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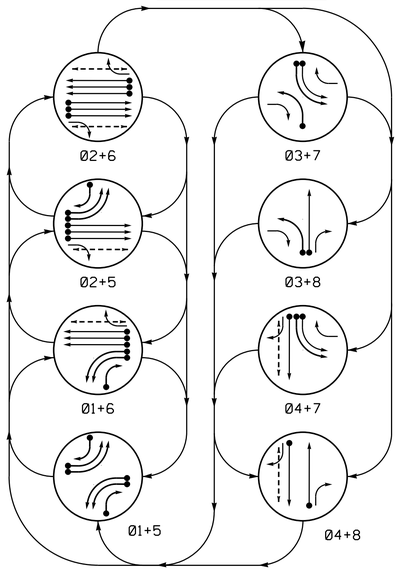
PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig. 77.0

PHASING DIAGRAM



EV PREEMPT PHASES

SIGNAL FACE I.D.

All Heads L.E.D.

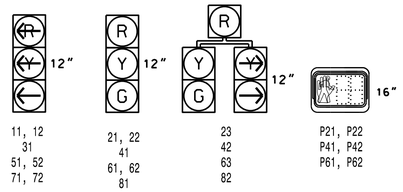


TABLE OF OPERATION

SIGNAL FACE	PHASE 01+5	01+6	02+5	02+6	03+7	03+8	04+7	04+8	PRE 3	FLASH
11, 12	~~—~~	~~—~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~
21, 22	R	R	G	G	R	R	R	R	R	Y
23	R	R	G	G	R/	/R	R	R	R	Y
31	~~R~~	~~R~~	~~R~~	~~R~~	~~—~~	~~—~~	~~R~~	~~R~~	~~—~~	~~R~~
41	R	R	R	R	R	R	G	G	R	R
42	R/	R	R/	R	R	R	G	G	R	R
51, 52	~~—~~	~~R~~	~~—~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~
61, 62	R	G	R	G	R	R	R	R	R	Y
63	R	G	R	G	R/	R	R/	R	R	Y
71, 72	~~R~~	~~R~~	~~R~~	~~R~~	~~—~~	~~R~~	~~—~~	~~R~~	~~R~~	~~R~~
81	R	R	R	R	R	G	R	G	G	R
82	R/	R/	R	R	R	G	R	G	G	R
P21, P22	DW	DW	W	W	DW	DW	DW	DW	DW	DRK
P41, P42	DW	DW	DW	DW	DW	DW	W	W	DW	DRK
P61, P62	DW	W	DW	W	DW	DW	DW	DRK	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
1A	6X40	+10	2-4-2	-	1	Yes	-	-	-	S	-	X
1B	6X40	+15	2-4-2	-	1	Yes	-	-	-	S	-	X
1C	6X40	0	2-4-2	-	1	Yes	-	15	-	S	-	X
2A	6X6	275	EXIST	-	2	Yes	-	-	X	N	-	X
2B	6X6	275	EXIST	-	2	Yes	-	-	X	N	-	X
2C	6X6	275	EXIST	-	2	Yes	-	-	X	N	-	X
3A	6X40	0	2-4-2	-	3	Yes	-	-	-	S	-	X
4A	6X40	0	2-4-2	-	4	Yes	-	-	-	S	-	X
5A	6X40	0	2-4-2	-	5	Yes	-	-	-	S	-	X
5B	6X40	0	2-4-2	-	5	Yes	-	-	-	S	-	X
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
6C	6X6	300	EXIST	-	6	Yes	-	-	X	N	-	X
7A	6X40	0	2-4-2	-	7	Yes	-	3	-	S	-	X
7B	6X40	0	2-4-2	-	7	Yes	-	-	-	S	-	X
8A	6X40	0	2-4-2	-	8	Yes	-	-	-	S	-	X
S1	6X6	+200	EXIST	-	-	Yes	-	-	-	N	X	X
S2	6X6	+200	EXIST	-	-	Yes	-	-	-	N	X	X
S3	6X6	+200	EXIST	-	-	Yes	-	-	-	N	X	X
S4	6X6	+225	EXIST	-	-	Yes	-	-	-	N	X	X
S5	6X6	+225	EXIST	-	-	Yes	-	-	-	N	X	X
S6	6X6	+225	EXIST	-	-	Yes	-	-	-	N	X	X
S7	6X6	+205	EXIST	-	-	Yes	-	-	-	N	X	X
S8	6X6	+205	EXIST	-	-	Yes	-	-	-	N	X	X

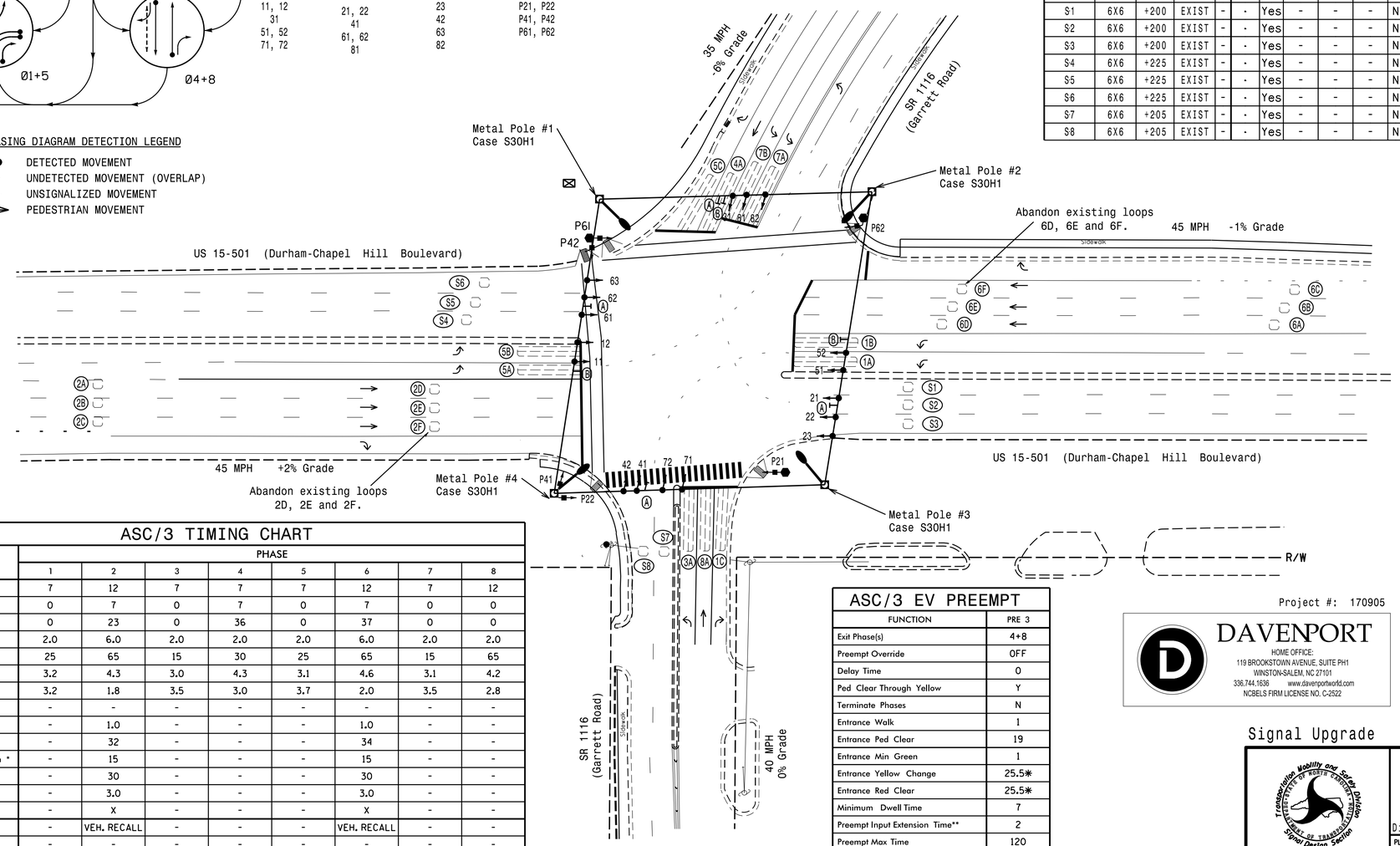
8 Phase Fully Actuated w/ Emergency Vehicle Preemption (Durham Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 and/or phase 5 may be lagged.
4. Phase 3 and/or phase 7 may be lagged.
5. Set all detector units to presence mode.
6. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
7. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
8. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
9. Pavement markings are existing.
10. 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 lead-in cable to separate loops 2A, 2B, 2C, 6A,6B, and 6C as shown.
14. Install GPS emergency preemption system per manufacturer's instructions to achieve the 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



LEGEND

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

ASC/3 TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6	7	8
Min Green *	7	12	7	7	7	12	7	12
Walk *	0	7	0	7	0	7	0	0
Ped Clear	0	23	0	36	0	37	0	0
Veh. Extension *	2.0	6.0	2.0	2.0	2.0	6.0	2.0	2.0
Max 1 *	25	65	15	30	25	65	15	65
Yellow	3.2	4.3	3.0	4.3	3.1	4.6	3.1	4.2
Red Clear	3.2	1.8	3.5	3.0	3.7	2.0	3.5	2.8
Actuations B4 Add *	-	-	-	-	-	-	-	-
Seconds /Actuation *	-	1.0	-	-	-	1.0	-	-
Max Initial *	-	32	-	-	-	34	-	-
Time Before Reduction *	-	15	-	-	-	15	-	-
Time To Reduce *	-	30	-	-	-	30	-	-
Minimum Gap	-	3.0	-	-	-	3.0	-	-
Locking Detector	-	X	-	-	-	X	-	-
Recall Position	-	VEH. RECALL	-	-	-	VEH. RECALL	-	-
Dual Entry	-	-	-	-	-	-	-	-
Simultaneous Gap	X	X	X	X	X	X	X	X

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

ASC/3 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	19
Entrance Min Green	1
Entrance Yellow Change	25.5*
Entrance Red Clear	25.5*
Minimum Dwell Time	7
Preempt Input Extension Time**	2
Preempt Max Time	120
Exit Yellow Change	25.5*
Exit Red Clear	25.5*

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

Project #: 170905

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Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

SCALE 0 40 1"=40'

US 15-501
(Durham-Chapel Hill Blvd)
at
SR 1116 (Garrett Road)

Division 5 Durham County Durham

PLAN DATE:	December 2018	REVIEWED BY:	R. Hinshaw
PREPARED BY:	T. S. Warren	REVIEWED BY:	L.Boyer

REVISIONS	INIT.	DATE

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 030912 ENGINEER LORI M. BOYER

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

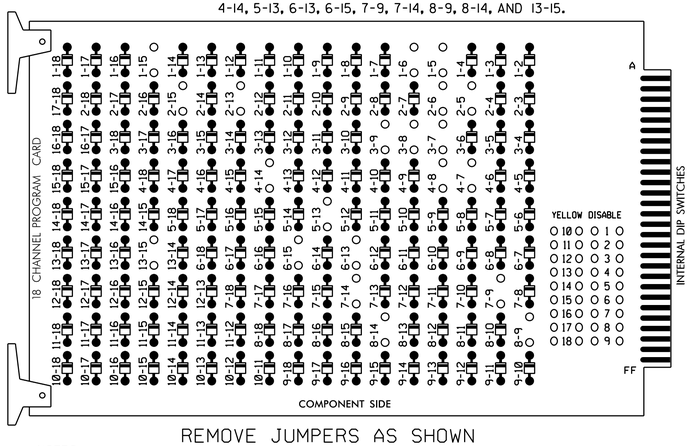
SIG. INVENTORY NO. 05-0384

PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig. 77.1

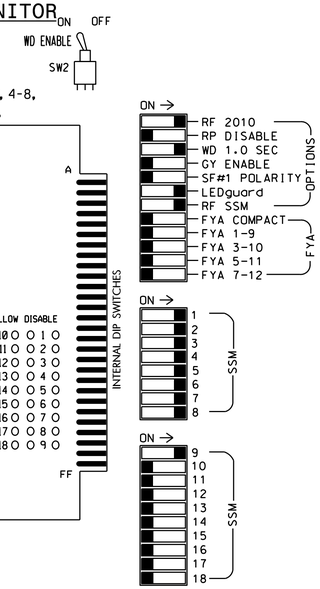
EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 1-5, 1-6, 1-15, 2-5, 2-6, 2-13, 2-15, 3-7, 3-8, 3-9, 4-7, 4-8, 4-14, 5-13, 6-13, 6-15, 7-9, 7-14, 8-9, 8-14, AND 13-15.



