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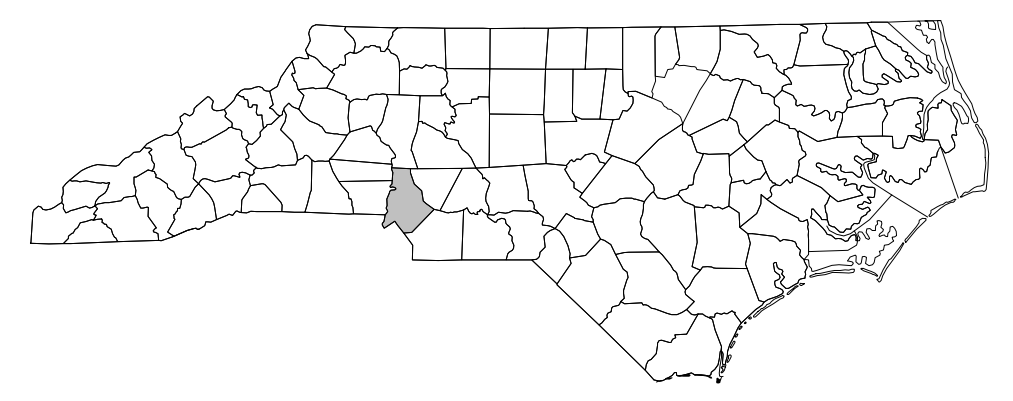
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Project: U-5114

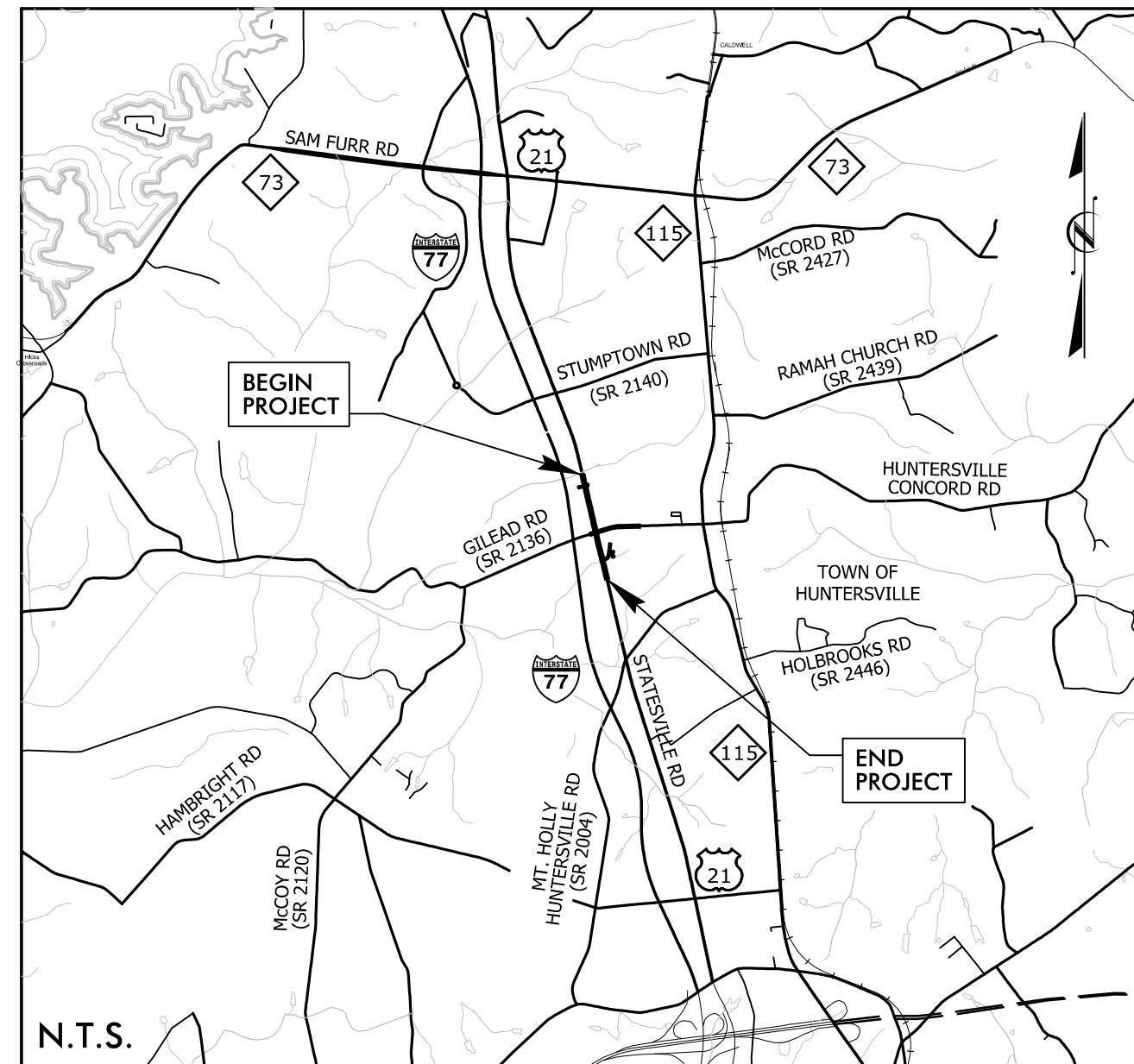
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

MECKLENBURG COUNTY

Project No.	Sheet No.
U-5114	Sig. 1.0



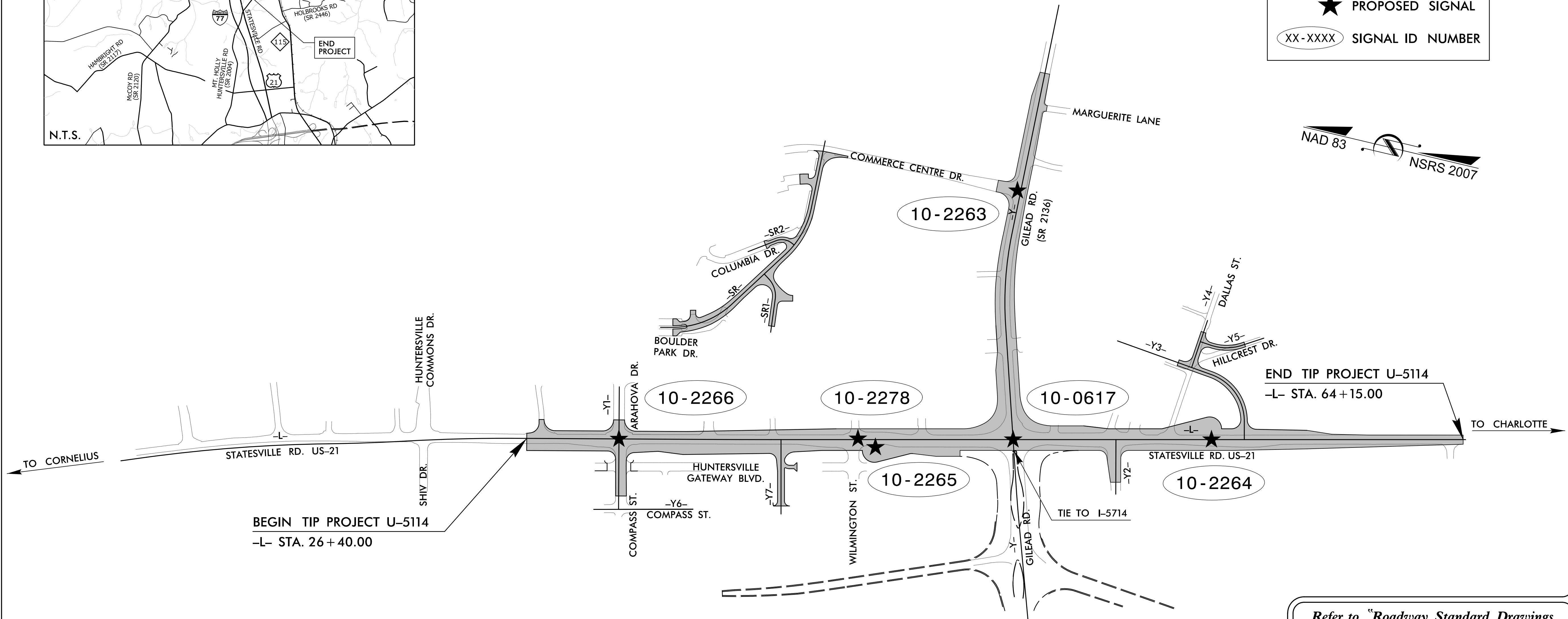
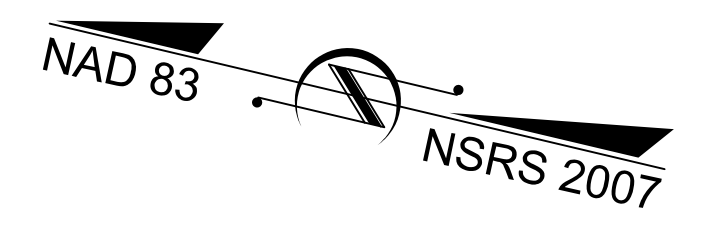
Vicinity Map



LOCATION: US 21 (STATESVILLE ROAD) AND SR 2136 (GILEAD ROAD)

TYPE OF WORK: SIGNALS

★ PROPOSED SIGNAL
 ○ XX-XXXX SIGNAL ID NUMBER



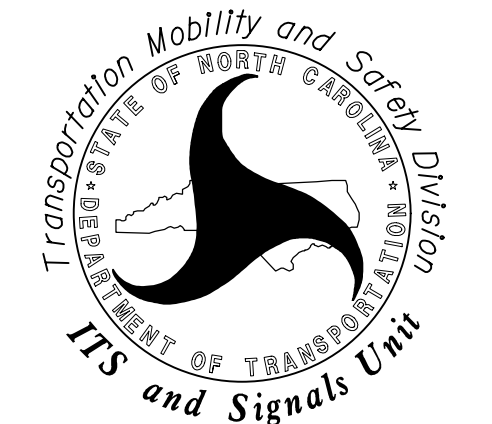
Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.

Sheet #	Reference #	Index of Plans Location/Description
Sig. 1.0	-----	Title Sheet
Sig. 2.0-2.1	10-0617	SR 2136 (Gilead Road) at US 21 (Statesville Road)
Sig. 3.0-3.1	10-2263	SR 2136 (Gilead Road) at Commerce Center Drive
Sig. 4.0-4.1	10-2264	US 21 (Statesville Road) at U-turn Bulb-out South of SR 2136 (Gilead Road)
Sig. 5.0-5.1	10-2265	US 21 (Statesville Road) at U-turn Bulb-out North of SR 2136 (Gilead Road)
Sig. 6.0-6.2	10-2278	US 21 (Statesville Road) at U-turn Bulb-out North of SR 2136 (Gilead Road)
Sig. 7.0-7.1	10-2266	US 21 (Statesville Road) at Arahova Drive/Compass Street
Sig. 8.0-9.0	-----	Revised Standard Drawings
Sig. M1-M8	-----	Standard Metal Pole Detail Sheets

INTELLIGENT TRANSPORTATION AND SIGNALS UNIT

- Contacts:
- Timothy J. Williams, P.E. - Western Region Signals Engineer
 - D. Todd Joyce, P.E. - Signal Equipment Design Engineer
 - R. Nicholas Zinser, P.E. - Western Region Signal Project Engineer
 - I. Neil Avery - Signal Communications Project Engineer

DIVISION OF HIGHWAYS
TRANSPORTATION MOBILITY AND SAFETY
DIVISION

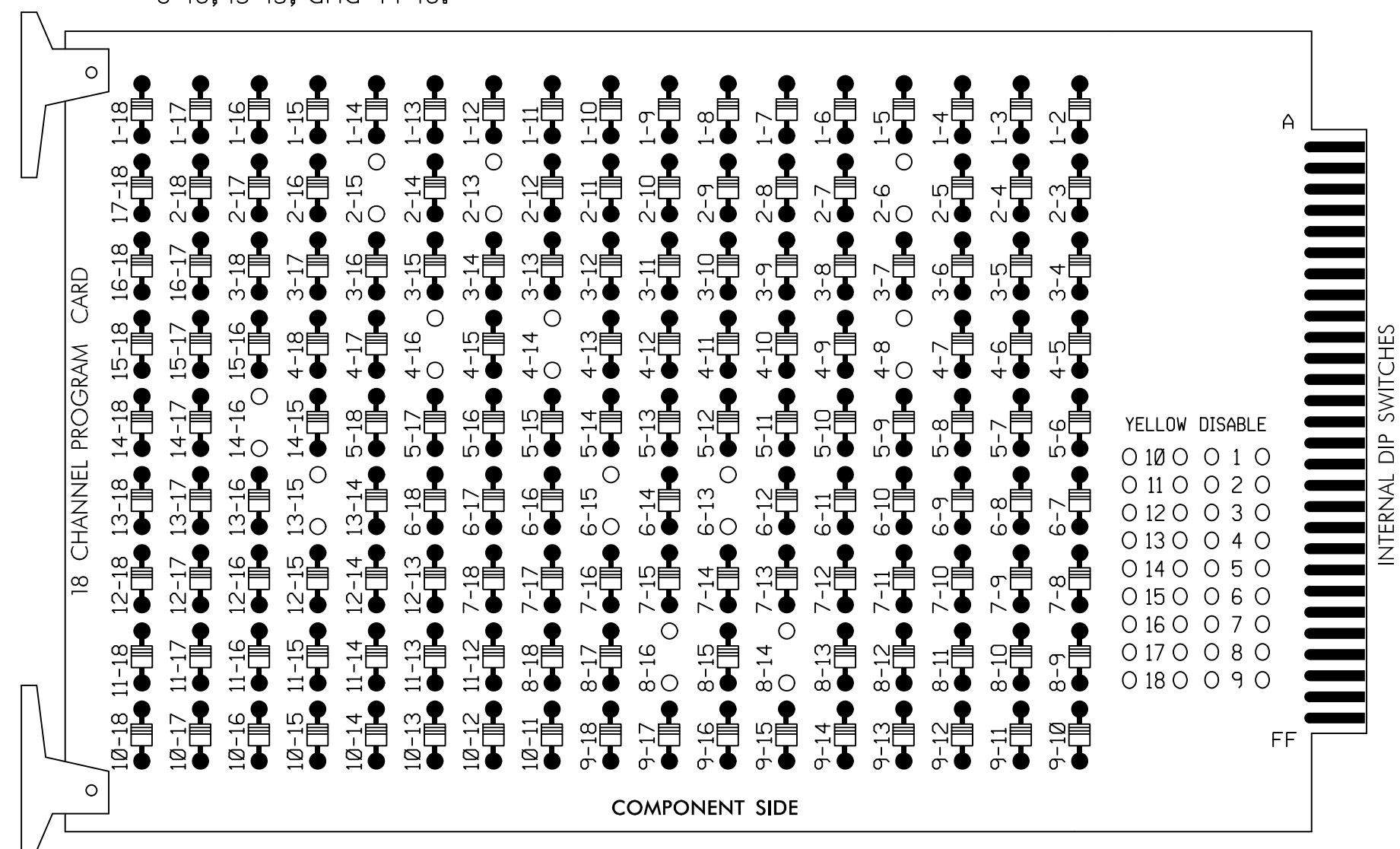


750 N. Greenfield Parkway, Garner, NC 27529
(919) 773-2800

EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

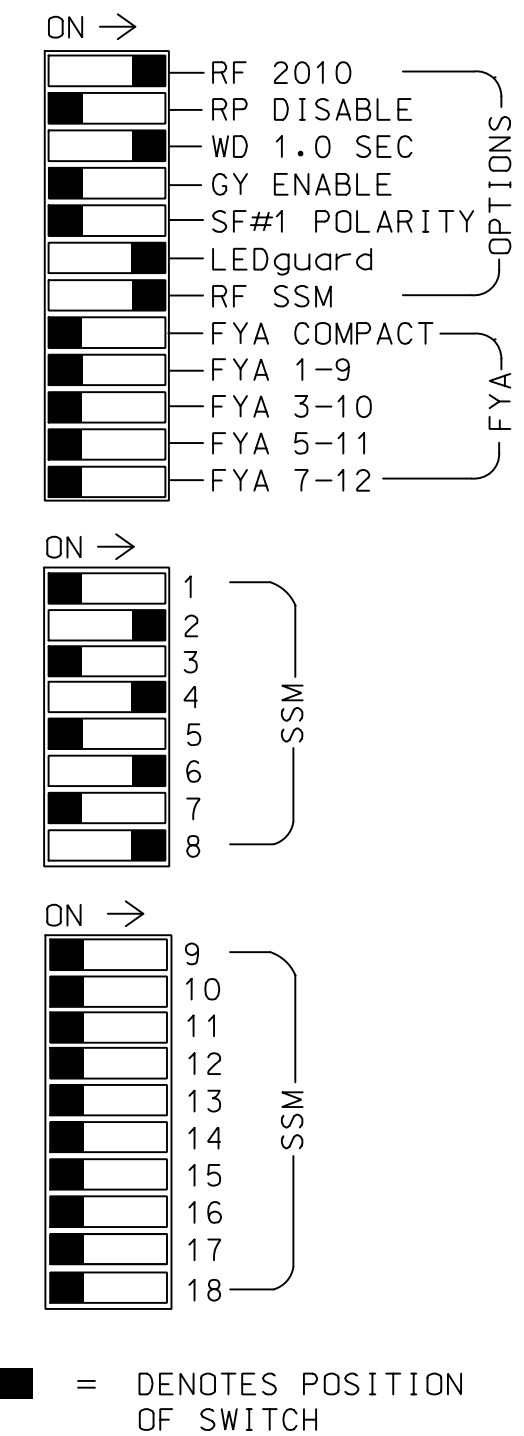
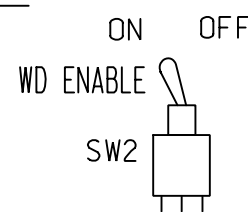
REMOVE DIODE JUMPERS 2-6, 2-13, 2-15, 4-8, 4-14, 4-16, 6-13, 6-15, 8-14, 8-16, 13-15, and 14-16.



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 Red Enable is active at all times during normal operation.



NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
- Program phases 4 and 8 for Dual Entry.
- Enable Simultaneous Gap-Out for all phases.
- Program phases 2 and 6 for Start Up In Green.
- Program phases 2, 4, 6 and 8 for 'STARTUP PED CALL'.
- Program phases 2 and 6 for Yellow Flash.
- The cabinet and controller are part of the Gilead Road Closed Loop System.

EQUIPMENT INFORMATION

CONTROLLER.....2070E
 CABINET.....332 /W/ AUX
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
 LOAD SWITCHES USED.....S2,S3,S5,S6,S8,S9,S11,S12
 PHASES USED.....2,2 PED,4,4 PED,6,6 PED,
 8,8 PED
 OVERLAP "A".....NOT USED
 OVERLAP "B".....NOT USED
 OVERLAP "C".....NOT USED
 OVERLAP "D".....NOT USED

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	NU	21,22, 25	23,24, 26,27	P21, P22	NU	41,42, 45	43,44, 46,47	P41,P42, P43,P44	NU	61,62, 63	P61,P62, P63,P64	NU	81,82, 83	P81, P82	NU	NU	NU	NU
RED		128	128		101	101			134			107						
YELLOW		129			102				135			108						
GREEN		130			103				136			109						
RED ARROW																		
YELLOW ARROW			129			102												
GREEN ARROW			130			103												
Hand					113			104			119			110				
Walker					115			106			121			112				

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)

FILE	1	2	3	4	5	6	7	8	9	10	11	12	13	14
U	∅ 2	∅ 2	∅ 2	∅ 4	∅ 4	∅ 4	∅ 4	SYS. DET. S5	∅ 2 PED	∅ 6 PED	FS			
	2A	2C	2C	4A	4B	4D	4F		DC ISOLATOR	DC ISOLATOR	DC ISOLATOR			
L	∅ 2	∅ 2		NOT USED	∅ 4	∅ 4	NOT USED	SYS. DET. S6	∅ 4 PED	∅ 8 PED	ST			
	2B	2D		4C	4E				DC ISOLATOR	DC ISOLATOR	DC ISOLATOR			
U	∅ 6	∅ 6	∅ 6	∅ 8	∅ 8	∅ 8	SYS. DET. S12	SYS. DET. S13	∅ 6 PED	∅ 8 PED	FS			
	6A	6A	6A	8A	8C	8C			DC ISOLATOR	DC ISOLATOR	DC ISOLATOR			
L	∅ 6	∅ 6	∅ 6	∅ 8	∅ 8	∅ 8	NOT USED	SYS. DET. S14	∅ 6 PED	∅ 8 PED	FS			
	6B	6B	6B	8B	8D	8D			DC ISOLATOR	DC ISOLATOR	DC ISOLATOR			

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

FS = FLASH SENSE
 ST = STOP TIME

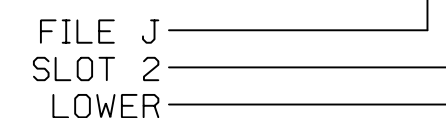
INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
2A	TB2-5,6	I2U	39	1	2	2	Y	Y	-	-	-
2B	TB2-7,8	I2L	43	5	12	2	Y	Y	-	-	-
2C	TB2-9,10	I3U	63	25	32	2	Y	Y	-	-	-
2D	TB2-11,12	I3L	76	38	42	2	Y	Y	-	-	-
4A	TB4-5,6	I5U	58	20	3	4	-	Y	-	-	-
4B	TB4-9,10	I6U	41	3	4	4	-	Y	-	-	-
4C	TB4-11,12	I6L	45	7	14	4	Y	Y	Y	2.0	5
4D	TB6-1,2	I7U	65	27	34	4	Y	Y	Y	2.0	5
4E	TB6-3,4	I7L	78	40	44	4	Y	Y	-	-	10
4F	TB6-5,6	I8U	49	11	24	4	Y	Y	-	-	15
* S5	TB6-9,10	I9U	60	22	11	SYS	-	-	-	-	-
* S6	TB6-11,12	I9L	62	24	13	SYS	-	-	-	-	-
6A	TB3-5,6	J2U	40	2	6	6	Y	Y	-	-	-
6B	TB3-7,8	J2L	44	6	16	6	Y	Y	-	-	-
8A	TB5-9,10	J6U	42	4	8	8	-	Y	-	-	-
8B	TB5-11,12	J6L	46	8	18	8	-	Y	-	-	-
8C	TB7-1,2	J7U	66	28	38	8	Y	Y	Y	2.0	5
8D	TB7-3,4	J7L	79	41	48	8	Y	Y	Y	2.0	5
* S12	TB7-5,6	J8U	50	12	28	SYS	-	-	-	-	-
* S13	TB7-9,10	J9U	59	21	15	SYS	-	-	-	-	-
* S14	TB7-11,12	J9L	61	23	17	SYS	-	-	-	-	-
PED PUSH BUTTONS											
P21,P22	TB8-4,6	I12U	67	29	PED 2	2 PED					
P41-P44	TB8-5,6	I12L	69	31	PED 4	4 PED					
P61-P64	TB8-7,9	I13U	68	30	PED 6	6 PED					
P81,P82	TB8-8,9	I13L	70	32	PED 8	8 PED					

NOTE:
 INSTALL DC ISOLATORS IN INPUT FILE SLOTS 112 AND 113.

* SYSTEM DETECTOR ONLY. REMOVE THE VEHICLE PHASE ASSIGNED TO THIS DETECTOR IN THE DEFAULT PROGRAMMING.

INPUT FILE POSITION LEGEND: J2L



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.

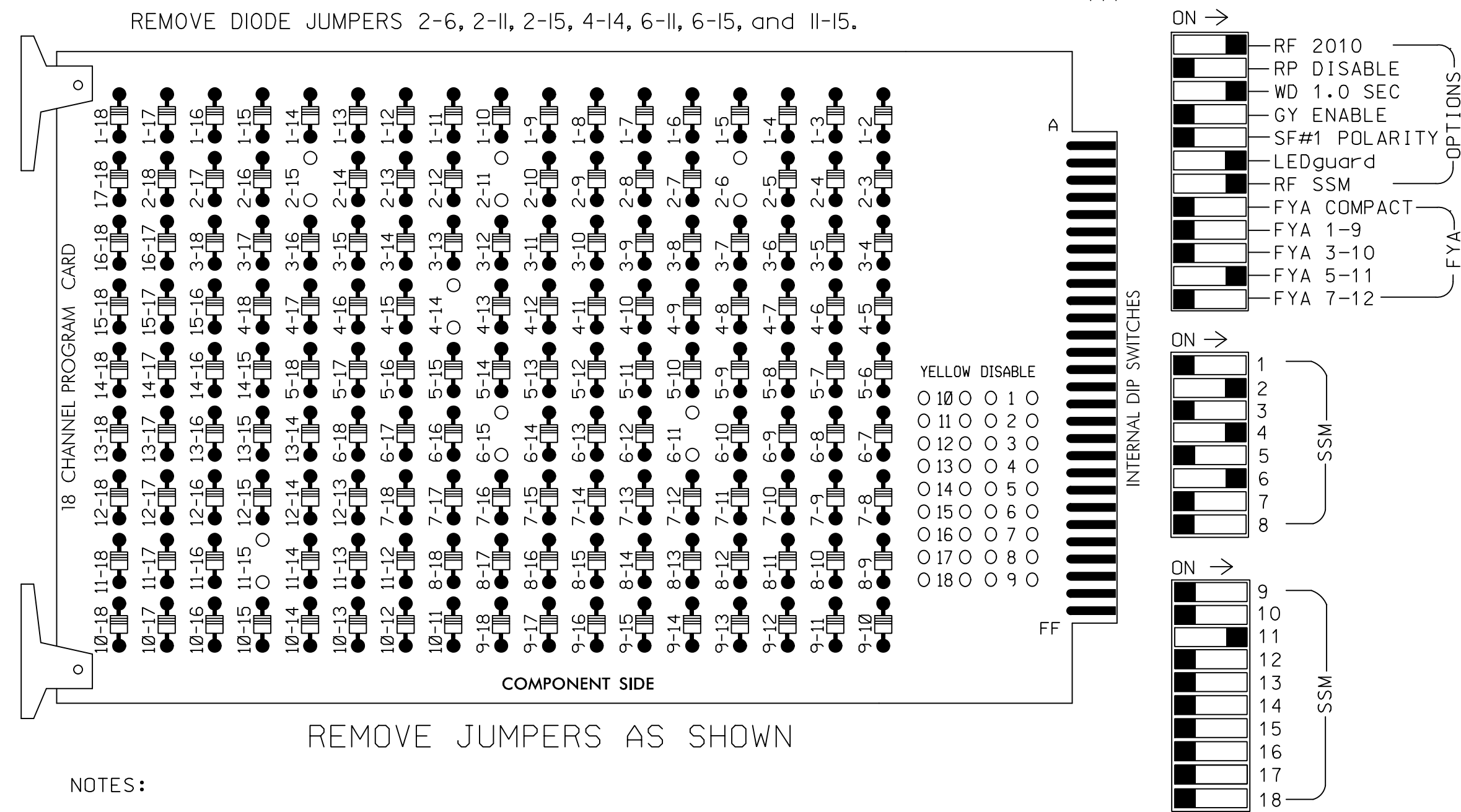
THIS ELECTRICAL DETAIL IS FOR
 THE SIGNAL DESIGN: 10-0617
 DESIGNED: NOV 2017
 SEALED: 4/18/2018
 REVISED: N/A



ELECTRICAL DETAIL SHEET		DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	
Prepared for: 750 N. Greenfield Pkwy, Garner, NC 27529		SR 2136 (Gilead Road) at US 21 (Statesville Road)	
Division 10 Wecklenburg Huntersville		SEAL NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 030005 J. T. CARROLL	
PLAN DATE: November 2017 REVIEWED BY: R. Dubnicka		Division 10 Wecklenburg Huntersville	
PREPARED BY: J. Trueblood REVIEWED BY: J. Carroll		SEAL 030005 J. T. CARROLL	
REVISIONS		INIT. DATE	
DocuSigned by: 		4/18/2018	
SIGNATURE		DATE	
SIG. INVENTORY NO. 10-0617			

EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



NOTES:

- Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
- Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
- Ensure that Red Enable is active at all times during normal operation.

NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
- Enable Simultaneous Gap-Out for all phases.
- Program phases 2 and 6 for Start Up In Green.
- Program phases 4 and 6 for 'STARTUP PED CALL'.
- Program phases 2 and 6 for Yellow Flash.
- The cabinet and controller are part of the Gilead Road Closed Loop System.

EQUIPMENT INFORMATION

CONTROLLER.....2070E
 CABINET.....332 /W/ AUX
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
 LOAD SWITCHES USED.....S2,S5,S6,S8,S9,AUX S4
 PHASES USED.....2,4,4 PED,6,6 PED
 OVERLAP "A".....NOT USED
 OVERLAP "B".....NOT USED
 OVERLAP "C".....6
 OVERLAP "D".....NOT USED

SIGNAL HEAD HOOK-UP CHART

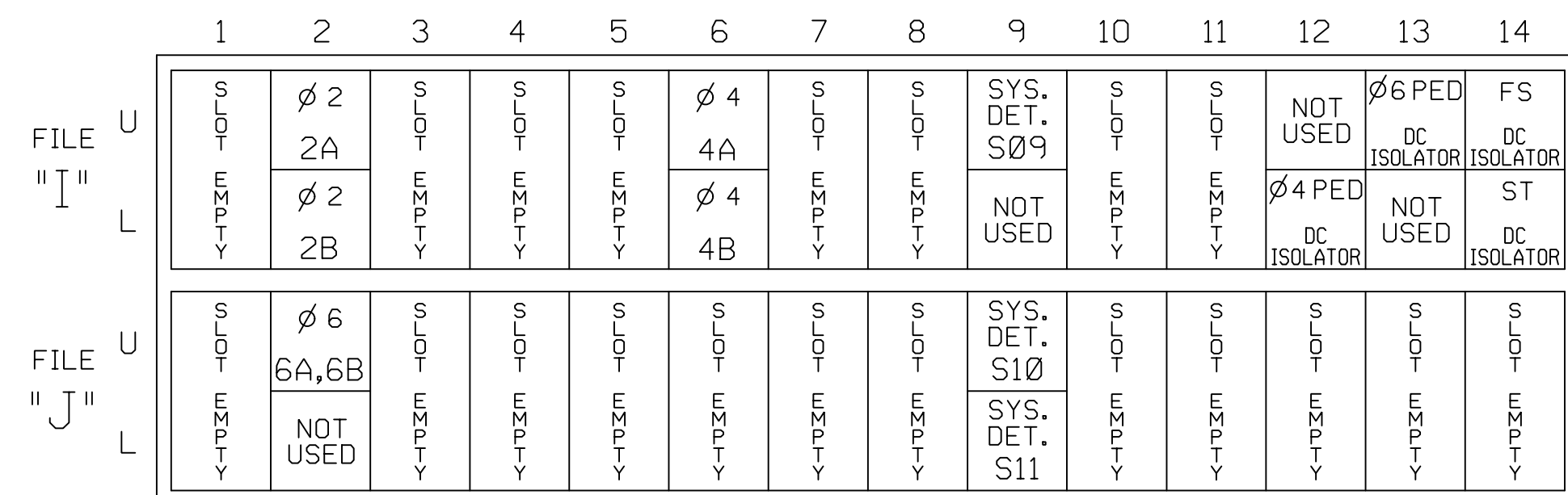
LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6	
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18	
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE	
SIGNAL HEAD NO.	NU	22,23	NU	NU	41,42	P41,P42, P43,P44	NU	61,62	P61, P62	NU	NU	NU	NU	NU	NU	21	NU	NU	
RED		128			101			134											
YELLOW		129			102			135											
GREEN		130			103			136											
RED ARROW																		A114	
YELLOW ARROW																			A115
FLASHING YELLOW ARROW																			A116
GREEN ARROW																			
Hand icon							104		119										
Walking person icon							106		121										

NU = Not Used

★ See pictorial of head wiring in detail below.

INPUT FILE POSITION LAYOUT

(front view)



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

FS = FLASH SENSE
 ST = STOP TIME

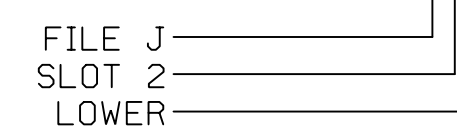
INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
2A	TB2-5,6	I2U	39	1	2	2	Y	Y	-	-	-
2B	TB2-7,8	I2L	43	5	12	2	Y	Y	-	-	-
4A	TB4-9,10	I6U	41	3	4	4	Y	Y	-	-	-
4B	TB4-11,12	I6L	45	7	14	4	Y	Y	-	-	15
*S09	TB6-9,10	I9U	60	22	11	SYS	-	-	-	-	-
6A,6B	TB3-5,6	J2U	40	2	6	6	Y	Y	-	-	-
*S10	TB7-9,10	J9U	59	21	15	SYS	-	-	-	-	-
*S11	TB7-11,12	J9L	61	23	17	SYS	-	-	-	-	-
PED PUSH BUTTONS											
P41,P42, P43,P44	TB8-5,6	I12L	69	31		PED 4	4 PED				
P61,P62	TB8-7,9	I13U	68	30		PED 6	6 PED				

NOTE:
 INSTALL DC ISOLATORS IN INPUT FILE SLOTS 112 AND 113.

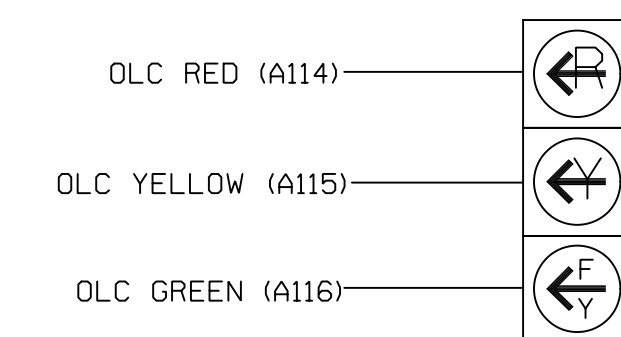
* System detector only. Remove the vehicle phase assigned to this detector in the default programming.

INPUT FILE POSITION LEGEND: J2L



3 SECTION FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



21

OVERLAP PROGRAMMING DETAIL

(program controller as shown below)

FROM MAIN MENU PRESS '8' (OVERLAPS), THEN '1' (VEHICLE OVERLAP SETTINGS).

PRESS '+' TWICE

PAGE 1: VEHICLE OVERLAP 'C' SETTINGS
 PHASE: :12345678910111213141516 X
 VEH OVL PARENTS: :
 VEH OVL NOT VEH: :
 VEH OVL NOT PED: :
 VEH OVL GRN EXT: :
 STARTUP COLOR: - RED - YELLOW - GREEN
 FLASH COLORS: - RED - YELLOW X GREEN
 SELECT VEHICLE OVERLAP OPTIONS: (Y/N)
 FLASH YELLOW IN CONTROLLER FLASH?...Y
 GREEN EXTENSION (0-255 SEC)...0
 YELLOW CLEAR (0=PARENT,3-25.5 SEC)...0.0
 RED CLEAR (0=PARENT,0.1-25.5 SEC)...0.0
 OUTPUT AS PHASE # (0=NONE, 1-16)...0

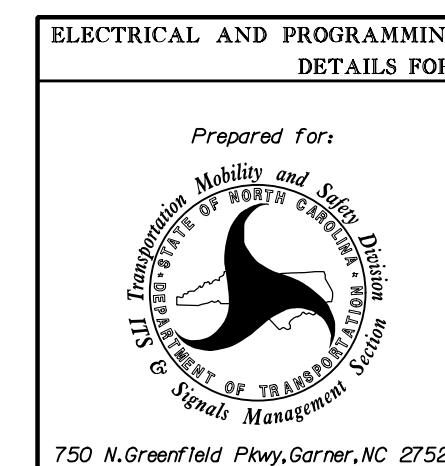
← NOTICE GREEN FLASH

OVERLAP PROGRAMMING COMPLETE

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 10-2263
 DESIGNED: NOV 2017
 SEALED: 4/18/2018
 REVISED: N/A



ELECTRICAL DETAIL SHEET



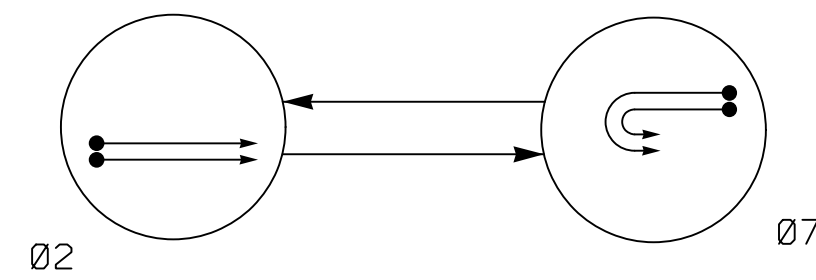
SR 2136 (Gilead Road) at Commerce Center Drive

Division 10	Wecklenburg	Huntersville
PLAN DATE: November 2017	REVIEWED BY: R. Dubnicka	
PREPARED BY: J. Trueblood	REVIEWED BY: J. Carroll	
REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
 NORTH CAROLINA PROFESSIONAL ENGINEER
 SEAL 030005
 JUSTIN T. CARROLL
 DocuSigned by:
 Justin T. Carroll
 4/18/2018
 SIGNATURE DATE
 SIG. INVENTORY NO. 10-2263

PHASING DIAGRAM



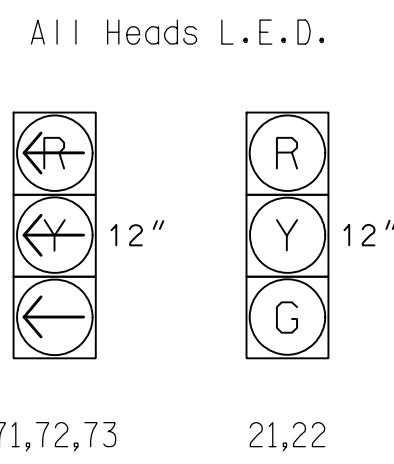
PHASING DIAGRAM DETECTION LEGEND

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

TABLE OF OPERATION

SIGNAL FACE	PHASE		
	02	07	FLASH
21,22	G	R	Y
71,72,73	R	R	R

SIGNAL FACE I.D.



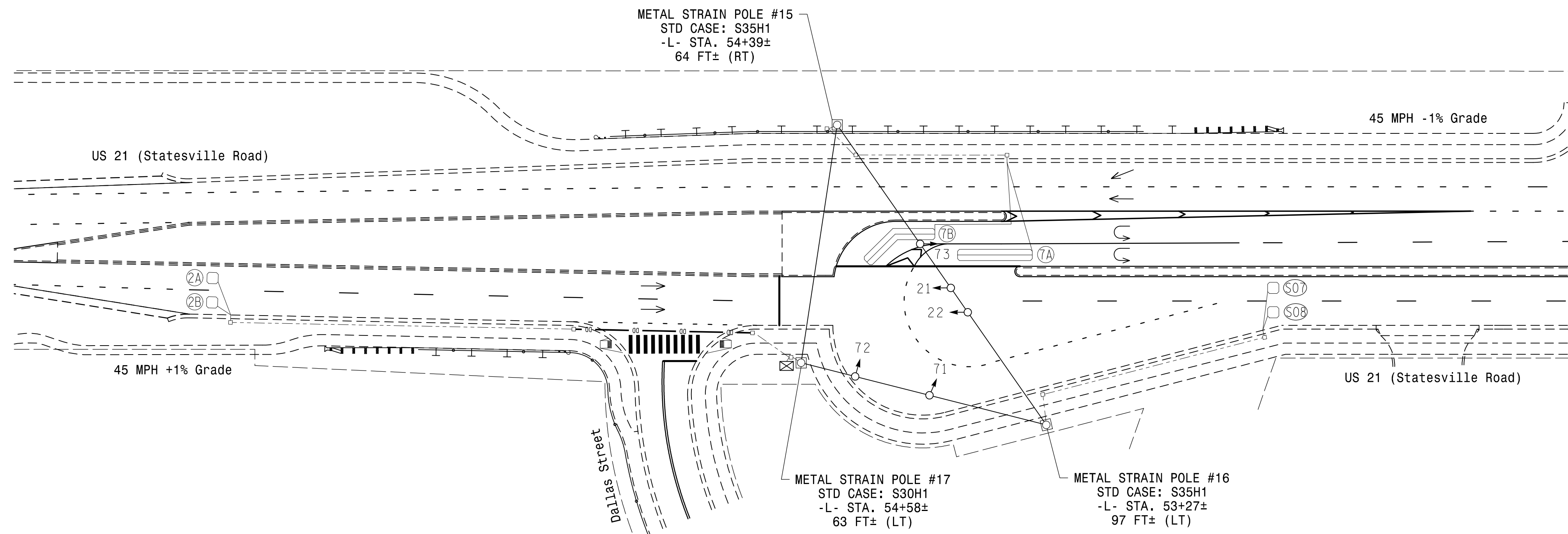
OASIS 2070 LOOP & DETECTOR INSTALLATION CHART

LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	DETECTOR PROGRAMMING							
					PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
2A	6X6	300	4	Y	2	Y	Y	-	-	-	-	Y
2B	6X6	300	4	Y	2	Y	Y	-	-	-	-	Y
7A	6X40	0	2-4-2	Y	7	Y	Y	-	-	-	-	Y
7B	6X40	0	2-4-2	Y	7	Y	Y	-	-	-	-	Y
S07	6X6	+260	4	Y	-	-	-	-	-	-	-	Y
S08	6X6	+260	4	Y	-	-	-	-	-	-	-	Y

2 Phase Fully Actuated (Gilead Road Closed Loop System)

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2018, "Standard Specifications for Roads and Structures" dated January 2018.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Set all detector units to presence mode.
- Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
- 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 #2264.



LEGEND

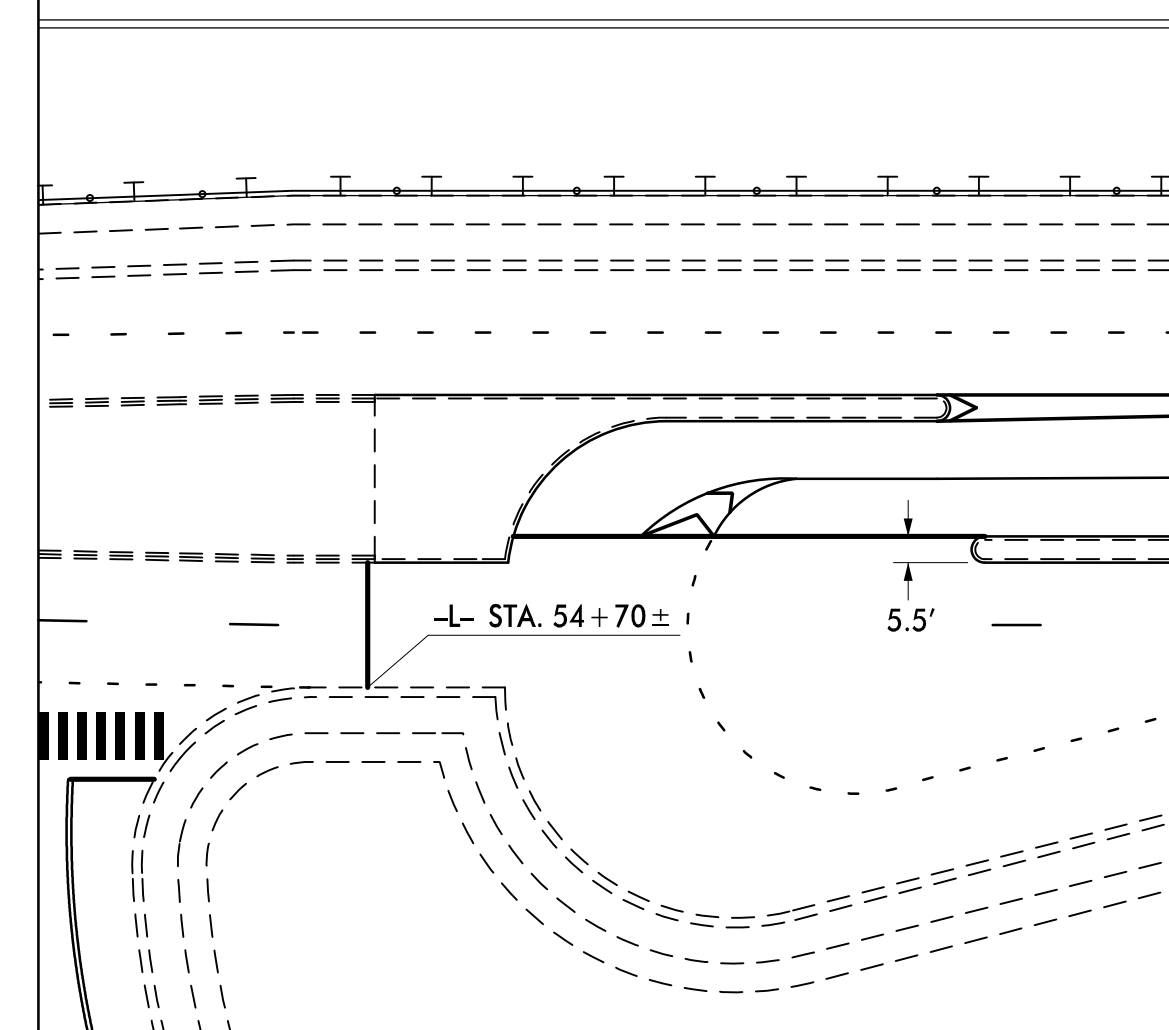
PROPOSED	EXISTING
○ → Traffic Signal Head	● → N/A
○ → Modified Signal Head	○ → N/A
→ Sign	→ N/A
□ ⊗ Inductive Loop Detector	□ ⊗ Inductive Loop Detector
□ ⊗ Controller & Cabinet Junction Box	□ ⊗ Controller & Cabinet Junction Box
--- 2-in Underground Conduit	--- 2-in Underground Conduit
— Directional Drill	— Directional Drill
N/A Right of Way	N/A Right of Way
→ Directional Arrow	→ Directional Arrow
⊙ Metal Strain Pole	⊙ Metal Strain Pole

OASIS 2070 TIMING CHART

FEATURE	PHASE	
	2	7
Min Green 1 *	12	7
Extension 1 *	6.0	2.0
Max Green 1 *	90	25
Yellow Clearance	4.4	3.0
Red Clearance	2.0	3.9
Red Revert	2.0	2.0
Walk 1 *	-	-
Don't Walk 1	-	-
Seconds Per Actuation *	1.5	-
Max Variable Initial *	34	-
Time Before Reduction *	15	-
Time To Reduce *	30	-
Minimum Gap	3.0	-
Recall Mode	MIN RECALL	-
Vehicle Call Memory	YELLOW	-
Dual Entry	-	-
Simultaneous Gap	ON	ON

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

STOPBAR AND CROSSWALK LOCATIONS



NEW INSTALLATION

US 21 (Statesville Road) at U-turn Bulb-out South of SR 2136 (Gilead Road)

Division 10 Wecklenburg Huntersville

PLAN DATE: November 2017 REVIEWED BY: J. Lassiter

PREPARED BY: J. Trueblood REVIEWED BY: J. Carroll

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL NORTH CAROLINA PROFESSIONAL ENGINEER JUSTIN T. CARROLL

DocuSigned by: Justin S. Arnold 4/18/2018

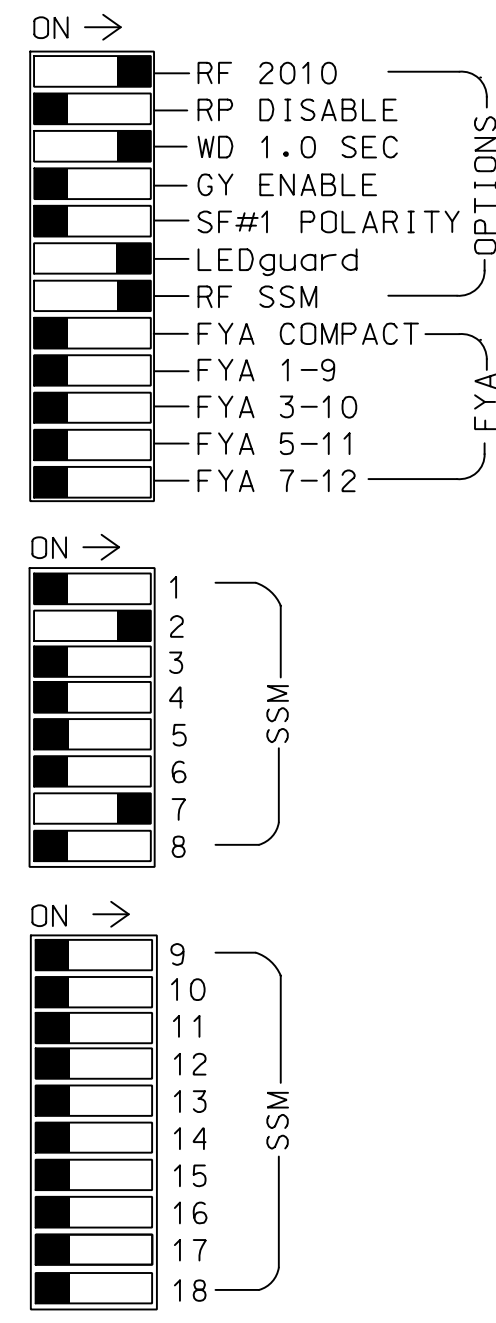
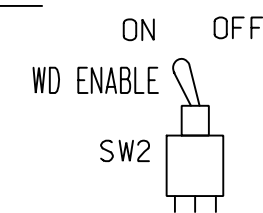
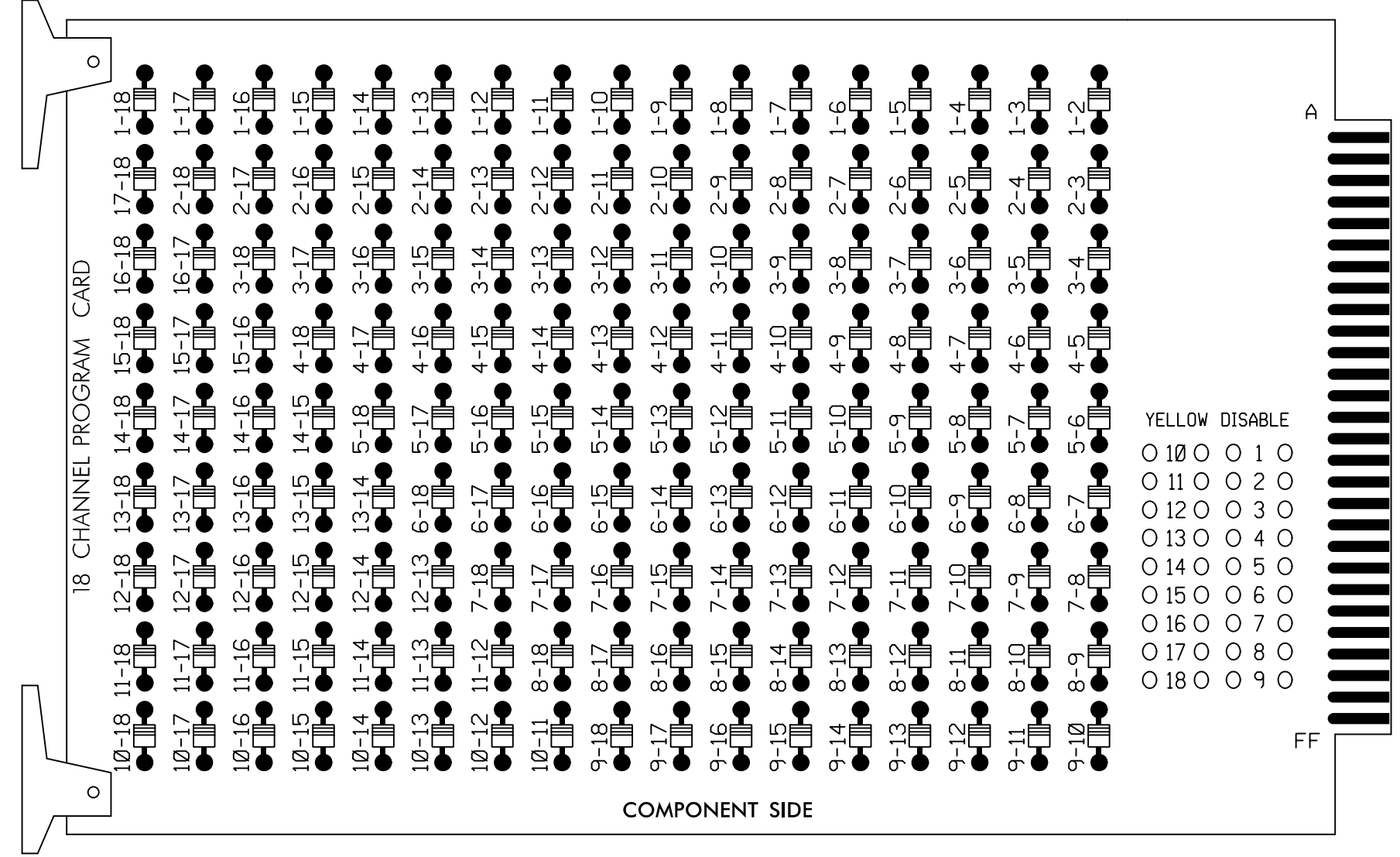
SIGNATURE DATE

SIG. INVENTORY NO. 10-2264

EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(set switches as shown)

DO NOT REMOVE ANY JUMPERS.



■ = DENOTES POSITION OF SWITCH

NOTES:

- Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
- Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
- Ensure that Red Enable is active at all times during normal operation.

NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
- Enable Simultaneous Gap-Out for all phases.
- Program phase 2 for Variable Initial and Gap Reduction.
- Program phase 2 for Start Up In Green.
- Program phase 2 for Yellow Flash.
- The cabinet and controller are part of the Gilead Road Closed Loop System.

EQUIPMENT INFORMATION

CONTROLLER.....2070E
 CABINET.....332 /W/ AUX
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
 LOAD SWITCHES USED.....S2,S10
 PHASES USED.....2,7
 OVERLAP "A".....NOT USED
 OVERLAP "B".....NOT USED
 OVERLAP "C".....NOT USED
 OVERLAP "D".....NOT USED

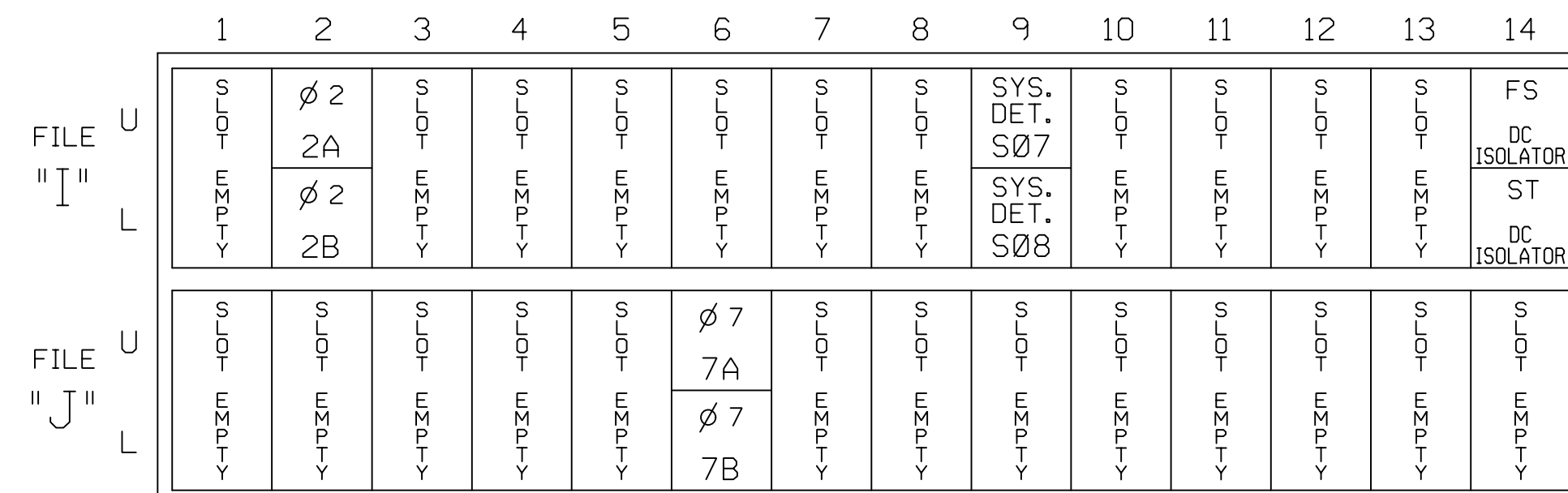
SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	NU	21,22	NU	NU	NU	NU	NU	NU	NU	71,72,73	NU	NU	NU	NU	NU	NU	NU	NU
RED		128																
YELLOW		129																
GREEN		130																
RED ARROW										122								
YELLOW ARROW										123								
GREEN ARROW										124								
Hand icon																		
Person icon																		

NU = Not Used

INPUT FILE POSITION LAYOUT

(from view)



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

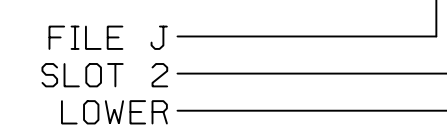
FS = FLASH SENSE
 ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
2A	TB2-5,6	I2U	39	1	2	2	Y	Y	-	-	-
2B	TB2-7,8	I2L	43	5	12	2	Y	Y	-	-	-
*S07	TB6-9,10	I9U	60	22	11	SYS	-	-	-	-	-
*S08	TB6-11,12	I9L	62	24	13	SYS	-	-	-	-	-
7A	TB5-9,10	J6U	42	4	8	7	Y	Y	-	-	-
7B	TB5-11,12	J6L	46	8	18	7	Y	Y	-	-	-

* System detector only. Remove the vehicle phase assigned to this detector in the default programming.

