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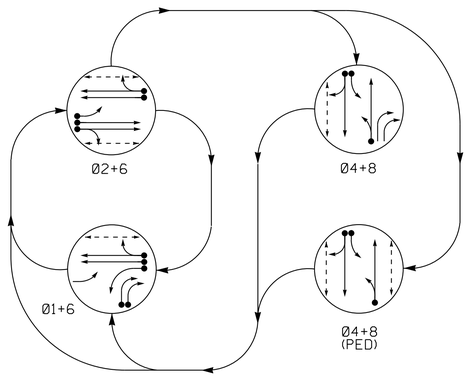
PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG.304.0

3 PHASE FULLY ACTUATED (DURHAM SIGNAL SYSTEM)

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

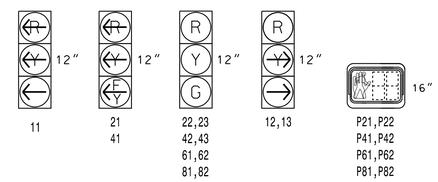
TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+6	Ø2+6	Ø4+8	PED	FLASH
11	←	~~R~~	~~R~~	~~R~~	~~R~~
12, 13	→	R	→	R	R
21	~~F Y~~	~~F Y~~	~~R~~	~~R~~	~~Y~~
22, 23	R	G	R	R	Y
41	~~R~~	~~R~~	~~F Y~~	~~F Y~~	~~R~~
42, 43	R	R	G	G	R
61, 62	G	G	R	R	Y
81, 82	R	R	G	G	R
P21, P22	DW	W	DW	DW	DRK
P41, P42	DW	DW	DW	W	DRK
P61, P62	W	W	DW	DW	DRK
P81, P82	DW	DW	DW	W	DRK
*SIGN C	OFF	OFF	OFF	ON	#

See Note 8
* See Note 11

SIGNAL FACE I.D.

All Heads L.E.D.

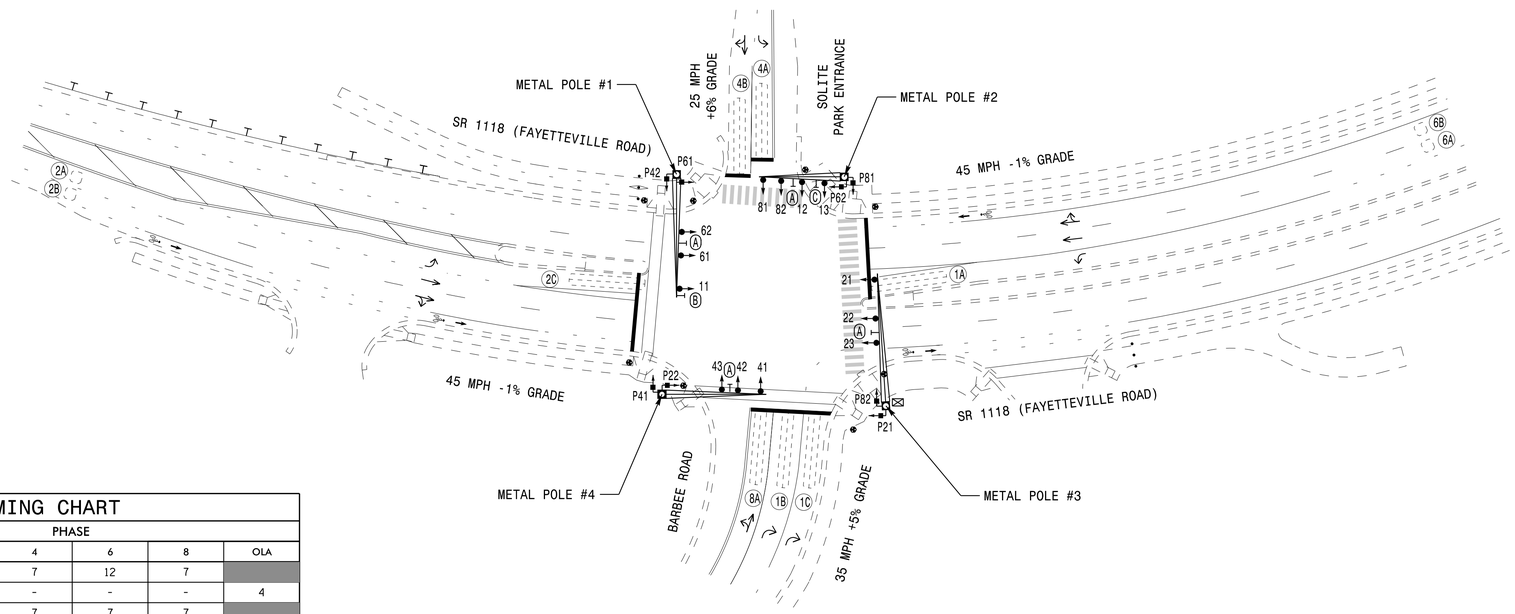


ASC/3 DETECTOR INSTALLATION CHART

DETECTOR					PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
1A	6X40	0	2-4-2	-	1	Yes	-	-	-	S	-	X
1B	6X40	0	2-4-2	-	1	Yes	-	15	-	S	-	X
1C	6X40	0	2-4-2	-	1	Yes	-	15	-	S	-	X
2A	6X6	300	EXIST	-	2	Yes	-	-	X	N	-	X
2B	6X6	300	EXIST	-	2	Yes	-	-	X	N	-	X
2C	6X40	3	2-4-2	-	2	Yes	-	3	-	G	-	X
4A	6X40	0	2-4-2	-	4	Yes	-	3	-	S	-	X
4B	6X40	0	2-4-2	-	4	Yes	-	10	-	S	-	X
6A	6X6	300	EXIST	-	6	Yes	-	-	X	N	-	X
6B	6X6	300	EXIST	-	6	Yes	-	-	X	N	-	X
8A	6X40	0	2-4-2	-	8	Yes	-	3	-	S	-	X

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. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
5. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
6. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
7. Pavement markings are existing.
8. Ensure flashing operation does not alter operation of blankout signs.
9. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
10. Loop data based on previous plan and/or field observations.
11. Install new cabinet on the existing cabinet foundation.
12. Blankout Sign C shall illuminate solid on when a Phase 8 Pedestrian is detected, and Phase 8 is next in the cycle, and shall remain on through the flashing "DON'T WALK" interval.



LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Type I Pushbutton Post	
	Metal Pole with Mastarm	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
N/A	Curb Ramp	
N/A	Guardrail	
Ⓐ	Street Sign (D3-1)	Ⓐ
Ⓑ	"U-TURN MUST YIELD TO RIGHT TURN" Sign (R10-16)	Ⓑ
Ⓒ	"NO TURN ON RED" L.E.D. Blankout Sign	Ⓒ

ASC/3 TIMING CHART

FEATURE	PHASE 1	2	4	6	8	OLA
Min Green *	7	12	7	12	7	
Guar Min OVL Green	-	-	-	-	-	4
Walk *	0	7	7	7	7	
Ped Clear	0	19	20	13	24	
Veh. Extension *	2.0	6.0	2.0	6.0	2.0	
Max 1 *	20	90	30	90	30	
Yellow	3.0	4.6	3.6	4.6	3.6	
Red Clear	3.1	1.7	3.2	1.7	3.2	
Actuations B4 Add *	-	-	-	-	-	
Seconds /Actuation *	-	1.5	-	1.5	-	
Max Initial *	-	34	-	34	-	
Time Before Reduction *	-	15	-	15	-	
Time To Reduce *	-	45	-	45	-	
Minimum Gap	-	3.0	-	3.0	-	
Locking Detector	-	X	-	X	-	
Recall Position	-	VEH. RECALL	-	VEH. RECALL	-	
Dual Entry	-	-	X	-	X	
Simultaneous Gap	X	X	X	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.

12/19/2018
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derrick.waller

Signal Upgrade

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

SR 1118 (Fayetteville Road)
at
Barbee Road/
Solite Park Entrance

Division 5 Durham County Durham

PLAN DATE:	May 2018	REVIEWED BY:	SL Phillips
PREPARED BY:	DA Waller	REVIEWED BY:	KP Baumann

REVISIONS	INIT.	DATE

SCALE 0 40 1"=40'

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACIE L. PHILLIPS
DocuSigned by: 9C87A56E0058437...
12/19/2018
SIGNATURE DATE
SIG. INVENTORY NO. 05-1976

PLANS PREPARED IN THE OFFICE OF:
Kimley»Horn
NC License #F-0102
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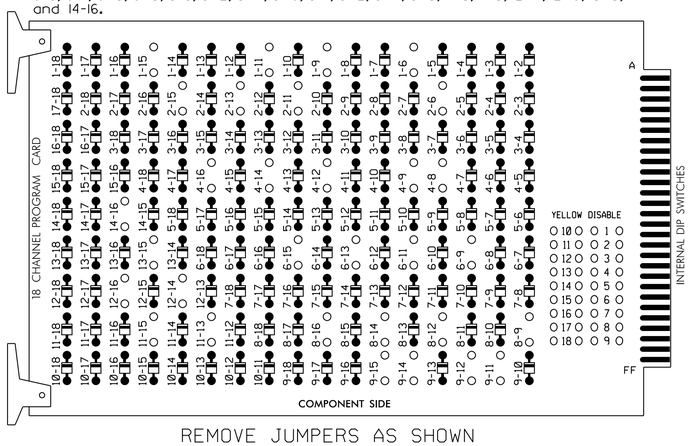
PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG.304.1

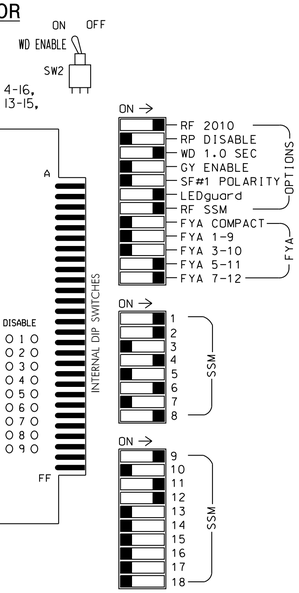
EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 1-6, 1-9, 1-11, 1-15, 2-6, 2-11, 2-13, 2-15, 4-8, 4-9, 4-12, 4-14, 4-16, 6-9, 6-11, 6-13, 6-15, 8-9, 8-12, 8-14, 8-16, 9-11, 9-12, 9-14, 9-15, 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 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 phases 4 and 8 for Dual Entry.
3. Program controller to start up in phase 2 Walk and 6 Walk.
4. The cabinet and controller are part of the Durham Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070LX
CABINET.....332 W/AUX
SOFTWARE.....ECONOLITE ASC/3-2070
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
LOAD SWITCHES USED.....S1,S2,S3,S5,S6,S8,S9,S11,S12, AUX S1,AUX S4,AUX S5
PHASES USED.....1,2,2PED,4,4PED,6,6PED,8,8PED
OVERLAP "A".....*
OVERLAP "B".....NOT USED
OVERLAP "C".....*
OVERLAP "D".....*

* 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	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	11	22,23	P21, P22	NU	42,43	P41, P42	NU	61,62	P61, P62	NU	81,82	P81, P82	12,13	NU	NU	21 ★	41 ★	NU
RED		128			101			134			107		A121					
YELLOW		129			102			135			108							
GREEN		130			103			136			109							
RED ARROW	125															A114	A101	
YELLOW ARROW	126												A122			A115	A102	
FLASHING YELLOW ARROW																A116	A103	
GREEN ARROW	127												A123					
✋			113			104			119			110						
PED YELLOW												* *						
🚶			115			106			121			112						

NU = Not Used

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

* * A blackout sign is wired to S8P-Y. See wiring and programming detail on Sheet 2 of this electrical detail.

★ See pictorial of head wiring in detail this sheet.

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	Ø2 2C	SLOT EMPTY	SLOT EMPTY	Ø4 4A	SLOT EMPTY	SLOT EMPTY	Ø1 1B	SLOT EMPTY	SLOT EMPTY	Ø2 PED DC ISOLATOR	Ø6 PED DC ISOLATOR	FS DC ISOLATOR
	L	NOT USED	Ø2 2B	NOT USED			Ø4 4B			Ø1 1C			Ø4 PED DC ISOLATOR	Ø8 PED DC ISOLATOR	ST DC ISOLATOR
FILE "J"	U	SLOT EMPTY	Ø6 6A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	Ø8 8A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L		Ø6 6B				NOT USED								

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

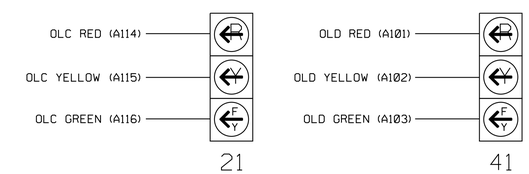
LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND TIME	DELAY TIME	ADDED INITIAL	DETECTOR TYPE
1A	TB2-1,2	I1U	56	1	1	YES				S
1B	TB6-9,10	I9U	60	11	1	YES		15		S
1C	TB6-11,12	I9L	62	13	1	YES		15		S
2A	TB2-5,6	I2U	39	2	2	YES			X	N
2B	TB2-7,8	I2L	43	12	2	YES			X	N
2C	TB2-9,10	I3U	63	32	2	YES		3		G
4A	TB4-9,10	I6U	41	4	4	YES		3		S
4B	TB4-11,12	I6L	45	14	4	YES		10		S
6A	TB3-5,6	J2U	40	6	6	YES			X	N
6B	TB3-7,8	J2L	44	16	6	YES			X	N
8A	TB5-9,10	J6U	42	8	8	YES		3		S
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

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



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: 05-1976
DESIGNED: MAY 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail - Sheet 1 of 3

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ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

SR 1118 (Fayetteville Road) at Barbee Road/ Solite Park Entrance

Division 5 Durham County Durham

PLAN DATE: May 2018	REVIEWED BY: SL Phillips
PREPARED BY: DA Waller	REVIEWED BY: KP Baumann

REVISIONS	INIT.	DATE

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DocuSigned by: 12/19/2018
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SIG. INVENTORY NO. 05-1976

PLANS PREPARED IN THE OFFICE OF:
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PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG.304.2

ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select [2. CONTROLLER]
2. From CONTROLLER Submenu select [2. VEHICLE OVERLAPS]

OVERLAP A

Select TMG VEH OVLP [A] and 'OTHER/ECONOLITE'

```
TMG VEH OVLP...[A] TYPE:OTHER/ECONOLITE
  PHASES 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
INCLUDED X . . . . . . X . . . . . . . .
PROTECT  . . . . . . . . . . . . . . . .
PED PRTC . . . . . . . X . . . . . . . .
NOT OVLP . . . . . . . . . . . . . . . .
FLSH GRN . . . . . . . . . . . . . . . .
LAG X PH . . . . . . . . . . . . . . . .
LAG 2 PH . . . . . . . . . . . . . . . .

LAG GRN 0.0 YEL 0.0 RED 0.0 ADV GRN 0.0
```

Toggle Twice

↓

OVERLAP C

Select TMG VEH OVLP [C] and 'OTHER/ECONOLITE'

```
TMG VEH OVLP...[C] TYPE:OTHER/ECONOLITE
  PHASES 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
INCLUDED . . . . . X . . . . . . . . . .
PROTECT  . . . . . . . . . . . . . . . .
PED PRTC . . . . . . . . . . . . . . . .
NOT OVLP . . . . . . . . . . . . . . . .
FLSH GRN . . . . . 1 . . . . . . . . . .
LAG X PH . . . . . . . . . . . . . . . .
LAG 2 PH . . . . . . . . . . . . . . . .

LAG GRN 0.0 YEL 0.0 RED 0.0 ADV GRN 0.0
```

Toggle Once

↓

OVERLAP D

Select TMG VEH OVLP [D] and 'OTHER/ECONOLITE'

```
TMG VEH OVLP...[D] TYPE:OTHER/ECONOLITE
  PHASES 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
INCLUDED . . . . . . . X . . . . . . . .
PROTECT  . . . . . . . . . . . . . . . .
PED PRTC . . . . . . . . . . . . . . . .
NOT OVLP . . . . . . . . . . . . . . . .
FLSH GRN . . . . . . . 1 . . . . . . . .
LAG X PH . . . . . . . . . . . . . . . .
LAG 2 PH . . . . . . . . . . . . . . . .

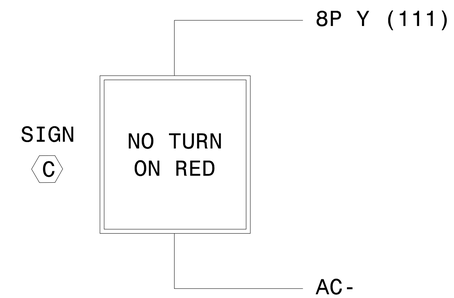
LAG GRN 0.0 YEL 0.0 RED 0.0 ADV GRN 0.0
```

END PROGRAMMING

3. From Main Menu select [2. CONTROLLER]
4. From CONTROLLER Submenu select [4. GUAR MIN TIME]

Set the Guaranteed Minimum Time for Overlap A to 4 seconds.

BLANKOUT SIGN "C" WIRING AND PROGRAMMING DETAIL



NOTE

If Terminal 111 has a conflict monitor wire connected, remove, tap and label wire.

FLASHER CIRCUIT MODIFICATION DETAIL

IN ORDER TO ENSURE 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: 05-1976
DESIGNED: MAY 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail - Sheet 2 of 3

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PLANS PREPARED IN THE OFFICE OF:
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NC License #F-0102
421 Fayetteville Street, Suite 600
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(919) 677-2000

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared For:
NC Department of Transportation Mobility and Safety Division
Traffic Engineering & Signals Management Section
750 N.Greenfield Pkwy,Garner,NC 27529

SR 1118 (Fayetteville Road)
at
Barbee Road/
Solite Park Entrance

Division 5 Durham County Durham

PLAN DATE: May 2018		REVIEWED BY:	SL Phillips
PREPARED BY: DA Waller		REVIEWED BY:	KP Baumann

REVISIONS	INIT.	DATE

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACE L. PHILLIPS

DocuSigned by: 0C87A56ED60B437... 12/19/2018

SIGNATURE DATE

SIG. INVENTORY NO. 05-1976

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PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG.304.3

ECONOLITE ASC/3-2070 LOGIC PROCESSOR PROGRAMMING DETAIL FOR PEDESTRIAN BLANKOUT SIGN

(program controller as shown)

The following logic processor configuration turns on blankout sign prior to Phase 8 if there is a Phase 8 Pedestrian call.

1. From Main Menu select 1. CONFIGURATION
2. From CONFIGURATION Submenu select 8. LOGIC PROCESSOR
3. From LOGIC PROCESSOR Submenu select 2. LOGIC STATEMENTS

ENTER A "1" IN THE LP# FIELD, PRESS 'ENTER', AND PROGRAM AS SHOWN.

```
LP#:   1  COPY FROM:   1  ACTIVE:  M   (T/F)

IF     CTR ON PH PED CHK        8   IS  ON
AND    CTR PH NEXT ON PHS       8   IS  ON
OR     PED ON PH WALK           8   IS  ON
OR     PED ON PH PED CLR        8   IS  ON

THEN   SIG SET PH PED CLR       8       ON
```

TURNS ON BLANKOUT SIGN PRIOR TO PHASE 8 IF THERE IS A PHASE 8 PEDESTRIAN CALL

1. From Main Menu select 1. CONFIGURATION
2. From CONFIGURATION Submenu select 8. LOGIC PROCESSOR
3. From the LOGIC PROCESSOR Submenu select 1. LOGIC STATEMENT CONTROL

ENABLE LOGIC PROCESSOR STATEMENT 1 BY POSITIONING THE CURSOR OVER THE FIELD SHOWN BELOW AND USING THE TOGGLE KEY TO ENABLE IT.

```
LOGIC STATEMENT CONTROL
          1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
LP 1-15   E . . . . . . . . . . . . . . .
LP 16-30  . . . . . . . . . . . . . . . .
LP 31-45  . . . . . . . . . . . . . . . .
LP 46-60  . . . . . . . . . . . . . . . .
LP 61-75  . . . . . . . . . . . . . . . .
LP 76-90  . . . . . . . . . . . . . . . .
```

END PROGRAMMING

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1976
DESIGNED: MAY 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail - Sheet 3 of 3

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PLANS PREPARED IN THE OFFICE OF:
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ELECTRICAL AND PROGRAMMING DETAILS FOR:

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PLAN DATE:	May 2018	REVIEWED BY:	SL Phillips
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REVISIONS	INIT.	DATE

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NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACIE L. PHILLIPS

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SIG. INVENTORY NO. 05-1976

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derrick.waller

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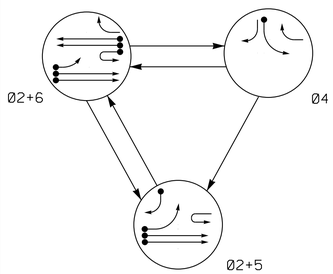
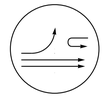
PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG.305.0

DEFAULT PHASING DIAGRAM



DEFAULT PHASING EV PREEMPT PHASES

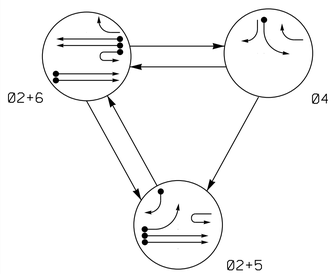
(Medium Priority)



DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE 02+5	PHASE 02+6	PHASE 04	PHASE PRE 3	PHASE FLASH
21,22	G	G	R	G	Y
41	R	R	G	R	R
42	R	R	G	R	R
51	~~F~~	~~F~~	~~R~~	~~F~~	~~Y~~
61	F	F	R	F	Y
62	R	G	R	R	Y
63	R	G	R	R	Y

ALTERNATE PHASING DIAGRAM



ALTERNATE PHASING EV PREEMPT PHASES

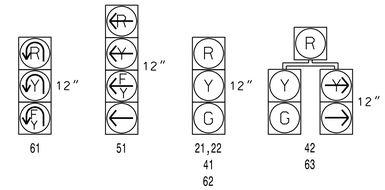
(Medium Priority)

ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE 02+5	PHASE 02+6	PHASE 04	PHASE PRE 3	PHASE FLASH
21,22	G	G	R	G	Y
41	R	R	G	R	R
42	R	R	G	R	R
51	~~F~~	~~R~~	~~R~~	~~F~~	~~Y~~
61	F	F	R	F	Y
62	R	G	R	R	Y
63	R	G	R	R	Y

SIGNAL FACE I.D.

All Heads L.E.D.



ASC/3 DETECTOR INSTALLATION CHART

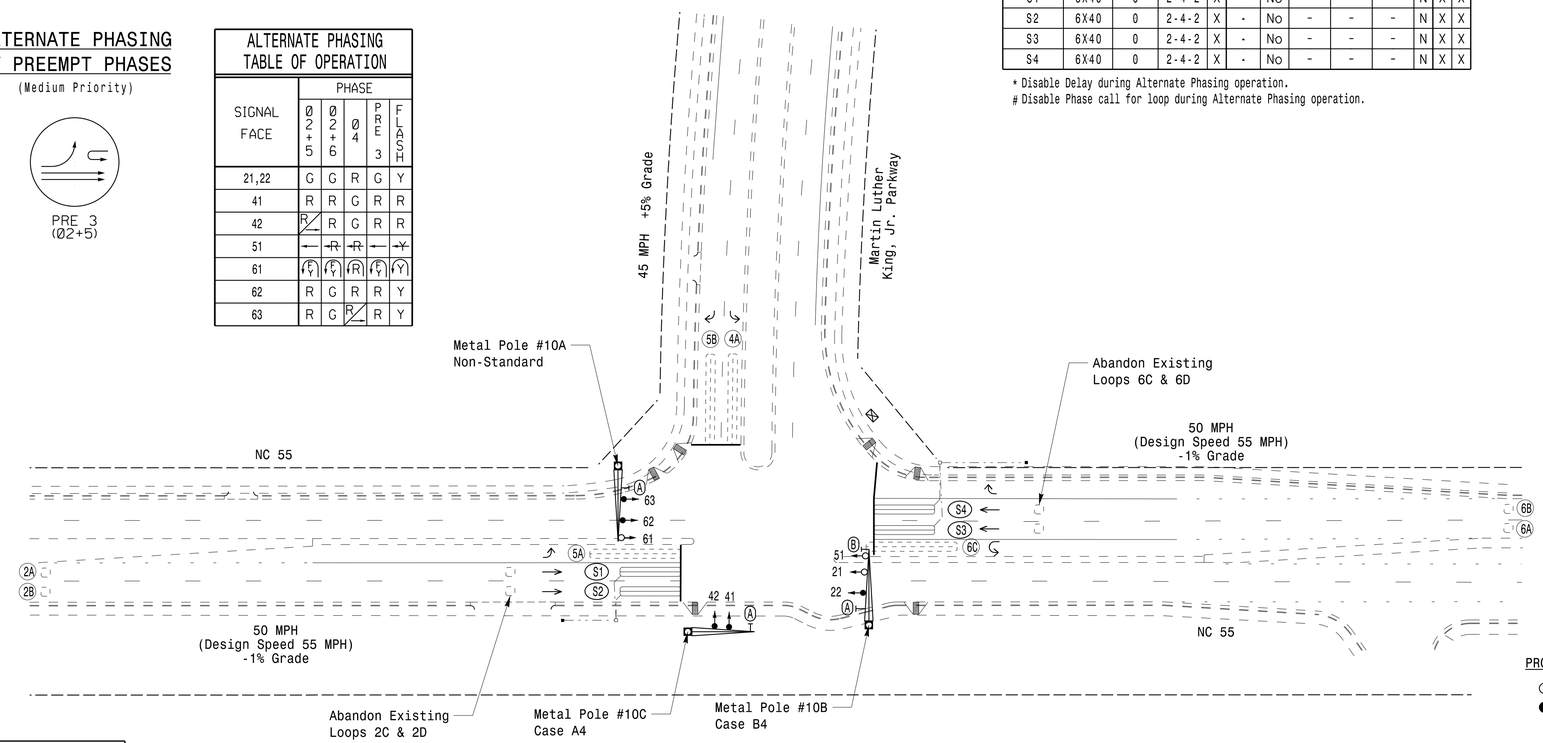
DETECTOR					PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
2A	6X6	420	EXIST	-	2	Yes	-	-	X	N	-	X
2B	6X6	420	EXIST	-	2	Yes	-	-	X	N	-	X
4A	6X60	0	EXIST	-	4	No	-	-	-	S	-	X
5A	6X60	0	2-4-2	-	5	Yes	-	15*	-	S	-	X
					2#	Yes	-	3	-	G	-	X
5B	6X60	0	2-4-2	-	5	Yes	-	15	-	S	-	X
6A	6X6	420	EXIST	-	6	Yes	-	-	X	N	-	X
6B	6X6	420	EXIST	-	6	Yes	-	-	X	N	-	X
6C	6X60	+5	2-4-2	-	6	Yes	-	3	-	G	-	X
S1	6X40	0	2-4-2	X	-	No	-	-	-	N	X	X
S2	6X40	0	2-4-2	X	-	No	-	-	-	N	X	X
S3	6X40	0	2-4-2	X	-	No	-	-	-	N	X	X
S4	6X40	0	2-4-2	X	-	No	-	-	-	N	X	X

* Disable Delay during Alternate Phasing operation.
\# Disable Phase call for loop during Alternate Phasing operation.

