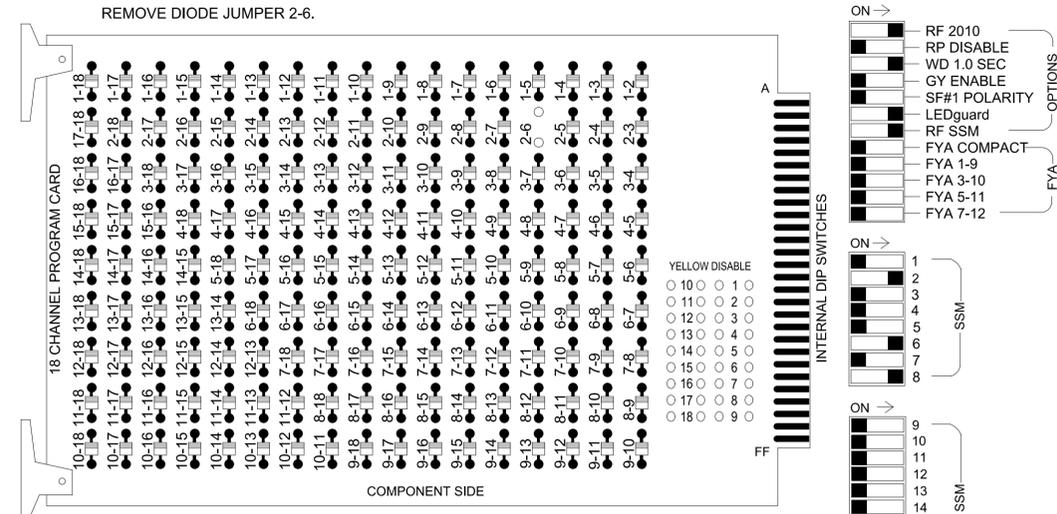


18 CHANNEL CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumper and set switches as shown)



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

NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the signal plan.
- Program controller to start up in phase 2 Green No Walk and 6 Green No Walk.
- If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
- The cabinet and controller are part of the SR 1700 (Covered Bridge Road) System.

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, S8, S11
 Phases Used.....2, 6, 8
 Overlap "1".....NOT USED
 Overlap "2".....NOT USED
 Overlap "3".....NOT USED
 Overlap "4".....NOT USED

SIGNAL HEAD HOOK-UP CHART

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

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)

FILE	1	2	3	4	5	6	7	8	9	10	11	12	13	14
U	S	S	S	S	S	S	S	S	S	S	S	S	S	FS
L	T	T	T	T	T	T	T	T	T	T	T	T	T	DC ISOLATOR
U	S	S	S	S	S	S	S	S	S	S	S	S	S	ST
L	T	T	T	T	T	T	T	T	T	T	T	T	T	DC ISOLATOR

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

SPECIAL DETECTOR NOTE

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

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

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.

Start Up Parameters

StartUp Clearance Hold	6
------------------------	---

Unit Flash Parameters

All Red Flash Exit Time	6
-------------------------	---

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 04-1470T1
 DESIGNED: February 2025
 SEALED: 02/04/25
 REVISED: N/A



Electrical Detail - Temporary Design 1

Electrical and Programming Details For: SR 1700 (Covered Bridge Road) at SR 1705 (Castleberry Road)

Divison 4 Johnston County Archer Lodge

PLAN DATE: February 2025 REVIEWED BY: M.L. Stygles

PREPARED BY: L. Gottlieb REVIEWED BY: J. Ma/J.L. Lewis

REVISIONS: _____ INIT. DATE

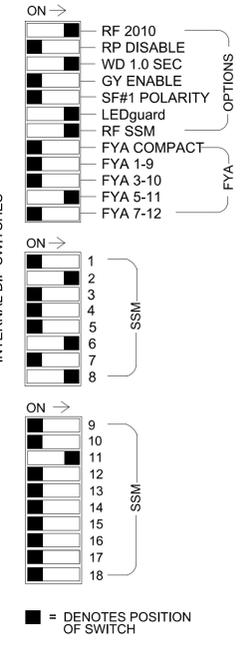
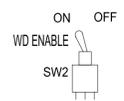
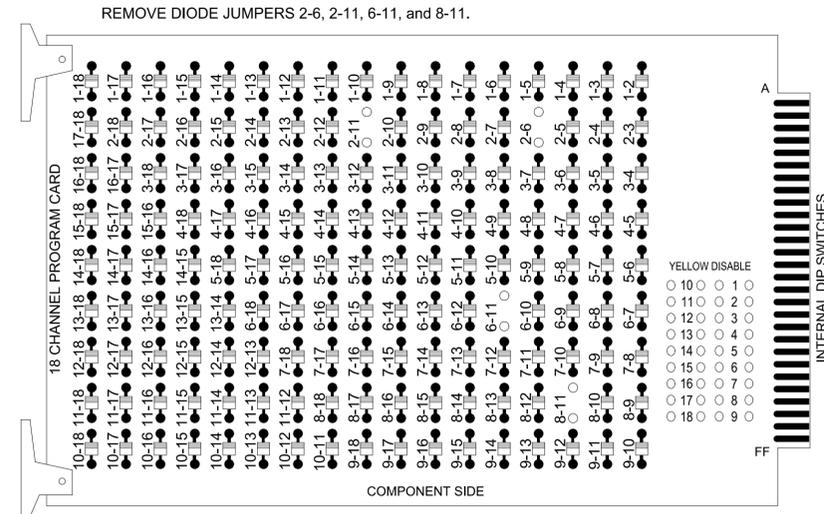
Seal: NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 046057 MATTHEW L. STYGLES

DocSigned by: _____ DATE: 2/4/2025

SIG. INVENTORY NO. 04-1470T1

18 CHANNEL CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that 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 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 and 6 Green No Walk.
3. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
4. The cabinet and controller are part of the SR 1700 (Covered Bridge Road) System.

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, S8, S11, AUX S4
 Phases Used.....2, 6, 8
 Overlap "1".....NOT USED
 Overlap "2".....NOT USED
 Overlap "3".....*
 Overlap "4".....NOT USED
 *See overlap programming detail on sheet 2

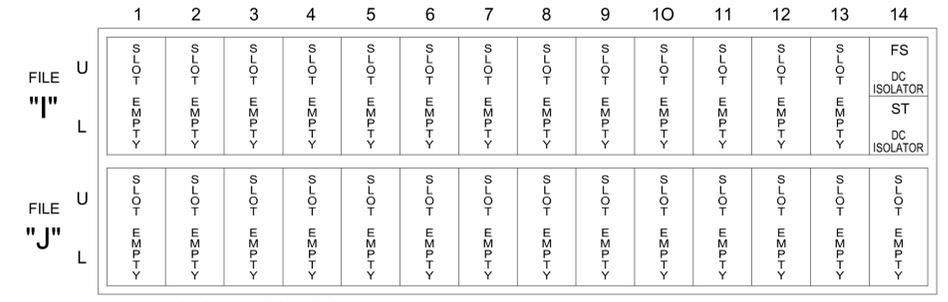
SIGNAL HEAD HOOK-UP CHART

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	OL6	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	NU	21,22	NU	NU	NU	NU	NU	61,62	NU	NU	81,82	83	NU	NU	NU	23*	NU	NU
RED		128						134			107						A114	
YELLOW		129						135										
GREEN		130						136										
RED ARROW											107							
YELLOW ARROW											108	108					A115	
FLASHING YELLOW ARROW																		A116
GREEN ARROW											109	109						

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

INPUT FILE POSITION LAYOUT

(front view)



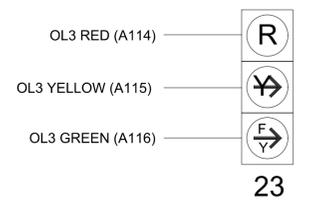
EX.: 1A, 2A, ETC. = LOOP NO.'S
 FS = FLASH SENSE
 ST = STOP TIME

SPECIAL DETECTOR NOTE

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

FYA SIGNAL WIRING DETAIL

(wire signal head as shown)



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 04-1470T2
 DESIGNED: February 2025
 SEALED: 02/04/25
 REVISED: N/A



Electrical Detail - Sheet 1 of 2 - Temporary Design 2

	SR 1700 (Covered Bridge Road) at SR 1705 (Castleberry Road)	
	Divison 4 Johnston County Archer Lodge	PLAN DATE: February 2025 REVIEWED BY: M.L. Stygles
PREPARED BY: L. Gottlieb	REVIEWED BY: J. Ma/J.L. Lewis	
REVISIONS	INIT. DATE	DocuSigned by: <i>Matthew L. Stygles</i> 2/4/2025 304861E8469746C DATE
SIG. INVENTORY NO. 04-1470T2		DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

2/3/2025 04:xx112_sm.ele_20240717.dgn lgc111eb

MAXTIME OVERLAP PROGRAMMING DETAIL

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

Overlap Plan 1

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

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.

Start Up Parameters

StartUp Clearance Hold
6

Unit Flash Parameters

All Red Flash Exit Time
6

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 04-1470T2
DESIGNED: February 2025
SEALED: 02/04/25
REVISED: N/A



Electrical Detail - Sheet 2 of 2 - Temporary Design 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared in the Offices of:

750 N. Greenfield Pkwy, Garner, NC 27529

SR 1700 (Covered Bridge Road)
at
SR 1705 (Castleberry Road)

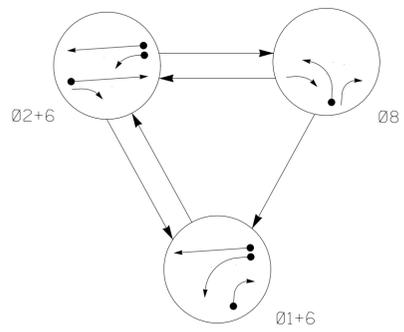
Divison 4	Johnston County	Archer Lodge
PLAN DATE: February 2025	REVIEWED BY: M.L. Stygles	
PREPARED BY: L. Gottlieb	REVIEWED BY: J. Ma/J.L. Lewis	
REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

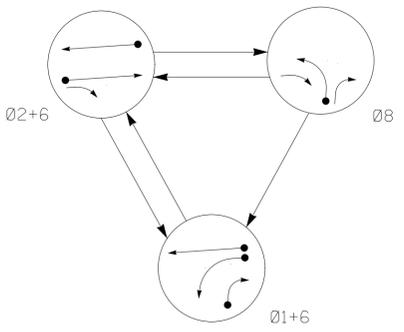
SEAL

DocuSigned by: Matthew L. Stygles
2/4/2025
394081E64497480
DATE
SIG. INVENTORY NO. 04-1470T2

DEFAULT PHASING DIAGRAM



ALTERNATE PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND
 ● DETECTED MOVEMENT
 ◀ UNDETECTED MOVEMENT (OVERLAP)
 - - - UNSIGNALIZED MOVEMENT
 <- - - PEDESTRIAN MOVEMENT

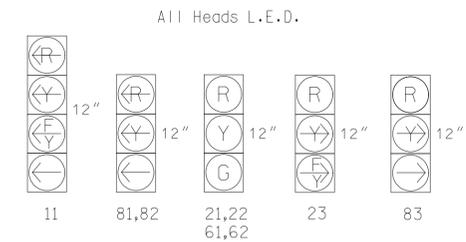
DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE			
	Ø 1+6	Ø 2+6	Ø 8	Ø 1+6
11	←	←	←	←
21,22	R	G	R	R
23	R	F	F	R
61,62	G	G	R	R
81,82	←	←	←	←
83	→	R	→	R

ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE			
	Ø 1+6	Ø 2+6	Ø 8	Ø 1+6
11	←	←	←	←
21,22	R	G	R	R
23	R	F	F	R
61,62	G	G	R	R
81,82	←	←	←	←
83	→	R	→	R

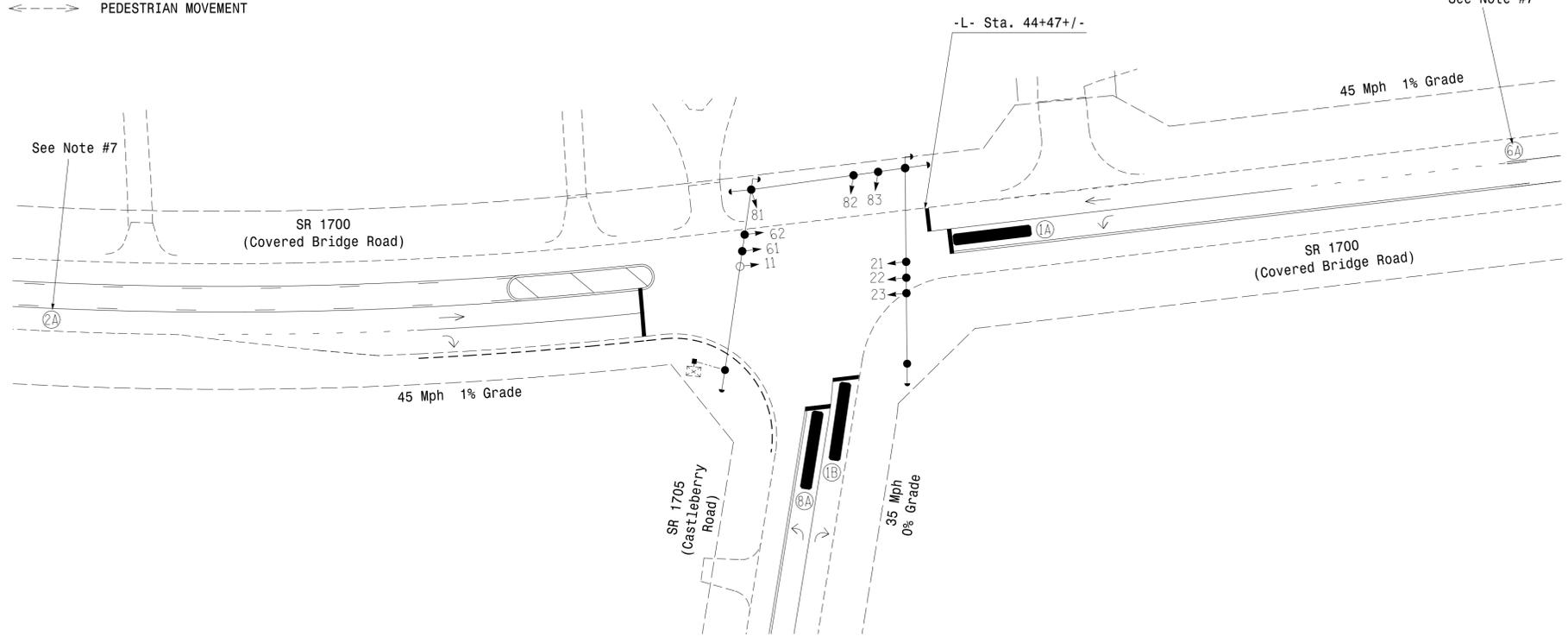
SIGNAL FACE I.D.



