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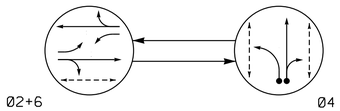
PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-93.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

EV PREEMPT PHASES

(Medium Priority)

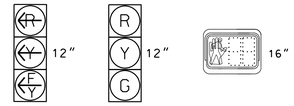
PRE 3
(Ø2+6)

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2+6	PHASE Ø4	PHASE PRE 3	FLASH
21	~~F Y~~	~~R~~	~~F Y~~	~~Y~~
22, 23	G	R	G	Y
41, 42	R	G	R	R
61	~~F Y~~	~~R~~	~~F Y~~	~~Y~~
62, 63	G	R	R	Y
P21, P22	W	DW	DW	DRK
P41, P42, P43, P44	DW	W	DW	DRK

SIGNAL FACE I.D.

All Heads L.E.D.



21
61

22, 23
41, 42
62, 63

P21, P22
P41, P42, P43, P44

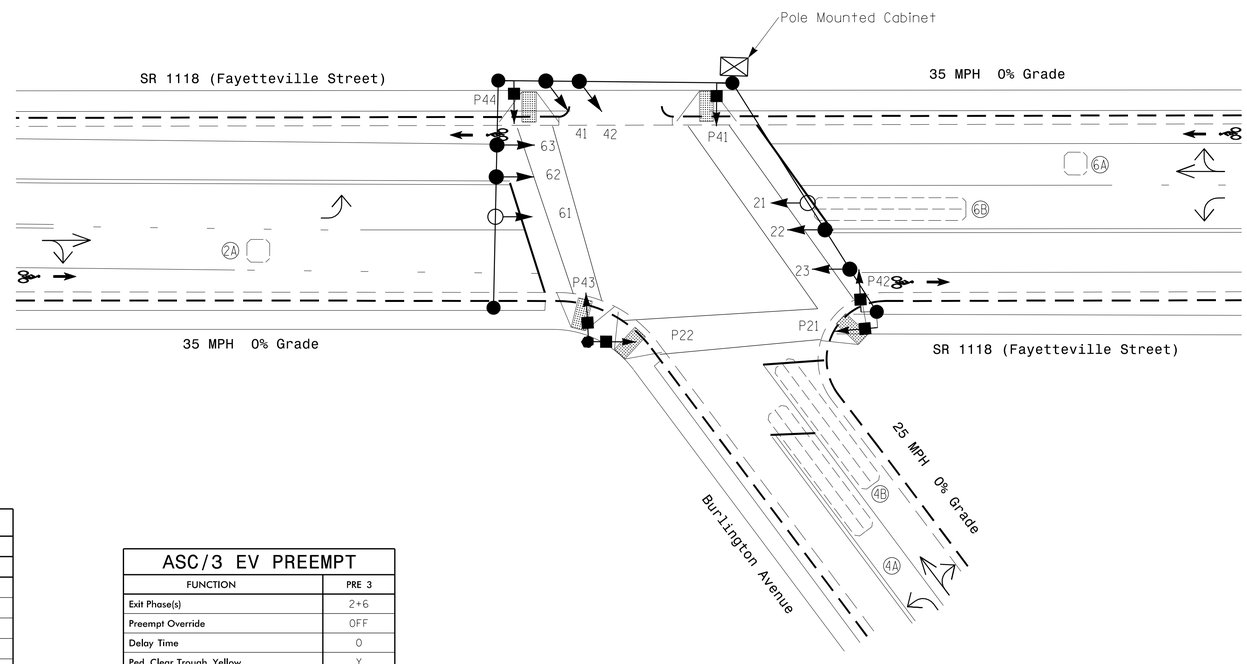
ASC/3 DETECTOR INSTALLATION CHART

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	70	Exist	-	2	Yes	-	-	-	S	-	X
4A	6X40	+10	2-4-2	-	4	Yes	-	3	-	S	-	X
4B	6X40	0	2-4-2	-	4	Yes	-	10	-	S	-	X
6A	6X6	70	Exist	-	6	Yes	-	-	-	S	-	X
6B	6X40	0	2-4-2	-	6	Yes	-	-	-	S	-	X

2 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. Renumber existing signal heads 21, 22, 61 and 62 as 22, 23, 62 and 63 respectively.
4. Reposition existing signal heads numbered 62 and 63.
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. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
11. Loop data based on previous plan and/or field observations.
12. Install GPS emergency preemption system per manufacturers instructions to achieve preemption needed, as shown in phasing diagram.
13. Remove existing optical detection equipment.



LEGEND

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

ASC/3 TIMING CHART

FEATURE	PHASE 2	PHASE 4	PHASE 6
Min Green *	10	7	10
Walk *	7	7	0
Ped Clear	10	14	0
Veh. Extension *	3.0	2.0	3.0
Max 1 *	45	25	45
Yellow	3.8	3.2	3.8
Red Clear	1.4	3.0	1.4
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	-	-	-
Simultaneous Gap	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 Farlington Place, Suite 100
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Phone: 919-872-5115
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SCALE 0 20
1"=20'

SR 1118 (Fayetteville St.)
at
Burlington Ave.

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

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SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32396 ENGINEER WILLIAM J. HAMILTON

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

SIG. INVENTORY NO. 05-0406

12/18/2018
ASC-05-0406_W05-0406_sig.dgn
User:tpopelka

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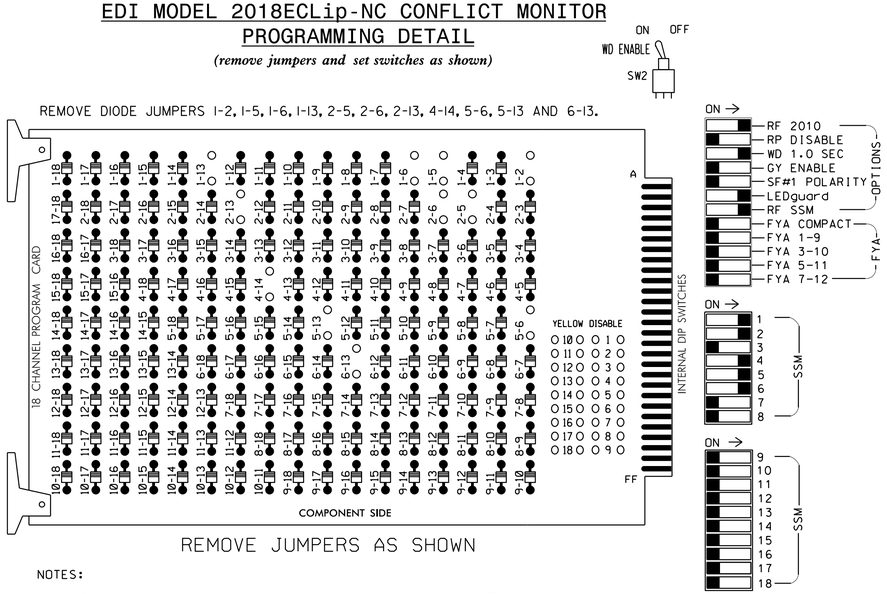
PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-93.1

EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches 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 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.....336
SOFTWARE.....ECONOLITE ASC/3-2070
CABINET MOUNT.....POLE
OUTPUT FILE POSITIONS...12
LOAD SWITCHES USED.....S1,S2,S3,S5,S6,S7,S8
PHASES USED.....2,2PED,4,4PED,6
OVERLAP "A".....*
OVERLAP "B".....NOT USED
OVERLAP "C".....*
OVERLAP "D".....NOT USED

* See overlap programming on sheet 3.

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16
PHASE	OLA	2	2 PED	3	4	4 PED	OLC	6	6 PED	7	8	8 PED
SIGNAL HEAD NO.	61★	22,23	P21, P22	NU	41,42	P41,P42, P43,P44	21★	62,63	NU	NU	NU	NU
RED		128			101			134				
YELLOW		129			102			135				
GREEN		130			103			136				
RED ARROW	125						131					
YELLOW ARROW	126						132					
FLASHING YELLOW ARROW	127						133					
✋			113			104			119			
GREEN ARROW												
🚶			115			106			121			

★See pictorial of head wiring in detail below.

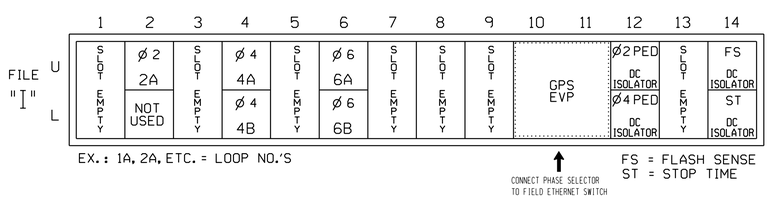
NOTE: Load Switches S1, S7 requires output remapping.

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)



INPUT FILE CONNECTION & PROGRAMMING CHART

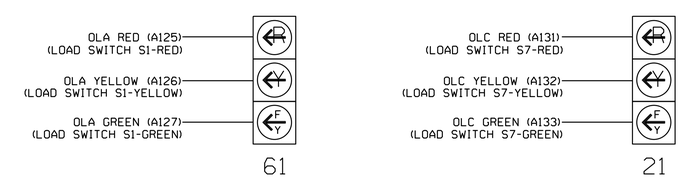
LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND TIME	DELAY TIME	ADDED INITIAL	DETECTOR TYPE
2A	TB21-3,4	I2U	39	2	2	YES				S
4A	TB21-7,8	I4U	41	4	4	YES		3		S
4B	TB23-7,8	I4L	45	14	4	YES		10		S
6A	TB21-11,12	I6U	40	6	6	YES				S
6B	TB23-11,12	I6L	44	16	6	YES				S
PED PUSH BUTTONS										
P21,P22	TB22-9,10	I12U	67	PED 2	2 PED					
P41,P42, P43,P44	TB24-9,10	I12L	69	PED 4	4 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 head as shown)



THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0406
DESIGNED: Dec 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail
Sheet 1 of 3

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Transportation Engineers
5808 Faringdon Place, Suite 100
Raleigh, North Carolina 27609
919-872-5115 Tel, 919-878-5416 Fax,
www.rameykemp.com

ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 1118 (Fayetteville St.)
at
Burlington Ave.

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

750 N.Greenfield Pkwy,Garner,NC 27529

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32396 ENGINEER WILLIAM J. HAMILTON

DocuSigned by: William J. Hamilton 12/19/2018
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SIG. INVENTORY NO. 05-0406

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User:tpopelka

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PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-93.2

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 4. 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 . . . . . . . . . . . . . .
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     OI     OI    OI25.5I25.5
-----------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.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0406
DESIGNED: Dec 2018
SEALED: 12/19/2018
REVISED: N/A

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..
```

Electrical Detail
Sheet 2 of 3

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5808 Farrington Place, Suite 100
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ELECTRICAL AND PROGRAMMING DETAILS FOR:

750 N.Greenfield Pkwy,Garner,NC 27529

SR 1118 (Fayetteville St.)
at
Burlington Ave.

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

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PROJECT REFERENCE NO.	SHEET NO.
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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 '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
```

END PROGRAMMING

ECONOLITE ASC/3-2070 LOAD SWITCH ASSIGNMENT DETAIL

(program controller as shown)

To assign load switches S1 and S7 as OLA and OLC, program LD SWITCH 1 as OVLP 'OL1' TYPE 'O' and LD SWITCH 5 as OVLP 'OLC' TYPE 'O' as shown below.

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

NOTICE OVERLAP A ASSIGNED TO LD SWITCH 1 ➡

NOTICE OVERLAP C ASSIGNED TO LD SWITCH 5 ➡

LD SWITCH ASSIGN

	PHASE /OVLP	TYPE	DIMMING R	Y	G	D	---FLASH--- PWR	AUT	TGR
1	1	O	.	.	.	+	A	R	X
2	2	V	.	.	.	+	A	Y	.
3	3	V	.	.	.	+	A	R	X
4	4	V	.	.	.	+	A	R	.
5	5	O	.	.	.	−	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	8	P	.	.	.	−	A	.	.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0406
DESIGNED: Dec 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail
Sheet 3 of 3

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SR 1118 (Fayetteville St.) at Burlington Ave.

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

SIGNATURE: DocuSigned by: William J. Hamilton A056007046484A4... 12/19/2018

SIG. INVENTORY NO. 05-0406

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

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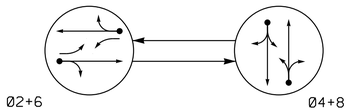
U-5968	Sig-94.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

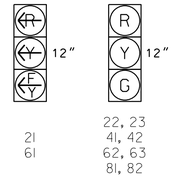
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE 02+6	PHASE 04+8	FLASH
21	~~R~~ ~~Y~~	~~R~~	~~Y~~
22, 23	G	R	Y
41, 42	R	G	R
61	~~R~~ ~~Y~~	~~R~~	~~Y~~
62, 63	G	R	Y
81, 82	R	G	R

SIGNAL FACE I.D.

All Heads L.E.D.



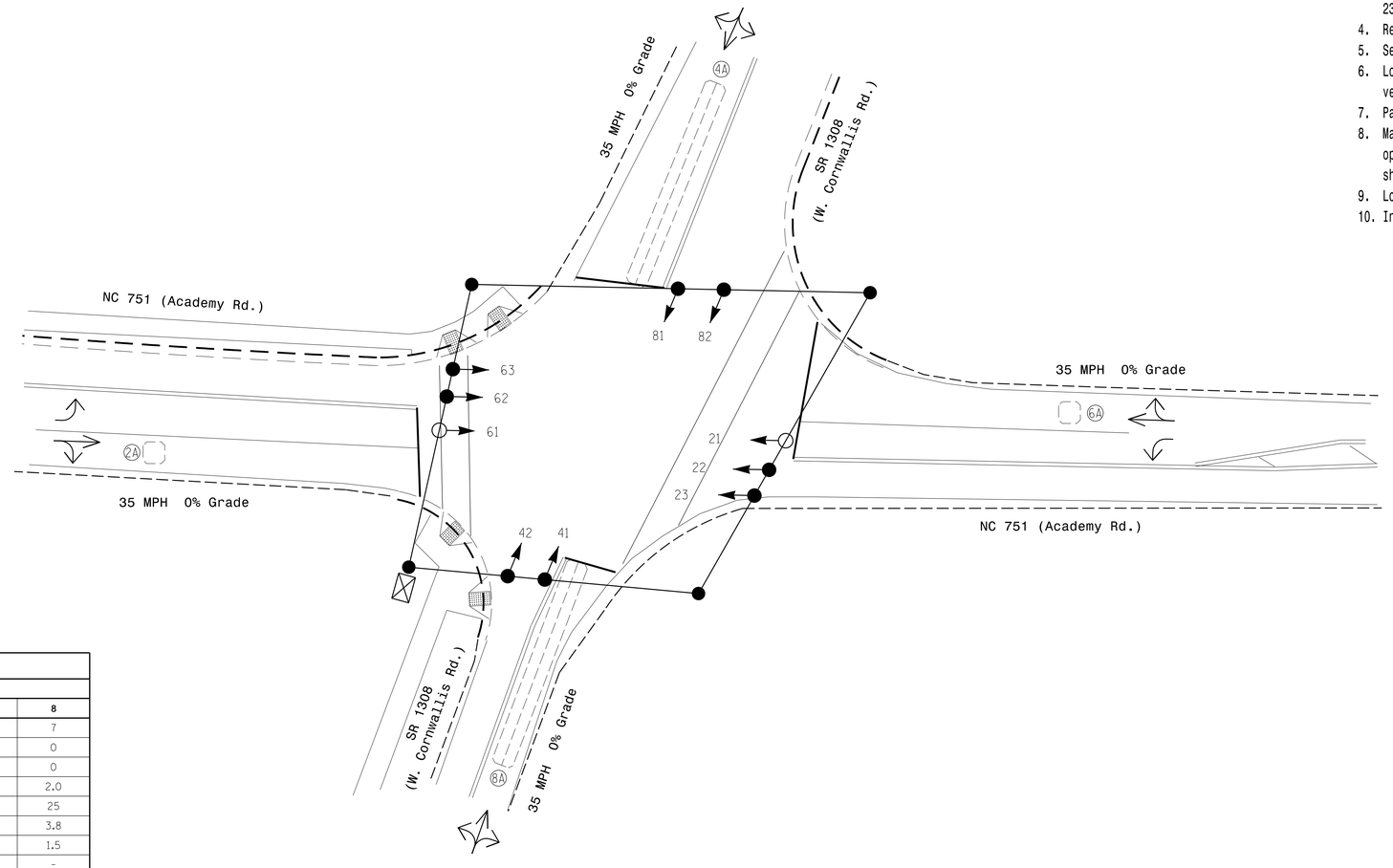
ASC/3 DETECTOR INSTALLATION CHART

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	70	Exist	-	2	Yes	-	-	-	S	-	X
4A	6X40	0	2-4-2	-	4	Yes	-	10	-	S	-	X
6A	6X6	70	Exist	-	6	Yes	-	-	-	S	-	X
8A	6X40	0	2-4-2	-	8	Yes	-	10	-	S	-	X

2 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. Renumber existing signal heads 21, 22, 61 and 62 and 22, 23, 62 and 63 respectively.
4. Reposition existing signal heads numbered 22, 23, 62 and 63.
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. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
9. Loop data based on previous plan and/or field observations.
10. Install new cabinet on the existing cabinet foundation.



