

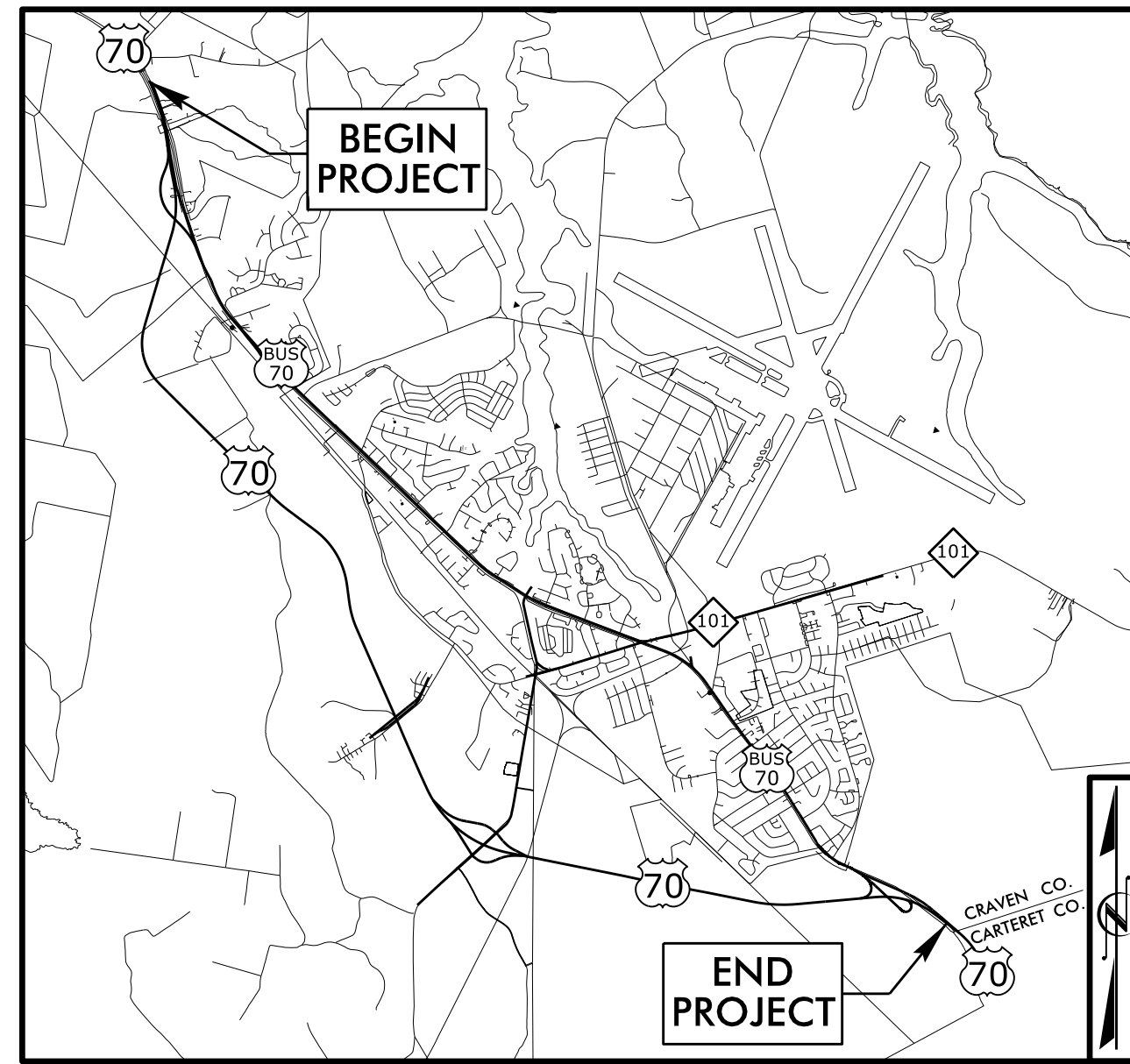
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Project: R-1015

Contract: C204177

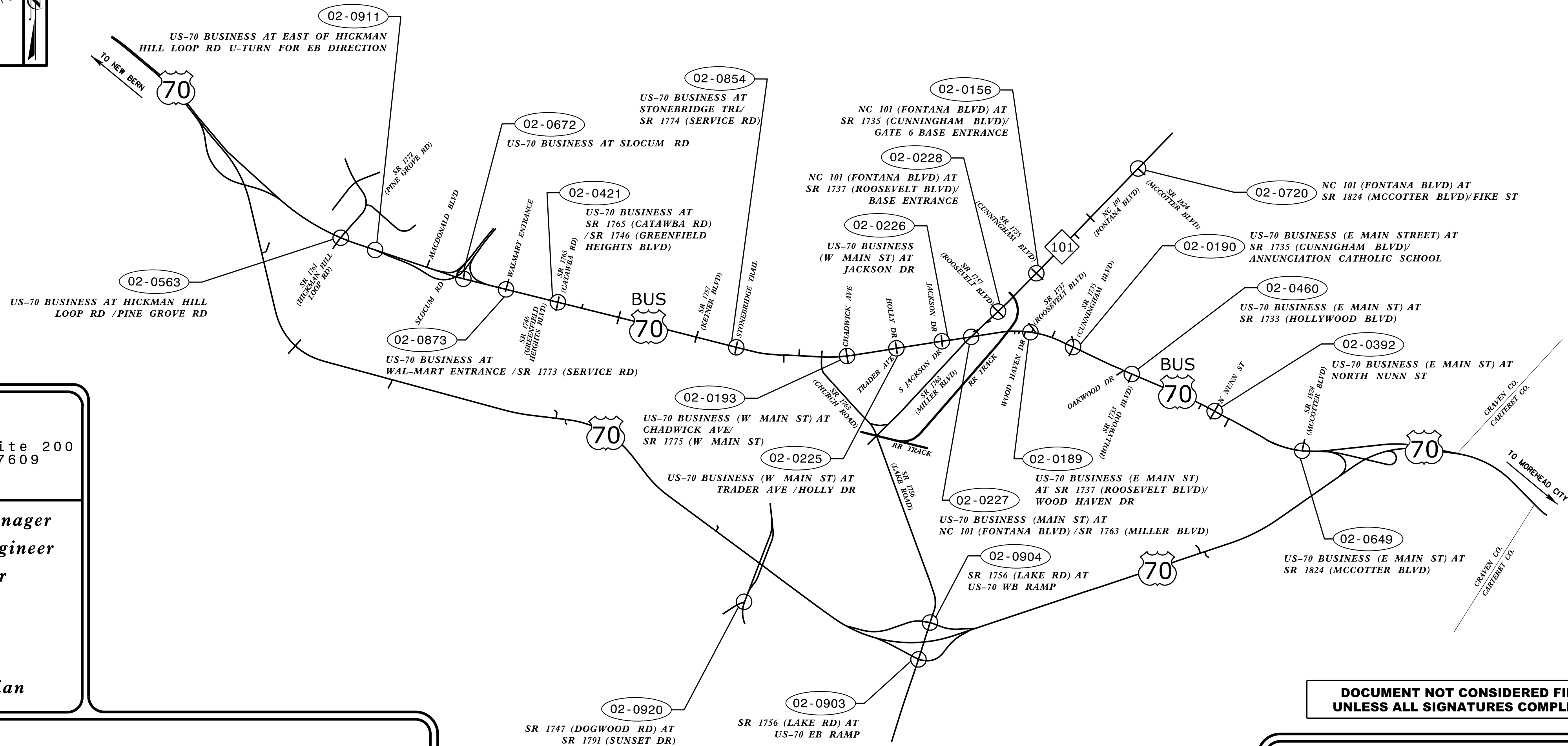


STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

CRAVEN AND CARTERET COUNTIES

**LOCATION: US 70 HAVELOCK BYPASS, NORTH OF SR 1772
(PINE GROVE RD)/SR 1761 (HICKMAN HILL LOOP RD)
TO NORTH OF COUNTY LINE**

**TYPE OF WORK: SIGNALS, CABLE ROUTING, CCTV CAMERAS &
DYNAMIC MESSAGE SIGN INSTALLATIONS**



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

Natasha R. Simmons, PE, PTOE - Project Manager
Andrew D. Klinksiek, PE, PTOE - Project Engineer
Alex H. Thornburg, PE - Project Engineer
John A. Wagner, PE - Design Engineer
James T. Thibault, EI - Design Engineer
Nicole K. Vlanich, EI - Design Engineer
Tracey R. Terrell - Senior Design Technician

Sheet #	Reference #	Index of Plans Location/Description
Sig. 1.0	-----	Title Sheet
Sig. 2.0-2.1	02-0873	US-70 Business at Wal-Mart Entrance/SR 1773 (Service Road)
Sig. 3.0-3.1	02-0421	US-70 Business at SR 1765 (Catawba Road)/SR 1746 (Greenfield Heights Boulevard)
Sig. 4.0-4.2	02-0854	US-70 Business at Stonebridge Trail/SR 1774 (Service Road)
Sig. 5.0-5.1	02-0193	US-70 Business (W Main Street) at Chadwick Avenue/SR 1775 (W Main Street)
Sig. 6.0-6.1	02-0225	US-70 Business (W Main Street) at Trader Avenue/Holly Drive
Sig. 7.0-7.1	02-0226	US-70 Business (W Main Street) at Jackson Drive
Sig. 8.0-8.1	02-0227	US-70 Business (Main Street) at NC 101 (Fontana Boulevard)/SR 1763 (Miller Boulevard)
Sig. 9.0-9.1	02-0189	US-70 Business (E Main Street) at SR 1737 (Roosevelt Boulevard)/Wood Haven Drive
Sig. 10.0-10.3	02-0190	US-70 Business (E Main Street) at SR 1735 (Cunningham Boulevard)/Annunciation Catholic School
Sig. 11.0-11.1	02-0460	US-70 Business (E Main Street) at SR 1733 (Hollywood Boulevard)
Sig. 12.0-12.1	02-0392	US-70 Business (E Main Street) at North Nunn Street
Sig. 13.0-16.1	02-0649	US-70 Business (E Main Street) at SR 1824 (McCotter Boulevard)
Sig. 17.0-17.2	02-0903	SR 1756 (Lake Road) at US-70 EB Ramp
Sig. 18.0-18.2	02-0904	SR 1756 (Lake Road) at US-70 WB Ramp
Sig. 19.0-19.1	02-0228	NC 101 (Fontana Boulevard) at SR 1737 (Roosevelt Boulevard)/Base Entrance
Sig. 20.0-20.1	02-0156	NC 101 (Fontana Boulevard) at SR 1735 (Cunningham Boulevard)/Gate 6 Base Entrance
Sig. 21.0-21.2	02-0720	NC 101 (Fontana Boulevard) at SR 1824 (McCotter Boulevard)/Fike Street
Sig. 22.0	-----	Standard Drawing for Electrical Service Grounding and Wood Poles
Sig. 23.0	-----	Standard Drawing for Pedestals
Sig. 24.0-24.1	02-0920T1	SR 1747 (Dogwood Road) at SR 1791 (Sunset Drive) - Temporary 1
Sig. 25.0-25.1	02-0920T2	SR 1747 (Dogwood Road) at SR 1791 (Sunset Drive) - Temporary 2
Sig. M1-M8	-----	Standard Drawing for Metal Poles
SCP. 1-97	-----	Signal Communication Plans

**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.

LEGEND
##-####
SIGNAL INVENTORY NUMBER

INTELLIGENT TRANSPORTATION AND SIGNALS UNIT

Contacts:

Meghan LeBlanc, PE - Eastern Region Signals Engineer
Todd Joyce, PE - Signal Equipment Design Engineer
Andrew Skuce - Signal Communications Project Engineer
Gregory Green - ITS Design Engineer

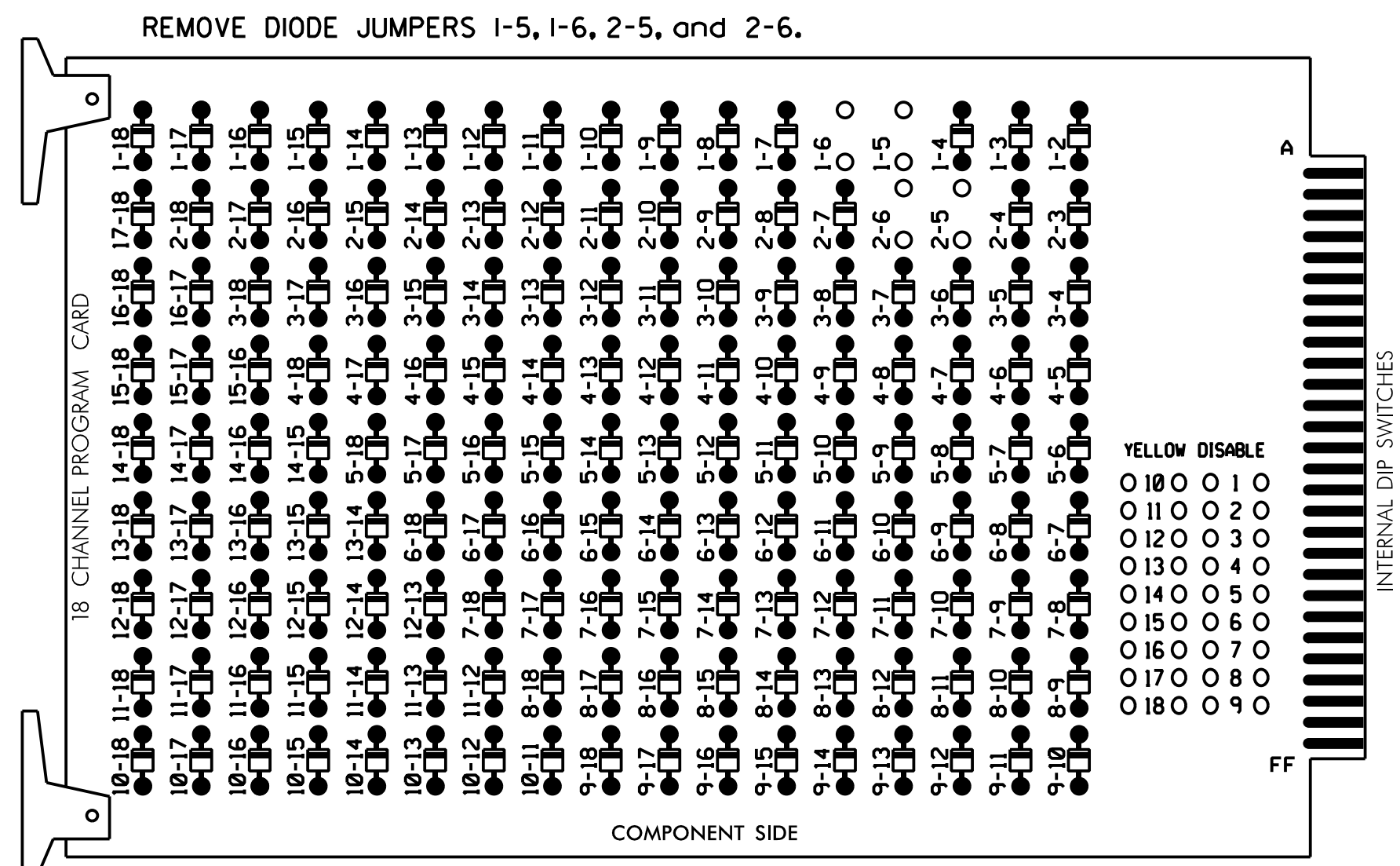
Prepared for the Office of:
**DIVISION OF HIGHWAYS
TRANSPORTATION MOBILITY AND SAFETY
DIVISION**

ITS and Signals Unit

750 N. Greenfield Parkway, Garner, NC 27529

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

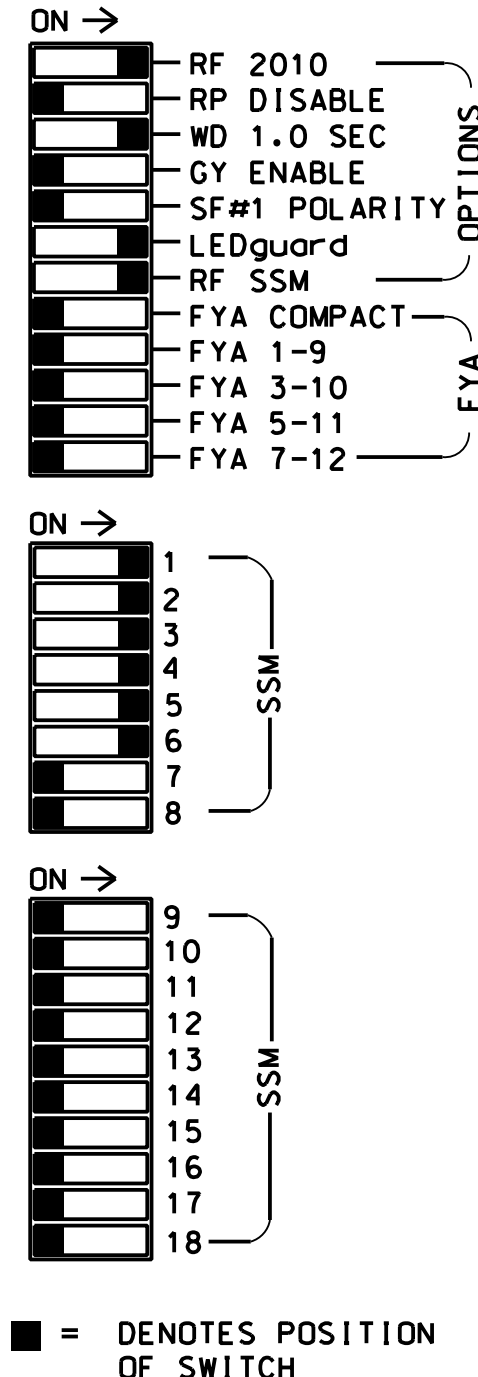
(remove jumpers and set switches as shown)



REMOVE JUMPERS AS SHOWN

NOTES:

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



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 6 for Yellow Flash.
- The cabinet and controller are part of the Havelock US 70 Business Closed Loop 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	NU	22	31	32	41	42	62	NU	42	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	125												131					
YELLOW ARROW	126			117				102		132	132							
GREEN ARROW	127			118	118			103	103	133	133							

NU = Not Used

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,S4,S5,S7,S8
 PHASES USED.....1,2,3,4,5,6
 OVERLAPS.....NONE

INPUT FILE POSITION LAYOUT

(front view)

FILE "I"	1	2	3	4	5	6	7	8	9	10	11	12	13	14
U	∅ 1	∅ 2	∅ 3	S	S	∅ 3	∅ 4	S	SYS	S	S	S	S	FS
L	1A	2A	3A	-TOP	-TOP	3C	4A	-TOP	S31	-TOP	-TOP	-TOP	-TOP	DC ISOLATOR
	NOT USED	∅ 2	∅ 3	-TOP	-TOP	∅ 3	∅ 4	-TOP	SYS	-TOP	-TOP	-TOP	-TOP	ST
		2B	3B	-TOP	-TOP	3D	4B	-TOP	S32	-TOP	-TOP	-TOP	-TOP	DC ISOLATOR
U	∅ 5	∅ 5	∅ 6	S	S	S	S	S	S	S	S	S	S	S
L	5A	5B	6A	-TOP	-TOP	-TOP	-TOP	-TOP	-TOP	-TOP	-TOP	-TOP	-TOP	-TOP
	NOT USED	NOT USED	∅ 6	-TOP	-TOP	-TOP	-TOP	-TOP	-TOP	-TOP	-TOP	-TOP	-TOP	-TOP

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

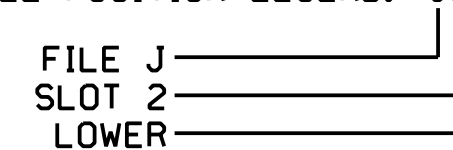
FS = FLASH SENSE
 ST = STOP TIME

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	I1U	56	18	1	1	Y	Y			
2A	TB2-5,6	I2U	39	1	2	2	Y	Y			
2B	TB2-7,8	I2L	43	5	12	2	Y	Y			
3A	TB2-9,10	I3U	63	25	32	3	Y	Y			
3B	TB2-11,12	I3L	76	38	42	3	Y	Y			10
3C	TB4-9,10	I6U	41	3	4	3	Y	Y		2.0	
3D	TB4-11,12	I6L	45	7	14	3	Y	Y		1.0	
4A	TB6-1,2	I7U	65	27	34	4	Y	Y			
4B	TB6-3,4	I7L	78	40	44	4	Y	Y			
* S31	TB6-9,10	I9U	60	22	11	SYS					
* S32	TB6-11,12	I9L	62	24	13	SYS					
5A	TB3-1,2	J1U	55	17	5	5	Y	Y			
5B	TB3-5,6	J2U	40	2	6	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			

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

INPUT FILE POSITION LEGEND: J2L



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 02-0873
 DESIGNED: March 2018
 SEALED: 12-7-18
 REVISED: N/A

Electrical Detail Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Prepared for:

US 70 Business at Wal-Mart Entrance/SR 1773 (Service Road)

Division 02 Craven Co. Havelock
 PLAN DATE: March 2018 REVIEWED BY: A.D. Klinksiek
 PREPARED BY: A.H. Thornburg REVIEWED BY: N.B. Simmons

REVISIONS	INIT.	DATE

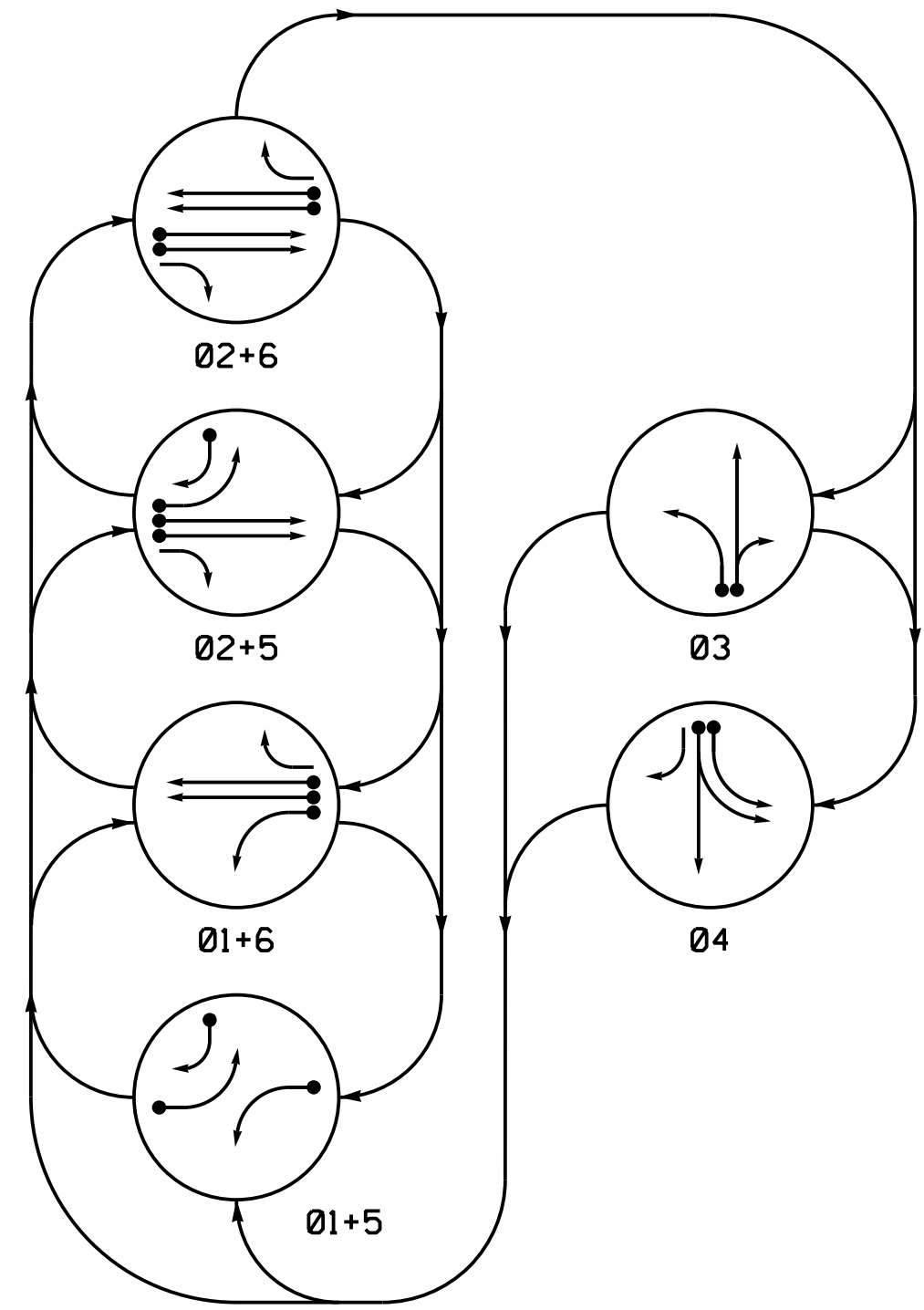
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750 N. Greenfield Pkwy, Corner, NC 27529

DocuSigned by: 12/7/2018
 SIGNATURE DATE
 SIG. INVENTORY NO. 02-0873

PHASING DIAGRAM



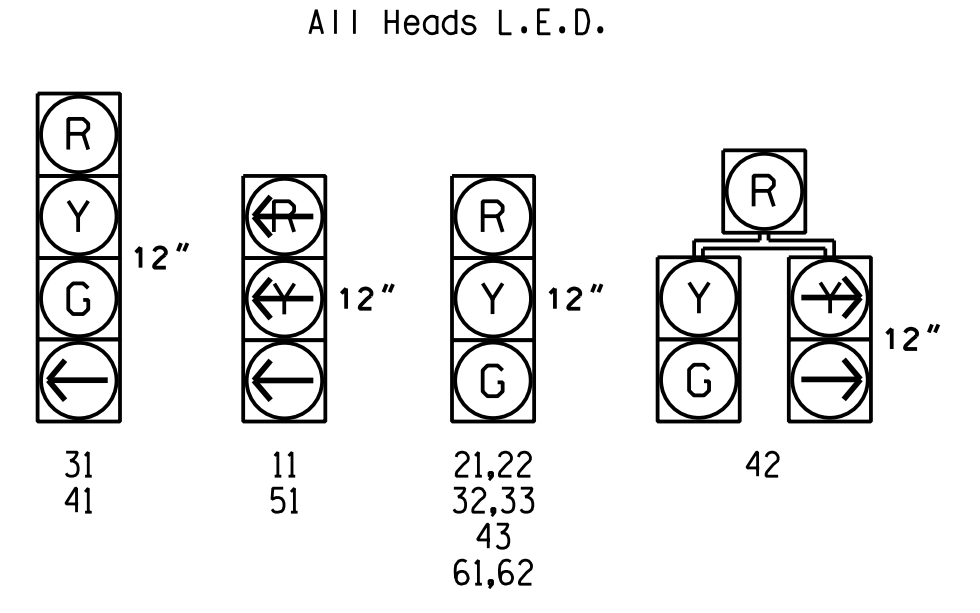
PHASING DIAGRAM DETECTION LEGEND

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

TABLE OF OPERATION

SIGNAL FACE	PHASE					
	01+5	02+5	02+6	03	04	FLSH
11	---	---	---	---	---	---
21,22	R	R	G	G	R	Y
31	R	R	R	R	G	R
32,33	R	R	R	R	G	R
41	R	R	R	R	G	R
42	R	R	R	R	G	R
43	R	R	R	R	G	R
51	---	---	---	---	---	---
61,62	R	G	R	G	R	Y

SIGNAL FACE I.D.



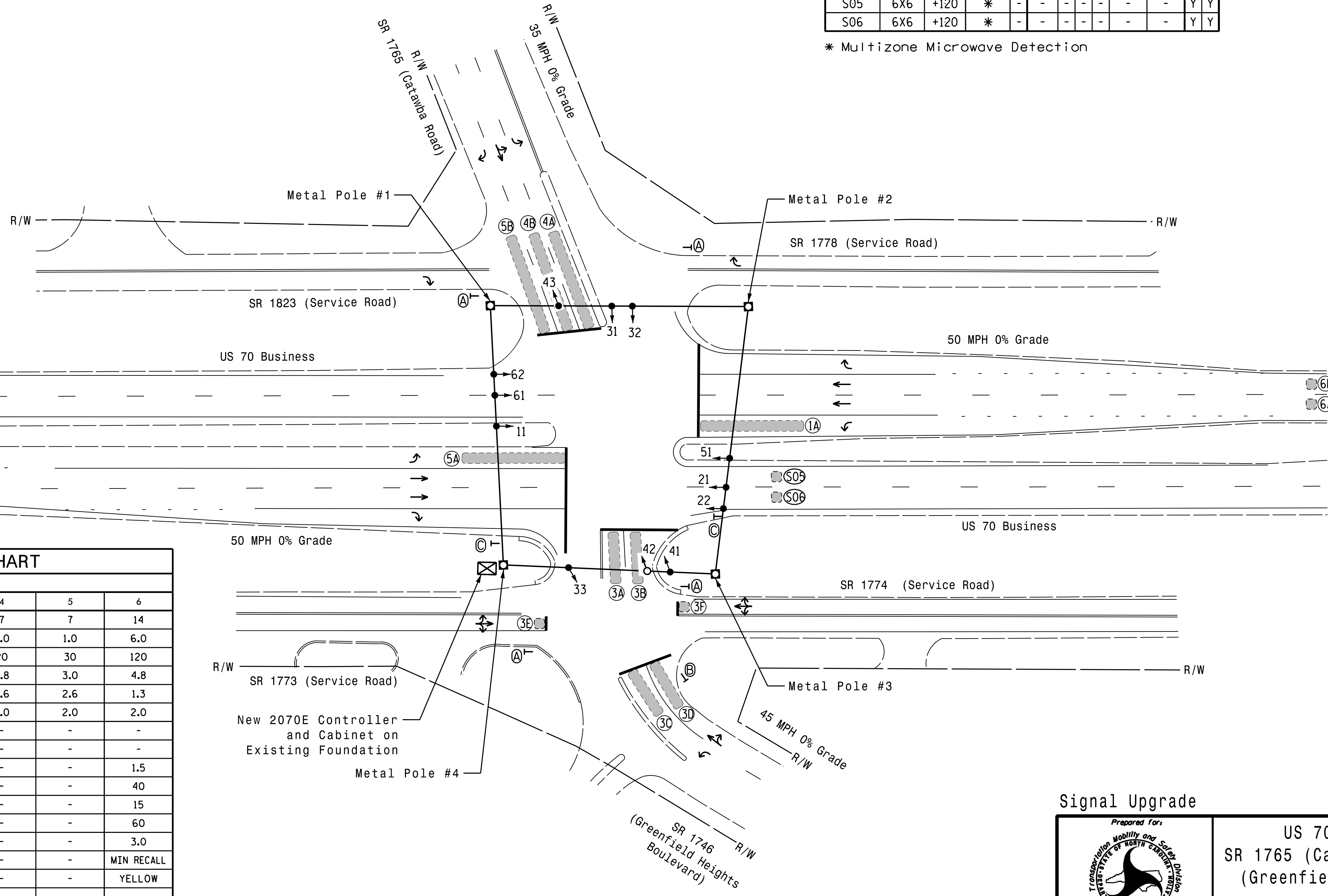
OASIS 2070 LOOP & DETECTOR INSTALLATION CHART

LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	DETECTOR PROGRAMMING					SYSTEM LOOP	NEW CARD
					PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME		
1A	6X60	0	*	-	1	Y	Y	-	-	-	Y
2A	6X6	355	*	-	2	Y	Y	-	-	-	Y
2B	6X6	355	*	-	2	Y	Y	-	-	-	Y
3A	6X30	0	*	-	3	Y	Y	-	-	-	Y
3B	6X30	0	*	-	3	Y	Y	-	-	10	Y
3C	6X30	0	*	-	3	Y	Y	-	2.0	10	Y
3D	6X30	0	*	-	3	Y	Y	-	2.0	10	Y
3E	6X6	0	*	-	3	Y	Y	-	2.0	15	Y
3F	6X6	0	*	-	3	Y	Y	-	2.0	15	Y
4A	6X60	0	*	-	4	Y	Y	-	-	-	Y
4B	6X60	0	*	-	4	Y	Y	-	-	-	Y
5A	6X60	0	*	-	5	Y	Y	-	-	-	Y
5B	6X60	0	*	-	5	Y	Y	-	-	15	Y
6A	6X6	355	*	-	6	Y	Y	-	-	-	Y
6B	6X6	355	*	-	6	Y	Y	-	-	-	Y
S05	6X6	+120	*	-	-	-	-	-	-	-	Y
S06	6X6	+120	*	-	-	-	-	-	-	-	Y

* Multizone Microwave Detection

6 Phase Fully Actuated
Havelock US 70 Business CLS
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. Reposition existing signal head numbered 41.
6. Set all detector units to presence mode.
7. The cabinet should be designed to include Auxiliary Output file for future use.
8. Incorporate Microwave Detection system for vehicle detection.
9. Provide the Engineer with the Manufacturer's approved Microwave Detection locations and mounting heights to obtain detection zones as shown.
10. Pavement markings are existing.
11. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
12. Closed loop system data: Controller Asset #0421



OASIS 2070 TIMING CHART

FEATURE	PHASE					
	1	2	3	4	5	6
Min Green 1*	7	14	7	7	7	14
Extension 1*	1.0	6.0	2.0	2.0	1.0	6.0
Max Green 1*	15	120	25	20	30	120
Yellow Clearance	3.0	4.8	4.5	3.8	3.0	4.8
Red Clearance	3.1	1.0	1.6	2.6	2.6	1.3
Red Revert	2.0	2.0	2.0	2.0	2.0	2.0
Walk 1*	-	-	-	-	-	-
Don't Walk 1	-	-	-	-	-	-
Seconds Per Actuation*	-	1.5	-	-	-	1.5
Max Variable Initial*	-	40	-	-	-	40
Time Before Reduction*	-	15	-	-	-	15
Time To Reduce*	-	60	-	-	-	60
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.

LEGEND

PROPOSED	EXISTING
○→ Traffic Signal Head	●→ Traffic Signal Head
○→ Modified Signal Head	N/A
○→ Pedestrian Signal Head With Push Button & Sign	N/A
□→ Signal Pole with Guy	□→ Signal Pole with Guy
□→ Signal Pole with Sidewalk Guy	□→ Signal Pole with Sidewalk Guy
□→ Inductive Loop Detector	□→ Inductive Loop Detector
□→ Controller & Cabinet	□→ Controller & Cabinet
□→ Junction Box	□→ Junction Box
□→ 2-in Underground Conduit	□→ 2-in Underground Conduit
N/A → Right of Way	N/A → Right of Way
→ Directional Arrow	→ Directional Arrow
▬ Microwave Detection Zone	▬ Microwave Detection Zone
○ Metal Strain Pole	○ Metal Strain Pole
Ⓐ "STOP" Sign (R1-1)	Ⓐ "STOP" Sign (R1-1)
Ⓑ "DO NOT BLOCK INTERSECTION" Sign (R10-7)	Ⓑ "DO NOT BLOCK INTERSECTION" Sign (R10-7)
Ⓒ "NO TURN ON RED" Sign (R10-11) w/ "730-830, 230-330 M-F" Panel	Ⓒ "NO TURN ON RED" Sign (R10-11) w/ "730-830, 230-330 M-F" Panel

Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

HNTB NORTH CAROLINA, P.C.
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NC License No: C-1554
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US 70 Business at SR 1765 (Catawba Rd.)/SR 1746 (Greenfield Heights Blvd.)

Division 02 Craven Co. Havelock
 PLAN DATE: March 2018 REVIEWED BY: A.D. Klinksiek
 PREPARED BY: A.H. Thornburg REVIEWED BY: N.R. Simmons

SEAL
 NORTH CAROLINA PROFESSIONAL ENGINEER
 SEAL 031464
 N. R. SIMMONS

SCALE
0 40
1"=40'

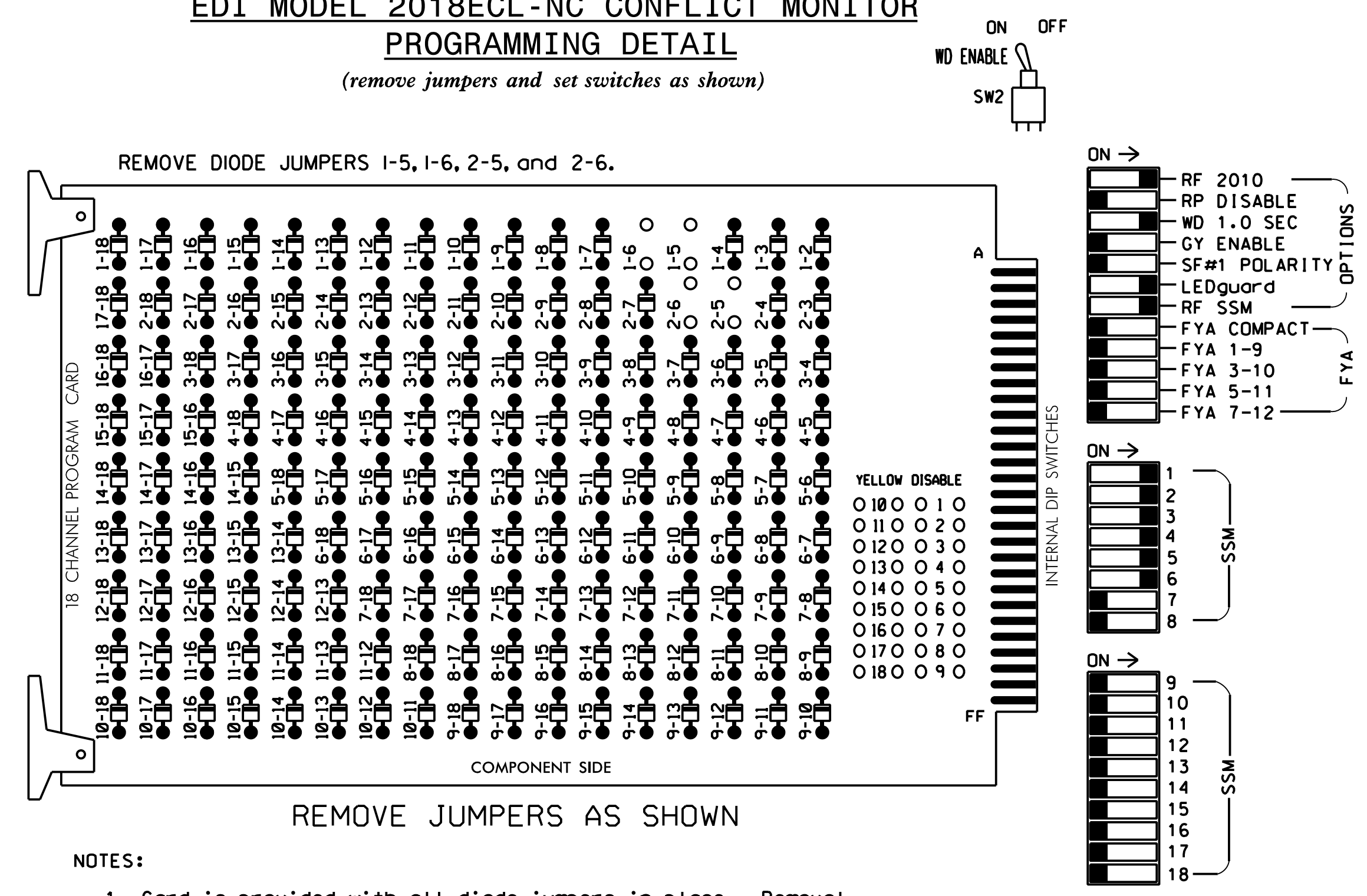
REVISIONS

NO.	REVISIONS	INIT.	DATE

DocuSigned by:
 Natasha R. Simmons
 DATE: 12/7/2018
 SIG. INVENTORY NO. 02-0421

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



NOTES:

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

NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
- 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 6 for Yellow Flash.
- The cabinet and controller are part of the Havelock US 70 Business Closed Loop 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	NU	31	32,33	41	42,43	NU	42	51	61,62	NU	NU	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	125										131							
YELLOW ARROW	126										132	132						
GREEN ARROW	127			118	103					133	133							

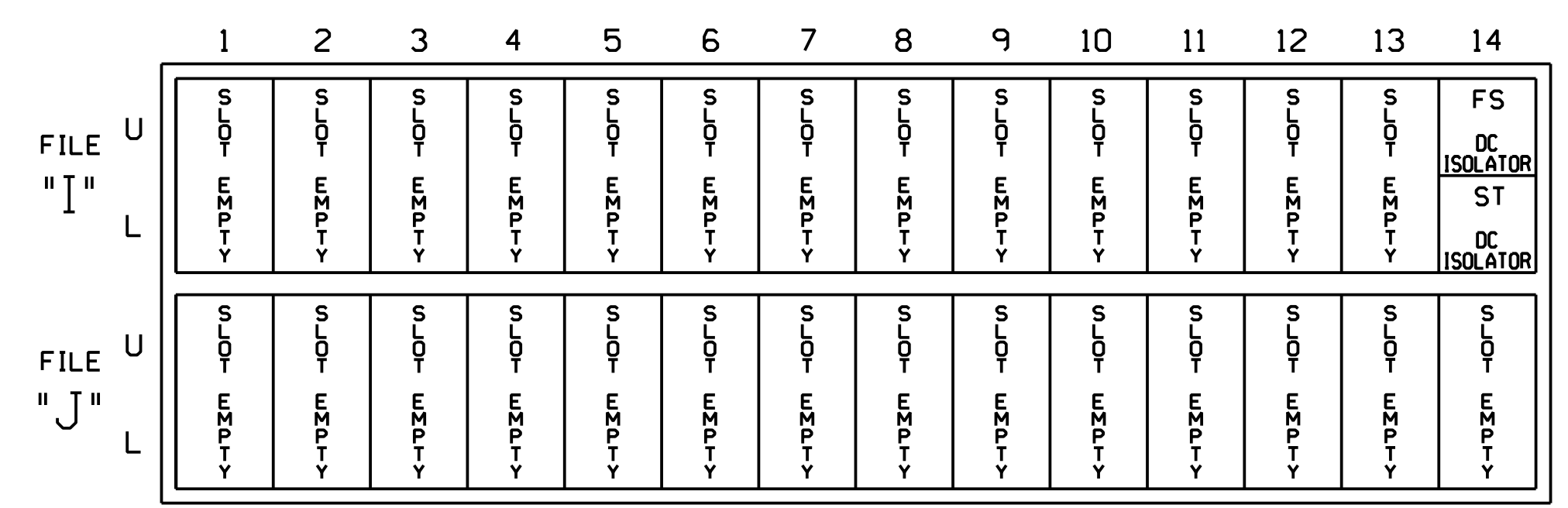
NU = Not Used

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,S4,S5,S7,S8
 PHASES USED.....1,2,3,4,5,6
 OVERLAPS.....NONE

INPUT FILE POSITION LAYOUT

(front view)



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

FS = FLASH SENSE
 ST = STOP TIME

SPECIAL DETECTOR NOTE

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.

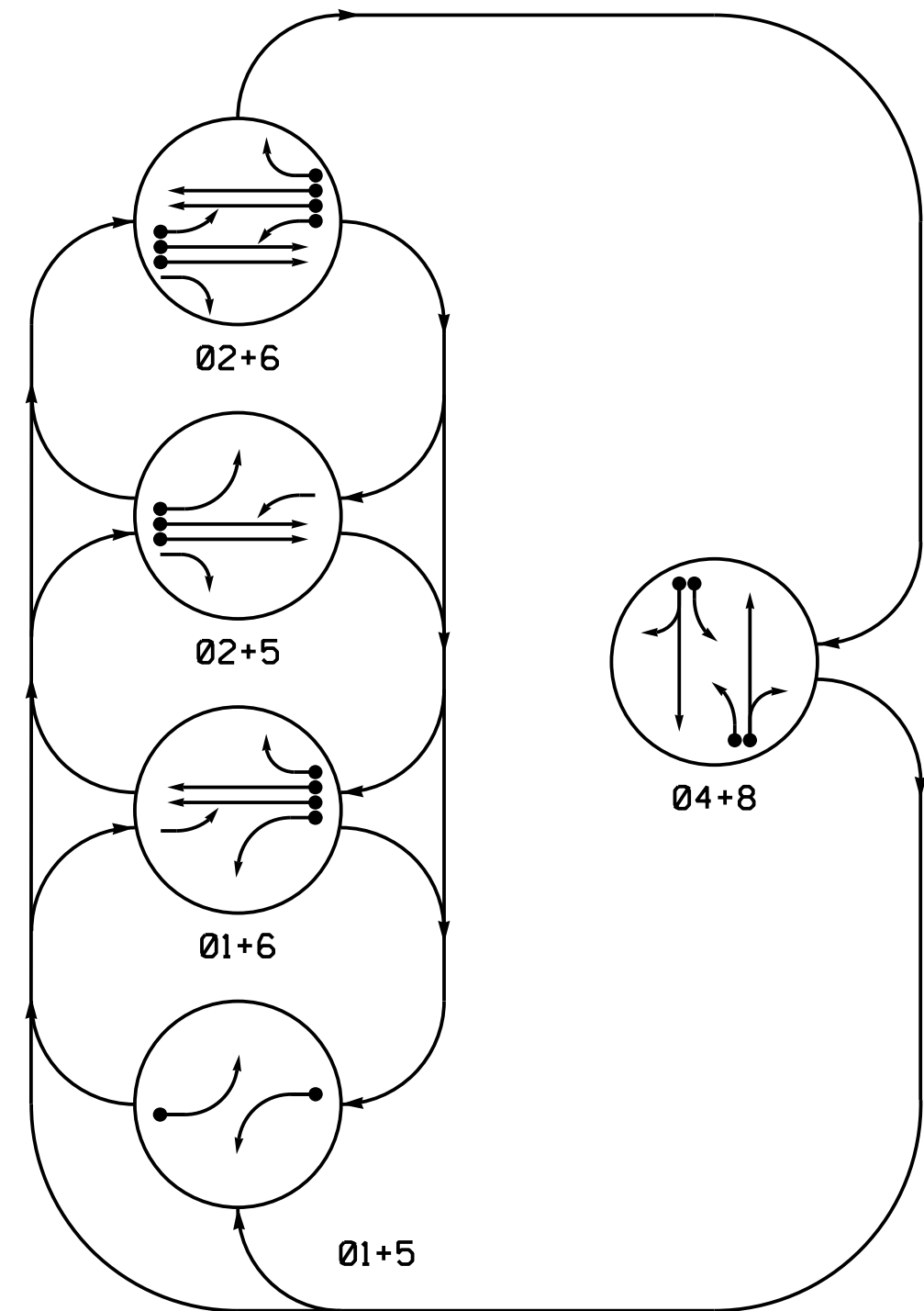
THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 02-0421
 DESIGNED: March 2018
 SEALED: 12-7-18
 REVISED: N/A

Electrical Detail
 Signal Upgrade

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

	Prepared for: 		SEAL
	US 70 Business at SR 1765 (Catawba Rd.)/SR 1746 (Greenfield Heights Blvd.)		
Division 02 Craven Co. Havelock		PLAN DATE: March 2018 REVIEWED BY: A.D. Klinksiek	
PREPARED BY: A.H. Thornburg REVIEWED BY: N.R. Simmons		REVISIONS: INIT. DATE	
HNTB NORTH CAROLINA, P.C. 343 E. Six Forks Road, Suite 200 Raleigh, North Carolina 27609 NC License No: C-1554 (919) 546-8997		DocuSigned by: Natasha R. Simmons 12/7/2018 DATE SIG. INVENTORY NO. 02-0421	

PHASING DIAGRAM

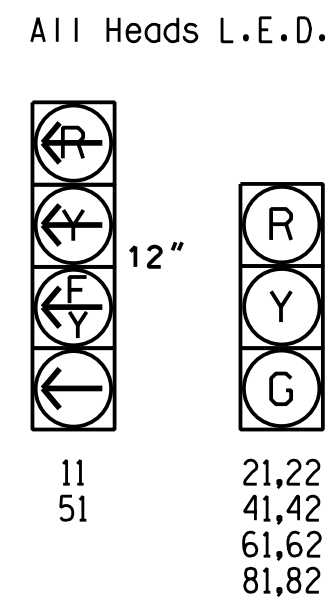


PHASING DIAGRAM DETECTION LEGEND

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

SIGNAL FACE	PHASE					
	01+5	01+6	02+5	02+6	04+8	F
11	-	-	F	F	R	Y
21,22	R	R	G	G	R	Y
41,42	R	R	R	R	G	R
51	-	F	-	F	R	Y
61,62	R	G	R	G	R	Y
81,82	R	R	R	R	G	R

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			STRETCH TIME
1A	6X60	+5	2-4-2	-	1	Y	Y	-	15	-	Y
2A	6X6	355	6	-	2	Y	Y	-	3	-	Y
2B	6X6	355	6	-	2	Y	Y	-	-	-	Y
4A	6X30	0	2-4-2	-	4	Y	Y	-	3	-	Y
4B	6X30	0	2-4-2	-	4	Y	Y	-	10	-	Y
5A	6X60	+5	2-4-2	-	5	Y	Y	-	15	-	Y
6A	6X6	310	5	-	6	Y	Y	-	-	-	Y
6B	6X6	310	5	-	6	Y	Y	-	-	-	Y
6C	6X6	310	5	-	6	Y	Y	-	-	-	Y
8A	6X30	0	2-4-2	-	8	Y	Y	-	3	-	Y
8B	6X30	0	2-4-2	-	8	Y	Y	-	10	-	Y

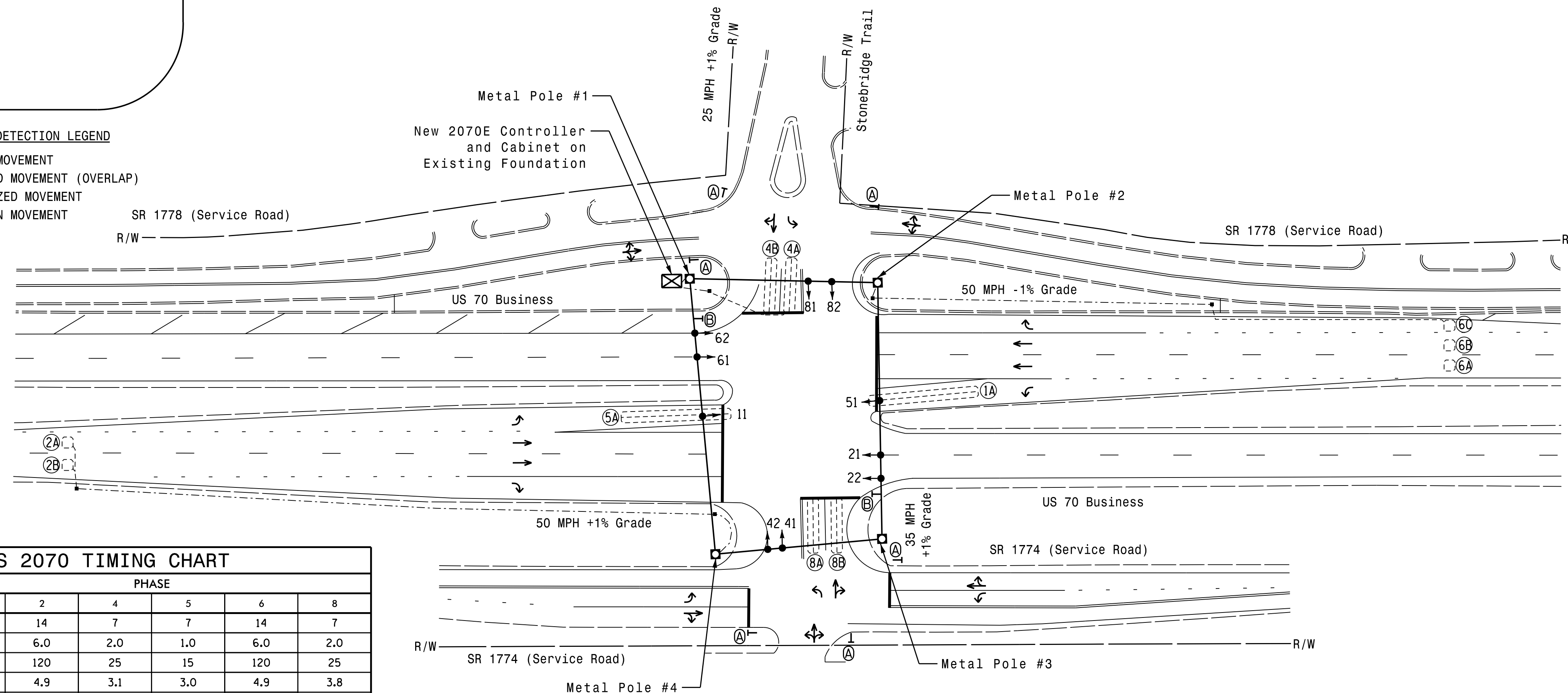
5 Phase Fully Actuated Havelock US 70 Business CLS

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.
- 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.
- Pavement markings are existing.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- Closed loop system data: Controller Asset #0854

OASIS 2070 TIMING CHART						
FEATURE	PHASE					
	1	2	4	5	6	8
Min Green 1 *	7	14	7	7	14	7
Extension 1 *	1.0	6.0	2.0	1.0	6.0	2.0
Max Green 1 *	15	120	25	15	120	25
Yellow Clearance	3.0	4.9	3.1	3.0	4.9	3.8
Red Clearance	2.6	1.1	2.9	2.6	1.1	2.1
Red Revert	2.0	2.0	2.0	2.0	2.0	2.0
Walk 1 *	-	-	-	-	-	-
Don't Walk 1	-	-	-	-	-	-
Seconds Per Actuation *	-	1.5	-	-	1.5	-
Max Variable Initial *	-	40	-	-	35	-
Time Before Reduction *	-	15	-	-	15	-
Time To Reduce *	-	45	-	-	45	-
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.



PROPOSED		EXISTING	
○ →	Traffic Signal Head	● →	N/A
○ →	Modified Signal Head	○ →	N/A
⊥	Sign	⊥	N/A
⊥	Pedestrian Signal Head With Push Button & Sign	⊥	N/A
⊥	Signal Pole with Guy	⊥	N/A
⊥	Signal Pole with Sidewalk Guy	⊥	N/A
⊠	Inductive Loop Detector	⊠	N/A
⊠	Controller & Cabinet	⊠	N/A
⊠	Junction Box	⊠	N/A
⊠	2-in Underground Conduit	⊠	N/A
N/A	Right of Way	---	N/A
→	Directional Arrow	→	N/A
⊠	Metal Strain Pole	⊠	N/A
⊠	"STOP" Sign (R1-1)	⊠	N/A
⊠	"NO TURN ON RED" Sign (R10-11)	⊠	N/A

Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

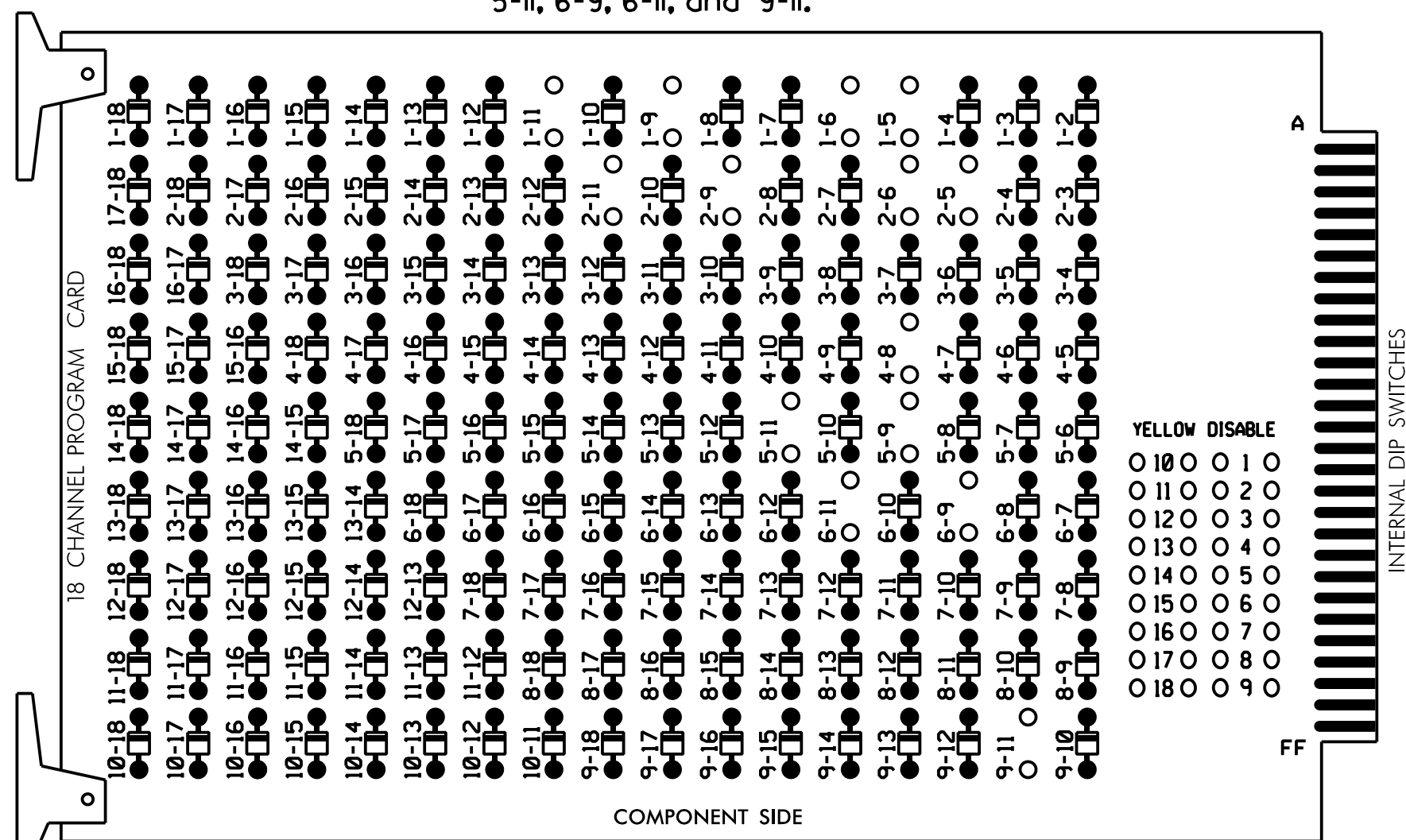
	Prepared For: TRANSPORTATION MOBILITY AND SAFETY DIVISION DEPARTMENT OF TRANSPORTATION SIGNAL DESIGN SECTION		Division 02 Craven Co. Havelock US 70 Business at Stonebridge Trail / SR 1774 (Service Road)		SEAL
	PLAN DATE: March 2018 PREPARED BY: A.H. Thornburg SCALE: 1"=40' REVISIONS:	REVIEWED BY: A.D. Klinsky REVIEWED BY: N.R. Simmons	DATE: 12/7/2018 SIGNATURE: Natasha R. Simmons	DATE:	

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 NC License No: C-1554
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EDI MODEL 2018ECL-NC CONFLICT MONITOR
PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

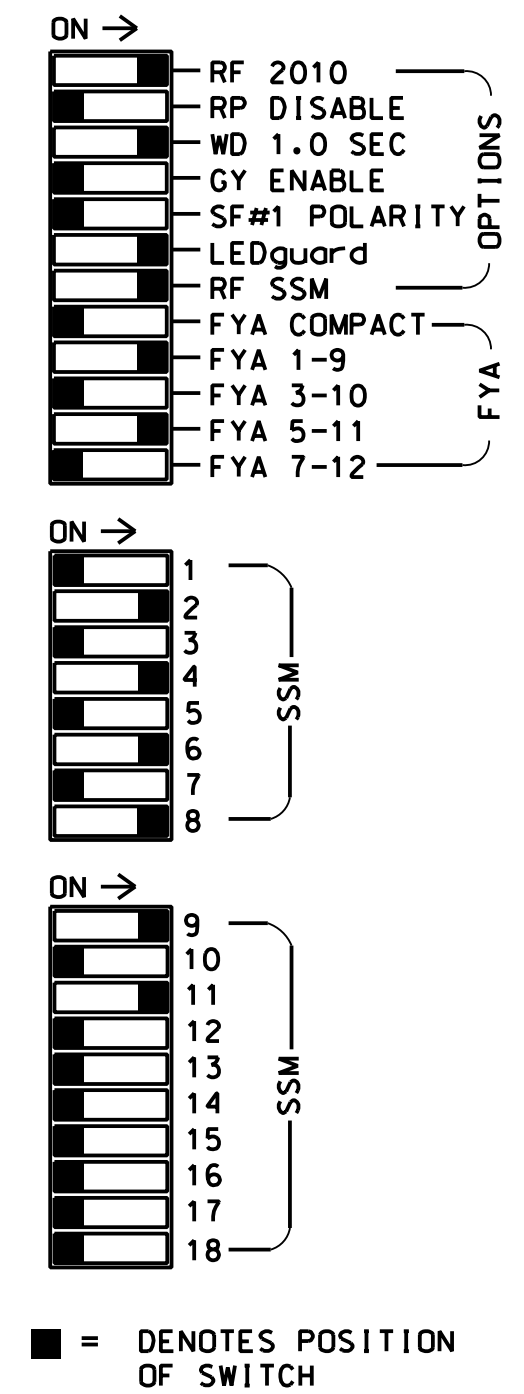
REMOVE DIODE JUMPERS 1-5, 1-6, 1-9, 1-11, 2-5, 2-6, 2-9, 2-11, 4-8, 5-9, 5-11, 6-9, 6-11, and 9-11.