3 PHASE FULLY ACTUATED SR 1700 (COVERED BRIDGE ROAD) CLOSED LOOP SYSTEM

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2024 and "Standard Specifications for Roads and Structures" dated January 2024.
- Do not program signal for late night operation unless otherwise directed by the Engineer.
- Reposition existing signal heads numbered 61 and 62.
- Phase 1 may be lagged.
- Set all detector units to presence mode.
- The Division Traffic Engineer will determine the hours of use for each phasing plan.
- This intersection features multizone microwave detection. Install detectors according to the manufacturers instructions to achieve the desired detection scheme.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.



MAXTIME TIMING CHART

FEATURE	PHASE			
	1	2	6	8
Walk *	-	-	-	-
Ped Clear *	-	-	-	-
Min Green *	7	12	12	7
Passage *	2.0	2.0	2.0	2.0
Max 1 *	20	75	90	30
Yellow Change	3.0	4.4	4.4	3.0
Red Clear	3.5	1.9	2.1	3.1
Added Initial *	-	-	-	-
Maximum Initial *	-	-	-	-
Time Before Reduction *	-	-	-	-
Time To Reduce *	-	-	-	-
Minimum Gap	-	-	-	-
Advance Walk	-	-	-	-
Non Lock Detector	X	-	-	X
Vehicle 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 DETECTOR INSTALLATION CHART

LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING						
					CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN
1A	*	0	*	*	1	15.0*	-	X	X	-	*
					6#	-	-	X	X	-	*
1B	*	0	*	*	1	15.0	-	X	X	-	*
8A	*	0	*	*	8	3.0	-	X	X	-	*

* Multizone Microwave Detection Zone
 * Disable Delay During Alternate Phasing Operation.
 # Disable Phase Calls for Loop during Alternate Phasing Operation.

RADAR DETECTION SYSTEM

FUNCTION	Sensor 1 (2A)	Sensor 2 (6A)
Channel	1	2
Phase	2	6
Direction of Travel	EB	WB
Detection Zone (ft)	500-100	500-100
Enable Speed	Y	Y
Speed Range (mph)	35-100	35-100
Enable Estimated Time of Arrival	Y	Y
Estimated Time of Arrival (sec)	2.5-6.5	2.5-6.5

LEGEND

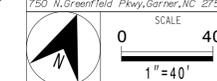
PROPOSED	EXISTING
○ → Traffic Signal Head	● → N/A
● → Modified Signal Head	○ → N/A
⊥ Sign	⊥ N/A
⊥ Pedestrian Signal Head With Push Button & Sign	⊥ N/A
○ ⊥ Signal Pole with Guy	● ⊥ N/A
⊥ Signal Pole with Sidewalk Guy	● ⊥ N/A
▭ Inductive Loop Detector	▭ N/A
⊠ Controller & Cabinet	⊠ N/A
□ Junction Box	□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

New Installation - Final Design



SR 1700 (Covered Bridge Road) at SR 1705 (Castleberry Road)
 Division 4 Johnston County Archer Lodge
 PLAN DATE: April 2025 REVIEWED BY: M.L. Stygles
 PREPARED BY: L. Gottlieb REVIEWED BY: J. Ma

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



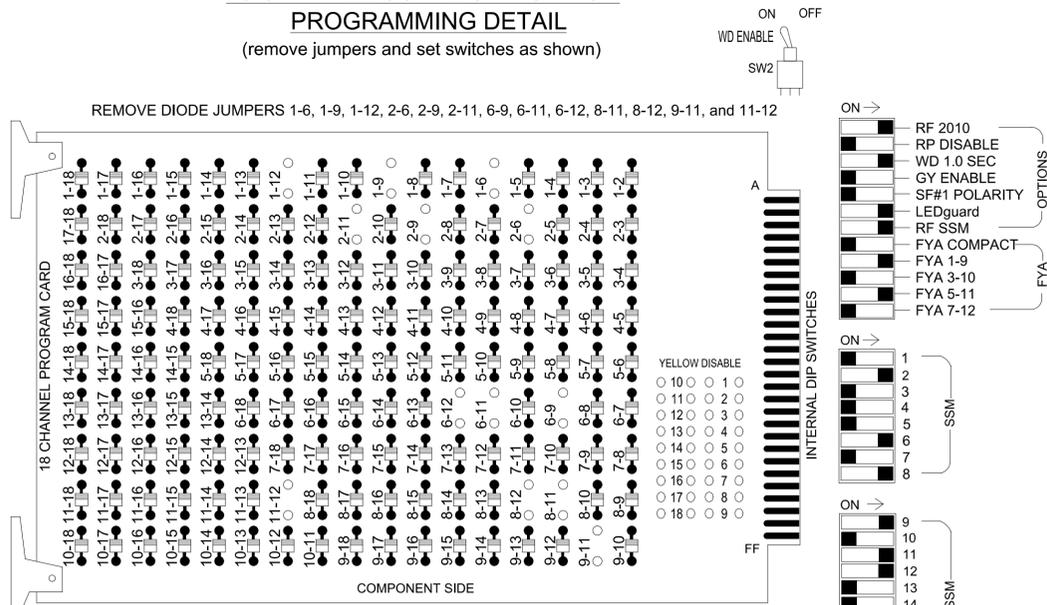
REVISIONS	INIT.	DATE

Signed by: *Matthew L. Stygles* 4/24/2025
 DATE
 SIG. INVENTORY NO. 04-1470



18 CHANNEL CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE JUMPERS AS SHOWN

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

NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the signal plan.
- Program controller to start up in phase 2 Green No Walk and 6 Green No Walk.
- If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
- The cabinet and controller are part of the SR 1700 (Covered Bridge Road) System.

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, S8, S11,
 AUX S1, AUX S4, AUX S5
 Phases Used.....1, 2, 6, 8
 Overlap "1".....*
 Overlap "2".....NOT USED
 Overlap "3".....*
 Overlap "4".....*

*See overlap programming detail on sheet 2

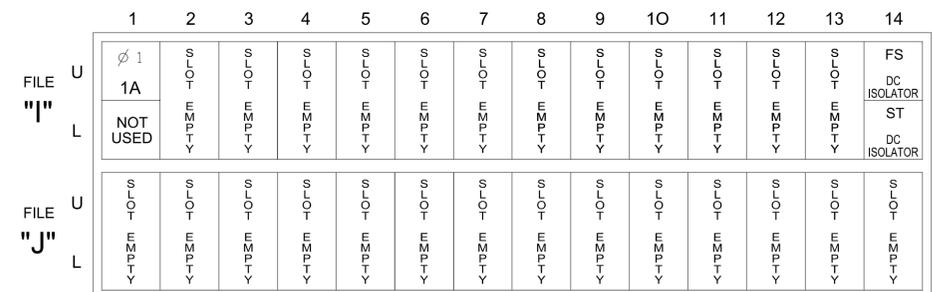
SIGNAL HEAD HOOK-UP CHART

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	OL6	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	11*	21,22	NU	NU	NU	NU	NU	61,62	NU	NU	81,82	NU	11*	NU	NU	23*	83	NU
RED		128						134								A114	A101	
YELLOW	*	129						135										
GREEN		130						136										
RED ARROW										107			A121					
YELLOW ARROW										108			A122			A115	A102	
FLASHING YELLOW ARROW													A123			A116		
GREEN ARROW	127									109								A103

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

INPUT FILE POSITION LAYOUT

(front view)



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	TB2-12	I1U	56	18	1*	1	15		X		X	
				-	29*	6			X		X	

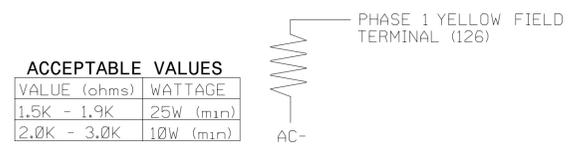
* For the detectors to work as shown on the signal design plan, see the Detector Programming Detail for Alternate Phasing on Sheet 2 of this plan.

INPUT FILE POSITION LEGEND: J2L



LOAD RESISTOR INSTALLATION DETAIL

(install resistor as shown below)

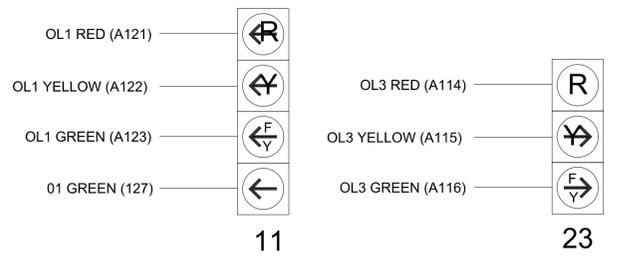


SPECIAL DETECTOR NOTE

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

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 04-1470
 DESIGNED: April 2025
 SEALED: 04/24/2025
 REVISED: N/A



Electrical Detail - Sheet 1 of 3 - Final Design

	ELECTRICAL AND PROGRAMMING DETAILS FOR: SR 1700 (Covered Bridge Road) at SR 1705 (Castleberry Road)	DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
	Prepared in the Offices of: 	SEAL NORTH CAROLINA PROFESSIONAL ENGINEER MATTHEW L. STYGLES SEAL 046057
Divison 4 Johnston County Archer Lodge	PLAN DATE: April 2025 REVIEWED BY: M.L. Stygles PREPARED BY: L. Gottlieb REVIEWED BY: J. Ma	REVISIONS INIT. DATE
750 N. Greenfield Pkwy, Garner, NC 27529	Signed by: DATE: 4/24/2025 304861E6485748C. DATE: _____ SIG. INVENTORY NO. 04-1470	

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	3	4
Type	FYA 4 - Section	FYA 4 - Section	Normal
Included Phases	2	2,8	1,8
Modifier Phases	1	-	-
Modifier Overlaps	-	-	-
Trail Green	0	0	0
Trail Yellow	0.0	0.0	0.0
Trail Red	0.0	0.0	0.0

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	3	4
Type	FYA 4 - Section	FYA 4 - Section	Normal
Included Phases	-	2,8	1,8
Modifier Phases	1	-	-
Modifier Overlaps	-	-	-
Trail Green	0	0	0
Trail Yellow	0.0	0.0	0.0
Trail Red	0.0	0.0	0.0

← NOTICE INCLUDED PHASE

MAXTIME DETECTOR PROGRAMMING DETAIL FOR ALTERNATE PHASING LOOP 1A

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

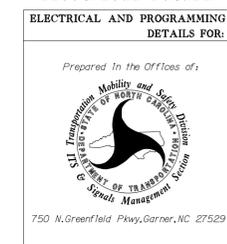
Detector	Call Phase	Delay
1	1	0
29	0	-

1A

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 04-1470
DESIGNED: April 2025
SEALED: 04/24/2025
REVISED: N/A



Electrical Detail - Sheet 2 of 3 - Final Design



SR 1700 (Covered Bridge Road)
at
SR 1705 (Castleberry Road)

Division 4 Johnston County Archer Lodge
PLAN DATE: April 2025 REVIEWED BY: M.L. Stygles
PREPARED BY: L. Gottlieb REVIEWED BY: J. Ma
REVISIONS INIT. DATE

DOCUMENT NOT CONSIDERED
FINAL UNLESS ALL
SIGNATURES COMPLETED



Signed by: M.L. Stygles 4/24/2025
DATE
SIG. INVENTORY NO. 04-1470

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.

Start Up Parameters	Unit Flash Parameters
StartUp Clearance Hold 6	All Red Flash Exit Time 6

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

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.

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 phase for head 11 to run protected turns only.

VEH DET PLAN 2: Disables phase 6 call on loop 1A and reduces delay time for phase 1 call on loop 1A to 0 seconds.

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 04-1470
DESIGNED: April 2025
SEALED: 04/24/2025
REVISED: N/A



Electrical Detail - Sheet 3 of 3 - Final Design

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared in the Offices of:

750 N. Greenfield Pkwy, Garner, NC 27529

SR 1700 (Covered Bridge Road)
at
SR 1705 (Castleberry Road)

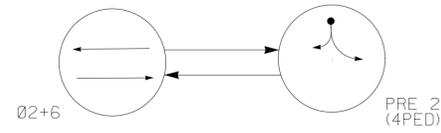
Divison 4	Johnston County	Archer Lodge
PLAN DATE: April 2025	REVIEWED BY: M.L. Stygles	
PREPARED BY: L. Gottlieb	REVIEWED BY: J. Ma	
REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL

Signed by: *Matthew L. Stygles* 4/24/2025
DATE: 4/24/2025
SIG. INVENTORY NO. 04-1470

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

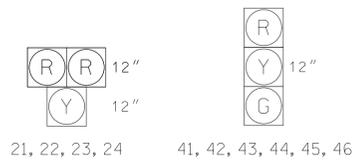
- DETECTED MOVEMENT
- ◄ UNDETECTED MOVEMENT (OVERLAP)
- ◄--- UNSIGNALIZED MOVEMENT
- ◄--- PEDESTRIAN MOVEMENT

SIGNAL FACE	PHASE					
	2	4	6	4	2	6
21, 22	DRK	FY	Y	R	FR*	Y
23, 24	DRK	FY	Y	R	FR*	Y
41, 42, 43, 44, 45, 46	DRK	DRK	DRK	DRK	G	R

* ALTERNATING FLASH
 Y - STEADY YELLOW
 FY - FLASHING YELLOW
 R - STEADY RED
 FR - FLASHING RED
 DRK - DARK

SIGNAL FACE I.D.

All Heads L.E.D.

