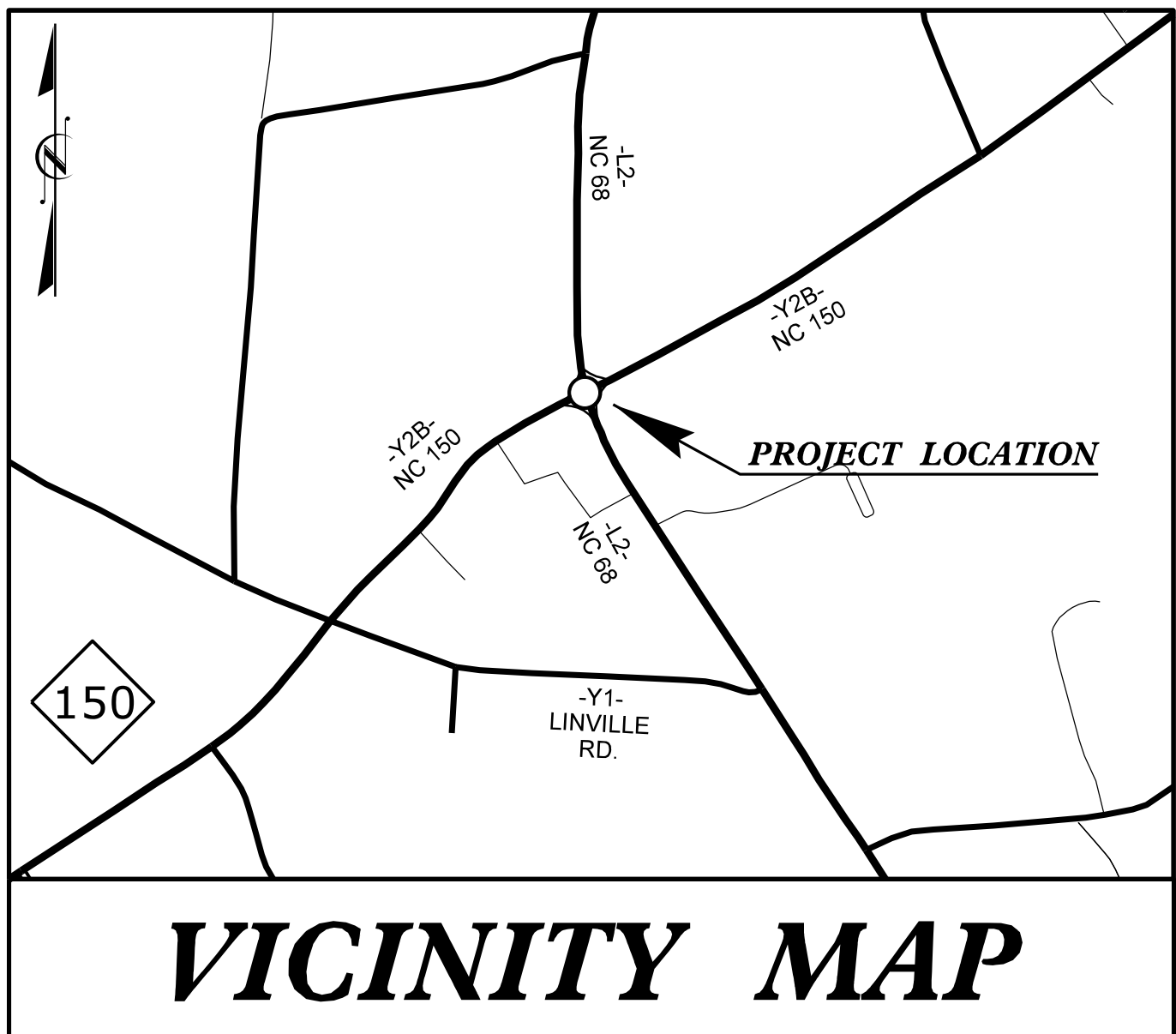


PROJECT REFERENCE NO.	R-5725	SHEET NO.	Sig 1.0
APPROVED:	Timothy Popelka		
DATE:	04/05/2023		
SEAL			
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED			

TIP PROJECT: R-5725

CONTRACT: C204771

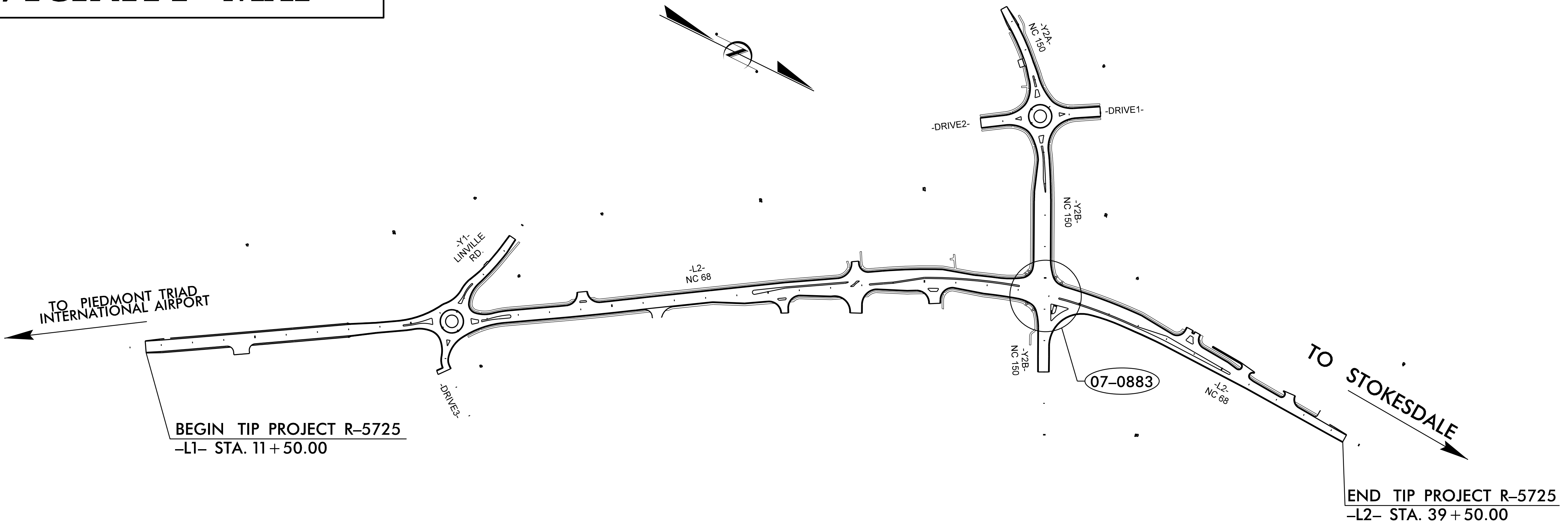


STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

GUILFORD COUNTY

LOCATION: INTERSECTION IMPROVEMENTS ALONG NC 68 AND NC 150 IN OAK RIDGE.

TYPE OF WORK: TRAFFIC SIGNALS



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

Infrastructure Consulting Services, Inc.
RKA
RAMEY KEMP ASSOCIATES
8210 University Executive Park Drive Suite 220 Charlotte, North Carolina 28262
Phone: 704-549-4300 | www.rameykemp.com | NC License No. R-1489

PLANS PREPARED BY:

Timothy S. Popelka, P.E. – Project Manager
Joshua A. Wendt, E.I. – Project Engineer

INDEX OF PLANS

Sheet Number	SIN	Location/Description
Sig. 1.0	-	Project Title Sheet
Sig. 1.1-1.2	-	2018 Standard Plate Sheets
Sig. 2.0-7.2	07-0883	NC 68 at NC 150 (Oak Ridge Road)
Sig. M1-M8	-	Standard Metal Pole Drawings

DIVISION OF HIGHWAYS



750 N. Greenfield Pkwy, Garner, NC 27529

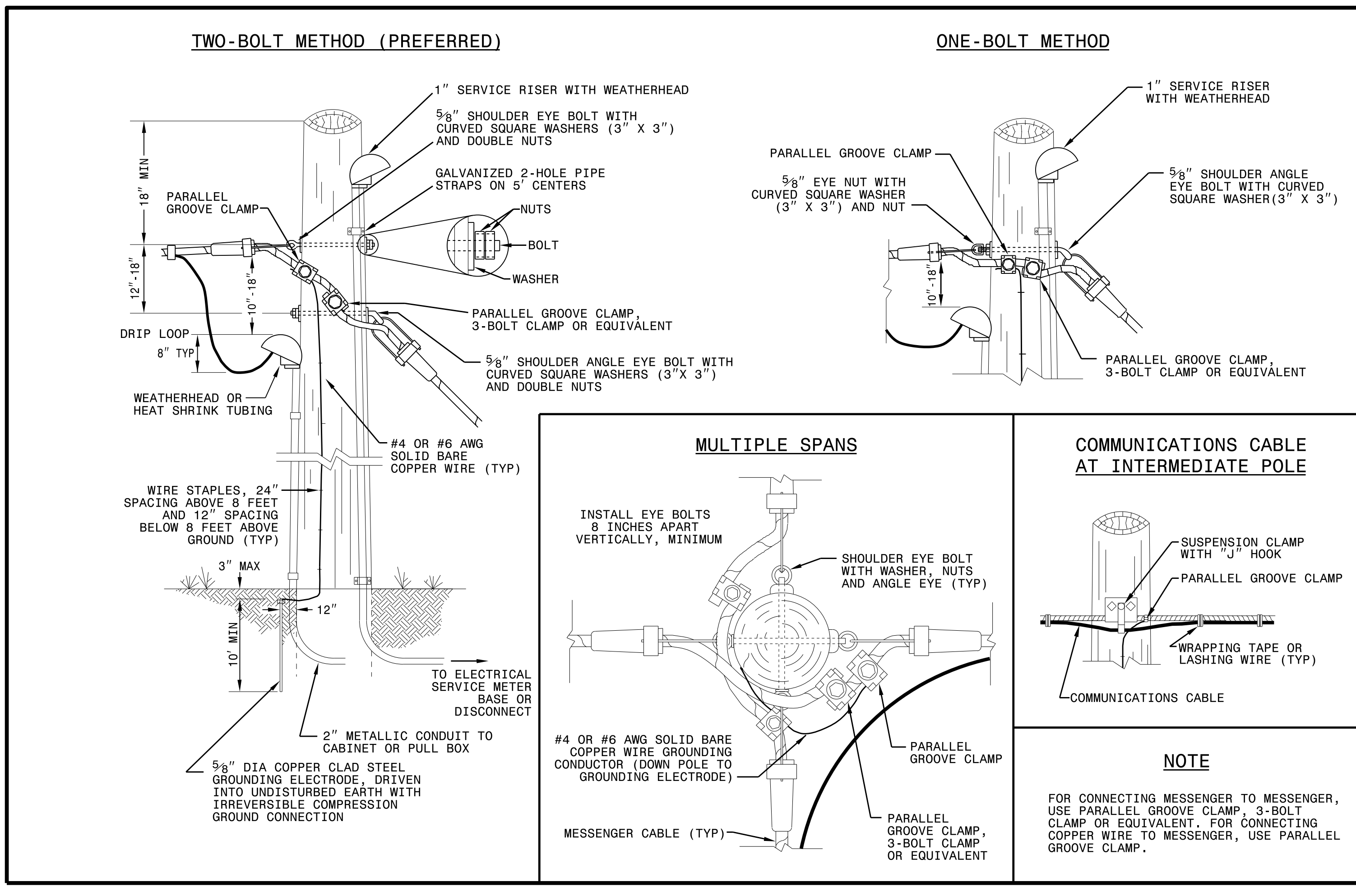
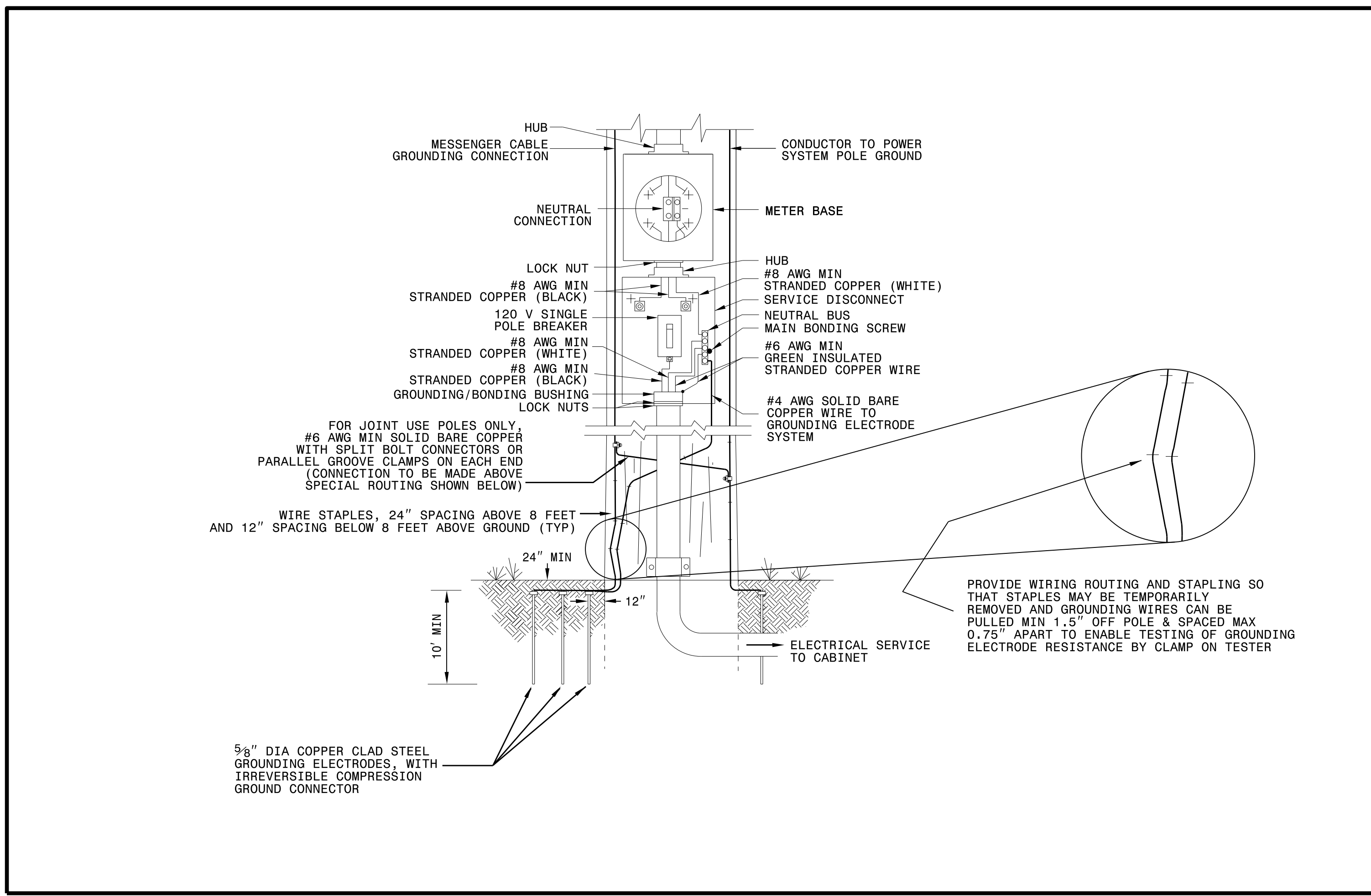
LEGEND

XX-XXXX TRAFFIC SIGNAL

TRANSPORTATION SYSTEMS MANAGEMENT & OPERATIONS

Robert J. Ziemba, P.E. – Central Region Signals Engineer
D. Todd Joyce, P.E. – Signal Equipment Design Review Engineer

\$\$\$\$\$ SYSTEM \$\$\$\$\$\$ DDN \$\$\$\$\$\$ USERNAME \$\$\$\$\$\$



DOCUMENT NOT CONSIDERED
FINAL UNLESS ALL
SIGNATURES COMPLETED

See Plate for Title

Prepared in the Offices of:

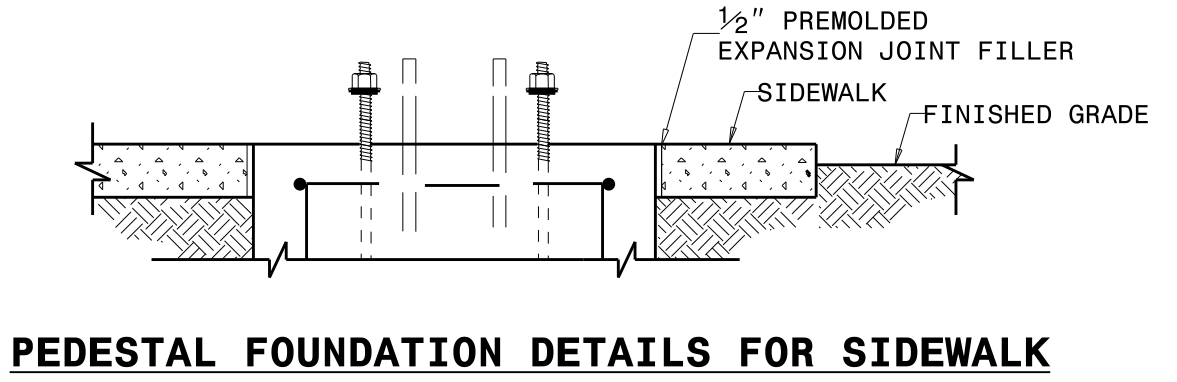
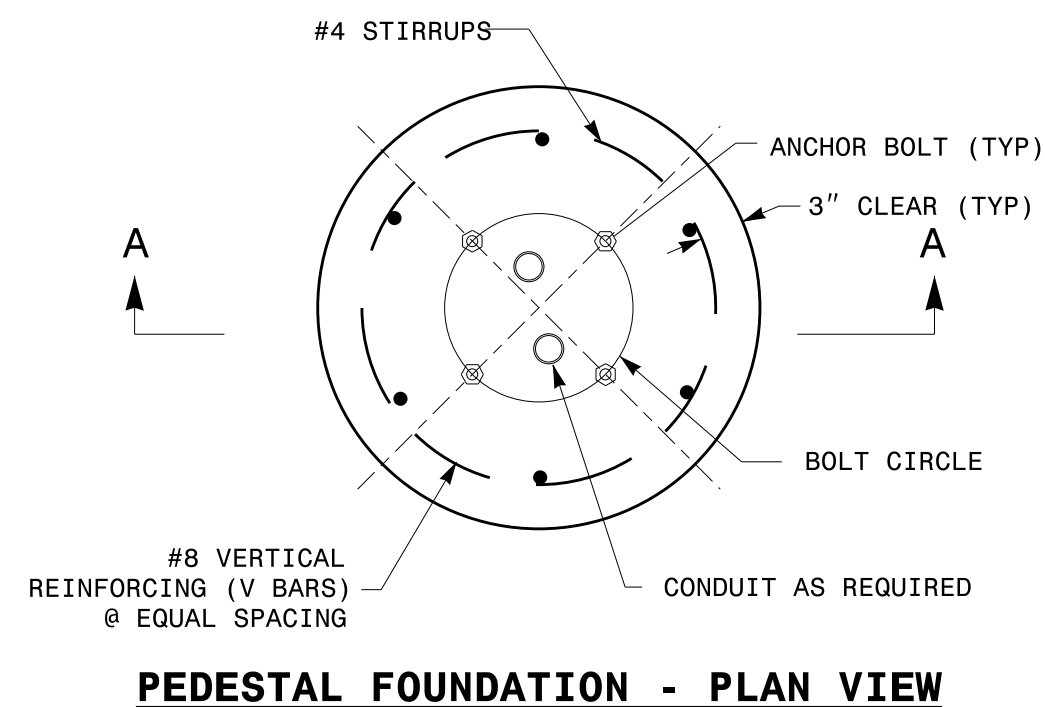
SEAL

DocuSigned by:
Mohd Aslami

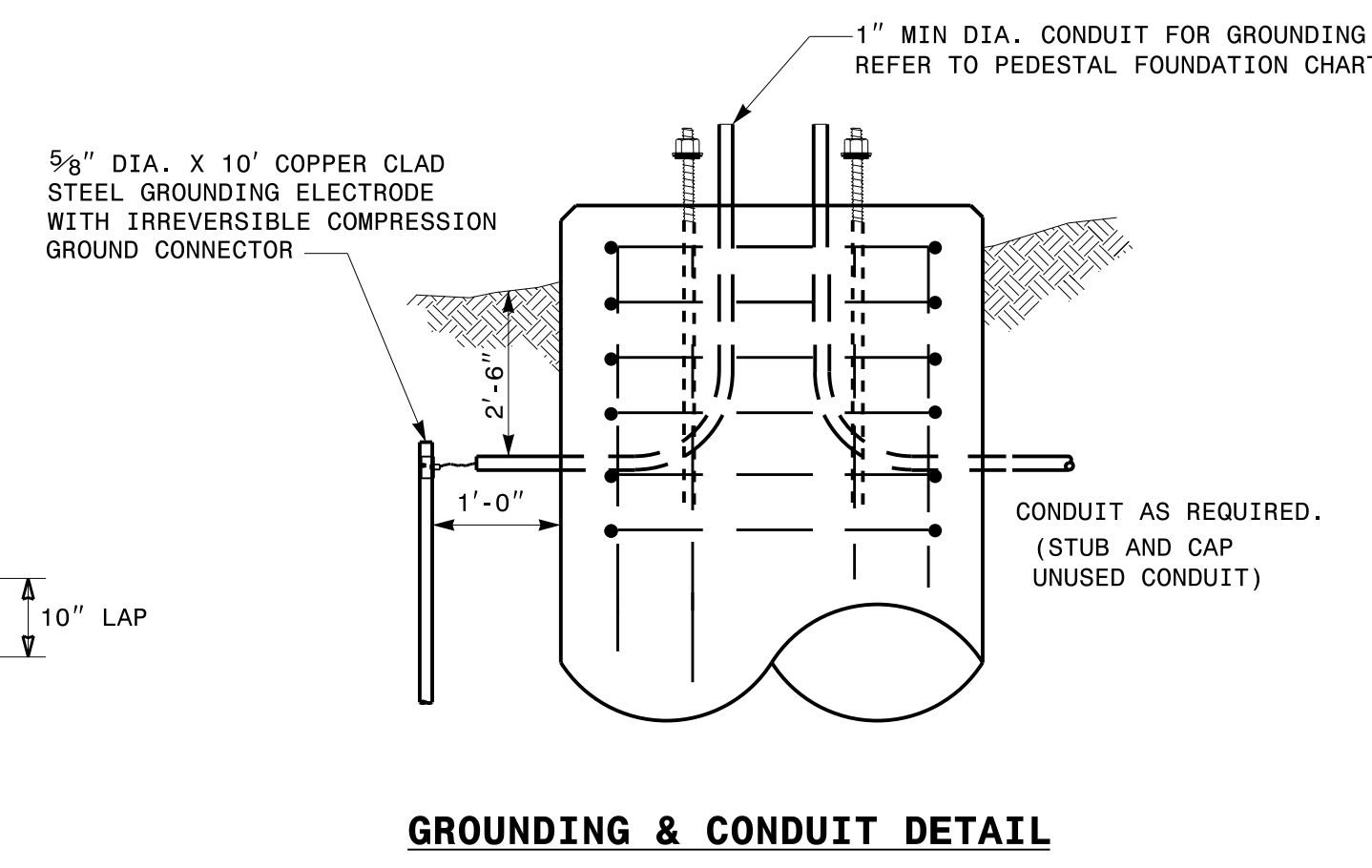
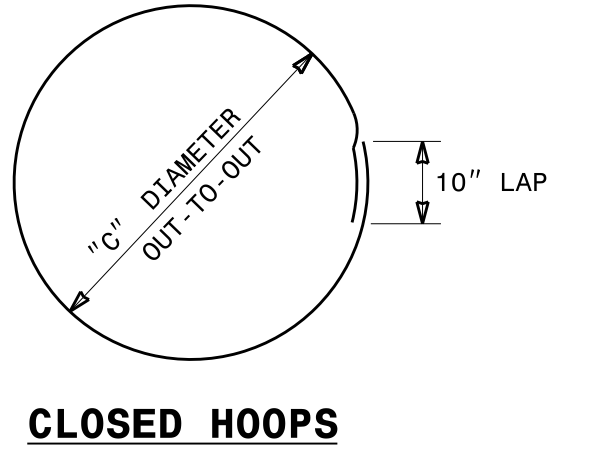
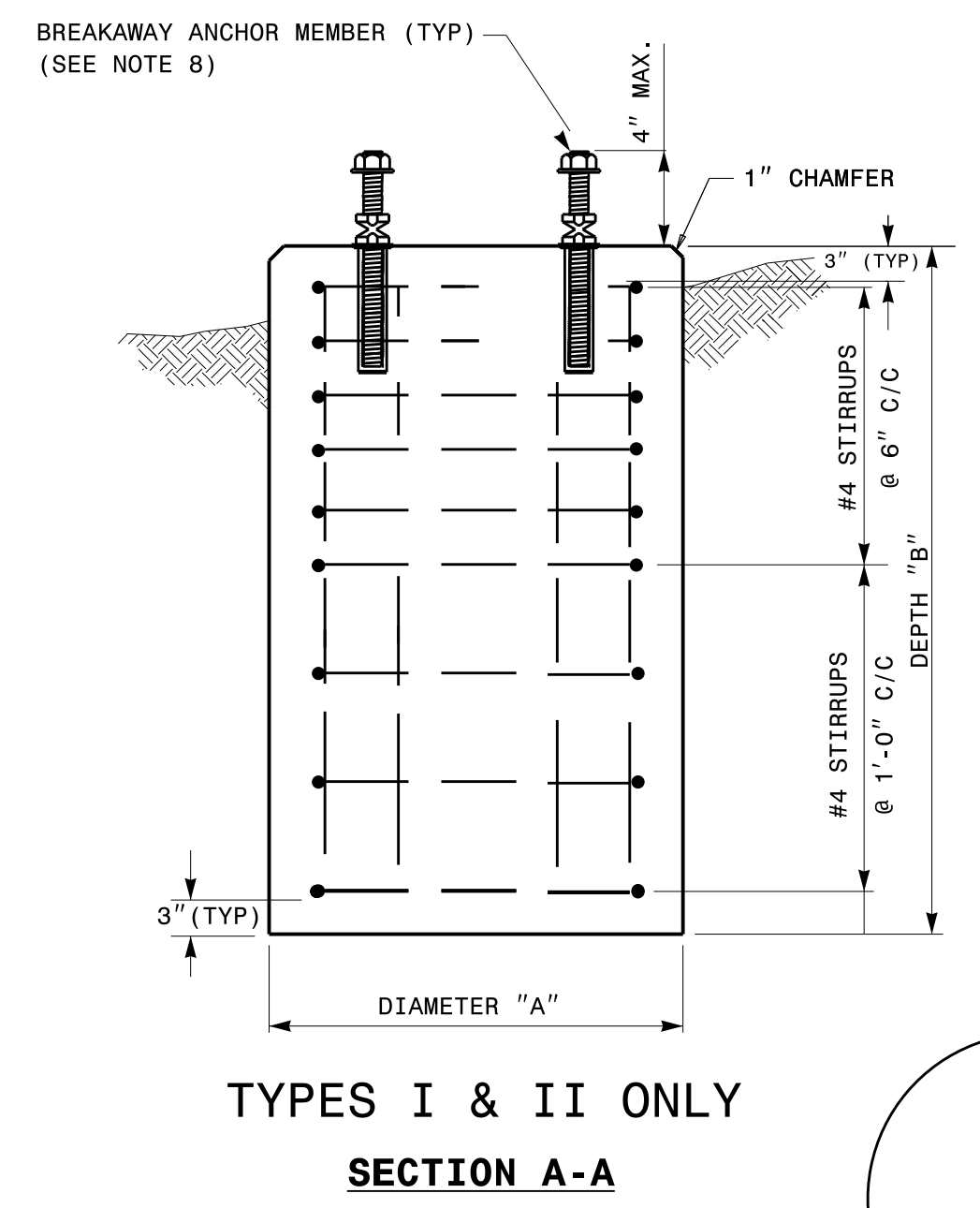
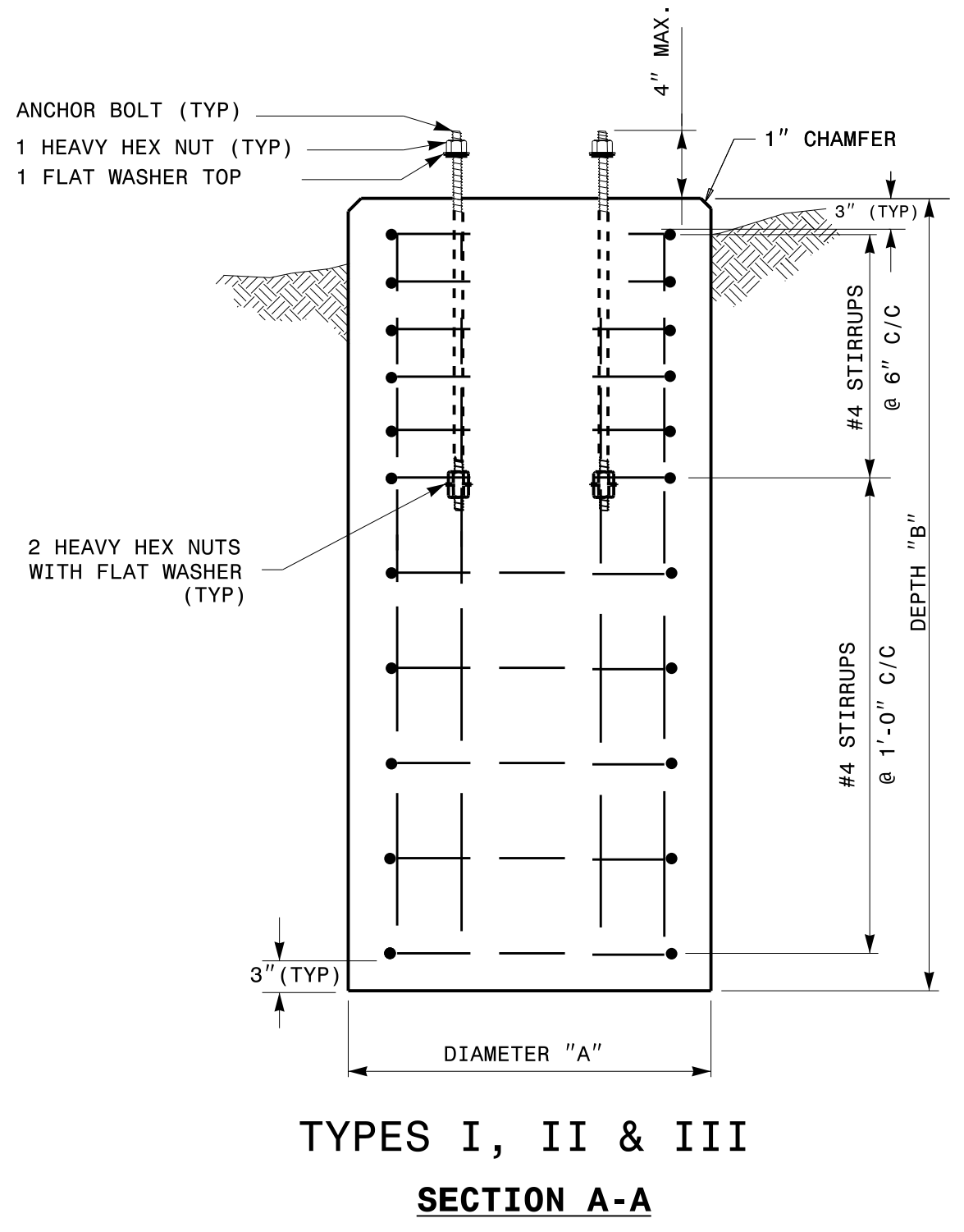
750 N. Greenfield Parkway
Garner, NC 27529

10/11/2017
DATE

11-0CT-2017_08-56
11-2018_S14_DrawingPlate_Sheets2018_Plate_Sheet.dgn
r:\rough



- 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:
 - SANDY TYPE SOIL
 - NO GROUND WATER WITHIN 5'-0" OF SURFACE ELEVATION
 - 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.