LEGEND

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

ASC/3 TIMING CHART

FEATURE	PHASE 2	PHASE 4	PHASE 6	PHASE 8
Min Green *	10	7	10	7
Walk *	0	0	0	0
Ped Clear	0	0	0	0
Veh. Extension *	3.0	2.0	3.0	2.0
Max 1 *	45	25	45	25
Yellow	3.8	3.8	3.8	3.8
Red Clear	1.9	1.3	1.9	1.5
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

* 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.

12/17/2018
mcpherson, matthew
wf05-5007 w05-0407_sig-dgn
User:tpopelka

Signal Upgrade

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

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

SCALE 0 20 1"=20'

NC 751 (Academy Rd.) at SR 1308 (W. Cornwallis Rd.)

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 A056ED7D46484B4... 12/19/2018
SIGNATURE DATE

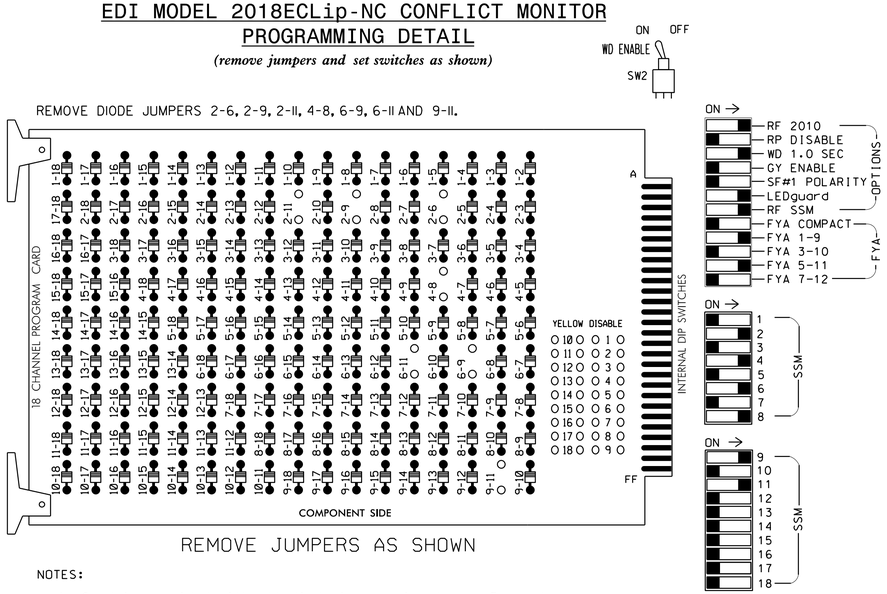
SIG. INVENTORY NO. 05-0407

DocuSign Envelope ID: A3F8DAFA-3A02-4B3B-A7EA-0DD651296150

PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-94.1

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.

■ = DENOTES POSITION OF SWITCH

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 Green and 6 Green.
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.....S2,S5,S8,S11,AUX S1,AUX S4
PHASES USED.....2,4,6,8
OVERLAP "A".....*
OVERLAP "B".....NOT USED
OVERLAP "C".....*
OVERLAP "D".....NOT USED

* See overlap programming on sheet 2.

SIGNAL HEAD HOOK-UP CHART

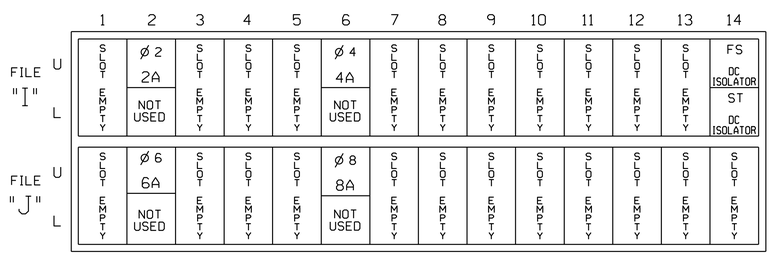
LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	NU	22,23	NU	NU	41,42	NU	NU	62,63	NU	NU	81,82	NU	61★	NU	NU	21★	NU	NU
RED		128			101			134			107							
YELLOW		129			102			135			108							
GREEN		130			103			136			109							
RED ARROW													A121			A114		
YELLOW ARROW													A122			A115		
FLASHING YELLOW ARROW													A123			A116		
GREEN ARROW																		

NU = Not Used

★ See pictorial of head wiring in detail this sheet.

INPUT FILE POSITION LAYOUT

(front view)



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

FS = FLASH SENSE
ST = STOP TIME

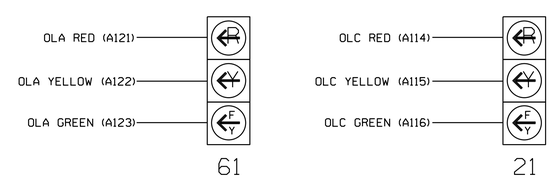
INPUT FILE CONNECTION & PROGRAMMING CHART

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				S
4A	TB4-9,10	I6U	41	4	4	YES		10		S
6A	TB3-5,6	J2U	40	6	6	YES				S
8A	TB5-9,10	J6U	42	8	8	YES		10		S

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0407
DESIGNED: Dec 2018
SEALED: 12/19/2018
REVISED: N/A

Prepared in the offices of:
RAMEY KEMP & ASSOCIATES, INC.
Transportation Engineers
5808 Faringdon Place, Suite 100
Raleigh, North Carolina 27609
919-872-5115 Tel, 919-878-5416 Fax,
www.rameykemp.com

Electrical Detail
Sheet 1 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

NC 751 (Academy Rd.)
at
SR 1308 (W. Cornwallis Rd.)

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

750 N.Greenfield Pkwy,Garner,NC 27529

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32396 ENGINEER WILLIAM J. HAMILTON

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

SIG. INVENTORY NO. 05-0407

12/17/2018
Sig-94.1 05-0407.dle.dgn
User:tspopelka

DocuSign Envelope ID: A3F8DAFA-3A02-4B3B-A7EA-0DD651296150

PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-94.2

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 . . . . . . . . . . . . . .
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 '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
```

END PROGRAMMING

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0407
DESIGNED: Dec 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail
Sheet 2 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Prepared in the offices of:

RAMEY KEMP & ASSOCIATES, INC.
Transportation Engineers
5808 Farrington Place, Suite 100
Raleigh, North Carolina 27609
919-872-5115 Tel, 919-878-5416 Fax,
www.rameykemp.com

ELECTRICAL AND PROGRAMMING DETAILS FOR:

NC 751 (Academy Rd.)
at
SR 1308 (W. Cornwallis Rd.)

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

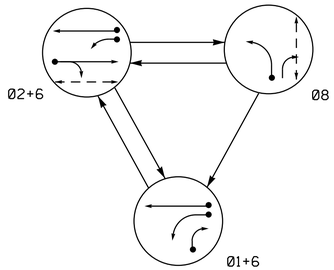
DocuSigned by: William J. Hamilton
A0560D704648484...
12/19/2018
SIGNATURE DATE

SIG. INVENTORY NO. 05-0407

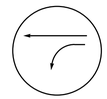
12/17/2018
05-0407_elec2.dgn
User:tpopelka

PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig. 95.0

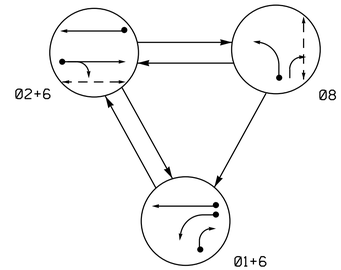
DEFAULT PHASING DIAGRAM



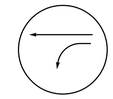
DEFAULT EV PREEMPT PHASES



ALTERNATE PHASING DIAGRAM



ALTERNATE EV PREEMPT PHASES



PHASING DIAGRAM DETECTION LEGEND

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

ASC/3 DETECTOR INSTALLATION CHART

DETECTOR					PROGRAMMING							
LOOP/ ZONE	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	***	-	1	Yes	-	15*	-	S	-	X
				-	6#	Yes	-	-	-	S	-	X
1B	6X40	0	2-4-2	-	1	Yes	-	15	-	S	-	X
2A	6X6	70	EXISTING	-	2	Yes	-	-	-	S	-	X
6A	6X6	60	***	-	6	Yes	-	-	-	S	-	X
8A	6X40	+5	2-4-2	-	8	Yes	-	3	-	S	-	X

* Disable delay during Alternate Phasing Operation.
\# Disable phase call for loop during Alternate Phasing Operation.
*** Video Detection Zone

DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE 01+6	PHASE 02+6	PHASE 08	PHASE PRE3	FLASH
11	←	~~FY~~	~~R~~	←	~~Y~~
21,22	R	G	R	R	Y
61,62	G	G	R	G	Y
81	R	R	G	R	R
82	R/	R	G	R	R
P21,P22	DW	W	DW	DW	DRK
P81,P82	DW	DW	W	DW	DRK

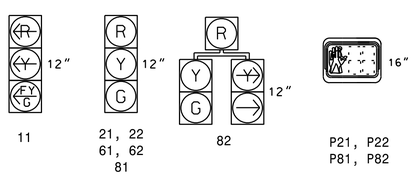
ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE 02+5	PHASE 02+6	PHASE 08	PHASE PRE3	FLASH
11	←	~~R~~	~~R~~	←	~~Y~~
21,22	R	G	R	R	Y
61,62	G	G	R	G	Y
81	R	R	G	R	R
82	R/	R	G	R	R
P21,P22	DW	W	DW	DW	DRK
P81,P82	DW	DW	W	DW	DRK

SIGNAL FACE I.D.

All Heads L.E.D.

FY/G = Bimodal Section



ASC/3 TIMING CHART

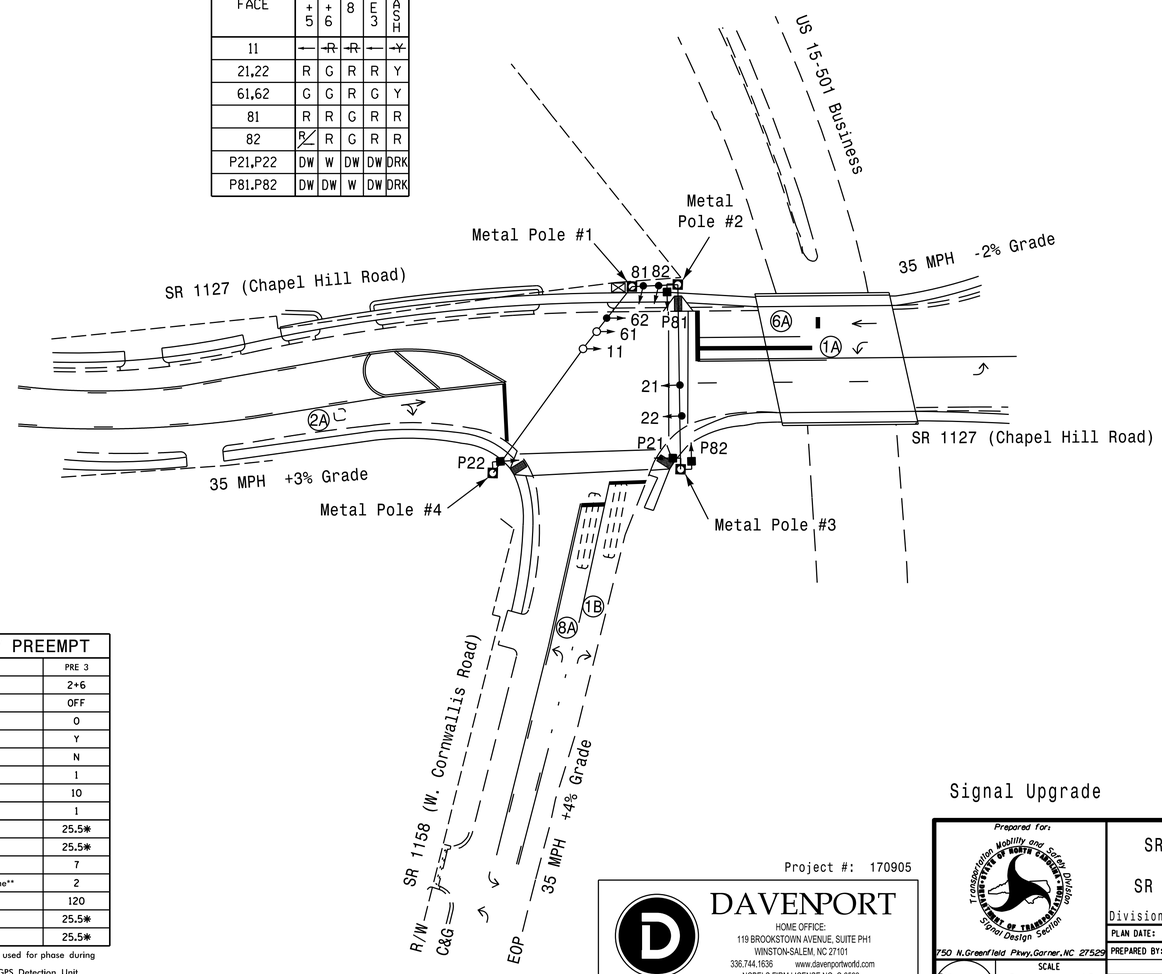
FEATURE	PHASE 1	PHASE 2	PHASE 6	PHASE 8
Min Green *	7	10	10	7
Walk *	0	7	0	7
Ped Clear	0	17	0	16
Veh. Extension *	2.0	3.0	3.0	2.0
Max 1 *	15	60	60	30
Yellow	3.0	4.0	4.0	3.0
Red Clear	2.9	1.9	1.9	2.6
Actuations B4 Add *	-	-	-	-
Seconds /Actuation *	-	-	-	-
Max Initial *	-	-	-	-
Time Before Reduction *	-	-	-	-
Time To Reduce *	-	-	-	-
Minimum Gap	-	-	-	-
Locking Detector	-	X	X	-
Recall Position	-	VEH. RECALL	VEH. RECALL	-
Dual Entry	-	-	-	-
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	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✱
Minimum 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.



3 Phase Fully Actuated w/ Emergency Vehicle 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 may be lagged.
4. Reposition existing signal head 62.
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 supersede these values.
12. Loop Data based on previous plans and/or field observations.
13. Install new cabinet on the existing cabinet foundation.
14. 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.
15. Remove existing optical detection equipment.

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 with Marker	
	Directional Arrow	
	Metal Strain Pole	
	Video Detection Area	
N/A	Curb Ramp	

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

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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

SCALE 0 40 1"=40'

SR 1127 (Chapel Hill Road) at SR 1158 (W. Cornwallis Road)

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

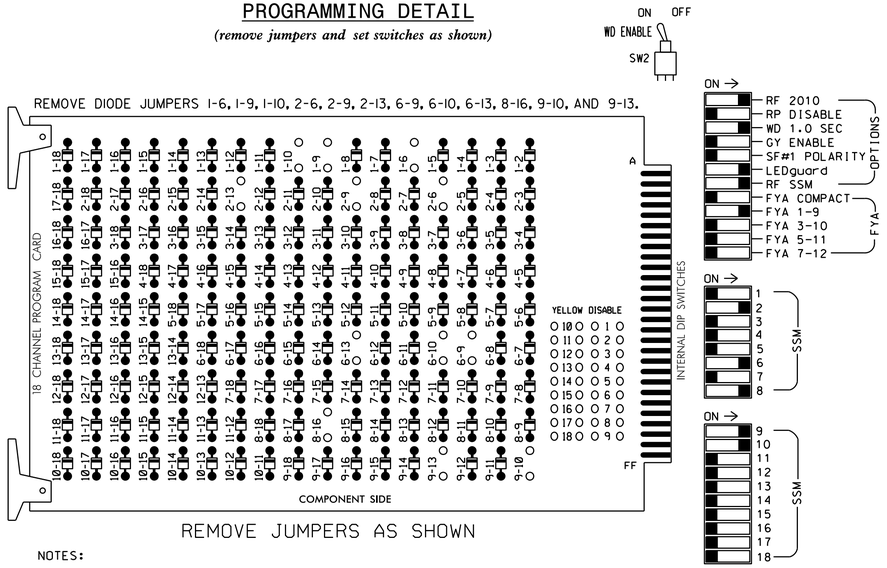
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 030912 ENGINEER LORI M. BOYER
DocuSigned by: Lori M. Boyer 12/21/2018
DATE

SIG. INVENTORY NO. 05-0408

PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig. 95.1

EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches 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 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.....S1,S2,S3,S8,S11,S12
AUX S1,AUX S2
PHASES USED.....1,2,2PED,6,8,8PED
OVERLAP "A".....*
OVERLAP "B".....*
OVERLAP "C".....NOT USED
OVERLAP "D".....NOT USED

* See overlap programming detail on sheet 3

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	NU	NU	NU	NU	61,62	NU	NU	81,82	P81 P82	11★	82	NU	NU	NU	NU
RED		128						134			107			*				
YELLOW	*	129						135			108							
GREEN		130						136			109							
RED ARROW													A121					
YELLOW ARROW													A122	A125				
FLASHING YELLOW ARROW													A123					
GREEN ARROW	127													A126				
✋			113									110						
🚶			115									112						

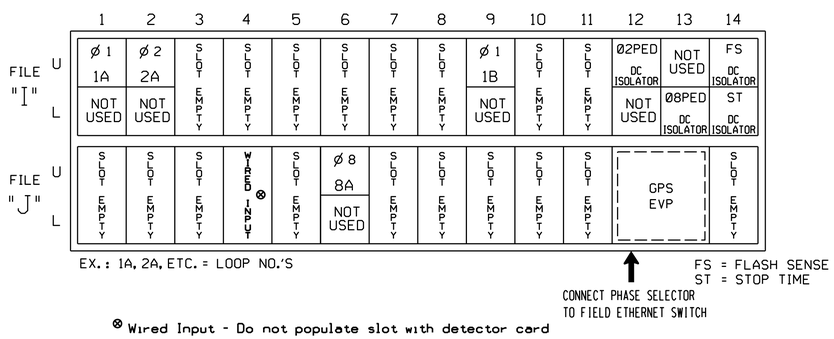
NU = Not Used

* 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)



⊗ Wired Input - Do not populate slot with detector card

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP/ ZONE 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
1B	TB6-9,10	I9U	60	11	1	YES	-	15	-	S
2A	TB2-5,6	I2U	39	2	2	YES	-	-	-	S
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					
P81,P82	TB8-8,9	I13L	70	PED 8	8 PED					

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

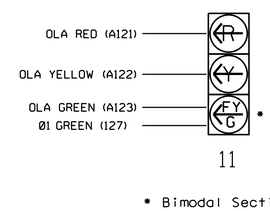
[1] Add jumper from I1-W to J4-W, on rear of input file.

★ For loop 1A, detector card placement and slots reserved for wired inputs are typical for a NCDOT installation. Inputs associated with these slots are compatible with alternate phasing instructions shown on sheets 3 and 4 of this electrical detail.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

FYA SIGNAL WIRING DETAIL

(wire signal head as shown)



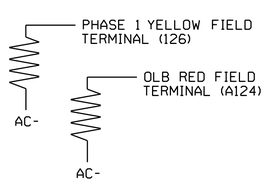
* Bimodal Section

SPECIAL DETECTOR NOTE

Install a video detection system for detection zones 1A and 6A for vehicle detection. Perform installation according to manufacturer's directions and NCDOT engineer-approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)



ACCEPTABLE VALUES

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0408
DESIGNED: December 2018
SEALED: 12/21/2018
REVISED: N/A

Project #: 170905

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Electrical Details - Sheet 1 of 4

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

SR 1127 (Chapel Hill Road)
at
SR 1158 (W. Cornwallis Road)

Division 5 Durham County Durham

PLAN DATE:	December 2018	REVIEWED BY:	L. Boyer
PREPARED BY:	A. Hayes	REVIEWED BY:	R. Hinshaw

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 030912 ENGINEER LORI M. BOYER
DocuSigned by: Lori M. Boyer
SIGNATURE 12/21/2018 DATE
SIG. INVENTORY NO. 05-0408

PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig. 95.2

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 . . . . . . . . . . . . . . .
CYC VEH  . . . . . . . . . . . . . . . .
CYC PED  . . . . . . . . . . . . . . . .
CYC OLP  . . . . . . . . . . . . . . . .
EXIT PH  . X . . . X . . . . . . . . . .
EXIT CAL . . . . . . . . . . . . . . . .
SP FUNC  . . . . . . . . . . . . . . . .

ENABLE... YES|PMT OVRIDE..|INTERLOCK. NO
DET LOCK... X|DELAY..    0|INHIBIT...  0
OVERIDE FL. .|DURATION   0|CLR-GRN... NO
TERM OLP.  NO|PC>YEL   YES|TERM PH    NO
PED DARK.. NO|TC RESRV  NO|DWELL FL  OFF
LINK PMT....0|X FLCOLR RED|EXIT OPT. OFF
X TMG PLN...0|RE-SERV..  0|FLT TYPE.HARD
FREE DUR PMT|R1  NO|R2  NO|R3  NO|R4  NO
--TIMING-----WALK|PED CL|MN GR| YEL| RED
ENTRANCE TM.    1|    10|    1|25.5|25.5
-----------MIN GR|EXT GR|MX GR| YEL| RED
TRACK CLEAR     0|     0|    0|25.5|25.5
-----------MIN DL|PMTEXT|IMX TM| YEL| RED
DWL/CYC-EXIT    7|   0.0|  120|25.5|25.5
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 UNIT FOR 2.0 SEC.

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..
```

