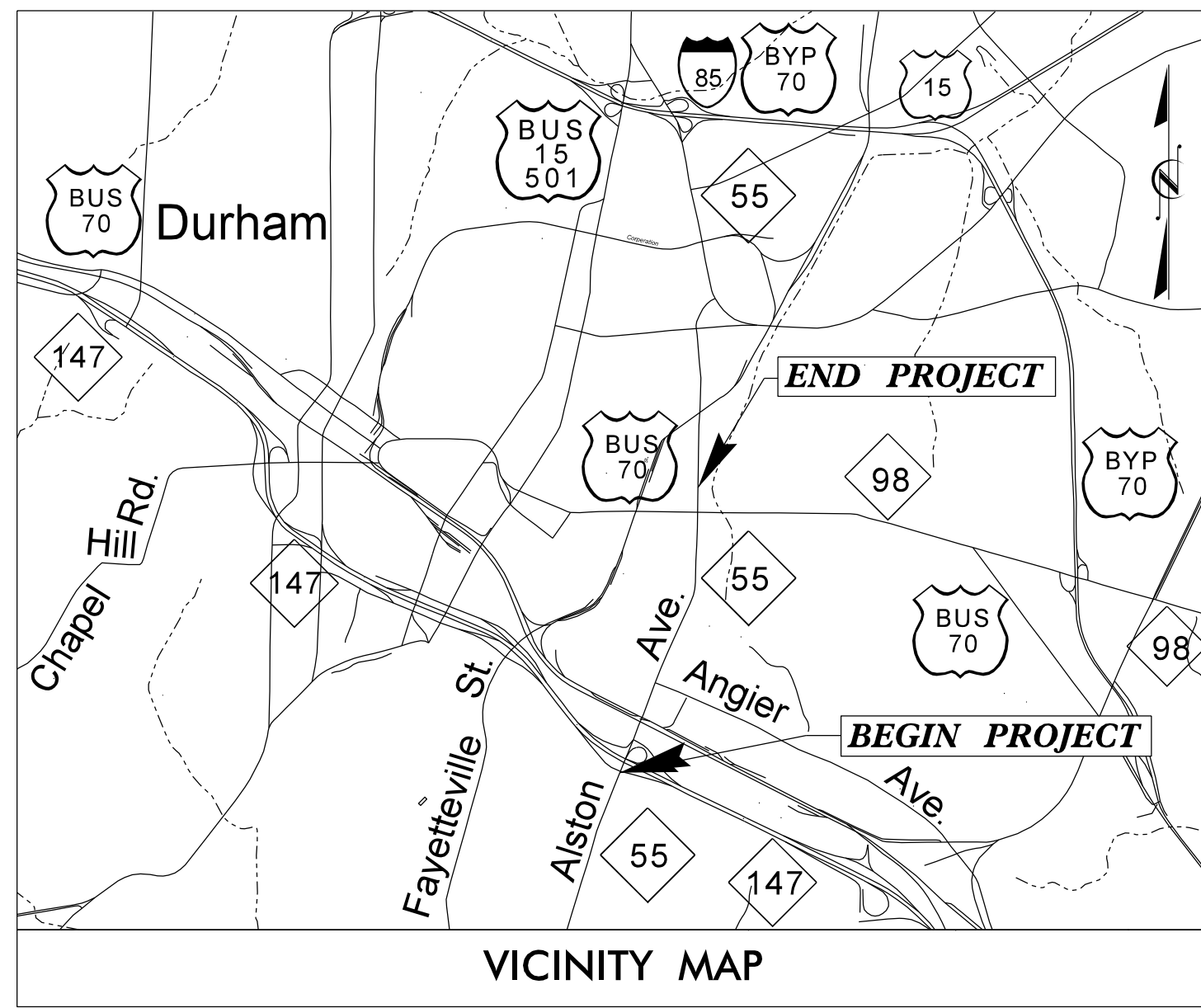
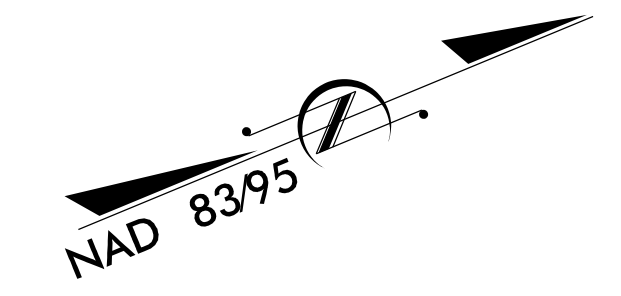


STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

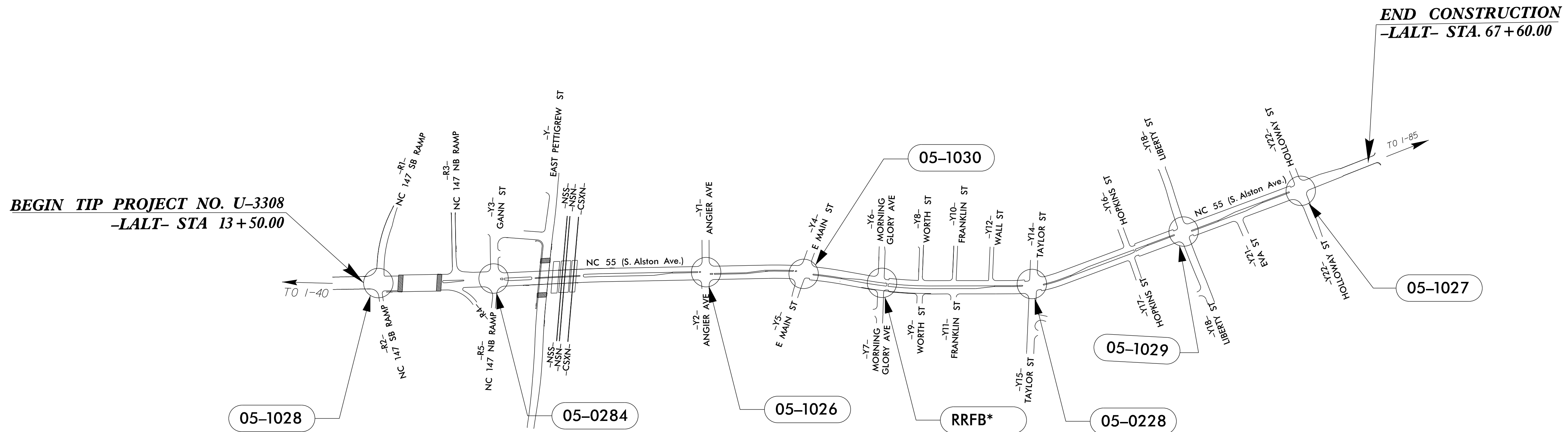
DURHAM COUNTY

LOCATION: NC 55 (ALSTON AVE.) FROM NC 147 (I.L. "BUCK" DEAN FREEWAY) TO NORTH OF US 70 BUSNC 98 (HOLLOWAY ST.)

TYPE OF WORK: TRAFFIC SIGNALS AND SIGNAL COMMUNICATIONS



VICINITY MAP



TIP PROJECT: U-3308

CONTRACT: C203567

INDEX OF PLANS

SHEET NUMBER	SIGNAL INV. NUMBER	LOCATION / DESCRIPTION
Sig.1.0	-	Title Sheet
Sig.2.0 - Sig.5.4	05-1028	NC 55 (South Alston Avenue) at NC 147 SB Ramps
Sig.6.0 - Sig.11.4	05-0284	NC 55 (South Alston Avenue) at NC 147 NB Ramp/Gann Street
Sig.12.0 - Sig.16.4	05-1026	NC 55 (South Alston Avenue) at SR 1926 (Angier Avenue)
Sig.17.0 - Sig.22.4	05-1030	NC 55 (South / North Alston Avenue) at E Main Street
Sig.23.0 - Sig.30.4	05-0228	NC 55 (North Alston Avenue) at Taylor Street
Sig.31.0 - Sig.39.4	05-1029	NC 55 (North Alston Avenue) at Liberty Street
Sig.40.0 - Sig.46.4	05-1027	NC 55 (North Alston Avenue) at NC 98 (Holloway Street)
MI - M9	-	Metal Pole Design Plans
PI - P3	-	Pedestrian Standards
SCP.1 - SCP.8	-	Communications Cable and Conduit/Wiring Plans
SCP.9 - SCP.18	-	Splice Details

***RRFB to be removed after project.**

PLANS PREPARED BY:

1025 Wade Avenue
Raleigh, NC 27605
Tel: 919-789-9977
Fax: 919-789-9591
License #: C-2197

JEFFREY HOCHANADEL, P.E. - PROJECT MANAGER
MATTHEW COPPLE, P.E. - PROJECT ENGINEER
CLIFTON LAWSON, E.J. - DESIGN ENGINEER

LEGEND

##-### SIGNAL INVENTORY NUMBER

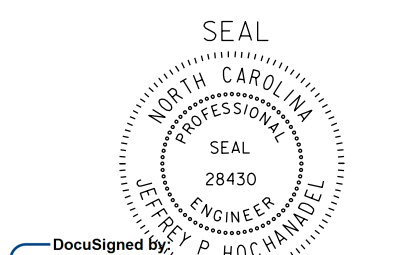
TRANSPORTATION PLANS PREPARED FOR:

MOBILITY AND SAFETY DIVISION / ITS & SIGNALS UNIT
ROBERT J. ZIEMBA, P.E. - CENTRAL REGION SIGNALS ENGINEER
GEORGE C. BROWN, P.E. - SIGNAL EQUIPMENT DESIGN ENGINEER
I. NEIL AVERY - SIGNAL COMMUNICATIONS PROJECT ENGINEER

Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012



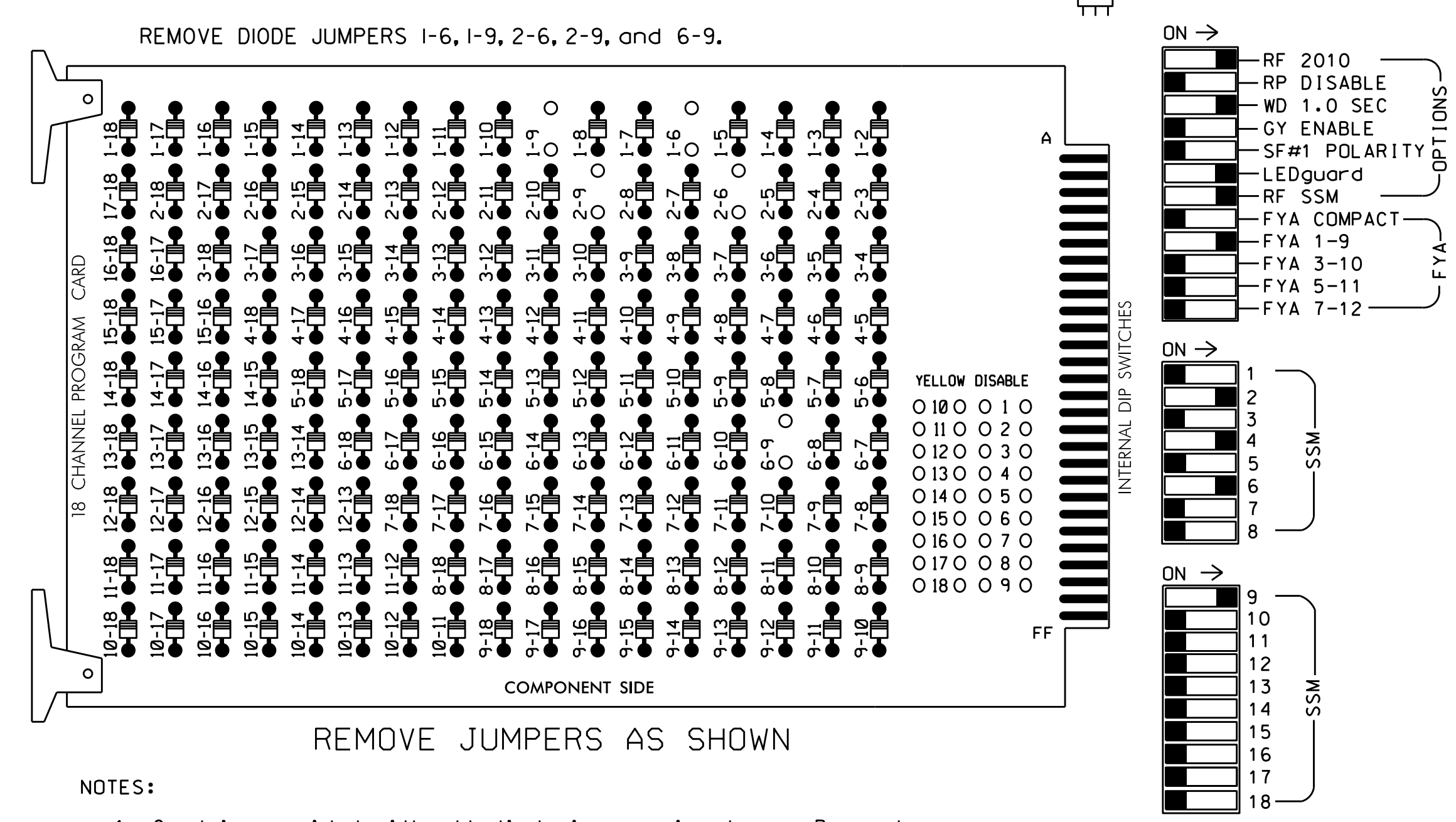
ALL DIMENSIONS IN THESE PLANS ARE IN FEET UNLESS OTHERWISE NOTED



DocuSigned by: I. NEIL AVERY, P. E. 5/13/2015

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.
 - 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. Verify that signal heads flash in accordance with the signal plans.
- Program controller to Start Up in phases 2 and 6 green.
- Set power-up flash time to 0 seconds within the controller programming. The conflict monitor will govern startup flash. Ensure STARTUP "RED START" is set to 0 seconds.
- Enable Simultaneous Gap-Out feature for all phases.
- Program all timing information into phase banks 1, 2, and 3 unless otherwise noted.
- Set phase bank 3 maximum limit to 250 seconds for phases used.
- Ensure start up flash phases are coordinated with flash program block assignments.
- Set the Red Revert interval on the controller to 1 second.
- This cabinet and controller are part of the Durham 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	OL1	OL2	SPARE	OL3	OL4	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																	

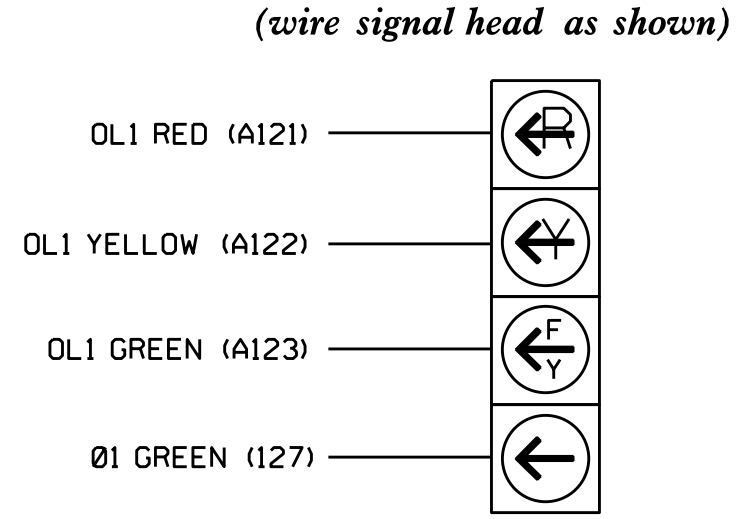
NU = Not Used
 * Denotes install load resistor. See load resistor installation detail this sheet.
 ★ See pictorial of head wiring in detail below.

EQUIPMENT INFORMATION

CONTROLLER.....2070E
 CABINET.....332 W/ AUX
 SOFTWARE.....McCAIN 2033
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX FILE
 LOAD SWITCHES USED.....S1,S2,S5,S8,AUX S1
 PHASES USED.....1,2,4,6
 OVERLAP 1.....*
 OVERLAP 2.....NOT USED
 OVERLAP 3.....NOT USED
 OVERLAP 4.....NOT USED

* See FYA PPLT Programming detail this sheet.

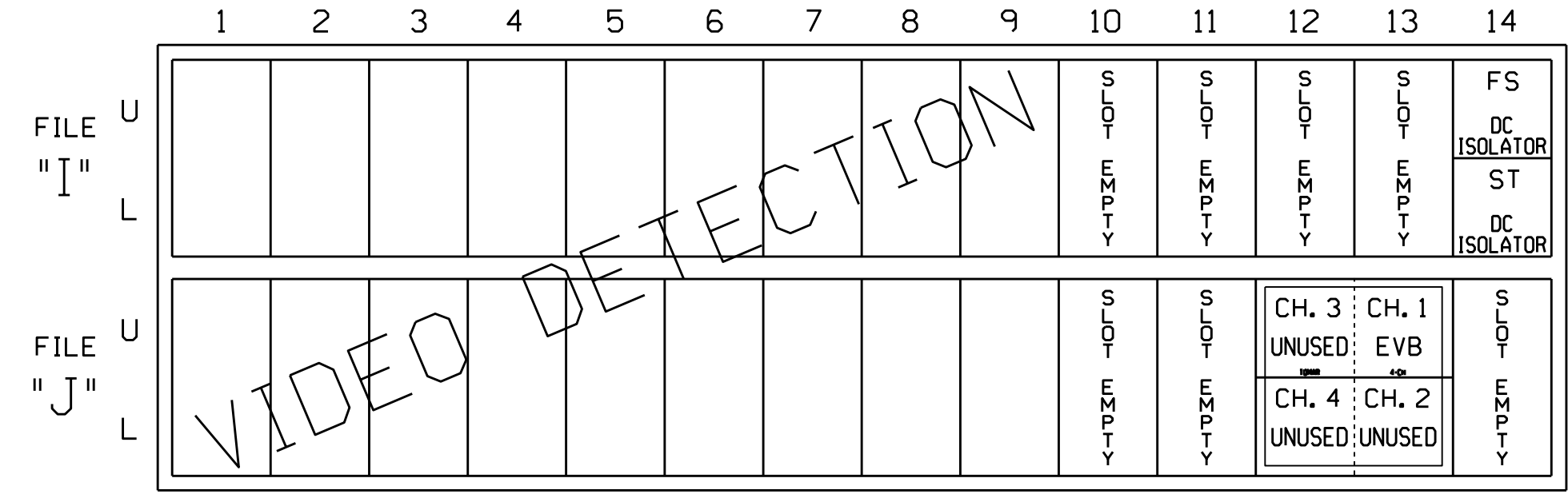
FYA SIGNAL WIRING DETAIL



11

INPUT FILE POSITION LAYOUT

(front view)



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

FS = FLASH SENSE
 ST = STOP TIME
 EVB = EMERGENCY VEHICLE PREEMPT

EMERGENCY VEHICLE PREEMPTION PROGRAMMING

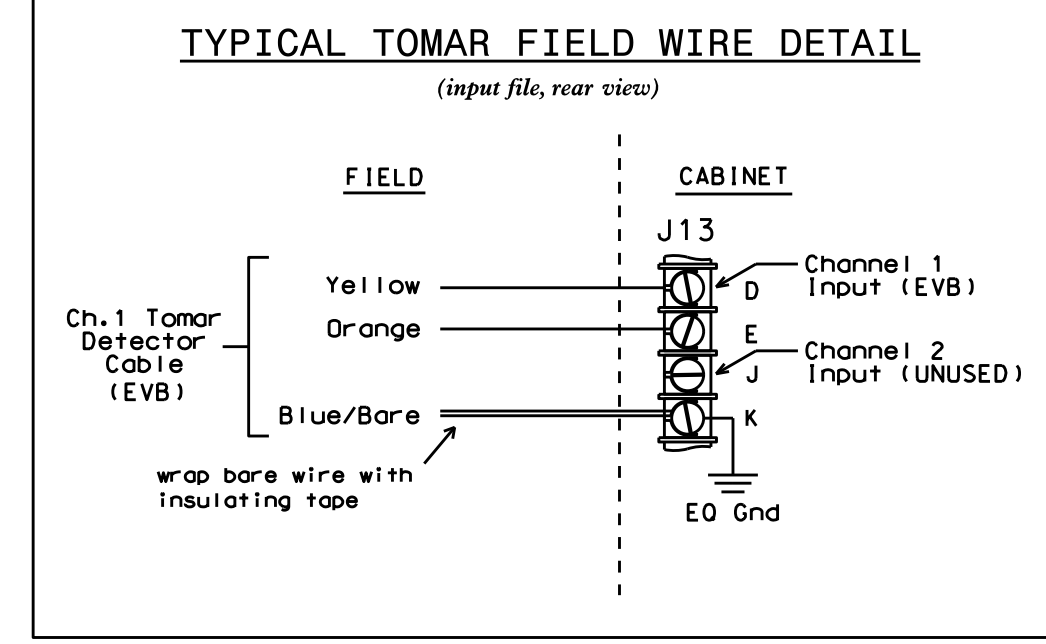
- Program EVB preempt as follows:
 Main Menu - 2) PREEMPT - 4) EMERGENCY VEHICLE
 EVB Clear = 2
 EVB Clearance Phases = 1,6
- Program general preemption parameters as follows:
 Main Menu - 2) PREEMPT - 6) MISC PREEMPTION PARAMETERS
 Min Time Before PE ForceOff = 1

Program extend time on optical detector unit for 2.0 sec for EVB.

SPECIAL DETECTOR NOTE

Install a video detection system for vehicle detection. Perform installation according to manufacturer's directions and NCDOT engineer approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.

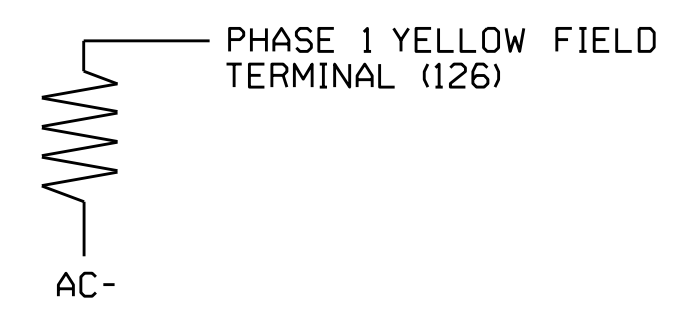
4 CHANNEL TOMAR OSP CARD
 INSERT CARD INTO SLOT J13



LOAD RESISTOR INSTALLATION DETAIL

(install resistor as shown below)

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



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-1028T1/T3
 DESIGNED: September 2014
 SEALED: 4/2/15
 REVISED: N/A

Electrical Detail - Temporary Design 1 (TMP Phase 1, Steps 1-10)
 Electrical Detail - Temporary Design 3 (TMP Phase 1, Steps 11-21)

Electrical and Programming Details for: **NC 55 (South Alston Avenue) at NC 147 SB Ramps**

Prepared in the Offices of: **Transportation Mobility and Safety Solutions**

Division 5 Durham County
 PLAN DATE: November 2014 REVIEWED BY: *JTR*
 PREPARED BY: S. Armstrong REVIEWED BY: *JTR*

750 N. Greenfield Pkwy, Garner, NC 27529

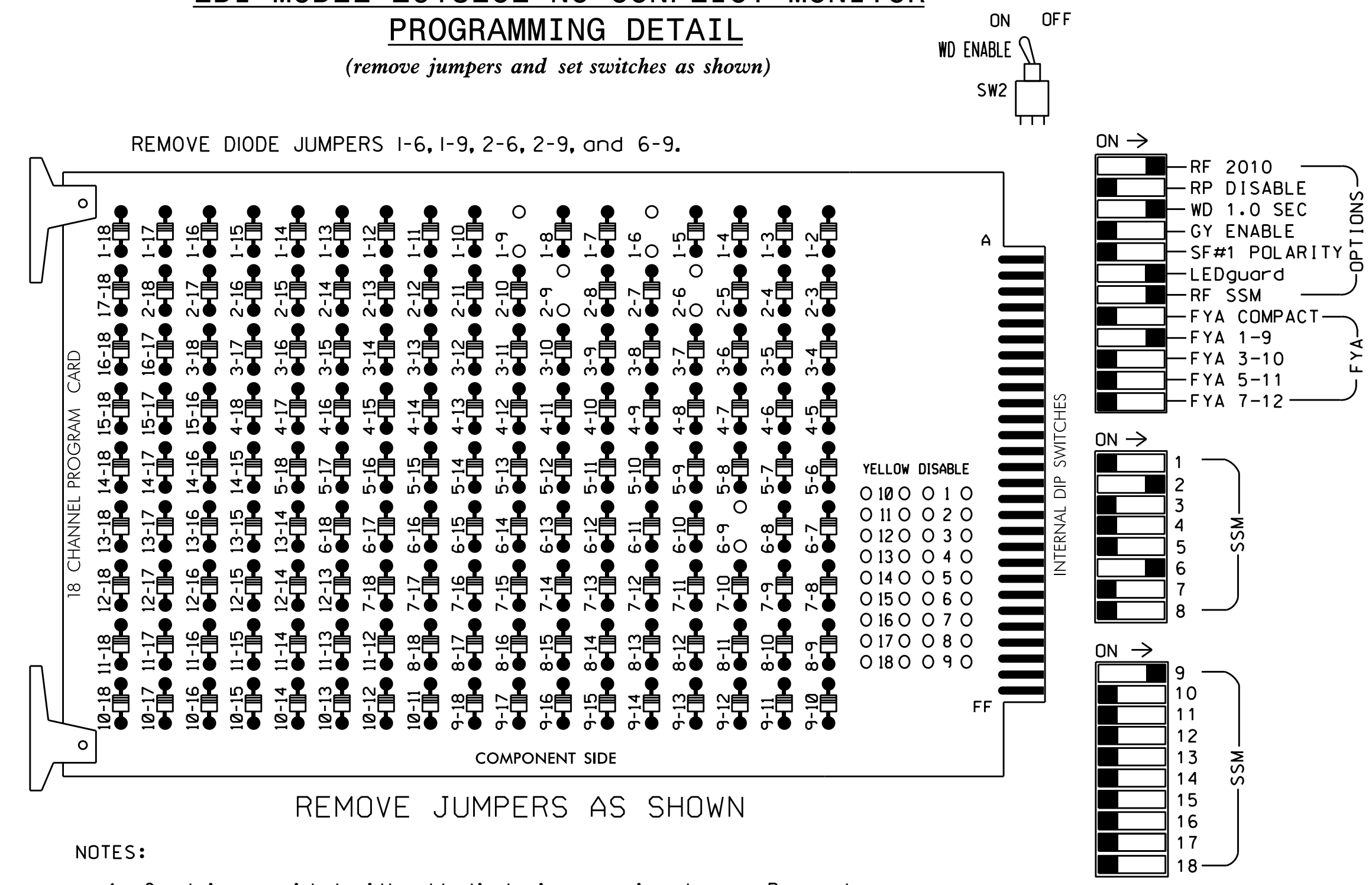
SEAL: **JOHN T. ROWE, JR.** ENGINEER
 SEAL 008453

DocuSigned by: **John T. Rowe, Jr.** 4/2/2015

SIG. INVENTORY NO. 05-1028T1/T3

27-0456-2014 08-27
 S:\MITS\15\SIGNAL\work\hous\51028_sml.e\cxxx.dgn
 sarmstrong

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. Verify that signal heads flash in accordance with the signal plans.
- Program controller to Start Up in phases 2 and 6 green.
- Set power-up flash time to 0 seconds within the controller programming. The conflict monitor will govern startup flash. Ensure STARTUP "RED START" is set to 0 seconds.
- Enable Simultaneous Gap-Out feature for all phases.
- Program all timing information into phase banks 1, 2, and 3 unless otherwise noted.
- Set phase bank 3 maximum limit to 250 seconds for phases used.
- Ensure start up flash phases are coordinated with flash program block assignments.
- Set the Red Revert interval on the controller to 1 second.
- This cabinet and controller are part of the Durham 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	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	11	21,22	NU	NU	NU	NU	NU	61,62	NU	NU	NU	NU	11	NU	NU	NU	NU	NU
RED		128						134										
YELLOW	*	129						135										
GREEN		130						136										
RED ARROW													A121					
YELLOW ARROW													A122					
FLASHING YELLOW ARROW													A123					
GREEN ARROW	127																	

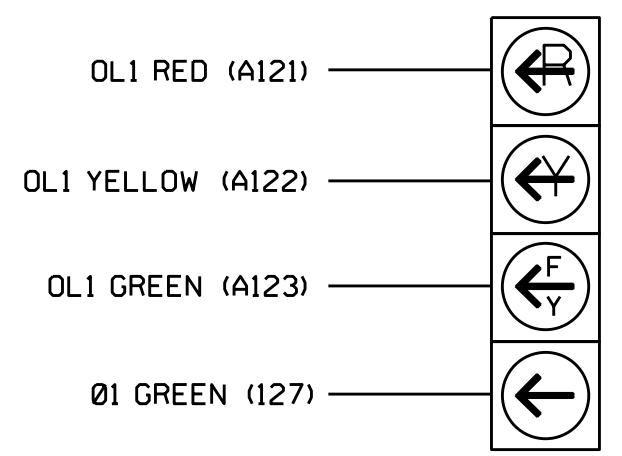
NU = Not Used
* Denotes install load resistor. See load resistor installation detail this sheet.
★ See pictorial of head wiring in detail below.

EQUIPMENT INFORMATION

CONTROLLER.....2070E
CABINET.....332 W/ AUX
SOFTWARE.....McCAIN 2033
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 WITH AUX FILE
LOAD SWITCHES USED.....S1,S2,S8,AUX S1
PHASES USED.....1,2,6
OVERLAP 1.....*
OVERLAP 2.....NOT USED
OVERLAP 3.....NOT USED
OVERLAP 4.....NOT USED

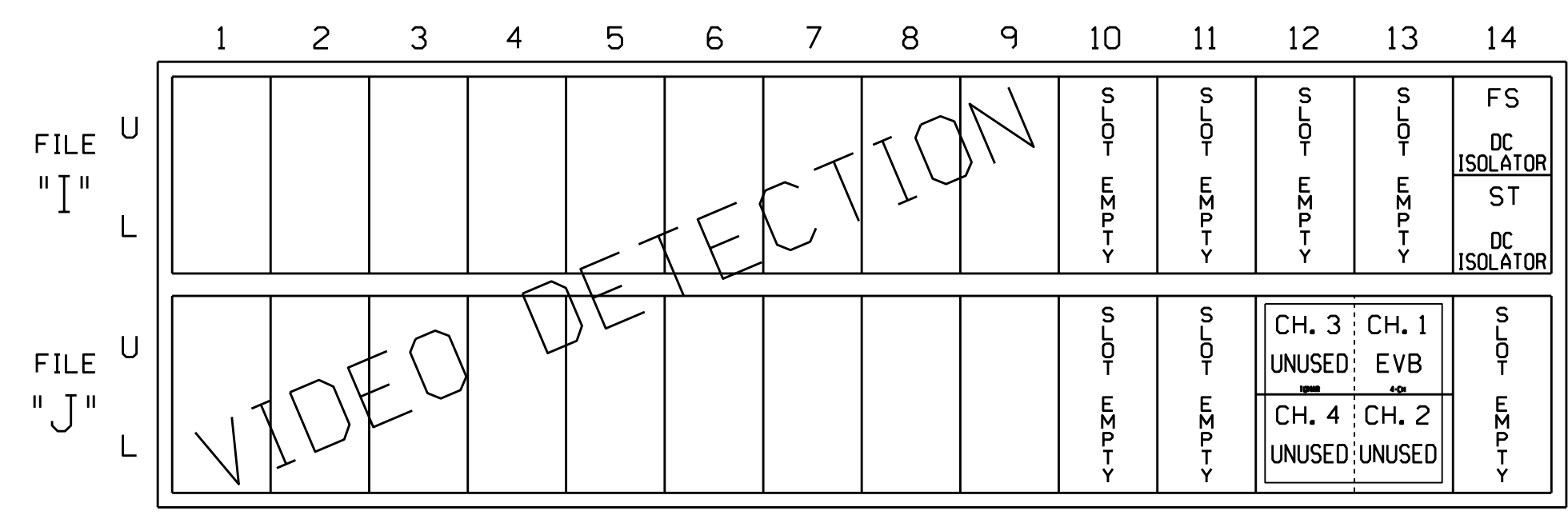
* See FYA PPLT Programming detail this sheet.

FYA SIGNAL WIRING DETAIL
(wire signal head as shown)



11

INPUT FILE POSITION LAYOUT
(front view)



EMERGENCY VEHICLE PREEMPTION PROGRAMMING

- Program EVB preempt as follows:
Main Menu - 2) PREEMPT - 4) EMERGENCY VEHICLE
EVB Clear = 2
EVB Clearance Phases = 1,6
- Program general preemption parameters as follows:
Main Menu - 2) PREEMPT - 6) MISC PREEMPTION PARAMETERS
Min Time Before PE ForceOff = 1

Program extend time on optical detector unit for 2.0 sec for EVB.

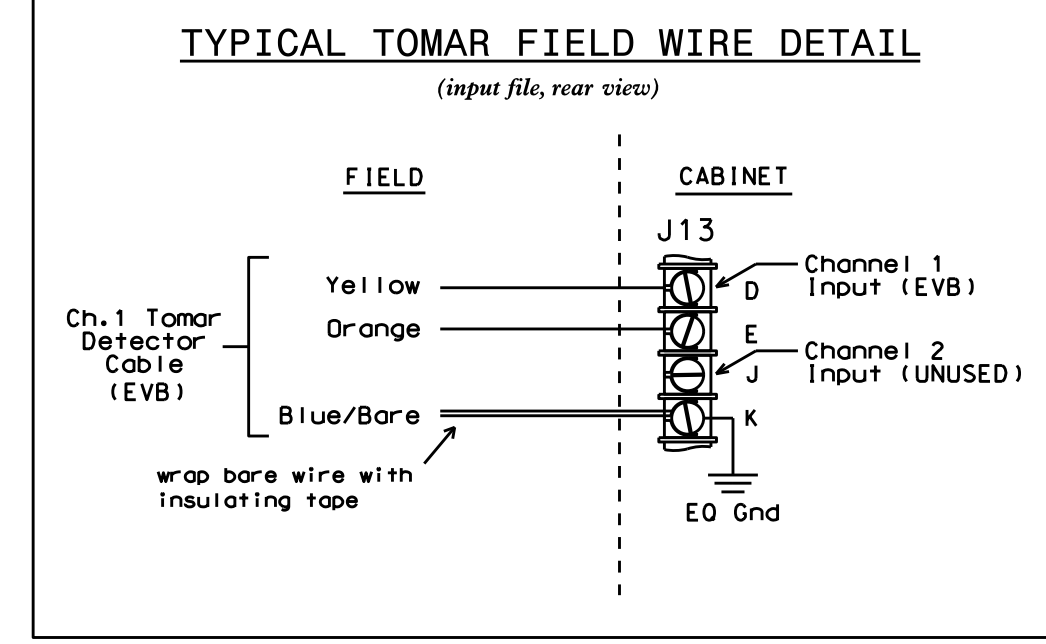
FYA PPLT PROGRAMMING

- Program Flashing Yellow Arrow phases as follows:
Main Menu - 1) PHASE - 2) PHASE FUNCTIONS PAGE TWO
PPLT FYA = PHASE 1
- Assign output pin for Flashing Yellow Arrow as follows:
Main Menu - 6) OUTPUTS - F) FYA PPLT
Phase 1 = 99
- Redirect RED and YELLOW outputs for the left turn phases as follows:
Main Menu - 6) OUTPUTS - 8) REDIRECT PHASE
Phase 1 RED = 97, Phase 1 YELLOW = 98

SPECIAL DETECTOR NOTE

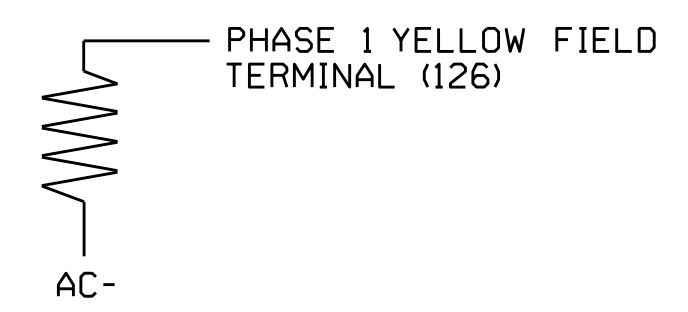
Install a video detection system for vehicle detection. Perform installation according to manufacturer's directions and NCDOT engineer approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.

4 CHANNEL TOMAR OSP CARD
INSERT CARD INTO SLOT J13



LOAD RESISTOR INSTALLATION DETAIL
(install resistor as shown below)

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



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-1028T2
DESIGNED: March 2015
SEALED: 4/2/15
REVISED: N/A

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

Electrical and Programming Details for: **NC 55 (South Alston Avenue) at NC 147 SB Ramps**

Prepared in the Offices of: **TRANSPO-MOBILITY AND SAFETY CONSULTANTS**

750 N. Greenfield Pkwy, Garner, NC 27529

Division 5 Durham County

PLAN DATE: March 2015 REVIEWED BY: JTR

PREPARED BY: S. Armstrong REVIEWED BY:

SEAL: JOHN T. ROWE, JR. ENGINEER

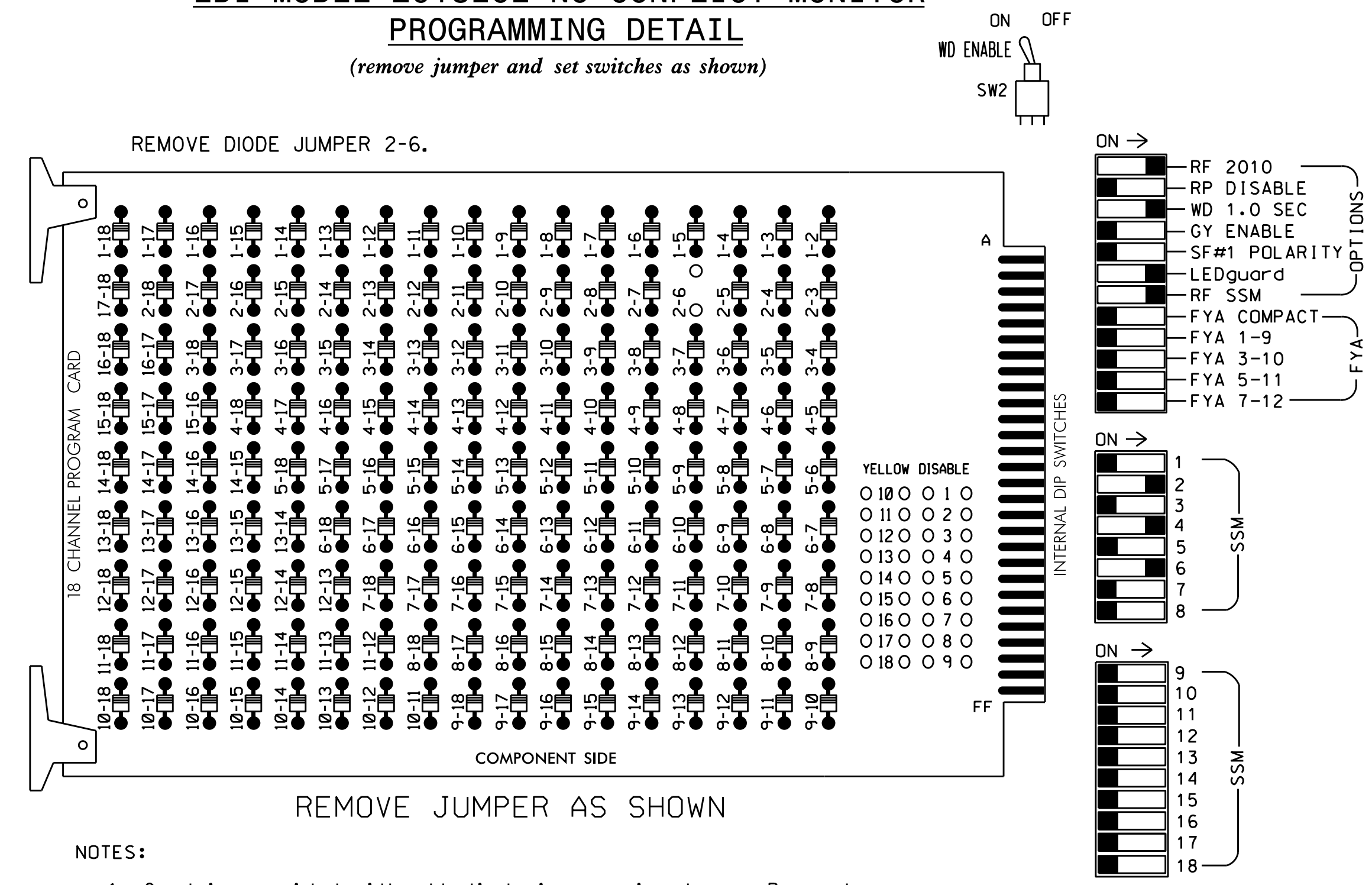
DocuSigned by: John T. Rowe, Jr. 4/2/2015

SIG. INVENTORY NO. 05-1028T2

27-MAR-2015 08:28 S:\MITS\15-Signal\work\hous\51028_sml.e\c_xxx.dgn somstron

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 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. 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. Verify that signal heads flash in accordance with the signal plans.
2. Program controller to Start Up in phases 2 and 6 green.
3. Set power-up flash time to 0 seconds within the controller programming. The conflict monitor will govern startup flash. Ensure STARTUP "RED START" is set to 0 seconds.
4. Enable Simultaneous Gap-Out feature for all phases.
5. Program all timing information into phase banks 1, 2, and 3 unless otherwise noted.
6. Set phase bank 3 maximum limit to 250 seconds for phases used.
7. Ensure start up flash phases are coordinated with flash program block assignments.
8. Set the Red Revert interval on the controller to 1 second.
9. This cabinet and controller are part of the Durham 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	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	NU	21,22	NU	NU	41,42	NU	NU	61,62	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU
RED		128			101			134										
YELLOW		129			102			135										
GREEN		130			103			136										
RED ARROW																		
YELLOW ARROW																		
FLASHING YELLOW ARROW																		
GREEN ARROW																		

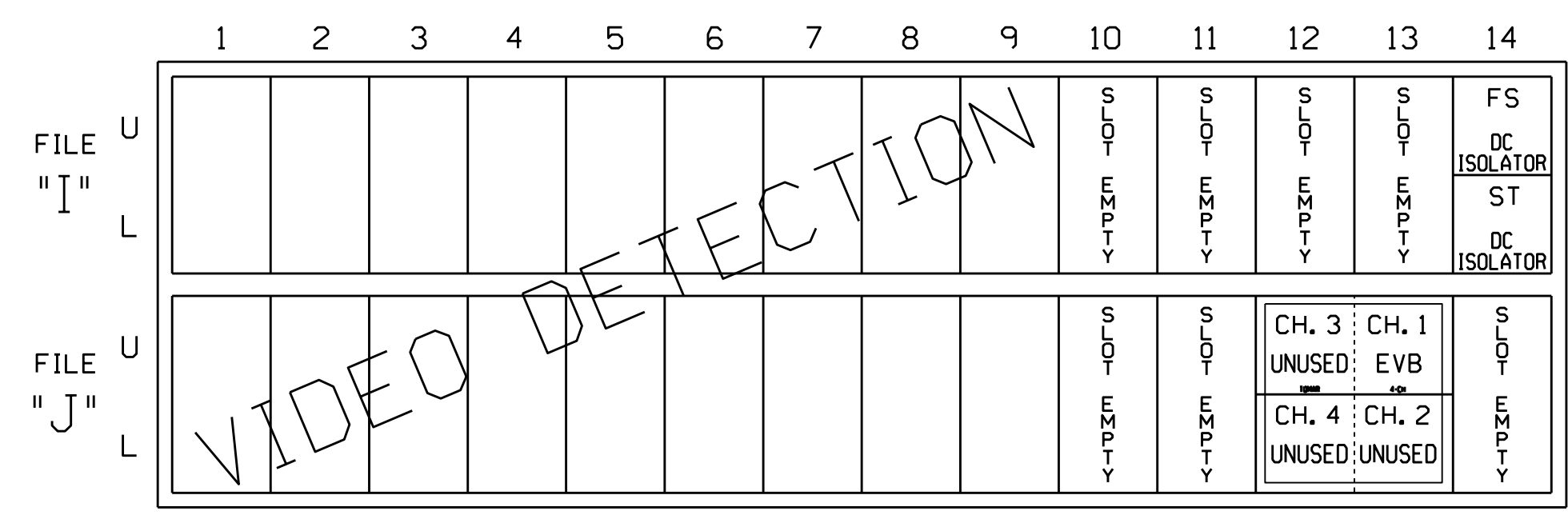
NU = Not Used

EQUIPMENT INFORMATION

CONTROLLER.....2070E
 CABINET.....332 W/ AUX
 SOFTWARE.....McCAIN 2033
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX FILE
 LOAD SWITCHES USED.....S2,S5,S8
 PHASES USED.....2,4,6
 OVERLAP 1.....NOT USED
 OVERLAP 2.....NOT USED
 OVERLAP 3.....NOT USED
 OVERLAP 4.....NOT USED

INPUT FILE POSITION LAYOUT

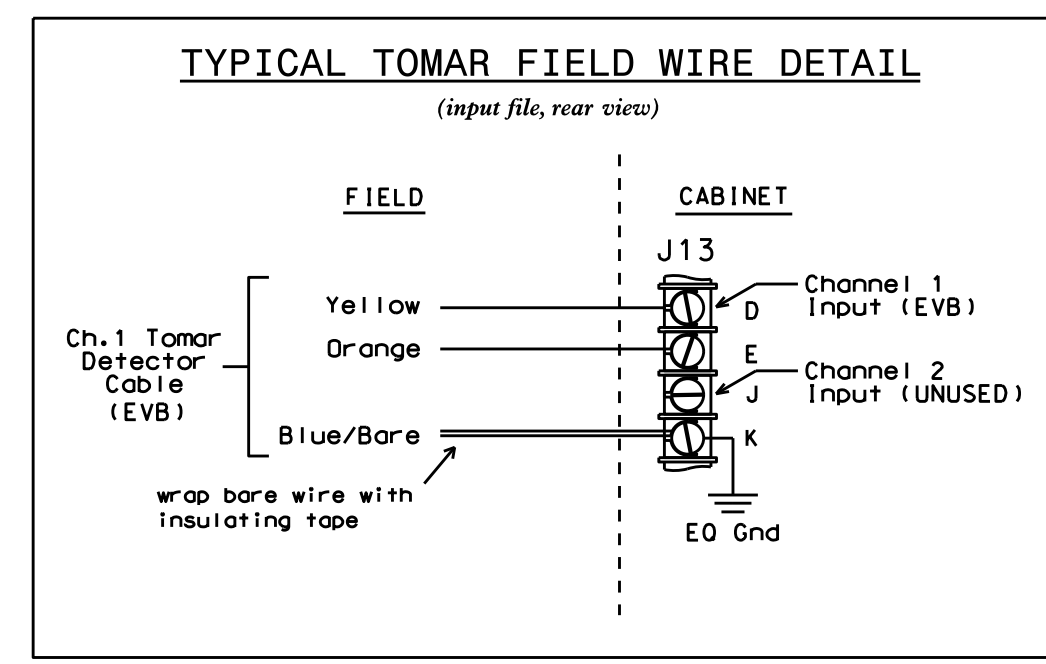
(front view)



SPECIAL DETECTOR NOTE

Install a video detection system for vehicle detection. Perform installation according to manufacturer's directions and NCDOT engineer approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.