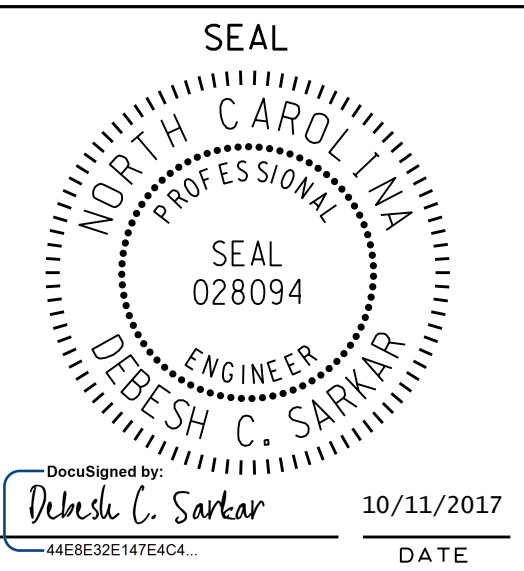
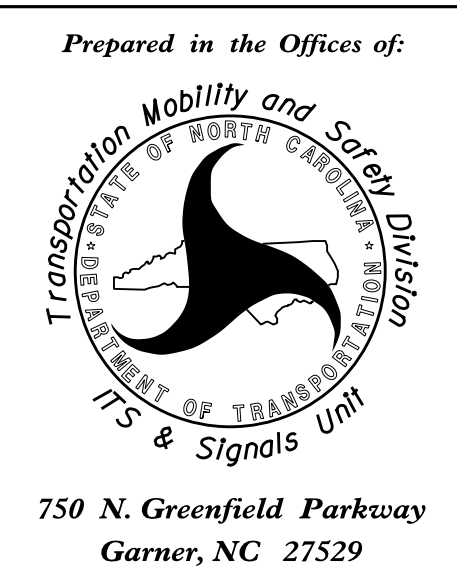
ENGLISH STANDARD DRAWING FOR
PEDESTALS
 FOUNDATIONS

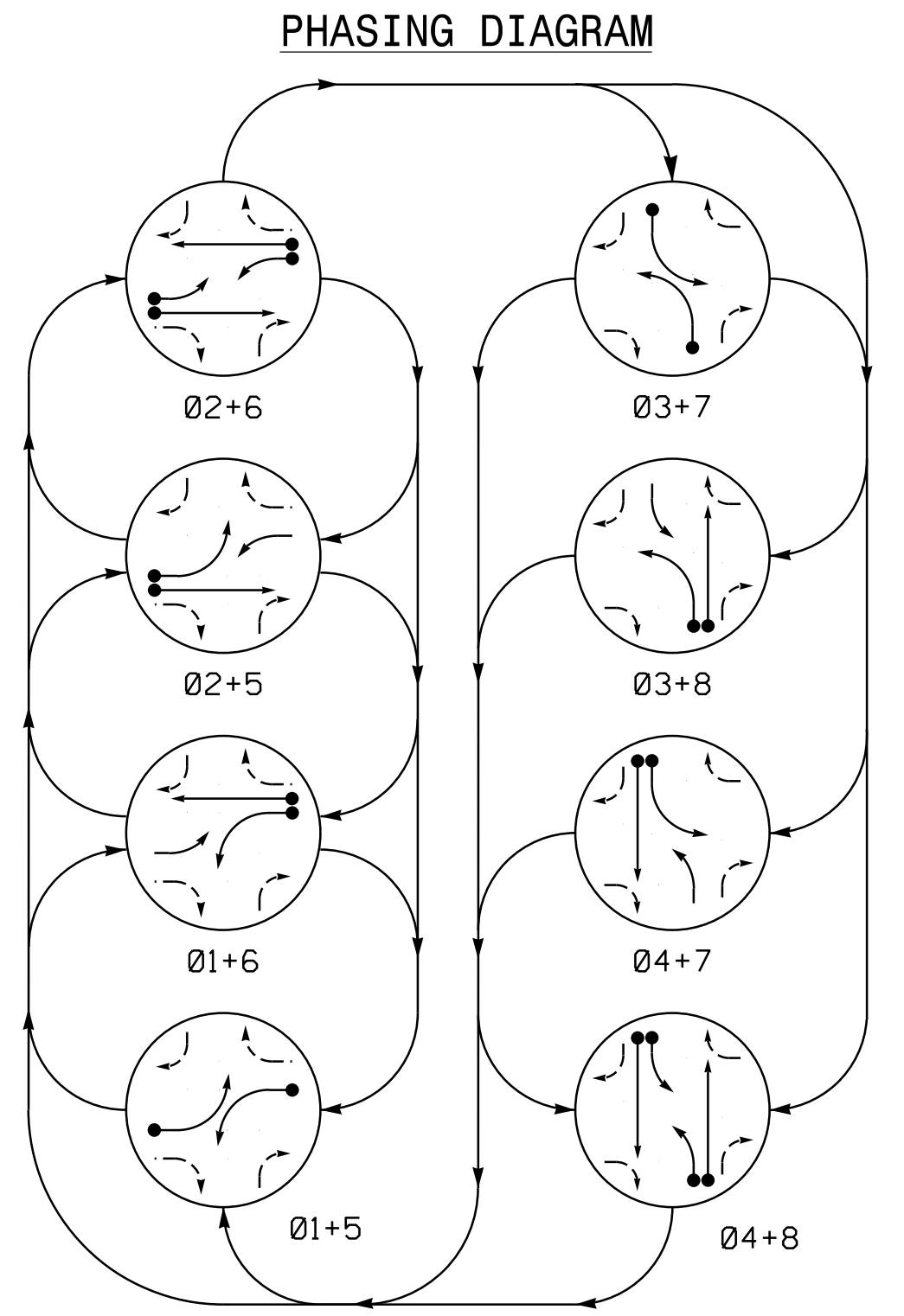
SHEET 1 OF 1
1743D01

11-10-2017 08:03
 U:\2018 S14 Drawings\Plate Sheets\2018_Plate Sheet - .dgn
 r:\rough

DOCUMENT NOT CONSIDERED
FINAL UNLESS ALL
SIGNATURES COMPLETED

See Plate for Title

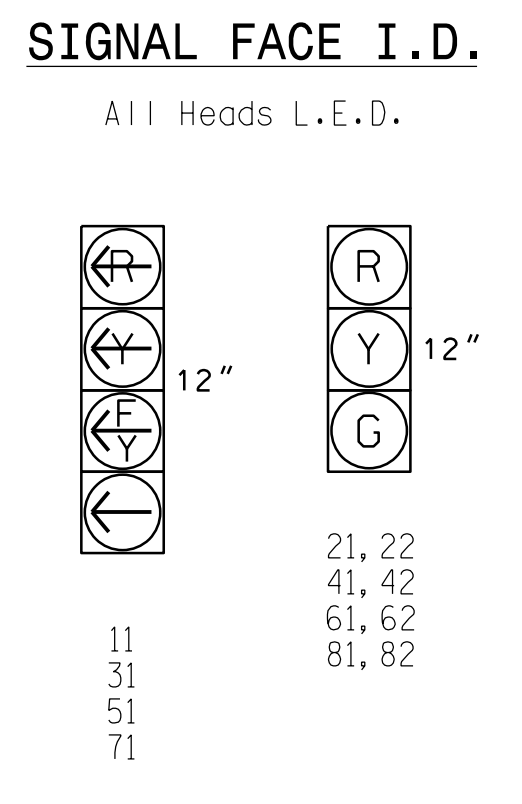




PHASING DIAGRAM DETECTION LEGEND

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

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



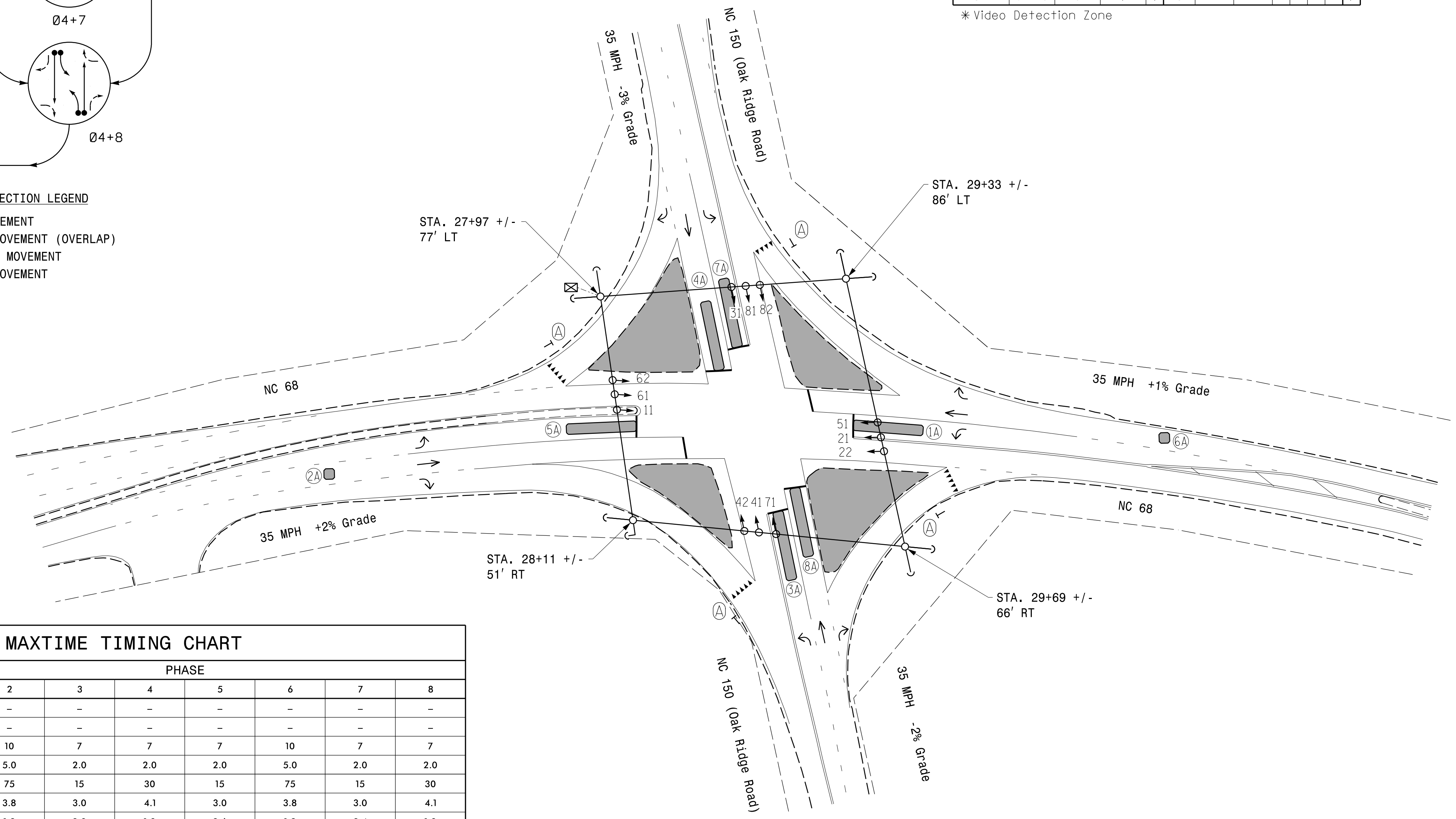
MAXTIME DETECTOR INSTALLATION CHART											
DETECTOR					PROGRAMMING						
ZONE	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	NEW CARD
1A	6X40	0	*	*	1	15	-	X	-	X	-
2A	6X6	200	*	*	6	3	-	X	-	X	X
3A	6X40	0	*	*	3	15	-	X	-	X	-
4A	6X40	0	*	*	4	-	-	X	-	X	-
5A	6X40	0	*	*	5	15	-	X	-	X	-
6A	6X6	200	*	*	2	3	-	X	X	X	X
7A	6X40	0	*	*	7	15	-	X	-	X	-
8A	6X40	0	*	*	4	3	-	X	-	X	-

* Video Detection Zone

8 Phase Fully Actuated (Isolated)

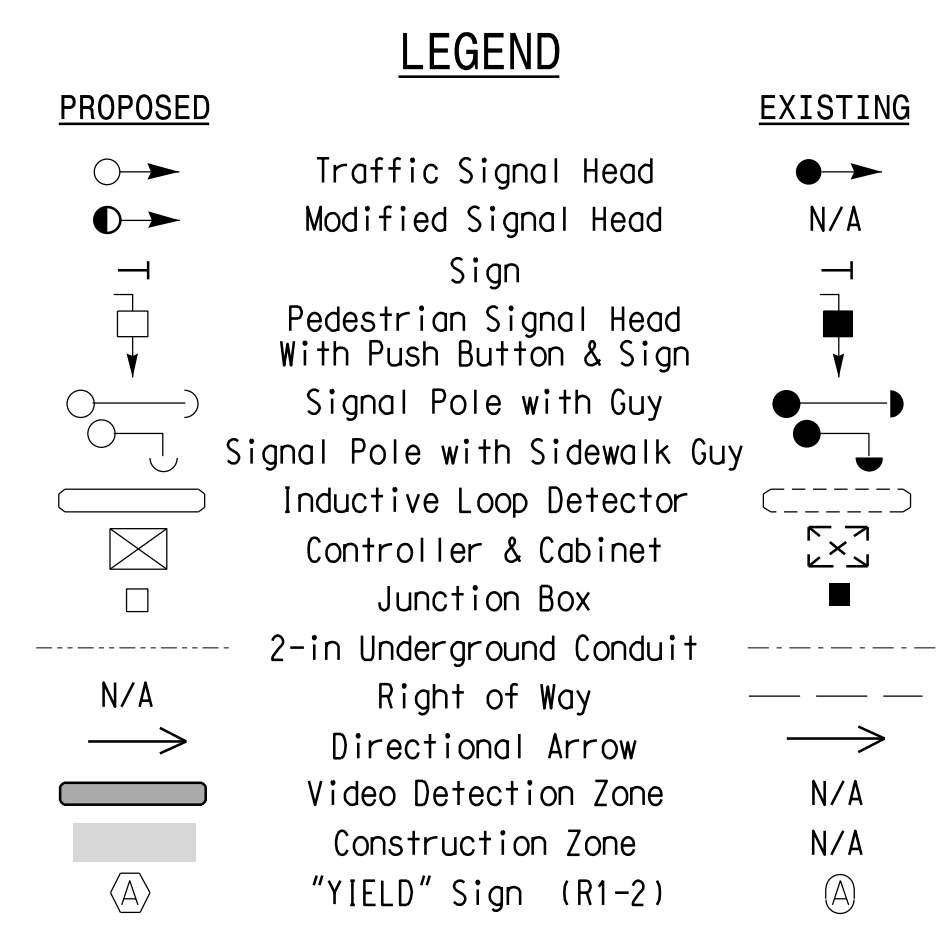
NOTES

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



FEATURE	MAXTIME TIMING CHART							
	PHASE							
	1	2	3	4	5	6	7	8
Walk *	-	-	-	-	-	-	-	-
Ped Clear *	-	-	-	-	-	-	-	-
Min Green	7	10	7	7	7	10	7	7
Passage *	2.0	5.0	2.0	2.0	2.0	5.0	2.0	2.0
Max 1 *	15	75	15	30	15	75	15	30
Yellow Change	3.0	3.8	3.0	4.1	3.0	3.8	3.0	4.1
Red Clear	2.4	1.9	2.8	1.8	2.6	1.9	2.4	1.8
Added Initial *	-	2.5	-	-	-	2.5	-	-
Maximum Initial *	-	24	-	-	-	24	-	-
Time Before Reduction *	-	15	-	-	-	15	-	-
Time To Reduce *	-	30	-	-	-	30	-	-
Minimum Gap	-	3.0	-	-	-	3.0	-	-
Advance Walk	-	-	-	-	-	-	-	-
Non Lock Detector	X	-	X	X	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.



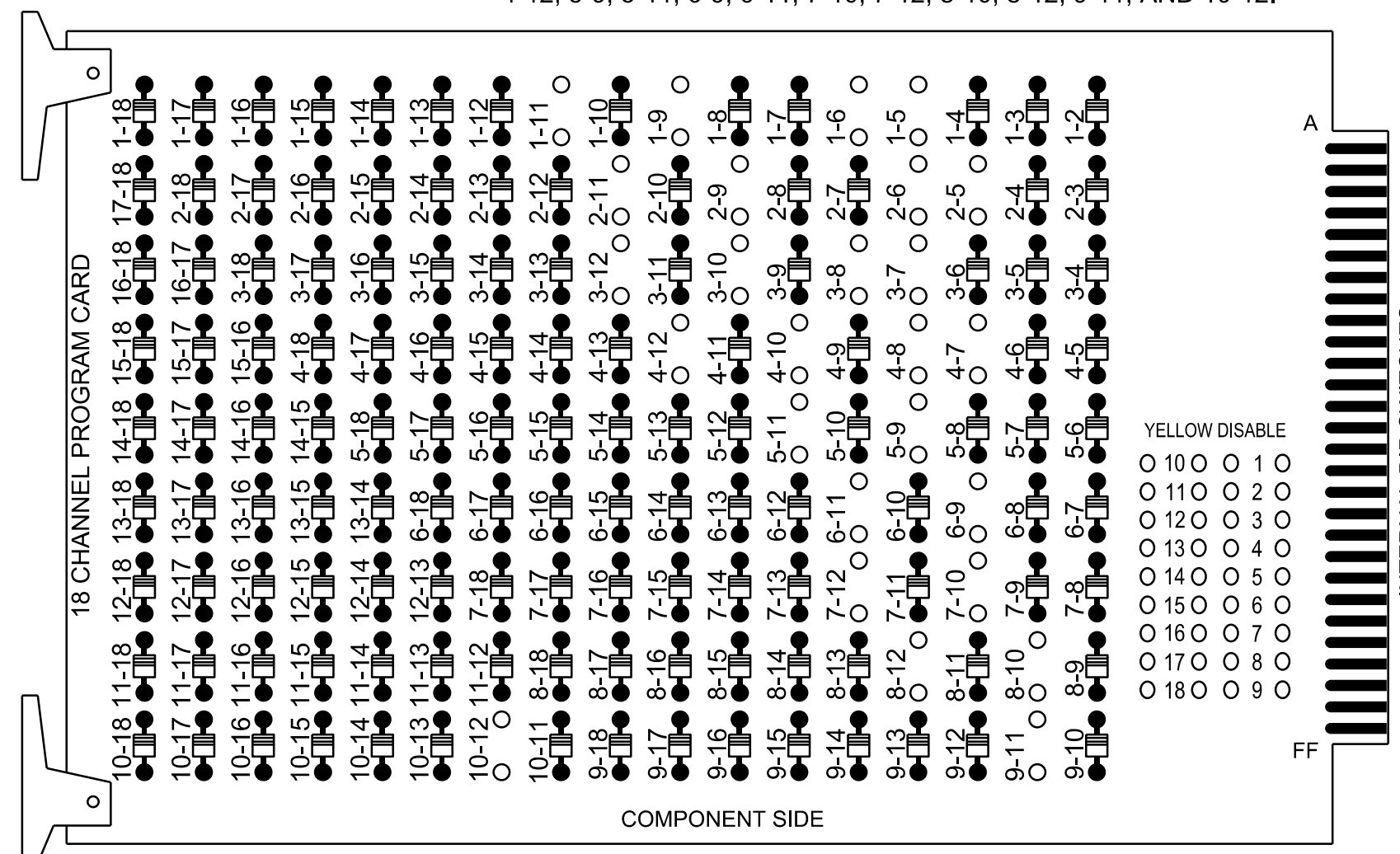
Signal Upgrade -
Temporary Design 1 (TMP Phase 1, Step 2)

<p>Infrastructure Consulting Services, Inc.</p> <p>RKA</p> <p>RAMEY KEMP ASSOCIATES</p> <p>8018 Pullington Place Raleigh, North Carolina 27609 Phone: 919-972-9115</p>	<p>NC 68 at NC 150 (Oak Ridge Road)</p> <p>Division 7 Guilford County Oak Ridge</p> <p>PLAN DATE: April 2023 REVIEWED BY: TS Popelka</p> <p>PREPARED BY: JA Wendt RKA PROJ. NO.: 18062 (040)</p>		<p>DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED</p> <p>SEAL</p> <p>NORTH CAROLINA PROFESSIONAL ENGINEER</p> <p>SEAL 051573</p> <p>TIMOTHY S. POPELKA</p> <p>04/05/2023</p> <p>SIG. INVENTORY NO. 07-0883T1</p>
	<p>750 N. Greenfield Pkwy, Garner, NC 27529</p> <p>SCALE 1"=40'</p>	<p>REVISIONS</p> <p>INIT. DATE</p>	

18 CHANNEL CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

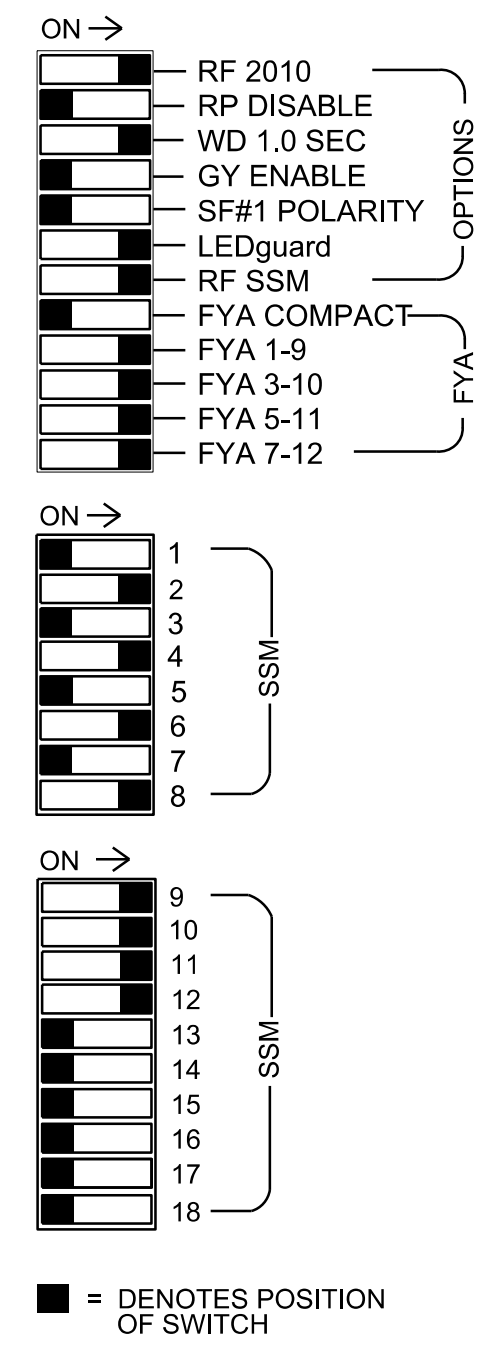
REMOVE DIODE JUMPERS 1-5, 1-6, 1-9, 1-11, 2-5, 2-6, 2-9, 2-11, 3-7, 3-8, 3-10, 3-12, 4-7, 4-8, 4-10, 4-12, 5-9, 5-11, 6-9, 6-11, 7-10, 7-12, 8-10, 8-12, 9-11, AND 10-12.



REMOVE JUMPERS AS SHOWN

NOTES:

- 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.

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, S7, S8, S10, S11, AUX S1, AUX S2, AUX S4, AUX S5
 Phases Used.....1, 2, 3, 4, 5, 6, 7, 8
 Overlap "1".....*
 Overlap "2".....*
 Overlap "3".....*
 Overlap "4".....*

*See overlap programming detail on this sheet

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.

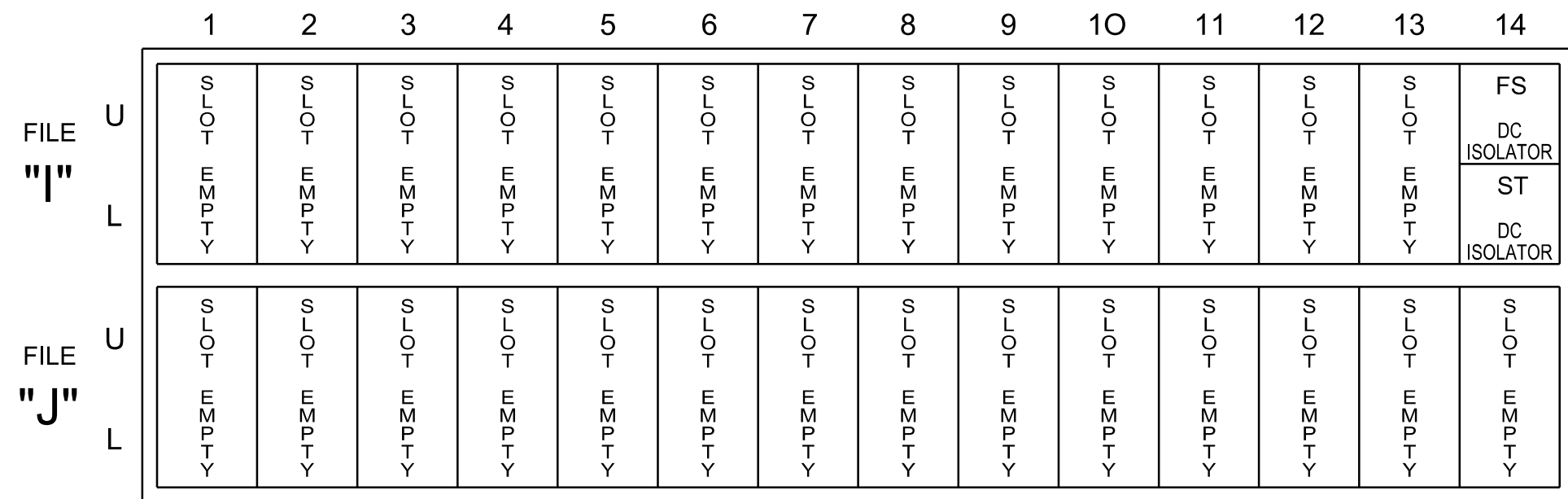
SIGNAL HEAD HOOK-UP CHART

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	31	41,42	NU	51	61,62	NU	71	81,82	NU	11	31	NU	51	71	NU
RED		128			101			134			107							
YELLOW	*	129		*	102		*	135		*	108							
GREEN		130			103			136			109							
RED ARROW													A121	A124		A114	A101	
YELLOW ARROW													A122	A125		A115	A102	
FLASHING YELLOW ARROW													A123	A126		A116	A103	
GREEN ARROW	127			118				133			124							

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

INPUT FILE POSITION LAYOUT

(front view)



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

FS = FLASH SENSE
 ST = STOP TIME

FLASHER CIRCUIT MODIFICATION DETAIL

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

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

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

OVERLAP PROGRAMMING

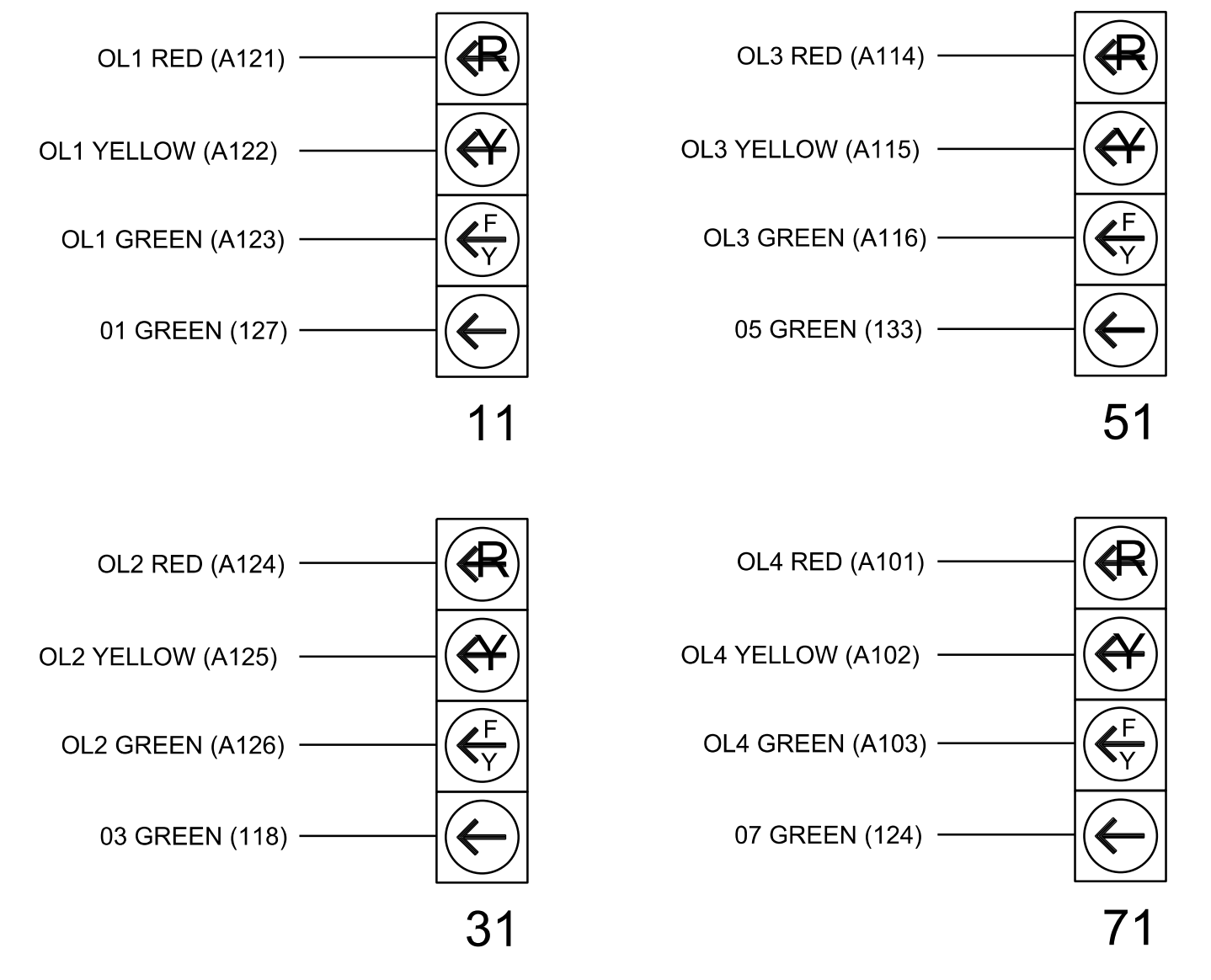
Front Panel
 Main Menu > Controller > Overlap > Overlap Parameters/Overlap Timings
 Web Interface
 Home > Controller > Overlap Configuration > Overlaps

Overlap Plan 1

Overlap	1	2	3	4
Type	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section
Included Phases	2	4	6	8
Modifier Phases	1	3	5	7
Trail Green	0	0	0	0
Trail Yellow	0.0	0.0	0.0	0.0
Trail Red	0.0	0.0	0.0	0.0

FYA SIGNAL WIRING DETAIL

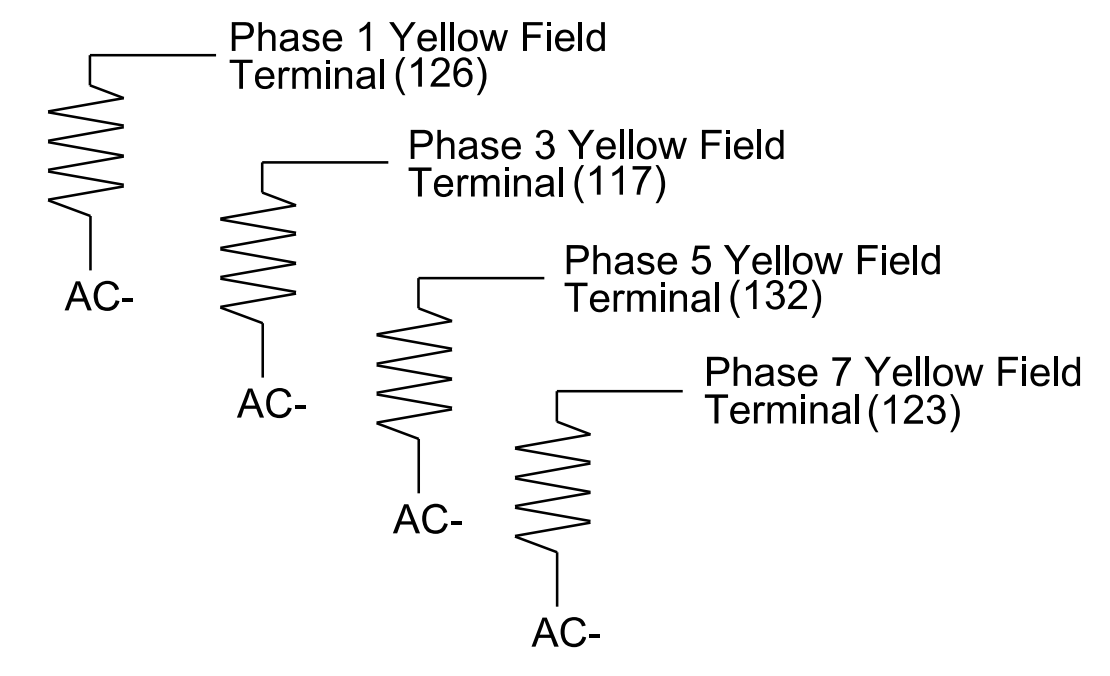
(wire signal heads as shown)



LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

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



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 07-0883T1
 DESIGNED: Apr 2023
 SEALED: 04/05/2023
 REVISED: N/A

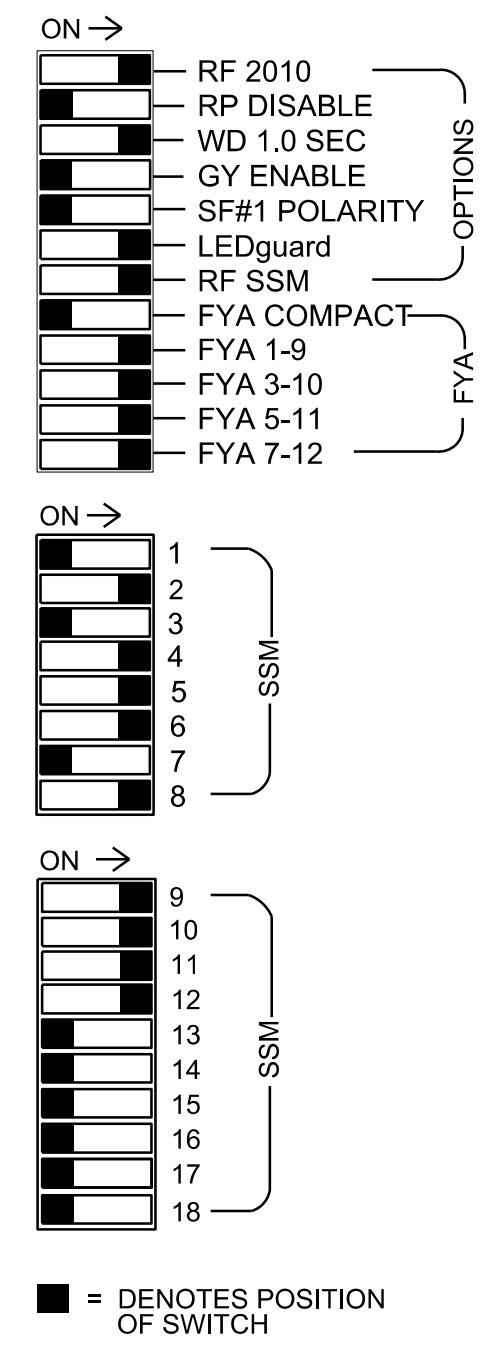
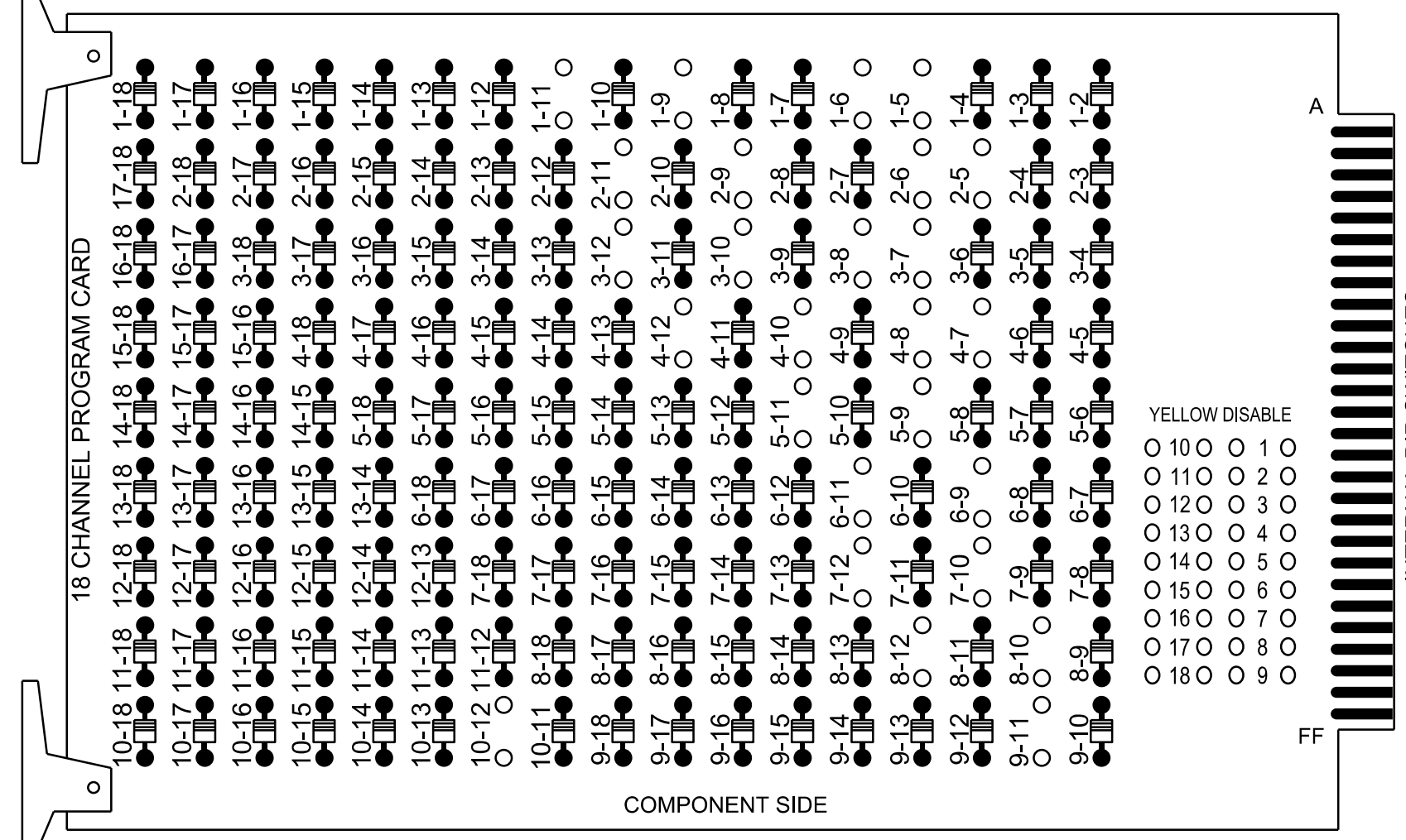
Electrical Detail (Temporary Design 1 - TMP Phase 1, Step 2)

<p>Infrastructure Consulting Services, Inc. RKA RAMEY KEMP ASSOCIATES 5808 Farrington Place Raleigh, North Carolina 27609 Phone: 919.872.5116</p>	NC 68 at NC 150 (Oak Ridge Road)		SEAL
	Division 7 PLAN DATE: April 2023 PREPARED BY: JA Went REVISIONS:	Guilford County REVIEWED BY: TS Popelka RKA PROJ. NO.: 18062 (040) INIT. DATE:	

18 CHANNEL CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

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



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.

REMOVE JUMPERS AS SHOWN

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.

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, S7, S8, S10, S11, AUX S1, AUX S2, AUX S4, AUX S5

Phases Used.....1, 2, 3, 4, 5, 6, 7, 8
 Overlap "1".....*
 Overlap "2".....*
 Overlap "3".....*
 Overlap "4".....*

*See overlap programming detail on this sheet

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.