REMOVE JUMPERS AS SHOWN



■ = DENOTES POSITION OF SWITCH

NOTES:

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

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Program phases 2 and 6 for volume density operation.
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.....S1,S2,S3,S4,S5,S6,S7, S8,S9,S10,S11,AUX S1
PHASES USED.....1,2,2 PED,3,4,4 PED, 5,6,6 PED,7,8
OVERLAP "A".....*
OVERLAP "B".....NOT USED
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.	11,12	82	21,22 23	P21, P22	31	41,42	P41, P42	42	51,52	61,62 63	P61, P62	63	71,72	81,82	NU	23	NU	NU	NU	NU	NU
RED			128			101				134				107		*					
YELLOW			129			102				135				108							
GREEN			130			103				136				109							
RED ARROW	125				116				131				122								
YELLOW ARROW	126	126			117			132	132			123	123			A122					
GREEN ARROW	127	127			118			133	133			124	124			A123					
✋				113			104				119										
🚶				115			106				121										

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	Ø1 1A	Ø2 2A	Ø2 2C	SLOT EMPTY	Ø3 3A	Ø4 4A	SYS. DET. S1	SLOT EMPTY	SYS. DET. S3	SLOT EMPTY	SLOT EMPTY	Ø2 PED DC ISOLATOR	Ø6 PED DC ISOLATOR	FS DC ISOLATOR
	L	Ø1 1B	Ø2 2B	Ø1 1C		NOT USED	NOT USED	SYS. DET. S2		SYS. DET. S4			Ø4 PED DC ISOLATOR	NOT USED	ST DC ISOLATOR
FILE "J"	U	Ø5 5A	Ø6 6A	Ø6 6C	SLOT EMPTY	Ø7 7A	Ø8 8A	SYS. DET. S5	SLOT EMPTY	SYS. DET. S7	SLOT EMPTY	SLOT EMPTY	GPS EVP		SLOT EMPTY
	L	Ø5 5B	Ø6 6B	Ø5 5C		NOT USED	Ø7 7B	SYS. DET. S6		SYS. DET. S8					

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

FS = FLASH SENSE
ST = STOP TIME

CONNECT PHASE SELECTOR TO FIELD ETHERNET SWITCH

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND TIME	DELAY TIME	ADDED INITIAL	DETECTOR TYPE
1A	TB2-1,2	I1U	56	1	1	YES	-	-	-	S
1B	TB2-3,4	I1L								
1C	TB2-11,12	I3L	76	42	1	YES	-	15	-	S
2A	TB2-5,6	I2U	39	2	2	YES	-	-	X	N
2B	TB2-7,8	I2L	43	12	2	YES	-	-	X	N
2C	TB2-9,10	I3U	63	32	2	YES	-	-	X	N
3A	TB4-5,6	I5U	58	3	3	YES	-	-	-	S
4A	TB4-9,10	I6U	41	4	4	YES	-	-	-	S
5A	TB3-1,2	J1U	55	5	5	YES	-	-	-	S
5B	TB3-3,4	J1L								
5C	TB3-11,12	J3L	77	46	5	YES	-	15	-	S
6A	TB3-5,6	J2U	40	6	6	YES	-	-	X	N
6B	TB3-7,8	J2L	44	16	6	YES	-	-	X	N
6C	TB3-9,10	J3U	64	36	6	YES	-	-	X	N
7A	TB5-5,6	J5U	57	7	7	YES	-	3	-	S
7B	TB5-11,12	J6L	46	18	7	YES	-	-	-	S
8A	TB5-9,10	J6U	42	8	8	YES	-	-	-	S
* S1	TB6-1,2	I7U	65	34	SYS	NO	-	-	-	N
* S2	TB6-3,4	I7L	78	44	SYS	NO	-	-	-	N
* S3	TB6-9,10	I9U	60	11	SYS	NO	-	-	-	N
* S4	TB6-11,12	I9L	62	13	SYS	NO	-	-	-	N
* S5	TB7-1,2	J7U	66	38	SYS	NO	-	-	-	N
* S6	TB7-3,4	J7L	79	48	SYS	NO	-	-	-	N
* S7	TB7-9,10	J9U	59	15	SYS	NO	-	-	-	N
* S8	TB7-11,12	J9L	61	17	SYS	NO	-	-	-	N
PED PUSH BUTTONS										
P21,P22	TB8-4,6	I12U	67	PED 2	2 PED					
P41,P42	TB8-5,6	I12L	69	PED 4	4 PED					
P61,P62	TB8-7,9	I13U	68	PED 6	6 PED					

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

* System detector only. Remove any assigned vehicle phase.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

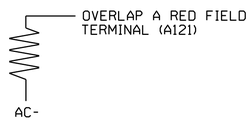
Countdown Ped Signals are required to display timing only during Ped Clearance Interval. Consult Ped Signal Module user's manual for instructions on selecting this feature.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0384
DESIGNED: December 2018
SEALED: 12/21/2018
REVISED: N/A

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)



Project #: 170905

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Electrical Detail - Sheet 1 of 2

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ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

US 15-501
(Durham-Chapel Hill Blvd)
at
SR 1116 (Garrett Road)

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 030912 ENGINEER LORI M. BOYER
DocuSigned by: Lori M. Boyer
1FC96D60A912483...
SIGNATURE 12/21/2018 DATE
SIG. INVENTORY NO. 05-0384

PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig. 77.2

ECONOLITE ASC/3-2070 EMERGENCY VEHICLE PREEMPT PROGRAMMING DETAIL

(program controller as shown)

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

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

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

ENABLE... 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    19I    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.OI  12OI25.5I25.5
PMT ACTIVE OUT..ON   PMT ACT DWELL...NO
OTHER - PRI PMT.OFF  NON-PRI PMT.....OFF
INH EXT TIME... 0.O  PED PR RETURN...OFF
PRIORITY RETURN.OFF  QUEUE DELAY.... OFF
COND DELAY......OFF
PHASES     1   2   3   4   5   6   7   8
PR RTN%    0   0   0   0   0   0   0   0
PHASES     9  10  11  12  13  14  15  16
PR RTN%    0   0   0   0   0   0   0   0
```

PROGRAM EXTEND TIME ON GPS DETECTOR UNIT FOR 2.0 SEC.

ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

(program controller as shown)

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

OVERLAP A

Select TMG VEH OVLP [A] and 'NORMAL'

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

LAG GRN 0.0 YEL 0.0 RED 0.0
```

END PROGRAMMING

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: 05-0384
DESIGNED: December 2018
SEALED: 12/21/2018
REVISED: N/A

Project #: 170905

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Electrical Detail - Sheet 2 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

750 N.Greenfield Pkwy,Garner,NC 27529

US 15-501
(Durham-Chapel Hill Blvd)
at
SR 1116 (Garrett Road)

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 030912 ENGINEER LORI M. BOYER

DocuSigned by: Lori M. Boyer 12/21/2018
1FC9E050A912483...
SIGNATURE DATE

SIG. INVENTORY NO. 05-0384

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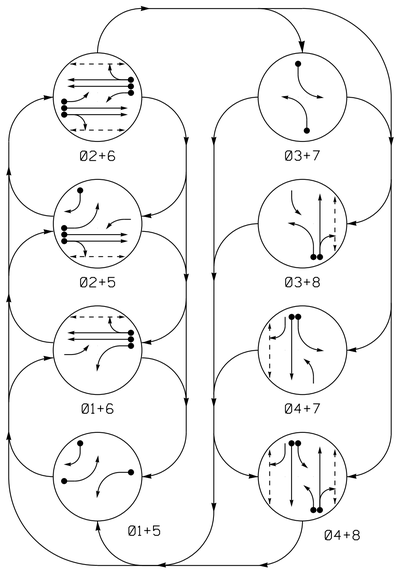
PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG. 78.0

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

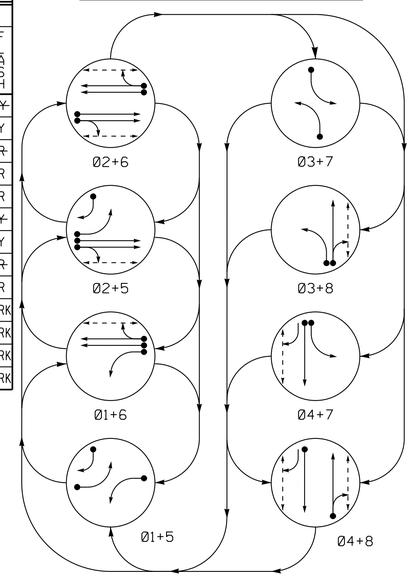
DEFAULT PHASING DIAGRAM



DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE 01+5	01+6	02+5	02+6	03+7	03+8	04+7	04+8	PRE 3	FLASH
11	←	←	F Y	F Y	R	R	R	R	←	Y
21,22	R	R	G	G	R	R	R	R	R	Y
31	R	R	R	R	←	←	F Y	F Y	R	R
41	R	R	R	R	R	R	G	G	R	R
42	R	R	R	R	R	R	G	G	R	R
51	←	F Y	←	F Y	R	R	R	R	F Y	Y
61,62	R	G	R	G	R	R	R	R	G	Y
71	R	R	R	R	←	F Y	←	F Y	R	R
81,82	R	R	R	R	R	G	R	G	R	R
P21,P22	DW	DW	W	W	DW	DW	DW	DW	DW	DRK
P41,P42	DW	DW	DW	DW	DW	DW	W	W	DW	DRK
P61,P62	DW	W	DW	W	DW	DW	DW	DW	DW	DRK
P81,P82	DW	DW	DW	DW	DW	W	DW	W	DW	DRK

ALTERNATE PHASING DIAGRAM



ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE 01+5	01+6	02+5	02+6	03+7	03+8	04+7	04+8	PRE 3	FLASH
11	←	←	R	R	R	R	R	R	←	Y
21,22	R	R	G	G	R	R	R	R	R	Y
31	R	R	R	R	←	←	R	R	R	R
41	R	R	R	R	R	R	G	G	R	R
42	R	R	R	R	R	R	G	G	R	R
51	←	R	←	R	R	R	R	R	F Y	Y
61,62	R	G	R	G	R	R	R	R	G	Y
71	R	R	R	R	←	R	←	R	R	R
81,82	R	R	R	R	R	G	R	G	R	R
P21,P22	DW	DW	W	W	DW	DW	DW	DW	DW	DRK
P41,P42	DW	DW	DW	DW	DW	DW	W	W	DW	DRK
P61,P62	DW	W	DW	W	DW	DW	DW	DW	DW	DRK
P81,P82	DW	DW	DW	DW	DW	W	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
1A	6X60	+10	EXIST	-	1	Yes	-	15*	-	S	-	X
					6#	Yes	-	3	-	G	-	X
2A	6X6	250	EXIST	-	2	Yes	-	-	X	N	-	X
2B	6X6	250	EXIST	-	2	Yes	-	-	X	N	-	X
3A	6X40	+10	2-4-2	-	3	Yes	-	15**	-	S	-	X
					8#	Yes	-	3	-	S	-	X
4A	6X60	+10	EXIST	-	4	Yes	-	-	-	S	-	X
5A	6X60	+10	EXIST	-	5	Yes	-	15*	-	S	-	X
					2#	Yes	-	3	-	G	-	X
5B	6X60	+10	EXIST	-	5	Yes	-	15	-	S	-	X
6A	6X6	250	EXIST	-	6	Yes	-	-	X	N	-	X
6B	6X6	250	EXIST	-	6	Yes	-	-	X	N	-	X
7A	6X60	+10	EXIST	-	7	Yes	-	15**	-	S	-	X
					4#	Yes	-	3	-	S	-	X
8A	6X40	+10	2-4-2	-	8	Yes	-	10	-	S	-	X
S1	6X6	445	EXIST	-	SYS	No	-	-	-	N	X	X
S2	6X6	135	EXIST	-	SYS	No	-	-	-	N	X	X
S3	6X6	135	EXIST	-	SYS	No	-	-	-	N	X	X

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

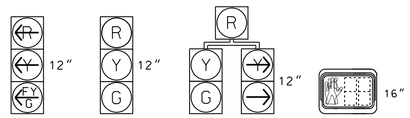
NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 and/or phase 5 may be lagged.
4. Phase 3 and/or phase 7 may be lagged.
5. Reposition existing signal heads numbered 22 and 62.
6. Abandon existing loops 2C, 2D, 6C, and 6D.
7. Set all detector units to presence mode.
8. In the event of loop replacement, refer to the current ITS and Signal Design Manual and submit a Plan of Record to the Signal Design Section.
9. Locate new cabinet on so as not to obstruct sight distance of vehicles turning right on red.
10. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
11. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
12. Remove existing "Left Turn Yield on Green" ball signs-(R10-12).
13. Pavement markings are existing.
14. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
15. The Division (City) Traffic Engineer will determine the hours of use for each phasing plan.
16. Loop data based on previous plan and/or field observations.
17. Install new cabinet on the existing cabinet foundation.
18. Install GPS emergency preemption system per manufacturer's instructions to achieve preemption needed, as shown in phasing diagram.
19. Remove existing optical detection equipment.

SIGNAL FACE I.D.

All Heads L.E.D.

