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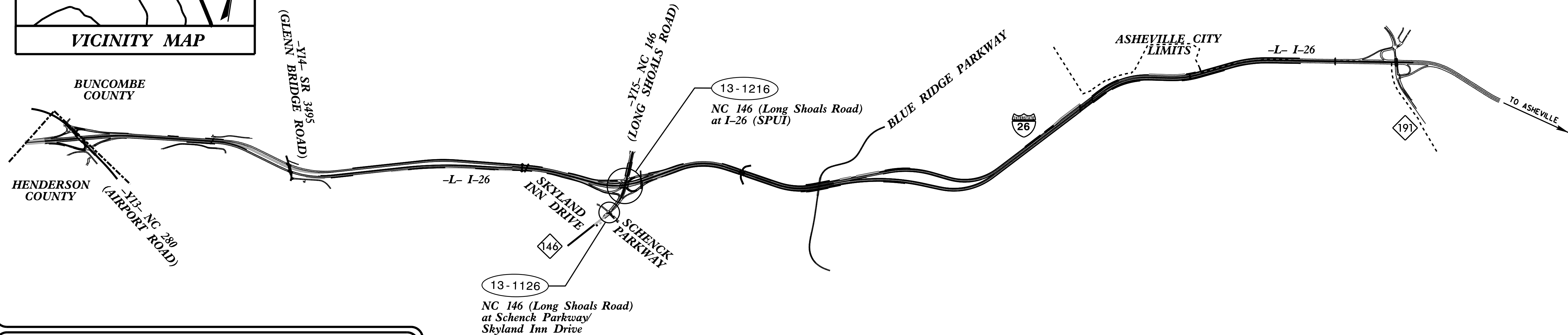
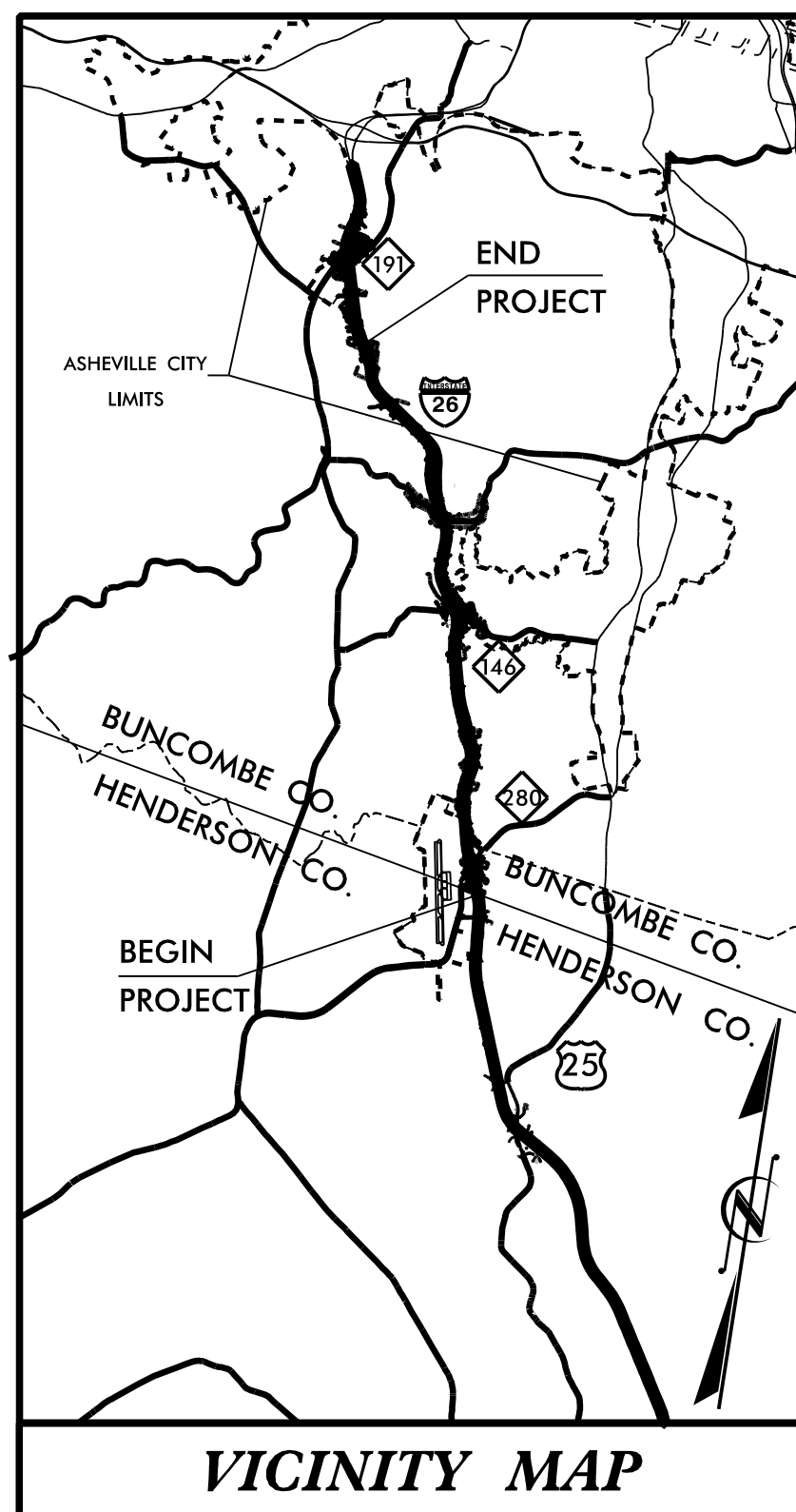
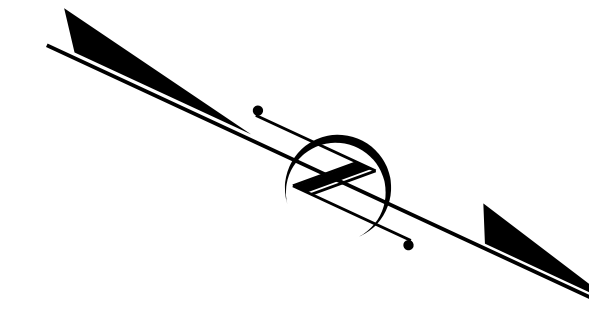
Project: I-4700

Contract: C204266

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

BUNCOMBE & HENDERSON COUNTIES

**LOCATION: I-26 FROM 0.3 MI EAST OF NC 280 (AIRPORT ROAD)
TO 0.5 MI EAST OF NC 191 (BREVARD ROAD)**
TYPE OF WORK: TRAFFIC SIGNALS



HNTB HNTB NORTH CAROLINA, P.C.
343 E. Six Forks Road, Suite 200
Raleigh, North Carolina 27609
NC License No: C-1554
(919) 546-8997

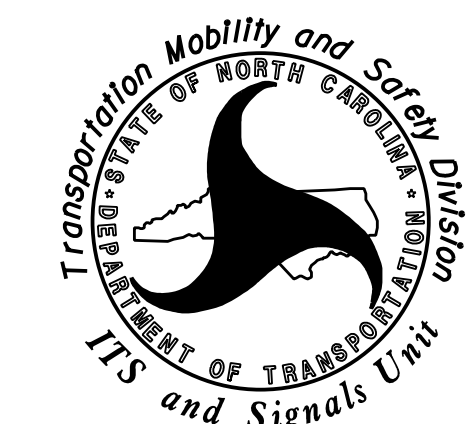
Joseph S. Olsen, PE - Project Manager
Natasha R. Simmons, PE, PTOE - Project Task Leader
Andrew D. Klinksiek, PE, PTOE - Project Engineer
Alex H. Thornburg, PE - Project Engineer
John A. Wagner, PE - Design Engineer
Tracey R. Terrell - Senior Design Technician

Sheet #	Reference #	Location/Description
Sig. 1.0	-----	Title Sheet
Sig. 2.0-2.2	13-1216	NC 146 (Long Shoals Road) at I-26 (SPUI)
Sig. 3.0-7.3	13-1126	NC 146 (Long Shoals Road) at Schenck Parkway/Skyland Inn Drive
Sig. 8.0	-----	Standard Drawing for Electrical Service Grounding and Wood Poles
Sig. 9.0	-----	Standard Drawing for Pedestals
Sig. M1-M8	-----	Standard Drawing for Metal Poles

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

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

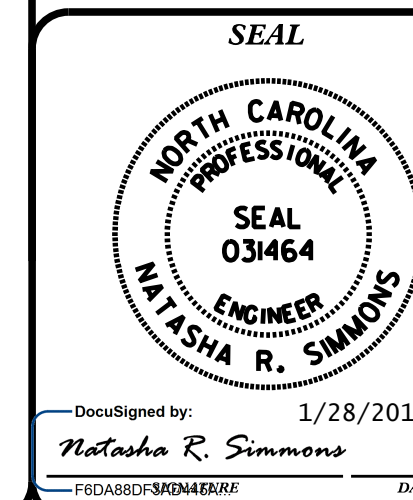
Prepared for the Office of:
DIVISION OF HIGHWAYS
TRANSPORTATION MOBILITY AND SAFETY
DIVISION



750 N. Greenfield Parkway, Garner, NC 27529

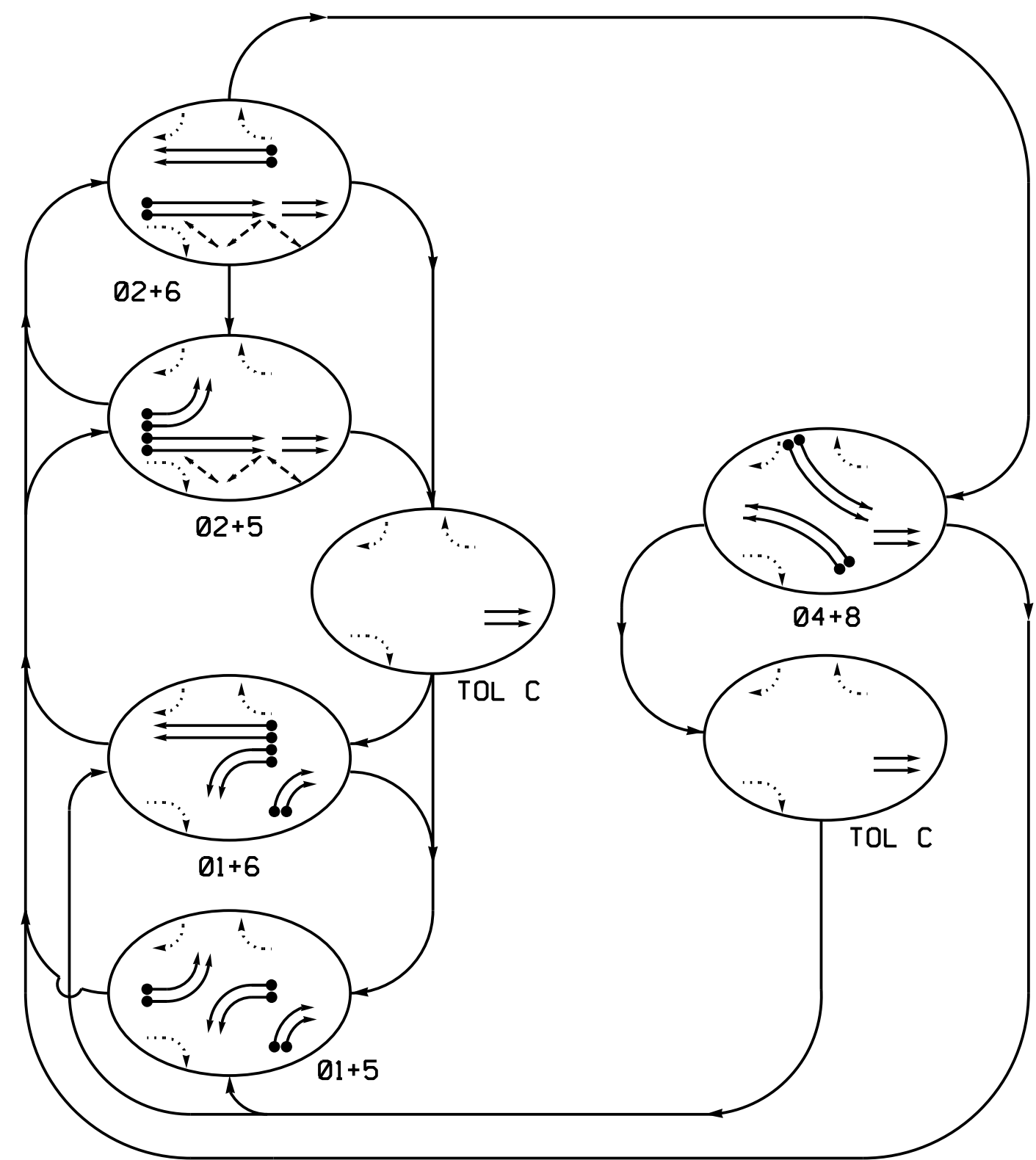
LEGEND
##-###
SIGNAL INVENTORY NUMBER

INTELLIGENT TRANSPORTATION AND SIGNALS UNIT
Contacts:
Tim Williams, PE - Western Region Signals Engineer
Todd Joyce, PE - Signal Equipment Design Engineer
D.D. (Bucky) Galloway, PE - Western Region Field Operations Engineer
NCDOT - DIVISION 13
Contacts:
Anna G. Henderson, PE - Division Traffic Engineer
NCDOT - DIVISION 14
Contacts:
Steven Buchanan - Division Traffic Engineer



Desigined by: 1/28/2019
Natasha R. Simmons
DATE

PHASING DIAGRAM

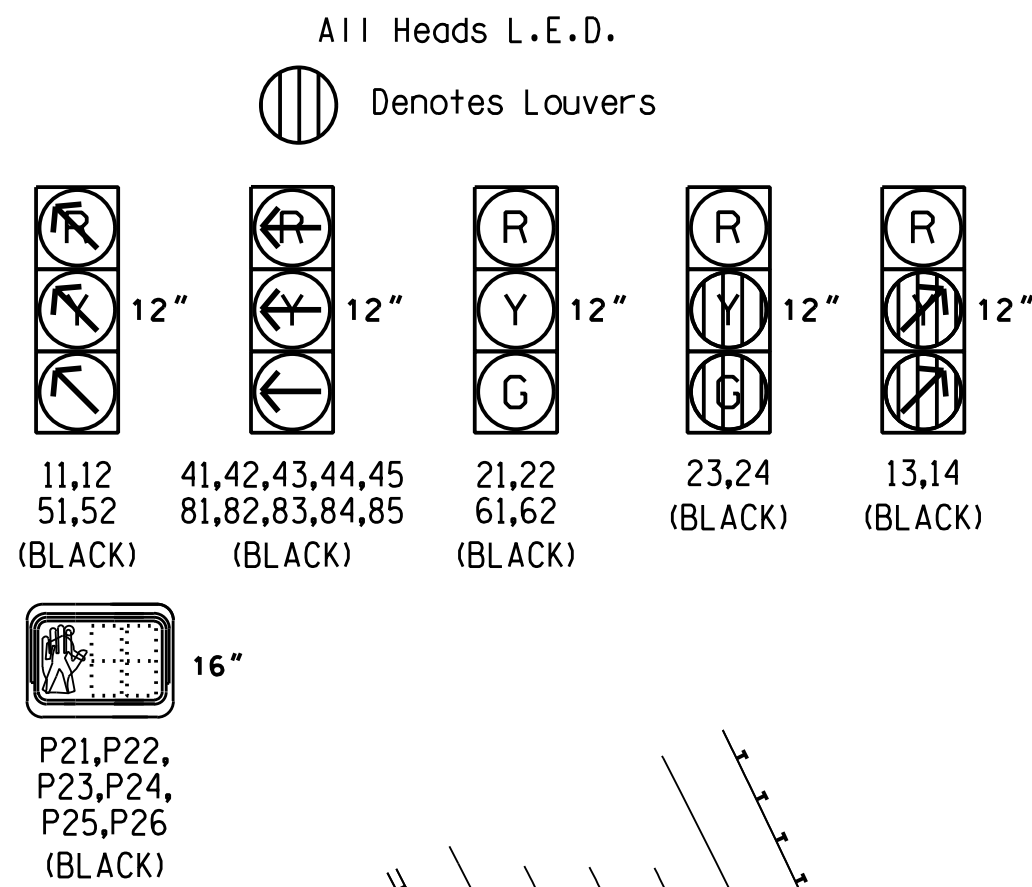


PHASING DIAGRAM DETECTION LEGEND
 ← ● DETECTED MOVEMENT
 ← ○ UNDETECTED MOVEMENT (OVERLAP)
 - - - UNSIGNALIZED MOVEMENT
 - - - PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE						
	01+5	01+6	02+5	02+6	04+8	TOLC	F L TOLC
11,12	✓	✓	✓	✓	✓	✓	✓
13,14	✓	✓	✓	✓	✓	✓	✓
21,22	R	R	G	G	R	R	Y
23,24	R	R	G	G	G	G	Y
41,42,43,44,45	✓	✓	✓	✓	✓	✓	✓
51,52	✓	✓	✓	✓	✓	✓	✓
61,62	R	G	R	G	R	R	Y
81,82,83,84,85	✓	✓	✓	✓	✓	✓	✓
P21,P22 P23,P24 P25,P26	DW	DW	W	W	DW	DW	DRK

SIGNAL FACE I.D.



OASIS 2070 LOOP & DETECTOR INSTALLATION CHART

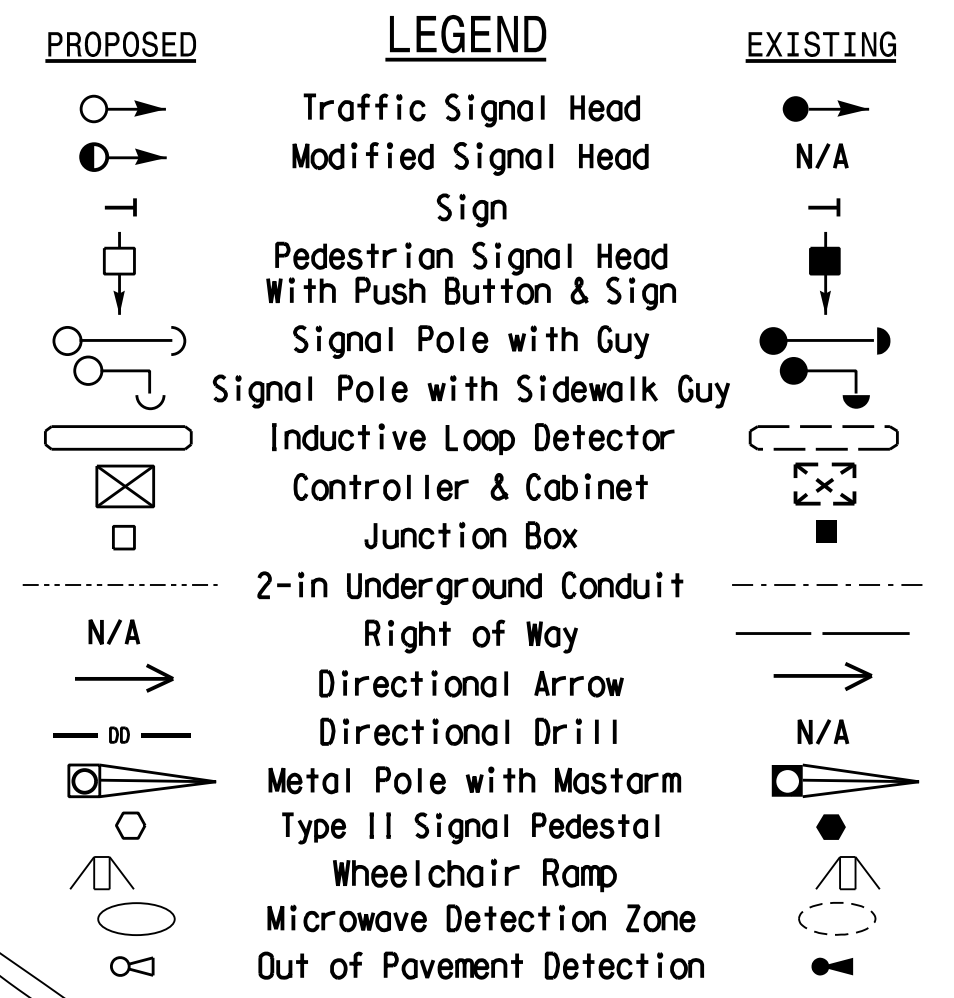
LOOP	INDUCTIVE LOOPS			DETECTOR PROGRAMMING								
	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
1A	6X40	0	2-4-2	-	1	Y	Y	-	-	-	-	-
1B	6X40	0	2-4-2	-	1	Y	Y	-	-	-	-	-
1C	6X40	0	2-4-2	Y	1	Y	Y	-	-	15	-	Y
1D	6X40	0	2-4-2	Y	1	Y	Y	-	-	15	-	Y
2A	*	300	*	-	2	Y	Y	-	-	-	-	-
4A	6X40	0	2-4-2	-	4	Y	Y	-	-	-	-	-
4B	6X40	0	2-4-2	-	4	Y	Y	-	-	-	-	-
5A	6X40	0	2-4-2	-	5	Y	Y	-	-	-	-	-
5B	6X40	0	2-4-2	-	5	Y	Y	-	-	-	-	-
6A	6X6	300	6	-	6	Y	Y	-	-	-	-	-
6B	6X6	300	6	-	6	Y	Y	-	-	-	-	-
8A	6X40	0	2-4-2	Y	8	Y	Y	-	-	-	-	-
8B	6X40	0	2-4-2	Y	8	Y	Y	-	-	-	-	-
S1	6X6	+420	4	-	-	-	-	-	-	-	Y	-
S2	6X6	+420	4	-	-	-	-	-	-	-	Y	-
S3	6X6	+340	5	-	-	-	-	-	-	-	Y	-
S4	6X6	+340	5	-	-	-	-	-	-	-	Y	-
S5	6X6	715	6	Y	-	-	-	-	-	-	Y	-
S6	6X6	715	6	Y	-	-	-	-	-	-	Y	-

* Microwave Detection Zone

5 Phase Fully Actuated Asheville Signal System

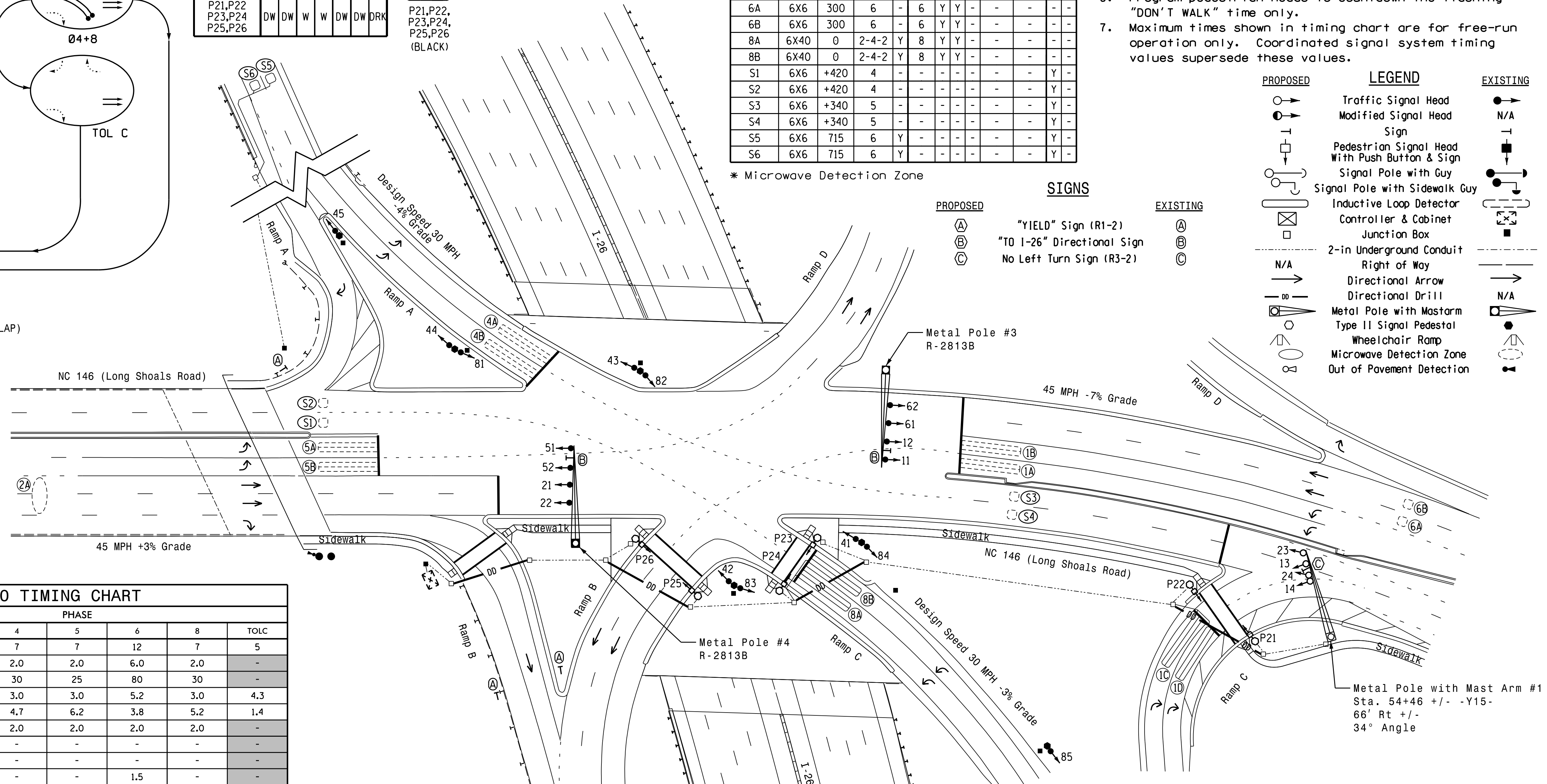
NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
- Do not program signal for latenight flashing operation unless otherwise directed by the Engineer.
- Phase 1 and/or 5 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.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.



SIGNS

- PROPOSED**
- (A) "YIELD" Sign (R1-2)
 - (B) "TO I-26" Directional Sign
 - (C) No Left Turn Sign (R3-2)
- EXISTING**
- (A)
 - (B)
 - (C)



OASIS 2070 TIMING CHART

FEATURE	PHASE						
	1	2	4	5	6	8	TOLC
Min Green 1 *	7	12	7	7	12	7	5
Extension 1 *	2.0	6.0	2.0	2.0	6.0	2.0	-
Max Green 1 *	25	80	30	25	80	30	-
Yellow Clearance	3.2	4.3	3.0	3.0	5.2	3.0	4.3
Red Clearance	5.1	3.0	4.7	6.2	3.8	5.2	1.4
Red Revert	2.0	2.0	2.0	2.0	2.0	2.0	-
Walk 1 *	-	7	-	-	-	-	-
Don't Walk 1	-	10	-	-	-	-	-
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	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.

Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Prepared For: **TRANSPORTATION MOBILITY AND SAFETY DIVISION**

Project: **NC 146 (Long Shoals Road) at I-26 (SPUI)**

Division 13 Buncombe Co. Asheville

PLAN DATE: September 2018 REVIEWED BY: A.D. Klinksiek

PREPARED BY: A.H. Thornburg REVIEWED BY: N.R. Simmons

750 N. Greenfield Pkwy, Garner, NC 27525

REVISIONS: INITI. DATE

DocuSigned by: **Notasha R. Simmons** 4/26/2019

SEAL: **NORTH CAROLINA PROFESSIONAL ENGINEER** W. TASHA R. SIMMONS

SEAL: **031464**

SIGNATURE: DATE

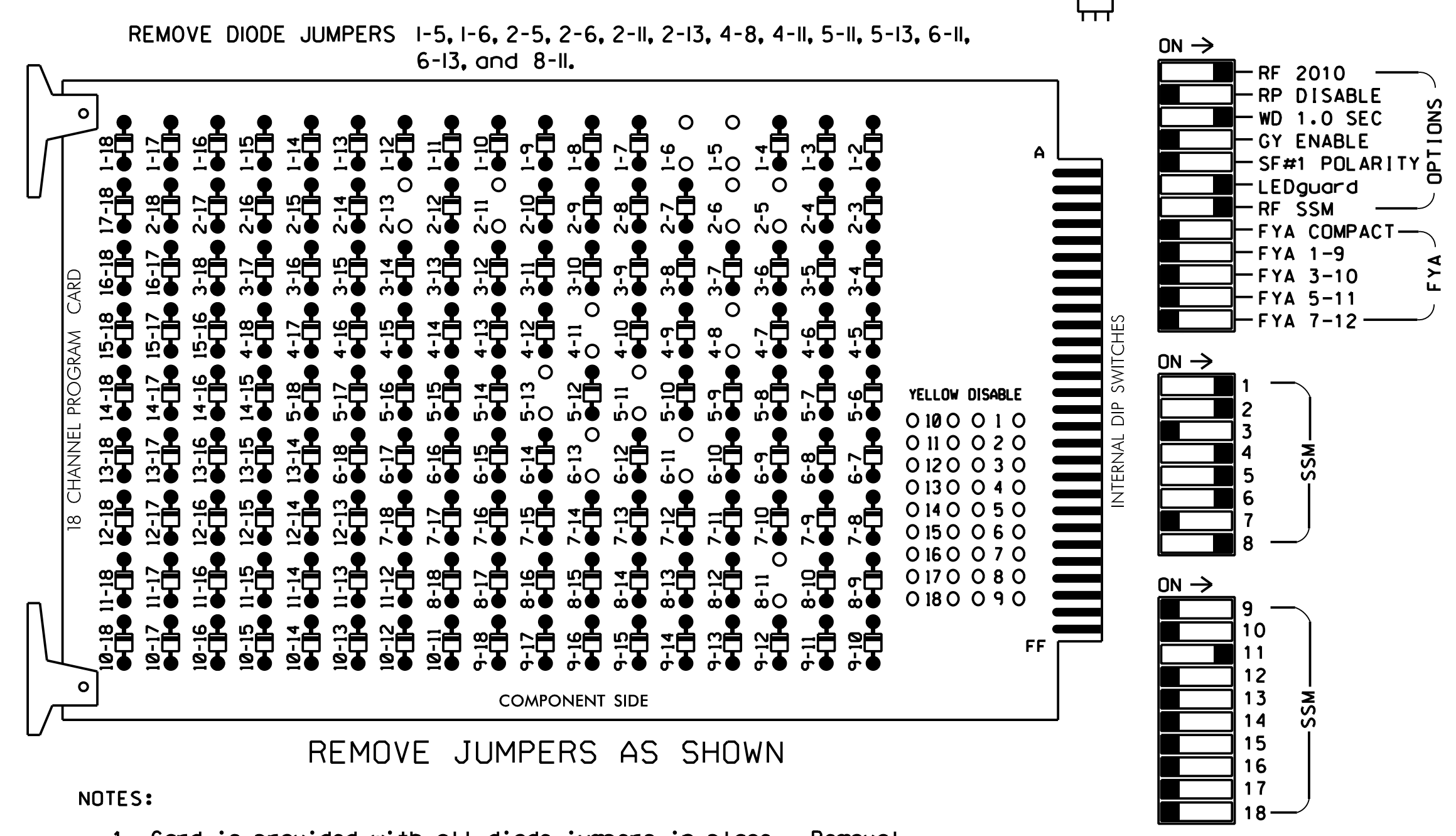
SIG. INVENTORY NO. 13-1216

HNTB HNTB NORTH CAROLINA, P.C.
 343 E. Six Forks Road, Suite 200
 Raleigh, North Carolina 27609
 NC License No: C-1554
 (919) 546-8997

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.
- Integrate monitor with Ethernet network in cabinet.

NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal 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 Startup In Green.
- Program phase 2 for 'STARTUP PED CALL'.
- Program phases 2 and 6 for Yellow Flash.
- The cabinet and controller are part of the Asheville Signal 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.....S1,S2,S3,S5,S7,S8,S11,AUX S4
 PHASES USED.....1,2,2 PED,4,5,6,8
 OVERLAP "A".....NOT USED
 OVERLAP "B".....NOT USED
 OVERLAP "C".....2+4
 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.	11,12	13,14	21,22	P21,P22, P23,P24, P25,P26	NU	41,42, 43,44, 45	NU	51,52	61,62	NU	NU	81,82, 83,84, 85	NU	NU	NU	23,24	NU	NU
RED	125	128							134							A114		
YELLOW		129							135							A115		
GREEN		130							136							A116		
RED ARROW	125				101			131				107						
YELLOW ARROW	126	126			102			132				108						
GREEN ARROW	127	127			103			133				109						
Hand																113		
Walking																115		

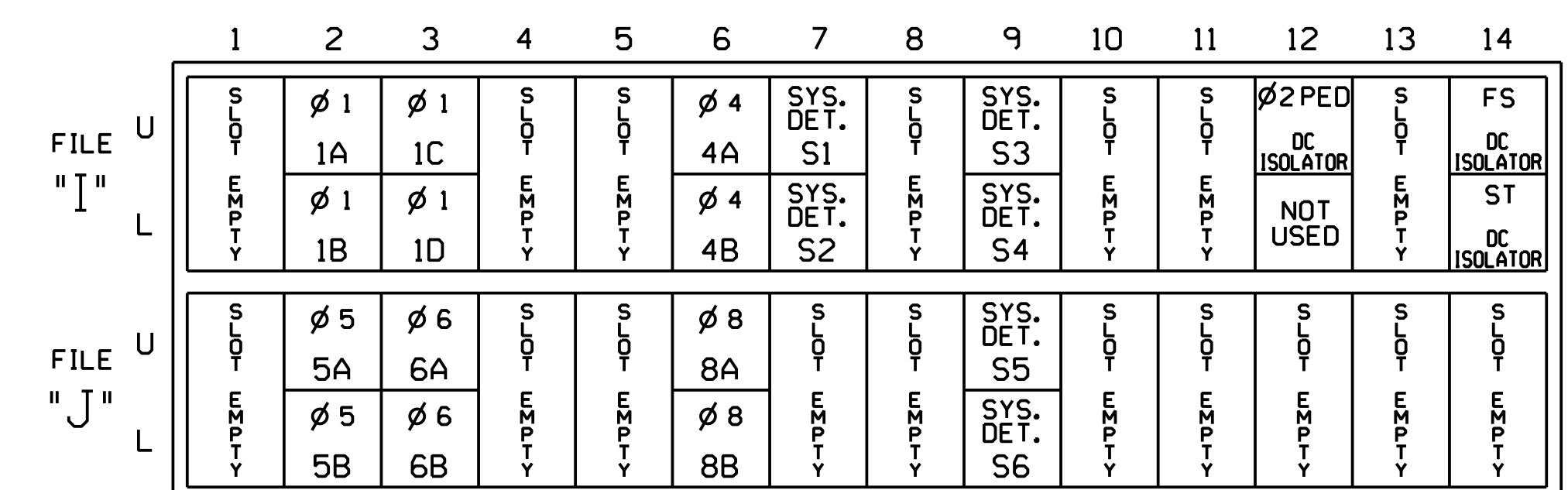
NU = Not Used

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.

INPUT FILE POSITION LAYOUT

(front view)



SPECIAL DETECTOR NOTE

For detection zone 2A, install a microwave detection system for vehicle detection. Perform installation according to manufacturer's directions and NCDOT engineer approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.

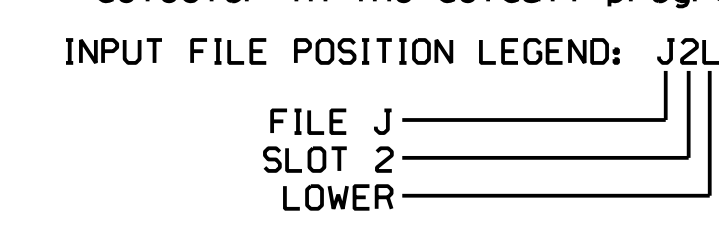
THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 13-1216
 DESIGNED: September 2018
 SEALED: 4/26/2019
 REVISED: N/A

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
1A	TB2-5,6	I2U	39	1	2	1	Y	Y			
1B	TB2-7,8	I2L	43	5	12	1	Y	Y			
1C	TB2-9,10	I3U	63	25	32	1	Y	Y			15
1D	TB2-11,12	I3L	76	38	42	1	Y	Y			15
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			
4B	TB4-11,12	I6L	45	7	14	4	Y	Y			
5A	TB3-5,6	J2U	40	2	6	5	Y	Y			
5B	TB3-7,8	J2L	44	6	16	5	Y	Y			
6A	TB3-9,10	J3U	64	26	36	6	Y	Y			
6B	TB3-11,12	J3L	77	39	46	6	Y	Y			
8A	TB5-9,10	J6U	42	4	8	8	Y	Y			
8B	TB5-11,12	J6L	46	8	18	8	Y	Y			
* S1	TB6-1,2	I7U	65	27	34	SYS					
* S2	TB6-3,4	I7L	78	40	44	SYS					
* S3	TB6-9,10	I9U	60	22	11	SYS					
* S4	TB6-11,12	I9L	62	24	13	SYS					
* S5	TB7-9,10	J9U	59	21	15	SYS					
* S6	TB7-11,12	J9L	61	23	17	SYS					
PED PUSH BUTTONS											
P21,P22, P23,P24, P25,P26	TB8-4,6	I12U	67	29	PED 2	2 PED					

NOTE: INSTALL DC ISOLATOR IN INPUT FILE SLOT I12.