SIGNAL HEAD HOOK-UP CHART

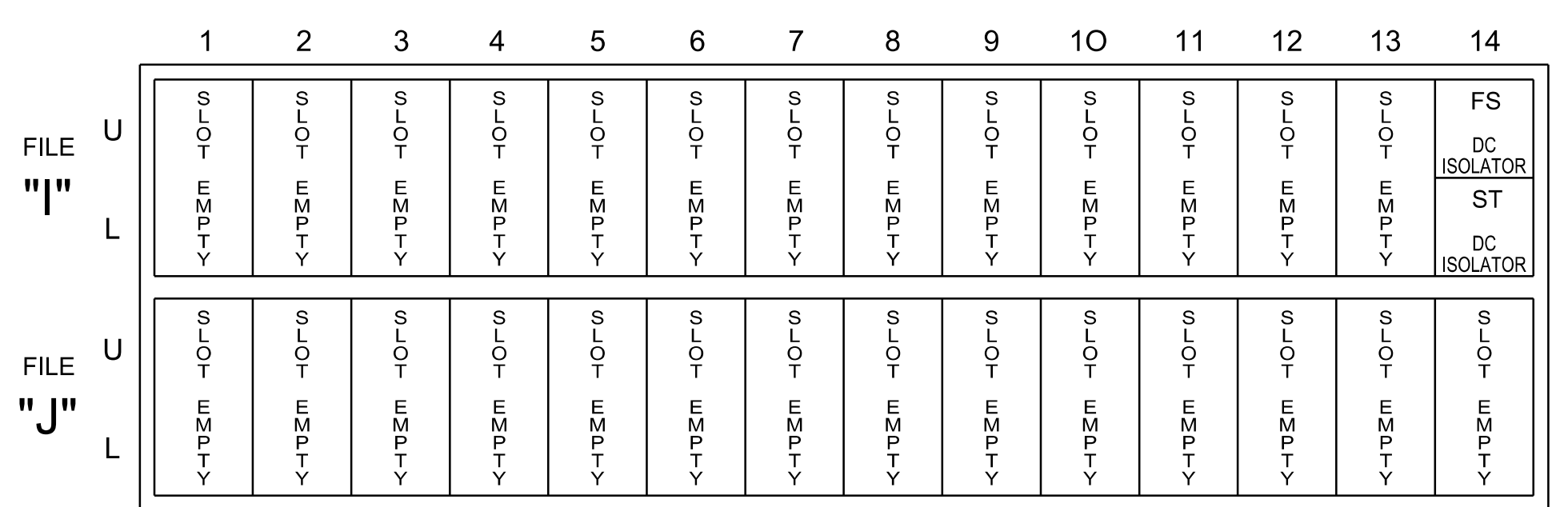
LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	11*	21,22	NU	31*	41,42	NU	51*	61,62	NU	71*	81,82	NU	11*	31*	NU	51*	71*	NU
RED		128			101		*	134			107							
YELLOW	*	129		*	102			135		*	108							
GREEN		130			103			136			109							
RED ARROW													A121	A124		A114	A101	
YELLOW ARROW								132					A122	A125		A115	A102	
FLASHING YELLOW ARROW													A123	A126		A116	A103	
GREEN ARROW	127			118			133	133		124								

NU = Not Used

* Denotes install load resistor. See load resistor installation detail this sheet.
 *See pictorial of head wiring in detail this sheet.

INPUT FILE POSITION LAYOUT

(front view)



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

FS = FLASH SENSE
 ST = STOP TIME

FLASHER CIRCUIT MODIFICATION DETAIL

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

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

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

OVERLAP PROGRAMMING

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

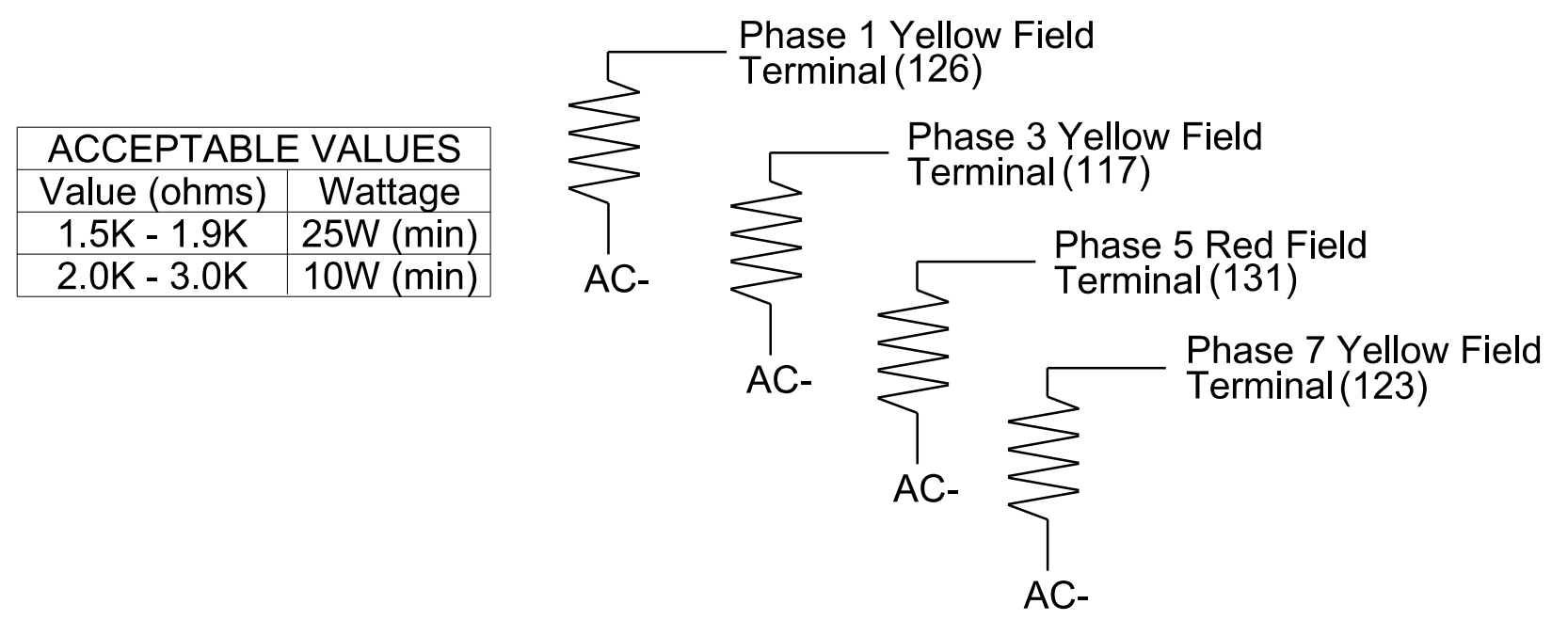
Web Interface
 Home > Controller > Overlap Configuration > Overlaps

Overlap Plan 1

Overlap	1	2	3	4
Type	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section
Included Phases	2	4	6	8
Modifier Phases	1	3	5	7
Trail Green	0	0	0	0
Trail Yellow	0.0	0.0	0.0	0.0
Trail Red	0.0	0.0	0.0	0.0

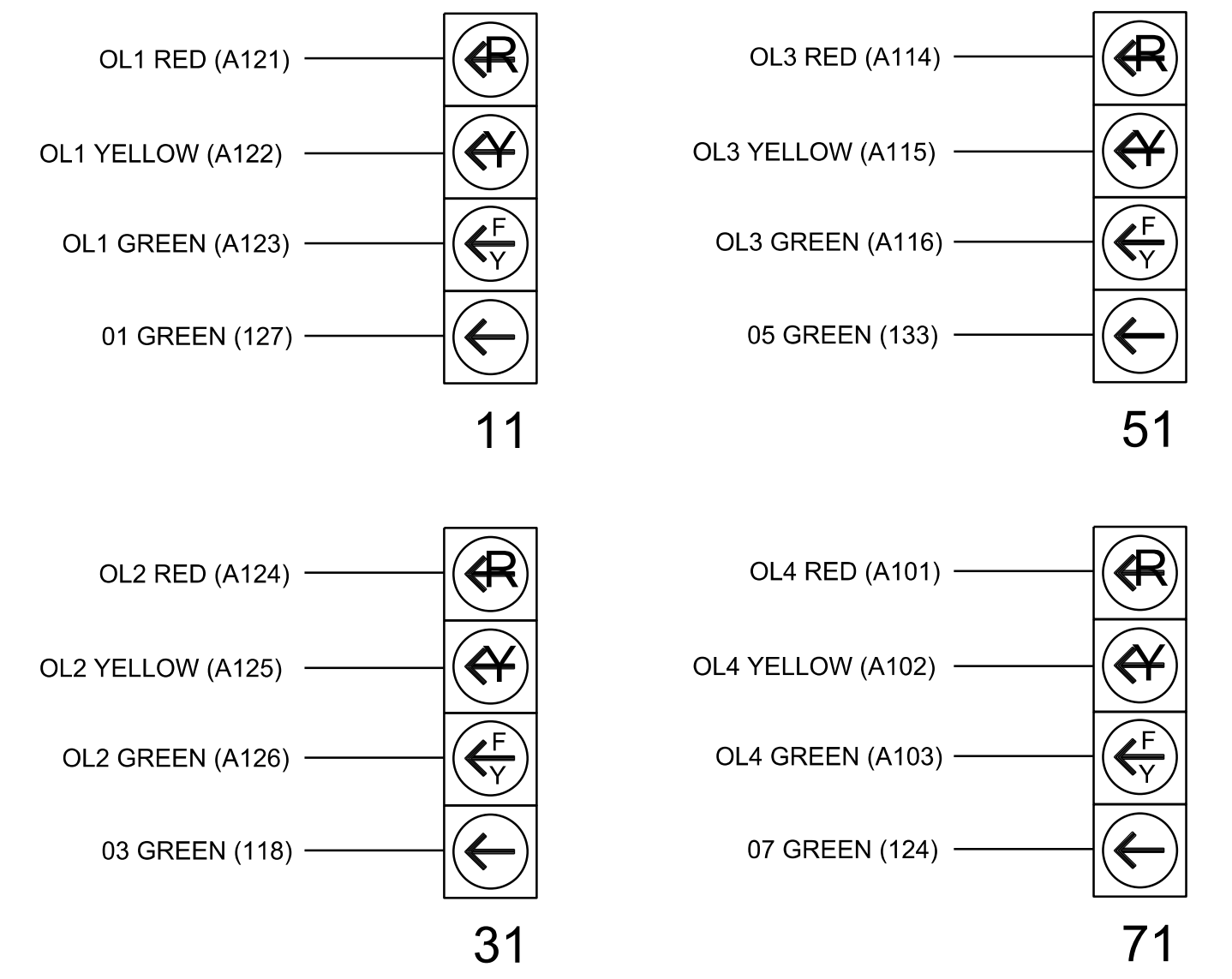
LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)



FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)

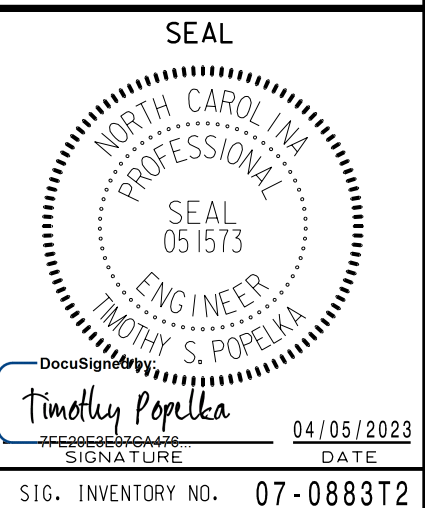


THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 07-0883T2
 DESIGNED: Apr 2023
 SEALED: 04/05/2023
 REVISED: N/A

Electrical Detail (Temporary Design 2 - TMP Phase 1, Step 4)

<p>Infrastructure Consulting Services, Inc. RKA RAMEY KEMP ASSOCIATES 5808 Farringham Place Raleigh, North Carolina 27609 Phone: 919.872.5116</p>	<p>750 N. Greenfield Pkwy, Garner, NC 27529</p>	
	<p>NC License No. F-1449 www.rameykemp.com</p>	
<p>Electrical and Programming Details For:</p>		
<p>NC 68 at NC 150 (Oak Ridge Road)</p>		
<p>Division 7 Guilford County Oak Ridge</p>		
<p>PLAN DATE: April 2023</p>	<p>REVIEWED BY: TS Popelka</p>	
<p>PREPARED BY: JA Wendt</p>	<p>RKA PROJ. NO.: 18062 (040)</p>	
<p>REVISIONS</p>	<p>INIT.</p>	<p>DATE</p>
<p>Signature: Timothy S. Popelka DATE: 04/05/2023</p>		
<p>SIG. INVENTORY NO. 07-0883T2</p>		

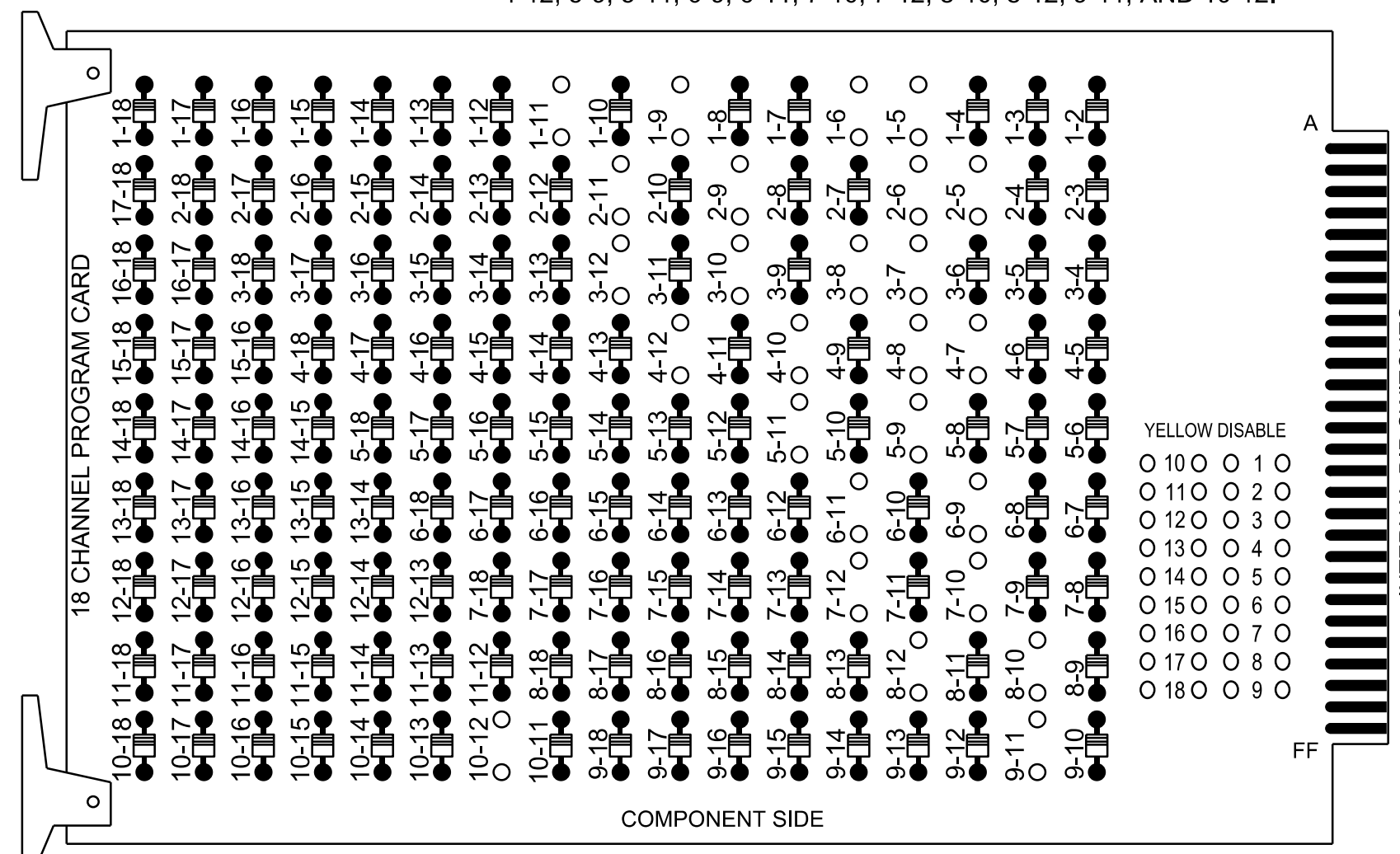
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



18 CHANNEL CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

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



REMOVE JUMPERS AS SHOWN

NOTES:

- 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.

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, S7, S8, S10, S11, AUX S1, AUX S2, AUX S4, AUX S5
 Phases Used.....1, 2, 3, 4, 5, 6, 7, 8
 Overlap "1".....*
 Overlap "2".....*
 Overlap "3".....*
 Overlap "4".....*

*See overlap programming detail on this sheet

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.

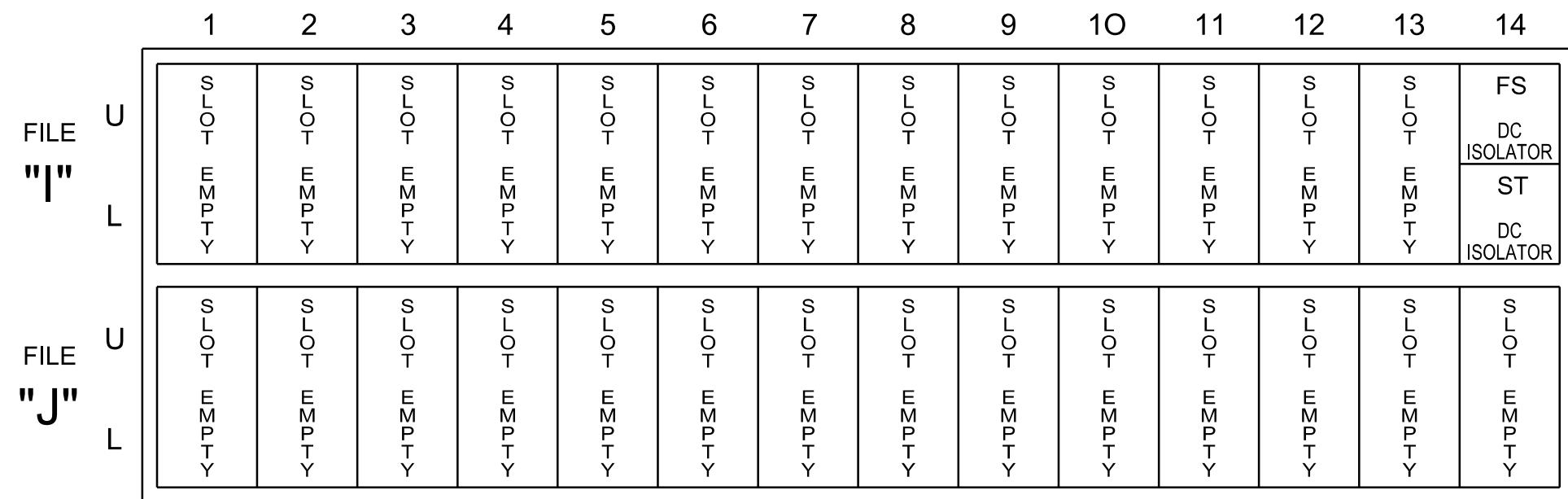
SIGNAL HEAD HOOK-UP CHART

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	31*	41,42	NU	51*	61,62	NU	71*	81,82	NU	11*	31*	NU	51*	71*	NU
RED		128			101		*	134			107							
YELLOW	*	129		*	102			135		*	108							
GREEN		130			103			136			109							
RED ARROW													A121	A124		A114	A101	
YELLOW ARROW								132					A122	A125		A115	A102	
FLASHING YELLOW ARROW													A123	A126		A116	A103	
GREEN ARROW	127			118			133	133		124								

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

INPUT FILE POSITION LAYOUT

(front view)



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

FS = FLASH SENSE
 ST = STOP TIME

FLASHER CIRCUIT MODIFICATION DETAIL

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

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

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

OVERLAP PROGRAMMING

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

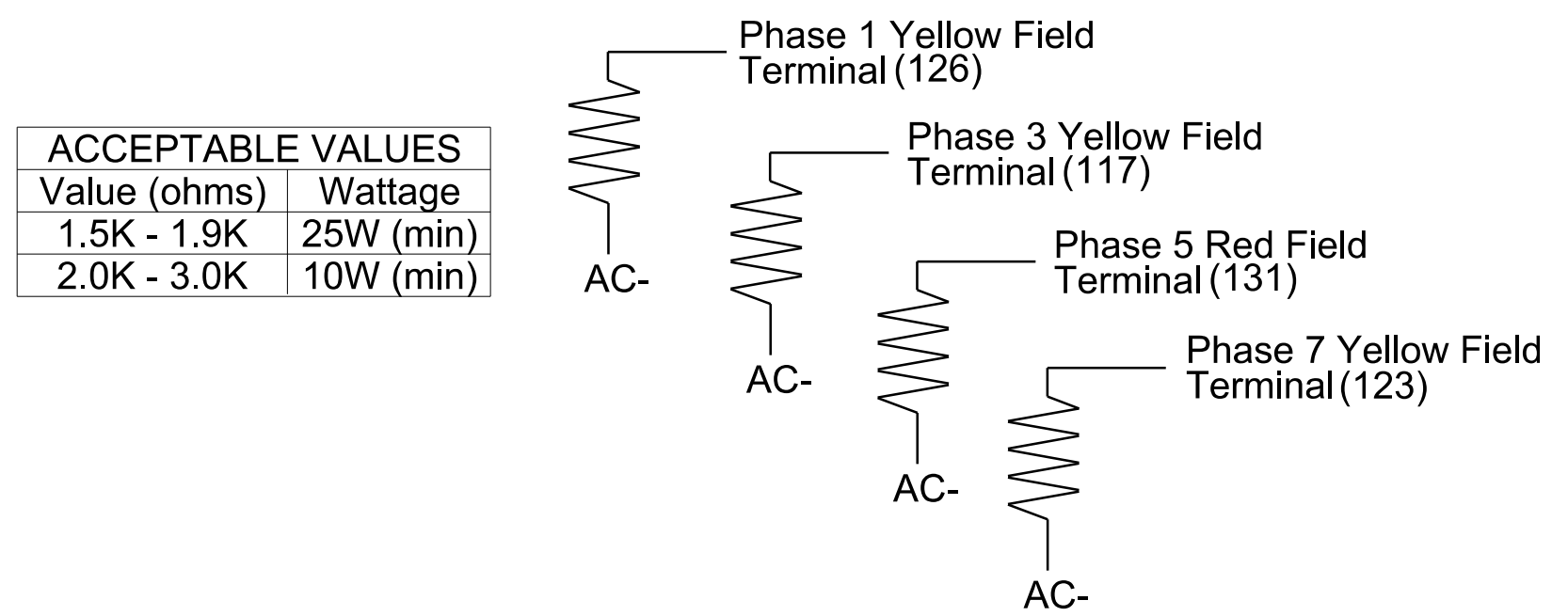
Web Interface
 Home > Controller > Overlap Configuration > Overlaps

Overlap Plan 1

Overlap	1	2	3	4
Type	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section
Included Phases	2	4	6	8
Modifier Phases	1	3	5	7
Trail Green	0	0	0	0
Trail Yellow	0.0	0.0	0.0	0.0
Trail Red	0.0	0.0	0.0	0.0

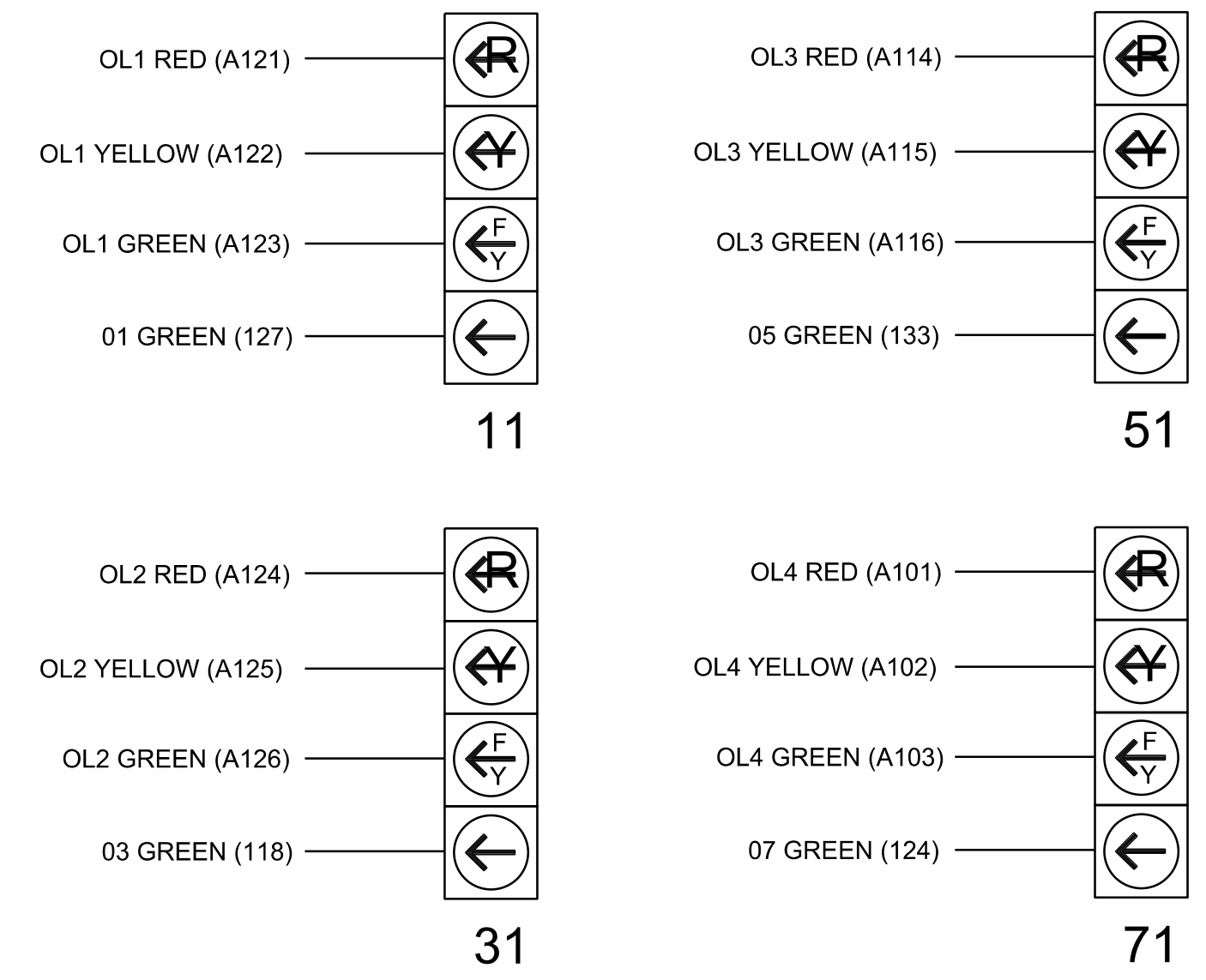
LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)



FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



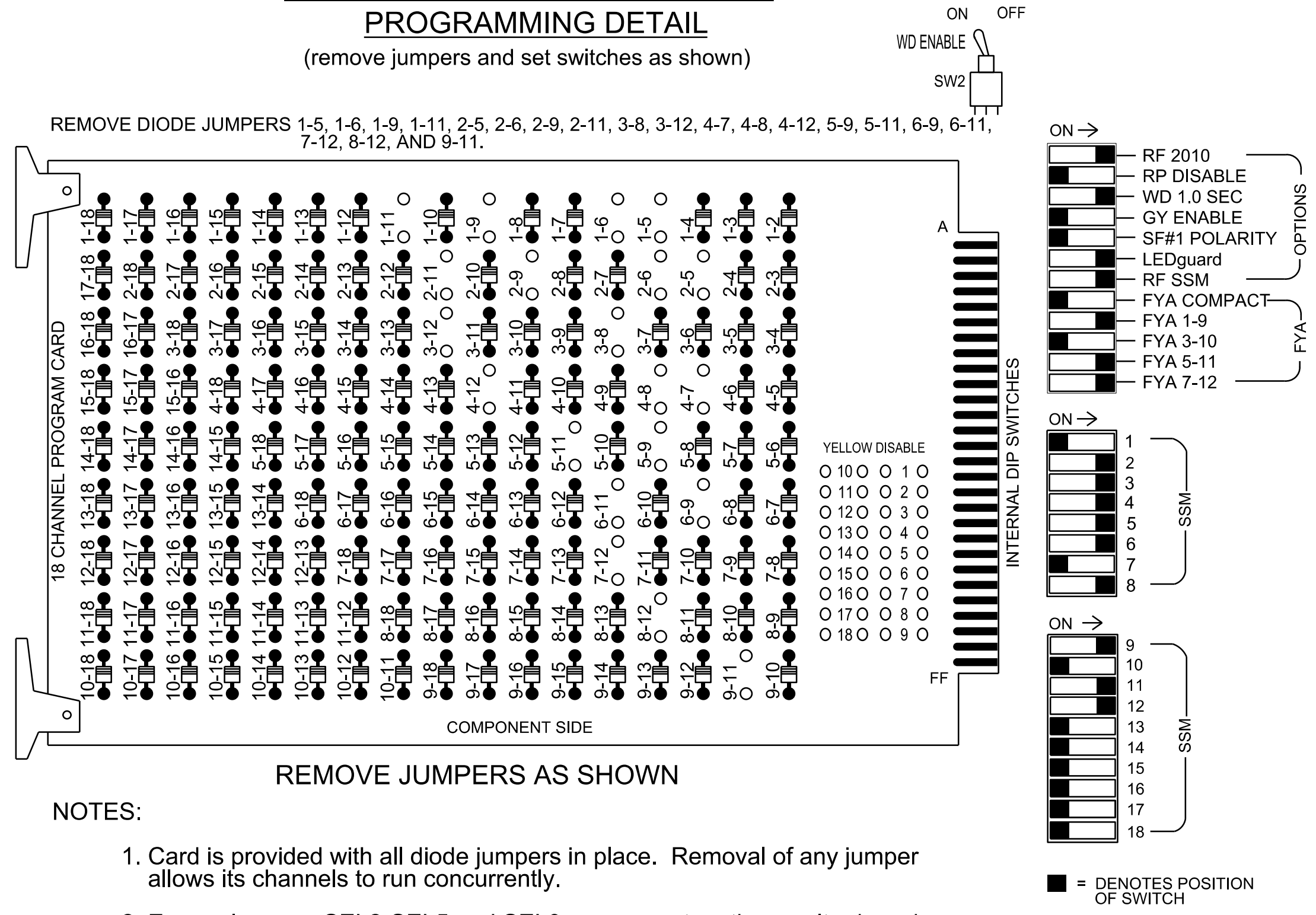
THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 07-0883T3
 DESIGNED: Apr 2023
 SEALED: 04/05/2023
 REVISED: N/A

Electrical Detail (Temporary Design 3 - TMP Phase 2, Step 3)

<p>Infrastructure Consulting Services, Inc. RKA RAMEY KEMP ASSOCIATES 5808 Farrington Place Raleigh, North Carolina 27609 Phone: 919.872.5116</p>	NC 68 at NC 150 (Oak Ridge Road)		DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED SEAL
	Division 7 Guilford County Oak Ridge	Division 7 Guilford County Oak Ridge	

18 CHANNEL CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



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.

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, S7, S8, S10, S11, AUX S1, AUX S4, AUX S5
 Phases Used.....1, 2, 3, 4, 5, 6, 7, 8
 Overlap "1".....*
 Overlap "2".....NOT USED
 Overlap "3".....*
 Overlap "4".....*

*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.	11*	21,22	NU	81	41,42	NU	51*	42	61,62	NU	71*	81,82	NU	11*	NU	NU	51*	71*	NU
RED		128		*	101		*		134			107							
YELLOW	*	129			102				135		*	108							
GREEN		130			103				136			109							
RED ARROW													A121			A114	A101		
YELLOW ARROW					117				132				A122			A115	A102		
FLASHING YELLOW ARROW													A123			A116	A103		
GREEN ARROW	127			118			133	133			124								

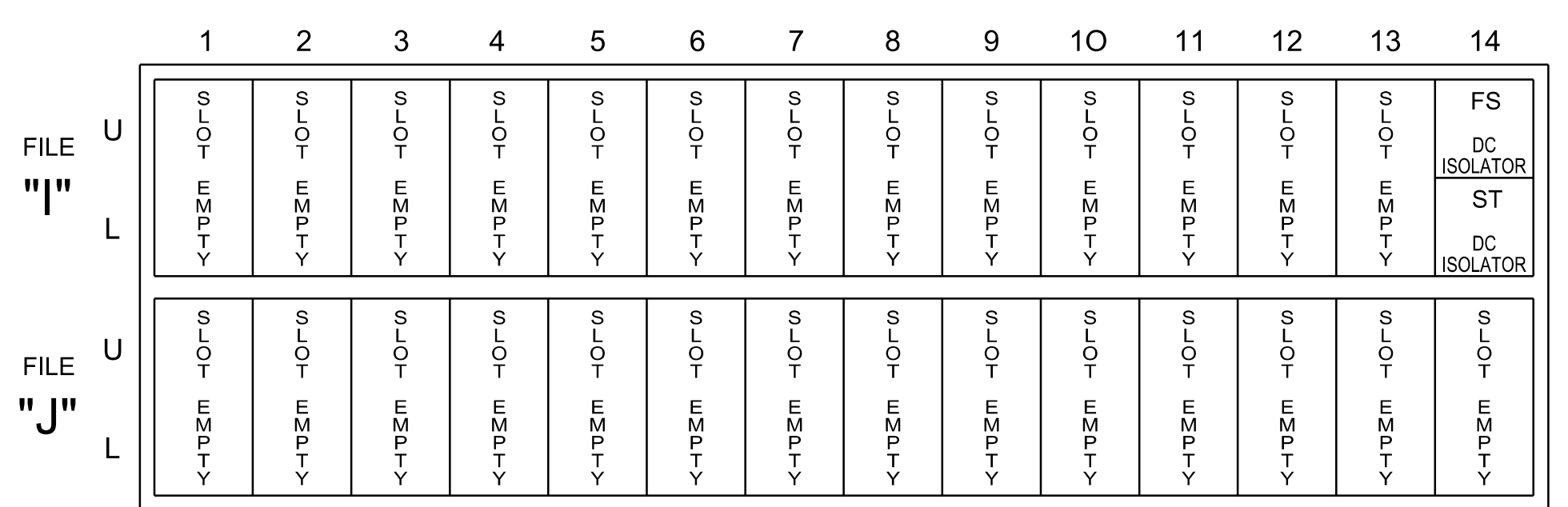
NU = Not Used
 * Denotes install load resistor. See load resistor installation detail this sheet.
 * See pictorial of head wiring in detail this sheet.

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.

