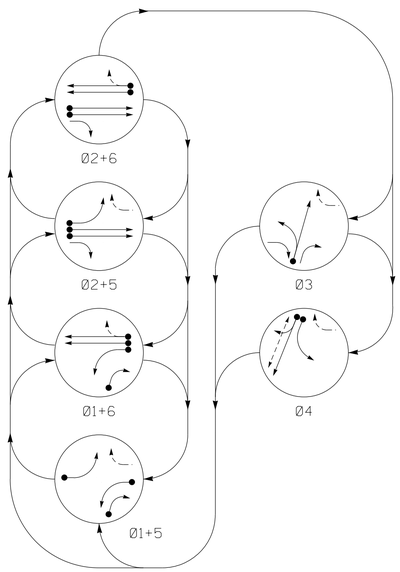
PROJECT REFERENCE NO.	SHEET NO.
U-6022	Sig. 27.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

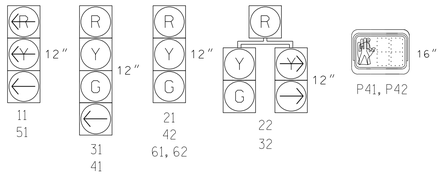
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3	Ø4	FLASH
11	←-	←-	←R	←R	←R	←R	←R
21	R	R	G	G	R	R	Y
22	R	R	G	G	R/→	R	Y
31	R	R	R	R	G/←	R	R
32	R/→	R/→	R	R	G	R	R
41	R	R	R	R	R	G/←	R
42	R	R	R	R	R	G	R
51	←-	←R	←-	←R	←R	←R	←R
61, 62	R	G	R	G	R	R	Y
P41, P42	DW	DW	DW	DW	DW	W	DRK

SIGNAL FACE I.D.

All Heads L.E.D.



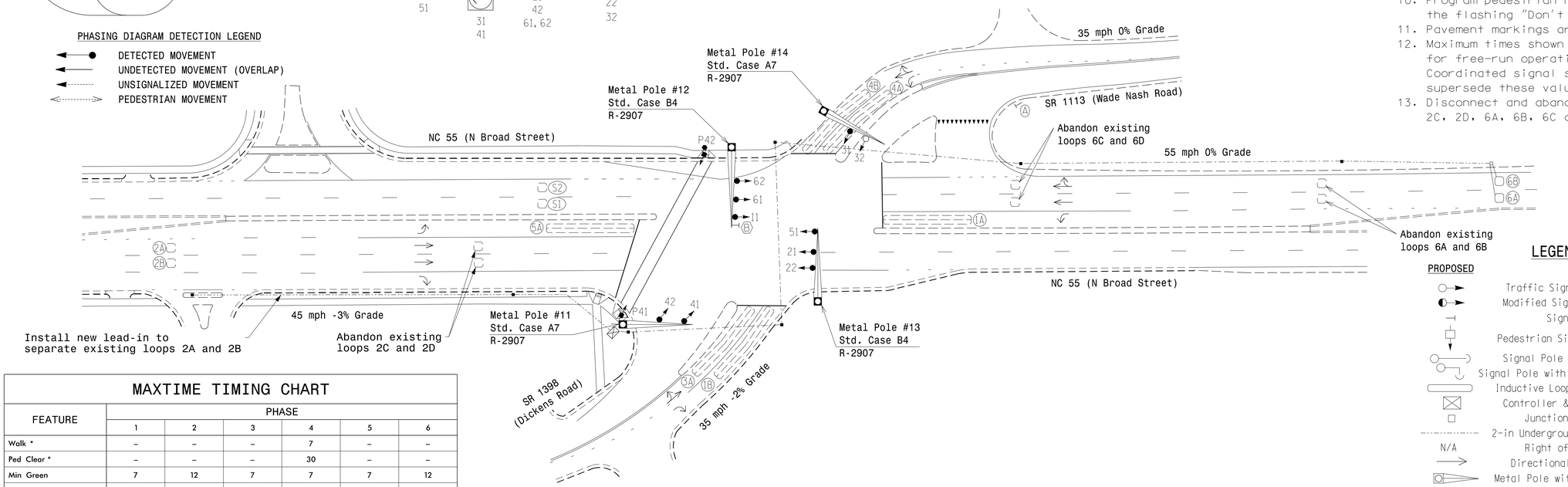
MAXTIME DETECTOR INSTALLATION CHART

LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
1A	6X60	0	2-4-2	-	1	-	-	X	-	X	-	X
1B	6X60	0	2-4-2	-	1	15	-	X	-	X	-	X
2A	6X6	300	EXIST	-	2	-	-	X	X	X	-	X
2B	6X6	300	EXIST	-	2	-	-	X	X	X	-	X
3A	6X60	0	2-4-2	-	3	-	-	X	-	X	-	X
4A	6X60	0	2-4-2	-	4	-	-	X	-	X	-	X
4B	6X60	0	2-4-2	-	4	10	-	X	-	X	-	X
5A	6X60	0	2-4-2	-	5	-	-	X	-	X	-	X
6A	6X6	420	6	X	6	-	-	X	X	X	-	X
6B	6X6	420	6	X	6	-	-	X	X	X	-	X
S1	6X6	+230	EXIST	-	-	-	-	-	-	-	-	X
S2	6X6	+230	EXIST	-	-	-	-	-	-	-	-	X

6 Phase Fully Actuated (Fuquay-Varina Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 and/or phase 5 may be lagged.
4. The order of phase 3 and phase 4 may be reversed.
5. Set all detector units to presence mode.
6. In the event of loop replacement, refer to the current ITS and Signals Design Manual and submit a Plan of Record to the Signal Design Section.
7. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
8. The cabinet should be designed to include an Auxilliary Output File for future use.
9. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
10. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
11. Pavement markings are existing.
12. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
13. Disconnect and abandon existing loops 2C, 2D, 6A, 6B, 6C and 6D.



LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
▯↓	Pedestrian Signal Head	■↓
○	Signal Pole with Guy	●
○	Signal Pole with Sidewalk Guy	●
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
□	Junction Box	■
----	2-in Underground Conduit	----
N/A	Right of Way	----
→	Directional Arrow	→
○	Metal Pole with Mastarm	■
⬡	Type II Signal Pedestal	⬢
N/A	Curb Ramp	♿
Ⓐ	"YIELD" Sign (R1-2)	Ⓐ
Ⓑ	"U-TURN YIELD TO RIGHT TURN" Sign (R10-16)	Ⓑ

MAXTIME TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6
Walk *	–	–	–	7	–	–
Ped Clear *	–	–	–	30	–	–
Min Green	7	12	7	7	7	12
Passage *	1.5	6.0	1.5	1.5	1.5	6.0
Max 1 *	15	90	25	35	15	90
Yellow Change	3.2	4.8	4.0	3.8	3.3	5.2
Red Clear	3.1	2.1	2.2	2.4	3.5	1.7
Added Initial *	–	2.0	–	–	–	1.5
Maximum Initial *	–	34	–	–	–	46
Time Before Reduction *	–	15	–	–	–	15
Time To Reduce *	–	30	–	–	–	30
Minimum Gap	–	3.0	–	–	–	3.4
Advance Walk	–	–	–	3	–	–
Non Lock Detector	X	–	X	X	X	–
Vehicle Recall	–	MIN RECALL	–	–	–	MIN RECALL
Dual Entry	–	–	–	–	–	–

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

Signal Upgrade

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

NC 55 (N Broad Street) at SR 1398 (Dickens Road)/ SR 1113 (Wade Nash Road)

Division 5 | Wake County | Fuquay-Varina

PLAN DATE: April 2023 | REVIEWED BY: AM Encarnacion

PREPARED BY: JT Stiff | REVIEWED BY: PL Alexander

REVISIONS	INIT.	DATE

SCALE 0 40 1"=40'

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 044476 ENGINEER ANTHONY M. ENCARNACION

Designed by: Anthony Encarnacion 4/14/2023
CHECKED BY SIGNATURE DATE

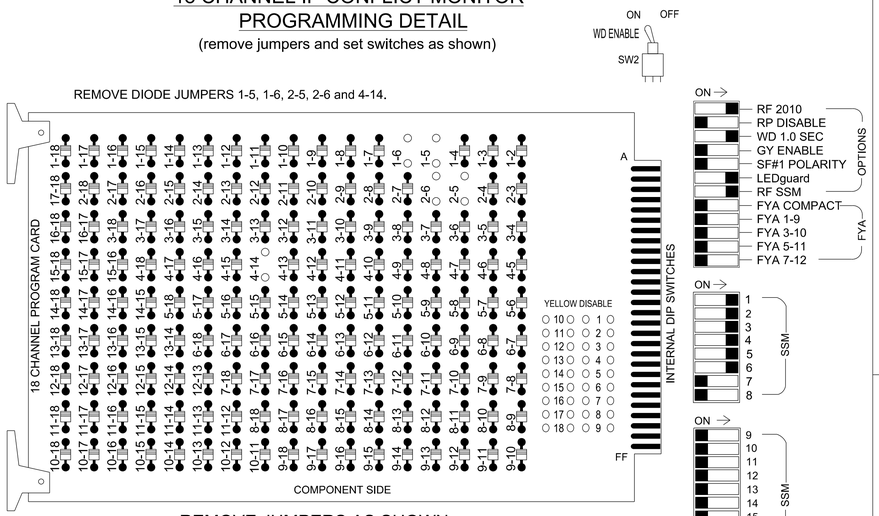
SIG. INVENTORY NO. 05-1817

ATKINS
1616 EAST MILLBROOK ROAD, SUITE 160
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888 NCBEES #F-0326

PROJECT REFERENCE NO.	SHEET NO.
U-6022	Sig. 27.1

18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE JUMPERS AS SHOWN

NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that the Red Enable is active at all times during normal operation.
4. 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. Program controller to start up in phase 2 Green No Walk and 6 Green No Walk.
3. The cabinet and controller are part of the Fuquay-Varina Signal 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, S6, S7, S8
Phases Used.....1, 2, 3, 4, 4PED, 5, 6
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.	11	32	21,22	NU	22	31	32	41	42	P41, P42	51	61,62	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU
RED			128			116	116	101	101			134										
YELLOW			129			117	117	102	102			135										
GREEN			130			118	118	103	103			136										
RED ARROW	125										131											
YELLOW ARROW	126	126			117						132											
GREEN ARROW	127	127			118	118		103			133											
										104												
										106												

NU = Not Used

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	ø1 1A	ø2 2A	ø1 1B	SLOT EMPTY	ø3 3A	ø4 4A	SLOT EMPTY	SLOT EMPTY	SYS. DET. S1	SLOT EMPTY	SLOT EMPTY	NOT USED	SLOT EMPTY	FS DC ISOLATOR
	L	NOT USED	ø2 2B	NOT USED		NOT USED	ø4 4B			SYS. DET. S2			ø4 PED DC ISOLATOR		ST DC ISOLATOR
FILE "J"	U	ø5 5A	ø6 6A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L	NOT USED	ø6 6B												

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT 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			X		X	
2A	TB2-5,6	I2U	39	1	2	2			X	X	X	
2B	TB2-7,8	I2L	43	5	3	2			X	X	X	
1B	TB2-9,10	I3U	63	29	4	1	15		X		X	
3A	TB4-5,6	I5U	58	20	7	3			X		X	
4A	TB4-9,10	I6U	41	3	8	4			X		X	
4B	TB4-11,12	I6L	45	7	9	4	10		X		X	
*S1	TB6-9,10	I9U	60	22	13	SYS						
*S2	TB6-11,12	I9L	62	24	14	SYS						
5A	TB3-1,2	J1U	55	17	15	5			X		X	
6A	TB3-5,6	J2U	40	2	16	6			X	X	X	
6B	TB3-7,8	J2L	44	6	17	6			X	X	X	
PED PUSH BUTTONS												
P41,P42	TB8-5,6	I12L	69	35	4	PED 4						

NOTE:
INSTALL DC ISOLATORS IN INPUT FILE SLOT I12.

*System detector only. Remove any assigned vehicle phase.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1817
DESIGNED: APRIL 2023
SEALED: 4/14/2023
REVISED: N/A

Electrical Detail

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Electrical and Programming Details For:

NC 55 (N Broad Street)
at
SR 1398 (Dickens Road)/
SR 1113 (Wade Nash Road)

Division 5 | Wake County | Fuquay-Varina

PLAN DATE: April 2023 | REVIEWED BY: AM Encarnacion
PREPARED BY: JT Stiff | REVIEWED BY: PL Alexander

REVISIONS	INIT.	DATE

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

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 044476 ENGINEER ANTHONY M ENCARNACION

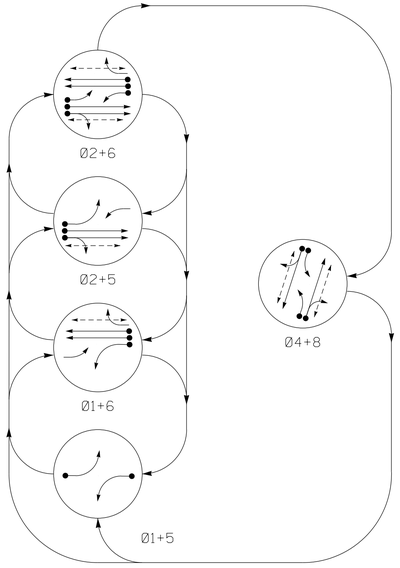
Digitally Signed by: Anthony Encarnacion 4/14/2023
DocuSign SIGNATURE DATE

SIG. INVENTORY NO. 05-1817

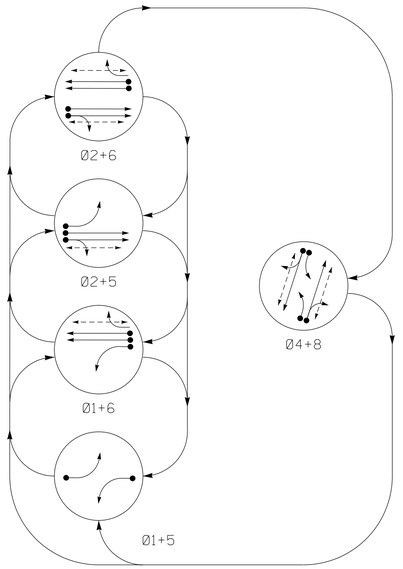
ATKINS 1616 EAST MILLBROOK ROAD, SUITE 160
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888 NCBEES #F-0326

PROJECT REFERENCE NO.	SHEET NO.
U-6022	Sig. 28.0

DEFAULT PHASING DIAGRAM



ALTERNATE PHASING DIAGRAM



DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE 01+5	01+6	02+5	02+6	04+8	FLASH
11	←—	←—	←F/Y	←F/Y	←R	←Y
21, 22	R	R	G	G	R	Y
41	←R	←R	←R	←R	←F/Y	←R
42, 43	R	R	R	R	G	R
51	←—	←F/Y	←—	←F/Y	←R	←Y
61, 62	R	G	R	G	R	Y
81	←R	←R	←R	←R	←F/Y	←R
82, 83	R	R	R	R	G	R
P21, P22	DW	DW	W	W	DW	DRK
P41, P42	DW	DW	DW	DW	W	DRK
P61, P62	DW	W	DW	W	DW	DRK
P81, P82	DW	DW	DW	DW	W	DRK

ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE 01+5	01+6	02+5	02+6	04+8	FLASH
11	←—	←—	←R	←R	←R	←Y
21, 22	R	R	G	G	R	Y
41	←R	←R	←R	←R	←F/Y	←R
42, 43	R	R	R	R	G	R
51	←—	←R	←—	←R	←R	←Y
61, 62	R	G	R	G	R	Y
81	←R	←R	←R	←R	←F/Y	←R
82, 83	R	R	R	R	G	R
P21, P22	DW	DW	W	W	DW	DRK
P41, P42	DW	DW	DW	DW	W	DRK
P61, P62	DW	W	DW	W	DW	DRK
P81, P82	DW	DW	DW	DW	W	DRK

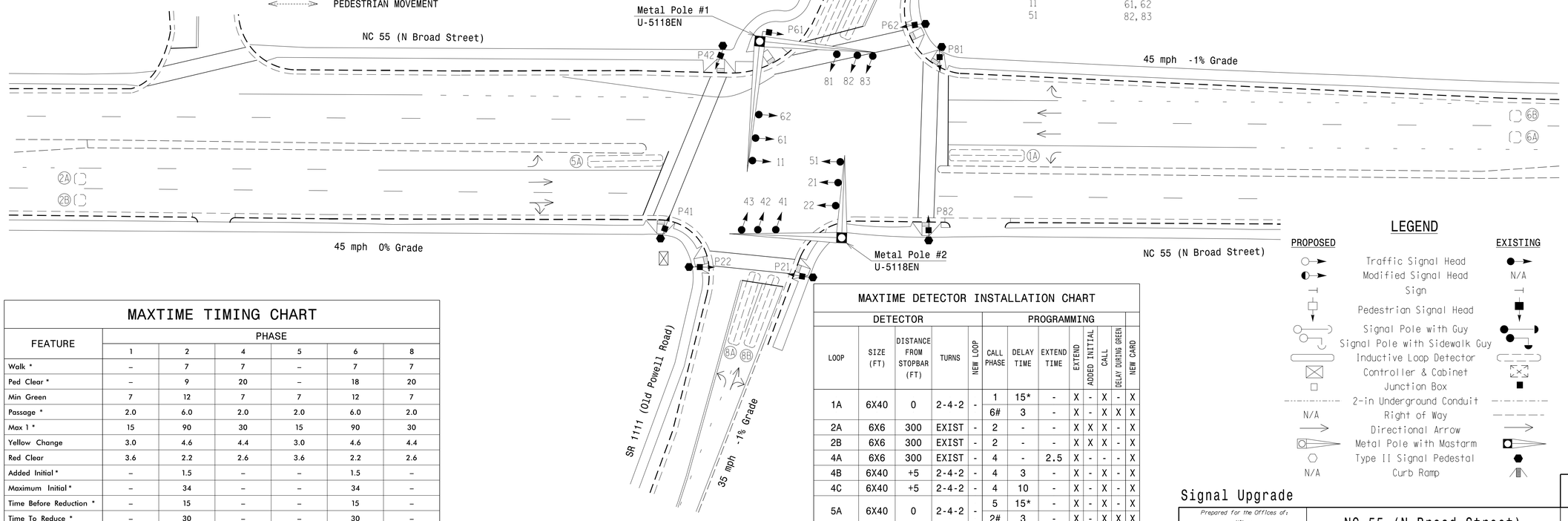
5 Phase
Fully Actuated
(Fuquay-Varina Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 and/or phase 5 may be lagged.
4. Set all detector units to presence mode.
5. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
6. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
7. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
8. Pavement markings are existing.
9. The Division Traffic Engineer will determine the hours of use for each phasing plan.
10. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.

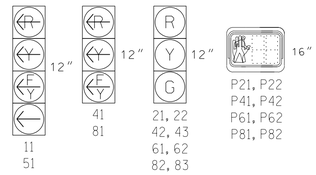
PHASING DIAGRAM DETECTION LEGEND

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



SIGNAL FACE I.D.

All Heads L.E.D.



MAXTIME TIMING CHART

FEATURE	PHASE 1	2	4	5	6	8
Walk *	–	7	7	–	7	7
Ped Clear *	–	9	20	–	18	20
Min Green	7	12	7	7	12	7
Passage *	2.0	6.0	2.0	2.0	6.0	2.0
Max 1 *	15	90	30	15	90	30
Yellow Change	3.0	4.6	4.4	3.0	4.6	4.4
Red Clear	3.6	2.2	2.6	3.6	2.2	2.6
Added Initial *	–	1.5	–	–	1.5	–
Maximum Initial *	–	34	–	–	34	–
Time Before Reduction *	–	15	–	–	15	–
Time To Reduce *	–	30	–	–	30	–
Minimum Gap	–	3.0	–	–	3.0	–
Advance Walk	–	3	3	–	3	3
Non Lock Detector	X	–	X	X	–	X
Vehicle Recall	–	MIN RECALL	–	–	MIN RECALL	–
Dual Entry	–	–	X	–	–	X

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

MAXTIME DETECTOR INSTALLATION CHART

DETECTOR LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
1A	6X40	0	2-4-2	-	1	15*	-	X	-	X	-	X
					6#	3	-	X	-	X	X	X
2A	6X6	300	EXIST	-	2	-	-	X	X	X	-	X
2B	6X6	300	EXIST	-	2	-	-	X	X	X	-	X
4A	6X6	300	EXIST	-	4	-	2.5	X	-	-	-	X
4B	6X40	+5	2-4-2	-	4	3	-	X	-	X	-	X
4C	6X40	+5	2-4-2	-	4	10	-	X	-	X	-	X
5A	6X40	0	2-4-2	-	5	15*	-	X	-	X	-	X
					2#	3	-	X	-	X	X	X
6A	6X6	300	EXIST	-	6	-	-	X	X	X	-	X
6B	6X6	300	EXIST	-	6	-	-	X	X	X	-	X
8A	6X40	+5	2-4-2	-	8	3	-	X	-	X	-	X
8B	6X40	+5	2-4-2	-	8	10	-	X	-	X	-	X

* Disable delay during alternate phasing operation
\# Disable phase call for loop(s) during alternate phasing operation

LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
	Metal Pole with Mastarm	
	Type II Signal Pedestal	
N/A	Curb Ramp	

Signal Upgrade

ATKINS
1616 EAST MILLBROOK ROAD, SUITE 160
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888 NCBEES #F-0326

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

NC 55 (N Broad Street)
at
SR 1111 (Old Powell Road)

Division 5 Wake County Fuquay-Varina

PLAN DATE:	April 2023	REVIEWED BY:	AM Encarnacion
PREPARED BY:	JT Stiff	REVIEWED BY:	PL Alexander

SCALE 0 30 1"=30'

REVISIONS	INIT.	DATE

Authorized by: Anthony Encarnacion 4/14/2023
ORIGINATOR'S SIGNATURE DATE

SIG. INVENTORY NO. 05-1818

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 044476 ENGINEER ANTHONY M. ENCARNACION

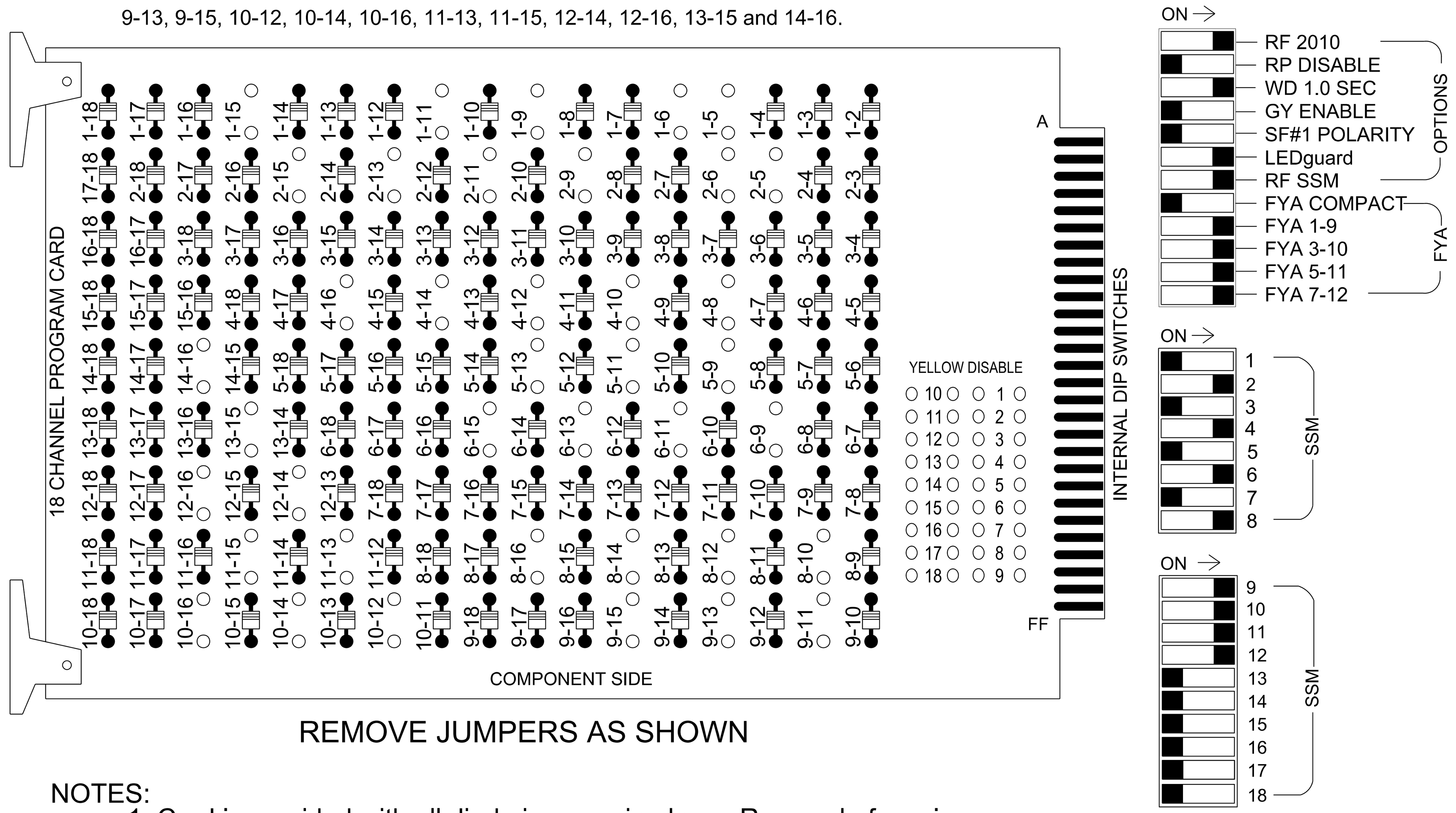
PROJECT REFERENCE NO.	SHEET NO.
U-6022	Sig. 28.1

18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 1-5, 1-6, 1-9, 1-11, 1-15, 2-5, 2-6, 2-9, 2-11, 2-13, 2-15, 4-8, 4-10, 4-12, 4-14, 4-16, 5-9, 5-11, 5-13, 6-9, 6-11, 6-13, 6-15, 8-10, 8-12, 8-14, 8-16, 9-11, 9-13, 9-15, 10-12, 10-14, 10-16, 11-13, 11-15, 12-14, 12-16, 13-15 and 14-16.

ON OFF
WD ENABLE
SW2



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. 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. 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. The cabinet and controller are part of the Fuquay-Varina Signal 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, S3, S5, S6, S7, S8, S9, S11, S12, AUX S1, AUX S2, AUX S4, AUX S5
Phases Used.......................................1, 2, 2PED, 4, 4PED, 5, 6, 6PED, 8, 8PED
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	P21, P22	NU	42,43	P41, P42	51★	61,62	P61, P62	NU	82,83	P81, P82	11★	81★	NU	51★	41★	NU
RED		128			101			134			107							
YELLOW	*	129			102		*	135			108							
GREEN		130			103			136			109							
RED ARROW													A121	A124		A114	A101	
YELLOW ARROW													A122	A125		A115	A102	
FLASHING YELLOW ARROW													A123	A126		A116	A103	
GREEN ARROW	127						133											
(Don't Walk hand)			113			104			119			110						
(Walk person)			115			106			121			112						

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

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)

INPUT FILE POSITION LAYOUT

(front view)

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

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	X
2A	TB2-5,6	I2U	39	1	2	2			X	X	X	
2B	TB2-7,8	I2L	43	5	3	2			X	X	X	
4A	TB4-9,10	I6U	41	3	8	4		2.5	X			
4B	TB4-11,12	I6L	45	7	9	4	3		X		X	
4C	TB6-1,2	I7U	65	31	10	4	10		X		X	
5A	TB3-1,2	J1U	55	17	15 ★	5	15		X		X	
				-	31 ★	2	3		X		X	X
6A	TB3-5,6	J2U	40	2	16	6			X	X	X	
6B	TB3-7,8	J2L	44	6	17	6			X	X	X	
8A	TB5-9,10	J6U	42	4	22	8	3		X		X	
8B	TB5-11,12	J6L	46	8	23	8	10		X		X	
PED PUSH BUTTONS												
P21,P22	TB8-4,6	I12U	67	33	2	PED 2						
P41,P42	TB8-5,6	I12L	69	35	4	PED 4						
P61,P62	TB8-7,9	I13U	68	34	6	PED 6						
P81,P82	TB8-8,9	I13L	70	36	8	PED 8						

NOTE:
INSTALL DC ISOLATORS IN INPUT FILE SLOTS I12 AND I13.

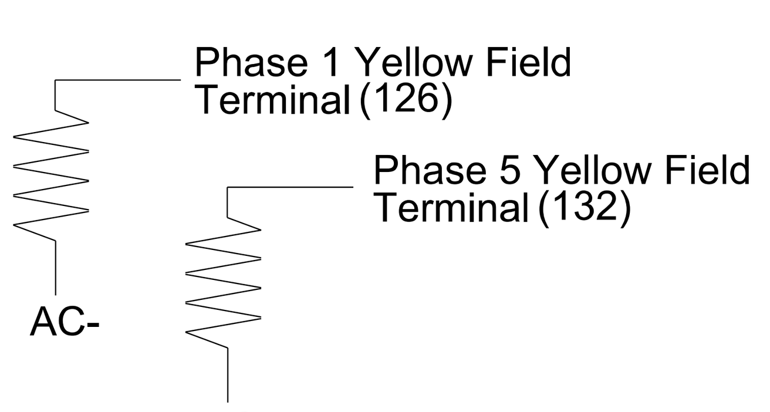
★ For the detectors to work as shown on the signal design plan, see the Vehicle Detector Setup Programming Detail for Alternate Phasing on sheet 2.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

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



COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1818
DESIGNED: APRIL 2023
SEALED: 4/14/2023
REVISED: N/A

ATKINS 1616 EAST MILLBROOK ROAD, SUITE 160
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888 NCBEES #F-0326

Electrical Detail - Sheet 1 of 2

Electrical and Programming Details For:

NC 55 (N Broad Street)
at
SR 1111 (Old Powell Road)

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

Division 5 | Wake County | Fuquay-Varina
PLAN DATE: April 2023 | REVIEWED BY: AM Encarnacion
PREPARED BY: JT Stiff | REVIEWED BY: PL Alexander

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 044476 ANTHONY M. ENCARNACION

DocuSigned by: Anthony Encarnacion 4/14/2023
SIGNATURE DATE

SIG. INVENTORY NO. 05-1818

PROJECT REFERENCE NO.	SHEET NO.
U-6022	Sig. 28.2

MAXTIME OVERLAP PROGRAMMING DETAIL FOR DEFAULT PHASING

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

Overlap Plan 1

Overlap	1	2	3	4
Type	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section
Included Phases	2	4	6	8
Modifier Phases	1	-	5	-
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	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section
Included Phases	-	4	-	8
Modifier Phases	1	-	5	-
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.

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

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

Web Interface
Home >Controller >Detector Configuration >Vehicle Detectors

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

1A

Detector	Call Phase	Delay
1	1	0
29	0	-

5A

Detector	Call Phase	Delay
15	5	0
31	0	-

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.

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 and 51 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.