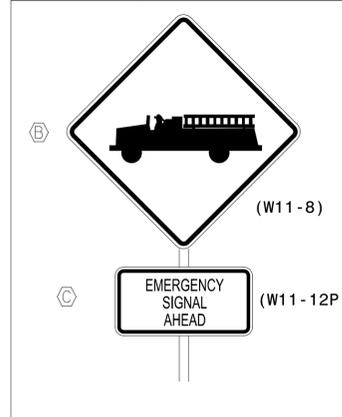


MAXTIME PREEMPTION CHART

FUNCTION	PRE 2
Type	EMERG VEH
Exit Phases	2
Delay	#
Call Extend Time	0
Max Presence	0
Enter Min Green	1
Enter Walk	255*
Enter Ped Clear	255*
Enter Yellow Change	25.5*
Enter Red Clear	25.5*
Track Green	0
Track Yellow Change	25.5*
Track Red Clear	25.5*
Dwell Green	#
Exit Min Green	255*
Exit Yellow Change	25.5*
Exit Red Clear	25.5*
Exit Type	EXIT PHASES
Ped Clear Through Yellow	N
Require All Red Entry	N

* Directs controller to use default phase timing.
 # See Note 5.

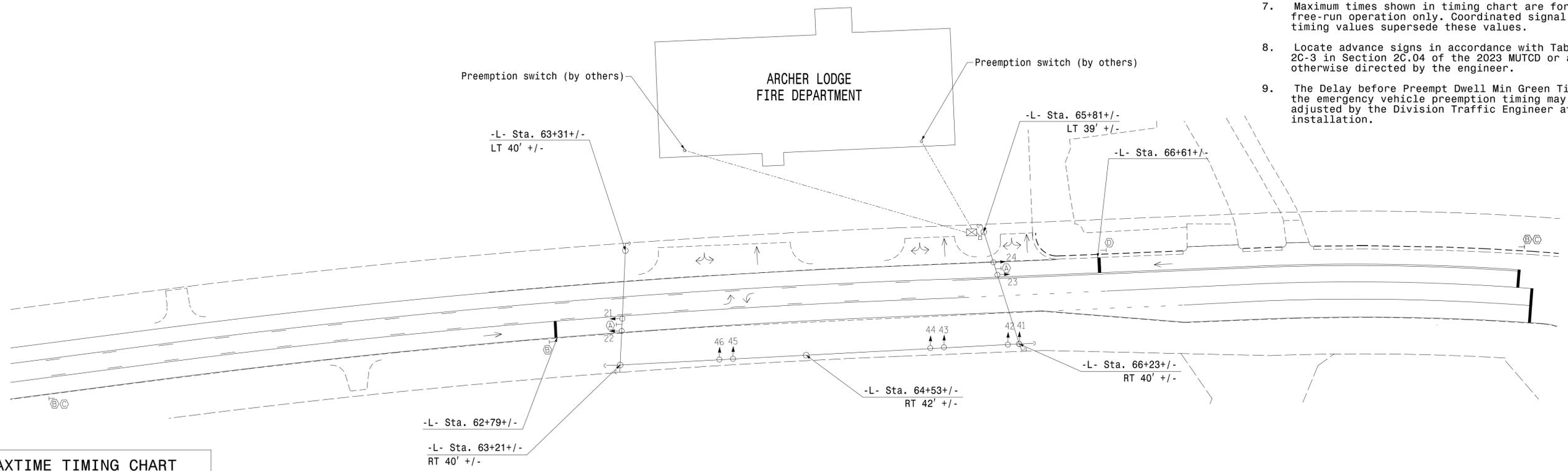
Figure 1: Advanced Warning Sign Assembly



2 PHASE SEMI-ACTUATED EMERGENCY HYBRID BEACON

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2024 and "Standard Specifications for Roads and Structures" dated January 2024.
- Do not program signal for late night operation unless otherwise directed by the Engineer.
- Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
- Connect two emergency vehicle preemption switches located in the fire station building. Installation of switch, circuitry to the signal cabinet, and all other work outside of the public Right of Way shall be completed by others.
- The Division Traffic Engineer will determine the Delay before Preempt and Preempt Dwell Min Green time for the emergency preemption timing.
- Clear signal heads 41, 42, 43, 44, 45 and 46 from dark to steady red during interval 1 and 2 before going to green.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- Locate advance signs in accordance with Table 2C-3 in Section 2C.04 of the 2023 MUTCD or as otherwise directed by the engineer.
- The Delay before Preempt Dwell Min Green Time for the emergency vehicle preemption timing may be adjusted by the Division Traffic Engineer after installation.



FEATURE	PHASE		
	2	4	6
Walk *	-	-	-
Ped Clear *	-	**	-
Min Green *	12	7	12
Passage *	0.0	0.0	0.0
Max 1 *	30	30	30
Yellow Change	4.6	3.0	4.6
Red Clear	4.2	3.0	4.2
Added Initial *	-	-	-
Maximum Initial *	-	-	-
Time Before Reduction *	-	-	-
Time To Reduce *	-	-	-
Minimum Gap	-	-	-
Advance Walk	-	-	-
Pre Clearance	5.0	-	5.0
Non Lock Detector	-	-	-
Vehicle Recall	MIN RECALL	-	MIN RECALL
Dual Entry	-	-	-

Serves as Preempt Dwell Time
 Serves as Steady Yellow Clearance Time
 Serves as All Red Clearance Time
 Serves as Flashing Yellow Interval

* 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.
 ** See Note 5.

LEGEND

- | | |
|--|--|
| PROPOSED | EXISTING |
| ○ → Traffic Signal Head | ● → Traffic Signal Head |
| — Sign | — Sign |
| ○ → Signal Pole with Guy | ● → Signal Pole with Guy |
| ○ → Signal Pole with Sidewalk Guy | ● → Signal Pole with Sidewalk Guy |
| ☒ Controller & Cabinet | ☒ Controller & Cabinet |
| □ Junction Box | ■ Junction Box |
| --- 2-in Underground Conduit | --- 2-in Underground Conduit |
| N/A Directional Arrow | → Directional Arrow |
| Ⓐ "EMERGENCY SIGNAL STOP ON FLASHING RED" Sign (R10-14a) | Ⓐ "EMERGENCY SIGNAL STOP ON FLASHING RED" Sign (R10-14a) |
| Ⓑ Emergency Vehicle Sign (W11-8) | Ⓑ Emergency Vehicle Sign (W11-8) |
| Ⓒ "EMERGENCY SIGNAL AHEAD" Sign (W11-12P) | Ⓒ "EMERGENCY SIGNAL AHEAD" Sign (W11-12P) |
| Ⓓ "STOP HERE ON RED" Sign (R10-14b) | Ⓓ "STOP HERE ON RED" Sign (R10-14b) |

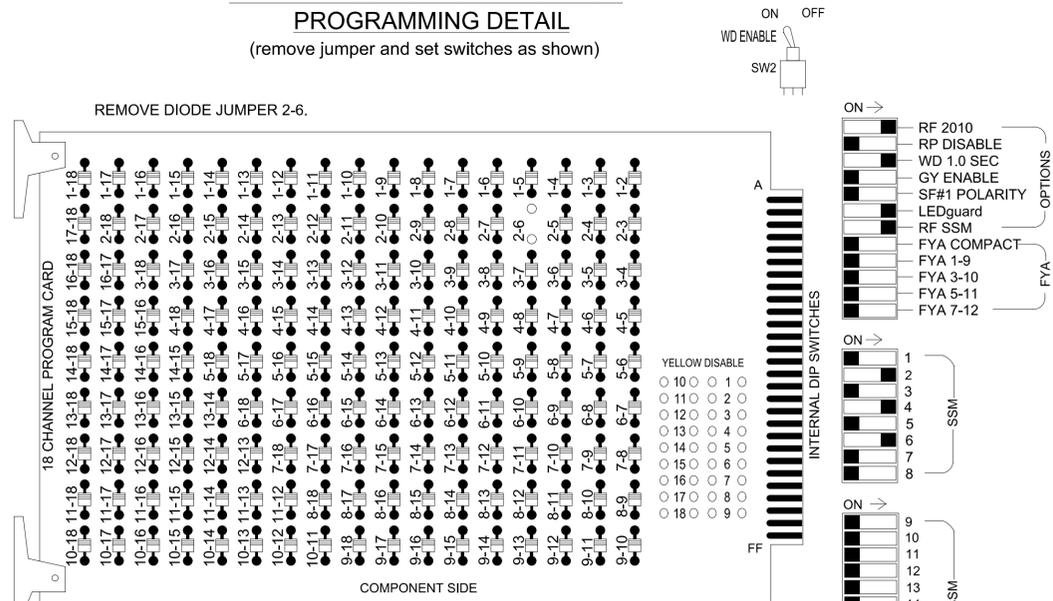
New Installation

SR 1700 (Covered Bridge Road) at Archer Lodge Fire Department	
Division 4	Johnston County Archer Lodge
PLAN DATE: April 2025	REVIEWED BY: M.L. Stygles
PREPARED BY: L. Gottlieb	REVIEWED BY: J. Ma
REVISIONS	INIT. DATE

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18 CHANNEL CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumper and set switches as shown)



NOTES:

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

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. Install most current version of 332_NCDOT_HAWK default database onto controller.
3. Program controller to start up in phase 2 Green No Walk and 6 Green No Walk.
4. Program phases 4 for No Startup Veh Call and No Startup Ped Call.
5. Program phase 4 for Ped Clear During Red Clear.
6. The cabinet and controller are part of the SR 1700 (Covered Bridge Road) System.

EQUIPMENT INFORMATION

Controller.....2070LX
 Cabinet.....332 w/ AUX
 Software.....Q-Free MAXTIME
 Cabinet Mount.....Base
 Output File Positions.....18 w/ Aux. Output File
 Load Switches Used.....S2, S3, S5, S8
 Phases Used.....2, 2PED, *4, 6
 Overlap "1".....NOT USED
 Overlap "2".....NOT USED
 Overlap "3".....NOT USED
 Overlap "4".....NOT USED

* Phases used for timing purposes only.

SIGNAL HEAD HOOK-UP CHART

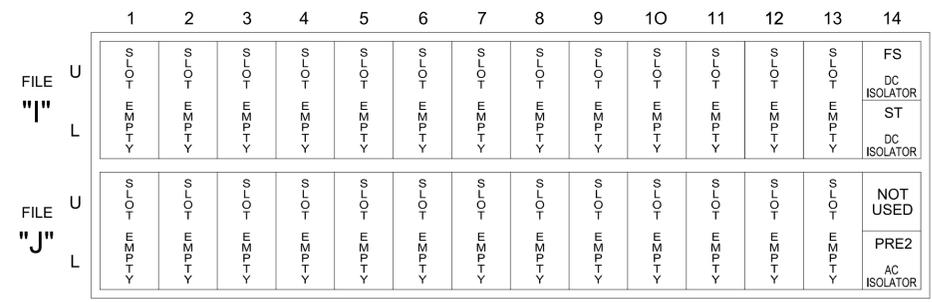
LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6	
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18	
PHASE	1	2	2 PED	EVP 2	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	NU	21,22 23,24	NU	FIRE PILOT LAMP	NU	41,42 43,44 45,46	NC	NU	21,22 23,24	NU	NU	NU	NU	NU	NU	51	NU	NU	
RED		128			101			134											
YELLOW		129			102			*											
GREEN		*			103			*											
RED ARROW																			
YELLOW ARROW																			
FLASHING YELLOW ARROW																			
GREEN ARROW																			
PED YELLOW							*	114											

NU = Not Used
 NC = Not Connected

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

INPUT FILE POSITION LAYOUT

(front view)



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

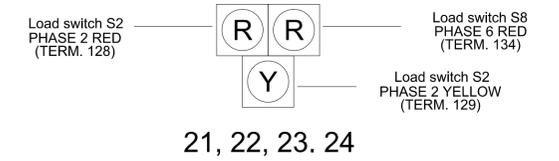
FS = FLASH SENSE
 ST = STOP TIME
 PRE = PREEMPT

TIMING INTERVAL

- PHASE 2+6 GREEN = Dark Display
- PHASE 2+6 PRE CLEARANCE = Flashing Yellow Time
- PHASE 2+6 YELLOW CHANGE = Solid Yellow Time
- PHASE 2+5 RED CLEAR = Steady Red Display
- PHASE 4 PED CLEAR = Alternating Flashing Red Display
- PHASE 4 YELLOW CHANGE = Alternating Flashing Red Display
- PHASE 4 RED CLEAR = Alternating Flashing Red Display

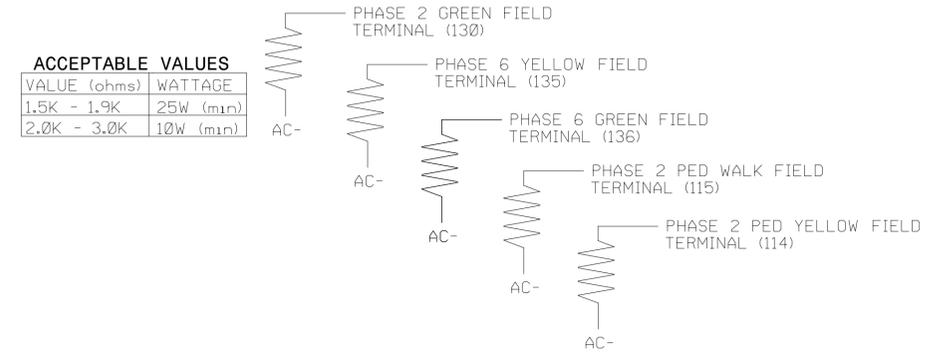
SIGNAL WIRING DETAIL

(wire signal heads as shown)



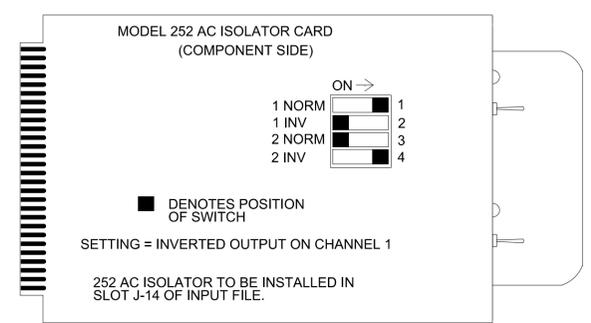
LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown below)



PREEMPT 2 AC ISOLATOR (MODEL 252) OUTPUT PROGRAMMING DETAIL

(set DIP switches as shown below)



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 04-1471
 DESIGNED: April 2025
 SEALED: 04/24/25
 REVISED: N/A



Electrical Detail - Sheet 1 of 3 - Final Design

Electrical and Programming Details For:

SR 1700 (Covered Bridge Road) at Archer Lodge Fire Department

Divison 4 Johnston County Archer Lodge

PLAN DATE: April 2025 REVIEWED BY: M.L. Stygles

PREPARED BY: L. Gottlieb REVIEWED BY: J. Ma

REVISIONS INIT. DATE

4/24/2025

SIG. INVENTORY NO. 04-1471

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL NORTH CAROLINA PROFESSIONAL ENGINEER MATHIEW L. STYGLES

LOGIC PROCESSOR PROGRAMMING

Front Panel
Main Menu >Controller >More >User Programs >Definition

Web Interface
Home >Controller >User Programs Configuration >User Programs Definition

Program 1

Statement	Result	Index	Operation	Parameter A	Index	Parameter B	Index	Delay	Ext
21	Phase Phase Omit	4	Result=!A	Preempt Status	2	None	0	0.0	0.0
22	Global Variable	33	Result=(A OR B)	Preempt Input	2	Preempt Status	2	0.0	0.0

LOGIC STATEMENT DESCRIPTION

Statement 21 Description: Omits phase 4 while not in preemption.

