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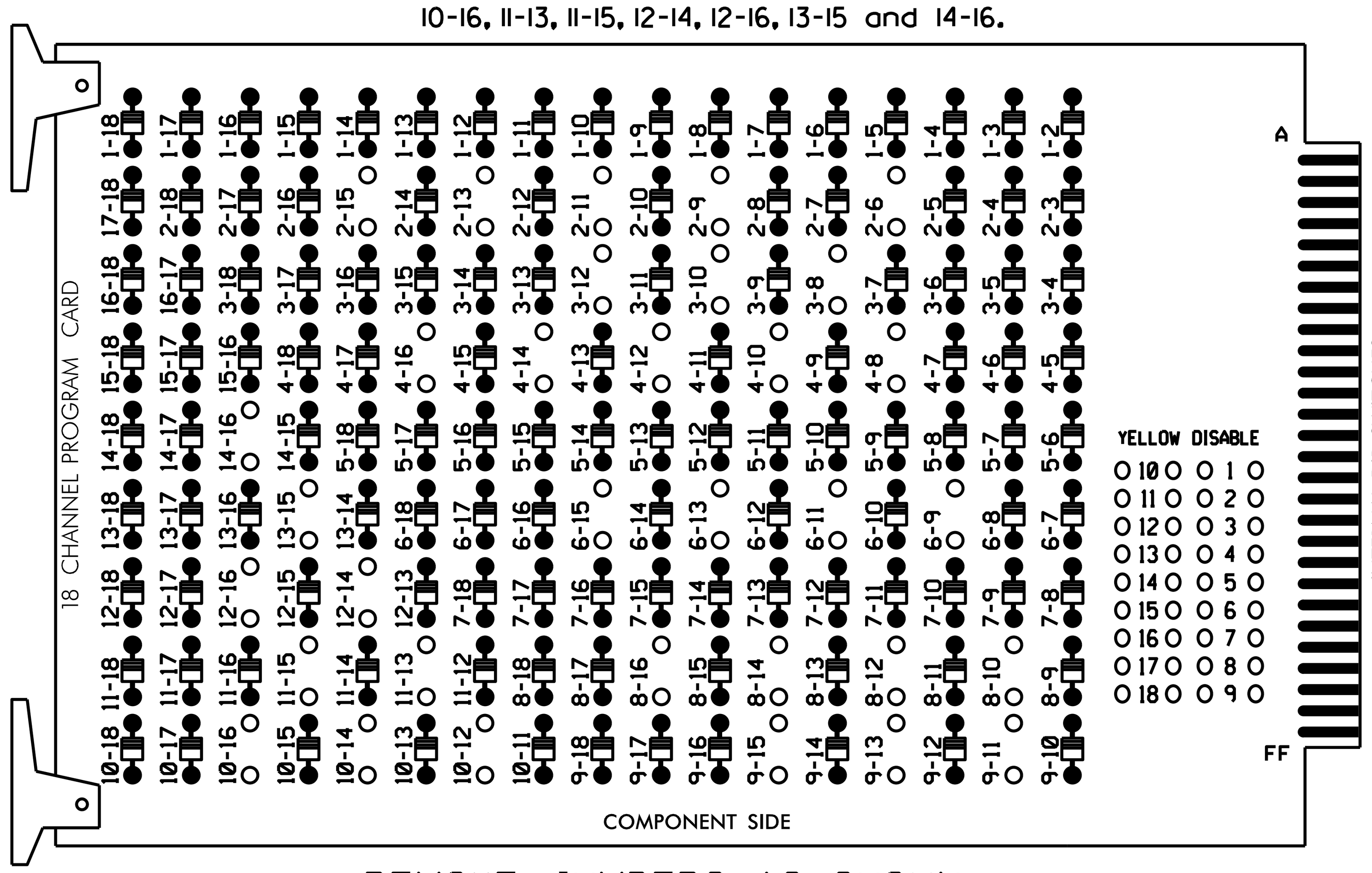
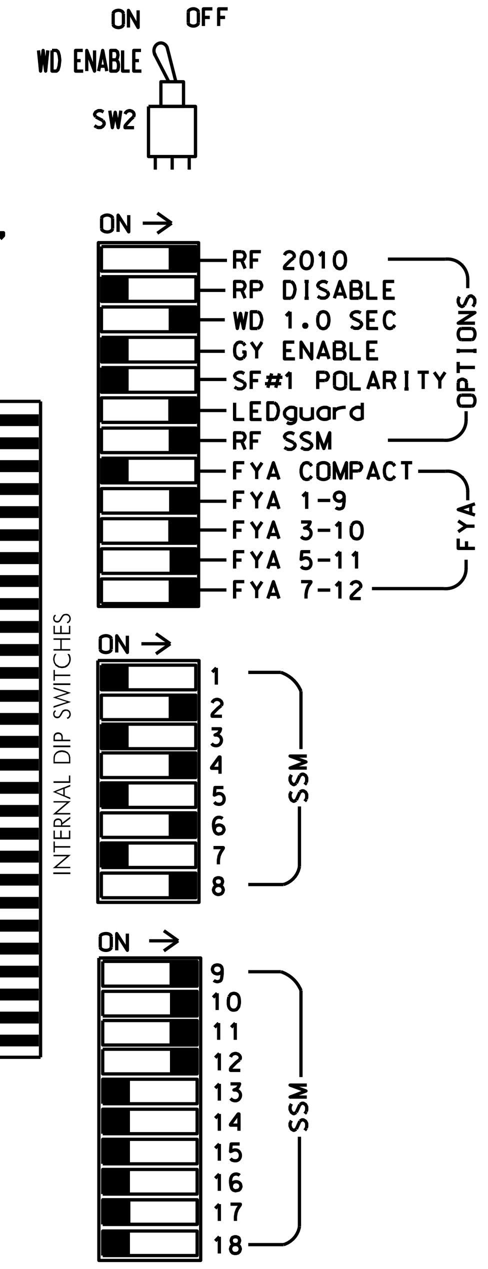
EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

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



REMOVE JUMPERS AS SHOWN



■ = DENOTES POSITION OF SWITCH

NOTES:

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

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Program 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.
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......S2,S3,S4,S5,S6,S8,S9,S11,S12, AUX S1,AUX S2,AUX S4,AUX S5
PHASES USED.............2,2PED,**3,4,4PED,6,6PED,8,8PED
OVERLAP "A".............*
OVERLAP "B".............*
OVERLAP "C".............*
OVERLAP "D".............*

* See overlap programming detail on sheet 2

** Phase used only during Preempt.

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	31★	42,43	P41, P42	NU	62,63	P61, P62	NU	81,82	P81, P82	61★	31★	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				118														
(hand)			113			104			119			110						
(walk)			115			106			121			112						

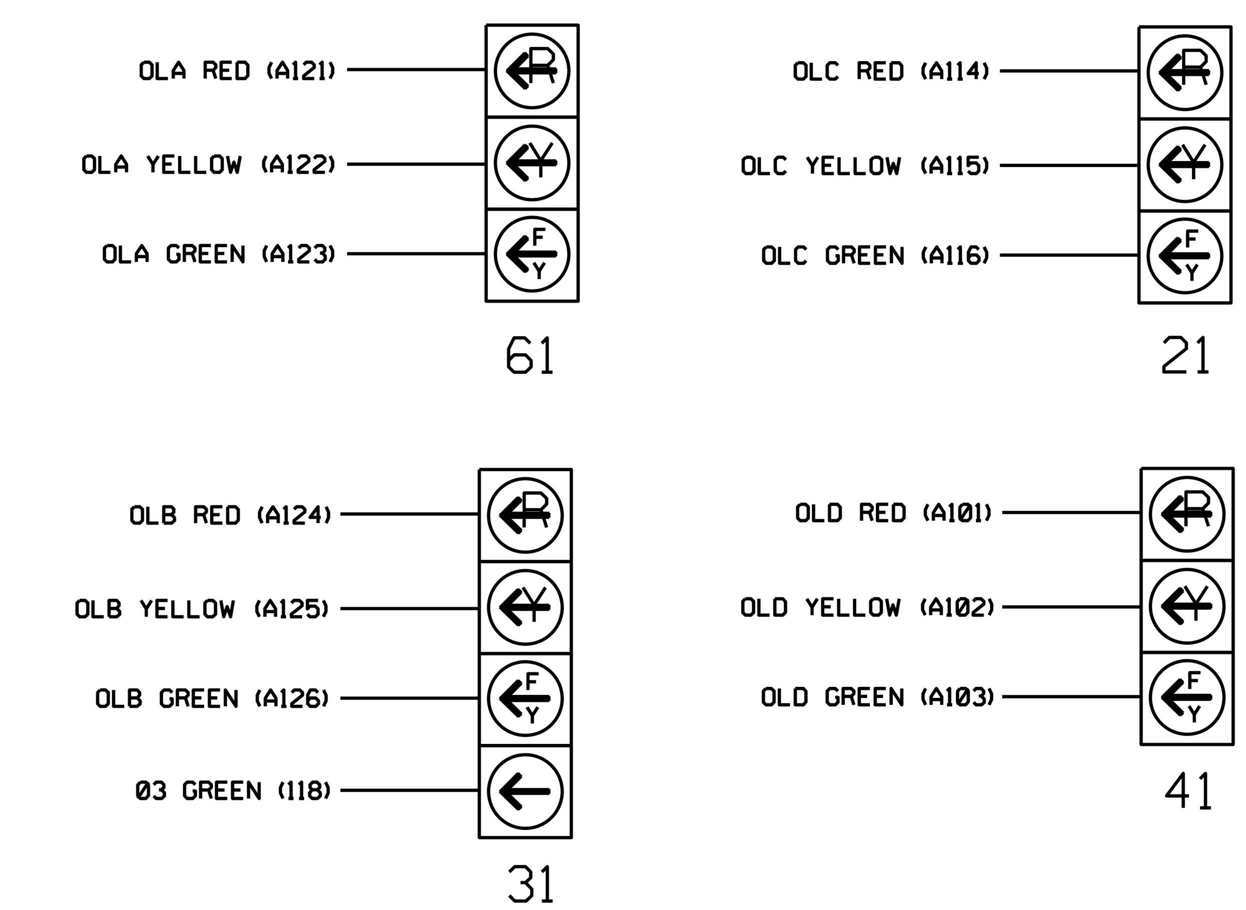
NU = Not Used

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

★ See pictorial of head wiring in detail below.

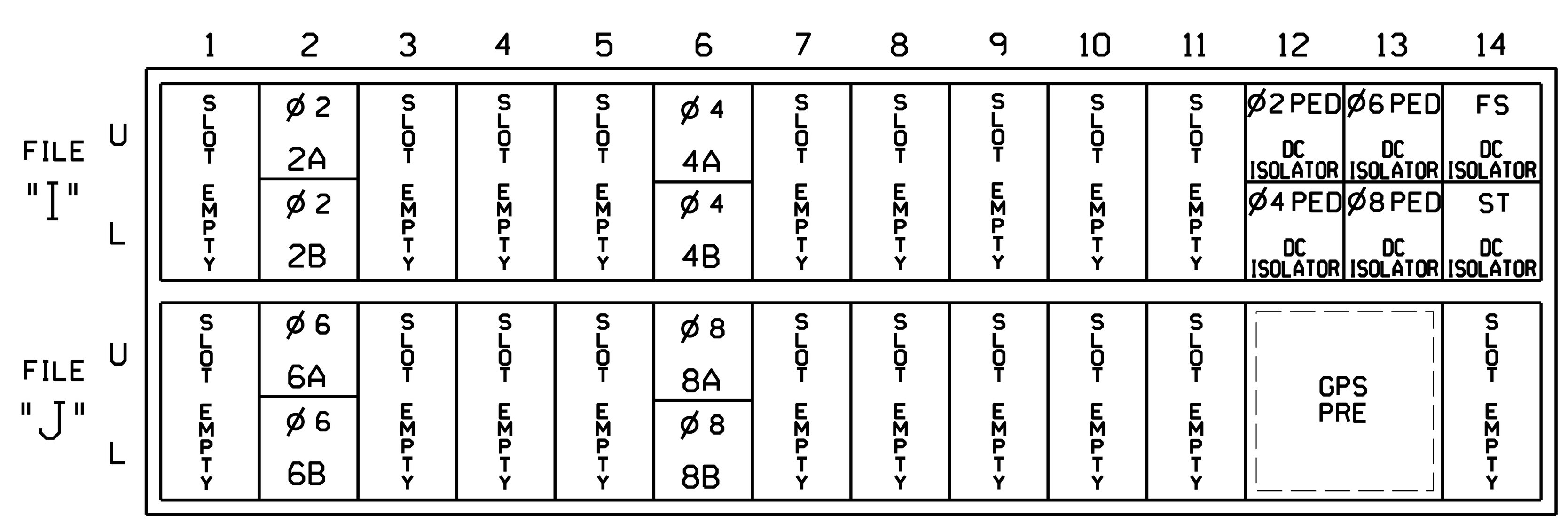
FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



INPUT FILE POSITION LAYOUT

(front view)



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
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		10		S
6A	TB3-5,6	J2U	40	6	6	YES				S
6B	TB3-7,8	J2L	44	16	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					
P61,P62	TB8-7,9	I13U	68	PED 6	6 PED					
P81,P82	TB8-8,9	I13L	70	PED 8	8 PED					

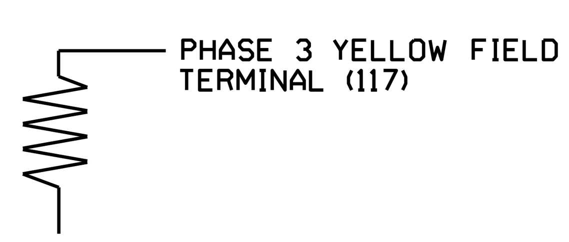
NOTE:
INSTALL DC ISOLATORS IN INPUT FILE SLOTS I12 AND I13.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

LOAD RESISTOR INSTALLATION DETAIL

(install resistor as shown below)

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: 05-1029
DESIGNED: October 2018
SEALED: November 2, 2018
REVISED: N/A

Electrical Detail - Sheet 1 of 3

Prepared in the Office of:
SUMMIT DESIGN AND ENGINEERING SERVICES
NC FIRM LICENSE No: P-0339
504 Meadowlands Drive
Hillsborough, NC 27278
(919) 732-3883
(919) 732-6676 (FAX)

ELECTRICAL AND PROGRAMMING DETAILS FOR:

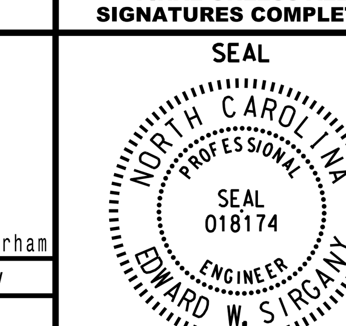
Prepared For:
Transportation Mobility and Safety Division
ITS & Signals Management Section
750 N.Greenfield Pkwy,Garner,NC 27529

NC 55 (North Alston Avenue)
at
Liberty Street

Division 5 Durham County Durham
PLAN DATE: October 2018 REVIEWED BY: E. Sirgany
PREPARED BY: J. Smith REVIEWED BY:

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



DocuSigned by: Edward W Sirgany 11/2/2018
DATE
SIG. INVENTORY NO. 05-1029

PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig 198.2

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 '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........... 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

ECONOLITE ASC/3-2070 LOGIC PROCESSOR PROGRAMMING DETAIL FOR PHASE 3 OMIT

(program controller as shown)

The following logic processor programming ensures phase 3 is only serviced during preemption. This logic will ensure phase 3 is not served during startup.

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

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

```
LP#:   1  COPY FROM:   1  ACTIVE:  M   (T/F)
IF    PMT PREEMPT ACTIVE    3   IS  OFF
THEN  CTR OMIT PHASE        3       ON
```

LOGIC FOR OMITTING PHASE 3 WHILE NOT IN PREEMPT 3

END PROGRAMMING

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

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

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

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.