3 PHASE FULLY ACTUATED W/ EMERGENCY PREEMPTION (DURHAM 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. Abandon existing loops 2C, 2D, 6C, and 6D.
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. Pavement markings are existing.
8. The Division (City) 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 shall supersede these values.
10. Loop data based on previous plan and/or field observations.
11. Install new cabinet on the existing cabinet foundation.
12. Reconnect lead-in cable to separate loops 2A & 2B, and 6A & 6B, as shown.
13. Install GPS emergency preemption system per manufacturer's instructions to achieve preemption needed, as shown in phasing diagram.
14. Remove existing optical detection equipment.



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 With Push Button & Sign	
	Metal Pole with Mastarm	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
N/A	Curb Ramp	
A	Street Sign (D3-1)	A
B	"U-TURN YIELD TO RIGHT TURN" Sign (R10-16)	B

ASC/3 TIMING CHART

FEATURE	PHASE 2	PHASE 4	PHASE 5	PHASE 6
Min Green *	14	7	7	14
Walk *	0	0	0	0
Ped Clear	0	0	0	0
Veh. Extension *	6.0	1.0	1.0	6.0
Max 1 *	90	30	20	90
Yellow	5.3	3.0	3.0	5.3
Red Clear	1.5	3.4	2.9	1.5
Actuations B4 Add *	-	-	-	-
Seconds /Actuation *	1.5	-	-	1.5
Max Initial *	46	-	-	46
Time Before Reduction *	15	-	-	15
Time To Reduce *	45	-	-	45
Minimum Gap	3.4	-	-	3.4
Locking Detector	X	-	-	X
Recall Position	VEH. RECALL	-	-	VEH. RECALL
Dual Entry	-	-	-	-
Simultaneous Gap	X	X	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.

ASC/3 EV PREEMPT

FUNCTION	PRE 3
Exit Phase(s)	2+6
Preempt Override	OFF
Delay Time	0
Ped Clear Through Yellow	N
Terminate Phases	N
Entrance Walk	0
Entrance Ped Clear	0
Entrance Min Green	1
Entrance Yellow Change	25.5✱
Entrance Red Clear	25.5✱
Minimum Dwell Time	7
Preempt Input Extension Time **	2.0
Preempt Max Time	120
Exit Yellow Change	25.5✱
Exit Red Clear	25.5✱

* Time defaults to time used for phase during normal operation.
** Program timing on GPS detector unit.

Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Prepared For: Transportation Mobility and Safety Division, Traffic Engineering Branch, Signal Design Section, 750 N.Greenfield Pkwy,Garner,NC 27529

NC 55 at Martin Luther King, Jr. Parkway

Division 5 Durham County Durham

PLAN DATE: June 2018 REVIEWED BY: SL Phillips
PREPARED BY: DA Waller REVIEWED BY: KP Baumann

SCALE 0 50 1"=50'

REVISIONS | INIT. | DATE

SEAL: NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACIE L. PHILLIPS

DocuSigned by: 0C87A59ED60B437... 12/19/2018

SIGNATURE | DATE

SIG. INVENTORY NO. 05-1977

PLANS PREPARED IN THE OFFICE OF:
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NC License #F-0102
421 Fayetteville Street, Suite 600
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12/19/2018
KARPAGAM, TIMOTHY
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ITS#01036410 - Durham Signal System&Signals#54 - Signal Design#GROUP 7#U-5968_051977-2018.dgn

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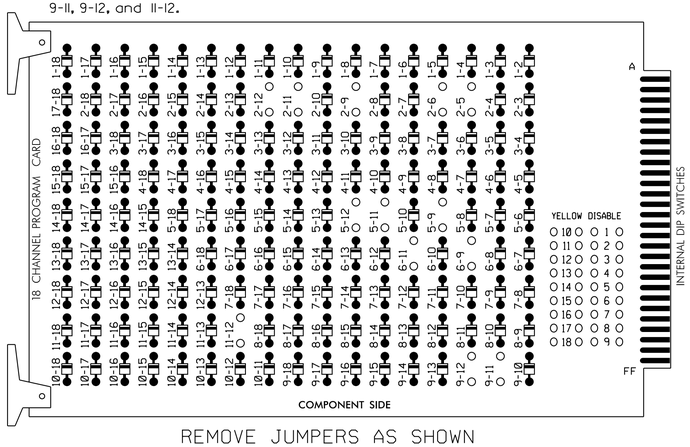
PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG.305.1

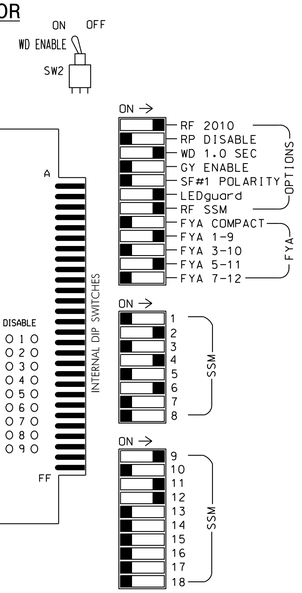
EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

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



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 phase 2 Green and 6 Green.
3. The cabinet and controller are part of the Durham Signal System.
4. Install GPS preemption system. Perform installation according to manufacturer's directions and NCDOT engineer - approved mounting location to accomplish the preemption schemes shown on the Signal Design Plans.

EQUIPMENT INFORMATION

CONTROLLER.....2070LX
CABINET.....332 W/AUX
SOFTWARE.....ECONOLITE ASC/3-2070
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
LOAD SWITCHES USED.....S2,S5,S7,S8,AUX S1,AUX S4,AUX S5
PHASES USED.....2,4,5,6
OVERLAP "A".....✳
OVERLAP "B".....NOT USED
OVERLAP "C".....✳
OVERLAP "D".....✳

✳ 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	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	NU	21,22	NU	NU	41,42	63	NU	51★	62,63	NU	NU	NU	NU	61★	NU	NU	51★	42★	NU
RED		128			101				134									✳	
YELLOW		129			102			✳	135										
GREEN		130			103				136										
RED ARROW														A121			A114		
YELLOW ARROW						102								A122			A115	A102	
FLASHING YELLOW ARROW														A123			A116		
GREEN ARROW						103		133										A103	

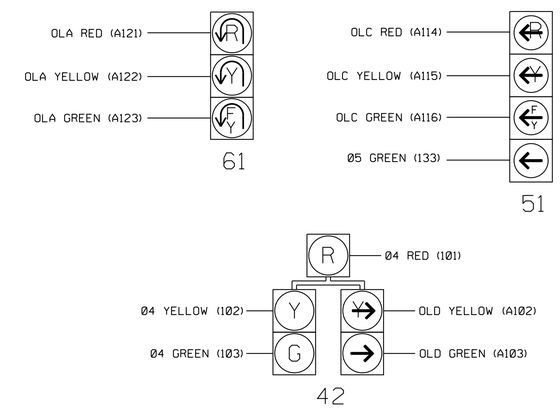
NU = Not Used

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

★ See pictorial of head wiring in detail this sheet.

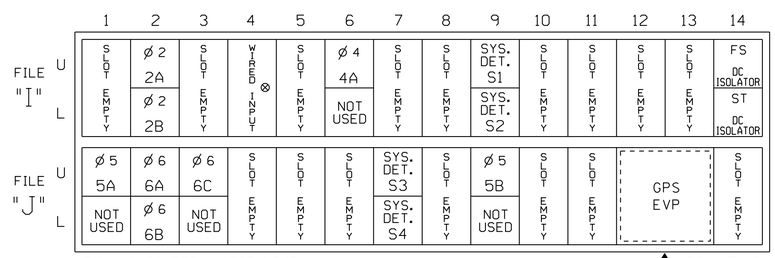
SIGNAL WIRING DETAIL

(wire signal heads as shown)



INPUT FILE POSITION LAYOUT

(front view)



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

FS = FLASH SENSE
ST = STOP TIME

CONNECT PHASE SELECTOR TO FIELD ETHERNET SWITCH

⊗ Wired Input - Do not populate slot with detector card

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND TIME	DELAY TIME	ADDED INITIAL	DETECTOR TYPE
2A	TB2-5,6	I2U	39	2	2	YES			X	N
2B	TB2-7,8	I2L	43	12	2	YES			X	N
4A	TB4-9,10	I6U	41	4	4	YES				S
5A[1]	TB3-1,2	J1U	55	5★	5	YES		15		S
	-	I4U	47	22★	2	YES		3		G
5B	TB7-9,10	J9U	59	15	5	YES		15		S
6A	TB3-5,6	J2U	40	6	6	YES			X	N
6B	TB3-7,8	J2L	44	16	6	YES			X	N
6C	TB3-9,10	J3U	64	36	6	YES		3		G
✳ S1	TB6-9,10	I9U	60	11	SYS	NO				N
✳ S2	TB6-11,12	I9L	62	13	SYS	NO				N
✳ S3	TB7-1,2	J7U	66	38	SYS	NO				N
✳ S4	TB7-3,4	J7L	79	48	SYS	NO				N

✳ System detector only. Remove any assigned vehicle phase.

[1] Add jumper from J1-W to I4-W, on rear of input file.

★ 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.

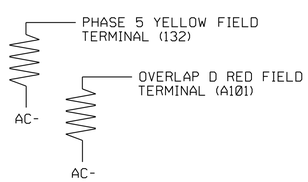
INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

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: 05-1977
DESIGNED: JUNE 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail - Sheet 1 of 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

NC 55
at
Martin Luther King, Jr. Parkway

Division 5 Durham County Durham

PLAN DATE: June 2018 REVIEWED BY: SL Phillips
PREPARED BY: DA Waller REVIEWED BY: KP Baumann

REVISIONS	INIT.	DATE

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

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACIE L. PHILLIPS
DocuSigned by: SLPh
-DC8TA5DE2K0B437...
12/19/2018
SIGNATURE DATE
SIG. INVENTORY NO. 05-1977

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12/19/2018
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PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG.305.2

ECONOLITE ASC/3-2070 VEHICLE DETECTOR SETUP PROGRAMMING DETAIL FOR ALTERNATE PHASING LOOP 5A

IMPORTANT!

Program detectors per the input file connection and programming chart shown on sheet 1 before proceeding.

1. From Main Menu select [8. UTILITIES]
2. From UTILITIES Submenu select [1. COPY/CLEAR]
3. Copy from DETECTOR PLAN "1" to DETECTOR PLAN "2".

```
COPY / CLEAR UTILITY
      FROM                TO
PHASE TIMING.... . > PHASE TIMING.... .
TIMING PLAN..... . > TIMING PLAN..... .
PH DET OPT PLAN. . > PH DET OPT PLAN. .
DETECTOR PLAN... 1 > DETECTOR PLAN... 2
  TOGGLE TO SELECT A "FROM" AND A "TO"
          THEN PRESS ENTER
```

4. From Main Menu select [6. DETECTORS]
5. From DETECTOR Submenu select [2. VEHICLE DETECTOR SETUP]
6. Place cursor in VEH DET PLAN [ ] position and enter "2".

   - Place cursor in VEH DETECTOR [ ] position and enter "5".
   - Set delay time to "0".

```
VEH DETECTOR [ 5]   VEH DET PLAN [ 2]
TYPE: S-STANDARD
TS2 DETECTOR..... . ECPI LOG.......   NO
DET PH - 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 5  5    . . . . . . . . . . . . . . . .
EXTEND TIME...  0.0 DELAY TIME...    0.0
USE ADDED INITIAL . CROSS SWITCH PH..  0
LOCK IN....... NONE NTCIP VOL . OR OCC .
PMT QUEUE DELAY. NO
```

NOTICE VEH DET PLAN 2

ENSURE DELAY IS SET TO '0'

   - Place cursor in VEH DETECTOR [ ] position and enter "22".
   - Set assigned phase to "0".

ENSURE PHASE IS SET TO "0"

```
VEH DETECTOR [22]   VEH DET PLAN [ 2]
TYPE: G-GREEN EXTENSION/DELAY
TS2 DETECTOR..... . ECPI LOG.......   NO
DET PH - 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 22 0    . . . . . . . . . . . . . . . .
EXTEND TIME...  0.0 DELAY TIME...    3.0
USE ADDED INITIAL . CROSS SWITCH PH..  0
LOCK IN....... NONE NTCIP VOL . OR OCC .
PMT QUEUE DELAY. NO
```

NOTICE VEH DET PLAN 2

END PROGRAMMING

ECONOLITE ASC/3-2070 EMERGENCY VEHICLE PREEMPT PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select [4. PREEMPTOR/TSP]
2. From PREEMPTOR/TSP/SCP Submenu select [1. PREEMPT PLAN 1-10]

Place cursor in [ ] next to Preempt Plan and press 3. Then press the right cursor arrow and toggle the controller to YES. Next cursor down. This will select Emergency Vehicle Preempt #3.

```
PREEMPT PLAN [  3]    ENABLE....YES
 VEH/PED 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 OVERLAP A B C D E F G H I J K L M N O P
TRKCLR V . . . . . . . . . . . . . . . .
TRKCLR O . . . . . . . . . . . . . . . .
ENA TRL  . . . . . . . . . . . . . . . .
DWEL VEH . X . . X . . . . . . . . . . .
DWEL PED . . . . . . . . . . . . . . . .
DWEL OLP F1. F1. . . . . . . . . . . . .
CYC VEH  . . . . . . . . . . . . . . . .
CYC PED  . . . . . . . . . . . . . . . .
CYC OLP  . . . . . . . . . . . . . . . .
EXIT PH  . X . . . X . . . . . . . . . .
EXIT CAL . . . . . . . . . . . . . . . .
SP FUNC  . . . . . . . . . . . . . . . .

ENABLE... YESIPMT OVRIDE..IINTERLOCK. NO
DET LOCK... XIDELAY..    0IINHIBIT...  0
OVERIDE FL. .IDURATION   0ICLR-GRN... NO
TERM OLP.  NOIPC>YEL    NOITERM PH    NO
PED DARK.. NOITC RESRV  NOIDWELL FL  OFF
LINK PMT....0IX FLCOLR REDIEXIT OPT. OFF
X TMG PLN...0IRE-SERV..  0IFLT TYPE.HARD
FREE DUR PMTIR1  NOIR2  NOIR3  NOIR4  NO
--TIMING-----WALKIPED CLIMN GRI YELI RED
ENTRANCE TM.    0I     0I    1I25.5I25.5
-----------MIN GRIEXT GRIMX GRI YELI RED
TRACK CLEAR     0I     0I    0I25.5I25.5
-----------MIN DLIPMTEXTIMX TMI YELI RED
DWL/CYC-EXIT    7I   0.0I   120I25.5I25.5
PMT ACTIVE OUT..ON   PMT ACT DWELL...NO
OTHER - PRI PMT.OFF  NON-PRI PMT.....OFF
INH EXT TIME... 0.0  PED PR RETURN...OFF
PRIORITY RETURN.OFF  QUEUE DELAY.... OFF
COND DELAY......OFF
PHASES     1   2   3   4   5   6   7   8
PR RTN%    0   0   0   0   0   0   0   0
PHASES     9  10  11  12  13  14  15  16
PR RTN%    0   0   0   0   0   0   0   0
```

PROGRAM EXTEND TIME ON GPS DETECTOR UNITS FOR 2.0 SEC.

ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select [2. CONTROLLER]
2. From CONTROLLER Submenu select [2. VEHICLE OVERLAPS]

OVERLAP A

Select TMG VEH OVLP [A] and 'OTHER/ECONOLITE'

```
TMG VEH OVLP...[A] TYPE:OTHER/ECONOLITE
  PHASES 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
INCLUDED . X . . . . . . . . . . . . . .
PROTECT  . . . . . . . . . . . . . . . .
PED PRTC . . . . . . . . . . . . . . . .
NOT OVLP . . . . . . . . . . . . . . . .
FLSH GRN . 1 . . . . . . . . . . . . . .
LAG X PH . . . . . . . . . . . . . . . .
LAG 2 PH . . . . . . . . . . . . . . . .

LAG GRN 0.0 YEL 0.0 RED 0.0 ADV GRN 0.0
```

Toggle Twice

OVERLAP C

Select TMG VEH OVLP [C] and 'PPLT FYA'

```
TMG VEH OVLP...[C] TYPE: .....PPLT FYA

PROTECTED LEFT TURN....   PHASE    5
OPPOSING THROUGH.......   PHASE    6

FLASHING ARROW OUTPUT.....CH11 ISOLATE

DELAY START OF: FYA..0.0 CLEARANCE..0.0
ACTION PLAN SF BIT DISABLE........... 5
```

NOTICE ACTION PLAN SF BIT "5"

Toggle Once

OVERLAP D

Select TMG VEH OVLP [D] and 'NORMAL'

```
TMG VEH OVLP...[D] TYPE: .......NORMAL
  PHASES 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
INCLUDED . . . . X . . . . . . . . . . .

LAG GRN 0.0 YEL 0.0 RED 0.0
```

END PROGRAMMING

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1977
DESIGNED: JUNE 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail - Sheet 2 of 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

NC 55
at
Martin Luther King, Jr. Parkway

Division 5 Durham County Durham

PLAN DATE:	June 2018	REVIEWED BY:	SL Phillips
PREPARED BY:	DA Waller	REVIEWED BY:	KP Baumann

REVISIONS	INIT.	DATE

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACIE L. PHILLIPS

DocuSigned by: 0C87A59ED60B437...
12/19/2018
SIGNATURE DATE

SIG. INVENTORY NO. 05-1977

PLANS PREPARED IN THE OFFICE OF:
Kimley»Horn
NC License #F-0102
421 Fayetteville Street, Suite 600
Raleigh, NC 27601
(919) 677-2000

12/19/2018
K:\RAL_LPTM_ITS\011036410 - Durham Signal System\Signals\54 - Signal Design\GROUP 7\U-5968.051977-2018a2.dgn
dderrick.waller

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PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG.305.3

ECONOLITE ASC/3-2070 PREEMPT FILTERING PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select [4. PREEMPTOR/TSP]
2. From PREEMPT/TSP/SCP Submenu select [2. ENABLE PREEMPT FILTERING & TSP/SCP]

```
ENABLE PREEMPT FILTERING & TSP/SCP
FILTERED     SOLID          PULSING
INPUT  1 ...BYPASSED.. ...BYPASSED..
       2 ...BYPASSED.. ...BYPASSED..
       3 ..PREEMPT  3. ...BYPASSED..
       4 ..PREEMPT  4. ...BYPASSED..
       5 ..PREEMPT  5. ...BYPASSED..
       6 ..PREEMPT  6. ...BYPASSED..
       7 ...BYPASSED.. ...BYPASSED..
       8 ...BYPASSED.. ...BYPASSED..
       9 ...BYPASSED.. ...BYPASSED..
      10 ...BYPASSED.. ...BYPASSED..
```

ALTERNATE PHASING ACTIVATION DETAIL

TO RUN ALT. PHASING DURING FREE RUN - PROGRAM CHANGES (SHOWN BELOW) IN A TIME BASED ACTION PLAN. SCHEDULE A DAY PLAN THAT INCLUDES THE ACTION PLAN PROGRAMMED TO SELECT VEH DET PLAN 2 AND ENABLE SF BIT 5.

TO RUN ALT. PHASING DURING COORDINATION - SELECT THE TIME BASED ACTION PLAN THAT IS PROGRAMMED TO SELECT VEH DET PLAN 2 AND ENABLE SF BIT 5.

PHASING	VEH DET PLAN	SF BITS ENABLED
ACTIONS REQUIRED TO RUN DEFAULT PHASING	1	NONE
ACTIONS REQUIRED TO RUN ALTERNATE PHASING	2	5

IMPORTANT: IF ALT. PHASING IS USED DURING FREE RUN AND COORDINATION, DO NOT OPERATE TIME OF DAY EVENTS CONCURRENTLY WITH COORDINATION PLAN EVENTS IN THE EVENT SCHEDULER. (EX. FREE RUN EVENT SHOULD END BEFORE COORDINATION PLAN EVENT STARTS AND VICE-VERSA).

ALTERNATE PHASING CHANGE SUMMARY

THE FOLLOWING IS A SUMMARY OF WHAT TAKES PLACE WHEN SF BIT 5 AND VEH DET PLAN 2 ACTIVATE TO CALL THE "ALTERNATE PHASING":

SF BIT 5: Modifies overlap parent phases for head 51 to run protected turns only.

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

ECONOLITE ASC/3-2070 ACTION PLAN PROGRAMMING DETAIL

1. From Main Menu select [5. TIME BASE]
2. From TIME BASE Submenu select [2. ACTION PLAN]

```
ACTION PLAN...[  1]
PATTERN.........AUTO   SYS OVERRIDE.... NO
TIMING PLAN........ 0   SEQUENCE........  0
VEH DETECTOR PLAN.. 2   DET LOG........NONE
FLASH...........   --   RED REST........ NO
VEH DET DIAG PLN... 0   PED DET DIAG PLN..0
DIMMING ENABLE..   NO   PRIORITY RETURN. NO
PED PR RETURN..    NO   QUEUE DELAY..... NO
PMT COND DELAY     NO
  PHASE   1  2  3  4  5  6  7  8  9  0  1  2  3  4  5  6
PED RCL   .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
WALK 2    .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
VEX 2     .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
VEH RCL   .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
MAX RCL   .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
MAX 2     .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
  PHASE   1  2  3  4  5  6  7  8  9  0  1  2  3  4  5  6
MAX 3     .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
CS INH    .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
SOMIT     .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
SPC FCT   .  .  .  .  X  .  .  .  (1-8)
AUX FCT   .  .  .  (1-3)
          1  2  3  4  5  6  7  8  9  0  1  2  3  4  5
LP 1-15   .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 16-30  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 31-45  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 46-60  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 61-75  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 76-90  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 91-100 .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
```

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1977
DESIGNED: JUNE 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail - Sheet 3 of 3

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Prepared For: Transportation Mobility and Safety Division, State of North Carolina, Department of Transportation, Traffic Engineering & Signal Management Section
750 N.Greenfield Pkwy,Garner,NC 27529

NC 55
at
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Division 5 Durham County Durham

PLAN DATE: June 2018		REVIEWED BY:	SL Phillips
PREPARED BY: DA Waller		REVIEWED BY:	KP Baumann

REVISIONS	INIT.	DATE

SEAL
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12/19/2018
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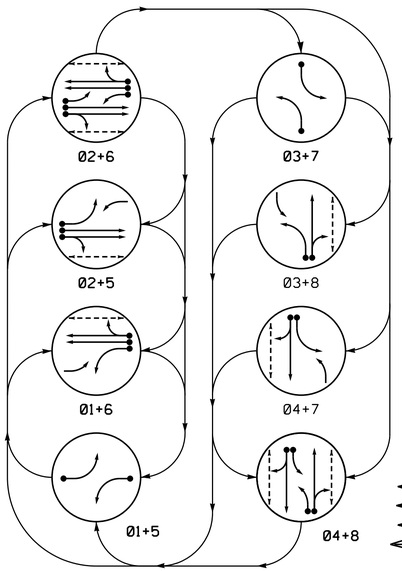
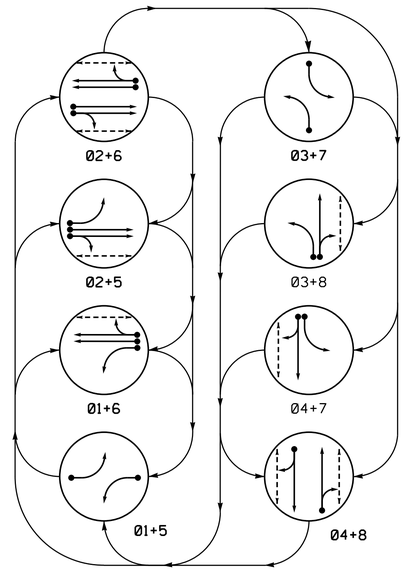
derrick.waller

PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig.306.0

DEFAULT PHASING DIAGRAM



ALTERNATE PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

ASC/3 DETECTOR INSTALLATION CHART

DETECTOR					PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
1A	6X60	0	2-4-2	-	1	Yes	-	15*	-	S	-	X
					6#	Yes	-	-	-	S	-	X
2A	6X6	300	5	-	2	Yes	-	-	X	N	-	X
2B	6X6	300	5	-	2	Yes	-	-	X	N	-	X
3A	6X60	0	2-4-2	-	3	Yes	-	15**	-	S	-	X
					8#	Yes	-	3	-	S	-	X
4A	6X60	0	2	-	4	Yes	-	10	-	S	-	X
5A	6X60	0	2-4-2	-	5	Yes	-	15**	-	S	-	X
					2#	Yes	-	-	-	S	-	X
6A	6X6	300	5	-	6	Yes	-	-	X	N	-	X
6B	6X6	300	5	-	6	Yes	-	-	X	N	-	X
7A	6X60	0	2-4-2	-	7	Yes	-	15**	-	S	-	X
					4#	Yes	-	3	-	S	-	X
8A	6X60	0	2	-	8	Yes	-	10	-	S	-	X

* Disable Delay for Loop 1A during Alternate Phasing Operation.
** Reduce Delay to 3 seconds for loops 3A, 5A, and 7A during Alternate Phasing operation.
# Disable Phase call for loop during Alternate Phasing operation.