REMOVE JUMPERS AS SHOWN

NOTES:

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



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 phases 2 and 6 for Yellow Flash, and overlap 1 as Wag Overlaps.
- The cabinet and controller are part of the Havelock US 70 Business Closed Loop 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,S5,S7,S8,S11,
 AUX S1,AUX S4
 PHASES USED.....1,2,4,5,6,8
 OVERLAP "A".....1+2
 OVERLAP "B".....NOT USED
 OVERLAP "C".....5+6
 OVERLAP "D".....NOT USED

SIGNAL HEAD HOOK-UP CHART

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

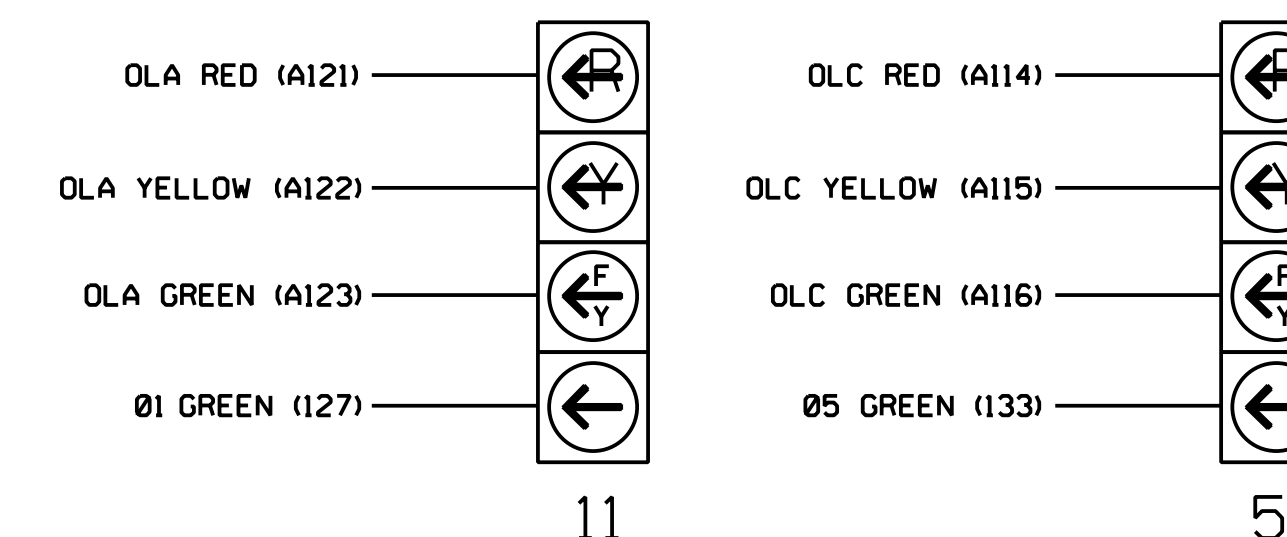
NU = Not Used

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

* See pictorial of head wiring in detail this sheet.

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)

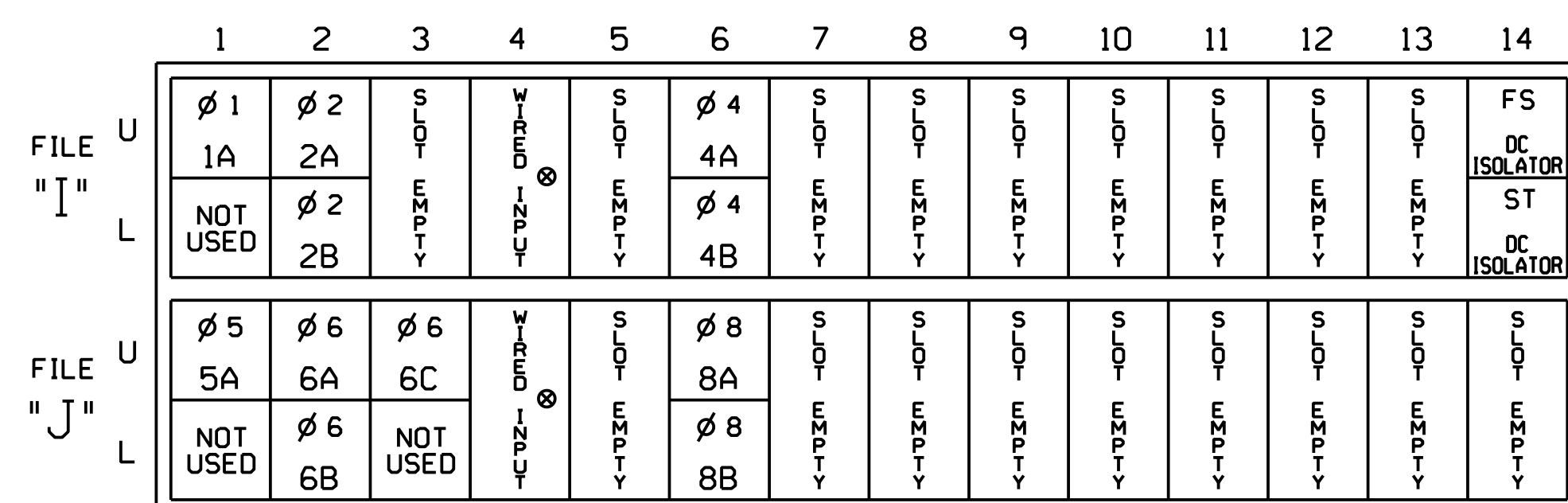


NOTE

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

INPUT FILE POSITION LAYOUT

(front view)



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

⊗ Wired Input - Do not populate slot with detector card

FS = FLASH SENSE
 ST = STOP TIME

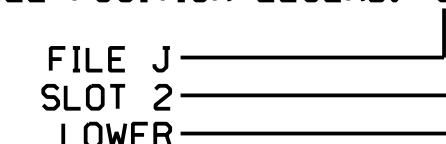
INPUT FILE CONNECTION & PROGRAMMING CHART

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 ¹	TB2-1,2	J1U	56	18	1	1	Y	Y			15
	-	J4U	48	10	26	6	Y	Y	Y		3
2A	TB2-5,6	J2U	39	1	2	2	Y	Y			
2B	TB2-7,8	J2L	43	5	12	2	Y	Y			
4A	TB4-9,10	J6U	41	3	4	4	Y	Y			3
4B	TB4-11,12	J6L	45	7	14	4	Y	Y			10
5A ²	TB3-1,2	J1U	55	17	5	5	Y	Y			15
	-	J4U	47	9	22	2	Y	Y	Y		3
6A	TB3-5,6	J2U	40	2	6	6	Y	Y			
6B	TB3-7,8	J2L	44	6	16	6	Y	Y			
6C	TB3-9,10	J3U	64	26	36	6	Y	Y			
8A	TB5-9,10	J6U	42	4	8	8	Y	Y			3
8B	TB5-11,12	J6L	46	8	18	8	Y	Y			10

¹Add jumper from J1-W to J4-W, on rear of input file.

²Add jumper from J1-W to J4-W, on rear of input file.

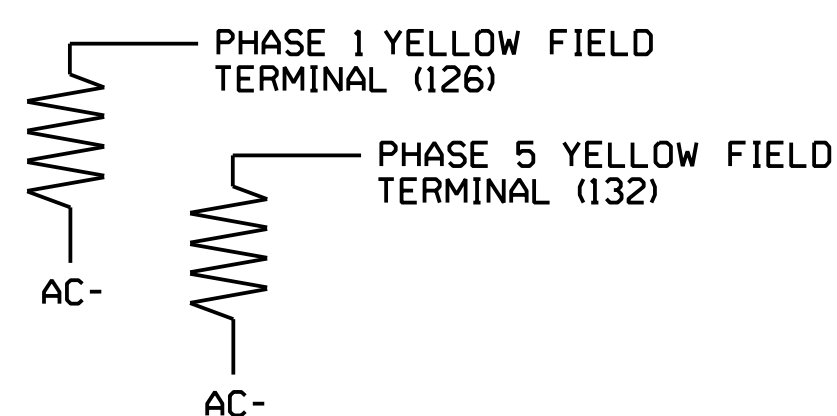
INPUT FILE POSITION LEGEND: J2L



LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown below)

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



Electrical Detail - Sheet 1 of 2
 Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

US 70 Business at Stonebridge Trail / SR 1774 (Service Road)

Division 02 Craven Co. Havelock

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

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

REVISIONS: INIT. DATE

DocuSigned by: *12/7/2018*
 Natasha R. Simmons
 SEAL 031464
 NORTH CAROLINA PROFESSIONAL ENGINEER
 SEAL 031464
 N. R. SIMMONS
 SIG. INVENTORY NO. 02-0854

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, 3, 4, 5, and 6.
- 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

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

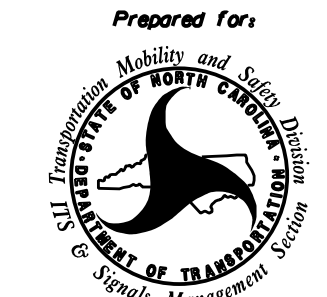
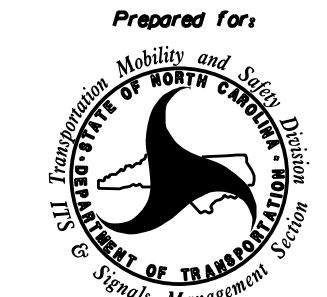
OUTPUT REFERENCE SCHEDULE	
USE TO INTERPRET LOGIC PROCESSOR	
OUTPUT 42 =	Overlap C Red
OUTPUT 43 =	Overlap C Yellow
OUTPUT 44 =	Overlap C Green
OUTPUT 50 =	Overlap A Red
OUTPUT 51 =	Overlap A Yellow
OUTPUT 52 =	Overlap A Green

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 02-0854
DESIGNED: March 2018
SEALED: 12-7-18
REVISED: N/A

Electrical Detail - Sheet 2 of 2
Signal Upgrade

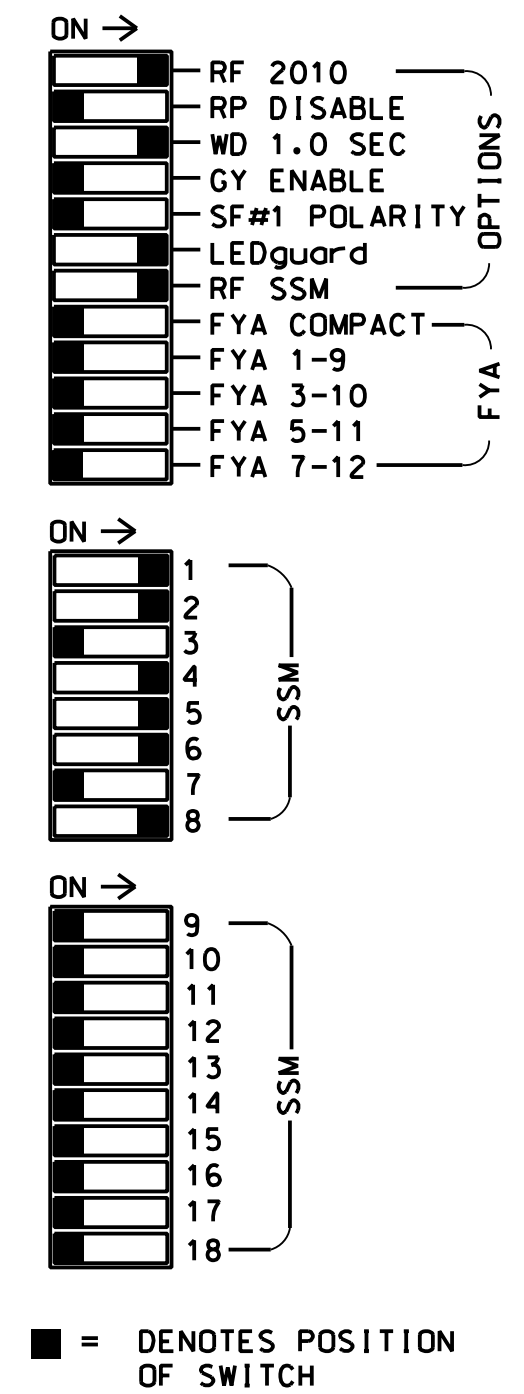
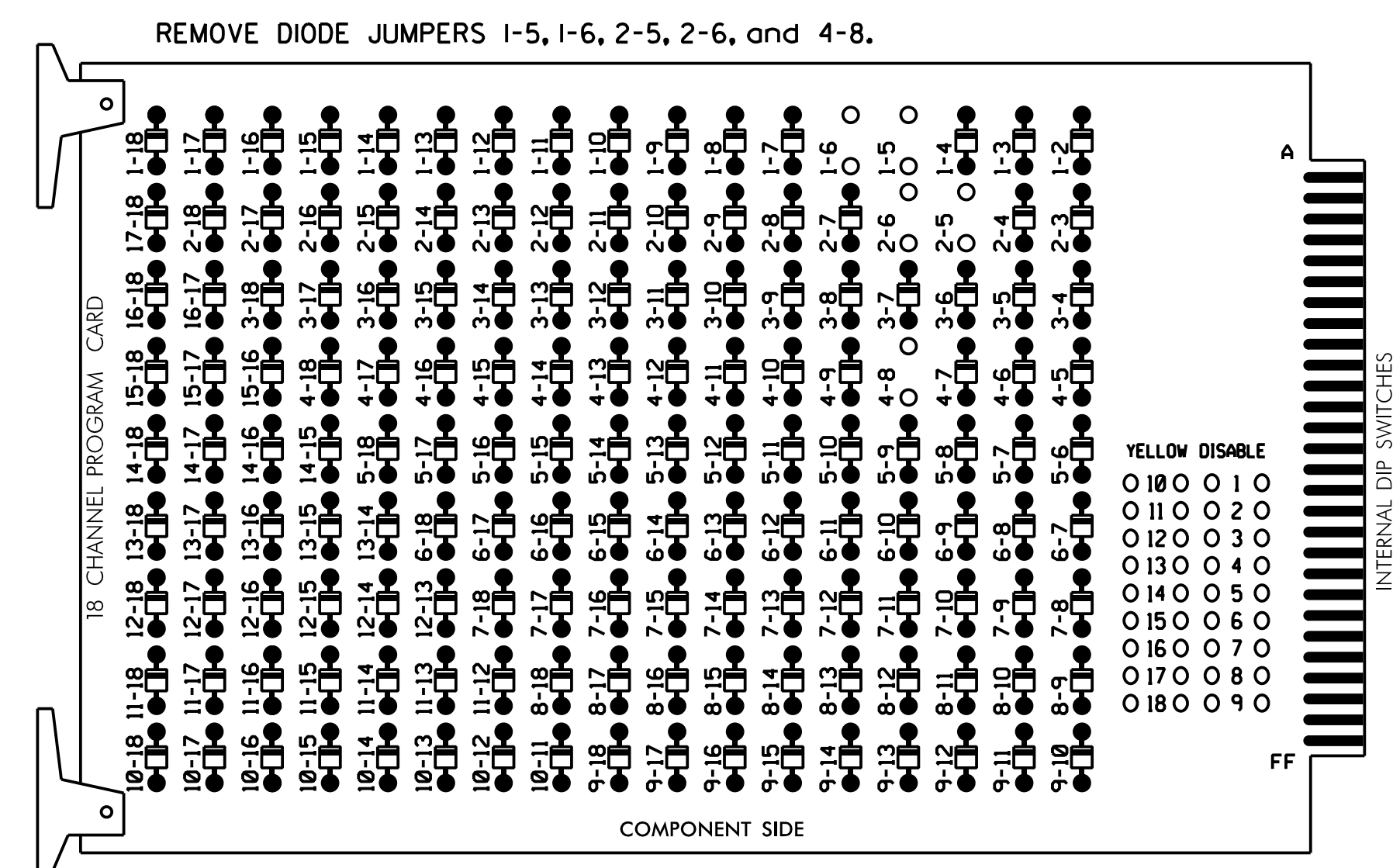
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	US 70 Business at Stonebridge Trail / SR 1774 (Service Road)	SEAL NORTH CAROLINA PROFESSIONAL ENGINEER NATASHA R. SIMMONS
Prepared for: 	Division 02 Craven Co. Havelock	SEAL 031464
PLAN DATE: March 2018	REVIEWED BY: A.D. Klinksiek	DocuSigned by: Natasha R. Simmons
PREPARED BY: A.H. Thornburg	REVIEWED BY: N.R. Simmons	DATE: 12/7/2018
REVISIONS	INIT. DATE	DATE
1750 N. Greenfield Pkwy, Corner, NC 27529	SIGNATURE	DATE
SIG. INVENTORY NO. 02-0854		

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



NOTES:

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

NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
- Enable Simultaneous Gap-Out for all Phases.
- Program phases 4 and 8 for Dual Entry.
- Program phases 2 and 6 for Variable Initial and Gap Reduction.
- Program phases 2 and 6 for Startup In Green.
- Program phases 2 and 6 for Yellow Flash.
- The cabinet and controller are part of the Havelock US 70 Business Closed Loop 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	NU	NU	41,42	NU	51	61,62	NU	NU	81,82	NU	NU	NU	NU	NU	NU	NU
RED		128			101			134			107							
YELLOW		129			102			135			108							
GREEN		130			103			136			109							
RED ARROW	125							131										
YELLOW ARROW	126							132										
FLASHING YELLOW ARROW																		
GREEN ARROW	127							133										

NU = Not Used

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,S5,S7,S8,S11
 PHASES USED.....1,2,4,5,6,8
 OVERLAPS.....NONE

INPUT FILE POSITION LAYOUT

(front view)

FILE "I"	1	2	3	4	5	6	7	8	9	10	11	12	13	14
U	∅ 1	∅ 2	∅ S	∅ S	∅ S	∅ 4	∅ 4	∅ S	∅ S	∅ S	∅ S	∅ S	∅ S	FS
L	1A	2A	2B	2B	2B	4A	4C	4B	4D	4B	4D	4B	4D	DC ISOLATOR
U	∅ 5	∅ 6	∅ S	∅ S	∅ S	∅ 8	∅ 8	∅ S	∅ S	∅ S	∅ S	∅ S	∅ S	∅ S
L	5A	6A	6B	6B	6B	8A	8C	8B	8B	8B	8B	8B	8B	DC ISOLATOR

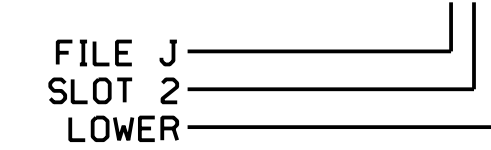
EX. : 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE
 ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
1A	TB2-1,2	I1U	56	18	1	1	Y	Y			
2A	TB2-5,6	I2U	39	1	2	2	Y	Y			
2B	TB2-7,8	I2L	43	5	12	2	Y	Y			
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			3
4B	TB4-11,12	I6L	45	7	14	4	Y	Y		2.0	5
4C	TB6-1,2	I7U	65	27	34	4	Y	Y		2.0	15
4D	TB6-3,4	I7L	78	40	44	4	Y	Y		2.0	15
5A	TB3-1,2	J1U	55	17	5	5	Y	Y			
6A	TB3-5,6	J2U	40	2	6	6	Y	Y			
6B	TB3-7,8	J2L	44	6	16	6	Y	Y			
8A	TB5-9,10	J6U	42	4	8	8	Y	Y			3
8B	TB5-11,12	J6L	46	8	18	8	Y	Y		2.0	15
8C	TB7-1,2	J7U	66	28	38	8	Y	Y		2.0	15

INPUT FILE POSITION LEGEND: J2L



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 02-0193
 DESIGNED: March 2018
 SEALED: 12-7-18
 REVISED: N/A

Electrical Detail Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Prepared for:

US 70 Business (W Main Street) at Chadwick Avenue / SR 1775 (W Main Street)

Division 02 Craven Co. Havelock

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

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

REVISIONS	INIT.	DATE

SEAL

 SEAL 031464
 NATASHA R. SIMMONS
 ENGINEER

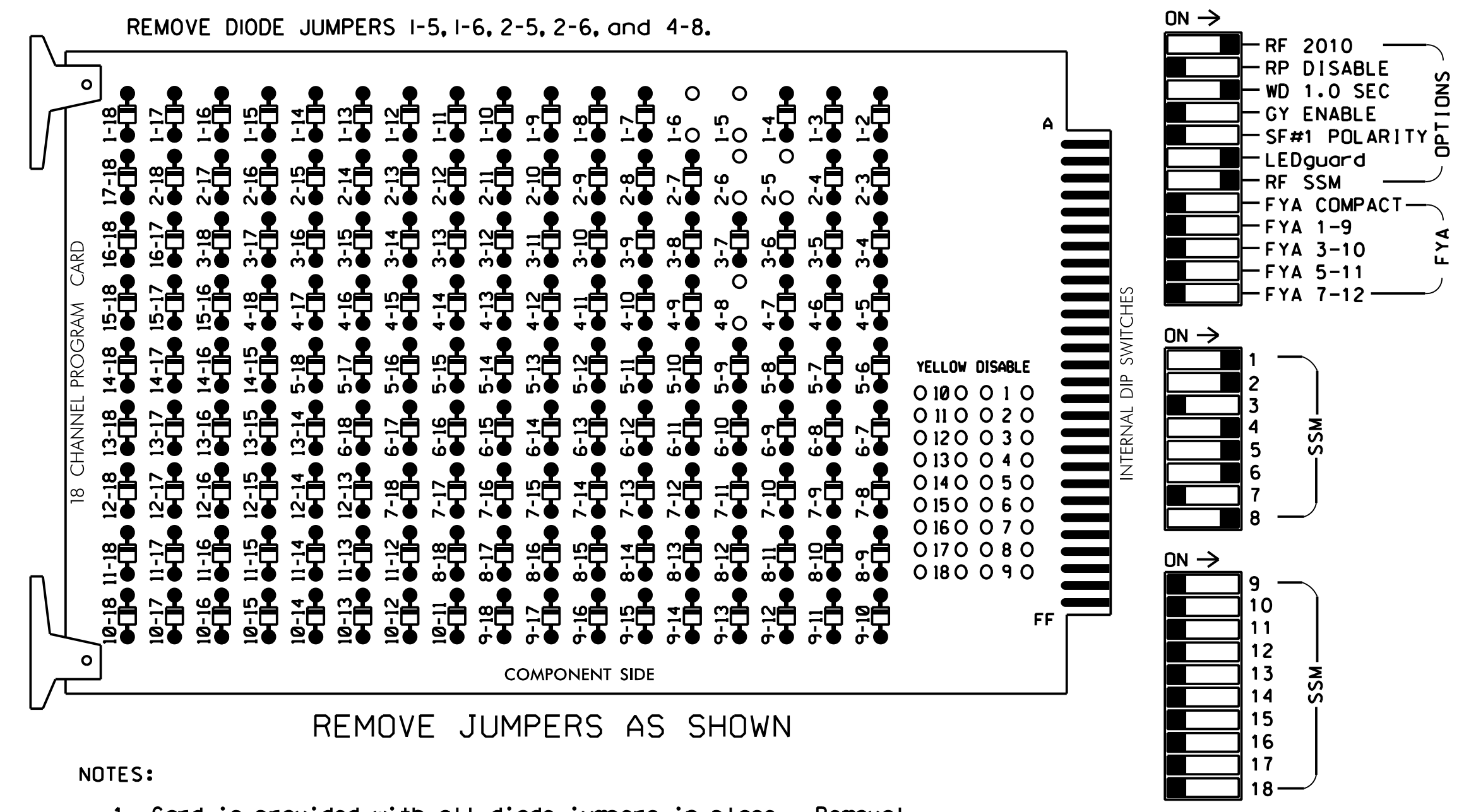
HNTB HNTB NORTH CAROLINA, P.C.
 343 E. Six Forks Road, Suite 200
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 NC License No: C-1554
 (919) 546-8997

750 N. Greenfield Pkwy, Corner, NC 27529

DocuSigned by:
 12/7/2018
 SIGNATURE DATE
 SIG. INVENTORY NO. 02-0193

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



NOTES:

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

NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
- Enable Simultaneous Gap-Out for all Phases.
- Program phases 4 and 8 for Dual Entry.
- Program phases 2 and 6 for Variable Initial and Gap Reduction.
- Program phases 2 and 6 for Startup In Green.
- Program phases 2 and 6 for Yellow Flash.
- The cabinet and controller are part of the Havelock US 70 Business Closed Loop 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	NU	NU	41,42	NU	51	61,62	NU	NU	81,82	NU	NU	NU	NU	NU	NU	NU
RED		128			101			134			107							
YELLOW		129			102			135			108							
GREEN		130			103			136			109							
RED ARROW	125							131										
YELLOW ARROW	126							132										
FLASHING YELLOW ARROW																		
GREEN ARROW	127							133										

NU = Not Used

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,S5,S7,S8,S11
 PHASES USED.....1,2,4,5,6,8
 OVERLAPS.....NONE

INPUT FILE POSITION LAYOUT

(front view)

FILE "I"	1	2	3	4	5	6	7	8	9	10	11	12	13	14
U	∅ 1	∅ 2	∅ 3	S	∅ 4	∅ 4	S	SYS	S	S	S	S	S	FS
L	1A	2A	∅ 2	∅ 3	∅ 4	∅ 4	∅ 3	S09	∅ 4	∅ 4	∅ 3	∅ 4	∅ 3	DC ISOLATOR
U	NOT USED	2B	∅ 3	∅ 4	∅ 4	∅ 4	∅ 3	SYS	∅ 4	∅ 4	∅ 3	∅ 4	∅ 3	ST
L								S10						DC ISOLATOR
U	∅ 5	∅ 6	∅ 7	∅ 8	∅ 8	∅ 7	∅ 8	∅ 8	∅ 7	∅ 8	∅ 8	∅ 7	∅ 8	∅ 8
L	5A	6A	∅ 6	∅ 7	∅ 8	∅ 8	∅ 7	∅ 8	∅ 8	∅ 7	∅ 8	∅ 8	∅ 7	∅ 8
U	NOT USED	6B	∅ 7	∅ 8	∅ 8	∅ 7	∅ 8	∅ 8	∅ 7	∅ 8	∅ 8	∅ 7	∅ 8	∅ 8
L														

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

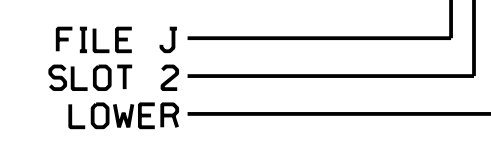
FS = FLASH SENSE
 ST = STOP TIME

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			
2A	TB2-5,6	12U	39	1	2	Y	Y				
2B	TB2-7,8	12L	43	5	12	2	Y	Y			
4A	TB4-9,10	16U	41	3	4	4	Y	Y			3
4B	TB4-11,12	16L	45	7	14	4	Y	Y		2.0	10
4C	TB6-1,2	17U	65	27	34	4	Y	Y		2.0	15
4D	TB6-3,4	17L	78	40	44	4	Y	Y		2.0	15
* S09	TB6-9,10	19U	60	22	11	SYS					
* S10	TB6-11,12	19L	62	24	13	SYS					
5A	TB3-1,2	J1U	55	17	5	5	Y	Y			
6A	TB3-5,6	J2U	40	2	6	6	Y	Y			
6B	TB3-7,8	J2L	44	6	16	6	Y	Y			
8A	TB5-9,10	J6U	42	4	8	8	Y	Y			3
8B	TB5-11,12	J6L	46	8	18	8	Y	Y		2.0	10
8C	TB7-1,2	J7U	66	28	38	8	Y	Y		2.0	15
8D	TB7-3,4	J7L	79	41	48	8	Y	Y		2.0	15

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

INPUT FILE POSITION LEGEND: J2L



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 02-0225
 DESIGNED: March 2018
 SEALED: 12-7-18
 REVISED: N/A

Electrical Detail Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Prepared for: **US 70 Business (W Main Street) at Trader Avenue / Holly Drive**

Division 02 Craven Co. Havelock

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

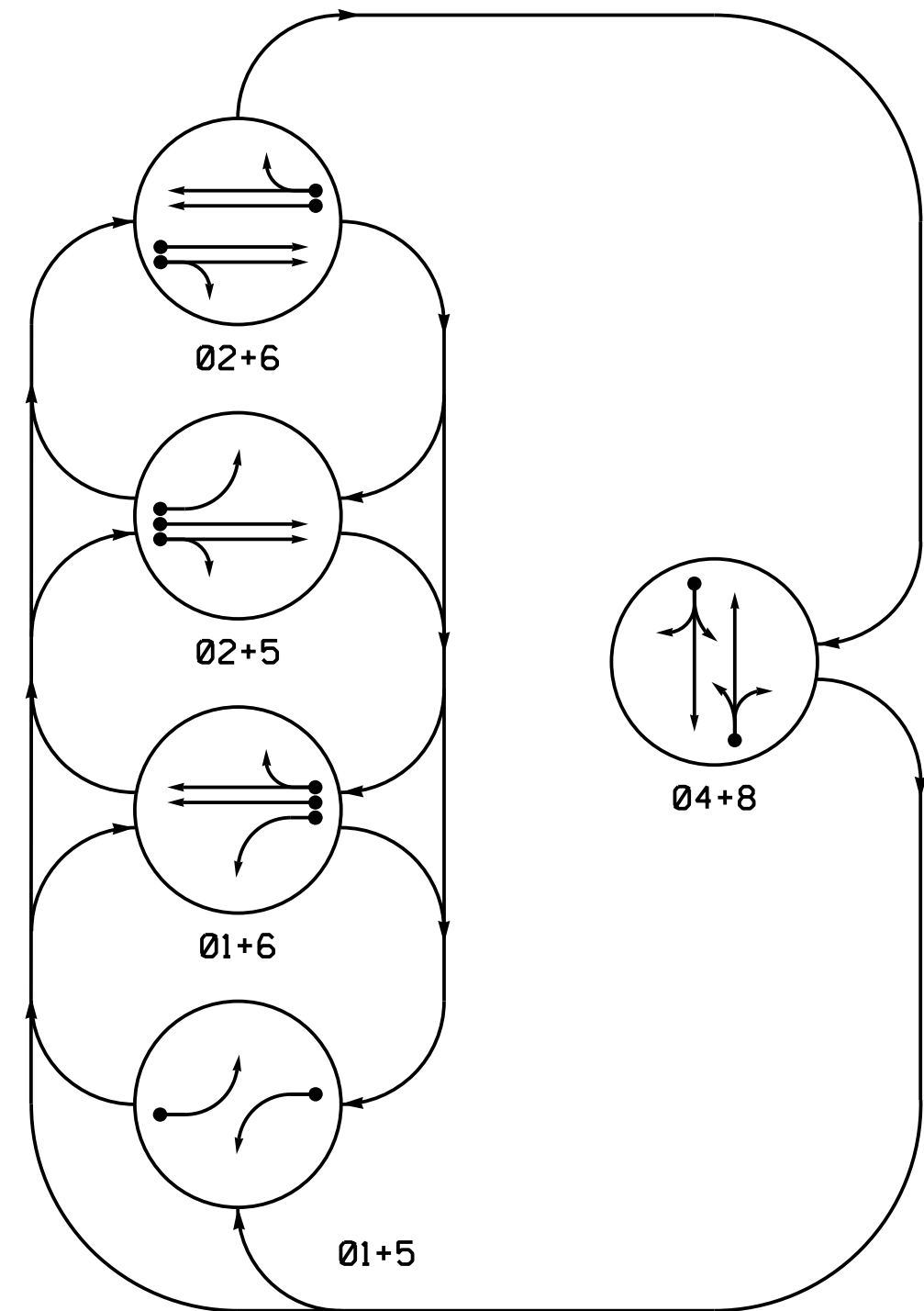
PREPARED BY: A.H. Thornburg REVIEWED BY: N.R. Simmons

REVISIONS: _____ INITI: _____ DATE: _____

DocuSigned by: **Natasha R. Simmons** 12/7/2018

SIG. INVENTORY NO. 02-0225

PHASING DIAGRAM



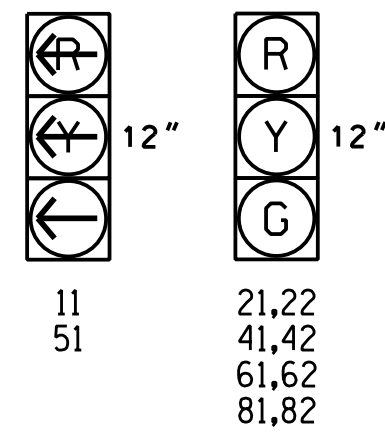
PHASING DIAGRAM DETECTION LEGEND

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

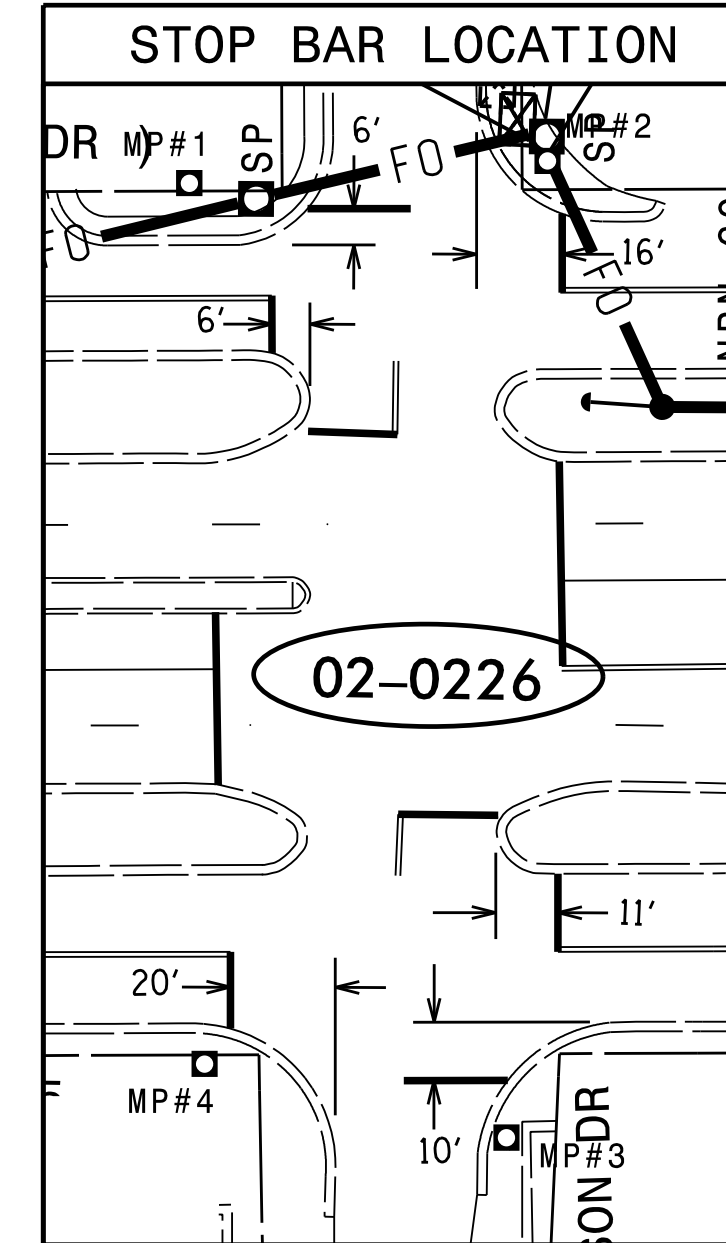
SIGNAL FACE	PHASE				
	01+5	01+6	02+5	02+6	04+8
11	---	---	---	---	---
21,22	R	R	G	G	R
41,42	R	R	R	R	G
51	---	---	---	---	---
61,62	R	G	R	G	R
81,82	R	R	R	R	G

SIGNAL FACE I.D.

All Heads L.E.D.



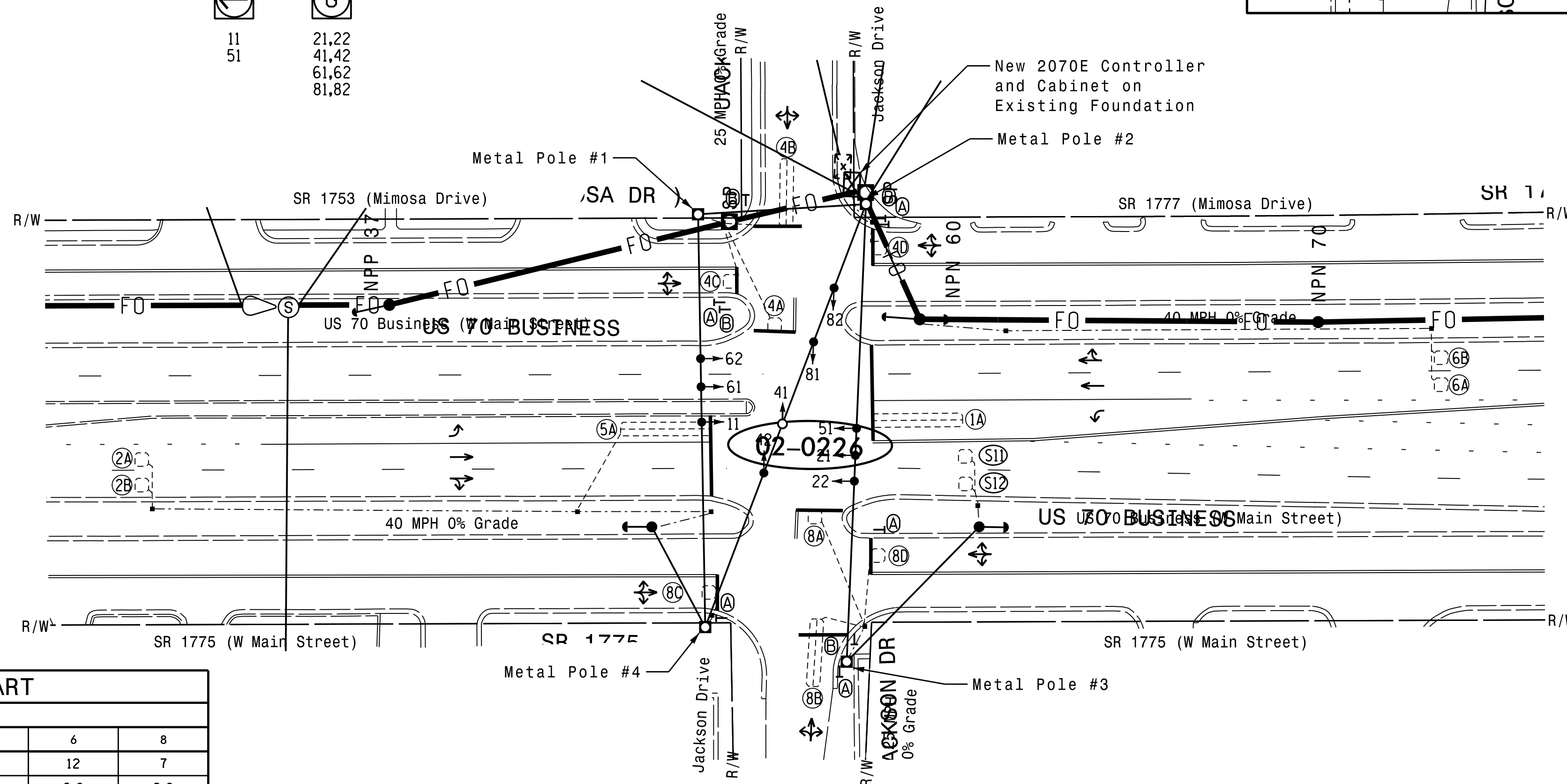
INDUCTIVE LOOPS				DETECTOR PROGRAMMING								
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
1A	6X40	0	2-4-2	-	1	Y	Y	-	-	-	-	Y
2A	6X6	250	4	-	2	Y	Y	-	-	-	-	Y
2B	6X6	250	4	-	2	Y	Y	-	-	-	-	Y
4A	6X6	0	4	-	4	Y	Y	-	-	5	-	Y
4B	6X30	45	2-4-2	-	4	Y	Y	-	1.0	5	-	Y
4C	6X6	0	4	-	4	Y	Y	-	2.0	15	-	Y
4D	6X6	0	4	-	4	Y	Y	-	2.0	15	-	Y
5A	6X40	0	2-4-2	-	5	Y	Y	-	-	-	-	Y
6A	6X6	255	4	-	6	Y	Y	-	-	-	-	Y
6B	6X6	255	4	-	6	Y	Y	-	-	-	-	Y
8A	6X6	0	4	-	8	Y	Y	-	-	5	-	Y
8B	6X30	+5	2-4-2	-	8	Y	Y	-	1.0	5	-	Y
8C	6X6	0	4	-	8	Y	Y	-	2.0	15	-	Y
8D	6X6	0	4	-	8	Y	Y	-	2.0	15	-	Y
S11	6X6	+110	4	-	-	-	-	-	-	-	Y	Y
S12	6X6	+110	4	-	-	-	-	-	-	-	Y	Y



5 Phase Fully Actuated Havelock US 70 Business CLS

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.
- 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.
- The cabinet should be designed to include Auxiliary Output file for future use.
- Repaint pavement markings as shown.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- Closed loop system data: Controller Asset #0226



FEATURE	PHASE					
	1	2	4	5	6	8
Min Green 1 *	7	12	7	7	12	7
Extension 1 *	2.0	6.0	2.0	2.0	6.0	2.0
Max Green 1 *	20	75	25	15	75	25
Yellow Clearance	3.0	4.2	3.2	3.0	4.2	3.2
Red Clearance	2.1	1.2	2.2	2.3	1.0	2.2
Red Revert	2.0	2.0	2.0	2.0	2.0	2.0
Walk 1 *	-	-	-	-	-	-
Don't Walk 1	-	-	-	-	-	-
Seconds Per Actuation *	-	1.5	-	-	1.5	-
Max Variable Initial *	-	29	-	-	30	-
Time Before Reduction *	-	15	-	-	15	-
Time To Reduce *	-	45	-	-	45	-
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.

PROPOSED	LEGEND	EXISTING
	Traffic Signal Head	
	Modified Signal Head	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
	Right of Way	
	Directional Arrow	
	Metal Strain Pole	
	"STOP" Sign (R1-1)	
	"DO NOT BLOCK INTERSECTION" Sign (R10-7)	

Signal Upgrade

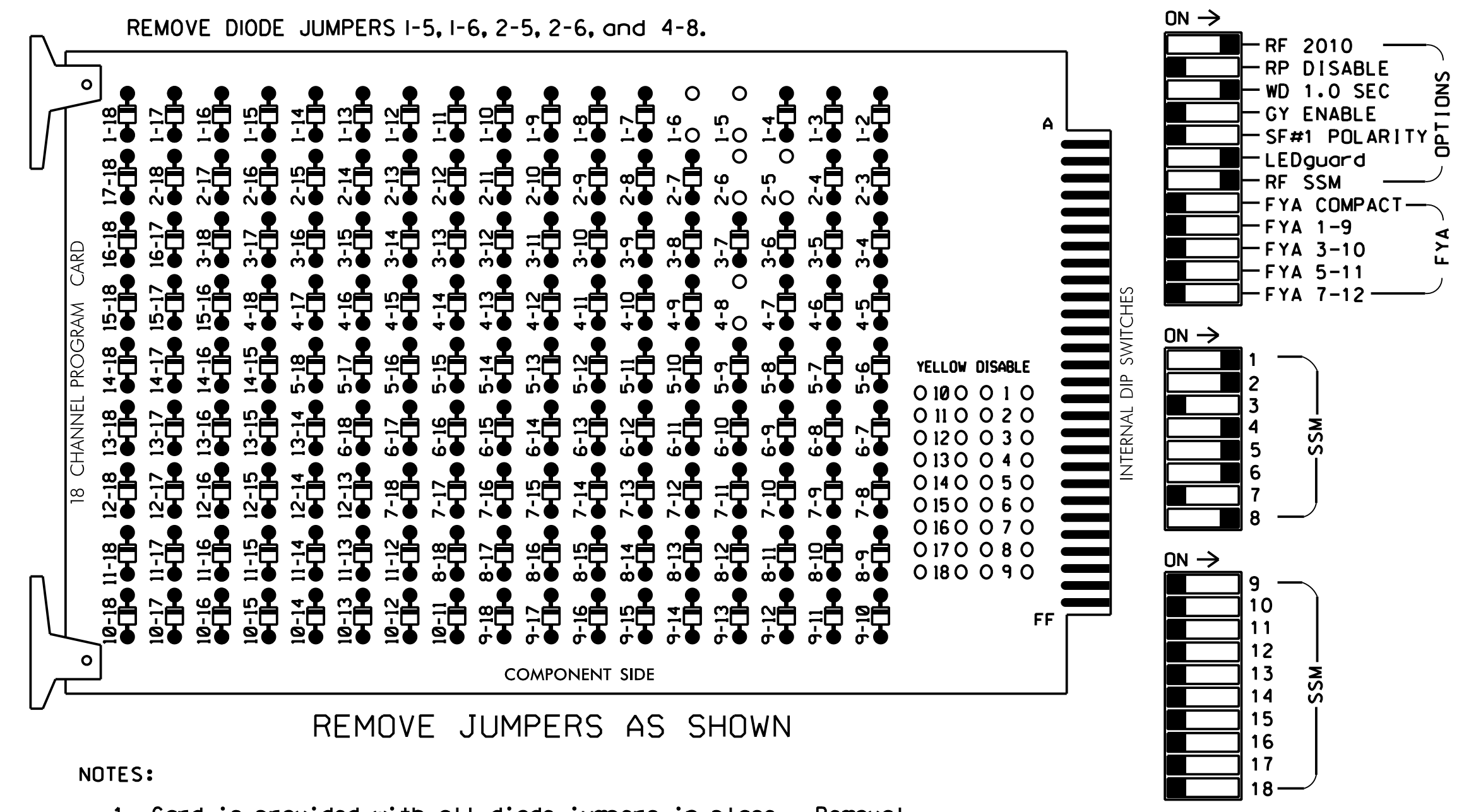
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

	US 70 Business (W Main Street) at Jackson Drive		
	Division 02 Craven Co. Havelock	PLAN DATE: March 2018 REVIEWED BY: A.D. Klinskiak	
SCALE: 1"=40'	REVISIONS:	INITI. DATE	DATE: 12/7/2018

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 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



NOTES:

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

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Enable Simultaneous Gap-Out for all Phases.
3. Program phases 4 and 8 for Dual Entry.
4. Program phases 2 and 6 for Variable Initial and Gap Reduction.
5. Program phases 2 and 6 for Startup In Green.
6. Program phases 2 and 6 for Yellow Flash.
7. The cabinet and controller are part of the Havelock US 70 Business Closed Loop 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	NU	NU	41,42	NU	51	61,62	NU	NU	81,82	NU	NU	NU	NU	NU	NU	NU
RED		128			101			134			107							
YELLOW		129			102			135			108							
GREEN		130			103			136			109							
RED ARROW	125							131										
YELLOW ARROW	126							132										
FLASHING YELLOW ARROW																		
GREEN ARROW	127							133										

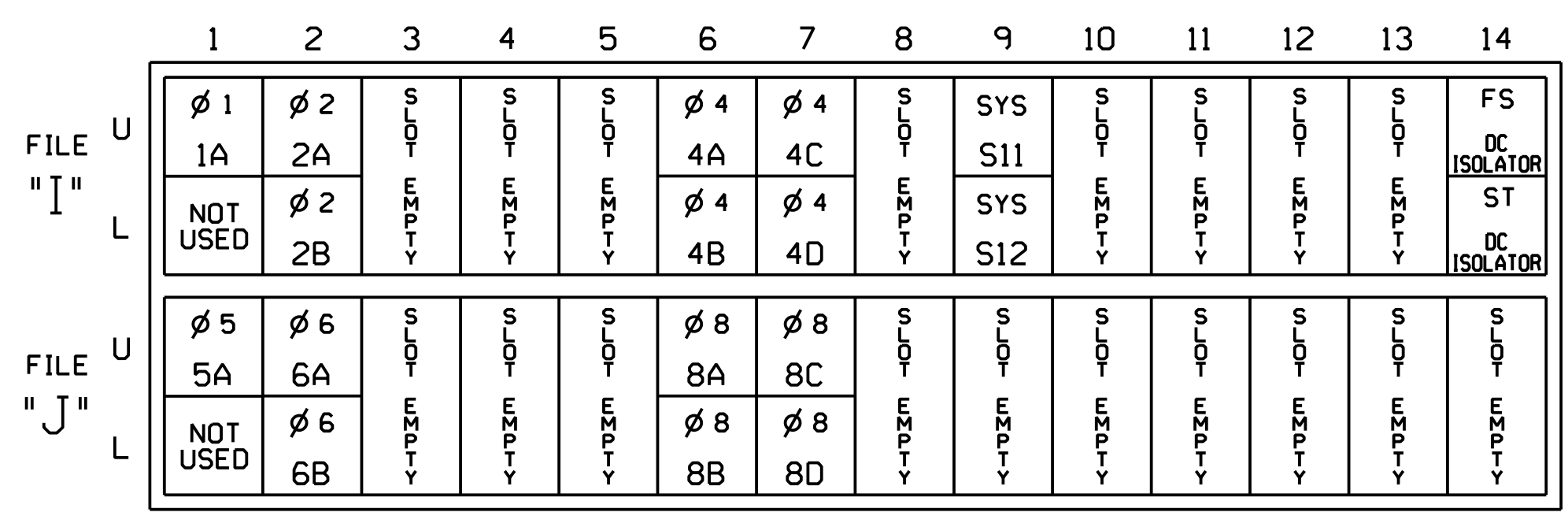
NU = Not Used

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,S5,S7,S8,S11
 PHASES USED.....1,2,4,5,6,8
 OVERLAPS.....NONE

INPUT FILE POSITION LAYOUT

(front view)



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

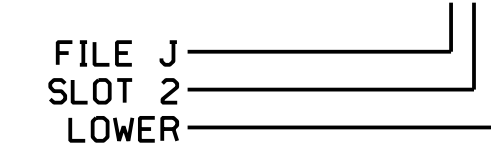
FS = FLASH SENSE
 ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
1A	TB2-1,2	I1U	56	18	1	1	Y	Y			
2A	TB2-5,6	I2U	39	1	2	2	Y	Y			
2B	TB2-7,8	I2L	43	5	12	2	Y	Y			
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			5
4B	TB4-11,12	I6L	45	7	14	4	Y	Y		1.0	5
4C	TB6-1,2	I7U	65	27	34	4	Y	Y		2.0	15
4D	TB6-3,4	I7L	78	40	44	4	Y	Y		2.0	15
* S11	TB6-9,10	I9U	60	22	11	SYS					
* S12	TB6-11,12	I9L	62	24	13	SYS					
5A	TB3-1,2	J1U	55	17	5	5	Y	Y			
6A	TB3-5,6	J2U	40	2	6	6	Y	Y			
6B	TB3-7,8	J2L	44	6	16	6	Y	Y			
8A	TB5-9,10	J6U	42	4	8	8	Y	Y			5
8B	TB5-11,12	J6L	46	8	18	8	Y	Y		1.0	5
8C	TB7-1,2	J7U	66	28	38	8	Y	Y		2.0	15
8D	TB7-3,4	J7L	79	41	48	8	Y	Y		2.0	15

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

INPUT FILE POSITION LEGEND: J2L



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 02-0226
 DESIGNED: March 2018
 SEALED: 12-7-18
 REVISED: N/A

Electrical Detail Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Prepared for: **US 70 Business (W Main Street) at Jackson Drive**

Division 02 Craven Co. Havelock

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

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

750 N. Greenfield Pkwy, Corner, NC 27529

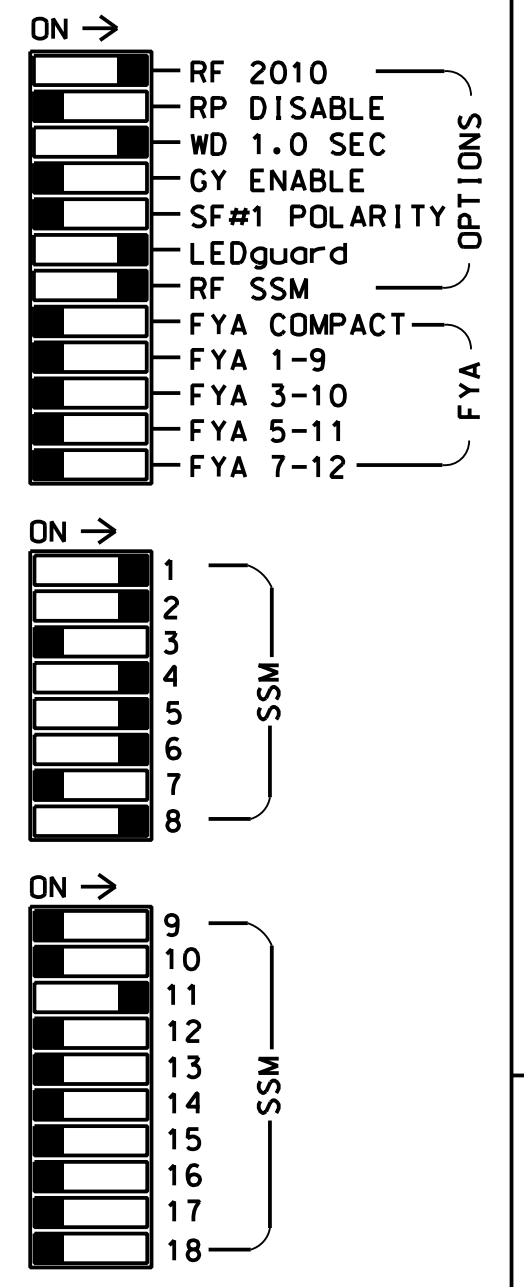
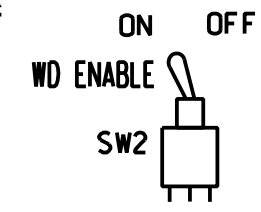
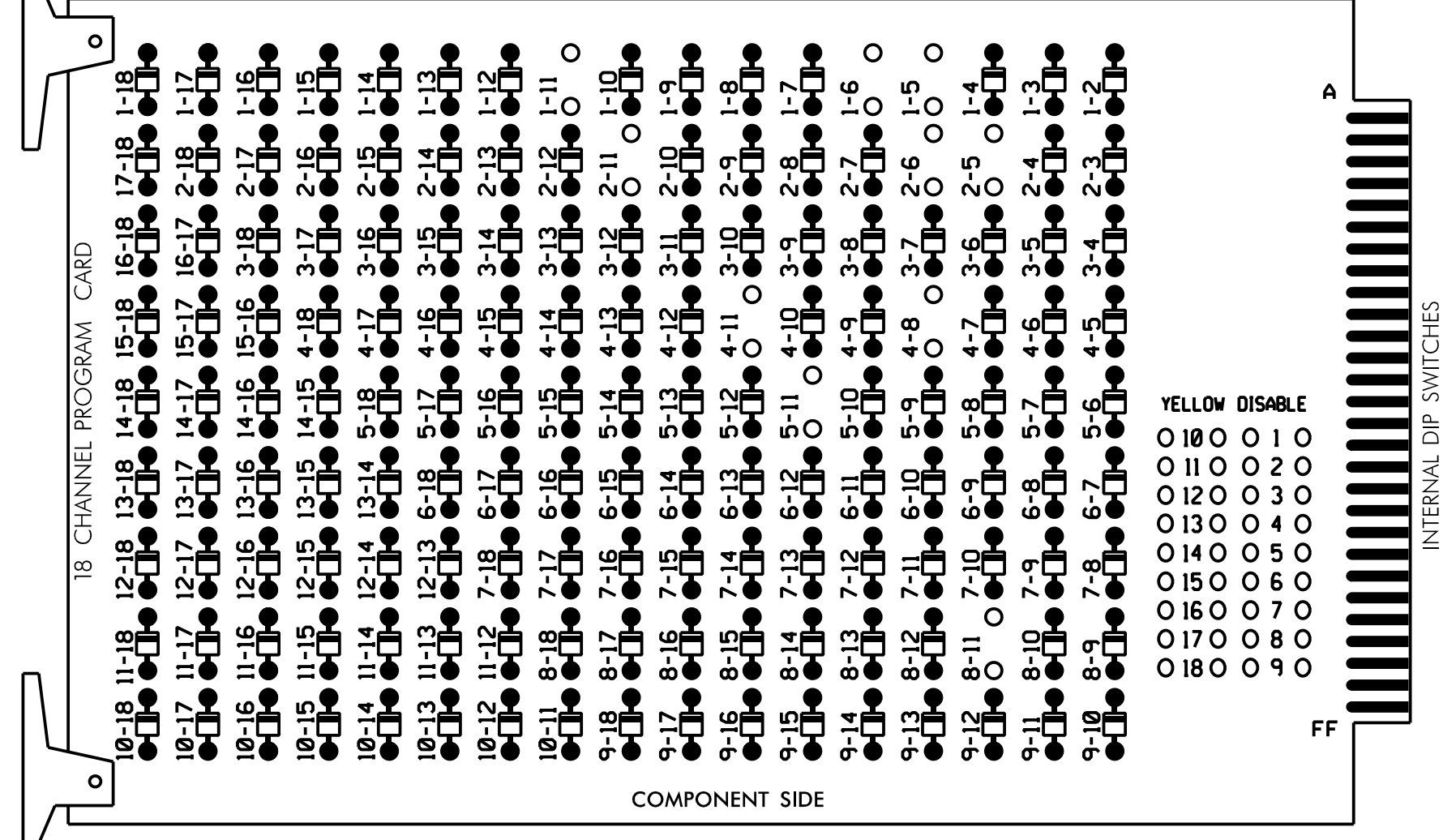
Signature: *Matasha R. Simmons* 12/7/2018

SIG. INVENTORY NO. 02-0226

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 1-5, 1-6, 1-11, 2-5, 2-6, 2-11, 4-8, 4-11, 5-11, and 8-11.