Statement 22 Description: Turns pilot lamp on when button is pushed.

OUTPUT POINTS PROGRAMMING

Front Panel
Main Menu >Controller >More >Advanced IO>Output Points

Web Interface
Home >Controller >Advanced IO>Cabinet Configuration>Output Points

Modify IO Module 1 as shown below and save changes.

IO Module 1

Output Point	Description	Output Control Type	Index
33	C1-35	Global Variable	33

OPERATIONAL NOTES

- In order for the controller to perform the Emergency Hybrid Beacon (HAWK signal) sequence, the 332_NCDOT_HAWK default database must be installed on the controller.
- The Logic Processor flashes Phase 2 Yellow during the Phase 2 Pre-Clearance interval. Phase 2 Yellow drives the solid yellow signal face during the Phase 2 vehicle Yellow Change.
- The Phase 2 and Phase 6 Red outputs drives the solid Red displays during the Phase 2 and 6 Red Clear. The Logic Processor flashes Phase 2 and 6 Red Outputs in a wig-wag pattern during Phase 4 Ped Clear interval.
- The controller must be programmed for Ped Clear During Red Clear for Pedestrian Phase 4 so that Red displays continue to flash during Phase 4 Yellow Change and Red Clear.
- Make sure that all Phase 2 and Phase 6 timings match each other.

PREEMPTION PROGRAMMING

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

Web Interface
Home >Controller >Preempt Configuration >Preempts

Preempt Configuration

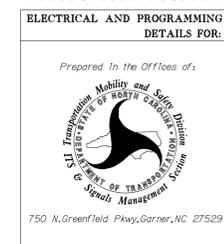
Preempt	2
Enabled	Enabled
Type	Emergency Veh
Track Phases	-
Track Overlaps	-
Dwell Phases	4
Dwell Peds	4
Dwell Overlaps	-
Cycling Phases	-
Cycling Peds	-
Cycling Overlaps	-
Exit Phases	2
Exit Overlaps	-
Delay	*
Call Ext Time	2.0
Max Presence	0
Max Pres Act	Terminate
Enter Min Green	1
Enter Walk	255
Enter Ped Clear	255
Enter Yellow Change	25.5
Enter Red Clear	25.5
Track Green	0
Track Yellow Clr	25.5
Track Red Clear	25.5
Dwell Green	*
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	-
Track Reserve	-

* The Division Traffic Engineer will determine the Delay before Preempt time and Dwell Green time.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 04-1471
DESIGNED: April 2025
SEALED: 04/24/25
REVISED: N/A



Electrical Detail - Sheet 2 of 3 - Final Design



SR 1700 (Covered Bridge Road)
at
Archer Lodge Fire Department

Divison 4	Johnston County	Archer Lodge
PLAN DATE: April 2025	REVIEWED BY: M.L. Stygles	
PREPARED BY: L. Gottlieb	REVIEWED BY: J. Ma	
REVISIONS	INIT.	DATE

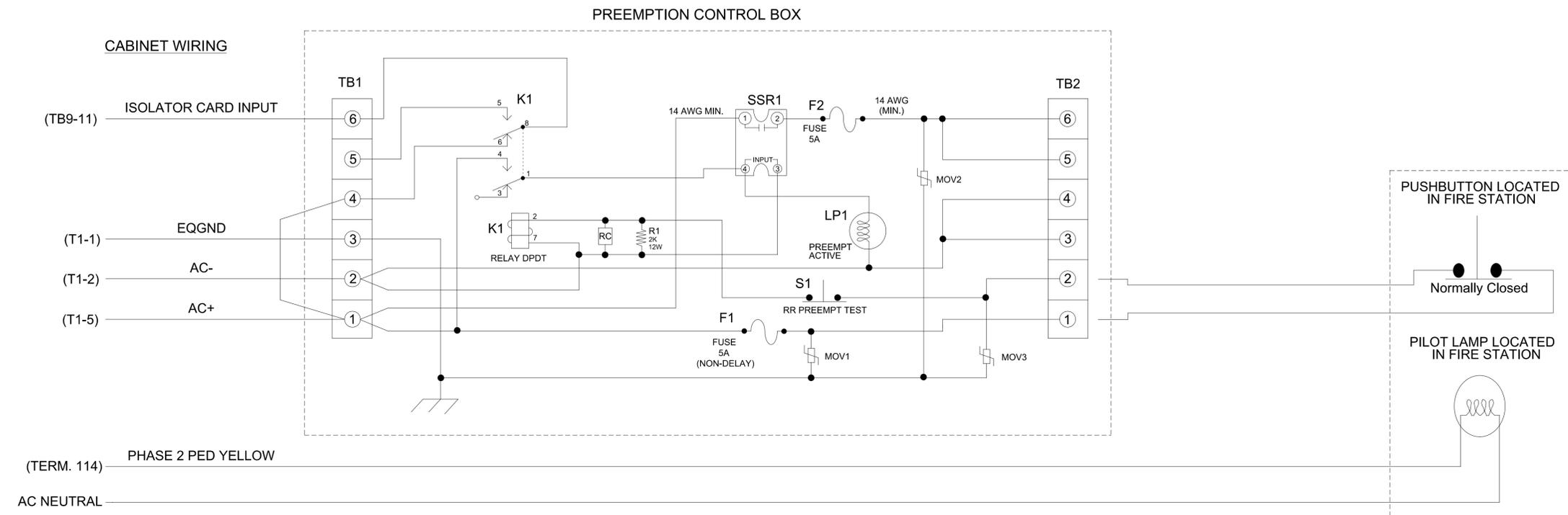
DOCUMENT NOT CONSIDERED
FINAL UNLESS ALL
SIGNATURES COMPLETED



Signed by: *Matthew L. Stygles* 4/24/2025
DATE
SIG. INVENTORY NO. 04-1471

EMERGENCY VEHICLE PREEMPTION WIRING DETAIL

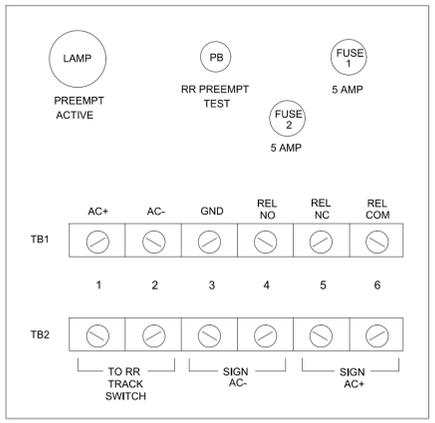
(wire as shown below)



NOTES

- Relay K1 is shown in the energized (Preempt not active) normal operation state.
- Relay K1 is a DPDT with 120VAC coil with octal base.
- Relay SSR1 is a SPST (normally open) Solid State Relay with AC input and AC (25 amp) output.
- AC Isolator Card shall activate preemption upon removal of AC+ from the input (as shown above). To accomplish this set invert dip switch on AC Isolator Card.
- IMPORTANT!!** 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



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 04-1471
 DESIGNED: April 2025
 SEALED: 04/24/25
 REVISED: N/A



Electrical Detail - Sheet 3 of 3 - Final Design

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared in the Offices of:

750 N. Greenfield Pkwy, Garner, NC 27529

SR 1700 (Covered Bridge Road) at Archer Lodge Fire Department	
Divison 4	Johnston County Archer Lodge
PLAN DATE: April 2025	REVIEWED BY: M.L. Stygles
PREPARED BY: L. Gottlieb	REVIEWED BY: J. Ma
REVISIONS	INIT. DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

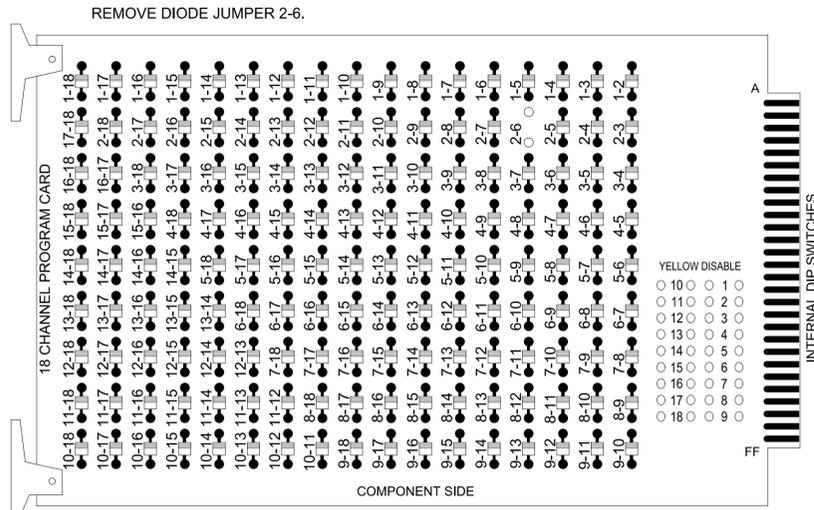
SEAL

Signed by: *Matthew L. Stygles* 4/24/2025
 DATE: 4/24/2025
 304861E8465740C
 DATE: 4/24/2025
 SIG. INVENTORY NO. 04-1471

4/24/2025 04xxx2_sm.ea.20240725.dgn mstygles

18 CHANNEL CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumper and set switches as shown)



NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that 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 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 and 6 Green No Walk.
3. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
4. The cabinet and controller are part of the SR 1700 (Covered Bridge Road) System.

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, S8, S11
 Phases Used.....2, 6, 8
 Overlap "1".....NOT USED
 Overlap "2".....NOT USED
 Overlap "3".....NOT USED
 Overlap "4".....NOT USED

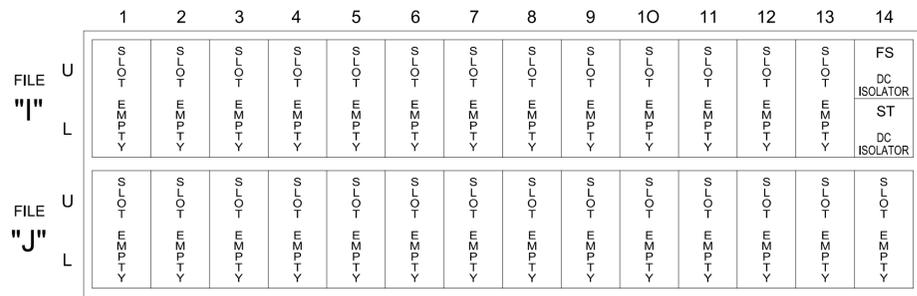
SIGNAL HEAD HOOK-UP CHART

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

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)



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

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.

Start Up Parameters

StartUp Clearance Hold	6
------------------------	---

Unit Flash Parameters

All Red Flash Exit Time	6
-------------------------	---

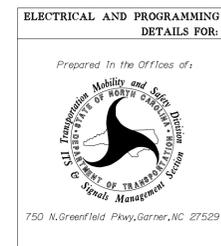
SPECIAL DETECTOR NOTE

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

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 04-1473T1
 DESIGNED: February 2025
 SEALED: 02/04/25
 REVISED: N/A



Electrical Detail - Temporary Design 1



SR 1700 (Covered Bridge Road) at SR 1703 (S Murphrey Road)

Divison 4	Johnston County	Archer Lodge
PLAN DATE: February 2025	REVIEWED BY: M.L. Stygles	
PREPARED BY: L. Gottlieb	REVIEWED BY: J. Ma/J.L. Lewis	
REVISIONS	INIT.	DATE

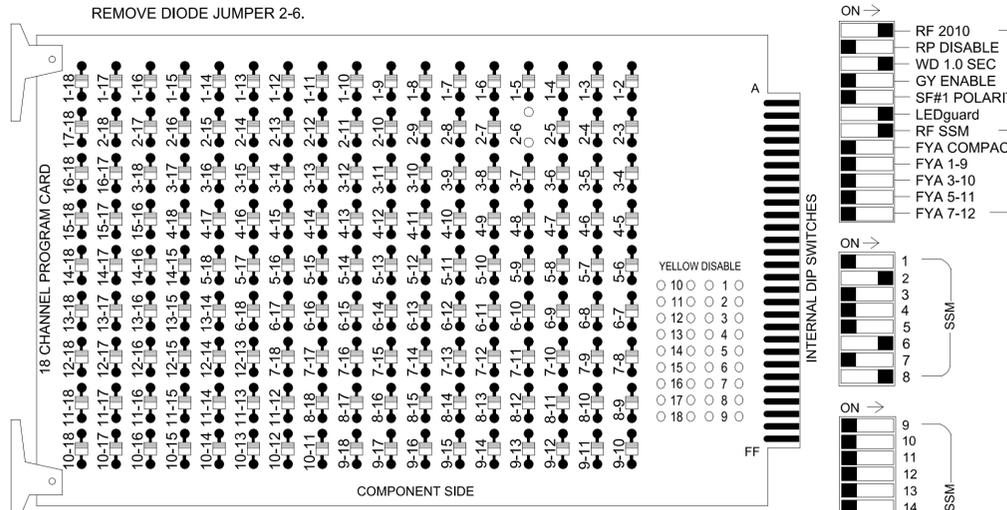
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



DocuSigned by: Matthew L. Stygles 2/4/2025
 384861E8460745C
 DATE
 SIG. INVENTORY NO. 04-1473T1

18 CHANNEL CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumper and set switches as shown)



NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that 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 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 and 6 Green No Walk.
3. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
4. The cabinet and controller are part of the SR 1700 (Covered Bridge Road) System.