INPUT FILE POSITION LAYOUT

(front view)



FLASHER CIRCUIT MODIFICATION DETAIL

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

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

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

OVERLAP PROGRAMMING

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

Web Interface
 Home > Controller > Overlap Configuration > Overlaps

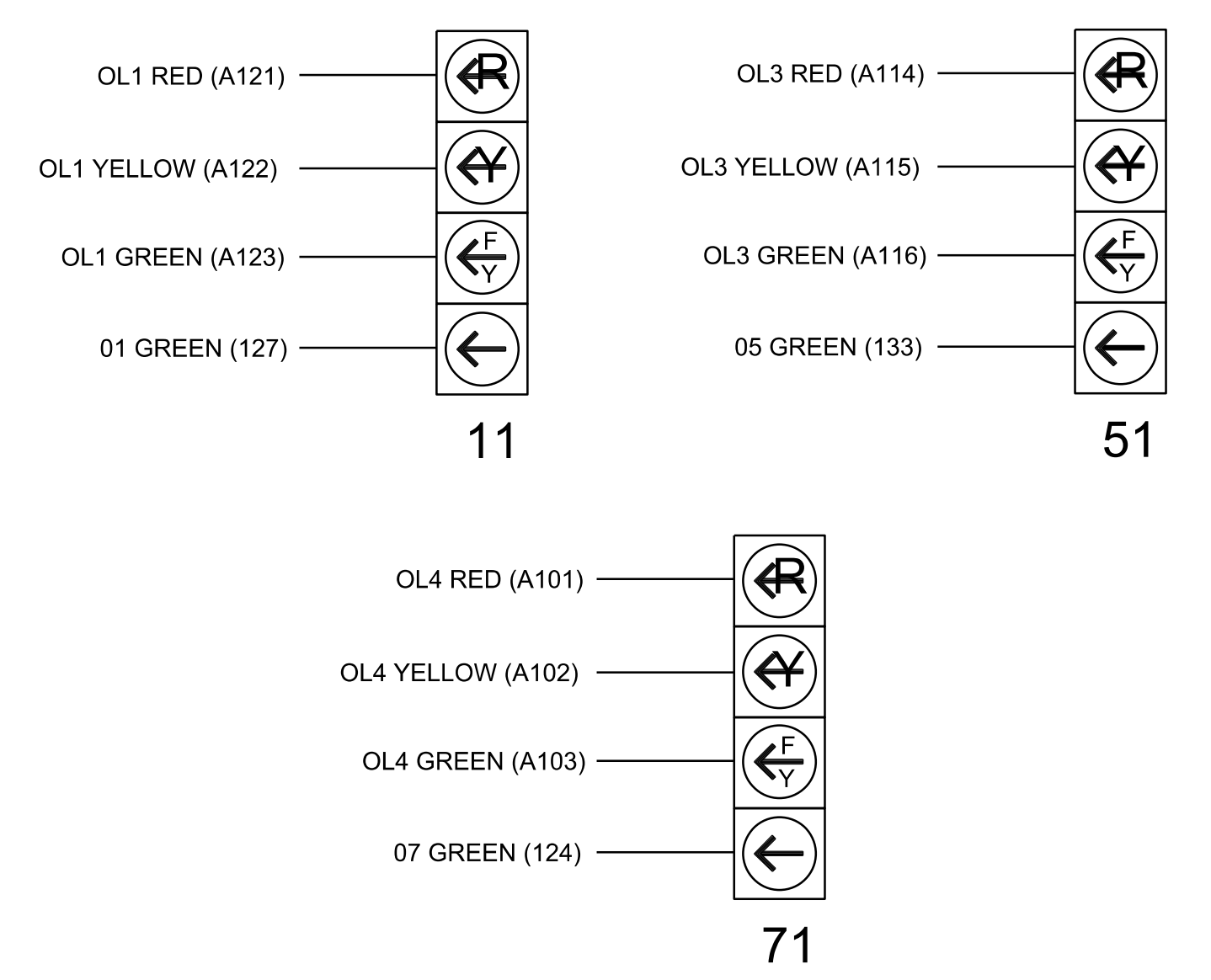
Overlap Plan 1

Overlap	1	2	3	4
Type	FYA 4 - Section	-	FYA 4 - Section	FYA 4 - Section
Included Phases	2	-	6	8
Modifier Phases	1	-	5	7
Trail Green	0	0	0	0
Trail Yellow	0.0	0.0	0.0	0.0
Trail Red	0.0	0.0	0.0	0.0

REMOVE OL2 PROGRAMMING

FYA SIGNAL WIRING DETAIL

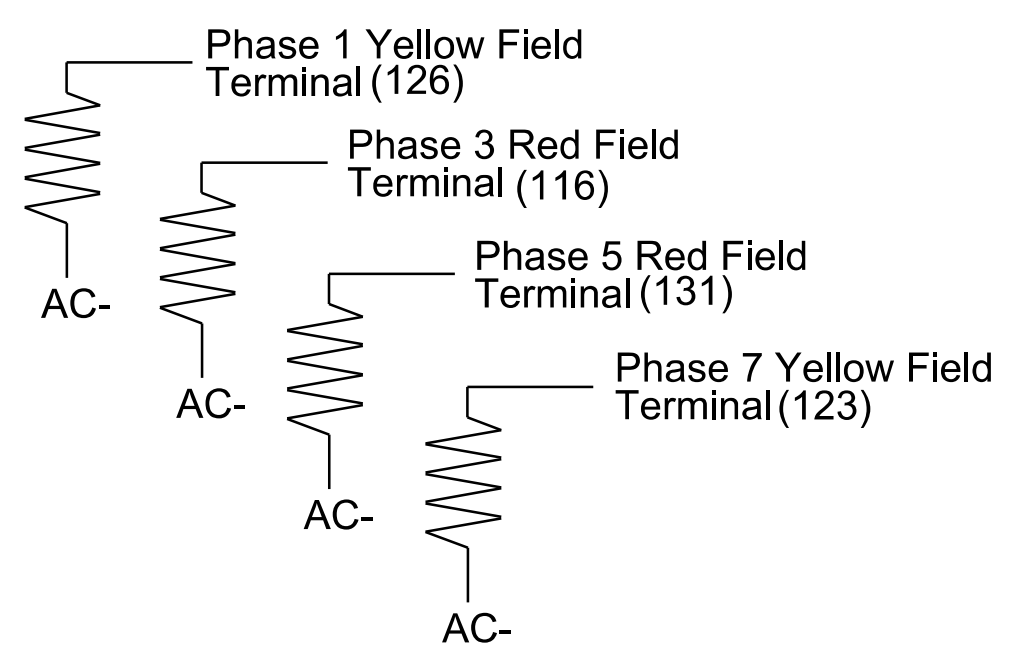
(wire signal heads as shown)



LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

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



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 07-0883T4
 DESIGNED: Apr 2023
 SEALED: 04/05/2023
 REVISED: N/A

Electrical Detail - Sheet 1 of 2
 (Temporary Design 4 - TMP Phase 2, Step 5)

<p>Infrastructure Consulting Services, Inc. RAMEY KEMP ASSOCIATES 5808 Farrington Place Raleigh, North Carolina 27609 Phone: 919.872.5116</p>	NC 68 at NC 150 (Oak Ridge Road)		SEAL
	Division 7 Guilford County Oak Ridge	PREPARED BY: JA Wentt RKA PROJ. NO.: 18062 (040) REVIEWED BY: TS Popelka DATE: 04/05/2023	
ELECTRICAL AND PROGRAMMING DETAILS FOR:		REVISIONS: _____ INIT. DATE _____	SIG. INVENTORY NO. 07-0883T4

SEQUENCE DETAIL

Front Panel
Main Menu >Controller >Sequence & Phs Config>Sequences

Web Interface
Home >Controller >Sequence

Sequence 1

Ring	Sequence Data
1	1,2,a,4,3,b
2	5,6,a,7,8,b

COMPATIBILITY

Front Panel
Main Menu >Controller >Sequence & Phs Config>No Served Phase Plans

Web Interface
Home >Controller >Phase Configuration>No Served Phase Plans

Sequence 1

Phase	No Serve Phase
1	
2	
3	7
4	
5	
6	
7	3
8	

BACKUP PREVENTION PROGRAMMING

Front Panel
Main Menu >Controller >Sequence & Phs Config >Backup Prevention > Backup Protection Plan

Web Interface
Home >Controller> Backup Prevention >Backup Protection Plan

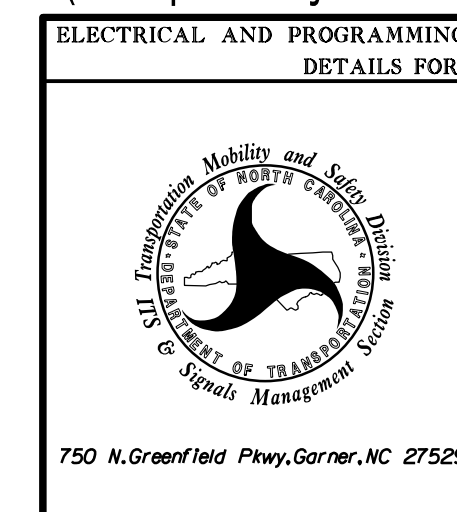
Sequence 1

No Backup Phase	1	2	3	4	5	6	7	8
Serve Phase 1	-	-	-	-	-	-	-	-
Serve Phase 2	-	-	-	-	-	-	-	-
Serve Phase 3	-	-	-	-	-	-	-	-
Serve Phase 4	-	-	-	-	-	-	-	-
Serve Phase 5	-	-	-	-	-	-	-	-
Serve Phase 6	-	-	-	-	-	-	-	-
Serve Phase 7	-	-	-	-	-	-	-	-
Serve Phase 8	-	-	-	-	-	-	X	-

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-0883T4
DESIGNED: Apr 2023
SEALED: 04/05/2023
REVISED: N/A

Electrical Detail - Sheet 2 of 2
(Temporary Design 4 - TMP Phase 2, Step 5)

DOCUMENT NOT CONSIDERED
FINAL UNLESS ALL
SIGNATURES COMPLETED



NC 68 at NC 150 (Oak Ridge Road)	
Division 7 Guilford County Oak Ridge	
PLAN DATE: April 2023	REVIEWED BY: TS Popelka
PREPARED BY: JA Wendt	RKA PROJ. NO.: 18062 (040)
REVISIONS	INIT. DATE

SEAL

NORTH CAROLINA
PROFESSIONAL
ENGINEER
TIMOTHY S. POPELKA
051573

DocuSign Envelope ID: 04/05/2023
SIGNATURE DATE

SIG. INVENTORY NO. 07-0883T4

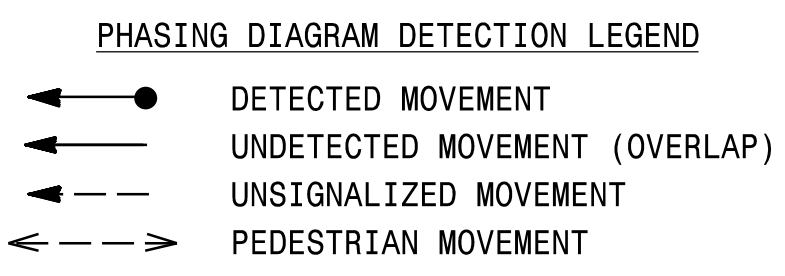
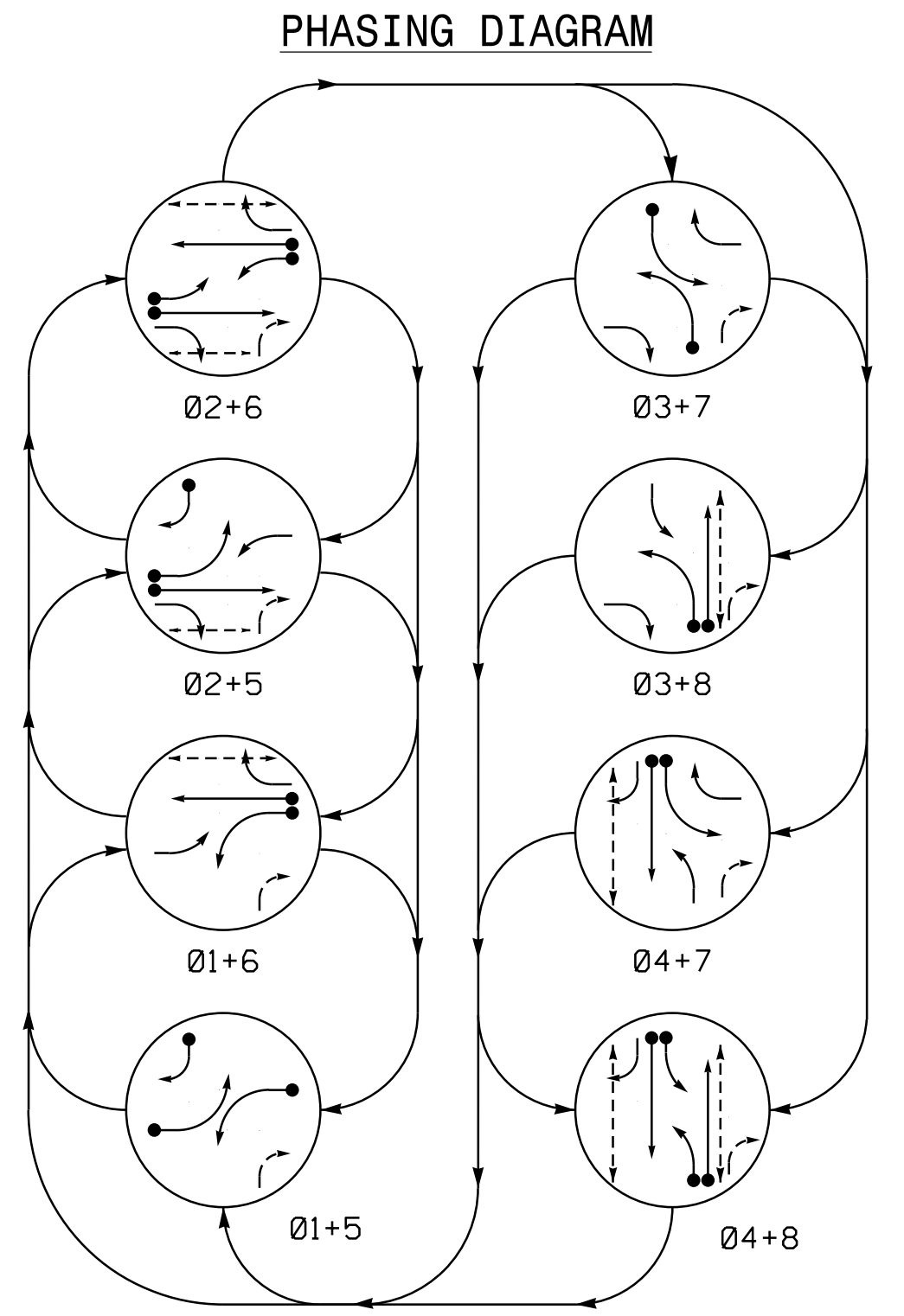
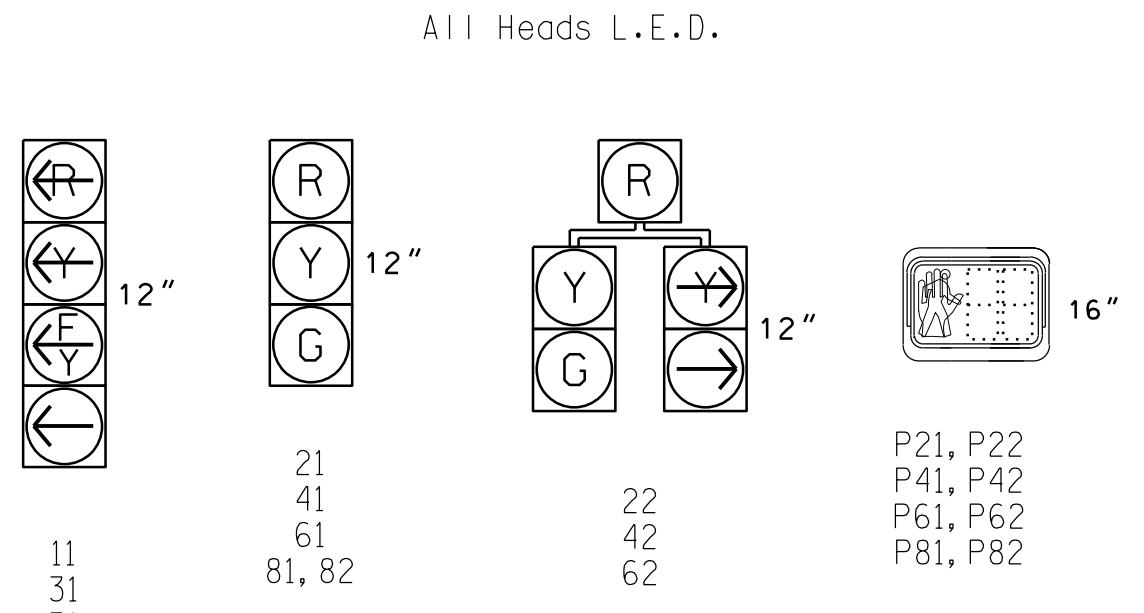


TABLE OF OPERATION table with columns for SIGNAL FACE, PHASE (01-08), and specific signal face configurations (e.g., 11, 21, 31, 41, 51, 61, 71, 81, 82, P21, P22, P41, P42, P61, P62, P81, P82).

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



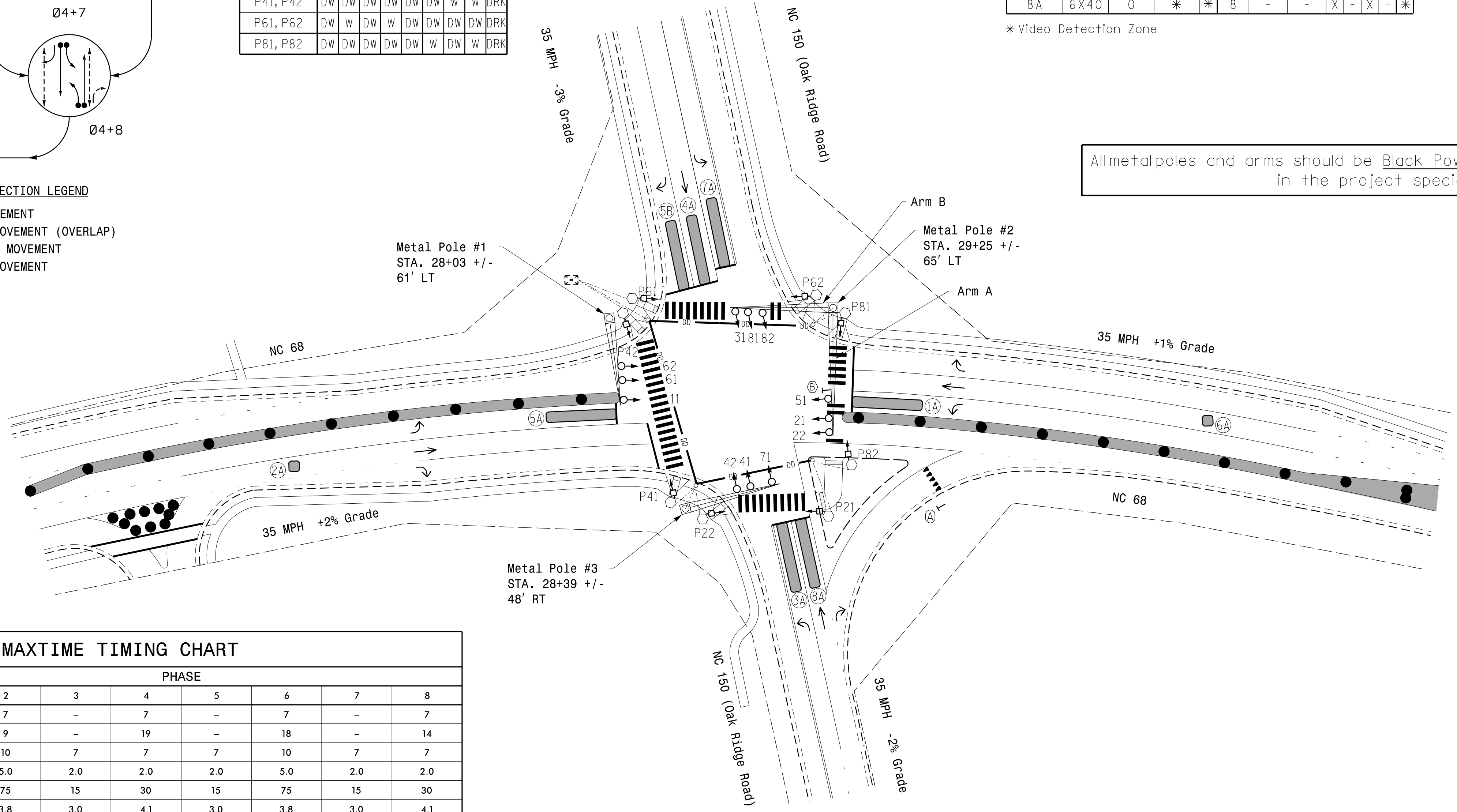
MAXTIME DETECTOR INSTALLATION CHART table with columns for LOOP, SIZE (FT), DISTANCE FROM STOPBAR (FT), TURNS, NEW LOOP, CALL PHASE, DELAY TIME, EXTEND TIME, EXTEND INITIAL, ADDED CALL, and NEW CARD. Includes a note: * Video Detection Zone.

8 Phase Fully Actuated (Isolated)

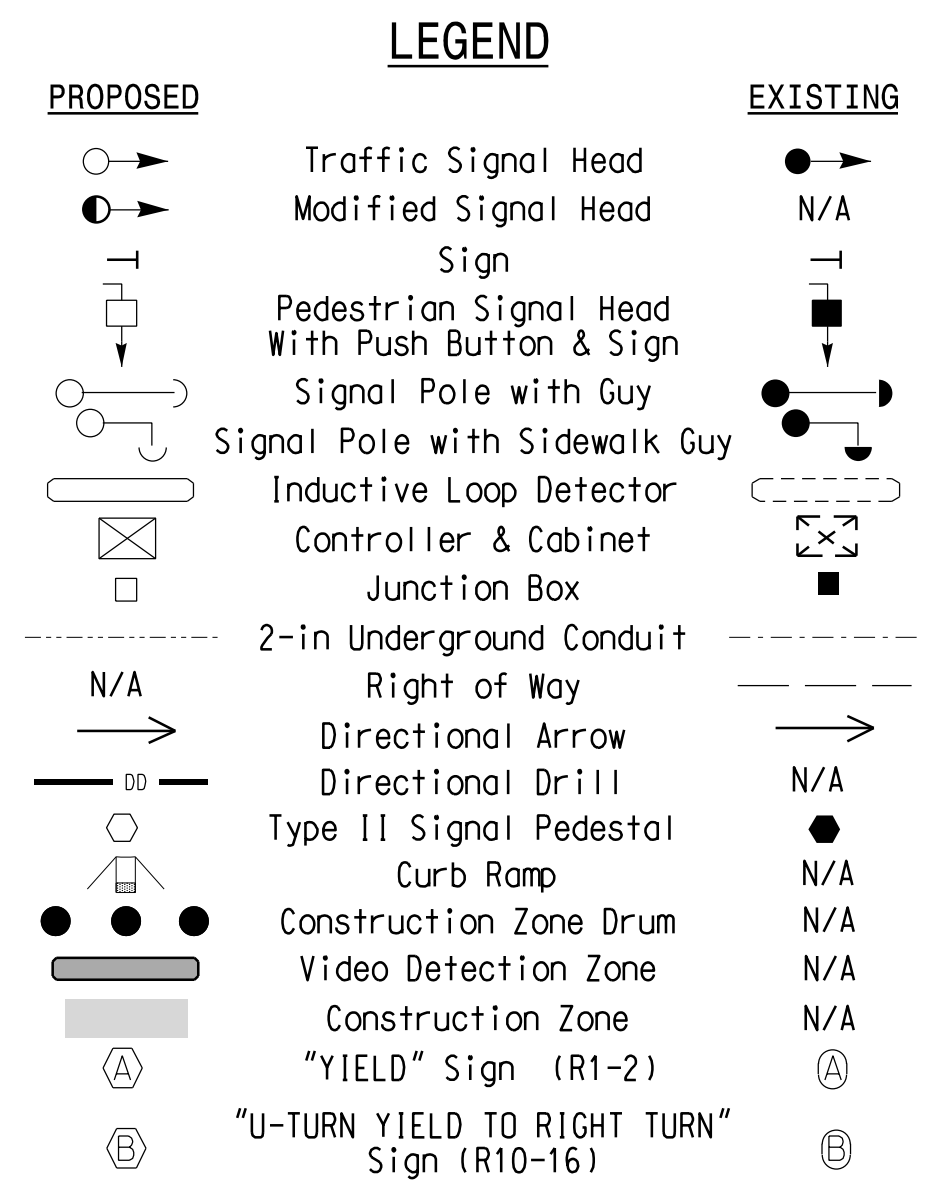
NOTES

- 1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 and/or phase 5 may be lagged.
4. Phase 3 and/or phase 7 may be lagged.
5. Set all detector units to presence mode.
6. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
7. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
8. This intersection uses video detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.

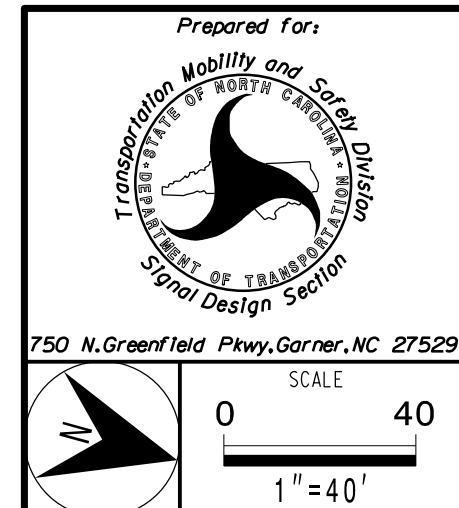
All metal poles and arms should be Black Powder Coated in color as specified in the project special provisions.



MAXTIME TIMING CHART table with columns for FEATURE and PHASE (1-8). Rows include Walk, Ped Clear, Min Green, Passage, Max I, Yellow Change, Red Clear, Added Initial, Maximum Initial, Time Before Reduction, Time To Reduce, Minimum Gap, Advance Walk, Non Lock Detector, Vehicle Recall, and Dual Entry.



Signal Upgrade (Temporary Design 5 - TMP Phase 2, Step 7)



Project information table including: NC 68 at NC 150 (Oak Ridge Road), Division 7, Guilford County, Oak Ridge, PLAN DATE: April 2023, REVIEWED BY: TS Popelka, PREPARED BY: JA Wendt, RKA PROJ. NO.: 18062 (040).

Professional Engineer seal for Timothy S. Popelka, State of North Carolina, License No. 051573. Includes signature and date: 04/05/2023.

* 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.

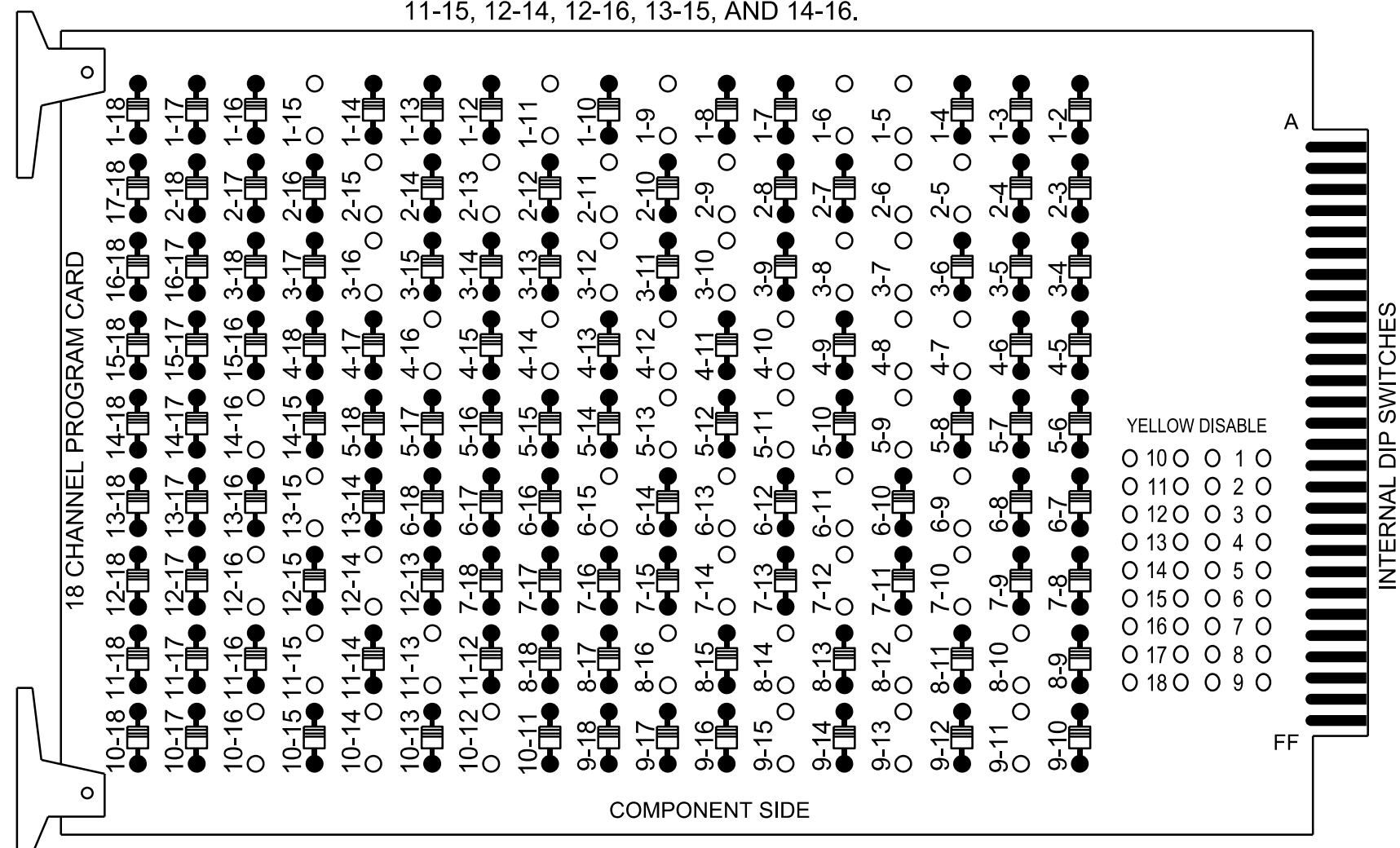
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SIG. INVENTORY NO. 07-0883T5

18 CHANNEL CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

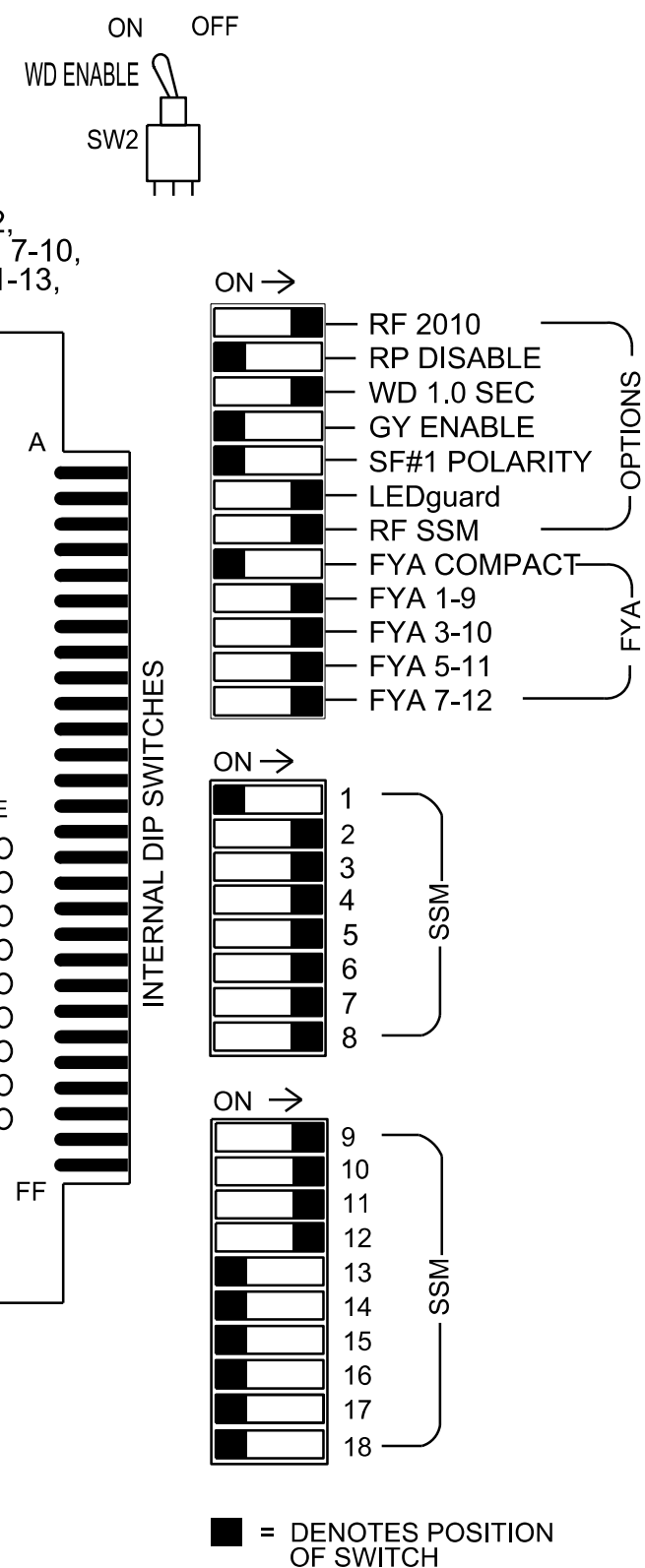
REMOVE DIODE JUMPERS 1-5, 1-6, 1-9, 1-11, 1-15, 2-5, 2-6, 2-9, 2-11, 2-13, 2-15, 3-7, 3-8, 3-10, 3-12, 3-16, 4-7, 4-8, 4-10, 4-12, 4-14, 4-16, 5-9, 5-11, 5-13, 6-9, 6-11, 6-13, 6-15, 7-10, 7-12, 7-14, 8-10, 8-12, 8-14, 8-16, 9-11, 9-13, 9-15, 10-12, 10-14, 10-16, 11-13, 11-15, 12-14, 12-16, 13-15, AND 14-16.



REMOVE JUMPERS AS SHOWN

NOTES:

- Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
- Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
- Ensure that the Red Enable is active at all times during normal operation.
- 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 Walk and 6 Walk.
- If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.

EQUIPMENT INFORMATION

Controller.....2070LX
 Cabinet.....332 w/ Aux
 Software.....Q-Free MAXTIME
 Cabinet Mount.....Base
 Output File Positions.....18 With Aux. Output File
 Load Switches Used.....S1, S2, S3, S4, S5, S6, S7, S8, S9, S10, S11, S12, AUX S1, AUX S2, AUX S4, AUX S5
 Phases Used.....1, 2, 2PED, 3, 4, 4PED, 5, 6, 6PED, 7, 8, 8PED
 Overlap "1".....*
 Overlap "2".....*
 Overlap "3".....*
 Overlap "4".....*

*See overlap programming detail on this sheet

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.

