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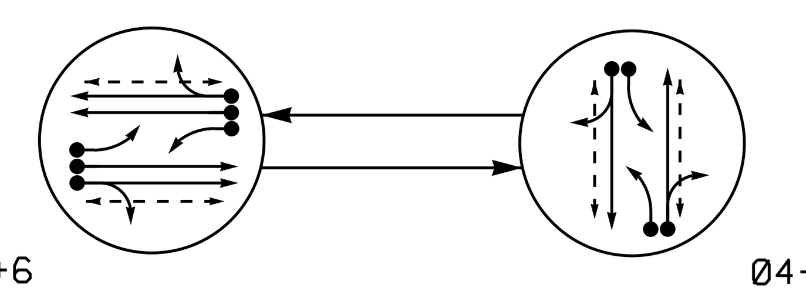
PROJECT REFERENCE NO.	SHEET NO.
HS-2005G	Sig 1.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

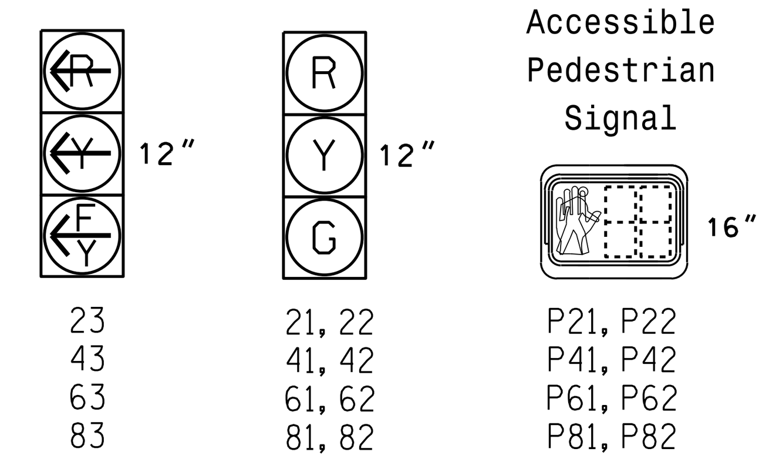
- ←● DETECTED MOVEMENT
- ← UNDETECTED MOVEMENT (OVERLAP)
- ←-- UNSIGNALIZED MOVEMENT
- ←--→ PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2+6	PHASE Ø4+8	FLASH
21, 22	G	R	Y
23	F/Y	-R-	-Y-
41, 42	R	G	R
43	-R-	F/Y	-R-
61, 62	G	R	Y
63	F/Y	-R-	-Y-
81, 82	R	G	R
83	-R-	F/Y	-R-
P21, P22	W	DW	DRK
P41, P42	DW	W	DRK
P61, P62	W	DW	DRK
P81, P82	DW	W	DRK

SIGNAL FACE I.D.

All Heads L.E.D.



LOOP & DETECTOR UNIT INSTALLATION CHART

SE-PAC 2070 CONTROLLER WITH 170 CABINET

INDUCTIVE LOOPS						DETECTOR PROGRAMMING															
						ASSIGNED PHASE	TIMING		OPERATION MODE								SWITCH	SYSTEM LOOPS	STATUS	
LOOP NO.	SIZE (ft)	TURNS	DIST. FROM STOPBAR (ft)	NEW	EXISTING		DELAY	EXTEND (STRETCH)	0 VEHICLE	1 PEDESTRIAN	2 1 CALL	3 STOP A	4 STOP B	5 PROT/PER LEFT	6 PROT/PER THROUGH	7 AND			NEW	EXISTING
2A	6X6	EXIST	290	-	X	2	- SEC.	- SEC.	X	-	-	-	-	-	-	-	-	-	X	-
2B	6X6	EXIST	290	-	X	2	- SEC.	- SEC.	X	-	-	-	-	-	-	-	-	-	X	-
2C	6X40	2-4-2	+8	-	X	2	- SEC.	- SEC.	X	-	-	-	-	-	-	-	-	-	X	-
4A	6X60	2-4-2	+9	-	X	4	- SEC.	- SEC.	X	-	-	-	-	-	-	-	-	-	X	-
4B	6X60	2-4-2	+9	-	X	4	10 SEC.	- SEC.	X	-	-	-	-	-	-	-	-	-	X	-
6A	6X6	EXIST	295	-	X	6	- SEC.	- SEC.	X	-	-	-	-	-	-	-	-	-	X	-
6B	6X6	EXIST	295	-	X	6	- SEC.	- SEC.	X	-	-	-	-	-	-	-	-	-	X	-
6C	6X40	2-4-2	+5	-	X	6	- SEC.	- SEC.	X	-	-	-	-	-	-	-	-	-	X	-
8A	6X40	2-4-2	+4	-	X	8	- SEC.	- SEC.	X	-	-	-	-	-	-	-	-	-	X	-
8B	6X40	2-4-2	+4	-	X	8	10 SEC.	- SEC.	X	-	-	-	-	-	-	-	-	-	X	-

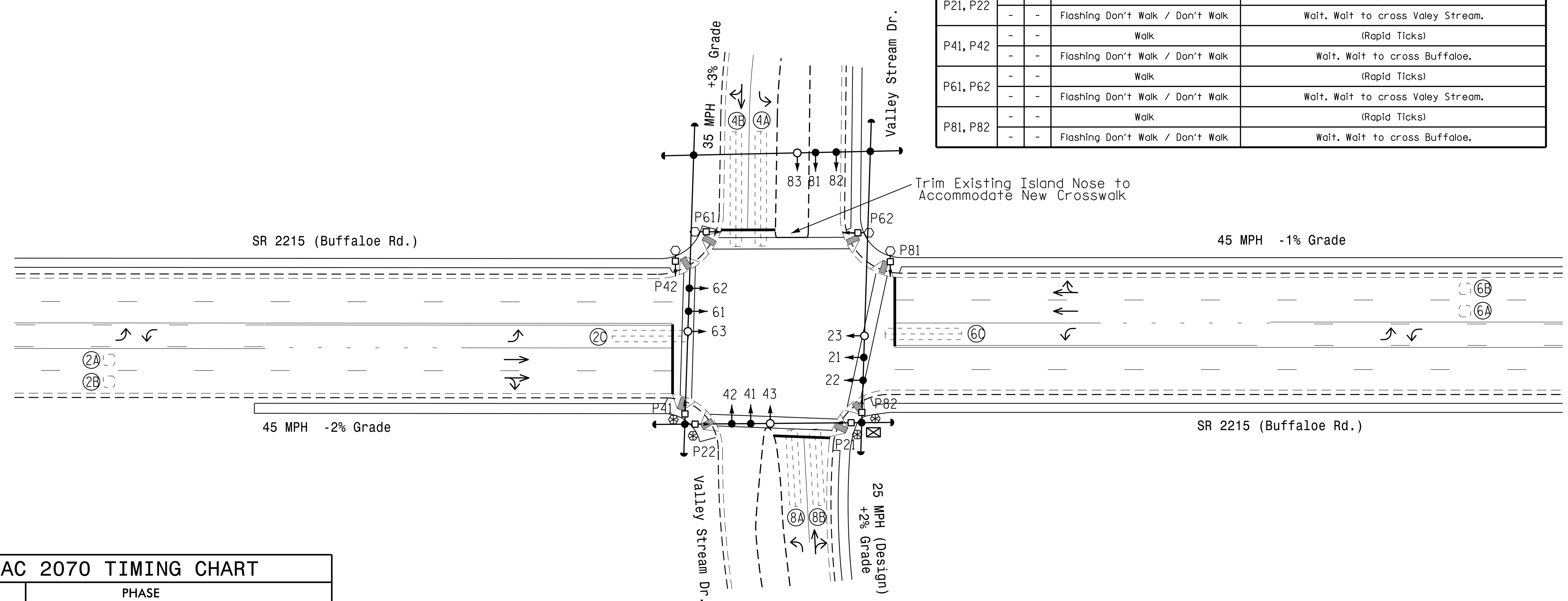
ACCESSIBLE PEDESTRIAN SIGNAL OPERATION

SIGNAL FACE	VOICE	TONES	INTERVAL	SPEECH MESSAGE
P21, P22	-	-	Walk	(Rapid Ticks)
	-	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Valey Stream.
P41, P42	-	-	Walk	(Rapid Ticks)
	-	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Buffaloe.
P61, P62	-	-	Walk	(Rapid Ticks)
	-	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Valey Stream.
P81, P82	-	-	Walk	(Rapid Ticks)
	-	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Buffaloe.

2 Phase
Fully Actuated
(Raleigh Signal System)

NOTES

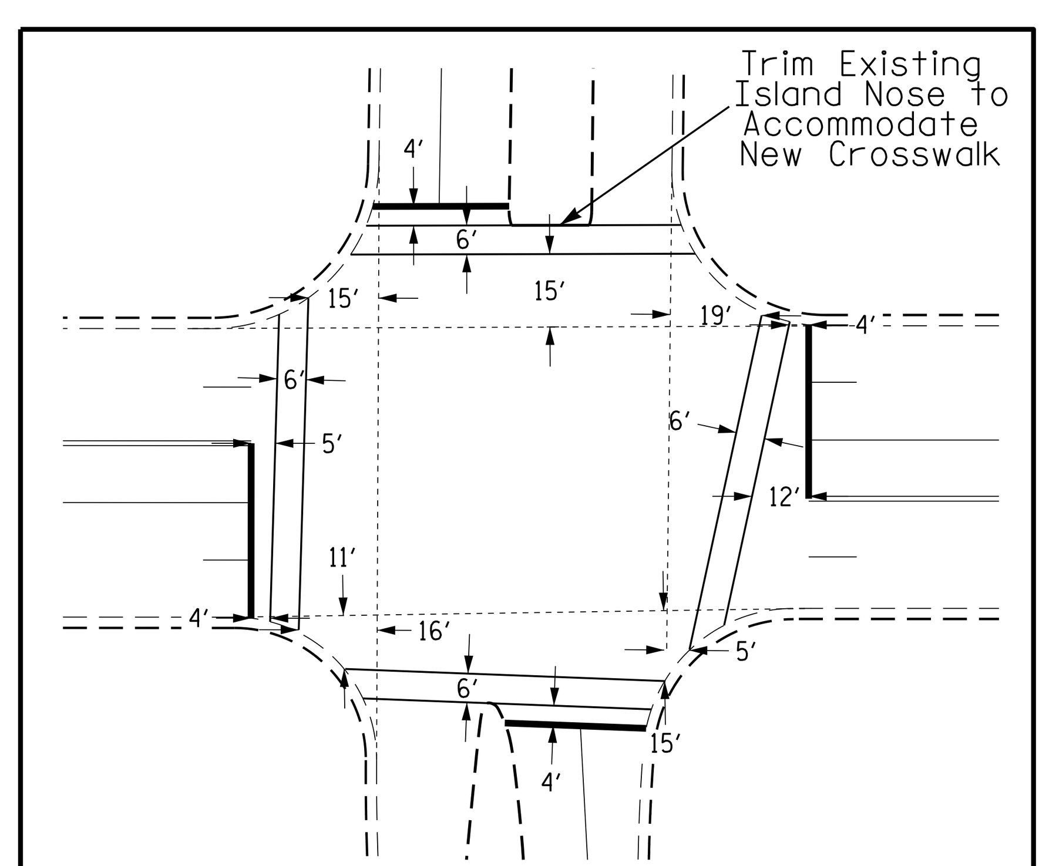
1. Refer to "Roadway Standard Drawings NCDOT" dated January 2024 and "Standard Specifications for Roads and Structures" dated January 2024.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Reposition existing signal heads as shown.
4. Set all detector 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. 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. This intersection features accessible pedestrian signals utilizing percussive tone walk indications and/or speech messages.
10. Pavement markings are existing unless otherwise shown.
11. Repaint stopbars and/or crosswalks.
12. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.



SE-PAC 2070 TIMING CHART

FEATURE	PHASE 2	PHASE 4	PHASE 6	PHASE 8
Min Green *	12	7	12	7
Passage Gap *	6.0	1.0	6.0	2.0
Maximum Green *	90	20	90	20
Yellow Change	4.7	3.7	4.6	3.1
Red Clear	1.6	2.2	1.6	2.8
Advance Walk *	5	4	5	4
Walk *	7	7	7	7
Pedestrian Clear	14	16	15	17
Added Initial *	1.5	-	1.5	-
Maximum Initial *	33	-	33.5	-
Time Before Reduction *	15	-	15	-
Time To Reduce *	30	-	30	-
Minimum Gap	3.0	-	3.0	-
Recall Mode	MIN RECALL	-	MIN RECALL	-
Vehicle Call Memory	LOCK	NON-LOCK	LOCK	NON-LOCK
Dual Entry	-	ON	-	ON
Simultaneous Gap	ON	ON	ON	ON

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



PROPOSED CROSSWALK AND STOP LINE LOCATIONS

This plan supersedes the plan signed and sealed on 5/20/21.

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	Curb Ramp	⊿
⊛	Type I Pushbutton Post	⊛
⬡	Type II Signal Pedestal	⬢

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Signal Upgrade

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

SR 2215 (Buffaloe Road)
at
Valley Stream Drive

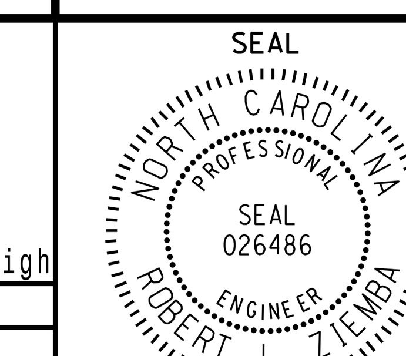
Division 05 Wake County Raleigh

PLAN DATE: February 2024 REVIEWED BY:
PREPARED BY: J.A. Lohr REVIEWED BY:

SCALE 0 40
1"=40'

REVISIONS	INIT.	DATE

SEAL



DocuSigned by:
02/27/2024
DATE

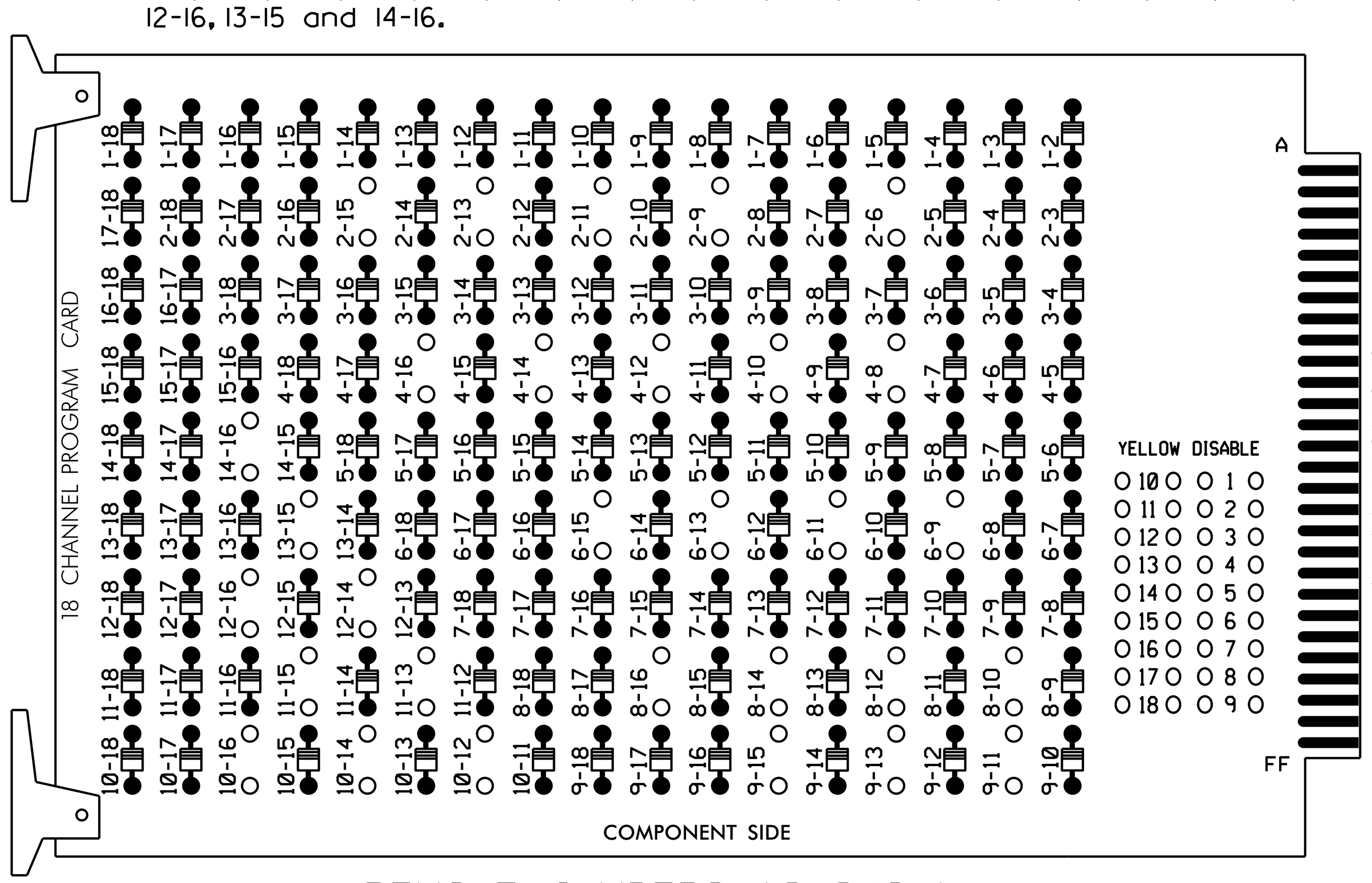
SIG. INVENTORY NO. 05-2247

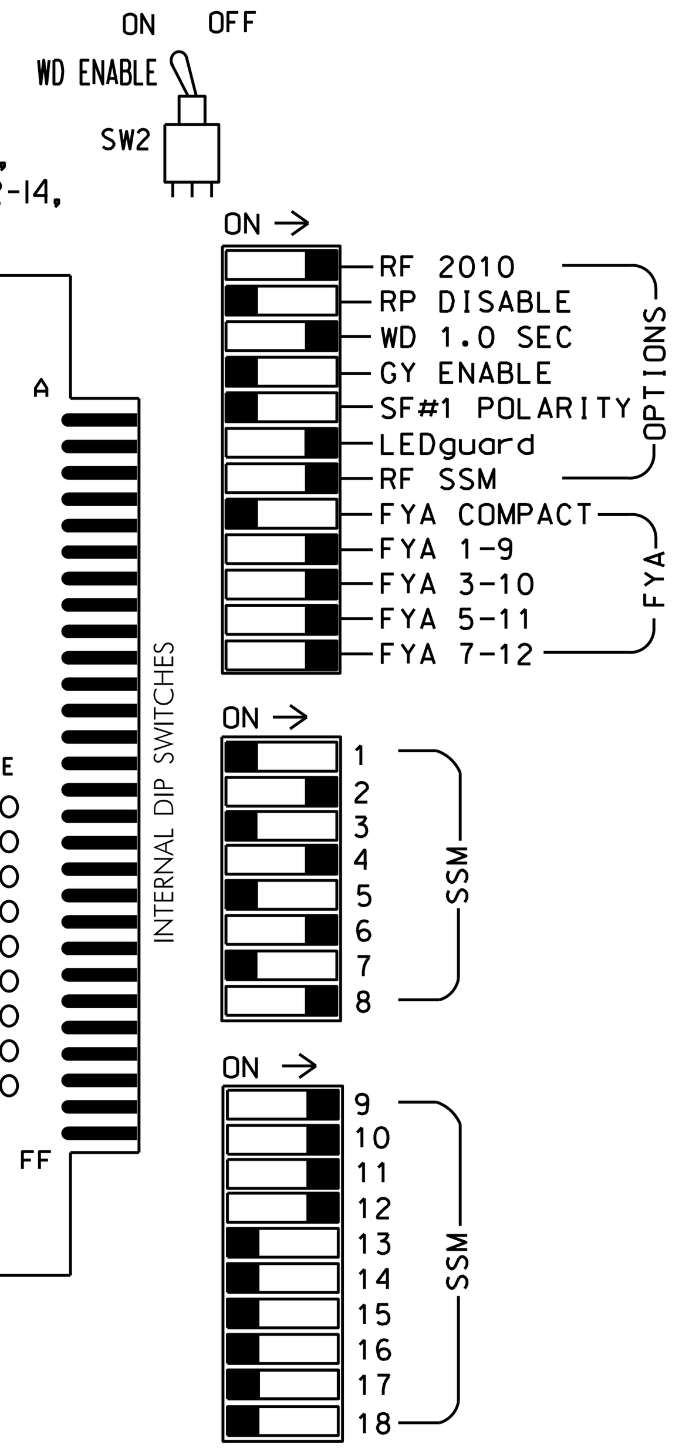
27-FEB-2024 12:35
JALohr

18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

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





REMOVE JUMPERS AS SHOWN

■ = DENOTES POSITION OF SWITCH

NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that Red Enable is active at all times during normal operation.
4. 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 Plans.
2. Program controller to start up in phases 2 and 6 Green/ Don't Walk.
3. Enable simultaneous gap-out feature for all phases.
4. Program phases 2 and 6 for volume density operation.
5. Program phases 4 and 8 for dual entry.
6. The cabinet and controller are part of the Raleigh Signal System.