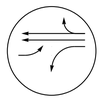
= Bimodal Section



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

DEFAULT PHASING EV PREEMPT PHASES

(Medium Priority)



PRE 3 (Ø1+6)

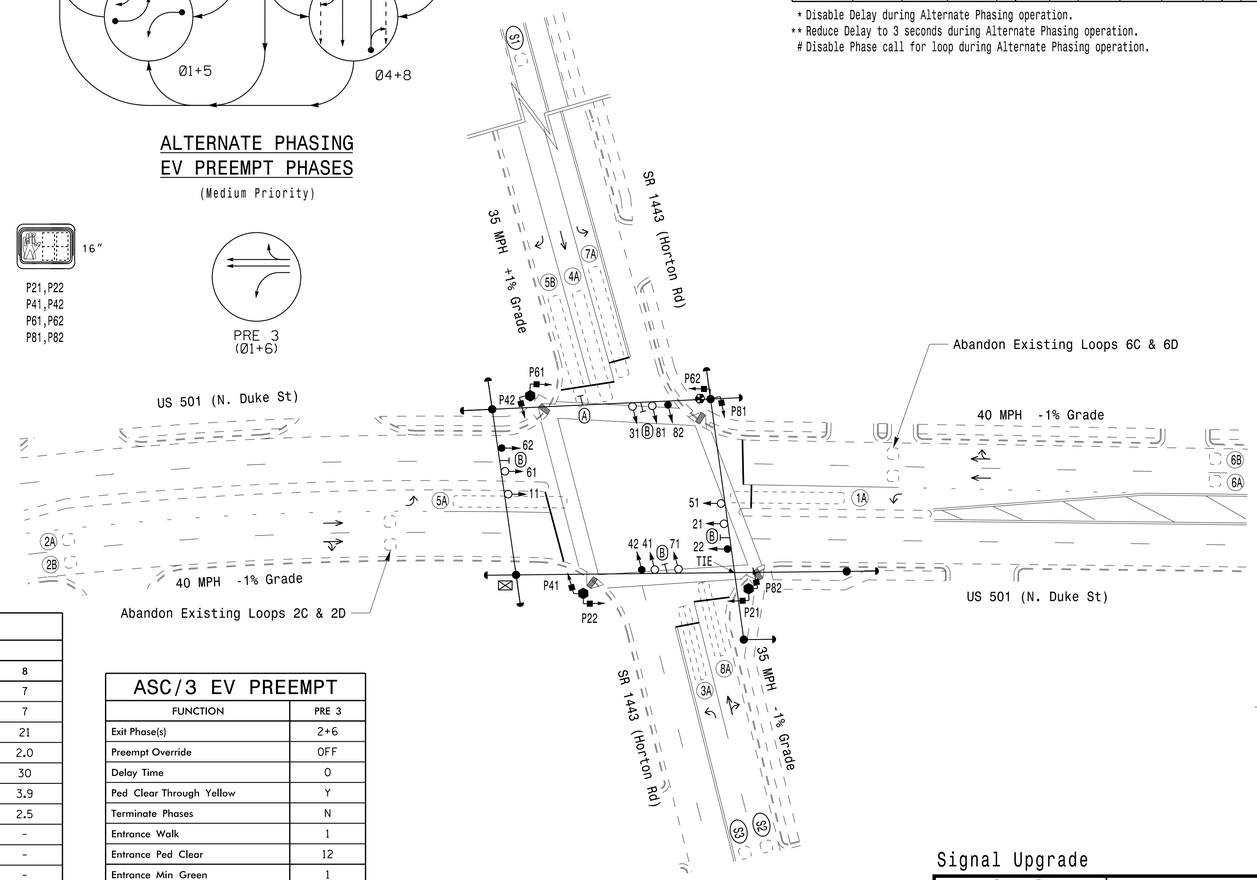
ALTERNATE PHASING EV PREEMPT PHASES

(Medium Priority)

PRE 3 (Ø1+6)

PHASING DIAGRAM DETECTION LEGEND

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



LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Type I Pushbutton Post	
	Type II Signal Pedestal	
	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	
A	Right Arrow "Only" Sign (R3-5R)	A
B	Street Sign (D3-1)	B

ASC/3 TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6	7	8
Min Green *	7	12	7	7	7	12	7	7
Walk *	0	7	0	7	0	7	0	7
Ped Clear	0	22	0	24	0	19	0	21
Veh. Extension *	1.0	6.0	2.0	1.0	1.0	6.0	1.0	2.0
Max 1 *	15	60	20	30	15	60	20	30
Yellow	3.0	4.2	3.0	3.9	3.0	4.2	3.0	3.9
Red Clear	2.4	1.8	3.3	2.5	2.6	1.8	3.3	2.5
Actuations B4 Add *	-	-	-	-	-	-	-	-
Seconds /Actuation *	-	1.5	-	-	-	1.5	-	-
Max Initial *	-	29	-	-	-	29	-	-
Time Before Reduction *	-	15	-	-	-	15	-	-
Time To Reduce *	-	45	-	-	-	45	-	-
Minimum Gap	-	3.0	-	-	-	3.0	-	-
Locking Detector	-	X	-	-	-	X	-	-
Recall Position	-	VEH. RECALL	-	-	-	VEH. RECALL	-	-
Dual Entry	-	-	-	X	-	-	-	X
Simultaneous Gap	X	X	X	X	X	X	X	X

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

ASC/3 EV PREEMPT

FUNCTION	PRE 3
Exit Phase(s)	2+6
Preempt Override	OFF
Delay Time	0
Ped Clear Through Yellow	Y
Terminate Phases	N
Entrance Walk	1
Entrance Ped Clear	12
Entrance Min Green	1
Entrance Yellow Change	25.5✱
Entrance Red Clear	25.5✱
Minimum Dwell Time	7
Preempt Input Extension Time **	2.0
Preempt Max Time	120
Exit Yellow Change	25.5✱
Exit Red Clear	25.5✱

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

Signal Upgrade

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

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

SCALE 0 40 1"=40'

US 501 (N. Duke Street) at SR 1443 (Horton Road)

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACIE L. PHILLIPS
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SIGNATURE DATE
SIG. INVENTORY NO. 05-0385

12/19/2018
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susan.pennington

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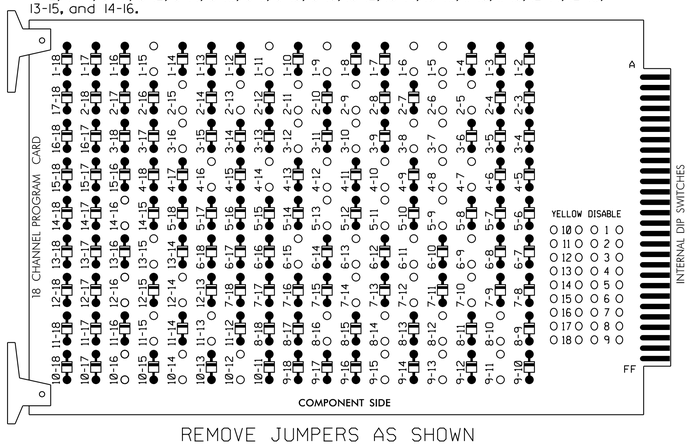
PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG. 78.1

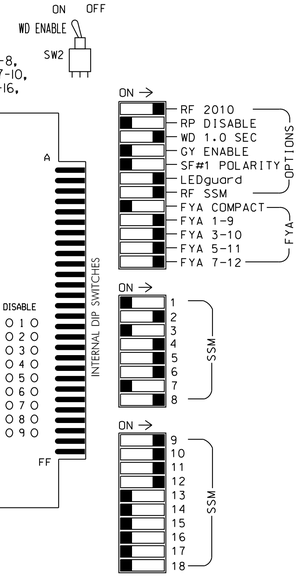
EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

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



REMOVE JUMPERS AS SHOWN



NOTES:

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

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Program phases 4 and 8 for Dual Entry.
3. Program controller to start up in phase 2 Walk and 6 Walk.
4. The cabinet and controller are part of the Durham Signal System.
5. Install GPS preemption system. Perform installation according to manufacturer's directions and NCDOT engineer - approved mounting location to accomplish the preemption schemes shown on the Signal Design Plans.

EQUIPMENT INFORMATION

CONTROLLER.....2070LX
CABINET.....332 W/AUX
SOFTWARE.....ECONOLITE ASC/3-2070
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
LOAD SWITCHES USED.....S1,S2,S3,S4,S5,S6,S7,S8,S9,S10, S11,S12,AUX S1,AUX S2,AUX S4, AUX S5
PHASES USED.....1,2,2PED,3,4,4PED,5,6,6PED,7,8, 8PED
OVERLAP "A".....*
OVERLAP "B".....*
OVERLAP "C".....*
OVERLAP "D".....*

* See overlap programming detail on sheet 2

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7		S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5		6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5		6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	11★	21,22	P21, P22	31★	41,42	P41, P42	42	51★	61,62	P61, P62	71★	81,82	P81, P82	11★	31★	NU	51★	71★	NU
RED		128			101			*	134			107							
YELLOW	*	129		*	102				135		*	108							
GREEN		130			103				136			109							
RED ARROW														A121	A124		A114	A101	
YELLOW ARROW							132							A122	A125		A115	A102	
FLASHING YELLOW ARROW														A123	A126		A116	A103	
GREEN ARROW	127		118			133	133			124									
✋			113			104				119			110						
🚶			115			106				121			112						

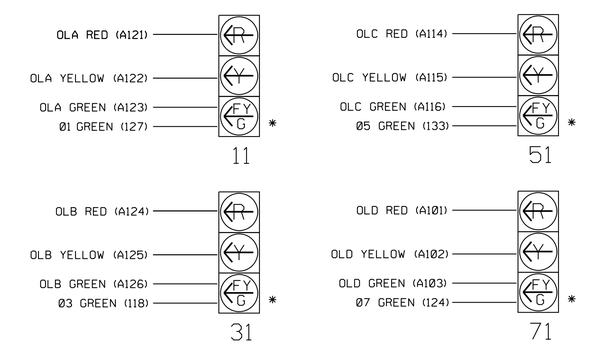
NU = Not Used

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

★ See pictorial of head wiring in detail this sheet.

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



* Bimodal Section

INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	Ø1 1A	Ø2 2A	SLOT EMPTY	WIRED INPUT ⊗	Ø3 3A	Ø4 4A	SLOT EMPTY	WIRED INPUT ⊗	SYS. DET. S1	SLOT EMPTY	SLOT EMPTY	Ø2 PED DC ISOLATOR	Ø6 PED DC ISOLATOR	FS DC ISOLATOR
	L	NOT USED	Ø2 2B			NOT USED	NOT USED			SYS. DET. S2			Ø4 PED DC ISOLATOR	Ø8 PED DC ISOLATOR	ST DC ISOLATOR
FILE "J"	U	Ø5 5A	Ø6 6A	SLOT EMPTY	WIRED INPUT ⊗	Ø7 7A	Ø8 8A	SLOT EMPTY	WIRED INPUT ⊗	Ø5 5B	SLOT EMPTY	SLOT EMPTY	GPS EVP		SLOT EMPTY
	L	NOT USED	Ø6 6B			NOT USED	NOT USED			SYS. DET. S3					

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 [2]	TB4-5,6	I5U	58	3★	3	YES		15		S
	-	J8U	50	28★	8	YES		3		S
4A	TB4-9,10	I6U	41	4	4	YES				S
5A [3]	TB3-1,2	J1U	55	5★	5	YES		15		S
	-	I4U	47	22★	2	YES		3		G
5B	TB7-9,10	J9U	59	15	5	YES		15		S
6A	TB3-5,6	J2U	40	6	6	YES			X	N
6B	TB3-7,8	J2L	44	16	6	YES			X	N
7A [4]	TB5-5,6	J5U	57	7★	7	YES		15		S
	-	I8U	49	24★	4	YES		3		S
8A	TB5-9,10	J6U	42	8	8	YES		10		S
* S1	TB6-9,10	I9U	60	11	SYS	NO				N
* S2	TB6-11,12	I9L	62	13	SYS	NO				N
* S3	TB7-11,12	J9L	61	17	SYS	NO				N
PED PUSH BUTTONS										
P21,P22	TB8-4,6	I12U	67	PED 2	2 PED					
P41,P42	TB8-5,6	I12L	69	PED 4	4 PED					
P61,P62	TB8-7,9	I13U	68	PED 6	6 PED					
P81,P82	TB8-8,9	I13L	70	PED 8	8 PED					

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

* System detector only. Remove any assigned vehicle phase.

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

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

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

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

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

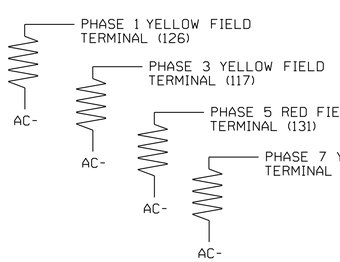
INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

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: 05-0385
DESIGNED: MARCH 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:
Transportation Mobility and Safety Division
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
ITS & Signals Management Section
750 N.Greenfield Pkwy,Garner,NC 27529

US 501 (N. Duke Street)
at
SR 1443 (Horton Road)

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

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NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACIE L. PHILLIPS
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12/19/2018
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susan.pennington

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PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG.78.2

ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

(program controller as shown)

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

OVERLAP A

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

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

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

FLASHING ARROW OUTPUT.....CH9  ISOLATE

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

← NOTICE ACTION PLAN SF BIT "1"

Toggle Once

↓

OVERLAP B

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

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

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

FLASHING ARROW OUTPUT.....CH10 ISOLATE

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

← NOTICE ACTION PLAN SF BIT "3"

Toggle Once

↓

OVERLAP C

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

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

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

FLASHING ARROW OUTPUT.....CH11 ISOLATE

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

← NOTICE ACTION PLAN SF BIT "5"

Toggle Once

↓

OVERLAP D

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

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

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

FLASHING ARROW OUTPUT.....CH12 ISOLATE

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

← NOTICE ACTION PLAN SF BIT "7"

END PROGRAMMING

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   YES|TERM PH    NO
PED DARK.. NO|TC RESRV  NO|DWELL FL  OFF
LINK PMT....0|X FLCOLR RED|EXIT OPT. OFF
X TMG PLN...0|RE-SERV..  0|FLT TYPE.HARD
FREE DUR PMT|R1  NO|R2  NO|R3  NO|R4  NO
--TIMING-----WALK|PED CL|MN GR| YEL| RED
ENTRANCE TM.   1|   12|   1|25.5|25.5
-----------MIN GR|EXT GR|MX GR| YEL| RED
TRACK CLEAR    0|    0|   0|25.5|25.5
-----------MIN DL|PMTEXT|TMX 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.

