Project No.	Sheet No.
R–5726	Sig. 1.0

Project: R–5726

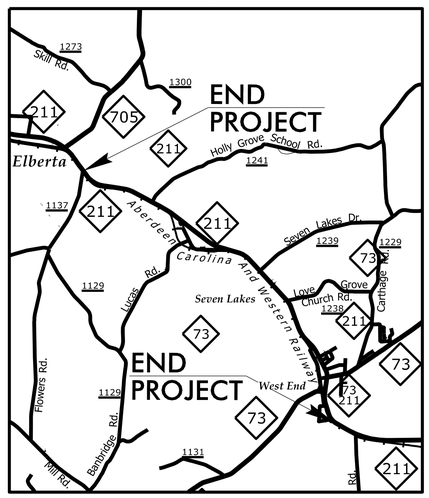
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

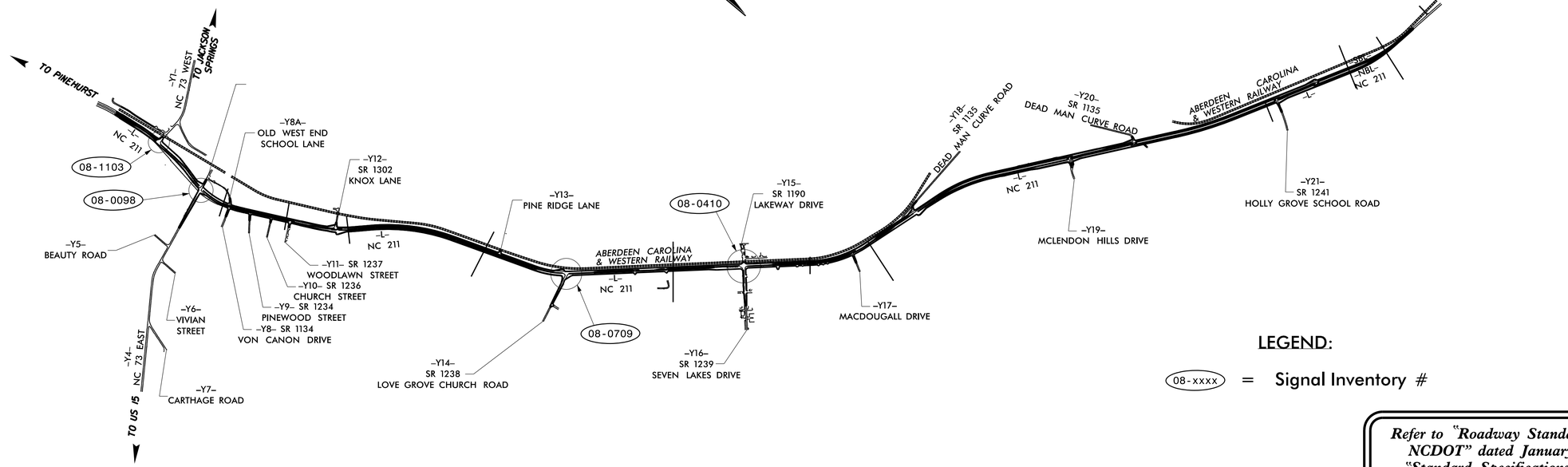
MOORE COUNTY

LOCATION: NC 211 FROM SOUTH OF NC 73 IN WEST END TO NORTH OF SR 1241 (HOLLY GROVE SCHOOL ROAD).

TYPE OF WORK: TRAFFIC SIGNALS

Vicinity





LEGEND:

08-xxxx = Signal Inventory #

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

Index of Plans

Sheet #	*Reference #*	*Location/Description*
Sig. 1.0	--------	*Title Sheet*
Sig. 1.1		*Standard Plate Sheet*
Sig. 2.0–5.5	*08–1103*	*NC 211 at NC 73 (South Intersection)*
Sig. 6.0–11.4	*08–0098*	*NC 211 at NC 73/SR 1133 (Mode Rd)*
Sig. 12.0–15.4	*08–0709*	*NC 211 at SR 1238 (Love Grove Church Rd)*
Sig. 16.0–19.5	*08–0410*	*NC 211 at SR 1239 (Seven Lakes Drive and SR 1190 (Lakeway Drive)*
M1A–M9		*Standard Metal Pole Details*

TRANSPORTATION SYSTEMS MANAGEMENT & OPERATIONS

Contacts:

Robert J. Ziemba, PE – Central Region Signals Engineer
Ryan W. Hough, PE – Signal Equipment Design Engineer

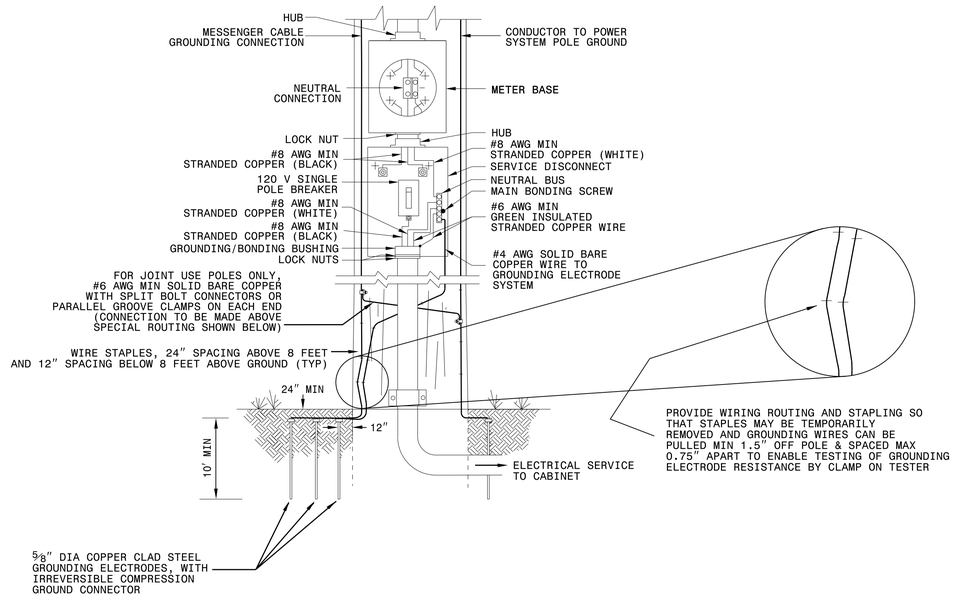
Prepared for the office of:
DIVISION OF HIGHWAYS
TRANSPORTATION MOBILITY & SAFETY DIVISION

Transportation Mobility and Safety Division · State of North Carolina · Department of Transportation
TSMO UNIT

750 N. Greenfield Parkway, Garner, NC 27529

$$$$SYSTIME$$$$
$$$$USERNAME$$$$
$$$$DGNFILE$$$$

PROJECT NO.	SHEET NO.
	Sig.



1-18

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

ENGLISH STANDARD DRAWING FOR

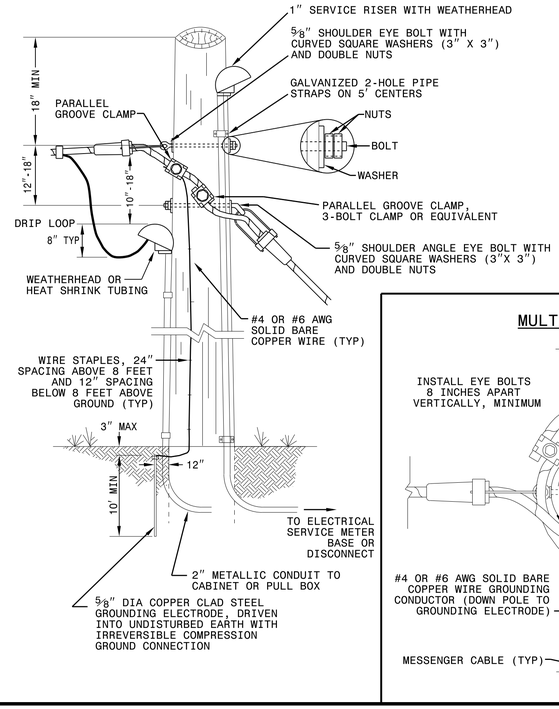
ELECTRICAL SERVICE GROUNDING

GROUNDING AND BONDING

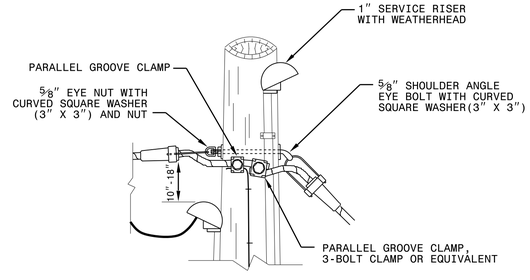
SHEET 1 OF 1

1700D01

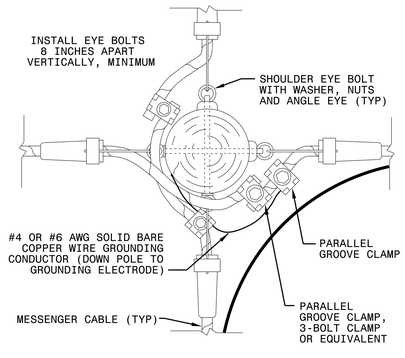
TWO-BOLT METHOD (PREFERRED)



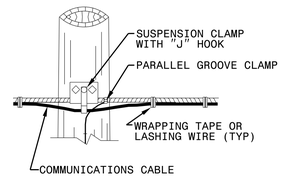
ONE-BOLT METHOD



MULTIPLE SPANS



COMMUNICATIONS CABLE AT INTERMEDIATE POLE



NOTE

FOR CONNECTING MESSENGER TO MESSENGER, USE PARALLEL GROOVE CLAMP, 3-BOLT CLAMP OR EQUIVALENT. FOR CONNECTING COPPER WIRE TO MESSENGER, USE PARALLEL GROOVE CLAMP.

1-18

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

ENGLISH STANDARD DRAWING FOR

WOOD POLES

METHODS OF ATTACHMENT AND GROUNDING

SHEET 1 OF 1

1720D01

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

See Plate for Title

Prepared in the Offices of:

Transportation Mobility and Safety Division
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
ITS & Signals Unit

750 N. Greenfield Parkway
Garner, NC 27529

SEAL

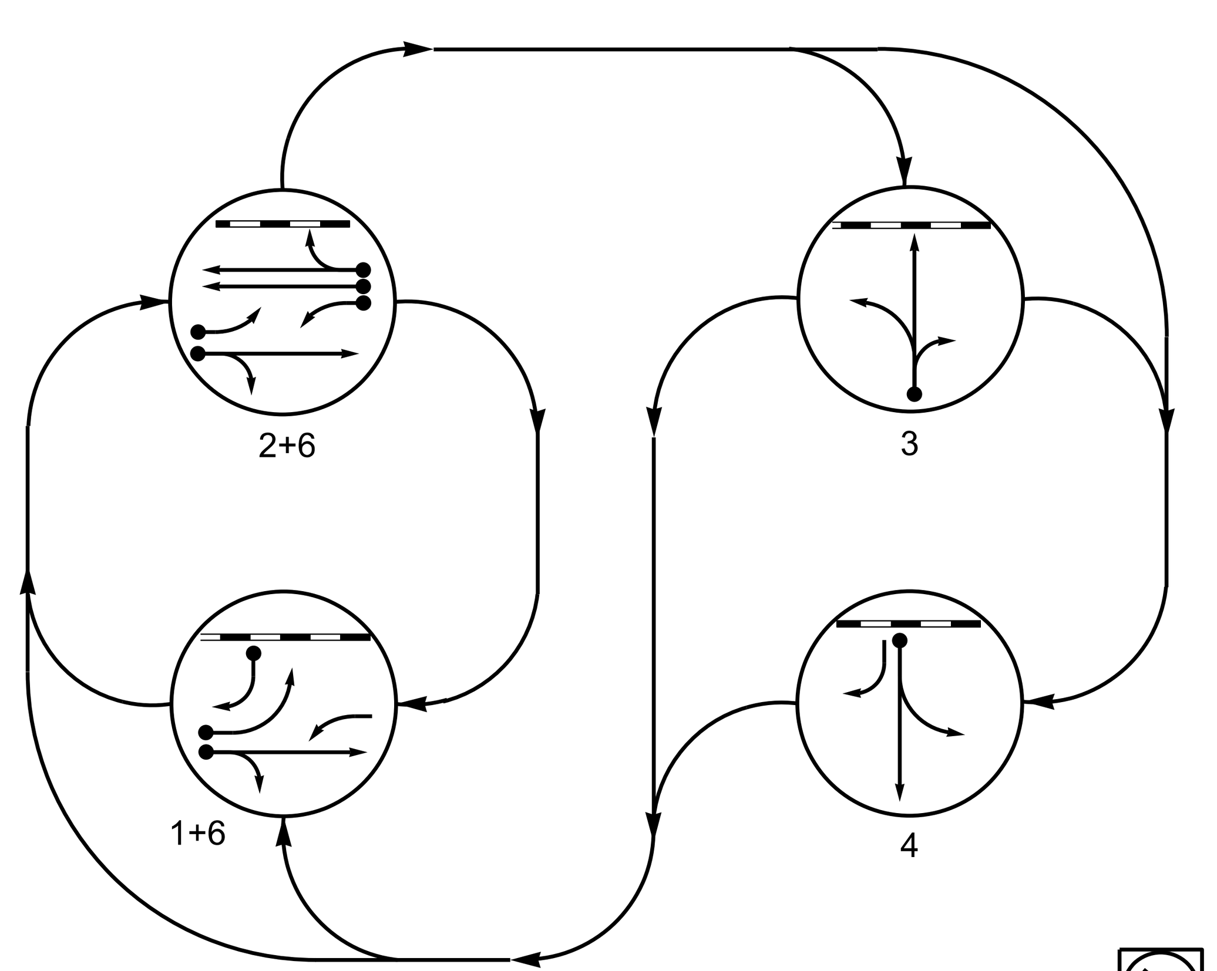
NORTH CAROLINA PROFESSIONAL SEAL 032108 ENGINEER MOHD A. ASLAMI

DocuSigned by: Mohd Aslami
5D90B0BA6DBB6495...

10/11/2017
DATE

11-OCT-2017 08:56
U:\NCDOT\Std Drawings\Plate Sheets\2018_Plate Sheet .dgn
rwhough

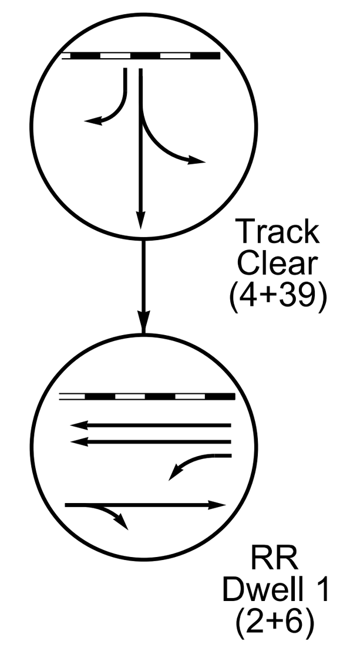
PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

RAIL PREEMPT PHASES
(High Priority)



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

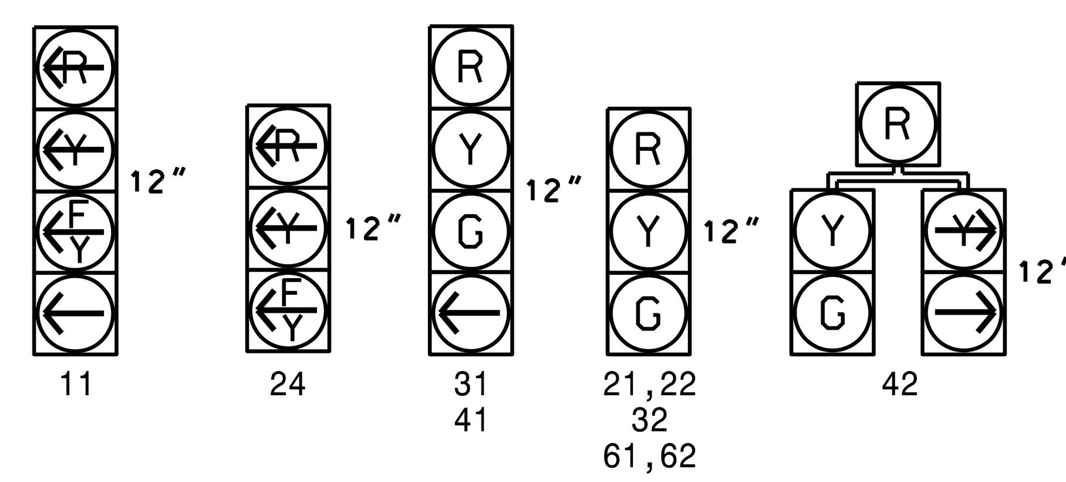


TABLE OF OPERATION

SIGNAL FACE	PHASE 1+6	2+6	3	4	TRACK CLEAR	RR DWELL 1	FLASH
11	←	FY←	R←	R←	R←	R←	R←
21,22	R	G	R	R	R	G	R
24	FY←	FY←	R←	R←	R←	FY←	R←
31	R	R	G←	R	R	R	R
32	R	R	G	R	R	R	R
41	R	R	R	G←	G←	R	R
42	R/→	R	R	G	G	R	R
61,62	G	G	R	R	R	G	R
Sign A	OFF	OFF	OFF	OFF	ON	ON	*

* See Note 7

MAXTIME DETECTOR INSTALLATION CHART

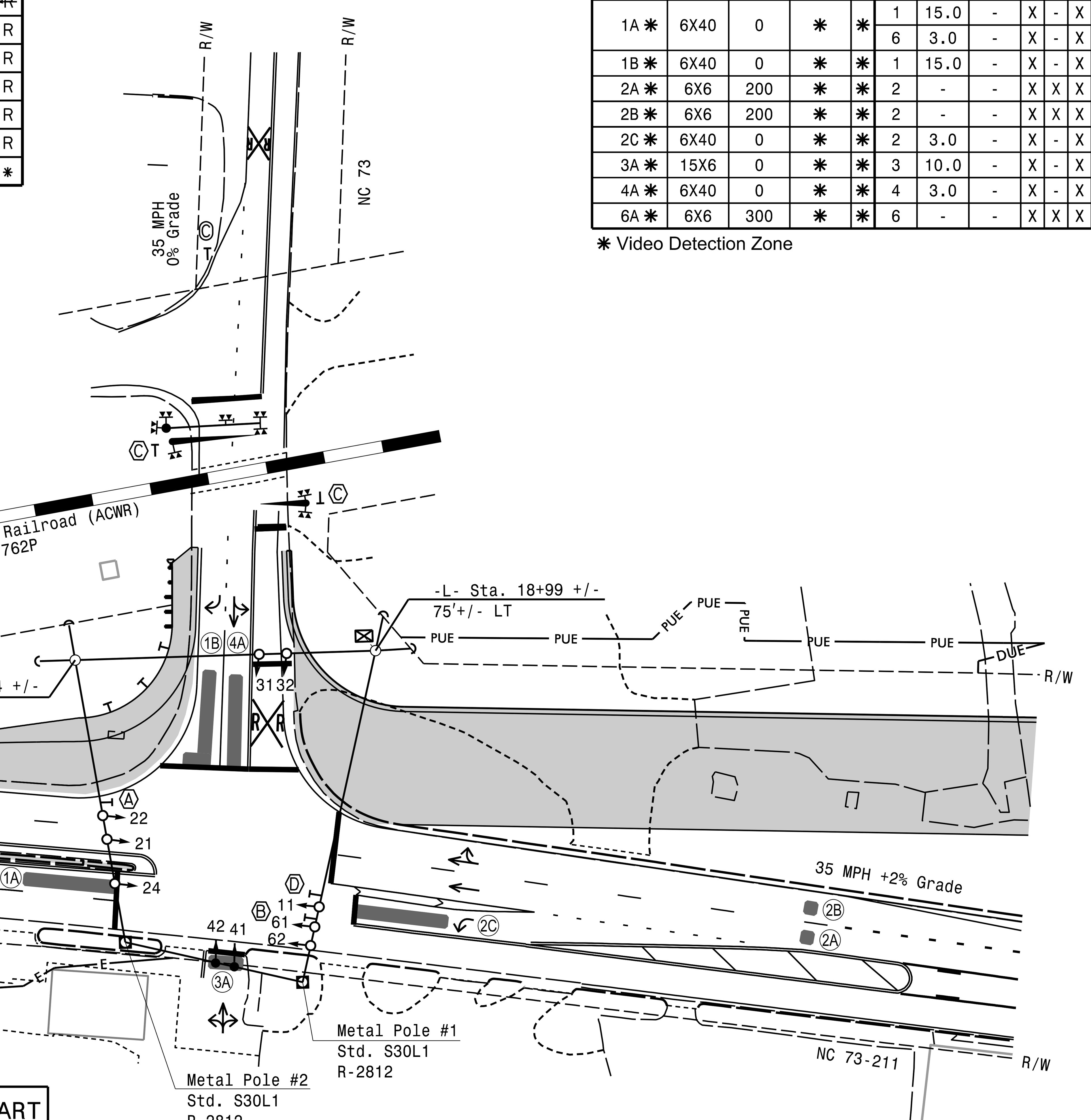
ZONE	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
1A *	6X40	0	*	*	1	15.0	-	X	-	X	-	*
					6	3.0	-	X	-	X	X	*
1B *	6X40	0	*	*	1	15.0	-	X	-	X	-	*
2A *	6X6	200	*	*	2	-	-	X	X	X	-	*
2B *	6X6	200	*	*	2	-	-	X	X	X	-	*
2C *	6X40	0	*	*	2	3.0	-	X	-	X	X	*
3A *	15X6	0	*	*	3	10.0	-	X	-	X	-	*
4A *	6X40	0	*	*	4	3.0	-	X	-	X	-	*
6A *	6X6	300	*	*	6	-	-	X	X	X	-	*

* Video Detection Zone

4 Phase Fully Actuated With Railroad Preemption (Isolated)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. This location contains railroad preemption phasing. Do not program signal for late night phasing operation.
3. Phase 1 may be lagged.
4. The order of phase 3 and phase 4 may be reversed.
5. Set all detector units to presence mode.
6. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
7. Ensure flashing operation does not alter operation of blankout signs.
8. Program phase 40 to run concurrently with all phases during normal operation. Phase 39 must be incompatible with Phase 40 and included as a track clear phase.
9. This intersection uses video detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.



LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
— PUE —	Permanent Utility Easement	N/A
— E —	Temporary Construction Easement	N/A
— PDE —	Permanent Drainage Easement	N/A
— TDE —	Temporary Drainage Easement	N/A
— DUE —	Permanent Drainage/Utility Easement	N/A
	Directional Arrow	
N/A	Railroad Cantilever	
N/A	Railroad Gate and Flasher	
N/A	Railroad Tracks	
N/A	Guardrail	
	Construction Zone	
	Non-Intrusive Detection Zone	
	Metal Strain Pole	
(A)	"NO RIGHT TURN - TRAIN" LED Blankout Sign	(A)
(B)	Left Arrow "ONLY" Sign (R3-5L)	(B)
(C)	"DO NOT STOP ON TRACKS" Sign (R8-8)	(C)
(D)	"U-TURN YIELD TO RIGHT TURN" Sign (R10-16)	(D)

MAXTIME TIMING CHART

FEATURE	PHASE 1	2	3	4	6	39	40
Walk *	–	–	–	–	–		
Ped Clear *	–	–	–	–	–		
Min Green *	7	10	7	7	12		
Passage *	2.0	5.0	2.0	2.0	6.0		
Max 1 *	20	60	15	30	60		
Yellow Change	3.0	4.4	3.8	3.8	4.4	3.8	4.4
Red Clear	2.4	1.7	1.3	1.6	1.7	1.6	2.4
Added Initial *	–	1.5	–	–	2.5		
Maximum Initial *	–	24	–	–	34		
Time Before Reduction *	–	15	–	–	15		
Time To Reduce *	–	34	–	–	34		
Minimum Gap	–	3.0	–	–	3.0		
Advance Walk	–	–	–	–	–		
Non Lock Detector	X	–	X	X	–		
Vehicle Recall	–	MIN RECALL	–	–	MIN RECALL		MIN RECALL
Dual Entry	–	–	–	–	–		

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

MAXTIME PREEMPTION CHART

FUNCTION	PRE 1
Type	RAIL ROAD
Exit Phases	4
Delay	0
Max Presence	0
Enter Min Green	1
Enter Walk	0
Enter Ped Clear	0
Enter Yellow Change	4.4*
Enter Red Clear	2.4*
Track Green	27
Track Yellow Change	3.8
Track Red Clear	1.6
Dwell Green	0
Exit Min Green	255*
Exit Yellow Change	25.5*
Exit Red Clear	25.5*
Call Extend Time	1.0
Exit Type	EXIT PHASES
Ped Clear Through Yellow	–
Require All Red Entry	–

* Directs controller to use default phase timing.

This signal was designed for advanced preemption

Signal Upgrade
Temporary Design 1 (TMP Phase I)

MOTT MACDONALD
MOTT MACDONALD I & E, LLC
930 Main Campus Drive
Suite 200
RALEIGH, NC 27606
License No. F-0669

Prepared for: Transportation Mobility and Safety Division — State of North Carolina Department of Transportation — Signal Design Section
750 N.Greenfield Pkwy.Garner,NC 27529

NC 211/NC 73-211 at NC 73 (South Intersection)

Division 8 Moore County West End

PLAN DATE:	June 2024	REVIEWED BY:	R. Mullinax
PREPARED BY:	LD Stouchko	REVIEWED BY:	

SCALE 0 40 — 1"=40'

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 034437 ENGINEER LORI D. STOUCHKO

SIGNATURE DATE

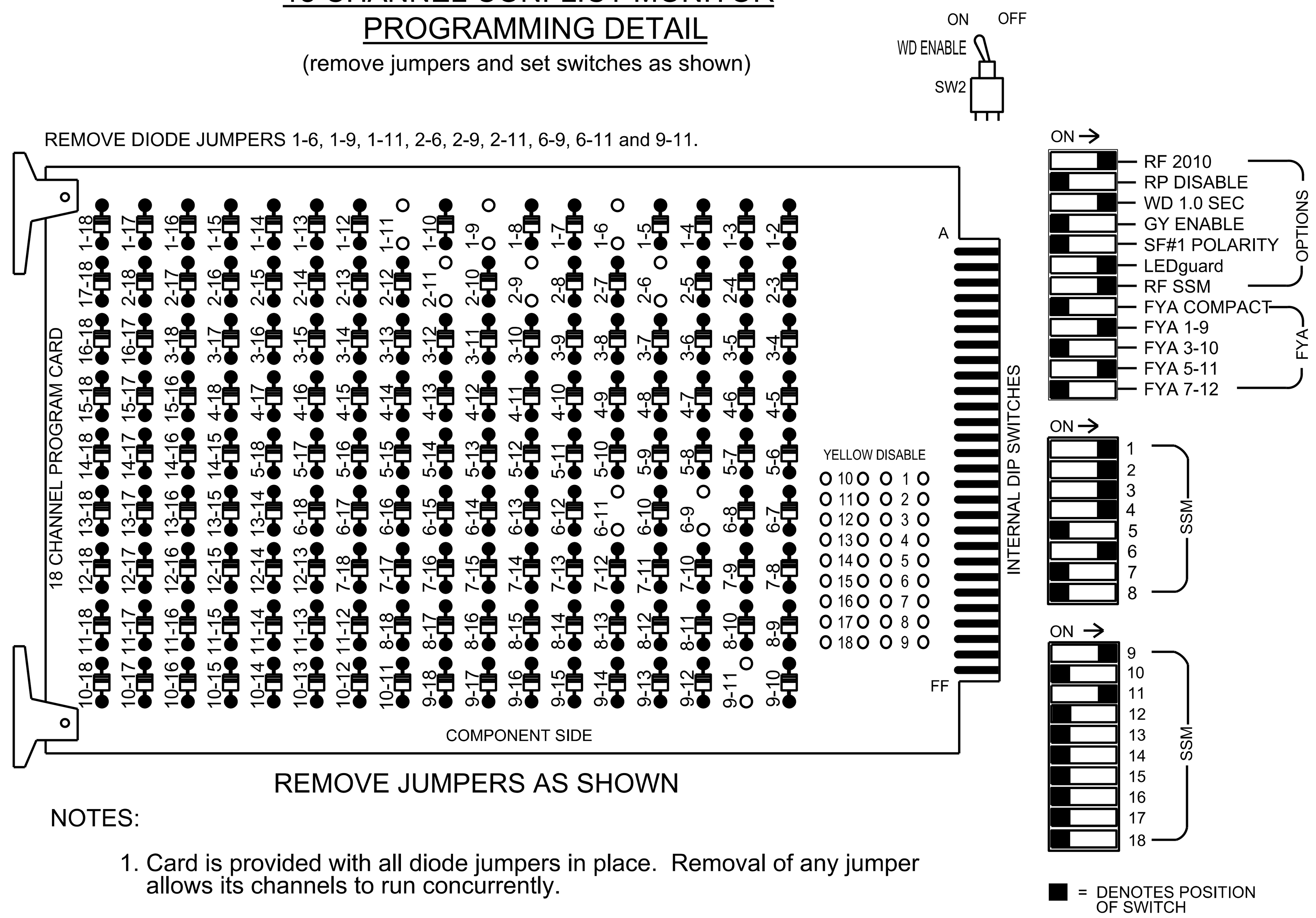
SIG. INVENTORY NO. 08-1103T1

PROJECT REFERENCE NO.	SHEET NO.
R-5726	Sig.2.1

18 CHANNEL 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, 6-9, 6-11 and 9-11.



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 the Red Enable is active at all times during normal operation.
4. Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the signal plan.
2. Program controller to start up in phase 2 Green No Walk, 6 Green No Walk, 39 Phase Not On, and 40 Green No Walk.
3. Program Phase 39 for No Startup Veh Call.
4. Program Phase 40 for Min Recall.
5. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.

EQUIPMENT INFORMATION

Controller..2070LX
Cabinet...332 w/ Aux
Software...Q-Free MAXTIME
Cabinet Mount....................................Base
Output File Positions..........................18 With Aux. Output File
Load Switches Used...........................S1, S2, S4, S5, S8, AUX S1, AUX S4
Phases Used.......................................1, 2, 3, 4, 6, 39**, 40**
Overlap "1"..*
Overlap "2"..NOT USED
Overlap "3"..*
Overlap "4"..NOT USED

*See overlap programming detail on this sheet
**Phase used for preemption timing purposes only

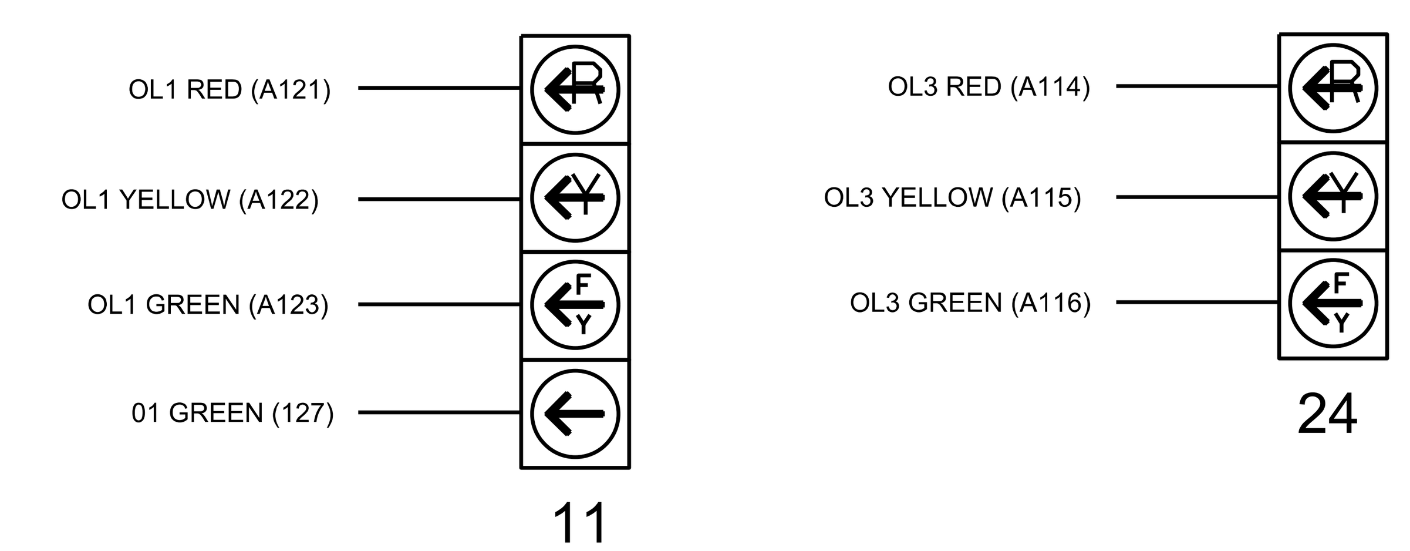
SIGNAL HEAD HOOK-UP CHART

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★	42	21,22	NU	31	32	41	42	NU	NU	61,62	NU	NU	NU	NU	11★	NU	NU	24★	NU	NU
RED		✱	128		116	116	101	101			134										
YELLOW			129		117	117	102	102			135										
GREEN			130		118	118	103	103			136										
RED ARROW																A121			A114		
YELLOW ARROW		126														A122			A115		
FLASHING YELLOW ARROW																A123			A116		
GREEN ARROW	127	127			118		103														

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

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



INPUT FILE POSITION LAYOUT

(front view)

	1	2	3	4	5	6	7	8	9	1O	11	12	13	14
U	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
L														ST DC ISOLATOR
U	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	PRE1 AC ISOLATOR
L														NOT USED

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

FS = FLASH SENSE
ST = STOP TIME
PRE = PREEMPT

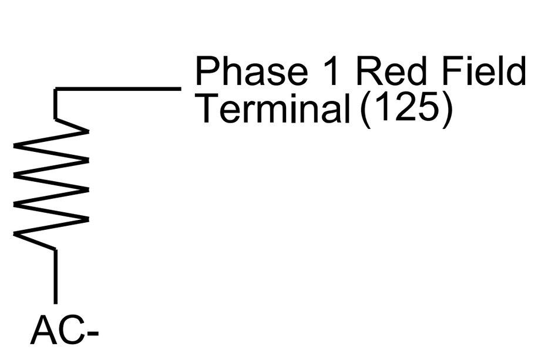
SPECIAL DETECTOR NOTES

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 resistors as shown)

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



OVERLAP PROGRAMMING

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

Overlap Plan 1

Overlap	1	2	3	4
Type	FYA 4 - Section	Off	FYA 4 - Section	Off
Included Phases	2	-	6	-
Modifier Phases	1	-	-	-
Modifier Overlaps	-	-	-	-
Trail Green	0	0	0	0
Trail Yellow	0.0	0.0	0.0	0.0
Trail Red	0.0	0.0	0.0	0.0

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 08-1103T1
DESIGNED: June 2024
SEALED: 7/11/2024
REVISED:

MOTT MACDONALD
MOTT MACDONALD I & E, LLC
930 Main Campus Drive
Suite 200
RALEIGH, NC 27606
License No. F-0669

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

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for: Transportation Mobility and Safety Division, ITS & Signals Management Section, State of North Carolina Department of Transportation
750 N.Greenfield Pkwy.Garner.NC 27529

NC 211/NC 73-211
at
NC 73 (South Intersection)

Division 8 | Moore County | West End

PLAN DATE: June 2024	REVIEWED BY: R. Mullinax
PREPARED BY: LD Stouchko	REVIEWED BY:

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 034437 LORI D. STOUCHKO

DATE

SIG. INVENTORY NO. 08-1103T1

OUTPUT CHANNEL CONFIGURATION

Front Panel
Main Menu >Controller >More>Channels>Channels Config

Web Interface
Home >Controller >Advanced IO>Channels>Channels Configuration

Channel Configuration

	Channel	Control Type	Control Source	Flash Yellow	Flash Red	Flash Alt	MMU Channel
	1	Phase Vehicle	1		X	X	1
NOTICE PHASE 2 FLASH RED →	2	Phase Vehicle	2		X		2
	3	Phase Vehicle	3		X	X	3
	4	Phase Vehicle	4		X		4
	5	Phase Vehicle	5		X		5
NOTICE PHASE 6 FLASH RED →	6	Phase Vehicle	6		X	X	6
	7	Phase Vehicle	7		X		7
	8	Phase Vehicle	8		X	X	8
NOTICE OVERLAP 1 FLASH RED →	9	Overlap	1		X	X	9
	10	Overlap	2		X	X	10
NOTICE OVERLAP 3 FLASH RED →	11	Overlap	3		X		11
	12	Overlap	4		X		12
	13	Phase Ped	2				13
	14	Phase Ped	4				14
	15	Phase Ped	6				15
	16	Phase Ped	8				16
	17	Overlap	5		X	X	17
	18	Overlap	6		X		18

MAXTIME STARTUP AND SOFTWARE FLASH PROGRAMMING DETAIL

Front Panel
Main Menu >Controller >Unit

Web Interface
Home >Controller >Unit

Modify parameters as shown below and save changes.