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0408
DESIGNED: December 2018
SEALED: 12/21/2018
REVISED: N/A

Project #: 170905

DAVENPORT
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Electrical Details - Sheet 2 of 4

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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 1127 (Chapel Hill Road)
at
SR 1158 (W. Cornwallis Road)

Division 5 Durham County Durham

PLAN DATE:	December 2018	REVIEWED BY:	L. Boyer
PREPARED BY:	A. Hayes	REVIEWED BY:	R. Hinshaw

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 030912 ENGINEER LORI M. BOYER
DocuSigned by: Lori M. Boyer
12/21/2018
SIGNATURE DATE

SIG. INVENTORY NO. 05-0408

PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig. 95.3

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

(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" →

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...[B] 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

Electrical Details - Sheet 3 of 4

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THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0408
DESIGNED: December 2018
SEALED: 12/21/2018
REVISED: N/A

Project #: 170905

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NCBELS FIRM LICENSE NO. C-2522

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 1127 (Chapel Hill Road)
at
SR 1158 (W. Cornwallis Road)

Division 5 Durham County Durham

PLAN DATE:	December 2018	REVIEWED BY:	L Boyer
PREPARED BY:	A. Hayes	REVIEWED BY:	R. Hinshaw

REVISIONS	INIT.	DATE

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 030912 ENGINEER LORI M. BOYER

DocuSigned by: Lori M. Boyer 12/21/2018
SIGNATURE DATE

SIG. INVENTORY NO. 05-0408

PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig. 95.4

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 BIT 1.

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 1.

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

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 1 AND VEH DET PLAN 2 ACTIVATE TO CALL THE "ALTERNATE PHASING":

SF BIT 1:	Modifies overlap parent phase for head 11 to run protected turns only.
VEH DET PLAN 2:	Disables phase 6 call on loop 1A and reduces delay time for phase 1 call on loop 1A to 0.0 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  .  .  .  .  .  .  .  (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: 05-0408
DESIGNED: December 2018
SEALED: 12/21/2018
REVISED: N/A

Project #: 170905

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Electrical Details - Sheet 4 of 4

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

SR 1127 (Chapel Hill Road)
at
SR 1158 (W. Cornwallis Road)

Division 5 Durham County Durham

PLAN DATE:	December 2018	REVIEWED BY:	L. Boyer
PREPARED BY:	A. Hayes	REVIEWED BY:	R. Hinshaw

REVISIONS	INIT.	DATE

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 030912 ENGINEER LORI M. BOYER

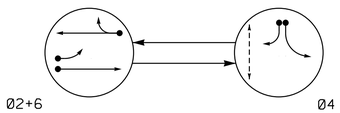
DocuSigned by: Lori M. Boyer 12/21/2018
SIGNATURE DATE

SIG. INVENTORY NO. 05-0408

DocuSign Envelope ID: A3F8DAFA-3A02-4B3B-A7EA-0DD651296150

PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-96.0

PHASING DIAGRAM

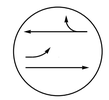


PHASING DIAGRAM DETECTION LEGEND

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

EV PREEMPT PHASES

(Medium Priority)



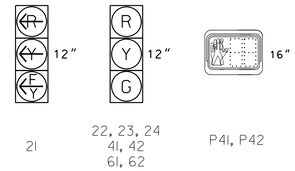
PRE 3
(Ø2+6)

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2+6	PHASE Ø4	PHASE PRE 3	PHASE FLASH
21	~~F Y~~	~~R~~	~~F Y~~	~~Y~~
22, 23, 24	G	R	G	Y
41, 42	R	G	R	R
61, 62	G	R	G	Y
P41, P42	DW	W	DW	DRK

SIGNAL FACE I.D.

All Heads L.E.D.



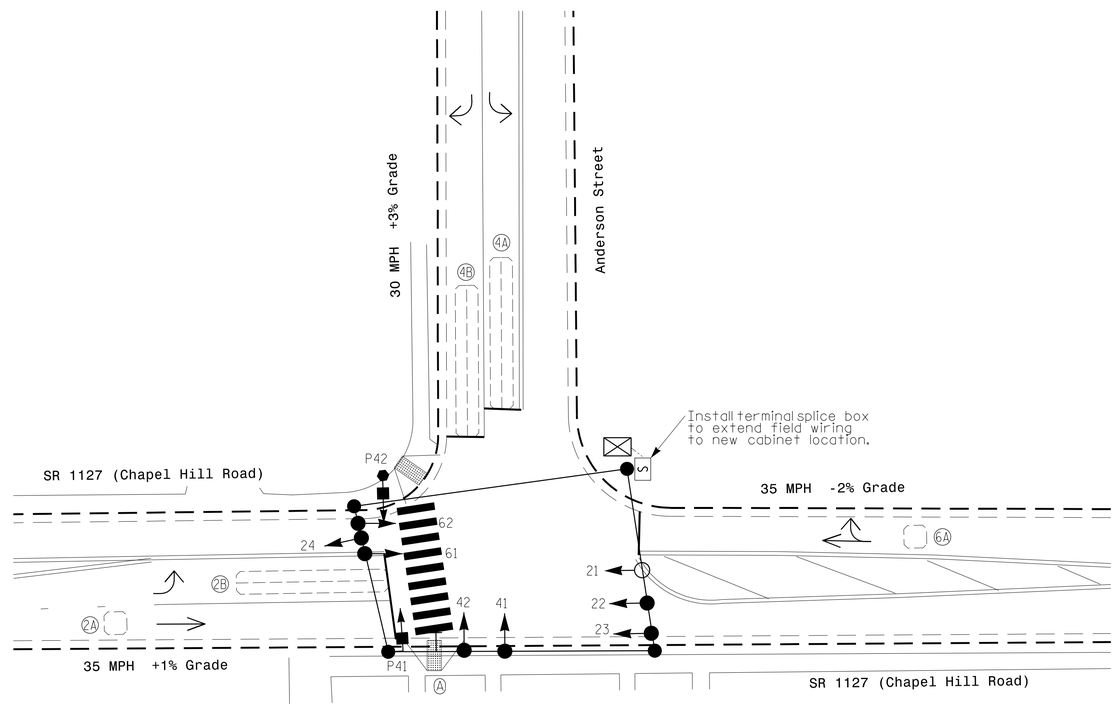
ASC/3 DETECTOR INSTALLATION CHART

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	70	Exist	-	2	Yes	-	-	-	S	-	X
2B	6X40	0	2-4-2	-	2	Yes	-	-	-	S	-	X
4A	6X40	0	2-4-2	-	4	Yes	-	3	-	S	-	X
4B	6X40	0	2-4-2	-	4	Yes	-	-	-	S	-	X
6A	6X6	70	Exist	-	6	Yes	-	-	-	S	-	X

2 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. Renumber existing signal heads 21 and 22 as 22 and 23.
4. Set all detector units to presence mode.
5. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
6. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
7. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
8. Pavement markings are existing.
9. 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 GPS emergency preemption system per manufacturer's instructions to achieve preemption needed, as shown in phasing diagram.
12. Remove existing optical detection equipment.



LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
	Type II Signal Pedestal	
A	No Right Turn "ON RED" Sign (R3-1)	A

ASC/3 TIMING CHART

FEATURE	PHASE 2	PHASE 4	PHASE 6
Min Green *	10	7	10
Walk *	0	7	0
Ped Clear	0	9	0
Veh. Extension *	3.0	2.0	3.0
Max 1 *	45	25	45
Yellow	4.0	3.0	4.0
Red Clear	1.1	2.1	1.1
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	-	-	-
Simultaneous Gap	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
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

SR 1127 (Chapel Hill Rd.)
at
Anderson St.

Division 5 Durham County Durham

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

SCALE 0 20 1"=20'

REVISIONS	INIT.	DATE

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

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SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32396 ENGINEER WILLIAM J. HAMILTON

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

SIG. INVENTORY NO. 05-0409

12/17/2018
ts:MSC05-0409_sig.dgn
User:tpopelka

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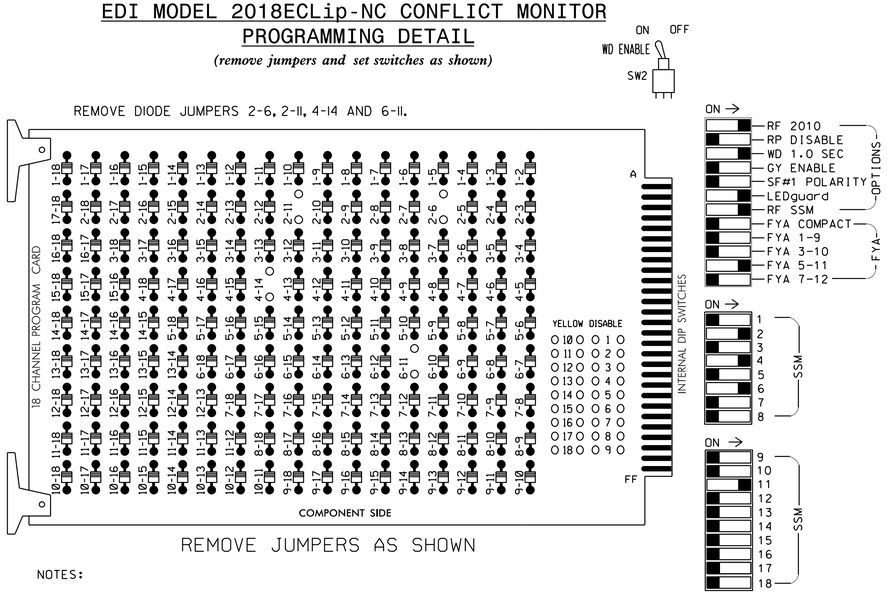
PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-96.1

EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches 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 scheme shown on the Signal Design Plan.

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	22,23, 24	NU	NU	41,42	P41, P42	NU	61,62	NU	NU	NU	NU	NU	NU	NU	21 ★	NU	NU
RED		128			101			134										
YELLOW		129			102			135										
GREEN		130			103			136										
RED ARROW																A114		
YELLOW ARROW																A115		
FLASHING YELLOW ARROW																A116		
GREEN ARROW																		
✋						104												
🚶						106												

NU = Not Used

★ See pictorial of head wiring in detail this sheet.

EQUIPMENT INFORMATION

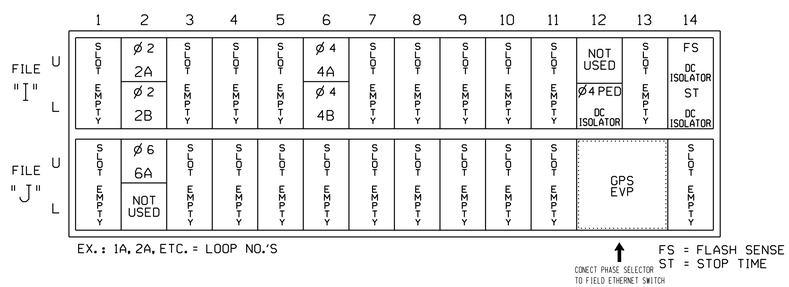
CONTROLLER.....2070LX
CABINET.....332 W/ AUX
SOFTWARE.....ECONOLITE ASC/3-2070
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
LOAD SWITCHES USED.....S2,S5,S6,S8,AUX S4
PHASES USED.....2,4,4PED,6
OVERLAP "A".....NOT USED
OVERLAP "B".....NOT USED
OVERLAP "C".....*
OVERLAP "D".....NOT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

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

INPUT FILE POSITION LAYOUT

(front view)



INPUT FILE CONNECTION & PROGRAMMING CHART

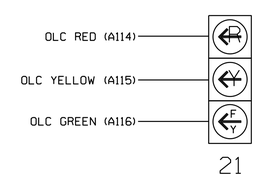
LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND TIME	DELAY TIME	ADDED INITIAL	DETECTOR TYPE
2A	TB2-5,6	I2U	39	2	2	YES				S
2B	TB2-7,8	I2L	43	12	2	YES				S
4A	TB4-9,10	I6U	41	4	4	YES		3		S
4B	TB4-11,12	I6L	45	14	4	YES				S
6A	TB3-5,6	J2U	40	6	6	YES				S
PED PUSH BUTTONS										
P41,P42	TB8-5,6	I12L	69	PED 4	4 PED					

NOTE:
INSTALL DC ISOLATOR IN INPUT FILE SLOT I12.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

FYA SIGNAL WIRING DETAIL

(wire signal head as shown)



THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0409
DESIGNED: Dec 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:

SR 1127 (Chapel Hill Rd.)
at
Anderson 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 A0560D704648484...
12/19/2018
SIGNATURE DATE
SIG. INVENTORY NO. 05-0409

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

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User:tspopelka

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PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-96.2

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 . . . . . . . . . . . . .
CYC VEH  . . . . . . . . . . . . . . . .
CYC PED  . . . . . . . . . . . . . . . .
CYC OLP  . . . . . . . . . . . . . . . .
EXIT PH  . X . . . X . . . . . . . . . .
EXIT CAL . . . . . . . . . . . . . . . .
SP FUNC  . . . . . . . . . . . . . . . .