4 CHANNEL TOMAR OSP CARD
 INSERT CARD INTO SLOT J13



EMERGENCY VEHICLE PREEMPTION PROGRAMMING

1. Program EVB preempt as follows:
 Main Menu - 2) PREEMPT - 4) EMERGENCY VEHICLE
 EVB Clear = 2
 EVB Clearance Phases = 6
2. Program general preemption parameters as follows:
 Main Menu - 2) PREEMPT - 6) MISC PREEMPTION PARAMETERS
 Min Time Before PE ForceOff = 1

Program extend time on optical detector unit for 2.0 sec for EVB.

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-1028T4
 DESIGNED: September 2014
 SEALED: 4/2/15
 REVISED: N/A

Electrical Detail - Temporary Design 4 (TMP Phase 2, Steps 1-6)

Electrical and Programming Details for: **NC 55 (South Alston Avenue) at NC 147 SB Ramps**

Prepared in the Offices of: **Transportation Mobility and Safety Solutions**

750 N. Greenfield Pkwy, Garner, NC 27529

Division 5 Durham County, Durham

PLAN DATE: November 2014 REVIEWED BY: [Signature]

PREPARED BY: S. Armstrong REVIEWED BY: [Signature]

SEAL: JOHN T. ROWE, JR., ENGINEER, SEAL 008453

DocuSigned by: John T. Rowe, Jr. 4/2/2015

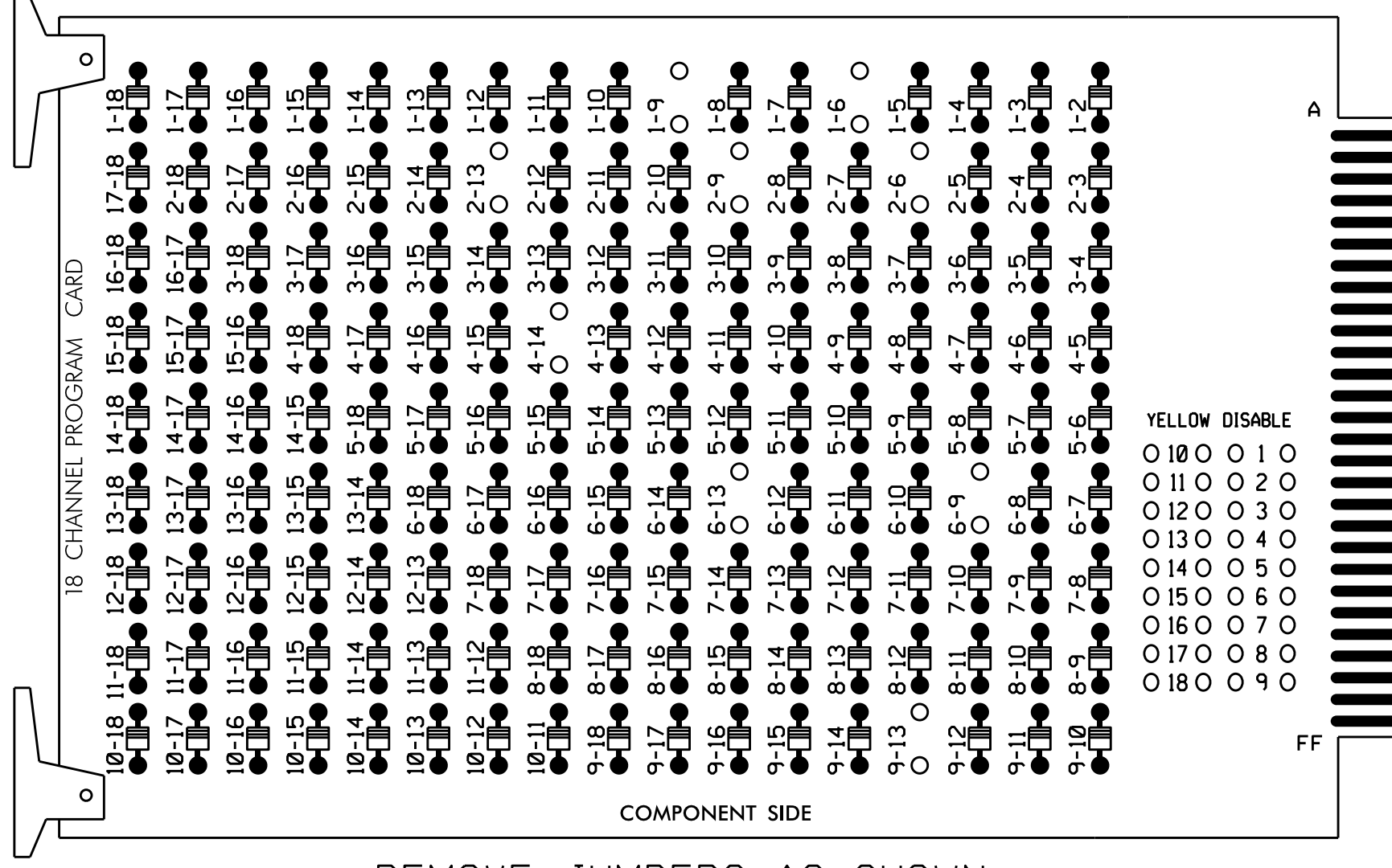
SIG. INVENTORY NO. 05-1028T4

27-1028-2014-08-29
 S:\MITS\15\SIGNAL\work\hgc\051028_sml.elec.xxx.dgn
 somstrong

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

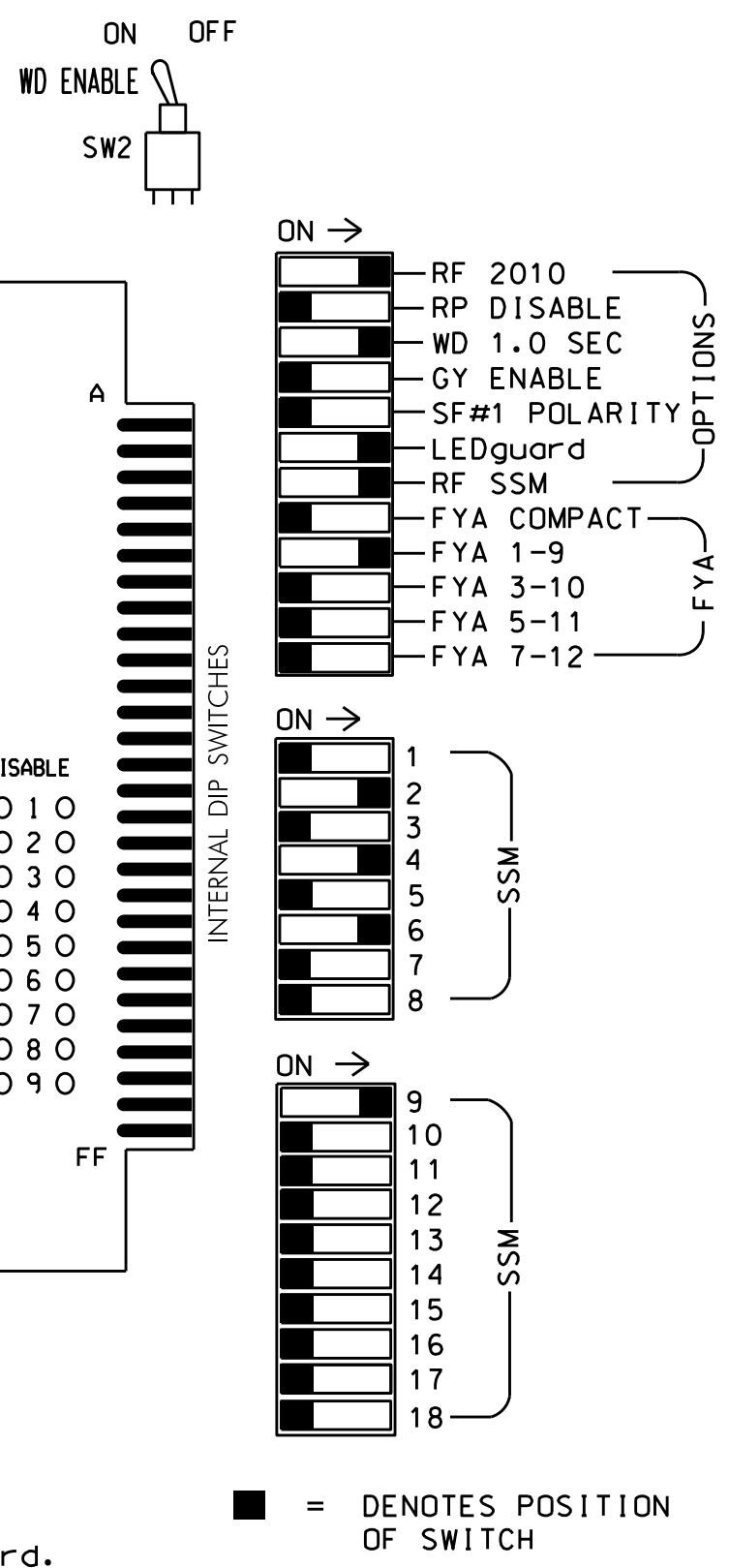
REMOVE DIODE JUMPERS 1-6, 1-9, 2-6, 2-9, 2-13, 4-14, 6-9, 6-13, and 9-13.



REMOVE JUMPERS AS SHOWN

NOTES:

- Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
- Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
- Ensure that Red Enable is active at all times during normal operation.
- 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. Verify that signal heads flash in accordance with the signal plans.
- Program controller to Start Up in phases 2 and 6 green.
- Set power-up flash time to 0 seconds within the controller programming. The conflict monitor will govern startup flash. Ensure STARTUP "RED START" is set to 0 seconds.
- Enable Simultaneous Gap-Out feature for all phases.
- Program all timing information into phase banks 1, 2, and 3 unless otherwise noted.
- Set phase bank 3 maximum limit to 250 seconds for phases used.
- Ensure start up flash phases are coordinated with flash program block assignments.
- Program Startup Ped Calls for phases 2 and 4.
- Set the Red Revert interval on the controller to 1 second.
- This cabinet and controller are part of the Durham Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070E
 CABINET.....332 W/ AUX
 SOFTWARE.....McCain 2033
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX FILE
 LOAD SWITCHES USED.....S1,S2,S3,S5,S6,S8,AUX S1
 PHASES USED.....1,2,2PED,4,4PED,6
 OVERLAP 1.....*
 OVERLAP 2.....NOT USED
 OVERLAP 3.....NOT USED
 OVERLAP 4.....NOT USED

* See FYA PPLT Programming detail on sheet 2.

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	11	21,22	P21, P22	NU	41,42	P41, P42	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																	
Hand icon			113			104												
Person icon			115			106												

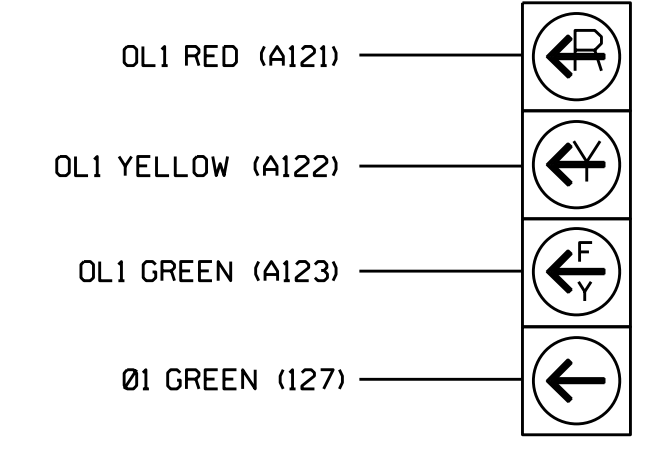
NU = Not Used

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

* See pictorial of head wiring in detail below.

FYA SIGNAL WIRING DETAIL

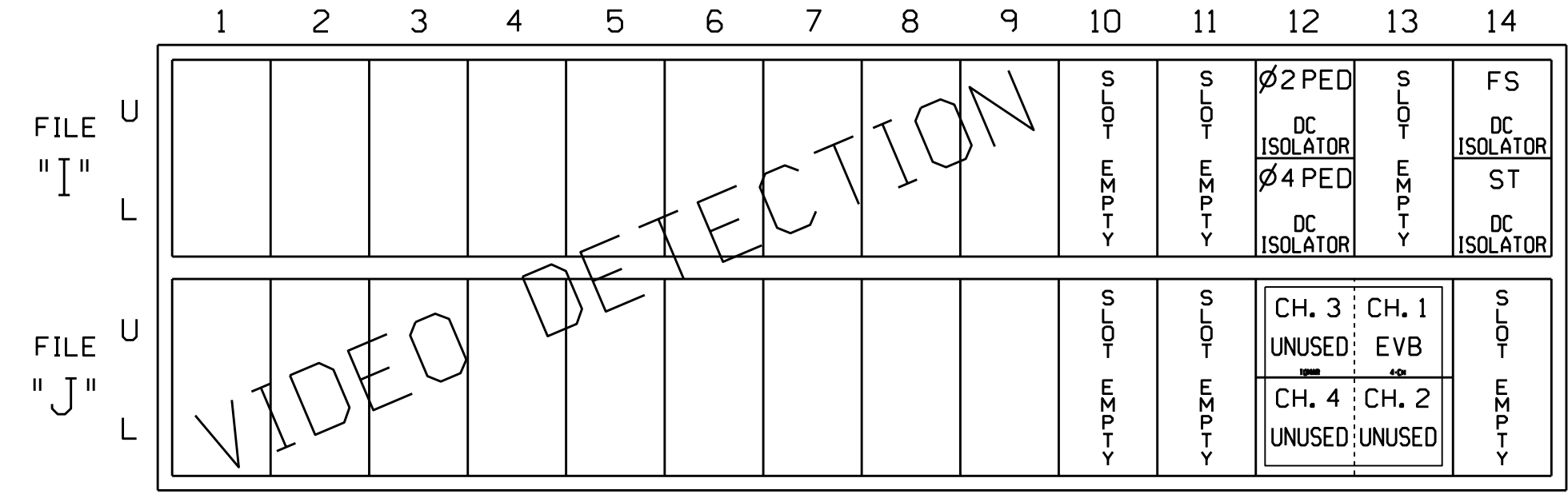
(wire signal head as shown)



11

INPUT FILE POSITION LAYOUT

(front view)



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

FS = FLASH SENSE
 ST = STOP TIME
 EVB = EMERGENCY VEHICLE PREEMPT

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	DETECTOR NO.	PIN NO.	ATTRIBUTES	NEMA PHASE
PED PUSH BUTTONS						
P21,P22	T88-4,6	I12U	25	67	2	2 PED
P41,P42	T88-5,6	I12L	27	69	2	4 PED

NOTE: INSTALL DC ISOLATOR IN INPUT FILE SLOT 112.

NOTE: PROGRAM DETECTOR DELAY AND CARRYOVER TIMES AS SPECIFIED ON SIGNAL DESIGN PLANS.

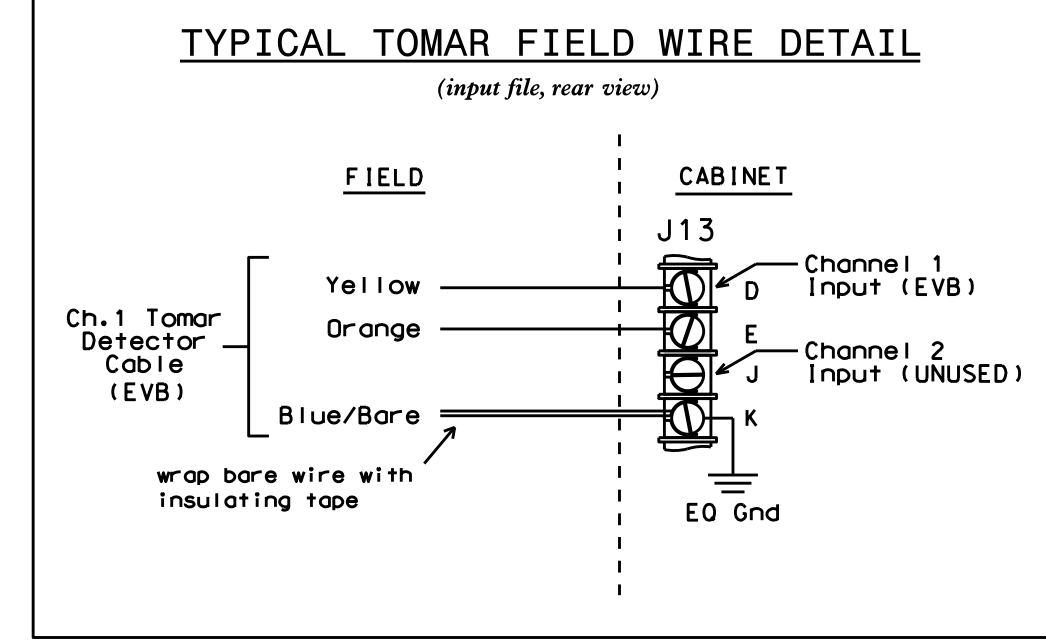
DETECTOR ATTRIBUTES LEGEND: INPUT FILE POSITION LEGEND: J2L

- 1-FULL TIME DELAY
 2-PED CALL
 3-RESERVED
 4-COUNTING
 5-EXTENSION
 6-TYPE 3
 7-CALLING
 8-ALTERNATE
- FILE J
 SLOT 2
 LOWER

SPECIAL DETECTOR NOTE

Install a video detection system for vehicle detection. Perform installation according to manufacturer's directions and NCDOT engineer approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.

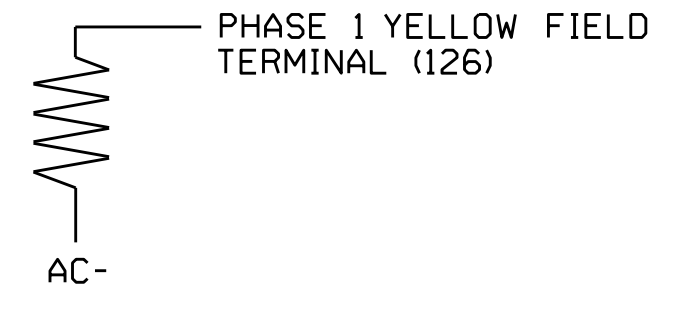
4 CHANNEL TOMAR OSP CARD
 INSERT CARD INTO SLOT J13



LOAD RESISTOR INSTALLATION DETAIL

(install resistor as shown below)

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



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-1028T5
 DESIGNED: September 2014
 SEALED: 4/2/15
 REVISED: N/A

Electrical Detail - Temporary Design 5 (TMP Phase 3) - Sheet 1 of 2

ELECTRICAL AND PROGRAMMING DETAILS FOR: Prepared In the Offices of: 750 N. Greenfield Pkwy, Garner, NC 27529	NC 55 (South Alston Avenue) at NC 147 SB Ramps		SEAL SEAL 008453 JOHN T. ROWE, JR. ENGINEER
	Division 5 PLAN DATE: November 2014 PREPARED BY: S. Armstrong	Durham County REVIEWED BY: JTR REVIEWED BY:	
REVISIONS			INIT. DATE

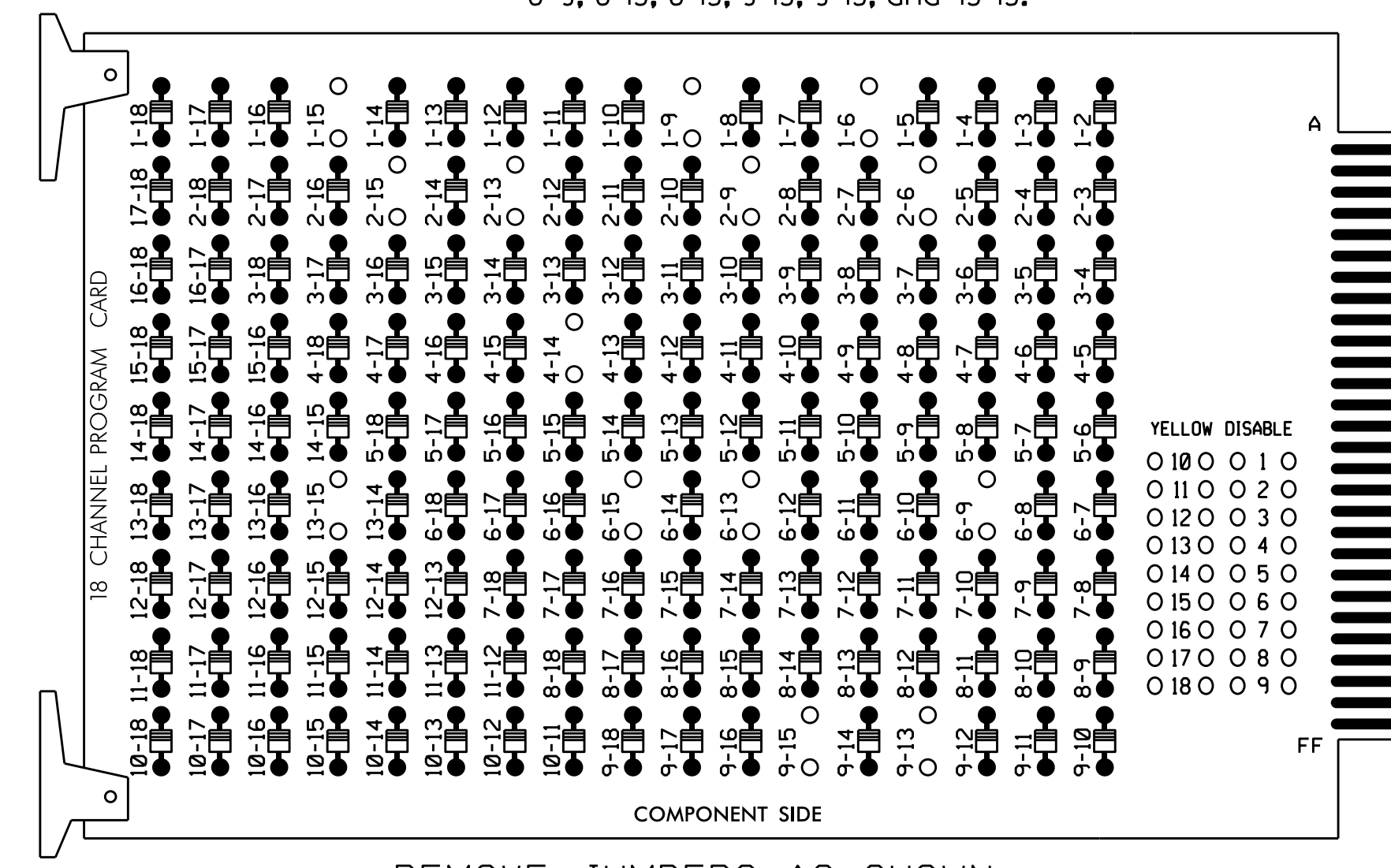
27-MAR-2015 08:59
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 somstr003

EDI MODEL 2018ECL-NC CONFLICT MONITOR

PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

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

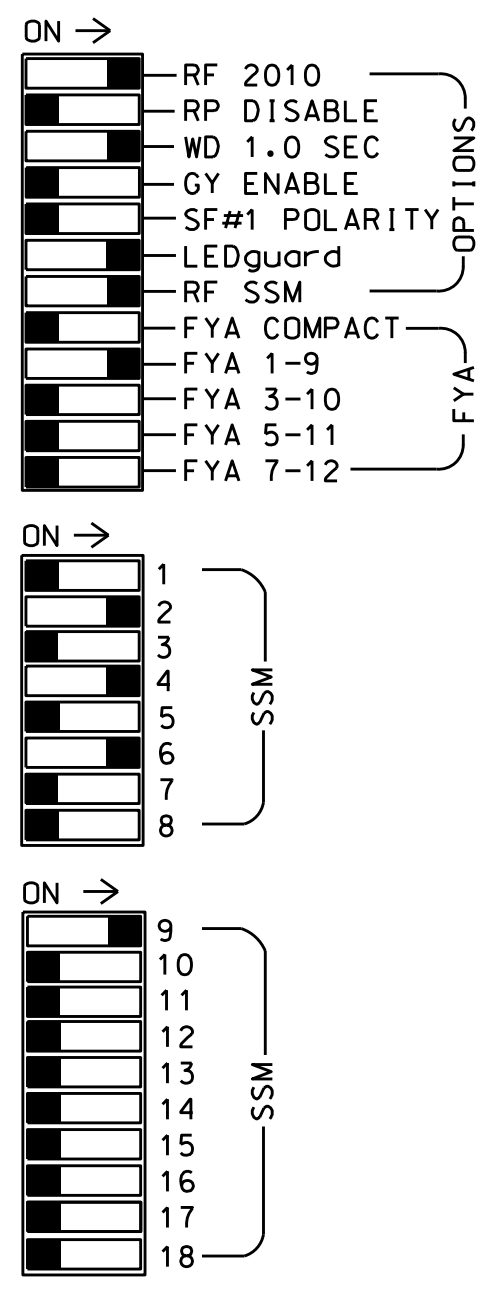
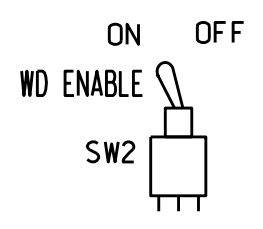


REMOVE JUMPERS AS SHOWN

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. 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. Verify that signal heads flash in accordance with the signal plans.
2. Program controller to Start Up in phases 2 and 6 green.
3. Set power-up flash time to 0 seconds within the controller programming. The conflict monitor will govern startup flash. Ensure STARTUP "RED START" is set to 0 seconds.
4. Enable Simultaneous Gap-Out feature for all phases.
5. Program all timing information into phase banks 1, 2, and 3 unless otherwise noted.
6. Set phase bank 3 maximum limit to 250 seconds for phases used.
7. Ensure start up flash phases are coordinated with flash program block assignments.
8. Program Startup Ped Calls for phases 2, 4, and 6.
9. Set the Red Revert interval on the controller to 1 second.
10. This cabinet and controller are part of the Durham Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070E
 CABINET.....332 W/ AUX
 SOFTWARE.....McCain 2033
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX FILE
 LOAD SWITCHES USED.....S1,S2,S3,S5,S6,S8,S9,AUX S1
 PHASES USED.....1,2,2PED,4,4PED,6,6PED
 OVERLAP 1.....*
 OVERLAP 2.....NOT USED
 OVERLAP 3.....NOT USED
 OVERLAP 4.....NOT USED

* See FYA PPLT Programming detail on sheet 2.

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	11	21,22	P21, P22	NU	41	42	P41, P42	NU	61,62	P61, P62	NU	NU	11	NU	NU	NU	NU	NU
RED		128			101	101			134									
YELLOW	*	129			102	102			135									
GREEN		130			103	103			136									
RED ARROW													A121					
YELLOW ARROW													A122					
FLASHING YELLOW ARROW													A123					
GREEN ARROW	127					103												
Hand				113				104				119						
Foot								106										

NU = Not Used

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

* See pictorial of head wiring in detail below.

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	∅ 4	∅ 5	∅ 6	∅ 7	∅ 8	∅ 9	∅ 10	∅ 11	∅ 12	∅ 13	∅ 14
L	1A	2A	∅ 3	∅ 4	∅ 5	4A	4C	∅ 8	∅ 9	∅ 10	∅ 11	∅ 12	∅ 13	∅ 14
U	NOT USED	∅ 2	∅ 3	∅ 4	∅ 5	4B	NOT USED	∅ 8	∅ 9	∅ 10	∅ 11	∅ 12	∅ 13	∅ 14
L	2B	∅ 3	∅ 4	∅ 5	∅ 6	∅ 7	∅ 8	∅ 9	∅ 10	∅ 11	∅ 12	∅ 13	∅ 14	∅ 15

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

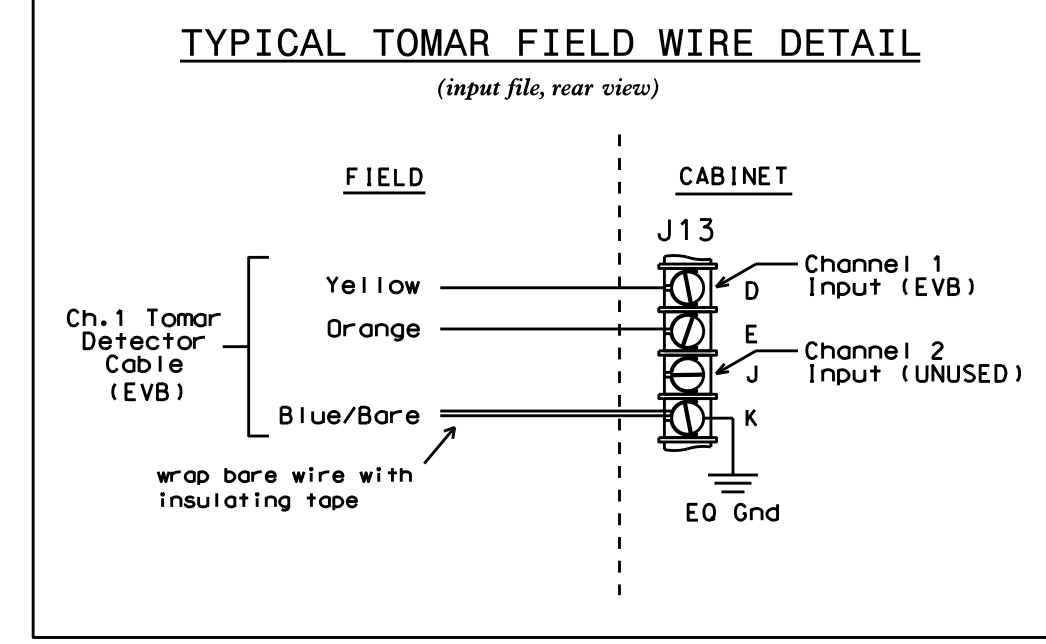
FS = FLASH SENSE
 ST = STOP TIME
 EVB = EMERGENCY VEHICLE PREEMPT

SPECIAL DETECTOR NOTE

Install a video detection system for vehicle detection for zones 6A and 6B.

Perform installation according to manufacturer's directions and NCDOT engineer approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.

4 CHANNEL TOMAR OSP CARD
 INSERT CARD INTO SLOT J13



INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	DETECTOR NO.	PIN NO.	ATTRIBUTES	NEMA PHASE
1A	TB2-1,2	I1U	14	56	5 7	1
2A	TB2-5,6	I2U	10	56	5 7	6
2B	TB2-7,8	I2L	1	39	5 7	2
4A	TB4-9,10	I6U	5	43	5 7	2
4B	TB4-11,12	I6L	3	41	5 7	4
4C	TB6-1,2	I7U	7	45	5 7	4
* 6A	-	-	23	65	5 7	4
* 6B	-	-	-	-	5 7	6
PED PUSH BUTTONS						
P21,P22	TB8-4,6	I12U				
P41,P42	TB8-5,6	I12L	25	67	2	2 PED
P61,P62	TB8-7,9	I13U	27	69	2	4 PED
			26	68	2	6 PED

* VIDEO DETECTION ZONE. SEE SPECIAL DETECTOR NOTE THIS PAGE.

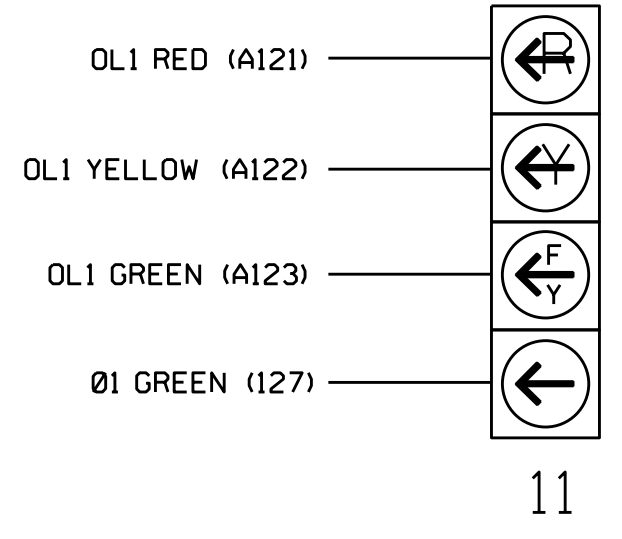
NOTE: PROGRAM DETECTOR DELAY AND CARRYOVER TIMES AS SPECIFIED ON SIGNAL DESIGN PLANS.

- DETECTOR ATTRIBUTES LEGEND: 1-FULL TIME DELAY, 2-PED CALL, 3-RESERVED, 4-COUNTING, 5-EXTENSION, 6-TYPE 3, 7-CALLING, 8-ALTERNATE
- INPUT FILE POSITION LEGEND: J2L, FILE J, SLOT 2, LOWER

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-1028
 DESIGNED: September 2014
 SEALED: 4/2/15
 REVISED: N/A

FYA SIGNAL WIRING DETAIL

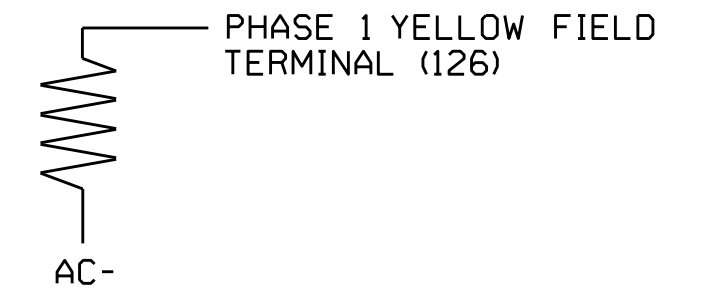
(wire signal head as shown)



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 - Final Design - Sheet 1 of 2

Electrical and Programming Details for: NC 55 (South Alston Avenue) at NC 147 SB Ramps

Prepared In the Offices of: TRANSPORTATION MOBILITY AND SAFETY DIVISION, NORTH CAROLINA DEPARTMENT OF TRANSPORTATION, Signal Management Section

750 N. Greenfield Pkwy, Garner, NC 27529

Division 5 Durham County, Durham

PLAN DATE: November 2014 REVIEWED BY: JTR

PREPARED BY: S. Armstrong REVIEWED BY:

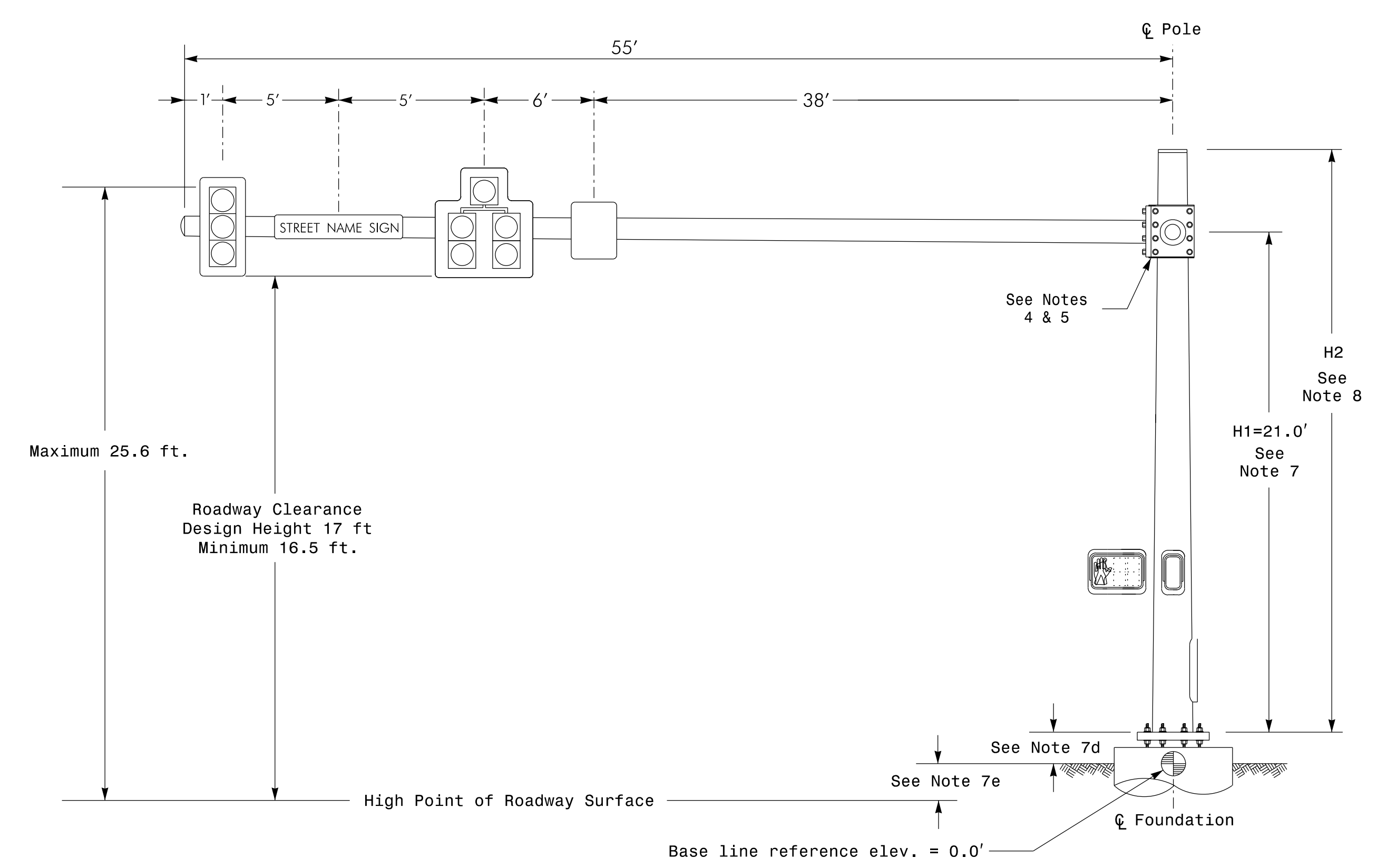
SEAL: JOHN T. ROWE, JR., ENGINEER, SEAL 008453

DocuSigned by: John T. Rowe, Jr. 4/2/2015

SIG. INVENTORY NO. 05-1028

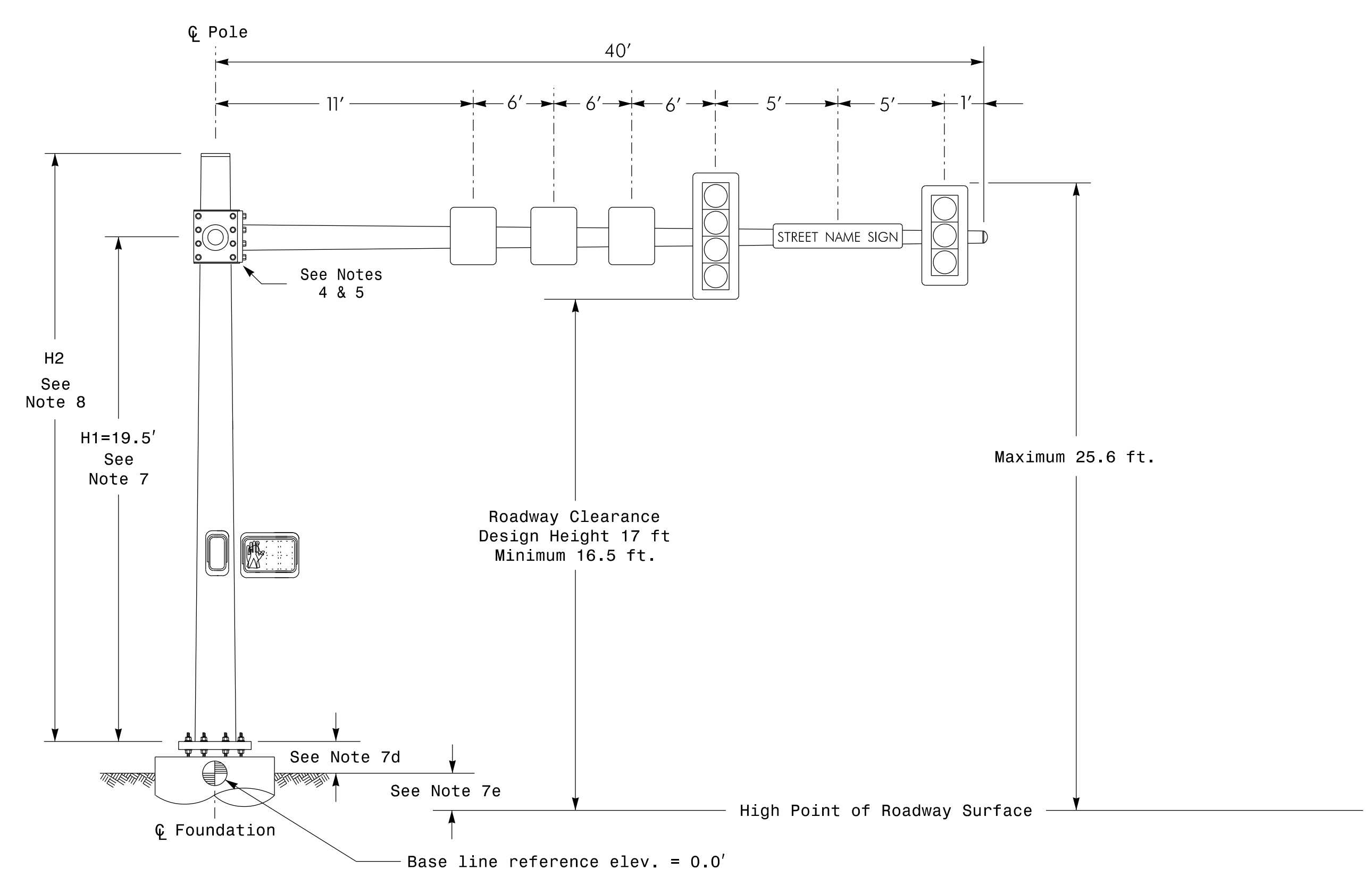
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Design Loading for METAL POLE NO. 2, MAST ARM A



Elevation View @ 0°

Design Loading for METAL POLE NO. 2, MAST ARM B

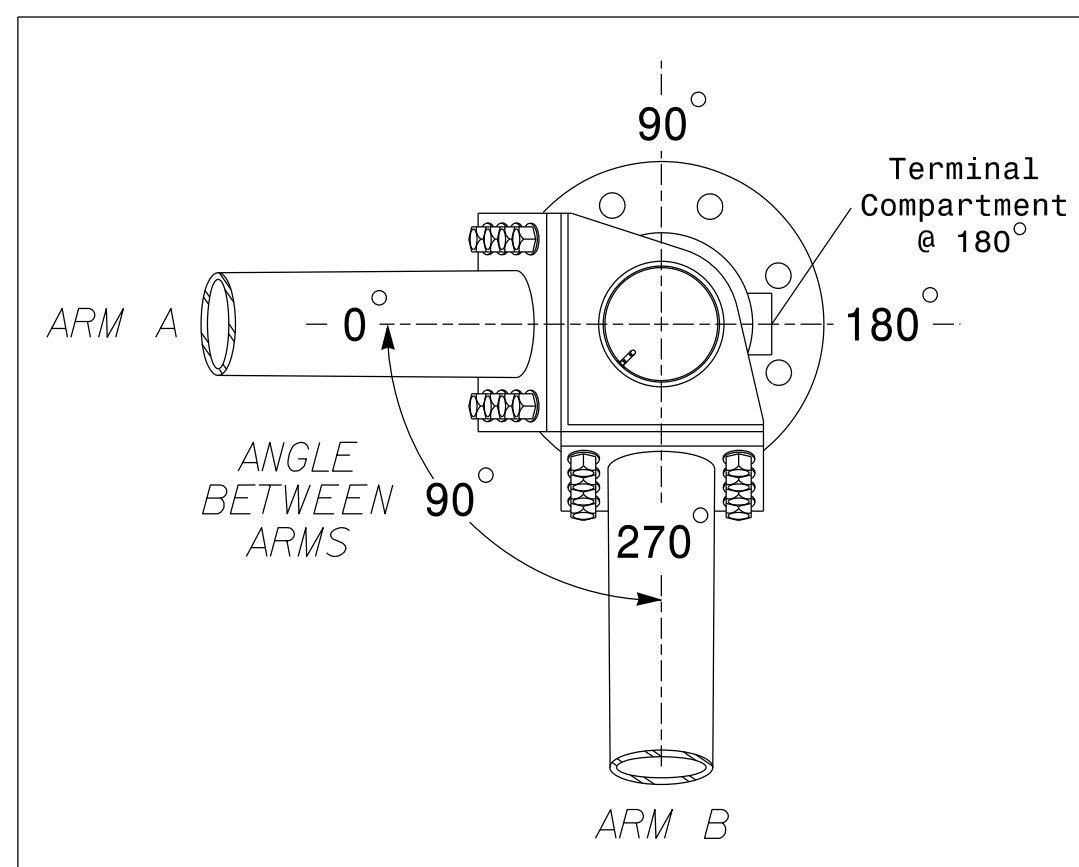


Elevation View @ 270°

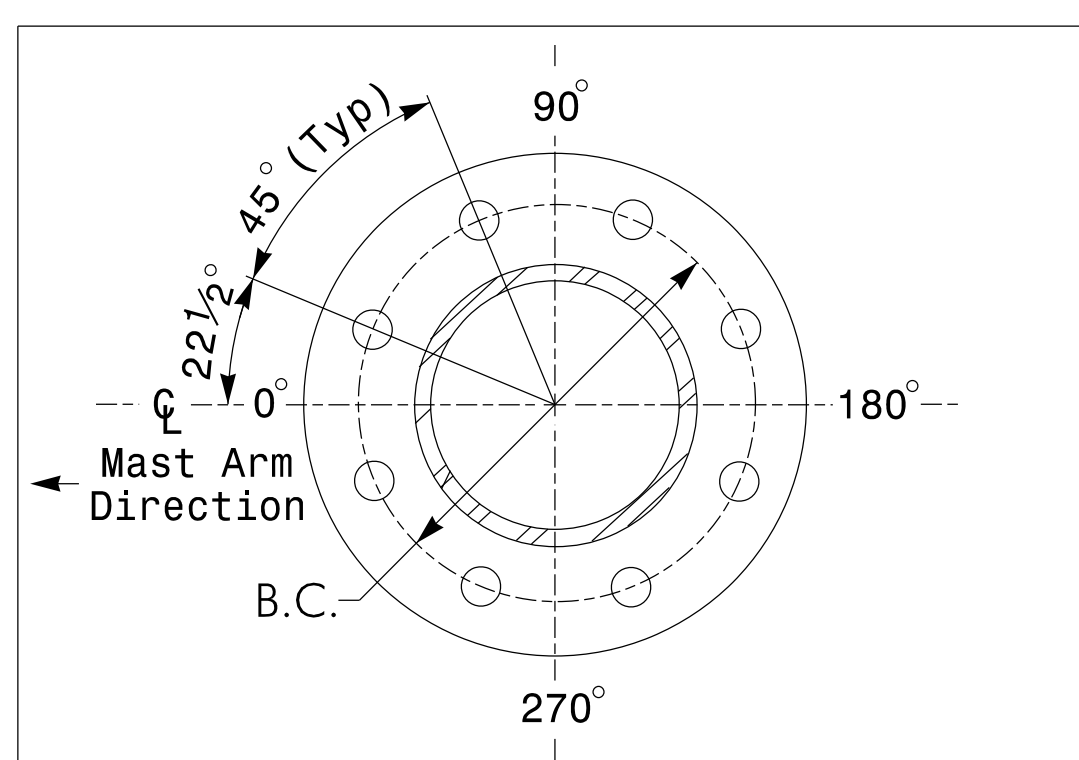
SPECIAL NOTE
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project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

Elevation Data for Mast Arm Attachment (H1)

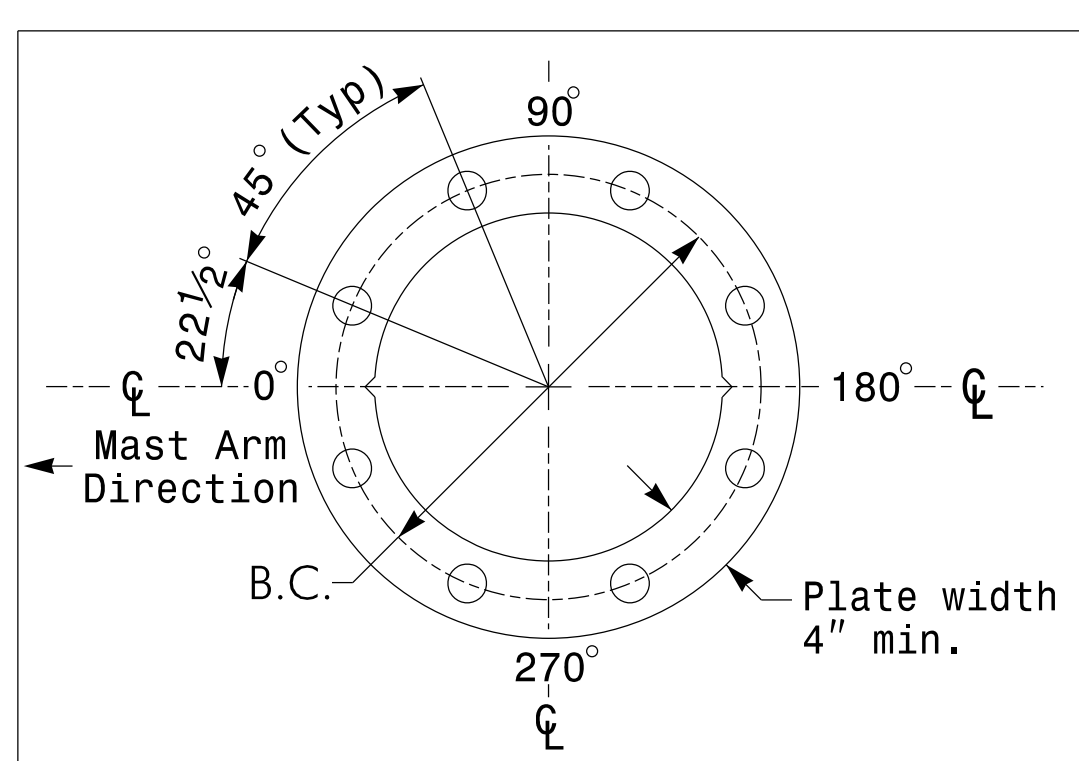
Elevation Differences for:	Arm "A"	Arm "B"
Baseline reference point at ϕ Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	+2.07 ft.	+0.15 ft.
Elevation difference at Edge of travelway or face of curb	+0.84 ft.	+0.07 ft.



POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL
See Note 6



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

MAST ARM LOADING SCHEDULE				
LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	SIGNAL HEAD 12"-4 SECTION WITH 8" BACKPLATE RIGID MOUNTED	15.8 S.F.	31.5" W X 72.0" L	78 LBS
	SIGNAL HEAD 12"-3 SECTION WITH 8" BACKPLATE RIGID MOUNTED	12.8 S.F.	31.5" W X 58.5" L	63 LBS
	SIGNAL HEAD 12"-5 SECTION WITH 8" BACKPLATE RIGID MOUNTED	20.7 S.F.	48.0" W X 62.0" L	107 LBS
	STREET NAME SIGN RIGID MOUNTED	12.0 S.F.	18.0" W X 96.0" L	27 LBS
	PEDESTRIAN SIGNAL HEAD WITH MOUNTING HARDWARE	2.2 S.F.	18.5" W X 17.0" L	21 LBS
	SIGN RIGID MOUNTED	7.5 S.F.	30.0" W X 36.0" L	14 LBS

NOTES

Design Reference Material

- Design the traffic signal structure and foundation in accordance with:
 - The 5th Edition 2009 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
 - The 2012 NCDOT "Standard Specifications for Roads and Structures". The latest addenda to these specifications can be found in the traffic signal project special provisions.
 - The 2012 NCDOT Roadway Standard Drawings.
 - The traffic signal project plans and special provisions.
 - The NCDOT "Metal Pole Standards" located at the following NCDOT website: <https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx>

Design Requirements

- Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "Design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
- Design all signal supports using stress ratios that do not exceed 0.9.
- The camber design for mast arm deflection should provide an appearance of a low pitched arch where the tip or the free end of the mast arm does not deflect below horizontal when fully loaded.
- A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements. This requires staggering the connections. Use elevation data for each arm to determine appropriate arm connection points.
- Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
- The mast arm attachment height (H1) shown is based on the following design assumptions:
 - Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
 - Signal heads attached to the mast arm are rigid mounted and vertically centered on the arm.
 - The roadway clearance height for design is as shown in the elevation views.
 - The top of the pole base plate is .75 feet above the ground elevation.
 - Refer to the Elevation Data chart for elevation differences between the proposed foundation ground level and the high point on the roadway.
- The pole manufacturer will determine the total height (H2) of the pole using the greater of the following:
 - Mast arm attachment height (H1) plus 2 feet, or
 - H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
- If pole location adjustments are required, the contractor must gain approval from the engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signal Design Structural Engineer for assistance at (919) 773-2800.
- The contractor is responsible for verifying that the mast arm lengths shown will allow proper positioning of the signal heads over the roadway.
- The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

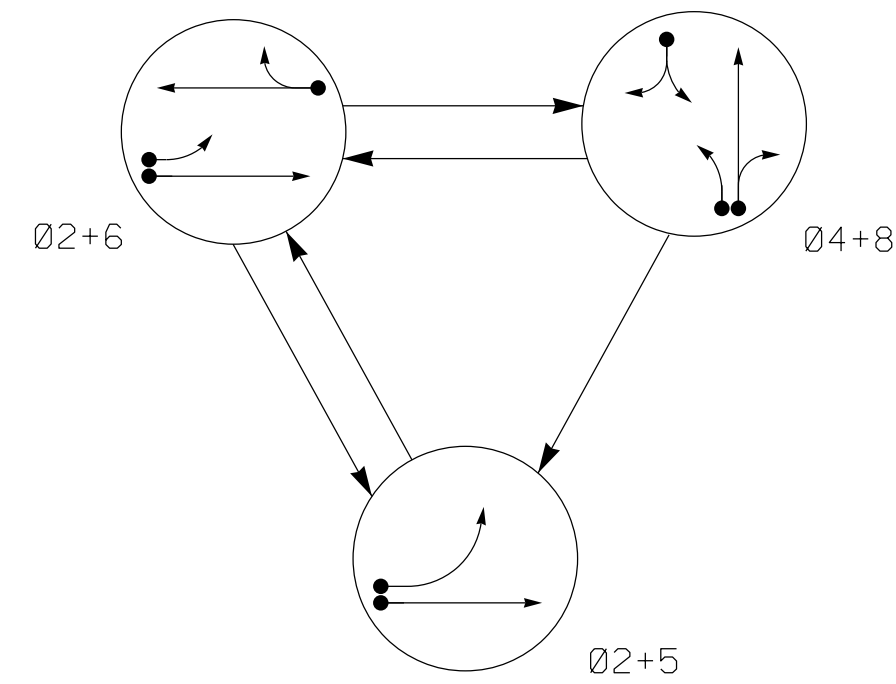
SEPI ENGINEERING & CONSTRUCTION
1025 Wade Avenue
Raleigh, NC 27605
Tel: 919-789-9977
Fax: 919-789-9591
License #: C-2197

NCDOT Wind Zone 4 (90 mph)

	Prepared for the Offices of: NC 55 (South Alston Avenue) at NC 147 SB Ramps		SEAL
	Division 5 Durham County Durham PLAN DATE: December 2014 REVIEWED BY: J. Hochanadel PREPARED BY: M Copple REVIEWED BY:	SCALE: N/A REVISIONS:	

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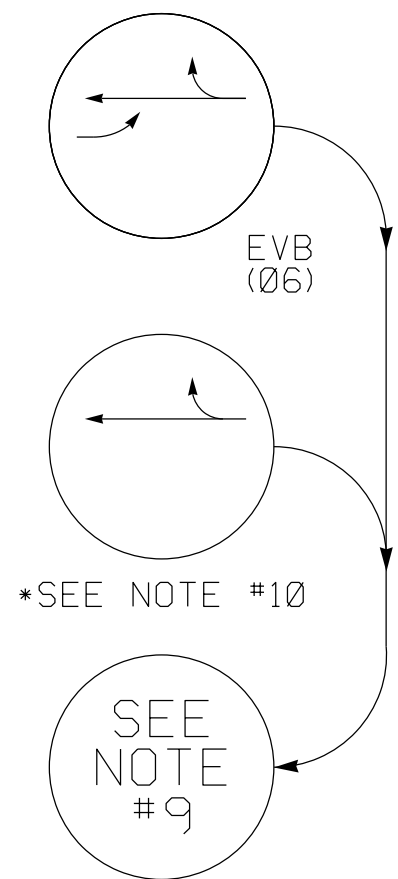
PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

EV Preempt Phases

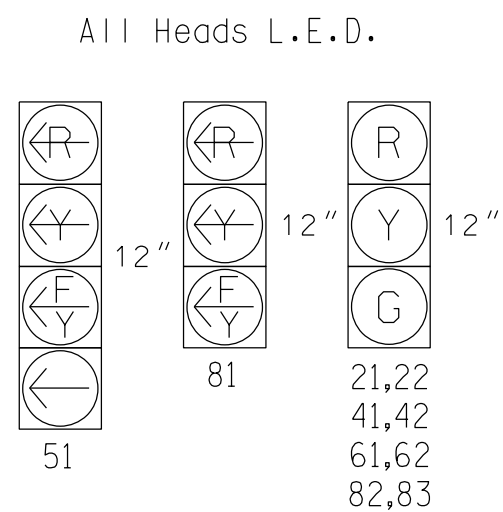


2033 EV PREEMPTION	
FUNCTION	EVB (SECONDS)
DELAY BEFORE PREEMPT	0
MIN. PED. CLEAR BEFORE PREEMPT	0
MIN. GREEN BEFORE PREEMPT	1
CLEARANCE TIME	2
PREEMPT EXTEND**	2.0

** Program Timing on Optical Detector Unit

SIGNAL FACE	PHASE					
	02+5	02+6	04+8	05	06	08
21,22	G	G	R	R	Y	
41,42	R	R	G	R	R	
51	←	←	←	←	←	
61,62	R	G	R	G	Y	
81	←	←	←	←	←	
82,83	R	R	G	R	R	

SIGNAL FACE I.D.



2033 SOFTWARE w/ 2070 CONTROLLER LOOP & DETECTOR UNIT INSTALLATION CHART																		
INDUCTIVE LOOPS					DETECTOR PROGRAMMING													
LOOP NO.	SIZE (ft)	TURNS	DIST. FROM STOPBAR (ft)	NEW EXISTING	NEMA PHASE	TIMING		ATTRIBUTES							STATUS			
						DELAY	CARRY (STRETCH)	1	2	3	4	5	6	7	8	NEW	EXISTING	
2A	6x6	*	70	*	-	2	- SEC.	-	-	-	-	-	X	-	X	-	*	-
4A	6x40	*	0	*	-	4	3 SEC.	-	-	-	-	-	X	-	X	-	*	-
5A	6x40	*	0	*	-	5	15 SEC.	-	-	-	-	-	X	-	X	-	*	-
6A	6x6	*	70	*	-	6	- SEC.	-	-	-	-	-	X	-	X	-	*	-
8A	6x40	*	0	*	-	8	- SEC.	-	-	-	-	-	X	-	X	-	*	-
8B	6x40	*	0	*	-	8	10 SEC.	-	-	-	-	-	X	-	X	-	*	-

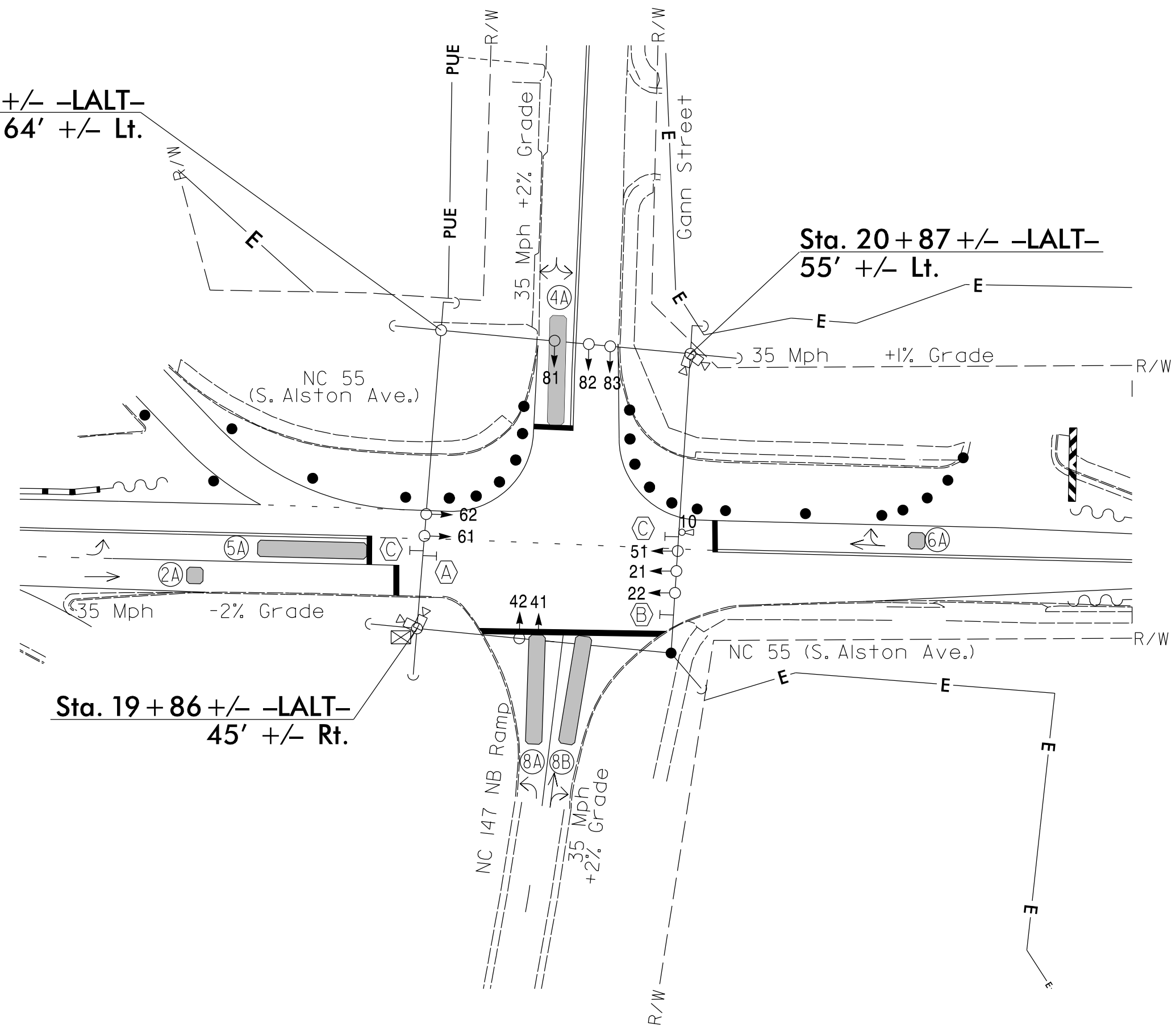
* Video Detection Zone

3 Phase Fully Actuated w/ EV Preemption (Durham Signal System)

NOTES

- Refer to "Road Standard Drawings NCDOT" dated January 2012, "Standard Specifications for Roads and Structures" dated January 2012.
- 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 as to not obstruct sight distance of vehicles turning on red.
- Program all timing information into phase banks 1,2, and 3 unless otherwise noted.
- Set phase bank 3 maximum limit to 250 seconds for phases used.
- This intersection features an optical preemption system. Shown locations of optical detectors are conceptual only.
- Upon completion of Emergency Vehicle Preemption, controller returns to normal operation.
- When EVB preemption initializes during side street service signal head 51 will display a red arrow.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.

Sta. 19 + 95 +/- -LALT- 64' +/- Lt.



Sta. 20 + 87 +/- -LALT- 55' +/- Lt.

Sta. 19 + 86 +/- -LALT- 45' +/- Rt.

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 Sidewalk Guy	● Signal Pole with Guy
⊠ 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
ⓐ "No Left Turn" (R3-2)	ⓐ N/A
ⓑ "No Right Turn" (R3-1)	ⓑ N/A
ⓒ Left Arrow "ONLY" Sign (R3-5L)	ⓒ N/A
■ Work Area	■ N/A
● Drums	● N/A
-E- Construction Easement	-E- N/A
-PUE- Permanent Utility Easement	-PUE- N/A
▨ Barricades	▨ N/A
▨ Direct Bury	▨ N/A
○ Optical Detector	○ N/A
◻ Video Detector	◻ N/A
▭ Video Detection Area	▭ N/A

TIMING CHART						
2033 SOFTWARE w/2070 CONTROLLER						
PHASE	02	04	05	06	08	DL2
MINIMUM INITIAL *	10 SEC.	7 SEC.	7 SEC.	10 SEC.	7 SEC.	0 SEC.
VEHICLE EXTENSION *	3.0 SEC.	2.0 SEC.	2.0 SEC.	3.0 SEC.	2.0 SEC.	
YELLOW CHANGE INT.	4.0 SEC.	3.7 SEC.	4.0 SEC.	4.0 SEC.	3.7 SEC.	3.7 SEC.
RED CLEARANCE	1.8 SEC.	1.8 SEC.	2.8 SEC.	1.8 SEC.	1.8 SEC.	1.8 SEC.
MAXIMUM LIMIT *	50 SEC.	35 SEC.	15 SEC.	50 SEC.	35 SEC.	
RECALL POSITION	VEH. RECALL	NONE	NONE	VEH. RECALL	NONE	
VEHICLE CALL MEMORY	YELLOW LOCK	NONE	NONE	YELLOW LOCK	NONE	
DOUBLE ENTRY	OFF	ON	OFF	OFF	ON	
WALK *	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	
FLASHING DON'T WALK	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	
MIN PED CLEARANCE	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	
TYPE 3 LIMIT	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	
ALTERNATE EXTENSION	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	
ADD PER VEHICLE *	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	
MAXIMUM INITIAL *	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	
MAXIMUM GAP*	3.0 SEC.	2.0 SEC.	2.0 SEC.	3.0 SEC.	2.0 SEC.	
REDUCE 0.1 SEC EVERY *	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	
MINIMUM GAP	3.0 SEC.	2.0 SEC.	2.0 SEC.	3.0 SEC.	2.0 SEC.	

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

Signal Upgrade - Temporary Design 1 (TMP Phase 1, Steps 1-10)

SEPI ENGINEERING & CONSTRUCTION
 1025 Wade Avenue
 Raleigh, NC 27605
 Tel: 919-789-9977
 Fax: 919-789-9591
 License #: C-2197

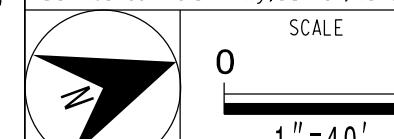
Prepared for the Offices of:

 750 N. Greenfield Pkwy, Garner, NC 27529

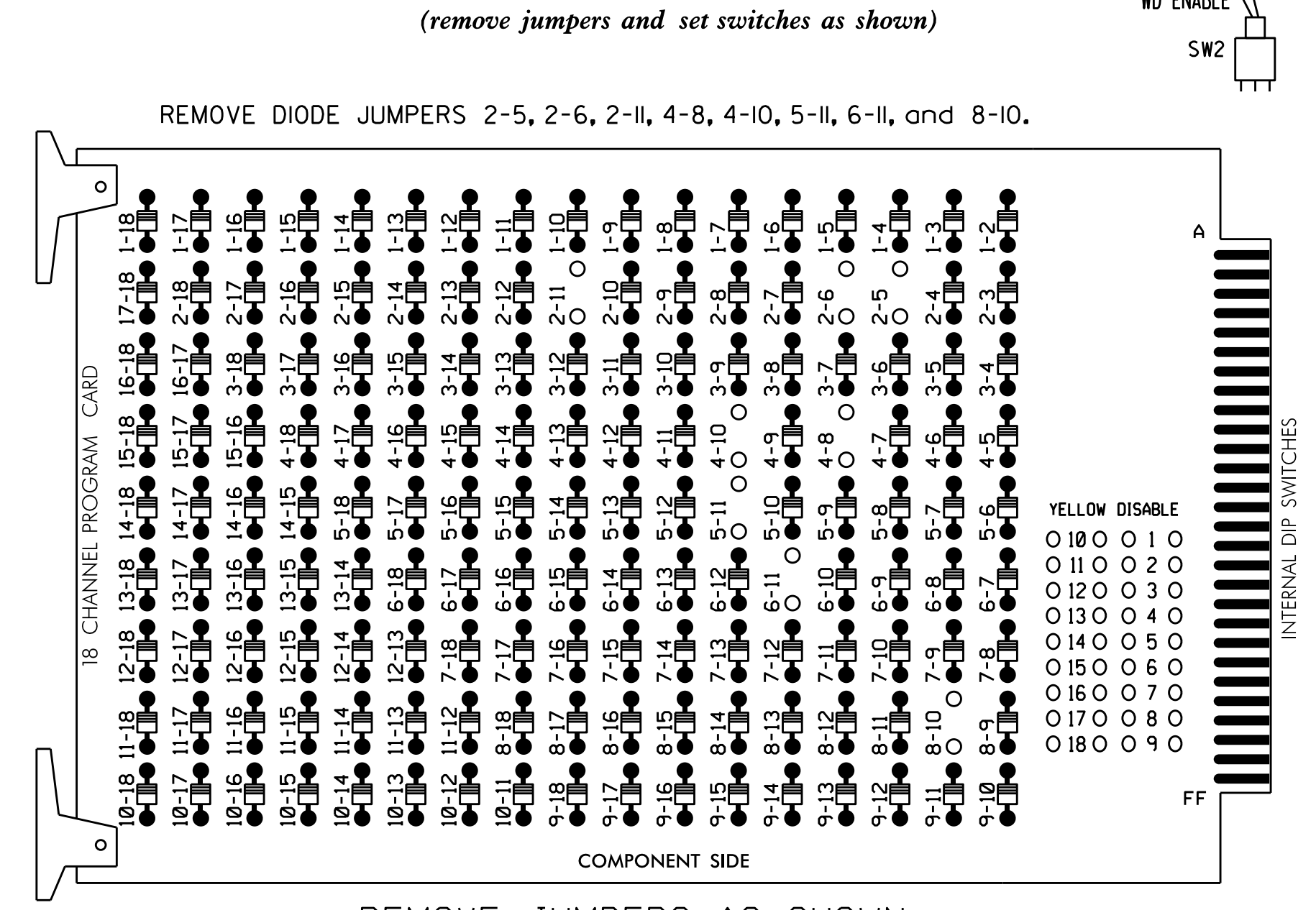
NC 55 (South Alston Avenue) at NC 147 NB Ramp / Gann Street
 Division 5 Durham County Durham
 PLAN DATE: September 2014 REVIEWED BY: J. Hochanadel
 PREPARED BY: C. Lawson REVIEWED BY:

SEAL

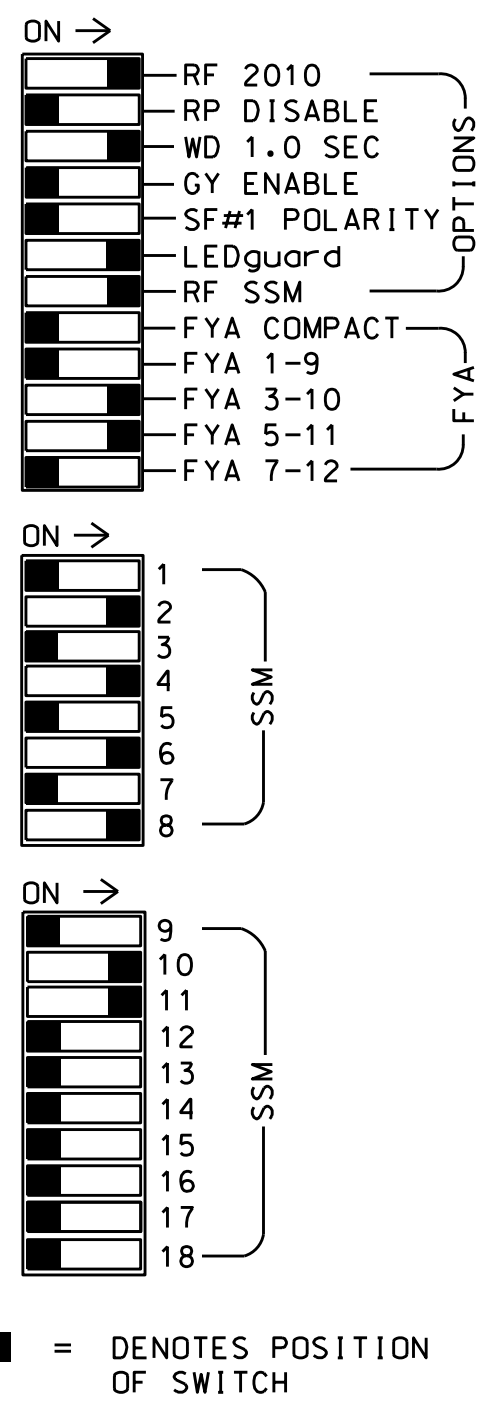
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 4/02/15
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 SIG. INVENTORY NO. 05-028471



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.
 - 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. Verify that signal heads flash in accordance with the signal plans.
- Program controller to Start Up in phases 2 and 6 green.
- Set power-up flash time to 0 seconds within the controller programming. The conflict monitor will govern startup flash. Ensure STARTUP "RED START" is set to 0 seconds.
- Enable Simultaneous Gap-Out feature for all phases.
- Program all timing information into phase banks 1, 2, and 3 unless otherwise noted.
- Set phase bank 3 maximum limit to 250 seconds for phases used.
- Program phases 4 and 8 for Double Entry.
- Ensure start up flash phases are coordinated with flash program block assignments.
- Set the Red Revert interval on the controller to 1 second.
- This cabinet and controller are part of the Durham Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070E
CABINET.....332 W/ AUX
SOFTWARE.....McCAIN 2033
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 WITH AUX FILE
LOAD SWITCHES USED.....S2,S5,S7,S8,S11,AUX S2,AUX S4
PHASES USED.....2,4,5,6,8
OVERLAP 1.....NOT USED
OVERLAP 2.....8
OVERLAP 3.....*
OVERLAP 4.....NOT USED

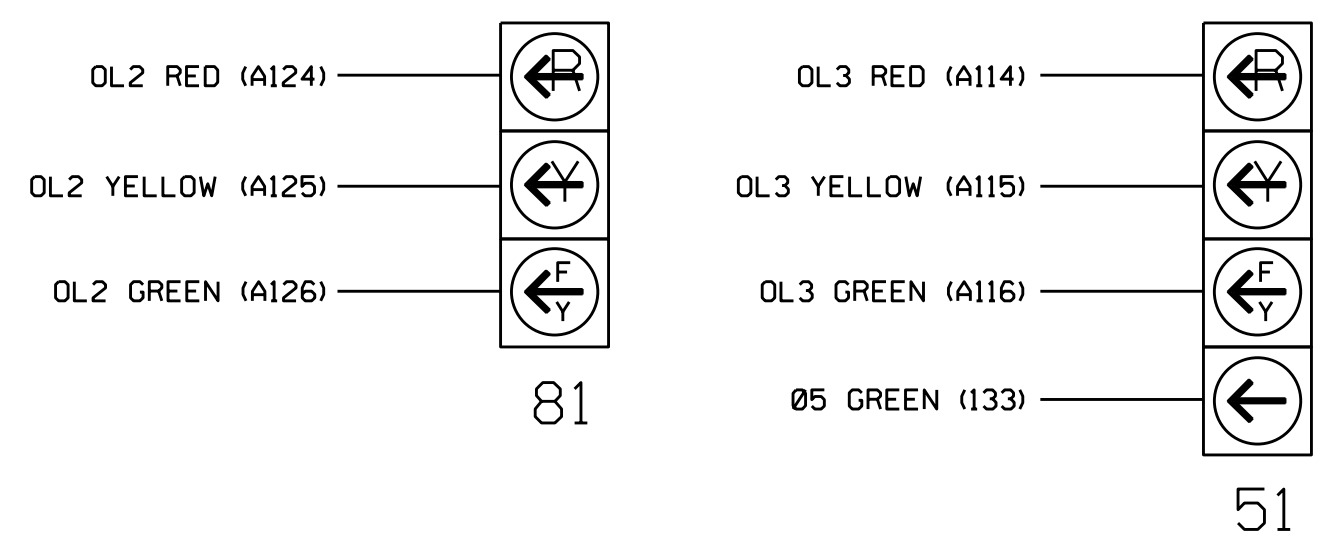
* See FYA PPLT Programming detail on sheet 2.

SIGNAL HEAD HOOK-UP CHART

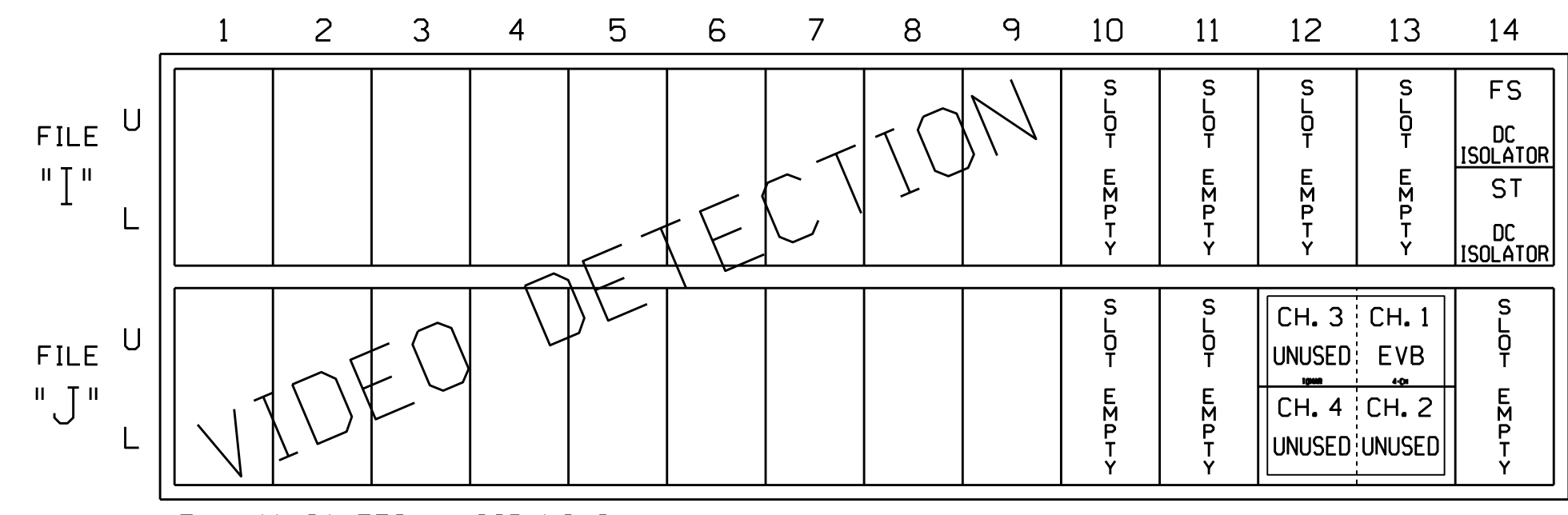
LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	NU	21,22	NU	NU	41,42	NU	51	61,62	NU	NU	82,83	NU	NU	81	NU	51	NU	NU
RED		128			101			134			107							
YELLOW		129			102		*	135			108							
GREEN		130			103			136			109							
RED ARROW															A124		A114	
YELLOW ARROW															A125		A115	
FLASHING YELLOW ARROW															A126		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 below.

FYA SIGNAL WIRING DETAIL
(wire signal heads as shown)



INPUT FILE POSITION LAYOUT
(front view)



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

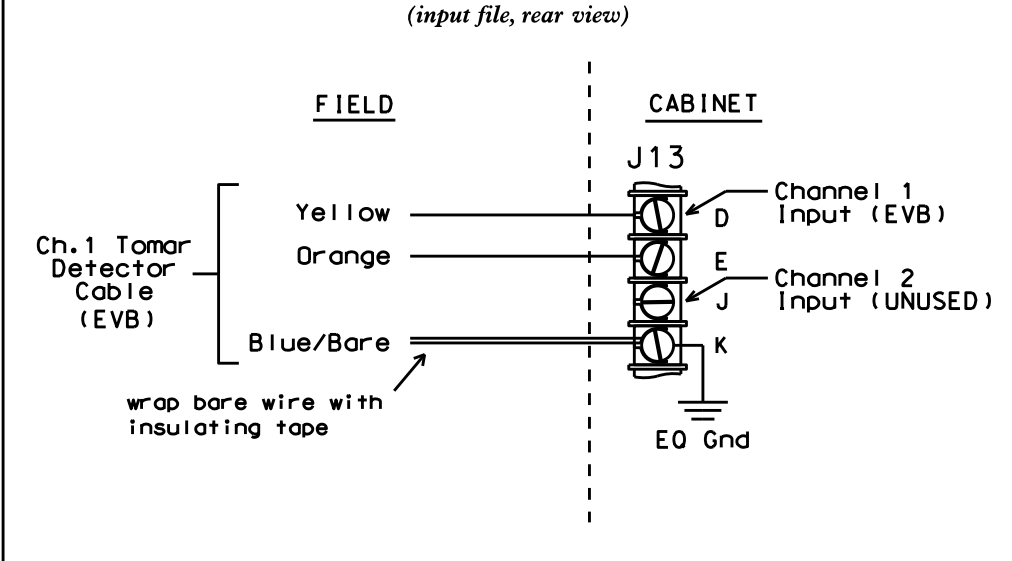
FS = FLASH SENSE
ST = STOP TIME
EVB = EMERGENCY VEHICLE PREEMPT

SPECIAL DETECTOR NOTE

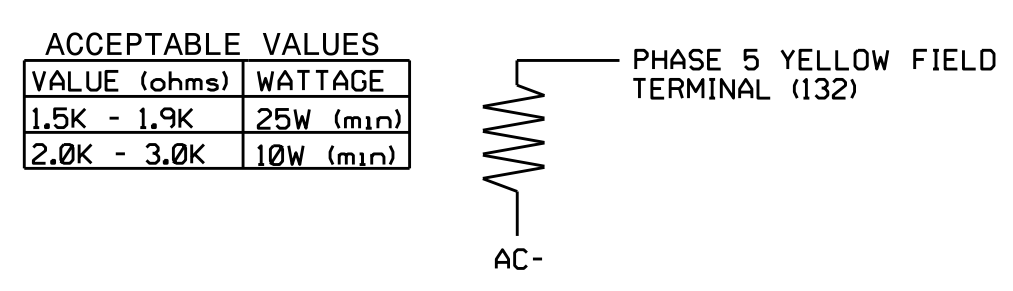
Install a video detection system for vehicle detection. Perform installation according to manufacturer's directions and NCDOT engineer approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.

4 CHANNEL TOMAR OSP CARD
INSERT CARD INTO SLOT J13

TYPICAL TOMAR FIELD WIRE DETAIL
(input file, rear view)



LOAD RESISTOR INSTALLATION DETAIL
(install resistor as shown below)



Electrical Detail - Temporary Design 1 (TMP Phase 1, Steps 1-10) - Sheet 1 of 2

ELECTRICAL AND PROGRAMMING DETAILS FOR: NC 55 (South Alston Avenue) at NC 147 NB Ramp / Gann Street

Prepared In the Offices of: **TRANSPO-MOBILITY AND SAFETY SOLUTIONS**

Division 5 Durham County

PLAN DATE: November 2014 REVIEWED BY: [Signature]

PREPARED BY: S. Armstrong REVIEWED BY: [Signature]

750 N. Greenfield Pkwy, Garner, NC 27529

SEAL: JOHN T. ROWE, JR. ENGINEER

DocuSigned by: John T. Rowe, Jr. 4/2/2015

SIG. INVENTORY NO. 05-0284T1

27-MAR-2015 05:43 S:\MITS\15\Sig\15\work\hous\51g_MarkArmstrong\050284_sml.e.xxx.dgn s0armstrong

OVERLAP PROGRAMMING DETAIL

Program overlaps as follows:
Main Menu - 4) OVERLAP

Press "+"

OVERLAP [2]:

LOADSWITCH = 10	NOTE: For head 81
VEH SET 1 = 8	
YELLOW CLEARANCE = 3.7	
RED CLEARANCE = 1.8	

END OF OVERLAP PROGRAMMING

EMERGENCY VEHICLE PREEMPTION PROGRAMMING

1. Program EVB preempt as follows:
Main Menu - 2) PREEMPT - 4) EMERGENCY VEHICLE
EVB Clear = 2
EVB Clearance Phases = 6
2. Program general preemption parameters as follows:
Main Menu - 2) PREEMPT - 6) MISC PREEMPTION PARAMETERS
Min Time Before PE ForceOff = 1

Program extend time on optical detector unit for 2.0 sec for EVB.

FYA PPLT PROGRAMMING

1. Program Flashing Yellow Arrow phases as follows:
Main Menu - 1) PHASE - 2) PHASE FUNCTIONS PAGE TWO
PPLT FYA = PHASE 5
2. Assign output pin for Flashing Yellow Arrow as follows:
Main Menu - 6) OUTPUTS - F) FYA PPLT
Phase 5 = 90
3. Redirect RED and YELLOW outputs for the left turn phases as follows:
Main Menu - 6) OUTPUTS - 8) REDIRECT PHASE
Phase 5 RED = 88, Phase 5 YELLOW = 89

**OVERLAP GREEN FLASH PROGRAMMING
DETAIL FOR 3-SECTION FYA HEAD**

The following will cause the overlap green outputs to flash, which are wired to the flashing yellow arrows. Program as follows:

Main Menu - 1) PHASE - 2) PHASE FUNCTIONS PAGE TWO
OLAP G FL = 2

SPECIAL NOTE EV PREEMPT PROGRAMMING

Setting 'FYA DURING PREEMPT' to 'Y' eliminates yellow trap when transitioning to preempt from adjacent through phase.
Main Menu - 9) UTILITIES - 9) MISC
FYA DURING PREEMPT (Y/N) = Y

FLASHER CIRCUIT MODIFICATION DETAIL

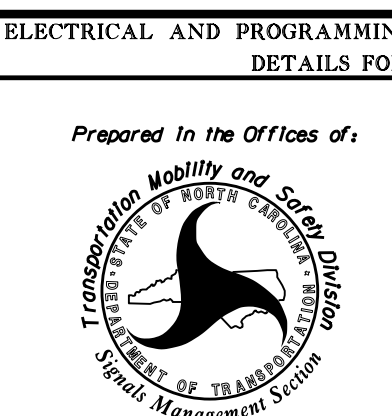
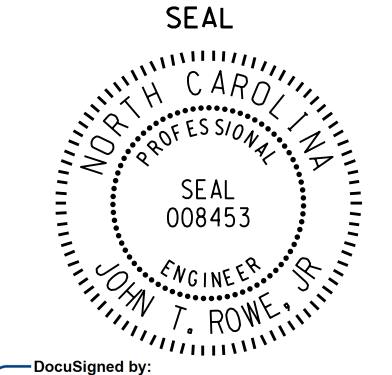
IN ORDER TO INSURE THAT SIGNALS FLASH CONCURRENTLY ON THE SAME APPROACH, MAKE THE FOLLOWING FLASHER CIRCUIT CHANGES:

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

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0284T1
DESIGNED: September 2014
SEALED: 4/2/15
REVISED: N/A

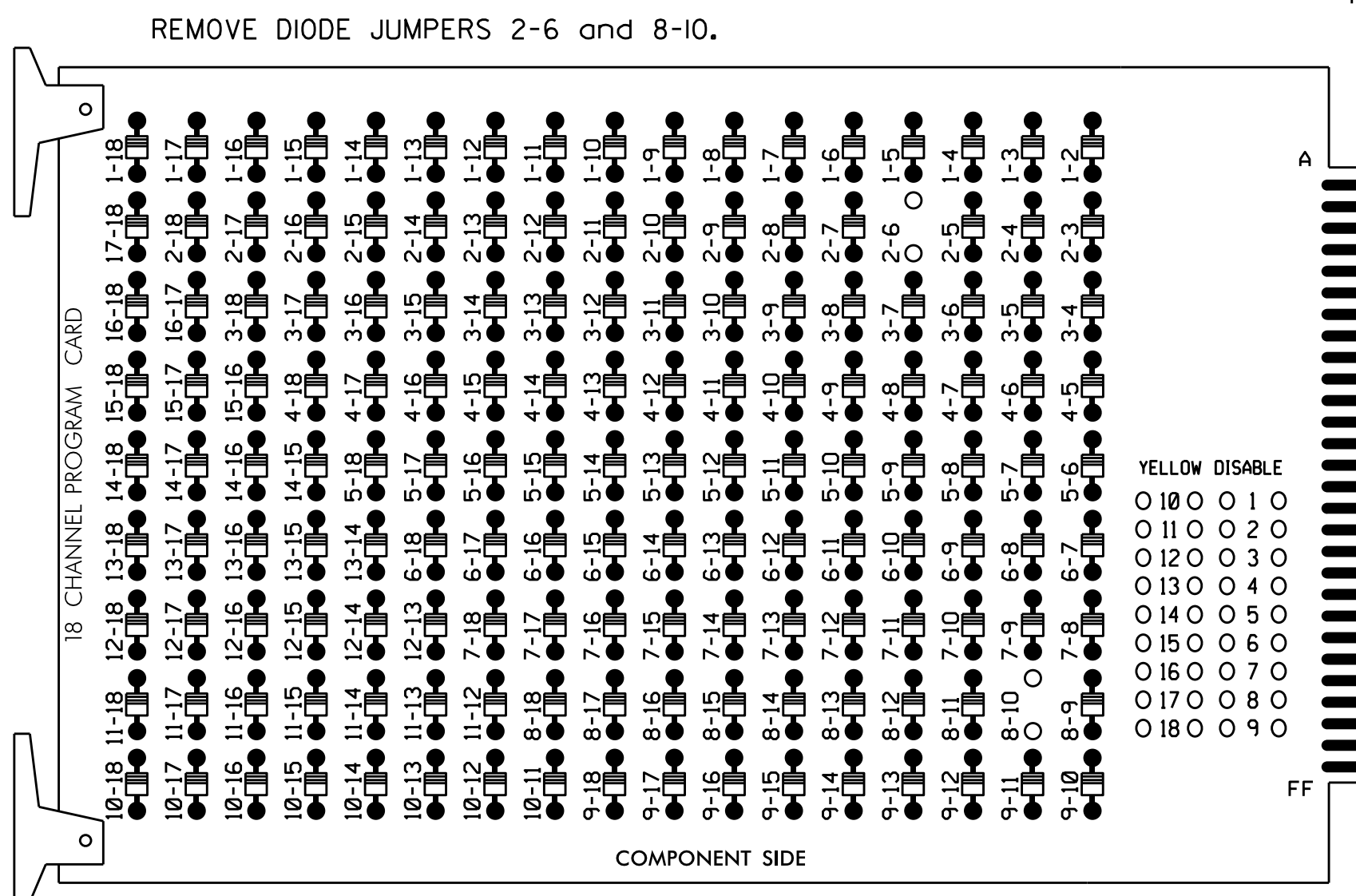
Electrical Detail - Temporary Design 1 (TMP Phase 1, Steps 1-10) - Sheet 2 of 2

	DETAILS FOR: NC 55 (South Alston Avenue) at NC 147 NB Ramp / Gann Street		
	Division 5 PLAN DATE: November 2014 PREPARED BY: S. Armstrong	Durham County REVIEWED BY: JTR REVIEWED BY:	

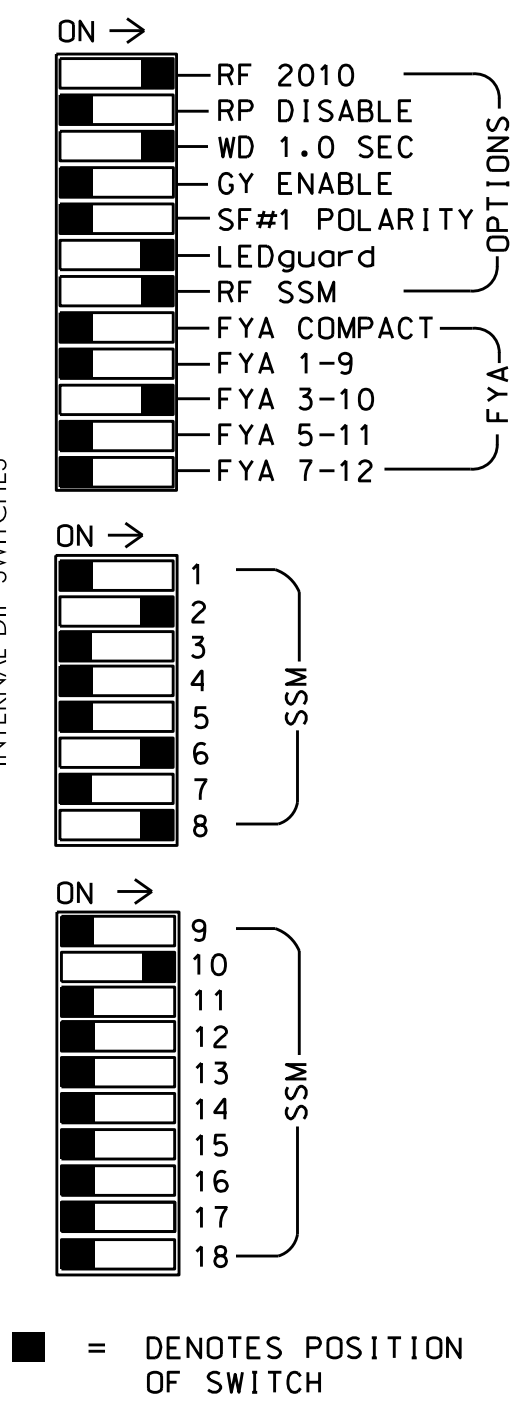
27-1105-2015-05-14
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 sarmstrong

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. 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. Verify that signal heads flash in accordance with the signal plans.
2. Program controller to Start Up in phases 2 and 6 green.
3. Set power-up flash time to 0 seconds within the controller programming. The conflict monitor will govern startup flash. Ensure STARTUP "RED START" is set to 0 seconds.
4. Enable Simultaneous Gap-Out feature for all phases.
5. Program all timing information into phase banks 1, 2, and 3 unless otherwise noted.
6. Set phase bank 3 maximum limit to 250 seconds for phases used.
7. Ensure start up flash phases are coordinated with flash program block assignments.
8. Set the Red Revert interval on the controller to 1 second.
9. This cabinet and controller are part of the Durham Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070E
 CABINET.....332 W/ AUX
 SOFTWARE.....McCAIN 2033
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX FILE
 LOAD SWITCHES USED.....S2,S8,S11,AUX S2
 PHASES USED.....2,6,8
 OVERLAP 1.....NOT USED
 OVERLAP 2.....8
 OVERLAP 3.....NOT USED
 OVERLAP 4.....NOT USED

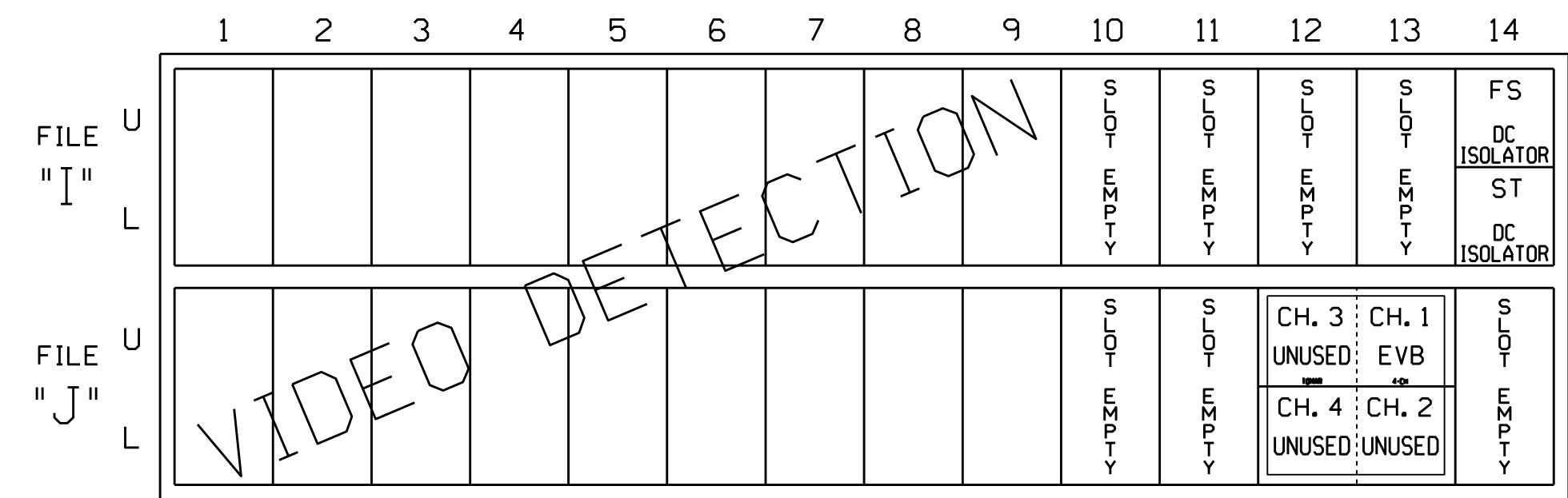
SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	NU	21,22	NU	NU	NU	NU	NU	61,62	NU	NU	82,83	NU	NU	81	NU	NU	NU	NU
RED		128						134			107							
YELLOW		129						135			108							
GREEN		130						136			109							
RED ARROW														A124				
YELLOW ARROW														A125				
FLASHING YELLOW ARROW														A126				
GREEN ARROW																		

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

INPUT FILE POSITION LAYOUT

(front view)



SPECIAL DETECTOR NOTE

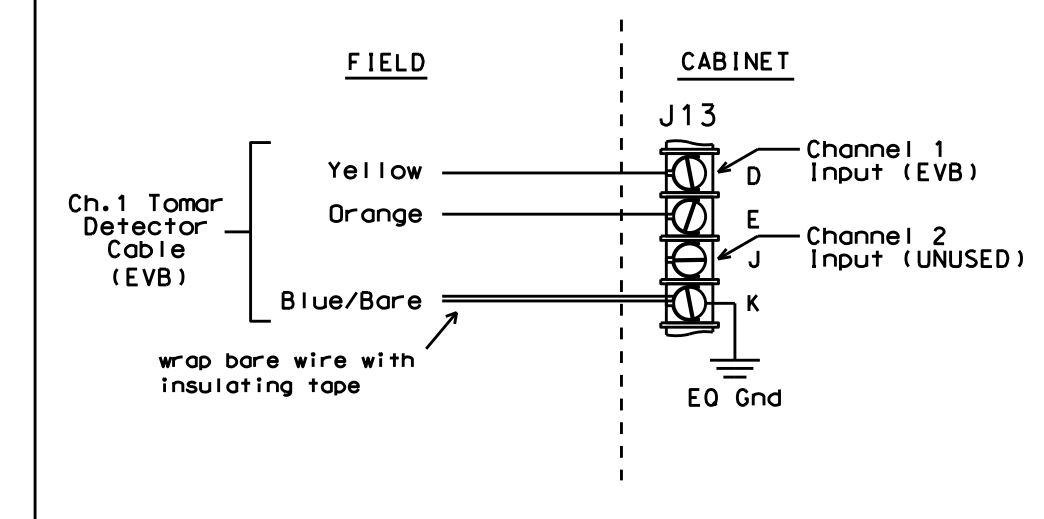
Install a video detection system for vehicle detection. Perform installation according to manufacturer's directions and NCDOT engineer approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.

