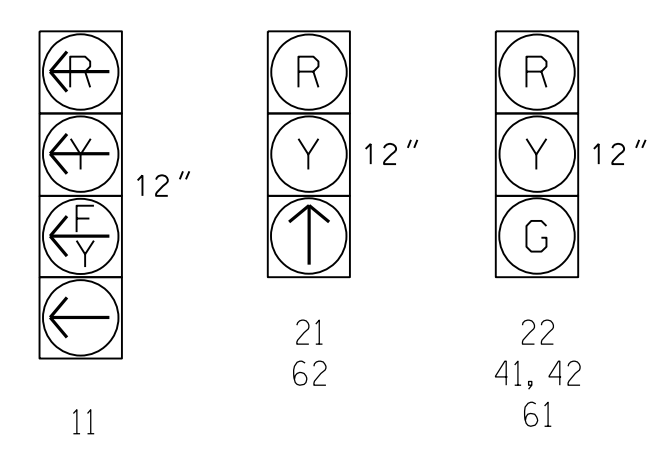
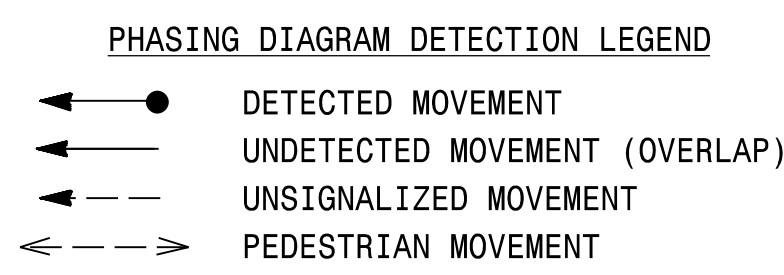


**DEFAULT PHASING TABLE OF OPERATION**

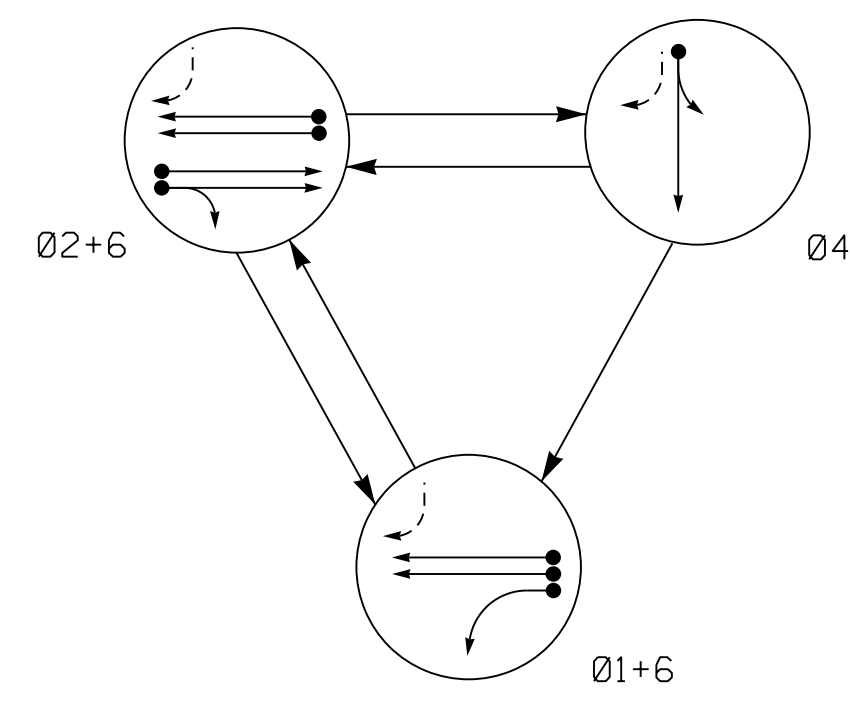
SIGNAL FACE	PHASE			
	Ø 1 + 6	Ø 2 + 6	Ø 4	FLASH
11	←	←	←	←
21	R	↑	R	Y
22	R	G	R	Y
41, 42	R	R	G	R
61	G	G	R	Y
62	↑	↑	R	Y

**SIGNAL FACE I.D.**

All Heads L.E.D.

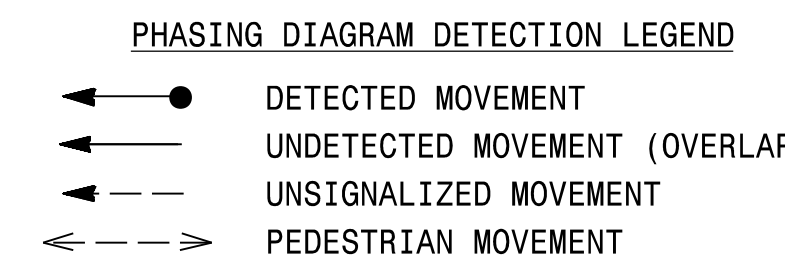


**ALTERNATE PHASING DIAGRAM**



**ALTERNATE PHASING TABLE OF OPERATION**

SIGNAL FACE	PHASE			
	Ø 1 + 6	Ø 2 + 6	Ø 4	FLASH
11	←	←	←	←
21	R	↑	R	Y
22	R	G	R	Y
41, 42	R	R	G	R
61	G	G	R	Y
62	↑	↑	R	Y



**MAXTIME DETECTOR INSTALLATION CHART**

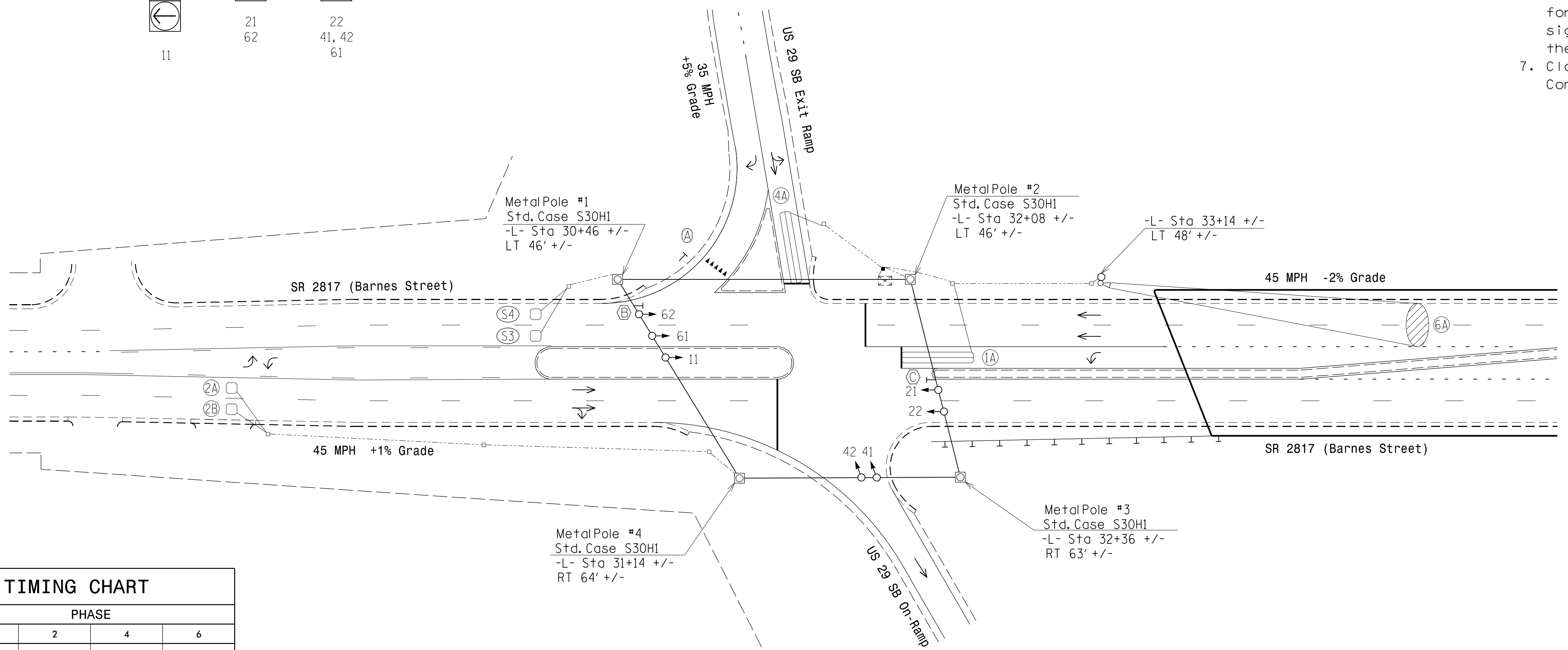
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING									
					CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	QUEUE	PASSAGE 2	SYSTEM LOOP	NEW CARD	
1A	6X40	0	2-4-2	X	1	#15	-	X	-	X	-	X	-	X
2A	6X6	300	5	X	2	-	-	X	X	-	X	-	X	-
2B	6X6	300	5	X	2	-	-	X	X	-	X	-	X	-
4A	6X40	0	2-4-2	X	4	-	-	X	-	X	-	X	-	X
6A*	*	300	*	X	6	-	-	X	X	-	X	-	*	-
S3	6X6	+180	5	-	-	-	-	-	-	-	-	-	X	X
S4	6X6	+180	5	-	-	-	-	-	-	-	-	-	X	X

\* Microwave Detection Zone  
 # Reduce Delay to 3 Seconds During Alternate Phasing Operation.  
 ## Disable Phase call for loop during Alternate Phasing Operation.

**3 Phase Fully Actuated**  
 NC 87/SR 2817 (Barnes Street) CLS  
 Signal System #: D07-10\_Reidsville

**NOTES**

- Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Phase 1 may be lagged.
- Set all detector units to presence mode.
- This intersection uses multi-zone microwave detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- Closed loop system data: Controller Asset #: 1665.



**MAXTIME TIMING CHART**

FEATURE	PHASE			
	1	2	4	6
Walk *	-	-	-	-
Ped Clear *	-	-	-	-
Min Green	7	12	7	12
Passage *	2.0	6.0	2.0	6.0
Passage 2 *	-	-	-	3.0
Max 1 *	20	90	30	90
Yellow Change	3.0	4.7	3.6	4.7
Red Clear	2.4	1.0	2.2	1.0
Added Initial *	-	1.8	-	1.8
Maximum Initial *	-	34	-	34
Time Before Reduction *	-	20	-	20
Time To Reduce *	-	30	-	30
Minimum Gap	-	3.0	-	3.0
Advance Walk	-	-	-	-
Non Lock Detector	X	-	X	-
Vehicle Recall	-	MIN RECALL	-	MIN RECALL
Dual Entry	-	-	-	-

\* These values may be field adjusted. Do not adjust Min Green and 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	● → Traffic Signal Head
● → Modified Signal Head	N/A
□ → Pedestrian Signal Head With Push Button & Sign	□ → Pedestrian Signal Head
□ → Signal Pole with Guy	□ → Signal Pole with Guy
□ → Signal Pole with Sidewalk Guy	□ → Signal Pole with Sidewalk Guy
□ → Inductive Loop Detector	□ → Inductive Loop Detector
□ → Controller & Cabinet	□ → Controller & Cabinet
□ → Junction Box	□ → Junction Box
--- 2-in Underground Conduit	--- 2-in Underground Conduit
N/A → Right of Way	N/A → Right of Way
N/A → Directional Arrow	N/A → Directional Arrow
N/A → Guardrail	N/A → Guardrail
○ → Out of Pavement Detector	○ → Out of Pavement Detector
▨ → Microwave Detection Zone	▨ → Microwave Detection Zone
○ → Metal Strain Pole	○ → Metal Strain Pole
A → "YIELD" Sign (R1-2)	A → "YIELD" Sign (R1-2)
B → No Right Turn Sign (R3-1)	B → No Right Turn Sign (R3-1)
C → No U-Turn/No Left Turn Sign (R3-18)	C → No U-Turn/No Left Turn Sign (R3-18)

**Signal Upgrade - Final Design**



Prepared For the Offices of:  
 Transportation Mobility and Safety Division  
 NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
 Signal Design Section

**SR 2817 (Barnes Street) at US 29 SB Ramps**

Division 7 Rockingham County Reidsville

PLAN DATE: Jan 2023 REVIEWED BY: H.M. Surti

PREPARED BY: M.D. Tindal REVIEWED BY:

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

SCALE: 0 40  
1" = 40'

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

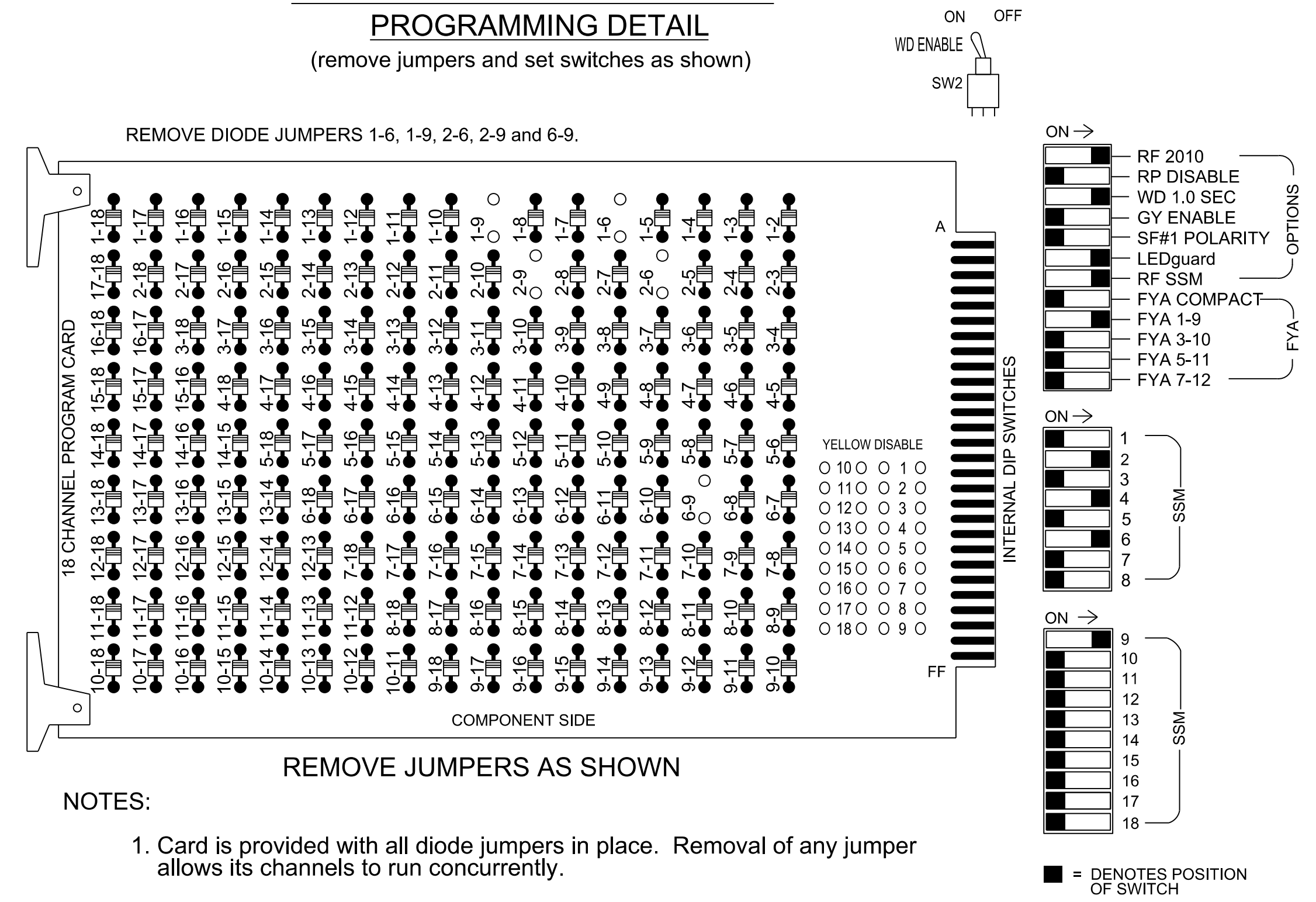
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 HEAVY M. SURTI  
 PROFESSIONAL ENGINEER  
 034481  
 3/10/2023  
 STG: INVENTORY NO. 07-1665

3/10/2023  
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 mitchell.coveaugh



### 18 CHANNEL CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



- NOTES:
- Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
  - Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
  - Ensure that the Red Enable is active at all times during normal operation.
  - 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 plan.
- Return controller to Factory Defaults before programming per this electrical detail.
- Program controller to start up in phase 2 Green No Walk and 6 Green No Walk.
- If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
- The cabinet and controller are part of NC 87/ SR 2817 (Barnes Street) Closed Loop System. Signal System #: D07-10 Reidsville.

### EQUIPMENT INFORMATION

Controller.....2070LX  
 Cabinet.....332 w/ Aux  
 Software.....Q-Free MAXTIME  
 Cabinet Mount.....BASE  
 Output File Positions.....18 With Aux. Output File  
 Load Switches Used.....S1, S2, S5, S8, AUX S1  
 Phases Used.....1, 2, 4, 6  
 Overlap "1".....\*  
 Overlap "2".....NOT USED  
 Overlap "3".....NOT USED  
 Overlap "4".....NOT USED

\*See overlap programming detail on sheet 3

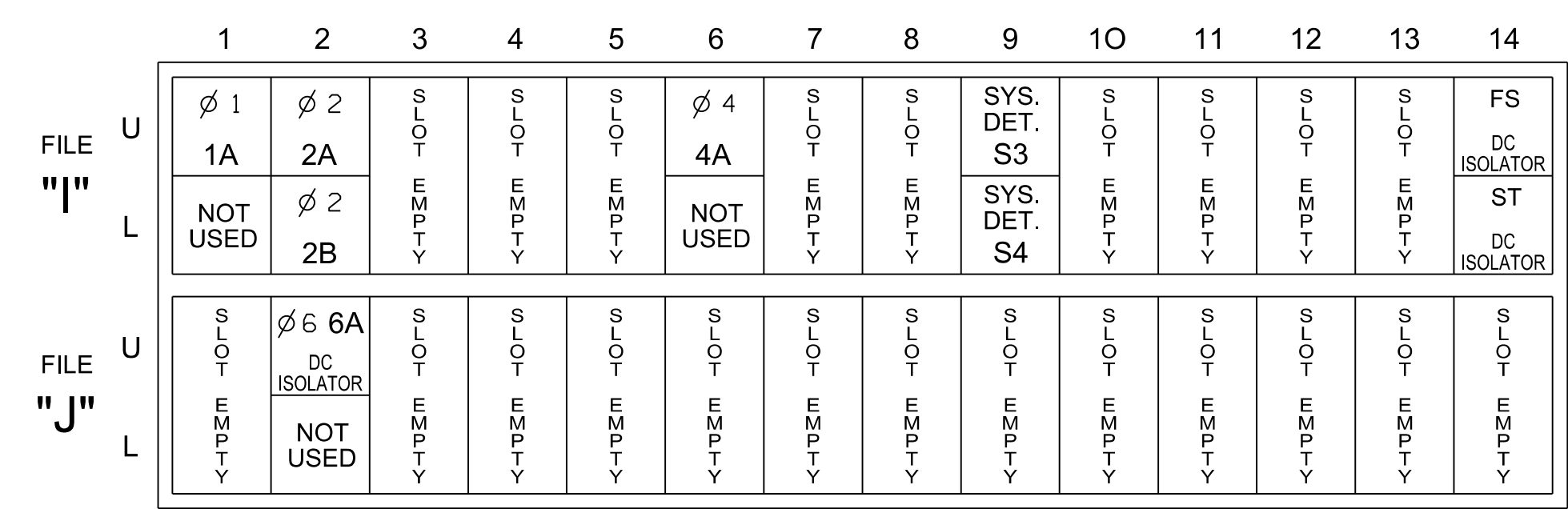
### SIGNAL HEAD HOOK-UP CHART

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	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	11*	21	22	NU	NU	41,42	NU	NU	61	62	NU	NU	11*	NU	NU	NU	NU	NU
RED	128	128			101			134	134									
YELLOW	*	129	129		102			135	135									
GREEN			130		103			136										
RED ARROW														A121				
YELLOW ARROW														A122				
FLASHING YELLOW ARROW														A123				
GREEN ARROW	127	130								136								

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

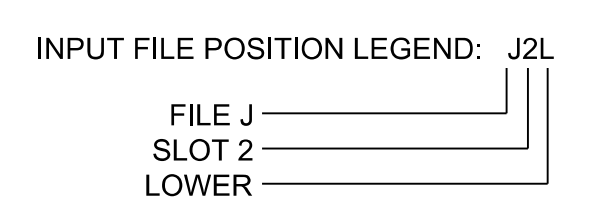
Note: Install a model 242 DC Isolator in slot J2 for use with microwave detector. See the Microwave Detector Wiring Details on sheet 2.

- IMPORTANT: For proper operation of the microwave detector, remove surge protection from TB3-5 and TB3-6, and from TB3-7 and TB3-8.
- IMPORTANT: If TB3-6 is tied to AC NEUTRAL, remove jumper, DO NOT connect TB3-6 to AC NEUTRAL.

### INPUT FILE CONNECTION & PROGRAMMING CHART

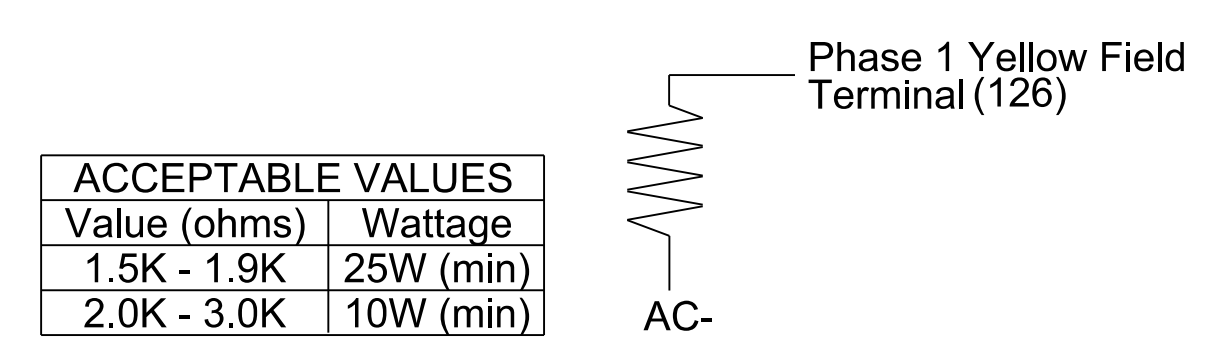
LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	QUEUE	CALL	PASSAGE 2
1A	TB2-1,2	I1U	56	18	1	1	15		X			X	X
2A	TB2-5,6	I2U	39	1	2	2			X	X		X	
2B	TB2-7,8	I2L	43	5	3	2			X	X		X	
4A	TB4-9,10	I6U	41	3	8	4			X			X	
*S3	TB6-9,10	I9U	60	22	13	SYS							
*S4	TB6-11,12	I9L	62	24	14	SYS							
6A	**	J2U	40	2	16	**			X	X		X	

\*\*Microwave Pulse Detector (See Wiring Detail Sheet 2).  
 \*System detector only. Remove any assigned vehicle phase.



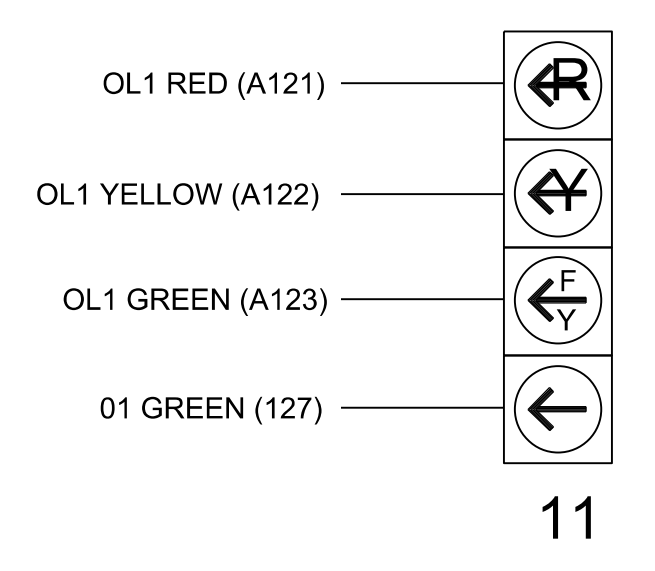
### LOAD RESISTOR INSTALLATION DETAIL

(install resistor as shown)



### FYA SIGNAL WIRING DETAIL

(wire signal head as shown)



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 07-1665  
 DESIGNED: Jan 2023  
 SEALED: 3/10/2023  
 REVISED:

Final Design  
 Electrical Detail - Sheet 1 of 4

Electrical and Programming Details For:

Prepared for the Offices of:

Transporation Mobility and Safety Division  
 UNIVERSITY OF NORTH CAROLINA  
 SCHOOL OF TRANSPORTATION & SIGNALS MANAGEMENT

750 N. Greenfield Pkwy, Garner, NC 27529

SR 2817 (Barnes Street) at US 29 SB Ramps

Division 7 Rockingham County Reidsville

PLAN DATE: January 2023 REVIEWED BY: H M Surti

PREPARED BY: A Ravipati REVIEWED BY:

REVISIONS

INIT. DATE

DocuSigned by: Hemang M. Surti 3/10/2023

SEAL

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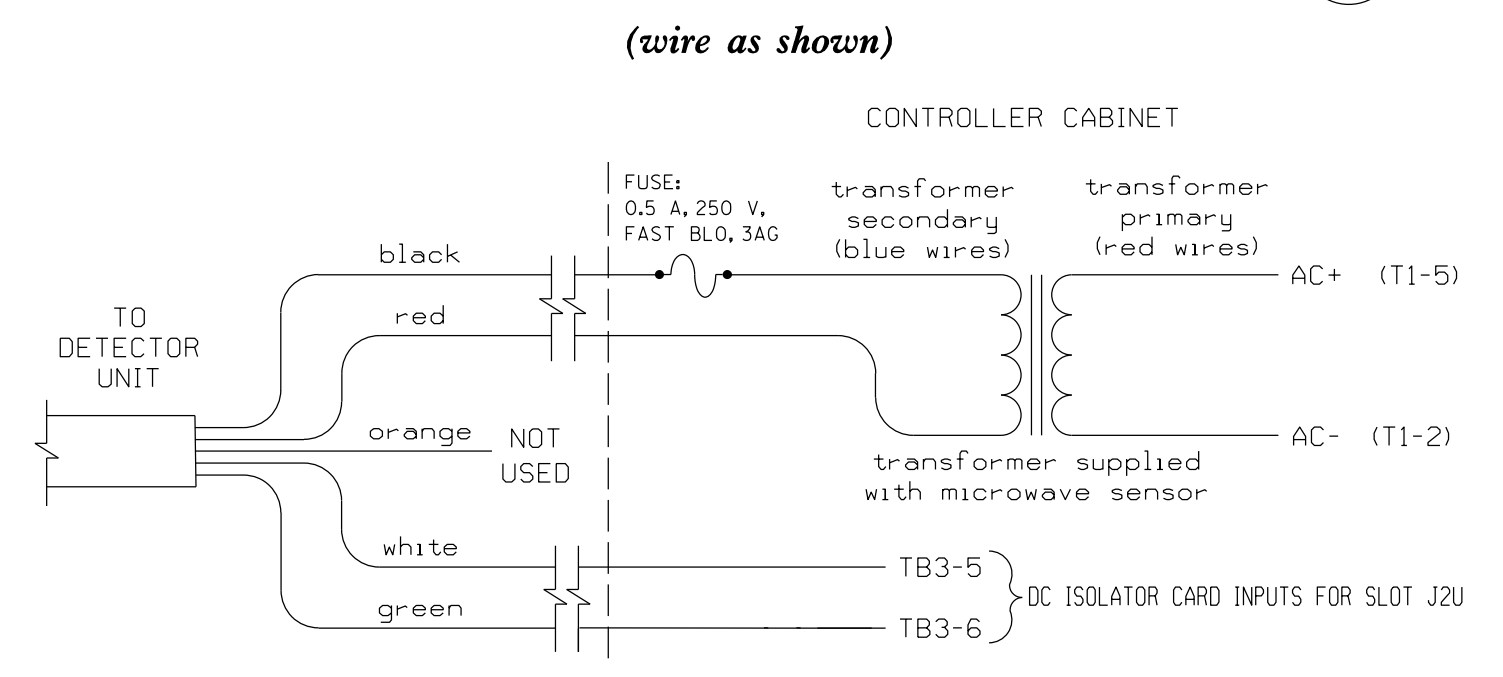
SIG. INVENTORY NO. 07-1665



3/10/2023  
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 micheal.covebaugh



### MICROWAVE DETECTOR WIRING DETAIL (6A)



MICROWAVE DETECTOR WIRE LIST

COLOR	FUNCTION
black	12V to 24V AC/DC (no polarity)
red	12V to 24V AC/DC (no polarity)
orange	Output Relay Normally Open
white	Output Relay Normally Closed
green	Output Relay Common

NOTES:

- Sensor is microwave motion detector mounted on a pole as indicated on the Signal Design Plans.
- Microwave wiring shown above will cause a permanent call unless the Vehicle Detector Programming and Logical I/O Processor Programming details are entered as shown on this sheet. These programming details will cause a call to be placed upon opening the Normally Closed contact on the microwave detector.
- DC Isolator's LED will be ON when no call is present and will be OFF when a call is present.
- Important:** For proper operation of the microwave detectors, remove surge protection from TB3-5, TB3-6, TB3-7, and TB3-8 and insert 242 DC Isolator in slot J2.