Startup Parameters

Startup Clearance Hold
6

Unit Flash Parameters

All Red Flash Exit Time
6

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 08-1103T1
DESIGNED: June 2024
SEALED: 7/11/2024
REVISED:

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

MOTT MACDONALD
MOTT MACDONALD I & E, LLC
930 Main Campus Drive
Suite 200
RALEIGH, NC 27606
License No. F-0669

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for:
Transportation Mobility and Safety Division
ITS & Signals Management Section
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
750 N.Greenfield Pkwy,Garner,NC 27529

NC 211/NC 73-211
at
NC 73 (South Intersection)

Division 8 Moore County West End

PLAN DATE: June 2024	REVIEWED BY: R. Mullinax
PREPARED BY: LD Stouchko	REVIEWED BY:

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 034437 ENGINEER LORI D. STOUCHKO

DATE

SIG. INVENTORY NO. 08-1103T1

SEQUENCE DETAIL

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

Web Interface
Home >Controller >Sequence

Sequence 1

Ring	Sequence Data
1	1,2,a,3,4,b
2	5,6,a,7,8,b
3	39,c,40,d

PREEMPTION PROGRAMMING

Front Panel
Main Menu >Controller >Preemption >Preempt Phasing/Preempt Parameters

Web Interface
Home >Controller >Preempt Configuration >Preempts

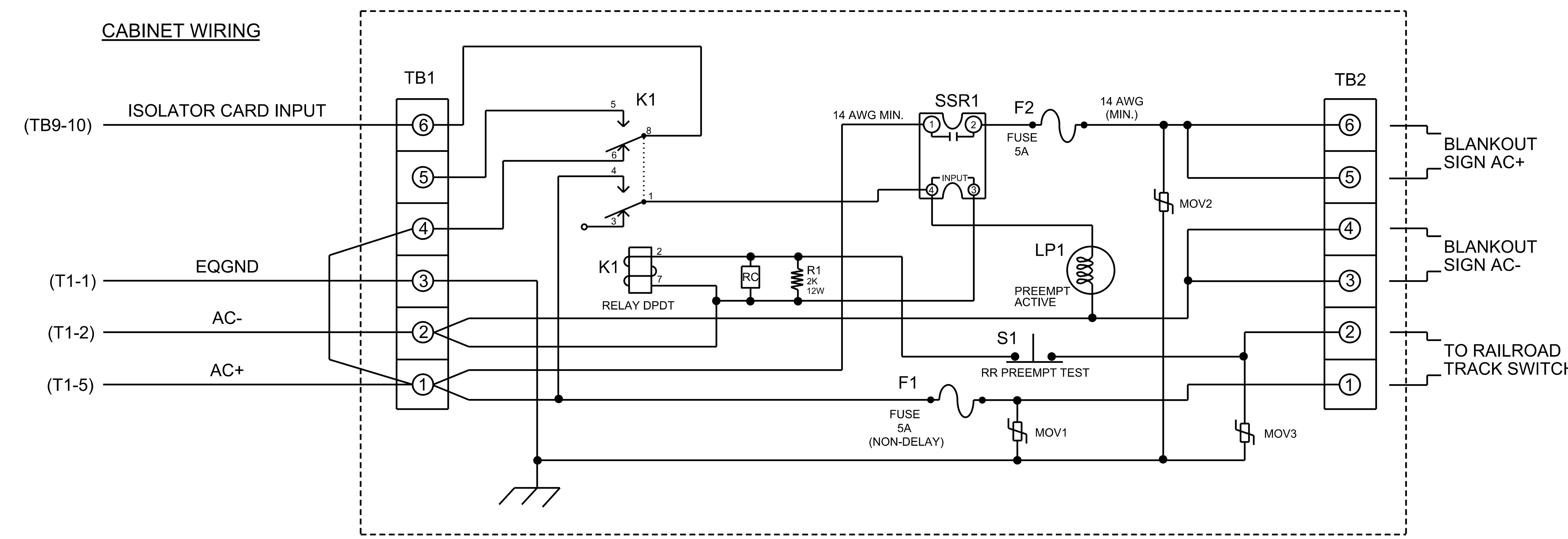
Preempt Configuration

Preempt	1
Enabled	Enabled
Type	Rail Road
Track Phases	4,39
Track Overlaps	-
Dwell Phases	2,6
Dwell Peds	-
Dwell Overlaps	3
Cycling Phases	-
Cycling Peds	-
Cycling Overlaps	-
Exit Phases	4
Exit Overlaps	-
Delay	0
Call Ext Time	1.0
Max Presence	0
Max Pres Act	Terminate
Enter Min Green	1
Enter Walk	0
Enter Ped Clear	0
Enter Yellow Change	4.4
Enter Red Clear	2.4
Track Green	27
Track Yellow Clr	3.8
Track Red Clear	1.6
Dwell Green	0
Exit Min Green	255
Exit Yellow Change	25.5
Exit Red Clear	25.5
Exit Type	Exit Phases
Non Locking Memory	-
Not Ovrd Flash	X
Not Ovrd Nxt Pre	-
Require All Red Entry	-
Track Clear Ovrd	X
Ped Clear During Yellow	-
Entry Omit OLTG	X
Track Reserve	X

RAILROAD PREEMPTION WIRING DETAIL

(wire as shown below)

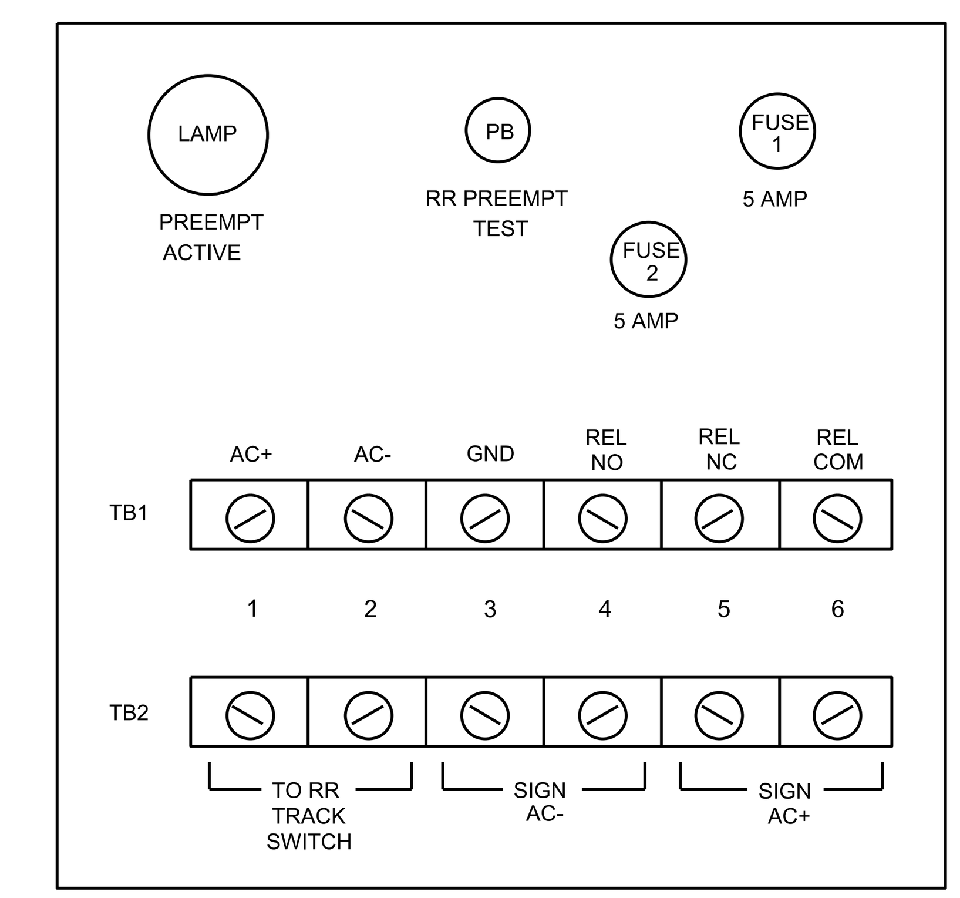
PREEMPTION AND BLANKOUT SIGN CONTROL BOX



NOTES

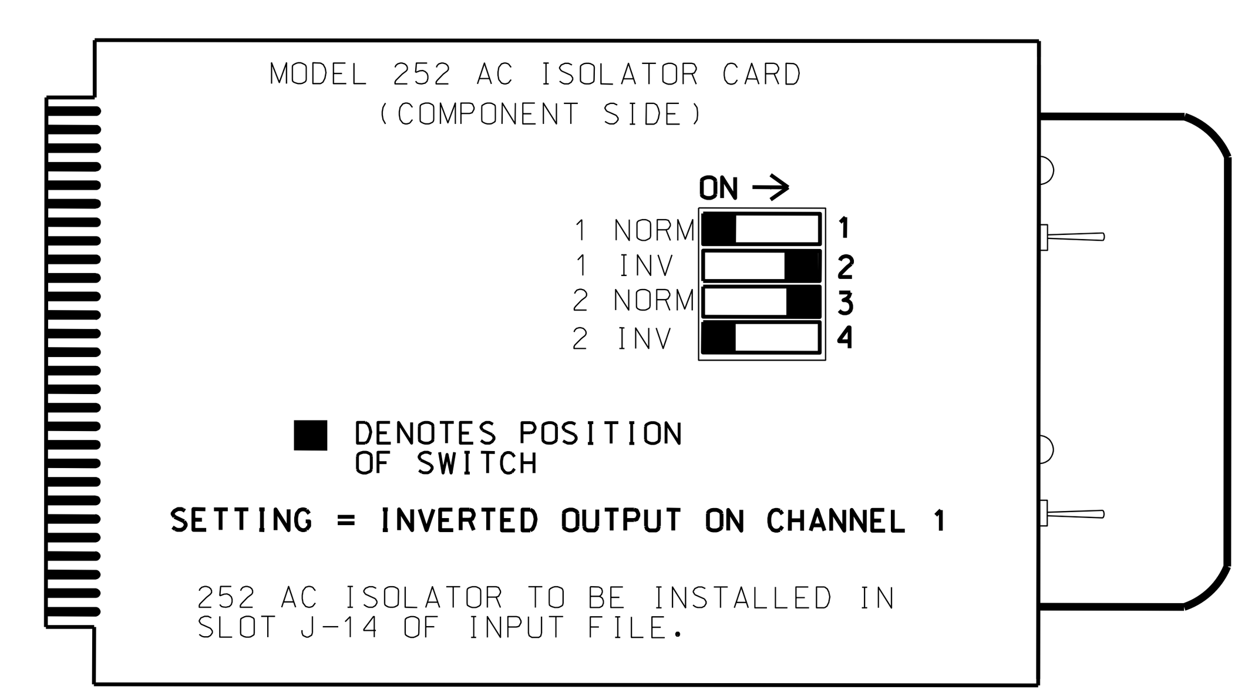
1. Relay K1 is shown in the energized (Preempt not active) normal operation state.
2. Relay K1 is a DPDT with 120VAC coil with octal base.
3. Relay SSR1 is a SPST (normally open) Solid State Relay with AC input and AC (25 amp) output.
4. AC Isolator Card shall activate preemption upon removal of AC+ from the input (as shown above). To accomplish this set invert dip switch on AC Isolator Card.
5. IMPORTANT!! A jumper must be added between input file terminals J14-E and J14-K if not already present. Also, terminal TB9-12 (on input panel) shall be connected to AC neutral (jumper may have to be added).

FRONT VIEW



PREEMPT 1 AC ISOLATOR (MODEL 252) OUTPUT PROGRAMMING DETAIL

(set DIP switches as shown below)



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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 08-1103T1
DESIGNED: June 2024
SEALED: 7/11/2024
REVISED:

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

MOTT MACDONALD
MOTT MACDONALD I & E, LLC
930 Main Campus Drive
Suite 200
RALEIGH, NC 27606
License No. F-0669

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for:
Transportation Mobility and Safety Division – State of North Carolina Department of Transportation – ITS & Signals Management Section
750 N.Greenfield Pkwy,Garner,NC 27529

NC 211/NC 73-211
at
NC 73 (South Intersection)

Division 8	Moore County	West End
PLAN DATE: June 2024	REVIEWED BY: R. Mullinax	
PREPARED BY: LD Stouchko	REVIEWED BY:	

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

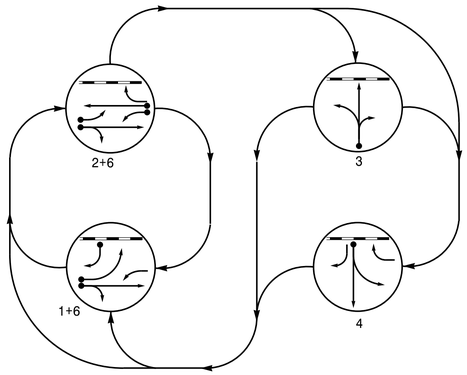
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 034437 ENGINEER LORI D. STOUCHKO

DATE

SIG. INVENTORY NO. 08-1103T1

PROJECT REFERENCE NO.	SHEET NO.
R-5726	Sig.3.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

RAIL PREEMPT PHASES

(High Priority)

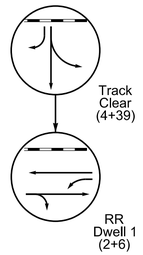


TABLE OF OPERATION

SIGNAL FACE	PHASE 1+6	2+6	3	4	TRACK CLEAR	RR DWELL 1	FLASH
11	~~—~~	~~F Y~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~
21,22	R	G	R	R	R	G	R
23	R	~~F Y~~	R	~~F Y~~	R	R	R
24	~~F Y~~	~~F Y~~	~~R~~	~~R~~	~~R~~	~~F Y~~	~~R~~
31	R	R	G	R	R	R	R
32	R	R	G	R	R	R	R
41	R	R	R	G	G	R	R
42	R	R	R	G	G	R	R
43	R	R	R	G	G	R	R
61,62	G	G	R	R	R	G	R

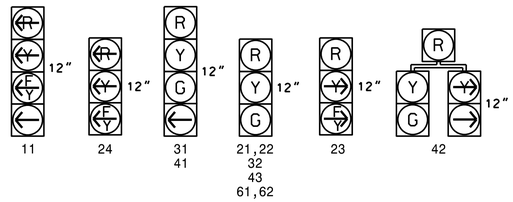
MAXTIME DETECTOR INSTALLATION CHART

DETECTOR ZONE	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
1A ✱	6X40	0	✱	✱	1	15.0	-	X	-	X	-	✱
					6	3.0	-	X	-	X	X	✱
1B ✱	6X40	0	✱	✱	1	15.0	-	X	-	X	-	✱
2A ✱	6X6	200	✱	✱	2	-	-	X	X	X	-	✱
2C ✱	6X40	0	✱	✱	2	3.0	-	X	-	X	X	✱
3A ✱	15X6	0	✱	✱	3	10.0	-	X	-	X	-	✱
4A ✱	6X40	0	✱	✱	4	3.0	-	X	-	X	-	✱
6A ✱	6X6	300	✱	✱	6	-	-	X	X	X	-	✱

✱ Video Detection Zone

SIGNAL FACE I.D.

All Heads L.E.D.



MAXTIME TIMING CHART

FEATURE	PHASE 1	2	3	4	6	39	40
Walk *	–	–	–	–	–		
Ped Clear *	–	–	–	–	–		
Min Green *	7	10	7	7	12		
Passage *	2.0	5.0	2.0	2.0	6.0		
Max 1 *	20	60	15	30	60		
Yellow Change	3.0	4.4	3.8	3.8	4.4	3.8	4.4
Red Clear	1.9	1.6	1.0	1.2	1.6	1.2	1.9
Added Initial *	–	2.5	–	–	2.5		
Maximum Initial *	–	24	–	–	34		
Time Before Reduction *	–	15	–	–	15		
Time To Reduce *	–	34	–	–	34		
Minimum Gap	–	3.0	–	–	3.0		
Advance Walk	–	–	–	–	–		
Non Lock Detector	X	–	X	X	–		
Vehicle Recall	–	MIN RECALL	–	–	MIN RECALL		MIN RECALL
Dual Entry	–	–	–	–	–		

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

MAXTIME PREEMPTION CHART

FUNCTION	PRE 1
Type	RAIL ROAD
Exit Phases	4
Delay	0
Max Presence	0
Enter Min Green	1
Enter Walk	0
Enter Ped Clear	0
Enter Yellow Change	4.4 *
Enter Red Clear	1.9 *
Track Green	27
Track Yellow Change	3.8
Track Red Clear	1.2
Dwell Green	0
Exit Min Green	255 *
Exit Yellow Change	25.5 *
Exit Red Clear	25.5 *
Call Extend Time	1.0
Exit Type	EXIT PHASES
Ped Clear Through Yellow	–
Require All Red Entry	–

* Directs controller to use default phase timing.

4 Phase
Fully Actuated
With Railroad Preemption
(Isolated)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. This location contains railroad preemption phasing. Do not program signal for late night flashing operation.
3. Phase 1 may be lagged.
4. The order of phase 3 and phase 4 may be reversed.
5. Reposition existing signal heads numbered 11,21,22,24,61 and 62.
6. Set all detector units to presence mode.
7. Program phase 40 to run concurrently with all phases during normal operation. Phase 39 must be incompatible with Phase 40 and included as a track clear phase.
8. This intersection uses video detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.

LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
N/A	Railroad Cantilever	
N/A	Railroad Gate and Flasher	
N/A	Railroad Tracks	
N/A	Guardrail	
	Construction Zone	
	Non-Intrusive Detection Zone	
	Metal Strain Pole	
Ⓐ	"RIGHT TURN SIGNAL" Sign (R10-10R)	Ⓐ
Ⓑ	Left Arrow "ONLY" Sign (R3-5L)	Ⓑ
Ⓒ	"DO NOT STOP ON TRACKS" Sign (R8-8)	Ⓒ
Ⓓ	"U-TURN YIELD TO RIGHT TURN" Sign (R10-16)	Ⓓ

This signal was designed for advanced preemption

Signal Upgrade
Temporary Design 2 (TMP Phase II)

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

MOTT MACDONALD

MOTT MACDONALD I & E, LLC
930 Main Campus Drive
Suite 200
RALEIGH, NC 27606
License No. F-0669

Prepared for:
Transportation Mobility and Safety Division
Signal Design Section
750 N.Greenfield Pkwy.Garner,NC 27529

NC 211/NC 73-211
at
NC 73 (South Intersection)

Division 8 Moore County West End

PLAN DATE:	June 2024	REVIEWED BY:	R. Mullinax
PREPARED BY:	LD Stouchko	REVIEWED BY:	

REVISIONS	INIT.	DATE

SCALE 0 40 1"=40'

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 034437 ENGINEER LON D. STOUCHKO

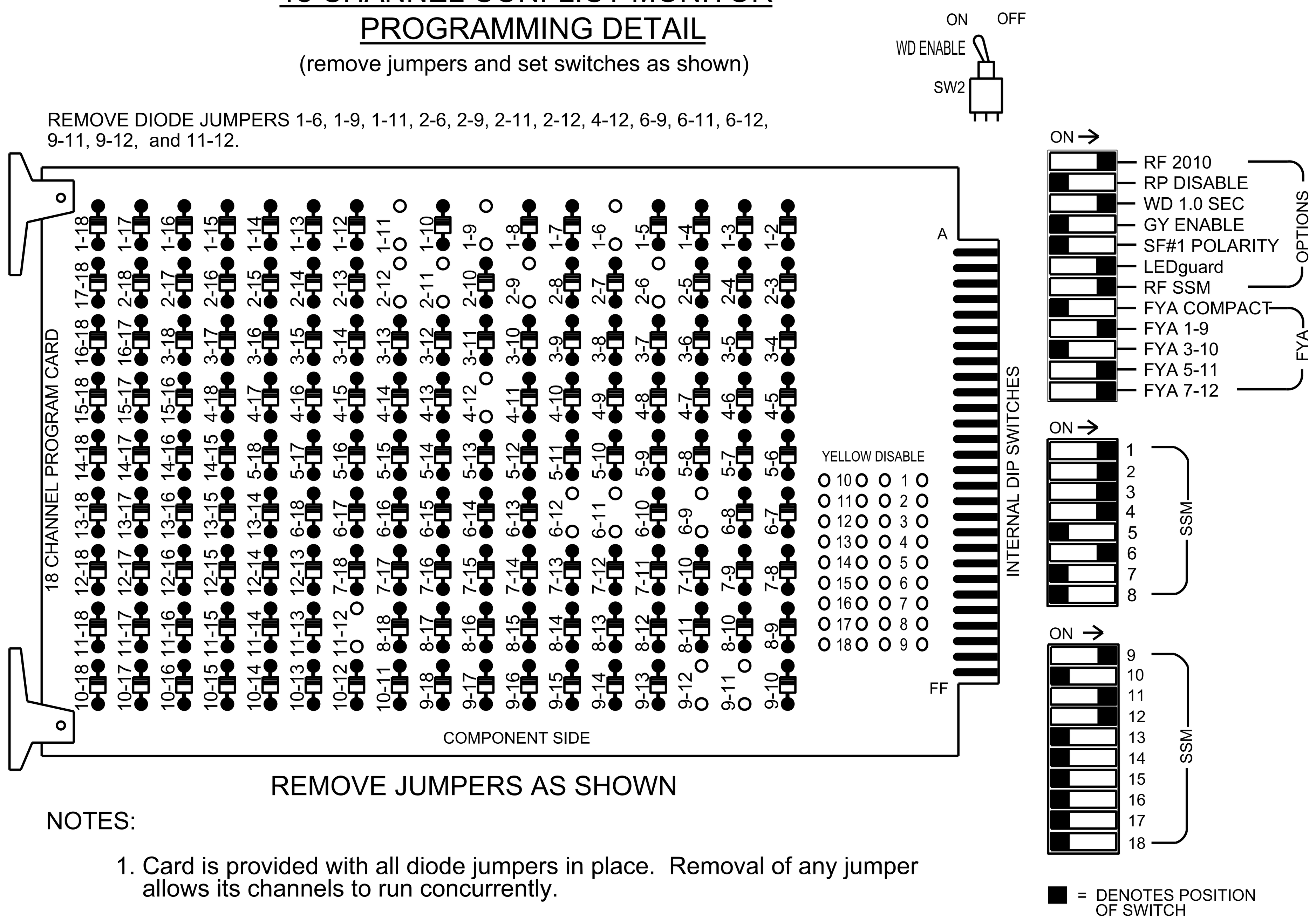
SIGNATURE DATE

SIG. INVENTORY NO. 08-110312

18 CHANNEL 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, 2-12, 4-12, 6-9, 6-11, 6-12, 9-11, 9-12, and 11-12.



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 the Red Enable is active at all times during normal operation.
4. Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the signal plan.
2. Program controller to start up in phase 2 Green No Walk, 6 Green No Walk, 39 Phase Not On, and 40 Green No Walk.
3. Program Phase 39 for No Startup Veh Call.
4. Program Phase 40 for Min Recall.
5. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.

EQUIPMENT INFORMATION

Controller...2070LX
Cabinet..332 w/ Aux
Software...Q-Free MAXTIME
Cabinet Mount.....................................Base
Output File Positions...........................18 With Aux. Output File
Load Switches Used............................S1, S2, S4, S5, S8, AUX S1, AUX S4, AUX S5
Phases Used..1, 2, 3, 4, 6, 39**, 40**
Overlap "1"...*
Overlap "2"...NOT USED
Overlap "3"...*
Overlap "4"...*

*See overlap programming detail on sheet 2
**Phase used for preemption timing purposes only

SIGNAL HEAD HOOK-UP CHART

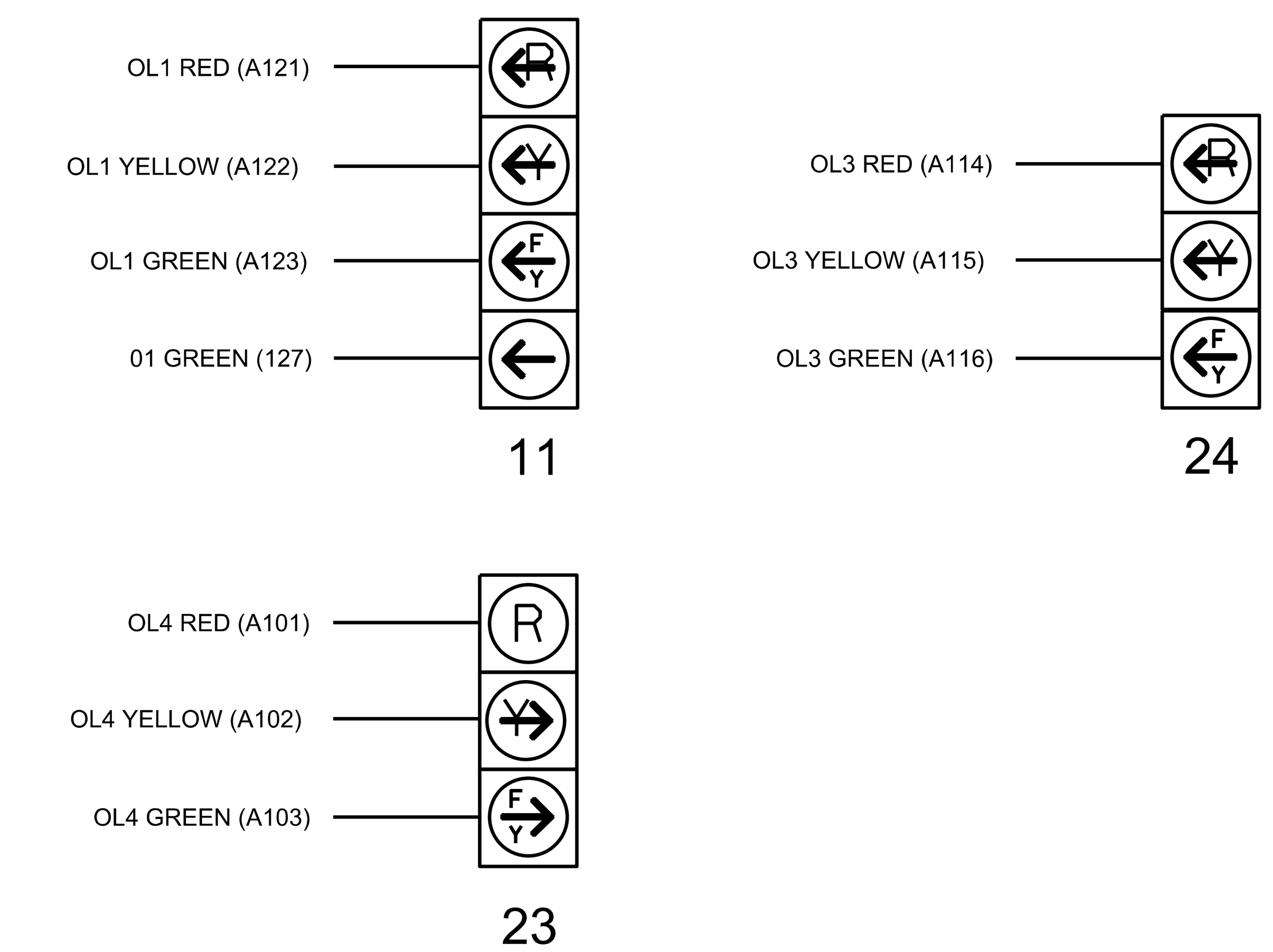
LOAD SWITCH NO.	S1		S2	S3	S4		S5		S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1		2	13	3		4		14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1		2	2 PED	3		4		4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	11★	42	21,22	NU	31	32	41	42,43	NU	NU	61,62	NU	NU	NU	NU	11★	NU	NU	24★	23★	NU
RED		✻	128		116	116	101	101			134									A101	
YELLOW			129		117	117	102	102			135										
GREEN			130		118	118	103	103			136										
RED ARROW																A121			A114		
YELLOW ARROW		126														A122			A115	A102	
FLASHING YELLOW ARROW																A123			A116	A103	
GREEN ARROW	127	127			118		103														

NU = Not Used

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

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



INPUT FILE POSITION LAYOUT

(front view)

	1	2	3	4	5	6	7	8	9	1O	11	12	13	14
U	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
L														ST DC ISOLATOR
U	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	PRE1 AC ISOLATOR
L														NOT USED

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

FS = FLASH SENSE
ST = STOP TIME
PRE = PREEMPT

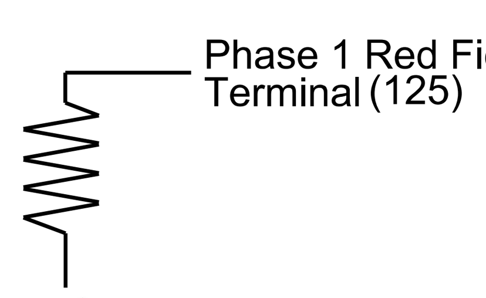
SPECIAL DETECTOR NOTES

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 resistors as shown)

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



THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 08-1103T2
DESIGNED: June 2024
SEALED: 7/11/2024
REVISED:

MOTT MACDONALD
MOTT MACDONALD I & E, LLC
930 Main Campus Drive
Suite 200
RALEIGH, NC 27606
License No. F-0669

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

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for: Transportation Mobility and Safety Division, ITS & Signals Management Section, Department of Transportation, State of North Carolina
750 N.Greenfield Pkwy,Garner,NC 27529

NC 211/NC 73-211
at
NC 73 (South Intersection)

Division 8 Moore County West End

PLAN DATE: June 2024	REVIEWED BY: R. Mullinax
PREPARED BY: LD Stouchko	REVIEWED BY:

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 034437 ENGINEER LORI D. STOUCHKO

DATE

SIG. INVENTORY NO. 08-1103T2

OVERLAP PROGRAMMING

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

Overlap Plan 1

Overlap	1	2	3	4
Type	FYA 4 - Section	Off	FYA 4 - Section	FYA 4 - Section
Included Phases	2	-	6	2,4
Modifier Phases	1	-	-	-
Modifier Overlaps	-	-	-	-
Trail Green	0	0	0	0
Trail Yellow	0.0	0.0	0.0	0.0
Trail Red	0.0	0.0	0.0	0.0

OUTPUT CHANNEL CONFIGURATION

Front Panel
Main Menu >Controller >More>Channels>Channels Config

Web Interface
Home >Controller >Advanced IO>Channels>Channels Configuration

Channel Configuration

Notice	Channel	Control Type	Control Source	Flash Yellow	Flash Red	Flash Alt	MMU Channel
	1	Phase Vehicle	1		X	X	1
NOTICE PHASE 2 FLASH RED	2	Phase Vehicle	2		X		2
	3	Phase Vehicle	3		X	X	3
	4	Phase Vehicle	4		X		4
	5	Phase Vehicle	5		X		5
NOTICE PHASE 6 FLASH RED	6	Phase Vehicle	6		X	X	6
	7	Phase Vehicle	7		X		7
	8	Phase Vehicle	8		X	X	8
NOTICE OVERLAP 1 FLASH RED	9	Overlap	1		X	X	9
	10	Overlap	2		X	X	10
NOTICE OVERLAP 3 FLASH RED	11	Overlap	3		X		11
	12	Overlap	4		X		12
	13	Phase Ped	2				13
	14	Phase Ped	4				14
	15	Phase Ped	6				15
	16	Phase Ped	8				16
	17	Overlap	5		X	X	17
	18	Overlap	6		X		18

MAXTIME STARTUP AND SOFTWARE FLASH PROGRAMMING DETAIL

Front Panel
Main Menu >Controller >Unit

Web Interface
Home >Controller >Unit

Modify parameters as shown below and save changes.

Startup Parameters

Startup Clearance Hold
6

Unit Flash Parameters

All Red Flash Exit Time
6

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 08-1103T2
DESIGNED: June 2024
SEALED: 7/11/2024
REVISED:

MOTT MACDONALD
MOTT MACDONALD I & E, LLC
930 Main Campus Drive
Suite 200
RALEIGH, NC 27606
License No. F-0669

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

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for:
Transportation Mobility and Safety Division
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
ITS & Signals Management Section
750 N.Greenfield Pkwy,Garner,NC 27529

NC 211/NC 73-211
at
NC 73 (South Intersection)

Division 8 Moore County West End

PLAN DATE: June 2024	REVIEWED BY: R. Mullinax
PREPARED BY: LD Stouchko	REVIEWED BY:

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 034437 ENGINEER LORI D. STOUCHKO

DATE

SIG. INVENTORY NO. 08-1103T2

SEQUENCE DETAIL

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

Web Interface
Home >Controller >Sequence

Sequence 1

Ring	Sequence Data
1	1,2,a,3,4,b
2	5,6,a,7,8,b
3	39,c,40,d

PREEMPTION PROGRAMMING

Front Panel
Main Menu >Controller >Preemption >Preempt Phasing/Preempt Parameters

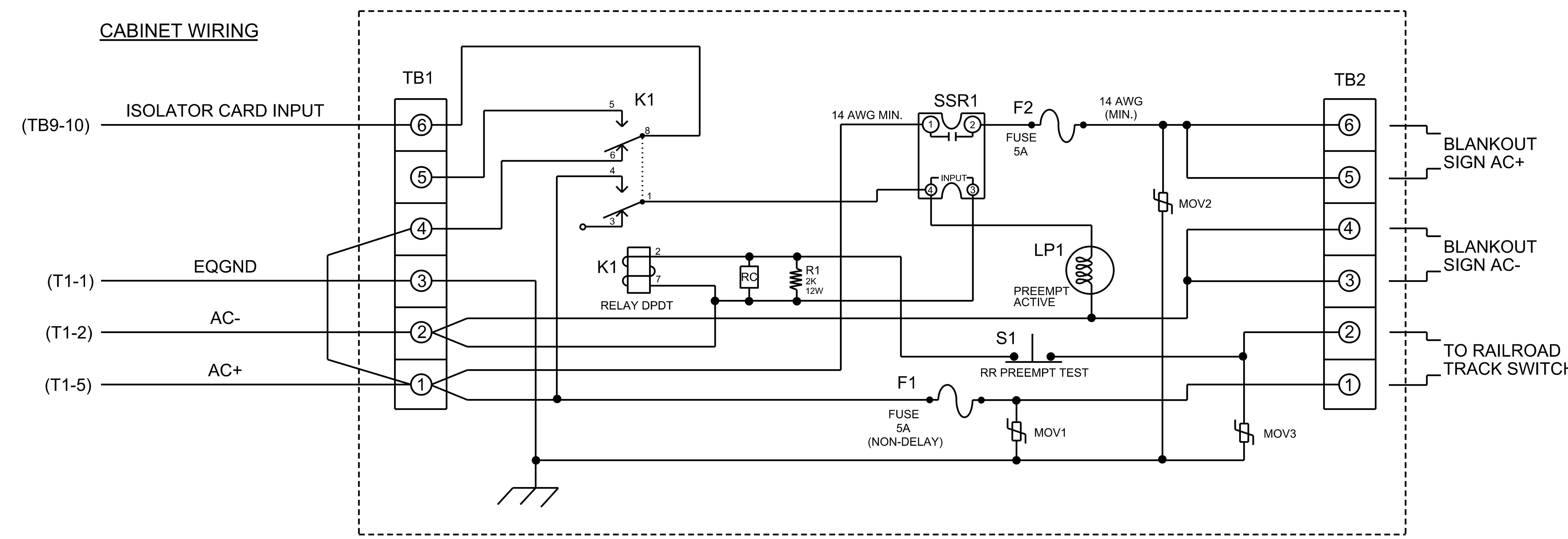
Web Interface
Home >Controller >Preempt Configuration >Preempts

Preempt Configuration

Preempt	1
Enabled	Enabled
Type	Rail Road
Track Phases	4,39
Track Overlaps	-
Dwell Phases	2,6
Dwell Peds	-
Dwell Overlaps	3
Cycling Phases	-
Cycling Peds	-
Cycling Overlaps	-
Exit Phases	4
Exit Overlaps	4
Delay	0
Call Ext Time	1.0
Max Presence	0
Max Pres Act	Terminate
Enter Min Green	1
Enter Walk	0
Enter Ped Clear	0
Enter Yellow Change	4.4
Enter Red Clear	1.9
Track Green	27
Track Yellow Clr	3.8
Track Red Clear	1.2
Dwell Green	0
Exit Min Green	255
Exit Yellow Change	25.5
Exit Red Clear	25.5
Exit Type	Exit Phases
Non Locking Memory	-
Not Ovrd Flash	X
Not Ovrd Nxt Pre	X
Require All Red Entry	-
Track Clear Ovrd	X
Ped Clear During Yellow	-
Entry Omit OLTG	X
Track Reserve	X

RAILROAD PREEMPTION WIRING DETAIL

(wire as shown below)



NOTES

1. Relay K1 is shown in the energized (Preempt not active) normal operation state.

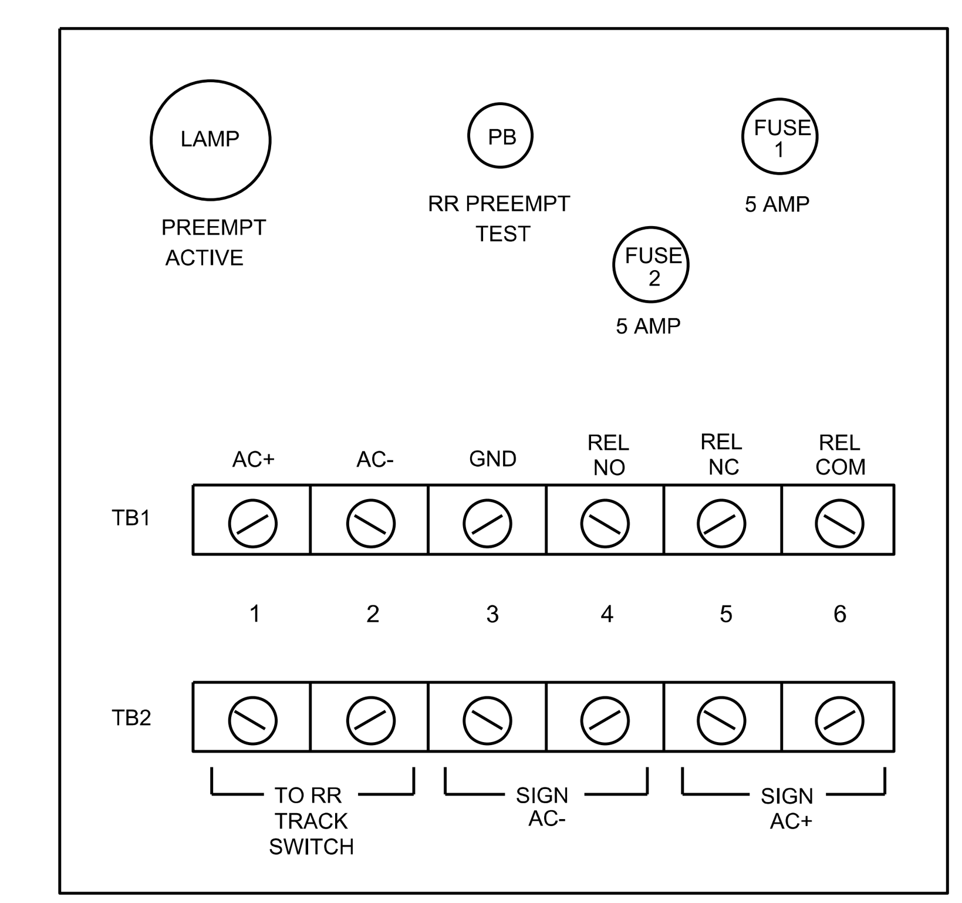
2. Relay K1 is a DPDT with 120VAC coil with octal base.