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



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
 VEH OVL PARENTS: X X
 VEH OVL NOT VEH: :
 VEH OVL NOT PED: :
 VEH OVL GRN EXT: X X
 STARTUP COLOR: - RED - YELLOW - GREEN
 FLASH COLORS: - RED - YELLOW - GREEN
 SELECT VEHICLE OVERLAP OPTIONS: (Y/N)
 FLASH YELLOW IN CONTROLLER FLASH?...Y
 GREEN EXTENSION (0-255 SEC).....5
 YELLOW CLEAR (0=PARENT.3-25.5 SEC)...4.3
 RED CLEAR (0=PARENT.0.1-25.5 SEC)...1.4
 OUTPUT AS PHASE # (0=NONE, 1-16)....0

OVERLAP PROGRAMMING COMPLETE

Electrical Detail
 Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Prepared for:

NC 146 (Long Shoals Road) at I-26 (SPUI)

Division 13 Buncombe Co. Asheville

PLAN DATE: September 2018 REVIEWED BY: A.D. Klinksiek
 PREPARED BY: A.H. Thornburg REVIEWED BY: N.R. Simmons

REVISIONS: _____ INIT. DATE _____

DocuSigned by:

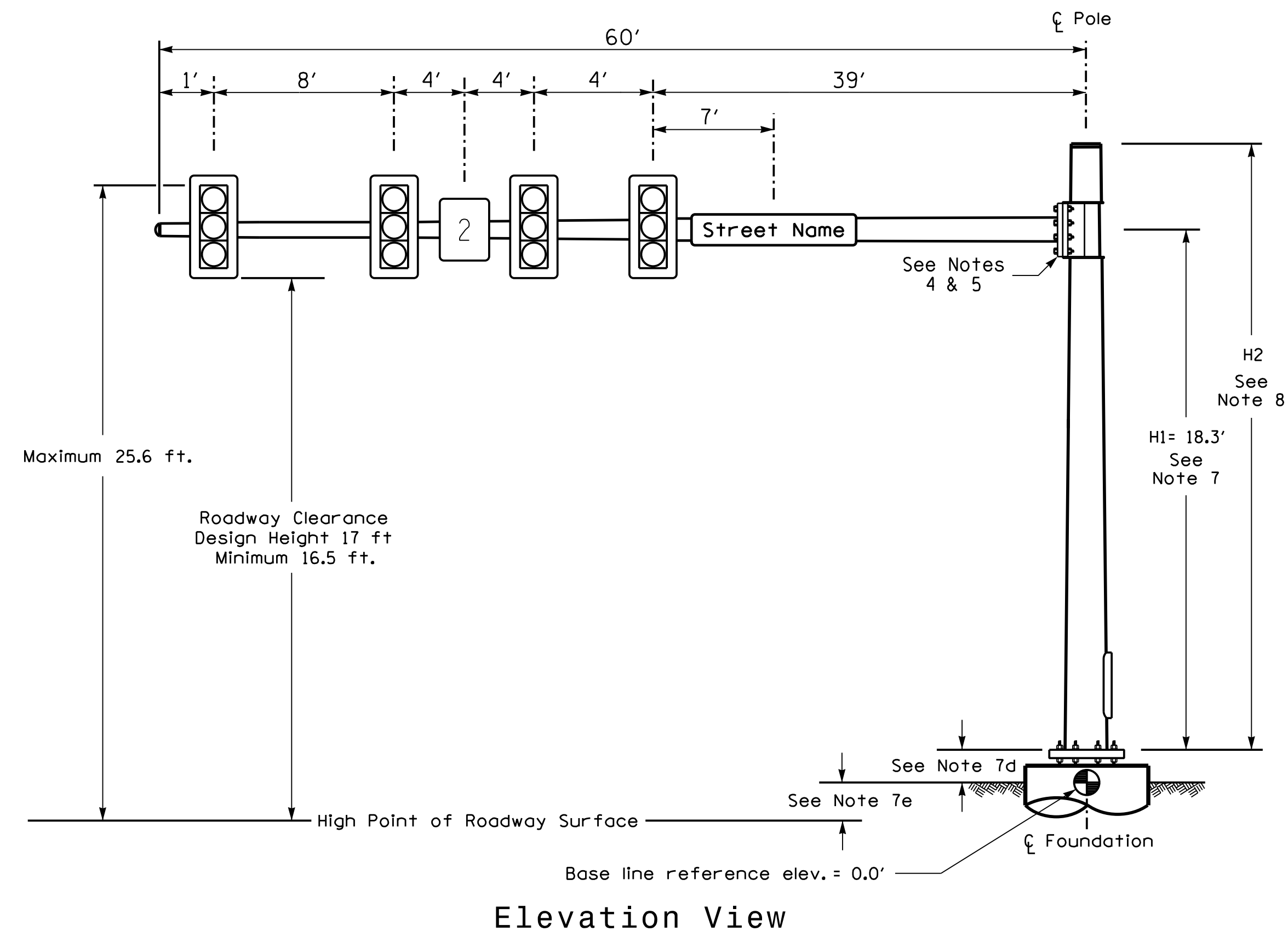
4/26/2019
 SIGNATURE DATE
 SIG. INVENTORY NO. 13-1216

SEAL NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 031464 NATASHA R. SIMMONS

HNTB HNTB NORTH CAROLINA, P.C. 343 E. Six Forks Road, Suite 200 Raleigh, North Carolina 27609 NC License No: C-1554 (919) 546-8997

750 N. Greenfield Pkwy, Corner, NC 27529

Design Loading for METAL POLE NO. 1

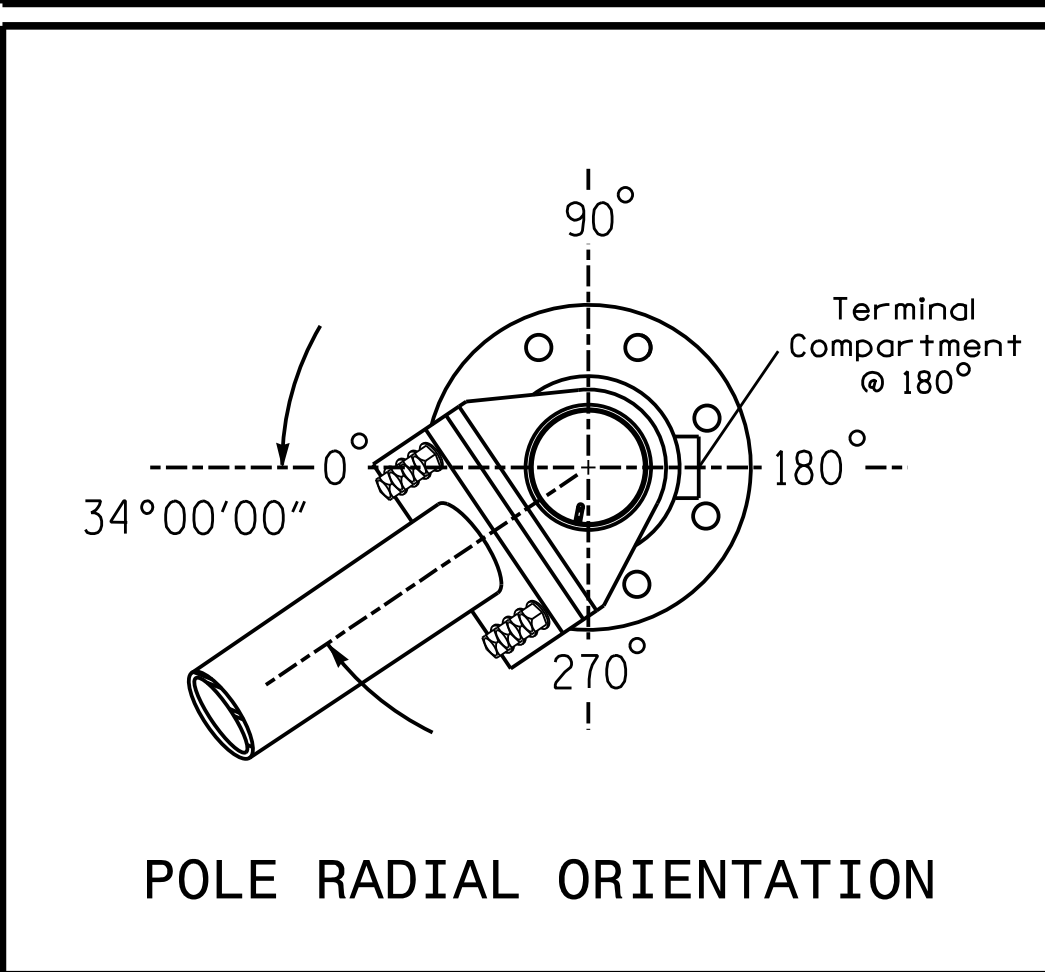


Elevation View

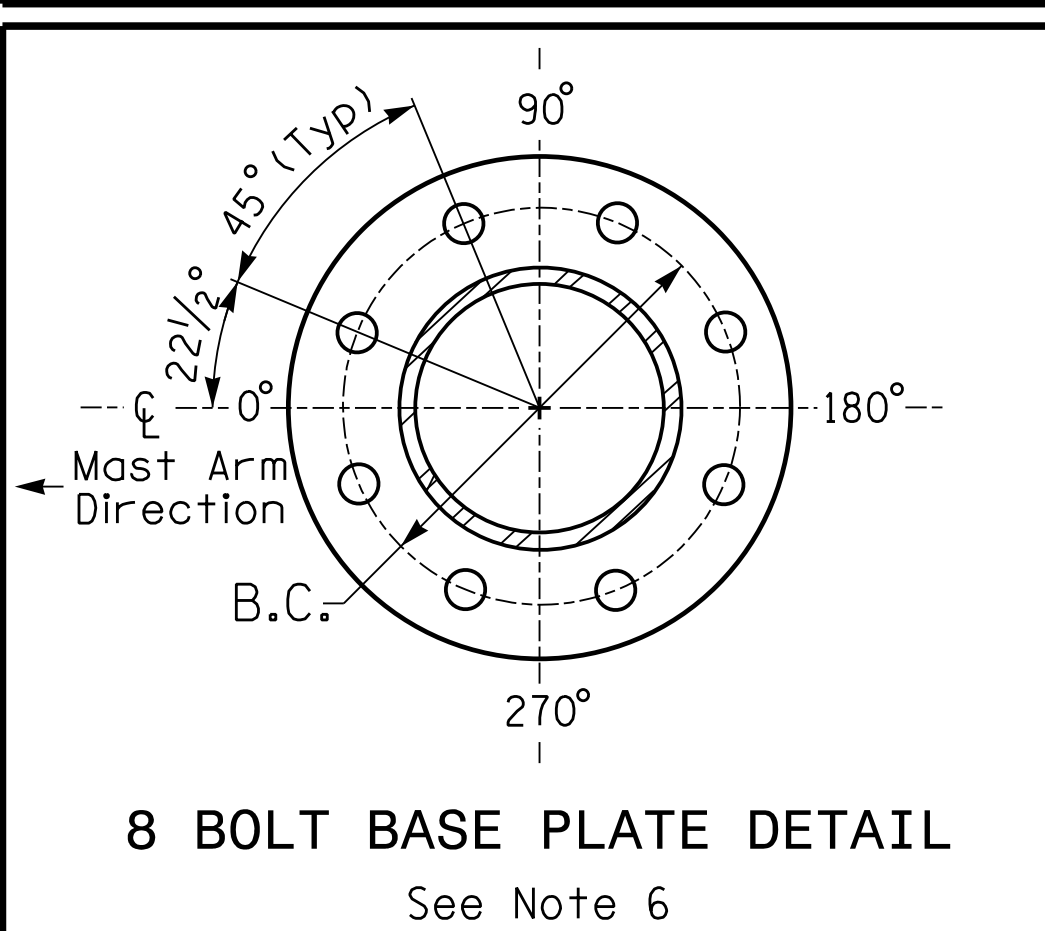
SPECIAL NOTE
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project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

Elevation Data for Mast Arm Attachment (H1)

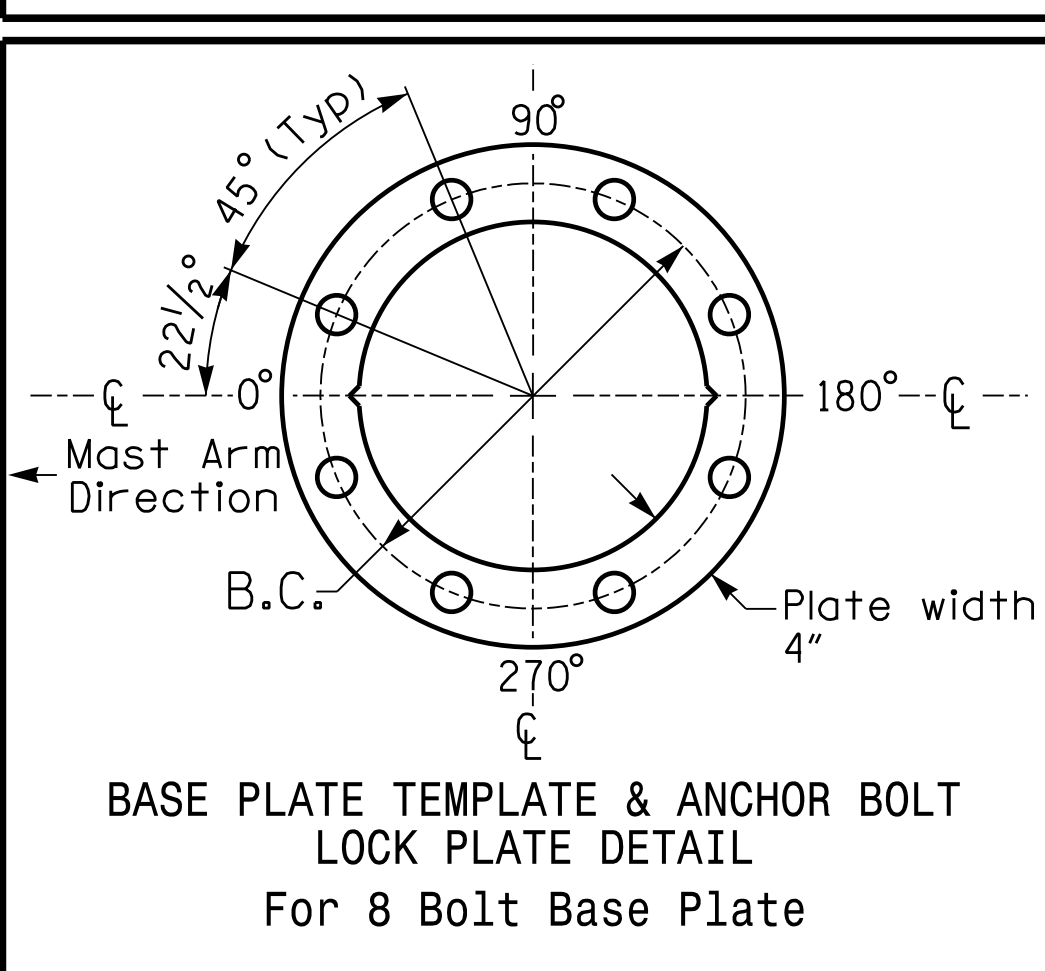
Elevation Differences for:	Pole 1	
Baseline reference point at ϕ Foundation @ ground level	0.0 ft.	
Elevation difference at High point of roadway surface	-0.12 ft.	
Elevation difference at Edge of travelway or face of curb	-0.87 ft.	



POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL



HNTB HNTB NORTH CAROLINA, P.C.
343 E. Six Forks Road, Suite 200
Raleigh, North Carolina 27609
NC License No: C-1554
(919) 546-8997

METAL POLE No. 1

PROJECT REFERENCE NO.	SHEET NO.
I-4700	Sig. 2.2

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
	SIGN RIGID MOUNTED	7.5 S.F.	30.0"W X 36.0"L	14 LBS
	STREET NAME SIGN RIGID MOUNTED	16.0 S.F.	24.0"W X 96.0"L	36 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.
- The camber design for the mast arm deflection should provide an appearance of a low pitched arch where the tip or the free end of the mast arm does not deflect below horizontal when fully loaded.
- 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:
 - Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
 - 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.
- 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 in color as specified in the project special provisions.

NCDOT Wind Zone 4 (90 mph)

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

	NC 146 (Long Shoals Road) at I-26 (SPUI)		
	Division 13 Buncombe Co. Asheville PLAN DATE: September 2018 REVIEWED BY: A.D. Klinskyk PREPARED BY: A.H. Thornburg REVIEWED BY: N.R. Simmons	SCALE: 0 N/A REVISIONS: _____ INITI. DATE: _____ DATE: 1/28/2019 SIGNATURE: _____ DATE: _____ SIG. INVENTORY NO. 13-1216	

PHASING DIAGRAM

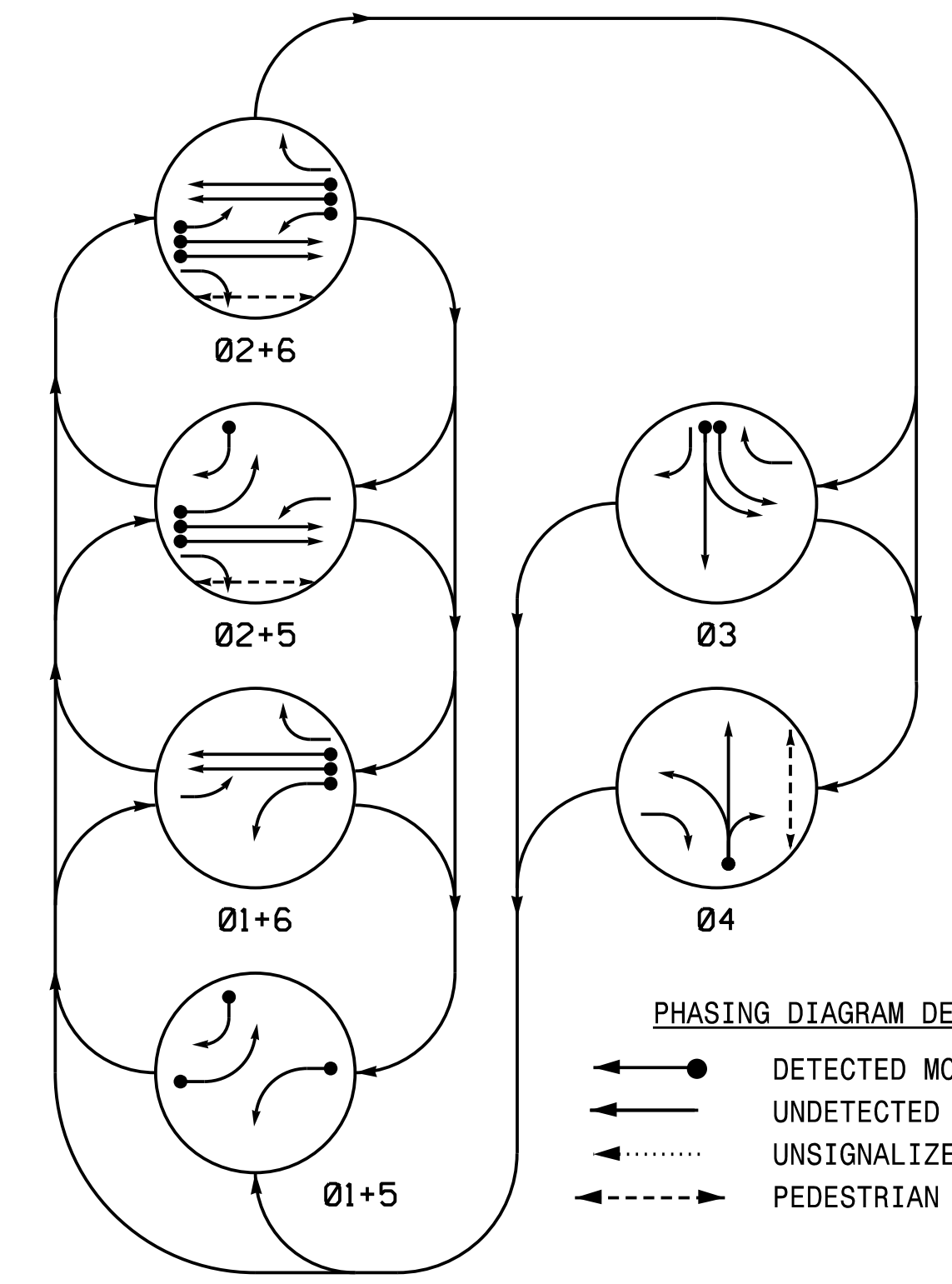
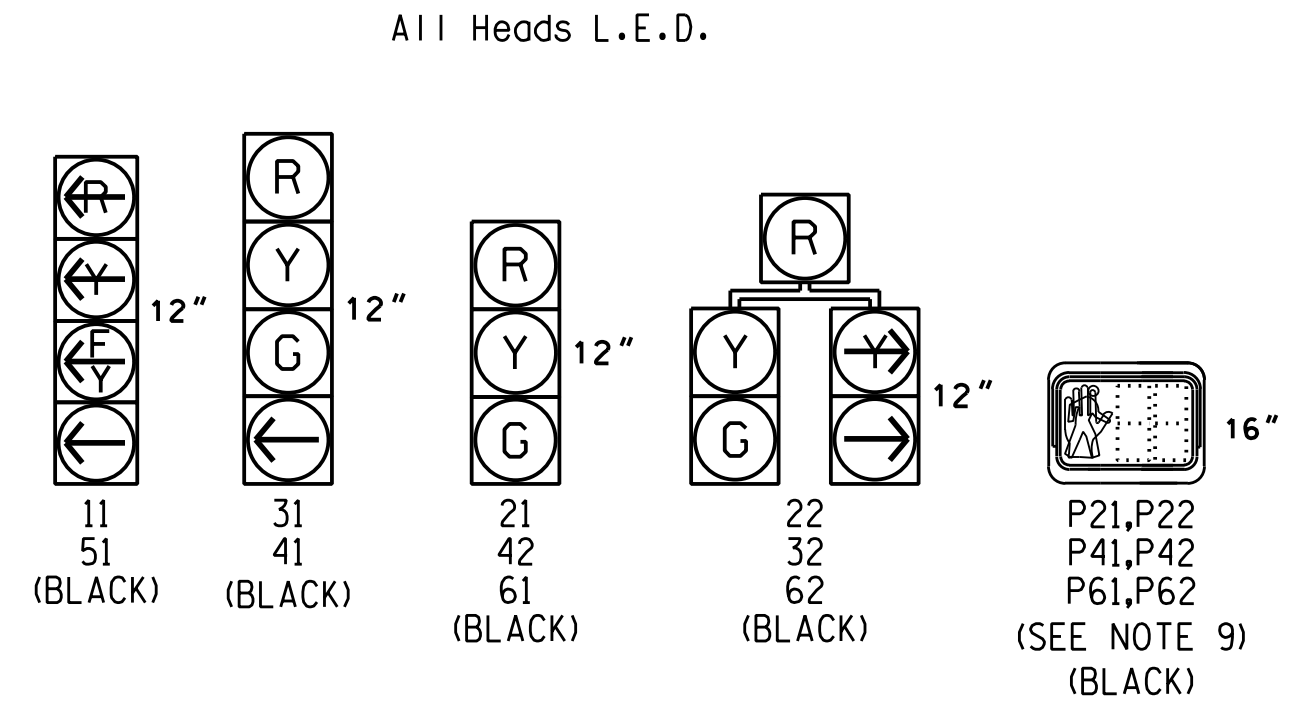


TABLE OF OPERATION

SIGNAL FACE	PHASE						FLASH
	01+5	01+6	02+5	02+6	03	04	
11	---	---	F	F	R	R	Y
21	R	R	G	G	R	R	Y
22	R	R	G	G	R	R	Y
31	R	R	R	R	G	R	R
32	R	R	R	R	G	R	R
41	R	R	R	R	R	G	R
42	R	R	R	R	R	G	R
51	---	---	F	F	R	R	Y
61	R	G	R	G	R	R	Y
62	R	G	R	G	R	R	Y
P21,22	DW	DW	W	W	DW	DW	DRK
P41,42	DW	DW	DW	DW	DW	W	DRK

SIGNAL FACE I.D.

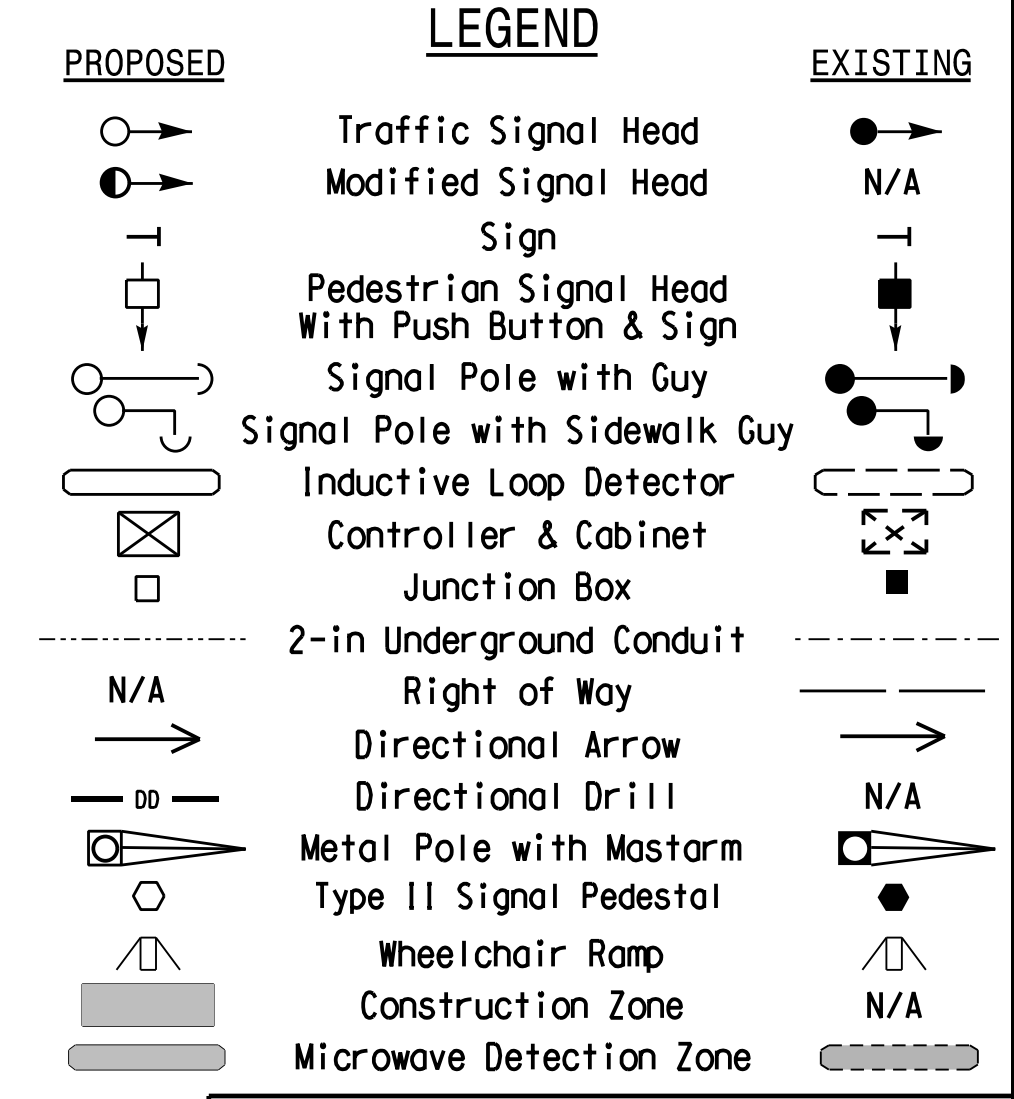


6 Phase Fully Actuated Asheville Signal System

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
1A	6X60	0	2-4-2	-	1	Y	Y	-	-	15	-	-
2A	6X6	300	*	Y	2	Y	Y	-	-	-	-	*
2B	6X6	300	*	Y	2	Y	Y	-	-	-	-	*
3A	6X40	0	2-4-2	Y	3	Y	Y	-	-	3	-	-
3B	6X40	0	2-4-2	Y	3	Y	Y	-	-	-	-	-
4A	6X40	0	2-4-2	Y	4	Y	Y	-	-	10	-	-
5A	6X40	0	*	Y	5	Y	Y	-	-	15	-	*
5B	6X40	0	2-4-2	Y	5	Y	Y	-	-	15	-	-
6A	6X6	300	*	Y	6	Y	Y	-	-	-	-	*
6B	6X6	300	*	Y	6	Y	Y	-	-	-	-	*
S1	6X6	+124	4	Y	-	-	-	-	-	-	-	Y
S2	6X6	+124	4	Y	-	-	-	-	-	-	-	Y
S3	6X6	+130	*	Y	-	-	-	-	-	-	-	Y
S4	6X6	+130	*	Y	-	-	-	-	-	-	-	Y

- 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 5 may be lagged.
 - The order of phase 3 and phase 4 may be reversed.
 - Set all detector units to presence mode.
 - In the event of loop replacement, refer to the current ITS and Signals Design Manual and submit a Plan of Record to the Signal Design Section.
 - Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
 - Program pedestrian heads to countdown the flashing "DON'T WALK" time only.
 - Bag existing pedestrian signal heads numbered P61 and P62.
 - Refer to Pavement Marking Plans for proposed stop bar locations.
 - Incorporate Microwave Detection system for vehicle detection.
 - Provide the Engineer with the Manufacturer's approved Microwave Detection locations and mounting heights to obtain detection zones as shown.
 - Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.



OASIS 2070 TIMING CHART

FEATURE	PHASE					
	1	2	3	4	5	6
Min Green 1 *	7	12	7	7	7	12
Extension 1 *	1.0	6.0	2.0	2.0	2.0	6.0
Max Green 1 *	15	100	30	20	15	100
Yellow Clearance	3.1	5.1	3.0	3.0	3.0	5.1
Red Clearance	3.2	2.0	3.4	3.3	3.1	2.0
Red Revert	2.0	2.0	2.0	2.0	2.0	2.0
Walk 1 *	-	7	-	7	-	-
Don't Walk 1	-	8	-	26	-	-
Seconds Per Actuation *	-	1.5	-	-	-	1.5
Max Variable Initial *	-	34	-	-	-	34
Time Before Reduction *	-	20	-	-	-	20
Time To Reduce *	-	30	-	-	-	30
Minimum Gap	-	3.0	-	-	-	3.0
Recall Mode	-	MIN RECALL	-	-	-	MIN RECALL
Vehicle Call Memory	-	YELLOW	-	-	-	YELLOW
Dual Entry	-	-	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON	ON	ON

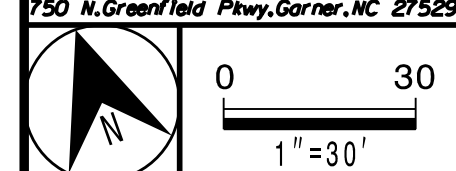
* These values may be field adjusted. Do not adjust Min Green and Extension times for phases 2 and 6 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.

- SIGNS**
- | PROPOSED | EXISTING |
|----------|----------|
| | |
| | |
| | |

Signal Upgrade
Temporary Design 1
Construction Phase 1C

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

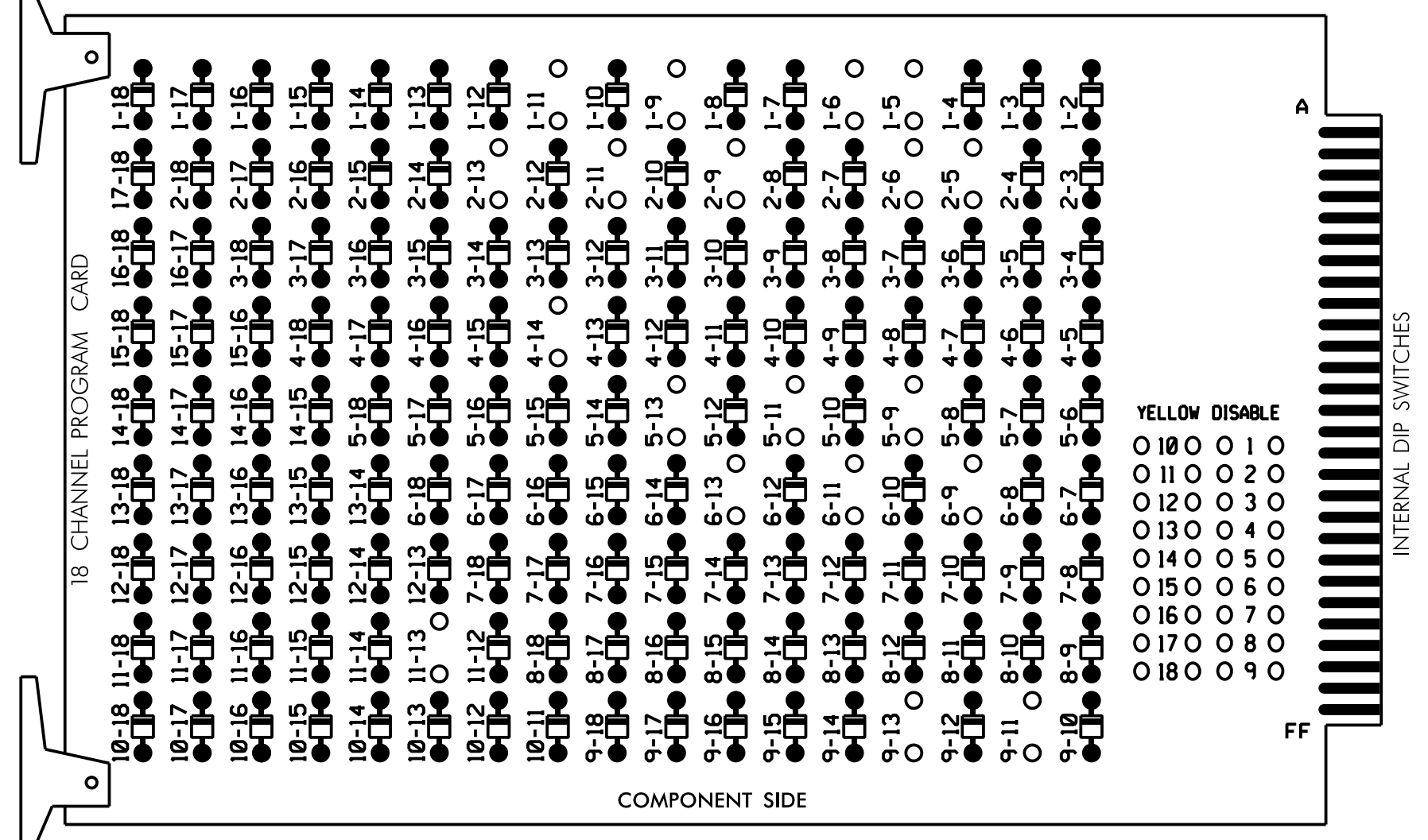
	NC 146 (Long Shoals Road) at Schenck Parkway / Skyland Inn Drive		
	Division 13 Buncombe Co. Asheville PLAN DATE: September 2018 PREPARED BY: A.H. Thornburg	REVIEWED BY: A.D. Klinksiek REVIEWED BY: N.R. Simmons	



EDI MODEL 2018ECLIP-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

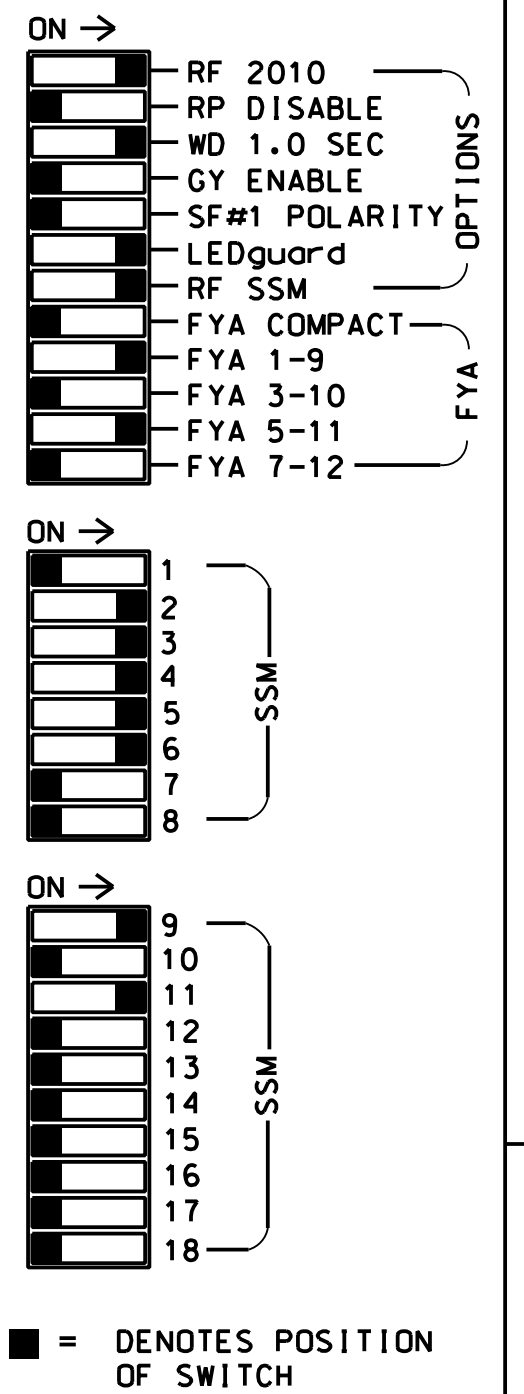
REMOVE DIODE JUMPERS 1-5, 1-6, 1-9, 1-11, 2-5, 2-6, 2-9, 2-11, 2-13, 4-14, 5-9, 5-11, 5-13, 6-9, 6-11, 6-13, 9-11, 9-13, and 11-13.



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.
- Integrate monitor with Ethernet network in cabinet.



NOTES

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

SIGNAL HEAD HOOK-UP CHART

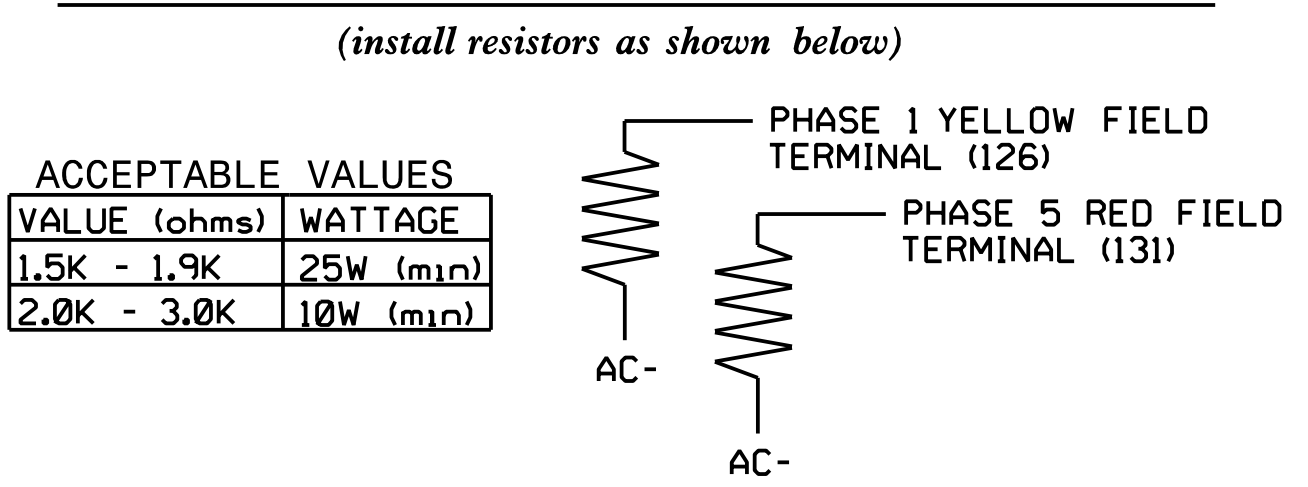
LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6		
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18		
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE		
SIGNAL HEAD NO.	11	21,22	P21, P22	31	32	62	22	41	42	P41, P42	32	51	61,62	NU	NU	NU	NU	NU		
RED		128		116	116			101	101		*		134							
YELLOW	*	129		117	117			102	102				135							
GREEN		130		118	118			103	103				136							
RED ARROW																		A121	A114	
YELLOW ARROW						117	102												A122	A115
FLASHING YELLOW ARROW																			A123	A116
GREEN ARROW	127			118	118	103	103						133	133						
Hand				113									104							
Walker				115									106							

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

EQUIPMENT INFORMATION

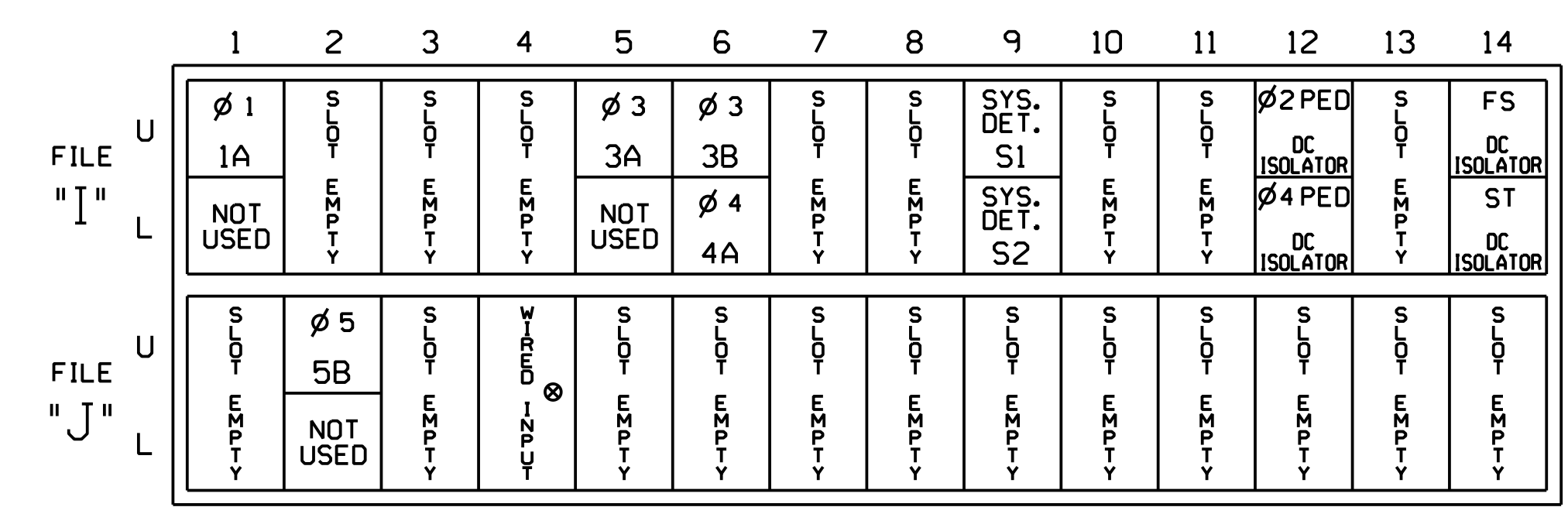
CONTROLLER.....2070E
 CABINET.....332 W/AUX
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
 LOAD SWITCHES USED.....S1,S2,S3,S4,S5,S6,S7,S8,
 AUX S1,AUX S4
 PHASES USED.....1,2,2 PED,3,4,4 PED,5,6
 OVERLAP "A".....1+2
 OVERLAP "B".....NOT USED
 OVERLAP "C".....5+6
 OVERLAP "D".....NOT USED

LOAD RESISTOR INSTALLATION DETAIL



INPUT FILE POSITION LAYOUT

(front view)



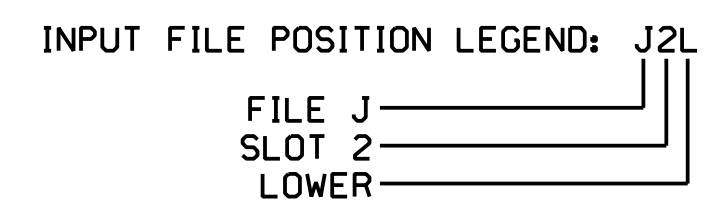
EX.: 1A, 2A, ETC. = LOOP NO.'S
 FS = FLASH SENSE
 ST = STOP TIME
 * Wired Input - Do not populate slot with detector card

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
1A ¹	TB2-1,2	I1U	56	18	1	1	Y	Y			15
	-	J4U	48	10	26	6	Y	Y	Y		3
3A	TB4-5,6	I5U	58	20	3	3	Y	Y			3
3B	TB4-9,10	I6U	41	3	4	3	Y	Y			
4A	TB4-11,12	I6L	45	7	14	4	Y	Y			10
5B	TB3-5,6	J2U	40	2	6	5	Y	Y			15
* S1	TB6-9,10	I9U	60	22	11	SYS					
* S2	TB6-11,12	I9L	62	24	13	SYS					
PED PUSH BUTTONS											
P21,P22	TB8-4,6	I12U	67	29	PED 2	2 PED					
P41,P42	TB8-5,6	I12L	69	31	PED 4	4 PED					

NOTE:
 INSTALL DC ISOLATORS IN INPUT FILE SLOT 112.