FS = FLASH SENSE
 ST = STOP TIME
 EVB = EMERGENCY VEHICLE PREEMPT

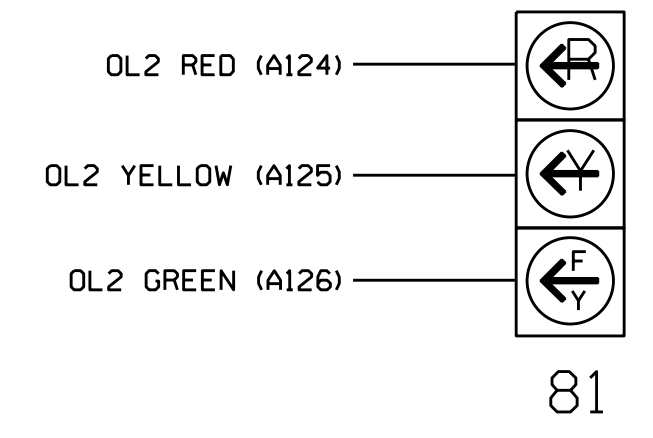
4 CHANNEL TOMAR OSP CARD
 INSERT CARD INTO SLOT J13

TYPICAL TOMAR FIELD WIRE DETAIL

(input file, rear view)



FYA SIGNAL WIRING DETAIL



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-0284T2
 DESIGNED: September 2014
 SEALED: 4/2/15
 REVISED: N/A

Electrical Detail - Temporary Design 2 (TMP Phase 1, Steps 1-10) - Sheet 1 of 2

ELECTRICAL AND PROGRAMMING DETAILS FOR: Prepared In the Offices of: 750 N. Greenfield Pkwy, Garner, NC 27529	NC 55 (South Alston Avenue) at NC 147 NB Ramp / Gann Street		SEAL PROFESSIONAL ENGINEER SEAL 008453 JOHN T. ROWE, III
	PLAN DATE: November 2014 PREPARED BY: S. Armstrong	REVIEWED BY: JTR REVIEWED BY:	
DocuSigned by: John T. Rowe, Jr. 4/2/2015			SIG. INVENTORY NO. 05-0284T2

05-16
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 somstron

OVERLAP PROGRAMMING DETAIL

Program overlaps as follows:
 Main Menu - 4) OVERLAP

Press "+"

OVERLAP [2]:

LOADSWITCH = 10	NOTE: For head 81
VEH SET 1 = 8	
YELLOW CLEARANCE = 3.0	
RED CLEARANCE = 1.4	

END OF OVERLAP PROGRAMMING

EMERGENCY VEHICLE PREEMPTION PROGRAMMING

1. Program EVB preempt as follows:
 Main Menu - 2) PREEMPT - 4) EMERGENCY VEHICLE
 EVB Clear = 2
 EVB Clearance Phases = 6
2. Program general preemption parameters as follows:
 Main Menu - 2) PREEMPT - 6) MISC PREEMPTION PARAMETERS
 Min Time Before PE ForceOff = 1

Program extend time on optical detector unit for 2.0 sec for EVB.

FLASHER CIRCUIT MODIFICATION DETAIL

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

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

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

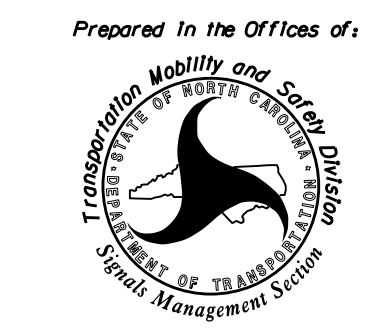
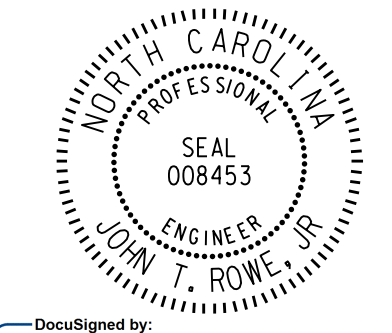
**OVERLAP GREEN FLASH PROGRAMMING
 DETAIL FOR 3-SECTION FYA HEAD**

The following will cause the overlap green outputs to flash, which are wired to the flashing yellow arrows. Program as follows:

Main Menu - 1) PHASE - 2) PHASE FUNCTIONS PAGE TWO
 OLAP G FL = 2

THIS ELECTRICAL DETAIL IS FOR
 THE SIGNAL DESIGN: 05-0284T2
 DESIGNED: September 2014
 SEALED: 4/2/15
 REVISED: N/A

Electrical Detail - Temporary Design 2 (TMP Phase 1, Steps 1-10) - Sheet 2 of 2

<p>ELECTRICAL AND PROGRAMMING DETAILS FOR:</p> <p>Prepared In the Offices of:</p>  <p>750 N. Greenfield Pkwy, Garner, NC 27529</p>	<p>NC 55 (South Alston Avenue) at NC 147 NB Ramp / Gann Street</p> <p>Division 5 Durham County Durham</p> <p>PLAN DATE: November 2014 REVIEWED BY: <i>JTR</i></p> <p>PREPARED BY: S. Armstrong REVIEWED BY:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>REVISIONS</th> <th>INIT.</th> <th>DATE</th> </tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> </tbody> </table>	REVISIONS	INIT.	DATE										<p>SEAL</p>  <p>DocuSigned by: John T. Rowe, Jr. 4/2/2015</p> <p>SIG. INVENTORY NO. 05-0284T2</p>
REVISIONS	INIT.	DATE												

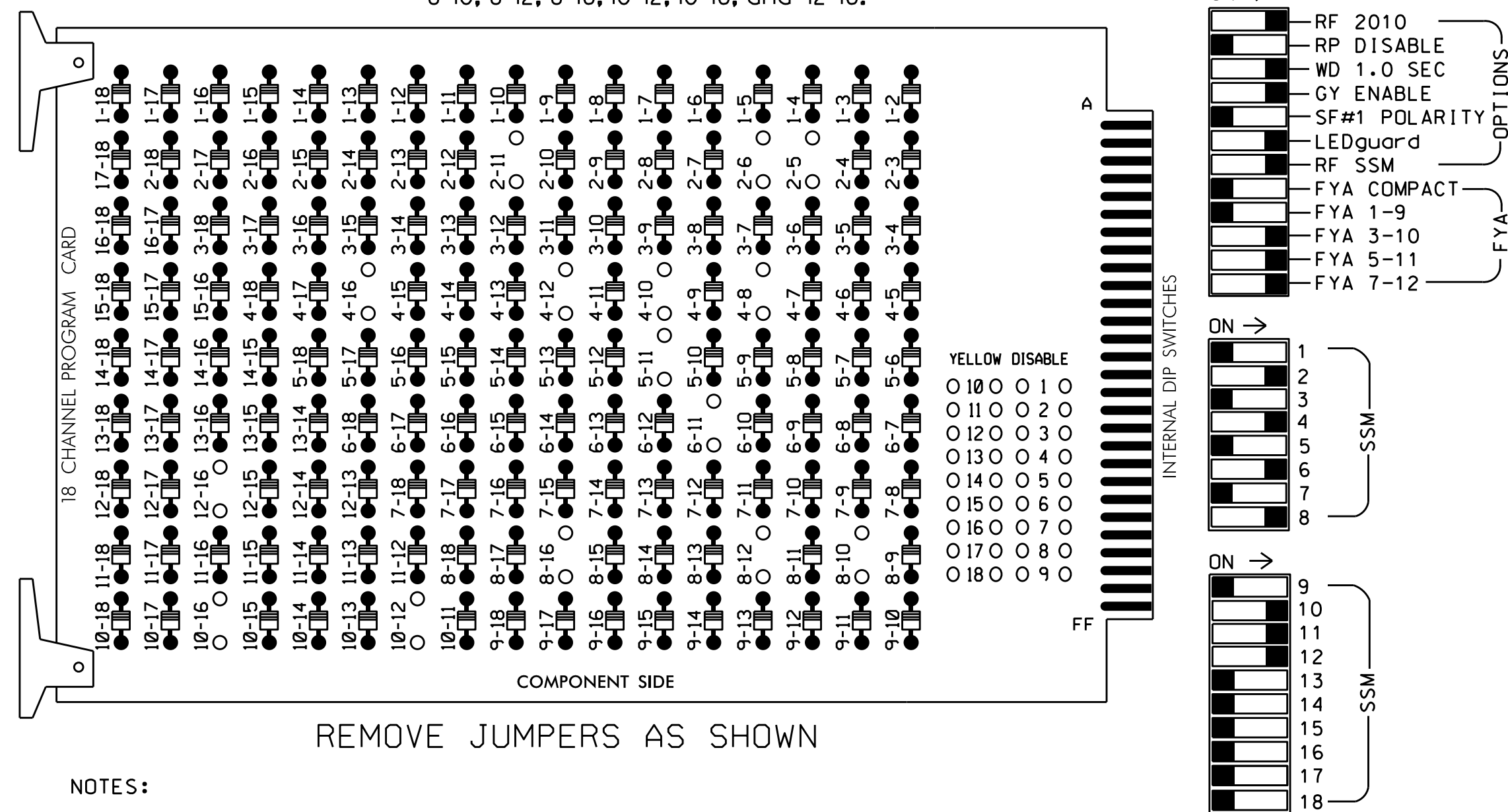
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 sarmstrong

EDI MODEL 2018ECL-NC CONFLICT MONITOR

PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 2-5, 2-6, 2-11, 4-8, 4-10, 4-12, 4-16, 5-11, 6-11, 8-10, 8-12, 8-16, 10-12, 10-16, and 12-16.



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. 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. Verify that signal heads flash in accordance with the signal plans.
2. Program controller to Start Up in phases 2 and 6 green.
3. Set power-up flash time to 0 seconds within the controller programming. The conflict monitor will govern startup flash. Ensure STARTUP "RED START" is set to 0 seconds.
4. Enable Simultaneous Gap-Out feature for all phases.
5. Program all timing information into phase banks 1, 2, and 3 unless otherwise noted.
6. Set phase bank 3 maximum limit to 250 seconds for phases used.
7. Program phases 4 and 8 for Double Entry.
8. Ensure start up flash phases are coordinated with flash program block assignments.
9. Program Startup Ped Calls for phase 8.
10. Set the Red Revert interval on the controller to 1 second.
11. This cabinet and controller are part of the Durham Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070E
 CABINET.....332 W/ AUX
 SOFTWARE.....McCain 2033
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX FILE
 LOAD SWITCHES USED.....S2,S5,S7,S8,S11,S12,AUX S2,
 AUX S4,AUX S5
 PHASES USED.....2,4,5,6,8,8PED
 OVERLAP 1.....NOT USED
 OVERLAP 2.....4+8
 OVERLAP 3.....*
 OVERLAP 4.....4+8
 * See FYA PPLT Programming detail on sheet 2.

SIGNAL HEAD HOOK-UP CHART

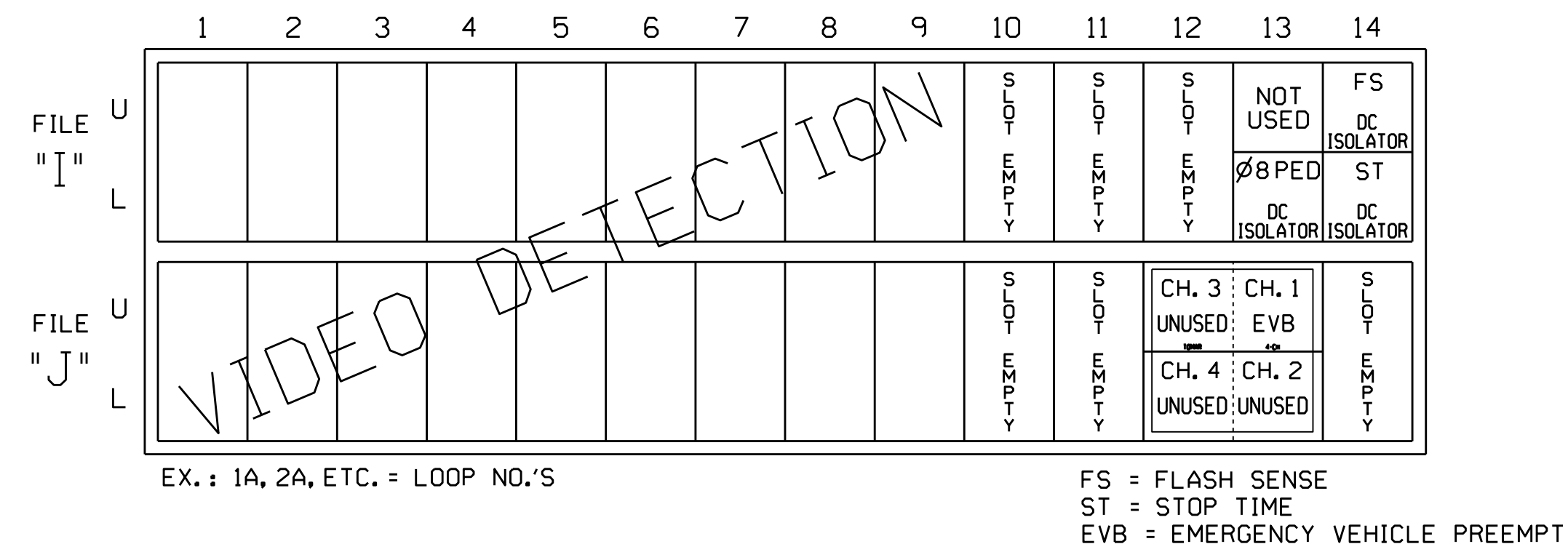
LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	NU	21,22	NU	NU	42,43	NU	43	51	61,62	NU	NU	82,83	NU	81	NU	51	41	NU
RED		128			101				134			107						
YELLOW		129			102				135			108						
GREEN		130			103				136			109						
RED ARROW															A124	A114	A101	
YELLOW ARROW							132								A125	A115	A102	
FLASHING YELLOW ARROW															A126	A116	A103	
GREEN ARROW							133	133										
Hand icon													110					
Person icon																		

NU = Not Used

* See pictorial of head wiring in detail below.

INPUT FILE POSITION LAYOUT

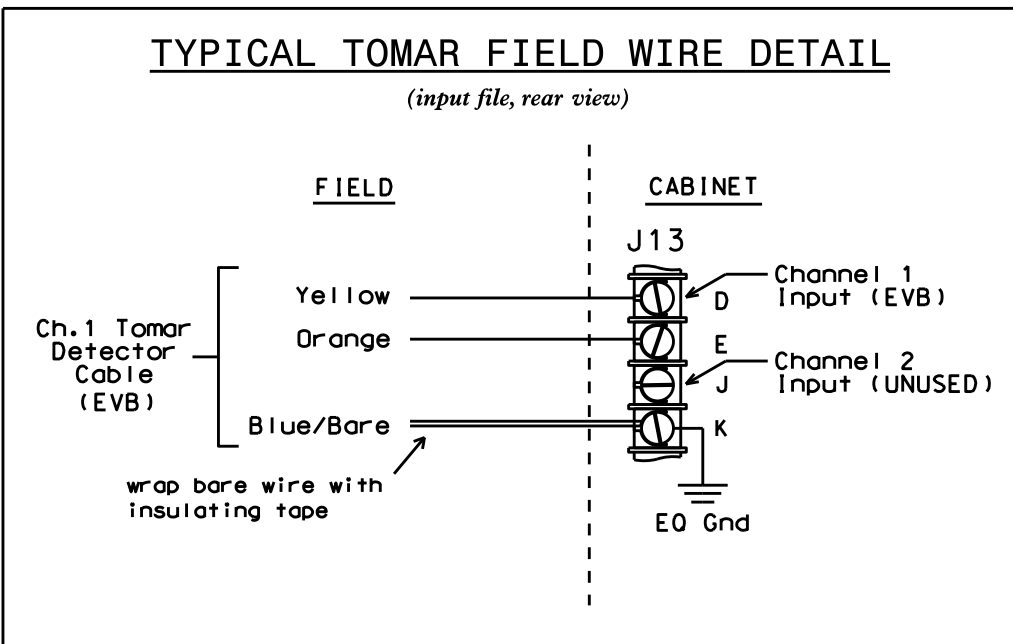
(front view)



SPECIAL DETECTOR NOTE

Install a video detection system for vehicle detection. Perform installation according to manufacturer's directions and NCDOT engineer approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.

4 CHANNEL TOMAR OSP CARD
 INSERT CARD INTO SLOT J13



INPUT FILE CONNECTION & PROGRAMMING CHART

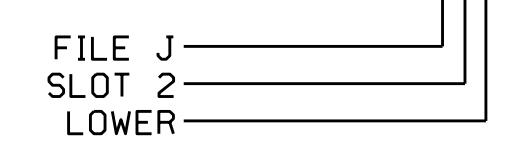
PED PUSH BUTTONS	LOOP TERMINAL	INPUT FILE POS.	DETECTOR NO.	PIN NO.	ATTRIBUTES	NEMA PHASE
P81,P82	TB8-8,9	I13L	28	70	2	8 PED

DETECTOR ATTRIBUTES LEGEND:

- 1-FULL TIME DELAY
- 2-PED CALL
- 3-RESERVED
- 4-COUNTING
- 5-EXTENSION
- 6-TYPE 3
- 7-CALLING
- 8-ALTERNATE

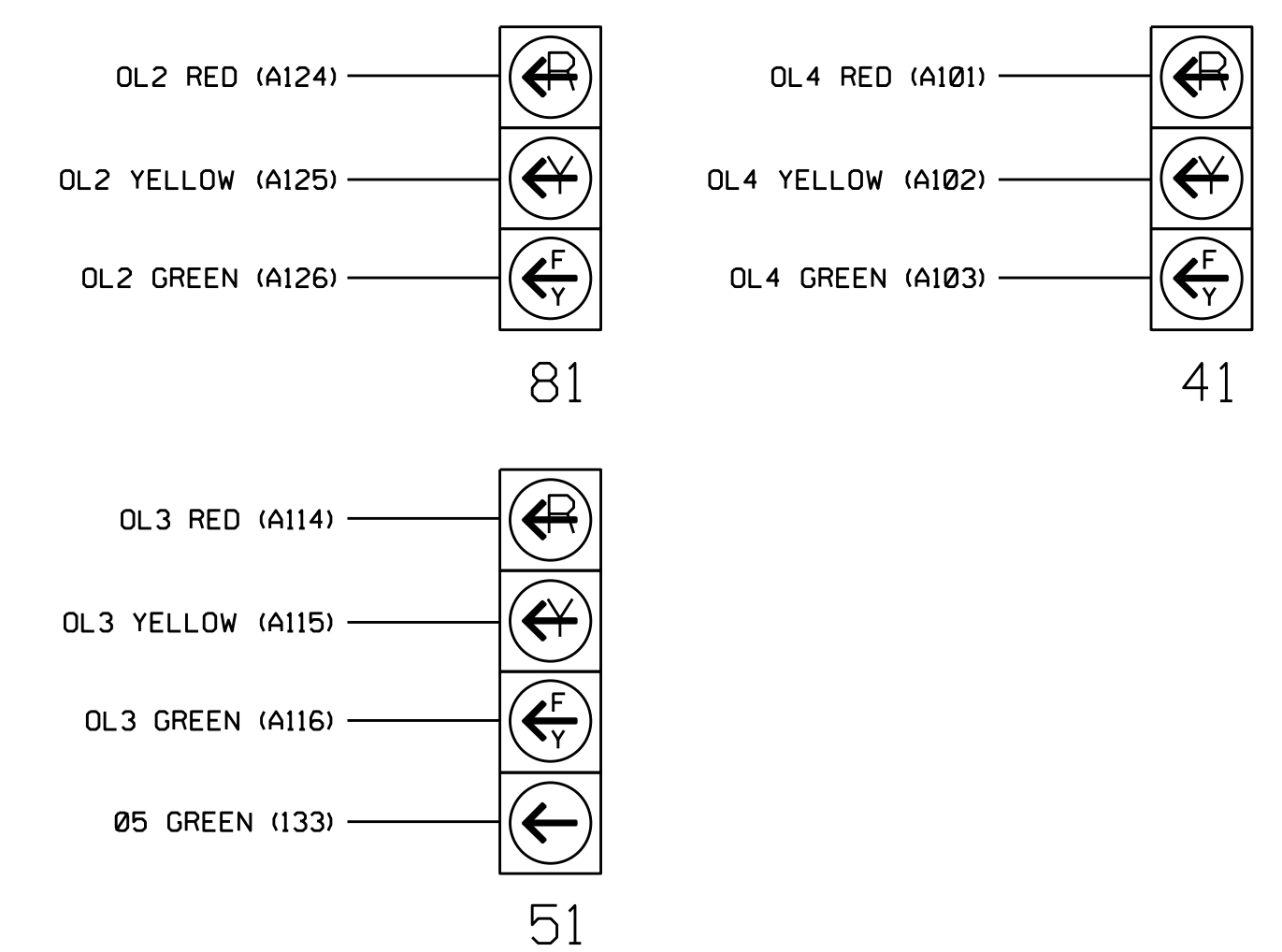
NOTE:
 INSTALL DC ISOLATOR IN INPUT FILE SLOT I13.

INPUT FILE POSITION LEGEND: J2L



FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



Electrical Detail - Temporary Design 3 (TMP Phase 1, Steps 11-21) - Sheet 1 of 2

Electrical and Programming Details for: **NC 55 (South Alston Avenue) at NC 147 NB Ramp / Gann Street**

Prepared in the Offices of: **Transportation Mobility and Safety Solutions**

750 N. Greenfield Pkwy, Garner, NC 27529

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-0284T3
 DESIGNED: September 2014
 SEALED: 4/2/15
 REVISED: N/A

Division 5 Durham County Durham
 PLAN DATE: November 2014 REVIEWED BY:
 PREPARED BY: S. Armstrong REVIEWED BY:

SEAL: PROFESSIONAL ENGINEER JOHN T. ROWE, SE

SIG. INVENTORY NO. 05-0284T3

27-MAR-2015 08:48
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OVERLAP PROGRAMMING DETAIL

Program overlaps as follows:
Main Menu - 4) OVERLAP

Press "+"

OVERLAP [2]:

LOADSWITCH = 10	NOTE: For head 81
VEH SET 1 = 4.8	
YELLOW CLEARANCE = 3.7	
RED CLEARANCE = 2.3	

Press "+" twice

OVERLAP [4]:

LOADSWITCH = 12	NOTE: For head 41
VEH SET 1 = 4.8	
YELLOW CLEARANCE = 3.7	
RED CLEARANCE = 2.3	

END OF OVERLAP PROGRAMMING

EMERGENCY VEHICLE PREEMPTION PROGRAMMING

1. Program EVB preempt as follows:
Main Menu - 2) PREEMPT - 4) EMERGENCY VEHICLE
EVB Clear = 2
EVB Clearance Phases = 6
2. Program general preemption parameters as follows:
Main Menu - 2) PREEMPT - 6) MISC PREEMPTION PARAMETERS
Min Time Before PE ForceOff = 1
3. Ped Clear Before Preempt is a pedestrian timing parameter, and is programmed as follows:
Main Menu - 1) PHASE - 5) PEDESTRIAN TIMING
PHASE 8 MIN FDW = 4

Program extend time on optical detector unit for 2.0 sec for EVB.

FYA PPLT PROGRAMMING

1. Program Flashing Yellow Arrow phases as follows:
Main Menu - 1) PHASE - 2) PHASE FUNCTIONS PAGE TWO
PPLT FYA = PHASE 5
2. Assign output pin for Flashing Yellow Arrow as follows:
Main Menu - 6) OUTPUTS - F) FYA PPLT
Phase 5 = 90
3. Redirect RED and YELLOW outputs for the left turn phases as follows:
Main Menu - 6) OUTPUTS - 8) REDIRECT PHASE
Phase 5 RED = 88, Phase 5 YELLOW = 89

**OVERLAP GREEN FLASH PROGRAMMING
DETAIL FOR 3-SECTION FYA HEADS**

The following will cause the overlap green outputs to flash, which are wired to the flashing yellow arrows. Program as follows:

Main Menu - 1) PHASE - 2) PHASE FUNCTIONS PAGE TWO
OLAP G FL = 2,4

**MIN WALK DURING PREEMPTION
PROGRAMMING**

To disable MIN WALK pedestrian timing during preemption, program the controller as follows:
Main Menu - 9) UTILITIES - 5) CONFIGURATION
EXTRA TWO = 3

SPECIAL NOTE EV PREEMPT PROGRAMMING

Setting 'FYA DURING PREEMPT' to 'Y' eliminates yellow trap when transitioning to preempt from adjacent through phase.
Main Menu - 9) UTILITIES - 9) MISC
FYA DURING PREEMPT (Y/N) = Y

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.

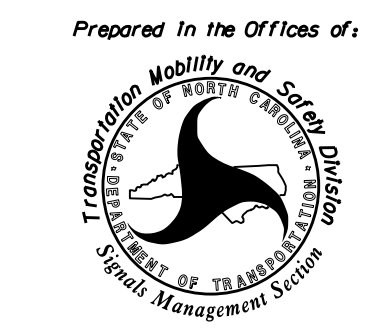
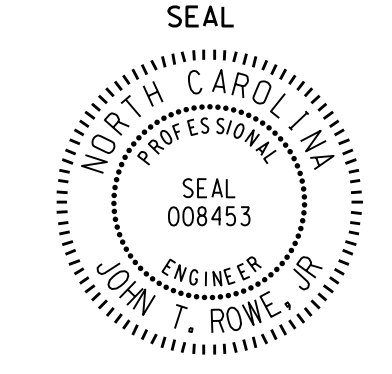
FLASHER CIRCUIT MODIFICATION DETAIL

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

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

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

Electrical Detail - Temporary Design 3 (TMP Phase 1, Steps 11-21) - Sheet 2 of 2

	ELECTRICAL AND PROGRAMMING DETAILS FOR:	NC 55 (South Alston Avenue) at NC 147 NB Ramp / Gann Street	SEAL 
	Prepared In the Offices of: S. ARMSTRONG	PLAN DATE: November 2014 PREPARED BY: S. Armstrong	REVIEWED BY: REVIEWED BY:
REVISIONS		INIT.	DATE
750 N. Greenfield Pkwy, Garner, NC 27529		SIG. INVENTORY NO. 05-0284T3	

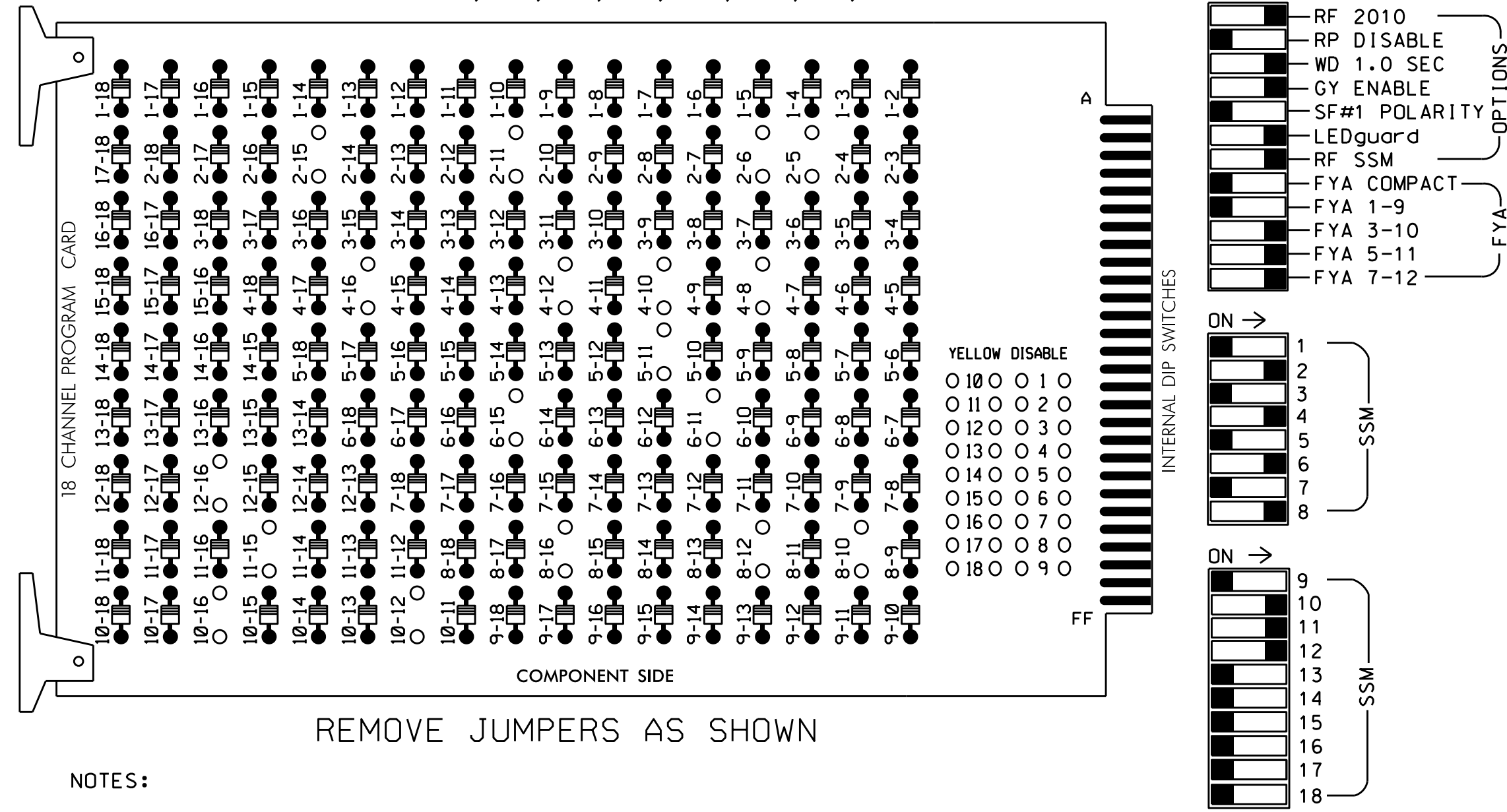
THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-0284T3
DESIGNED: September 2014
SEALED: 4/2/15
REVISED: N/A

EDI MODEL 2018ECL-NC CONFLICT MONITOR

PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 2-5, 2-6, 2-11, 2-15, 4-8, 4-10, 4-12, 4-16, 5-11, 6-11, 6-15, 8-10, 8-12, 8-16, 10-12, 10-16, 11-15, and 12-16.



- 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. 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. Verify that signal heads flash in accordance with the signal plans.
2. Program controller to Start Up in phases 2 and 6 green.
3. Set power-up flash time to 0 seconds within the controller programming. The conflict monitor will govern startup flash. Ensure STARTUP "RED START" is set to 0 seconds.
4. Enable Simultaneous Gap-Out feature for all phases.
5. Program all timing information into phase banks 1, 2, and 3 unless otherwise noted.
6. Set phase bank 3 maximum limit to 250 seconds for phases used.
7. Program phases 4 and 8 for Double Entry.
8. Ensure start up flash phases are coordinated with flash program block assignments.
9. Program Startup Ped Calls for phases 6 and 8.
10. Set the Red Revert interval on the controller to 1 second.
11. This cabinet and controller are part of the Durham Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070E
 CABINET.....332 W/ AUX
 SOFTWARE.....McCAIN 2033
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX FILE
 LOAD SWITCHES USED.....S2,S5,S7,S8,S9,S11,S12,AUX S2,
 AUX S4,AUX S5
 PHASES USED.....2,4,5,6,6PED,8,8PED
 OVERLAP 1.....NOT USED
 OVERLAP 2.....4+8
 OVERLAP 3.....*
 OVERLAP 4.....4+8

* See FYA PPLT Programming detail on sheet 2.

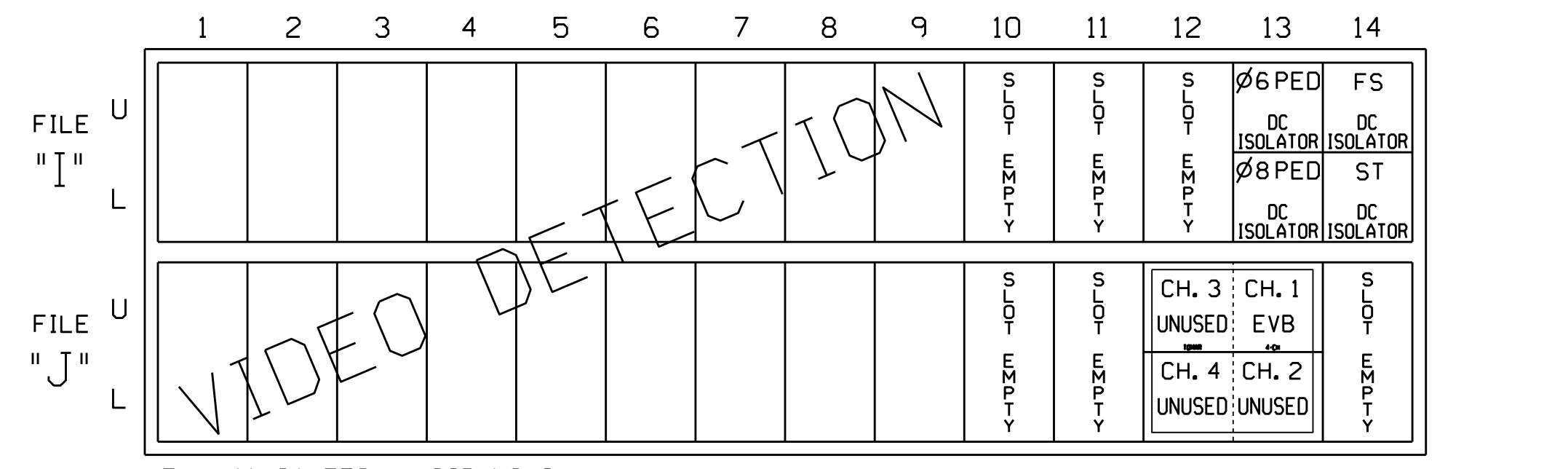
SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	NU	21,22	NU	NU	42,43	NU	43	51	61,62	P61, P62	NU	82,83	NU	81	NU	51	41	NU
RED		128			101				134			107						
YELLOW		129			102				135			108						
GREEN		130			103				136			109						
RED ARROW															A124	A114	A101	
YELLOW ARROW							132								A125	A115	A102	
FLASHING YELLOW ARROW															A126	A116	A103	
GREEN ARROW							133	133										
Hand icon										119			110					
Person icon																		

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

INPUT FILE POSITION LAYOUT

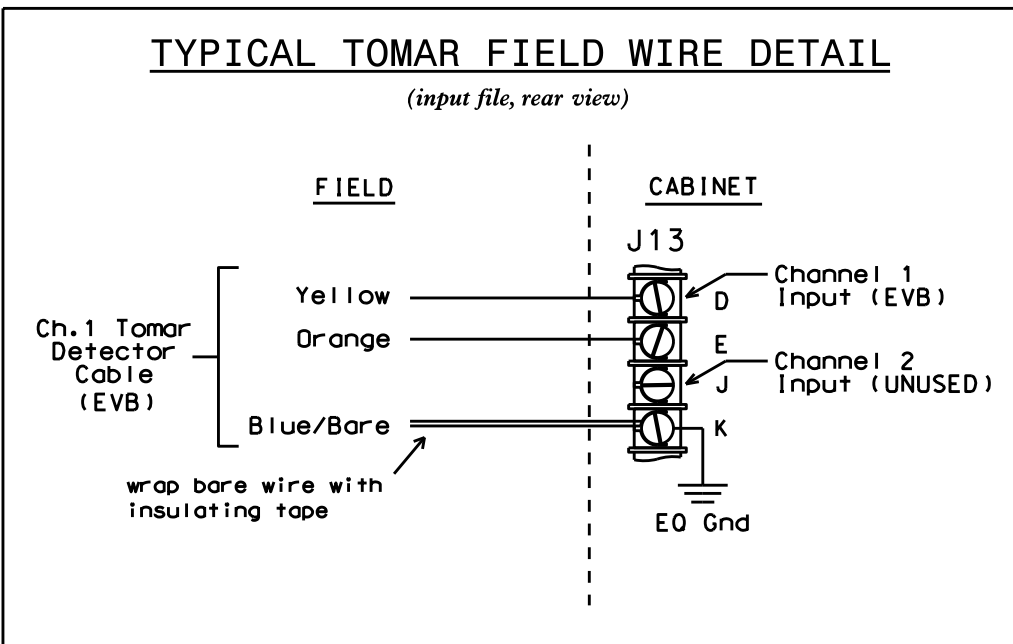
(front view)



SPECIAL DETECTOR NOTE

Install a video detection system for vehicle detection. Perform installation according to manufacturer's directions and NCDOT engineer approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.

4 CHANNEL TOMAR OSP CARD
 INSERT CARD INTO SLOT J13



INPUT FILE CONNECTION & PROGRAMMING CHART

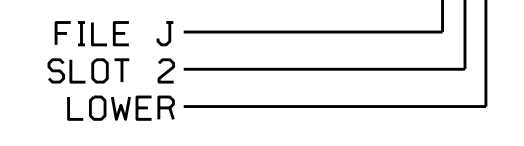
PED PUSH BUTTONS	LOOP TERMINAL	INPUT FILE POS.	DETECTOR NO.	PIN NO.	ATTRIBUTES	NEMA PHASE
P61,P62	TB8-7,9	I13U	26	68	2	6 PED
P81,P82	TB8-8,9	I13L	28	70	2	8 PED

DETECTOR ATTRIBUTES LEGEND:

- 1-FULL TIME DELAY
- 2-PED CALL
- 3-RESERVED
- 4-COUNTING
- 5-EXTENSION
- 6-TYPE 3
- 7-CALLING
- 8-ALTERNATE

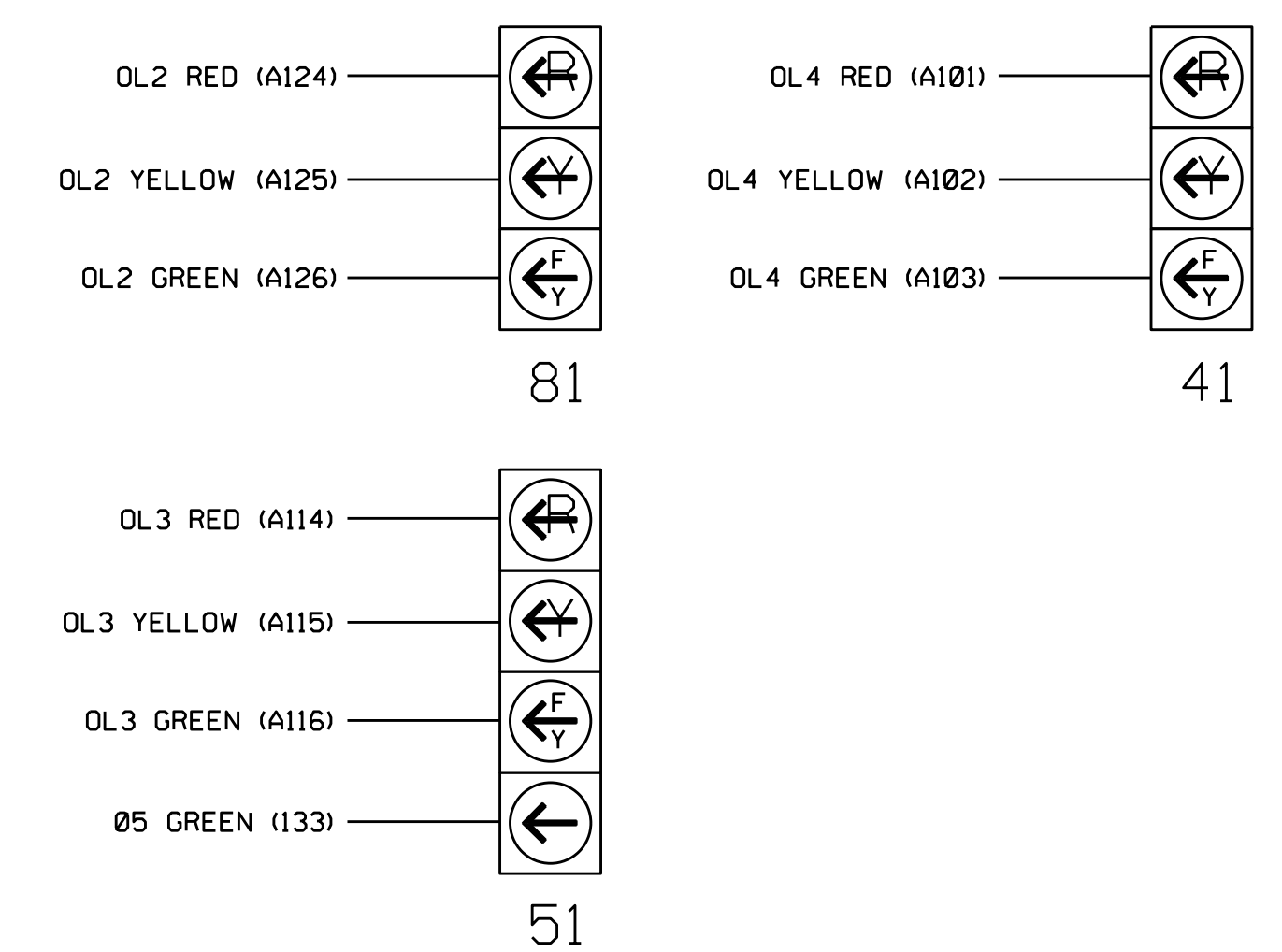
NOTE:
 INSTALL DC ISOLATOR IN INPUT FILE SLOT I13.