3. Relay SSR1 is a SPST (normally open) Solid State Relay with AC input and AC (25 amp) output.

4. AC Isolator Card shall activate preemption upon removal of AC+ from the input (as shown above). To accomplish this set invert dip switch on AC Isolator Card.

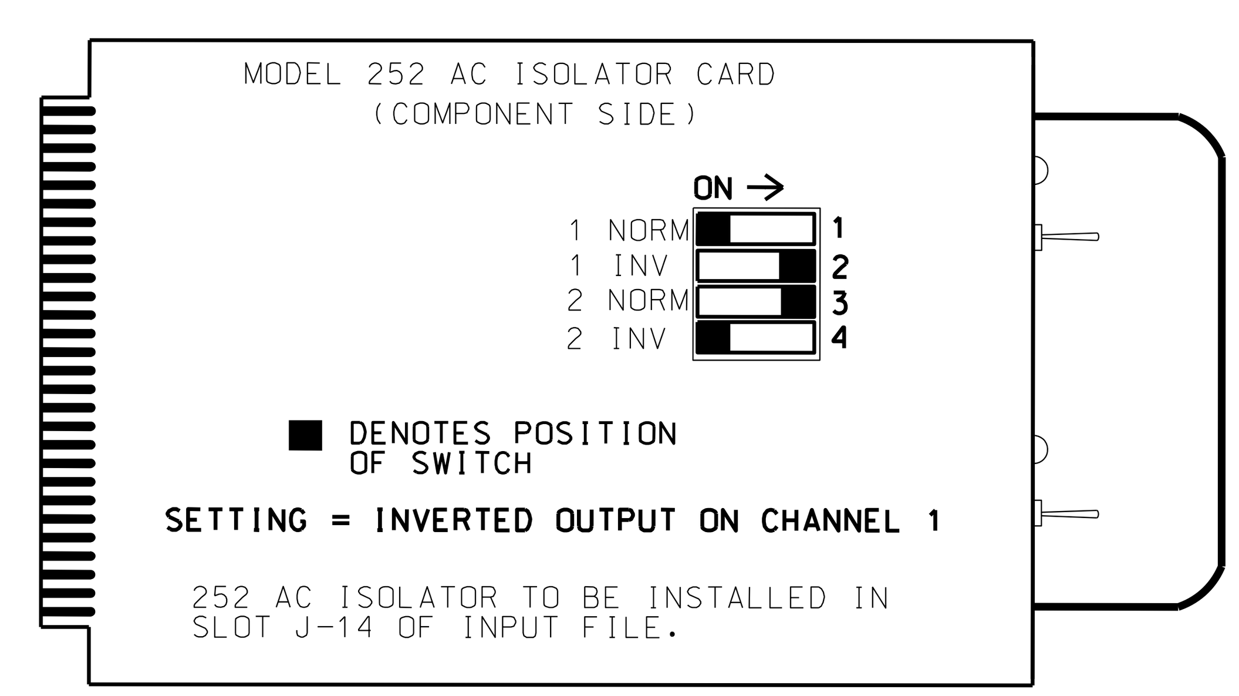
5. IMPORTANT!! A jumper must be added between input file terminals J14-E and J14-K if not already present. Also, terminal TB9-12 (on input panel) shall be connected to AC neutral (jumper may have to be added).

FRONT VIEW



PREEMPT 1 AC ISOLATOR (MODEL 252) OUTPUT PROGRAMMING DETAIL

(set DIP switches as shown below)



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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 08-1103T2
DESIGNED: June 2024
SEALED: 7/11/2024
REVISED:

MOTT MACDONALD
MOTT MACDONALD I & E, LLC
930 Main Campus Drive
Suite 200
RALEIGH, NC 27606
License No. F-0669

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

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for:
Transportation Mobility and Safety Division
State of North Carolina Department of Transportation
ITS & Signals Management Section
750 N.Greenfield Pkwy,Garner,NC 27529

NC 211/NC 73-211
at
NC 73 (South Intersection)

Division 8 Moore County West End

PLAN DATE:	June 2024	REVIEWED BY:	R. Mullinax
PREPARED BY:	LD Stouchko	REVIEWED BY:	

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

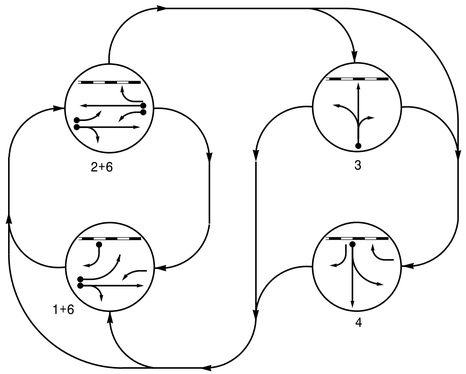
SEAL
NORTH CAROLINA PROFESSIONAL
SEAL
034437
ENGINEER
LORI D. STOUCHKO

DATE

SIG. INVENTORY NO. 08-1103T2

PROJECT REFERENCE NO.	SHEET NO.
R-5726	Sig.4.0

PHASING DIAGRAM

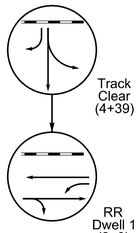


PHASING DIAGRAM DETECTION LEGEND

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

RAIL PREEMPT PHASES

(High Priority)



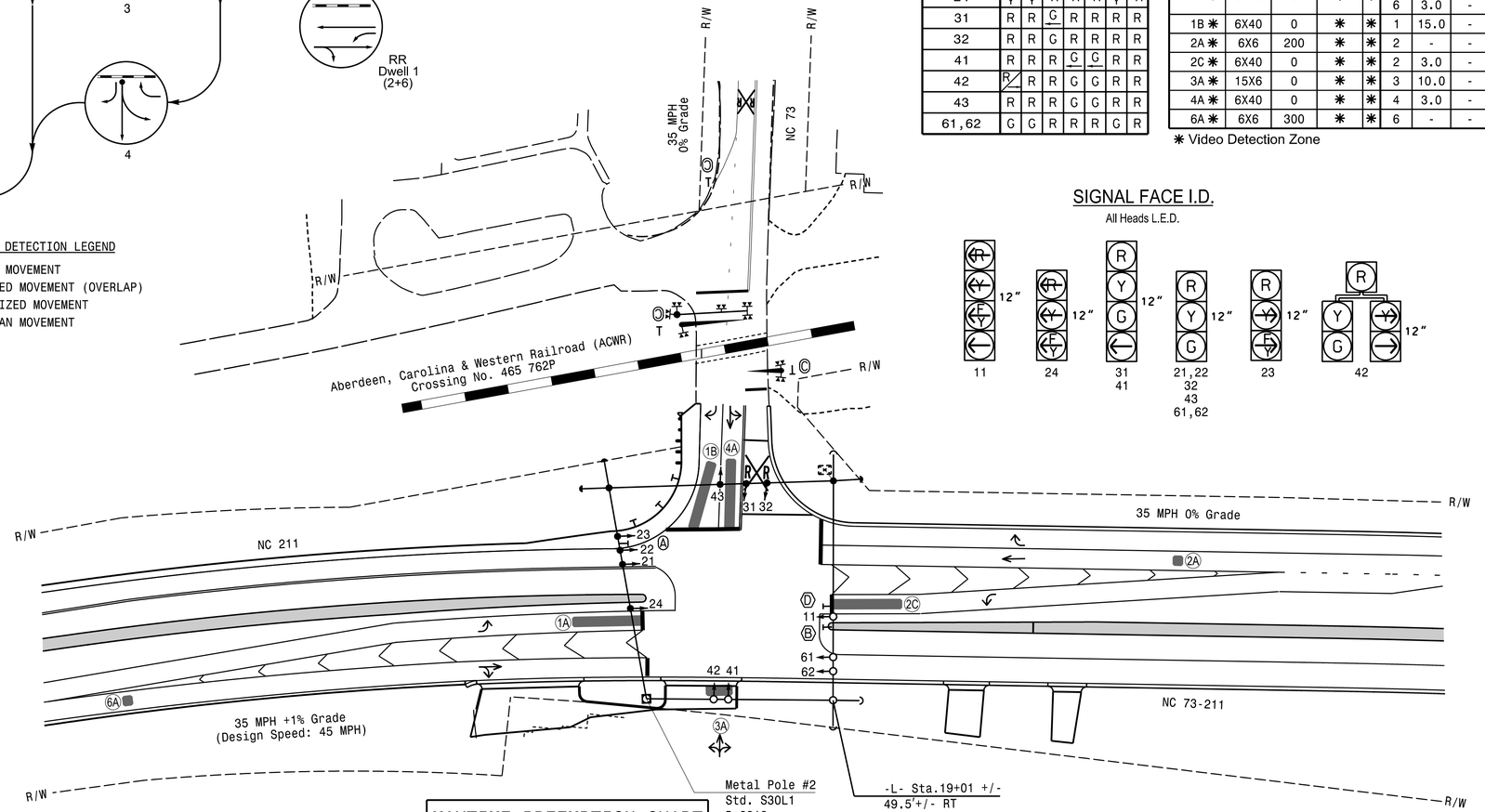


TABLE OF OPERATION

SIGNAL FACE	PHASE 1+6	2+6	3	4	TC RLACAKR	RR DWELL FL	FLASH
11	—	F/Y	R	R	R	R	R
21,22	R	G	R	R	R	G	R
23	R	F/Y	R	F/Y	R	R	R
24	F/Y	F/Y	R	R	R	F/Y	R
31	R	R	G	R	R	R	R
32	R	R	G	R	R	R	R
41	R	R	R	G	G	R	R
42	R/—	R	R	G	G	R	R
43	R	R	R	G	G	R	R
61,62	G	G	R	R	R	G	R

MAXTIME DETECTOR INSTALLATION CHART

DETECTOR ZONE	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
1A ✳	6X40	0	✳	✳	1	15.0	-	X	-	X	-	✳
					6	3.0	-	X	-	X	X	✳
1B ✳	6X40	0	✳	✳	1	15.0	-	X	-	X	-	✳
2A ✳	6X6	200	✳	✳	2	-	-	X	X	X	-	✳
2C ✳	6X40	0	✳	✳	2	3.0	-	X	-	X	X	✳
3A ✳	15X6	0	✳	✳	3	10.0	-	X	-	X	-	✳
4A ✳	6X40	0	✳	✳	4	3.0	-	X	-	X	-	✳
6A ✳	6X6	300	✳	✳	6	-	-	X	X	X	-	✳

✳ Video Detection Zone

SIGNAL FACE I.D.

All Heads L.E.D.

4 Phase
Fully Actuated
With Railroad Preemption
(Isolated)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. This location contains railroad preemption phasing. Do not program signal for late night flashing operation.
3. Phase 1 may be lagged.
4. The order of phase 3 and phase 4 may be reversed.
5. Reposition existing signal heads numbered 11,21,22,24,61 and 62.
6. Set all detector units to presence mode.
7. Program phase 40 to run concurrently with all phases during normal operation. Phase 39 must be incompatible with Phase 40 and included as a track clear phase.
8. This intersection uses video detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.

LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
N/A	Railroad Cantilever	
N/A	Railroad Gate and Flasher	
N/A	Railroad Tracks	
N/A	Guardrail	
	Construction Zone	
	Non-Intrusive Detection Zone	
	Metal Strain Pole	
Ⓐ	"RIGHT TURN SIGNAL" Sign (R10-10R)	Ⓐ
Ⓑ	Left Arrow "ONLY" Sign (R3-5L)	Ⓑ
Ⓒ	"DO NOT STOP ON TRACKS" Sign (R8-8)	Ⓒ
Ⓓ	"U-TURN YIELD TO RIGHT TURN" Sign (R10-16)	Ⓓ

MAXTIME TIMING CHART

FEATURE	PHASE 1	2	3	4	6	39	40
Walk *	–	–	–	–	–		
Ped Clear *	–	–	–	–	–		
Min Green *	7	10	7	7	12		
Passage *	2.0	5.0	2.0	2.0	6.0		
Max 1 *	20	60	15	30	60		
Yellow Change	3.0	4.5	3.8	3.8	4.5	3.8	4.5
Red Clear	3.1	2.3	1.9	1.8	2.3	1.8	3.1
Added Initial *	–	2.5	–	–	2.5		
Maximum Initial *	–	24	–	–	34		
Time Before Reduction *	–	15	–	–	15		
Time To Reduce *	–	34	–	–	34		
Minimum Gap	–	3.0	–	–	3.0		
Advance Walk	–	–	–	–	–		
Non Lock Detector	X	–	X	X	–		
Vehicle Recall	–	MIN RECALL	–	–	MIN RECALL		MIN RECALL
Dual Entry	–	–	–	–	–		

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

MAXTIME PREEMPTION CHART

FUNCTION	PRE 1
Type	RAIL ROAD
Exit Phases	4
Delay	0
Max Presence	0
Enter Min Green	1
Enter Walk	0
Enter Ped Clear	0
Enter Yellow Change	4.5*
Enter Red Clear	3.1*
Track Green	27
Track Yellow Change	3.8
Track Red Clear	1.8
Dwell Green	0
Exit Min Green	255*
Exit Yellow Change	25.5*
Exit Red Clear	25.5*
Call Extend Time	1.0
Exit Type	EXIT PHASES
Ped Clear Through Yellow	–
Require All Red Entry	–

* Directs controller to use default phase timing.

This signal was designed for advanced preemption

MOTT MACDONALD

MOTT MACDONALD I & E, LLC
930 Main Campus Drive
Suite 200
RALEIGH, NC 27606
License No. F-0669

Signal Upgrade
Temporary Design 3 (TMP Phase III)

Prepared for:
Transportation Mobility and Safety Division
Signal Design Section

750 N.Greenfield Pkwy.Garner,NC 27529

SCALE 0 40 1"=40'

NC 211/NC 73-211
at
NC 73 (South Intersection)

Division 8 Moore County West End

PLAN DATE: June 2024 REVIEWED BY: R. Mullinax
PREPARED BY: LD Stouchko REVIEWED BY:

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNTIL ALL SIGNATURES COMPLETED

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 034437 ENGINEER LONG D STOUCHKO

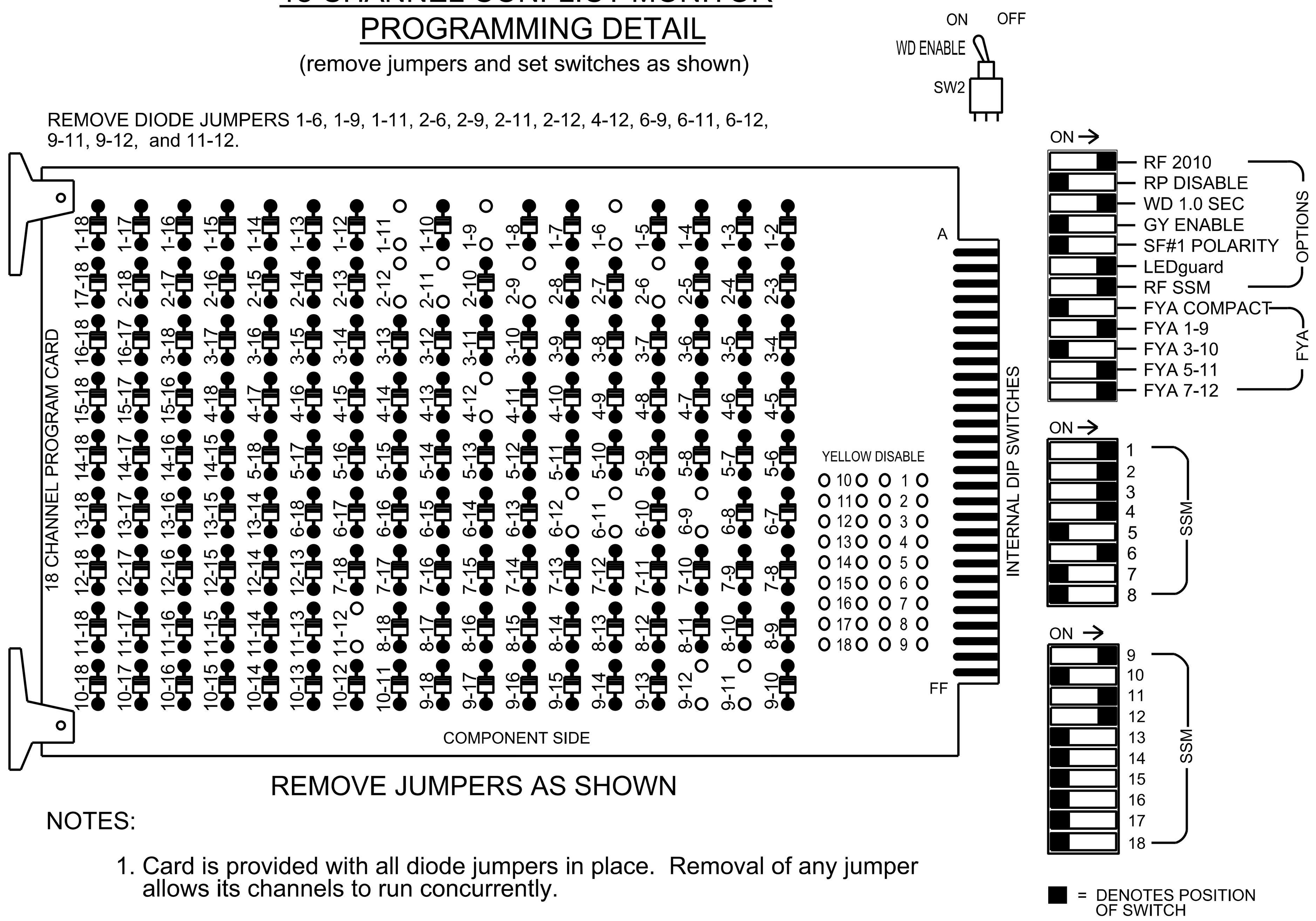
SIGNATURE DATE

SIG. INVENTORY NO. 08-110313

18 CHANNEL 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, 2-12, 4-12, 6-9, 6-11, 6-12, 9-11, 9-12, and 11-12.



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 the Red Enable is active at all times during normal operation.
4. Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the signal plan.
2. Program controller to start up in phase 2 Green No Walk, 6 Green No Walk, 39 Phase Not On, and 40 Green No Walk.
3. Program Phase 39 for No Startup Veh Call.
4. Program Phase 40 for Min Recall.
5. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.

EQUIPMENT INFORMATION

Controller..2070LX
Cabinet...332 w/ Aux
Software..Q-Free MAXTIME
Cabinet Mount....................................Base
Output File Positions..........................18 With Aux. Output File
Load Switches Used...........................S1, S2, S4, S5, S8, AUX S1, AUX S4, AUX S5
Phases Used.......................................1, 2, 3, 4, 6, 39**, 40**
Overlap "1"..*
Overlap "2"..NOT USED
Overlap "3"..*
Overlap "4"..*

*See overlap programming detail on sheet 2
**Phase used for preemption timing purposes only

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★	42	21,22	NU	31	32	41	42,43	NU	NU	61,62	NU	NU	NU	NU	11★	NU	NU	24★	23★	NU
RED		✱	128		116	116	101	101			134									A101	
YELLOW			129		117	117	102	102			135										
GREEN			130		118	118	103	103			136										
RED ARROW																A121			A114		
YELLOW ARROW		126														A122			A115	A102	
FLASHING YELLOW ARROW																A123			A116	A103	
GREEN ARROW	127	127			118		103														

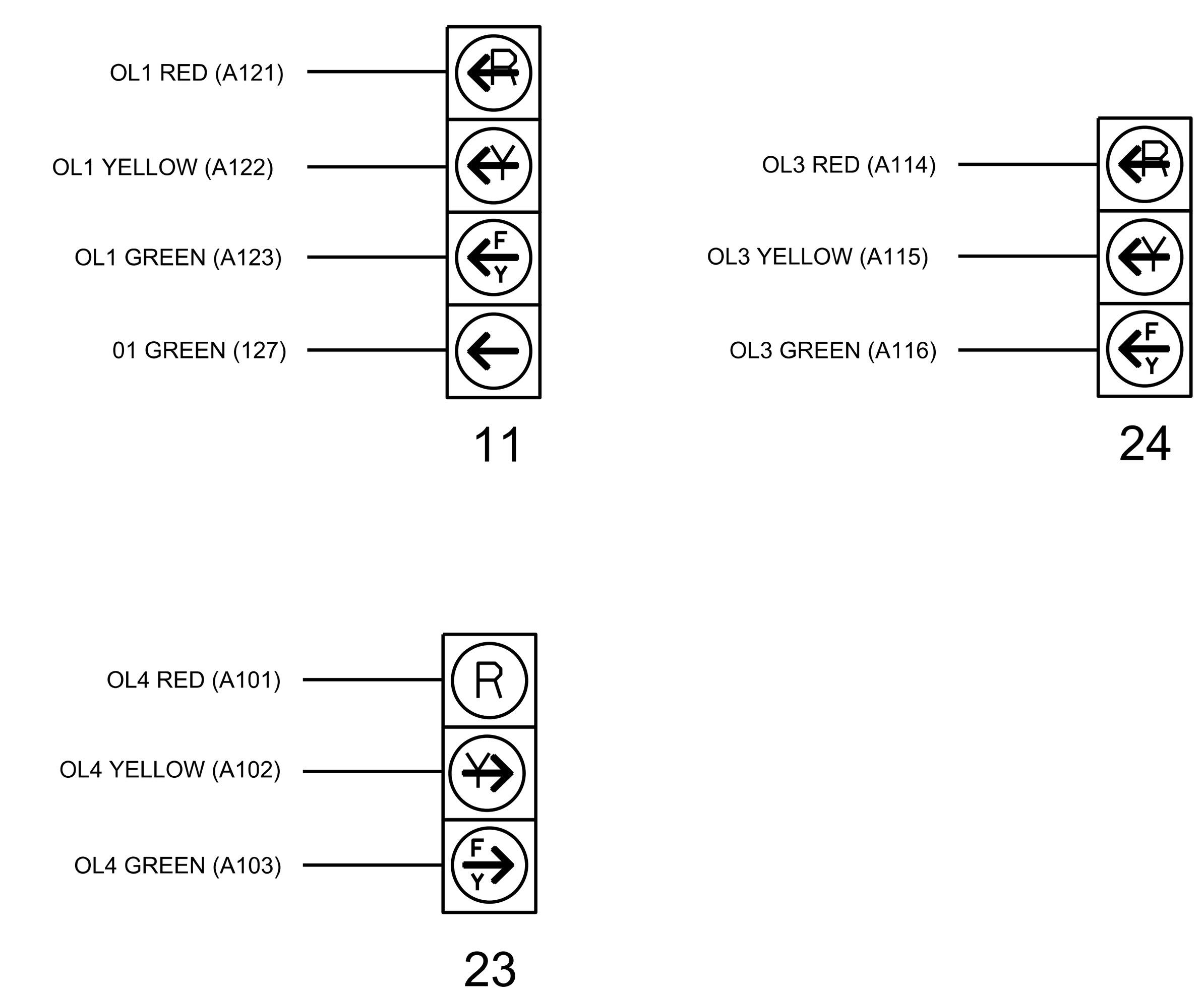
NU = Not Used

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

★ See pictorial of head wiring in detail this sheet.

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



INPUT FILE POSITION LAYOUT

(front view)

FILE		1	2	3	4	5	6	7	8	9	1O	11	12	13	14
FILE "I"	U	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
	L														ST DC ISOLATOR
FILE "J"	U	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	PRE1 AC ISOLATOR
	L														NOT USED

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

FS = FLASH SENSE
ST = STOP TIME
PRE = PREEMPT

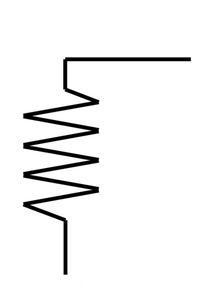
SPECIAL DETECTOR NOTES

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 resistors as shown)

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



THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 08-1103T3
DESIGNED: June 2024
SEALED: 7/11/2024
REVISED:

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

MOTT MACDONALD
MOTT MACDONALD I & E, LLC
930 Main Campus Drive
Suite 200
RALEIGH, NC 27606
License No. F-0669

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for:

Transportation Mobility and Safety Division – ITS & Signals Management Section – State of North Carolina Department of Transportation

750 N.Greenfield Pkwy.Garner.NC 27529

NC 211/NC 73-211
at
NC 73 (South Intersection)

Division 8 Moore County West End

PLAN DATE:	June 2024	REVIEWED BY:	R. Mullinax
PREPARED BY:	LD Stouchko	REVIEWED BY:	

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 034437 ENGINEER LORI D. STOUCHKO

DATE

SIG. INVENTORY NO. 08-1103T3

OVERLAP PROGRAMMING

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

Overlap Plan 1

Overlap	1	2	3	4
Type	FYA 4 - Section	Off	FYA 4 - Section	FYA 4 - Section
Included Phases	2	-	6	2,4
Modifier Phases	1	-	-	-
Modifier Overlaps	-	-	-	-
Trail Green	0	0	0	0
Trail Yellow	0.0	0.0	0.0	0.0
Trail Red	0.0	0.0	0.0	0.0

OUTPUT CHANNEL CONFIGURATION

Front Panel
Main Menu >Controller >More>Channels>Channels Config

Web Interface
Home >Controller >Advanced IO>Channels>Channels Configuration

Channel Configuration

Channel	Control Type	Control Source	Flash Yellow	Flash Red	Flash Alt	MMU Channel
1	Phase Vehicle	1		X	X	1
2	Phase Vehicle	2		X		2
3	Phase Vehicle	3		X	X	3
4	Phase Vehicle	4		X		4
5	Phase Vehicle	5		X		5
6	Phase Vehicle	6		X	X	6
7	Phase Vehicle	7		X		7
8	Phase Vehicle	8		X	X	8
9	Overlap	1		X	X	9
10	Overlap	2		X	X	10
11	Overlap	3		X		11
12	Overlap	4		X		12
13	Phase Ped	2				13
14	Phase Ped	4				14
15	Phase Ped	6				15
16	Phase Ped	8				16
17	Overlap	5		X	X	17
18	Overlap	6		X		18

NOTICE PHASE 2 FLASH RED (channel 2)
NOTICE PHASE 6 FLASH RED (channel 6)
NOTICE OVERLAP 1 FLASH RED (channel 9)
NOTICE OVERLAP 3 FLASH RED (channel 11)

MAXTIME STARTUP AND SOFTWARE FLASH PROGRAMMING DETAIL

Front Panel
Main Menu >Controller >Unit

Web Interface
Home >Controller >Unit

Modify parameters as shown below and save changes.

Startup Parameters
Startup Clearance Hold
6

Unit Flash Parameters
All Red Flash Exit Time
6

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 08-1103T3
DESIGNED: June 2024
SEALED: 7/11/2024
REVISED:

MOTT MACDONALD
MOTT MACDONALD I& E, LLC
930 Main Campus Drive
Suite 200
RALEIGH, NC 27606
License No. F-0669

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

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for:
Transportation Mobility and Safety Division
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
ITS & Signals Management Section
750 N.Greenfield Pkwy,Garner,NC 27529

NC 211/NC 73-211
at
NC 73 (South Intersection)

Division 8 Moore County West End

PLAN DATE: June 2024	REVIEWED BY: R. Mullinax
PREPARED BY: LD Stouchko	REVIEWED BY:

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 034437 ENGINEER LORI D. STOUCHKO

DATE

SIG. INVENTORY NO. 08-1103T3

SEQUENCE DETAIL

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

Web Interface
Home >Controller >Sequence

Sequence 1

Ring	Sequence Data
1	1,2,a,3,4,b
2	5,6,a,7,8,b
3	39,c,40,d

PREEMPTION PROGRAMMING

Front Panel
Main Menu >Controller >Preemption >Preempt Phasing/Preempt Parameters

Web Interface
Home >Controller >Preempt Configuration >Preempts

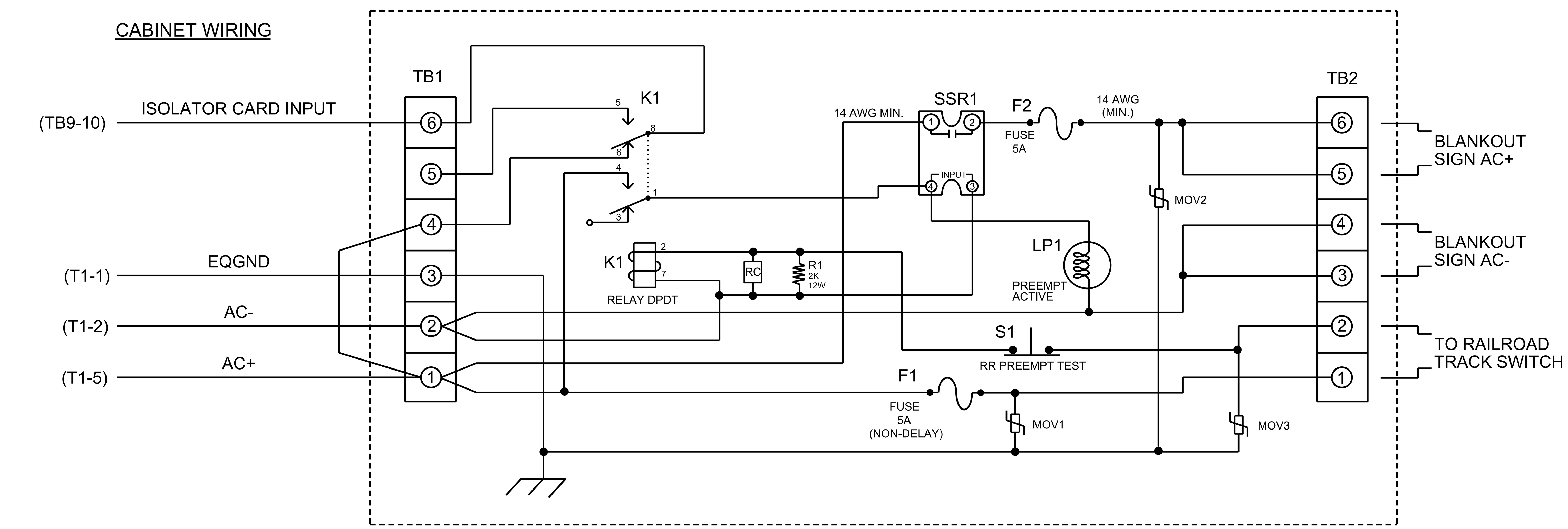
Preempt Configuration

Preempt	1
Enabled	Enabled
Type	Rail Road
Track Phases	4,39
Track Overlaps	-
Dwell Phases	2,6
Dwell Peds	-
Dwell Overlaps	3
Cycling Phases	-
Cycling Peds	-
Cycling Overlaps	-
Exit Phases	4
Exit Overlaps	4
Delay	0
Call Ext Time	1.0
Max Presence	0
Max Pres Act	Terminate
Enter Min Green	1
Enter Walk	0
Enter Ped Clear	0
Enter Yellow Change	4.5
Enter Red Clear	3.1
Track Green	27
Track Yellow Clr	3.8
Track Red Clear	1.8
Dwell Green	0
Exit Min Green	255
Exit Yellow Change	25.5
Exit Red Clear	25.5
Exit Type	Exit Phases
Non Locking Memory	-
Not Ovrd Flash	X
Not Ovrd Nxt Pre	-
Require All Red Entry	-
Track Clear Ovrd	X
Ped Clear During Yellow	-
Entry Omit OLTG	X
Track Reserve	X

RAILROAD PREEMPTION WIRING DETAIL

(wire as shown below)

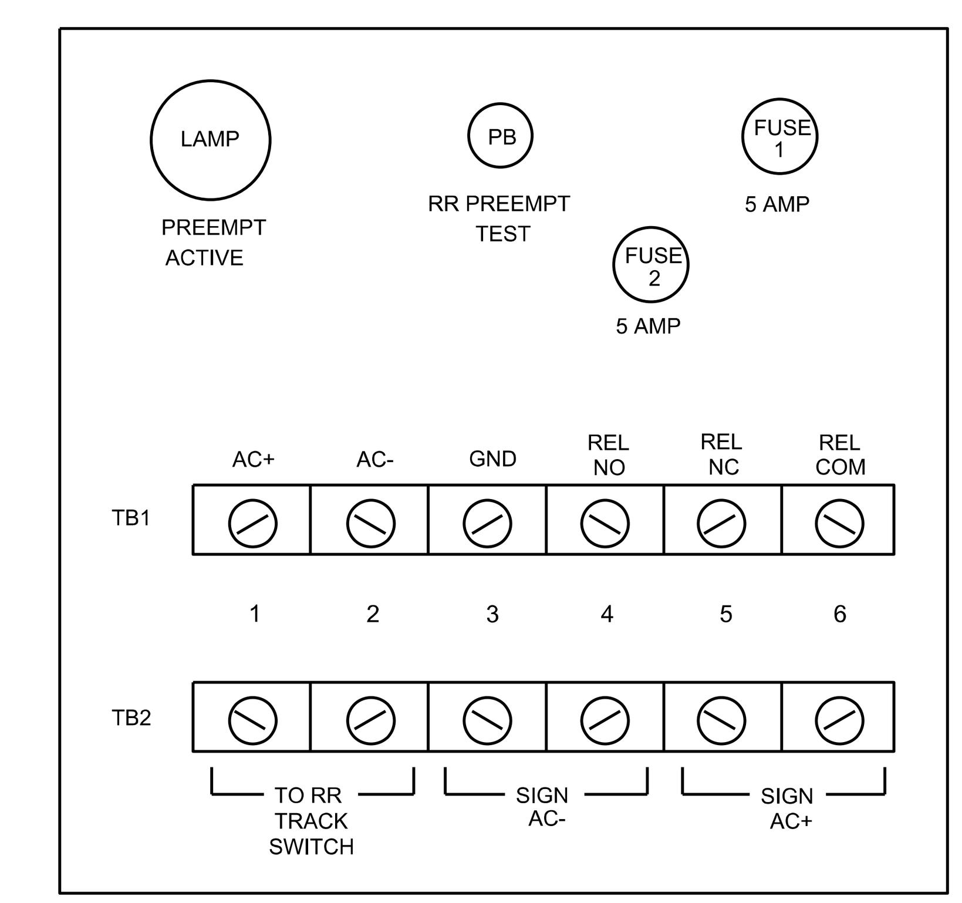
PREEMPTION AND BLANKOUT SIGN CONTROL BOX



NOTES

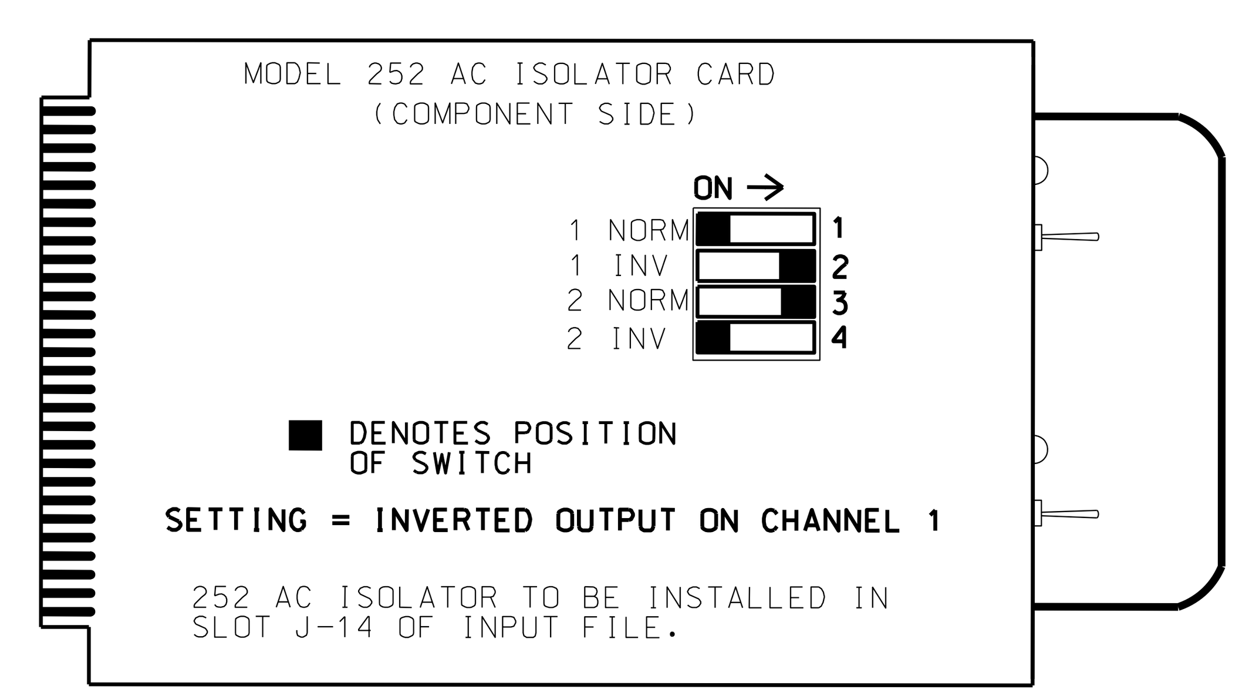
1. Relay K1 is shown in the energized (Preempt not active) normal operation state.
2. Relay K1 is a DPDT with 120VAC coil with octal base.
3. Relay SSR1 is a SPST (normally open) Solid State Relay with AC input and AC (25 amp) output.
4. AC Isolator Card shall activate preemption upon removal of AC+ from the input (as shown above). To accomplish this set invert dip switch on AC Isolator Card.
5. IMPORTANT!! A jumper must be added between input file terminals J14-E and J14-K if not already present. Also, terminal TB9-12 (on input panel) shall be connected to AC neutral (jumper may have to be added).