¹Add jumper from I1-W to J4-W, on rear of input file.
 * System detector only. Remove the vehicle phase assigned to this detector in the default programming.

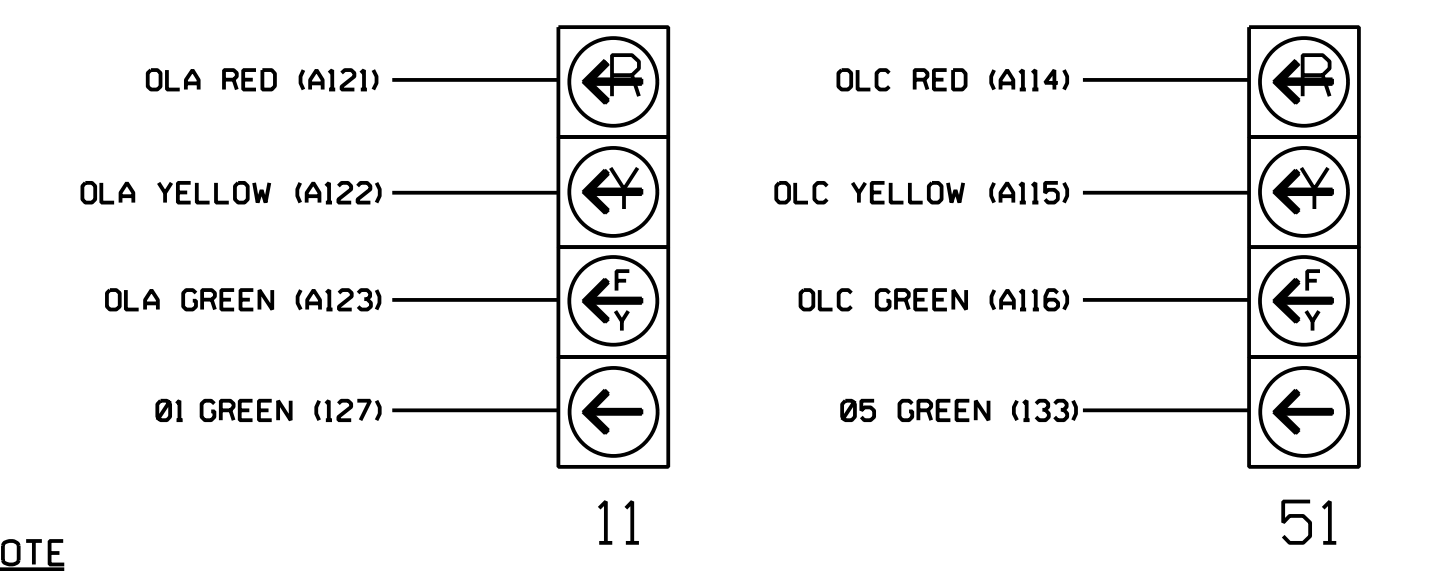


SPECIAL DETECTOR NOTE

For detection zones 2A, 2B, 5A, 6A, 6B, S3, and S4 install a microwave detection system for vehicle detection. Perform installation according to manufacturer's directions and NCDOT engineer approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



NOTE
 The sequence display for signal heads 11 and 51 requires special logic programming. See sheet 2 for programming instructions.

Electrical Detail - Sheet 1 of 2
 Signal Upgrade
 Temporary Design 1

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 13-1126T1
 DESIGNED: September 2018
 SEALED: 1/28/2019
 REVISED: N/A

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

	Prepared for: NC 146 (Long Shoals Road) at Schenck Parkway / Skyland Inn Drive	SEAL
	Division 13 Buncombe Co. Asheville PLAN DATE: September 2018 REVIEWED BY: A.D. Klinskiesk PREPARED BY: A.H. Thornburg REVIEWED BY: N.R. Simmons	
Revisions table with columns for REVISIONS, INITI., and DATE.	DocuSigned by: Natasha R. Simmons 1/28/2019	DATE: _____ SIGNATURE: _____ DATE: _____

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

(program controller as shown below)

1. 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, 3, 4, 5, and 6.
2. FROM MAIN MENU PRESS '6' (OUTPUTS), THEN '3' (LOGICAL I/O PROCESSOR).

```

LOGICAL I/O COMMAND #1 (+/-COMMAND#)
IF ACTIVE PHASE #1 IS ON
AND RED CLEAR ON PHASE #1 IS ON

      ↓
      SCROLL DOWN

THEN:
SET OUTPUT ASSIGNMENT #50 ON
SET OUTPUT ASSIGNMENT #51 OFF

      ↓
      PRESS '+'
    
```

NOTE: LOGIC FOR PHASE 1 RED CLEAR WHEN TRANSITIONING FROM PHASE 1 TO PHASE 2 (HEAD 11).

```

LOGICAL I/O COMMAND #2 (+/-COMMAND#)
IF ACTIVE PHASE #1 IS ON

      ↓
      SCROLL DOWN

THEN:
SET OUTPUT ASSIGNMENT #52 OFF

      ↓
      PRESS '+'
    
```

NOTE: LOGIC FOR SWITCHING FLASHING YELLOW ARROW OFF DURING PHASE 1 (HEAD 11).

```

LOGICAL I/O COMMAND #3 (+/-COMMAND#)
IF YELLOW ON PHASE #1 IS ON

      ↓
      SCROLL DOWN

THEN:
SET OUTPUT ASSIGNMENT #51 ON

      ↓
      PRESS '+'
    
```

NOTE: LOGIC FOR YELLOW ARROW CLEARANCE FROM PHASE 1 (HEAD 11).

```

LOGICAL I/O COMMAND #4 (+/-COMMAND#)
IF ACTIVE PHASE #5 IS ON
AND RED CLEAR ON PHASE #5 IS ON

      ↓
      SCROLL DOWN

THEN:
SET OUTPUT ASSIGNMENT #42 ON
SET OUTPUT ASSIGNMENT #43 OFF

      ↓
      PRESS '+'
    
```

NOTE: LOGIC FOR PHASE 5 RED CLEAR WHEN TRANSITIONING FROM PHASE 5 TO PHASE 6 (HEAD 51).

```

LOGICAL I/O COMMAND #5 (+/-COMMAND#)
IF ACTIVE PHASE #5 IS ON

      ↓
      SCROLL DOWN

THEN:
SET OUTPUT ASSIGNMENT #44 OFF

      ↓
      PRESS '+'
    
```

NOTE: LOGIC FOR SWITCHING FLASHING YELLOW ARROW OFF DURING PHASE 5 (HEAD 51).

```

LOGICAL I/O COMMAND #6 (+/-COMMAND#)
IF YELLOW ON PHASE #5 IS ON

      ↓
      SCROLL DOWN

THEN:
SET OUTPUT ASSIGNMENT #43 ON

      ↓
      PRESS '+'
    
```

NOTE: LOGIC FOR YELLOW ARROW CLEARANCE FROM PHASE 5 (HEAD 51).

LOGIC I/O PROCESSOR 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.

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: :XX
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

PRESS '+' TWICE

```

PAGE 1: VEHICLE OVERLAP 'C' SETTINGS
PHASE:      :12345678910111213141516
VEH OVL PARENTS: :XX
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

OUTPUT REFERENCE SCHEDULE	
USE TO INTERPRET LOGIC PROCESSOR	
OUTPUT 42 =	Overlap C Red
OUTPUT 43 =	Overlap C Yellow
OUTPUT 44 =	Overlap C Green
OUTPUT 50 =	Overlap A Red
OUTPUT 51 =	Overlap A Yellow
OUTPUT 52 =	Overlap A Green

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 13-1126T1
DESIGNED: September 2018
SEALED: 1/28/2019
REVISED: N/A

Electrical Detail - Sheet 2 of 2
Signal Upgrade
Temporary Design 1

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

	Prepared for: 	SEAL
NC 146 (Long Shoals Road) at Schenck Parkway / Skyland Inn Drive		
Division 13 Buncombe Co. Asheville		
PLAN DATE: September 2018 REVIEWED BY: A.D. Klinksiek		
PREPARED BY: A.H. Thornburg REVIEWED BY: N.R. Simmons		
REVISIONS	INITI.	DATE
DocuSigned by: Natasha R. Simmons 1/28/2019		
FROM SIGNATURE DATE		
SIG. INVENTORY NO. 13-1126T1		

HNTB HNTB NORTH CAROLINA, P.C.
343 E. Six Forks Road, Suite 200
Raleigh, North Carolina 27609
NC License No: C-1554
(919) 546-8997

PHASING DIAGRAM

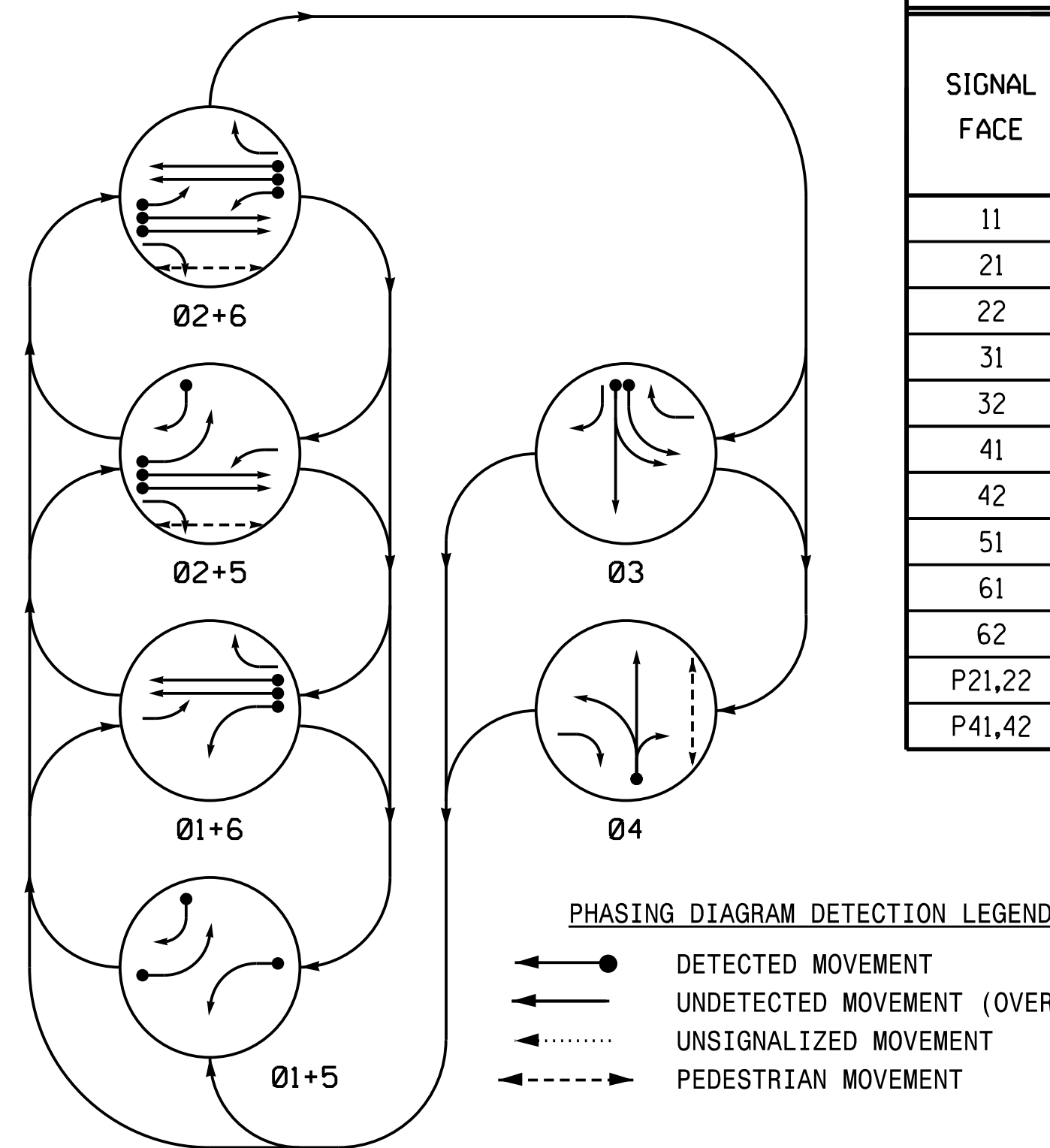
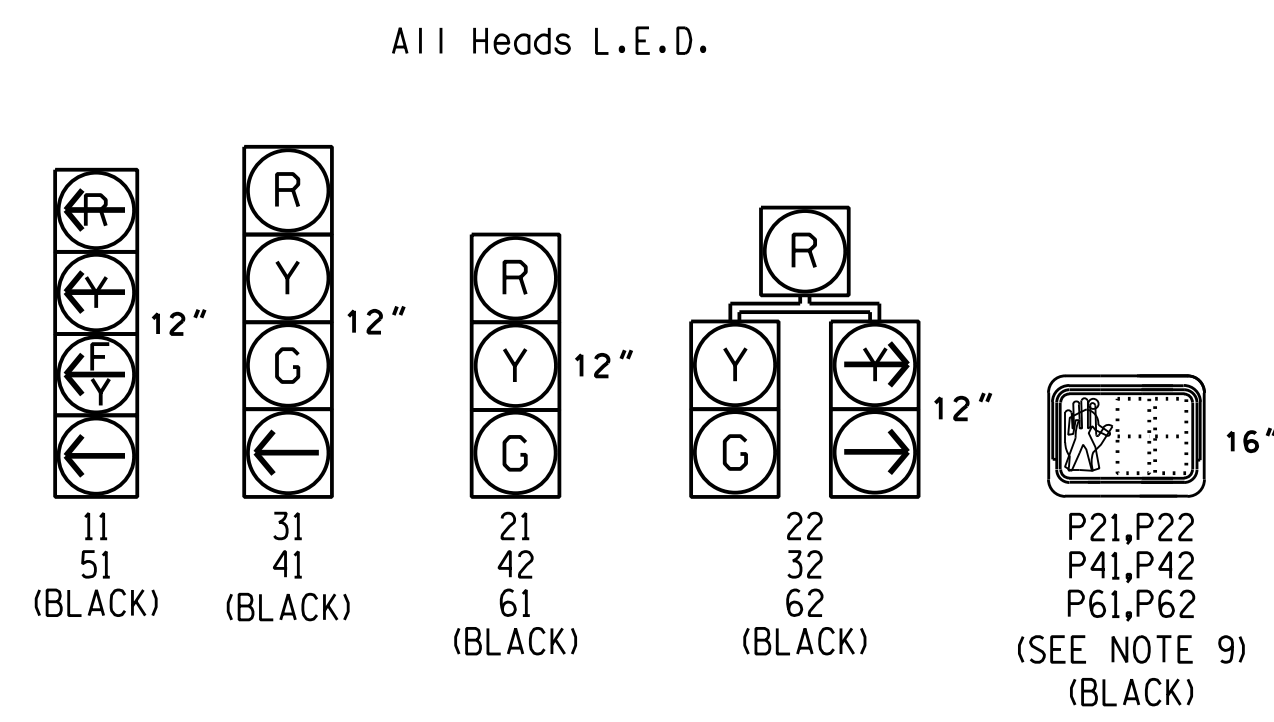


TABLE OF OPERATION table with columns for SIGNAL FACE and PHASE (01+5 to 04, FLASH, H).

SIGNAL FACE I.D.



6 Phase Fully Actuated Asheville Signal System

OASIS 2070 LOOP & DETECTOR INSTALLATION CHART table with columns for LOOP, SIZE, DISTANCE FROM STOPBAR, TURNS, NEW LOOP, PHASE, CALLING, EXTENSION, FULL TIME DELAY, STRETCH TIME, DELAY TIME, SYSTEM LOOP, NEW CARD.

NOTES

- List of 13 notes regarding roadway standards, signal programming, detection zones, and timing values.

LEGEND table with columns for PROPOSED and EXISTING, listing symbols for traffic signal heads, signs, detectors, and construction zones.

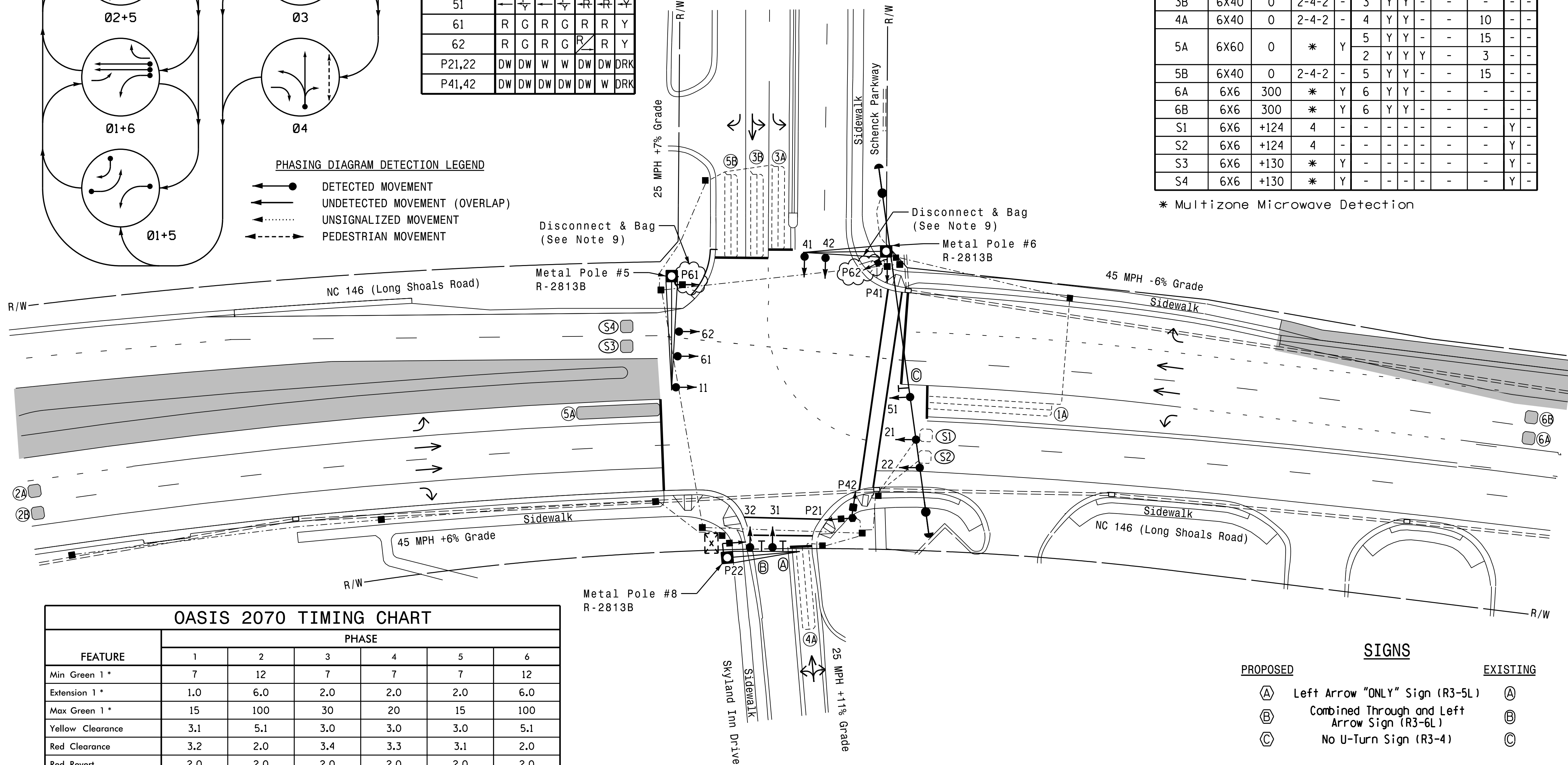
SIGNS table with columns for PROPOSED and EXISTING, listing sign types like Left Arrow 'ONLY' Sign, Combined Through and Left Arrow Sign, and No U-Turn Sign.

Signal Upgrade Temporary Design 2 Construction Phase 2A

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

OASIS 2070 TIMING CHART table with columns for FEATURE and PHASE (1-6), listing timing values for various signal features.

* 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.

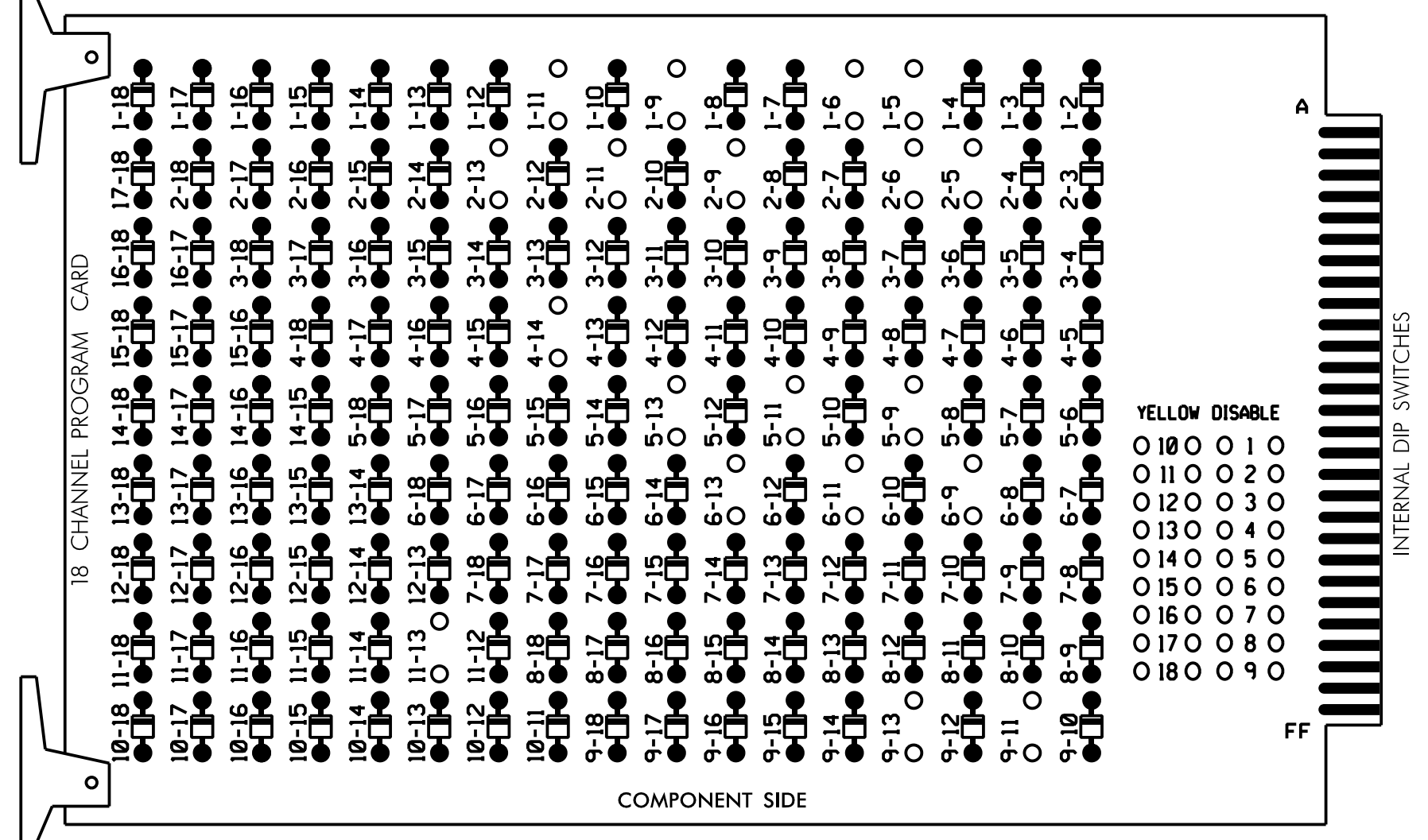


Professional seal and project information block including project name, location, date, and signatures.

EDI MODEL 2018ECLIP-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

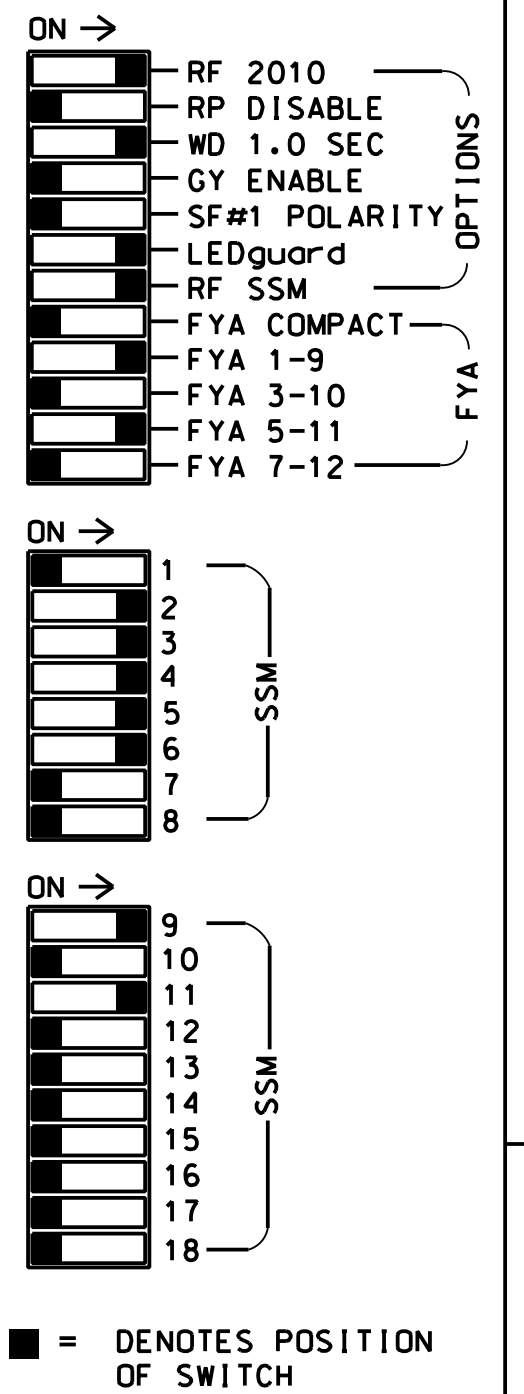
REMOVE DIODE JUMPERS 1-5, 1-6, 1-9, 1-11, 2-5, 2-6, 2-9, 2-11, 2-13, 4-14, 5-9, 5-11, 5-13, 6-9, 6-11, 6-13, 9-11, 9-13, and 11-13.



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.
- Integrate monitor with Ethernet network in cabinet.



NOTES

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

SIGNAL HEAD HOOK-UP CHART

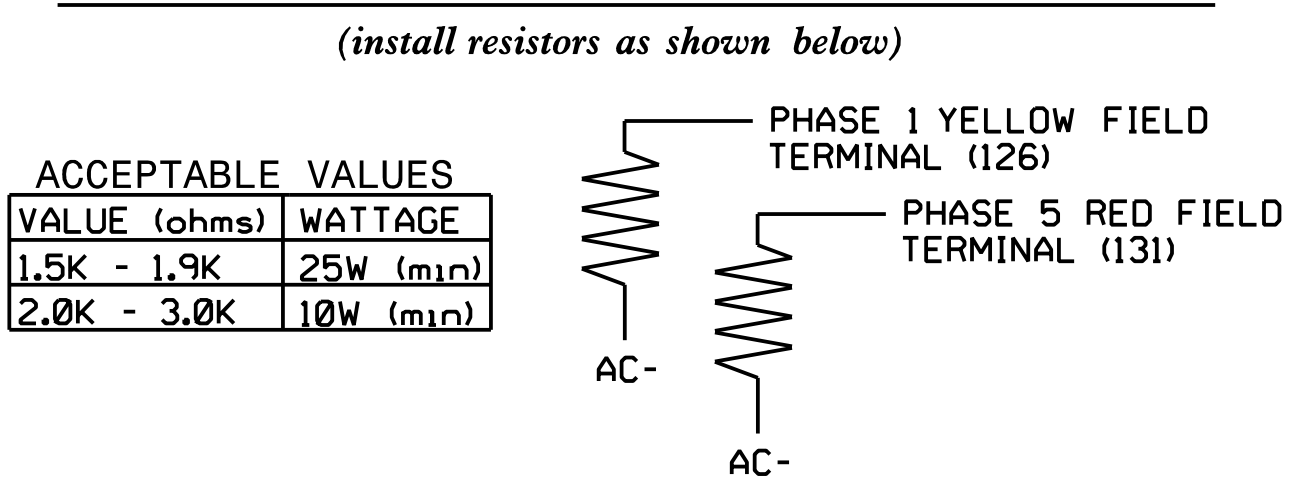
LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6		
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18		
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE		
SIGNAL HEAD NO.	11	21,22	P21, P22	31	32	62	22	41	42	P41, P42	32	51	61,62	NU	NU	NU	NU	NU		
RED		128		116	116			101	101		*		134							
YELLOW	*	129		117	117			102	102				135							
GREEN		130		118	118			103	103				136							
RED ARROW																		A121	A114	
YELLOW ARROW						117	102												A122	A115
FLASHING YELLOW ARROW																			A123	A116
GREEN ARROW	127			118	118	103	103						133	133						
Hand				113									104							
Walker				115									106							

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

EQUIPMENT INFORMATION

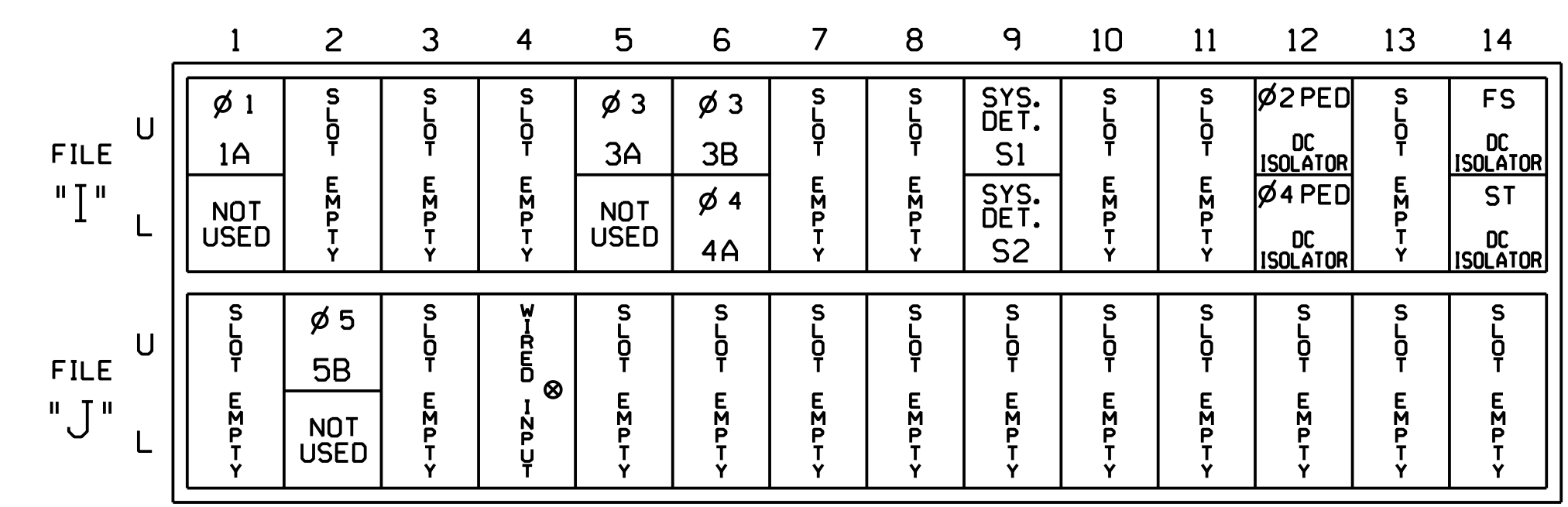
CONTROLLER.....2070E
 CABINET.....332 W/AUX
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
 LOAD SWITCHES USED.....S1,S2,S3,S4,S5,S6,S7,S8,
 AUX S1,AUX S4
 PHASES USED.....1,2,2 PED,3,4,4 PED,5,6
 OVERLAP "A".....1+2
 OVERLAP "B".....NOT USED
 OVERLAP "C".....5+6
 OVERLAP "D".....NOT USED

LOAD RESISTOR INSTALLATION DETAIL



INPUT FILE POSITION LAYOUT

(front view)



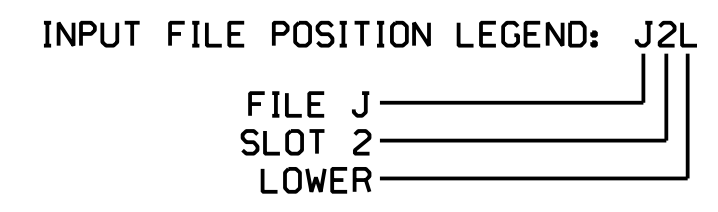
EX.: 1A, 2A, ETC. = LOOP NO.'S
 FS = FLASH SENSE
 ST = STOP TIME
 * Wired Input - Do not populate slot with detector card

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
1A ¹	TB2-1,2	11U	56	18	1	1	Y	Y			15
	-	J4U	48	10	26	6	Y	Y	Y		3
3A	TB4-5,6	15U	58	20	3	3	Y	Y			3
3B	TB4-9,10	16U	41	3	4	3	Y	Y			
4A	TB4-11,12	16L	45	7	14	4	Y	Y			10
5B	TB3-5,6	J2U	40	2	6	5	Y	Y			15
* S1	TB6-9,10	19U	60	22	11	SYS					
* S2	TB6-11,12	19L	62	24	13	SYS					
PED PUSH BUTTONS											
P21,P22	TB8-4,6	112U	67	29	PED 2	2 PED					
P41,P42	TB8-5,6	112L	69	31	PED 4	4 PED					

NOTE:
 INSTALL DC ISOLATORS IN INPUT FILE SLOT 112.

¹Add jumper from 11-W to J4-W. on rear of input file.
 * System detector only. Remove the vehicle phase assigned to this detector in the default programming.

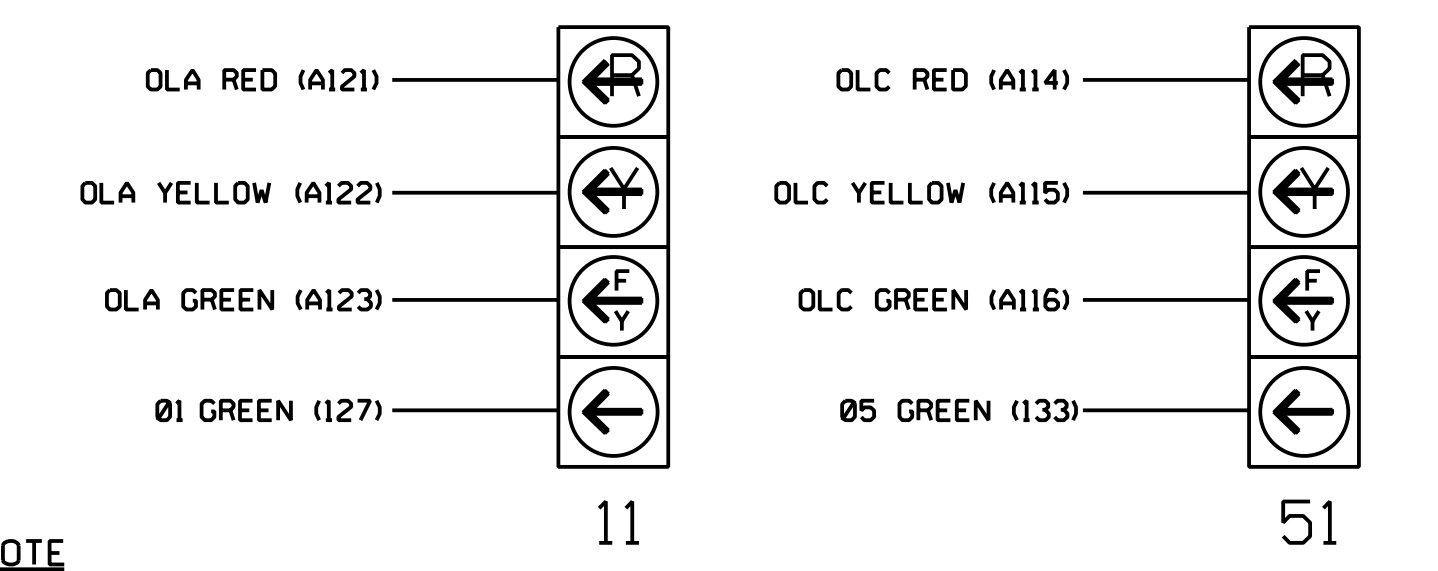


SPECIAL DETECTOR NOTE

For detection zones 2A, 2B, 5A, 6A, 6B, S3, and S4 install a microwave detection system for vehicle detection. Perform installation according to manufacturer's directions and NCDOT engineer approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



NOTE
 The sequence display for signal heads 11 and 51 requires special logic programming. See sheet 2 for programming instructions.

Electrical Detail - Sheet 1 of 2
 Signal Upgrade
 Temporary Design 2

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 13-1126T2
 DESIGNED: September 2018
 SEALED: 1/28/2019
 REVISED: N/A

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

	Prepared for: NC 146 (Long Shoals Road) at Schenck Parkway / Skyland Inn Drive	SEAL
	Division 13 Buncombe Co. Asheville PLAN DATE: September 2018 REVIEWED BY: A.D. Klinskiak PREPARED BY: A.H. Thornburg REVIEWED BY: N.R. Simmons	
Revisions table with columns for Revisions, Init., and Date.	Date: 1/28/2019 Signature: Natasha R. Simmons	Date: _____ Signature: _____

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

(program controller as shown below)

1. 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, 3, 4, 5, and 6.
2. FROM MAIN MENU PRESS '6' (OUTPUTS), THEN '3' (LOGICAL I/O PROCESSOR).

```

LOGICAL I/O COMMAND #1 (+/-COMMAND#)
IF ACTIVE PHASE #1 IS ON
AND RED CLEAR ON PHASE #1 IS ON

      ↓
    SCROLL DOWN

THEN:
SET OUTPUT ASSIGNMENT #50 ON
SET OUTPUT ASSIGNMENT #51 OFF
    
```

NOTE: LOGIC FOR PHASE 1 RED CLEAR WHEN TRANSITIONING FROM PHASE 1 TO PHASE 2 (HEAD 11).