8 Phase
Fully Actuated
(Durham Signal System)

NOTES

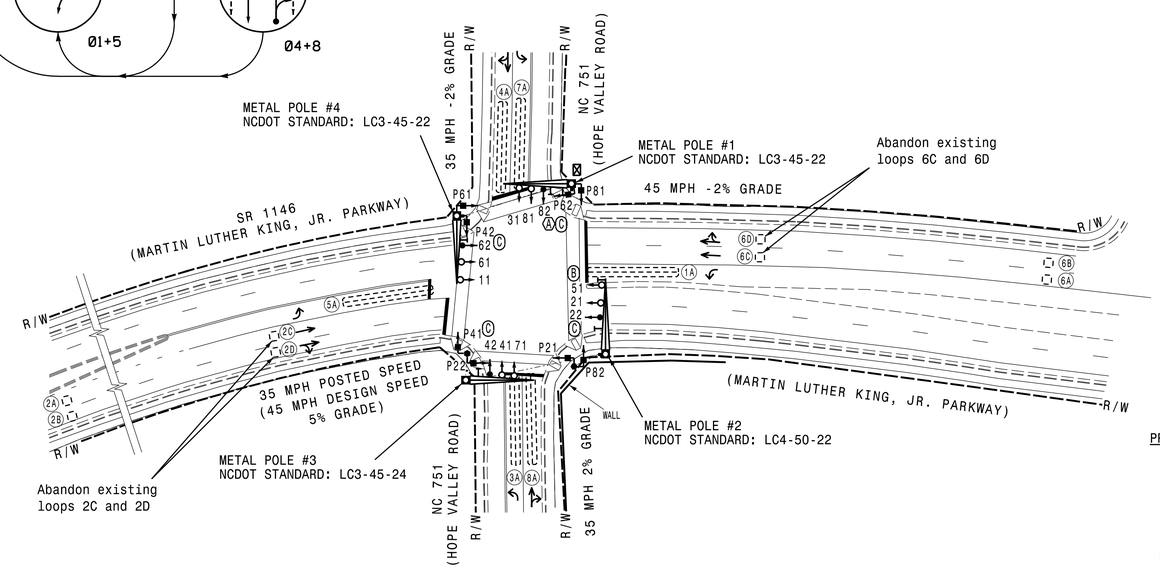
1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 and/or phase 5 may be lagged.
4. Phase 3 and/or phase 7 may be lagged.
5. Reposition existing signal heads 22, 42, 62, and 82.
6. Abandon Existing loops 2C, 2D, 6C, 6D
7. Set all detector units to mode.
8. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
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. 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.
14. Loop data based on previous plan and/or field observations.
15. Install new cabinet on the existing cabinet foundation.

DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE 01+05	01+06	02+05	02+06	03+07	03+08	04+07	04+08	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, 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, 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 TABLE OF OPERATION

SIGNAL FACE	PHASE 01+05	01+06	02+05	02+06	03+07	03+08	04+07	04+08	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, 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, 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



LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Metal Pole with Mastarm	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
N/A	Curb Ramp	
Ⓐ	"NO TURN ON RED" Sign (R10-11)	Ⓐ
Ⓑ	No U-Turn Sign (R3-4)	Ⓑ
Ⓒ	Street Name Sign	Ⓒ

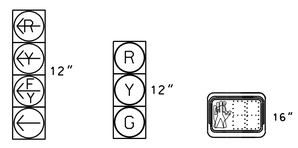
ASC/3 TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6	7	8
Min Green *	7	12	7	7	7	12	7	7
Walk *	0	7	0	7	0	7	0	7
Ped Clear	0	11	0	16	0	9	0	20
Veh. Extension *	1.0	6.0	1.0	1.0	1.0	6.0	1.0	1.0
Max 1 *	20	90	20	20	20	90	20	20
Yellow	3.0	4.7	3.0	4.0	3.0	4.7	3.0	4.0
Red Clear	2.8	2.0	2.6	2.2	3.1	2.0	2.6	2.2
Actuations B4 Add *	-	-	-	-	-	-	-	-
Seconds /Actuation *	-	2.5	-	-	-	2.5	-	-
Max Initial *	-	34	-	-	-	34	-	-
Time Before Reduction *	-	15	-	-	-	15	-	-
Time To Reduce *	-	30	-	-	-	30	-	-
Minimum Gap	-	3.0	-	-	-	3.0	-	-
Locking Detector	-	X	-	-	-	X	-	-
Recall Position	-	VEH. RECALL	-	-	-	VEH. RECALL	-	-
Dual Entry	-	-	-	X	-	-	-	X
Simultaneous Gap	X	X	X	X	X	X	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.



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

Project #: 170905

DAVENPORT
HOME OFFICE:
119 BROOKSTOWN AVENUE, SUITE PH1
WINSTON-SALEM, NC 27101
336.744.1636 www.davenportworld.com
NCBELS FIRM LICENSE NO. C-2522

Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

SR 1146
(Martin Luther King, Jr. Parkway)
at
NC 751 (Hope Valley Road)
Division 5 Durham County Durham

PLAN DATE:	December 2018	REVIEWED BY:	L. Boyer
PREPARED BY:	T. S. Warren	REVIEWED BY:	A. Ravipati

SCALE 0 50 1"=50'

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 032117 ENGINEER F. ROYAL HINSHAW

DocuSigned by: F. Royal Hinshaw 12/21/2018
SIGNATURE DATE

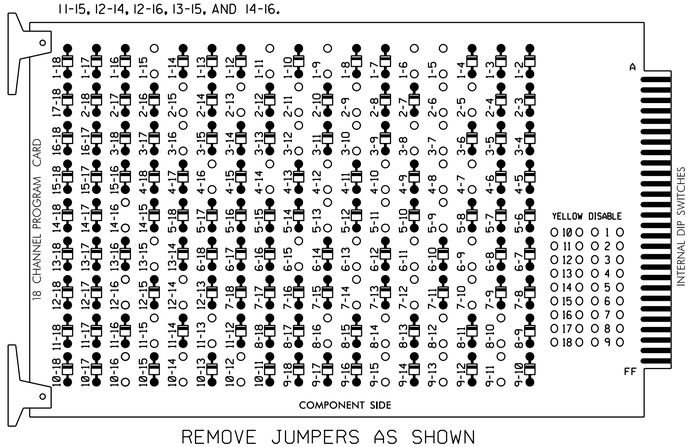
SIG. INVENTORY NO. 05-1978

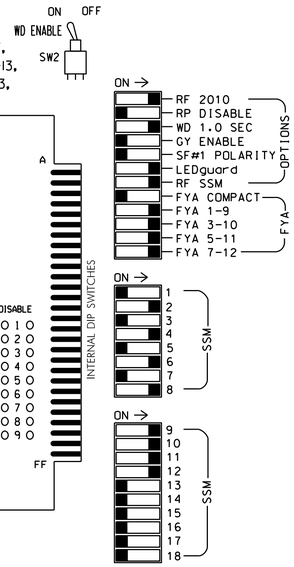
PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig.306.1

EDI MODEL 2018ECLip-NC 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 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 phases 4 and 8 for Dual Entry.
3. Program controller to start up in phase 2 Walk and 6 Walk.
4. The cabinet and controller are part of the Durham Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070LX
CABINET.....332 W/AUX
SOFTWARE.....ECONOLITE ASC/3-2070
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.....1,2,2 PED,3,4,4 PED,5,6,6 PED,7, 8,8 PED
OVERLAP "A".....*
OVERLAP "B".....*
OVERLAP "C".....*
OVERLAP "D".....*

* 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	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	11★	21,22	P21, P22	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													A122	A125		A115	A102	
FLASHING YELLOW ARROW													A123	A126		A116	A103	
GREEN ARROW	127			118			133			124								
✋			113			104			119			110						
🚶			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.

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	SLOT EMPTY	WIRED INPUT ⊗	Ø 3 3A	Ø 4 4A	SLOT EMPTY	WIRED INPUT ⊗	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						Ø4 PED DC ISOLATOR	Ø8 PED DC ISOLATOR	ST DC ISOLATOR
FILE "J"	U	Ø 5 5A	Ø 6 6A	SLOT EMPTY	WIRED INPUT ⊗	Ø 7 7A	Ø 8 8A	SLOT EMPTY	WIRED INPUT ⊗	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L	NOT USED	Ø 6 6B			NOT USED	NOT USED								

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

FS = FLASH SENSE
ST = STOP TIME

⊗ Wired Input - Do not populate slot with detector card

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND TIME	DELAY TIME	ADDED INITIAL	DETECTOR TYPE
1A [1]	TB2-1,2	I1U	56	1★	1	YES	-	15	-	S
	-	J4U	48	26★	6	YES	-	-	-	S
2A	TB2-5,6	I2U	39	2	2	YES	-	-	X	N
2B	TB2-7,8	I2L	43	12	2	YES	-	-	X	N
3A [2]	TB4-5,6	I5U	58	3★	3	YES	-	15	-	S
	-	J8U	50	28★	8	YES	-	3	-	S
4A	TB4-9,10	I6U	41	4	4	YES	-	10	-	S
5A [3]	TB3-1,2	J1U	55	5★	5	YES	-	15	-	S
	-	I4U	47	22★	2	YES	-	-	-	S
6A	TB3-5,6	J2U	40	6	6	YES	-	-	X	N
6B	TB3-7,8	J2L	44	16	6	YES	-	-	X	N
7A [4]	TB5-5,6	J5U	57	7★	7	YES	-	15	-	S
	-	I8U	49	24★	4	YES	-	3	-	S
8A	TB5-9,10	J6U	42	8	8	YES	-	10	-	S
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.

* System detector only. Remove any assigned vehicle phase.

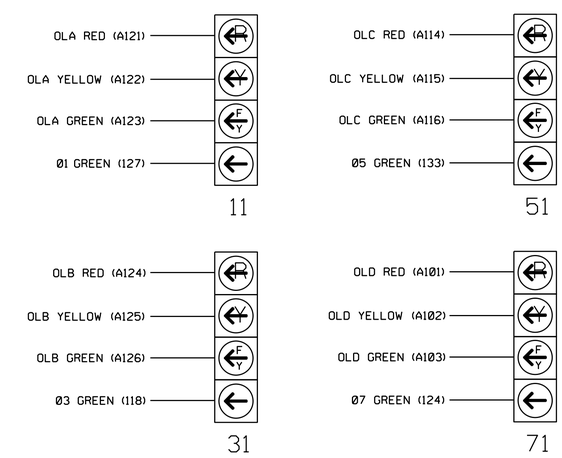
[1] Add jumper from I1-W to J4-W, on rear of input file.
[2] Add jumper from I5-W to J8-W, on rear of input file.
[3] Add jumper from J1-W to I4-W, on rear of input file.
[4] Add jumper from J5-W to I8-W, on rear of input file.

★ For the detectors to work as shown on the signal design plan, see the Vehicle Detector Setup Programming Detail for Alternate Phasing on sheet 3.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

FYA SIGNAL WIRING DETAIL

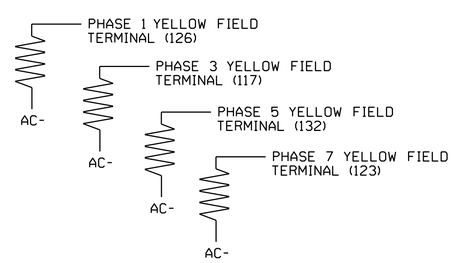
(wire signal heads as shown)



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: 05-1978
DESIGNED: December 2018
SEALED: 12/21/2018
REVISED: N/A

Project #: 170905

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Signal Upgrade - Sheet 1 of 4

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ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 1146
(Martin Luther King Jr. Parkway)
at
NC 751 (Hope Valley Road)

Division 5 Durham County Durham

PLAN DATE:	December 2018	REVIEWED BY:	L.Boyer
PREPARED BY:	T. S. Warren	REVIEWED BY:	A. Ravipati

REVISIONS | INIT. | DATE

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

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 032117 ENGINEER ROYAL HINSHAW

DocuSigned by: 12/21/2018
SIGNATURE DATE
TPGBOOKWORM
SIG. INVENTORY NO. 05-1978

PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig.306.2

ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select [2. CONTROLLER]
2. From CONTROLLER Submenu select [2. VEHICLE OVERLAPS]

OVERLAP A

Select TMG VEH OVLP [A] and 'PPLT FYA'

```
TMG VEH OVLP...[A] TYPE: ....PPLT FYA

PROTECTED LEFT TURN....   PHASE    1
OPPOSING THROUGH.......   PHASE    2

FLASHING ARROW OUTPUT.....CH9  ISOLATE

DELAY START OF: FYA..0.0 CLEARANCE..0.0
ACTION PLAN SF BIT DISABLE........... 1
```

← NOTICE ACTION PLAN SF BIT "1"

Toggle Once

↓

OVERLAP B

Select TMG VEH OVLP [B] and 'PPLT FYA'

```
TMG VEH OVLP...[B] TYPE: ....PPLT FYA

PROTECTED LEFT TURN....   PHASE    3
OPPOSING THROUGH.......   PHASE    4

FLASHING ARROW OUTPUT.....CH10 ISOLATE

DELAY START OF: FYA..0.0 CLEARANCE..0.0
ACTION PLAN SF BIT DISABLE........... 3
```

← NOTICE ACTION PLAN SF BIT "3"

Toggle Once

↓

OVERLAP C

Select TMG VEH OVLP [C] and 'PPLT FYA'

```
TMG VEH OVLP...[C] TYPE: ....PPLT FYA

PROTECTED LEFT TURN....   PHASE    5
OPPOSING THROUGH.......   PHASE    6

FLASHING ARROW OUTPUT.....CH11 ISOLATE

DELAY START OF: FYA..0.0 CLEARANCE..0.0
ACTION PLAN SF BIT DISABLE........... 5
```

← NOTICE ACTION PLAN SF BIT "5"

Toggle Once

↓

OVERLAP D

Select TMG VEH OVLP [D] and 'PPLT FYA'

```
TMG VEH OVLP...[D] TYPE: ....PPLT FYA

PROTECTED LEFT TURN....   PHASE    7
OPPOSING THROUGH.......   PHASE    8

FLASHING ARROW OUTPUT.....CH12 ISOLATE

DELAY START OF: FYA..0.0 CLEARANCE..0.0
ACTION PLAN SF BIT DISABLE........... 7
```

← NOTICE ACTION PLAN SF BIT "7"

END PROGRAMMING

FLASHER CIRCUIT MODIFICATION DETAIL

IN ORDER TO ENSURE 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: 05-1978
DESIGNED: December 2018
SEALED: 12/21/2018
REVISED: N/A

Project #: 170905

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Signal Upgrade - Sheet 2 of 4

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ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for: Transportation Mobility and Safety Division, Signals Management Section, NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

750 N.Greenfield Pkwy,Garner,NC 27529

SR 1146
(Martin Luther King Jr. Parkway)
at
NC 751 (Hope Valley Road)

Division 5 Durham County Durham

PLAN DATE:	December 2018	REVIEWED BY:	L. Boyer
PREPARED BY:	T. S. Warren	REVIEWED BY:	A. Ravipati

REVISIONS	INIT.	DATE

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 032117 ENGINEER ROYAL HINSHAW

DocuSigned by:
F. Royal Hinshaw 12/21/2018
SIGNATURE DATE

SIG. INVENTORY NO. 05-1978

PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig.306.3

ECONOLITE ASC/3-2070 VEHICLE DETECTOR SETUP PROGRAMMING DETAIL FOR ALTERNATE PHASING
LOOPS 1A, 5A, 3A, 7A

(program controller as shown)

IMPORTANT!

Program detectors per the input file connection and programming chart shown on sheet 1 before proceeding.

1. From Main Menu select [8. UTILITIES]
2. From UTILITIES Submenu select [1. COPY/CLEAR]
3. Copy from DETECTOR PLAN "1" to DETECTOR PLAN "2".

```
COPY / CLEAR UTILITY
      FROM                TO
PHASE TIMING.... . > PHASE TIMING.... .
TIMING PLAN..... . > TIMING PLAN..... .
PH DET OPT PLAN. . > PH DET OPT PLAN. .
DETECTOR PLAN... 1 > DETECTOR PLAN... 2
  TOGGLE TO SELECT A "FROM" AND A "TO"
          THEN PRESS ENTER
```

4. From Main Menu select [6. DETECTORS]
5. From DETECTOR Submenu select [2. VEHICLE DETECTOR SETUP]
6. Place cursor in VEH DET PLAN [ ] position and enter "2".

- Place cursor in VEH DETECTOR [ ] position and enter "1".
- Set delay time to "0.0 seconds".

```
VEH DETECTOR [ 1]   VEH DET PLAN [ 2]
TYPE: S-STANDARD
TS2 DETECTOR..... . ECPI LOG.......   NO
DET PH - 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 1  1    . . . . . . . . . . . . . . . .
EXTEND TIME...  0.0 DELAY TIME...    0.0
USE ADDED INITIAL . CROSS SWITCH PH..  0
LOCK IN....... NONE NTCIP VOL . OR OCC .
PMT QUEUE DELAY. NO
```

← NOTICE VEH DET PLAN 2

← ENSURE DELAY IS SET TO '0.0'

- Place cursor in VEH DETECTOR [ ] position and enter "26".
- Set assigned phase to "0".

```
VEH DETECTOR [26]   VEH DET PLAN [ 2]
TYPE: S-STANDARD
TS2 DETECTOR..... . ECPI LOG.......   NO
DET PH - 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 26 0    . . . . . . . . . . . . . . . .
EXTEND TIME...  0.0 DELAY TIME...    0.0
USE ADDED INITIAL . CROSS SWITCH PH..  0
LOCK IN....... NONE NTCIP VOL . OR OCC .
PMT QUEUE DELAY. NO
```

← NOTICE VEH DET PLAN 2

ENSURE PHASE IS SET TO "0" →

- Place cursor in VEH DETECTOR [ ] position and enter "5".
- Set delay time to "3.0 seconds".

```
VEH DETECTOR [ 5]   VEH DET PLAN [ 2]
TYPE: S-STANDARD
TS2 DETECTOR..... . ECPI LOG.......   NO
DET PH - 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 5  5    . . . . . . . . . . . . . . . .
EXTEND TIME...  0.0 DELAY TIME...    3.0
USE ADDED INITIAL . CROSS SWITCH PH..  0
LOCK IN....... NONE NTCIP VOL . OR OCC .
PMT QUEUE DELAY. NO
```

← NOTICE VEH DET PLAN 2

← ENSURE DELAY IS SET TO '3.0'

- Place cursor in VEH DETECTOR [ ] position and enter "22".
- Set assigned phase to "0".

```
VEH DETECTOR [22]   VEH DET PLAN [ 2]
TYPE: S-STANDARD
TS2 DETECTOR..... . ECPI LOG.......   NO
DET PH - 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 22 0    . . . . . . . . . . . . . . . .
EXTEND TIME...  0.0 DELAY TIME...    0.0
USE ADDED INITIAL . CROSS SWITCH PH..  0
LOCK IN....... NONE NTCIP VOL . OR OCC .
PMT QUEUE DELAY. NO
```

← NOTICE VEH DET PLAN 2

ENSURE PHASE IS SET TO "0" →

- Place cursor in VEH DETECTOR [ ] position and enter "3".
- Set delay time to "3.0 seconds".

```
VEH DETECTOR [ 3]   VEH DET PLAN [ 2]
TYPE: S-STANDARD
TS2 DETECTOR..... . ECPI LOG.......   NO
DET PH - 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 3  3    . . . . . . . . . . . . . . . .
EXTEND TIME...  0.0 DELAY TIME...    3.0
USE ADDED INITIAL . CROSS SWITCH PH..  0
LOCK IN....... NONE NTCIP VOL . OR OCC .
PMT QUEUE DELAY. NO
```

← NOTICE VEH DET PLAN 2

← ENSURE DELAY IS SET TO '3.0'

- Place cursor in VEH DETECTOR [ ] position and enter "28".
- Set assigned phase to "0".

```
VEH DETECTOR [28]   VEH DET PLAN [ 2]
TYPE: S-STANDARD
TS2 DETECTOR..... . ECPI LOG.......   NO
DET PH - 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 28 0    . . . . . . . . . . . . . . . .
EXTEND TIME...  0.0 DELAY TIME...    0.0
USE ADDED INITIAL . CROSS SWITCH PH..  0
LOCK IN....... NONE NTCIP VOL . OR OCC .
PMT QUEUE DELAY. NO
```

← NOTICE VEH DET PLAN 2

ENSURE PHASE IS SET TO "0" →

- Place cursor in VEH DETECTOR [ ] position and enter "7".
- Set delay time to "3.0 seconds".

```
VEH DETECTOR [ 7]   VEH DET PLAN [ 2]
TYPE: S-STANDARD
TS2 DETECTOR..... . ECPI LOG.......   NO
DET PH - 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 7  7    . . . . . . . . . . . . . . . .
EXTEND TIME...  0.0 DELAY TIME...    3.0
USE ADDED INITIAL . CROSS SWITCH PH..  0
LOCK IN....... NONE NTCIP VOL . OR OCC .
PMT QUEUE DELAY. NO
```

← NOTICE VEH DET PLAN 2

← ENSURE DELAY IS SET TO '3.0'

- Place cursor in VEH DETECTOR [ ] position and enter "24".
- Set assigned phase to "0".

```
VEH DETECTOR [24]   VEH DET PLAN [ 2]
TYPE: S-STANDARD
TS2 DETECTOR..... . ECPI LOG.......   NO
DET PH - 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 24 0    . . . . . . . . . . . . . . . .
EXTEND TIME...  0.0 DELAY TIME...    0.0
USE ADDED INITIAL . CROSS SWITCH PH..  0
LOCK IN....... NONE NTCIP VOL . OR OCC .
PMT QUEUE DELAY. NO
```

← NOTICE VEH DET PLAN 2

ENSURE PHASE IS SET TO "0" →

END PROGRAMMING

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1978
DESIGNED: December 2018
SEALED: 12/21/2018
REVISED: N/A

Project #: 170905

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Signal Upgrade - Sheet 3 of 4

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ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 1146
(Martin Luther King Jr. Parkway)
at
NC 751 (Hope Valley Road)

Division 5 Durham County Durham

Prepared for: Transportation Mobility and Safety Division, Traffic Engineering & Signals Management Section, Department of Transportation, State of North Carolina

750 N.Greenfield Pkwy,Garner,NC 27529

PLAN DATE: December 2018	REVIEWED BY: L. Boyer
PREPARED BY: T. S. Warren	REVIEWED BY: A. Ravipati

REVISIONS	INIT.	DATE

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 032117 ENGINEER ROYAL HINSHAW

DocuSigned by: R. Royal Hinshaw 12/21/2018
SIGNATURE DATE

SIG. INVENTORY NO. 05-1978

PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig.306.4

ALTERNATE PHASING ACTIVATION DETAIL

TO RUN ALT. PHASING DURING FREE RUN - PROGRAM CHANGES (SHOWN BELOW) IN A TIME BASED ACTION PLAN. SCHEDULE A DAY PLAN THAT INCLUDES THE ACTION PLAN PROGRAMMED TO SELECT VEH DET PLAN 2 AND ENABLE SF BITS 1, 3, 5, and 7.

TO RUN ALT. PHASING DURING COORDINATION - SELECT THE TIME BASED ACTION PLAN THAT IS PROGRAMMED TO SELECT VEH DET PLAN 2 AND ENABLE SF BITS 1, 3, 5, and 7.

PHASING	VEH DET PLAN	SF BITS ENABLED
ACTIONS REQUIRED TO RUN DEFAULT PHASING	1	NONE
ACTIONS REQUIRED TO RUN ALTERNATE PHASING	2	1, 3, 5, 7

IMPORTANT: IF ALT. PHASING IS USED DURING FREE RUN AND COORDINATION, DO NOT OPERATE TIME OF DAY EVENTS CONCURRENTLY WITH COORDINATION PLAN EVENTS IN THE EVENT SCHEDULER. (EX. FREE RUN EVENT SHOULD END BEFORE COORDINATION PLAN EVENT STARTS AND VICE-VERSA).

ALTERNATE PHASING CHANGE SUMMARY

THE FOLLOWING IS A SUMMARY OF WHAT TAKES PLACE WHEN SF BITS 1, 3, 5, AND 7 AND VEH DET PLAN 2 ACTIVATE TO CALL THE "ALTERNATE PHASING":

SF BITS 1,3,5,7: Modifies overlap parent 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 disables the delay time for the phase 1 call on loop 1A.

Disables phase 8 call on loop 3A and reduces delay time for phase 3 call on loop 3A to 3.0 seconds.

Disables phase 2 call on loop 5A and reduces delay time for phase 5 call on loop 5A to 3.0 seconds.

Disables phase 4 call on loop 7A and reduces delay time for phase 7 call on loop 7A to 3.0 seconds.