REMOVE JUMPERS AS SHOWN

NOTES:

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

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 4 and 8 for Dual Entry.
- Program phases 2 and 6 for Variable Initial and Gap Reduction.
- Program phases 2 and 6 for Startup In Green.
- Program phases 2 and 6 for Yellow Flash.
- The cabinet and controller are part of the Havelock US 70 Business Closed Loop 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	NU	NU	41,42	NU	51,52	61,62	NU	NU	81,82	NU	NU	NU	NU	43,44	NU	NU
RED		128			101			134			107					A114		
YELLOW		129			102			135			108							
GREEN		130			103			136			109							
RED ARROW	125							131										
YELLOW ARROW	126							132								A115		
FLASHING YELLOW ARROW																		
GREEN ARROW	127							133								A116		

NU = Not Used

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,S5,S7,S8,S11,AUX S4
 PHASES USED.....1,2,4,5,6,8
 OVERLAP "A".....NOT USED
 OVERLAP "B".....NOT USED
 OVERLAP "C".....4+5
 OVERLAP "D".....NOT USED

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: XX
 VEH OVL NOT VEH:
 VEH OVL NOT PED:
 VEH OVL GRN EXT:
 STARTUP COLOR: - RED - YELLOW - GREEN
 FLASH COLORS: - RED - YELLOW - GREEN
 SELECT VEHICLE OVERLAP OPTIONS: (Y/N)
 FLASH YELLOW IN CONTROLLER FLASH?...N
 GREEN EXTENSION (0-255 SEC).....0
 YELLOW CLEAR (0=PARENT,3-25.5 SEC)...3.9
 RED CLEAR (0=PARENT,0.1-25.5 SEC)...3.4
 OUTPUT AS PHASE # (0=NONE, 1-16).....0

OVERLAP PROGRAMMING COMPLETE

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 02-0227
 DESIGNED: March 2018
 SEALED: 12-7-18
 REVISED: N/A

INPUT FILE POSITION LAYOUT

(front view)

FILE "I"	1	2	3	4	5	6	7	8	9	10	11	12	13	14
∅ 1	∅ 2	∅ 3	∅ 4	∅ 5	∅ 6	∅ 7	∅ 8	∅ 9	∅ 10	∅ 11	∅ 12	∅ 13	∅ 14	FS
1A	2A	3A	4A	5A	6A	7A	8A	9A	10A	11A	12A	13A	14A	DC ISOLATOR
NOT USED	2B	3B	4B	5B	6B	7B	8B	9B	10B	11B	12B	13B	14B	DC ISOLATOR

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

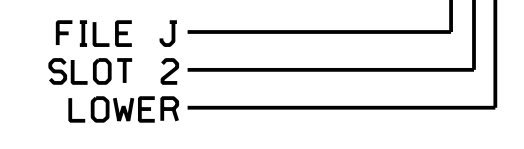
FS = FLASH SENSE
 ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
1A	TB2-1,2	I1U	56	18	1	1	Y	Y			
2A	TB2-5,6	I2U	39	1	2	2	Y	Y			
2B	TB2-7,8	I2L	43	5	12	2	Y	Y			
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			
4B	TB4-11,12	I6L	45	7	14	4	Y	Y			
* S13	TB6-9,10	I9U	60	22	11	SYS					
* S14	TB6-11,12	I9L	62	24	13	SYS					
5A	TB3-1,2	J1U	55	17	5	5	Y	Y			
5B	TB3-3,4	J1L	55	17	5	5	Y	Y			
5C	TB3-5,6	J2U	40	2	6	5	Y	Y			
5D	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			10

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

INPUT FILE POSITION LEGEND: J2L

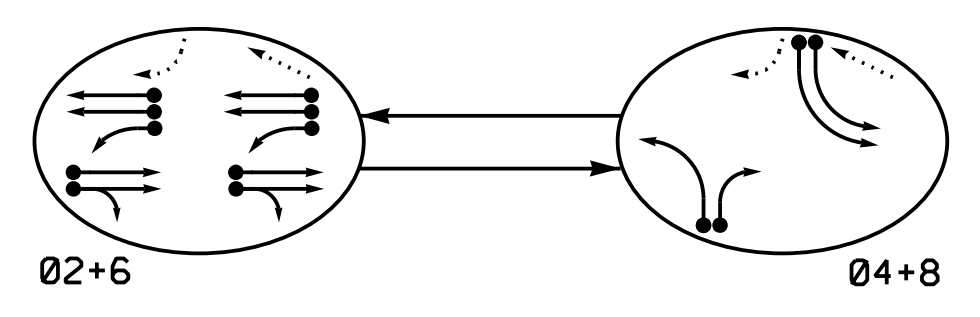


Electrical Detail Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

	Prepared for: US 70 Business (Main Street) at NC 101 (Fontana Boulevard)/ SR 1763 (Miller Boulevard)	SEAL
	Division 02 Craven Co. Havelock PLAN DATE: March 2018 REVIEWED BY: A.D. Klinksiek PREPARED BY: A.H. Thornburg REVIEWED BY: N.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	REVISIONS INITI. DATE 12/7/2018 Natasha R. Simmons DATE SIG. INVENTORY NO. 02-0227	SEAL 1750 N. Greenfield Pkwy, Corner, NC 27529

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

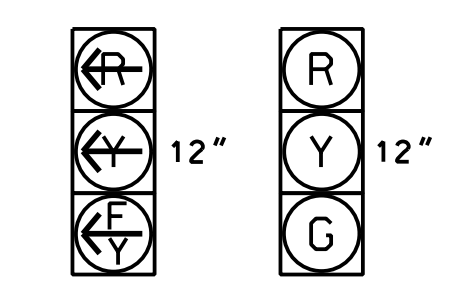
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- ⋯ UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE		
	02+6	04+8	FLASH
21,22,23,24	G	R	Y
41,42	R	G	R
61,64	Y	R	Y
62,63,65,66	G	R	Y
81,82	R	G	R

SIGNAL FACE I.D.

All Heads L.E.D.



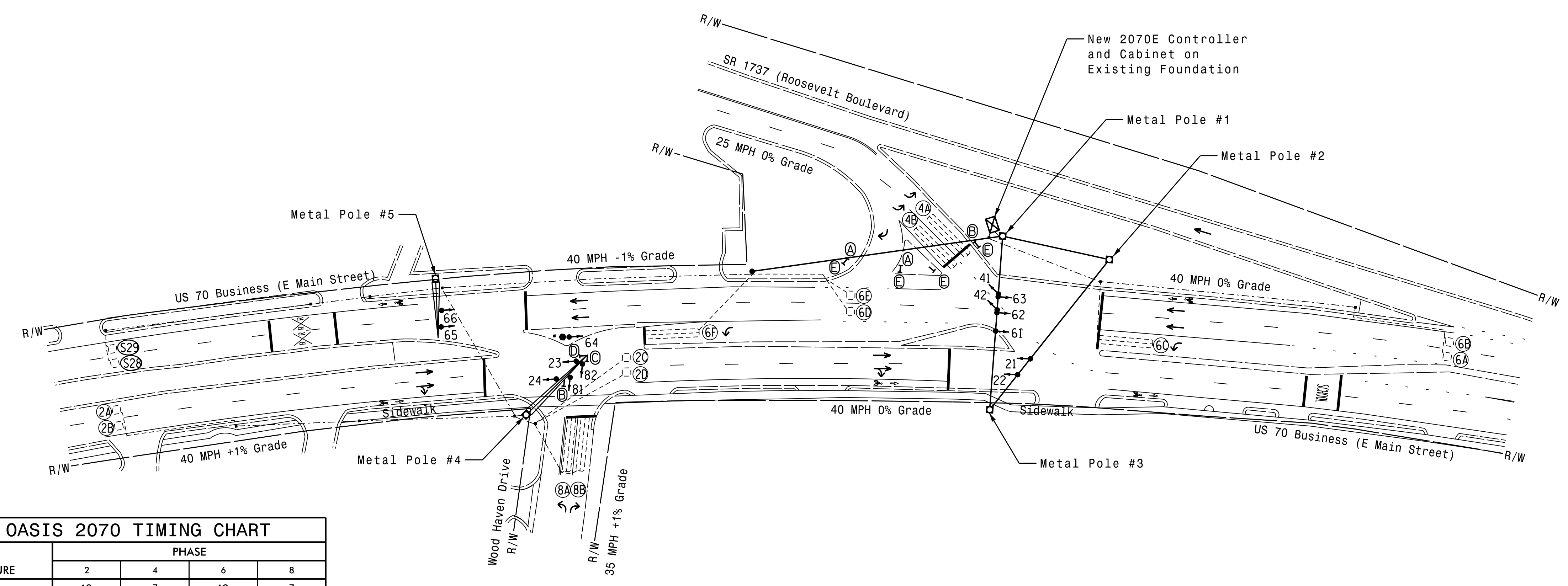
OASIS 2070 LOOP & DETECTOR INSTALLATION CHART

LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	DETECTOR PROGRAMMING					SYSTEM LOOP	NEW CARD
					PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME		
2A	6X6	250	6	-	2	Y	Y	-	-	-	Y
2B	6X6	250	6	-	2	Y	Y	-	-	-	Y
2C	6X6	240	5	-	2	Y	Y	-	-	-	Y
2D	6X6	240	5	-	2	Y	Y	-	-	-	Y
4A	6X40	+5	2-4-2	-	4	Y	Y	-	-	-	Y
4B	6X40	+5	2-4-2	-	4	Y	Y	-	-	-	Y
6A	6X6	250	4	-	6	Y	Y	-	-	-	Y
6B	6X6	250	4	-	6	Y	Y	-	-	-	Y
6C	6X40	0	2-4-2	-	6	Y	Y	-	-	-	Y
6D	6X6	250	3	-	6	Y	Y	-	-	-	Y
6E	6X6	250	3	-	6	Y	Y	-	-	-	Y
6F	6X40	0	2-4-2	-	6	Y	Y	-	-	-	Y
8A	6X40	+5	2-4-2	-	8	Y	Y	-	-	-	Y
8B	6X40	+5	2-4-2	-	8	Y	Y	-	-	15	Y
S28	6X6	+300	6	-	-	-	-	-	-	-	Y
S29	6X6	+300	6	-	-	-	-	-	-	-	Y

2 Phase Fully Actuated
Havelock US 70 Business CLS

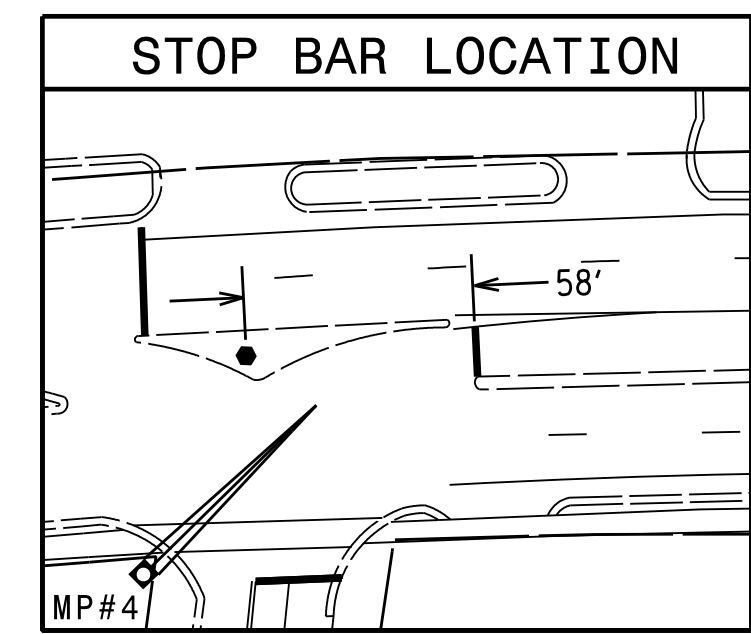
NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Set all detector units to presence mode.
- 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.
- Repaint pavement markings as shown.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- Signal system data: Controller Asset #0189



OASIS 2070 TIMING CHART

FEATURE	PHASE			
	2	4	6	8
Min Green 1 *	12	7	12	7
Extension 1 *	6.0	2.0	6.0	2.0
Max Green 1 *	90	25	90	25
Yellow Clearance	4.2	3.0	4.2	3.0
Red Clearance	2.1	3.6	2.1	2.6
Red Revert	2.0	2.0	2.0	2.0
Walk 1 *	-	-	-	-
Don't Walk 1	-	-	-	-
Seconds Per Actuation *	1.5	-	1.5	-
Max Variable Initial *	29	-	29	-
Time Before Reduction *	15	-	15	-
Time To Reduce *	45	-	45	-
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



LEGEND

PROPOSED	EXISTING
○ → Traffic Signal Head	● → N/A
○ → Modified Signal Head	○ → N/A
○ → Pedestrian Signal Head With Push Button & Sign	○ → N/A
○ → Signal Pole with Guy	○ → N/A
○ → Signal Pole with Sidewalk Guy	○ → N/A
□ → Inductive Loop Detector	□ → N/A
□ → Junction Box	□ → N/A
--- 2-in Underground Conduit	--- 2-in Underground Conduit
→ Right of Way	→ Right of Way
→ Directional Arrow	→ Directional Arrow
○ → Metal Pole with Mastarm	○ → Metal Pole with Mastarm
○ → Metal Strain Pole	○ → Metal Strain Pole
○ → Type II Signal Pedestal	○ → Type II Signal Pedestal
Ⓐ → "YIELD" Sign (R1-2)	Ⓐ → "YIELD" Sign (R1-2)
Ⓑ → Left Arrow "ONLY" Sign (R3-5L)	Ⓑ → Left Arrow "ONLY" Sign (R3-5L)
Ⓒ → Right Arrow "ONLY" Sign (R3-5R)	Ⓒ → Right Arrow "ONLY" Sign (R3-5R)
Ⓓ → No Left Turn Sign (R3-2)	Ⓓ → No Left Turn Sign (R3-2)
Ⓔ → "DO NOT ENTER" Sign (R5-1)	Ⓔ → "DO NOT ENTER" Sign (R5-1)

Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

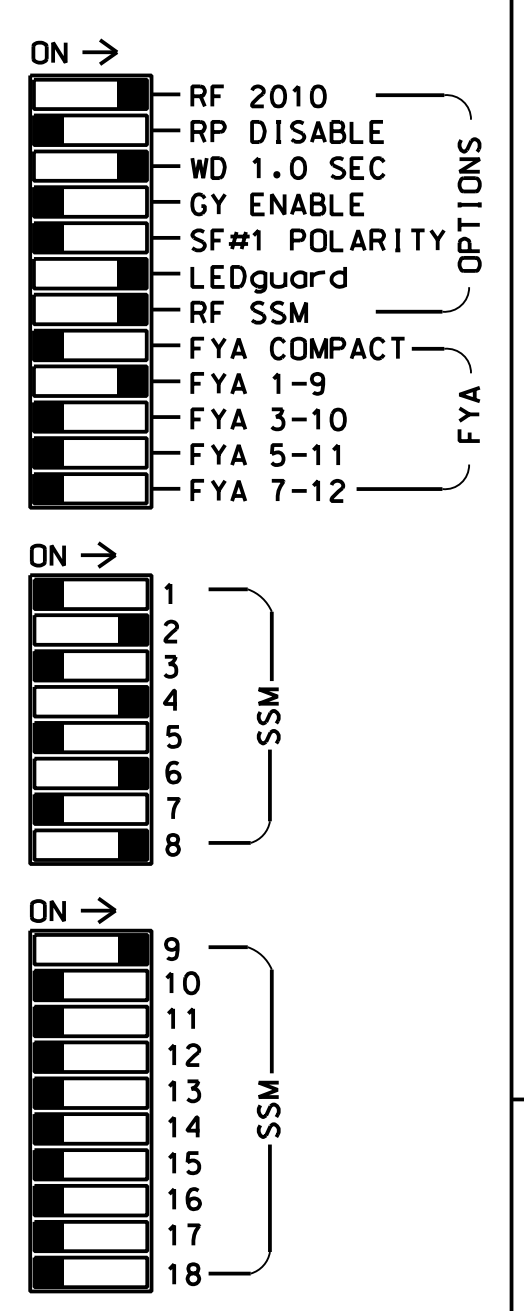
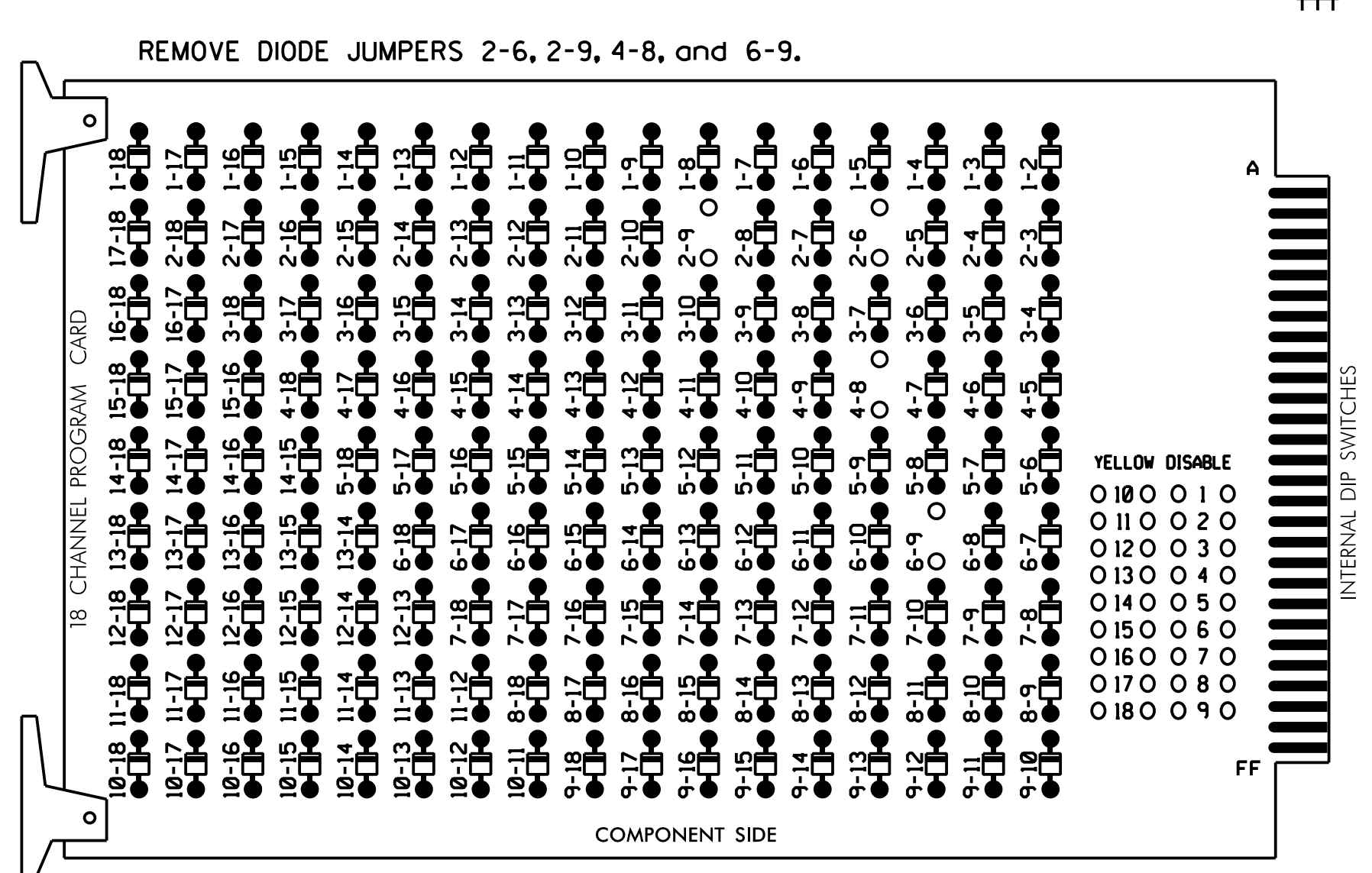
	US 70 Business (E Main Street) at SR 1737 (Roosevelt Boulevard)/Wood Haven Drive		
	Division 02 Craven Co. Havelock	PLAN DATE: March 2018	
PREPARED BY: A.H. Thornburg	REVIEWED BY: N.R. Simmons	DATE: 12/7/2018	SIGNATURE: _____

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

* 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.

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



NOTES:

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

■ = 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 4 and 8 for Dual Entry.
- Program phases 2 and 6 for Variable Initial and Gap Reduction.
- Program phases 2 and 6 for Startup In Green.
- Program phases 2 and 6 for Yellow Flash, and overlap 1 as Wag Overlaps.
- The cabinet and controller are part of the Havelock US 70 Business Closed Loop 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.	NU	21,22,23,24	NU	NU	41,42	NU	NU	62,63,65,66	NU	NU	81,82	NU	61,64	NU	NU	NU	NU	NU
RED		128			101			134			107							
YELLOW		129			102			135			108							
GREEN		130			103			136			109							
RED ARROW													A121					
YELLOW ARROW														A122				
FLASHING YELLOW ARROW														A123				
GREEN ARROW																		

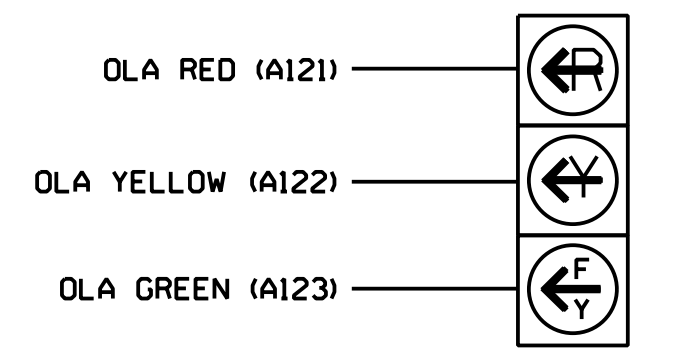
NU = Not Used
 ★ See pictorial of head wiring in detail this sheet.

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.....S2,S5,S8,S11,AUX S1
 PHASES USED.....2,4,6,8
 OVERLAP "A".....2
 OVERLAP "B".....NOT USED
 OVERLAP "C".....NOT USED
 OVERLAP "D".....NOT USED

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



61,64

INPUT FILE POSITION LAYOUT

(front view)

FILE "I"	1	2	3	4	5	6	7	8	9	10	11	12	13	14
U	S	∅ 2	∅ 2	S	S	∅ 4	S	S	SYS	S	S	S	S	FS
L	2A	2C	2B	2D	4A	4B	S28	S29	DC ISOLATOR	ST	DC ISOLATOR			
U	∅ 6	∅ 6	∅ 6	∅ 6	S	∅ 8	S	S	S	S	S	S	S	S
L	6A	6B	6D	6F	8A	8B								
U	NOT USED	∅ 6	∅ 6	NOT USED										
L	6C	6E												

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

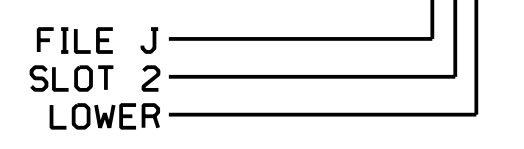
FS = FLASH SENSE
 ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
2A	TB2-5,6	I2U	39	1	2	2	Y	Y			
2B	TB2-7,8	I2L	43	5	12	2	Y	Y			
2C	TB2-9,10	I3U	63	25	32	2	Y	Y			
2D	TB2-11,12	I3L	76	38	42	2	Y	Y			
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			
4B	TB4-11,12	I6L	45	7	14	4	Y	Y			
*S28	TB6-9,10	I9U	60	22	11	SYS					
*S29	TB6-11,12	I9L	62	24	13	SYS					
6A	TB3-1,2	J1U	55	17	5	6	Y	Y			
6B	TB3-5,6	J2U	40	2	6	6	Y	Y			
6C	TB3-7,8	J2L	44	6	16	6	Y	Y			
6D	TB3-9,10	J3U	64	26	36	6	Y	Y			
6E	TB3-11,12	J3L	77	39	46	6	Y	Y			
6F	TB5-1,2	J4U	48	10	26	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			15

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

INPUT FILE POSITION LEGEND: J2L



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 02-0189
 DESIGNED: March 2018
 SEALED: 12-7-18
 REVISED: N/A

OVERLAP PROGRAMMING DETAIL FOR DEFAULT PHASING

(program controller as shown below)

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

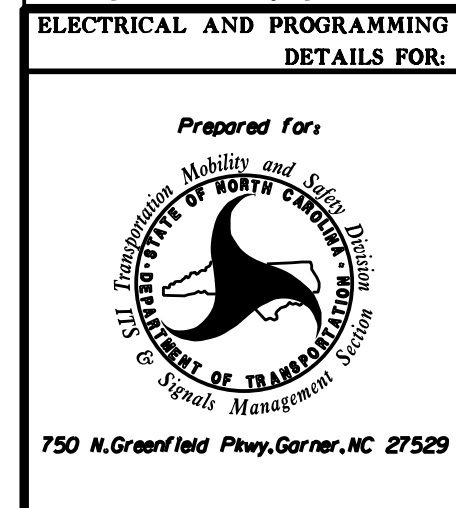
PAGE 1: VEHICLE OVERLAP 'A' SETTINGS
 PHASE: :12345678910111213141516
 VEH OVL PARENTS: X
 VEH OVL NOT VEH: :
 VEH OVL NOT PED: :
 VEH OVL GRN EXT: :
 STARTUP COLOR: - RED - YELLOW - GREEN
 FLASH COLORS: - RED - YELLOW X GREEN
 SELECT VEHICLE OVERLAP OPTIONS: (Y/N)
 FLASH YELLOW IN CONTROLLER FLASH?...Y
 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

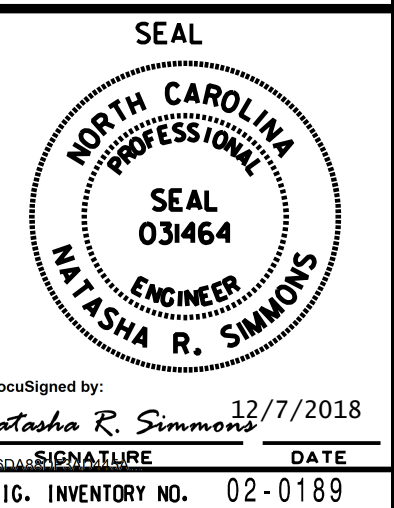
OVERLAP PROGRAMMING COMPLETE

Electrical Detail Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



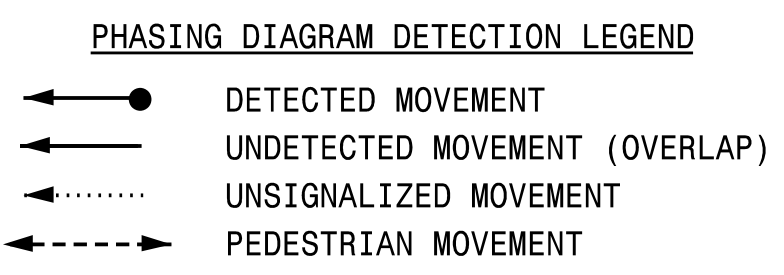
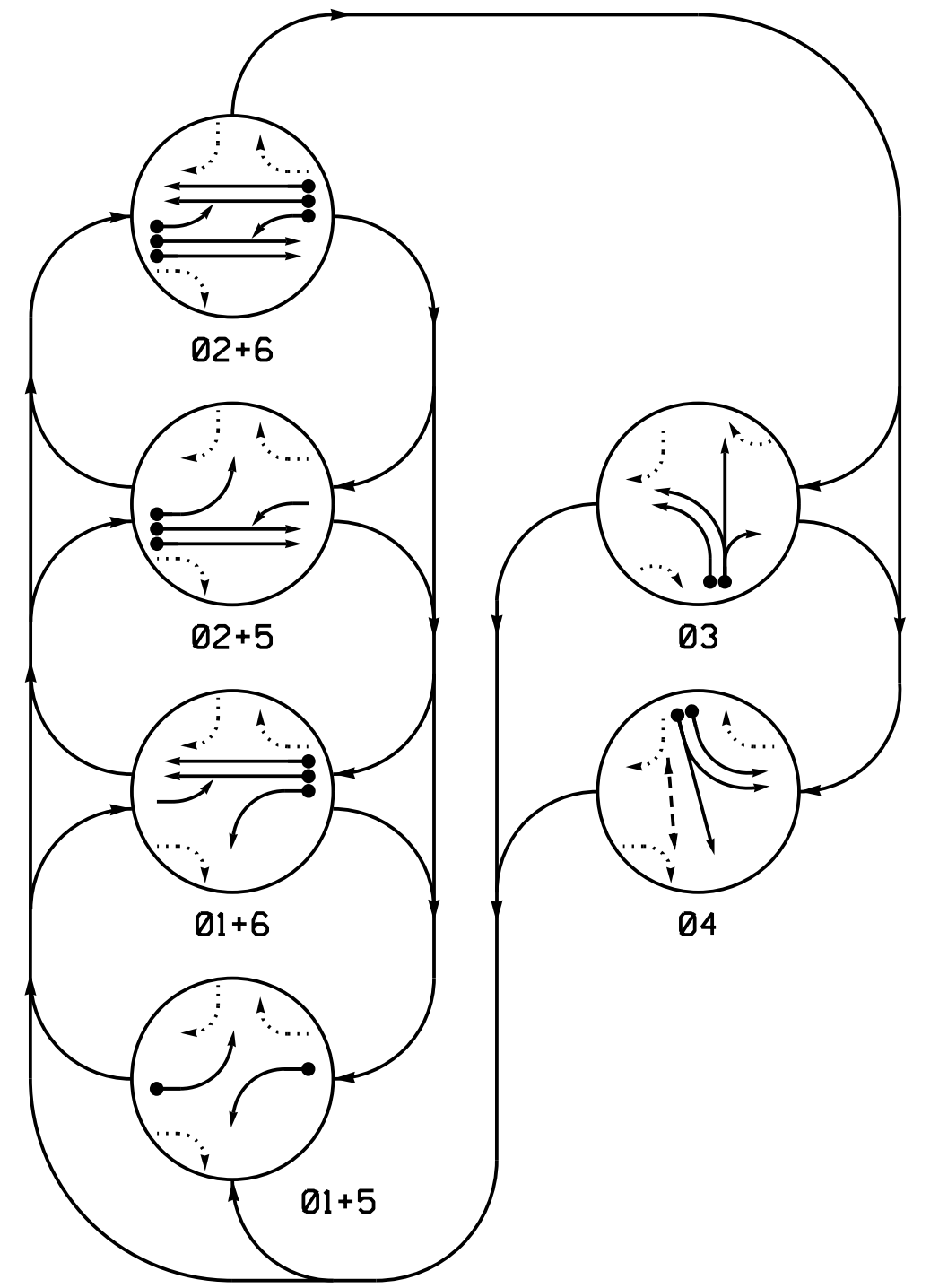
US 70 Business (E Main Street) at SR 1737 (Roosevelt Boulevard)/Woodhaven Drive
 Division 02 Craven Co. Havelock
 PLAN DATE: March 2018 REVIEWED BY: A.D. Klinksiek
 PREPARED BY: A.H. Thornburg REVIEWED BY: N.R. Simmons



REVISIONS	INIT.	DATE

DocuSigned by: Natasha R. Simmons 12/7/2018
 SIGNATURE DATE
 SIG. INVENTORY NO. 02-0189

PHASING DIAGRAM



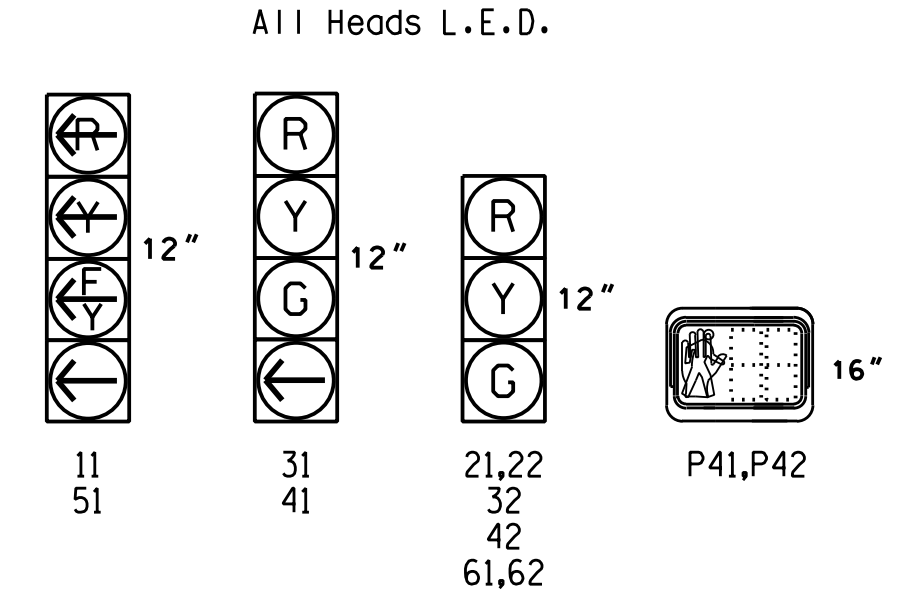
EV PREEMPT PHASES
(Medium Priority)



TABLE OF OPERATION

SIGNAL FACE	PHASE									
	01+5	01+6	02+5	02+6	03	04	PRE 2	FL	IS	DRK
11	-	-	F	F	R	R	R	-	-	-
21,22	R	R	G	G	R	R	R	Y	-	-
31	R	R	R	R	G	R	R	R	-	-
32	R	R	R	R	G	R	R	R	-	-
41	R	R	R	R	R	G	G	R	-	-
42	R	R	R	R	R	G	G	R	-	-
51	-	F	-	F	R	R	R	-	-	-
61,62	R	G	R	G	R	R	R	Y	-	-
P41,P42	DW	DW	DW	DW	DW	W	DW	DRK	-	-

SIGNAL FACE I.D.



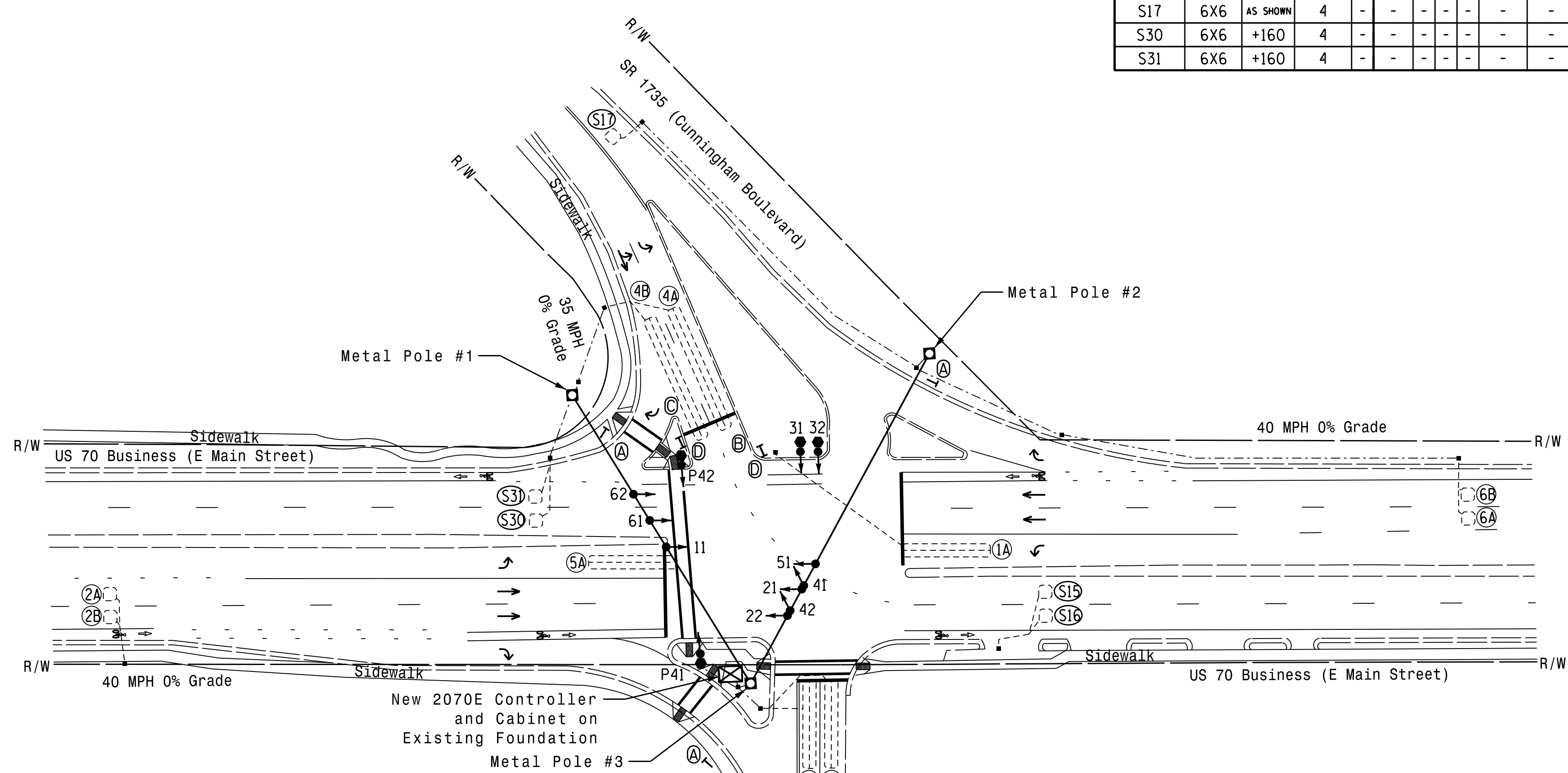
OASIS 2070 LOOP & DETECTOR INSTALLATION CHART

LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	DETECTOR PROGRAMMING				SYSTEM LOOP	NEW CARD
					PHASE	CALLING	EXTENSION	FULL TIME DELAY		
1A	6X40	0	2-4-2	-	1	Y	Y	-	15	-
2A,2B	6X6	250	4	-	2	Y	Y	-	3	-
3A	6X40	0	2-4-2	-	3	Y	Y	-	-	-
3B	6X40	0	2-4-2	-	3	Y	Y	-	5	-
4A	6X60	+5	2-4-2	-	4	Y	Y	-	-	-
4B	6X60	+5	2-4-2	-	4	Y	Y	-	5	-
5A	6X40	+5	2-4-2	-	5	Y	Y	-	15	-
6A,6B	6X6	255	4	-	6	Y	Y	-	-	-
S15	6X6	+170	4	-	-	-	-	-	-	Y
S16	6X6	+170	4	-	-	-	-	-	-	Y
S17	6X6	AS SHOWN	4	-	-	-	-	-	-	Y
S30	6X6	+160	4	-	-	-	-	-	-	Y
S31	6X6	+160	4	-	-	-	-	-	-	Y

6 Phase Fully Actuated w/ EV Preempt Havelock US 70 Business CLS

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Phase 1 and/or phase 5 may be lagged.
- 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.
- Renumber existing loops 2B,2C,6B, and 6C as 2A,2B,6A, and 6B, respectively.
- Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
- Program pedestrian heads to countdown the flashing "DON'T WALK" time only.
- Pavement markings are existing.
- The Division Traffic Engineer will determine the Delay before Preempt and Preempt Dwell Min Green time for the emergency vehicle preemption timing.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- Closed loop system data: Controller Asset #0190



OASIS 2070 TIMING CHART

FEATURE	PHASE					
	1	2	3	4	5	6
Min Green 1 *	7	12	7	7	7	12
Extension 1 *	2.0	6.0	3.0	3.0	2.0	6.0
Max Green 1 *	20	75	35	35	20	75
Yellow Clearance	3.0	4.2	3.2	3.8	3.0	4.2
Red Clearance	2.4	1.9	3.2	2.6	3.1	1.9
Red Revert	2.0	2.0	2.0	2.0	2.0	2.0
Walk 1 *	-	-	-	7	-	-
Don't Walk 1	-	-	-	20	-	-
Seconds Per Actuation *	-	1.5	-	-	-	1.5
Max Variable Initial *	-	29	-	-	-	30
Time Before Reduction *	-	15	-	-	-	15
Time To Reduce *	-	45	-	-	-	45
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

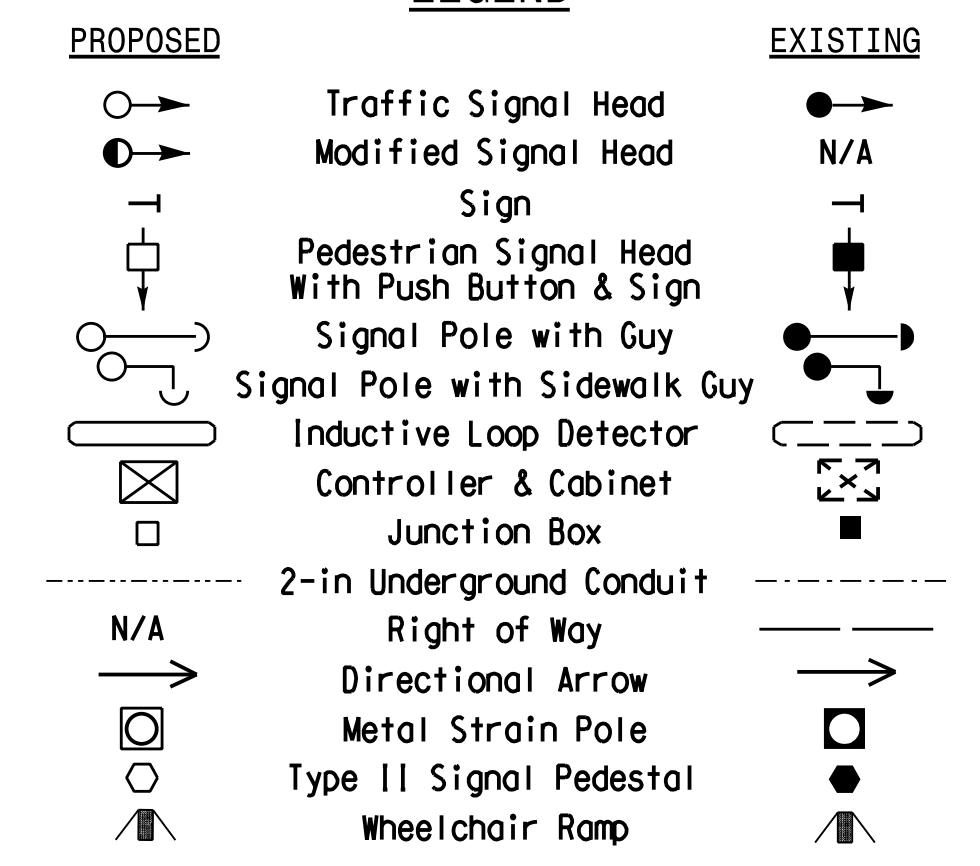
* These values may be field adjusted. Do not adjust Min Green and Extension times for phases 2 and 6 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.

OASIS 2070 EV PREEMPT

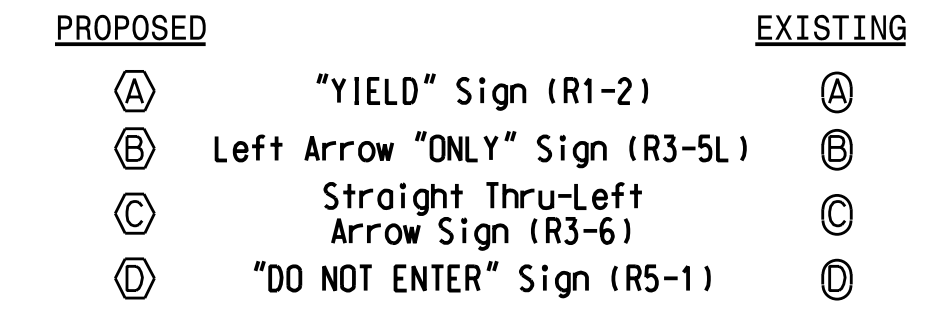
FUNCTION	PRE 2
Interval 1 - Dwell Green	255
Interval 1 - Dwell Yellow	0.0*
Interval 1 - Dwell Red	0.0*
Interval 5 - Exit Green	1
Interval 5 - Yellow	0.0
Interval 5 - Red	0.0
Exit Phase(s)	2,6
Priority	Medium
Delay Time	**
Min Green Before Pre	1
Ped Clear Before Pre	0*
Yellow Clear Before Pre	0.0*
Red Clear Before Pre	0.0*
Dwell Min Time	**
Enable Backup Protection	N
Ped Clear Through Yellow	Y
Omit Overlaps	-
Preempt Extend	-

** Time defaults to time used for phase during normal operation See Note 10

LEGEND



SIGNS

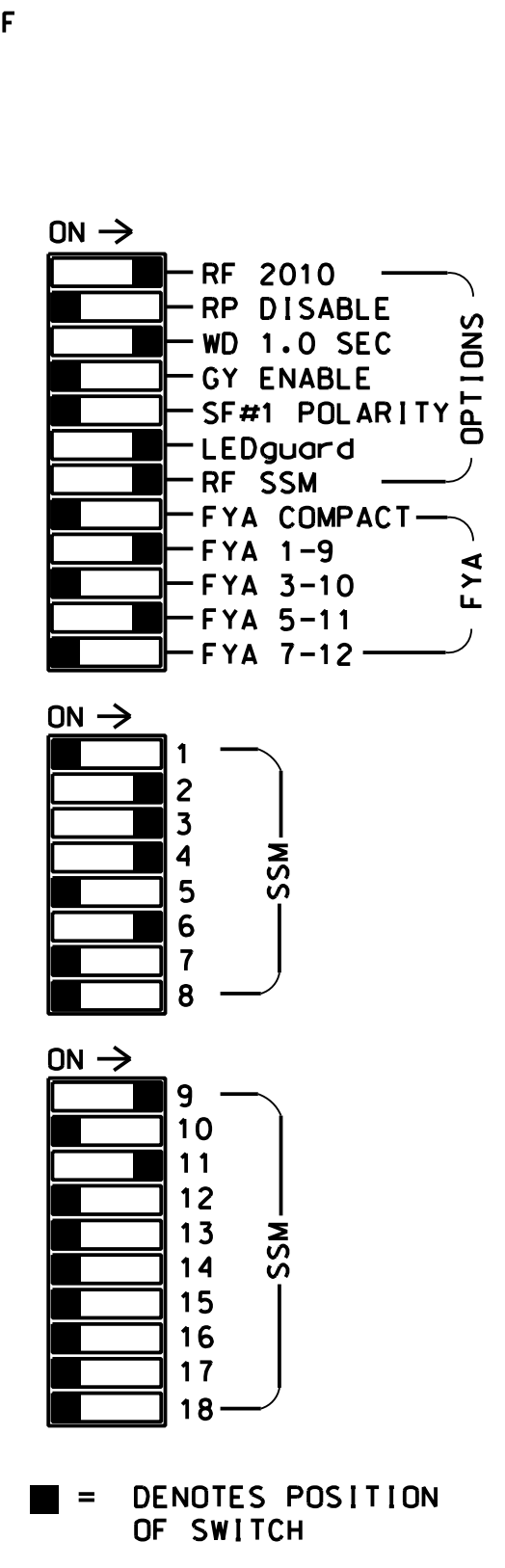
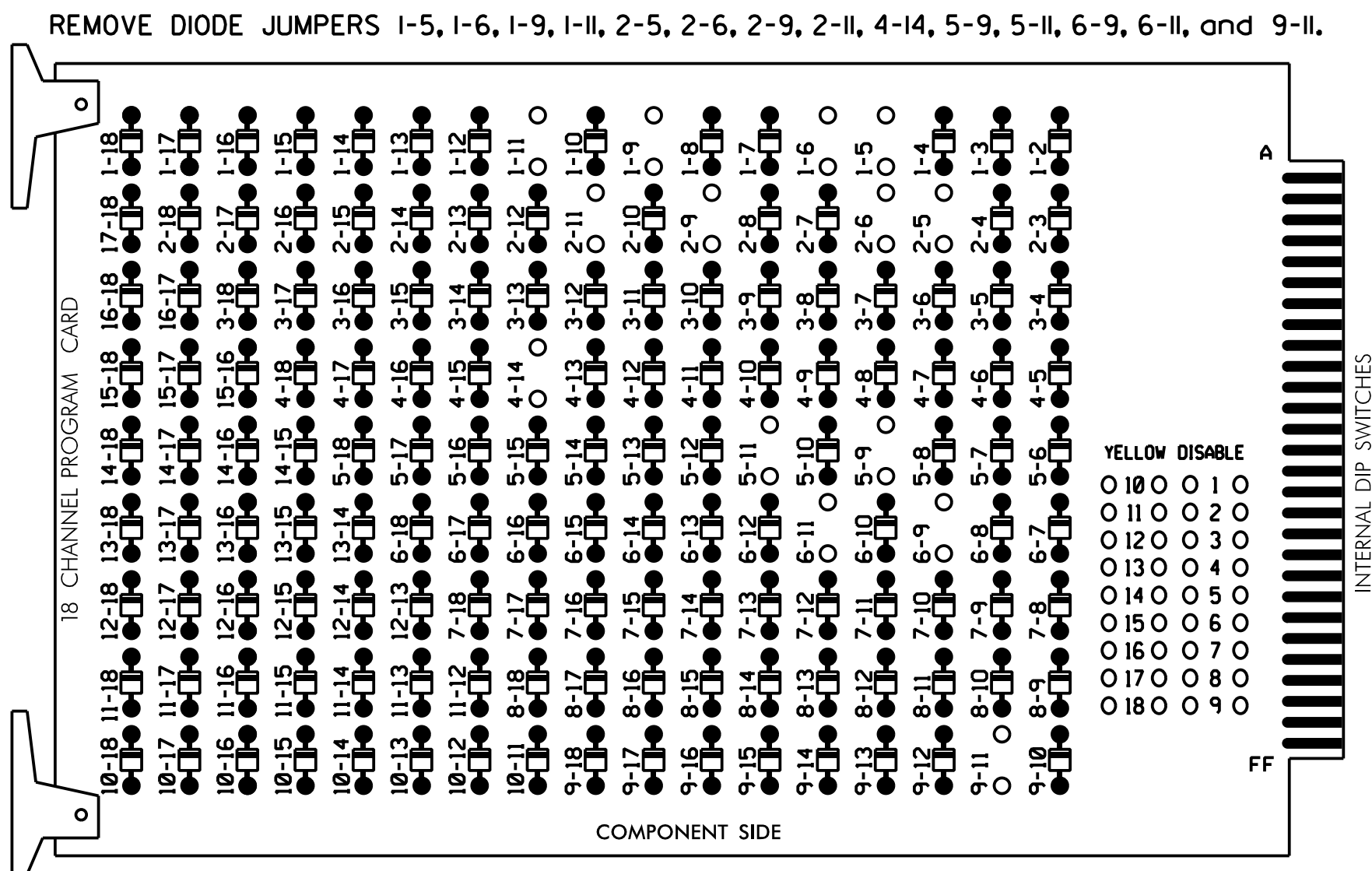


Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

	US 70 Business (E Main St) at SR 1735 (Cunningham Boulevard)/ Annunciation Catholic School		
	Division 02 Craven Co. Havelock	PLAN DATE: March 2018	
PREPARED BY: A.H. Thornburg	REVIEWED BY: N.R. Simmons	DATE: 12/7/2018	SIGNATURE: _____
SCALE: 1"=40'	REVISIONS: _____	INITI: _____	DATE: _____

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



NOTES:

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

REMOVE JUMPERS AS SHOWN

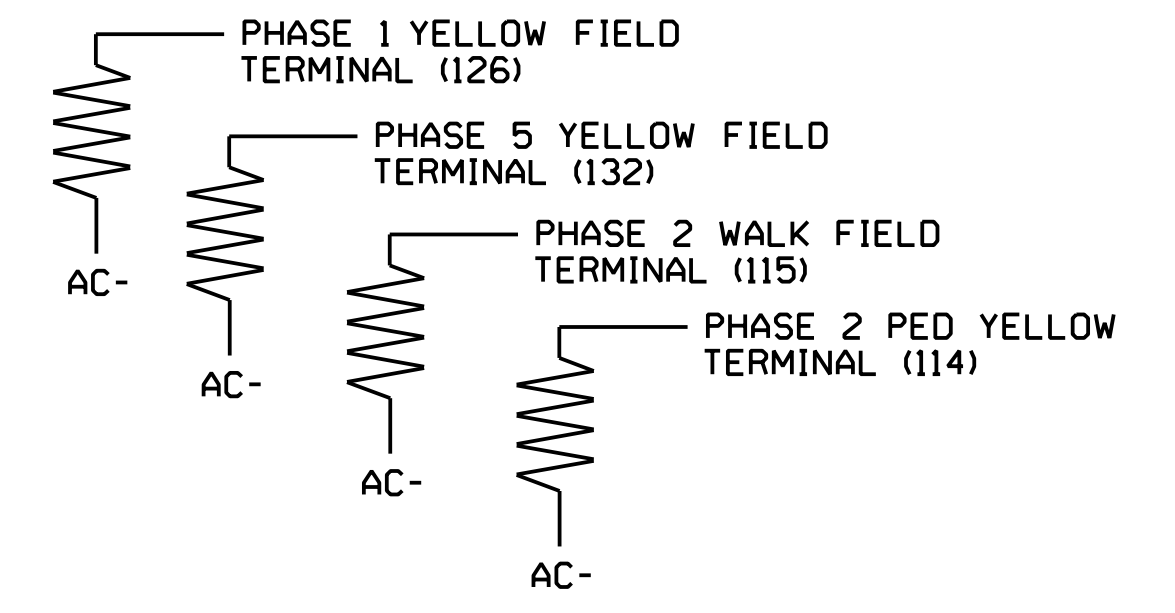
INPUT FILE POSITION LAYOUT
(front view)

FILE	1	2	3	4	5	6	7	8	9	10	11	12	13	14
U	∅ 1 1A	∅ 2 2A,2B	∅ 3 3A	∅ 3 3B	∅ 4 4A	∅ 4 4B	SYS S15	FS S16	FS S17	FS S18	FS S19	FS S20	FS S21	FS S22
L	NOT USED	NOT USED	NOT USED	NOT USED	∅ 4	∅ 4	SYS S16	FS S17	FS S18	FS S19	FS S20	FS S21	FS S22	FS S23
U	∅ 5 5A	∅ 6 6A,6B	∅ 7 7A	∅ 7 7B	SYS S17	SYS S18	SYS S19	SYS S20	SYS S21	SYS S22	SYS S23	SYS S24	SYS S25	SYS S26
L	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	SYS S20	SYS S21	SYS S22	SYS S23	SYS S24	SYS S25	SYS S26	NOT USED PRE2

EX.: 1A, 2A, ETC. = LOOP NO.'S
 ⊗ Wired Input - Do not populate slot with detector card
 FS = FLASH SENSE
 ST = STOP TIME
 PRE2 = EV PREEMPT

LOAD RESISTOR INSTALLATION DETAIL
(install resistors as shown below)

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



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 phase 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 Havelock US 70 Business Closed Loop Signal System.

EQUIPMENT INFORMATION

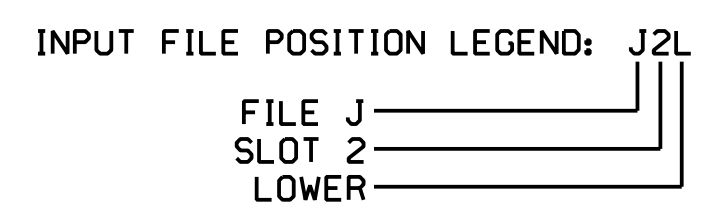
CONTROLLER.....2070E
 CABINET.....332 W/AUX
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE AUX S1,AUX S4
 LOAD SWITCHES USED.....S1,S2,S3*,S4,S5,S6,S7,S8
 PHASES USED.....1,2,3,4,4 PED,5,6
 OVERLAP "A".....1+2
 OVERLAP "B".....NOT USED
 OVERLAP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

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	I1U	56	18	1	1	Y	Y			15
		J4U	48	10	26	6	Y	Y	Y		3
2A,2B	TB2-5,6	I2U	39	1	2	2	Y	Y			
3A	TB4-5,6	I5U	58	20	3	3	Y	Y			
3B	TB4-9,10	I6U	41	3	4	3	Y	Y			5
4A	TB6-1,2	I7U	65	27	34	4	Y	Y			
4B	TB6-3,4	I7L	78	40	44	4	Y	Y			5
5A ²	TB3-1,2	J1U	55	17	5	5	Y	Y			15
		I4U	47	9	22	2	Y	Y	Y		3
*S15	TB6-9,10	I9U	60	22	11	SYS					
*S16	TB6-11,12	I9L	62	24	13	SYS					
6A,6B	TB3-5,6	J2U	40	2	6	6	Y	Y			
*S17	TB7-1,2	J7U	66	28	38	SYS	Y	Y			
*S30	TB7-9,10	J9U	59	21	15	SYS					
*S31	TB7-11,12	J9L	61	23	17	SYS					
PED PUSH BUTTONS											
P41,P42	TB8-5,6	I12L	69	31		PED 4		4 PED			

NOTE:
 INSTALL DC ISOLATOR IN INPUT FILE SLOT I12.

- ¹Add jumper from I1-W to J4-W. on rear of input file.
²Add jumper from J1-W to I4-W. on rear of input file.
 * System detector only. Remove the vehicle phase assigned to this detector in the default programming.



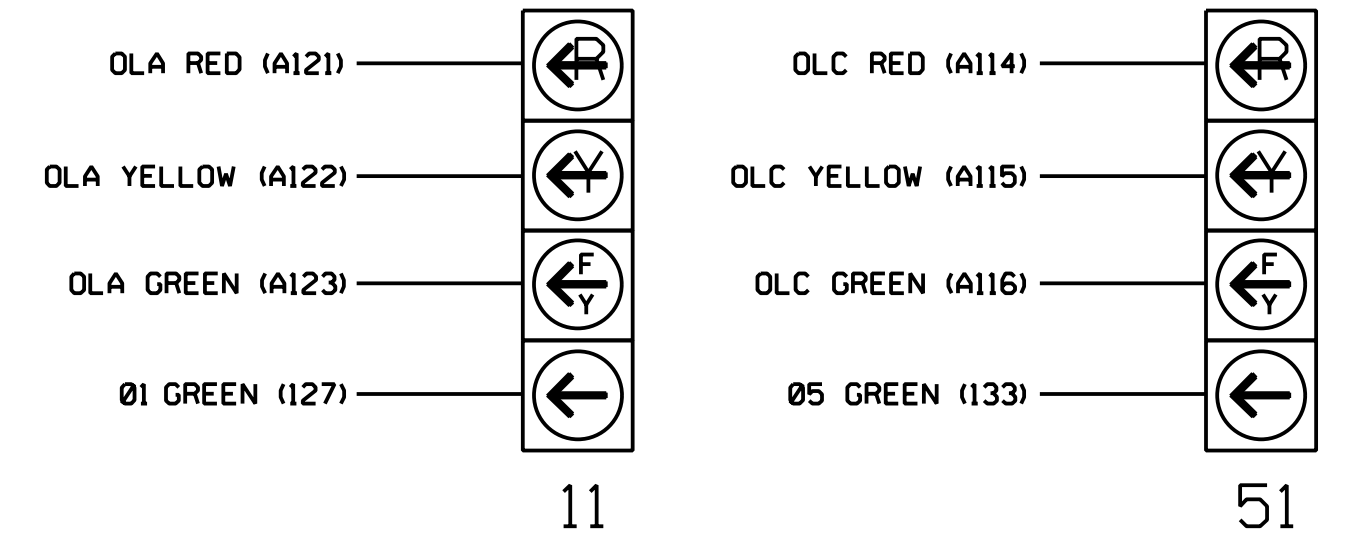
HNTB NORTH CAROLINA, P.C.
 343 E. Six Forks Road, Suite 200
 Raleigh, North Carolina 27609
 NC License No: C-1554
 (919) 546-8997

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	FIRE PILOT LAMP	31	32	41	42	P41, P42	51	61,62	NU	NU	11	NU	NU	51	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													A122					A115
FLASHING YELLOW ARROW													A123					A116
GREEN ARROW	127			118		103			133									
PED YELLOW									104									
PED YELLOW																		

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

FYA SIGNAL WIRING DETAIL
(wire signal heads as shown)



NOTE

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

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 02-0190
 DESIGNED: March 2018
 SEALED: 12-7-18
 REVISED: N/A

Electrical Detail - Sheet 1 of 3
 Signal Upgrade

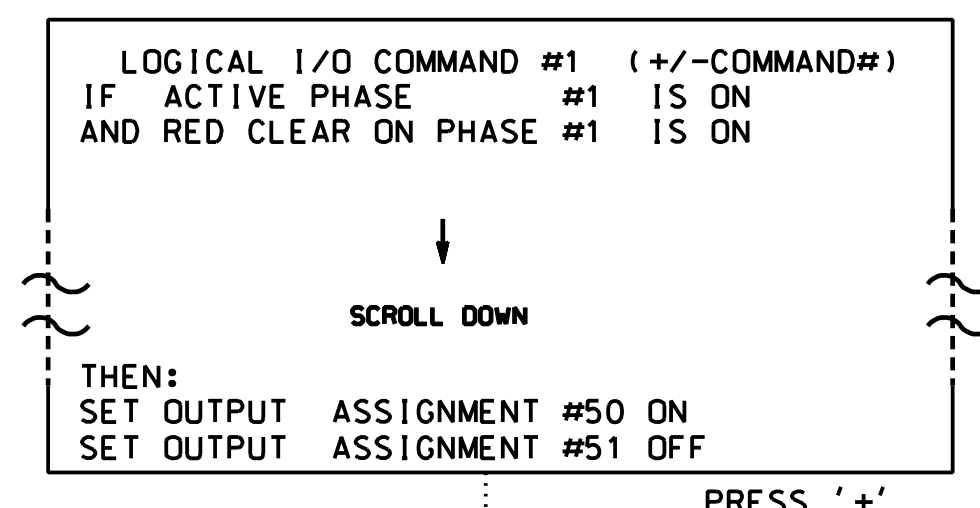
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR: 	US 70 Business (E Main St) at SR 1735 (Cunningham Boulevard)/ Annunciation Catholic School		SEAL NORTH CAROLINA PROFESSIONAL SEAL 031464 MARYSHA R. SIMMONS ENGINEER	
	Division 02 Craven Co. Havelock			
	PLAN DATE: March 2018 PREPARED BY: A.H. Thornburg	REVIEWED BY: A.D. Klinksiek REVIEWED BY: N.R. Simmons		DocuSigned by: 12/7/2018 Natasha R. Simmons SIGNATURE DATE SIG. INVENTORY NO. 02-0190

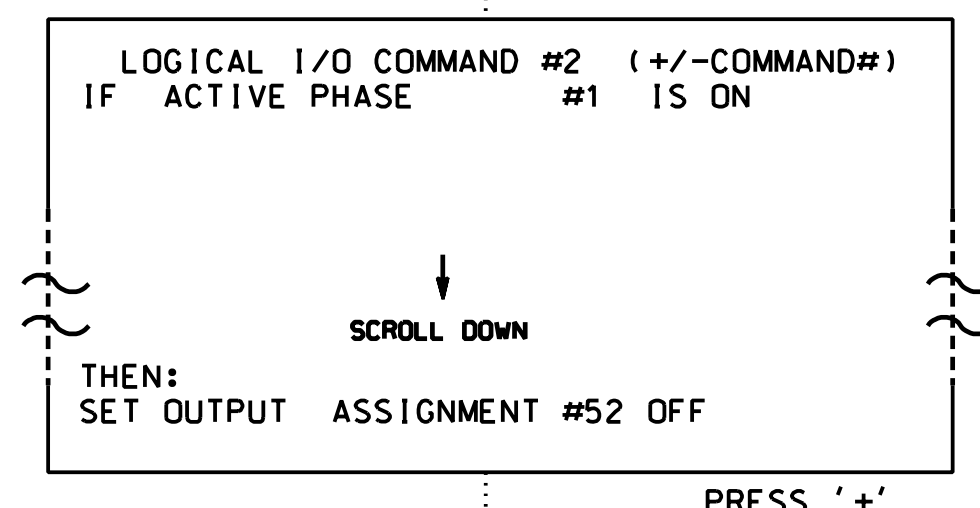
LOGICAL I/O PROCESSOR PROGRAMMING DETAIL TO PRODUCE SPECIAL FYA-PPLT SIGNAL SEQUENCE

(program controller as shown below)

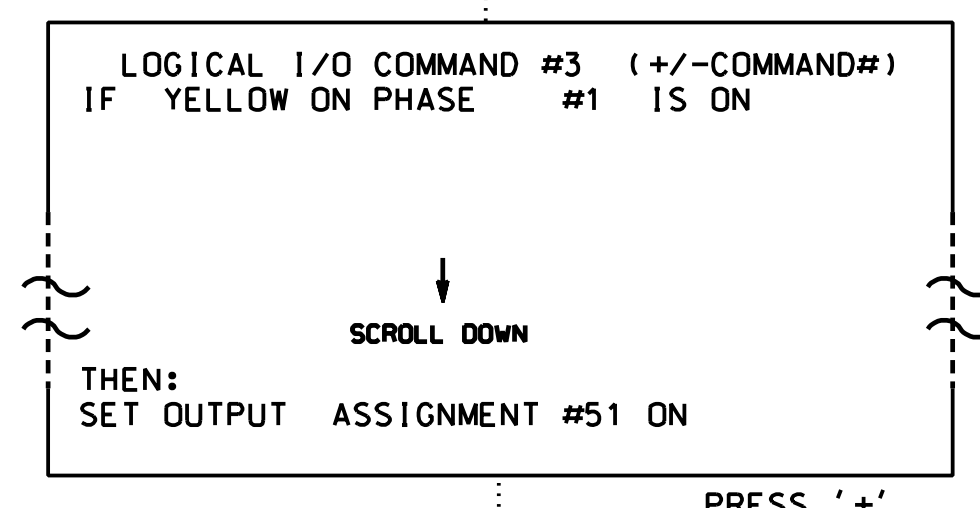
- FROM MAIN MENU PRESS '2' (PHASE CONTROL), THEN '1' (PHASE CONTROL FUNCTIONS). SCROLL TO THE BOTTOM OF THE MENU AND ENABLE ACT LOGIC COMMANDS 1, 2, 3, 4, 5, 6, 7, AND 8.
- FROM MAIN MENU PRESS '6' (OUTPUTS), THEN '3' (LOGICAL I/O PROCESSOR).