```

LOGICAL I/O COMMAND #2 (+/-COMMAND#)
IF ACTIVE PHASE #1 IS ON

      ↓
    SCROLL DOWN

THEN:
SET OUTPUT ASSIGNMENT #52 OFF
    
```

NOTE: LOGIC FOR SWITCHING FLASHING YELLOW ARROW OFF DURING PHASE 1 (HEAD 11).

```

LOGICAL I/O COMMAND #3 (+/-COMMAND#)
IF YELLOW ON PHASE #1 IS ON

      ↓
    SCROLL DOWN

THEN:
SET OUTPUT ASSIGNMENT #51 ON
    
```

NOTE: LOGIC FOR YELLOW ARROW CLEARANCE FROM PHASE 1 (HEAD 11).

```

LOGICAL I/O COMMAND #4 (+/-COMMAND#)
IF ACTIVE PHASE #5 IS ON
AND RED CLEAR ON PHASE #5 IS ON

      ↓
    SCROLL DOWN

THEN:
SET OUTPUT ASSIGNMENT #42 ON
SET OUTPUT ASSIGNMENT #43 OFF
    
```

NOTE: LOGIC FOR PHASE 5 RED CLEAR WHEN TRANSITIONING FROM PHASE 5 TO PHASE 6 (HEAD 51).

```

LOGICAL I/O COMMAND #5 (+/-COMMAND#)
IF ACTIVE PHASE #5 IS ON

      ↓
    SCROLL DOWN

THEN:
SET OUTPUT ASSIGNMENT #44 OFF
    
```

NOTE: LOGIC FOR SWITCHING FLASHING YELLOW ARROW OFF DURING PHASE 5 (HEAD 51).

```

LOGICAL I/O COMMAND #6 (+/-COMMAND#)
IF YELLOW ON PHASE #5 IS ON

      ↓
    SCROLL DOWN

THEN:
SET OUTPUT ASSIGNMENT #43 ON
    
```

NOTE: LOGIC FOR YELLOW ARROW CLEARANCE FROM PHASE 5 (HEAD 51).

LOGIC I/O PROCESSOR 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.

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: :XX
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

PRESS '+' TWICE

```

PAGE 1: VEHICLE OVERLAP 'C' SETTINGS
PHASE: :12345678910111213141516
VEH OVL PARENTS: :XX
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

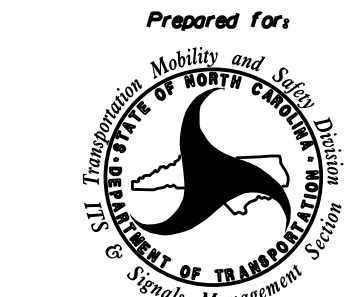
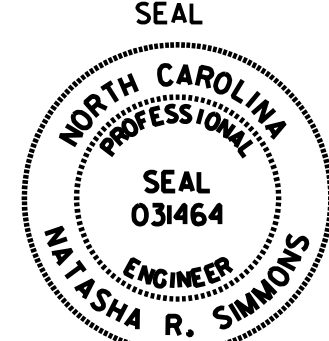
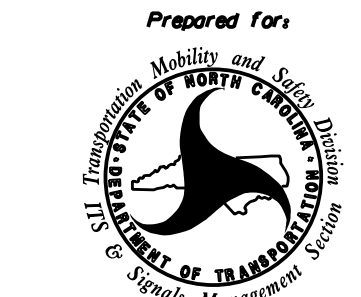
OVERLAP PROGRAMMING COMPLETE

OUTPUT REFERENCE SCHEDULE	
USE TO INTERPRET LOGIC PROCESSOR	
OUTPUT 42 =	Overlap C Red
OUTPUT 43 =	Overlap C Yellow
OUTPUT 44 =	Overlap C Green
OUTPUT 50 =	Overlap A Red
OUTPUT 51 =	Overlap A Yellow
OUTPUT 52 =	Overlap A Green

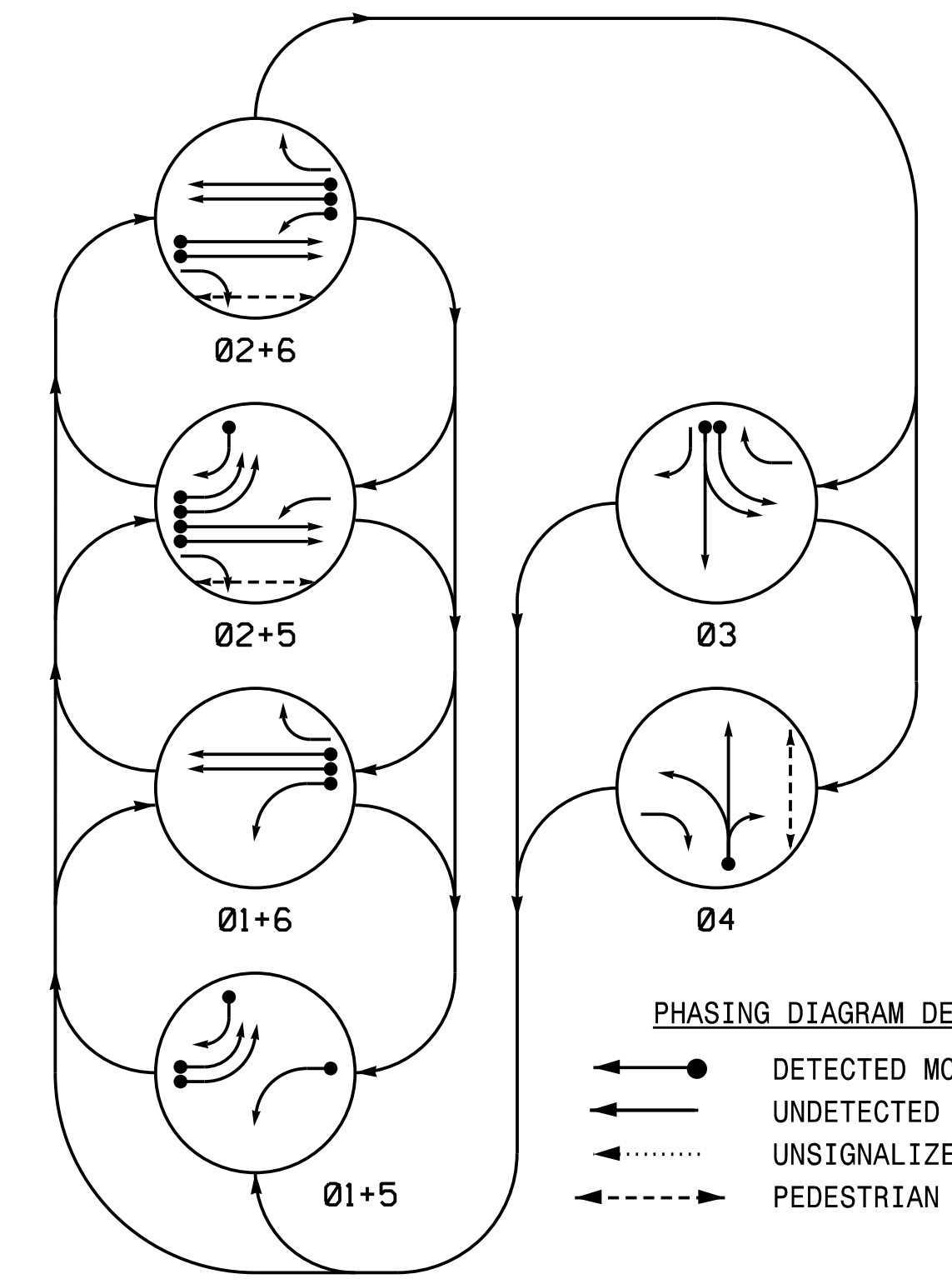
THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 13-1126T2
DESIGNED: September 2018
SEALED: 1/28/2019
REVISED: N/A

Electrical Detail - Sheet 2 of 2
Signal Upgrade
Temporary Design 2

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

	Prepared for: NC 146 (Long Shoals Road) at Schenck Parkway / Skyland Inn Drive	SEAL 						
Prepared for: 	Division 13 Buncombe Co. Asheville	SEAL 031464 ENGINEER NATASHA R. SIMMONS						
HNTB NORTH CAROLINA, P.C. 343 E. Six Forks Road, Suite 200 Raleigh, North Carolina 27609 NC License No: C-1554 (919) 546-8997	PLAN DATE: September 2018 REVIEWED BY: A.D. Klinksiek PREPARED BY: A.H. Thornburg REVIEWED BY: N.R. Simmons	DocuSigned by: Natasha R. Simmons 1/28/2019						
1750 N. Greenfield Pkwy, Corner, NC 27529	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>REVISIONS</th> <th>INIT.</th> <th>DATE</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>	REVISIONS	INIT.	DATE				DocuSigned by: Natasha R. Simmons 1/28/2019 SIG. INVENTORY NO. 13-1126T2
REVISIONS	INIT.	DATE						

PHASING DIAGRAM



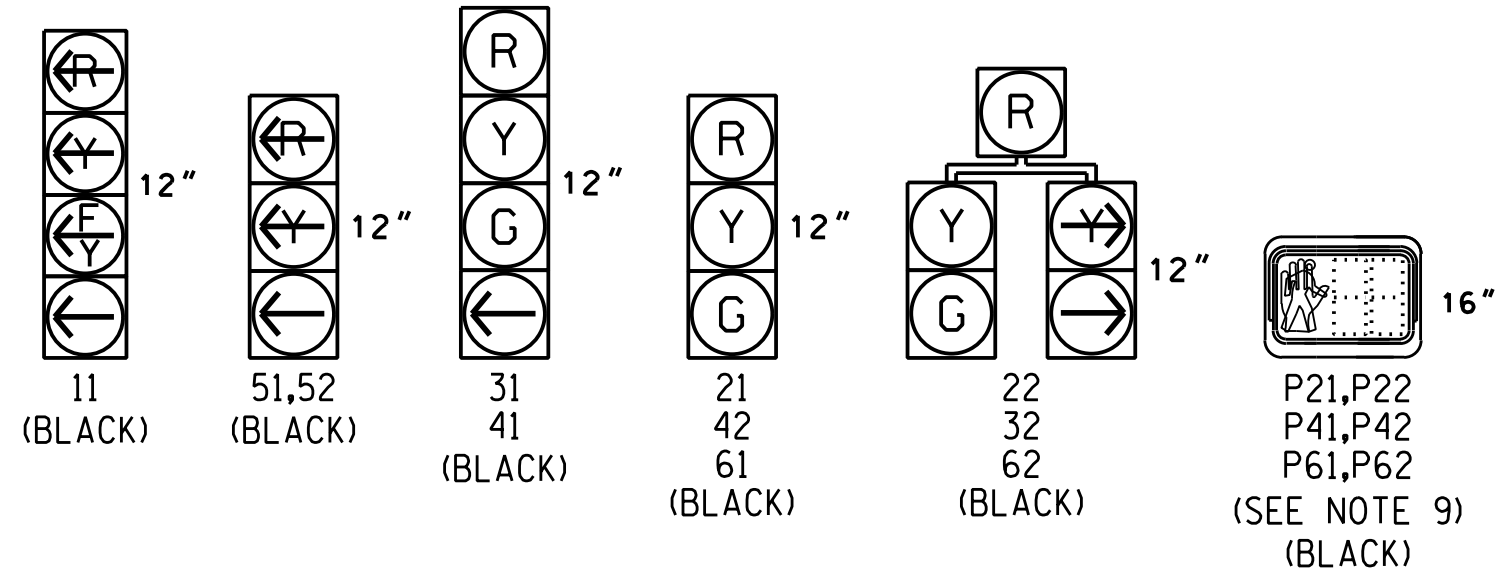
PHASING DIAGRAM DETECTION LEGEND

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

SIGNAL FACE	PHASE					
	01+5	01+6	02+5	02+6	03	04
11	---	---	---	---	---	---
21	R	R	G	G	R	R
22	R	R	G	G	R	R
31	R	R	R	R	G	R
32	R	R	R	R	G	R
41	R	R	R	R	R	G
42	R	R	R	R	R	G
51,52	---	---	---	---	---	---
61	R	G	R	G	R	R
62	R	G	R	G	R	R
P21,22	DW	DW	W	W	DW	DRK
P41,42	DW	DW	DW	DW	DW	DRK

SIGNAL FACE I.D.

All Heads L.E.D.



6 Phase Fully Actuated Asheville Signal System

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		
1A	6X60	0	2-4-2	-	1	Y	Y	-	15	-
2A	6X6	300	4	Y	2	Y	Y	-	3	-
2B	6X6	300	4	Y	2	Y	Y	-	-	-
3A	6X40	0	2-4-2	-	3	Y	Y	-	3	-
3B	6X40	0	2-4-2	-	3	Y	Y	-	-	-
4A	6X40	0	2-4-2	-	4	Y	Y	-	10	-
5A	6X40	0	2-4-2	Y	5	Y	Y	-	-	-
5B	6X40	0	2-4-2	Y	5	Y	Y	-	-	-
5C	6X40	0	2-4-2	-	5	Y	Y	-	15	-
6A	6X6	300	6	Y	6	Y	Y	-	-	-
6B	6X6	300	6	Y	6	Y	Y	-	-	-
S1	6X6	+120	4	-	-	-	-	-	-	Y
S2	6X6	+120	4	-	-	-	-	-	-	Y
S3	6X6	+130	*	Y	-	-	-	-	-	Y
S4	6X6	+130	*	Y	-	-	-	-	-	Y

* Multizone Microwave Detection

- 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 5 may be lagged.
 - The order of phase 3 and phase 4 may be reversed.
 - Set all detector units to presence mode.
 - Reposition existing sign ©.
 - Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
 - Program pedestrian heads to countdown the flashing "DON'T WALK" time only.
 - Bag existing pedestrian signal heads numbered P61 and P62.
 - Refer to Pavement Marking Plans for proposed stop bar locations.
 - Incorporate Microwave Detection system for vehicle detection.
 - Provide the Engineer with the Manufacturer's approved Microwave Detection locations and mounting heights to obtain detection zones as shown.
 - Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.

LEGEND

PROPOSED	EXISTING
○ → Traffic Signal Head	● → N/A
○ → Modified Signal Head	○ → N/A
○ → Sign	○ → N/A
○ → Pedestrian Signal Head With Push Button & Sign	○ → N/A
○ → Signal Pole with Guy	○ → N/A
○ → Signal Pole with Sidewalk Guy	○ → N/A
○ → Inductive Loop Detector Controller & Cabinet	○ → N/A
○ → Junction Box	○ → N/A
○ → 2-in Underground Conduit	○ → N/A
○ → Right of Way	○ → N/A
○ → Directional Arrow	○ → N/A
○ → Directional Drill	○ → N/A
○ → Metal Pole with Mastarm	○ → N/A
○ → Type II Signal Pedestal	○ → N/A
○ → Wheelchair Ramp	○ → N/A
○ → Construction Zone	○ → N/A
○ → Left Arrow "ONLY" Sign (R3-5L)	○ → N/A
○ → Combined Through and Left Arrow Sign (R3-6L)	○ → N/A
○ → No U-Turn Sign (R3-4)	○ → N/A

OASIS 2070 TIMING CHART

FEATURE	PHASE					
	1	2	3	4	5	6
Min Green 1 *	7	12	7	7	7	12
Extension 1 *	1.0	6.0	2.0	2.0	2.0	6.0
Max Green 1 *	15	100	30	20	15	100
Yellow Clearance	3.1	4.1	3.0	3.0	3.0	5.1
Red Clearance	3.2	1.6	3.4	3.3	3.3	1.5
Red Revert	2.0	2.0	2.0	2.0	2.0	2.0
Walk 1 *	-	7	-	7	-	-
Don't Walk 1	-	8	-	26	-	-
Seconds Per Actuation *	-	1.5	-	-	-	1.5
Max Variable Initial *	-	34	-	-	-	34
Time Before Reduction *	-	20	-	-	-	20
Time To Reduce *	-	30	-	-	-	30
Minimum Gap	-	3.0	-	-	-	3.0
Recall Mode	-	MIN RECALL	-	-	-	MIN RECALL
Vehicle Call Memory	-	YELLOW	-	-	-	YELLOW
Dual Entry	-	-	-	-	-	-
Simultaneous Gap	ON	ON	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.

Signal Upgrade
Temporary Design 3
Construction Phase 2B

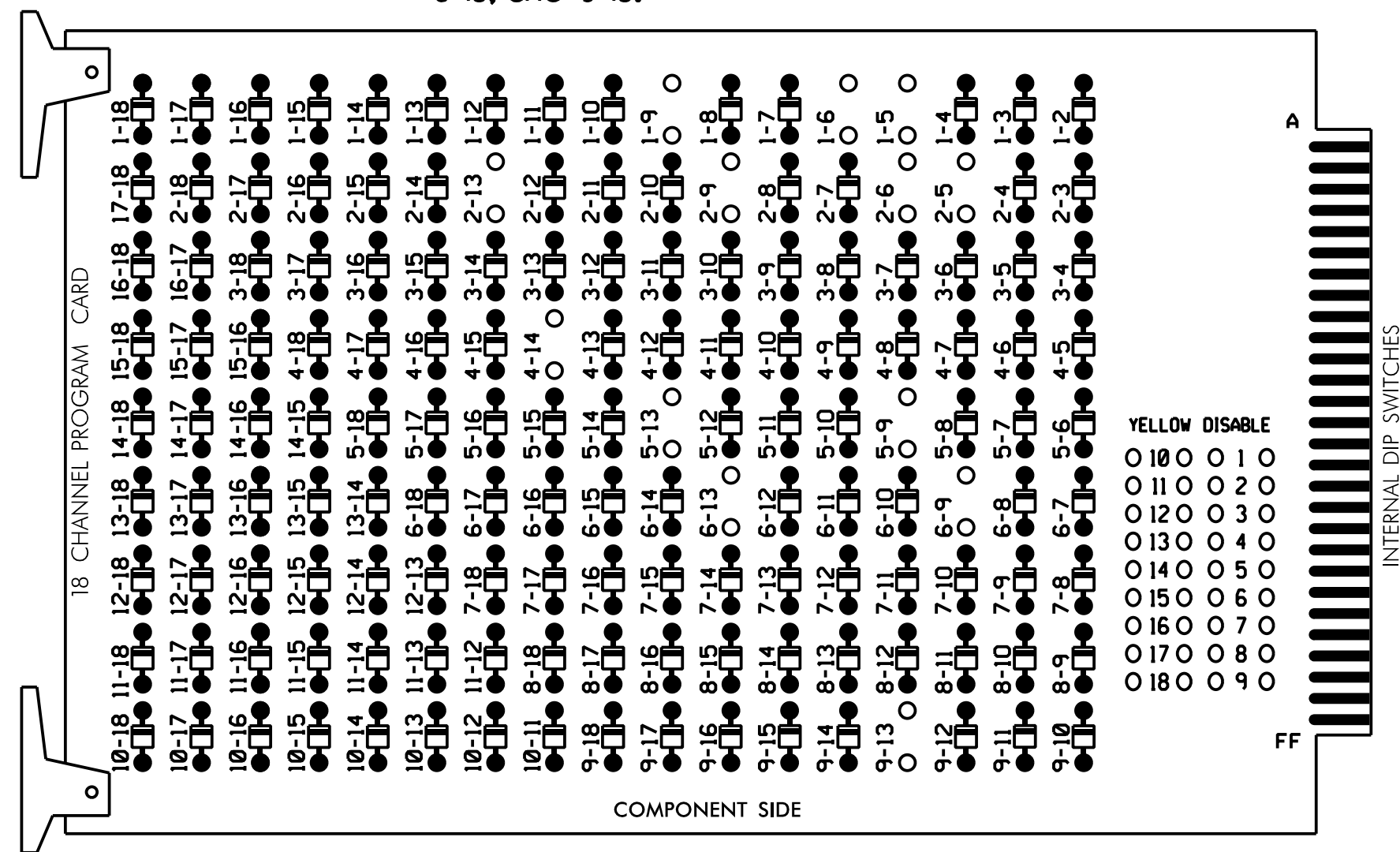
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

	NC 146 (Long Shoals Road) at Schenck Parkway / Skyland Inn Drive		
	Division 13 Buncombe Co. Asheville PLAN DATE: September 2018 REVIEWED BY: A.D. Klinksiek PREPARED BY: A.H. Thornburg REVIEWED BY: N.R. Simmons	750 N. Greenfield Pkwy, Garner, NC 27529 HNTB NORTH CAROLINA, P.C. 343 E. Six Forks Road, Suite 200 Raleigh, North Carolina 27609 NC License No: C-1554 (919) 546-8997	

EDI MODEL 2018EClip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

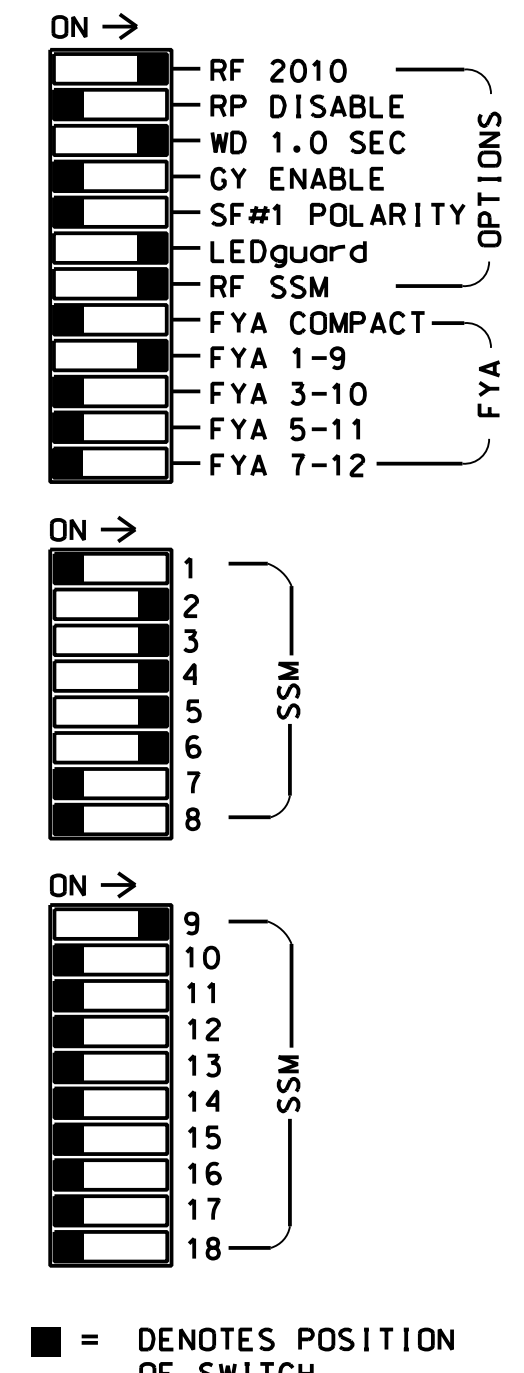
REMOVE DIODE JUMPERS 1-5, 1-6, 1-9, 2-5, 2-6, 2-9, 2-13, 4-14, 5-9, 5-13, 6-9, 6-13, and 9-13.



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.
- Integrate monitor with Ethernet network in cabinet.



NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
- Restore controller to factory defaults before programming per this electrical detail.
- Enable Simultaneous Gap-Out for all phases.
- Program phases 2 and 6 for Variable Initial and Gap Reduction.
- Program phases 2 and 6 for Startup In Green.
- Program phases 2 and 4 for 'STARTUP PED CALL'.
- Program phases 2 and 6 for Yellow Flash, and overlap 1 as Wag Overlaps.
- The cabinet and controller are part of the Asheville Signal System.

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6	
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18	
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE	
SIGNAL HEAD NO.	11	21,22	P21, P22	31	32	62	22	41	42	P41, P42	32	51,52	61,62	NU	NU	NU	NU	NU	
RED		128	116	116		101	101					134							
YELLOW	*	129	117	117		102	102					135							
GREEN		130	118	118		103	103					136							
RED ARROW												131						A121	
YELLOW ARROW					117	102					132	132							A122
FLASHING YELLOW ARROW																			A123
GREEN ARROW	127		118	118	103	103		133	133										
Hand				113						104									
Walking																			106

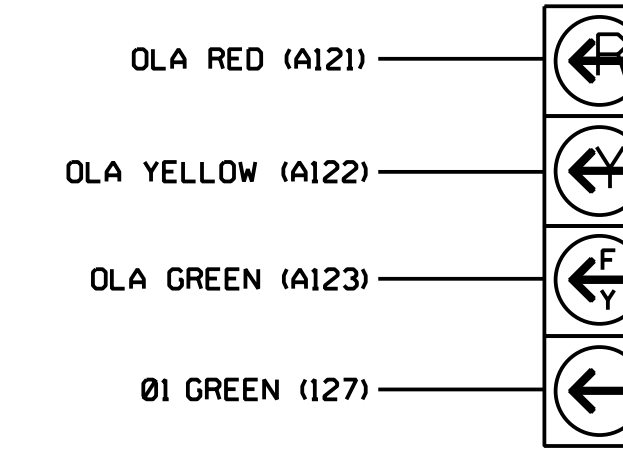
NU = Not Used
 * Denotes install load resistor. See load resistor installation detail this sheet.
 ★ See pictorial of head wiring in detail this sheet.

EQUIPMENT INFORMATION

CONTROLLER.....2070E
 CABINET.....332 W/AUX
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
 LOAD SWITCHES USED.....S1,S2,S3,S4,S5,S6,S7,S8,AUX S1
 PHASES USED.....1,2,2 PED,3,4,4 PED,5,6
 OVERLAP "A".....1+2
 OVERLAP "B".....NOT USED
 OVERLAP "C".....NOT USED
 OVERLAP "D".....NOT USED

FYA SIGNAL WIRING DETAIL

(wire signal head as shown)



NOTE

The sequence display for signal head 11 requires special logic programming. See sheet 2 for programming instructions.

INPUT FILE POSITION LAYOUT

(front view)

FILE "I"	1	2	3	4	5	6	7	8	9	10	11	12	13	14
U	∅ 1 1A	∅ 2 2A	S TOP	S TOP	∅ 3 3A	∅ 3 3B	S TOP	S TOP	SYS. DET. S1	S TOP	S TOP	∅ 2 PED DC ISOLATOR	S TOP	FS DC ISOLATOR
L	NOT USED	∅ 2 2B	Y TOP	Y TOP	NOT USED	∅ 4 4A	Y TOP	Y TOP	SYS. DET. S2	Y TOP	Y TOP	∅ 4 PED DC ISOLATOR	Y TOP	ST DC ISOLATOR
U	∅ 5 5A	∅ 5 5B	∅ 6 6A	Y TOP	S TOP	S TOP	S TOP	S TOP	S TOP	S TOP	S TOP	S TOP	S TOP	S TOP
L	NOT USED	∅ 5 5C	∅ 6 6B	Y TOP	Y TOP	Y TOP	Y TOP	Y TOP	Y TOP	Y TOP	Y TOP	Y TOP	Y TOP	Y TOP

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

SPECIAL DETECTOR NOTE

For detection zones S3 and S4 install a microwave 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.

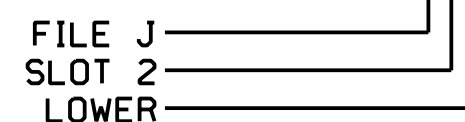
INPUT FILE CONNECTION & PROGRAMMING CHART

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
1A ¹	TB2-1,2	I1U	56	18	1	1	Y	Y			15
	-	J4U	48	10	26	6	Y	Y	Y		3
2A	TB2-5,6	I2U	39	1	2	2	Y	Y			
2B	TB2-7,8	I2L	43	5	12	2	Y	Y			
3A	TB4-5,6	I5U	58	20	3	3	Y	Y			3
3B	TB4-9,10	I6U	41	3	4	3	Y	Y			
4A	TB4-11,12	I6L	45	7	14	4	Y	Y			10
5A	TB3-1,2	J1U	55	17	5	5	Y	Y			
5B	TB3-5,6	J2U	40	2	6	5	Y	Y			
5C	TB3-7,8	J2L	44	6	16	5	Y	Y			15
6A	TB3-9,10	J3U	64	26	36	6	Y	Y			
6B	TB3-11,12	J3L	77	39	46	6	Y	Y			
* S1	TB6-9,10	I9U	60	22	11	SYS					
* S2	TB6-11,12	I9L	62	24	13	SYS					
PED PUSH BUTTONS											
P21,P22	TB8-4,6	I12U	67	29	PED 2	2 PED					
P41,P42	TB8-5,6	I12L	69	31	PED 4	4 PED					

NOTE:
 INSTALL DC ISOLATORS IN INPUT FILE SLOT 112.

¹Add jumper from I1-W to J4-W, on rear of input file.
 * System detector only. Remove the vehicle phase assigned to this detector in the default programming.

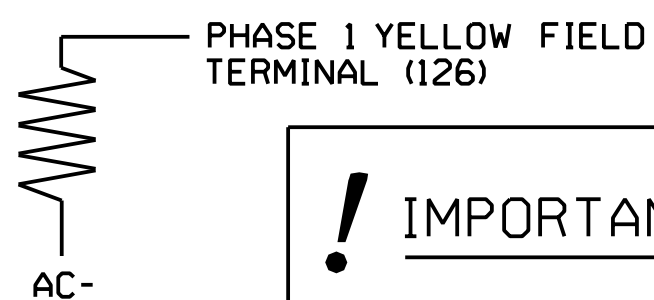
INPUT FILE POSITION LEGEND: J2L



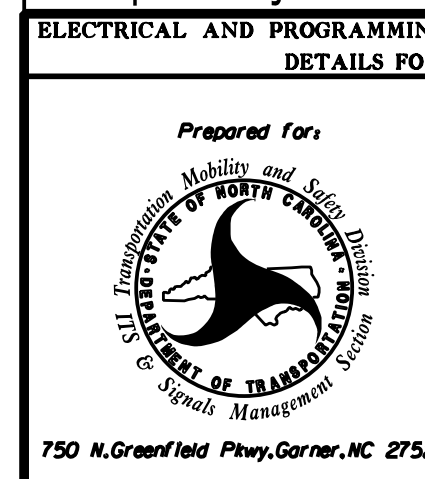
LOAD RESISTOR INSTALLATION DETAIL

(install resistor as shown below)

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



! IMPORTANT: REMOVE RESISTOR FROM PHASE 5 RED FIELD TERMINAL, IF PRESENT.



HNTB NORTH CAROLINA, P.C.
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 Raleigh, North Carolina 27609
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 (919) 546-8997

Electrical Detail - Sheet 1 of 2
 Signal Upgrade
 Temporary Design 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NC 146 (Long Shoals Road) at Schenck Parkway / Skyland Inn Drive

Division 13 Buncombe Co. Asheville

PLAN DATE: September 2018 REVIEWED BY: A.D. Klinksiek
 PREPARED BY: A.H. Thornburg REVIEWED BY: N.R. Simmons

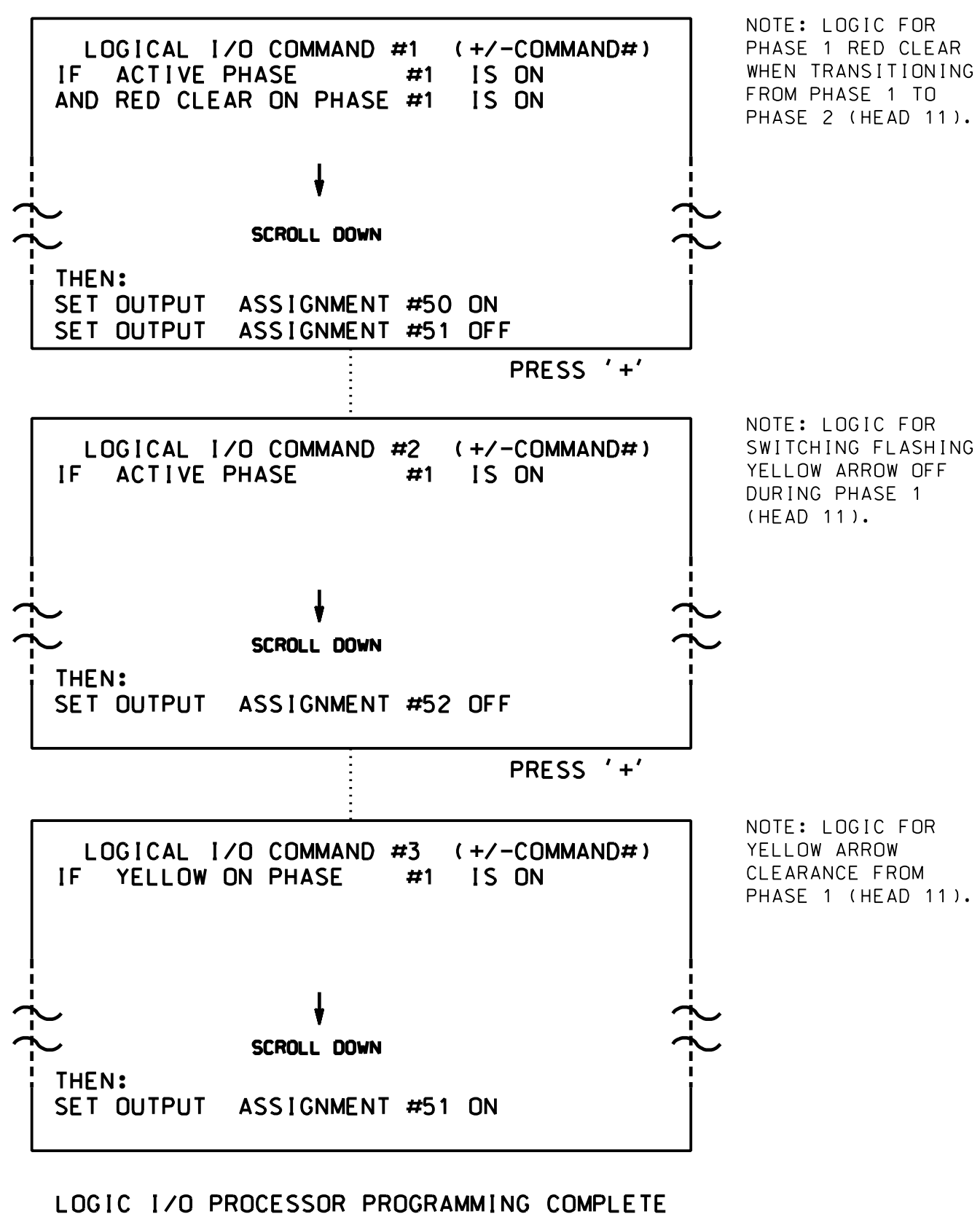
REVISIONS	INIT.	DATE

DocuSigned by: 1/28/2019
 Natasha R. Simmons
 SEAL 031464
 NORTH CAROLINA PROFESSIONAL ENGINEER
 SEAL 031464
 SIG. INVENTORY NO. 13-1126T3

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 50 =	Overlap A Red
OUTPUT 51 =	Overlap A Yellow
OUTPUT 52 =	Overlap A Green

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: :XX
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: 13-1126T3
DESIGNED: September 2018
SEALED: 1/28/2019
REVISED: N/A

Electrical Detail - Sheet 2 of 2
Signal Upgrade
Temporary Design 3

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343 E. Six Forks Road, Suite 200
Raleigh, North Carolina 27609
NC License No: C-1554
(919) 546-8997

	Prepared for: NC 146 (Long Shoals Road) at Schenck Parkway / Skyland Inn Drive	
	Division 13 Buncombe Co. Asheville PLAN DATE: September 2018 REVIEWED BY: A.D. Klinksiek PREPARED BY: A.H. Thornburg REVIEWED BY: N.R. Simmons	
750 N. Greenfield Pkwy, Corner, NC 27529	REVISIONS INIT. DATE	DocuSigned by: 1/28/2019 Natasha R. Simmons DATE SIG. INVENTORY NO. 13-1126T3

PHASING DIAGRAM

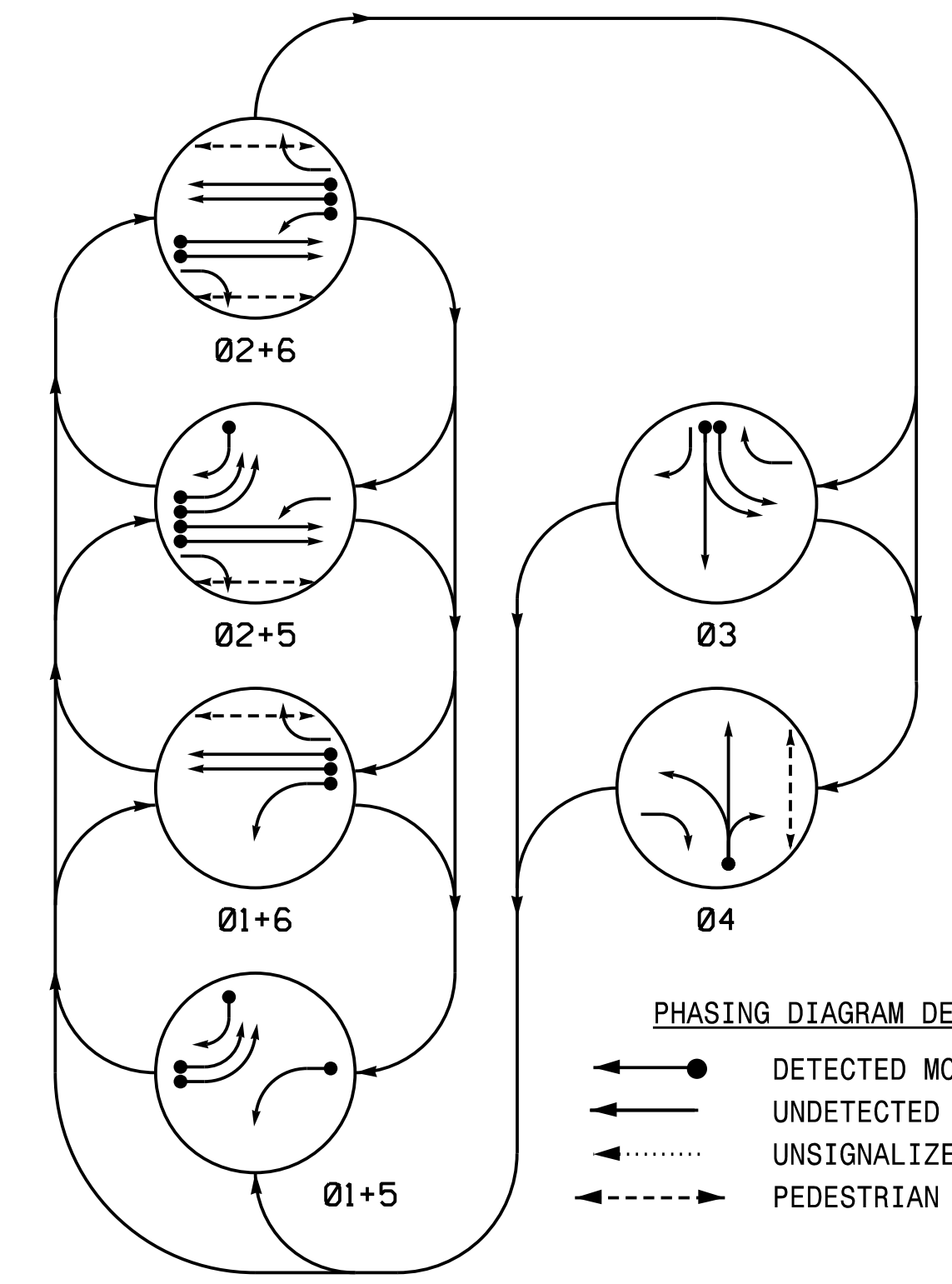
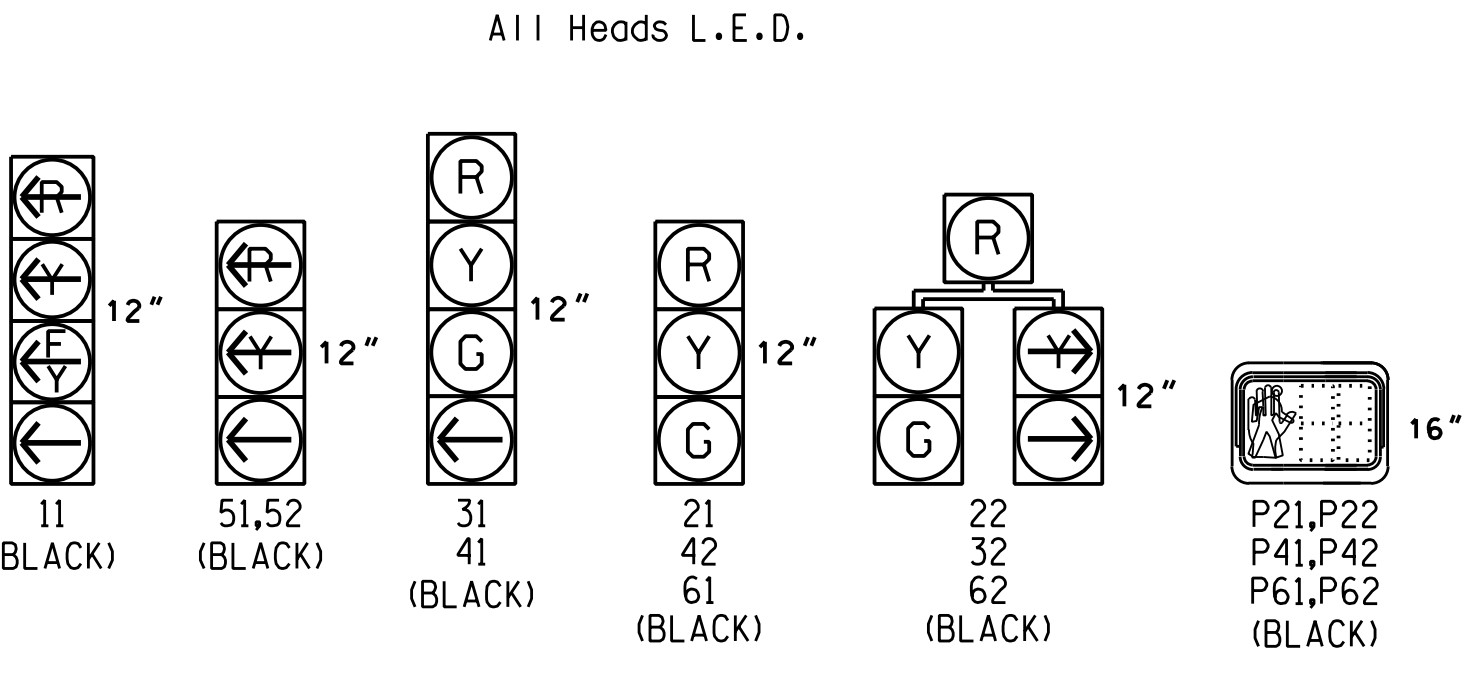


TABLE OF OPERATION

SIGNAL FACE	PHASE						FLASH
	01+5	01+6	02+5	02+6	03	04	
11	-	-	F	F	R	R	Y
21	R	R	G	G	R	R	Y
22	R	R	G	G	R	R	Y
31	R	R	R	R	G	R	R
32	R	R	R	R	G	R	R
41	R	R	R	R	R	G	R
42	R	R	R	R	R	G	R
51,52	-	R	-	R	R	R	-
61	R	G	R	G	R	R	Y
62	R	G	R	G	R	R	Y
P21,22	DW	DW	W	W	DW	DW	DRK
P41,42	DW	DW	DW	DW	DW	W	DRK
P61,62	DW	W	DW	W	DW	DW	DRK

SIGNAL FACE I.D.