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.

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..
```

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: 05-0385
DESIGNED: MARCH 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: State of North Carolina Department of Transportation — Mobility and Safety Division — Traffic Engineering & Signals Management Section

750 N.Greenfield Pkwy,Garner,NC 27529

US 501 (N. Duke Street)
at
SR 1443 (Horton Road)

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACIE L. PHILLIPS

DocuSigned by: DC87A9BED9DB437...

12/19/2018

SIGNATURE DATE

SIG. INVENTORY NO. 05-0385

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.78.3

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

(program controller as shown)

IMPORTANT!

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

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

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

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

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

```
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

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

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

NOTICE VEH DET PLAN 2

ENSURE DELAY IS SET TO '3'

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

ENSURE PHASE IS SET TO "0"

```
VEH DETECTOR [28]   VEH DET PLAN [ 2]
TYPE: S-STANDARD
TS2 DETECTOR..... . ECPI LOG.......   NO
DET PH - 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 28 0    . . . . . . . . . . . . . . . .
EXTEND TIME...  0.0 DELAY TIME...    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 "7".
- Set delay time to "3".

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

NOTICE VEH DET PLAN 2

ENSURE DELAY IS SET TO '3'

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

ENSURE PHASE IS SET TO "0"

```
VEH DETECTOR [24]   VEH DET PLAN [ 2]
TYPE: S-STANDARD
TS2 DETECTOR..... . ECPI LOG.......   NO
DET PH - 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 24 0    . . . . . . . . . . . . . . . .
EXTEND TIME...  0.0 DELAY TIME...    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: 05-0385
DESIGNED: MARCH 2018
SEALED: 12/19/2018
REVISED: N/A

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

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

US 501 (N. Duke Street)
at
SR 1443 (Horton Road)

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACIE L. PHILLIPS

DocuSigned by: DC87A59ED60B497... 12/19/2018

SIGNATURE DATE

SIG. INVENTORY NO. 05-0385

12/19/2018
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susan.pennington

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PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG.78.4

ALTERNATE PHASING ACTIVATION DETAIL

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

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

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

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

ALTERNATE PHASING CHANGE SUMMARY

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

SF BITS 1,3,5,7: Modifies overlap parent phases for heads 11, 31, 51, and 71 to run protected turns only.

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

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

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

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

ECONOLITE ASC/3-2070 ACTION PLAN PROGRAMMING DETAIL

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

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0385
DESIGNED: MARCH 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail - Sheet 4 of 4

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

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

US 501 (N. Duke Street)
at
SR 1443 (Horton Road)

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACE L. PHILLIPS
DocuSigned by: DC87A59ED60B437...
12/19/2018
SIGNATURE DATE
SIG. INVENTORY NO. 05-0385

12/19/2018
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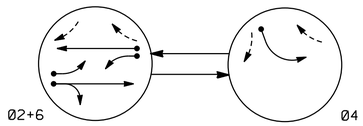
susan.pennington

PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig. 79.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

SIGNAL FACE I.D.

All Heads L.E.D.

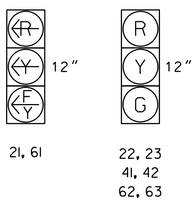
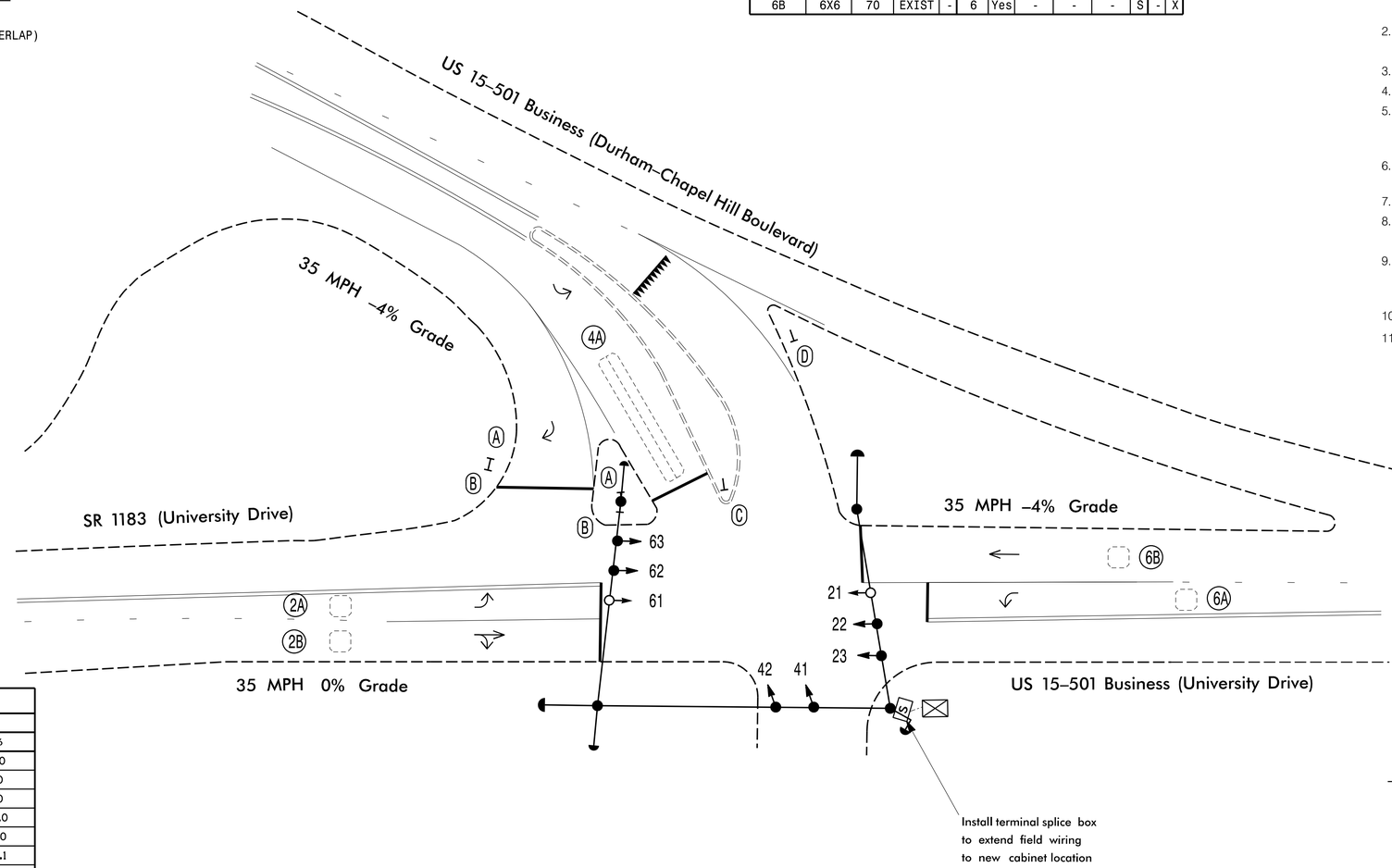


TABLE OF OPERATION

SIGNAL FACE	PHASE 02+6	PHASE 04	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

ASC/3 DETECTOR INSTALLATION CHART

DETECTOR					PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
2A	6X6	70	EXIST	-	2	Yes	-	-	-	S	-	X
2B	6X6	70	EXIST	-	2	Yes	-	-	-	S	-	X
4A	6X40	0	2-4-2	-	4	Yes	-	-	-	S	-	X
6A	6X6	70	EXIST	-	6	Yes	-	-	-	S	-	X
6B	6X6	70	EXIST	-	6	Yes	-	-	-	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 22, 23, 62, and 63.
4. Set all detector units to presence mode.
5. In the event of loop replacement, refer to the current ITS and Signals Design Manual and submit a Plan of Record to the Signal Design Section.
6. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
7. Pavement markings are existing.
8. Existing Yellow Change Interval for phase 4 may be decreased by 0.2 seconds per week until the required vaule is reached.
9. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timings values supersede these values.
10. Loop data based on previous plans and/or field observations.
11. 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	
S	Terminal Splice Box	S
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way with Marker	
	Directional Arrow	
A	"STOP" SIGN (R1-1)	A
B	"DO NOT ENTER" SIGN (R5-1)	B
C	KEEP RIGHT SIGN (R4-7A)	C
D	"YIELD" Sign (R1-2)	D

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 *	3.0	2.0	3.0
Max 1 *	60	30	60
Yellow	4.1	3.0	4.1
Red Clear	1.1	2.6	1.1
Actuations B4 Add *	-	-	-
Seconds /Actuation *	-	-	-
Max Initial *	-	-	-
Time Before Reduction *	-	-	-
Time To Reduce *	-	-	-
Minimum Gap	-	-	-
Locking Detector	X	-	X
Recall Position	VEH. RECALL	-	VEH. RECALL
Dual Entry	-	-	-
Simultaneous Gap	X	X	X

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

Project #: 170905

DAVENPORT
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Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

SR 1183/US 15-501 Business
(University Dr) at
US 15-501 Business
(Durham-Chapel Hill Blvd)

Division 5 Durham County Durham

PLAN DATE:	December 2018	REVIEWED BY:	R. Hinshaw
PREPARED BY:	A. D. Hayes	REVIEWED BY:	A. Ravipati

SCALE 0 20 1"=20'

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 032117 ENGINEER ROYAL HINSHAW

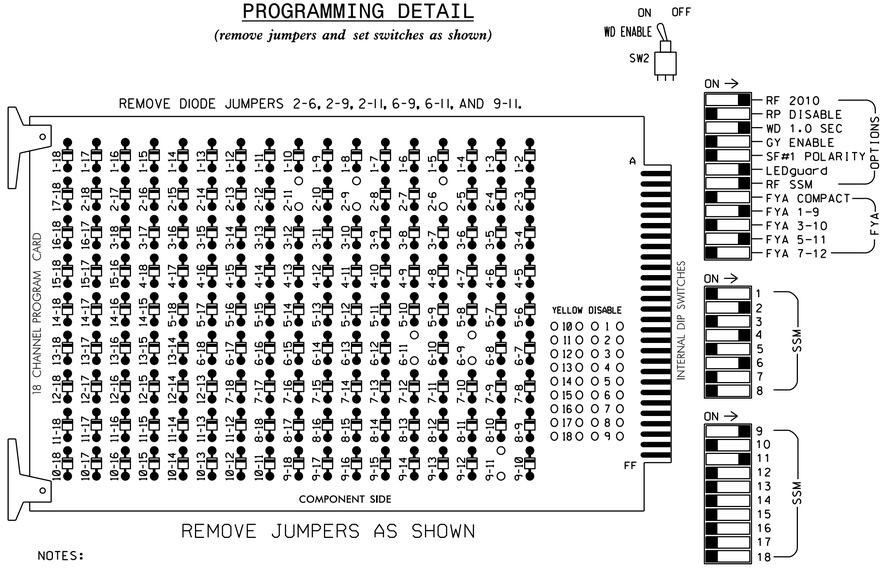
DocuSigned by: R. Royal Hinshaw 12/20/2018
SIGNATURE DATE

SIG. INVENTORY NO. 05-0386

PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig. 79.1

EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



NOTES:

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

NOTES

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

EQUIPMENT INFORMATION

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

* See overlap programming detail on sheet 2

SIGNAL HEAD HOOK-UP CHART

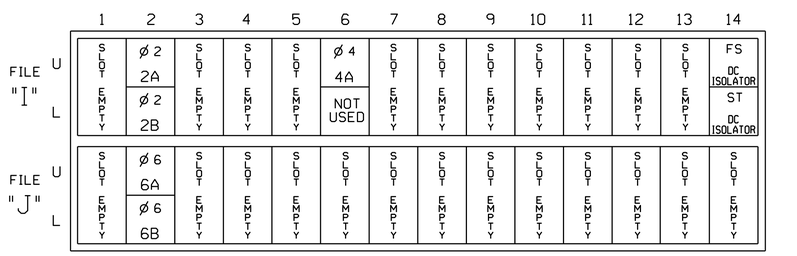
LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	NU	22,23	NU	NU	41,42	NU	NU	62,63	NU	NU	NU	NU	61★	NU	NU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

NU = Not Used

★ See pictorial of head wiring in detail this sheet.