ENABLE... YES|PMT OVRIDE..|INTERLOCK. NO
DET LOCK... X|DELAY..    0|INHIBIT...  0
OVERIDE FL. .|DURATION   0|CLR-GRN... NO
TERM OLP.  NO|PC>YEL   YES|TERM PH    NO
PED DARK.. NO|TC RESRV  NO|DWELL FL  OFF
LINK PMT....0|X FLCOLR RED|EXIT OPT. OFF
X TMG PLN...0|RE-SERV..  0|FLT TYPE.HARD
FREE DUR PMT|R1  NO|R2  NO|R3  NO|R4  NO
--TIMING-----WALK|PED CL|MN GR| YEL| RED
ENTRANCE TM.    1|    10|    1|25.5|25.5
-----------MIN GR|EXT GR|MX GR| YEL| RED
TRACK CLEAR     0|     0|    0|25.5|25.5
-----------MIN DL|PMTEXT|MX TM| YEL| RED
DWL/CYC-EXIT    7|   0.0|  120|25.5|25.5
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 UNIT 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]

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
```

END PROGRAMMING

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..
```

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0409
DESIGNED: Dec 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail
Sheet 2 of 2

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ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

SR 1127 (Chapel Hill Rd.)
at
Anderson 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

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William J. Hamilton 12/19/2018
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SIG. INVENTORY NO. 05-0409

12/19/2018
ASC-3-2070-PREEMPT-05-0409.elec2.dgn
User:tpopelko

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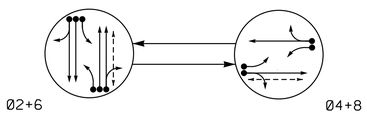
PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-97.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

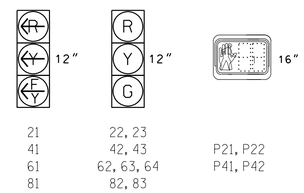
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2+6	PHASE Ø4+8	FLASH
21	~~F Y~~	~~R~~	~~Y~~
22, 23	G	R	Y
41	~~R~~	~~F Y~~	~~R~~
42, 43	R	G	R
61	~~F Y~~	~~R~~	~~Y~~
62, 63, 64	G	R	Y
81	~~R~~	~~F Y~~	~~R~~
82, 83	R	G	R
P21, P22	W	DW	DRK
P41, P42	DW	W	DRK

SIGNAL FACE I.D.

All Heads L.E.D.



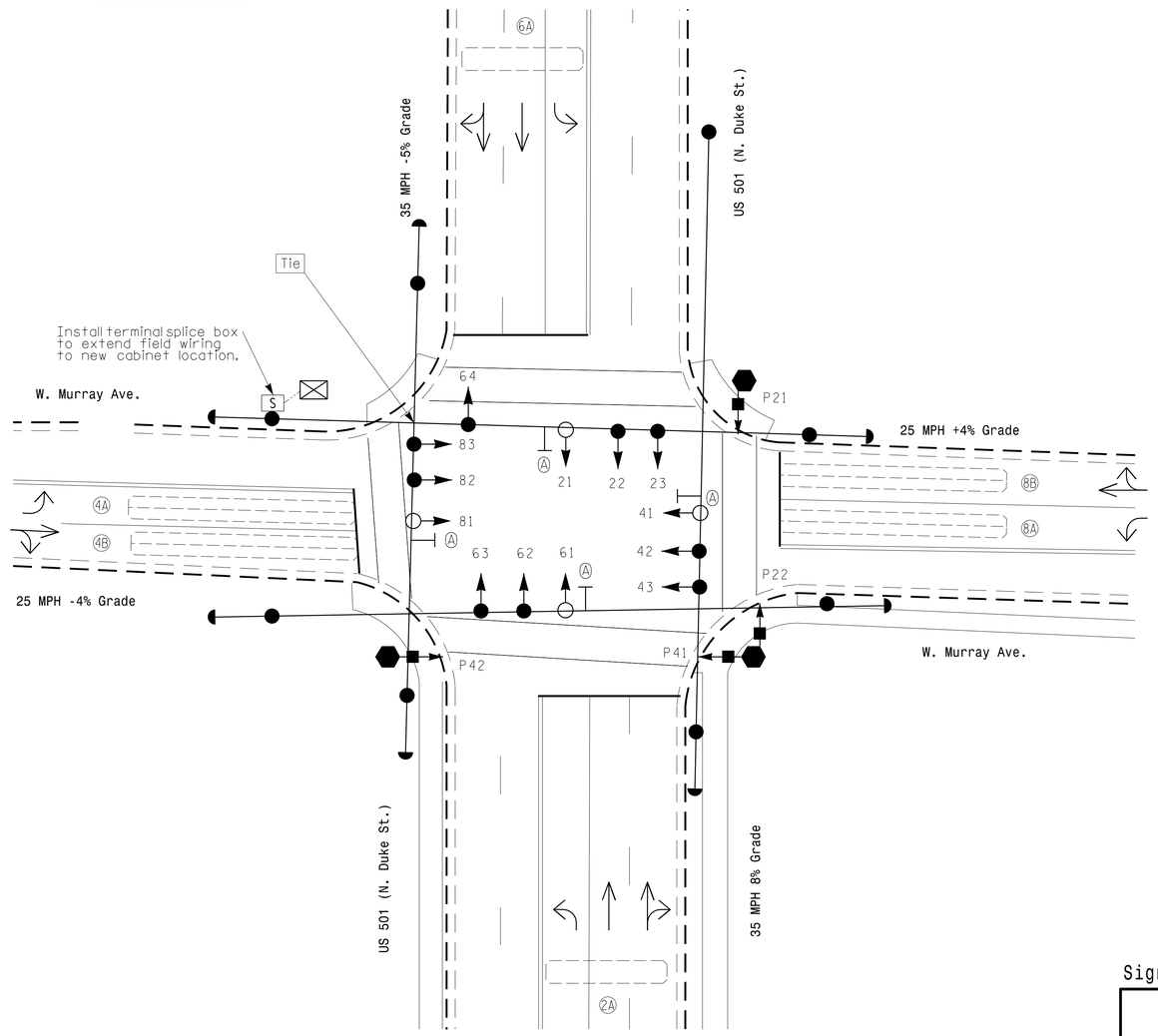
ASC/3 DETECTOR INSTALLATION CHART

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	6X32	70	Exist	-	2	Yes	-	-	-	S	-	X
4A	6X60	0	2-4-2	-	4	Yes	-	3	-	S	-	X
4B	6X60	0	2-4-2	-	4	Yes	-	10	-	S	-	X
6A	6X32	70	Exist	-	6	Yes	-	-	-	S	-	X
8A	6X60	0	2-4-2	-	8	Yes	-	3	-	S	-	X
8B	6X60	0	2-4-2	-	8	Yes	-	10	-	S	-	X

2 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. Renumber existing signal heads numbered 21, 22, 41, 42, 61, 62, 63, 81 and 82 as 22, 23, 42, 43, 62, 63, 64, 82 and 83 respectively.
4. Reposition existing signal heads numbered 22, 23, 42, 43, 62, 63, 82 and 83.
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. Reconnect loops and heads in cabinet as indicated to match current NCDOT standards.
14. Existing Left Arrow "ONLY" Signs (R3-5L) may be removed at the direction of the Engineer.



ASC/3 TIMING CHART

FEATURE	PHASE 2	PHASE 4	PHASE 6	PHASE 8
Min Green *	10	7	10	7
Walk *	7	7	0	0
Ped Clear	10	17	0	0
Veh. Extension *	3.0	1.0	3.0	1.0
Max 1 *	45	25	45	25
Yellow	4.2	3.4	4.2	3.4
Red Clear	2.2	2.8	2.2	2.8
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

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

LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pedestal	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
	Type II Signal Pedestal	
S	Terminal Splice Box	S
A	Left Arrow "ONLY" Sign (R3-5L)	A

Signal Upgrade

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

US 501 (N. Duke St.) at W. Murray Ave.

Division 5 Durham County Durham

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

SCALE 1"=20' (0 – 20)

REVISIONS	INIT.	DATE

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DocuSigned by: William J. Hamilton A0A6D7D4BA8484... 12/19/2018

SIGNATURE DATE

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User:tpopelka

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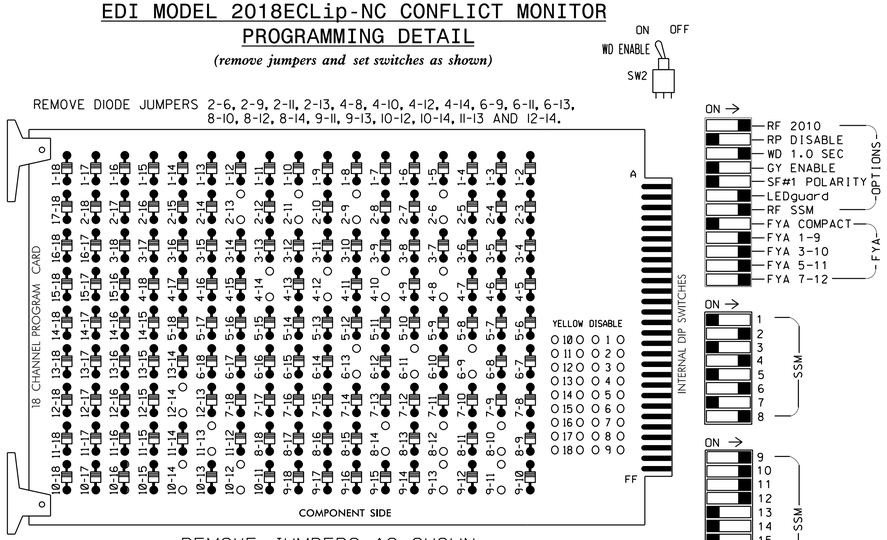
U-5968	Sig-97.1

EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches 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 Green.
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.....S2,S3,S5,S6,S8,S11,AUX S1, AUX S2,AUX S4,AUX S5
PHASES USED.....2,2PED,4,4PED,6,8
OVERLAP "A".....*
OVERLAP "B".....*
OVERLAP "C".....*
OVERLAP "D".....*

* 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	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	NU	22,23	P21, P22	NU	42,43	P41, P42	NU	62,63, 64	NU	NU	82,83	NU	61★	81★	NU	21★	41★	NU
RED		128			101			134			107							
YELLOW		129			102			135			108							
GREEN		130			103			136			109							
RED ARROW													A121	A124		A114	A101	
YELLOW ARROW													A122	A125		A115	A102	
FLASHING YELLOW ARROW													A123	A126		A116	A103	
GREEN ARROW																		
✋			113			104												
🚶			115			106												

NU = Not Used

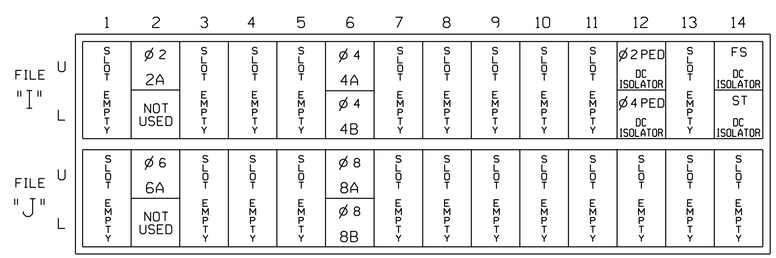
★ See pictorial of head wiring in detail this sheet.

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)



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
2A	TB2-5,6	I2U	39	2	2	YES				S
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				S
8A	TB5-9,10	J6U	42	8	8	YES		3		S
8B	TB5-11,12	J6L	46	18	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					

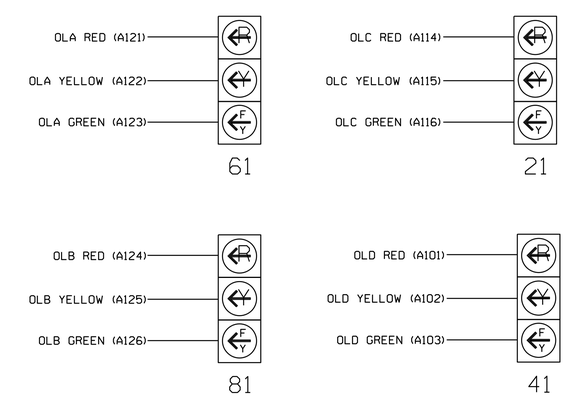
NOTE:

INSTALL DC ISOLATORS IN INPUT FILE SLOT I12.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



Electrical Detail
Sheet 1 of 2

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0410
DESIGNED: Dec 2018
SEALED: 12/19/2018
REVISED: N/A

Prepared in the offices of:
RAMEY KEMP & ASSOCIATES, INC.
Transportation Engineers
5808 Farrington Place, Suite 100
Raleigh, North Carolina 27609
919-872-5115 Tel, 919-878-5416 Fax,
www.rameykemp.com

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

US 501 (N. Duke St.)
at
W. Murray Ave.

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
SIGNATURE DATE

SIG. INVENTORY NO. 05-0410

12/17/2018
U-5968_sig_05-0410_ele.dgn
User:tpopelka

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PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-97.2

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 . . . . . . . . . . . . . .
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 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 . . . . . . . . . . . .
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 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

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: 05-0410
DESIGNED: Dec 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail
Sheet 2 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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ELECTRICAL AND PROGRAMMING DETAILS FOR:

US 501 (N. Duke 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 12/19/2018
SIGNATURE DATE

SIG. INVENTORY NO. 05-0410

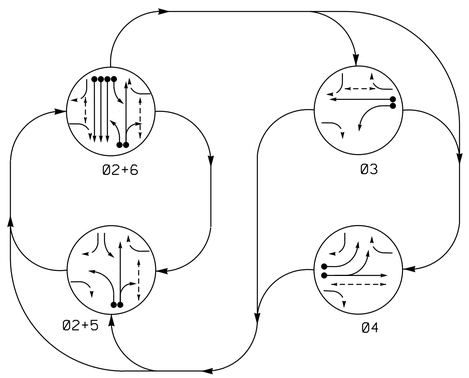
750 N.Greenfield Pkwy,Garner,NC 27529

12/17/2018
R:\Traffic Control\05-0410_ele2.dgn
User:tspopelka

DocuSign Envelope ID: A3F8DAFA-3A02-4B3B-A7EA-0DD651296150

PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-98.0

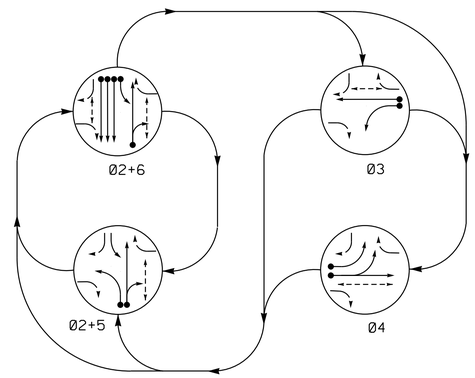
DEFAULT PHASING DIAGRAM



DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE 02+5	02+6	03	04	FLASH
21, 22	G	G	R	R	Y
31	R	R	G	R	R
32	R	R	G	R	R
41	R	R	R	G	R
42	R	R	R	G	R
51	←	F Y	R	R	Y
61	F Y	F Y	R	R	Y
62, 63, 64	R	G	R	R	Y
P21, P22	W	W	DW	DW	DRK
P31, P32	DW	DW	W	DW	DRK
P41, P42	DW	DW	DW	W	DRK
P61, P62	DW	W	DW	DW	DRK