Electrical Detail - Sheet 2 of 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1029
DESIGNED: October 2018
SEALED: November 2, 2018
REVISED: N/A

Prepared in the Office of:

SUMMIT DESIGN AND ENGINEERING SERVICES

NC FIRM LICENSE No: P-0339
504 Meadowlands Drive
Hillsborough, NC 27278
(919) 732-3883
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ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared For:

Transportation Mobility and Safety Division
Traffic Engineering Branch
Signals Management Section

750 N.Greenfield Pkwy,Garner,NC 27529

NC 55 (North Alston Avenue)
at
Liberty Street

Division 5 Durham County Durham

PLAN DATE:	October 2018	REVIEWED BY:	E. Sirgany
PREPARED BY:	J. Smith	REVIEWED BY:	

REVISIONS	INIT.	DATE

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 018174 ENGINEER EDWARD W. SIRGANY

DocuSigned by:
Edward W Sirgany 11/2/2018
DOCUSIGNED NAME DATE

SIG. INVENTORY NO. 05-1029

$$$$$$$$$$TIME$$$$$
$$$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$
$$$$$USERNAME$$$$

PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig 198.3

ECONOLITE ASC/3-2070 EMERGENCY VEHICLE PREEMPT PROGRAMMING DETAIL

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... YESIPMT OVRIDE..IINTERLOCK. NO
DET LOCK... XIDELAY..    OIINHIBIT...  0
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.

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: 05-1029
DESIGNED: October 2018
SEALED: November 2, 2018
REVISED: N/A

Electrical Detail - Sheet 3 of 3

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Prepared For:
Intelligent Transportation Mobility and Safety Division
Institute of North Carolina
NC Department of Transportation
Traffic Engineering & Signals Management Section
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NC 55 (North Alston Avenue)
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PLAN DATE:	October 2018	REVIEWED BY:	E. Sirgany
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REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 018174 ENGINEER EDWARD W. SIRGANY

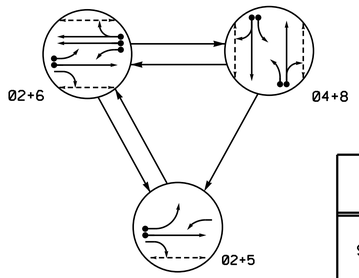
DocuSigned by: Edward W Sirgany 11/2/2018
TRAFFIC MANAGER DATE

SIG. INVENTORY NO. 05-1029

$$$$$$SYSTIME$$$$$
$$$$$$USERNAME$$$$$
$$$$$$SCREEN$$$$$

PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig 199.0

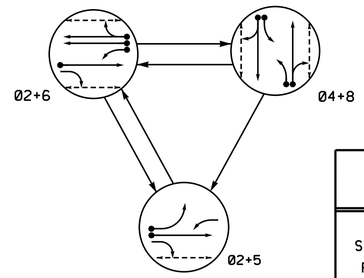
DEFAULT PHASING DIAGRAM



DEFAULT EV PREEMPT PHASES

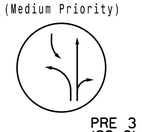
(Medium Priority)

ALTERNATE PHASING DIAGRAM



ALTERNATE EV PREEMPT PHASES

(Medium Priority)



PHASING DIAGRAM DETECTION LEGEND

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

DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE 02+5	02+6	04+8	PRE3	FLASH
21,22	G	G	R	R	Y
31	~~R~~	~~R~~	~~F Y~~	~~—~~	~~R~~
41	~~R~~	~~R~~	~~F Y~~	~~F Y~~	~~R~~
42,43	R	R	G	R	R
51	~~—~~	~~F Y~~	~~R~~	~~R~~	~~Y~~
61	~~F Y~~	~~F Y~~	~~R~~	~~R~~	~~Y~~
62,63	R	G	R	R	Y
81,82	R	R	G	G	R
P21,P22	W	W	DW	DW	DRK
P41,P42	DW	DW	W	DW	DRK
P61,P62	DW	W	DW	DW	DRK
P81,P82	DW	DW	W	DW	DRK

ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE 02+5	02+6	04+8	PRE3	FLASH
21,22	G	G	R	R	Y
31	~~R~~	~~R~~	~~F Y~~	~~—~~	~~R~~
41	~~R~~	~~R~~	~~F Y~~	~~F Y~~	~~R~~
42,43	R	R	G	R	R
51	~~—~~	~~R~~	~~R~~	~~R~~	~~Y~~
61	~~F Y~~	~~F Y~~	~~R~~	~~R~~	~~Y~~
62,63	R	G	R	R	Y
81,82	R	R	G	G	R
P21,P22	W	W	DW	DW	DRK
P41,P42	DW	DW	W	DW	DRK
P61,P62	DW	W	DW	DW	DRK
P81,P82	DW	DW	W	DW	DRK

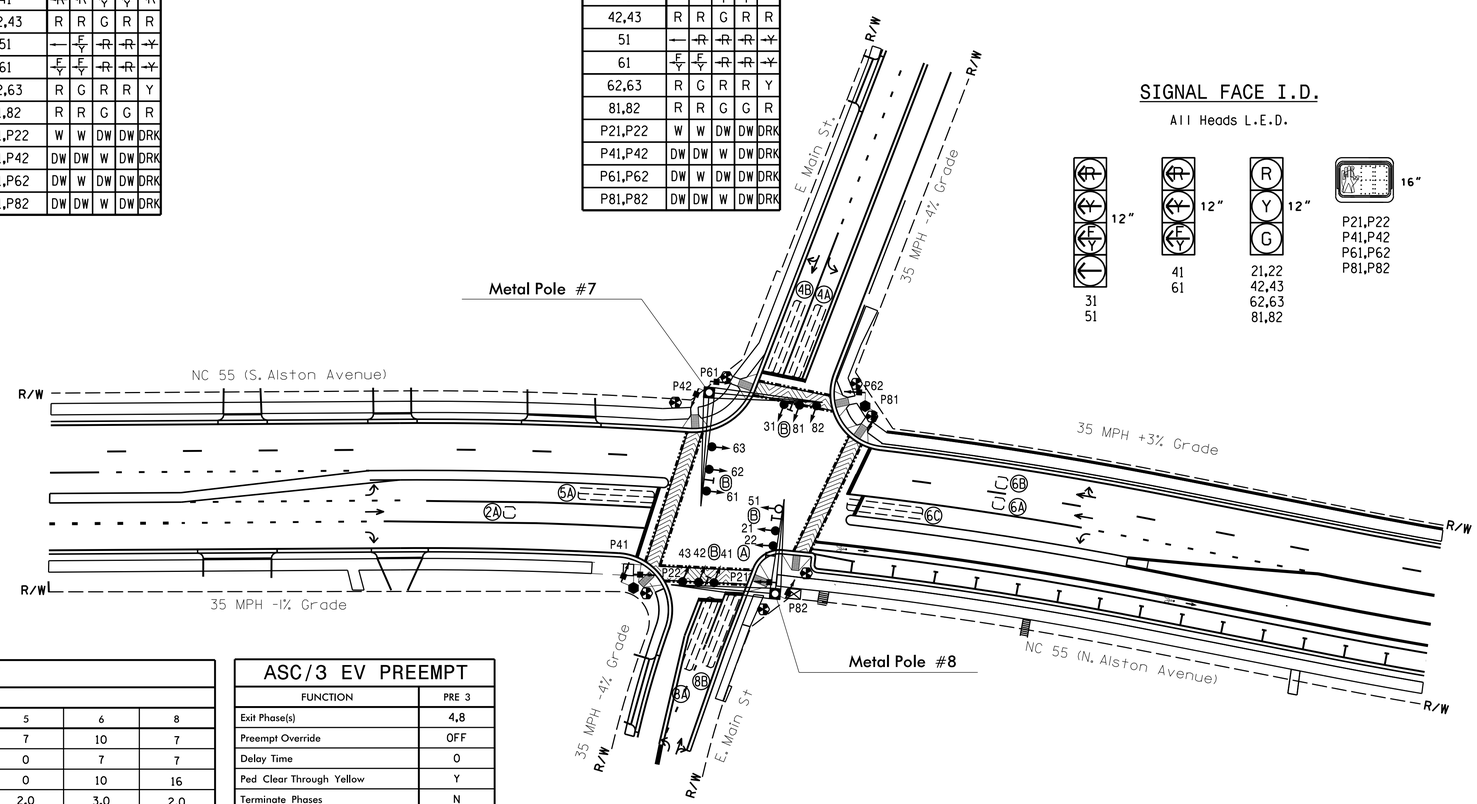
ASC/3 DETECTOR INSTALLATION CHART

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	4	-	2	Yes	-	-	-	S	-	X
4A	6X40	0	2-4-2	-	4	Yes	-	3	-	S	-	X
4B	6X40	0	2-4-2	-	4	Yes	-	10	-	S	-	X
5A	6X40	0	2-4-2	-	5	Yes	-	*15	-	S	-	X
					#2	Yes	-	-	-	S	-	X
6A	6X6	70	4	-	6	Yes	-	-	-	S	-	X
6B	6X6	70	4	-	6	Yes	-	-	-	S	-	X
6C	6X40	+5	2-4-2	-	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

*Disable Delay During Alternate Phasing operation.
#Disable phase call for loop during Alternate Phasing operation.

SIGNAL FACE I.D.

All Heads L.E.D.



3 Phase
Fully Actuated
W/ EV Preemption
(Durham Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 5 may be lagged.
4. Set all detector units to presence mode.
5. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
6. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
7. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
8. Pavement markings are existing.
9. The Division (City) Traffic Engineer will determine the hours of use for each phasing plan.
10. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
11. Loop data based on previous plan and/or field observations.
12. Install new cabinet on the existing cabinet foundation.
13. Reconnect loops and heads in cabinet as indicated to match current NCDOT standards.
14. Install GPS emergency preemption system per manufacturer's instructions to achieve preemption needed, as shown in phasing diagram.
15. Remove existing optical detection equipment.

LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
N/A	Curb Ramp	
	Metal Pole with Mastarm	
	Type I Pushbutton Post	
	Type II Signal Pedestal	
	Right Arrow "Only" Sign (R3-5R)	
	Street Name Sign	

ASC/3 TIMING CHART

FEATURE	PHASE 2	3	4	5	6	8
Min Green *	10	0	7	7	10	7
Walk *	7	0	7	0	7	7
Ped Clear	11	0	18	0	10	16
Veh. Extension *	3.0	0	2.0	2.0	3.0	2.0
Max 1 *	50	0	35	15	50	35
Yellow	3.9	3.0	4.1	3.0	3.9	4.1
Red Clear	2.6	2.8	2.3	3.3	2.6	2.3
Actuations B4 Add *	-	-	-	-	-	-
Seconds /Actuation *	-	-	-	-	-	-
Max Initial *	-	-	-	-	-	-
Time Before Reduction *	-	-	-	-	-	-
Time To Reduce *	-	-	-	-	-	-
Minimum Gap	-	-	-	-	-	-
Locking Detector	X	-	-	-	X	-
Recall Position	VEH. RECALL	-	-	-	VEH. RECALL	-
Dual Entry	-	-	X	-	-	X
Simultaneous Gap	X	X	X	X	X	X

* 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	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

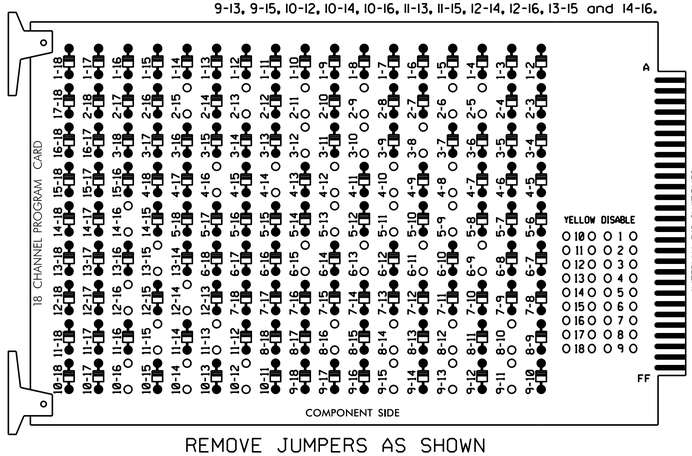
$$$

PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig 199.1

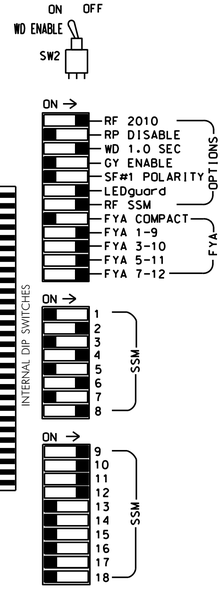
EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

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



REMOVE JUMPERS AS SHOWN



NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that 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.
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.....S2,S3,S4,S5,S6,S7,S8,S9,S11,S12, AUX S1,AUX S2,AUX S4,AUX S5
PHASES USED.....2,2PED,**3,4,4PED,5,6,6PED,8,8PED
OVERLAP "A".....*
OVERLAP "B".....*
OVERLAP "C".....*
OVERLAP "D".....*

* See overlap programming detail on sheet 2
** Phase used only during Preempt.

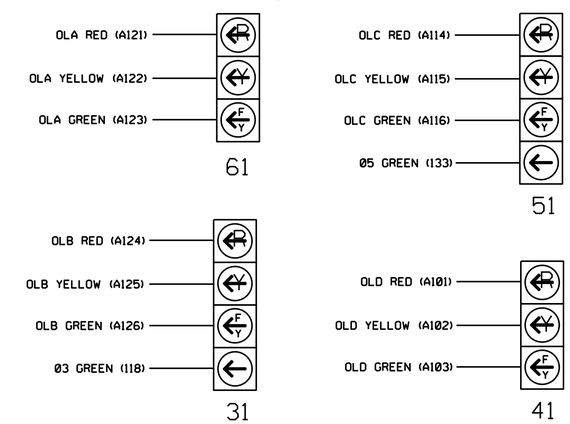
SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	NU	21,22	P21, P22	31★	42,43	P41, P42	51★	62,63	P61, P62	NU	81,82	P81, P82	61★	31★	NU	51★	41★	NU
RED		128			101			134			107							
YELLOW		129		*	102		*	135			108							
GREEN		130			103			136			109							
RED ARROW													A121	A124		A114	A101	
YELLOW ARROW													A122	A125		A115	A102	
FLASHING YELLOW ARROW													A123	A126		A116	A103	
GREEN ARROW				118			133											
✋			113			104			119			110						
🚶			115			106			121			112						

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

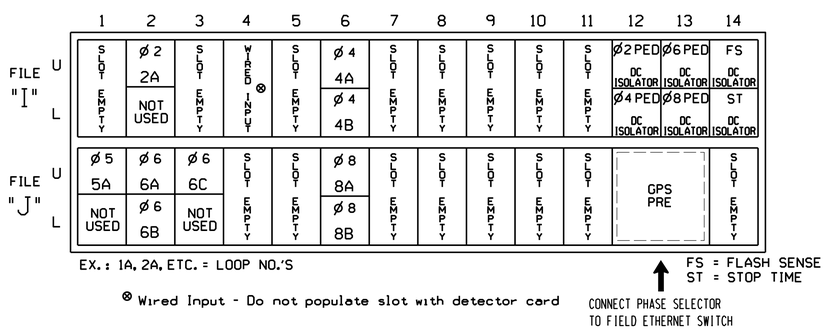
FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



INPUT FILE POSITION LAYOUT

(front view)



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
5A[1]	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
6B	TB3-7,8	J2L	44	16	6	YES				S
6C	TB3-9,10	J3U	64	36	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					
P61,P62	TB8-7,9	I13U	68	PED 6	6 PED					
P81,P82	TB8-8,9	I13L	70	PED 8	8 PED					

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

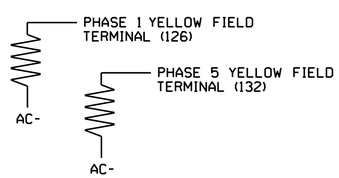
INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

[1] Add jumper from J1-W to I4-W. on rear of input file.
★ See vehicle detector setup programming detail for alternate phasing on sheet 2.