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, S8, S11
 Phases Used.....2, 6, 8
 Overlap "1".....NOT USED
 Overlap "2".....NOT USED
 Overlap "3".....NOT USED
 Overlap "4".....NOT USED

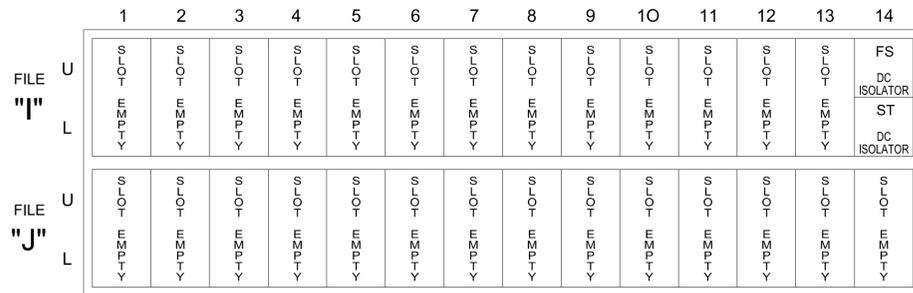
SIGNAL HEAD HOOK-UP CHART

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

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)



OUTPUT CHANNEL CONFIGURATION

Front Panel
Main Menu >Controller >Unit

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

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.

Start Up Parameters

StartUp Clearance Hold	6
------------------------	---

Unit Flash Parameters

All Red Flash Exit Time	6
-------------------------	---

SPECIAL DETECTOR NOTE

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

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 04-1473T2
 DESIGNED: February 2025
 SEALED: 02/04/25
 REVISED: N/A



Electrical Detail - Temporary Design 2

Electrical and Programming Details For: SR 1700 (Covered Bridge Road) at SR 1703 (S Murphrey Road)

Divison 4 Johnston County Archer Lodge

PLAN DATE: February 2025 REVIEWED BY: M.L. Stygles

PREPARED BY: L. Gottlieb REVIEWED BY: J. Ma/J.L. Lewis

REVISIONS INIT. DATE

DocuSigned by: Matthew L. Stygles 2/4/2025

394861E6487480 DATE

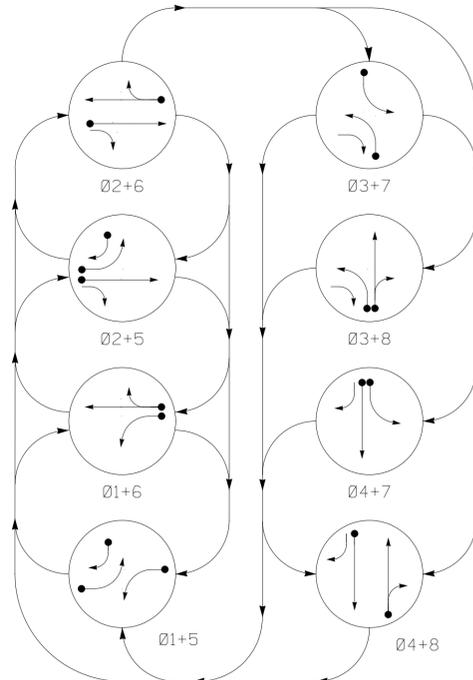
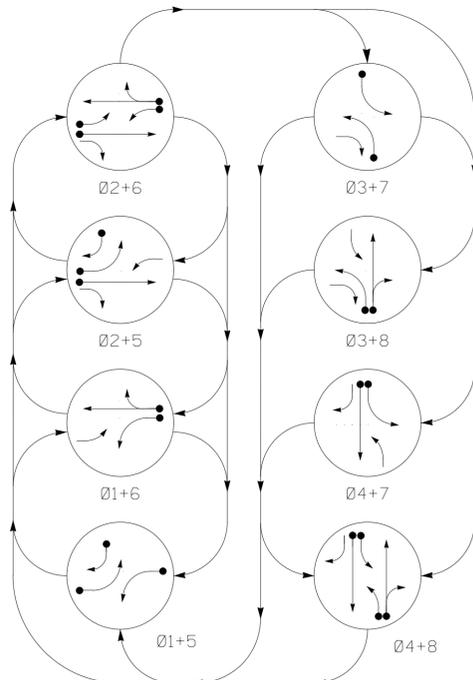
SIG. INVENTORY NO. 04-1473T2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL NORTH CAROLINA PROFESSIONAL ENGINEER MATTHEW L. STYGLES SEAL 046057

DEFAULT PHASING DIAGRAM

ALTERNATE PHASING DIAGRAM



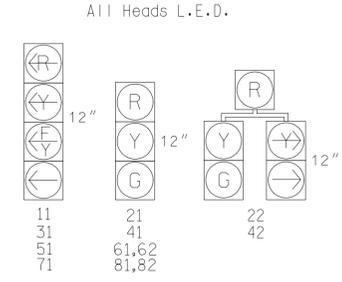
DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE							
	Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3+7	Ø3+8	Ø4+7	Ø4+8
11	←	←	←	←	←	←	←	←
21	R	R	G	G	R	R	R	R
22	R	R	G	G	R	R	R	R
31	←	←	←	←	←	←	←	←
41	R	R	R	R	R	R	G	G
42	R	R	R	R	R	R	G	G
51	←	←	←	←	←	←	←	←
61,62	R	G	R	G	R	R	R	R
71	←	←	←	←	←	←	←	←
81,82	R	R	R	R	R	G	R	G

ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE							
	Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3+7	Ø3+8	Ø4+7	Ø4+8
11	←	←	←	←	←	←	←	←
21	R	R	G	G	R	R	R	R
22	R	R	G	G	R	R	R	R
31	←	←	←	←	←	←	←	←
41	R	R	R	R	R	R	G	G
42	R	R	R	R	R	R	G	G
51	←	←	←	←	←	←	←	←
61,62	R	G	R	G	R	R	R	R
71	←	←	←	←	←	←	←	←
81,82	R	R	R	R	R	G	R	G

SIGNAL FACE I.D.

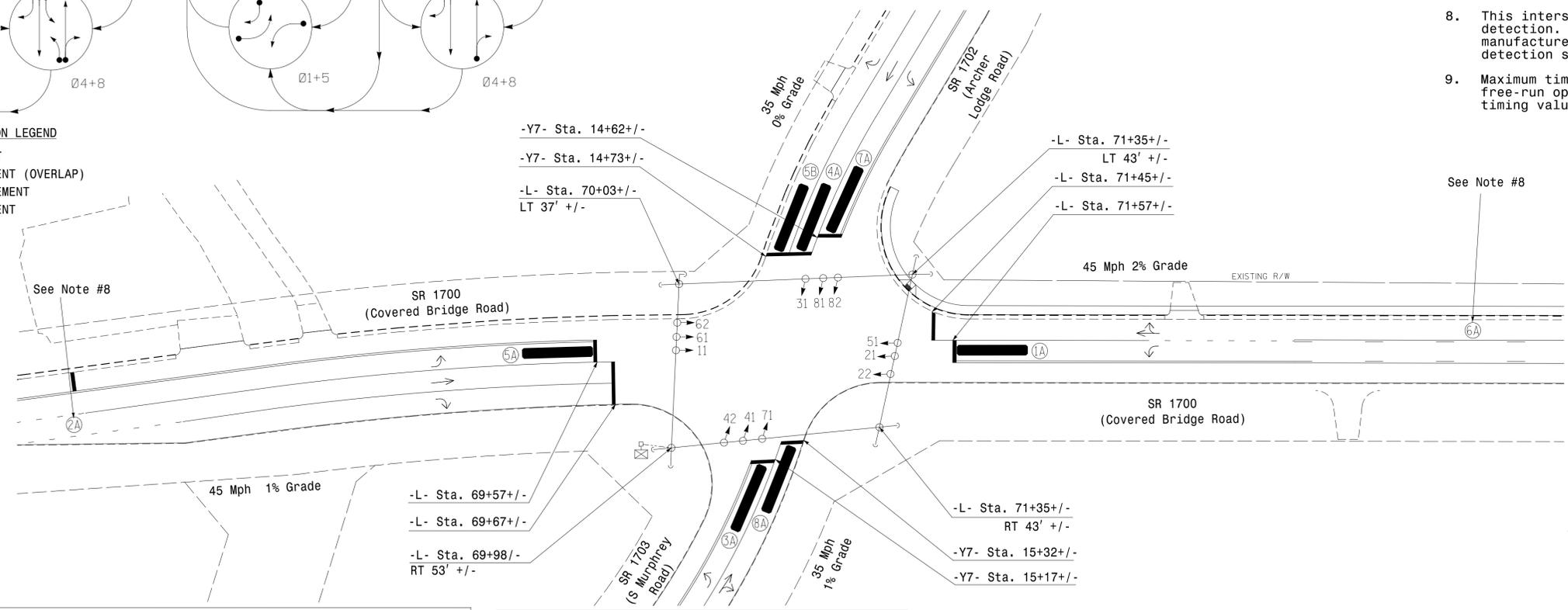
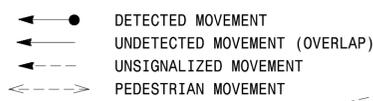


8 PHASE FULLY ACTUATED SR 1700 (COVERED BRIDGE ROAD) CLOSED LOOP SYSTEM

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2024 and "Standard Specifications for Roads and Structures" dated January 2024.
- Do not program signal for late night operation unless otherwise directed by the Engineer.
- Phase 1 and/or phase 5 may be lagged.
- Phase 3 and/or phase 7 may be lagged.
- Set all detector units to presence mode.
- Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
- The Division Traffic Engineer will determine the hours of use for each phasing plan.
- This intersection features multizone microwave detection. Install detectors according to the manufacturers instructions to achieve the desired detection scheme.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.

PHASING DIAGRAM DETECTION LEGEND



MAXTIME TIMING CHART

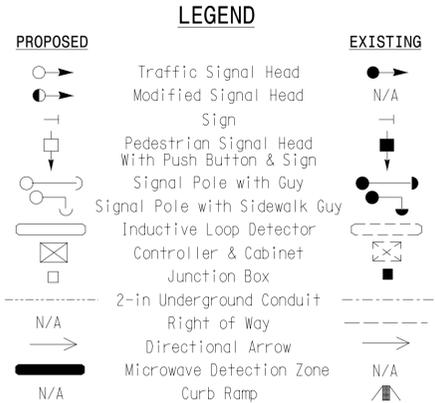
FEATURE	PHASE							
	1	2	3	4	5	6	7	8
Walk *	-	-	-	-	-	-	-	-
Ped Clear *	-	-	-	-	-	-	-	-
Min Green *	7	12	7	7	7	12	7	7
Passage *	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Max 1 *	15	60	25	20	15	60	15	30
Yellow Change	3.0	4.4	3.0	3.8	3.0	4.4	3.0	3.8
Red Clear	3.4	2.1	2.6	1.8	3.5	2.1	2.6	1.8
Added Initial *	-	-	-	-	-	-	-	-
Maximum Initial *	-	-	-	-	-	-	-	-
Time Before Reduction *	-	-	-	-	-	-	-	-
Time To Reduce *	-	-	-	-	-	-	-	-
Minimum Gap	-	-	-	-	-	-	-	-
Advance Walk	-	-	-	-	-	-	-	-
Non Lock Detector	X	-	X	X	-	-	X	X
Vehicle Recall	-	MIN RECALL	-	-	-	MIN RECALL	-	-
Dual Entry	-	-	-	X	-	-	-	X

MAXTIME DETECTOR INSTALLATION CHART

LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING							
					CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND INITIAL	CALL	DELAY DURING GREEN	NEW CARD	
1A	*	0	*	*	1	15.0*	-	X	-	X	-	*
					6#	3.0	-	X	-	X	-	*
3A	*	0	*	*	3	15.0*	-	X	-	X	-	*
					8#	3.0	-	X	-	X	-	*
4A	*	0	*	*	4	-	-	X	-	X	-	*
5A	*	0	*	*	5	15.0*	-	X	-	X	-	*
					2#	3.0	-	X	-	X	-	*
5B	*	0	*	*	5	-	-	X	-	X	-	*
7A	*	0	*	*	7	15.0*	-	X	-	X	-	*
					4#	3.0	-	X	-	X	-	*
8A	*	0	*	*	8	10.0	-	X	-	X	-	*

RADAR DETECTION SYSTEM

FUNCTION	Sensor 1 (2A)	Sensor 2 (6A)
Channel	1	2
Phase	2	6
Direction of Travel	EB	WB
Detection Zone (ft)	500-100	500-100
Enable Speed	Y	Y
Speed Range (mph)	35-100	35-100
Enable Estimated Time of Arrival	Y	Y
Estimated Time of Arrival (sec)	2.5-6.5	2.5-6.5



* 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.

* Multizone Microwave Detection Zone
 * Reduce Delay to 3 seconds during Alternate Phasing Operation.
 * Disable Phase Calls for Loop during Alternate Phasing Operation.

New Installation - Final Design

SR 1700 (Covered Bridge Road) at SR 1702 (Archer Lodge Road) / SR 1703 (S Murphrey Road)

Division 4 Johnston County Archer Lodge

PLAN DATE: February 2025 REVIEWED BY: M.L. Stygles

PREPARED BY: L. Gottlieb REVIEWED BY: J. Ma/J.L. Lewis

REVISIONS: _____ INIT. DATE

SCALE: 1"=40'

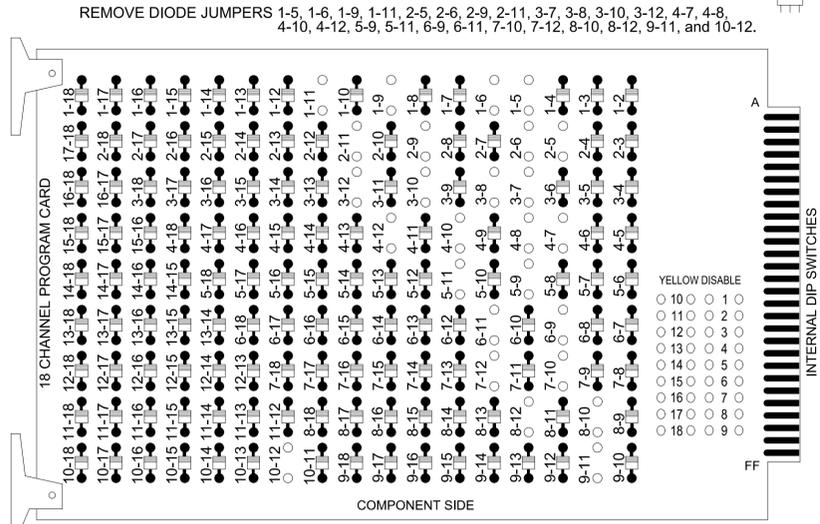
2/4/2025

SIG. INVENTORY NO. 04-1473

2/3/2025 04:xx:xx_s:\g...den_20240108.dgn lgc111 feb

18 CHANNEL CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that 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 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.
5. The cabinet and controller are part of the SR 1700 (Covered Bridge Road) System.