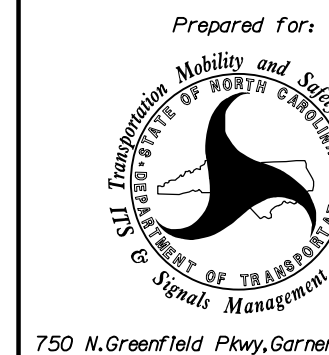
INPUT FILE POSITION LEGEND: J2L



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 10-2264
 DESIGNED: NOV 2017
 SEALED: 4/18/2018
 REVISED: N/A

ELECTRICAL DETAIL SHEET

ELECTRICAL AND PROGRAMMING DETAILS FOR:



Prepared for:
US 21 (Statesville Road) at U-turn Bulb-out South of SR 2136 (Gilead Road)

Division 10 Wecklenburg Huntersville

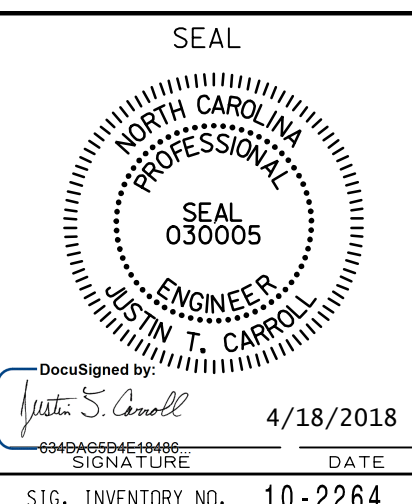
PLAN DATE: November 2017 REVIEWED BY: R. Dubnicka

PREPARED BY: J. Trueblood REVIEWED BY: J. Carroll

REVISIONS	INIT.	DATE

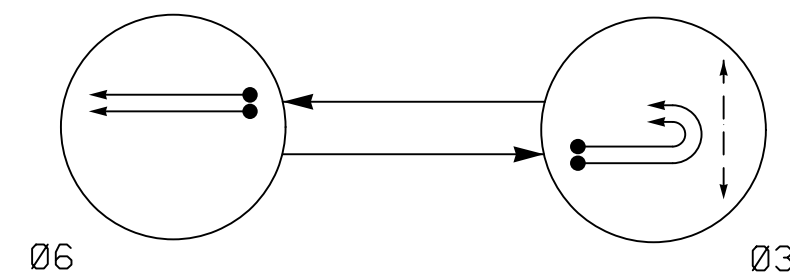
DocuSigned by: Justin S. Carroll
 SIGNATURE DATE: 4/18/2018

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



SIG. INVENTORY NO. 10-2264

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

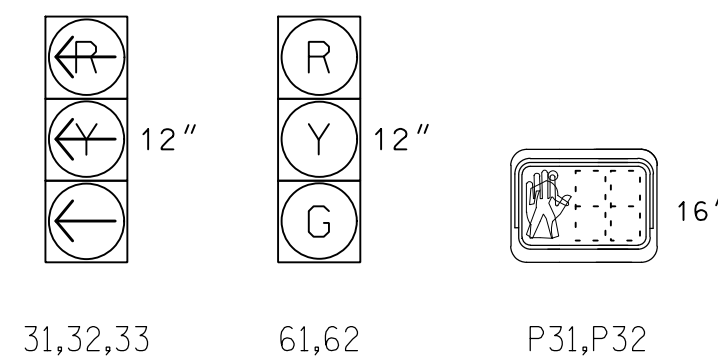
- DETECTED MOVEMENT
- ◄ UNDETECTED MOVEMENT (OVERLAP)
- ◄ UNSIGNALIZED MOVEMENT
- ◄ PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE		
	Ø6	Ø3	FLASH
31,32,33	R	R	R
61,62	G	R	Y
P31,P32	DW	W	DRK

SIGNAL FACE I.D.

All Heads L.E.D.



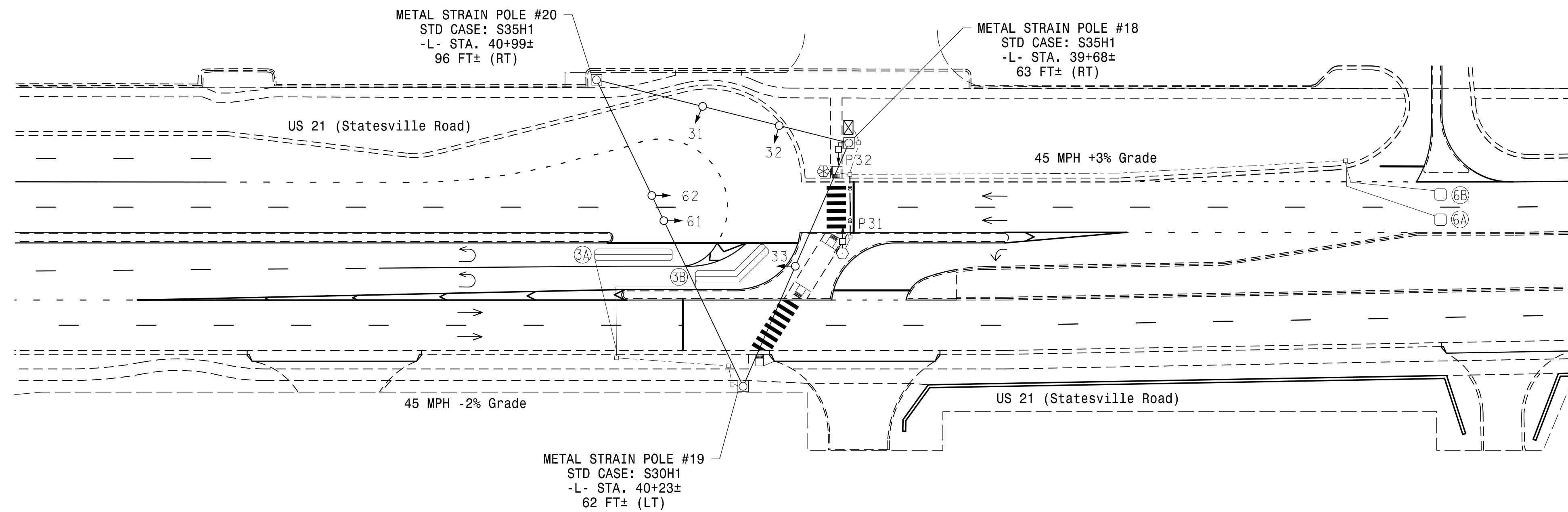
OASIS 2070 LOOP & DETECTOR INSTALLATION CHART

LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	DETECTOR PROGRAMMING							
					PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
3A	6X40	0	2-4-2	Y	3	Y	Y	-	-	-	-	Y
3B	6X40	0	2-4-2	Y	3	Y	Y	-	-	-	-	Y
6A	6X6	300	4	Y	6	Y	Y	-	-	-	-	Y
6B	6X6	300	4	Y	6	Y	Y	-	-	-	-	Y

2 Phase Fully Actuated (Gilead Road Closed Loop System)

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2018, "Standard Specifications for Roads and Structures" dated January 2018.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Set all detector units to presence mode.
- Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
- The cabinet should be designed to include an Auxiliary Output File for future use.
- Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
- Program pedestrian heads to countdown the flashing "Don't Walk" time only.
- All pedestrian pushbuttons shall be located in the field by the Division Traffic Engineer before installation.
- 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 #2265.



LEGEND

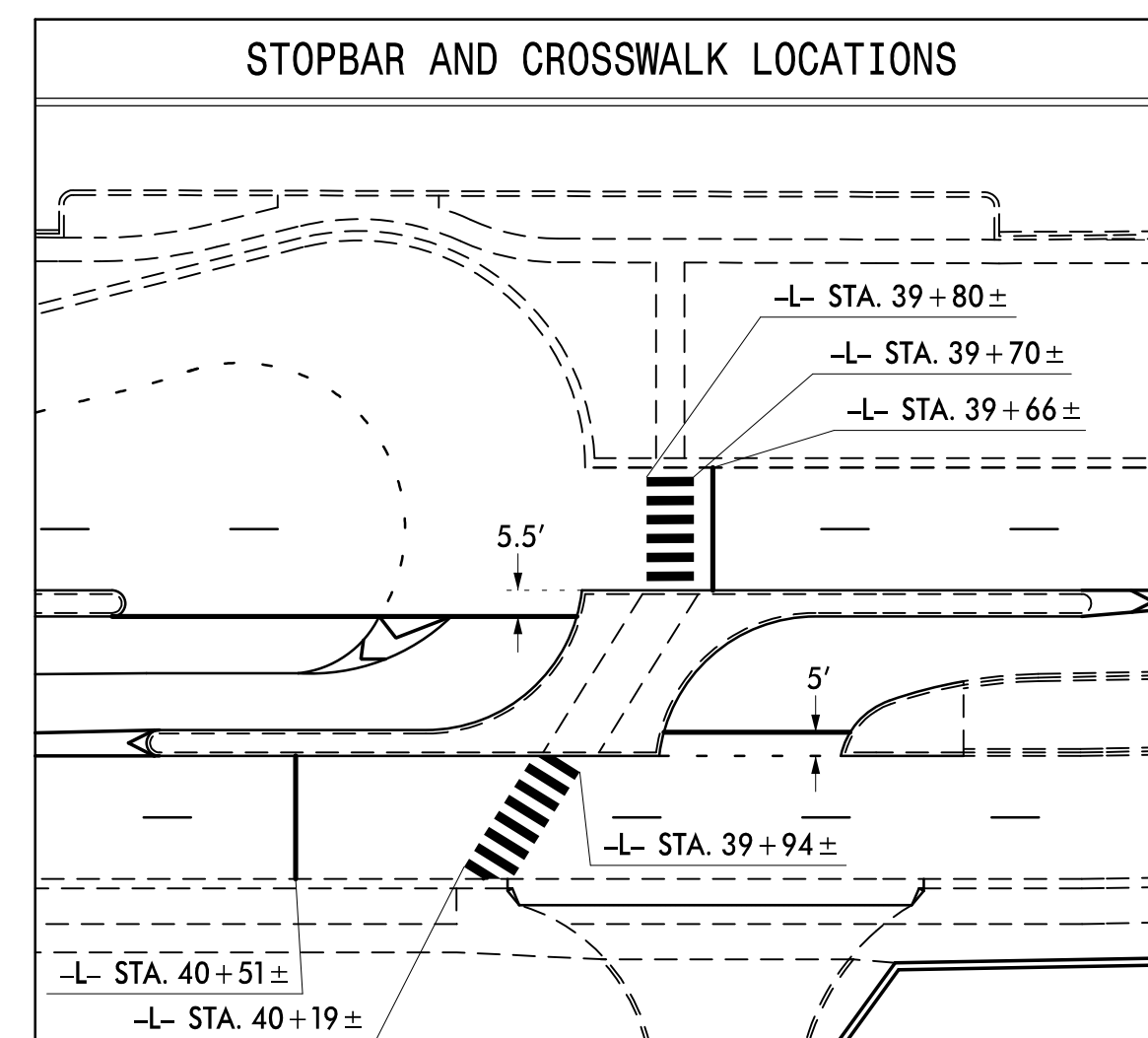
- | | |
|------------------------------|-----------------------------|
| PROPOSED | EXISTING |
| ○ → Traffic Signal Head | ● → N/A |
| ● → Modified Signal Head | ◄ → N/A |
| ◄ → Sign | ◄ → N/A |
| ◄ → Pedestrian Signal Head | ◄ → N/A |
| ◄ → Pushbutton & Sign | ◄ → N/A |
| ◄ → Inductive Loop Detector | ◄ → N/A |
| ◄ → Controller & Cabinet | ◄ → N/A |
| ◄ → Junction Box | ◄ → N/A |
| ◄ → 2-in Underground Conduit | ◄ → N/A |
| ◄ → Directional Drill | ◄ → N/A |
| ◄ → Right of Way | ◄ → N/A |
| ◄ → Directional Arrow | ◄ → N/A |
| ○ ⊕ Metal Strain Pole | ○ ⊕ Metal Strain Pole |
| ○ ⊕ Type I Pushbutton Post | ○ ⊕ Type I Pushbutton Post |
| ○ ⊕ Type II Signal Pedestal | ○ ⊕ Type II Signal Pedestal |

OASIS 2070 TIMING CHART

FEATURE	PHASE	
	3	6
Min Green 1 *	7	12
Extension 1 *	2.0	6.0
Max Green 1 *	25	90
Yellow Clearance	3.0	4.3
Red Clearance	3.9	1.9
Red Revert	2.0	2.0
Walk 1 *	7	-
Don't Walk 1	6	-
Seconds Per Actuation *	-	1.5
Max Variable Initial *	-	34
Time Before Reduction *	-	15
Time To Reduce *	-	30
Minimum Gap	-	3.0
Recall Mode	-	MIN RECALL
Vehicle Call Memory	-	YELLOW
Dual Entry	-	-
Simultaneous Gap	ON	ON

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

STOPBAR AND CROSSWALK LOCATIONS



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 STV Engineers, Inc.
 900 West Trade St., Suite 715
 Charlotte, NC 28202
 (704) 372-1885
 NC License Number F-0991

NEW INSTALLATION

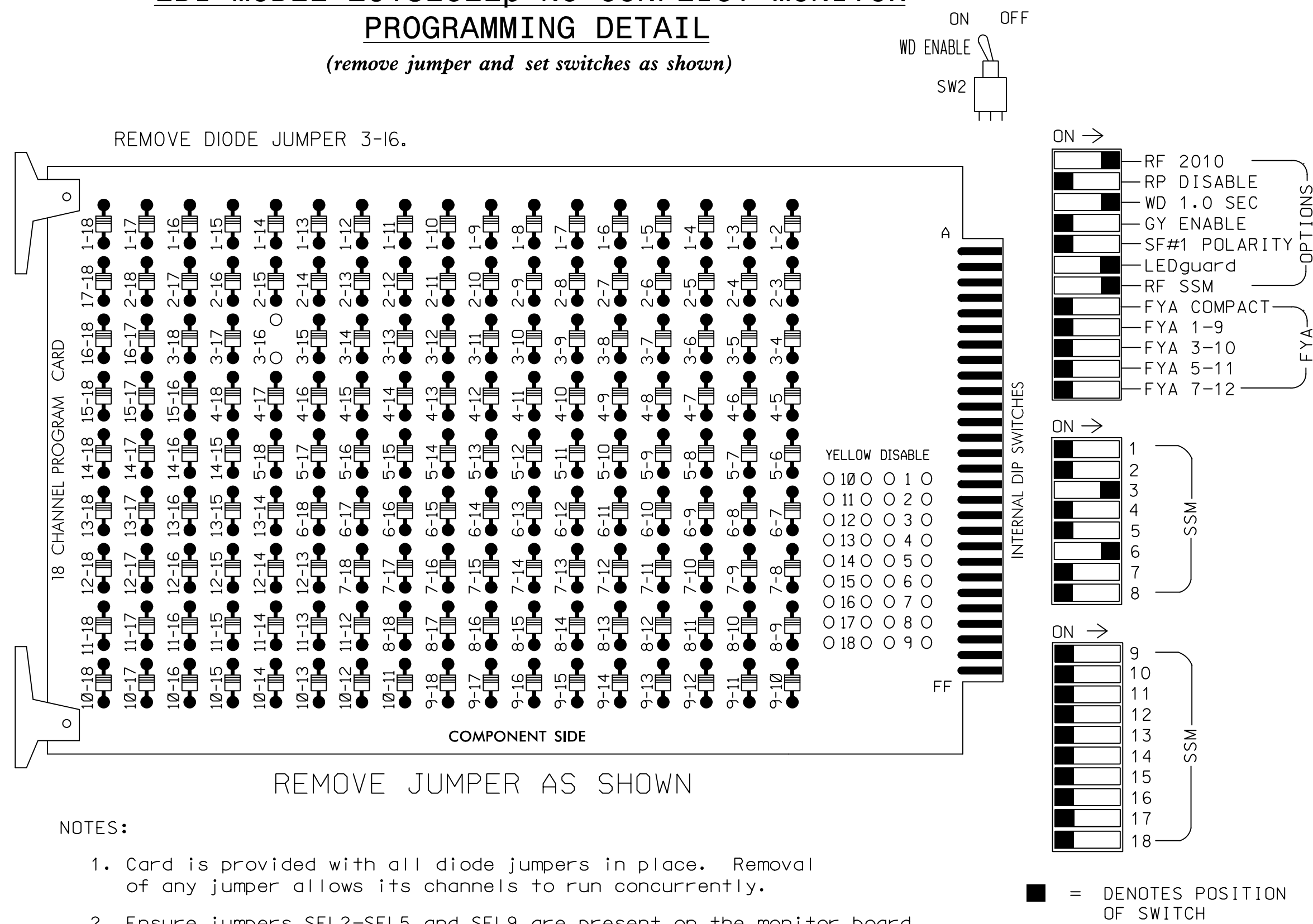
Prepared For: Transportation Mobility and Safety Division
 NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 Signal Design Section
 750 N. Greenfield Pkwy, Garner, NC 27529
 SCALE: 0 40
 1" = 40'

US 21 (Statesville Road) at U-turn Bulb-out North of SR 2136 (Gilead Road)
 Division 10 Wecklenburg Huntersville
 PLAN DATE: November 2017 REVIEWED BY: R. Mattern
 PREPARED BY: J. Trueblood REVIEWED BY: J. Carroll
 REVISIONS: INIT. DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
 SEAL
 NORTH CAROLINA PROFESSIONAL ENGINEER
 SEAL 030005
 JUSTIN T. CARROLL
 4/18/2018
 SIG. INVENTORY NO. 10-2265

EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumper 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 Plans.
- Enable Simultaneous Gap-Out for all phases.
- Program phase 6 for Variable Initial and Gap Reduction.
- Program phase 6 for Start Up In Green.
- Program phase 3 for 'STARTUP PED CALL'.
- Program phase 6 for Yellow Flash.
- The cabinet and controller are part of the Gilead Road Closed Loop System.

EQUIPMENT INFORMATION

CONTROLLER.....2070E
 CABINET.....332 /W/ AUX
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
 LOAD SWITCHES USED.....S4,S8,S12
 PHASES USED.....3,3 PED,6
 OVERLAP "A".....NOT USED
 OVERLAP "B".....NOT USED
 OVERLAP "C".....NOT USED
 OVERLAP "D".....NOT USED

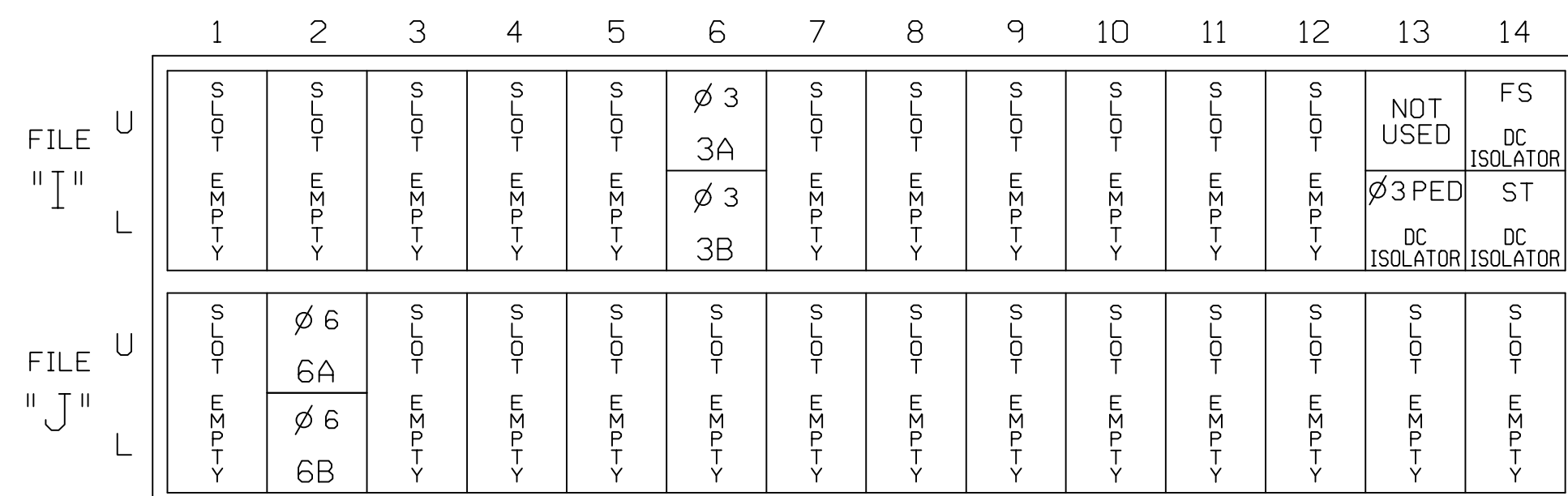
SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	3 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	NU	NU	NU	31,32,33	NU	NU	NU	61,62	NU	NU	NU	P31, P32	NU	NU	NU	NU	NU	NU
RED								134										
YELLOW								135										
GREEN								136										
RED ARROW					116													
YELLOW ARROW					117													
GREEN ARROW					118													
Hand icon												110						
Walking person icon												112						

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)



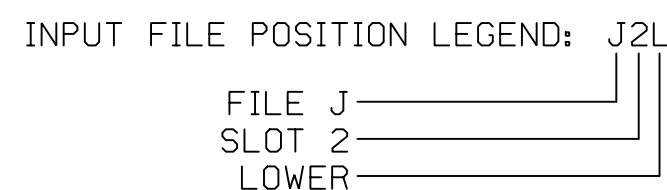
EX.: 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
3A	TB4-9,10	I6U	41	3	4	3	Y	Y	-	-	-
3B	TB4-11,12	I6L	45	7	14	3	Y	Y	-	-	-
6A	TB3-5,6	J2U	40	2	6	6	Y	Y	-	-	-
6B	TB3-7,8	J2L	44	6	16	6	Y	Y	-	-	-
PED PUSH BUTTONS											
P31,P32	TB8-8,9	I13L	70	32	PED 8	3 PED					

NOTE:
INSTALL DC ISOLATOR
IN INPUT FILE SLOT 113.



PED 3 PROGRAMMING DETAIL

(program controller as shown below)

CHANGING OUTPUT ASSIGNMENTS

- FROM MAIN MENU SELECT '6' (OUTPUTS), THEN '1' (OUTPUT ASSIGNMENTS)
- ENTER 17 (PHASE 8 DW) FOR OUTPUT ASSIGNMENT #.
- SCROLL DOWN TO 'PEDESTRIAN PHASE' AND ENTER 'Y' **REGARDLESS OF DEFAULT PROGRAMMING**
- ENTER '3' FOR 'SELECT PEDESTRIAN PHASE'. NO CHANGE NEEDED FOR 'SELECT COLOR'
- BACKUP TO 'OUTPUT ASSIGNMENTS AND SETTINGS MENU:' BY PRESSING THE 'ESC' BUTTON ON KEYBOARD.
- SELECT '1' (OUTPUT ASSIGNMENTS)
- ENTER 18 (PHASE 8 W) FOR OUTPUT ASSIGNMENT #.
- REPEAT STEPS # 3 AND # 4.

CHANGING INPUT ASSIGNMENTS

- FROM MAIN MENU SELECT '7' (DETECTORS), THEN '2' (PEDESTRIAN DETECTOR ASSIGNMENTS)
- CYCLE TO PED DETECTOR #8 BY REPEATEDLY DEPRESSING '4' KEY
- MODIFY PHASE ASSIGNED TO PED DETECTOR # 8 FROM PHASE 8 TO PHASE 3

PROGRAMMING COMPLETE

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: 10-2265
DESIGNED: NOV 2017
SEALED: 4/18/2018
REVISED: N/A

ELECTRICAL DETAIL SHEET

ELECTRICAL AND PROGRAMMING DETAILS FOR:

US 21 (Statesville Road)
at
U-turn Bulb-out North of
SR 2136 (Gilead Road)

Division 10 Wecklenburg Huntersville

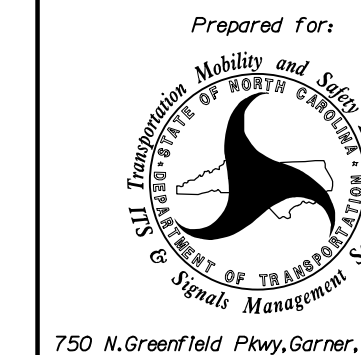
PLAN DATE: November 2017 REVIEWED BY: R. Dubnicka

PREPARED BY: J. Trueblood REVIEWED BY: J. Carroll

REVISIONS INIT. DATE

SIGNATURE DATE

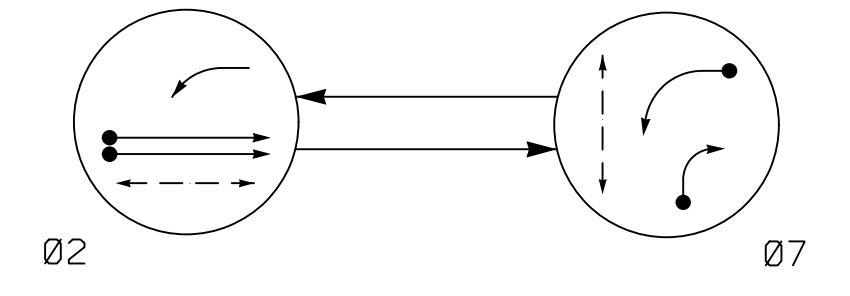
SIG. INVENTORY NO. 10-2265



DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER
SEAL 030005
JUSTIN T. CARROLL
4/18/2018

PHASING DIAGRAM



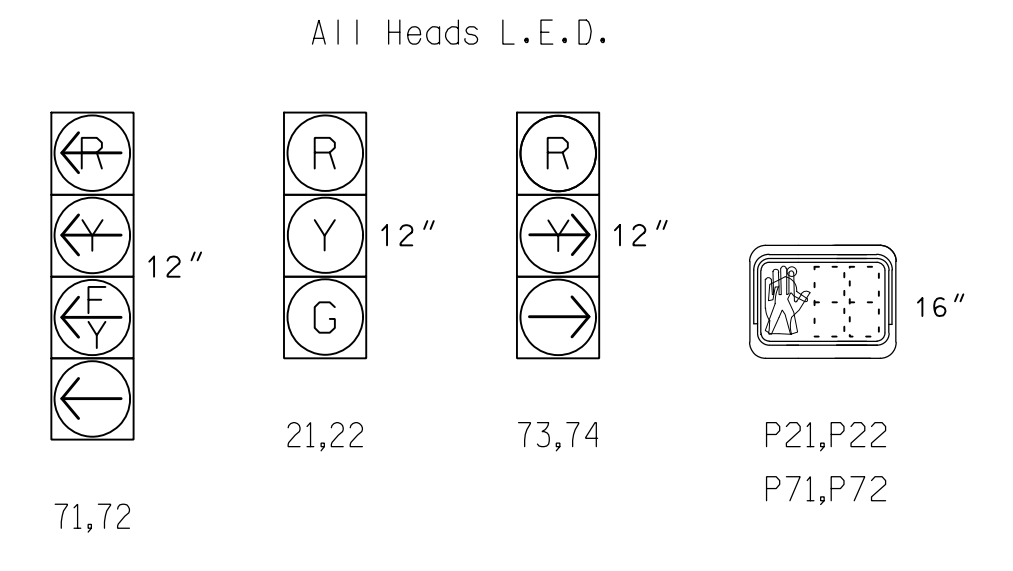
PHASING DIAGRAM DETECTION LEGEND

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

TABLE OF OPERATION

SIGNAL FACE	PHASE		
	Ø2	Ø7	FLASH
21,22	G	R	Y
71,72	Y	←	←Y
73,74	R	→	R
P21,P22	W	DW	DRK
P71,P72	DW	W	DRK

SIGNAL FACE I.D.