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown below)

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



THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1030
DESIGNED: October 2018
SEALED: November 5, 2018
REVISED: N/A

Electrical Detail - Sheet 1 of 5

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Prepared in the Office of:
SUMMIT DESIGN AND ENGINEERING SERVICES
NC FIRM LICENSE No: P-0339
504 Meadowlands Drive
Hillsborough, NC 27278
(919) 732-3883
(919) 732-6676 (FAX)

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

NC 55 (Alston Avenue) at East Main Street

Division 5 Durham County Durham

PLAN DATE:	October 2018	REVIEWED BY:	E. Sirgany
PREPARED BY:	J. Smith	REVIEWED BY:	

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 018174 ENGINEER EDWARD W. SIRGANY

DocuSigned by: Edward W Sirgany 11/5/2018
"SPECIMAGRAPER" DATE
SIG. INVENTORY NO. 05-1030

$$$$$$SECTIONCODE$$$$
$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$
$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$
$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

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 '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........... 0
```

Toggle Once

OVERLAP C

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

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

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

FLASHING ARROW OUTPUT.....CH11 ISOLATE

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

NOTICE SPECIAL FUNCTION BIT "5"

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

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 selet `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 [ 2]   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".

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

NOTICE VEH DET PLAN 2

ENSURE PHASE IS SET TO '0'

END PROGRAMMING

PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig 199.2

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-1030
DESIGNED: October 2018
SEALED: November 5, 2018
REVISED: N/A

Prepared in the Office of:
SUMMIT DESIGN AND ENGINEERING SERVICES
NC FIRM LICENSE No: P-0339
504 Meadowlands Drive
Hillsborough, NC 27278
(919) 732-3883
(919) 732-6676 (FAX)

Electrical Detail - Sheet 2 of 5

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

NC 55 (Alston Avenue) at East Main Street

Division 5 | Durham County | Durham
PLAN DATE: October 2018 | REVIEWED BY: E. Sirgany
PREPARED BY: J. Smith | REVIEWED BY:

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 018174 ENGINEER EDWARD W. SIRGANY
DocuSigned by: Edward W Sirgany 11/5/2018
DATE

SIG. INVENTORY NO. 05-1030

$$$$$$SYSTIME$$$$$ $$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$ $$$$USERNAME$$$$

ALTERNATE PHASING ACTIVATION DETAIL

TO RUN ALT. PHASING DURING FREE RUN - PROGRAM PAGE 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 PAGE 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 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 . . . . . . . . . . . . . . .
```

NOTICE SPECIAL FUNCTION BIT "5" → (SPC FCT)

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-1030
DESIGNED: October 2018
SEALED: November 5, 2018
REVISED: N/A

Prepared in the Office of:
SUMMIT DESIGN AND ENGINEERING SERVICES
NC FIRM LICENSE No: P-0339
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Hillsborough, NC 27278
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Electrical Detail - Sheet 3 of 5

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

NC 55 (Alston Avenue)
at
East Main Street

Division 5 | Durham County | Durham

PLAN DATE: October 2018	REVIEWED BY: E. Sirgany
PREPARED BY: J. Smith	REVIEWED BY:

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 018174 ENGINEER EDWARD W. SIRGANY

DocuSigned by: Edward W Sirgany 39DE9C86A6684E9 — 11/5/2018
DATE

SIG. INVENTORY NO. 05-1030

$$$$$$SYSTIME$$$$$ $$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$ $$$$USERNAME$$$$

PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig 199.4

ECONOLITE ASC/3-2070 EMERGENCY VEHICLE PREEMPT PROGRAMMING DETAIL

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

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

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

ENABLE... YESIPMT OVRIDE..IINTERLOCK. NO
DET LOCK... XIDELAY..    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.

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..
```

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: 05-1030
DESIGNED: October 2018
SEALED: November 5, 2018
REVISED: N/A

Electrical Detail - Sheet 4 of 5

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Prepared in the Office of:

SUMMIT DESIGN AND ENGINEERING SERVICES

NC FIRM LICENSE No: P-0339
504 Meadowlands Drive
Hillsborough, NC 27278
(919) 732-3883
(919) 732-6676 (FAX)

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 55 (Alston Avenue)
at
East Main Street

Division 5 | Durham County | Durham

PLAN DATE:	October 2018	REVIEWED BY:	E. Sirgany
PREPARED BY:	J. Smith	REVIEWED BY:	

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 018174 ENGINEER EDWARD W. SIRGANY

DocuSigned by:
Edward W Sirgany 11/5/2018
DATE

SIG. INVENTORY NO. 05-1030

$$$$$$SYSTIME$$$$$
$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$
$$$$DGNNAME$$$$

PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig 199.5

ECONOLITE ASC/3-2070 LOGIC PROCESSOR PROGRAMMING
DETAIL FOR PHASE 3 OMIT

(program controller as shown)

The following logic processor programming ensures phase 3 is only serviced during preemption. This logic will ensure phase 3 is not served during startup.

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

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