### LOGIC PROCESSOR PROGRAMMING

Front Panel  
Main Menu >Controller >More >User Programs >Definition

Web Interface  
Home >Controller >User Programs Configuration >User Programs Definition

Program 1

Statement	Result	Index	Operation	Parameter A	Index	Parameter B	Index	Delay	Ext
1	Vehicle Detector Call	128	Result=!A	Vehicle Detector Input	6	None	0	0.0	0.0

### LOGIC STATEMENT DESCRIPTION

Statement 1 Description: If a call is present on vehicle detector 6, do not place a call on vehicle detector 128. If no call is present on vehicle detector 6, place a call on vehicle detector 128.

\* Vehicle Detector 128 = Logical Detector for microwave detection zone

### MAXTIME DETECTOR PROGRAMMING DETAIL

Front Panel  
Main Menu >Controller >Detector >Veh Det Plans

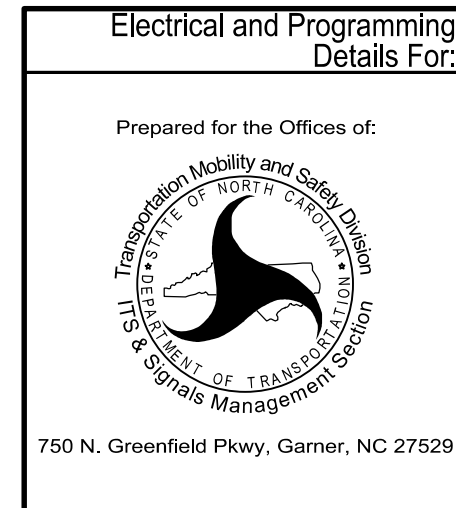
Web Interface  
Home >Controller >Detector Configuration >Vehicle Detectors

Plan 1

Detector	Call Phase	Delay
6	0	-
128	6	-

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 07-1665  
DESIGNED: Jan 2023  
SEALED: 3/10/2023  
REVISED:

Final Design  
Electrical Detail - Sheet 2 of 4



Prepared for the Offices of:		SR 2817 (Barnes Street) at US 29 SB Ramps	
Division 7	Rockingham County	Reidsville	
PLAN DATE: January 2023	REVIEWED BY: H M Surti		
PREPARED BY: A Ravigpati	REVIEWED BY:		
REVISIONS	INIT.	DATE	

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H. Wang M. Surti  
3/10/2023  
SIG. INVENTORY NO. 07-1665

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### MAXTIME OVERLAP PROGRAMMING DETAIL FOR DEFAULT PHASING

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

Web Interface  
Home >Controller >Overlap Configuration >Overlaps

Overlap Plan 1

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

### MAXTIME OVERLAP PROGRAMMING DETAIL FOR ALTERNATE PHASING

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

Web Interface  
Home >Controller >Overlap Configuration >Overlaps

In the table view of the web interface, right click on "Overlap" in the top left corner of the table. Copy the entire contents of Overlap Plan 1. Paste Overlap Plan 1 into Overlap Plan 2. Modify Overlap Plan 2 as shown below and save changes.

Overlap Plan 2

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

← NOTICE INCLUDED PHASE

### MAXTIME DETECTOR PROGRAMMING DETAIL FOR ALTERNATE PHASING LOOP 1A

Front Panel  
Main Menu >Controller >Detector >Veh Det Plans

Web Interface  
Home >Controller >Detector Configuration >Vehicle Detectors

In the table view of web interface right click on "Detector" in the top left corner of the table. Copy the entire contents of Detector Plan 1. Paste Detector Plan 1 into Detector Plan 2. Modify Detector Plan 2 as shown below and save changes.

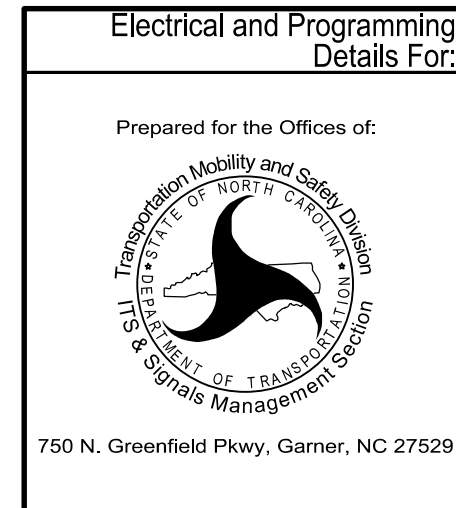
1A

Plan 2

Detector	Call Phase	Delay
1	1	-
29	0	-

THIS ELECTRICAL DETAIL IS FOR  
THE SIGNAL DESIGN: 07-1665  
DESIGNED: Jan 2023  
SEALED: 3/10/2023  
REVISED:

Final Design  
Electrical Detail - Sheet 3 of 4



<b>SR 2817 (Barnes Street) at US 29 SB Ramps</b>	
Division 7	Rockingham County
PLAN DATE: January 2023	REVIEWED BY: H M Surti
PREPARED BY: A Ravigati	REVIEWED BY:
REVISIONS	INIT. DATE

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SEAL  
STATE OF NORTH CAROLINA  
PROFESSIONAL ENGINEER  
H. WANG M. SURTI  
034481

DocuSigned by:  
**Hemang M. Surti** 3/10/2023  
SIG. INVENTORY NO. 07-1665

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## MAXTIME ALTERNATE PHASING ACTIVATION DETAIL

TO RUN ALT. PHASING DURING FREE RUN - PROGRAM CHANGES (SHOWN BELOW) IN A COORDINATION PATTERN.  
 SCHEDULE A DAY PLAN THAT INCLUDES THE PATTERN PROGRAMMED  
 TO SELECT OVERLAP PLAN 2 AND VEHICLE DETECTOR PLAN 2.

TO RUN ALT. PHASING DURING COORDINATION - SELECT A COORDINATION PATTERN THAT IS PROGRAMMED  
 TO SELECT OVERLAP PLAN 2 AND VEHICLE DETECTOR PLAN 2.

<u>PHASING</u>	<u>OVERLAP PLAN</u>	<u>VEH DET PLAN</u>
ACTIVE PAGES REQUIRED TO <u>RUN DEFAULT PHASING</u>	1	1
ACTIVE PAGES REQUIRED TO <u>RUN ALTERNATE PHASING</u>	2	2

ALTERNATE PHASING CHANGE SUMMARY

THE FOLLOWING IS A SUMMARY OF WHAT TAKES PLACE WHEN OVERLAP 2 AND VEHICLE DETECTOR PLAN 2 ACTIVATE TO CALL THE "ALTERNATE PHASING":

OVERLAP PLAN 2: Modifies overlap included phases for head 11 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 0 seconds.

## MAXTIME ALTERNATE PHASING PATTERN PROGRAMMING DETAIL

Front Panel  
 Main Menu >Controller >Coordination >Patterns

Web Interface  
 Home >Controller >Coordination >Patterns

Pattern Parameters

Pattern	Veh Det Plan	Overlap Plan
*	2	2

\* The Pattern number(s) are to be determined by the Division and/or City Traffic Engineer.

THIS ELECTRICAL DETAIL IS FOR  
 THE SIGNAL DESIGN: 07-1665  
 DESIGNED: Jan 2023  
 SEALED: 3/10/2023  
 REVISED:

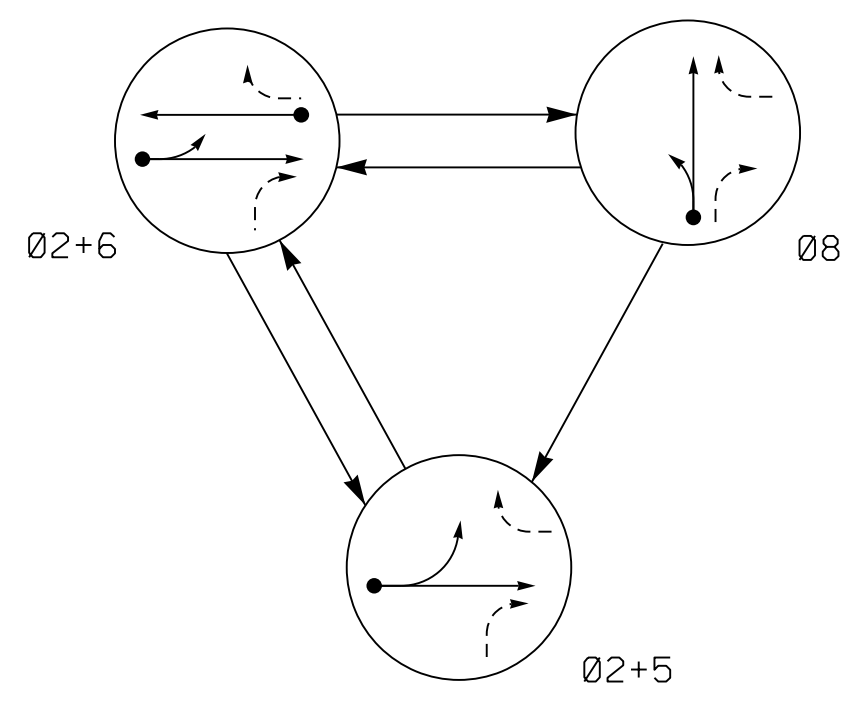
Final Design  
 Electrical Detail - Sheet 4 of 4

DOCUMENT NOT CONSIDERED  
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 SIGNATURES COMPLETED

Electrical and Programming Details For:  Prepared for the Offices of:  NC Firm License No.: F-0342 5438 Wade Park Boulevard Suite 200, Raleigh, NC 27607 Phone: 919-461-1100	SR 2817 (Barnes Street) at US 29 SB Ramps  Division 7      Rockingham County      Reidsville PLAN DATE: January 2023      REVIEWED BY: H M Surti PREPARED BY: A Ravigati      REVIEWED BY:	SEAL  ENGINEER HE WANG M. SURTI									
750 N. Greenfield Pkwy, Garner, NC 27529	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">REVISIONS</th> <th style="text-align: center;">INIT.</th> <th style="text-align: center;">DATE</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>	REVISIONS	INIT.	DATE							DocuSigned by:  H. Wang M. Surti      3/10/2023 SIG. INVENTORY NO.      07-1665
REVISIONS	INIT.	DATE									

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**PHASING DIAGRAM**



**TABLE OF OPERATION**

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

**MAXTIME DETECTOR INSTALLATION CHART**

ZONE	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING									
					CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	QUEUE	CALL	PASSAGE 2	SYSTEM LOOP	NEW CARD
2A*	6X6	300	*	*	2	-	-	X	X	-	X	-	-	*
5A*	6X40	0	*	*	5	10	-	X	-	-	X	-	-	*
6A*	6X6	300	*	*	6	-	-	X	X	-	X	-	-	*
8A*	6X40	0	*	*	8	-	-	X	-	-	X	-	-	*

\* Video Detection Zone

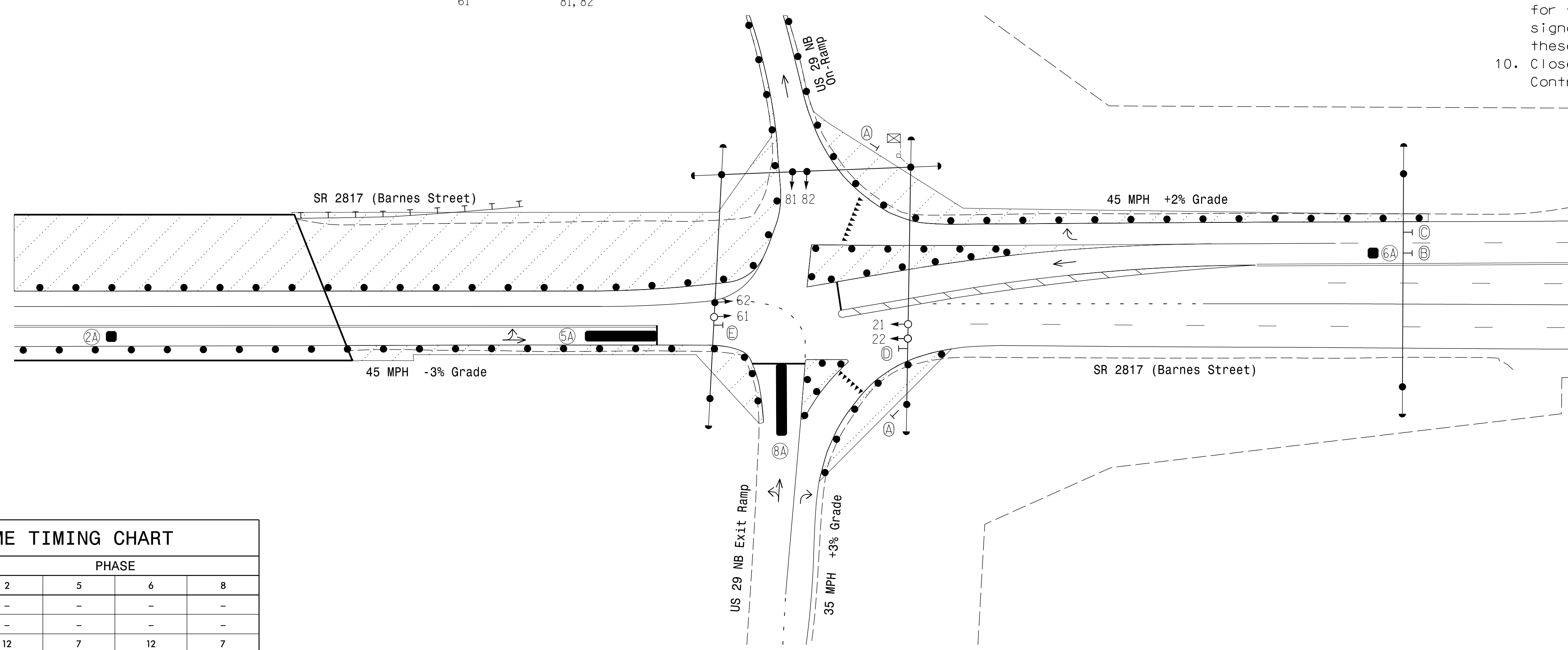
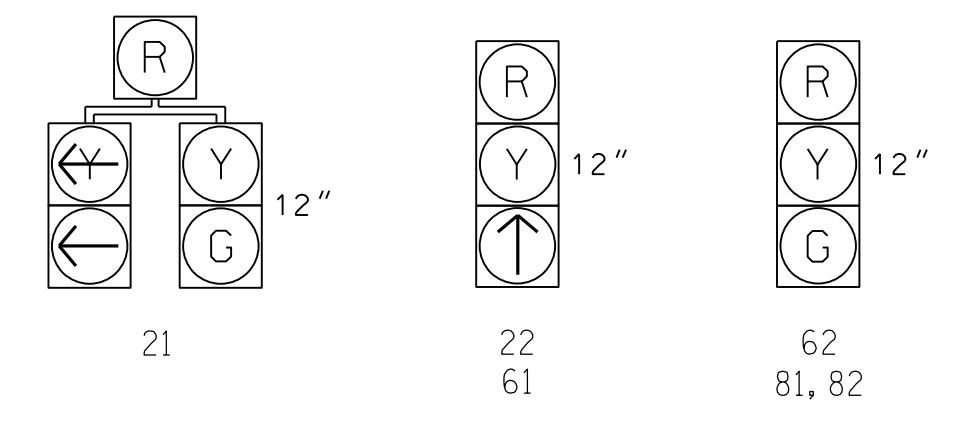
**3 Phase Fully Actuated**  
**NC 87/SR 2817 (Barnes Street) CLS**  
**Signal System #: D07-10\_Reidsville**

**NOTES**

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 5 may be lagged.
4. Reposition existing signal heads numbered 62, 81, and 82.
5. Reposition existing turn prohibition signs (D) and (E).
6. Relocate existing YIELD signs.
7. Set all detector units to presence mode.
8. Locate new cabinet so as not to obstruct distance of vehicles turning right on red.
9. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
10. Closed loop system data:  
Controller Asset #: 1675.

**PHASING DIAGRAM DETECTION LEGEND**

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



**LEGEND**

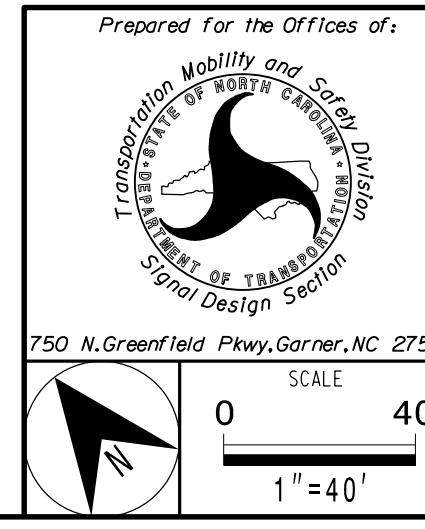
- | PROPOSED  | EXISTING |
|---|----------|
| ○→ Traffic Signal Head                            | ●→ N/A   |
| ○→ Modified Signal Head                           | ○→ N/A   |
| ○→ Pedestrian Signal Head With Push Button & Sign | ○→ N/A   |
| ○→ Signal Pole with Guy                           | ○→ N/A   |
| ○→ Signal Pole with Sidewalk Guy                  | ○→ N/A   |
| □→ Inductive Loop Detector                        | □→ N/A   |
| □→ Controller & Cabinet                           | □→ N/A   |
| □→ Junction Box                                   | □→ N/A   |
| --- 2-in Underground Conduit                      | --- N/A  |
| --- Right of Way                                  | --- N/A  |
| → Directional Arrow                               | → N/A    |
| --- Construction Zone Drums                       | --- N/A  |
| --- Video Detection Zone                          | --- N/A  |
| --- Construction Zone                             | --- N/A  |
| --- Guardrail                                     | --- N/A  |
| (A) "YIELD" Sign (R1-2)                           | (A) N/A  |
| (B) Through Arrow "ONLY" Sign (R3-5A)             | (B) N/A  |
| (C) Right Arrow "ONLY" Sign (R3-5R)               | (C) N/A  |
| (D) No Right Turn Sign (R3-1)                     | (D) N/A  |
| (E) No U-Turn/No Left Turn Sign (R3-18)           | (E) N/A  |

**MAXTIME TIMING CHART**

FEATURE	PHASE			
	2	5	6	8
Walk *	-	-	-	-
Ped Clear *	-	-	-	-
Min Green	12	7	12	7
Passage *	6.0	2.0	6.0	2.0
Passage 2 *	-	-	-	-
Max 1 *	90	20	90	30
Yellow Change	4.8	3.0	4.3	3.7
Red Clear	1.3	2.4	1.0	1.0
Added Initial *	-	2.5	-	2.5
Maximum Initial *	-	34	-	34
Time Before Reduction *	-	20	-	20
Time To Reduce *	-	30	-	30
Minimum Gap	-	3.0	-	3.0
Advance Walk	-	-	-	-
Non Lock Detector	-	X	-	X
Vehicle Recall	-	MIN RECALL	-	MIN RECALL
Dual Entry	-	-	-	-

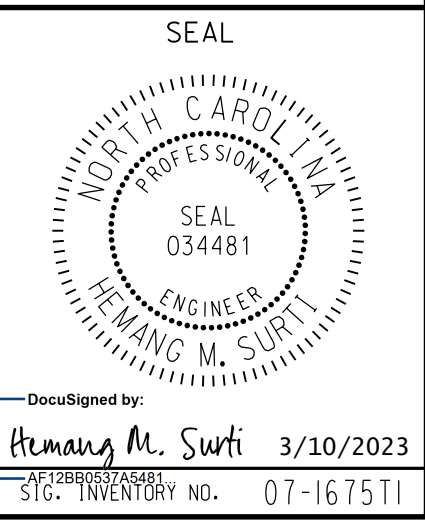
\* These values may be field adjusted. Do not adjust Min Green and Extension times for phases 2 and 6 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.

**Signal Upgrade - Temp Design 1 (TMP Phase I)**



<b>SR 2817 (Barnes Street) at US 29 NB Ramps</b>	
Division 7	Rockingham County Reidsville
PLAN DATE: Jan 2023	REVIEWED BY: H.M. Surti
PREPARED BY: M.D. Tindal	REVIEWED BY:
REVISIONS	INIT. DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

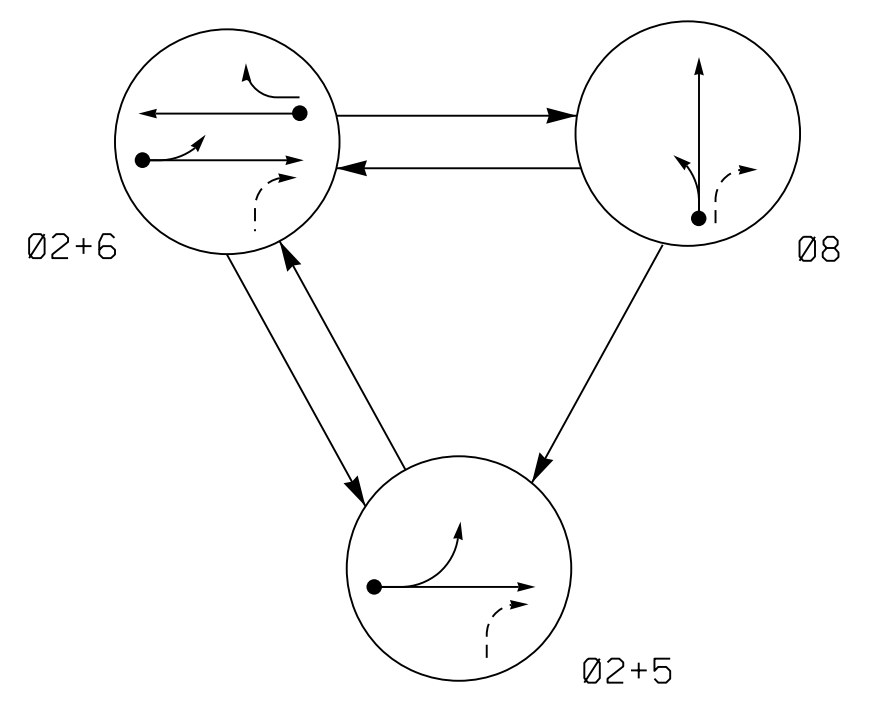


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 mitchael.l.covden@ghg





**PHASING DIAGRAM**



**TABLE OF OPERATION**

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

**MAXTIME DETECTOR INSTALLATION CHART**

ZONE	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING									
					CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	QUEUE	CALL	PASSAGE 2	SYSTEM LOOP	NEW CARD
2A*	6X6	300	*	*	2	-	-	X	X	-	X	-	-	*
5A*	6X40	0	*	*	5	10	-	X	-	-	X	-	-	*
6A*	6X6	300	*	*	6	-	-	X	X	-	X	-	-	*
8A*	6X40	0	*	*	8	-	-	X	-	-	X	-	-	*

\* Video Detection Zone

3 Phase Fully Actuated  
NC 87/SR 2817 (Barnes Street) CLS  
Signal System #: D07-10\_Reidsville

**NOTES**

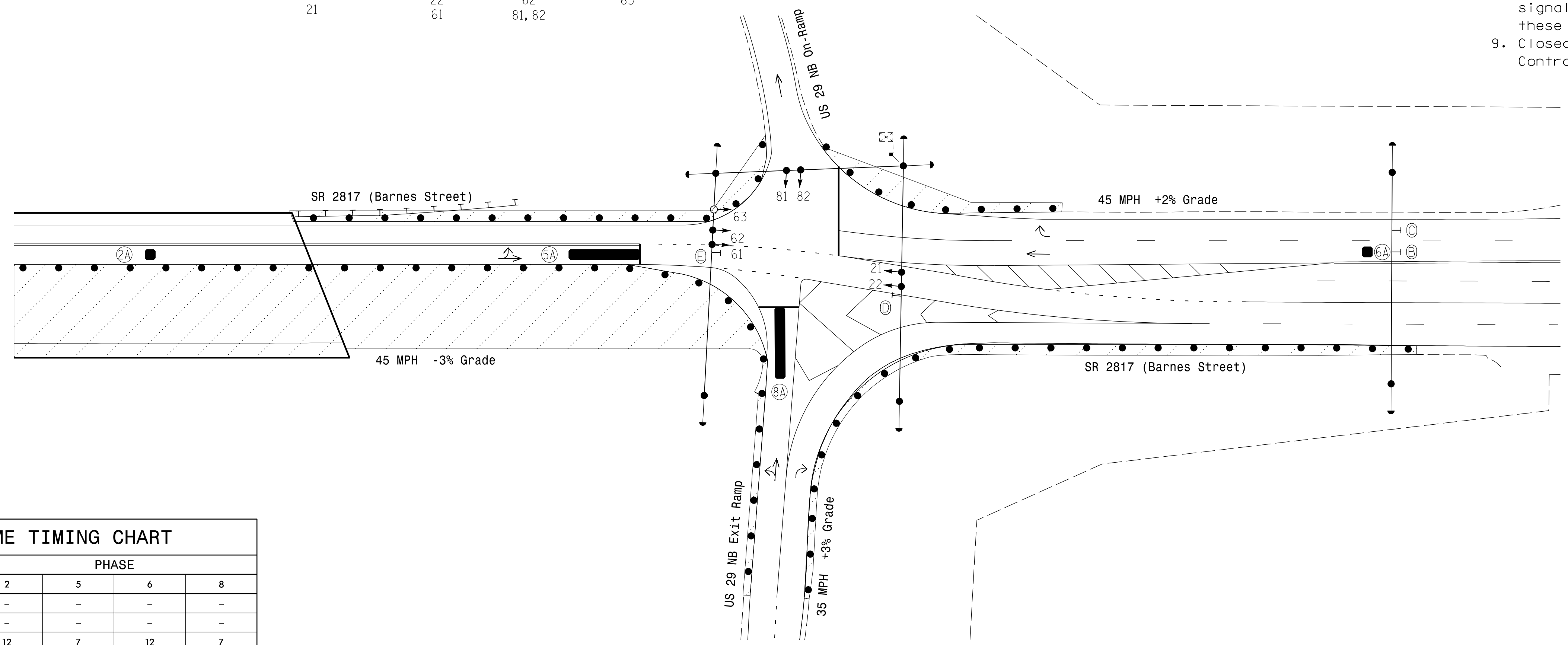
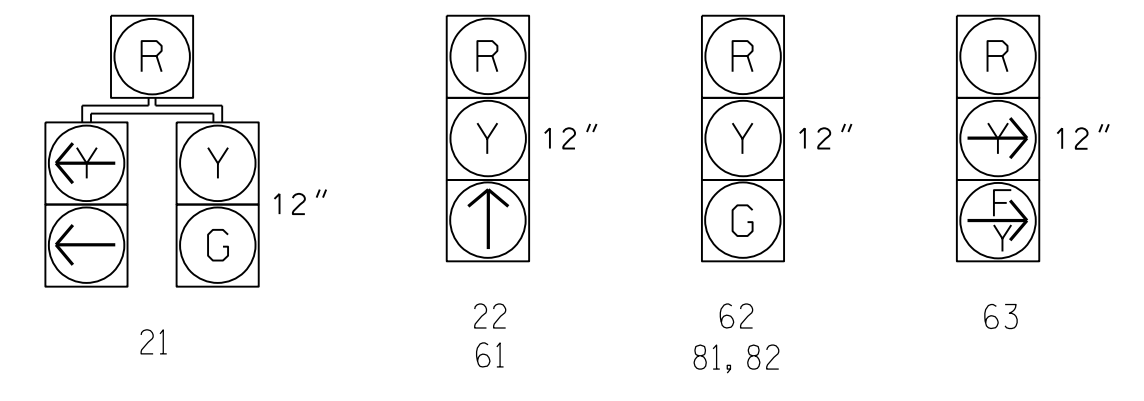
1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 5 may be lagged.
4. Reposition existing signal heads numbered 21, 22, 61, 62, 81, and 82.
5. Reposition existing turn prohibition signs (D) and (E).
6. Remove existing "YIELD (R1-2) sign.
7. Set all detector units to presence mode.
8. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
9. Closed loop system data: Controller Asset #: 1675.