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1818
DESIGNED: APRIL 2023
SEALED: 4/14/2023
REVISED: N/A

ATKINS 1616 EAST MILLBROOK ROAD, SUITE 160
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888 NCBEES #F-0326

Electrical Detail - Sheet 2 of 2

Electrical and Programming Details For:

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

NC 55 (N Broad Street)
at
SR 1111 (Old Powell Road)

Division 5 | Wake County | Fuquay-Varina

PLAN DATE:	April 2023	REVIEWED BY:	AM Encarnacion
PREPARED BY:	JT Stiff	REVIEWED BY:	PL Alexander

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

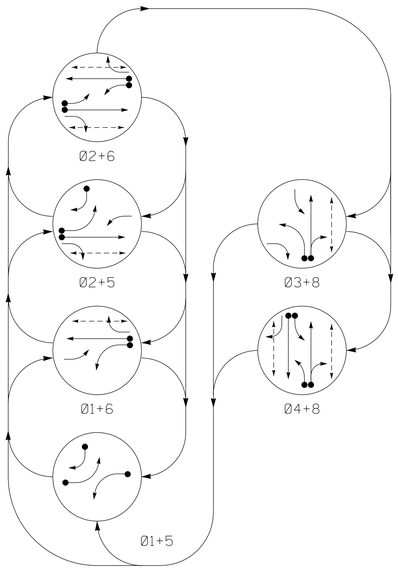
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 044476 ENGINEER ANTHONY M. ENCARNACION

DocuSigned by: Anthony Encarnacion
D8EC537F8...
SIGNATURE 4/14/2023 DATE

SIG. INVENTORY NO. 05-1818

PROJECT REFERENCE NO.	SHEET NO.
U-6022	Sig. 29.0

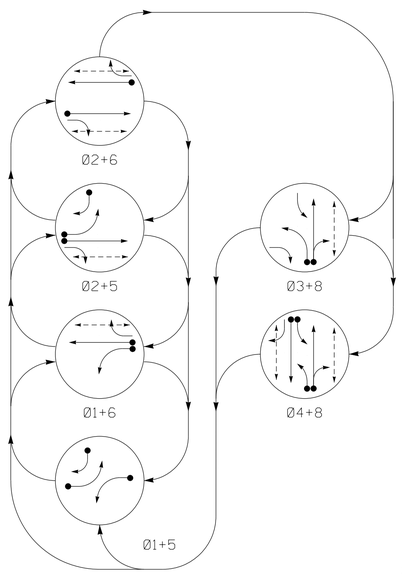
DEFAULT PHASING DIAGRAM



DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3+8	Ø4+8	FLASH
11	←-	←-	F Y	F Y	-R	-R	-Y
21	R	R	G	G	R	R	Y
22	R	R	G	G	R/	R	Y
31	-R	-R	-R	-R	←-	F Y	-R
41	-R	-R	-R	-R	F Y	F Y	-R
42	R	R	R	R	R	G	R
43	R/	R	R/	R	R	G	R
51	←-	F Y	←-	F Y	-R	-R	-Y
61, 62	R	G	R	G	R	R	Y
81, 82	R	R	R	R	G	G	R
P21, P22	DW	DW	W	W	DW	DW	DRK
P41, P42	DW	DW	DW	DW	DW	W	DRK
P61, P62	DW	W	DW	W	DW	DW	DRK
P81, P82	DW	DW	DW	DW	W	W	DRK

ALTERNATE PHASING DIAGRAM



ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3+8	Ø4+8	FLASH
11	←-	←-	-R	-R	-R	-R	-Y
21	R	R	G	G	R	R	Y
22	R	R	G	G	R/	R	Y
31	-R	-R	-R	-R	←-	F Y	-R
41	-R	-R	-R	-R	F Y	F Y	-R
42	R	R	R	R	R	G	R
43	R/	R	R/	R	R	G	R
51	←-	-R	←-	-R	-R	-R	-Y
61, 62	R	G	R	G	R	R	Y
81, 82	R	R	R	R	G	G	R
P21, P22	DW	DW	W	W	DW	DW	DRK
P41, P42	DW	DW	DW	DW	W	W	DRK
P61, P62	DW	W	DW	W	DW	DW	DRK
P81, P82	DW	DW	DW	DW	W	W	DRK

MAXTIME DETECTOR INSTALLATION CHART

DETECTOR LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND ADDED INITIAL	CALL DELAY DURING GREEN	NEW CARD
1A	6X40	0	2-4-2	-	1	15*	-	X -	X -	-
					6#	3	-	X -	X X	-
2A	6X6	300	EXIST	-	2	-	-	X X	X -	-
3A	6X40	0	2-4-2	-	3	15	-	X -	X -	-
					8	-	-	X -	X -	-
4A	6X40	0	2-4-2	-	4	-	-	X -	X -	-
4B	6X40	0	2-4-2	-	4	-	-	X -	X -	-
@4C	4X6	0	EXIST	-	4	-	-	X -	X -	-
5A	6X40	0	2-4-2	-	5	15*	-	X -	X -	-
					2#	3	-	X -	X X	-
5B	6X40	0	2-4-2	-	5	15	-	X -	X -	-
6A	6X6	300	EXIST	-	6	-	-	X X	X -	-
8A	6X40	0	2-4-2	-	8	10	-	X -	X -	-
@8B	6X6	0	EXIST	-	8	-	-	X -	X -	-

@ Set sensitivity to appropriate level to detect bicycles
* Reduce delay to 3 seconds during alternate phasing operation
\# Disable phase call for loop(s) during alternate phasing operation

6 Phase Fully Actuated (Fuquay-Varina Signal System)

NOTES

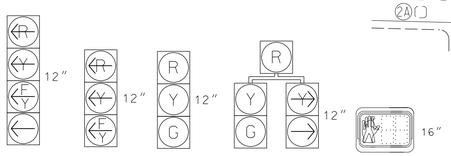
1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 and/or phase 5 may be lagged.
4. Phase 3 may be lagged.
5. Renumber existing signal heads 82 and 83 as 81 and 82, respectively.
6. Renumber existing loop 8A, 8B and 8C as 3A, 8A and 8B, respectively.
7. Set all detector units to presence mode.
8. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
9. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
10. Pavement markings are existing.
11. The Division Traffic Engineer will determine the hours of use for each phasing plan.
12. Install new controller, software and conflict monitor in existing cabinet.
13. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.

PHASING DIAGRAM DETECTION LEGEND

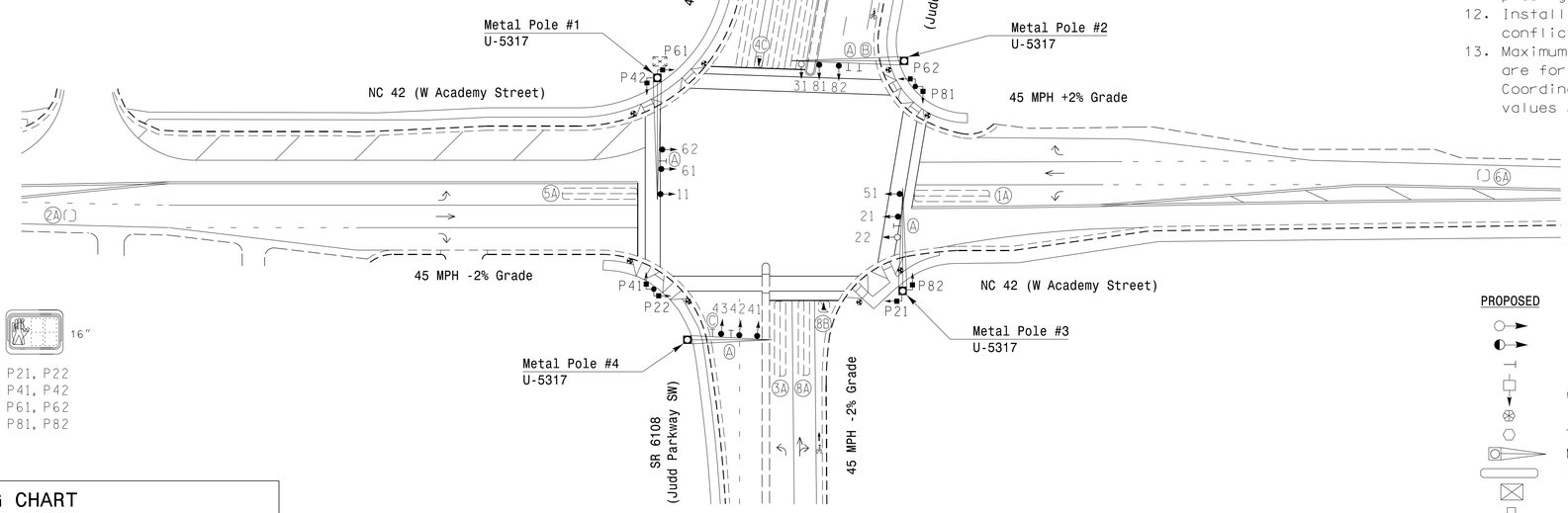
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

SIGNAL FACE I.D.

All Heads L.E.D.



11, 31, 51 | 41 | 21, 42, 61, 62, 81, 82 | 22, 43 | P21, P22, P41, P42, P61, P62, P81, P82



LEGEND

PROPOSED		EXISTING
○►	Traffic Signal Head	●►
◐►	Modified Signal Head	N/A
⊣	Sign	⊣
□	Pedestrian Signal Head With Push Button & Sign	■
⊛	Type I Pushbutton Post	✪
⬡	Type II Signal Pedestal	⬢
○	Metal Pole with Mastarm	○
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
□	Junction Box	■
N/A	Curb Ramp	◢
·-·-·-·	2-in Underground Conduit	·-·-·-·
N/A	Right of Way	– – – –
→	Directional Arrow	→
Ⓐ	Street Sign (D3-1)	Ⓐ
Ⓑ	"TURNING VEHICLES YIELD TO PEDESTRIAN" Sign (R10-15R)	Ⓑ
Ⓒ	Right Arrow "ONLY" Sign (R3-5R)	Ⓒ

MAXTIME TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6	8
Walk *	–	7	–	7	–	7	7
Ped Clear *	–	23	–	20	–	26	19
Min Green	7	12	7	7	7	12	7
Passage *	2.0	6.0	2.0	2.0	2.0	6.0	2.0
Max 1 *	20	60	20	30	20	60	30
Yellow Change	3.0	4.7	3.0	4.7	3.0	4.7	4.7
Red Clear	3.3	2.1	3.3	1.9	3.5	2.1	1.9
Added Initial *	–	2.5	–	–	–	2.5	–
Maximum Initial *	–	34	–	–	–	34	–
Time Before Reduction *	–	15	–	–	–	15	–
Time To Reduce *	–	45	–	–	–	45	–
Minimum Gap	–	3.0	–	–	–	3.0	–
Advance Walk	–	3	–	3	–	3	3
Non Lock Detector	X	–	X	X	X	–	X
Vehicle Recall	–	MIN RECALL	–	–	–	MIN RECALL	–
Dual Entry	–	–	–	X	–	–	X

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

Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

NC 42 (W Academy Street) at SR 6108 (Judd Parkway)

Division 5 Wake County Fuquay-Varina

PLAN DATE: April 2023 REVIEWED BY: AM Encarnacion
PREPARED BY: JT Stiff REVIEWED BY: PL Alexander

REVISIONS	INIT.	DATE

SCALE 0 40 1"=40'

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 044476 ENGINEER ANTHONY M. ENCARNACION

Designed by: Anthony Encarnacion 4/14/2023
CHECKED BY SIGNATURE DATE

SIG. INVENTORY NO. 05-1827

ATKINS 1616 EAST MILLBROOK ROAD, SUITE 160 RALEIGH, NORTH CAROLINA 27609 (919) 876-6888 NCBEES #F-0326

14-APR-2023 13:47
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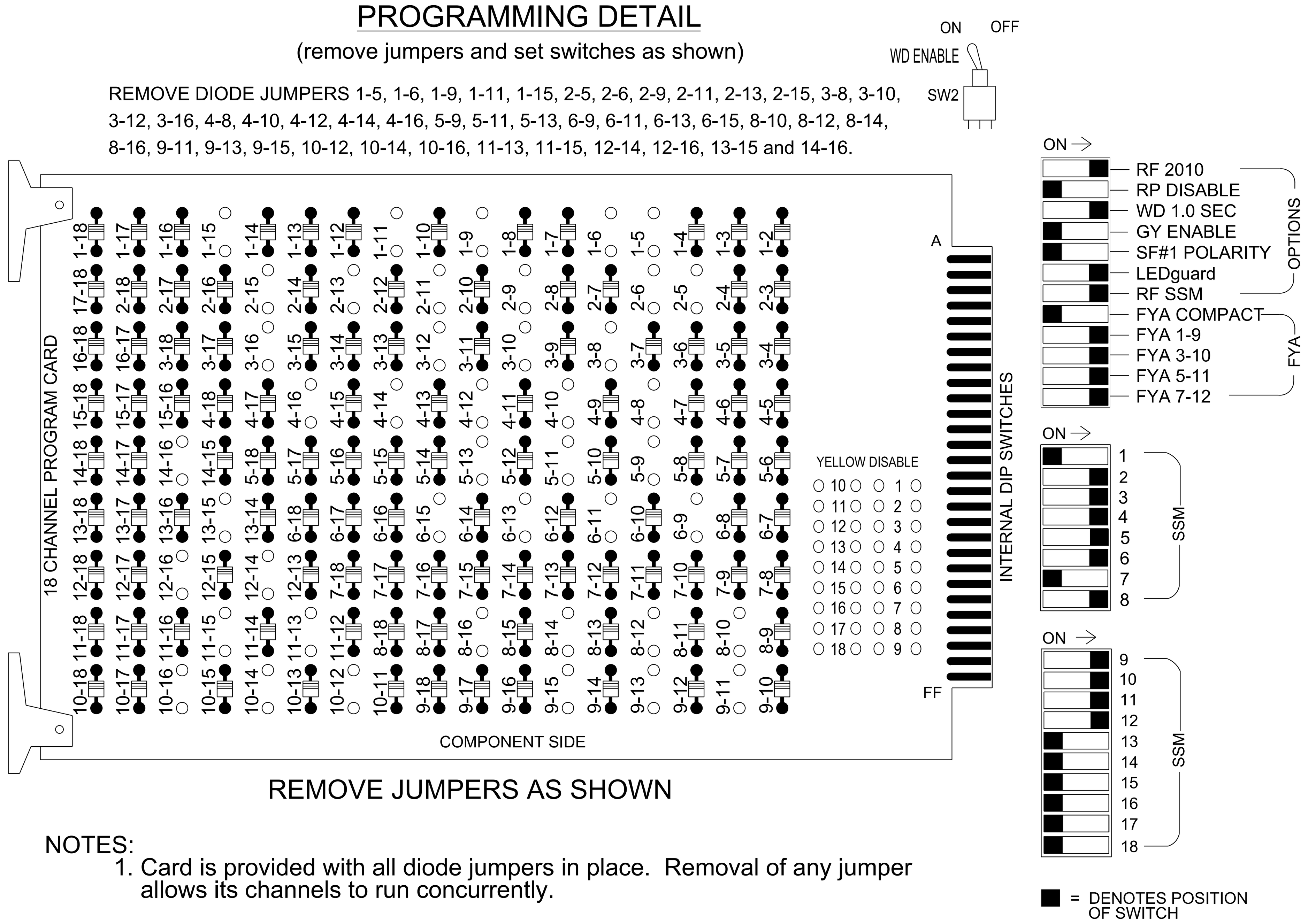
STIF4685 AT LU5491089

PROJECT REFERENCE NO.	SHEET NO.
U-6022	Sig. 29.1

18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 1-5, 1-6, 1-9, 1-11, 1-15, 2-5, 2-6, 2-9, 2-11, 2-13, 2-15, 3-8, 3-10, 3-12, 3-16, 4-8, 4-10, 4-12, 4-14, 4-16, 5-9, 5-11, 5-13, 6-9, 6-11, 6-13, 6-15, 8-10, 8-12, 8-14, 8-16, 9-11, 9-13, 9-15, 10-12, 10-14, 10-16, 11-13, 11-15, 12-14, 12-16, 13-15 and 14-16.



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. 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. 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. The cabinet and controller are part of the Fuquay-Varina Signal 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, S3, S4, S5, S6, S7, S8, S9, S11, S12, AUX S1, AUX S2, AUX S4, AUX S5
Phases Used..1, 2, 2PED, 3, 4, 4PED, 5, 6, 6PED, 8, 8PED
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	P21, P22	22	31★	42,43	P41, P42	43	51★	61,62	P61, P62	NU	81,82	P81, P82	11★	31★	NU	51★	41★	NU
RED		128		*		101		*		134			107							
YELLOW	*	129				102				135			108							
GREEN		130				103				136			109							
RED ARROW															A121	A124		A114	A101	
YELLOW ARROW				117				132							A122	A125		A115	A102	
FLASHING YELLOW ARROW															A123	A126		A116	A103	
GREEN ARROW	127			118	118			133	133											
(Don't Walk symbol)			113				104				119			110						
(Walk symbol)			115				106				121			112						

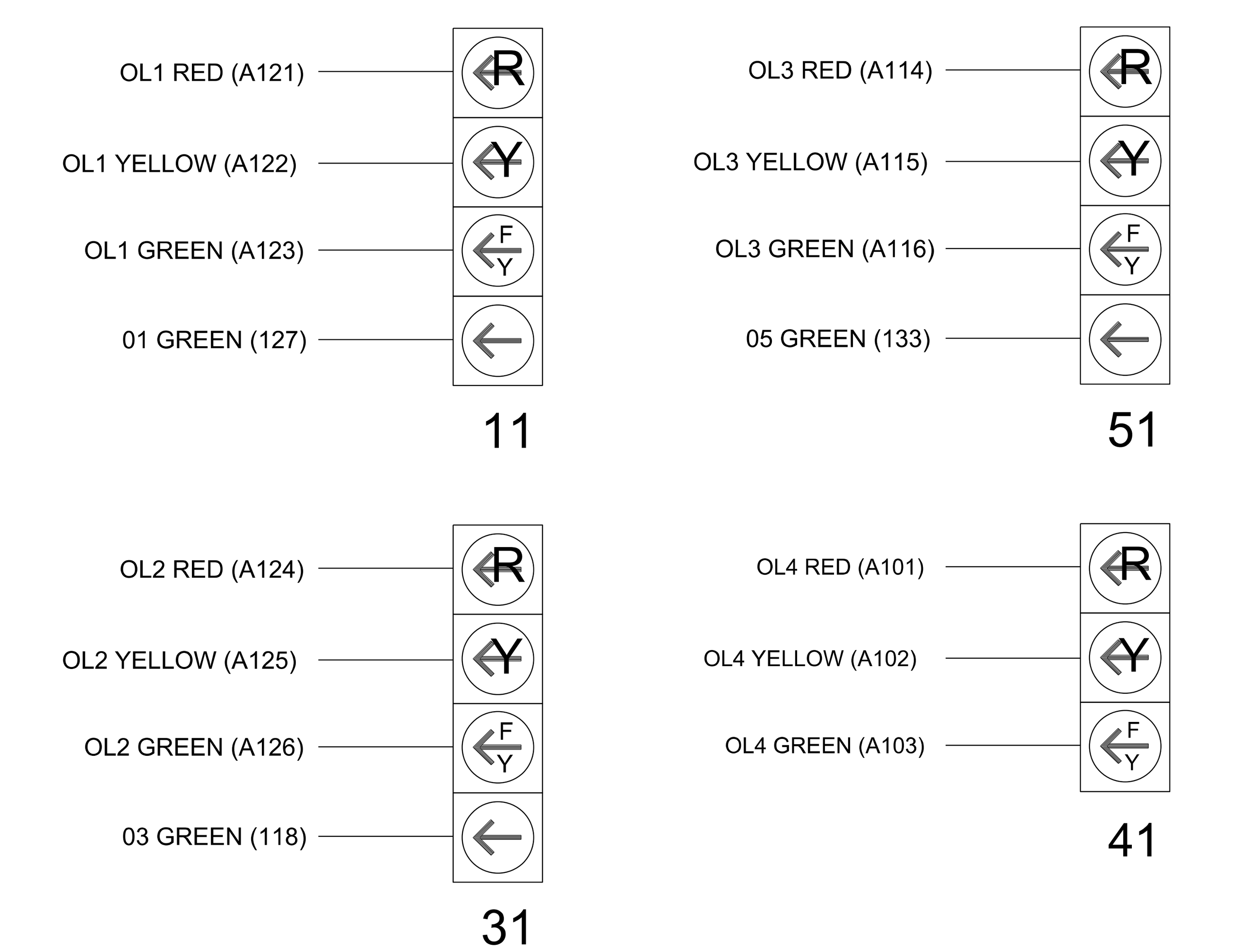
NU = Not Used

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

★ See pictorial of head wiring in detail this sheet.

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



INPUT FILE POSITION LAYOUT

(front view)

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

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	X
2A	TB2-5,6	I2U	39	1	2	2			X	X	X	
3A	TB4-5,6	I5U	58	20	7	3	15		X		X	
				-	30	8			X		X	
4A	TB4-9,10	I6U	41	3	8	4			X		X	
4B	TB4-11,12	I6L	45	7	9	4			X		X	
4C	TB6-1,2	I7U	65	31	10	4			X		X	
5A	TB3-1,2	J1U	55	17	15 ★	5	15		X		X	
				-	31 ★	2	3		X		X	X
5B	TB3-5,6	J2U	40	2	16	5	15		X		X	
6A	TB3-9,10	J3U	64	30	18	6			X	X	X	
8A	TB5-9,10	J6U	42	4	22	8	10		X		X	
8B	TB5-11,12	J6L	46	8	23	8			X		X	
PED PUSH BUTTONS												
P21,P22	TB8-4,6	I12U	67	33	2	PED 2						
P41,P42	TB8-5,6	I12L	69	35	4	PED 4						
P61,P62	TB8-7,9	I13U	68	34	6	PED 6						
P81,P82	TB8-8,9	I13L	70	36	8	PED 8						

NOTE:
INSTALL DC ISOLATORS IN INPUT FILE SLOTS I12 AND I13.

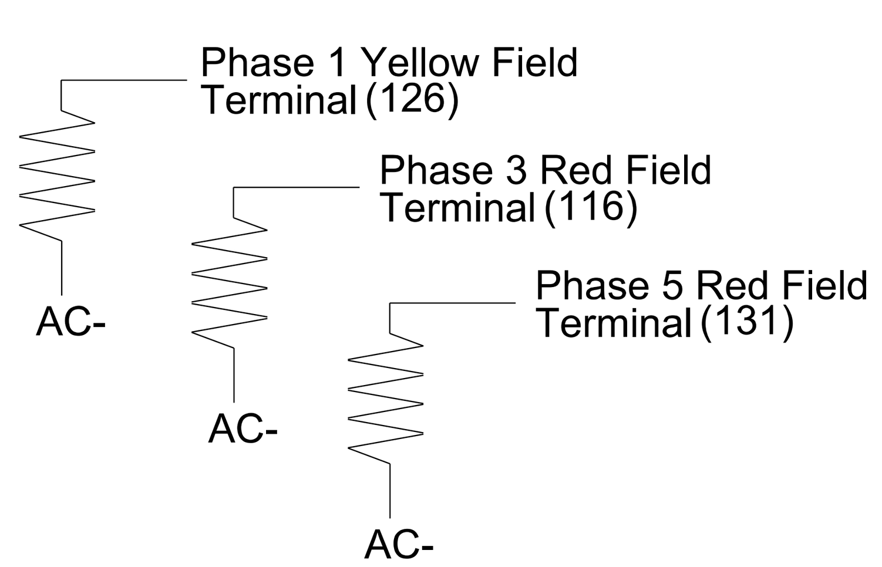
★ For the detectors to work as shown on the signal design plan, see the Vehicle Detector Setup Programming Detail for Alternate Phasing on sheet 2.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

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



COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1827
DESIGNED: APRIL 2023
SEALED: 4/14/2023
REVISED: N/A

ATKINS 1616 EAST MILLBROOK ROAD, SUITE 160
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888 NCBEES #F-0326

Electrical Detail - Sheet 1 of 2

Electrical and Programming Details For:

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

NC 42 (W Academy Street)
at
SR 6108 (Judd Parkway)

Division 5 | Wake County | Fuquay-Varina

PLAN DATE:	April 2023	REVIEWED BY:	AM Encarnacion
PREPARED BY:	JT Stiff	REVIEWED BY:	PL Alexander

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 044476 ENGINEER ANTHONY M. ENCARNACION

DocuSigned by: Anthony Encarnacion
SIGNATURE 4/14/2023 DATE

SIG. INVENTORY NO. 05-1827

PROJECT REFERENCE NO.	SHEET NO.
U-6022	Sig. 29.2

MAXTIME OVERLAP PROGRAMMING DETAIL FOR DEFAULT PHASING

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

Overlap Plan 1

Overlap	1	2	3	4
Type	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section
Included Phases	2	4	6	8
Modifier Phases	1	3	5	-
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	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section
Included Phases	-	4	-	8
Modifier Phases	1	3	5	-
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.

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

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

Web Interface
Home >Controller >Detector Configuration >Vehicle Detectors

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

1A

Detector	Call Phase	Delay
1	1	3
29	0	-

5A

Detector	Call Phase	Delay
15	5	3
31	0	-

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.

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 and 51 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 2 call on loop 5A and reduces delay time for phase 5 call on loop 5A to 3 seconds.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1827
DESIGNED: APRIL 2023
SEALED: 4/14/2023
REVISED: N/A

ATKINS
1616 EAST MILLBROOK ROAD, SUITE 160
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888 NCBEES #F-0326

Electrical Detail - Sheet 2 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Electrical and Programming Details For:

Prepared for the Offices of:
Transportation Mobility and Safety Division
Traffic Signals Management Section
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
750 N. Greenfield Pkwy, Garner, NC 27529

NC 42 (W Academy Street)
at
SR 6108 (Judd Parkway)

Division 5 | Wake County | Fuquay-Varina

PLAN DATE:	April 2023	REVIEWED BY:	AM Encarnacion
PREPARED BY:	JT Stiff	REVIEWED BY:	PL Alexander

REVISIONS	INIT.	DATE

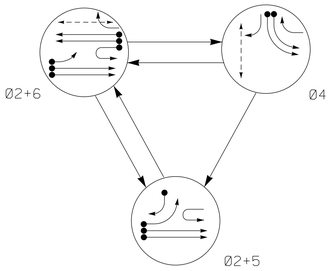
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 044476 ENGINEER ANTHONY M ENCARNACION

Designed by: Anthony Encarnacion 4/14/2023
DESIGNER SIGNATURE DATE

SIG. INVENTORY NO. 05-1827

PROJECT REFERENCE NO.	SHEET NO.
U-6022	Sig. 30.0

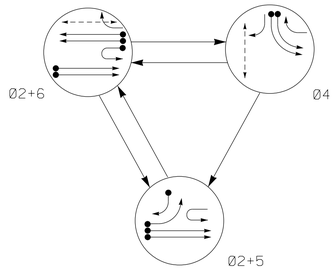
DEFAULT PHASING DIAGRAM



DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2+5	Ø2+6	Ø4	FLASH
21, 22	G	G	R	Y
41, 42	←R	←R	←	←R
43	→	R	F→	R
51	←	F↓	←R	←Y
61	(F)↓Y	(F)↓Y	(R)↓	(Y)↓
62, 63	R	G	R	Y
64	R	F→	→	→Y
P41, P42	DW	DW	W	DRK
P61, P62	DW	W	DW	DRK

ALTERNATE PHASING DIAGRAM



ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2+5	Ø2+6	Ø4	FLASH
21, 22	G	G	R	Y
41, 42	←R	←R	←	←R
43	→	R	F→	R
51	←	←R	←R	←Y
61	(F)↓Y	(F)↓Y	(R)↓	(Y)↓
62, 63	R	G	R	Y
64	R	F→	→	→Y
P41, P42	DW	DW	W	DRK
P61, P62	DW	W	DW	DRK

MAXTIME DETECTOR INSTALLATION CHART

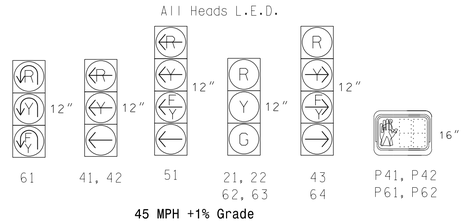
DETECTOR					PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL DELAY DURING GREEN	NEW CARD	
2A	6X6	300	EXIST	-	2	-	-	X	X	X	-	-
2B	6X6	300	EXIST	-	2	-	-	X	X	X	-	-
4A	6X40	0	2-4-2	-	4	-	-	X	-	X	-	-
4B	6X40	0	2-4-2	-	4	-	-	X	-	X	-	-
5A	6X40	0	2-4-2	-	5	15*	-	X	-	X	-	-
					2#	3	-	X	-	X	X	-
5B	6X40	0	2-4-2	-	5	15	-	X	-	X	-	-
6A	6X6	300	EXIST	-	6	-	-	X	X	X	-	-
6B	6X6	300	EXIST	-	6	-	-	X	X	X	-	-
6C	6X40	0	2-4-2	-	6	3	-	X	-	X	X	-

* Disable delay during alternate phasing operation
\# Disable phase call for loop(s) during alternate phasing operation

PHASING DIAGRAM DETECTION LEGEND

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

SIGNAL FACE I.D.



MAXTIME TIMING CHART

FEATURE	PHASE 2	4	5	6
Walk *	–	7	–	7
Ped Clear *	–	28	–	21
Min Green	12	7	7	12
Passage *	6.0	2.0	2.0	6.0
Max 1 *	60	30	20	60
Yellow Change	4.4	3.0	3.0	4.4
Red Clear	2.3	3.9	3.6	2.3
Added Initial *	1.5	–	–	1.5
Maximum Initial *	34	–	–	34
Time Before Reduction *	15	–	–	15
Time To Reduce *	45	–	–	45
Minimum Gap	3.0	–	–	3.0
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 Extension times for phases 2 and 6 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.
** See Note 13

3 Phase Fully Actuated (Fuquay-Varina Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 5 may be lagged.
4. Reposition existing signal head 62.
5. Set all detector units to presence mode.
6. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
7. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
8. Pavement markings are existing.
9. The Division Traffic Engineer will determine the hours of use for each phasing plan.
10. Install new controller, software and conflict monitor in existing cabinet.
11. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
12. To provide leading pedestrian interval on phase 4, program FYA head 43 to delay for 3 seconds after the start of the phase 4 walk interval. See electrical details.
13. To provide leading pedestrian interval on phase 6, program FYA heads 51 and 64 to delay for 3 seconds after the start of the phase 6 walk interval. See electrical details.

LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
□↓	Pedestrian Signal Head With Push Button & Sign	■↓
⊛	Type I Pushbutton Post	⊛
⬡	Type II Signal Pedestal	⬢
○	Metal Pole with Mastarm	○
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
□	Junction Box	■
----	2-in Underground Conduit	----
N/A	Curb Ramp	◿
N/A	Right of Way	------
→	Directional Arrow	→
Ⓐ	Street Sign (D3-1)	Ⓐ
Ⓑ	"U-TURN YIELD TO RIGHT TURN" Sign (R10-16)	Ⓑ
Ⓒ	"RIGHT TURN SIGNAL" Sign (R10-10R)	Ⓒ

Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

SR 1110 (Judd Parkway NW) at SR 1110 (Wilbon Road)

Division 5 | Wake County | Fuquay-Varina

PLAN DATE: April 2023 | REVIEWED BY: AM Encarnacion
PREPARED BY: JT Stiff | REVIEWED BY: PL Alexander

SCALE 1"=40' (0 40)

REVISIONS	INIT.	DATE

Developed by: Anthony Encarnacion 4/14/2023
DESIGNER SIGNATURE DATE

SIG. INVENTORY NO. 05-1829

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 044476 ENGINEER ANTHONY M. ENCARNACION

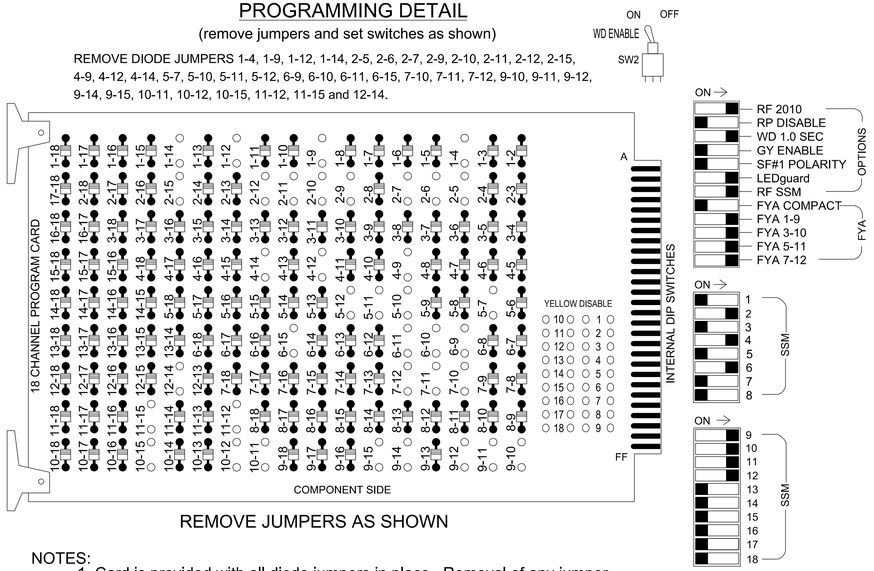
ATKINS 1616 EAST MILLBROOK ROAD, SUITE 160 RALEIGH, NORTH CAROLINA 27609 (919) 876-6888 NCBEES #F-0326

PROJECT REFERENCE NO.	SHEET NO.
U-6022	Sig. 30.1

18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 1-4, 1-9, 1-12, 1-14, 2-5, 2-6, 2-7, 2-9, 2-10, 2-11, 2-12, 2-15, 4-9, 4-12, 4-14, 5-7, 5-10, 5-11, 5-12, 6-9, 6-10, 6-11, 6-15, 7-10, 7-11, 7-12, 9-10, 9-11, 9-12, 9-14, 9-15, 10-11, 10-12, 10-15, 11-12, 11-15 and 12-14.



■ = DENOTES POSITION OF SWITCH

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. 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. Program controller to start up in phase 2 Green No Walk and 6 Green No Walk.
3. The cabinet and controller are part of the Fuquay-Varina Signal 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, S5, S6, S7, S8, S9, S10, AUX S1, AUX S2, AUX S4, AUX S5
Phases Used.....2, 4, 4PED, 5, 6, 6PED
Overlap "1".....*
Overlap "2".....*
Overlap "3".....*
Overlap "4".....*
Overlap "7".....*
Overlap "8".....*

*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	OL7	2	2 PED	3	4	4 PED	5	6	6 PED	OL8	8	8 PED	OL1	OL2	OL5	OL3	OL4	SPARE
SIGNAL HEAD NO.	64★	21,22	NU	NU	41,42	P41, P42	51★	62,63	P61, P62	43★	NU	NU	64★	61★	NU	51★	43★	NU
RED		128						134					A121				A101	
YELLOW	*	129					*	135		*								
GREEN		130						136										
RED ARROW					101									A124		A114		
YELLOW ARROW					102								A122	A125		A115	A102	
FLASHING YELLOW ARROW													A123	A126		A116	A103	
GREEN ARROW	127				103		133			124								
✋						104			119									
🚶						106			121									

NU = Not Used

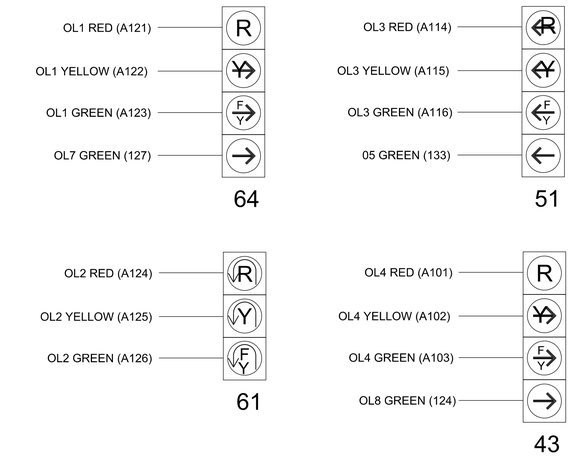
*Denotes install load resistor. See load resistor installation detail this sheet.