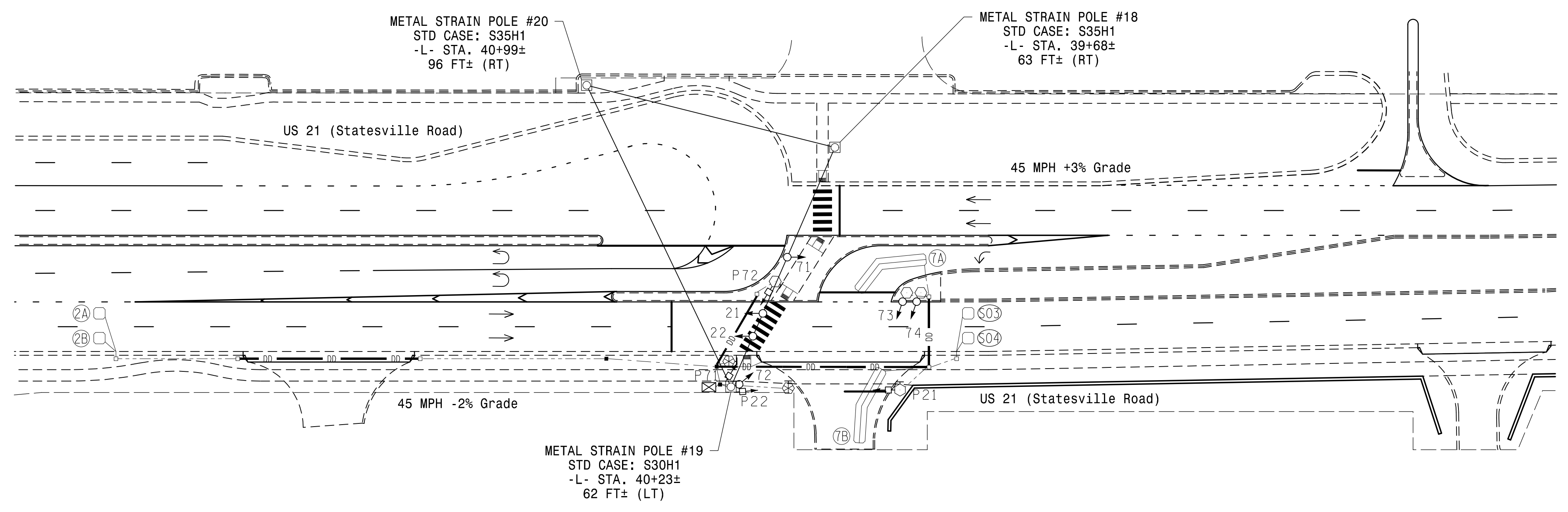
OASIS 2070 LOOP & DETECTOR INSTALLATION CHART

LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	DETECTOR PROGRAMMING				STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
					PHASE	CALLING	EXTENSION	FULL TIME DELAY				
2A	6X6	300	4	Y	2	Y	Y	-	-	-	-	Y
2B	6X6	300	4	Y	2	Y	Y	-	-	-	-	Y
7A	6X40	0	2-4-2	Y	7	Y	Y	-	15	-	-	Y
7B	6X40	+10	2-4-2	Y	7	Y	Y	-	15	-	-	Y
S03	6X6	+150	3	Y	-	-	-	-	-	-	-	Y
S04	6X6	+150	3	Y	-	-	-	-	-	-	-	Y

2 Phase Fully Actuated (Gilead Road Closed Loop System)

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2018, "Standard Specifications for Roads and Structures" dated January 2018.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Set all detector units to presence mode.
- Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
- Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
- Program pedestrian heads to countdown the flashing "Don't Walk" time only.
- All pedestrian pushbuttons shall be located in the field by the Division Traffic Engineer before installation.
- 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 #2278.



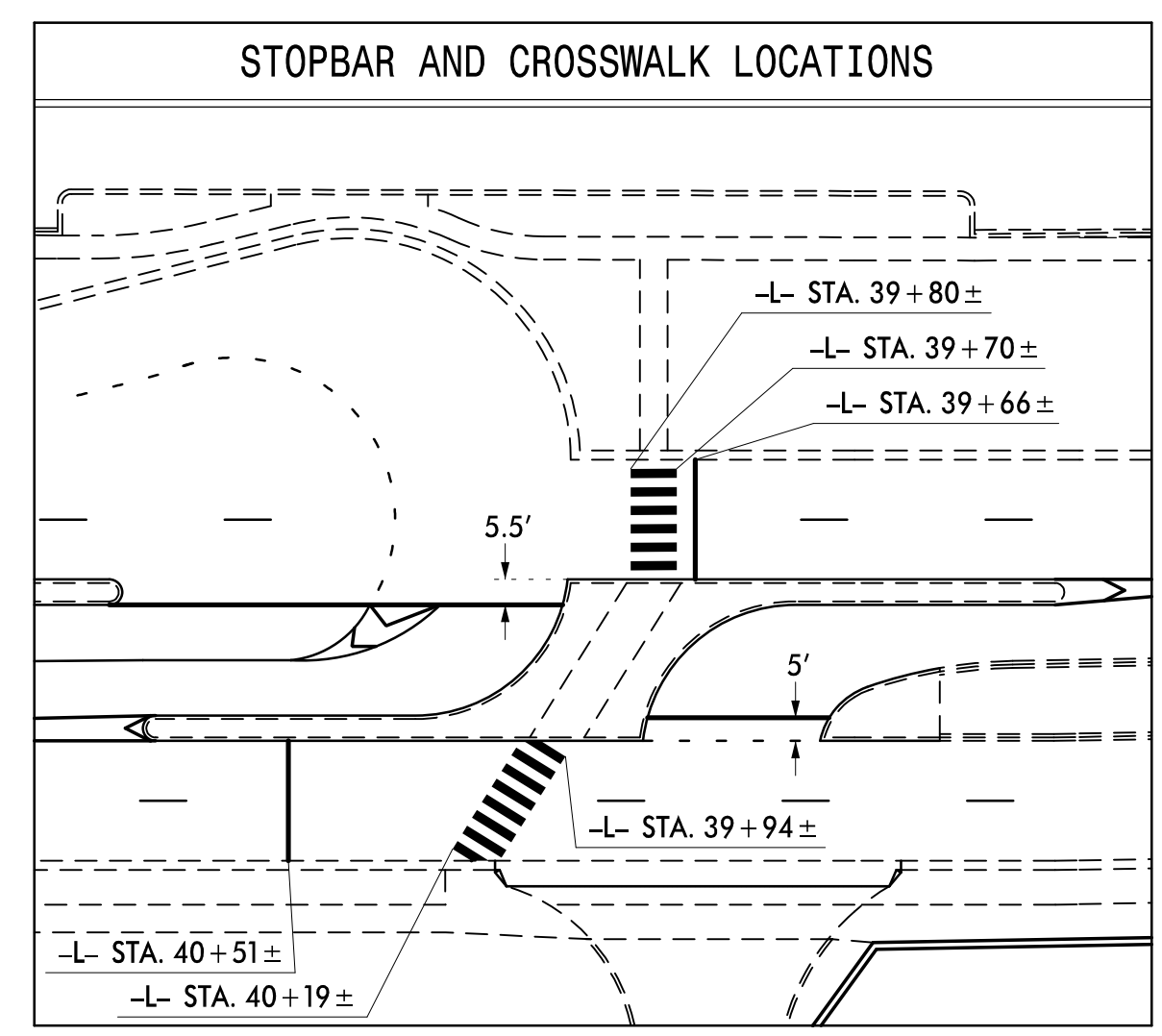
OASIS 2070 TIMING CHART

FEATURE	PHASE	
	2	7
Min Green 1 *	12	7
Extension 1 *	6.0	2.0
Max Green 1 *	90	30
Yellow Clearance	4.7	3.0
Red Clearance	1.8	1.4
Red Revert	2.0	2.0
Walk 1 *	7	7
Don't Walk 1	13	7
Seconds Per Actuation *	1.5	-
Max Variable Initial *	34	-
Time Before Reduction *	15	-
Time To Reduce *	30	-
Minimum Gap	3.0	-
Recall Mode	MIN RECALL	-
Vehicle Call Memory	YELLOW	-
Dual Entry	-	-
Simultaneous Gap	ON	ON

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

LEGEND

	PROPOSED Traffic Signal Head		EXISTING Traffic Signal Head
	PROPOSED Modified Signal Head Sign		EXISTING N/A
	PROPOSED Pedestrian Signal Head		EXISTING N/A
	PROPOSED Pushbutton & Sign		EXISTING N/A
	PROPOSED Inductive Loop Detector		EXISTING Inductive Loop Detector
	PROPOSED Controller & Cabinet Junction Box		EXISTING Controller & Cabinet Junction Box
	PROPOSED 2-in Underground Conduit		EXISTING 2-in Underground Conduit
	PROPOSED Directional Drill		EXISTING N/A
	PROPOSED Right of Way		EXISTING Right of Way
	PROPOSED Directional Arrow		EXISTING Directional Arrow
	PROPOSED Metal Strain Pole		EXISTING Metal Strain Pole
	PROPOSED Type I Pushbutton Post		EXISTING Type I Pushbutton Post
	PROPOSED Type II Signal Pedestal		EXISTING Type II Signal Pedestal



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 STV Engineers, Inc.
 900 West Trade St., Suite 715
 Charlotte, NC 28202
 (704) 372-1885
 NC License Number F-0991

NEW INSTALLATION

US 21 (Statesville Road) at U-turn Bulb-out North of SR 2136 (Gilead Road)

Division 10 Wecklenburg Huntersville

PLAN DATE: November 2017 REVIEWED BY: R. Mattern

PREPARED BY: J. Trueblood REVIEWED BY: J. Carroll

750 N. Greenfield Pkwy, Garner, NC 27529

SCALE: 1" = 40'

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL NORTH CAROLINA PROFESSIONAL ENGINEER JUSTIN T. CARROLL

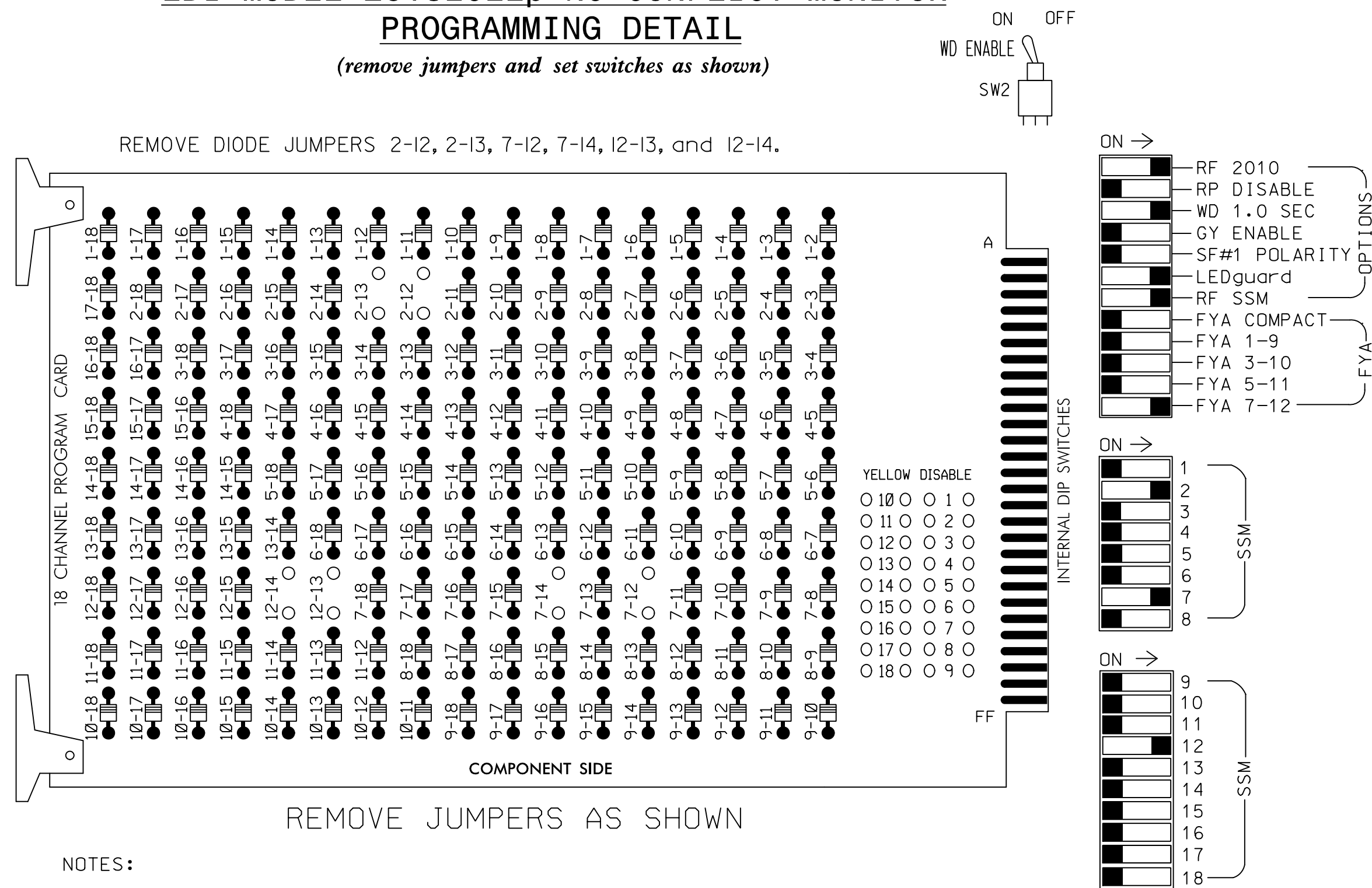
DocuSigned by: Justin S. Arnold 4/18/2018

SIGNATURE DATE

SIG. INVENTORY NO. 10-2278

EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



- NOTES:
- Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
 - Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
 - Ensure that Red Enable is active at all times during normal operation.

NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
- Enable Simultaneous Gap-Out for all phases.
- Program phase 2 for Variable Initial and Gap Reduction.
- Program phase 2 for Start Up In Green.
- Program phases 2 and 7 for 'STARTUP PED CALL'.
- Program phase 2 for Yellow Flash.
- The cabinet and controller are part of the Gilead Road Closed Loop System.

EQUIPMENT INFORMATION

CONTROLLER.....2070E
 CABINET.....332 /W/ AUX
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
 LOAD SWITCHES USED.....S2,S3,S6,S10,AUX S5
 PHASES USED.....2,2 PED,7 PED,7
 OVERLAP "A".....NOT USED
 OVERLAP "B".....NOT USED
 OVERLAP "C".....NOT USED
 OVERLAP "D".....2+7

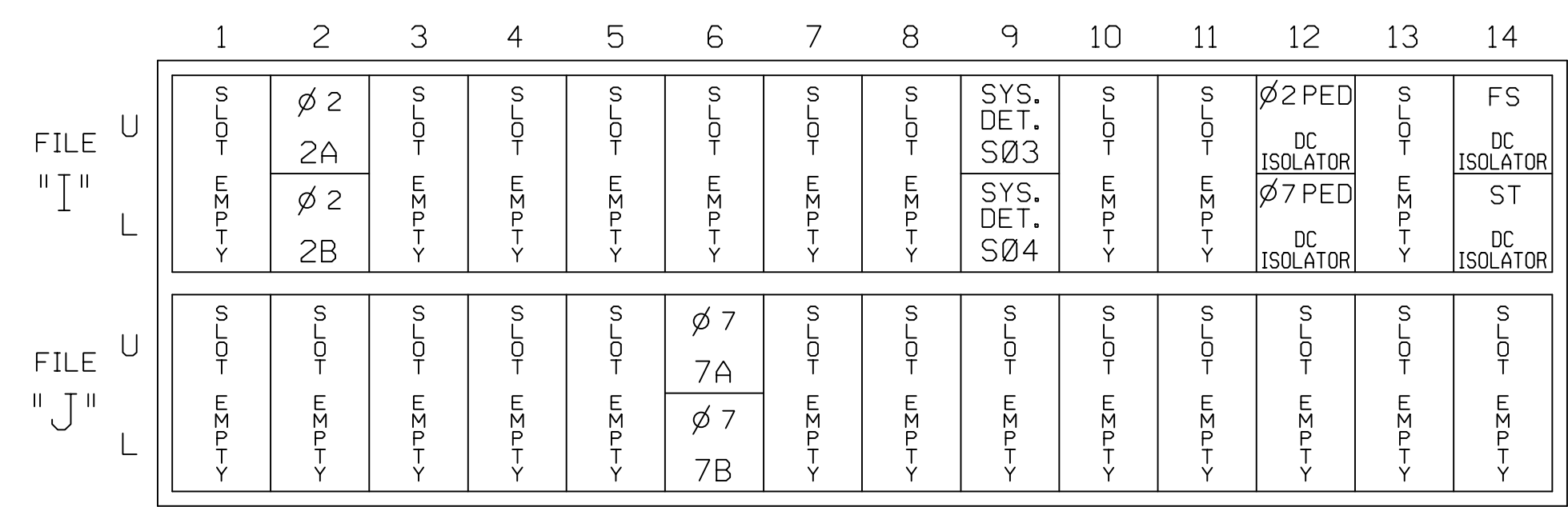
SIGNAL HEAD HOOK-UP CHART

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	7 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	NU	21,22	P21, P22	NU	NU	P71, P72	NU	NU	NU	71,72	73,74	NU	NU	NU	NU	NU	71,72	NU
RED		128										122						
YELLOW		129																
GREEN		130																
RED ARROW																		A101
YELLOW ARROW											123							A102
FLASHING YELLOW ARROW																		A103
GREEN ARROW										124	124							
Hand				113			104											
Walking				115			106											

NU = Not Used
 * See pictorial of head wiring in detail below.

INPUT FILE POSITION LAYOUT

(front view)



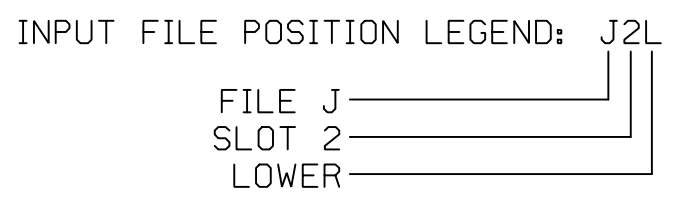
EX. : 1A, 2A, ETC. = LOOP NO.'S
 FS = FLASH SENSE
 ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
2A	TB2-5,6	I2U	39	1	2	2	Y	Y	-	-	-
2B	TB2-7,8	I2L	43	5	12	2	Y	Y	-	-	-
*S03	TB6-9,10	I9U	60	22	11	SYS	-	-	-	-	-
*S04	TB6-11,12	I9L	62	24	13	SYS	-	-	-	-	-
7A	TB5-9,10	J6U	42	4	8	7	Y	Y	-	-	15
7B	TB5-11,12	J6L	46	8	18	7	Y	Y	-	-	15
PED PUSH BUTTONS											
P21,P22	TB8-4,6	I12U	67	29	PED 2	2 PED					
P71,P72	TB8-5,6	I12L	69	31	PED 4	7 PED					

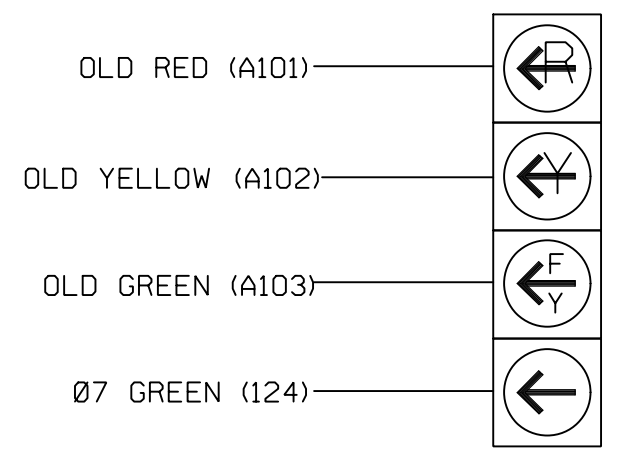
NOTE:
 INSTALL DC ISOLATORS IN INPUT FILE SLOT 112.

* System detector only. Remove the vehicle phase assigned to this detector in the default programming.



4 SECTION FYA PPLT SIGNAL WIRING DETAIL

(wire signal heads as shown)



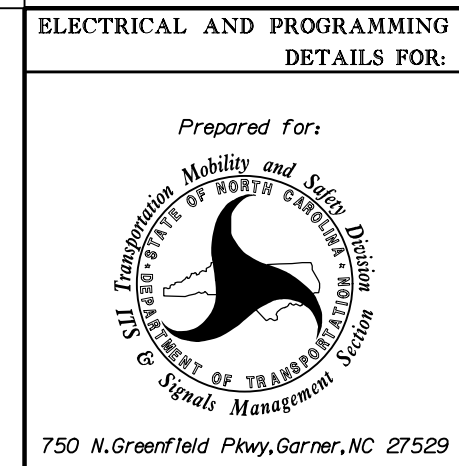
71,72

NOTE:
 1. The sequence display for these signals require special logic programming. See sheet 2 of 2 for programming instructions.

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: 10-2278
 DESIGNED: NOV 2017
 SEALED: 4/18/2018
 REVISED: N/A



ELECTRICAL AND PROGRAMMING DETAILS FOR:

US 21 (Statesville Road) at U-turn Bulb-out North of SR 2136 (Gilead Road)

Division 10	Mecklenburg	Huntersville
PLAN DATE: November 2017	REVIEWED BY: R. Dubnicka	
PREPARED BY: J. Trueblood	REVIEWED BY: J. Carroll	
REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

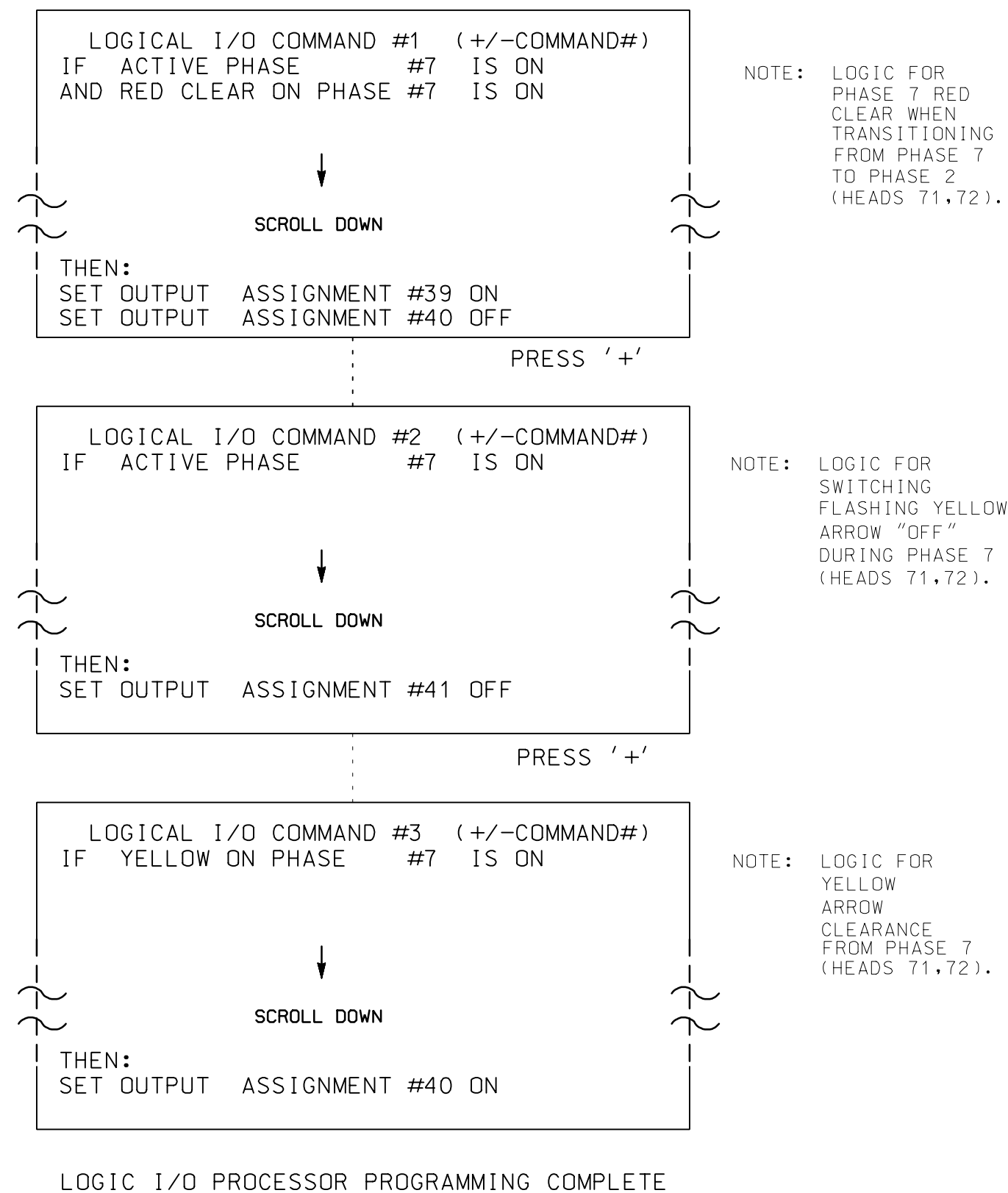
SEAL
 NORTH CAROLINA PROFESSIONAL ENGINEER
 SEAL 030005
 JUSTIN T. CARROLL
 4/18/2018
 SIG. INVENTORY NO. 10-2278

ELECTRICAL DETAIL SHEET 1 OF 2

LOGICAL I/O PROCESSOR PROGRAMMING DETAIL TO PRODUCE SPECIAL FYA-PPLT SIGNAL SEQUENCE

(program controller as shown below)

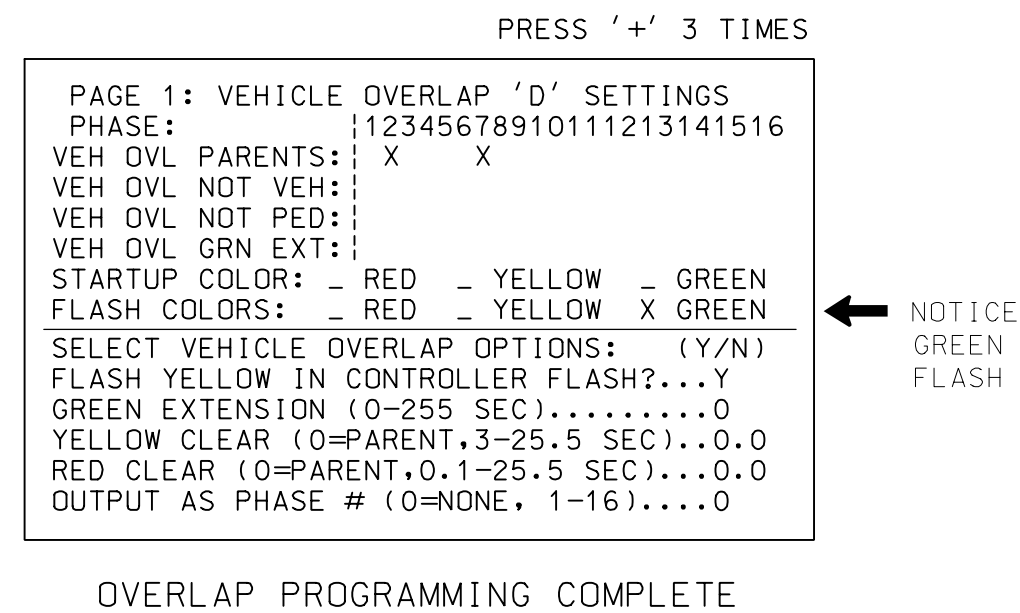
- FROM MAIN MENU PRESS '2' (PHASE CONTROL), THEN '1' (PHASE CONTROL FUNCTIONS), SCROLL TO THE BOTTOM OF THE MENU AND ENABLE ACT LOGIC COMMANDS 1, 2, AND 3.
- FROM MAIN MENU PRESS '6' (OUTPUTS), THEN '3' (LOGICAL I/O PROCESSOR).