**PHASING DIAGRAM DETECTION LEGEND**

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

**SIGNAL FACE I.D.**

All Heads L.E.D.



**MAXTIME TIMING CHART**

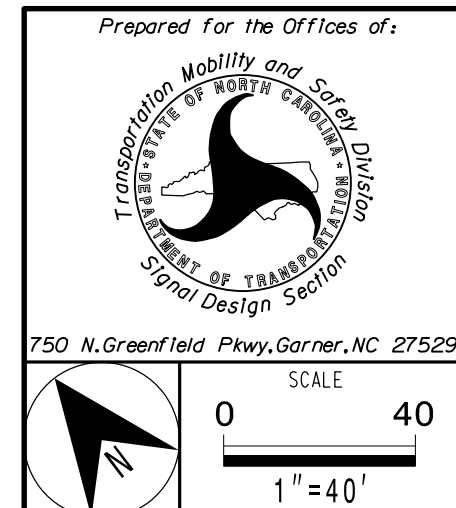
FEATURE	PHASE			
	2	5	6	8
Walk *	-	-	-	-
Ped Clear *	-	-	-	-
Min Green	12	7	12	7
Passage *	6.0	2.0	6.0	2.0
Passage 2 *	-	-	-	-
Max 1 *	90	20	90	30
Yellow Change	4.8	3.0	4.3	3.7
Red Clear	1.5	3.2	1.0	1.1
Added Initial *	-	2.5	-	2.5
Maximum Initial *	-	34	-	34
Time Before Reduction *	-	20	-	20
Time To Reduce *	-	30	-	30
Minimum Gap	-	3.0	-	3.0
Advance Walk	-	-	-	-
Non Lock Detector	-	X	-	X
Vehicle Recall	-	MIN RECALL	-	MIN RECALL
Dual Entry	-	-	-	-

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

**LEGEND**

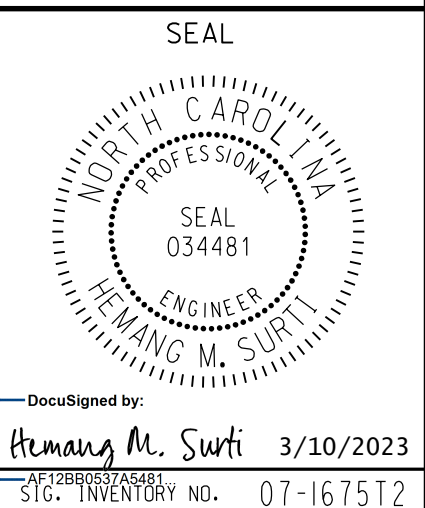
- |  |  |  |                              |
|--|--|--|------------------------------|
|  | Proposed Traffic Signal Head           |  | Existing Traffic Signal Head |
|  | Proposed Modified Signal Head          |  | N/A                          |
|  | Proposed Pedestrian Signal Head        |  | N/A                          |
|  | Proposed Signal Pole with Guy          |  | N/A                          |
|  | Proposed Signal Pole with Sidewalk Guy |  | N/A                          |
|  | Proposed Inductive Loop Detector       |  | N/A                          |
|  | Proposed Controller & Cabinet          |  | N/A                          |
|  | Proposed Junction Box                  |  | N/A                          |
|  | Proposed 2-in Underground Conduit      |  | N/A                          |
|  | Proposed Right of Way                  |  | N/A                          |
|  | Proposed Directional Arrow             |  | N/A                          |
|  | Proposed Construction Zone Drums       |  | N/A                          |
|  | Proposed Video Detection Zone          |  | N/A                          |
|  | Proposed Construction Zone             |  | N/A                          |
|  | Proposed Guardrail                     |  | N/A                          |
- (B) Through Arrow "ONLY" Sign (R3-5A) (B)  
 (C) Right Arrow "ONLY" Sign (R3-5R) (C)  
 (D) No Right Turn Sign (R3-1) (D)  
 (E) No U-Turn/No Left Turn Sign (R3-18) (E)

Signal Upgrade - Temp Design 2 (TMP Phase II)



SR 2817 (Barnes Street) at US 29 NB Ramps	
Division 7	Rockingham County Reidsville
PLAN DATE: Jan 2023	REVIEWED BY: H.M. Surti
PREPARED BY: M.D. Tindal	REVIEWED BY:
REVISIONS	INIT. DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

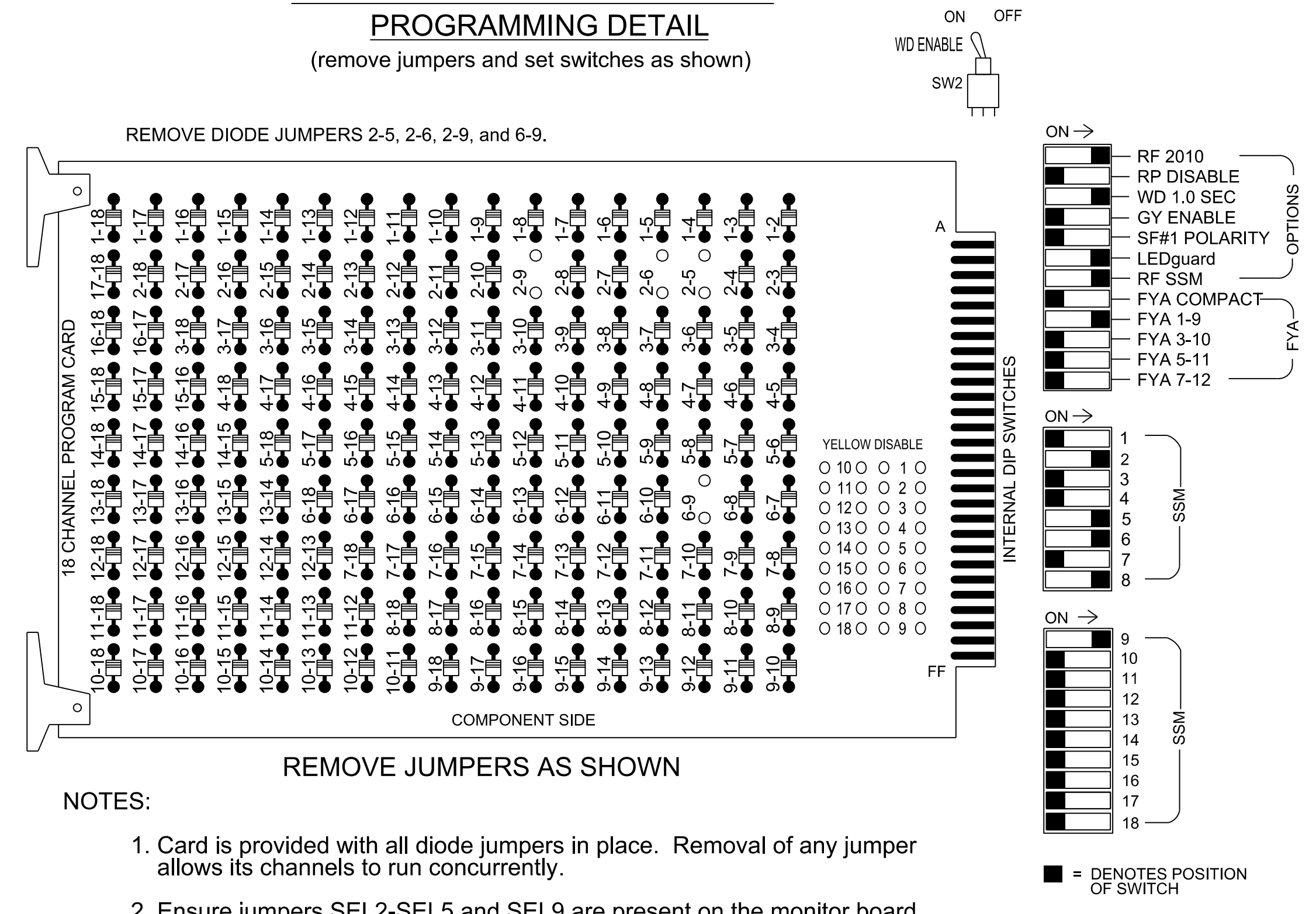


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### 18 CHANNEL CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



- NOTES:**
- Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
  - Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
  - Ensure that the Red Enable is active at all times during normal operation.
  - 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 plan.
- Program controller to start up in phase 2 Green No Walk and 6 Green No Walk.
- If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
- The cabinet and controller are part of NC 87/ SR 2817 (Barnes Street) Closed Loop System. Signal System #: D07-10 Reidsville.

### EQUIPMENT INFORMATION

Controller.....2070LX  
 Cabinet.....332 w/ Aux  
 Software.....Q-Free MAXTIME  
 Cabinet Mount.....BASE  
 Output File Positions.....18 With Aux. Output File  
 Load Switches Used.....S2, S7, S8, S11, AUX S1  
 Phases Used.....2, 5, 6, 8  
 Overlap "1".....\*  
 Overlap "2".....NOT USED  
 Overlap "3".....NOT USED  
 Overlap "4".....NOT USED

\*See overlap programming detail on this sheet.

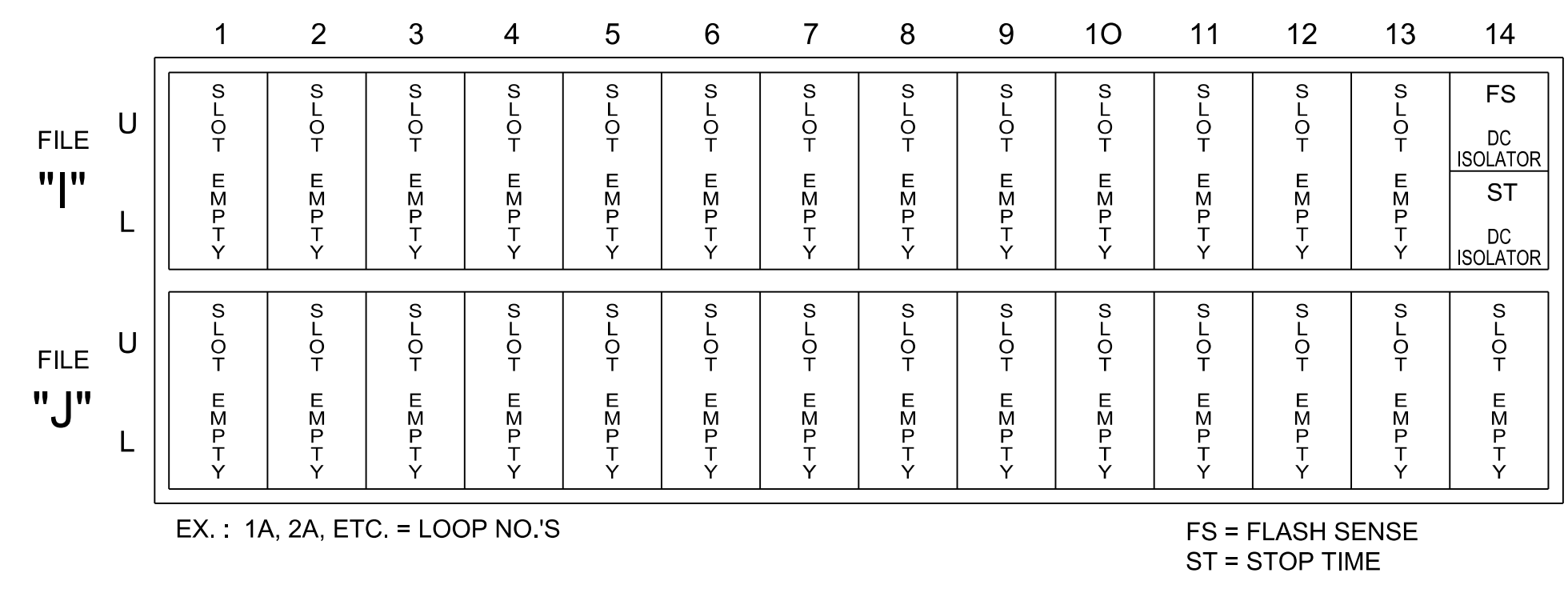
### SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
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	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	NU	21	22	NU	NU	NU	21	61	62	NU	NU	81,82	63	NU	NU	NU	NU	NU
RED		128	128				*	134	134			107	A121					
YELLOW		129	129					135	135			108						
GREEN		130							136			109						
RED ARROW																		
YELLOW ARROW							132						A122					
FLASHING YELLOW ARROW													A123					
GREEN ARROW		130					133	136										

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)

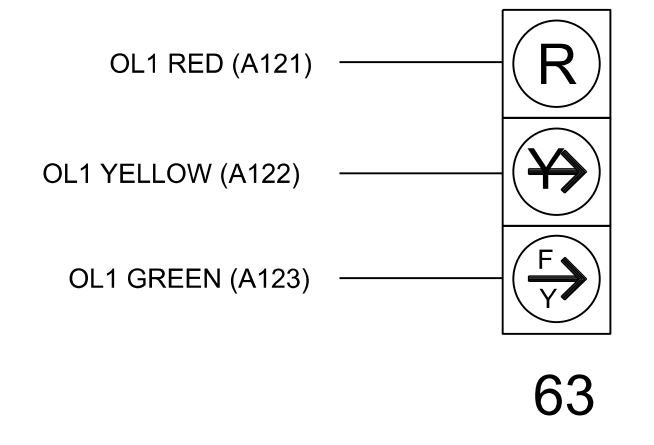


### SPECIAL DETECTOR NOTE

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.

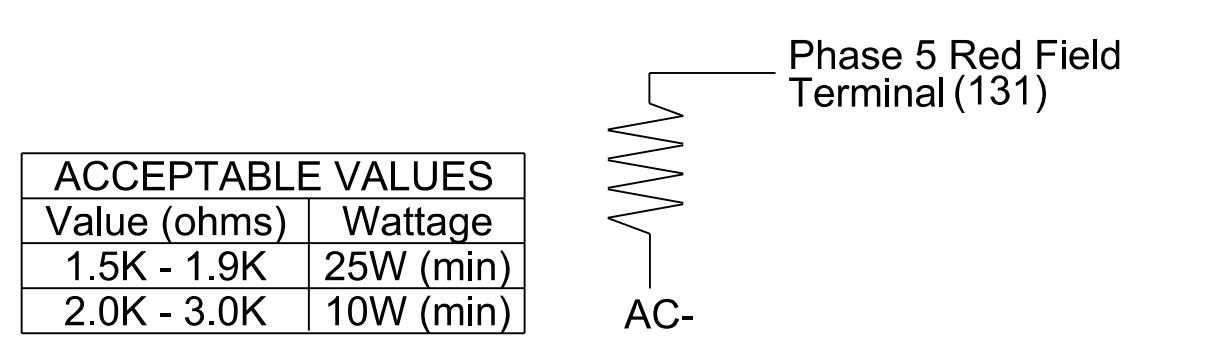
### FYA SIGNAL WIRING DETAIL

(wire signal head as shown)



### LOAD RESISTOR INSTALLATION DETAIL

(install resistor as shown)



### OVERLAP PROGRAMMING

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

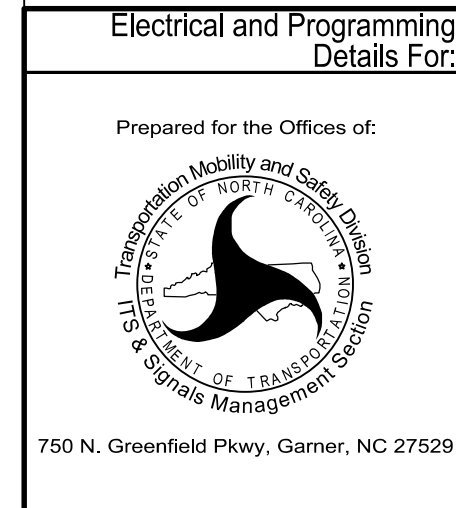
Web Interface  
 Home > Controller > Overlap Configuration > Overlaps

Overlap Plan 1

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

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 07-1675T2  
 DESIGNED: Jan 2023  
 SEALED: 3/10/2023  
 REVISED:

Temporary Design 2 (TMP Phase II)  
 Electrical Detail



Prepared for the Offices of:

**SR 2817 (Barnes Street) at US 29 NB Ramps**

Division 7 Rockingham County Reidsville

PLAN DATE: January 2023 REVIEWED BY: H M Surti

PREPARED BY: A Raviapati REVIEWED BY:

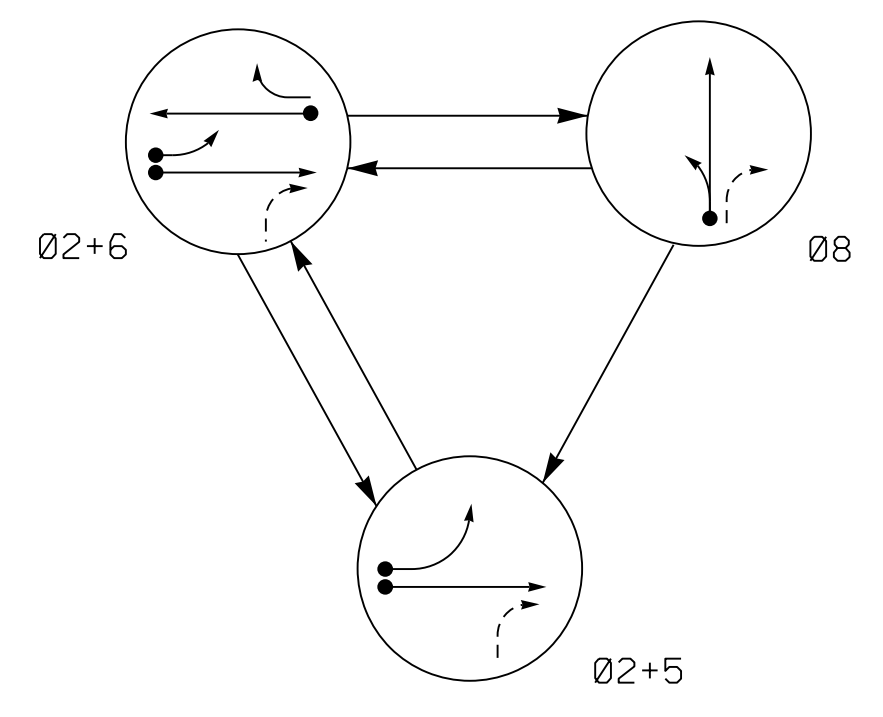
REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL  
 Hemang M. Surti 3/10/2023  
 SIG. INVENTORY NO. 07-1675T2

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**PHASING DIAGRAM**



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

MAXTIME DETECTOR INSTALLATION CHART													
ZONE	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING								
					CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	QUEUE	CALL	PASSAGE 2	SYSTEM LOOP
2A*	6X6	300	*	*	2	-	-	X	X	-	X	-	*
5A*	6X40	0	*	*	5	15	-	X	-	-	X	-	*
6A*	6X6	300	*	*	6	-	-	X	X	-	X	-	*
8A*	6X40	0	*	*	8	-	-	X	-	-	X	-	*

\* Video Detection Zone

3 Phase Fully Actuated  
NC 87/SR 2817 (Barnes Street) CLS  
Signal System #: D07-10\_Reidsville

**NOTES**

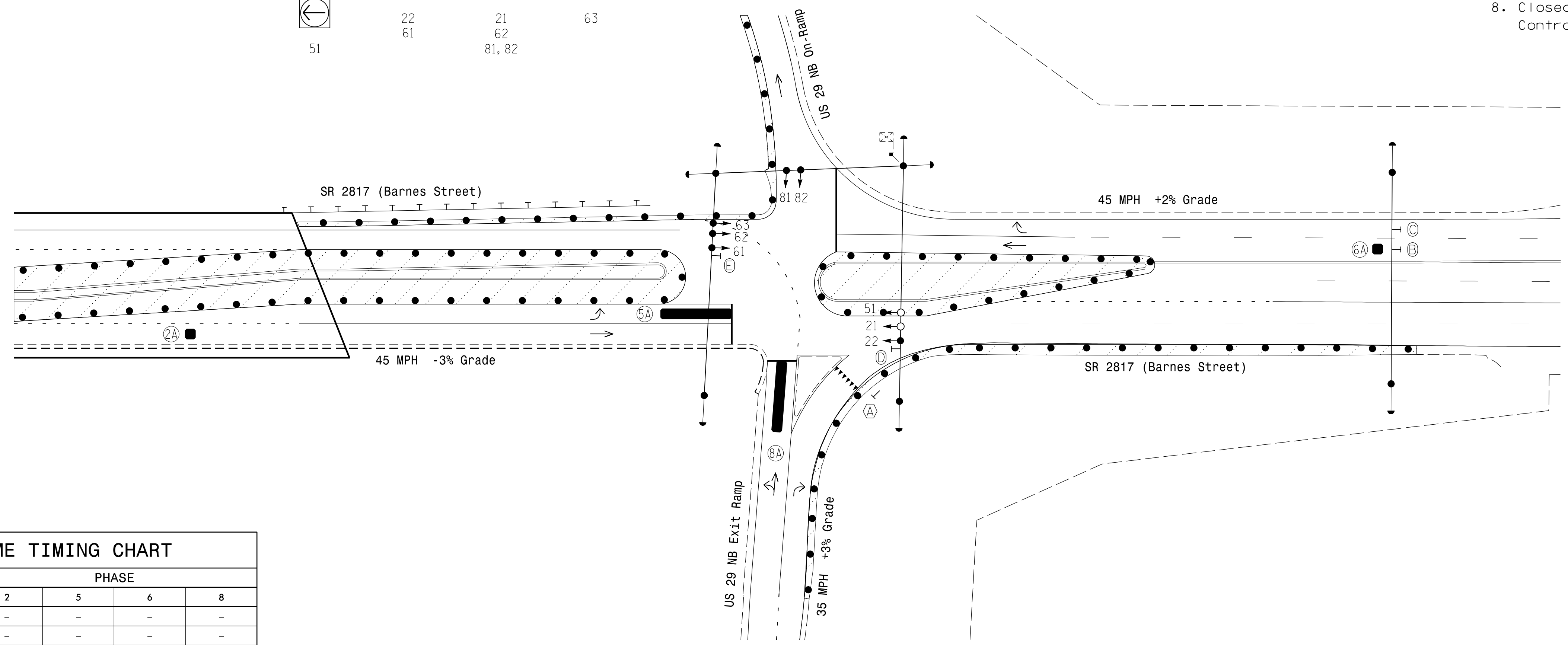
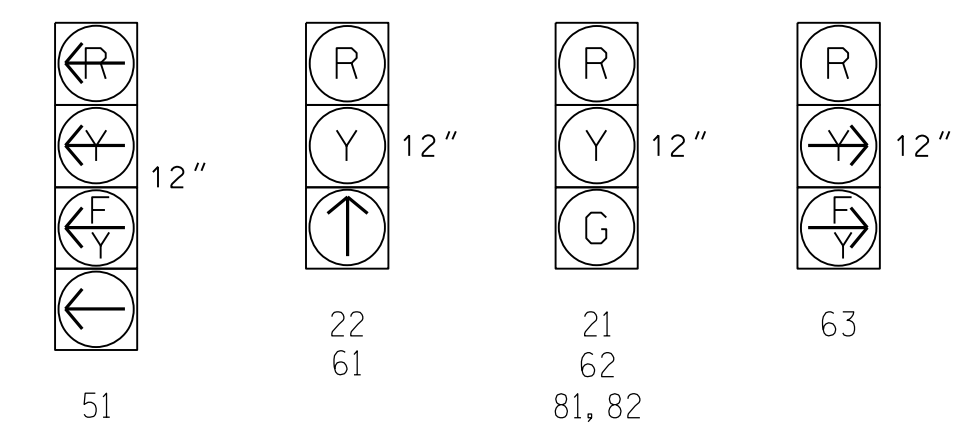
1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 5 may be logged.
4. Reposition all existing signal heads.
5. Reposition existing turn prohibition signs (D) and (E).
6. Set all detector units to presence mode.
7. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
8. Closed loop system data: Controller Asset #: 1675.

**PHASING DIAGRAM DETECTION LEGEND**

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

**SIGNAL FACE I.D.**

All Heads L.E.D.

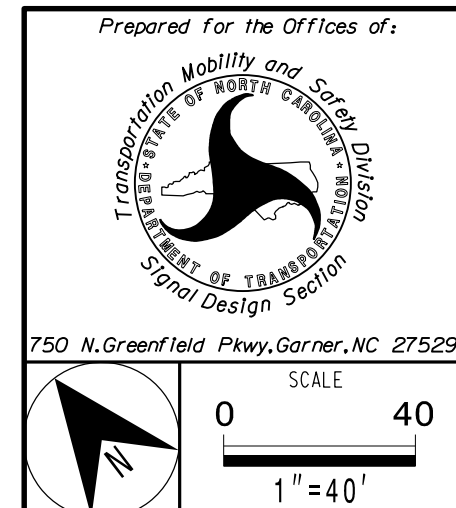


FEATURE	PHASE			
	2	5	6	8
Walk *	-	-	-	-
Ped Clear *	-	-	-	-
Min Green	12	7	12	7
Passage *	6.0	2.0	6.0	2.0
Passage 2 *	3.0	-	-	-
Max 1 *	90	20	90	30
Yellow Change	4.8	3.0	4.8	3.7
Red Clear	1.0	2.6	1.0	1.7
Added Initial *	-	2.5	-	2.5
Maximum Initial *	-	34	-	34
Time Before Reduction *	-	20	-	20
Time To Reduce *	-	30	-	30
Minimum Gap	-	3.0	-	3.0
Advance Walk	-	-	-	-
Non Lock Detector	-	X	-	X
Vehicle Recall	-	MIN RECALL	-	MIN RECALL
Dual Entry	-	-	-	-

\* These values may be field adjusted. Do not adjust Min Green and 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.