★See pictorial of head wiring in detail this sheet.

Note: Load Switches S1 and S10 require output remapping. See sheet 2 for programming details.

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



INPUT FILE POSITION LAYOUT

(front view)

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

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN
2A	TB2-5,6	I2U	39	1	2	2			X	X	X	
2B	TB2-7,8	I2L	43	5	3	2			X	X	X	
4A	TB4-9,10	I6U	41	3	8	4			X		X	
4B	TB4-11,12	I6L	45	7	9	4			X		X	
5A	TB3-1,2	J1U	55	17	15 ★	5	15		X		X	
				-	31 ★	2	3		X		X	X
5B	TB3-5,6	J2U	40	2	16	5	15		X		X	
6A	TB3-9,10	J3U	64	30	18	6			X	X	X	
6B	TB3-11,12	J3L	77	43	19	6			X	X	X	
6C	TB5-1,2	J4U	48	10	20	6	3		X		X	X
PED PUSH BUTTONS												
P41,P42	TB8-5,6	I12L	69	35	4	PED 4						
P61,P62	TB8-7,9	I13U	68	34	6	PED 6						

★ For the detectors to work as shown on the signal design plan, see the Vehicle Detector Setup Programming Detail for Alternate Phasing on sheet 2.

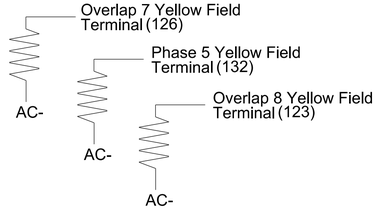
NOTE:
INSTALL DC ISOLATORS IN INPUT FILE SLOTS I12 AND I13.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

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



COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1829
DESIGNED: APRIL 2023
SEALED: 4/14/2023
REVISED: N/A

ATKINS 1616 EAST MILLBROOK ROAD, SUITE 160 RALEIGH, NORTH CAROLINA 27609 (919) 876-6888 NCBEES #F-0326

Electrical Detail - Sheet 1 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Electrical and Programming Details For:

SR 1110 (N Judd Parkway NW) at SR 1110 (Wilbon Road)

Division 5 | Wake County | Fuquay-Varina

PLAN DATE: April 2023 | REVIEWED BY: AM Encarnacion

PREPARED BY: JT Stiff | REVIEWED BY: PL Alexander

REVISIONS	INIT.	DATE

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

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 044476 ANTHONY M. ENCARNACION

Docusigned by: Anthony Encarnacion 4/14/2023
SIGNATURE DATE

SIG. INVENTORY NO. 05-1829

PROJECT REFERENCE NO.	SHEET NO.
U-6022	Sig. 30.2

MAXTIME OVERLAP PROGRAMMING DETAIL FOR DEFAULT PHASING

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

Overlap Plan 1

Overlap	1	2	3	4	7	8
Type	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section	Normal	Normal
Included Phases	6	2	6	4	4	5
Modifier Phases	-	-	5	-	-	-
Modifier Overlaps	7	-	-	8	-	-
Trail Green	0	0	0	0	0	0
Trail Yellow	0.0	0.0	0.0	0.0	0.0	0.0
Trail Red	0.0	0.0	0.0	0.0	0.0	0.0
FYA Ped Delay	3.0	0.0	3.0	3.0	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	7	8
Type	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section	Normal	Normal
Included Phases	6	2	-	4	4	5
Modifier Phases	-	-	5	-	-	-
Modifier Overlaps	7	-	-	8	-	-
Trail Green	0	0	0	0	0	0
Trail Yellow	0.0	0.0	0.0	0.0	0.0	0.0
Trail Red	0.0	0.0	0.0	0.0	0.0	0.0
FYA Ped Delay	3.0	0.0	3.0	3.0	0.0	0.0

← NOTICE INCLUDED PHASE

MAXTIME DETECTOR PROGRAMMING DETAIL FOR ALTERNATE PHASING LOOP 5A

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

Web Interface
Home >Controller >Detector Configuration >Vehicle Detectors

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

5A

Detector	Call Phase	Delay
15	5	0
31	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	Overlap	7		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	Overlap	8		X		7
8	Phase Vehicle	8		X	X	8
9	Overlap	1	X		X	9
10	Overlap	2	X		X	10
11	Overlap	3	X			11
12	Overlap	4		X		12
13	Phase Ped	2				13
14	Phase Ped	4				14
15	Phase Ped	6				15
16	Phase Ped	8				16
17	Overlap	5		X	X	17
18	Overlap	6		X		18

NOTICE OVERLAP 7 ASSIGNED TO CHANNEL 1 →

NOTICE OVERLAP 8 ASSIGNED TO CHANNEL 7 →

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.

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.

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 phase for head 51 to run protected turns only.

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1829
DESIGNED: APRIL 2023
SEALED: 4/14/2023
REVISED: N/A

ATKINS
1616 EAST MILLBROOK ROAD, SUITE 160
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888 NCBEES #F-0326

Electrical Detail - Sheet 2 of 2

Electrical and Programming Details For:

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

SR 1110 (N Judd Parkway NW)
at
SR 1110 (Wilbon Road)

Division 5 | Wake County | Fuquay-Varina

PLAN DATE:	April 2023	REVIEWED BY:	AM Encarnacion
PREPARED BY:	JT Stiff	REVIEWED BY:	PL Alexander

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

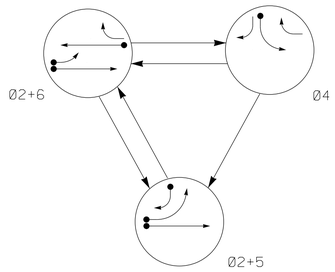
SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 044476 ANTHONY M ENCARNACION

Designed by: Anthony Encarnacion 4/14/2023
DESIGNER SIGNATURE DATE

SIG. INVENTORY NO. 05-1829

PROJECT REFERENCE NO.	SHEET NO.
U-6022	Sig. 31.0

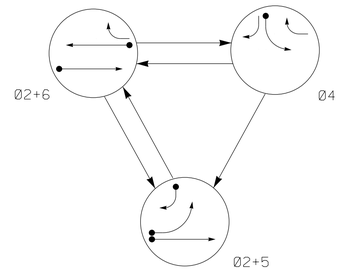
DEFAULT PHASING DIAGRAM



DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2+5	PHASE Ø2+6	PHASE Ø4	FLASH
21, 22	G	G	R	Y
41, 43	~~R~~	~~R~~	~~R~~	~~R~~
42	→	R	→	R
51	~~←~~	~~G/Y~~	~~R~~	~~Y~~
61	R	G	R	Y
62	R	G	R/→	Y

ALTERNATE PHASING DIAGRAM



ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2+5	PHASE Ø2+6	PHASE Ø4	FLASH
21, 22	G	G	R	Y
41, 43	~~R~~	~~R~~	~~R~~	~~R~~
42	→	R	→	R
51	~~←~~	~~R~~	~~R~~	~~Y~~
61	R	G	R	Y
62	R	G	R/→	Y

MAXTIME DETECTOR INSTALLATION CHART

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

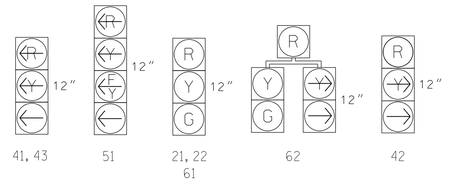
* Disable delay during alternate phasing operation
\# Disable phase call for loop(s) during alternate phasing operation

PHASING DIAGRAM DETECTION LEGEND

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

SIGNAL FACE I.D.

All Heads L.E.D.



3 Phase
Fully Actuated
(Fuquay-Varina Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 5 may be lagged.
4. Set all detector units to presence mode.
5. Pavement markings are existing.
6. The Division Traffic Engineer will determine the hours of use for each phasing plan.
7. Install new controller, software and conflict monitor in existing cabinet.
8. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.

LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
□↓	Pedestrian Signal Head With Push Button & Sign	■↓
○—	Signal Pole with Guy	●—
○⤵	Signal Pole with Sidewalk Guy	●⤵
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
□	Junction Box	■
·-·-·	2-in Underground Conduit	·-·-·
N/A	Right of Way	- - - -
→	Directional Arrow	→
Ⓐ	Street Sign (D3-1)	Ⓐ

MAXTIME TIMING CHART

FEATURE	PHASE 2	PHASE 4	PHASE 5	PHASE 6
Walk *	–	–	–	–
Ped Clear *	–	–	–	–
Min Green	12	7	7	12
Passage *	6.0	2.0	2.0	6.0
Max 1 *	60	30	20	60
Yellow Change	4.8	3.0	3.0	4.8
Red Clear	1.1	2.1	2.1	1.1
Added Initial *	2.5	–	–	2.5
Maximum Initial *	34	–	–	34
Time Before Reduction *	15	–	–	15
Time To Reduce *	45	–	–	45
Minimum Gap	3.0	–	–	3.0
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 Extension times for phases 2 and 6 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.

Signal Upgrade

ATKINS 1616 EAST MILLBROOK ROAD, SUITE 160 RALEIGH, NORTH CAROLINA 27609 (919) 876-6888 NCBEES #F-0326

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

SCALE 0 40 1"=40'

SR 1101 (Piney Grove Wilbon Road) at SR 1126 (Honeycutt Road)

Division 5 Wake County Fuquay-Varina

PLAN DATE: April 2023 REVIEWED BY: AM Encarnacion
PREPARED BY: JT Stiff REVIEWED BY: PL Alexander

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 044476 ENGINEER ANTHONY M. ENCARNACION

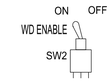
Designed by: Anthony Encarnacion 4/14/2023
DESIGNER SIGNATURE DATE

SIG. INVENTORY NO. 05-1908

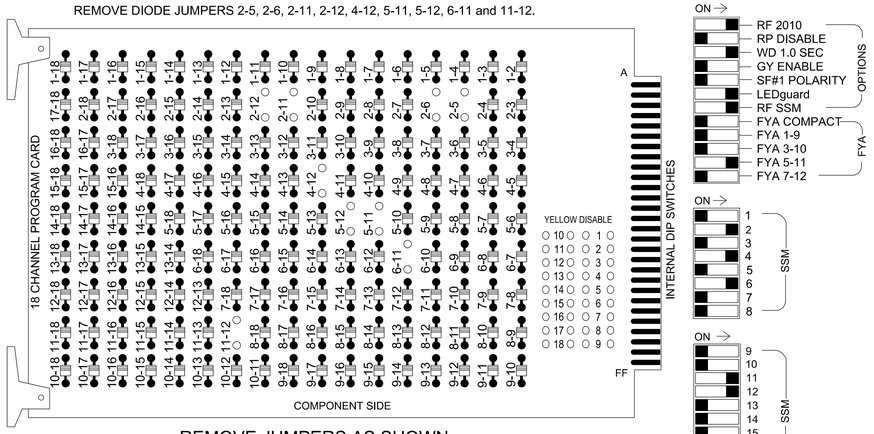
PROJECT REFERENCE NO.	SHEET NO.
U-6022	Sig. 31.1

18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



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



■ = DENOTES POSITION OF SWITCH

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. 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. Program controller to start up in phase 2 Green No Walk and 6 Green No Walk.
3. The cabinet and controller are part of the Fuquay-Varina Signal 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, S5, S7, S8, AUX S4, AUX S5
Phases Used.....2, 4, 5, 6
Overlap "1".....NOT USED
Overlap "2".....NOT USED
Overlap "3".....*
Overlap "4".....*

*See overlap programming detail on sheet 2

SIGNAL HEAD HOOK-UP CHART

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

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 head as shown)

INPUT FILE POSITION LAYOUT

(front view)

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

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

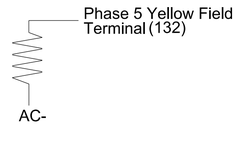
LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN
2A	TB2-5,6	I2U	39	1	2	2			X	X	X	
4A	TB4-9,10	I6U	41	3	8	4	3		X		X	
5A	TB3-1,2	J1U	55	17	15 ★	5	15		X		X	
				-	31 ★	2	3		X		X	X
5B	TB3-5,6	J2U	40	2	16	5	15		X		X	
6A	TB3-9,10	J3U	64	30	18	6			X	X	X	

★ For the detectors to work as shown on the signal design plan, see the Vehicle Detector Setup Programming Detail for Alternate Phasing on sheet 2.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

LOAD RESISTOR INSTALLATION DETAIL

(install resistor as shown)



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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1908
DESIGNED: APRIL 2023
SEALED: 4/14/2023
REVISED: N/A

Electrical Detail - Sheet 1 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Electrical and Programming Details For:

SR 1101 (Piney Grove Wilbon Road)
at
SR 1126 (Honeycutt Road)

Division 5 | Wake County | Fuquay-Varina

PLAN DATE: April 2023 | REVIEWED BY: AM Encarnacion
PREPARED BY: JT Stiff | REVIEWED BY: PL Alexander

REVISIONS	INIT.	DATE

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

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 044476 ANTHONY M. ENCARNACION

Docusigned by: Anthony Encarnacion 4/14/2023
SIGNATURE DATE

SIG. INVENTORY NO. 05-1908

ATKINS 1616 EAST MILLBROOK ROAD, SUITE 160
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888 NCBEES #F-0326

PROJECT REFERENCE NO.	SHEET NO.
U-6022	Sig. 31.2

MAXTIME OVERLAP PROGRAMMING DETAIL FOR DEFAULT PHASING

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

Overlap Plan 1

Overlap	1	2	3	4
Type	-	-	FYA 4 - Section	Normal
Included Phases	-	-	6	4,5
Modifier Phases	-	-	5	-
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	Normal
Included Phases	-	-	-	4,5
Modifier Phases	-	-	5	-
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.

MAXTIME DETECTOR PROGRAMMING DETAIL FOR ALTERNATE PHASING LOOP 5A

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

Web Interface
Home >Controller >Detector Configuration >Vehicle Detectors

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

5A

Detector	Call Phase	Delay
15	5	0
31	0	-

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.

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 phase for head 51 to run protected turns only.

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1908
DESIGNED: APRIL 2023
SEALED: 4/14/2023
REVISED: N/A

ATKINS 1616 EAST MILLBROOK ROAD, SUITE 160 RALEIGH, NORTH CAROLINA 27609 (919) 876-6888 NCBEES #F-0326

Electrical Detail - Sheet 2 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Electrical and Programming Details For:

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

SR 1101 (Piney Grove Wilbon Road)
at
SR 1126 (Honeycutt Road)

Division 5 | Wake County | Fuquay-Varina

PLAN DATE:	April 2023	REVIEWED BY:	AM Encarnacion
PREPARED BY:	JT Stiff	REVIEWED BY:	PL Alexander

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 044476 ANTHONY M. ENCARNACION

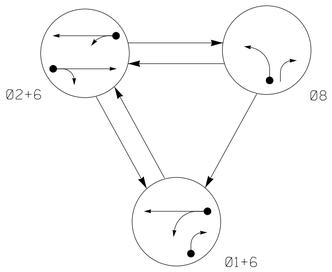
Anthony Encarnacion 4/14/2023
DIGITAL SIGNATURE DATE

SIG. INVENTORY NO. 05-1908

13-APR-2023 12:51
pw:/SUSD03643.wsatkins.com:ATKNANC01/Documents/Roads and Bridges/Projects/100063268 Fuquay Varina/Task 05_11_Signals/Electrical Details/051908_sm_ele_2022mod4.dgn
STIF4685 AT LUS491089

PROJECT REFERENCE NO.	SHEET NO.
U-6022	Sig. 32.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

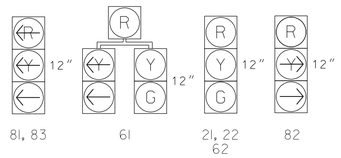
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+6	PHASE Ø2+6	PHASE Ø8	FLASH
21, 22	R	G	R	Y
61	G	G	R	Y
62	G	G	R	Y
81, 83	~~R~~	~~R~~	~~R~~	~~R~~
82	→	R	→	R

SIGNAL FACE I.D.

All Heads L.E.D.



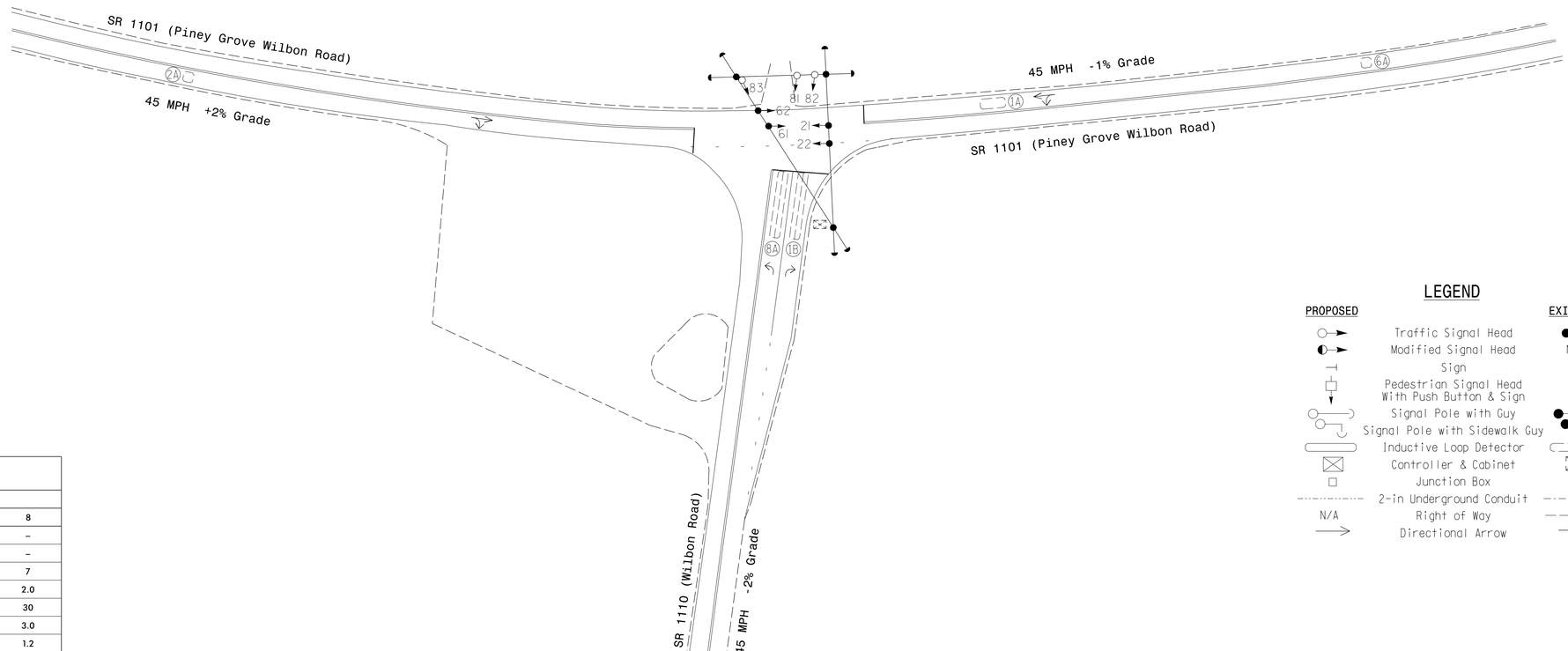
MAXTIME DETECTOR INSTALLATION CHART

DETECTOR					PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
1A	6X15	70	EXIST	-	1	15	-	X	-	X	-	-
1B	6X40	0	2-4-2	-	1	15	-	X	-	X	-	-
2A	6X6	300	EXIST	-	2	-	-	X	X	X	-	-
6A	6X6	300	EXIST	-	6	-	-	X	X	X	-	-
8A	6X40	0	2-4-2	-	8	3	-	X	-	X	-	-

3 Phase Fully Actuated (Fuquay-Varina Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 may be lagged.
4. Set all detector units to presence mode.
5. Pavement markings are existing.
6. Install new controller, software and conflict monitor in existing cabinet.
7. 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	PHASE 2	PHASE 6	PHASE 8
Walk *	–	–	–	–
Ped Clear *	–	–	–	–
Min Green	7	12	12	7
Passage *	2.0	6.0	6.0	2.0
Max 1 *	15	90	90	30
Yellow Change	3.0	4.3	4.6	3.0
Red Clear	2.1	1.2	1.0	1.2
Added Initial *	–	2.5	2.5	–
Maximum Initial *	–	34	34	–
Time Before Reduction *	–	15	15	–
Time To Reduce *	–	30	30	–
Minimum Gap	–	3.0	3.0	–
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 Extension times for phases 2 and 6 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.

LEGEND

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

ATKINS
1616 EAST MILLBROOK ROAD, SUITE 160
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888 NCBEES #F-0326

Signal Upgrade

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

SR 1101 (Piney Grove Wilbon Road) at SR 1110 (Wilbon Road)

Division 5 Wake County Fuquay-Varina

PLAN DATE:	April 2023	REVIEWED BY:	AM Encarnacion
PREPARED BY:	JT Stiff	REVIEWED BY:	PL Alexander

SCALE 0 40 1"=40'

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 044476 ANTHONY M. ENCARNACION

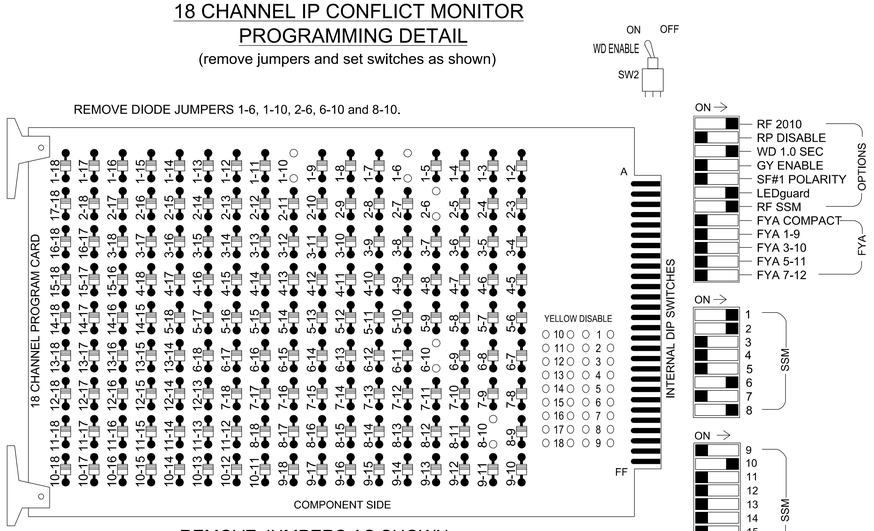
Documents by: Anthony Encarnacion 4/14/2023
DOCUMENTS SIGNATURE DATE

SIG. INVENTORY NO. 05-1909

PROJECT REFERENCE NO.	SHEET NO.
U-6022	Sig. 32.1

18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE JUMPERS AS SHOWN

NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that the Red Enable is active at all times during normal operation.
4. 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. Program controller to start up in phase 2 Green No Walk and 6 Green No Walk.
3. The cabinet and controller are part of the Fuquay-Varina Signal 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 S2
Phases Used.....1, 2, 6, 8
Overlap "1".....NOT USED
Overlap "2".....*
Overlap "3".....NOT USED
Overlap "4".....NOT USED

*See overlap programming detail this sheet

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.	61	21,22	NU	NU	NU	NU	NU	61,62	NU	NU	81,83	NU	NU	82	NU	NU	NU	NU
RED	*	128						134						A124				
YELLOW		129						135										
GREEN		130						136										
RED ARROW											107							
YELLOW ARROW	126										108			A125				
GREEN ARROW	127										109			A126				

NU = Not Used

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

OVERLAP PROGRAMMING

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

Overlap Plan 1

Overlap	1	2	3	4
Type	-	Normal	-	-
Included Phases	-	1,8	-	-
Modifier Phases	-	-	-	-
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

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	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
	L	1A	2A												ST DC ISOLATOR
	L	NOT USED	NOT USED												
FILE "J"	U	SLOT EMPTY	∅ 6	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	∅ 8	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L		6A				∅ 1								
	L		NOT USED				1B								

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

FS = FLASH SENSE
ST = STOP TIME

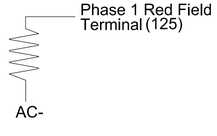
INPUT FILE CONNECTION & PROGRAMMING CHART

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	
2A	TB2-5,6	I2U	39	1	2	2			X	X	X	
6A	TB3-5,6	J2U	40	2	16	6			X	X	X	
8A	TB5-9,10	J6U	42	4	22	8	3		X		X	
1B	TB5-11,12	J6L	46	8	23	1	15		X		X	

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

LOAD RESISTOR INSTALLATION DETAIL

(install resistor as shown)



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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1909
DESIGNED: APRIL 2023
SEALED: 4/14/2023
REVISED: N/A

Electrical Detail

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Electrical and Programming Details For:

SR 1101 (Piney Grove Wilbon Road)
at
SR 1110 (Wilbon Road)

Division 5 | Wake County | Fuquay-Varina

PLAN DATE:	April 2023	REVIEWED BY:	AM Encarnacion
PREPARED BY:	JT Stiff	REVIEWED BY:	PL Alexander

REVISIONS	INT.	DATE

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

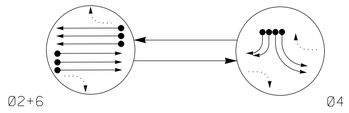
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 044476 ENGINEER ANTHONY M ENCARNACION

Anthony Encarnacion 4/14/2023
SIGNATURE DATE
SIG. INVENTORY NO. 05-1909

ATKINS 1616 EAST MILLBROOK ROAD, SUITE 160
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888 NCBEES #F-0326

PROJECT REFERENCE NO.	SHEET NO.
U-6022	Sig. 33.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

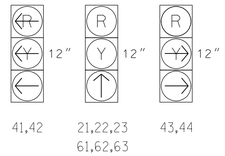
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2+6	PHASE Ø4	FLASH
21, 22, 23	↑	R	Y
41, 42	←R	←	←R
43, 44	R	→	R
61, 62, 63	↑	R	Y

SIGNAL FACE I.D.

All Heads L.E.D.



MAXTIME DETECTOR INSTALLATION CHART

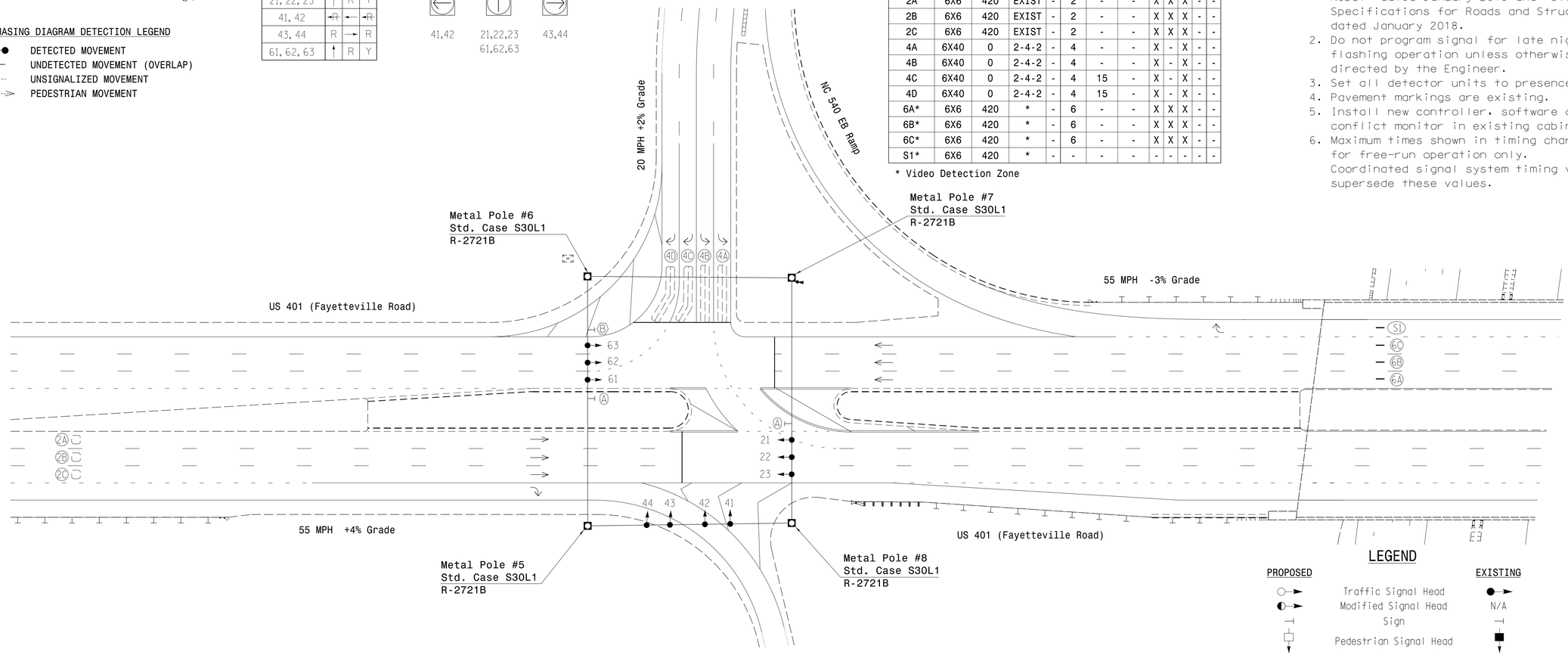
DETECTOR					PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
2A	6X6	420	EXIST	-	2	-	-	X	X	X	-	-
2B	6X6	420	EXIST	-	2	-	-	X	X	X	-	-
2C	6X6	420	EXIST	-	2	-	-	X	X	X	-	-
4A	6X40	0	2-4-2	-	4	-	-	X	-	X	-	-
4B	6X40	0	2-4-2	-	4	-	-	X	-	X	-	-
4C	6X40	0	2-4-2	-	4	15	-	X	-	X	-	-
4D	6X40	0	2-4-2	-	4	15	-	X	-	X	-	-
6A*	6X6	420	*	-	6	-	-	X	X	X	-	-
6B*	6X6	420	*	-	6	-	-	X	X	X	-	-
6C*	6X6	420	*	-	6	-	-	X	X	X	-	-
S1*	6X6	420	*	-	-	-	-	-	-	-	-	-

* Video Detection Zone

2 Phase Fully Actuated (Fuquay-Varina Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Set all detector units to presence mode.
4. Pavement markings are existing.
5. Install new controller, software and conflict monitor in existing cabinet.
6. 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 2	PHASE 4	PHASE 6
Walk *	–	–	–
Ped Clear *	–	–	–
Min Green	14	7	14
Passage *	6.0	2.0	6.0
Max 1 *	90	20	90
Yellow Change	4.8	3.0	5.5
Red Clear	1.0	3.3	1.0
Added Initial *	1.5	–	1.5
Maximum Initial *	46	–	46
Time Before Reduction *	15	–	15
Time To Reduce *	45	–	45
Minimum Gap	3.4	–	3.4
Advance Walk	–	–	–
Non Lock Detector	–	X	–
Vehicle Recall	MIN RECALL	–	MIN RECALL
Dual Entry	–	–	–

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

LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
□↓	Pedestrian Signal Head	■↓
○	Signal Pole with Guy	●
○	Signal Pole with Sidewalk Guy	●
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
□	Junction Box	■
·-·-·	2-in Underground Conduit	·-·-·
N/A	Right of Way	------
→	Directional Arrow	→
◯	Metal Strain Pole	◘
N/A	Guardrail	⊤
○	Video Detector	●
———	Video Detection Zone	———
Ⓐ	No U-Turn/No Left Turn Sign (R3-18)	Ⓐ
Ⓑ	No Right Turn Sign (R3-1)	Ⓑ

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Signal Upgrade

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

US 401 (Fayetteville Road) at NC 540 EB Ramps

Division 5 | Wake County | Fuquay-Varina

PLAN DATE: April 2023 | REVIEWED BY: AM Encarnacion

PREPARED BY: JT Stiff | REVIEWED BY: PL Alexander

SCALE 0 40 1"=40'

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 044476 ENGINEER ANTHONY M. ENCARNACION

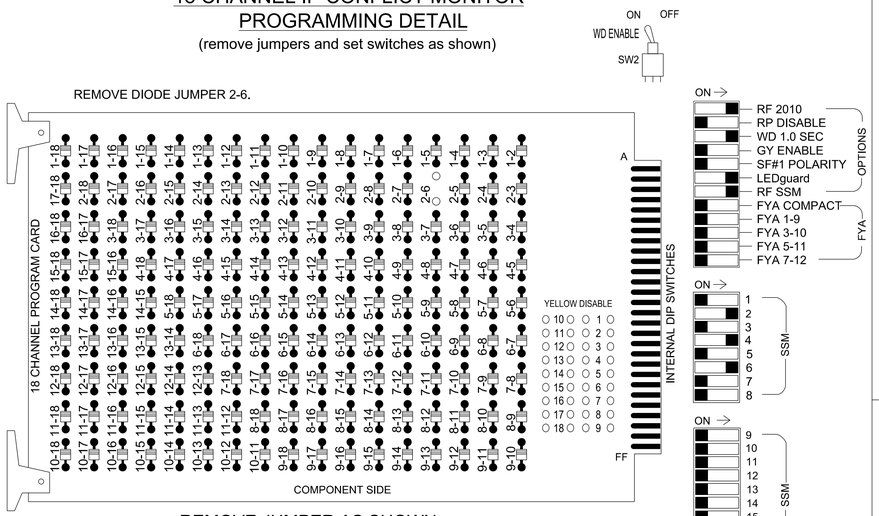
Designed by: Anthony Encarnacion 4/14/2023
Drawn by: JTLIPE DATE
SIG. INVENTORY NO. 05-1920

ATKINS 1616 EAST MILLBROOK ROAD, SUITE 160 RALEIGH, NORTH CAROLINA 27609 (919) 876-6888 NCBEES #F-0326

PROJECT REFERENCE NO.	SHEET NO.
U-6022	Sig. 33.1

18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE JUMPER 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. Program controller to start up in phase 2 Green No Walk and 6 Green No Walk.
3. The cabinet and controller are part of the Fuquay-Varina Signal 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, S5, S8
Phases Used.....2, 4, 6
Overlap "1".....NOT USED
Overlap "2".....NOT USED
Overlap "3".....NOT USED
Overlap "4".....NOT USED

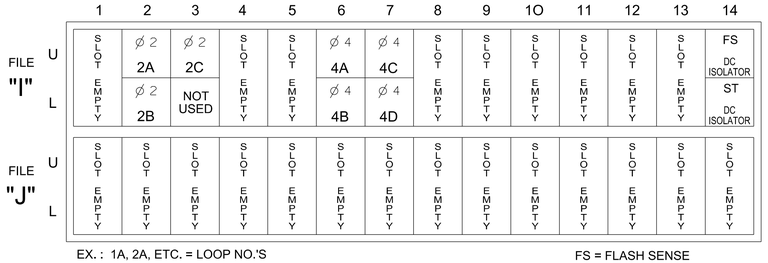
SIGNAL HEAD HOOK-UP CHART

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, 23	NU	NU	41,42	43,44	NU	NU	61,62, 63	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU
RED		128				101			134										
YELLOW		129							135										
GREEN																			
RED ARROW					101 (LEFT)														
YELLOW ARROW					102 (LEFT)	102 (RIGHT)													
GREEN ARROW		130			103 (LEFT)	103 (RIGHT)			136										

NU = Not Used

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
2A	TB2-5,6	I2U	39	1	2	2			X	X	X	
2B	TB2-7,8	I2L	43	5	3	2			X	X	X	
2C	TB2-9,10	I3U	63	29	4	2			X	X	X	
4A	TB4-9,10	I6U	41	3	8	4			X		X	
4B	TB4-11,12	I6L	45	7	9	4			X		X	
4C	TB6-1,2	I7U	65	31	10	4	15		X		X	
4D	TB6-3,4	I7L	78	44	11	4	15		X		X	

INPUT FILE POSITION LEGEND: J2L
J = FILE J
2 = SLOT 2
L = LOWER

SPECIAL DETECTOR NOTE

Install a video detection system for vehicle detection zones 6A, 6B, 6C and S1. Perform installation according to manufacturer's directions and NCDOT engineer-approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1920
DESIGNED: APRIL 2023
SEALED: 4/14/2023
REVISED: N/A

Electrical Detail

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Electrical and Programming Details For:

US 401 (Fayetteville Road)
at
NC 540 EB Ramps

Division 5 | Wake County | Fuquay-Varina

PLAN DATE:	April 2023	REVIEWED BY:	AM Encarnacion
PREPARED BY:	JT Stiff	REVIEWED BY:	PL Alexander

REVISIONS	INIT.	DATE

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

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 044476 ENGINEER ANTHONY M ENCARNACION

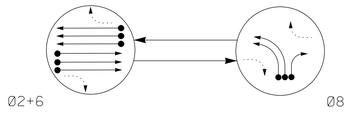
Docusigned by: Anthony Encarnacion 4/14/2023
DOCUSIGNED SIGNATURE DATE

SIG. INVENTORY NO. 05-1920

ATKINS
1616 EAST MILLBROOK ROAD, SUITE 160
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888 NCBEES #F-0326

PROJECT REFERENCE NO.	SHEET NO.
U-6022	Sig. 34.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

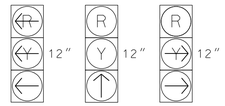
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2+6	PHASE Ø8	FLASH
21, 22, 23	↑	R	Y
61, 62, 63	↑	R	Y
81, 82	~~R~~	~~R~~	~~R~~
83	R	R	R

SIGNAL FACE I.D.