INPUT FILE POSITION LEGEND: J2L



FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



Electrical Detail - Temporary Design 4 (TMP Phase 2, Steps 1-6) - Sheet 1 of 2
 Electrical Detail - Temporary Design 6 (TMP Phase 2, Steps 7-12) - Sheet 1 of 2

Electrical and Programming Details for: **NC 55 (South Alston Avenue) at NC 147 NB Ramp / Gann Street**

Prepared in the Offices of: **Transporatio Mobility and Safety Solutions**

Division 5 Durham County

PLAN DATE: November 2014 REVIEWED BY: *[Signature]*

PREPARED BY: S. Armstrong REVIEWED BY: *[Signature]*

750 N. Greenfield Pkwy, Garner, NC 27529

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-0284T4/T6
 DESIGNED: September 2014
 SEALED: 4/2/15
 REVISED: N/A

SEAL: **JOHN T. ROWE, JR.** ENGINEER SEAL 008453

DocuSigned by: **John T. Rowe, Jr.** 4/2/2015

SIG. INVENTORY NO. 05-0284T4/T6

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 somstr00g

OVERLAP PROGRAMMING DETAIL

Program overlaps as follows:
Main Menu - 4) OVERLAP

Press "+"

OVERLAP [2]:

LOADSWITCH = 10	NOTE: For head 81
VEH SET 1 = 4.8	
YELLOW CLEARANCE = 3.7	
RED CLEARANCE = 2.6	

Press "+" twice

OVERLAP [4]:

LOADSWITCH = 12	NOTE: For head 41
VEH SET 1 = 4.8	
YELLOW CLEARANCE = 3.7	
RED CLEARANCE = 2.6	

END OF OVERLAP PROGRAMMING

EMERGENCY VEHICLE PREEMPTION PROGRAMMING

1. Program EVB preempt as follows:
Main Menu - 2) PREEMPT - 4) EMERGENCY VEHICLE
EVB Clear = 2
EVB Clearance Phases = 6
2. Program general preemption parameters as follows:
Main Menu - 2) PREEMPT - 6) MISC PREEMPTION PARAMETERS
Min Time Before PE ForceOff = 1
3. Ped Clear Before Preempt is a pedestrian timing parameter, and is programmed as follows:
Main Menu - 1) PHASE - 5) PEDESTRIAN TIMING
PHASE 6 MIN FDW = 4
PHASE 8 MIN FDW = 2

Program extend time on optical detector unit for 2.0 sec for EVB.

FYA PPLT PROGRAMMING

1. Program Flashing Yellow Arrow phases as follows:
Main Menu - 1) PHASE - 2) PHASE FUNCTIONS PAGE TWO
PPLT FYA = PHASE 5
2. Assign output pin for Flashing Yellow Arrow as follows:
Main Menu - 6) OUTPUTS - F) FYA PPLT
Phase 5 = 90
3. Redirect RED and YELLOW outputs for the left turn phases as follows:
Main Menu - 6) OUTPUTS - 8) REDIRECT PHASE
Phase 5 RED = 88, Phase 5 YELLOW = 89

**OVERLAP GREEN FLASH PROGRAMMING
DETAIL FOR 3-SECTION FYA HEADS**

The following will cause the overlap green outputs to flash, which are wired to the flashing yellow arrows. Program as follows:

Main Menu - 1) PHASE - 2) PHASE FUNCTIONS PAGE TWO
OLAP G FL = 2,4

**MIN WALK DURING PREEMPTION
PROGRAMMING**

To disable MIN WALK pedestrian timing during preemption, program the controller as follows:
Main Menu - 9) UTILITIES - 5) CONFIGURATION
EXTRA TWO = 3

SPECIAL NOTE EV PREEMPT PROGRAMMING

Setting 'FYA DURING PREEMPT' to 'Y' eliminates yellow trap when transitioning to preempt from adjacent through phase.
Main Menu - 9) UTILITIES - 9) MISC
FYA DURING PREEMPT (Y/N) = Y

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.

FLASHER CIRCUIT MODIFICATION DETAIL

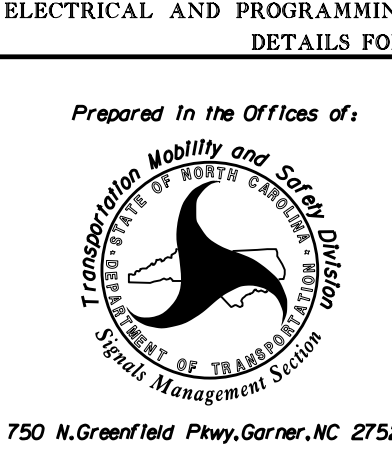
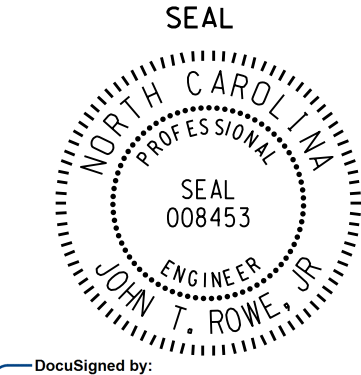
IN ORDER TO INSURE THAT SIGNALS FLASH CONCURRENTLY ON THE SAME APPROACH, MAKE THE FOLLOWING FLASHER CIRCUIT CHANGES:

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

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

Electrical Detail - Temporary Design 4 (TMP Phase 2, Steps 1-6) - Sheet 2 of 2
Electrical Detail - Temporary Design 6 (TMP Phase 2, Steps 7-12) - Sheet 2 of 2

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0284T4/T6
DESIGNED: September 2014
SEALED: 4/2/15
REVISED: N/A

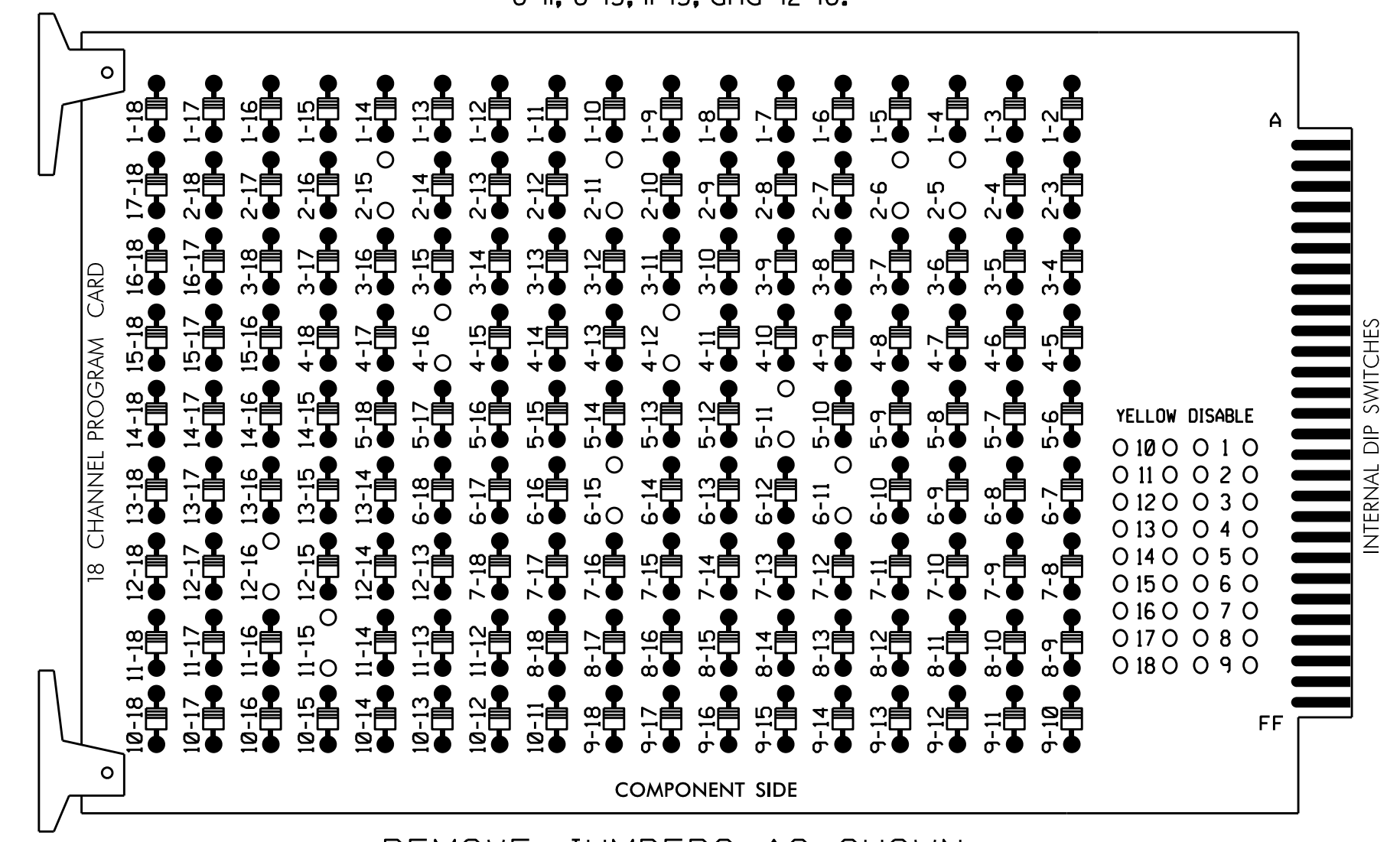
	ELECTRICAL AND PROGRAMMING DETAILS FOR:	NC 55 (South Alston Avenue) at NC 147 NB Ramp / Gann Street	SEAL 
	Division 5 Durham County	PLAN DATE: November 2014 PREPARED BY: S. Armstrong	REVIEWED BY: JTR REVIEWED BY:
REVISIONS		INIT.	DATE
SIG. INVENTORY NO. 05-0284T4/T6			

05-0284-T4-06-S1
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 sarmstrong

EDI MODEL 2018ECL-NC CONFLICT MONITOR
PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 2-5, 2-6, 2-11, 2-15, 4-12, 4-16, 5-11, 6-11, 6-15, 11-15, and 12-16.



REMOVE JUMPERS AS SHOWN

NOTES:

- Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
- Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
- Ensure that Red Enable is active at all times during normal operation.
- 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. Verify that signal heads flash in accordance with the signal plans.
- Program controller to Start Up in phases 2 and 6 green.
- Set power-up flash time to 0 seconds within the controller programming. The conflict monitor will govern startup flash. Ensure STARTUP "RED START" is set to 0 seconds.
- Enable Simultaneous Gap-Out feature for all phases.
- Program all timing information into phase banks 1, 2, and 3 unless otherwise noted.
- Set phase bank 3 maximum limit to 250 seconds for phases used.
- Program phases 4 and 8 for Double Entry.
- Ensure start up flash phases are coordinated with flash program block assignments.
- Program Startup Ped Calls for phases 6 and 8.
- Set the Red Revert interval on the controller to 1 second.
- This cabinet and controller are part of the Durham Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070E
 CABINET.....332 W/ AUX
 SOFTWARE.....McCAIN 2033
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX FILE
 LOAD SWITCHES USED.....S2,S5,S7,S8,S9,S12,
 AUX S4,AUX S5
 PHASES USED.....2,4,5,6,6PED,8PED
 OVERLAP 1.....NOT USED
 OVERLAP 2.....NOT USED
 OVERLAP 3.....NOT *
 OVERLAP 4.....4

* See FYA PPLT Programming detail on sheet 2.

SIGNAL HEAD HOOK-UP CHART

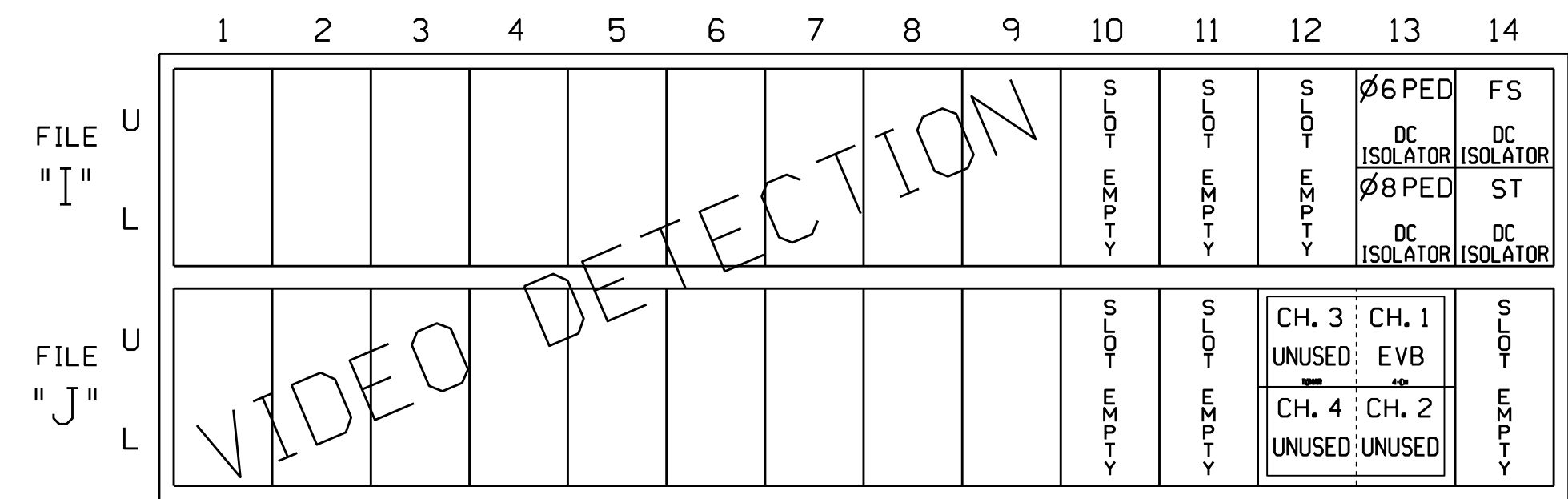
LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6	
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18	
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE	
SIGNAL HEAD NO.	NU	21,22	NU	NU	42,43	NU	43	51*	61,62	P61, P62	NU	NU	NU	NU	NU	51*	41*	NU	
RED		128			101				134										
YELLOW		129			102				135										
GREEN		130			103				136										
RED ARROW																	A114	A101	
YELLOW ARROW							132										A115	A102	
FLASHING YELLOW ARROW																		A116	A103
GREEN ARROW							133	133											
Hand icon									119				110						
Person icon									121				112						

NU = Not Used

* See pictorial of head wiring in detail below.

INPUT FILE POSITION LAYOUT

(front view)



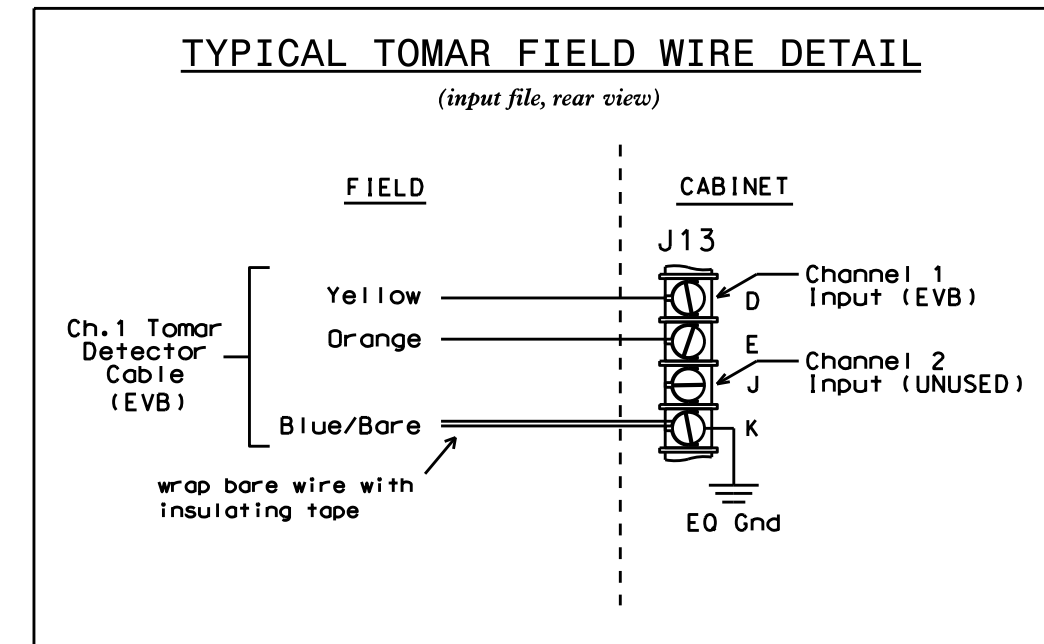
EX.: 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE
 ST = STOP TIME
 EVB = EMERGENCY VEHICLE PREEMPT

SPECIAL DETECTOR NOTE

Install a video detection system for vehicle detection. Perform installation according to manufacturer's directions and NCDOT engineer approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.

4 CHANNEL TOMAR OSP CARD
 INSERT CARD INTO SLOT J13



INPUT FILE CONNECTION & PROGRAMMING CHART

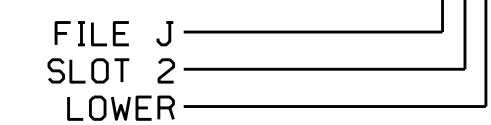
PED PUSH BUTTONS	LOOP TERMINAL	INPUT FILE POS.	DETECTOR NO.	PIN NO.	ATTRIBUTES	NEMA PHASE
P61,P62	TB8-7,9	I13U	26	68	2	6 PED
P81,P82	TB8-8,9	I13L	28	70	2	8 PED

DETECTOR ATTRIBUTES LEGEND:

- FULL TIME DELAY
- PED CALL
- RESERVED
- COUNTING
- EXTENSION
- TYPE 3
- CALLING
- ALTERNATE

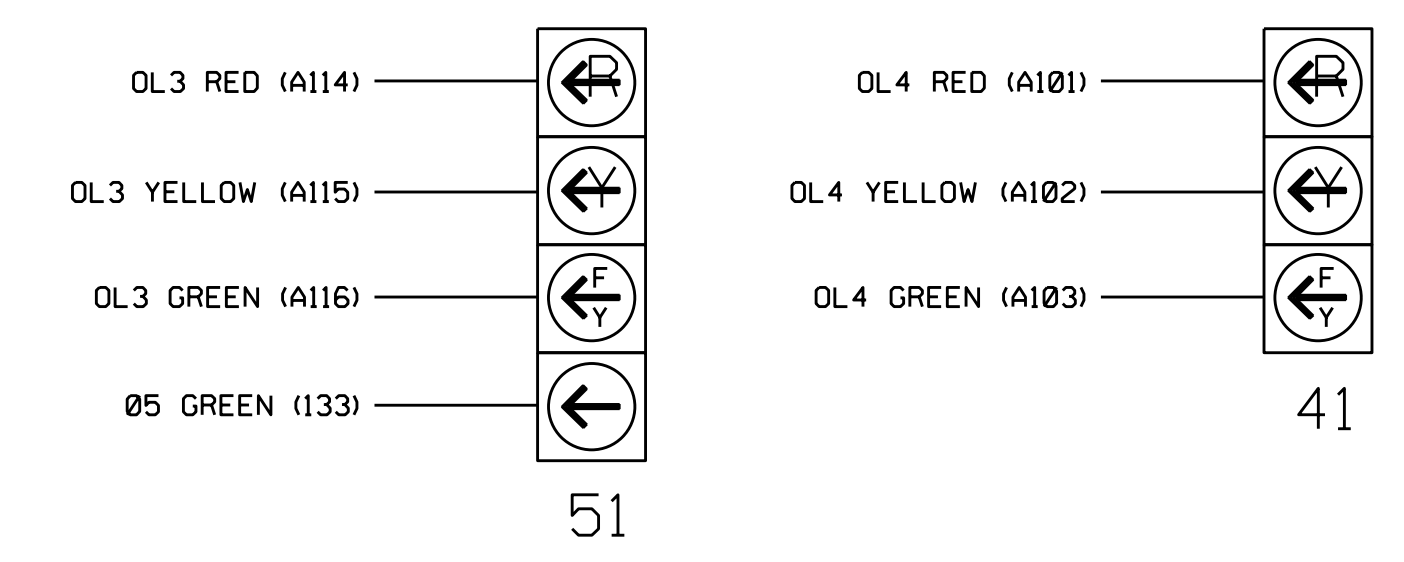
NOTE:
 INSTALL DC ISOLATOR IN INPUT FILE SLOT I13.

INPUT FILE POSITION LEGEND: J2L



FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



Electrical Detail - Temporary Design 5 (TMP Phase 2, Steps 1-6) - Sheet 1 of 2

Electrical and Programming Details for: **NC 55 (South Alston Avenue) at NC 147 NB Ramp / Gann Street**

Prepared in the Offices of: **Transportation Mobility and Safety Solutions**

Division 5, Durham County, Durham

PLAN DATE: November 2014 REVIEWED BY: *[Signature]*

PREPARED BY: S. Armstrong REVIEWED BY: *[Signature]*

750 N. Greenfield Pkwy, Garner, NC 27529

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-0284T5
 DESIGNED: September 2014
 SEALED: 4/2/15
 REVISED: N/A

SEAL: JOHN T. ROWE, JR., ENGINEER, SEAL 008453

DocuSigned by: **John T. Rowe, Jr.** 4/2/2015

SIG. INVENTORY NO. 05-0284T5

27-MAR-2015 08:52
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 somstr003

OVERLAP PROGRAMMING DETAIL

Program overlaps as follows:
Main Menu - 4) OVERLAP

Press "+" three times

OVERLAP [4]:

LOADSWITCH = 12	NOTE: For head 41
VEH SET 1 = 4	
YELLOW CLEARANCE = 3.0	
RED CLEARANCE = 2.6	

END OF OVERLAP PROGRAMMING

EMERGENCY VEHICLE PREEMPTION PROGRAMMING

1. Program EVB preempt as follows:
Main Menu - 2) PREEMPT - 4) EMERGENCY VEHICLE
EVB Clear = 2
EVB Clearance Phases = 6
2. Program general preemption parameters as follows:
Main Menu - 2) PREEMPT - 6) MISC PREEMPTION PARAMETERS
Min Time Before PE ForceOff = 1
3. Ped Clear Before Preempt is a pedestrian timing parameter, and is programmed as follows:
Main Menu - 1) PHASE - 5) PEDESTRIAN TIMING
PHASE 6 MIN FDW = 4
PHASE 8 MIN FDW = 2

Program extend time on optical detector unit for 2.0 sec for EVB.

FYA PPLT PROGRAMMING

1. Program Flashing Yellow Arrow phases as follows:
Main Menu - 1) PHASE - 2) PHASE FUNCTIONS PAGE TWO
PPLT FYA = PHASE 5
2. Assign output pin for Flashing Yellow Arrow as follows:
Main Menu - 6) OUTPUTS - F) FYA PPLT
Phase 5 = 90
3. Redirect RED and YELLOW outputs for the left turn phases as follows:
Main Menu - 6) OUTPUTS - 8) REDIRECT PHASE
Phase 5 RED = 88, Phase 5 YELLOW = 89

**OVERLAP GREEN FLASH PROGRAMMING
DETAIL FOR 3-SECTION FYA HEADS**

The following will cause the overlap green outputs to flash, which are wired to the flashing yellow arrows. Program as follows:

Main Menu - 1) PHASE - 2) PHASE FUNCTIONS PAGE TWO
OLAP G FL = 4

**MIN WALK DURING PREEMPTION
PROGRAMMING**

To disable MIN WALK pedestrian timing during preemption, program the controller as follows:
Main Menu - 9) UTILITIES - 5) CONFIGURATION
EXTRA TWO = 3

SPECIAL NOTE EV PREEMPT PROGRAMMING

Setting 'FYA DURING PREEMPT' to 'Y' eliminates yellow trap when transitioning to preempt from adjacent through phase.
Main Menu - 9) UTILITIES - 9) MISC
FYA DURING PREEMPT (Y/N) = Y

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.

FLASHER CIRCUIT MODIFICATION DETAIL

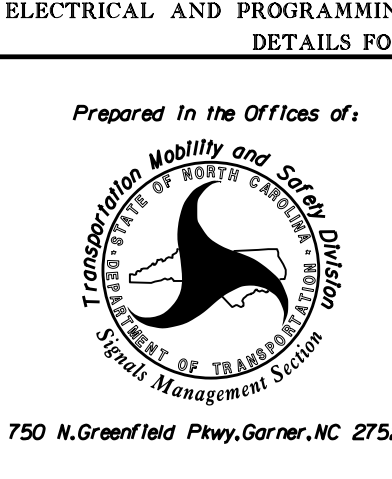
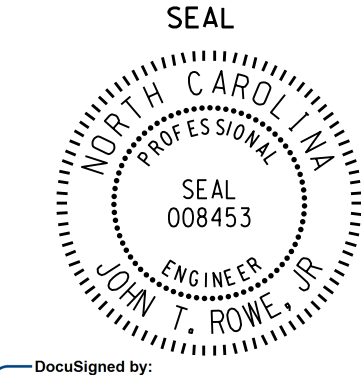
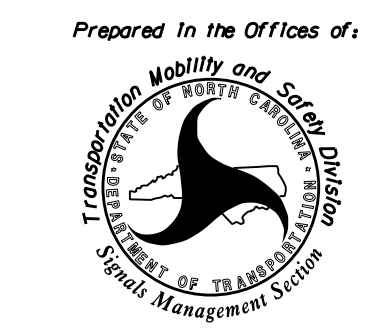
IN ORDER TO INSURE THAT SIGNALS FLASH CONCURRENTLY ON THE SAME APPROACH, MAKE THE FOLLOWING FLASHER CIRCUIT CHANGES:

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

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

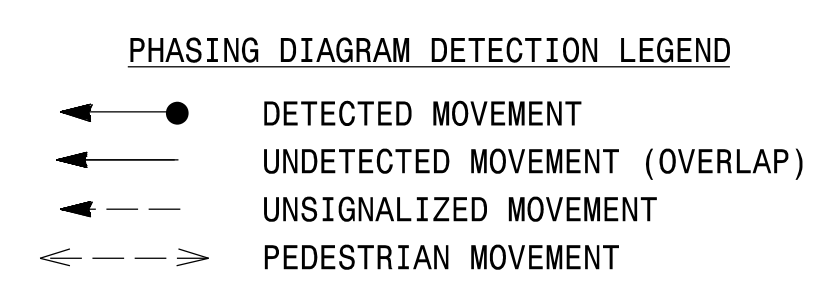
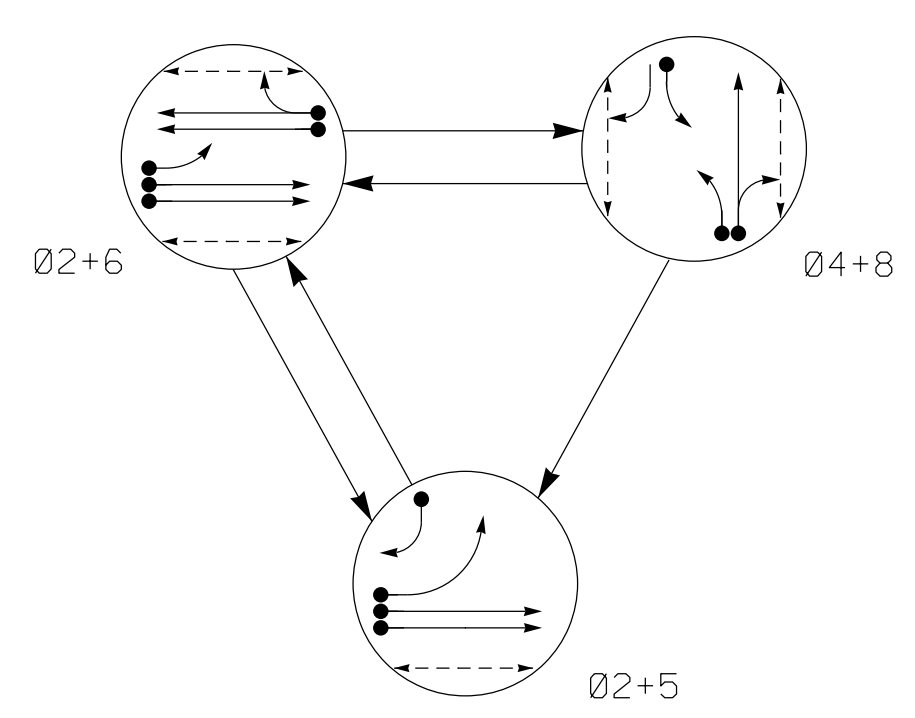
THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0284T5
DESIGNED: September 2014
SEALED: 4/2/15
REVISED: N/A

Electrical Detail - Temporary Design 5 (TMP Phase 2, Steps 1-6) - Sheet 2 of 2

	ELECTRICAL AND PROGRAMMING DETAILS FOR:	NC 55 (South Alston Avenue) at NC 147 NB Ramp / Gann Street	SEAL 
	Prepared In the Offices of: 	Division 5 Durham County Durham	PLAN DATE: November 2014 REVIEWED BY: JTR
	PREPARED BY: S. Armstrong REVIEWED BY:	REVISIONS INIT. DATE	DocuSigned by: John T. Rowe, Jr. 4/2/2015
			SIG. INVENTORY NO. 05-0284T5

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 sarmstrong

PHASING DIAGRAM



EV Preempt Phases

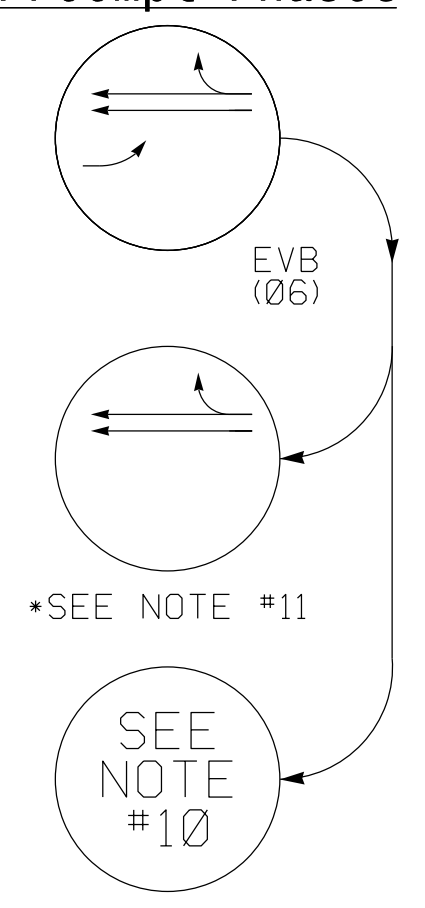
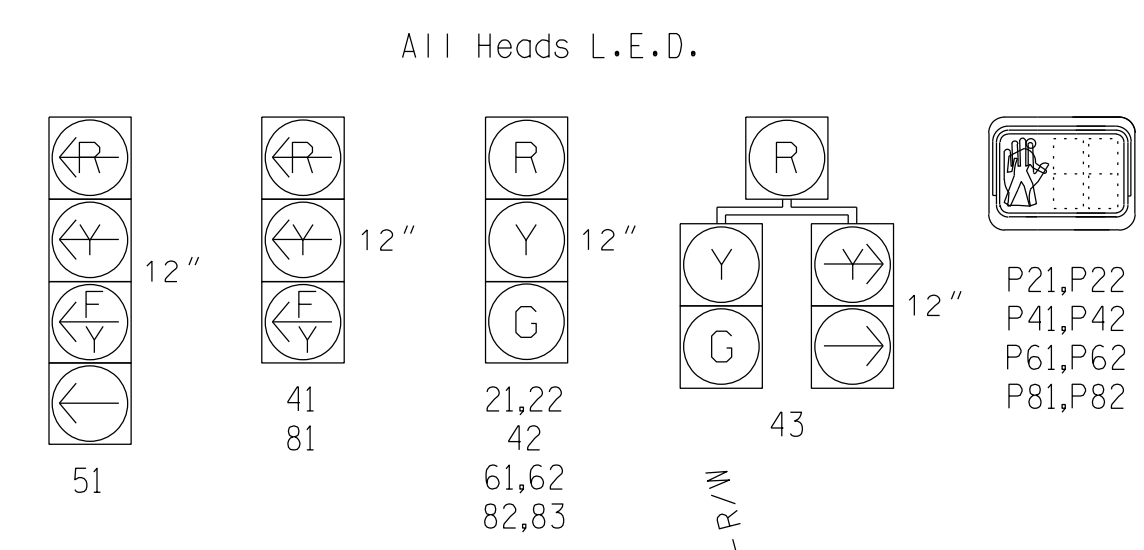


TABLE OF OPERATION table with columns for SIGNAL FACE, PHASE (02+5, 04+8, 05, 06, 08, F, H, G, L, T, F), and signal face details.

SIGNAL FACE I.D.



2033 SOFTWARE w/ 2070 CONTROLLER LOOP & DETECTOR UNIT INSTALLATION CHART

2033 SOFTWARE w/ 2070 CONTROLLER LOOP & DETECTOR UNIT INSTALLATION CHART table with columns for LOOP NO., SIZE (ft), TURNS, DIST. FROM STOPBAR (ft), NEW EXISTING, NEMA PHASE, DELAY, CARRY (STRETCH), and DETECTOR PROGRAMMING attributes.

3 Phase Fully Actuated w/ EV Preemption (Durham Signal System)

NOTES

- 1. Refer to "Road Standard Drawings NCDOT" dated January 2012, "Standard Specifications for Roads and Structures" dated January 2012.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 5 may be lagged.
4. Set all detector units to presence mode.
5. Program all timing information into phase banks 1, 2, and 3 unless otherwise noted.
6. Set phase bank 3 maximum limit to 250 seconds for phases used.
7. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
8. Program pedestrian heads to countdown the flashing "Don't Walk" time.
9. This intersection features an optical preemption system. Shown locations of optical detectors are conceptual only.
10. Upon completion of Emergency Vehicle Preemption, controller returns to normal operation.
11. When EVB preemption initializes during side street service signal head 51 will display a red arrow.
12. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
13. Pedestrian pedestals are conceptual and shown for reference only. See sheets P1-P3 for pushbutton location details.

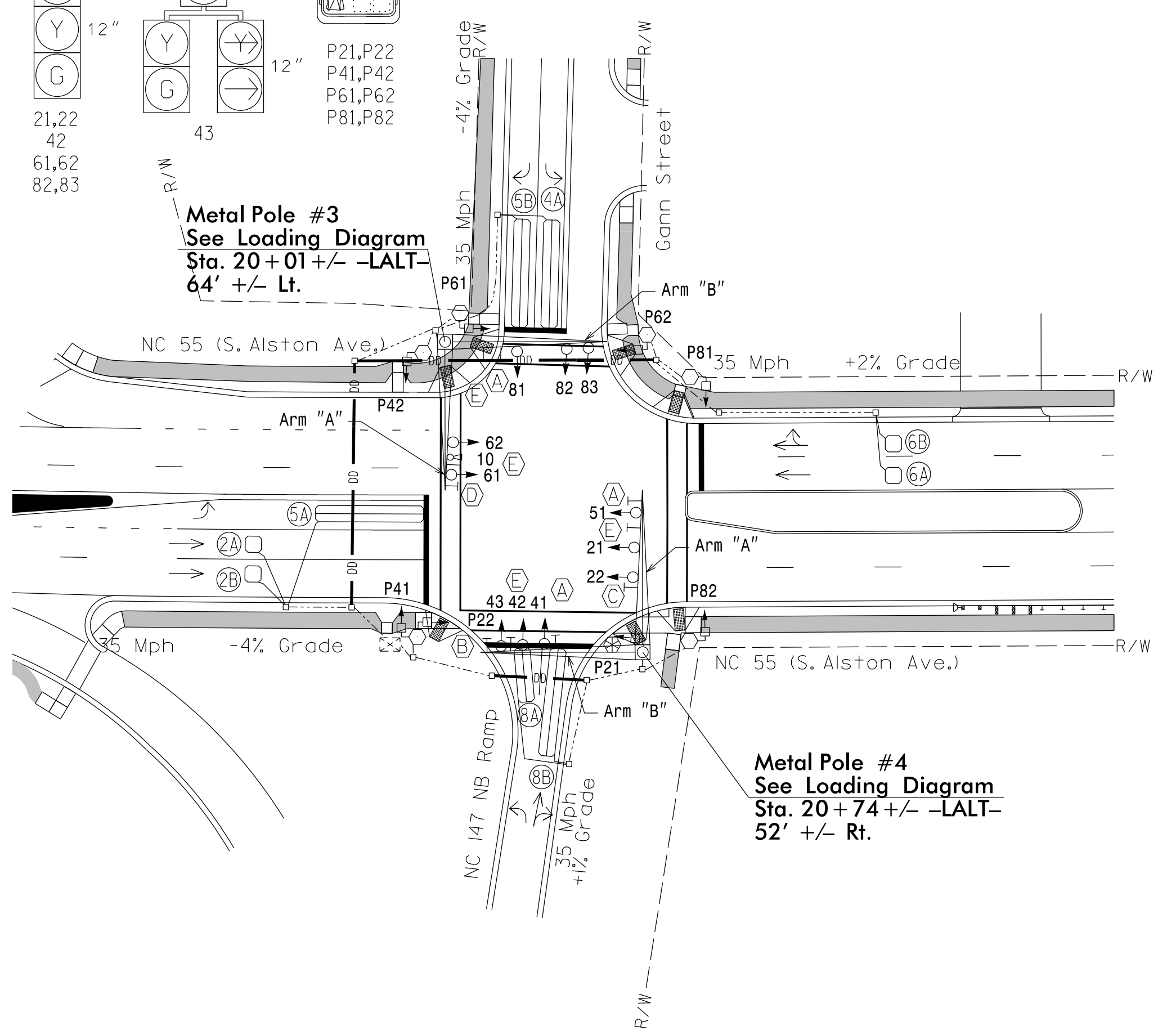
2033 EV PREEMPTION table with columns for FUNCTION and EVB (SECONDS) for delay before preempt, min. ped. clear before preempt, min. green before preempt, clearance time, and preempt extend.

* See Timing Chart for Min Ped Clearance
** Program Timing on Optical Detector Unit

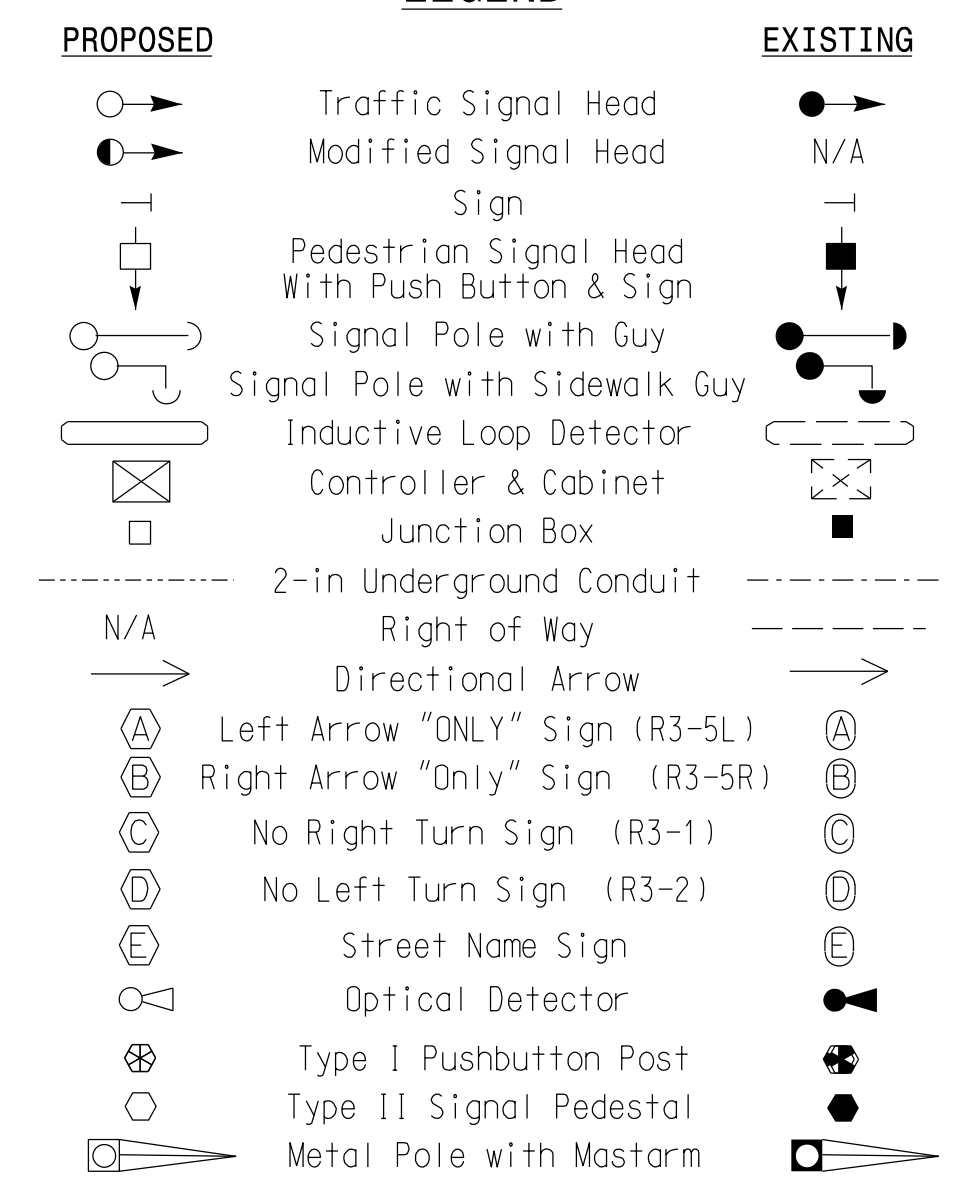
TIMING CHART

TIMING CHART table with columns for PHASE and timing values for 02, 04, 05, 06, 08, 0L2, 0L4 for various functions like minimum initial, vehicle extension, yellow change int., red clearance, maximum limit, recall position, vehicle call memory, double entry, walk, flashing don't walk, min ped clearance, type 3 limit, alternate extension, add per vehicle, maximum initial, maximum gap, reduce 0.1 sec every, and minimum gap.

* 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



Signal Upgrade - Final Design

SEPI ENGINEERING & CONSTRUCTION logo and contact information: 1025 Wade Avenue, Raleigh, NC 27605, Tel: 919-789-9977, Fax: 919-789-9591, License #: C-2197

Professional Engineer Seal for Gregory P. Hochanadel, State of North Carolina, License No. 28430.

Project information: NC 55 (South Alston Avenue) at NC 147 NB Ramp / Gann Street, Division 5 Durham County, Durham, PLAN DATE: September 2014, REVIEWED BY: J Hochanadel, PREPARED BY: C Lawson, REVISIONS table, INIT., DATE, SCALE 1"=40'

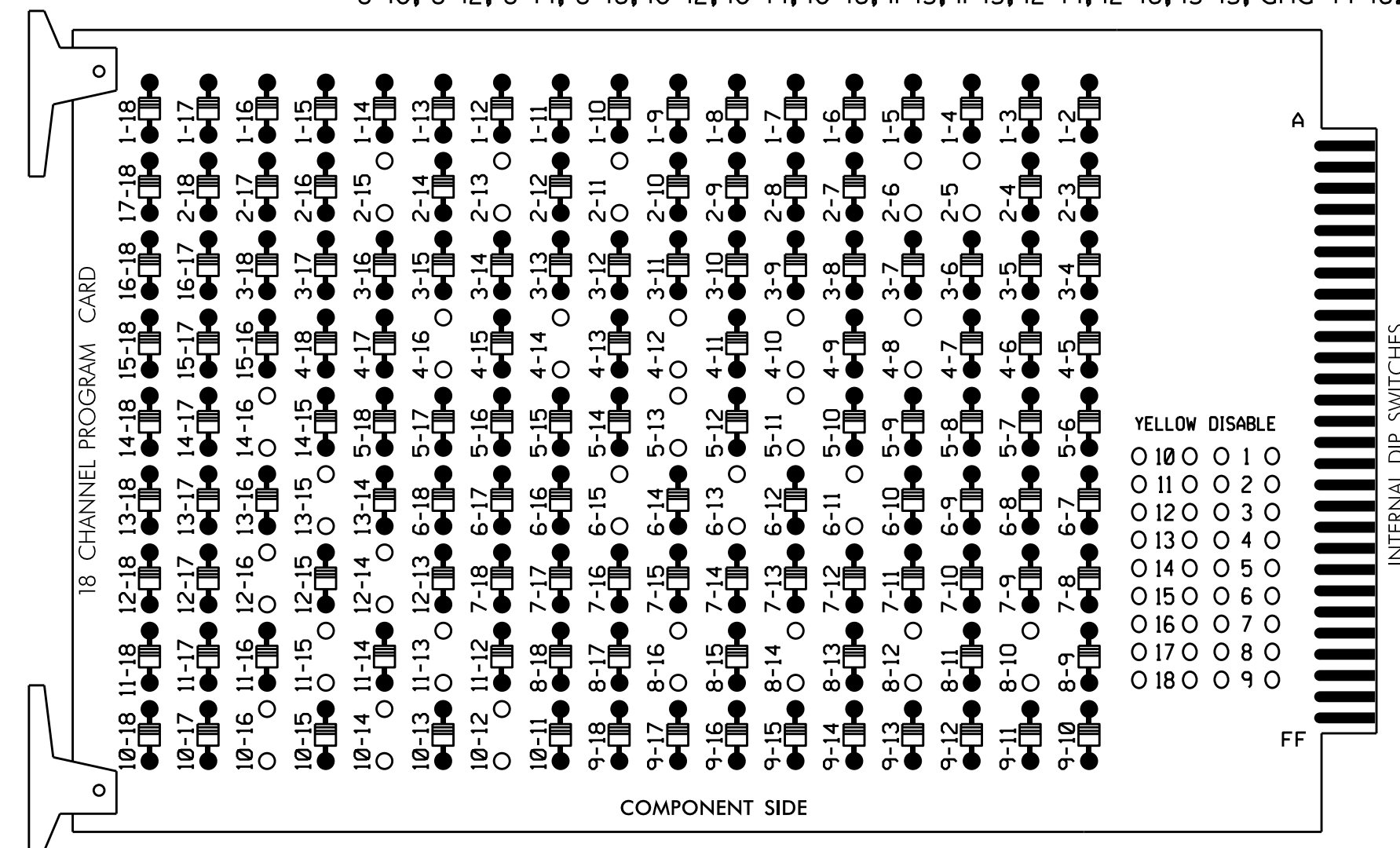
Inventory table with columns for REVISIONS, INIT., DATE, and SIG. INVENTORY NO. 05-0284

3/20/2015 10:11:00 AM C:\Users\pawson\Documents\2012 Traffic\Signal Design\Signal Design Section\Signal Design Section.dgn

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 2-5, 2-6, 2-11, 2-13, 2-15, 4-8, 4-10, 4-12, 4-14, 4-16, 5-11, 5-13, 6-11, 6-13, 6-15, 8-10, 8-12, 8-14, 8-16, 10-12, 10-14, 10-16, 11-13, 11-15, 12-14, 12-16, 13-15, and 14-16.