INPUT FILE POSITION LAYOUT

(front view)



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

FS = FLASH SENSE
ST = STOP TIME

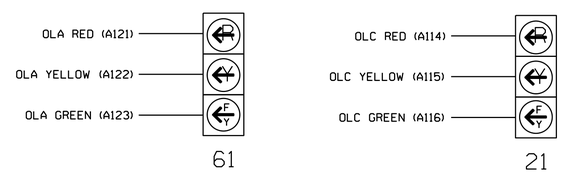
INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND TIME	DELAY TIME	ADDED INITIAL	DETECTOR TYPE
2A	TB2-5,6	I2U	39	2	2	YES	-	-	-	S
2B	TB2-7,8	I2L	43	12	2	YES	-	-	-	S
4A	TB4-9,10	I6U	41	4	4	YES	-	-	-	S
6A	TB3-5,6	J2U	40	6	6	YES	-	-	-	S
6B	TB3-7,8	J2L	44	16	6	YES	-	-	-	S

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



Signal Upgrade - Sheet 1 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0386
DESIGNED: December 2018
SEALED: 12/20/2018
REVISED: N/A

Project #: 170905

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

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

SR 1183/US 15-501 Business
(University Dr) at
US 15-501 Business
(Durham-Chapel Hill Blvd)

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 032117 ENGINEER ROYAL HINSHAW

DocuSigned by:
R. Royal Hinshaw 12/20/2018
SIGNATURE DATE
TRANSPORTATION ENGINEER
SIG. INVENTORY NO. 05-0386

PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig. 79.2

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 [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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0386
DESIGNED: December 2018
SEALED: 12/20/2018
REVISED: N/A

Project #: 170905

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Signal Upgrade - Sheet 2 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

750 N.Greenfield Pkwy,Garner,NC 27529

SR 1183/US 15-501 Business
(University Dr) at
US 15-501 Business
(Durham-Chapel Hill Blvd)

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 032117 ENGINEER ROYAL HINSHAW

DocuSigned by:
R Royal Hinshaw 12/20/2018
SIGNATURE DATE
R. ROYAL HINSHAW, PE

SIG. INVENTORY NO. 05-0386

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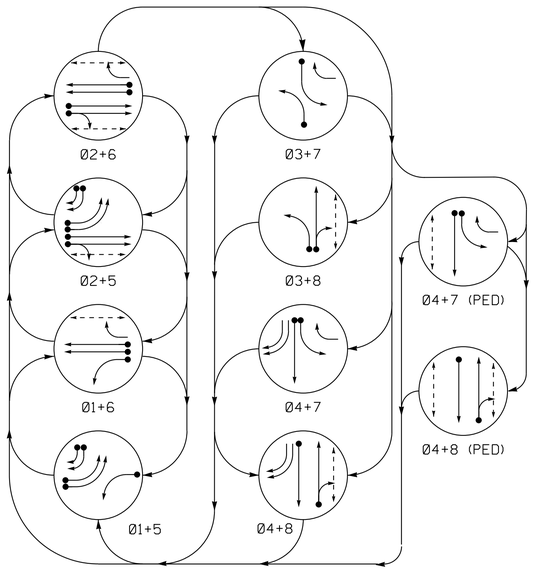
PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG.80.0

8 PHASE FULLY ACTUATED (DURHAM SIGNAL SYSTEM)

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

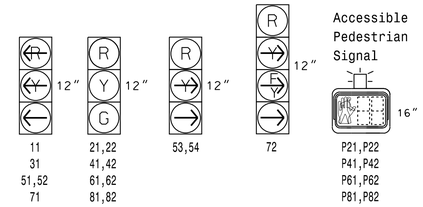
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE 01+5	01+6	02+5	02+6	03+7	03+8	04+7	04+8	04+7 PED	04+8 PED	FLASH
11	~~←~~	~~←~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~
21,22	R	R	G	G	R	R	R	R	R	R	Y
31	~~R~~	~~R~~	~~R~~	~~R~~	~~←~~	~~←~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~
41,42	R	R	R	R	R	R	G	G	G	G	R
51,52	~~←~~	~~R~~	~~←~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~
53,54	~~→~~	R	~~→~~	R	R	R	~~→~~	~~→~~	R	R	R
61,62	R	G	R	G	R	R	R	R	R	R	Y
71	~~R~~	~~R~~	~~R~~	~~R~~	~~←~~	~~R~~	~~←~~	~~R~~	~~←~~	~~R~~	~~R~~
72	R	~~F Y~~	R	~~F Y~~	~~→~~	R	~~→~~	R	~~→~~	R	~~Y~~
81,82	R	R	R	R	R	G	R	G	R	G	R
P21,P22	DW	DW	W	W	DW	DW	DW	DW	DW	DW	DRK
P41,P42	DW	DW	DW	DW	DW	DW	DW	DW	W	W	DRK
P61,P62	DW	W	DW	W	DW	DW	DW	DW	DW	DW	DRK
P81,P82	DW	DW	DW	DW	DW	W	DW	W	DW	W	DRK

SIGNAL FACE I.D.

All Heads L.E.D.

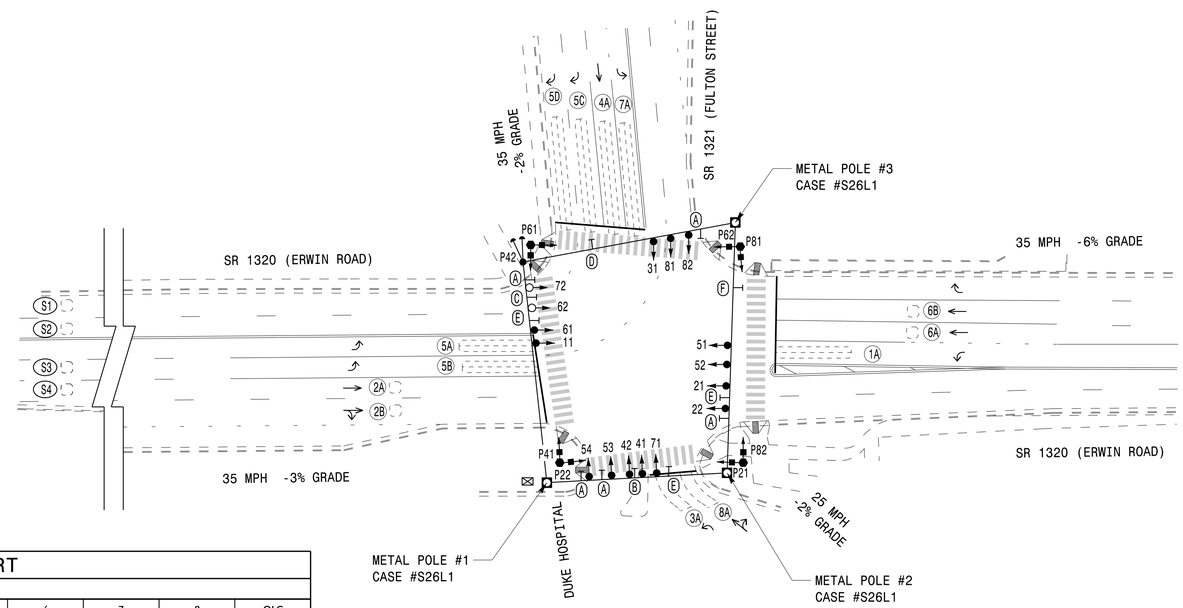


ASC/3 DETECTOR INSTALLATION CHART

DETECTOR					PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
1A	6X40	0	2-4-2	-	1	Yes	-	3	-	S	-	X
2A	6X6	70	EXIST	-	2	Yes	-	-	-	S	-	X
2B	6X6	70	EXIST	-	2	Yes	-	-	-	S	-	X
3A	6X25	0	EXIST	-	3	Yes	-	-	-	S	-	X
4A	6X60	+5	2-4-2	-	4	Yes	-	-	-	S	-	X
5A	6X40	0	2-4-2	-	5	Yes	-	3	-	S	-	X
5B	6X40	0	2-4-2	-	5	Yes	-	3	-	S	-	X
5C	6X60	+5	2-4-2	-	5	Yes	-	-	-	S	-	X
5D	6X60	+5	2-4-2	-	5	Yes	-	-	-	S	-	X
6A	6X6	70	EXIST	-	6	Yes	-	-	-	S	-	X
6B	6X6	70	EXIST	-	6	Yes	-	-	-	S	-	X
7A	6X60	+5	2-4-2	-	7	Yes	-	3	-	S	-	X
8A	6X25	0	EXIST	-	8	Yes	-	-	-	S	-	X
S1	6X6	+800	EXIST	-	SYS	No	-	-	-	N	X	X
S2	6X6	+800	EXIST	-	SYS	No	-	-	-	N	X	X
S3	6X6	675	EXIST	-	SYS	No	-	-	-	N	X	X
S4	6X6	675	EXIST	-	SYS	No	-	-	-	N	X	X

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 and/or phase 5 may be lagged.
4. Phase 3 and/or phase 7 may be lagged.
5. Reposition existing signal head numbered 61.
6. Set all detector units to presence mode.
7. In the event of loop replacement, refer to the current ITS and Signal Design Manual and submit a Plan of Record to the Signal Design Section.
8. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
9. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
10. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
11. Pavement markings are existing.
12. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
13. This intersection features accessible pedestrian signals utitlizing a percussive tone walk indication. Refer to section 4E.11 of the 2009 MUTCD for tone rate and frequency requirements.
14. Locate Pedestrian and Crosswalk advance signs in accordance with Table 2C-4 in Section 2C.05 of the 2009 MUTCD or as otherwise directed by the engineer.
15. Loop data based on previous plan and/or field observations.
16. Install new cabinet on the existing cabinet foundation.



LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Metal Strain Pole	
	Type II Signal Pedestal	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
N/A	Curb Ramp	
Ⓐ	"NO TURN ON RED" Sign (R10-11A)	Ⓐ
Ⓑ	Through Arrow "ONLY" Sign (R3-5A)	Ⓑ
Ⓒ	"Parking" Sign	Ⓒ
Ⓓ	Right Arrow "ONLY" Sign (R3-5R)	Ⓓ
Ⓔ	Street Sign (D3-1)	Ⓔ
Ⓕ	"TURNING VEHICLES YIELD TO PEDS" Sign (R10-15)	Ⓕ

ASC/3 TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6	7	8	OLC
Min Green *	7	10	7	7	7	10	7	7	
Guar Min Ovl Green	-	-	-	-	-	-	-	-	4
Walk *	0	7	0	7	0	7	0	7	
Ped Clear	0	15	0	22	0	22	0	21	
Veh. Extension *	2.0	3.0	2.0	1.0	2.0	3.0	1.0	2.0	
Max 1 *	20	60	15	20	20	60	15	20	
Delayed Green *	-	4	-	4	-	4	-	4	
Yellow	3.1	4.1	3.0	4.0	3.0	4.3	3.0	3.3	
Red Clear	3.2	2.2	3.2	2.5	3.2	2.4	3.3	3.1	
Actuations B4 Add *	-	-	-	-	-	-	-	-	
Seconds /Actuation *	-	-	-	-	-	-	-	-	
Max Initial *	-	-	-	-	-	-	-	-	
Time Before Reduction *	-	-	-	-	-	-	-	-	
Time To Reduce *	-	-	-	-	-	-	-	-	
Minimum Gap	-	-	-	-	-	-	-	-	
Locking Detector	-	X	-	-	-	X	-	-	
Recall Position	-	VEH. RECALL	-	-	-	VEH. RECALL	-	-	
Dual Entry	-	-	-	-	-	-	-	-	
Simultaneous Gap	X	X	X	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.

ACCESSIBLE PEDESTRIAN SIGNAL OPERATION

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

* Volume should be set to 5dB over ambient noise level.

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

Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

SR 1320 (Erwin Road) at SR 1321 (Fulton Street)/Duke University Hospital Entrance

Division 5 Durham County Durham

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

SCALE 0 40 1"=40'

REVISIONS	INIT.	DATE

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

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

SIGNATURE DATE

SIG. INVENTORY NO. 05-0388

12/19/2018
kimley-horn\ITS\01036410 - Durham Signal System\Signals\54 - Signal Design\GROUP 3\U-5968_050388-2018.dgn
derrick.waller

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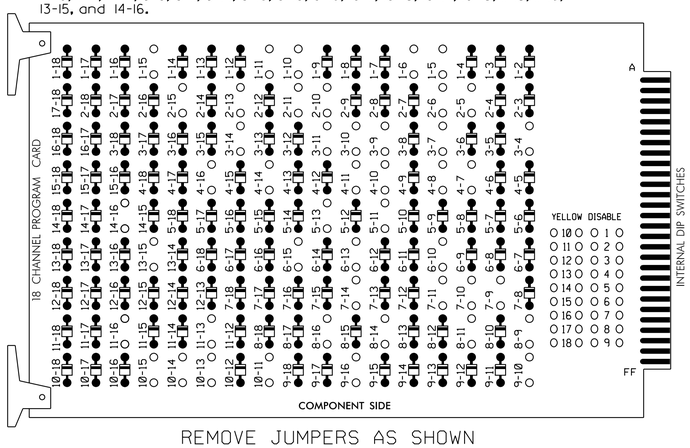
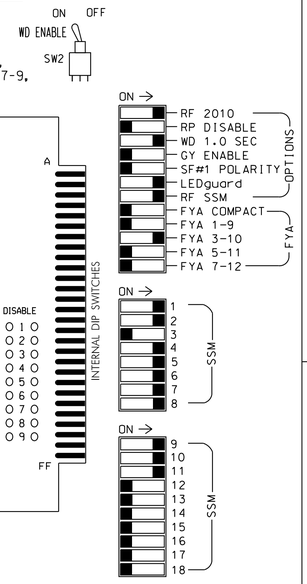
PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG.80.1

EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

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





REMOVE JUMPERS AS SHOWN

■ = DENOTES POSITION OF SWITCH

NOTES:

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

NOTES

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

EQUIPMENT INFORMATION

CONTROLLER.....2070LX
CABINET.....332 W/AUX
SOFTWARE.....ECONOLITE ASC/3-2070
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
LOAD SWITCHES USED.....S1,S2,S3,S4,S5,S6,S7,S8,S9,S10,S11, S12,AUX S1,AUX S2,AUX S4
PHASES USED.....1,2,2PED,3,4,4PED,5,6,6PED,7,8,8PED
OVERLAP "A".....*
OVERLAP "B".....*
OVERLAP "C".....*
OVERLAP "D".....NOT USED
OVERLAP "G".....*

* 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	OLG	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	11	21,22	P21, P22	72 ★	41,42	P41, P42	51,52	61,62	P61, P62	71	81,82	P81, P82	31	72 ★	NU	53,54	NU	NU
RED		128			101			134			107			A124		A114		
YELLOW		129		*	102			135			108							
GREEN		130			103			136			109							
RED ARROW	125						131			122			A121					
YELLOW ARROW	126						132			123			A122	A125		A115		
FLASHING YELLOW ARROW														A126				
GREEN ARROW	127			118			133			124			A123			A116		
✋			113			104			119			110						
🚶			115			106			121			112						

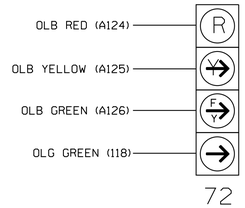
NU = Not Used

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

★ See pictorial of head wiring in detail this sheet.