```
LP#:   1  COPY FROM:   1  ACTIVE:  M   (T/F)
IF     PMT PREEMPT ACTIVE    3   IS  OFF
THEN   CTR OMIT PHASE        3       ON
```

LOGIC FOR OMITTING PHASE 3 WHILE NOT IN PREEMPT 3

END PROGRAMMING

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

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

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

END PROGRAMMING

Electrical Detail - Sheet 5 of 5

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1030
DESIGNED: October 2018
SEALED: November 5, 2018
REVISED: N/A

Prepared in the Office of:

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(919) 732-6676 (FAX)

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

NC 55 (Alston Avenue)
at
East Main Street

Division 5 Durham County Durham

PLAN DATE:	October 2018	REVIEWED BY:	E. Sirgany
PREPARED BY:	J. Smith	REVIEWED BY:	

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 018174 ENGINEER EDWARD W. SIRGANY

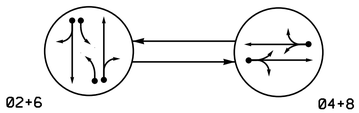
DocuSigned by:
Edward W Sirgany 11/5/2018
10DE5C90A6664EB... DATE

SIG. INVENTORY NO. 05-1030

$$$$$$$$SYSTIME$$$$$
$$$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig 200.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

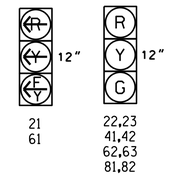
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

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

SIGNAL FACE I.D.

All Heads L.E.D.



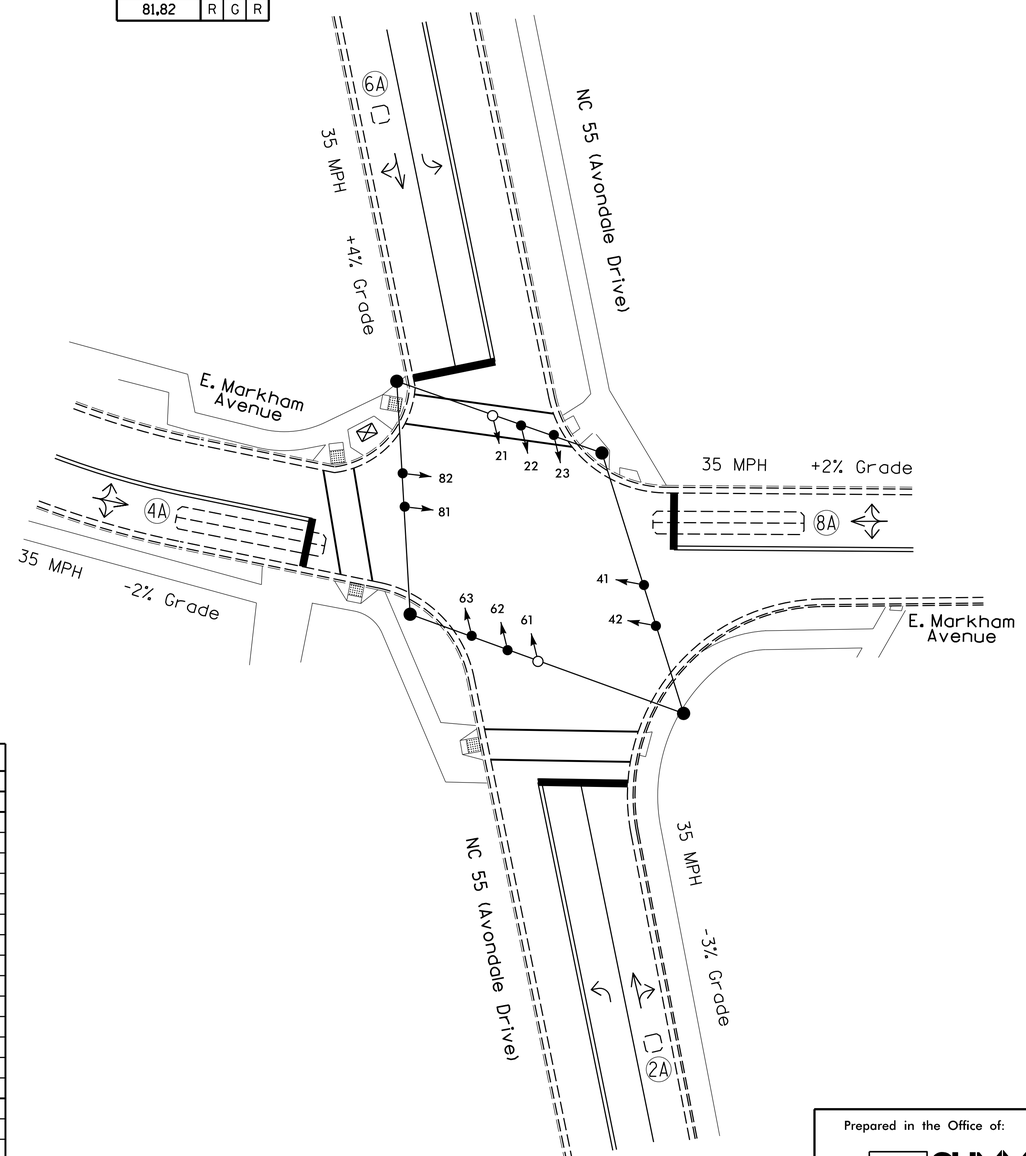
ASC/3 DETECTOR INSTALLATION CHART

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	5	-	2	Yes	-	-	-	S	-	X
4A	6X40	+5	2-4-2	-	4	Yes	-	5	-	S	-	X
6A	6X6	70	5	-	6	Yes	-	-	-	S	-	X
8A	6X40	+5	2-4-2	-	8	Yes	-	5	-	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. Reposition existing signal heads numbered 22, 23, 62 and 63.
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. Pavement markings are existing.
7. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
8. Loop data based on previous plan and/or field observations.
9. Install new cabinet on the existing cabinet foundation.
10. Reconnect loops and heads in cabinet as indicated to match current NCDOT standards.



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	

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 *	50	30	50	30
Yellow	4.1	4.0	4.1	3.7
Red Clear	2.2	1.5	2.2	1.9
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.

$$$$$$SYSTIME$$$$$
$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

Signal Upgrade

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SUMMIT DESIGN AND ENGINEERING SERVICES

NC FIRM LICENSE No: P-0339
504 Meadowlands Drive
Hillsborough, NC 27278
(919) 732-3883
(919) 732-6676 (FAX)

Prepared For: Transportation Mobility and Safety Division, Signal Design Section, NC Department of Transportation

750 N.Greenfield Pkwy,Garner,NC 27529

SCALE 0 20 1"=20'

NC 55 (Avondale Drive)
at
East Markham Avenue

Division 5 Durham County Durham

PLAN DATE:	October 2018	REVIEWED BY:	E. Sirgany
PREPARED BY:	J. Smith	REVIEWED BY:	

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 018174 ENGINEER EDWARD W. SIRGANY

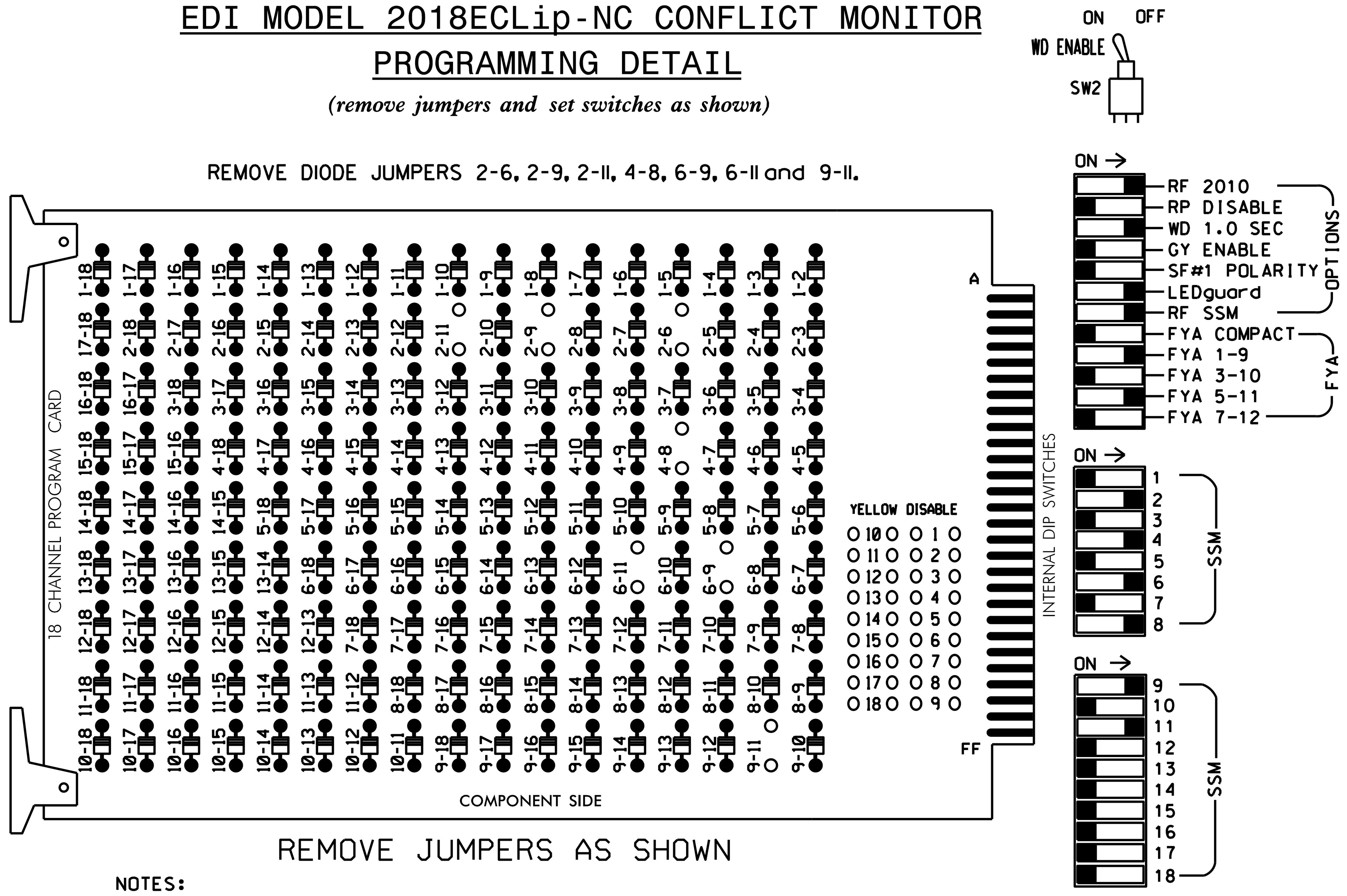
DocuSigned by: Edward W Sirgany 11/5/2018
DOCFC9E4BAB4A8E... DATE

SIG. INVENTORY NO. 05-1031

EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

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



REMOVE JUMPERS AS SHOWN

NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that 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.

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 detail on sheet 2

PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig 200.1

SIGNAL HEAD HOOK-UP CHART

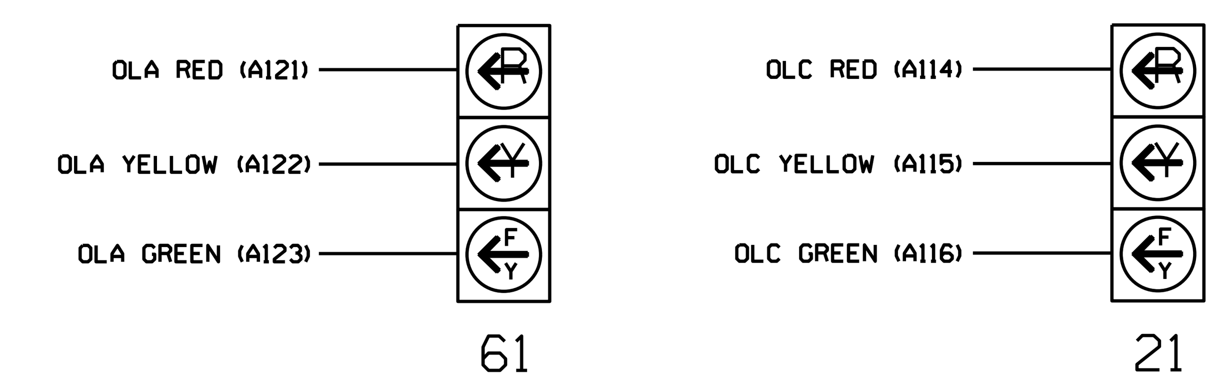
LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	NU	22,23	NU	NU	41,42	NU	NU	62,63	NU	NU	81,82	NU	61★	NU	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 below.

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



INPUT FILE POSITION LAYOUT

(front view)

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

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND TIME	DELAY TIME	ADDED INITIAL	DETECTOR TYPE
2A	TB2-5,6	I2U	39	2	2	YES				S
4A	TB4-9,10	I6U	41	4	4	YES		5		S
6A	TB3-5,6	J2U	40	6	6	YES				S
8A	TB5-9,10	J6U	42	8	8	YES		5		S

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-1031
PREPARED: October 2018
SEALED: November 5, 2018
REVISED: N/A

Electrical Detail - Sheet 1 of 2

Prepared in the Office of:

SUMMIT DESIGN AND ENGINEERING SERVICES

NC FIRM LICENSE No: P-0339
504 Meadowlands Drive
Hillsborough, NC 27278
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(919) 732-6676 (FAX)

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared For:

750 N.Greenfield Pkwy,Garner,NC 27529

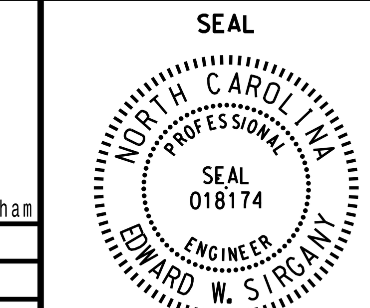
NC 55 (Avondale Drive)
at
East Markham Avenue

Division 5 Durham County Durham

PLAN DATE:	October 2018	REVIEWED BY:	E. Sirgany
PREPARED BY:	J. Smith	REVIEWED BY:	
REVISIONS		INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL



DocuSigned by: Edward W Sirgany 11/5/2018

DATE

SIG. INVENTORY NO. 05-1031

PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig 200.2

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: 05-1031
PREPARED: October 2018
SEALED: November 5, 2018
REVISED: N/A

Electrical Detail - Sheet 2 of 2

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ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

NC 55 (Avondale Drive)
at
Markham Avenue

Division 5 Durham County Durham

PLAN DATE:	October 2018	REVIEWED BY:	E. Sirgany
PREPARED BY:	J. Smith	REVIEWED BY:	

REVISIONS	INIT.	DATE

SEAL

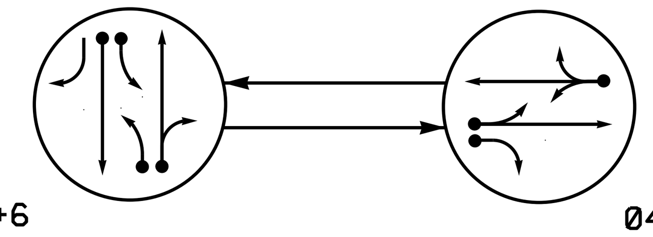
NORTH CAROLINA PROFESSIONAL SEAL 018174 ENGINEER EDWARD W. SIRGANY

DocuSigned by:
Edward W Sirgany 11/5/2018
10DF5C86A6664E5 DATE

SIG. INVENTORY NO. 05-1031

$$$$$$SYSTIME$$$$$
$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

PHASING DIAGRAM



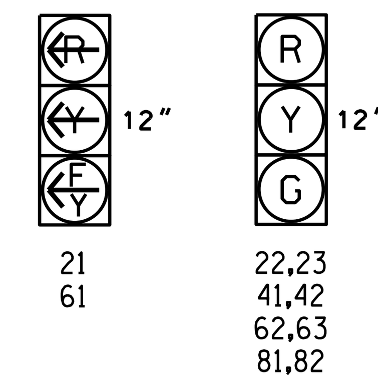
PHASING DIAGRAM DETECTION LEGEND

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

TABLE OF OPERATION			
	PHASE		
SIGNAL FACE	Ø2+6	Ø4+8	FLASH
21	F/Y	R	Y
22,23	G	R	Y
41,42	R	G	R
61	F/Y	R	Y
62,63	G	R	Y
81,82	R	G	R

SIGNAL FACE I.D.

All Heads L.E.D.

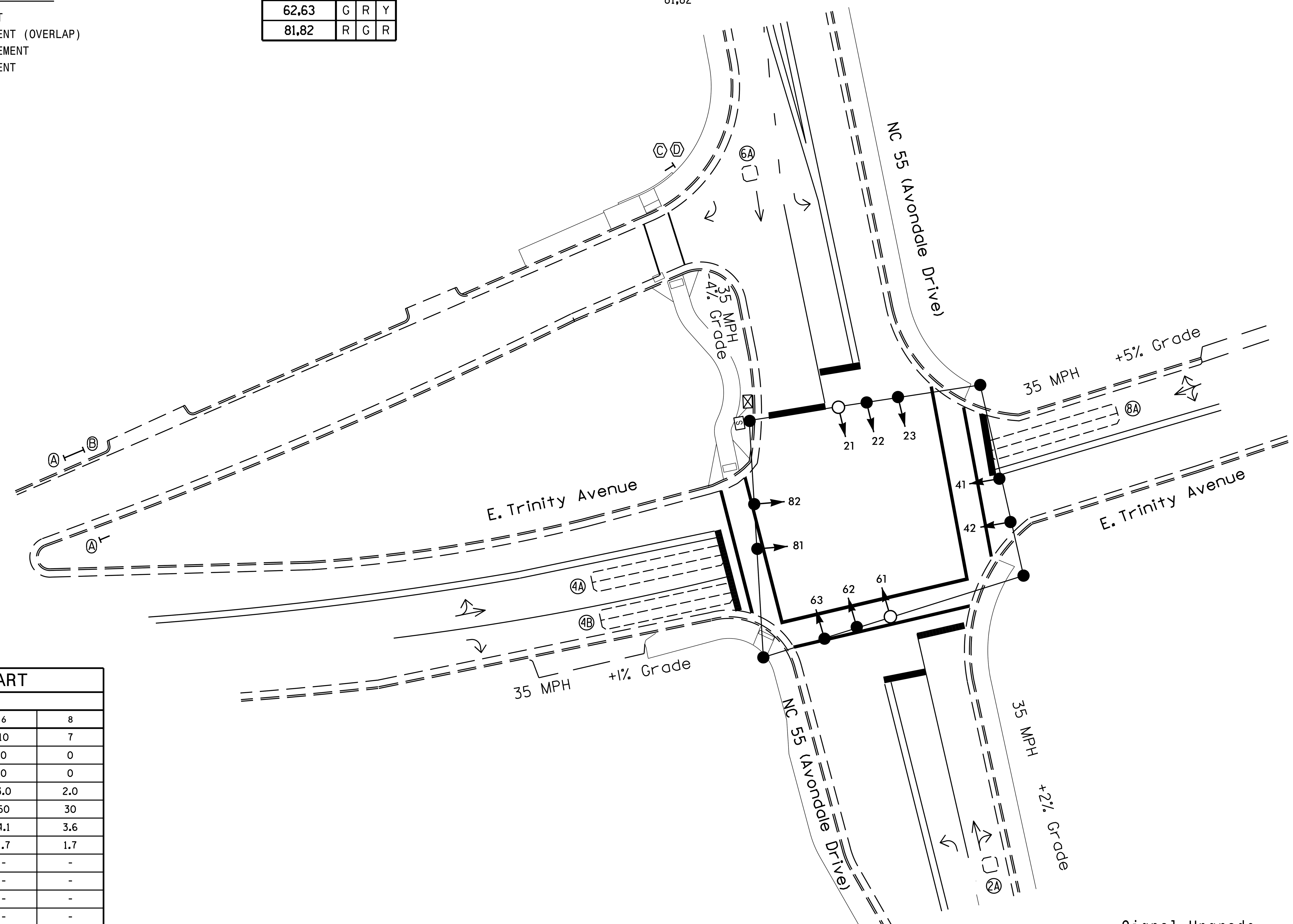


ASC/3 DETECTOR INSTALLATION CHART												
DETECTOR					PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
2A	6X6	70	5	-	2	Yes	-	-	-	S	-	X
4A	6X40	0	2-4-2	-	4	Yes	-	3	-	S	-	X
4B	6X40	0	2-4-2	-	4	Yes	-	15	-	S	-	X
6A	6X6	70	5	-	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. Reposition existing signal heads numbered 22, 23, 62 and 63.
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. Pavement markings are existing.
7. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values 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.



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	
S	Terminal Splice Box	S
A	"DO NOT ENTER" Sign (R5-1)	A
B	"YIELD" Sign (R1-2)	B
C	Pedestrian Crossing Sign (W11-2)	C
D	Downward Pointing Arrow Sign (W16-7P)	D

ASC/3 TIMING CHART				
	PHASE			
FEATURE	2	4	6	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 *	50	30	50	30
Yellow	4.1	3.8	4.1	3.6
Red Clear	1.7	1.4	1.7	1.7
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.

$$$$SYSTIME$$$$
$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

Signal Upgrade

Prepared in the Office of:

SUMMIT DESIGN AND ENGINEERING SERVICES

NC FIRM LICENSE No: P-0339
504 Meadowlands Drive
Hillsborough, NC 27278
(919) 732-3883
(919) 732-6676 (FAX)

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

SCALE 0 20
1"=20'

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NC 55 (Avondale Drive)
at
East Trinity Avenue

Division 5 Durham County Durham

PLAN DATE:	October 2018	REVIEWED BY:	E. Sirgany
PREPARED BY:	J. Smith	REVIEWED BY:	

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER
SEAL 018174
EDWARD W. SIRGANY

DocuSigned by: Edward W Sirgany 11/5/2018
DATE

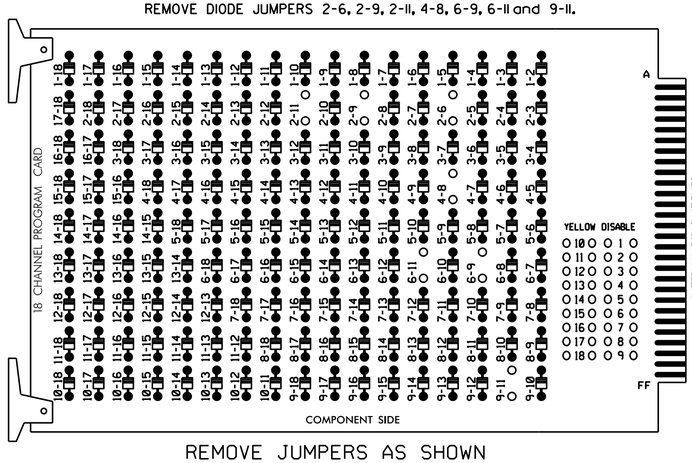
SIG. INVENTORY NO. 05-1032

PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig 201.1

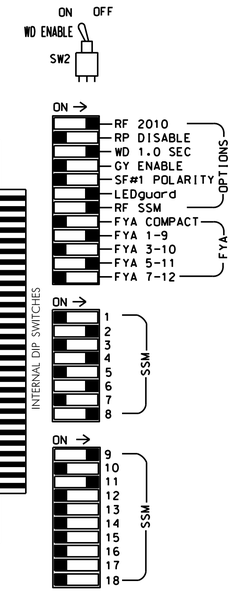
EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

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



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.

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 detail on sheet 2

SIGNAL HEAD HOOK-UP CHART

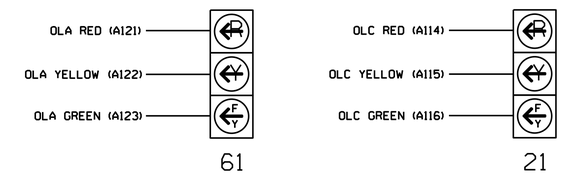
LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	NU	22,23	NU	NU	41,42	NU	NU	62,63	NU	NU	81,82	NU	61★	NU	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 below.

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	SLOT	Ø2	SLOT	SLOT	SLOT	Ø4	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	FS
			2A				4A								DC ISOLATOR
	L	EMPTY	NOT USED	EMPTY	EMPTY	EMPTY	Ø4	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	ST
							4B								DC ISOLATOR
FILE "J"	U	SLOT	Ø6	SLOT	SLOT	SLOT	Ø8	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT
			6A				8A								
	L	EMPTY	NOT USED	EMPTY	EMPTY	EMPTY	NOT USED	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY

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	12U	39	2	2	YES				S
4A	TB4-9,10	16U	41	4	4	YES		3		S
4B	TB4-11,12	16L	45	14	4	YES		15		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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1032
PREPARED: October 2018
SEALED: November 5, 2018
REVISED: N/A

Electrical Detail - Sheet 1 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Prepared in the Office of:

SUMMIT DESIGN AND ENGINEERING SERVICES

NC FIRM LICENSE No: P-0339
504 Meadowlands Drive
Hillsborough, NC 27278
(919) 732-3883
(919) 732-6676 (FAX)

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

NC 55 (Avondale Drive)