OASIS 2070 LOOP & DETECTOR INSTALLATION CHART

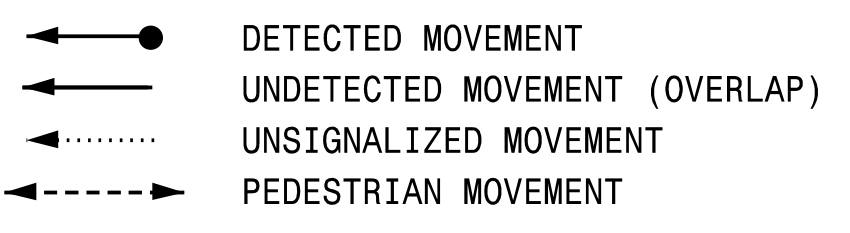
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	DETECTOR PROGRAMMING				SYSTEM LOOP	NEW CARD
					PHASE	CALLING	EXTENSION	FULL TIME DELAY		
1A	6X60	0	2-4-2	-	1	Y	Y	-	15	-
2A	6X6	300	4	-	2	Y	Y	-	-	-
2B	6X6	300	4	-	2	Y	Y	-	-	-
3A	6X40	0	2-4-2	-	3	Y	Y	-	3	-
3B	6X40	0	2-4-2	-	3	Y	Y	-	-	-
4A	6X40	0	2-4-2	-	4	Y	Y	-	10	-
5A	6X40	0	2-4-2	-	5	Y	Y	-	-	-
5B	6X40	0	2-4-2	-	5	Y	Y	-	-	-
5C	6X40	0	2-4-2	-	5	Y	Y	-	15	-
6A	6X6	300	6	-	6	Y	Y	-	-	-
6B	6X6	300	6	-	6	Y	Y	-	-	-
S1	6X6	+120	4	-	-	-	-	-	-	Y
S2	6X6	+120	4	-	-	-	-	-	-	Y
S3	6X6	+130	4	Y	-	-	-	-	-	Y
S4	6X6	+130	4	Y	-	-	-	-	-	Y

6 Phase Fully Actuated Asheville Signal System

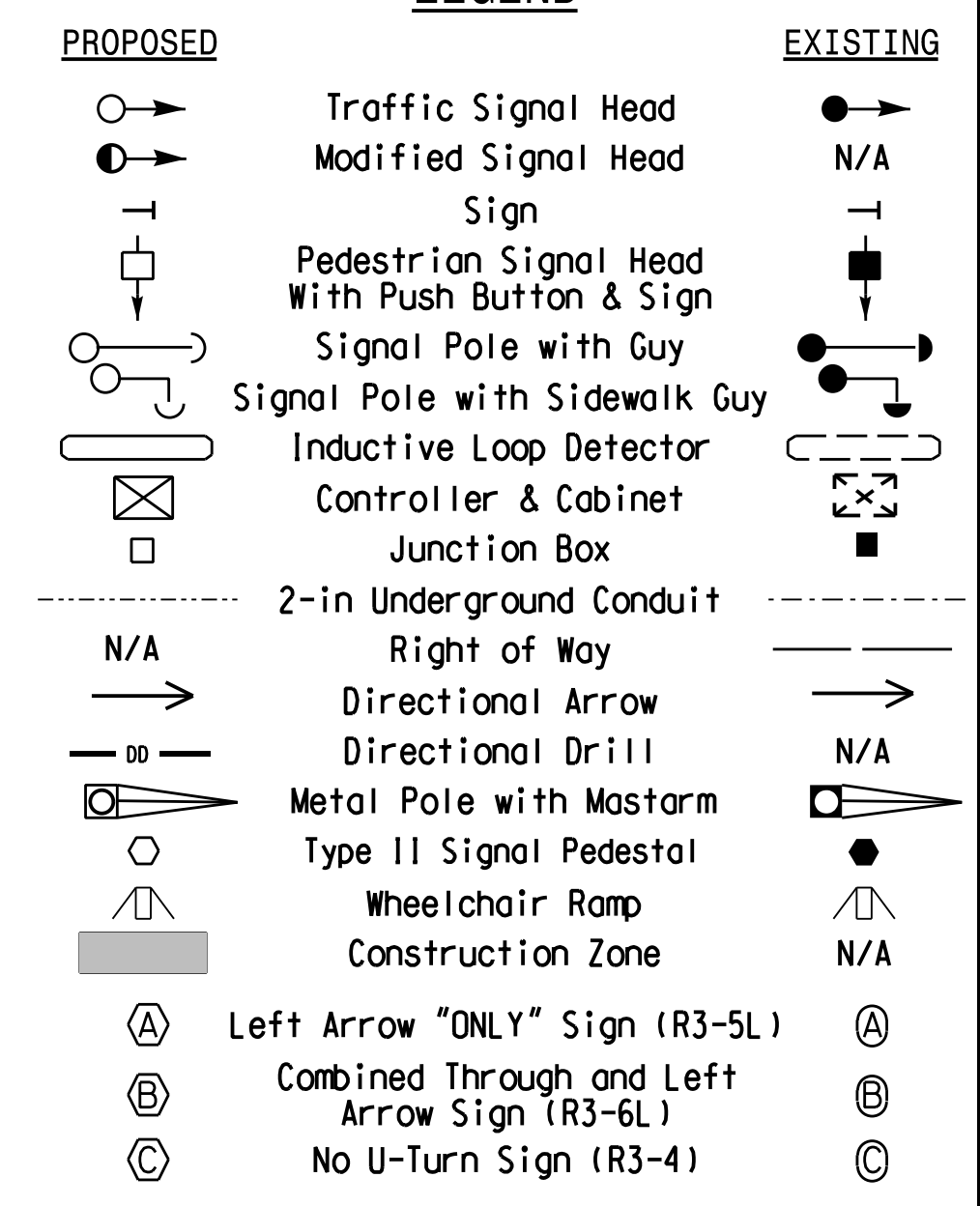
NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Phase 1 and/or 5 may be lagged.
- The order of phase 3 and phase 4 may be reversed.
- Set all detector units to presence mode.
- Remove bags and reconnect pedestrian signal heads numbered P61 and P62.
- Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
- Program pedestrian heads to countdown the flashing "DON'T WALK" time only.
- Refer to Pavement Marking Plans for proposed stop bar and crosswalk locations.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.

PHASING DIAGRAM DETECTION LEGEND



LEGEND



OASIS 2070 TIMING CHART

FEATURE	PHASE					
	1	2	3	4	5	6
Min Green 1 *	7	12	7	7	7	12
Extension 1 *	1.0	6.0	2.0	2.0	2.0	6.0
Max Green 1 *	15	100	30	20	15	100
Yellow Clearance	3.1	4.1	3.0	3.0	3.0	5.1
Red Clearance	3.2	1.6	3.4	3.3	3.3	1.5
Red Revert	2.0	2.0	2.0	2.0	2.0	2.0
Walk 1 *	-	7	-	7	-	7
Don't Walk 1	-	8	-	26	-	19
Seconds Per Actuation *	-	1.5	-	-	-	1.5
Max Variable Initial *	-	34	-	-	-	34
Time Before Reduction *	-	20	-	-	-	20
Time To Reduce *	-	30	-	-	-	30
Minimum Gap	-	3.0	-	-	-	3.0
Recall Mode	-	MIN RECALL	-	-	-	MIN RECALL
Vehicle Call Memory	-	YELLOW	-	-	-	YELLOW
Dual Entry	-	-	-	-	-	-
Simultaneous Gap	ON	ON	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.

Signal Upgrade
Temporary Design 4
Construction Phases 2C-4

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Division 13 Buncombe Co. Asheville
PLAN DATE: September 2018 REVIEWED BY: A.D. Klinksiek
PREPARED BY: A.H. Thornburg REVIEWED BY: N.R. Simmons

750 N. Greenfield Pkwy, Garner, NC 27529

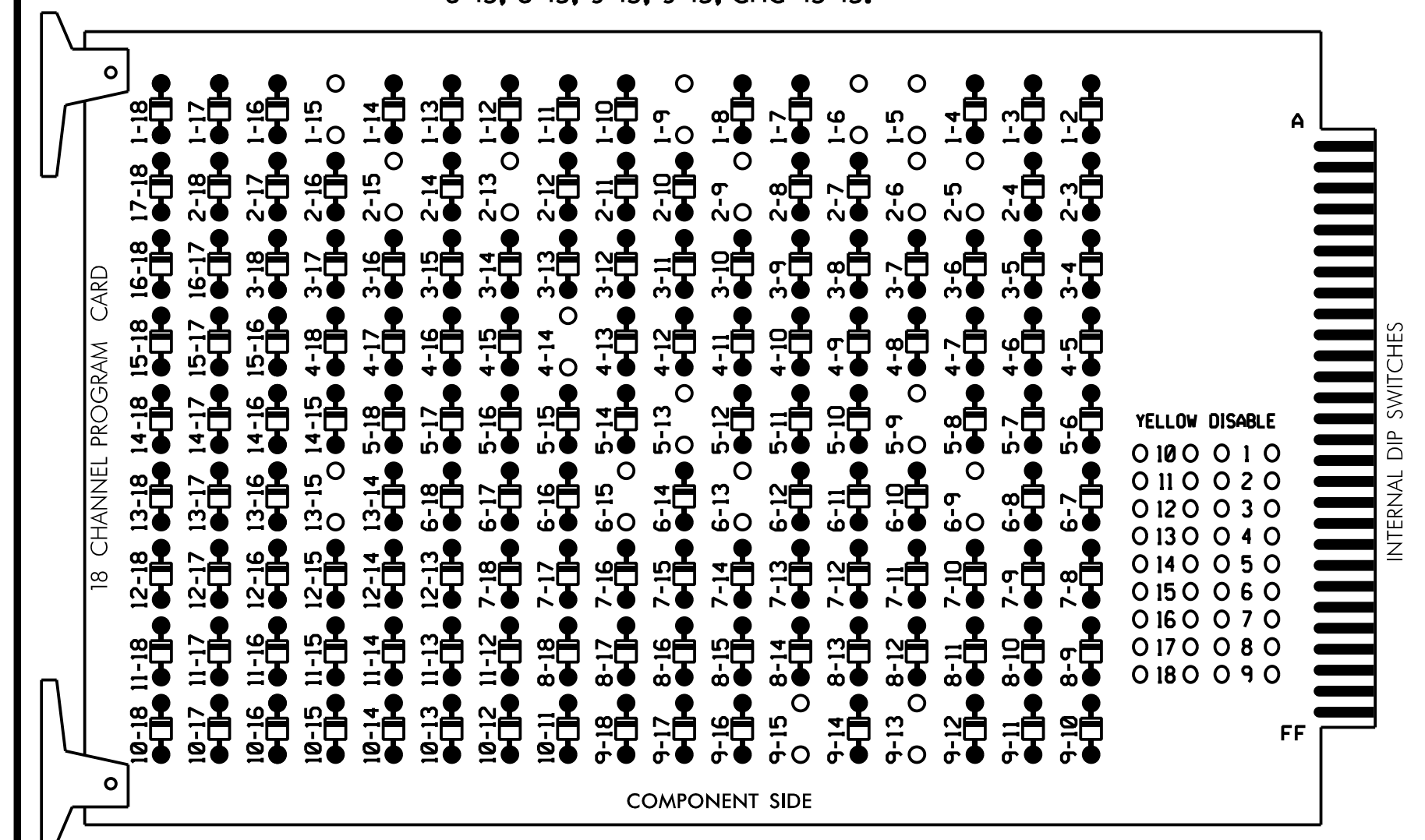
SEAL
NORTH CAROLINA
PROFESSIONAL
ENGINEER
SEAL
031464
NATASHA R. SIMMONS

DocuSigned by:
1/28/2019
Natasha R. Simmons
DATE

SIG. INVENTORY NO. 13-1126T4

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

REMOVE DIODE JUMPERS 1-5, 1-6, 1-9, 1-15, 2-5, 2-6, 2-9, 2-13, 2-15, 4-14, 5-9, 5-13, 6-9, 6-13, 6-15, 9-13, 9-15, and 13-15.



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.
- Integrate monitor with Ethernet network in cabinet.

■ = DENOTES POSITION OF SWITCH

NOTES

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

SIGNAL HEAD HOOK-UP CHART

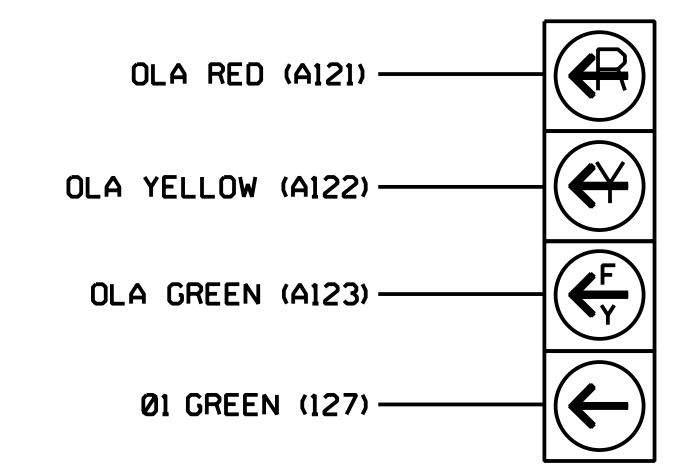
LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6	
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18	
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE	
SIGNAL HEAD NO.	11	21,22	P21, P22	31	32	62	22	41	42	P41, P42	32	51,52	61,62	P61, P62	NU	NU	NU	NU	
RED		128	116	116				101	101				134						
YELLOW	*	129	117	117				102	102				135						
GREEN		130	118	118				103	103				136						
RED ARROW													131					A121	
YELLOW ARROW					117	102							132	132					A122
FLASHING YELLOW ARROW																			A123
GREEN ARROW	127		118	118	103	103				133	133								
Hand			113							104									119
Walking			115							106									121

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

EQUIPMENT INFORMATION

CONTROLLER.....2070E
 CABINET.....332 W/AUX
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
 LOAD SWITCHES USED.....S1,S2,S3,S4,S5,S6,S7,S8,S9,AUX S1
 PHASES USED.....1,2,2 PED,3,4,4 PED,5,6,6 PED
 OVERLAP "A".....1+2
 OVERLAP "B".....NOT USED
 OVERLAP "C".....NOT USED
 OVERLAP "D".....NOT USED

FYA SIGNAL WIRING DETAIL
 (wire signal head as shown)



NOTE

The sequence display for signal head 11 requires special logic programming. See sheet 2 for programming instructions.

INPUT FILE POSITION LAYOUT
 (front view)

FILE	1	2	3	4	5	6	7	8	9	10	11	12	13	14
U	∅ 1	∅ 2	∅ 3	∅ 3	∅ 3	∅ 3	∅ 3	∅ 3	∅ 3	∅ 3	∅ 3	∅ 3	∅ 3	∅ 3
I	1A	2A	3A	3B	3A	3B	3A	3B	3A	3B	3A	3B	3A	3B
L	NOT USED	2B	NOT USED	4A	NOT USED	4A	NOT USED	4A	NOT USED	4A	NOT USED	4A	NOT USED	4A
U	∅ 5	∅ 5	∅ 6	∅ 6	∅ 6	∅ 6	∅ 6	∅ 6	∅ 6	∅ 6	∅ 6	∅ 6	∅ 6	∅ 6
J	5A	5B	6A	6A	6A	6A	6A	6A	6A	6A	6A	6A	6A	6A
L	NOT USED	5C	6B	6B	6B	6B	6B	6B	6B	6B	6B	6B	6B	6B

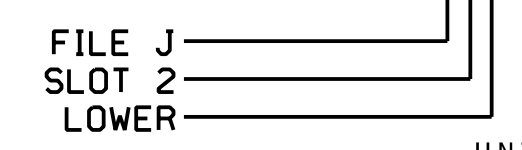
EX.: 1A, 2A, ETC. = LOOP NO.'S
 FS = FLASH SENSE
 ST = STOP TIME

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
1A	TB2-1,2	11U	56	18	1	1	Y	Y			15
2A	TB2-5,6	12U	39	1	2	2	Y	Y	Y		3
2B	TB2-7,8	12L	43	5	12	2	Y	Y			
3A	TB4-5,6	15U	58	20	3	3	Y	Y			3
3B	TB4-9,10	16U	41	3	4	3	Y	Y			
4A	TB4-11,12	16L	45	7	14	4	Y	Y			10
5A	TB3-1,2	11U	55	17	5	5	Y	Y			
5B	TB3-5,6	12U	40	2	6	5	Y	Y			
5C	TB3-7,8	12L	44	6	16	5	Y	Y			15
6A	TB3-9,10	13U	64	26	36	6	Y	Y			
6B	TB3-11,12	13L	77	39	46	6	Y	Y			
* S1	TB6-9,10	19U	60	22	11	SYS					
* S2	TB6-11,12	19L	62	24	13	SYS					
* S3	TB7-9,10	19U	59	21	15	SYS					
* S4	TB7-11,12	19L	61	23	17	SYS					

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

* Add jumper from I1-W to J4-W, on rear of input file.
 * System detector only. Remove the vehicle phase assigned to this detector in the default programming.
 INPUT FILE POSITION LEGEND: J2L



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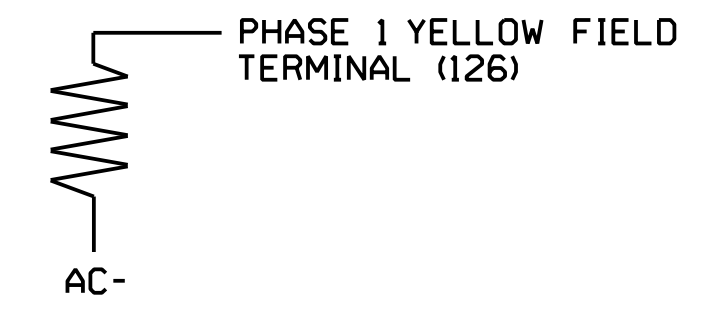
COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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: 13-1126T4
 DESIGNED: September 2018
 SEALED: 1/28/2019
 REVISED: N/A

LOAD RESISTOR INSTALLATION DETAIL
 (install resistor as shown below)

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



Electrical Detail - Sheet 1 of 2
 Signal Upgrade
 Temporary Design 4

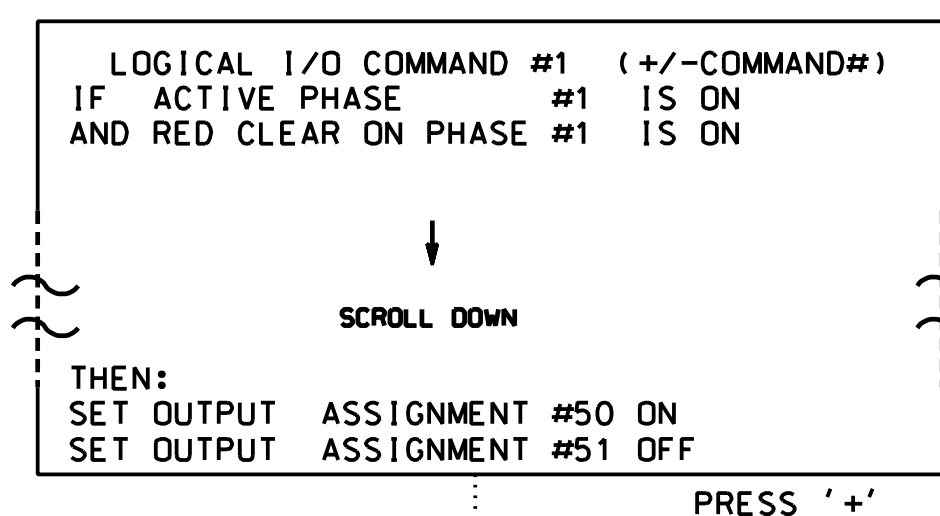
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Prepared for: **UNIVERSITY OF NORTH CAROLINA**
 Division 13, Buncombe Co., Asheville
 NC 146 (Long Shoals Road) at Schenck Parkway / Skyland Inn Drive
 PLAN DATE: September 2018 REVIEWED BY: A.D. Klinksiek
 PREPARED BY: A.H. Thornburg REVIEWED BY: N.R. Simmons
 REVISIONS: _____ INITI. _____ DATE _____
 DocuSigned by: **Natasha R. Simmons** 1/28/2019
 PREPARED BY: _____ DATE _____
 SIGNATURE: _____
 SIG. INVENTORY NO. 13-1126T4

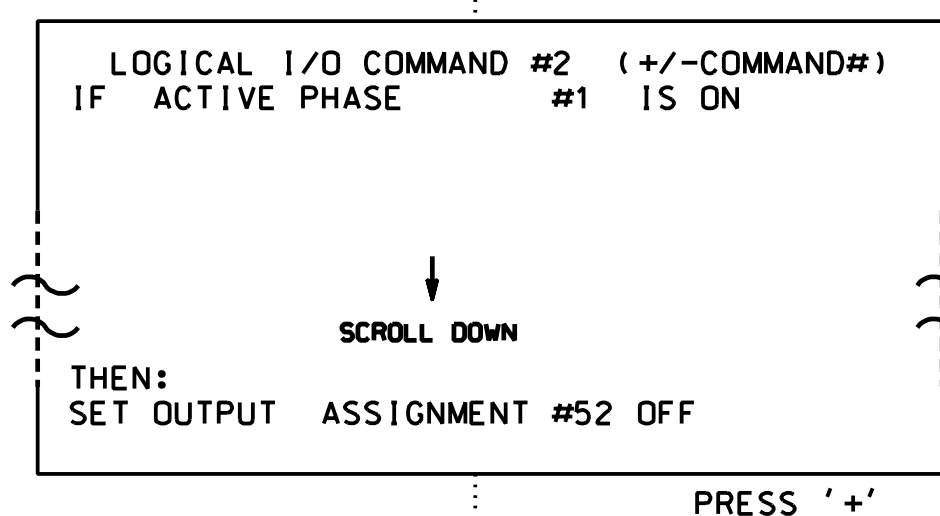
LOGICAL I/O PROCESSOR PROGRAMMING DETAIL TO PRODUCE SPECIAL FYA-PPLT SIGNAL SEQUENCE

(program controller as shown below)

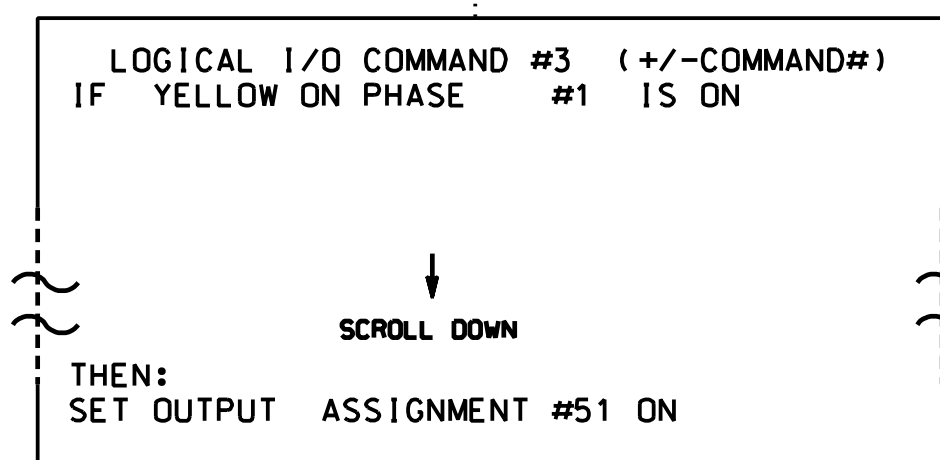
- FROM MAIN MENU PRESS '2' (PHASE CONTROL), THEN '1' (PHASE CONTROL FUNCTIONS). SCROLL TO THE BOTTOM OF THE MENU AND ENABLE ACT LOGIC COMMANDS 1, 2, and 3.
- FROM MAIN MENU PRESS '6' (OUTPUTS), THEN '3' (LOGICAL I/O PROCESSOR).



NOTE: LOGIC FOR PHASE 1 RED CLEAR WHEN TRANSITIONING FROM PHASE 1 TO PHASE 2 (HEAD 11).



NOTE: LOGIC FOR SWITCHING FLASHING YELLOW ARROW OFF DURING PHASE 1 (HEAD 11).



NOTE: LOGIC FOR YELLOW ARROW CLEARANCE FROM PHASE 1 (HEAD 11).

LOGIC I/O PROCESSOR PROGRAMMING COMPLETE

OUTPUT REFERENCE SCHEDULE	
USE TO INTERPRET LOGIC PROCESSOR	
OUTPUT 50 =	Overlap A Red
OUTPUT 51 =	Overlap A Yellow
OUTPUT 52 =	Overlap A Green

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: :XX
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


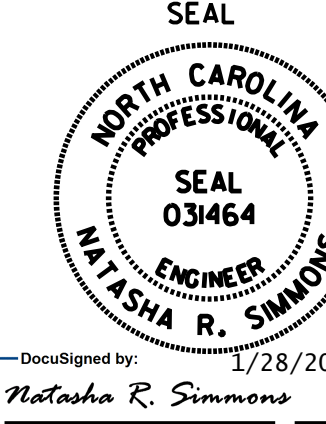
OVERLAP PROGRAMMING COMPLETE

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 13-1126T4
DESIGNED: September 2018
SEALED: 1/28/2019
REVISED: N/A

Electrical Detail - Sheet 2 of 2
Signal Upgrade
Temporary Design 4

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750 N. Greenfield Pkwy, Corner, NC 27529	REVISIONS INIT. DATE	DocuSigned by: Natasha R. Simmons 1/28/2019
		SIG. INVENTORY NO. 13-1126T4

PHASING DIAGRAM

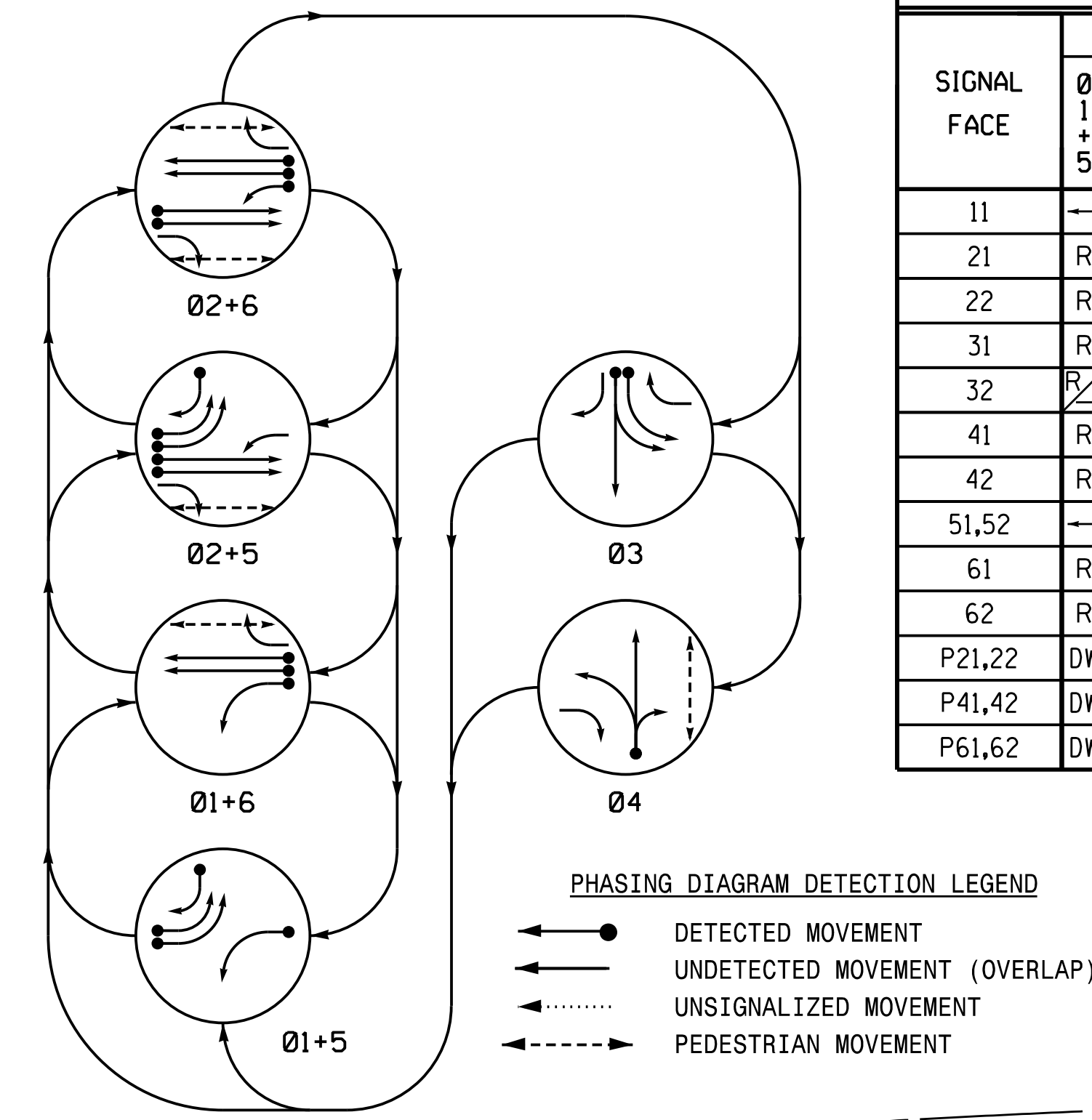
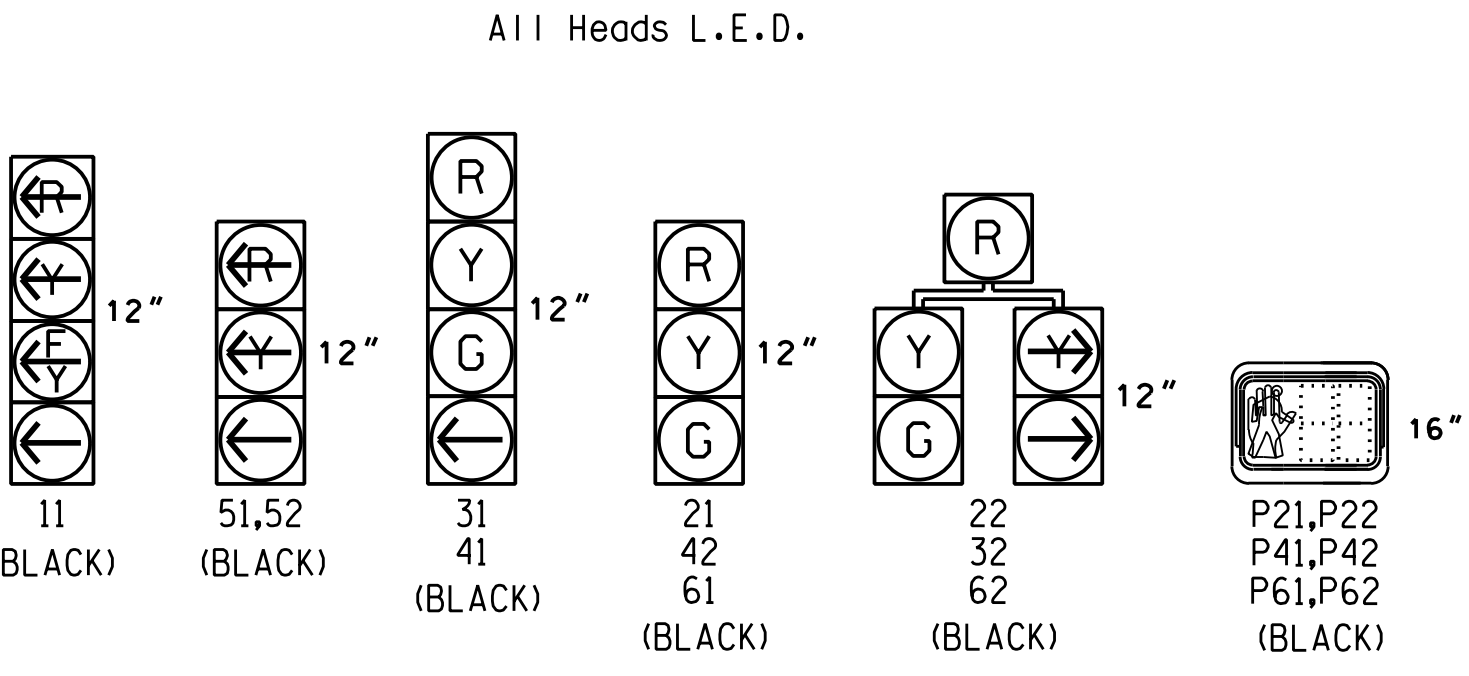


TABLE OF OPERATION

SIGNAL FACE	PHASE						FLASH
	01+5	01+6	02+5	02+6	03	04	
11	-	-	-	-	-	-	-
21	R	R	G	G	R	R	Y
22	R	R	G	G	R	R	Y
31	R	R	R	R	G	R	R
32	R	R	R	R	G	R	R
41	R	R	R	R	R	G	R
42	R	R	R	R	R	G	R
51,52	-	-	-	-	-	-	-
61	R	G	R	G	R	R	Y
62	R	G	R	G	R	R	Y
P21,22	DW	DW	W	W	DW	DW	DRK
P41,42	DW	DW	DW	DW	DW	W	DRK
P61,62	DW	W	DW	W	DW	DW	DRK

SIGNAL FACE I.D.



OASIS 2070 LOOP & DETECTOR INSTALLATION CHART

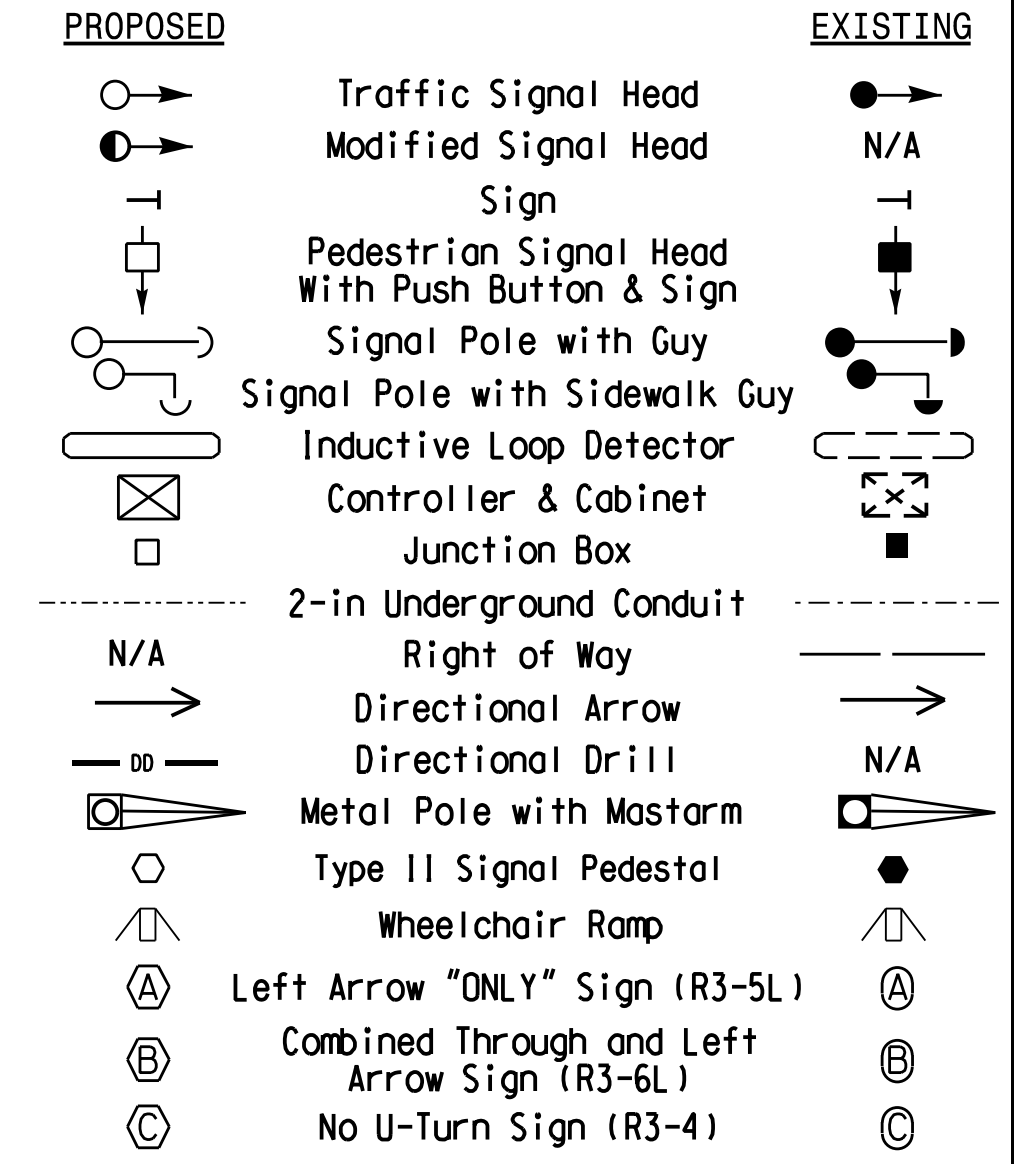
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	DETECTOR PROGRAMMING				SYSTEM LOOP	NEW CARD
					PHASE	CALLING	EXTENSION	FULL TIME DELAY		
1A	6X60	0	2-4-2	-	1	Y	Y	-	15	-
2A	6X6	300	4	-	2	Y	Y	-	-	-
2B	6X6	300	4	-	2	Y	Y	-	-	-
3A	6X40	0	2-4-2	-	3	Y	Y	-	3	-
3B	6X40	0	2-4-2	-	3	Y	Y	-	-	-
4A	6X40	0	2-4-2	-	4	Y	Y	-	10	-
5A	6X40	0	2-4-2	-	5	Y	Y	-	-	-
5B	6X40	0	2-4-2	-	5	Y	Y	-	-	-
5C	6X40	0	2-4-2	-	5	Y	Y	-	15	-
6A	6X6	300	6	-	6	Y	Y	-	-	-
6B	6X6	300	6	-	6	Y	Y	-	-	-
S1	6X6	+120	4	-	-	-	-	-	-	Y
S2	6X6	+120	4	-	-	-	-	-	-	Y
S3	6X6	+130	4	-	-	-	-	-	-	Y
S4	6X6	+130	4	-	-	-	-	-	-	Y

6 Phase Fully Actuated Asheville Signal System

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 5 may be lagged.
4. The order of phase 3 and phase 4 may be reversed.
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. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.