REMOVE JUMPERS AS SHOWN

NOTES:

- Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
- Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
- Ensure that Red Enable is active at all times during normal operation.
- 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. Verify that signal heads flash in accordance with the signal plans.
- Program controller to Start Up in phases 2 and 6 green.
- Set power-up flash time to 0 seconds within the controller programming. The conflict monitor will govern startup flash. Ensure STARTUP "RED START" is set to 0 seconds.
- Enable Simultaneous Gap-Out feature for all phases.
- Program all timing information into phase banks 1, 2, and 3 unless otherwise noted.
- Set phase bank 3 maximum limit to 250 seconds for phases used.
- Program phases 4 and 8 for Double Entry.
- Ensure start up flash phases are coordinated with flash program block assignments.
- Program Startup Ped Calls for phases 2, 4, 6, and 8.
- Set the Red Revert interval on the controller to 1 second.
- This cabinet and controller are part of the Durham Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070E
 CABINET.....332 W/ AUX
 SOFTWARE.....McCAIN 2033
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX FILE
 LOAD SWITCHES USED.....S2,S3,S5,S6,S7,S8,S9,S11,S12, AUX S2,AUX S4,AUX S5
 PHASES USED.....2,2PED,4,4PED,5,6,6PED,8,8PED
 OVERLAP 1.....NOT USED
 OVERLAP 2.....4+8
 OVERLAP 3.....*
 OVERLAP 4.....4+8

* See FYA PPLT Programming detail on sheet 2.

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	NU	21,22	P21, P22	NU	42,43	P41, P42	43	51	61,62	P61, P62	NU	82,83	81	81	NU	51	41	NU
RED		128			101				134			107						
YELLOW		129			102				135			108						
GREEN		130			103				136			109						
RED ARROW															A124	A114	A101	
YELLOW ARROW							132								A125	A115	A102	
FLASHING YELLOW ARROW															A126	A116	A103	
GREEN ARROW							133	133										
Hand icon				113						119		110						
Person icon				115				106				121			112			

NU = Not Used

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

★ See pictorial of head wiring in detail below.

INPUT FILE POSITION LAYOUT

(front view)

FILE	1	2	3	4	5	6	7	8	9	10	11	12	13	14
U	∅ 2	∅ 2	∅ 2	∅ 2	∅ 4	∅ 4	∅ 4	∅ 4	∅ 4	∅ 4	∅ 4	∅ 4	∅ 4	∅ 4
L	2A	2B	2C	2D	2E	2F	2G	2H	2I	2J	2K	2L	2M	2N
U	∅ 5	∅ 5	∅ 6	∅ 6	∅ 8	∅ 8	∅ 8	∅ 8	∅ 8	∅ 8	∅ 8	∅ 8	∅ 8	∅ 8
L	5A	5B	6A	6B	8A	8B	8C	8D	8E	8F	8G	8H	8I	8J

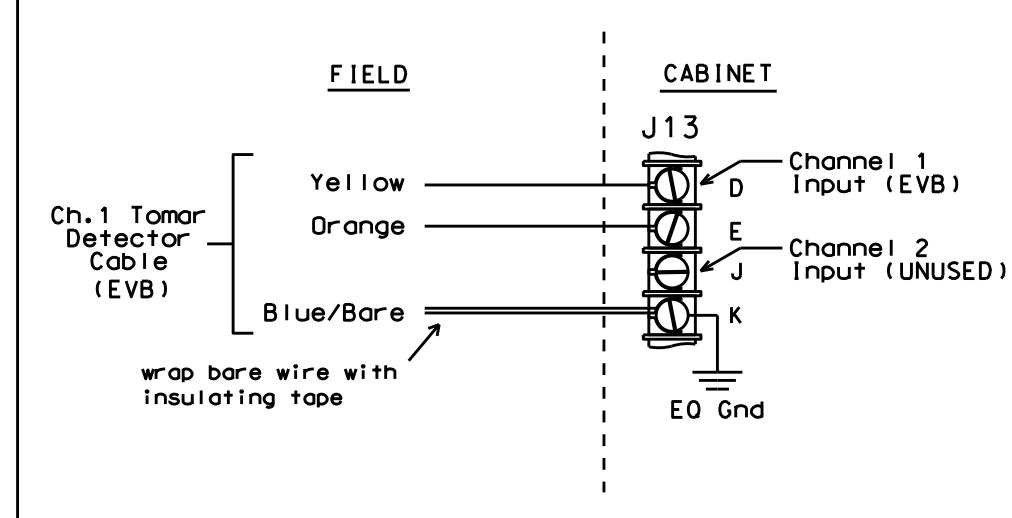
EX. : 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE
 ST = STOP TIME
 EVB = EMERGENCY VEHICLE PREEMPT

4 CHANNEL TOMAR OSP CARD
 INSERT CARD INTO SLOT J13

TYPICAL TOMAR FIELD WIRE DETAIL

(input file, rear view)



INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	DETECTOR NO.	PIN NO.	ATTRIBUTES	NEMA PHASE
2A	TB2-5,6	I2U	1	39	5 7 2	2
2B	TB2-7,8	I2L	5	43	5 7 2	2
4A	TB4-9,10	I6U	3	41	5 7 4	4
5A	TB3-1,2	J1U	13	55	5 7 5	5
5B	TB3-5,6	J2U	2	40	5 7 5	5
6A	TB3-9,10	J3U	22	64	5 7 6	6
6B	TB3-11,12	J3L	30	77	5 7 6	6
8A	TB5-9,10	J6U	4	42	5 7 8	8
8B	TB5-11,12	J6L	8	46	5 7 8	8
PED PUSH BUTTONS						
P21,P22	TB8-4,6	I12U	25	67	2	2 PED
P41,P42	TB8-5,6	I12L	27	69	2	4 PED
P61,P62	TB8-7,9	I13U	26	68	2	6 PED
P81,P82	TB8-8,9	I13L	28	70	2	8 PED

DETECTOR ATTRIBUTES LEGEND:

- FULL TIME DELAY
- PED CALL
- RESERVED
- COUNTING
- EXTENSION
- TYPE 3
- CALLING
- ALTERNATE

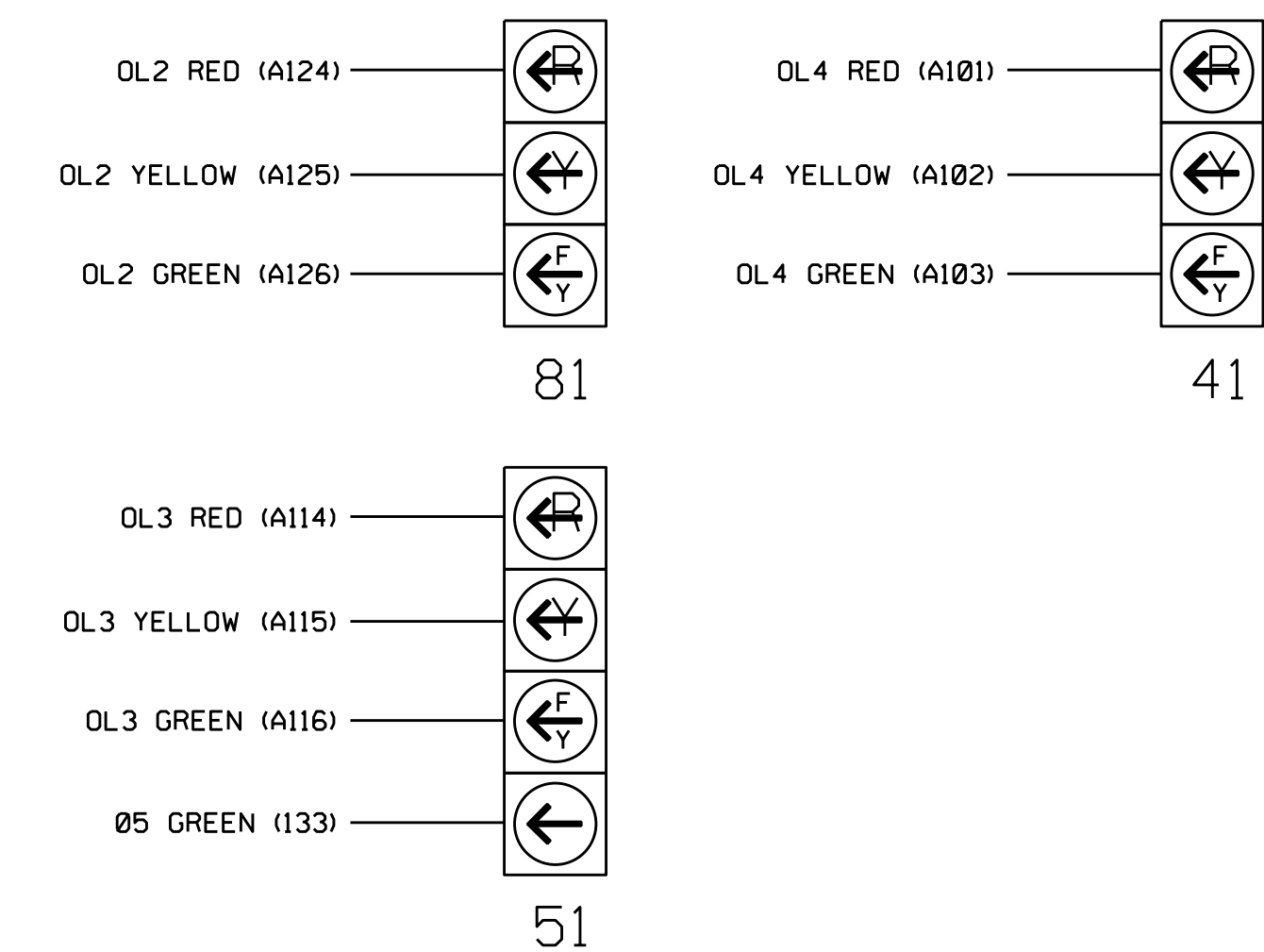
INPUT FILE POSITION LEGEND: J2L

- FILE J
 SLOT 2
 LOWER

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

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



THIS ELECTRICAL DETAIL IS FOR
 THE SIGNAL DESIGN: 05-0284
 DESIGNED: September 2014
 SEALED: 4/2/15
 REVISED: N/A

Electrical Detail - Final Design - Sheet 1 of 2

Electrical and Programming Details For: NC 55 (South Alston Avenue) at NC 147 NB Ramp / Gann Street

Prepared In the Offices of: *Transporatio Mobility and Safety Solutions*

Division 5 Durham County

PLAN DATE: November 2014 REVIEWED BY: *JTR*

PREPARED BY: S. Armstrong REVIEWED BY:

REVISIONS INIT. DATE

Seal: JOHN T. ROWE, INC. ENGINEER SEAL 008453

DocuSigned by: John T. Rowe, Inc. 4/2/2015

750 N. Greenfield Pkwy, Garner, NC 27529

SIG. INVENTORY NO. 05-0284

27-MAR-2015 08:55
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 sarmstrong

OVERLAP PROGRAMMING DETAIL

Program overlaps as follows:
Main Menu - 4) OVERLAP

Press "+"

OVERLAP [2]:

LOADSWITCH = 10	NOTE: For head 81
VEH SET 1 = 4.8	
YELLOW CLEARANCE = 3.8	
RED CLEARANCE = 3.4	

Press "+" twice

OVERLAP [4]:

LOADSWITCH = 12	NOTE: For head 41
VEH SET 1 = 4.8	
YELLOW CLEARANCE = 3.8	
RED CLEARANCE = 3.4	

END OF OVERLAP PROGRAMMING

EMERGENCY VEHICLE PREEMPTION PROGRAMMING

1. Program EVB preempt as follows:
Main Menu - 2) PREEMPT - 4) EMERGENCY VEHICLE
EVB Clear = 2
EVB Clearance Phases = 6
2. Program general preemption parameters as follows:
Main Menu - 2) PREEMPT - 6) MISC PREEMPTION PARAMETERS
Min Time Before PE ForceOff = 1
3. Ped Clear Before Preempt is a pedestrian timing parameter, and is programmed as follows:
Main Menu - 1) PHASE - 5) PEDESTRIAN TIMING
PHASE 2 MIN FDW = 7
PHASE 4 MIN FDW = 10
PHASE 6 MIN FDW = 4
PHASE 8 MIN FDW = 9

Program extend time on optical detector unit for 2.0 sec for EVB.

FYA PPLT PROGRAMMING

1. Program Flashing Yellow Arrow phases as follows:
Main Menu - 1) PHASE - 2) PHASE FUNCTIONS PAGE TWO
PPLT FYA = PHASE 5
2. Assign output pin for Flashing Yellow Arrow as follows:
Main Menu - 6) OUTPUTS - F) FYA PPLT
Phase 5 = 90
3. Redirect RED and YELLOW outputs for the left turn phases as follows:
Main Menu - 6) OUTPUTS - 8) REDIRECT PHASE
Phase 5 RED = 88, Phase 5 YELLOW = 89

**OVERLAP GREEN FLASH PROGRAMMING
DETAIL FOR 3-SECTION FYA HEADS**

The following will cause the overlap green outputs to flash, which are wired to the flashing yellow arrows. Program as follows:

Main Menu - 1) PHASE - 2) PHASE FUNCTIONS PAGE TWO
OLAP G FL = 2,4

**MIN WALK DURING PREEMPTION
PROGRAMMING**

To disable MIN WALK pedestrian timing during preemption, program the controller as follows:
Main Menu - 9) UTILITIES - 5) CONFIGURATION
EXTRA TWO = 3

SPECIAL NOTE EV PREEMPT PROGRAMMING

Setting 'FYA DURING PREEMPT' to 'Y' eliminates yellow trap when transitioning to preempt from adjacent through phase.
Main Menu - 9) UTILITIES - 9) MISC
FYA DURING PREEMPT (Y/N) = Y

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.

FLASHER CIRCUIT MODIFICATION DETAIL

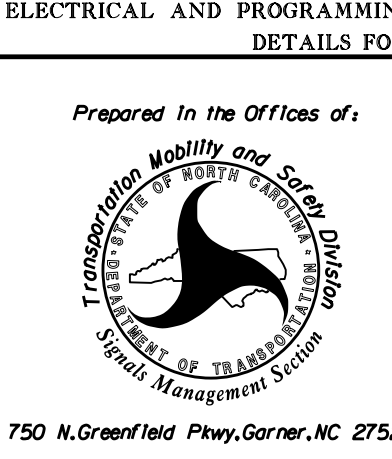
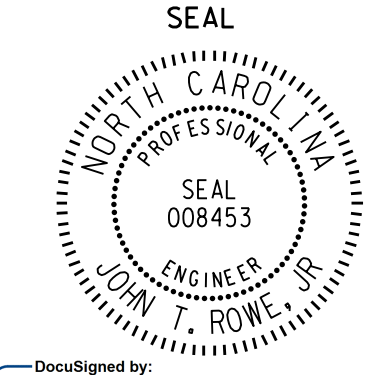

IN ORDER TO INSURE THAT SIGNALS FLASH CONCURRENTLY ON THE SAME APPROACH, MAKE THE FOLLOWING FLASHER CIRCUIT CHANGES:

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

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0284
DESIGNED: September 2014
SEALED: 4/2/15
REVISED: N/A

Electrical Detail - Final Design - Sheet 2 of 2

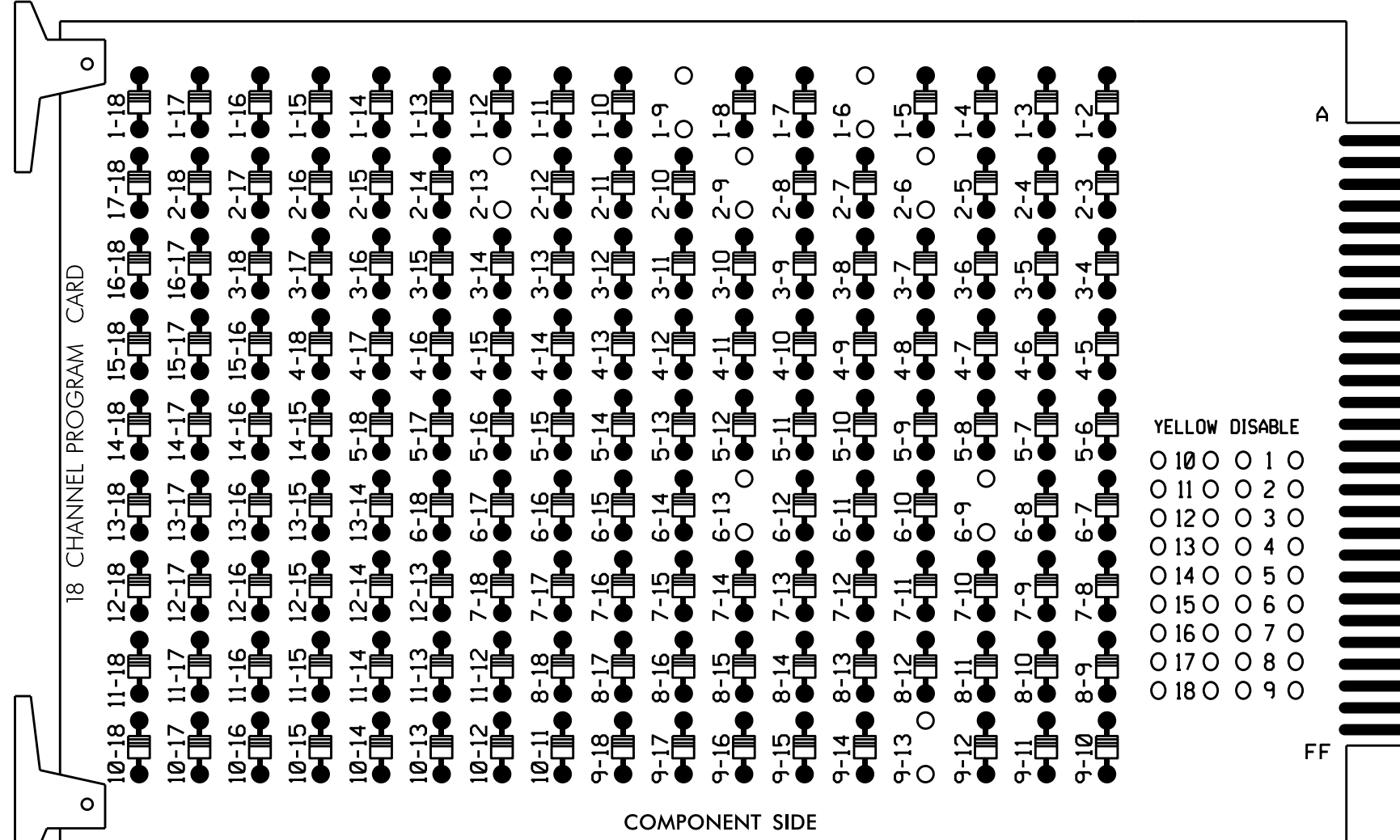
	DETAILS FOR: NC 55 (South Alston Avenue) at NC 147 NB Ramp / Gann Street						
	Division 5 Durham County PLAN DATE: November 2014 REVIEWED BY: JTR Durham PREPARED BY: S. Armstrong REVIEWED BY:						
<table border="1"> <thead> <tr> <th>REVISIONS</th> <th>INIT.</th> <th>DATE</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>	REVISIONS	INIT.	DATE				DocuSigned by:  DATE: 4/2/2015 SIG. INVENTORY NO. 05-0284
REVISIONS	INIT.	DATE					

EDI MODEL 2018ECL-NC CONFLICT MONITOR

PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

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



REMOVE JUMPERS AS SHOWN

NOTES:

- Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
- Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
- Ensure that Red Enable is active at all times during normal operation.
- 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. Verify that signal heads flash in accordance with the signal plans.
- Program controller to Start Up in phases 2 and 6 green.
- Set power-up flash time to 0 seconds within the controller programming. The conflict monitor will govern startup flash. Ensure STARTUP "RED START" is set to 0 seconds.
- Enable Simultaneous Gap-Out feature for all phases.
- Program all timing information into phase banks 1, 2, and 3 unless otherwise noted.
- Set phase bank 3 maximum limit to 250 seconds for phases used.
- Ensure start up flash phases are coordinated with flash program block assignments.
- Program Startup Ped Calls for phase 2.
- Set the Red Revert interval on the controller to 1 second.
- This cabinet and controller are part of the Durham Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070E
 CABINET.....332 W/ AUX
 SOFTWARE.....McCain 2033
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX FILE
 LOAD SWITCHES USED.....S1,S2,S3,S8,S11,AUX S1
 PHASES USED.....1,2,2 PED,6,8
 OVERLAP 1.....*
 OVERLAP 2.....NOT USED
 OVERLAP 3.....NOT USED
 OVERLAP 4.....NOT USED

* See FYA PPLT Programming Detail on Sheet 2.

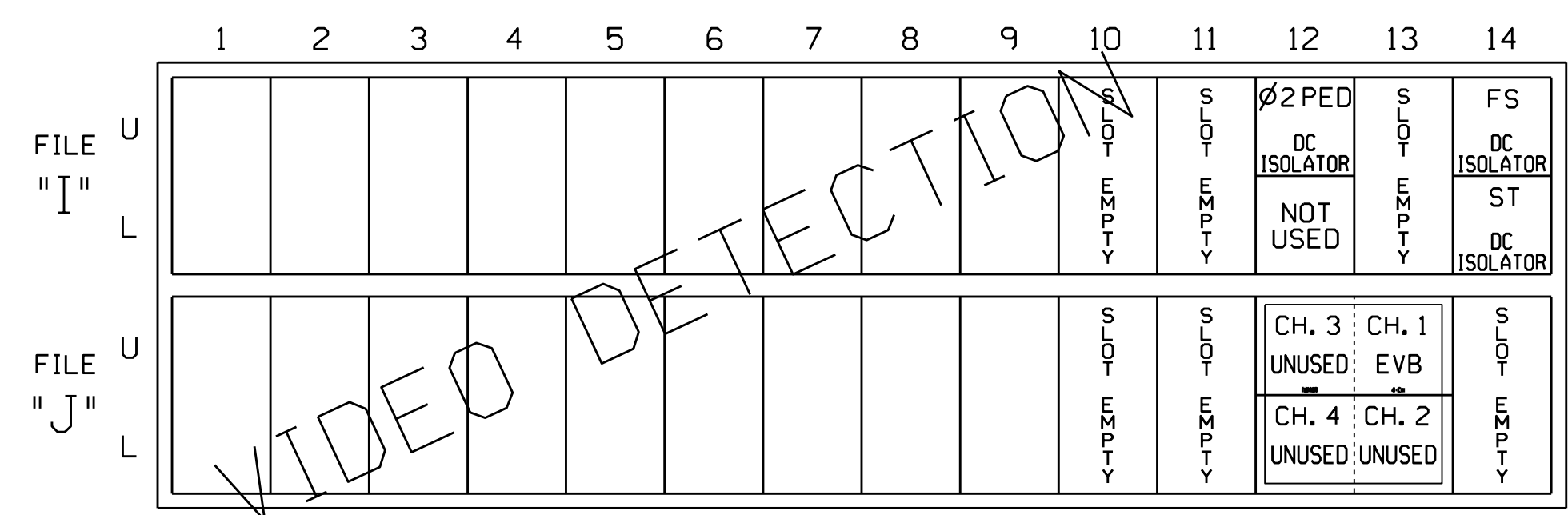
SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	11	21,22	P21, P22	NU	NU	NU	NU	61,62	NU	NU	81,82	NU	11	NU	NU	NU	NU	NU
RED		128						134			107							
YELLOW	*	129						135			108							
GREEN		130						136			109							
RED ARROW													A121					
YELLOW ARROW														A122				
FLASHING YELLOW ARROW														A123				
GREEN ARROW	127																	
Hand icon																		
Person icon																		

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

INPUT FILE POSITION LAYOUT

(front view)



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

FS = FLASH SENSE
 ST = STOP TIME
 EVx = EMERGENCY VEHICLE PREEMPT

INPUT FILE CONNECTION & PROGRAMMING CHART

PED PUSH BUTTONS	LOOP TERMINAL	INPUT FILE POS.	DETECTOR NO.	PIN NO.	ATTRIBUTES	NEMA PHASE
P21,P22	T88-4,6	I12U	25	67	2	2 PED

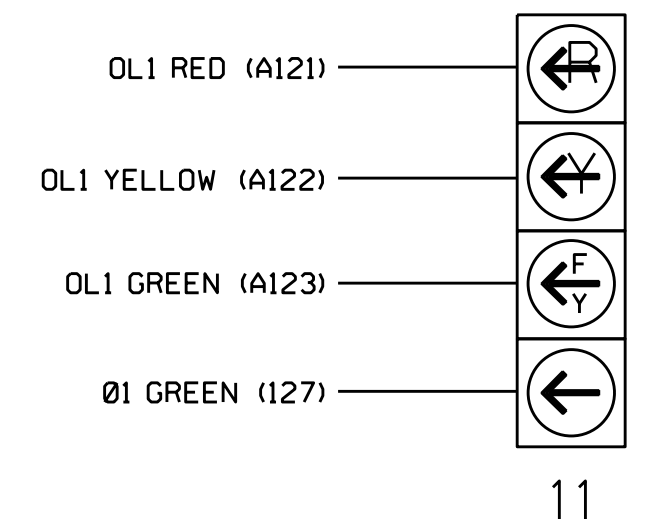
NOTE: INSTALL DC ISOLATORS IN INPUT FILE SLOT 112.

DETECTOR ATTRIBUTES LEGEND: INPUT FILE POSITION LEGEND: J2L

- 1-FULL TIME DELAY
 2-PED CALL
 3-RESERVED
 4-COUNTING
 5-EXTENSION
 6-TYPE 3
 7-CALLING
 8-ALTERNATE
- FILE J
 SLOT 2
 LOWER

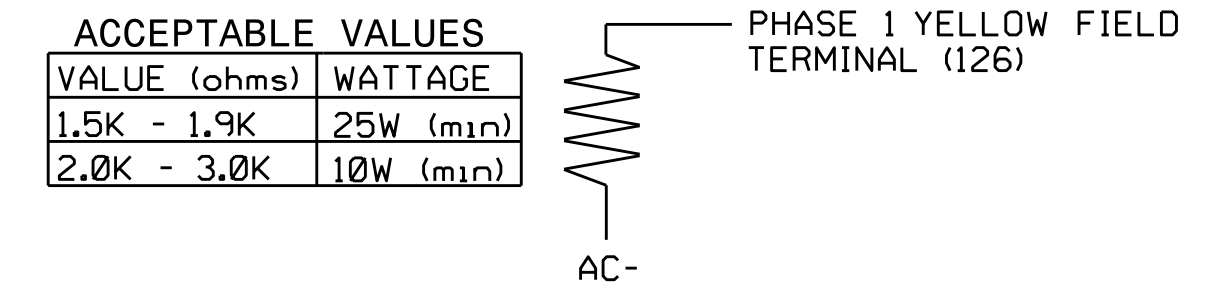
FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



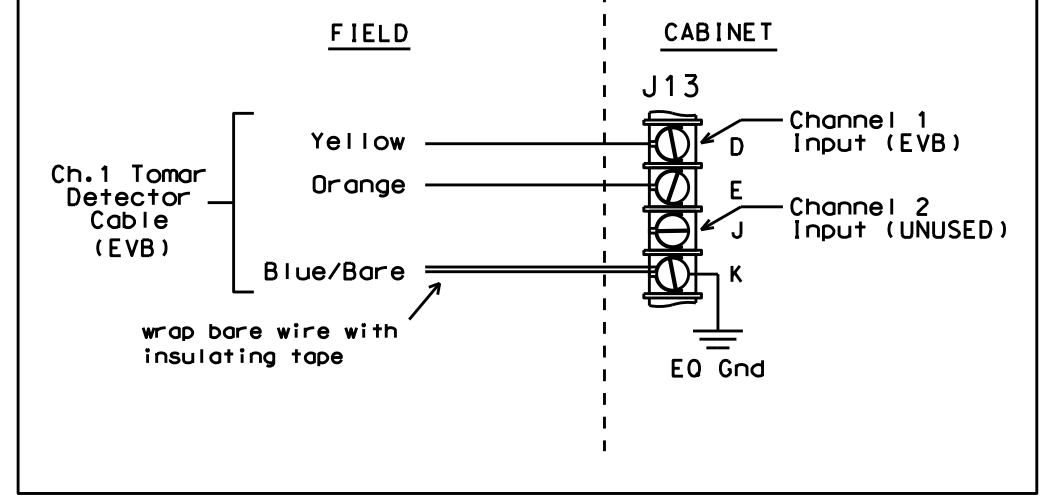
LOAD RESISTOR INSTALLATION DETAIL

(install resistor as shown below)



TYPICAL TOMAR FIELD WIRE DETAIL

(input file, rear view)



SPECIAL DETECTOR NOTE

Install a video detection system for vehicle detection. Perform installation according to manufacturer's directions and NCDOT engineer-approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-1026T1
 DESIGNED: September 2014
 SEALED: 04/02/2015
 REVISED: N/A

Electrical Detail - Temporary 1 - Sheet 1 of 2

ELECTRICAL AND PROGRAMMING DETAILS FOR: Prepared in the Offices of: 750 N. Greenfield Pkwy, Garner, NC 27529	NC 55 (South Alston Avenue) at SR 1926 (Angier Avenue)		SEAL SEAL 022013 GEORGE C. BROWN
	Division 5 PLAN DATE: November 2014 PREPARED BY: C. Strickland	Durham County REVIEWED BY: T. Joyce REVIEWED BY:	

SIG. INVENTORY NO. 05-1026T1

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**FYA PPLT PROGRAMMING
(SIGNAL HEAD 11)**

1. Program Flashing Yellow Arrow phases as follows:
Main Menu - 1) PHASE - 2) PHASE FUNCTIONS PAGE TWO
PPLT FYA = PHASE 1
2. Assign output pin for Flashing Yellow Arrow as follows:
Main Menu - 6) OUTPUTS - F) FYA PPLT
Phase 1 = 99
3. Redirect RED and YELLOW outputs for the left turn phases as follows:
Main Menu - 6) OUTPUTS - 8) REDIRECT PHASE
Phase 1 RED = 97, Phase 1 YELLOW = 98

EMERGENCY VEHICLE PREEMPTION PROGRAMMING

1. Program EVB preempt as follows:
Main Menu - 2) PREEMPT - 4) EMERGENCY VEHICLE
EVB Clear = 2
EVB Clearance Phases = 1.6
2. Program general preemption parameters as follows:
Main Menu - 2) PREEMPT - 6) MISC PREEMPTION PARAMETERS
Min Time Before PE ForceOff = 1
3. Ped Clear Before Preempt is a pedestrian timing parameter, and is programmed as follows:
Main Menu - 1) PHASE - 5) PEDESTRIAN TIMING
PHASE 2 MIN FDW = 5

Program extend time on optical detector units for 2.0 sec for EVB.

SPECIAL NOTES EV PREEMPT PROGRAMMING

Setting 'FYA DURING PREEMPT' to 'Y' eliminates yellow trap when transitioning to preempt from adjacent through phase.
Main Menu - 9) UTILITIES - 9) MISC
FYA DURING PREEMPT (Y/N) = Y

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

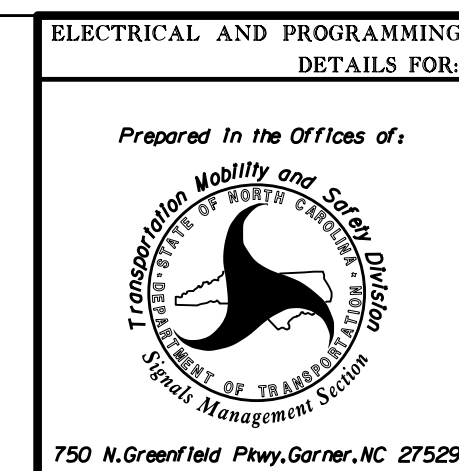
Countdown Ped Signals are required to display timing only during Ped Clearance Interval. Consult Ped Signal Module user's manual for instructions on selecting this feature.

MIN WALK DURING PREEMPTION PROGRAMMING

To disable MIN WALK pedestrian timing during preemption, program the controller as follows:
Main Menu - 9) UTILITIES - 5) CONFIGURATION
EXTRA TWO = 3

Electrical Detail - Temporary 1 - Sheet 2 of 2

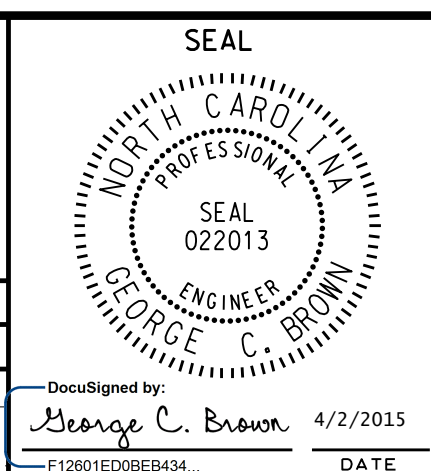
THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-1026T1
DESIGNED: September 2014
SEALED: 04/02/2015
REVISED: N/A



**NC 55 (South Alston Avenue)
at
SR 1926 (Angier Avenue)**

Division 5	Durham County	Durham
PLAN DATE: November 2014	REVIEWED BY: T. Joyce	
PREPARED BY: C. Strickland	REVIEWED BY:	

REVISIONS	INIT.	DATE

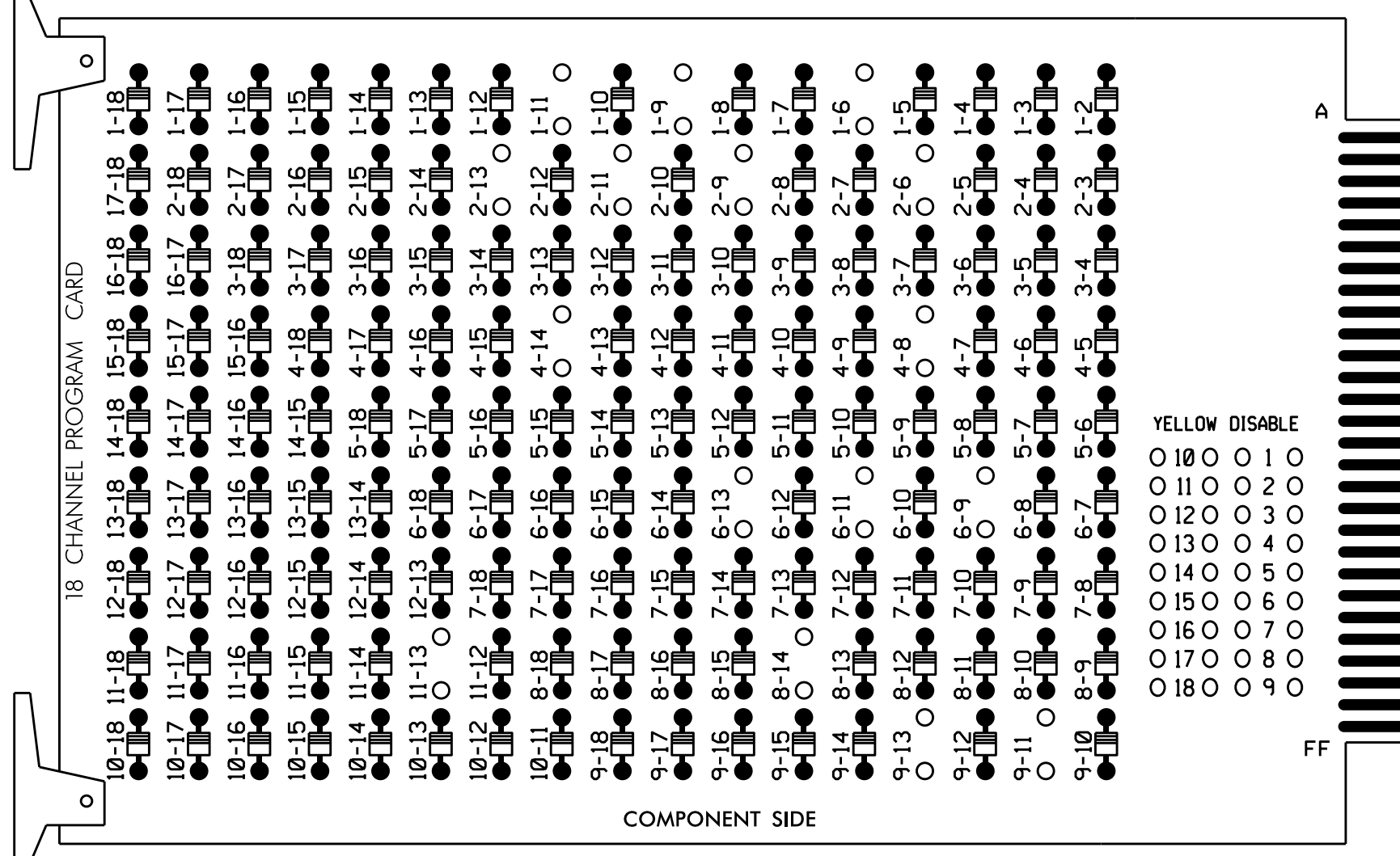


SIG. INVENTORY NO. 05-1026T1

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

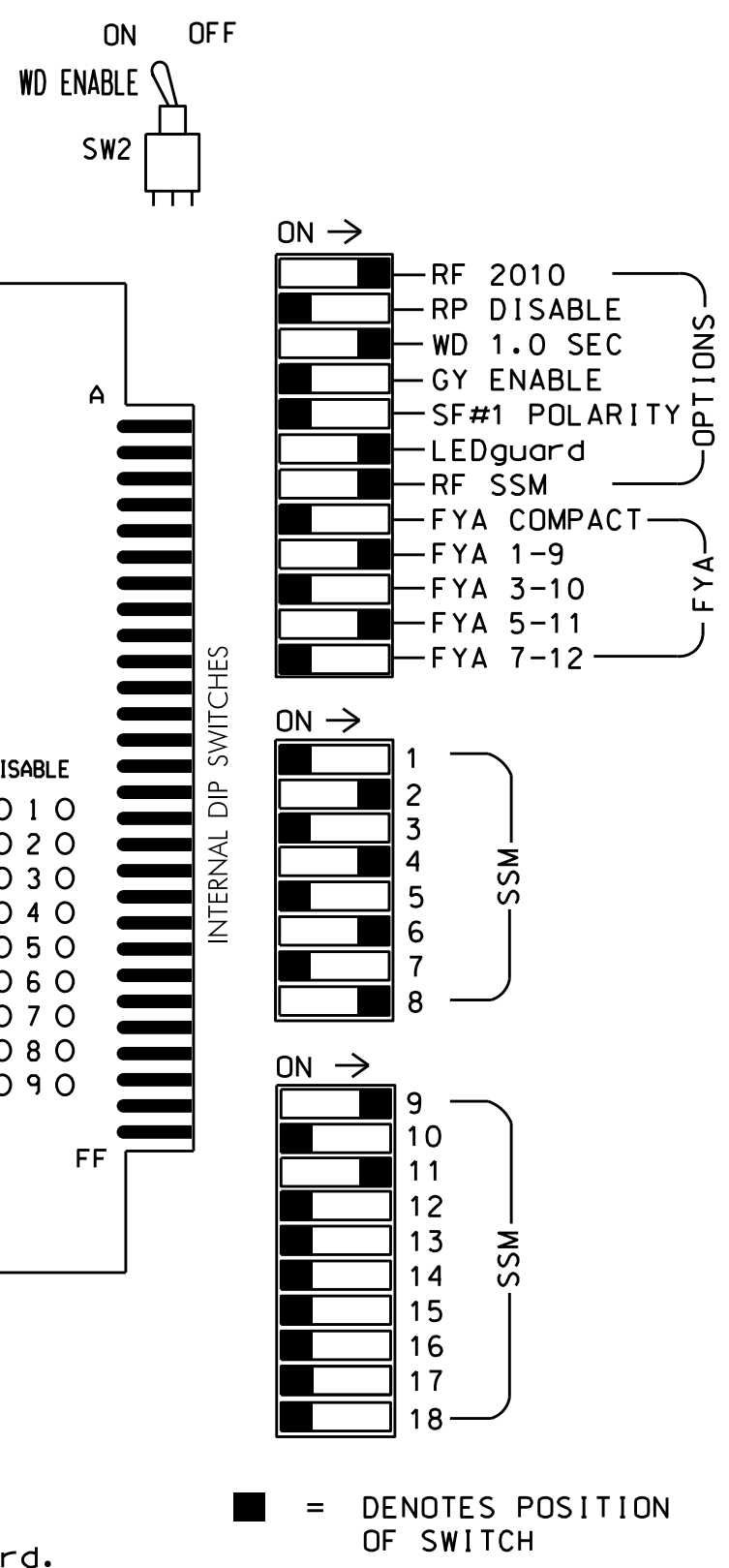
(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 1-6, 1-9, 1-11, 2-6, 2-9, 2-11, 2-13, 4-8, 4-14, 6-9, 6-11, 6-13, 8-14, 9-11, 9-13 and 11-13.



REMOVE JUMPERS AS SHOWN

- NOTES:
- Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
 - Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
 - Ensure that Red Enable is active at all times during normal operation.
 - 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. Verify that signal heads flash in accordance with the signal plans.
- Program controller to Start Up in phases 2 and 6 green.
- Set power-up flash time to 0 seconds within the controller programming. The conflict monitor will govern startup flash. Ensure STARTUP "RED START" is set to 0 seconds.
- Enable Simultaneous Gap-Out feature for all phases.
- Program all timing information into phase banks 1, 2, and 3 unless otherwise noted.
- Set phase bank 3 maximum limit to 250 seconds for phases used.
- Program phases 4 and 8 for Double Entry.
- Ensure start up flash phases are coordinated with flash program block assignments.
- Program Startup Ped Calls for phases 2 and 4.
- Set the Red Revert interval on the controller to 1 second.
- This cabinet and controller are part of the Durham Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070E
 CABINET.....332 W/ AUX
 SOFTWARE.....McCain 2033
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX FILE
 LOAD SWITCHES USED.....S1,S2,S3,S5,S6,S8,S11,AUX S1, AUX S4
 PHASES USED.....1,2,2 PED,4,4 PED,6,8
 OVERLAP 1.....*
 OVERLAP 2.....NOT USED
 OVERLAP 3.....2+6
 OVERLAP 4.....NOT USED

* See FYA PPLT Programming Detail on Sheet 2.