All Heads L.E.D.



MAXTIME DETECTOR INSTALLATION CHART

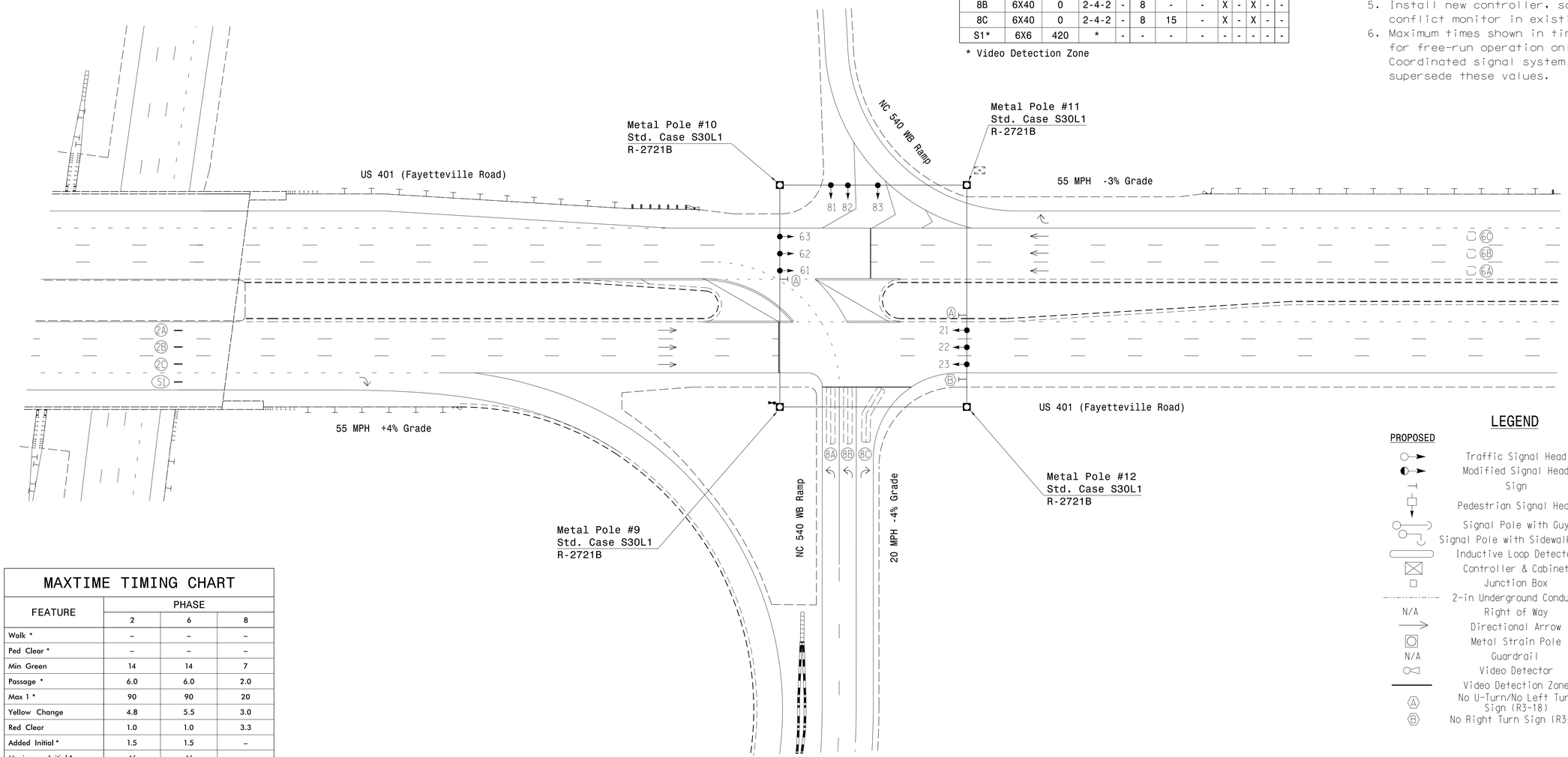
DETECTOR					PROGRAMMING						
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL DELAY DURING GREEN	NEW CARD
2A*	6X6	420	*	-	2	-	-	X	X	X	-	-
2B*	6X6	420	*	-	2	-	-	X	X	X	-	-
2C*	6X6	420	*	-	2	-	-	X	X	X	-	-
6A	6X6	420	EXIST	-	6	-	-	X	X	X	-	-
6B	6X6	420	EXIST	-	6	-	-	X	X	X	-	-
6C	6X6	420	EXIST	-	6	-	-	X	X	X	-	-
8A	6X40	0	2-4-2	-	8	-	-	X	-	X	-	-
8B	6X40	0	2-4-2	-	8	-	-	X	-	X	-	-
8C	6X40	0	2-4-2	-	8	15	-	X	-	X	-	-
S1*	6X6	420	*	-	-	-	-	-	-	-	-	-

* Video Detection Zone

2 Phase Fully Actuated (Fuquay-Varina Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Set all detector units to presence mode.
4. Pavement markings are existing.
5. Install new controller, software and conflict monitor in existing cabinet.
6. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.



LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
▯	Pedestrian Signal Head	■
○	Signal Pole with Guy	●
○	Signal Pole with Sidewalk Guy	●
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
□	Junction Box	■
----	2-in Underground Conduit	----
N/A	Right of Way	----
→	Directional Arrow	→
◯	Metal Strain Pole	■
N/A	Guardrail	⊣
⊂	Video Detector	⊂
▬	Video Detection Zone	▬
Ⓐ	No U-Turn/No Left Turn Sign (R3-18)	Ⓐ
Ⓑ	No Right Turn Sign (R3-1)	Ⓑ

MAXTIME TIMING CHART

FEATURE	PHASE 2	PHASE 6	PHASE 8
Walk *	–	–	–
Ped Clear *	–	–	–
Min Green	14	14	7
Passage *	6.0	6.0	2.0
Max 1 *	90	90	20
Yellow Change	4.8	5.5	3.0
Red Clear	1.0	1.0	3.3
Added Initial *	1.5	1.5	–
Maximum Initial *	46	46	–
Time Before Reduction *	15	15	–
Time To Reduce *	45	45	–
Minimum Gap	3.4	3.4	–
Advance Walk	–	–	–
Non Lock Detector	–	–	X
Vehicle Recall	MIN RECALL	MIN RECALL	–
Dual Entry	–	–	–

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

Signal Upgrade

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

US 401 (Fayetteville Road) at NC 540 WB Ramps

Division 5 | Wake County | Fuquay-Varina

PLAN DATE: April 2023 | REVIEWED BY: AM Encarnacion

PREPARED BY: JT Stiff | REVIEWED BY: PL Alexander

SCALE 0 40 1"=40'

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 044476 ENGINEER ANTHONY M. ENCARNACION

Designed by: Anthony Encarnacion 4/14/2023
Checked by: ATLIPE DATE

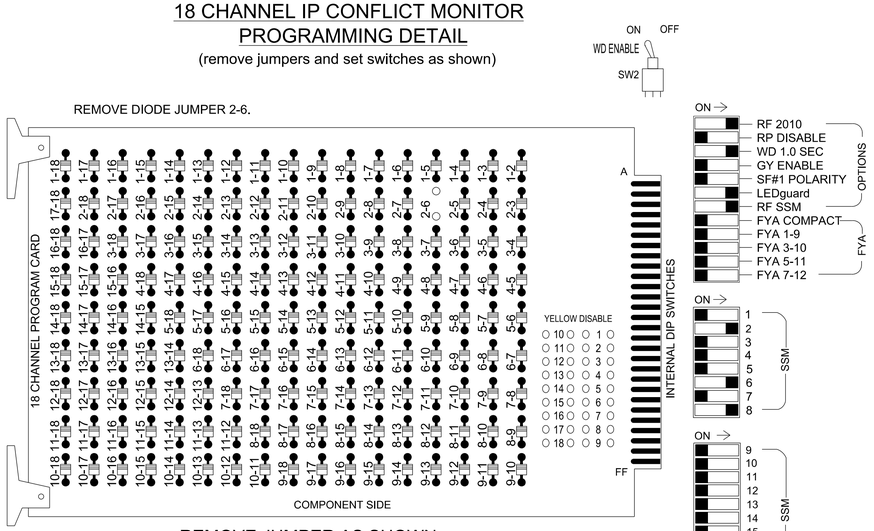
SIG. INVENTORY NO. 05-1921

ATKINS 1616 EAST MILLBROOK ROAD, SUITE 160
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888 NCBEES #F-0326

PROJECT REFERENCE NO.	SHEET NO.
U-6022	Sig. 34.1

18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE JUMPER 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. Program controller to start up in phase 2 Green No Walk and 6 Green No Walk.
3. The cabinet and controller are part of the Fuquay-Varina Signal 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, 23	NU	NU	NU	NU	NU	61,62, 63	NU	NU	81,82	83	NU	NU	NU	NU	NU	NU	NU
RED		128						134				107							
YELLOW		129						135											
GREEN																			
RED ARROW											107 (LEFT)								
YELLOW ARROW											108 (LEFT)	108 (RIGHT)							
GREEN ARROW		130						136			109 (LEFT)	109 (RIGHT)							

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	1O	11	12	13	14
FILE "I"	U	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
	L														ST DC ISOLATOR
FILE "J"	U	SLOT EMPTY	Ø6 6A	Ø6 6C	SLOT EMPTY	SLOT EMPTY	Ø8 8A	Ø8 8C	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L		Ø6 6B	NOT USED			Ø8 8B	NOT USED							

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN
6A	TB3-5,6	J2U	40	2	16	6			X	X	X	
6B	TB3-7,8	J2L	44	6	17	6			X	X	X	
6C	TB3-9,10	J3U	64	30	18	6			X	X	X	
8A	TB5-9,10	J6U	42	4	22	8			X		X	
8B	TB5-11,12	J6L	46	8	23	8			X		X	
8C	TB7-1,2	J7U	66	32	24	8	15		X		X	

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

SPECIAL DETECTOR NOTE

Install a video detection system for vehicle detection zones 2A, 2B, 2C and S1. Perform installation according to manufacturer's directions and NCDOT engineer-approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1921
DESIGNED: APRIL 2023
SEALED: 4/14/2023
REVISED: N/A

Electrical Detail

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Electrical and Programming Details For:

Prepared for the Offices of:

Transportation Mobility and Safety Division
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
ITS & Signals Management Section

750 N. Greenfield Pkwy, Garner, NC 27529

US 401 (Fayetteville Road)
at
NC 540 WB Ramps

Division 5 | Wake County | Fuquay-Varina

PLAN DATE:	April 2023	REVIEWED BY:	AM Encarnacion
PREPARED BY:	JT Stiff	REVIEWED BY:	PL Alexander

REVISIONS	INT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 044476 ENGINEER ANTHONY M ENCARNACION

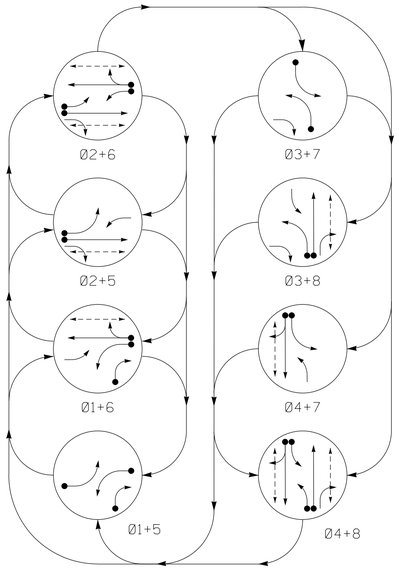
Digitally signed by Anthony Encarnacion 4/14/2023
DOCUSIGN SIGNATURE DATE

SIG. INVENTORY NO. 05-1921

ATKINS 1616 EAST MILLBROOK ROAD, SUITE 160
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888 NCBEES #F-0326

PROJECT REFERENCE NO.	SHEET NO.
U-6022	Sig. 35.0

DEFAULT PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

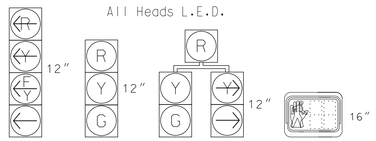
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3+7	Ø3+8	Ø4+7	Ø4+8	FLASH
11	←●	←	←F/Y	←F/Y	←R	←R	←R	←R	←Y
21	R	R	G	G	R	R	R	R	Y
22	R	R	G	G	R/→	R/→	R	R	Y
31	←R	←R	←R	←R	←	←	←F/Y	←F/Y	←R
41, 42	R	R	R	R	R	R	G	G	R
51	←	←F/Y	←	←F/Y	←R	←R	←R	←R	←Y
61, 62	R	G	R	G	R	R	R	R	Y
71	←R	←R	←R	←R	←	←	←F/Y	←F/Y	←R
81	R	R	R	R	R	R	G	R	G	R
82	R/→	R/→	R	R	R	R	G	R	G	R
P21, P22	DW	DW	W	W	DW	DW	DW	DW	DRK
P41, P42	DW	DW	DW	DW	DW	DW	W	W	DRK
P61, P62	DW	W	DW	W	DW	DW	DW	DW	DRK
P81, P82	DW	DW	DW	DW	DW	W	DW	W	DRK

SIGNAL FACE I.D.

All Heads L.E.D.



11, 31, 51, 71 | 21, 41, 42, 61, 62, 81 | 22, 82 | P21, P22, P41, P42, P61, P62, P81, P82

MAXTIME TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6	7	8
Walk *	–	7	–	7	–	7	–	7
Ped Clear *	–	18	–	18	–	13	–	11
Min Green	7	10	7	7	7	10	7	7
Passage *	2.0	5.0	2.0	6.0	2.0	5.0	2.0	6.0
Max 1 *	20	75	20	40	20	75	20	40
Yellow Change	3.0	3.9	3.0	4.5	3.0	3.9	3.0	4.5
Red Clear	3.2	2.3	2.4	1.4	2.8	2.3	2.3	1.4
Added Initial *	–	2.5	–	–	–	2.5	–	–
Maximum Initial *	–	24	–	–	–	24	–	–
Time Before Reduction *	–	30	–	15	–	30	–	15
Time To Reduce *	–	30	–	15	–	30	–	15
Minimum Gap	–	3.0	–	3.0	–	3.0	–	3.0
Advance Walk	–	3	–	3	–	3	–	3
Non Lock Detector	X	–	X	X	X	–	X	X
Vehicle Recall	–	MIN RECALL	–	–	–	MIN RECALL	–	–
Dual Entry	–	–	–	X	–	–	–	X

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

MAXTIME DETECTOR INSTALLATION CHART

DETECTOR LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
1A	6X40	0	2-4-2	-	1	15*	-	X	-	X	-	-
					6#	3	-	X	-	X	X	-
1B	6X40	0	2-4-2	-	1	15	-	X	-	X	-	-
2A	6X6	200	EXIST	-	2	-	-	X	X	X	-	-
3A	6X40	0	2-4-2	-	3	15*	-	X	-	X	-	-
					8#	3	-	X	-	X	X	-
4A	6X6	300	EXIST	-	4	-	-	X	-	-	-	-
4B	6X40	0	2-4-2	-	4	5	2.0	X	-	X	X	-
5A	6X40	0	2-4-2	-	5	15*	-	X	-	X	-	-
					2#	3	-	X	-	X	X	-
6A	6X6	200	EXIST	-	6	-	-	X	X	X	-	-
7A	6X40	0	2-4-2	-	7	15*	-	X	-	X	-	-
					4#	3	-	X	-	X	X	-
8A	6X6	300	EXIST	-	8	-	-	X	-	-	-	-
8B	6X40	0	2-4-2	-	8	5	2.0	X	-	X	X	-

* Reduce delay to 3 seconds during alternate phasing operation
\# Disable phase call for loop(s) during alternate phasing operation

ALTERNATE PHASING DIAGRAM

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
11	←	←	←R	←R	←R	←R	←R	←R	←Y
21	R	R	G	G	R	R	R	R	Y
22	R	R	G	G	R/→	R/→	R	R	Y
31	←R	←R	←R	←R	←	←	←R	←R	←R
41, 42	R	R	R	R	R	R	G	G	R
51	←	←R	←	←R	←R	←R	←R	←R	←Y
61, 62	R	G	R	G	R	R	R	R	Y
71	←R	←R	←R	←R	←	←	←R	←R	←R
81	R	R	R	R	R	G	R	G	R
82	R/→	R/→	R	R	R	G	R	G	R
P21, P22	DW	DW	W	W	DW	DW	DW	DW	DRK
P41, P42	DW	DW	DW	DW	DW	DW	W	W	DRK
P61, P62	DW	W	DW	W	DW	DW	DW	DW	DRK
P81, P82	DW	DW	DW	DW	DW	W	DW	W	DRK

8 Phase
Fully Actuated
(Fuquay-Varina Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 and/or phase 5 may be lagged.
4. Phase 3 and/or phase 7 may be lagged.
5. Set all detector units to presence mode.
6. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
7. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
8. Pavement markings are existing.
9. The Division Traffic Engineer will determine the hours of use for each phasing plan.
10. Install new controller, software and conflict monitor in existing cabinet.
11. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.

LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
□↓	Pedestrian Signal Head With Push Button & Sign	■↓
○→	Signal Pole with Guy	●→
○→	Signal Pole with Sidewalk Guy	●→
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
□	Junction Box	■
·-·-·	2-in Underground Conduit	·-·-·
N/A	Right of Way	———
→	Directional Arrow	→
○	Metal Pole with Mastarm	○
⬡	Type II Signal Pedestal	⬢
N/A	Curb Ramp	

Signal Upgrade

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

ATKINS
1616 EAST MILLBROOK ROAD, SUITE 160
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888 NCBEES #F-0326

US 401 (S Main Street) at SR 2768 (Judd Parkway)

Division 5 | Wake County | Fuquay-Varina

PLAN DATE: April 2023 | REVIEWED BY: AM Encarnacion

PREPARED BY: JT Stiff | REVIEWED BY: PL Alexander

REVISIONS	INIT.	DATE

SCALE 0 40 1"=40'

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 044476 ENGINEER ANTHONY M. ENCARNACION

Documents generated by: Anthony Encarnacion
DocuSigned by: SIGNATURE 4/14/2023 DATE

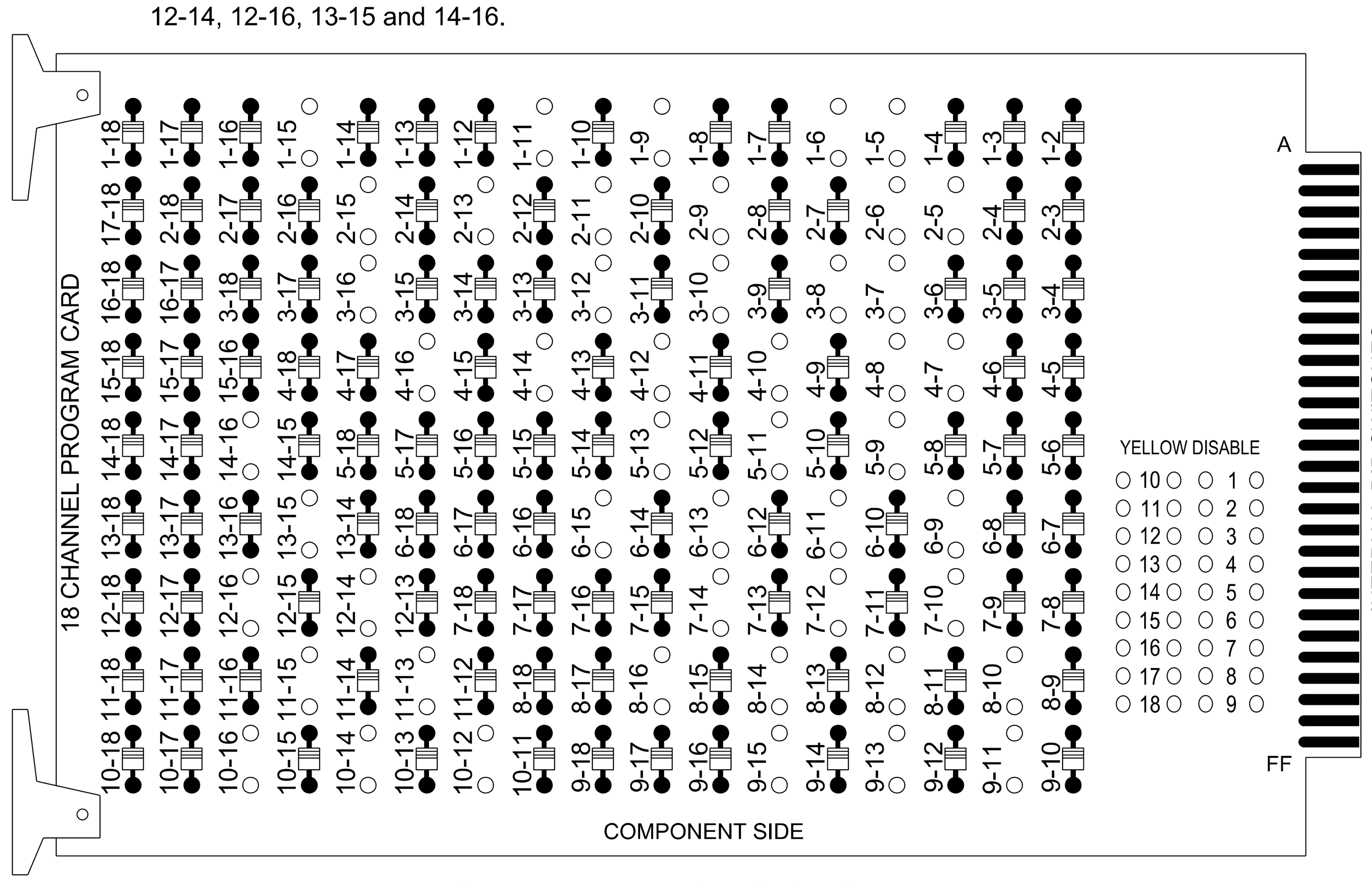
SIG. INVENTORY NO. 05-1932

PROJECT REFERENCE NO.	SHEET NO.
U-6022	Sig. 35.1

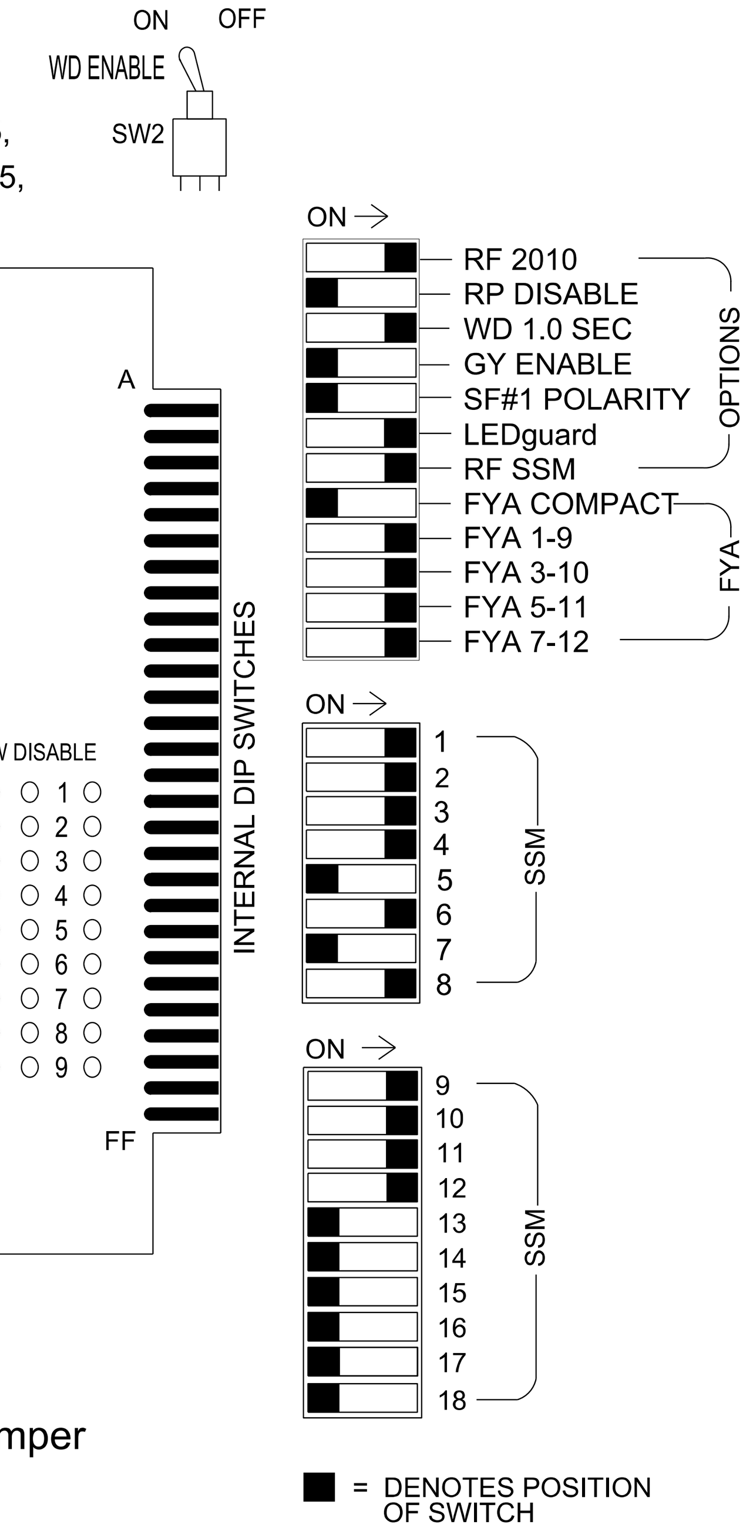
18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 1-5, 1-6, 1-9, 1-11, 1-15, 2-5, 2-6, 2-9, 2-11, 2-13, 2-15, 3-7, 3-8, 3-10, 3-12, 3-16, 4-7, 4-8, 4-10, 4-12, 4-14, 4-16, 5-9, 5-11, 5-13, 6-9, 6-11, 6-13, 6-15, 7-10, 7-12, 7-14, 8-10, 8-12, 8-14, 8-16, 9-11, 9-13, 9-15, 10-12, 10-14, 10-16, 11-13, 11-15, 12-14, 12-16, 13-15 and 14-16.



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. 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. 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. The cabinet and controller are part of the Fuquay-Varina Signal 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, S3, S4, S5, S6, S7, S8, S9 S10, S11, S12, AUX S1, AUX S2, AUX S4, AUX S5
Phases Used.......................................1, 2, 2PED, 3, 4, 4PED, 5, 6, 6PED, 7, 8, 8PED
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★	82	21,22	P21, P22	22	31★	41,42	P41, P42	51★	61,62	P61, P62	71★	81,82	P81, P82	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		126			117										A122	A125		A115	A102	
FLASHING YELLOW ARROW															A123	A126		A116	A103	
GREEN ARROW	127	127			118	118			133			124								
(hand)				113				104			119			110						
(walk)				115				106			121			112						

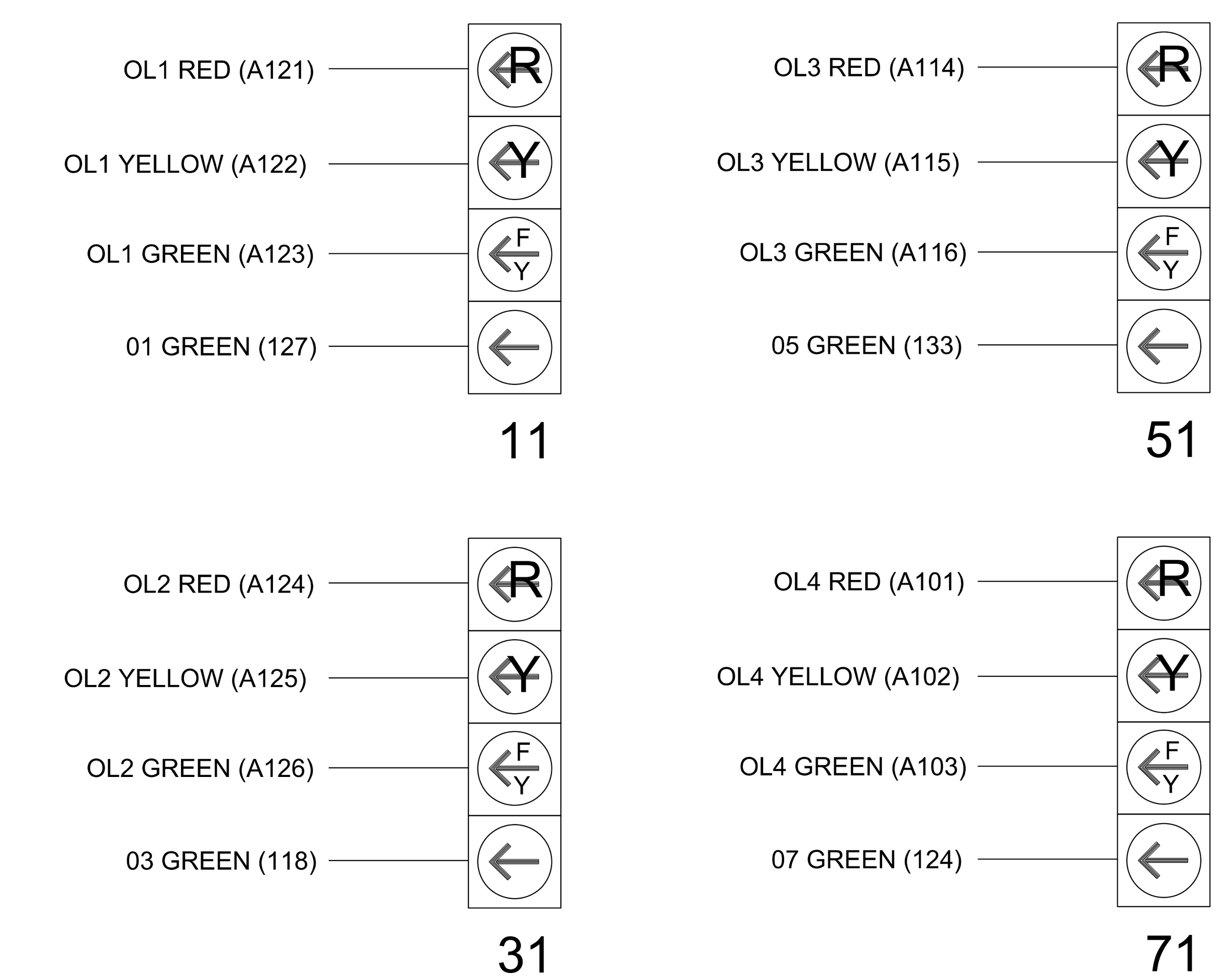
NU = Not Used

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

★See pictorial of head wiring in detail this sheet.