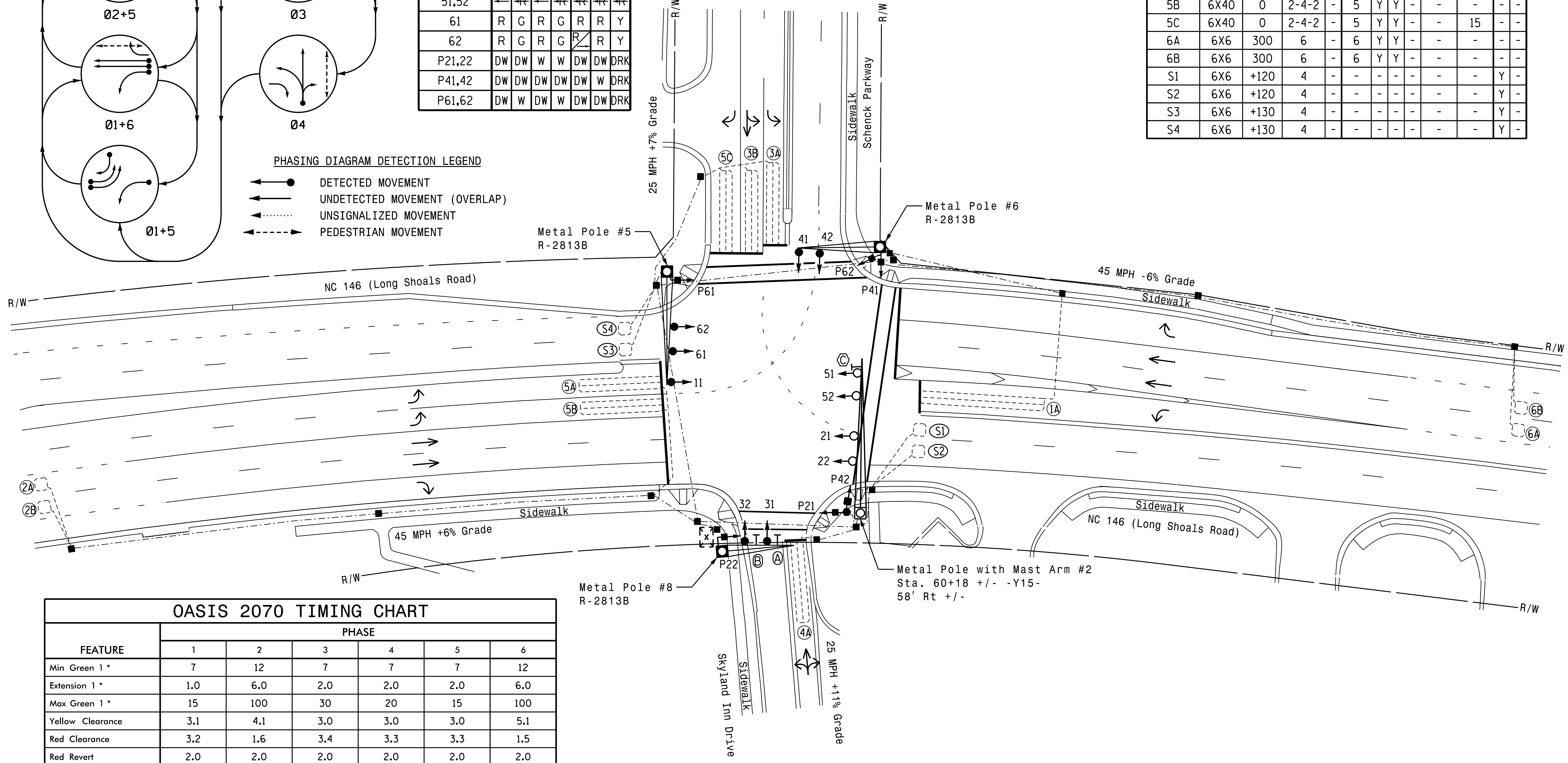
LEGEND



OASIS 2070 TIMING CHART

FEATURE	PHASE					
	1	2	3	4	5	6
Min Green 1*	7	12	7	7	7	12
Extension 1*	1.0	6.0	2.0	2.0	2.0	6.0
Max Green 1*	15	100	30	20	15	100
Yellow Clearance	3.1	4.1	3.0	3.0	3.0	5.1
Red Clearance	3.2	1.6	3.4	3.3	3.3	1.5
Red Revert	2.0	2.0	2.0	2.0	2.0	2.0
Walk 1*	-	7	-	7	-	7
Don't Walk 1	-	8	-	26	-	19
Seconds Per Actuation*	-	1.5	-	-	-	1.5
Max Variable Initial*	-	34	-	-	-	34
Time Before Reduction*	-	20	-	-	-	20
Time To Reduce*	-	30	-	-	-	30
Minimum Gap	-	3.0	-	-	-	3.0
Recall Mode	-	MIN RECALL	-	-	-	MIN RECALL
Vehicle Call Memory	-	YELLOW	-	-	-	YELLOW
Dual Entry	-	-	-	-	-	-
Simultaneous Gap	ON	ON	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.



Signal Upgrade - Final Design

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Raleigh, North Carolina 27609
NC License No: C-1554
(919) 546-8997

NC 146 (Long Shoals Road) at Schenck Parkway / Skyland Inn Drive

Division 13 Buncombe Co. Asheville

PLAN DATE: September 2018 REVIEWED BY: A.D. Klinskiesk

PREPARED BY: A.H. Thornburg REVIEWED BY: N.R. Simmons

750 N. Greenfield Pkwy, Garner, NC 27525

SEAL

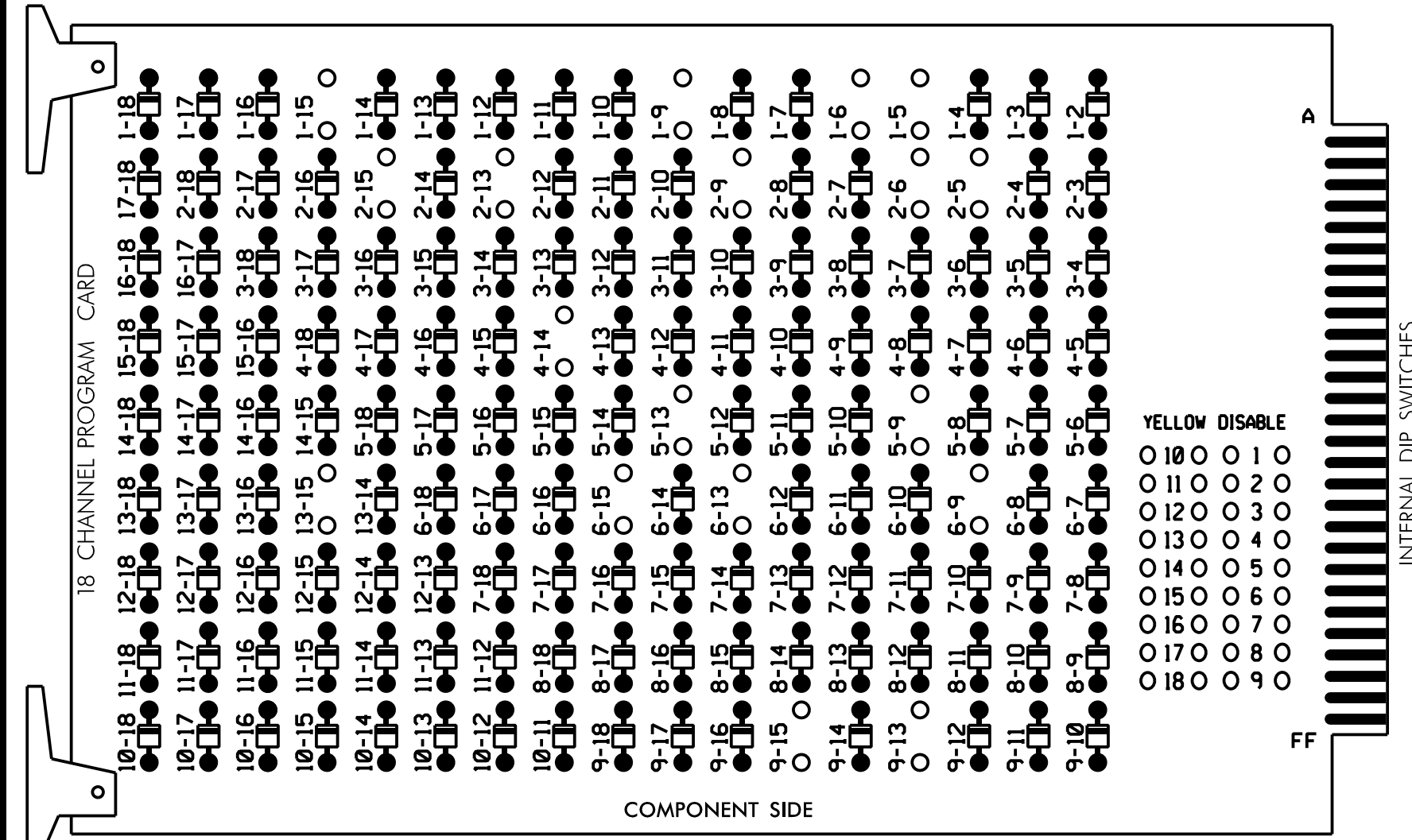
DocuSigned by:
Natasha R. Simmons
1/28/2019

REVISIONS	INIT.	DATE

DATE: 1/28/2019
SIG. INVENTORY NO. 13-1126

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

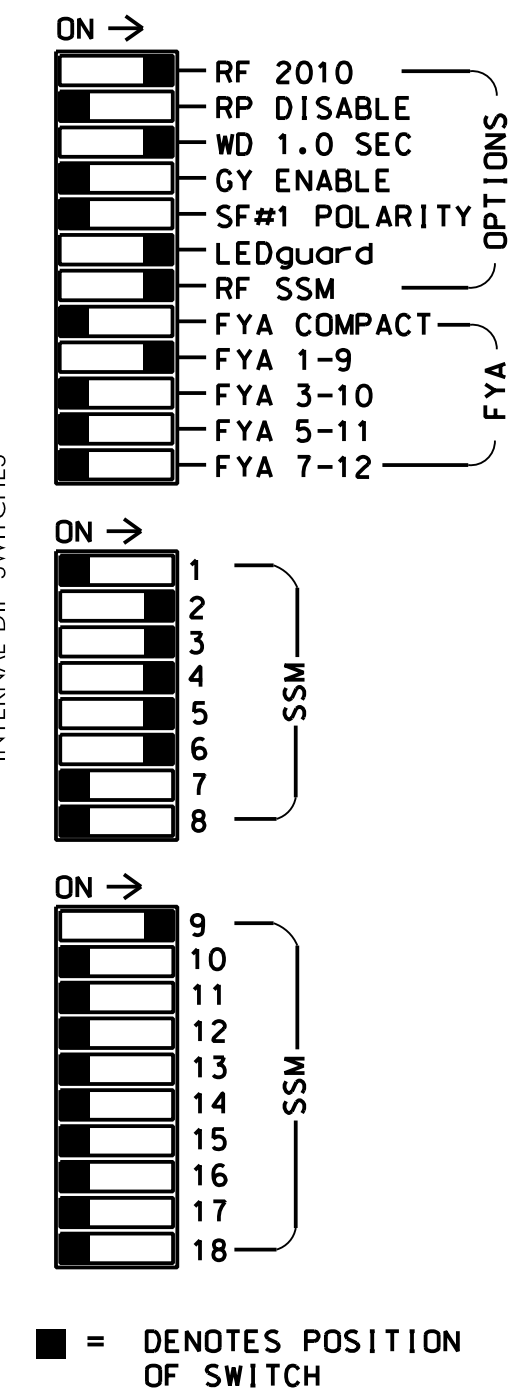
REMOVE DIODE JUMPERS 1-5, 1-6, 1-9, 1-15, 2-5, 2-6, 2-9, 2-13, 2-15, 4-14, 5-9, 5-13, 6-9, 6-13, 6-15, 9-13, 9-15, and 13-15.



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.
- Integrate monitor with Ethernet network in cabinet.



NOTES

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

SIGNAL HEAD HOOK-UP CHART

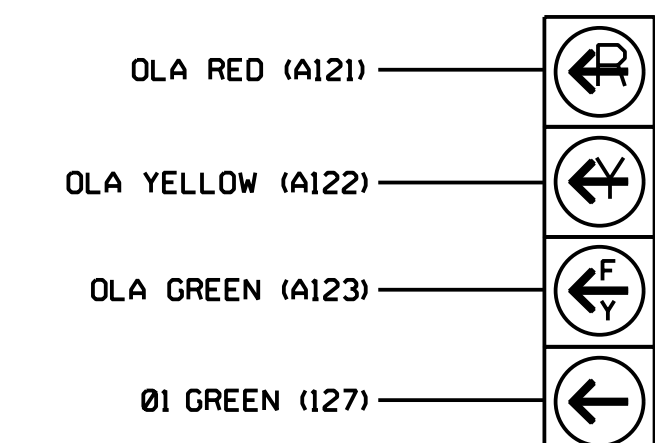
LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6	
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18	
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE	
SIGNAL HEAD NO.	11	21,22	P21, P22	31	32	62	22	41	42	P41, P42	32	51,52	61,62	P61, P62	NU	NU	NU	NU	
RED		128	116	116				101	101				134						
YELLOW	*	129	117	117				102	102				135						
GREEN		130	118	118				103	103				136						
RED ARROW													131					A121	
YELLOW ARROW					117	102							132	132					A122
FLASHING YELLOW ARROW																			A123
GREEN ARROW	127			118	118	103	103						133	133					
Hand				113									104						119
Walker				115									106						121

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

EQUIPMENT INFORMATION

CONTROLLER.....2070E
CABINET.....332 W/AUX
SOFTWARE.....ECONOLITE OASIS
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
LOAD SWITCHES USED.....S1,S2,S3,S4,S5,S6,S7,S8,S9,AUX S1
PHASES USED.....1,2,2 PED,3,4,4 PED,5,6,6 PED
OVERLAP "A".....1+2
OVERLAP "B".....NOT USED
OVERLAP "C".....NOT USED
OVERLAP "D".....NOT USED

FYA SIGNAL WIRING DETAIL
(wire signal head as shown)



NOTE

The sequence display for signal head 11 requires special logic programming. See sheet 2 for programming instructions.

INPUT FILE POSITION LAYOUT
(front view)

FILE	1	2	3	4	5	6	7	8	9	10	11	12	13	14
U	∅ 1	∅ 2	∅ 3	∅ 3	∅ 3	∅ 3	∅ 3	∅ 3	∅ 3	∅ 3	∅ 3	∅ 3	∅ 3	∅ 3
I	1A	2A	3A	3B	3A	3B	3A	3B	3A	3B	3A	3B	3A	3B
L	NOT USED	2B	NOT USED	4A	NOT USED	4A	NOT USED	4A	NOT USED	4A	NOT USED	4A	NOT USED	4A
U	∅ 5	∅ 5	∅ 6	∅ 6	∅ 6	∅ 6	∅ 6	∅ 6	∅ 6	∅ 6	∅ 6	∅ 6	∅ 6	∅ 6
J	5A	5B	6A	6B	5A	5B	6A	6B	5A	5B	6A	6B	5A	5B
L	NOT USED	5C	6C	6C	NOT USED	5C	6C	6C	NOT USED	5C	6C	6C	NOT USED	5C

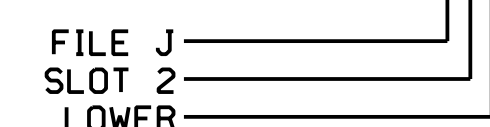
EX.: 1A, 2A, ETC. = LOOP NO.'S
FS = FLASH SENSE
ST = STOP TIME
⊗ Wired Input - Do not populate slot with detector card

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
1A	TB2-1,2	11U	56	18	1	1	Y	Y			15
2A	TB2-5,6	J4U	48	10	26	6	Y	Y	Y		3
2B	TB2-7,8	I2L	43	5	12	2	Y	Y			
3A	TB4-5,6	I5U	58	20	3	3	Y	Y			3
3B	TB4-9,10	I6U	41	3	4	3	Y	Y			
4A	TB4-11,12	I6L	45	7	14	4	Y	Y			10
5A	TB3-1,2	J1U	55	17	5	5	Y	Y			
5B	TB3-5,6	J2U	40	2	6	5	Y	Y			
5C	TB3-7,8	J2L	44	6	16	5	Y	Y			15
6A	TB3-9,10	J3U	64	26	36	6	Y	Y			
6B	TB3-11,12	J3L	77	39	46	6	Y	Y			
* S1	TB6-9,10	I9U	60	22	11	SYS					
* S2	TB6-11,12	I9L	62	24	13	SYS					
* S3	TB7-9,10	J9U	59	21	15	SYS					
* S4	TB7-11,12	J9L	61	23	17	SYS					
PED PUSH BUTTONS											
P21,P22	TB8-4,6	I12U	67	29	PED 2	2 PED					
P41,P42	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.

* Add jumper from I1-W to J4-W, on rear of input file.
* System detector only. Remove the vehicle phase assigned to this detector in the default programming.
INPUT FILE POSITION LEGEND: J2L



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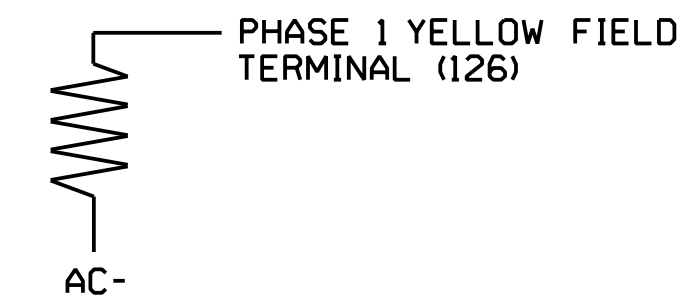
COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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: 13-1126
DESIGNED: September 2018
SEALED: 1/28/2019
REVISED: N/A

LOAD RESISTOR INSTALLATION DETAIL
(install resistor as shown below)

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



Electrical Detail - Sheet 1 of 2
Signal Upgrade

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Prepared for: **UNIVERSITY OF NORTH CAROLINA**
Department of Transportation, Mobility and Safety Division
750 N. Greenfield Pkwy, Corner, NC 27529

NC 146 (Long Shoals Road) at Schenck Parkway / Skyland Inn Drive

Division 13 Buncombe Co. Asheville

PLAN DATE: September 2018 REVIEWED BY: A.D. Klinksiek
PREPARED BY: A.H. Thornburg REVIEWED BY: N.R. Simmons

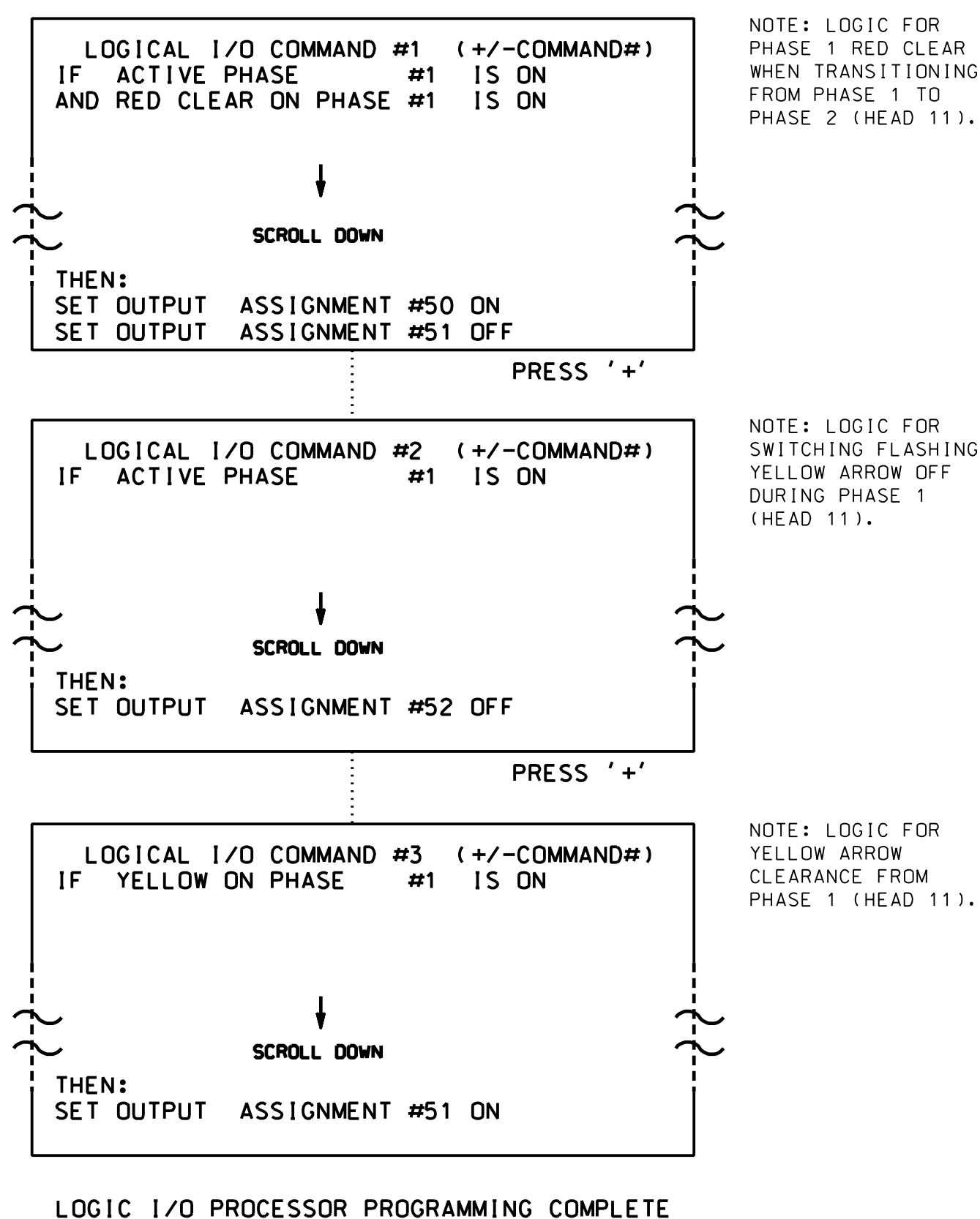
REVISIONS: _____ INITI. DATE _____

DocuSigned by: **Natasha R. Simmons** 1/28/2019
SEAL 031464
NATASHA R. SIMMONS
DATE _____
SIG. INVENTORY NO. 13-1126

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 50 =	Overlap A Red
OUTPUT 51 =	Overlap A Yellow
OUTPUT 52 =	Overlap A Green

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: :XX
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: 13-1126
DESIGNED: September 2018
SEALED: 1/28/2019
REVISED: N/A

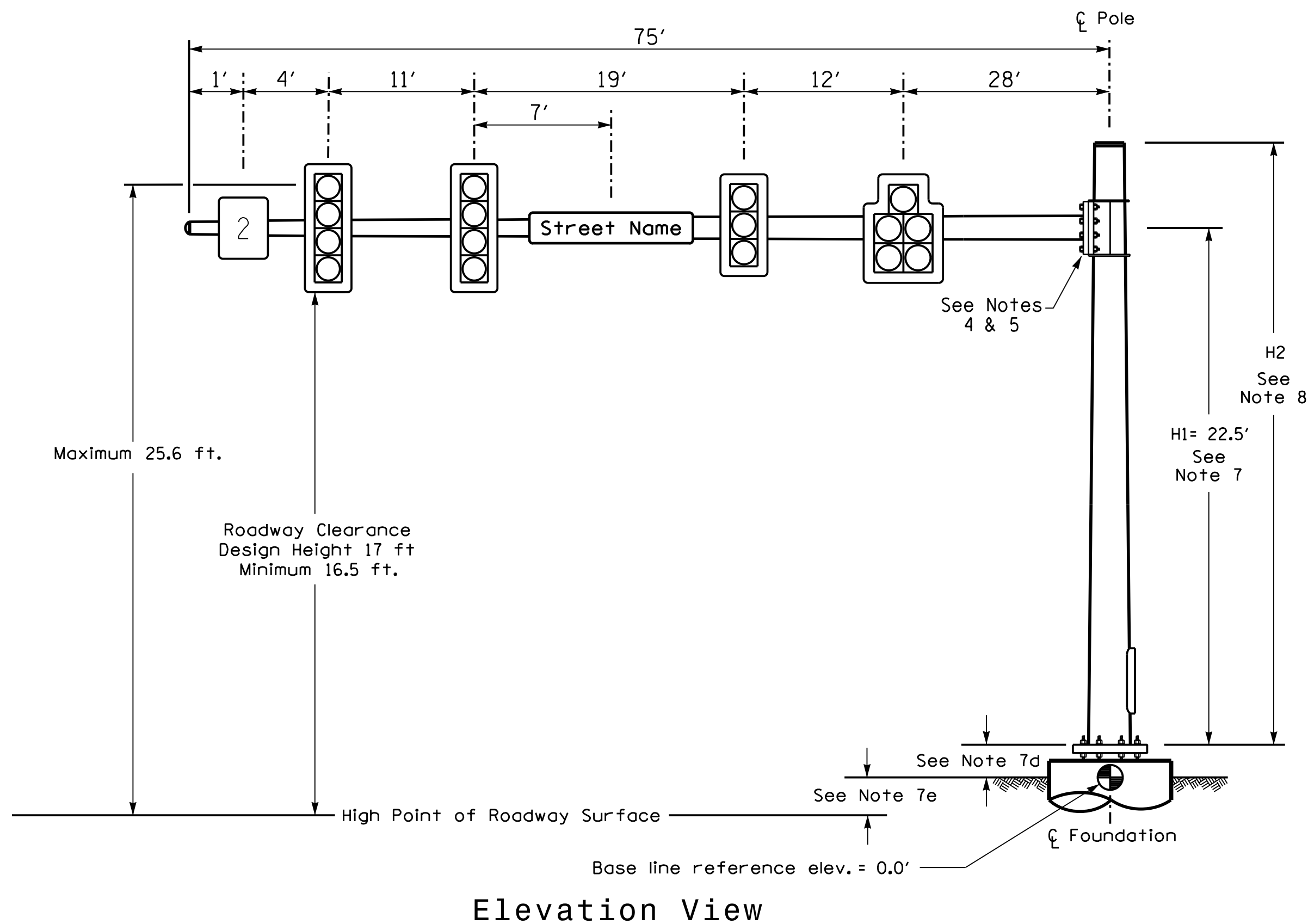
Electrical Detail - Sheet 2 of 2
Signal Upgrade

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(919) 546-8997

	Prepared for: NC 146 (Long Shoals Road) at Schenck Parkway / Skyland Inn Drive	Division 13 Buncombe Co. Asheville PLAN DATE: September 2018 REVIEWED BY: A.D. Klinksiek PREPARED BY: A.H. Thornburg REVIEWED BY: N.R. Simmons	SEAL
	REVISIONS INIT. DATE		

Design Loading for METAL POLE NO. 2



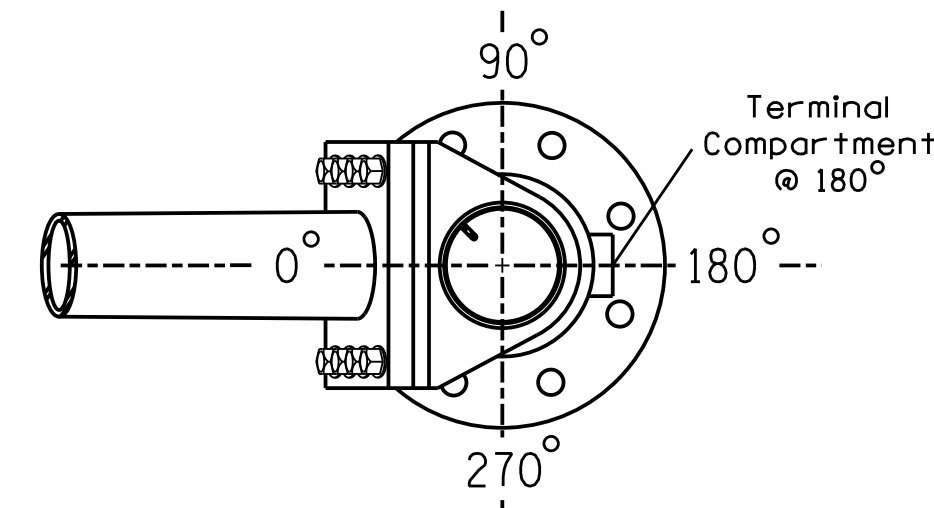
Elevation View

SPECIAL NOTE

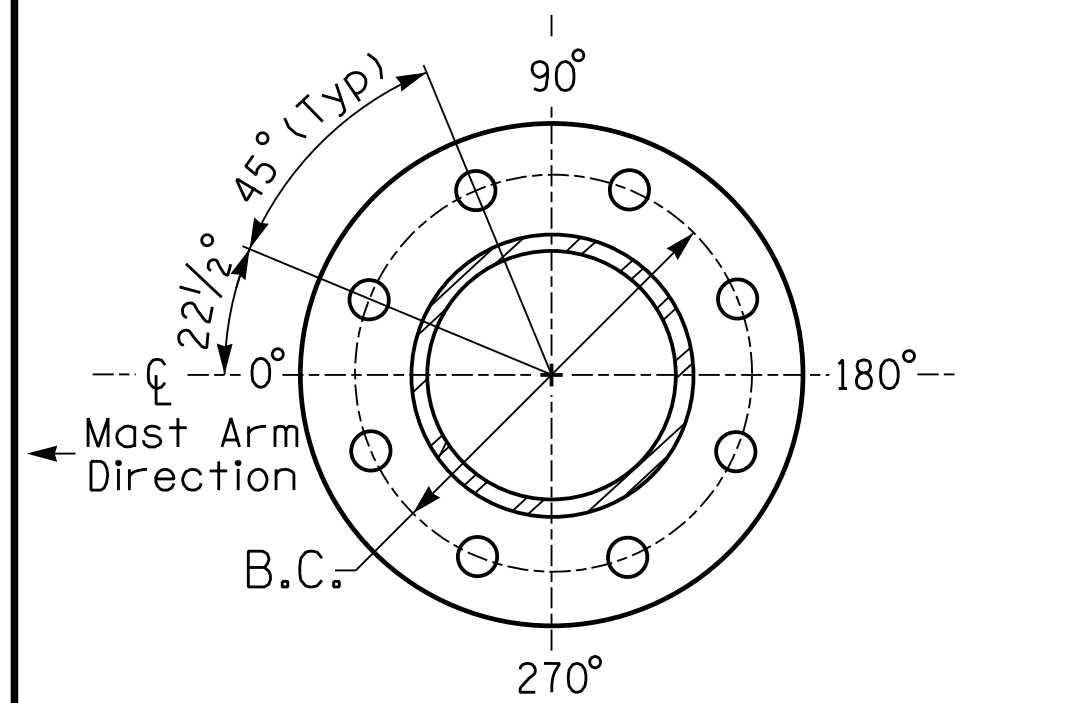
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 2	
Baseline reference point at ϕ Foundation @ ground level	0.0 ft.	
Elevation difference at High point of roadway surface	+3.47 ft.	
Elevation difference at Edge of travelway or face of curb	+0.34 ft.	

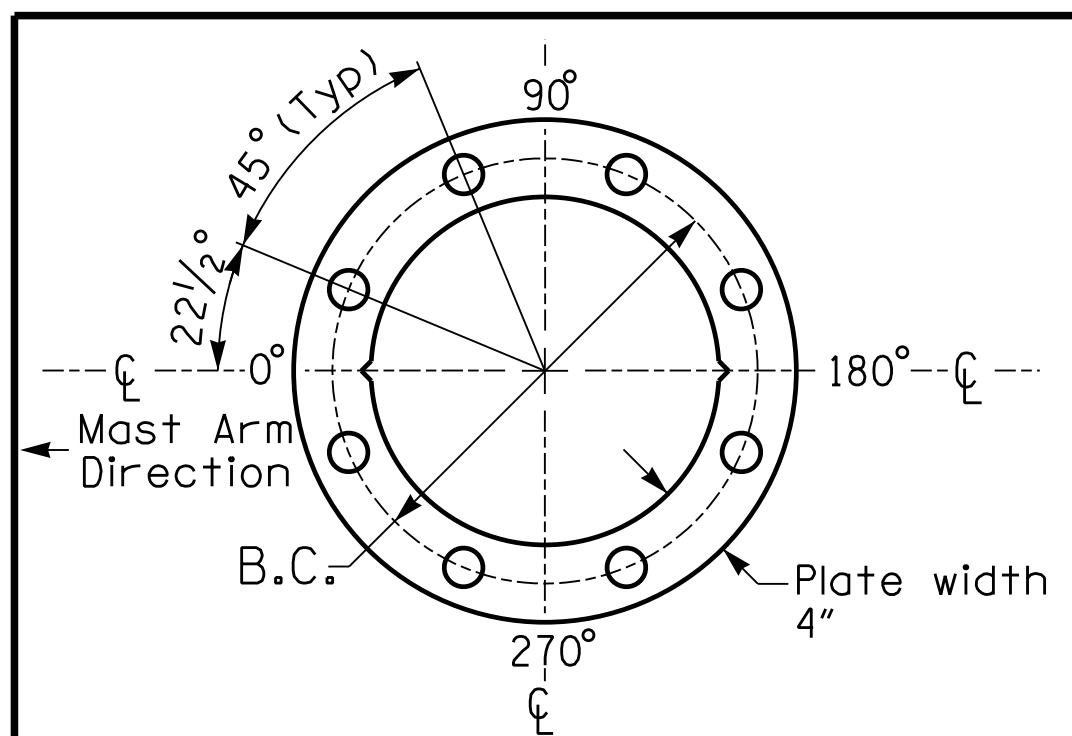


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



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



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METAL POLE No. 2

PROJECT REFERENCE NO.	SHEET NO.
I-4700	Fig. 7.3

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	RIGID MOUNTED SIGNAL HEAD 12"-5 SECTION-WITH BACKPLATE	16.3 S.F.	42.0" W X 56.0" L	103 LBS
	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
	SIGN RIGID MOUNTED	7.5 S.F.	30.0" W X 36.0" L	14 LBS
	STREET NAME SIGN RIGID MOUNTED	16.0 S.F.	24.0" W X 96.0" L	36 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.
- The camber design for the mast arm deflection should provide an appearance of a low pitched arch where the tip or the free end of the mast arm does not deflect below horizontal when fully loaded.
- 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:
 - Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
 - 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.
- 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 in color as specified in the project special provisions.