ALTERNATE PHASING DIAGRAM



ALTERNATE PHASING TABLE OF OPERATION

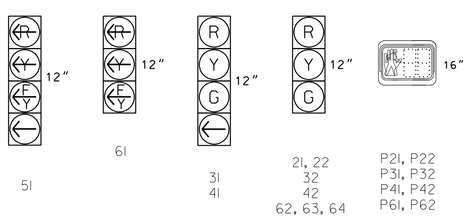
SIGNAL FACE	PHASE 02+5	02+6	03	04	FLASH
21, 22	G	G	R	R	Y
31	R	R	G	R	R
32	R	R	G	R	R
41	R	R	R	G	R
42	R	R	R	G	R
51	←	R	R	R	Y
61	F Y	F Y	R	R	Y
62, 63, 64	R	G	R	R	Y
P21, P22	W	W	DW	DW	DRK
P31, P32	DW	DW	W	DW	DRK
P41, P42	DW	DW	DW	W	DRK
P61, P62	DW	W	DW	DW	DRK

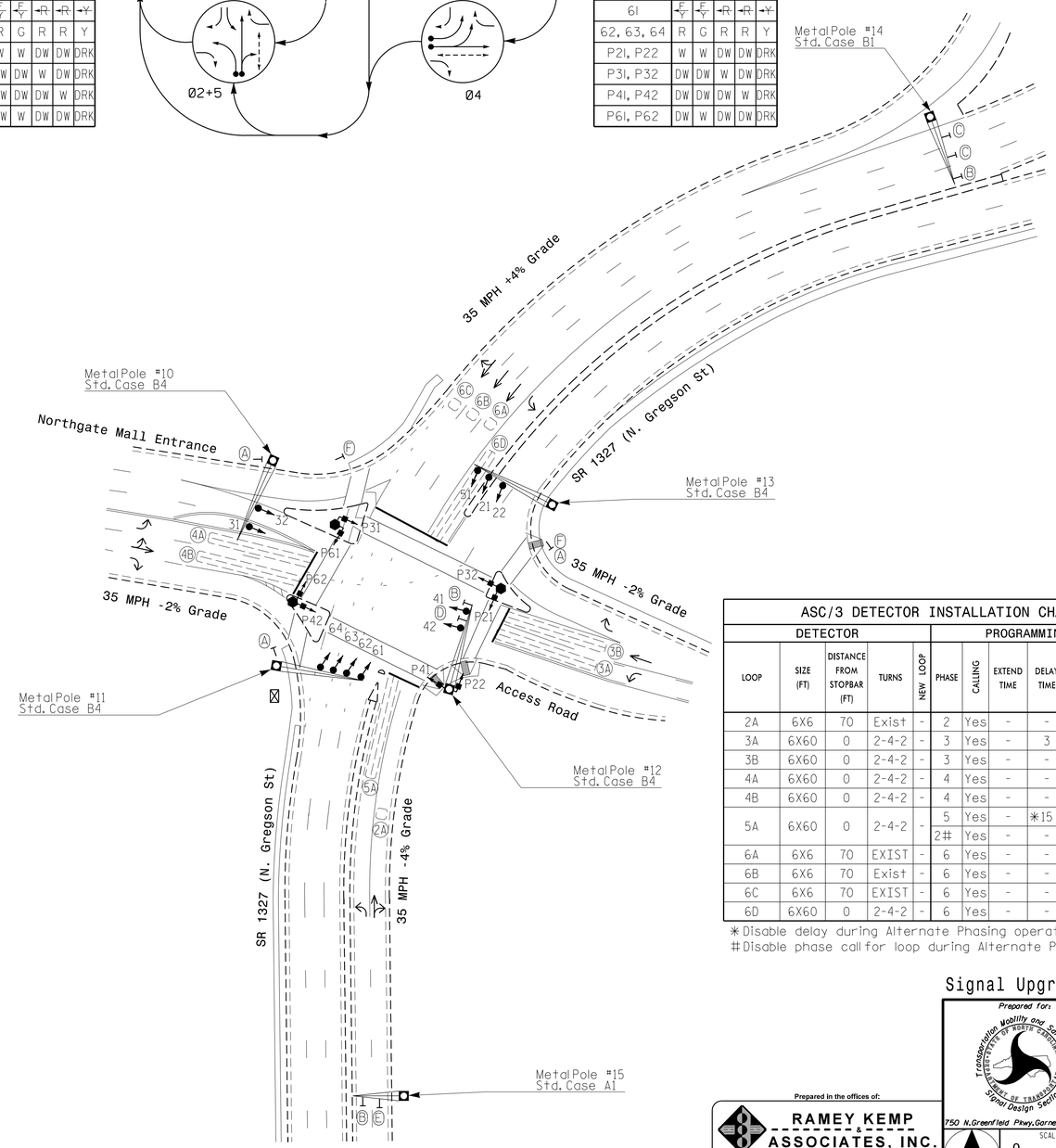
PHASING DIAGRAM DETECTION LEGEND

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

SIGNAL FACE I.D.

All Heads L.E.D.





ASC/3 TIMING CHART

FEATURE	PHASE 2	3	4	5	6
Min Green *	10	7	7	7	10
Walk *	7	7	7	0	7
Ped Clear	8	21	16	0	9
Veh. Extension *	3.0	1.0	1.0	1.0	3.0
Max 1 *	45	25	25	25	45
Yellow	4.1	4.0	4.0	3.0	4.1
Red Clear	2.2	2.0	2.2	2.8	2.2
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	-	-	-	-	-
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.

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	70	Exist	-	2	Yes	-	-	-	S	-	X
3A	6X60	0	2-4-2	-	3	Yes	-	3	-	S	-	X
3B	6X60	0	2-4-2	-	3	Yes	-	-	-	S	-	X
4A	6X60	0	2-4-2	-	4	Yes	-	-	-	S	-	X
4B	6X60	0	2-4-2	-	4	Yes	-	-	-	S	-	X
5A	6X60	0	2-4-2	-	5	Yes	-	✳15	-	S	-	X
					2#	Yes	-	-	-	S	-	X
6A	6X6	70	EXIST	-	6	Yes	-	-	-	S	-	X
6B	6X6	70	Exist	-	6	Yes	-	-	-	S	-	X
6C	6X6	70	EXIST	-	6	Yes	-	-	-	S	-	X
6D	6X60	0	2-4-2	-	6	Yes	-	-	-	S	-	X

✳ Disable delay during Alternate Phasing operation.
Disable phase call for loop during Alternate Phasing operation.

4 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 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. The Division (City) Traffic Engineer will determine the hours of use for each phasing plan.
13. Loop data based on previous plan and/or field observations.
14. Reconnect loops and heads in cabnet as indicated to match current NCDOT standards.
15. Install new cabinet on existing cabinet foundation.

LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
N/A	Curb Ramp	
	Type II Signal Pedestal	
	Metal Pole with Mastarm	
Ⓐ	"YIELD" Sign (R1-2)	Ⓐ
Ⓑ	Left Arrow "ONLY" Sign (R3-5L)	Ⓑ
Ⓒ	Through Arrow "ONLY" Sign (R3-5A)	Ⓒ
Ⓓ	Combined Through and Left Arrow Sign (R3-6L)	Ⓓ
Ⓔ	Combined Through and Right Arrow Sign (R3-6R)	Ⓔ
Ⓕ	Pedestrian Crossing Sign (W11-2)	Ⓕ

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.
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SR 1327 (N. Gregson St.)
at
Northgate Mall Entrance /
Access Rd.

Division 5 Durham County Durham

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

SCALE 1"=40' (0 – 40)

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
SIGNATURE DATE

SIG. INVENTORY NO. 05-0411

12/18/2018
ASC3_Sig_05-0411_sig.dgn
User:tpopelka

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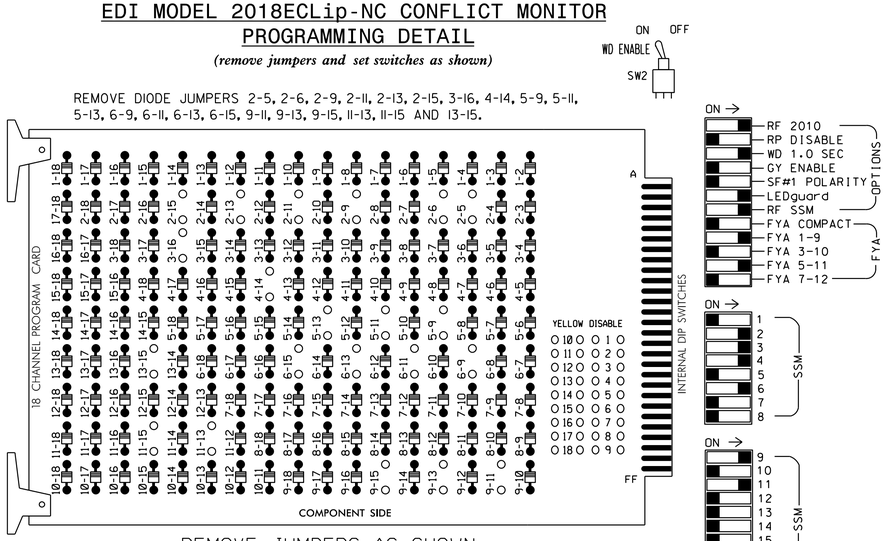
PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-98.1

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, 2-13, 2-15, 3-16, 4-14, 5-9, 5-11, 5-13, 6-9, 6-11, 6-13, 6-15, 9-11, 9-13, 9-15, 11-13, 11-15 AND 13-15.



REMOVE JUMPERS AS SHOWN

■ = 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.

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,S3,S4,S5,S6,S7,S8,S9,S12, AUX S1,AUX S4
PHASES USED.....2,2PED,3,3PED,4,4PED,5,6,6PED
OVERLAP "A".....*
OVERLAP "B".....NOT USED
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.	NU	21,22	P21, P22	31	32	41	42	P41, P42	51★	62,63, 64	P61, P62	NU	NU	P31, P32	61★	NU	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			A115		
FLASHING YELLOW ARROW															A123			A116		
GREEN ARROW				118		103			133											
✋			113					104			119			110						
🚶			115					106			121			112						

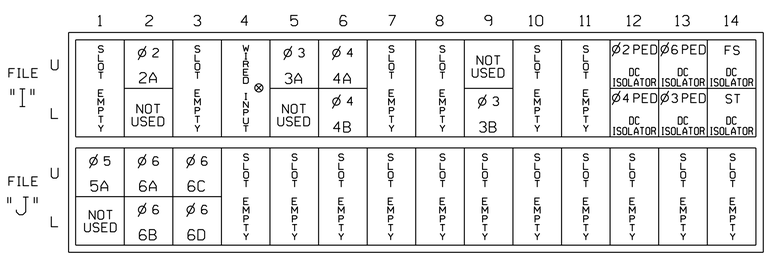
NU = Not Used

* 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

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
2A	TB2-5,6	I2U	39	2	2	YES				S
3A	TB4-5,6	I5U	58	3	3	YES		3		S
3B	TB6-11,12	I9L	62	13	3	YES				S
4A	TB4-9,10	I6U	41	4	4	YES				S
4B	TB4-11,12	I6L	45	14	4	YES				S
5A[1]	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				S
6B	TB3-7,8	J2L	44	16	6	YES				S
6C	TB3-9,10	J3U	64	36	6	YES				S
6D	TB3-11,12	J3L	77	46	6	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					
P31,P32	TB8-8,9	I13L	70	PED 8	3 PED					

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

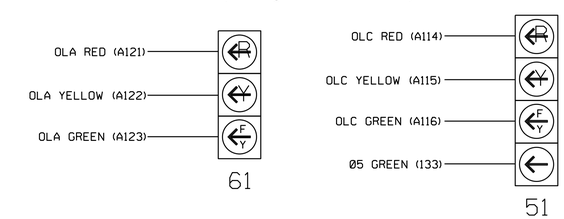
[1] Add jumper from J1-W to I4-W, on rear of input file.

★ 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

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)

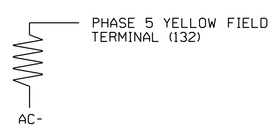


THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0411
DESIGNED: Dec 2018
SEALED: 12/19/2018
REVISED: N/A

LOAD RESISTOR INSTALLATION DETAIL

(install resistor as shown)

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



COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

Electrical Detail
Sheet 1 of 4

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 1327 (N. Gregson St.)
at
Northgate Mall Entrance/
Access Rd.

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
ADMINISTRATOR SIGNATURE DATE

SIG. INVENTORY NO. 05-0411

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PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-98.2

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 . . . . . . . . . . . . . .
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"

END PROGRAMMING

ECONOLITE ASC/3-2070 VEHICLE DETECTOR SETUP PROGRAMMING DETAIL FOR ALTERNATE PHASING LOOP 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 "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: 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

END PROGRAMMING

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0411
DESIGNED: Dec 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail
Sheet 2 of 4

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RAMEY KEMP & ASSOCIATES, INC.
Transportation Engineers
5808 Faringdon Place, Suite 100
Raleigh, North Carolina 27609
919-872-5115 Tel, 919-878-8416 Fax,
www.rameykemp.com

ELECTRICAL AND PROGRAMMING DETAILS FOR:
Transportation Mobility and Safety Division
ITS & Signals Management Section
750 N.Greenfield Pkwy,Garner,NC 27529

SR 1327 (N. Gregson St.)
at
Northgate Mall Entrance/
Access Rd.

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

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NORTH CAROLINA PROFESSIONAL SEAL 32396 ENGINEER WILLIAM J. HAMILTON
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12/18/2018
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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    .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
OMIT      .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
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: 05-0411
DESIGNED: Dec 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail
Sheet 3 of 4

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ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

SR 1327 (N. Gregson St.)
at
Northgate Mall Entrance/
Access Rd.

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

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U-5968	Sig-98.4

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 /OVLP	TYPE	DIMMING R	Y	G	D	---FLASH--- 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: 05-0411
DESIGNED: Dec 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail
Sheet 4 of 4

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ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 1327 (N. Gregson St.)
at
Northgate Mall Entrance/
Access Rd.

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

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

12/18/2018
05-0411 #05-0411.dgn
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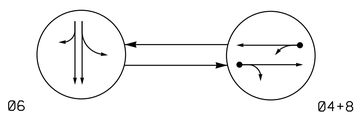
PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-99.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

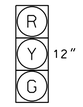
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø6	PHASE Ø4+8	FLASH
41, 42	R	G	R
61, 62	G	R	Y
81, 82	R	G	R

SIGNAL FACE I.D.

All Heads L.E.D.



41, 42
61, 62
81, 82

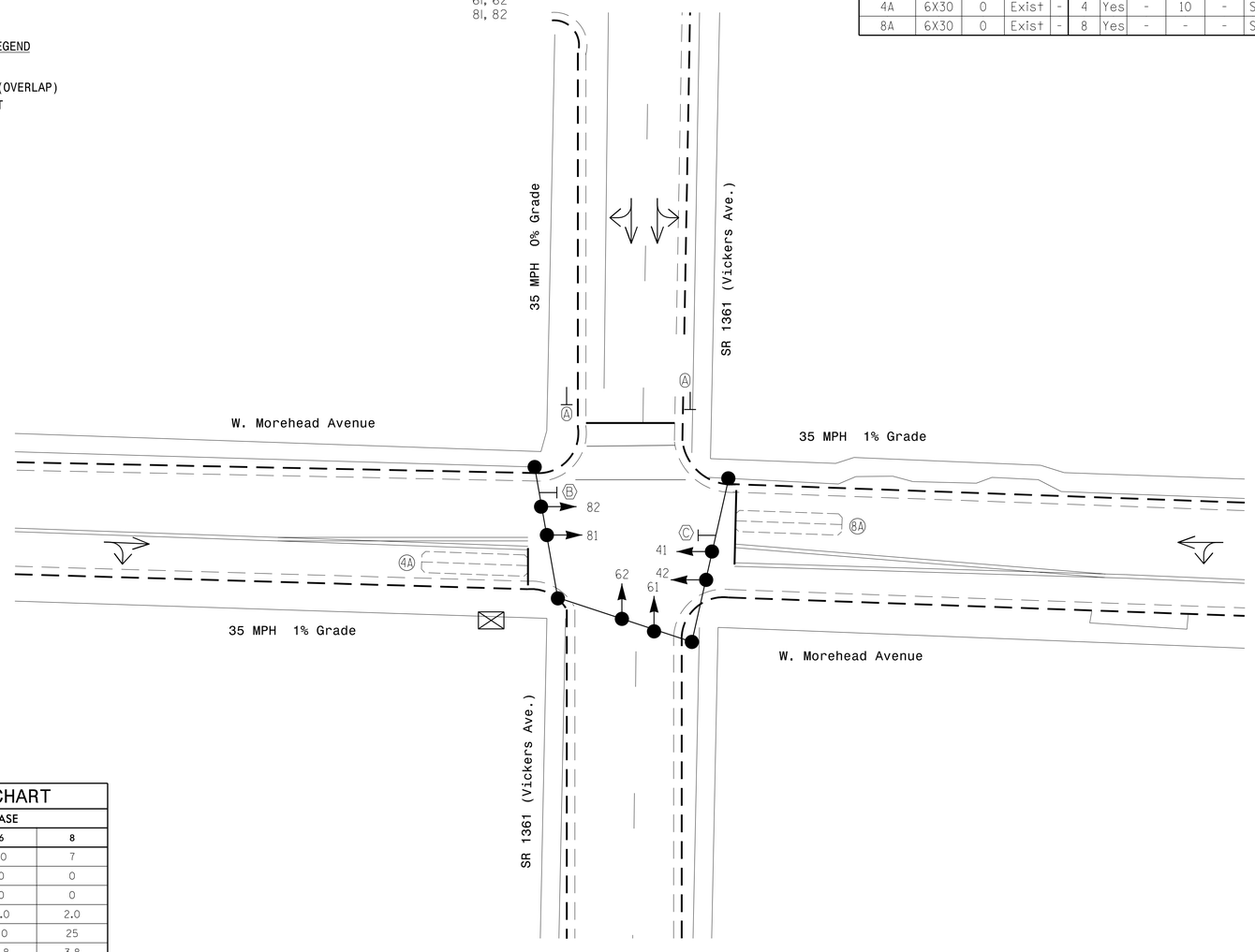
ASC/3 DETECTOR INSTALLATION CHART

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
4A	6X30	0	Exist	-	4	Yes	-	10	-	S	-	X
8A	6X30	0	Exist	-	8	Yes	-	-	-	S	-	X

2 Phase
Semi-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. Set all detector units to presence mode.
4. 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.
5. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
6. Pavement markings are existing.
7. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
8. Loop data based on previous plan and/or field observations.
9. Reconnect loops and heads in cabinet as indicated to match current NCDOT standards.
10. Install new cabinet on the existing cabinet foundation.