FRONT VIEW



PREEMPT 1 AC ISOLATOR (MODEL 252) OUTPUT PROGRAMMING DETAIL

(set DIP switches as shown below)



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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 08-1103T3
DESIGNED: June 2024
SEALED: 7/11/2024
REVISED:

Electrical Detail - Sheet 3 of 3
Temporary Design 3 (TMP Phase III)

MOTT MACDONALD
MOTT MACDONALD I & E, LLC
930 Main Campus Drive
Suite 200
RALEIGH, NC 27606
License No. F-0669

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for:
750 N.Greenfield Pkwy,Garner,NC 27529

NC 211/NC 73-211
at
NC 73 (South Intersection)

Division 8 Moore County West End

PLAN DATE: June 2024	REVIEWED BY: R. Mullinax
PREPARED BY: LD Stouchko	REVIEWED BY:

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

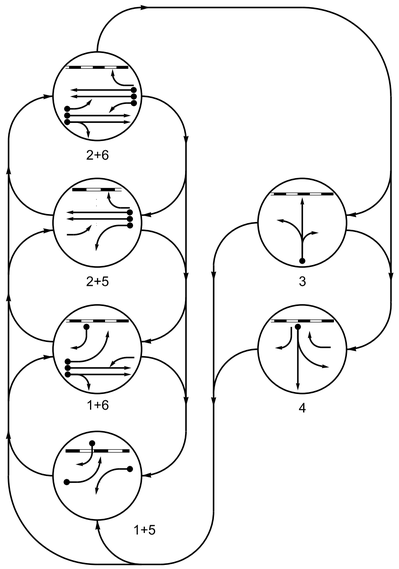
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 034437 ENGINEER LORI D. STOUCHKO

DATE

SIG. INVENTORY NO. 08-1103T3

PROJECT REFERENCE NO.	SHEET NO.
R-5726	Sig.5.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

RAIL PREEMPT PHASES

(High Priority)

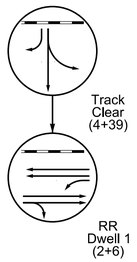
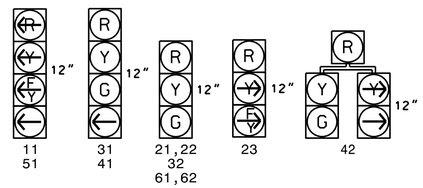


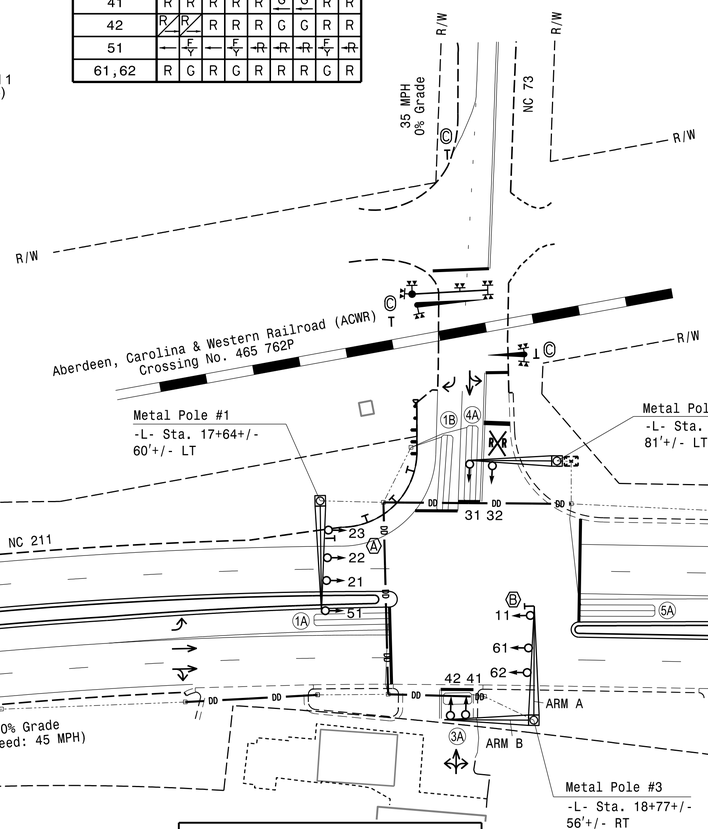
TABLE OF OPERATION

SIGNAL FACE	PHASE 1+5	1+6	2+5	2+6	3	4	TRACK CLEAR	RR DWELL	FLASH
11	—	—	F/Y	F/Y	R	R	R	R	R
21,22	R	R	G	G	R	R	R	G	R
23	R	R	F/Y	F/Y	R	F/Y	R	R	R
31	R	R	R	R	G	R	R	R	R
32	R	R	R	R	G	R	R	R	R
41	R	R	R	R	R	G	G	R	R
42	R/R		R	R	R	G	G	R	R
51	—	F/Y	—	F/Y	R	R	R	F/Y	R
61,62	R	G	R	G	R	R	R	G	R

SIGNAL FACE I.D.

All Heads L.E.D.





MAXTIME DETECTOR INSTALLATION CHART

DETECTOR					PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
1A	6X40	0	2-4-2	X	1	15.0	-	X	-	X	-	X
					6	3.0	-	X	-	X	X	X
1B	6X40	0	2-4-2	X	1	15.0	-	X	-	X	-	X
2A	6X6	200	4	X	2	-	-	X	X	X	-	X
2B	6X6	200	4	X	2	-	-	X	X	X	-	X
3A	15X6	0	4	X	3	10.0	-	X	-	X	-	X
4A	6X40	0	2-4-2	X	4	3.0	-	X	-	X	-	X
5A	6X40	0	2-4-2	X	5	30.0	-	X	-	X	-	X
					2	3.0	-	X	-	X	X	X
6A	6X6	300	5	X	6	-	-	X	X	X	-	X
6B	6X6	300	5	X	6	-	-	X	X	X	-	X

6 Phase
Fully Actuated
With Railroad Preemption
(Isolated)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. This location contains railroad preemption phasing. Do not program signal for late night flashing operation.
3. Phase 1 and/or Phase 5 may be lagged.
4. The order of phase 3 and phase 4 may be reversed.
5. Set all detector units to presence mode.
6. Program phase 40 to run concurrently with all phases during normal operation. Phase 39 must be incompatible with Phase 40 and included as a track clear phase.

LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
1-UC	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
N/A	Railroad Cantilever	
N/A	Railroad Gate and Flasher	
N/A	Railroad Tracks	
N/A	Guardrail	
1-DD	Directional Drill	DD
	Metal Pole with Mastarm	
Ⓐ	"RIGHT TURN SIGNAL" Sign (R10-10R)	Ⓐ
Ⓑ	"U-TURN YIELD TO RIGHT TURN" Sign (R10-16)	Ⓑ
Ⓒ	"DO NOT STOP ON TRACKS" Sign (R8-8)	Ⓒ

MAXTIME TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6	39	40
Walk *	–	–	–	–	–	–		
Ped Clear *	–	–	–	–	–	–		
Min Green *	7	10	7	7	7	12		
Passage *	2.0	5.0	2.0	2.0	2.0	6.0		
Max 1 *	30	75	15	30	15	75		
Yellow Change	3.0	4.5	3.8	3.8	3.0	4.5	3.8	4.5
Red Clear	2.6	2.3	1.0	2.0	3.1	2.3	2.0	3.1
Added Initial *	–	1.5	–	–	–	1.5		
Maximum Initial *	–	24	–	–	–	34		
Time Before Reduction *	–	15	–	–	–	15		
Time To Reduce *	–	34	–	–	–	34		
Minimum Gap	–	3.0	–	–	–	3.0		
Advance Walk	–	–	–	–	–	–		
Non Lock Detector	X	–	X	X	X	–		
Vehicle Recall	–	MIN RECALL	–	–	–	MIN RECALL		MIN RECALL
Dual Entry	–	–	–	–	–	–		

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

MAXTIME PREEMPTION CHART

FUNCTION	PRE 1
Type	RAIL ROAD
Exit Phases	4
Delay	0
Max Presence	0
Enter Min Green	1
Enter Walk	0
Enter Ped Clear	0
Enter Yellow Change	4.5*
Enter Red Clear	3.1*
Track Green	27
Track Yellow Change	3.8
Track Red Clear	2.0
Dwell Green	0
Exit Min Green	255 *
Exit Yellow Change	25.5*
Exit Red Clear	25.5 *
Call Extend Time	1.0
Exit Type	EXIT PHASES
Ped Clear Through Yellow	–
Require All Red Entry	–

* Directs controller to use default phase timing.

This signal was designed for advanced preemption

Signal Upgrade - Final Design

MOTT MACDONALD

MOTT MACDONALD I & E, LLC
930 Main Campus Drive
Suite 200
RALEIGH, NC 27606
License No. F-0669

Prepared for:
Transportation Mobility and Safety Division
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signal Design Section
750 N.Greenfield Pkwy.Garner,NC 27529

SCALE 0 40 1"=40'

NC 211/NC 73-211
at
NC 73 (South Intersection)

Division 8 Moore County West End

PLAN DATE: June 2024 REVIEWED BY: R. Mullinax
PREPARED BY: LD Stouchko REVIEWED BY:

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 034437 ENGINEER LONG D STOUCHKO

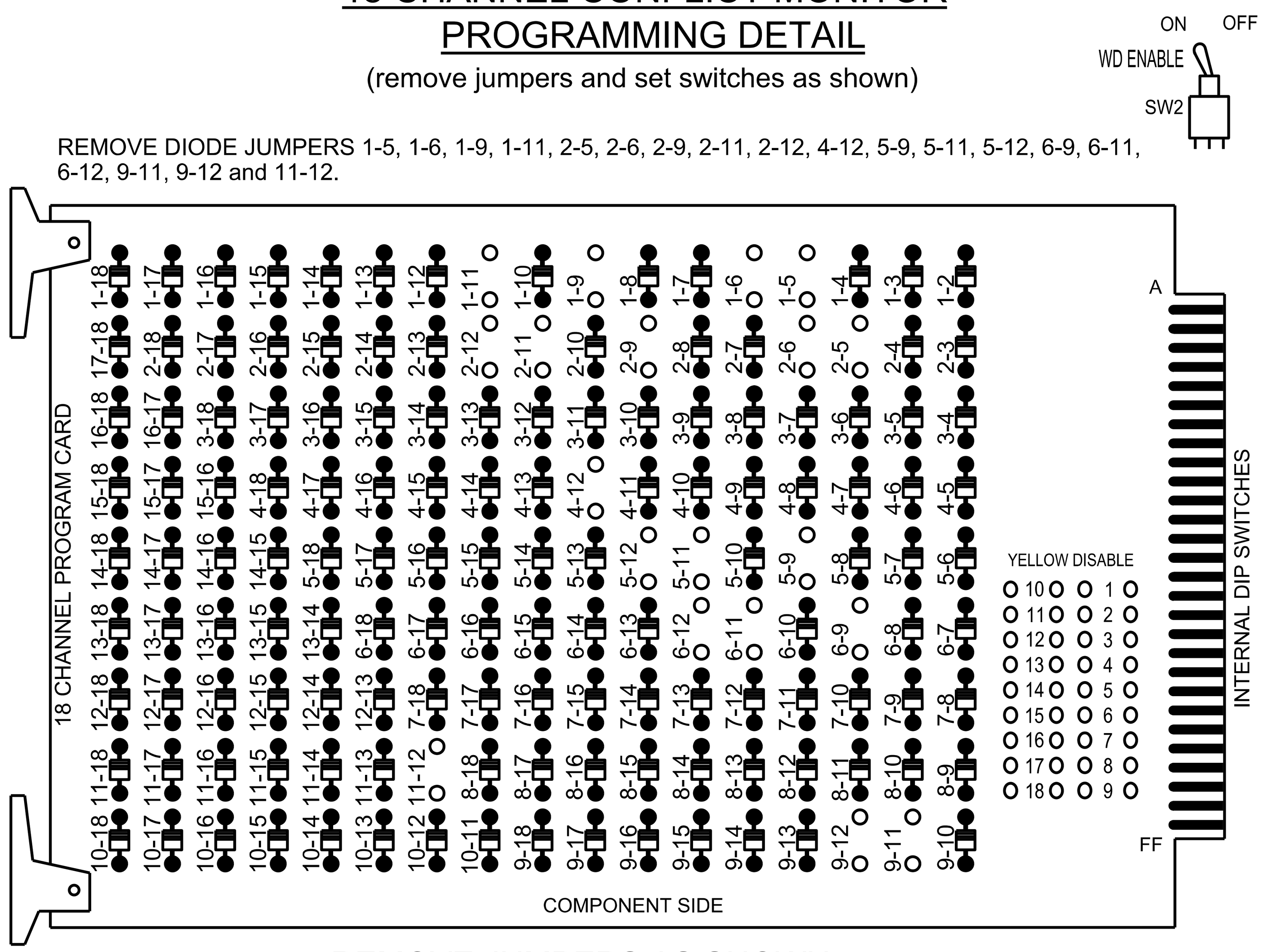
SIGNATURE DATE

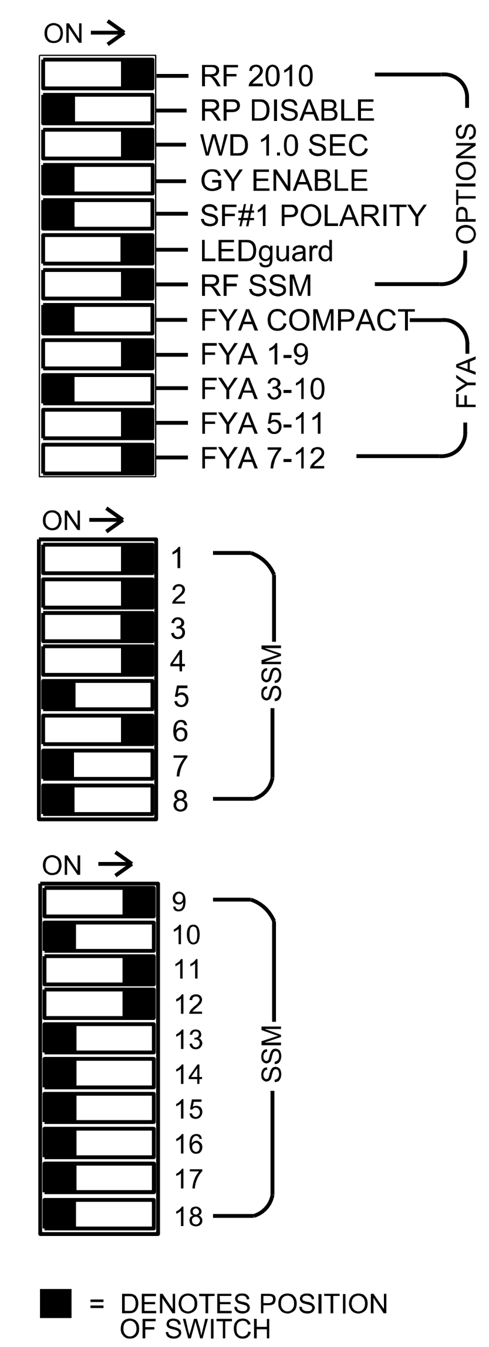
SIG. INVENTORY NO. 08-1103

18 CHANNEL CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 1-5, 1-6, 1-9, 1-11, 2-5, 2-6, 2-9, 2-11, 2-12, 4-12, 5-9, 5-11, 5-12, 6-9, 6-11, 6-12, 9-11, 9-12 and 11-12.





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 the Red Enable is active at all times during normal operation.
4. Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the signal plan.
2. Program controller to start up in phase 2 Green No Walk, 6 Green No Walk, 39 Phase Not On, and 40 Green No Walk.
3. Program Phase 39 for No Startup Veh Call.
4. Program Phase 40 for Min Recall.
5. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.

EQUIPMENT INFORMATION

Controller..2070LX
Cabinet..332 w/ Aux
Software..Q-Free MAXTIME
Cabinet Mount...................................Base
Output File Positions..........................18 With Aux. Output File
Load Switches Used...........................S1, S2, S4, S5, S7, S8, AUX S1, AUX S4, AUX S5
Phases Used.......................................1, 2, 3, 4, 5, 6, 39**, 40**
Overlap "1"..*
Overlap "2"..NOT USED
Overlap "3"..*
Overlap "4"..*

*See overlap programming detail on sheet 2
**Phase used for preemption timing purposes only

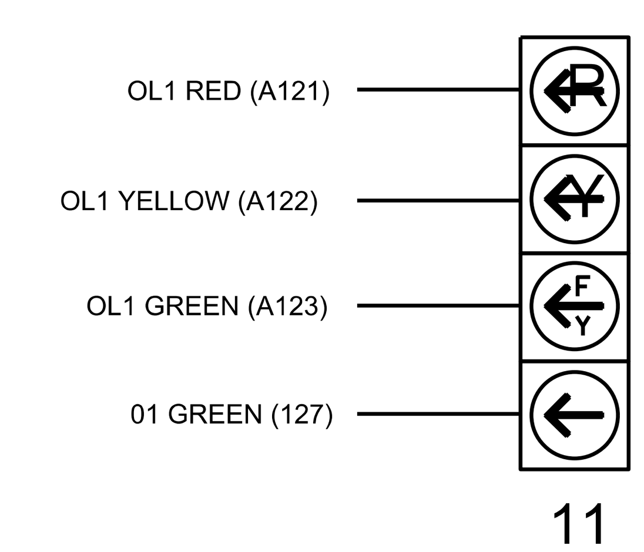
SIGNAL HEAD HOOK-UP CHART

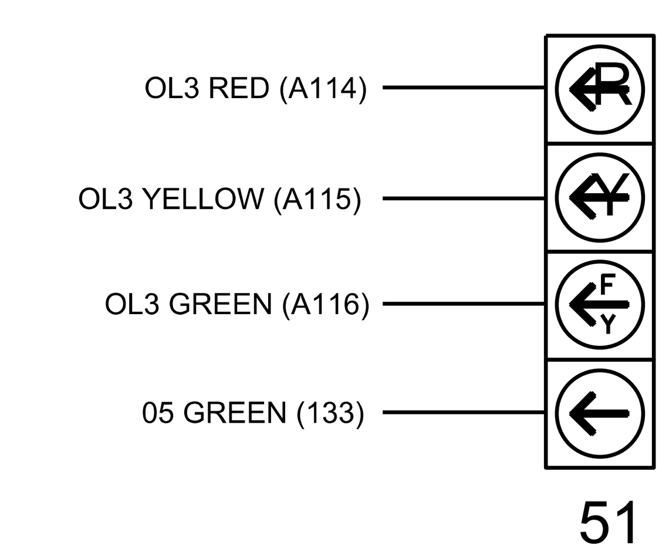
LOAD SWITCH NO.	S1		S2	S3	S4		S5		S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1		2	13	3		4		14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1		2	2 PED	3		4		4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	11★	42	21,22	NU	31	32	41	42	NU	51★	61,62	NU	NU	NU	NU	11★	NU	NU	51★	23★	NU
RED		✳	128		116	116	101	101			134									A101	
YELLOW			129		117	117	102	102		✳	135										
GREEN			130		118	118	103	103			136										
RED ARROW																A121			A114		
YELLOW ARROW		126														A122			A115	A102	
FLASHING YELLOW ARROW																A123			A116	A103	
GREEN ARROW	127	127			118		103			133											

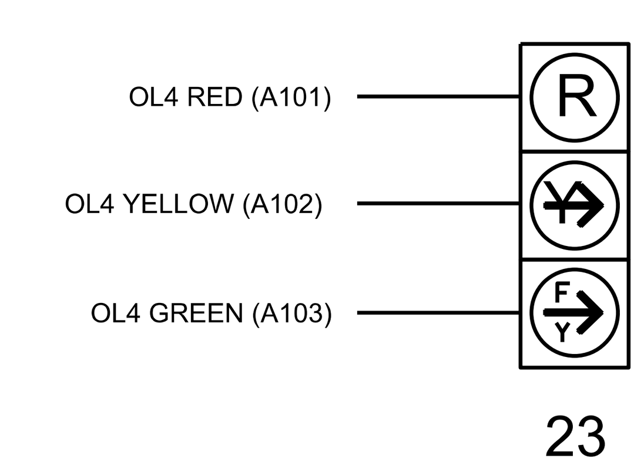
NU = Not Used
✳ Denotes install load resistor. See load resistor installation detail this sheet.
★ See pictorial of head wiring in detail this sheet.

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)







INPUT FILE POSITION LAYOUT

(front view)

FILE		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	Ø 1 1A	Ø 2 2A	NOT USED	SLOT EMPTY	Ø 3 3A	Ø 4 4A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
	L	NOT USED	Ø 2 2B	Ø 1 1B		NOT USED	NOT USED								ST DC ISOLATOR
FILE "J"	U	Ø 5 5A	Ø 6 6A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	PRE1 AC ISOLATOR
	L	NOT USED	Ø 6 6B												NOT USED

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

FS = FLASH SENSE
ST = STOP TIME
PRE = PREEMPT

INPUT FILE CONNECTION & PROGRAMMING CHART

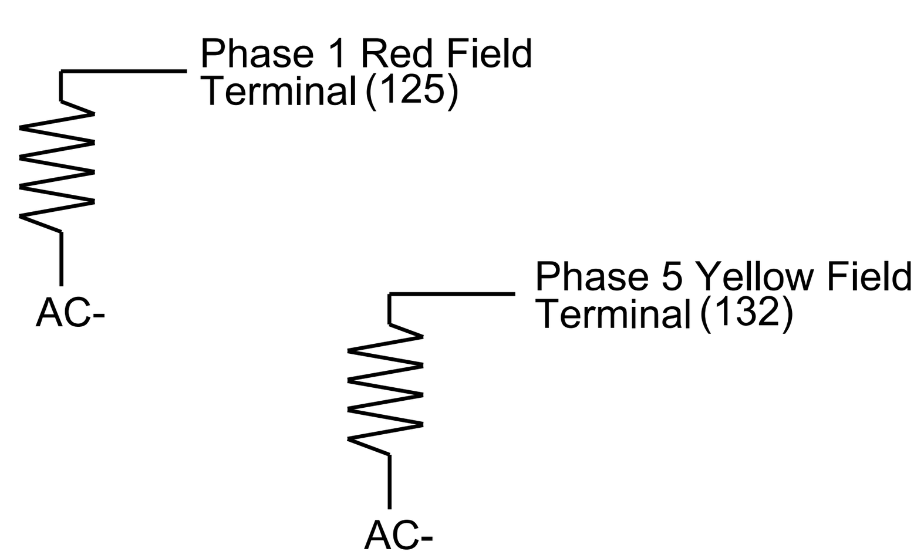
LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN
1A	TB2-1,2	I1U	56	18	1	1	15.0		X		X	
				-	29	6	3.0		X		X	X
1B	TB2-11,12	I3L	76	42	5	1	15.0		X		X	
2A	TB2-5,6	I2U	39	1	2	2			X	X	X	
2B	TB2-7,8	I2L	43	5	3	2			X	X	X	
3A	TB4-5,6	I5U	58	20	7	3	10.0		X		X	
4A	TB4-9,10	I6U	41	3	8	4	3.0		X		X	
5A	TB3-1,2	J1U	55	17	15	5	30.0		X		X	
				-	31	2	3.0		X		X	X
6A	TB3-5,6	J2U	40	2	16	6			X	X	X	
6B	TB3-7,8	J2L	44	6	17	6			X	X	X	

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

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



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 08-1103
DESIGNED: June 2024
SEALED: 7/11/2024
REVISED:

MOTT MACDONALD
MOTT MACDONALD I & E, LLC
930 Main Campus Drive
Suite 200
RALEIGH, NC 27606
License No. F-0669

Electrical Detail - Sheet 1 of 3

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for:
750 N.Greenfield Pkwy.Garner,NC 27529

NC 211/NC 73-211
at
NC 73 (South Intersection)

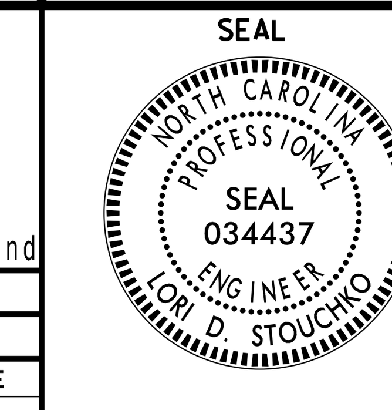
Division 8 Moore County West End

PLAN DATE: June 2024	REVIEWED BY: R. Mullinax
PREPARED BY: LD Stouchko	REVIEWED BY:

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL



DATE

SIG. INVENTORY NO. 08-1103

OVERLAP PROGRAMMING

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

Overlap Plan 1

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

MAXTIME STARTUP AND SOFTWARE FLASH PROGRAMMING DETAIL

Front Panel
Main Menu >Controller >Unit

Web Interface
Home >Controller >Unit

Modify parameters as shown below and save changes.

Startup Parameters

Startup Clearance Hold
6

Unit Flash Parameters

All Red Flash Exit Time
6

OUTPUT CHANNEL CONFIGURATION

Front Panel
Main Menu >Controller >More>Channels>Channels Config

Web Interface
Home >Controller >Advanced IO>Channels>Channels Configuration

Channel Configuration

Notice	Channel	Control Type	Control Source	Flash Yellow	Flash Red	Flash Alt	MMU Channel
	1	Phase Vehicle	1		X	X	1
NOTICE PHASE 2 FLASH RED	2	Phase Vehicle	2		X		2
	3	Phase Vehicle	3		X	X	3
	4	Phase Vehicle	4		X		4
	5	Phase Vehicle	5		X		5
NOTICE PHASE 6 FLASH RED	6	Phase Vehicle	6		X	X	6
	7	Phase Vehicle	7		X		7
	8	Phase Vehicle	8		X	X	8
NOTICE OVERLAP 1 FLASH RED	9	Overlap	1		X	X	9
	10	Overlap	2		X	X	10
NOTICE OVERLAP 3 FLASH RED	11	Overlap	3		X		11
	12	Overlap	4		X		12
	13	Phase Ped	2				13
	14	Phase Ped	4				14
	15	Phase Ped	6				15
	16	Phase Ped	8				16
	17	Overlap	5		X	X	17
	18	Overlap	6		X		18

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 08-1103
DESIGNED: June 2024
SEALED: 7/11/2024
REVISED:

MOTT MACDONALD
MOTT MACDONALD I & E, LLC
930 Main Campus Drive
Suite 200
RALEIGH, NC 27606
License No. F-0669

Electrical Detail - Sheet 2 of 3

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for:
Transportation Mobility and Safety Division
ITS & Signals Management Section
State of North Carolina Department of Transportation
750 N.Greenfield Pkwy,Garner,NC 27529

NC 211/NC 73-211
at
NC 73 (South Intersection)

Division 8 Moore County West End

PLAN DATE: June 2024	REVIEWED BY: R. Mullinax
PREPARED BY: LD Stouchko	REVIEWED BY:

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 034437 ENGINEER LORI D. STOUCHKO

DATE

SIG. INVENTORY NO. 08-1103

SEQUENCE DETAIL

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

Web Interface
Home >Controller >Sequence

Sequence 1

Ring	Sequence Data
1	1,2,a,3,4,b
2	5,6,a,7,8,b
3	39,c,40,d

PREEMPTION PROGRAMMING

Front Panel
Main Menu >Controller >Preemption >Preempt Phasing/Preempt Parameters

Web Interface
Home >Controller >Preempt Configuration >Preempts

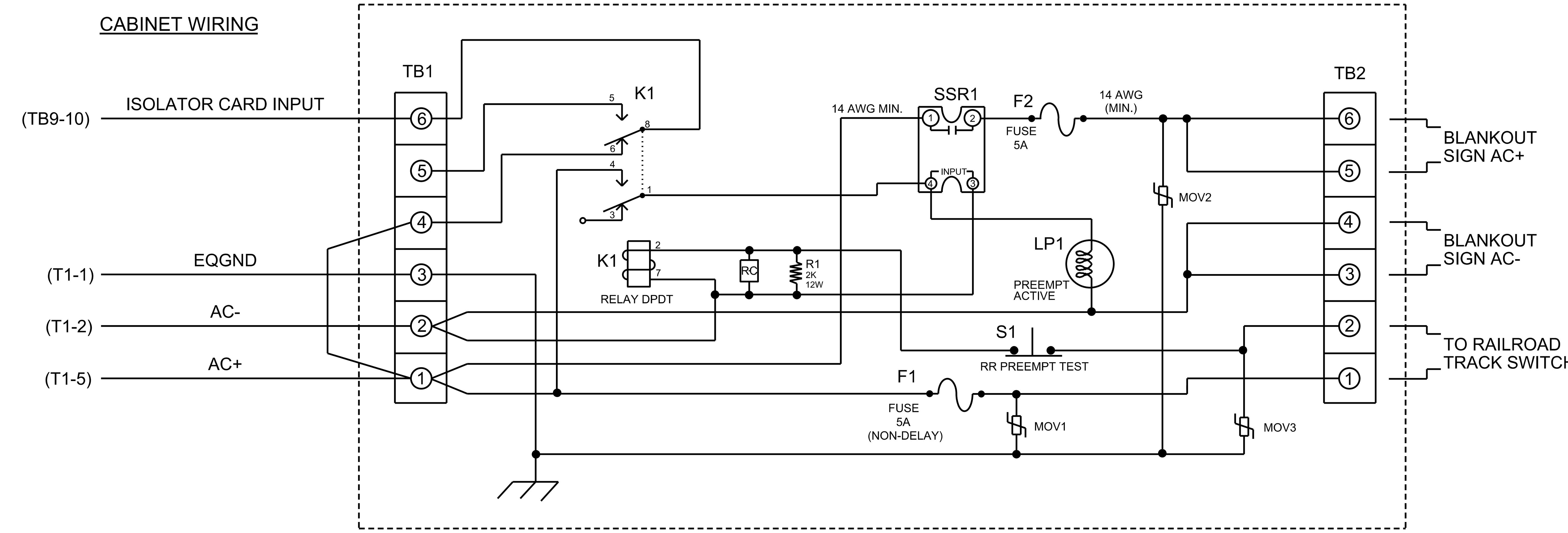
Preempt Configuration

Preempt	1
Enabled	Enabled
Type	Rail Road
Track Phases	4,39
Track Overlaps	-
Dwell Phases	2,6
Dwell Peds	-
Dwell Overlaps	3
Cycling Phases	-
Cycling Peds	-
Cycling Overlaps	-
Exit Phases	4
Exit Overlaps	4
Delay	0
Call Ext Time	1.0
Max Presence	0
Max Pres Act	Terminate
Enter Min Green	1
Enter Walk	0
Enter Ped Clear	0
Enter Yellow Change	4.5
Enter Red Clear	3.1
Track Green	27
Track Yellow Clr	3.8
Track Red Clear	2.0
Dwell Green	0
Exit Min Green	255
Exit Yellow Change	25.5
Exit Red Clear	25.5
Exit Type	Exit Phases
Non Locking Memory	-
Not Ovrd Flash	X
Not Ovrd Nxt Pre	-
Require All Red Entry	-
Track Clear Ovrd	X
Ped Clear During Yellow	-
Entry Omit OLTG	X
Track Reserve	X

RAILROAD PREEMPTION WIRING DETAIL

(wire as shown below)

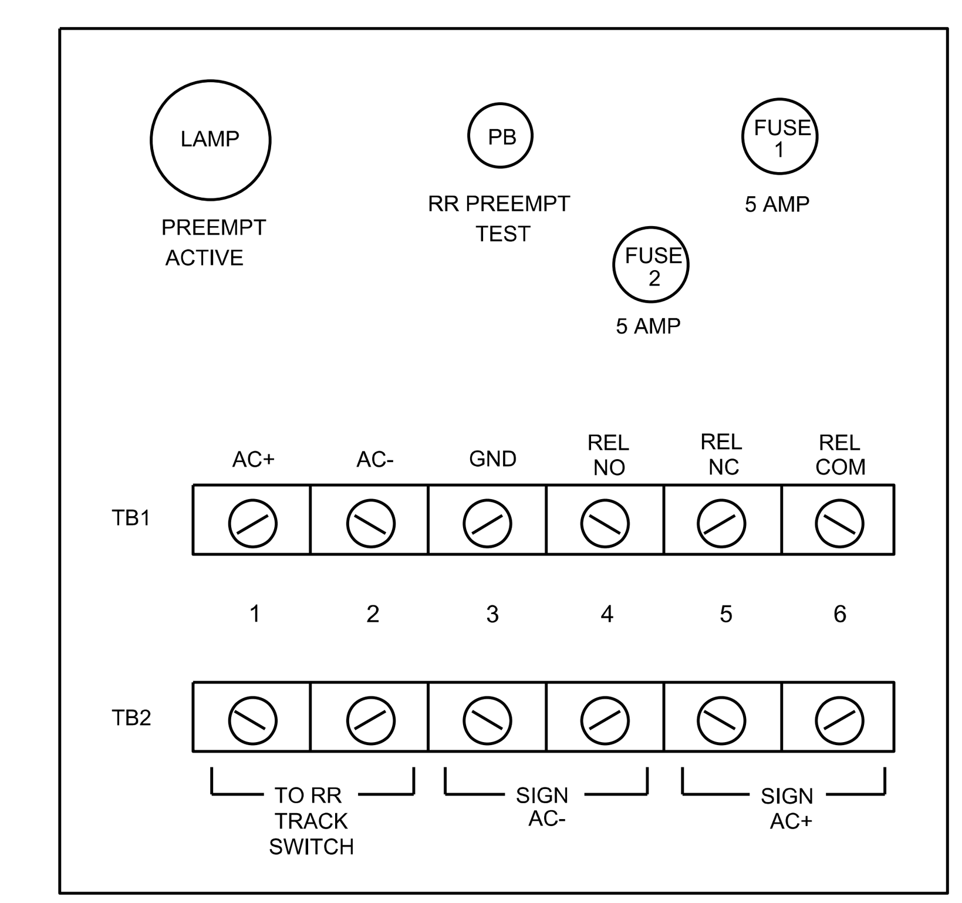
PREEMPTION AND BLANKOUT SIGN CONTROL BOX



NOTES

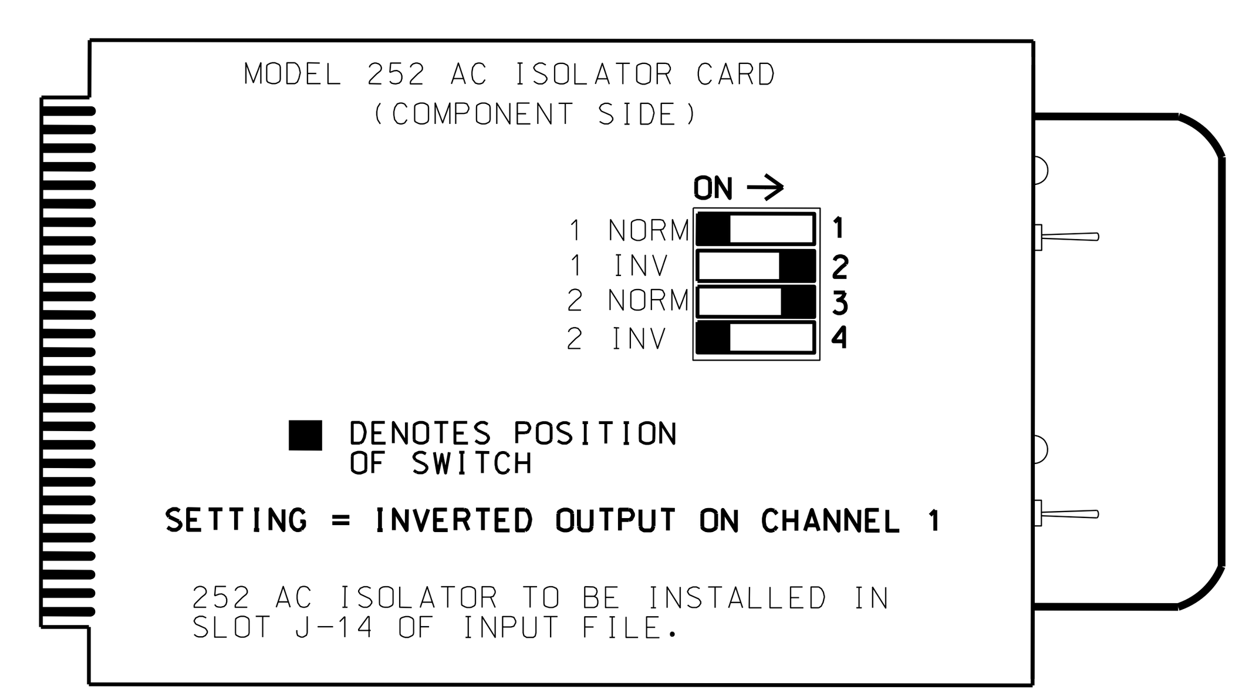
1. Relay K1 is shown in the energized (Preempt not active) normal operation state.
2. Relay K1 is a DPDT with 120VAC coil with octal base.
3. Relay SSR1 is a SPST (normally open) Solid State Relay with AC input and AC (25 amp) output.
4. AC Isolator Card shall activate preemption upon removal of AC+ from the input (as shown above). To accomplish this set invert dip switch on AC Isolator Card.
5. IMPORTANT!! A jumper must be added between input file terminals J14-E and J14-K if not already present. Also, terminal TB9-12 (on input panel) shall be connected to AC neutral (jumper may have to be added).