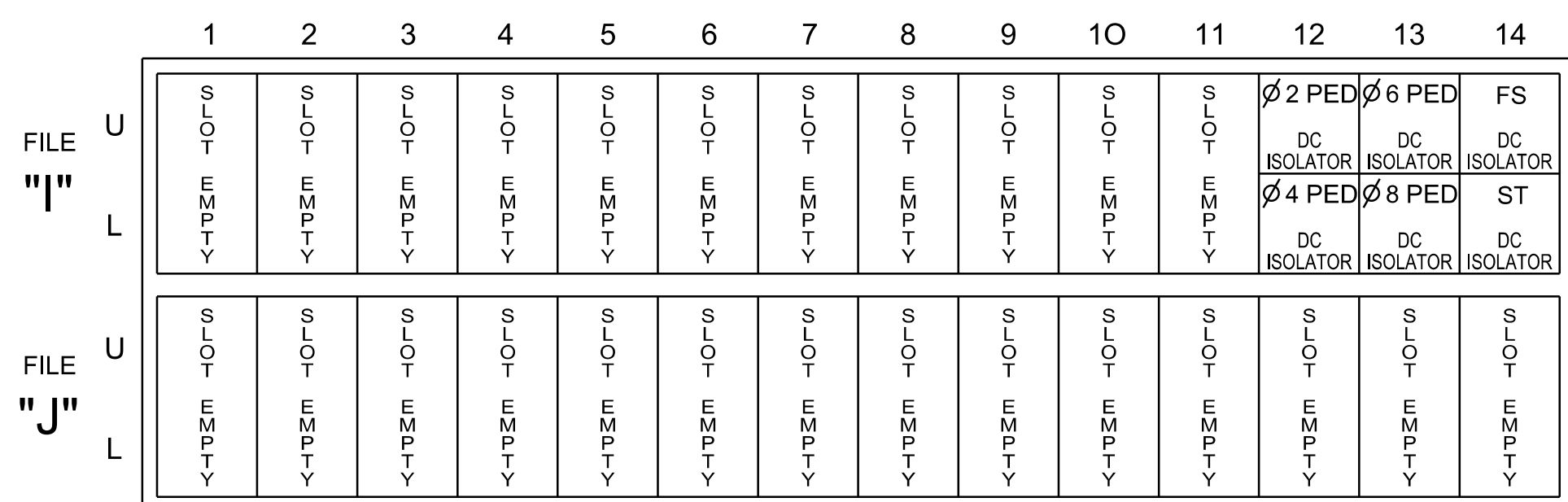
SIGNAL HEAD HOOK-UP CHART

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	P21, P22	31*	22	41,42	P41, P42	51*	42	61,62	P61, P62	71*	62	81,82	P81, P82	11*	31*	NU	51*	71*	NU		
RED		128		*		101		*		134		*		107									
YELLOW	*	129				102				135				108									
GREEN		130				103				136				109									
RED ARROW														A121	A124		A114	A101					
YELLOW ARROW						117				132				123		A122	A125		A115	A102			
FLASHING YELLOW ARROW																A123	A126		A116	A103			
GREEN ARROW	127					118	118			133	133			124	124								
Hand						113				104				119						110			
Walking						115				106				121						112			

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)



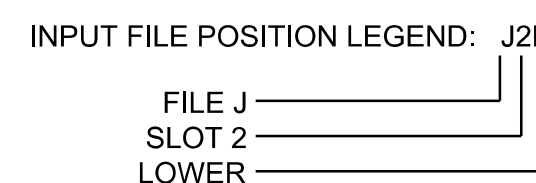
EX.: 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE
 ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

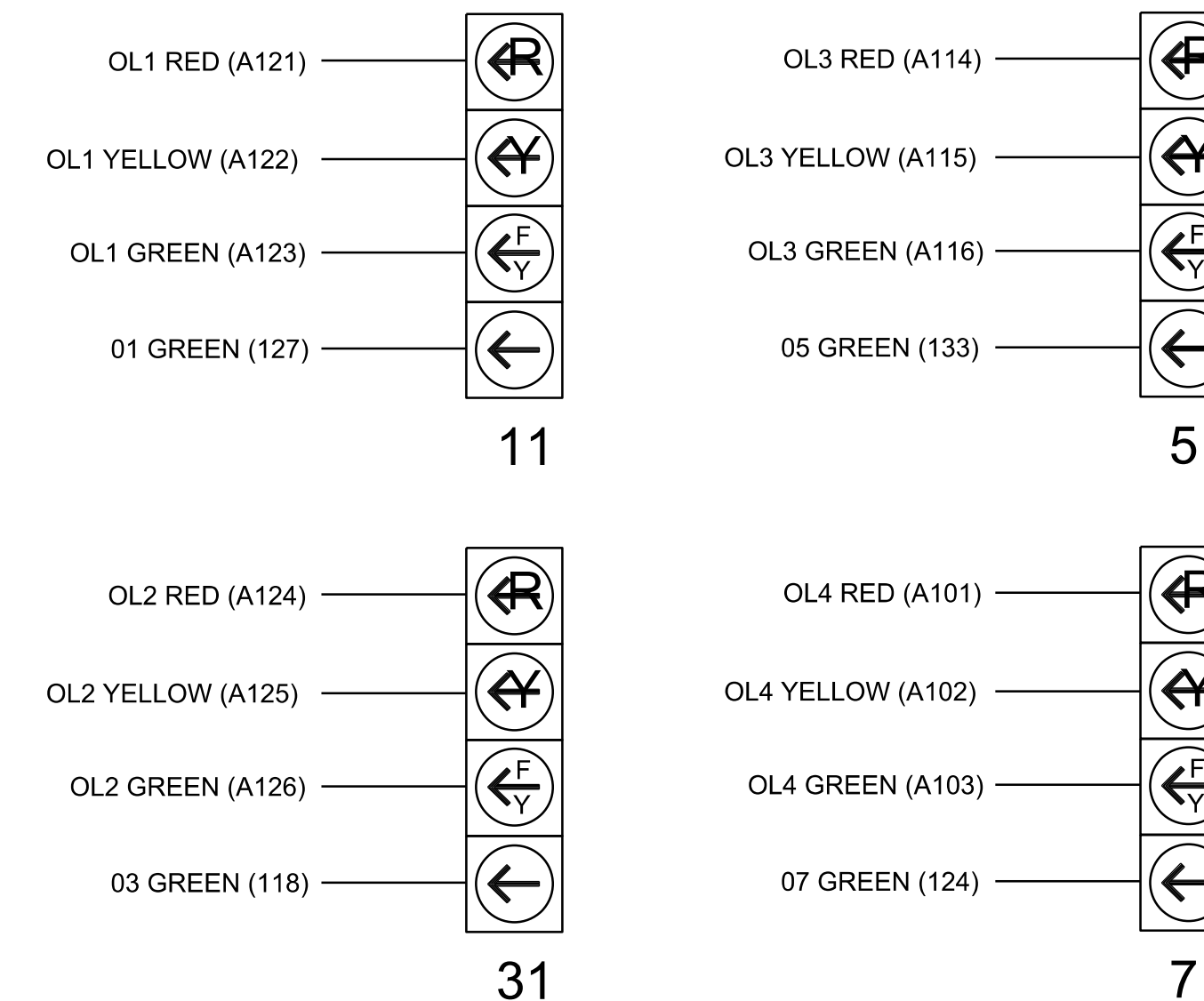
LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN
PED PUSH BUTTONS												
P21,P22	TB8-4,6	I12U	67	33	2	PED 2						
P41,P42	TB8-5,6	I12L	69	35	4	PED 4						
P61,P62	TB8-7,9	I13U	68	34	6	PED 6						
P81,P82	TB8-8,9	I13L	70	36	8	PED 8						

NOTE: INSTALL DC ISOLATORS IN INPUT FILE SLOTS I12 AND I13.



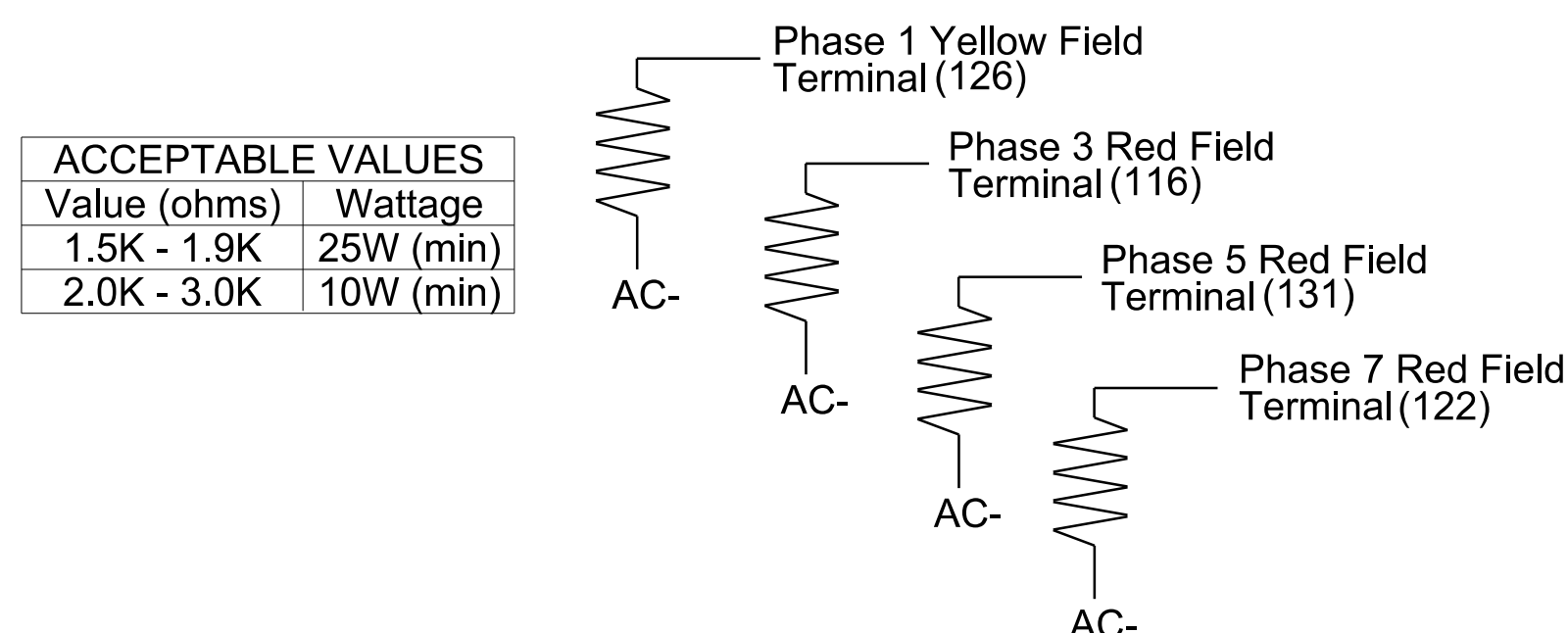
FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)



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

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

Countdown Ped Signals are required to display timing only during Ped Clearance Interval. Consult Ped Signal Module user's manual for instructions on selecting this feature.

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 07-0883T5
 DESIGNED: Apr 2023
 SEALED: 04/05/2023
 REVISED: N/A

Electrical Detail - Sheet 1 of 2
 (Temporary Design 5 - TMP Phase 2, Step 7)

<p>Infrastructure Consulting Services, Inc. RKA RAMEY KEMP ASSOCIATES 5808 Farrington Place Raleigh, North Carolina 27609 Phone: 919.872.5116</p>	NC 68 at NC 150 (Oak Ridge Road)		
	Division 7 PLAN DATE: April 2023 PREPARED BY: JA Wentt	Guilford County REVIEWED BY: TS Popelka RKA PROJ. NO.: 18062 (040)	

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SIG. INVENTORY NO. 07-0883T5

FLASHER CIRCUIT MODIFICATION DETAIL

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

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

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

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	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section
Included Phases	2	4	6	8
Modifier Phases	1	3	5	7
Trail Green	0	0	0	0
Trail Yellow	0.0	0.0	0.0	0.0
Trail Red	0.0	0.0	0.0	0.0

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 07-0883T5
DESIGNED: Apr 2023
SEALED: 04/05/2023
REVISED: N/A

Electrical Detail - Sheet 2 of 2
(Temporary Design 5 - TMP Phase 2, Step 7)

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



ELECTRICAL AND PROGRAMMING DETAILS FOR:

750 N. Greenfield Pkwy, Garner, NC 27529

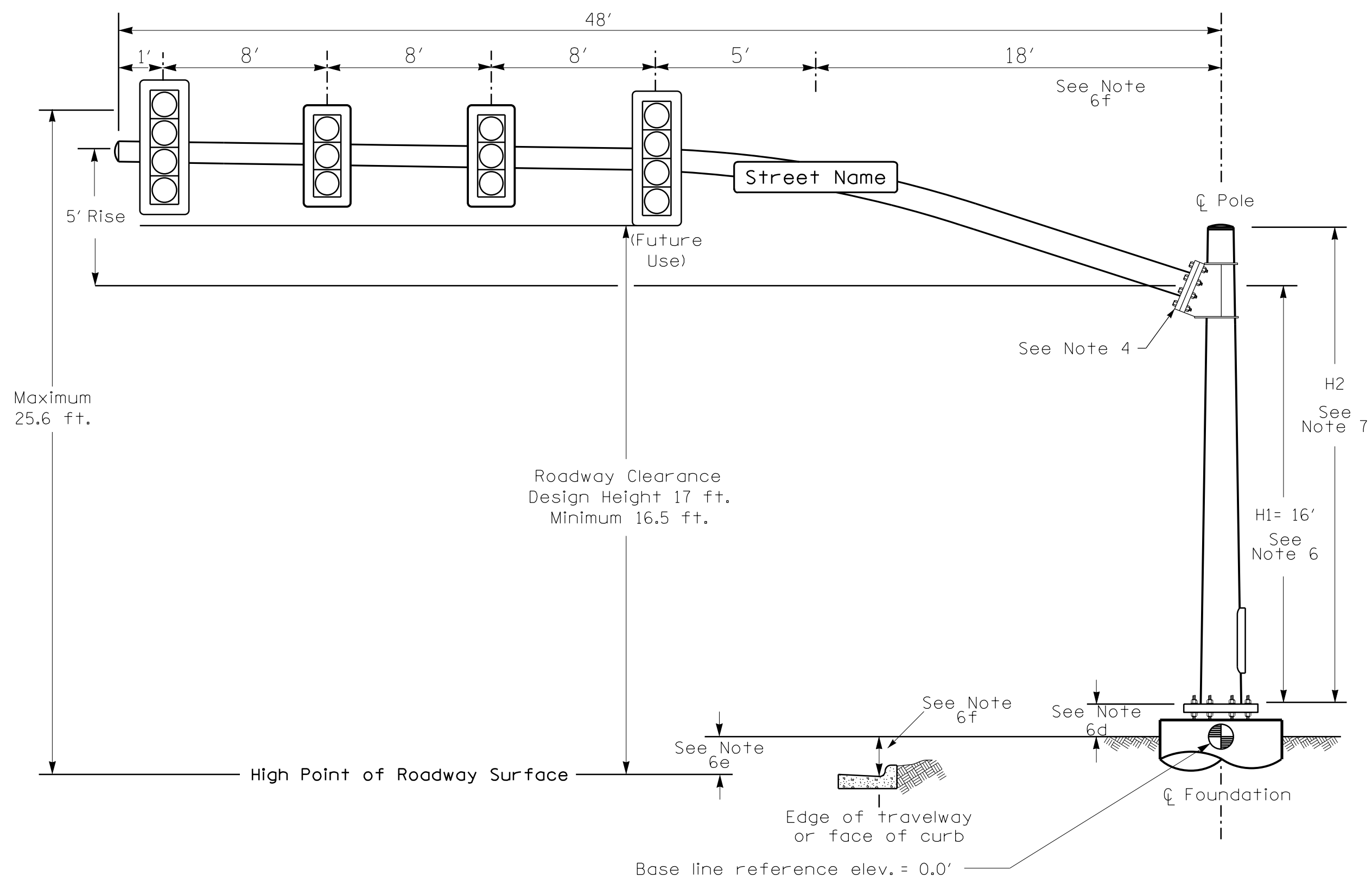
NC 68 at NC 150 (Oak Ridge Road)	
Division 7	Guilford County Oak Ridge
PLAN DATE: April 2023	REVIEWED BY: TS Popelka
PREPARED BY: JA Wendt	RKA PROJ. NO.: 18062 (040)
REVISIONS	INIT. DATE

SEAL

SEAL
051573
ENGINEER
TIMOTHY S. POPELKA

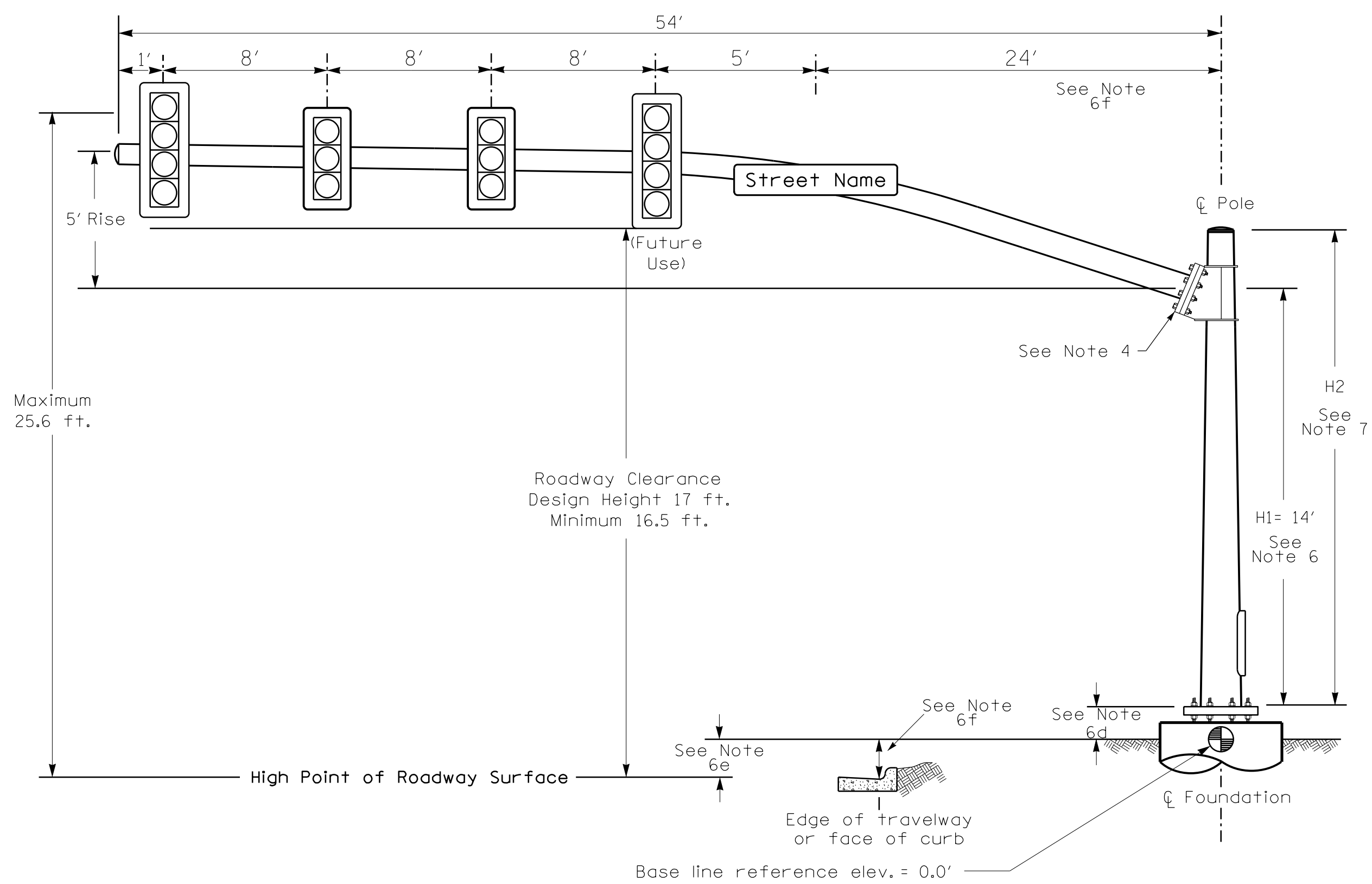
DocuSign
Signature
DATE: 04/05/2023
SIG. INVENTORY NO. 07-0883T5

Design Loading for METAL POLE NO. 1



Elevation View @ 270°

Design Loading for METAL POLE NO. 3



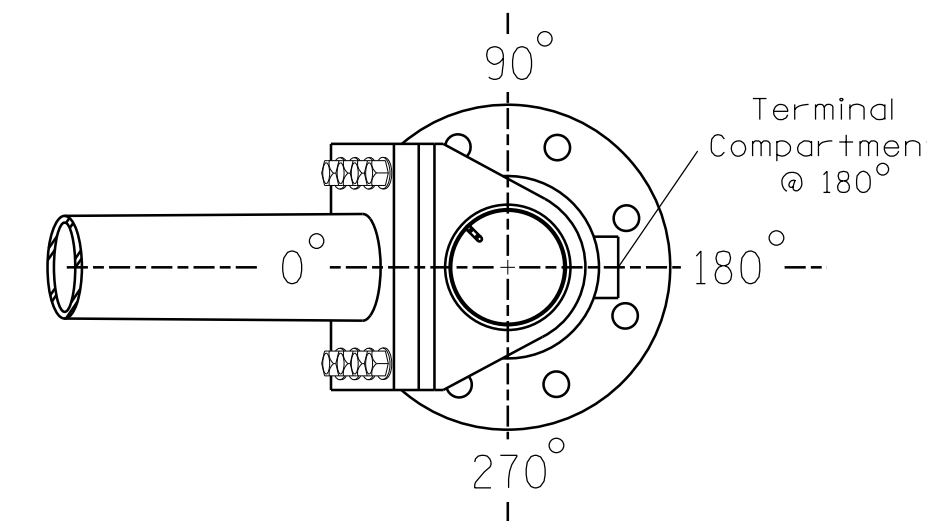
Elevation View @ 270°

SPECIAL NOTE

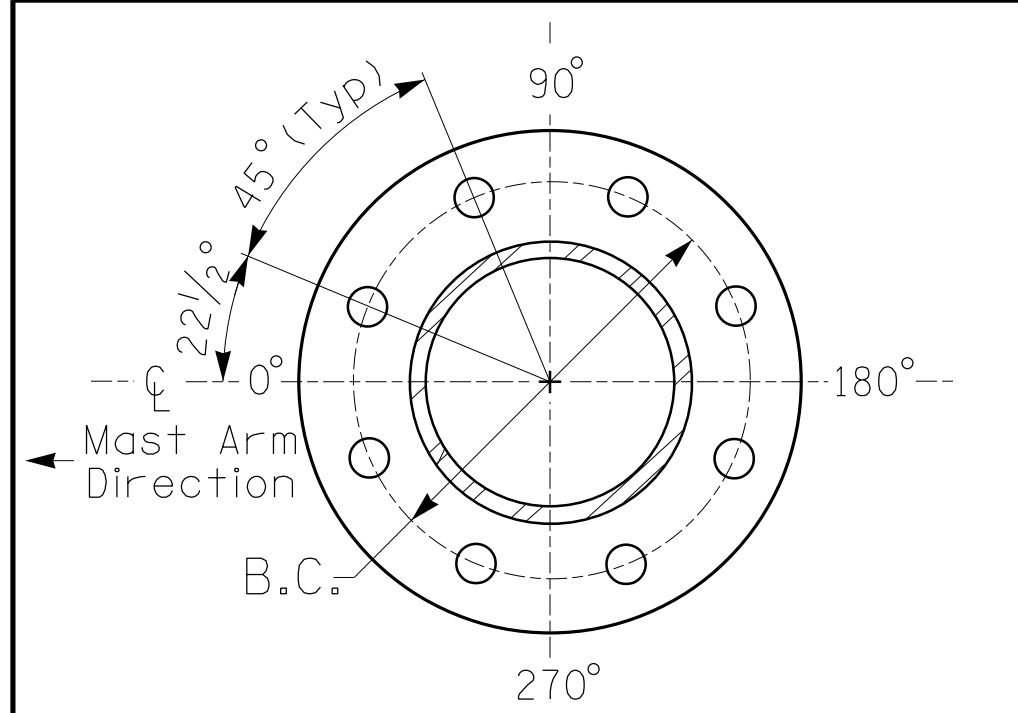
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 1	Pole 3
Baseline reference point at ϕ Foundation @ ground level	938.0 ft.	940.0 ft.
Elevation difference at High point of roadway surface	+2.0 ft.	0.0 ft.
Elevation difference at Edge of travelway or face of curb	+1.0 ft.	0.0 ft.

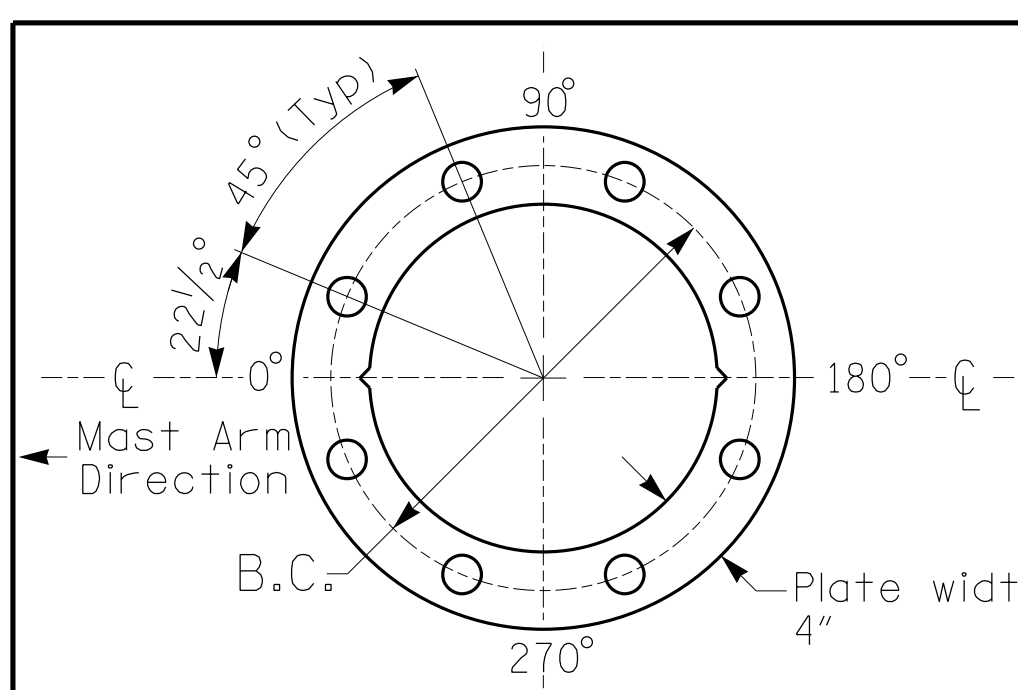


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL For 8 Bolt Base Plate

METAL POLE No. 1 AND No. 3

PROJECT REFERENCE NO.	SHEET NO.
R-5725	Sig-6.3

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	RIGID MOUNTED SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE	9.3 S.F.	25.5" W X 52.5" L	60 LBS
	RIGID MOUNTED SIGNAL HEAD 12"-4 SECTION-WITH BACKPLATE	11.5 S.F.	25.5" W X 66.0" L	74 LBS
	STREET NAME SIGN RIGID MOUNTED	12.0 S.F.	18.0" W X 96.0" L	27 LBS

NOTES

DESIGN REFERENCE MATERIAL

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

DESIGN REQUIREMENTS

- Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
- Design all signal supports using stress ratios that do not exceed 0.9.
- A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements.
- Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
- The mast arm attachment height (H1) shown is based on the following design assumptions:
 - Nominal vertical rise in mast arm is 5 feet as measured from the centerline of the arm base to the centerline of the free end of the arm.
 - Signal heads are rigidly mounted and vertically centered on the mast arm.
 - The roadway clearance height for design is as shown in the elevation views.
 - The top of the pole base plate is 0.75 feet above the ground elevation.
 - Refer to the Elevation Data Chart for the elevation differences between the proposed foundation ground level and the high point of the roadway.
 - Provide horizontal distance from the proposed centerline of the foundation to the edge of travelway. Refer to the Elevation Data Chart for elevation difference between the proposed foundation ground level and the edge of travelway. This information is necessary to ensure that the roadway clearance is maintained at the edge of the travelway and to aid in the camber design of the arm.
- The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
 - Mast arm attachment height (H1) plus 2 feet, or
 - H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
- If pole location adjustments are required, the contractor must gain approval from the Engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signal Design Section Senior Structural Engineer for assistance at (919) 814-5000.
- The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
- The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

All metal poles and arms should be Black Powder Coated in color as specified in the project special provisions.

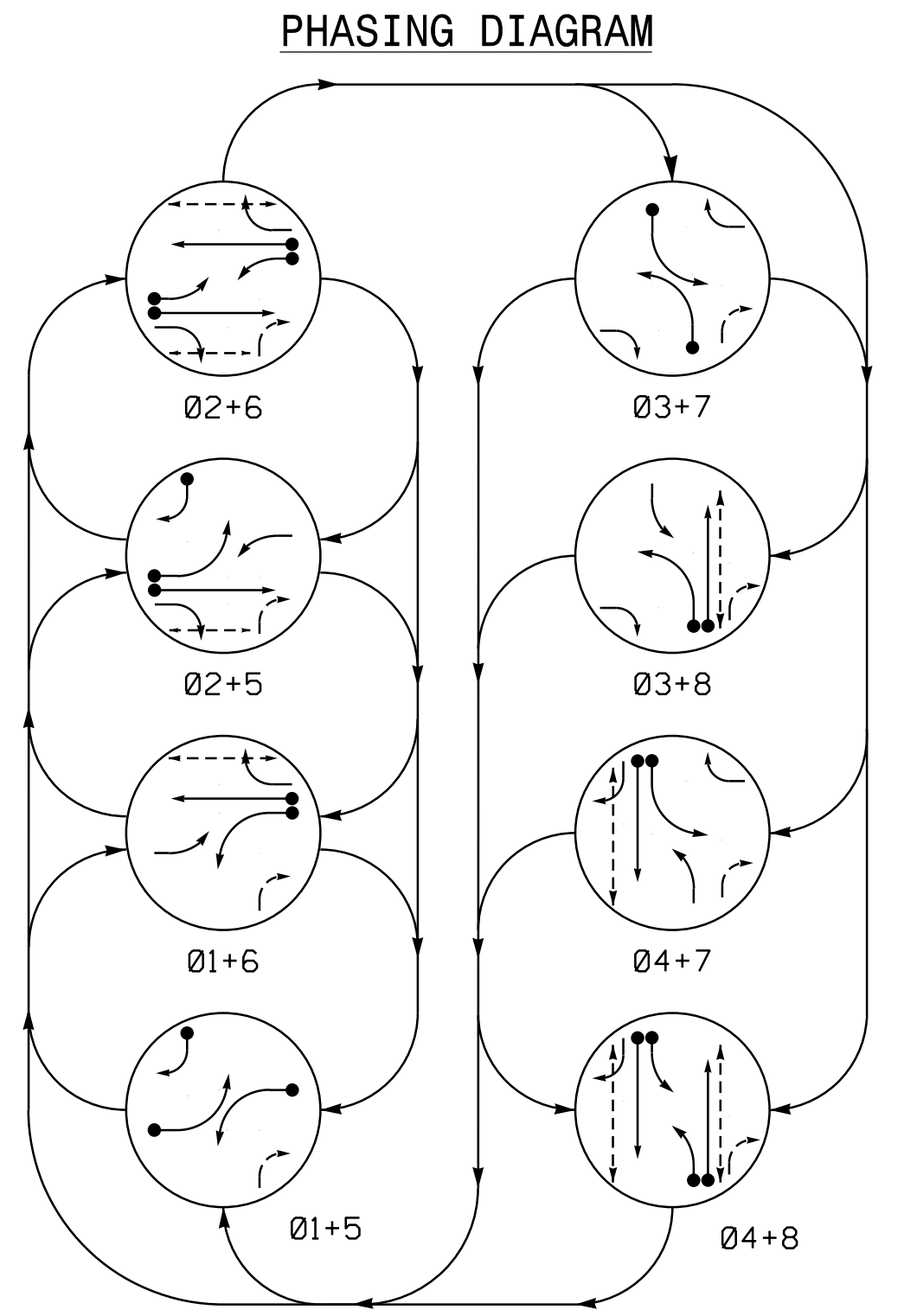
Infrastructure Consulting Services, Inc.



DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NCDOT Wind Zone 4 (90 mph)

	NC 68 at NC 150 (Oak Ridge Road)		
	Division 7 Guilford County Oak Ridge	PLAN DATE: April 2023	
PREPARED BY: JA Wendt	RKA PROJ. NO.: 18062 (040)	SCALE: 0 N/A	SIGNATURE: DATE: 04/05/2023
750 N. Greenfield Pkwy, Garner, NC 27529	REVISIONS:	INIT. DATE:	SIG. INVENTORY NO. 07-088315

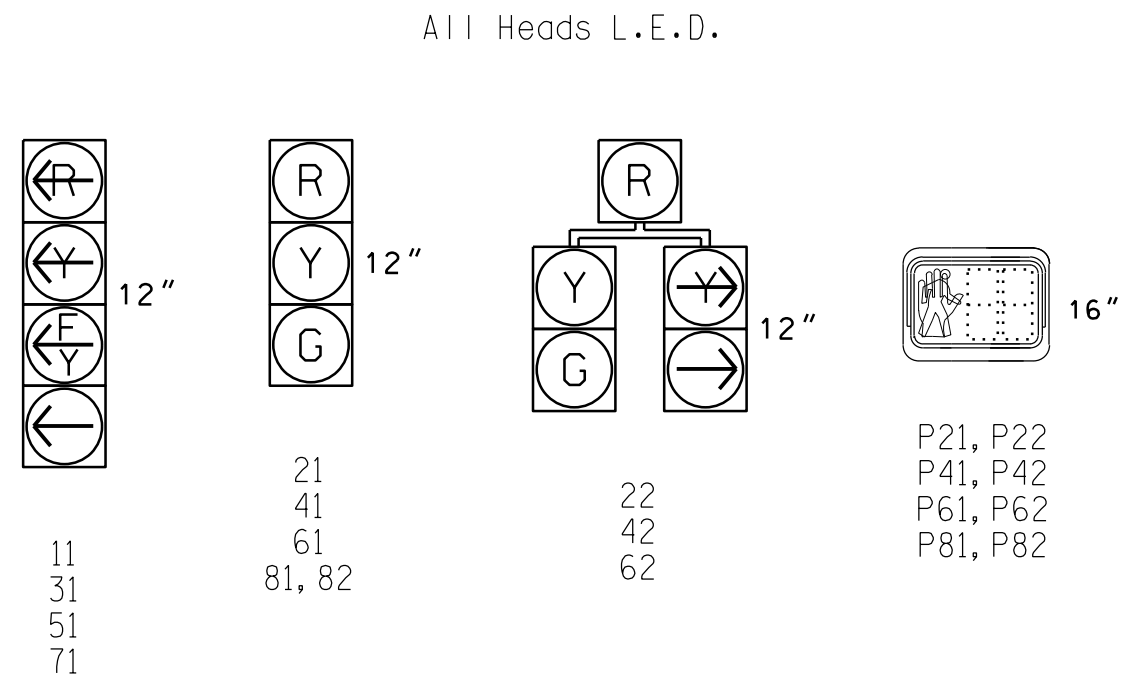


PHASING DIAGRAM DETECTION LEGEND

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

SIGNAL FACE	PHASE							
	01+5	01+6	02+5	02+6	03+7	03+8	04+7	04+8
11	←	←	←	←	←	←	←	←
21	R	R	G	G	R	R	R	Y
22	R	R	G	G	R	R	R	Y
31	←	←	←	←	←	←	←	←
41	R	R	R	R	R	R	G	G
42	R	R	R	R	R	R	G	G
51	←	←	←	←	←	←	←	←
61	R	G	R	G	R	R	R	Y
62	R	G	R	G	R	R	R	Y
71	←	←	←	←	←	←	←	←
81, 82	R	R	R	R	R	G	R	G
P21, P22	DW	DW	W	W	DW	DW	DW	DRK
P41, P42	DW	DW	DW	DW	DW	DW	W	DRK
P61, P62	DW	W	DW	W	DW	DW	DW	DRK
P81, P82	DW	DW	DW	DW	DW	W	DW	DRK

SIGNAL FACE I.D.