ECONOLITE ASC/3-2070 ACTION PLAN PROGRAMMING DETAIL

1. From Main Menu select [5. TIME BASE]
2. From TIME BASE Submenu select [2. ACTION PLAN]

```
ACTION PLAN...[  1]
PATTERN..........AUTO   SYS OVERRIDE.... NO
TIMING PLAN........ 0   SEQUENCE........  0
VEH DETECTOR PLAN.. 2   DET LOG........NONE
FLASH...........   --   RED REST........ NO
VEH DET DIAG PLN... 0   PED DET DIAG PLN..0
DIMMING ENABLE..   NO   PRIORITY RETURN. NO
PED PR RETURN..    NO   QUEUE DELAY..... NO
PMT COND DELAY     NO
  PHASE   1  2  3  4  5  6  7  8  9  0  1  2  3  4  5  6
PED RCL   .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
WALK 2    .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
VEX 2     .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
VEH RCL   .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
MAX RCL   .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
MAX 2     .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
  PHASE   1  2  3  4  5  6  7  8  9  0  1  2  3  4  5  6
MAX 3     .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
CS INH    .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
OMIT      .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
SPC FCT   X  .  X  .  X  .  X  .  (1-8)
AUX FCT   .  .  .  (1-3)
          1  2  3  4  5  6  7  8  9  0  1  2  3  4  5
LP 1-15   .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 16-30  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 31-45  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 46-60  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 61-75  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 76-90  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 91-100 .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
```

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: 05-1978
DESIGNED: December 2018
SEALED: 12/21/2018
REVISED: N/A

Project #: 170905

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Signal Upgrade - Sheet 4 of 4

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 1146
(Martin Luther King Jr. Parkway)
at
NC 751 (Hope Valley Road)

Division 5 Durham County Durham

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

PLAN DATE:	December 2018	REVIEWED BY:	L. Boyer
PREPARED BY:	T. S. Warren	REVIEWED BY:	A. Ravipati

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 032117 ENGINEER ROYAL HINSHAW

DocuSigned by: S. Royal Hinshaw 12/21/2018
SIGNATURE DATE
DOCUSIGNED VERIFIED
SIG. INVENTORY NO. 05-1978

DocuSign Envelope ID: DBF03BB9-B0B2-4696-9D4D-F5D5477BFB20

PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG.307.0

PHASING DIAGRAM

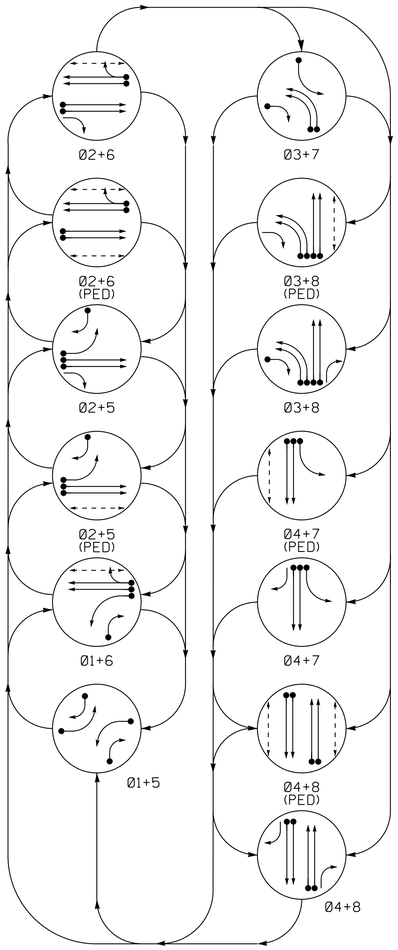


TABLE OF OPERATION

SIGNAL FACE	PHASE 01+5	01+6	02+5+PED	02+5	02+6+PED	02+6	03+7	03+8+PED	03+8	04+7+PED	04+7	04+8+PED	04+8	FLASH
11	←●	←●	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~
12	→●	→●	R	R	R	R	R	R	→●	R	R	R	→●	R
21, 22	R	R	G	G	G	G	R	R	R	R	R	R	R	Y
31, 32	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	←–	←–	←–	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~
33	R	R	R	→●	R	→●	→●	→●	→●	R	R	R	R	R
41, 42	R	R	R	R	R	R	R	R	R	G	G	G	G	R
51	←●	~~R~~	←–	←–	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~
52	→●	R	→●	→●	R	R	R	R	R	R	→●	R	→●	R
61, 62	R	G	R	R	G	G	R	R	R	R	R	R	R	Y
71	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	←–	~~R~~	~~R~~	←–	←–	~~R~~	~~R~~	~~R~~
81, 82	R	R	R	R	R	R	R	G	G	R	R	G	G	R
P21, P22	DW	DW	W	DW	W	DW	DW	DW	DW	DW	DW	DW	DW	DRK
P41, P42	DW	DW	DW	DW	DW	DW	DW	DW	W	DW	W	DW	DW	DRK
P61, P62	DW	W	DW	DW	W	W	DW	DW	DW	DW	DW	DW	DW	DRK
P81, P82	DW	DW	DW	DW	DW	DW	DW	W	DW	DW	DW	W	DW	DRK
✱ SIGN C	OFF	OFF	ON	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	#
✱ SIGN D	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF	ON	OFF	#
✱ SIGN E	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF	OFF	OFF	ON	OFF	#

See Note 10
✱ See Note 15

ASC/3 DETECTOR INSTALLATION CHART

DETECTOR LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
1A	6X40	0	2-4-2	-	1	Yes	-	-	-	S	-	X
1B	6X40	0	2-4-2	-	1	Yes	-	15	-	S	-	X
2A	6X6	300	EXIST	-	2	Yes	-	-	X	N	-	X
2B	6X6	300	EXIST	-	2	Yes	-	-	X	N	-	X
3A	6X40	0	2-4-2	-	3	Yes	-	-	-	S	-	X
3B	6X40	0	2-4-2	-	3	Yes	-	-	-	S	-	X
3C	6X40	0	2-4-2	-	3	Yes	-	15	-	S	-	X
4A	6X6	300	EXIST	-	4	No	3.4	-	-	N	-	X
4B	6X6	300	EXIST	-	4	No	3.4	-	-	N	-	X
4C	6X40	0	2-4-2	-	4	Yes	-	-	-	S	-	X
4D	6X40	0	2-4-2	-	4	Yes	-	-	-	S	-	X
4E#	5X6	0	2-4-2 DIAGONAL	-	4	Yes	-	-	-	S	-	X
5A	6X40	0	2-4-2	-	5	Yes	-	-	-	S	-	X
5B	6X40	0	2-4-2	-	5	Yes	-	15	-	S	-	X
6A	6X6	300	EXIST	-	6	Yes	-	-	X	N	-	X
6B	6X6	300	EXIST	-	6	Yes	-	-	X	N	-	X
7A	6X40	0	2-4-2	-	7	Yes	-	-	-	S	-	X
8A	6X6	300	EXIST	-	8	No	3.4	-	-	N	-	X
8B	6X6	300	EXIST	-	8	No	3.4	-	-	N	-	X
8C	6X40	0	2-4-2	-	8	Yes	-	-	-	S	-	X
8D	6X40	0	2-4-2	-	8	Yes	-	-	-	S	-	X
8E#	5X6	0	2-4-2 DIAGONAL	-	8	Yes	-	-	-	S	-	X

Bike Detector. Set sensitivity to appropriate level to detect bicycles.

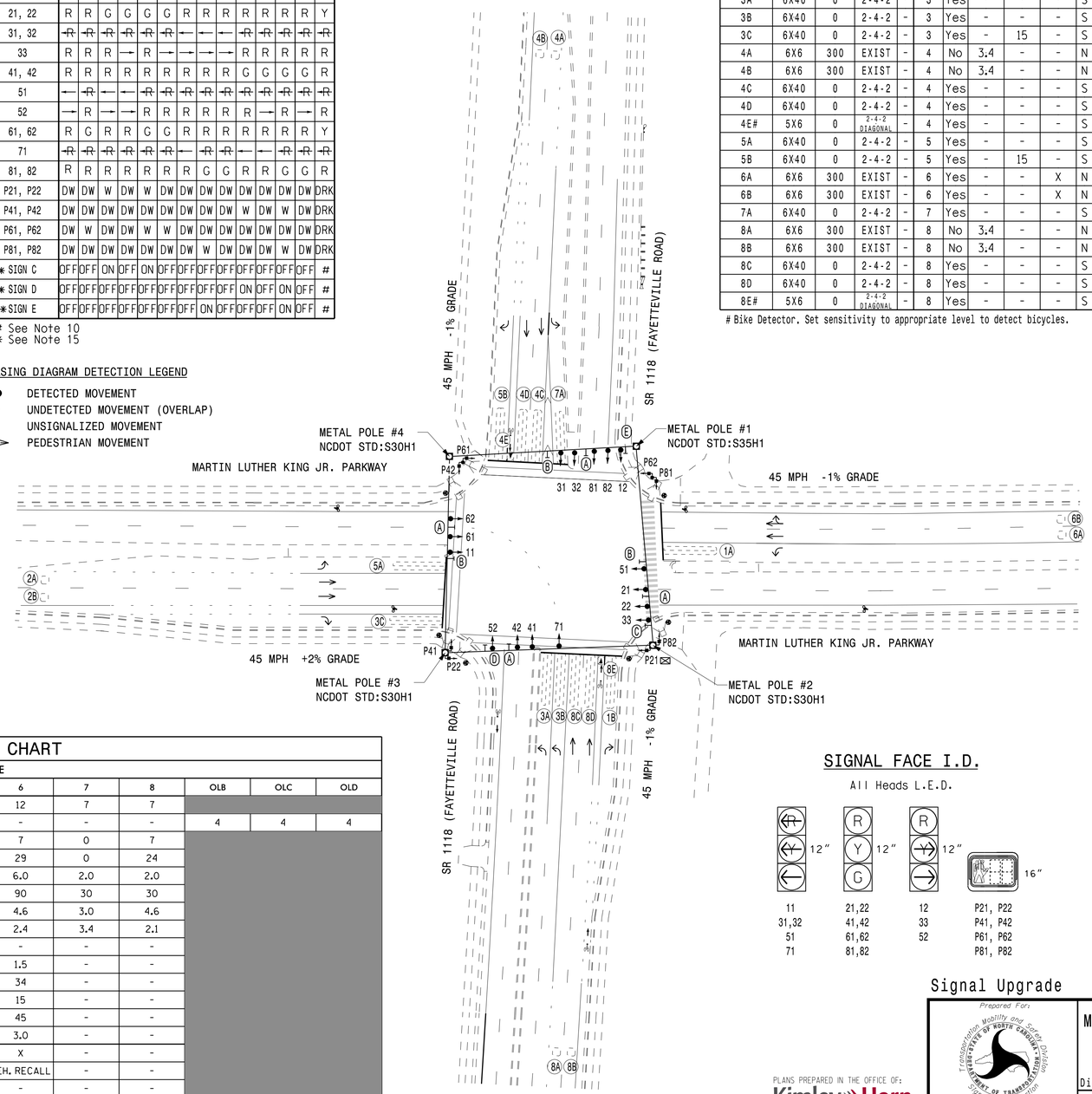
8 PHASE FULLY ACTUATED (DURHAM SIGNAL SYSTEM)

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. Ensure flashing operation does not alter operation of blankout signs.
11. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
12. Loop data based on previous plan and/or field observations.
13. Install new cabinet on the existing cabinet foundation.
14. Maintain pedestrian/bike camera detection.
15. Blankout signs C, D, and E shall illuminate on when a Phase 2, 4, and 8 Pedestrian, respectively, is detected, and the corresponding phase is next in the cycle, and shall remain on through the flashing "DON'T WALK" interval.

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 With Push Button & Sign	
	Type I Pushbutton Post	
	Type II Signal Pedestal	
	Metal Strain Pole	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
	Bike Marking	
Ⓐ	Street Sign (D3-1)	Ⓐ
Ⓑ	"U-TURN YIELD TO RIGHT TURN" Sign (R10-16)	Ⓑ
Ⓒ	"NO TURN ON RED" LED Blankout Sign	Ⓒ
Ⓓ	"NO TURN ON RED" LED Blankout Sign	Ⓓ
Ⓔ	"NO TURN ON RED" LED Blankout Sign	Ⓔ

SIGNAL FACE I.D.

All Heads L.E.D.

11	21,22	12	P21, P22
31,32	41,42	33	P41, P42
51	61,62	52	P61, P62
71	81,82		P81, P82

ASC/3 TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6	7	8	OLB	OLC	OLD
Min Green *	7	12	7	7	7	12	7	7			
Guar Min OVL Green	-	-	-	-	-	-	-	-	4	4	4
Walk *	0	7	0	7	0	7	0	7			
Ped Clear	0	33	0	27	0	29	0	24			
Veh. Extension *	2.0	6.0	2.0	2.0	2.0	6.0	2.0	2.0			
Max 1 *	30	90	30	30	30	90	30	30			
Yellow	3.0	4.3	3.0	4.6	3.0	4.6	3.0	4.6			
Red Clear	3.7	2.4	3.8	2.1	3.7	2.4	3.4	2.1			
Actuations B4 Add *	-	-	-	-	-	-	-	-			
Seconds /Actuation *	-	1.5	-	-	-	1.5	-	-			
Max Initial *	-	34	-	-	-	34	-	-			
Time Before Reduction *	-	15	-	-	-	15	-	-			
Time To Reduce *	-	45	-	-	-	45	-	-			
Minimum Gap	-	3.0	-	-	-	3.0	-	-			
Locking Detector	-	X	-	-	-	X	-	-			
Recall Position	-	VEH. RECALL	-	-	-	VEH. RECALL	-	-			
Dual Entry	-	-	-	-	-	-	-	-			
Simultaneous Gaps	X	X	X	X	X	X	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: Transportation Mobility and Safety Division, Signal Design Section, NORTH CAROLINA DEPARTMENT OF TRANSPORTATION, 750 N.Greenfield Pkwy,Garner,NC 27529

Martin Luther King Jr. Parkway at SR 1118 (Fayetteville Road)

Division 5 Durham County Durham

PLAN DATE:	May 2018	REVIEWED BY:	SL Phillips
PREPARED BY:	DA Waller	REVIEWED BY:	KP Baumann

REVISIONS	INIT.	DATE

SCALE 0 50 1"=50'

SEAL: NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACIE L. PHILLIPS

DocuSigned by: 5C87A59ED60B437... 12/19/2018

SIGNATURE DATE

SIG. INVENTORY NO. 05-1979

PLANS PREPARED IN THE OFFICE OF:
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12/19/2018
KAHALL, DERICK M.
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ITS401036410 - Durham Signal System$signals$4 - Signal Design$GROUP 6$U-5968_051979-2018.dgn

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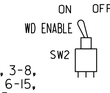
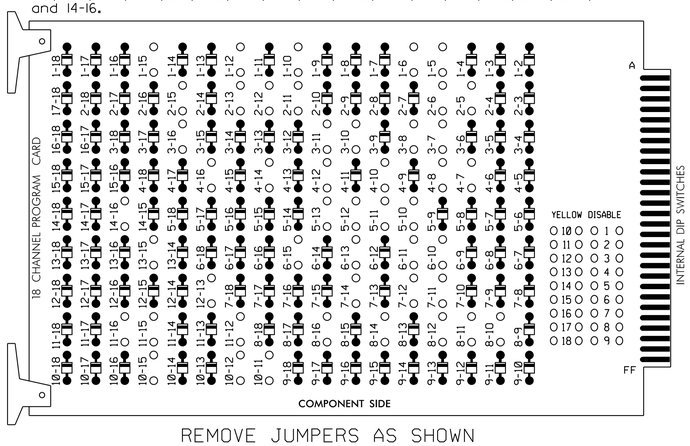
PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG.307.1

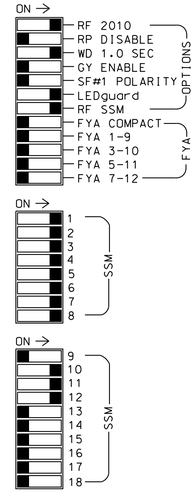
EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



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





■ = 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 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 phase 2 Walk and 6 Walk.
3. The cabinet and controller are part of the Durham Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070LX
CABINET.....332 W/AUX
SOFTWARE.....ECONOLITE ASC/3-2070
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 S2,AUX S4, AUX S5
PHASES USED.....1,2,2PED,3,4,4PED,5,6,6PED,7, 8,8PED
OVERLAP "A".....NOT USED
OVERLAP "B".....*
OVERLAP "C".....*
OVERLAP "D".....*

* 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	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	11	21,22	P21, P22	31,32	41,42	P41, P42	51	61,62	P61, P62	71	81,82	P81, P82	NU	12	NU	33	52	NU
RED		128			101			134			107			A124		A114	A101	
YELLOW		129			102			135			108							
GREEN		130			103			136			109							
RED ARROW	125			116			131			122								
YELLOW ARROW	126			117			132			123				A125		A115	A102	
GREEN ARROW	127			118			133			124				A126		A116	A103	
✋			113			104			119			110						
PED YELLOW			**			**						**						
🚶			115			106			121			112						

NU = Not Used

** A blankout sign is wired to S2P-Y, S4P-Y, and S8P-Y. See wiring and programming detail on Sheet 2 of this electrical detail.

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	SLOT EMPTY	SLOT EMPTY	Ø3 3A	Ø4 4A	Ø4 4C	Ø4 4E	Ø1 1B	SLOT EMPTY	SLOT EMPTY	Ø2 PED DC ISOLATOR	Ø6 PED DC ISOLATOR	FS DC ISOLATOR
	L	NOT USED	Ø2 2B			Ø3 3B	Ø4 4B	Ø4 4D	NOT USED	Ø3 3C			Ø4 PED DC ISOLATOR	Ø8 PED DC ISOLATOR	ST DC ISOLATOR
FILE "J"	U	Ø5 5A	Ø6 6A	SLOT EMPTY	SLOT EMPTY	Ø7 7A	Ø8 8A	Ø8 8C	Ø8 8E	Ø5 5B	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L	NOT USED	Ø6 6B			NOT USED	Ø8 8B	Ø8 8D	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.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND TIME	DELAY TIME	ADDED INITIAL	DETECTOR TYPE
1A	TB2-1,2	I1U	56	1	1	YES				S
1B	TB6-9,10	I9U	60	11	1	YES		15		S
2A	TB2-5,6	I2U	39	2	2	YES			X	N
2B	TB2-7,8	I2L	43	12	2	YES			X	N
3A	TB4-5,6	I5U	58	3	3	YES				S
3B	TB4-7,8	I5L	58	3	3	YES				S
3C	TB6-11,12	I9L	62	13	3	YES		15		S
4A	TB4-9,10	I6U	41	4	4	NO	3.4			N
4B	TB4-11,12	I6L	45	14	4	NO	3.4			N
4C	TB6-1,2	I7U	65	34	4	YES				S
4D	TB6-3,4	I7L	78	44	4	YES				S
4E	TB6-5,6	I8U	49	24	4	YES				S
5A	TB3-1,2	J1U	55	5	5	YES				S
5B	TB7-9,10	J9U	59	15	5	YES		15		S
6A	TB3-5,6	J2U	40	6	6	YES			X	N
6B	TB3-7,8	J2L	44	16	6	YES			X	N
7A	TB5-5,6	J5U	57	7	7	YES				S
8A	TB5-9,10	J6U	42	8	8	NO	3.4			N
8B	TB5-11,12	J6L	46	18	8	NO	3.4			N
8C	TB7-1,2	J7U	66	38	8	YES				S
8D	TB7-3,4	J7L	79	48	8	YES				S
8E	TB7-5,6	J8U	50	28	8	YES				S
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.

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

FLASHER CIRCUIT MODIFICATION DETAIL

IN ORDER TO ENSURE 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: 05-1979
DESIGNED: MAY 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail - Sheet 1 of 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

Martin Luther King Jr. Parkway at SR 1118 (Fayetteville Road)

Division 5 Durham County Durham

PLAN DATE: May 2018		REVIEWED BY:	SL Phillips
PREPARED BY: DA Waller		REVIEWED BY:	KP Baumann

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACIE L. PHILLIPS

DocuSigned by: 12/19/2018
DC87A59ED60B437...
SIGNATURE DATE

SIG. INVENTORY NO. 05-1979

PLANS PREPARED IN THE OFFICE OF:
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NC License #F-0102
421 Fayetteville Street, Suite 600
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(919) 677-2000

12/19/2018
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derrick.waller

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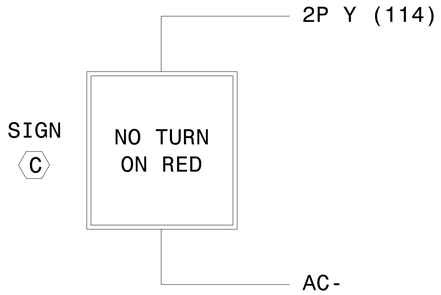
PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG.307.2

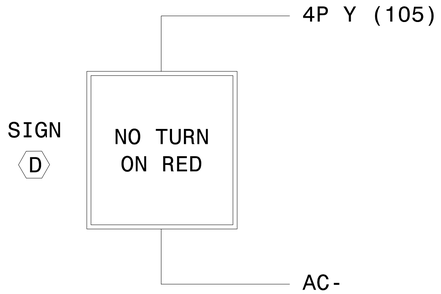
BLANKOUT SIGN "C" WIRING AND PROGRAMMING DETAIL



NOTE

If Terminal 114 has a conflict monitor wire connected, remove, tap and label wire.

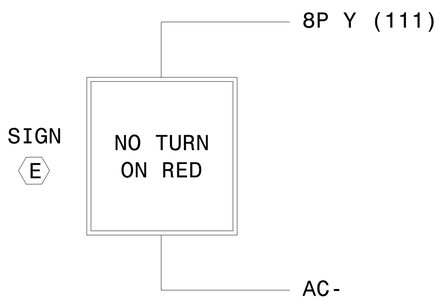
BLANKOUT SIGN "D" WIRING AND PROGRAMMING DETAIL



NOTE

If Terminal 105 has a conflict monitor wire connected, remove, tap and label wire.

BLANKOUT SIGN "E" WIRING AND PROGRAMMING DETAIL



NOTE

If Terminal 111 has a conflict monitor wire connected, remove, tap and label wire.

ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select [2. CONTROLLER]
2. From CONTROLLER Submenu select [2. VEHICLE OVERLAPS]

Toggle Once

OVERLAP B

Select TMG VEH OVLP [B] and 'OTHER/ECONOLITE'

```
TMG VEH OVLP...[B] TYPE:OTHER/ECONOLITE
  PHASES 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
INCLUDED X . . . . . . X . . . . . . . .
PROTECT  . . . . . . . . . . . . . . . .
PED PRTC . . . . . . . X . . . . . . . .
NOT OVLP . . . . . . . . . . . . . . . .
FLSH GRN . . . . . . . . . . . . . . . .
LAG X PH . . . . . . . . . . . . . . . .
LAG 2 PH . . . . . . . . . . . . . . . .

LAG GRN 0.0 YEL 0.0 RED 0.0 ADV GRN 0.0
```

Toggle Once

OVERLAP C

Select TMG VEH OVLP [C] and 'OTHER/ECONOLITE'

```
TMG VEH OVLP...[C] TYPE:OTHER/ECONOLITE
  PHASES 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
INCLUDED . X X . . . . . . . . . . . . .
PROTECT  . . . . . . . . . . . . . . . .
PED PRTC . X . . . . . . . . . . . . . .
NOT OVLP . . . . . . . . . . . . . . . .
FLSH GRN . . . . . . . . . . . . . . . .
LAG X PH . . . . . . . . . . . . . . . .
LAG 2 PH . . . . . . . . . . . . . . . .

LAG GRN 0.0 YEL 0.0 RED 0.0 ADV GRN 0.0
```

Toggle Once

OVERLAP D

Select TMG VEH OVLP [D] and 'OTHER/ECONOLITE'

```
TMG VEH OVLP...[D] TYPE:OTHER/ECONOLITE
  PHASES 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
INCLUDED . . . X X . . . . . . . . . . .
PROTECT  . . . . . . . . . . . . . . . .
PED PRTC . . . X . . . . . . . . . . . .
NOT OVLP . . . . . . . . . . . . . . . .
FLSH GRN . . . . . . . . . . . . . . . .
LAG X PH . . . . . . . . . . . . . . . .
LAG 2 PH . . . . . . . . . . . . . . . .

LAG GRN 0.0 YEL 0.0 RED 0.0 ADV GRN 0.0
```

END PROGRAMMING

3. From Main Menu select [2. CONTROLLER]
4. From CONTROLLER Submenu select [4. GUAR MIN TIME]

Set the Guaranteed Minimum Time for Overlaps B, C, and D to 4 seconds.

Electrical Detail - Sheet 2 of 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1979
DESIGNED: MAY 2018
SEALED: 12/19/2018
REVISED: N/A

PLANS PREPARED IN THE OFFICE OF:
Kimley»Horn
NC License #F-0102
421 Fayetteville Street, Suite 600
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ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

Martin Luther King Jr. Parkway
at
SR 1118 (Fayetteville Road)

Division 5 Durham County Durham

PLAN DATE: May 2018		REVIEWED BY:	SL Phillips
PREPARED BY: DA Waller		REVIEWED BY:	KP Baumann

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACIE L. PHILLIPS

DocuSigned by:
DC87A55ED60B437...
12/19/2018
SIGNATURE DATE

SIG. INVENTORY NO. 05-1979

12/19/2018
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derrick.waller

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PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG.307.3

ECONOLITE ASC/3-2070 LOGIC PROCESSOR PROGRAMMING DETAIL FOR PEDESTRIAN BLANKOUT SIGNS

(program controller as shown)

The following logic processor configuration turns on blankout signs prior to the corresponding phase if there is a Phase 2, 4, or 8 Pedestrian call.

1. From Main Menu select 1. CONFIGURATION
2. From CONFIGURATION Submenu select 8. LOGIC PROCESSOR
3. From LOGIC PROCESSOR Submenu select 2. LOGIC STATEMENTS

ENTER A "1" IN THE LP# FIELD, PRESS 'ENTER', AND PROGRAM AS SHOWN.

```
LP#:   1  COPY FROM:   1  ACTIVE:  M   (T/F)

IF     CTR ON PH PED CHK        2   IS  ON
AND    CTR PH NEXT ON PHS       2   IS  ON
OR     PED ON PH WALK           2   IS  ON
OR     PED ON PH PED CLR        2   IS  ON

THEN   SIG SET PH PED CLR       2       ON
```

TURNS ON BLANKOUT SIGN C PRIOR TO PHASE 2 IF THERE IS A PHASE 2 PEDESTRIAN CALL

ENTER A "2" IN THE LP# FIELD, PRESS 'ENTER', AND PROGRAM AS SHOWN.

```
LP#:   2  COPY FROM:   1  ACTIVE:  M   (T/F)

IF     CTR ON PH PED CHK        4   IS  ON
AND    CTR PH NEXT ON PHS       4   IS  ON
OR     PED ON PH WALK           4   IS  ON
OR     PED ON PH PED CLR        4   IS  ON

THEN   SIG SET PH PED CLR       4       ON
```

TURNS ON BLANKOUT SIGN D PRIOR TO PHASE 4 IF THERE IS A PHASE 4 PEDESTRIAN CALL

ENTER A "3" IN THE LP# FIELD, PRESS 'ENTER', AND PROGRAM AS SHOWN.

```
LP#:   3  COPY FROM:   1  ACTIVE:  M   (T/F)

IF     CTR ON PH PED CHK        8   IS  ON
AND    CTR PH NEXT ON PHS       8   IS  ON
OR     PED ON PH WALK           8   IS  ON
OR     PED ON PH PED CLR        8   IS  ON

THEN   SIG SET PH PED CLR       8       ON
```

TURNS ON BLANKOUT SIGN E PRIOR TO PHASE 8 IF THERE IS A PHASE 8 PEDESTRIAN CALL

1. From Main Menu select 1. CONFIGURATION
2. From CONFIGURATION Submenu select 8. LOGIC PROCESSOR
3. From the LOGIC PROCESSOR Submenu select 1. LOGIC STATEMENT CONTROL

ENABLE LOGIC PROCESSOR STATEMENTS 1-3 BY POSITIONING THE CURSOR OVER THE FIELDS SHOWN BELOW AND USING THE TOGGLE KEY TO ENABLE THEM.