NCDOT Wind Zone 4 (90 mph)

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 Prepared For: TRANSPORTATION MOBILITY AND SAFETY DIVISION DIVISION OF TRANSPORTATION SIGNAL DESIGN SECTION 750 N. Greenfield Pkwy, Garner, NC 27529	NC 146 (Long Shoals Road) at Schenck Parkway / Skyland Inn Drive		SEAL N. R. SIMMONS ENGINEER
	Division 13 Buncombe Co. Asheville PLAN DATE: September 2018 REVIEWED BY: A.D. Klinsky PREPARED BY: A.H. Thornburg REVIEWED BY: N.R. Simmons	DATE: 1/28/2019 SIGNATURE: Natasha R. Simmons DATE: _____ SIGNATURE: _____ DATE: _____	

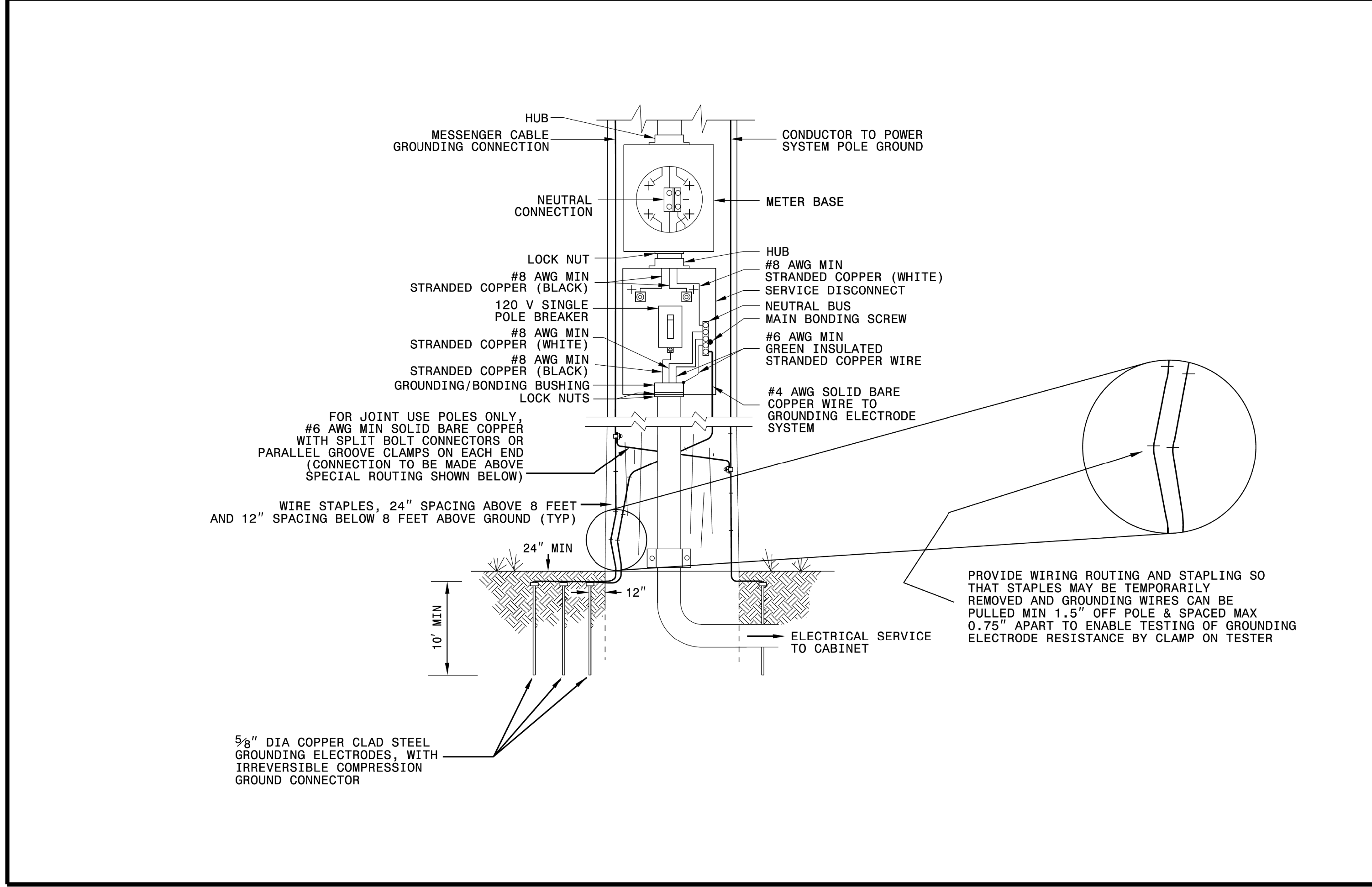
DocuSigned by:
Natasha R. Simmons
1/28/2019
DATE

SIG. INVENTORY NO. 13-1126

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

ENGLISH STANDARD DRAWING FOR
ELECTRICAL SERVICE GROUNDING
GROUNDING AND BONDING

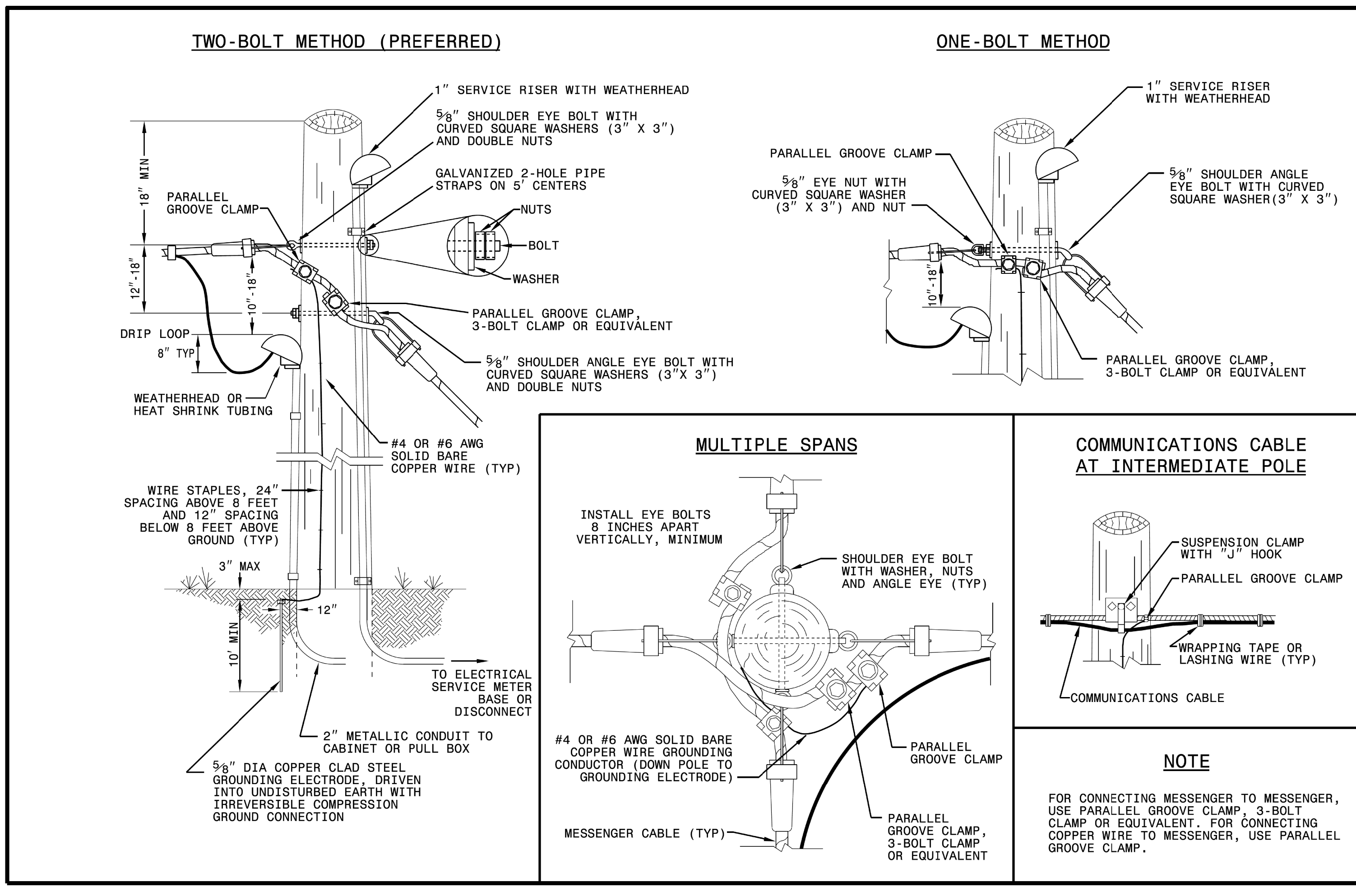
SHEET 1 OF 1
1700D01



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

ENGLISH STANDARD DRAWING FOR
WOOD POLES
METHODS OF ATTACHMENT AND GROUNDING

SHEET 1 OF 1
1720D01

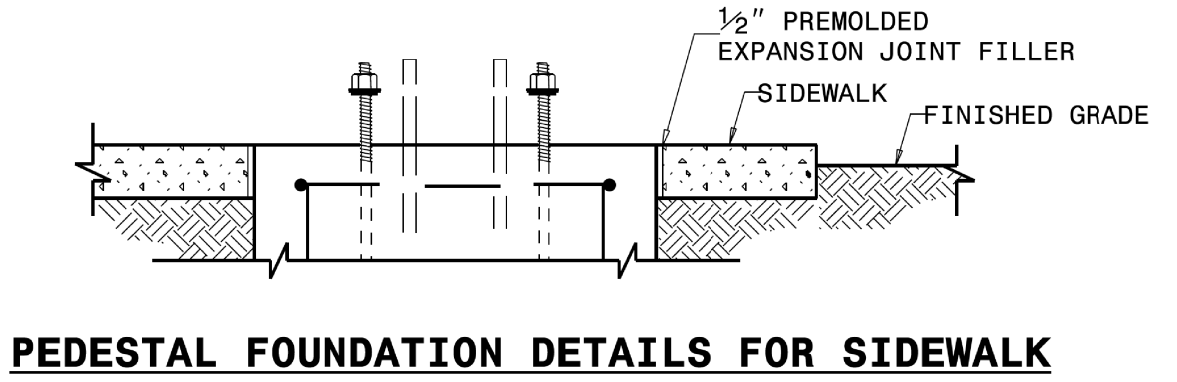
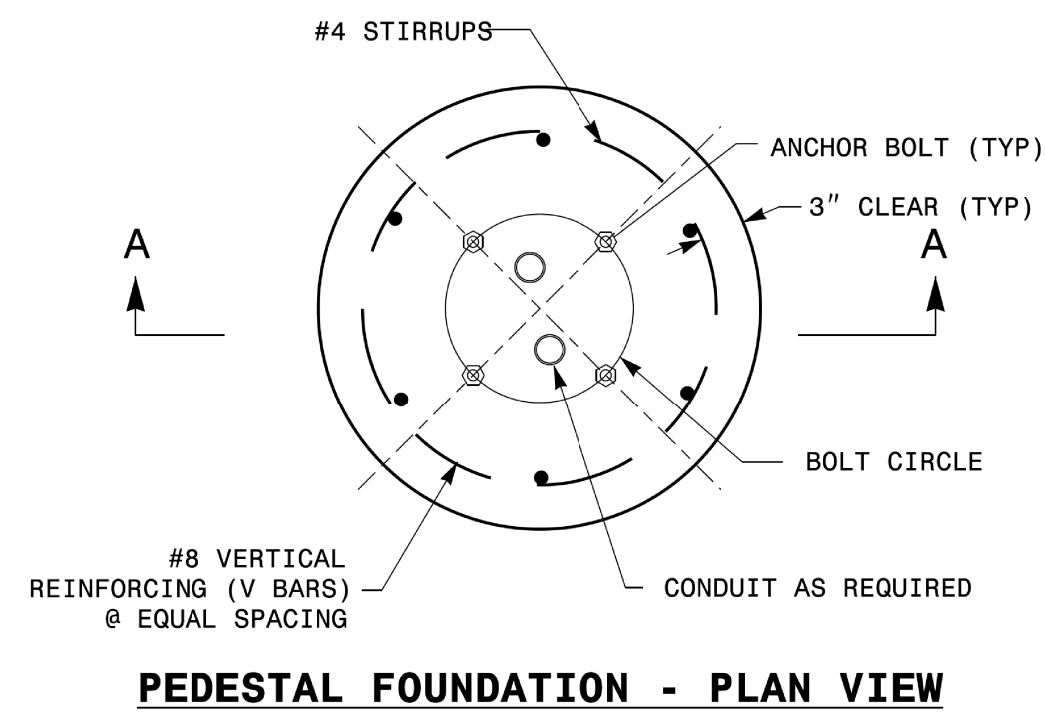


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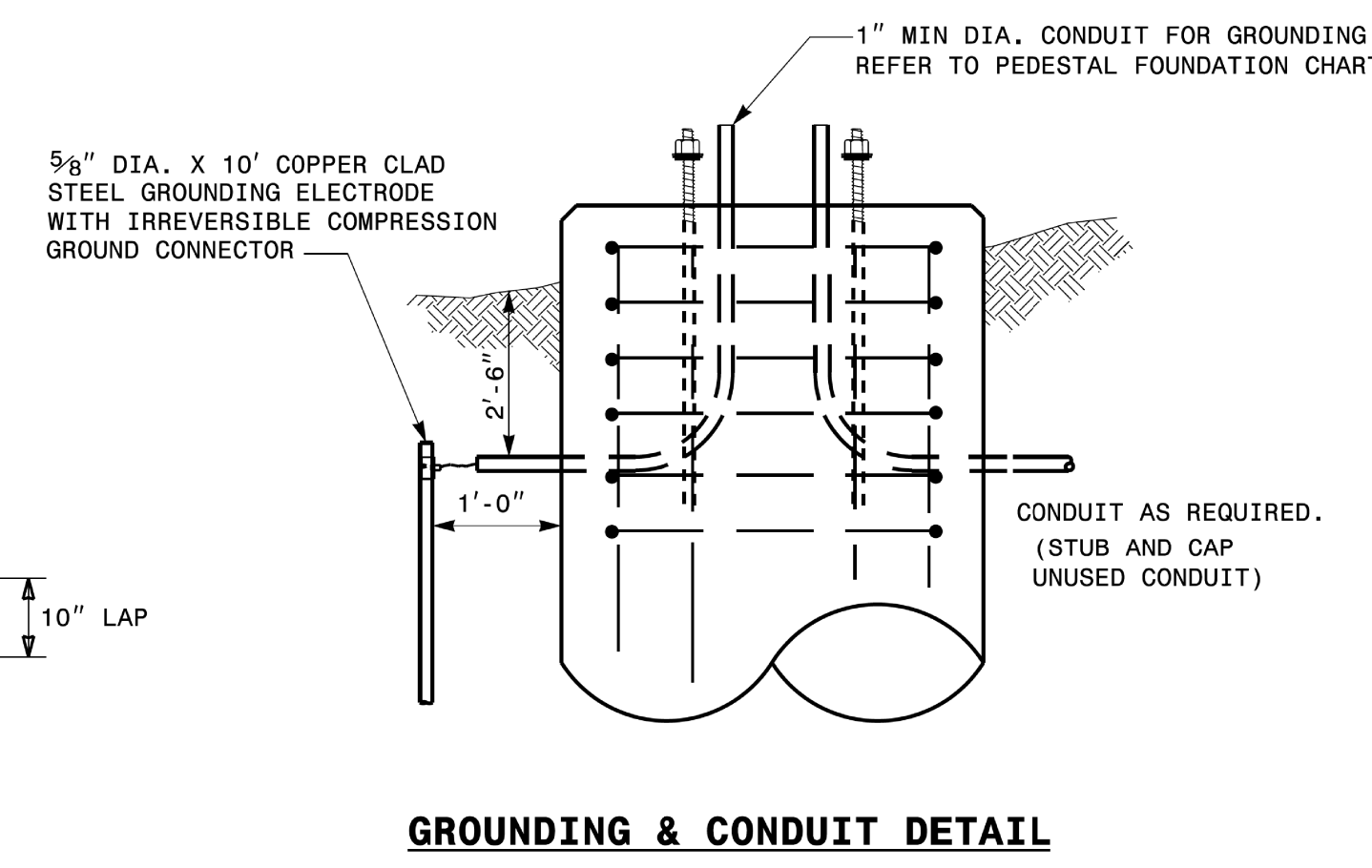
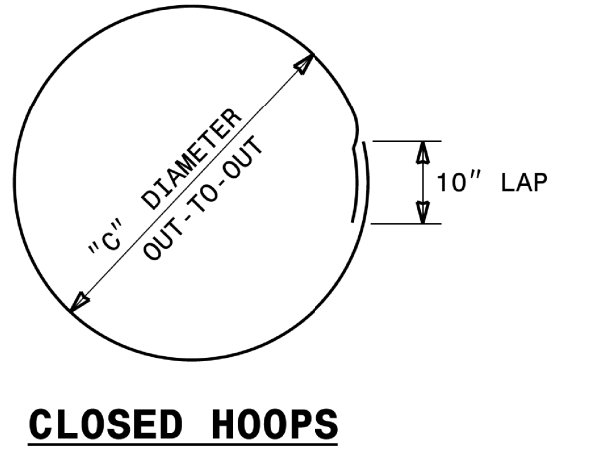
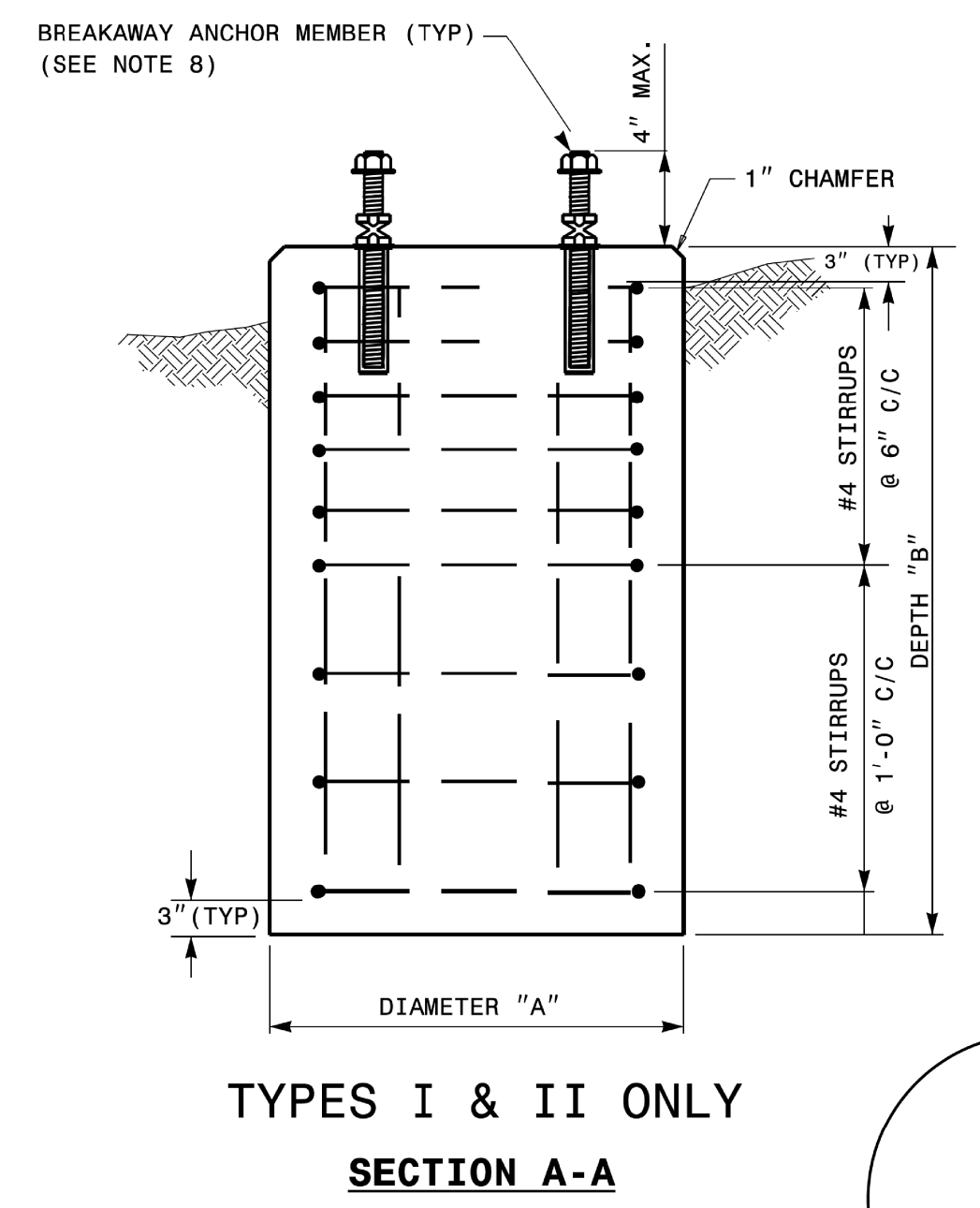
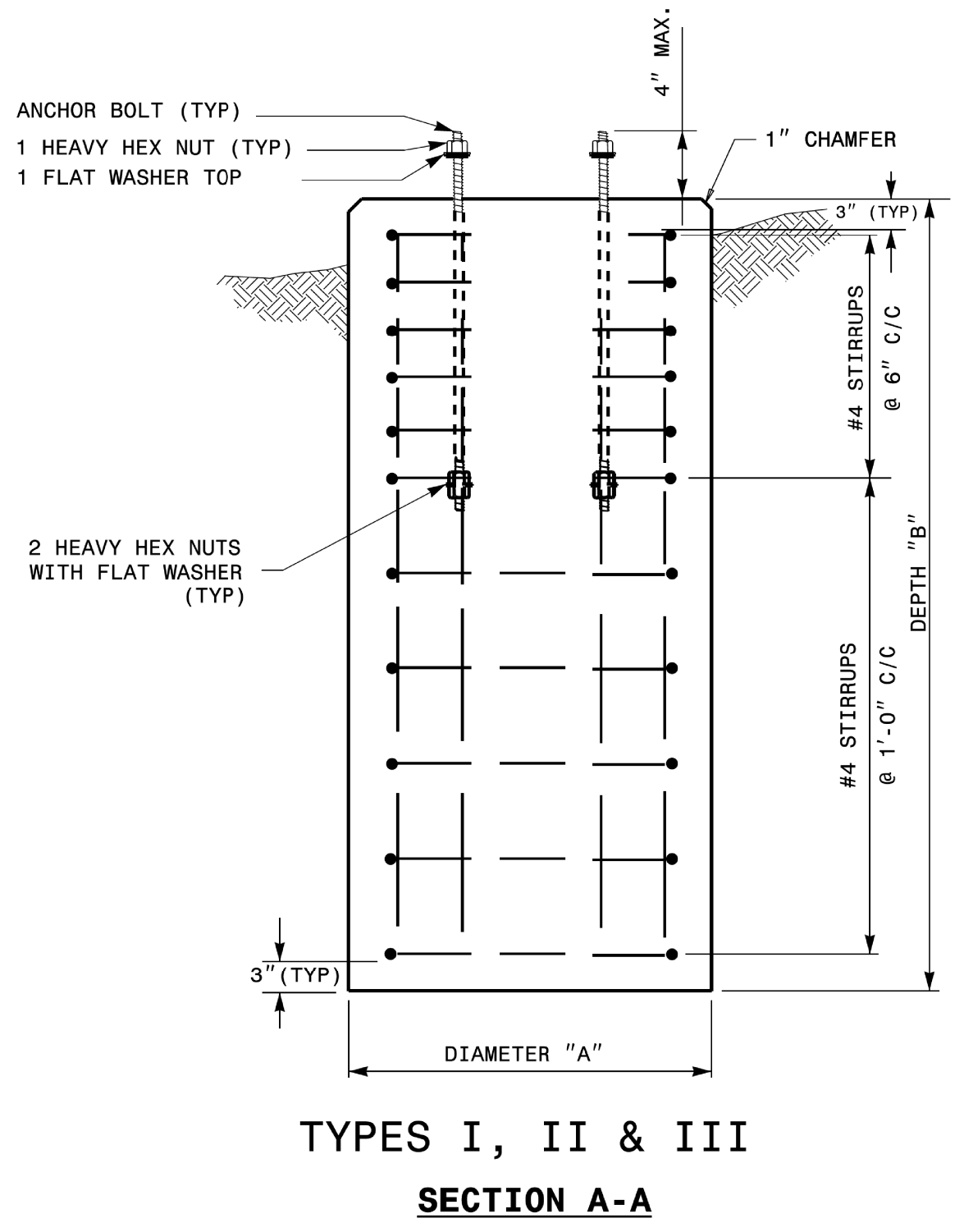
See Plate for Title

<p>Prepared in the Offices of:</p> <p>750 N. Greenfield Parkway Garner, NC 27529</p>	<p>SEAL</p> <p>DocuSigned by: Mohd Aslami</p> <p>10/11/2017 DATE</p>
--	--

11-2017-2017_08-56
11-2018 314 Drawings/Plate Sheets/2018_Plate Sheet -dgn
r.wrough



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



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

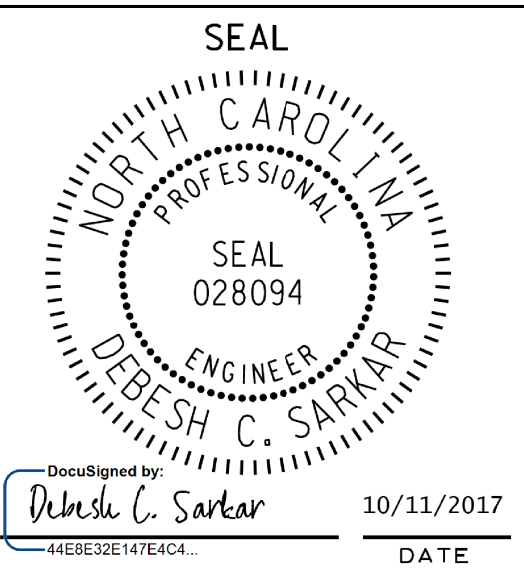
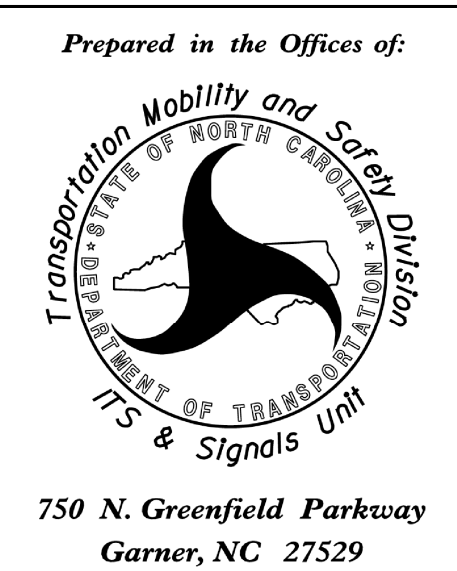
REINFORCING STEEL SCHEDULE													
TYPE	V-BAR				STIRRUP								
	SIZE #	QTY	LENGTH	WEIGHT LBS	SIZE #	QUANTITY			LENGTH	DIAMETER "C" FT	OVERLAP MIN.	WEIGHT LBS	TOTAL STEEL WEIGHT LBS
						VERTICAL SPACING ON 6" CENTERS	ON 12" CENTERS	TOTAL					
I	8	6	3'-0"	56	4	0	4	4	5'-7"	1'-6"	0'-10"	15	71
II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



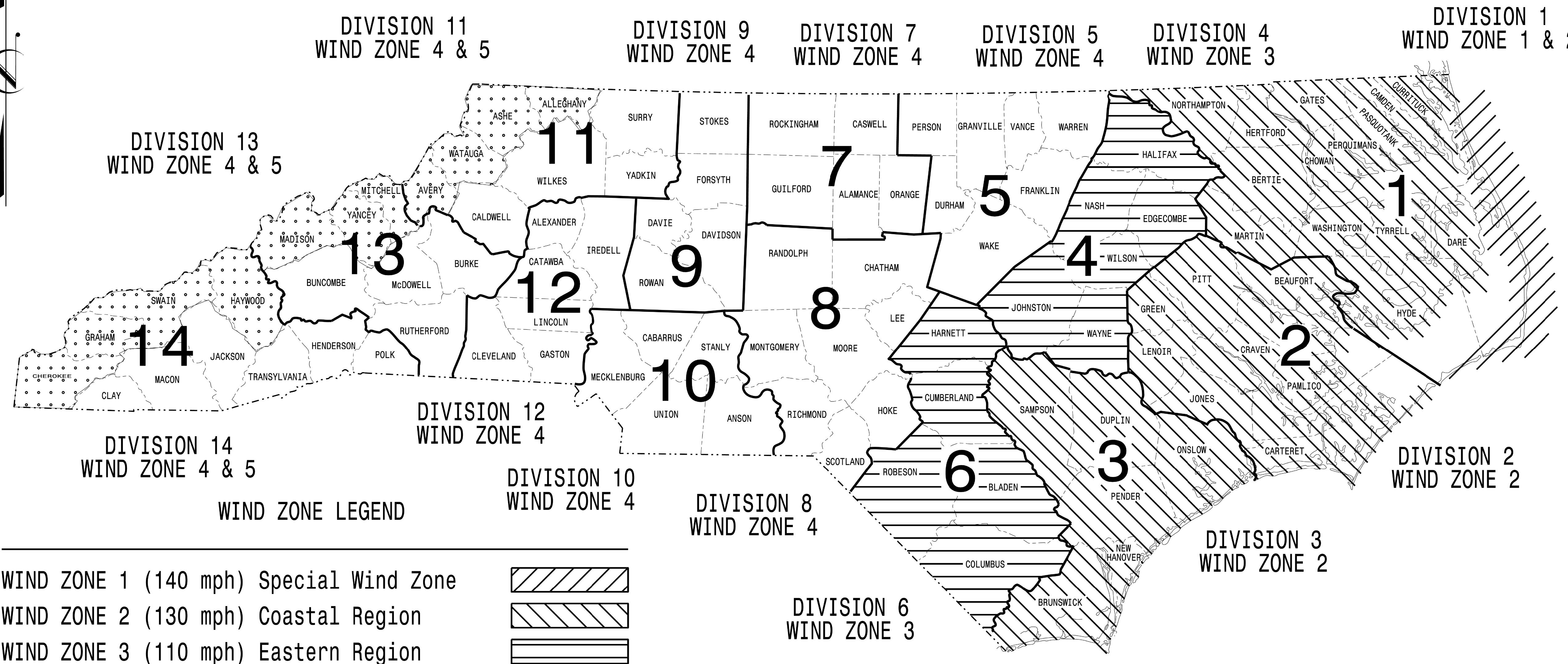
DOCUMENT NOT CONSIDERED
FINAL UNLESS ALL
SIGNATURES COMPLETED

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STATE OF NORTH CAROLINA DIVISION OF HIGHWAYS

PROJECT I.D. NO.	SHEET NO.
I - 4700	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

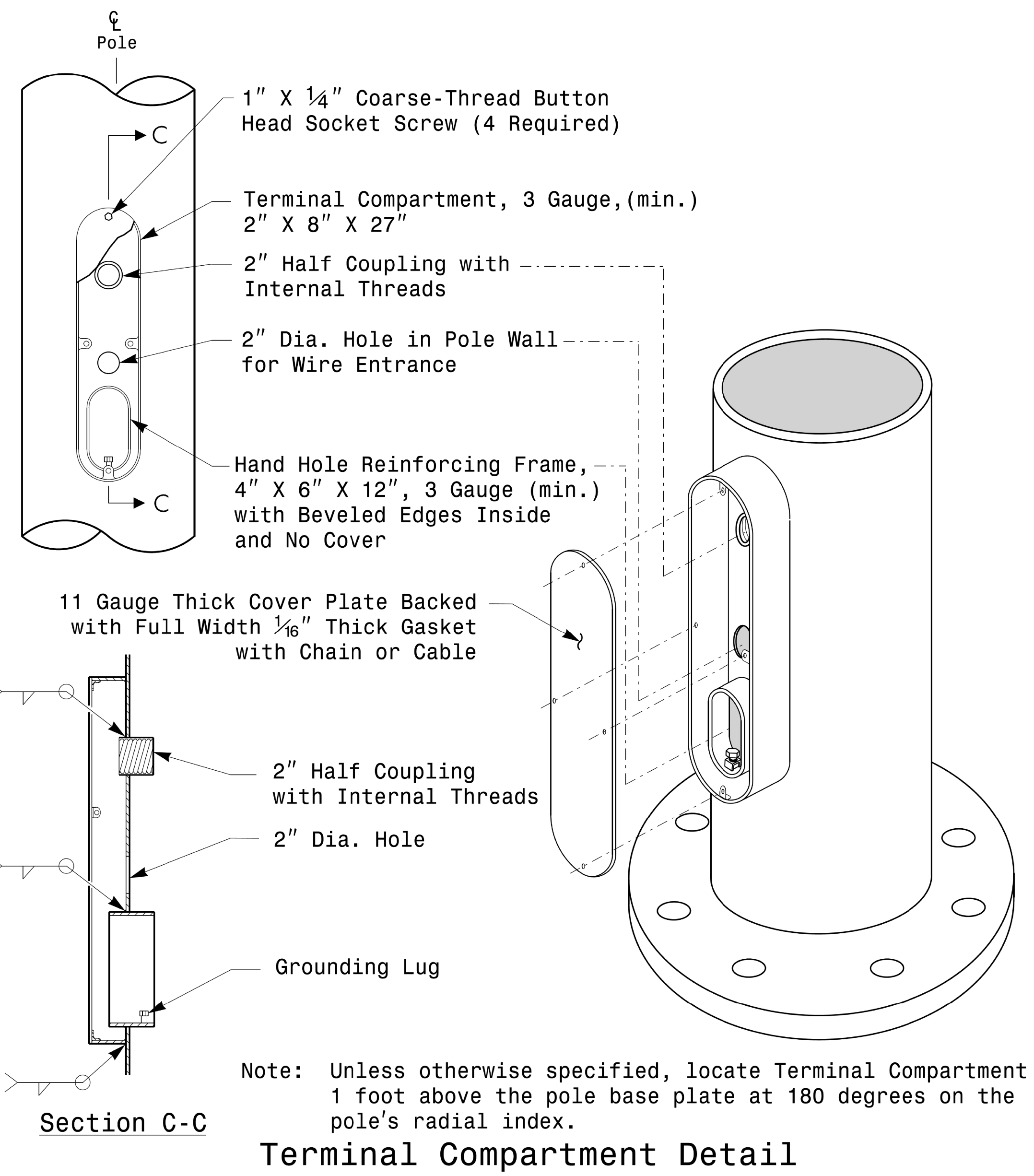
M.M. MCDIARMID, P.E. - STATE ITS AND SIGNALS ENGINEER

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

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

SEAL

10/11/2017
SIGNATURE DATE



Terminal Compartment Detail

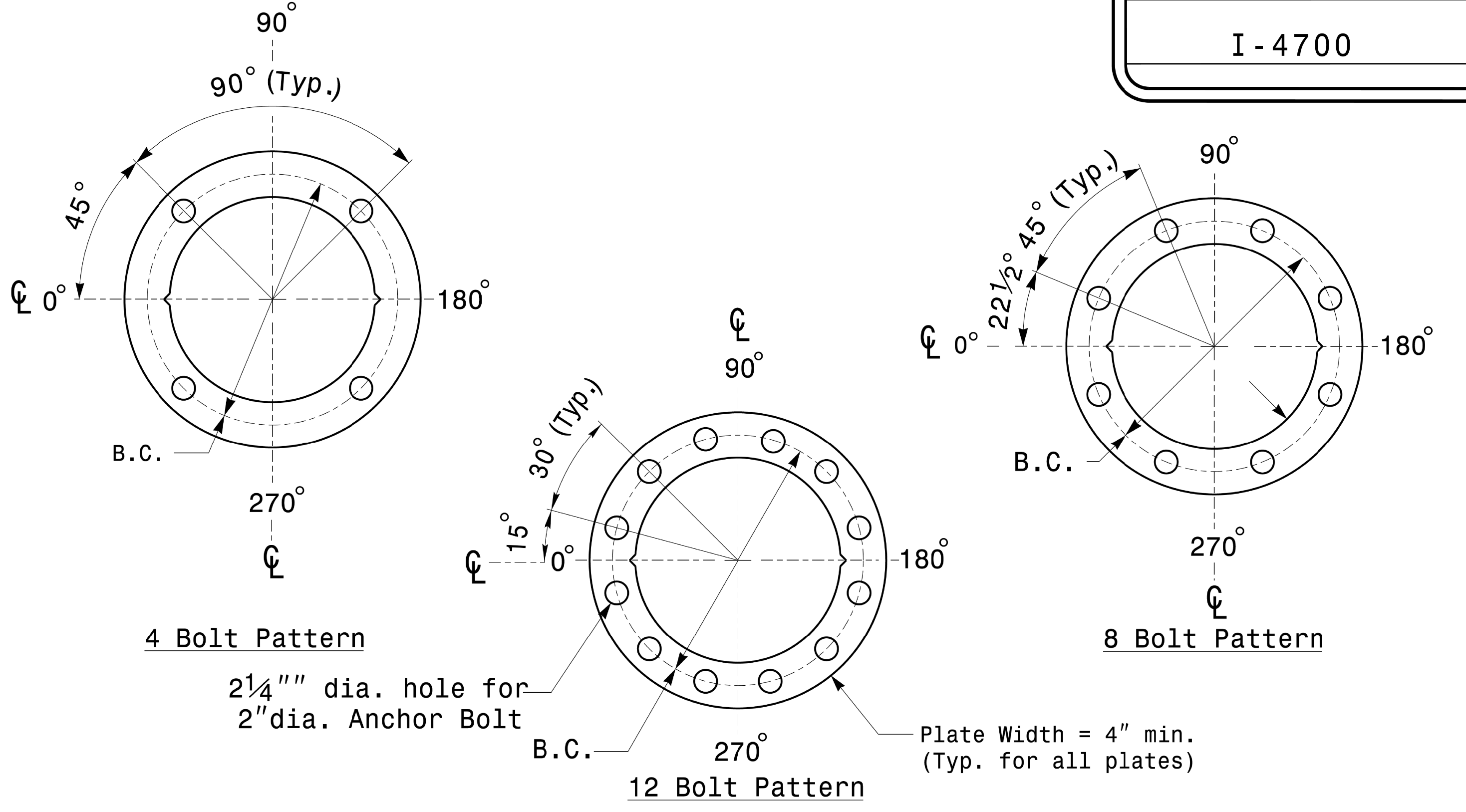
MFG _____ MFG. DATE: MM/YY	MFG _____ MFG. DATE:MM/YY
SHAFT D/T/L/Y _____	SECTION D/T/L/Y _____
ARM-A D/T/L/Y _____	NCDOT SIG. INV. NO. _____
ARM-B D/T/L/Y _____	NCDOT POLE NO. _____
A.B. DIA./B.C./L/Y _____	
NCDOT SIG. INV. NO. _____	
NCDOT POLE NO. _____	

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

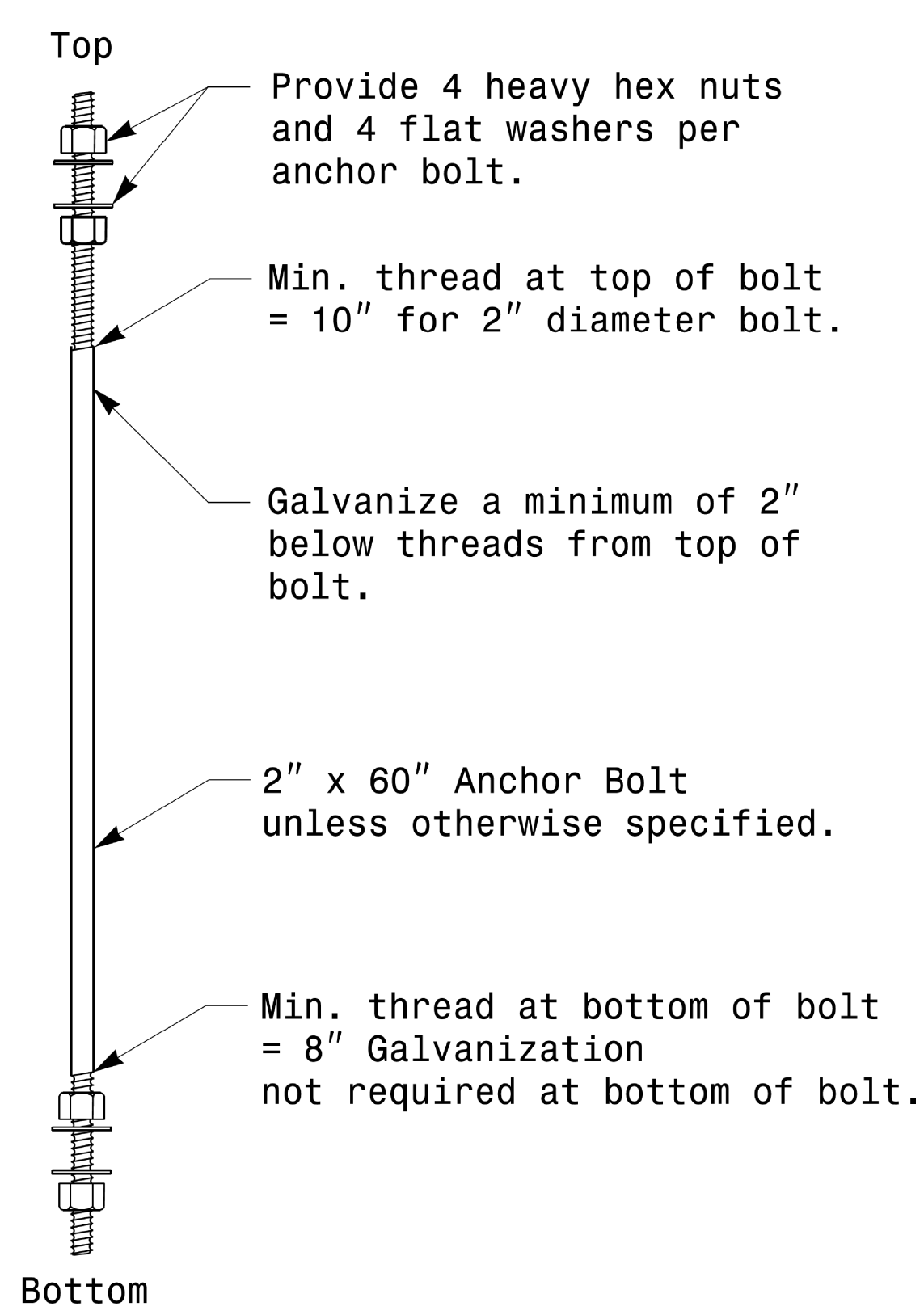
Shaft I.D. Tag
(Provide on Shaft of Strain Poles and Mast Arm Poles Shaft)