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, S10, S11,
 AUX S1, AUX S2, AUX S4, AUX S5
 Phases Used.....1, 2, 3, 4, 5, 6, 7, 8
 Overlap "1".....*
 Overlap "2".....*
 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.	11	21,22	NU	31	22	41,42	NU	51	42	61,62	NU	71	81,82	NU	11	31	NU	51	71
RED		128		*	101			*	134		107								
YELLOW	*	129			102				135		*	108							
GREEN		130			103				136		109								
RED ARROW													A121	A124		A114	A101		
YELLOW ARROW					117				132				A122	A125		A115	A102		
FLASHING YELLOW ARROW													A123	A126		A116	A103		
GREEN ARROW	127			118	118			133	133		124								

NU = Not Used

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

INPUT FILE POSITION LAYOUT

(front view)

FILE	1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	1A	2A	3A	4A	5A	6A	7A	8A	9A	10A	11A	12A	13A	14A
FILE "J"	1B	2B	3B	4B	5B	6B	7B	8B	9B	10B	11B	12B	13B	14B

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

FS = FLASH SENSE
 ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

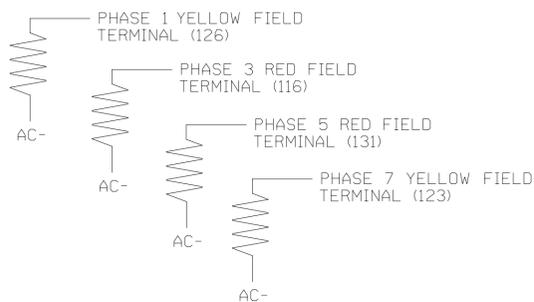
LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN
1A	TB2-1,2	11U	56	18	1★	1	15		X		X	
				-	29★	6	3		X		X	
3A	TB4-5,6	15U	58	20	7★	3	15		X		X	
				-	30★	8	3		X		X	
5A	TB3-1,2	J1U	55	17	15★	5	15		X		X	
				-	31★	2	3		X		X	
7A	TB5-5,6	J5U	57	19	21★	7	15		X		X	
				-	32★	4	3		X		X	

* For the detectors to work as shown on the signal design plan, see the Detector Programming Detail for Alternate Phasing on Sheet 2 of this plan.

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown below)

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



INPUT FILE POSITION LEGEND: J2L

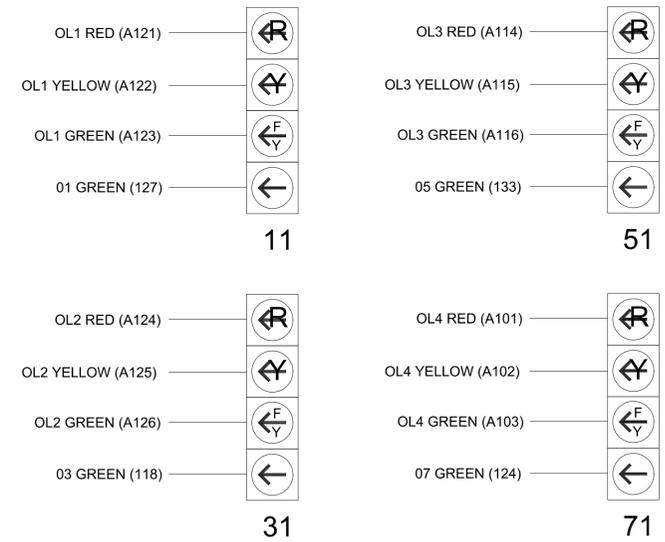


SPECIAL DETECTOR NOTE

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

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 04-1473
 DESIGNED: February 2025
 SEALED: 02/04/25
 REVISED: N/A



Electrical Detail - Sheet 1 of 3 - Final Design

	ELECTRICAL AND PROGRAMMING DETAILS FOR: SR 1700 (Covered Bridge Road) at SR 1702 (Archer Lodge Road) / SR 1703 (S Murphrey Road)	DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED SEAL NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 046057 MATTHEW L. STYGLES
	Prepared in the Offices of: State of North Carolina Department of Transportation Signal Management Section 750 N. Greenfield Pkwy, Garner, NC 27529	
PLAN DATE: February 2025 PREPARED BY: L. Gottlieb	REVIEWED BY: M.L. Stygles REVIEWED BY: J. Ma/J.L. Lewis	SEALS DATE: 2/4/2025 SIG. INVENTORY NO. 04-1473

MAXTIME DETECTOR PROGRAMMING DETAIL FOR ALTERNATE PHASING LOOPS 1A, 3A, 5A & 7A

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
1	1	3.0
29	0	-

Detector	Call Phase	Delay
7	3	3.0
30	0	-

Detector	Call Phase	Delay
15	5	3.0
31	0	-

Detector	Call Phase	Delay
21	7	3.0
32	0	-

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			
Included Phases	2	4	6	8
Modifier Phases	1	3	5	7
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 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			
Included Phases	-	-	-	-
Modifier Phases	1	3	5	7
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

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.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 04-1473
DESIGNED: February 2025
SEALED: 02/04/25
REVISED: N/A



Electrical Detail - Sheet 2 of 3 - Final Design

ELECTRICAL AND PROGRAMMING
DETAILS FOR:

SR 1700 (Covered Bridge Road)
at
SR 1702 (Archer Lodge Road) /
SR 1703 (S Murphrey Road)



750 N. Greenfield Pkwy, Garner, NC 27529

Division 4 Johnston County Archer Lodge
PLAN DATE: February 2025 REVIEWED BY: M.L. Stygles
PREPARED BY: L. Gottlieb REVIEWED BY: J. Ma/J.L. Lewis

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED
FINAL UNLESS ALL
SIGNATURES COMPLETED



DocuSigned by:
Matthew L. Stygles
2/4/2025
DATE
SIG. INVENTORY NO. 04-1473

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

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.

Start Up Parameters

StartUp Clearance Hold
6

Unit Flash Parameters

All Red Flash Exit Time
6

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

FLASHER CIRCUIT MODIFICATION DETAIL

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

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

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

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 heads 11, 31, 51, and 71 to run protected turns only.

VEH DET PLAN 2: Disables phase 6 call on loop 1A and reduces delay time for phase 1 call on loop 1A to 3 seconds.

Disables phase 8 call on loop 3A and reduces delay time for phase 3 call on loop 3A to 3 seconds.

Disables phase 2 call on loop 5A and reduces delay time for phase 5 call on loop 5A to 3 seconds.

Disables phase 4 call on loop 7A and reduces delay time for phase 7 call on loop 7A to 3 seconds.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 04-1473
DESIGNED: February 2025
SEALED: 02/04/25
REVISED: N/A



Electrical Detail - Sheet 3 of 3 - Final Design

ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 1700 (Covered Bridge Road)
at
SR 1702 (Archer Lodge Road) /
SR 1703 (S Murphrey Road)



750 N. Greenfield Pkwy, Garner, NC 27529

Divison 4 Johnston County Archer Lodge
PLAN DATE: February 2025 REVIEWED BY: M.L. Stygles
PREPARED BY: L. Gottlieb REVIEWED BY: J. Ma/J.L. Lewis

REVISIONS	INIT.	DATE

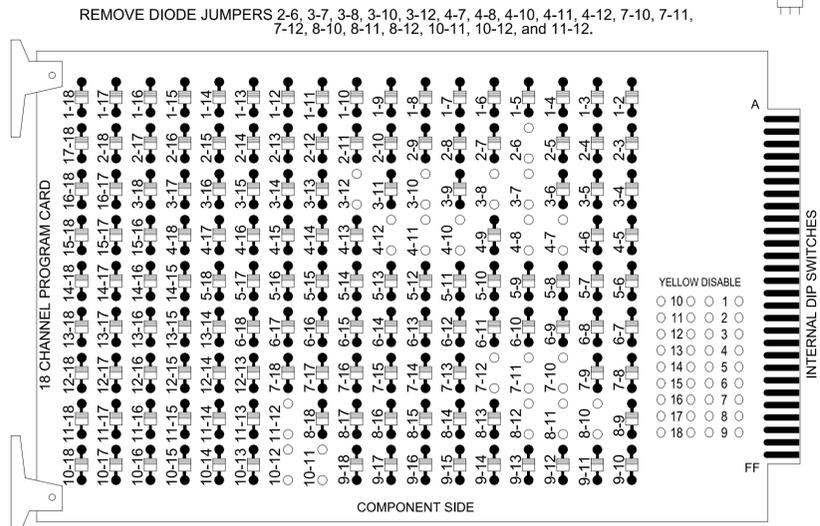
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



DocuSigned by: Matthew L. Stygles 2/4/2025
304881E6A48748C DATE
SIG. INVENTORY NO. 04-1473

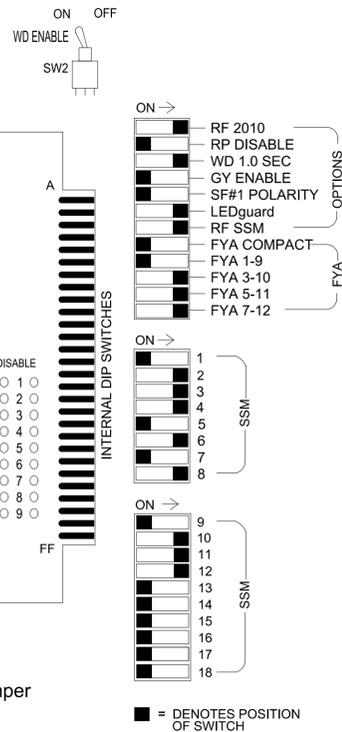
18 CHANNEL CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that 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 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.
5. The cabinet and controller are part of the SR 1700 (Covered Bridge Road) System.

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, S4, S5, S8, S10, S11, AUX S2, AUX S4, AUX S5
 Phases Used.....2, 3, 4, 6, 7, 8
 Overlap "1".....NOT USED
 Overlap "2".....*
 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	NU	31*	22	41,42	NU	61,62	NU	71*	81,82	NU	NU	31*	NU	43*	71*	NU
RED		128		*	101			134			107							A114
YELLOW		129			102			135		*	108							
GREEN		130			103			136			109							
RED ARROW														A124				A101
YELLOW ARROW					117									A125		A115	A102	
FLASHING YELLOW ARROW														A126		A116	A103	
GREEN ARROW					118	118					124							

NU = Not Used

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

INPUT FILE POSITION LAYOUT

(front view)

FILE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
FILE "I"	S-O-T P-M-E Y	S-O-T P-M-E Y	S-O-T P-M-E Y	S-O-T P-M-E Y	∅ 3 3A NOT USED	S-O-T P-M-E Y	FS DC ISOLATOR ST DC ISOLATOR								
FILE "J"	S-O-T P-M-E Y	S-O-T P-M-E Y	S-O-T P-M-E Y	S-O-T P-M-E Y	∅ 7 7A NOT USED	S-O-T P-M-E Y									

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
3A	TB4-5,6	I5U	58	20	7 ★	3	15		X		X	
				-	30 ★	8	3		X		X	
7A	TB5-5,6	J5U	57	19	21 ★	7	15		X		X	
				-	32 ★	4	3		X		X	

★ For the detectors to work as shown on the signal design plan, see the Detector Programming Detail for Alternate Phasing on Sheet 2 of this plan.

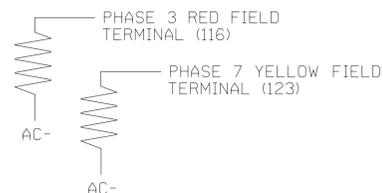
INPUT FILE POSITION LEGEND: J2L



LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown below)

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



SPECIAL DETECTOR NOTE

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

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



Electrical Detail - Sheet 1 of 3 - Temporary Design 1

ELECTRICAL AND PROGRAMMING DETAILS FOR:



SR 1700 (Covered Bridge Road) at SR 1003 (Buffalo Road)

Divison 4	Johnston County	Archer Lodge
PLAN DATE: April 2025	REVIEWED BY: M.L. Stygles	
PREPARED BY: L. Gottlieb	REVIEWED BY: J. Ma	
REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



Signed by: [Signature] DATE: 4/24/2025
 304851E046057ASC
 SIG. INVENTORY NO. 04-1181T1

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

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.

Start Up Parameters

StartUp Clearance Hold
6

Unit Flash Parameters

All Red Flash Exit Time
6

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 heads 31 and 71 to run protected turns only.

VEH DET PLAN 2: Disables phase 8 call on loop 3A and reduces delay time for phase 3 call on loop 3A to 3 seconds.

Disables phase 4 call on loop 7A and reduces delay time for phase 7 call on loop 7A to 3 seconds.