LOGIC STATEMENT CONTROL

	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6
LP 1-15	E	E	E	.	.	.	.	.	.	.	.	.	.	.	.	.
LP 16-30	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
LP 31-45	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
LP 46-60	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
LP 61-75	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
LP 76-90	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

END PROGRAMMING

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1979
DESIGNED: MAY 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail - Sheet 3 of 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared For:
Transportation Mobility and Safety Division
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
Bureau of Traffic Engineering & Signal Management Section
750 N.Greenfield Pkwy,Garner,NC 27529

Martin Luther King Jr. Parkway
at
SR 1118 (Fayetteville Road)

Division 5 Durham County Durham

PLAN DATE: May 2018	REVIEWED BY:	SL Phillips	
PREPARED BY: DA Waller	REVIEWED BY:	KP Baumann	

REVISIONS	INIT.	DATE

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACE L. PHILLIPS

DocuSigned by:
SIGNATURE 12/19/2018 DATE

SIG. INVENTORY NO. 05-1979

PLANS PREPARED IN THE OFFICE OF:
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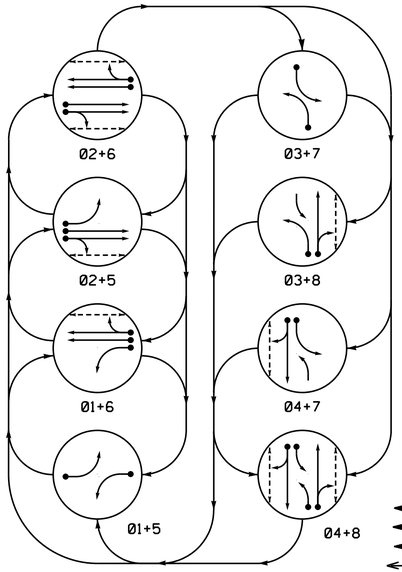
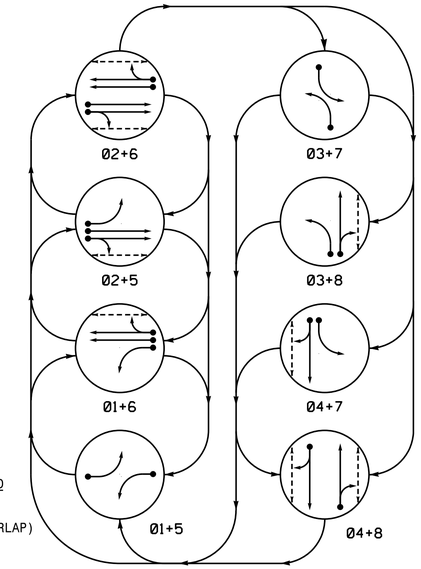
12/19/2018
K:\RAL_TPO\ITS\011036410 - Durham Signal System\Signals\S4 - Signal Design\GROUP 6\U-5968_051979-2018e3.dgn
derrick.waller

PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig.308.0

DEFAULT PHASING DIAGRAM



ALTERNATE PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

ASC/3 DETECTOR INSTALLATION CHART

DETECTOR					PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
1A	6X40	+5	2-4-2	-	1	Yes	-	3	-	S	-	X
2A	6X6	70	4	-	2	Yes	-	-	-	S	-	X
2B	6X6	70	4	-	2	Yes	-	-	-	S	-	X
3A	6X60	0	2-4-2	-	3	Yes	-	10*	-	S	-	X
					8#	Yes	-	3	-	S	-	X
4A	6X60	0	2-4-2	-	4	Yes	-	10	-	S	-	X
5A	6X60	0	2-4-2	-	5	Yes	-	3	-	S	-	X
6A	6X6	70	4	-	6	Yes	-	-	-	S	-	X
6B	6X6	70	4	-	6	Yes	-	-	-	S	-	X
7A	6X60	0	2-4-2	-	7	Yes	-	10*	-	S	-	X
					4#	Yes	-	3	-	S	-	X
8A	6X60	0	2-4-2	-	8	Yes	-	10	-	S	-	X

* Reduce delay to 3 seconds during Alternate Phasing Operation.
\# Disable phase call for loop(s) during Alternate Phasing Operation.

8 Phase
Fully Actuated
(Durham Signal System)

NOTES

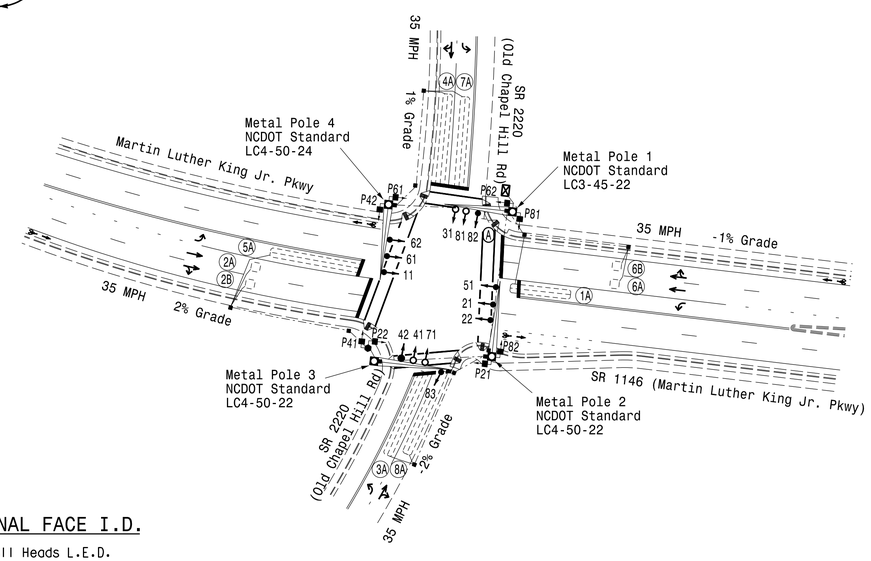
1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 and/or phase 5 may be lagged.
4. Phase 3 and/or phase 7 may be lagged.
5. Reposition existing signal head numbered 42 and 82 and sign A.
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. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
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. 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.
14. Loop data based on previous plan and/or field observations.
15. Install new cabinet on the existing cabinet foundation.

DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE 01+5	01+6	02+5	02+6	03+7	03+8	04+7	04+8	FLASH
11	—	—	R	R	R	R	R	R	R
21,22	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	—	R	—	R	R	R	R	R	R
61,62	R	G	R	G	R	R	R	R	Y
71	R	R	R	R	—	F Y	—	F Y	R
81,82,83	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 TABLE OF OPERATION

SIGNAL FACE	PHASE 01+5	01+6	02+5	02+6	03+7	03+8	04+7	04+8	FLASH
11	—	—	R	R	R	R	R	R	R
21,22	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	R
61,62	R	G	R	G	R	R	R	R	Y
71	R	R	R	R	—	R	—	R	R
81,82,83	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



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	
N/A	Curb Ramp	
	Turn on Red Yield to U-Turn R10-30(modified)	

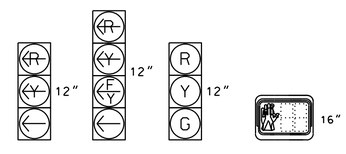
ASC/3 TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6	7	8
Min Green *	7	10	7	7	7	10	7	7
Walk *	0	7	0	7	0	7	0	7
Ped Clear	0	10	0	20	0	9	0	21
Veh. Extension *	2.0	3.0	2.0	2.0	2.0	3.0	2.0	2.0
Max 1 *	15	60	15	40	15	60	15	40
Yellow	3.0	3.7	3.0	4.0	3.0	3.9	3.0	4.0
Red Clear	2.8	1.5	2.6	2.3	2.9	1.3	2.6	2.3
Actuations B4 Add *	-	-	-	-	-	-	-	-
Seconds /Actuation *	-	-	-	-	-	-	-	-
Max Initial *	-	-	-	-	-	-	-	-
Time Before Reduction *	-	-	-	-	-	-	-	-
Time To Reduce *	-	-	-	-	-	-	-	-
Minimum Gap	-	-	-	-	-	-	-	-
Locking Detector	-	X	-	-	-	X	-	-
Recall Position	-	VEH. RECALL	-	-	-	VEH. RECALL	-	-
Dual Entry	-	-	-	X	-	-	-	X
Simultaneous Gap	X	X	X	X	X	X	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.



11 51	31 71	21,22 41,42 61,62 81,82,83	P21,P22 P41,P42 P61,P62 P81,P82

Project #: 170905

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NCBELS FIRM LICENSE NO: C-2522

Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

SCALE 0 50 1'=50'

SR 1146 (Martin Luther King Jr. Parkway) at SR 2220 (Old Chapel Hill Road)

Division 5 Durham County Durham

PLAN DATE:	December 2018	REVIEWED BY:	A. D. Hayes
PREPARED BY:	A. Ravipati	REVIEWED BY:	L. Boyer

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 044157 ENGINEER ANDREW D HAYES

DocuSigned by: Andrew Hayes
SIGNATURE 12/21/2018 DATE

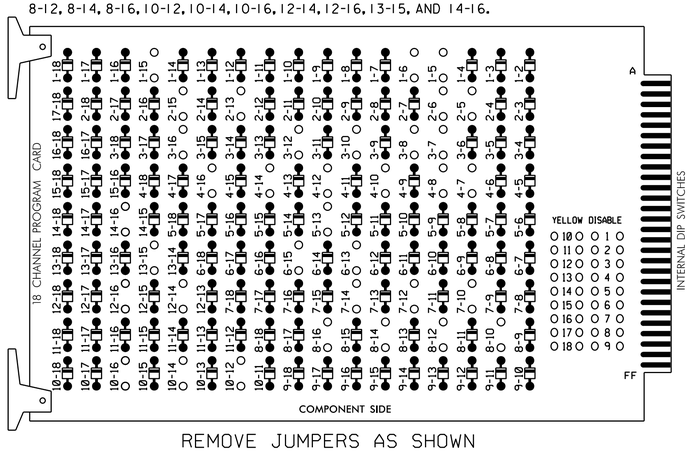
SIG. INVENTORY NO. 05-1980

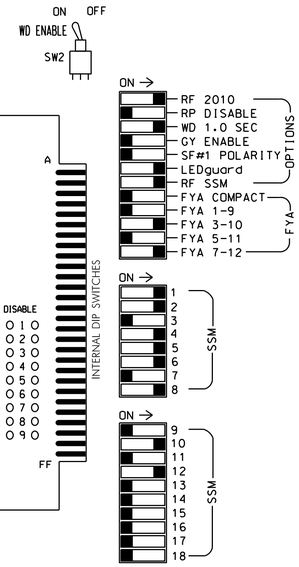
PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig.308.1

EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS I-5, I-6, I-15, 2-5, 2-6, 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, 5-13, 6-13, 6-15, 7-10, 7-12, 7-14, 8-10, 8-12, 8-14, 8-16, 10-12, 10-14, 10-16, 12-14, 12-16, 13-15, AND 14-16.





■ = 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 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 phases 4 and 8 for Dual Entry.
3. Program controller to start up in phase 2 Walk and 6 Walk.
4. The cabinet and controller are part of the Durham Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070LX
CABINET.....332 W/AUX
SOFTWARE.....ECONOLITE ASC/3-2070
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 S2,AUX S5
PHASES USED.....1,2,2 PED,3,4,4 PED,5,6,6 PED, 7,8,8 PED
OVERLAP "A".....NOT USED
OVERLAP "B".....✳
OVERLAP "C".....NOT USED
OVERLAP "D".....✳

✳ 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	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	11	21,22	P21, P22	31★	41,42	P41, P42	51	61,62	P61, P62	71★	81,82, 83	P81, P82	NU	31★	NU	NU	71★	NU
RED		128			101			134			107							
YELLOW		129		✳	102			135		✳	108							
GREEN		130			103			136			109							
RED ARROW	125						131							A124			A101	
YELLOW ARROW	126						132							A125			A102	
FLASHING YELLOW ARROW														A126			A103	
GREEN ARROW	127			118			133			124								
✋			113			104			119			110						
🚶			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.

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	SLOT EMPTY	SLOT EMPTY	Ø3 3A	Ø4 4A	SLOT EMPTY	WIRED INPUT ⊗	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	Ø2 PED DC ISOLATOR	Ø6 PED DC ISOLATOR	FS DC ISOLATOR
	L	NOT USED	Ø2 2B			NOT USED	NOT USED						Ø4 PED DC ISOLATOR	Ø8 PED DC ISOLATOR	ST DC ISOLATOR
FILE "J"	U	Ø5 5A	Ø6 6A	SLOT EMPTY	SLOT EMPTY	Ø7 7A	Ø8 8A	SLOT EMPTY	WIRED INPUT ⊗	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L	NOT USED	Ø6 6B			NOT USED	NOT USED								

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

FS = FLASH SENSE
ST = STOP TIME

⊗ Wired Input - Do not populate slot with detector card

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND TIME	DELAY TIME	ADDED INITIAL	DETECTOR TYPE
1A	TB2-1,2	I1U	56	1	1	YES	-	3	-	S
2A	TB2-5,6	I2U	39	2	2	YES	-	-	-	S
2B	TB2-7,8	I2L	43	12	2	YES	-	-	-	S
3A[1]	TB4-5,6	I5U	58	3★	3	YES	-	10	-	S
	-	J8U	50	28★	8	YES	-	3	-	S
4A	TB4-9,10	I6U	41	4	4	YES	-	10	-	S
5A	TB3-1,2	J1U	55	5	5	YES	-	3	-	S
6A	TB3-5,6	J2U	40	6	6	YES	-	-	-	S
6B	TB3-7,8	J2L	44	16	6	YES	-	-	-	S
7A[2]	TB5-5,6	J5U	57	7★	7	YES	-	10	-	S
	-	I8U	49	24★	4	YES	-	3	-	S
8A	TB5-9,10	J6U	42	8	8	YES	-	10	-	S
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.

[1] Add jumper from I5-W to J8-W, on rear of input file.

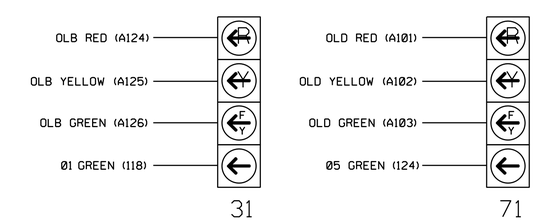
[2] Add jumper from J5-W to I8-W, on rear of input file.

★ 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

FYA SIGNAL WIRING DETAIL

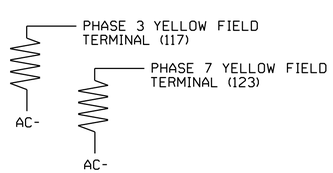
(wire signal heads as shown)



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: 05-1980
DESIGNED: December 2018
SEALED: 12/21/2018
REVISED: N/A

Project #: 170905

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Electrical Detail - Sheet 1 of 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

SR 1146 (Martin Luther King Jr. Parkway) at SR 2220 (Old Chapel Hill Road)

Division 5 Durham County Durham

PLAN DATE:	December 2018	REVIEWED BY:	L Boyer
PREPARED BY:	A Ravipati	REVIEWED BY:	A D Hayes

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 044157 ENGINEER ANDREW D HAYES

DocuSigned by: Andrew Hayes
PE-0000207-0000
SIGNATURE 12/21/2018 DATE

SIG. INVENTORY NO. 05-1980

PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig.308.2

ECONOLITE ASC/3-2070 VEHICLE DETECTOR SETUP PROGRAMMING DETAIL FOR ALTERNATE PHASING LOOPS 3A, 7A

(program controller as shown)

IMPORTANT!

Program detectors per the input file connection and programming chart shown on sheet 1 before proceeding.

1. From Main Menu select [8. UTILITIES]
2. From UTILITIES Submenu select [1. COPY/CLEAR]
3. Copy from DETECTOR PLAN "1" to DETECTOR PLAN "2".

```
COPY / CLEAR UTILITY
      FROM                TO
PHASE TIMING.... . > PHASE TIMING.... .
TIMING PLAN..... . > TIMING PLAN..... .
PH DET OPT PLAN. . > PH DET OPT PLAN. .
DETECTOR PLAN... 1 > DETECTOR PLAN... 2
  TOGGLE TO SELECT A "FROM" AND A "TO"
          THEN PRESS ENTER
```

4. From Main Menu select [6. DETECTORS]
5. From DETECTOR Submenu select [2. VEHICLE DETECTOR SETUP]
6. Place cursor in VEH DET PLAN [ ] position and enter "2".

- Place cursor in VEH DETECTOR [ ] position and enter "3".
- Set delay time to "3.0 seconds".

```
VEH DETECTOR [ 3]   VEH DET PLAN [ 2]
TYPE: S-STANDARD
TS2 DETECTOR..... . ECPI LOG.......   NO
DET PH - 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 3  3    . . . . . . . . . . . . . . . .
EXTEND TIME...  0.0 DELAY TIME...    3.0
USE ADDED INITIAL . CROSS SWITCH PH..  0
LOCK IN....... NONE NTCIP VOL . OR OCC .
PMT QUEUE DELAY. NO
```

NOTICE VEH DET PLAN 2

ENSURE DELAY IS SET TO '3.0'

- Place cursor in VEH DETECTOR [ ] position and enter "28".
- Set assigned phase to "0".

```
VEH DETECTOR [28]   VEH DET PLAN [ 2]
TYPE: S-STANDARD
TS2 DETECTOR..... . ECPI LOG.......   NO
DET PH - 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 28 0    . . . . . . . . . . . . . . . .
EXTEND TIME...  0.0 DELAY TIME...    0.0
USE ADDED INITIAL . CROSS SWITCH PH..  0
LOCK IN....... NONE NTCIP VOL . OR OCC .
PMT QUEUE DELAY. NO
```

NOTICE VEH DET PLAN 2

ENSURE PHASE IS SET TO "0"

- Place cursor in VEH DETECTOR [ ] position and enter "7".
- Set delay time to "3.0 seconds".

```
VEH DETECTOR [ 7]   VEH DET PLAN [ 2]
TYPE: S-STANDARD
TS2 DETECTOR..... . ECPI LOG.......   NO
DET PH - 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 7  7    . . . . . . . . . . . . . . . .
EXTEND TIME...  0.0 DELAY TIME...    3.0
USE ADDED INITIAL . CROSS SWITCH PH..  0
LOCK IN....... NONE NTCIP VOL . OR OCC .
PMT QUEUE DELAY. NO
```

NOTICE VEH DET PLAN 2

ENSURE DELAY IS SET TO '3.0'

- Place cursor in VEH DETECTOR [ ] position and enter "24".
- Set assigned phase to "0".

```
VEH DETECTOR [24]   VEH DET PLAN [ 2]
TYPE: S-STANDARD
TS2 DETECTOR..... . ECPI LOG.......   NO
DET PH - 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 24 0    . . . . . . . . . . . . . . . .
EXTEND TIME...  0.0 DELAY TIME...    0.0
USE ADDED INITIAL . CROSS SWITCH PH..  0
LOCK IN....... NONE NTCIP VOL . OR OCC .
PMT QUEUE DELAY. NO
```

NOTICE VEH DET PLAN 2

ENSURE PHASE IS SET TO "0"

END PROGRAMMING

ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select [2. CONTROLLER]
2. From CONTROLLER Submenu select [2. VEHICLE OVERLAPS]

OVERLAP B

Select TMG VEH OVLP [B] and 'PPLT FYA'

```
TMG VEH OVLP...[B] TYPE: ....PPLT FYA

PROTECTED LEFT TURN....   PHASE    3
OPPOSING THROUGH.......   PHASE    4

FLASHING ARROW OUTPUT.....CH10  ISOLATE

DELAY START OF: FYA..0.0 CLEARANCE..0.0
ACTION PLAN SF BIT DISABLE........... 3
```

NOTICE ACTION PLAN SF BIT "3"

Toggle Twice

OVERLAP D

Select TMG VEH OVLP [D] and 'PPLT FYA'

```
TMG VEH OVLP...[D] TYPE: ....PPLT FYA

PROTECTED LEFT TURN....   PHASE    7
OPPOSING THROUGH.......   PHASE    8

FLASHING ARROW OUTPUT.....CH12 ISOLATE

DELAY START OF: FYA..0.0 CLEARANCE..0.0
ACTION PLAN SF BIT DISABLE........... 7
```

NOTICE ACTION PLAN SF BIT "7"

END PROGRAMMING

Project #: 170905

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1980
DESIGNED: December 2018
SEALED: 12/21/2018
REVISED: N/A

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Electrical Detail - Sheet 2 of 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 1146 (Martin Luther King Jr. Parkway) at SR 2220 (Old Chapel Hill Road)

Division 5 Durham County Durham

PLAN DATE:	December 2018	REVIEWED BY:	L Boyer
PREPARED BY:	A Ravipati	REVIEWED BY:	A D Hayes

REVISIONS	INIT.	DATE

Prepared for:
N.C. Department of Transportation Mobility and Safety Division Traffic Engineering & Signals Management Section
750 N.Greenfield Pkwy,Garner,NC 27529

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 044157 ENGINEER ANDREW D HAYES

DocuSigned by: Andrew Hayes 12/21/2018
SIGNATURE DATE

SIG. INVENTORY NO. 05-1980

PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig.308.3

ALTERNATE PHASING ACTIVATION DETAIL

TO RUN ALT. PHASING DURING FREE RUN - PROGRAM CHANGES (SHOWN BELOW) IN A TIME BASED ACTION PLAN. SCHEDULE A DAY PLAN THAT INCLUDES THE ACTION PLAN PROGRAMMED TO SELECT VEH DET PLAN 2 AND ENABLE SF BITS 3 and 7.

TO RUN ALT. PHASING DURING COORDINATION - SELECT THE TIME BASED ACTION PLAN THAT IS PROGRAMMED TO SELECT VEH DET PLAN 2 AND ENABLE SF BITS 3 and 7.

PHASING	VEH DET PLAN	SF BITS ENABLED
ACTIONS REQUIRED TO RUN DEFAULT PHASING	1	NONE
ACTIONS REQUIRED TO RUN ALTERNATE PHASING	2	3, 7

IMPORTANT: IF ALT. PHASING IS USED DURING FREE RUN AND COORDINATION, DO NOT OPERATE TIME OF DAY EVENTS CONCURRENTLY WITH COORDINATION PLAN EVENTS IN THE EVENT SCHEDULER. (EX. FREE RUN EVENT SHOULD END BEFORE COORDINATION PLAN EVENT STARTS AND VICE-VERSA).

ALTERNATE PHASING CHANGE SUMMARY

THE FOLLOWING IS A SUMMARY OF WHAT TAKES PLACE WHEN SF BITS 3 AND 7 AND VEH DET PLAN 2 ACTIVATE TO CALL THE "ALTERNATE PHASING":

SF BITS 3,7: Modifies overlap parent phases for heads 31 and 71 to run protected turns only.

VEH DET PLAN 2: Disables phase 8 call on loop 3A and reduces delay time for phase 3 call on loop 3A to 3.0 seconds.

Disables phase 4 call on loop 7A and reduces delay time for phase 7 call on loop 7A to 3.0 seconds.

ECONOLITE ASC/3-2070 ACTION PLAN PROGRAMMING DETAIL

1. From Main Menu select 5. TIME BASE
2. From TIME BASE Submenu select 2. ACTION PLAN

```
ACTION PLAN...[  1]
PATTERN..........AUTO   SYS OVERRIDE.... NO
TIMING PLAN........ 0   SEQUENCE........  0
VEH DETECTOR PLAN.. 2   DET LOG........NONE
FLASH...........   --   RED REST........ NO
VEH DET DIAG PLN... 0   PED DET DIAG PLN..0
DIMMING ENABLE..   NO   PRIORITY RETURN. NO
PED PR RETURN..    NO   QUEUE DELAY..... NO
PMT COND DELAY     NO
  PHASE   1  2  3  4  5  6  7  8  9  0  1  2  3  4  5  6
PED RCL   .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
WALK 2    .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
VEX 2     .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
VEH RCL   .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
MAX RCL   .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
MAX 2     .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
  PHASE   1  2  3  4  5  6  7  8  9  0  1  2  3  4  5  6
MAX 3     .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
CS INH    .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
OMIT      .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
SPC FCT   .  .  X  .  .  .  X  .  (1-8)
AUX FCT   .  .  .  (1-3)
          1  2  3  4  5  6  7  8  9  0  1  2  3  4  5
LP 1-15   .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 16-30  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 31-45  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 46-60  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 61-75  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 76-90  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 91-100 .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
```

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

FLASHER CIRCUIT MODIFICATION DETAIL

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

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

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1980
DESIGNED: December 2018
SEALED: 12/21/2018
REVISED: N/A

Project #: 170905

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Electrical Detail - Sheet 3 of 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

SR 1146 (Martin Luther King Jr. Parkway) at SR 2220 (Old Chapel Hill Road)

Division 5 Durham County Durham

PLAN DATE:	December 2018	REVIEWED BY:	L Boyer
PREPARED BY:	A Ravipati	REVIEWED BY:	A D Hayes

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 044157 ENGINEER ANDREW D HAYES

DocuSigned by: Andrew Hayes 12/21/2018
SIGNATURE DATE
SIG. INVENTORY NO. 05-1980

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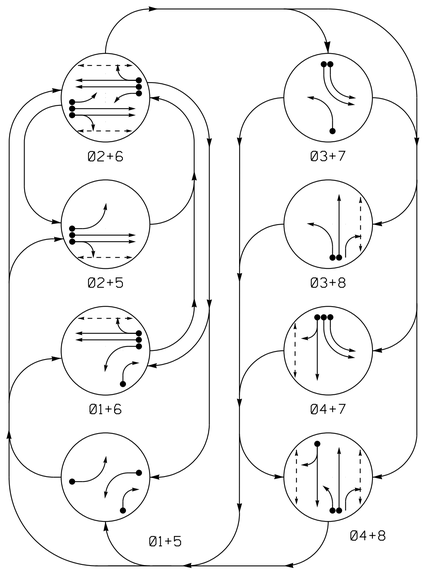
PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG.309.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