FYA SIGNAL WIRING DETAIL

(wire signal head as shown)



INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	Ø1 1A	Ø2 2A	SLOT EMPTY	SLOT EMPTY	Ø3 3A	Ø4 4A	SLOT EMPTY	SLOT EMPTY	SYS. DET. S1	SLOT EMPTY	SLOT EMPTY	Ø2 PED DC ISOLATOR	Ø6 PED DC ISOLATOR	FS DC ISOLATOR
	L	NOT USED	Ø2 2B			NOT USED	NOT USED			SYS. DET. S2			Ø4 PED DC ISOLATOR	Ø8 PED DC ISOLATOR	ST DC ISOLATOR
FILE "J"	U	Ø5 5A	Ø6 6A	SLOT EMPTY	SLOT EMPTY	Ø7 7A	Ø8 8A	SYS. DET. S3	SLOT EMPTY	Ø5 5C	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L	Ø5 5B	Ø6 6B			NOT USED	NOT USED	SYS. DET. S4		Ø5 5D					

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND TIME	DELAY TIME	ADDED INITIAL	DETECTOR TYPE
1A	TB2-1,2	I1U	56	1	1	YES		3		S
2A	TB2-5,6	I2U	39	2	2	YES				S
2B	TB2-7,8	I2L	43	12	2	YES				S
3A	TB4-5,6	I5U	58	3	3	YES				S
4A	TB4-9,10	I6U	41	4	4	YES				S
5A	TB3-1,2	J1U	55	5	5	YES		3		S
5B	TB3-3,4	J1L	55	5	5	YES		3		S
5C	TB7-9,10	J9U	59	15	5	YES				S
5D	TB7-11,12	J9L	61	17	5	YES				S
6A	TB3-5,6	J2U	40	6	6	YES				S
6B	TB3-7,8	J2L	44	16	6	YES				S
7A	TB5-5,6	J5U	57	7	7	YES		3		S
8A	TB5-9,10	J6U	42	8	8	YES				S
* S1	TB6-9,10	I9U	60	11	SYS	NO				N
* S2	TB6-11,12	I9L	62	13	SYS	NO				N
* S3	TB7-1,2	J7U	66	38	SYS	NO				N
* S4	TB7-3,4	J7L	79	48	SYS	NO				N
PED PUSH BUTTONS										
P21,P22	TB8-4,6	I12U	67	PED 2	2 PED					
P41,P42	TB8-5,6	I12L	69	PED 4	4 PED					
P61,P62	TB8-7,9	I13U	68	PED 6	6 PED					
P81,P82	TB8-8,9	I13L	70	PED 8	8 PED					

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

* System detector only. Remove any assigned vehicle phase.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

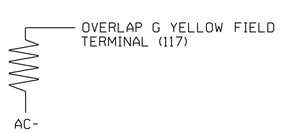
Countdown Ped Signals are required to display timing only during Ped Clearance Interval. Consult Ped Signal Module user's manual for instructions on selecting this feature.

LOAD RESISTOR INSTALLATION DETAIL

(install 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: 05-0388
DESIGNED: FEBRUARY 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: NC Department of Transportation Mobility and Safety Division Traffic Engineering & Signal Management Section
750 N.Greenfield Pkwy,Garner,NC 27529

SR 1320 (Erwin Road)
at
SR 1321 (Fulton Street)/Duke University Hospital Entrance
Division 5 Durham County Durham

PLAN DATE: February 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
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SIGNATURE DATE
SIG. INVENTORY NO. 05-0388

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.80.2

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]

Toggle To 'Overlap G'

OVERLAP G

Select TMG VEH OVLP [G] and 'NORMAL'

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

LAG GRN 0.0 YEL 0.0 RED 0.0
```

Toggle To 'Overlap A'

OVERLAP A

Select TMG VEH OVLP [A] and 'NORMAL'

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

LAG GRN 0.0 YEL 0.0 RED 0.0
```

Toggle Once

OVERLAP B

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

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

PROTECTED LEFT TURN....   OVERLAP  G
OPPOSING THROUGH.......   PHASE    6

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 X . . . . . . . . . . .
PROTECT  . . . . . . . . . . . . . . . .
PED PRTC . . . X . . . . . . . . . . . .
NOT OVLP . . . . . . . . . . . . . . . .
FLSH GRN . . . . . . . . . . . . . . . .
LAG X PH . . . . . . . . . . . . . . . .
LAG 2 PH . . . . . . . . . . . . . . . .

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

END PROGRAMMING

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

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

ECONOLITE ASC/3-2070
LOADSWITCH PROGRAMMING ASSIGNMENT DETAIL

(program controller as shown)

To assign load switch S4 as OLG, program
LD SWITCH 3 as OVLP '7' TYPE 'O' as shown below.

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

NOTICE OVERLAP G ASSIGNED TO LD SWITCH 3 →

LD SWITCH ASSIGN

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

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.

ACCESSIBLE PEDESTRIAN SIGNAL (APS) INSTALLATION NOTES

1. Install push buttons and APS equipment per manufacturer's instructions.
2. Provide a dedicated cable to each push button per manufacturer's instructions.
3. If APS equipment is mounted in cabinet, use filtered power (i.e., Controller Receptacle) to power APS equipment. Do not use Equipment Receptacle, which is a GFCI outlet.
4. Never attempt to operate a standard contact closure push button with the APS system unless cabinet is re-wired for standard button operation or unless explicitly allowed by the manufacturer.
5. Place manufacturer's instructions in cabinet with cabinet prints, signal plans, and electrical details.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0388
DESIGNED: FEBRUARY 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail - Sheet 2 of 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

SR 1320 (Erwin Road)
at
SR 1321 (Fulton Street)/Duke University Hospital Entrance

Division 5 Durham County Durham

PLAN DATE:	February 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. 05-0388

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

12/19/2018
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derrick.waller

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PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG.80.3

ECONOLITE ASC/3-2070 LOGIC PROCESSOR PROGRAMMING DETAIL FOR LEADING PED INTERVAL (DELAYED GREEN)

(program controller as shown)

The following logic processor configuration holds the FYA on signal head 72 red for the duration of the delayed green time (leading ped interval) when serving a ped call on the adjacent through phase.

1. From Main Menu select **1. CONFIGURATION**
2. From CONFIGURATION Submenu select **8. LOGIC PROCESSOR**
3. From the 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     PED ON PH WALK        6     IS   ON
AND    VEH GREEN ON PH       6     IS   OFF

THEN   SIG SET OLP RED       2          ON
       SIG SET OLP YELLOW    2          OFF
       SIG SET OVLP GREEN    2          OFF