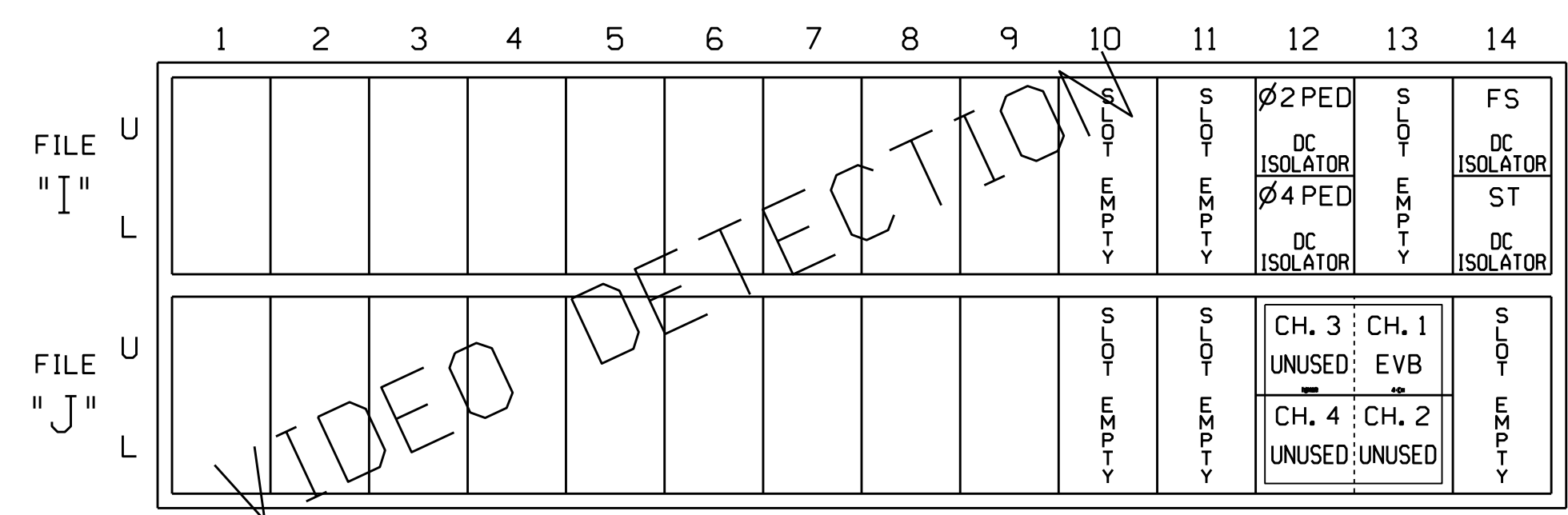
SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CHU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	11	22,23	P21, P22	NU	41,42	P41, P42	NU	61,62	NU	NU	81,82	NU	11	NU	NU	21	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																	
Hand icon					113			104										
Person icon					115			106										

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

INPUT FILE POSITION LAYOUT

(front view)



INPUT FILE CONNECTION & PROGRAMMING CHART

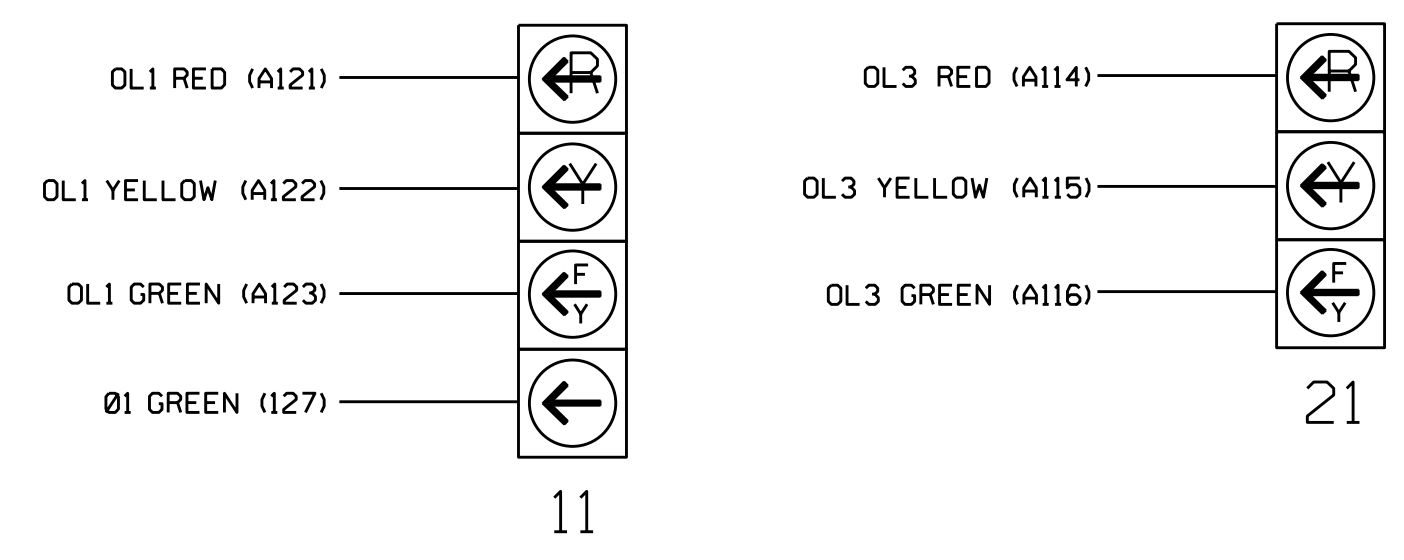
PED PUSH BUTTONS	LOOP TERMINAL	INPUT FILE POS.	DETECTOR NO.	PIN NO.	ATTRIBUTES	NEMA PHASE
P21,P22	TB8-4,6	I12U	25	67	2	2 PED
P41,P42	TB8-5,6	I12L	27	69	2	4 PED

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

- DETECTOR ATTRIBUTES LEGEND: INPUT FILE POSITION LEGEND: J2L
- 1-FULL TIME DELAY
 - 2-PED CALL
 - 3-RESERVED
 - 4-COUNTING
 - 5-EXTENSION
 - 6-TYPE 3
 - 7-CALLING
 - 8-ALTERNATE
- FILE J
 SLOT 2
 LOWER

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)

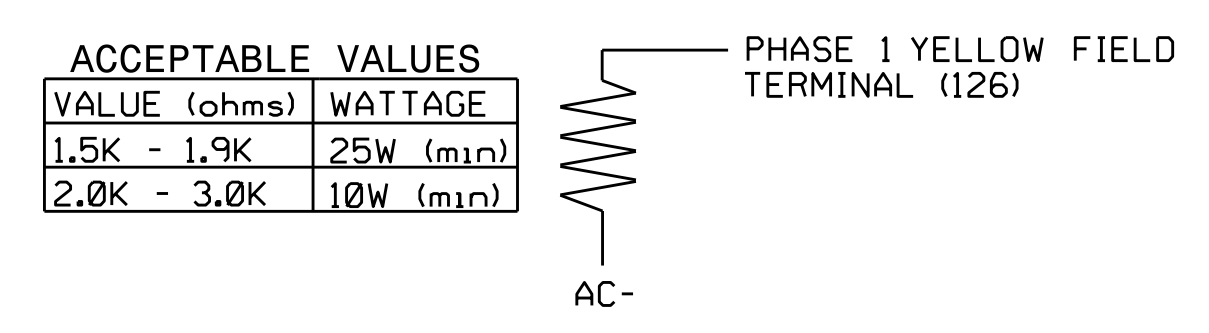


SPECIAL DETECTOR NOTE

Install a video detection system for vehicle detection. Perform installation according to manufacturer's directions and NCDOT engineer-approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.

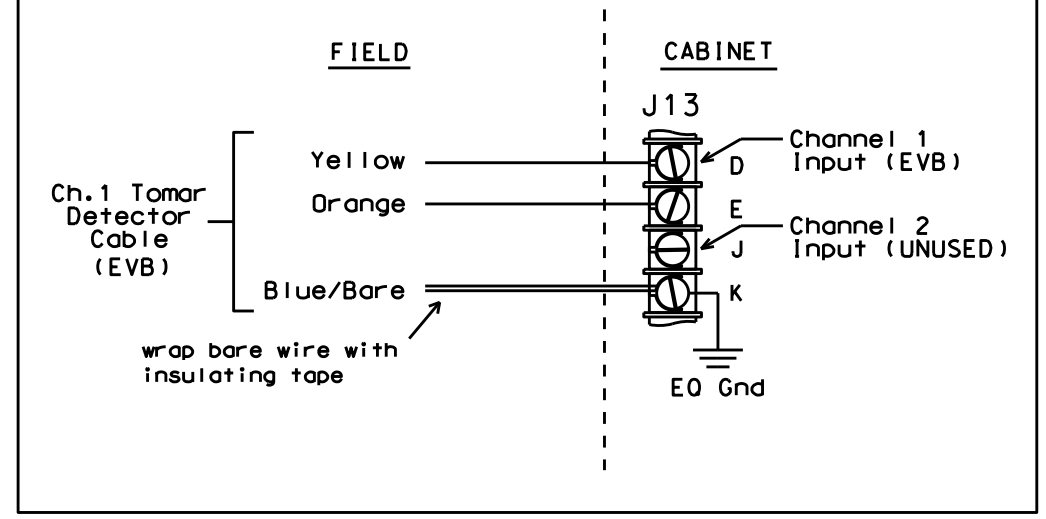
LOAD RESISTOR INSTALLATION DETAIL

(install resistor as shown below)



TYPICAL TOMAR FIELD WIRE DETAIL

(input file, rear view)



Electrical Detail - Temporary 2 - Sheet 1 of 2

Electrical and Programming Details For: NC 55 (South Alston Avenue) at SR 1926 (Angier Avenue)

Prepared In the Offices of: **TRANSPO-MOBILITY AND SAFETY CONSULTANTS**

750 N. Greenfield Pkwy, Garner, NC 27529

Division 5 Durham County Durham

PLAN DATE: November 2014 REVIEWED BY: T. Joyce

PREPARED BY: C. Strickland REVIEWED BY:

REVISIONS INIT. DATE

DocuSigned by: **George C. Brown** 4/2/2015

SEAL: GEORGE C. BROWN, PROFESSIONAL ENGINEER, No. 022013

SIG. INVENTORY NO. 05-1026T2

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-1026T2
 DESIGNED: September 2014
 SEALED: 04/02/2015
 REVISED: N/A

C:\p05-2015_13-15_Signals\work\garner\05-1026_sme.le.xxx.dgn
 05/11/2015 10:10:15 AM
 05/11/2015 10:10:15 AM
 05/11/2015 10:10:15 AM

OVERLAP [3] PROGRAMMING DETAIL

Program overlap as follows:
Main Menu - 4) OVERLAP

PRESS '+' TWICE

OVERLAP [3]:

LOADSWITCH = 11
VEH SET 1 = 2+6
YELLOW CLEARANCE = 4.3
RED CLEARANCE = 1.6

NOTE: FOR SIGNAL HEAD 21

END OF OVERLAP PROGRAMMING

FYA PPLT PROGRAMMING
(SIGNAL HEAD 11)

1. Program Flashing Yellow Arrow phases as follows:
Main Menu - 1) PHASE - 2) PHASE FUNCTIONS PAGE TWO
PPLT FYA = PHASE 1
2. Assign output pin for Flashing Yellow Arrow as follows:
Main Menu - 6) OUTPUTS - F) FYA PPLT
Phase 1 = 99
3. Redirect RED and YELLOW outputs for the left turn phases as follows:
Main Menu - 6) OUTPUTS - 8) REDIRECT PHASE
Phase 1 RED = 97, Phase 1 YELLOW = 98

EMERGENCY VEHICLE PREEMPTION PROGRAMMING

1. Program EVB preempt as follows:
Main Menu - 2) PREEMPT - 4) EMERGENCY VEHICLE
EVB Clear = 2
EVB Clearance Phases = 1.6
2. Program general preemption parameters as follows:
Main Menu - 2) PREEMPT - 6) MISC PREEMPTION PARAMETERS
Min Time Before PE ForceOff = 1
3. Ped Clear Before Preempt is a pedestrian timing parameter, and is programmed as follows:
Main Menu - 1) PHASE - 5) PEDESTRIAN TIMING
PHASE 2 MIN FDW = 5
PHASE 4 MIN FDW = 11

Program extend time on optical detector units for 2.0 sec for EVB.

SPECIAL NOTES EV PREEMPT PROGRAMMING

Setting 'FYA DURING PREEMPT' to 'Y' eliminates yellow trap when transitioning to preempt from adjacent through phase.
Main Menu - 9) UTILITIES - 9) MISC
FYA DURING PREEMPT (Y/N) = Y

OVERLAP GREEN FLASH PROGRAMMING
FOR 3 SECTION FYA

The following will cause the overlap green output to flash, which is wired to the flashing yellow arrow. Program as follows:

Main Menu - 1) PHASE - 2) PHASE FUNCTIONS PAGE TWO
OLAP G FL = 3

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

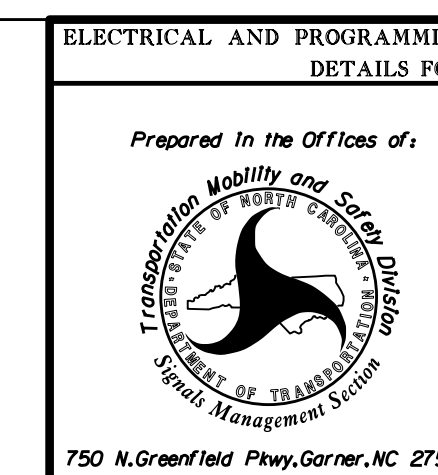
Countdown Ped Signals are required to display timing only during Ped Clearance Interval. Consult Ped Signal Module user's manual for instructions on selecting this feature.

MIN WALK DURING PREEMPTION
PROGRAMMING

To disable MIN WALK pedestrian timing during preemption, program the controller as follows:
Main Menu - 9) UTILITIES - 5) CONFIGURATION
EXTRA TWO = 3

Electrical Detail - Temporary 2 - Sheet 2 of 2

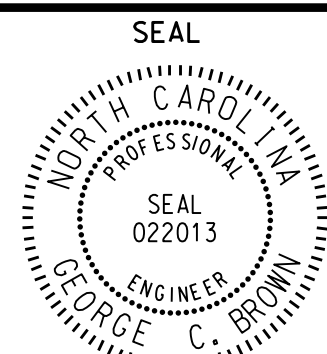
THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1026T2
DESIGNED: September 2014
SEALED: 04/02/2015
REVISED: N/A



NC 55 (South Alston Avenue)
at
SR 1926 (Angier Avenue)

Division 5 Durham County Durham
PLAN DATE: November 2014 REVIEWED BY: T. Joyce
PREPARED BY: C. Strickland REVIEWED BY:

REVISIONS	INIT.	DATE

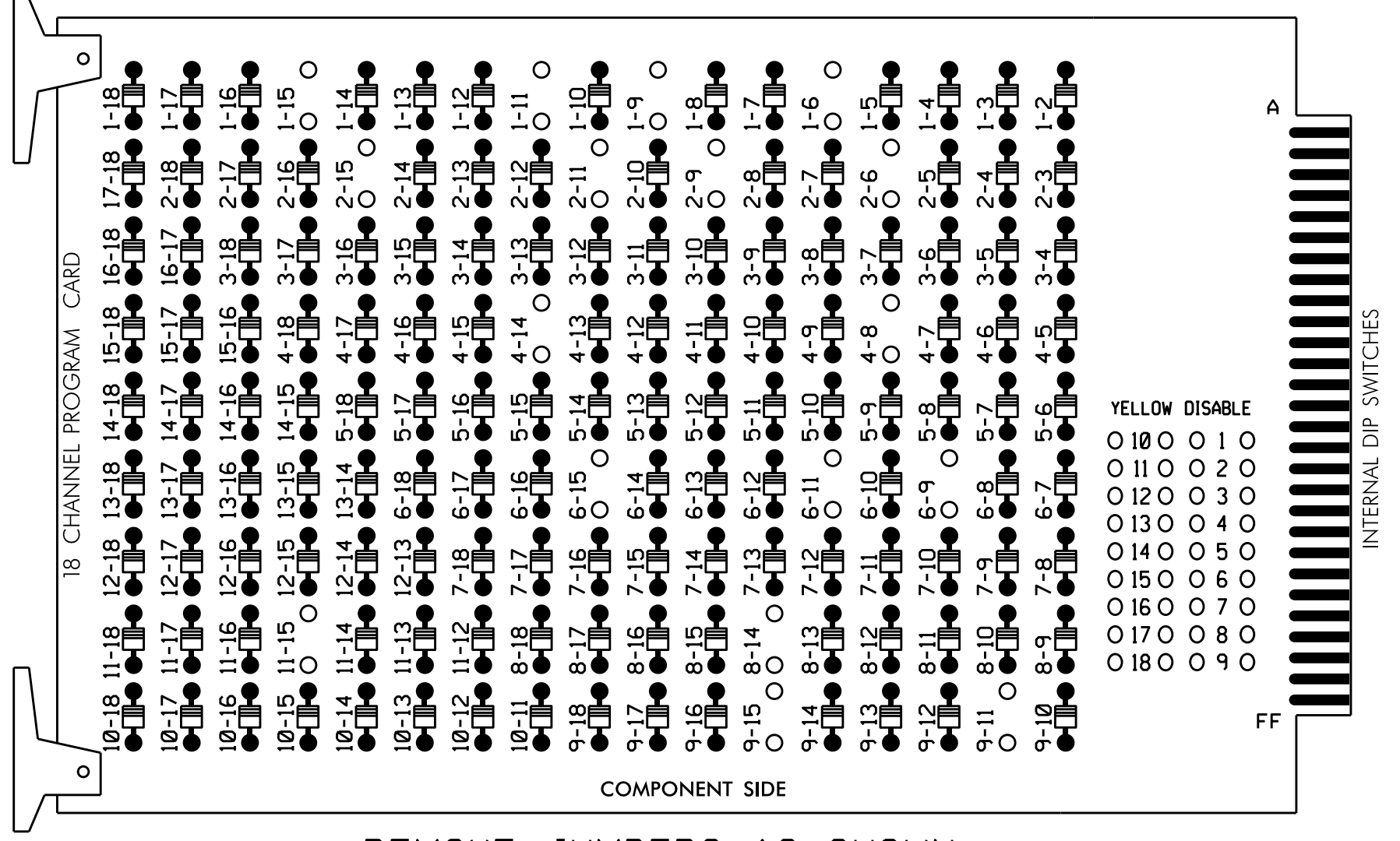


DocuSigned by:
George C. Brown 4/2/2015
F12801E2058E8434 DATE
SIG. INVENTORY NO. 05-1026T2

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 1-6, 1-9, 1-11, 1-15, 2-6, 2-9, 2-11, 2-15, 4-8, 4-14, 6-9, 6-11, 6-15, 8-14, 9-11, 9-15 and 11-15.



REMOVE JUMPERS AS SHOWN

NOTES:

- Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
- Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
- Ensure that Red Enable is active at all times during normal operation.
- 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. Verify that signal heads flash in accordance with the signal plans.
- Program controller to Start Up in phases 2 and 6 green.
- Set power-up flash time to 0 seconds within the controller programming. The conflict monitor will govern startup flash. Ensure STARTUP "RED START" is set to 0 seconds.
- Enable Simultaneous Gap-Out feature for all phases.
- Program all timing information into phase banks 1, 2, and 3 unless otherwise noted.
- Set phase bank 3 maximum limit to 250 seconds for phases used.
- Program phases 4 and 8 for Double Entry.
- Ensure start up flash phases are coordinated with flash program block assignments.
- Program Startup Ped Calls for phases 4 and 6.
- Set the Red Revert interval on the controller to 1 second.
- This cabinet and controller are part of the Durham Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070E
 CABINET.....332 W/ AUX
 SOFTWARE.....McCAIN 2033
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX FILE
 LOAD SWITCHES USED.....S1,S2,S5,S6,S8,S9,S11,
 AUX S1,AUX S4
 PHASES USED.....1,2,4,4 PED,6,6 PED,8
 OVERLAP 1.....*
 OVERLAP 2.....NOT USED
 OVERLAP 3.....2+6
 OVERLAP 4.....NOT USED

* See FYA PPLT Programming Detail on Sheet 2.

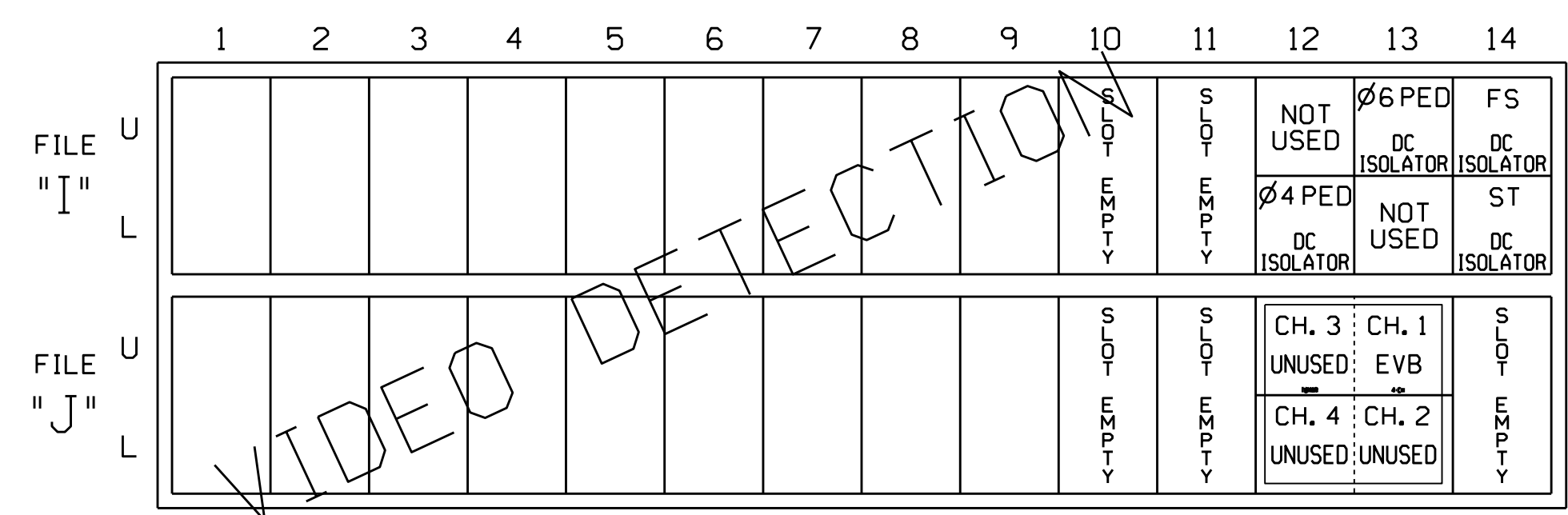
SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CHU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	11*	22,23	NU	NU	41,42	P41, P42	NU	61,62	P61, P62	NU	81,82	NU	11*	NU	NU	21*	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																	
						104			119									
						106			121									

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

INPUT FILE POSITION LAYOUT

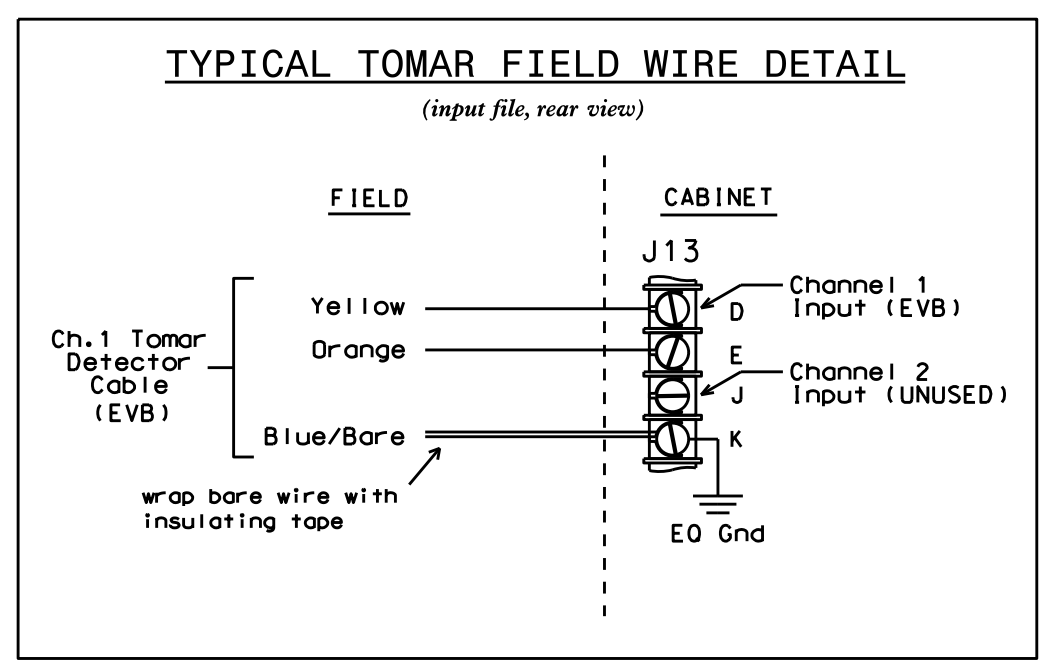
(front view)



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

FS = FLASH SENSE
 ST = STOP TIME
 EVx = EMERGENCY VEHICLE PREEMPT

4 CHANNEL TOMAR OSP CARD
 INSERT CARD INTO SLOT J13



INPUT FILE CONNECTION & PROGRAMMING CHART

PED PUSH BUTTONS	LOOP TERMINAL	INPUT FILE POS.	DETECTOR NO.	PIN NO.	ATTRIBUTES	NEMA PHASE
P41,P42	TB8-5,6	112L	27	69	2	4 PED
P61,P62	TB8-7,9	113U	26	68	2	6 PED

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

DETECTOR ATTRIBUTES LEGEND: INPUT FILE POSITION LEGEND: J2L

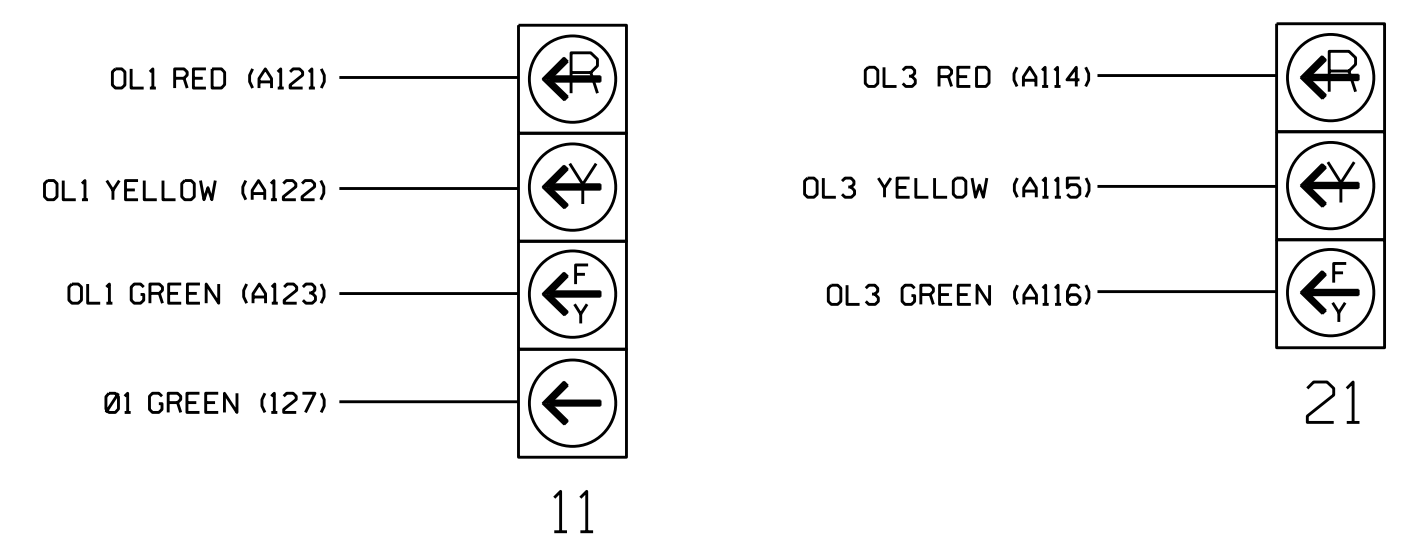
- 1-FULL TIME DELAY
 2-PED CALL
 3-RESERVED
 4-COUNTING
 5-EXTENSION
 6-TYPE 3
 7-CALLING
 8-ALTERNATE
- FILE J
 SLOT 2
 LOWER

SPECIAL DETECTOR NOTE

Install a video detection system for vehicle detection. Perform installation according to manufacturer's directions and NCDOT engineer-approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.

FYA SIGNAL WIRING DETAIL

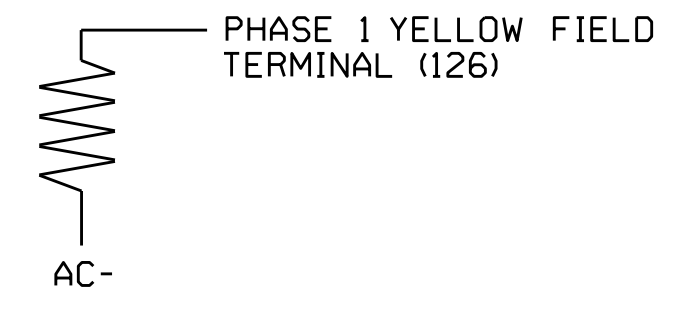
(wire signal heads as shown)



LOAD RESISTOR INSTALLATION DETAIL

(install resistor as shown below)

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



Electrical Detail - Temporary 3 - Sheet 1 of 2

ELECTRICAL AND PROGRAMMING DETAILS FOR: Prepared In the Offices of: 750 N. Greenfield Pkwy, Garner, NC 27529	NC 55 (South Alston Avenue) at SR 1926 (Angier Avenue)		SEAL SEAL 022013 ENGINEER GEORGE C. BROWN
	Division 5 PLAN DATE: November 2014 PREPARED BY: C. Strickland	Durham County REVIEWED BY: T. Joyce REVIEWED BY:	

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-1026T3
 DESIGNED: September 2014
 SEALED: 04/02/2015
 REVISED: N/A

01-1026-2015_13-18
 S:\IT\SS\115\SIGNAL\work\gpc\051026_sml_e_0xxx.dgn
 GCSH:CKI:and

OVERLAP [3] PROGRAMMING DETAIL

Program overlap as follows:
Main Menu - 4) OVERLAP

PRESS '+' TWICE

OVERLAP [3]:

LOADSWITCH = 11
VEH SET 1 = 2+6
YELLOW CLEARANCE = 4.1
RED CLEARANCE = 2.1

NOTE: FOR SIGNAL HEAD 21

END OF OVERLAP PROGRAMMING

**FYA PPLT PROGRAMMING
(SIGNAL HEAD 11)**

1. Program Flashing Yellow Arrow phases as follows:
Main Menu - 1) PHASE - 2) PHASE FUNCTIONS PAGE TWO
PPLT FYA = PHASE 1
2. Assign output pin for Flashing Yellow Arrow as follows:
Main Menu - 6) OUTPUTS - F) FYA PPLT
Phase 1 = 99
3. Redirect RED and YELLOW outputs for the left turn phases as follows:
Main Menu - 6) OUTPUTS - 8) REDIRECT PHASE
Phase 1 RED = 97, Phase 1 YELLOW = 98

EMERGENCY VEHICLE PREEMPTION PROGRAMMING

1. Program EVB preempt as follows:
Main Menu - 2) PREEMPT - 4) EMERGENCY VEHICLE
EVB Clear = 2
EVB Clearance Phases = 1.6
2. Program general preemption parameters as follows:
Main Menu - 2) PREEMPT - 6) MISC PREEMPTION PARAMETERS
Min Time Before PE ForceOff = 1
3. Ped Clear Before Preempt is a pedestrian timing parameter, and is programmed as follows:
Main Menu - 1) PHASE - 5) PEDESTRIAN TIMING
PHASE 4 MIN FDW = 4
PHASE 6 MIN FDW = 4

Program extend time on optical detector units for 2.0 sec for EVB.

SPECIAL NOTES EV PREEMPT PROGRAMMING

Setting 'FYA DURING PREEMPT' to 'Y' eliminates yellow trap when transitioning to preempt from adjacent through phase.
Main Menu - 9) UTILITIES - 9) MISC
FYA DURING PREEMPT (Y/N) = Y

**OVERLAP GREEN FLASH PROGRAMMING
FOR 3 SECTION FYA**

The following will cause the overlap green outputs to flash, which are wired to the flashing yellow arrow. Program as follows:

Main Menu - 1) PHASE - 2) PHASE FUNCTIONS PAGE TWO
OLAP G FL = 3

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.

**MIN WALK DURING PREEMPTION
PROGRAMMING**

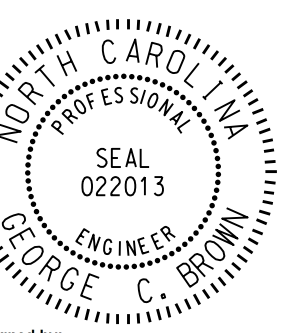
To disable MIN WALK pedestrian timing during preemption, program the controller as follows:
Main Menu - 9) UTILITIES - 5) CONFIGURATION
EXTRA TWO = 3

Electrical Detail - Temporary 3 - Sheet 2 of 2

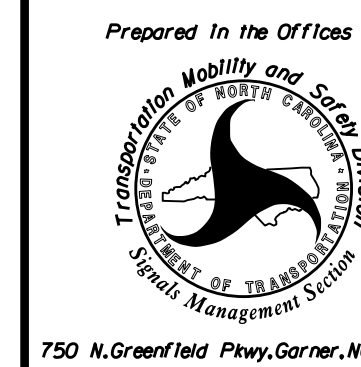
ELECTRICAL AND PROGRAMMING
DETAILS FOR:

NC 55 (South Alston Avenue)
at
SR 1926 (Angier Avenue)

SEAL



THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1026T3
DESIGNED: September 2014
SEALED: 04/02/2015
REVISED: N/A

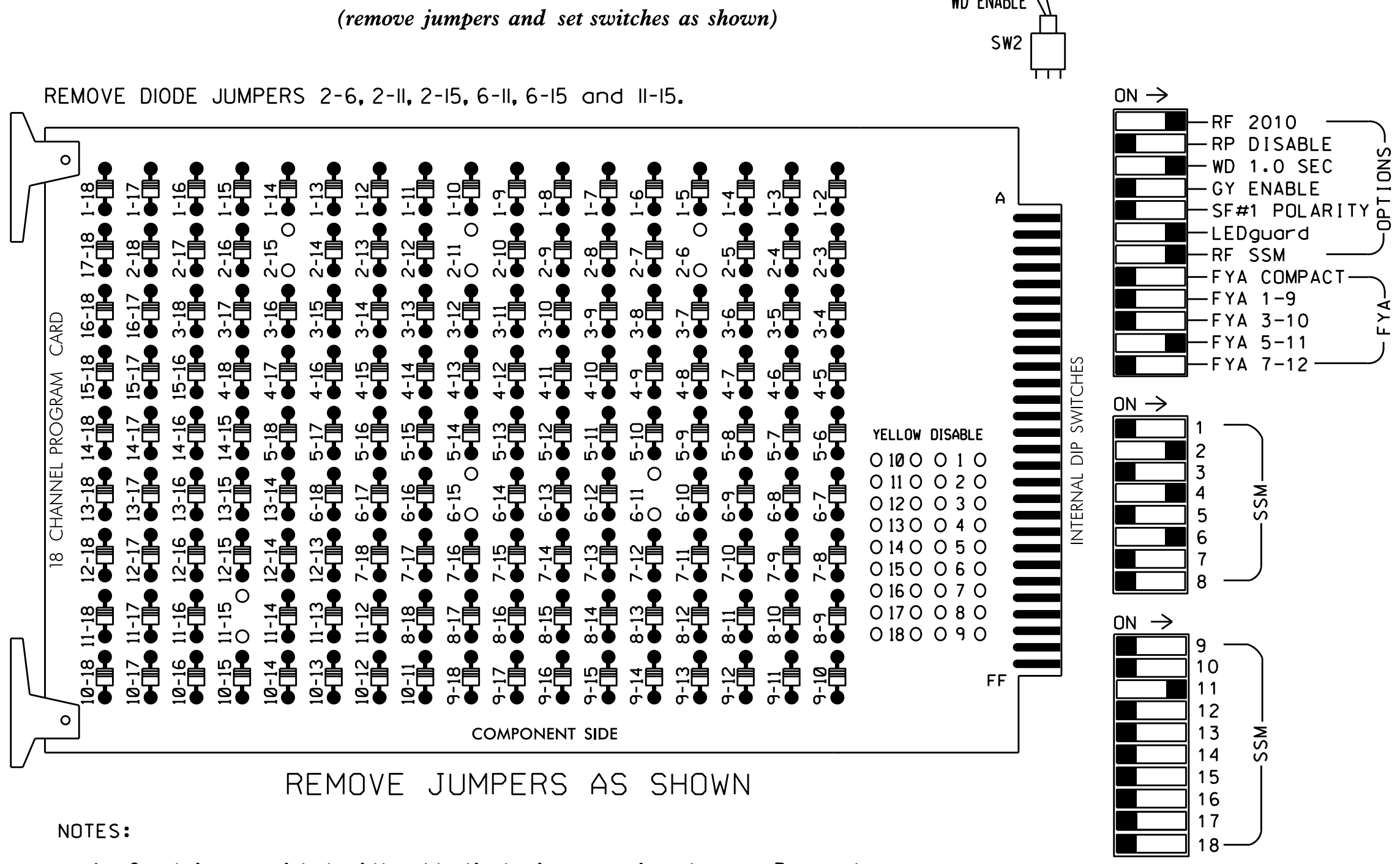


Division 5 Durham County Durham
PLAN DATE: November 2014 REVIEWED BY: T. Joyce
PREPARED BY: C. Strickland REVIEWED BY:

REVISIONS	INIT.	DATE

DocuSigned by:
George C. Brown 4/2/2015
F12801E2058E8434 DATE
SIG. INVENTORY NO. 05-1026T3

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.
 - 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. Verify that signal heads flash in accordance with the signal plans.
- Program controller to Start Up in phases 2 and 6 green.
- Set power-up flash time to 0 seconds within the controller programming. The conflict monitor will govern startup flash. Ensure STARTUP "RED START" is set to 0 seconds.
- Enable Simultaneous Gap-Out feature for all phases.
- Program all timing information into phase banks 1, 2, and 3 unless otherwise noted.
- Set phase bank 3 maximum limit to 250 seconds for phases used.
- Ensure start up flash phases are coordinated with flash program block assignments.
- Program Startup Ped Call for phase 6.
- Set the Red Revert interval on the controller to 1 second.
- This cabinet and controller are part of the Durham Signal System.

SIGNAL HEAD HOOK-UP CHART

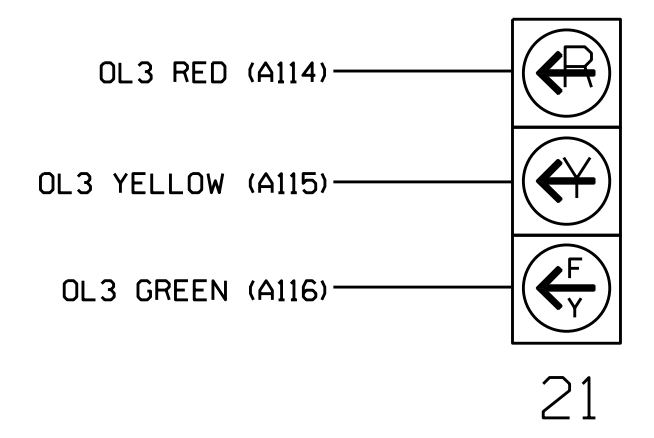
LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6	
CHU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18	
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE	
SIGNAL HEAD NO.	NU	22,23	NU	NU	41,42	NU	NU	61,62	P61, P62	NU	NU	NU	NU	NU	NU	21	NU	NU	
RED		128			101			134											
YELLOW		129			102			135											
GREEN		130			103			136											
RED ARROW																		A114	
YELLOW ARROW																			A115
FLASHING YELLOW ARROW																			A116
GREEN ARROW																			
									119										
									121										

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

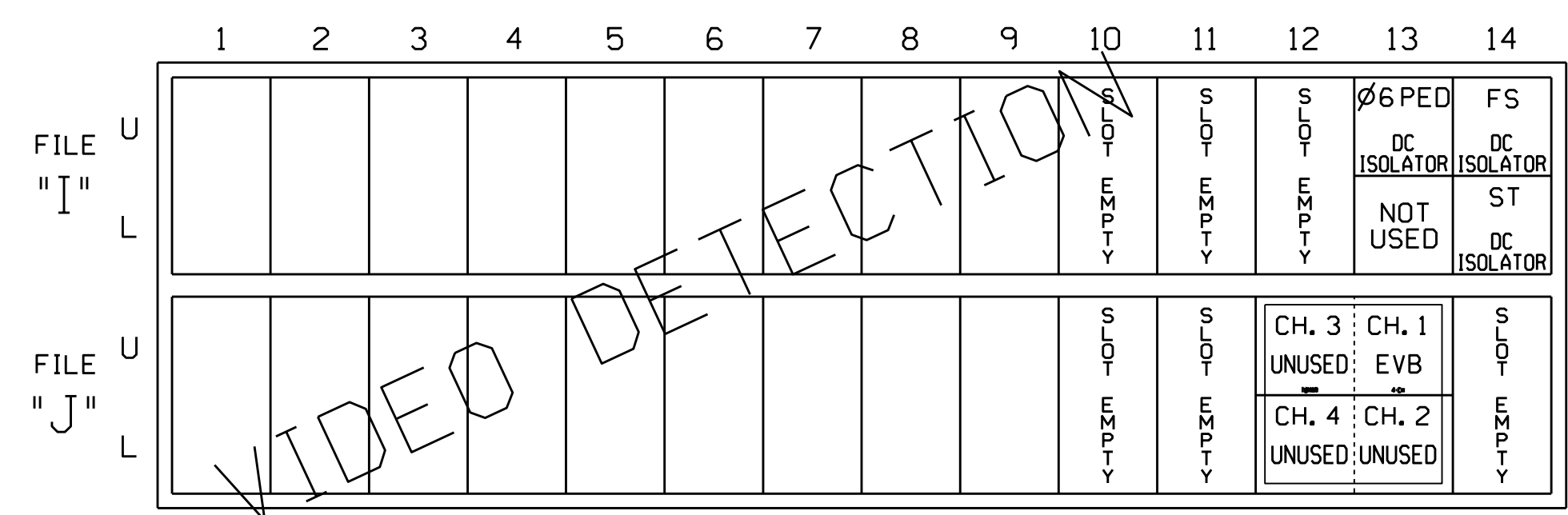
EQUIPMENT INFORMATION

CONTROLLER.....2070E
CABINET.....332 W/ AUX
SOFTWARE.....McCain 2033
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 WITH AUX FILE
LOAD SWITCHES USED.....S2,S5,S8,S9,AUX S4
PHASES USED.....2,4,6,6 PED
OVERLAP 1.....NOT USED
OVERLAP 2.....NOT USED
OVERLAP 3.....2+6
OVERLAP 4.....NOT USED

FYA SIGNAL WIRING DETAIL
(wire signal heads as shown)



INPUT FILE POSITION LAYOUT
(front view)



INPUT FILE CONNECTION & PROGRAMMING CHART

PED PUSH BUTTONS	LOOP TERMINAL	INPUT FILE POS.	DETECTOR NO.	PIN NO.	ATTRIBUTES	NEMA PHASE
P61,P62	T88-7,9	I13U	26	68	2	6 PED

- DETECTOR ATTRIBUTES LEGEND: 1-FULL TIME DELAY, 2-PED CALL, 3-RESERVED, 4-COUNTING, 5-EXTENSION, 6-TYPE 3, 7-CALLING, 8-ALTERNATE
- INPUT FILE POSITION LEGEND: J2L, FILE J, SLOT 2, LOWER

NOTE: INSTALL DC ISOLATORS IN INPUT FILE SLOT 113.

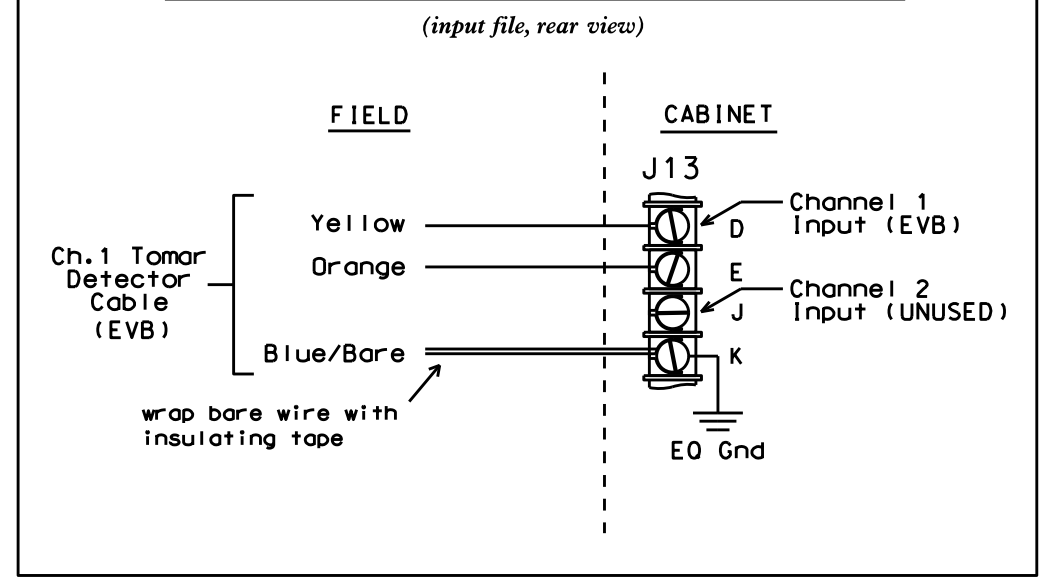
COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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.

SPECIAL DETECTOR NOTE

Install a video detection system for vehicle detection. Perform installation according to manufacturer's directions and NCDOT engineer-approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.

TYPICAL TOMAR FIELD WIRE DETAIL
(input file, rear view)



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-1026T4
DESIGNED: September 2014
SEALED: 04/02/2015
REVISED: N/A

Electrical Detail - Temporary 4 - Sheet 1 of 2

Prepared In the Offices of:
TRANSPORTATION MOBILITY AND SAFETY DIVISION
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signal Management Section
750 N. Greenfield Pkwy, Garner, NC 27529

NC 55 (South Alston Avenue) at SR 1926 (Angier Avenue)

Division 5 Durham County Durham

PLAN DATE: November 2014 REVIEWED BY: T. Joyce

PREPARED BY: C. Strickland REVIEWED BY:

REVISIONS INIT. DATE

DocuSigned by: George C. Brown 4/2/2015

SEAL PROFESSIONAL ENGINEER SEAL 022013 GEORGE C. BROWN

SIG. INVENTORY NO. 05-1026T4

C:\p05-1026-15.dwg
S:\IT\GIS\DATA\TSS\Signal\work\p05-1026-15.dwg
C:\p05-1026-15.dwg

OVERLAP [3] PROGRAMMING DETAIL

Program overlaps as follows:
Main Menu - 4) OVERLAP

PRESS '+' TWICE

OVERLAP [3]:

LOADSWITCH = 11
VEH SET 1 = 2+6
YELLOW CLEARANCE = 4.1
RED CLEARANCE = 1.7

NOTE: FOR SIGNAL HEAD 21

END OF OVERLAP PROGRAMMING

EMERGENCY VEHICLE PREEMPTION PROGRAMMING

1. Program EVB preempt as follows:
Main Menu - 2) PREEMPT - 4) EMERGENCY VEHICLE
EVB Clear = 2
EVB Clearance Phases = 6
2. Program general preemption parameters as follows:
Main Menu - 2) PREEMPT - 6) MISC PREEMPTION PARAMETERS
Min Time Before PE ForceOff = 1
3. Ped Clear Before Preempt is a pedestrian timing parameter, and is programmed as follows:
Main Menu - 1) PHASE - 5) PEDESTRIAN TIMING
PHASE 6 MIN FDW = 4

Program extend time on optical detector units for 2.0 sec for EVB.