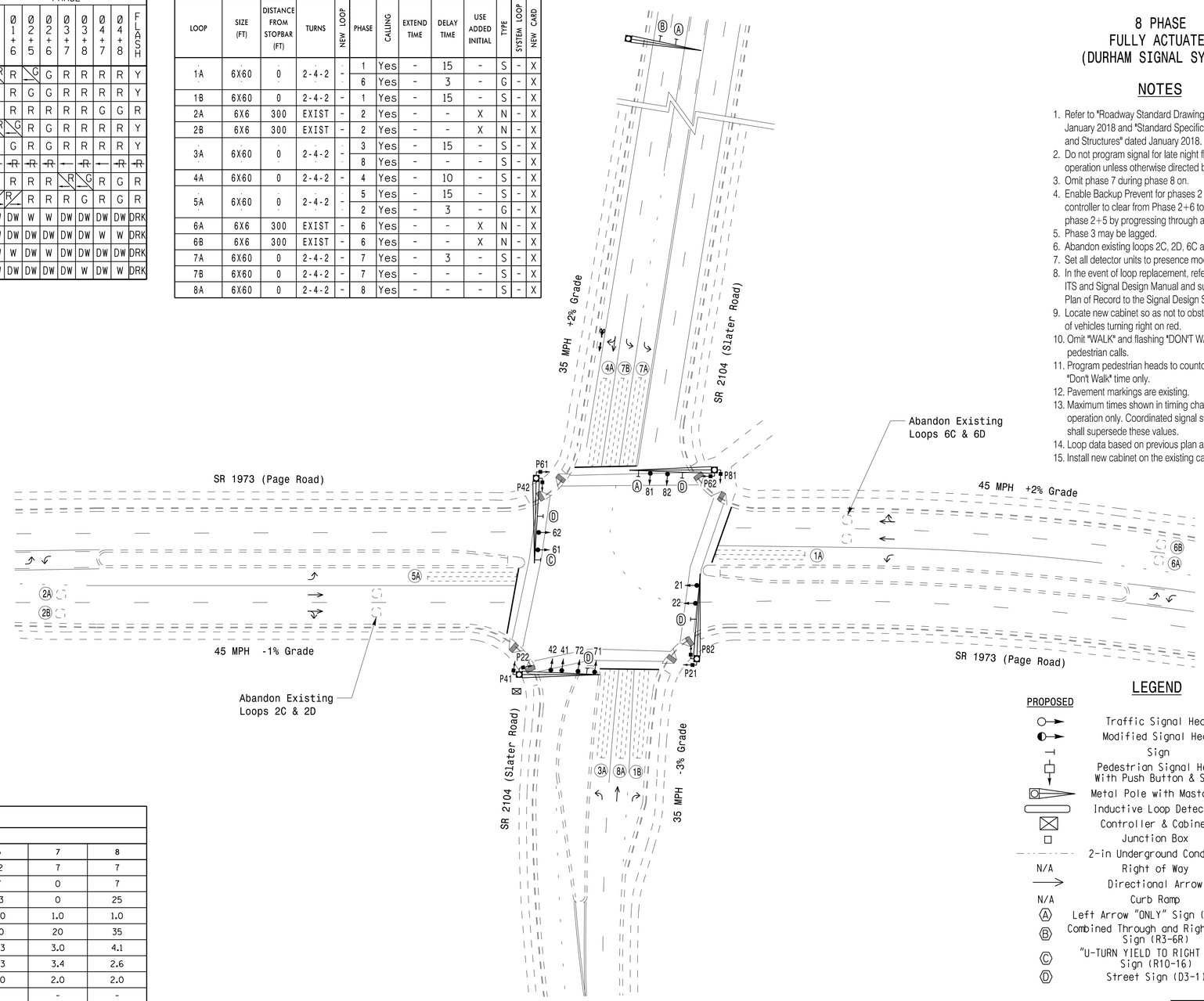
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3+7	Ø3+8	Ø4+7	Ø4+8	FLASH
21	R/—	R	—/G	G	R	R	R	R	Y
22	R	R	G	G	R	R	R	R	Y
41,42	R	R	R	R	R	R	G	G	R
61	—/R	—/G	R	G	R	R	R	R	Y
62	R	G	R	G	R	R	R	R	Y
71,72	~~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

ASC/3 DETECTOR INSTALLATION CHART

DETECTOR LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
1A	6X60	0	2-4-2	-	1	Yes	-	15	-	S	-	X
					6	Yes	-	3	-	G	-	X
1B	6X60	0	2-4-2	-	1	Yes	-	15	-	S	-	X
2A	6X6	300	EXIST	-	2	Yes	-	-	X	N	-	X
2B	6X6	300	EXIST	-	2	Yes	-	-	X	N	-	X
3A	6X60	0	2-4-2	-	3	Yes	-	15	-	S	-	X
					8	Yes	-	-	-	S	-	X
4A	6X60	0	2-4-2	-	4	Yes	-	10	-	S	-	X
5A	6X60	0	2-4-2	-	5	Yes	-	15	-	S	-	X
					2	Yes	-	3	-	G	-	X
6A	6X6	300	EXIST	-	6	Yes	-	-	X	N	-	X
6B	6X6	300	EXIST	-	6	Yes	-	-	X	N	-	X
7A	6X60	0	2-4-2	-	7	Yes	-	3	-	S	-	X
7B	6X60	0	2-4-2	-	7	Yes	-	-	-	S	-	X
8A	6X60	0	2-4-2	-	8	Yes	-	-	-	S	-	X



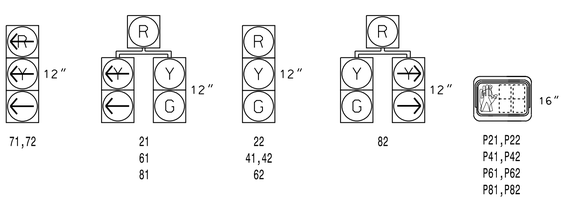
8 PHASE FULLY ACTUATED (DURHAM SIGNAL SYSTEM)

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. Omit phase 7 during phase 8 on.
4. Enable Backup Prevent for phases 2 and 6 to allow the controller to clear from Phase 2+6 to phase 1+6 and/or phase 2+5 by progressing through an all red display.
5. Phase 3 may be lagged.
6. Abandon existing loops 2C, 2D, 6C and 6D.
7. Set all detector units to presence mode.
8. In the event of loop replacement, refer to the current ITS and Signal Design Manual and submit a Plan of Record to the Signal Design Section.
9. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
10. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
11. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
12. Pavement markings are existing.
13. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
14. Loop data based on previous plan and/or field observations.
15. Install new cabinet on the existing cabinet foundation.

SIGNAL FACE I.D.

All Heads L.E.D.



LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Metal Pole with Mastarm	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
N/A	Curb Ramp	
Ⓐ	Left Arrow "ONLY" Sign (R3-5L)	Ⓐ
Ⓑ	Combined Through and Right Arrow Sign (R3-6R)	Ⓑ
Ⓒ	"U-TURN YIELD TO RIGHT TURN" Sign (R10-16)	Ⓒ
Ⓓ	Street Sign (D3-1)	Ⓓ

ASC/3 TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6	7	8
Min Green *	7	12	7	7	7	12	7	7
Walk *	0	7	0	7	0	7	0	7
Ped Clear	0	23	0	27	0	23	0	25
Veh. Extension *	1.0	6.0	1.0	1.0	1.0	6.0	1.0	1.0
Max 1 *	20	60	20	35	20	60	20	35
Yellow	3.0	4.6	3.0	3.7	3.0	4.3	3.0	4.1
Red Clear	3.6	1.9	3.3	2.6	3.3	2.3	3.4	2.6
Red Revert	2.0	5.0	2.0	2.0	2.0	5.0	2.0	2.0
Actuations B4 Add *	-	-	-	-	-	-	-	-
Seconds /Actuation *	-	1.5	-	-	-	1.5	-	-
Max Initial *	-	34	-	-	-	34	-	-
Time Before Reduction *	-	15	-	-	-	15	-	-
Time To Reduce *	-	45	-	-	-	45	-	-
Minimum Gap	-	3.0	-	-	-	3.0	-	-
Locking Detector	-	X	-	-	-	X	-	-
Recall Position	-	VEH. RECALL	-	-	-	VEH. RECALL	-	-
Dual Entry	-	-	-	X	-	-	-	-
Simultaneous Gap	X	X	X	X	X	X	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

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

SR 1973 (Page Road) at SR 2104 (Slater Road)

Division 5 Durham County Durham

PLAN DATE: July 2018	REVIEWED BY: SL Phillips
PREPARED BY: DA Waller	REVIEWED BY: KP Baumann

SCALE 0 40 1"=40'

REVISIONS	INIT.	DATE

SEAL: NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACIE L. PHILLIPS

DocuSigned by: 12/19/2018
SIGNATURE DATE

SIG. INVENTORY NO. 05-2000

PLANS PREPARED IN THE OFFICE OF:
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12/19/2018
12:41:21 PM ITS#U11036410 - Durham Signal System#Signals#24 - Signal Design#GROUP 8#U-5968_052000-2018.dgn
derrick.waller

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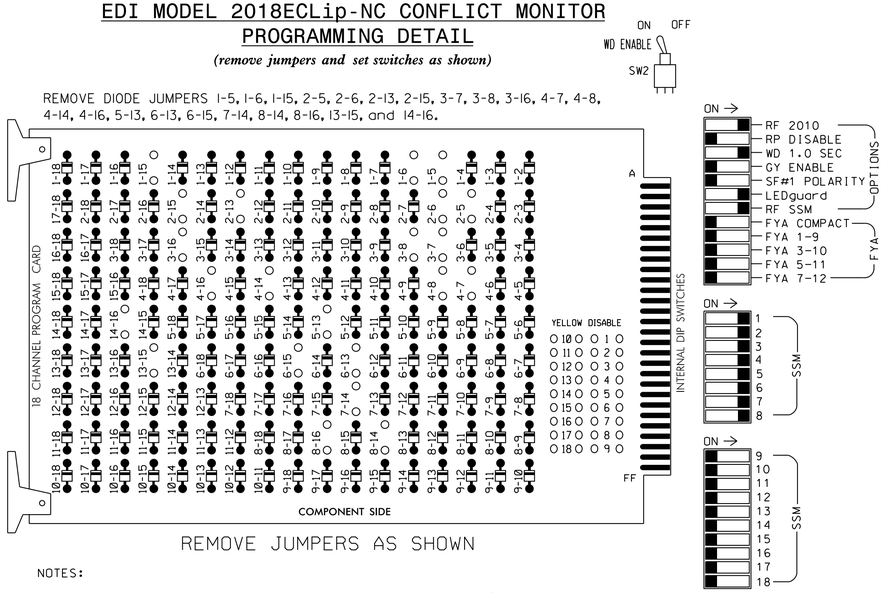
PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG.309.1

EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that Red Enable is active at all times during normal operation.
4. 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 phase 4 for Dual Entry.
3. Program controller to start up in phase 2 Walk and 6 Walk.
4. The cabinet and controller are part of the Durham Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070LX
CABINET.....332 W/AUX
SOFTWARE.....ECONOLITE ASC/3-2070
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
PHASES USED.....1,2,2PED,3,4,4PED,5,6,6PED,7,8,8PED
OVERLAP "A".....NOT USED
OVERLAP "B".....NOT USED
OVERLAP "C".....NOT USED
OVERLAP "D".....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	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	61	82	21,22	P21, P22	81	41,42	P41, P42	21	61,62	P61, P62	71,72	81,82	P81, P82	NU	NU	NU	NU	NU	NU
RED	✳		128		✳	101		✳	134			107							
YELLOW			129			102			135			108							
GREEN			130			103			136			109							
RED ARROW											122								
YELLOW ARROW	126	126			117			132			123								
GREEN ARROW	127	127			118			133			124								
✋				113			104			119			110						
🚶				115			106			121			112						

NU = Not Used

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

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	Ø 1 1A	Ø 2 2A	SLOT EMPTY	WIRED INPUT ⊗	Ø 3 3A	Ø 4 4A	SLOT EMPTY	SLOT EMPTY	Ø 1 1B	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			Ø4 PED DC ISOLATOR	Ø8 PED DC ISOLATOR	ST DC ISOLATOR
FILE "J"	U	Ø 5 5A	Ø 6 6A	SLOT EMPTY	WIRED INPUT ⊗	Ø 7 7A	Ø 8 8A	SLOT EMPTY	WIRED INPUT ⊗	NOT USED	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L	NOT USED	Ø 6 6B			NOT USED	NOT USED			Ø 7 7B					

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

FS = FLASH SENSE
ST = STOP TIME

⊗ Wired Input - Do not populate slot with detector card

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND TIME	DELAY TIME	ADDED INITIAL	DETECTOR TYPE
1A [1]	TB2-1,2	I1U	56	1	1	YES		15		S
	-	J4U	48	26	6	YES		3		G
1B	TB6-9,10	I9U	60	11	1	YES		15		S
2A	TB2-5,6	I2U	39	2	2	YES			X	N
2B	TB2-7,8	I2L	43	12	2	YES			X	N
3A [2]	TB4-5,6	I5U	58	3	3	YES		15		S
	-	J8U	50	28	8	YES				S
4A	TB4-9,10	I6U	41	4	4	YES		10		S
5A [3]	TB3-1,2	J1U	55	5	5	YES		15		S
	-	I4U	47	22	2	YES				G
6A	TB3-5,6	J2U	40	6	6	YES			X	N
6B	TB3-7,8	J2L	44	16	6	YES			X	N
7A	TB5-5,6	J5U	57	7	7	YES		3		S
7B	TB7-11,12	J9L	61	17	7	YES				S
8A	TB5-9,10	J6U	42	8	8	YES				S
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.

[1] Add jumper from I1-W to J4-W, on rear of input file.
[2] Add jumper from I5-W to J8-W, on rear of input file.
[3] Add jumper from J1-W to I4-W, on rear of input file.

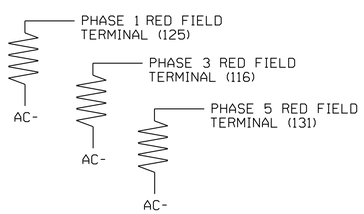
INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

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: 05-2000
DESIGNED: JULY 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail - Sheet 1 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

SR 1973 (Page Road)
at
SR 2104 (Slater Road)

Division 5 Durham County Durham

PLAN DATE:	July 2018	REVIEWED BY:	SL Phillips
PREPARED BY:	DA Waller	REVIEWED BY:	KP Baumann

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACIE L. PHILLIPS

DocuSigned by:
12/19/2018
SIGNATURE DATE

SIG. INVENTORY NO. 05-2000

PLANS PREPARED IN THE OFFICE OF:
Kimley»Horn
NC License #F-0102
421 Fayetteville Street, Suite 600
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(919) 677-2000

12/19/2018
K:\RAL_LPTM_ITS\011036410 - Durham Signal System\Signals\S4 - Signal Design\GROUP 8\U-5968_DS2000-2018e1.dgn
derrick.waller

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PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG.309.2

ECONOLITE ASC/3-2070 BACKUP PROTECTION ENABLE PROGRAMMING

(program controller as shown)

1. From Main Menu select **1. CONFIGURATION**
2. From CONFIGURATION Submenu select **1. CONTROLLER SEQ**
3. From CONTROLLER SEQUENCE Submenu select **3. BACKUP PREVENT PHASES**

Follow programming as shown below. On the 'ENABLE BACKUP PREVENT' screen move cursor to the appropriate field and press 'YES/NO' on the controller keypad to toggle field value between 'X' ,'B', 'C' and 'OFF'.

```
ENABLE BACKUP PREVENT
TMG/BKUP 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
       1   . . . . . . . . . . . . . . .
       2 B   . . . . . . . . . . . . . .
       3 . .   . . . . . . . . . . . . .
       4 . . .   . . . . . . . . . . . .
       5 . . . .   . . . . . . . . . . .
       6 . . . . B   . . . . . . . . . .
       7 . . . . . .   . . . . . . . . .
       8 . . . . . . X   . . . . . . . .
       9 . . . . . . .   . . . . . . . .
      10 . . . . . . .   . . . . . . . .
      11 . . . . . . .   . . . . . . . .
      12 . . . . . . .   . . . . . . . .
      13 . . . . . . .   . . . . . . . .
      14 . . . . . . .   . . . . . . . .
      15 . . . . . . .   . . . . . . . .
      16 . . . . . . .   . . . . . . . .
```

END PROGRAMMING

NOTES

1. 'B' without a 'C' programmed for the 'TIMING' (row) phase inhibits the controller from servicing the 'BACKUP' (column) phase when the 'TIMING' (row) phase is active, or next, until the controller goes through Red Revert and Red Clear. Make sure the proper Red Revert and Red Clear times shown on the Signal Design plan are programmed in the controller phase timing.

2. 'X' inhibits the controller from servicing the 'BACKUP' (column) phase when the 'TIMING' (row) phase is active or next.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-2000
DESIGNED: JULY 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail - Sheet 2 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared For:

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

750 N.Greenfield Pkwy,Garner,NC 27529

SR 1973 (Page Road)
at
SR 2104 (Slater Road)

Division 5 Durham County Durham

PLAN DATE:	July 2018	REVIEWED BY:	SL Phillips
PREPARED BY:	DA Waller	REVIEWED BY:	KP Baumann

REVISIONS	INIT.	DATE

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACIE L. PHILLIPS

DocuSigned by:
12/19/2018
DC5A3A9CB0B4A4F...
SIGNATURE DATE

SIG. INVENTORY NO. 05-2000

PLANS PREPARED IN THE OFFICE OF:
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12/19/2018
K:\RAL_TPTM_ITS\011036410 - Durham Signal System\Signals\54 - Signal Design\GROUP 8\U-5968_052000-2018e2.dgn
derrick.waller

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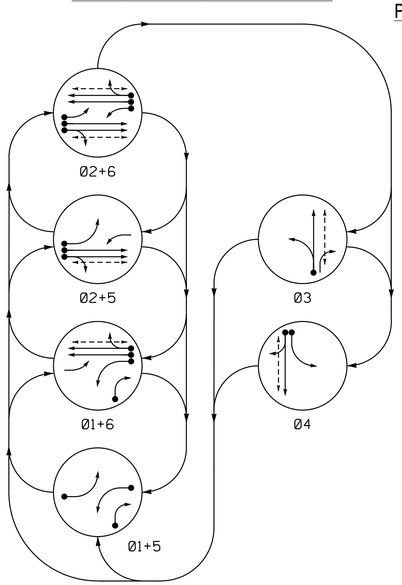
PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-310.0

DEFAULT PHASING DIAGRAM

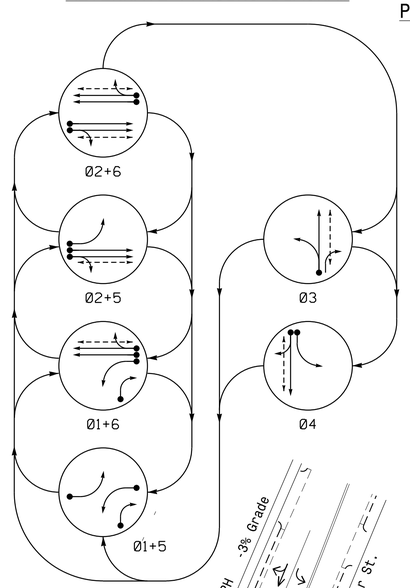


DEFAULT EV PREEMPT PHASES
(Medium Priority)

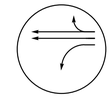
DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE 0 1 + 5	0 1 + 6	0 2 + 5	0 2 + 6	0 3	0 4	PRE 3	FLASH
11	←R	←R	←F Y	←F Y	←R	←R	←	←Y
21, 22	R	R	G	G	R	R	R	Y
31	R	R	R	R	G ←	R	R	R
32	R/R	R/R	R	R	G	R	R	R
41	R	R	R	R	G ←	R	R	R
42	R	R	R	R	R	G	R	R
51	←	←F Y	←	←F Y	←R	←R	←F Y	←Y
61, 62	R	G	R	G	R	R	G	Y
P21, P22	DW	DW	W	W	DW	DW	DW	DRK
P31, P32	DW	DW	DW	DW	W	DW	DW	DRK
P41, P42	DW	DW	DW	DW	DW	W	DW	DRK
P61, P62	DW	W	DW	W	DW	DW	DW	DRK

ALTERNATE PHASING DIAGRAM



ALTERNATE EV PREEMPT PHASES
(Medium Priority)



ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE 0 1 + 5	0 1 + 6	0 2 + 5	0 2 + 6	0 3	0 4	PRE 3	FLASH
11	←R	←R	←R	←R	←R	←R	←	←Y
21, 22	R	R	G	G	R	R	R	Y
31	R	R	R	R	G ←	R	R	R
32	R/R	R/R	R	R	G	R	R	R
41	R	R	R	R	G ←	R	R	R
42	R	R	R	R	R	G	R	R
51	←	←R	←	←R	←R	←R	←R	←Y
61, 62	R	G	R	G	R	R	G	Y
P21, P22	DW	DW	W	W	DW	DW	DW	DRK
P31, P32	DW	DW	DW	DW	W	DW	DW	DRK
P41, P42	DW	DW	DW	DW	DW	W	DW	DRK
P61, P62	DW	W	DW	W	DW	DW	DW	DRK

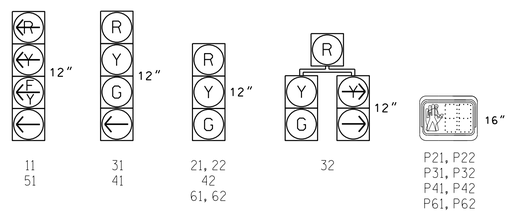
6 Phase
Fully Actuated
w/ EV Preemption
(Durham Signal System)

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. 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. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
12. Loop data based on previous plan and/or field observations.
13. Install new cabinet on the existing cabinet foundation.
14. Install GPS emergency preemption system per manufacturer's instructions to achieve preemption needed, as shown in phasing diagram.
15. Remove existing optical detection equipment.

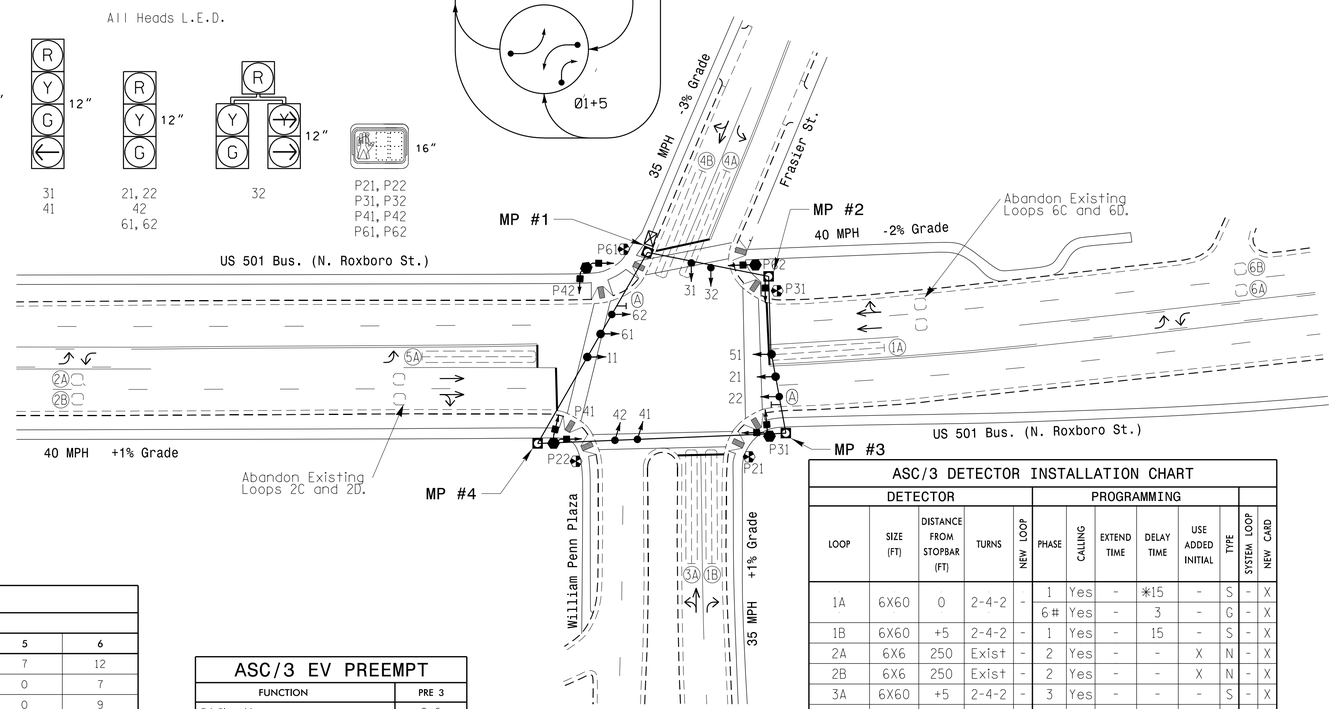
SIGNAL FACE I.D.

All Heads L.E.D.



PHASING DIAGRAM DETECTION LEGEND

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



ASC/3 DETECTOR INSTALLATION CHART

DETECTOR					PROGRAMMING						
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
1A	6X60	0	2-4-2	-	1	Yes	-	*15	-	S	-	X
					6#	Yes	-	3	-	G	-	X
1B	6X60	+5	2-4-2	-	1	Yes	-	15	-	S	-	X
2A	6X6	250	Exist	-	2	Yes	-	-	X	N	-	X
2B	6X6	250	Exist	-	2	Yes	-	-	X	N	-	X
3A	6X60	+5	2-4-2	-	3	Yes	-	-	-	S	-	X
4A	6X60	+20	2-4-2	-	4	Yes	-	3	-	S	-	X
4B	6X60	+15	2-4-2	-	4	Yes	-	10	-	S	-	X
5A	6X60	0	2-4-2	-	5	Yes	-	*15	-	S	-	X
					2#	Yes	-	3	-	G	-	X
6A	6X6	250	Exist	-	6	Yes	-	-	X	N	-	X
6B	6X6	250	Exist	-	6	Yes	-	-	X	N	-	X

* Reduce delay to 3 seconds during Alternate Phasing operation.
# Disable phase call for loop during Alternate Phasing operation.

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 I Pushbutton Post	
	Type II Signal Pedestal	
	Street Name Sign (D3-1)	

ASC/3 TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6
Min Green *	7	12	7	7	7	12
Walk *	0	7	7	7	0	7
Ped Clear	0	18	15	15	0	9
Veh. Extension *	2.0	6.0	2.0	2.0	2.0	6.0
Max 1 *	25	70	25	25	25	70
Yellow	3.0	4.3	3.8	4.1	3.0	4.3
Red Clear	2.8	2.2	2.1	2.1	3.3	2.2
Actuations B4 Add *	-	0	-	-	-	0
Seconds /Actuation *	-	1.5	-	-	-	1.5
Max Initial *	-	29	-	-	-	29
Time Before Reduction *	-	15	-	-	-	15
Time To Reduce *	-	45	-	-	-	45
Minimum Gap	-	2.2	-	-	-	2.2
Locking Detector	-	X	-	-	-	X
Recall Position	-	VEH RECALL	-	-	-	VEH RECALL
Dual Entry	-	-	-	-	-	-
Simultaneous Gap	X	X	X	X	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.

ASC/3 EV PREEMPT

FUNCTION	PRE 3
Exit Phase(s)	2+6
Preempt Override	OFF
Delay Time	0
Ped Clear Trough Yellow	Y
Terminate Phases	N
Entrance Walk	1
Entrance Ped Clear	10
Entrance Min Green	1
Entrance Yellow Change	25.5*
Entrance Red Clear	25.5*
Min Dwell Time	7
Preempt Input Extension Time **	2
Preempt Max Time	120
Exit Yellow Change	25.5*
Exit Red Clear	25.5*

* Time defaults to time used for phase during normal operation.
** Program Timing on GPS Detection Unit.

Signal Upgrade

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

Prepared in the offices of:
RAMEY KEMP & ASSOCIATES, INC.
Transportation Engineers
5808 Faringdon Place, Suite 100
Raleigh, North Carolina 27609
Phone: 919-872-5115
www.rameykemp.com

SCALE 0 40 1"=40'

US 501 Bus. (N. Roxboro St.)
at
William Penn Plaza/
Frasier St.