PROPOSED		EXISTING	
○ →	Traffic Signal Head	● →	N/A
○ →	Modified Signal Head	○ →	N/A
○ →	Sign	○ →	N/A
○ →	Pedestrian Signal Head With Push Button & Sign	○ →	N/A
○ →	Signal Pole with Guy	○ →	N/A
○ →	Signal Pole with Sidewalk Guy	○ →	N/A
⊠	Inductive Loop Detector	⊠	N/A
⊠	Controller & Cabinet	⊠	N/A
⊠	Junction Box	⊠	N/A
- - -	2-in Underground Conduit	- - -	N/A
- - -	Right of Way	- - -	N/A
→	Directional Arrow	→	N/A
—	Construction Zone Drums	—	N/A
—	Video Detection Zone	—	N/A
—	Construction Zone	—	N/A
—	Guardrail	—	N/A
(A)	"YIELD" Sign (R1-2)	(A)	N/A
(B)	Through Arrow "ONLY" Sign (R3-5A)	(B)	N/A
(C)	Right Arrow "ONLY" Sign (R3-5R)	(C)	N/A
(D)	No Right Turn Sign (R3-1)	(D)	N/A
(E)	No U-Turn/No Left Turn Sign (R3-18)	(E)	N/A

Signal Upgrade - Temp Design 3 (TMP Phase III)



SR 2817 (Barnes Street) at US 29 NB Ramps

Division 7 Rockingham County Reidsville

PLAN DATE: Jan 2023 REVIEWED BY: H.M. Surti

PREPARED BY: M.D. Tindal REVIEWED BY:

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL

HEAVY M. SURTI

PROFESSIONAL ENGINEER

SEAL 034481

HEAVY M. SURTI

DocuSigned by: Heavy M. Surti 3/10/2023

STG: INVENTORY NO. 07-1675T3

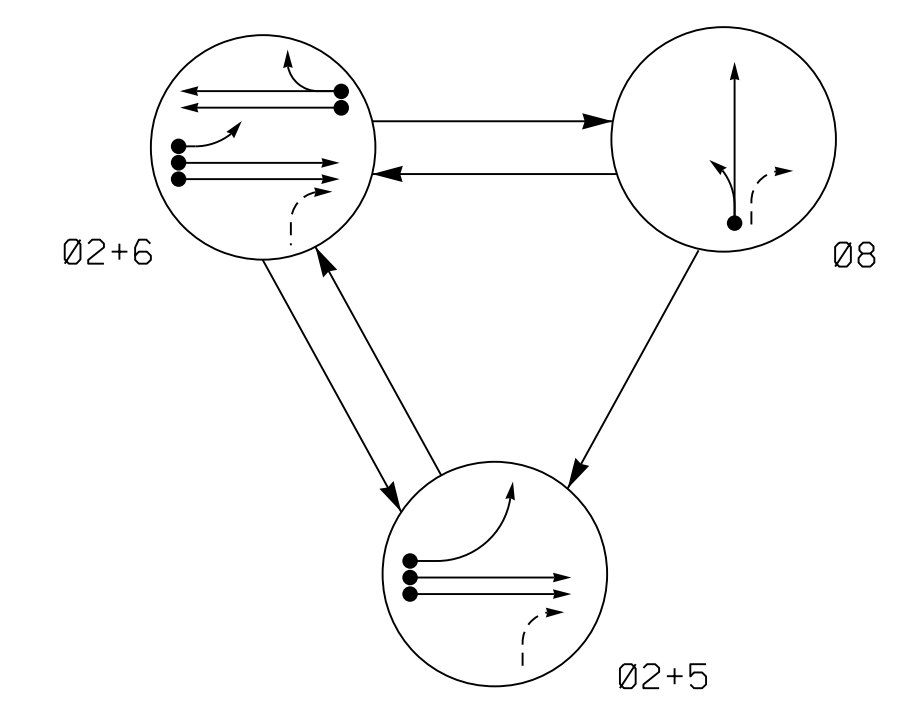
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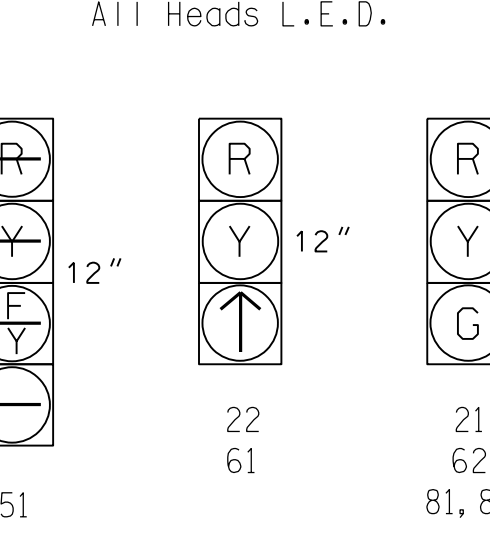
**DEFAULT PHASING DIAGRAM**



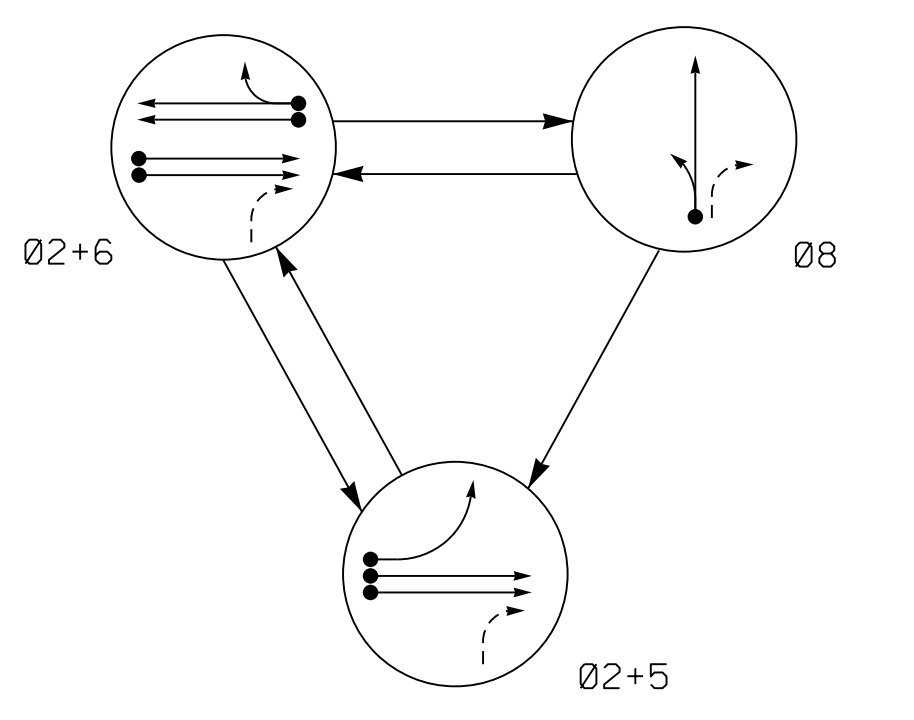
**DEFAULT PHASING TABLE OF OPERATION**

SIGNAL FACE	PHASE			
	02+5	02+6	08	F L S H
21	G	G	R	Y
22	↑	↑	R	Y
51	←	←	←	←
61	R	↑	R	Y
62	R	G	R	Y
81, 82	R	R	G	R

**SIGNAL FACE I.D.**



**ALTERNATE PHASING DIAGRAM**



**ALTERNATE PHASING TABLE OF OPERATION**

SIGNAL FACE	PHASE			
	02+5	02+6	08	F L S H
21	G	G	R	Y
22	↑	↑	R	Y
51	←	←	←	←
61	R	↑	R	Y
62	R	G	R	Y
81, 82	R	R	G	R

**PHASING DIAGRAM DETECTION LEGEND**

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

**PHASING DIAGRAM DETECTION LEGEND**

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

**MAXTIME DETECTOR INSTALLATION CHART**

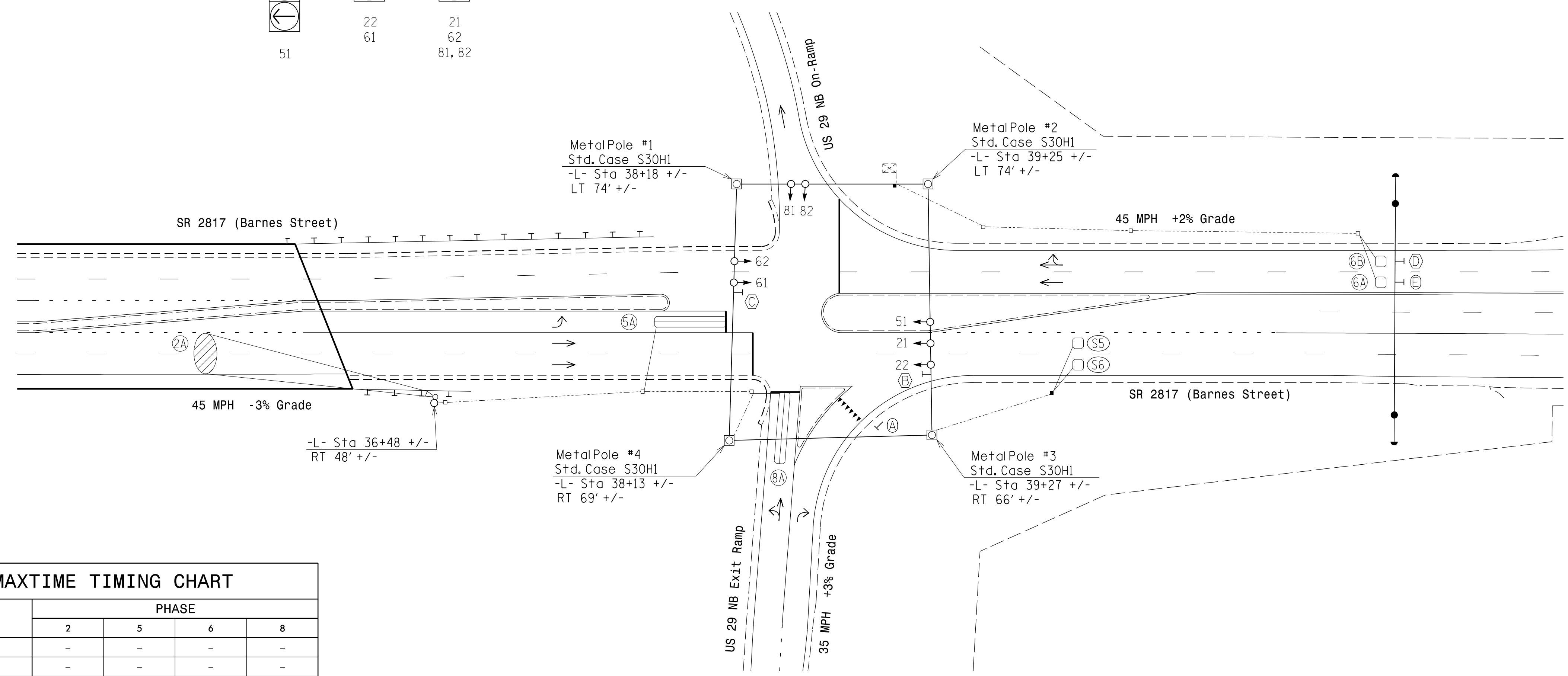
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING							
					CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND ADDED INITIAL	QUEUE CALL	PASSAGE 2	SYSTEM LOOP	NEW CARD
2A*	*	300	*	X	2	-	-	X	X	-	-	*
5A	6X40	0	2-4-2	X	5	#15	-	X	-	X	-	X
6A	6X6	300	5	X	6	-	-	X	X	-	-	X
6B	6X6	300	5	X	6	-	-	X	X	-	-	X
8A	6X40	0	2-4-2	X	8	-	-	X	-	X	-	X
S5	6X6	+180	5	X	-	-	-	-	-	-	-	X
S6	6X6	+180	5	X	-	-	-	-	-	-	-	X

- \* Microwave Detection Zone
- # Reduce Delay to 3 Seconds During Alternate Phasing Operation.
- ## Disable Phase call for loop during Alternate Phasing Operation.

**3 Phase Fully Actuated**  
**NC 87/SR 2817 (Barnes Street) CLS**  
**Signal System #: D07-10\_Reidsville**

**NOTES**

- Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Phase 5 may be lagged.
- Set all detector units to presence mode.
- This intersection uses multi-zone microwave detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- Lane control signs (R3-5A and R3-6R) may be removed at the direction of the Engineer.
- Closed loop system data:  
Controller Asset #: 1675.



**MAXTIME TIMING CHART**

FEATURE	PHASE			
	2	5	6	8
Walk *	-	-	-	-
Ped Clear *	-	-	-	-
Min Green	12	7	12	7
Passage *	6.0	2.0	6.0	2.0
Passage 2 *	3.0	-	-	-
Max 1 *	90	20	90	30
Yellow Change	4.8	3.0	4.8	3.7
Red Clear	1.3	2.1	1.3	1.6
Added Initial *	-	1.5	-	1.5
Maximum Initial *	-	34	-	34
Time Before Reduction *	-	20	-	20
Time To Reduce *	-	30	-	30
Minimum Gap	-	3.0	-	3.0
Advance Walk	-	-	-	-
Non Lock Detector	-	X	-	X
Vehicle Recall	MIN RECALL	-	MIN RECALL	-
Dual Entry	-	-	-	-

\* These values may be field adjusted. Do not adjust Min Green and 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	● Traffic Signal Head
◐ Modified Signal Head	N/A
◑ Sign	N/A
◒ Pedestrian Signal Head With Push Button & Sign	◒ Pedestrian Signal Head
◓ Signal Pole with Guy	◓ Signal Pole with Sidewalk Guy
◔ Inductive Loop Detector	◔ Inductive Loop Detector
◕ Controller & Cabinet	◕ Junction Box
◖ 2-in Underground Conduit	◖ 2-in Underground Conduit
N/A Right of Way	N/A Right of Way
→ Directional Arrow	→ Directional Arrow
◑ Metal Strain Pole	◑ Metal Strain Pole
◒ Out of Pavement Detector	◒ Out of Pavement Detector
◓ Microwave Detection Zone	◓ Microwave Detection Zone
N/A Guardrail	N/A Guardrail
(A) "YIELD" Sign (R1-2)	(A) "YIELD" Sign (R1-2)
(B) No Right Turn Sign (R3-1)	(B) No Right Turn Sign (R3-1)
(C) No U-Turn/No Left Turn Sign (R3-18)	(C) No U-Turn/No Left Turn Sign (R3-18)
(D) Combined Through and Right Arrow Sign (R3-6R)	(D) Combined Through and Right Arrow Sign (R3-6R)
(E) Through Arrow "ONLY" Sign (R3-5A)	(E) Through Arrow "ONLY" Sign (R3-5A)

**Signal Upgrade - Final Design**

NC Firm License No.: F-0342  
 5438 Wade Park Boulevard  
 Suite 200 Raleigh, NC 27607  
 Phone: 919-461-1100

**SR 2817 (Barnes Street)**  
**at**  
**US 29 NB Ramps**

Division 7 Rockingham County Reidsville

PLAN DATE: Jan 2023 REVIEWED BY: H.M. Surti

PREPARED BY: M.D. Tindal REVIEWED BY:

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL

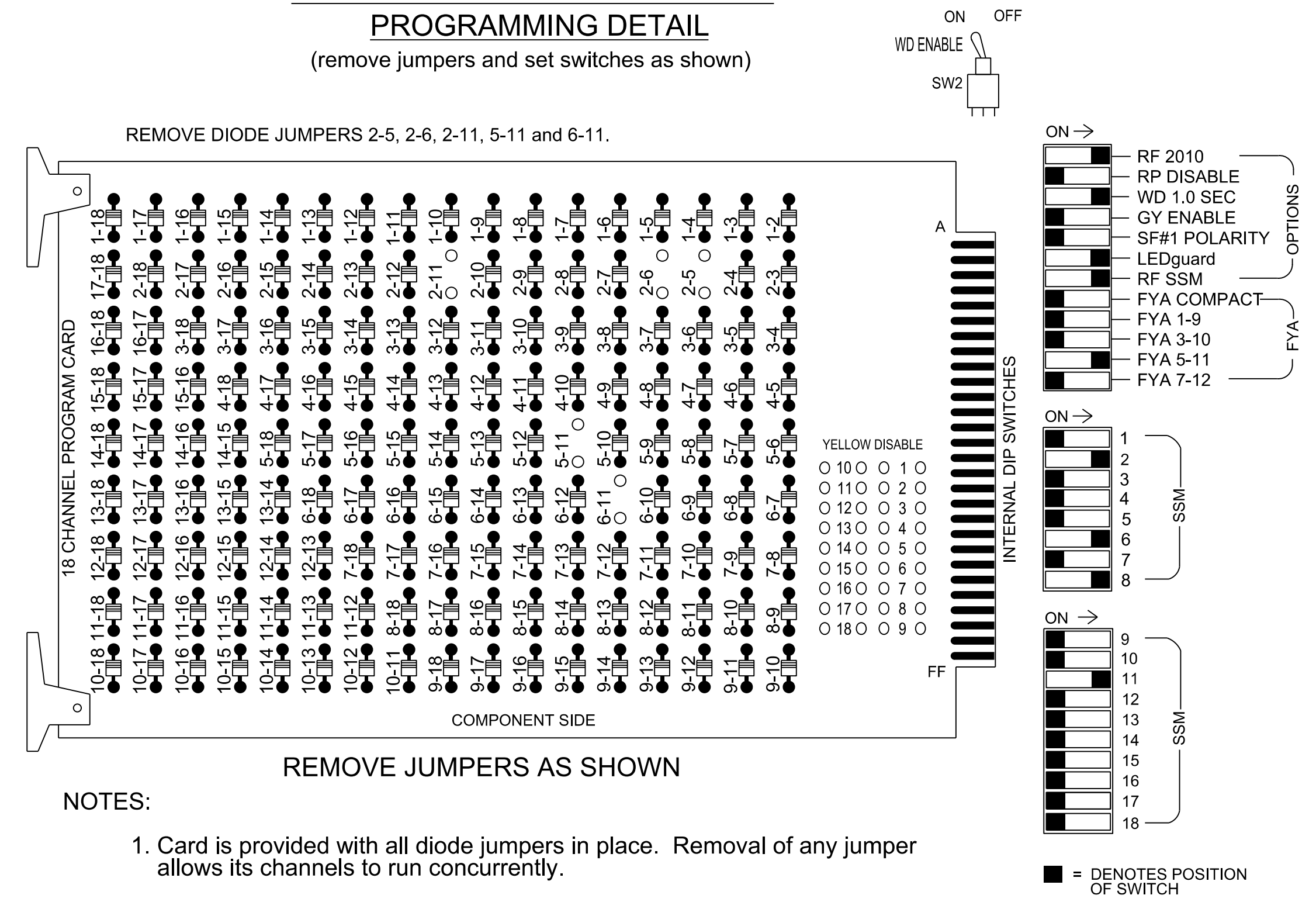
DocuSigned by:  
**Henry M. Surti** 3/10/2023  
 STG: INVENTORY NO. 07-1675

3/10/2023 10:44:00 AM C:\Users\mcbent\OneDrive\Documents\60581577\NCDOT\_SMI\_BR-0041\300-CAD\_6154910-CAD\70-NCDOT\_TIP\K51\Signal\K51\gpr\071675\_sig\_dsn-2022XXXX.dgn  
 mcbent\covenough



### 18 CHANNEL CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



- NOTES:
- Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
  - Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
  - Ensure that the Red Enable is active at all times during normal operation.
  - 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 plan.
- Return controller to Factory Defaults before programming per this electrical detail.
- Program controller to start up in phase 2 Green No Walk and 6 Green No Walk.
- If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
- The cabinet and controller are part of NC 87/ SR 2817 (Barnes Street) Closed Loop System. Signal System #: D07-10 Reidsville.

### EQUIPMENT INFORMATION

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

\*See overlap programming detail on sheet 3

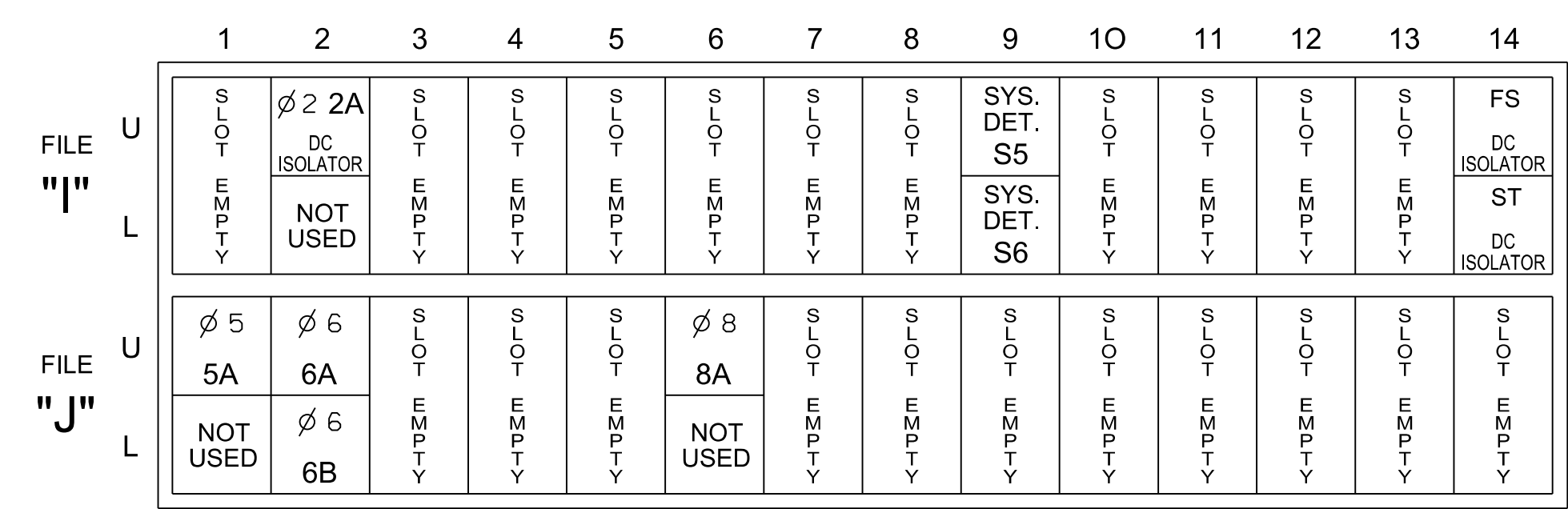
### SIGNAL HEAD HOOK-UP CHART

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

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)



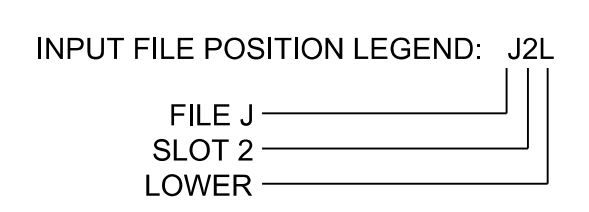
Note: Install a model 242 DC Isolator in slot 12 for use with microwave detector. See the Microwave Detector Wiring Details on sheet 2.

- IMPORTANT: For proper operation of the microwave detector, remove surge protection from TB2-5 and TB2-6, and from TB2-7 and TB2-8.
- IMPORTANT: If TB2-6 is tied to AC NEUTRAL, remove jumper, DO NOT connect TB2-6 to AC NEUTRAL.

### INPUT FILE CONNECTION & PROGRAMMING CHART

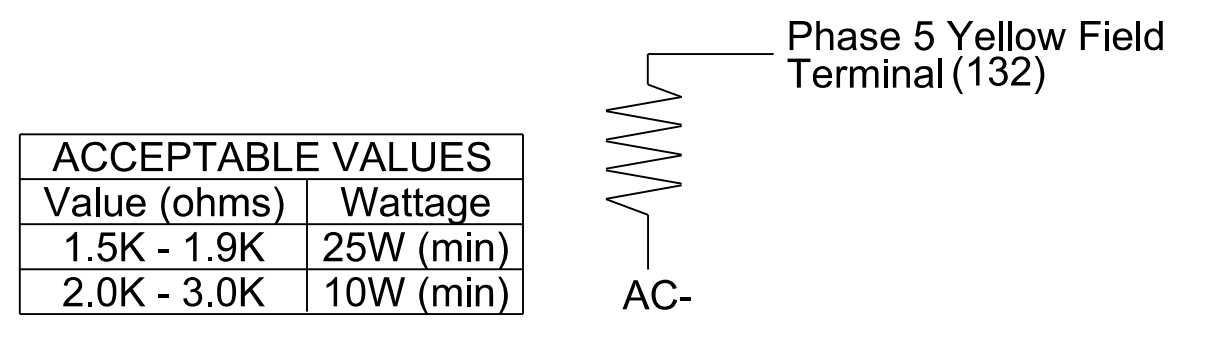
LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	QUEUE	CALL	PASSAGE 2
2A	**	I2U	39	1	2	**			X	X		X	
*S5	TB6-9,10	I9U	60	22	13	SYS							
*S6	TB6-11,12	I9L	62	24	14	SYS							
5A	TB3-1,2	J1U	55	17	15	5	15		X			X	
6A	TB3-5,6	J2U	40	2	16	6			X	X		X	X
6B	TB3-7,8	J2L	44	6	17	6			X	X		X	
8A	TB5-9,10	J6U	42	4	22	8			X			X	

\*\*Microwave Pulse Detector (See Wiring Detail Sheet 2).  
 \*System detector only. Remove any assigned vehicle phase.



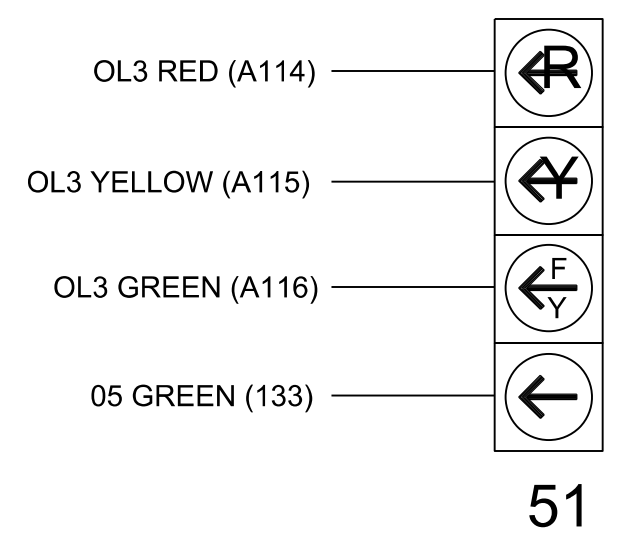
### LOAD RESISTOR INSTALLATION DETAIL

(install resistor as shown)

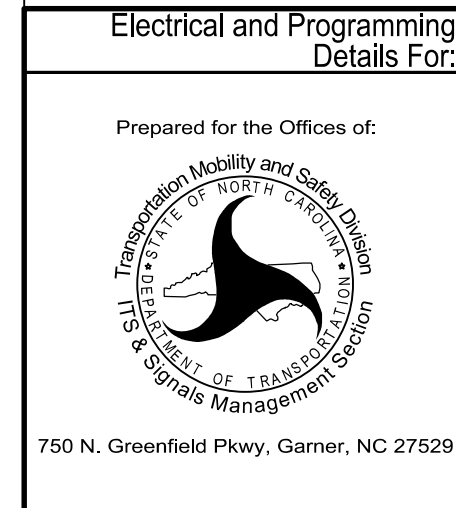


### FYA SIGNAL WIRING DETAIL

(wire signal head as shown)



Final Design  
 Electrical Detail - Sheet 1 of 4



Prepared for the Offices of:  
 Transportation Mobility and Safety Division  
 UNIVERSITY OF NORTH CAROLINA  
 SCHOOL OF TRANSPORTATION & SIGNALS MANAGEMENT

750 N. Greenfield Pkwy, Garner, NC 27529

Division 7 Rockingham County Reidsville

PLAN DATE: January 2023 REVIEWED BY: H M Surti

PREPARED BY: A Raviapati REVIEWED BY:

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL

PROFESSORIAL SEAL OF NORTH CAROLINA ENGINEER

SEAL 034481

HEWANG M. SURTI

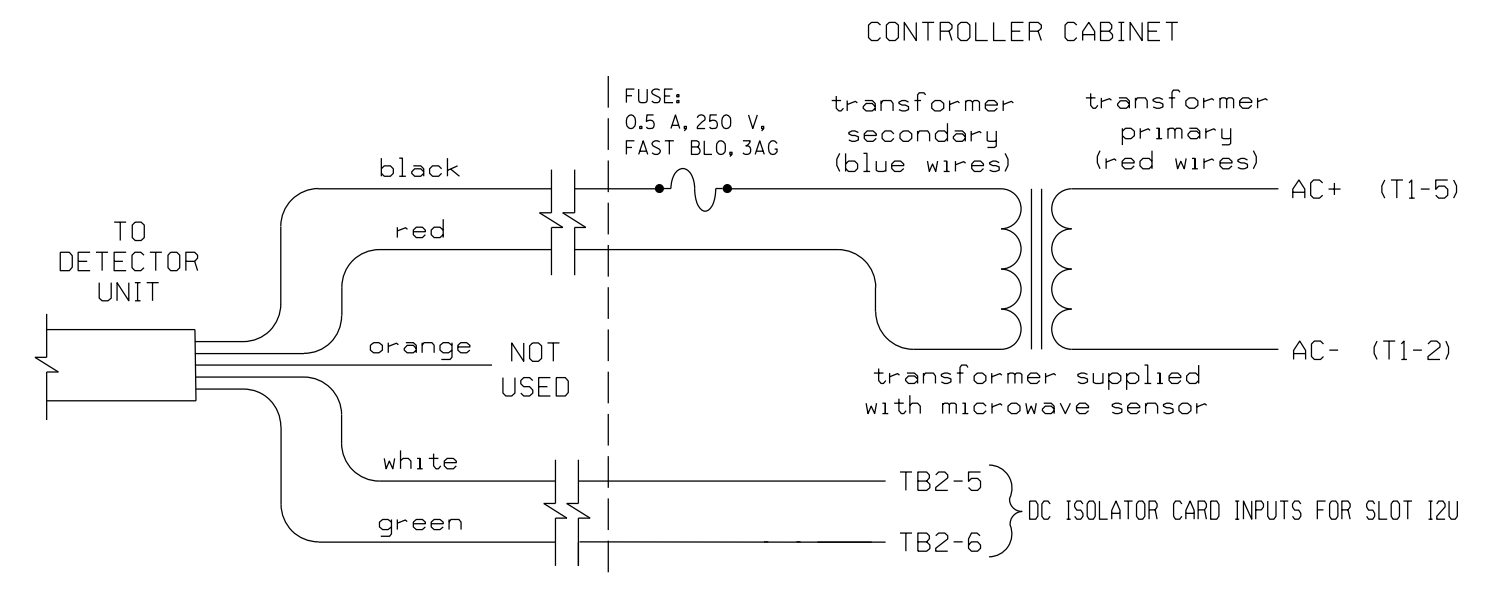
DocuSigned by:  
 Hemang M. Surti 3/10/2023  
 AEC0000224481

SIG. INVENTORY NO. 07-1675

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 micheal.l.covebaugh

### MICROWAVE DETECTOR WIRING DETAIL (2A)

(wire as shown)



**NOTES:**

- Sensor is microwave motion detector mounted on a pole as indicated on the Signal Design Plans.
- Microwave wiring shown above will cause a permanent call unless the Vehicle Detector Programming and Logical I/O Processor Programming details are entered as shown on this sheet. These programming details will cause a call to be placed upon opening the Normally Closed contact on the microwave detector.
- DC Isolator's LED will be ON when no call is present and will be OFF when a call is present.
- Important:** For proper operation of the microwave detector, remove surge protection from TB2-5, TB2-6, TB2-7, and TB2-8 and insert 242 DC Isolator in slot I2.