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

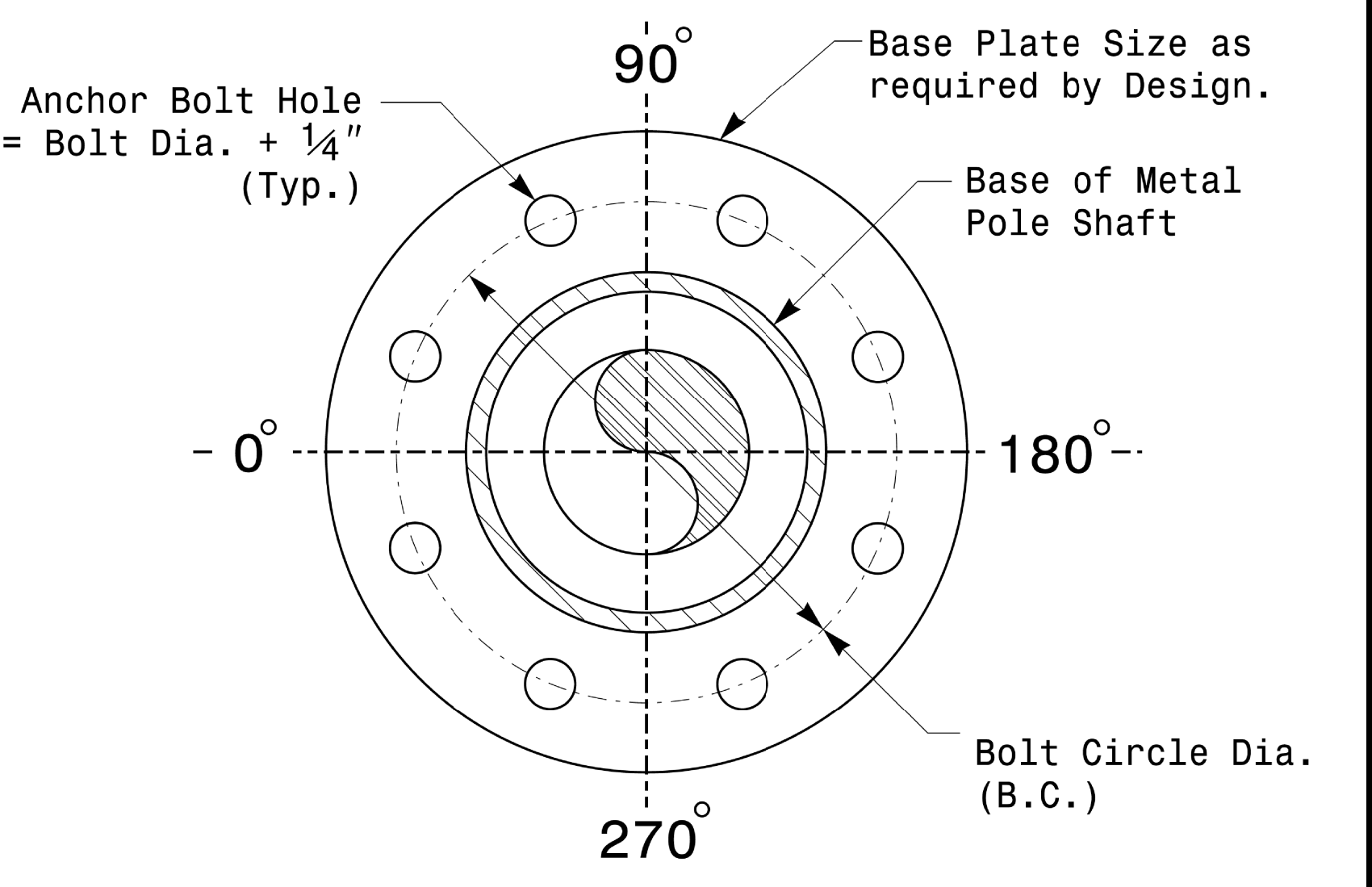
Identification Tag Details



Base Plate Template and Anchor Bolt Lock Plate Details



Anchor Bolt Detail



Typical Base Plate Detail

Typical Fabrication Details
For
All Metal Poles

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

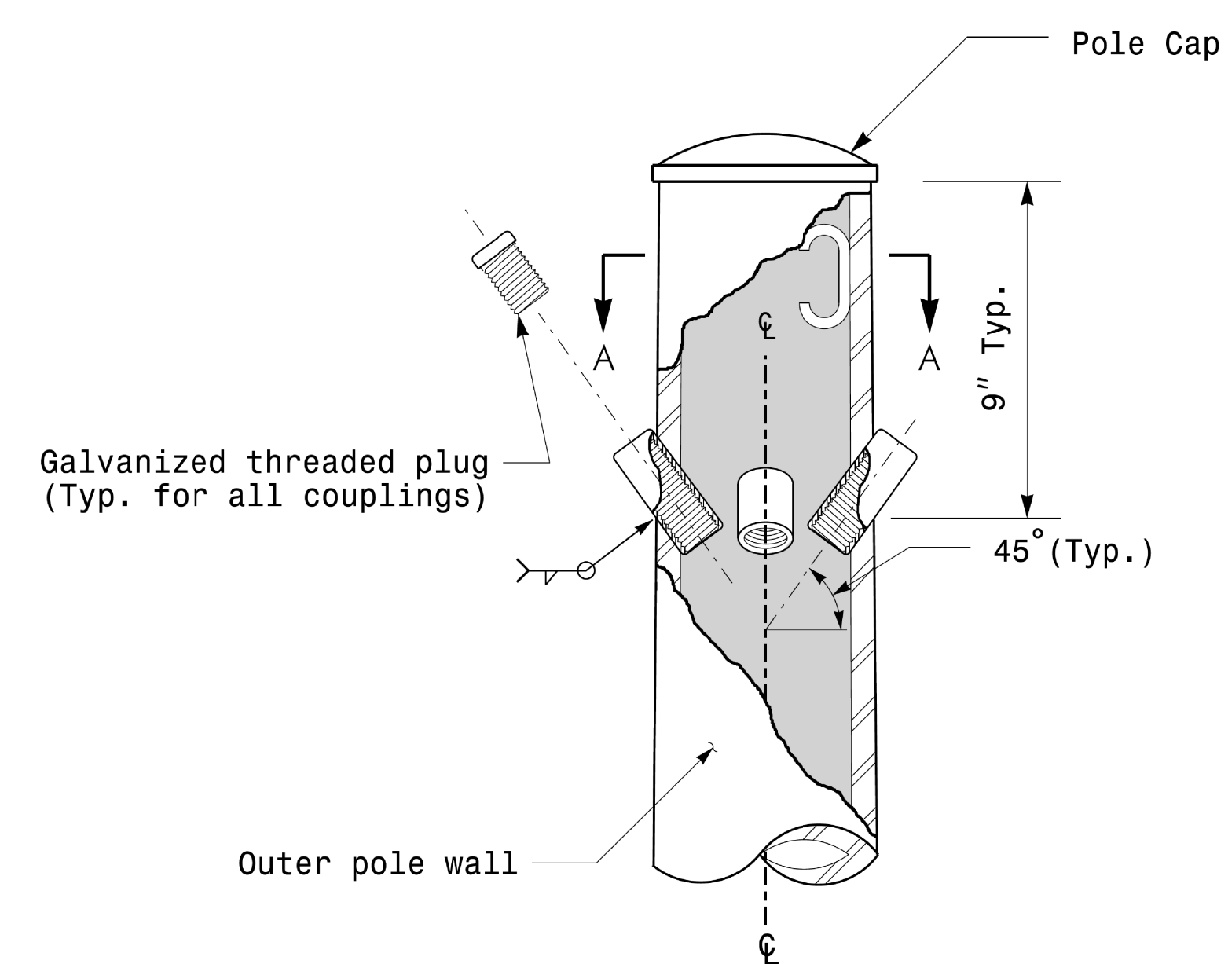
DocuSigned by:
D. C. SARKAR

10/11/2017

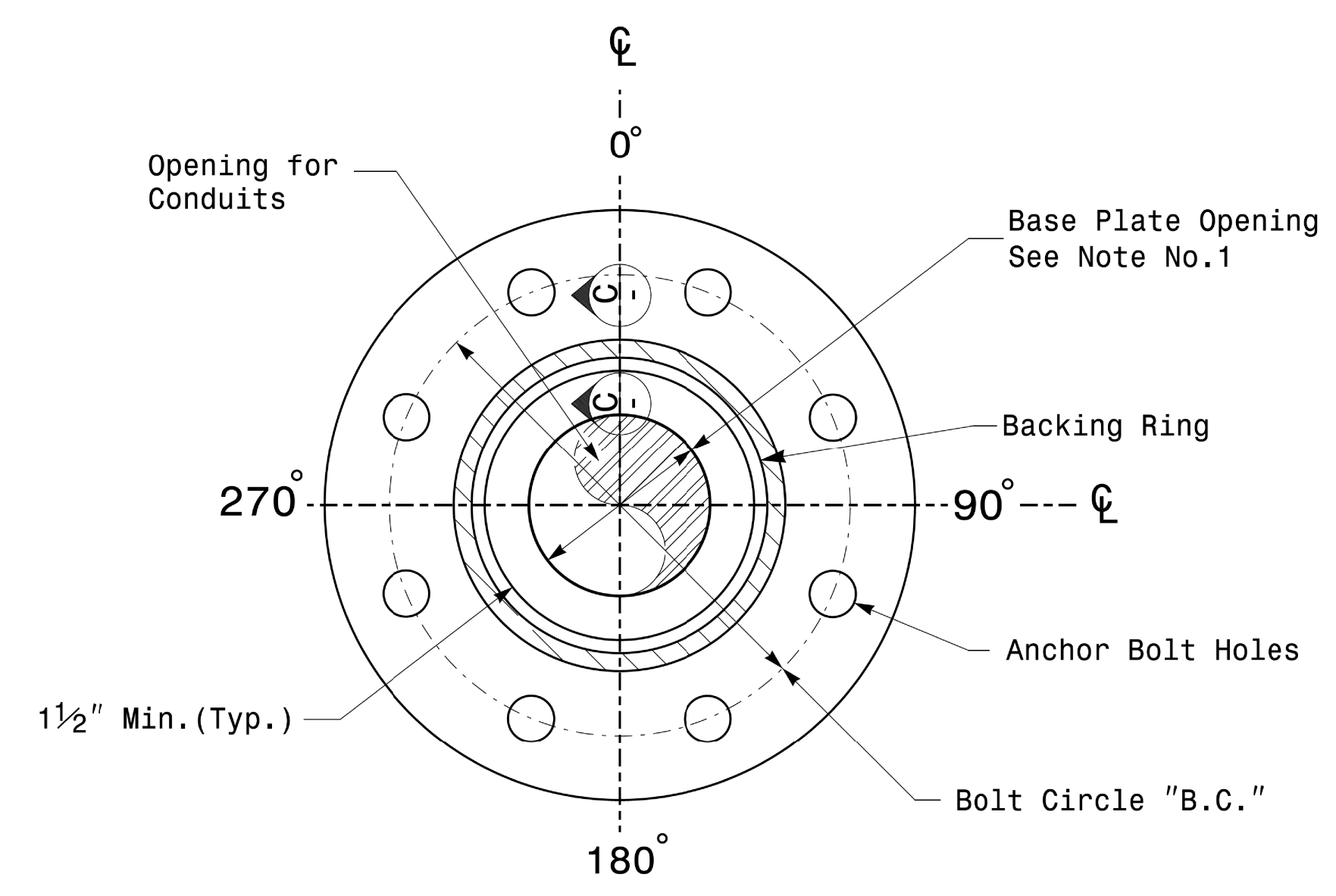
Fabrication Details - All Metal Poles

11/15/2017 11:10:30 S:\IT\2017\11\Sigsheet\Sigsheet2017\2017 Sig.M2 Sht. Fabrication Details-All Metal Poles.dgn

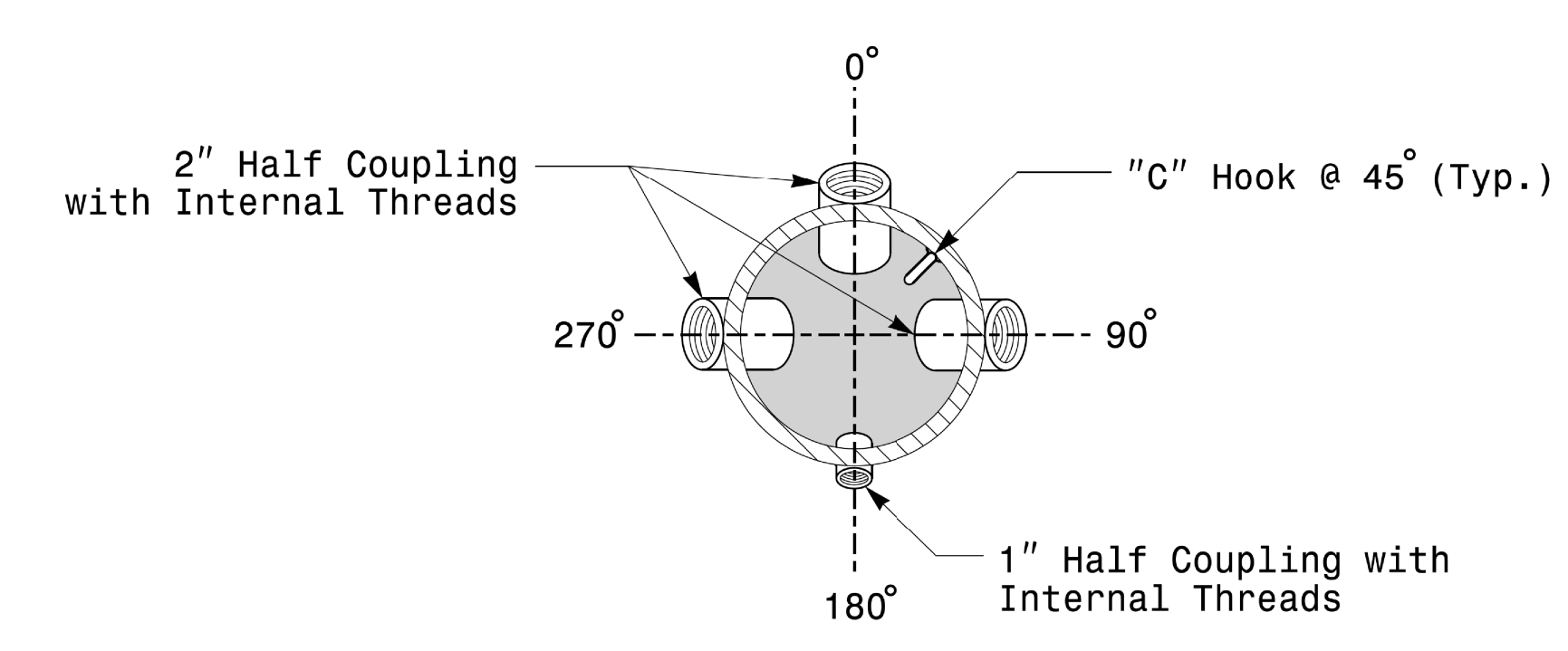
Note:
1. Opening in pole base plate shall be equal to pole base inside diameter minus 3 1/2" but shall not be less than 8 1/2".



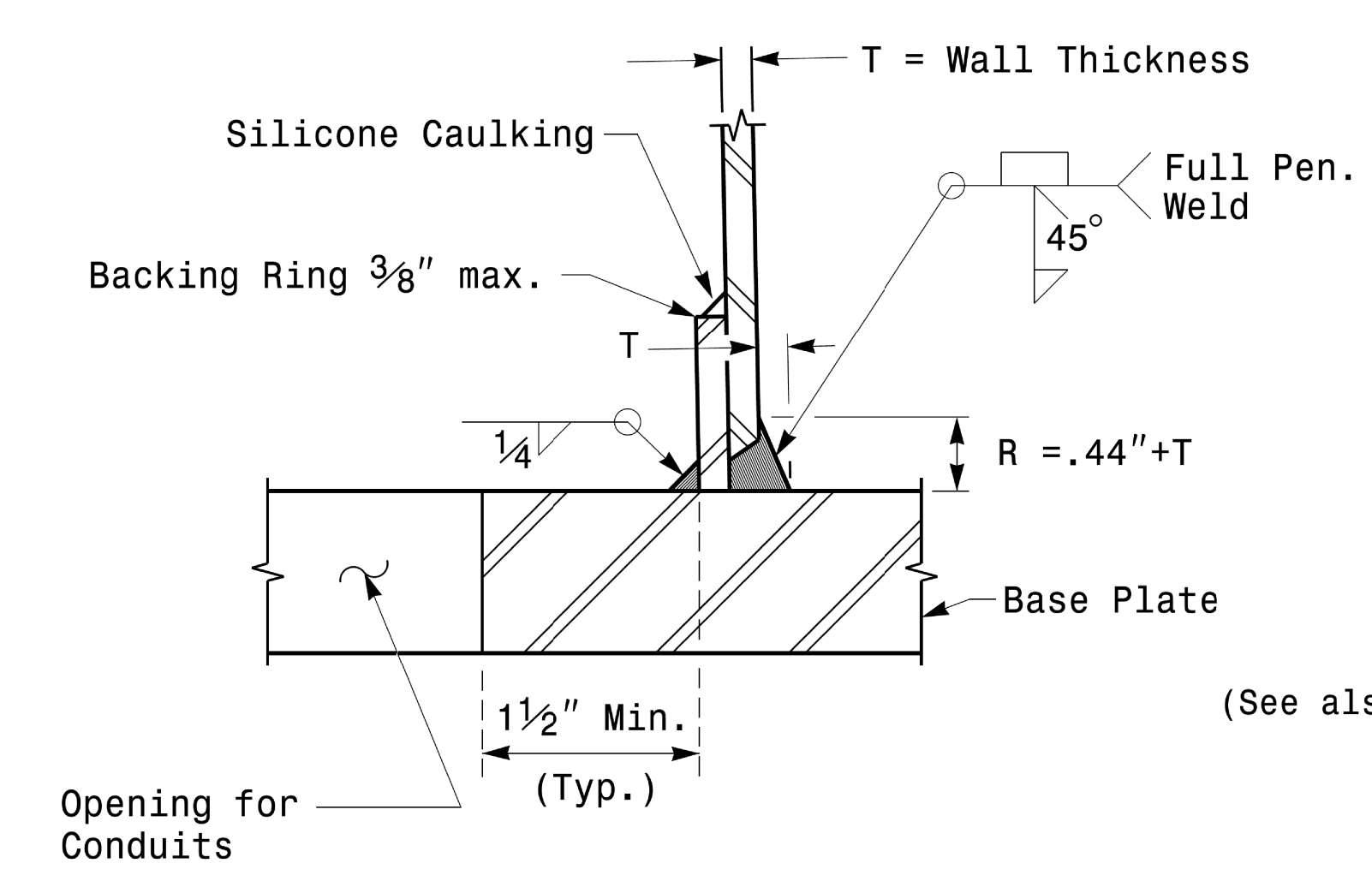
Cable Entrances at Top of Pole



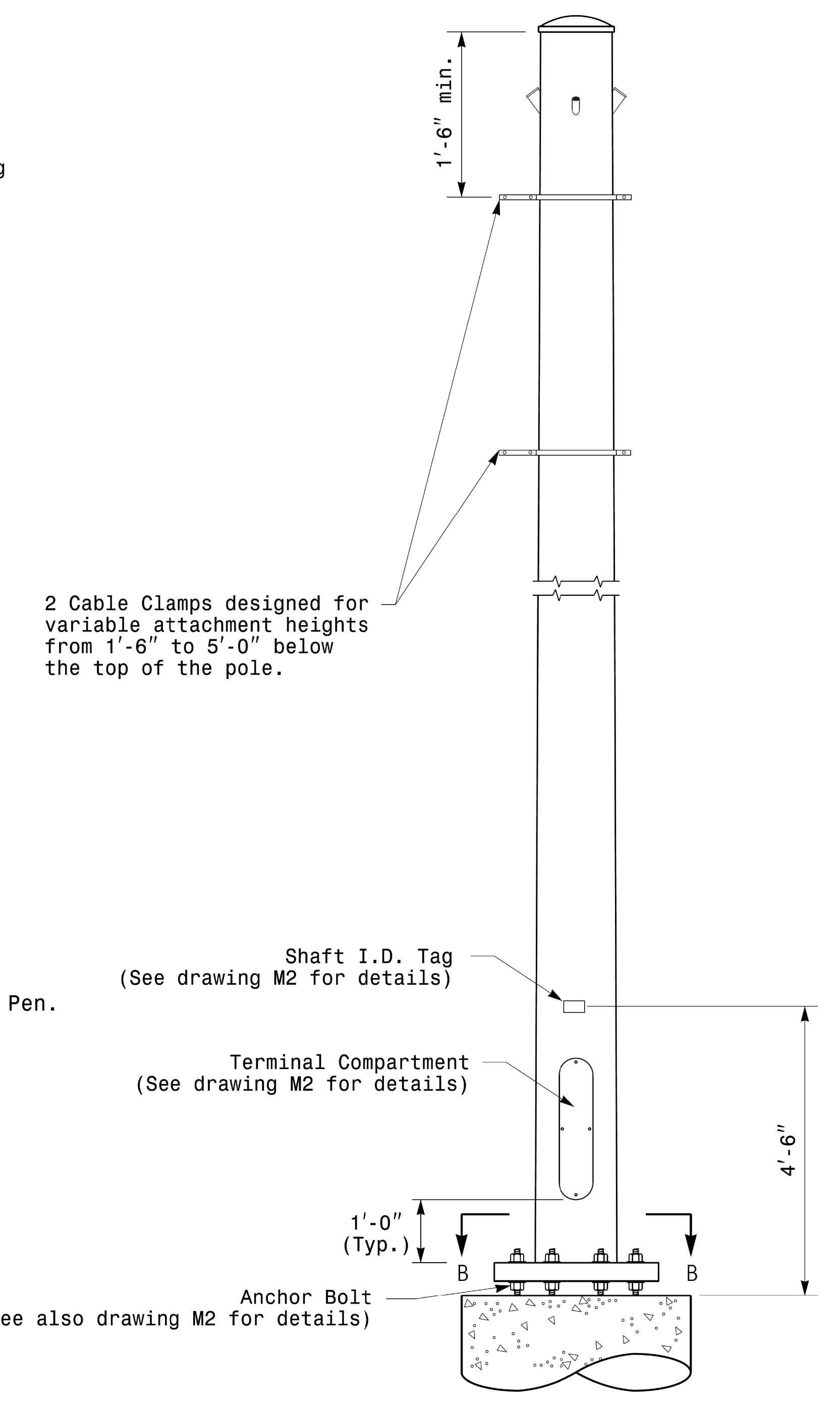
Section B-B
Pole Base Plate Details
(8 and 12 Bolt Pattern)



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



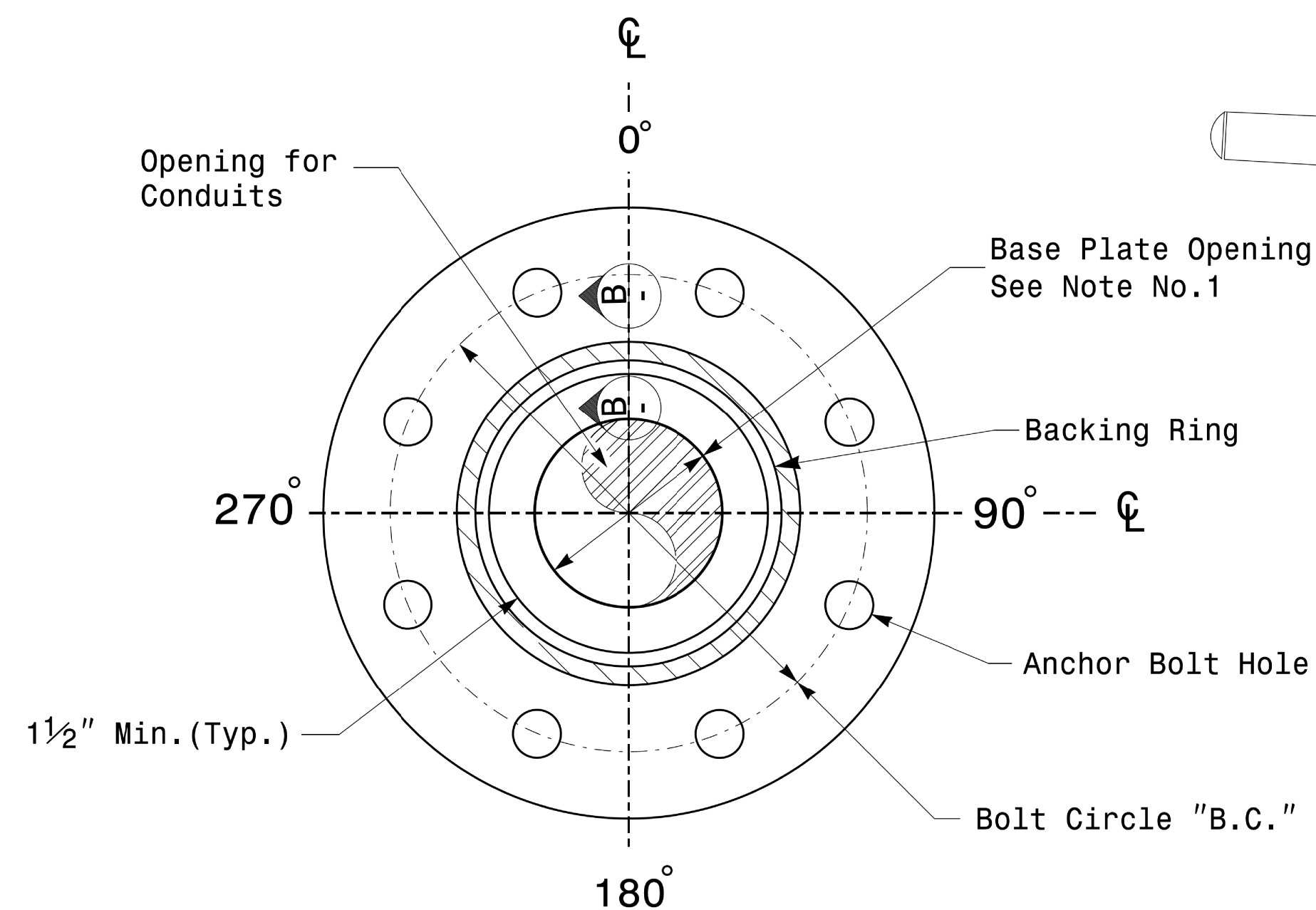
Monotube Strain Pole

Fabrication Details - Strain Poles

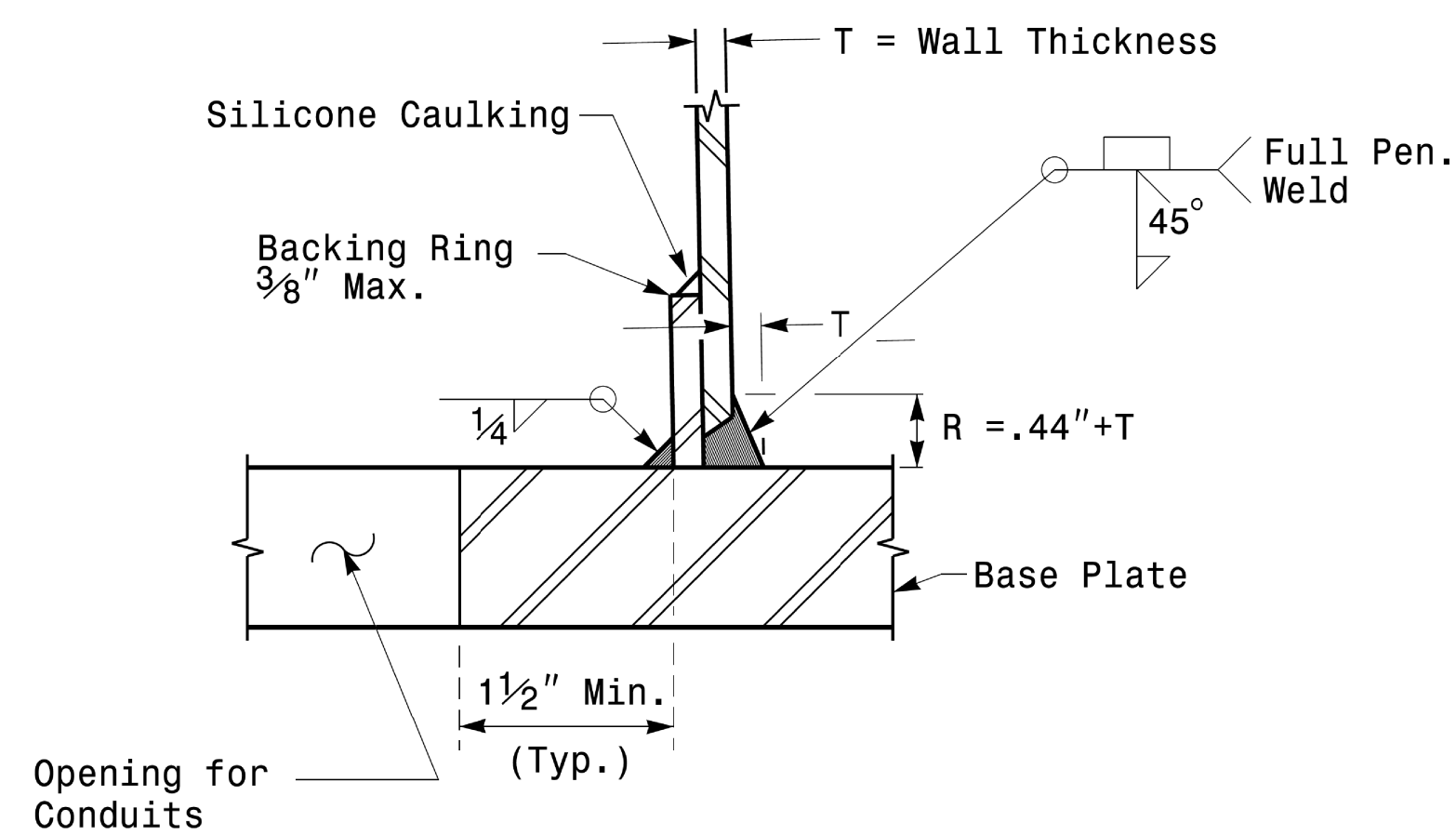
11-OCT-2017 08:25 S:\IT\SS\115 Signal Design Section\Eastern Region\MI Sheets\2016\2014 Sig.M3 Strd. Fabrication Details\Strain Poles.dgn

<p>750 N. Greenfield Pkwy, Garner, NC 27529</p>	Typical Fabrication Details For Strain Poles		
	PLAN DATE: OCTOBER 2017 PREPARED BY: N. BITTING	DESIGNED BY: K.C. DURIGON REVIEWED BY: D.C. SARKAR	
SCALE: NA NONE	REVISIONS: _____ INIT.: _____ DATE: _____	DocuSigned by: Dinesh C. Sarkar	10/11/2017 DATE: _____

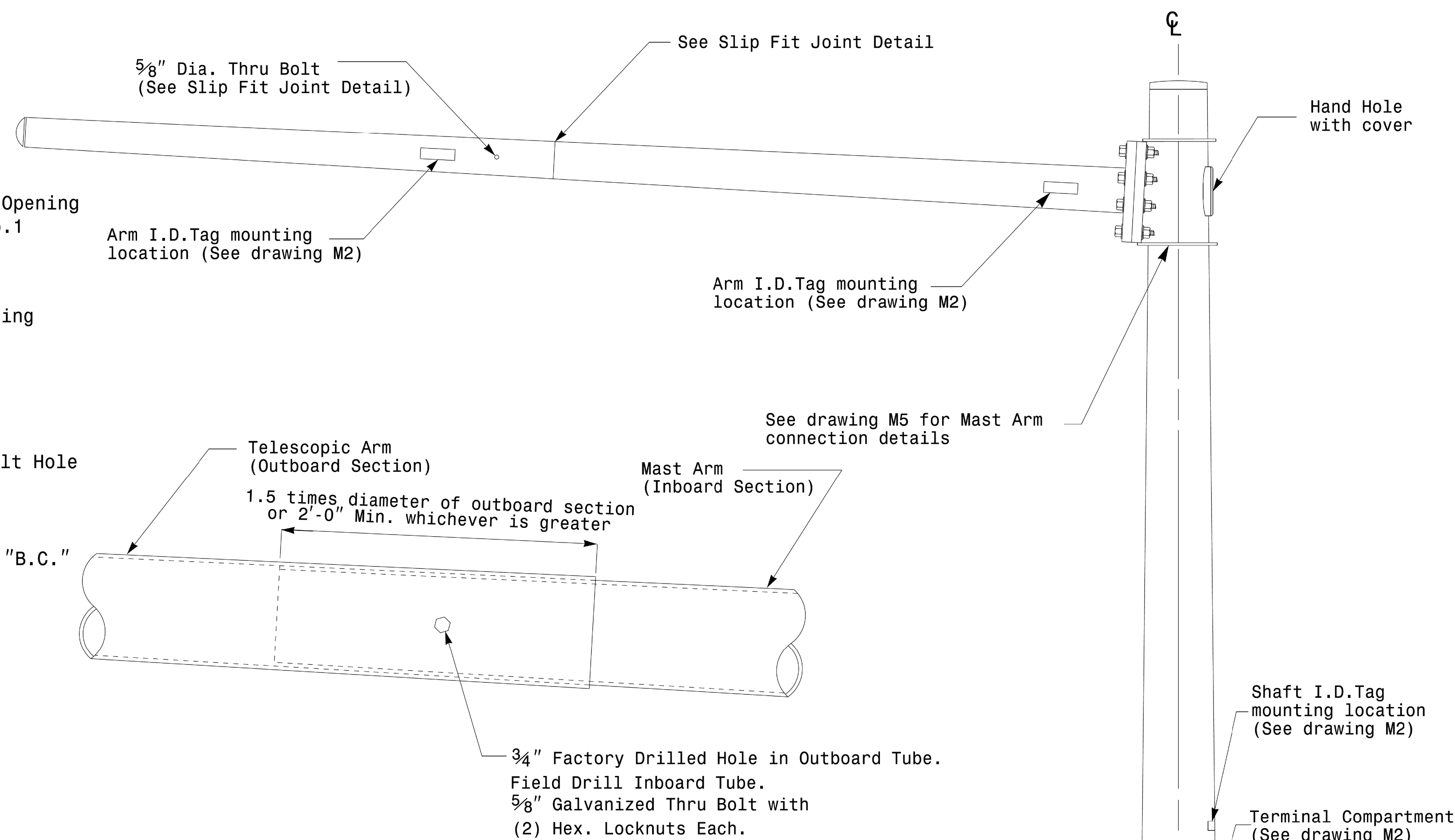
Note:
1. Opening in pole base plate shall be equal to pole base inside diameter minus 3 1/2" but shall not be less than 8 1/2".



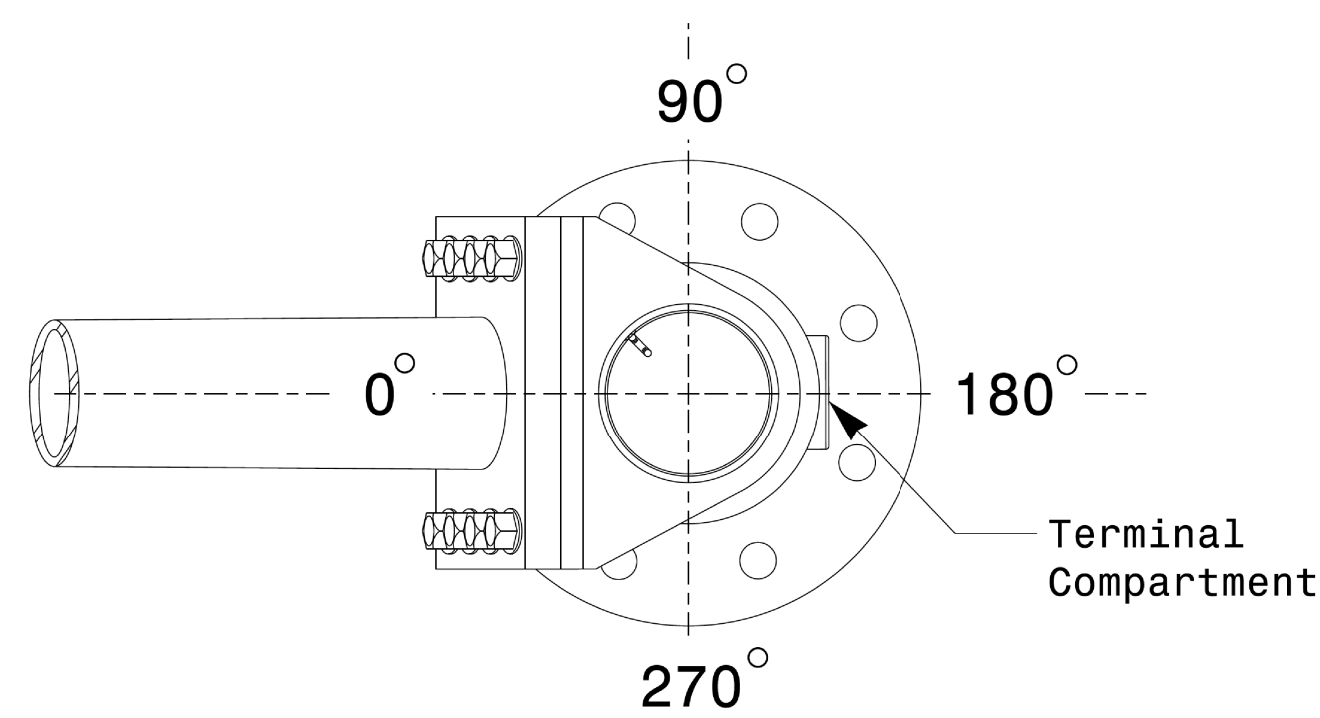
Section A-A
Pole Base Plate Details



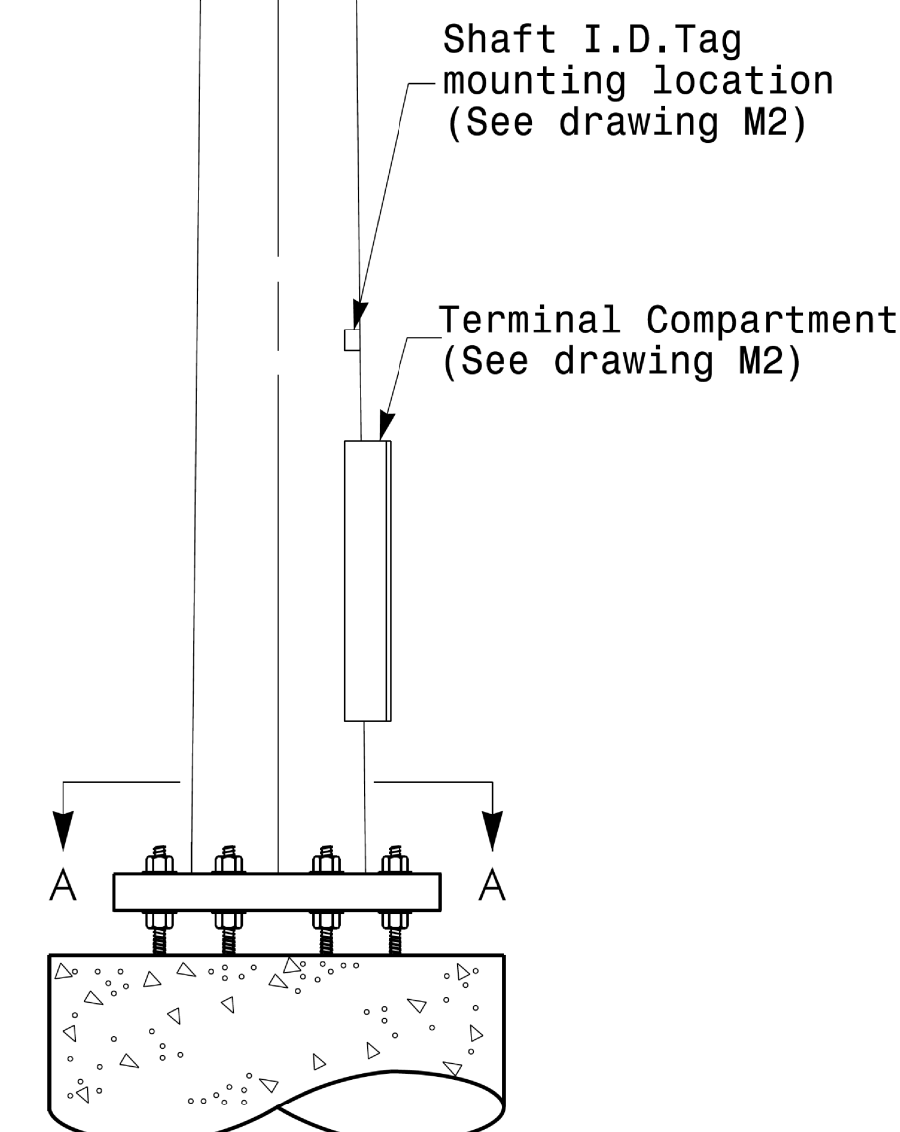
Section B-B
(Pole Attachment to Base Plate)
Full-Penetration Groove Weld Detail



Slip Fit Joint Detail for Mast Arm



Mast Arm Radial Orientation



Mast Arm Pole

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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	REVISIONS	INIT.
SCALE: 0 NA NONE		Drawn by: <i>D. Sarkar</i> DATE: 10/11/2017		