at
East Trinity Avenue

Division 5 | Durham County | Durham

PLAN DATE:	October 2018	REVIEWED BY:	E. Sirgany
PREPARED BY:	J. Smith	REVIEWED BY:	

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 018174 ENGINEER EDWARD W. SIRGANY

DocuSigned by:
Edward W Sirgany 11/5/2018
ENGINEER/MANAGER DATE

SIG. INVENTORY NO. 05-1032

$$$$$$SYSTIME$$$$$
$$$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig 201.2

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: 05-1032
PREPARED: October 2018
SEALED: November 5, 2018
REVISED: N/A

Electrical Detail - Sheet 2 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Prepared in the Office of:

SUMMIT DESIGN AND ENGINEERING SERVICES

NC FIRM LICENSE No: P-0339
504 Meadowlands Drive
Hillsborough, NC 27278
(919) 732-3883
(919) 732-6676 (FAX)

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

NC 55 (Avondale Drive)
at
East Trinity Avenue

Division 5 Durham County Durham

PLAN DATE:	October 2018	REVIEWED BY:	E. Sirgany
PREPARED BY:	J. Smith	REVIEWED BY:	

REVISIONS	INIT.	DATE

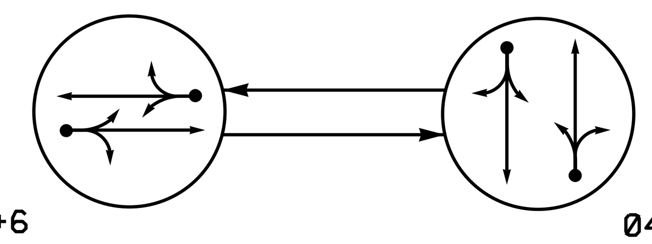
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 018174 ENGINEER EDWARD W. SIRGANY

DocuSigned by:
Edward W Sirgany 11/5/2018
ENGINEER MANAGER DATE

SIG. INVENTORY NO. 05-1032

$$$$$$SYSTIME$$$$$
$$$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

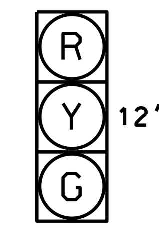
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2+6	PHASE Ø4+8	FLASH
21,22	G	R	Y
41,42	R	G	R
61,62	G	R	Y
81,82	R	G	R

SIGNAL FACE I.D.

All Heads L.E.D.



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

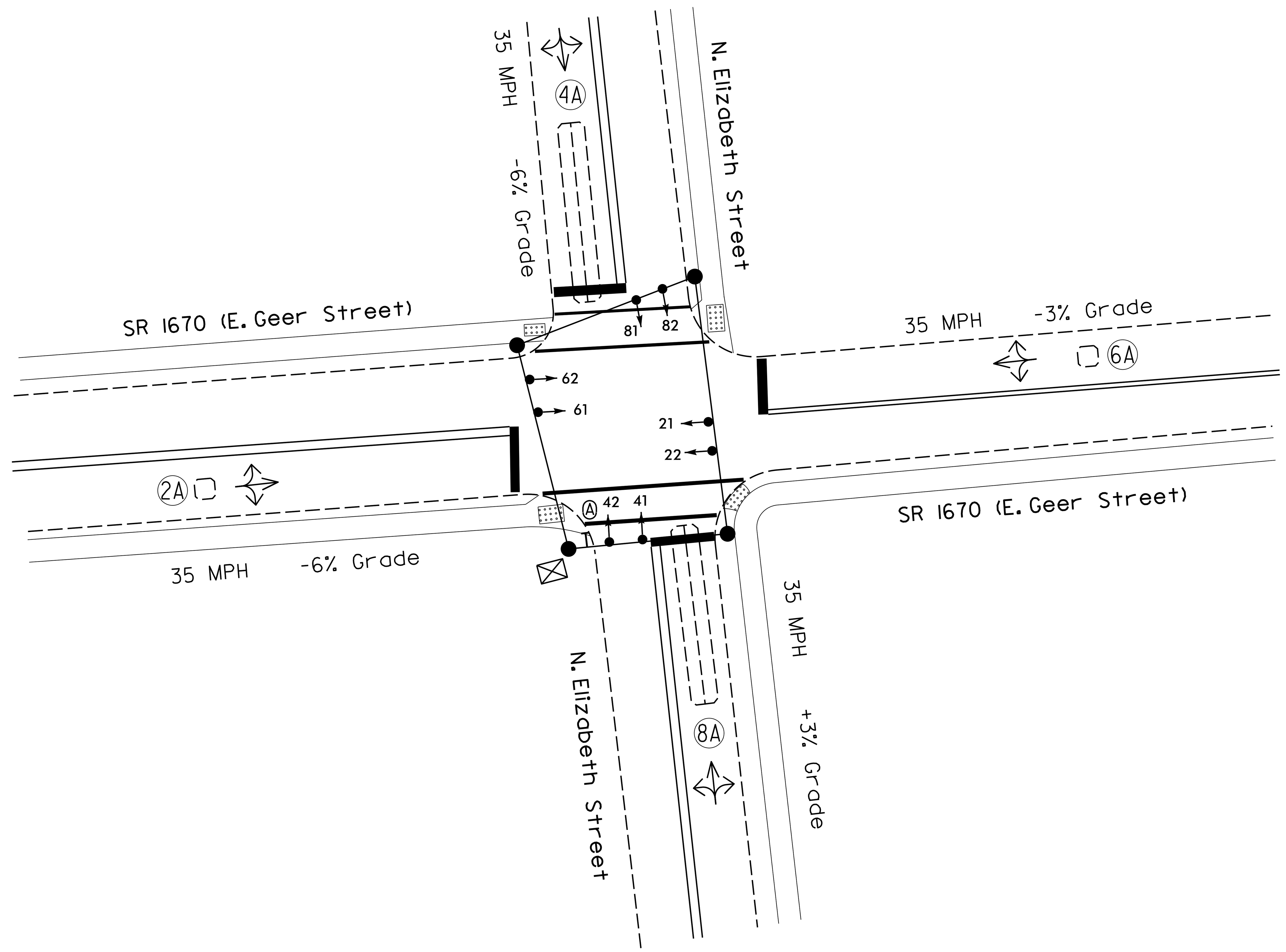
ASC/3 DETECTOR INSTALLATION CHART

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
2A	6X6	70	5	-	2	Yes	-	-	-	S	-	X
4A	6X40	+5	2-4-2	-	4	Yes	-	3	-	S	-	X
6A	6X6	70	5	-	6	Yes	-	-	-	S	-	X
8A	6X40	+5	2-4-2	-	8	Yes	-	5	-	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. Set all detector units to presence mode.
4. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
5. Pavement markings are existing.
6. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
7. Loop data based on previous plan and/or field observations.
8. Install new cabinet on the existing cabinet foundation.
9. Reconnect loops and heads in cabinet as indicated to match current NCDOT standards.



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	
Ⓐ	"NO TURN ON RED" Sign (R10-11)	Ⓐ

ASC/3 TIMING CHART

FEATURE	PHASE 2	4	6	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 *	50	30	50	30
Yellow	4.3	4.3	4.1	3.7
Red Clear	1.0	1.0	1.0	1.0
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

* 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 in the Office of:
SUMMIT DESIGN AND ENGINEERING SERVICES
NC FIRM LICENSE No: P-0339
504 Meadowlands Drive
Hillsborough, NC 27278
(919) 732-3883
(919) 732-6676 (FAX)

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

SR 1670 (East Geer Street)
at
North Elizabeth Street

Division 5 | Durham County | Durham

PLAN DATE:	October 2018	REVIEWED BY:	E. Sirgany
PREPARED BY:	J. Smith	REVIEWED BY:	

SCALE 0 20 1"=20'

REVISIONS	INIT.	DATE

SEAL: North Carolina Professional Engineer Seal 018174 Edward W. Sirgany

DocuSigned by: Edward W Sirgany 11/5/2018 DATE

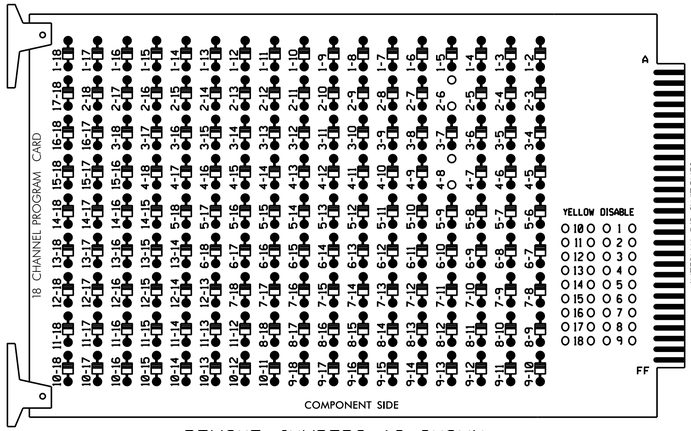
SIG. INVENTORY NO. 05-1034

PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig 202.1

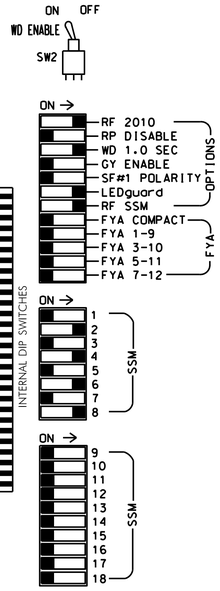
EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 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.

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	21,22	NU	NU	41,42	NU	NU	61,62	NU	NU	81,82	NU
RED		128			101			134			107	
YELLOW		129			102			135			108	
GREEN		130			103			136			109	
RED ARROW												
YELLOW ARROW												
GREEN ARROW												

NU = Not Used

EQUIPMENT INFORMATION

CONTROLLER.....2070LX
CABINET.....332
SOFTWARE.....ECONOLITE ASC/3-2070
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...12
LOAD SWITCHES USED.....S2,S5,S8,S11
PHASES USED.....2,4,6,8
OVERLAPS.....NONE

INPUT FILE POSITION LAYOUT

(front view)

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

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

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1034
PREPARED: October 2018
SEALED: November 5, 2018
REVISED: N/A

Electrical Detail

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 1670 (East Geer Street)
at
North Elizabeth Street

Division 5 Durham County Durham

PLAN DATE: October 2018	REVIEWED BY: E. Sirgany
PREPARED BY: J. Smith	REVIEWED BY:

REVISIONS	INIT.	DATE

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

Prepared in the Office of:
SUMMIT DESIGN AND ENGINEERING SERVICES
NC FIRM LICENSE No: P-0339
504 Meadowlands Drive
Hillsborough, NC 27278
(919) 732-3883
(919) 732-6676 (FAX)

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 018174 ENGINEER EDWARD W. SIRGANY

DocuSigned by:
Edward W Sirgany 11/5/2018
SPECIFICATIONS MANAGER DATE

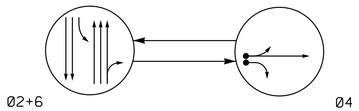
SIG. INVENTORY NO. 05-1034

$$$$$$SYSTIME$$$$$
$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$
$$$$$$$USERNAME$$$$

DocuSign Envelope ID: 93F7D2D0-AF8C-4C45-B1AD-C8DBA135FDBA

PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-203.0

PHASING DIAGRAM

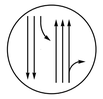


PHASING DIAGRAM DETECTION LEGEND

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

EV PREEMPT PHASES

(Medium Priority)



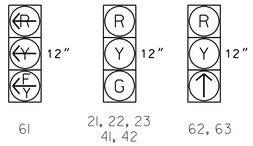
PRE3
(Ø2+6)

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2+6	PHASE Ø4	PHASE PRE3	FLASH
21, 22, 23	G	R	G	Y
41, 42	R	G	R	R
61	F Y	R	F Y	Y
62, 63	↑	R	↑	Y

SIGNAL FACE I.D.

All Heads L.E.D.



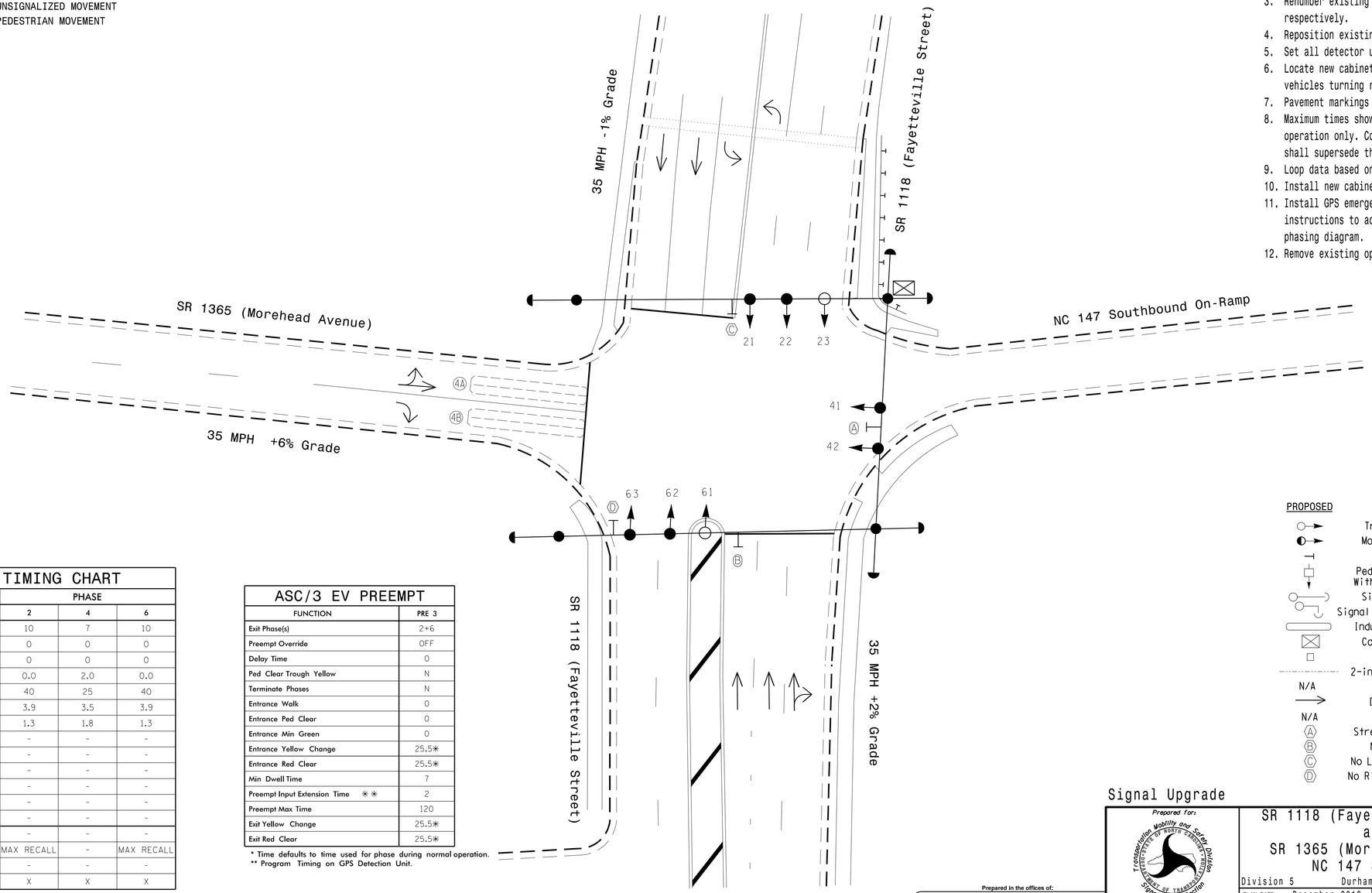
ASC/3 DETECTOR INSTALLATION CHART

DETECTOR					PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
4A	6X40	0	2-4-2	-	4	Yes	-	-	-	S	-	X
4B	6X40	0	2-4-2	-	4	Yes	-	15	-	S	-	X

2 Phase
Semi-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 61 and 62 as 62 and 63 respectively.
4. Reposition existing signal heads 21, 22, 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.
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.



ASC/3 TIMING CHART

FEATURE	PHASE 2	PHASE 4	PHASE 6
Min Green *	10	7	10
Walk *	0	0	0
Ped Clear	0	0	0
Veh. Extension *	0.0	2.0	0.0
Max 1 *	40	25	40
Yellow	3.9	3.5	3.9
Red Clear	1.3	1.8	1.3
Actuations B4 Add *	-	-	-
Seconds /Actuation *	-	-	-
Max Initial *	-	-	-
Time Before Reduction *	-	-	-
Time To Reduce *	-	-	-
Minimum Gap	-	-	-
Locking Detector	-	-	-
Recall Position	MAX RECALL	-	MAX 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	N
Terminate Phases	N
Entrance Walk	0
Entrance Ped Clear	0
Entrance Min Green	0
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.

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	Guardrail	
Ⓐ	Street Name Sign (D3-1)	Ⓐ
Ⓑ	NC 147 Guide Sign	Ⓑ
Ⓒ	No Left Turn Sign (R3-2)	Ⓒ
Ⓓ	No Right Turn Sign (R3-1)	Ⓓ

Signal Upgrade

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

SR 1118 (Fayetteville St.) at SR 1365 (Morehead Ave.)/ NC 147 SB Ramp

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 Farlingdon Place, Suite 100
Raleigh, North Carolina 27609
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www.rameykemp.com

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NORTH CAROLINA PROFESSIONAL SEAL 32396 ENGINEER WILLIAM J. HAMILTON

DocuSigned by: William J. Hamilton 12/19/2018
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SIG. INVENTORY NO. 05-1035

12/17/2018
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User:tpopelka

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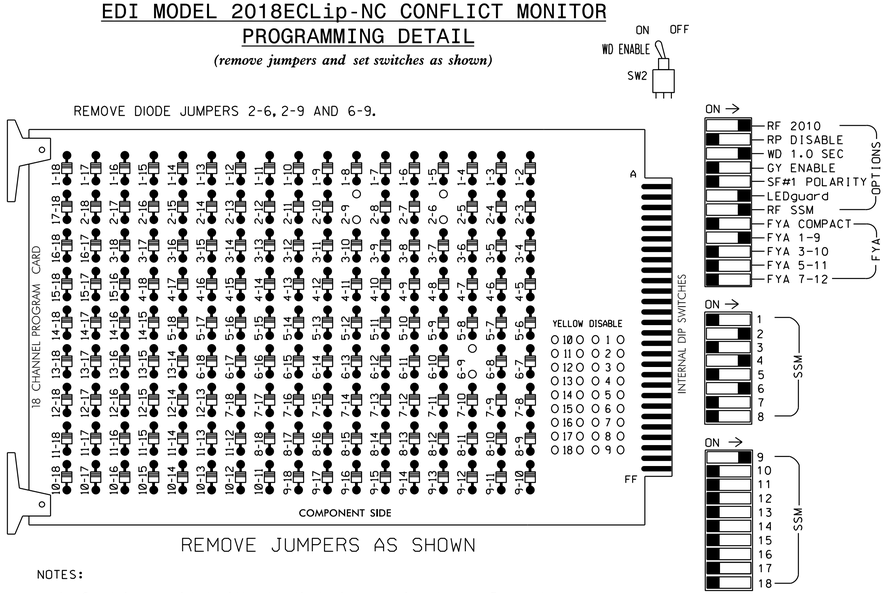
PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-203.1

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 schemes shown on the Signal Design Plans.

EQUIPMENT INFORMATION

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

* See overlap programming on sheet 2.

SIGNAL HEAD HOOK-UP CHART

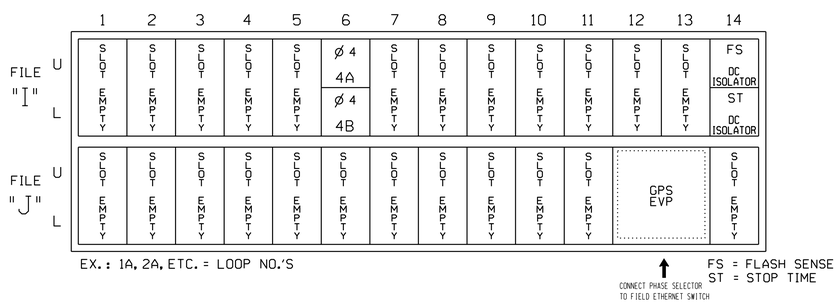
LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	NU	21,22, 23	NU	NU	41,42	NU	NU	62,63	NU	NU	NU	NU	61★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

NU = Not Used

★ See pictorial of head wiring in detail this sheet.

INPUT FILE POSITION LAYOUT

(front view)



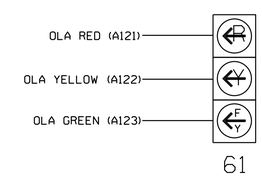
INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND TIME	DELAY TIME	ADDED INITIAL	DETECTOR TYPE
4A	TB4-9,10	I6U	41	4	4	YES				S
4B	TB4-11,12	I6L	45	14	4	YES		15		S

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: 05-1035
DESIGNED: Dec 2018
SEALED: 12/19/2018
REVISED: N/A

Prepared in the offices of:
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5808 Faringdon Place, Suite 100
Raleigh, North Carolina 27609
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www.rameykemp.com

Electrical Detail
Sheet 1 of 2

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ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 1118 (Fayetteville St.)
at
SR 1365 (Morehead Ave.)/
NC 147 SB Ramp

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
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12/19/2018
SIGNATURE DATE
SIG. INVENTORY NO. 05-1035

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

12/17/2018
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PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-203.2

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... YESIPMT OVRIDE..IINTERLOCK. NO
DET LOCK... XIDELAY..    OIINHIBIT...  O
OVERIDE FL. .IDURATION   OICLR-GRN... NO
TERM OLP.  NOIPC>YEL    NOITERM 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.    OI     OI    OI25.5I25.5
-----------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
```