FRONT VIEW



PREEMPT 1 AC ISOLATOR (MODEL 252) OUTPUT PROGRAMMING DETAIL

(set DIP switches as shown below)



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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 08-1103
DESIGNED: June 2024
SEALED: 7/11/2024
REVISED:

Electrical Detail - Sheet 3 of 3

MOTT MACDONALD
MOTT MACDONALD I & E, LLC
930 Main Campus Drive
Suite 200
RALEIGH, NC 27606
License No. F-0669

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for:
Transportation Mobility and Safety Division, ITS & Signals Management Section, State of North Carolina Department of Transportation
750 N.Greenfield Pkwy.Garner,NC 27529

NC 211/NC 73-211
at
NC 73 (South Intersection)

Division 8 Moore County West End

PLAN DATE: June 2024	REVIEWED BY: R. Mullinax
PREPARED BY: LD Stouchko	REVIEWED BY:

REVISIONS	INIT.	DATE

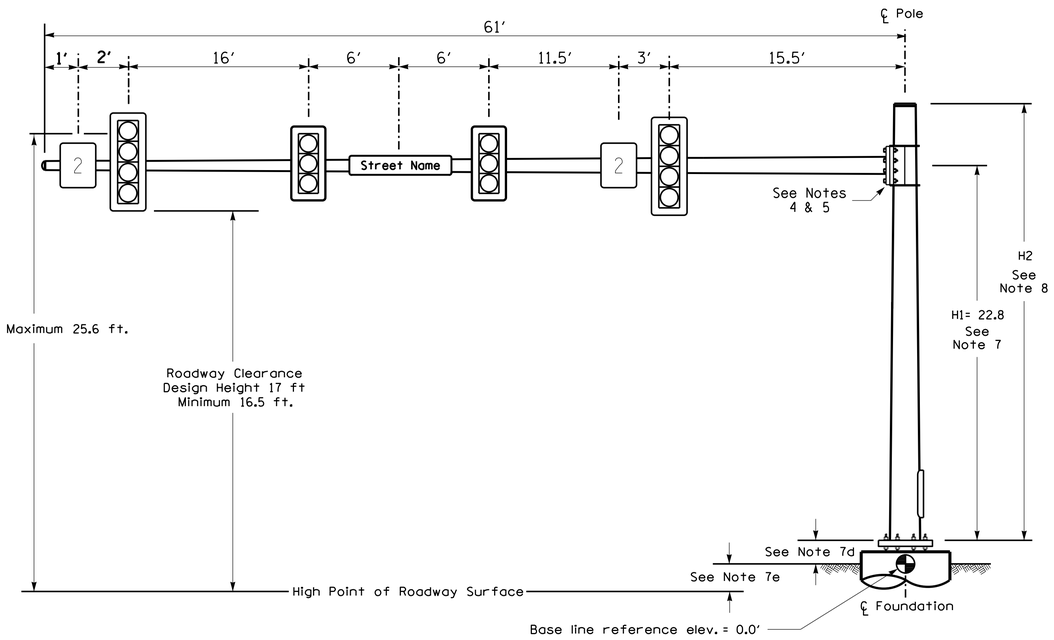
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 034437 ENGINEER LORI D. STOUCHKO

DATE

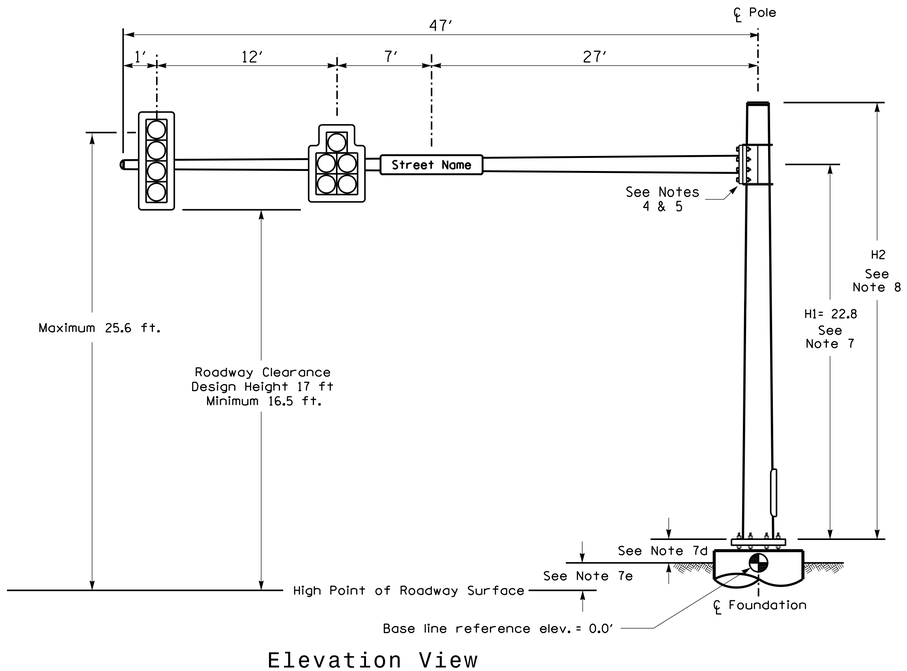
SIG. INVENTORY NO. 08-1103

Design Loading for METAL POLE NO. 1



Elevation View @ 270°

Design Loading for METAL POLE NO. 2



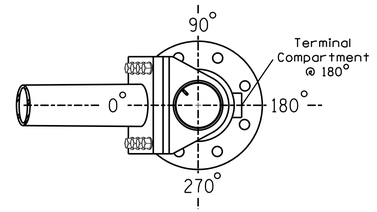
Elevation View

SPECIAL NOTE

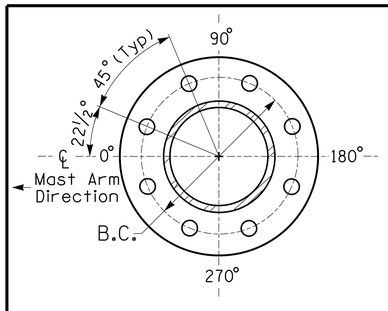
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 1	Pole 2
Baseline reference point at ⊕ ℄ Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	+3.7 ft.	-2.1 ft.
Elevation difference at Edge of travelway or face of curb	NA	-1.7 ft.

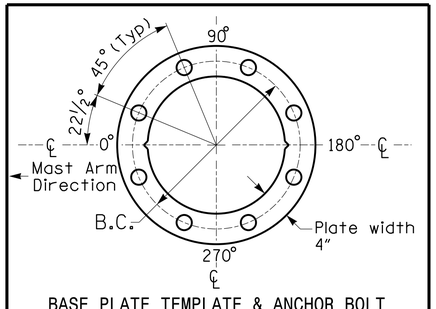


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL

For 8 Bolt Base Plate

METAL POLE No. 1 and 2

PROJECT REFERENCE NO.	SHEET NO.
R-5726	Sig.5.4

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	RIGID MOUNTED SIGNAL HEAD 12″-5 SECTION-WITH BACKPLATE	16.3 S.F.	42.0″W X 56.0″L	103 LBS
	RIGID MOUNTED SIGNAL HEAD 12″-4 SECTION-WITH BACKPLATE	11.5 S.F.	25.5″W X 66.0″L	74 LBS
	RIGID MOUNTED SIGNAL HEAD 12″-3 SECTION-WITH BACKPLATE	9.3 S.F.	25.5″W X 52.5″L	60 LBS
2	SIGN RIGID MOUNTED	7.5 S.F.	30.0″W X 36.0″L	14 LBS
Street Name	STREET NAME SIGN RIGID MOUNTED	16.0 S.F.	24.0″W X 96.0″L	36 LBS

MOTT MACDONALD

MOTT MACDONALD I & E, LLC
930 Main Campus Drive
Suite 200
RALEIGH, NC 27606
License No. F-0669

NOTES

DESIGN REFERENCE MATERIAL

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

DESIGN REQUIREMENTS

2. 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.
3. Design all signal supports using stress ratios that do not exceed 0.9.
4. The camber design for the mast arm deflection should provide an appearance of a low pitched arch where the tip or the free end of the mast arm does not deflect below horizontal when fully loaded.
5. 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.
6. Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
7. The mast arm attachment height (H1) shown is based on the following design assumptions:
   a. Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
   b. Signal heads are rigidly mounted and vertically centered on the mast arm.
   c. The roadway clearance height for design is as shown in the elevation views.
   d. The top of the pole base plate is 0.75 feet above the ground elevation.
   e. Refer to the Elevation Data Chart for the elevation differences between the proposed foundation ground level and the high point of the roadway.
8. The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
   - Mast arm attachment height (H1) plus 2 feet, or
   - H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
9. If pole location adjustments are required, the contractor must gain approval from the Engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signal Design Section Senior Structural Engineer for assistance at (919) 814-5000.
10. The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
11. The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

NCDOT Wind Zone 4 (90 mph)

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Prepared for: Transportation Mobility and Safety Division, Department of Transportation, Signal Design Section

750 N.Greenfield Pkwy.Garner,NC 27529

NC 211/NC 73-211
at
NC 73 (South Intersection)

Division 8 Moore County West End

PLAN DATE: June 2024 REVIEWED BY: R. Mullinax

PREPARED BY: LD Stouchko REVIEWED BY:

SCALE 0 N/A N/A

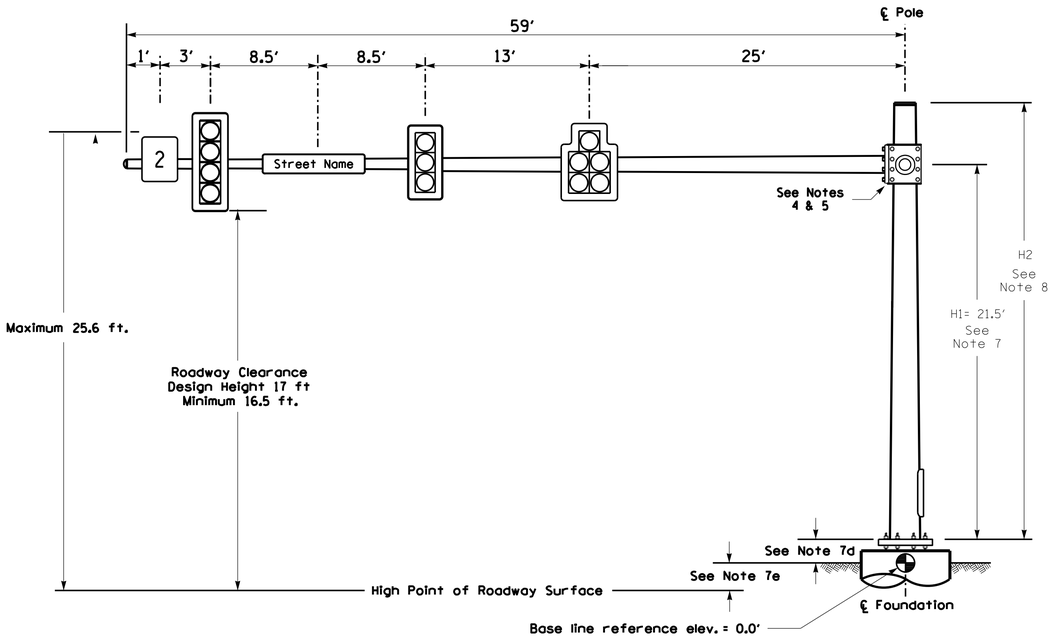
REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 034437 ENGINEER LONG D. STOUCHKO

SIGNATURE DATE

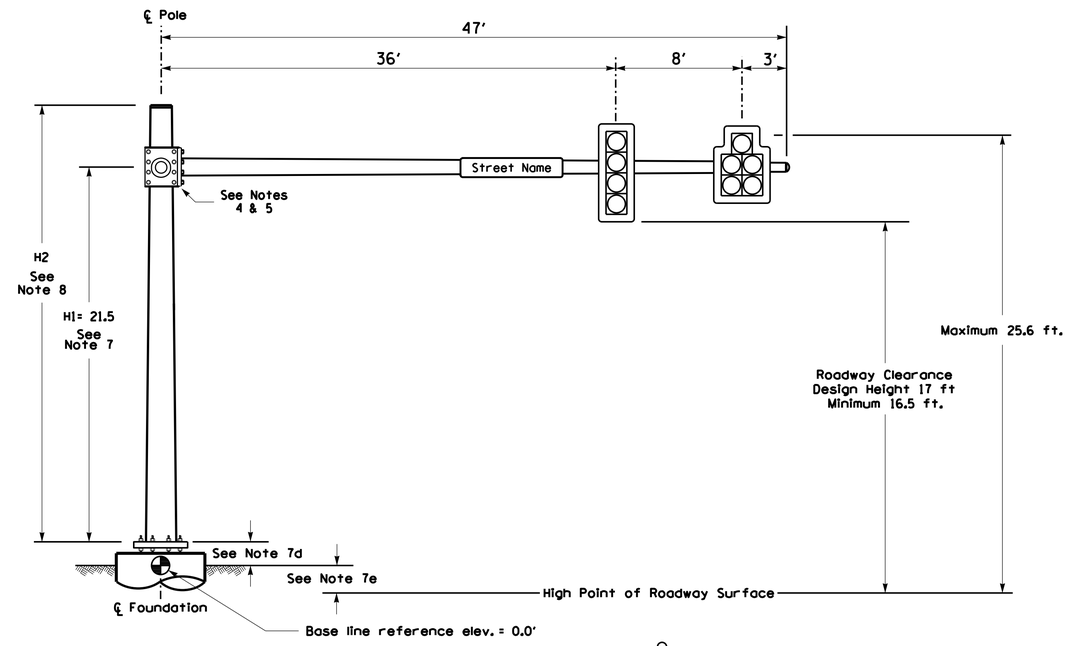
SIG. INVENTORY NO. 08-1103

Design Loading for METAL POLE NO. 3, MAST ARM A



Elevation View @ 270°

Design Loading for METAL POLE NO. 3, MAST ARM B



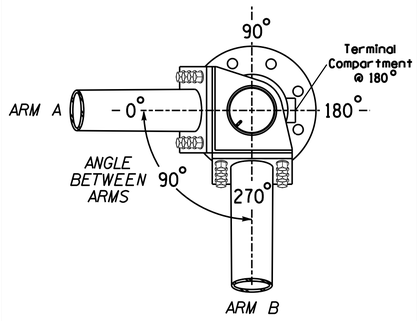
Elevation View @ 0°

SPECIAL NOTE

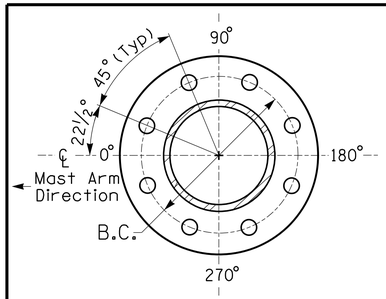
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 3	
℄ Foundation @ ground level ⊕	0.0 ft.	
Elevation difference at High point of roadway surface	-2.5 ft.	
Elevation difference at Edge of travelway or face of curb	+/-0.0 ft.	

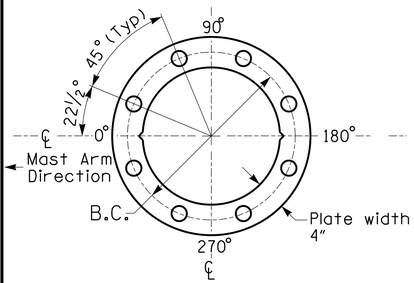


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL

For 8 Bolt Base Plate

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	RIGID MOUNTED SIGNAL HEAD 12"-5 SECTION-WITH BACKPLATE	16.3 S.F.	42.0"W X 56.0"L	103 LBS
	RIGID MOUNTED SIGNAL HEAD 12"-4 SECTION-WITH BACKPLATE	11.5 S.F.	25.5"W X 66.0"L	74 LBS
	RIGID MOUNTED SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE	9.3 S.F.	25.5"W X 52.5"L	60 LBS
2	SIGN RIGID MOUNTED	7.5 S.F.	30.0"W X 36.0"L	14 LBS

M M
MOTT MACDONALD
MOTT MACDONALD I & E, LLC
930 Main Campus Drive
Suite 200
RALEIGH, NC 27606
License No. F-0669

NOTES

DESIGN REFERENCE MATERIAL

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

DESIGN REQUIREMENTS

2. 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.
3. Design all signal supports using stress ratios that do not exceed 0.9.
4. The camber design for the mast arm deflection should provide an appearance of a low pitched arch where the tip or the free end of the mast arm does not deflect below horizontal when fully loaded.
5. 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.
6. Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
7. The mast arm attachment height (H1) shown is based on the following design assumptions:
   a. Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
   b. Signal heads are rigidly mounted and vertically centered on the mast arm.
   c. The roadway clearance height for design is as shown in the elevation views.
   d. The top of the pole base plate is 0.75 feet above the ground elevation.
   e. Refer to the Elevation Data Chart for the elevation differences between the proposed foundation ground level and the high point of the roadway.
8. The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
   Mast arm attachment height (H1) plus 2 feet, or
   H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
9. If pole location adjustments are required, the contractor must gain approval from the Engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signal Design Section Senior Structural Engineer for assistance at (919) 814-5000.
10. The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
11. The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

NCDOT Wind Zone 4 (90 mph)

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Prepared for: Transportation Mobility and Safety Division, North Carolina Department of Transportation, Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

NC 211/NC 73-211
at
NC 73 (South Intersection)

Division 8 Moore County West End

PLAN DATE:	June 2024	REVIEWED BY:	R. Mullinax
PREPARED BY:	LD Stouchko	REVIEWED BY:	

SCALE 0 N/A N/A

REVISIONS	INIT.	DATE

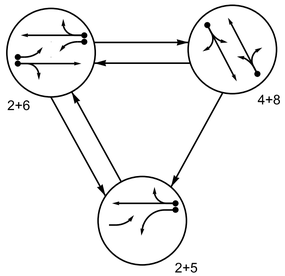
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 034437 ENGINEER LORI D. STOUCHKO

SIGNATURE DATE

SIG. INVENTORY NO. 08-1103

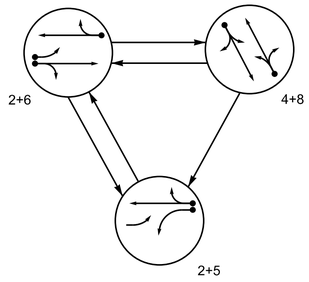
PROJECT REFERENCE NO.	SHEET NO.
R-5726	Sig.6.0

DEFAULT PHASING DIAGRAM



DEFAULT PHASING TABLE OF OPERATION				
SIGNAL FACE	PHASE 2+5	PHASE 2+6	PHASE 4+8	PHASE FLASH
21,22,23	G	G	R	R
41,42,43	R	R	G	R
51	~~←~~	~~F Y~~	~~R~~	~~R~~
61,62	R	G	R	R
64	~~F Y~~	~~F Y~~	~~R~~	~~R~~
81,82	R	R	G	R

ALTERNATE PHASING DIAGRAM



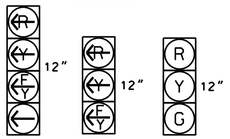
ALTERNATE PHASING TABLE OF OPERATION				
SIGNAL FACE	PHASE 2+5	PHASE 2+6	PHASE 4+8	PHASE FLASH
21,22,23	G	G	R	R
41,42,43	R	R	G	R
51	~~←~~	~~R~~	~~R~~	~~R~~
61,62	R	G	R	R
64	~~F Y~~	~~F Y~~	~~R~~	~~R~~
81,82	R	R	G	R

PHASING DIAGRAM DETECTION LEGEND

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

SIGNAL FACE I.D.

All Heads L.E.D.



MAXTIME DETECTOR INSTALLATION CHART

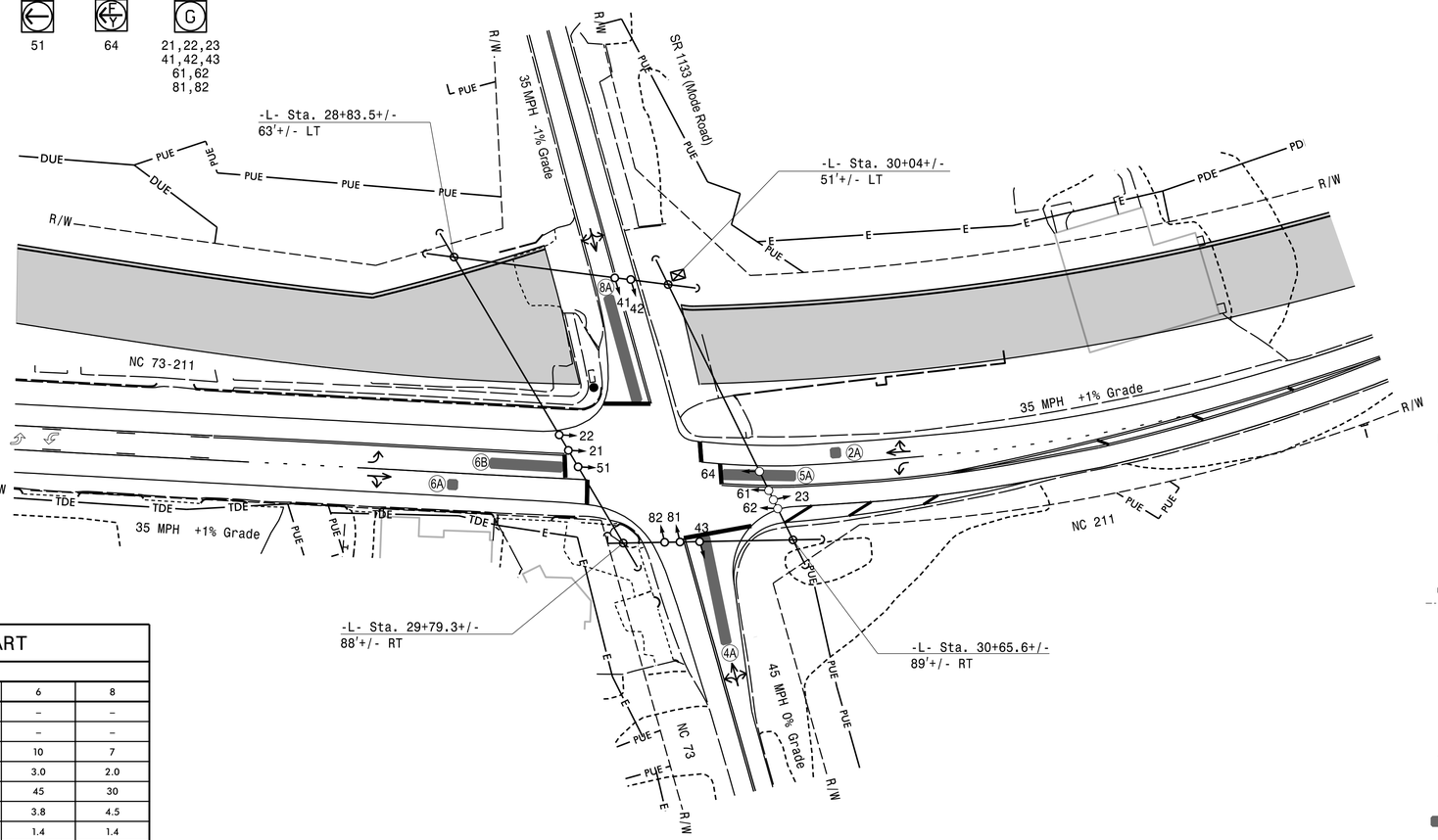
DETECTOR					PROGRAMMING							
ZONE	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
2A✱	6X6	70	✱	✱	2	-	-	X	-	X	-	✱
4A✱	6X60	0	✱	✱	4	10.0	-	X	-	X	-	✱
5A✱	6X40	0	✱	✱	5	15.0#	-	X	-	X	-	✱
					2##	-	-	X	-	X	-	✱
6A✱	6X6	70	✱	✱	6	-	-	X	-	X	-	✱
6B✱	6X40	0	✱	✱	6	-	-	X	-	X	-	✱
8A✱	6X60	0	✱	✱	8	10.0	-	X	-	X	-	✱

\# Disable Delay During Alternate Phasing Operation
Disable Phase Call for Loop During Alternate Phasing Operation
✱ Video Detection Zone

3 Phase
Fully Actuated
(Isolated)

NOTES

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



LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
— PUE —	Permanent Utility Easement	N/A
— E —	Temporary Construction Easement	N/A
— TDE —	Temporary Drainage Easement	N/A
— PDE —	Permanent Drainage Easement	N/A
— DUE —	Permanent Drainage/Utility Easement	N/A
→	Directional Arrow	→
	Construction Zone	
	Non-Intrusive Detection Zone	

MAXTIME TIMING CHART

FEATURE	PHASE 2	PHASE 4	PHASE 5	PHASE 6	PHASE 8
Walk *	–	–	–	–	–
Ped Clear *	–	–	–	–	–
Min Green *	10	7	7	10	7
Passage *	3.0	2.0	2.0	3.0	2.0
Max 1 *	45	30	20	45	30
Yellow Change	3.8	4.5	3.0	3.8	4.5
Red Clear	1.4	1.4	1.2	1.4	1.4
Added Initial *	–	–	–	–	–
Maximum Initial *	–	–	–	–	–
Time Before Reduction *	–	–	–	–	–
Time To Reduce *	–	–	–	–	–
Minimum Gap	–	–	–	–	–
Advance Walk	–	–	–	–	–
Non Lock Detector	–	X	X	–	X
Vehicle Recall	MIN RECALL	–	–	MIN RECALL	–
Dual Entry	–	X	–	–	X

* These values may be field adjusted. Do not adjust Min Green and Passage 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 I)

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

MOTT MACDONALD
MOTT MACDONALD I & E, LLC
930 Main Campus Drive
Suite 200
RALEIGH, NC 27606
License No. F-0669

Prepared for:
Transportation Mobility and Safety Division
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
Signal Design Section
750 N.Greenfield Pkwy.Garner,NC 27529

NC 73-211/NC 211
at
NC 73/SR 1133 (Mode Rd)

Division 8 Moore County West End

PLAN DATE:	June 2024	REVIEWED BY:	R. Mullinax
PREPARED BY:	LD Stouchko	REVIEWED BY:	

SCALE 0 40 1"=40'

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 034437 LON D. STOUCHKO

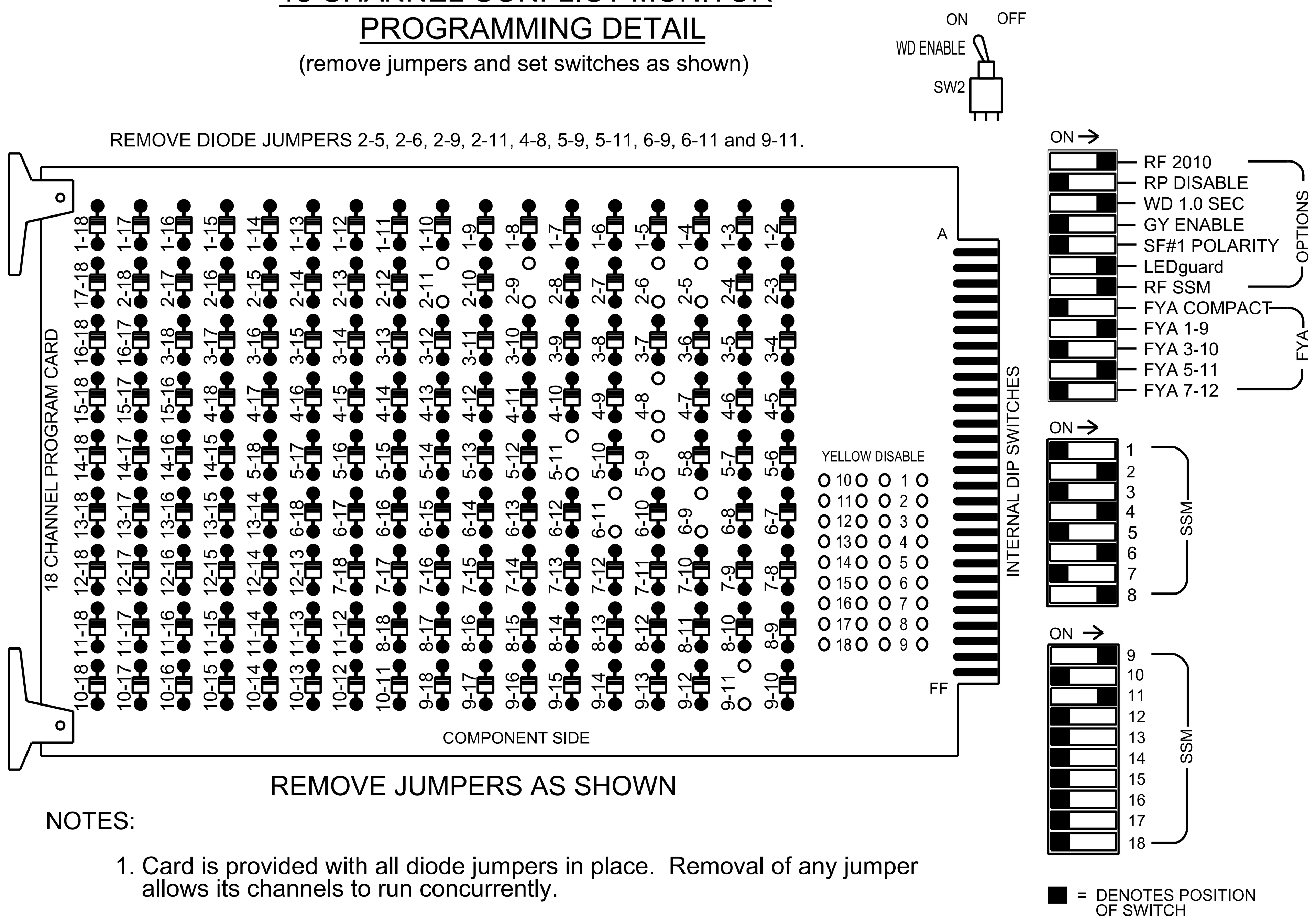
SIGNATURE DATE

SIG. INVENTORY NO. 08-0098TI

18 CHANNEL CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

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



REMOVE JUMPERS AS SHOWN

NOTES:

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 the Red Enable is active at all times during normal operation.
4. Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the signal plan.
2. Program phases 4 and 8 for Dual Entry.
3. Program controller to start up in phase 2 Green No Walk and 6 Green No Walk.
4. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.

EQUIPMENT INFORMATION

Controller..2070LX
Cabinet...332 w/ Aux
Software..Q-Free MAXTIME
Cabinet Mount.....................................Base
Output File Positions...........................18 With Aux. Output File
Load Switches Used.............................S2, S5, S7, S8, S11, AUX S1, AUX S4
Phases Used...2, 4, 5, 6, 8
Overlap "1"...*
Overlap "2"...NOT USED
Overlap "3"...*
Overlap "4"...NOT USED

*See overlap programming detail on sheet 2

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	NU	21,22 23	NU	NU	41,42 43	NU	51★	61,62	NU	NU	81,82	NU	64★	NU	NU	51★	NU	NU
RED		128			101			134			107							
YELLOW		129			102		✱	135			108							
GREEN		130			103			136			109							
RED ARROW													A121			A114		
YELLOW ARROW													A122			A115		
FLASHING YELLOW ARROW													A123			A116		
GREEN ARROW							133											

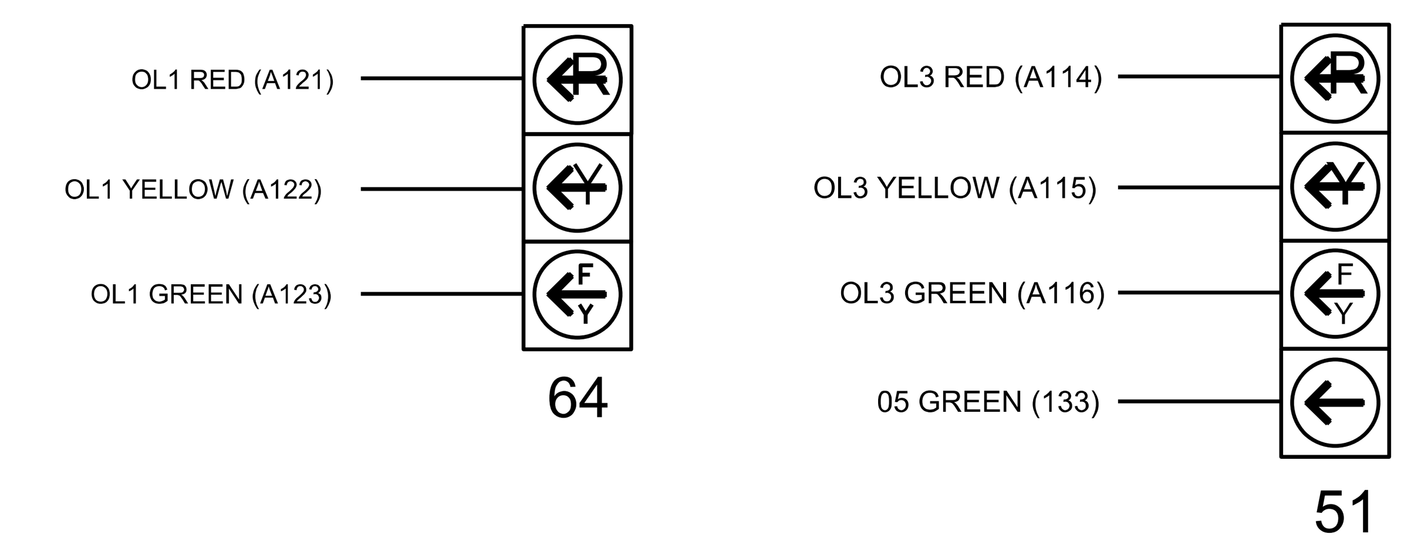
NU = Not Used

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

★ See pictorial of head wiring in detail this sheet.