OUTPUT REFERENCE SCHEDULE
USE TO INTERPRET LOGIC PROCESSOR
OUTPUT 39 = Overlap D Red
OUTPUT 40 = Overlap D Yellow
OUTPUT 41 = Overlap D Green

OVERLAP PROGRAMMING DETAIL (program controller as shown below)

FROM MAIN MENU PRESS '8' (OVERLAPS), THEN '1' (VEHICLE OVERLAP SETTINGS).



PED 7 PROGRAMMING DETAIL (program controller as shown below)

CHANGING OUTPUT ASSIGNMENTS

- FROM MAIN MENU SELECT '6' (OUTPUTS), THEN '1' (OUTPUT ASSIGNMENTS)
- ENTER 1 (PHASE 4 DW) FOR OUTPUT ASSIGNMENT #.
- SCROLL DOWN TO 'PEDESTRIAN PHASE' AND ENTER 'Y' REGARDLESS OF DEFAULT PROGRAMMING
- ENTER '7' FOR 'SELECT PEDESTRIAN PHASE'. NO CHANGE NEEDED FOR 'SELECT COLOR'
- BACKUP TO 'OUTPUT ASSIGNMENTS AND SETTINGS MENU:' BY PRESSING THE 'ESC' BUTTON ON KEYBOARD.
- SELECT '1' (OUTPUT ASSIGNMENTS)
- ENTER 2 (PHASE 4 W) FOR OUTPUT ASSIGNMENT #.
- REPEAT STEPS # 3 AND # 4.

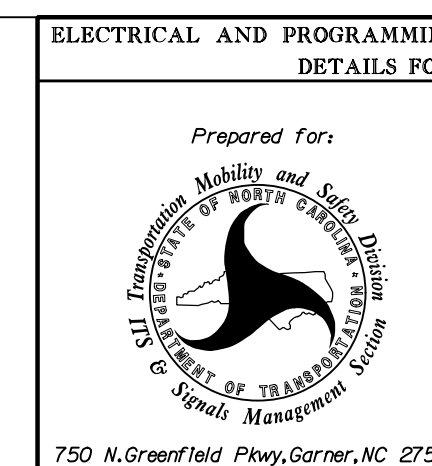
CHANGING INPUT ASSIGNMENTS

- FROM MAIN MENU SELECT '7' (DETECTORS), THEN '2' (PEDESTRIAN DETECTOR ASSIGNMENTS)
- CYCLE TO PED DETECTOR #4 BY REPEATEDLY DEPRESSING '+' KEY
- MODIFY PHASE ASSIGNED TO PED DETECTOR # 4 FROM PHASE 4 TO PHASE 7

PROGRAMMING COMPLETE

ELECTRICAL DETAIL SHEET 2 OF 2

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 10-2278
DESIGNED: NOV 2017
SEALED: 4/18/2018
REVISED: N/A



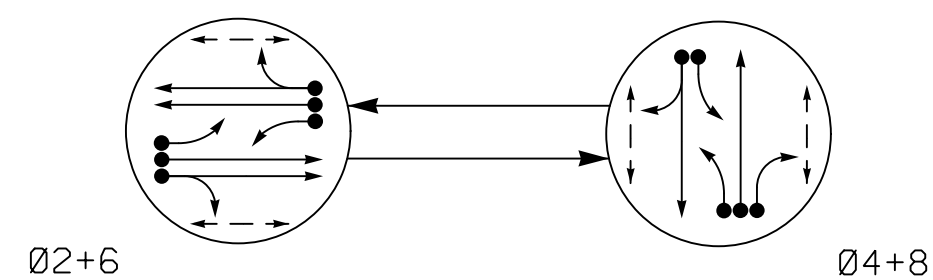
US 21 (Statesville Road) at U-turn Bulb-out North of SR 2136 (Gilead Road)	
Division 10	Mecklenburg
Prepared by: J. Trueblood	Reviewed by: R. Dubnicka
Prepared by: J. Trueblood	Reviewed by: J. Carroll
REVISIONS	INIT. DATE

DOCUMENT NOT CONSIDERED
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SIGNATURES COMPLETED

SEAL
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PROFESSIONAL
ENGINEER
JUSTIN T. CARROLL
SEAL
030005

4/18/2018
SIGNATURE DATE
SIG. INVENTORY NO. 10-2278

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

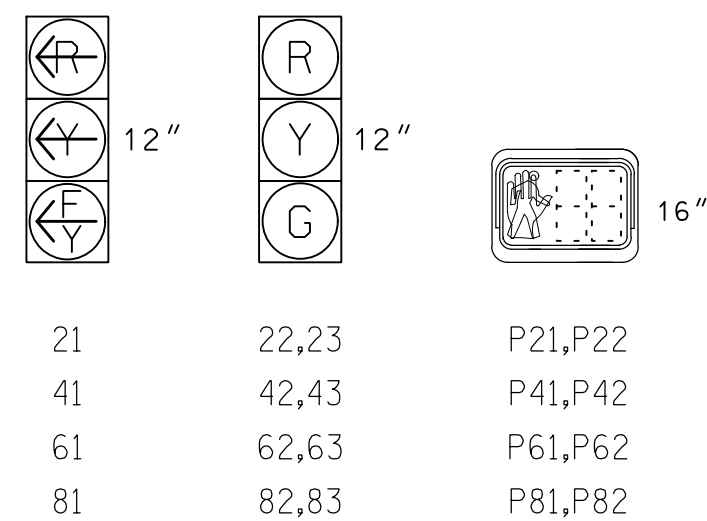
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- ⇄ PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE		
	02+6	04+8	FLASH
21	Y	Y	Y
22,23	G	R	Y
41	R	F	R
42,43	R	G	R
61	Y	Y	Y
62,63	G	R	Y
81	R	F	R
82,83	R	G	R
P21,P22	W	DW	DRK
P41,P42	DW	W	DRK
P61,P62	W	DW	DRK
P81,P82	DW	W	DRK

SIGNAL FACE I.D.

All Heads L.E.D.



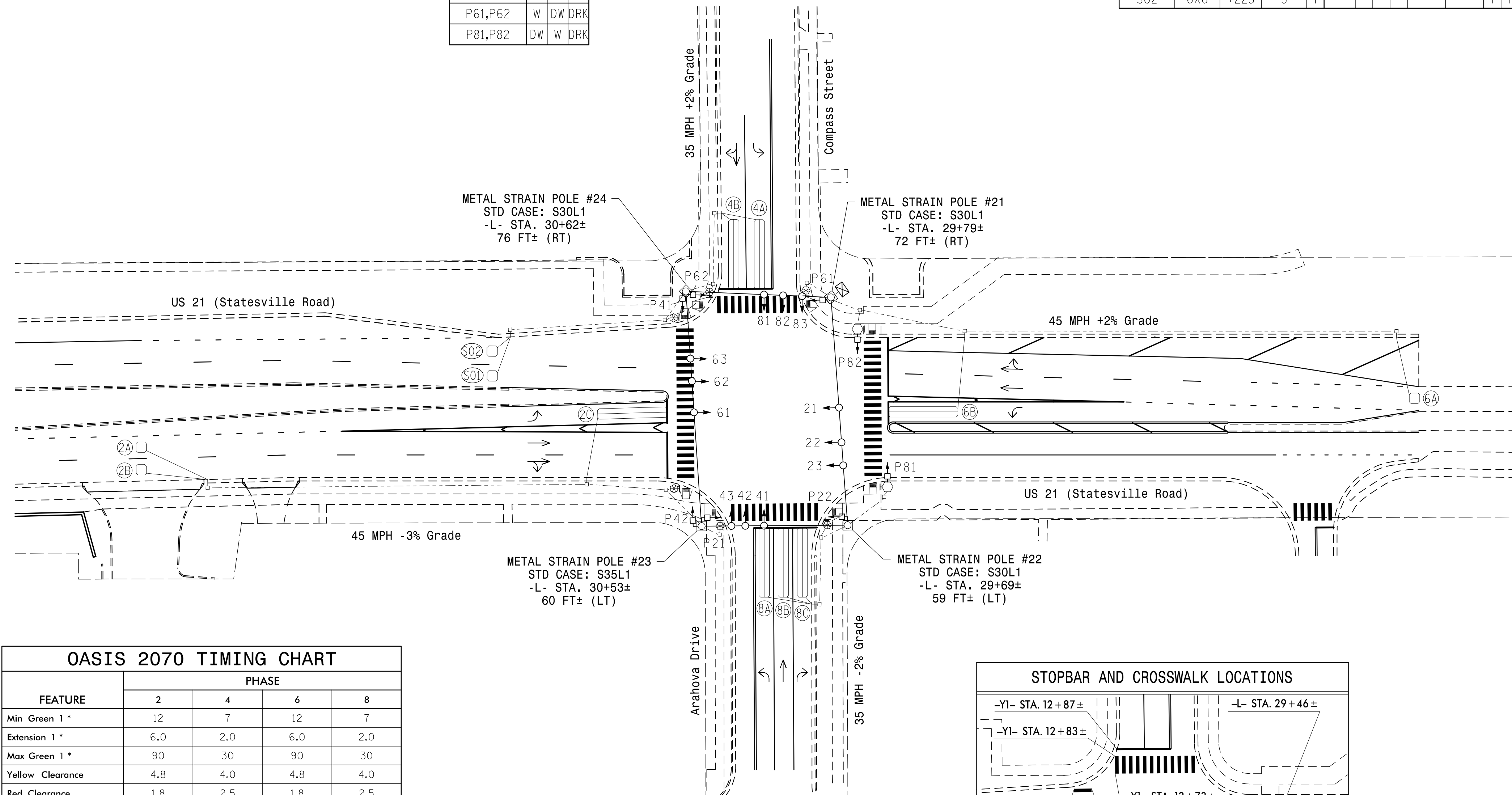
OASIS 2070 LOOP & DETECTOR INSTALLATION CHART

LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	DETECTOR PROGRAMMING					SYSTEM LOOP	NEW CARD
					PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME		
2A	6X6	300	6	Y	2	Y	Y	-	-	-	Y
2B	6X6	300	6	Y	2	Y	Y	-	-	-	Y
2C	6X40	0	2-4-2	Y	2	Y	Y	-	-	3	Y
4A	6X40	0	2-4-2	Y	4	Y	Y	-	-	3	Y
4B	6X40	0	2-4-2	Y	4	Y	Y	-	-	10	Y
6A	6X6	300	4	Y	6	Y	Y	-	-	-	Y
6B	6X40	0	2-4-2	Y	6	Y	Y	-	-	3	Y
8A	6X40	0	2-4-2	Y	8	Y	Y	-	-	3	Y
8B	6X40	0	2-4-2	Y	8	Y	Y	-	-	-	Y
8C	6X40	0	2-4-2	Y	8	Y	Y	-	-	15	Y
S01	6X6	+225	3	Y	-	-	-	-	-	-	Y
S02	6X6	+225	3	Y	-	-	-	-	-	-	Y

2 Phase Fully Actuated (Gilead Road Closed Loop System)

NOTES

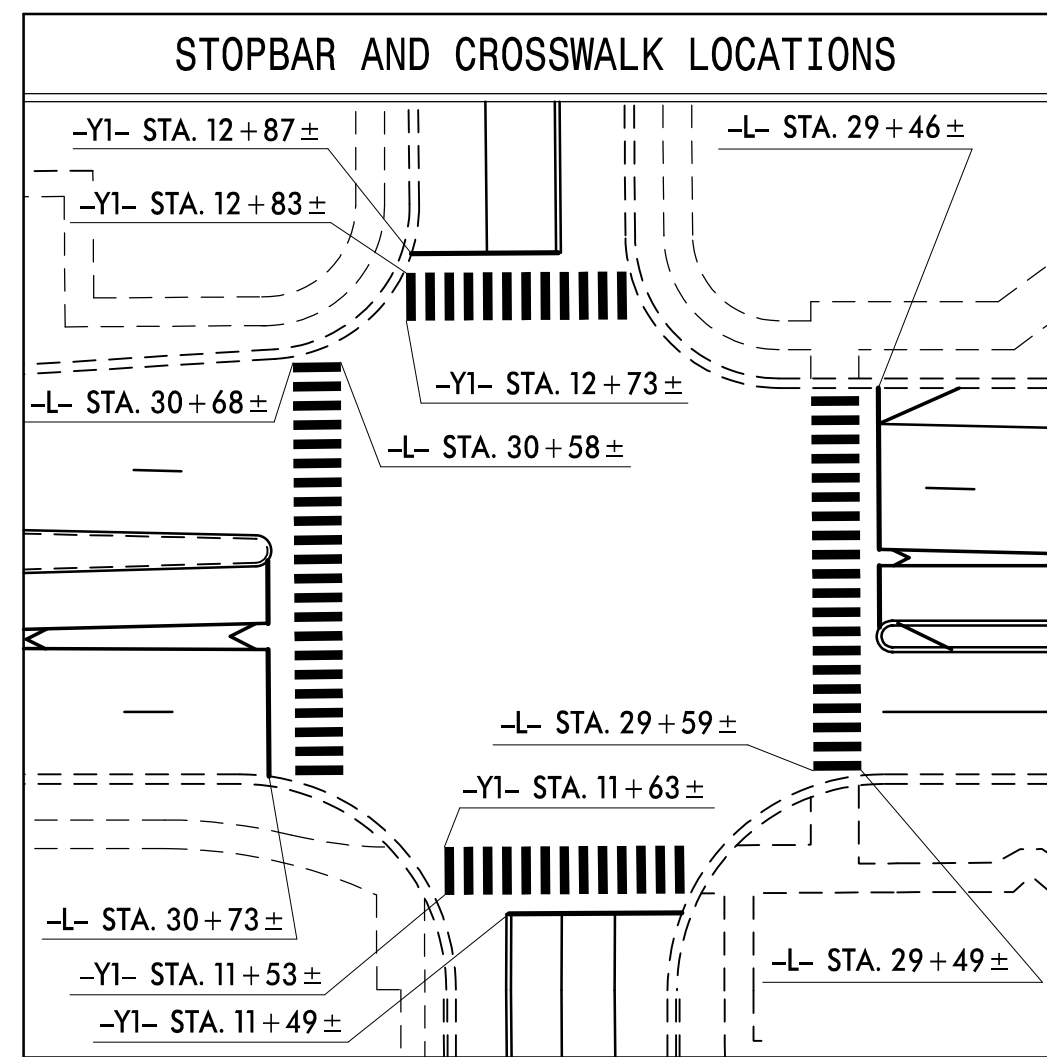
- Refer to "Roadway Standard Drawings NCDOT" dated January 2018, "Standard Specifications for Roads and Structures" dated January 2018.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Set all detector units to presence mode.
- Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
- Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
- Program pedestrian heads to countdown the flashing "Don't Walk" time only.
- All pedestrian pushbuttons shall be located in the field by the Division Traffic Engineer before installation.
- 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 #2266.



OASIS 2070 TIMING CHART

FEATURE	PHASE			
	2	4	6	8
Min Green 1 *	12	7	12	7
Extension 1 *	6.0	2.0	6.0	2.0
Max Green 1 *	90	30	90	30
Yellow Clearance	4.8	4.0	4.8	4.0
Red Clearance	1.8	2.5	1.8	2.5
Red Revert	2.0	2.0	2.0	2.0
Walk 1 *	7	7	7	7
Don't Walk 1	13	24	12	21
Seconds Per Actuation *	1.5	-	1.5	-
Max Variable Initial *	34	-	34	-
Time Before Reduction *	15	-	15	-
Time To Reduce *	30	-	30	-
Minimum Gap	3.0	-	3.0	-
Recall Mode	MIN RECALL	-	MIN RECALL	-
Vehicle Call Memory	YELLOW	-	YELLOW	-
Dual Entry	-	ON	-	ON
Simultaneous Gap	ON	ON	ON	ON

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



LEGEND

PROPOSED	EXISTING
○ Traffic Signal Head	● N/A
● Modified Signal Head	— N/A
— Sign	— N/A
□ Pedestrian Signal Head	□ N/A
□ Pushbutton & Sign	□ 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
⊙ Metal Strain Pole	⊙ N/A
⊙ Type I Pushbutton Post	⊙ N/A
○ Type II Signal Pedestal	○ N/A

STV 100 Years
 STV Engineers, Inc.
 900 West Trade St., Suite 715
 Charlotte, NC 28202
 (704) 372-1885
 NC License Number F-0991

NEW INSTALLATION

US 21 (Statesville Road) at Arahova Drive/Compass Street

Division 10 Wecklenburg Huntersville

PLAN DATE: November 2017 REVIEWED BY: R. Mattern

PREPARED BY: J. Trueblood REVIEWED BY: J. Carroll

750 N. Greenfield Pkwy, Garner, NC 27529

SCALE: 1" = 40'

4/18/2018

SIG. INVENTORY NO. 10-2266

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL NORTH CAROLINA PROFESSIONAL ENGINEER

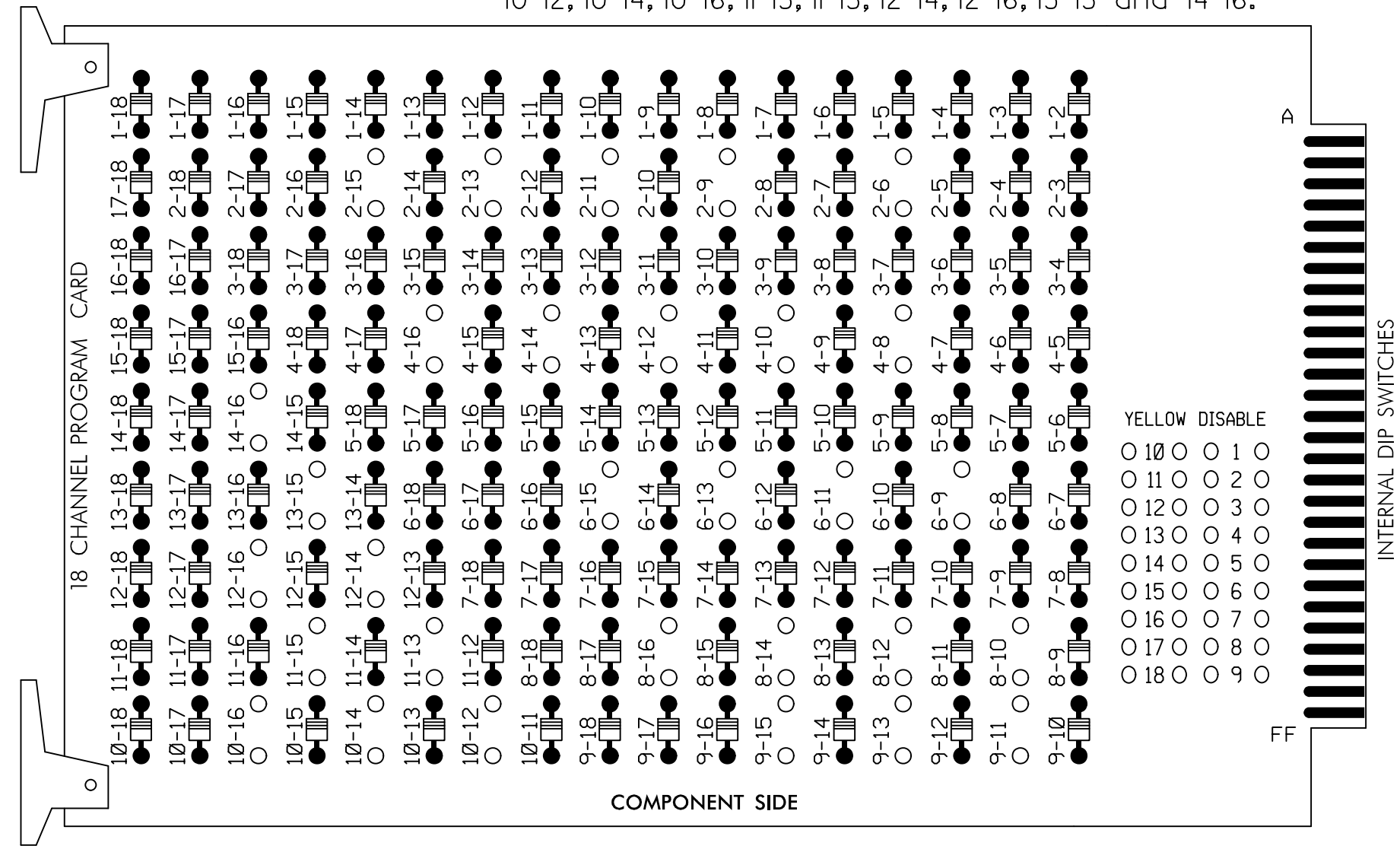
SEAL 030005

DATE 4/18/2018

EDI MODEL 2018ECLIP-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 2-6, 2-9, 2-11, 2-13, 2-15, 4-8, 4-10, 4-12, 4-14, 4-16, 6-9, 6-11, 6-13, 6-15, 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 Red Enable is active at all times during normal operation.

NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
- Program phases 4 and 8 for Dual Entry.
- Enable Simultaneous Gap-Out for all phases.
- Program phases 2 and 6 for Variable Initial and Gap Reduction.
- Program phases 2 and 6 for Start Up In Green.
- Program phases 2, 4, 6, and 8 for 'STARTUP PED CALL'.
- Program phases 2 and 6 for Yellow Flash and overlaps 1 and 2 as Wag Overlaps.
- The cabinet and controller are part of the Gilead Road Closed Loop System.

EQUIPMENT INFORMATION

CONTROLLER.....2070E
 CABINET.....332 /W/ AUX
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
 LOAD SWITCHES USED.....S2,S3,S5,S6,S8,S9,S11,S12,AUX S1, AUX S2,AUX S4,AUX S5
 PHASES USED.....2,2 PED,4,4 PED,6,6 PED,8,8 PED
 OVERLAP "A".....2
 OVERLAP "B".....4
 OVERLAP "C".....6
 OVERLAP "D".....8

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	NU	22,23	P21, P22	NU	42,43	P41, P42	NU	62,63	P61, P62	NU	82,83	P81, P82	61	81	NU	21	41	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																		
Hand icon				113		104			119			110						
Walking person icon				115		106			121			112						

NU = Not Used

★ See pictorial of head wiring in detail below.

FLASHER CIRCUIT MODIFICATION DETAIL

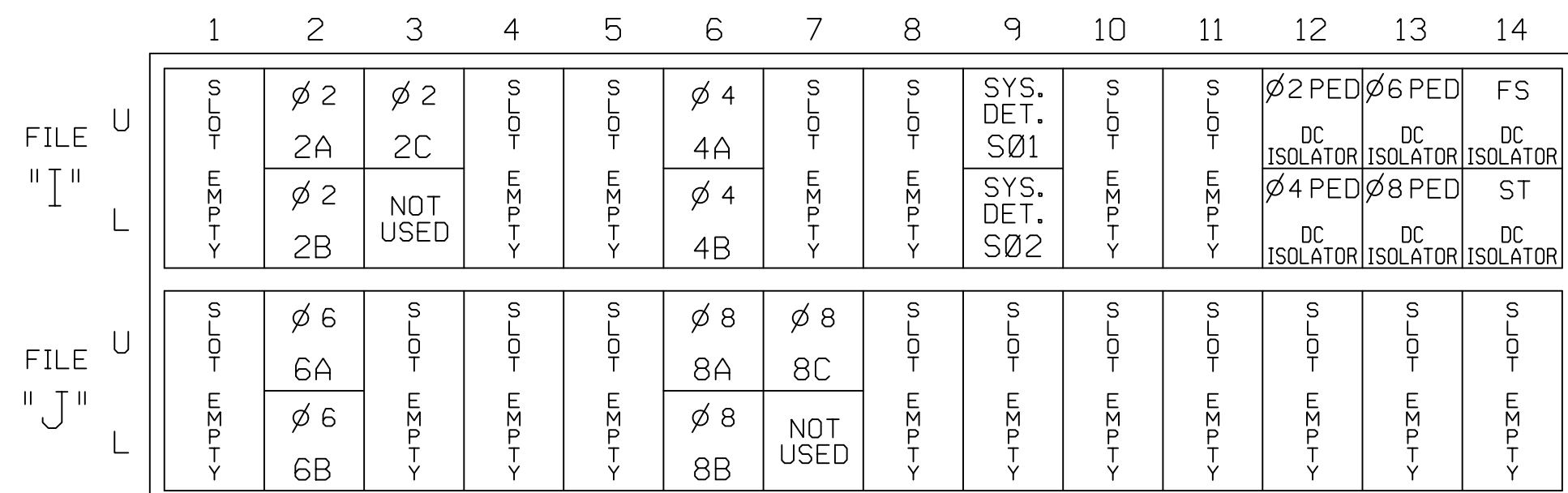
IN ORDER TO INSURE THAT SIGNALS FLASH CONCURRENTLY ON THE SAME APPROACH, MAKE THE FOLLOWING FLASHER CIRCUIT CHANGES:

- 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.

INPUT FILE POSITION LAYOUT

(front view)



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

FS = FLASH SENSE
ST = STOP TIME

OVERLAP PROGRAMMING DETAIL

(program controller as shown below)

FROM MAIN MENU PRESS '8' (OVERLAPS), THEN '1' (VEHICLE OVERLAP SETTINGS).