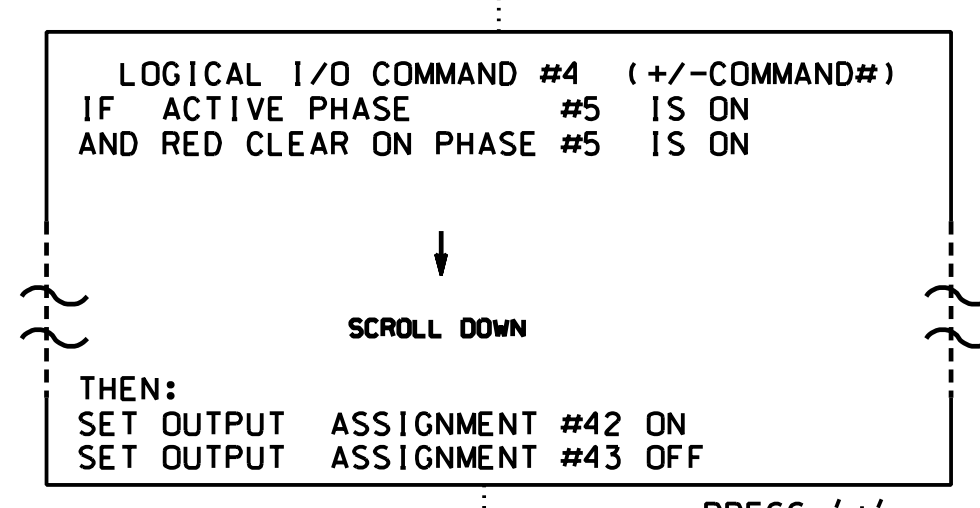
NOTE: LOGIC FOR PHASE 1 RED CLEAR WHEN TRANSITIONING FROM PHASE 1 TO PHASE 2 (HEAD 11).



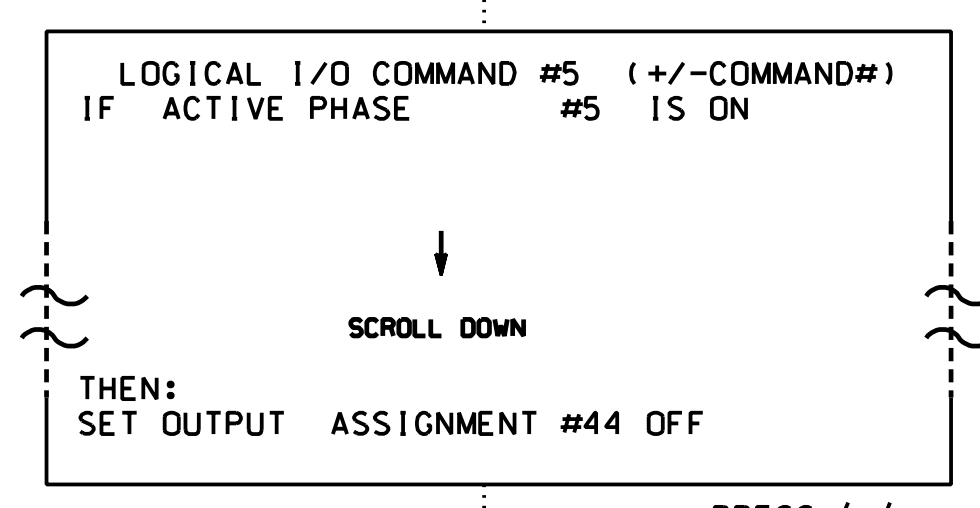
NOTE: LOGIC FOR SWITCHING FLASHING YELLOW ARROW OFF DURING PHASE 1 (HEAD 11).



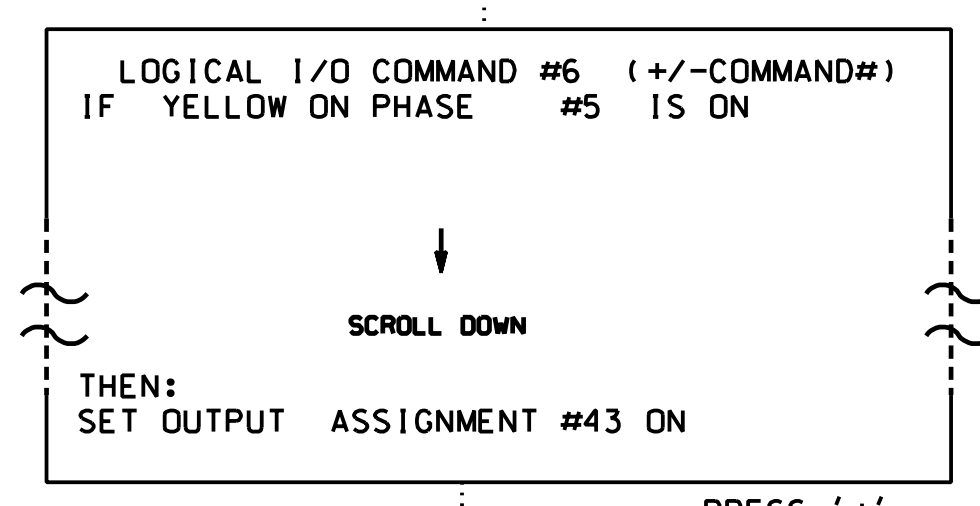
NOTE: LOGIC FOR YELLOW ARROW CLEARANCE FROM PHASE 1 (HEAD 11).



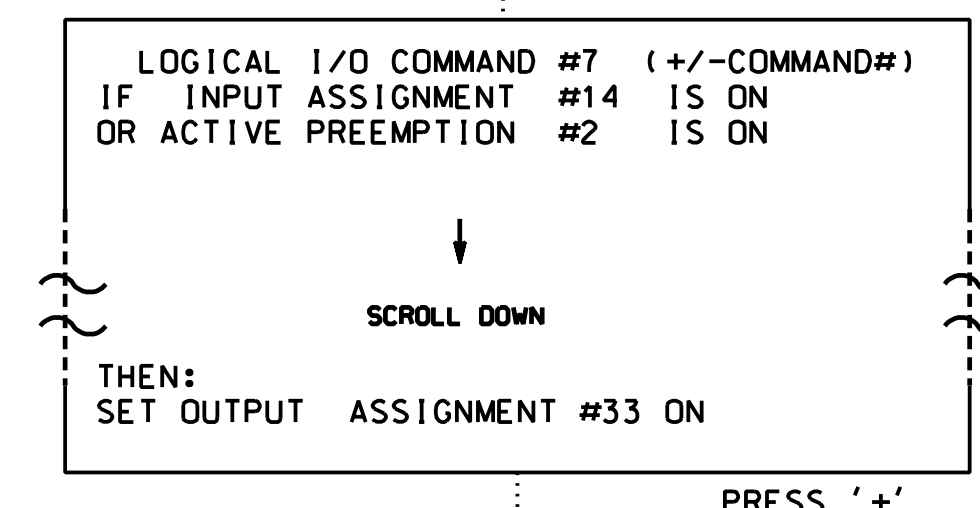
NOTE: LOGIC FOR PHASE 5 RED CLEAR WHEN TRANSITIONING FROM PHASE 5 TO PHASE 6 (HEAD 51).



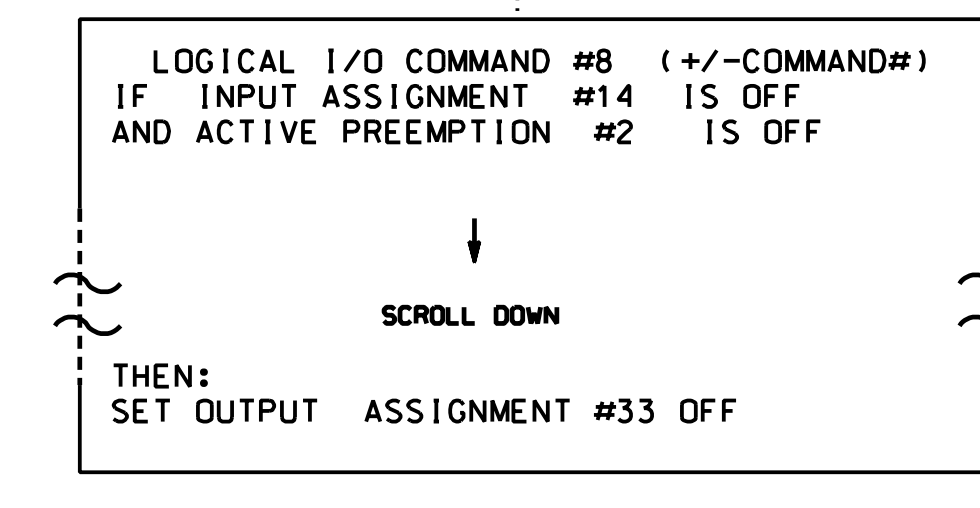
NOTE: LOGIC FOR SWITCHING FLASHING YELLOW ARROW OFF DURING PHASE 5 (HEAD 51).



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



NOTE: FIRE STATION PILOT LAMP LOGIC



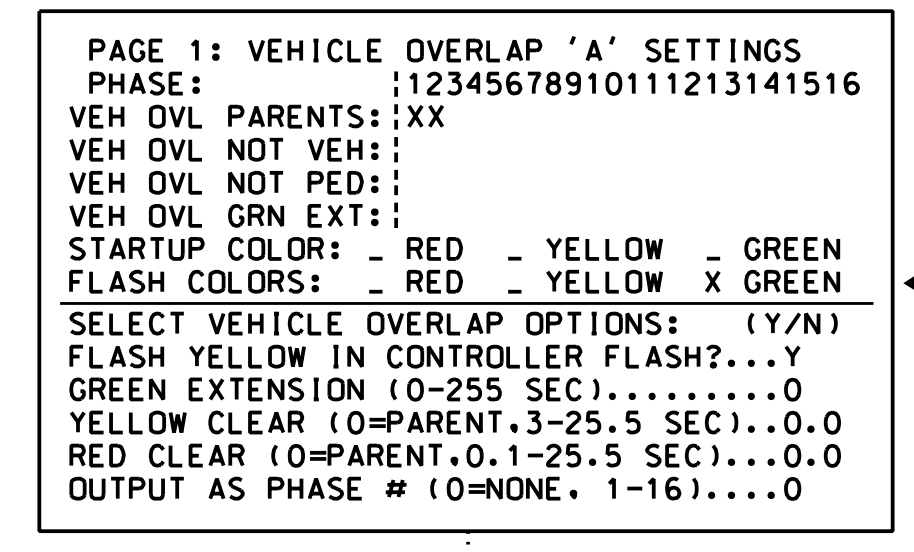
NOTE: FIRE STATION PILOT LAMP LOGIC

LOGIC I/O PROCESSOR PROGRAMMING COMPLETE

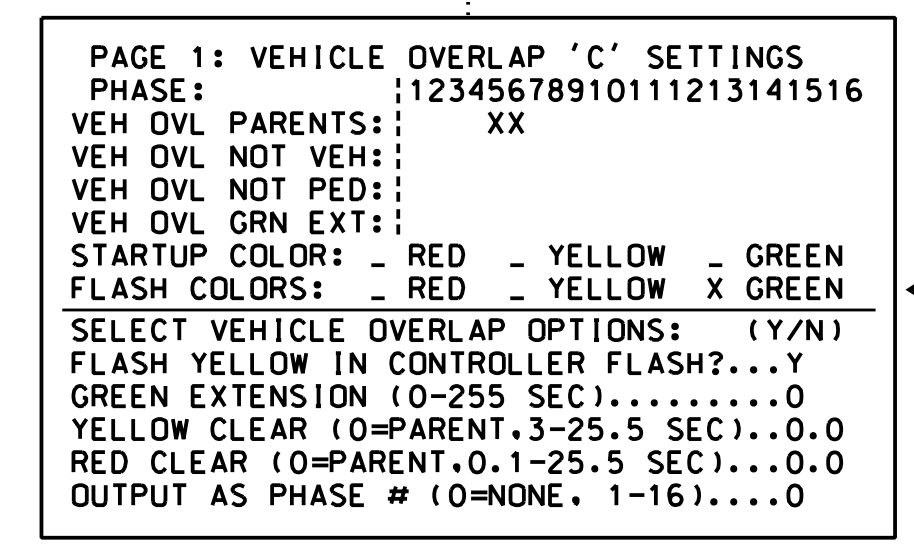
OVERLAP PROGRAMMING DETAIL

(program controller as shown below)

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



NOTICE GREEN FLASH



NOTICE GREEN FLASH

OUTPUT REFERENCE SCHEDULE

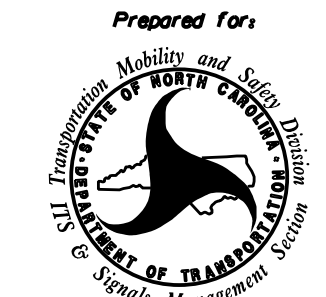
USE TO INTERPRET LOGIC PROCESSOR

- INPUT 14 = Preempt 2 Input
- OUTPUT 33 = Phase 2 Ped Yellow
- 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

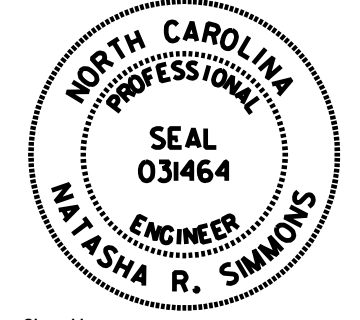
THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 02-0190
DESIGNED: March 2018
SEALED: 12-7-18
REVISED: N/A

Electrical Detail - Sheet 2 of 3
Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Prepared for:

 750 N. Greenfield Pkwy, Corner, NC 27529

US 70 Business (E Main St) at SR 1735 (Cunningham Boulevard)/ Annunciation Catholic School		
Division 02	Craven Co. Havelock	
PLAN DATE: March 2018	REVIEWED BY: A.D. Klinksiek	
PREPARED BY: A.H. Thornburg	REVIEWED BY: N.R. Simmons	
REVISIONS	INIT.	DATE

SEAL

 DocuSigned by:
 Natasha R. Simmons
 12/7/2018
 DATE
 SIG. INVENTORY NO. 02-0190

EMERGENCY VEHICLE PREEMPTION PROGRAMMING DETAIL

(program controller as shown below)

From Main Menu press 'A' (Preemption), then '1' (Standard Preemptions). Press 'NEXT' to advance to Preemption #2.

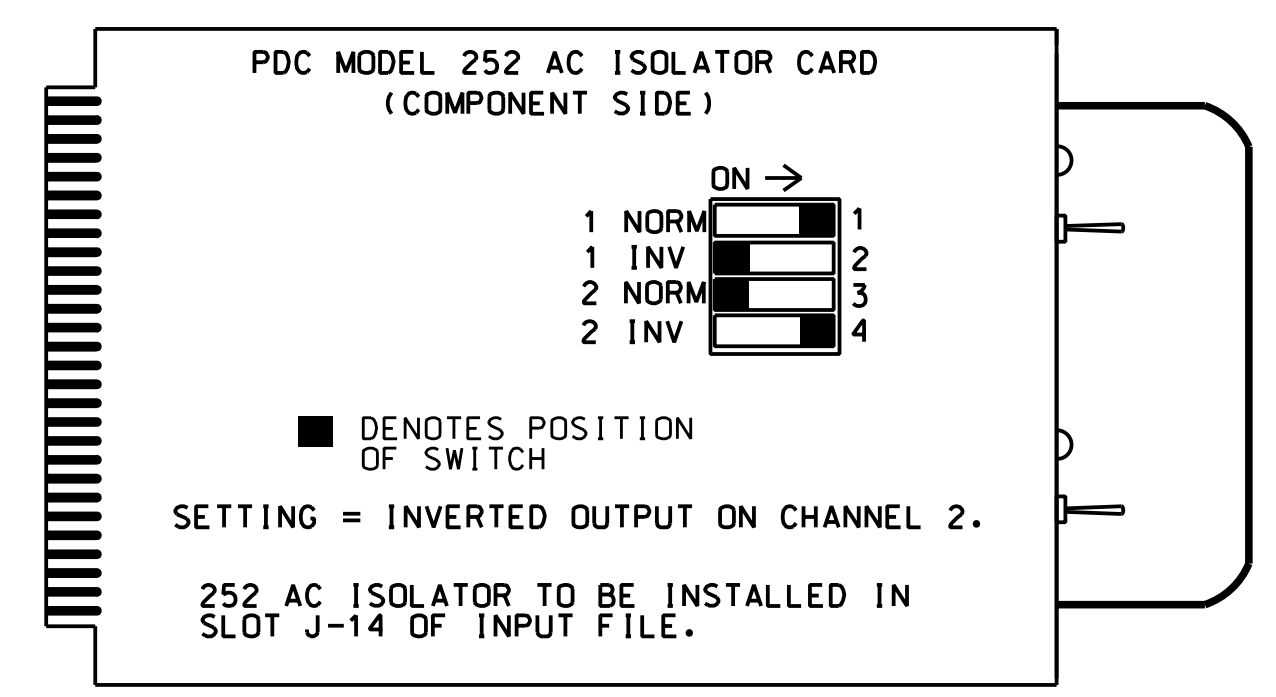
PREEMPTION #2	SETTINGS (NEXT:1-10)
INTERVAL/TIMING	CLEAR/DWELL PHASES
GRN YEL RED	12345678910111213141516
1 255 3.8 2.6	X
2 0 0.0 0.0	
3 0 0.0 0.0	
4 0 0.0 0.0	
5 1 0.0 0.0	X X

EXIT CALLS	OPTIONS
PRIORITY (Y/N TO SELECT)	MED
DELAY TIMER (0-255 SEC)	*
MIN GREEN BEFORE PRE (0= DEFAULT)...	1
PED CLEAR BEFORE PRE (0= DEFAULT)...	0
YELLOW CLEAR BEFORE PRE (0= DEFAULT)...	0
RED CLEAR BEFORE PRE (0= DEFAULT)...	0
DWELL MIN TIMER (0-255 SEC)	*
DWELL MAX TIMER (0=OFF,1-255MIN)	0
DWELL HOLD-OVER TIMER (0-255)	0
LATCH CALL?	Y
LINK TO NEXT PREEMPT?	N
ENABLE BACKUP PROTECTION?	N
HOLD CLEAR 1 PHASES DURING DELAY? ..	N
FAST GREEN FLASH DWELL PHASES?	N
PED CLEARANCE THROUGH YELLOW?	Y
INHIBIT OVERLAP GREEN EXTENSION? ..	N
SERVICE DURING SOFTWARE FLASH?	N
REST IN RED DURING DWELL INTERVAL? ..	N
FLASH DWELL INTERVAL?	N
ALLOW PEDS IN DWELL INTERVAL?	N
RE-TIME DWELL INTERVAL?	Y
OVERLAPS:	ABCDEFGHIJKLMNOP
DWELL INT FLASH YELLOW	
OMIT OVERLAPS:	

* Denotes timing to be determined in field.

PREEMPT 2 AC ISOLATOR (MODEL 252) OUTPUT PROGRAMMING DETAIL

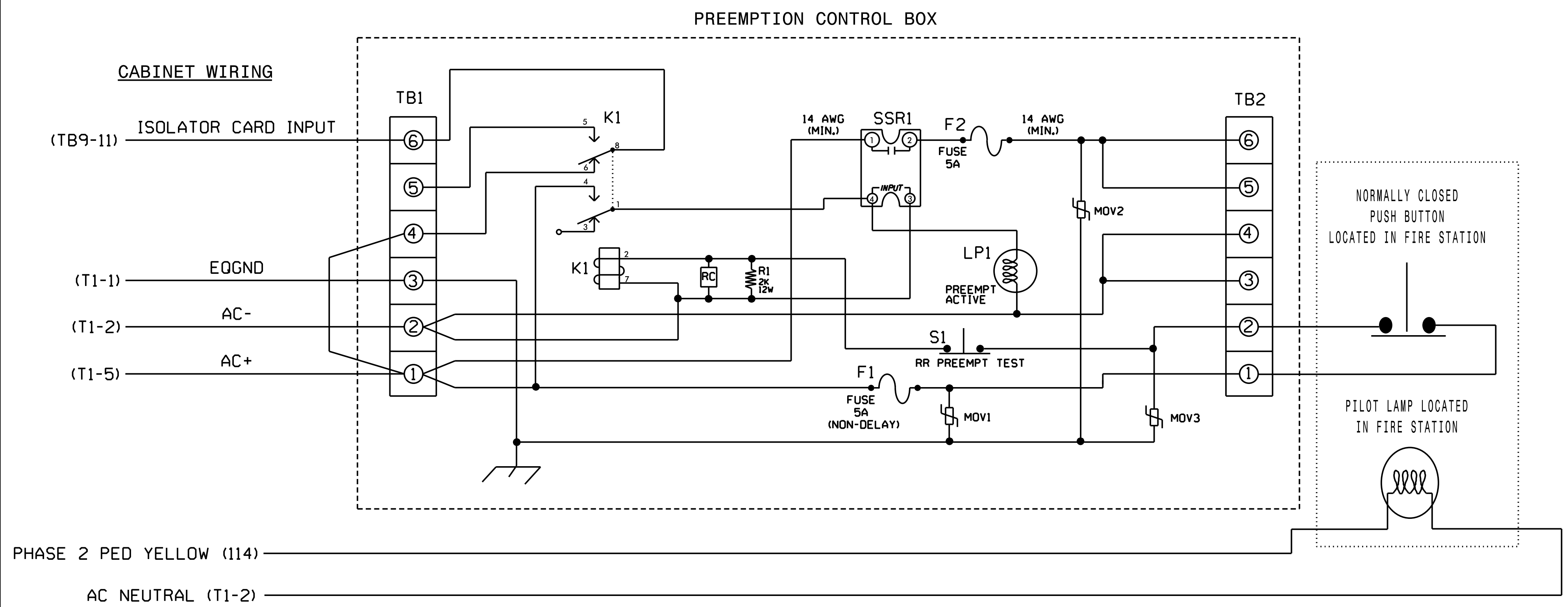
(set DIP switches as shown below)



NOTE: IF ANOTHER MANUFACTURER TYPE OF AC ISOLATOR IS USED, OUTPUT PROGRAMMING IS LIKELY NOT TO EQUATE TO THAT SHOWN ABOVE.

EV Preemption Control Box Wiring Detail

(wire as shown below)



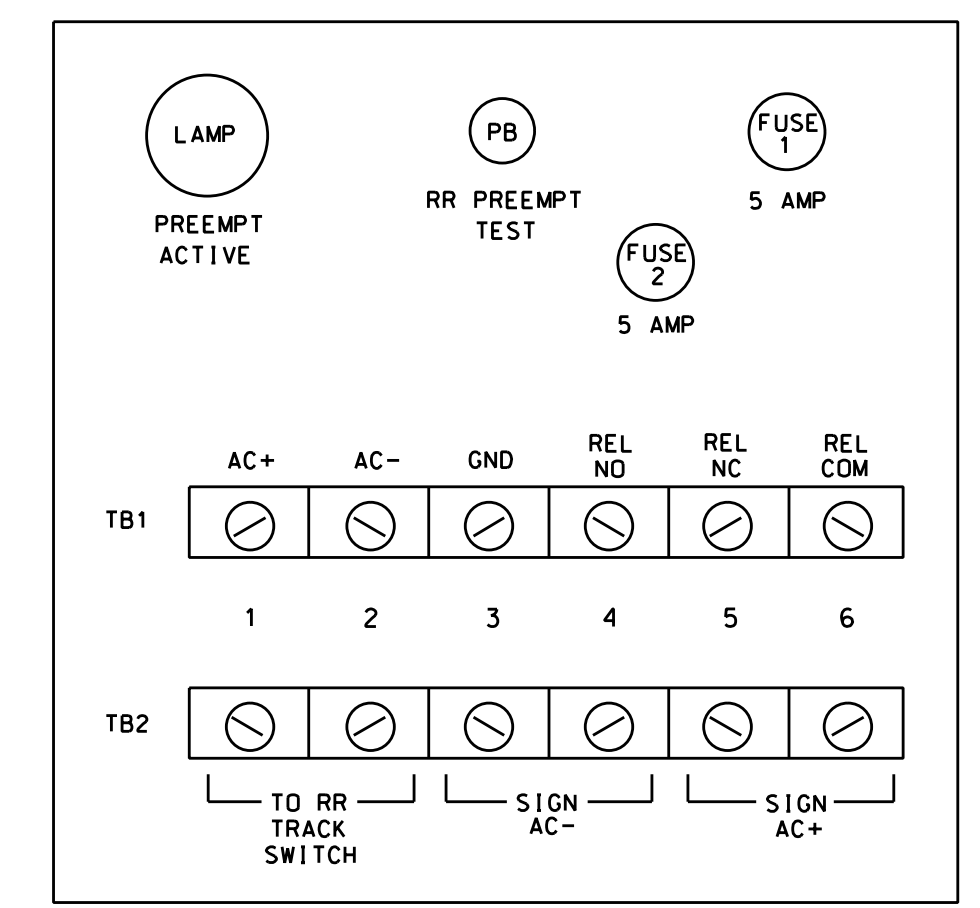
NOTES

- Relay K1 is shown in the energized (Preempt not active) normal operation state.
- Relay 'K1' is an enclosed DPDT general purpose relay with a 120VAC coil, 10A contacts, and octal-style plug.
- Relay SSR1 is a SPST (normally open) Solid State Relay with AC input and AC (25 amp) output.
- AC Isolator Card shall activate preemption upon removal of AC+ from the input (as shown above). To accomplish this, set invert dip switch on AC Isolator Card.
- IMPORTANT!!** Terminal TB9-12 (on input panel) shall be connected to AC neutral (jumper may have to be added).

LAMP NOTES

- If field terminal 114 has a conflict monitor wire attached, remove, tape, and label wire.
- Make sure load resistors are in place as shown in the Load Resistor Installation Detail on Sheet 1.
- Install a loadswitch in Output File Slot S3.

FRONT VIEW



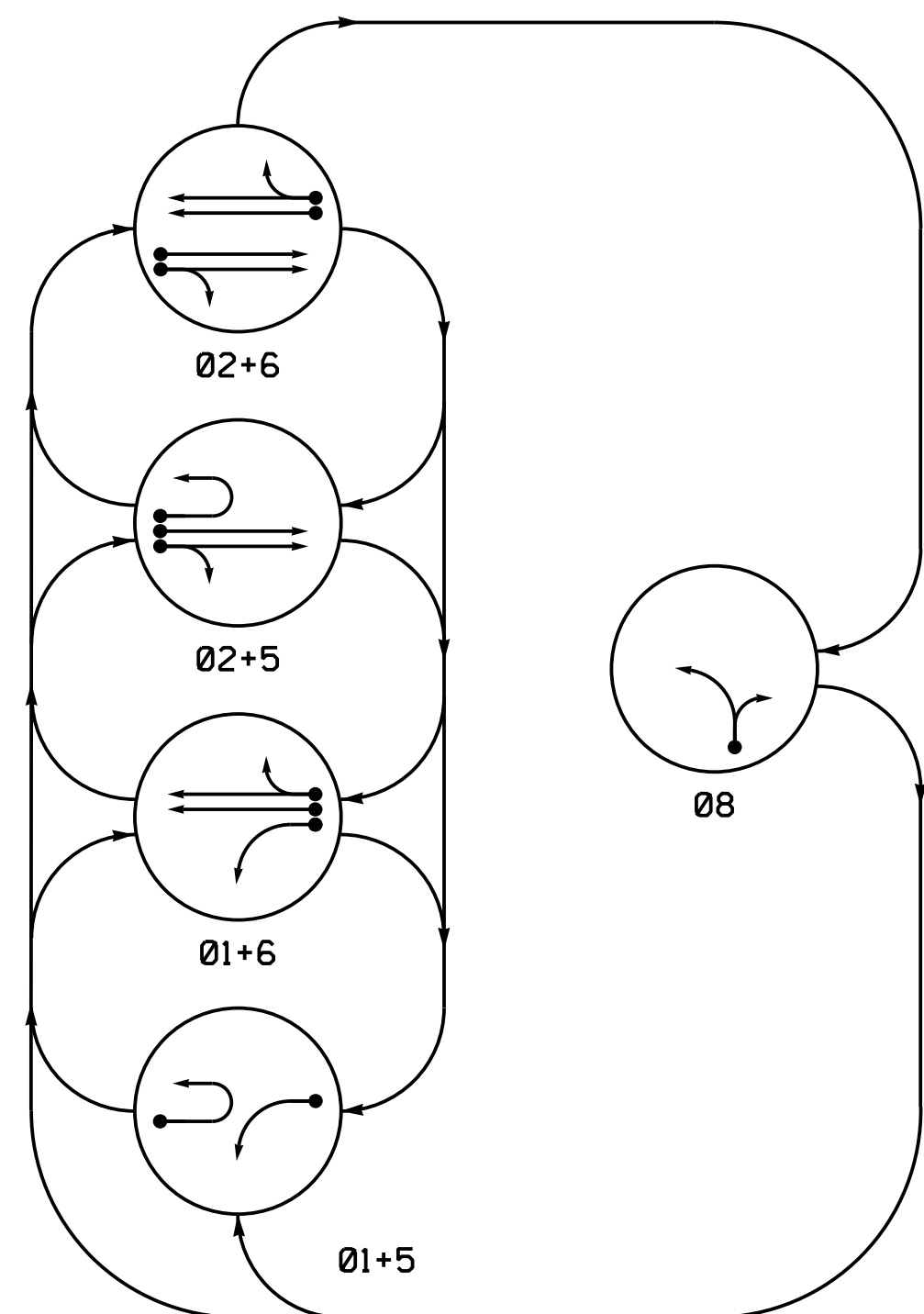
THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 02-0190
 DESIGNED: March 2018
 SEALED: 12-7-18
 REVISED: N/A

Electrical Detail - Sheet 3 of 3
 Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

	Prepared for: US 70 Business (E Main St) at SR 1735 (Cunningham Boulevard)/ Annunciation Catholic School	SEAL
	Division 02 Craven Co. Havelock PLAN DATE: March 2018 REVIEWED BY: A.D. Klinksiek PREPARED BY: A.H. Thornburg REVIEWED BY: N.R. Simmons	
REVISIONS INIT. DATE	DocuSigned by: Natasha R. Simmons DATE: 12/7/2018	SIG. INVENTORY NO. 02-0190

PHASING DIAGRAM



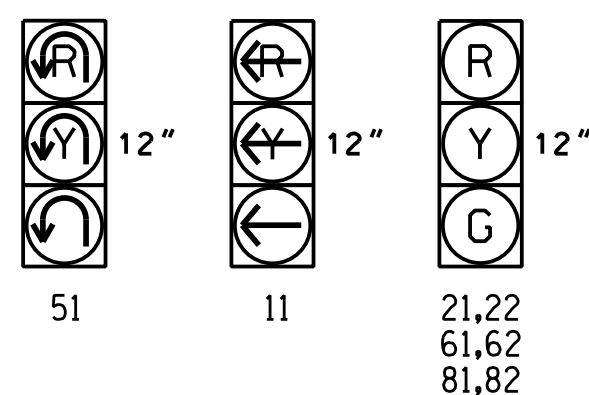
PHASING DIAGRAM DETECTION LEGEND

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

SIGNAL FACE	PHASE				
	01+5	01+6	02+5	02+6	04+8
11	---	---	---	---	---
21,22	R	R	G	G	Y
51	↶	↷	↶	↷	↶
61,62	R	G	R	G	R
81,82	R	R	R	R	G

SIGNAL FACE I.D.

All Heads L.E.D.

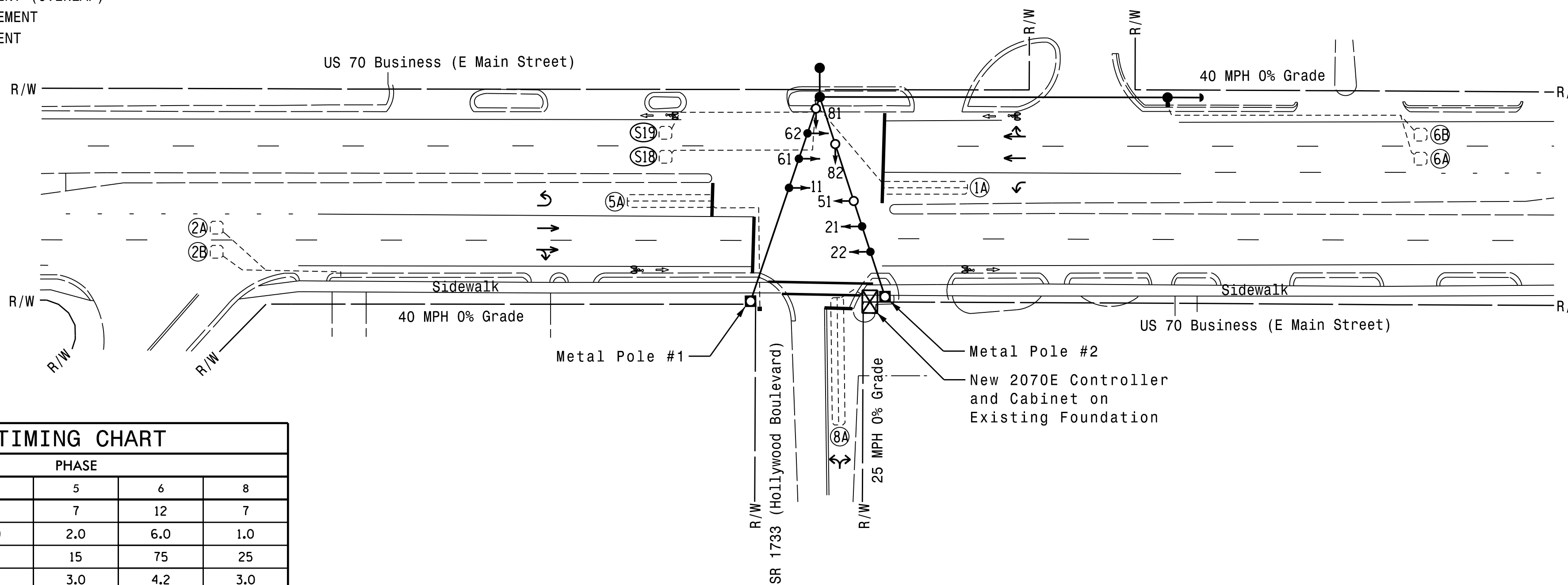


LOOP	INDUCTIVE LOOPS				DETECTOR PROGRAMMING							
	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
1A	6X40	0	2-4-2	-	1	Y	Y	-	-	-	-	Y
2A	6X6	250	4	-	2	Y	Y	-	-	-	-	Y
2B	6X6	250	4	-	2	Y	Y	-	-	-	-	Y
5A	6X40	0	2-4-2	-	5	Y	Y	-	-	-	-	Y
6A	6X6	255	4	-	6	Y	Y	-	-	-	-	Y
6B	6X6	255	4	-	6	Y	Y	-	-	-	-	Y
8A	6X60	+5	2-4-2	-	8	Y	Y	-	-	10	-	Y
S18	6X6	+100	4	-	-	-	-	-	-	-	-	Y
S19	6X6	+100	4	-	-	-	-	-	-	-	-	Y

5 Phase Fully Actuated Havelock US 70 Business CLS

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.
- 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.
- The cabinet should be designed to include Auxiliary Output file for future use.
- Pavement markings are existing.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- Closed loop system data: Controller Asset #0460



FEATURE	PHASE				
	1	2	5	6	8
Min Green 1 *	7	12	7	12	7
Extension 1 *	2.0	6.0	2.0	6.0	1.0
Max Green 1 *	15	75	15	75	25
Yellow Clearance	3.0	4.2	3.0	4.2	3.0
Red Clearance	1.9	1.0	2.4	1.5	3.2
Red Revert	2.0	2.0	2.0	2.0	2.0
Walk 1 *	-	-	-	-	-
Don't Walk 1	-	-	-	-	-
Seconds Per Actuation *	-	1.5	-	1.5	-
Max Variable Initial *	-	29	-	30	-
Time Before Reduction *	-	15	-	15	-
Time To Reduce *	-	45	-	45	-
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

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

PROPOSED	LEGEND	EXISTING
	Traffic Signal Head	
	Modified Signal Head	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
	Right of Way	
	Directional Arrow	
	Metal Strain Pole	

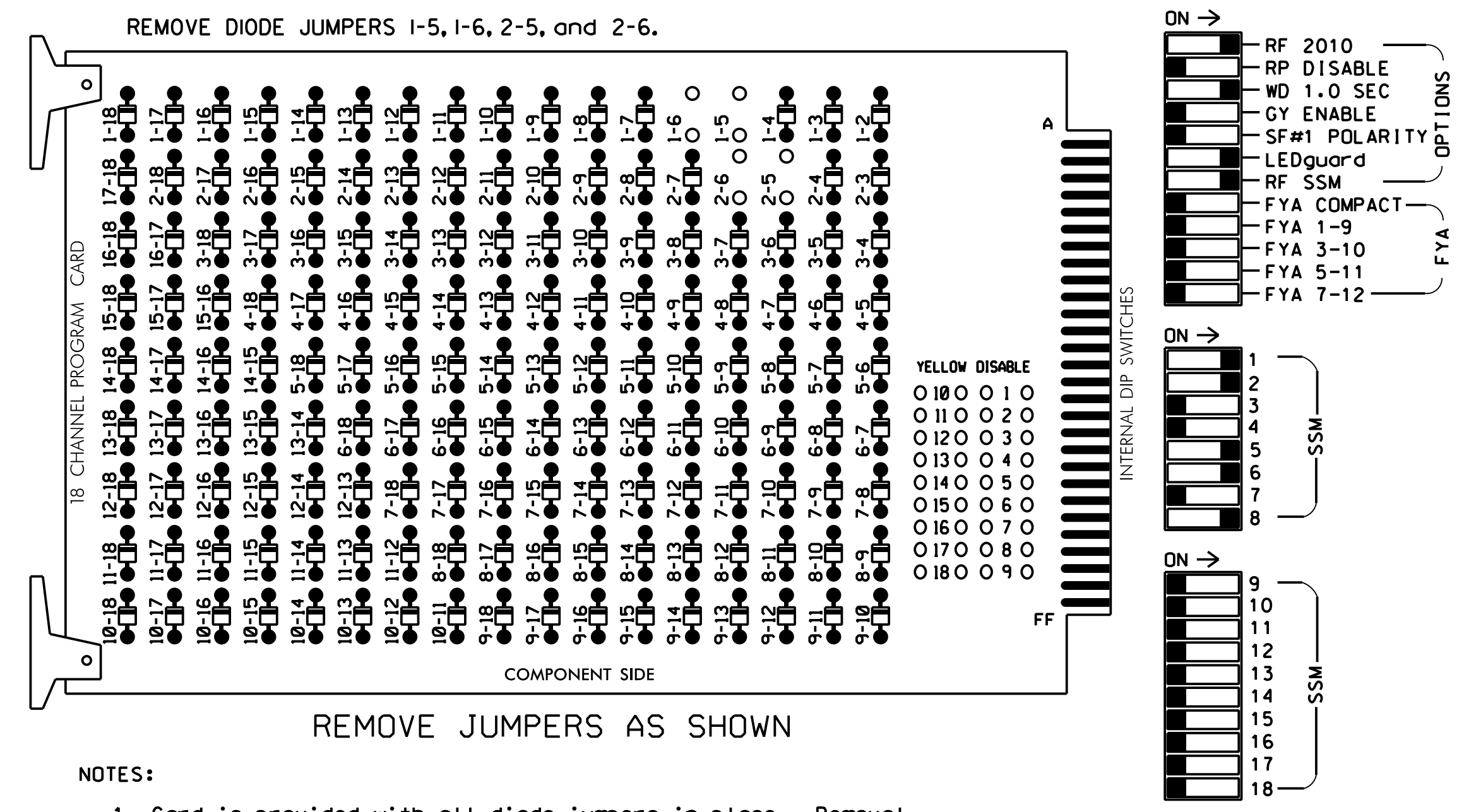
Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

	Prepared For: US 70 Business (E Main Street) at SR 1733 (Hollywood Boulevard)		SEAL
	Division 02 Craven Co. Havelock PLAN DATE: March 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	SCALE 0 40 1"=40'		DocuSigned by: Natasha R. Simmons DATE: 12/7/2018 SIG. INVENTORY NO. 02-0460

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



NOTES:

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

NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
- 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 6 for Yellow Flash.
- The cabinet and controller are part of the Havelock US 70 Business Closed Loop 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
EMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	11	21,22	NU	NU	NU	NU	51	61,62	NU	NU	81,82	NU	NU	NU	NU	NU	NU	NU
RED		128						134			107							
YELLOW		129						135			108							
GREEN		130						136			109							
RED ARROW	125							131										
YELLOW ARROW	126							132										
FLASHING YELLOW ARROW																		
GREEN ARROW	127							133										

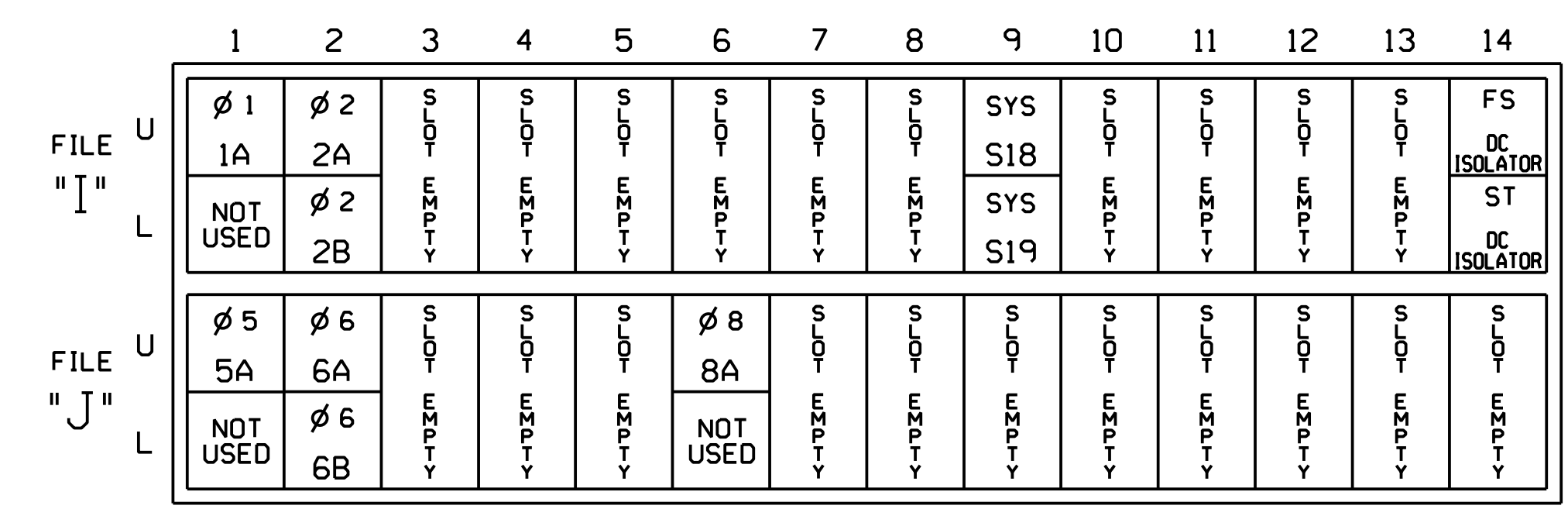
NU = Not Used

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,S7,S8,S11
 PHASES USED.....1,2,5,6,8
 OVERLAPS.....NONE

INPUT FILE POSITION LAYOUT

(front view)



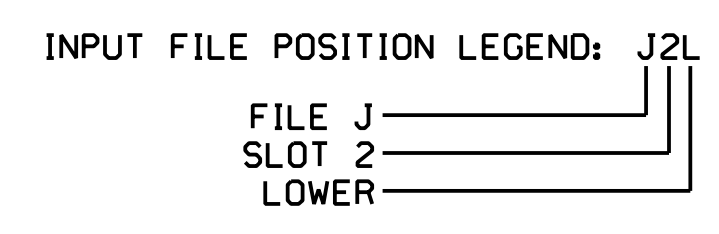
EX. : 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE
 ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
1A	TB2-1,2	11U	56	18	1	1	Y	Y			
2A	TB2-5,6	12U	39	1	2	2	Y	Y			
2B	TB2-7,8	12L	43	5	12	2	Y	Y			
*S18	TB6-9,10	19U	60	22	11	SYS					
*S19	TB6-11,12	19L	62	24	13	SYS					
5A	TB3-1,2	J1U	55	17	5	5	Y	Y			
6A	TB3-5,6	J2U	40	2	6	6	Y	Y			
6B	TB3-7,8	J2L	44	6	16	6	Y	Y			
8A	TB5-9,10	J6U	42	4	8	8	Y	Y			10

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



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 02-0460
 DESIGNED: March 2018
 SEALED: 12-7-18
 REVISED: N/A

Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Electrical and Programming Details For: US 70 Business (E Main Street) at SR 1733 (Hollywood Boulevard)

Division 02 Craven Co. Havelock

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

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

REVISIONS: INIT. DATE

DocuSigned by: 12/7/2018
 Natasha R. Simmons
 SEAL 031464
 NORTH CAROLINA PROFESSIONAL ENGINEER
 W. TASHA R. SIMMONS

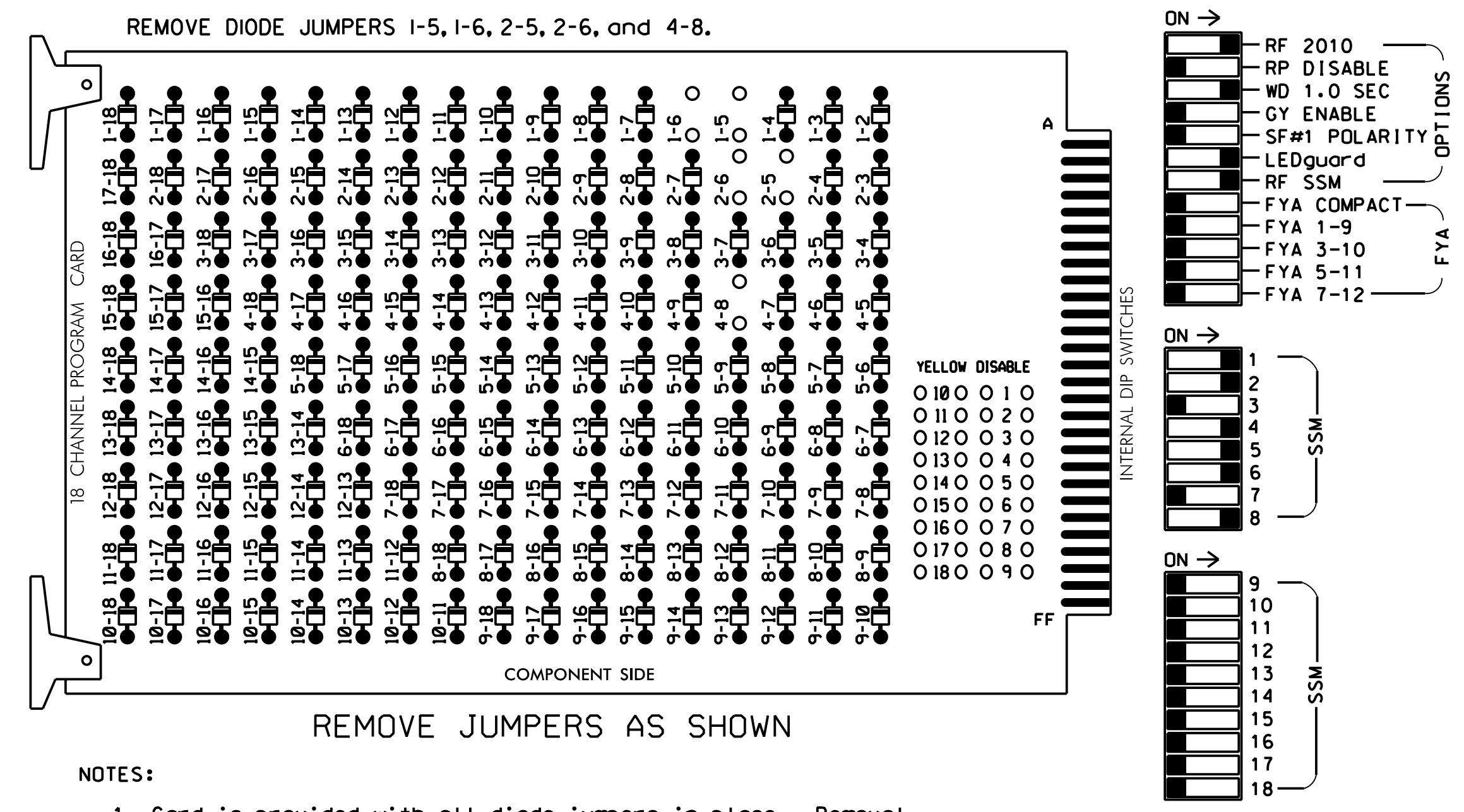
750 N. Greenfield Pkwy, Corner, NC 27529

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

SIG. INVENTORY NO. 02-0460

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



NOTES:

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

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Enable Simultaneous Gap-Out for all Phases.
3. Program phases 4 and 8 for Dual Entry.
4. Program phases 2 and 6 for Variable Initial and Gap Reduction.
5. Program phases 2 and 6 for Startup In Green.
6. Program phases 2 and 6 for Yellow Flash.
7. The cabinet and controller are part of the Havelock US 70 Business Closed Loop 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
EMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	11	21,22	NU	NU	41,42	NU	51	61,62	NU	NU	81,82	NU	NU	NU	NU	NU	NU	NU
RED		128			101			134			107							
YELLOW		129			102			135			108							
GREEN		130			103			136			109							
RED ARROW	125							131										
YELLOW ARROW	126							132										
FLASHING YELLOW ARROW																		
GREEN ARROW	127							133										

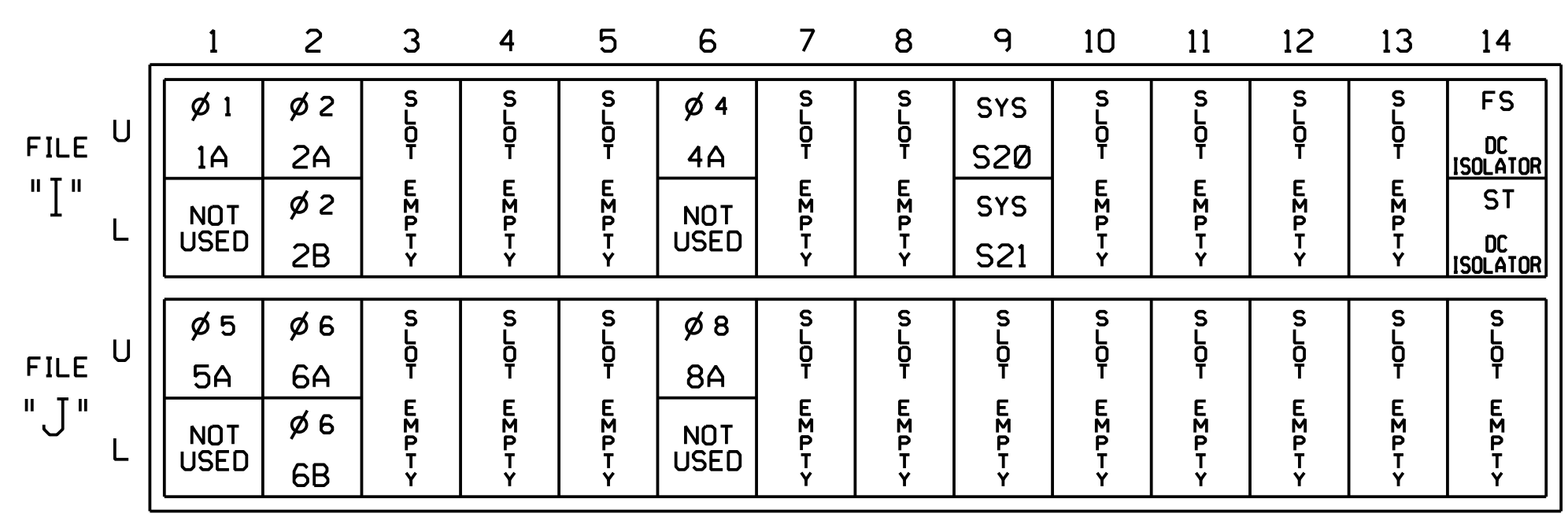
NU = Not Used

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,S5,S7,S8,S11
 PHASES USED.....1,2,4,5,6,8
 OVERLAPS.....NONE

INPUT FILE POSITION LAYOUT

(front view)



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

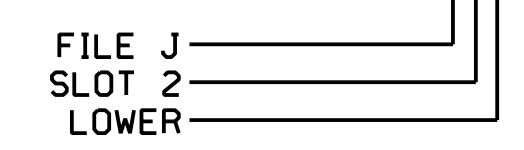
FS = FLASH SENSE
 ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
1A	TB2-1,2	I1U	56	18	1	1	Y	Y			
2A	TB2-5,6	I2U	39	1	2	2	Y	Y			
2B	TB2-7,8	I2L	43	5	12	2	Y	Y			
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			
* S20	TB6-9,10	I9U	60	22	11	SYS					
* S21	TB6-11,12	I9L	62	24	13	SYS					
5A	TB3-1,2	J1U	55	17	5	5	Y	Y			
6A	TB3-5,6	J2U	40	2	6	6	Y	Y			
6B	TB3-7,8	J2L	44	6	16	6	Y	Y			
8A	TB5-9,10	J6U	42	4	8	8	Y	Y			

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

INPUT FILE POSITION LEGEND: J2L



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 02-0392
 DESIGNED: March 2018
 SEALED: 12-7-18
 REVISED: N/A

Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Electrical and Programming Details For: US 70 Business (E Main Street) at North Nunn Street

Division 02 Craven Co. Havelock

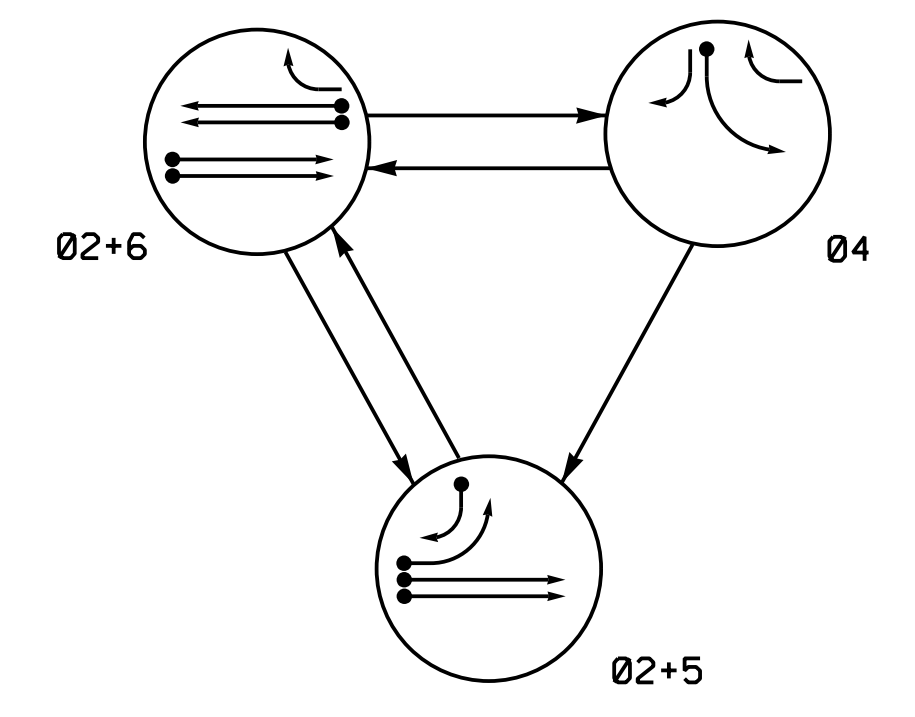
PLAN DATE: March 2018 REVIEWED BY: A.D. Klinksiek

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

Signature: *Matasha R. Simmons* 12/7/2018

SIG. INVENTORY NO. 02-0392

PHASING DIAGRAM



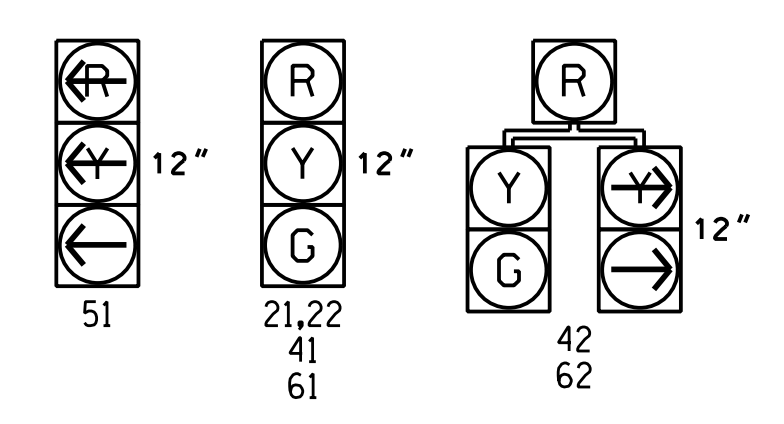
PHASING DIAGRAM DETECTION LEGEND

- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UN SIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

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

SIGNAL FACE I.D.