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



INPUT FILE POSITION LAYOUT

(front view)

FILE		1	2	3	4	5	6	7	8	9	1O	11	12	13	14
FILE "I"	U	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
	L														ST DC ISOLATOR
FILE "J"	U	ø 5 5A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L	NOT USED													

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN
5A	TB3-1,2	J1U	55	17	15 *	5	15.0		X		X	
				-	31 *	2			X		X	

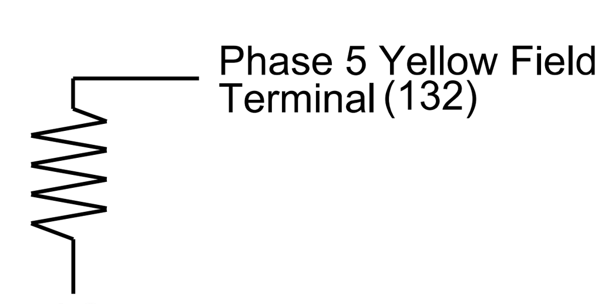
* For the detectors to work as shown on the signal design plan see the Vehicle Detector Setup Programming Detail for Alternate phasing on sheet 2 of 3

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

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



SPECIAL DETECTOR NOTES

1. 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.
2. For loop 5A, detector card placement is typical for a NCDOT installation. Detectors associated with these slots are compatible with the Vehicle Detector Programming Detail located on sheet 2 of this electrical detail.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 08-0098T1
DESIGNED: June 2024
SEALED: 7/11/2024
REVISED:

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

MOTT MACDONALD
MOTT MACDONALD I & E, LLC
930 Main Campus Drive
Suite 200
RALEIGH, NC 27606
License No. F-0669

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for:
Transportation Mobility and Safety Division - State of North Carolina - Department of Transportation - ITS & Signals Management Section
750 N.Greenfield Pkwy,Garner,NC 27529

NC 73-211/NC 211
at
NC 73/SR 1133 (Mode Rd)

Division 8 Moore County West End

PLAN DATE: June 2024	REVIEWED BY: R. Mullinax
PREPARED BY: LD Stouchko	REVIEWED BY:

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 034437 ENGINEER LORI D. STOUCHKO

DATE

SIG. INVENTORY NO. 08-0098T1

MAXTIME OVERLAP PROGRAMMING DETAIL FOR DEFAULT PHASING

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

Overlap Plan 1

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

NOTICE INCLUDED PHASE
NOTICE MODIFIER PHASE

MAXTIME DETECTOR PROGRAMMING DETAIL FOR ALTERNATE PHASING LOOP 5A

Front Panel
Main Menu >Controller >Detector >Veh Det Plans

Web Interface
Home >Controller >Detector Configuration >Vehicle Detectors

In the table view of web interface right click on "Detector" in the top left corner of the table. Copy the entire contents of Detector Plan 1. Paste Detector Plan 1 into Detector Plan 2. Modify Detector Plan 2 as shown below and save changes.

Plan 2

	Detector	Call Phase	Delay
5A	15	5	-
	31	0	-

MAXTIME ALTERNATE PHASING PATTERN PROGRAMMING DETAIL

Front Panel
Main Menu >Controller >Coordination >Patterns

Web Interface
Home >Controller >Coordination >Patterns

Pattern Parameters

Pattern	Veh Det Plan	Overlap Plan
*	2	2

* The Pattern number(s) are to be determined by the Division and/or City Traffic Engineer.

MAXTIME OVERLAP PROGRAMMING DETAIL FOR ALTERNATE PHASING

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

In the table view of the web interface, right click on "Overlap" in the top left corner of the table. Copy the entire contents of Overlap Plan 1. Paste Overlap Plan 1 into Overlap Plan 2. Modify Overlap Plan 2 as shown below and save changes.

Overlap Plan 2

Overlap	1	2	3	4
Type	FYA 4 - Section	Off	FYA 4 - Section	Off
Included Phases	2	-	-	-
Modifier Phases	-	-	5	-
Modifier Overlaps	-	-	-	-
Trail Green	0	0	0	0
Trail Yellow	0.0	0.0	0.0	0.0
Trail Red	0.0	0.0	0.0	0.0

NOTICE INCLUDED PHASE
NOTICE MODIFIER PHASE

MAXTIME ALTERNATE PHASING ACTIVATION DETAIL

To run alternate phasing, select a Pattern that is programmed to run Overlap Plan 2 and Detector Plan 2.
A Pattern can be selected through the scheduler or manually by changing the Operational Mode.

PHASING	OVERLAP PLAN	VEH DET PLAN
ACTIVE PLAN REQUIRED TO RUN DEFAULT PHASING	1	1
ACTIVE PLAN REQUIRED TO RUN ALTERNATE PHASING	2	2

ALTERNATE PHASING CHANGE SUMMARY

THE FOLLOWING IS A SUMMARY OF WHAT TAKES PLACE WHEN OVERLAP PLAN 2 AND VEHICLE DETECTOR PLAN 2 ACTIVATE TO CALL THE "ALTERNATE PHASING":

OVERLAP PLAN 2: Modifies overlap included phases for head 51 to run protected turns only.

VEH DET PLAN 2: Disables phase 2 call on loop 5A and reduces delay time for phase 5 call on loop 5A to 0 seconds.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 08-0098T1
DESIGNED: June 2024
SEALED: 7/11/2024
REVISED:

MOTT MACDONALD
MOTT MACDONALD I & E, LLC
930 Main Campus Drive
Suite 200
RALEIGH, NC 27606
License No. F-0669

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

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for:
Transportation Mobility and Safety Division — ITS & Signals Management Section — State of North Carolina Department of Transportation
750 N.Greenfield Pkwy,Garner,NC 27529

NC 73-211/NC 211
at
NC 73/SR 1133 (Mode Rd)

Division 8 Moore County West End

PLAN DATE: June 2024	REVIEWED BY: R. Mullinax
PREPARED BY: LD Stouchko	REVIEWED BY:

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 034437 ENGINEER LORI D. STOUCHKO

DATE

SIG. INVENTORY NO. 08-0098TI

MAXTIME STARTUP AND SOFTWARE FLASH PROGRAMMING DETAIL

Front Panel
Main Menu >Controller >Unit

Web Interface
Home >Controller >Unit

Modify parameters as shown below and save changes.

Startup Parameters

Startup Clearance Hold
6

Unit Flash Parameters

All Red Flash Exit Time
6

OUTPUT CHANNEL CONFIGURATION

Front Panel
Main Menu >Controller >More>Channels>Channels Config

Web Interface
Home >Controller >Advanced IO>Channels>Channels Configuration

Channel Configuration

NOTICE PHASE 2 FLASH RED (channel 2)
NOTICE PHASE 6 FLASH RED (channel 6)
NOTICE OVERLAP 1 FLASH RED (channel 9)
NOTICE OVERLAP 3 FLASH RED (channel 11)

Channel	Control Type	Control Source	Flash Yellow	Flash Red	Flash Alt	MMU Channel
1	Phase Vehicle	1		X	X	1
2	Phase Vehicle	2		X		2
3	Phase Vehicle	3		X	X	3
4	Phase Vehicle	4		X		4
5	Phase Vehicle	5		X		5
6	Phase Vehicle	6		X	X	6
7	Phase Vehicle	7		X		7
8	Phase Vehicle	8		X	X	8
9	Overlap	1		X	X	9
10	Overlap	2		X	X	10
11	Overlap	3		X		11
12	Overlap	4		X		12
13	Phase Ped	2				13
14	Phase Ped	4				14
15	Phase Ped	6				15
16	Phase Ped	8				16
17	Overlap	5		X	X	17
18	Overlap	6		X		18

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 08-0098T1
DESIGNED: June 2024
SEALED: 7/11/2024
REVISED:

MOTT MACDONALD
MOTT MACDONALD I & E, LLC
930 Main Campus Drive
Suite 200
RALEIGH, NC 27606
License No. F-0669

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

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for:
Transportation Mobility and Safety Division — ITS & Signals Management Section — State of North Carolina Department of Transportation
750 N.Greenfield Pkwy,Garner,NC 27529

NC 73-211/NC 211
at
NC 73/SR 1133 (Mode Rd)

Division 8 Moore County West End

PLAN DATE: June 2024	REVIEWED BY: R. Mullinax
PREPARED BY: LD Stouchko	REVIEWED BY:

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

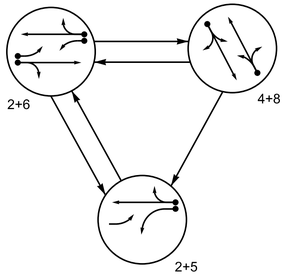
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 034437 ENGINEER LORI D. STOUCHKO

SIGNATURE DATE

SIG. INVENTORY NO. 08-0098TI

PROJECT REFERENCE NO.	SHEET NO.
R-5726	Sig.7.0

DEFAULT PHASING DIAGRAM



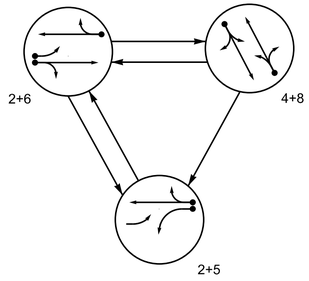
PHASING DIAGRAM DETECTION LEGEND

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

DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE 2+5	PHASE 2+6	PHASE 4+8	PHASE FLASH
21,22,23	G	G	R	R
41,42,43	R	R	G	R
51	~~←~~	~~F Y~~	~~R~~	~~R~~
61,62	R	G	R	R
64	~~F Y~~	~~F Y~~	~~R~~	~~R~~
81,82	R	R	G	R

ALTERNATE PHASING DIAGRAM

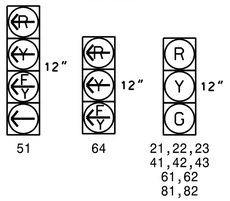


ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE 2+5	PHASE 2+6	PHASE 4+8	PHASE FLASH
21,22,23	G	G	R	R
41,42,43	R	R	G	R
51	~~←~~	~~R~~	~~R~~	~~R~~
61,62	R	G	R	R
64	~~F Y~~	~~F Y~~	~~R~~	~~R~~
81,82	R	R	G	R

SIGNAL FACE I.D.

All Heads L.E.D.



MAXTIME DETECTOR INSTALLATION CHART

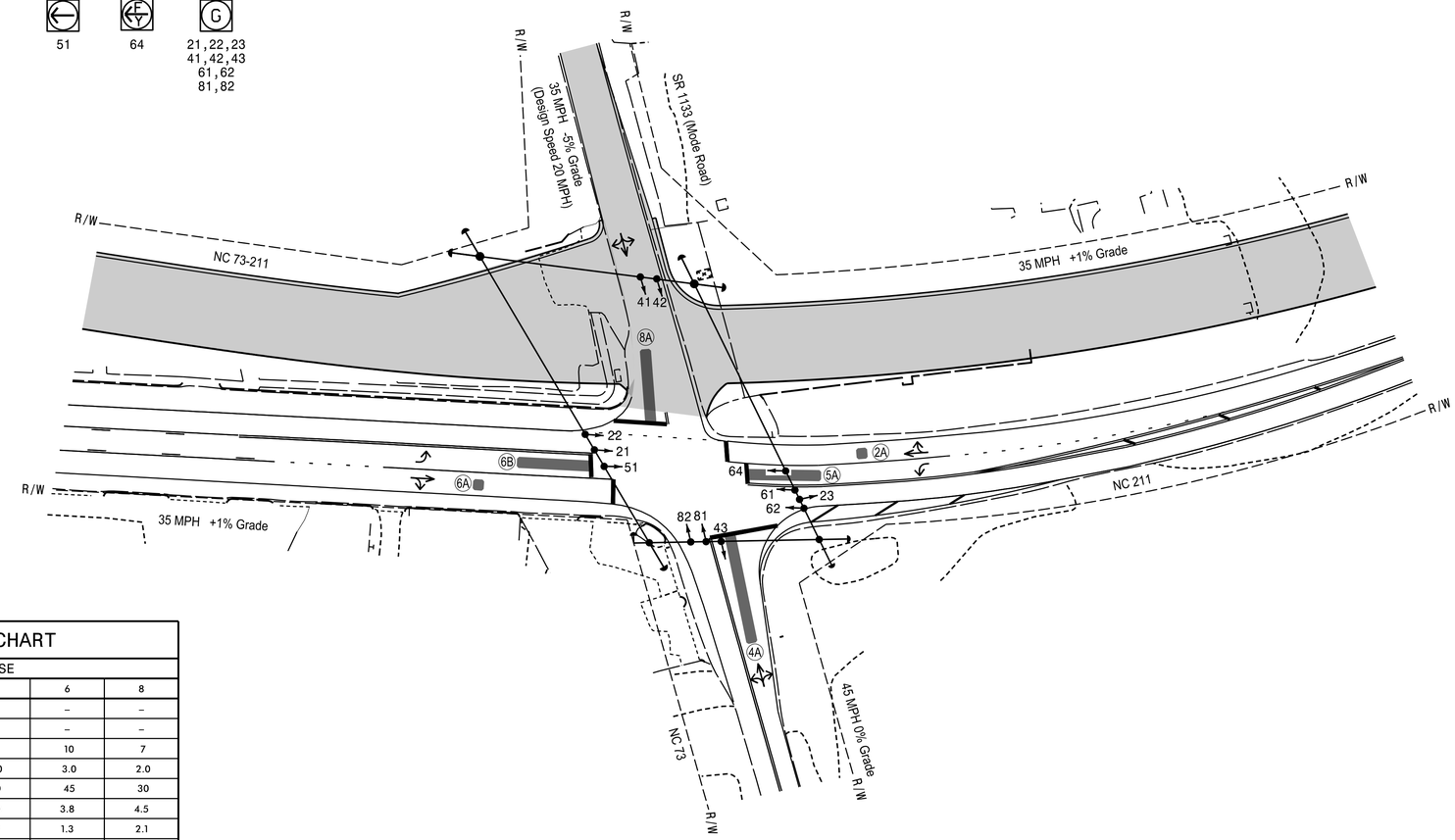
DETECTOR					PROGRAMMING						
ZONE	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
2A✱	6X6	70	✱	✱	2	-	-	X	-	X	-	✱
4A✱	6X60	0	✱	✱	4	10.0	-	X	-	X	-	✱
5A✱	6X40	0	✱	✱	5	15.0#	-	X	-	X	-	✱
					2##	-	-	X	-	X	-	✱
6A✱	6X6	70	✱	✱	6	-	-	X	-	X	-	✱
6B✱	6X40	0	✱	✱	6	-	-	X	-	X	-	✱
8A✱	6X40	0	✱	✱	8	10.0	-	X	-	X	-	✱

\# Disable Delay During Alternate Phasing Operation.
Disable Phase Call for Loop During Alternate Phasing Operation.
✱ Video Detection Zone

3 Phase
Fully Actuated
(Isolated)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 5 may be lagged.
4. Set all detector units to presence mode.
5. The Division Traffic Engineer will determine the hours of use for each phasing plan.
6. This intersection uses video detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.



MAXTIME TIMING CHART

FEATURE	PHASE 2	PHASE 4	PHASE 5	PHASE 6	PHASE 8
Walk *	–	–	–	–	–
Ped Clear *	–	–	–	–	–
Min Green *	10	7	7	10	7
Passage *	3.0	2.0	2.0	3.0	2.0
Max 1 *	45	30	20	45	30
Yellow Change	3.8	4.5	3.0	3.8	4.5
Red Clear	1.3	2.1	1.2	1.3	2.1
Added Initial *	–	–	–	–	–
Maximum Initial *	–	–	–	–	–
Time Before Reduction *	–	–	–	–	–
Time To Reduce *	–	–	–	–	–
Minimum Gap	–	–	–	–	–
Advance Walk	–	–	–	–	–
Non Lock Detector	–	X	X	–	X
Vehicle Recall	MIN RECALL	–	–	MIN RECALL	–
Dual Entry	–	X	–	–	X

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

LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
	Construction Zone	
	Non-Intrusive Detection Zone	

Signal Upgrade
Temporary Design 2 (TMP Phase I)

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

MOTT MACDONALD
MOTT MACDONALD I & E, LLC
930 Main Campus Drive
Suite 200
RALEIGH, NC 27606
License No. F-0669

Prepared for:
Transportation Mobility and Safety Division
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signal Design Section
750 N.Greenfield Pkwy.Garner,NC 27529

NC 73-211/NC 211
at
NC 73/SR 1133 (Mode Rd)

Division 8 Moore County West End

PLAN DATE: June 2024 REVIEWED BY: R. Mullinax
PREPARED BY: LD Stouchko REVIEWED BY:

SCALE 0 40 1"=40'

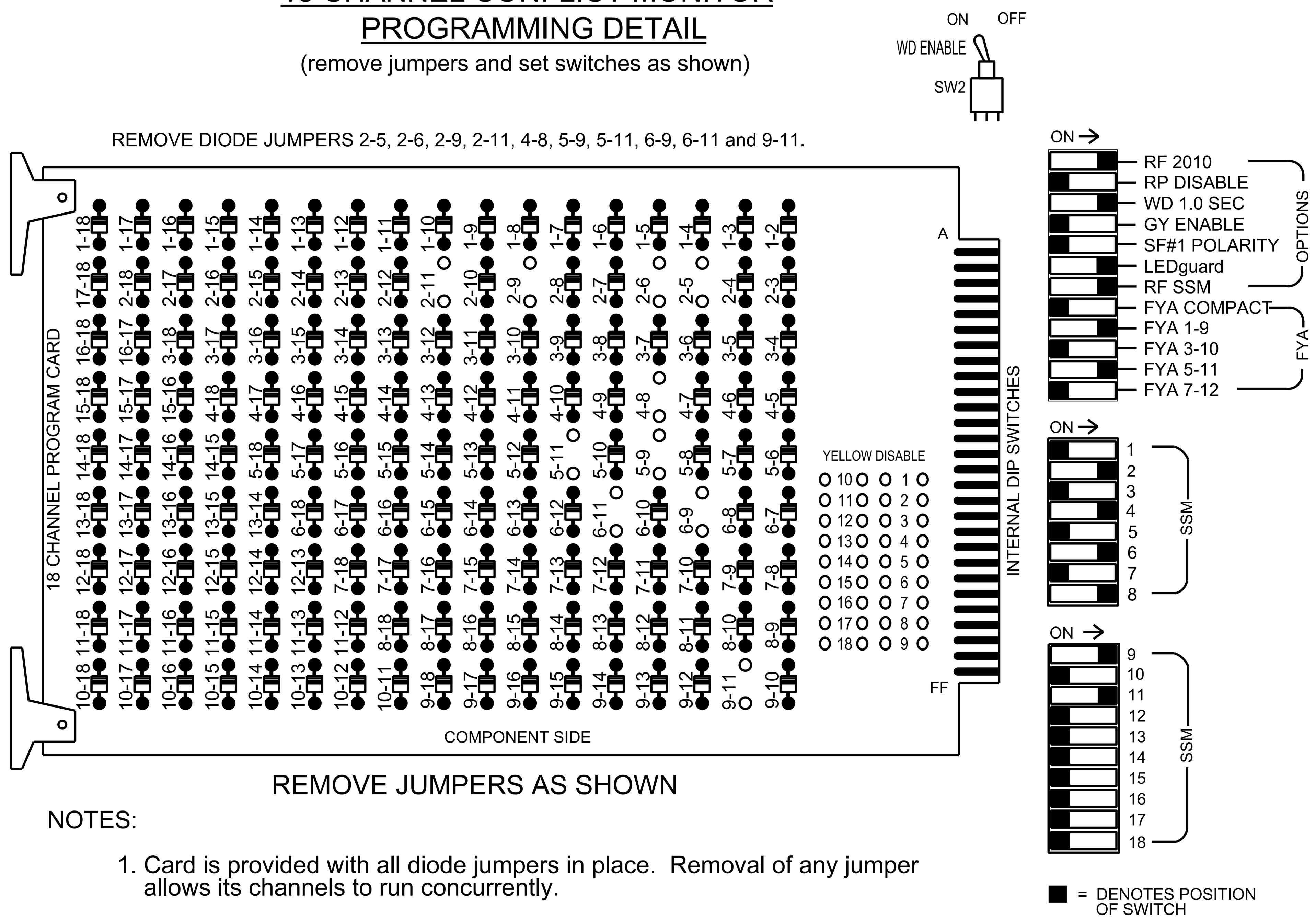
REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 034437 LORI D. STOUCHKO
SIGNATURE DATE
SIG. INVENTORY NO. 08-0098T2

18 CHANNEL CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

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



REMOVE JUMPERS AS SHOWN

NOTES:

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 the Red Enable is active at all times during normal operation.
4. Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the signal plan.
2. Program phases 4 and 8 for Dual Entry.
3. Program controller to start up in phase 2 Green No Walk and 6 Green No Walk.
4. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.

EQUIPMENT INFORMATION

Controller..2070LX
Cabinet..332 w/ Aux
Software..Q-Free MAXTIME
Cabinet Mount......................................Base
Output File Positions...........................18 With Aux. Output File
Load Switches Used.............................S2, S5, S7, S8, S11, AUX S1, AUX S4
Phases Used..2, 4, 5, 6, 8
Overlap "1"..*
Overlap "2"..NOT USED
Overlap "3"..*
Overlap "4"..NOT USED

*See overlap programming detail on sheet 2

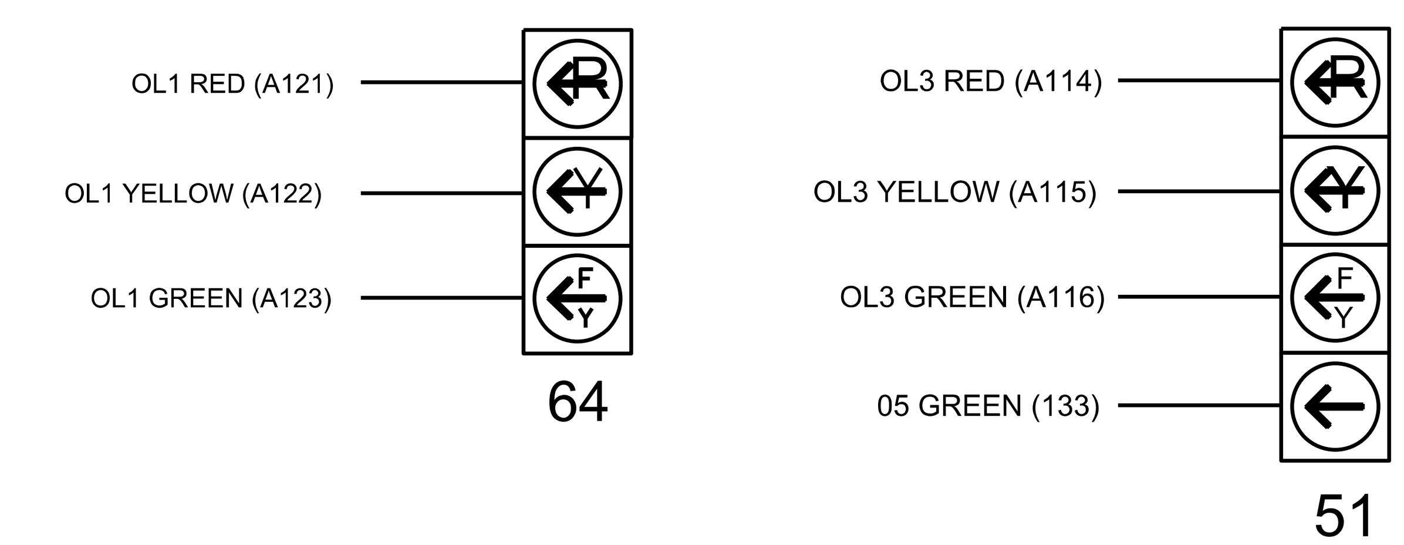
SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	NU	21,22 23	NU	NU	41,42 43	NU	51★	61,62	NU	NU	81,82	NU	64★	NU	NU	51★	NU	NU
RED		128			101			134			107							
YELLOW		129			102		❋	135			108							
GREEN		130			103			136			109							
RED ARROW													A121			A114		
YELLOW ARROW													A122			A115		
FLASHING YELLOW ARROW													A123			A116		
GREEN ARROW							133											

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

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



INPUT FILE POSITION LAYOUT

(front view)

FILE		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
	L														ST DC ISOLATOR
FILE "J"	U	ø 5 5A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L	NOT USED													

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN
5A	TB3-1,2	J1U	55	17	15 *	5	15.0		X		X	
				-	31 *	2			X		X	

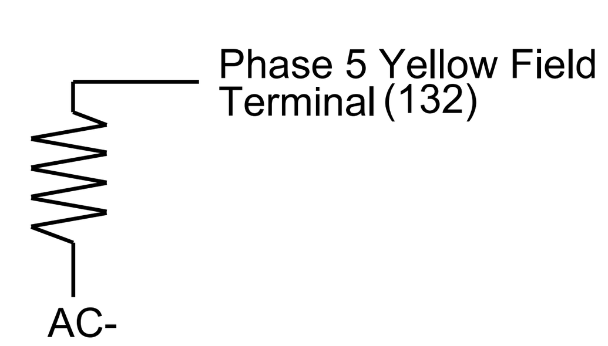
* For the detectors to work as shown on the signal design plan see the Vehicle Detector Setup Programming Detail for Alternate phasing on sheet 2 of 3

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

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



SPECIAL DETECTOR NOTES

1. 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.
2. For loop 5A, detector card placement is typical for a NCDOT installation. Detectors associated with these slots are compatible with the Vehicle Detector Programming Detail located on sheet 2 of this electrical detail.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 08-0098T2
DESIGNED: June 2024
SEALED: 7/11/2024
REVISED:

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

MOTT MACDONALD

MOTT MACDONALD I & E, LLC
930 Main Campus Drive
Suite 200
RALEIGH, NC 27606
License No. F-0669

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for:
Transportation Mobility and Safety Division — ITS & Signals Management Section — State of North Carolina Department of Transportation
750 N.Greenfield Pkwy,Garner,NC 27529

NC 73-211/NC 211
at
NC 73/SR 1133 (Mode Rd)

Division 8 Moore County West End

PLAN DATE: June 2024	REVIEWED BY: R. Mullinax
PREPARED BY: LD Stouchko	REVIEWED BY:

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 034437 ENGINEER LORI D. STOUCHKO

DATE

SIG. INVENTORY NO. 08-0098T2

PROJECT REFERENCE NO.	SHEET NO.
R-5726	Sig.7.2

MAXTIME OVERLAP PROGRAMMING DETAIL FOR DEFAULT PHASING

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

Overlap Plan 1

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

NOTICE INCLUDED PHASE
NOTICE MODIFIER PHASE

MAXTIME DETECTOR PROGRAMMING DETAIL FOR ALTERNATE PHASING LOOP 5A

Front Panel
Main Menu >Controller >Detector >Veh Det Plans

Web Interface
Home >Controller >Detector Configuration >Vehicle Detectors

In the table view of web interface right click on "Detector" in the top left corner of the table. Copy the entire contents of Detector Plan 1. Paste Detector Plan 1 into Detector Plan 2. Modify Detector Plan 2 as shown below and save changes.

Plan 2

	Detector	Call Phase	Delay
5A	15	5	-
	31	0	-

MAXTIME ALTERNATE PHASING PATTERN PROGRAMMING DETAIL

Front Panel
Main Menu >Controller >Coordination >Patterns

Web Interface
Home >Controller >Coordination >Patterns

Pattern Parameters

Pattern	Veh Det Plan	Overlap Plan
*	2	2

* The Pattern number(s) are to be determined by the Division and/or City Traffic Engineer.

MAXTIME OVERLAP PROGRAMMING DETAIL FOR ALTERNATE PHASING

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

In the table view of the web interface, right click on "Overlap" in the top left corner of the table. Copy the entire contents of Overlap Plan 1. Paste Overlap Plan 1 into Overlap Plan 2. Modify Overlap Plan 2 as shown below and save changes.

Overlap Plan 2

Overlap	1	2	3	4
Type	FYA 4 - Section	Off	FYA 4 - Section	Off
Included Phases	2	-	-	-
Modifier Phases	-	-	5	-
Modifier Overlaps	-	-	-	-
Trail Green	0	0	0	0
Trail Yellow	0.0	0.0	0.0	0.0
Trail Red	0.0	0.0	0.0	0.0

NOTICE INCLUDED PHASE
NOTICE MODIFIER PHASE

MAXTIME ALTERNATE PHASING ACTIVATION DETAIL

To run alternate phasing, select a Pattern that is programmed to run Overlap Plan 2 and Detector Plan 2.
A Pattern can be selected through the scheduler or manually by changing the Operational Mode.

PHASING	OVERLAP PLAN	VEH DET PLAN
ACTIVE PLAN REQUIRED TO RUN DEFAULT PHASING	1	1
ACTIVE PLAN REQUIRED TO RUN ALTERNATE PHASING	2	2

ALTERNATE PHASING CHANGE SUMMARY

THE FOLLOWING IS A SUMMARY OF WHAT TAKES PLACE WHEN OVERLAP PLAN 2 AND VEHICLE DETECTOR PLAN 2 ACTIVATE TO CALL THE "ALTERNATE PHASING":

OVERLAP PLAN 2: Modifies overlap included phases for head 51 to run protected turns only.

VEH DET PLAN 2: Disables phase 2 call on loop 5A and reduces delay time for phase 5 call on loop 5A to 0 seconds.

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 08-0098T2
DESIGNED: June 2024
SEALED: 7/11/2024
REVISED:

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

MOTT MACDONALD
MOTT MACDONALD I & E, LLC
930 Main Campus Drive
Suite 200
RALEIGH, NC 27606
License No. F-0669

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for:
Transportation Mobility and Safety Division ITS & Signals Management Section
750 N.Greenfield Pkwy,Garner,NC 27529

NC 73-211/NC 211
at
NC 73/SR 1133 (Mode Rd)

Division 8 Moore County West End

PLAN DATE: June 2024	REVIEWED BY: R. Mullinax
PREPARED BY: LD Stouchko	REVIEWED BY:

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 034437 ENGINEER LORI D. STOUCHKO

DATE

SIG. INVENTORY NO. 08-0098T2

PROJECT REFERENCE NO.	SHEET NO.
R-5726	Sig.7.3

OUTPUT CHANNEL CONFIGURATION

Front Panel
Main Menu >Controller >More>Channels>Channels Config

Web Interface
Home >Controller >Advanced IO>Channels>Channels Configuration

Channel Configuration

Channel	Control Type	Control Source	Flash Yellow	Flash Red	Flash Alt	MMU Channel
1	Phase Vehicle	1		X	X	1
2	Phase Vehicle	2		X		2
3	Phase Vehicle	3		X	X	3
4	Phase Vehicle	4		X		4
5	Phase Vehicle	5		X		5
6	Phase Vehicle	6		X	X	6
7	Phase Vehicle	7		X		7
8	Phase Vehicle	8		X	X	8
9	Overlap	1		X	X	9
10	Overlap	2		X	X	10
11	Overlap	3		X		11
12	Overlap	4		X		12
13	Phase Ped	2				13
14	Phase Ped	4				14
15	Phase Ped	6				15
16	Phase Ped	8				16
17	Overlap	5		X	X	17
18	Overlap	6		X		18

NOTICE PHASE 2 FLASH RED →
NOTICE PHASE 6 FLASH RED →
NOTICE OVERLAP 1 FLASH RED →
NOTICE OVERLAP 3 FLASH RED →

MAXTIME STARTUP AND SOFTWARE FLASH PROGRAMMING DETAIL

Front Panel
Main Menu >Controller >Unit

Web Interface
Home >Controller >Unit

Modify parameters as shown below and save changes.

Startup Parameters	Unit Flash Parameters
Startup Clearance Hold	All Red Flash Exit Time
6	6

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 08-0098T2
DESIGNED: June 2024
SEALED: 7/11/2024
REVISED:

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

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

MOTT MACDONALD
MOTT MACDONALD I & E, LLC
930 Main Campus Drive
Suite 200
RALEIGH, NC 27606
License No. F-0669
750 N.Greenfield Pkwy.Garner.NC 27529

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for:

NC 73-211/NC 211
at
NC 73/SR 1133 (Mode Rd)

Division 8 Moore County West End

PLAN DATE:	June 2024	REVIEWED BY:	R. Mullinax
PREPARED BY:	LD Stouchko	REVIEWED BY:	

REVISIONS	INIT.	DATE

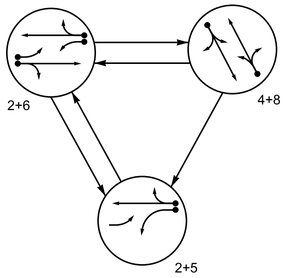
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 034437 ENGINEER LORI D. STOUCHKO

DATE

SIG. INVENTORY NO. 08-0098T2

PROJECT REFERENCE NO.	SHEET NO.
R-5726	Sig.8.0

DEFAULT PHASING DIAGRAM



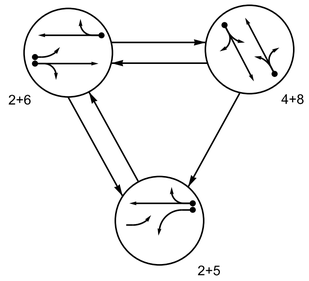
PHASING DIAGRAM DETECTION LEGEND

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

DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE 2+5	PHASE 2+6	PHASE 4+8	PHASE FLASH
21,22,23	G	G	R	R
41,42,43	R	R	G	R
51	~~←~~	~~F Y~~	~~R~~	~~R~~
61,62	R	G	R	R
64	~~F Y~~	~~F Y~~	~~R~~	~~R~~
81,82	R	R	G	R

ALTERNATE PHASING DIAGRAM

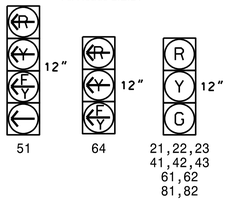


ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE 2+5	PHASE 2+6	PHASE 4+8	PHASE FLASH
21,22,23	G	G	R	R
41,42,43	R	R	G	R
51	~~←~~	~~R~~	~~R~~	~~R~~
61,62	R	G	R	R
64	~~F Y~~	~~F Y~~	~~R~~	~~R~~
81,82	R	R	G	R

SIGNAL FACE I.D.

All Heads L.E.D.



MAXTIME DETECTOR INSTALLATION CHART

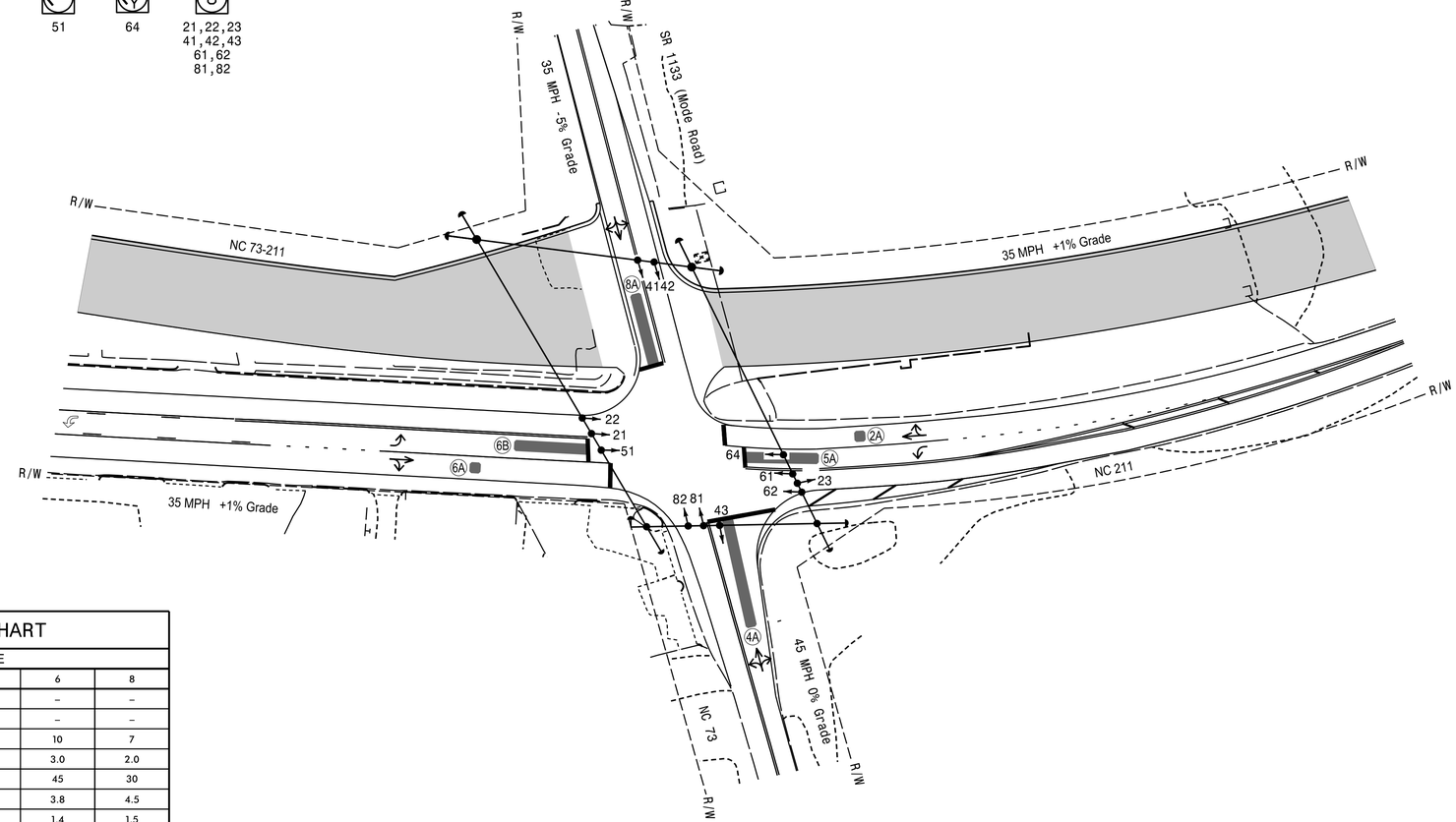
DETECTOR ZONE	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
2A ✳	6X6	70	✳	✳	2	-	-	X	-	X	-	✳
4A ✳	6X60	0	✳	✳	4	10.0	-	X	-	X	-	✳
5A ✳	6X40	0	✳	✳	1	15.0#	-	X	-	X	-	✳
					6##	-	-	X	-	X	-	✳
6A ✳	6X6	70	✳	✳	6	-	-	X	-	X	-	✳
6B ✳	6X40	0	✳	✳	6	-	-	X	-	X	-	✳
8A ✳	6X40	0	✳	✳	8	10.0	-	X	-	X	-	✳

\# Disable Delay During Alternate Phasing Operation.
\## Disable Phase Call for Loop During Alternate Phasing Operation.
✳ Video Detection Zone

3 Phase
Fully Actuated
(Isolated)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 5 may be lagged.
4. Set all detector units to presence mode.
5. The Division Traffic Engineer will determine the hours of use for each phasing plan.
6. This intersection uses video detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.