OVERLAP GREEN FLASH PROGRAMMING FOR 3 SECTION FYA

The following will cause the overlap green outputs to flash, which are wired to the flashing yellow arrow. Program as follows:

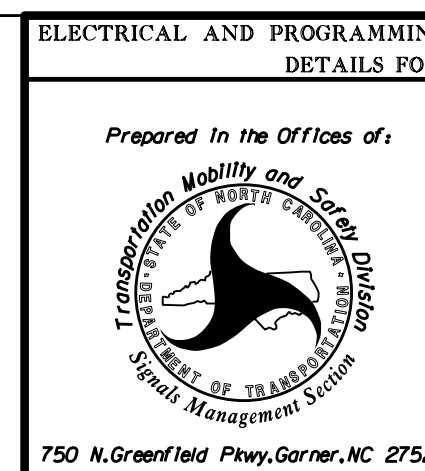
Main Menu - 1) PHASE - 2) PHASE FUNCTIONS PAGE TWO
OLAP G FL = 3

MIN WALK DURING PREEMPTION PROGRAMMING

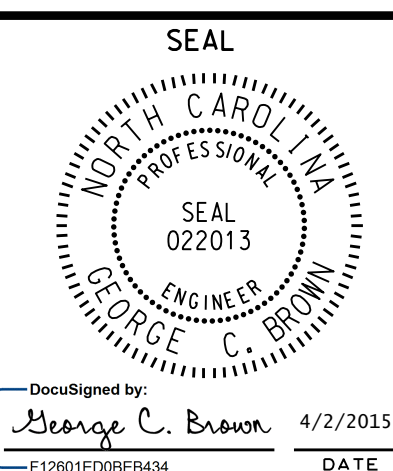
To disable MIN WALK pedestrian timing during preemption, program the controller as follows:
Main Menu - 9) UTILITIES - 5) CONFIGURATION
EXTRA TWO = 3

Electrical Detail - Temporary 4 - Sheet 2 of 2

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-1026T4
DESIGNED: September 2014
SEALED: 04/02/2015
REVISED: N/A



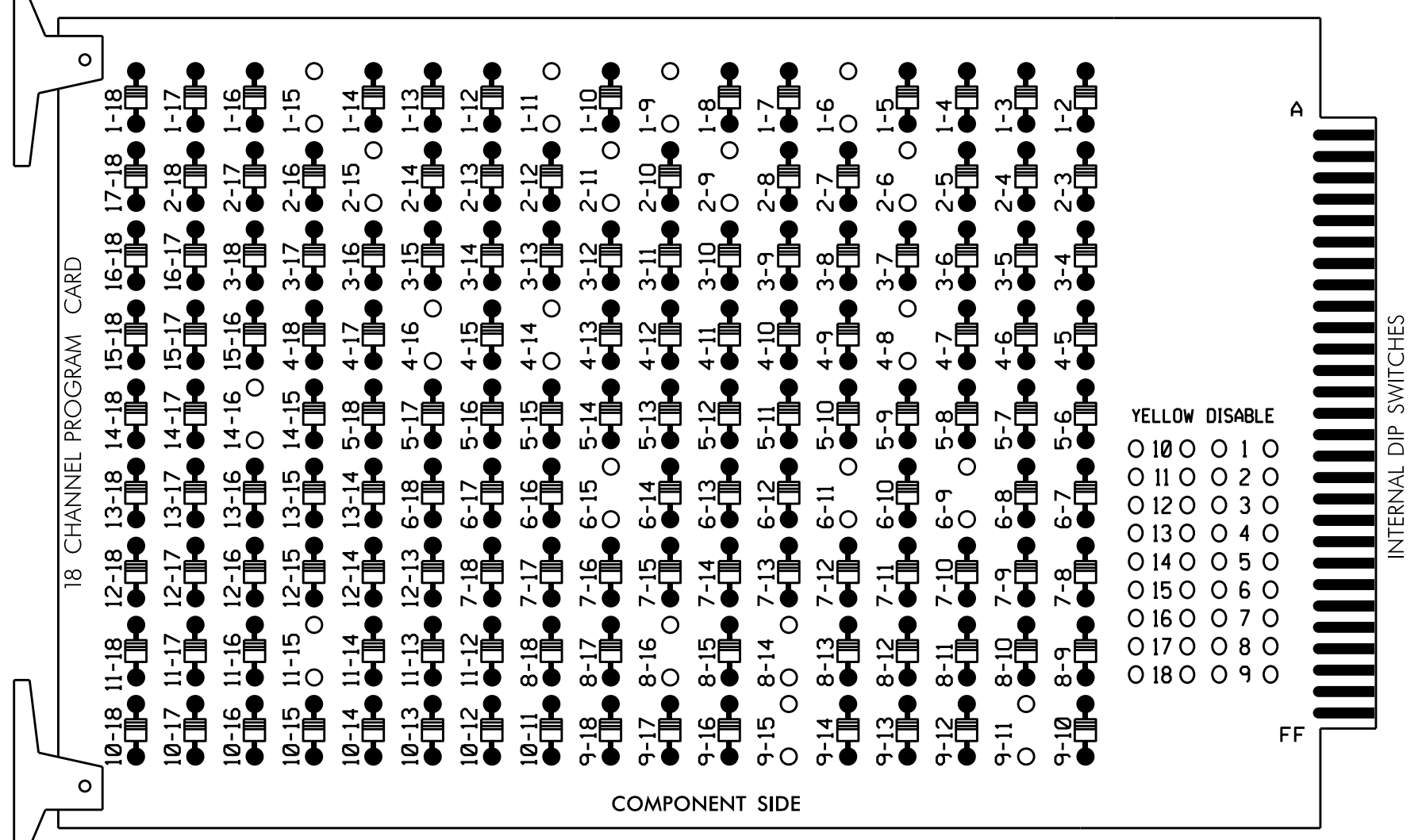
ELECTRICAL AND PROGRAMMING DETAILS FOR:		NC 55 (South Alston Avenue) at SR 1926 (Angier Avenue)	
Division 5	Durham County	Durham	
PLAN DATE: November 2014	REVIEWED BY: T. Joyce		
PREPARED BY: C. Strickland	REVIEWED BY:		
REVISIONS	INIT.	DATE	



EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

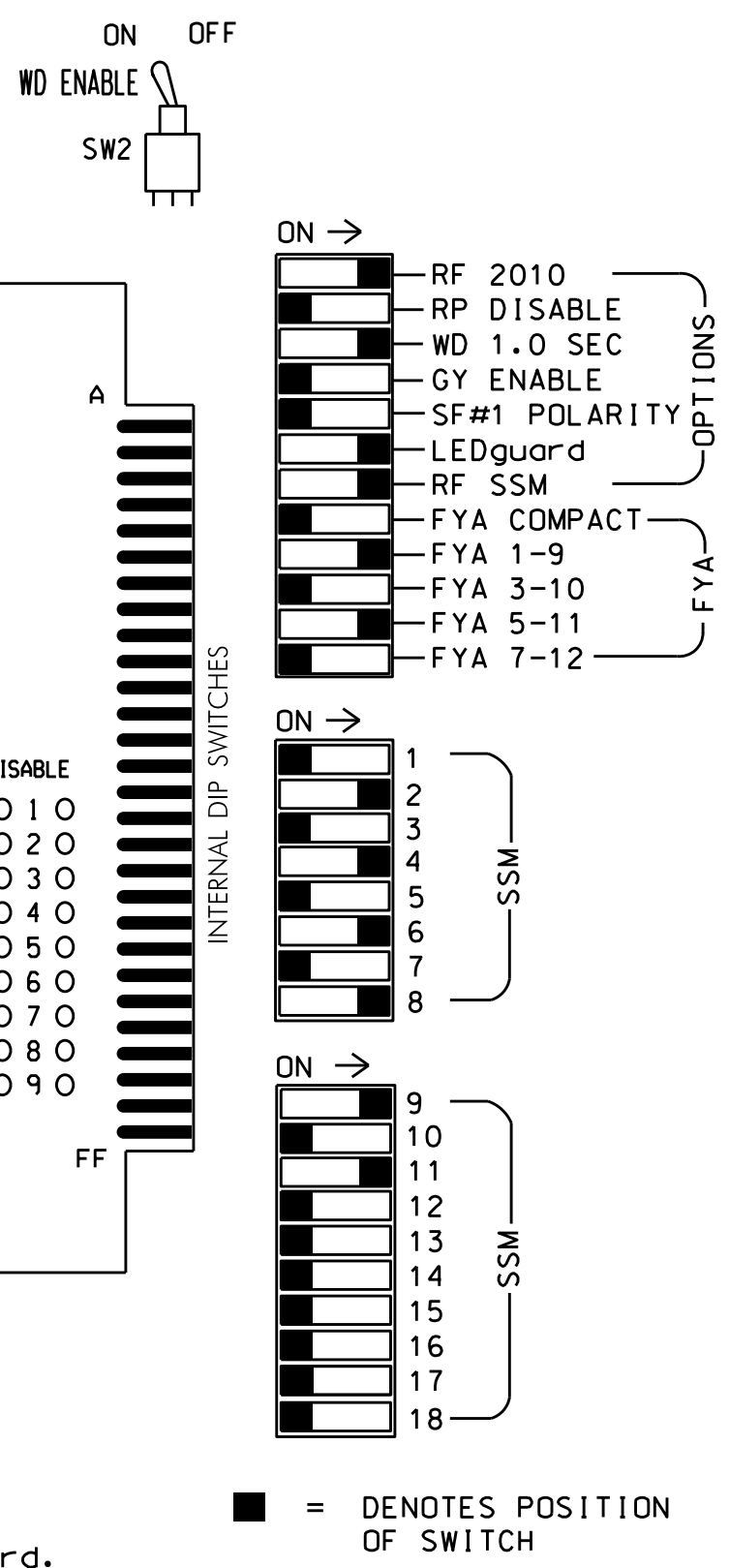
REMOVE DIODE JUMPERS 1-6, 1-9, 1-11, 1-15, 2-6, 2-9, 2-11, 2-15, 4-8, 4-14, 4-16, 6-9, 6-11, 6-15, 8-14, 8-16, 9-11, 9-15, 11-15 and 14-16.



REMOVE JUMPERS AS SHOWN

NOTES:

- Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
- Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
- Ensure that Red Enable is active at all times during normal operation.
- 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. Verify that signal heads flash in accordance with the signal plans.
- Program controller to Start Up in phases 2 and 6 green.
- Set power-up flash time to 0 seconds within the controller programming. The conflict monitor will govern startup flash. Ensure STARTUP "RED START" is set to 0 seconds.
- Enable Simultaneous Gap-Out feature for all phases.
- Program all timing information into phase banks 1, 2, and 3 unless otherwise noted.
- Set phase bank 3 maximum limit to 250 seconds for phases used.
- Program phases 4 and 8 for Double Entry.
- Ensure start up flash phases are coordinated with flash program block assignments.
- Program Startup Ped Calls for phases 4, 6, and 8.
- Set the Red Revert interval on the controller to 1 second.
- This cabinet and controller are part of the Durham Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070E
 CABINET.....332 W/ AUX
 SOFTWARE.....McCAIN 2033
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX FILE
 LOAD SWITCHES USED.....S1,S2,S5,S6,S8,S9,S11,S12,
 AUX S1,AUX S4
 PHASES USED.....1,2,4,4 PED,6,6 PED,8,8 PED
 OVERLAP 1.....*
 OVERLAP 2.....NOT USED
 OVERLAP 3.....2+6
 OVERLAP 4.....NOT USED

* See FYA PPLT Programming Detail on Sheet 2.

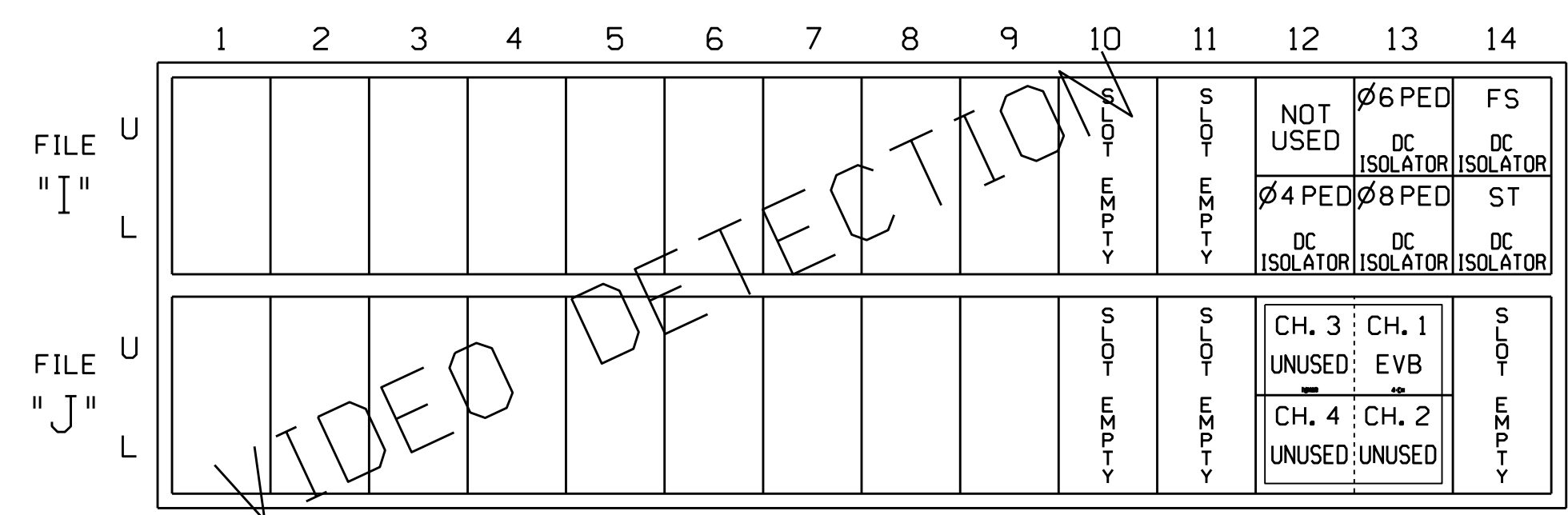
SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CHU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	11	22,23	NU	NU	41,42	P41, P42	NU	61,62	P61, P62	NU	81,82	P81, P82	11	NU	NU	21	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																	
						104			119			110						
						106			121			112						

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

INPUT FILE POSITION LAYOUT

(front view)



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

FS = FLASH SENSE
 ST = STOP TIME
 EVx = EMERGENCY VEHICLE PREEMPT

INPUT FILE CONNECTION & PROGRAMMING CHART

PED PUSH BUTTONS	LOOP TERMINAL	INPUT FILE POS.	DETECTOR NO.	PIN NO.	ATTRIBUTES	NEMA PHASE
P41,P42	TB8-5,6	I12L	27	69	2	4 PED
P61,P62	TB8-7,9	I13U	26	68	2	6 PED
P81,P82	TB8-8,9	I13L	28	70	2	8 PED

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

DETECTOR ATTRIBUTES LEGEND: INPUT FILE POSITION LEGEND: J2L

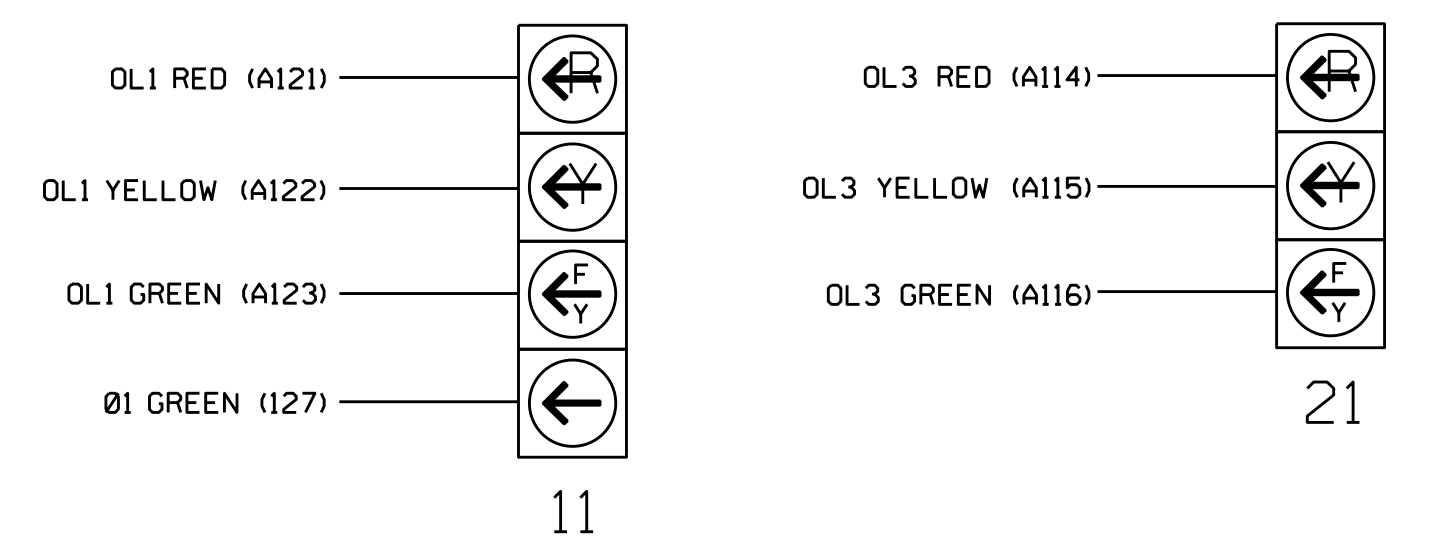
- 1-FULL TIME DELAY
 2-PED CALL
 3-RESERVED
 4-COUNTING
 5-EXTENSION
 6-TYPE 3
 7-CALLING
 8-ALTERNATE
- FILE J
 SLOT 2
 LOWER

SPECIAL DETECTOR NOTE

Install a video detection system for vehicle detection. Perform installation according to manufacturer's directions and NCDOT engineer-approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.

FYA SIGNAL WIRING DETAIL

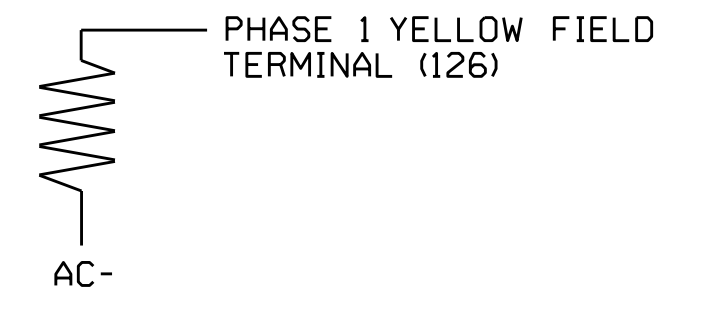
(wire signal heads as shown)



LOAD RESISTOR INSTALLATION DETAIL

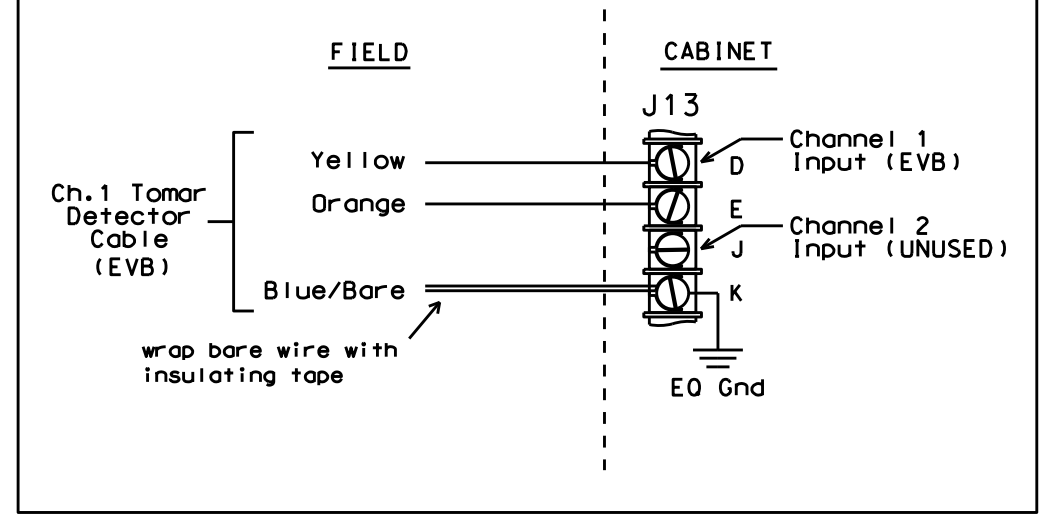
(install resistor as shown below)

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



TYPICAL TOMAR FIELD WIRE DETAIL

(input file, rear view)



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-1026T5
 DESIGNED: March 2015
 SEALED: 04/02/2015
 REVISED: N/A

Electrical Detail - Temporary 5 - Sheet 1 of 2

	NC 55 (South Alston Avenue) at SR 1926 (Angier Avenue)	SEAL
Prepared In the Offices of: TRANSPORTATION MOBILITY AND SAFETY SOLUTIONS, INC. 750 N. Greenfield Pkwy, Garner, NC 27529	Division 5 Durham County Durham PLAN DATE: March 2015 REVIEWED BY: T. Joyce PREPARED BY: C. Strickland REVIEWED BY:	DocuSigned by: George C. Brown 4/2/2015 SEAL DATE

01-10-2015 13:45
 S:\IT\SSM\T5 - Signal\work\garner\05-1026_sml_e_000.dgn
 C:\Users\cstrickland

OVERLAP [3] PROGRAMMING DETAIL

Program overlap as follows:
Main Menu - 4) OVERLAP

PRESS '+' TWICE

OVERLAP [3]:

LOADSWITCH = 11
VEH SET 1 = 2+6
YELLOW CLEARANCE = 4.1
RED CLEARANCE = 2.1

NOTE: FOR SIGNAL HEAD 21

END OF OVERLAP PROGRAMMING

**FYA PPLT PROGRAMMING
(SIGNAL HEAD 11)**

1. Program Flashing Yellow Arrow phases as follows:
Main Menu - 1) PHASE - 2) PHASE FUNCTIONS PAGE TWO
PPLT FYA = PHASE 1
2. Assign output pin for Flashing Yellow Arrow as follows:
Main Menu - 6) OUTPUTS - F) FYA PPLT
Phase 1 = 99
3. Redirect RED and YELLOW outputs for the left turn phases as follows:
Main Menu - 6) OUTPUTS - 8) REDIRECT PHASE
Phase 1 RED = 97, Phase 1 YELLOW = 98

EMERGENCY VEHICLE PREEMPTION PROGRAMMING

1. Program EVB preempt as follows:
Main Menu - 2) PREEMPT - 4) EMERGENCY VEHICLE
EVB Clear = 2
EVB Clearance Phases = 1.6
2. Program general preemption parameters as follows:
Main Menu - 2) PREEMPT - 6) MISC PREEMPTION PARAMETERS
Min Time Before PE ForceOff = 1
3. Ped Clear Before Preempt is a pedestrian timing parameter, and is programmed as follows:
Main Menu - 1) PHASE - 5) PEDESTRIAN TIMING
PHASE 4 MIN FDW = 9
PHASE 6 MIN FDW = 4
PHASE 8 MIN FDW = 8

Program extend time on optical detector units for 2.0 sec for EVB.

SPECIAL NOTES EV PREEMPT PROGRAMMING

Setting 'FYA DURING PREEMPT' to 'Y' eliminates yellow trap when transitioning to preempt from adjacent through phase.
Main Menu - 9) UTILITIES - 9) MISC
FYA DURING PREEMPT (Y/N) = Y

**OVERLAP GREEN FLASH PROGRAMMING
FOR 3 SECTION FYA**

The following will cause the overlap green outputs to flash, which are wired to the flashing yellow arrow. Program as follows:

Main Menu - 1) PHASE - 2) PHASE FUNCTIONS PAGE TWO
OLAP G FL = 3

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.

**MIN WALK DURING PREEMPTION
PROGRAMMING**

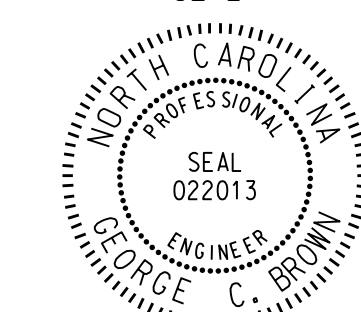
To disable MIN WALK pedestrian timing during preemption, program the controller as follows:
Main Menu - 9) UTILITIES - 5) CONFIGURATION
EXTRA TWO = 3

Electrical Detail - Temporary 5 - Sheet 2 of 2

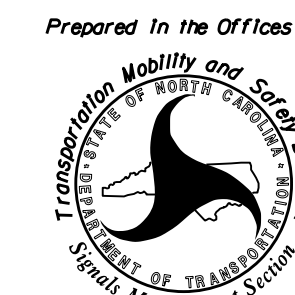
ELECTRICAL AND PROGRAMMING
DETAILS FOR:

NC 55 (South Alston Avenue)
at
SR 1926 (Angier Avenue)

SEAL



THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1026T5
DESIGNED: March 2015
SEALED: 04/02/2015
REVISED: N/A



750 N. Grantfield Pkwy, Garner, NC 27529

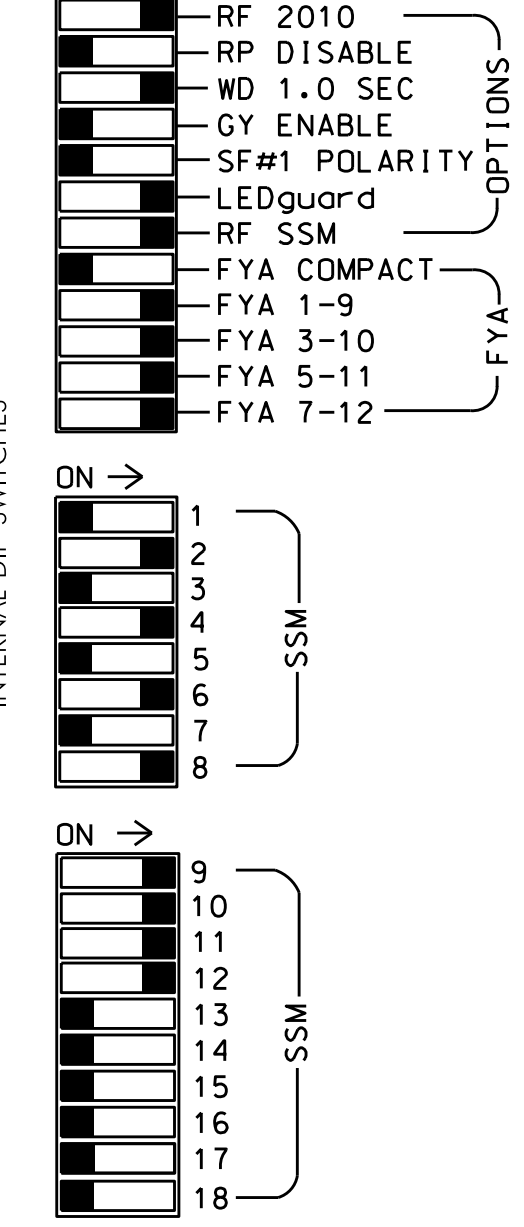
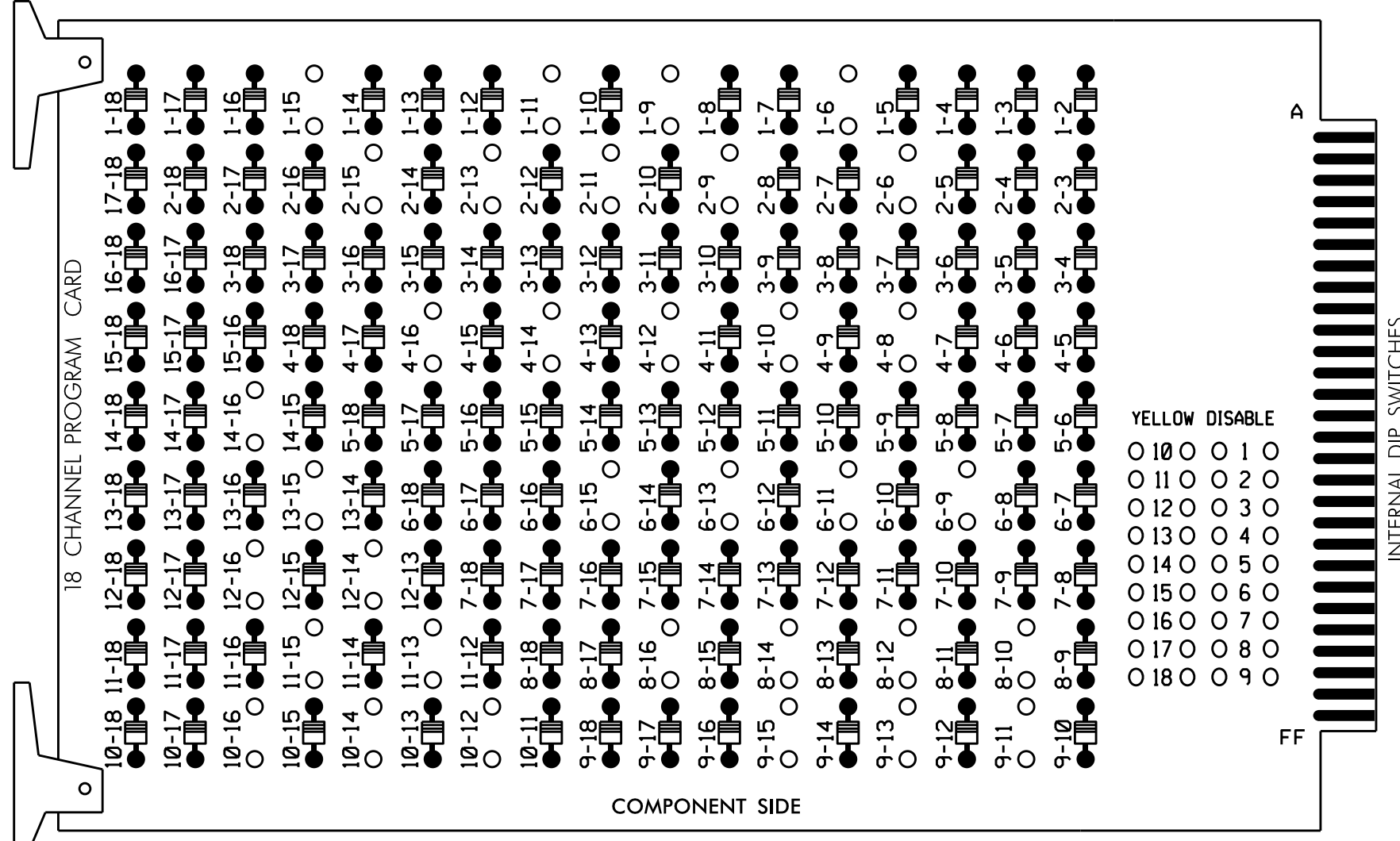
Division 5	Durham County	Durham
PLAN DATE: March 2015	REVIEWED BY: T. Joyce	
PREPARED BY: C. Strickland	REVIEWED BY:	

REVISIONS	INIT.	DATE

DocuSigned by:
George C. Brown 4/2/2015
F12601E0B8B431
DATE
SIG. INVENTORY NO. 05-1026T5

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)
 REMOVE DIODE JUMPERS 1-6, 1-9, 1-11, 1-15, 2-6, 2-9, 2-11, 2-13, 2-15, 4-8, 4-10, 4-12, 4-14, 4-16, 6-9, 6-11, 6-13, 6-15, 8-10, 8-12, 8-14, 8-16, 9-11, 9-13, 9-15, 10-12, 10-14, 10-16, 11-13, 11-15, 12-16, 13-15 and 14-16.



REMOVE JUMPERS AS SHOWN

NOTES:

- Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
- Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
- Ensure that Red Enable is active at all times during normal operation.
- 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. Verify that signal heads flash in accordance with the signal plans.
- Program controller to Start Up in phases 2 and 6 green.
- Set power-up flash time to 0 seconds within the controller programming. The conflict monitor will govern startup flash. Ensure STARTUP "RED START" is set to 0 seconds.
- Enable Simultaneous Gap-Out feature for all phases.
- Program all timing information into phase banks 1, 2, and 3 unless otherwise noted.
- Set phase bank 3 maximum limit to 250 seconds for phases used.
- Program phases 4 and 8 for Double Entry.
- Ensure start up flash phases are coordinated with flash program block assignments.
- Program Startup Ped Calls for phases 2, 4, 6, and 8.
- Set the Red Revert interval on the controller to 1 second.
- This cabinet and controller are part of the Durham Signal System.

EQUIPMENT INFORMATION

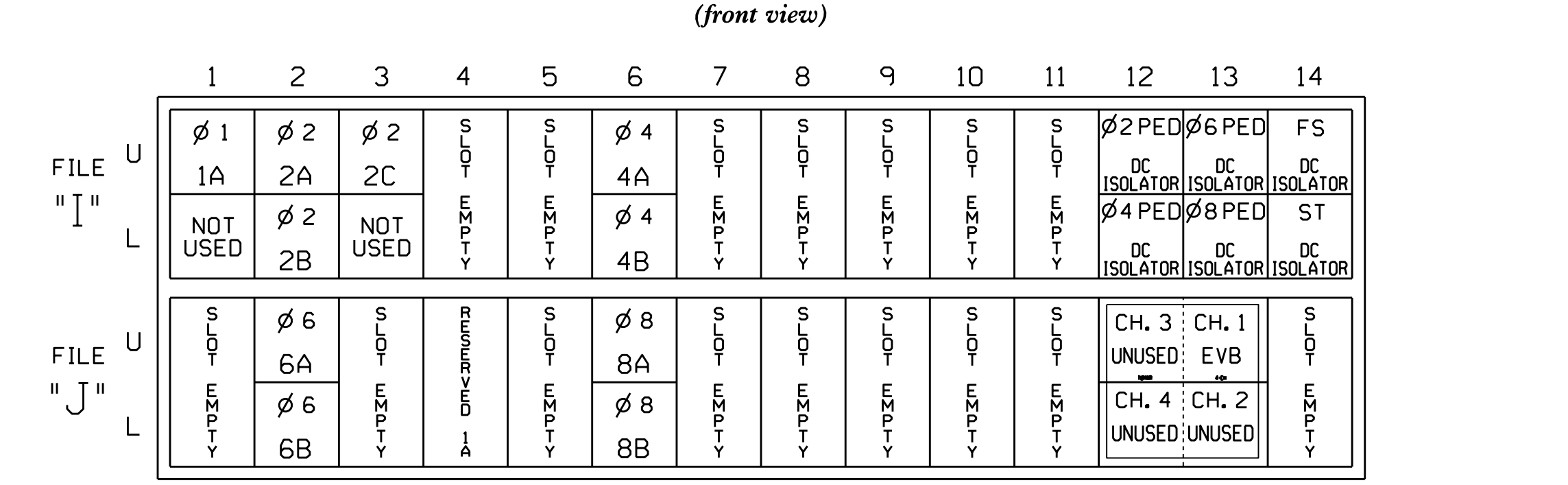
CONTROLLER.....2070E
 CABINET.....332 W/ AUX
 SOFTWARE.....McCAIN 2033
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX FILE
 LOAD SWITCHES USED.....S1,S2,S3,S5,S6,S8,S9,S11,S12,
 AUX S1,AUX S2,AUX S4,AUX S5
 PHASES USED.....1,2,2 PED,4,4 PED,6,6 PED,8,8 PED
 OVERLAP 1.....*
 OVERLAP 2.....4+8
 OVERLAP 3.....2+6
 OVERLAP 4.....4+8
 * See FYA PPLT Programming Detail on Sheet 2.

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CHU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	11*	22,23	P21, P22	NU	42,43	P41, P42	NU	61,62	P61, P62	NU	82,83	P81, P82	11*	81*	NU	21*	41*	NU
RED	128			101				134			107							
YELLOW	* 129			102				135			108							
GREEN	130			103				136			109							
RED ARROW													A121	A124		A114	A101	
YELLOW ARROW													A122	A125		A115	A102	
FLASHING YELLOW ARROW													A123	A126		A116	A103	
GREEN ARROW	127																	
Hand			113		104			119			110							
Person			115		106			121			112							

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

INPUT FILE POSITION LAYOUT



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

INPUT FILE CONNECTION & PROGRAMMING CHART

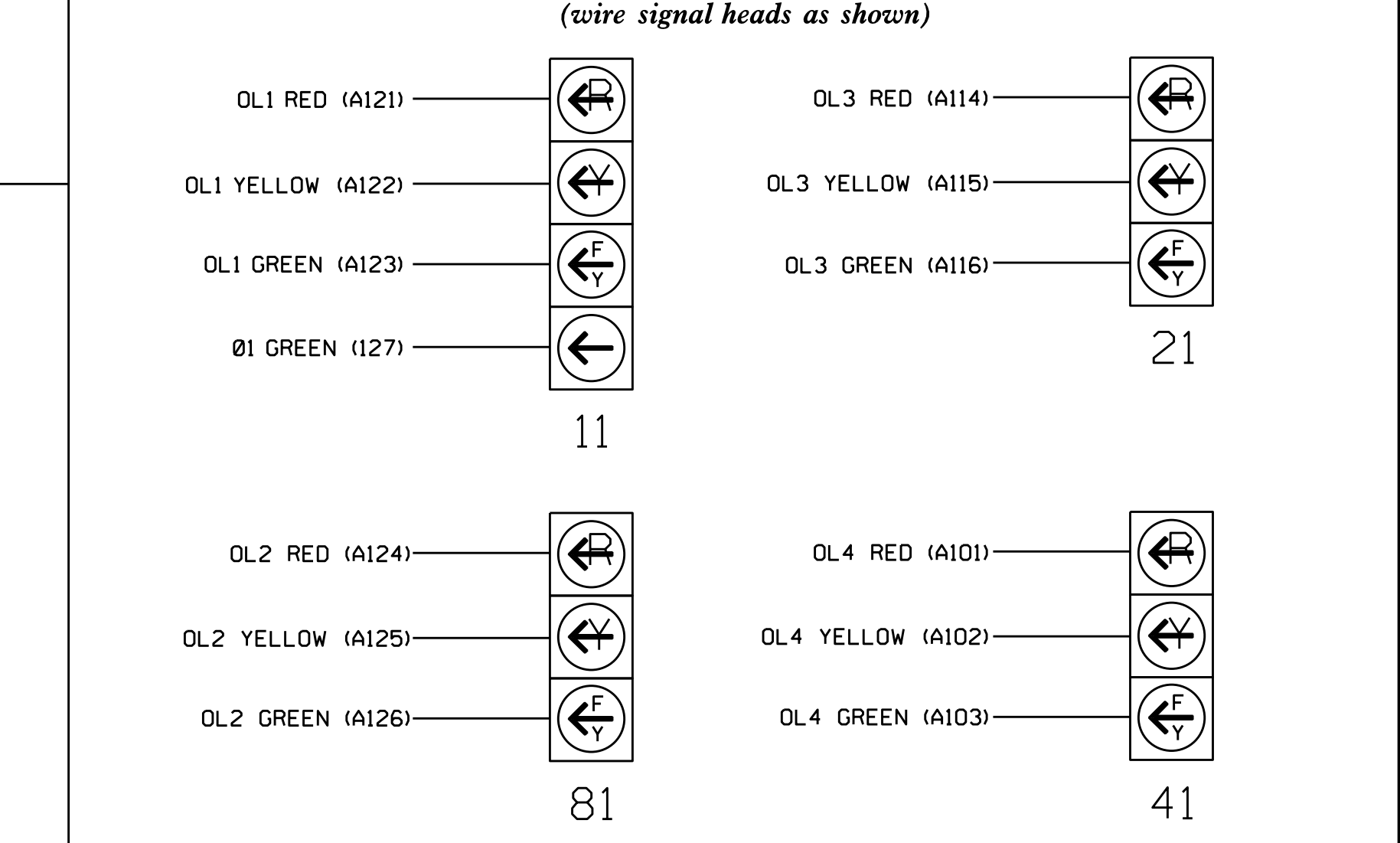
LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	DETECTOR NO.	PIN NO.	ATTRIBUTES	NEMA PHASE
1A	TB2-1,2	11U	14	56	5 7	1
			10	56	5 7	6
2A	TB2-5,6	12U	1	39	5 7	2
2B	TB2-7,8	12L	5	43	5 7	2
2C	TB2-9,10	13U	21	63	5 7	2
4A	TB4-9,10	16U	3	41	5 7	4
4B	TB4-11,12	16L	7	45	5 7	4
6A	TB3-5,6	J2U	2	40	5 7	6
6B	TB3-7,8	J2L	6	44	5 7	6
8A	TB5-9,10	J6U	4	42	5 7	8
8B	TB5-11,12	J6L	8	46	5 7	8
PED PUSH BUTTONS						
P21,P22	TB8-4,6	112U	25	67	2	2 PED
P41,P42	TB8-5,6	112L	27	69	2	4 PED
P61,P62	TB8-7,9	113U	26	68	2	6 PED
P81,P82	TB8-8,9	113L	28	70	2	8 PED

NOTE: PROGRAM DETECTOR DELAY AND CARRYOVER TIMES AS SPECIFIED ON SIGNAL DESIGN PLANS.

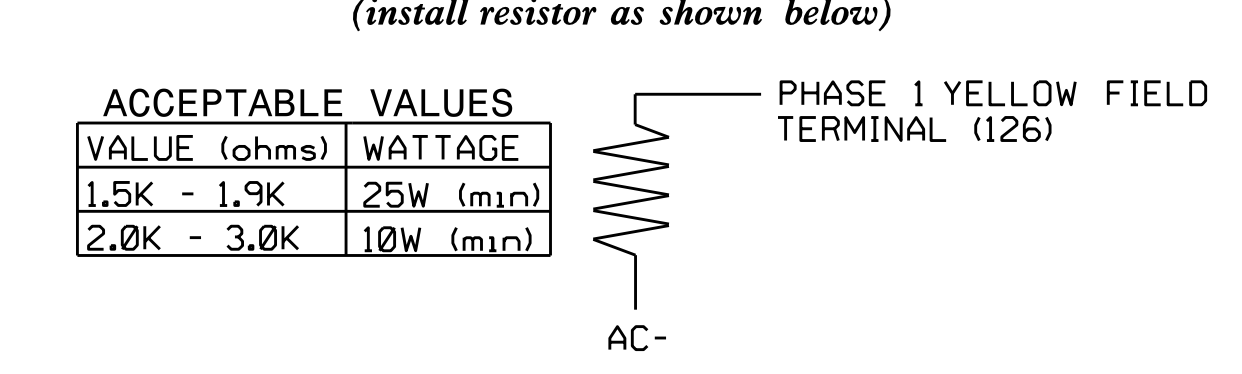
DETECTOR ATTRIBUTES LEGEND: INPUT FILE POSITION LEGEND: J2L
 1-FULL TIME DELAY
 2-PED CALL
 3-RESERVED
 4-COUNTING
 5-EXTENSION
 6-TYPE 3
 7-CALLING
 8-ALTERNATE

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-1026
 DESIGNED: September 2014
 SEALED: 04/02/2015
 REVISED: N/A

FYA SIGNAL WIRING DETAIL



LOAD RESISTOR INSTALLATION DETAIL



Electrical Detail - Sheet 1 of 2

Electrical and Programming Details For: NC 55 (South Alston Avenue) at SR 1926 (Angier Avenue)

Prepared In the Offices of: Transpacific Mobility and Safety Solutions, Inc. 750 N. Greenfield Pkwy, Garner, NC 27529

Division 5 Durham County Durham
 PLAN DATE: November 2014 REVIEWED BY: T. Joyce
 PREPARED BY: C. Strickland REVIEWED BY:

SEAL: GEORGE C. BROWN, PROFESSIONAL ENGINEER, No. 022013

DocuSigned by: George C. Brown 4/2/2015

SIG. INVENTORY NO. 05-1026

01-1026-2015 13-18
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 08/17/2014

OVERLAPS [2-4] PROGRAMMING DETAIL

Program overlaps as follows:
Main Menu - 4) OVERLAP

PRESS '+'

OVERLAP [2]:
LOADSWITCH = 10 NOTE: FOR SIGNAL HEAD 81
VEH SET 1 = 4+8
YELLOW CLEARANCE = 4.1
RED CLEARANCE = 2.9

PRESS '+'

OVERLAP [3]:
LOADSWITCH = 11 NOTE: FOR SIGNAL HEAD 21
VEH SET 1 = 2+6
YELLOW CLEARANCE = 4.1
RED CLEARANCE = 2.4

PRESS '+'

OVERLAP [4]:
LOADSWITCH = 12 NOTE: FOR SIGNAL HEAD 41
VEH SET 1 = 4+8
YELLOW CLEARANCE = 4.1
RED CLEARANCE = 2.9

END OF OVERLAP PROGRAMMING

**FYA PPLT PROGRAMMING
(SIGNAL HEAD 11)**

1. Program Flashing Yellow Arrow phases as follows:
Main Menu - 1) PHASE - 2) PHASE FUNCTIONS PAGE TWO
PPLT FYA = PHASE 1
2. Assign output pin for Flashing Yellow Arrow as follows:
Main Menu - 6) OUTPUTS - F) FYA PPLT
Phase 1 = 99
3. Redirect RED and YELLOW outputs for the left turn phases as follows:
Main Menu - 6) OUTPUTS - 8) REDIRECT PHASE
Phase 1 RED = 97, Phase 1 YELLOW = 98

EMERGENCY VEHICLE PREEMPTION PROGRAMMING

1. Program EVB preempt as follows:
Main Menu - 2) PREEMPT - 4) EMERGENCY VEHICLE
EVB Clear = 2
EVB Clearance Phases = 1.6
2. Program general preemption parameters as follows:
Main Menu - 2) PREEMPT - 6) MISC PREEMPTION PARAMETERS
Min Time Before PE ForceOff = 1
3. Ped Clear Before Preempt is a pedestrian timing parameter, and is programmed as follows:
Main Menu - 1) PHASE - 5) PEDESTRIAN TIMING
PHASE 2 MIN FDW = 5
PHASE 4 MIN FDW = 9
PHASE 6 MIN FDW = 4
PHASE 8 MIN FDW = 8

Program extend time on optical detector units for 2.0 sec for EVB.

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.

SPECIAL NOTES EV PREEMPT PROGRAMMING

Setting 'FYA DURING PREEMPT' to 'Y' eliminates yellow trap when transitioning to preempt from adjacent through phase.
Main Menu - 9) UTILITIES - 9) MISC
FYA DURING PREEMPT (Y/N) = Y

FLASHER CIRCUIT MODIFICATION DETAIL

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

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

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

MIN WALK DURING PREEMPTION PROGRAMMING

To disable MIN WALK pedestrian timing during preemption, program the controller as follows:
Main Menu - 9) UTILITIES - 5) CONFIGURATION
EXTRA TWO = 3

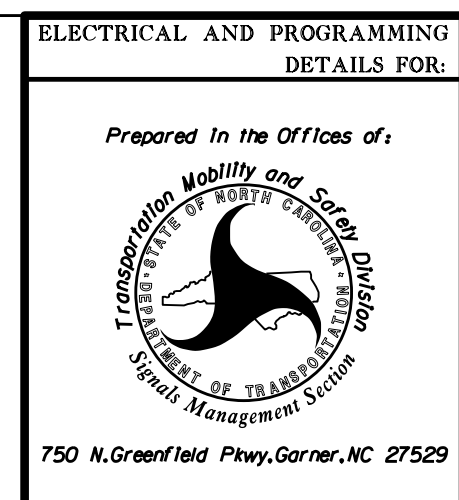
OVERLAP GREEN FLASH PROGRAMMING FOR 3 SECTION FYA

The following will cause the overlap green outputs to flash, which are wired to the flashing yellow arrow. Program as follows:

Main Menu - 1) PHASE - 2) PHASE FUNCTIONS PAGE TWO
OLAP G FL = 2, 3, 4

Electrical Detail - Sheet 2 of 2

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-1026
DESIGNED: September 2014
SEALED: 04/02/2015
REVISED: N/A



ELECTRICAL AND PROGRAMMING DETAILS FOR:		NC 55 (South Alston Avenue) at SR 1926 (Angier Avenue)	
Prepared In the Offices of:	Division 5	Durham County	Durham
	PLAN DATE: November 2014	REVIEWED BY: T. Joyce	
	PREPARED BY: C. Strickland	REVIEWED BY:	
REVISIONS	INIT.	DATE	

SEAL

DocuSigned by:
George C. Brown 4/2/2015

SIG. INVENTORY NO. 05-1026

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