EQUIPMENT INFORMATION

CONTROLLER..............2070LX
CABINET.................332 W/ AUX
SOFTWARE................SE-PAC2070
CABINET MOUNT...........BASE
OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
LOAD SWITCHES USED......S2,S3,S5,S6,S8,S9,S11,S12,AUX S1, AUX S2,AUX S4,AUX S5
PHASES USED.............2,2PED,4,4PED,6,6PED,8,8PED
OVERLAP "A".............*
OVERLAP "B".............*
OVERLAP "C".............*
OVERLAP "D".............*

* See sheet 2 for Overlap Programming Detail

SIGNAL HEAD HOOK-UP CHART

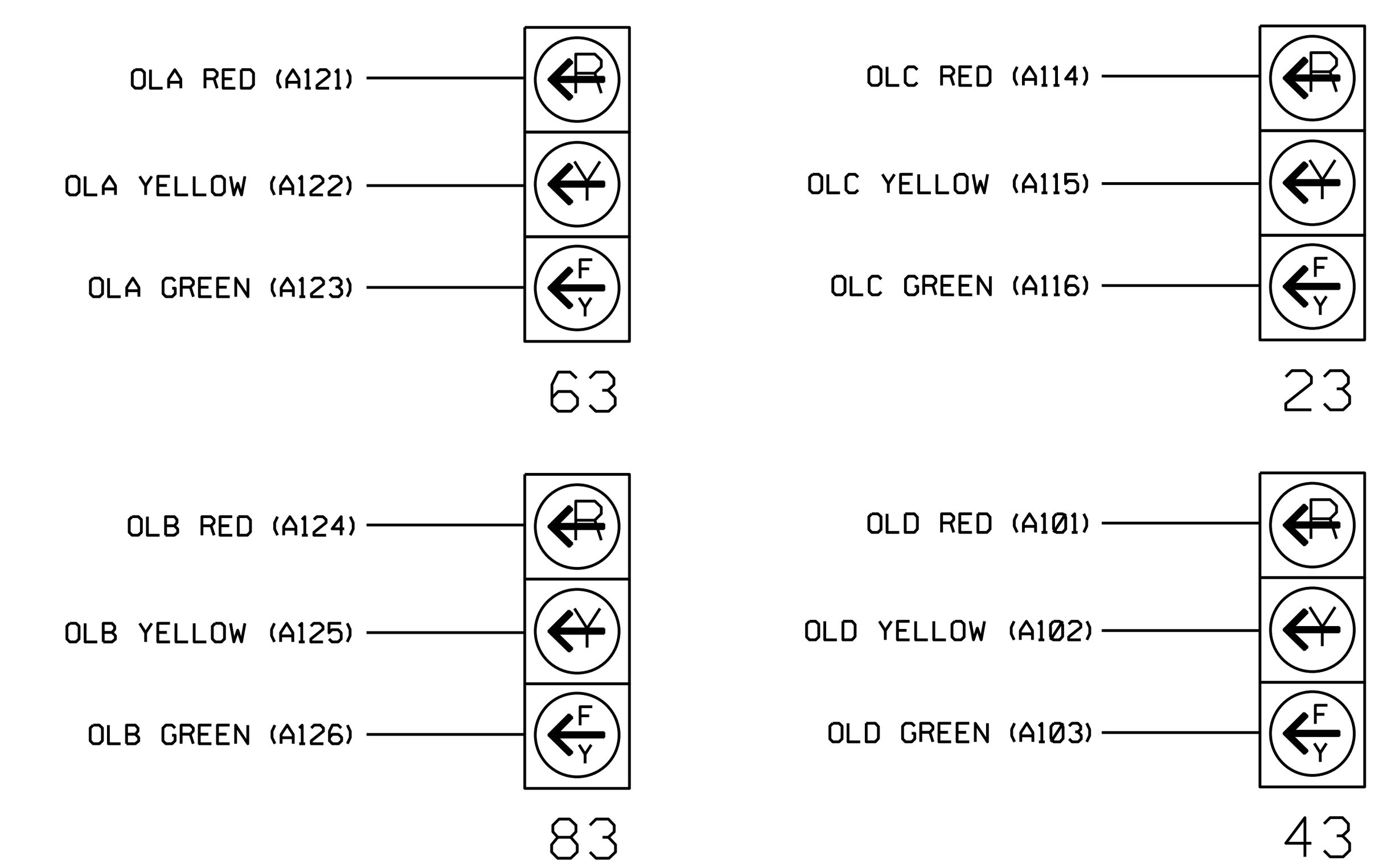
LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	NU	21,22	P21, P22	NU	41,42	P41, P42	NU	61,62	P61, P62	NU	81,82	P81, P82	63 ★	83 ★	NU	23 ★	43 ★	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	
(Don't Walk hand)			113			104			119			110						
(Walk person)			115			106			121			112						

NU = Not Used

★ 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
"I"	U	SLOT EMPTY	Ø2 2A	Ø2 2C	SLOT EMPTY	SLOT EMPTY	Ø4 4A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	Ø2PED DC ISOLATOR	Ø6PED DC ISOLATOR	FS DC ISOLATOR
"I"	L		Ø2 2B	NOT USED			Ø4 4B						Ø4PED DC ISOLATOR	Ø8PED DC ISOLATOR	ST DC ISOLATOR
"J"	U	SLOT EMPTY	Ø6 6A	Ø6 6C	SLOT EMPTY	SLOT EMPTY	Ø8 8A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
"J"	L		Ø6 6B	NOT USED			Ø8 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.	DETECTOR NO.	NEMA PHASE	DELAY TIME	EXTEND (STRETCH) TIME
2A	TB2-5,6	I2U	39	3	2		
2B	TB2-7,8	I2L	43	4	2		
2C	TB2-9,10	I3U	63	5	2		
4A	TB4-9,10	I6U	41	11	4		
4B	TB4-11,12	I6L	45	12	4	10	
6A	TB3-5,6	J2U	40	21	6		
6B	TB3-7,8	J2L	44	22	6		
6C	TB3-9,10	J3U	64	23	6		
8A	TB5-9,10	J6U	42	31	8		
8B	TB5-11,12	J6L	46	32	8	10	
PED PUSH BUTTONS							
P21,P22	TB8-4,6	I12U	67	PED 2	2 PED		
P41,P42	TB8-5,6	I12L	69	PED 4	4 PED		
P61,P62	TB8-7,9	I13U	68	PED 6	6 PED		
P81,P82	TB8-8,9	I13L	70	PED 8	8 PED		

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

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

FLASHER CIRCUIT MODIFICATION DETAIL

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

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

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

This plan supersedes the plan signed and sealed on 5/24/2021.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-2247
DESIGNED: February 2024
SEALED: 02/27/2024
REVISED: N/A

Electrical Detail - Sheet 1 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared in 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

SR 2215 (Buffaloe Road)
at
Valley Stream Drive

Division 5 Wake County Raleigh

PLAN DATE: February 2024 | REVIEWED BY:
PREPARED BY: S.Kirkpatrick | REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 036833 ENGINEER RYAN W. HOUGH

DocuSigned by: Ryan W. Hough 02/27/2024
430320FAA2654C3...
DATE

SIG. INVENTORY NO. 05-2247

27-FEB-2024 14:42
S:*ITS&SU*ITS Signals*Workgroups*Sig Man*Projects From Signal Design*Active Projects*Kirkpatrick*05-1780 & 05-2247 (HS-2005G)*052247_sm_ele_20240227.dgn
sgkirkpatrick

OVERLAP PROGRAMMING DETAIL

1. From Main Menu select [4 - UNIT DATA]
2. From UNIT DATA Submenu select [3 - OVERLAP DATA]

```
OVERLAP DATA

  A: FYA   E: ---   I: ---   M: ---
  B: FYA   F: ---   J: ---   N: ---
  C: FYA   G: ---   K: ---   O: ---
  D: FYA   H: ---   L: ---   P: ---

 PREV/NEXT TO CYCLE
```

Press ESC

OVERLAP A

Use Up/Dn/Left/Right keys to position cursor on Overlap 'A', use the NEXT key to select 'FYA', then press ENT

```
FYA OVERLAP - A           DELAY/10:   0
       PHASES..12345678 90123456
  PERM PHASES: 01000000 00000000
  PROT PHASES: 10000000 00000000
  -PED PHASES: 00000000 00000000
     OVERLAPS..ABCDEFGH IJKLMNOP
PERM OVERLAPS: x0000000 00000000
PROT OVERLAPS: x0000000 00000000
```

← NOTICE DELAY/10 = 0

Press ESC

OVERLAP B

Use Up/Dn/Left/Right keys to position cursor on Overlap 'B', use the NEXT key to select 'FYA', then press ENT

```
FYA OVERLAP - B           DELAY/10:   0
       PHASES..12345678 90123456
  PERM PHASES: 00010000 00000000
  PROT PHASES: 00100000 00000000
  -PED PHASES: 00000000 00000000
     OVERLAPS..ABCDEFGH IJKLMNOP
PERM OVERLAPS: 0x000000 00000000
PROT OVERLAPS: 0x000000 00000000
```

← NOTICE DELAY/10 = 0

Press ESC

OVERLAP C

Use Up/Dn/Left/Right keys to position cursor on Overlap 'C', use the NEXT key to select 'FYA', then press ENT

```
FYA OVERLAP - C           DELAY/10:   0
       PHASES..12345678 90123456
  PERM PHASES: 00000100 00000000
  PROT PHASES: 00001000 00000000
  -PED PHASES: 00000000 00000000
     OVERLAPS..ABCDEFGH IJKLMNOP
PERM OVERLAPS: 00x00000 00000000
PROT OVERLAPS: 00x00000 00000000
```

← NOTICE DELAY/10 = 0

Press ESC

OVERLAP D

Use Up/Dn/Left/Right keys to position cursor on Overlap 'D', use the NEXT key to select 'FYA', then press ENT

```
FYA OVERLAP - D           DELAY/10:   0
       PHASES..12345678 90123456
  PERM PHASES: 00000001 00000000
  PROT PHASES: 00000010 00000000
  -PED PHASES: 00000000 00000000
     OVERLAPS..ABCDEFGH IJKLMNOP
PERM OVERLAPS: 000x0000 00000000
PROT OVERLAPS: 000x0000 00000000
```

← NOTICE DELAY/10 = 0

END OVERLAP PROGRAMMING

ADVANCE WALK PED PROGRAMMING DETAIL

(program controller as shown below)

1. From Main Menu select [3 - PHASE DATA]
2. From PHASE DATA Submenu select [3 - PEDESTRIAN DATA]
3. From PEDESTRIAN DATA Submenu select [3 - PED OFFSET+]

```
PHASE......1...2...3...4...5...6...7...8
 WOFF/10   0  50   0  40   0  50   0  40
 MODE      0   0   0   0   0   0   0   0


CODES: * 0-ADVANCE   1-DELAY
```

Advance Walk PED programming complete.

ACCESSIBLE PEDESTRIAN SIGNAL (APS) INSTALLATION NOTES

1. Install push buttons and APS equipment per manufacturer's instructions.
2. Provide a dedicated cable to each push button per manufacturer's instructions.
3. If APS equipment is mounted in cabinet, use filtered power (i.e., Controller Receptacle) to power APS equipment. Do not use Equipment Receptacle, which is a GFCI outlet.
4. Never attempt to operate a standard contact closure push button with the APS system unless cabinet is re-wired for standard button operation or unless explicitly allowed by the manufacturer.
5. Place manufacturer's instructions in cabinet with cabinet prints, signal plans, and electrical details.
6. An APS push button station that is designed to work without the need for interfacing with a pedestrian signal head shall be installed for applications where a push button is installed in a median without a pedestrian signal head.
7. A push button with a single tactile arrow that points in both directions of travel shall be installed if the median separates two parallel crosswalks.

INIT & N.A. RESP PROGRAMMING DETAIL

1. From Main Menu select [3 - PHASE DATA]
2. From PHASE DATA Submenu select [4 - INIT & N.A RESP]

Note Phases 1,3,5 and 7 NOT used! →

```
PHASE......1...2...3...4...5...6...7...8...
 INITIAL   0   6   0   1   0   6   0   1
 NA RESP   0   1   0   2   0   1   0   2

CODES.....0....1....2....3....4....5...6
 INITL  NONE INACT RED  YEL   GRN  DRK G/DW
 NA RSP NONE  NA1  NA2  1&2   ---  --- ---
                                        ***
```

INIT & N.A. RESP PROGRAMMING COMPLETE

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 plan supersedes the plan signed and sealed on 5/24/2021.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-2247
DESIGNED: February 2024
SEALED: 02/27/2024
REVISED: N/A

Electrical Detail - Sheet 2 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 2215 (Buffaloe Road)
at
Valley Stream Drive

Division 5 | Wake County | Raleigh

Prepared in 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

PLAN DATE: February 2024	REVIEWED BY:
PREPARED BY: S.Kirkpatrick	REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 036833 ENGINEER RYAN W. HOUGH

DocuSigned by: Ryan W. Hough 430320EAA2654C3...
02/27/2024
DATE

SIG. INVENTORY NO. 05-2247

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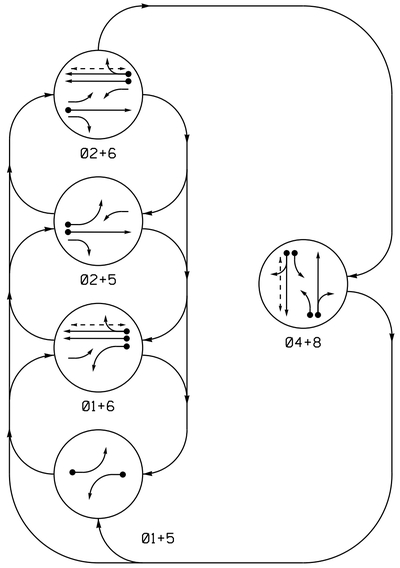
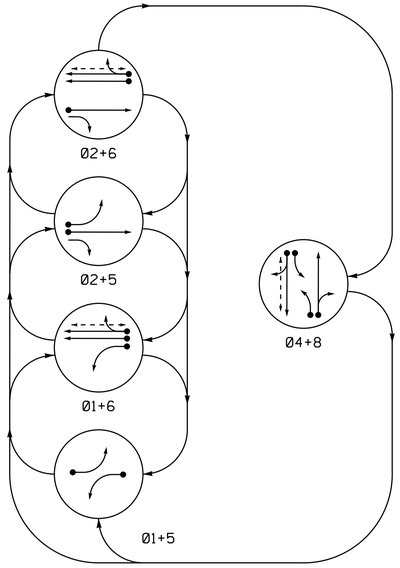
sgkirkpatrick

PROJECT REFERENCE NO.	SHEET NO.
HS-2005G	Sig 2.0

DEFAULT PHASING DIAGRAM



ALTERNATE PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

LOOP & DETECTOR UNIT INSTALLATION CHART
SE-PAC 2070 CONTROLLER WITH 170 CABINET

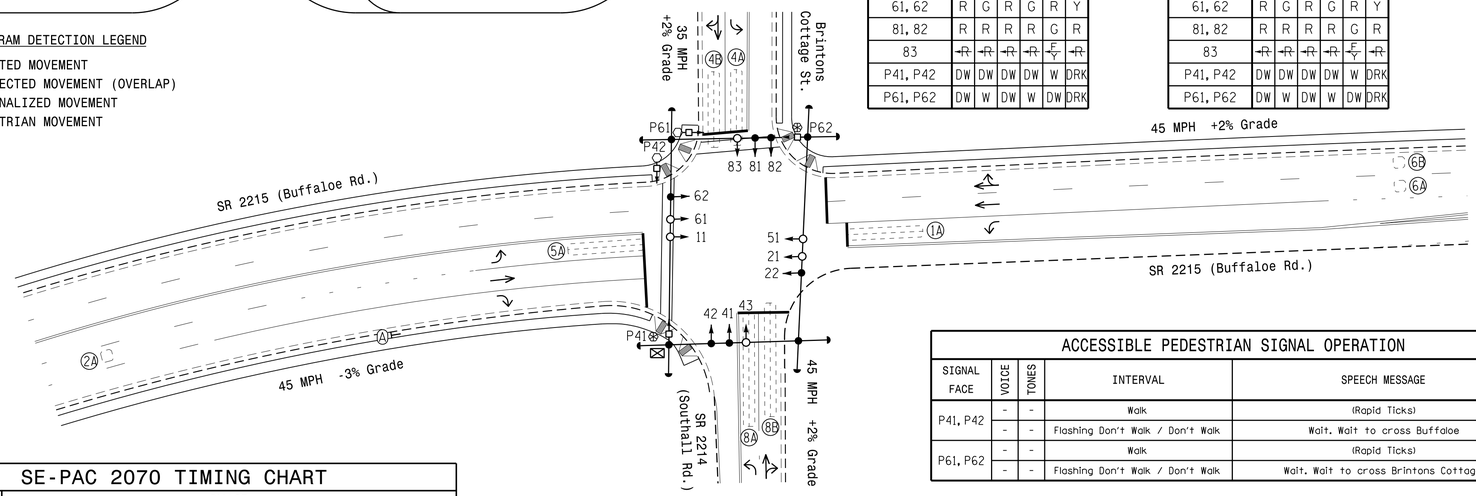
INDUCTIVE LOOPS						DETECTOR PROGRAMMING																
							TIMING		OPERATION MODE										SWITCH		STATUS	
LOOP NO.	SIZE (ft)	TURNS	DIST. FROM STOPBAR (ft)	NEW	EXISTING	ASSIGNED PHASE	DELAY	EXTEND (STRETCH)	0 VEHICLE	1 PEDESTRIAN	2 1 CALL	3 STOP A	4 STOP B	5 PROTPER LEFT	6 PROTPER THROUGH	7 AND	SYSTEM LOOPS		NEW	EXISTING
1A	6X40	2-4-2	0	-	X	1	5 SEC.	- SEC.	X	-	-	-	-	-	-	-	-		X	-
2A	6X6	EXIST	284	-	X	2	- SEC.	- SEC.	X	-	-	-	-	-	-	-	-		X	-
4A	6X40	2-4-2	+7	-	X	4	3 SEC.	- SEC.	X	-	-	-	-	-	-	-	-		X	-
4B	6X40	2-4-2	+7	-	X	4	10 SEC.	- SEC.	X	-	-	-	-	-	-	-	-		X	-
5A	6X40	2-4-2	0	-	X	5	5 SEC.	- SEC.	X	-	-	-	-	-	-	-	-		X	-
6A	6X6	5	300	-	X	6	- SEC.	- SEC.	X	-	-	-	-	-	-	-	-		X	-
6B	6X6	5	300	-	X	6	- SEC.	- SEC.	X	-	-	-	-	-	-	-	-		X	-
8A	6X60	EXIST	0	-	X	8	3 SEC.	- SEC.	X	-	-	-	-	-	-	-	-		X	-
8B	6X60	EXIST	+5	-	X	8	10 SEC.	- SEC.	X	-	-	-	-	-	-	-	-		X	-

DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE 01+05	01+06	02+05	02+06	04+08	FLASH
11	←	←	F/Y	F/Y	~~R~~	~~Y~~
21, 22	R	R	G	G	R	Y
41, 42	R	R	R	R	G	R
43	~~R~~	~~R~~	~~R~~	~~R~~	F/Y	~~R~~
51	←	F/Y	←	F/Y	~~R~~	~~Y~~
61, 62	R	G	R	G	R	Y
81, 82	R	R	R	R	G	R
83	~~R~~	~~R~~	~~R~~	~~R~~	F/Y	~~R~~
P41, P42	DW	DW	DW	DW	W	DRK
P61, P62	DW	W	DW	W	DW	DRK

ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE 01+05	01+06	02+05	02+06	04+08	FLASH
11	←	←	~~R~~	~~R~~	~~R~~	~~Y~~
21, 22	R	R	G	G	R	Y
41, 42	R	R	R	R	G	R
43	~~R~~	~~R~~	~~R~~	~~R~~	F/Y	~~R~~
51	←	~~R~~	←	~~R~~	~~R~~	~~Y~~
61, 62	R	G	R	G	R	Y
81, 82	R	R	R	R	G	R
83	~~R~~	~~R~~	~~R~~	~~R~~	F/Y	~~R~~
P41, P42	DW	DW	DW	DW	W	DRK
P61, P62	DW	W	DW	W	DW	DRK



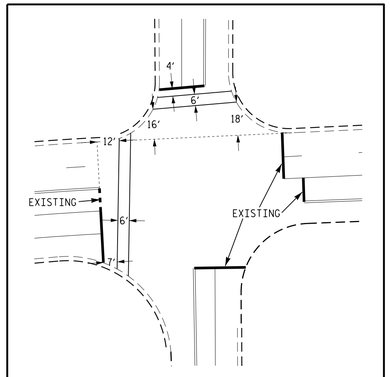
ACCESSIBLE PEDESTRIAN SIGNAL OPERATION

SIGNAL FACE	VOICE	TONES	INTERVAL	SPEECH MESSAGE
P41, P42	-	-	Walk	(Rapid Ticks)
	-	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Buffaloe
P61, P62	-	-	Walk	(Rapid Ticks)
	-	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Brintons Cottage.