Division 5 Durham County Durham

PLAN DATE: December 2018	REVIEWED BY: WJ Hamilton		
PREPARED BY: TS Popelka	RKA PROJ. NO.: 17287 (040)		
REVISIONS		INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32396 ENGINEER WILLIAM J. HAMILTON

DocuSigned by: William J. Hamilton 12/19/2018
ASSISTANT ENGINEER — SIGNATURE — DATE

SIG. INVENTORY NO. 05-2006

12/17/2018
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User:tspopelka

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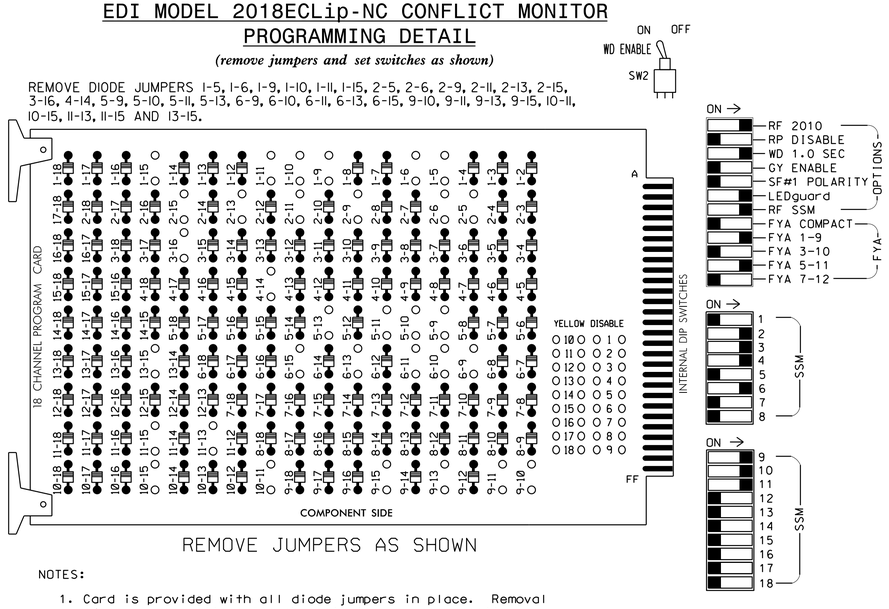
PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-310.1

EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS I-5, I-6, I-9, I-10, I-11, I-15, 2-5, 2-6, 2-9, 2-11, 2-13, 2-15, 3-16, 4-14, 5-9, 5-10, 5-11, 5-13, 6-9, 6-10, 6-11, 6-13, 6-15, 9-10, 9-11, 9-13, 9-15, 10-11, 10-15, 11-13, 11-15 AND 13-15.



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 phase 2 Walk and 6 Walk.
3. The cabinet and controller are part of the Durham Signal System.
4. Install GPS preemption system. Perform installation according to manufacturer's directions and NCDOT engineer-approved mounting location to accomplish the preemption schemes shown on the Signal Design Plans.

EQUIPMENT INFORMATION

CONTROLLER.....2070LX
CABINET.....332 /W/ AUX
SOFTWARE.....ECONOLITE ASC/3-2070
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
LOAD SWITCHES USED.....S1,S2,S3,S4,S5,S6,S7,S8,S9, S12,AUX S1,AUX S2,AUX S4
PHASES USED.....1,2,2PED,3,3PED,4,4PED,5,6, 6PED
OVERLAP "A".....✳
OVERLAP "B".....✳
OVERLAP "C".....✳
OVERLAP "D".....NOT USED

✳ See overlap programming 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	3 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	11★	21,22	P21, P22	31	32	41	42	P41, P42	51★	61,62	P61, P62	NU	NU	P31, P32	11★	32	NU	51★	NU	NU
RED		128		116	116	101	101			134						✳				
YELLOW	✳	129		117	117	102	102		✳	135										
GREEN		130		118	118	103	103			136										
RED ARROW															A121			A114		
YELLOW ARROW															A122	A125		A115		
FLASHING YELLOW ARROW															A123			A116		
GREEN ARROW	127			118		103			133							A126				
✋			113					104			119			110						
🚶			115					106			121			112						

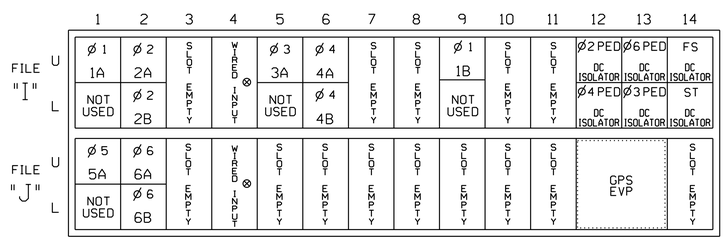
NU = Not Used

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

★ See pictorial of head wiring in detail this sheet.

INPUT FILE POSITION LAYOUT

(front view)



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

⊗ Wired Input - Do not populate slot with detector card

CONNECT PHASE SELECTOR TO FIELD ETHERNET SWITCH

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND TIME	DELAY TIME	ADDED INITIAL	DETECTOR TYPE
1A [1]	TB2-1,2	I1U	56	1 ★	1	YES		15		S
	-	J4U	48	26★	6	YES		3		G
1B	TB6-9,10	I9U	60	11	1	YES		15		S
2A	TB2-5,6	I2U	39	2	2	YES			X	N
2B	TB2-7,8	I2L	43	12	2	YES			X	N
3A	TB4-5,6	I5U	58	3	3	YES				S
4A	TB4-9,10	I6U	41	4	4	YES		3		S
4B	TB4-11,12	I6L	45	14	4	YES		10		S
5A [2]	TB3-1,2	J1U	55	5 ★	5	YES		15		S
	-	I4U	47	22★	2	YES		3		G
6A	TB3-5,6	J2U	40	6	6	YES			X	N
6B	TB3-7,8	J2L	44	16	6	YES			X	N
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					
P31,P32	TB8-8,9	I13L	70	PED 8	3 PED					

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

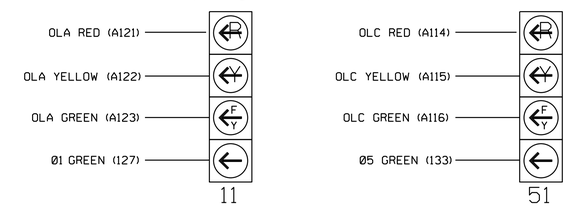
[1] Add jumper from I1-W to J4-W, on rear of input file.
[2] Add jumper from J1-W to I4-W, on rear of input file.

★ 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

SIGNAL WIRING DETAIL

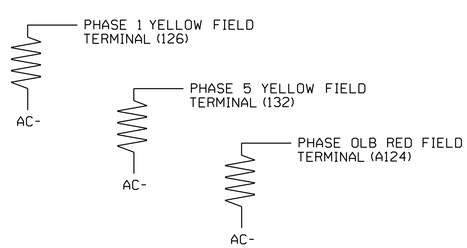
(wire signal heads as shown)



LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

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



THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-2006
DESIGNED: Dec 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail
Sheet 1 of 4

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

US 501 Bus. (N. Roxboro St.)
at
William Penn Plaza/
Frasier St.

Division 5 Durham County Durham

PLAN DATE: December 2018	REVIEWED BY: WJ Hamilton
PREPARED BY: TS Popelka	RKA PROJ. NO.: 17287 (040)

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32396 ENGINEER WILLIAM J. HAMILTON

DocuSigned by: William J. Hamilton 12/19/2018
SIGNATURE DATE
SIG. INVENTORY NO. 05-2006

Prepared in the offices of:
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PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-310.2

ECONOLITE ASC/3-2070 VEHICLE DETECTOR SETUP PROGRAMMING DETAIL FOR ALTERNATE PHASING LOOPS 1A AND 5A

(program controller as shown)

IMPORTANT!

Program detectors per the input file connection and programming chart shown on sheet 1 before proceeding.

1. From Main Menu select [8. UTILITIES]
2. From UTILITIES Submenu select [1. COPY/CLEAR]
3. Copy from DETECTOR PLAN "1" to DETECTOR PLAN "2".

```
COPY / CLEAR UTILITY
      FROM                TO
PHASE TIMING.... . > PHASE TIMING.... .
TIMING PLAN..... . > TIMING PLAN..... .
PH DET OPT PLAN. . > PH DET OPT PLAN. .
DETECTOR PLAN... 1 > DETECTOR PLAN... 2
  TOGGLE TO SELECT A "FROM" AND A "TO"
          THEN PRESS ENTER
```

4. From Main Menu select [6. DETECTORS]
5. From DETECTOR Submenu select [2. VEHICLE DETECTOR SETUP]
6. Place cursor in VEH DET PLAN [ ] position and enter "2".

- Place cursor in VEH DETECTOR [ ] position and enter "1".
- Set delay time to "3".

```
VEH DETECTOR [ 1]   VEH DET PLAN [ 2]
TYPE: S-STANDARD
TS2 DETECTOR..... . ECPI LOG.......   NO
DET PH - 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 1  1    . . . . . . . . . . . . . . . .
EXTEND TIME...  0.0 DELAY TIME...    3.0
USE ADDED INITIAL . CROSS SWITCH PH..  0
LOCK IN....... NONE NTCIP VOL . OR OCC .
PMT QUEUE DELAY. NO
```

← NOTICE VEH DET PLAN 2

← ENSURE DELAY IS SET TO '3'

- Place cursor in VEH DETECTOR [ ] position and enter "26".
- Set assigned phase to "0".

```
VEH DETECTOR [26]   VEH DET PLAN [ 2]
TYPE: G-GREEN EXTENSION/DELAY
TS2 DETECTOR..... . ECPI LOG.......   NO
DET PH - 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 26 0    . . . . . . . . . . . . . . . .
EXTEND TIME...  0.0 DELAY TIME...    0.0
USE ADDED INITIAL . CROSS SWITCH PH..  0
LOCK IN....... NONE NTCIP VOL . OR OCC .
PMT QUEUE DELAY. NO
```

← NOTICE VEH DET PLAN 2

ENSURE PHASE IS SET TO "0" →

- Place cursor in VEH DETECTOR [ ] position and enter "5".
- Set delay time to "3".

```
VEH DETECTOR [ 5]   VEH DET PLAN [ 2]
TYPE: S-STANDARD
TS2 DETECTOR..... . ECPI LOG.......   NO
DET PH - 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 5  5    . . . . . . . . . . . . . . . .
EXTEND TIME...  0.0 DELAY TIME...    3.0
USE ADDED INITIAL . CROSS SWITCH PH..  0
LOCK IN....... NONE NTCIP VOL . OR OCC .
PMT QUEUE DELAY. NO
```

← NOTICE VEH DET PLAN 2

← ENSURE DELAY IS SET TO '3'

- Place cursor in VEH DETECTOR [ ] position and enter "22".
- Set assigned phase to "0".

```
VEH DETECTOR [22]   VEH DET PLAN [ 2]
TYPE: G-GREEN EXTENSION/DELAY
TS2 DETECTOR..... . ECPI LOG.......   NO
DET PH - 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 22 0    . . . . . . . . . . . . . . . .
EXTEND TIME...  0.0 DELAY TIME...    0.0
USE ADDED INITIAL . CROSS SWITCH PH..  0
LOCK IN....... NONE NTCIP VOL . OR OCC .
PMT QUEUE DELAY. NO
```

← NOTICE VEH DET PLAN 2

ENSURE PHASE IS SET TO "0" →

END PROGRAMMING

ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select [2. CONTROLLER]
2. From CONTROLLER Submenu select [2. VEHICLE OVERLAPS]

OVERLAP A

Select TMG VEH OVLP [A] and 'PPLT FYA'

```
TMG VEH OVLP...[A] TYPE: .....PPLT FYA

PROTECTED LEFT TURN....   PHASE    1
OPPOSING THROUGH.......   PHASE    2

FLASHING ARROW OUTPUT.....CH9  ISOLATE

DELAY START OF: FYA..0.0 CLEARANCE..0.0
ACTION PLAN SF BIT DISABLE........... 1
```

← NOTICE ACTION PLAN SF BIT "1"

Toggle Once

OVERLAP B

Select TMG VEH OVLP [B] and 'NORMAL'

```
TMG VEH OVLP...[E] TYPE: .......NORMAL
  PHASES 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
INCLUDED X . . . . . . . . . . . . . . .

LAG GRN 0.0 YEL 0.0 RED 0.0
```

Toggle Once

OVERLAP C

Select TMG VEH OVLP [C] and 'PPLT FYA'

```
TMG VEH OVLP...[C] TYPE: .....PPLT FYA

PROTECTED LEFT TURN....   PHASE    5
OPPOSING THROUGH.......   PHASE    6

FLASHING ARROW OUTPUT.....CH11 ISOLATE

DELAY START OF: FYA..0.0 CLEARANCE..0.0
ACTION PLAN SF BIT DISABLE........... 5
```

← NOTICE ACTION PLAN SF BIT "5"

END PROGRAMMING

Electrical Detail
Sheet 2 of 4

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-2006
DESIGNED: Dec 2018
SEALED: 12/19/2018
REVISED: N/A

Prepared in the offices of:

RAMEY KEMP & ASSOCIATES, INC.
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www.rameykemp.com

ELECTRICAL AND PROGRAMMING DETAILS FOR:

NC Department of Transportation Mobility and Safety Division Signals Management Section

750 N.Greenfield Pkwy,Garner,NC 27529

US 501 Bus. (N. Roxboro St.)
at
William Penn Plaza/
Frasier St.

Division 5 Durham County Durham

PLAN DATE:	December 2018	REVIEWED BY:	WJ Hamilton
PREPARED BY:	TS Popelka	RKA PROJ. NO.:	17287 (040)

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 32396 ENGINEER WILLIAM J. HAMILTON

DocuSigned by: William J. Hamilton A66600704648464 12/19/2018

SIGNATURE DATE

SIG. INVENTORY NO. 05-2006

12/17/2018
U-5968_Sig-310.2_05-2006_01R2.dgn
User:tspopelka

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PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-310.3

ALTERNATE PHASING ACTIVATION DETAIL

TO RUN ALT. PHASING DURING FREE RUN - PROGRAM CHANGES (SHOWN BELOW) IN A TIME BASED ACTION PLAN. SCHEDULE A DAY PLAN THAT INCLUDES THE ACTION PLAN PROGRAMMED TO SELECT VEH DET PLAN 2 AND ENABLE SF BITS 1 AND 5.

TO RUN ALT. PHASING DURING COORDINATION - SELECT THE TIME BASED ACTION PLAN THAT IS PROGRAMMED TO SELECT VEH DET PLAN 2 AND ENABLE SF BITS 1 AND 5.

PHASING	VEH DET PLAN	SF BITS ENABLED
ACTIONS REQUIRED TO RUN DEFAULT PHASING	1	NONE
ACTIONS REQUIRED TO RUN ALTERNATE PHASING	2	1,5

IMPORTANT: IF ALT. PHASING IS USED DURING FREE RUN AND COORDINATION, DO NOT OPERATE TIME OF DAY EVENTS CONCURRENTLY WITH COORDINATION PLAN EVENTS IN THE EVENT SCHEDULER. (EX. FREE RUN EVENT SHOULD END BEFORE COORDINATION PLAN EVENT STARTS AND VICE-VERSA).

ALTERNATE PHASING CHANGE SUMMARY

THE FOLLOWING IS A SUMMARY OF WHAT TAKES PLACE WHEN SF BITS 1 AND 5 AND VEH DET PLAN 2 ACTIVATE TO CALL THE "ALTERNATE PHASING":

SF BIT 1,5:	Modifies overlap parent 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.
VEH DET PLAN 2:	Disables phase 2 call on loop 5A and reduces delay time for phase 5 call on loop 5A to 3 seconds.

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.

ECONOLITE ASC/3-2070 PREEMPT FILTERING PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select [4. PREEMPTOR/TSP]
2. From PREEMPT/TSP/SCP Submenu select [2. ENABLE PREEMPT FILTERING & TSP/SCP]

```
ENABLE PREEMPT FILTERING & TSP/SCP
FILTERED     SOLID          PULSING
INPUT  1 ...BYPASSED.. ...BYPASSED..
       2 ...BYPASSED.. ...BYPASSED..
       3 ..PREEMPT  3. ...BYPASSED..
       4 ...BYPASSED.. ...BYPASSED..
       5 ...BYPASSED.. ...BYPASSED..
       6 ...BYPASSED.. ...BYPASSED..
       7 ...BYPASSED.. ...BYPASSED..
       8 ...BYPASSED.. ...BYPASSED..
       9 ...BYPASSED.. ...BYPASSED..
      10 ...BYPASSED.. ...BYPASSED..
```

ECONOLITE ASC/3-2070 ACTION PLAN PROGRAMMING DETAIL

1. From Main Menu select [5. TIME BASE]
2. From TIME BASE Submenu select [2. ACTION PLAN]

```
ACTION PLAN...[  1]
PATTERN..........AUTO   SYS OVERRIDE.... NO
TIMING PLAN........ 0   SEQUENCE........  0
VEH DETECTOR PLAN.. 2   DET LOG........NONE
FLASH...........   --   RED REST........ NO
VEH DET DIAG PLN... 0   PED DET DIAG PLN..0
DIMMING ENABLE..   NO   PRIORITY RETURN. NO
PED PR RETURN..    NO   QUEUE DELAY..... NO
PMT COND DELAY     NO
  PHASE   1  2  3  4  5  6  7  8  9  0  1  2  3  4  5  6
PED RCL   .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
WALK 2    .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
VEX 2     .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
VEH RCL   .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
MAX RCL   .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
MAX 2     .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
  PHASE   1  2  3  4  5  6  7  8  9  0  1  2  3  4  5  6
MAX 3     .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
CS INH    .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
OMIT      .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
SPC FCT   X  .  .  .  X  .  .  .  (1-8)
AUX FCT   .  .  .  (1-3)
          1  2  3  4  5  6  7  8  9  0  1  2  3  4  5
LP 1-15   .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 16-30  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 31-45  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 46-60  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 61-75  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 76-90  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 91-100 .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
```

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-2006
DESIGNED: Dec 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail
Sheet 3 of 4

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

US 501 Bus. (N. Roxboro St.)
at
William Penn Plaza/
Frasier St.

Division 5 Durham County Durham

PLAN DATE: December 2018 REVIEWED BY: WJ Hamilton
PREPARED BY: TS Popelka RKA PROJ. NO.: 17287 (040)

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32396 ENGINEER WILLIAM J. HAMILTON

DocuSigned by: William J. Hamilton 12/19/2018
ASSOCIATE ENGINEER DATE

SIG. INVENTORY NO. 05-2006

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750 N.Greenfield Pkwy,Garner,NC 27529

12/17/2018
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User:tspopelka

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PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-310.4

ECONOLITE ASC/3-2070 EMERGENCY VEHICLE PREEMPT PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select [4. PREEMPTOR/TSP]
2. From PREEMPTOR/TSP/SCP Submenu select [1. PREEMPT PLAN 1-10]

Place cursor in [ ] next to Preempt Plan and press 3. Then press the right cursor arrow and toggle the controller to YES. Next cursor down. This will select Emergency Vehicle Preempt #3.

```
PREEMPT PLAN [  3]    ENABLE....YES
 VEH/PED 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 OVERLAP A B C D E F G H I J K L M N O P
TRKCLR V . . . . . . . . . . . . . . . .
TRKCLR O . . . . . . . . . . . . . . . .
ENA TRL  . . . . . . . . . . . . . . . .
DWEL VEH X . . . . X . . . . . . . . . .
DWEL PED . . . . . . . . . . . . . . . .
DWEL OLPF1 .F1 . . . . . . . . . . . . .
CYC VEH  . . . . . . . . . . . . . . . .
CYC PED  . . . . . . . . . . . . . . . .
CYC OLP  . . . . . . . . . . . . . . . .
EXIT PH  . X . . . X . . . . . . . . . .
EXIT CAL . . . . . . . . . . . . . . . .
SP FUNC  . . . . . . . . . . . . . . . .

ENABLE... YESIPMT OVRIDE..IINTERLOCK. NO
DET LOCK... XIDELAY..    OIINHIBIT...  O
OVERIDE FL. .IDURATION   OICLR-GRN... NO
TERM OLP.  NOIPC>YEL   YESITERM PH    NO
PED DARK.. NOITC RESRV  NOIDWELL FL  OFF
LINK PMT....OIX FLCOLR REDIEXIT OPT. OFF
X TMG PLN...OIRE-SERV..  OIFLT TYPE.HARD
FREE DUR PMTIR1  NOIR2  NOIR3  NOIR4  NO
--TIMING-----WALKIPED CLIMN GRI YELI RED
ENTRANCE TM.    1I    10I    1I25.5I25.5
-----------MIN GRIEXT GRIMX GRI YELI RED
TRACK CLEAR     0I     0I    0I25.5I25.5
-----------MIN DLIPMTEXTIMX TMI YELI RED
DWL/CYC-EXIT    7I   0.0I  120I25.5I25.5
PMT ACTIVE OUT..ON   PMT ACT DWELL...NO
OTHER - PRI PMT.OFF  NON-PRI PMT.....OFF
INH EXT TIME... 0.0  PED PR RETURN...OFF
PRIORITY RETURN.OFF  QUEUE DELAY.... OFF
COND DELAY......OFF
PHASES     1  2  3  4  5  6  7  8
PR RTN%    0  0  0  0  0  0  0  0
PHASES     9 10 11 12 13 14 15 16
PR RTN%    0  0  0  0  0  0  0  0
```

PROGRAM EXTEND TIME ON GPS DETECTOR UNITS FOR 2.0 SEC.

ECONOLITE ASC/3-2070 PED 3 PROGRAMMING ASSIGNMENT DETAIL

(program controller as shown)

1. From Main Menu select [6. DETECTORS]
2. From DETECTOR Submenu select [3. PED DETECTOR INPUT ASSIGNMENT]

```
PED DET PHASE ASSIGNMENT MODE:  NTCIP

   PHASE  1  2  3  4  5  6  7  8
DETECTOR  0  2  8  4  0  6  0  0

   PHASE  9 10 11 12 13 14 15 16
DETECTOR  0  0  0  0  0  0  0  0
```

NOTICE PED DETECTOR 8 ASSIGNED TO PHASE 3

1. From Main Menu select [1. CONFIGURATION]
2. From CONFIGURATION Submenu select [3. LOAD SW ASSIGN]

```
LD SWITCH ASSIGN
    PHASE      DIMMING ---FLASH---
    /OVLP TYPE R Y G D PWR AUT TGR
1    1    V    . . . + A   R   X
2    2    V    . . . + A   Y   .
3    3    V    . . . + A   R   X
4    4    V    . . . + A   R   .
5    5    V    . . . - A   R   .
6    6    V    . . . - A   Y   X
7    7    V    . . . - A   R   .
8    8    V    . . . - A   R   X
9    1    O    . . . + A   R   X
10   2    O    . . . + A   R   X
11   3    O    . . . - A   R   .
12   4    O    . . . - A   R   .
13   2    P    . . . + A   .   .
14   4    P    . . . - A   .   .
15   6    P    . . . + A   .   .
16   3    P    . . . - A   .   .
```

NOTICE PHASE 3 PED ASSIGNED TO LD SWITCH 16

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-2006
DESIGNED: Dec 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail
Sheet 4 of 4

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

US 501 Bus. (N. Roxboro St.)
at
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Division 5 Durham County Durham

PLAN DATE:	December 2018	REVIEWED BY:	WJ Hamilton
PREPARED BY:	TS Popelka	RKA PROJ. NO.:	17287 (040)

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32396 ENGINEER WILLIAM J. HAMILTON

DocuSigned by: William J. Hamilton A9E6BD7D46484A4... 12/19/2018
SIGNATURE DATE

SIG. INVENTORY NO. 05-2006

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NC Department of Transportation Mobility and Safety Division
Traffic Engineering & Signals Management Section
750 N.Greenfield Pkwy,Garner,NC 27529

12/17/2018
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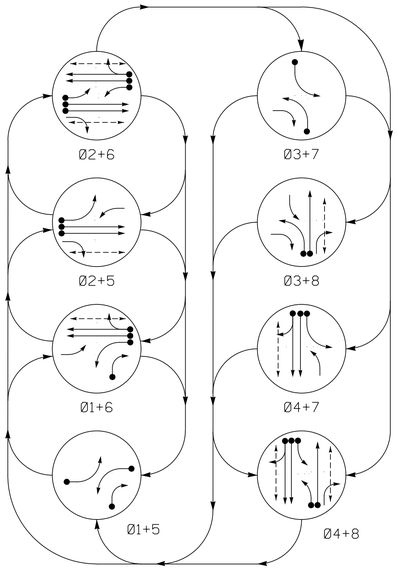
User:tspopelka

PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG.311.0

DEFAULT PHASING DIAGRAM

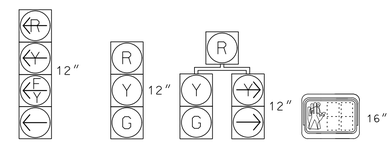


DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE 01+5	01+6	02+5	02+6	03+7	03+8	04+7	04+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	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

SIGNAL FACE I.D.

All Heads L.E.D.