PAGE 1: VEHICLE OVERLAP 'A' SETTINGS
 PHASE: 12345678910111213141516
 VEH OVL PARENTS: X
 VEH OVL NOT VEH: X
 VEH OVL NOT PED: X
 VEH OVL GRN EXT: X
 STARTUP COLOR: - RED - YELLOW - GREEN
 FLASH COLORS: - RED - YELLOW X GREEN
 SELECT VEHICLE OVERLAP OPTIONS: (Y/N)
 FLASH YELLOW IN CONTROLLER FLASH?...Y
 GREEN EXTENSION (0-255 SEC).....0
 YELLOW CLEAR (0=PARENT,3-25.5 SEC)...0.0
 RED CLEAR (0=PARENT,0.1-25.5 SEC)...0.0
 OUTPUT AS PHASE # (0=NONE, 1-16)....0

NOTICE GREEN FLASH

PRESS '+'

PAGE 1: VEHICLE OVERLAP 'B' SETTINGS
 PHASE: 12345678910111213141516
 VEH OVL PARENTS: X
 VEH OVL NOT VEH: X
 VEH OVL NOT PED: X
 VEH OVL GRN EXT: X
 STARTUP COLOR: - RED - YELLOW - GREEN
 FLASH COLORS: - RED - YELLOW X GREEN
 SELECT VEHICLE OVERLAP OPTIONS: (Y/N)
 FLASH YELLOW IN CONTROLLER FLASH?...N
 GREEN EXTENSION (0-255 SEC).....0
 YELLOW CLEAR (0=PARENT,3-25.5 SEC)...0.0
 RED CLEAR (0=PARENT,0.1-25.5 SEC)...0.0
 OUTPUT AS PHASE # (0=NONE, 1-16)....0

NOTICE GREEN FLASH

PRESS '+'

PAGE 1: VEHICLE OVERLAP 'C' SETTINGS
 PHASE: 12345678910111213141516
 VEH OVL PARENTS: X
 VEH OVL NOT VEH: X
 VEH OVL NOT PED: X
 VEH OVL GRN EXT: X
 STARTUP COLOR: - RED - YELLOW - GREEN
 FLASH COLORS: - RED - YELLOW X GREEN
 SELECT VEHICLE OVERLAP OPTIONS: (Y/N)
 FLASH YELLOW IN CONTROLLER FLASH?...Y
 GREEN EXTENSION (0-255 SEC).....0
 YELLOW CLEAR (0=PARENT,3-25.5 SEC)...0.0
 RED CLEAR (0=PARENT,0.1-25.5 SEC)...0.0
 OUTPUT AS PHASE # (0=NONE, 1-16)....0

NOTICE GREEN FLASH

PRESS '+'

PAGE 1: VEHICLE OVERLAP 'D' SETTINGS
 PHASE: 12345678910111213141516
 VEH OVL PARENTS: X
 VEH OVL NOT VEH: X
 VEH OVL NOT PED: X
 VEH OVL GRN EXT: X
 STARTUP COLOR: - RED - YELLOW - GREEN
 FLASH COLORS: - RED - YELLOW X GREEN
 SELECT VEHICLE OVERLAP OPTIONS: (Y/N)
 FLASH YELLOW IN CONTROLLER FLASH?...N
 GREEN EXTENSION (0-255 SEC).....0
 YELLOW CLEAR (0=PARENT,3-25.5 SEC)...0.0
 RED CLEAR (0=PARENT,0.1-25.5 SEC)...0.0
 OUTPUT AS PHASE # (0=NONE, 1-16)....0

NOTICE GREEN FLASH

OVERLAP PROGRAMMING COMPLETE

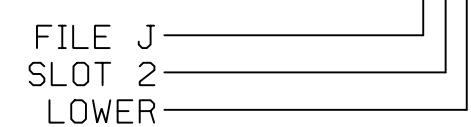
INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
2A	TB2-5,6	I2U	39	1	2	2	Y	Y	-	-	-
2B	TB2-7,8	I2L	43	5	12	2	Y	Y	-	-	-
2C	TB2-9,10	I3U	63	25	32	2	Y	Y	Y	-	3
4A	TB4-9,10	I6U	41	3	4	4	Y	Y	-	-	3
4B	TB4-11,12	I6L	45	7	14	4	Y	Y	-	-	10
*S01	TB6-9,10	I9U	60	22	11	SYS	-	-	-	-	-
*S02	TB6-11,12	I9L	62	24	13	SYS	-	-	-	-	-
6A	TB3-5,6	J2U	40	2	6	6	Y	Y	-	-	-
6B	TB3-7,8	J2L	44	6	16	6	Y	Y	Y	-	3
8A	TB5-9,10	J6U	42	4	8	8	Y	Y	-	-	3
8B	TB5-11,12	J6L	46	8	18	8	Y	Y	-	-	-
8C	TB7-1,2	J7U	66	28	38	8	Y	Y	-	-	15
PED PUSH BUTTONS											
P21,P22	TB8-4,6	I12U	67	29	PED 2	2 PED					
P41,P42, P43,P44	TB8-5,6	I12L	69	31	PED 4	4 PED					
P61,P62, P63,P64	TB8-7,9	I13U	68	30	PED 6	6 PED					
P81,P82	TB8-8,9	I13L	70	32	PED 8	8 PED					

NOTE:

INSTALL DC ISOLATORS IN INPUT FILE SLOTS 112 AND 113.

INPUT FILE POSITION LEGEND: J2L



* System detector only. Remove the vehicle phase assigned to this detector in the default programming.

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

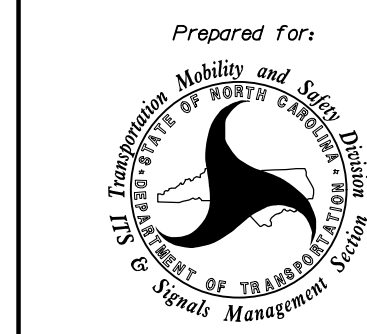
Countdown Ped Signals are required to display timing only during Ped Clearance Interval. Consult Ped Signal Module user's manual for instructions on selecting this feature.

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 10-2266
DESIGNED: NOV 2017
SEALED: 4/18/2018
REVISED: N/A



ELECTRICAL DETAIL SHEET

ELECTRICAL AND PROGRAMMING DETAILS FOR:



US 21 (Statesville Road) at Arahova Drive/Compass Street

Division 10 Wecklenburg Huntersville

PLAN DATE: November 2017 REVIEWED BY: R. Dubnicka

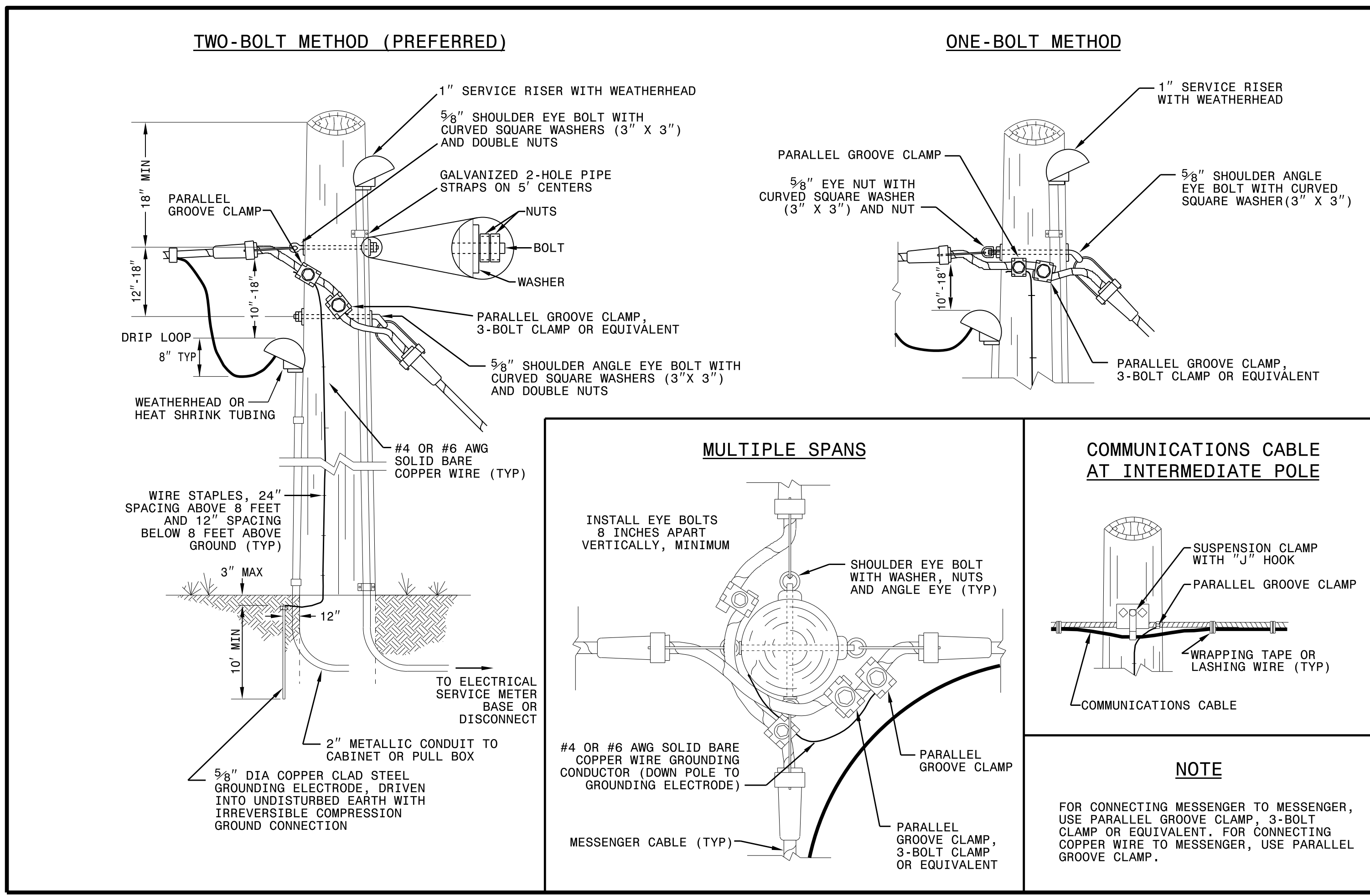
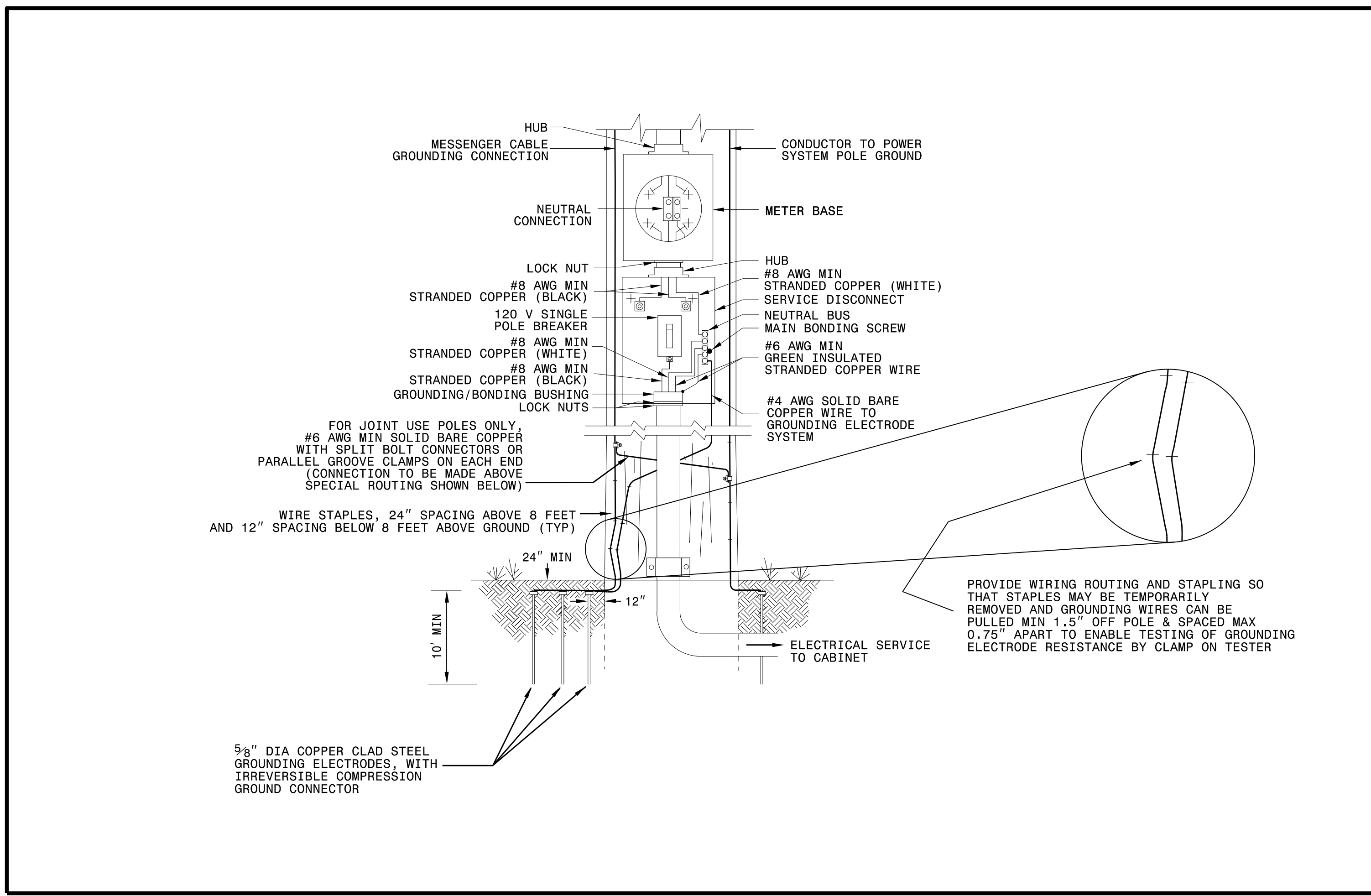
PREPARED BY: J. Trueblood REVIEWED BY: J. Carroll

REVISIONS INIT. DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Signature and date: Justin T. Carroll, 4/18/2018

SIG. INVENTORY NO. 10-2266



DOCUMENT NOT CONSIDERED
FINAL UNLESS ALL
SIGNATURES COMPLETED

See Plate for Title

Prepared in the Offices of:

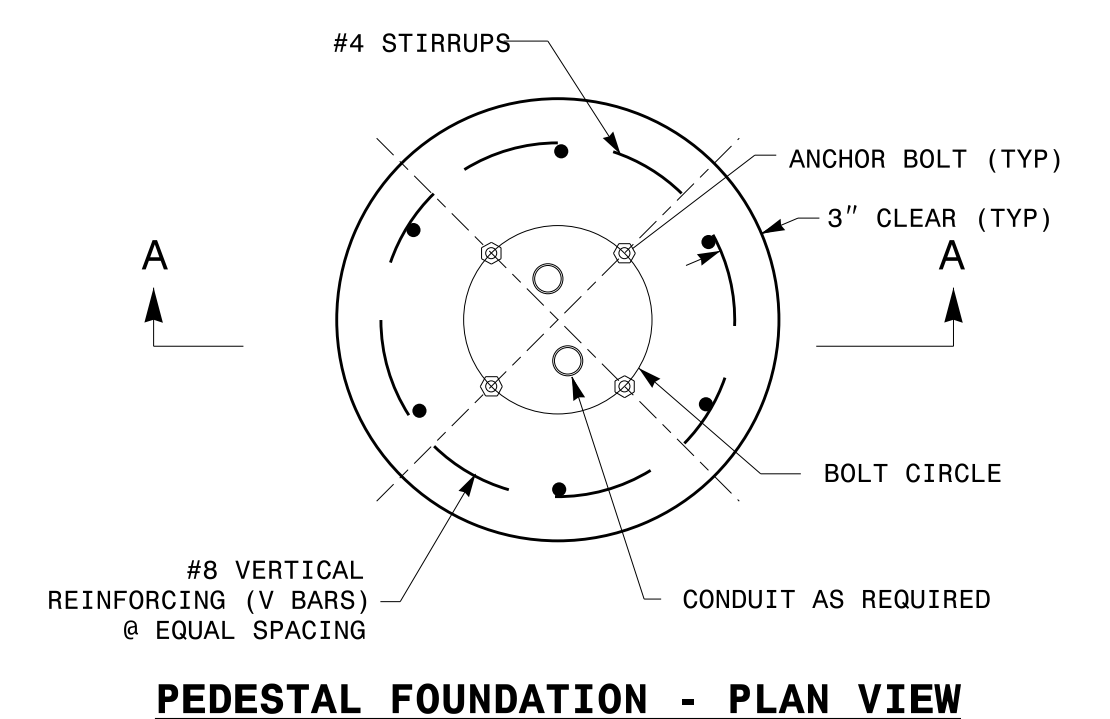
SEAL

DocuSigned by:
Mohd Aslami

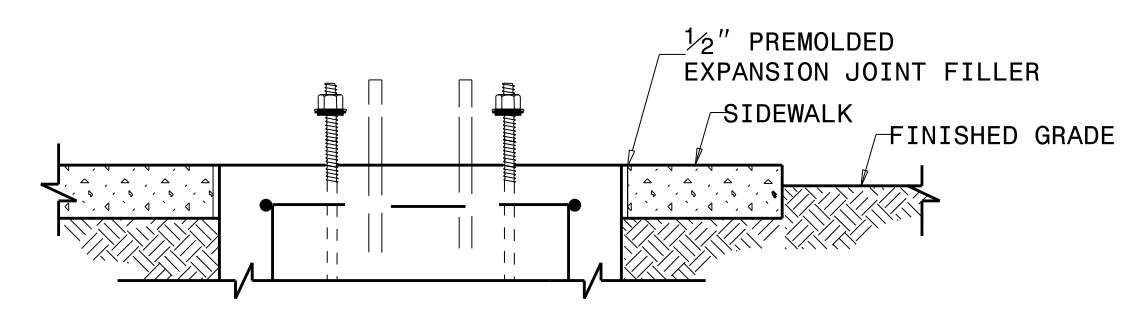
750 N. Greenfield Parkway
Garner, NC 27529

10/11/2017
DATE

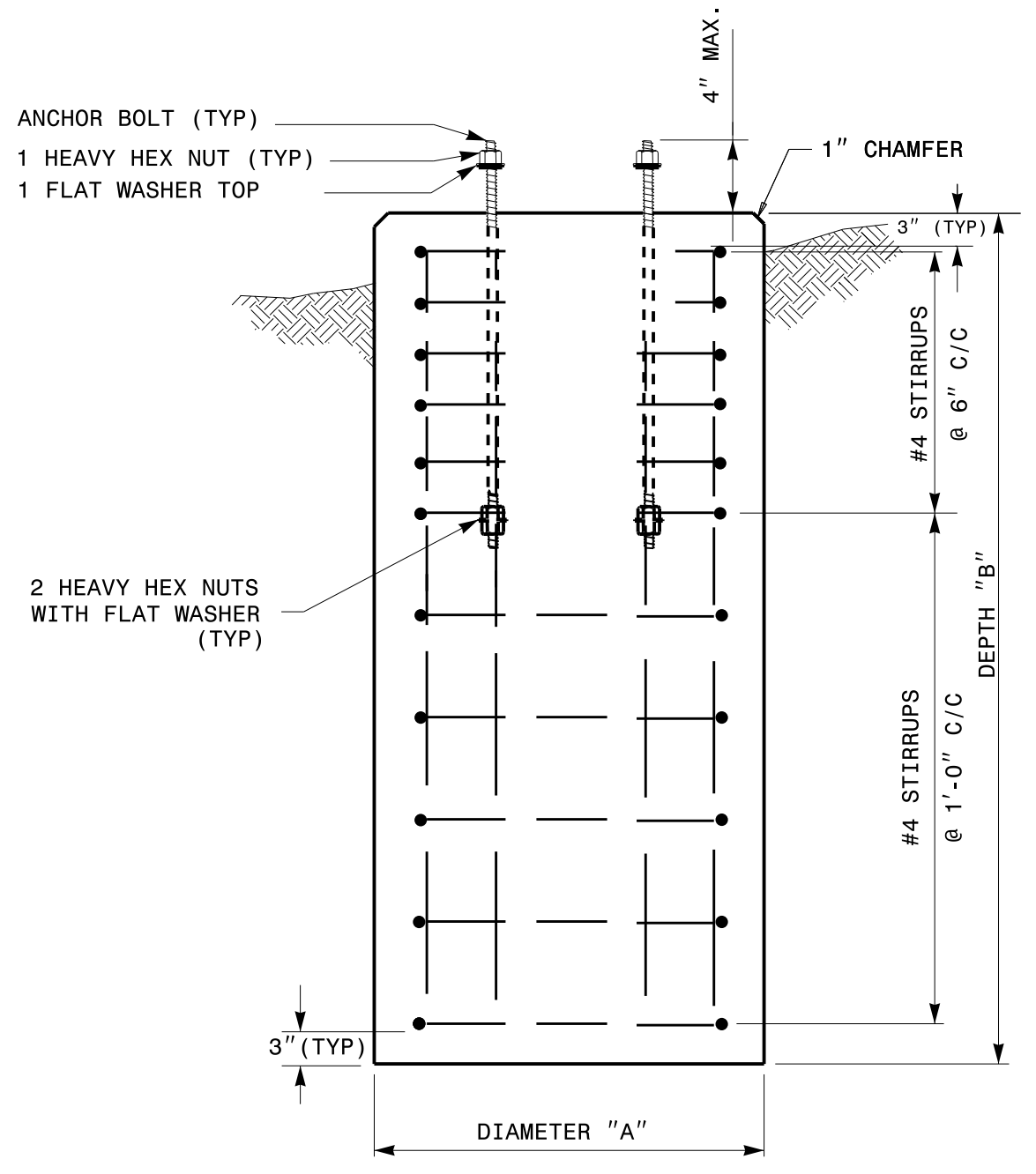
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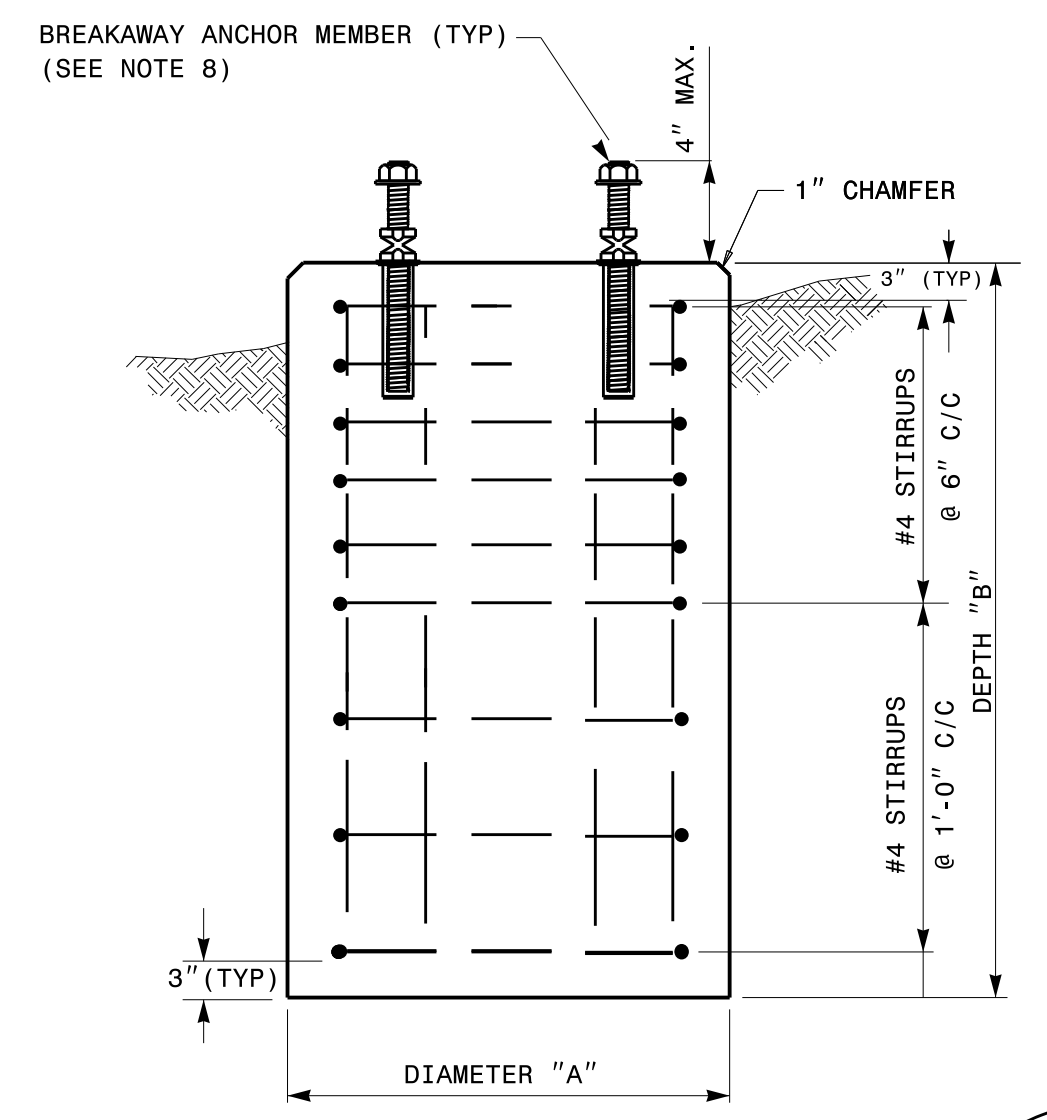
PEDESTAL FOUNDATION - PLAN VIEW



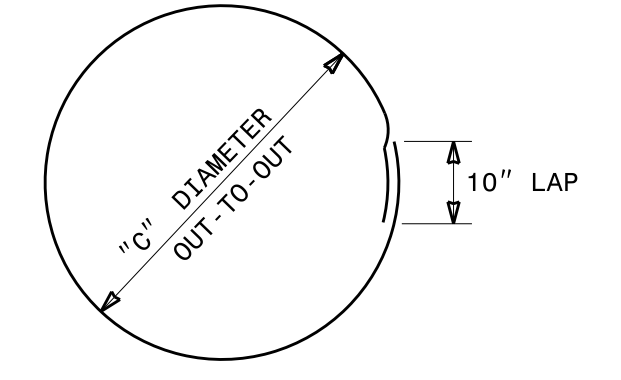
PEDESTAL FOUNDATION DETAILS FOR SIDEWALK