**MICROWAVE DETECTOR WIRE LIST**

COLOR	FUNCTION
black	12V to 24V AC/DC (no polarity)
red	12V to 24V AC/DC (no polarity)
orange	Output Relay Normally Open
white	Output Relay Normally Closed
green	Output Relay Common

### MAXTIME DETECTOR PROGRAMMING DETAIL

**Front Panel**  
Main Menu >Controller >Detector >Veh Det Plans

**Web Interface**  
Home >Controller >Detector Configuration >Vehicle Detectors

**Plan 1**

Detector	Call Phase	Delay
2	0	-
128	2	-

### LOGIC PROCESSOR PROGRAMMING

**Front Panel**  
Main Menu >Controller >More >User Programs >Definition

**Web Interface**  
Home >Controller >User Programs Configuration >User Programs Definition

**Program 1**

Statement	Result	Index	Operation	Parameter A	Index	Parameter B	Index	Delay	Ext
1	Vehicle Detector Call	128	Result=!A	Vehicle Detector Input	2	None	0	0.0	0.0

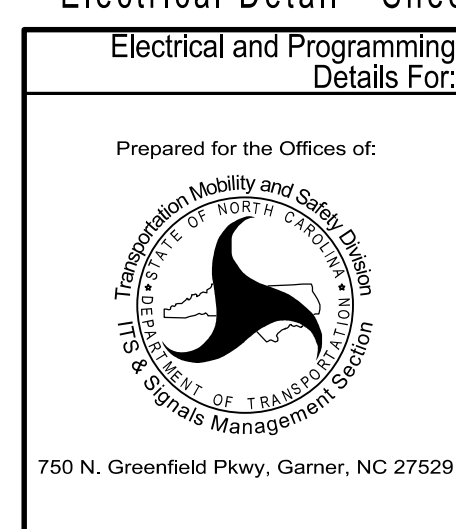
### LOGIC STATEMENT DESCRIPTION

**Statement 1 Description:** If a call is present on vehicle detector 2, do not place a call on vehicle detector 128. If no call is present on vehicle detector 2, place a call on vehicle detector 128.

\* Vehicle Detector 128 = Logical Detector for microwave detection zone

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 07-1675  
DESIGNED: Jan 2023  
SEALED: 3/10/2023  
REVISED:

Final Design  
Electrical Detail - Sheet 2 of 4



Prepared for the Offices of:		
Electrical and Programming Details For:		
SR 2817 (Barnes Street) at US 29 NB Ramps		
Division 7	Rockingham County	Reidsville
PLAN DATE: January 2023	REVIEWED BY: H M Surti	
PREPARED BY: A Ravigpati	REVIEWED BY:	
REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL  
H. Wang M. Surti  
Professional Engineer  
034481  
3/10/2023  
SIG. INVENTORY NO. 07-1675

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## MAXTIME ALTERNATE PHASING ACTIVATION DETAIL

TO RUN ALT. PHASING DURING FREE RUN - PROGRAM CHANGES (SHOWN BELOW) IN A COORDINATION PATTERN.  
 SCHEDULE A DAY PLAN THAT INCLUDES THE PATTERN PROGRAMMED  
 TO SELECT OVERLAP PLAN 2 AND VEHICLE DETECTOR PLAN 2.

TO RUN ALT. PHASING DURING COORDINATION - SELECT A COORDINATION PATTERN THAT IS PROGRAMMED  
 TO SELECT OVERLAP PLAN 2 AND VEHICLE DETECTOR PLAN 2.

<u>PHASING</u>	<u>OVERLAP PLAN</u>	<u>VEH DET PLAN</u>
ACTIVE PAGES REQUIRED TO <u>RUN DEFAULT PHASING</u>	1	1
ACTIVE PAGES REQUIRED TO <u>RUN ALTERNATE PHASING</u>	2	2

ALTERNATE PHASING CHANGE SUMMARY

THE FOLLOWING IS A SUMMARY OF WHAT TAKES PLACE WHEN OVERLAP 2 AND VEHICLE DETECTOR PLAN 2 ACTIVATE TO CALL THE "ALTERNATE PHASING":

OVERLAP PLAN 2: Modifies overlap included phases for head 51 to run protected turns only.

VEH DET PLAN 2: Disables phase 2 call on loop 5A and reduces delay time for phase 5 call on loop 5A to 0 seconds.

## MAXTIME ALTERNATE PHASING PATTERN PROGRAMMING DETAIL

Front Panel  
 Main Menu >Controller >Coordination >Patterns

Web Interface  
 Home >Controller >Coordination >Patterns

Pattern Parameters


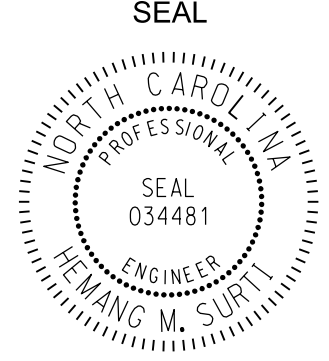
Pattern	Veh Det Plan	Overlap Plan
*	2	2

\* The Pattern number(s) are to be determined by the Division and/or City Traffic Engineer.

THIS ELECTRICAL DETAIL IS FOR  
 THE SIGNAL DESIGN: 07-1675  
 DESIGNED: Jan 2023  
 SEALED: 3/10/2023  
 REVISED:

Final Design  
 Electrical Detail - Sheet 4 of 4

DOCUMENT NOT CONSIDERED  
 FINAL UNLESS ALL  
 SIGNATURES COMPLETED

Electrical and Programming Details For:  Prepared for the Offices of:   NC Firm License No.: F-0342 5438 Wade Park Boulevard Suite 200, Raleigh, NC 27607 Phone: 919-461-1100	SR 2817 (Barnes Street) at US 29 NB Ramps  Division 7      Rockingham County      Reidsville PLAN DATE: January 2023      REVIEWED BY: H M Surti PREPARED BY: A Ravigati      REVIEWED BY:	SEAL  H. Wang M. Surti ENGINEER 034481 3/10/2023
REVISIONS      INIT.      DATE		DocuSigned by: H. Wang M. Surti      3/10/2023 SIG. INVENTORY NO.      07-1675

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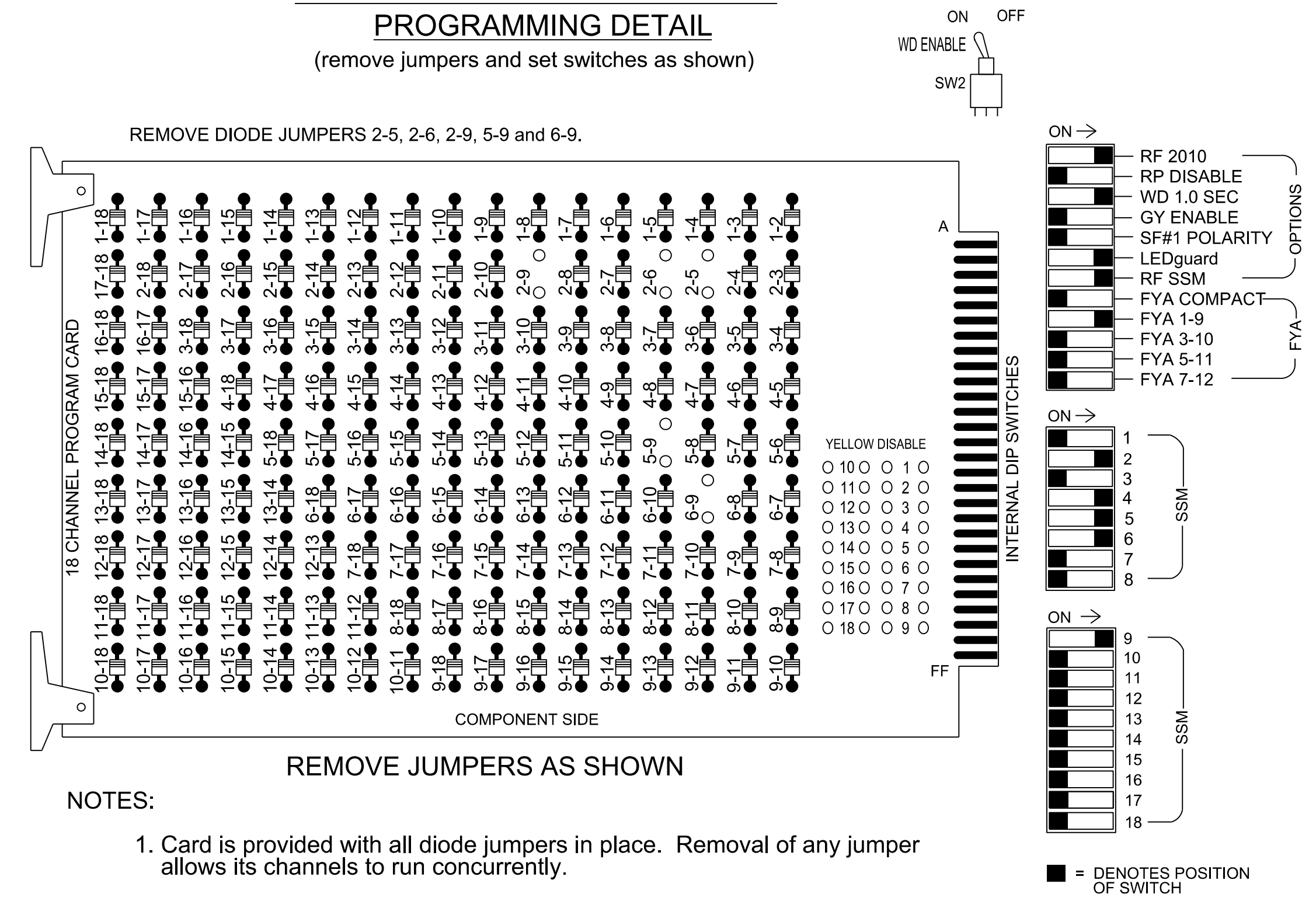






### 18 CHANNEL CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



**NOTES:**

- Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
- Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
- Ensure that the Red Enable is active at all times during normal operation.
- 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 plan.
- Program controller to start up in phase 2 Green No Walk and 6 Green No Walk.
- If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
- The cabinet and controller are part of NC 87/ SR 2817 (Barnes Street) Closed Loop System. Signal System #: D07-10 Reidsville.

### EQUIPMENT INFORMATION

Controller.....2070LX  
 Cabinet.....332 w/ Aux  
 Software.....Q-Free MAXTIME  
 Cabinet Mount.....BASE  
 Output File Positions.....18 With Aux. Output File  
 Load Switches Used.....S2, S5, S7, S8, AUX S1  
 Phases Used.....2, 4, 5, 6  
 Overlap "1".....\*  
 Overlap "2".....NOT USED  
 Overlap "3".....NOT USED  
 Overlap "4".....NOT USED

\*See overlap programming detail on this sheet.

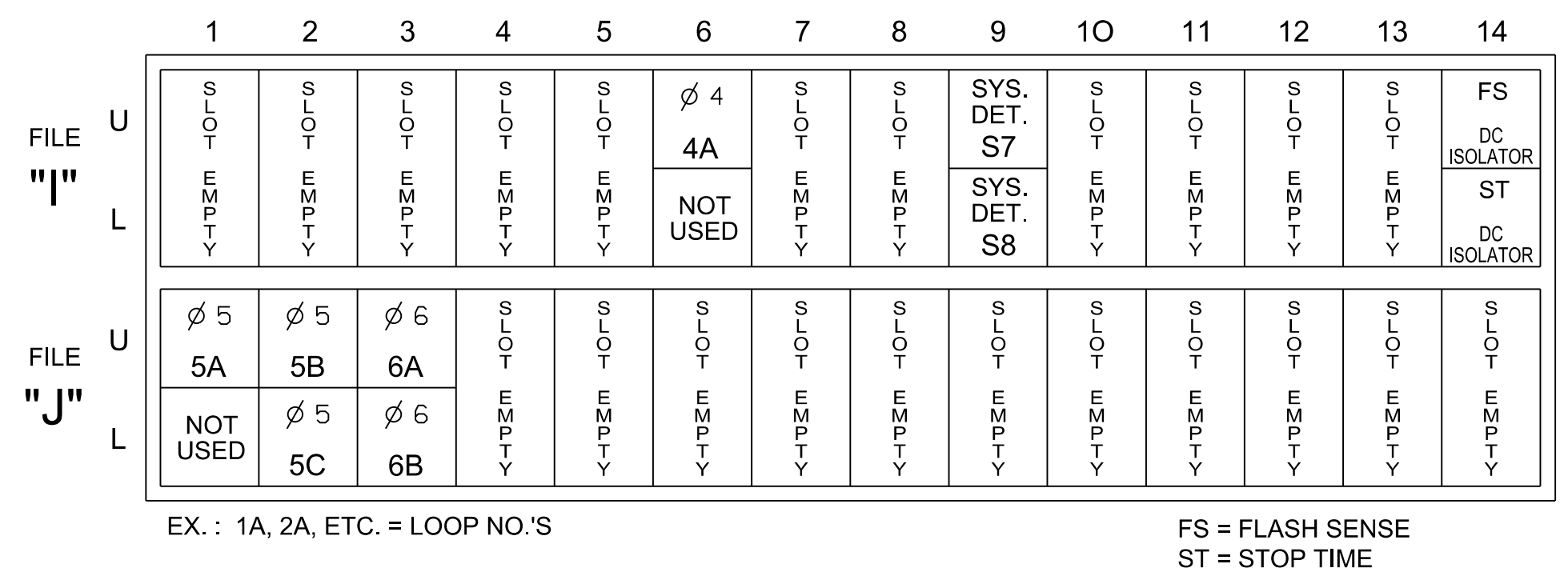
### SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
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	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	NU	21,22	NU	NU	41,42	NU	42	51,52	62,63	NU	NU	NU	61	NU	NU	NU	NU	NU
RED		128			101		*		134									
YELLOW		129			102				135									
GREEN		130			103				136									
RED ARROW									131					A121				
YELLOW ARROW								132	132					A122				
FLASHING YELLOW ARROW														A123				
GREEN ARROW								133	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

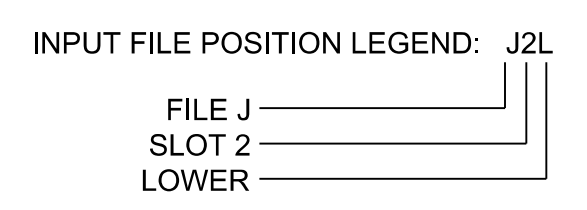
(front view)



### INPUT FILE CONNECTION & PROGRAMMING CHART

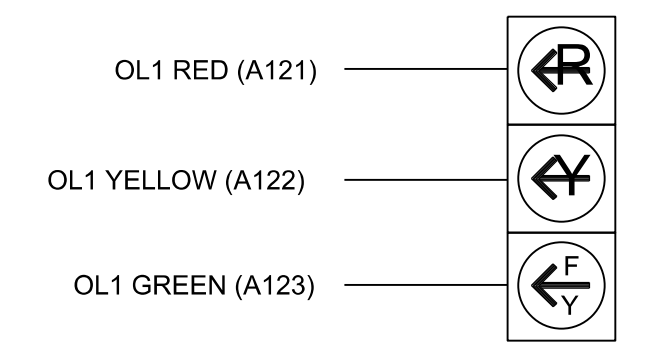
LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	QUEUE	CALL	PASSAGE 2
4A	TB4-9,10	I6U	41	3	8	4	3					X	
*S7	TB6-9,10	I9U	60	22	13	SYS							
*S8	TB6-11,12	I9L	62	24	14	SYS							
5A	TB3-1,2	J1U	55	17	15	5	3		X			X	
5B	TB3-5,6	J2U	40	2	16	5			X			X	
5C	TB3-7,8	J2L	44	6	17	5	15		X			X	
6A	TB3-9,10	J3U	64	30	18	6			X	X		X	
6B	TB3-11,12	J3L	77	43	19	6			X	X		X	

\*System detector only. Remove any assigned vehicle phase.



### FYA SIGNAL WIRING DETAIL

(wire signal head as shown)



61

### OVERLAP PROGRAMMING

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

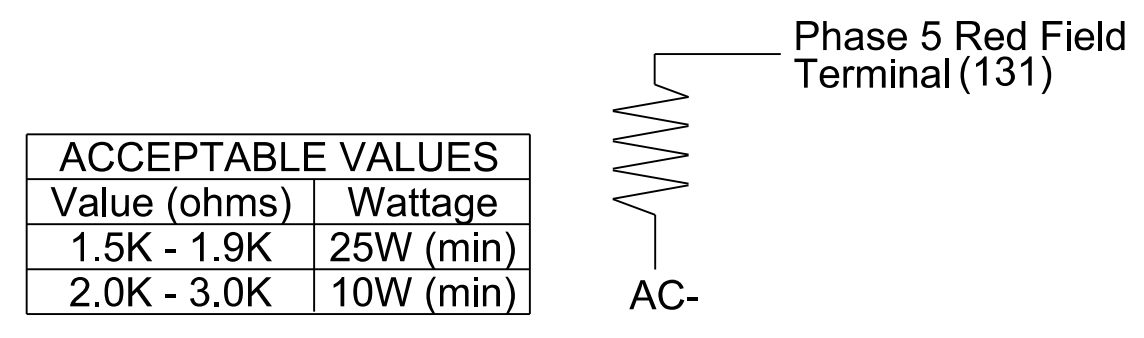
Web Interface  
 Home > Controller > Overlap Configuration > Overlaps

#### Overlap Plan 1

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

### LOAD RESISTOR INSTALLATION DETAIL

(install resistor as shown)



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

### SPECIAL DETECTOR NOTE

Install a video detection system for vehicle detection for Zones 2A and 2B. 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: 07-0888T  
 DESIGNED: Jan 2023  
 SEALED: 3/10/2023  
 REVISED:



Temporary Design (TMP Phase II)  
 Electrical Detail

Prepared for the Offices of:

Division 7  
 SR 2817 (Barnes Street) at SR 3103 (Diesel Drive)  
 Rockingham County, Reidsville

PLAN DATE: January 2023  
 PREPARED BY: A Ravipti  
 REVIEWED BY: H M Surti

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

DocuSigned by:  
 Hemang M. Surti 3/10/2023  
 AECOM 07-0888T

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

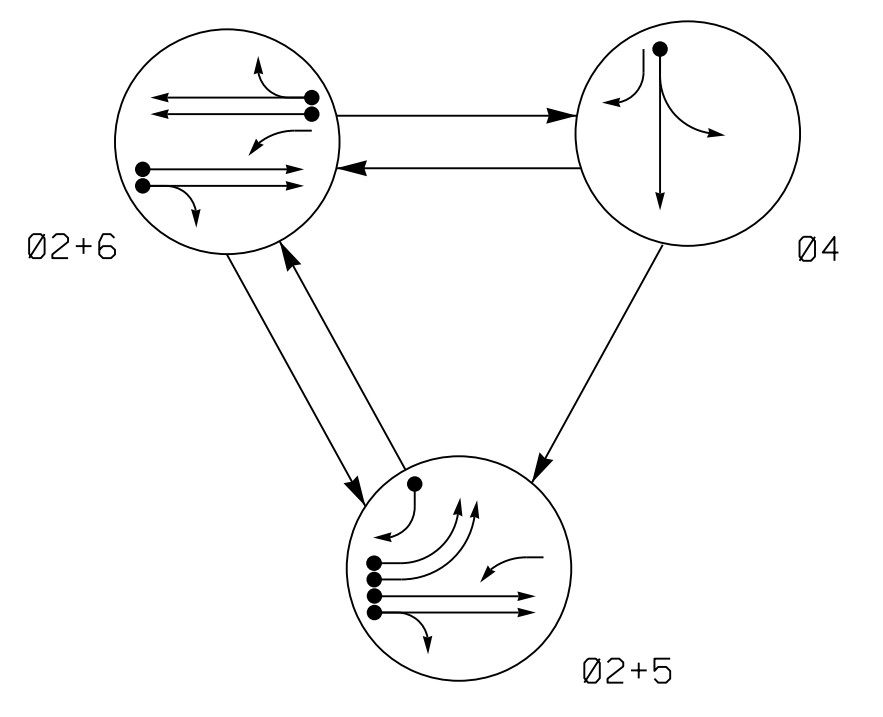
SEAL  
 HEMANG M. SURTI  
 PROFESSIONAL ENGINEER  
 STATE OF NORTH CAROLINA  
 034481

750 N. Greenfield Pkwy, Garner, NC 27529

3/10/2023 10:23:44 AM C:\Users\paw.bentl\OneDrive\Documents\07-0888T\07-0888T\_11P\Fig 13.1 Signal Management\07-0888T\_11P\Fig 13.1 Signal Management.dgn  
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**PHASING DIAGRAM**



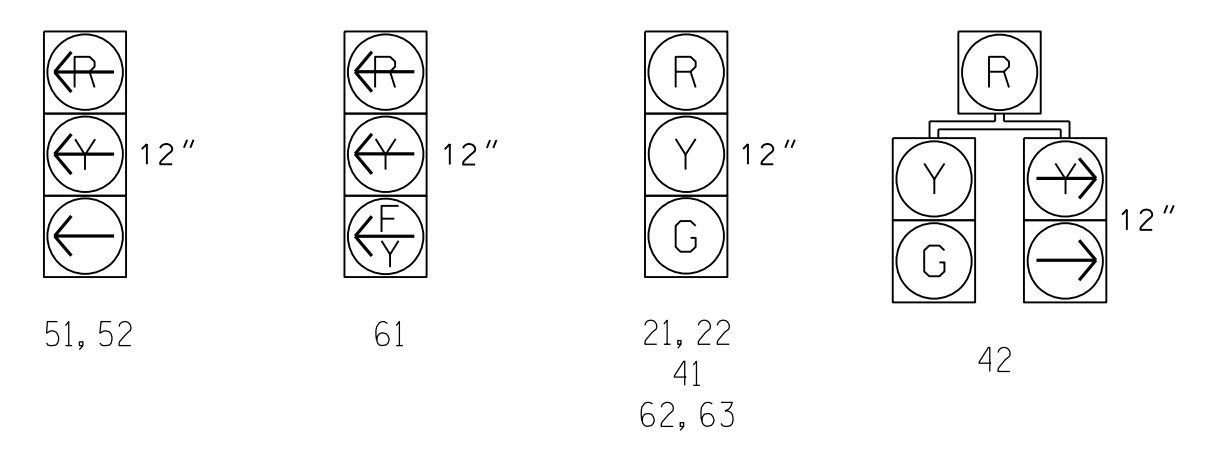
SIGNAL FACE	PHASE			
	02+5	02+6	04	FLASH
21, 22	G	G	R	Y
41	R	R	G	R
42	R	R	G	R
51, 52	R	R	R	R
61	F	F	R	Y
62, 63	R	G	R	Y

**SIGNAL FACE I.D.**

All Heads L.E.D.

**PHASING DIAGRAM DETECTION LEGEND**

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

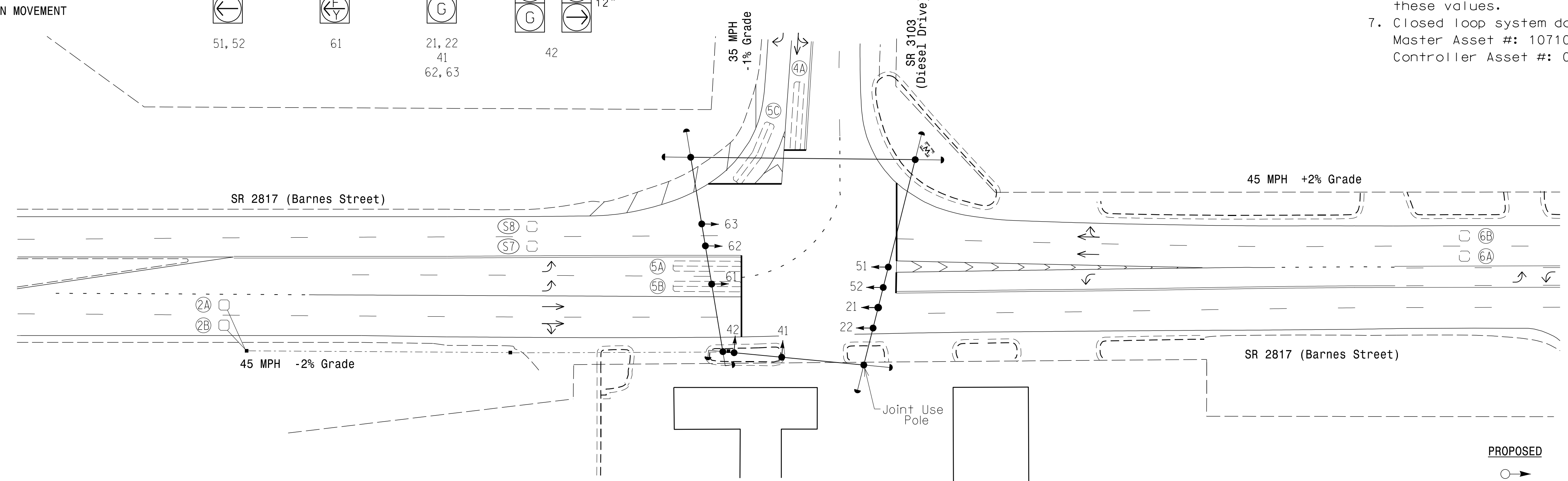


MAXTIME DETECTOR INSTALLATION CHART												
DETECTOR				PROGRAMMING								
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	QUEUE	PASSAGE 2	NEW CARD
2A	6X6	300	5	X	2	-	-	X	X	-	-	X
2B	6X6	300	5	X	2	-	-	X	X	-	-	X
4A	6X40	0	2-4-2	-	4	3	-	X	-	-	-	-
5A	6X40	0	2-4-2	-	5	3	-	X	-	-	-	-
5B	6X40	0	2-4-2	-	5	-	-	X	-	-	-	-
5C	6X40	0	2-4-2	-	5	15	-	X	-	-	-	-
6A	6X6	300	Exist	-	6	-	-	X	X	-	-	-
6B	6X6	300	Exist	-	6	-	-	X	X	-	-	-
S7	6X6	+210	Exist	-	-	-	-	-	-	-	-	X
S8	6X6	+210	Exist	-	-	-	-	-	-	-	-	X

3 Phase Fully Actuated  
NC 87/SR 2817 (Barnes Street) CLS  
Signal System #: D07-10\_Reidsville

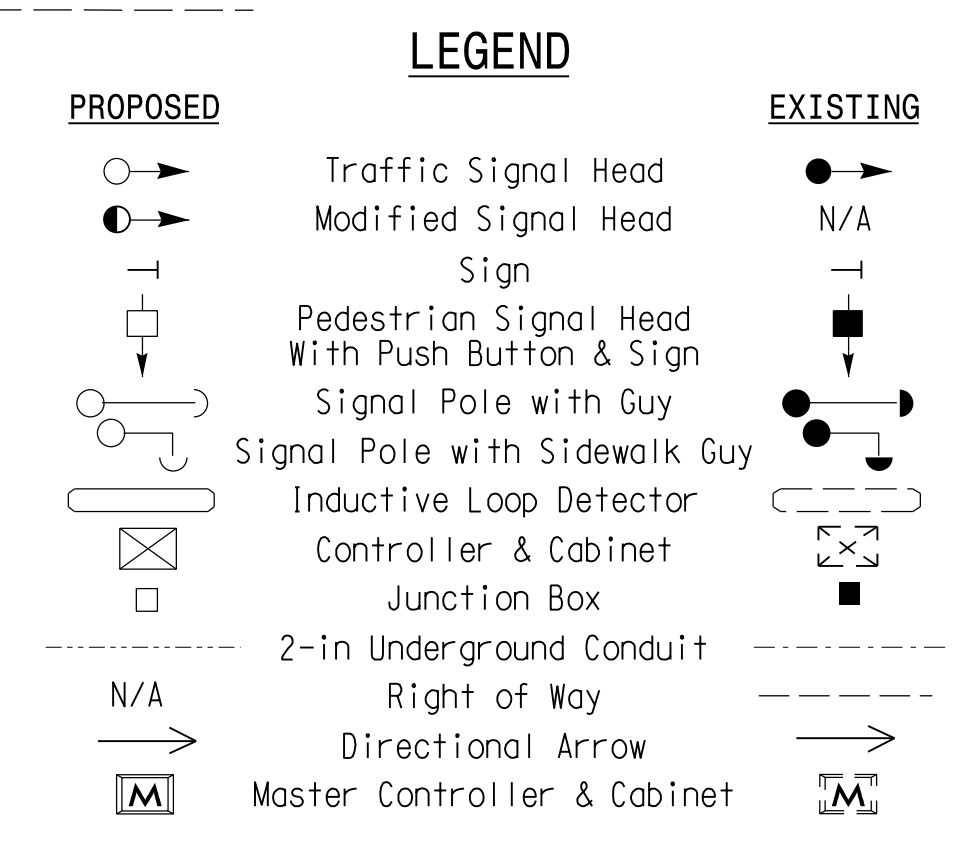
**NOTES**

- Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Phase 5 may be lagged.
- Set all detector units to presence mode.
- Pavement markings are existing.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- Closed loop system data:  
Master Asset #: 10710,  
Controller Asset #: 0888.