All Heads L.E.D.



OASIS 2070 LOOP & DETECTOR INSTALLATION CHART

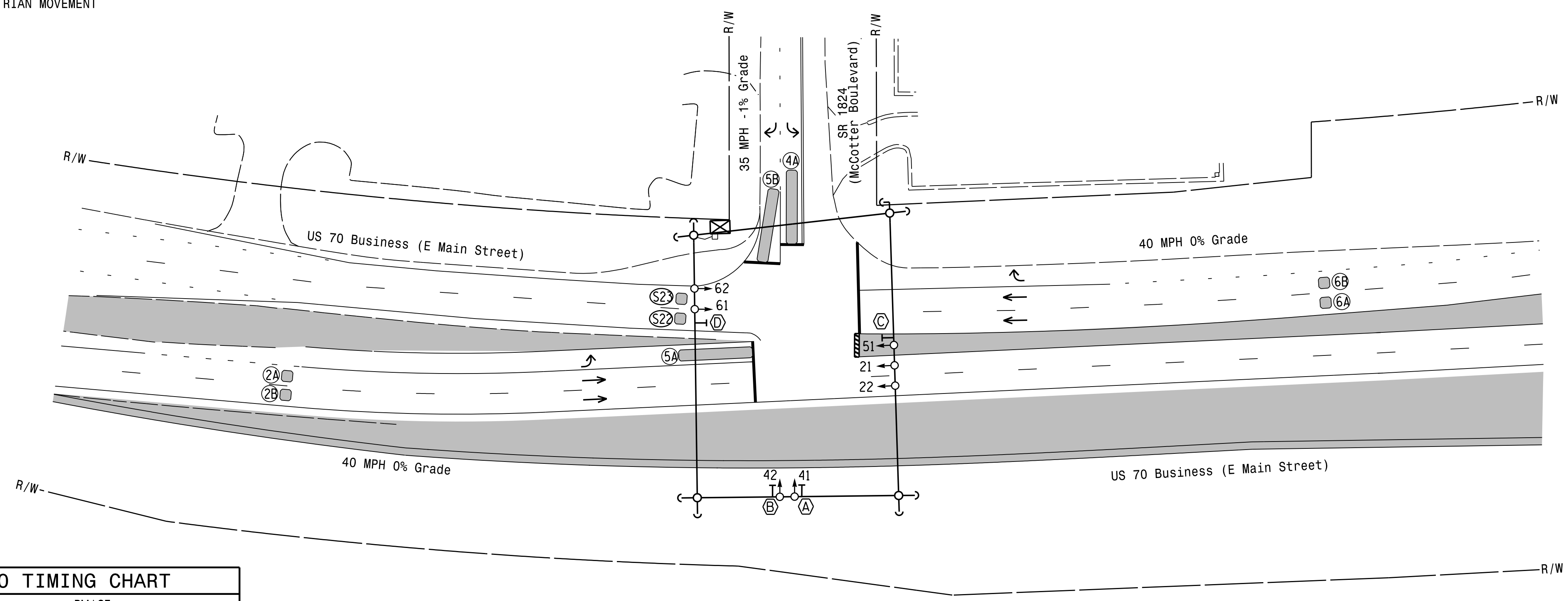
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	DETECTOR PROGRAMMING					SYSTEM LOOP	NEW CARD	
					PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME			DELAY TIME
2A	6X6	250	*	Y	2	Y	Y	-	-	-	-	Y
2B	6X6	250	*	Y	2	Y	Y	-	-	-	-	Y
4A	6X40	0	*	Y	4	Y	Y	-	-	3	-	Y
5A	6X40	0	*	Y	5	Y	Y	-	-	-	-	Y
5B	6X40	0	*	Y	5	Y	Y	-	-	15	-	Y
6A	6X6	250	*	Y	6	Y	Y	-	-	-	-	Y
6B	6X6	250	*	Y	6	Y	Y	-	-	-	-	Y
S22	6X6	+100	*	Y	-	-	-	-	-	-	-	Y
S23	6X6	+100	*	Y	-	-	-	-	-	-	-	Y

* Multizone Microwave Detection

3 Phase Fully Actuated
Havelock US 70 Business CLS

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Phase 5 may be lagged.
- Set all detector units to presence mode.
- Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
- The cabinet should be designed to include Auxiliary Output file for future use.
- 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.
- Signal system data:
Controller Asset #0649



FEATURE	PHASE			
	2	4	5	6
Min Green 1 *	12	7	7	12
Extension 1 *	6.0	2.0	2.0	6.0
Max Green 1 *	90	20	15	90
Yellow Clearance	4.2	3.0	3.0	4.2
Red Clearance	1.0	2.4	2.3	1.1
Red Revert	2.0	2.0	2.0	2.0
Walk 1 *	-	-	-	-
Don't Walk 1	-	-	-	-
Seconds Per Actuation *	1.5	-	-	1.5
Max Variable Initial *	29	-	-	29
Time Before Reduction *	15	-	-	15
Time To Reduce *	45	-	-	45
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

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

LEGEND

- | PROPOSED | EXISTING |
|--|--|
| ○ → Traffic Signal Head | ● → Traffic Signal Head |
| ○ → Modified Signal Head | ○ → Modified Signal Head |
| — Sign | — Sign |
| — Pedestrian Signal Head With Push Button & Sign | — Pedestrian Signal Head With Push Button & Sign |
| — Signal Pole with Guy | — Signal Pole with Guy |
| — Signal Pole with Sidewalk Guy | — Signal Pole with Sidewalk Guy |
| — Inductive Loop Detector | — Inductive Loop Detector |
| — Controller & Cabinet | — Controller & Cabinet |
| — Junction Box | — Junction Box |
| — 2-in Underground Conduit | — 2-in Underground Conduit |
| — Right of Way | — Right of Way |
| — Directional Arrow | — Directional Arrow |
| — Metal Strain Pole | — Metal Strain Pole |
| — Microwave Detection Zone | — Microwave Detection Zone |
| — Construction Zone | — Construction Zone |
| — Construction Barricade | — Construction Barricade |
| (A) Left Arrow "ONLY" Sign (R3-5L) | (A) Left Arrow "ONLY" Sign (R3-5L) |
| (B) Right Arrow "ONLY" Sign (R3-5R) | (B) Right Arrow "ONLY" Sign (R3-5R) |
| (C) "U-TURN YIELD TO RIGHT TURN" Sign (R10-16) | (C) "U-TURN YIELD TO RIGHT TURN" Sign (R10-16) |
| (D) No U-turn Sign (R3-4) | (D) No U-turn Sign (R3-4) |

Signal Upgrade
Temporary Design 1
Construction Phase 1, Step 3

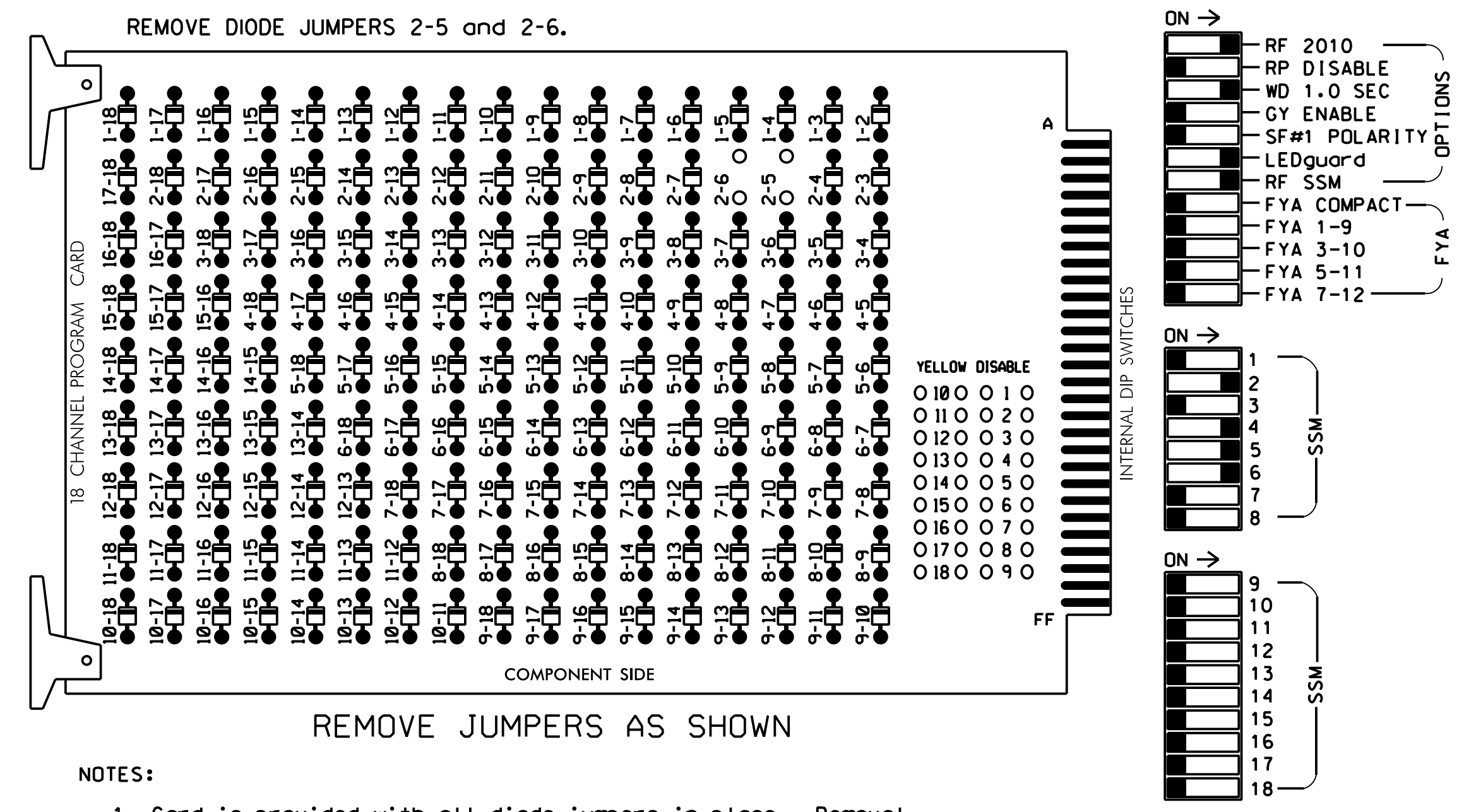
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

	US 70 Business (E Main Street) at SR 1824 (McCotter Boulevard)		
	Division 02 Craven Co. Havelock PLAN DATE: March 2018 REVIEWED BY: A.D. Klinskiak PREPARED BY: A.H. Thornburg REVIEWED BY: N.R. Simmons	SEAL NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 031464 NATASHA R. SIMMONS	
SCALE 0 40 1" = 40'	REVISIONS INIT. DATE		DocuSigned by: Natasha R. Simmons DATE 12/7/2018 SIGNATURE DATE SIG. INVENTORY NO. 02-0649T1

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 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal 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 6 for Yellow Flash.
- The cabinet and controller are part of the Havelock US 70 Business Closed Loop 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.	NU	21,22	NU	NU	41,42	62	NU	42	51	61,62	NU	NU	NU	NU	NU	NU	NU	NU
RED		128			101					134								
YELLOW		129			102					135								
GREEN		130			103					136								
RED ARROW										131								
YELLOW ARROW						102		132	132									
FLASHING YELLOW ARROW																		
GREEN ARROW						103		133	133									

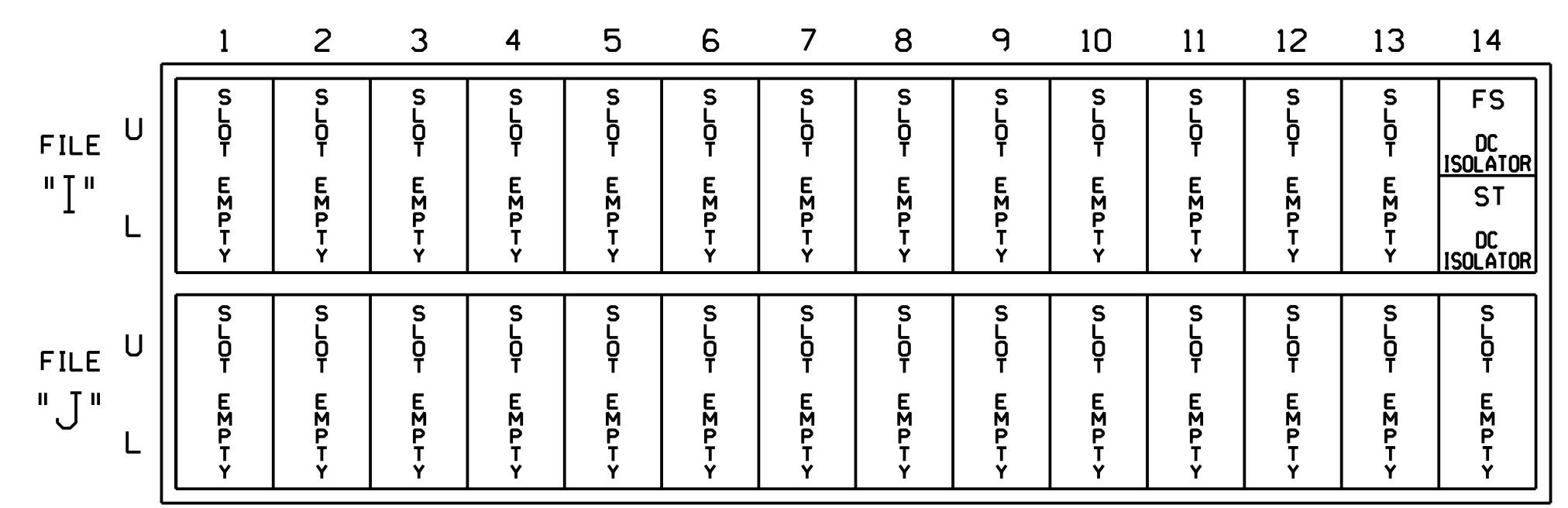
NU = Not Used

EQUIPMENT INFORMATION

CONTROLLER.....2070E
 CABINET.....332 W/AUX
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
 LOAD SWITCHES USED.....S2,S5,S7,S8
 PHASES USED.....2,4,5,6
 OVERLAPS.....NONE

INPUT FILE POSITION LAYOUT

(front view)



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

FS = FLASH SENSE
 ST = STOP TIME

SPECIAL DETECTOR NOTE

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.

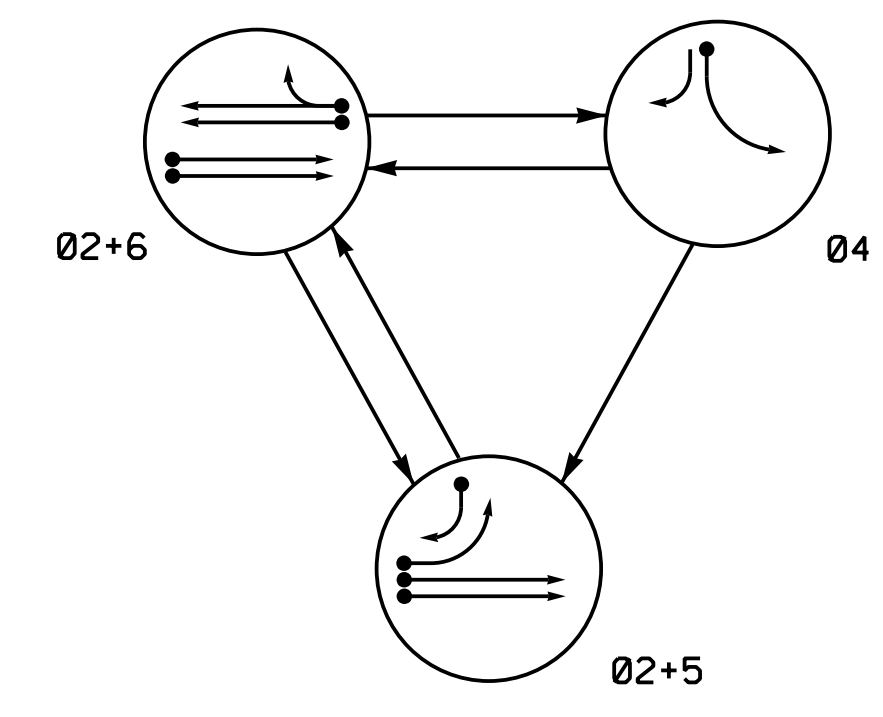
THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 02-0649T1
 DESIGNED: March 2018
 SEALED: 12-7-18
 REVISED: N/A

Electrical Detail
 Signal Upgrade
 Temporary Design 1

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

	Prepared for: 	US 70 Business (E Main Street) at SR 1824 (McCotter Boulevard) Division 02 Craven Co. Havelock	SEAL
	PLAN DATE: March 2018 PREPARED BY: A.H. Thornburg	REVIEWED BY: A.D. Klinskiak REVIEWED BY: N.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		REVISIONS INIT. DATE	DocuSigned by: Natasha R. Simmons 12/7/2018 DATE SIG. INVENTORY NO. 02-0649T1

PHASING DIAGRAM

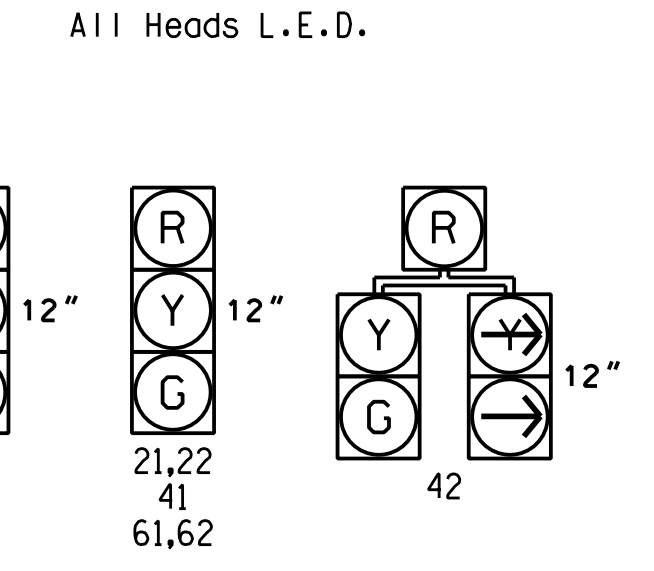


PHASING DIAGRAM DETECTION LEGEND

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

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

SIGNAL FACE I.D.



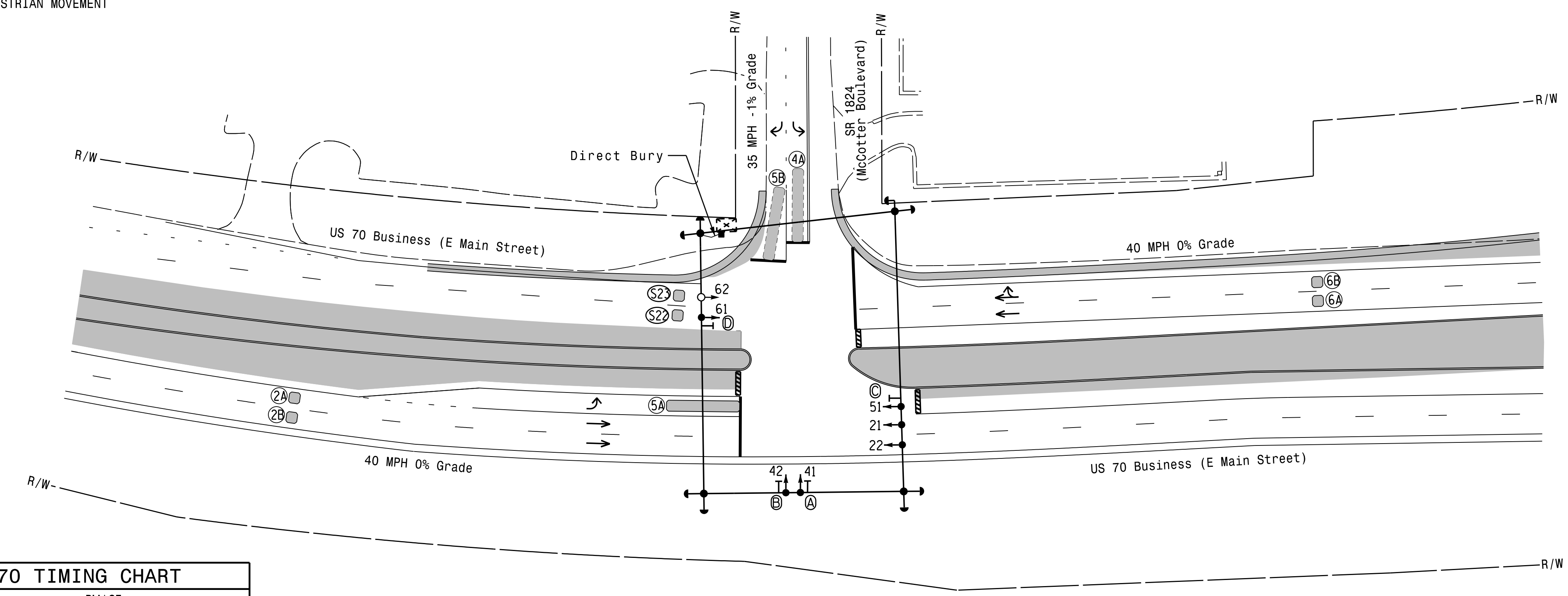
OASIS 2070 LOOP & DETECTOR INSTALLATION CHART												
INDUCTIVE LOOPS					DETECTOR PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
2A	6X6	250	*	Y	2	Y	Y	-	-	-	-	-
2B	6X6	250	*	Y	2	Y	Y	-	-	-	-	-
4A	6X40	0	*	-	4	Y	Y	-	-	3	-	-
5A	6X40	0	*	Y	5	Y	Y	-	-	-	-	-
5B	6X40	0	*	-	5	Y	Y	-	-	15	-	-
6A	6X6	250	*	Y	6	Y	Y	-	-	-	-	-
6B	6X6	250	*	Y	6	Y	Y	-	-	-	-	-
S22	6X6	+100	*	Y	-	-	-	-	-	-	Y	-
S23	6X6	+100	*	Y	-	-	-	-	-	-	Y	-

* Multizone Microwave Detection

3 Phase Fully Actuated
Havelock US 70 Business CLS

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Phase 5 may be lagged.
- Reposition existing signal heads numbered 21,22,51,61, and signs (C) and (D).
- Set all detector units to presence mode.
- 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.
- Signal system data: Controller Asset #0649



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	○ → N/A
○ → Controller & Cabinet	○ → N/A
○ → Junction Box	○ → N/A
○ → 2-in Underground Conduit	○ → N/A
N/A → Right of Way	N/A → N/A
○ → Directional Arrow	○ → N/A
○ → Metal Strain Pole	○ → N/A
○ → Microwave Detection Zone	○ → N/A
○ → Construction Zone	○ → N/A
○ → Construction Barricade	○ → N/A
(A) Left Arrow "ONLY" Sign (R3-5L)	(A) Left Arrow "ONLY" Sign (R3-5L)
(B) Right Arrow "ONLY" Sign (R3-5R)	(B) Right Arrow "ONLY" Sign (R3-5R)
(C) "U-TURN YIELD TO RIGHT TURN" Sign (R10-16)	(C) "U-TURN YIELD TO RIGHT TURN" Sign (R10-16)
(D) No U-turn Sign (R3-4)	(D) No U-turn Sign (R3-4)

OASIS 2070 TIMING CHART				
FEATURE	PHASE			
	2	4	5	6
Min Green 1 *	12	7	7	12
Extension 1 *	6.0	2.0	2.0	6.0
Max Green 1 *	90	20	15	90
Yellow Clearance	4.2	3.0	3.0	4.2
Red Clearance	1.2	3.3	2.9	1.0
Red Revert	2.0	2.0	2.0	2.0
Walk 1 *	-	-	-	-
Don't Walk 1	-	-	-	-
Seconds Per Actuation *	1.5	-	-	1.5
Max Variable Initial *	29	-	-	29
Time Before Reduction *	15	-	-	15
Time To Reduce *	45	-	-	45
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

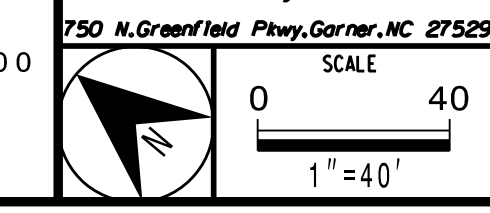
* These values may be field adjusted. Do not adjust Min Green and Extension times for phases 2 and 6 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.

Signal Upgrade
Temporary Design 2
Construction Phase 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

	US 70 Business (E Main Street) at SR 1824 (McCotter Boulevard)		
	Division 02 Craven Co. Havelock PLAN DATE: March 2018 REVIEWED BY: A.D. Klinsky PREPARED BY: A.H. Thornburg REVIEWED BY: N.R. Simmons	REVISIONS: _____ INITI: _____ DATE: _____ _____ _____ _____	

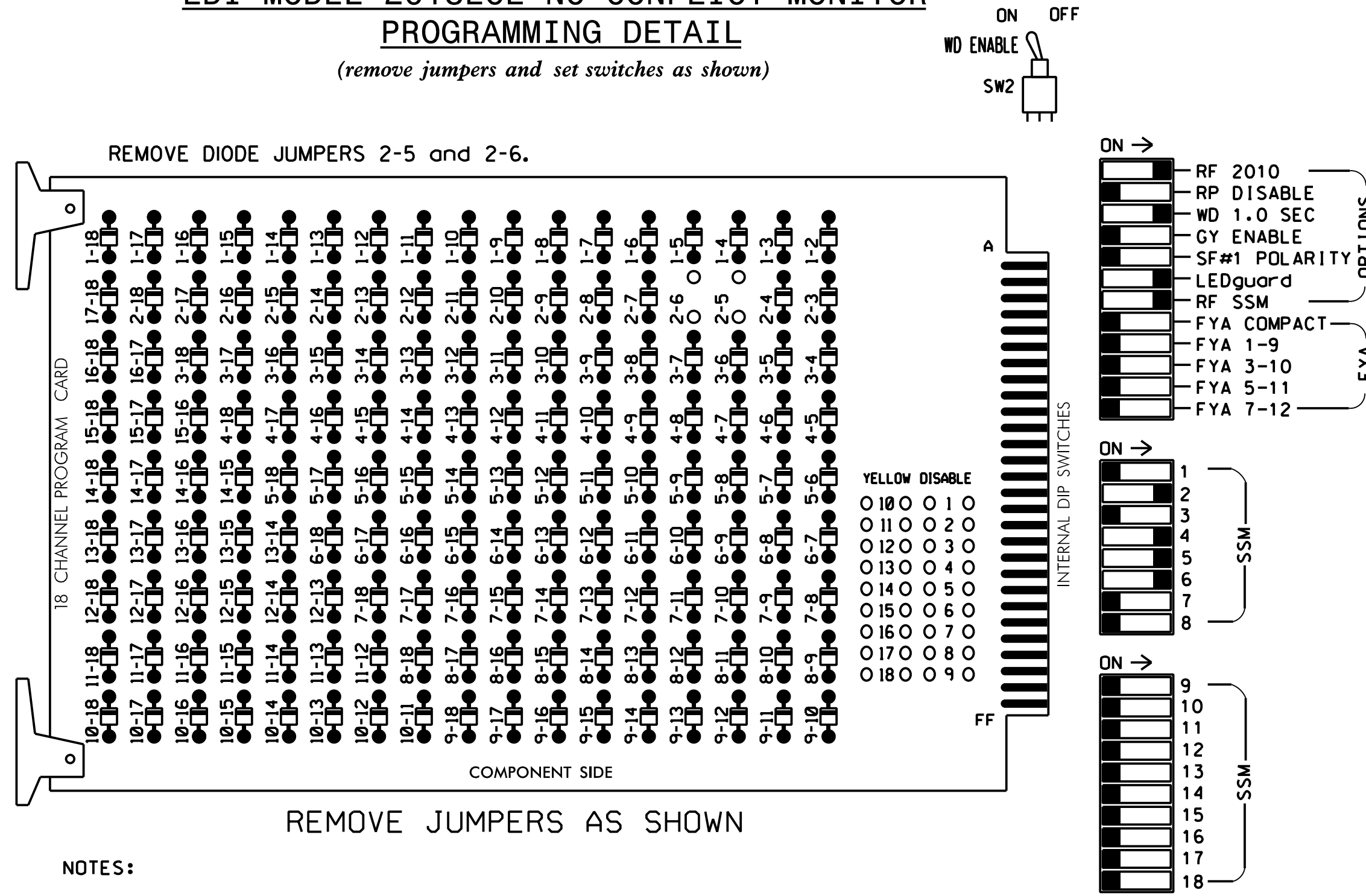
HNTB HNTB NORTH CAROLINA, P.C.
343 E. Six Forks Road, Suite 200
Raleigh, North Carolina 27609
NC License No: C-1554
(919) 546-8997



DocuSigned by:
Natasha R. Simmons
12/7/2018
DATE
SIG. INVENTORY NO. 02-0649T2

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

(remove jumpers and set switches as shown)



NOTES:

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

■ = DENOTES POSITION OF SWITCH

NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
- 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 6 for Yellow Flash.
- The cabinet and controller are part of the Havelock US 70 Business Closed Loop 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.	NU	21,22	NU	NU	41,42	NU	42	51	61,62	NU	NU	NU	NU	NU	NU	NU	NU	NU
RED		128			101				134									
YELLOW		129			102				135									
GREEN		130			103				136									
RED ARROW									131									
YELLOW ARROW									132	132								
FLASHING YELLOW ARROW																		
GREEN ARROW								133	133									

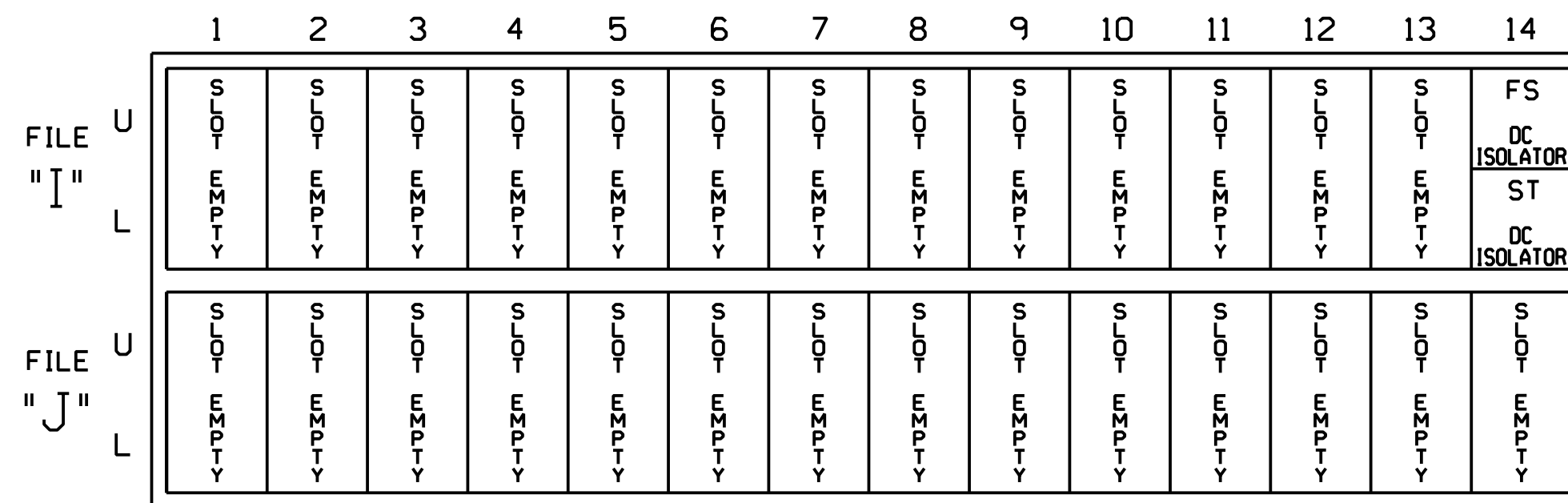
NU = Not Used

EQUIPMENT INFORMATION

CONTROLLER.....2070E
 CABINET.....332 W/AUX
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
 LOAD SWITCHES USED.....S2,S5,S7,S8
 PHASES USED.....2,4,5,6
 OVERLAPS.....NONE

INPUT FILE POSITION LAYOUT

(front view)



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

FS = FLASH SENSE
 ST = STOP TIME

SPECIAL DETECTOR NOTE

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: 02-0649T2
 DESIGNED: March 2018
 SEALED: 12-7-18
 REVISED: N/A

Electrical Detail
 Signal Upgrade
 Temporary Design 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR: US 70 Business (E Main Street) at SR 1824 (McCotter Boulevard)

Division 02 Craven Co. Havelock

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

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

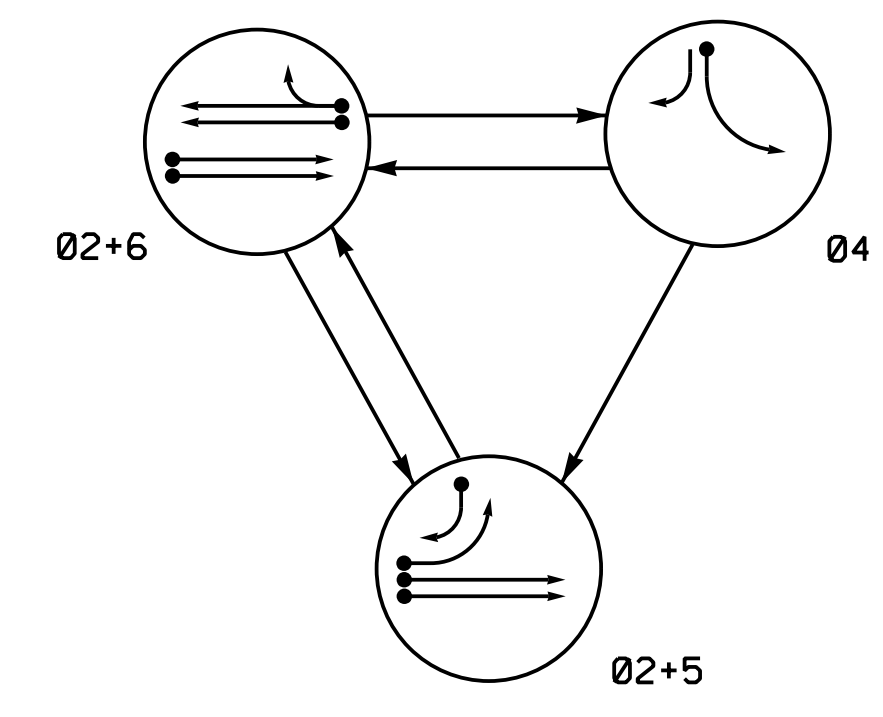
REVISIONS INIT. DATE

DocuSigned by: 12/7/2018
 Natasha R. Simmons
 SEAL 031464
 NORTH CAROLINA PROFESSIONAL ENGINEER
 SEAL 031464
 WATSHA R. SIMMONS
 SIG. INVENTORY NO. 02-0649T2

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750 N. Greenfield Pkwy, Corner, NC 27529

PHASING DIAGRAM

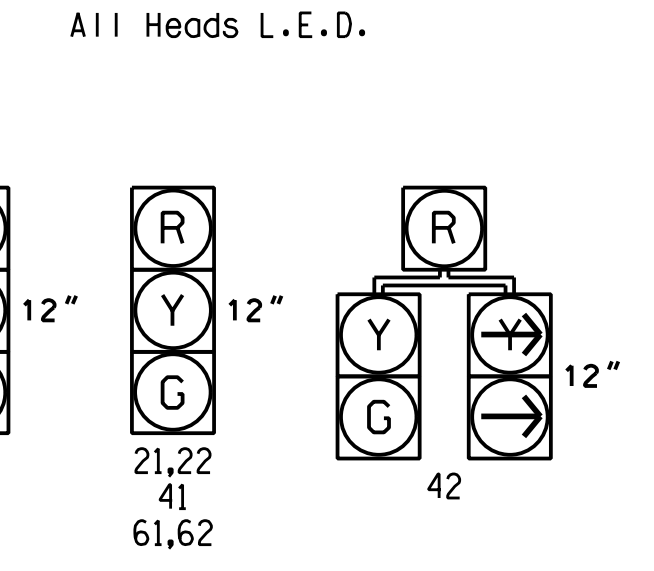


PHASING DIAGRAM DETECTION LEGEND

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

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

SIGNAL FACE I.D.



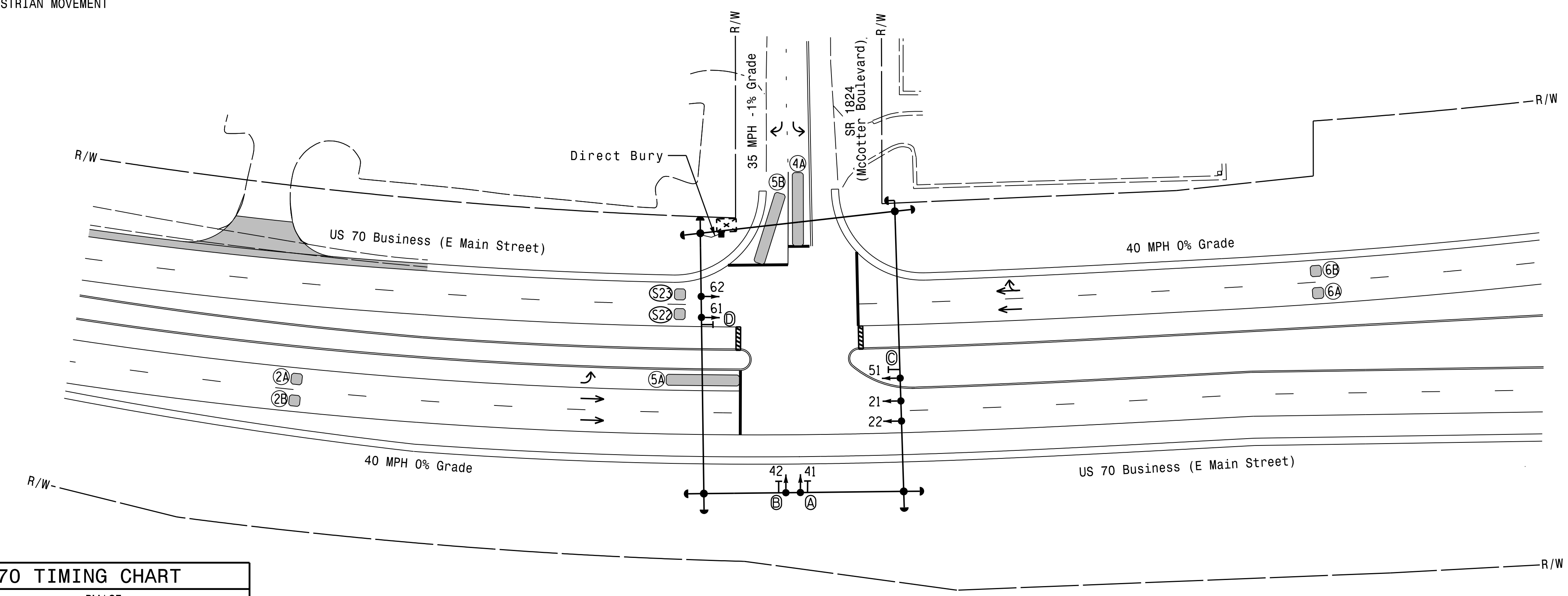
OASIS 2070 LOOP & DETECTOR INSTALLATION CHART												
INDUCTIVE LOOPS					DETECTOR PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
2A	6X6	250	*	Y	2	Y	Y	-	-	-	-	-
2B	6X6	250	*	Y	2	Y	Y	-	-	-	-	-
4A	6X40	0	*	Y	4	Y	Y	-	-	3	-	-
5A	6X40	0	*	Y	5	Y	Y	-	-	-	-	-
5B	6X40	0	*	Y	5	Y	Y	-	-	15	-	-
6A	6X6	250	*	Y	6	Y	Y	-	-	-	-	-
6B	6X6	250	*	Y	6	Y	Y	-	-	-	-	-
S22	6X6	+100	*	Y	-	-	-	-	-	-	Y	-
S23	6X6	+100	*	Y	-	-	-	-	-	-	Y	-

* Multizone Microwave Detection

3 Phase Fully Actuated Havelock US 70 Business CLS

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Phase 5 may be lagged.
- Reposition existing signal heads numbered 21,22,51, and sign 0.
- Set all detector units to presence mode.
- 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.
- Signal system data: Controller Asset #0649



LEGEND

PROPOSED	EXISTING
○ → Traffic Signal Head	● → Traffic Signal Head
○ → Modified Signal Head	N/A
○ → Pedestrian Signal Head With Push Button & Sign	○ → Pedestrian Signal Head
○ → Signal Pole with Guy	○ → Signal Pole with Guy
○ → Signal Pole with Sidewalk Guy	○ → Signal Pole with Sidewalk Guy
□ → Inductive Loop Detector	□ → Inductive Loop Detector
□ → Controller & Cabinet	□ → Controller & Cabinet
□ → Junction Box	□ → Junction Box
--- 2-in Underground Conduit	--- 2-in Underground Conduit
N/A Right of Way	N/A Right of Way
→ Directional Arrow	→ Directional Arrow
○ → Metal Strain Pole	○ → Metal Strain Pole
▬ Microwave Detection Zone	▬ Microwave Detection Zone
▬ Construction Zone	N/A
▬ Construction Barricade	N/A
Ⓐ Left Arrow "ONLY" Sign (R3-5L)	Ⓐ Left Arrow "ONLY" Sign (R3-5L)
Ⓑ Right Arrow "ONLY" Sign (R3-5R)	Ⓑ Right Arrow "ONLY" Sign (R3-5R)
Ⓒ "U-TURN YIELD TO RIGHT TURN" Sign (R10-16)	Ⓒ "U-TURN YIELD TO RIGHT TURN" Sign (R10-16)
Ⓓ No U-turn Sign (R3-4)	Ⓓ No U-turn Sign (R3-4)

OASIS 2070 TIMING CHART				
FEATURE	PHASE			
	2	4	5	6
Min Green 1 *	12	7	7	12
Extension 1 *	6.0	2.0	2.0	6.0
Max Green 1 *	90	20	15	90
Yellow Clearance	4.2	3.0	3.0	4.2
Red Clearance	1.2	2.9	2.6	1.2
Red Revert	2.0	2.0	2.0	2.0
Walk 1 *	-	-	-	-
Don't Walk 1	-	-	-	-
Seconds Per Actuation *	1.5	-	-	1.5
Max Variable Initial *	29	-	-	29
Time Before Reduction *	15	-	-	15
Time To Reduce *	45	-	-	45
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

* 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 3

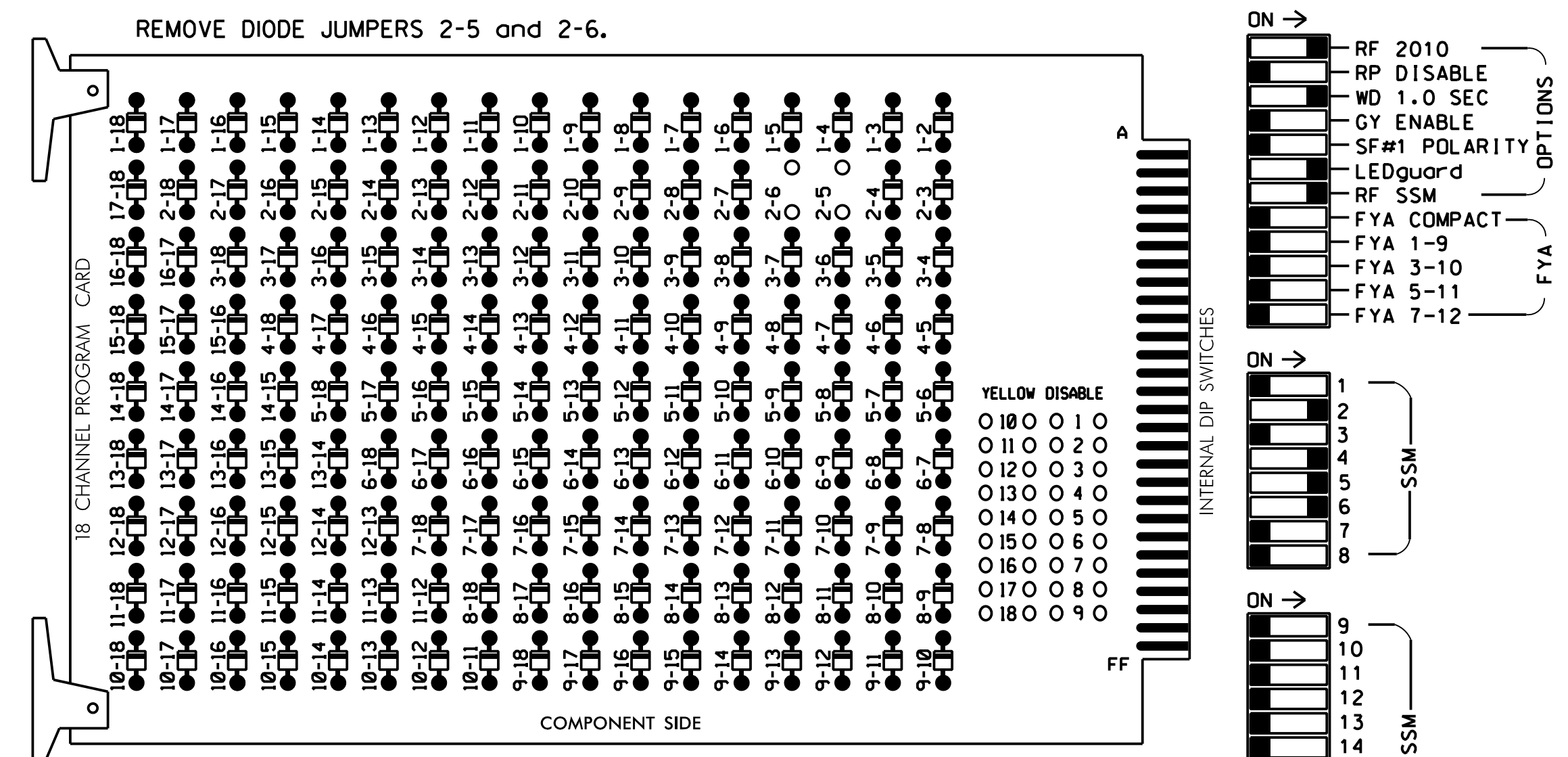
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	US 70 Business (E Main Street) at SR 1824 (McCotter Boulevard)		
	Division 02 Craven Co. Havelock PLAN DATE: March 2018 REVIEWED BY: A.D. Klinskyk PREPARED BY: A.H. Thornburg REVIEWED BY: N.R. Simmons	REVISIONS: _____ INITI: _____ DATE: _____ DocuSigned by: <i>Natasha R. Simmons</i> 12/7/2018 SIGNATURE: _____ DATE: _____ SIG. INVENTORY NO. 02-0649T3	

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EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



NOTES:

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

■ = DENOTES POSITION OF SWITCH

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Enable Simultaneous Gap-Out for all Phases.
3. Program phases 2 and 6 for Variable Initial and Gap Reduction.
4. Program phases 2 and 6 for Startup In Green.
5. Program phases 2 and 6 for Yellow Flash.
6. The cabinet and controller are part of the Havelock US 70 Business Closed Loop 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.	NU	21,22	NU	NU	41,42	NU	42	51	61,62	NU	NU	NU	NU	NU	NU	NU	NU	NU
RED		128			101				134									
YELLOW		129			102				135									
GREEN		130			103				136									
RED ARROW									131									
YELLOW ARROW									132	132								
FLASHING YELLOW ARROW																		
GREEN ARROW								133	133									

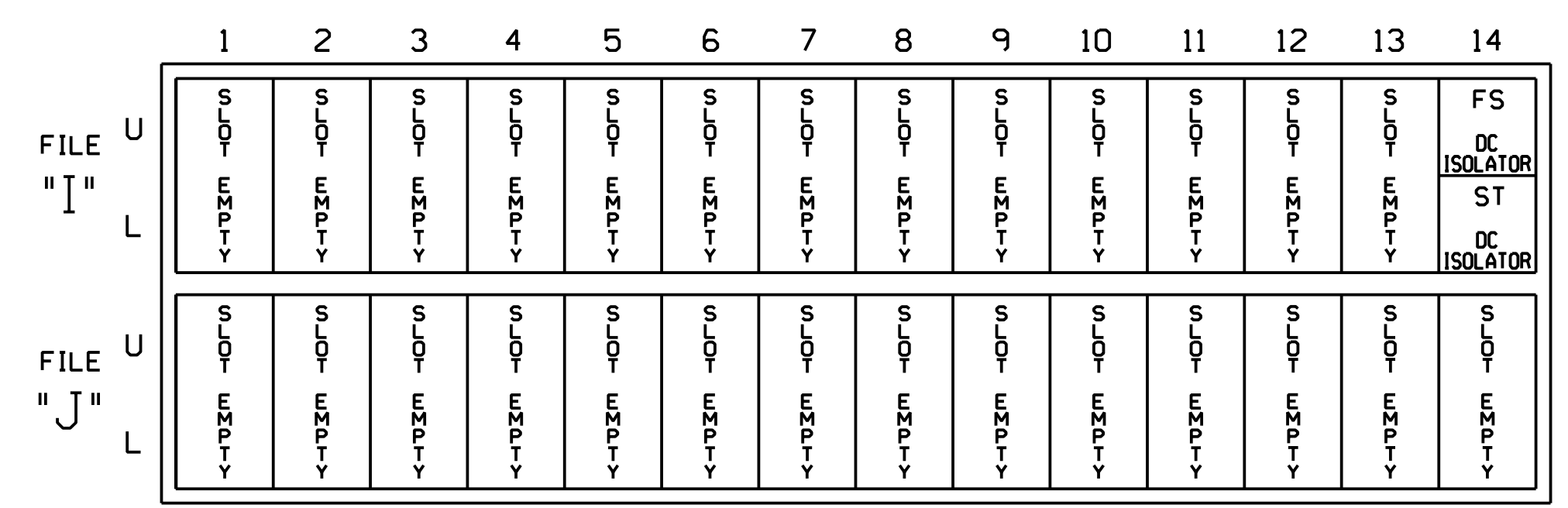
NU = Not Used

EQUIPMENT INFORMATION

CONTROLLER.....2070E
 CABINET.....332 W/AUX
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
 LOAD SWITCHES USED.....S2,S5,S7,S8
 PHASES USED.....2,4,5,6
 OVERLAPS.....NONE

INPUT FILE POSITION LAYOUT

(front view)



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

FS = FLASH SENSE
 ST = STOP TIME

SPECIAL DETECTOR NOTE

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: 02-0649T3
 DESIGNED: March 2018
 SEALED: 12-7-18
 REVISED: N/A

Electrical Detail
 Signal Upgrade
 Temporary Design 3

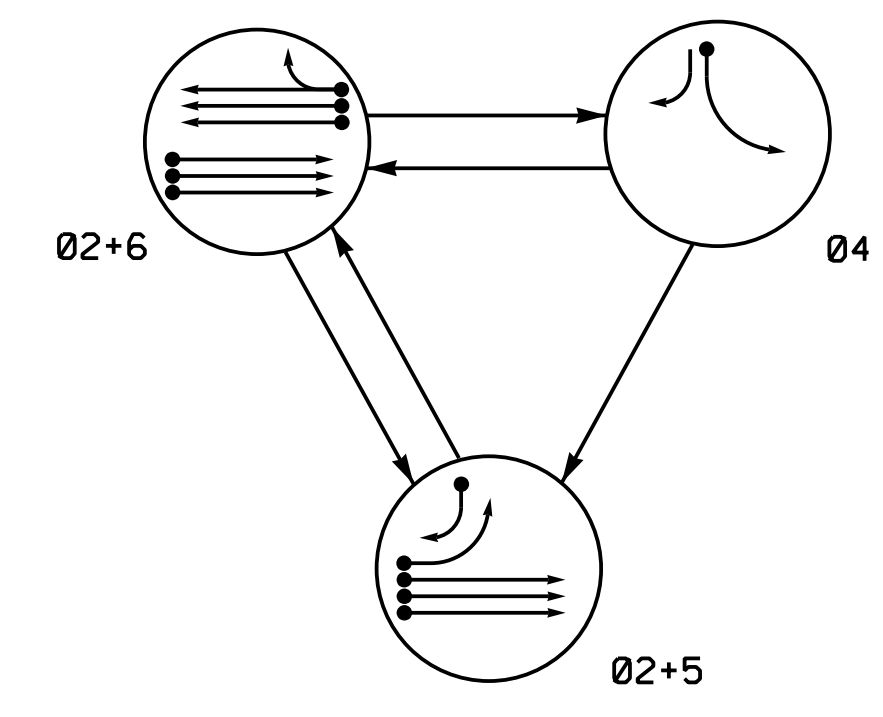
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	Prepared for: 	US 70 Business (E Main Street) at SR 1824 (McCotter Boulevard) Division 02 Craven Co. Havelock	SEAL
	PLAN DATE: March 2018 PREPARED BY: A.H. Thornburg	REVIEWED BY: A.D. Klinksiek REVIEWED BY: N.R. Simmons	REVISIONS INIT. DATE

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PHASING DIAGRAM

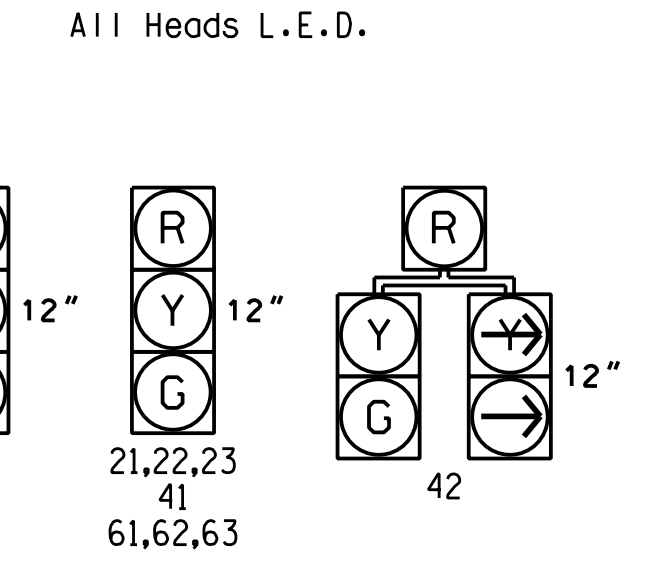


PHASING DIAGRAM DETECTION LEGEND

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

SIGNAL FACE	PHASE			
	02+5	02+6	04	FLASH
21,22,23	G	G	R	Y
41	R	R	G	R
42	R	R	G	R
51	-	-R	-R	-R
61,62,63	R	G	R	Y

SIGNAL FACE I.D.