11
31
51
71

21
41, 42
61, 62
81

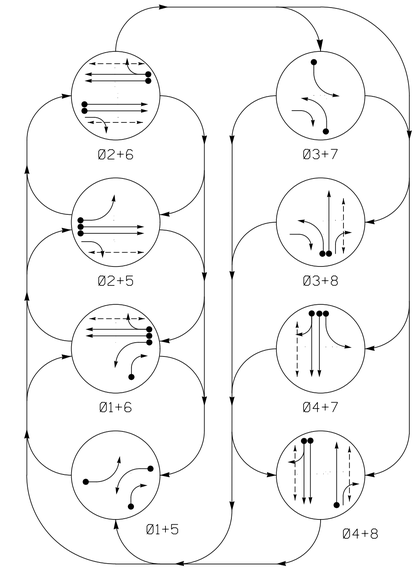
22
82

P21, P22
P41, P42
P61, P62
P81, P82

ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE 01+5	01+6	02+5	02+6	03+7	03+8	04+7	04+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

ALTERNATE PHASING DIAGRAM



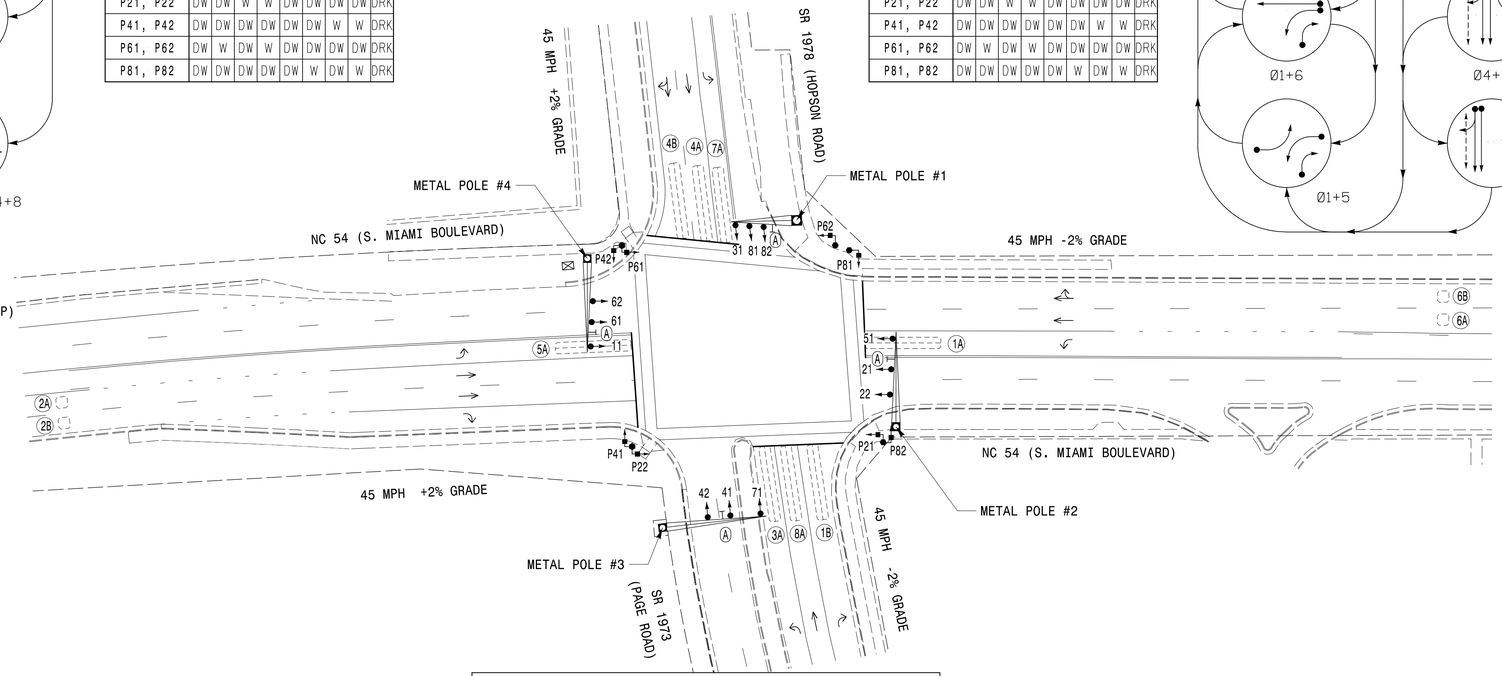
8 PHASE FULLY ACTUACTED (DURHAM SIGNAL SYSTEM)

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 (City) 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 shall supersede these values.
12. Loop data based on previous plan and/or field observations.
13. Install new cabinet on the existing cabinet foundation.

PHASING DIAGRAM DETECTION LEGEND

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



ASC/3 TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6	7	8
Min Green *	7	12	7	7	7	12	7	7
Walk *	0	7	0	7	0	7	0	7
Ped Clear	0	28	0	28	0	23	0	20
Veh. Extension *	2.0	6.0	2.0	2.0	2.0	6.0	2.0	2.0
Max 1 *	20	90	20	40	20	90	20	40
Yellow	3.0	4.7	3.0	4.7	3.0	4.7	3.0	4.7
Red Clear	3.1	1.8	3.2	1.9	2.6	1.8	3.2	1.9
Actuations B4 Add *	-	-	-	-	-	-	-	-
Seconds /Actuation *	-	1.5	-	-	-	1.5	-	-
Max Initial *	-	34	-	-	-	34	-	-
Time Before Reduction *	-	15	-	-	-	15	-	-
Time To Reduce *	-	45	-	-	-	45	-	-
Minimum Gap	-	3.0	-	-	-	3.0	-	-
Locking Detector	-	X	-	-	-	X	-	-
Recall Position	-	VEH. RECALL	-	-	-	VEH. RECALL	-	-
Dual Entry	-	-	-	X	-	-	-	X
Simultaneous Gap	X	X	X	X	X	X	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.

ASC/3 DETECTOR INSTALLATION CHART

DETECTOR					PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
1A	6X40	0	2-4-2	-	1	Yes	-	15**	-	S	-	X
				-	6#	Yes	-	3	-	G	-	X
1B	6X40	0	2-4-2	-	1	Yes	-	15	-	S	-	X
2A	6X6	300	EXIST	-	2	Yes	-	-	X	N	-	X
2B	6X6	300	EXIST	-	2	Yes	-	-	X	N	-	X
3A	6X40	0	2-4-2	-	3	Yes	-	10*	-	S	-	X
				-	8#	Yes	-	-	-	S	-	X
4A	6X40	0	2-4-2	-	4	Yes	-	-	-	S	-	X
4B	6X40	0	2-4-2	-	4	Yes	-	10	-	S	-	X
5A	6X40	0	2-4-2	-	5	Yes	-	15**	-	S	-	X
				-	2#	Yes	-	3	-	G	-	X
6A	6X6	300	EXIST	-	6	Yes	-	-	X	N	-	X
6B	6X6	300	EXIST	-	6	Yes	-	-	X	N	-	X
7A	6X40	0	2-4-2	-	7	Yes	-	10**	-	S	-	X
				-	4#	Yes	-	-	-	S	-	X
8A	6X40	0	2-4-2	-	8	Yes	-	-	-	S	-	X

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

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	Right of Way	
	Directional Arrow	
N/A	Curb Ramp	
	Street Sign (D3-1)	

Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

NC 54 (S. Miami Boulevard) at SR 1978 (Hopson Road)/ SR 1973 (Page Road)

Division 5 Durham County Durham

PLAN DATE: December 2017 REVIEWED BY: SL Phillips

PREPARED BY: SP Pennington REVIEWED BY:

SCALE 0 40 1"=40'

REVISIONS	INIT.	DATE

SEAL: NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACIE L. PHILLIPS

DocuSigned by: DC87A59ED6DB437... 12/19/2018

SIGNATURE DATE

SIG. INVENTORY NO. 05-2008

PLANS PREPARED IN THE OFFICE OF:
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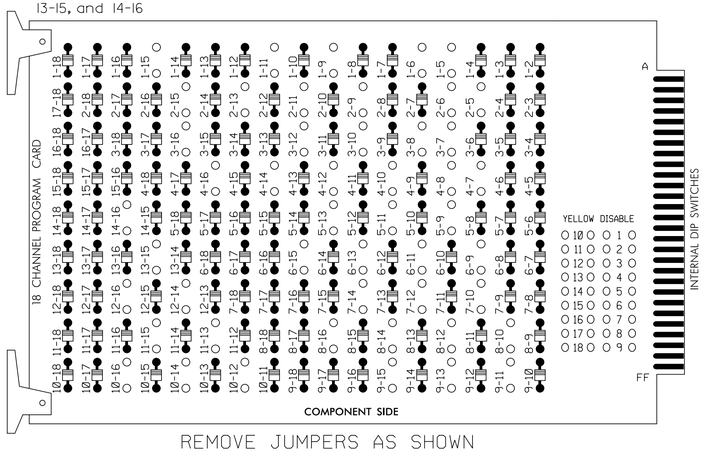
12/19/2018 $TIME$ $USER$ K:\REAL_TPTD_ITS\011036410 - Durham Signal Systems\Signals\54 - Signal Design\GROUP 1\U-5968_052008-2017.dgn

PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG.311.1

EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS I-5, I-6, I-9, I-11, I-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

■ = 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 phases 4 and 8 for Dual Entry.
3. Program controller to start up in phase 2 Walk and 6 Walk.
4. The cabinet and controller are part of the Durham Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070LX
CABINET.....332 W/AUX
SOFTWARE.....ECONOLITE ASC/3-2070
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 A.....*
OVERLAP B.....*
OVERLAP C.....*
OVERLAP D.....*

* 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	OLA	OLB	SPARE	OLC	OLD	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								
✋			113			104			119			110						
🚶			115			106			121			112						

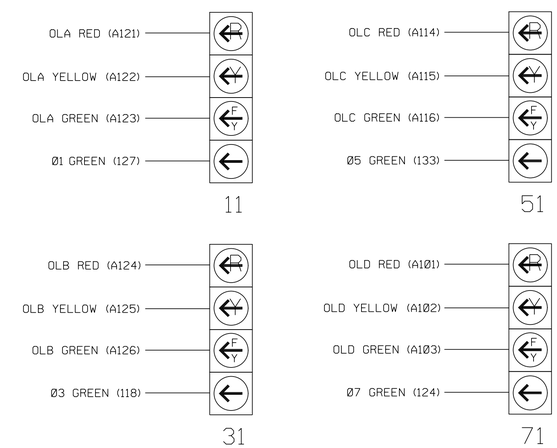
NU = Not Used

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

★ See pictorial of head wiring in detail below.

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	Ø1	Ø2	SLOT EMPTY	WIRED INPUT ⊗	Ø3	Ø4	SLOT EMPTY	WIRED INPUT ⊗	Ø1	SLOT EMPTY	SLOT EMPTY	Ø2 PED DC ISOLATOR	Ø6 PED DC ISOLATOR	FS DC ISOLATOR
	L	1A NOT USED	2A Ø2 2B			3A NOT USED	4A Ø4 4B			1B NOT USED			Ø4 PED DC ISOLATOR	Ø8 PED DC ISOLATOR	ST DC ISOLATOR
FILE "J"	U	Ø5	Ø6	SLOT EMPTY	WIRED INPUT ⊗	Ø7	Ø8	SLOT EMPTY	WIRED INPUT ⊗	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L	5A NOT USED	6A Ø6 6B			7A NOT USED	8A NOT USED								

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

FS = FLASH SENSE
ST = STOP TIME

⊗ Wired Input - Do not populate slot with detector card

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND TIME	DELAY TIME	ADDED INITIAL	DETECTOR TYPE
1A[1]	TB2-1,2	I1U	56	1★	1	YES		15		S
	-	J4U	48	26★	6	YES		3		G
1B	TB6-9,10	I9U	60	11	1	YES		15		S
2A	TB2-5,6	I2U	39	2	2	YES			X	N
2B	TB2-7,8	I2L	43	12	2	YES			X	N
3A[2]	TB4-5,6	I5U	58	3★	3	YES		10		S
	-	J8U	50	28★	8	YES				S
4A	TB4-9,10	I6U	41	4	4	YES				S
4B	TB4-11,12	I6L	45	14	4	YES		10		S
5A[3]	TB3-1,2	J1U	55	5★	5	YES		15		S
	-	I4U	47	22★	2	YES		3		G
6A	TB3-5,6	J2U	40	6	6	YES			X	N
6B	TB3-7,8	J2L	44	16	6	YES			X	N
7A[4]	TB5-5,6	J5U	57	7★	7	YES		10		S
	-	I8U	49	24★	4	YES				S
8A	TB5-9,10	J6U	42	8	8	YES				S
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.

[1] Add jumper from I1-W to J4-W, on rear of input file.
[2] Add jumper from I5-W to J8-W, on rear of input file.
[3] Add jumper from J1-W to I4-W, on rear of input file.
[4] Add jumper from J5-W to I8-W, on rear of input file.

★ For the detectors to work as shown on the signal design plan, see the Vehicle Detector Setup Programming Detail for Alternate Phasing on sheet 3.

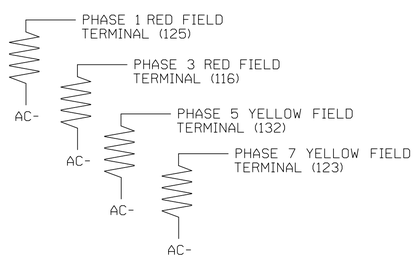
INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

ACCEPTABLE VALUES

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



THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-2008
DESIGN: DECEMBER 2017
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail - Sheet 1 of 4

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared For:
N.C. Department of Transportation
Mobility and Safety Division
Traffic Engineering & Safety Systems Branch
Signal Management Section
750 N.Greenfield Pkwy,Garner,NC 27529

NC 54 (S. Miami Boulevard) at SR 1978 (Hopson Road)/ SR 1973 (Page Road)

Division 5 | Durham County | Durham

PLAN DATE: December 2017 | REVIEWED BY: SL Phillips
PREPARED BY: SP Pennington | REVIEWED BY:

REVISIONS	INIT.	DATE

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DocuSigned by: SCATASEC9D0B437
12/19/2018
SIGNATURE | DATE

SIG. INVENTORY NO. 05-2008

12/19/2018
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derrick.waller

PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG.311.2

ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select [2. CONTROLLER]
2. From CONTROLLER Submenu select [2. VEHICLE OVERLAPS]

OVERLAP A

Select TMG VEH OVLP [A] and 'PPLT FYA'

```
TMG VEH OVLP...[A] TYPE: .....PPLT FYA

PROTECTED LEFT TURN....   PHASE    1
OPPOSING THROUGH.......   PHASE    2

FLASHING ARROW OUTPUT.....CH9  ISOLATE

DELAY START OF: FYA..0.0 CLEARANCE..0.0
ACTION PLAN SF BIT DISABLE........... 1
```

← NOTICE ACTION PLAN SF BIT "1"

Toggle Once

↓

OVERLAP B

Select TMG VEH OVLP [B] and 'PPLT FYA'

```
TMG VEH OVLP...[B] TYPE: .....PPLT FYA

PROTECTED LEFT TURN....   PHASE    3
OPPOSING THROUGH.......   PHASE    4

FLASHING ARROW OUTPUT.....CH10 ISOLATE

DELAY START OF: FYA..0.0 CLEARANCE..0.0
ACTION PLAN SF BIT DISABLE........... 3
```

← NOTICE ACTION PLAN SF BIT "3"

Toggle Once

↓

OVERLAP C

Select TMG VEH OVLP [C] and 'PPLT FYA'

```
TMG VEH OVLP...[C] TYPE: .....PPLT FYA

PROTECTED LEFT TURN....   PHASE    5
OPPOSING THROUGH.......   PHASE    6

FLASHING ARROW OUTPUT.....CH11 ISOLATE

DELAY START OF: FYA..0.0 CLEARANCE..0.0
ACTION PLAN SF BIT DISABLE........... 5
```

← NOTICE ACTION PLAN SF BIT "5"

Toggle Once

↓

OVERLAP D

Select TMG VEH OVLP [D] and 'PPLT FYA'

```
TMG VEH OVLP...[D] TYPE: .....PPLT FYA

PROTECTED LEFT TURN....   PHASE    7
OPPOSING THROUGH.......   PHASE    8

FLASHING ARROW OUTPUT.....CH12 ISOLATE

DELAY START OF: FYA..0.0 CLEARANCE..0.0
ACTION PLAN SF BIT DISABLE........... 7
```

← NOTICE ACTION PLAN SF BIT "7"

END PROGRAMMING

FLASHER CIRCUIT MODIFICATION DETAIL

IN ORDER TO ENSURE 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.

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: 05-2008
DESIGN: DECEMBER 2017
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail - Sheet 2 of 4

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ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared For:
NC Transportation Mobility and Safety Division
Traffic Engineering Branch
Signals Management Section
750 N.Greenfield Pkwy,Garner,NC 27529

NC 54 (S. Miami Boulevard)
at
SR 1978 (Hopson Road)/
SR 1973 (Page Road)

Division 5 Durham County Durham

PLAN DATE: December 2017 REVIEWED BY: SL Phillips
PREPARED BY: SP Pennington REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACIE L. PHILLIPS

DocuSigned by: 12/19/2018
0C87A59ED60B437...
SIGNATURE DATE

SIG. INVENTORY NO. 05-2008

12/19/2018
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derrick.waller

PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG.311.3

ECONOLITE ASC/3-2070 VEHICLE DETECTOR SETUP PROGRAMMING DETAIL FOR ALTERNATE PHASING
LOOPS 1A, 5A, 3A, 7A

(program controller as shown)

IMPORTANT!

Program detectors per the input file connection and programming chart shown on sheet 1 before proceeding.

1. From Main Menu select [8. UTILITIES]
2. From UTILITIES Submenu select [1. COPY/CLEAR]
3. Copy from DETECTOR PLAN "1" to DETECTOR PLAN "2".

```
COPY / CLEAR UTILITY
      FROM              TO
PHASE TIMING.... . > PHASE TIMING.... .
TIMING PLAN..... . > TIMING PLAN..... .
PH DET OPT PLAN. . > PH DET OPT PLAN. .
DETECTOR PLAN... 1 > DETECTOR PLAN... 2
  TOGGLE TO SELECT A "FROM" AND A "TO"
            THEN PRESS ENTER
```

4. From Main Menu select [6. DETECTORS]
5. From DETECTOR Submenu select [2. VEHICLE DETECTOR SETUP]
6. Place cursor in VEH DET PLAN [ ] position and enter "2".

- Place cursor in VEH DETECTOR [ ] position and enter "1".
- Set delay time to "3".

```
VEH DETECTOR [ 1]   VEH DET PLAN [ 2]
TYPE: S-STANDARD
TS2 DETECTOR..... . ECPI LOG.......   NO
DET PH - 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 1  1    . . . . . . . . . . . . . . . .
EXTEND TIME...  0.0 DELAY TIME...    3.0
USE ADDED INITIAL . CROSS SWITCH PH..  0
LOCK IN....... NONE NTCIP VOL . OR OCC .
PMT QUEUE DELAY. NO
```

← NOTICE VEH DET PLAN 2

← ENSURE DELAY IS SET TO '3'

- Place cursor in VEH DETECTOR [ ] position and enter "26".
- Set assigned phase to "0".

```
VEH DETECTOR [26]   VEH DET PLAN [ 2]
TYPE: G-GREEN EXTENSION/DELAY
TS2 DETECTOR..... . ECPI LOG.......   NO
DET PH - 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 26 0    . . . . . . . . . . . . . . . .
EXTEND TIME...  0.0 DELAY TIME...    3.0
USE ADDED INITIAL . CROSS SWITCH PH..  0
LOCK IN....... NONE NTCIP VOL . OR OCC .
PMT QUEUE DELAY. NO
```

← NOTICE VEH DET PLAN 2

ENSURE PHASE IS SET TO "0" →

- Place cursor in VEH DETECTOR [ ] position and enter "5".
- Set delay time to "3".

```
VEH DETECTOR [ 5]   VEH DET PLAN [ 2]
TYPE: S-STANDARD
TS2 DETECTOR..... . ECPI LOG.......   NO
DET PH - 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 5  5    . . . . . . . . . . . . . . . .
EXTEND TIME...  0.0 DELAY TIME...    3.0
USE ADDED INITIAL . CROSS SWITCH PH..  0
LOCK IN....... NONE NTCIP VOL . OR OCC .
PMT QUEUE DELAY. NO
```

← NOTICE VEH DET PLAN 2

← ENSURE DELAY IS SET TO '3'

- Place cursor in VEH DETECTOR [ ] position and enter "22".
- Set assigned phase to "0".

```
VEH DETECTOR [22]   VEH DET PLAN [ 2]
TYPE: G-GREEN EXTENSION/DELAY
TS2 DETECTOR..... . ECPI LOG.......   NO
DET PH - 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 22 0    . . . . . . . . . . . . . . . .
EXTEND TIME...  0.0 DELAY TIME...    3.0
USE ADDED INITIAL . CROSS SWITCH PH..  0
LOCK IN....... NONE NTCIP VOL . OR OCC .
PMT QUEUE DELAY. NO
```

← NOTICE VEH DET PLAN 2

ENSURE PHASE IS SET TO "0" →

- Place cursor in VEH DETECTOR [ ] position and enter "3".
- Set delay time to "0".

```
VEH DETECTOR [ 3]   VEH DET PLAN [ 2]
TYPE: S-STANDARD
TS2 DETECTOR..... . ECPI LOG.......   NO
DET PH - 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 3  3    . . . . . . . . . . . . . . . .
EXTEND TIME...  0.0 DELAY TIME...    0.0
USE ADDED INITIAL . CROSS SWITCH PH..  0
LOCK IN....... NONE NTCIP VOL . OR OCC .
PMT QUEUE DELAY. NO
```

← NOTICE VEH DET PLAN 2

← ENSURE DELAY IS SET TO '0'

- Place cursor in VEH DETECTOR [ ] position and enter "28".
- Set assigned phase to "0".

```
VEH DETECTOR [28]   VEH DET PLAN [ 2]
TYPE: S-STANDARD
TS2 DETECTOR..... . ECPI LOG.......   NO
DET PH - 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 28 0    . . . . . . . . . . . . . . . .
EXTEND TIME...  0.0 DELAY TIME...    0.0
USE ADDED INITIAL . CROSS SWITCH PH..  0
LOCK IN....... NONE NTCIP VOL . OR OCC .
PMT QUEUE DELAY. NO
```

← NOTICE VEH DET PLAN 2

ENSURE PHASE IS SET TO "0" →

- Place cursor in VEH DETECTOR [ ] position and enter "7".
- Set delay time to "3".

```
VEH DETECTOR [ 7]   VEH DET PLAN [ 2]
TYPE: S-STANDARD
TS2 DETECTOR..... . ECPI LOG.......   NO
DET PH - 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 7  7    . . . . . . . . . . . . . . . .
EXTEND TIME...  0.0 DELAY TIME...    3.0
USE ADDED INITIAL . CROSS SWITCH PH..  0
LOCK IN....... NONE NTCIP VOL . OR OCC .
PMT QUEUE DELAY. NO
```

← NOTICE VEH DET PLAN 2

← ENSURE DELAY IS SET TO '3'

- Place cursor in VEH DETECTOR [ ] position and enter "24".
- Set assigned phase to "0".

```
VEH DETECTOR [24]   VEH DET PLAN [ 2]
TYPE: S-STANDARD
TS2 DETECTOR..... . ECPI LOG.......   NO
DET PH - 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 24 0    . . . . . . . . . . . . . . . .
EXTEND TIME...  0.0 DELAY TIME...    0.0
USE ADDED INITIAL . CROSS SWITCH PH..  0
LOCK IN....... NONE NTCIP VOL . OR OCC .
PMT QUEUE DELAY. NO
```

← NOTICE VEH DET PLAN 2

ENSURE PHASE IS SET TO "0" →

END PROGRAMMING

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-2008
DESIGNED: DECEMBER 2017
SEALED: 12/19/2018
REVISED: N/A

PLANS PREPARED IN THE OFFICE OF:
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Electrical Detail - Sheet 3 of 4

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

NC 54 (S. Miami Boulevard)
at
SR 1978 (Hopson Road)/
SR 1973 (Page Road)

Division 5 Durham County Durham

PLAN DATE: December 2017		REVIEWED BY:	SL Phillips
PREPARED BY: SP Pennington		REVIEWED BY:	

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACIE L. PHILLIPS

DocuSigned by:
DC87A59ED4DB437...
12/19/2018
SIGNATURE DATE

SIG. INVENTORY NO. 05-2008

12/19/2018
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derrick.waller

ALTERNATE PHASING ACTIVATION DETAIL

TO RUN ALT. PHASING DURING FREE RUN - PROGRAM CHANGES (SHOWN BELOW) IN A TIME BASED ACTION PLAN. SCHEDULE A DAY PLAN THAT INCLUDES THE ACTION PLAN PROGRAMMED TO SELECT VEH DET PLAN 2 AND ENABLE SF BITS 1, 3, 5, and 7.

TO RUN ALT. PHASING DURING COORDINATION - SELECT THE TIME BASED ACTION PLAN THAT IS PROGRAMMED TO SELECT VEH DET PLAN 2 AND ENABLE SF BITS 1, 3, 5, and 7.

PHASING	VEH DET PLAN	SF BITS ENABLED
ACTIONS REQUIRED TO RUN DEFAULT PHASING	1	NONE
ACTIONS REQUIRED TO RUN ALTERNATE PHASING	2	1, 3, 5, 7

IMPORTANT: IF ALT. PHASING IS USED DURING FREE RUN AND COORDINATION, DO NOT OPERATE TIME OF DAY EVENTS CONCURRENTLY WITH COORDINATION PLAN EVENTS IN THE EVENT SCHEDULER. (EX. FREE RUN EVENT SHOULD END BEFORE COORDINATION PLAN EVENT STARTS AND VICE-VERSA).

ALTERNATE PHASING CHANGE SUMMARY

THE FOLLOWING IS A SUMMARY OF WHAT TAKES PLACE WHEN SF BITS 1, 3, 5, AND 7 AND VEH DET PLAN 2 ACTIVATE TO CALL THE "ALTERNATE PHASING":

SF BITS 1,3,5,7: Modifies overlap parent 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 0 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.

ECONOLITE ASC/3-2070 ACTION PLAN PROGRAMMING DETAIL

1. From Main Menu select 5. TIME BASE
2. From TIME BASE Submenu select 2. ACTION PLAN

```
ACTION PLAN...[  1]
PATTERN..........AUTO   SYS OVERRIDE.... NO
TIMING PLAN........ 0   SEQUENCE........  0
VEH DETECTOR PLAN.. 2   DET LOG........NONE
FLASH...........   --   RED REST........ NO
VEH DET DIAG PLN... 0   PED DET DIAG PLN..0
DIMMING ENABLE..   NO   PRIORITY RETURN. NO
PED PR RETURN..    NO   QUEUE DELAY..... NO
PMT COND DELAY     NO
  PHASE   1  2  3  4  5  6  7  8  9  0  1  2  3  4  5  6
PED RCL   .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
WALK 2    .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
VEX 2     .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
VEH RCL   .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
MAX RCL   .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
MAX 2     .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
  PHASE   1  2  3  4  5  6  7  8  9  0  1  2  3  4  5  6
MAX 3     .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
CS INH    .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
OMIT      .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
SPC FCT   X  .  X  .  X  .  X  .  (1-8)
AUX FCT   .  .  .  (1-3)
          1  2  3  4  5  6  7  8  9  0  1  2  3  4  5
LP 1-15   .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 16-30  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 31-45  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 46-60  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 61-75  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 76-90  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 91-100 .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
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THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-2008
DESIGNED: DECEMBER 2017
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail - Sheet 4 of 4

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

NC 54 (S. Miami Boulevard) at SR 1978 (Hopson Road)/ SR 1973 (Page Road)

Division 5 Durham County Durham

PLAN DATE: December 2017 REVIEWED BY: SL Phillips

PREPARED BY: SP Pennington REVIEWED BY:

REVISIONS	INIT.	DATE

Prepared For: Mobility and Safety Division, Signals Management Section, 750 N.Greenfield Pkwy,Garner,NC 27529

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SEAL
NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACIE L. PHILLIPS

DocuSigned by: 12/19/2018
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SIGNATURE DATE

SIG. INVENTORY NO. 05-2008

12/19/2018
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derrick.waller