SE-PAC 2070 TIMING CHART

FEATURE	PHASE 1	2	4	5	6	8
Min Green *	7	12	7	7	12	7
Passage Gap *	2.0	6.0	2.0	2.0	6.0	2.0
Maximum Green *	15	120	25	15	120	25
Yellow Change	3.0	4.8	4.3	3.0	4.8	4.3
Red Clear	2.4	1.3	1.7	2.8	1.3	1.7
Advance Walk *	-	-	6	-	4	-
Walk *	-	-	7	-	7	-
Pedestrian Clear	-	-	17	-	8	-
Added Initial *	-	2.5	-	-	1.5	-
Maximum Initial *	-	32	-	-	34	-
Time Before Reduction *	-	15	-	-	15	-
Time To Reduce *	-	45	-	-	45	-
Minimum Gap	-	3.0	-	-	3.0	-
Recall Mode	-	MIN RECALL	-	-	MIN RECALL	-
Vehicle Call Memory	NONLOCK	LOCK	NONLOCK	NONLOCK	LOCK	NONLOCK
Dual Entry	-	-	ON	-	-	ON
Simultaneous Gap	ON	ON	ON	ON	ON	ON

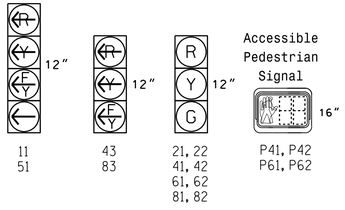
* These values may be field adjusted. Do not adjust Min Green and Extension times for phases 2 and 6 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.



PROPOSED CROSSWALKS AND STOP LINES

SIGNAL FACE I.D.

All Heads L.E.D.



This plan supersedes the plan signed and sealed on 5/25/21.

5 Phase
Fully Actuated
(Raleigh Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2024 and "Standard Specifications for Roads and Structures" dated January 2024.
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. Reposition existing signal heads as shownn
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. This intersection features accessible pedestrian signals utilizing percussive tone walk indications and/or speech messages.
11. Pavement markings are existing unless otherwise shown.
12. The Division (City) Traffic Engineer will determine the hours of use for each phasing plan.
13. 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	→
N/A	Curb Ramp	◢
⊛	Type I Pushbutton Post	⊛
⬡	Type II Signal Pedestal	⬢
Ⓐ	"RIGHT LANE MUST TURN RIGHT" Sign (R3-7R)	Ⓐ

Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

SR 2215 (Buffaloe Road)
at
SR 2214 (Southall Road)/
Brintons Cottage Street

Division 5 Wake County Raleigh

PLAN DATE: February 2024 REVIEWED BY:
PREPARED BY: J.A. Lohr REVIEWED BY:

REVISIONS	INIT.	DATE

SCALE 0 40 1"=40'

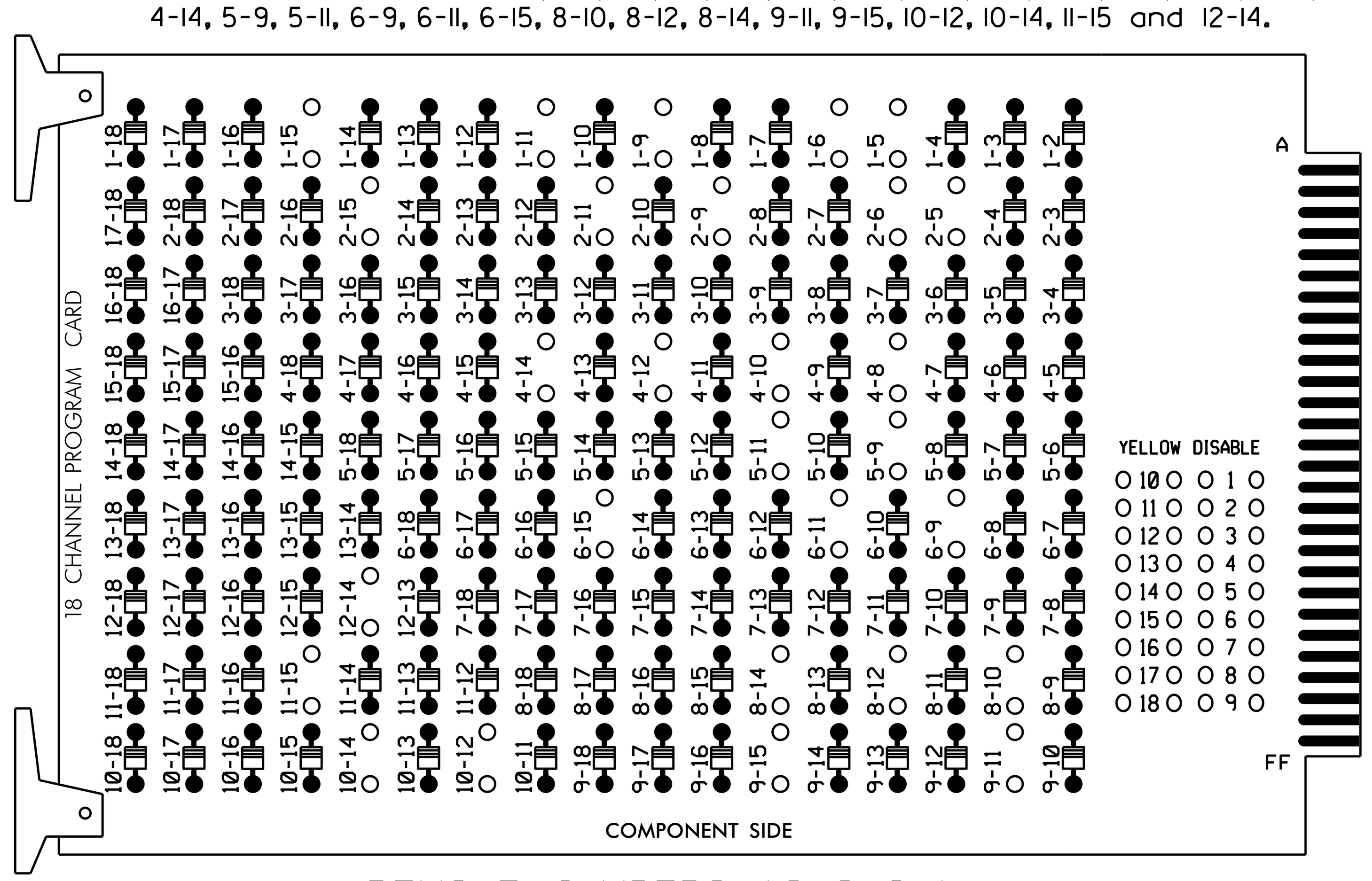
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 026486 ENGINEER ROBERT J. ZIEMBA
DocuSigned by: 02/27/2024
DATE
SIG. INVENTORY NO. 05-1780

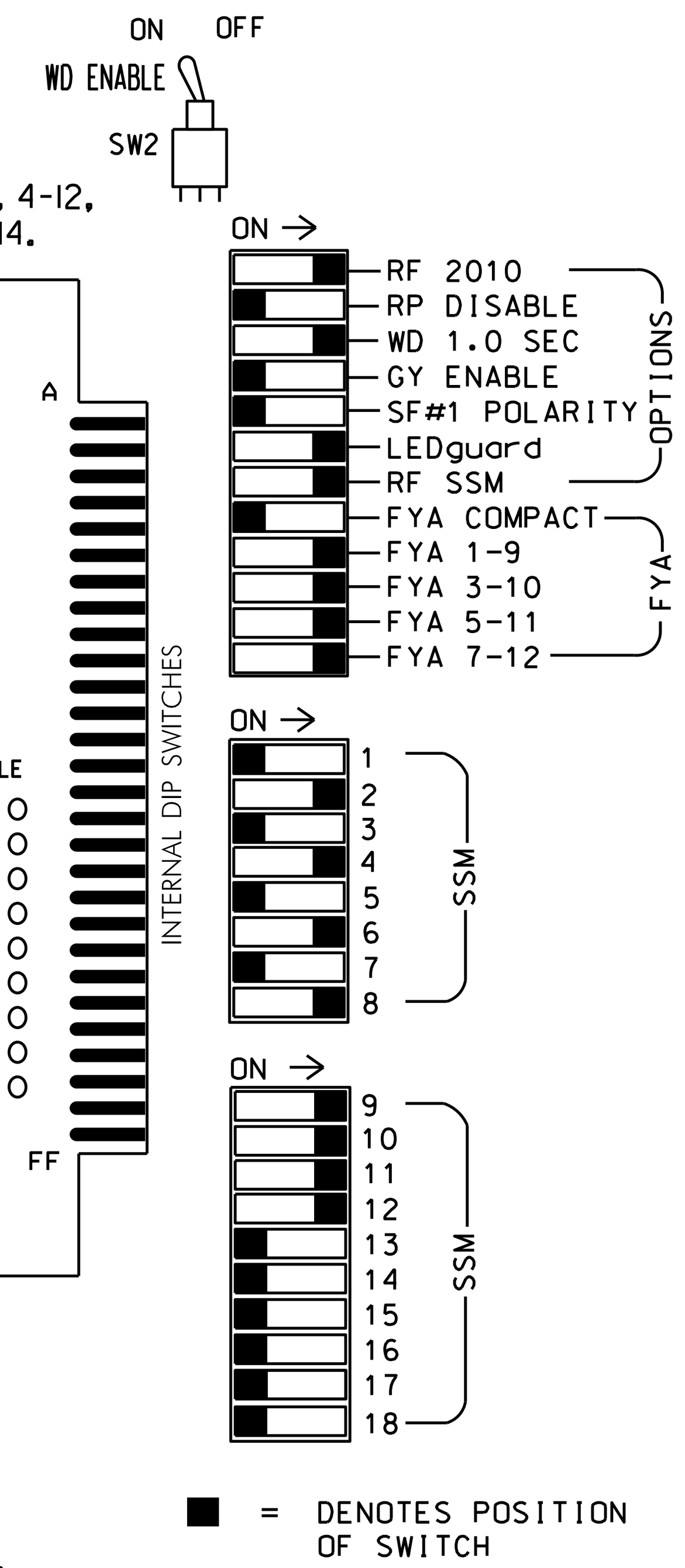
PROJECT REFERENCE NO.	SHEET NO.
HS-2005G	Sig. 2.1

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, 2-15, 4-8, 4-10, 4-12, 4-14, 5-9, 5-11, 6-9, 6-11, 6-15, 8-10, 8-12, 8-14, 9-11, 9-15, 10-12, 10-14, 11-15 and 12-14.





REMOVE JUMPERS AS SHOWN

NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that Red Enable is active at all times during normal operation.
4. 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 Plans.
2. Program controller to start up in phases 2 and 6 Green/ Don't Walk.
3. Enable simultaneous gap-out feature for all phases.
4. Program phases 2 and 6 for volume density operation.
5. Program phases 4 and 8 for dual entry.
6. The cabinet and controller are part of the Raleigh Signal System.

EQUIPMENT INFORMATION

CONTROLLER..............2070LX
CABINET.................332 W/ AUX
SOFTWARE................SE-PAC2070
CABINET MOUNT...........BASE
OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
LOAD SWITCHES USED......S1,S2,S5,S6,S7,S8,S9,S11,AUX S1, AUX S2,AUX S4,AUX S5
PHASES USED.............1,2,4,4PED,5,6,6PED,8
OVERLAP "A".............*
OVERLAP "B".............*
OVERLAP "C".............*
OVERLAP "D".............*

* See sheet 2 for Overlap Programming Detail

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	11★	21,22	NU	NU	41,42	P41, P42	51★	61,62	P61, P62	NU	81,82	NU	11★	83★	NU	51★	43★	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)						104			119									
(Walk person)						106			121									

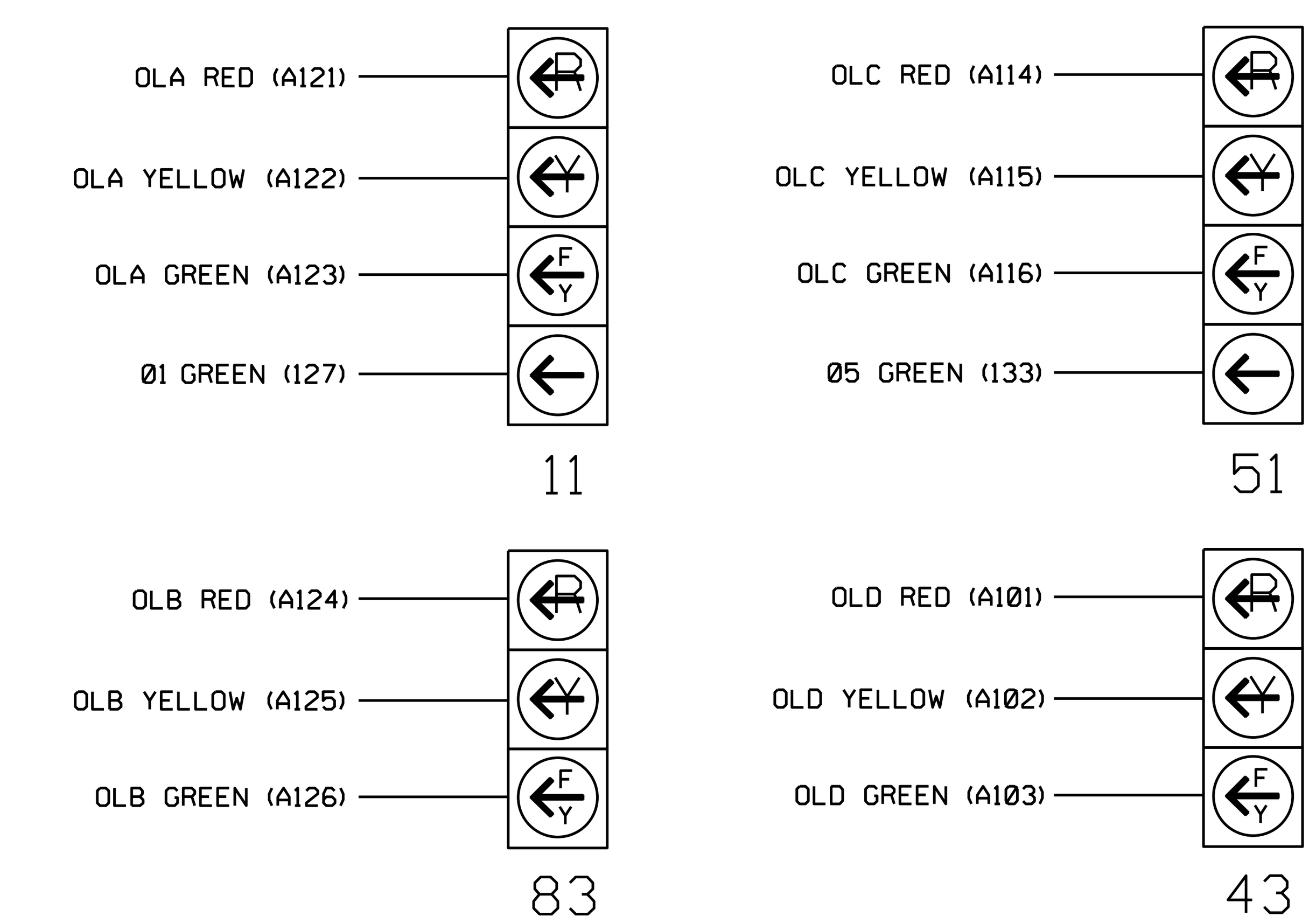
NU = Not Used

★ See pictorial of head wiring in detail this sheet.

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

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



INPUT FILE POSITION LAYOUT

(front view)

FILE		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	Ø 1 1A	Ø 2 2A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	Ø 4 4A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	NOT USED	Ø6 PED DC ISOLATOR	FS DC ISOLATOR
	L	NOT USED	NOT USED				Ø 4 4B						Ø4 PED DC ISOLATOR	NOT USED	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.	DETECTOR NO.	NEMA PHASE	DELAY TIME	EXTEND (STRETCH) TIME
1A	TB2-1,2	I1U	56	1	1	5	
2A	TB2-5,6	I2U	39	3	2		
4A	TB4-9,10	I6U	41	11	4	3	
4B	TB4-11,12	I6L	45	12	4	10	
5A	TB3-1,2	J1U	55	19	5	5	
6A	TB3-5,6	J2U	40	21	6		
6B	TB3-7,8	J2L	44	22	6		
8A	TB5-9,10	J6U	42	31	8	3	
8B	TB5-11,12	J6L	46	32	8	10	
PED PUSH BUTTONS							
P41,P42	TB8-5,6	I12L	69	PED 4	4 PED		
P61,P62	TB8-7,9	I13U	68	PED 6	6 PED		

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

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

This plan supersedes the plan signed and sealed on 6/1/2021.

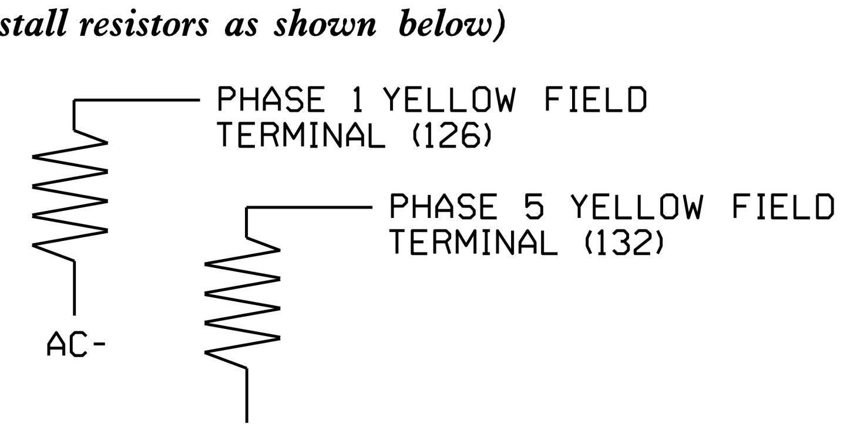
THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1780
DESIGNED: February 2024
SEALED: 02/27/2024
REVISED: N/A

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown below)

ACCEPTABLE VALUES

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



FLASHER CIRCUIT MODIFICATION DETAIL

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

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

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

Electrical Detail - Sheet 1 of 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 2215 (Buffaloe Road)
at
SR 2214 (Southall Road)/
Brintons Cottage Street

Division 5 Wake County Raleigh

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

PLAN DATE: February 2024	REVIEWED BY:
PREPARED BY: S.Kirkpatrick	REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 036833 ENGINEER RYAN W. HOUGH

DocuSigned by: Ryan W. Hough 02/27/2024
430320FAA2654C3...
DATE

SIG. INVENTORY NO. 05-1780

27-FEB-2024 14:46
S:*ITS&SU*ITS Signals*Workgroups*Sig Man*Projects From Signal Design*Active Projects*Kirkpatrick*05-1780 & 05-2247 (HS-2005G)*051780_sm_ele_20240227.dgn
sgkirkpatrick

OVERLAP PROGRAMMING DETAIL

1. From Main Menu select [4 - UNIT DATA]
2. From UNIT DATA Submenu select [3 - OVERLAP DATA]

```
OVERLAP DATA

   A: FYA   E: ---   I: ---   M: ---
   B: FYA   F: ---   J: ---   N: ---
   C: FYA   G: ---   K: ---   O: ---
   D: FYA   H: ---   L: ---   P: ---

 PREV/NEXT TO CYCLE
```

Press ESC

OVERLAP A

Use Up/Dn/Left/Right keys to position cursor on Overlap 'A', use the NEXT key to select 'FYA', then press ENT

```
FYA OVERLAP - A          DELAY/10:   0
       PHASES..12345678 90123456
  PERM PHASES: 01000000 00000000
  PROT PHASES: 10000000 00000000
  -PED PHASES: 00000000 00000000
     OVERLAPS..ABCDEFGH IJKLMNOP
PERM OVERLAPS: x0000000 00000000
PROT OVERLAPS: x0000000 00000000
```

← NOTICE DELAY/10 = 0

Press ESC

OVERLAP B

Use Up/Dn/Left/Right keys to position cursor on Overlap 'B', use the NEXT key to select 'FYA', then press ENT

```
FYA OVERLAP - B          DELAY/10:   0
       PHASES..12345678 90123456
  PERM PHASES: 00010000 00000000
  PROT PHASES: 00100000 00000000
  -PED PHASES: 00000000 00000000
     OVERLAPS..ABCDEFGH IJKLMNOP
PERM OVERLAPS: 0x000000 00000000
PROT OVERLAPS: 0x000000 00000000
```

← NOTICE DELAY/10 = 0

Press ESC

OVERLAP C

Use Up/Dn/Left/Right keys to position cursor on Overlap 'C', use the NEXT key to select 'FYA', then press ENT

```
FYA OVERLAP - C          DELAY/10:   0
       PHASES..12345678 90123456
  PERM PHASES: 00000100 00000000
  PROT PHASES: 00001000 00000000
  -PED PHASES: 00000000 00000000
     OVERLAPS..ABCDEFGH IJKLMNOP
PERM OVERLAPS: 00x00000 00000000
PROT OVERLAPS: 00x00000 00000000
```

← NOTICE DELAY/10 = 0

Press ESC

OVERLAP D

Use Up/Dn/Left/Right keys to position cursor on Overlap 'D', use the NEXT key to select 'FYA', then press ENT

```
FYA OVERLAP - D          DELAY/10:   0
       PHASES..12345678 90123456
  PERM PHASES: 00000001 00000000
  PROT PHASES: 00000010 00000000
  -PED PHASES: 00000000 00000000
     OVERLAPS..ABCDEFGH IJKLMNOP
PERM OVERLAPS: 000x0000 00000000
PROT OVERLAPS: 000x0000 00000000
```

← NOTICE DELAY/10 = 0

END OVERLAP PROGRAMMING

ADVANCE WALK PED PROGRAMMING DETAIL

(program controller as shown below)

1. From Main Menu select [3 - PHASE DATA]
2. From PHASE DATA Submenu select [3 - PEDESTRIAN DATA]
3. From PEDESTRIAN DATA Submenu select [3 - PED OFFSET+]

```
PHASE......1...2...3...4...5...6...7...8
 WOFF/10   0   0   0  60   0  40   0   0
 MODE      0   0   0   0   0   0   0   0


CODES: * 0-ADVANCE   1-DELAY
```

Advance Walk PED programming complete.