MAXTIME TIMING CHART

FEATURE	PHASE 2	PHASE 4	PHASE 5	PHASE 6	PHASE 8
Walk *	–	–	–	–	–
Ped Clear *	–	–	–	–	–
Min Green *	10	7	7	10	7
Passage *	3.0	2.0	2.0	3.0	2.0
Max 1 *	45	30	20	45	30
Yellow Change	3.8	4.5	3.0	3.8	4.5
Red Clear	1.4	1.5	1.2	1.4	1.5
Added Initial *	–	–	–	–	–
Maximum Initial *	–	–	–	–	–
Time Before Reduction *	–	–	–	–	–
Time To Reduce *	–	–	–	–	–
Minimum Gap	–	–	–	–	–
Advance Walk	–	–	–	–	–
Non Lock Detector	–	X	X	–	X
Vehicle Recall	MIN RECALL	–	–	MIN RECALL	–
Dual Entry	–	X	–	–	X

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

LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
▭	Pedestrian Signal Head With Push Button & Sign	■
○	Signal Pole with Guy	●
◐	Signal Pole with Sidewalk Guy	◐
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
□	Junction Box	■
	2-in Underground Conduit	
N/A	Right of Way	
→	Directional Arrow	→
	Construction Zone	
	Non-Intrusive Detection Zone	

Signal Upgrade
Temporary Design 3 (TMP Phase I)

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

MOTT MACDONALD

MOTT MACDONALD I & E, LLC
930 Main Campus Drive
Suite 200
RALEIGH, NC 27606
License No. F-0669

Prepared for: Transportation Mobility and Safety Division, State of North Carolina, Department of Transportation, Signal Design Section

750 N.Greenfield Pkwy.Garner,NC 27529

NC 73-211/NC 211
at
NC 73/SR 1133 (Mode Rd)

Division 8 Moore County West End

PLAN DATE: June 2024 REVIEWED BY: R. Mullinax

PREPARED BY: LD Stouchko REVIEWED BY:

SCALE 0 40 1"=40'

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 034437 LORI D. STOUCHKO

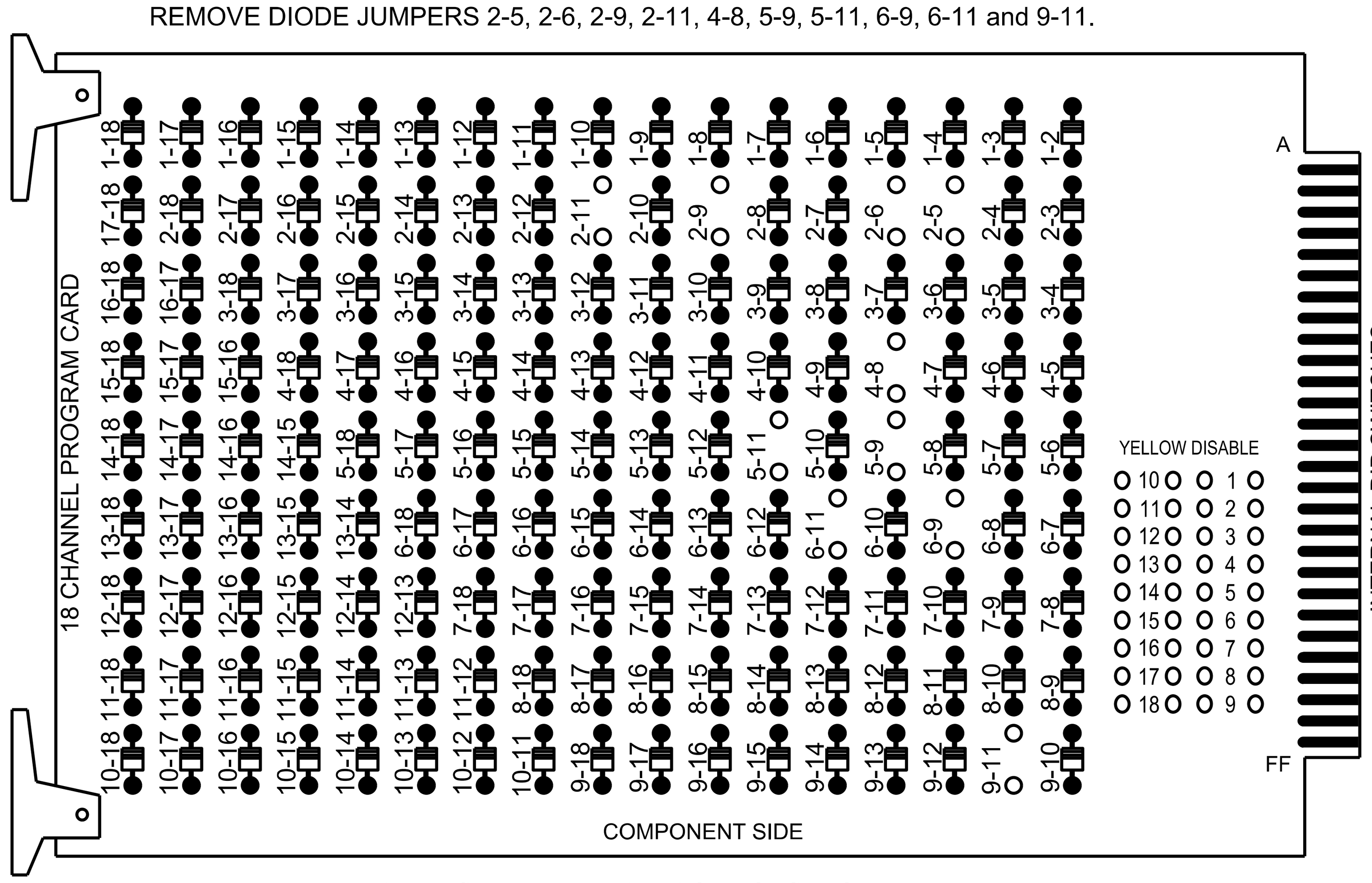
SIGNATURE DATE

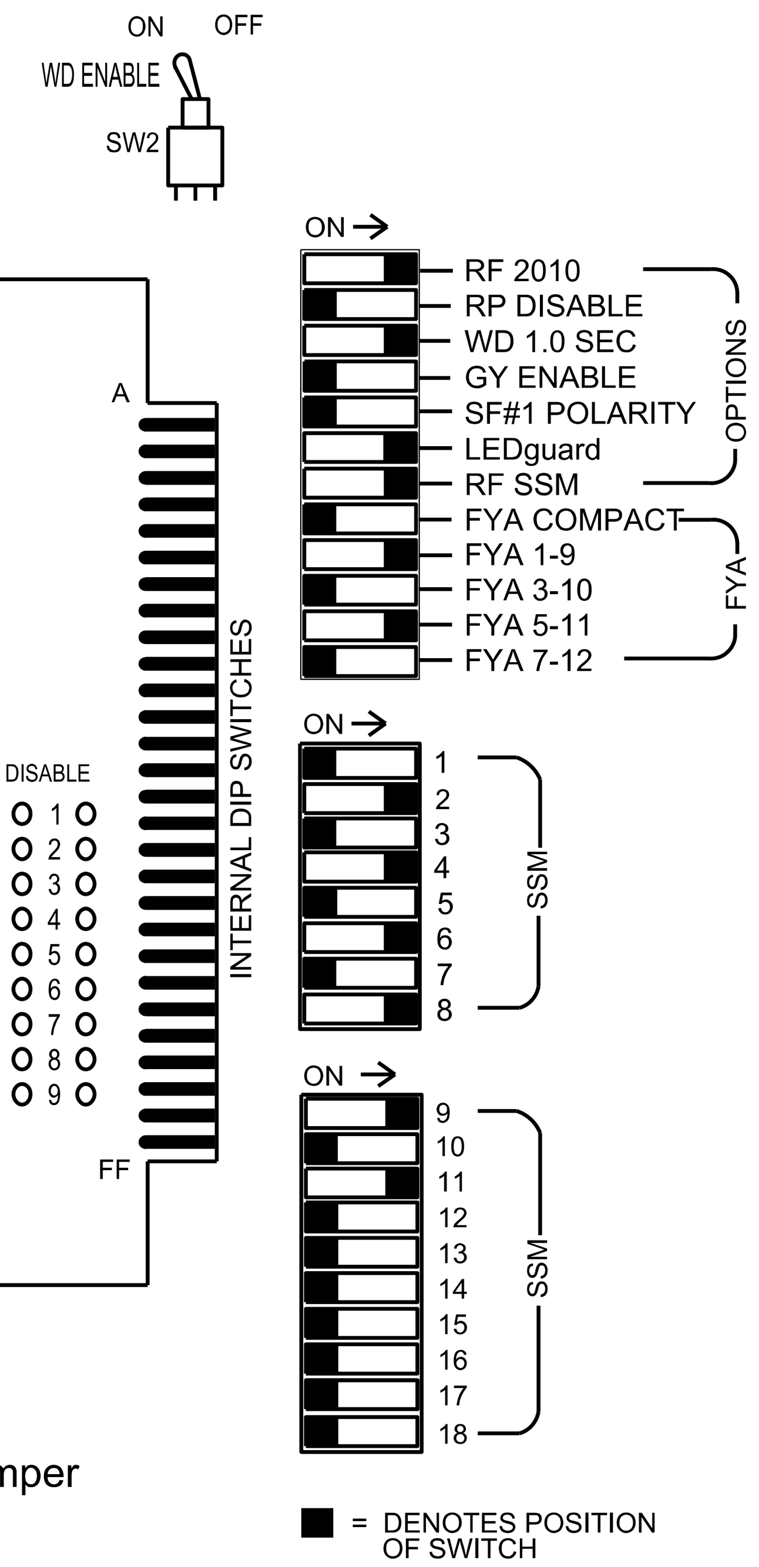
SIG. INVENTORY NO. 08-0098T3

18 CHANNEL CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

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





REMOVE JUMPERS AS SHOWN

NOTES:

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 the Red Enable is active at all times during normal operation.
4. Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the signal plan.
2. Program phases 4 and 8 for Dual Entry.
3. Program controller to start up in phase 2 Green No Walk and 6 Green No Walk.
4. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.

EQUIPMENT INFORMATION

Controller..2070LX
Cabinet...332 w/ Aux
Software..Q-Free MAXTIME
Cabinet Mount....................................Base
Output File Positions...........................18 With Aux. Output File
Load Switches Used............................S2, S5, S7, S8, S11, AUX S1, AUX S4
Phases Used.......................................2, 4, 5, 6, 8
Overlap "1"...*
Overlap "2"...NOT USED
Overlap "3"...*
Overlap "4"...NOT USED

*See overlap programming detail on sheet 2

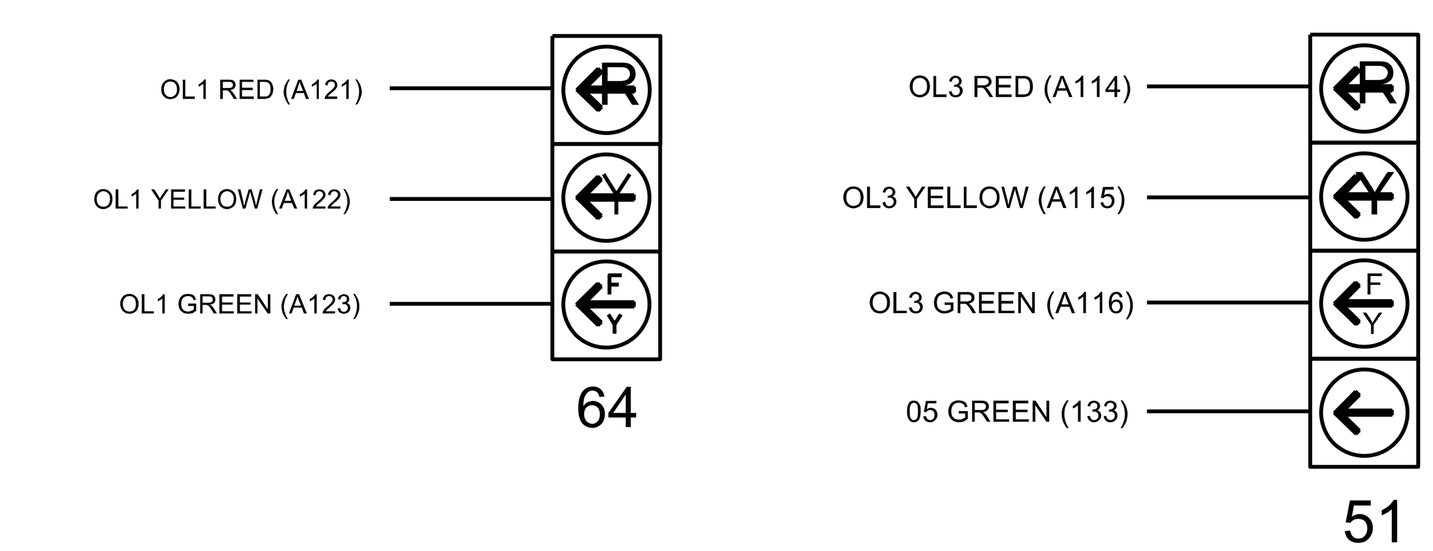
SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	NU	21,22 23	NU	NU	41,42 43	NU	51★	61,62	NU	NU	81,82	NU	64★	NU	NU	51★	NU	NU
RED		128			101			134			107							
YELLOW		129			102		✱	135			108							
GREEN		130			103			136			109							
RED ARROW													A121			A114		
YELLOW ARROW													A122			A115		
FLASHING YELLOW ARROW													A123			A116		
GREEN ARROW							133											

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

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



INPUT FILE POSITION LAYOUT

(front view)

FILE		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
	L														ST DC ISOLATOR
FILE "J"	U	Ø 5 5A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L	NOT USED													

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN
5A	TB3-1,2	J1U	55	17	15 ★	5	15.0		X		X	
				-	31 ★	2			X		X	

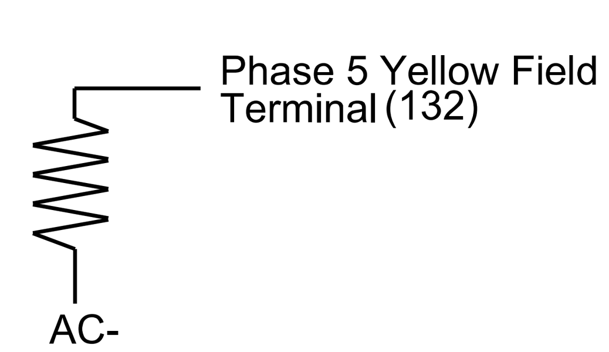
★ For the detectors to work as shown on the signal design plan see the Vehicle Detector Setup Programming Detail for Alternate phasing on sheet 2 of 3

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

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



SPECIAL DETECTOR NOTES

1. 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.
2. For loop 5A, detector card placement is typical for a NCDOT installation. Detectors associated with these slots are compatible with the Vehicle Detector Programming Detail located on sheet 2 of this electrical detail.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 08-0098T3
DESIGNED: June 2024
SEALED: 7/11/2024
REVISED:

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

MOTT MACDONALD
MOTT MACDONALD I & E, LLC
930 Main Campus Drive
Suite 200
RALEIGH, NC 27606
License No. F-0669

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for:
Transportation Mobility and Safety Division – ITS & Signals Management Section – State of North Carolina Department of Transportation
750 N.Greenfield Pkwy,Garner,NC 27529

NC 73-211/NC 211
at
NC 73/SR 1133 (Mode Rd)

Division 8 Moore County West End

PLAN DATE: June 2024	REVIEWED BY: R. Mullinax
PREPARED BY: LD Stouchko	REVIEWED BY:

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 034437 LORI D. STOUCHKO

DATE

SIG. INVENTORY NO. 08-0098T3

MAXTIME OVERLAP PROGRAMMING DETAIL FOR DEFAULT PHASING

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

Overlap Plan 1

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

NOTICE INCLUDED PHASE
NOTICE MODIFIER PHASE

MAXTIME DETECTOR PROGRAMMING DETAIL FOR ALTERNATE PHASING LOOP 5A

Front Panel
Main Menu >Controller >Detector >Veh Det Plans

Web Interface
Home >Controller >Detector Configuration >Vehicle Detectors

In the table view of web interface right click on "Detector" in the top left corner of the table. Copy the entire contents of Detector Plan 1. Paste Detector Plan 1 into Detector Plan 2. Modify Detector Plan 2 as shown below and save changes.

Plan 2

	Detector	Call Phase	Delay
5A	15	5	-
	31	0	-

MAXTIME ALTERNATE PHASING PATTERN PROGRAMMING DETAIL

Front Panel
Main Menu >Controller >Coordination >Patterns

Web Interface
Home >Controller >Coordination >Patterns

Pattern Parameters

Pattern	Veh Det Plan	Overlap Plan
*	2	2

* The Pattern number(s) are to be determined by the Division and/or City Traffic Engineer.

MAXTIME OVERLAP PROGRAMMING DETAIL FOR ALTERNATE PHASING

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

In the table view of the web interface, right click on "Overlap" in the top left corner of the table. Copy the entire contents of Overlap Plan 1. Paste Overlap Plan 1 into Overlap Plan 2. Modify Overlap Plan 2 as shown below and save changes.

Overlap Plan 2

Overlap	1	2	3	4
Type	FYA 4 - Section	Off	FYA 4 - Section	Off
Included Phases	2	-	-	-
Modifier Phases	-	-	5	-
Modifier Overlaps	-	-	-	-
Trail Green	0	0	0	0
Trail Yellow	0.0	0.0	0.0	0.0
Trail Red	0.0	0.0	0.0	0.0

NOTICE INCLUDED PHASE
NOTICE MODIFIER PHASE

MAXTIME ALTERNATE PHASING ACTIVATION DETAIL

To run alternate phasing, select a Pattern that is programmed to run Overlap Plan 2 and Detector Plan 2.
A Pattern can be selected through the scheduler or manually by changing the Operational Mode.

PHASING	OVERLAP PLAN	VEH DET PLAN
ACTIVE PLAN REQUIRED TO RUN DEFAULT PHASING	1	1
ACTIVE PLAN REQUIRED TO RUN ALTERNATE PHASING	2	2

ALTERNATE PHASING CHANGE SUMMARY

THE FOLLOWING IS A SUMMARY OF WHAT TAKES PLACE WHEN OVERLAP PLAN 2 AND VEHICLE DETECTOR PLAN 2 ACTIVATE TO CALL THE "ALTERNATE PHASING":

OVERLAP PLAN 2: Modifies overlap included phases for head 51 to run protected turns only.

VEH DET PLAN 2: Disables phase 2 call on loop 5A and reduces delay time for phase 5 call on loop 5A to 0 seconds.

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 08-0098T3
DESIGNED: June 2024
SEALED: 7/11/2024
REVISED:

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

MOTT MACDONALD
MOTT MACDONALD I & E, LLC
930 Main Campus Drive
Suite 200
RALEIGH, NC 27606
License No. F-0669

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for:
750 N.Greenfield Pkwy,Garner,NC 27529

NC 73-211/NC 211
at
NC 73/SR 1133 (Mode Rd)

Division 8 Moore County West End

PLAN DATE: June 2024	REVIEWED BY: R. Mullinax
PREPARED BY: LD Stouchko	REVIEWED BY:

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 034437 ENGINEER LORI D. STOUCHKO

DATE

SIG. INVENTORY NO. 08-0098T3

PROJECT REFERENCE NO.	SHEET NO.
R-5726	Sig.8.3

OUTPUT CHANNEL CONFIGURATION

Front Panel
Main Menu >Controller >More>Channels>Channels Config

Web Interface
Home >Controller >Advanced IO>Channels>Channels Configuration

Channel Configuration

Channel	Control Type	Control Source	Flash Yellow	Flash Red	Flash Alt	MMU Channel
1	Phase Vehicle	1		X	X	1
2	Phase Vehicle	2		X		2
3	Phase Vehicle	3		X	X	3
4	Phase Vehicle	4		X		4
5	Phase Vehicle	5		X		5
6	Phase Vehicle	6		X	X	6
7	Phase Vehicle	7		X		7
8	Phase Vehicle	8		X	X	8
9	Overlap	1		X	X	9
10	Overlap	2		X	X	10
11	Overlap	3		X		11
12	Overlap	4		X		12
13	Phase Ped	2				13
14	Phase Ped	4				14
15	Phase Ped	6				15
16	Phase Ped	8				16
17	Overlap	5		X	X	17
18	Overlap	6		X		18

NOTICE PHASE 2 FLASH RED → row 2
NOTICE PHASE 6 FLASH RED → row 6
NOTICE OVERLAP 1 FLASH RED → row 9
NOTICE OVERLAP 3 FLASH RED → row 11

MAXTIME STARTUP AND SOFTWARE FLASH PROGRAMMING DETAIL

Front Panel
Main Menu >Controller >Unit

Web Interface
Home >Controller >Unit

Modify parameters as shown below and save changes.

Startup Parameters	Unit Flash Parameters
Startup Clearance Hold	All Red Flash Exit Time
6	6

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 08-0098T3
DESIGNED: June 2024
SEALED: 7/11/2024
REVISED:

Electrical Detail - Sheet 3 of 3
Temporary Design 3 (TMP Phase I)

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

MOTT MACDONALD
MOTT MACDONALD I & E, LLC
930 Main Campus Drive
Suite 200
RALEIGH, NC 27606
License No. F-0669

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for:

750 N.Greenfield Pkwy.Garner,NC 27529

NC 73-211/NC 211
at
NC 73/SR 1133 (Mode Rd)

Division 8 Moore County West End

PLAN DATE:	June 2024	REVIEWED BY:	R. Mullinax
PREPARED BY:	LD Stouchko	REVIEWED BY:	

REVISIONS	INIT.	DATE

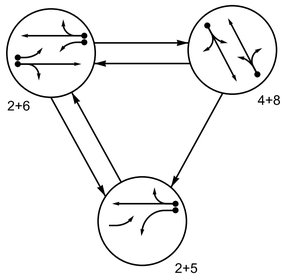
SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 034437 LOYD D STOUCHKO

DATE

SIG. INVENTORY NO. 08-0098T3

PROJECT REFERENCE NO.	SHEET NO.
R-5726	Sig.9.0

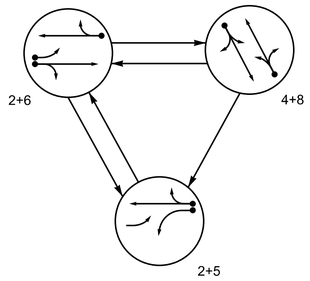
DEFAULT PHASING DIAGRAM



DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE 2+5	PHASE 2+6	PHASE 4+8	PHASE FLASH
21,22,23	G	G	R	R
41,42,43	R	R	G	R
51	~~R~~	~~FY~~	~~R~~	~~R~~
61,62	R	G	R	R
64	~~FY~~	~~FY~~	~~R~~	~~R~~
81,82,83	R	R	G	R

ALTERNATE PHASING DIAGRAM



ALTERNATE PHASING TABLE OF OPERATION

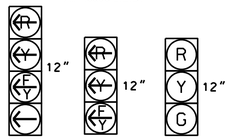
SIGNAL FACE	PHASE 2+5	PHASE 2+6	PHASE 4+8	PHASE FLASH
21,22,23	G	G	R	R
41,42,43	R	R	G	R
51	~~R~~	~~R~~	~~R~~	~~R~~
61,62	R	G	R	R
64	~~FY~~	~~FY~~	~~R~~	~~R~~
81,82,83	R	R	G	R

PHASING DIAGRAM DETECTION LEGEND

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

SIGNAL FACE I.D.

All Heads L.E.D.



51 64 21,22,23 41,42,43 61,62 81,82,83

MAXTIME DETECTOR INSTALLATION CHART

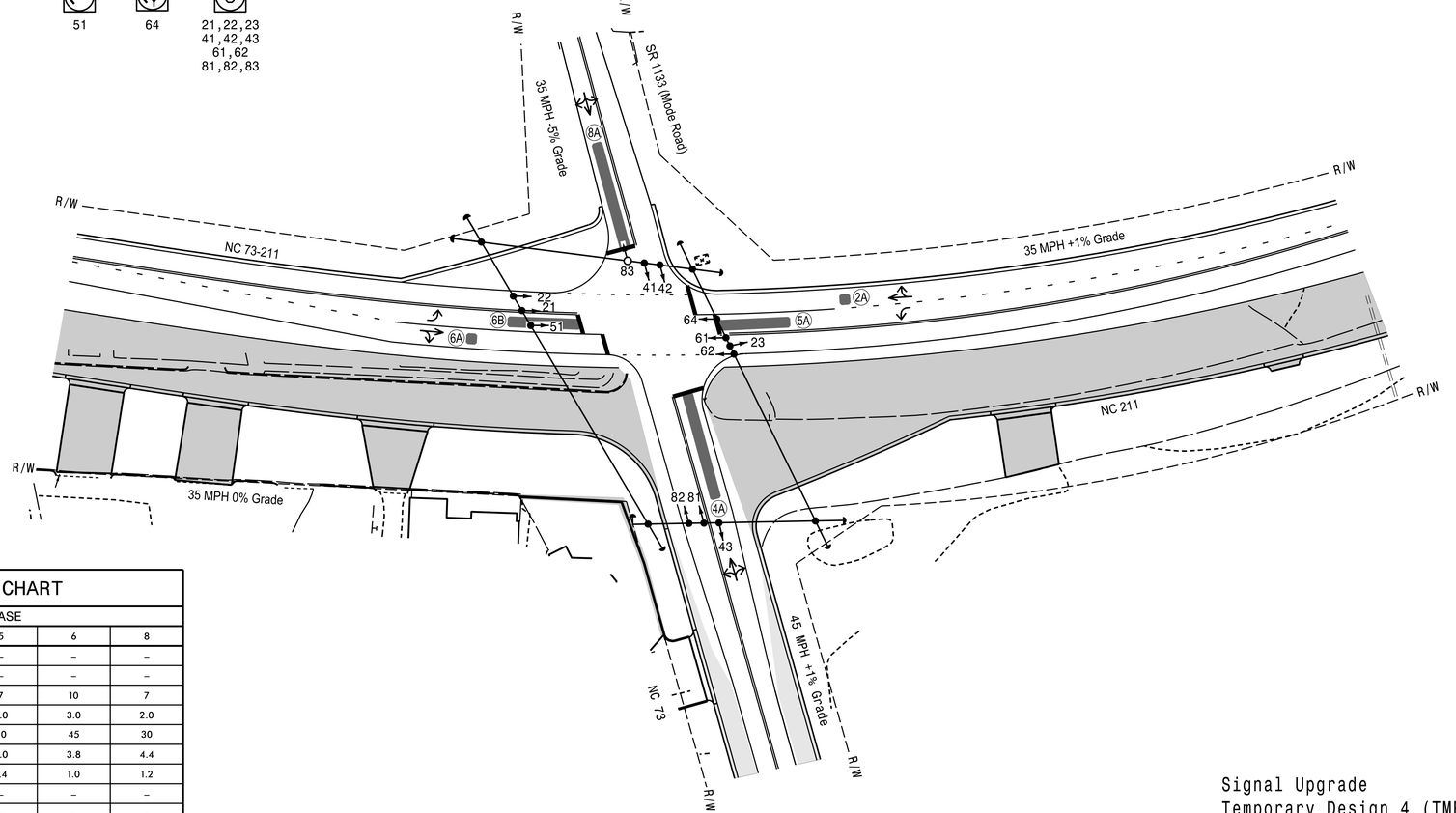
DETECTOR					PROGRAMMING						
ZONE	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
2A ✳	6X6	70	✳	✳	2	-	-	X -	X	-	✳
4A ✳	6X60	0	✳	✳	4	10.0	-	X -	X	-	✳
5A ✳	6X40	0	✳	✳	5	15.0#	-	X -	X	-	✳
					2##	-	-	X -	X	-	✳
6A ✳	6X6	70	✳	✳	6	-	-	X -	X	-	✳
6B ✳	6X40	0	✳	✳	6	-	-	X -	X	-	✳
8A ✳	6X60	0	✳	✳	8	10.0	-	X -	X	-	✳

\# Disable Delay During Alternate Phasing Operation
Disable Phase Call for Loop During Alternate Phasing Operation
✳ Video Detection Zone

3 Phase
Fully Actuated
(Isolated)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 5 may be lagged.
4. Reposition existing signal heads numbered 21,22,23,51 61,62 and 64.
5. Set all detector units to presence mode.
6. The Division Traffic Engineer will determine the hours of use for each phasing plan.
7. This intersection uses video detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.



LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
	Construction Zone	
	Non-Intrusive Detection Zone	

MAXTIME TIMING CHART

FEATURE	PHASE 2	PHASE 4	PHASE 5	PHASE 6	PHASE 8
Walk *	–	–	–	–	–
Ped Clear *	–	–	–	–	–
Min Green *	10	7	7	10	7
Passage *	3.0	2.0	2.0	3.0	2.0
Max 1 *	45	30	20	45	30
Yellow Change	3.8	4.4	3.0	3.8	4.4
Red Clear	1.0	1.2	1.4	1.0	1.2
Added Initial *	–	–	–	–	–
Maximum Initial *	–	–	–	–	–
Time Before Reduction *	–	–	–	–	–
Time To Reduce *	–	–	–	–	–
Minimum Gap	–	–	–	–	–
Advance Walk	–	–	–	–	–
Non Lock Detector	–	X	X	–	X
Vehicle Recall	MIN RECALL	–	–	MIN RECALL	–
Dual Entry	–	X	–	–	X

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

Signal Upgrade
Temporary Design 4 (TMP Phase II)

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

MOTT MACDONALD
MOTT MACDONALD I & E, LLC
930 Main Campus Drive
Suite 200
RALEIGH, NC 27606
License No. F-0669

Prepared for: Transportation Mobility and Safety Division, NORTH CAROLINA DEPARTMENT OF TRANSPORTATION, Signal Design Section

750 N.Greenfield Pkwy.Garner,NC 27529

NC 73-211/NC 211
at
NC 73/SR 1133 (Mode Rd)

Division 8 Moore County West End

PLAN DATE: June 2024 REVIEWED BY: R. Mullinax

PREPARED BY: LD Stouchko REVIEWED BY:

SCALE 0 40 1"=40'

REVISIONS	INIT.	DATE

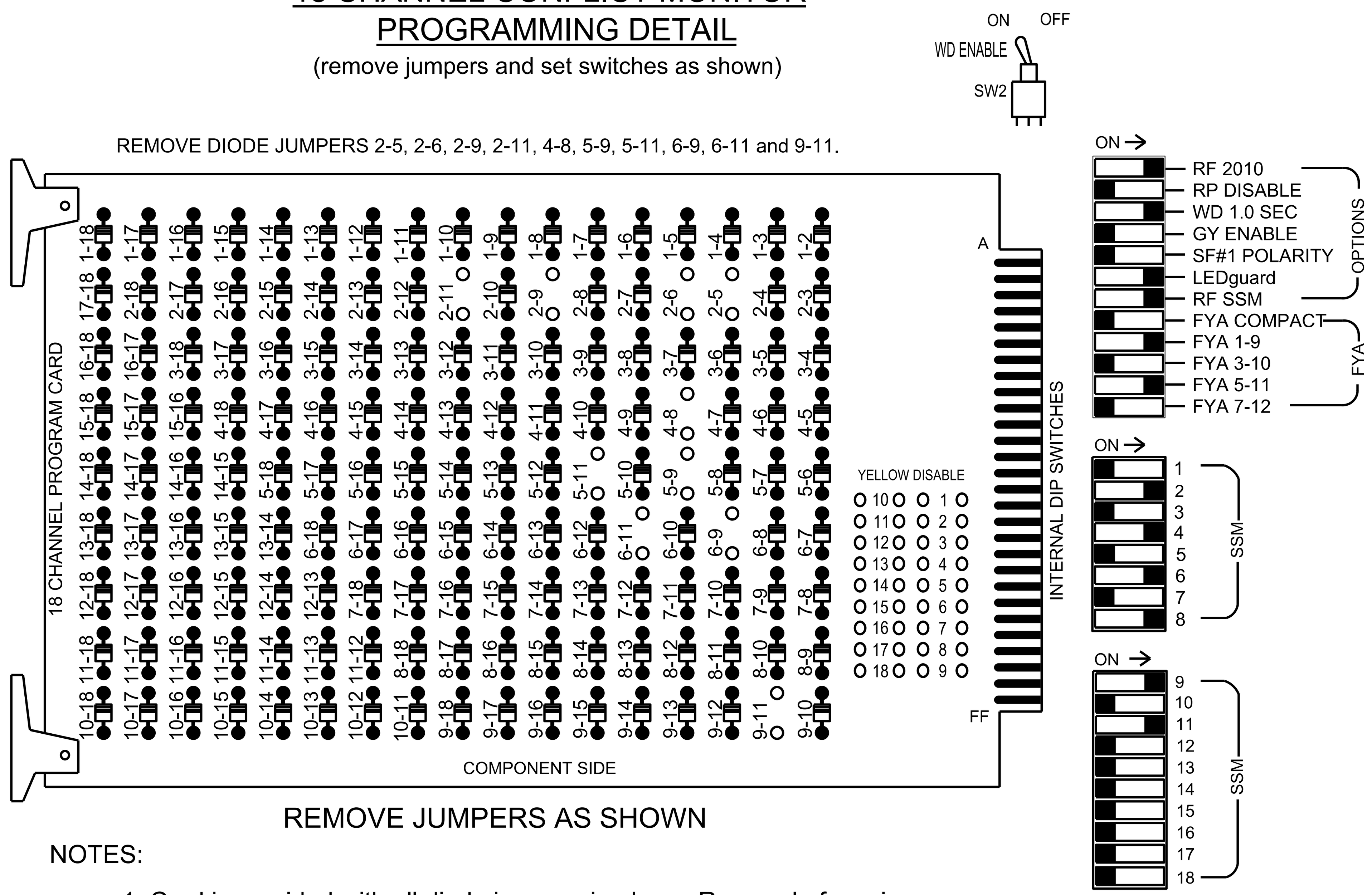
SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 034437 L.D. STOUCHKO

SIGNATURE DATE

SIG. INVENTORY NO. 08-0098T4

18 CHANNEL CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



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 the Red Enable is active at all times during normal operation.
4. Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the signal plan.
2. Program phases 4 and 8 for Dual Entry.
3. Program controller to start up in phase 2 Green No Walk and 6 Green No Walk.
4. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.