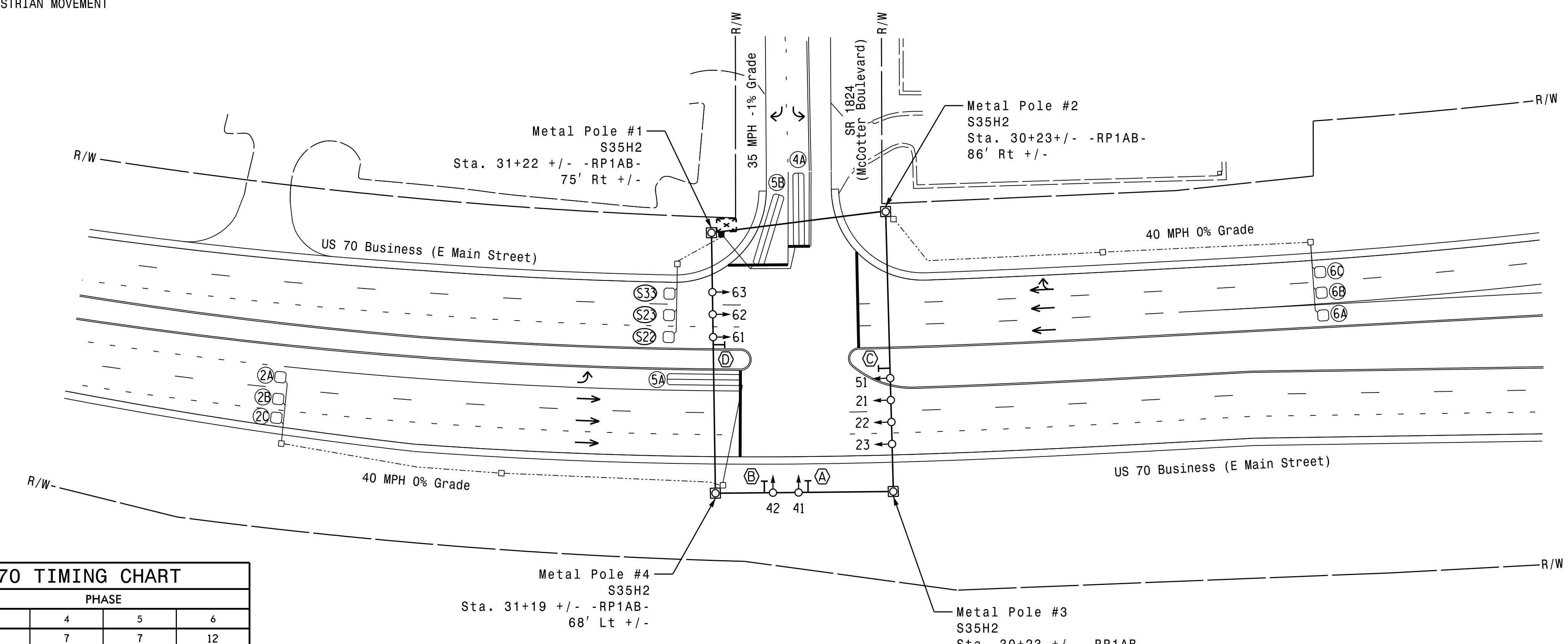


OASIS 2070 LOOP & DETECTOR INSTALLATION CHART												
INDUCTIVE LOOPS					DETECTOR PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
2A	6X6	250	5	Y	2	Y	Y	-	-	-	-	Y
2B	6X6	250	5	Y	2	Y	Y	-	-	-	-	Y
2C	6X6	250	5	Y	2	Y	Y	-	-	-	-	Y
4A	6X40	0	2-4-2	Y	4	Y	Y	-	-	3	-	Y
5A	6X40	0	2-4-2	Y	5	Y	Y	-	-	-	-	Y
5B	6X40	0	2-4-2	Y	5	Y	Y	-	-	15	-	Y
6A	6X6	250	5	Y	6	Y	Y	-	-	-	-	Y
6B	6X6	250	5	Y	6	Y	Y	-	-	-	-	Y
6C	6X6	250	5	Y	6	Y	Y	-	-	-	-	Y
S22	6X6	+100	3	Y	-	-	-	-	-	-	Y	Y
S23	6X6	+100	3	Y	-	-	-	-	-	-	Y	Y
S33	6X6	+100	3	Y	-	-	-	-	-	-	Y	Y

3 Phase Fully Actuated Havelock US 70 Business CLS

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Phase 5 may be lagged.
- Set all detector units to presence mode.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- Signal system data: Controller Asset #0649



OASIS 2070 TIMING CHART				
FEATURE	PHASE			
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Max Green 1 *	90	20	15	90
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Red Clearance	1.0	2.6	2.6	1.2
Red Revert	2.0	2.0	2.0	2.0
Walk 1 *	-	-	-	-
Don't Walk 1	-	-	-	-
Seconds Per Actuation *	1.5	-	-	1.5
Max Variable Initial *	29	-	-	29
Time Before Reduction *	15	-	-	15
Time To Reduce *	45	-	-	45
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

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

PROPOSED	LEGEND	EXISTING
○ →	Traffic Signal Head	● →
○ →	Modified Signal Head	N/A
○	Sign	N/A
○	Pedestrian Signal Head With Push Button & Sign	○
○	Signal Pole with Guy	○
○	Signal Pole with Sidewalk Guy	○
○	Inductive Loop Detector	○
○	Controller & Cabinet	○
○	Junction Box	○
○	2-in Underground Conduit	○
N/A	Direction of Way	→
○	Directional Arrow	→
○	Metal Strain Pole	○
○	Left Arrow "ONLY" Sign (R3-5L)	○
○	Right Arrow "ONLY" Sign (R3-5R)	○
○	"U-TURN YIELD TO RIGHT TURN" Sign (R10-16)	○
○	No U-turn Sign (R3-4)	○

Signal Upgrade - Final Design

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US 70 Business (E Main Street) at SR 1824 (McCotter Boulevard)

Division 02 Craven Co. Havelock

PLAN DATE: March 2018 REVIEWED BY: A.D. Klinsky

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

SEAL

SEAL 031464

ENGINEER

NATASHA R. SIMMONS

REVISIONS

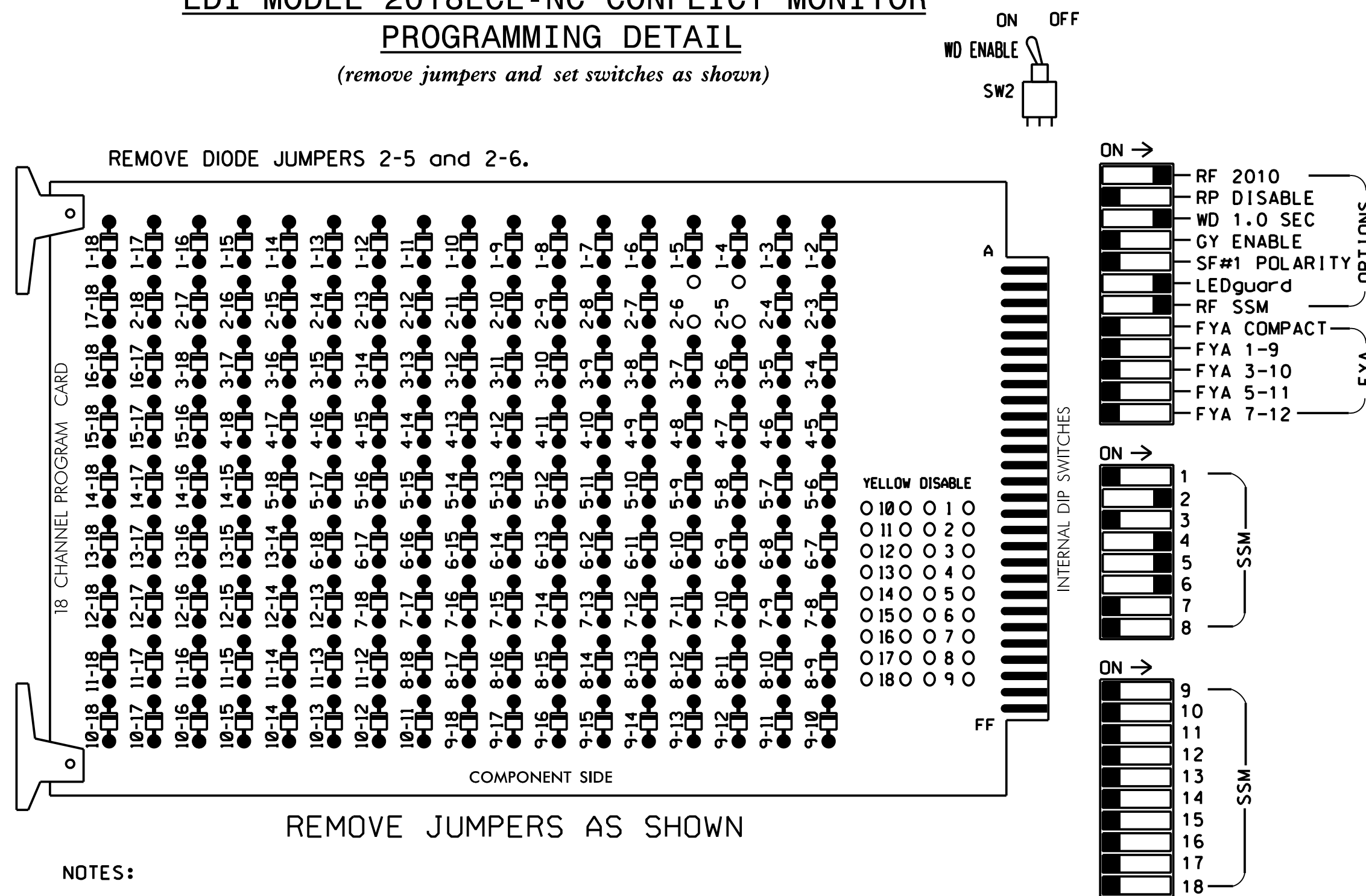
NO.	REVISIONS	INIT.	DATE

DocuSigned by: *Natasha R. Simmons* 12/7/2018

SIG. INVENTORY NO. 02-0649

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



NOTES:

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

NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
- 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 6 for Yellow Flash.
- The cabinet and controller are part of the Havelock US 70 Business Closed Loop 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.	NU	21,22,23	NU	NU	41,42	NU	42	51	61,62,63	NU	NU	NU	NU	NU	NU	NU	NU	NU
RED		128			101				134									
YELLOW		129			102				135									
GREEN		130			103				136									
RED ARROW									131									
YELLOW ARROW									132	132								
FLASHING YELLOW ARROW																		
GREEN ARROW									133	133								

NU = Not Used

EQUIPMENT INFORMATION

CONTROLLER.....2070E
 CABINET.....332 W/AUX
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
 LOAD SWITCHES USED.....S2,S5,S7,S8
 PHASES USED.....2,4,5,6
 OVERLAPS.....NONE

INPUT FILE POSITION LAYOUT

(front view)

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

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

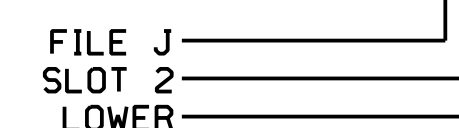
FS = FLASH SENSE
 ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
2A	TB2-5,6	I2U	39	1	2	2	Y	Y			
2B	TB2-7,8	I2L	43	5	12	2	Y	Y			
2C	TB2-9,10	I3U	63	25	32	2	Y	Y			
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			3
*S22	TB6-9,10	I9U	60	22	11	SYS					
*S23	TB6-11,12	I9L	62	24	13	SYS					
5A	TB3-1,2	J1U	55	17	5	5	Y	Y			
5B	TB3-5,6	J2U	40	2	6	5	Y	Y			15
6A	TB3-7,8	J2L	44	6	16	6	Y	Y			
6B	TB3-9,10	J3U	64	26	36	6	Y	Y			
6C	TB3-11,12	J3L	77	39	46	6	Y	Y			
*S33	TB7-9,10	J9U	59	21	15	SYS					

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

INPUT FILE POSITION LEGEND: J2L



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 02-0649
 DESIGNED: March 2018
 SEALED: 12-7-18
 REVISED: N/A

Electrical Detail
 Signal Upgrade

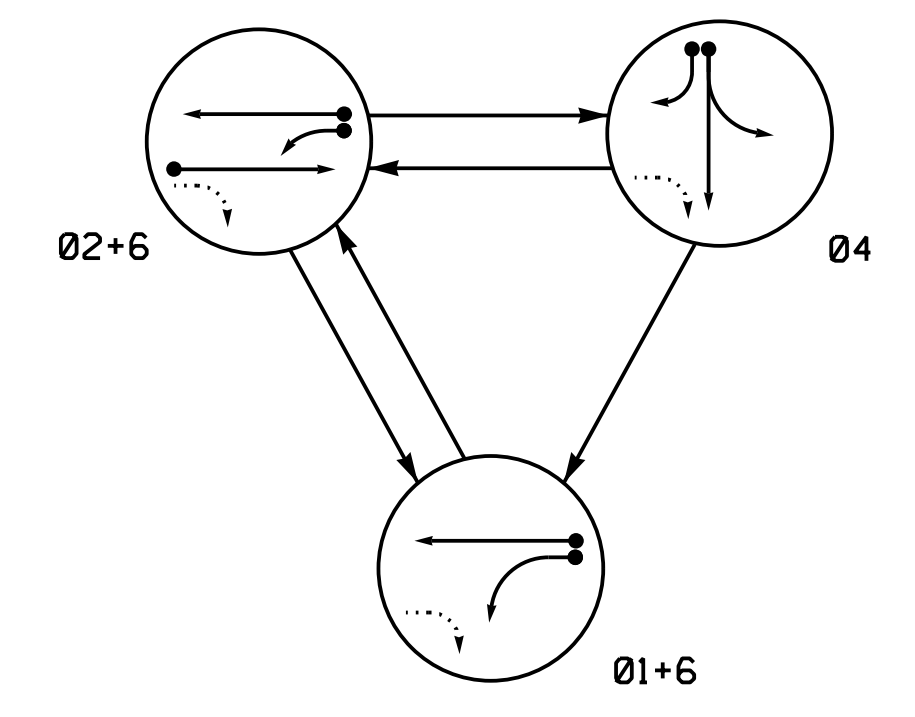
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Prepared for: **US 70 Business (E Main Street) at SR 1824 (McCotter Boulevard)**
 Division 02 Craven Co. Havelock
 PLAN DATE: March 2018 REVIEWED BY: A.D. Klinksiek
 PREPARED BY: A.H. Thornburg REVIEWED BY: N.R. Simmons

REVISIONS: _____ INITI. _____ DATE _____

DocuSigned by: **Matasha R. Simmons** 12/7/2018
 SIGNATURE DATE
 SIG. INVENTORY NO. 02-0649

PHASING DIAGRAM

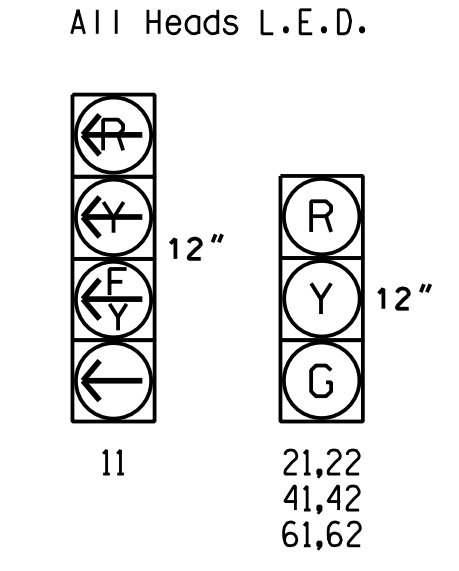


PHASING DIAGRAM DETECTION LEGEND

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

SIGNAL FACE	PHASE			
	01+6	02+6	04	FLASHT
11	Y	R	Y	Y
21,22	R	G	R	Y
41,42	R	R	G	R
61,62	G	G	R	Y

SIGNAL FACE I.D.



OASIS 2070 LOOP & DETECTOR INSTALLATION CHART

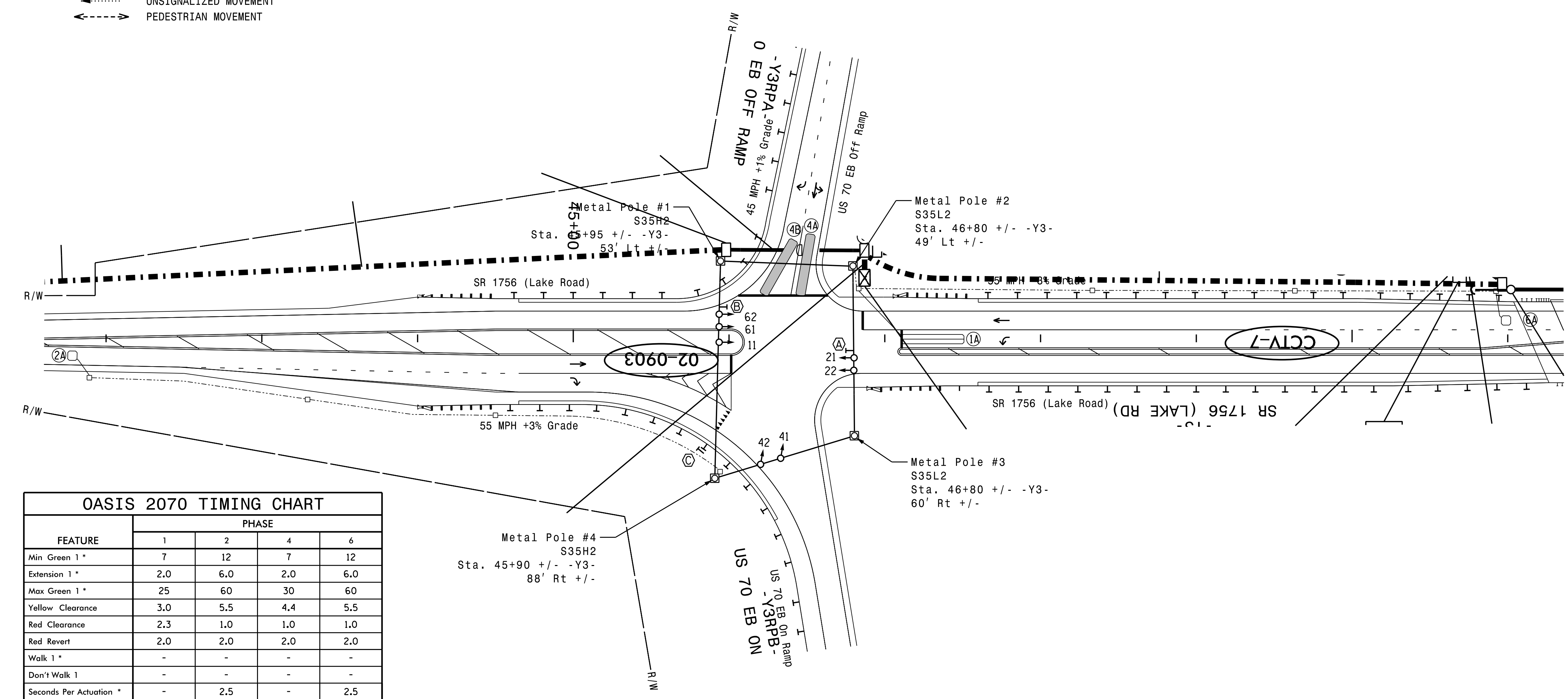
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	DETECTOR PROGRAMMING								
				NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
1A	6X40	0	2-4-2	Y	1	Y	Y	-	-	15	-	Y
2A	6X6	420	6	Y	2	Y	Y	-	-	3	-	Y
4A	6X40	0	*	Y	4	Y	Y	-	-	-	-	Y
4B	6X40	0	*	Y	4	Y	Y	-	-	15	-	Y
6A	6X6	410	6	Y	6	Y	Y	-	-	-	-	Y

* Multizone Microwave Detection

3 Phase Fully Actuated Havelock US 70 Business CLS

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Phase 1 may be lagged.
- Set all detector units to presence mode.
- Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
- 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.
- Signal system data: Controller Asset #0903



FEATURE	PHASE			
	1	2	4	6
Min Green 1 *	7	12	7	12
Extension 1 *	2.0	6.0	2.0	6.0
Max Green 1 *	25	60	30	60
Yellow Clearance	3.0	5.5	4.4	5.5
Red Clearance	2.3	1.0	1.0	1.0
Red Revert	2.0	2.0	2.0	2.0
Walk 1 *	-	-	-	-
Don't Walk 1	-	-	-	-
Seconds Per Actuation *	-	2.5	-	2.5
Max Variable Initial *	-	46	-	45
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	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON

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

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

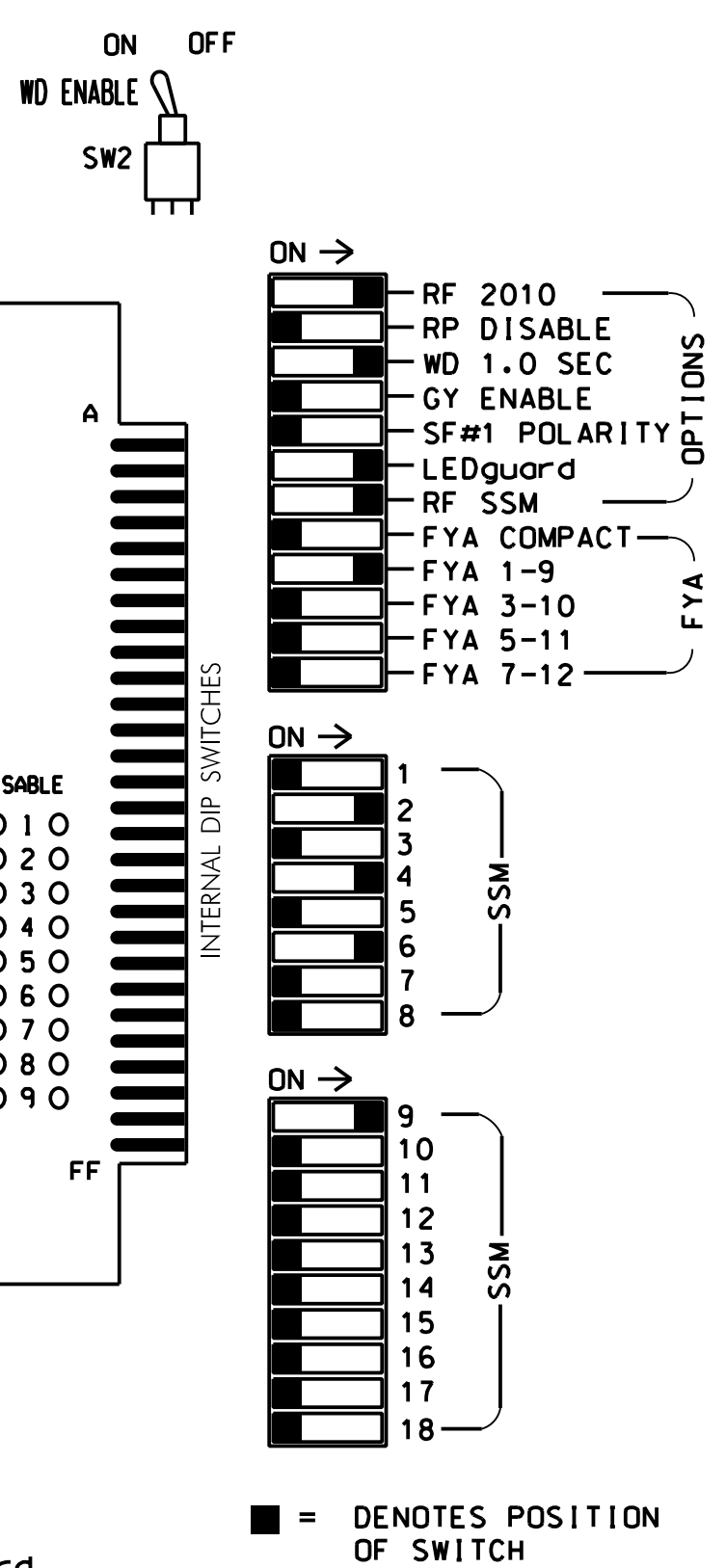
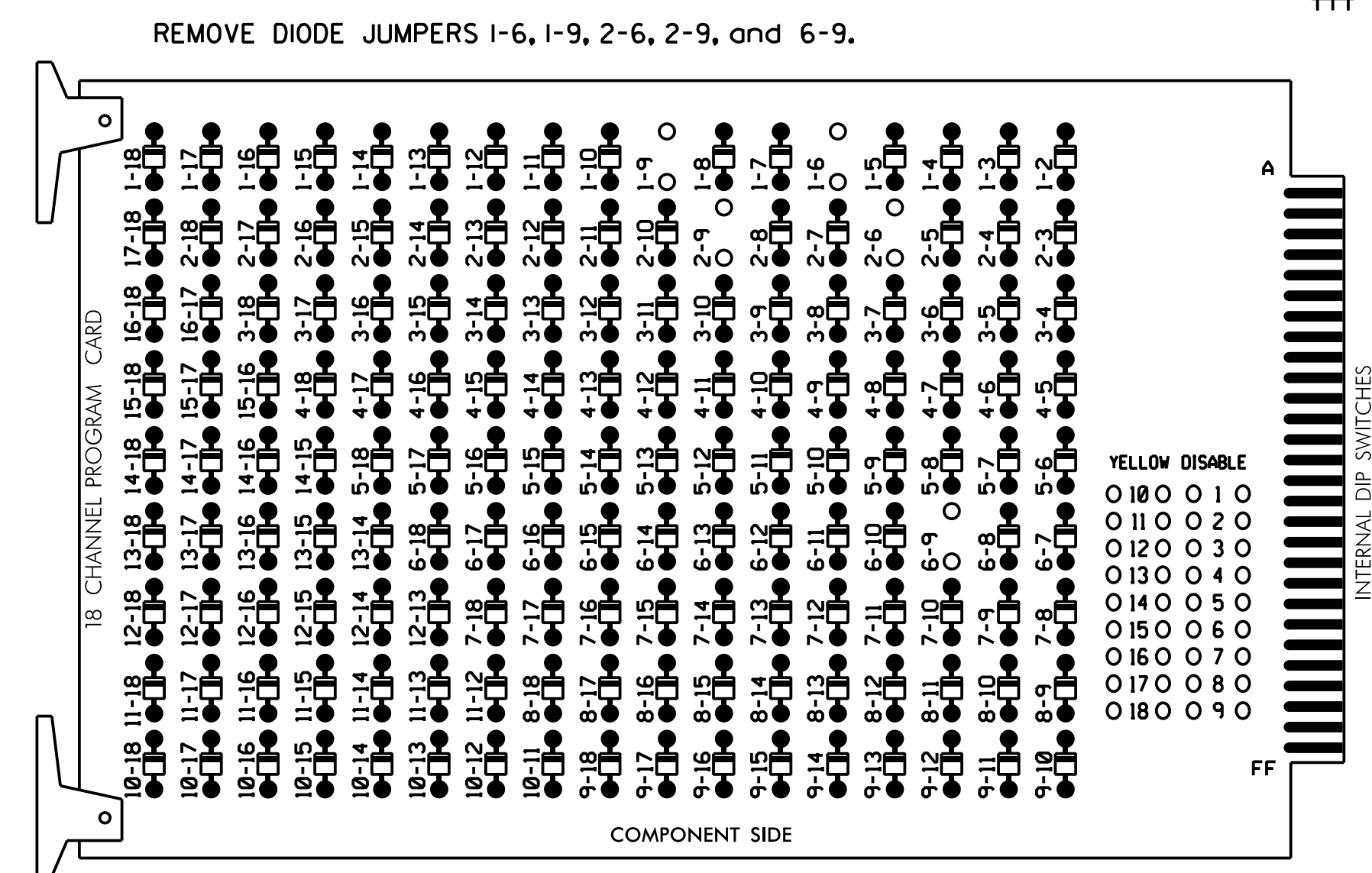
New Installation

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

	SR 1756 (Lake Road) at US 70 EB Ramp		
	Division 02 Craven Co. Havelock PLAN DATE: March 2018 PREPARED BY: A.H. Thornburg	REVIEWED BY: A.D. Klinskies REVIEWED BY: N.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	SCALE 0 40 1"=40'	REVISIONS INIT. DATE	DocuSigned by: Natasha R. Simmons DATE: 12/7/2018 SIG. INVENTORY NO. 02-0903

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal 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 6 for Yellow Flash, and overlap 1 as Wag Overlaps.
- The cabinet and controller are part of the Havelock US 70 Business Closed Loop 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,S5,S8,AUX S1
 PHASES USED.....1,2,4,6
 OVERLAP "A".....1+2
 OVERLAP "B".....NOT USED
 OVERLAP "C".....NOT USED
 OVERLAP "D".....NOT USED

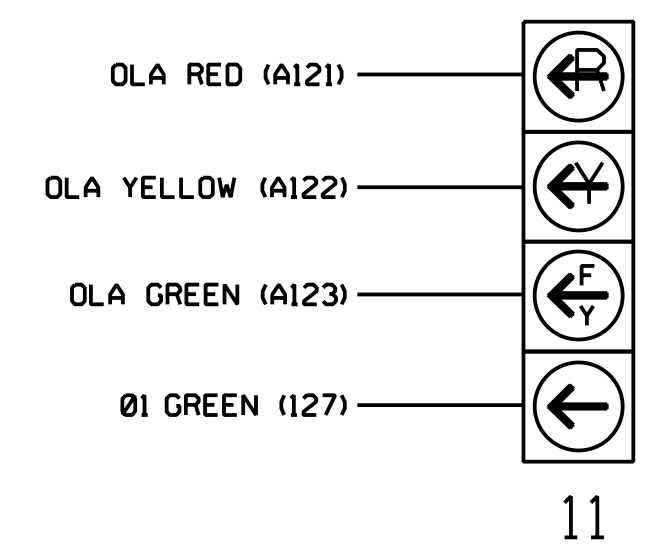
SIGNAL HEAD HOOK-UP CHART

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

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

FYA SIGNAL WIRING DETAIL

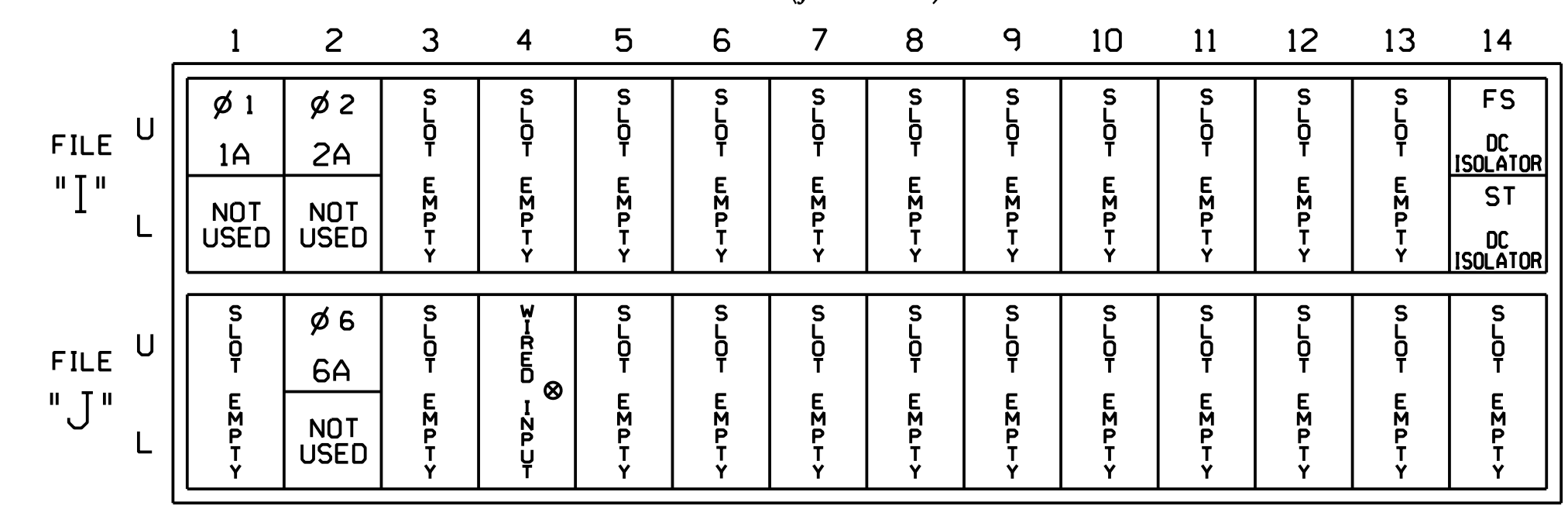
(wire signal heads as shown)



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

INPUT FILE POSITION LAYOUT

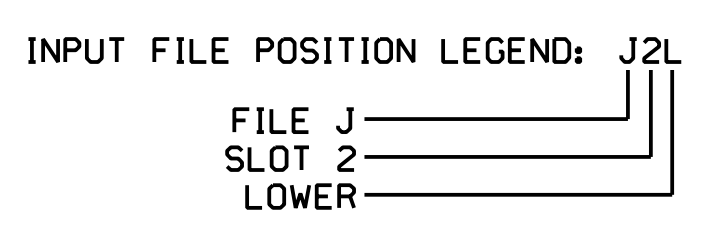
(front view)



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	I1U	56	18	1	1	Y	Y			15
2A	TB2-5,6	J4U	48	10	26	6	Y	Y	Y		3
6A	TB3-5,6	J2U	40	2	6	6	Y	Y			

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



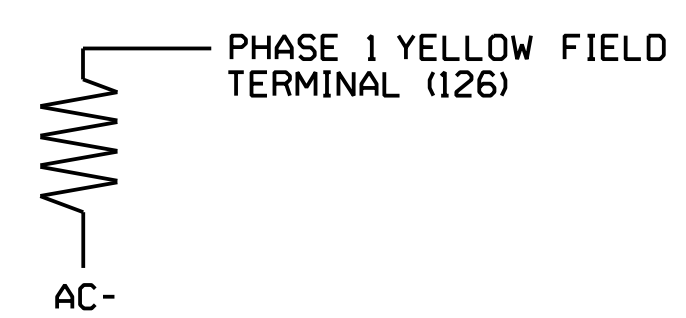
SPECIAL DETECTOR NOTE

For zones 4A and 4B, 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.

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

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Prepared for: **SR 1756 (Lake Road) at US 70 EB Ramp**

Division 02 Craven Co. Havelock

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

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

REVISIONS: _____ INITI. _____ DATE _____

DocuSigned by: **Matasha R. Simmons** 12/7/2018

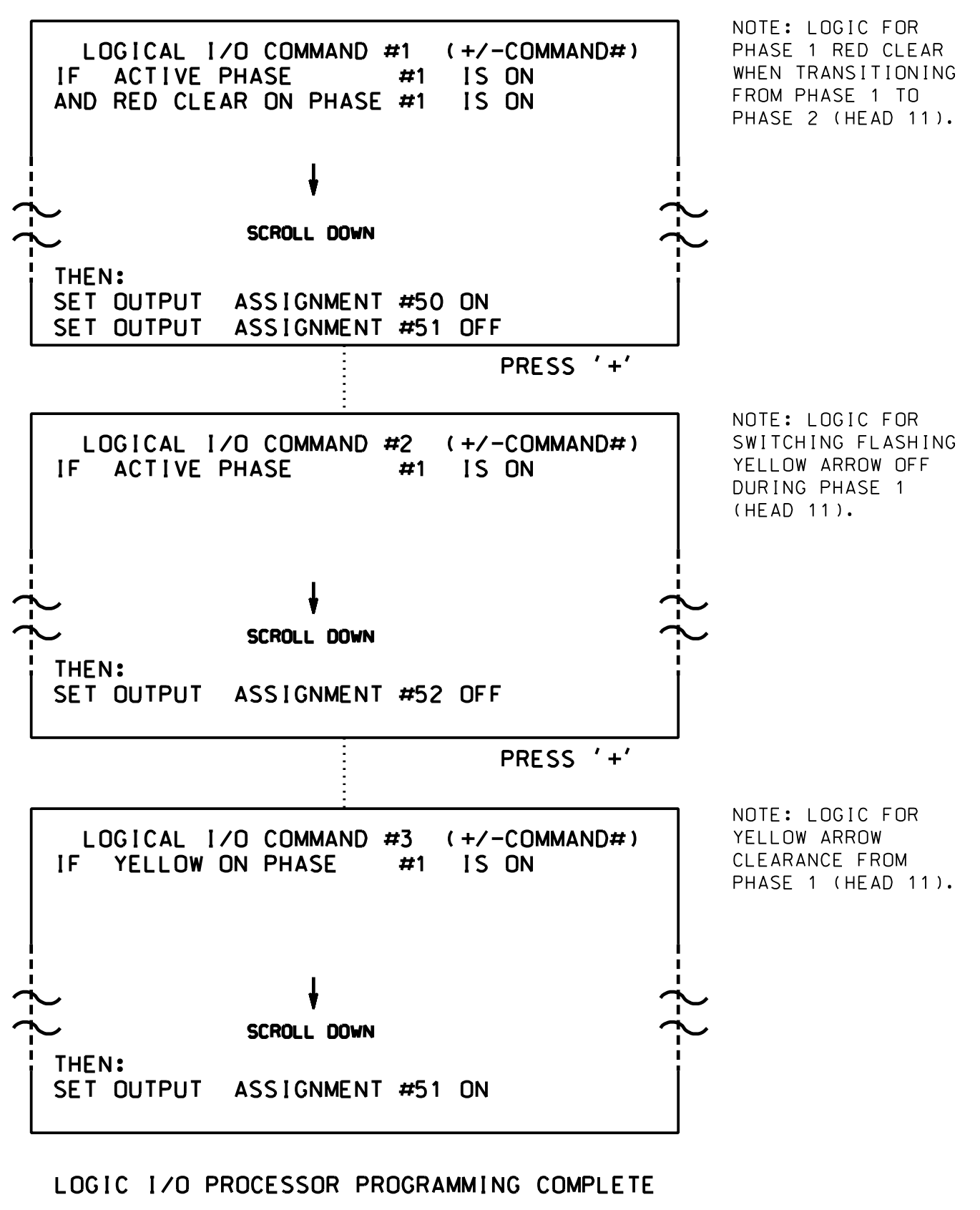
SIG. INVENTORY NO. 02-0903



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).



<u>OUTPUT REFERENCE SCHEDULE</u>	
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 (0-25.5 SEC)...0.0
 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

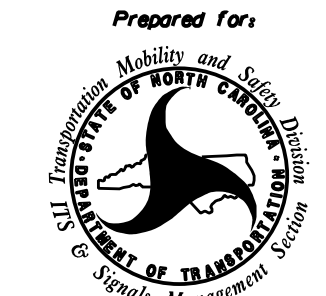
OVERLAP PROGRAMMING COMPLETE

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 02-0903
 DESIGNED: March 2018
 SEALED: 12-7-18
 REVISED: N/A

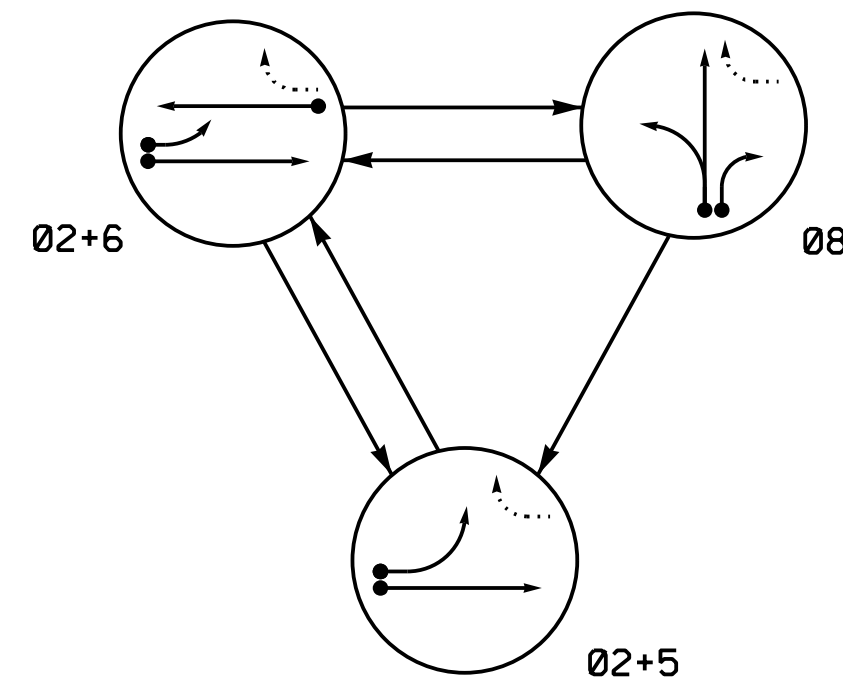
Electrical Detail - Sheet 2 of 2
Signal Upgrade

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ELECTRICAL AND PROGRAMMING DETAILS FOR:	SR 1756 (Lake Road) at US 70 EB Ramp	SEAL NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 031464 NATASHA R. SIMMONS
Prepared for: 	Division 02 Craven Co. Havelock	DocuSigned by: Natasha R. Simmons 12/7/2018
PREPARED BY: A.H. Thornburg	REVIEWED BY: A.D. Klinksiek REVIEWED BY: N.R. Simmons	DATE: _____ SIGNATURE: _____ DATE: _____
REVISIONS	INIT.	DATE
_____	_____	_____
750 N. Greenfield Pkwy, Corner, NC 27529		
SIG. INVENTORY NO. 02-0903		

PHASING DIAGRAM

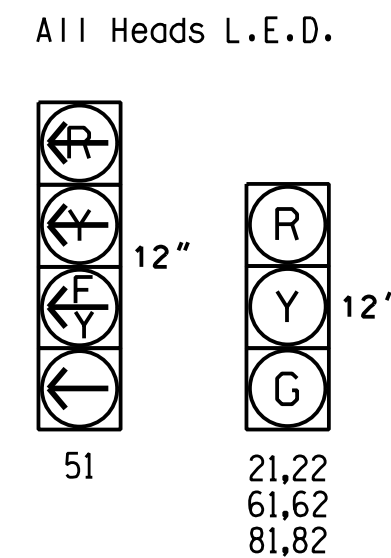


PHASING DIAGRAM DETECTION LEGEND

- DETECTED MOVEMENT (solid arrow)
UNDETECTED MOVEMENT (OVERLAP) (dashed arrow)
UNSIGNALIZED MOVEMENT (dotted arrow)
PEDESTRIAN MOVEMENT (arrow with foot)

TABLE OF OPERATION table with columns for SIGNAL FACE, PHASE (0, 2, 5, 6, 8, FLASH), and values for faces 21,22, 51, 61,62, and 81,82.

SIGNAL FACE I.D.



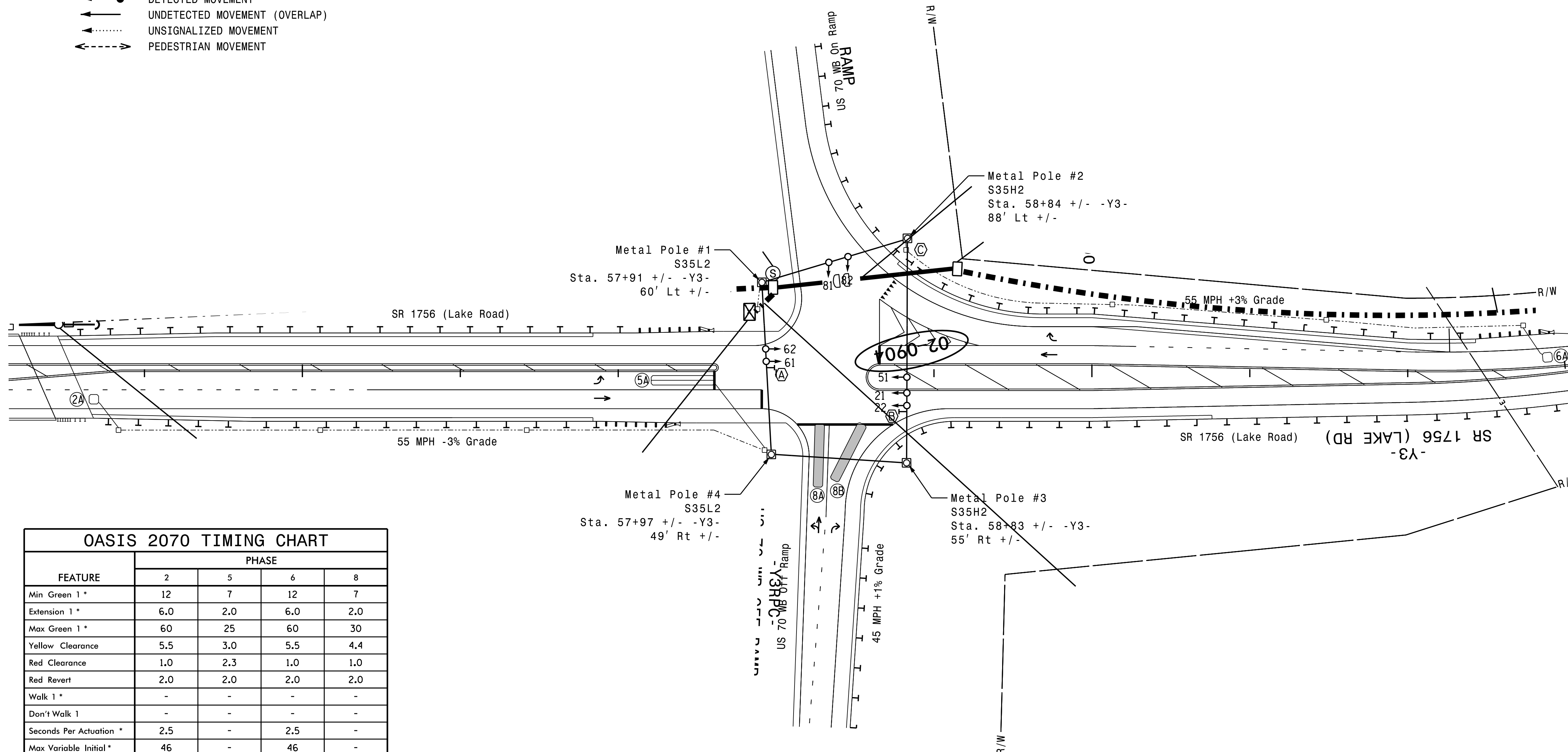
OASIS 2070 LOOP & DETECTOR INSTALLATION CHART table with columns for LOOP, SIZE, DISTANCE, TURNS, NEW LOOP, PHASE, CALLING, EXTENSION, FULL TIME DELAY, STRETCH TIME, DELAY TIME, SYSTEM LOOP, NEW CARD.

* Multizone Microwave Detection

3 Phase Fully Actuated Havelock US 70 Business CLS

NOTES

- 1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018...
2. Do not program signal for late night flashing operation...
3. Phase 5 may be lagged.
4. Set all detector units to presence mode.
5. Locate new cabinet so as not to obstruct sight distance...
6. Incorporate Microwave Detection system for vehicle detection.
7. Provide the Engineer with the Manufacturer's approved Microwave Detection locations...
8. Maximum times shown in timing chart are for free-run operation only...
9. Signal system data: Controller Asset #0904



OASIS 2070 TIMING CHART table with columns for FEATURE and PHASE (2, 5, 6, 8) and various timing values like Min Green, Extension, Max Green, etc.

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

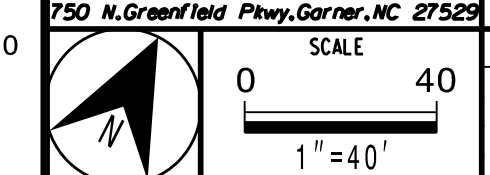
LEGEND table with columns for PROPOSED and EXISTING, listing symbols for Traffic Signal Head, Pedestrian Signal Head, Inductive Loop Detector, Junction Box, etc.

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

New Installation

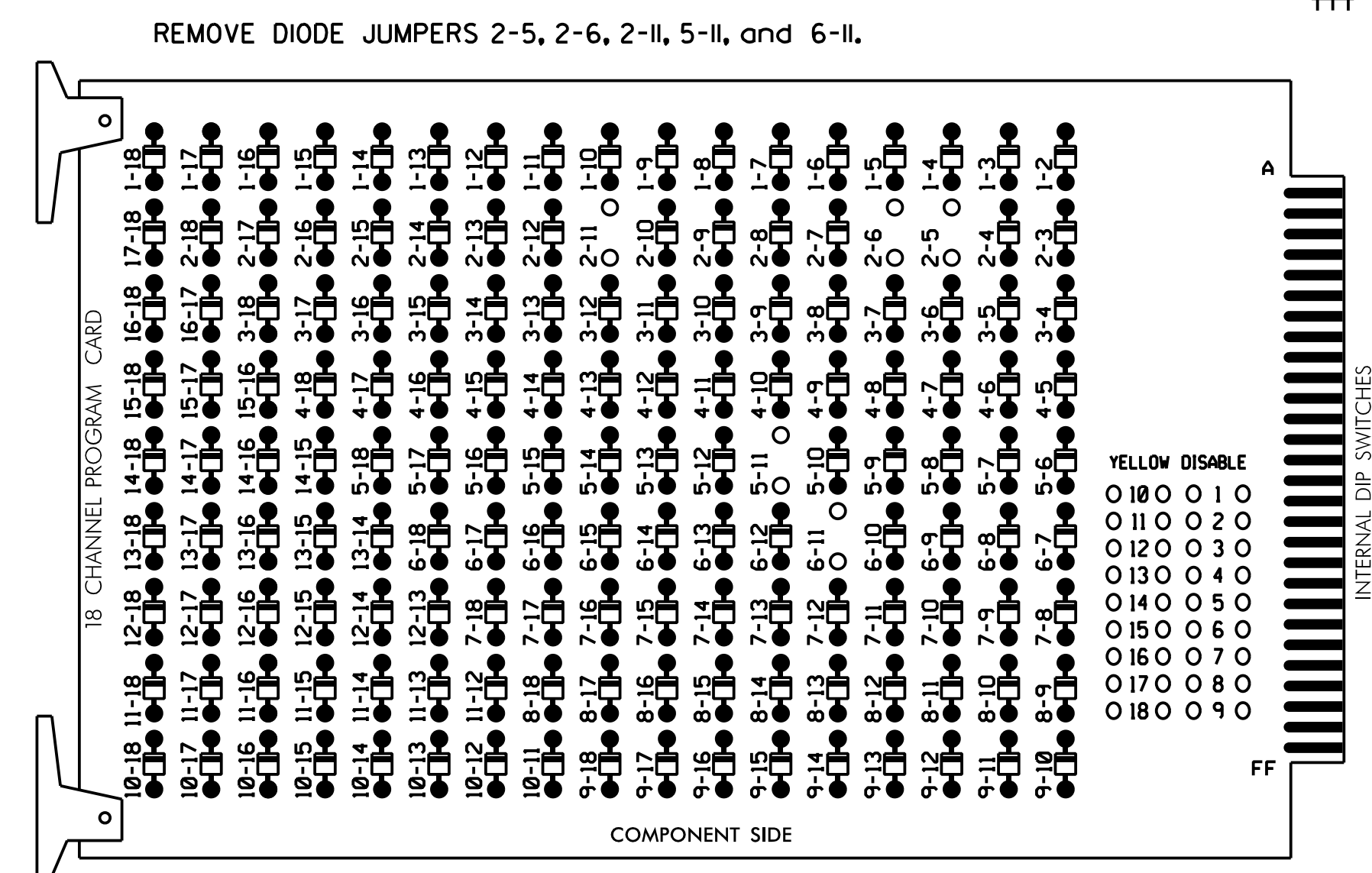
Professional seal area for North Carolina Professional Engineer, including project name (SR 1756 at US 70 WB Ramp), date (March 2018), and signature line for Natasha R. Simmons.

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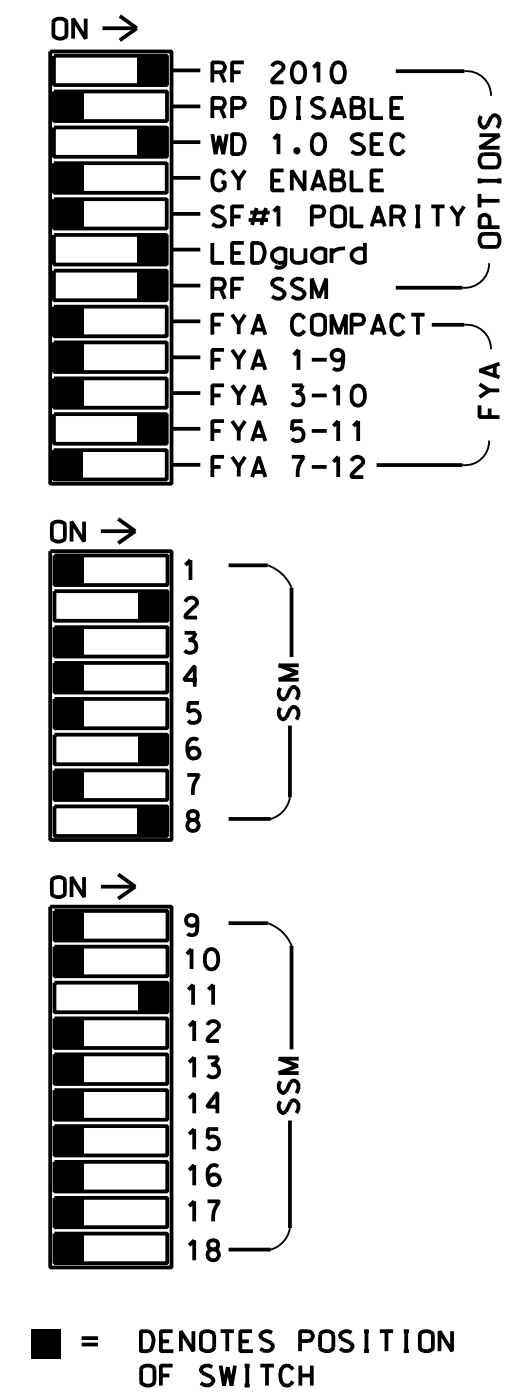
EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



NOTES:

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



NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Enable Simultaneous Gap-Out for all Phases.
3. Program phases 2 and 6 for Variable Initial and Gap Reduction.
4. Program phases 2 and 6 for Startup In Green.
5. Program phases 2 and 6 for Yellow Flash.
6. The cabinet and controller are part of the Havelock US 70 Business Closed Loop 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.....S2,S7,S8,S11,AUX S4
 PHASES USED.....2,5,6,8
 OVERLAP "A".....NOT USED
 OVERLAP "B".....NOT USED
 OVERLAP "C".....5+6
 OVERLAP "D".....NOT USED

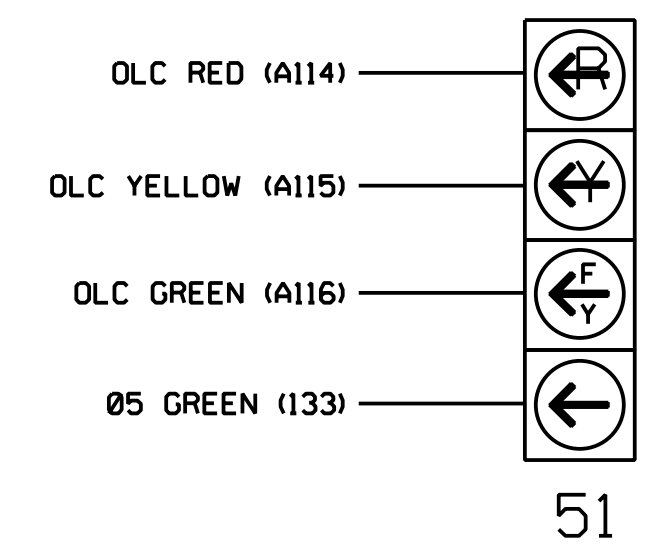
SIGNAL HEAD HOOK-UP CHART

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

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

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



NOTE

The sequence display for signal head 51 requires special logic programming. See sheet 2 for programming instructions.

INPUT FILE POSITION LAYOUT

(front view)

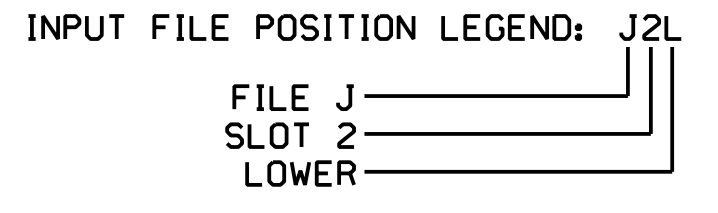
FILE "I"	1	2	3	4	5	6	7	8	9	10	11	12	13	14	FS
U	S	∅ 2	∅ 3	∅ 4	∅ 5	∅ 6	∅ 7	∅ 8	∅ 9	∅ 10	∅ 11	∅ 12	∅ 13	∅ 14	DC ISOLATOR
L	Y	NOT USED	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	ST
															DC ISOLATOR
FILE "J"	U	∅ 5	∅ 6	∅ 7	∅ 8	∅ 9	∅ 10	∅ 11	∅ 12	∅ 13	∅ 14	∅ 15	∅ 16	∅ 17	∅ 18
L		5A	6A	∅ 7	∅ 8	∅ 9	∅ 10	∅ 11	∅ 12	∅ 13	∅ 14	∅ 15	∅ 16	∅ 17	∅ 18
		NOT USED	NOT USED	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

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

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
2A	TB2-5,6	I2U	39	1	2	2	Y	Y			
5A ¹	TB3-1,2	J1U	55	17	5	5	Y	Y			15
	-	I4U	47	9	22	2	Y	Y	Y		3
6A	TB3-5,6	J2U	40	2	6	6	Y	Y			

¹Add jumper from J1-W to I4-W, on rear of input file.



SPECIAL DETECTOR NOTE

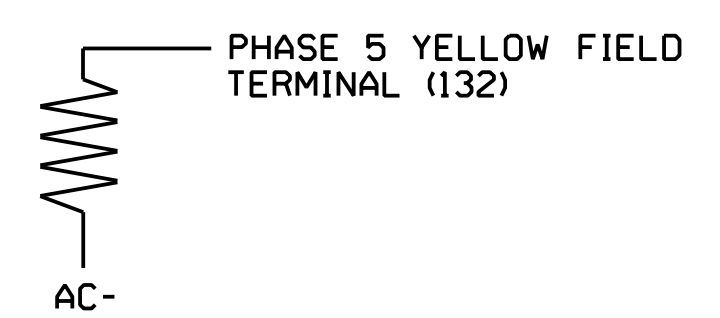
For zones 8A and 8B, install a microwave detection system for vehicle detection. Perform installation according to manufacturer's directions and NCDOT engineer-approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.

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)



Electrical Detail - Sheet 1 of 2
 Signal Upgrade

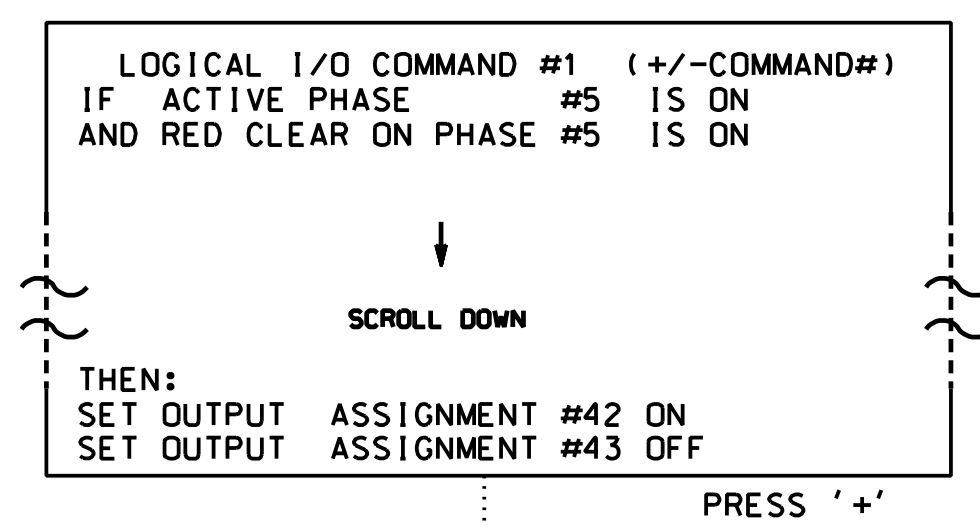
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

	SR 1756 (Lake Road) at US 70 WB Ramp		
	Division 02 Craven Co. Havelock	PREPARED BY: A.H. Thornburg REVIEWED BY: N.R. Simmons	
PLAN DATE: March 2018 REVIEWED BY: A.D. Klinskiak	REVISIONS INIT. DATE	DocuSigned by: Natasha R. Simmons 12/7/2018	SEAL NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 031464 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	750 N. Greenfield Pkwy, Corner, NC 27529	SIG. INVENTORY NO. 02-0904	

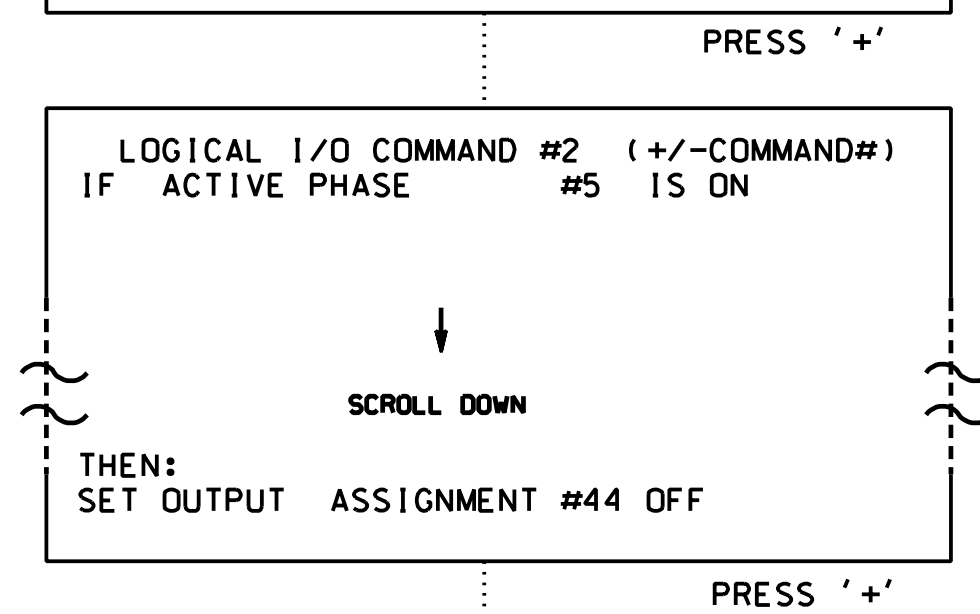
LOGICAL I/O PROCESSOR PROGRAMMING DETAIL TO PRODUCE SPECIAL FYA-PPLT SIGNAL SEQUENCE

(program controller as shown below)

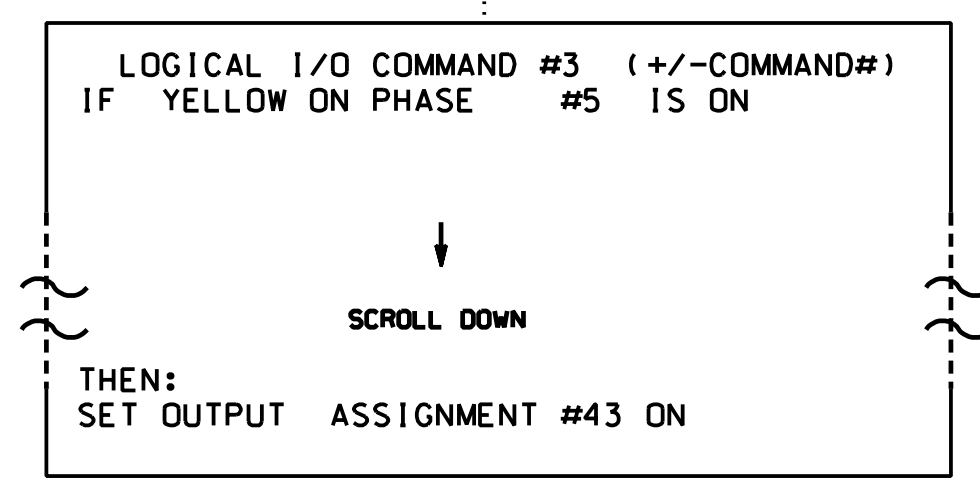
- FROM MAIN MENU PRESS '2' (PHASE CONTROL), THEN '1' (PHASE CONTROL FUNCTIONS). SCROLL TO THE BOTTOM OF THE MENU AND ENABLE ACT LOGIC COMMANDS 1, 2, and 3.
- FROM MAIN MENU PRESS '6' (OUTPUTS), THEN '3' (LOGICAL I/O PROCESSOR).