ACCESSIBLE PEDESTRIAN SIGNAL (APS) INSTALLATION NOTES

1. Install push buttons and APS equipment per manufacturer's instructions.
2. Provide a dedicated cable to each push button per manufacturer's instructions.
3. If APS equipment is mounted in cabinet, use filtered power (i.e., Controller Receptacle) to power APS equipment. Do not use Equipment Receptacle, which is a GFCI outlet.
4. Never attempt to operate a standard contact closure push button with the APS system unless cabinet is re-wired for standard button operation or unless explicitly allowed by the manufacturer.
5. Place manufacturer's instructions in cabinet with cabinet prints, signal plans, and electrical details.
6. An APS push button station that is designed to work without the need for interfacing with a pedestrian signal head shall be installed for applications where a push button is installed in a median without a pedestrian signal head.
7. A push button with a single tactile arrow that points in both directions of travel shall be installed if the median separates two parallel crosswalks.

INIT & N.A. RESP PROGRAMMING DETAIL

1. From Main Menu select [3 - PHASE DATA]
2. From PHASE DATA Submenu select [4 - INIT & N.A RESP]

Note Phases 3 and 7 NOT used! →

```
PHASE......1...2...3...4...5...6...7...8...
 INITIAL   1   6   0   1   1   6   0   1
 NA RESP   0   1   0   2   0   1   0   2

CODES.....0....1....2....3....4....5...6
 INITL  NONE INACT RED  YEL  GRN  DRK G/DW
 NA RSP NONE  NA1  NA2  1&2  ---  --- ---
                                       ***
```

INIT & N.A. RESP PROGRAMMING COMPLETE

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 plan supersedes the plan signed and sealed on 6/1/2021.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1780
DESIGNED: February 2024
SEALED: 02/27/2024
REVISED: N/A

Electrical Detail - Sheet 2 of 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 2215 (Buffaloe Road)
at
SR 2214 (Southall Road)/
Brintons Cottage Street

Division 5 Wake County Raleigh

PLAN DATE: February 2024 REVIEWED BY:
PREPARED BY: S.Kirkpatrick REVIEWED BY:

REVISIONS	INIT.	DATE

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

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 036833 ENGINEER RYAN W. HOUGH

DocuSigned by: Ryan W. Hough 02/27/2024
430320FAA2654C3
DATE

SIG. INVENTORY NO. 05-1780

PROJECT REFERENCE NO.	SHEET NO.
HS-2005G	Sig. 2.3

PROGRAMMING DETAILS TO CALL ALTERNATE PHASING

To run the Alternate phasing, schedule a Day Plan that calls an Action that is programmed to enable Phase Function 1.

Actions can be programmed to run free run or call a coordination pattern.

PHASE FUNCTION MAPPING PROGRAMMING DETAIL

Step 1 - Assign OMIT OVERLAPS A & C to Phase Function 1.

1. From Main Menu select [6 - TIME BASE DATA]
2. From TIME BASE DATA Submenu select [9 - PHS FUNC MAPPING]

Use Up/Dn Keys to position cursor on NUM 1

```
TIME BASE PHS FUNC MAPING
                PHS FUNC SEL(0-OFF/1-ON)
NUM..P-FUNCT NAME.....123456789 0123456
  1  PHS-01 MAX # 2   000000000 0000000
  2  PHS-02 MAX # 2   000000000 0000000
  3  PHS-03 MAX # 2   000000000 0000000
  4  PHS-04 MAX # 2   000000000 0000000
UP/DOWN TO SCROLL               E-EDIT
```

BEFORE PROCEEDING, SCROLL THRU ENTIRE RANGE OF FUNCTIONS TO ENSURE ALL P-FUNCT 1 NUM x VALUES ARE SET TO '0' (OFF)

Use Up/Dn/Left/Right keys to position cursor on NUM 145 and program P-FUNCT 1 as shown.

SET P-FUNCT 1 VALUES TO '1' (ON) AS SHOWN

```
TIME BASE PHS FUNC MAPING
                PHS FUNC SEL(0-OFF/1-ON)
NUM..P-FUNCT NAME.....123456789 0123456
145  OVERLAP A OMIT   100000000 0000000   <- FOR OVERLAP A OMIT
146  OVERLAP B OMIT   000000000 0000000
147  OVERLAP C OMIT   100000000 0000000   <- FOR OVERLAP C OMIT
148  OVERLAP D OMIT   000000000 0000000
UP/DOWN TO SCROLL               E-EDIT
```

PHASE FUNCTION PROGRAMMING COMPLETE

TIME BASE ACTIONS PROGRAMMING

Step 2 - Set up Action numbers to run Phase Function 1.

1. From Main Menu select [6 - TIME BASE DATA]
2. From TIME BASE DATA Submenu select [5 - ACTIONS]

```
TIME BASE ACTION # ***
                  12345678 90123456
  PATN:001     PHS: 10000000 00000000   <- NOTICE PHS 1
   0=I'CONN    AUX: 000-----
  1-253=PATN   SPC: 0000000-      0=NO
  254=FREE     DIM: 0-------      1=YES
  255=FLASH    DET: 000-----
UP/DOWN TO SCROLL
```

SPECIAL FUNCTION PROGRAMMING COMPLETE

*** Action #(s) are to be determined by the Division and/or City Traffic Engineer and are scheduled to run in Day Plan(s).

This plan supersedes the plan signed and sealed on 6/1/2021.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1780
DESIGNED: February 2024
SEALED: 02/27/2024
REVISED: N/A

Electrical Detail - Sheet 3 of 3

ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 2215 (Buffaloe Road)
at
SR 2214 (Southall Road)/
Brintons Cottage Street

Division 5 | Wake County | Raleigh

Prepared in 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

PLAN DATE: February 2024	REVIEWED BY:
PREPARED BY: S.Kirkpatrick	REVIEWED BY:

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 036833 ENGINEER RYAN W. HOUGH

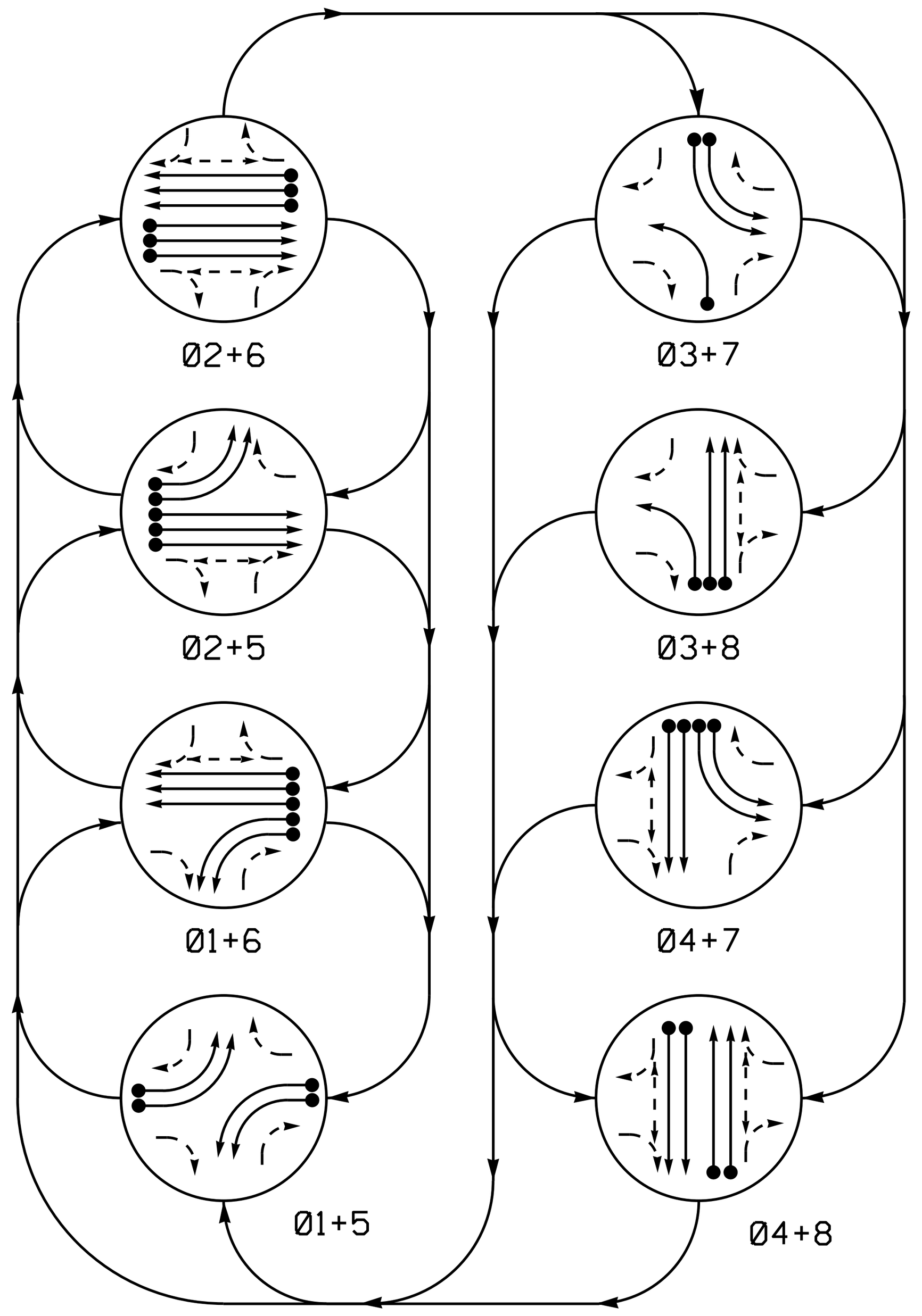
DocuSigned by:
Ryan W. Hough
430320FAA2654C3...
02/27/2024
DATE

SIG. INVENTORY NO. 05-1780

PROJECT REFERENCE NO.	SHEET NO.
HS-2005K	Sig. 1.0

8 Phase
Fully Actuated
(Raleigh Signal System)

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

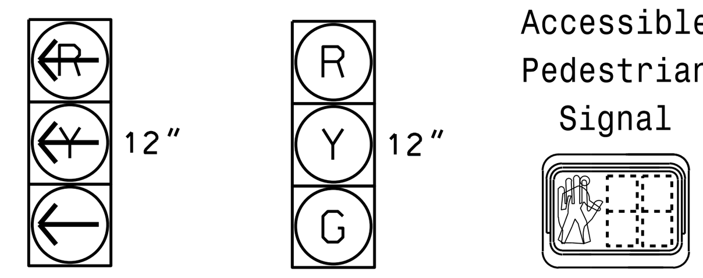
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

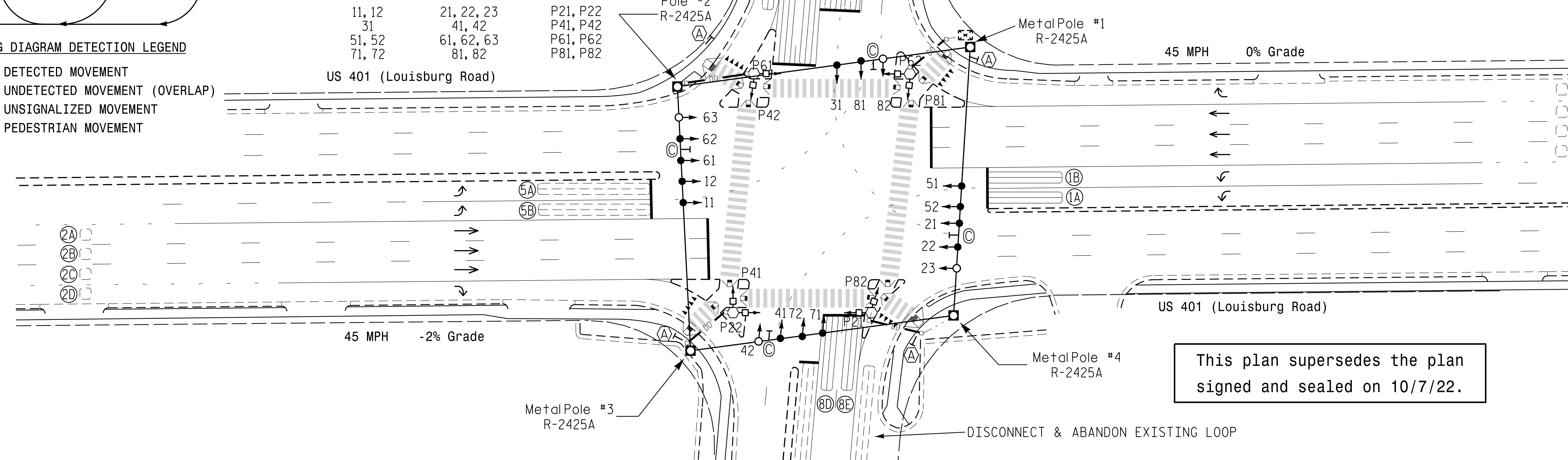
TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3+7	Ø3+8	Ø4+7	Ø4+8	FLASH
11, 12	←	←	←R	←R	←R	←R	←R	←R	←R
21, 22, 23	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, 52	←	←R	←	←R	←R	←R	←R	←R	←R
61, 62, 63	R	G	R	G	R	R	R	R	Y
71, 72	←R	←R	←R	←R	←	←R	←	←R	←R
81, 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

SIGNAL FACE I.D.

All Heads L.E.D.





This plan supersedes the plan signed and sealed on 10/7/22.

SE-PAC 2070 LOOP & DETECTOR UNIT INSTALLATION CHART

LOOP NO.	SIZE (ft)	TURNS	DIST. FROM STOPBAR (ft)	NEW	EXISTING	ASSIGNED PHASE	DELAY	EXTEND (STRETCH)	0 VEHICLE	1 PEDESTRIAN	2 1 CALL	3 STOP A	4 STOP B	5 PROT/PER LEFT	6 PROT/PER THROUGH	7 AND	SWITCH	SYSTEM LOOPS	STATUS NEW	STATUS EXISTING
1A	6X40	2-4-2	0	X	-	1	- SEC.	- SEC.	X	-	-	-	-	-	-	-	-	-	-	X
1B	6X40	2-4-2	0	X	-	1	- SEC.	- SEC.	X	-	-	-	-	-	-	-	-	-	-	X
1C	6X60	2-4-2	0	-	X	-	- SEC.	- SEC.	DISCONNECT & ABANDON										-	-
2A, 2B	6X6	5	330	-	X	2	- SEC.	- SEC.	X	-	-	-	-	-	-	-	-	-	-	X
2C, 2D	6X6	5	330	-	X	2	- SEC.	- SEC.	X	-	-	-	-	-	-	-	-	-	-	X
3A	6X60	2-4-2	0	-	X	3	- SEC.	- SEC.	X	-	-	-	-	-	-	-	-	-	-	X
4A,4B,4C	6X6	4	270	-	X	4	- SEC.	3.1 SEC.	X	-	-	-	-	-	-	-	-	-	-	X
4D	6X40	2-4-2	0	X	-	4	- SEC.	- SEC.	X	-	-	-	-	-	-	-	-	-	-	X
4E	6X40	2-4-2	0	X	-	4	- SEC.	- SEC.	X	-	-	-	-	-	-	-	-	-	-	X
5A	6X60	2-4-2	0	-	X	5	- SEC.	- SEC.	X	-	-	-	-	-	-	-	-	-	-	X
5B	6X60	2-4-2	0	-	X	5	- SEC.	- SEC.	X	-	-	-	-	-	-	-	-	-	-	X
5C	6X60	2-4-2	0	-	X	-	- SEC.	- SEC.	DISCONNECT & ABANDON										-	-
6A, 6B	6X6	4	335	-	X	6	- SEC.	- SEC.	X	-	-	-	-	-	-	-	-	-	-	X
6C, 6D	6X6	4	335	-	X	6	- SEC.	- SEC.	X	-	-	-	-	-	-	-	-	-	-	X
7A	6X60	2-4-2	0	-	X	7	3 SEC.	- SEC.	X	-	-	-	-	-	-	-	-	-	-	X
7B	6X60	2-4-2	0	-	X	7	- SEC.	- SEC.	X	-	-	-	-	-	-	-	-	-	-	X
8A,8B,8C	6X6	5	325	-	X	8	- SEC.	3.1 SEC.	X	-	-	-	-	-	-	-	-	-	-	X
8D	6X40	2-4-2	0	X	-	8	- SEC.	- SEC.	X	-	-	-	-	-	-	-	-	-	-	X
8E	6X40	2-4-2	0	X	-	8	- SEC.	- SEC.	X	-	-	-	-	-	-	-	-	-	-	X

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2024 and "Standard Specifications for Roads and Structures" dated January 2024.
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. Reposition existing signal heads numbered 21, 22, 41, 61, 62, and 81.
6. Set all detector units to presence mode.
7. 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.
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. This intersection features accessible pedestrian signals utilizing percussive tone walk indications and/or speech messages.
11. Pavement markings are existing unless otherwise shown.
12. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.

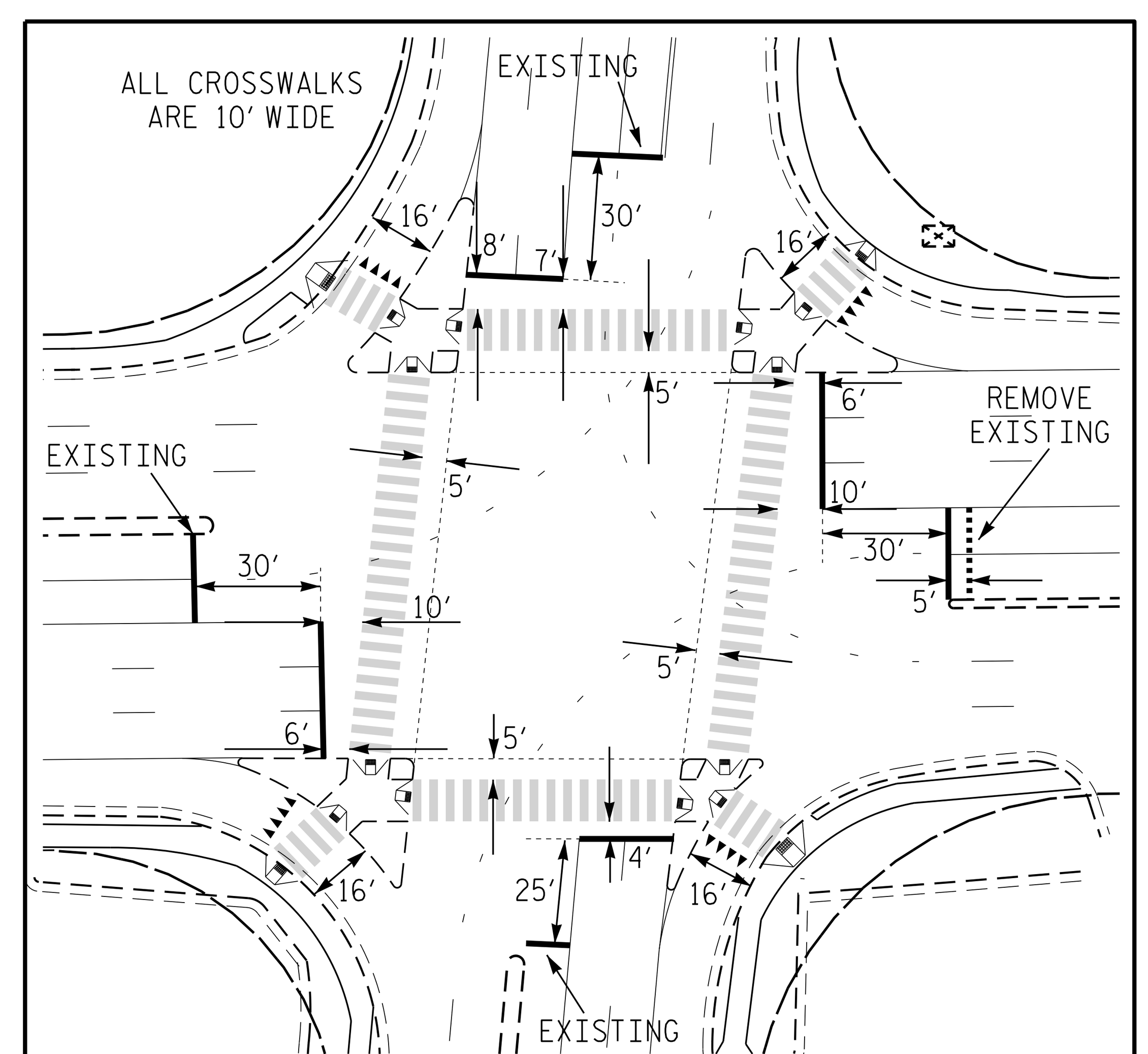
LEGEND

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 Strain Pole	
	Type II Signal Pedestal	
DD	Directional Drill	N/A
N/A	Curb Ramp	
(A)	"YIELD" Sign (R1-2)	(A)
(C)	Street Name Sign (D3-1)	(C)

SE-PAC 2070 TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6	7	8
Min Green *	7	12	7	7	7	12	7	7
Passage Gap *	2.0	6.0	2.0	2.0	2.0	6.0	2.0	2.0
Maximum Green *	30	60	20	40	20	60	20	40
Yellow Change	3.0	4.7	3.0	4.9	3.0	4.7	3.0	4.9
Red Clear	3.9	2.4	3.4	2.1	3.9	2.4	3.7	2.1
Walk *	-	7	-	7	-	7	-	7
Pedestrian Clear	-	14	-	22	-	15	-	23
Added Initial *	-	1.0	-	-	-	1.0	-	-
Maximum Initial *	-	34	-	-	-	34	-	-
Time Before Reduction *	-	15	-	-	-	15	-	-
Time To Reduce *	-	30	-	-	-	30	-	-
Minimum Gap	-	3.0	-	-	-	3.0	-	-
Recall Mode	-	MIN RECALL	-	-	-	MIN RECALL	-	-
Vehicle Call Memory	NON-LOCK	LOCK	NON-LOCK	NON-LOCK	NON-LOCK	LOCK	NON-LOCK	NON-LOCK
Dual Entry	-	-	-	-	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON	ON	ON	ON	ON

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



PROPOSED STOP LINE, CROSSWALK, AND ISLAND LOCATIONS

ACCESSIBLE PEDESTRIAN SIGNAL OPERATION

SIGNAL FACE	VOICE	TONES	INTERVAL	SPEECH MESSAGE
P21, P22	X	-	Walk	New Hope. Walk sign is on to cross New Hope.
	X	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross New Hope
P41, P42	X	-	Walk	Louisburg. Walk sign is on to cross Louisburg.
	X	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Louisburg.
P61, P62	X	-	Walk	New Hope. Walk sign is on to cross New Hope.
	X	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross New Hope
P81, P82	X	-	Walk	Louisburg. Walk sign is on to cross Louisburg.
	X	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Louisburg.