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1035
DESIGNED: Dec 2018
SEALED: 12/19/2018
REVISED: N/A

PROGRAM EXTEND TIME ON GPS DETECTOR UNITS FOR 2.0 SEC.

ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

(program controller as shown)

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

OVERLAP A

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

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

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

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..
```

Electrical Detail
Sheet 2 of 2

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ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

SR 1118 (Fayetteville St.)
at
SR 1365 (Morehead Ave.)/
NC 147 SB Ramp

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. 05-1035

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User:TPopelka

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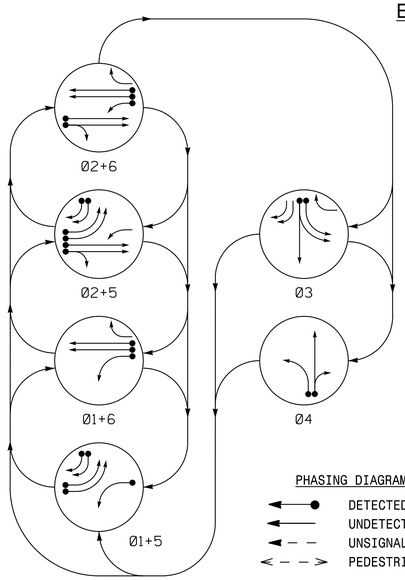
PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG.204.0

DEFAULT PHASING DIAGRAM



DEFAULT PHASING EV PREEMPT PHASES

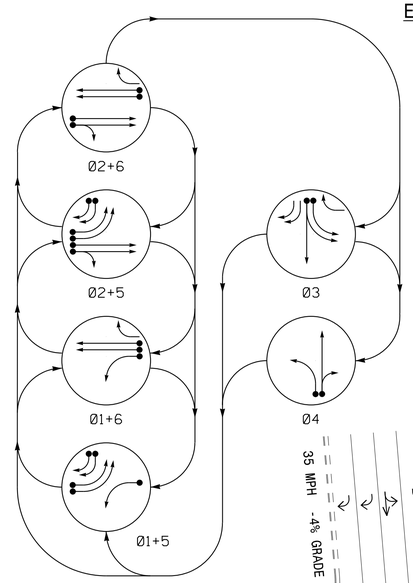
(Medium Priority)

PRE 3
(Ø1+6)

DEFAULT PHASING TABLE OF OPERATION

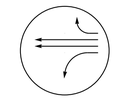
SIGNAL FACE	PHASE 01+5	01+6	02+5	02+6	03	04	PRE 3	FLASH
11	←	←	F Y	F Y	R	R	←	Y
21,22	R	R	G	G	R	R	R	Y
31	R	R	R	R	G	R	R	R
32	R	R	R	R	G	R	R	R
41	R	R	R	R	R	G	R	R
42	R	R	R	R	R	G	R	R
51,52	←	R	←	R	R	R	R	R
53,54	→	R	→	R	→	R	R	R
61	R	G	R	G	R	R	G	Y
62	R	G	R	G	R	R	G	Y

ALTERNATE PHASING DIAGRAM



ALTERNATE PHASING EV PREEMPT PHASES

(Medium Priority)



PRE 3
(Ø1+6)

ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE 01+5	01+6	02+5	02+6	03	04	PRE 3	FLASH
11	←	←	R	R	R	R	←	Y
21,22	R	R	G	G	R	R	R	Y
31	R	R	R	R	G	R	R	R
32	R	R	R	R	G	R	R	R
41	R	R	R	R	R	G	R	R
42	R	R	R	R	R	G	R	R
51,52	←	R	←	R	R	R	R	R
53,54	→	R	→	R	→	R	R	R
61	R	G	R	G	R	R	G	Y
62	R	G	R	G	R	R	G	Y

6 PHASE FULLY ACTUATED W/ EMERGENCY PREEMPTION (DURHAM SIGNAL SYSTEM)

NOTES

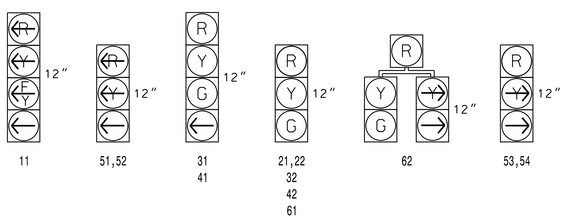
1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 and/or phase 5 may be lagged.
4. The order of phase 3 and phase 4 may be reversed.
5. Reposition existing signal head numbered 31.
6. Set all detector units to presence mode.
7. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
8. 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. The Division (City) Traffic Engineer will determine the hours of use for each phasing plan.
11. Loop data based on previous plan and/or field observations.
12. Install new cabinet on the existing cabinet foundation.
13. Existing signal heads 32, 62 and 63 have been relabeled to 31, 61 and 62, respectively.
14. Install GPS emergency preemption system per manufacturer's instructions to achieve preemption needed, as shown in phasing diagram.
15. Remove existing optical detection equipment.

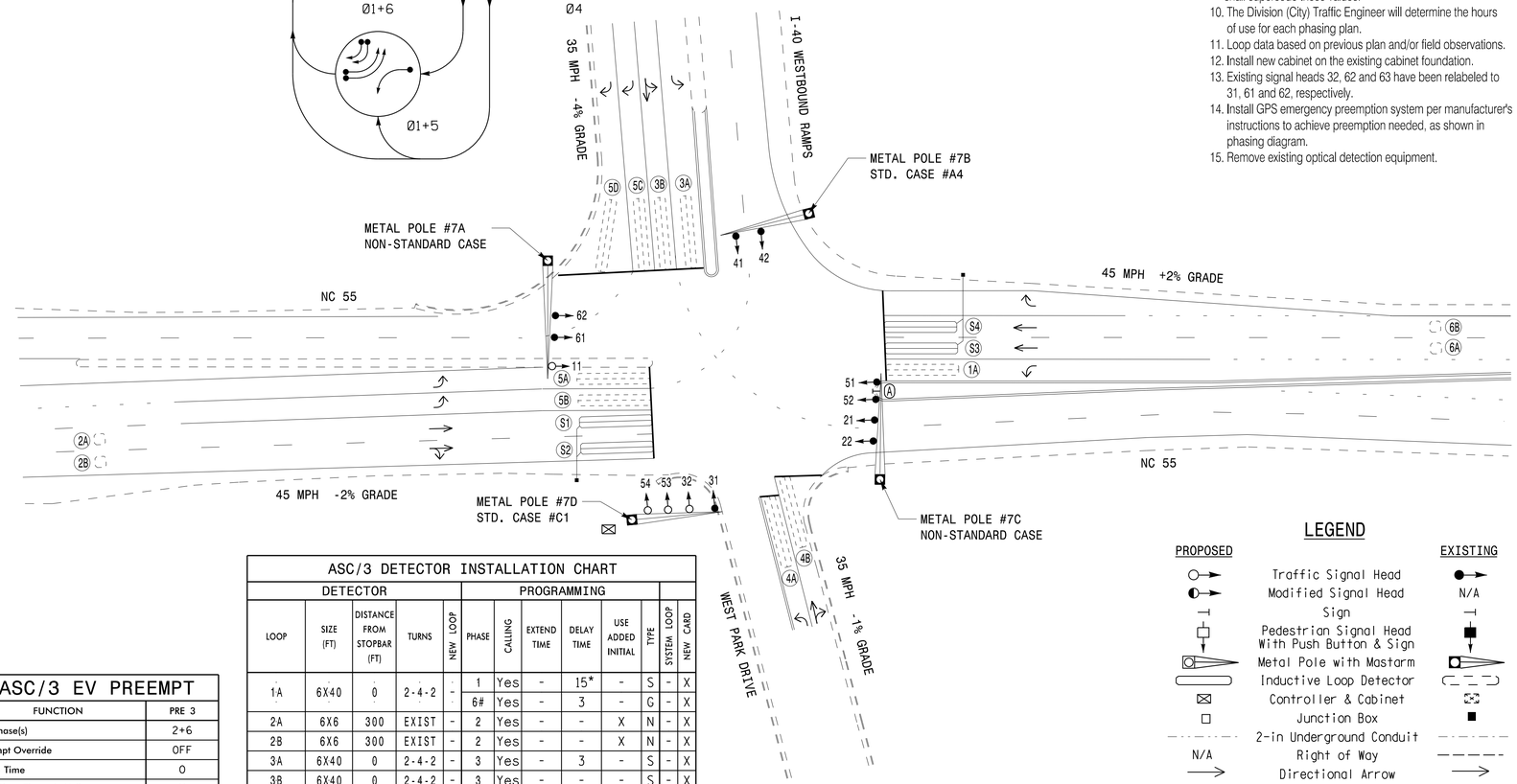
PHASING DIAGRAM DETECTION LEGEND

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

SIGNAL FACE I.D.

All Heads L.E.D.





LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Metal Pole with Mastarm	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
N/A	Curb Ramp	
A	"U-TURN YIELD TO RIGHT TURN" Sign (R10-16)	A

ASC/3 TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6
Min Green *	7	12	7	7	12	7
Walk *	0	0	0	0	0	0
Ped Clear	0	0	0	0	0	0
Veh. Extension *	2.0	6.0	2.0	2.0	2.0	6.0
Max 1 *	20	90	20	50	20	90
Yellow	3.0	4.7	4.1	3.9	3.0	4.7
Red Clear	3.2	2.3	2.7	3.0	2.9	2.3
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

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

ASC/3 EV PREEMPT

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

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

ASC/3 DETECTOR INSTALLATION CHART

DETECTOR					PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
1A	6X40	0	2-4-2	-	1	Yes	-	15*	-	S	-	X
				-	6#	Yes	-	3	-	G	-	X
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	-	3	-	S	-	X
3B	6X40	0	2-4-2	-	3	Yes	-	-	-	S	-	X
4A	6X40	0	2-4-2	-	4	Yes	-	3	-	S	-	X
4B	6X40	0	2-4-2	-	4	Yes	-	10	-	S	-	X
5A	6X40	0	2-4-2	-	5	Yes	-	-	-	S	-	X
5B	6X40	0	2-4-2	-	5	Yes	-	-	-	S	-	X
5C	6X40	0	2-4-2	-	5	Yes	-	15	-	S	-	X
5D	6X40	0	2-4-2	-	5	Yes	-	15	-	S	-	X
6A	6X6	300	EXIST	-	6	Yes	-	-	X	N	-	X
6B	6X6	300	EXIST	-	6	Yes	-	-	X	N	-	X
S1	6X40	0	EXIST	X	SYS	No	-	-	-	N	X	X
S2	6X40	0	EXIST	X	SYS	No	-	-	-	N	X	X
S3	6X40	0	EXIST	X	SYS	No	-	-	-	N	X	X
S4	6X40	0	EXIST	X	SYS	No	-	-	-	N	X	X

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

PLANS PREPARED IN THE OFFICE OF:
Kimley»Horn
NC License #F-0102
421 Fayetteville Street, Suite 600
Raleigh, NC 27601
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Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

SCALE 0 40
1"=40'

NC 55 at I-40 Westbound Ramp/ West Park Drive

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACIE L. PHILLIPS

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

SIG. INVENTORY NO. 05-1069

12/19/2018
K:\RAL_TMS\TMS_ITS\011036410 - Durham Signal System\Signals\S4 - Signal Design\GROUP 5\U-5968_051069-2018.dgn
derrick.waller

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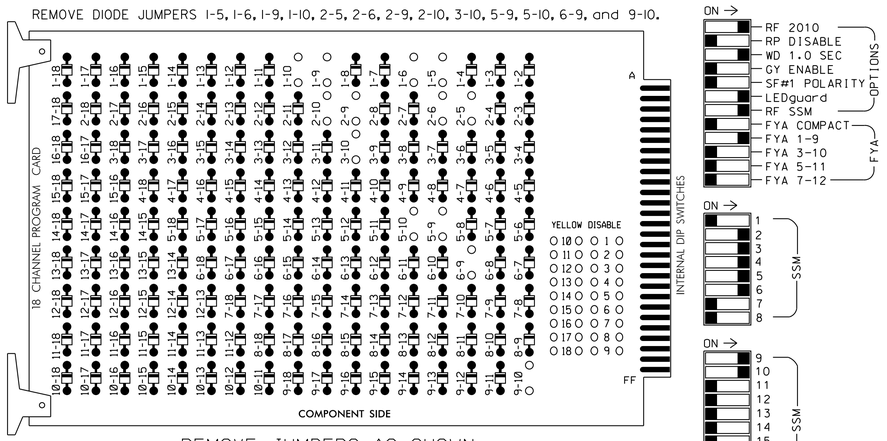
PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG.204.1

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 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,AUX S1, AUX S2
PHASES USED.....1,2,3,4,5,6
OVERLAP "A".....✳
OVERLAP "B".....✳
OVERLAP "C".....NOT USED
OVERLAP "D".....NOT USED

✳ See overlap programming detail on sheet 2

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4			S5		S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3			4		14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3			4		4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	11★	21,22	NU	31	32	62	41	42	NU	51,52	61,62	NU	NU	NU	NU	11★	53,54	NU	NU	NU	NU
RED		128		116	116		101	101			134						A124				
YELLOW	✳	129		117	117		102	102			135										
GREEN		130		118	118		103	103			136										
RED ARROW										131						A121					
YELLOW ARROW						117				132						A122	A125				
FLASHING YELLOW ARROW																A123					
GREEN ARROW	127			118		118	103			133							A126				

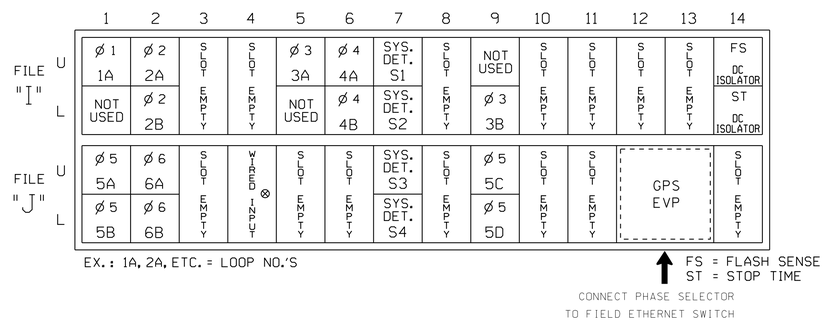
NU = Not Used

✳ 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 NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND TIME	DELAY TIME	ADDED INITIAL	DETECTOR TYPE
1A [1]	TB2-1,2	I1U	56	1★	1	YES		15		S
	-	J4U	48	26★	6	YES		3		G
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		3		S
3B	TB6-11,12	I9L	62	13	3	YES				S
4A	TB4-9,10	I6U	41	4	4	YES		3		S
4B	TB4-11,12	I6L	45	14	4	YES		10		S
5A	TB3-1,2	J1U	55	5	5	YES				S
5B	TB3-3,4	J1L	55	5	5	YES				S
5C	TB7-9,10	J9U	59	15	5	YES		15		S
5D	TB7-11,12	J9L	61	17	5	YES		15		S
6A	TB3-5,6	J2U	40	6	6	YES			X	N
6B	TB3-7,8	J2L	44	16	6	YES			X	N
✳ S1	TB6-1,2	I7U	65	34	SYS	NO				N
✳ S2	TB6-3,4	I7L	78	44	SYS	NO				N
✳ S3	TB7-1,2	J7U	66	38	SYS	NO				N
✳ S4	TB7-3,4	J7L	79	48	SYS	NO				N

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

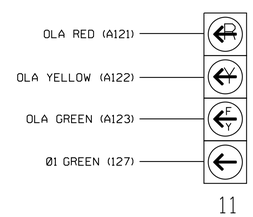
★ For the detectors to work as shown on the signal design plan, see the Vehicle Detector Setup Programming Detail for Alternate Phasing on sheet 2.

✳ System detector only. Remove any assigned vehicle phase.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

FYA SIGNAL WIRING DETAIL

(wire signal head as shown)

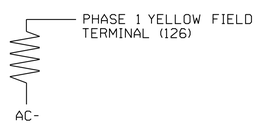


LOAD RESISTOR INSTALLATION DETAIL

(install resistor as shown)

ACCEPTABLE VALUES

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



THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1069
DESIGNED: APRIL 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail - Sheet 1 of 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

750 N.Greenfield Pkwy,Garner,NC 27529

NC 55
at
I-40 Westbound Ramps/
West Park Drive

Division 5 Durham County Durham

PLAN DATE: April 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: DC87A58ED0D8437...
12/19/2018
SIGNATURE DATE

SIG. INVENTORY NO. 05-1069

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.204.2

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

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".