ASC/3 TIMING CHART

FEATURE	PHASE 4	PHASE 6	PHASE 8
Min Green *	7	10	7
Walk *	0	0	0
Ped Clear	0	0	0
Veh. Extension *	2.0	0.0	2.0
Max 1 *	25	40	25
Yellow	3.8	3.8	3.8
Red Clear	1.0	1.0	1.0
Actuations B4 Add *	-	-	-
Seconds /Actuation *	-	-	-
Max Initial *	-	-	-
Time Before Reduction *	-	-	-
Time To Reduce *	-	-	-
Minimum Gap	-	-	-
Locking Detector	-	-	-
Recall Position	-	MAX RECALL	-
Dual Entry	X	-	X
Simultaneous Gap	X	X	X

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

LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
A	"DO NOT ENTER" Sign (R5-1)	A
B	No Right Turn Sign (R3-1)	B
C	No Left Turn Sign (R3-2)	C

Signal Upgrade

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

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SCALE 0 20 1"=20'

SR 1361 (Vickers Ave.)
at
W. Morehead Ave.

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

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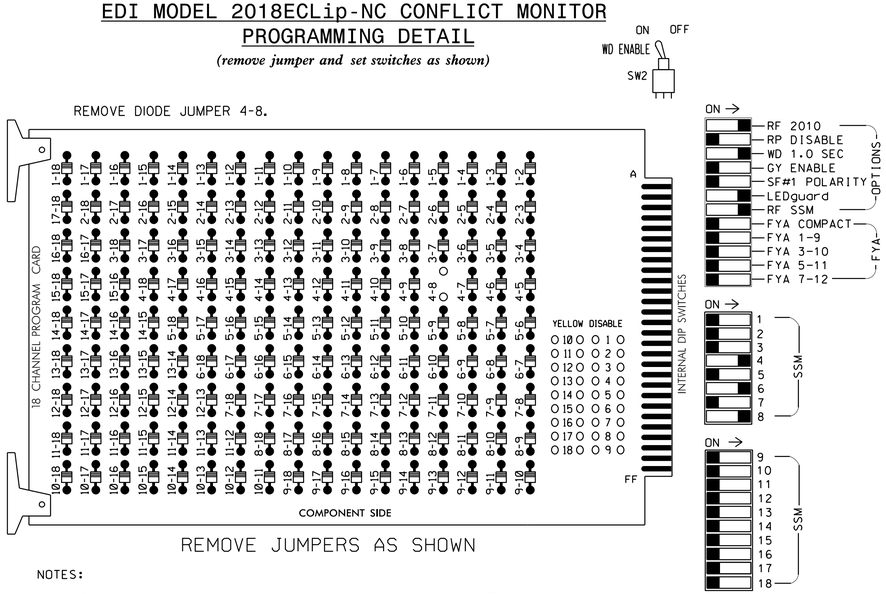
U-5968	Sig-99.1

EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumper and set switches as shown)



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 6 Green.
4. The cabinet and controller are part of the Durham Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070LX
CABINET.....332
SOFTWARE.....ECONOLITE ASC/3-2070
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...12
LOAD SWITCHES USED.....S5,S8,S11
PHASES USED.....4,6,8
OVERLAPS.....NONE

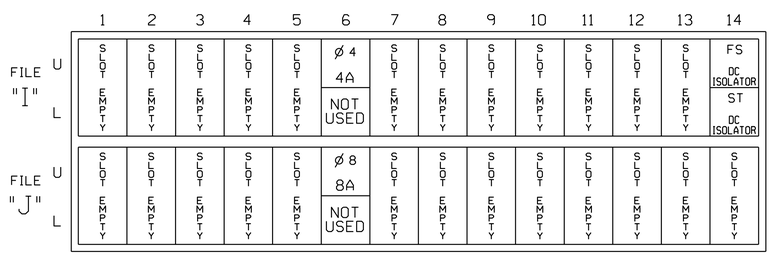
SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED
SIGNAL HEAD NO.	NU	NU	NU	NU	41,42	NU	NU	61,62	NU	NU	81,82	NU
RED					101			134			107	
YELLOW					102			135			108	
GREEN					103			136			109	
RED ARROW												
YELLOW ARROW												
GREEN ARROW												
✋												
🚶												

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)



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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND TIME	DELAY TIME	ADDED INITIAL	DETECTOR TYPE
4A	TB4-9,10	I6U	41	4	4	YES		10		S
8A	TB5-9,10	J6U	42	8	8	YES				S

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0412
DESIGNED: Dec 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail

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ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 1361 (Vickers Ave.)
at
W. Morehead Ave.

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

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NORTH CAROLINA PROFESSIONAL SEAL 32396 ENGINEER WILLIAM J. HAMILTON

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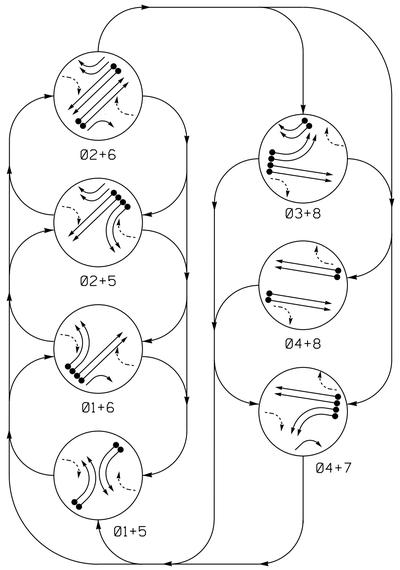
PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG.100.0

PHASING DIAGRAM



EV PREEMPT PHASES

(Medium Priority)

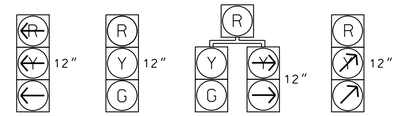
PRE 3
(Ø3+8)

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3+8	Ø4+8	Ø4+7	PRE 3	FLASH
11,12	—	—	R	R	R	R	R	R	R
21,22	R	R	G	G	R	R	R	R	Y
31,32	R	R	R	R	—	R	R	—	R
33,34	R	R	/	/	/	R	R	/	/
41,42	R	R	R	R	R	G	G	R	R
51,52	—	R	—	R	R	R	R	R	R
61,62	R	G	R	G	R	R	R	R	Y
63	R	G	R	G	R	R	R/	R	Y
71,72	R	R	R	R	R	R	—	R	R
81,82,83	R	R	R	R	G	G	R	G	R

SIGNAL FACE I.D.

All Heads L.E.D.



11,12
31,32
51,52
71,72

21,22
41,42
61,62
81,82,83

63

33,34

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	6X60	0	2-4-2	-	1	Yes	-	-	-	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	-	-	-	S	-	X
3D	6X40	0	2-4-2	-	3	Yes	-	-	-	S	-	X
4A	6X40	0	2-4-2	-	4	Yes	-	-	-	S	-	X
4B	6X40	0	2-4-2	-	4	Yes	-	-	-	S	-	X
5A	6X40	0	2-4-2	-	5	Yes	-	-	-	S	-	X
5B	6X40	0	2-4-2	-	5	Yes	-	-	-	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
7B	6X40	0	2-4-2	-	7	Yes	-	-	-	S	-	X
8A	6X40	0	2-4-2	-	8	Yes	-	-	-	S	-	X
8B	6X40	0	2-4-2	-	8	Yes	-	-	-	S	-	X

7 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 1 and/or phase 5 may be lagged.
4. The order of phase 3 and phase 7 may be reversed, but phases 3 and 7 shall not operate simultaneously.
5. Abandon existing loops 2C, 2D, 6C, and 6D.
6. Set all detector units to presence mode.
7. 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.
8. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
9. Pavement markings are existing.
10. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
11. Loop data based on previous plan and/or field observations.
12. Install new cabinet on the existing cabinet foundation.
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.

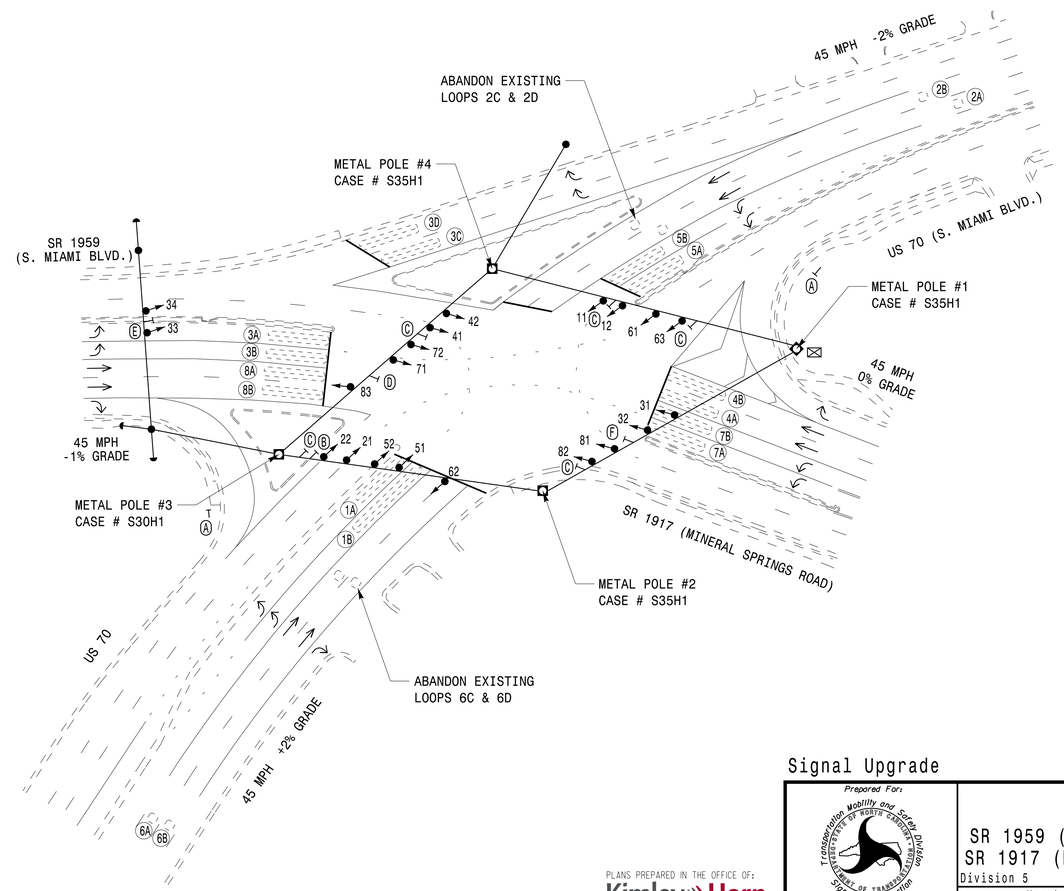
PHASING DIAGRAM DETECTION LEGEND

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

ASC/3 EV PREEMPT

FUNCTION	PRE 3
Exit Phase(s)	4+8
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.



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	
	Metal Strain Pole	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
N/A	Curb Ramp	
A	"YIELD" Sign (R1-2)	A
B	No Right Turn Sign (R3-1)	B
C	Street Sign (D3-1)	C
D	"U-TURN YIELD TO RIGHT TURN" Sign (R10-16)	D
E	"NO TURN ON RED" Sign (R10-11a)	E
F	"No U-Turn Sign" (R3-4)	F

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	0	0	0	0	0	0	0
Ped Clear	0	0	0	0	0	0	0	0
Veh. Extension *	2.0	6.0	2.0	2.0	2.0	6.0	2.0	2.0
Max 1 *	20	60	20	20	20	60	20	20
Yellow	3.0	4.7	3.0	4.5	3.0	4.3	3.0	4.6
Red Clear	3.8	1.9	4.8	3.3	3.4	2.2	4.6	2.5
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 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

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

US 70
at
SR 1959 (S. Miami Boulevard)/
SR 1917 (Mineral Springs Road)

Division 5 Durham County Durham

PLAN DATE: March 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: 1C87A3E0D6B347... 12/19/2018
SIGNATURE DATE

SIG. INVENTORY NO. 05-0414

PLANS PREPARED IN THE OFFICE OF:
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12/19/2018
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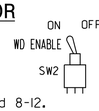
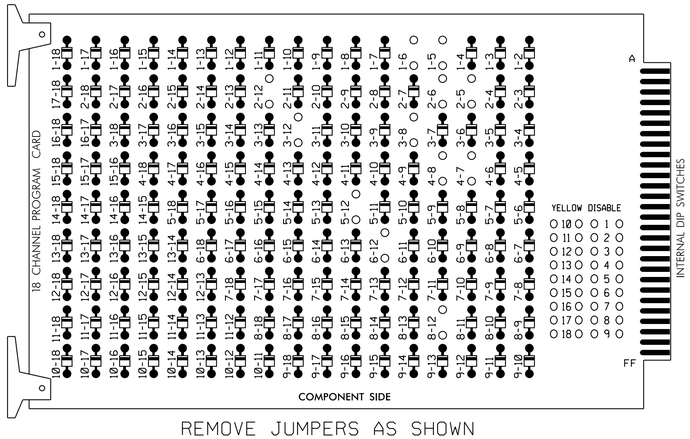
PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG.100.1

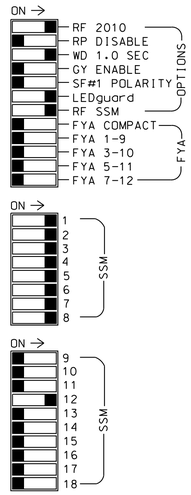
EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



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





REMOVE JUMPERS AS SHOWN

NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that 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.....S1,S2,S4,S5,S7,S8,S10,S11,AUX S5
PHASES USED.....1,2,3,4,5,6,7,8
OVERLAP "A".....NOT USED
OVERLAP "B".....NOT USED
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.	11,12	21,22	NU	31,32	41,42	NU	51,52	61,62, 63	NU	63	71,72	81,82, 83	NU	NU	NU	NU	NU	33,34	NU
RED		128			101			134				107						A101	
YELLOW		129			102			135				108							
GREEN		130			103			136				109							
RED ARROW	125			116			131				122								
YELLOW ARROW	126			117			132			123	123							A102	
GREEN ARROW	127			118			133			124	124							A103	

NU = Not Used

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	SLOT EMPTY	Ø 3 3A	Ø 4 4A	SLOT EMPTY	Ø 3 3C	Ø 1 1B	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
	L	NOT USED	Ø 2 2B			NOT USED	Ø 4 4B		Ø 3 3D	Ø 3 3B					ST DC ISOLATOR
FILE "J"	U	Ø 5 5A	Ø 6 6A	SLOT EMPTY	SLOT EMPTY	Ø 7 7A	Ø 8 8A	SLOT EMPTY	SLOT EMPTY	Ø 5 5B	SLOT EMPTY	SLOT EMPTY	GPS EVP		SLOT EMPTY
	L	NOT USED	Ø 6 6B			NOT USED	Ø 8 8B			Ø 7 7B					

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

FS = FLASH SENSE
ST = STOP TIME

CONNECT PHASE SELECTOR TO FIELD ETHERNET SWITCH

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				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	TB6-11,12	I9L	62	13	3	YES				S
3C	TB6-5,6	I8U	49	24	3	YES				S
3D	TB6-7,8	I8L	49	24	3	YES				S
4A	TB4-9,10	I6U	41	4	4	YES				S
4B	TB4-11,12	I6L	45	14	4	YES				S
5A	TB3-1,2	J1U	55	5	5	YES				S
5B	TB7-9,10	J9U	59	15	5	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	TB5-5,6	J5U	57	7	7	YES				S
7B	TB7-11,12	J9L	61	17	7	YES				S
8A	TB5-9,10	J6U	42	8	8	YES				S
8B	TB5-11,12	J6L	46	18	8	YES				S

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0414
DESIGNED: MARCH 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

US 70
at
SR 1959 (S. Miami Blvd.)/
SR 1917 (Mineral Springs Road)
Division 5 Durham County Durham

PLAN DATE: March 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: DC87A59ED60B437...
12/19/2018
SIGNATURE DATE
SIG. INVENTORY NO. 05-0414

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12/19/2018
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susan.pennington

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PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG.100.2

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 . . . X . . . . . . . . . . . .
CYC VEH  . . . . . . . . . . . . . . . .
CYC PED  . . . . . . . . . . . . . . . .
CYC OLP  . . . . . . . . . . . . . . . .
EXIT PH  . . . X . . . X . . . . . . . .
EXIT CAL . . . . . . . . . . . . . . . .
SP FUNC  . . . . . . . . . . . . . . . .