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Signal Upgrade

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

SCALE 0 40 1"=40'

US 401 (Louisburg Road) at SR 2036/2108 (N. New Hope Road)

Division 5 Wake County Raleigh

PLAN DATE: February 2024 REVIEWED BY:
PREPARED BY: J.A. Lohr REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 026486 ROBERT J. ZIEMBA

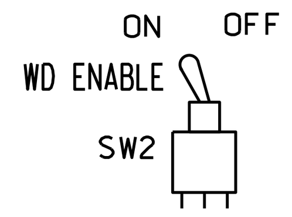
DocuSigned by: 02/27/2024 DATE

SIG. INVENTORY NO. 05-0139

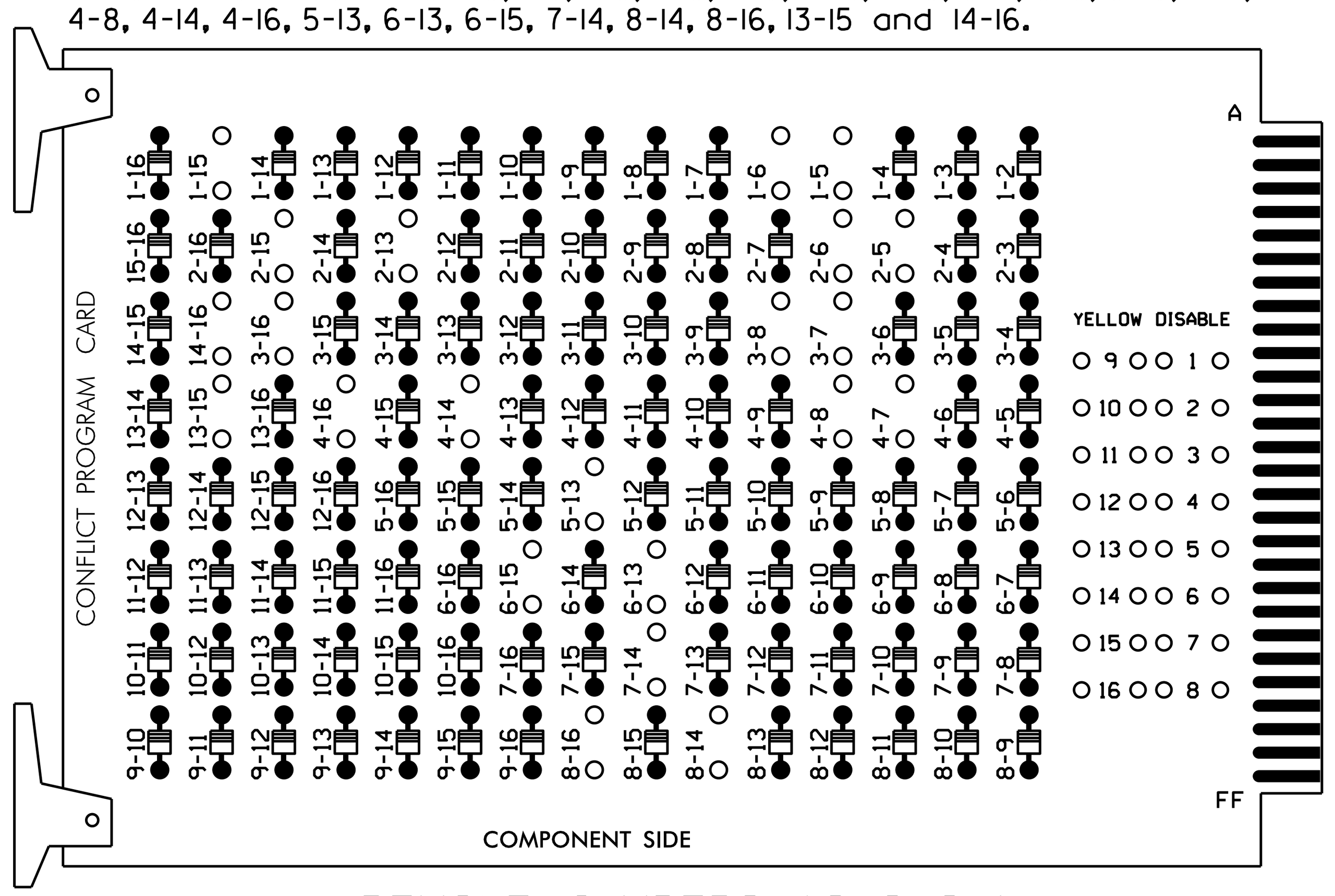
27-FEB-2024 12:27
JALohr

16 CHANNEL CONFLICT MONITOR PROGRAMMING DETAIL

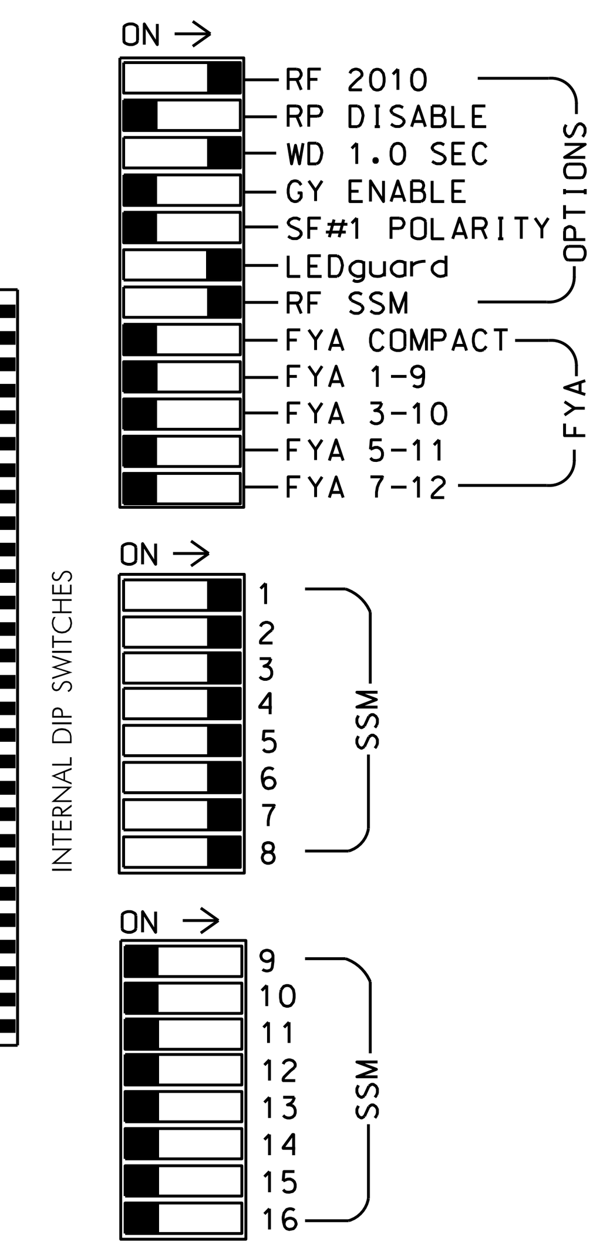
(remove jumpers and set switches as shown)



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



REMOVE JUMPERS AS SHOWN



■ = DENOTES POSITION OF SWITCH

NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Make sure jumpers SEL2-SEL5 are present on the monitor board.

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Ensure that Red Enable is active at all times during normal operation. To prevent Red Failures on unused monitor channels, tie unused red monitor inputs 9,10, 11,12,13,14,15 & 16 to load switch AC+ per the cabinet manufacturer's instructions.
3. Program controller to start up in phases 2 and 6 green.
4. Enable simultaneous gap-out feature for all phases.
5. Program phases 2 and 6 for volume density operation.
6. The cabinet and controller are part of the Raleigh Signal System.

EQUIPMENT INFORMATION

CONTROLLER..............2070
CABINET.................332
SOFTWARE................SE-PAC2070
CABINET MOUNT...........BASE
OUTPUT FILE POSITIONS...12
LOAD SWITCHES USED......S1,S2,S2P,S3,S4,S4P,S5,S6,S6P,S7,S8,S8P
PHASES USED.............1,2,3,4,5,6,7,8,2 PED,4 PED,6 PED,8 PED
OVERLAPS................NONE

PROJECT REFERENCE NO.	SHEET NO.
HS-2005K	Sig. 1.1

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S2P	S3	S4	S4P	S5	S6	S6P	S7	S8	S8P
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED
SIGNAL HEAD NO.	11,12	21,22 23	P21, P22	31	41,42	P41, P42	51,52	61,62 63	P61, P62	71,72	81,82	P81, P82
RED		128			101			134			107	
YELLOW		129			102			135			108	
GREEN		130			103			136			109	
RED ARROW	125			116			131			122		
YELLOW ARROW	126			117			132			123		
GREEN ARROW	127			118			133			124		
✋			113			104			119			110
🚶			115			106			121			112

NU = Not Used

ACCESSIBLE PEDESTRIAN SIGNAL (APS) INSTALLATION NOTES

1. Install push buttons and APS equipment per manufacturer's instructions.
2. Provide a dedicated cable to each push button per manufacturer's instructions.
3. If APS equipment is mounted in cabinet, use filtered power (i.e., Controller Receptacle) to power APS equipment. Do not use Equipment Receptacle, which is a GFCI outlet.
4. Never attempt to operate a standard contact closure push button with the APS system unless cabinet is re-wired for standard button operation or unless explicitly allowed by the manufacturer.
5. Place manufacturer's instructions in cabinet with cabinet prints, signal plans, and electrical details.
6. An APS push button station that is designed to work without the need for interfacing with a pedestrian signal head shall be installed for applications where a push button is installed in a median without a pedestrian signal head.
7. A push button with a single tactile arrow that points in both directions of travel shall be installed if the median separates two parallel crosswalks.

INPUT FILE POSITION LAYOUT

(front view)

		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,2B	SLOT EMPTY	Ø 3 3A	Ø 4 4A, 4B,4C	Ø 4 4E	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	Ø2 PED DC ISOLATOR	Ø6 PED DC ISOLATOR	FS DC ISOLATOR
	L	NOT USED	NOT USED	Ø 2 2C,2D		NOT USED	Ø 4 4D	NOT USED					Ø4 PED DC ISOLATOR	Ø8 PED DC ISOLATOR	ST DC ISOLATOR
FILE "J"	U	Ø 5 5A	Ø 5 5B	Ø 6 6A,6B	SLOT EMPTY	SLOT EMPTY	Ø 7 7A	Ø 8 8A, 8B,8C	Ø 8 8E	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L	NOT USED	NOT USED	Ø 6 6C,6D			Ø 7 7B	Ø 8 8D	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.	DETECTOR NO.	NEMA PHASE	DELAY TIME	EXTEND (STRETCH) TIME
1A	TB2-1,2	I1U	56	1	1		
1B	TB2-5,6	I2U	39	3	1		
2A,2B	TB2-9,10	I3U	63	5	2		
2C,2D	TB2-11,12	I3L	76	6	2		
3A	TB4-5,6	I5U	58	9	3		
4A,4B,4C	TB4-9,10	I6U	41	11	4		3.1
4D	TB4-11,12	I6L	45	12	4		
4E	TB6-1,2	I7U	65	13	4		
5A	TB3-1,2	J1U	55	19	5		
5B	TB3-5,6	J2U	40	21	5		
6A,6B	TB3-9,10	J3U	64	23	6		
6C,6D	TB3-11,12	J3L	77	24	6		
7A	TB5-9,10	J6U	42	31	7	3	
7B	TB5-11,12	J6L	46	32	7		
8A,8B,8C	TB7-1,2	J7U	66	33	8		3.1
8D	TB7-3,4	J7L	79	34	8		
8E	TB7-5,6	J8U	50	35	8		
PED PUSH BUTTONS							
P21,P22	TB8-4,6	I12U	67	PED 2	2 PED		
P41,P42	TB8-5,6	I12L	69	PED 4	4 PED		
P61,P62	TB8-7,9	I13U	68	PED 6	6 PED		
P81,P82	TB8-8,9	I13L	70	PED 8	8 PED		

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

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.

This Electrical Detail supersedes the detail sealed on 10-13-22

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0139
DESIGNED: February 2024
SEALED: 02-27-24
REVISED: N/A

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Electrical Detail

ELECTRICAL AND PROGRAMMING DETAILS FOR:

US 401 (Louisburg Rd.)
at
SR 2036/2108 (N. New Hope Road)

Division 5 Wake County Raleigh

Prepared in 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

PLAN DATE: February 2024 | REVIEWED BY:
PREPARED BY: James Peterson | REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 036833 RYAN W. HOUGH
DocuSigned by: Ryan W. Hough 430320FAA2654C3... 02/29/2024 DATE

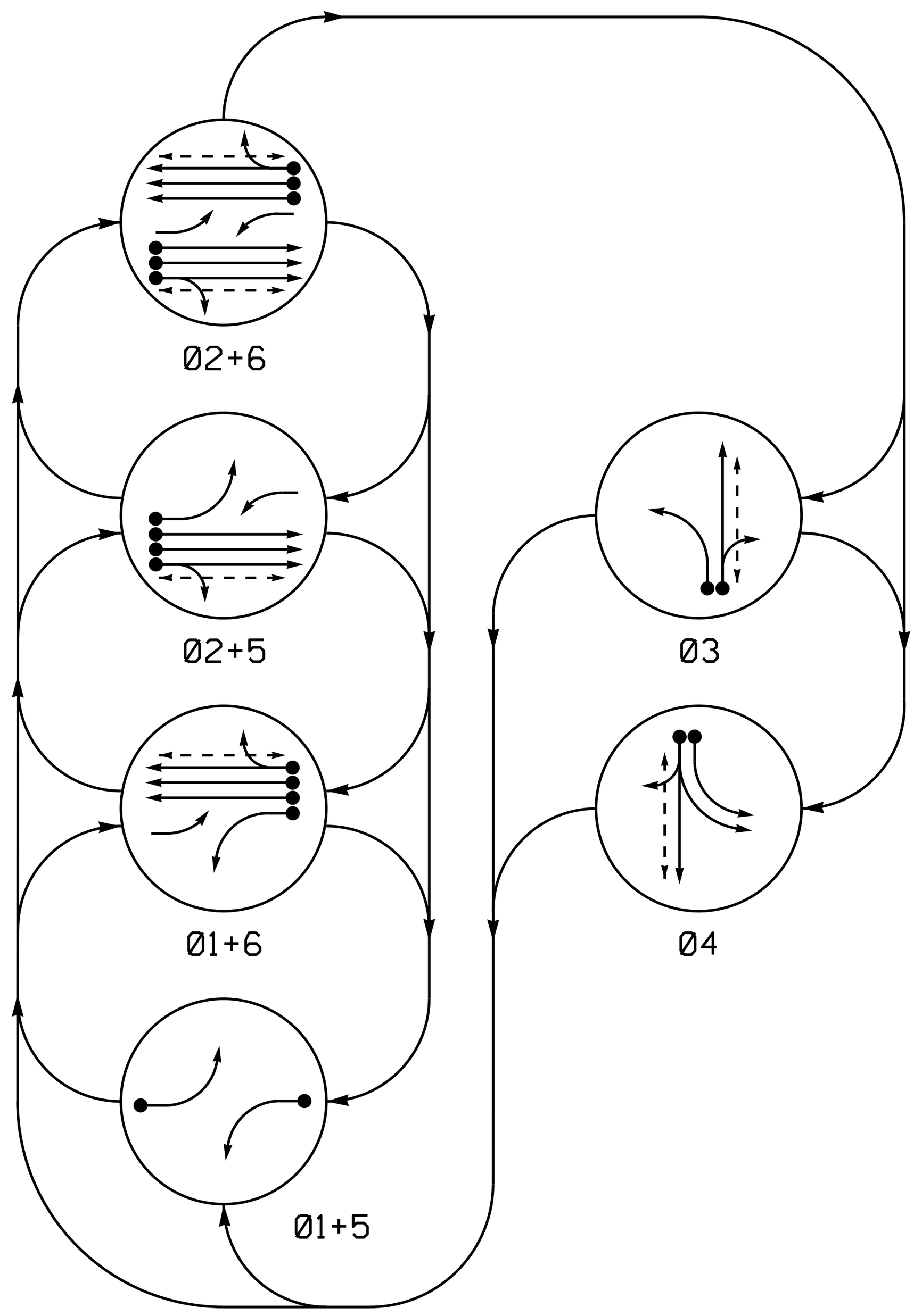
SIG. INVENTORY NO. 05-0139

28-FEB-2024 07:28
S:*ITS&SU*ITS Signals*Workgroups*Sig Man*Peterson*050139_sm_ele_20221013.dgn
JTPeterson

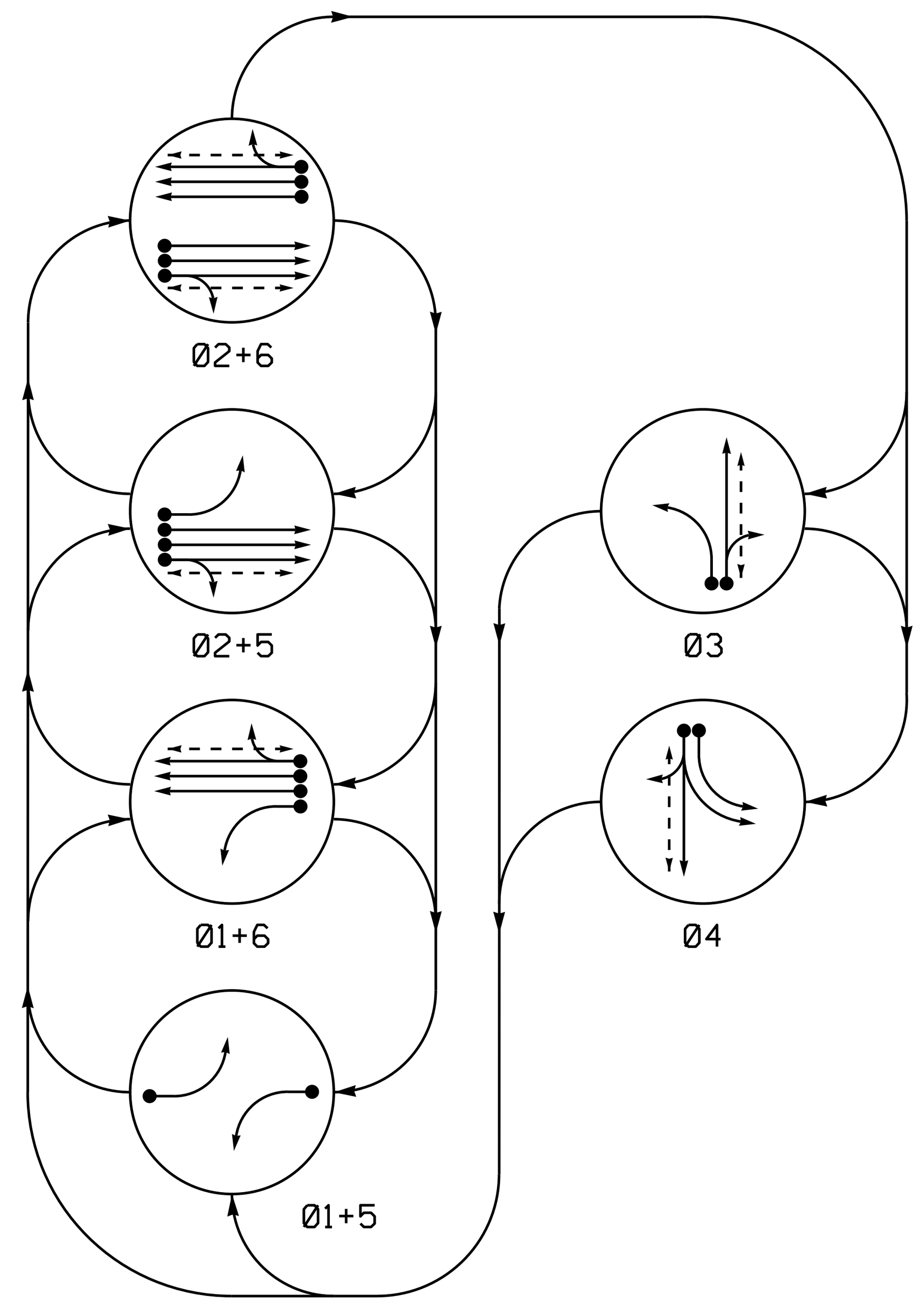
PROJECT REFERENCE NO.	SHEET NO.
HS-2005K	Sig. 2.0