ELSE
```

HOLD SIGNAL HEAD 72 FYA
RED DURING THE PHASE 6
DELAYED GREEN TIME
(LEADING PED INTERVAL)

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

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

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

END PROGRAMMING

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0388
DESIGNED: FEBRUARY 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail - Sheet 3 of 3

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ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

SR 1320 (Erwin Road)
at
SR 1321 (Fulton Street)/Duke University Hospital Entrance

Division 5 Durham County Durham

PLAN DATE:	February 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 STACIE L. PHILLIPS

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SIG. INVENTORY NO. 05-0388

12/19/2018
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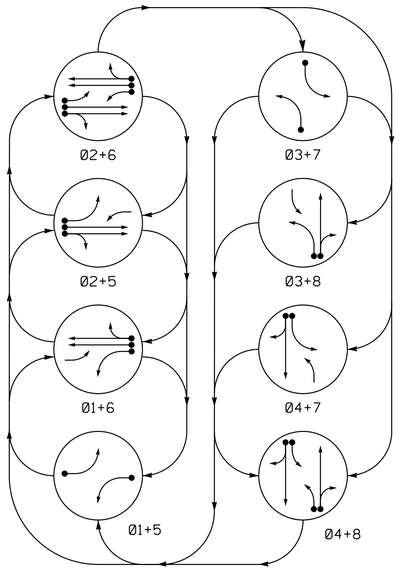
PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-81.0

DEFAULT PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

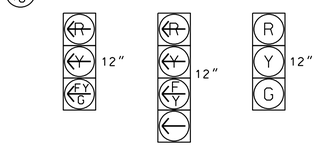
DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE 01+5	01+6	02+5	02+6	03+7	03+8	04+7	04+8	FLASH
11	↚	↚	F/Y	F/Y	̸R	̸R	̸R	̸R	̸Y
21, 22	R	R	G	G	R	R	R	R	Y
31	̸R	̸R	̸R	̸R	↚	↚	F/Y	F/Y	̸R
41, 42	R	R	R	R	R	R	G	G	R
51	↚	F/Y	↚	F/Y	̸R	̸R	̸R	̸R	̸Y
61, 62	R	G	R	G	R	R	R	R	Y
71	̸R	̸R	̸R	̸R	↚	F/Y	↚	F/Y	̸R
81, 82	R	R	R	R	R	G	R	G	R

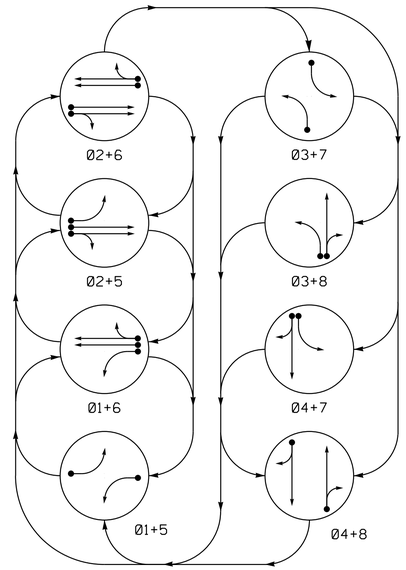
SIGNAL FACE I.D.

All Heads L.E.D.

F/Y/G = Bimodal Section



ALTERNATE PHASING DIAGRAM



ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE 01+5	01+6	02+5	02+6	03+7	03+8	04+7	04+8	FLASH
11	↚	↚	̸R	̸R	̸R	̸R	̸R	̸R	̸Y
21, 22	R	R	G	G	R	R	R	R	Y
31	̸R	̸R	̸R	̸R	↚	↚	̸R	̸R	̸R
41, 42	R	R	R	R	R	G	G	R	
51	↚	̸R	↚	̸R	̸R	̸R	̸R	̸R	̸Y
61, 62	R	G	R	G	R	R	R	R	Y
71	̸R	̸R	̸R	̸R	↚	̸R	↚	̸R	̸R
81, 82	R	R	R	R	R	G	R	G	R

ASC/3 DETECTOR INSTALLATION CHART

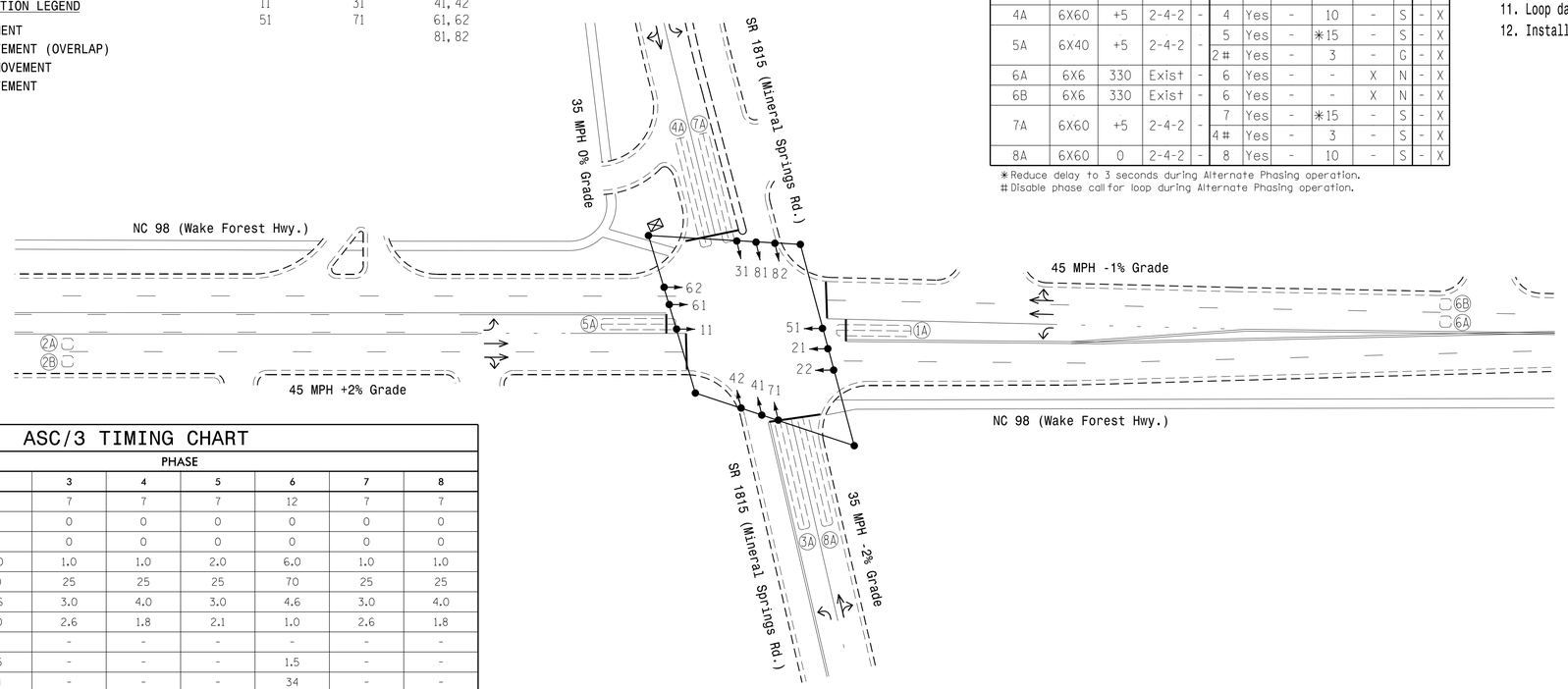
DETECTOR					PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
1A	6X40	+5	2-4-2	-	1	Yes	-	✳15	-	S	-	X
					6 #	Yes	-	3	-	G	-	X
2A	6X6	330	Exist	-	2	Yes	-	-	X	N	-	X
2B	6X6	330	Exist	-	2	Yes	-	-	X	N	-	X
3A	6X60	0	2-4-2	-	3	Yes	-	✳15	-	S	-	X
					8 #	Yes	-	3	-	S	-	X
4A	6X60	+5	2-4-2	-	4	Yes	-	10	-	S	-	X
5A	6X40	+5	2-4-2	-	5	Yes	-	✳15	-	S	-	X
					2 #	Yes	-	3	-	G	-	X
6A	6X6	330	Exist	-	6	Yes	-	-	X	N	-	X
6B	6X6	330	Exist	-	6	Yes	-	-	X	N	-	X
7A	6X60	+5	2-4-2	-	7	Yes	-	✳15	-	S	-	X
					4 #	Yes	-	3	-	S	-	X
8A	6X60	0	2-4-2	-	8	Yes	-	10	-	S	-	X

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

8 Phase
Fully Actuated
(Durham Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 and/or phase 5 may be lagged.
4. Phase 3 and/or phase 7 may be lagged.
5. Set all detector units to presence mode.
6. In the event of loop replacement, refer to the current ITS and Signals Design Manual and submit a Plan of Record to the Signal Design Section.
7. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
8. 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 existing cabinet foundation.



ASC/3 TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6	7	8
Min Green *	7	12	7	7	7	12	7	7
Walk *	0	0	0	0	0	0	0	0
Ped Clear	0	0	0	0	0	0	0	0
Veh. Extension *	2.0	6.0	1.0	1.0	2.0	6.0	1.0	1.0
Max 1 *	25	70	25	25	25	70	25	25
Yellow	3.0	4.6	3.0	4.0	3.0	4.6	3.0	4.0
Red Clear	2.1	1.0	2.6	1.8	2.1	1.0	2.6	1.8
Actuations B4 Add *	-	-	-	-	-	-	-	-
Seconds /Actuation *	-	1.5	-	-	-	1.5	-	-
Max Initial *	-	34	-	-	-	34	-	-
Time Before Reduction *	-	15	-	-	-	15	-	-
Time To Reduce *	-	45	-	-	-	45	-	-
Minimum Gap	-	3.0	-	-	-	3.0	-	-
Locking Detector	-	X	-	-	-	X	-	-
Recall Position	-	VEH RECALL	-	-	-	VEH RECALL	-	-
Dual Entry	-	-	-	X	-	-	-	X
Simultaneous Gap	X	X	X	X	X	X	X	X

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

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	

Signal Upgrade

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

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

SCALE 0 40 1"=40'

NC 98 (Wake Forest Hwy.)
at
SR 1815 (Mineral Springs Rd.)

Division 5 Durham County Durham

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

REVISIONS | INIT. | DATE

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SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32396 ENGINEER WILLIAM J. HAMILTON

DocuSigned by: William J. Hamilton 12/19/2018
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SIG. INVENTORY NO. 05-0389

12/17/2018
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User:tspopelka

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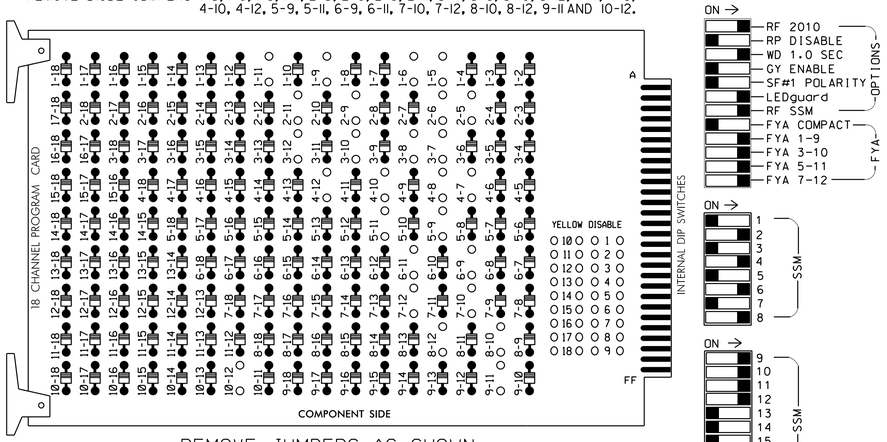
PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-81.1

EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 1-5, 1-6, 1-9, 1-11, 2-5, 2-6, 2-9, 2-11, 3-7, 3-8, 3-10, 3-12, 4-7, 4-8, 4-10, 4-12, 5-9, 5-11, 6-9, 6-11, 7-10, 7-12, 8-10, 8-12, 9-11 AND 10-12.



REMOVE JUMPERS AS SHOWN

NOTES:

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

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Program 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.....S1,S2,S4,S5,S7,S8,S10,S11
AUX S1,AUX S2,AUX S4,AUX S5
PHASES USED.....1,2,3,4,5,6,7,8
OVERLAP "A".....*
OVERLAP "B".....*
OVERLAP "C".....*
OVERLAP "D".....*

* See overlap programming on sheet 2.

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	11★	21,22	NU	31★	41,42	NU	51★	61,62	NU	71★	81,82	NU	11★	31★	NU	51★	71★	NU
RED		128			101			134			107							
YELLOW	*	129		*	102		*	135		*	108							
GREEN		130			103			136			109							
RED ARROW													A121	A124		A114	A101	
YELLOW ARROW													A122	A125		A115	A102	
FLASHING YELLOW ARROW													A123	A126		A116	A103	
GREEN ARROW	127			118			133			124								

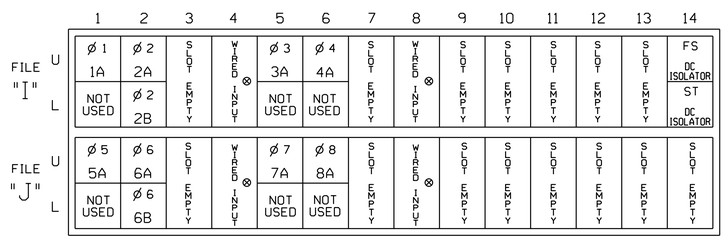
NU = Not Used

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

★ See pictorial of head wiring in detail this sheet.

INPUT FILE POSITION LAYOUT

(front view)



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

FS = FLASH SENSE
ST = STOP TIME

⊗ Wired Input - Do not populate slot with detector card

INPUT FILE CONNECTION & PROGRAMMING CHART

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

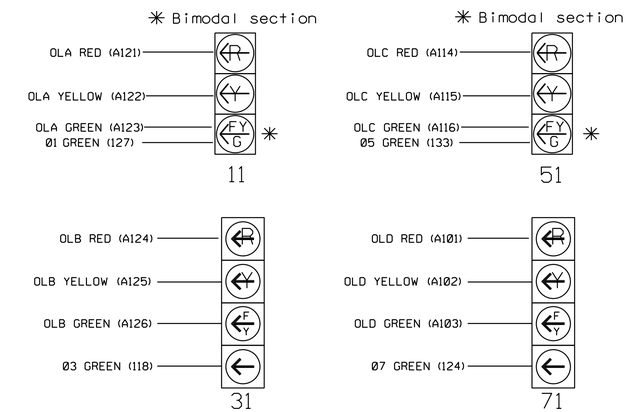
[1] Add jumper from I1-W to J4-W, on rear of input file.
[2] Add jumper from I5-W to J8-W, on rear of input file.
[3] Add jumper from J1-W to I4-W, on rear of input file.
[4] Add jumper from J5-W to I8-W, on rear of input file.

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

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

FYA SIGNAL WIRING DETAIL

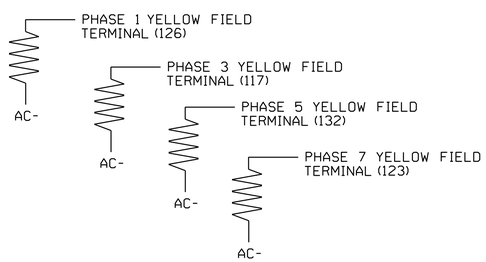
(wire signal heads as shown)



LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

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



THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0389
DESIGNED: Dec 2018
SEALED: 12/19/2018
REVISED: N/A

Prepared in the offices of:
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Transportation Engineers
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919-872-5115 Tel, 919-878-5416 Fax,
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Electrical Detail
Sheet 1 of 3

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ELECTRICAL AND PROGRAMMING DETAILS FOR:

NC 98 (Wake Forest Hwy.)
at
SR 1815 (Mineral Springs Rd.)

Division 5 Durham County Durham

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

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PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-81.2

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

(program controller as shown)

IMPORTANT!

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

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

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

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

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

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

← NOTICE VEH DET PLAN 2
← ENSURE DELAY IS SET TO '3'

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

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

ENSURE PHASE IS SET TO "0" →
← NOTICE VEH DET PLAN 2

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

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

← NOTICE VEH DET PLAN 2
← ENSURE DELAY IS SET TO '3'

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

```
VEH DETECTOR [28]   VEH DET PLAN [ 2]
TYPE: S-STANDARD
TS2 DETECTOR..... . ECPI LOG.......   NO
DET PH - 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 28 0   . . . . . . . . . . . . . . . .
EXTEND TIME...  0.0 DELAY TIME...    3.0
USE ADDED INITIAL . CROSS SWITCH PH..  0
LOCK IN....... NONE NTCIP VOL . OR OCC .
PMT QUEUE DELAY. NO
```

ENSURE PHASE IS SET TO "0" →
← NOTICE VEH DET PLAN 2

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

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

← NOTICE VEH DET PLAN 2
← ENSURE DELAY IS SET TO '3'

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

```
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
```

ENSURE PHASE IS SET TO "0" →
← NOTICE VEH DET PLAN 2

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

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

← NOTICE VEH DET PLAN 2
← ENSURE DELAY IS SET TO '3'

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