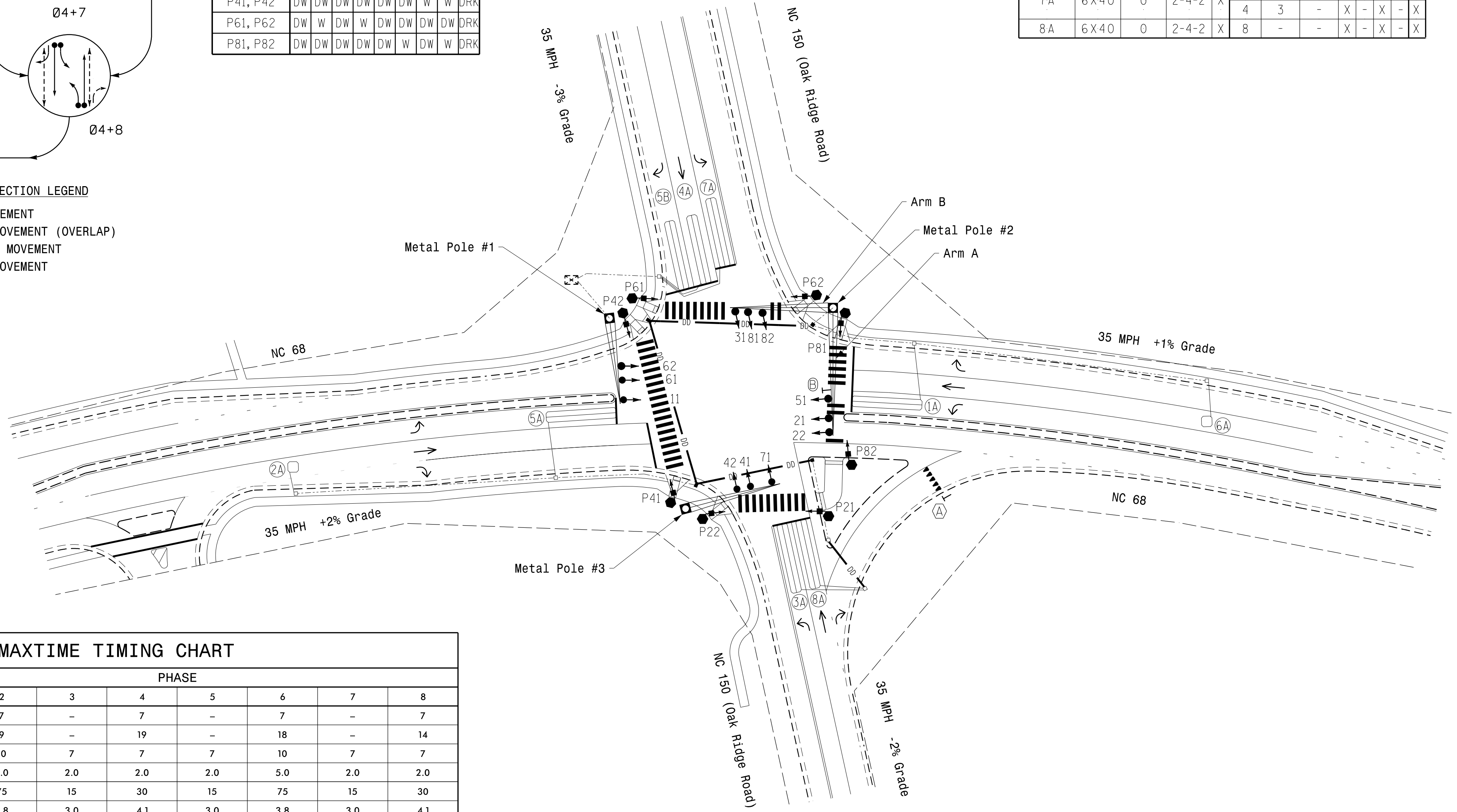


MAXTIME DETECTOR INSTALLATION CHART										
DETECTOR					PROGRAMMING					
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND ADDED INITIAL	CALL DURING GREEN	NEW CARD
1A	6X40	0	2-4-2	X	1	15	-	X	-	X
2A	6X6	200	4	X	2	-	-	X	X	X
3A	6X40	0	2-4-2	X	3	15	-	X	-	X
4A	6X40	0	2-4-2	X	4	-	-	X	-	X
5A	6X40	0	2-4-2	X	5	15	-	X	-	X
5B	6X40	0	2-4-2	X	5	15	-	X	-	X
6A	6X6	200	4	X	6	-	-	X	X	X
7A	6X40	0	2-4-2	X	7	15	-	X	-	X
8A	6X40	0	2-4-2	X	8	-	-	X	-	X

8 Phase Fully Actuated Isolated

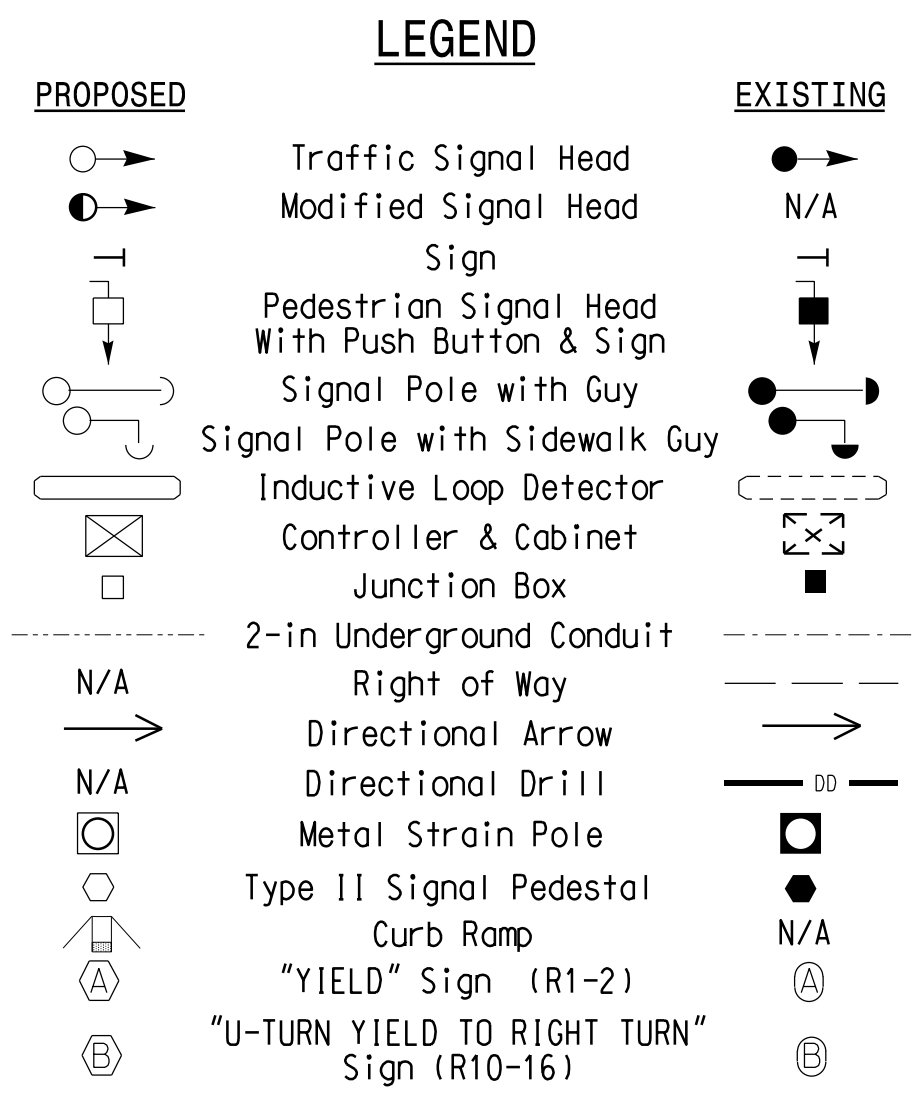
NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Phase 1 and/or phase 5 may be lagged.
- Phase 3 and/or phase 7 may be lagged.
- Set all detector units to presence mode.
- Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
- Program pedestrian heads to countdown the flashing "Don't Walk" time only.



FEATURE	MAXTIME TIMING CHART							
	1	2	3	4	5	6	7	8
Walk *	-	7	-	7	-	7	-	7
Ped Clear *	-	9	-	19	-	18	-	14
Min Green	7	10	7	7	7	10	7	7
Passage *	2.0	5.0	2.0	2.0	2.0	5.0	2.0	2.0
Max I *	15	75	15	30	15	75	15	30
Yellow Change	3.0	3.8	3.0	4.1	3.0	3.8	3.0	4.1
Red Clear	3.2	2.6	3.3	2.5	3.3	2.6	3.4	2.5
Added Initial *	-	2.5	-	-	-	2.5	-	-
Maximum Initial *	-	24	-	-	-	24	-	-
Time Before Reduction *	-	15	-	-	-	15	-	-
Time To Reduce *	-	30	-	-	-	30	-	-
Minimum Gap	-	3.0	-	-	-	3.0	-	-
Advance Walk	-	-	-	-	-	-	-	-
Non Lock Detector	X	-	X	X	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 - Final Design

Infrastructure Consulting Services, Inc.
RAMEY KEMP ASSOCIATES
9800 Farrington Place
Raleigh, North Carolina 27609
Phone: 919-872-6115

NC 68 at NC 150 (Oak Ridge Road)

Division 7 Guilford County Oak Ridge

PLAN DATE: April 2023 REVIEWED BY: TS Popelka

PREPARED BY: JA Wentt RKA PROJ. NO.: 18062 (040)

REVISIONS: _____ INIT. DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL

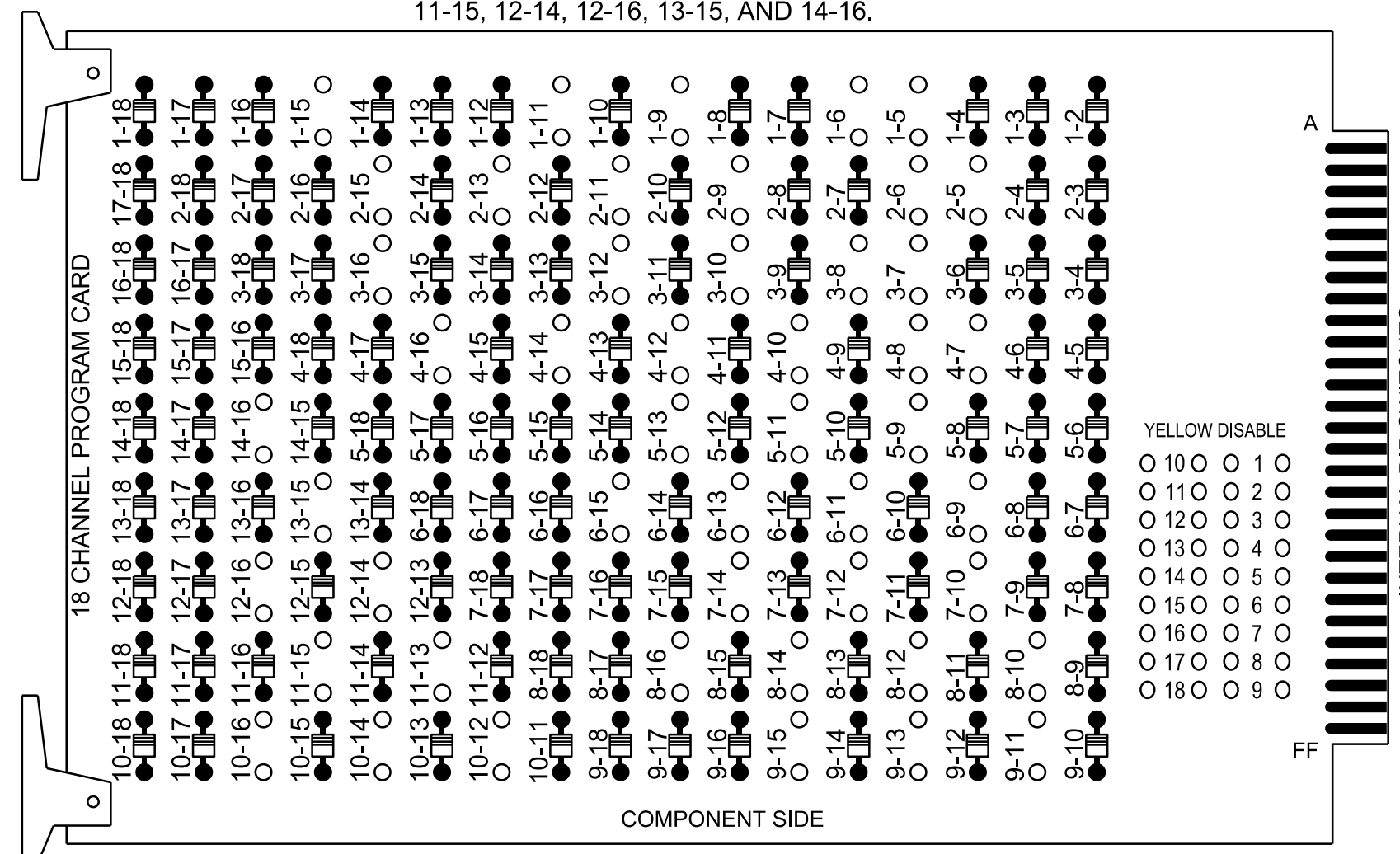
Timothy S. Popelka
Professional Engineer
04/05/2023
DATE

SIG. INVENTORY NO. 07-0883

18 CHANNEL CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

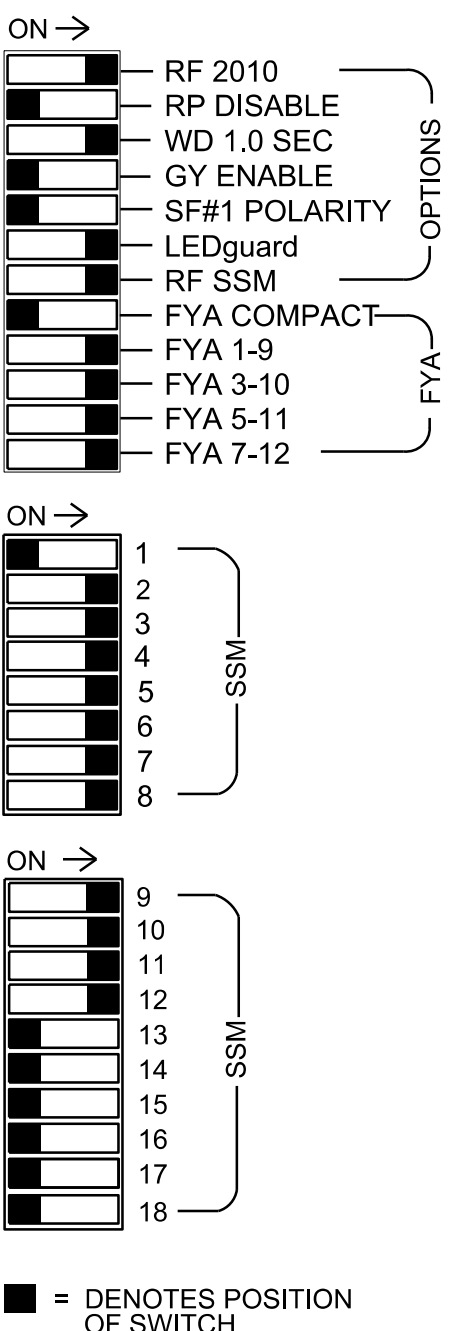
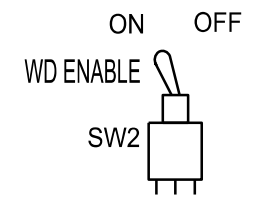
REMOVE DIODE JUMPERS 1-5, 1-6, 1-9, 1-11, 1-15, 2-5, 2-6, 2-9, 2-11, 2-13, 2-15, 3-7, 3-8, 3-10, 3-12, 3-16, 4-7, 4-8, 4-10, 4-12, 4-14, 4-16, 5-9, 5-11, 5-13, 6-9, 6-11, 6-13, 6-15, 7-10, 7-12, 7-14, 8-10, 8-12, 8-14, 8-16, 9-11, 9-13, 9-15, 10-12, 10-14, 10-16, 11-13, 11-15, 12-14, 12-16, 13-15, AND 14-16.



REMOVE JUMPERS AS SHOWN

NOTES:

- Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
- Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
- Ensure that the Red Enable is active at all times during normal operation.
- 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 Walk and 6 Walk.
- If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.

EQUIPMENT INFORMATION

Controller.....2070LX
 Cabinet.....332 w/ Aux
 Software.....Q-Free MAXTIME
 Cabinet Mount.....Base
 Output File Positions.....18 With Aux. Output File
 Load Switches Used.....S1, S2, S3, S4, S5, S6, S7, S8, S9, S10, S11, S12, AUX S1, AUX S2, AUX S4, AUX S5
 Phases Used.....1, 2, 2PED, 3, 4, 4PED, 5, 6, 6PED, 7, 8, 8PED
 Overlap "1".....*
 Overlap "2".....*
 Overlap "3".....*
 Overlap "4".....*
 *See overlap programming detail on sheet 2

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6				
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18				
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE				
SIGNAL HEAD NO.	11	21,22	P21, P22	31	22	41,42	P41, P42	51	42	61,62	P61, P62	71	62	81,82	P81, P82	11	31	NU	51	71	NU	
RED		128		*		101		*		134		*		107								
YELLOW	*	129				102				135				108								
GREEN		130				103				136				109								
RED ARROW														A121	A124				A114	A101		
YELLOW ARROW						117				132				123					A122	A125	A115	A102
FLASHING YELLOW ARROW																			A123	A126	A116	A103
GREEN ARROW	127					118	118			133	133			124	124							
Hand						113				104				119							110	
Walking						115				106				121							112	

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)

FILE	1	2	3	4	5	6	7	8	9	10	11	12	13	14
U	∅ 1 1A	∅ 2 2A	∅ 3 3A	∅ 4 4A	∅ 5 5A	∅ 6 6A	∅ 7 7A	∅ 8 8A	∅ 2 PED 4 PED	∅ 6 PED 8 PED	FS	DC ISOLATOR	DC ISOLATOR	DC ISOLATOR
L	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED
U	∅ 5 5A	∅ 5 5B	∅ 6 6A	∅ 7 7A	∅ 8 8A	∅ 9 9A	∅ 10 10A	∅ 11 11A	∅ 12 12A	∅ 13 13A	∅ 14 14A	∅ 15 15A	∅ 16 16A	∅ 17 17A
L	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED

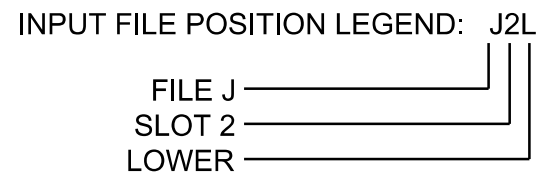
EX.: 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE
 ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN
1A	TB2-1,2	I1U	56	18	1	1	15		X		X	
2A	TB2-5,6	I2U	39	-	29	6	3		X	X	X	X
3A	TB4-5,6	I6U	58	20	7	3	15		X		X	
4A	TB4-9,10	I6U	41	3	30	8	3		X		X	
5A	TB3-1,2	J1U	55	17	15	5	15		X		X	
5B	TB3-5,6	J2U	40	-	31	2	3		X		X	X
6A	TB3-9,10	J3U	64	30	18	6			X	X	X	
7A	TB5-5,6	J5U	57	19	21	7	15		X		X	
8A	TB5-9,10	J6U	42	4	32	4	3		X		X	
PED PUSH BUTTONS												
P21,P22	TB8-4,6	I12U	67	33	2	PED 2						
P41,P42	TB8-5,6	I12L	69	35	4	PED 4						
P61,P62	TB8-7,9	I13U	68	34	6	PED 6						
P81,P82	TB8-8,9	I13L	70	36	8	PED 8						

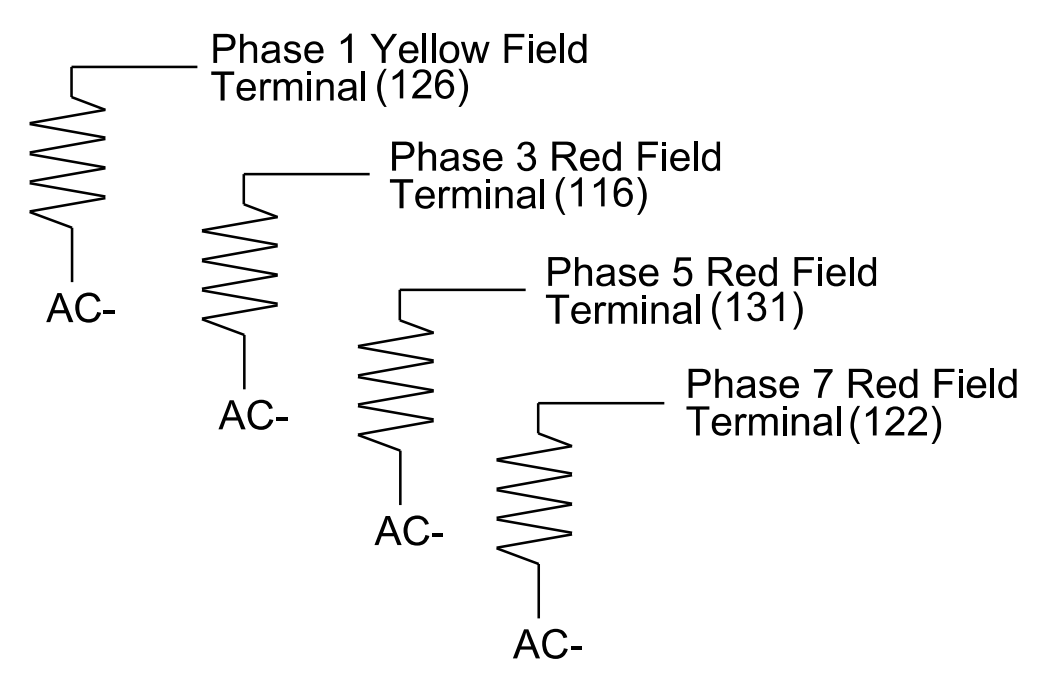
NOTE: INSTALL DC ISOLATORS IN INPUT FILE SLOTS I12 AND I13.



LOAD RESISTOR INSTALLATION DETAIL

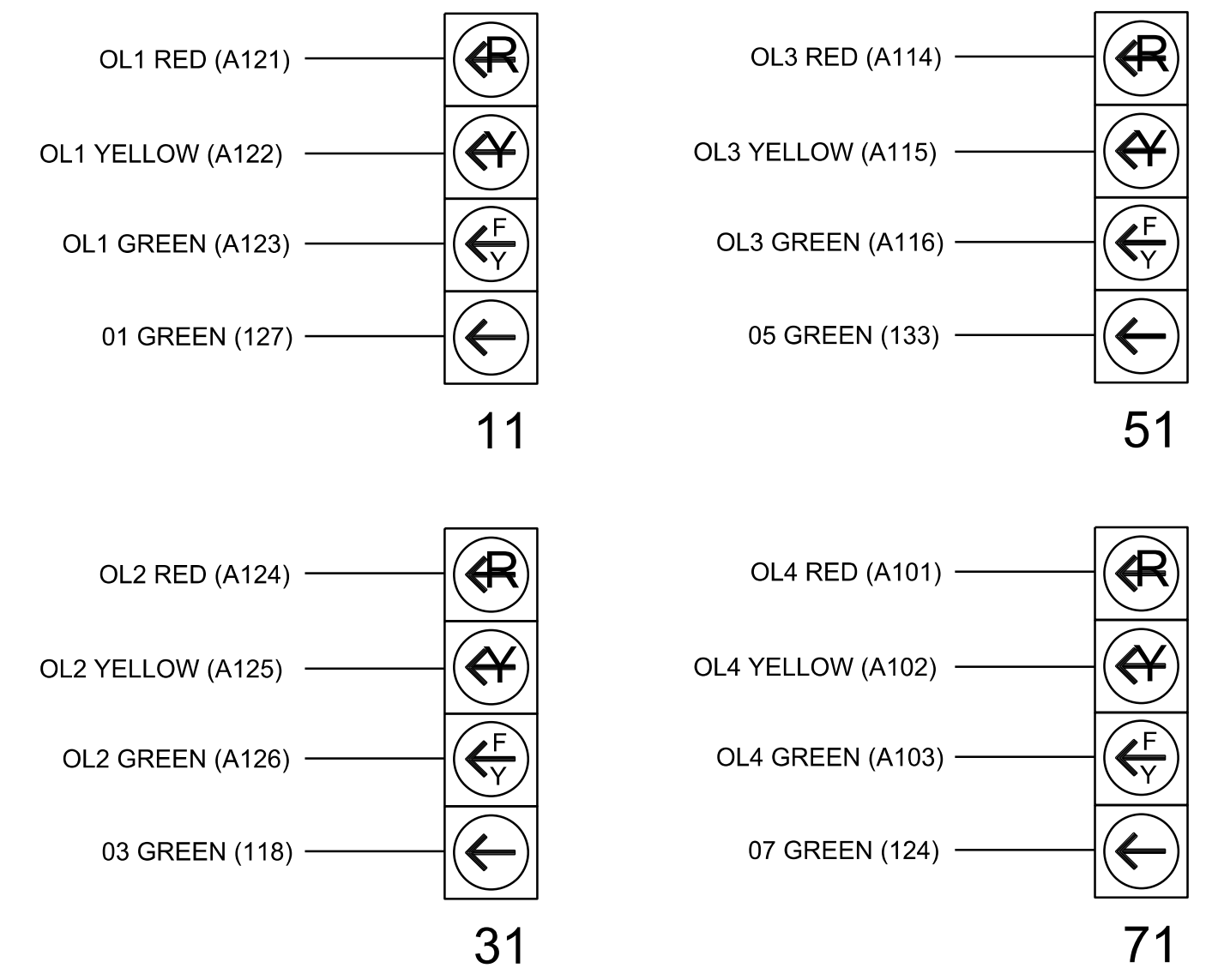
(install resistors as shown)

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



FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 07-0883
 DESIGNED: Apr 2023
 SEALED: 04/05/2023
 REVISED: N/A

Electrical Detail - Sheet 1 of 2
 Final Design

 Infrastructure Consulting Services, Inc. 5808 Farrington Place Raleigh, North Carolina 27609 Phone: 919-872-5116 NC License No. F-1489 www.rameykemp.com	DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
	SEAL NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 051573 TIMOTHY S. POPELKA
NC 68 at NC 150 (Oak Ridge Road) Division 7 Guilford County Oak Ridge PLAN DATE: April 2023 REVIEWED BY: TS Popelka PREPARED BY: JA Wendt RKA PROJ. NO.: 18062 (040)	REVISIONS INIT. DATE _____ _____ _____
750 N. Greenfield Phwy, Garner, NC 27529	TIMOTHY S. POPELKA DATE: 04/05/2023 SIGNATURE SIG. INVENTORY NO. 07-0883

FLASHER CIRCUIT MODIFICATION DETAIL

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

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

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

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	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section
Included Phases	2	4	6	8
Modifier Phases	1	3	5	7
Trail Green	0	0	0	0
Trail Yellow	0.0	0.0	0.0	0.0
Trail Red	0.0	0.0	0.0	0.0

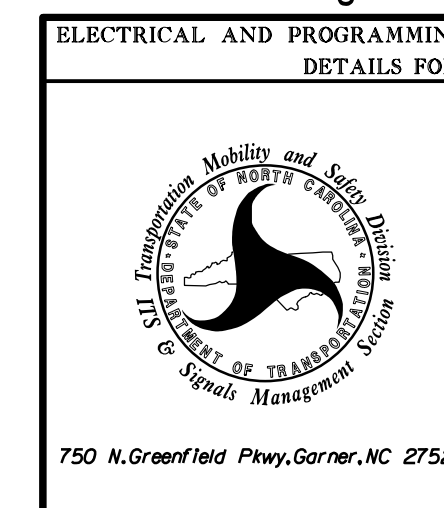
COUNTDOWN PEDESTRIAN SIGNAL OPERATION

Countdown Ped Signals are required to display timing only during Ped Clearance Interval. Consult Ped Signal Module user's manual for instructions on selecting this feature.

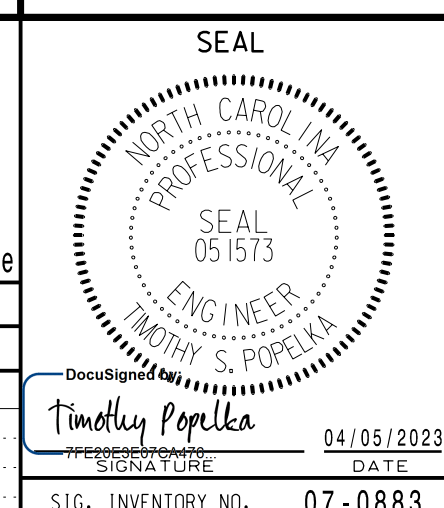
THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-0883
DESIGNED: Apr 2023
SEALED: 04/05/2023
REVISED: N/A

Electrical Detail - Sheet 2 of 2
Final Design

DOCUMENT NOT CONSIDERED
FINAL UNLESS ALL
SIGNATURES COMPLETED



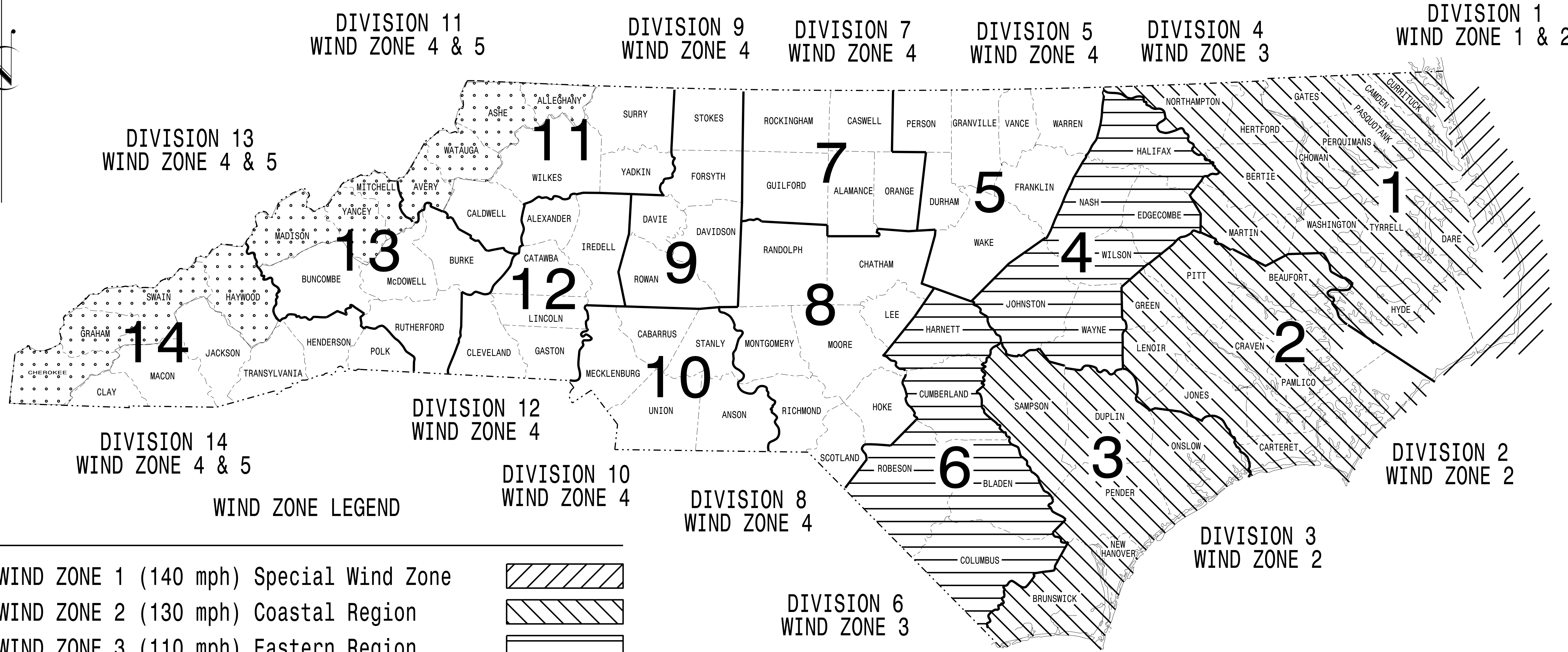
ELECTRICAL AND PROGRAMMING DETAILS FOR:		NC 68 at NC 150 (Oak Ridge Road)	
PLAN DATE:	April 2023	REVIEWED BY:	TS Popelka
PREPARED BY:	JA Wendt	RKA PROJ. NO.:	18062 (040)
REVISIONS	INIT.	DATE	



STATE OF NORTH CAROLINA DIVISION OF HIGHWAYS

PROJECT I.D. NO.	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

NCDOT CONTACTS:

MOBILITY AND SAFETY DIVISION - ITS AND SIGNALS UNIT

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

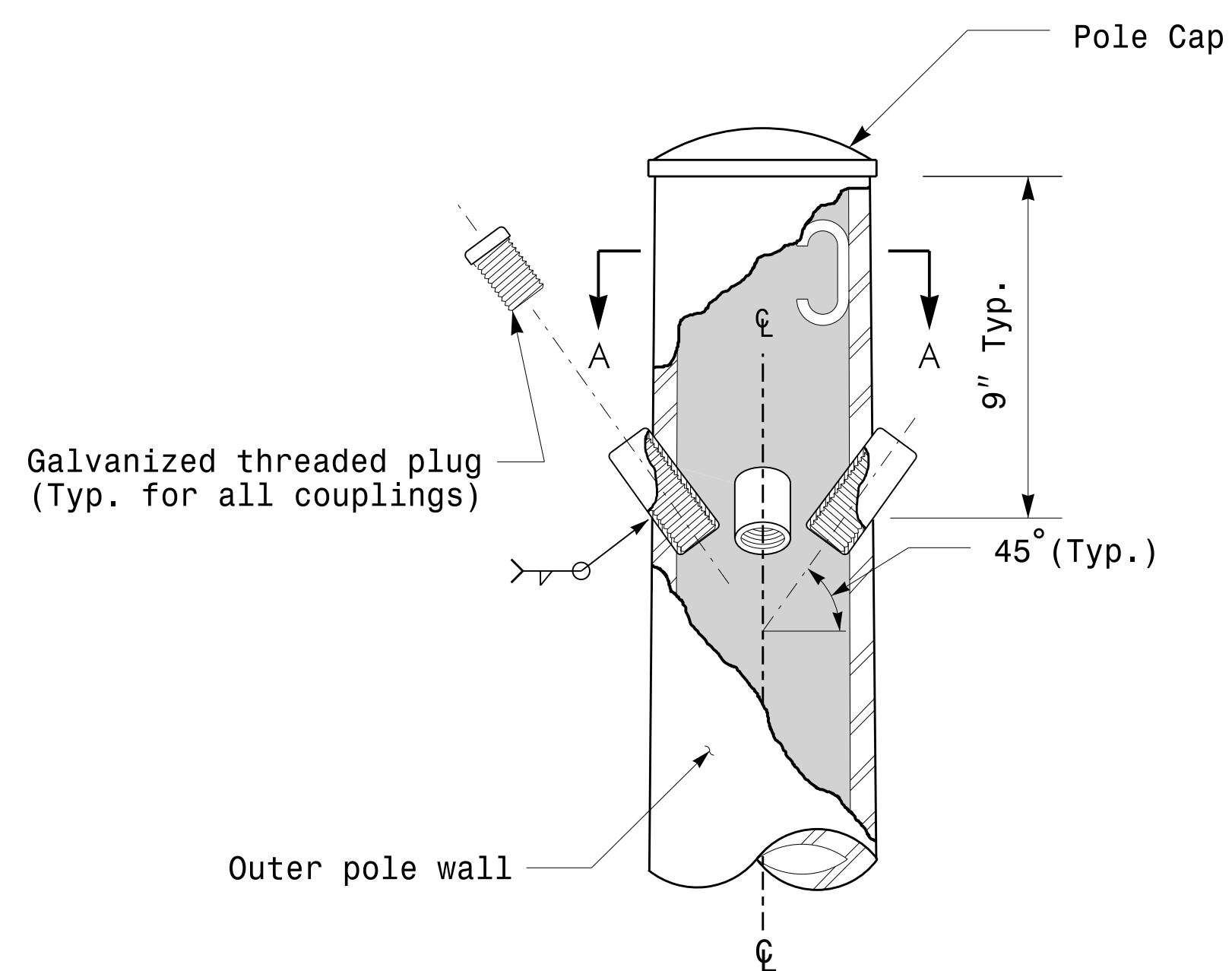
J.P. GALLOWAY, P.E. - STATE SIGNALS ENGINEER