6 Phase
Fully Actuated
(Raleigh Signal System)

DEFAULT PHASING DIAGRAM



ALTERNATE PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3	Ø4	FLASH
11	←	←	←FY	←FY	←R	←R	←Y
21, 22, 23	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	←	←R
42	R	R	R	R	R	←G	R
43	R	R	R	R	R	G	R
51	←	←FY	←	←FY	←R	←R	←Y
61, 62, 63	R	G	R	G	R	R	Y
P21, P22	DW	DW	W	W	DW	DW	DRK
P31, P32	DW	DW	DW	DW	W	DW	DRK
P41, P42	DW	DW	DW	DW	DW	W	DRK
P61, P62	DW	W	DW	W	DW	DW	DRK

ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3	Ø4	FLASH
11	←	←	←R	←R	←R	←R	←Y
21, 22, 23	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	←	←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, 63	R	G	R	G	R	R	Y
P21, P22	DW	DW	W	W	DW	DW	DRK
P31, P32	DW	DW	DW	DW	W	DW	DRK
P41, P42	DW	DW	DW	DW	DW	W	DRK
P61, P62	DW	W	DW	W	DW	DW	DRK

NOTES

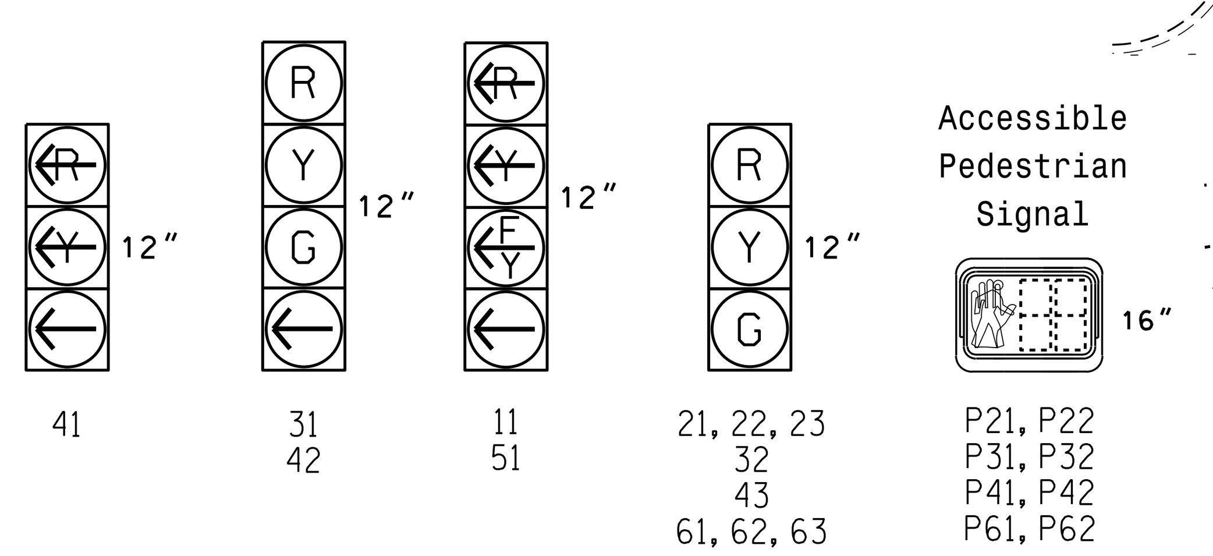
1. Refer to "Roadway Standard Drawings NCDOT" dated January 2024 and "Standard Specifications for Roads and Structures" dated January 2024.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 and/or phase 5 may be lagged.
4. The order of phase 3 and phase 4 may be reversed.
5. Reposition existing signal heads numbered 21, 22, 61, and 62.
6. Set all detector units to presence mode.
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. This intersection features accessible pedestrian signals utilizing percussive tone walk indications and/or speech messages.
11. Install backplates for signal heads numbered 11 and 63.
12. Pavement markings are existing unless otherwise noted.
13. Restripe existing crosswalks for high visibility markings.
14. The Division (City) Traffic Engineer will determine the hours of use for each phasing plan.
15. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
16. Run separate lead-in to loops 2A, 2B, 2C, 6A, 6B, and 6C.

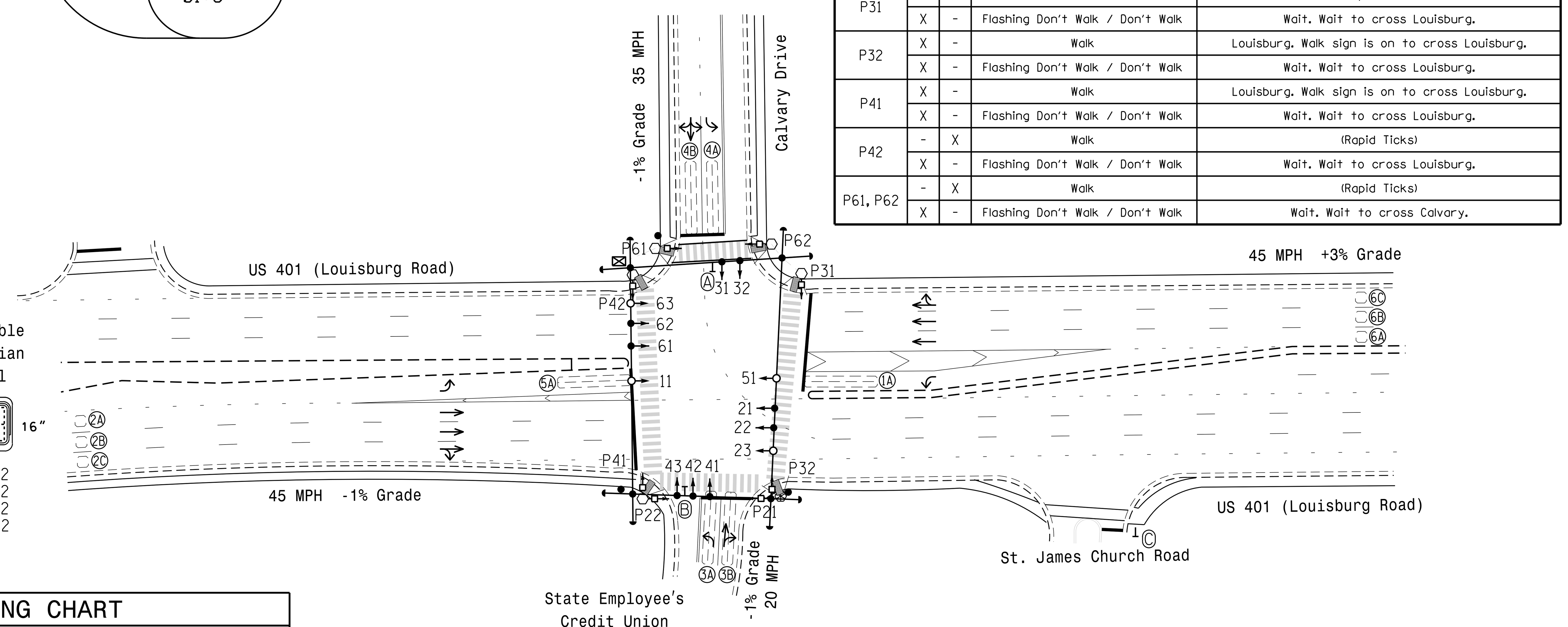
ACCESSIBLE PEDESTRIAN SIGNAL OPERATION

SIGNAL FACE	VOICE	TONES	INTERVAL	SPEECH MESSAGE
P21, P22	X	-	Walk	Credit Union. Walk sign is on to cross Credit Union.
	X	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Credit Union.
P31	-	X	Walk	(Rapid Ticks)
	X	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Louisburg.
P32	X	-	Walk	Louisburg. Walk sign is on to cross Louisburg.
	X	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Louisburg.
P41	X	-	Walk	Louisburg. Walk sign is on to cross Louisburg.
	X	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Louisburg.
P42	-	X	Walk	(Rapid Ticks)
	X	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Louisburg.
P61, P62	-	X	Walk	(Rapid Ticks)
	X	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Calvary.

SIGNAL FACE I.D.

All Heads L.E.D.





SE-PAC 2070 TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6
Min Green *	7	12	7	7	7	12
Passage Gap *	2.0	6.0	2.0	2.0	2.0	6.0
Maximum Green *	15	90	20	40	20	90
Yellow Change	3.0	4.6	3.0	3.9	3.0	4.6
Red Clear	2.8	2.5	3.9	2.7	3.1	2.5
Advance Walk *	-	7	4	6	-	4
Walk *	-	7	7	7	-	7
Pedestrian Clear	-	15	29	28	-	9
Added Initial *	-	2.0	-	-	-	2.0
Maximum Initial *	-	34	-	-	-	34
Time Before Reduction *	-	15	-	-	-	15
Time To Reduce *	-	20	-	-	-	20
Minimum Gap	-	3.2	-	-	-	3.2
Recall Mode	-	MIN RECALL	-	-	-	MIN RECALL
Vehicle Call Memory	NON-LOCK	LOCK	NON-LOCK	NON-LOCK	NON-LOCK	LOCK
Dual Entry	-	-	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON	ON	ON

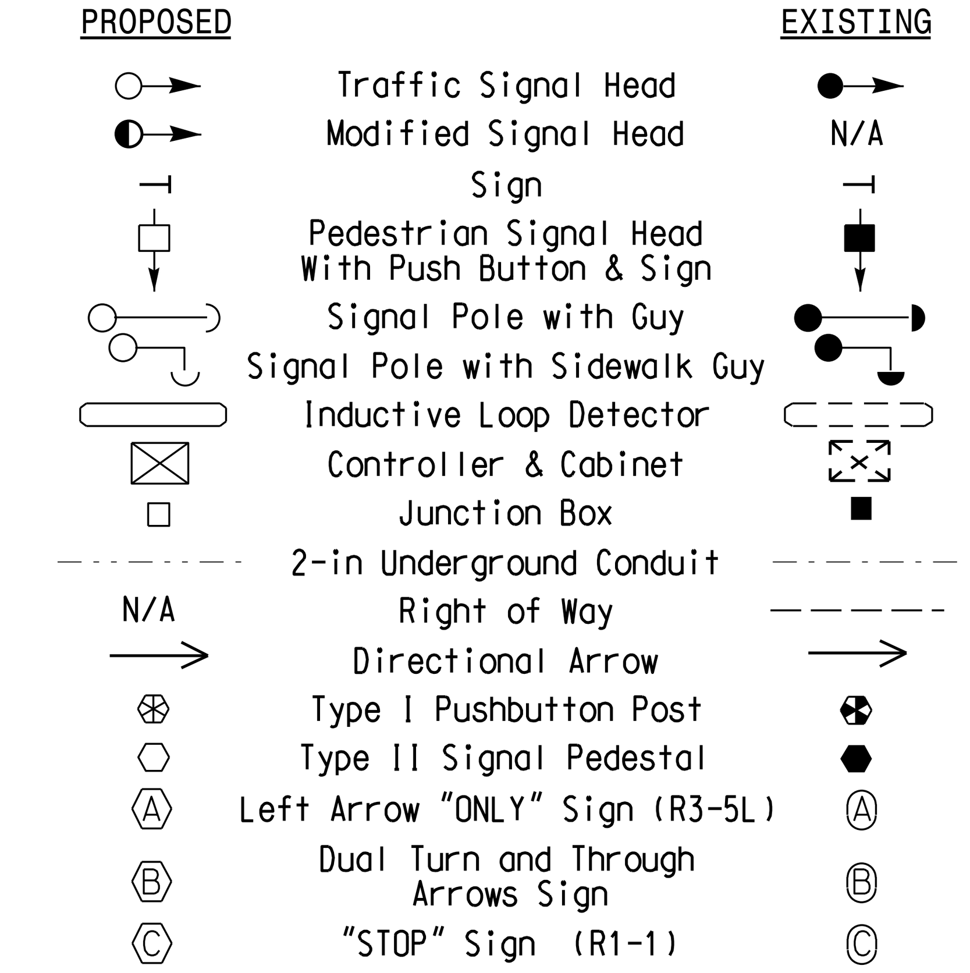
* These values may be field adjusted. Do not adjust Min Green and Extension times for phases 2 and 6 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.

SE-PAC 2070 LOOP & DETECTOR UNIT INSTALLATION CHART

LOOP NO.	SIZE (ft)	TURNS	DIST. FROM STOPBAR (ft)	NEW	EXISTING	ASSIGNED PHASE	DELAY	EXTEND (STRETCH)	0 VEHICLE	1 PEDESTRIAN	2 1 CALL	3 STOP A	4 STOP B	5 PROT/PER LEFT	6 PROT/PER THROUGH	7 AND	SWITCH	SYSTEM LOOPS	STATUS NEW	STATUS EXISTING
1A	6X40	2-4-2	0	-	X	1	5 SEC.	- SEC.	X	-	-	-	-	-	-	-	-	-	X	-
2A	6X6	EXIST	300	-	X	2	- SEC.	- SEC.	X	-	-	-	-	-	-	-	-	-	X	-
2B	6X6	EXIST	300	-	X	2	- SEC.	- SEC.	X	-	-	-	-	-	-	-	-	-	X	-
2C	6X6	EXIST	300	-	X	2	- SEC.	- SEC.	X	-	-	-	-	-	-	-	-	-	X	-
3A	6X40	2-4-2	0	-	X	3	3 SEC.	- SEC.	X	-	-	-	-	-	-	-	-	-	X	-
3B	6X40	2-4-2	0	-	X	3	10 SEC.	- SEC.	X	-	-	-	-	-	-	-	-	-	X	-
4A	6X40	2-4-2	0	-	X	4	3 SEC.	- SEC.	X	-	-	-	-	-	-	-	-	-	X	-
4B	6X40	2-4-2	0	-	X	4	10 SEC.	- SEC.	X	-	-	-	-	-	-	-	-	-	X	-
5A	6X40	2-4-2	0	-	X	5	5 SEC.	- SEC.	X	-	-	-	-	-	-	-	-	-	X	-
6A	6X6	EXIST	300	-	X	6	- SEC.	- SEC.	X	-	-	-	-	-	-	-	-	-	X	-
6B	6X6	EXIST	300	-	X	6	- SEC.	- SEC.	X	-	-	-	-	-	-	-	-	-	X	-
6C	6X6	EXIST	300	-	X	6	- SEC.	- SEC.	X	-	-	-	-	-	-	-	-	-	X	-

This plan supersedes the plan signed and sealed on 10/7/22.

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	
	Type I Pushbutton Post	
	Type II Signal Pedestal	
Ⓐ	Left Arrow "ONLY" Sign (R3-5L)	Ⓐ
Ⓑ	Dual Turn and Through Arrows Sign	Ⓑ
Ⓒ	"STOP" Sign (R1-1)	Ⓒ

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Signal Upgrade

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

US 401 (Louisburg Road)
at
Calvary Drive and
State Employee's Credit Union

Division 5 Wake County Raleigh

PLAN DATE: February 2024 REVIEWED BY:
PREPARED BY: J.A. Lohr REVIEWED BY:

SCALE 0 50 1"=50'

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 026486 ROBERT J. ZIEMBA
DocuSigned by: 1B9B4B66274A494
02/27/2024 DATE

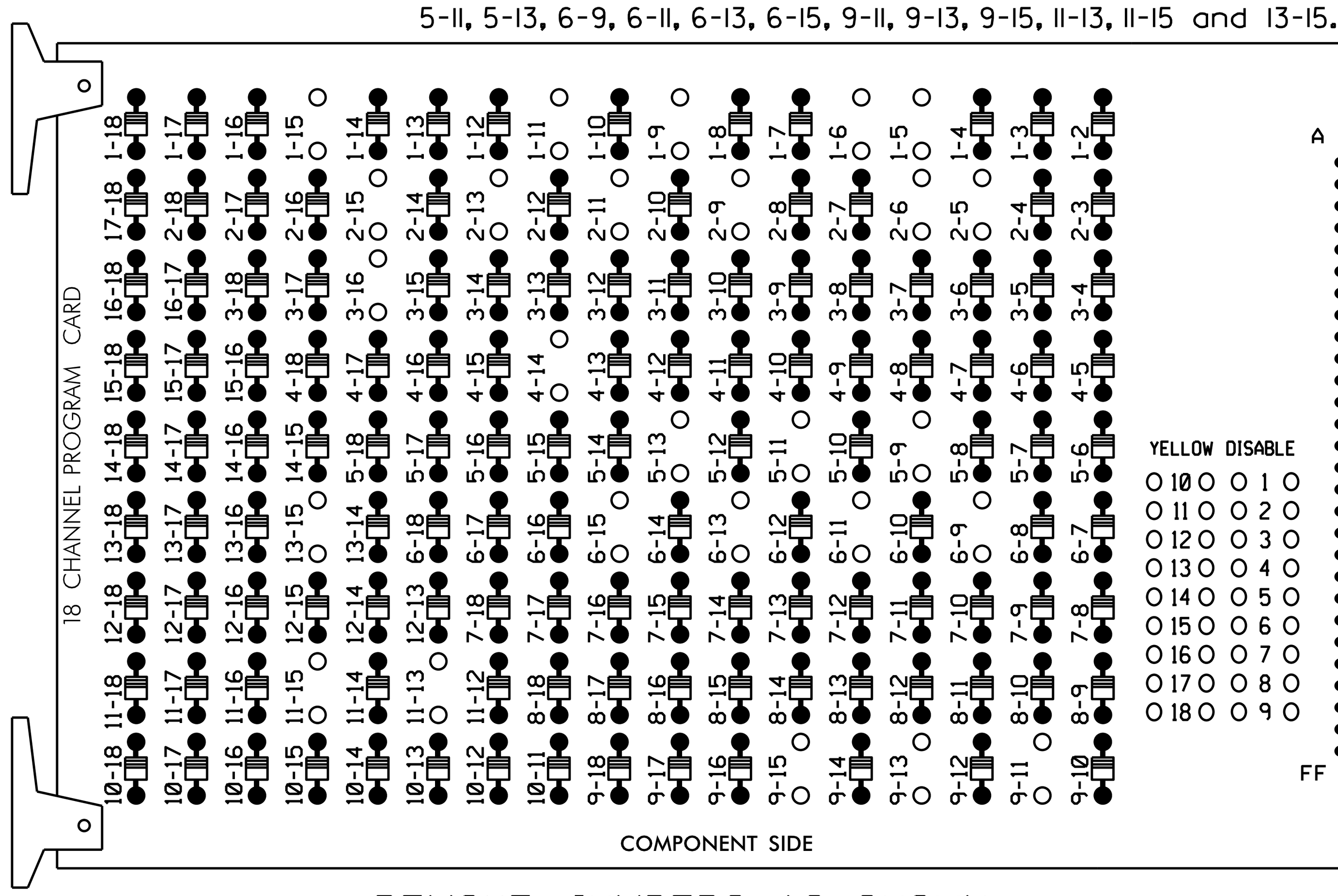
SIG. INVENTORY NO. 05-1902

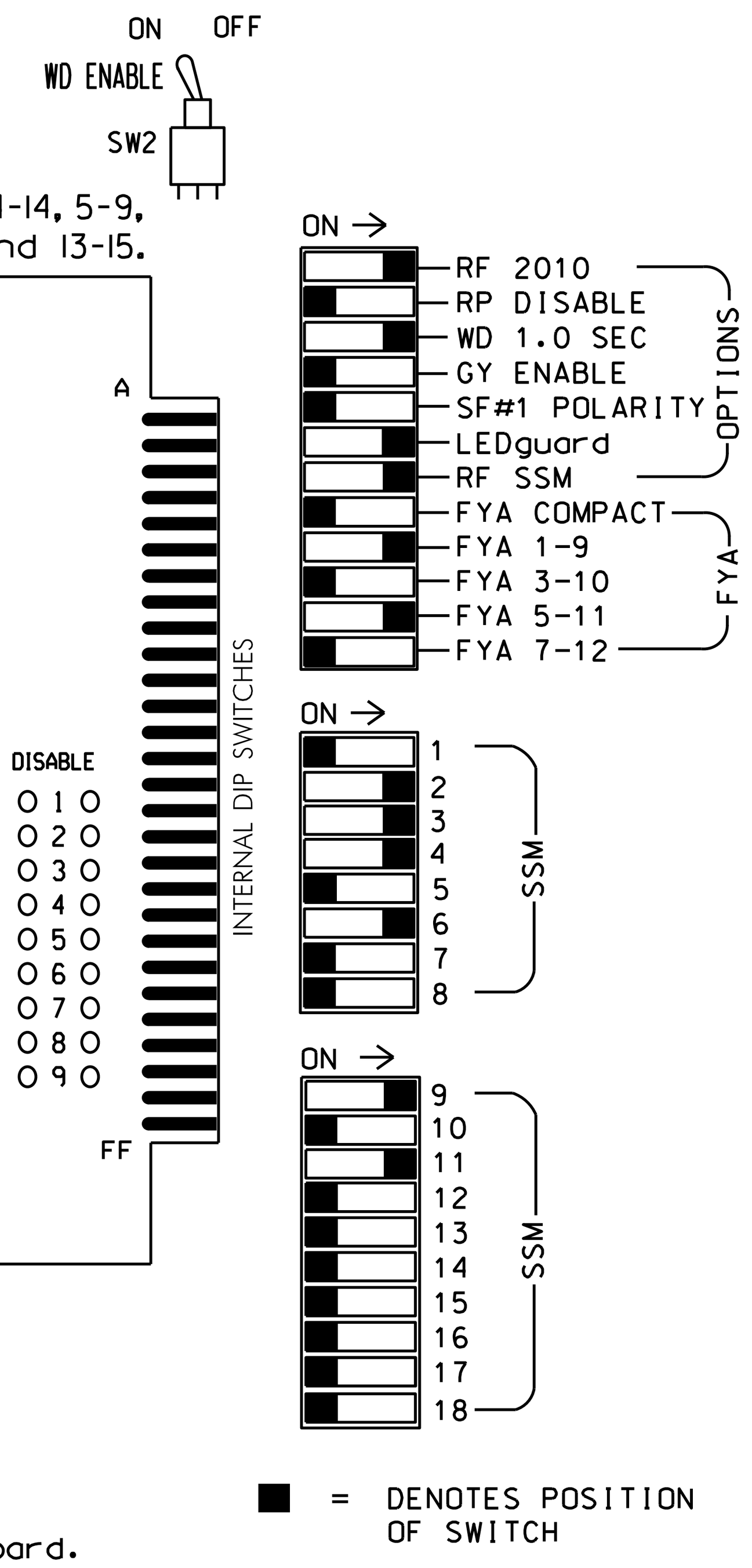
27-FEB-2024 14:17
**Dot*dfsroot01*Groups-TECC*ITS&SU*ITS Signals*Signal Design Section*Central Region*Div 5*HS-2005K*051902_sig_dsn_2024mmdd.dgn
JALohr

18 CHANNEL 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, 3-16, 4-14, 5-9, 5-11, 5-13, 6-9, 6-11, 6-13, 6-15, 9-11, 9-13, 9-15, 11-13, 11-15 and 13-15.