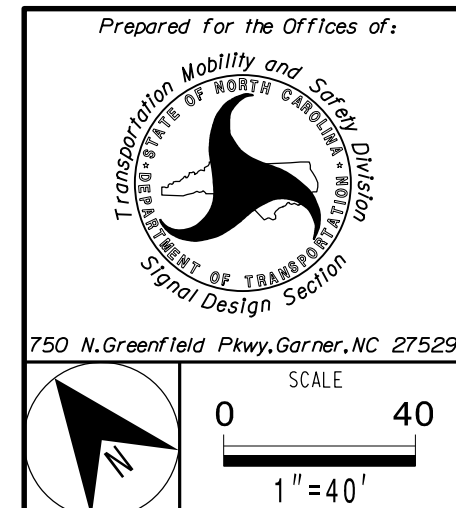


FEATURE	PHASE			
	2	4	5	6
Walk *	-	-	-	-
Ped Clear *	-	-	-	-
Min Green	12	7	7	12
Passage *	6.0	2.0	2.0	6.0
Passage 2 *	-	-	-	-
Max 1 *	100	30	40	100
Yellow Change	4.7	3.9	3.0	4.7
Red Clear	1.4	2.4	2.8	1.4
Added Initial *	1.5	-	-	1.5
Maximum Initial *	34	-	-	34
Time Before Reduction *	20	-	-	20
Time To Reduce *	30	-	-	30
Minimum Gap	3.0	-	-	3.0
Advance Walk	-	-	-	-
Non Lock Detector	-	X	X	-
Vehicle Recall	MIN RECALL	-	-	MIN RECALL
Dual Entry	-	-	-	-

\* These values may be field adjusted. Do not adjust Min Green and 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 - Final Design



SR 2817 (Barnes Street) at SR 3103 (Diesel Drive)		
Division 7	Rockingham County	Reidsville
PLAN DATE: Jan 2023	REVIEWED BY: H.M. Surti	
PREPARED BY: M.D. Tindal	REVIEWED BY:	
REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL

DocuSigned by:  
Henry M. Surti 3/10/2023  
STG: INVENTORY NO. 07-0888

3/10/2023 10:44:43 AM C:\Users\mjbent\OneDrive\Documents\60581577\NCDOT\_SMI\_BR-0041\300-CAD\_6154910-CAD\70-NCDOT\_TIP\Signal\0888.sig\_dsn-2022XXXX.dgn

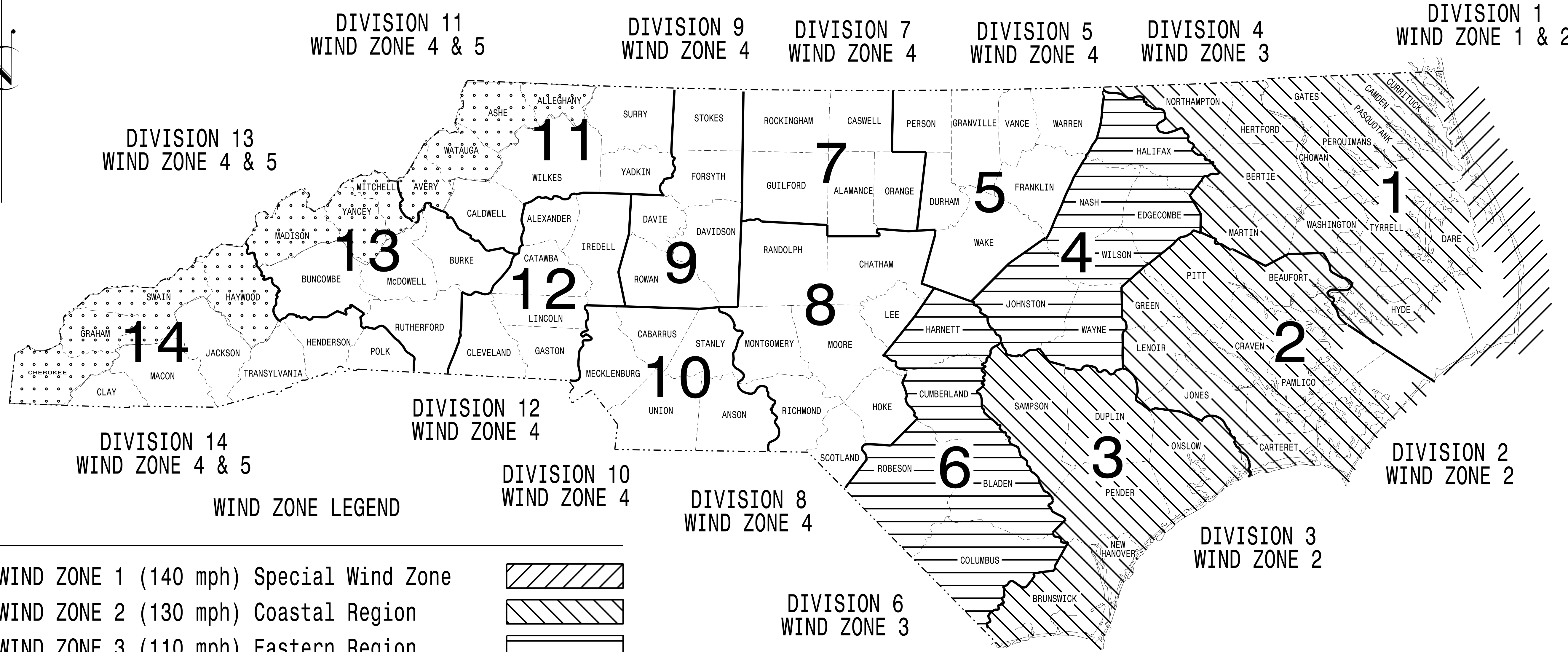
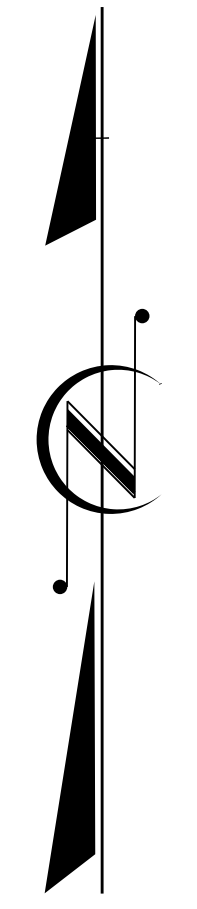




# STATE OF NORTH CAROLINA DIVISION OF HIGHWAYS

PROJECT I.D. NO. BR-0041	SHEET NO. Sig.M1
-----------------------------	---------------------

## STANDARD DRAWINGS FOR ALL METAL POLES



**WIND ZONE LEGEND**

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

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

Prepared In the Offices of:

750 N. Greenfield Pkwy.  
Garner, NC 27529

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

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

**NC DOT CONTACTS:**

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

---

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

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

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

SEAL

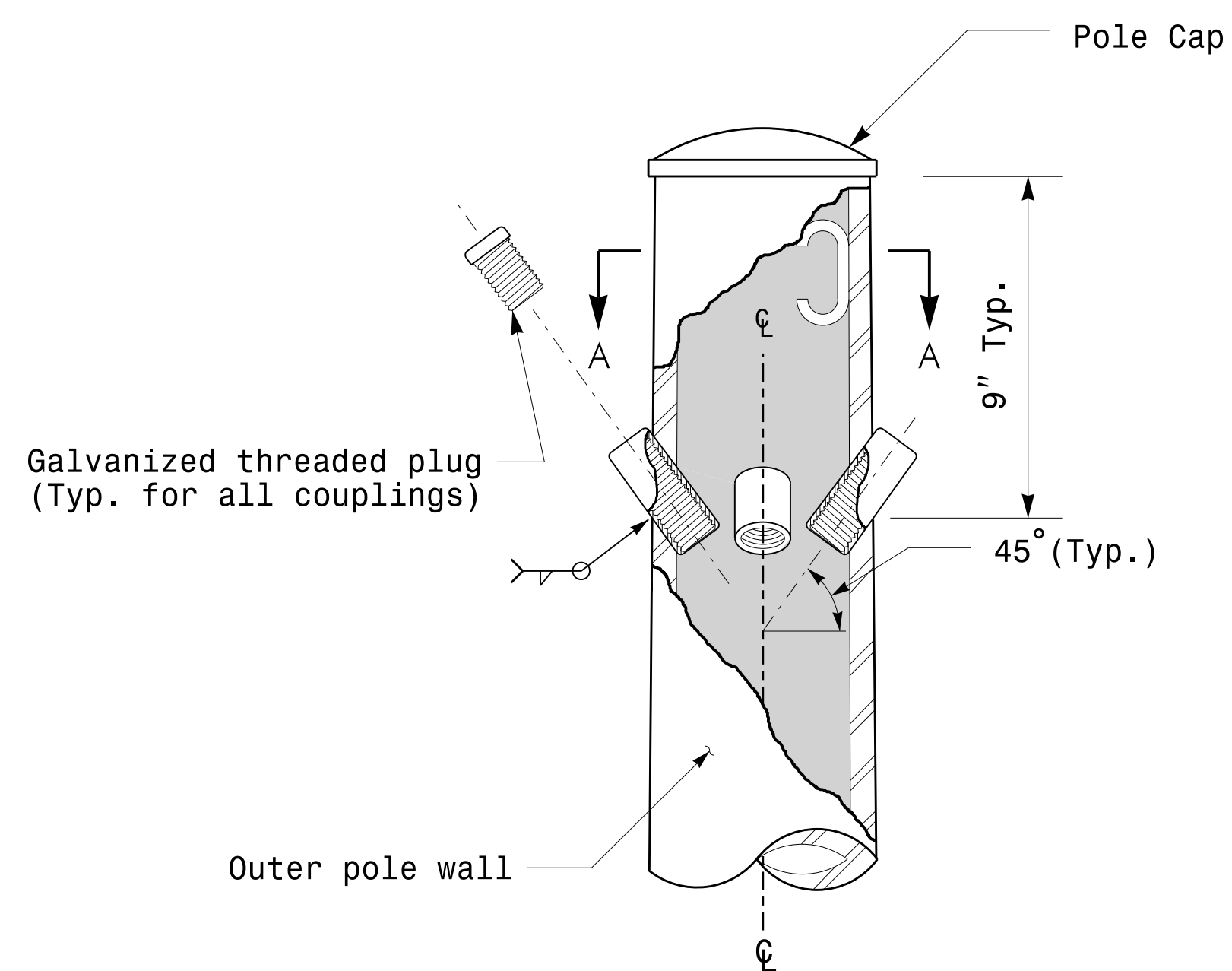
DocuSigned by:  
Debesh C. Sarkar  
DATE 10/11/2017



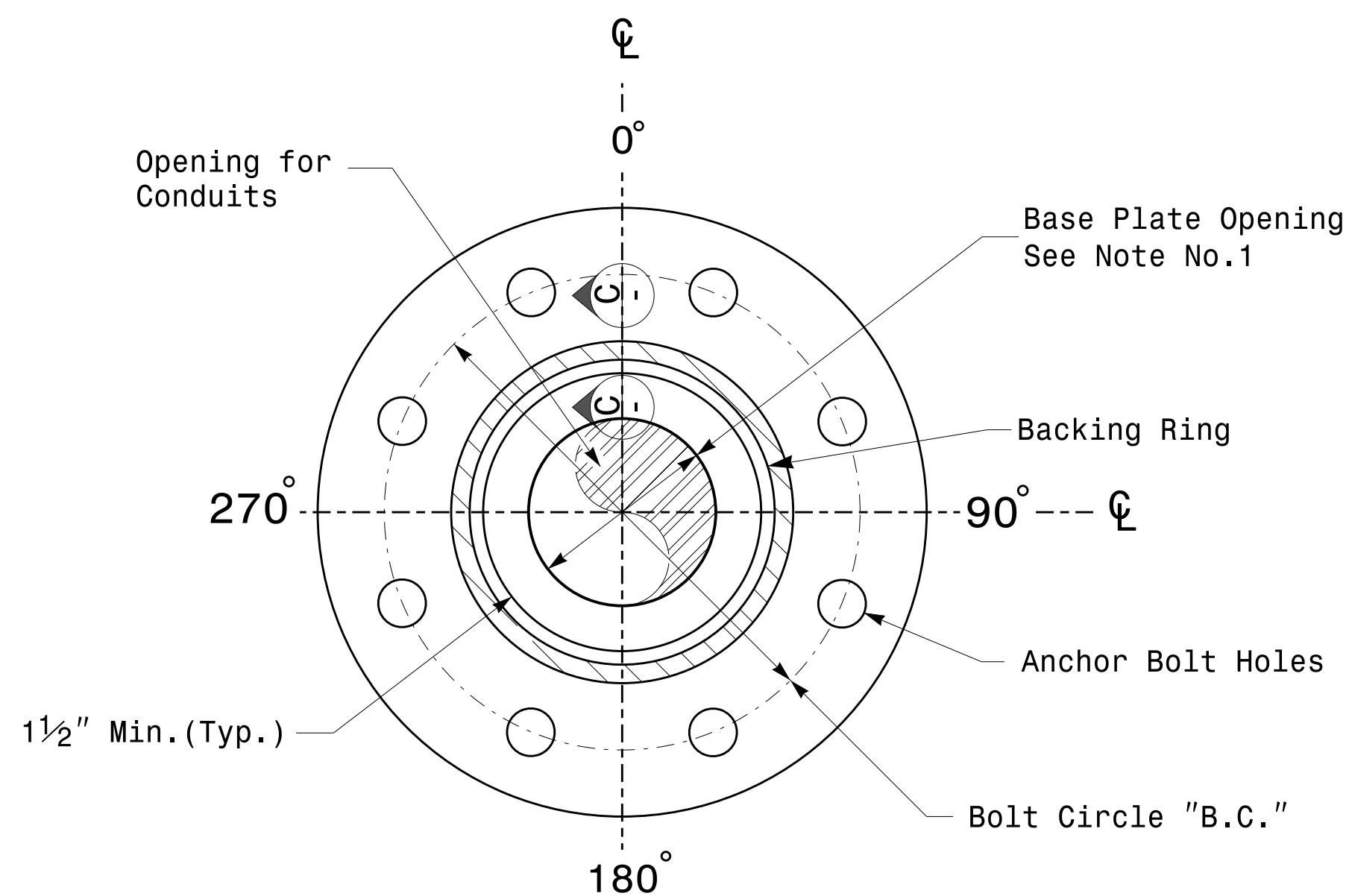




Note:  
1. Opening in pole base plate shall be equal to pole base inside diameter minus 3 1/2" but shall not be less than 8 1/2".

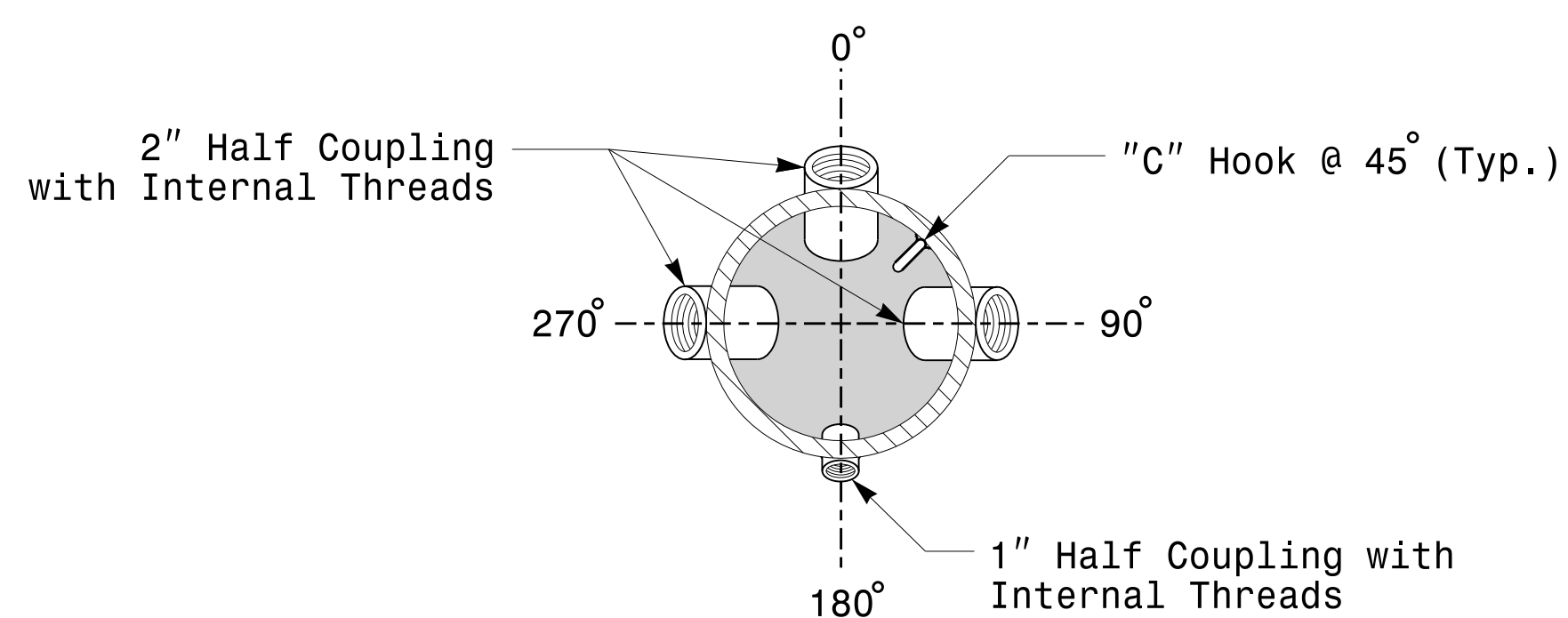


Cable Entrances at Top of Pole

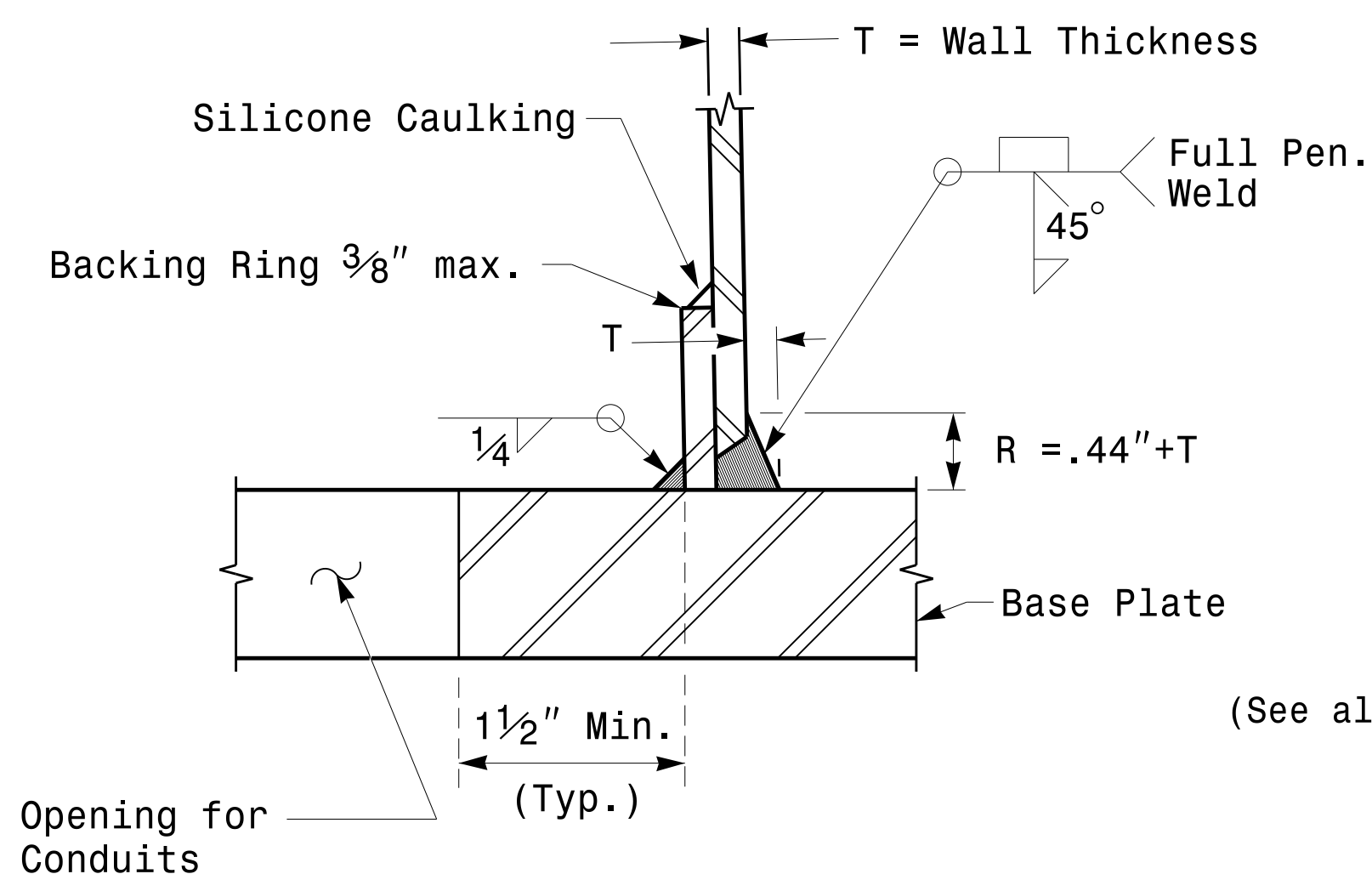


Section B-B  
Pole Base Plate Details  
(8 and 12 Bolt Pattern)

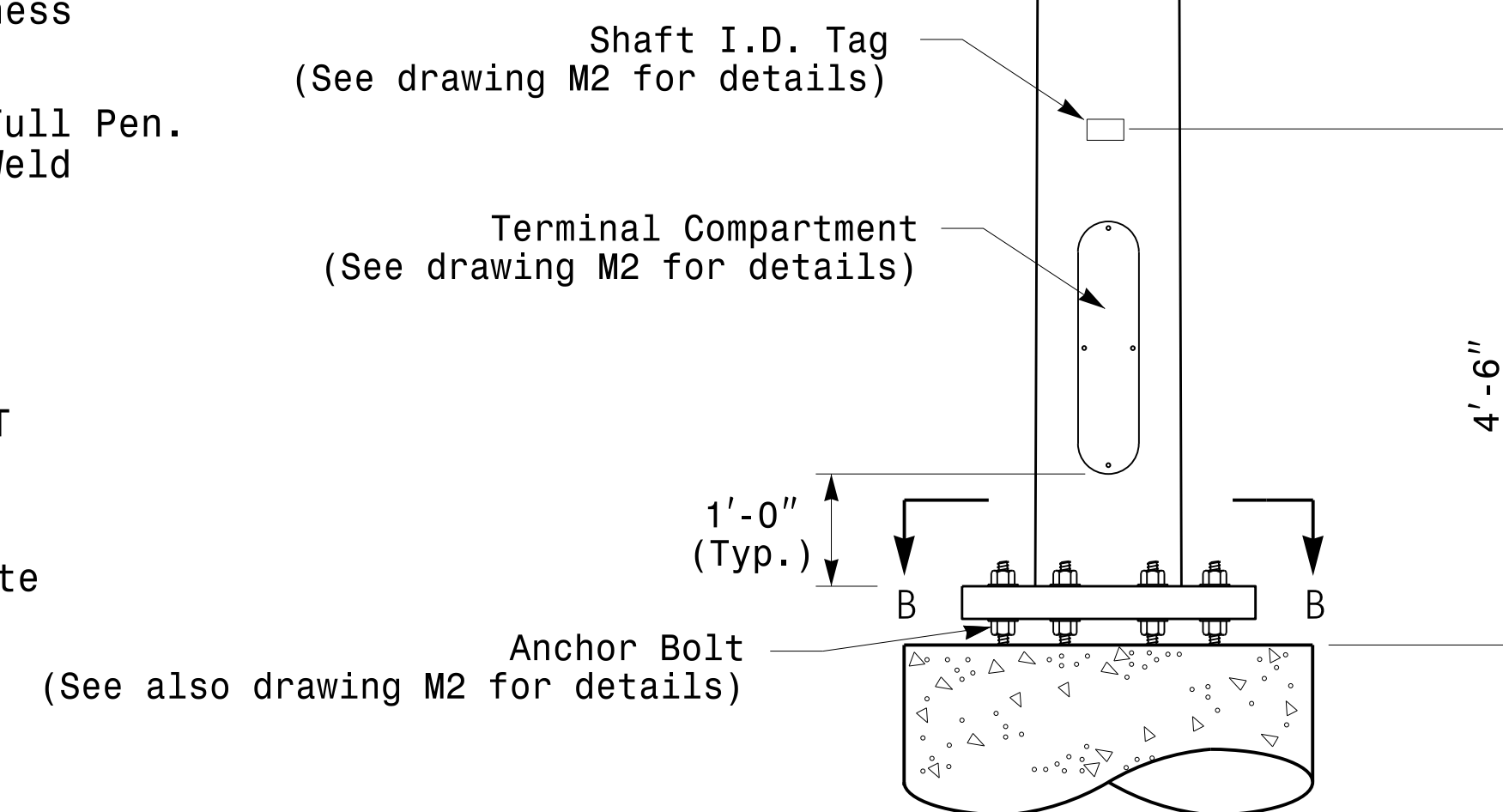
2 Cable Clamps designed for variable attachment heights from 1'-6" to 5'-0" below the top of the pole.