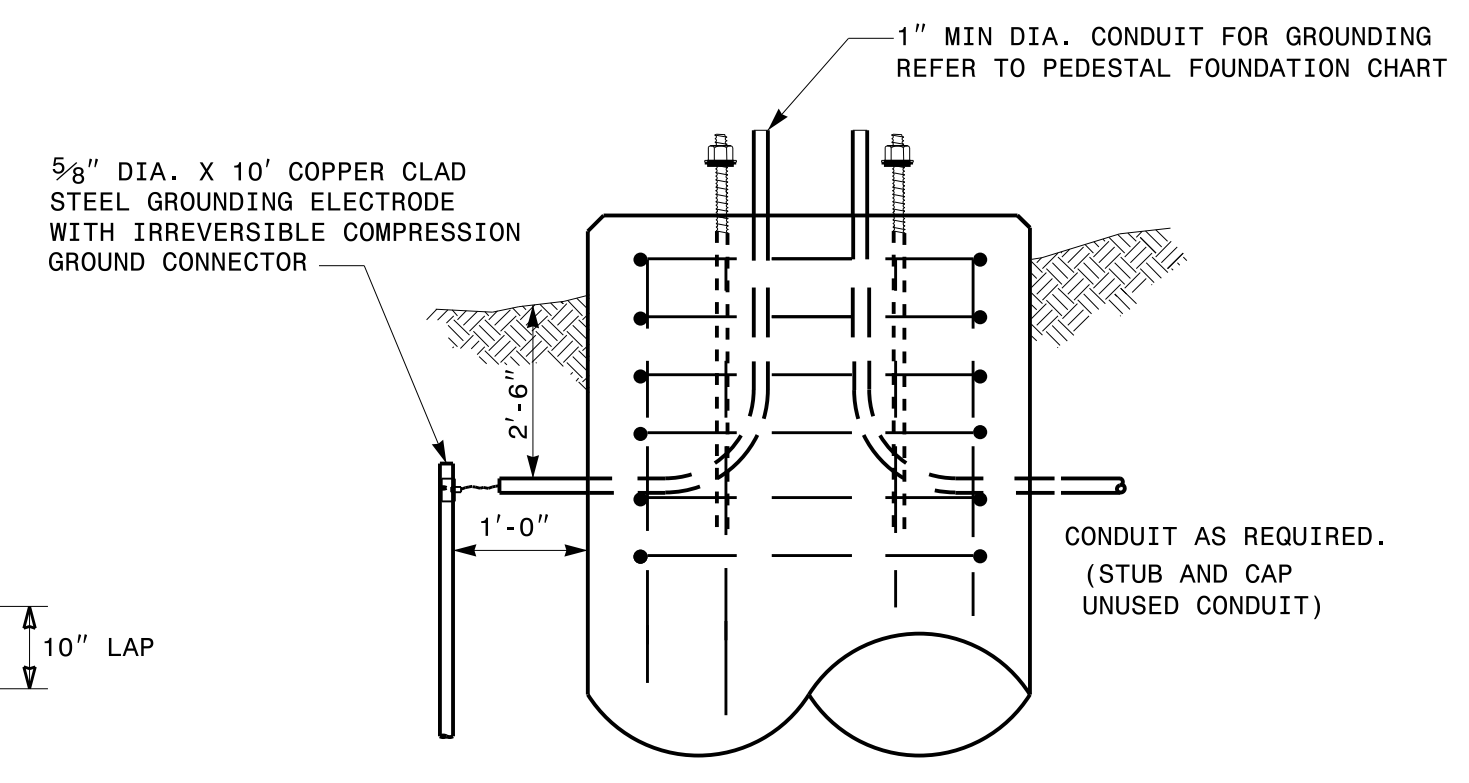
TYPES I, II & III
SECTION A-A



TYPES I & II ONLY
SECTION A-A



CLOSED HOOPS



GROUNDING & CONDUIT DETAIL

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

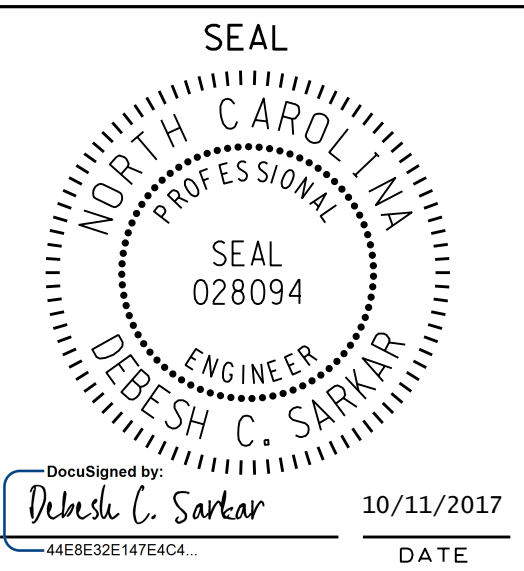
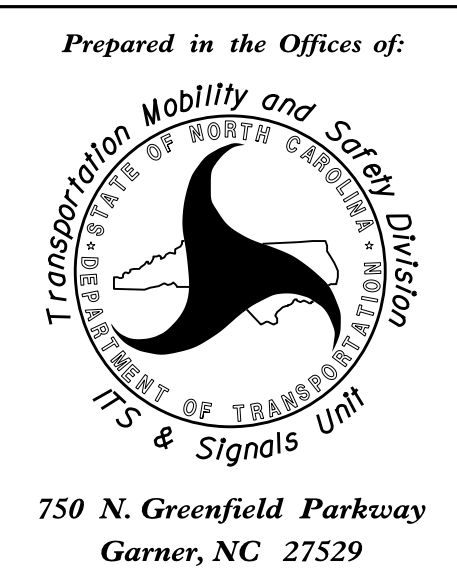
REINFORCING STEEL SCHEDULE													
TYPE	V-BAR				STIRRUP								
	SIZE #	QTY	LENGTH	WEIGHT LBS	SIZE #	QUANTITY			LENGTH	DIAMETER "C" FT	OVERLAP MIN.	WEIGHT LBS	TOTAL STEEL WEIGHT LBS
						VERTICAL ON 6" CENTERS	ON 12" CENTERS	TOTAL					
I	8	6	3'-0"	56	4	0	4	4	5'-7"	1'-6"	0'-10"	15	71
II	8	6	4'-6"	86	4	5	3	8	5'-7"	1'-6"	0'-10"	30	116
III	8	6	6'-6"	122	4	7	4	11	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

See Plate for Title



DOCUMENT NOT CONSIDERED
FINAL UNLESS ALL
SIGNATURES COMPLETED

750 N. Greenfield Parkway
Garner, NC 27529

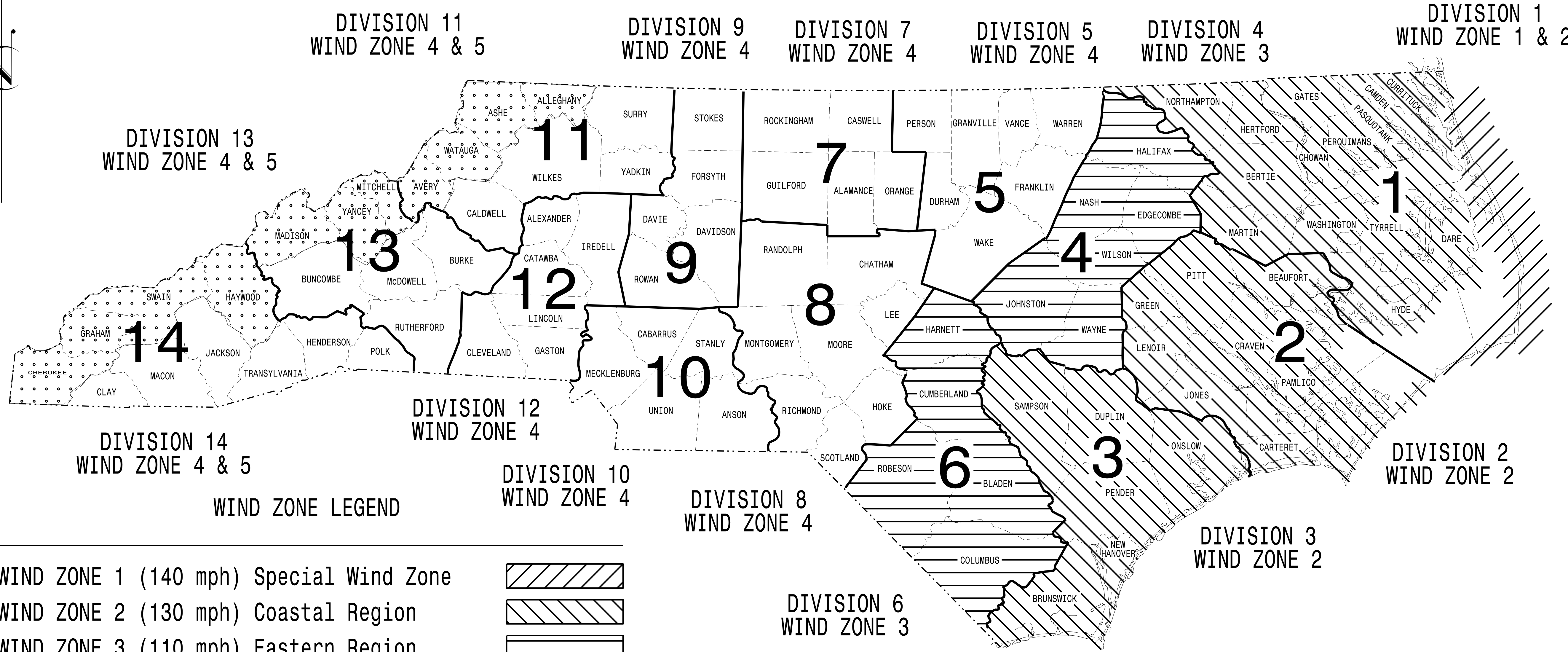
Disc Signed by: *Debesh C. Sarkar*
10/11/2017
DATE

11-10CT-2017_08x03
11-2018_S14 Drawings#Plate_Sheets#2018_Plate_Sheet - .dgn
r:\rough

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

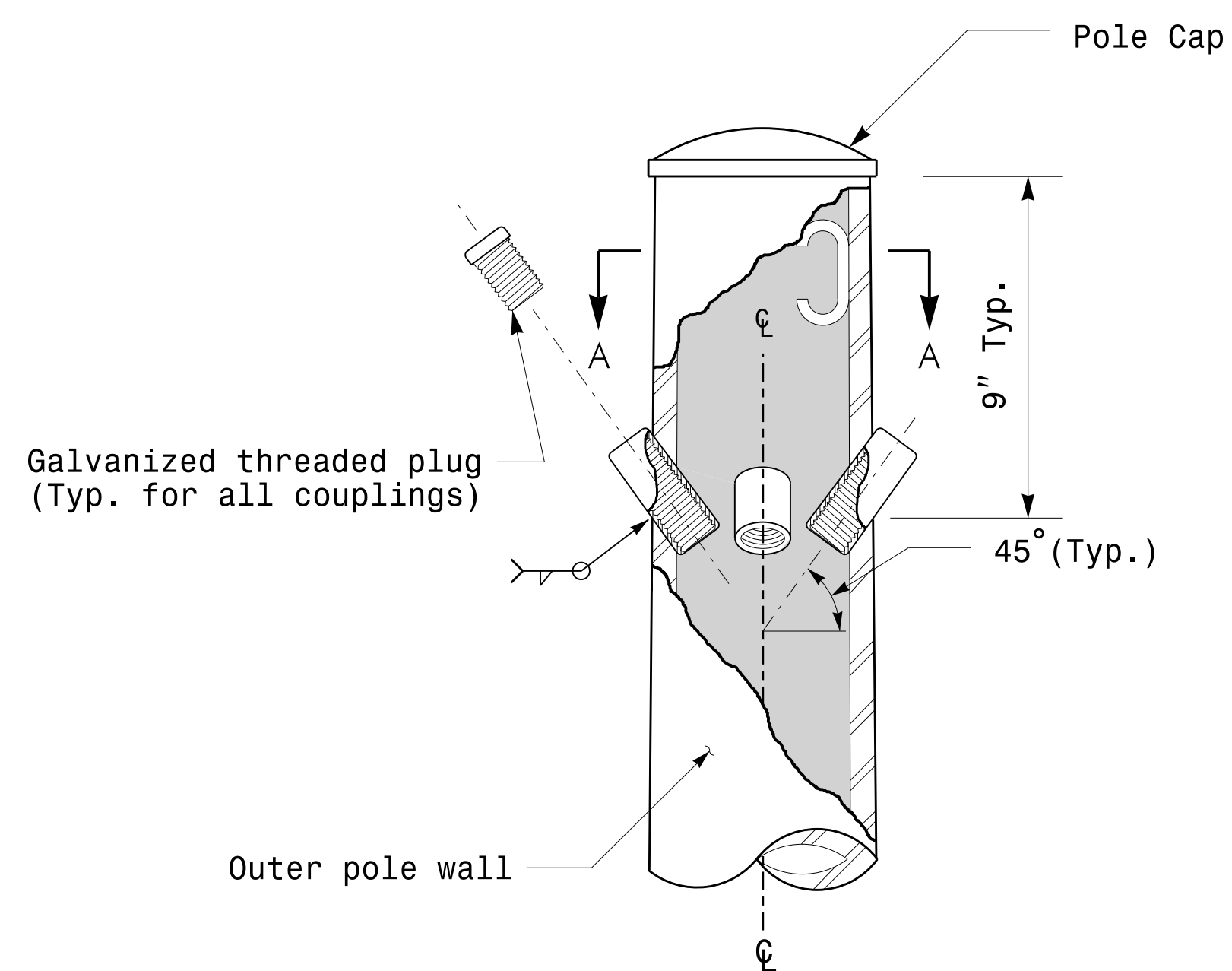
J.P. GALLOWAY, P.E. - STATE SIGNALS ENGINEER

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

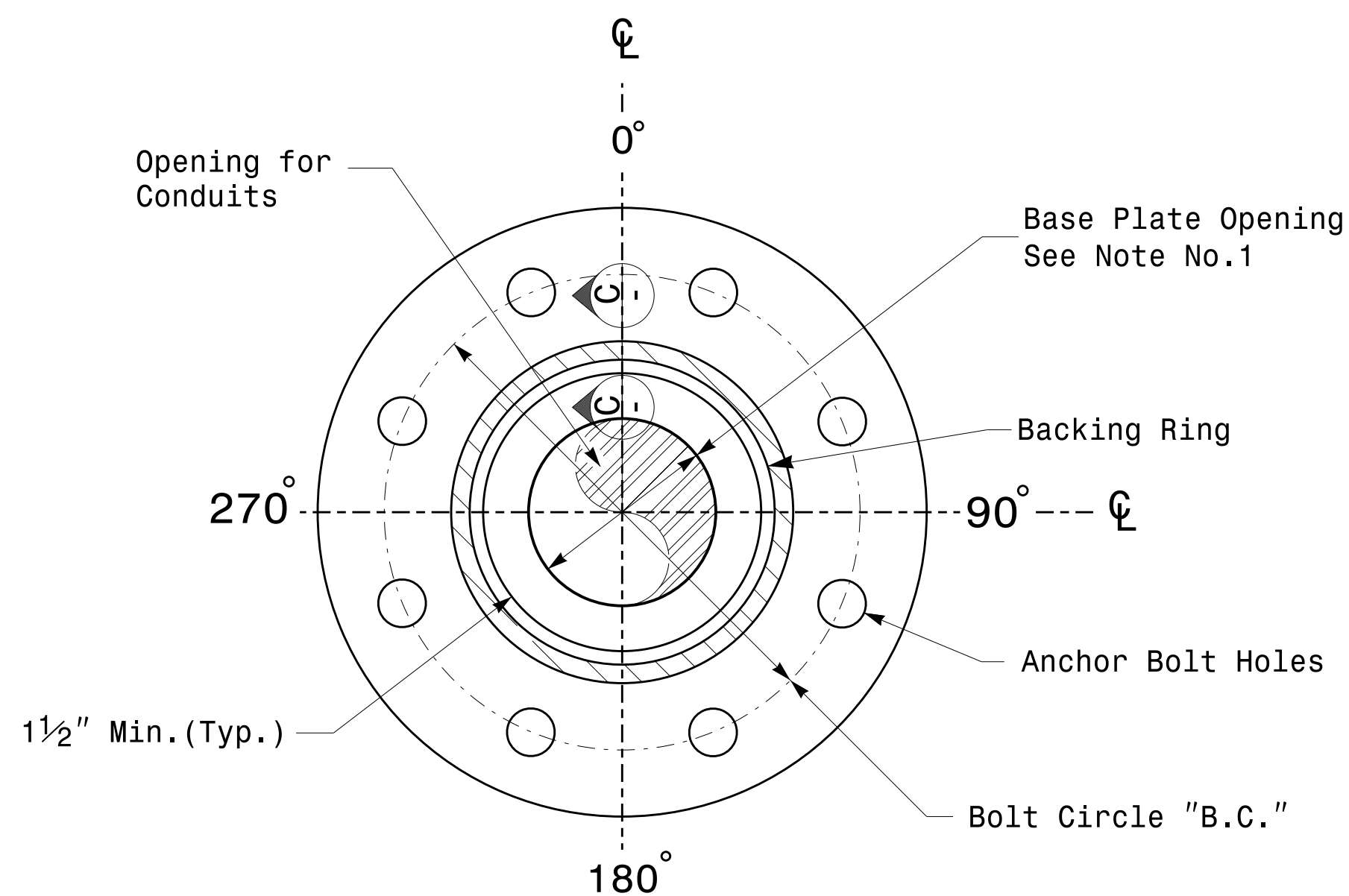
SEAL

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

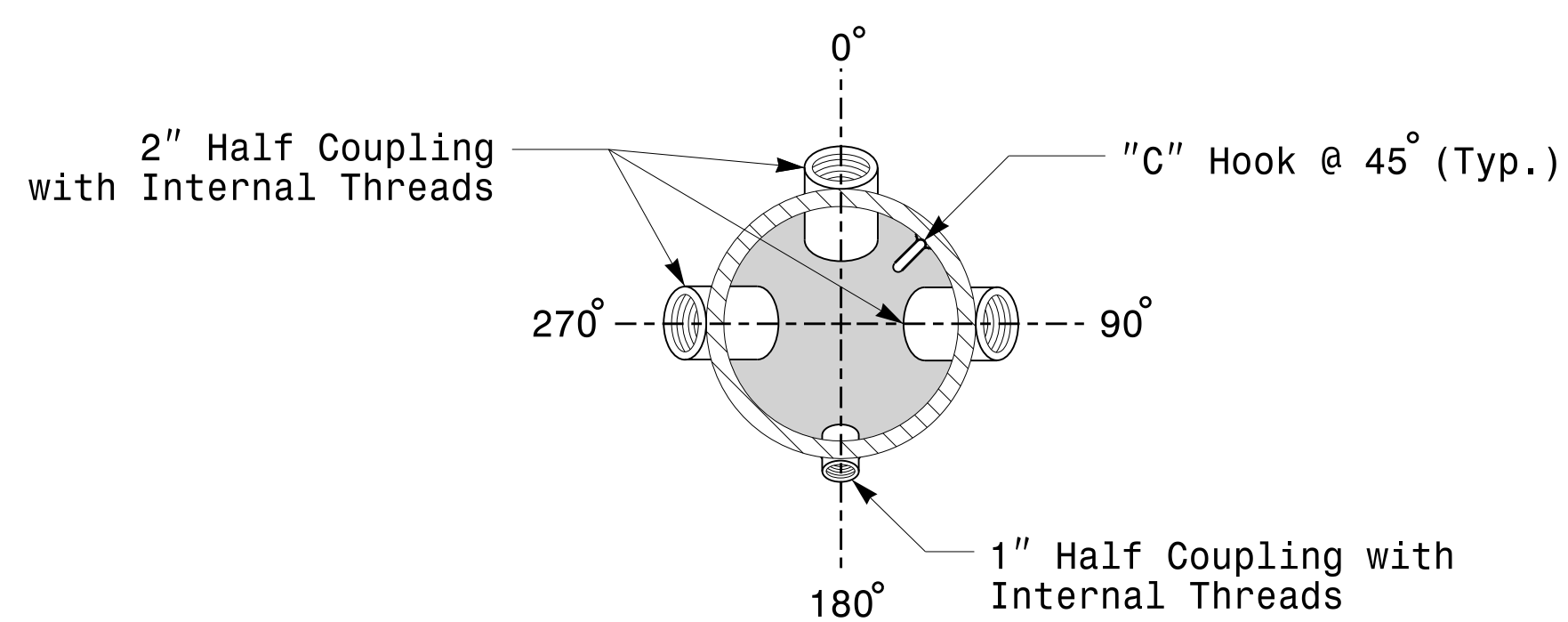
Note:
 1. Opening in pole base plate shall be equal to pole base inside diameter minus 3 1/2" but shall not be less than 8 1/2".



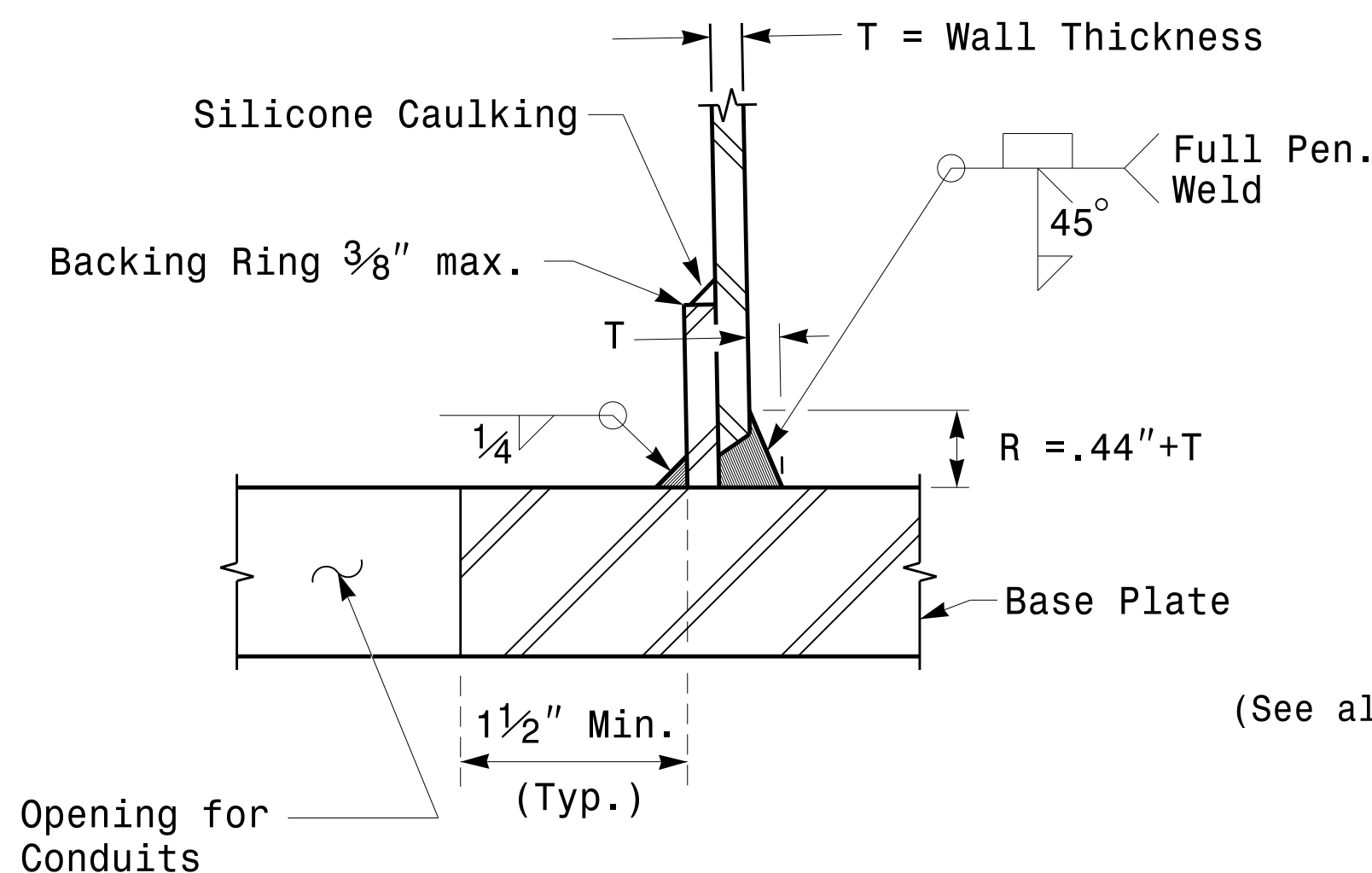
Cable Entrances at Top of Pole



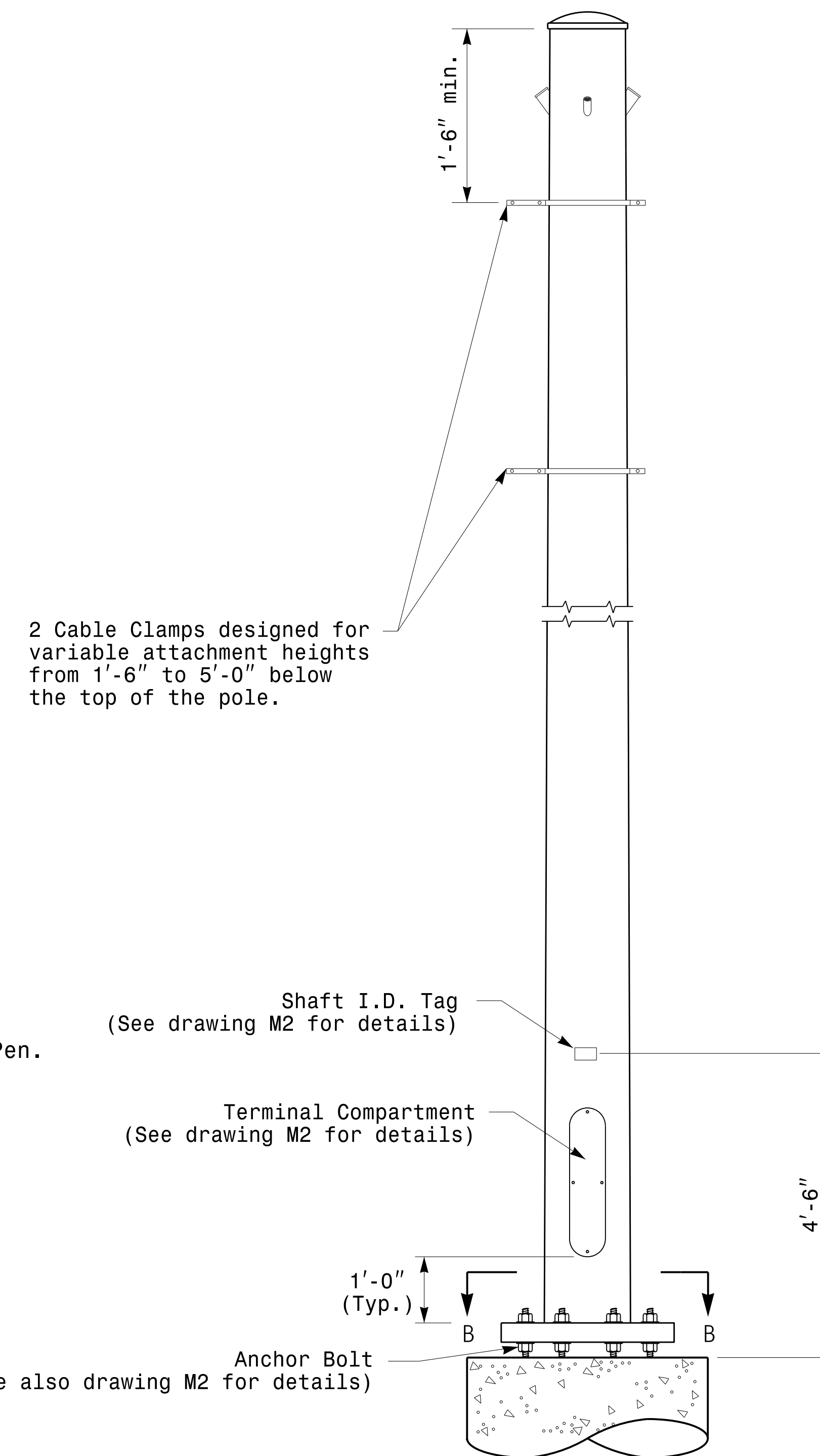
Section B-B
Pole Base Plate Details
(8 and 12 Bolt Pattern)