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



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



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

LOGIC I/O PROCESSOR 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

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: : 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

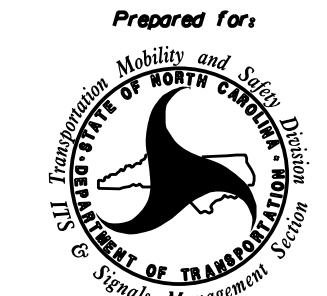
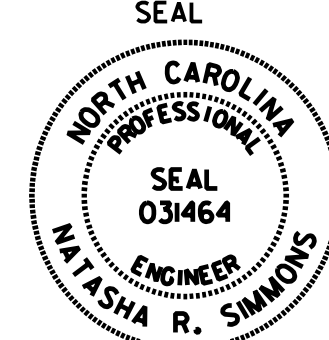
OVERLAP PROGRAMMING COMPLETE

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 02-0904
DESIGNED: March 2018
SEALED: 12-7-18
REVISED: N/A

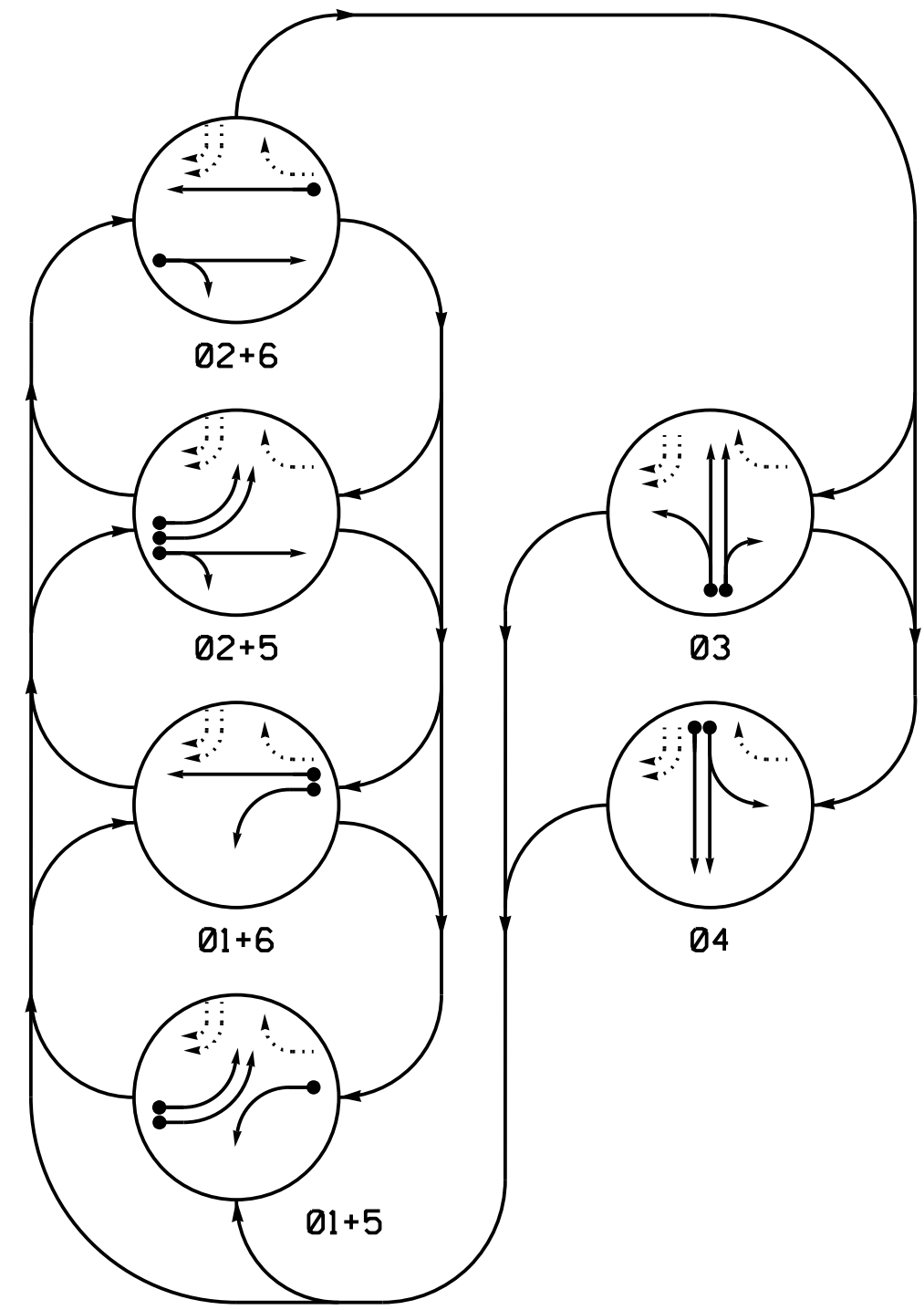
Electrical Detail - Sheet 2 of 2
Signal Upgrade

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

ELECTRICAL AND PROGRAMMING DETAILS FOR: Prepared for:  750 N. Greenfield Pkwy, Corner, NC 27529	SR 1756 (Lake Road) at US 70 WB Ramp		SEAL  SEAL 031464 NATASHA R. SIMMONS
	Division 02 PLAN DATE: March 2018 PREPARED BY: A.H. Thornburg	Craven Co. Havelock REVIEWED BY: A.D. Klinksiek REVIEWED BY: N.R. Simmons	

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

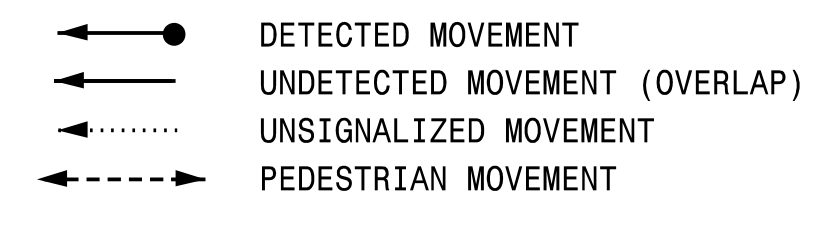
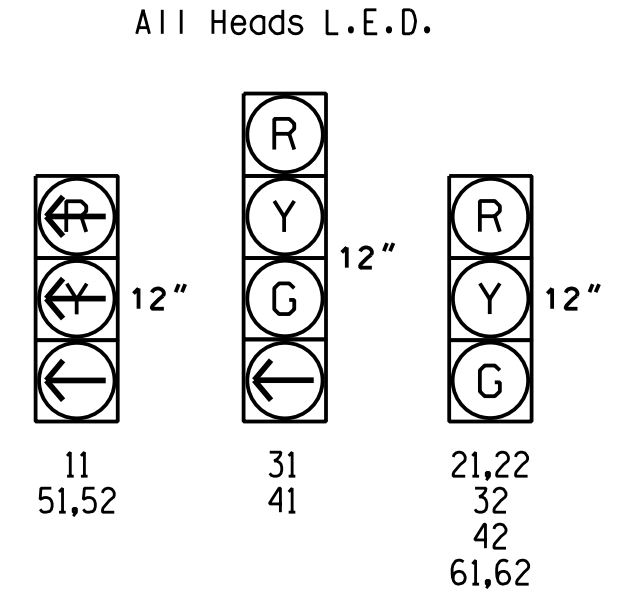


TABLE OF OPERATION

SIGNAL FACE	PHASE					
	01+5	01+6	02+5	02+6	03	04
11	-	-	-	-	-	-
21,22	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	G	R
42	R	R	R	R	G	R
51,52	-	-	-	-	-	-
61,62	R	G	R	G	R	R

SIGNAL FACE I.D.



OASIS 2070 LOOP & DETECTOR INSTALLATION CHART

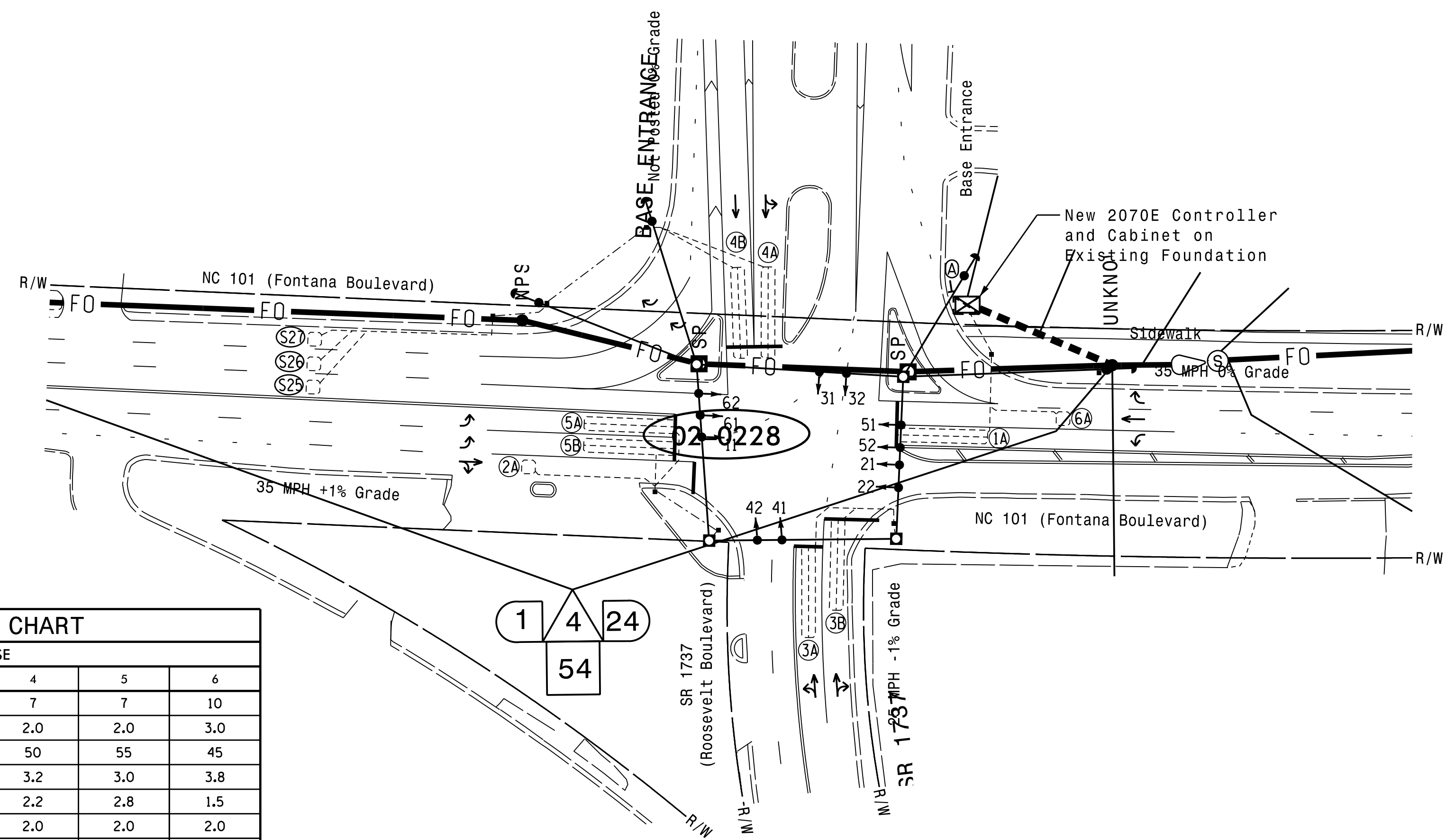
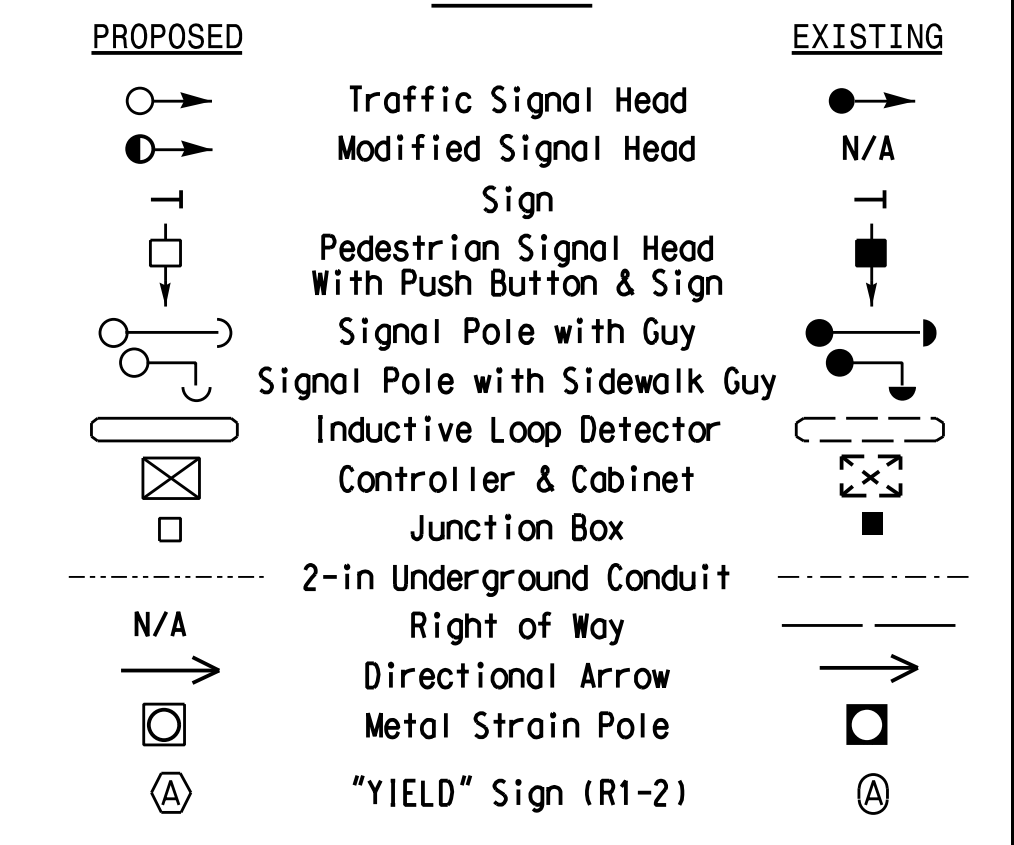
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	DETECTOR PROGRAMMING				SYSTEM LOOP	NEW CARD
					PHASE	CALLING	EXTENSION	FULL TIME DELAY		
1A	6X40	0	2-4-2	-	1	Y	Y	-	-	Y
2A	6X6	70	4	-	2	Y	Y	-	-	Y
3A	6X40	0	2-4-2	-	3	Y	Y	-	-	Y
3B	6X40	0	2-4-2	-	3	Y	Y	-	-	Y
4A	6X40	+5	2-4-2	-	4	Y	Y	-	-	Y
4B	6X40	+5	2-4-2	-	4	Y	Y	-	-	Y
5A	6X40	0	2-4-2	-	5	Y	Y	-	3	Y
5B	6X40	0	2-4-2	-	5	Y	Y	-	-	Y
6A	6X6	70	4	-	6	Y	Y	-	-	Y
S25	6X6	+260	5	-	-	-	-	-	-	Y
S26	6X6	+260	5	-	-	-	-	-	-	Y
S27	6X6	+260	5	-	-	-	-	-	-	Y

6 Phase Fully Actuated Havelock US 70 Business CLS

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.
- The cabinet should be designed to include Auxiliary Output file for future use.
- Pavement markings are existing.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- Closed loop system data: Controller Asset #0228

LEGEND



OASIS 2070 TIMING CHART

FEATURE	PHASE					
	1	2	3	4	5	6
Min Green 1 *	7	10	7	7	7	10
Extension 1 *	2.0	3.0	2.0	2.0	2.0	3.0
Max Green 1 *	15	45	35	50	55	45
Yellow Clearance	3.0	3.8	3.2	3.2	3.0	3.8
Red Clearance	1.9	1.5	2.4	2.2	2.8	1.5
Red Revert	2.0	2.0	2.0	2.0	2.0	2.0
Walk 1 *	-	-	-	-	-	-
Don't Walk 1	-	-	-	-	-	-
Seconds Per Actuation *	-	-	-	-	-	-
Max Variable Initial *	-	-	-	-	-	-
Time Before Reduction *	-	-	-	-	-	-
Time To Reduce *	-	-	-	-	-	-
Minimum Gap	-	-	-	-	-	-
Recall Mode	-	SOFT RECALL	-	-	-	SOFT 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

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

Prepared For: **NC 101 (Fontana Boulevard) at SR 1737 (Roosevelt Boulevard) / Base Entrance**

Division 02 Craven Co. Havelock

PLAN DATE: March 2018 REVIEWED BY: A.D. Klinsky

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

750 N. Greenfield Pkwy, Corner, NC 27528

SEAL

REVISIONS

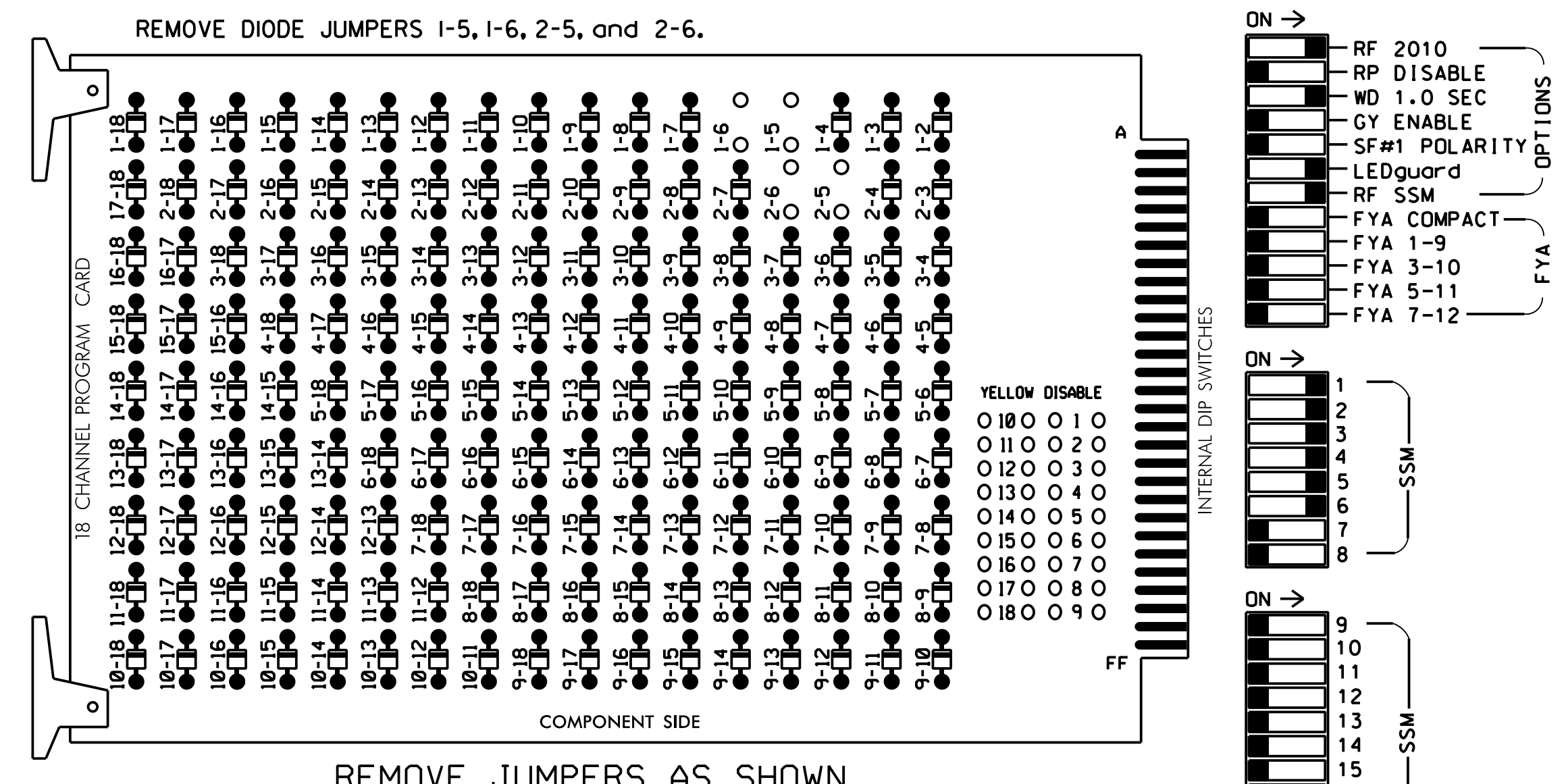
NO.	INIT.	DATE

DocuSigned by: *Natasha R. Simmons* 12/7/2018

SIG. INVENTORY NO. 02-0228

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



NOTES:

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

■ = DENOTES POSITION OF SWITCH

NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
- Enable Simultaneous Gap-Out for all Phases.
- Program phases 2 and 6 for Startup In Green.
- Program phases 2 and 6 for Yellow Flash.
- The cabinet and controller are part of the Havelock US 70 Business Closed Loop 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	NU	31	32	41	42	NU	51,52	61,62	NU	NU	NU	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	125									131								
YELLOW ARROW	126									132								
FLASHING YELLOW ARROW																		
GREEN ARROW	127			118		103				133								

NU = Not Used

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,S4,S5,S7,S8
 PHASES USED.....1,2,3,4,5,6
 OVERLAPS.....NONE

INPUT FILE POSITION LAYOUT

(front view)

FILE	1	2	3	4	5	6	7	8	9	10	11	12	13	14
U	∅ 1	∅ 2	S	S	S	∅ 3	∅ 4	S	SYS	S	S	S	S	FS
L	NOT USED	NOT USED	∅ 3	∅ 4	∅ 3	∅ 4	S	S	S25	S	S	S	S	DC ISOLATOR
U	∅ 5	∅ 5	∅ 6	S	S	S	S	S	SYS	S	S	S	S	S
L	NOT USED	NOT USED	NOT USED	∅ 5	∅ 6	∅ 5	∅ 6	∅ 5	S27	S	S	S	S	DC ISOLATOR

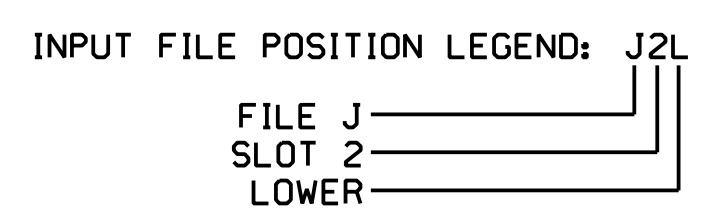
EX.: 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE
 ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
1A	TB2-1,2	I1U	56	18	1	1	Y	Y			
2A	TB2-5,6	I2U	39	1	2	2	Y	Y			
3A	TB4-9,10	I6U	41	3	4	3	Y	Y			
3B	TB4-11,12	I6L	45	7	14	3	Y	Y			
4A	TB6-1,2	I7U	65	27	34	4	Y	Y			
4B	TB6-3,4	I7L	78	40	44	4	Y	Y			
*S25	TB6-9,10	I9U	60	22	11	SYS					
*S26	TB6-11,12	I9L	62	24	13	SYS					
5A	TB3-1,2	J1U	55	17	5	5	Y	Y			3
5B	TB3-5,6	J2U	40	2	6	5	Y	Y			
6A	TB3-9,10	J3U	64	26	36	6	Y	Y			
*S27	TB7-9,10	J9U	59	21	15	SYS					

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



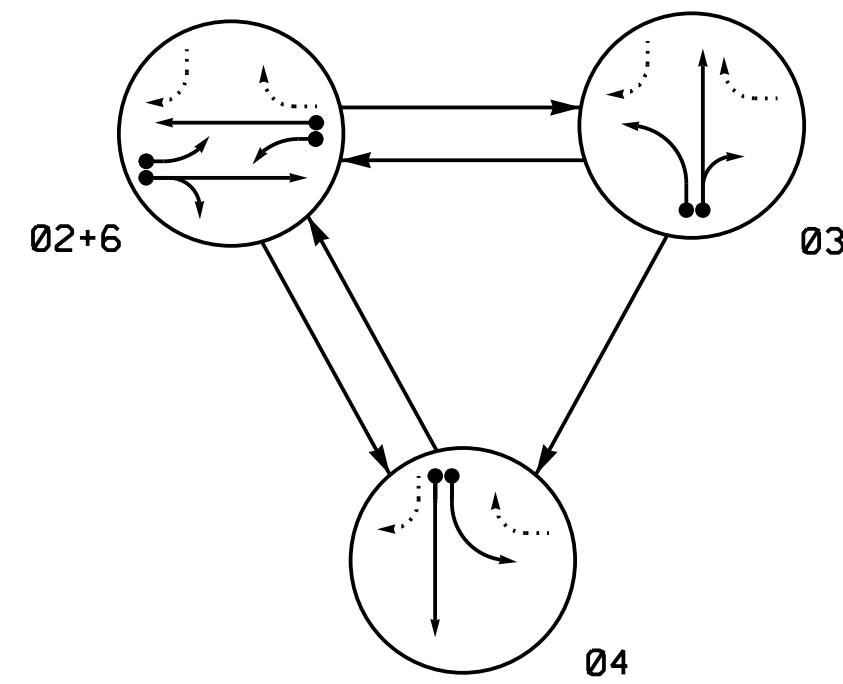
THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 02-0228
 DESIGNED: March 2018
 SEALED: 12-7-18
 REVISED: N/A

Electrical Detail Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

	Prepared for: 		NC 101 (Fontana Boulevard) at SR 1737 (Roosevelt Boulevard)/ Base Entrance		
	Division 02 Craven Co. Havelock		PLAN DATE: March 2018 REVIEWED BY: A.D. Klinksiek PREPARED BY: A.H. Thornburg REVIEWED BY: N.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		REVISIONS: _____ INITI: _____ DATE: _____ _____ _____		DocuSigned by: Natasha R. Simmons 12/7/2018 _____ _____ SIG. INVENTORY NO. 02-0228	

PHASING DIAGRAM

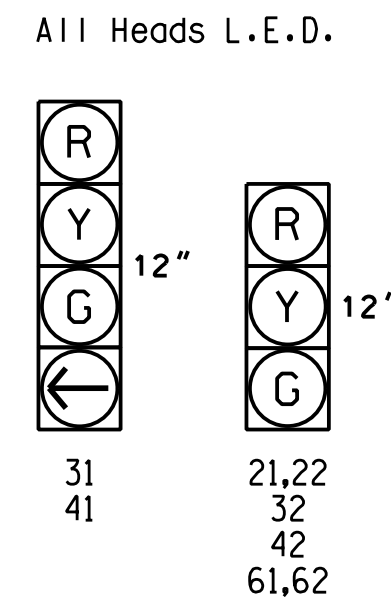


PHASING DIAGRAM DETECTION LEGEND

- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UN SIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

SIGNAL FACE	PHASE			
	02+6	03	04	FLASH
21,22	G	R	R	Y
31	R	G	R	R
32	R	G	R	R
41	R	R	G	R
42	R	R	G	R
61,62	G	R	R	Y

SIGNAL FACE I.D.

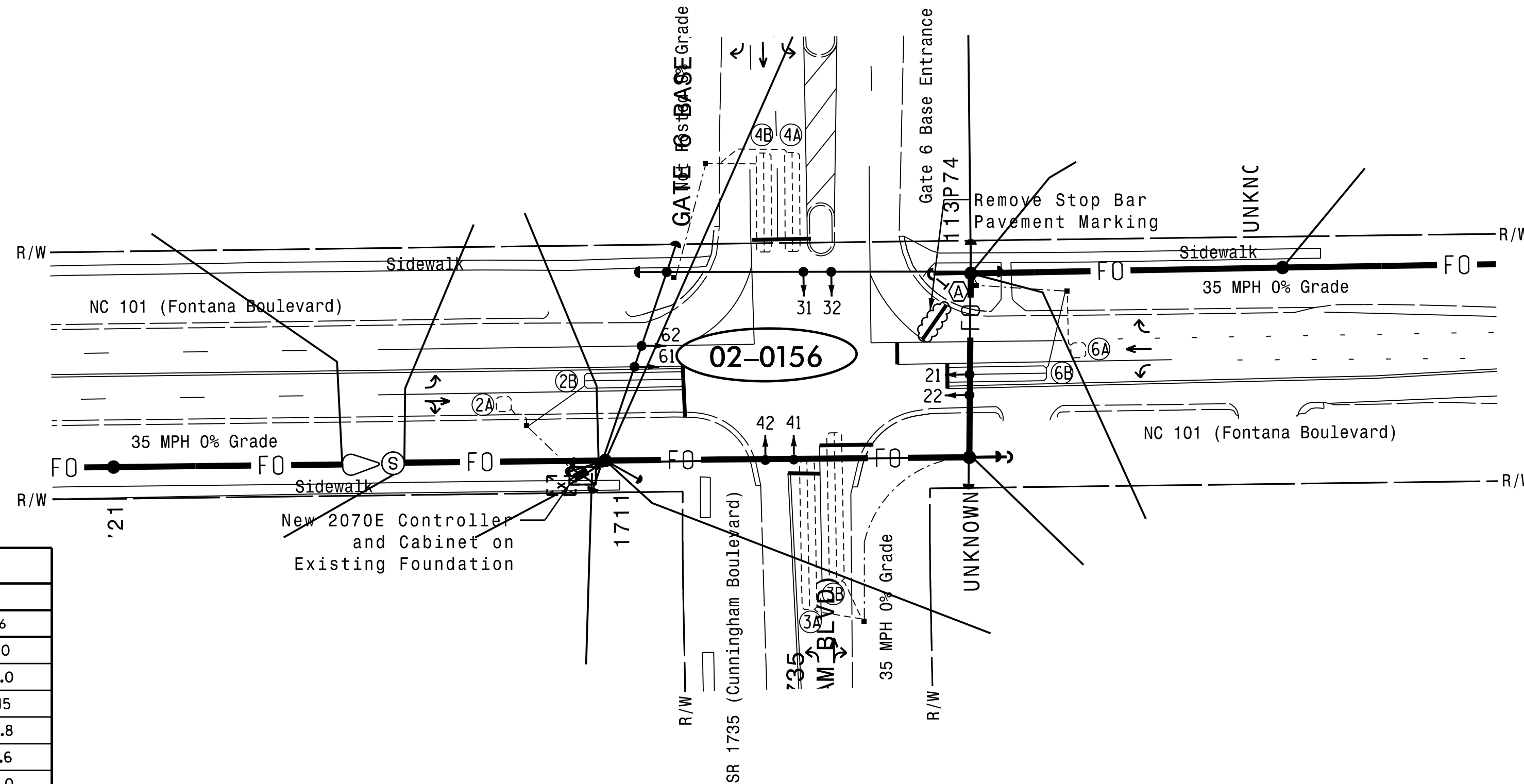


OASIS 2070 LOOP & DETECTOR INSTALLATION CHART											
INDUCTIVE LOOPS						DETECTOR PROGRAMMING					
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP NEW CARD
2A	6X6	70	4	-	2	Y	Y	-	-	-	-
2B	6X40	0	2-4-2	Y	2	Y	Y	-	-	3	-
3A	6X60	+5	2-4-2	-	3	Y	Y	-	-	3	-
3B	6X60	+5	2-4-2	-	3	Y	Y	-	-	-	-
4A	6X40	+5	2-4-2	-	4	Y	Y	-	-	-	-
4B	6X40	+5	2-4-2	-	4	Y	Y	-	-	-	-
6A	6X6	70	4	-	6	Y	Y	-	-	-	-
6B	6X40	0	2-4-2	Y	6	Y	Y	-	-	3	-

3 Phase Fully Actuated Havelock US 70 Business CLS

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.
- 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.
- The cabinet should be designed to include Auxiliary Output file for future use.
- Remove Stop Bar as shown.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- Closed loop system data: Controller Asset #0156



FEATURE	PHASE			
	2	3	4	6
Min Green 1 *	10	7	7	10
Extension 1 *	3.0	1.0	2.0	3.0
Max Green 1 *	45	40	40	45
Yellow Clearance	3.8	3.8	3.2	3.8
Red Clearance	1.5	1.1	2.2	1.6
Red Revert	2.0	2.0	2.0	2.0
Walk 1 *	-	-	-	-
Don't Walk 1	-	-	-	-
Seconds Per Actuation *	-	-	-	-
Max Variable Initial *	-	-	-	-
Time Before Reduction *	-	-	-	-
Time To Reduce *	-	-	-	-
Minimum Gap	-	-	-	-
Recall Mode	MIN RECALL	-	-	MIN RECALL
Vehicle Call Memory	YELLOW	-	-	YELLOW
Dual Entry	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON

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

PROPOSED	LEGEND	EXISTING
○→	Traffic Signal Head	●→
○→	Modified Signal Head	N/A
○→	Sign	N/A
○→	Pedestrian Signal Head With Push Button & Sign	○→
○→	Signal Pole with Guy	○→
○→	Signal Pole with Sidewalk Guy	○→
○→	Inductive Loop Detector	○→
○→	Controller & Cabinet	○→
○→	Junction Box	○→
○→	2-in Underground Conduit	○→
N/A	Right of Way	○→
○→	Directional Arrow	○→
○→	Right Entering Added Lane Sign (W4-6)	○→

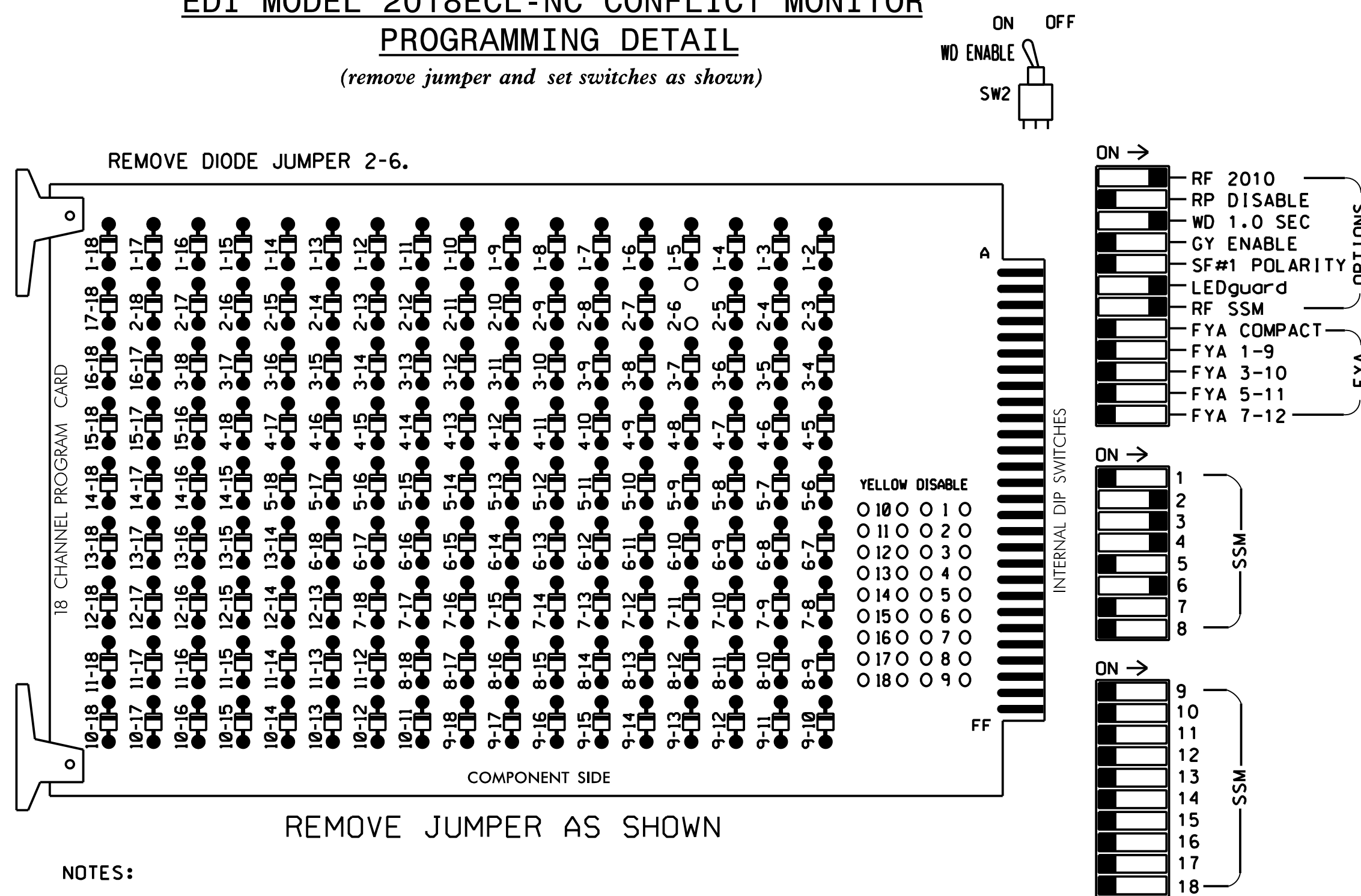
Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

	Prepared For: TRANSPORTATION MOBILITY AND SAFETY DIVISION NORTH CAROLINA DEPARTMENT OF TRANSPORTATION SIGNAL DESIGN SECTION		NC 101 (Fontana Boulevard) at SR 1735 (Cunningham Boulevard)/ Gate 6 Base Entrance	SEAL
	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	PLAN DATE: March 2018 PREPARED BY: A.H. Thornburg REVISIONS:		

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

(remove jumper and set switches as shown)



NOTES:

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

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Enable Simultaneous Gap-Out for all Phases.
3. Program phases 2 and 6 for Startup In Green.
4. Program phases 2 and 6 for Yellow Flash.
5. The cabinet and controller are part of the Havelock US 70 Business Closed Loop 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.	NU	21,22	NU	31	32	41	42	NU	61,62	NU	NU	NU	NU	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																		
YELLOW ARROW																		
FLASHING YELLOW ARROW																		
GREEN ARROW				118	103													

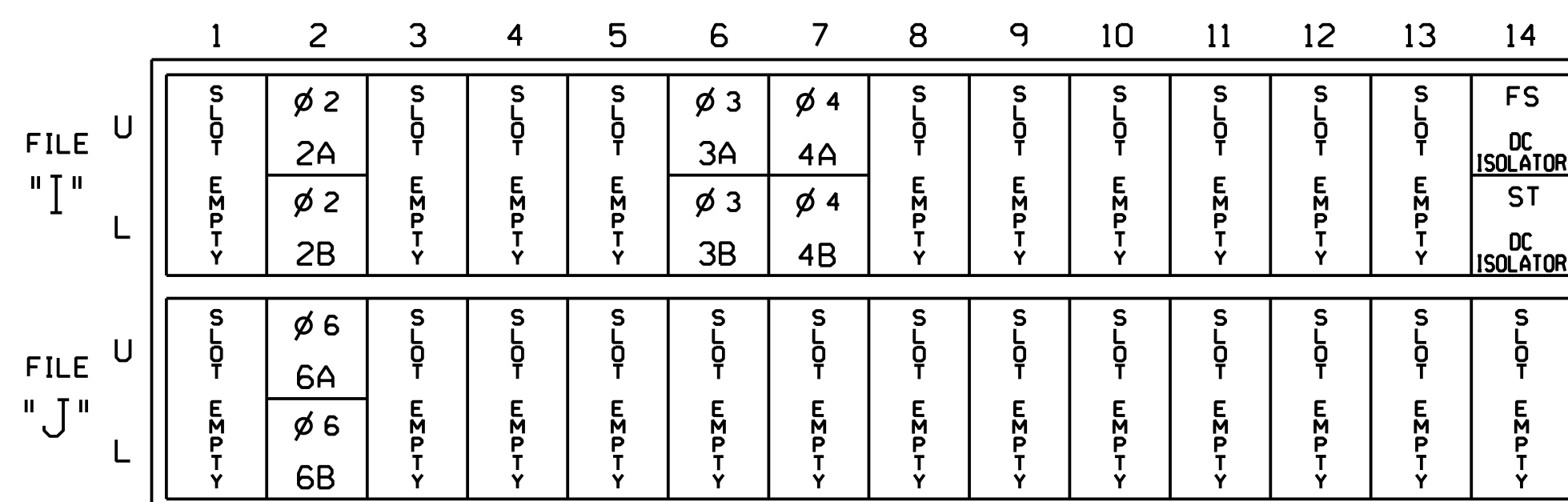
NU = Not Used

EQUIPMENT INFORMATION

CONTROLLER.....2070E
 CABINET.....332 W/AUX
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
 LOAD SWITCHES USED.....S2,S4,S5,S8
 PHASES USED.....2,3,4,6
 OVERLAPS.....NONE

INPUT FILE POSITION LAYOUT

(front view)



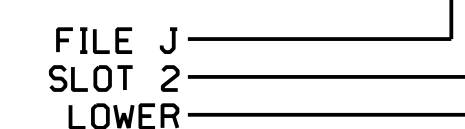
EX.: 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE
 ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
2A	TB2-5,6	I2U	39	1	2	2	Y	Y			
2B	TB2-7,8	I2L	43	5	12	2	Y	Y			3
3A	TB4-9,10	I6U	41	3	4	3	Y	Y			3
3B	TB4-11,12	I6L	45	7	14	3	Y	Y			
4A	TB6-1,2	I7U	65	27	34	4	Y	Y			
4B	TB6-3,4	I7L	78	40	44	4	Y	Y			
6A	TB3-5,6	J2U	40	2	6	6	Y	Y			
6B	TB3-7,8	J2L	44	6	16	6	Y	Y			3

INPUT FILE POSITION LEGEND: J2L



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 02-0156
 DESIGNED: March 2018
 SEALED: 12-7-18
 REVISED: N/A

Electrical Detail
 Signal Upgrade

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

Electrical and Programming Details For: **NC 101 (Fontana Boulevard) at SR 1735 (Cunningham Boulevard)/ Gate 6 Base Entrance**

Division 02 Craven Co. Havelock

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

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

REVISIONS: INIT. DATE

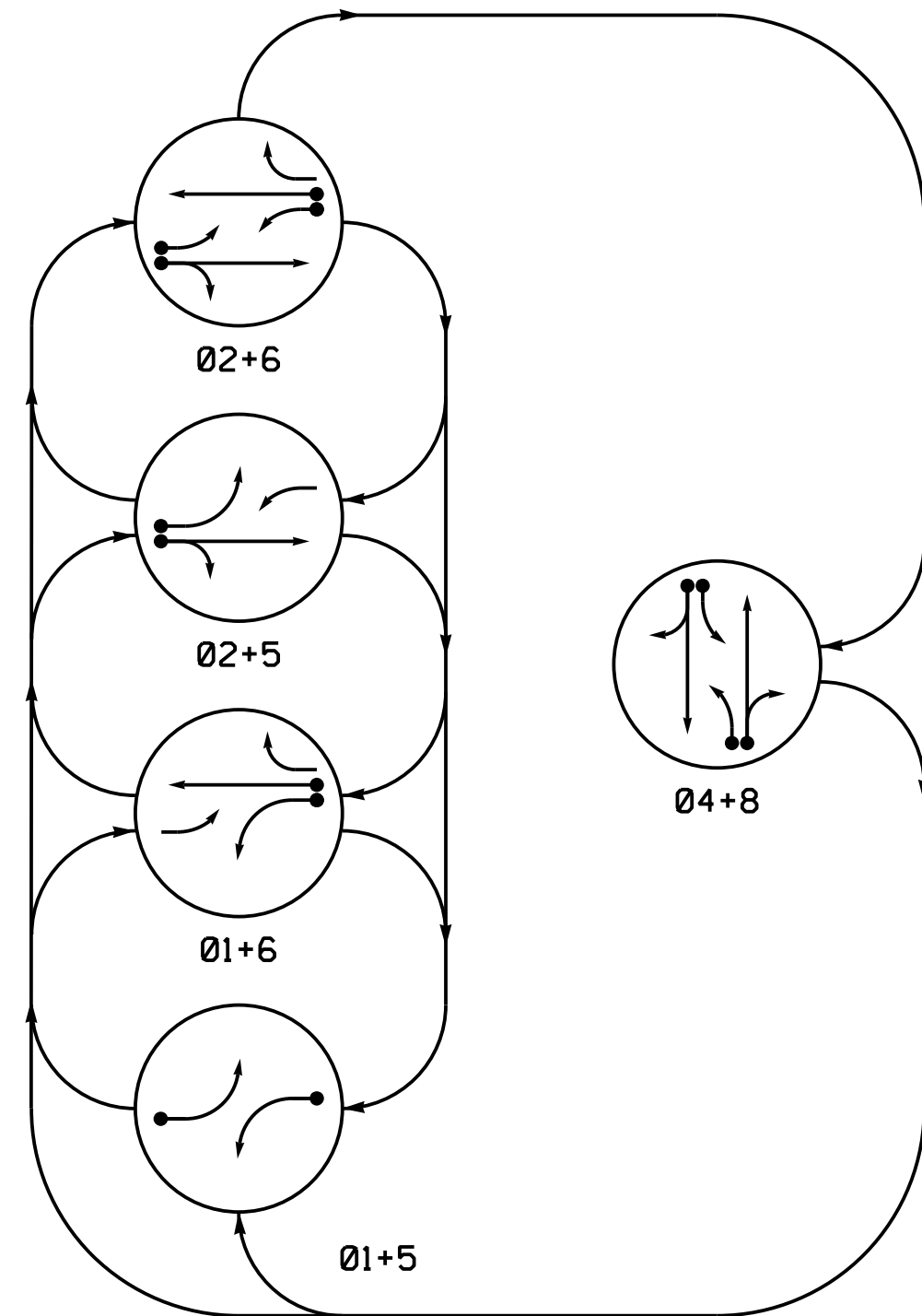
DocuSigned by: **Matasha R. Simmons** 12/7/2018

SIG. INVENTORY NO. 02-0156

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

PHASING DIAGRAM

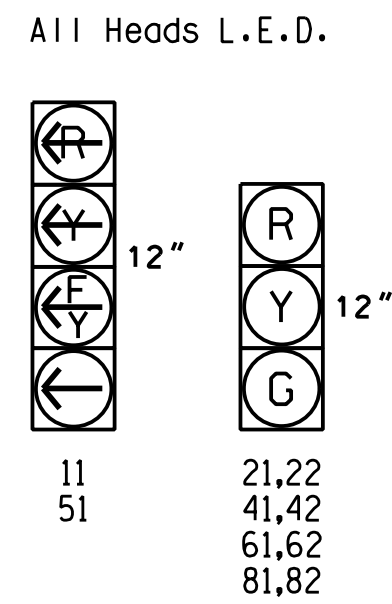


PHASING DIAGRAM DETECTION LEGEND

- DETECTED MOVEMENT (solid arrow with dot)
UNDETECTED MOVEMENT (OVERLAP) (solid arrow)
UNSIGNALIZED MOVEMENT (dotted arrow)
PEDESTRIAN MOVEMENT (dashed arrow)

TABLE OF OPERATION table with columns for SIGNAL FACE and PHASE (01+5, 02+5, 04+8, FLSH, FLSH, FLSH).

SIGNAL FACE I.D.

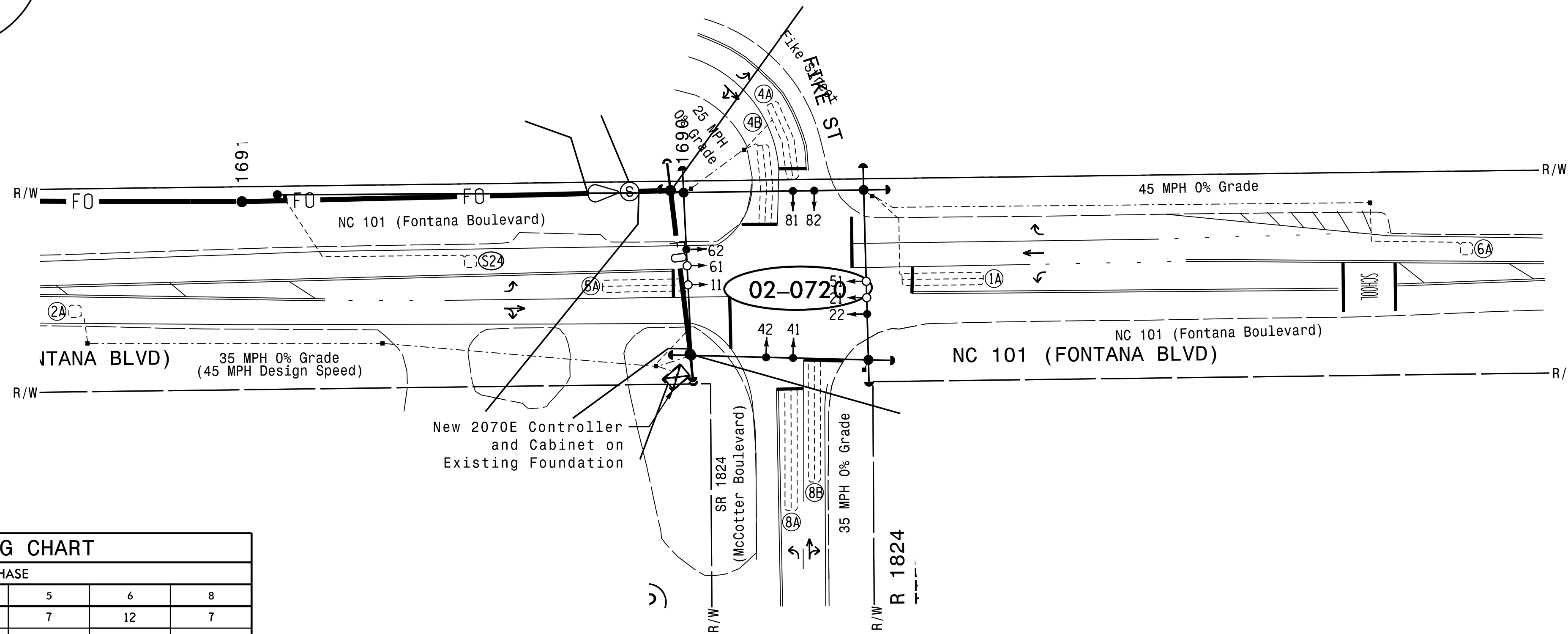


OASIS 2070 LOOP & DETECTOR INSTALLATION CHART table with columns for LOOP, SIZE, DISTANCE, TURNS, NEW LOOP, PHASE, CALLING, EXTENSION, FULL TIME DELAY, STRETCH TIME, DELAY TIME, SYSTEM LOOP, NEW CARD.

5 Phase Fully Actuated Havelock US 70 Business CLS

NOTES

- 1. Refer to "Roadway Standard Drawings NCDOT" 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. Set all detector units to presence mode.
5. Reposition existing signal heads numbered 22 and 62.
6. In the event of loop replacement, refer to the current ITS and Signals Design Manual...
7. Pavement markings are existing.
8. Maximum times shown in timing chart are for free-run operation only.
9. Closed loop system data: Controller Asset #0720



LEGEND

- PROPOSED: Traffic Signal Head, Modified Signal Head, Pedestrian Signal Head, Signal Pole with Guy, Inductive Loop Detector, Junction Box, 2-in Underground Conduit, Right of Way, Directional Arrow, Metal Strain Pole.
EXISTING: N/A, N/A, N/A, N/A, N/A, N/A, N/A, N/A, N/A, N/A

OASIS 2070 TIMING CHART table with columns for FEATURE and PHASE (1, 2, 4, 5, 6, 8).

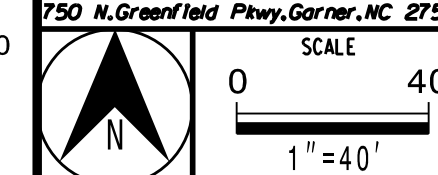
* These values may be field adjusted. Do not adjust Min Green and Extension times for phases 2 and 6 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Signal Upgrade

Professional seal area for HNTB, including project title, location, date, and signature lines for A.H. Thornburg and N.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



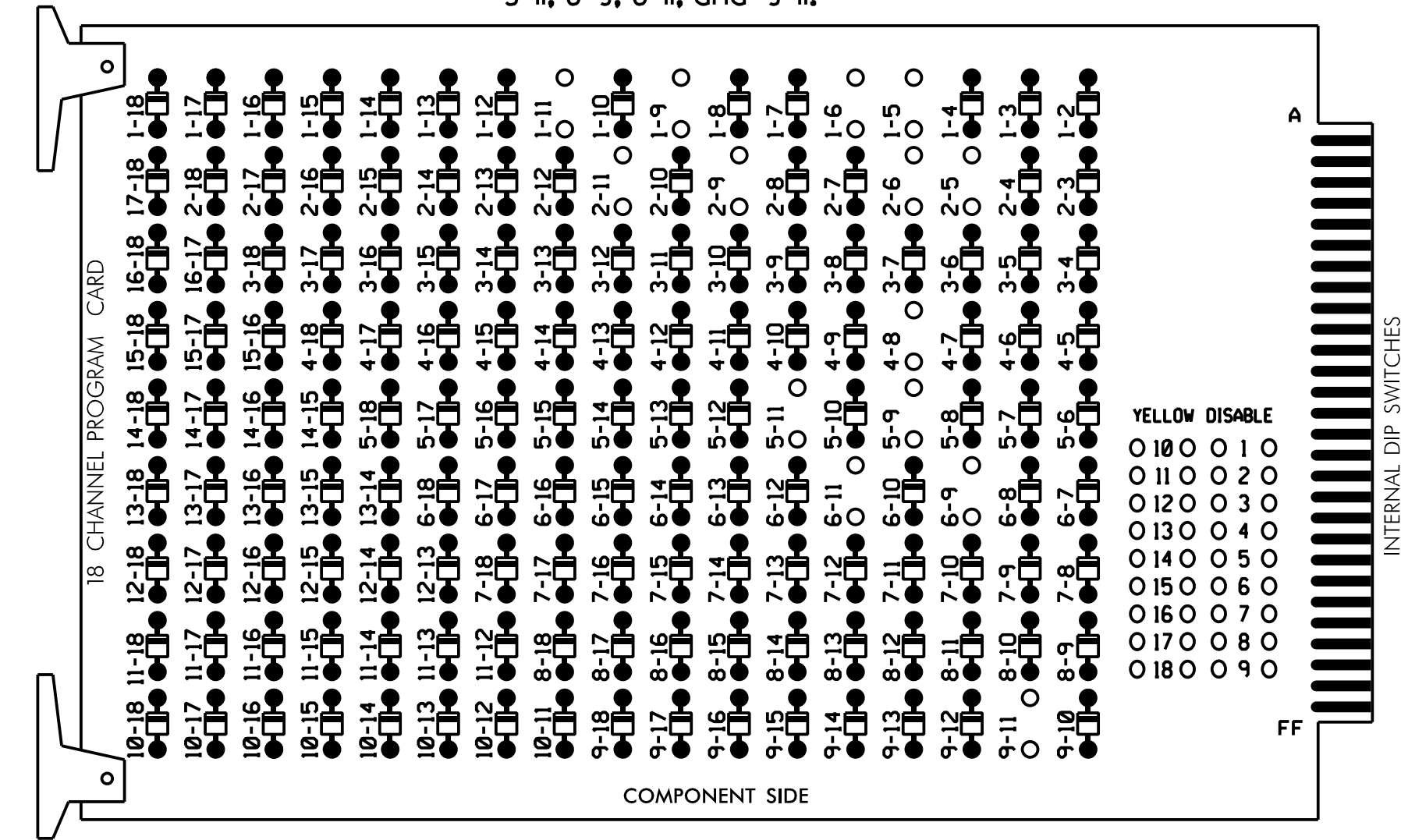
DocuSigned by: Natasha R. Simmons 12/7/2018

SIG. INVENTORY NO. 02-0720

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

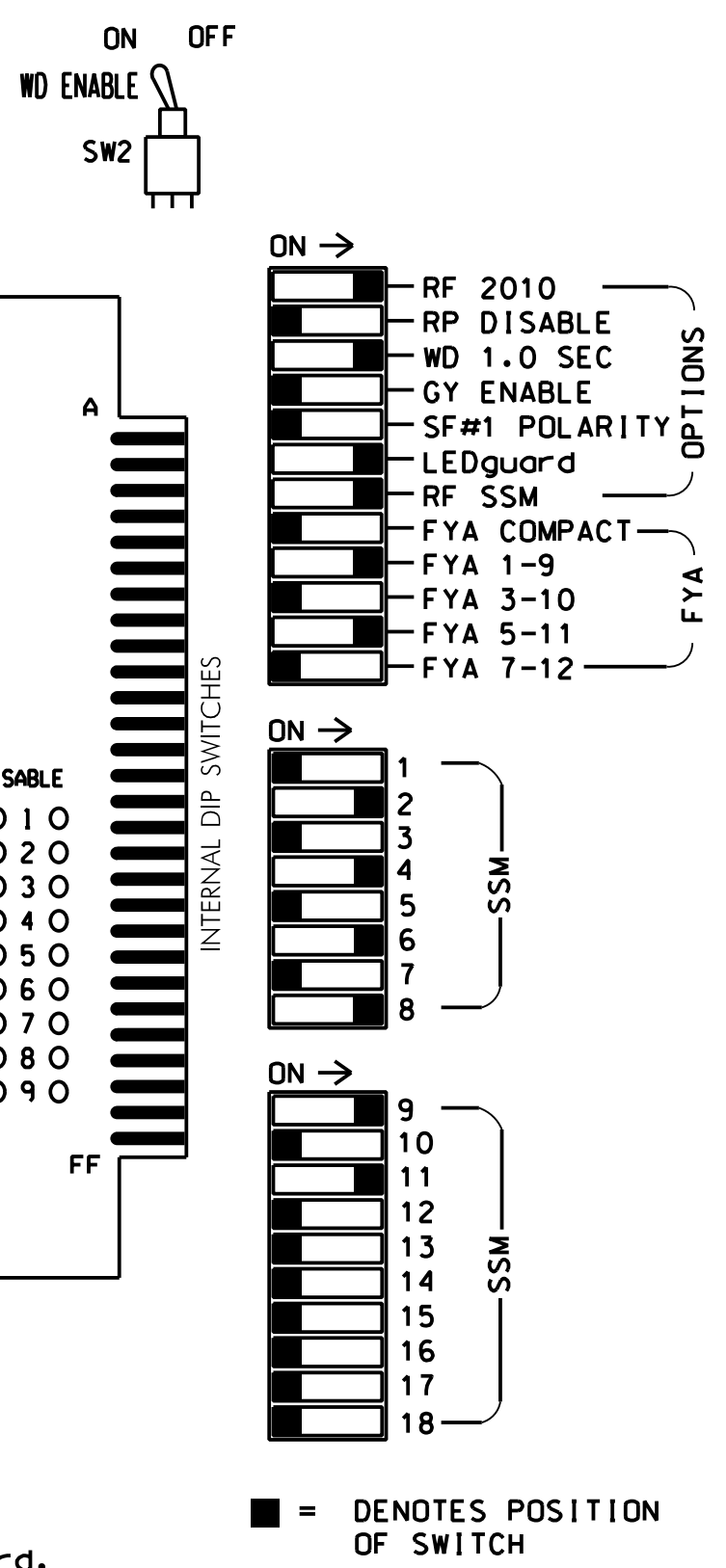
REMOVE DIODE JUMPERS 1-5, 1-6, 1-9, 1-11, 2-5, 2-6, 2-9, 2-11, 4-8, 5-9, 5-11, 6-9, 6-11, and 9-11.