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



Monotube Strain Pole

Prepared in the Offices of:

750 N. Greenfield Pkwy, Garner, NC 27529

SCALE: NONE

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

SEAL

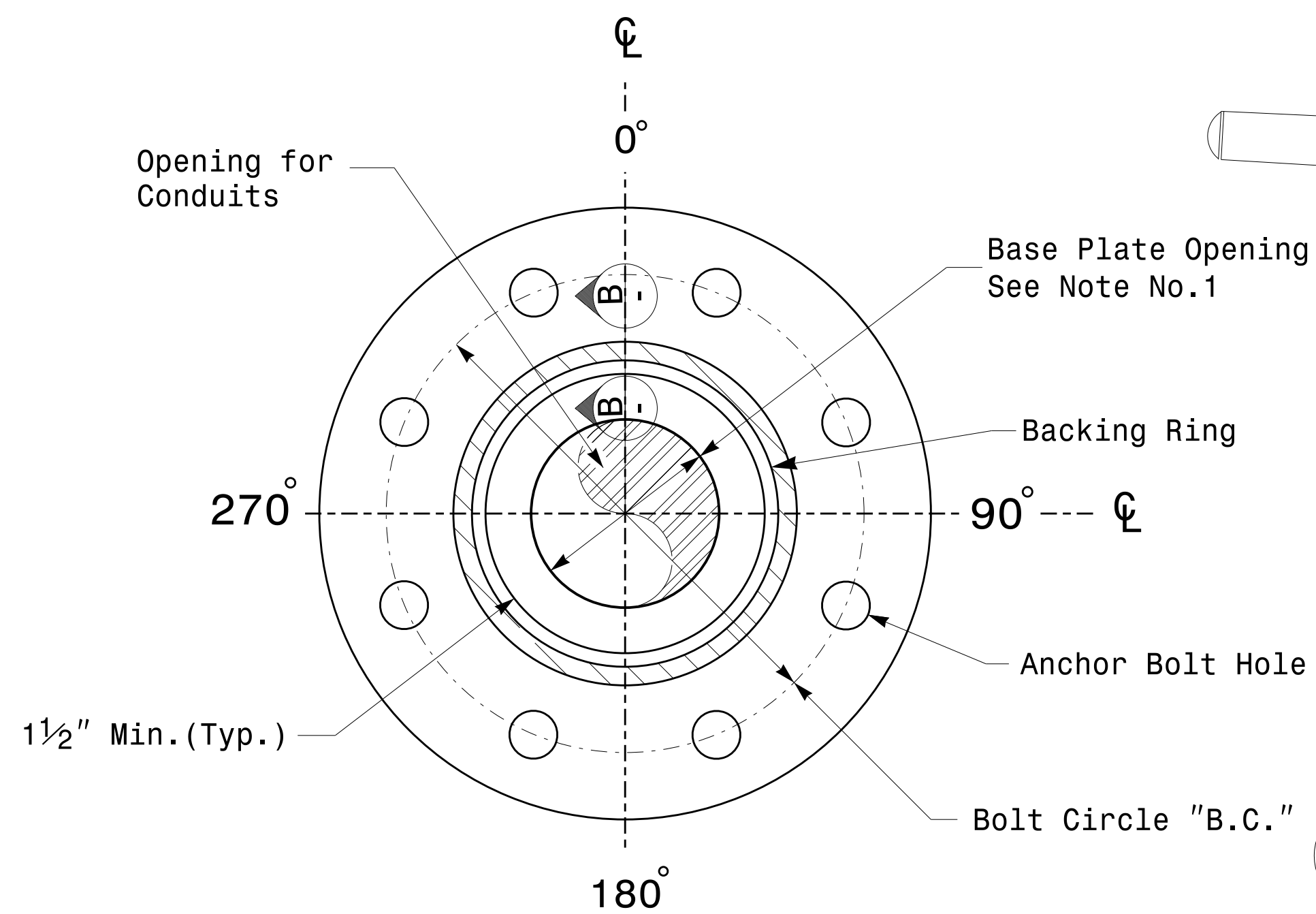
DocuSigned by: D.C. Sarkar

10/11/2017

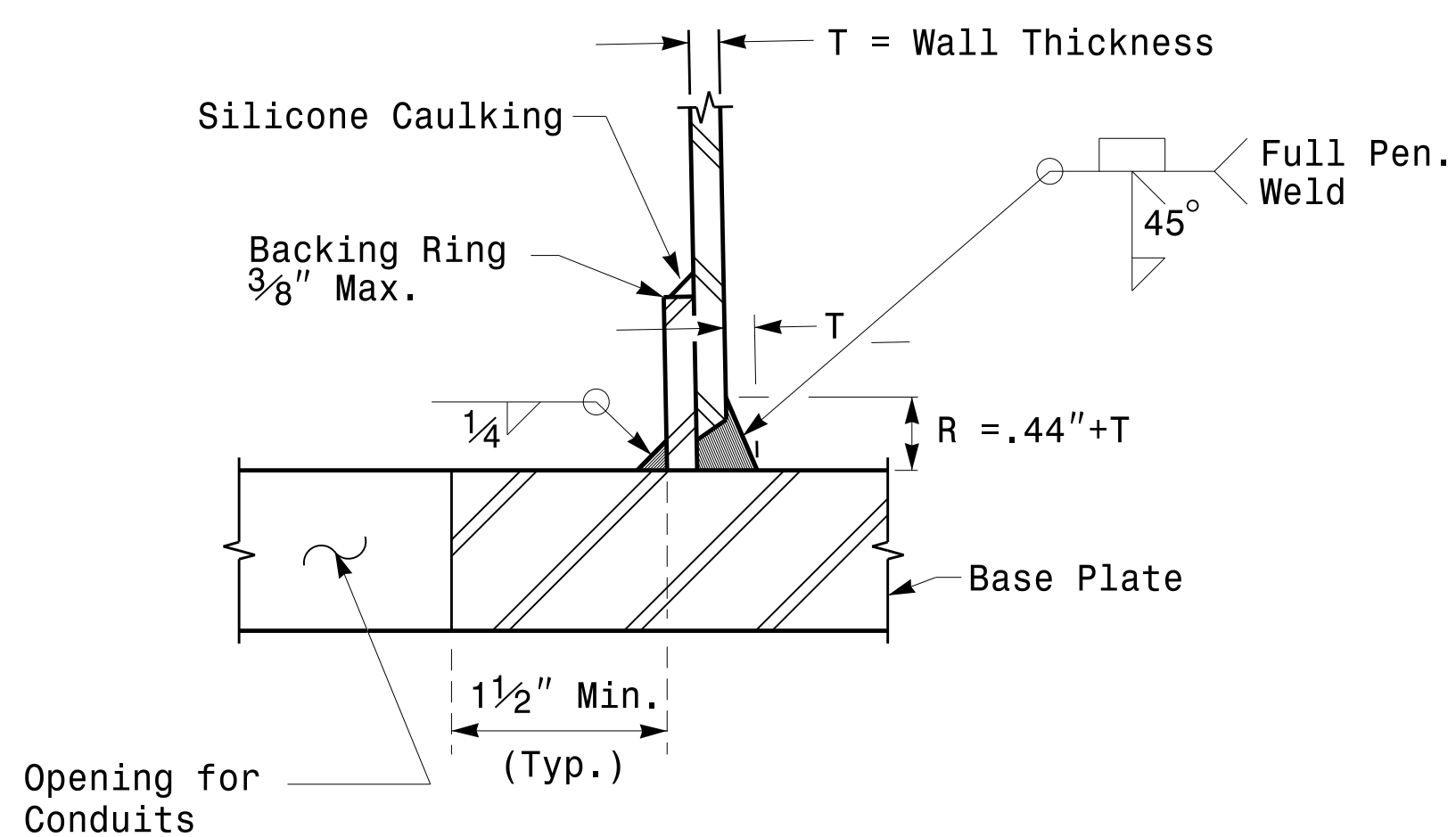
DATE

Fabrication Details - Strain Poles

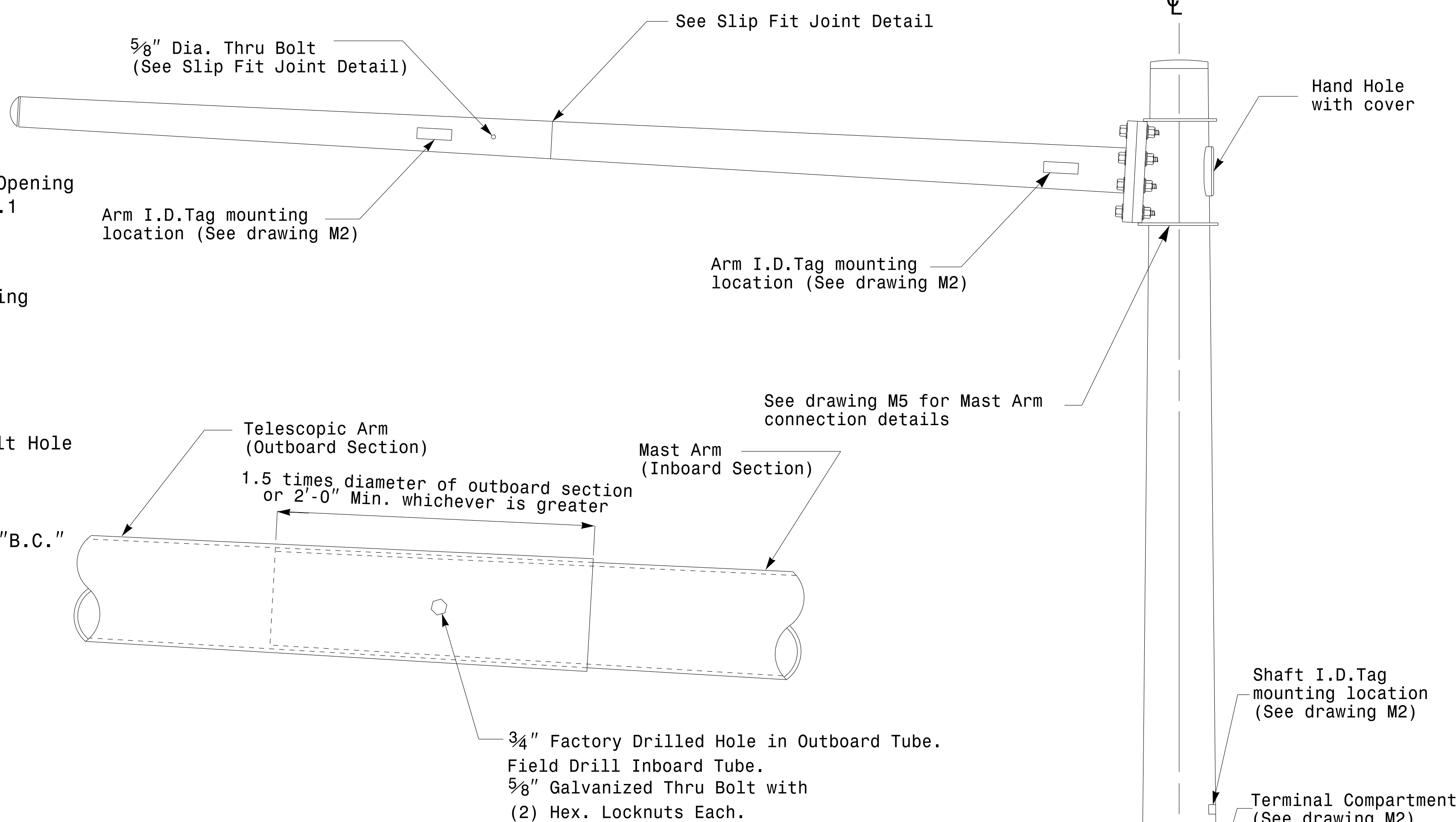
Note:  
1. Opening in pole base plate shall be equal to pole base inside diameter minus 3 1/2" but shall not be less than 8 1/2".



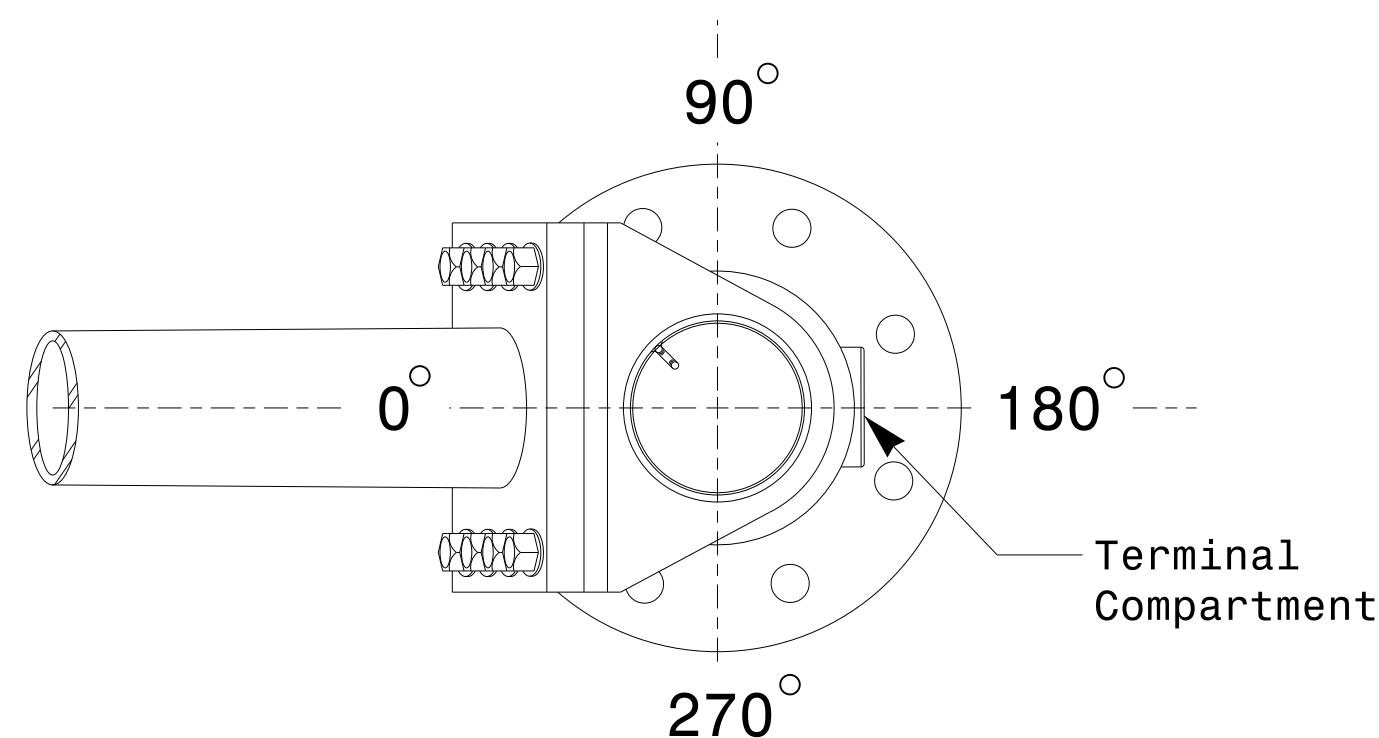
Section A-A  
Pole Base Plate Details



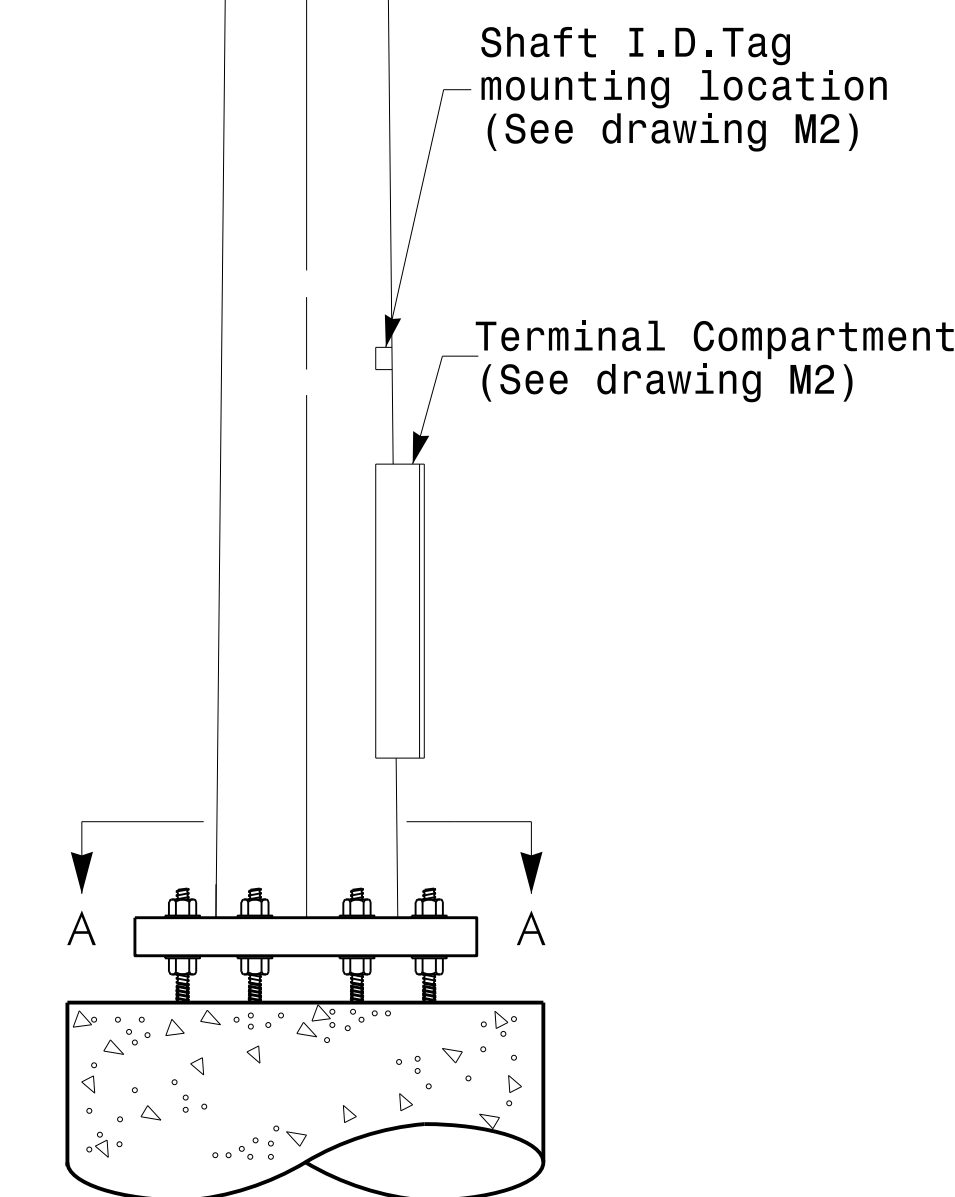
Section B-B  
(Pole Attachment to Base Plate)  
Full-Penetration Groove Weld Detail



Slip Fit Joint Detail for Mast Arm



Mast Arm Radial Orientation



Mast Arm Pole

<p>Prepared in the Offices of:</p> <p>750 N. Greenfield Pkwy, Garner, NC 27529</p>	<p>Typical Fabrication Details For Mast Arm Poles</p>		<p>SEAL</p>
	<p>PLAN DATE: OCTOBER 2017</p>	<p>DESIGNED BY: K.C. DURIGON</p>	
<p>PREPARED BY: N. BITTING</p>	<p>REVIEWED BY: D.C. SARKAR</p>	<p>INIT. DATE</p>	<p>10/11/2017</p>
<p>SCALE: 0 NA NONE</p>	<p>REVISIONS</p>	<p>DATE</p>	<p>DATE</p>

11-OCT-2017 08:33 136504115 Signal&SIGNAL Design Section Eastern Region\m4 Sheets\2016\2014 Sig.M4 Std. Fabrication Detail - Mast Arm Poles.dgn

Fabrication Details - Mast Arm Poles



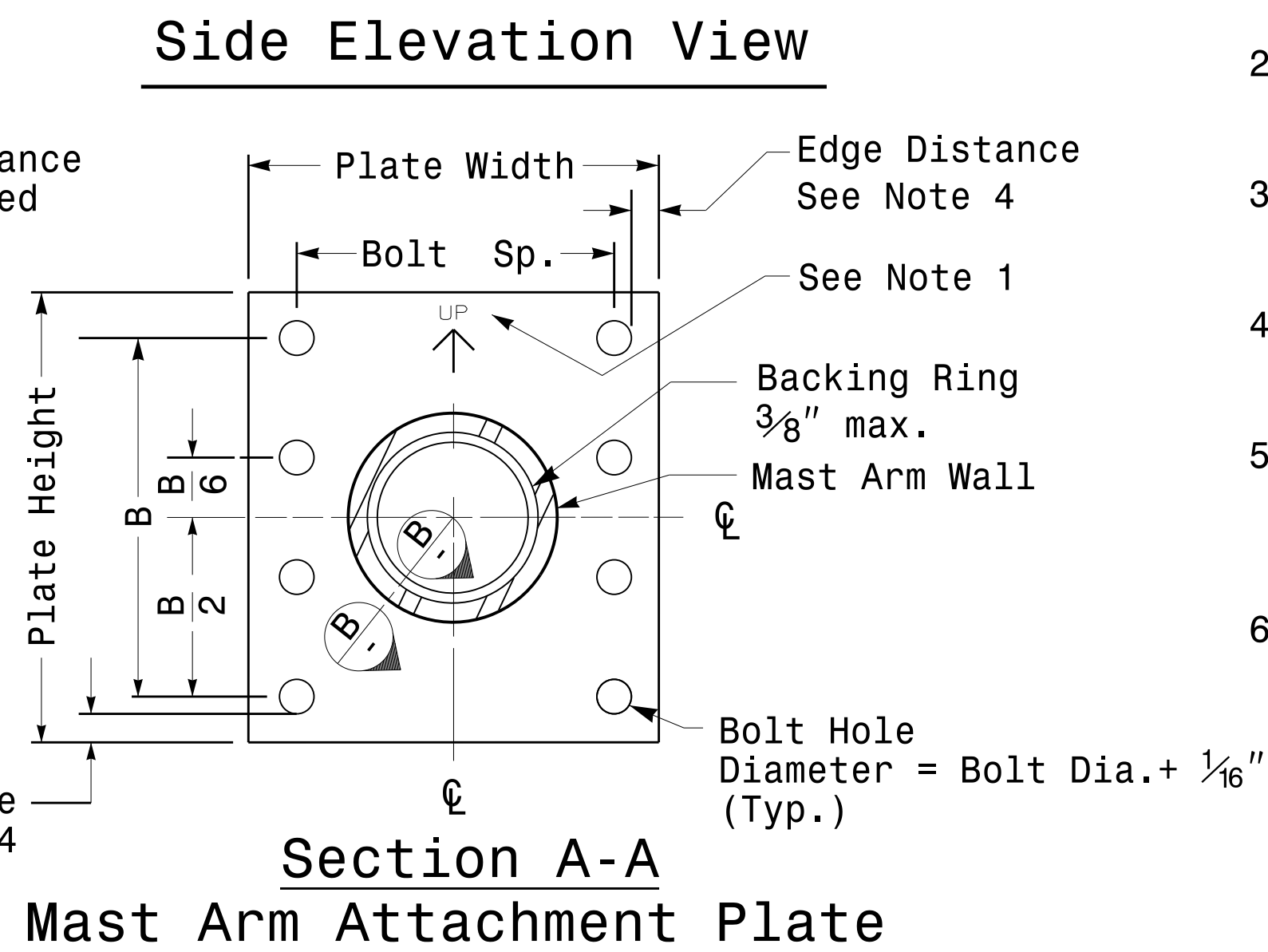
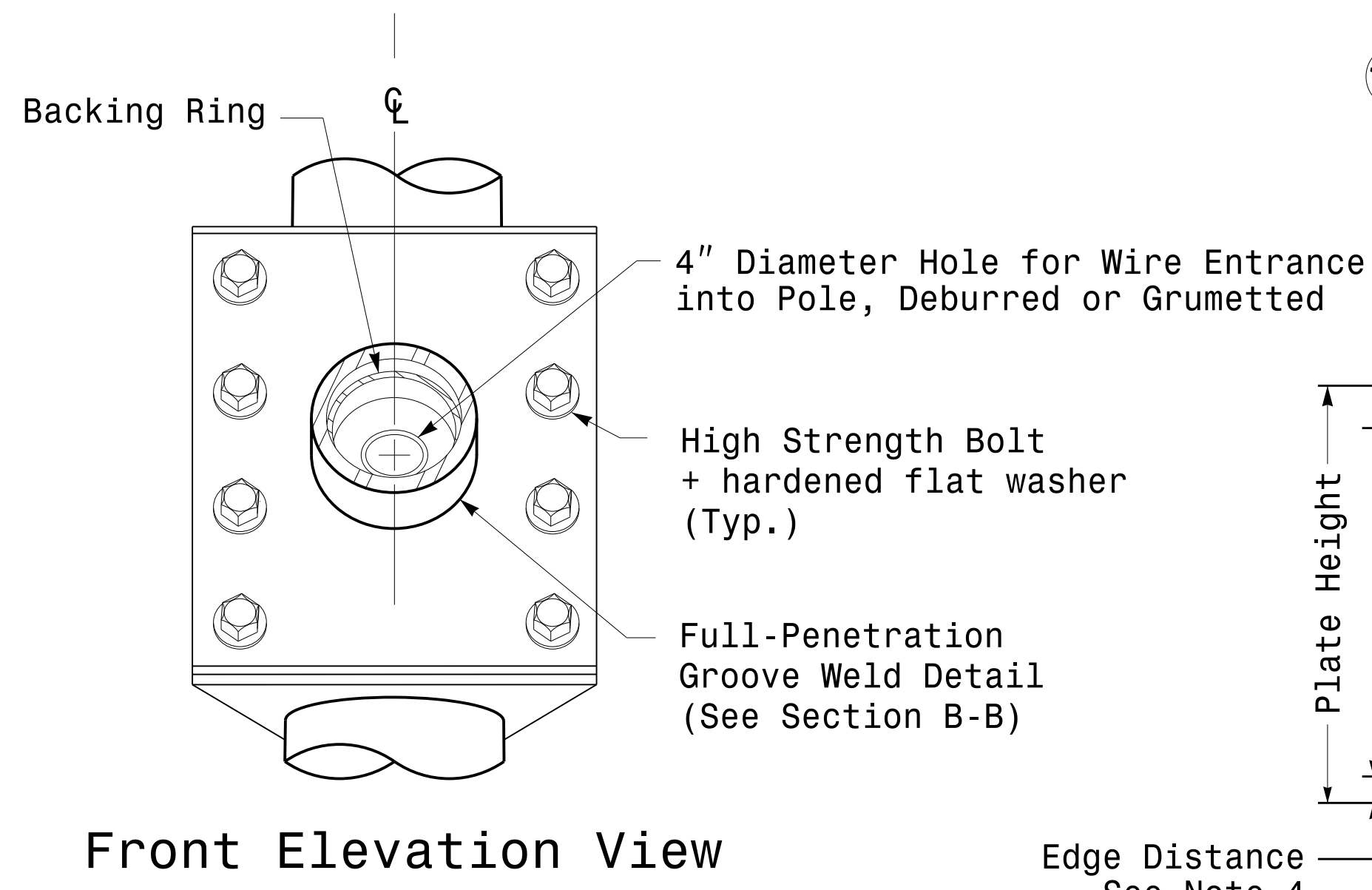
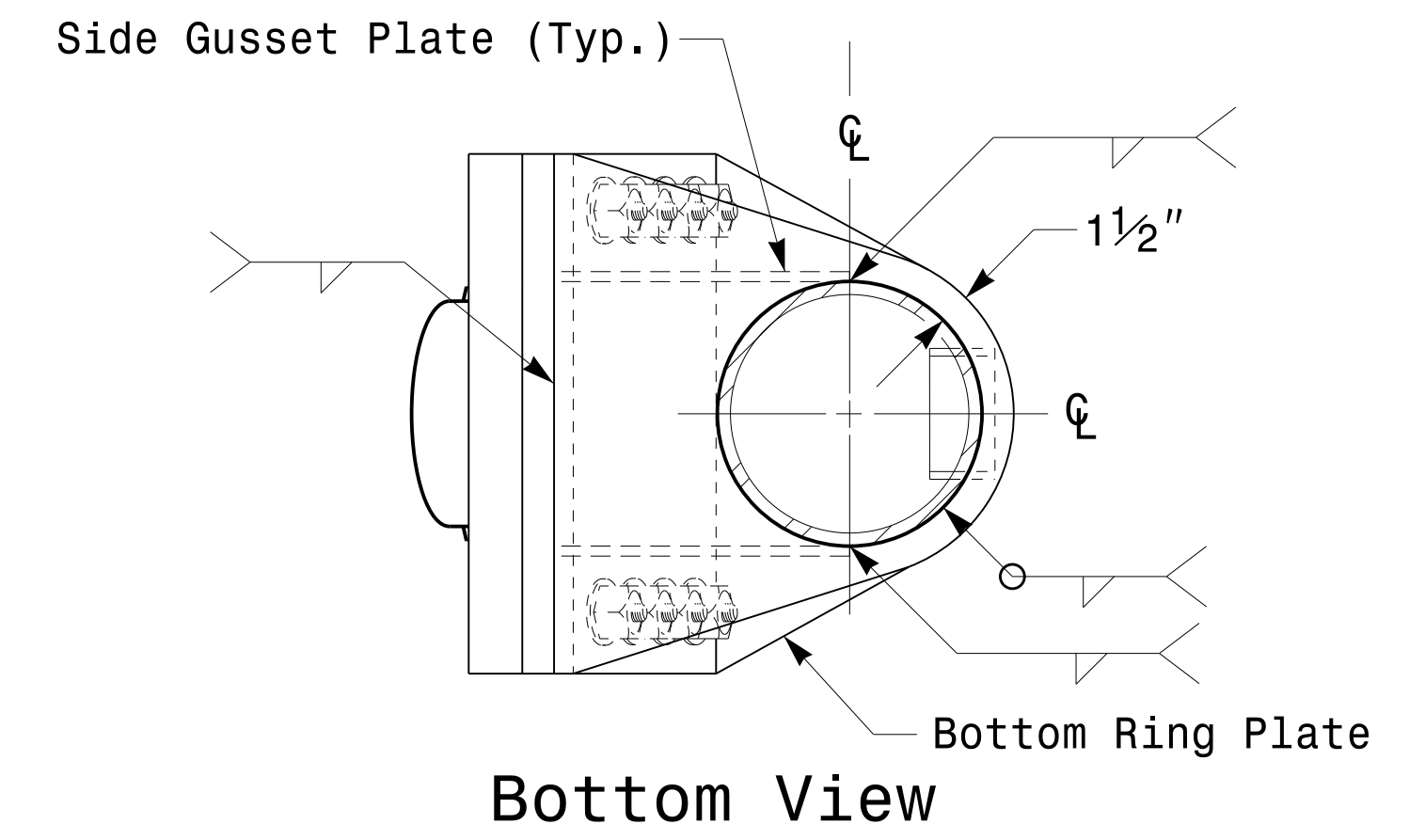
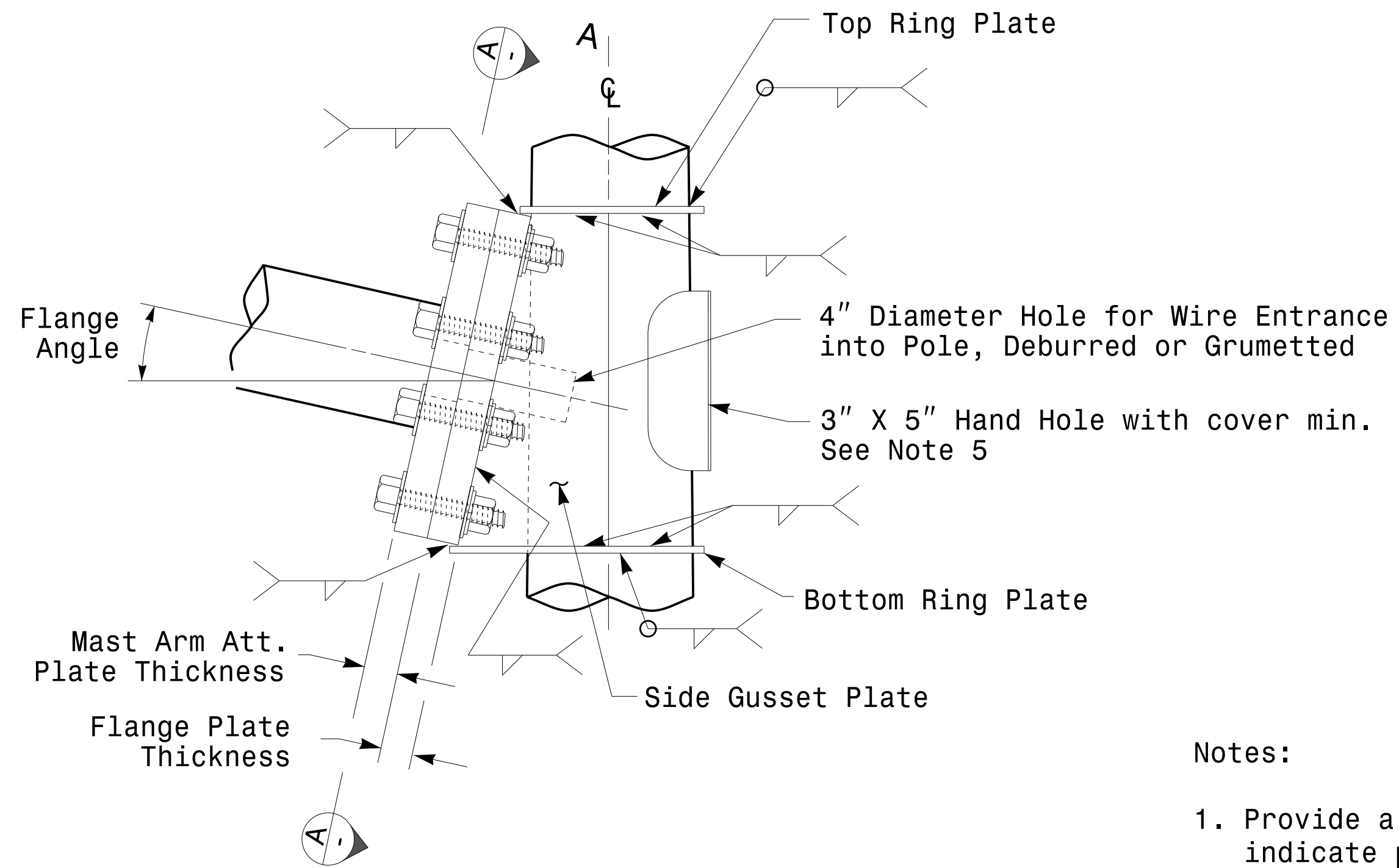
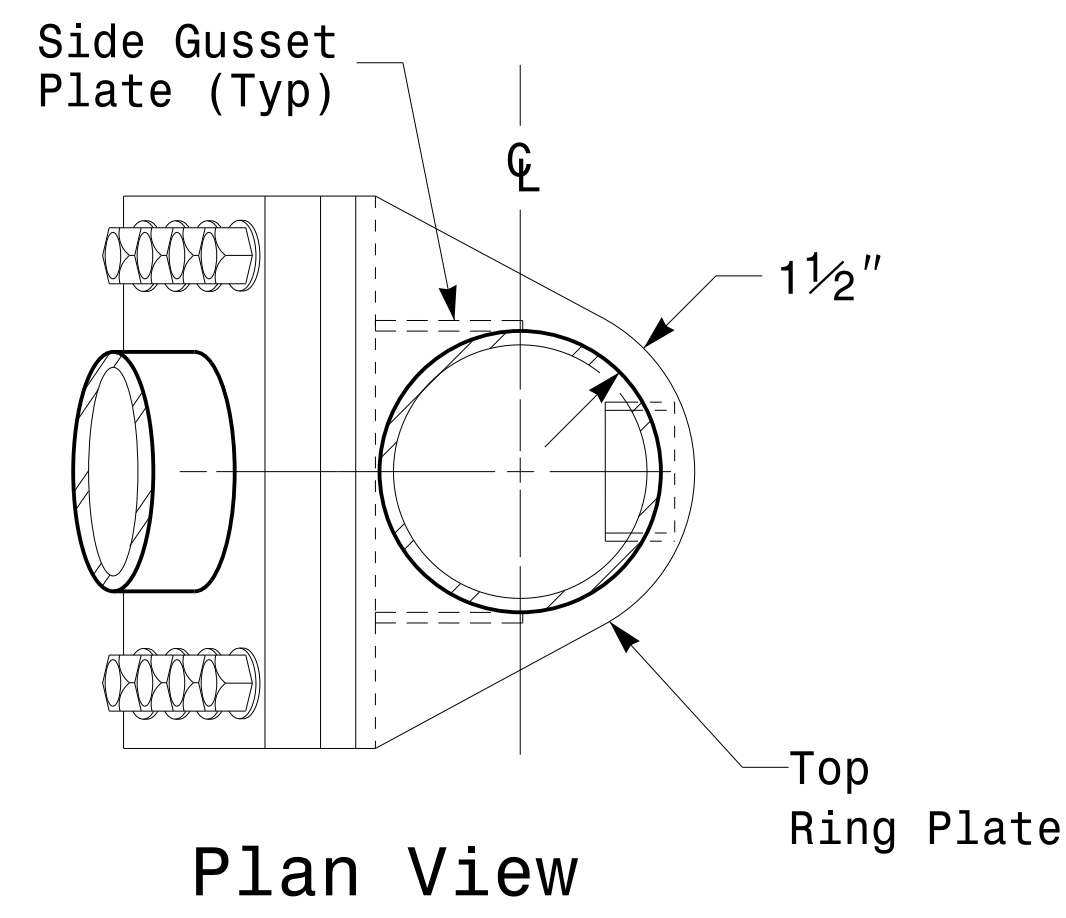
# Welded Ring Stiffened Mast Arm Connection