```
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'

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

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

NOTICE VEH DET PLAN 2

ENSURE PHASE IS SET TO "0"

END PROGRAMMING

ECONOLITE ASC/3-2070 EMERGENCY VEHICLE PREEMPT PROGRAMMING DETAIL

(program controller as shown)

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

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

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

ENABLE... YESIPMT OVRIDE..IINTERLOCK. NO
DET LOCK... XIDELAY..    OIINHIBIT...  0
OVERIDE FL. .IDURATION   OICLR-GRN... NO
TERM OLP.  NOIPC>YEL    NOITERM 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.    OI     OI    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: 05-1069
DESIGNED: APRIL 2018
SEALED: 12/19/2018
REVISED: N/A

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 . 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..
```

Electrical Detail - Sheet 2 of 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

NC 55
at
I-40 Westbound Ramps/
West Park Drive

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

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

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

DocuSigned by: 12/19/2018
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SIG. INVENTORY NO. 05-1069

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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 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 phases for head 11 to run protected turns only.

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

ECONOLITE ASC/3-2070 ACTION PLAN PROGRAMMING DETAIL

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

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1069
DESIGNED: APRIL 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail - Sheet 3 of 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

NC 55
at
I-40 Westbound Ramps/
West Park Drive

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACIE L. PHILLIPS

DocuSigned by: 12/19/2018
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SIGNATURE DATE

SIG. INVENTORY NO. 05-1069

12/19/2018
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derrick.waller

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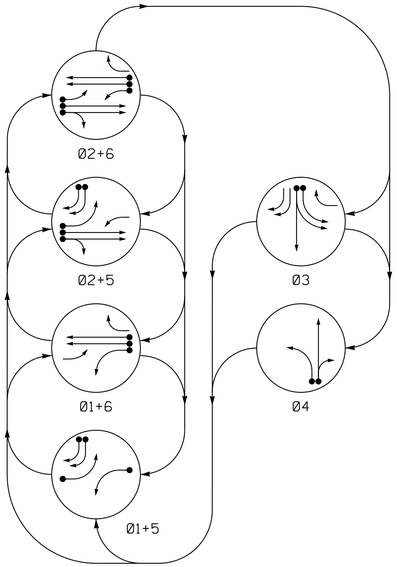
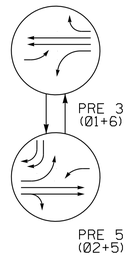
PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG.205.0

DEFAULT PHASING DIAGRAM



DEFAULT PHASING EV PREEMPT PHASES

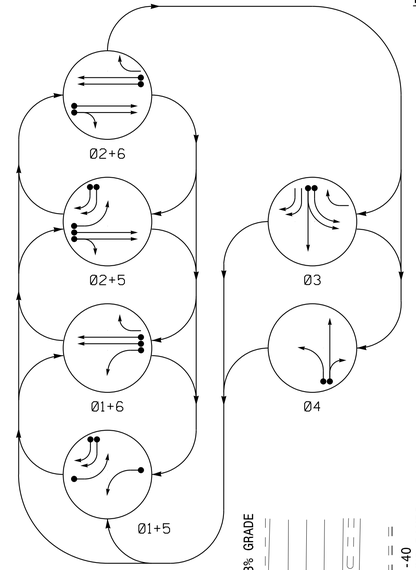
(Medium Priority)



DEFAULT PHASING TABLE OF OPERATION

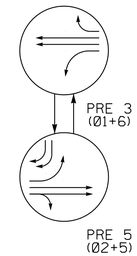
SIGNAL FACE	PHASE								
	Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3	Ø4	PRE 3	PRE 5	FLASH
11	←	←	F Y	F Y	~~R~~	~~R~~	←	F Y	~~Y~~
21,22	R	R	G	G	R	R	R	G	Y
31	R	R	R	R	G ←	R	R	R	R
32	R	R	R	R	G	R	R	R	R
41	R	R	R	R	R	G ←	R	R	R
42	R	R	R	R	R	G	R	R	R
51	←	F Y	←	F Y	~~R~~	~~R~~	F Y	←	~~Y~~
52,53	→	R	→	R	→	R	R	→	R
61	R	G	R	G	R	R	G	R	Y
62	R	G	R	G	R/	R	G	R	Y

ALTERNATE PHASING DIAGRAM



ALTERNATE PHASING EV PREEMPT PHASES

(Medium Priority)



ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE								
	Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3	Ø4	PRE 3	PRE 5	FLASH
11	←	←	~~R~~	~~R~~	~~R~~	~~R~~	←	~~R~~	~~Y~~
21,22	R	R	G	G	R	R	R	G	Y
31	R	R	R	R	G ←	R	R	R	R
32	R	R	R	R	G	R	R	R	R
41	R	R	R	R	R	G ←	R	R	R
42	R	R	R	R	R	G	R	R	R
51	←	~~R~~	←	~~R~~	~~R~~	~~R~~	~~R~~	←	~~Y~~
52,53	→	R	→	R	→	R	R	→	R
61	R	G	R	G	R	R	G	R	Y
62	R	G	R	G	R/	R	G	R	Y

6 PHASE FULLY ACTUATED W/ EMERGENCY PREEMPTION (DURHAM SIGNAL SYSTEM)

NOTES

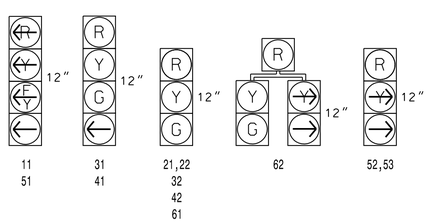
1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 and/or phase 5 may be lagged.
4. The order of phase 3 and phase 4 may be reversed.
5. Set all detector units to presence mode.
6. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
7. Pavement markings are existing.
8. The Division (City) Traffic Engineer will determine the hours of use for each phasing plan.
9. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
10. Loop data based on previous plan and/or field observations.
11. Install new cabinet on the existing cabinet foundation.
12. Install GPS emergency preemption system per manufacturer's instructions to achieve preemption needed, as shown in phasing diagram.
13. Remove existing optical detection equipment.

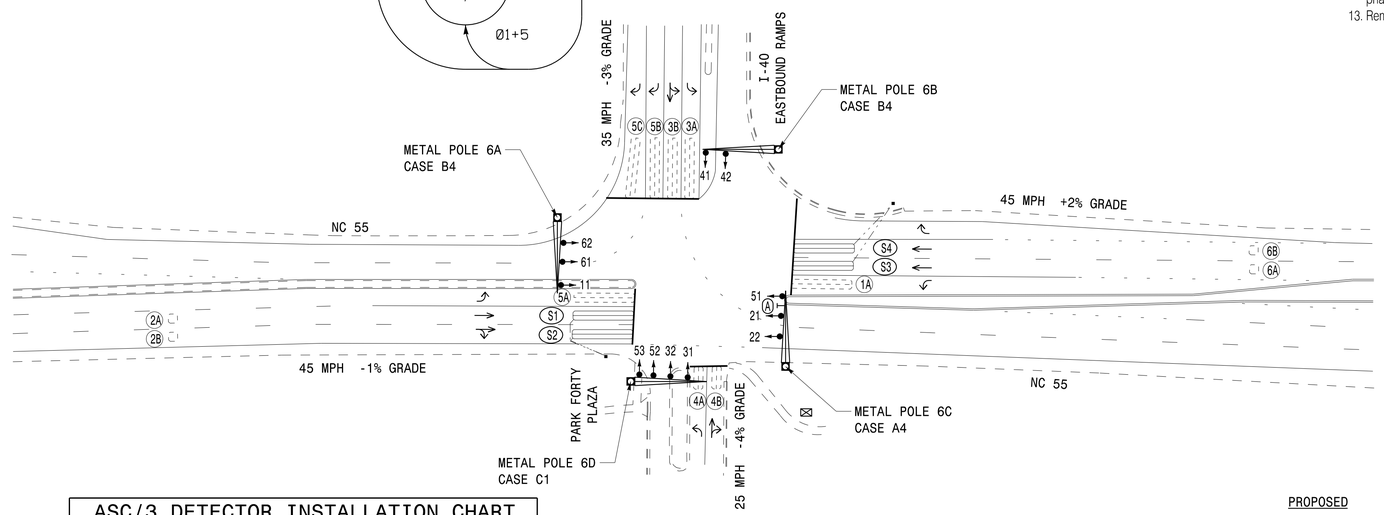
PHASING DIAGRAM DETECTION LEGEND

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

SIGNAL FACE I.D.

All Heads L.E.D.





ASC/3 TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6
Min Green *	7	12	7	7	7	12
Walk *	0	0	0	0	0	0
Ped Clear	0	0	0	0	0	0
Veh. Extension *	2.0	6.0	2.0	2.0	2.0	6.0
Max 1 *	20	90	50	25	30	90
Yellow	3.0	4.6	4.1	3.4	3.0	4.6
Red Clear	3.2	1.9	2.5	2.8	2.8	1.9
Actuations B4 Add *	-	-	-	-	-	-
Seconds /Actuation *	-	1.5	-	-	-	1.5
Max Initial *	-	34	-	-	-	34
Time Before Reduction *	-	15	-	-	-	15
Time To Reduce *	-	45	-	-	-	45
Minimum Gap	-	3.0	-	-	-	3.0
Locking Detector	-	X	-	-	-	X
Recall Position	-	VEH. RECALL	-	-	-	VEH. RECALL
Dual Entry	-	-	-	-	-	-
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 DETECTOR INSTALLATION CHART

DETECTOR					PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
1A	6X40	0	2-4-2	-	1	Yes	-	15*	-	S	-	X
					6#	Yes	-	3	-	G	-	X
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	-	3	-	S	-	X
3B	6X40	0	2-4-2	-	3	Yes	-	-	-	S	-	X
4A	6X15	0	2-4-2	-	4	Yes	-	-	-	S	-	X
4B	6X15	0	2-4-2	-	4	Yes	-	10	-	S	-	X
5A	6X40	0	2-4-2	-	5	Yes	-	15*	-	S	-	X
					2#	Yes	-	3	-	G	-	X
5B	6X40	0	2-4-2	-	5	Yes	-	15	-	S	-	X
5C	6X40	0	2-4-2	-	5	Yes	-	15	-	S	-	X
6A	6X6	300	EXIST	-	6	Yes	-	-	X	N	-	X
6B	6X6	300	EXIST	-	6	Yes	-	-	X	N	-	X
S1	6X40	0	2-4-2	X	SYS	No	-	-	-	N	X	X
S2	6X40	0	2-4-2	X	SYS	No	-	-	-	N	X	X
S3	6X40	0	2-4-2	X	SYS	No	-	-	-	N	X	X
S4	6X40	0	2-4-2	X	SYS	No	-	-	-	N	X	X

* Disable Delay during Alternate Phasing operation.
# Disable Phase Call for Loop during Alternate Phasing operation.

ASC/3 EV PREEMPT

FUNCTION	PRE 3	PRE 5
Exit Phase(s)	2+6	2+6
Preempt Override	OFF	OFF
Delay Time	0	0
Ped Clear Through Yellow	N	N
Terminate Phases	N	N
Entrance Walk	0	0
Entrance Ped Clear	0	0
Entrance Min Green	1	1
Entrance Yellow Change	25.5✱	25.5✱
Entrance Red Clear	25.5✱	25.5✱
Minimum Dwell Time	7	7
Preempt Input Extension Time **	2.0	2.0
Preempt Max Time	120	120
Exit Yellow Change	25.5✱	25.5✱
Exit Red Clear	25.5✱	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	
	Metal Pole with Mastarm	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
N/A	Curb Ramp	
	"U-TURN YIELD TO RIGHT TURN" Sign (R10-16)	

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

PLANS PREPARED IN THE OFFICE OF:
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421 Fayetteville Street, Suite 600
Raleigh, NC 27601
(919) 677-2000

SCALE 0 50 1"=50'

NC 55
at
I-40 Eastbound Ramps/
Park Forty Plaza

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

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SIGNATURE DATE
SIG. INVENTORY NO. 05-1070

12/19/2018
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derrick.waller

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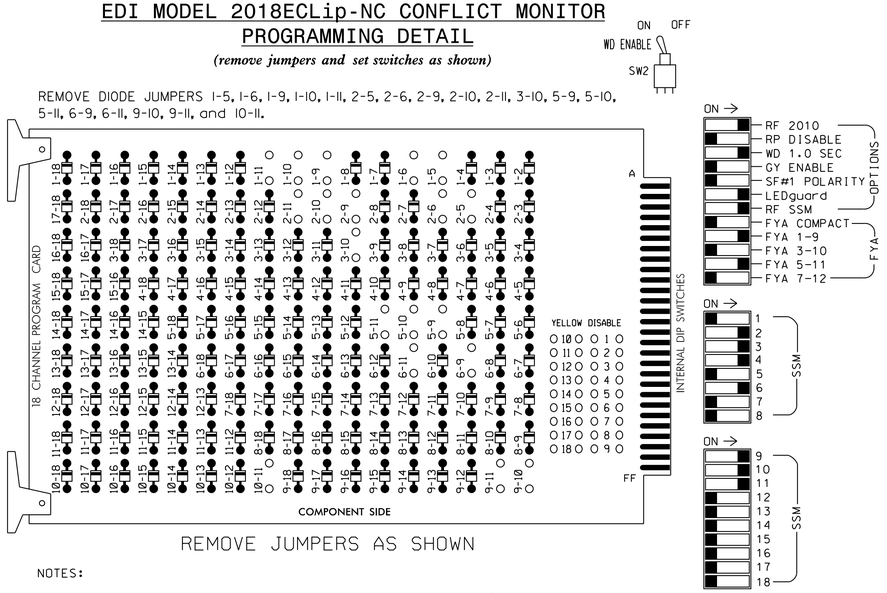
PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG.205.1

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 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,AUX S1, AUX S2,AUX S4
PHASES USED.....1,2,3,4,5,6
OVERLAP "A".....*
OVERLAP "B".....*
OVERLAP "C".....*
OVERLAP "D".....NOT USED

* See overlap programming detail on sheet 2

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4			S5		S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3			4		14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3			4		4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	11★	21,22	NU	31	32	62	41	42	NU	51★	61,62	NU	NU	NU	NU	11★	52,53★	NU	51★	NU	NU
RED		128		116	116		101	101			134						A124				
YELLOW	*	129		117	117		102	102		*	135										
GREEN		130		118	118		103	103			136										
RED ARROW																A121			A114		
YELLOW ARROW						117										A122	A125		A115		
FLASHING YELLOW ARROW																A123			A116		
GREEN ARROW	127			118		118	103			133							A126				

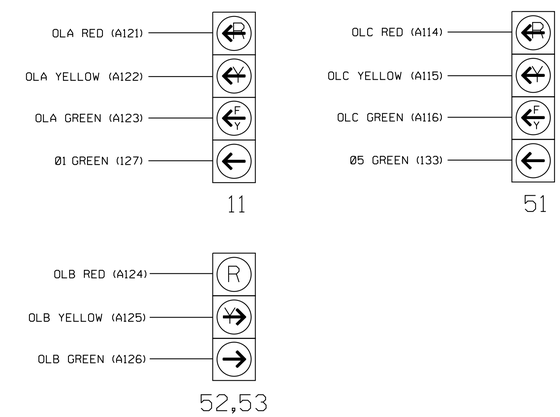
NU = Not Used

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

★ See pictorial of head wiring in detail this sheet.

SIGNAL WIRING DETAIL

(wire signal heads as shown)



INPUT FILE POSITION LAYOUT

(front view)

		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	SYS. DET. S1	SLOT EMPTY	NOT USED	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
	L	NOT USED	Ø2 2B			NOT USED	Ø4 4B	SYS. DET. S2		Ø3 3B					ST DC ISOLATOR
FILE "J"	U	Ø5 5A	Ø6 6A	SLOT EMPTY	WIRED INPUT ⊗	SLOT EMPTY	SLOT EMPTY	SYS. DET. S3	SLOT EMPTY	Ø5 5B	SLOT EMPTY	SLOT EMPTY	GPS EVP		SLOT EMPTY
	L	NOT USED	Ø6 6B					SYS. DET. S4		Ø5 5C					

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		3		G
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		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		10		S
5A [2]	TB3-1,2	J1U	55	5★	5	YES		15		S
	-	I4U	47	22★	2	YES		3		G
5B	TB7-9,10	J9U	59	15	5	YES		15		S
5C	TB7-11,12	J9L	61	17	5	YES		15		S
6A	TB3-5,6	J2U	40	6	6	YES			X	N
6B	TB3-7,8	J2L	44	16	6	YES			X	N
* S1	TB6-1,2	I7U	65	34	SYS	NO				N
* S2	TB6-3,4	I7L	78	44	SYS	NO				N
* S3	TB7-1,2	J7U	66	38	SYS	NO				N
* S4	TB7-3,4	J7L	79	48	SYS	NO				N

* System detector only. Remove any assigned vehicle phase.

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

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

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

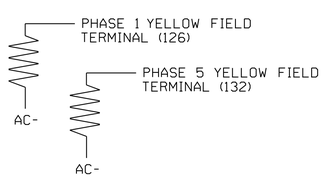
INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

ACCEPTABLE VALUES

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



THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1070
DESIGNED: JULY 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail - Sheet 1 of 4

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

NC 55
at
I-40 Eastbound Ramps/
Park Forty Plaza

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

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SIG. INVENTORY NO. 05-1070

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12/19/2018
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PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG.205.2

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. 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    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
```