FLASHER CIRCUIT MODIFICATION DETAIL

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

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

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 04-1181T1
DESIGNED: April 2025
SEALED: 04/24/25
REVISED: N/A



Electrical Detail - Sheet 3 of 3 - Temporary Design 1

ELECTRICAL AND PROGRAMMING
DETAILS FOR:



SR 1700 (Covered Bridge Road)
at
SR 1003 (Buffalo Road)

Divison 4 Johnston County Archer Lodge

PLAN DATE: April 2025 REVIEWED BY: M.L. Stygles

PREPARED BY: L. Gottlieb REVIEWED BY: J. Ma

REVISIONS INIT. DATE

Signed by: *M.L. Stygles* 4/24/2025

304861E0440740C DATE

SIG. INVENTORY NO. 04-1181T1

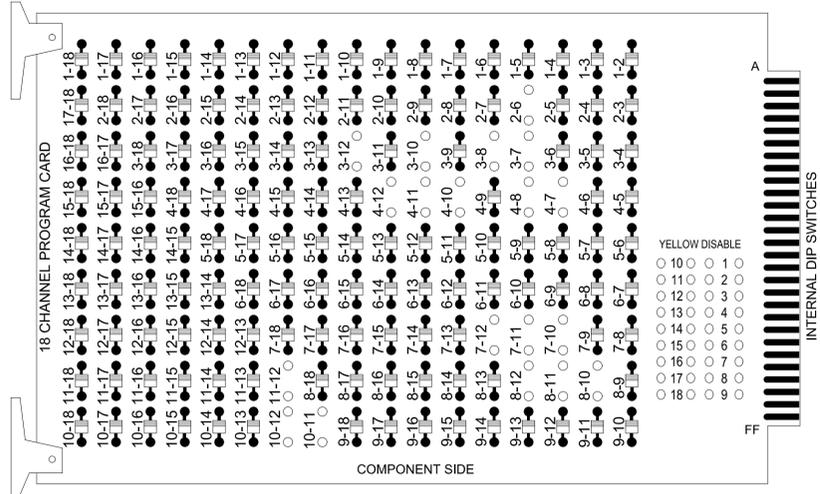
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SIGNATURES COMPLETED



18 CHANNEL CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

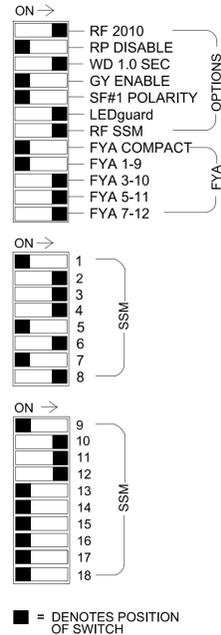
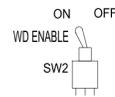
REMOVE DIODE JUMPERS 2-6, 3-7, 3-8, 3-10, 3-12, 4-7, 4-8, 4-10, 4-11, 4-12, 7-10, 7-11, 7-12, 8-10, 8-11, 8-12, 10-11, 10-12, and 11-12.



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 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.
5. The cabinet and controller are part of the SR 1700 (Covered Bridge Road) System.

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, S4, S5, S8, S10, S11, AUX S2, AUX S4, AUX S5
 Phases Used.....2, 3, 4, 6, 7, 8
 Overlap "1".....NOT USED
 Overlap "2".....*
 Overlap "3".....*
 Overlap "4".....*

*See overlap programming detail on sheet 2

SIGNAL HEAD HOOK-UP CHART

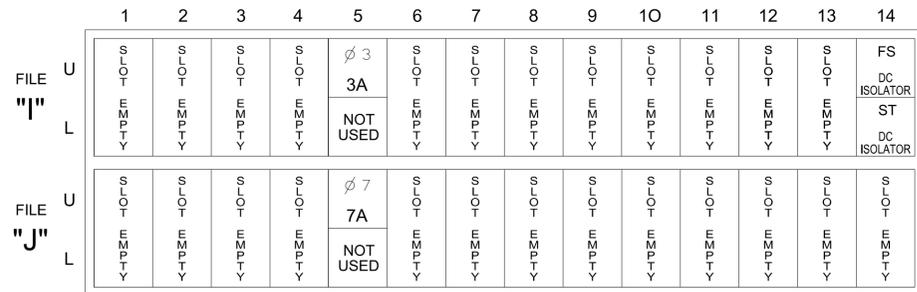
LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	NU	21,22	NU	31*	22	41,42	NU	61,62	NU	71*	81,82	NU	NU	31*	NU	43*	71*	NU
RED		128		*	101			134			107							A114
YELLOW		129			102			135		*	108							
GREEN		130			103			136			109							
RED ARROW														A124				A101
YELLOW ARROW					117									A125		A115	A102	
FLASHING YELLOW ARROW														A126		A116	A103	
GREEN ARROW					118	118					124							

NU = Not Used

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

INPUT FILE POSITION LAYOUT

(front view)



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

FS = FLASH SENSE
 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
3A	TB4-5,6	I5U	58	20	7 ★	3	15		X		X	
				-	30 ★	8	3		X	X		
7A	TB5-5,6	J5U	57	19	21 ★	7	15		X		X	
				-	32 ★	4	3		X	X		

* For the detectors to work as shown on the signal design plan, see the Detector Programming Detail for Alternate Phasing on Sheet 2 of this plan.

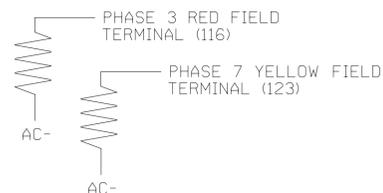
INPUT FILE POSITION LEGEND: J2L



LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown below)

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



SPECIAL DETECTOR NOTE

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

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



Electrical Detail - Sheet 1 of 3 - Temporary Design 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:
 Prepared in the Offices of:

 750 N. Greenfield Pkwy, Garner, NC 27529

SR 1700 (Covered Bridge Road) at SR 1003 (Buffalo Road)

Divison 4	Johnston County	Archer Lodge
PLAN DATE: April 2025	REVIEWED BY: M.L. Stygles	
PREPARED BY: L. Gottlieb	REVIEWED BY: J. Ma	
REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL

 Signed by:
 DATE: 4/24/2025
 3948E1E6447480
 SIG. INVENTORY NO. 04-1181T2

VHB Engineering NC, P.C. (C-3705)
 940 Main Campus Drive, Suite 500
 Raleigh, NC 27606
 919.829.0328

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 04-1181T2
 DESIGNED: April 2025
 SEALED: 04/24/25
 REVISED: N/A

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	2	3	4
Type	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section
Included Phases	4	4	8
Modifier Phases	3	-	7
Modifier Overlaps	-	-	-
Trail Green	0	0	0
Trail Yellow	0.0	0.0	0.0
Trail Red	0.0	0.0	0.0

MAXTIME DETECTOR PROGRAMMING DETAIL FOR ALTERNATE PHASING LOOPS 3A & 7A

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
7	3	3.0
30	0	-

Detector	Call Phase	Delay
21	7	3.0
32	0	-

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	2	3	4
Type	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section
Included Phases	-	4	-
Modifier Phases	3	-	7
Modifier Overlaps	-	-	-
Trail Green	0	0	0
Trail Yellow	0.0	0.0	0.0
Trail Red	0.0	0.0	0.0

← NOTICE INCLUDED PHASE

MAXTIME ALTERNATE PHASING PATTERN PROGRAMMING DETAIL

Front Panel
Main Menu >Controller >Coordination >Patterns

Web Interface
Home >Controller >Coordination >Patterns

Pattern Parameters

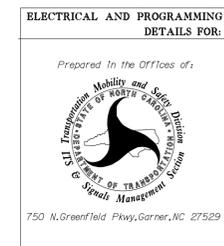
Pattern	Veh Det Plan	Overlap Plan
*	2	2

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 04-1181T2
DESIGNED: April 2025
SEALED: 04/24/25
REVISED: N/A



Electrical Detail - Sheet 2 of 3 - Temporary Design 2



SR 1700 (Covered Bridge Road)
at
SR 1003 (Buffalo Road)

Division 4	Johnston County	Archer Lodge
PLAN DATE: April 2025	REVIEWED BY: M.L. Stygles	
PREPARED BY: L. Gottlieb	REVIEWED BY: J. Ma	
REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED
FINAL UNLESS ALL
SIGNATURES COMPLETED



Signed by: *Matthew L. Stygles* 4/24/2025
DATE
SIG. INVENTORY NO. 04-1181T2

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

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.

Start Up Parameters

StartUp Clearance Hold
6

Unit Flash Parameters

All Red Flash Exit Time
6

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 heads 31 and 71 to run protected turns only.

VEH DET PLAN 2: Disables phase 8 call on loop 3A and reduces delay time for phase 3 call on loop 3A to 3 seconds.

Disables phase 4 call on loop 7A and reduces delay time for phase 7 call on loop 7A to 3 seconds.

FLASHER CIRCUIT MODIFICATION DETAIL

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

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

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 04-1181T2
DESIGNED: April 2025
SEALED: 04/24/25
REVISED: N/A



Electrical Detail - Sheet 3 of 3 - Temporary Design 2

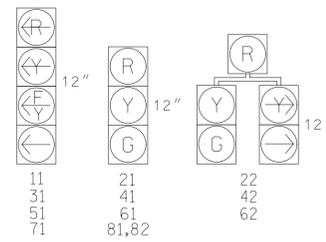
	ELECTRICAL AND PROGRAMMING DETAILS FOR: SR 1700 (Covered Bridge Road) at SR 1003 (Buffalo Road)		
	Prepared In the Offices of: 	Division 4 Johnston County Archer Lodge PLAN DATE: April 2025 REVIEWED BY: M.L. Stygles PREPARED BY: L. Gottlieb REVIEWED BY: J. Ma	

DEFAULT PHASING DIAGRAM

ALTERNATE PHASING DIAGRAM

SIGNAL FACE I.D.

All Heads L.E.D.



DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE										
	Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3+7	Ø3+8	Ø4+7	Ø4+8	FLASH	FL	FSH
11	←	←	←	←	←	←	←	←	←	←	←
21	R	R	G	G	R	R	R	R	R	R	R
22	R	R	G	G	R	R	R	R	R	R	R
31	R	R	R	R	←	←	←	←	←	←	←
41	R	R	R	R	R	R	G	G	R	R	R
42	R	R	R	R	R	R	G	G	R	R	R
51	←	←	←	←	←	←	←	←	←	←	←
61	R	G	R	G	R	R	R	R	R	R	R
62	R	G	R	G	R	R	R	R	R	R	R
71	R	R	R	R	←	←	←	←	←	←	←
81.82	R	R	R	R	R	G	R	G	R	R	R

ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE										
	Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3+7	Ø3+8	Ø4+7	Ø4+8	FLASH	FL	FSH
11	←	←	←	←	←	←	←	←	←	←	←
21	R	R	G	G	R	R	R	R	R	R	R
22	R	R	G	G	R	R	R	R	R	R	R
31	R	R	R	R	←	←	←	←	←	←	←
41	R	R	R	R	R	R	G	G	R	R	R
42	R	R	R	R	R	R	G	G	R	R	R
51	←	←	←	←	←	←	←	←	←	←	←
61	R	G	R	G	R	R	R	R	R	R	R
62	R	G	R	G	R	R	R	R	R	R	R
71	R	R	R	R	←	←	←	←	←	←	←
81.82	R	R	R	R	R	G	R	G	R	R	R

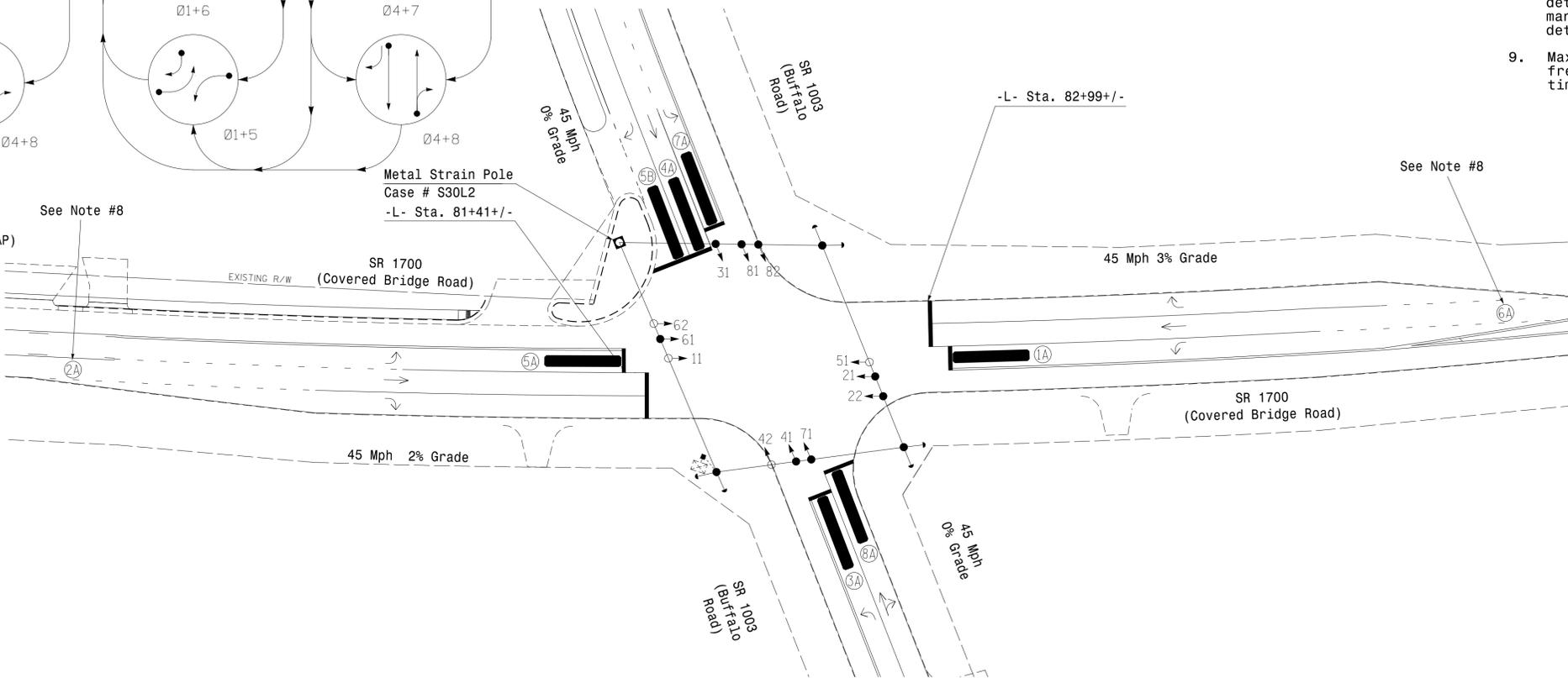
8 PHASE FULLY ACTUATED SR 1700 (COVERED BRIDGE ROAD) CLOSED LOOP SYSTEM

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2024 and "Standard Specifications for Roads and Structures" dated January 2024.
- Do not program signal for late night operation unless otherwise directed by the Engineer.
- Phase 1 and/or phase 5 may be lagged.
- Phase 3 and/or phase 7 may be lagged.
- Reposition existing signal head 61.
- Set all detector units to presence mode.
- The Division Traffic Engineer will determine the hours of use for each phasing plan.
- This intersection features multizone microwave detection. Install detectors according to the manufacturers instructions to achieve the desired detection scheme.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.