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



INPUT FILE POSITION LAYOUT

(front view)

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

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	X
1B	TB2-5,6	I2U	39	1	2	1	15		X		X	
2A	TB2-9,10	I3U	63	29	4	2			X	X	X	
3A	TB4-5,6	I5U	58	20	7 ★	3	15		X		X	
				-	30 ★	8	3		X		X	X
4A	TB4-9,10	I6U	41	3	8	4			X			
4B	TB4-11,12	I6L	45	7	9	4	5	2.0	X		X	X
5A	TB3-1,2	J1U	55	17	15 ★	5	15		X		X	
				-	31 ★	2	3		X		X	X
6A	TB3-5,6	J2U	40	2	16	6			X	X	X	
7A	TB5-5,6	J5U	57	19	21 ★	7	15		X		X	
				-	32 ★	4	3		X		X	X
8A	TB5-9,10	J6U	42	4	22	8			X			
8B	TB5-11,12	J6L	46	8	23	8	5	2.0	X		X	X
PED PUSH BUTTONS												
P21,P22	TB8-4,6	I12U	67	33	2	PED 2						
P41,P42	TB8-5,6	I12L	69	35	4	PED 4						
P61,P62	TB8-7,9	I13U	68	34	6	PED 6						
P81,P82	TB8-8,9	I13L	70	36	8	PED 8						

NOTE: INSTALL DC ISOLATORS IN INPUT FILE SLOTS I12 AND I13.

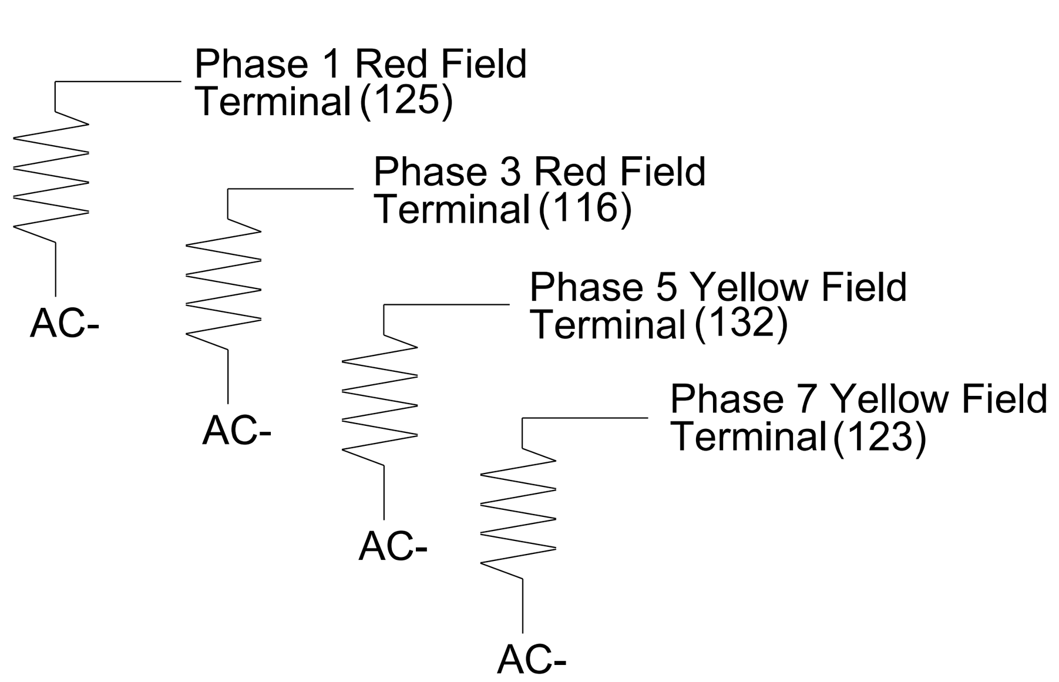
★ For the detectors to work as shown on the signal design plan, see the Vehicle Detector Setup Programming Detail for Alternate Phasing on sheet 2.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

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



COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1932
DESIGNED: APRIL 2023
SEALED: 4/14/2023
REVISED: N/A

ATKINS 1616 EAST MILLBROOK ROAD, SUITE 160 RALEIGH, NORTH CAROLINA 27609 (919) 876-6888 NCBEES #F-0326

Electrical Detail - Sheet 1 of 2

Electrical and Programming Details For:

Prepared for the Offices of: Transportation Mobility and Safety Division, ITS & Signals Management Section, State of North Carolina Department of Transportation

750 N. Greenfield Pkwy, Garner, NC 27529

US 401 (S Main Street) at SR 2768 (Judd Parkway)

Division 5 | Wake County | Fuquay-Varina

PLAN DATE: April 2023 | REVIEWED BY: AM Encarnacion
PREPARED BY: JT Stiff | REVIEWED BY: PL Alexander

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL: NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 044476 ANTHONY M. ENCARNACION

DocuSigned by: Anthony Encarnacion 4/14/2023
SIGNATURE DATE

SIG. INVENTORY NO. 05-1932

PROJECT REFERENCE NO.	SHEET NO.
U-6022	Sig. 35.2

MAXTIME OVERLAP PROGRAMMING DETAIL FOR DEFAULT PHASING

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

Overlap Plan 1

Overlap	1	2	3	4
Type	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section
Included Phases	2	4	6	8
Modifier Phases	1	3	5	7
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	1	2	3	4
Type	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section
Included Phases	-	-	-	-
Modifier Phases	1	3	5	7
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.

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.

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.

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

1A

Detector	Call Phase	Delay
1	1	3
29	0	-

3A

Detector	Call Phase	Delay
7	3	3
30	0	-

5A

Detector	Call Phase	Delay
15	5	3
31	0	-

7A

Detector	Call Phase	Delay
21	7	3
32	0	-

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1932
DESIGNED: APRIL 2023
SEALED: 4/14/2023
REVISED: N/A

Electrical Detail - Sheet 2 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Electrical and Programming Details For:

US 401 (S Main Street)
at
SR 2768 (Judd Parkway)

Division 5 | Wake County | Fuquay-Varina

PLAN DATE:	April 2023	REVIEWED BY:	AM Encarnacion
PREPARED BY:	JT Stiff	REVIEWED BY:	PL Alexander

REVISIONS	INIT.	DATE

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

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 044476 ENGINEER ANTHONY M. ENCARNACION

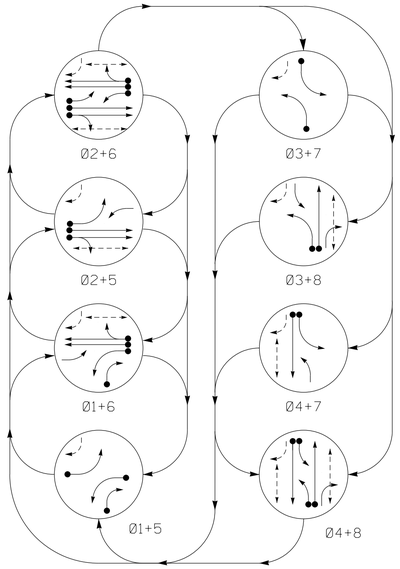
Documents by: Anthony Encarnacion 4/14/2023
DIRECTORY SIGNATURE DATE

SIG. INVENTORY NO. 05-1932

ATKINS 1616 EAST MILLBROOK ROAD, SUITE 160
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888 NCBEES #F-0326

PROJECT REFERENCE NO.	SHEET NO.
U-6022	Sig. 36.0

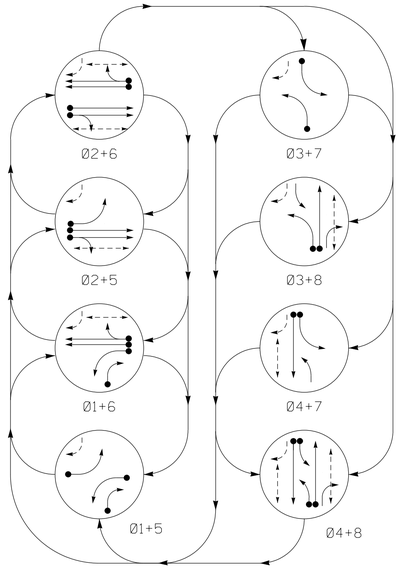
DEFAULT PHASING DIAGRAM



DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3+7	Ø3+8	Ø4+7	Ø4+8	FLASH
11	←	←	←FY	←FY	←R	←R	←R	←R	←Y
21, 22, 23	R	R	G	G	R	R	R	R	Y
31	←R	←R	←R	←R	←	←	←FY	←FY	←R
41, 42	R	R	R	R	R	R	G	G	R
51	←	←FY	←	←FY	←R	←R	←R	←R	←Y
61, 62	R	G	R	G	R	R	R	R	Y
71	←R	←R	←R	←R	←	←FY	←	←FY	←R
81, 83	R	R	R	R	R	G	R	G	R
82	R/→	R/→	R	R	R	G	R	G	R
P21, P22	DW	DW	W	W	DW	DW	DW	DW	DRK
P41, P42	DW	DW	DW	DW	DW	DW	W	W	DRK
P61, P62	DW	W	DW	W	DW	DW	DW	DW	DRK
P81, P82	DW	DW	DW	DW	DW	W	DW	W	DRK

ALTERNATE PHASING DIAGRAM



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
11	←	←	←R	←R	←R	←R	←R	←R	←Y
21, 22, 23	R	R	G	G	R	R	R	R	Y
31	←R	←R	←R	←R	←	←	←FY	←FY	←R
41, 42	R	R	R	R	R	R	G	G	R
51	←	←R	←	←R	←R	←R	←R	←R	←Y
61, 62	R	G	R	G	R	R	R	R	Y
71	←R	←R	←R	←R	←	←FY	←	←FY	←R
81, 83	R	R	R	R	R	G	R	G	R
82	R/→	R/→	R	R	R	G	R	G	R
P21, P22	DW	DW	W	W	DW	DW	DW	DW	DRK
P41, P42	DW	DW	DW	DW	DW	DW	W	W	DRK
P61, P62	DW	W	DW	W	DW	DW	DW	DW	DRK
P81, P82	DW	DW	DW	DW	DW	W	DW	W	DRK

MAXTIME DETECTOR INSTALLATION CHART

DETECTOR LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND ADDED INITIAL	CALL DELAY DURING GREEN	NEW CARD
1A	6X40	0	2-4-2	-	1	15*	-	X -	X -	-
					6#	3	-	X -	X X	-
1B	6X40	0	2-4-2	-	1	15	-	X -	X -	-
2A	6X6	300	EXIST	-	2	-	-	X X	X -	-
2B	6X6	300	EXIST	-	2	-	-	X X	X -	-
3A	6X40	0	2-4-2	-	3	15	-	X -	X -	-
					8	3	-	X -	X -	-
4A	6X40	0	2-4-2	-	4	-	-	X -	X -	-
5A	6X40	0	2-4-2	-	5	15**	-	X -	X -	-
					2#	3	-	X -	X X	-
6A	6X6	300	EXIST	-	6	-	-	X X	X -	-
6B	6X6	300	EXIST	-	6	-	-	X X	X -	-
7A	6X40	0	2-4-2	-	7	15	-	X -	X -	-
					4	3	-	X -	X -	-
8A	6X40	0	2-4-2	-	8	-	-	X -	X -	-
S5	6X6	+210	EXIST	-	-	-	-	- -	- -	-
S6	6X6	+210	EXIST	-	-	-	-	- -	- -	-
S7	6X6	+165	EXIST	-	-	-	-	- -	- -	-
S8	6X6	+180	EXIST	-	-	-	-	- -	- -	-

* Disable delay during alternate phasing operation
** Reduce delay to 3 seconds during alternate phasing operation
\# Disable phase call for loop(s) during alternate phasing operation

8 Phase Fully Actuated (Fuquay-Varina Signal System)

NOTES

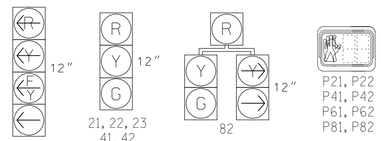
1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 and/or phase 5 may be lagged.
4. Phase 3 and/or phase 7 may be lagged.
5. Set all detector units to presence mode.
6. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
7. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
8. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
9. Pavement markings are existing.
10. The Division Traffic Engineer will determine the hours of use for each phasing plan.
11. 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

SIGNAL FACE I.D.

All Heads L.E.D.



LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
▯	Pedestrian Signal Head	■
○	Signal Pole with Guy	●
○	Signal Pole with Sidewalk Guy	●
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
□	Junction Box	■
----------	2-in Underground Conduit	----------
N/A	Right of Way	----------
→	Directional Arrow	→
○	Metal Pole with Mastarm	□
⬡	Type II Signal Pedestal	●
N/A	Curb Ramp	◢
(A)	"YIELD" Sign (R1-2)	(A)
(B)	"U-TURN YIELD TO RIGHT TURN" Sign (R10-16)	(B)
(C)	Street Name Sign (D3-1)	(C)
(D)	Pedestrian Crossing Sign (W11-2) with Diagonal Arrow Plaque (W16-7pL)	(D)

MAXTIME TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6	7	8
Walk *	–	7	–	7	–	7	–	7
Ped Clear *	–	20	–	16	–	13	–	21
Min Green	7	12	7	7	7	12	7	7
Passage *	2.0	6.0	2.0	2.0	2.0	6.0	2.0	2.0
Max 1 *	20	90	20	30	20	90	30	30
Yellow Change	3.0	4.5	3.0	3.8	3.0	4.5	3.0	3.8
Red Clear	2.8	1.9	3.5	3.2	2.3	1.9	3.9	3.2
Added Initial *	–	1.8	–	–	–	1.8	–	–
Maximum Initial *	–	34	–	–	–	34	–	–
Time Before Reduction *	–	15	–	–	–	15	–	–
Time To Reduce *	–	30	–	–	–	30	–	–
Minimum Gap	–	3.0	–	–	–	3.0	–	–
Advance Walk	–	3	–	3	–	3	–	3
Non Lock Detector	X	–	X	X	X	–	X	X
Vehicle Recall	–	MIN RECALL	–	–	–	MIN RECALL	–	–
Dual Entry	–	–	–	X	–	–	–	X

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

Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

SR 5056 (Judd Parkway NE) at E Broad Street

Division 5 Wake County Fuquay-Varina

PLAN DATE: April 2023 REVIEWED BY: AM Encarnacion

PREPARED BY: JT Stiff REVIEWED BY: PL Alexander

SCALE 0 40 1"=40'

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 044476 ANTHONY M. ENCARNACION

Documents by: Anthony Encarnacion 4/14/2023
DocuSigned by: DATE

SIG. INVENTORY NO. 05-2172

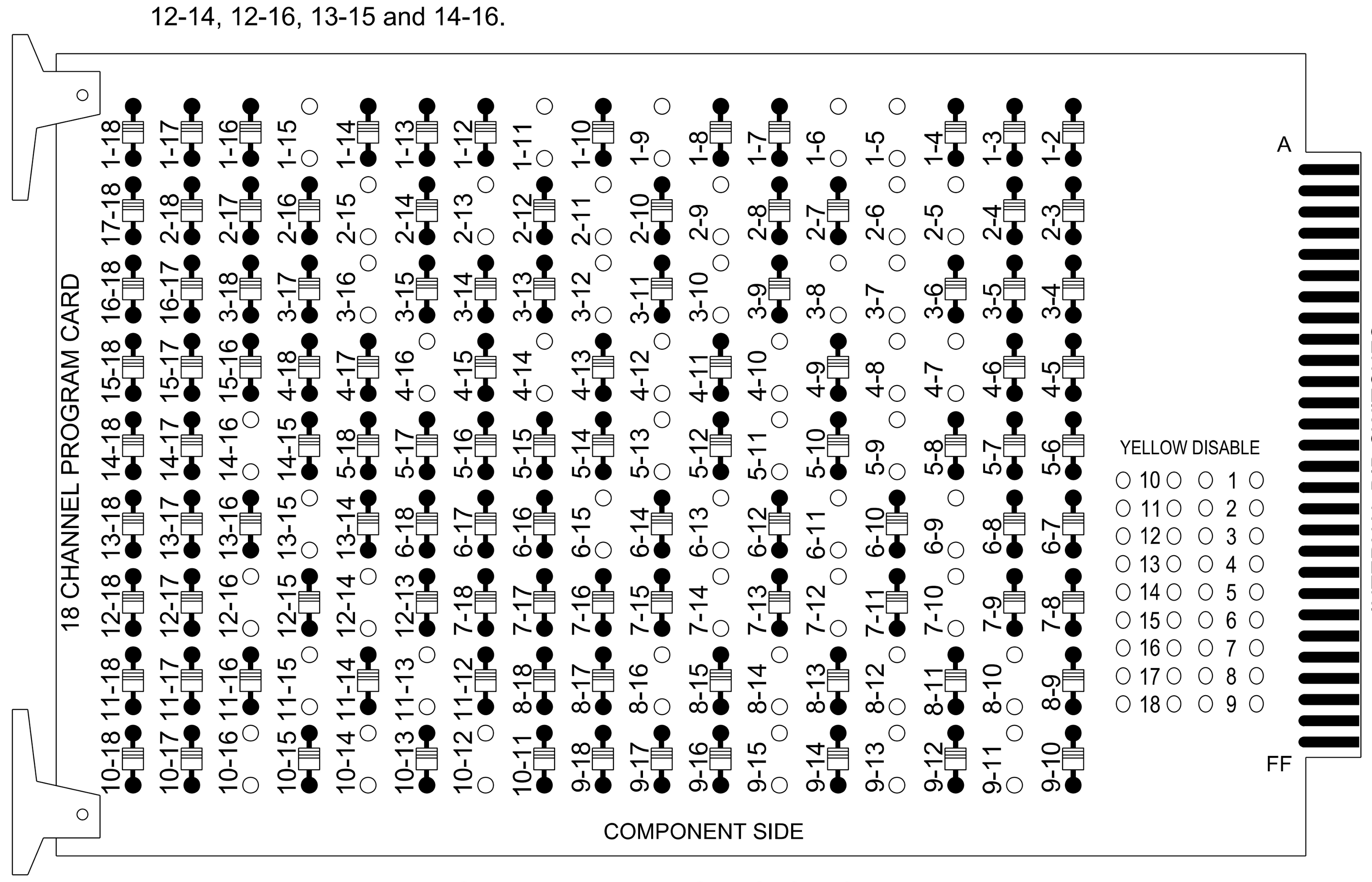
ATKINS 1616 EAST MILLBROOK ROAD, SUITE 160 RALEIGH, NORTH CAROLINA 27609 (919) 876-6888 NCBEES #F-0326

PROJECT REFERENCE NO.	SHEET NO.
U-6022	Sig. 36.1

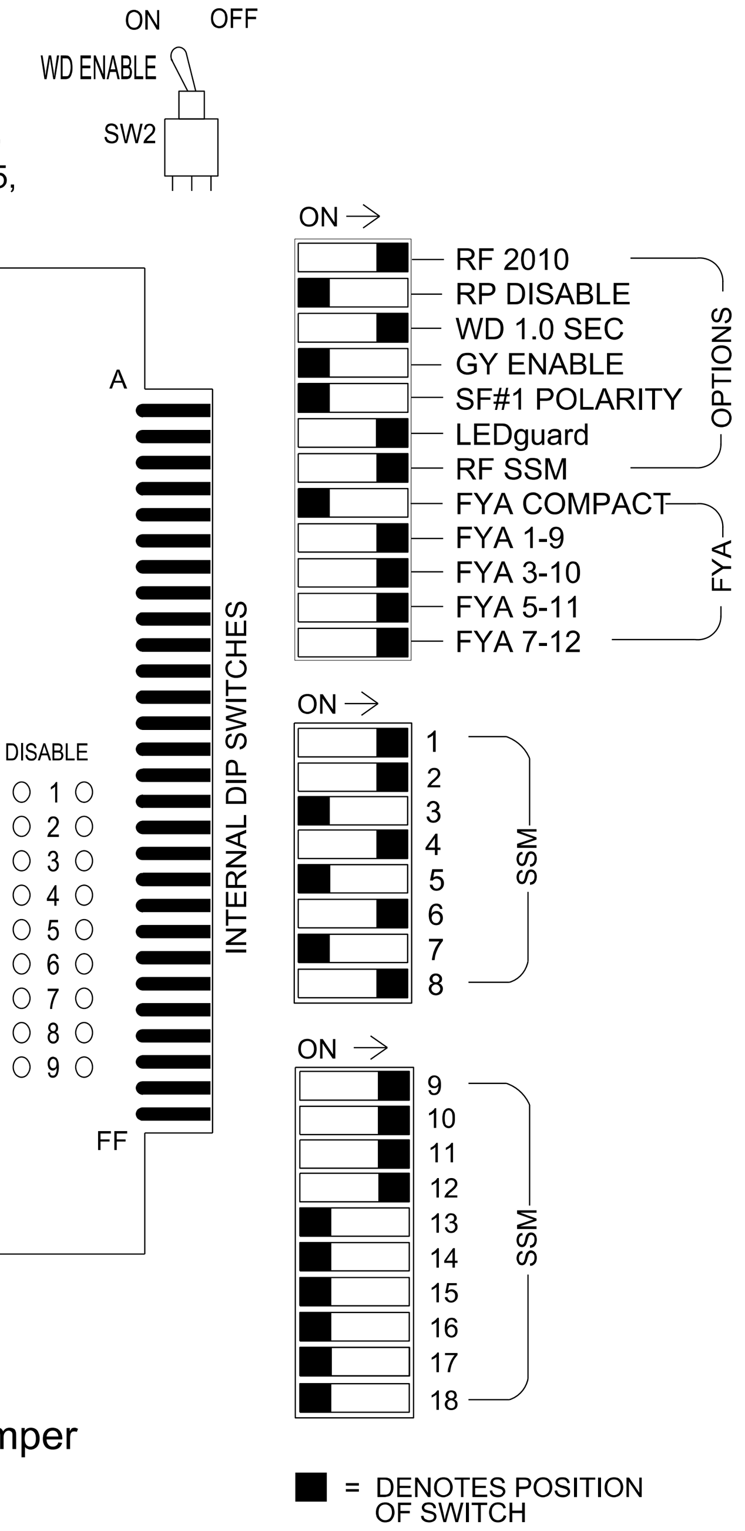
18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 1-5, 1-6, 1-9, 1-11, 1-15, 2-5, 2-6, 2-9, 2-11, 2-13, 2-15, 3-7, 3-8, 3-10, 3-12, 3-16, 4-7, 4-8, 4-10, 4-12, 4-14, 4-16, 5-9, 5-11, 5-13, 6-9, 6-11, 6-13, 6-15, 7-10, 7-12, 7-14, 8-10, 8-12, 8-14, 8-16, 9-11, 9-13, 9-15, 10-12, 10-14, 10-16, 11-13, 11-15, 12-14, 12-16, 13-15 and 14-16.



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. 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. 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. The cabinet and controller are part of the Fuquay-Varina Signal 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, S3, S4, S5, S6, S7, S8, S9, S10, S11, S12, AUX S1, AUX S2, AUX S4, AUX S5
Phases Used.......................................1, 2, 2PED, 3, 4, 4PED, 5, 6, 6PED, 7, 8, 8PED
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★	82	21,22, 23	P21, P22	31★	41,42	P41, P42	51★	61,62	P61, P62	71★	81,82, 83	P81, P82	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		126												A122	A125		A115	A102	
FLASHING YELLOW ARROW														A123	A126		A116	A103	
GREEN ARROW	127	127			118			133			124								
(Don't Walk symbol)				113			104			119			110						
(Walk symbol)				115			106			121			112						

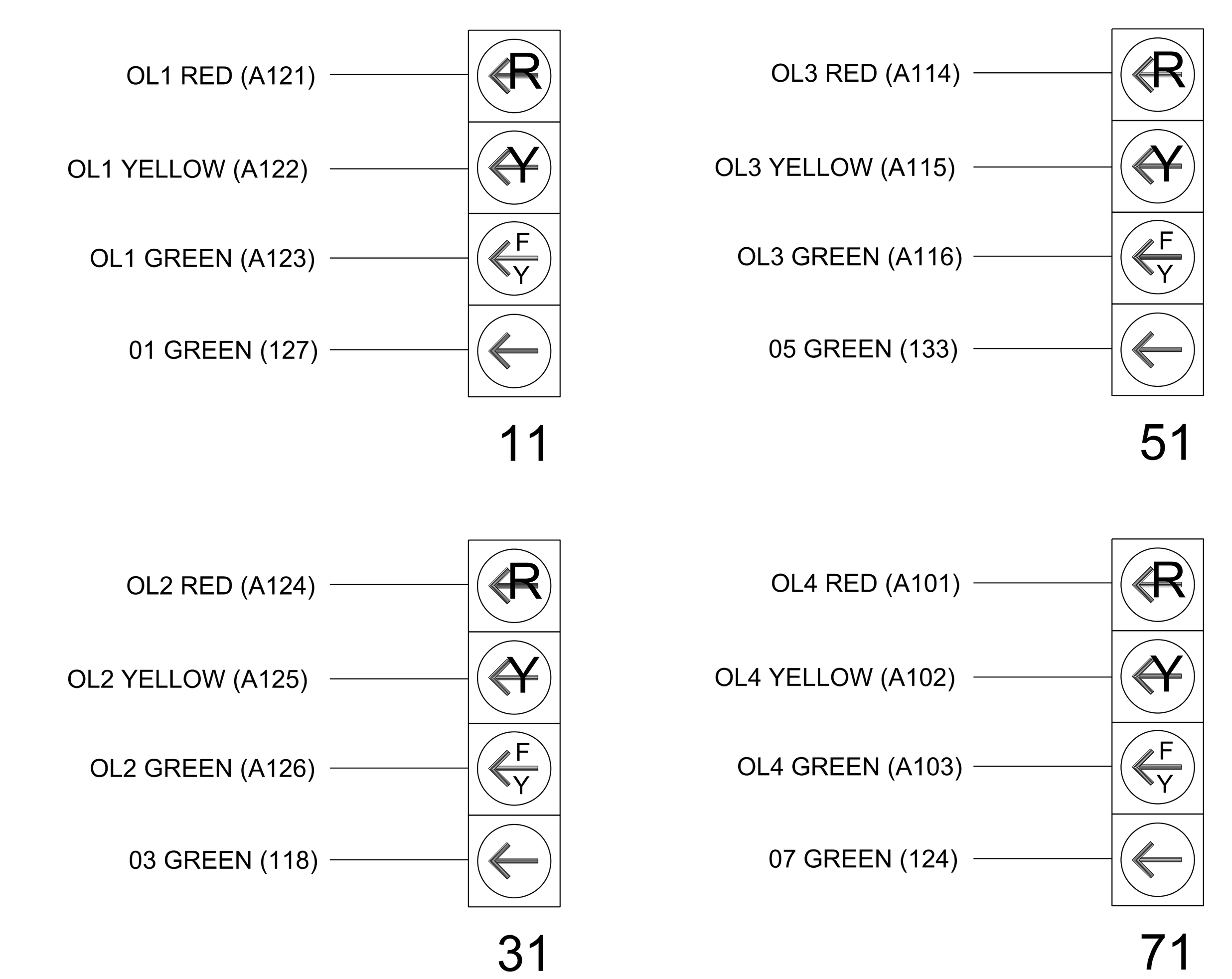
NU = Not Used

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

★ See pictorial of head wiring in detail this sheet.

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



INPUT FILE POSITION LAYOUT

(front view)

FILE		1	2	3	4	5	6	7	8	9	1O	11	12	13	14
"I"	U	Ø 1 1A	Ø 1 1B	Ø 2 2A	SLOT EMPTY	Ø 3 3A	Ø 4 4A	SLOT EMPTY	SLOT EMPTY	SYS. DET. S5	SLOT EMPTY	SLOT EMPTY	Ø 2 PED DC ISOLATOR	Ø 6 PED DC ISOLATOR	FS DC ISOLATOR
"I"	L	NOT USED	NOT USED	Ø 2 2B		NOT USED	NOT USED			SYS. DET. S6			Ø 4 PED DC ISOLATOR	Ø 8 PED DC ISOLATOR	ST DC ISOLATOR
"J"	U	Ø 5 5A	Ø 6 6A	SLOT EMPTY	SLOT EMPTY	Ø 7 7A	Ø 8 8A	SLOT EMPTY	SLOT EMPTY	SYS. DET. S7	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
"J"	L	NOT USED	Ø 6 6B			NOT USED	NOT USED			SYS. DET. S8					

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	X
1B	TB2-5,6	I2U	39	1	2	1	15		X		X	
2A	TB2-9,10	I3U	63	29	4	2			X	X	X	
2B	TB2-11,12	I3L	76	42	5	2			X	X	X	
3A	TB4-5,6	I5U	58	20	7	3	15		X		X	
				-	30	8	3		X		X	
4A	TB4-9,10	I6U	41	3	8	4			X		X	
*S5	TB6-9,10	I9U	60	22	13	SYS						
*S6	TB6-11,12	I9L	62	24	14	SYS						
5A	TB3-1,2	J1U	55	17	15 ★	5	15		X		X	
				-	31 ★	2	3		X		X	X
6A	TB3-5,6	J2U	40	2	16	6			X	X	X	
6B	TB3-7,8	J2L	44	6	17	6			X	X	X	
7A	TB5-5,6	J5U	57	19	21	7	15		X		X	
				-	32	4	3		X		X	
8A	TB5-9,10	J6U	42	4	22	8			X		X	
*S7	TB7-9,10	J9U	59	21	27	SYS						
*S8	TB7-11,12	J9L	61	23	28	SYS						
PED PUSH BUTTONS												
P21,P22	TB8-4,6	I12U	67	33	2	PED 2						
P41,P42	TB8-5,6	I12L	69	35	4	PED 4						
P61,P62	TB8-7,9	I13U	68	34	6	PED 6						
P81,P82	TB8-8,9	I13L	70	36	8	PED 8						

NOTE:
INSTALL DC ISOLATORS IN INPUT FILE SLOTS I12 AND I13.

*System detector only. Remove any assigned vehicle phase.

★ For the detectors to work as shown on the signal design plan, see the Vehicle Detector Setup Programming Detail for Alternate Phasing on sheet 2.

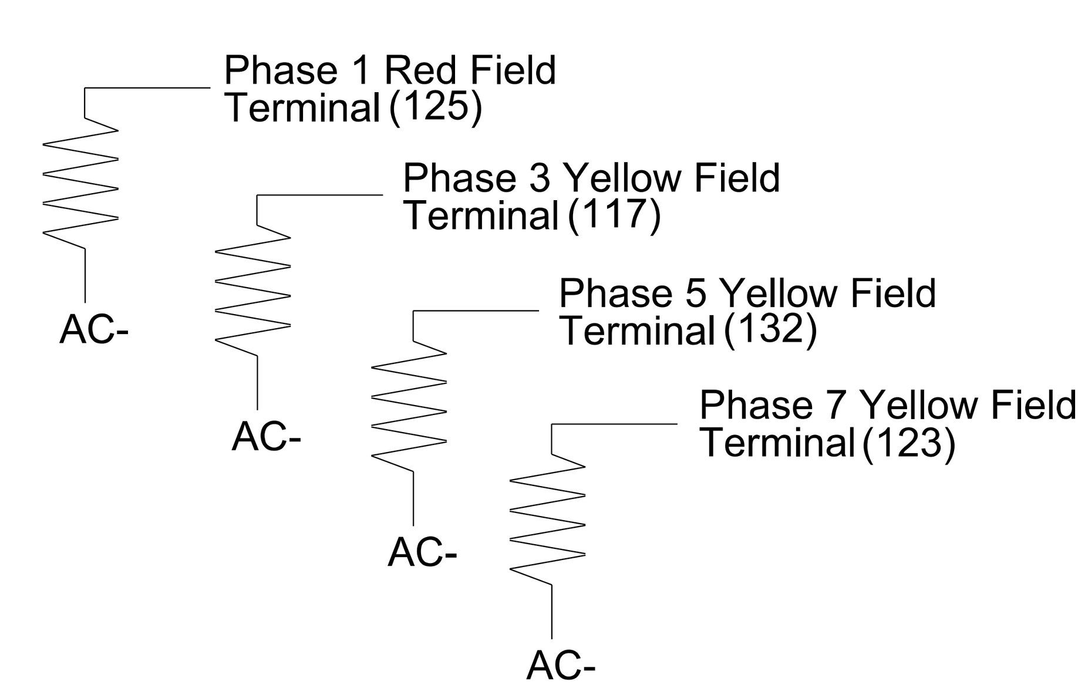
INPUT FILE POSITION LEGEND: J2L

FILE J
SLOT 2
LOWER

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

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



THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-2172
DESIGNED: APRIL 2023
SEALED: 4/14/2023
REVISED: N/A

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

ATKINS 1616 EAST MILLBROOK ROAD, SUITE 160
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888 NCBEES #F-0326

Electrical Detail - Sheet 1 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Electrical and Programming Details For:

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

SR 5056 (Judd Parkway NE) at E Broad Street

Division 5 | Wake County | Fuquay-Varina

PLAN DATE:	April 2023	REVIEWED BY:	AM Encarnacion
PREPARED BY:	JT Stiff	REVIEWED BY:	PL Alexander

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 044476 ANTHONY M. ENCARNACION

DocuSigned by: Anthony Encarnacion
SIGNATURE 4/14/2023 DATE

SIG. INVENTORY NO. 05-2172

PROJECT REFERENCE NO.	SHEET NO.
U-6022	Sig. 36.2

MAXTIME OVERLAP PROGRAMMING DETAIL FOR DEFAULT PHASING

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

Overlap Plan 1

Overlap	1	2	3	4
Type	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section
Included Phases	2	4	6	8
Modifier Phases	1	3	5	7
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	1	2	3	4
Type	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section
Included Phases	-	4	-	8
Modifier Phases	1	3	5	7
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.