Place cursor in [ ] next to Preempt Plan and press 5. Then press the right cursor arrow and toggle the controller to YES. Next cursor down. This will select Emergency Vehicle Preempt #5.

```
PREEMPT PLAN [  5]     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 F1X 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    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 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 . X . . . . . . . . . . .

LAG GRN 0.0 YEL 0.0 RED 0.0
```

Toggle Once

↓

OVERLAP C

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

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

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

FLASHING ARROW OUTPUT.....CH11 ISOLATE

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

← NOTICE ACTION PLAN SF BIT "5"

END PROGRAMMING

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..
```

FLASHER CIRCUIT MODIFICATION DETAIL

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

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

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1070
DESIGNED: JULY 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail - Sheet 2 of 4

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared For: Transportation Mobility and Safety Division, Intelligent Transportation Systems, Signals Management Section, State of North Carolina Department of Transportation

750 N.Greenfield Pkwy,Garner,NC 27529

NC 55
at
I-40 Eastbound Ramps/
Park Forty Plaza

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACIE L. PHILLIPS

DocuSigned by: 12/19/2018
DC57A56ED6DB437
SIGNATURE DATE

SIG. INVENTORY NO. 05-1070

PLANS PREPARED IN THE OFFICE OF:
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12/19/2018
K:\4GL_CPTP\ITS\011036410 - Durham Signal System\Signals\54 - Signal Design\GROUP 8\U-5968.051070-2018e2.dgn
derrick.waller

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PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG.205.3

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

(program controller as shown)

IMPORTANT!

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

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

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

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

- Place cursor in VEH DETECTOR [ ] position and enter "1".
- Set delay time to "0".

```
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'

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

NOTICE VEH DET PLAN 2

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

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

NOTICE VEH DET PLAN 2

ENSURE DELAY IS SET TO '0'

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

ENSURE PHASE IS SET TO "0"

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

NOTICE VEH DET PLAN 2

END PROGRAMMING

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1070
DESIGNED: JULY 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail - Sheet 3 of 4

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ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

NC 55
at
I-40 Eastbound Ramps/
Park Forty Plaza

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

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NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACE L. PHILLIPS

DocuSigned by:
12/19/2018
SIGNATURE DATE

SIG. INVENTORY NO. 05-1070

12/19/2018
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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 BITS 1 and 5.

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

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

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

ALTERNATE PHASING CHANGE SUMMARY

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

SF BITS 1,5: Modifies overlap parent phases for heads 11 and 51 to run protected turns only.

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

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  .  .  .  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: 05-1070
DESIGNED: JULY 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail - Sheet 4 of 4

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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 55
at
I-40 Eastbound Ramps/
Park Forty Plaza

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACIE L. PHILLIPS

DocuSigned by:
12/19/2018
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SIG. INVENTORY NO. 05-1070

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12/19/2018
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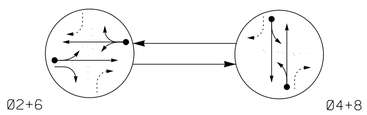
PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG.206.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

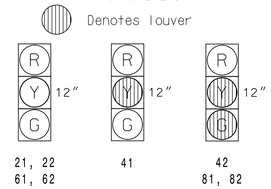
TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2+6	PHASE Ø4+8	FLASH
21, 22	G	R	Y
41, 42	R	G	R
61, 62	G	R	Y
81, 82	R	G	R

SIGNAL FACE I.D.

All Heads L.E.D.

Denotes louver



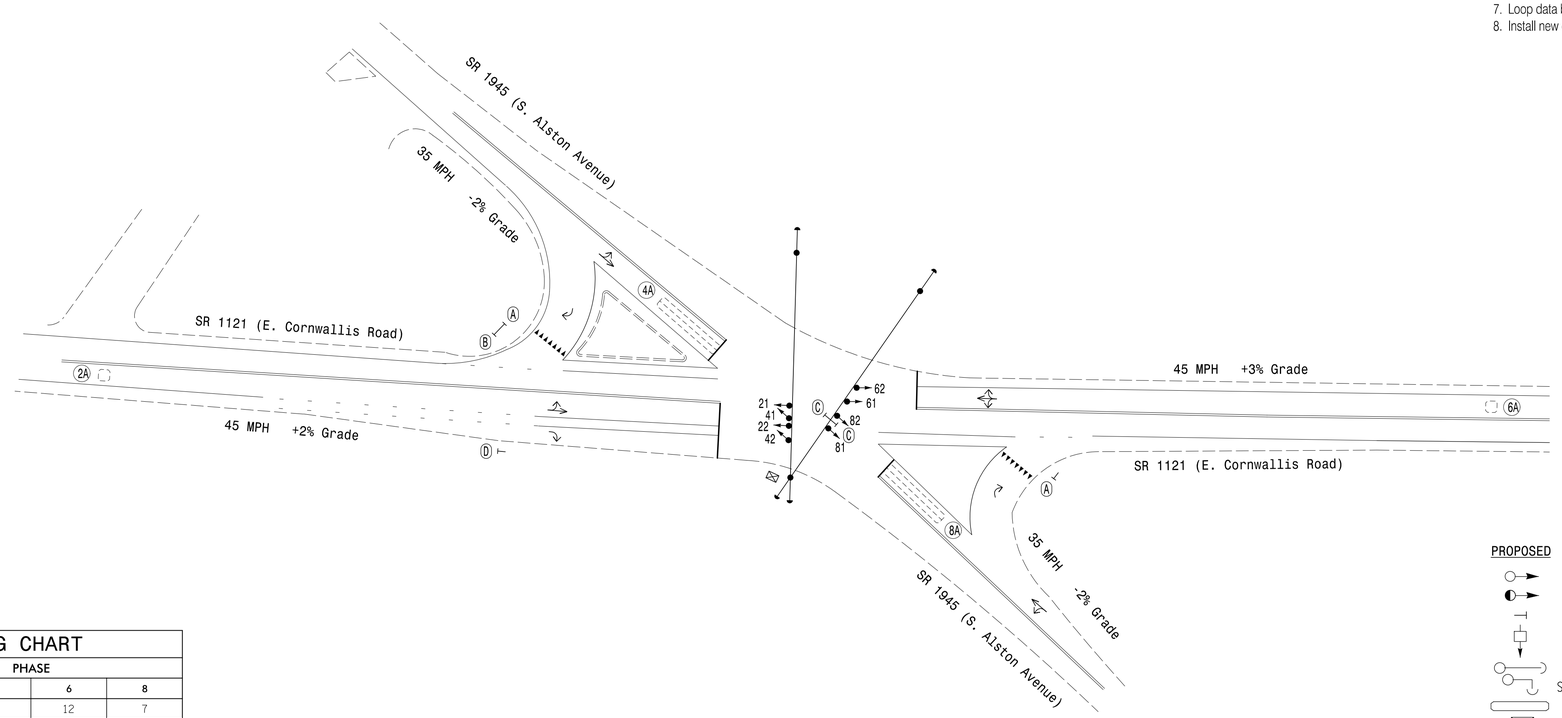
ASC/3 DETECTOR INSTALLATION CHART

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	300	EXIST	-	2	Yes	-	-	X	N	-	X
4A	6X40	0	2-4-2	-	4	Yes	-	3	-	S	-	X
6A	6X6	300	EXIST	-	6	Yes	-	-	X	N	-	X
8A	6X40	0	2-4-2	-	8	Yes	-	3	-	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. Set all detector units to presence mode.
4. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
5. Pavement markings are existing.
6. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
7. Loop data based on previous plan and/or field observations.
8. Install new cabinet on the existing cabinet foundation.



ASC/3 TIMING CHART

FEATURE	PHASE 2	PHASE 4	PHASE 6	PHASE 8
Min Green *	12	7	12	7
Walk *	0	0	0	0
Ped Clear	0	0	0	0
Veh. Extension *	6.0	2.0	6.0	2.0
Max 1 *	90	30	90	30
Yellow	4.3	4.0	4.3	4.0
Red Clear	1.6	2.2	1.7	2.1
Actuations B4 Add *	-	-	-	-
Seconds /Actuation *	2.5	-	2.5	-
Max Initial *	34	-	34	-
Time Before Reduction *	15	-	15	-
Time To Reduce *	45	-	45	-
Minimum Gap	3.0	-	3.0	-
Locking Detector	X	-	X	-
Recall Position	VEH. RECALL	-	VEH. RECALL	-
Dual Entry	-	X	-	X
Simultaneous Gap	X	X	X	X

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

LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
A	"YIELD" Sign (R1-2)	A
B	"DO NOT ENTER" Sign (R5-1)	B
C	Street Sign (D3-1)	C
D	"BEGIN RIGHT TURN LANE - YIELD TO BIKES" Sign (R4-4)	D

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Signal Upgrade

Prepared For: Transportation Mobility and Safety Division, Signal Design Section, NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

750 N.Greenfield Pkwy,Garner,NC 27529

SR 1121 (E. Cornwallis Road) at SR 1945 (S. Alston Avenue)

Division 5 Durham County Durham

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

SCALE 0 40 1"=40'

REVISIONS	INIT.	DATE

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACEY L. PHILLIPS

DocuSigned by: DC87A59ED60B437...

12/19/2018

SIGNATURE DATE

SIG. INVENTORY NO. 05-1071

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12/19/2018
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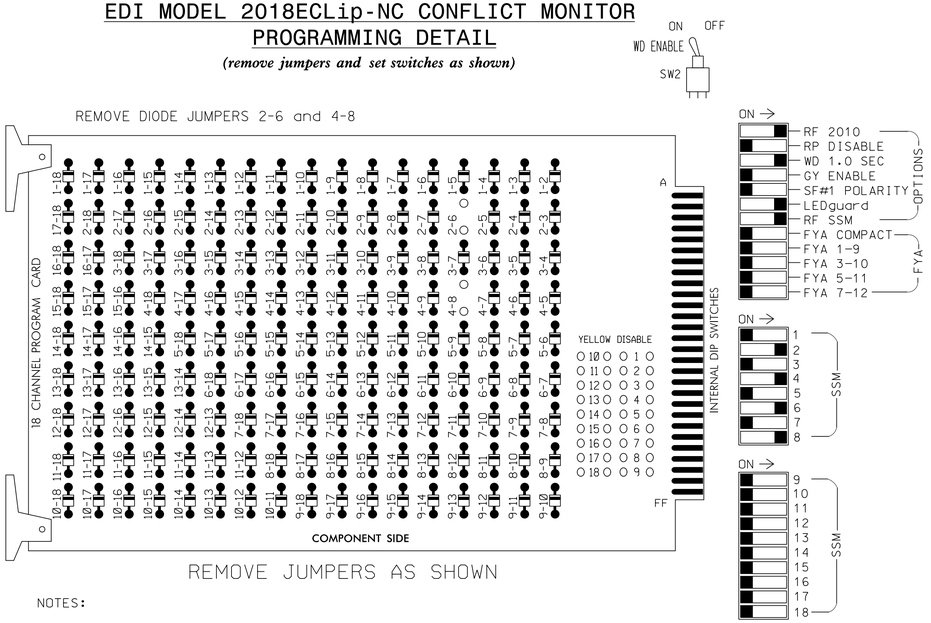
derrick.waller

PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG.206.1

EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE JUMPERS AS SHOWN

NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that 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.

EQUIPMENT INFORMATION

CONTROLLER.....2070LX
CABINET.....332
SOFTWARE.....ECONOLITE ASC/3-2070
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...12
LOAD SWITCHES USED.....S2,S5,S8,S11
PHASES USED.....2,4,6,8
OVERLAPS.....NONE

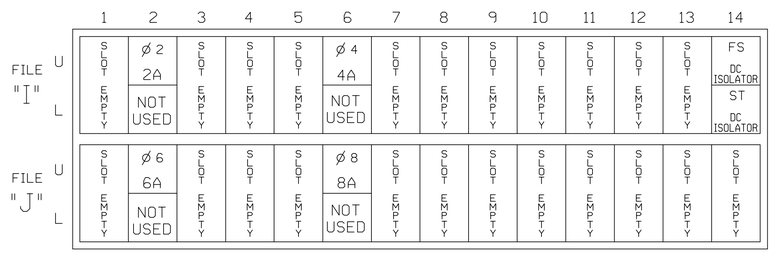
SIGNAL HEAD HOOK-UP CHART

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	21,22	NU	NU	41,42	NU	NU	61,62	NU	NU	81,82	NU
RED		128			101			134			107	
YELLOW		129			102			135			108	
GREEN		130			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
2A	TB2-5,6	I2U	39	2	2	YES			X	N
4A	TB4-9,10	I6U	41	4	4	YES		3		S
6A	TB3-5,6	J2U	40	6	6	YES			X	N
8A	TB5-9,10	J6U	42	8	8	YES		3		S

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1071
DESIGNED: DECEMBER 2017
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared For:

SR 1121 (E. Cornwallis Road) at SR 1945 (S. Alston Avenue)

Division 5 Durham County Durham

PLAN DATE: December 2017 REVIEWED BY: SL Phillips

PREPARED BY: SP Pennington REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACIE L. PHILLIPS

DocuSigned by: SLPh 12/19/2018
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SIGNATURE DATE

SIG. INVENTORY NO. 05-1071

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12/19/2018
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derrick.waller