REMOVE JUMPERS AS SHOWN

NOTES:

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



■ = DENOTES POSITION OF SWITCH

NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
- Enable Simultaneous Gap-Out for all Phases.
- Program phases 4 and 8 for Dual Entry.
- Program phases 2 and 6 for Variable Initial and Gap Reduction.
- Program phases 2 and 6 for Startup In Green.
- Program phases 2 and 6 for Yellow Flash, and overlap 1 as Wag Overlaps.
- The cabinet and controller are part of the Havelock US 70 Business Closed Loop 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,S5,S7,S8,S11,AUX S1,AUX S4
 PHASES USED.....1,2,4,5,6,8
 OVERLAP "A".....1+2
 OVERLAP "B".....NOT USED
 OVERLAP "C".....5+6
 OVERLAP "D".....NOT USED

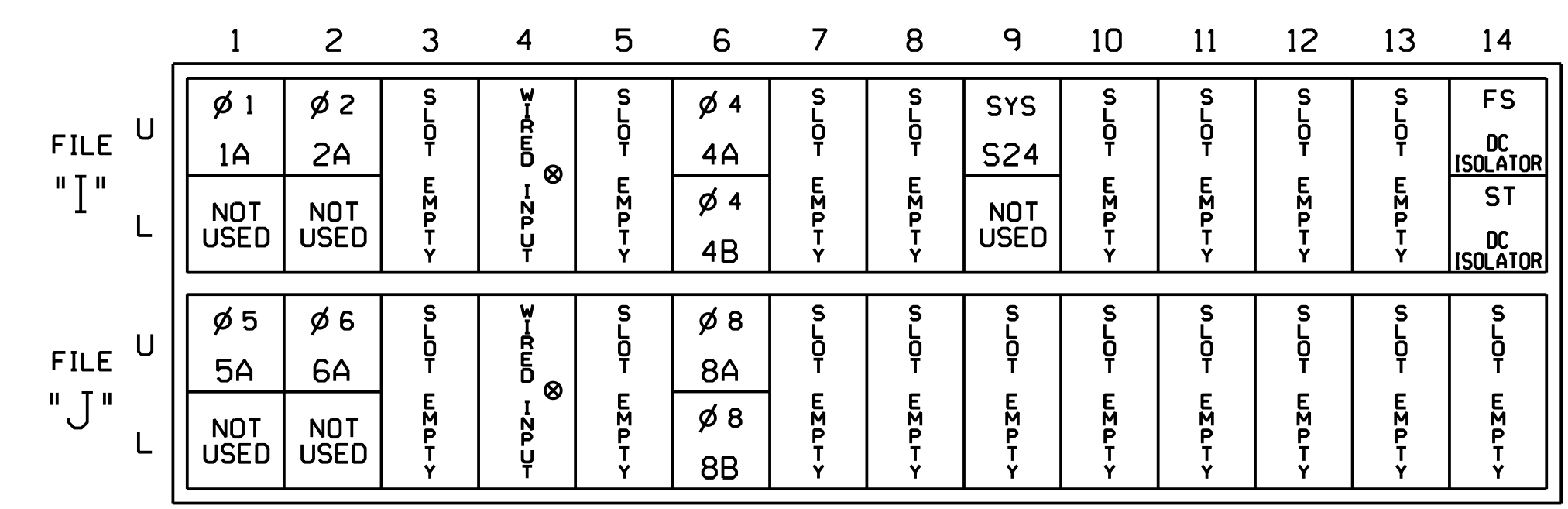
SIGNAL HEAD HOOK-UP CHART

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

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

INPUT FILE POSITION LAYOUT

(front view)



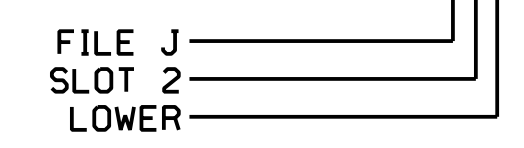
EX.: 1A, 2A, ETC. = LOOP NO.'S
 FS = FLASH SENSE
 DC ISOLATOR = Do not populate slot with detector card
 ST = STOP TIME

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 ¹	TB2-1,2	J1U	56	18	1	1	Y	Y			15
	-	J4U	48	10	26	6	Y	Y	Y		3
2A	TB2-5,6	J2U	39	1	2	2	Y	Y			
4A	TB4-9,10	J6U	41	3	4	4	Y	Y			3
4B	TB4-11,12	J6L	45	7	14	4	Y	Y			10
*S24	TB6-9,10	J9U	60	22	11	SYS					
5A ²	TB3-1,2	J1U	55	17	5	5	Y	Y			15
	-	J4U	47	9	22	2	Y	Y	Y		3
6A	TB3-5,6	J2U	40	2	6	6	Y	Y			
8A	TB5-9,10	J6U	42	4	8	8	Y	Y			3
8B	TB5-11,12	J6L	46	8	18	8	Y	Y			10

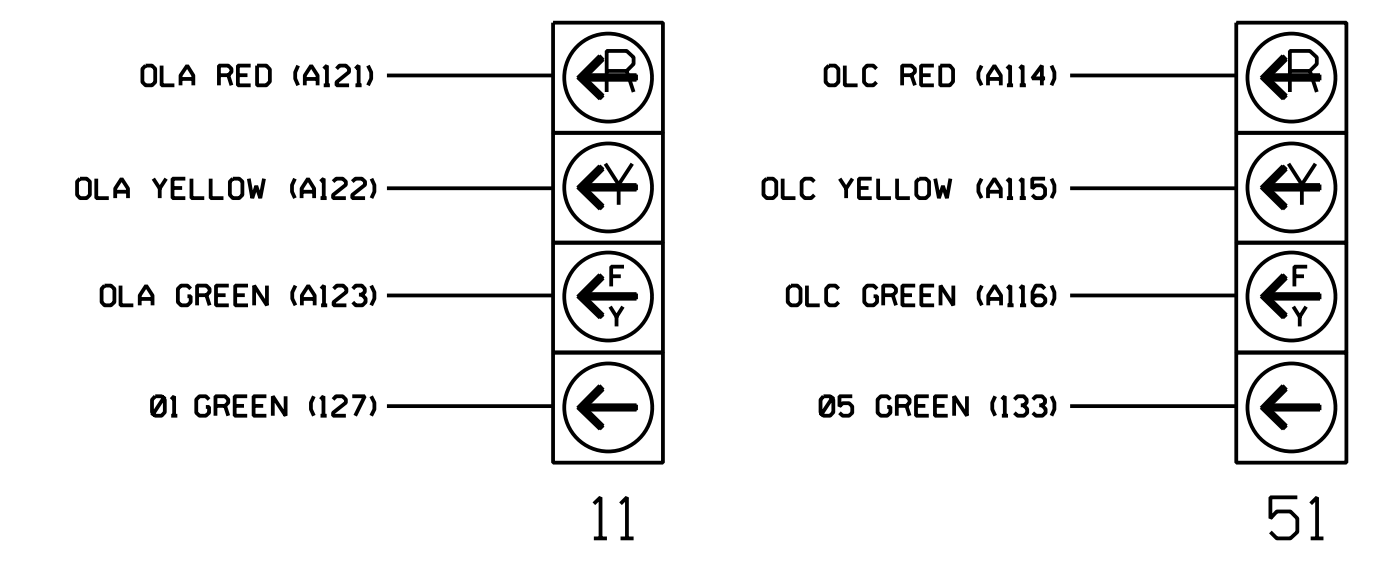
- Add jumper from J1-W to J4-W, on rear of input file.
 - Add jumper from J1-W to J4-W, on rear of input file.
- * System detector only. Remove the vehicle phase assigned to this detector in the default programming.

INPUT FILE POSITION LEGEND: J2L



FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



NOTE

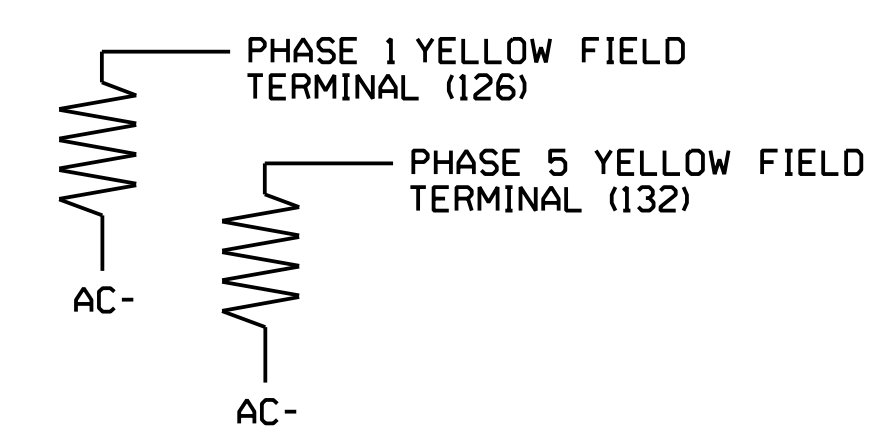
The sequence display for signal heads 11 and 51 requires special logic programming. See sheet 2 for programming instructions.

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 02-0720
 DESIGNED: March 2018
 SEALED: 12-7-18
 REVISED: N/A

LOAD RESISTOR INSTALLATION DETAIL

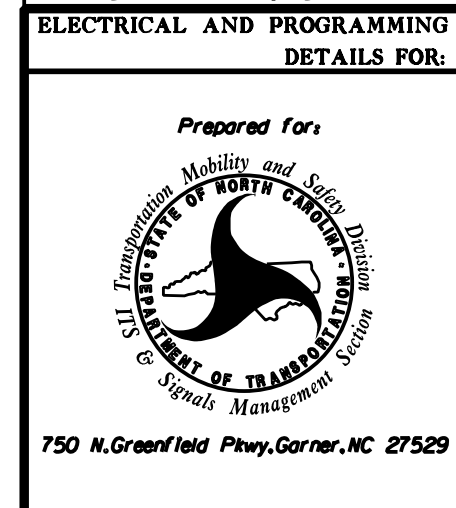
(install resistors as shown below)

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



Electrical Detail - Sheet 1 of 2
 Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



NC 101 (Fontana Boulevard) at SR 1824 (McCotter Boulevard) / Fike Street	
Division 02	Craven Co. Havelock
PLAN DATE: March 2018	REVIEWED BY: A.D. Klinksiek
PREPARED BY: A.H. Thornburg	REVIEWED BY: N.R. Simmons
REVISIONS	INIT. DATE

SEAL
 NORTH CAROLINA PROFESSIONAL ENGINEER
 SEAL 031464
 N.R. SIMMONS
 DATE 12/7/2018
 SIGNATURE
 SIG. INVENTORY NO. 02-0720

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

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

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

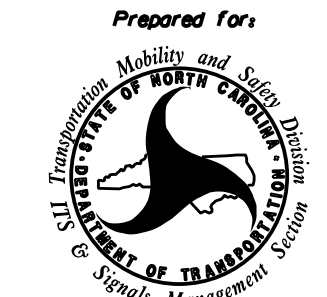
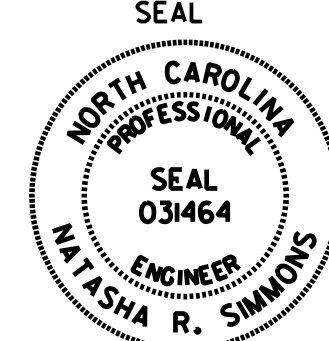
OUTPUT REFERENCE SCHEDULE	
USE TO INTERPRET LOGIC PROCESSOR	
OUTPUT 42 =	Overlap C Red
OUTPUT 43 =	Overlap C Yellow
OUTPUT 44 =	Overlap C Green
OUTPUT 50 =	Overlap A Red
OUTPUT 51 =	Overlap A Yellow
OUTPUT 52 =	Overlap A Green

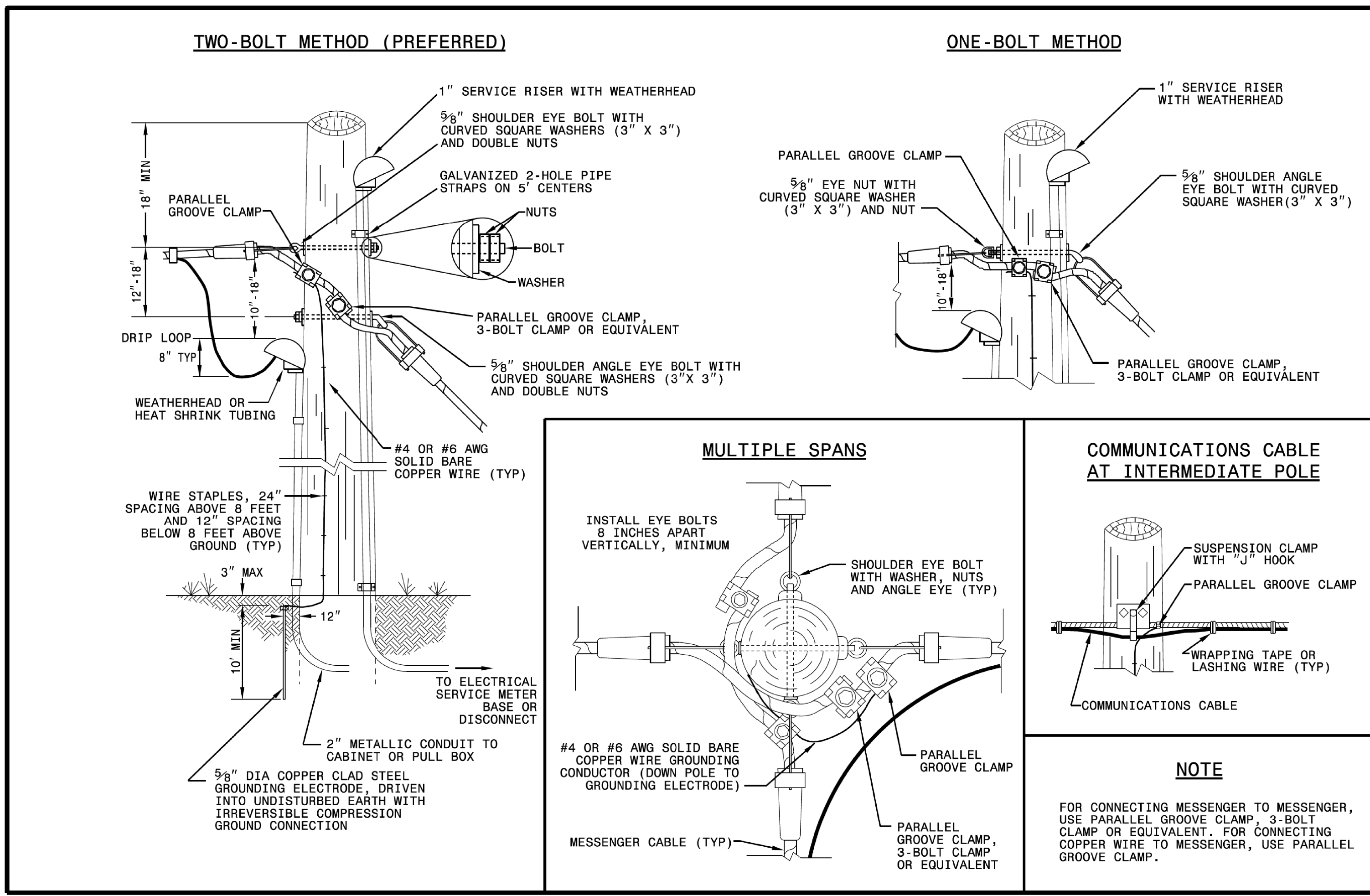
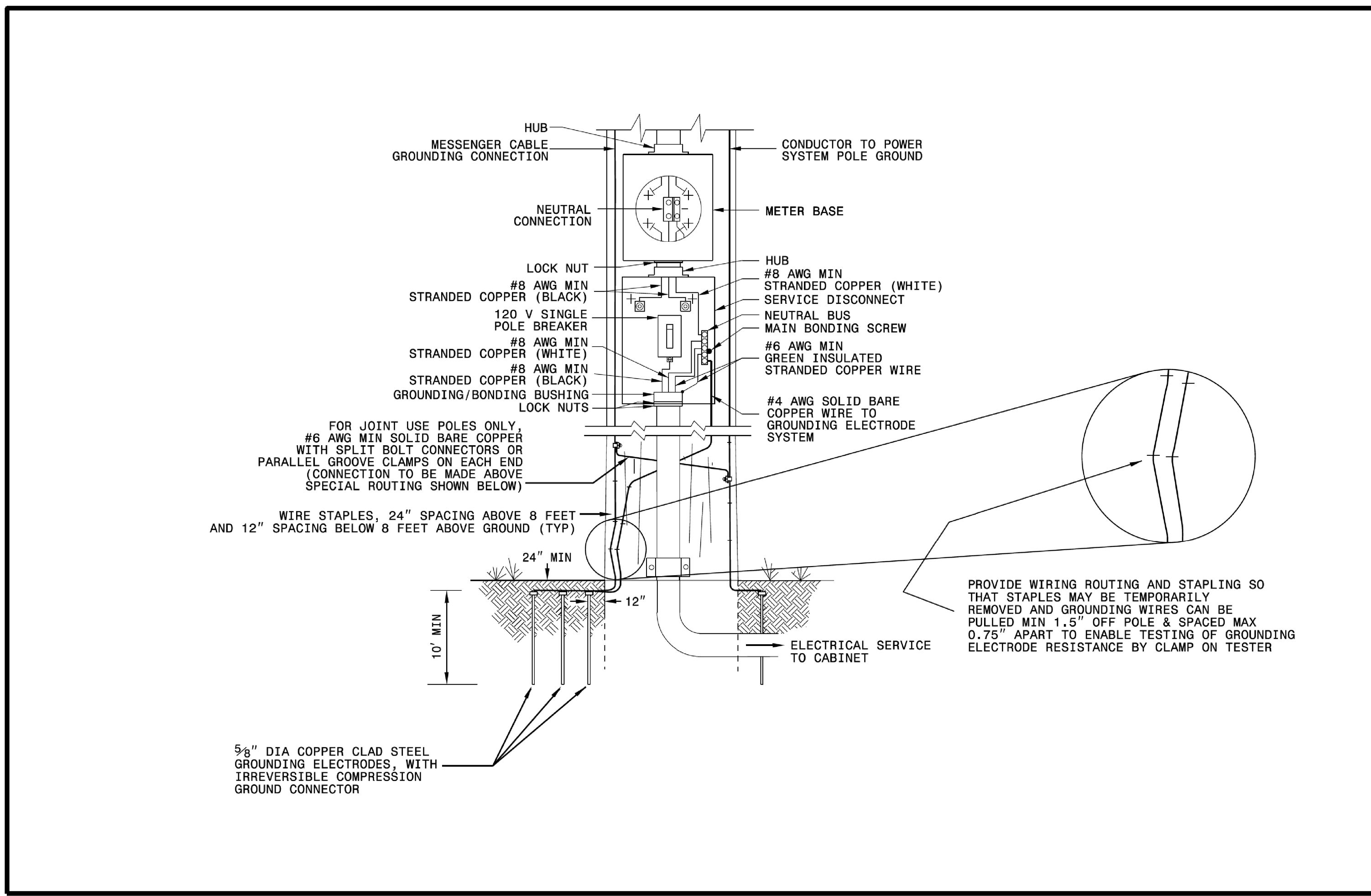
THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 02-0720
DESIGNED: March 2018
SEALED: 12-7-18
REVISED: N/A

Electrical Detail - Sheet 2 of 2
Signal Upgrade

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

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

	Prepared for: NC 101 (Fontana Boulevard) at SR 1824 (McCotter Boulevard)/ Fike Street	SEAL 
	Division 02 Craven Co. Havelock	PLAN DATE: March 2018 REVIEWED BY: A.D. Klinksiek PREPARED BY: A.H. Thornburg REVIEWED BY: N.R. Simmons
REVISIONS INIT. DATE		SIG. INVENTORY NO. 02-0720



11-2017-2017_08-556
11-2018-2018_544 DocuSign Plate Sheets 2018_Plate Sheet - dgn
r.wrough

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FINAL UNLESS ALL
SIGNATURES COMPLETED

See Plate for Title

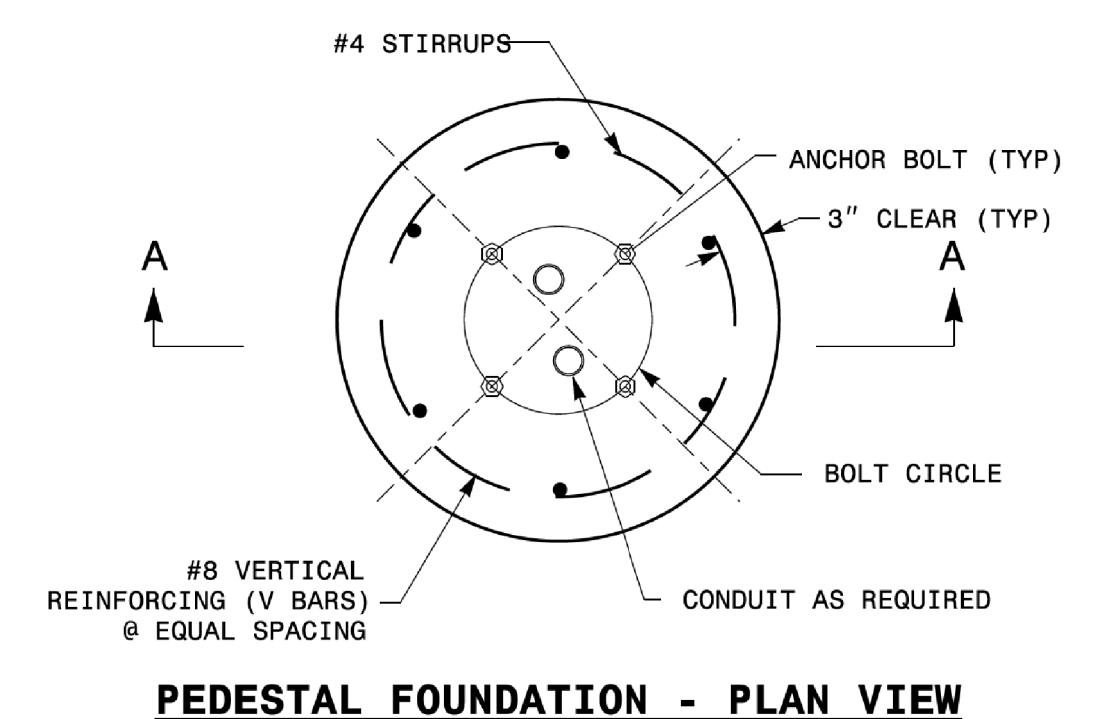
Prepared in the Offices of:

750 N. Greenfield Parkway
Garner, NC 27529

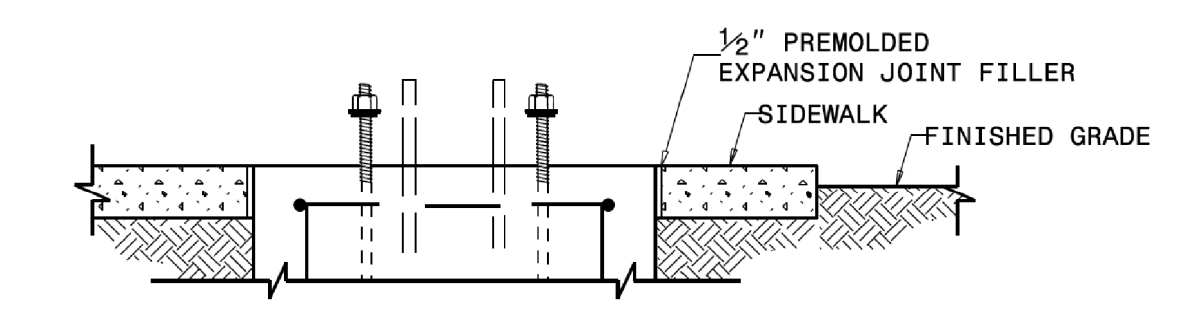
SEAL

DocuSigned by:
Mohd. Aslami

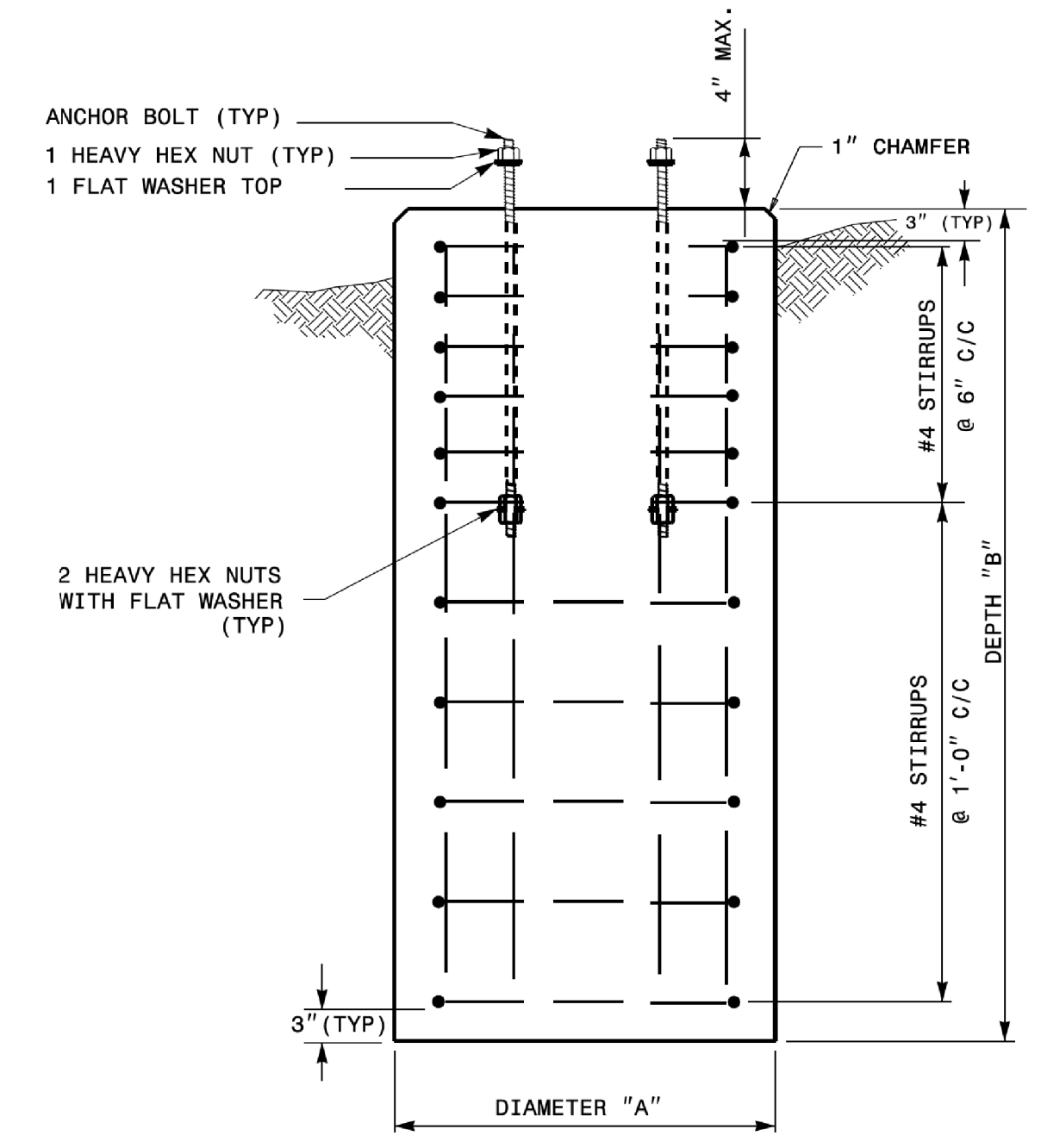
10/11/2017
DATE



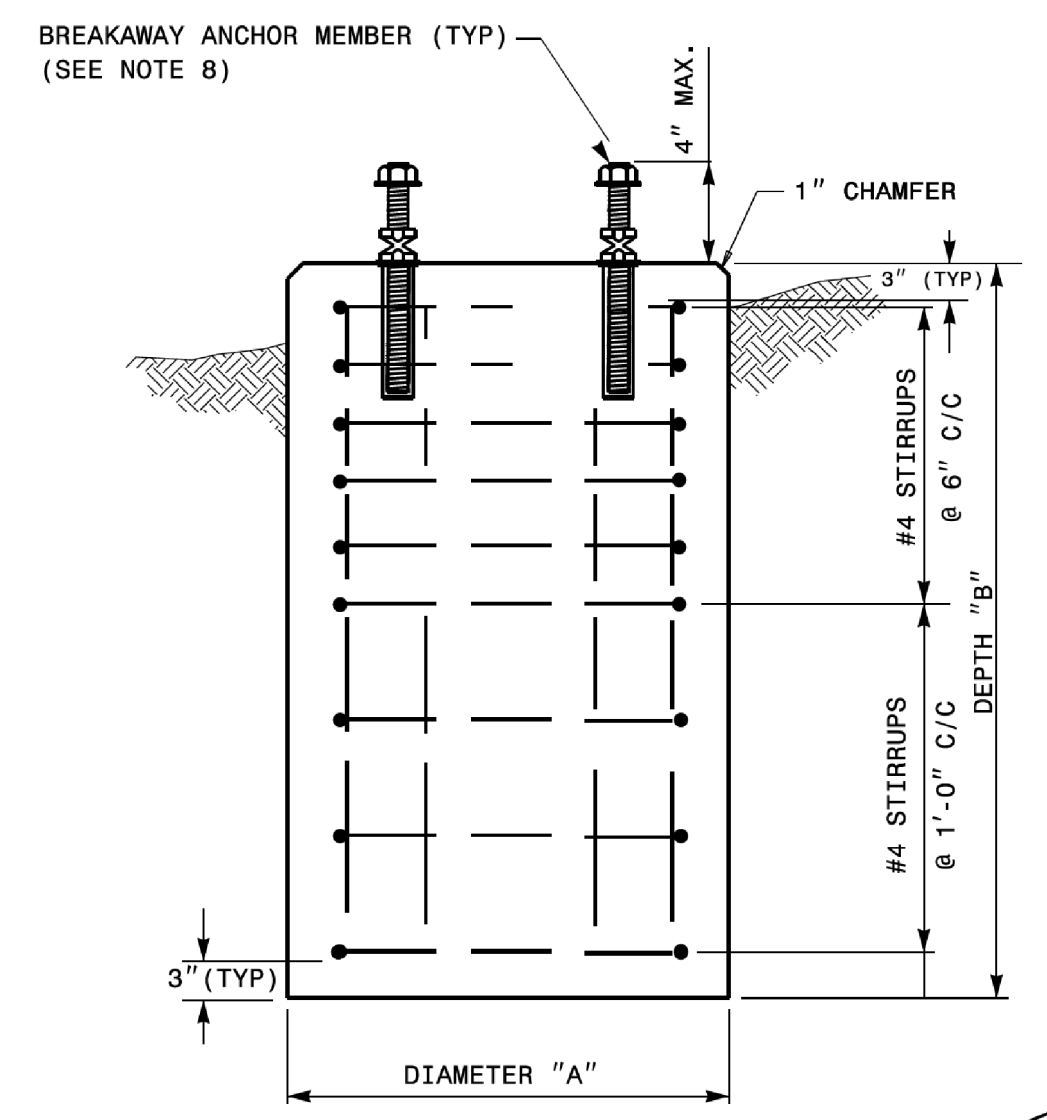
PEDESTAL FOUNDATION - PLAN VIEW



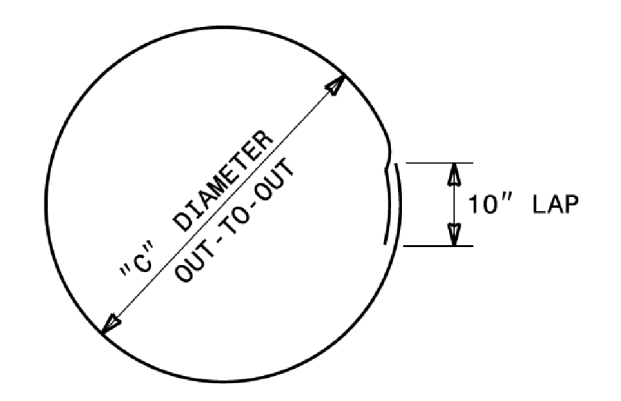
PEDESTAL FOUNDATION DETAILS FOR SIDEWALK



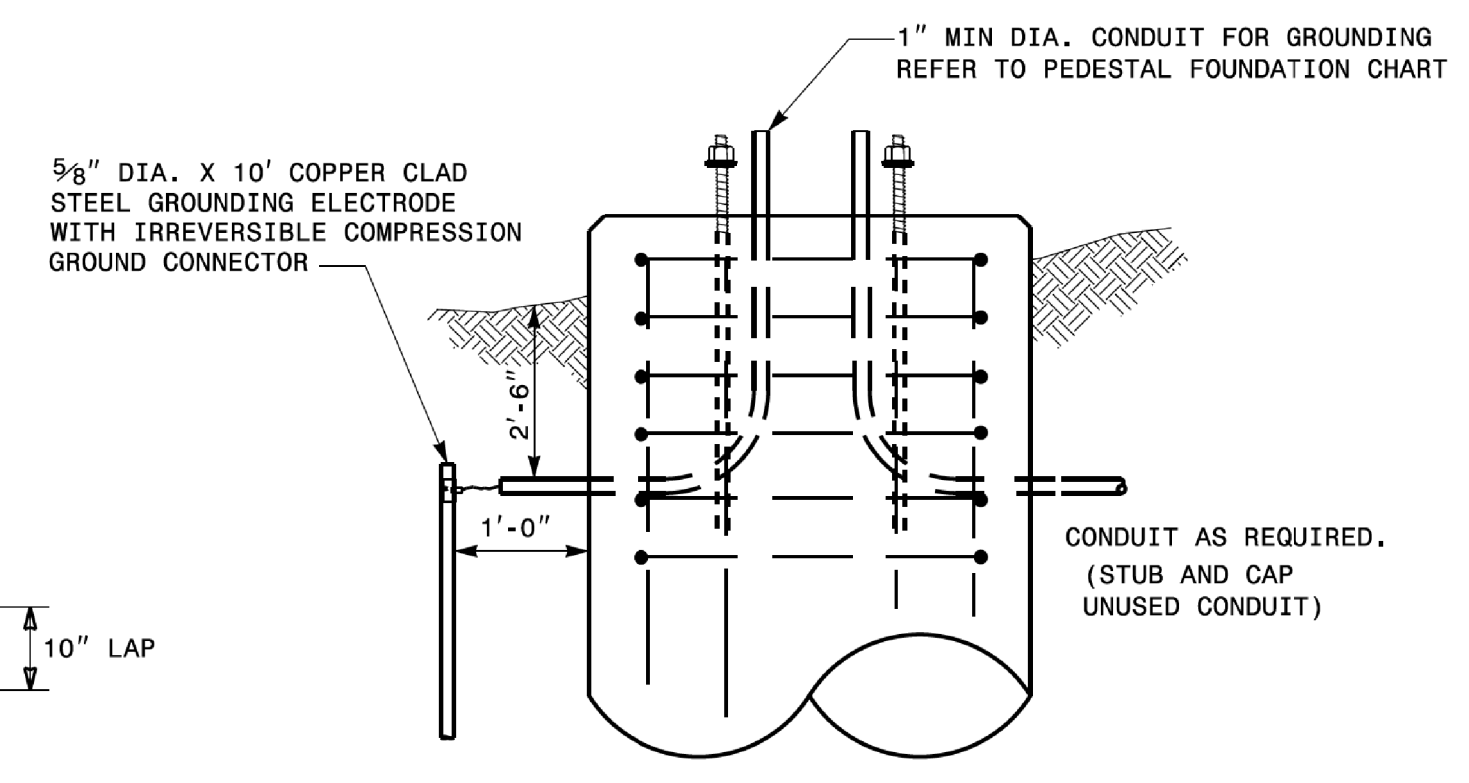
**TYPES I, II & III
SECTION A-A**



**TYPES I & II ONLY
SECTION A-A**



CLOSED HOOPS



GROUNDING & CONDUIT DETAIL

NOTES:

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

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

REINFORCING STEEL SCHEDULE													
TYPE	V-BAR				STIRRUP								
	SIZE #	QTY	LENGTH	WEIGHT LBS	QUANTITY			LENGTH	DIAMETER "C" FT	OVERLAP MIN.	WEIGHT LBS	TOTAL STEEL WEIGHT LBS	
					ON 6" CENTERS	ON 12" CENTERS	TOTAL						
I	8	6	3'-0"	56	4	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.

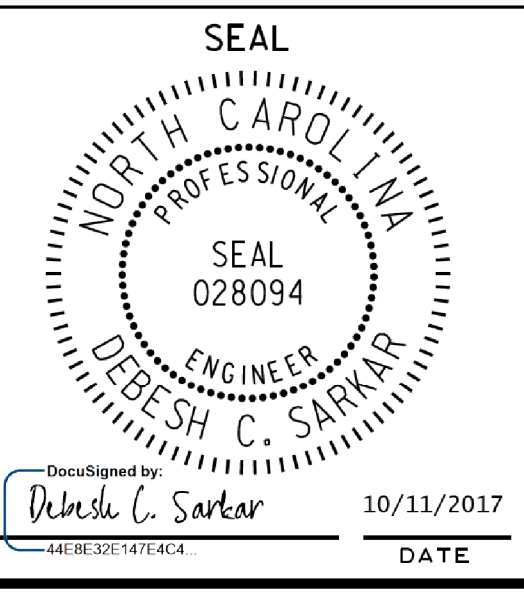
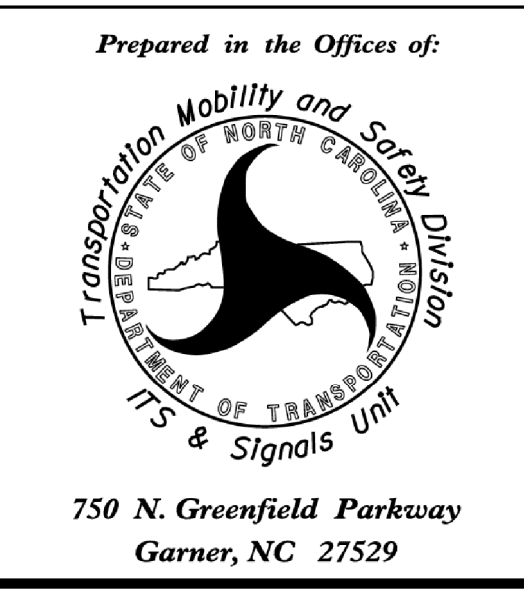
ENGLISH STANDARD DRAWING FOR
PEDESTALS
 FOUNDATIONS

SHEET 1 OF 1
1743D01

11-01-2017 09:03
 U:\2018 Std Drawings\Plate Sheets\2018_Plate Sheet -dgn
 r.w.rough

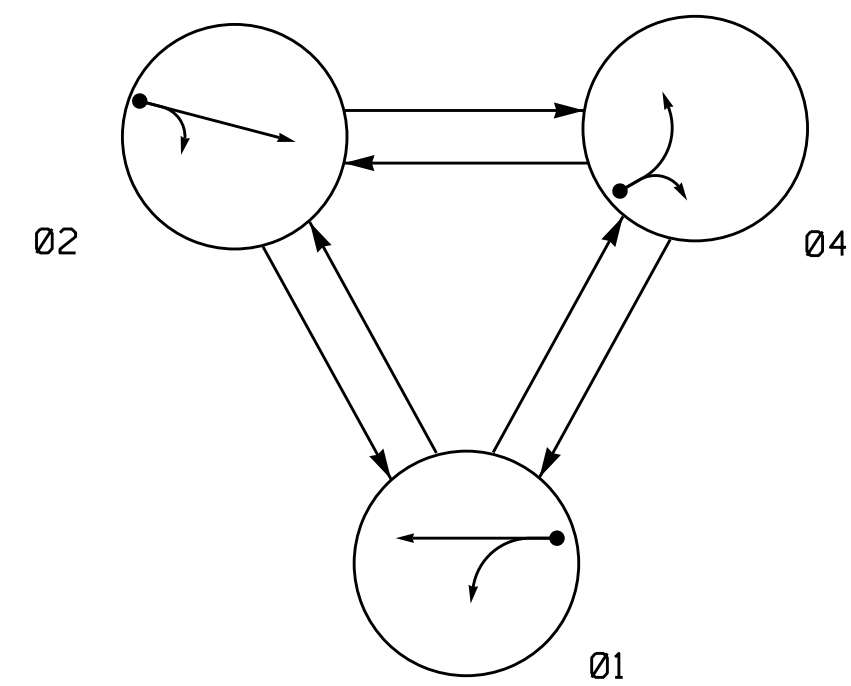
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 SIGNATURES COMPLETED

See Plate for Title



PHASING DIAGRAM

Program AllPhases for "Red Rest"



PHASING DIAGRAM DETECTION LEGEND

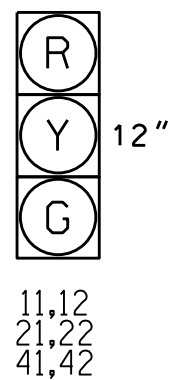
- ←●→ DETECTED MOVEMENT
- ←○→ UNDETECTED MOVEMENT (OVERLAP)
- ←- - -→ UNSIGNALIZED MOVEMENT
- ←- - -> PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE			
	01	02	04	FLASH
11,12	G	R	R	R
21,22	R	G	R	R
41,42	R	R	G	R

SIGNAL FACE I.D.

All Heads L.E.D.



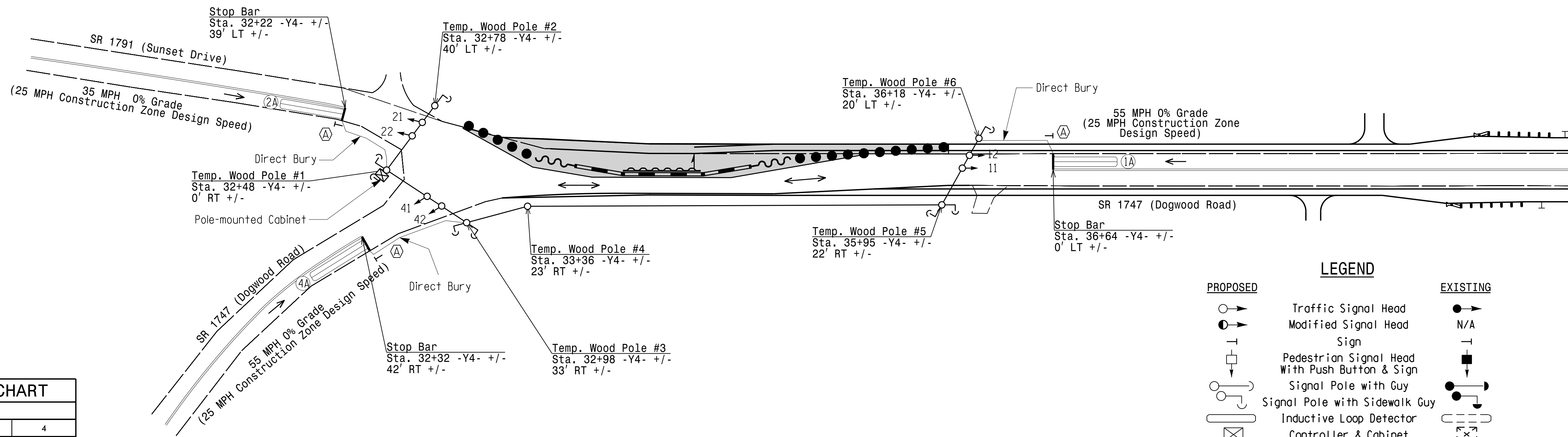
OASIS 2070 LOOP & DETECTOR INSTALLATION CHART

LOOP	SIZE (FT)	INDUCTIVE LOOPS		DETECTOR PROGRAMMING								
		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	Y	1	Y	Y	-	-	-	-	Y
2A	6X40	0	2-4-2	Y	2	Y	Y	-	-	-	-	Y
4A	6X40	0	2-4-2	Y	4	Y	Y	-	-	-	-	Y

3 Phase Fully Actuated Isolated

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Program controller to start up in phase 4 red clearance.
4. Program controller to rest in red in the absence of vehicle calls.
5. Set all detector units to presence mode.



OASIS 2070 TIMING CHART

FEATURE	PHASE		
	1	2	4
Min Green 1 *	10	10	10
Extension 1 *	2.0	2.0	2.0
Max Green 1 *	45	45	20
Yellow Clearance	5.2	3.8	5.2
Red Clearance	15.0	15.0	15.0
Walk 1 *	-	-	-
Don't Walk 1	-	-	-
Seconds Per Actuation *	-	-	-
Max Variable Initial *	-	-	-
Time Before Reduction *	-	-	-
Time To Reduce *	-	-	-
Minimum Gap	-	-	-
Recall Mode	-	-	-
Vehicle Call Memory	-	-	-
Dual Entry	-	-	-
Red Rest	ON	ON	ON
Simultaneous Gap	ON	ON	ON

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

LEGEND

PROPOSED	EXISTING
○→ Traffic Signal Head	●→ Traffic Signal Head
●→ Modified Signal Head	N/A
↑ Sign	↑ Sign
○→ Pedestrian Signal Head	○→ Pedestrian Signal Head
○→ Signal Pole with Guy	○→ Signal Pole with Guy
○→ Signal Pole with Sidewalk Guy	○→ Signal Pole with Sidewalk Guy
□ Inductive Loop Detector	□ Inductive Loop Detector
□ Controller & Cabinet	□ Controller & Cabinet
□ Junction Box	□ Junction Box
- - - 2-in Underground Conduit	- - - 2-in Underground Conduit
N/A Right of Way	- - - Right of Way
→ Directional Arrow	→ Directional Arrow
⊙ "STOP HERE ON RED" Sign (R10-6)	⊙ "STOP HERE ON RED" Sign (R10-6)
N/A Guardrail	- - - Guardrail
● Construction Zone Drums	● Construction Zone Drums
■ Construction Zone	■ Construction Zone

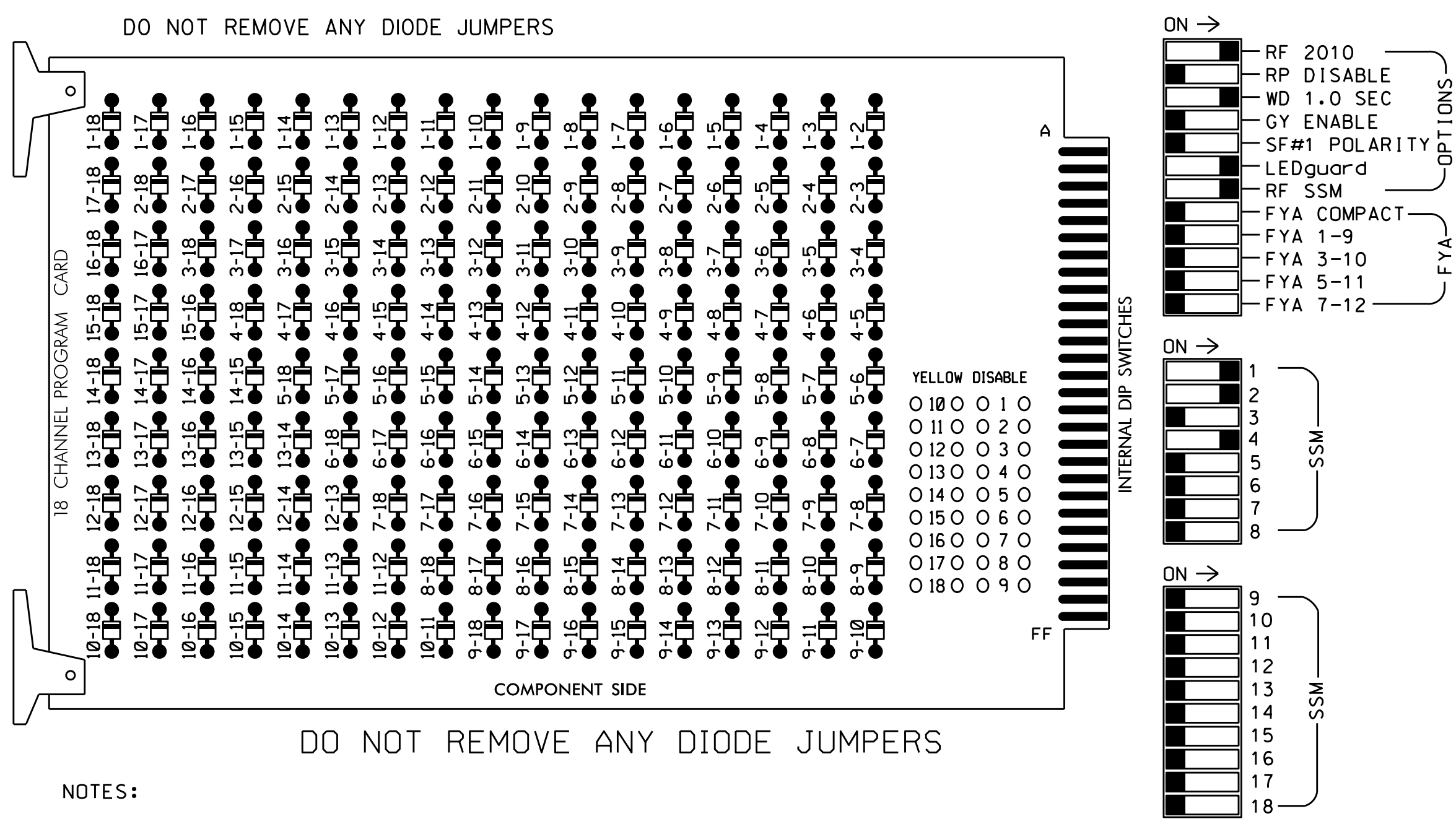
New Installation - Temporary Signal (Step 1)

	SR 1747 (Dogwood Road) at SR 1791 (Sunset Drive)		SEAL NORTH CAROLINA PROFESSIONAL ENGINEER ZACHARY M. LITTLE 030530
	Division 2 Craven County West of Havelock PLAN DATE: May 2019 REVIEWED BY: ZML PREPARED BY: KGP, Jr. REVIEWED BY:		
750 N. Greenfield Pkwy, Garner, NC 27529 SCALE: 1" = 40' 		DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED DATE: 5/8/2019 DATE:	

08-MAY-2019 16:20 S:\IT\GIS\K15\SIGNAL\Signal\EastTerm_Reg\on40\1015\02-0920\020920.dwg:q.dgn:2019madd-t1.dgn kgspeardr

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(set switches as shown)



NOTES:

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

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Enable Simultaneous Gap-Out for all Phases.
3. Program phases 1, 2, and 4 for Red Rest.
4. Program phase 4 for Startup In Red Clear.
5. Program phase 1 as First Phases.

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED
SIGNAL HEAD NO.	11,12	21,22	NU	NU	41,42	NU	NU	NU	NU	NU	NU	NU
RED	125	128			101							
YELLOW	126	129			102							
GREEN	127	130			103							
RED ARROW												
YELLOW ARROW												
GREEN ARROW												

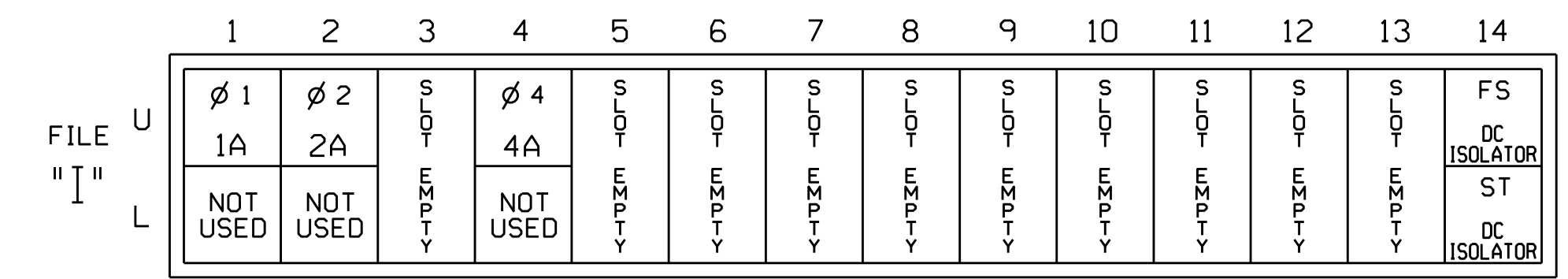
NU = Not Used

EQUIPMENT INFORMATION

CONTROLLER.....2070
 CABINET.....336
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....POLE
 OUTPUT FILE POSITIONS...12
 LOAD SWITCHES USED.....S1,S2,S5
 PHASES USED.....1,2,4
 OVERLAPS.....NONE

INPUT FILE POSITION LAYOUT

(front view)



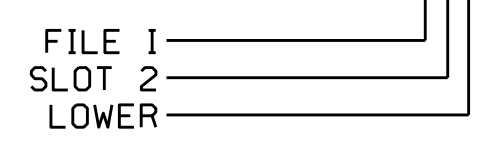
EX. : 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE
 ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
1A	TB21-1,2	I1U	56	18	1	1	Y	Y			
2A	TB21-3,4	I2U	39	1	2	2	Y	Y			
4A	TB21-7,8	I4U	41	3	4	4	Y	Y			

INPUT FILE POSITION LEGEND: I2L



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 02-0920T1
 DESIGNED: May 2019
 SEALED: 5/8/2019
 REVISED: N/A

09-MAY-2019 08:13 S:\MIS\SSM\15\SIGNAL\work\hough\020920_sm.elec.xxx.dgn somstron

Electrical Detail - Temporary Signal (Step 1)

Electrical and Programming Details For: SR 1747 (Dogwood Road) at SR 1791 (Sunset Drive)

Prepared In the Offices of:

Division 2 Craven County West of Havelock

PLAN DATE: May 2019 REVIEWED BY:
 PREPARED BY: S. Armstrong REVIEWED BY:
 REVISIONS INIT. DATE

DocuSigned by: **Ryan W. Hough** 5/13/2019 4:30:20 PM
 SEAL 036833
 ENGINEER RYAN W. HOUGH
 SIG. INVENTORY NO. 02-0920T1

PHASING DIAGRAM

Program AllPhases for "Red Rest"

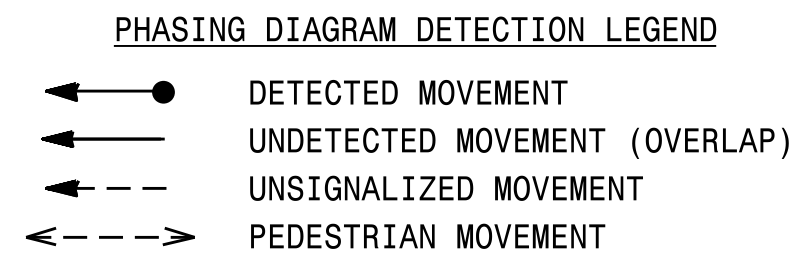
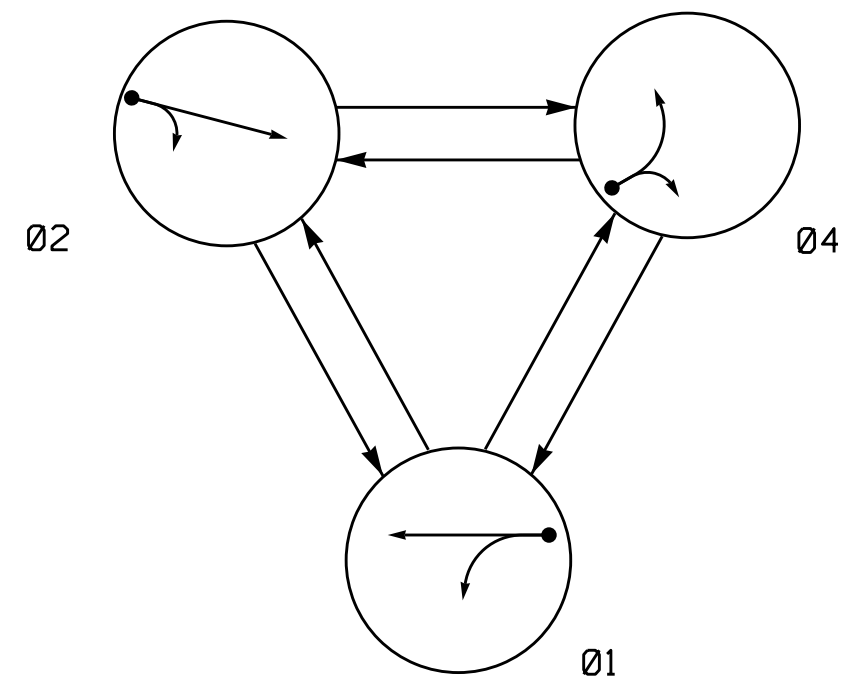
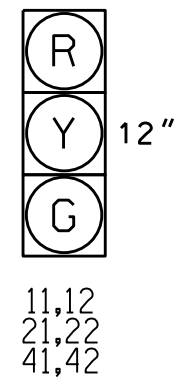


TABLE OF OPERATION

SIGNAL FACE	PHASE			
	Ø 1	Ø 2	Ø 4	F L S A H
11,12	G	R	R	R
21,22	R	G	R	R
41,42	R	R	G	R

SIGNAL FACE I.D.

All Heads L.E.D.



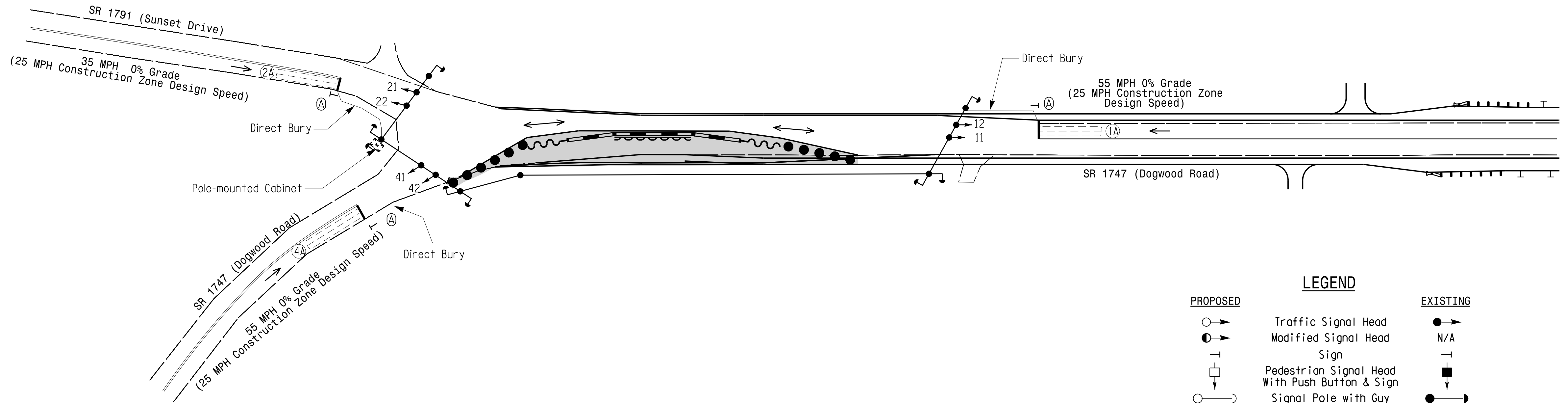
OASIS 2070 LOOP & DETECTOR INSTALLATION CHART

LOOP	SIZE (FT)	INDUCTIVE LOOPS			DETECTOR PROGRAMMING							
		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	-	-	-	-	-
2A	6X40	0	2-4-2	-	2	Y	Y	-	-	-	-	-
4A	6X40	0	2-4-2	-	4	Y	Y	-	-	-	-	-

3 Phase Fully Actuated Isolated

NOTES

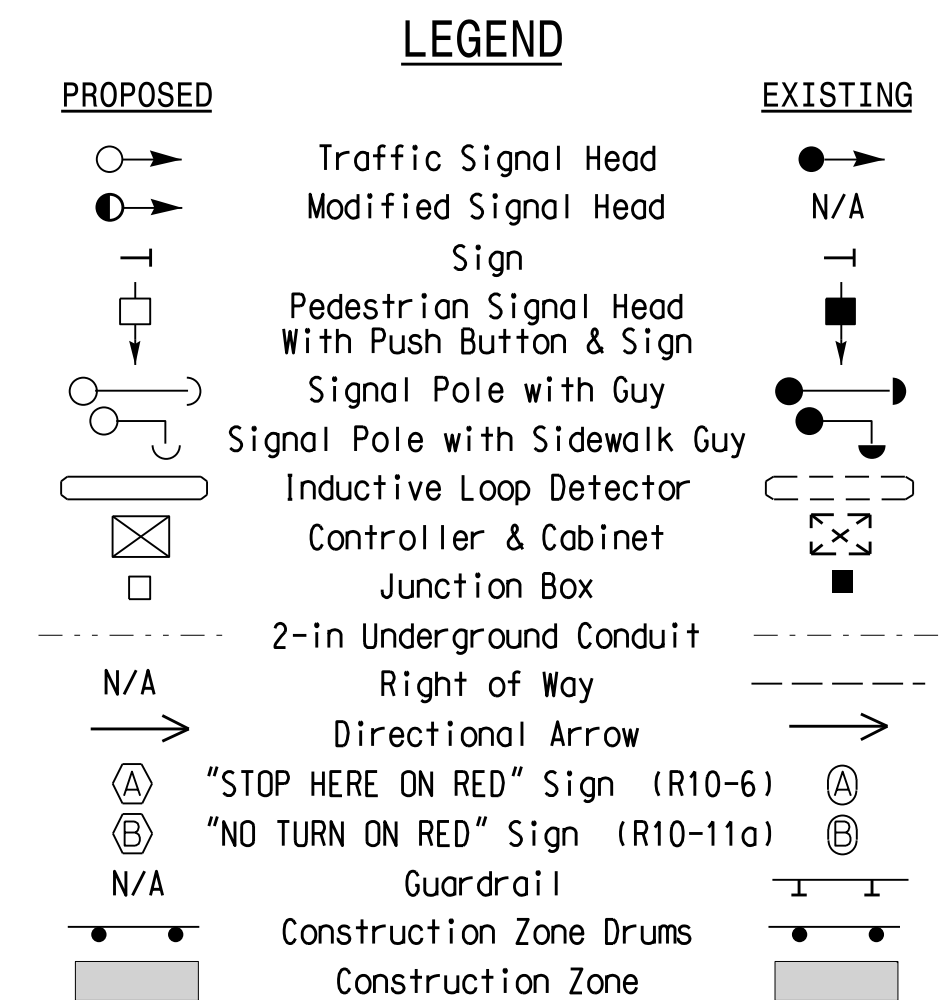
- Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Program controller to start up in phase 4 red clearance.
- Program controller to rest in red in the absence of vehicle calls.
- Set all detector units to presence mode.



OASIS 2070 TIMING CHART

FEATURE	PHASE		
	1	2	4
Min Green 1 *	10	10	10
Extension 1 *	2.0	2.0	2.0
Max Green 1 *	45	45	20
Yellow Clearance	5.2	3.8	5.2
Red Clearance	15.0	15.0	15.0
Walk 1 *	-	-	-
Don't Walk 1	-	-	-
Seconds Per Actuation *	-	-	-
Max Variable Initial *	-	-	-
Time Before Reduction *	-	-	-
Time To Reduce *	-	-	-
Minimum Gap	-	-	-
Recall Mode	-	-	-
Vehicle Call Memory	-	-	-
Dual Entry	-	-	-
Red Rest	ON	ON	ON
Simultaneous Gap	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.



New Installation - Temporary Signal (Step 2)

	SR 1747 (Dogwood Road) at SR 1791 (Sunset Drive)		SEAL NORTH CAROLINA PROFESSIONAL ENGINEER ZACHARY M. LITTLE 030530
	Division 2 Craven County West of Havelock PLAN DATE: May 2019 PREPARED BY: KGP, Jr.	REVIEWED BY: ZML REVIEWED BY:	
SCALE 0 40 1" = 40'	REVISIONS INIT. DATE	DATE: 5/8/2019	DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED SIG. INVENTORY NO. 02-0920T2