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 and 51 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.

Disables phase 2 call on loop 5A and reduces delay time for phase 5 call on loop 5A 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:

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.

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

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

Web Interface
Home >Controller >Detector Configuration >Vehicle Detectors

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

Plan 2

1A

Detector	Call Phase	Delay
1	1	0
29	0	-

5A

Detector	Call Phase	Delay
15	5	3
31	0	-

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-2172
DESIGNED: APRIL 2023
SEALED: 4/14/2023
REVISED: N/A

ATKINS 1616 EAST MILLBROOK ROAD, SUITE 160
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888 NCBEES #F-0326

Electrical Detail - Sheet 2 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Electrical and Programming Details For:

Prepared for the Offices of:

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

750 N. Greenfield Pkwy, Garner, NC 27529

SR 5056 (Judd Parkway NE)
at
E Broad Street

Division 5 | Wake County | Fuquay-Varina

PLAN DATE:	April 2023	REVIEWED BY:	AM Encarnacion
PREPARED BY:	JT Stiff	REVIEWED BY:	PL Alexander

REVISIONS	INIT.	DATE

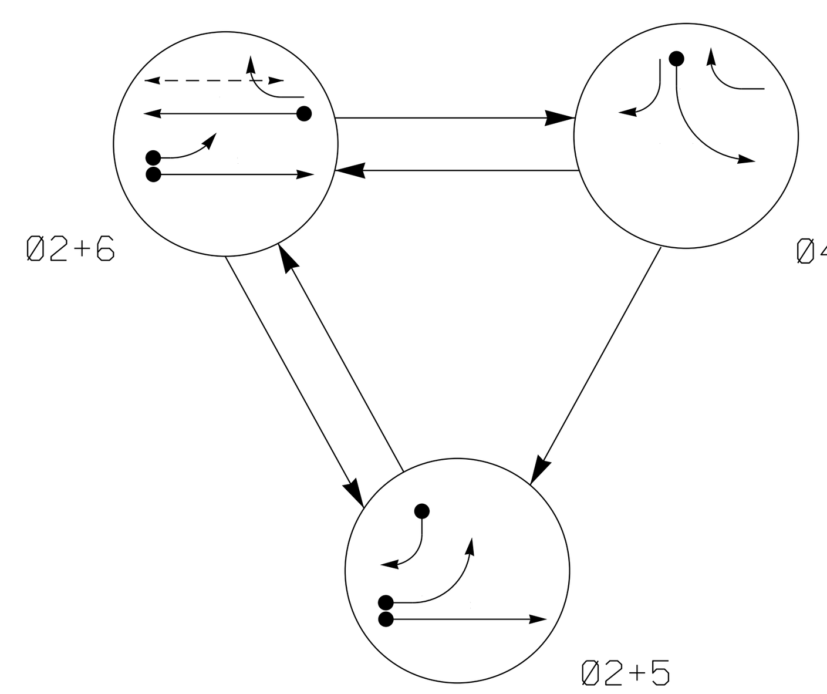
SEAL
NORTH CAROLINA PROFESSIONAL
SEAL 044476
ENGINEER
ANTHONY M. ENCARNACION

Docusigned by: Anthony Encarnacion 4/14/2023
ORIGINATOR SIGNATURE DATE

SIG. INVENTORY NO. 05-2172

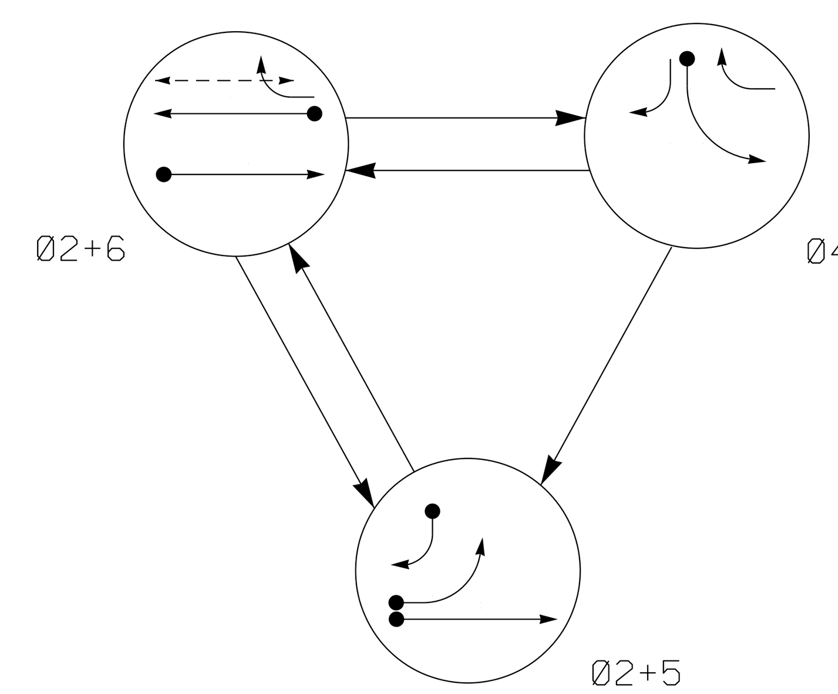
PROJECT REFERENCE NO.	SHEET NO.
U-6022	Sig. 37.0

DEFAULT PHASING DIAGRAM



DEFAULT PHASING TABLE OF OPERATION				
SIGNAL FACE	PHASE			
	Ø2+5	Ø2+6	Ø4	FLASH
21, 22	G	G	R	Y
41	←R	←R	←	←R
42, 43	→	R	→	R
51	←	←F/Y	←R	←Y
61, 62	R	G	R	Y
63	R	F/Y→	→	Y
P61, P62	DW	W	DW	DRK

ALTERNATE PHASING DIAGRAM



ALTERNATE PHASING TABLE OF OPERATION				
SIGNAL FACE	PHASE			
	Ø2+5	Ø2+6	Ø4	FLASH
21, 22	G	G	R	Y
41	←R	←R	←	←R
42, 43	→	R	→	R
51	←	←R	←R	←Y
61, 62	R	G	R	Y
63	R	F/Y→	→	Y
P61, P62	DW	W	DW	DRK

MAXTIME DETECTOR INSTALLATION CHART													
DETECTOR					PROGRAMMING								
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
2A	6X6	300	EXIST	-	2	-	-	X	X	X	-	-
4A	6X60	0	2-4-2	-	4	3	-	X	-	X	-	-
5A	6X60	0	2-4-2	-	5	15*	-	X	-	X	-	-
					2#	3	-	X	-	X	X	-
5B	6X60	0	2-4-2	-	5	15	-	X	-	X	-	-
6A	6X6	300	EXIST	-	6	-	-	X	X	X	-	-
S1	6X6	+100	EXIST	-	-	-	-	-	-	-	-	-
S2	6X6	@25	EXIST	-	-	-	-	-	-	-	-	-

* Disable delay during alternate phasing operation
# Disable phase call for loop(s) during alternate phasing operation
@ This distance is from the EB stopbar

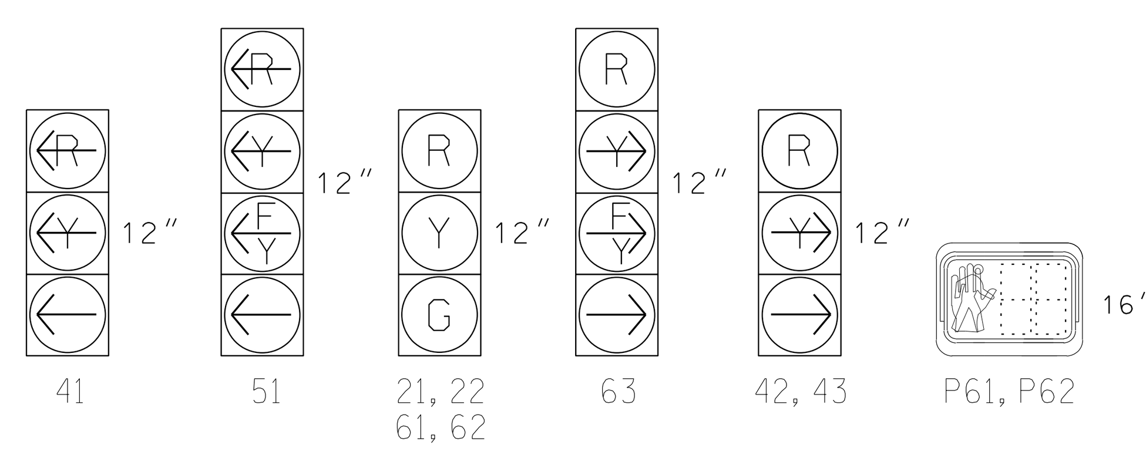
3 Phase
Fully Actuated
(Fuquay-Varina Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 5 may be lagged.
4. Reposition existing signal heads numbered 22 and 62.
5. Set all detector units to presence mode.
6. In the event of loop replacement, refer to the current ITS and Signals Design Manual and submit a Plan of Record to the Signal Design Section.
7. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
8. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
9. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
10. Pavement markings are existing.
11. The Division Traffic Engineer will determine the hours of use for each phasing plan.
12. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
13. To provide leading pedestrian interval on phase 6, program FYA heads 51 and 63 to delay for 3 seconds after the start of the phase 6 walk interval. See electrical details.

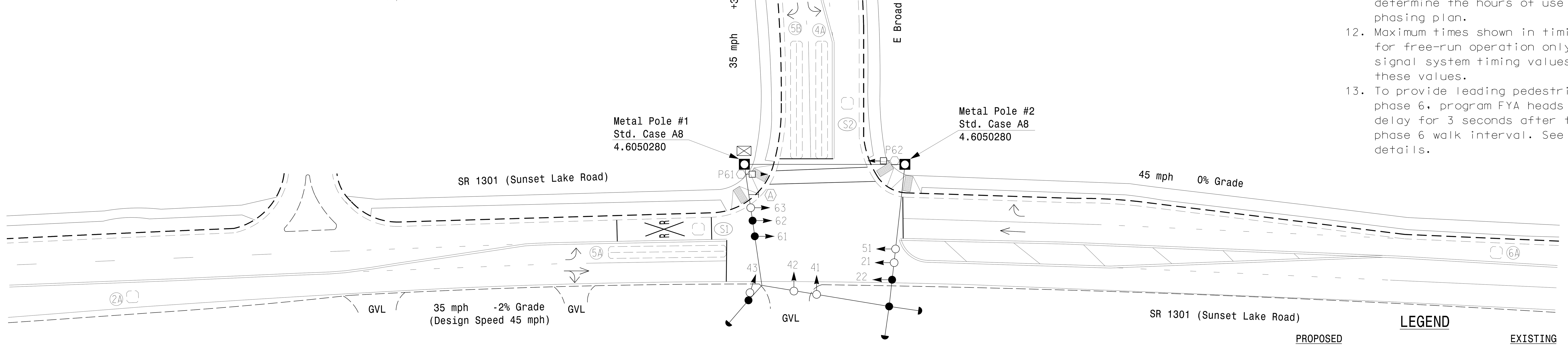
SIGNAL FACE I.D.

All Heads L.E.D.



PHASING DIAGRAM DETECTION LEGEND

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



LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
	Metal Strain Pole	
	Type II Signal Pedestal	
N/A	Curb Ramp	
Ⓐ	"RIGHT TURN SIGNAL" Sign (R10-10R)	Ⓐ

MAXTIME TIMING CHART				
FEATURE	PHASE			
	2	4	5	6
Walk *	–	–	–	7
Ped Clear *	–	–	–	11
Min Green	12	7	7	12
Passage *	6.0	1.0	1.0	6.0
Max 1 *	75	20	15	75
Yellow Change	4.7	3.0	3.0	4.7
Red Clear	1.1	2.1	2.4	1.1
Added Initial *	2.5	–	–	2.5
Maximum Initial *	34	–	–	34
Time Before Reduction *	15	–	–	15
Time To Reduce *	30	–	–	30
Minimum Gap	3.0	–	–	3.0
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 Extension times for phases 2 and 6 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.
** See Note 14

ATKINS 1616 EAST MILLBROOK ROAD, SUITE 160 RALEIGH, NORTH CAROLINA 27609 (919) 876-6888 NCBEES #F-0326

Signal Upgrade

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

SCALE 0 30 1"=30'

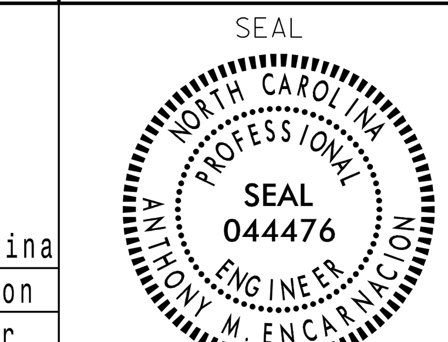
SR 1301 (Sunset Lake Road) at E Broad Street

Division 5	Wake County	Fuquay-Varina
PLAN DATE: April 2023	REVIEWED BY: AM Encarnacion	
PREPARED BY: JT Stiff	REVIEWED BY: PL Alexander	

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL



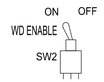
DocuSigned by: Anthony Encarnacion 4/14/2023
SIGNATURE DATE

SIG. INVENTORY NO. 05-2173

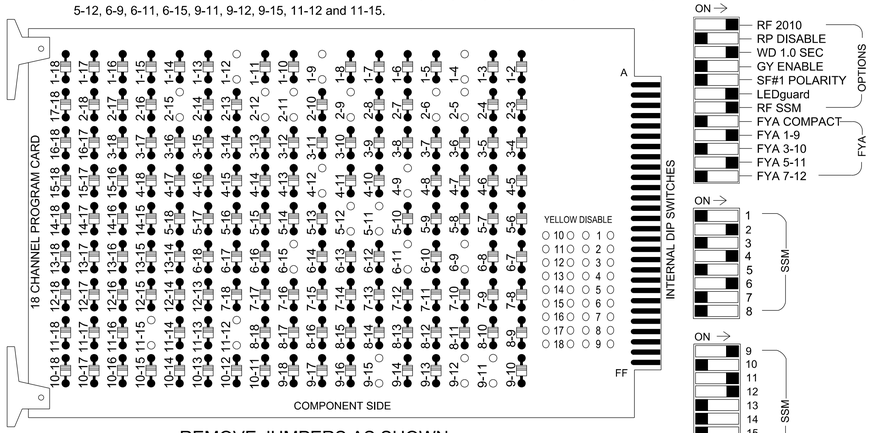
PROJECT REFERENCE NO.	SHEET NO.
U-6022	Sig. 37.1

18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE DIODE JUMPERS 1-4, 1-9, 1-12, 2-5, 2-6, 2-9, 2-11, 2-12, 2-15, 4-9, 4-12, 5-11, 5-12, 6-9, 6-11, 6-15, 9-11, 9-12, 9-15, 11-12 and 11-15.



■ = DENOTES POSITION OF SWITCH

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. 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. Program controller to start up in phase 2 Green No Walk and 6 Green No Walk.
3. The cabinet and controller are part of the Fuquay-Varina Signal 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, S5, S7, S8, S9, AUX S1, AUX S4, AUX S5
Phases Used.....2, 4, 5, 6, 6PED
Overlap "1".....*
Overlap "2".....NOT USED
Overlap "3".....*
Overlap "4".....*
Overlap "7".....*

*See overlap programming detail on sheet 2

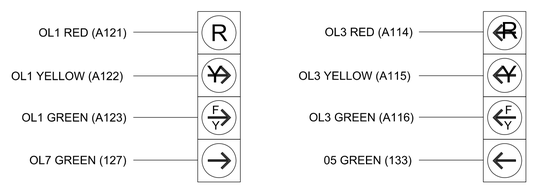
SIGNAL HEAD HOOK-UP CHART

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	OL7	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	63★	21,22	NU	NU	41	NU	51★	61,62	P61, P62	NU	NU	NU	63★	NU	NU	51★	42,43	NU
RED		128						134					A121				A101	
YELLOW	*	129					*	135										
GREEN		130						136										
RED ARROW					101											A114		
YELLOW ARROW					102								A122			A115	A102	
FLASHING YELLOW ARROW													A123			A116		
GREEN ARROW	127				103		133										A103	
✋									119									
🚶									121									

NU = Not Used
* Denotes install load resistor. See load resistor installation detail this sheet.
★ See pictorial of head wiring in detail this sheet.
Note: Load Switch S4 requires output remapping. See sheet 2 for programming details.

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



INPUT FILE POSITION LAYOUT

(front view)

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

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN
2A	TB2-5,6	I2U	39	1	2	2			X	X	X	
4A	TB4-9,10	I6U	41	3	8	4	3		X		X	
*S1	TB6-9,10	I9U	60	22	13	SYS						
*S2	TB6-11,12	I9L	62	24	14	SYS						
5A	TB3-1,2	J1U	55	17	15 ★	5	15		X		X	
				-	31 ★	2	3		X		X	X
5B	TB3-5,6	J2U	40	2	16	5	15		X		X	
6A	TB3-9,10	J3U	64	30	18	6			X	X	X	
PED PUSH BUTTONS												
P61,P62	TB8-7,9	I13U	68	34	6	PED 6						

NOTE:
INSTALL DC ISOLATORS IN INPUT FILE SLOT I13.

*System detector only. Remove any assigned vehicle phase.
★ For the detectors to work as shown on the signal design plan, see the Vehicle Detector Setup Programming Detail for Alternate Phasing on sheet 2.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

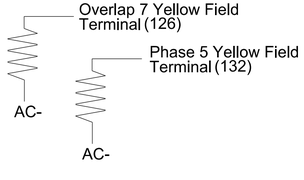
COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

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



THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-2173
DESIGNED: APRIL 2023
SEALED: 4/14/2023
REVISED: N/A

Electrical Detail - Sheet 1 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Electrical and Programming Details For:

SR 1301 (Sunset Lake Road)
at
E Broad Street

Division 5 | Wake County | Fuquay-Varina

PLAN DATE:	April 2023	REVIEWED BY:	AM Encarnacion
PREPARED BY:	JT Stiff	REVIEWED BY:	PL Alexander

REVISIONS	INIT.	DATE

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

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 044476 ANTHONY M. ENCARNACION

Documents signed by: Anthony Encarnacion 4/14/2023
SIGNATURE DATE

SIG. INVENTORY NO. 05-2173

ATKINS 1616 EAST MILLBROOK ROAD, SUITE 160 RALEIGH, NORTH CAROLINA 27609 (919) 876-6888 NCBEES #F-0326

PROJECT REFERENCE NO.	SHEET NO.
U-6022	Sig. 37.2

MAXTIME OVERLAP PROGRAMMING DETAIL FOR DEFAULT PHASING

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

Overlap Plan 1

Overlap	1	2	3	4	7
Type	FYA 4 - Section	-	FYA 4 - Section	Normal	Normal
Included Phases	6	-	6	4,5	4
Modifier Phases	-	-	5	-	-
Modifier Overlaps	7	-	-	-	-
Trail Green	0	0	0	0	0
Trail Yellow	0.0	0.0	0.0	0.0	0.0
Trail Red	0.0	0.0	0.0	0.0	0.0
FYA Ped Delay	3.0	0.0	3.0	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	7
Type	FYA 4 - Section	-	FYA 4 - Section	Normal	Normal
Included Phases	6	-	-	4,5	4
Modifier Phases	-	-	5	-	-
Modifier Overlaps	7	-	-	-	-
Trail Green	0	0	0	0	0
Trail Yellow	0.0	0.0	0.0	0.0	0.0
Trail Red	0.0	0.0	0.0	0.0	0.0
FYA Ped Delay	3.0	0.0	3.0	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.

MAXTIME DETECTOR PROGRAMMING DETAIL FOR ALTERNATE PHASING LOOP 5A

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

Web Interface
Home >Controller >Detector Configuration >Vehicle Detectors

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

5A

Detector	Call Phase	Delay
15	5	0
31	0	-

OUTPUT CHANNEL CONFIGURATION

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

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

Channel Configuration

NOTICE OVERLAP 7 ASSIGNED TO CHANNEL 1 →

Channel	Control Type	Control Source	Flash Yellow	Flash Red	Flash Alt	MMU Channel
1	Overlap	7		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

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.

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 phase for head 51 to run protected turns only.

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-2173
DESIGNED: APRIL 2023
SEALED: 4/14/2023
REVISED: N/A

ATKINS
1616 EAST MILLBROOK ROAD, SUITE 160
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888 NCBEES #F-0326

Electrical Detail - Sheet 2 of 2

Electrical and Programming Details For:

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

SR 1301 (Sunset Lake Road)
at
E Broad Street

Division 5 | Wake County | Fuquay-Varina

PLAN DATE:	April 2023	REVIEWED BY:	AM Encarnacion
PREPARED BY:	JT Stiff	REVIEWED BY:	PL Alexander

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 044476 ANTHONY M. ENCARNACION

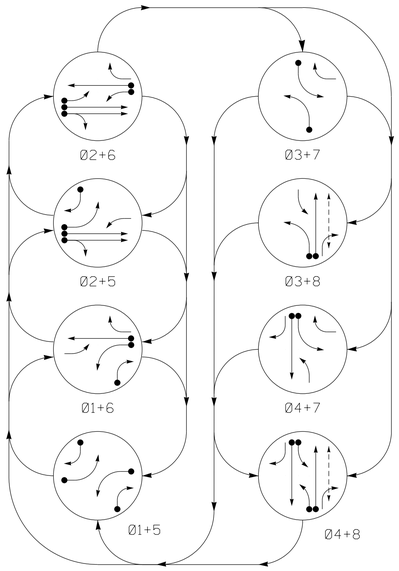
Anthony Encarnacion 4/14/2023
DIGITAL SIGNATURE DATE
SIG. INVENTORY NO. 05-2173

13-APR-2023 12:59
pw:/SUS036343.woatkins.com:ATKNANC01/Documents/Roads and Bridges/Projects/100063268 Fuquay Varina/Task 05_11_Signals/Electrical Details/052173_sm_ele_2022mmds.dgn
STIP4685 AT 105491089

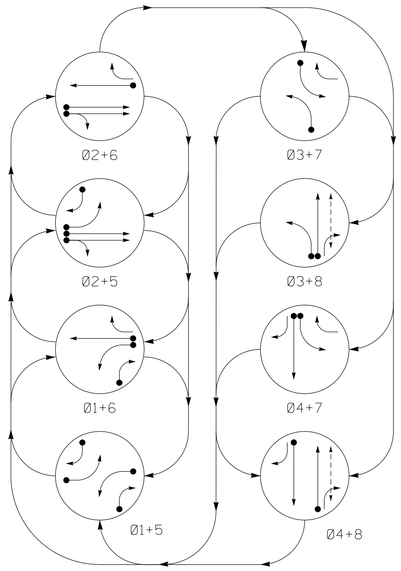
PROJECT REFERENCE NO.	SHEET NO.
U-6022	Sig. 38.0

8 Phase Fully Actuated (Fuquay-Varina Signal System)

DEFAULT PHASING DIAGRAM



ALTERNATE PHASING DIAGRAM



DEFAULT PHASING TABLE OF OPERATION

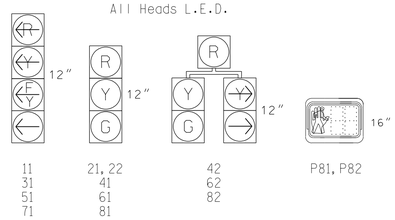
SIGNAL FACE	PHASE 1+5	1+6	2+5	2+6	3+7	3+8	4+7	4+8	FLASH
11	←	←	F Y	F Y	R	R	R	R	Y
21, 22	R	R	G	G	R	R	R	R	Y
31	R	R	R	R	←	←	F Y	F Y	R
41	R	R	R	R	R	R	G	G	R
42	R /	R	R /	R	R	R	G	G	R
51	←	F Y	←	F Y	R	R	R	R	Y
61	R	G	R	G	R	R	R	R	Y
62	R	G	R	G	R /	R	R /	R	Y
71	R	R	R	R	←	F Y	←	F Y	R
81	R	R	R	R	R	G	R	G	R
82	R /	R /	R	R	R	G	R	G	R
P81, P82	DW	DW	DW	DW	DW	W	DW	W	DRK

ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE 1+5	1+6	2+5	2+6	3+7	3+8	4+7	4+8	FLASH
11	←	←	R	R	R	R	R	R	Y
21, 22	R	R	G	G	R	R	R	R	Y
31	R	R	R	R	←	←	R	R	R
41	R	R	R	R	R	R	G	G	R
42	R /	R	R /	R	R	R	G	G	R
51	←	R	←	R	R	R	R	R	Y
61	R	G	R	G	R	R	R	R	Y
62	R	G	R	G	R /	R	R /	R	Y
71	R	R	R	R	←	R	←	R	R
81	R	R	R	R	R	G	R	G	R
82	R /	R /	R	R	R	G	R	G	R
P81, P82	DW	DW	DW	DW	DW	W	DW	W	DRK

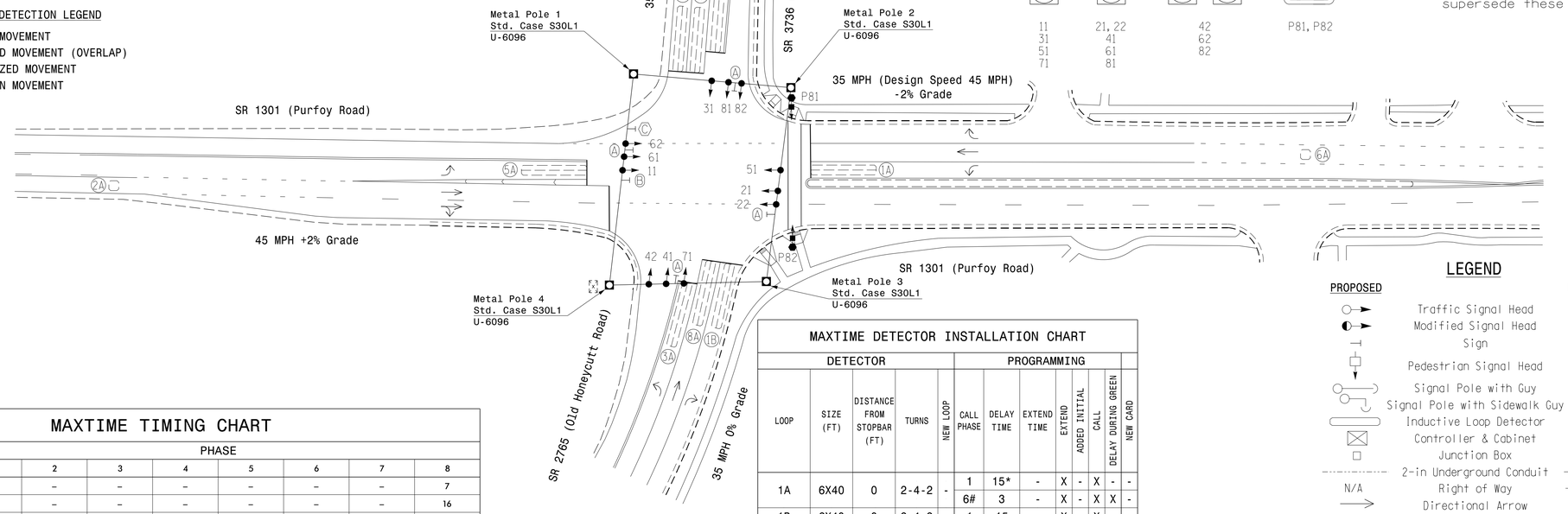
SIGNAL FACE I.D.

All Heads L.E.D.



PHASING DIAGRAM DETECTION LEGEND

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



MAXTIME DETECTOR INSTALLATION CHART

LOOP	DETECTOR SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
1A	6X40	0	2-4-2	-	1	15*	-	X	-	X	-	-
					6#	3	-	X	-	X	X	-
1B	6X40	0	2-4-2	-	1	15	-	X	-	X	-	-
2A	6X6	300	EXIST	-	2	-	-	X	X	X	-	-
3A	6X40	0	2-4-2	-	3	15**	-	X	-	X	-	-
					8#	3	-	X	-	X	-	-
4A	6X40	0	2-4-2	-	4	-	-	X	-	X	-	-
5A	6X40	0	2-4-2	-	5	15**	-	X	-	X	-	-
					2#	3	-	X	-	X	X	-
5B	6X40	0	2-4-2	-	5	15	-	X	-	X	-	-
6A	6X6	300	EXIST	-	6	-	-	X	X	X	-	-
7A	6X40	0	2-4-2	-	7	15**	-	X	-	X	-	-
					4#	3	-	X	-	X	-	-
8A	6X40	0	2-4-2	-	8	-	-	X	-	X	-	-

* Disable delay during alternate phasing operation
** Reduce delay to 3 seconds during alternate phasing operation
\# Disable phase call for loop(s) during alternate phasing operation

MAXTIME TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6	7	8
Walk *	–	–	–	–	–	–	–	7
Ped Clear *	–	–	–	–	–	–	–	16
Min Green	7	12	7	7	7	12	7	7
Passage *	2.0	6.0	2.0	2.0	2.0	6.0	2.0	2.0
Max 1 *	20	100	20	20	20	100	20	20
Yellow Change	3.0	4.7	3.0	3.8	3.0	4.7	3.0	3.8
Red Clear	2.9	1.8	2.8	2.5	3.1	1.8	3.3	2.5
Added Initial *	–	2.5	–	–	–	2.5	–	–
Maximum Initial *	–	34	–	–	–	34	–	–
Time Before Reduction *	–	15	–	–	–	15	–	–
Time To Reduce *	–	45	–	–	–	45	–	–
Minimum Gap	–	3.0	–	–	–	4.6	–	–
Advance Walk	–	–	–	–	–	–	–	3
Non Lock Detector	X	–	X	X	X	–	X	X
Vehicle Recall	–	MIN RECALL	–	–	–	MIN RECALL	–	–
Dual Entry	–	–	–	X	–	–	–	X

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

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 and/or phase 5 may be lagged.
4. Phase 3 and/or phase 7 may be lagged.
5. Set all detector units to presence mode.
6. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
7. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
8. Pavement markings are existing.
9. Install new controller, software and conflict monitor in existing cabinet.
10. The Division Traffic Engineer will determine the hours of use for each phasing plan.
11. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.

LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
▭	Pedestrian Signal Head	■
○	Signal Pole with Guy	●
○	Signal Pole with Sidewalk Guy	●
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
□	Junction Box	■
-----	2-in Underground Conduit	-----
N/A	Right of Way	------
→	Directional Arrow	→
◯	Metal Strain Pole	◘
⬡	Type II Signal Pedestal	⬢
N/A	Curb Ramp	◢
Ⓐ	Street Sign (D3-1)	Ⓐ
Ⓑ	"U-TURN YIELD TO RIGHT TURN" Sign (R10-16)	Ⓑ
Ⓒ	Right Arrow "ONLY" Sign (R3-5R)	Ⓒ

Signal Upgrade

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

SR 1301 (Purfoy Road) at SR 2765/SR 3736 (Old Honeycutt Road)

Division 5 Wake County Fuquay-Varina

PLAN DATE: April 2023 REVIEWED BY: AM Encarnacion
PREPARED BY: JT Stiff REVIEWED BY: PL Alexander

SCALE 0 40 1"=40'

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER ANTHONY M. ENCARNACION SEAL 044476

Designed by: Anthony Encarnacion 4/14/2023
SIGNATURE DATE

SIG. INVENTORY NO. 05-2191

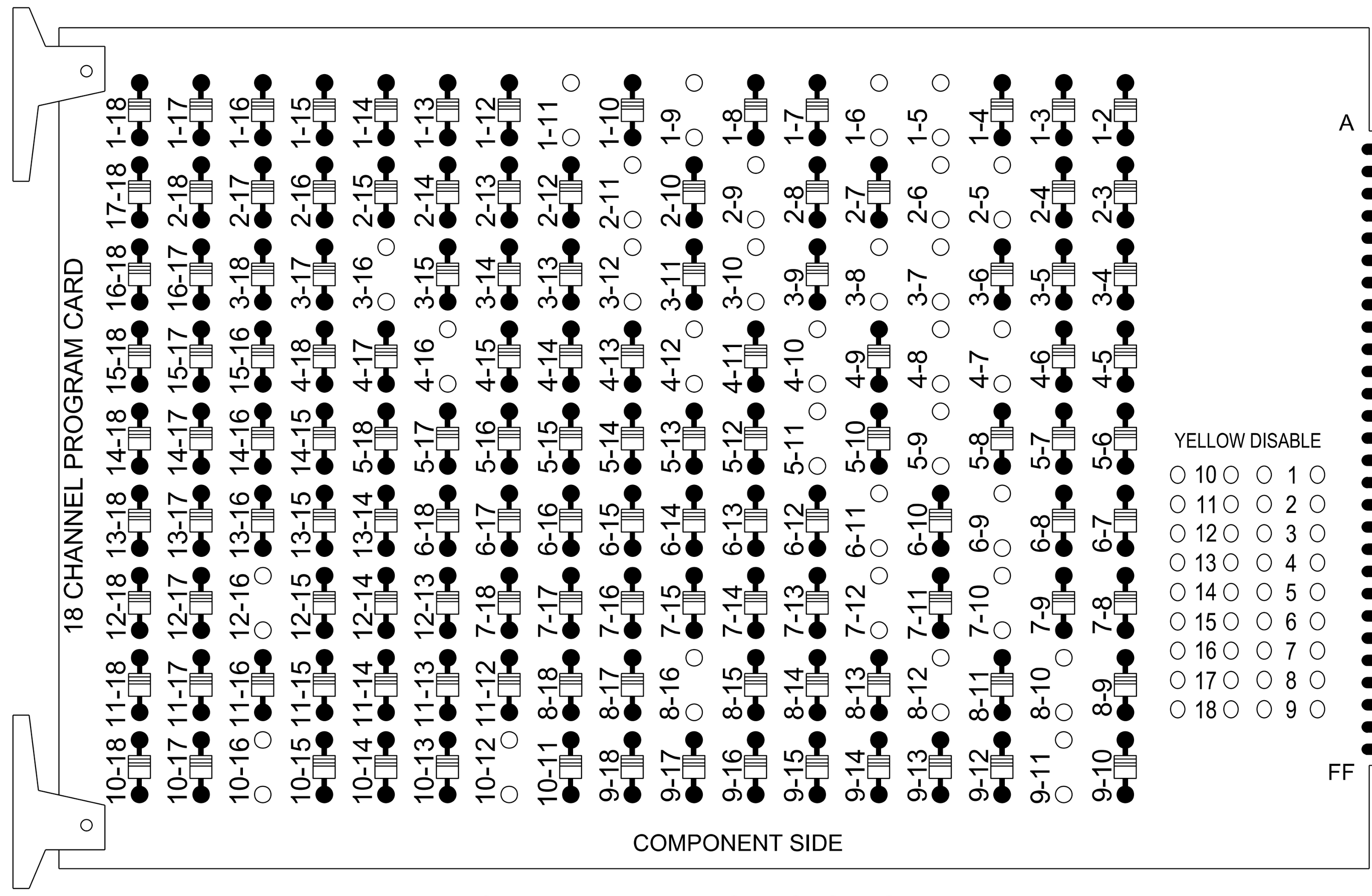
ATKINS
1616 EAST MILLBROOK ROAD, SUITE 160
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888 NCBEES #F-0326

PROJECT REFERENCE NO.	SHEET NO.
U-6022	Sig. 38.1

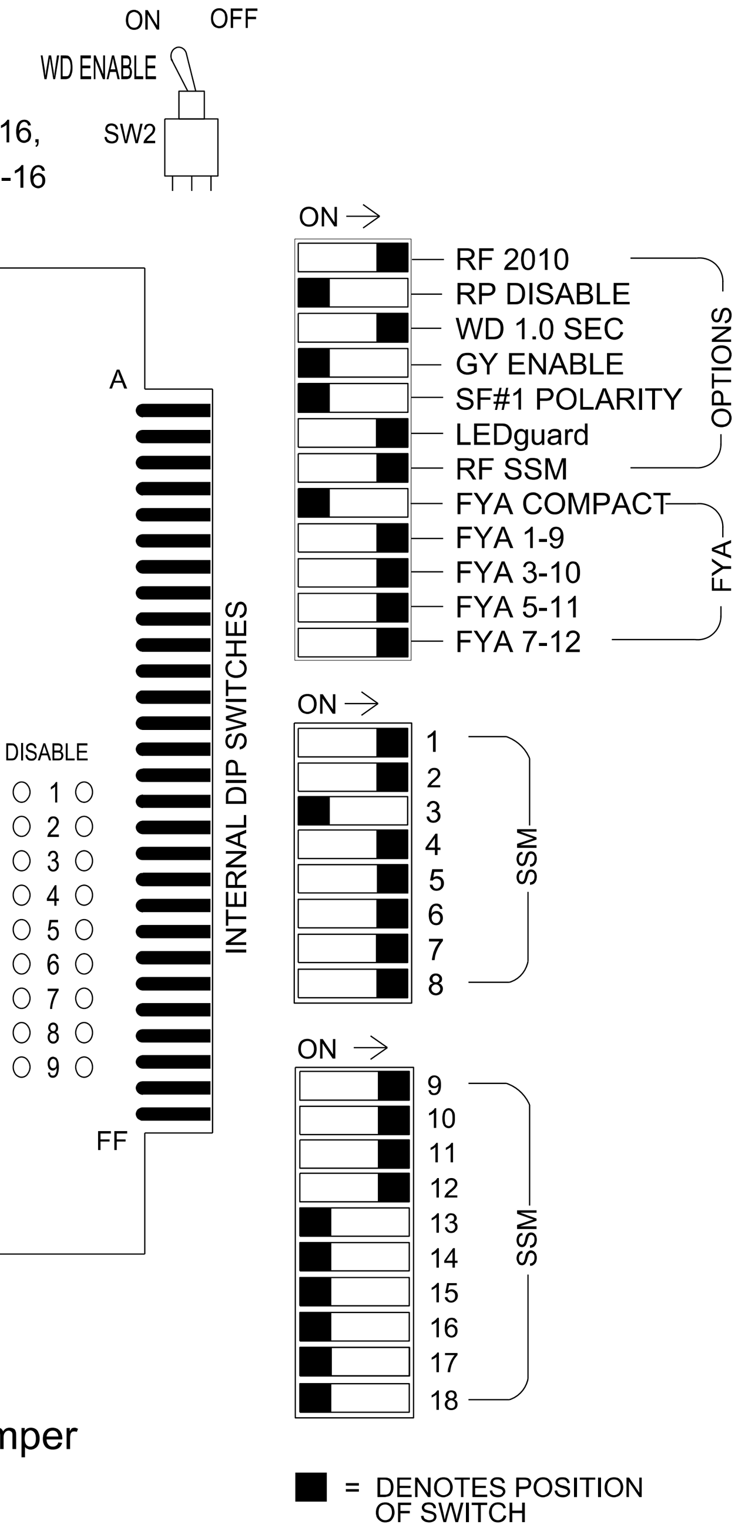
18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(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, 3-16, 4-7, 4-8, 4-10, 4-12, 4-16, 5-9, 5-11, 6-9, 6-11, 7-10, 7-12, 8-10, 8-12, 8-16, 9-11, 10-12, 10-16 and 12-16.



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. 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. 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. The cabinet and controller are part of the Fuquay-Varina Signal 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, S12, AUX S1, AUX S2, AUX S4, AUX S5
Phases Used.......................................1, 2, 3, 4, 5, 6, 7, 8, 8PED
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★	82	21,22	NU	31★	41,42	NU	42	51★	61,62	NU	62	71★	81,82	P81, P82	11★	31★	NU	51★	71★	NU
RED		*	128			101		*		134		*		107							
YELLOW			129		*	102								108							
GREEN			130			103				136				109							
RED ARROW																A121	A124		A114	A101	
YELLOW ARROW		126						132				123				A122	A125		A115	A102	
FLASHING YELLOW ARROW																A123	A126		A116	A103	
GREEN ARROW	127	127			118			133	133			124	124								
(Don't Walk hand)															110						
(Walk person)															112						

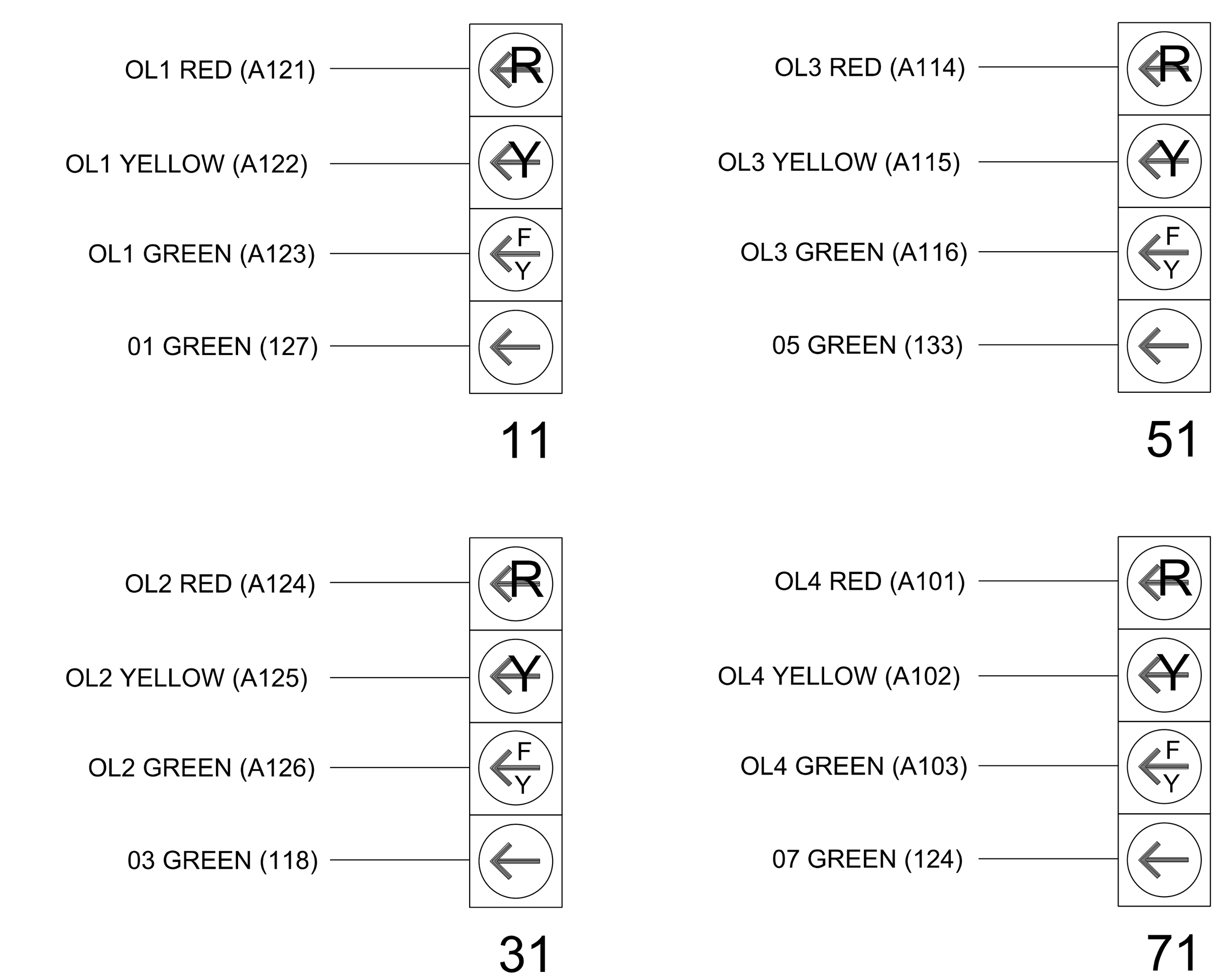
NU = Not Used

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

★ See pictorial of head wiring in detail this sheet.

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



INPUT FILE POSITION LAYOUT

(front view)

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

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN
1A	TB2-1,2	I1U	56	18	1 ★	1	15		X		X	
				-	29 ★	6	3		X		X	X
1B	TB2-5,6	I2U	39	1	2	1	15		X		X	
2A	TB2-9,10	I3U	63	29	4	2			X	X	X	
3A	TB4-5,6	I5U	58	20	7 ★	3	15		X		X	
				-	30 ★	8	3		X		X	
4A	TB4-9,10	I6U	41	3	8	4			X		X	
5A	TB3-1,2	J1U	55	17	15 ★	5	15		X		X	
				-	31 ★	2	3		X		X	X
5B	TB3-5,6	J2U	40	2	16	5	15		X		X	
6A	TB3-9,10	J3U	64	30	18	6			X	X	X	
7A	TB5-5,6	J5U	57	19	21 ★	7	15		X		X	
				-	32 ★	4	3		X		X	
8A	TB5-9,10	J6U	42	4	22	8			X		X	
PED PUSH BUTTONS												
P81,P82	TB8-8,9	I13L	70	36	8	PED 8						

NOTE:
INSTALL DC ISOLATORS IN INPUT FILE SLOT I13.

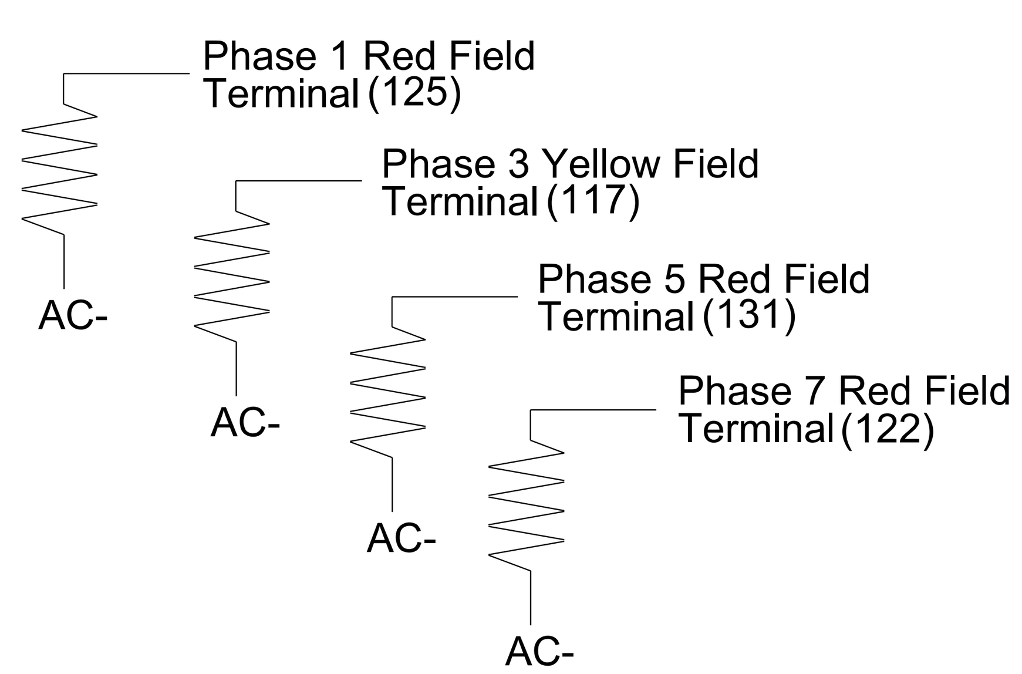
★ For the detectors to work as shown on the signal design plan, see the Vehicle Detector Setup Programming Detail for Alternate Phasing on sheet 2.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

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



COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-2191
DESIGNED: APRIL 2023
SEALED: 4/14/2023
REVISED: N/A

ATKINS 1616 EAST MILLBROOK ROAD, SUITE 160
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888 NCBEES #F-0326

Electrical Detail - Sheet 1 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Electrical and Programming Details For:

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

SR 1301 (Purfoy Road)
at
SR 2765/SR 3736
(Old Honeycutt Road)

Division 5 | Wake County | Fuquay-Varina

PLAN DATE:	April 2023	REVIEWED BY:	AM Encarnacion
PREPARED BY:	JT Stiff	REVIEWED BY:	PL Alexander

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 044476 ENGINEER ANTHONY M. ENCARNACION

DocuSigned by: Anthony Encarnacion
SIGNATURE 4/14/2023 DATE

SIG. INVENTORY NO. 05-2191

PROJECT REFERENCE NO.	SHEET NO.
U-6022	Sig. 38.2

MAXTIME OVERLAP PROGRAMMING DETAIL FOR DEFAULT PHASING

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

Overlap Plan 1

Overlap	1	2	3	4
Type	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section
Included Phases	2	4	6	8
Modifier Phases	1	3	5	7
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	1	2	3	4
Type	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section
Included Phases	-	-	-	-
Modifier Phases	1	3	5	7
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.

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 0 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.

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.

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

1A

Detector	Call Phase	Delay
1	1	0
29	0	-

3A

Detector	Call Phase	Delay
7	3	3
30	0	-

5A

Detector	Call Phase	Delay
15	5	3
31	0	-

7A

Detector	Call Phase	Delay
21	7	3
32	0	-

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-2191
DESIGNED: APRIL 2023
SEALED: 4/14/2023
REVISED: N/A

ATKINS 1616 EAST MILLBROOK ROAD, SUITE 160
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888 NCBEES #F-0326

Electrical Detail - Sheet 2 of 2

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Electrical and Programming Details For:

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

SR 1301 (Purfoy Road)
at
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Division 5 | Wake County | Fuquay-Varina

PLAN DATE:	April 2023	REVIEWED BY:	AM Encarnacion
PREPARED BY:	JT Stiff	REVIEWED BY:	PL Alexander

REVISIONS	INIT.	DATE

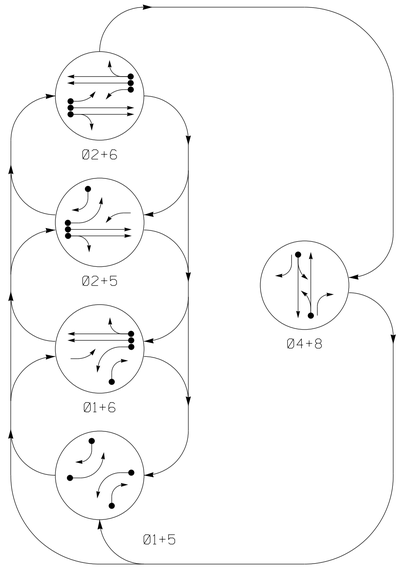
SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 044476 ANTHONY M. ENCARNACION

Documents by: Anthony Encarnacion 4/14/2023
DIRECTORY SIGNATURE DATE

SIG. INVENTORY NO. 05-2191

PROJECT REFERENCE NO.	SHEET NO.
U-6022	Sig. 39.0

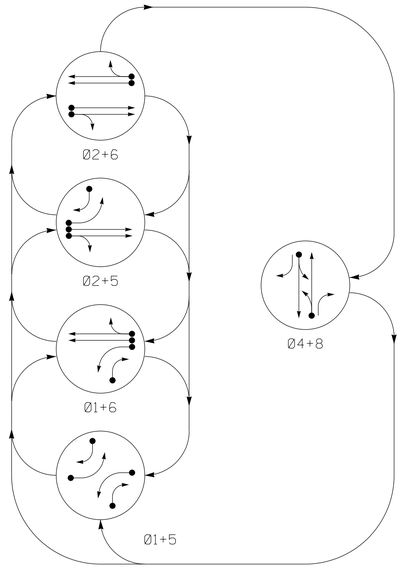
DEFAULT PHASING DIAGRAM



DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø4+8	FLASH
11	←	←	F Y	F Y	R	Y
21, 22	R	R	G	G	R	Y
41	R	R	R	R	G	R
42	R/→	R	R/→	R	G	R
51	←	F Y	←	F Y	R	Y
61, 62	R	G	R	G	R	Y
81	R	R	R	R	G	R
82	R/→	R/→	R	R	G	R

ALTERNATE PHASING DIAGRAM



ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø4+8	FLASH
11	←	←	R	R	R	Y
21, 22	R	R	G	G	R	Y
41	R	R	R	R	G	R
42	R/→	R	R/→	R	G	R
51	←	R	←	R	R	Y
61, 62	R	G	R	G	R	Y
81	R	R	R	R	G	R
82	R/→	R/→	R	R	G	R

MAXTIME DETECTOR INSTALLATION CHART

DETECTOR						PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP		CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
1A	6X60	0	2-4-2	-		1	15*	-	X	-	X	-	-
						6#	3	-	X	-	X	X	-
1B	6X60	0	2-4-2	-		1	15	-	X	-	X	-	-
2A	6X6	200	4	X		2	-	-	X	X	X	-	-
2B	6X6	200	4	X		2	-	-	X	X	X	-	-
4A	6X60	0	2-4-2	-		4	3	-	X	-	X	-	-
5A	6X60	0	2-4-2	-		5	15*	-	X	-	X	-	-
						2#	3	-	X	-	X	X	-
5B	6X60	0	2-4-2	-		5	15	-	X	-	X	-	-
6A	6X6	200	4	X		6	-	-	X	X	X	-	-
6B	6X6	200	4	X		6	-	-	X	X	X	-	-
8A	6X60	0	2-4-2	-		8	3	-	X	-	X	-	-
S1	6X6	300	EXIST	-		-	-	-	-	-	-	-	-
S2	6X6	300	EXIST	-		-	-	-	-	-	-	-	-
S3	6X6	300	EXIST	-		-	-	-	-	-	-	-	-
S4	6X6	300	EXIST	-		-	-	-	-	-	-	-	-

* Reduce delay to 3 seconds during alternate phasing operation
\# Disable phase call for loop(s) during alternate phasing operation

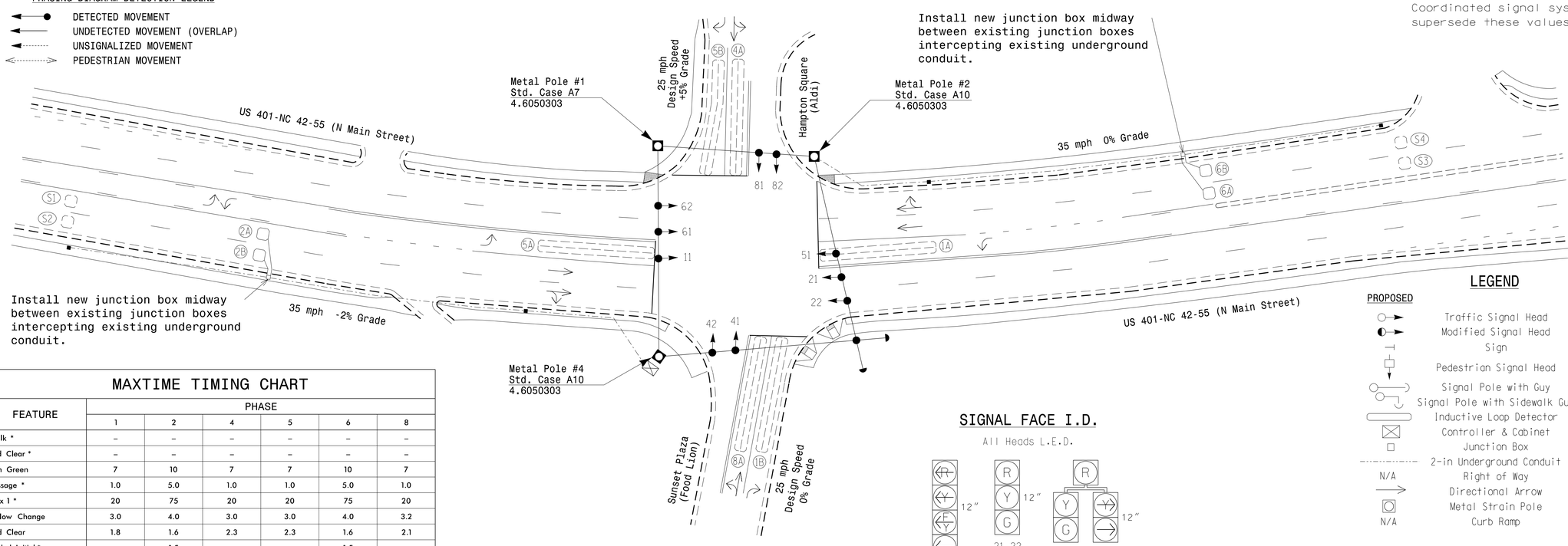
5 Phase
Fully Actuated
(Fuquay-Varina Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 and/or phase 5 may be lagged.
4. Set all detector units to presence mode.
5. In the event of loop replacement, refer to the current ITS and Signals Design Manual and submit a Plan of Record to the Signal Design Section.
6. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
7. Pavement markings are existing.
8. The Division Traffic Engineer will determine the hours of use for each phasing plan.
9. 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	4	5	6	8
Walk *	–	–	–	–	–	–
Ped Clear *	–	–	–	–	–	–
Min Green	7	10	7	7	10	7
Passage *	1.0	5.0	1.0	1.0	5.0	1.0
Max 1 *	20	75	20	20	75	20
Yellow Change	3.0	4.0	3.0	3.0	4.0	3.2
Red Clear	1.8	1.6	2.3	2.3	1.6	2.1
Added Initial *	–	1.5	–	–	1.5	–
Maximum Initial *	–	24	–	–	24	–
Time Before Reduction *	–	15	–	–	15	–
Time To Reduce *	–	30	–	–	30	–
Minimum Gap	–	3.0	–	–	3.0	–
Advance Walk	–	–	–	–	–	–
Non Lock Detector	X	–	X	X	–	X
Vehicle Recall	–	MIN RECALL	–	–	MIN RECALL	–
Dual Entry	–	–	X	–	–	X

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

SIGNAL FACE I.D.

All Heads L.E.D.

LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
	Metal Strain Pole	
N/A	Curb Ramp	

Signal Upgrade

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

US 401-NC 42-55 (N Main Street)
at
Sunset Plaza (Food Lion)/
Hampton Square (Aldi)

Division 5 | Wake County | Fuquay-Varina

PLAN DATE: April 2023 | REVIEWED BY: AM Encarnacion
PREPARED BY: JT Stiff | REVIEWED BY: PL Alexander

REVISIONS	INIT.	DATE

SCALE: 0 30 1"=30'

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 044476 ENGINEER ANTHONY M. ENCARNACION

Developed by: Anthony Encarnacion 4/14/2023
SIGNATURE DATE

SIG. INVENTORY NO. 05-2207

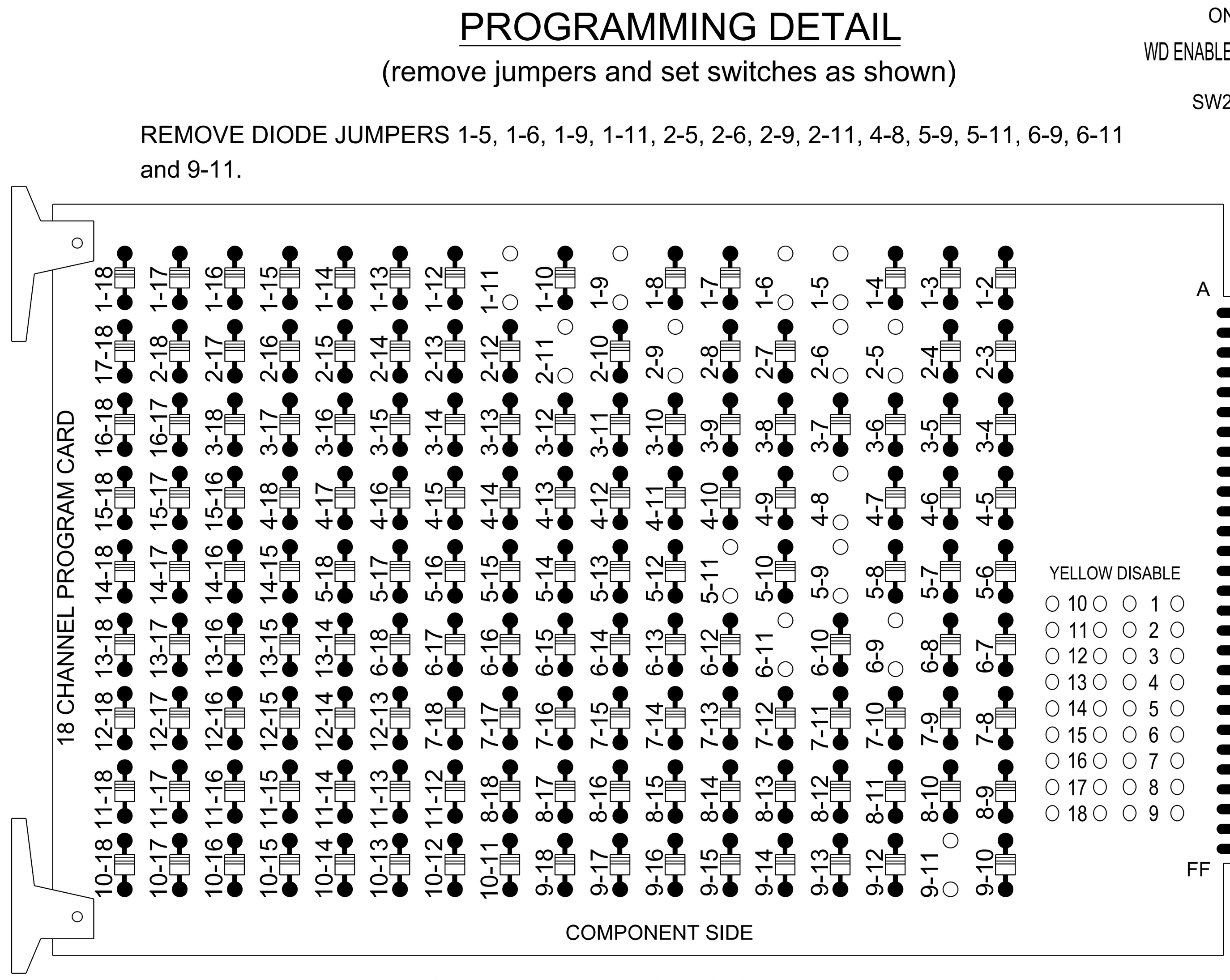
ATKINS
1616 EAST MILLBROOK ROAD, SUITE 160
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888 NCBEES #F-0326

PROJECT REFERENCE NO.	SHEET NO.
U-6022	Sig. 39.1

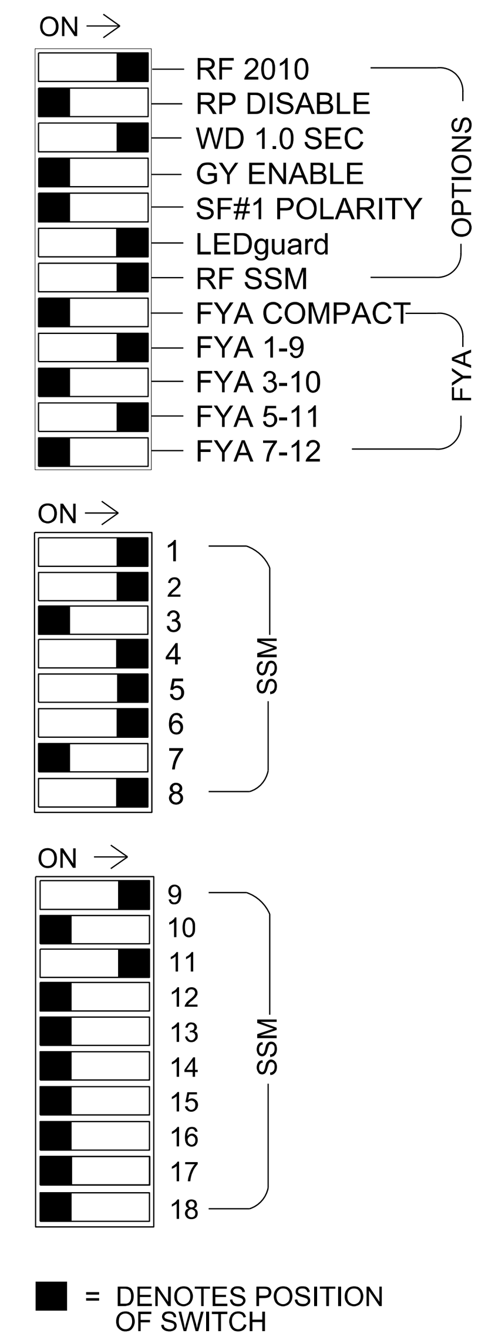
18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

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



REMOVE JUMPERS AS SHOWN



NOTES:

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. 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. The cabinet and controller are part of the Fuquay-Varina Signal 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, S5, S7, S8, S11, AUX S1, AUX S4
Phases Used.......................................1, 2, 4, 5, 6, 8
Overlap "1"..*
Overlap "2"..NOT USED
Overlap "3"..*
Overlap "4"..NOT USED

*See overlap programming detail on sheet 2

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1		S2	S3	S4	S5	S6	S7		S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1		2	13	3	4	14	5		6	15	7	8	16	9	10	17	11	12	18
PHASE	1		2	2 PED	3	4	4 PED	5		6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	11★	82	21,22	NU	NU	41,42	NU	42	51★	61,62	NU	NU	81,82	NU	11★	NU	NU	51★	NU	NU
RED		*	128			101		*		134			107							
YELLOW			129			102				135			108							
GREEN			130			103				136			109							
RED ARROW															A121			A114		
YELLOW ARROW		126						132							A122			A115		
FLASHING YELLOW ARROW															A123			A116		
GREEN ARROW	127	127						133	133											

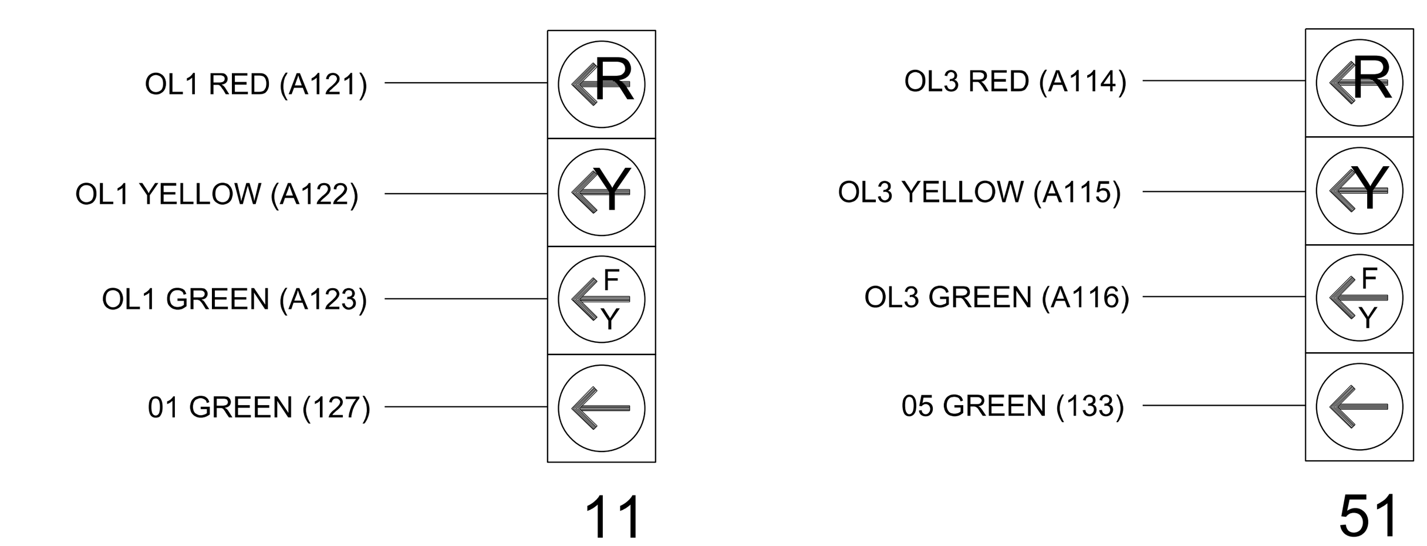
NU = Not Used

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

★See pictorial of head wiring in detail this sheet.