REMOVE JUMPERS AS SHOWN

NOTES:

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

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Program controller to start up in phases 2 and 6 green.
3. Enable simultaneous gap-out feature for all phases.
4. The cabinet and controller are part of the Raleigh Signal System.

EQUIPMENT INFORMATION

CONTROLLER..............2070
CABINET.................332 W/ AUX
SOFTWARE................SE-PAC2070
CABINET MOUNT...........BASE
OUTPUT FILE POSITIONS...18 WITH AUX FILE
LOAD SWITCHES USED......S1,S2,S3,S4,S5,S6,S8,S12, AUX S1,AUX S2,AUX S3
PHASES USED.............1,2,2PED,3,3PED,4,4PED,6,6PED
OVERLAP A...............*
OVERLAP B...............*
OVERLAP C...............NOT USED
OVERLAP D...............NOT USED
OVERLAP E...............*
OVERLAP F...............NOT USED
OVERLAP G...............1+4

* SEE SHEET 2 FOR OVERLAP PROGRAMMING

PROJECT REFERENCE NO.	SHEET NO.
HS-2005K	Sig. 2.1

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	OLG	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	OLE	OLC	OLD	SPARE
SIGNAL HEAD NO.	11★	21.22	P21, P22	33★	41,42	P41, P42	NU	61,62	NU	NU	NU	P31, P32	11★	33★	31,32	NU	NU	NU
RED		128			101			134						A124				
YELLOW	*	129		*	102			135										
GREEN		130			103			136										
RED ARROW													A121		A111			
YELLOW ARROW													A122	A125	A112			
FLASHING YELLOW ARROW													A123	A126				
GREEN ARROW	127			118											A113			
(Don't Walk hand)			113			104						110						
(Walk pedestrian)			115			106						112						

NU = Not Used

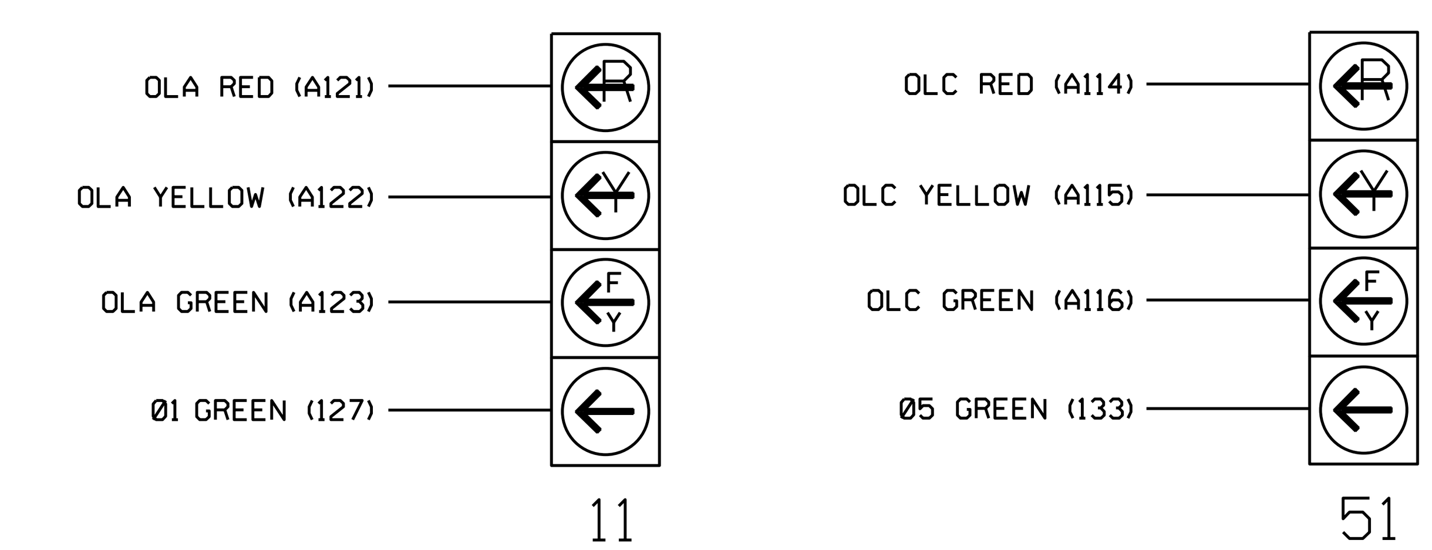
* Denotes install load resistor. See load resistor installation detail this sheet.

** See Phase 3 PED output programming deatil on sheet 2.

★ See pictorial of head wiring in detail this sheet.

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



NOTE: See sheet 2 for Protected & Permitted Phases programming.

INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	Ø 1 1A	Ø 2 2A	Ø 2 2C	SLOT EMPTY	Ø 3 3A	Ø 3 3B	Ø 4 4A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	Ø2 PED DC ISOLATOR	Ø6 PED DC ISOLATOR	FS DC ISOLATOR
	L	NOT USED	Ø 2 2B	NOT USED		NOT USED	NOT USED	Ø 4 4B					Ø4 PED DC ISOLATOR	Ø3 PED DC ISOLATOR	ST DC ISOLATOR
FILE "J"	U	Ø 5 5A	Ø 6 6A	Ø 6 6C	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	Ø 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.	DETECTOR NO.	NEMA PHASE	DELAY TIME	EXTEND (STRETCH) TIME
1A	TB2-1,2	I1U	56	1	1	5	
2A	TB2-5,6	I2U	39	3	2		
2B	TB2-7,8	I2L	43	4	2		
1B	TB2-9,10	I3U	63	5	2		
3A	TB4-5,6	I5U	58	9	3	3	
3B	TB4-9,10	I6U	41	11	3	10	
6A	TB3-5,6	J2U	40	21	6		
6B	TB3-7,8	J2L	44	22	6		
PED PUSH BUTTONS							
P21,P22	TB8-4,6	I12U	67	PED 2	2 PED		
P41,P42	TB8-5,6	I12L	69	PED 4	4 PED		
P31,P32	TB8-8,9	I13L	70	PED 8	3 PED		

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

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

This Electrical Detail supersedes the detail sealed on 10-18-22

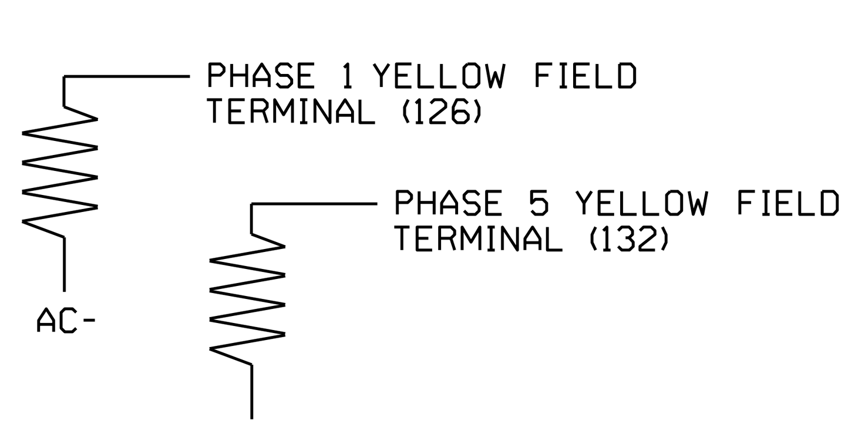
THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-1902
DESIGNED: February 2024
SEALED: 02-27-24
REVISED: N/A

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown below)

ACCEPTABLE VALUES

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



Electrical Detail - Sheet 1 of 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared in the Offices of:
750 N.Greenfield Pkwy,Garner,NC 27529

US 401 (Louisburg Road)
at
Calvary Drive and
State Employee's Credit Union

Division 5 Wake County Raleigh

PLAN DATE: February 2024 | REVIEWED BY:
PREPARED BY: James Peterson | REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 036833 ENGINEER RYAN W. HOUGH

DocuSigned by: Ryan W. Hough 02/29/2024
430320FAA2654C3...
DATE

SIG. INVENTORY NO. 05-1902

28-FEB-2024 07:24
S:*ITS&SU*ITS Signals*Workgroups*Sig Man*Peterson*051902_sm_ele_20221018.dgn
JTPeterson

OVERLAP PROGRAMMING DETAIL

1. From Main Menu select [4 - UNIT DATA]
2. From UNIT DATA Submenu select [3 - OVERLAP DATA]

Use Up/Dn/Left/Right keys to position cursor on the desired Overlap. Use the NEXT key to select the overlap type. Press the ENT key and then program as per the Overlap screen(s) shown.

```
OVERLAP DATA

   A: FYA   E: ---   I: ---   M: ---
   B: ---   F: ---   J: ---   N: ---
   C: FYA   G: ---   K: ---   O: ---
   D: ---   H: ---   L: ---   P: ---

 PREV/NEXT TO CYCLE
```

OVERLAP A

Use Up/Dn/Left/Right keys to position cursor on Overlap 'A', use the NEXT key to select 'FYA', then press ENT

```
FYA OVERLAP - A          DELAY/10:   0
       PHASES..12345678 90123456
  PERM PHASES: 01000000 00000000
  PROT PHASES: 10000000 00000000
  -PED PHASES: 00000000 00000000
     OVERLAPS..ABCDEFGH IJKLMNOP
PERM OVERLAPS: x0000000 00000000
PROT OVERLAPS: x0000000 00000000
```

NOTICE DELAY/10 = 0

Press ESC

OVERLAP C

Use Up/Dn/Left/Right keys to position cursor on Overlap 'C', use the NEXT key to select 'FYA', then press ENT

```
FYA OVERLAP - C          DELAY/10:   0
       PHASES..12345678 90123456
  PERM PHASES: 00000100 00000000
  PROT PHASES: 00001000 00000000
  -PED PHASES: 00000000 00000000
     OVERLAPS..ABCDEFGH IJKLMNOP
PERM OVERLAPS: 00x00000 00000000
PROT OVERLAPS: 00x00000 00000000
```

NOTICE DELAY/10 = 0

END OVERLAP PROGRAMMING

PED DETECTOR ASSIGNMENT PROGRAMMING TO ASSIGN PHASE 3 TO PED DETECTOR 8

1. From Main Menu select [3 - PHASE DATA]
2. From PHASE DATA Submenu select [7 - DETECTOR DATA]
3. From DETECTOR DATA Submenu select [9-PED 1-8]
4. From DETECTOR CONFIG DATA Submenu select [8-PEDESTRIAN DET 8+]

ASSIGN PHASE 3
TO DETECTOR 8

```
PED DET 8      PHASE 12345678 90123456
 ASSIGNED PHASES....00100000 00000000
 SWITCH PHASES......00000000 00000000
   MODE    1    CALL   1    EXT/10    0
   VOLUME  0    PASS   0    DLY/10    0
   OCCUPY  0    ADDED  0    FAIL    255
   LOCK    0    QUEUE  0    QLIMIT    0
                                     [1]
```

PED DETECTOR PROGRAMMING COMPLETE

ACCESSIBLE PEDESTRIAN SIGNAL (APS) INSTALLATION NOTES

1. Install push buttons and APS equipment per manufacturer's instructions.
2. Provide a dedicated cable to each push button per manufacturer's instructions.
3. If APS equipment is mounted in cabinet, use filtered power (i.e., Controller Receptacle) to power APS equipment. Do not use Equipment Receptacle, which is a GFCI outlet.
4. Never attempt to operate a standard contact closure push button with the APS system unless cabinet is re-wired for standard button operation or unless explicitly allowed by the manufacturer.
5. Place manufacturer's instructions in cabinet with cabinet prints, signal plans, and electrical details.
6. An APS push button station that is designed to work without the need for interfacing with a pedestrian signal head shall be installed for applications where a push button is installed in a median without a pedestrian signal head.
7. A push button with a single tactile arrow that points in both directions of travel shall be installed if the median separates two parallel crosswalks.

LOAD SWITCH MAPPING DETAIL

(program controller as shown below)

FROM MAIN MENU PRESS 4 (UNIT DATA)

```
UNIT DATA
 1-STARTUP & MISC.   6-SEQUENCES
 2-REMOTE FLASH      7-PORT 1/ITS DATA
 3-OVERLAP DATA      8-I/O MISC
 4-PEER-TO-PEER      9-OUTPUT MAPPING
 5-RING STRUCTURE    B-BANK SELECTION
                     C-COPY BANK
'+' DENOTES BANKABLE UNIT DATA       [1]
```

SELECT 9 - OUTPUT MAPPING

```
OUTPUT MAPPING               EDIT MODE: LDSW
                              E-TOGGLE MODE
LDSW ..7.. ..8.. ..9.. .10.. .11.. .12..
RED  PH5   PH6   PD6   PH7   PH8   PD3
YEL   -     -     -     -     -     -
GRN   -     -     -     -     -     -
FIO   7     8     9    10    11    12
PREV/NEXT TO CYCLE       D-DISPLAY COMPAT
```

USE ENTER AND NEXT KEYS TO MAP 'LDSW 12' AS 'PD3'

LOAD SWITCH MAPPING COMPLETE

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 supersedes the detail sealed on 10-18-22

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1902
DESIGNED: February 2024
SEALED: 02-27-24
REVISED: N/A

Electrical Detail - Sheet 2 of 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

US 401 (Louisburg Road)
at
Calvary Drive and
State Employee's Credit Union

Division 5 Wake County Raleigh

Prepared in 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

PLAN DATE: February 2024	REVIEWED BY:
PREPARED BY: James Peterson	REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 036833 RYAN W. HOUGH

DocuSigned by: Ryan W. Hough 02/29/2024
430320EAA2654C3
DATE

SIG. INVENTORY NO. 05-1902

28-FEB-2024 07:25
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JTPeterson

PROGRAMMING DETAILS TO CALL ALTERNATE PHASING

To run the Alternate phasing, schedule a Day Plan that calls an Action that is programmed to enable Phase Function 1.

Actions can be programmed to run free run or call a coordination pattern.

PHASE FUNCTION MAPPING PROGRAMMING DETAIL

Step 1 - Assign OMIT OVERLAPS A & C to Phase Function 1.

1. From Main Menu select [6 - TIME BASE DATA]
2. From TIME BASE DATA Submenu select [9 - PHS FUNC MAPPING]

Use Up/Dn Keys to position cursor on NUM 1

```
TIME BASE PHS FUNC MAPING
                PHS FUNC SEL(0-OFF/1-ON)
NUM..P-FUNCT NAME.....123456789 0123456
  1  PHS-01 MAX # 2   000000000 0000000
  2  PHS-02 MAX # 2   000000000 0000000
  3  PHS-03 MAX # 2   000000000 0000000
  4  PHS-04 MAX # 2   000000000 0000000
UP/DOWN TO SCROLL               E-EDIT
```

BEFORE PROCEEDING, SCROLL THRU ENTIRE RANGE OF FUNCTIONS TO ENSURE ALL P-FUNCT 1 NUM x VALUES ARE SET TO '0' (OFF)

Use Up/Dn/Left/Right keys to position cursor on NUM 145 and program P-FUNCT 1 as shown.

```
TIME BASE PHS FUNC MAPING
                PHS FUNC SEL(0-OFF/1-ON)
NUM..P-FUNCT NAME.....123456789 0123456
145  OVERLAP A OMIT   100000000 0000000
146  OVERLAP B OMIT   000000000 0000000
147  OVERLAP C OMIT   100000000 0000000
148  OVERLAP D OMIT   000000000 0000000
UP/DOWN TO SCROLL               E-EDIT
```

SET P-FUNCT 1 VALUE TO '1' (ON) AS SHOWN

← FOR OVERLAP A OMIT

← FOR OVERLAP C OMIT

PHASE FUNCTION PROGRAMMING COMPLETE

TIME BASE ACTIONS PROGRAMMING

Step 2 - Set up an Action to run Phase Function 1.

1. From Main Menu select [6 - TIME BASE DATA]
2. From TIME BASE DATA Submenu select [5 - ACTIONS]

```
TIME BASE ACTION # ***
                      12345678 90123456
  PATN:001      PHS:  10000000 00000000
   0=I'CONN     AUX:  000-----
  1-253=PATN    SPC:  0000000-      0=NO
  254=FREE      DIM:  0-------      1=YES
  255=FLASH     DET:  000-----
UP/DOWN TO SCROLL
```

← NOTICE PHS 1

SPECIAL FUNCTION PROGRAMMING COMPLETE

*** Action #(s) are to be determined by the Division and/or City Traffic Engineer and are scheduled to run in Day Plan(s).