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

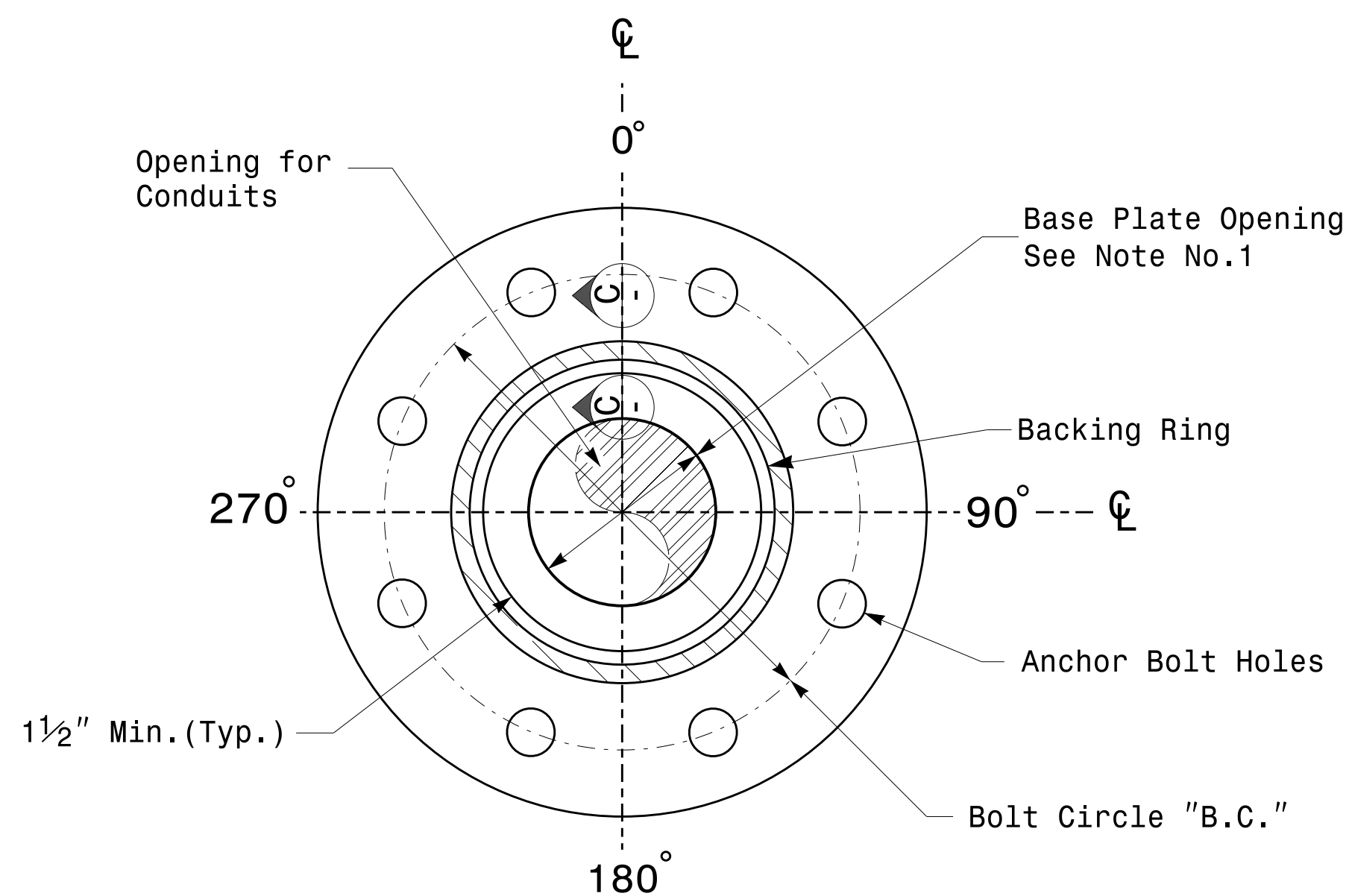
SEAL

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

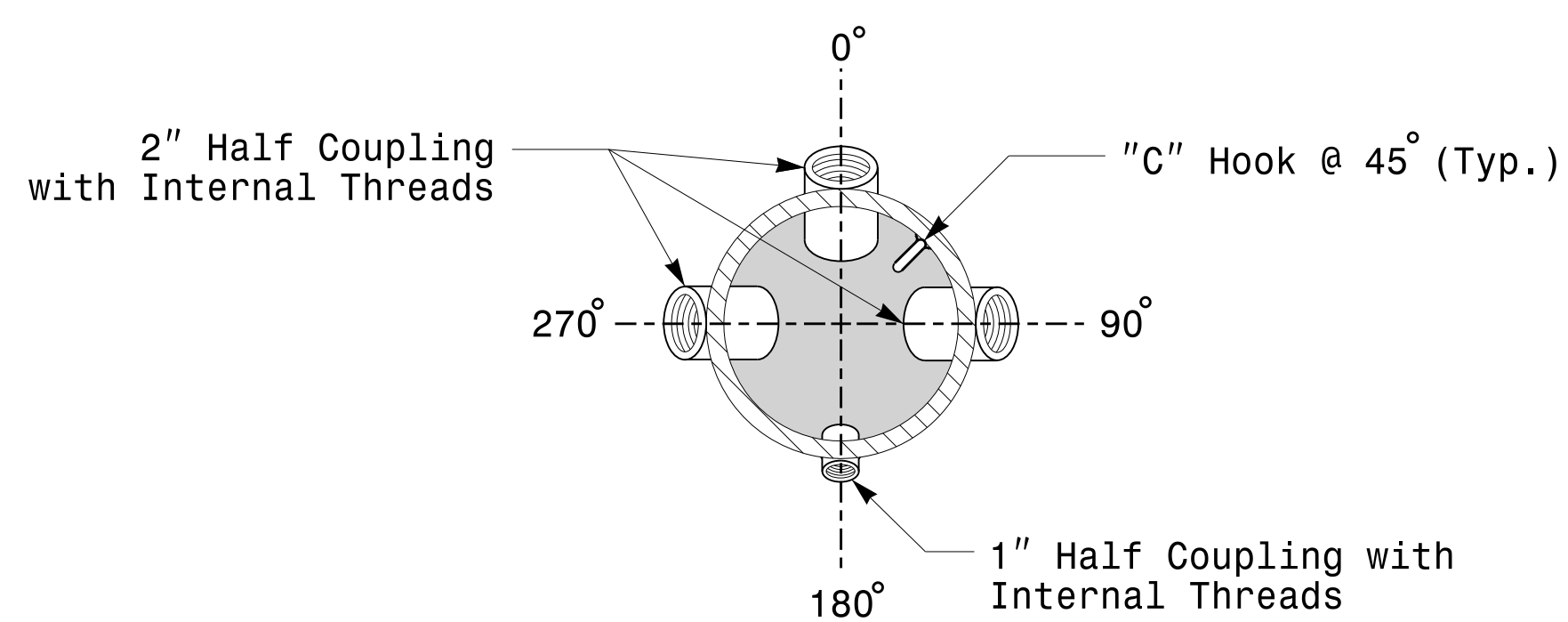
Note:
 1. Opening in pole base plate shall be equal to pole base inside diameter minus 3 1/2" but shall not be less than 8 1/2".



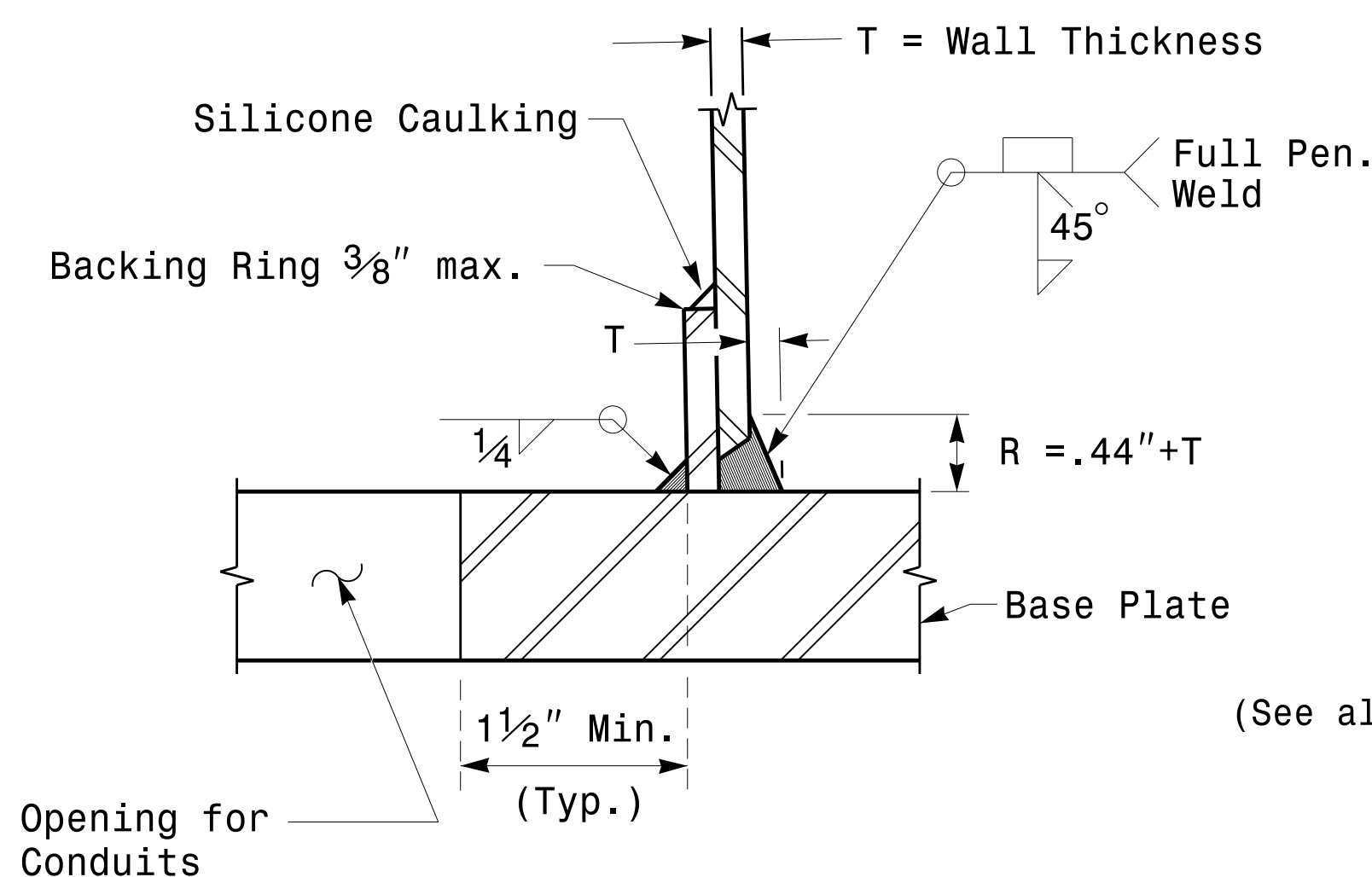
Cable Entrances at Top of Pole



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

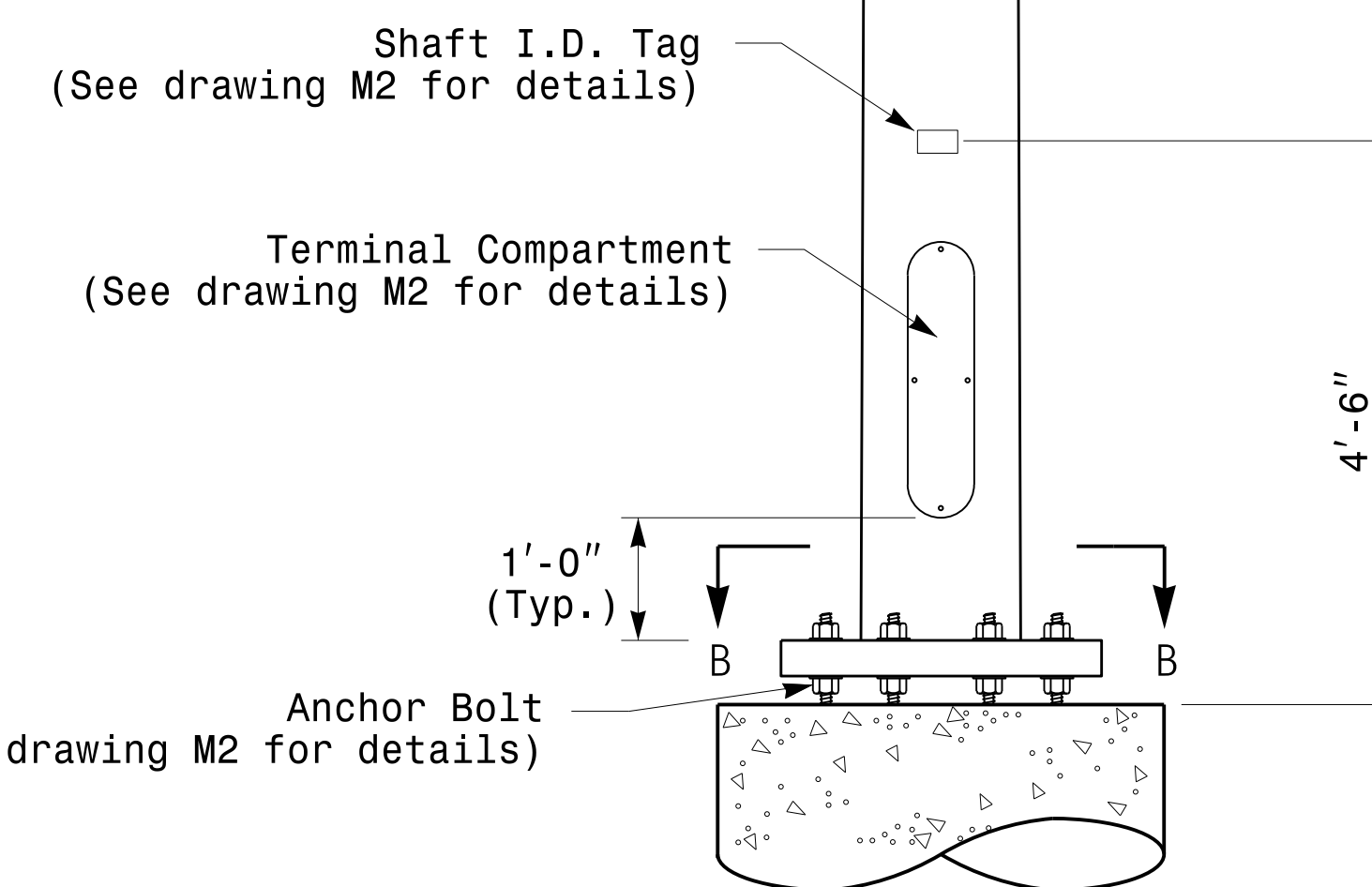


Section A-A
Radial Orientation for Factory Installed
Accessories at Top of Pole



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

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



Monotube Strain Pole

Prepared in the Offices of:

 750 N. Greenleaf Pkwy, Garner, NC 27529

SCALE: 0 NONE

Typical Fabrication Details For Strain Poles

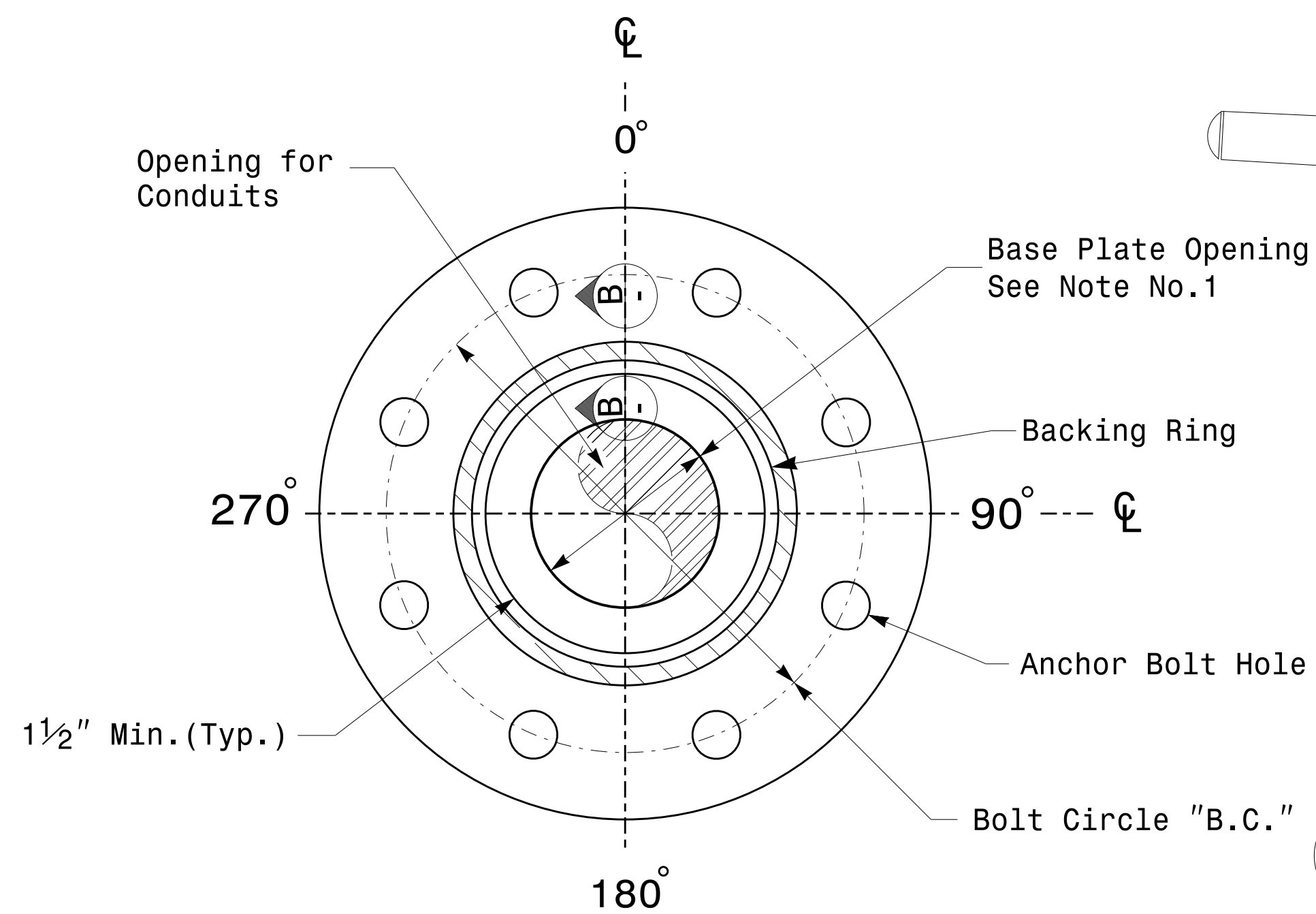
PLAN DATE: OCTOBER 2017	DESIGNED BY: K.C. DURIGON
PREPARED BY: N. BITTING	REVIEWED BY: D.C. SARKAR
REVISIONS	INIT. DATE

SEAL

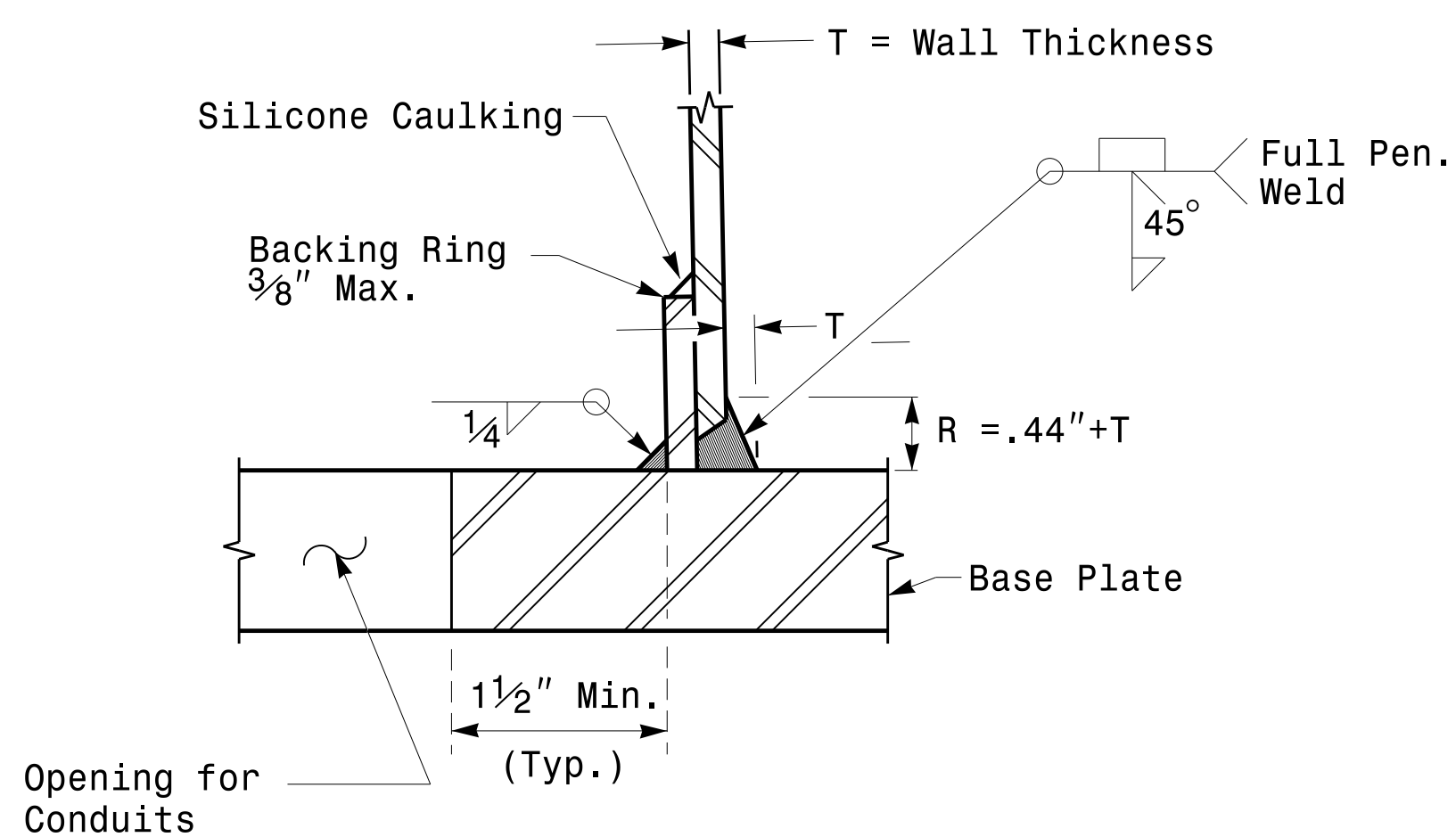
DocuSigned by:
 Debesh C. Sarkar
 44EBE7816FA4F49E

10/11/2017
 DATE

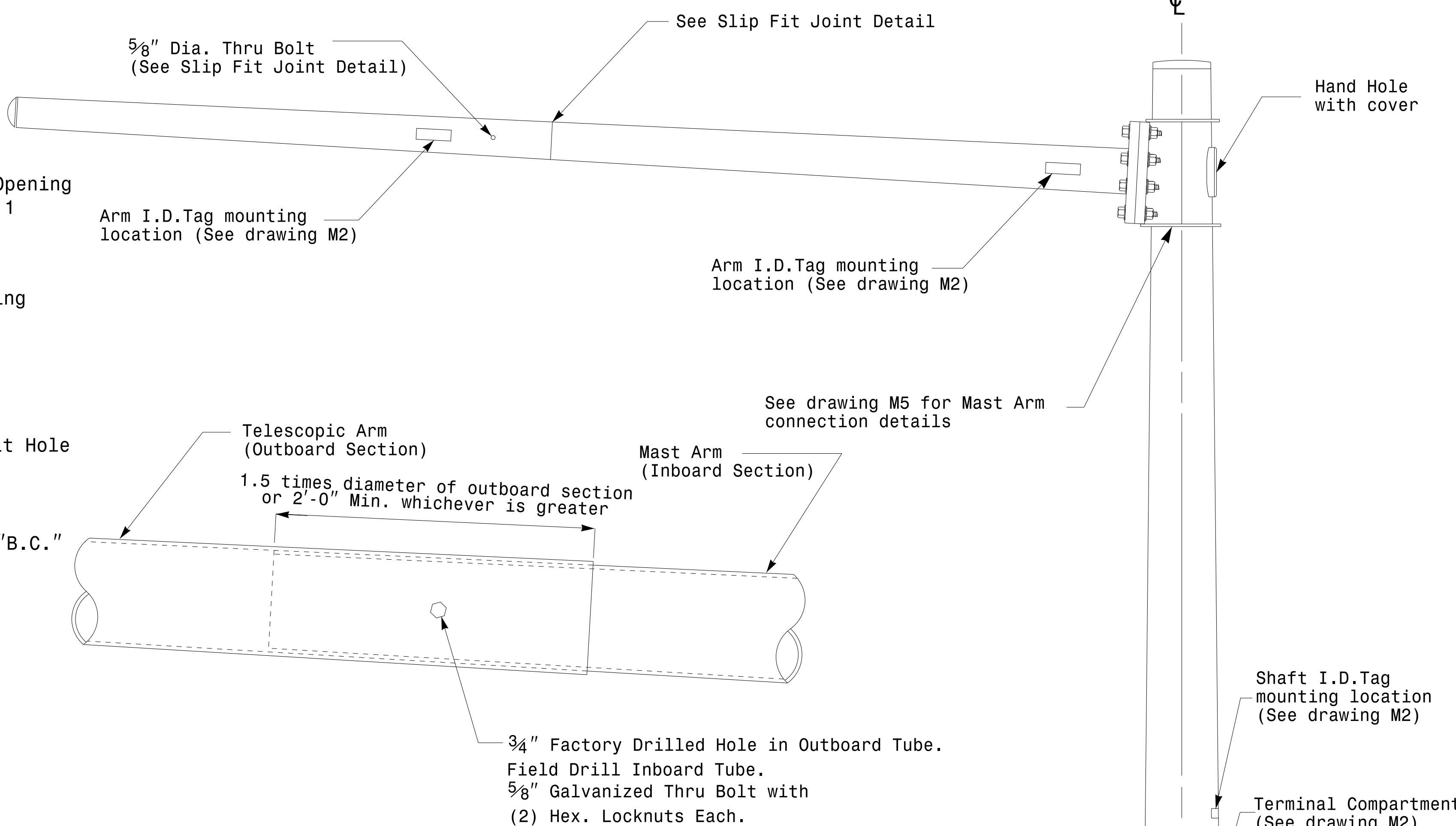
Note:
1. Opening in pole base plate shall be equal to pole base inside diameter minus 3 1/2" but shall not be less than 8 1/2".



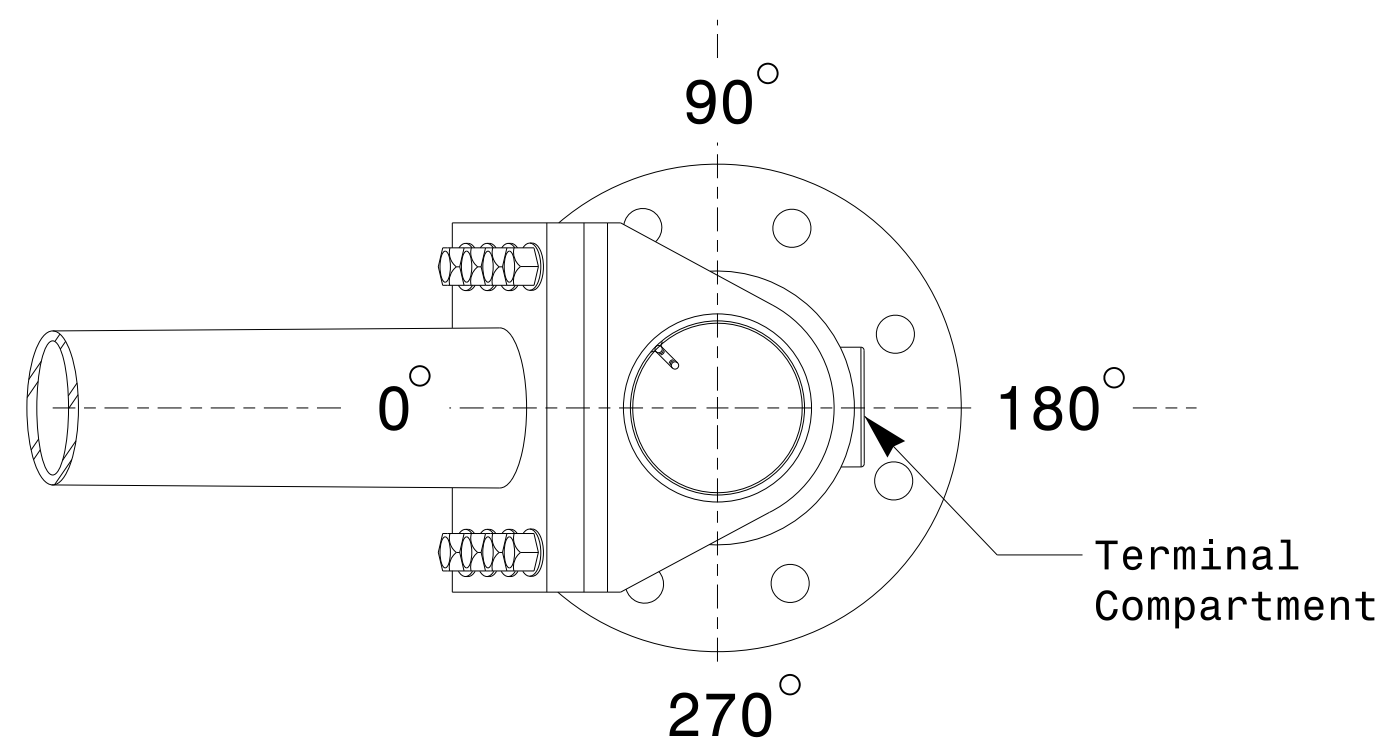
Section A-A
Pole Base Plate Details



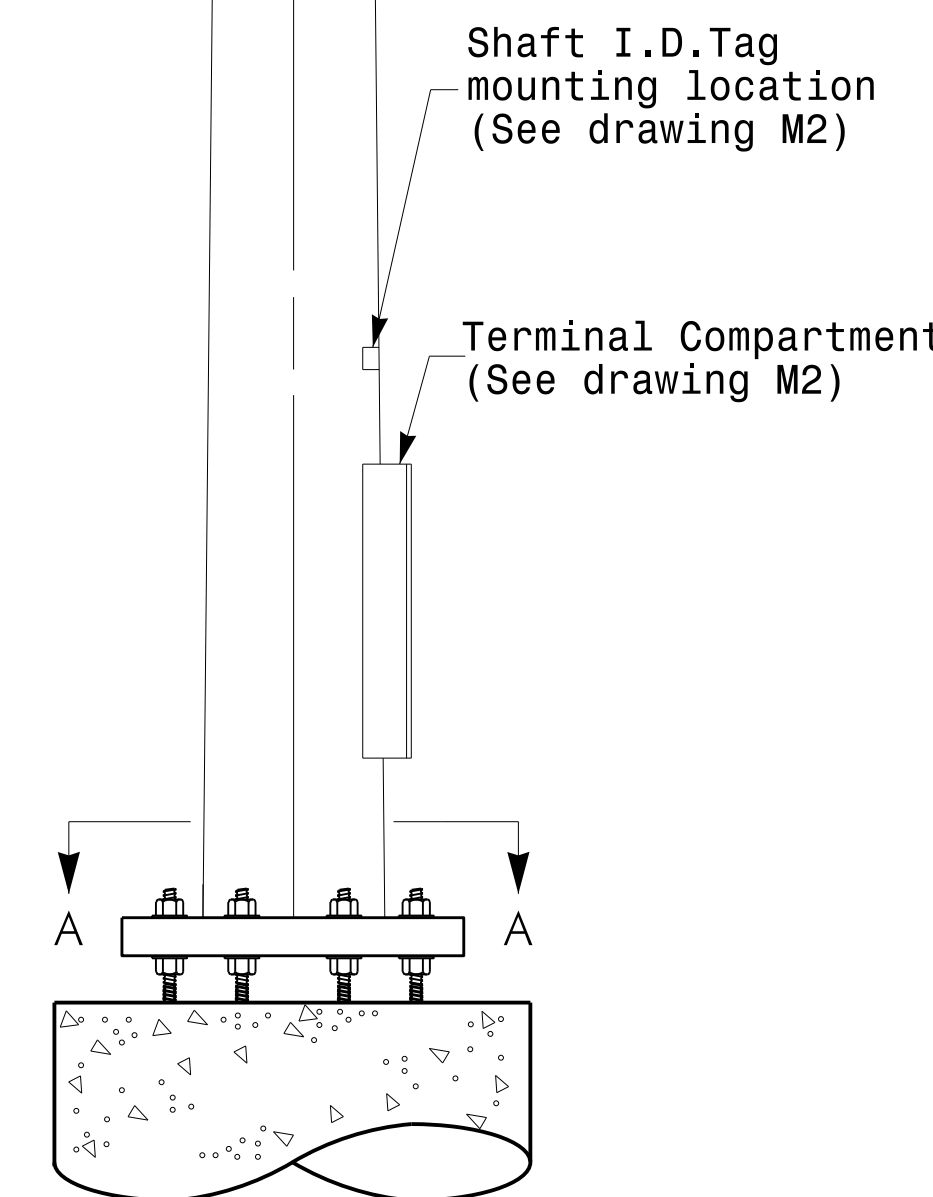
Section B-B
(Pole Attachment to Base Plate)
Full-Penetration Groove Weld Detail



Slip Fit Joint Detail for Mast Arm



Mast Arm Radial Orientation



Mast Arm Pole

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

11-001-2017-08433
 136504115 Signal Design Section
 Design Section Eastern Region
 Sheets 2016-2014 Sig.M4 Std. Fabrication Detail - Mast Arm Poles.dgn
 10/11/2017