EQUIPMENT INFORMATION

Controller..2070LX
Cabinet...332 w/ Aux
Software..Q-Free MAXTIME
Cabinet Mount.....................................Base
Output File Positions...........................18 With Aux. Output File
Load Switches Used............................S2, S5, S7, S8, S11, AUX S1, AUX S4
Phases Used..2, 4, 5, 6, 8
Overlap "1"...*
Overlap "2"...NOT USED
Overlap "3"...*
Overlap "4"...NOT USED

*See overlap programming detail on sheet 2

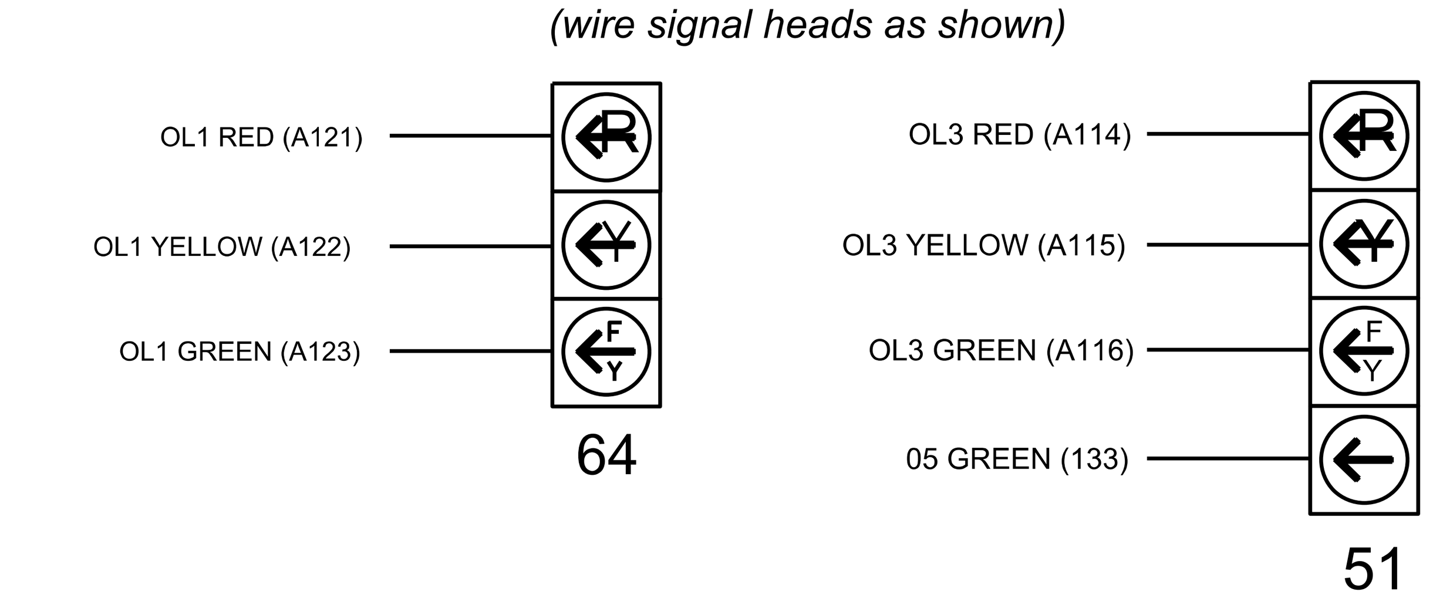
SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	NU	21,22 23	NU	NU	41,42 43	NU	51★	61,62	NU	NU	81,82 83	NU	64★	NU	NU	51★	NU	NU
RED		128			101			134			107							
YELLOW		129			102		✱	135			108							
GREEN		130			103			136			109							
RED ARROW													A121			A114		
YELLOW ARROW													A122			A115		
FLASHING YELLOW ARROW													A123			A116		
GREEN ARROW							133											

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

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



INPUT FILE POSITION LAYOUT

(front view)

FILE		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
	L														ST DC ISOLATOR
FILE "J"	U	ø 5 5A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L	NOT USED													

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN
5A	TB3-1,2	J1U	55	17	15 *	5	15.0		X		X	
				-	31 *	2			X		X	

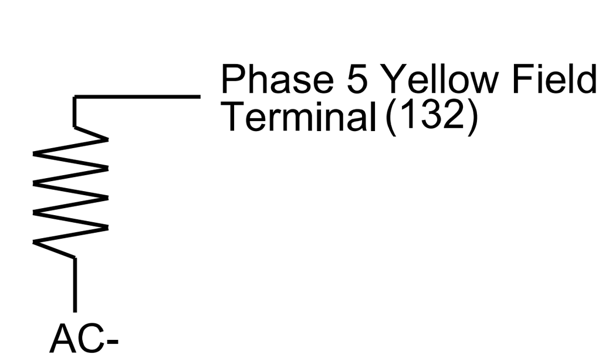
* For the detectors to work as shown on the signal design plan see the Vehicle Detector Setup Programming Detail for Alternate phasing on sheet 2 of 3

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

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



SPECIAL DETECTOR NOTES

1. 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.
2. For loop 5A, detector card placement is typical for a NCDOT installation. Detectors associated with these slots are compatible with the Vehicle Detector Programming Detail located on sheet 2 of this electrical detail.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 08-0098T4
DESIGNED: June 2024
SEALED: 7/11/2024
REVISED:

Electrical Detail - Sheet 1 of 3
Temporary Design 4 (TMP Phase II)

MOTT MACDONALD
MOTT MACDONALD I & E, LLC
930 Main Campus Drive
Suite 200
RALEIGH, NC 27606
License No. F-0669

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for:
Transportation Mobility and Safety Division, ITS & Signals Management Section, State of North Carolina Department of Transportation
750 N.Greenfield Pkwy,Garner,NC 27529

NC 73-211/NC 211
at
NC 73/SR 1133 (Mode Rd)

Division 8 Moore County West End

PLAN DATE: June 2024	REVIEWED BY: R. Mullinax
PREPARED BY: LD Stouchko	REVIEWED BY:

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 034437 ENGINEER LORI D. STOUCHKO

DATE

SIG. INVENTORY NO. 08-0098T4

PROJECT REFERENCE NO.	SHEET NO.
R-5726	Sig.9.2

MAXTIME OVERLAP PROGRAMMING DETAIL FOR DEFAULT PHASING

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

Overlap Plan 1

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

← NOTICE INCLUDED PHASE
← NOTICE MODIFIER PHASE

MAXTIME DETECTOR PROGRAMMING DETAIL FOR ALTERNATE PHASING LOOP 5A

Front Panel
Main Menu >Controller >Detector >Veh Det Plans

Web Interface
Home >Controller >Detector Configuration >Vehicle Detectors

In the table view of web interface right click on "Detector" in the top left corner of the table. Copy the entire contents of Detector Plan 1. Paste Detector Plan 1 into Detector Plan 2. Modify Detector Plan 2 as shown below and save changes.

Plan 2

	Detector	Call Phase	Delay
5A	15	5	-
	31	0	-

MAXTIME ALTERNATE PHASING PATTERN PROGRAMMING DETAIL

Front Panel
Main Menu >Controller >Coordination >Patterns

Web Interface
Home >Controller >Coordination >Patterns

Pattern Parameters

Pattern	Veh Det Plan	Overlap Plan
*	2	2

* The Pattern number(s) are to be determined by the Division and/or City Traffic Engineer.

MAXTIME OVERLAP PROGRAMMING DETAIL FOR ALTERNATE PHASING

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

In the table view of the web interface, right click on "Overlap" in the top left corner of the table. Copy the entire contents of Overlap Plan 1. Paste Overlap Plan 1 into Overlap Plan 2. Modify Overlap Plan 2 as shown below and save changes.

Overlap Plan 2

Overlap	1	2	3	4
Type	FYA 4 - Section	Off	FYA 4 - Section	Off
Included Phases	2	-	-	-
Modifier Phases	-	-	5	-
Modifier Overlaps	-	-	-	-
Trail Green	0	0	0	0
Trail Yellow	0.0	0.0	0.0	0.0
Trail Red	0.0	0.0	0.0	0.0

← NOTICE INCLUDED PHASE
← NOTICE MODIFIER PHASE

MAXTIME ALTERNATE PHASING ACTIVATION DETAIL

To run alternate phasing, select a Pattern that is programmed to run Overlap Plan 2 and Detector Plan 2.
A Pattern can be selected through the scheduler or manually by changing the Operational Mode.

PHASING	OVERLAP PLAN	VEH DET PLAN
ACTIVE PLAN REQUIRED TO RUN DEFAULT PHASING	1	1
ACTIVE PLAN REQUIRED TO RUN ALTERNATE PHASING	2	2

ALTERNATE PHASING CHANGE SUMMARY

THE FOLLOWING IS A SUMMARY OF WHAT TAKES PLACE WHEN OVERLAP PLAN 2 AND VEHICLE DETECTOR PLAN 2 ACTIVATE TO CALL THE "ALTERNATE PHASING":

OVERLAP PLAN 2: Modifies overlap included phases for head 51 to run protected turns only.

VEH DET PLAN 2: Disables phase 2 call on loop 5A and reduces delay time for phase 5 call on loop 5A to 0 seconds.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 08-0098T4
DESIGNED: June 2024
SEALED: 7/11/2024
REVISED:

Electrical Detail - Sheet 2 of 3
Temporary Design 4 (TMP Phase II)

MOTT MACDONALD
MOTT MACDONALD I & E, LLC
930 Main Campus Drive
Suite 200
RALEIGH, NC 27606
License No. F-0669

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for:
Transportation Mobility and Safety Division
ITS & Signals Management Section
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
750 N.Greenfield Pkwy,Garner,NC 27529

NC 73-211/NC 211
at
NC 73/SR 1133 (Mode Rd)

Division 8 Moore County West End

PLAN DATE: June 2024	REVIEWED BY: R. Mullinax
PREPARED BY: LD Stouchko	REVIEWED BY:

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 034437 ENGINEER LORI D. STOUCHKO

DATE

SIG. INVENTORY NO. 08-0098T4

MAXTIME STARTUP AND SOFTWARE FLASH PROGRAMMING DETAIL

Front Panel
Main Menu >Controller >Unit

Web Interface
Home >Controller >Unit

Modify parameters as shown below and save changes.

Startup Parameters

Startup Clearance Hold
6

Unit Flash Parameters

All Red Flash Exit Time
6

OUTPUT CHANNEL CONFIGURATION

Front Panel
Main Menu >Controller >More>Channels>Channels Config

Web Interface
Home >Controller >Advanced IO>Channels>Channels Configuration

Channel Configuration

	Channel	Control Type	Control Source	Flash Yellow	Flash Red	Flash Alt	MMU Channel
	1	Phase Vehicle	1		X	X	1
NOTICE PHASE 2 FLASH RED →	2	Phase Vehicle	2		X		2
	3	Phase Vehicle	3		X	X	3
	4	Phase Vehicle	4		X		4
	5	Phase Vehicle	5		X		5
NOTICE PHASE 6 FLASH RED →	6	Phase Vehicle	6		X	X	6
	7	Phase Vehicle	7		X		7
	8	Phase Vehicle	8		X	X	8
NOTICE OVERLAP 1 FLASH RED →	9	Overlap	1		X	X	9
	10	Overlap	2		X	X	10
NOTICE OVERLAP 3 FLASH RED →	11	Overlap	3		X		11
	12	Overlap	4		X		12
	13	Phase Ped	2				13
	14	Phase Ped	4				14
	15	Phase Ped	6				15
	16	Phase Ped	8				16
	17	Overlap	5		X	X	17
	18	Overlap	6		X		18

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 08-0098T4
DESIGNED: June 2024
SEALED: 7/11/2024
REVISED:

Electrical Detail - Sheet 3 of 3
Temporary Design 4 (TMP Phase I)

MOTT MACDONALD
MOTT MACDONALD I & E, LLC
930 Main Campus Drive
Suite 200
RALEIGH, NC 27606
License No. F-0669

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for:
Transportation Mobility and Safety Division
ITS & Signals Management Section
State of North Carolina Department of Transportation
750 N.Greenfield Pkwy,Garner,NC 27529

NC 73-211/NC 211
at
NC 73/SR 1133 (Mode Rd)

Division 8 Moore County West End

PLAN DATE: June 2024	REVIEWED BY: R. Mullinax
PREPARED BY: LD Stouchko	REVIEWED BY:

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

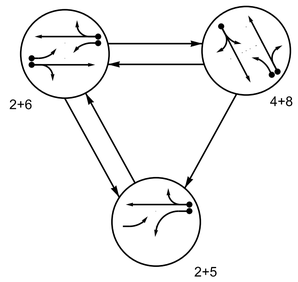
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 034437 ENGINEER LORI D. STOUCHKO

DATE

SIG. INVENTORY NO. 08-0098T4

PROJECT REFERENCE NO.	SHEET NO.
R-5726	Sig.10.0

DEFAULT PHASING DIAGRAM



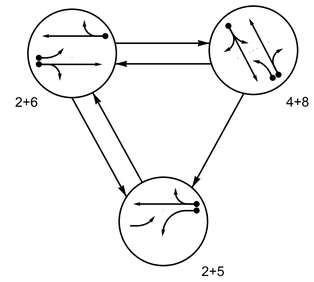
PHASING DIAGRAM DETECTION LEGEND

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

DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE 2+5	PHASE 2+6	PHASE 4+8	PHASE FLASH
21,22,23	G	G	R	R
41,42,43	R	R	G	R
44	~~R~~	~~R~~	FY	~~R~~
51	←	FY	~~R~~	~~R~~
61,62	R	G	R	R
64	FY	FY	~~R~~	~~R~~
81,82,83	R	R	G	R

ALTERNATE PHASING DIAGRAM

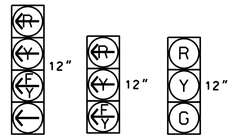


ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE 2+5	PHASE 2+6	PHASE 4+8	PHASE FLASH
21,22,23	G	G	R	R
41,42,43	R	R	G	R
44	~~R~~	~~R~~	FY	~~R~~
51	←	~~R~~	~~R~~	~~R~~
61,62	R	G	R	R
64	FY	FY	~~R~~	~~R~~
81,82,83	R	R	G	R

SIGNAL FACE I.D.

All Heads L.E.D.



51 — 44, 64 — 21,22,23, 41,42,43, 61,62, 81,82,83

MAXTIME DETECTOR INSTALLATION CHART

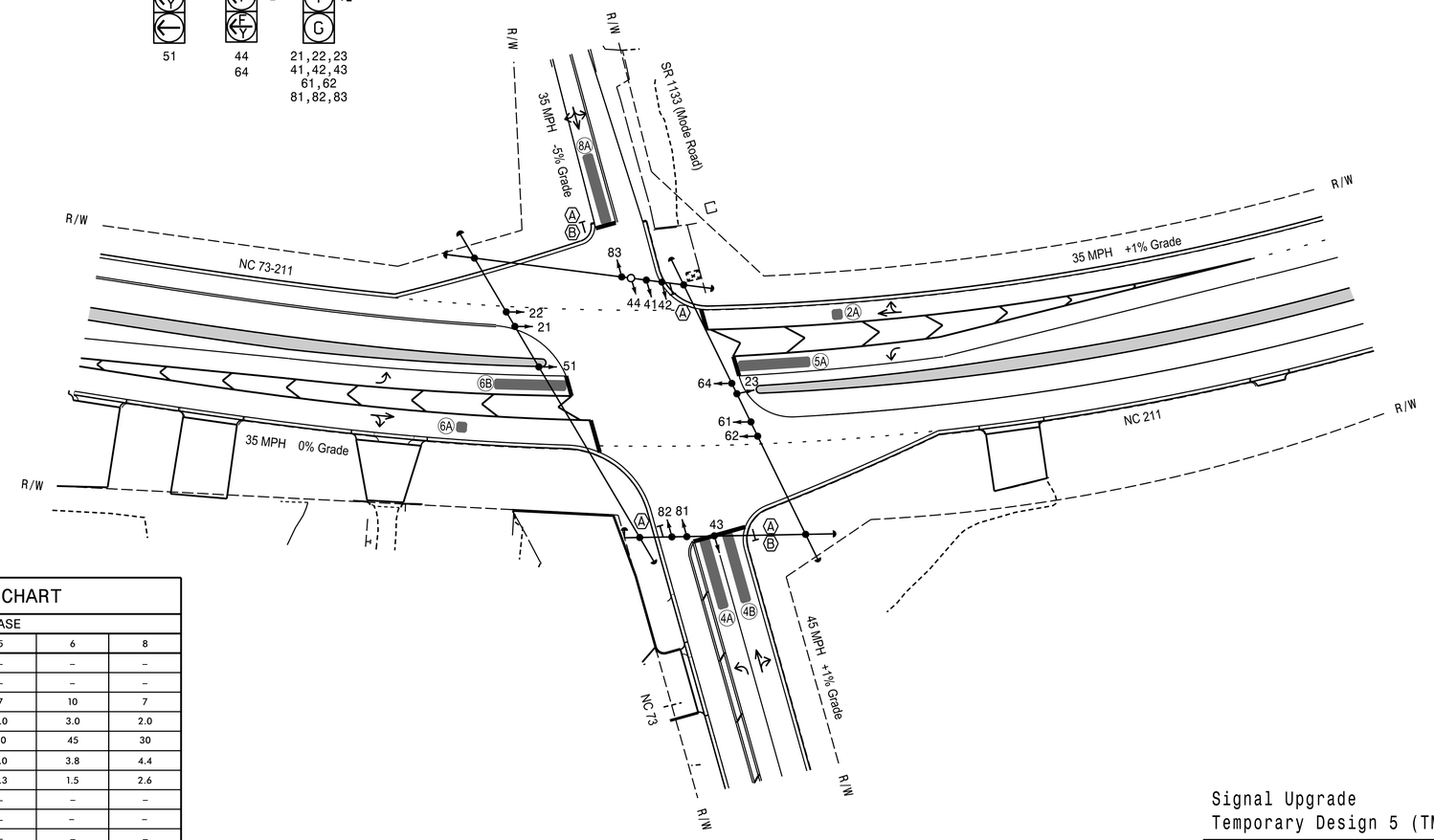
DETECTOR					PROGRAMMING						
ZONE	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
2A ✱	6X6	70	✱	✱	2	-	-	X	-	X	-	✱
4A ✱	6X40	0	✱	✱	4	3.0	-	X	-	X	-	✱
4B ✱	6X40	0	✱	✱	4	-	-	X	-	X	-	✱
5A ✱	6X40	0	✱	✱	5	15.0#	-	X	-	X	-	✱
					2##	-	-	X	-	X	-	✱
6A ✱	6X6	70	✱	✱	6	-	-	X	-	X	-	✱
6B ✱	6X40	0	✱	✱	6	-	-	X	-	X	-	✱
8A ✱	6X40	0	✱	✱	8	3.0	-	X	-	X	-	✱

\# Disable Delay During Alternate Phasing Operation
Disable Phase Call for Loop During Alternate Phasing Operation
✱ Video Detection Zone

3 Phase
Fully Actuated
(Isolated)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 5 may be lagged.
4. Reposition exsisting signal heads numbered 21,22,23,51,61,62 and 64.
5. Set all detector units to presence mode.
6. The Division Traffic Engineer will determine the hours of use for each phasing plan.
7. This intersection uses video detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.



LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
□↓	Pedestrian Signal Head With Push Button & Sign	■↓
○→	Signal Pole with Guy	●→
○↓	Signal Pole with Sidewalk Guy	●↓
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⛶
□	Junction Box	■
·-·-·	2-in Underground Conduit	·-·-·
N/A	Right of Way	- - - -
→	Directional Arrow	→
▒	Construction Zone	▒
▬	Non-Intrusive Detection Zone	▬
Ⓐ	"NO TURN ON RED" Sign (R10-11)	Ⓐ
Ⓑ	"STOP HERE ON RED" Sign (R10-6)	Ⓑ

MAXTIME TIMING CHART

FEATURE	PHASE 2	PHASE 4	PHASE 5	PHASE 6	PHASE 8
Walk *	–	–	–	–	–
Ped Clear *	–	–	–	–	–
Min Green *	10	7	7	10	7
Passage *	3.0	2.0	2.0	3.0	2.0
Max 1 *	45	30	20	45	30
Yellow Change	3.8	4.4	3.0	3.8	4.4
Red Clear	1.5	2.6	2.3	1.5	2.6
Added Initial *	–	–	–	–	–
Maximum Initial *	–	–	–	–	–
Time Before Reduction *	–	–	–	–	–
Time To Reduce *	–	–	–	–	–
Minimum Gap	–	–	–	–	–
Advance Walk	–	–	–	–	–
Non Lock Detector	–	X	X	–	X
Vehicle Recall	MIN RECALL	–	–	MIN RECALL	–
Dual Entry	–	X	–	–	X

* These values may be field adjusted. Do not adjust Min Green and Passage 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 5 (TMP Phase III)

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

MOTT MACDONALD

MOTT MACDONALD I & E, LLC
930 Main Campus Drive
Suite 200
RALEIGH, NC 27606
License No. F-0669

Prepared for: Transportation Mobility and Safety Division, North Carolina Department of Transportation, Signal Design Section

750 N.Greenfield Pkwy.Garner,NC 27529

NC 73-211/NC 211
at
NC 73/SR 1133 (Mode Rd)

Division 8 Moore County West End

PLAN DATE:	June 2024	REVIEWED BY:	R. Mullinax
PREPARED BY:	LD Stouchko	REVIEWED BY:	

SCALE 0 40 1"=40'

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 034437 LON D. STOUCHKO

SIGNATURE DATE

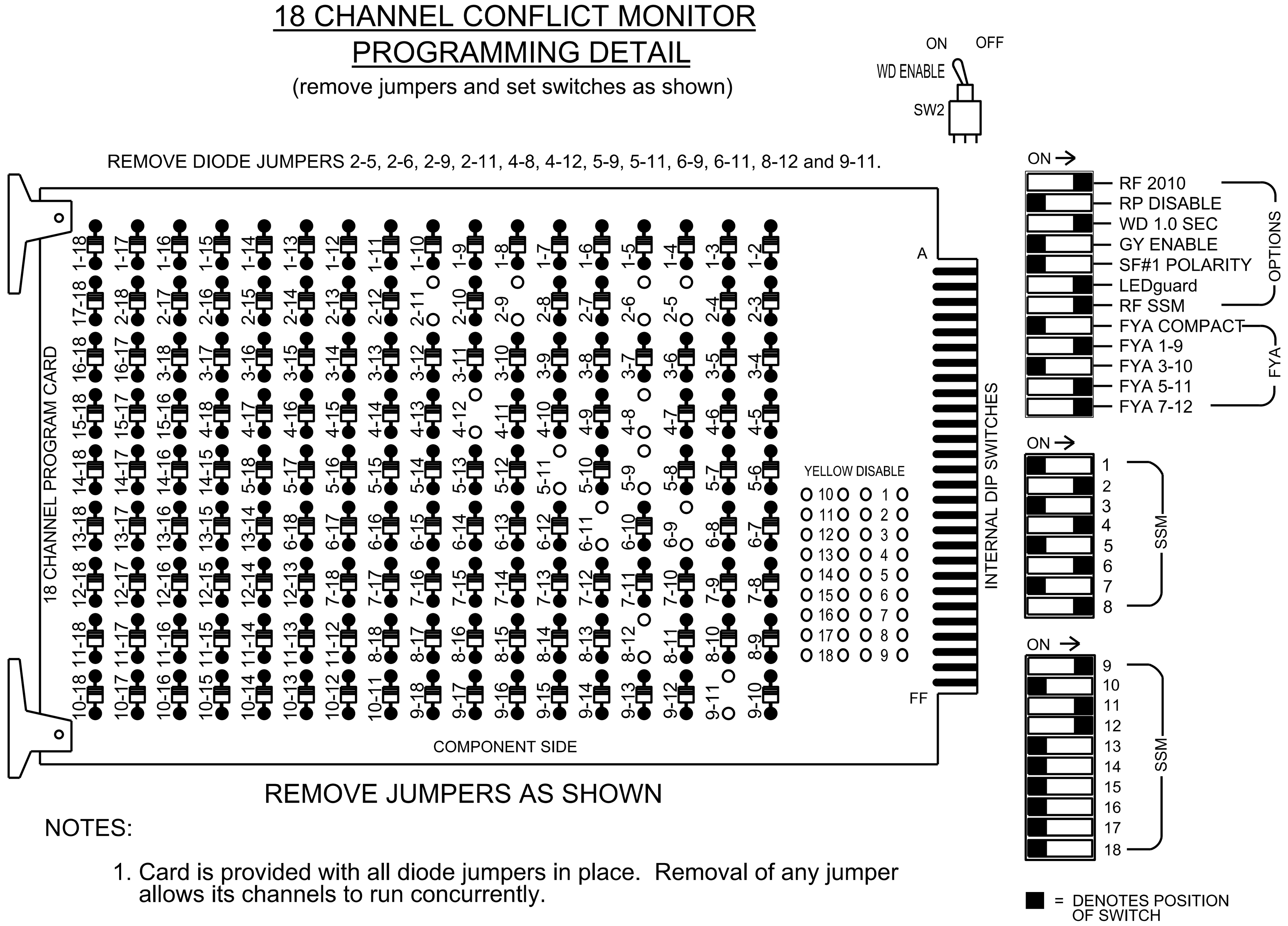
SIG. INVENTORY NO. 08-0098T5

PROJECT REFERENCE NO.	SHEET NO.
R-5726	Sig.10.1

18 CHANNEL CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 2-5, 2-6, 2-9, 2-11, 4-8, 4-12, 5-9, 5-11, 6-9, 6-11, 8-12 and 9-11.



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 the Red Enable is active at all times during normal operation.
4. Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the signal plan.
2. Program phases 4 and 8 for Dual Entry.
3. Program controller to start up in phase 2 Green No Walk and 6 Green No Walk.
4. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.

EQUIPMENT INFORMATION

Controller..2070LX
Cabinet..332 w/ Aux
Software..Q-Free MAXTIME
Cabinet Mount....................................Base
Output File Positions...........................18 With Aux. Output File
Load Switches Used............................S2, S5, S7, S8, S11, AUX S1, AUX S4, AUX S5
Phases Used..2, 4, 5, 6, 8
Overlap "1"...*
Overlap "2"...NOT USED
Overlap "3"...*
Overlap "4"...*

*See overlap programming detail on sheet 2

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	NU	21,22 23	NU	NU	41,42 43	NU	51★	61,62	NU	NU	81,82 83	NU	64★	NU	NU	51★	44★	NU
RED		128			101			134			107							
YELLOW		129			102		❋	135			108							
GREEN		130			103			136			109							
RED ARROW													A121			A114	A101	
YELLOW ARROW													A122			A115	A102	
FLASHING YELLOW ARROW													A123			A116	A103	
GREEN ARROW							133											

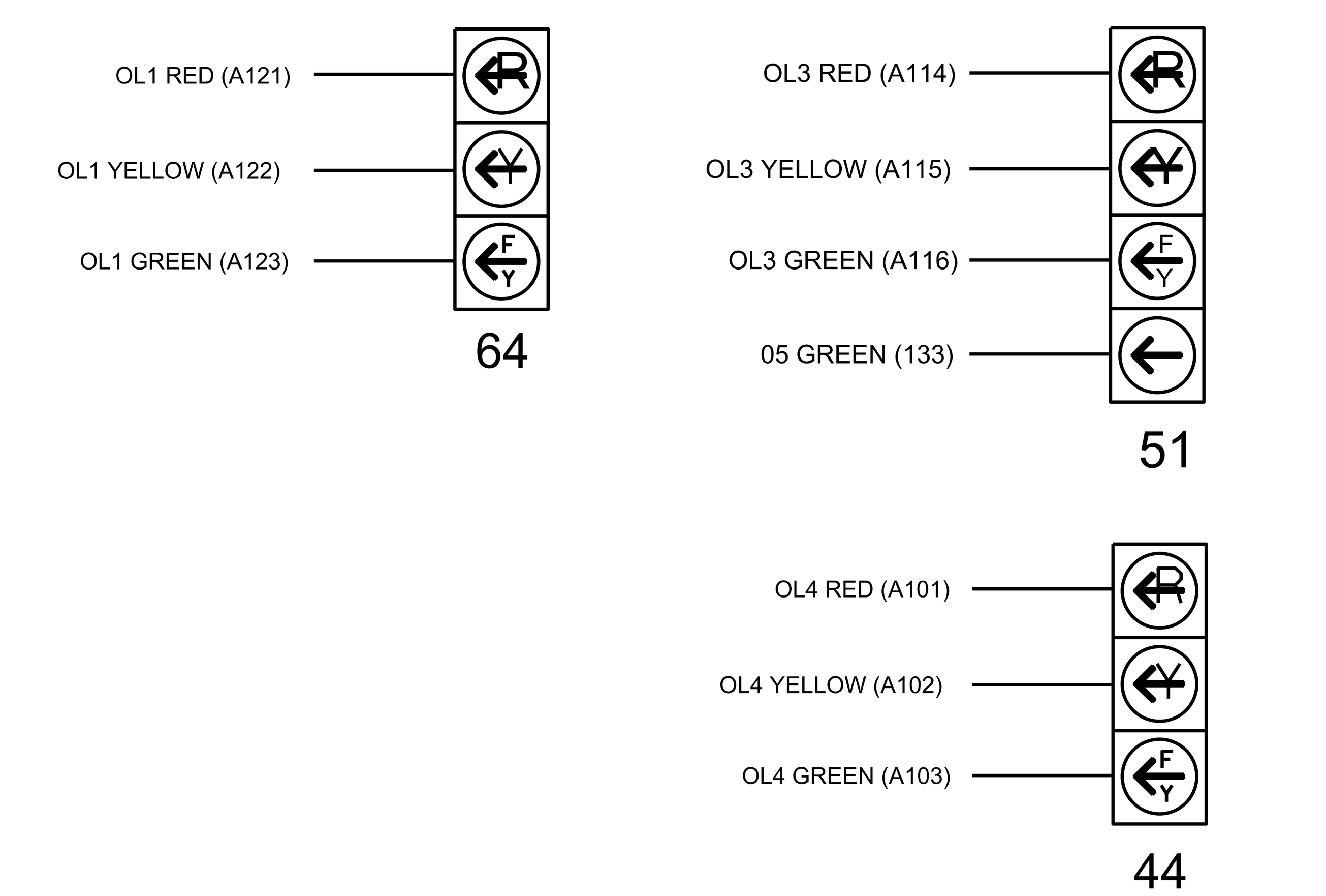
NU = Not Used

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

★ See pictorial of head wiring in detail this sheet.

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



INPUT FILE POSITION LAYOUT

(front view)

FILE		1	2	3	4	5	6	7	8	9	1O	11	12	13	14
FILE "I"	U	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
	L														ST DC ISOLATOR
FILE "J"	U	ø 5 5A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L	NOT USED													

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN
5A	TB3-1,2	J1U	55	17	15 *	5	15.0		X		X	
				-	31 *	2			X		X	

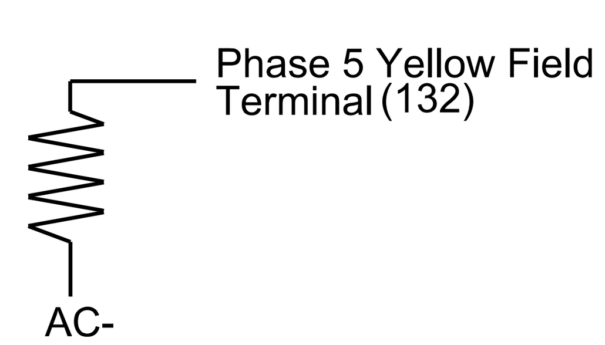
* For the detectors to work as shown on the signal design plan see the Vehicle Detector Setup Programming Detail for Alternate phasing on sheet 2 of 3

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

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



SPECIAL DETECTOR NOTES

1. 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.
2. For loop 5A, detector card placement is typical for a NCDOT installation. Detectors associated with these slots are compatible with the Vehicle Detector Programming Detail located on sheet 2 of this electrical detail.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 08-0098T5
DESIGNED: June 2024
SEALED: 7/11/2024
REVISED:

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

MOTT MACDONALD
MOTT MACDONALD I & E, LLC
930 Main Campus Drive
Suite 200
RALEIGH, NC 27606
License No. F-0669

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for:
Transportation Mobility and Safety Division, ITS & Signals Management Section, State of North Carolina Department of Transportation
750 N.Greenfield Pkwy,Garner,NC 27529

NC 73-211/NC 211
at
NC 73/SR 1133 (Mode Rd)

Division 8 Moore County West End

PLAN DATE: June 2024 REVIEWED BY: R. Mullinax
PREPARED BY: LD Stouchko REVIEWED BY:

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 034437 ENGINEER LORI D. STOUCHKO

DATE

SIG. INVENTORY NO. 08-0098T5

PROJECT REFERENCE NO.	SHEET NO.
R-5726	Sig.10.2

MAXTIME OVERLAP PROGRAMMING DETAIL FOR DEFAULT PHASING

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

Overlap Plan 1

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

NOTICE INCLUDED PHASE
NOTICE MODIFIER PHASE

MAXTIME DETECTOR PROGRAMMING DETAIL FOR ALTERNATE PHASING LOOP 5A

Front Panel
Main Menu >Controller >Detector >Veh Det Plans

Web Interface
Home >Controller >Detector Configuration >Vehicle Detectors

In the table view of web interface right click on "Detector" in the top left corner of the table. Copy the entire contents of Detector Plan 1. Paste Detector Plan 1 into Detector Plan 2. Modify Detector Plan 2 as shown below and save changes.

Plan 2

	Detector	Call Phase	Delay
5A	15	5	-
	31	0	-

MAXTIME ALTERNATE PHASING PATTERN PROGRAMMING DETAIL

Front Panel
Main Menu >Controller >Coordination >Patterns

Web Interface
Home >Controller >Coordination >Patterns

Pattern Parameters

Pattern	Veh Det Plan	Overlap Plan
*	2	2

* The Pattern number(s) are to be determined by the Division and/or City Traffic Engineer.

MAXTIME OVERLAP PROGRAMMING DETAIL FOR ALTERNATE PHASING

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

In the table view of the web interface, right click on "Overlap" in the top left corner of the table. Copy the entire contents of Overlap Plan 1. Paste Overlap Plan 1 into Overlap Plan 2. Modify Overlap Plan 2 as shown below and save changes.

Overlap Plan 2

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

NOTICE INCLUDED PHASE
NOTICE MODIFIER PHASE

MAXTIME ALTERNATE PHASING ACTIVATION DETAIL

To run alternate phasing, select a Pattern that is programmed to run Overlap Plan 2 and Detector Plan 2.
A Pattern can be selected through the scheduler or manually by changing the Operational Mode.

PHASING	OVERLAP PLAN	VEH DET PLAN
ACTIVE PLAN REQUIRED TO RUN DEFAULT PHASING	1	1
ACTIVE PLAN REQUIRED TO RUN ALTERNATE PHASING	2	2

ALTERNATE PHASING CHANGE SUMMARY

THE FOLLOWING IS A SUMMARY OF WHAT TAKES PLACE WHEN OVERLAP PLAN 2 AND VEHICLE DETECTOR PLAN 2 ACTIVATE TO CALL THE "ALTERNATE PHASING":

OVERLAP PLAN 2: Modifies overlap included phases for head 51 to run protected turns only.

VEH DET PLAN 2: Disables phase 2 call on loop 5A and reduces delay time for phase 5 call on loop 5A to 0 seconds.

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 08-0098T5
DESIGNED: June 2024
SEALED: 7/11/2024
REVISED:

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 - Sheet 2 of 3
Temporary Design 5 (TMP Phase III)

MOTT MACDONALD
MOTT MACDONALD I & E, LLC
930 Main Campus Drive
Suite 200
RALEIGH, NC 27606
License No. F-0669

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for:
750 N.Greenfield Pkwy.Garner,NC 27529

NC 73-211/NC 211
at
NC 73/SR 1133 (Mode Rd)

Division 8 Moore County West End

PLAN DATE: June 2024 REVIEWED BY: R. Mullinax
PREPARED BY: LD Stouchko REVIEWED BY:

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 034437 ENGINEER LORI D. STOUCHKO

DATE

SIG. INVENTORY NO. 08-0098T5

PROJECT REFERENCE NO.	SHEET NO.
R-5726	Sig.10.3

MAXTIME STARTUP AND SOFTWARE FLASH PROGRAMMING DETAIL

Front Panel
Main Menu >Controller >Unit

Web Interface
Home >Controller >Unit

Modify parameters as shown below and save changes.

Startup Parameters	Unit Flash Parameters
Startup Clearance Hold	All Red Flash Exit Time
6	6

OUTPUT CHANNEL CONFIGURATION

Front Panel
Main Menu >Controller >More>Channels>Channels Config

Web Interface
Home >Controller >Advanced IO>Channels>Channels Configuration

Channel Configuration

Channel	Control Type	Control Source	Flash Yellow	Flash Red	Flash Alt	MMU Channel
1	Phase Vehicle	1		X	X	1
2	Phase Vehicle	2		X		2
3	Phase Vehicle	3		X	X	3
4	Phase Vehicle	4		X		4
5	Phase Vehicle	5		X		5
6	Phase Vehicle	6		X	X	6
7	Phase Vehicle	7		X		7
8	Phase Vehicle	8		X	X	8
9	Overlap	1		X	X	9
10	Overlap	2		X	X	10
11	Overlap	3		X		11
12	Overlap	4		X		12
13	Phase Ped	2				13
14	Phase Ped	4				14
15	Phase Ped	6				15
16	Phase Ped	8				16
17	Overlap	5		X	X	17
18	Overlap	6		X		18

NOTICE PHASE 2 FLASH RED → row 2
NOTICE PHASE 6 FLASH RED → row 6
NOTICE OVERLAP 1 FLASH RED → row 9
NOTICE OVERLAP 3 FLASH RED → row 11

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 08-0098T5
DESIGNED: June 2024
SEALED: 7/11/2024
REVISED:

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

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

MOTT MACDONALD
MOTT MACDONALD I & E, LLC
930 Main Campus Drive
Suite 200
RALEIGH, NC 27606
License No. F-0669

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for:

750 N.Greenfield Pkwy.Garner,NC 27529

NC 73-211/NC 211
at
NC 73/SR 1133 (Mode Rd)

Division 8 | Moore County | West End

PLAN DATE:	June 2024	REVIEWED BY:	R. Mullinax
PREPARED BY:	LD Stouchko	REVIEWED BY:	

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 034437 LOYD D STOUCHKO

DATE

SIG. INVENTORY NO. 08-0098T5