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



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

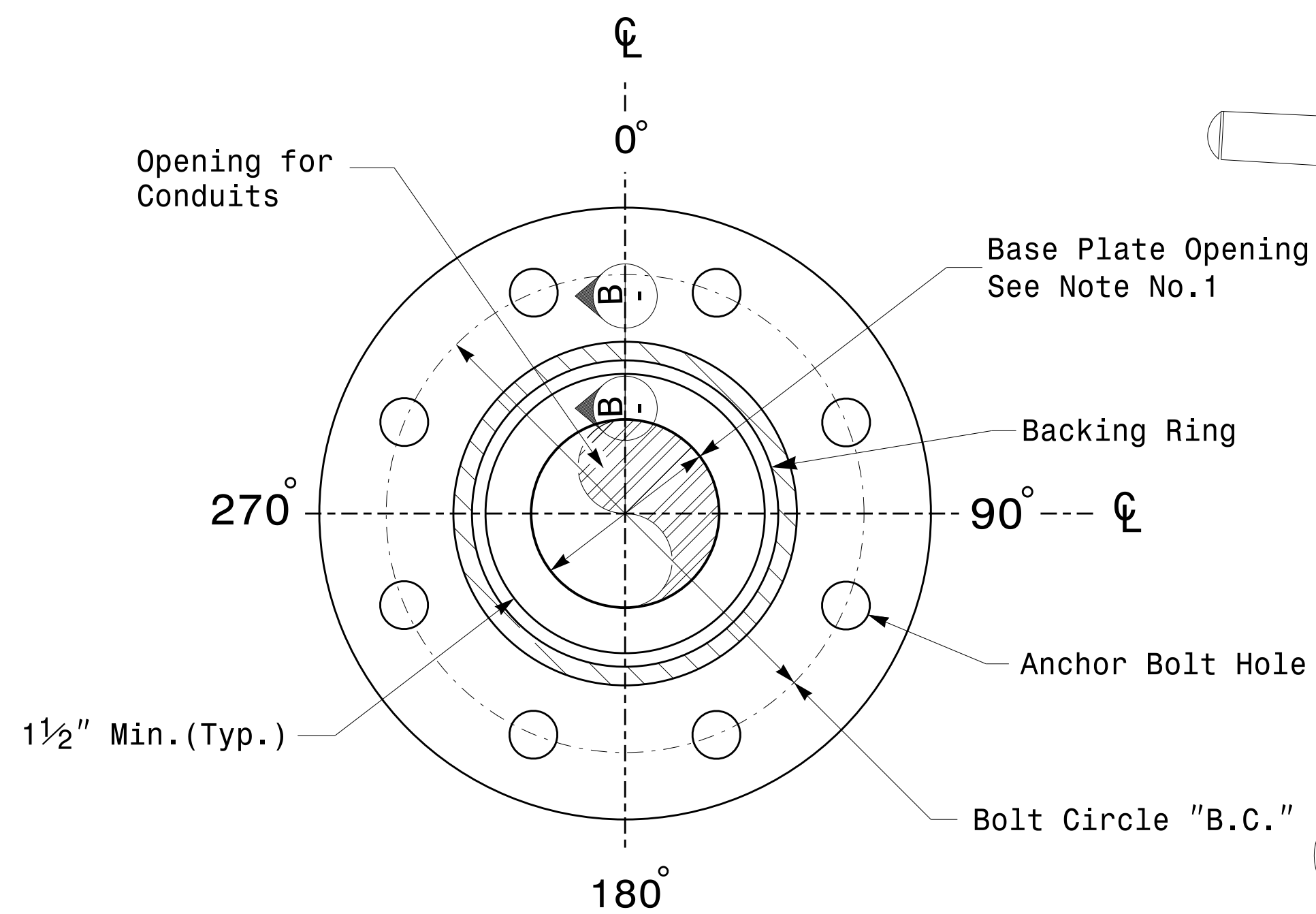
SEAL

DocuSigned by:
 Debesh C. Sarkar
 44EB87816FA4F49E

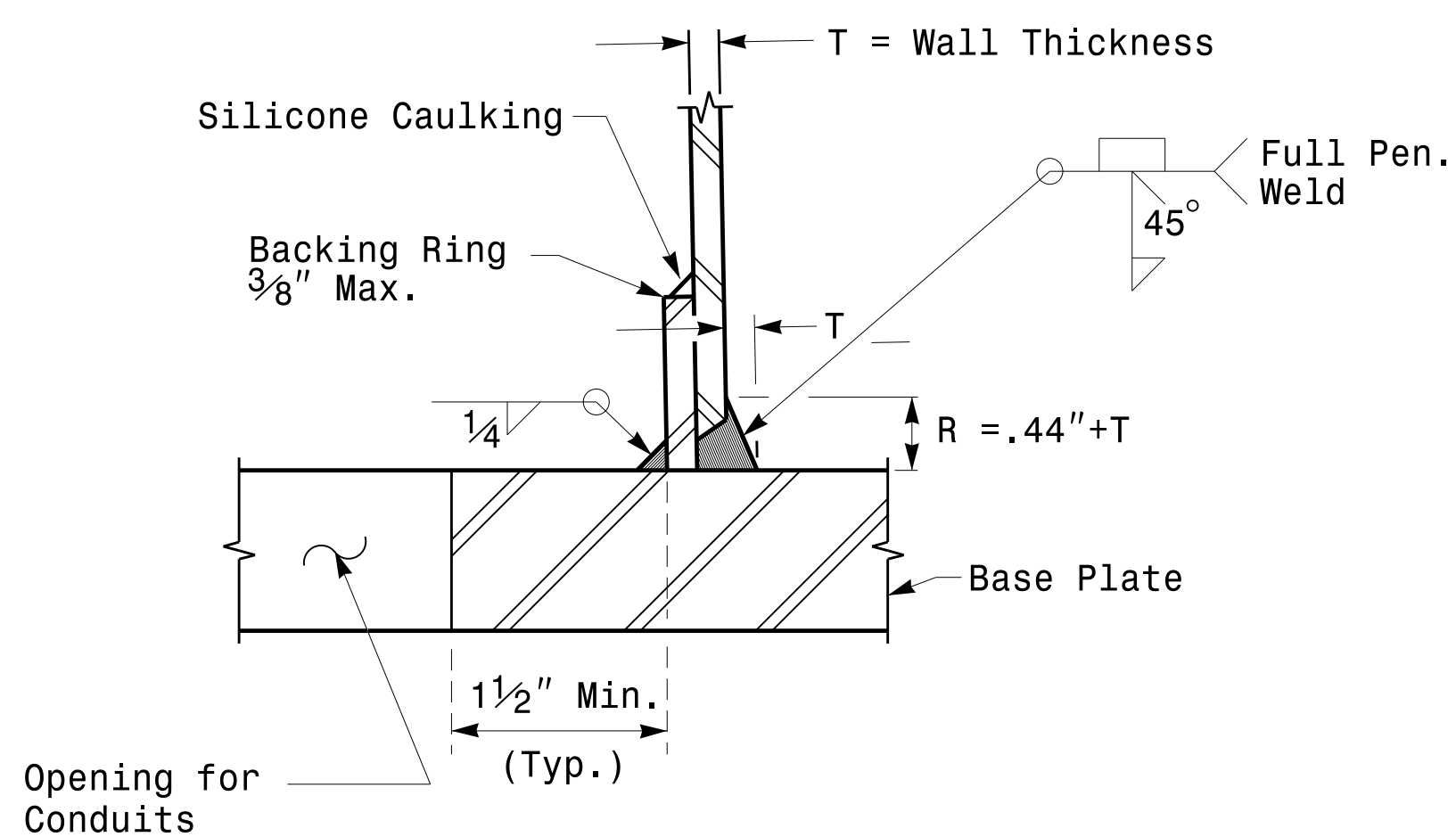
10/11/2017
 DATE

Fabrication Details – Strain Poles

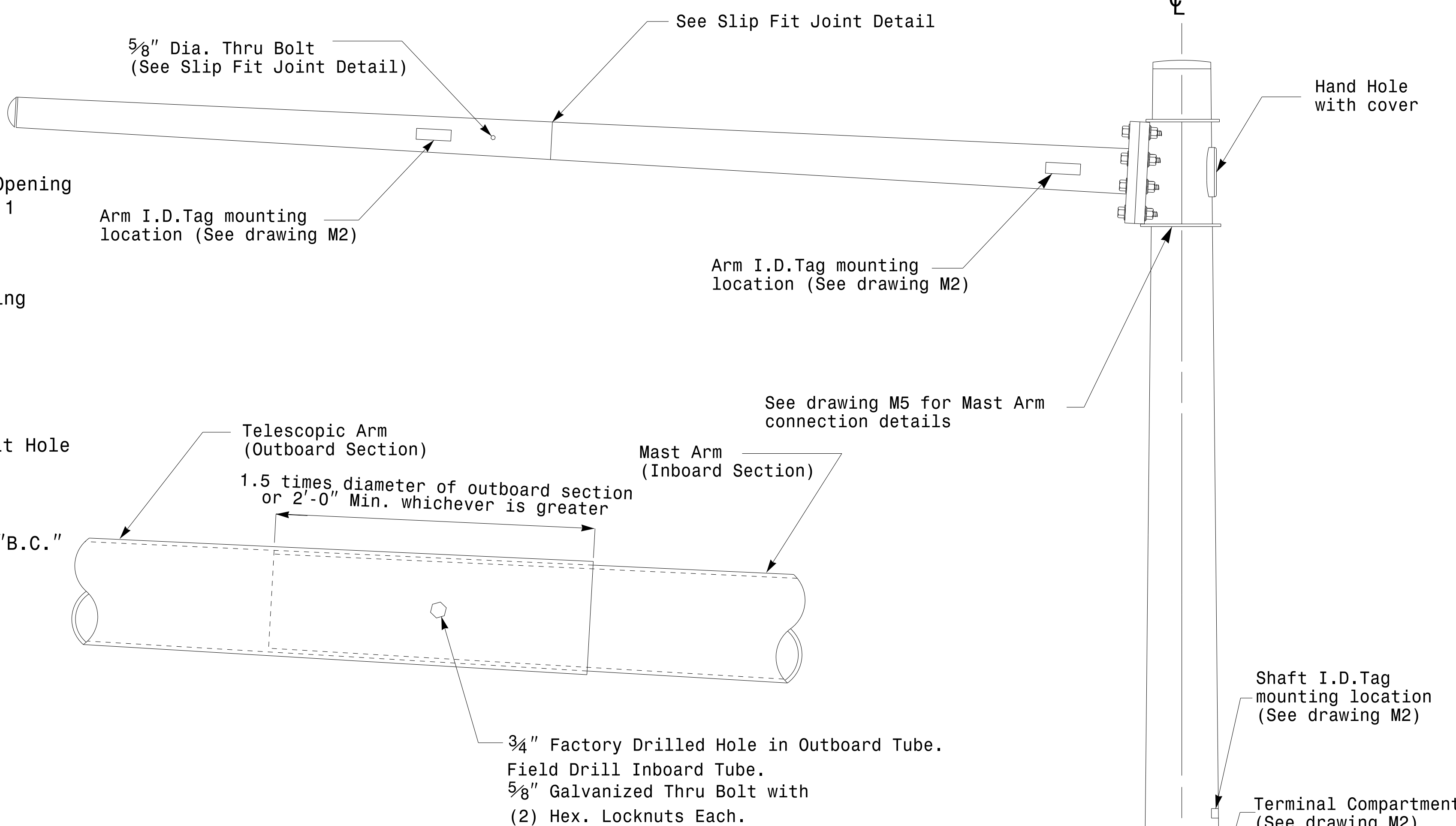
Note:
 1. Opening in pole base plate shall be equal to pole base inside diameter minus 3 1/2" but shall not be less than 8 1/2".



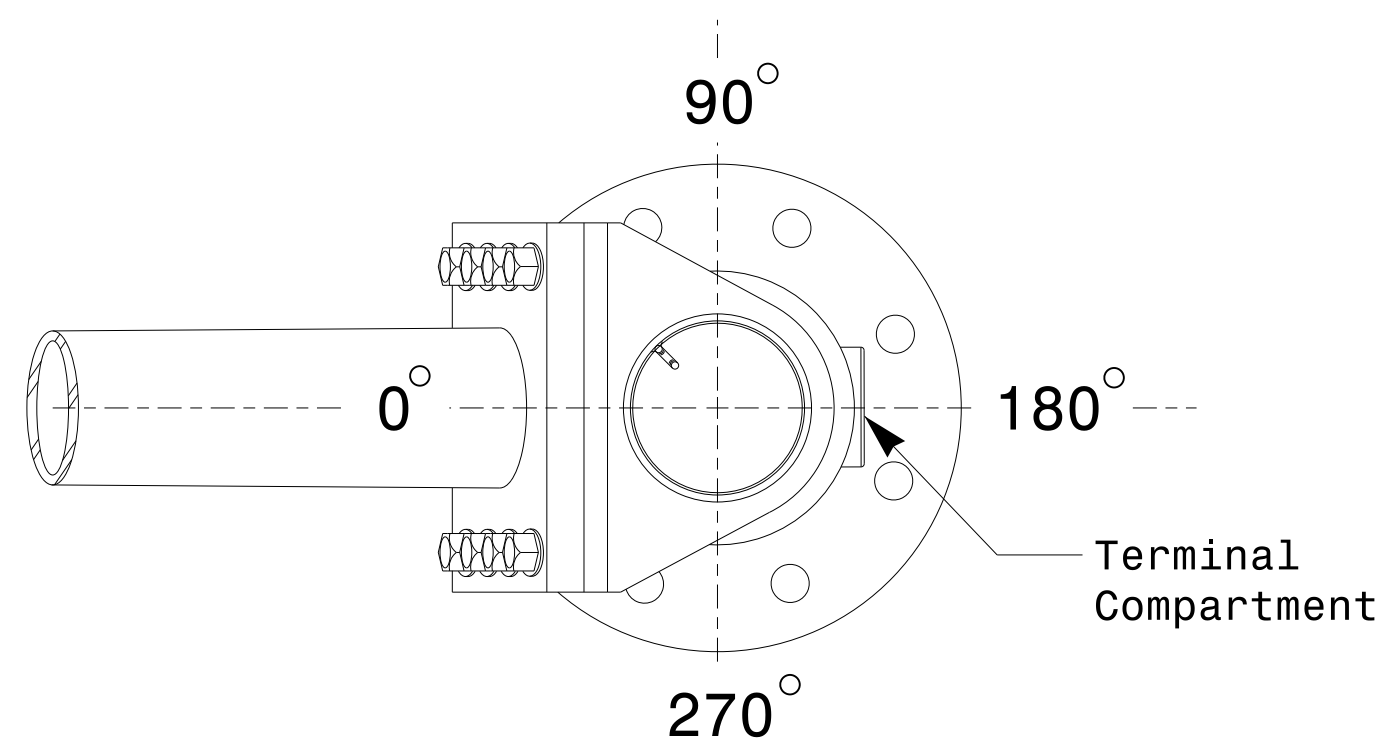
Section A-A
 Pole Base Plate Details



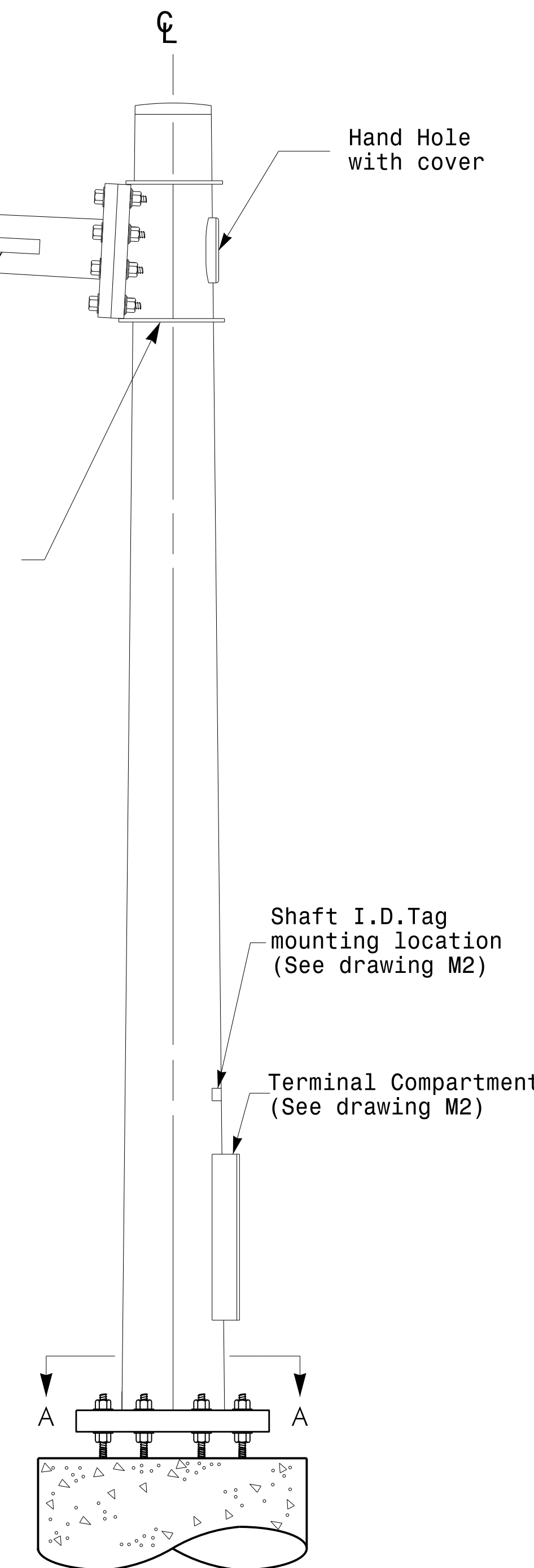
Section B-B
 (Pole Attachment to Base Plate)
 Full-Penetration Groove Weld Detail



Slip Fit Joint Detail for Mast Arm



Mast Arm Radial Orientation

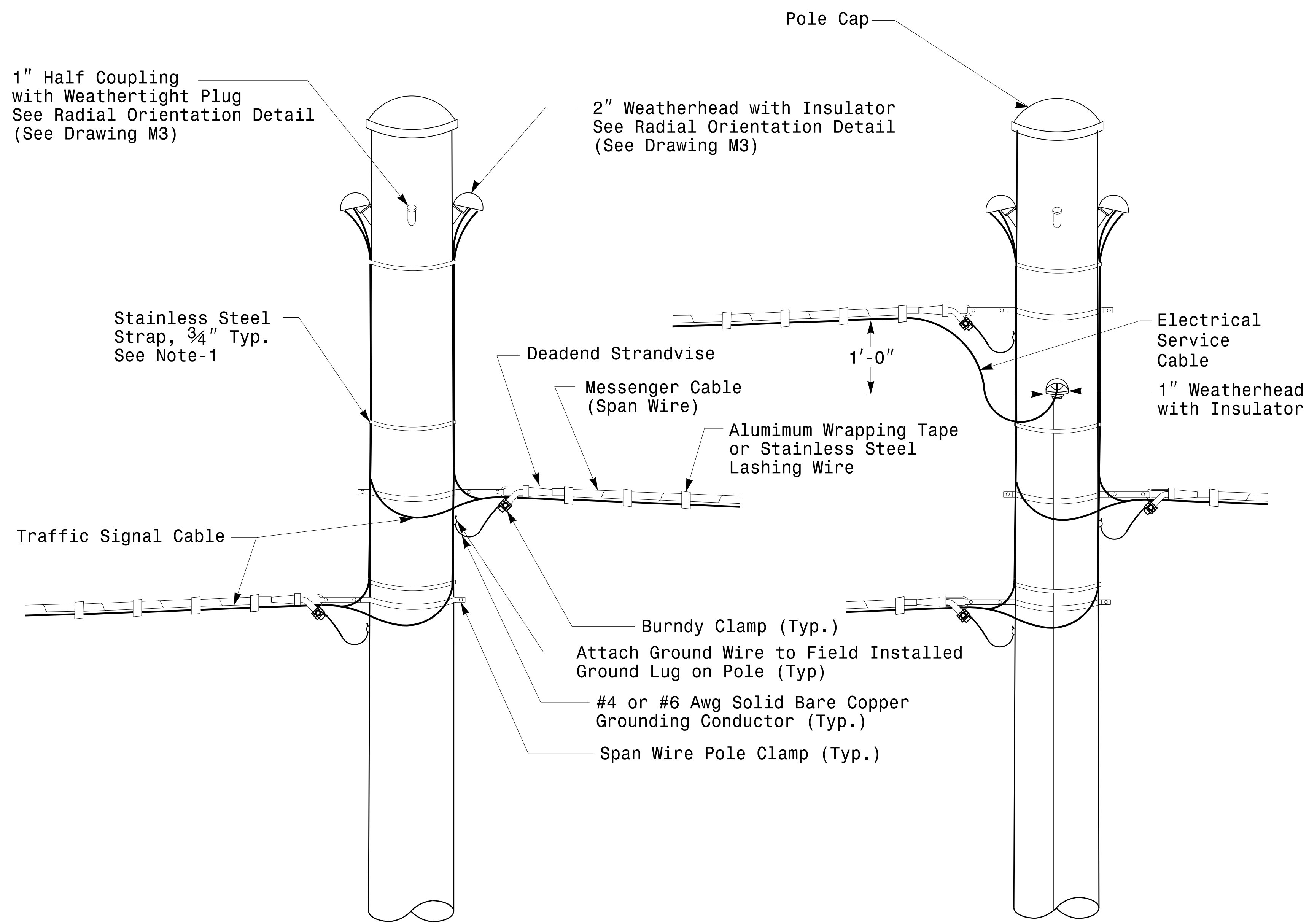


Mast Arm Pole

Fabrication Details – Mast Arm Poles

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

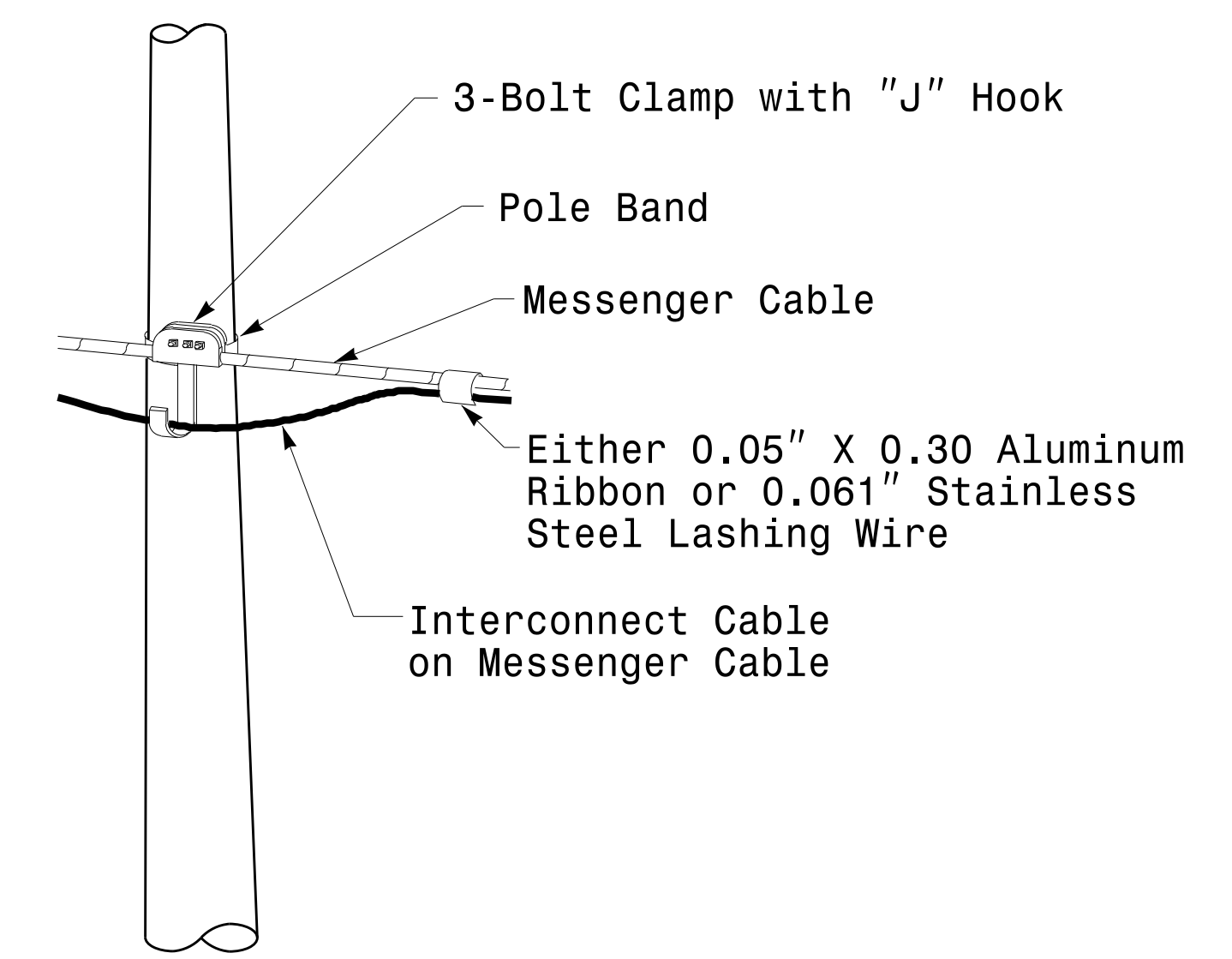
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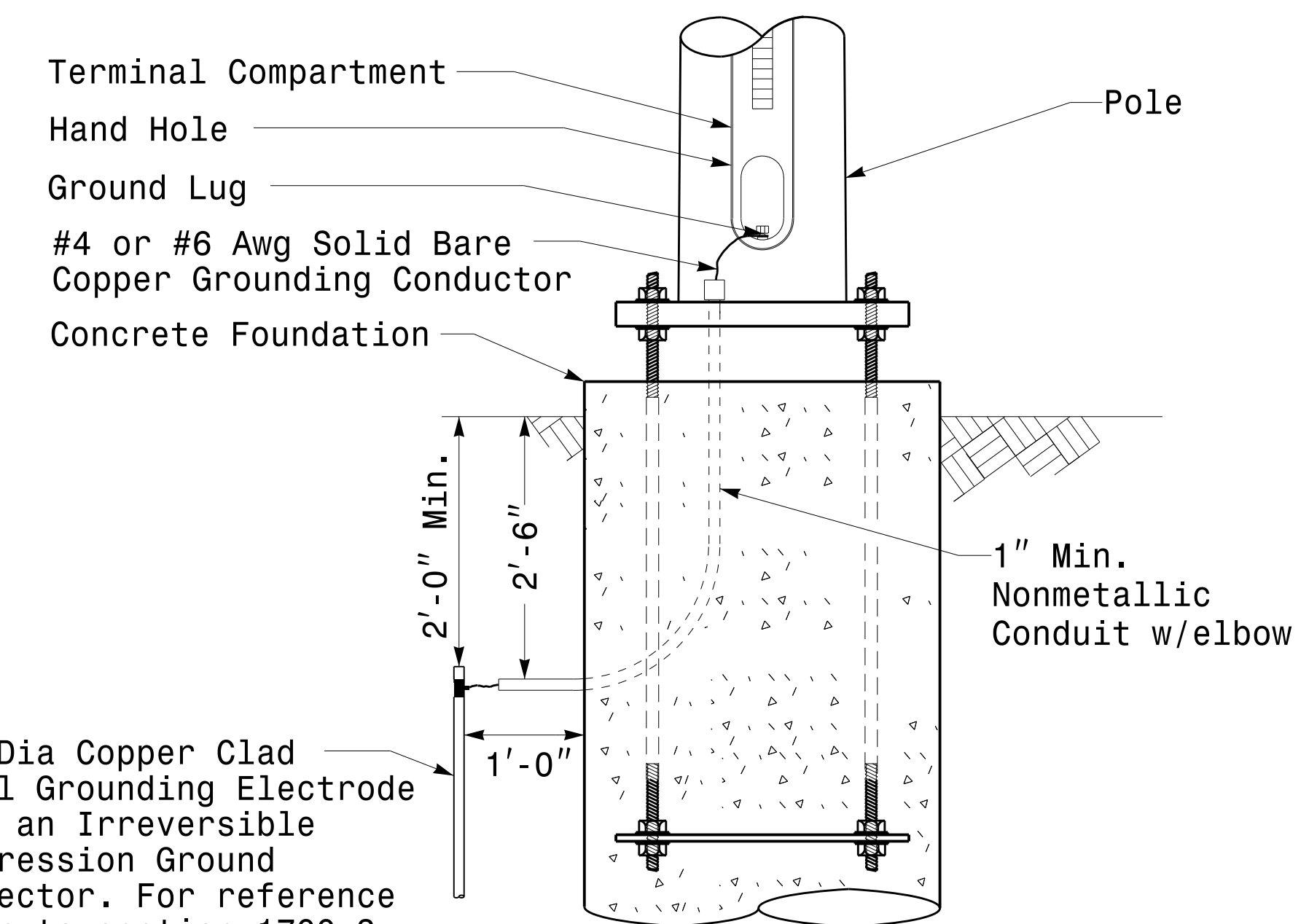
Strain Pole Attachments

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

11-0CT-2017-08:36 136504115 StrainPole.dgn Design Section Eastern Region 0162014 Sig.M6 Std. Fabrication Detail: Strain Poles.dgn

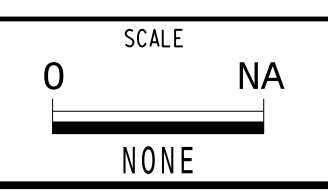
Prepared in the Offices of:

750 N. Greenfield Pkwy, Garner, NC 27529

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

SEAL

DocuSigned by: *Deshi C. Sarkar* 10/11/2017



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:

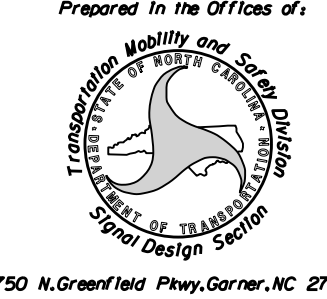
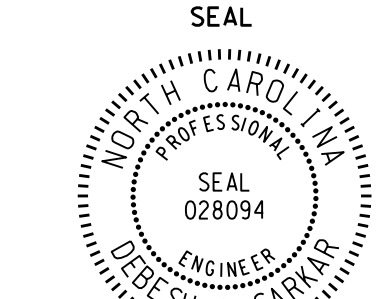
1. Values shown in the "Reactions at the Pole Base" column represent the minimum acceptable capacity allowed for design using a design CSR of 1.00.
2. Use chairs and spacers to maintain proper clearance.
3. For foundation, always use air-entrain concrete mix.

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.							

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