PHASING DIAGRAM DETECTION LEGEND

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



MAXTIME TIMING CHART

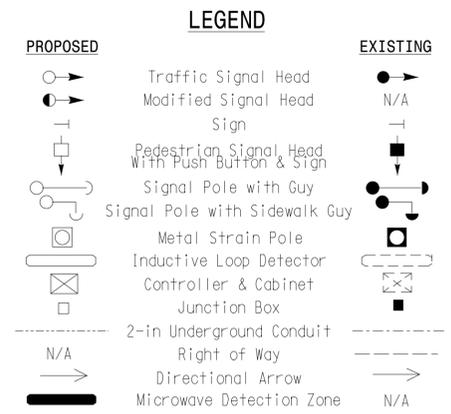
FEATURE	PHASE							
	1	2	3	4	5	6	7	8
Walk *	0	0	0	0	0	0	0	0
Ped Clear *	0	0	0	0	0	0	0	0
Min Green *	7	12	7	7	7	12	7	7
Passage *	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Max I *	15	50	15	40	15	50	15	40
Yellow Change	3.0	4.3	3.0	4.5	3.0	4.3	3.0	4.5
Red Clear	3.3	2.2	3.4	1.9	2.8	2.2	3.3	1.9
Added Initial *	-	-	-	-	-	-	-	-
Maximum Initial *	-	-	-	-	-	-	-	-
Time Before Reduction *	-	-	-	-	-	-	-	-
Time To Reduce *	-	-	-	-	-	-	-	-
Minimum Gap	-	-	-	-	-	-	-	-
Advance Walk	-	-	-	-	-	-	-	-
Non Lock Detector	X	-	X	X	X	-	X	X
Vehicle Recall	-	MIN RECALL	-	-	-	MIN RECALL	-	-
Dual Entry	-	-	-	X	-	-	-	X

MAXTIME DETECTOR INSTALLATION CHART

LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING							
					CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	INITIAL	CALL	NEW CARD	
1A	*	0	*	*	1	15.0*	-	X	-	X	-	*
					6#	3.0	-	X	-	X	-	*
3A	*	0	*	*	3	15.0*	-	X	-	X	-	*
					8#	3.0	-	X	-	X	-	*
4A	*	0	*	*	4	-	-	X	-	X	-	*
5A	*	0	*	*	5	15.0*	-	X	-	X	-	*
					2#	3.0	-	X	-	X	-	*
5B	*	0	*	*	5	-	-	X	-	X	-	*
7A	*	0	*	*	7	15.0*	-	X	-	X	-	*
					4#	3.0	-	X	-	X	-	*
8A	*	0	*	*	8	10.0	-	X	-	X	-	*

RADAR DETECTION SYSTEM

FUNCTION	Sensor 1 (2A)	Sensor 2 (6A)
Channel	1	2
Phase	2	6
Direction of Travel	EB	WB
Detection Zone (ft)	500-100	500-100
Enable Speed	Y	Y
Speed Range (mph)	35-100	35-100
Enable Estimated Time of Arrival	Y	Y
Estimated Time of Arrival (sec)	2.5-6.5	2.5-6.5



* 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.

* Multizone Microwave Detection Zone
 * Reduce Delay to 3 seconds during Alternate Phasing Operation.
 # Disable Phase Calls for Loop during Alternate Phasing Operation.

Signal Upgrade - Final Design

SR 1700 (Covered Bridge Road) at SR 1003 (Buffalo Road)

Division 4 Johnston County Archer Lodge

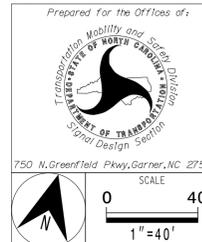
PLAN DATE: February 2025 REVIEWED BY: M.L. Stygles

PREPARED BY: L. Gottlieb REVIEWED BY: J. Ma/J.L. Lewis

SEAL NORTH CAROLINA PROFESSIONAL ENGINEER MATTHEW L. STYGLES

2/4/2025

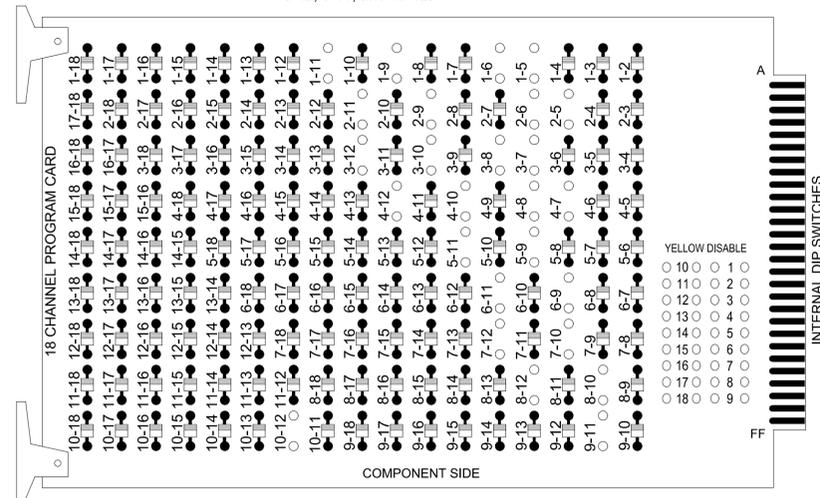
2/3/2025 04:xx:xx.s:q:dsn:20240108.dgn 1:gtt+1:feb



18 CHANNEL CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

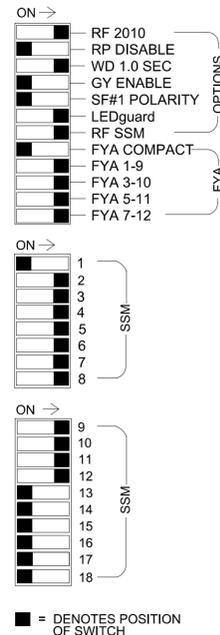
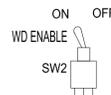
REMOVE DIODE JUMPERS 1-5, 1-6, 1-9, 1-11, 2-5, 2-6, 2-9, 2-11, 3-7, 3-8, 3-10, 3-12, 4-7, 4-8, 4-10, 4-12, 5-9, 5-11, 6-9, 6-11, 7-10, 7-12, 8-10, 8-12, 9-11, and 10-12.



REMOVE JUMPERS AS SHOWN

NOTES:

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



NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the signal plan.
- Program phases 4 and 8 for Dual Entry.
- Program controller to start up in phase 2 Green No Walk and 6 Green No Walk.
- If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
- The cabinet and controller are part of the SR 1700 (Covered Bridge Road) System.

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, S10, S11, AUX S1, AUX S2, AUX S4, AUX S5
 Phases Used.....1, 2, 3, 4, 5, 6, 7, 8
 Overlap "1".....*
 Overlap "2".....*
 Overlap "3".....*
 Overlap "4".....*

*See overlap programming detail on sheet 2

INPUT FILE POSITION LAYOUT

(front view)

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

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

FS = FLASH SENSE
 ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT 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		X		X	
					29 ★	6	3		X		X	
3A	TB4-5,6	I5U	58	20	7 ★	3	15		X		X	
					30 ★	8	3		X		X	
5A	TB3-1,2	J1U	55	17	15 ★	5	15		X		X	
					31 ★	2	3		X		X	
7A	TB5-5,6	J5U	57	19	21 ★	7	15		X		X	
					32 ★	4	3		X		X	

★ For the detectors to work as shown on the signal design plan, see the Detector Programming Detail for Alternate Phasing on Sheet 2 of this plan.

INPUT FILE POSITION LEGEND: J2L



SPECIAL DETECTOR NOTE

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

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	PED	3	4	PED	5	6	PED	7	8	PED	OL1	OL2	SPARE	OL3	OL4	SPARE				
SIGNAL HEAD NO.	11 ★	21,22	NU	31 ★	22	41,42	NU	51 ★	42	61,62	NU	71 ★	62	81,82	NU	11 ★	31 ★	NU	51 ★	71 ★	NU	
RED		128		*	101		*	134		*	107											
YELLOW	*	129			102			135			108											
GREEN		130			103			136			109											
RED ARROW																A121	A124		A114	A101		
YELLOW ARROW					117			132			123					A122	A125		A115	A102		
FLASHING YELLOW ARROW																A123	A126		A116	A103		
GREEN ARROW	127			118	118			133	133		124	124										

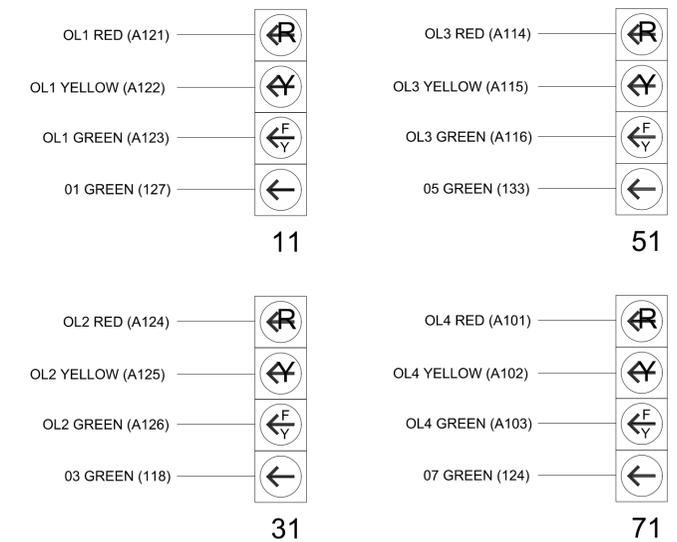
NU = Not Used

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

*See pictorial of head wiring in detail this sheet.

FYA SIGNAL WIRING DETAIL

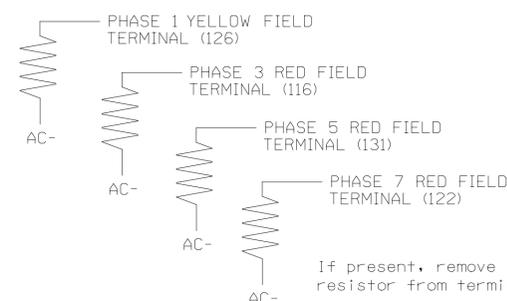
(wire signal heads as shown)



LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown below)

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



If present, remove load resistor from terminal 117.

Electrical Detail - Sheet 1 of 3 - Final Design

Electrical and Programming Details for: SR 1700 (Covered Bridge Road) at SR 1003 (Buffalo Road)

Divison 4 Johnston County Archer Lodge

PLAN DATE: February 2025 REVIEWED BY: M.L. Stygles

PREPARED BY: L. Gottlieb REVIEWED BY: J. Ma/J.L. Lewis

SEAL: 046057

DocuSigned by: M.L. Stygles 2/4/2025

SIG. INVENTORY NO. 04-1181



MAXTIME DETECTOR PROGRAMMING DETAIL FOR ALTERNATE PHASING LOOPS 1A, 3A, 5A & 7A

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
1A	1	1	3.0	
	29	0	-	
3A	7	3	3.0	
	30	0	-	
5A	15	5	3.0	
	31	0	-	
7A	21	7	3.0	
	32	0	-	

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			
Included Phases	2	4	6	8
Modifier Phases	1	3	5	7
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 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			
Included Phases	-	-	-	-
Modifier Phases	1	3	5	7
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

MAXTIME ALTERNATE PHASING PATTERN PROGRAMMING DETAIL

Front Panel
Main Menu >Controller >Coordination >Patterns

Web Interface
Home >Controller >Coordination >Patterns

Pattern Parameters

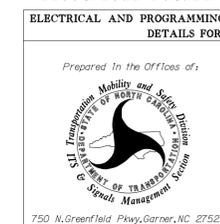
Pattern	Veh Det Plan	Overlap Plan
*	2	2

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 04-1181
DESIGNED: February 2025
SEALED: 02/04/25
REVISED: N/A



Electrical Detail - Sheet 2 of 3 - Final Design



SR 1700 (Covered Bridge Road)
at
SR 1003 (Buffalo Road)

Division 4 Johnston County Archer Lodge
PLAN DATE: February 2025 REVIEWED BY: M.L. Stygles
PREPARED BY: L. Gottlieb REVIEWED BY: J. Ma/J.L. Lewis

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED
FINAL UNLESS ALL
SIGNATURES COMPLETED



DocuSigned by:
Matthew L. Stygles
2/4/2025
304861E84452746C
DATE
SIG. INVENTORY NO. 04-1181

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.

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

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 heads 11, 31, 51, and 71 to run protected turns only.

VEH DET PLAN 2: Disables phase 6 call on loop 1A and reduces delay time for phase 1 call on loop 1A to 3 seconds.

Disables phase 8 call on loop 3A and reduces delay time for phase 3 call on loop 3A to 3 seconds.

Disables phase 2 call on loop 5A and reduces delay time for phase 5 call on loop 5A to 3 seconds.

Disables phase 4 call on loop 7A and reduces delay time for phase 7 call on loop 7A to 3 seconds.

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.

Start Up Parameters

StartUp Clearance Hold
6

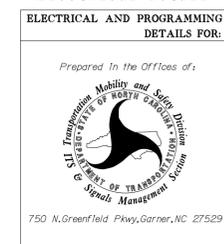
Unit Flash Parameters

All Red Flash Exit Time
6

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 04-1181
DESIGNED: February 2025
SEALED: 02/04/25
REVISED: N/A



Electrical Detail - Sheet 3 of 3 - Final Design



SR 1700 (Covered Bridge Road)
at
SR 1003 (Buffalo Road)

Divison 4	Johnston County	Archer Lodge
PLAN DATE: February 2025	REVIEWED BY: M.L. Stygles	
PREPARED BY: L. Gottlieb	REVIEWED BY: J. Ma/J.L. Lewis	
REVISIONS	INIT.	DATE

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DocSigned by: *Matthew L. Stygles* 2/4/2025
DATE
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SIG. INVENTORY NO. 04-1181