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



INPUT FILE POSITION LAYOUT

(front view)

FILE		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	Ø 1 1A	Ø 1 1B	Ø 2 2A	SLOT EMPTY	SLOT EMPTY	Ø 4 4A	SLOT EMPTY	SLOT EMPTY	SYS. DET. S1	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
	L	NOT USED	NOT USED	Ø 2 2B			NOT USED			SYS. DET. S2					ST DC ISOLATOR
FILE "J"	U	Ø 5 5A	Ø 5 5B	Ø 6 6A	SLOT EMPTY	SLOT EMPTY	Ø 8 8A	SLOT EMPTY	SLOT EMPTY	SYS. DET. S3	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L	NOT USED	NOT USED	Ø 6 6B			NOT USED			SYS. DET. S4					

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	X
1B	TB2-5,6	I2U	39	1	2	1	15		X		X	
2A	TB2-9,10	I3U	63	29	4	2			X	X	X	
2B	TB2-11,12	I3L	76	42	5	2			X	X	X	
4A	TB4-9,10	I6U	41	3	8	4	3		X		X	
*S1	TB6-9,10	I9U	60	22	13	SYS						
*S2	TB6-11,12	I9L	62	24	14	SYS						
5A	TB3-1,2	J1U	55	17	15 ★	5	15		X		X	
				-	31 ★	2	3		X		X	X
5B	TB3-5,6	J2U	40	2	16	5	15		X		X	
6A	TB3-9,10	J3U	64	30	18	6			X	X	X	
6B	TB3-11,12	J3L	77	43	19	6			X	X	X	
8A	TB5-9,10	J6U	42	4	22	8	3		X		X	
*S3	TB7-9,10	J9U	59	21	27	SYS						
*S4	TB7-11,12	J9L	61	23	28	SYS						

*System detector only. Remove any assigned vehicle phase.

★ For the detectors to work as shown on the signal design plan, see the Vehicle Detector Setup Programming Detail for Alternate Phasing on sheet 2.

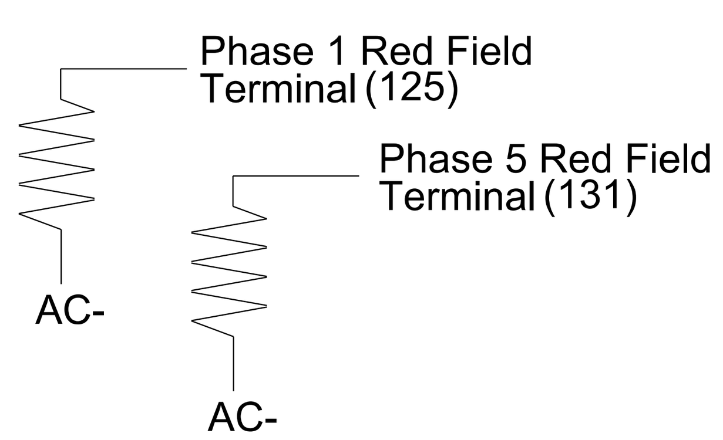
INPUT FILE POSITION LEGEND: J2L

FILE J
SLOT 2
LOWER

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

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



THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-2207
DESIGNED: APRIL 2023
SEALED: 4/14/2023
REVISED: N/A

ATKINS 1616 EAST MILLBROOK ROAD, SUITE 160
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888 NCBEES #F-0326

Electrical Detail - Sheet 1 of 2

Electrical and Programming Details For:

US 401-NC 42-55 (N Main Street)
at
Sunset Plaza (Food Lion)/
Hampton Square (Aldi)

Prepared for the Offices of: Transportation Mobility and Safety Division, ITS & Signals Management Section, State of North Carolina Department of Transportation

750 N. Greenfield Pkwy, Garner, NC 27529

Division 5 Wake County Fuquay-Varina

PLAN DATE:	April 2023	REVIEWED BY:	AM Encarnacion
PREPARED BY:	JT Stiff	REVIEWED BY:	PL Alexander

REVISIONS	INIT.	DATE

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SEAL

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 044476 ANTHONY M. ENCARNACION

DocuSigned by: Anthony Encarnacion 4/14/2023

SIGNATURE DATE

SIG. INVENTORY NO. 05-2207

PROJECT REFERENCE NO.	SHEET NO.
U-6022	Sig. 39.2

MAXTIME OVERLAP PROGRAMMING DETAIL FOR DEFAULT PHASING

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

Overlap Plan 1

Overlap	1	2	3	4
Type	FYA 4 - Section	-	FYA 4 - Section	-
Included Phases	2	-	6	-
Modifier Phases	1	-	5	-
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	-	FYA 4 - Section	-
Included Phases	-	-	-	-
Modifier Phases	1	-	5	-
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.

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

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

Web Interface
Home >Controller >Detector Configuration >Vehicle Detectors

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

1A

Detector	Call Phase	Delay
1	1	3
29	0	-

5A

Detector	Call Phase	Delay
15	5	3
31	0	-

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 and 51 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 2 call on loop 5A and reduces delay time for phase 5 call on loop 5A to 3 seconds.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-2207
DESIGNED: APRIL 2023
SEALED: 4/14/2023
REVISED: N/A

ATKINS
1616 EAST MILLBROOK ROAD, SUITE 160
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888 NCBEES #F-0326

Electrical Detail - Sheet 2 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Electrical and Programming Details For:

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

US 401-NC 42-55 (N Main Street)
at
Sunset Plaza (Food Lion)/
Hampton Square (Aldi)

Division 5 | Wake County | Fuquay-Varina

PLAN DATE:	April 2023	REVIEWED BY:	AM Encarnacion
PREPARED BY:	JT Stiff	REVIEWED BY:	PL Alexander

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 044476 ANTHONY M. ENCARNACION

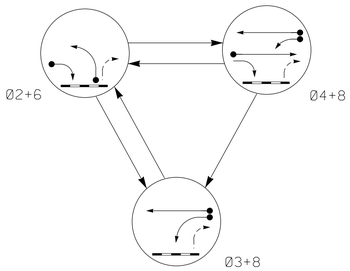
Documented by: Anthony Encarnacion 4/14/2023
DOCUMENTATION SIGNATURE DATE

SIG. INVENTORY NO. 05-2207

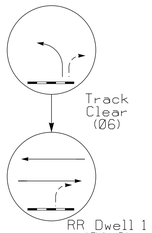
PROJECT REFERENCE NO.	SHEET NO.
U-6022	Sig. 40.0

3 Phase Fully Actuated w/ Railroad Preemption (Fuquay-Varina Signal System)

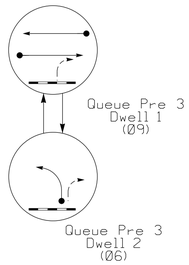
DEFAULT PHASING DIAGRAM



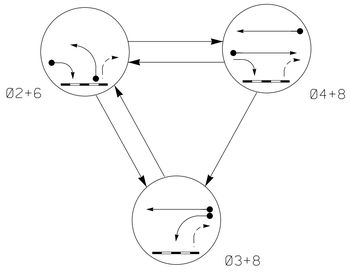
RAIL PREEMPT PHASES
(High Priority)



QUEUE PREEMPT PHASES
(Medium Priority)



ALTERNATE PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE								
	Ø2+6	Ø4+8	Ø3+8	TRACK CLEAR	DWELL 1	DWELL 3	DWELL 2	FLASH
21	→	F Y	R	R	R	R	R	R
31	R	F Y	←	R	R	R	R	R
41, 42	R	G	R	R	G	G	R	R
61, 62	←	R	R	←	R	R	←	R
81, 82	R	G	G	R	G	G	R	R

ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE								
	Ø2+6	Ø4+8	Ø3+8	TRACK CLEAR	DWELL 1	DWELL 3	DWELL 2	FLASH
21	→	F Y	R	R	R	R	R	R
31	R	R	←	R	R	R	R	R
41, 42	R	G	R	R	G	G	R	R
61, 62	←	R	R	←	R	R	←	R
81, 82	R	G	G	R	G	G	R	R

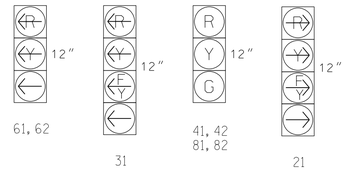
MAXTIME DETECTOR INSTALLATION CHART

DETECTOR					PROGRAMMING								
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	SWITCH PHASE	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
2A	6X40	0	2-4-2	-	2	-	-	4	X	-	X	-	-
3A	6X40	0	2-4-2	-	3	15*	-	-	X	-	X	-	-
					8#	-	-	-	X	-	X	-	-
4A	6X40	0	2-4-2	-	4/9	-	-	-	X	-	X	-	-
6A	6X40	0	2-4-2	-	6	-	-	-	X	-	X	-	-
8A	6X40	0	2-4-2	-	8/9	-	-	-	X	-	X	-	-
S1	6X6	0	EXIST	-	-	-	-	-	-	-	-	-	-
S2	6X6	+140	EXIST	-	-	-	-	-	-	-	-	-	-
Q1	6X15	EXIST	EXIST	-	PRE 3	-	-	-	-	-	X	-	-

* Disable delay during alternate phasing operation
\# Disable phase call for loop(s) during alternate phasing operation

SIGNAL FACE I.D.

All Heads L.E.D.



MAXTIME PREEMPTION CHART

FUNCTION	PRE 1	PRE 3
Type	RAIL ROAD	QUEUE
Exit Phases	2+6	2+6
Delay	0	0
Max Presence	0	120
Enter Min Green	1	1
Enter Walk	0	0
Enter Ped Clear	0	0
Enter Yellow Change	3.3	25.5*
Enter Red Clear	2.4	25.5*
Track Green	13	–
Track Yellow Change	3.0	–
Track Red Clear	2.4	–
Dwell Green	–	7
Exit Min Green	255*	255*
Exit Yellow Change	25.5*	25.5*
Exit Red Clear	25.5*	25.5*
Dwell Extend Time	0	1.0
Exit Type	EXIT PHASES	EXIT PHASES
Ped Clear Through Yellow	N	N
Require All Red Entry	–	–

* Directs controller to use default phase timing.

This signal was designed for simultaneous preemption

MAXTIME TIMING CHART

FEATURE	PHASE					
	2	3	4	6	8	9
Walk *	–	–	–	–	–	–
Ped Clear *	–	–	–	–	–	–
Min Green	7	7	7	7	7	7
Passage *	2.0	2.0	2.0	3.5	2.0	2.0
Max 1 *	30	15	25	30	25	25
Yellow Change	3.0	3.0	3.3	3.0	3.3	3.3
Red Clear	1.0	1.6	1.8	2.4	1.8	1.8
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	–

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

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. This location contains railroad preemption phasing. Do not program signal for late night flashing operation.
3. Phase 3 may be led.
4. Set all detector units to presence mode.
5. Loop Q1 serves as a queue backup detector. After 5 seconds of constant activation, the controller shall force off to phase 6 and dwell in phase 6 or phase 4+8 until the presence of a train or until loop no longer receives steady/constant detection.
6. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
7. Pavement markings are existing.
8. The Division Traffic Engineer will determine the hours of use for each phasing plan.
9. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
10. Remove "NO TURN ON RED" Blankout and "RIGHT TURN SIGNAL" (R10-10R) signs.

LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
□	Pedestrian Signal Head	■
○	Signal Pole with Guy	●
○⌐	Signal Pole with Sidewalk Guy	●⌐
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
□	Junction Box	■
-----	2-in Underground Conduit	-----
N/A	Right of Way	------
→	Directional Arrow	→
N/A	Railroad Tracks	▬
N/A	Railroad Gate and Flasher	▬
Ⓐ	"YIELD" Sign (R1-2)	Ⓐ
Ⓑ	"DO NOT STOP ON TRACKS" Sign (R8-8)	Ⓑ
Ⓒ	"NO TURN ON RED" Sign (R10-11)	Ⓒ

Signal Upgrade

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

NC 55/SR 1402 (E Broad Street) at NC 55 (N Ennis Street)

Division 5 | Wake County | Fuquay-Varina

PLAN DATE: April 2023 | REVIEWED BY: AM Encarnacion
PREPARED BY: JT Stiff | REVIEWED BY: PL Alexander

SCALE 0 40 1"=40'

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 044476 ENGINEER ANTHONY M ENCARNACION

Designed by: Anthony Encarnacion 4/14/2023
CHECKED BY: SIGNATURE DATE

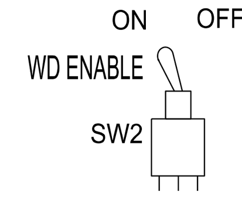
SIG. INVENTORY NO. 05-2252

ATKINS
1616 EAST MILLBROOK ROAD, SUITE 160
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888 NCBEES #F-0326

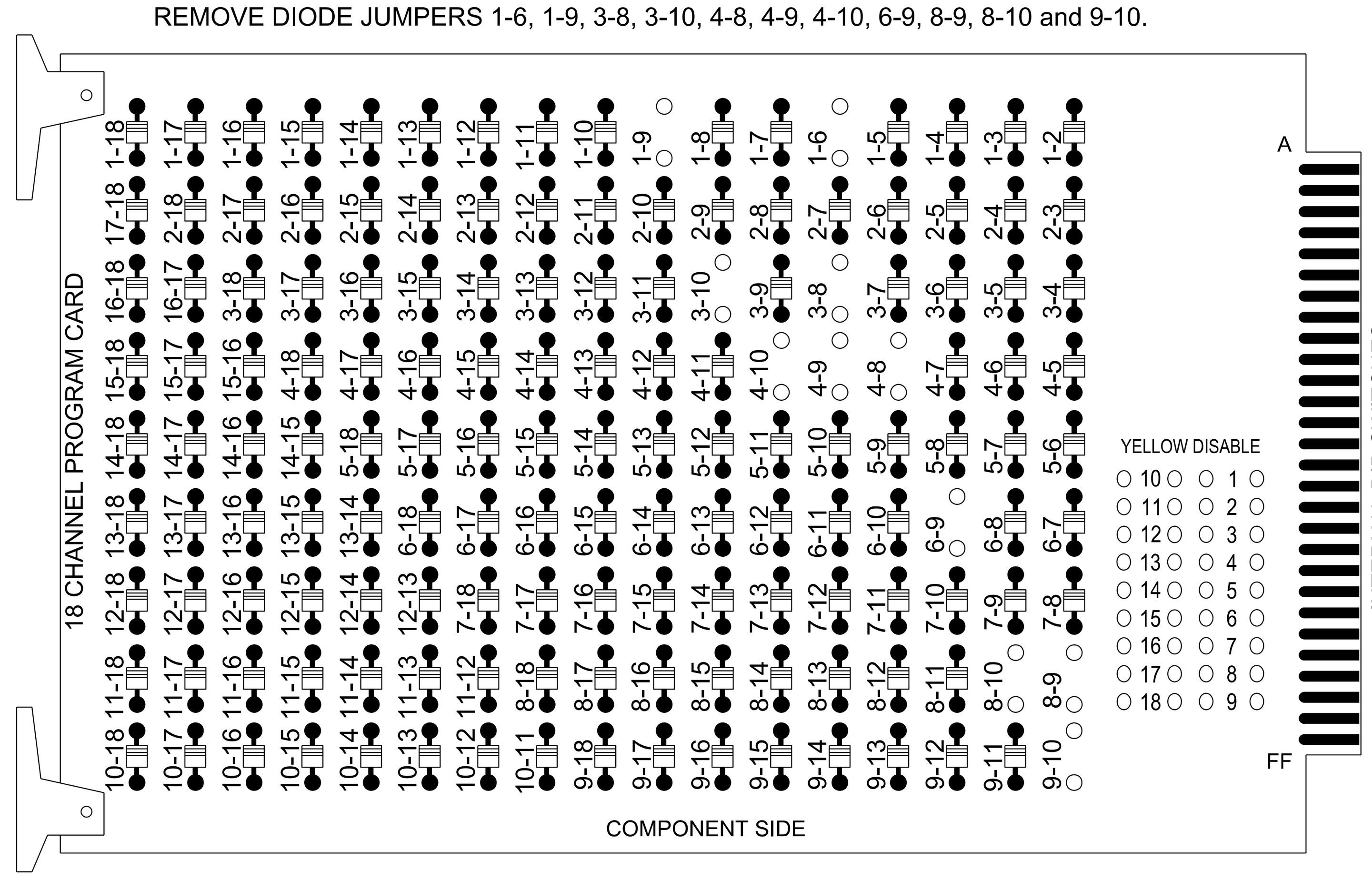
PROJECT REFERENCE NO.	SHEET NO.
U-6022	Sig. 40.1

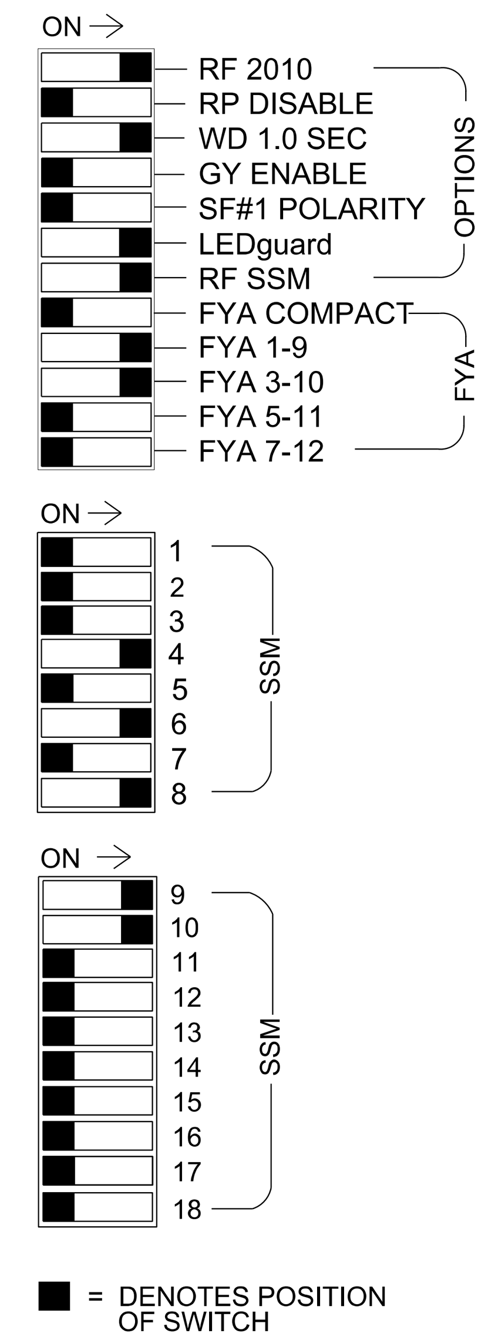
18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE DIODE JUMPERS 1-6, 1-9, 3-8, 3-10, 4-8, 4-9, 4-10, 6-9, 8-9, 8-10 and 9-10.





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. 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. Program phases 4 and 8 for Dual Entry.
3. Program phase 9 for No Start Up Vehicle Call.
4. Program controller to start up in phase 2 Red Clear and phase 6 Red Clear.
5. Program controller for 6 seconds of Start Up Clearance Hold.
6. Program controller for 6 seconds of All Red Flash Exit Time.
7. The cabinet and controller are part of the Fuquay-Varina Signal 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, S4, S5, S8, S11, AUX S1, AUX S2
Phases Used......................................2**, 3, 4, 6, 8, 9***
Overlap "1"..*
Overlap "2"..*
Overlap "3"..NOT USED
Overlap "4"..NOT USED
Overlap "7"..*
Overlap "8"..*
Overlap "9"..*

*See overlap programming detail on sheet 2
**Phase used for timing purposes only
***Phase used during queue preempt 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	OL7	2	2 PED	3	OL8	4 PED	5	6	6 PED	7	OL9	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	21★	NC	NU	31★	41,42	NU	NU	61,62	NU	NU	81,82	NU	21★	31★	NU	NU	NU	NU
RED					101						107							
YELLOW	*			*	102						108							
GREEN					103						109							
RED ARROW								134					A121	A124				
YELLOW ARROW								135					A122	A125				
FLASHING YELLOW ARROW													A123	A126				
GREEN ARROW	127			118				136										

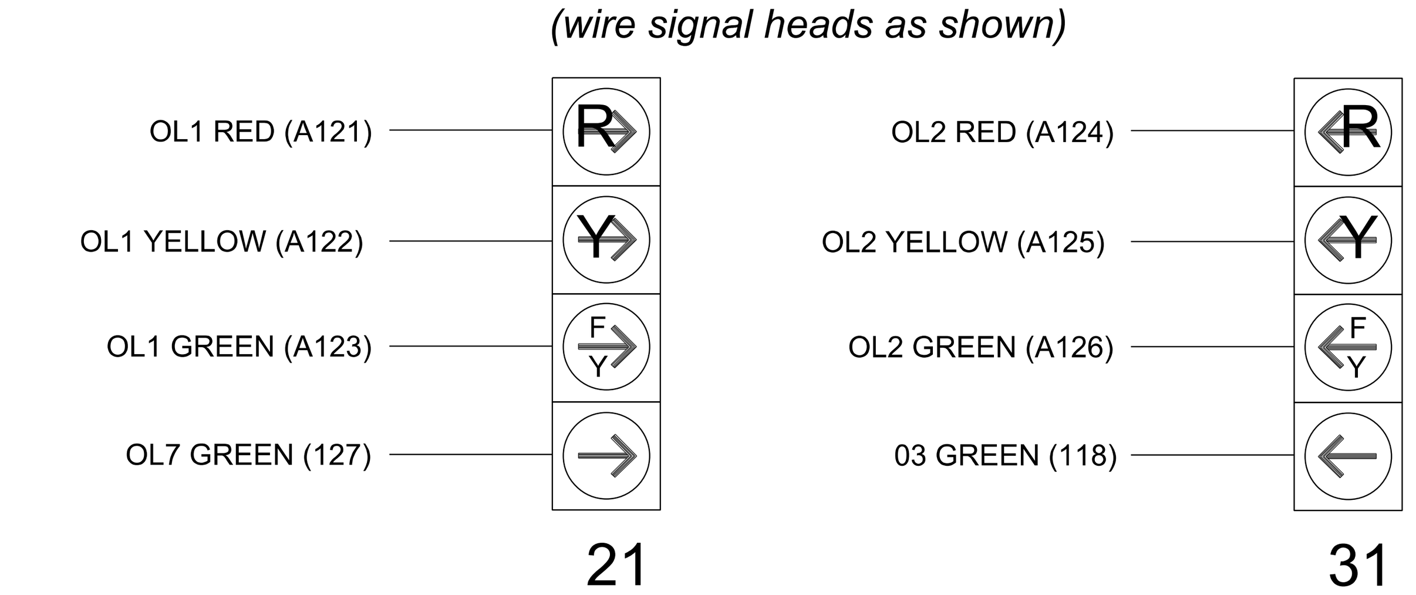
NU = Not Used
NC = Not Connected

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

Note: Output for load switches S1, S5 and S11 have been remapped. See sheet 2 for programming details.

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	1O	11	12	13	14
FILE "I"	U	SLOT EMPTY	ø 2 2A	SLOT EMPTY	SLOT EMPTY	ø 3 3A	ø 4/9 4A	SLOT EMPTY	SLOT EMPTY	SYS. DET. S1	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
	L		NOT USED			NOT USED	NOT USED			SYS. DET. S2					ST DC ISOLATOR
FILE "J"	U	SLOT EMPTY	PRE 3 Q1	ø 6 6A	SLOT EMPTY	SLOT EMPTY	ø 8/9 8A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	PRE1 AC ISOLATOR
	L		NOT USED	NOT USED			NOT USED								NOT USED

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

FS = FLASH SENSE
ST = STOP TIME
PRE = PREEMPT

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN
2A	TB2-5,6	I2U	39	1	2 **	2			X		X	
3A	TB4-5,6	I5U	58	20	7 ★	3	15		X		X	
				-	30 ★	8			X		X	X
4A	TB4-9,10	I6U	41	3	8	4/9			X		X	
6A	TB3-9,10	J3U	64	30	18	6			X		X	
8A	TB5-9,10	J6U	42	4	22	8/9			X		X	
Q1	TB3-5,6	J2U	40	2		PRE 3						
*S1	TB6-9,10	I9U	60	22	13	SYS						
*S2	TB6-11,12	I9L	62	24	14	SYS						

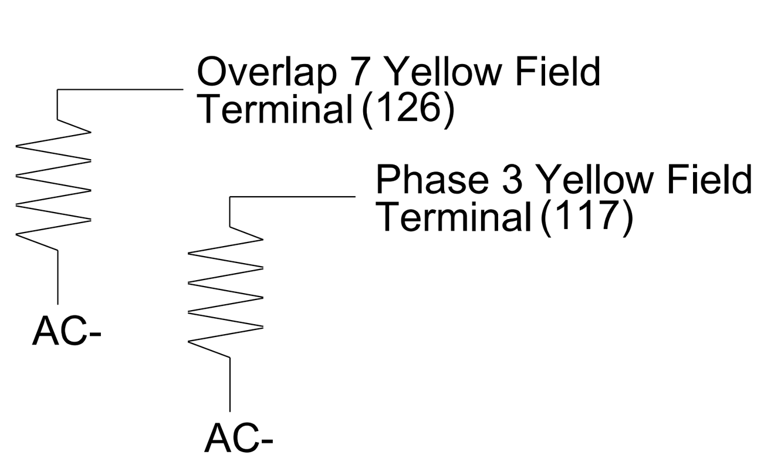
* System detector only. Remove any assigned vehicle phase.
** Enable detector 2 as switch phase detector and program detector 2 as switch phase 4 per the Vehicle Detector Switch Phase Programming detail shown on sheet 3.
★ For the detectors to work as shown on the signal design plan, see the Vehicle Detector Setup Programming Detail for Alternate Phasing on sheet 2.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

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



THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-2252
DESIGNED: APRIL 2023
SEALED: 4/14/2023
REVISED: N/A

ATKINS 1616 EAST MILLBROOK ROAD, SUITE 160
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888 NCBEES #F-0326

Electrical Detail - Sheet 1 of 4

Electrical and Programming Details For:

NC 55/SR 1402 (E Broad Street)
at
NC 55 (N Ennis Street)

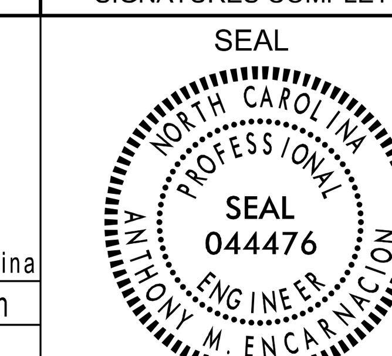
Prepared for the Offices of: Transportation Mobility and Safety Division, ITS & Signals Management Section
750 N. Greenfield Pkwy, Garner, NC 27529

Division 5	Wake County	Fuquay-Varina
PLAN DATE: April 2023	REVIEWED BY: AM Encarnacion	
PREPARED BY: JT Stiff	REVIEWED BY: PL Alexander	

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL



DocuSigned by: Anthony Encarnacion 4/14/2023
SIGNATURE DATE

SIG. INVENTORY NO. 05-2252

PROJECT REFERENCE NO.	SHEET NO.
U-6022	Sig. 40.2

MAXTIME OVERLAP PROGRAMMING DETAIL FOR DEFAULT PHASING

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

Overlap Plan 1

Overlap	1	2	3	4	7	8	9
Type	FYA 4 - Section	FYA 4 - Section	-	-	Normal	Normal	Normal
Included Phases	4	4	-	-	2	4,9	8,9
Modifier Phases	2	3	-	-	-	-	-
Trail Green	0	0	0	0	0	0	0
Trail Yellow	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Trail Red	0.0	0.0	0.0	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	7	8	9
Type	FYA 4 - Section	FYA 4 - Section	-	-	Normal	Normal	Normal
Included Phases	4	-	-	-	2	4,9	8,9
Modifier Phases	2	3	-	-	-	-	-
Trail Green	0	0	0	0	0	0	0
Trail Yellow	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Trail Red	0.0	0.0	0.0	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.

MAXTIME DETECTOR PROGRAMMING DETAIL FOR ALTERNATE PHASING LOOP 3A

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.

	Detector	Call Phase	Delay
3A	7	3	0
	30	0	-

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 phase for head 31 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 0 seconds.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-2252
DESIGNED: APRIL 2023
SEALED: 4/14/2023
REVISED: N/A

ATKINS 1616 EAST MILLBROOK ROAD, SUITE 160
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888 NCBEES #F-0326

Electrical Detail - Sheet 2 of 4

Electrical and Programming Details For:

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

NC 55/SR 1402 (E Broad Street)
at
NC 55 (N Ennis Street)

Division 5 Wake County Fuquay-Varina

PLAN DATE:	April 2023	REVIEWED BY:	AM Encarnacion
PREPARED BY:	JT Stiff	REVIEWED BY:	PL Alexander

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 044476 ENGINEER ANTHONY M. ENCARNACION

DocuSigned by: Anthony Encarnacion 4/14/2023
SIGNATURE DATE

SIG. INVENTORY NO. 05-2252

PROJECT REFERENCE NO.	SHEET NO.
U-6022	Sig. 40.3

VEHICLE DETECTOR SWITCH PHASE PROGRAMMING

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

Web Interface
Home >Controller >Detector Configuration >Vehicle Detectors

Plan 1

Detector	Call Phase	Call Overlap	Call Ped	Switch Phase	Delay	Extend
2	2	-	-	4	-	-

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.

PREEMPTION PROGRAMMING

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

Web Interface
Home >Controller >Preempt Configuration >Preempts

Preempt Configuration

Preempt	1	3
Enabled	Enabled	Enabled
Type	Rail Road	User
Track Phases	6	-
Track Overlaps	-	-
Dwell Phases	4,8	9
Dwell Overlaps	8,9	8,9
Cycling Phases	-	6,9
Cycling Overlaps	-	-
Exit Phases	2,6	2,6
Exit Overlaps	7	7
Delay	0	5
Max Presence	0	120
Max Pres Act	Terminate	Terminate
Enter Min Green	1	1
Enter Walk	0	0
Enter Ped Clear	0	0
Enter Yellow Change	3.3	25.5
Enter Red Clear	2.4	25.5
Track Green	13	-
Track Yellow Clr	3.0	25.5
Track Red Clear	2.4	25.5
Dwell Green	-	7
Exit Min Green	255	255
Exit Yellow Change	25.5	25.5
Exit Red Clear	25.5	25.5
Dwell Ext Time	0	1.0
Exit Type	Exit Phases	Exit Phases
Not Ovrd Flash	X	X
Not Ovrd Nxt Pre	-	X
Track Clear Ovrd	X	X
Ped Clear During Yellow	-	-

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
1	Phase Phase Omit	9	Result=!A	Preempt Status	3	None	0	0.0	0.0

LOGIC STATEMENT DESCRIPTION

Statement 1 Description: Omits phase 9 while not in preempt.

OUTPUT CHANNEL CONFIGURATION

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

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

Channel Configuration

NOTICE OVERLAP 7 ASSIGNED TO CHANNEL 1 →
NOTICE OVERLAP 8 ASSIGNED TO CHANNEL 4 →
NOTICE OVERLAP 9 ASSIGNED TO CHANNEL 8 →

Channel	Control Type	Control Source	Flash Yellow	Flash Red	Flash Alt	MMU Channel
1	Overlap	7		X	X	1
2	Phase Vehicle	2		X		2
3	Phase Vehicle	3		X	X	3
4	Overlap	8		X		4
5	Phase Vehicle	5		X		5
6	Phase Vehicle	6		X	X	6
7	Phase Vehicle	7		X		7
8	Overlap	9		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

SEQUENCE DETAIL

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

Web Interface
Home >Controller >Sequence

Sequence 1

Ring	Sequence Data
1	2,a,4,3,b,9,c
2	6,a,8,b,c

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-2252
DESIGNED: APRIL 2023
SEALED: 4/14/2023
REVISED: N/A

ATKINS 1616 EAST MILLBROOK ROAD, SUITE 160
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888 NCBEES #F-0326

Electrical Detail - Sheet 3 of 4

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Electrical and Programming Details For:

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

NC 55/SR 1402 (E Broad Street)
at
NC 55 (N Ennis Street)

Division 5 | Wake County | Fuquay-Varina

PLAN DATE:	April 2023	REVIEWED BY:	AM Encarnacion
PREPARED BY:	JT Stiff	REVIEWED BY:	PL Alexander

REVISIONS	INT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 044476 ANTHONY M ENCARNACION

Digitally signed by Anthony Encarnacion 4/14/2023
DocuSigned by: SIGNATURE DATE

SIG. INVENTORY NO. 05-2252