This Electrical Detail supersedes the detail sealed on 10-18-22

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1902
DESIGNED: February 2024
SEALED: 02-27-24
REVISED: N/A

Electrical Detail - Sheet 3 of 3

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared in 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 (Louisburg Road)
at
Calvary Drive and
State Employee's Credit Union

Division 5 | Wake County | Raleigh

PLAN DATE: February 2024 | REVIEWED BY:
PREPARED BY: James Peterson | REVIEWED BY:

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 036833 ENGINEER RYAN W. HOUGH

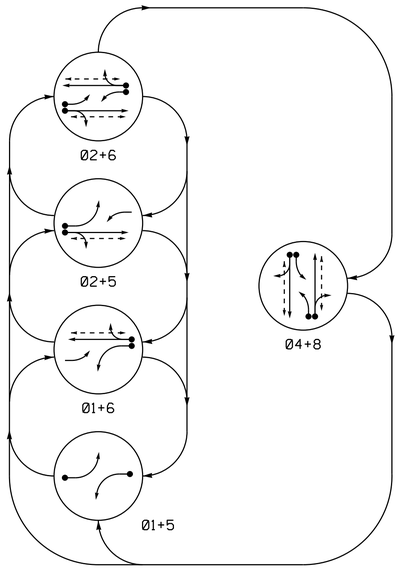
DocuSigned by: Ryan W. Hough 02/29/2024
430320FAA2654C3...
DATE

SIG. INVENTORY NO. 05-1902

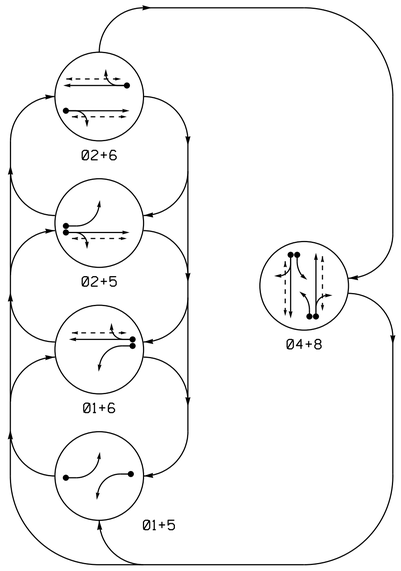
28-FEB-2024 07:26
S:*ITS&SU*ITS Signals*Workgroups*Sig Man*Peterson*051902_sm_ele_20221018.dgn
JTPeterson

PROJECT REFERENCE NO.	SHEET NO.
HS-2005Q	Sig 1

DEFAULT PHASING DIAGRAM



ALTERNATE PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE 01+05	01+06	02+05	02+06	04+08	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+05	01+06	02+05	02+06	04+08	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

MAXTIME DETECTOR INSTALLATION CHART

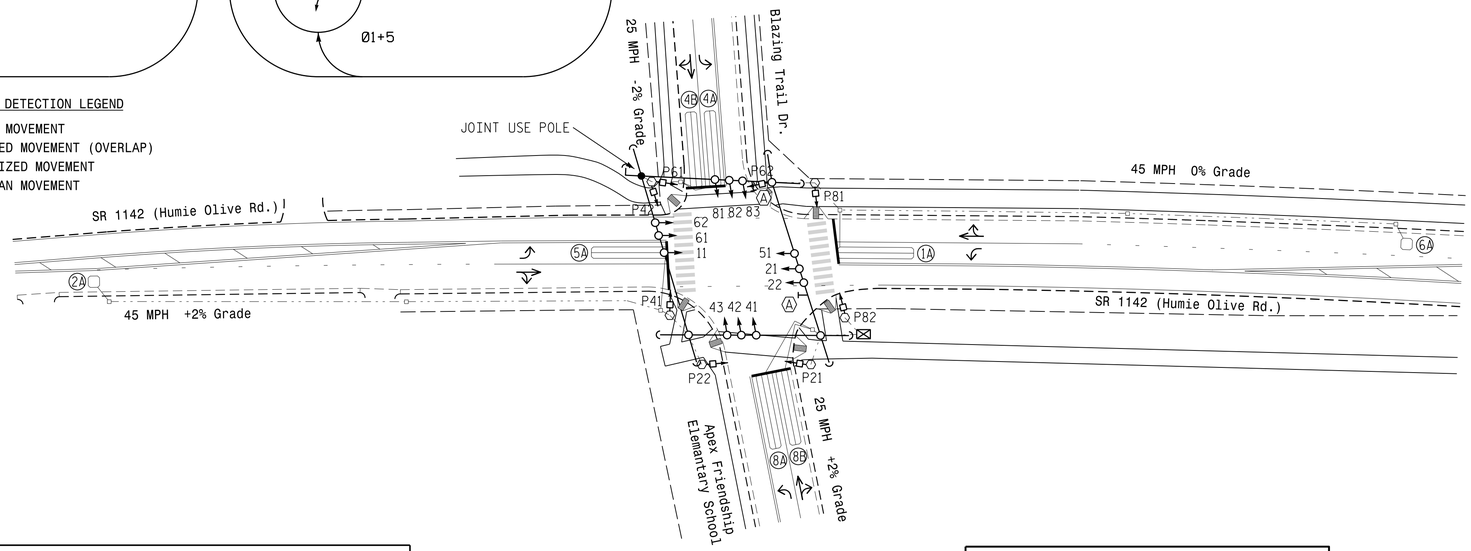
DETECTOR LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
1A	6X40	0	2-4-2	X	1	15 *	-	X	-	X	-	X
					6 #	3	-	X	-	X	X	X
2A	6X6	300	5	X	2	-	-	X	X	X	-	X
4A	6X40	0	2-4-2	X	4	3	-	X	-	X	-	X
4B	6X40	0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

* Reduce Delay to 3 seconds during Alternate Phasing Operation.
\# Disable call for loop during Alternate Phasing Operation.

5 Phase
Fully Actuated
(Isolated)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2024 and "Standard Specifications for Roads and Structures" dated January 2024.
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 unless otherwise shown.
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.



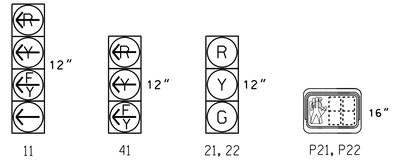
MAXTIME TIMING CHART

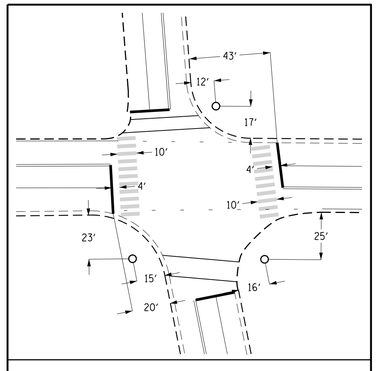
FEATURE	PHASE 1	2	4	5	6	8
Walk *	–	12	12	–	11	11
Ped Clear	–	7	11	–	7	10
Min Green	7	12	7	7	12	7
Passage *	2.0	6.0	2.0	2.0	6.0	2.0
Max 1 *	30	60	30	20	60	30
Yellow Change	3.0	4.5	3.3	3.0	4.5	3.3
Red Clear	2.4	1.3	2.8	1.6	1.3	2.8
Added Initial *	–	2.5	–	–	2.5	–
Maximum Initial *	–	34	–	–	34	–
Time Before Reduction *	–	15	–	–	15	–
Time To Reduce *	–	30	–	–	30	–
Minimum Gap	–	3.0	–	–	3.0	–
Advance Walk	–	5	5	–	4	4
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.





PROPOSED POLE, STOP LINE, AND CROSSWALK LOCATIONS

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	→
⬡	Type II Signal Pedestal	⬢
Ⓐ	"TURNING TRAFFIC MUST YIELD TO PEDESTRIANS" Sign (R10-15)	Ⓐ

New Installation

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

SR 1142 (Humie Olive Road) at Blazing Trail Drive and Apex Friendship Elementary School

Division 5 Wake County Apex

PLAN DATE: March 2023 REVIEWED BY:
PREPARED BY: J.A. Lohr REVIEWED BY:

SCALE 0 40 1"=40'

REVISIONS	INIT.	DATE

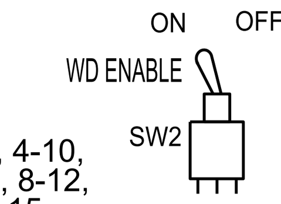
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 026486 ENGINEER ROBERT J. ZIEMBA
DocuSigned by: Robert J Ziemba 04/13/2023
DATE

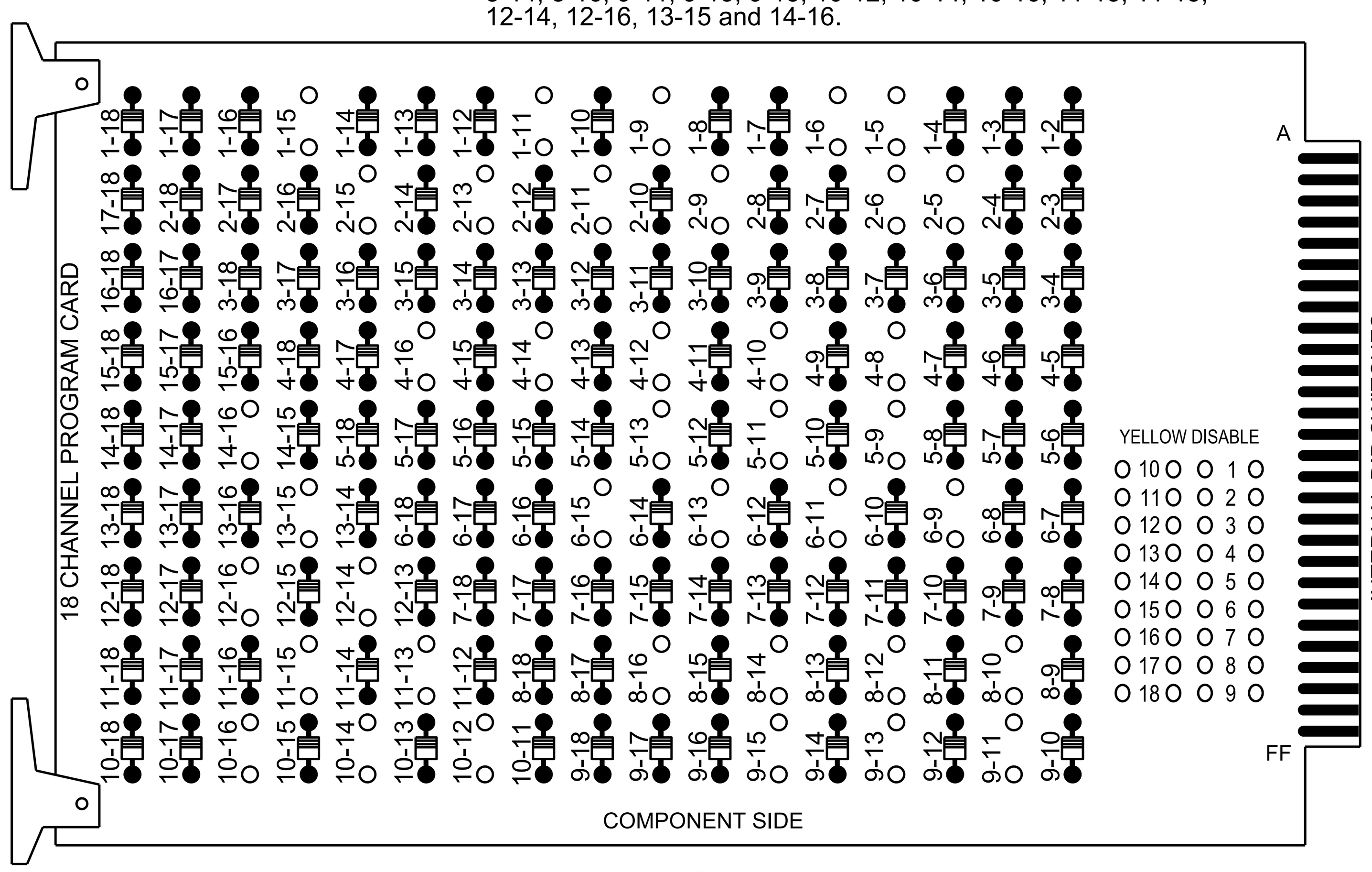
SIG. INVENTORY NO. 05-1319

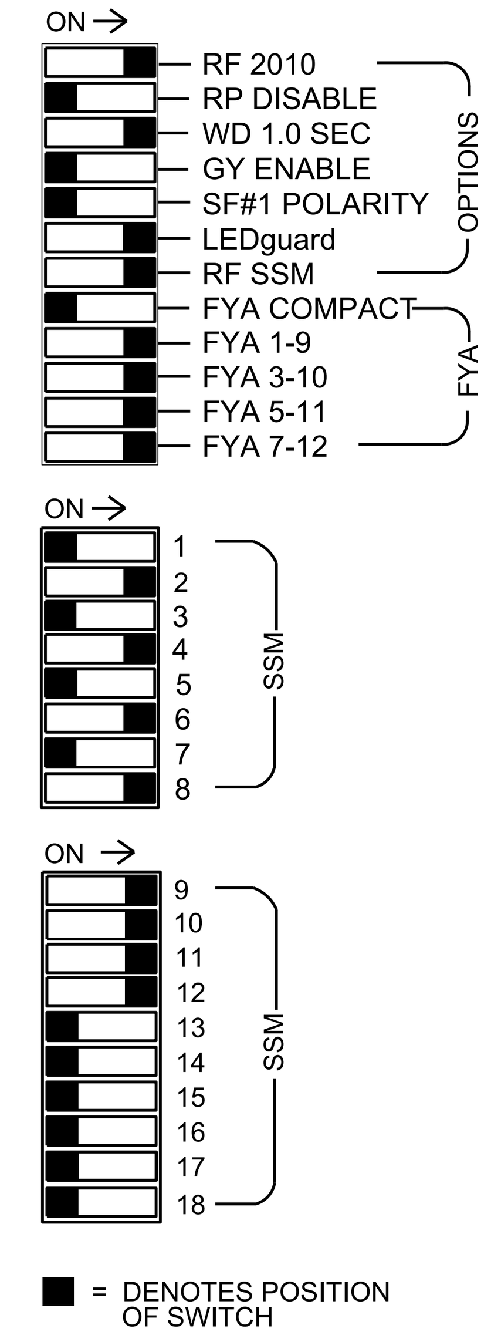
18 CHANNEL CONFLICT MONITOR PROGRAMMING DETAIL

(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.







REMOVE JUMPERS AS SHOWN

NOTES:

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

NOTES

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

EQUIPMENT INFORMATION

Controller..2070LX
Cabinet..332 w/ Aux
Software..Q-Free MAXTIME
Cabinet Mount....................................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"..*
Overlpa "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											
(hand)			113			104			119			110						
(walk)			115			106			121			112						

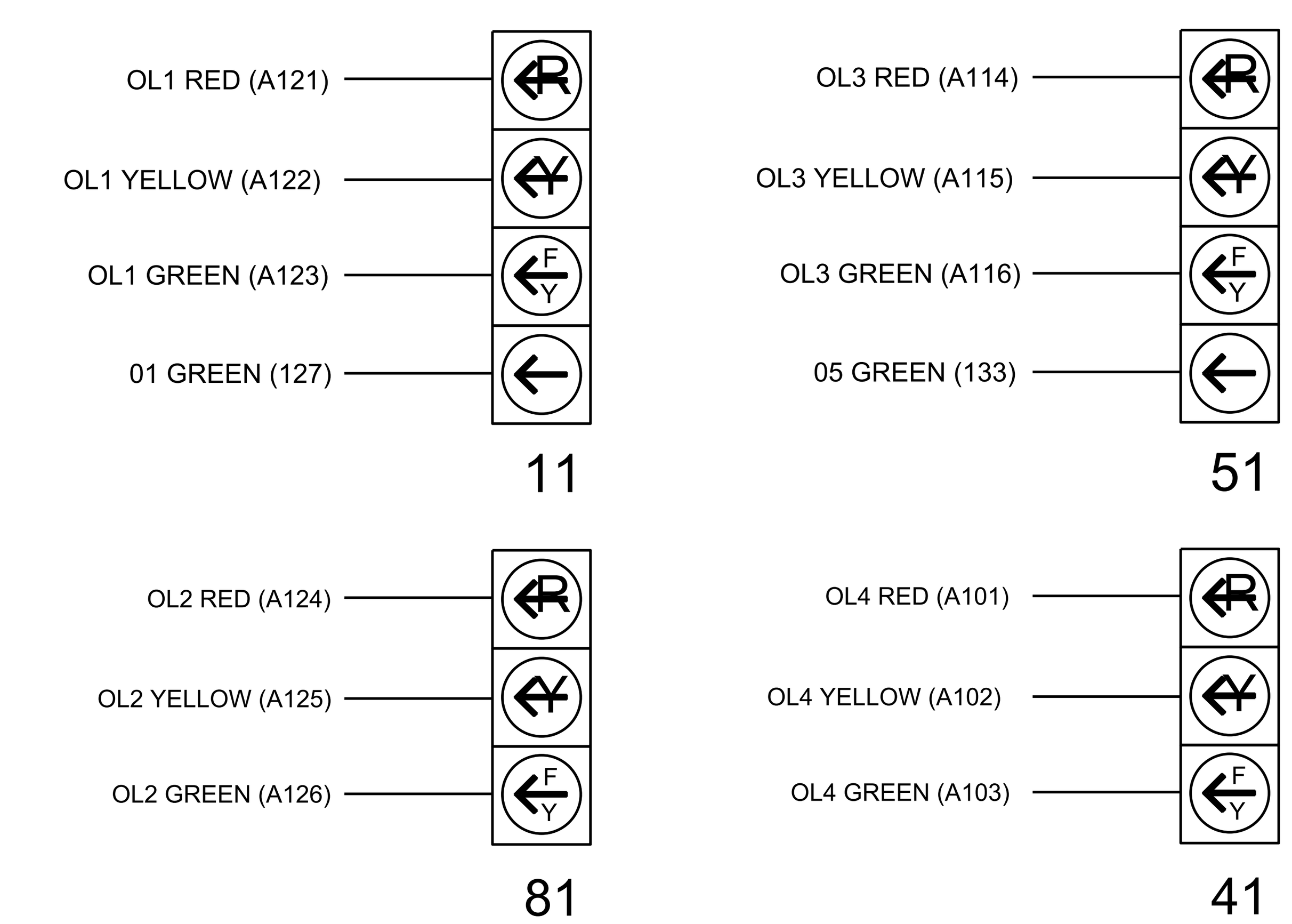
*Denotes install load resistor. See load resistor installation detail this sheet.
★See pictorial of head wiring in detail this sheet.
NU = Not Used

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.

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



INPUT FILE POSITION LAYOUT

(front view)

FILE		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	Ø 1 1A	Ø 2 2A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	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
	L	NOT USED	NOT USED				Ø 4 4B						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	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
2A	TB2-5,6	I2U	39	1	2	2			X	X	X	
4A	TB4-9,10	I6U	41	3	8	4	3		X		X	
4B	TB4-11,12	I6L	45	7	9	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	
8A	TB5-9,10	J6U	42	4	22	8	3		X		X	
8B	TB5-11,12	J6L	46	8	23	8	10		X		X	

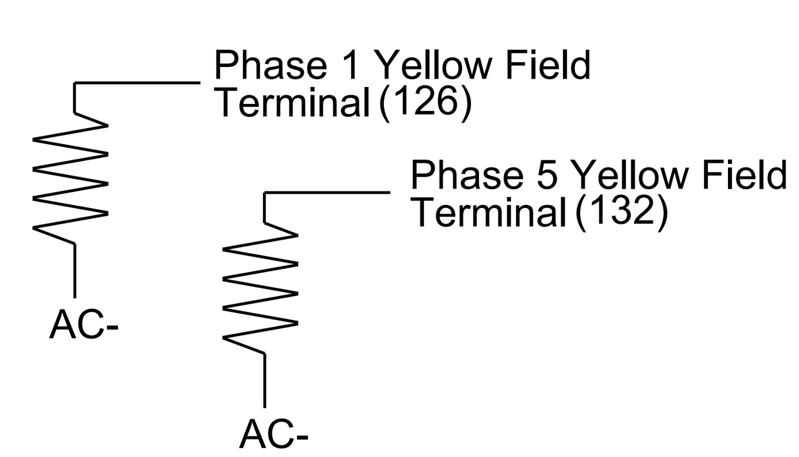
★For the detectors to work as shown on the signal plan see the Detector Programming Detail for Alternate Phasing on sheet 2 of this plan.

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)



FLASHER CIRCUIT MODIFICATION DETAIL

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

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

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1319
DESIGNED: March 2023
SEALED: 4/13/23
REVISED:

Electrical Detail - Sheet 1 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Electrical and Programming Details For:

SR 1142 (Humie Olive Road)
at
Blazing trail Drive and
Apex Friendship Elementary School

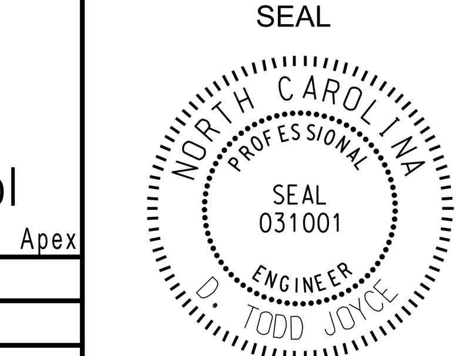
Division 5 Wake County Apex

Prepared in 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

PLAN DATE: April 2023	REVIEWED BY: DTJ
PREPARED BY: D.J. Craddock	REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL



DocuSigned by: D. Todd Joyce 04/13/2023
A90CADEDBD4241D
DATE

SIG. INVENTORY NO. 05-1319

13-APR-2023 11:27
S:*ITS&SU*ITS Signals*Workgroups*Sig Man*Projects From Signal Design*Active Projects*Craddock*2_Pending*05-1319__410000070243*051319_sm_ele_202304dd.dgn
djcraddock1

PROJECT REFERENCE NO.	SHEET NO.
HS-2005Q	Sig. 1.2

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 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.

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.

Plan 2

1A

Detector	Call Phase	Delay
1	1	3
29	0	-

5A

Detector	Call Phase	Delay
15	5	3
31	0	-

MAXTIME OVERLAP PROGRAMMING DETAIL FOR DEFAULT PHASING

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

Overlap Plan 1

Overlap	1	2	3	4
Type	FYA 4 - Section	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 PHASES

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1319
DESIGNED: March 2023
SEALED: 4/13/23
REVISED:

Electrical Detail - Sheet 2 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Electrical and Programming Details For:

SR 1142 (Humie Olive Road)
at
Blazing trail Drive and
Apex Friendship Elementary School

Division 5 Wake County Apex

PLAN DATE: April 2023 REVIEWED BY: DTJ
PREPARED BY: D.J. Craddock REVIEWED BY:

REVISIONS	INIT.	DATE

Prepared in 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

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 031001 ENGINEER D. TODD JOYCE

DocuSigned by: D. Todd Joyce 04/13/2023
A90CADFDBD4241D...
DATE

SIG. INVENTORY NO. 05-1319