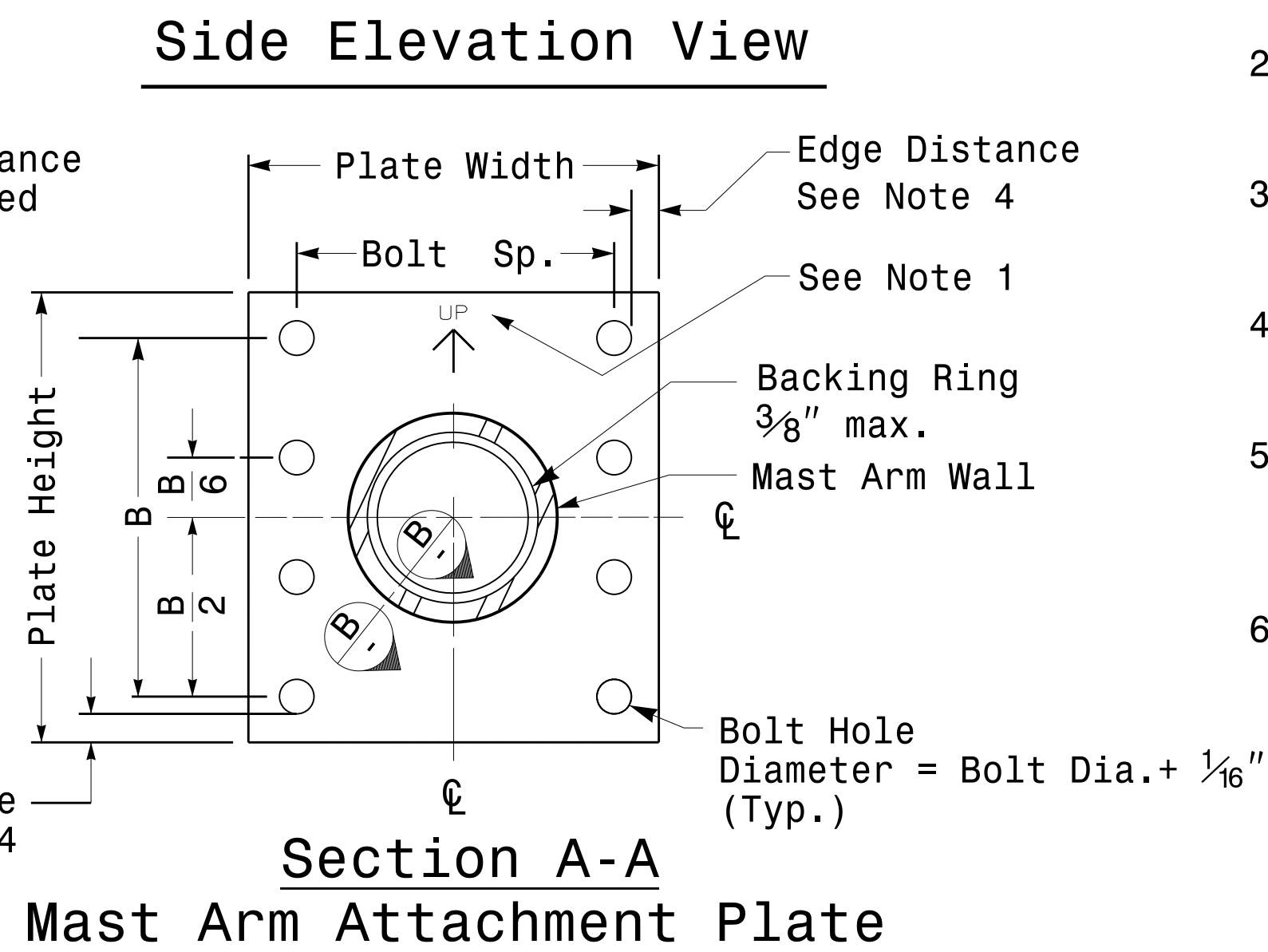
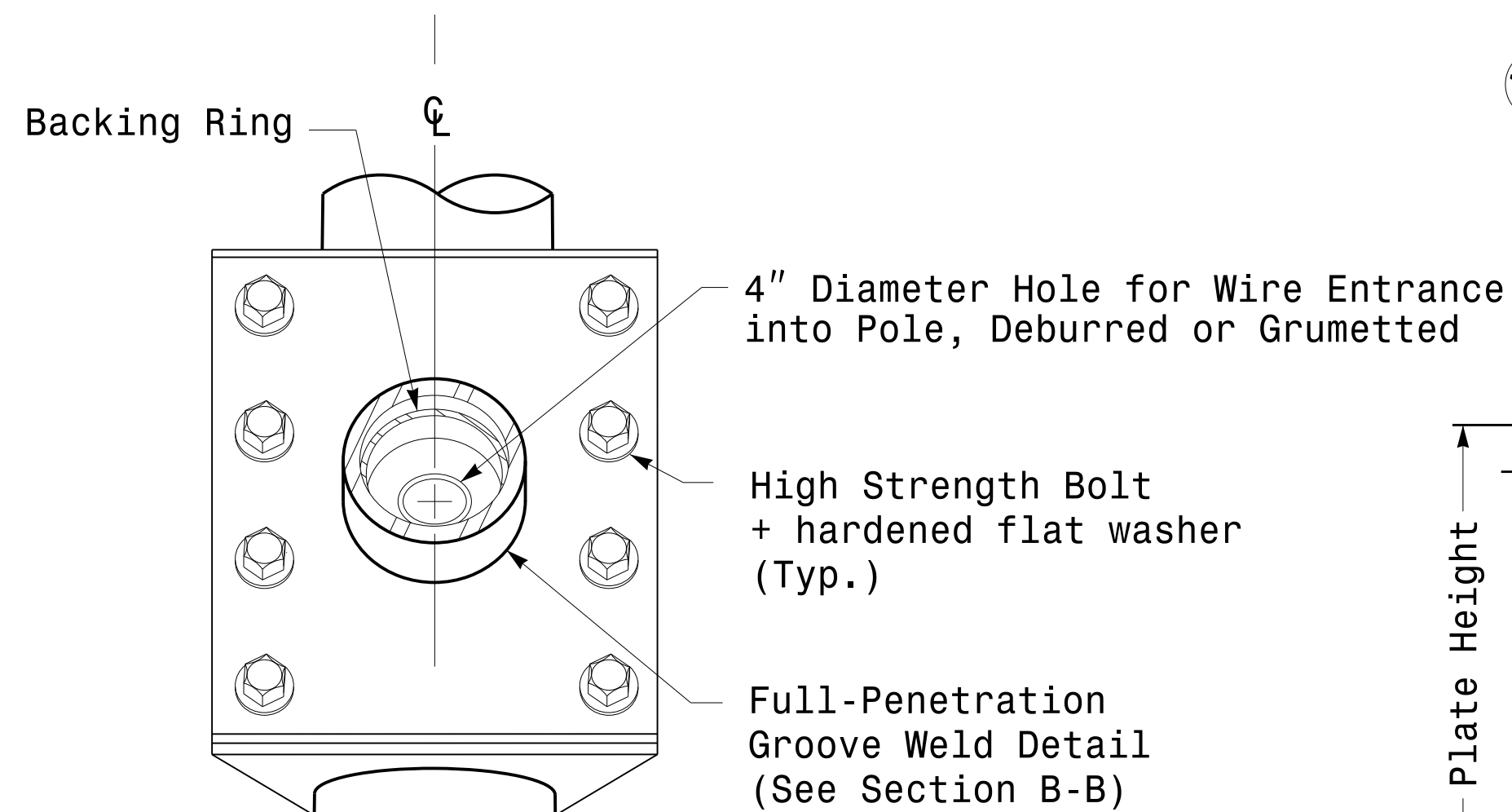
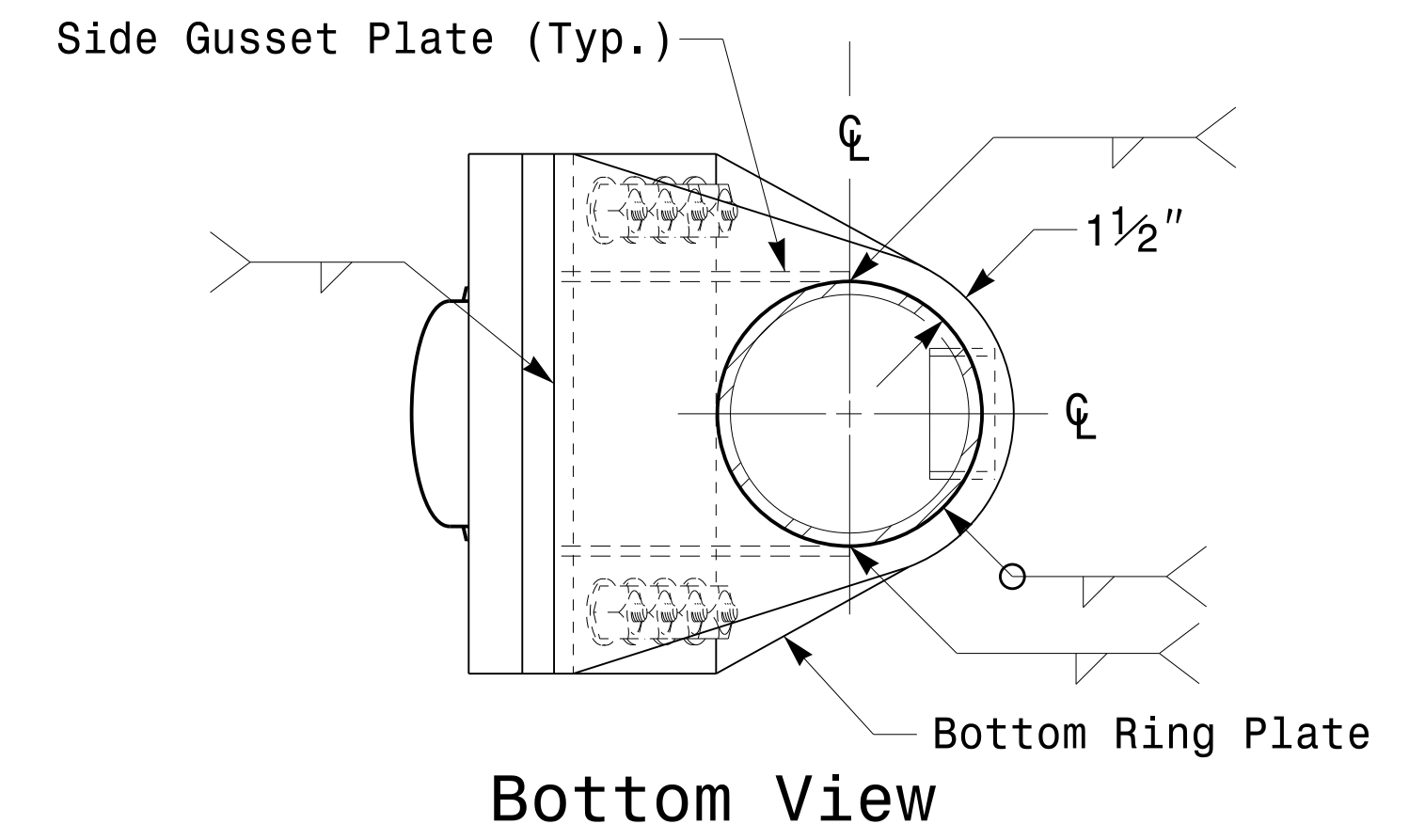
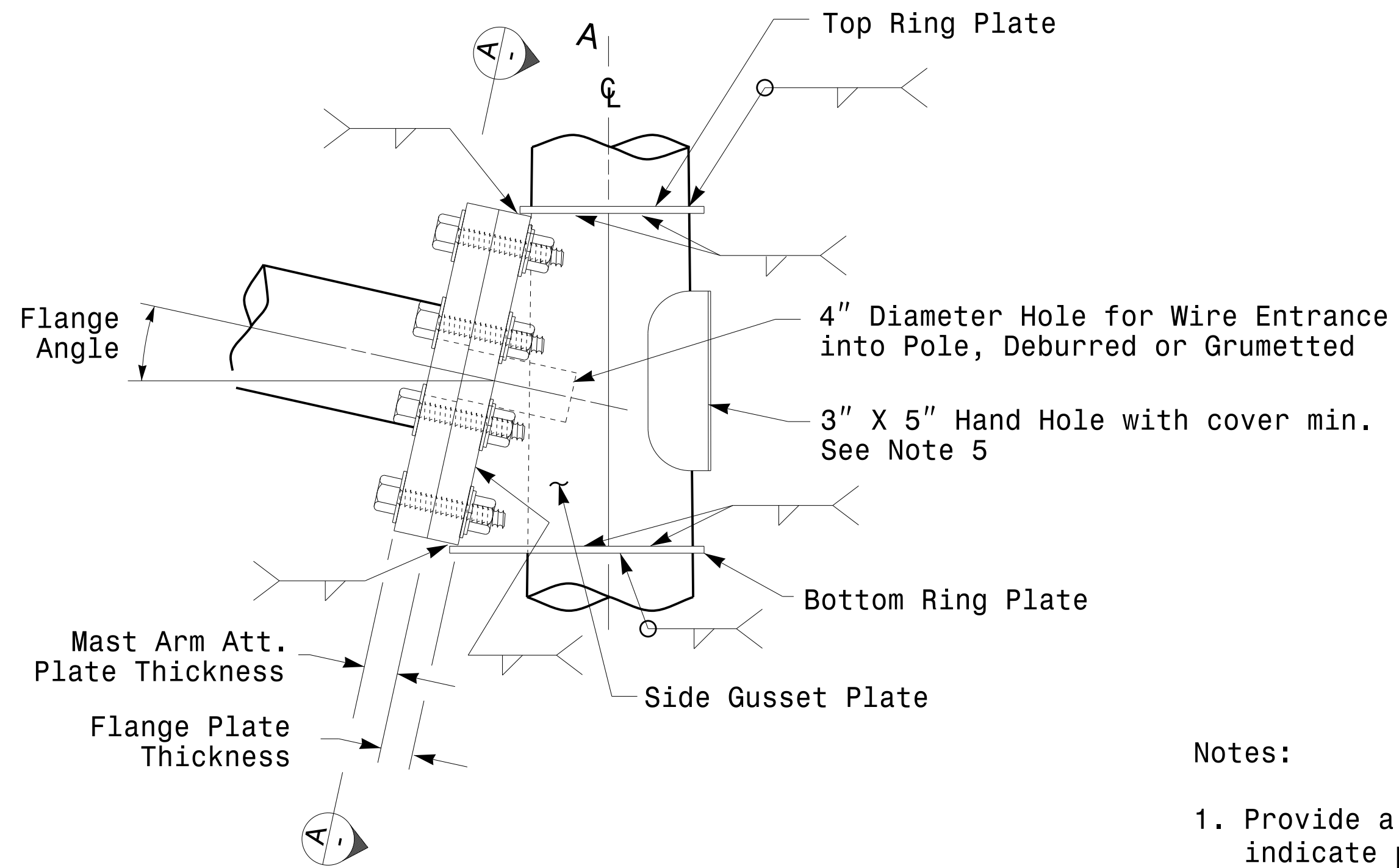
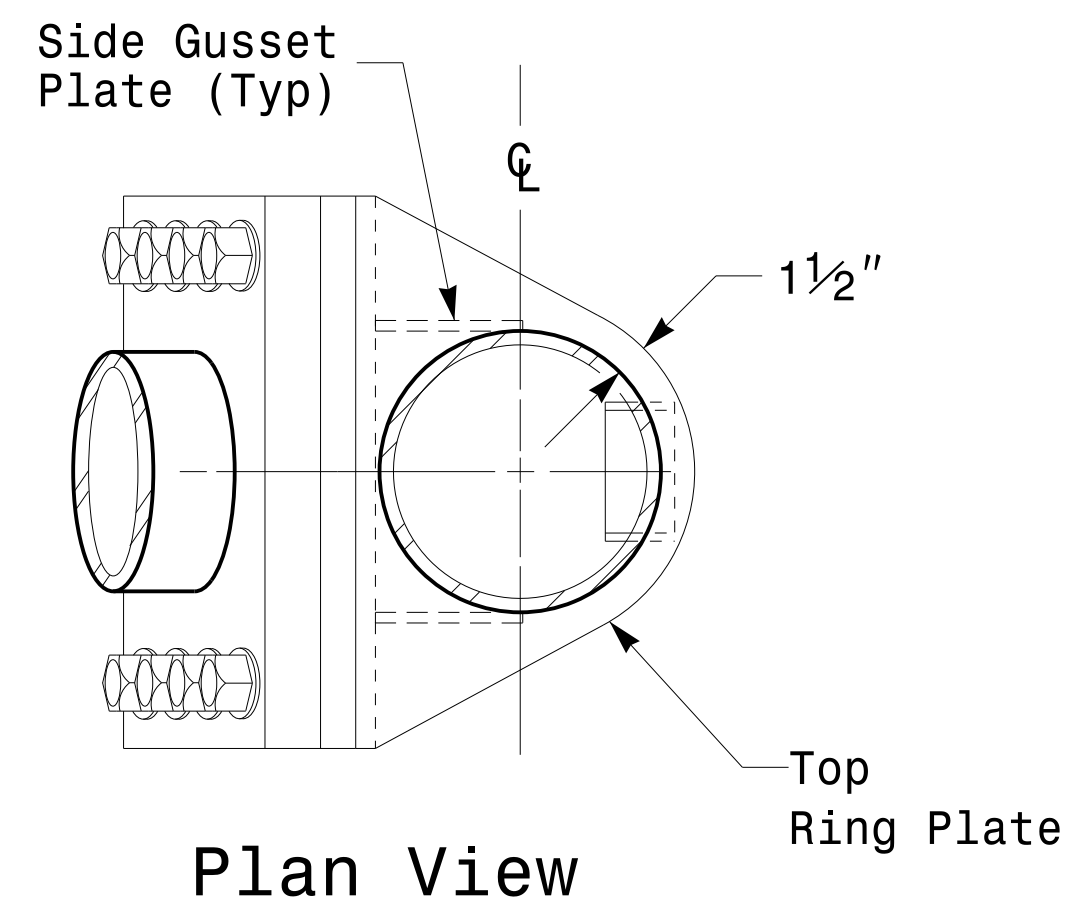
Fabrication Details - Mast Arm Poles

Welded Ring Stiffened Mast Arm Connection

PROJECT ID. NO.

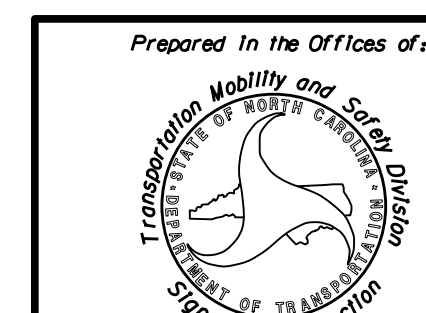
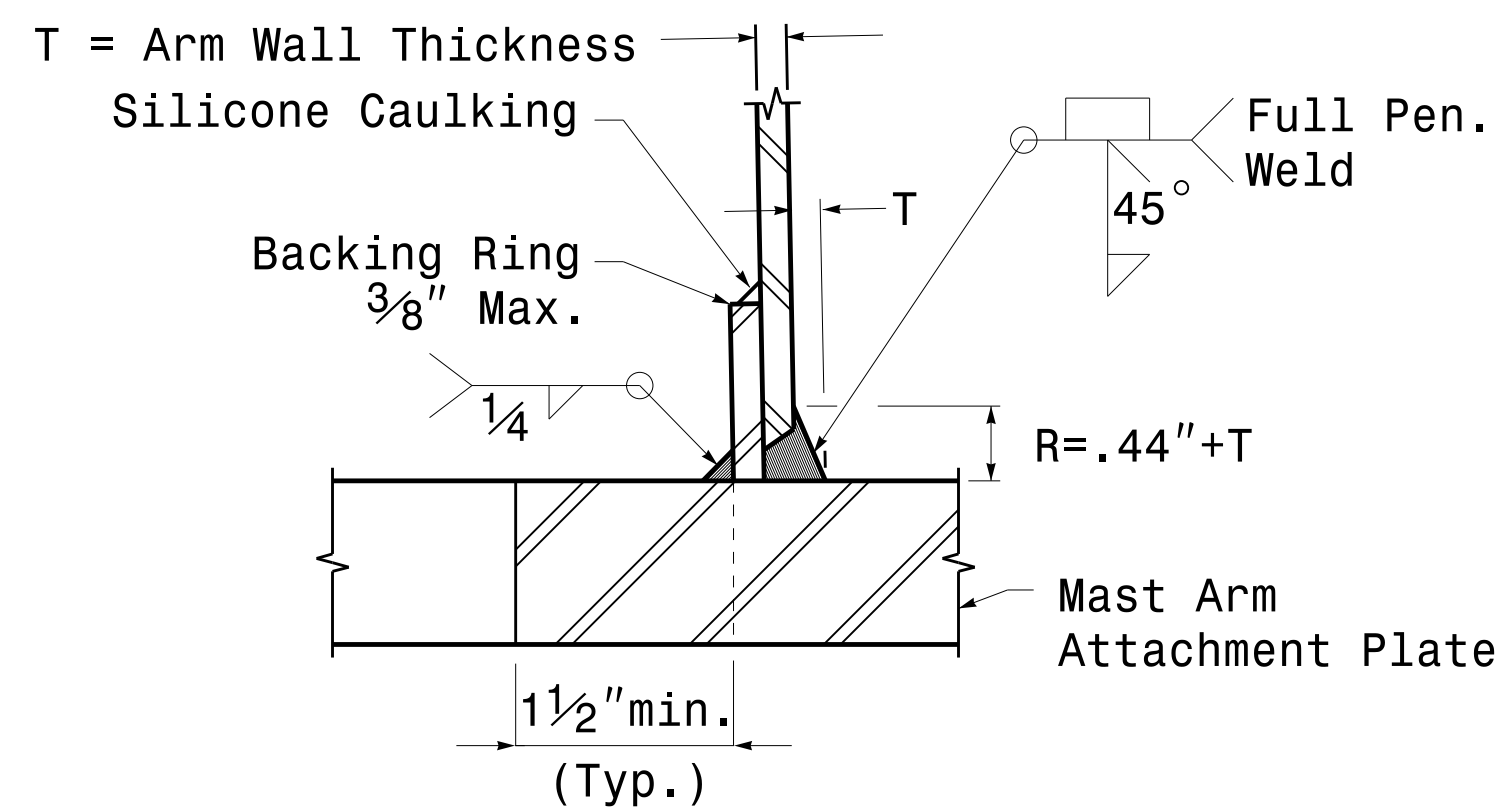
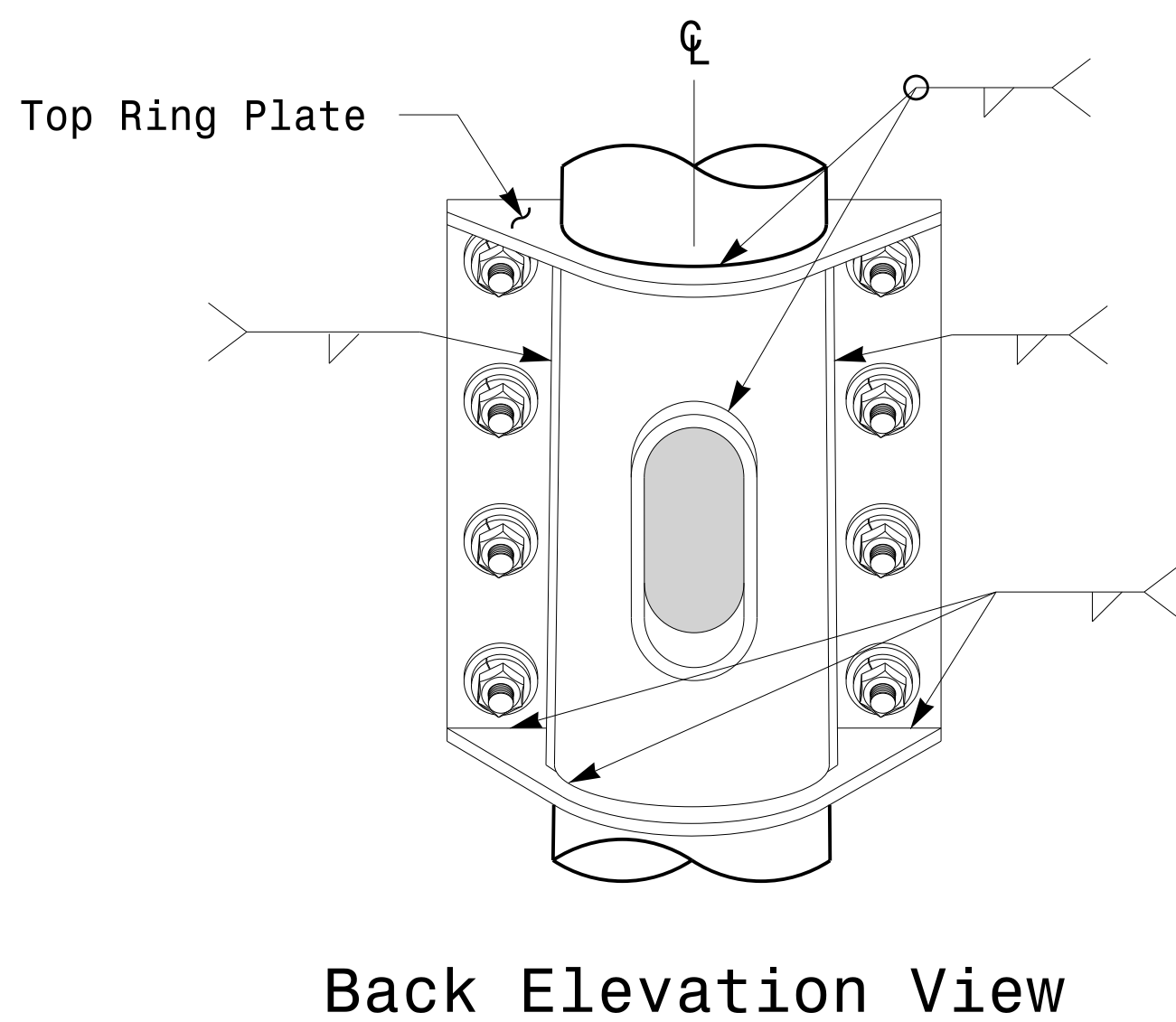
SHEET NO.

Sig.M5



Notes:

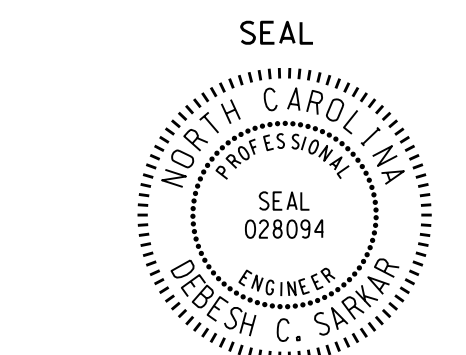
1. Provide a permanent means of identification above the mast arm to indicate proper attachment orientation of the mast arm.
2. Designer will determine the size of all structural components, plates, fasteners, and welds shown unless they are already specified.
3. Fabricator is responsible for providing 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.



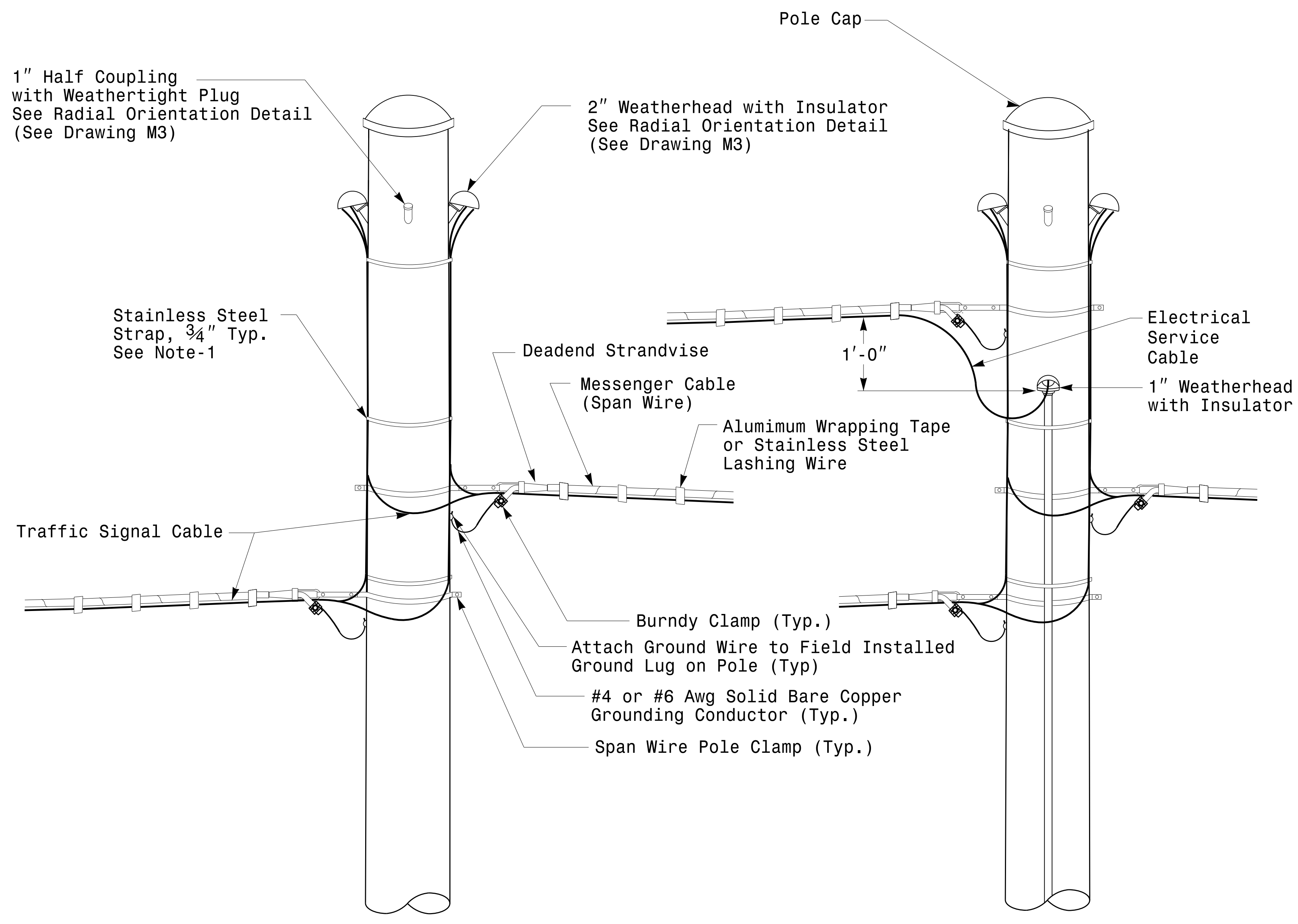
Typical Fabrication Details For Mast Arm Connection To Pole

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

REVISIONS	INIT.	DATE



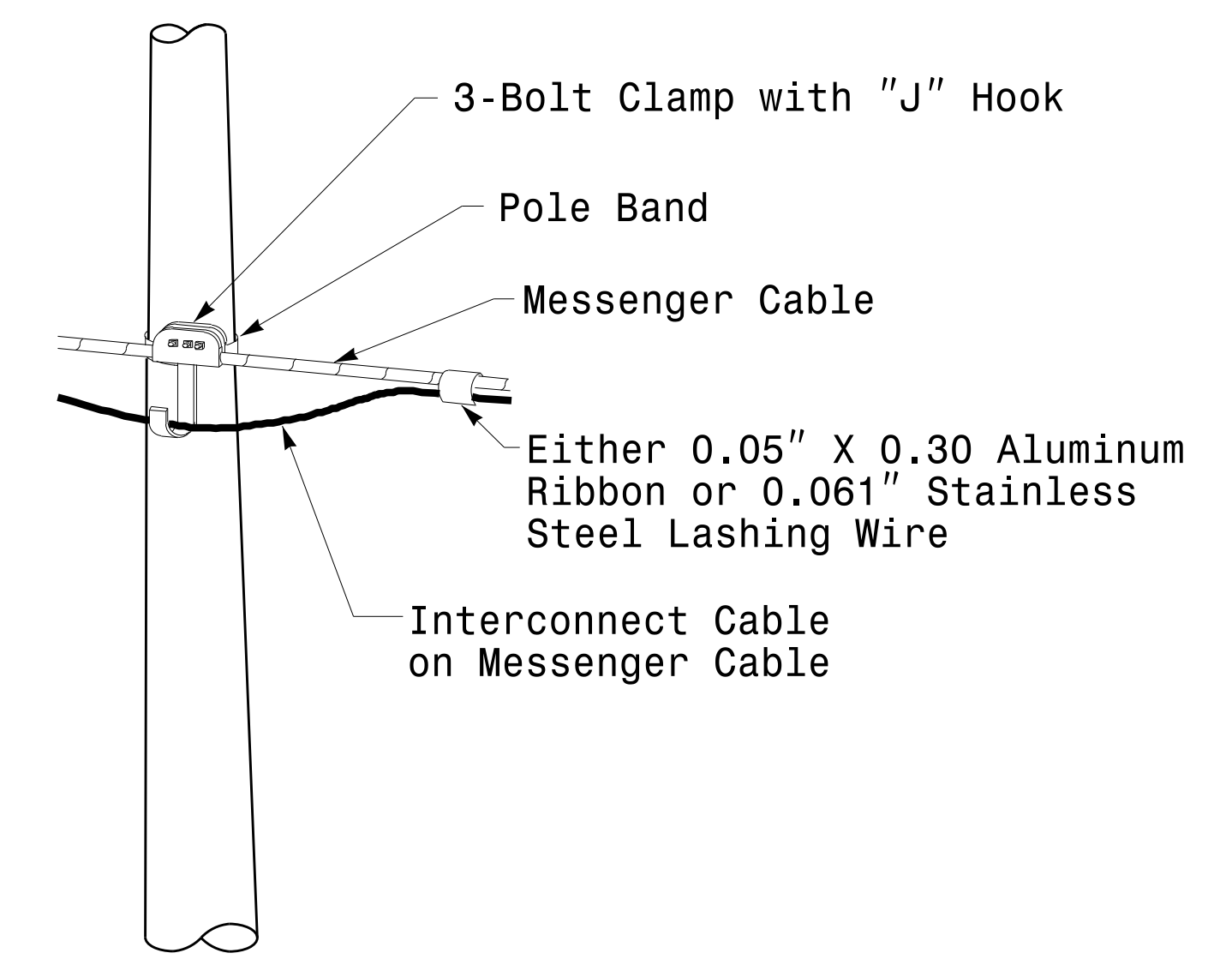
Discussed by: D.C. SARKAR
 DATE: 10/11/2017



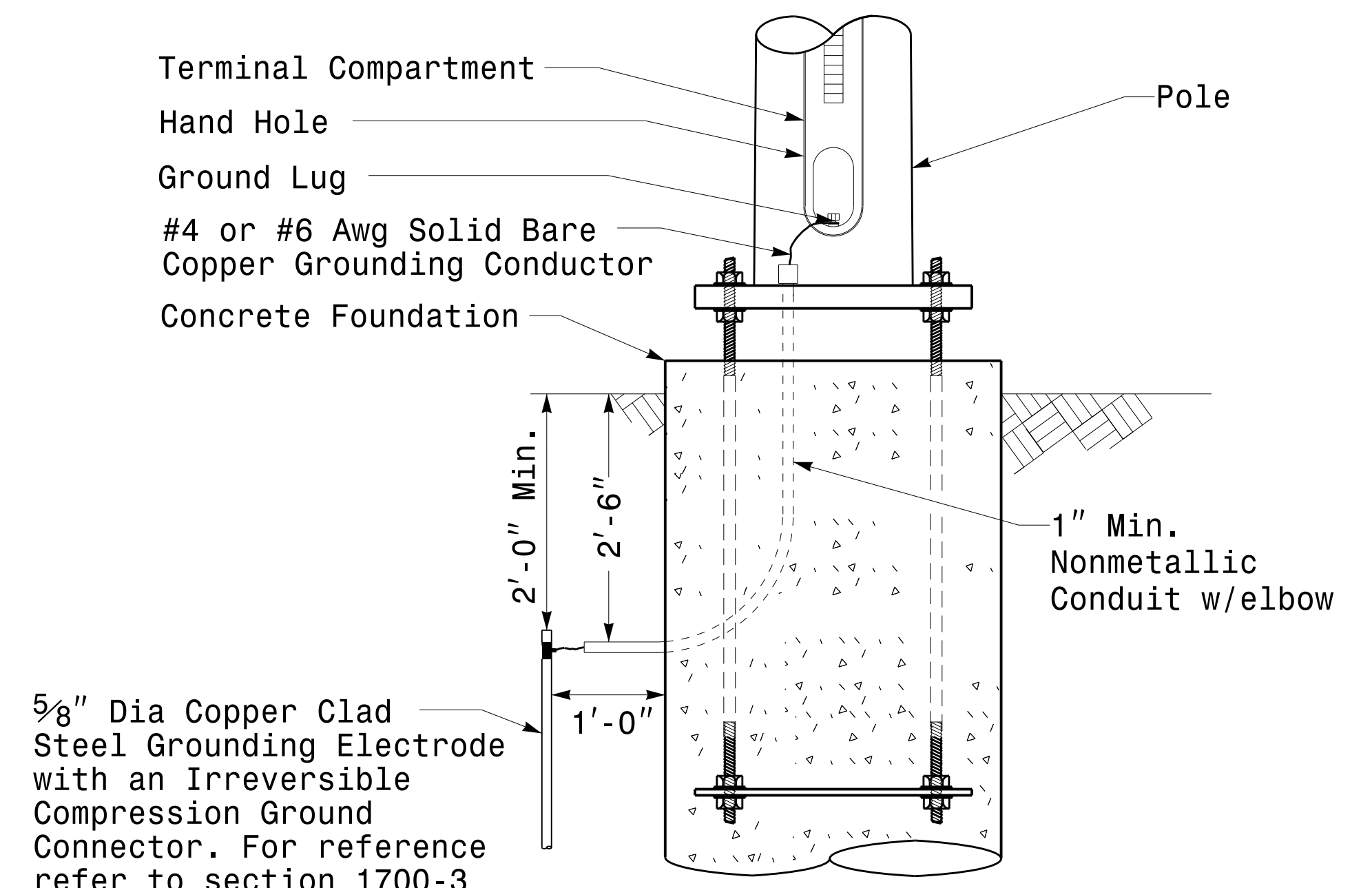
Strain Pole Attachments

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

11-OCT-2017 08:36 136504115 Signal.svk:gnrc Design Section\Facsim Regional\Sheets\2016\2014 Sig.M6 Std. Fabrication Details-Strain Poles.dgn

SOIL CONDITION

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

General Notes:


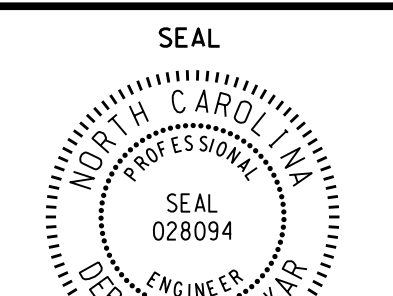
1. Values shown in the "Reactions at the Pole Base" column represent the minimum acceptable capacity allowed for design using a design CSR of 1.00.
2. Use chairs and spacers to maintain proper clearance.
3. For foundation, always use air-entrain concrete mix.

Foundation Selection:

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

Standard Strain Pole Foundation-All Soil Condition

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

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

I:\Projects\2017_08-10_Sig.M8\15_Sig.M8_Std_Strain Pole Found-Saturated Soil_Condition.dgn
 Sheets*2016*2014_Sig.M8_Std_Strain Pole Found-Saturated Soil_Condition.dgn
 rnz:insgr