ENABLE... YES|PMT OVRIDE..|INTERLOCK. NO
DET LOCK... X|DELAY..    0|INHIBIT...  0
OVERIDE FL. .|DURATION   0|CLR-GRN... NO
TERM OLP.  NO|PC>YEL    NO|TERM PH    NO
PED DARK.. NO|TC RESRV  NO|DWELL FL  OFF
LINK PMT....0|X FLCOLR RED|EXIT OPT. OFF
X TMG PLN...0|RE-SERV..  0|FLT TYPE.HARD
FREE DUR PMT|R1  NO|R2  NO|R3  NO|R4  NO
--TIMING-----WALK|PED CL|MN GR| YEL| RED
ENTRANCE TM.    0|    0|   1|25.5|25.5
-----------MIN GR|EXT GR|MX GR| YEL| RED
TRACK CLEAR     0|    0|   0|25.5|25.5
-----------MIN DL|PMT|EXT|MX TM| YEL| RED
DWL/CYC-EXIT    7|  0.0|  120|25.5|25.5
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 CONTROLLER SEQUENCE PROGRAMMING DETAIL

(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 [1. PHASE RING SEQUENCE AND ASSIGNMENT]

Move the cursor to the SEQUENCE COMMANDS field, toggle to select "C" mode, enter phases in desired sequence.

```
CONTROLLER SEQUENCE [ 1]
SEQUENCE COMMANDS  .  HW ALT SEQ ENA.          NO
    01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16
BC-   C  C  C  C  C  C  C  C  C  C  C  C  C  C  C
R1-  1  2  3  4  .  .  .  .  .  .  .  .  .  .  .
R2-  5  6  8  7  .  .  .  .  .  .  .  .  .  .  .
R3-  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
R4-  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .

R1-R4=RING 1-4, DATA ENTRY, PHASES 1-16
BC=BARRIER CONTROL, VALUES; B,C
B=CURRENT GROUP RING BARRIER
C=COMPATIBILITY PROGRAMMED BY MAIN MENU 1-1-2
```

END SEQUENCE AND ASSIGNMENT PROGRAMMING

NOTE: Phases 7 and 8 are reversed in the standard ring sequence to provide a lagging phase 7 left turn operation as required by the signal design plans.

1. From Main Menu select [1. CONFIGURATION]
2. From CONFIGURATION Submenu select [1. CONTROLLER SEQ]
3. From CONTROLLER SEQUENCE Submenu select [2. PHASE COMPATIBILITY]

Program phase compatibility as shown below to ensure phases 3 and 7 cannot run concurrently.

```
PHASE COMPATIBILITY

          6 5 4 3 2 1 0 9 8 7 6 5 4 3 2
       1 . . . . . . . . . . X X . . .
       2 . . . . . . . . . . X X . .
       3 . . . . . . . . X . . . .
       4 . . . . . . . . X X . .
       5 . . . . . . . . . . .
       6 . . . . . . . . . .
       7 . . . . . . . . .
       8 . . . . . . . .
       9 . . . . . . .
      10 . . . . . .
      11 . . . . .
      12 . . . .
      13 . . .
      14 . .
      15 .
```

END COMPATIBILITY 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]

Toggle Three Times

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 X . . . . . . . . . . . . .

LAG GRN 0.0 YEL 0.0 RED 0.0
```

END PROGRAMMING

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..
```

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0414
DESIGNED: MARCH 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail - Sheet 2 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PLANS PREPARED IN THE OFFICE OF:
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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

US 70
at
SR 1959 (S. Miami Blvd.)/
SR 1917 (Mineral Springs Road)

Division 5 Durham County Durham

PLAN DATE:	March 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: DC87A59ED60B437... 12/19/2018

SIGNATURE DATE

SIG. INVENTORY NO. 05-0414

12/19/2018
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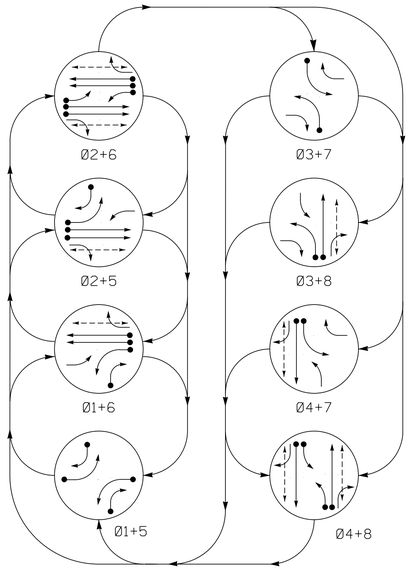
susan.pennington

PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG.101.0

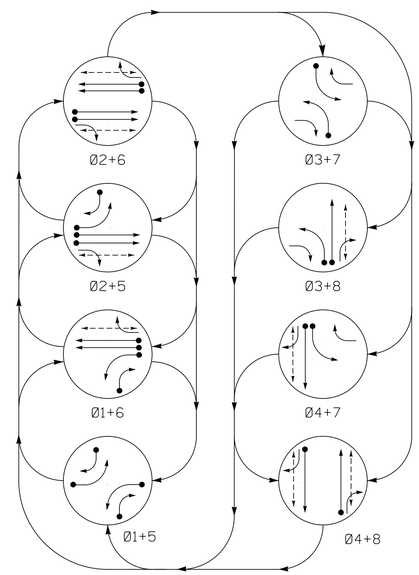
DEFAULT PHASING DIAGRAM



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	←●	←●	←Y	←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	←	←	←Y	←Y	←R
41	R	R	R	R	R	R	G	G	R
42	R↘	R	R↘	R	R	R	G	G	R
51	←	←Y	←	←Y	←R	←R	←R	←R	←Y
61	R	G	R	G	R	R	R	R	Y
62	R	G	R	G	R↘	R	R↘	R	Y
71	←R	←R	←R	←R	←	←Y	←	←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

ALTERNATE PHASING DIAGRAM



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	R	R	R	R	R	R	G	G	R
42	R↘	R	R↘	R	R	R	G	G	R
51	←	←R	←	←R	←R	←R	←R	←R	←Y
61	R	G	R	G	R	R	R	R	Y
62	R	G	R	G	R↘	R	R↘	R	Y
71	←R	←R	←R	←R	←	←R	←	←R	←R
81	R	R	R	R	R	G	R	G	R
82	R↘	R↘	R	R	R	G	R	G	R
P21, P22	DW	DW	W	W	DW	DW	DW	DW	DRK
P41, P42	DW	DW	DW	DW	DW	W	W	DW	DRK
P61, P62	DW	W	DW	W	DW	DW	DW	DW	DRK
P81, P82	DW	DW	DW	DW	DW	W	DW	W	DRK

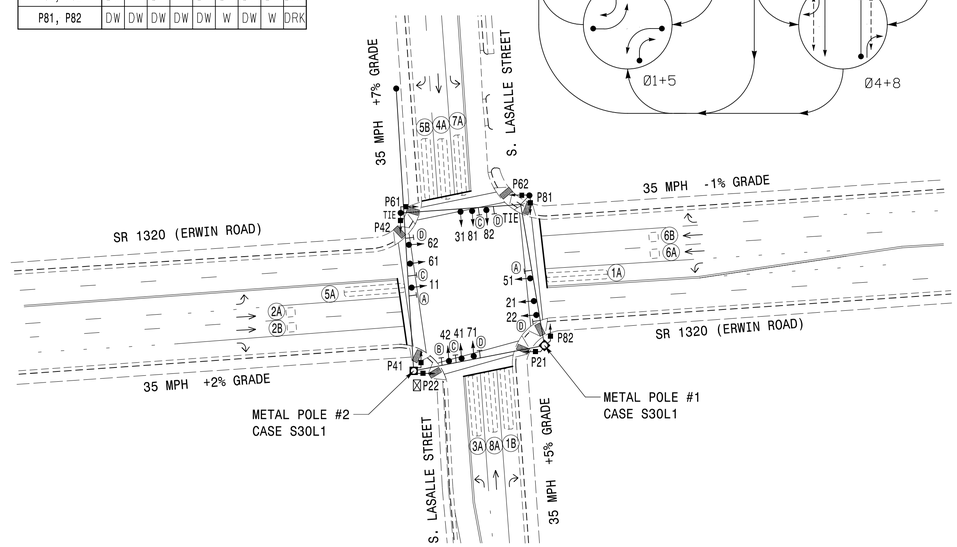
8 PHASE FULLY ACTUATED (DURHAM SIGNAL SYSTEM)

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. Existing Left Arrow "ONLY" sign-(R3-5L) may be removed at the discretion of the Engineer.
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. The Division (City) Traffic Engineer will determine the hours of use for each phasing plan.
13. Loop data based on previous plan and/or field observations.
14. Install new cabinet on the existing cabinet foundation.

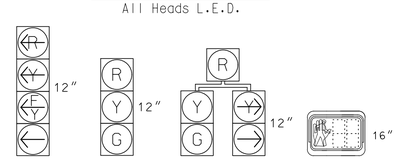
PHASING DIAGRAM DETECTION LEGEND

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



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

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	
N/A	Curb Ramp	
Ⓐ	Left Arrow "ONLY" Sign (R3-5L)	Ⓐ
Ⓑ	Right Arrow "ONLY" Sign (R3-5R)	Ⓑ
Ⓒ	Street Sign (D3-1)	Ⓒ
Ⓓ	"TURNING VEHICLES YIELD TO PEDESTRIANS" Sign (R10-15)	Ⓓ

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	13	0	18	0	12	0	18
Veh. Extension *	2.0	3.0	2.0	2.0	2.0	3.0	2.0	2.0
Max 1 *	15	60	15	30	15	60	15	30
Yellow	3.0	3.9	3.0	3.6	3.0	3.9	3.0	3.6
Red Clear	2.8	2.1	2.8	2.3	2.8	2.1	2.8	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.

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	-	-	-	S	-	X
1B	6X40	0	2-4-2	-	1	Yes	-	15	-	S	-	X
2A	6X6	70	EXIST	-	2	Yes	-	-	-	S	-	X
2B	6X6	70	EXIST	-	2	Yes	-	-	-	S	-	X
3A	6X40	0	2-4-2	-	3	Yes	-	15*	-	S	-	X
					8#	Yes	-	3	-	S	-	X
4A	6X40	+1	2-4-2	-	4	Yes	-	-	-	S	-	X
5A	6X40	+4	2-4-2	-	5	Yes	-	15*	-	S	-	X
					2#	Yes	-	-	-	S	-	X
5B	6X40	0	2-4-2	-	5	Yes	-	15	-	S	-	X
6A	6X6	70	EXIST	-	6	Yes	-	-	-	S	-	X
6B	6X6	70	EXIST	-	6	Yes	-	-	-	S	-	X
7A	6X40	+1	2-4-2	-	7	Yes	-	15*	-	S	-	X
					4#	Yes	-	3	-	S	-	X
8A	6X40	0	2-4-2	-	8	Yes	-	-	-	S	-	X

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

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

SR 1320 (Erwin Road) at S. LaSalle Street

Division 5 Durham County Durham

PLAN DATE: December 2017 REVIEWED BY: SL Phillips
PREPARED BY: DA Waller REVIEWED BY:

REVISIONS	INIT.	DATE

SCALE 0 50 1"=50'

PLANS PREPARED IN THE OFFICE OF:
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(919) 677-2000

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER TRACEY L. PHILLIPS
DocuSigned by: 0C87A56FD9C9437
12/19/2018
SIGNATURE DATE
SIG. INVENTORY NO. 05-0426

12/19/2018
11:46:21 AM
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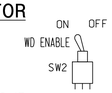
derrick.waller

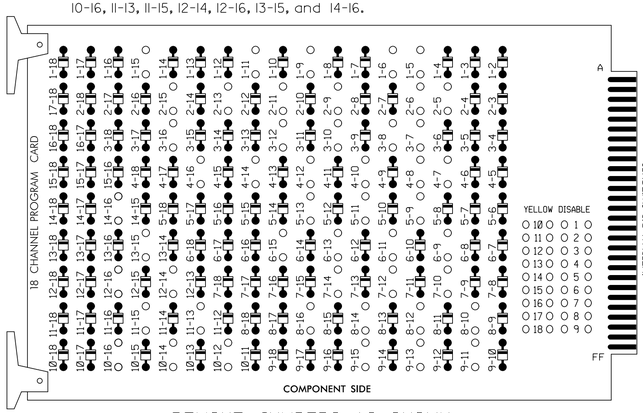
PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG.101.1

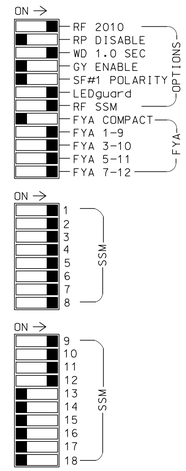
EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(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.....1,2,2PED,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	42	51★	61,62	P61, P62	62	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				132				123				A122	A125		A115	A102	
FLASHING YELLOW ARROW																A123	A126		A116	A103	
GREEN ARROW	127	127		118	118			133	133			124	124								
✋			113				104				119				110						
🚶			115				106				121				112						

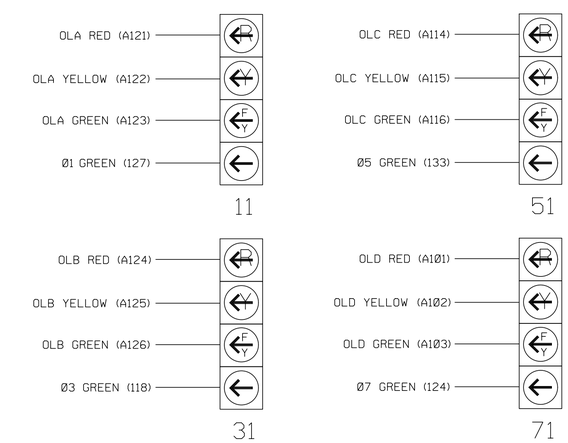
NU = Not Used

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

★ See pictorial of head wiring in detail this sheet.

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 1A	Ø2 2A	SLOT EMPTY	WIRED INPUT ⊗	Ø3 3A	Ø4 4A	SLOT EMPTY	WIRED INPUT ⊗	Ø1 1B	SLOT EMPTY	SLOT EMPTY	Ø2 PED DC ISOLATOR	Ø6 PED DC ISOLATOR	FS DC ISOLATOR
	L	NOT USED	Ø2 2B			NOT USED	NOT USED			NOT USED			Ø4 PED DC ISOLATOR	Ø8 PED DC ISOLATOR	ST DC ISOLATOR
FILE "J"	U	Ø5 5A	Ø6 6A	SLOT EMPTY	WIRED INPUT ⊗	Ø7 7A	Ø8 8A	SLOT EMPTY	WIRED INPUT ⊗	Ø5 5B	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L	NOT USED	Ø6 6B			NOT USED	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
1B	TB6-9,10	I9U	60	11	1	YES		15		S
2A	TB2-5,6	I2U	39	2	2	YES				S
2B	TB2-7,8	I2L	43	12	2	YES				S
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				S
5A[3]	TB3-1,2	J1U	55	5★	5	YES		15		S
	-	I4U	47	22★	2	YES				S
5B	TB7-9,10	J9U	59	15	5	YES		15		S
6A	TB3-5,6	J2U	40	6	6	YES				S
6B	TB3-7,8	J2L	44	16	6	YES				S
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				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.

★ 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.