PROJECT ID. NO.

SHEET NO.

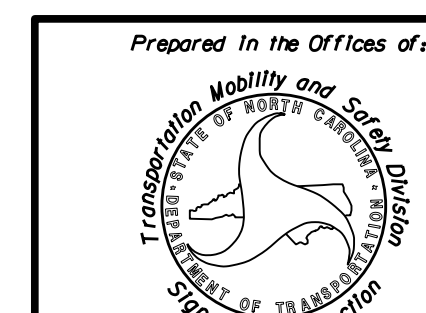
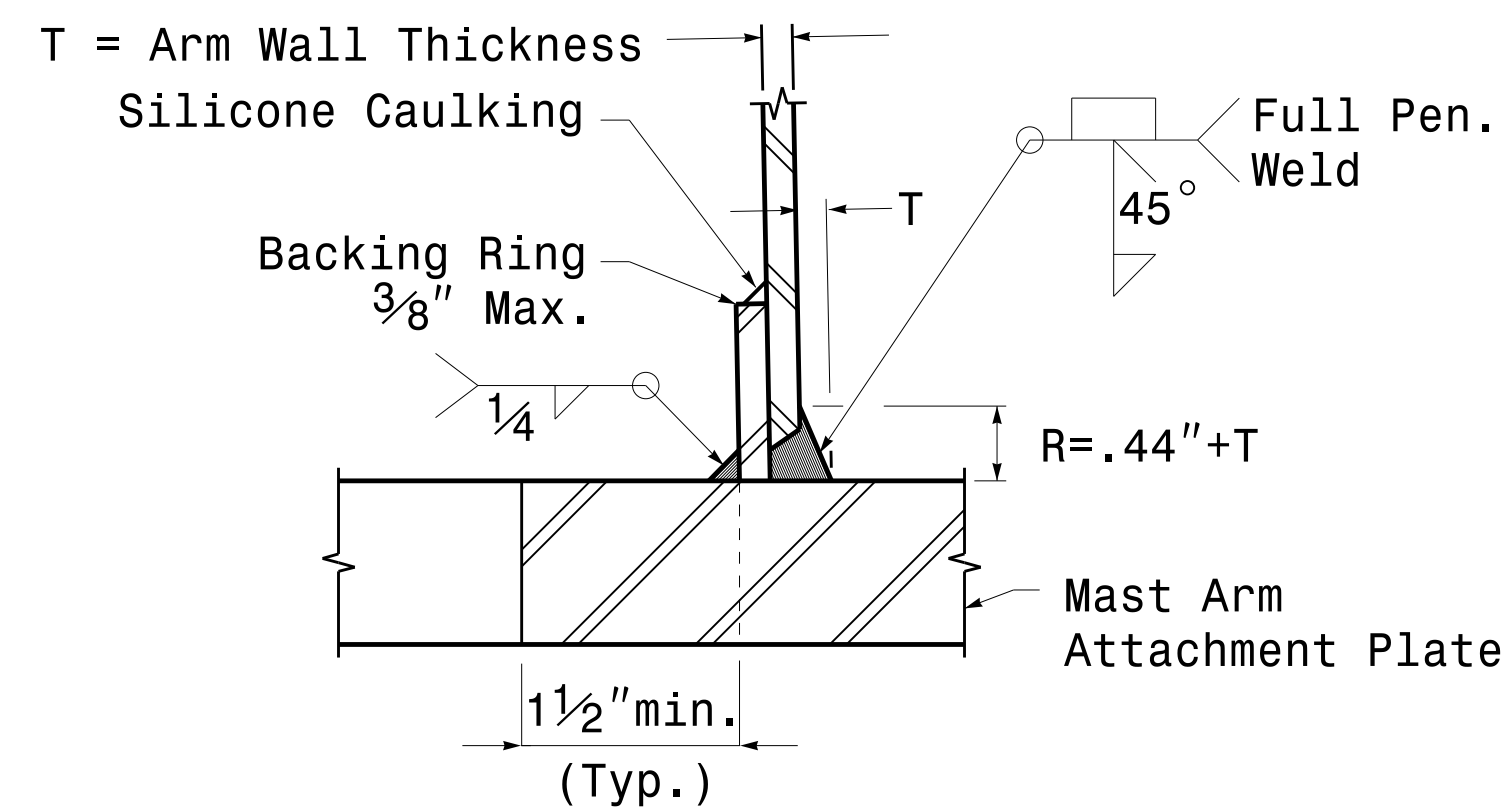
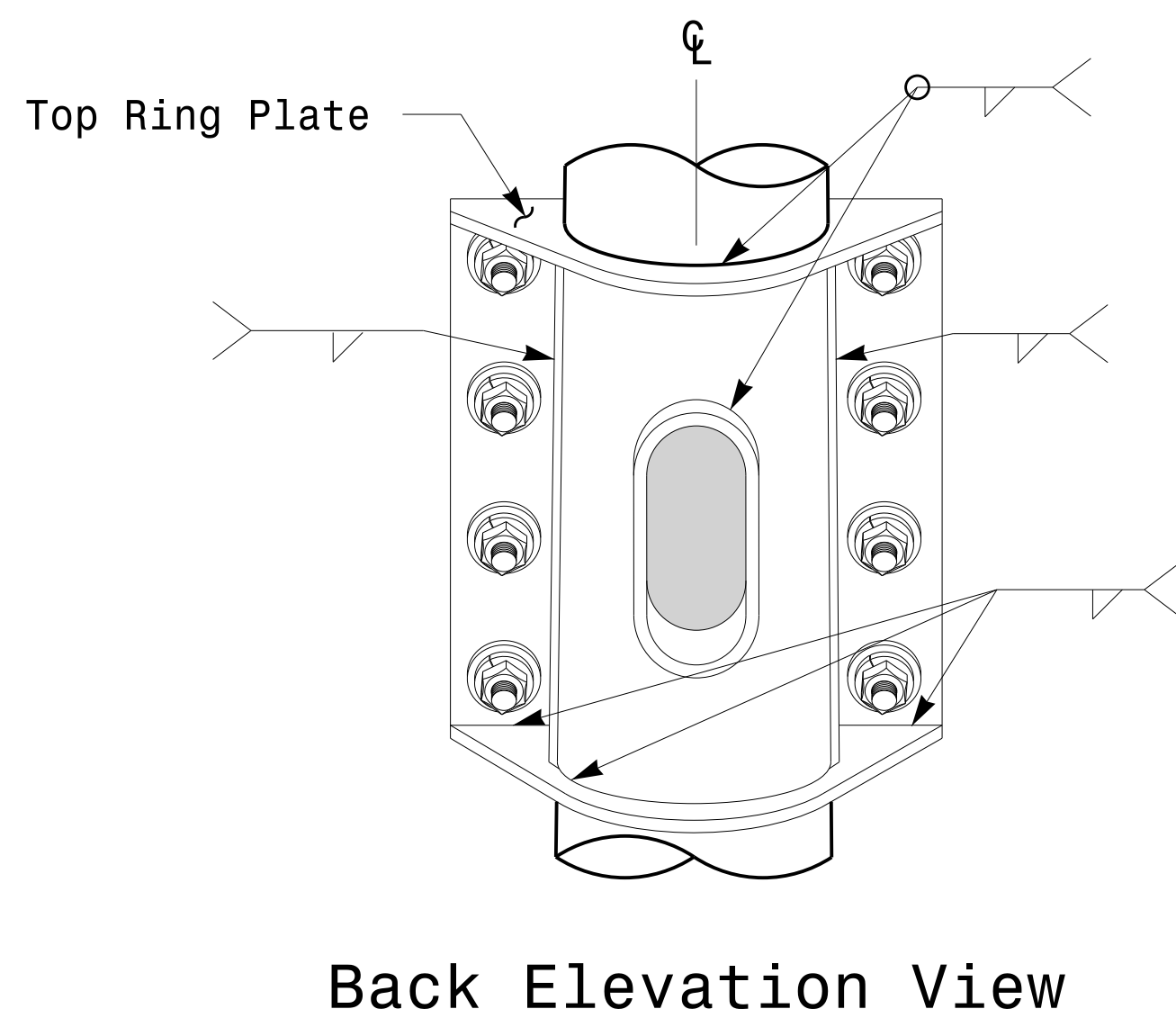
BR-0041

Sig.M5



**Notes:**

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



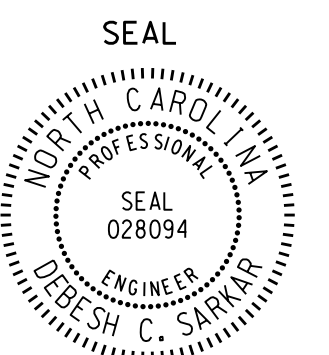
Typical Fabrication Details For Mast Arm Connection To Pole

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

750 N. Greenfield Pkwy, Garner, NC 27529

SCALE  
 0 NA  
 NONE

REVISIONS	INIT.	DATE

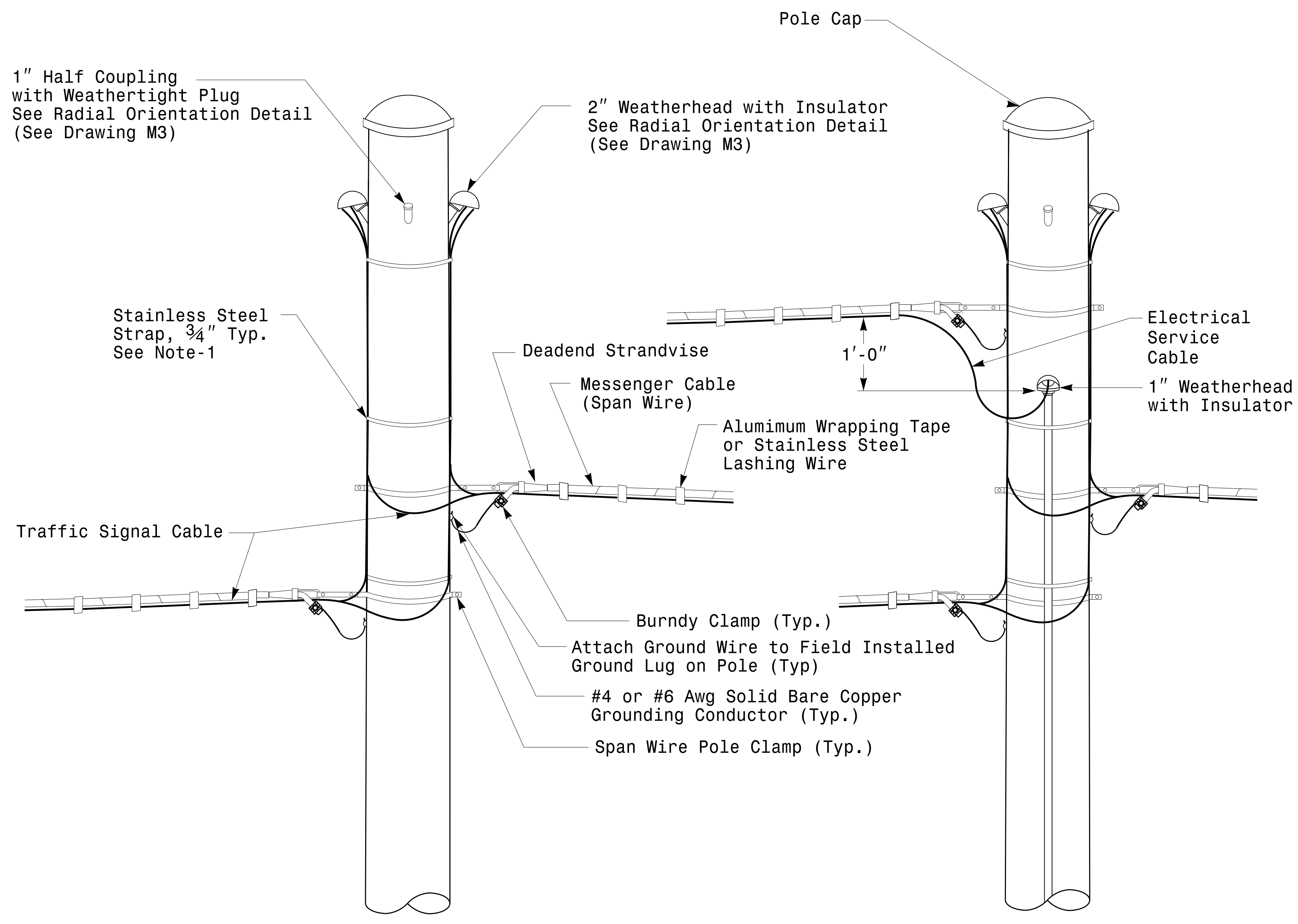


Designed by: Debesh C. Sarkar

10/11/2017  
 DATE

11-OCT-2017 08:35:13:560115:Signal:Sig:Design:Section:Eastern:Region:Sheet:2016:2014:Sig.M5:Std.:Connection:Fabrication:Detail:is:Mast:Arm:Poles.dgn

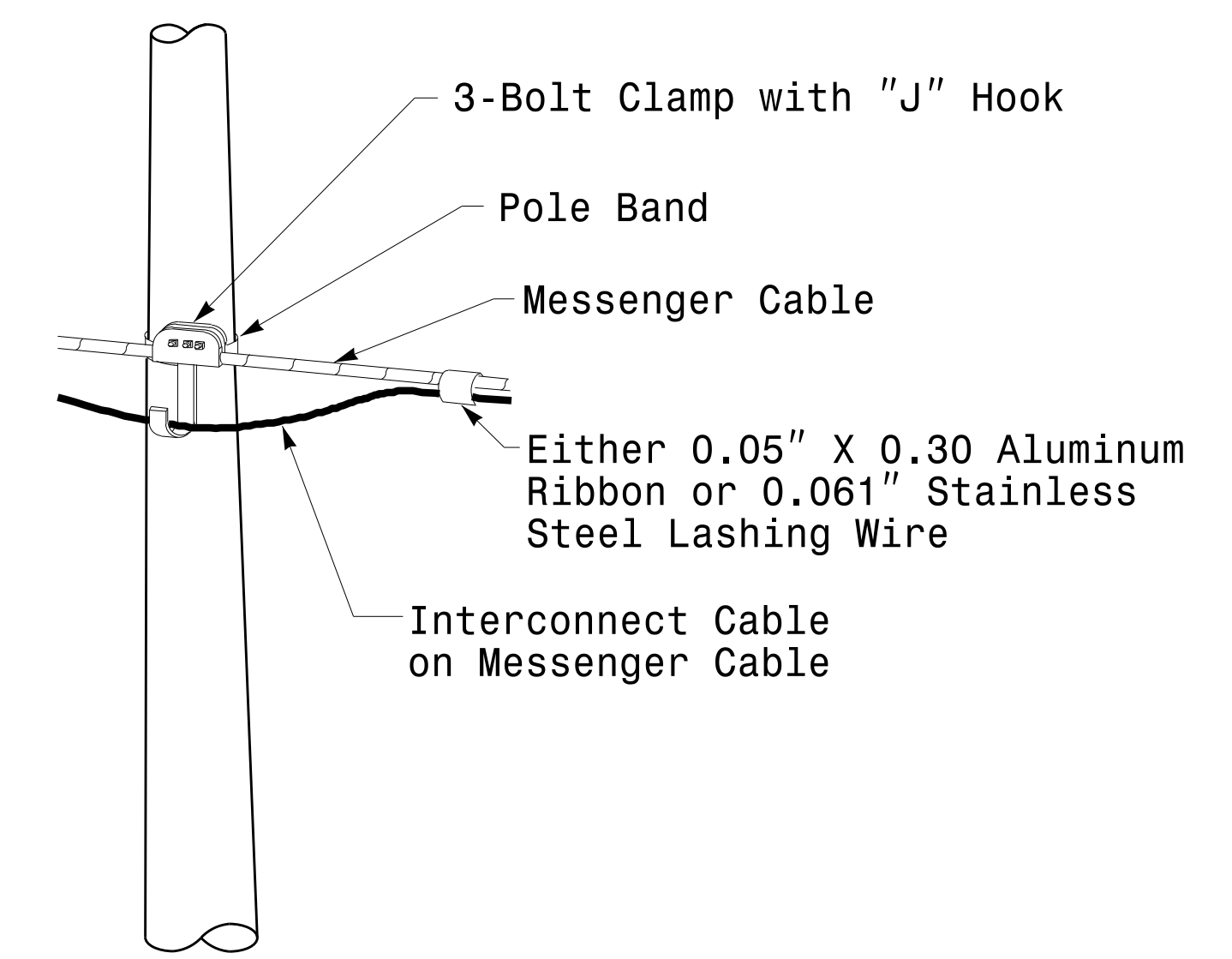
Fabrication Details - Mast Arm Connection



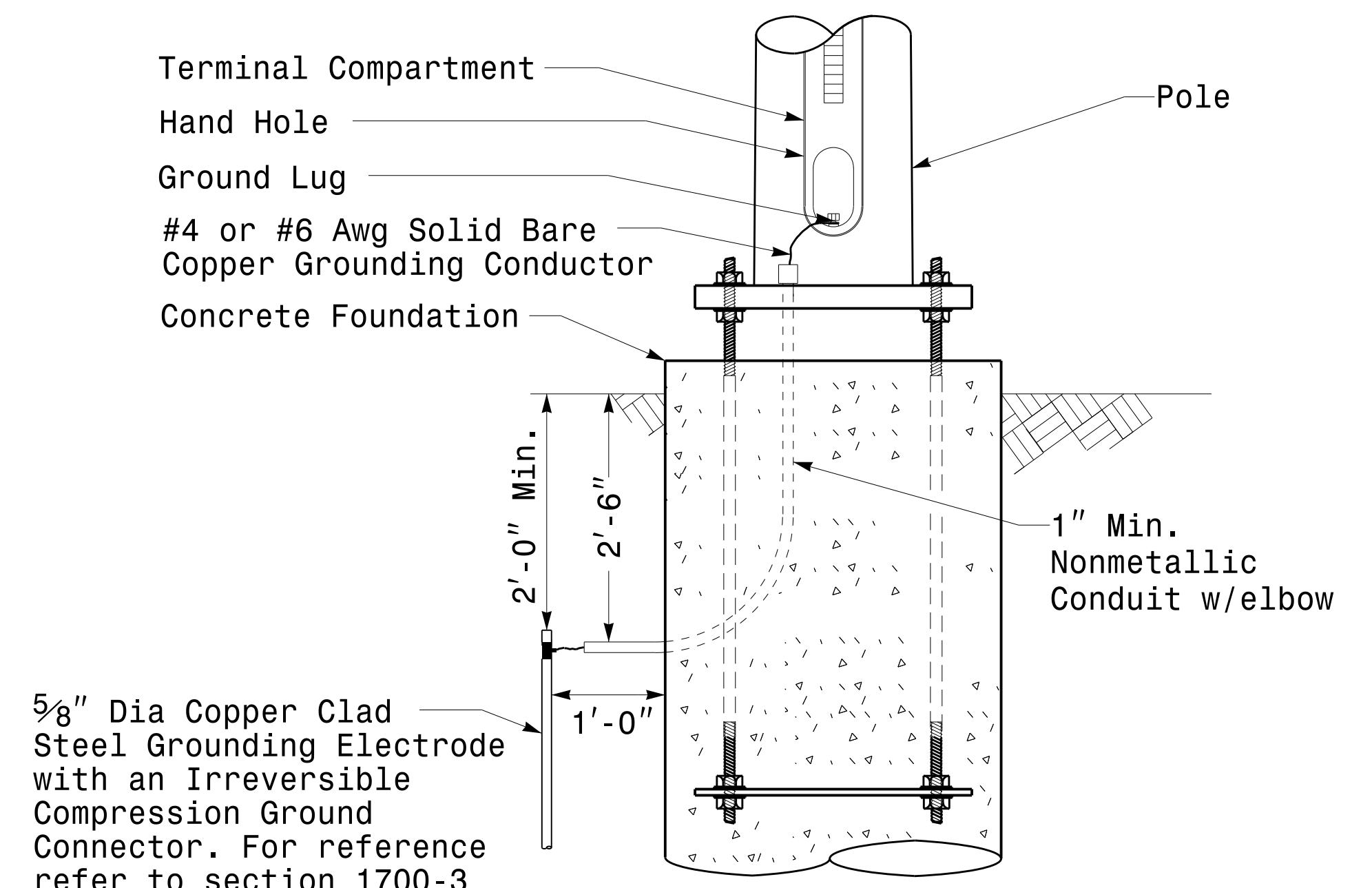
**Strain Pole Attachments**

**NOTE:**

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



**Attachment of Cable to Intermediate Metal Pole**



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

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

	<p>Typical Fabrication Details For Strain Pole Attachments</p>		
	<p>PLAN DATE: OCTOBER 2017</p>	<p>DESIGNED BY: C.F. ANDREWS</p>	
<p>750 N. Greenfield Pkwy, Garner, NC 27529</p>	<p>PREPARED BY: N. BITTING</p>	<p>REVISIONS</p>	<p>INIT. DATE</p>
<p>SCALE: 0 NA NONE</p>	<p>DocuSigned by: <i>Deshi C. Sarkar</i></p>		<p>10/11/2017</p>

11-OCT-2017 08:36 136504115 StrainPole.dgn Design Section Eastern Region\m\ Sheets\2016\2014 Sig.M6 Std. Fabrication Details-Strain Poles.dgn