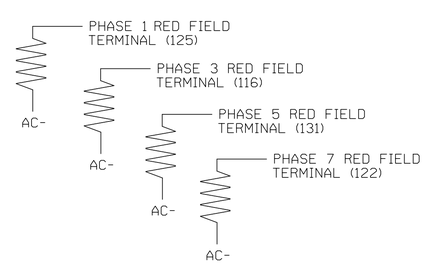
[1] Add jumper from I1-W to J4-W, on rear of input file.
[2] Add jumper from I5-W to J8-W, on rear of input file.
[3] Add jumper from J1-W to I4-W, on rear of input file.
[4] Add jumper from J5-W to I8-W, on rear of input file.

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: 05-0426
DESIGNED: 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:

SR 1320 (Erwin Road)
at
S. LaSalle Street

Division 5 Durham County Durham

PLAN DATE:	December 2017	REVIEWED BY:	SL Phillips
PREPARED BY:	DA Waller	REVIEWED BY:	

REVISIONS	INIT.	DATE

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

PLANS PREPARED IN THE OFFICE OF:
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SEAL
NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACIE L. PHILLIPS

DocuSigned by:
SLPh
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12/19/2018
SIGNATURE DATE

SIG. INVENTORY NO. 05-0426

12/19/2018
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PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG.101.2

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: 05-0426
DESIGNED: DECEMBER 2017
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail - Sheet 2 of 4

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

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

SR 1320 (Erwin Road)
at
S. LaSalle Street

Division 5 Durham County Durham

PLAN DATE:	December 2017	REVIEWED BY:	SL Phillips
PREPARED BY:	DA Waller	REVIEWED BY:	

REVISIONS	INIT.	DATE

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACIE L. PHILLIPS

DocuSigned by: 12/19/2018
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SIGNATURE DATE

SIG. INVENTORY NO. 05-0426

12/19/2018
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derrick.waller

PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG.101.3

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".

ENSURE PHASE IS SET 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

- 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".

ENSURE PHASE IS SET 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

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

```
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'

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

ENSURE PHASE IS SET 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

- 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".

ENSURE PHASE IS SET 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

END PROGRAMMING

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0426
DESIGNED: DECEMBER 2017
SEALED: 12/19/2018
REVISED: N/A

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

Electrical Detail - Sheet 3 of 4

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared For:
Transportation Mobility and Safety Division
Intelligent Transportation Systems & Signals Management Section
DEPT. OF TRANSPORTATION
750 N.Greenfield Pkwy,Garner,NC 27529

SR 1320 (Erwin Road)
at
S. LaSalle Street

Division 5 | Durham County | Durham

PLAN DATE:	December 2017	REVIEWED BY:	SL Phillips
PREPARED BY:	DA Waller	REVIEWED BY:	

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACE L. PHILLIPS

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

SIG. INVENTORY NO. 05-0426

12/19/2018
K:\RAL_LPTDM_ITS\011036410 - Durham Signal System\Signals\S4 - Signal Design\GROUP 1\U-5968_050426-2017e3.dgn
dderrick.waller

PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG.101.4

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 reduces delay time for phase 1 call on loop 1A to 3 seconds.

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

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

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

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 .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
```

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0426
DESIGNED: DECEMBER 2017
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail - Sheet 4 of 4

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PLANS PREPARED IN THE OFFICE OF:
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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 1320 (Erwin Road)
at
S. LaSalle Street

Division 5 Durham County Durham

PLAN DATE:	December 2017	REVIEWED BY:	SL Phillips
PREPARED BY:	DA Waller	REVIEWED BY:	

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACIE L. PHILLIPS
DocuSigned by:
DC87A58ED6D8437...
12/19/2018
SIGNATURE DATE
SIG. INVENTORY NO. 05-0426

12/19/2018
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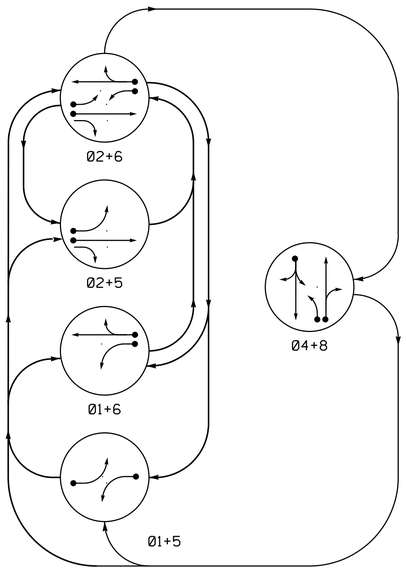
derrick.waller

PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig.102.0

PHASING DIAGRAM



EV PREEMPT PHASES

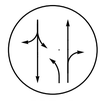


TABLE OF OPERATION

SIGNAL FACE	PHASE 01+5	PHASE 01+6	PHASE 02+5	PHASE 02+6	PHASE 04+8	PRE 3	FLASH
21	R	R	G	G	R	R	Y
22	R	R	G	G	R	R	Y
41;42	R	R	R	R	G	G	R
61	R	G	R	G	R	R	Y
62	R	G	R	G	R	R	Y
81;82	R	R	R	R	G	G	R

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	-	-	-	S	-	X
2A	6x6	70	EXIST	-	2	Yes	-	-	-	S	-	X
4A	6X40	0	2-4-2	-	4	Yes	-	10	-	S	-	X
5A	6X40	0	2-4-2	-	5	Yes	-	15	-	S	-	X
					2	Yes	-	-	-	S	-	X
6A	6X6	70	EXIST	-	6	Yes	-	-	-	S	-	X
8A	6X40	0	2-4-2	-	8	Yes	-	3	-	S	-	X
8B	6X40	0	2-4-2	-	8	Yes	-	10	-	S	-	X

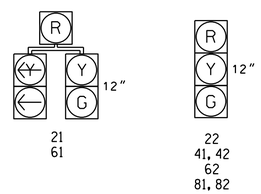
5 Phase
Fully Actuated
w/ Emergency Vehicle Preemption
(Durham Signal System)

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. Enable Backup Protect for phase 2+6 to allow the controller to clear from phase 2+6 to phases 1 and/or 5 by progressing through an all red display.
4. Set all detector units to presence mode.
5. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
6. Existing "Left Turn Yield on Green" ball signs (R10-12) may be removed at the discretion of the Regional Traffic Engineer.
7. Existing lane control signs may be removed at the discretion of the Regional Traffic Engineer.
8. Pavement markings are existing.
9. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
10. Loop data based on previous plans and/or field observations.
11. Install GPS emergency preemption system per manufacturer's instructions to achieve the preemption needed, as shown in phasing diagram.
12. Remove existing optical detection equipment.

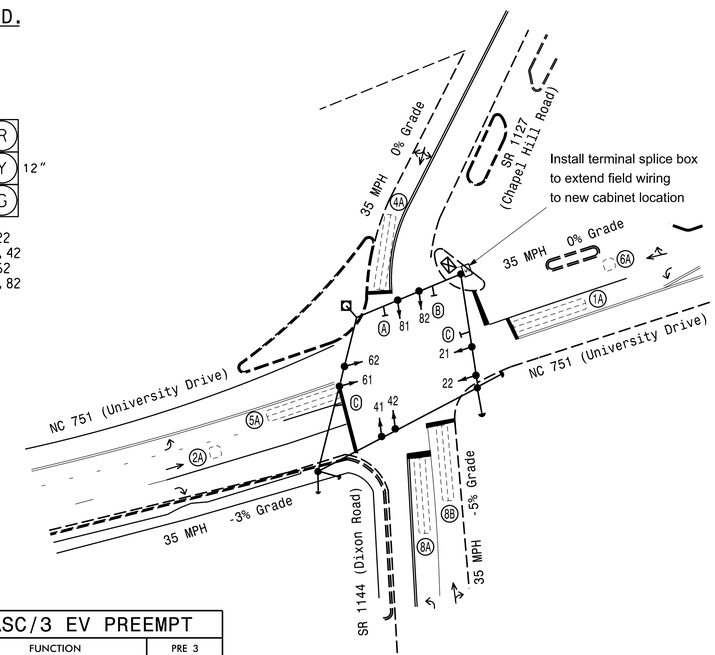
SIGNAL FACE I.D.

All Heads L.E.D.



PHASING DIAGRAM DETECTION LEGEND

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



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	
	Metal Strain Pole	
	Inductive Loop Detector	
	Controller & Cabinet	
S	Terminal Splice Box	S
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way with Marker	
	Directional Arrow	
A	Left Arrow "ONLY" Sign (R3-5L)	A
B	Combined Through and Right Arrow Sign (R3-6R)	B
C	"LEFT TURN YIELD ON GREEN" Sign (R10-12)	C

ASC/3 TIMING CHART

FEATURE	PHASE 1	PHASE 2	PHASE 4	PHASE 5	PHASE 6	PHASE 8
Min Green *	7	10	7	7	10	7
Walk *	0	0	0	0	0	0
Ped Clear	0	0	0	0	0	0
Veh. Extension *	2.0	3.0	2.0	2.0	3.0	2.0
Max 1 *	25	60	30	25	60	30
Yellow	3.0	4.1	3.8	3.0	3.8	4.2
Red Clear	2.9	1.2	1.6	1.8	2.1	1.2
Red Revert	2.0	5.0	2.0	2.0	5.0	2.0
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

* 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)	4+8
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
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.

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, Signal Design Section, State of North Carolina Department of Transportation

750 N.Greenfield Pkwy,Garner,NC 27529

NC 751 (University Dr.)
at
SR 1127 (Chapel Hill Road)
and SR 1144 (Dixon Road)

Division 5 Durham County Durham

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

SCALE 0 40 1"=40'

REVISIONS	INIT.	DATE

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 030912 ENGINEER LORI M. BOYER

DocuSigned by: Lori M. Boyer 12/21/2018
SIGNATURE DATE

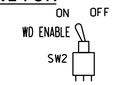
SIG. INVENTORY NO. 05-0427

PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig.102.1

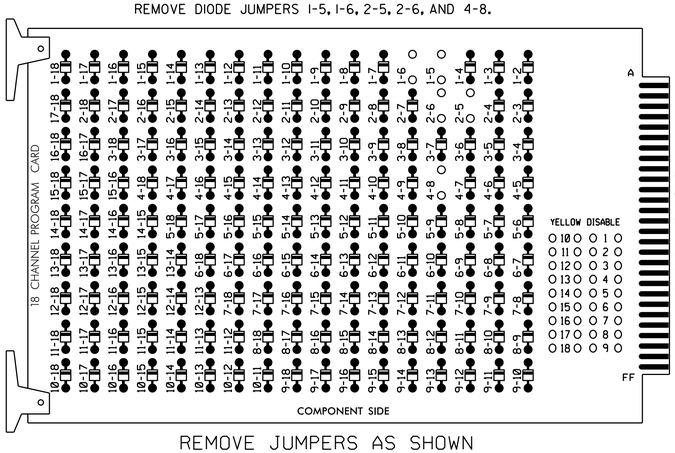
EDI MODEL 2018ECLip-NC CONFLICT MONITOR

PROGRAMMING DETAIL

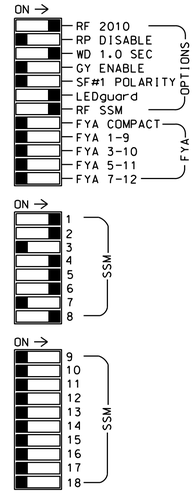
(remove jumpers and set switches as shown)



REMOVE DIODE JUMPERS 1-5, 1-6, 2-5, 2-6, AND 4-8.



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 Green and 6 Green.
4. The cabinet and controller are part of the Durham Signal System.
5. 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,S5,S7,S8,S11
PHASES USED.....1,2,4,5,6,8
OVERLAP "A".....NOT USED
OVERLAP "B".....NOT USED
OVERLAP "C".....NOT USED
OVERLAP "D".....NOT USED

SIGNAL HEAD HOOK-UP CHART

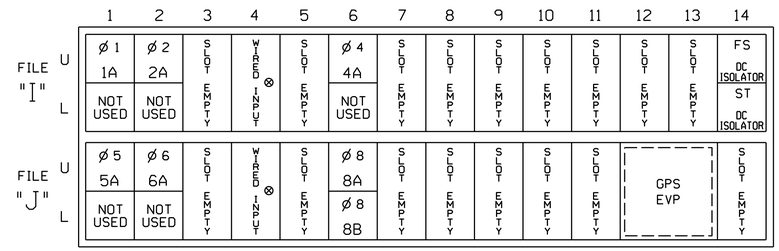
LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	61	21,22	NU	NU	41,42	NU	21	61,62	NU	NU	81,82	NU	NU	NU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

NU = Not Used

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

INPUT FILE POSITION LAYOUT

(front view)



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

FS = FLASH SENSE
ST = STOP TIME

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
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	-	-	-	S
4A	TB4-9,10	I6U	41	4	4	YES	-	10	-	S
5A [2]	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	-	-	-	S
8A	TB5-9,10	J6U	42	8	8	YES	-	3	-	S
8B	TB5-11,12	J6L	46	18	8	YES	-	10	-	S

[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.

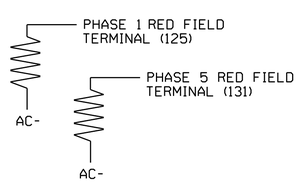
INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

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: 05-0427
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:
Transportation Mobility and Safety Division
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signals Management Section
750 N.Greenfield Pkwy,Garner,NC 27529

NC 751 (University Drive)
at
SR 1127 (Chapel Hill Road)
and SR 1144 (Dixon Road)

Division 5 Durham County Durham

PLAN DATE: December 2018	REVIEWED BY: R Hinshaw
PREPARED BY: L Boyer	REVIEWED BY: AD Hayes

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 030912 ENGINEER LORI M. BOYER
DocuSigned by: Lori M Boyer
1FC96D8A6A1D463...
SIGNATURE 12/21/2018
DATE

SIG. INVENTORY NO. 05-0427

PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig.102.2

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 . . . . . . . . . . . . . . . .
CYC VEH  . . . . . . . . . . . . . . . .
CYC PED  . . . . . . . . . . . . . . . .
CYC OLP  . . . . . . . . . . . . . . . .
EXIT PH  . . . X . . . X . . . . . . . .
EXIT CAL . . . . . . . . . . . . . . . .
SP FUNC  . . . . . . . . . . . . . . . .

ENABLE... YES|PMT OVRIDE..|INTERLOCK. NO
DET LOCK... X|DELAY..    0|INHIBIT...  0
OVERIDE FL. .|DURATION   0|CLR-GRN... NO
TERM OLP.  NO|PC>YEL    NO|TERM PH    NO
PED DARK.. NO|TC RESRV  NO|DWELL FL  OFF
LINK PMT....0|X FLCOLR RED|EXIT OPT. OFF
X TMG PLN...0|RE-SERV..  0|FLT TYPE.HARD
FREE DUR PMT|R1  NO|R2  NO|R3  NO|R4  NO
--TIMING-----WALK|PED CL|MN GR| YEL| RED
ENTRANCE TM.    0|     0|    1|25.5|25.5
-----------MIN GR|EXT GR|MX GR| YEL| RED
TRACK CLEAR     0|     0|    0|25.5|25.5
-----------MIN DL|PMTEXT|MX TM| YEL| RED
DWL/CYC-EXIT    7|   0.0|  120|25.5|25.5
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 UNIT FOR 2.0 SEC.

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..
```

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0427
DESIGNED: December 2018
SEALED: 12/21/2018
REVISED: N/A

Project #: 170905

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Electrical Detail - Sheet 2 of 3

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ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

750 N.Greenfield Pkwy,Garner,NC 27529

NC 751 (University Drive)
at
SR 1127 (Chapel Hill Road)
and SR 1144 (Dixon Road)

Division 5 Durham County Durham

PLAN DATE:	December 2018	REVIEWED BY:	R Hinshaw
PREPARED BY:	L Boyer	REVIEWED BY:	AD Hayes

REVISIONS	INIT.	DATE

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 030912 ENGINEER LORI M. BOYER

DocuSigned by: Lori M. Boyer 12/21/2018
1FC9E0E0A912463
SIGNATURE DATE

SIG. INVENTORY NO. 05-0427

PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig.102.3

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 . . . . . . .   . . . . . . . .
       9 . . . . . . . .   . . . . . . .
      10 . . . . . . . . .   . . . . . .
      11 . . . . . . . . . .   . . . . .
      12 . . . . . . . . . . .   . . . .
      13 . . . . . . . . . . . .   . . .
      14 . . . . . . . . . . . . .   . .
      15 . . . . . . . . . . . . . .   .
      16 . . . . . . . . . . . . . . .
```

END PROGRAMMING

NOTE

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.

Electrical Detail - Sheet 3 of 3

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THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0427
DESIGNED: December 2018
SEALED: 12/21/2018
REVISED: N/A

Project #: 170905

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SEAL
NORTH CAROLINA PROFESSIONAL SEAL 030912 ENGINEER LORI M. BOYER

Documents not considered final unless signed
Lori M. Boyer 12/21/2018
LICENSED ENGINEER SIGNATURE DATE

SIG. INVENTORY NO. 05-0427