```
VEH DETECTOR [24]   VEH DET PLAN [ 2]
TYPE: S-STANDARD
TS2 DETECTOR..... . ECPI LOG.......   NO
DET PH - 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 24 0   . . . . . . . . . . . . . . . .
EXTEND TIME...  0.0 DELAY TIME...    3.0
USE ADDED INITIAL . CROSS SWITCH PH..  0
LOCK IN....... NONE NTCIP VOL . OR OCC .
PMT QUEUE DELAY. NO
```

ENSURE PHASE IS SET TO "0" →
← NOTICE VEH DET PLAN 2

END PROGRAMMING

ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

(program controller as shown)

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

OVERLAP A

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

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

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

FLASHING ARROW OUTPUT.....CH9  ISOLATE

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

← NOTICE ACTION PLAN SF BIT "1"

Toggle Once

OVERLAP B

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

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

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

FLASHING ARROW OUTPUT.....CH10 ISOLATE

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

← NOTICE ACTION PLAN SF BIT "3"

Toggle Once

OVERLAP C

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

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

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

FLASHING ARROW OUTPUT.....CH11 ISOLATE

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

← NOTICE ACTION PLAN SF BIT "5"

Toggle Once

OVERLAP D

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

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

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

FLASHING ARROW OUTPUT.....CH12 ISOLATE

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

← NOTICE ACTION PLAN SF BIT "7"

END PROGRAMMING

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THE SIGNAL DESIGN: 05-0389
DESIGNED: Dec 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail
Sheet 2 of 3

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User:tspopelka

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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, 3, 5 AND 7.

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

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

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

ALTERNATE PHASING CHANGE SUMMARY

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

SF BIT 1,3,5,7:	Modifies overlap parent phases for heads 11, 31, 51 and 71 to run protected turns only.
VEH DET PLAN 2:	Disables phase 6 call on loop 1A and reduces delay time for phase 1 call on loop 1A to 3 seconds.
VEH DET PLAN 2:	Disables phase 8 call on loop 3A and reduces delay time for phase 3 call on loop 3A to 3 seconds.
VEH DET PLAN 2:	Disables phase 2 call on loop 5A and reduces delay time for phase 5 call on loop 5A to 3 seconds.
VEH DET PLAN 2:	Disables phase 4 call on loop 7A and reduces delay time for phase 7 call on loop 7A to 3 seconds.

FLASHER CIRCUIT MODIFICATION DETAIL

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

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

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

ECONOLITE ASC/3-2070 ACTION PLAN PROGRAMMING DETAIL

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

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

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THE SIGNAL DESIGN: 05-0389
DESIGNED: Dec 2018
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Sheet 3 of 3

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SEAL
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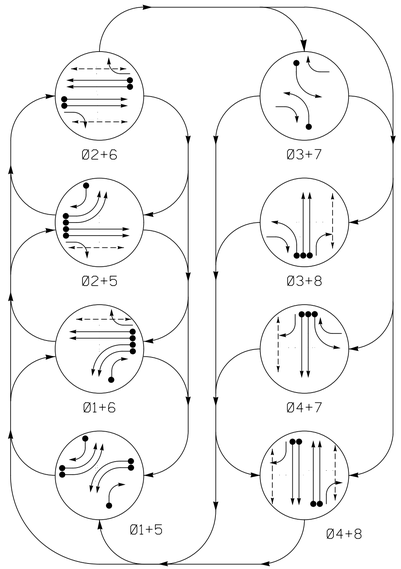
U-5968	SIG. 82.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

EV PREEMPT PHASES

(Medium Priority)

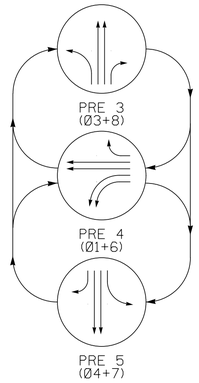
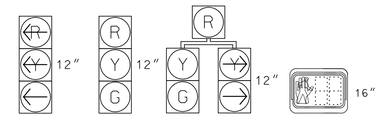


TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3+7	Ø3+8	Ø4+7	Ø4+8	PRE3	PRE4	PRE5	FLASH
11,12	←	←	←R	←R	←R	←R	←R	←R	←R	←	←R	←R
21,23	R	R	G	G	R	R	R	R	R	R	R	Y
22	R	R	G	G	R/←	R/←	R	R	R	R	R	Y
31	←R	←R	←R	←R	←	←	←R	←R	←	←R	←R	←R
41, 43	R	R	R	R	R	R	G	G	R	R	G	R
42	R/←	R	R/←	R	R	R	G	G	R	R	G	R
51, 52	←	←R	←	←R	←R	←R	←R	←R	←R	←R	←R	←R
61, 63	R	G	R	G	R	R	R	R	R	G	R	Y
62	R	G	R	G	R/←	R	R/←	R	R	G	R	Y
71	←R	←R	←R	←R	←	←R	←	←R	←R	←R	←	←R
81	R	R	R	R	R	G	R	G	G	R	R	R
82	R/←	R/←	R	R	R	G	R	G	G	R	R	R
P21, P22	DW	DW	W	W	DW	DW	DW	DW	DW	DW	DW	DRK
P41, P42	DW	DW	DW	DW	DW	DW	W	W	DW	DW	DW	DRK
P61, P62	DW	W	DW	W	DW	DW	DW	DW	DW	DW	DW	DRK
P81, P82	DW	DW	DW	DW	DW	W	DW	W	DW	DW	DW	DRK

SIGNAL FACE I.D.

All Heads L.E.D.



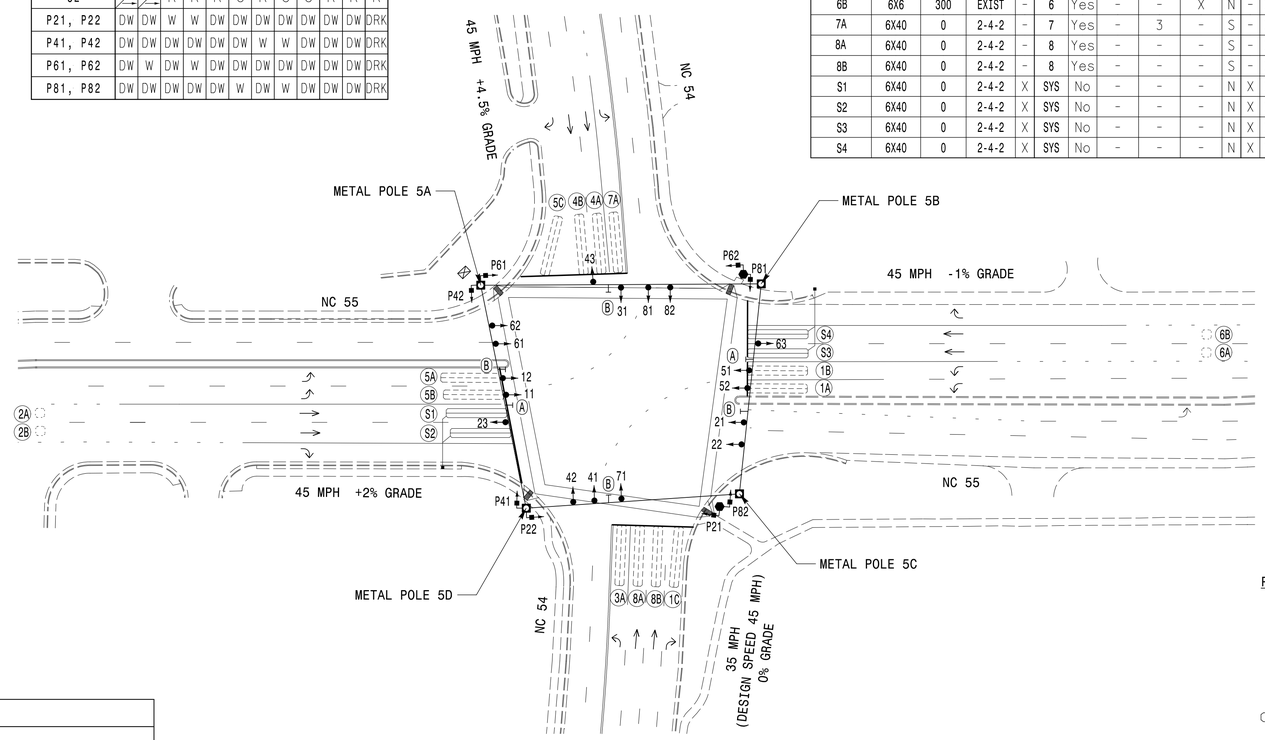
ASC/3 DETECTOR INSTALLATION CHART

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

8 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. Phase 3 and/or phase 7 may be lagged.
5. Set all detector units to presence mode.
6. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
7. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
8. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
9. Pavement markings are existing.
10. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
11. Loop data based on previous plan and/or field observations.
12. Install new cabinet on the existing cabinet foundation.
13. Install GPS emergency preemption system per manufacturer's instructions to achieve preemption needed, as shown in phasing diagram.
14. Remove existing optical detection equipment.



LEGEND

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

ASC/3 TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6	7	8
Min Green *	7	12	7	7	7	12	7	7
Walk *	0	7	0	7	0	7	0	7
Ped Clear	0	29	0	35	0	39	0	37
Veh. Extension *	2.0	6.0	2.0	2.0	2.0	6.0	2.0	2.0
Max 1 *	30	90	25	60	30	90	25	60
Yellow	3.0	4.3	3.0	4.2	3.0	4.6	3.0	4.5
Red Clear	3.8	2.0	3.9	2.2	3.6	2.4	3.4	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	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	PRE 4	PRE 5
Exit Phase(s)	2+6	2+6	4+8
Preempt Override	OFF	OFF	OFF
Delay Time	0	0	0
Ped Clear Through Yellow	Y	Y	Y
Terminate Phases	N	N	N
Entrance Walk	1	1	1
Entrance Ped Clear	20	20	20
Entrance Min Green	1	1	1
Entrance Yellow Change	25.5✱	25.5✱	25.5✱
Entrance Red Clear	25.5✱	25.5✱	25.5✱
Minimum Dwell Time	7	7	7
Preempt Input Extension Time **	2.0	2.0	2.0
Preempt Max Time	120	120	120
Exit Yellow Change	25.5✱	25.5✱	25.5✱
Exit Red Clear	25.5✱	25.5✱	25.5✱

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

PLANS PREPARED IN THE OFFICE OF:
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Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

NC 55 at NC 54

Division 5 Durham County Durham

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

SCALE 0 50 1"=50'

REVISIONS	INIT.	DATE

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

DocuSigned by: 12/19/2018
C287A58E9D08437
SIGNATURE DATE

SIG. INVENTORY NO. 05-0390

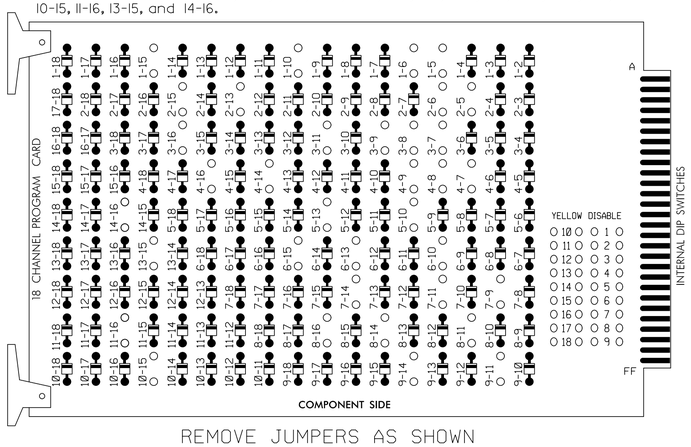
12/19/2018
K:\RDU\096968115\011036410 - Durham Signal Systems\Signals\S4 - Signal Design\GROUP 1\U-5968_050390-2017.dgn
derrick.weller

PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG. 82.1

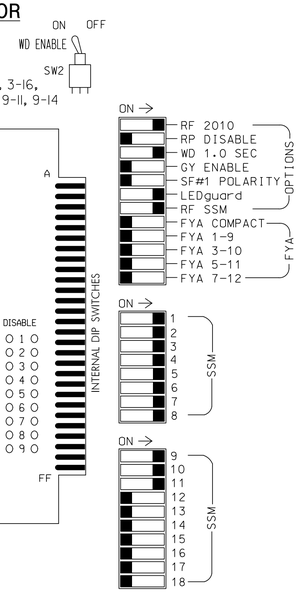
EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

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



REMOVE JUMPERS AS SHOWN



■ = DENOTES POSITION OF SWITCH

NOTES:

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

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Program controller to start up in phase 2 Walk and 6 Walk.
3. The cabinet and controller are part of the Durham Signal System.
4. Install GPS preemption system. Perform installation according to manufacturer's directions and NCDOT engineer - approved mounting location to accomplish the preemption schemes shown on the Signal Design Plans.

EQUIPMENT INFORMATION

CONTROLLER.....2070LX
CABINET.....332 W/AUX
SOFTWARE.....ECONOLITE ASC/3-2070
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
LOAD SWITCHES USED.....S1,S2,S3,S4,S5,S6,S7,S8,S9,S10,S11, S12,AUXS1,AUXS2,AUXS4
PHASES USED.....1,2,2PED,3,4,4PED,5,6,6PED,7,8,8PED
OVERLAP "A".....✳
OVERLAP "B".....✳
OVERLAP "C".....✳
OVERLAP "D".....NOT USED

✳ See overlap programming detail on sheet 2

SIGNAL HEAD HOOK-UP CHART

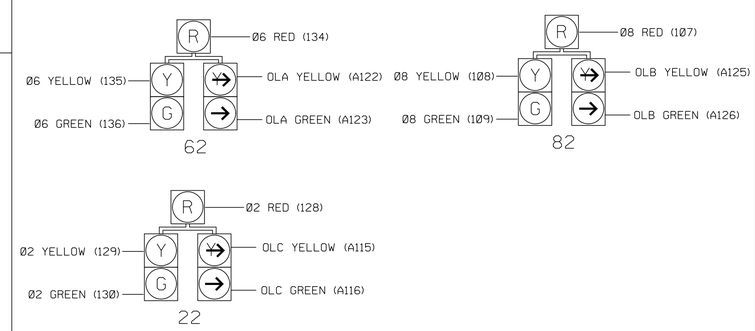
LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7		S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5		6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5		6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	11,12	21,22 23	P21, P22	31	41,42 43	P41, P42	51,52	42	61,62 63	P61, P62	71	81,82	P81, P82	62	82	NU	22	NU	NU
RED		128			101				134			107		✳	✳		✳		
YELLOW		129			102				135			108							
GREEN		130			103				136			109							
RED ARROW	125			116			131				122								
YELLOW ARROW	126			117			132	132			123			A122	A125		A115		
GREEN ARROW	127			118			133	133			124			A123	A126		A116		
✋			113			104				119			110						
🚶			115			106				121			112						

NU = Not Used

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

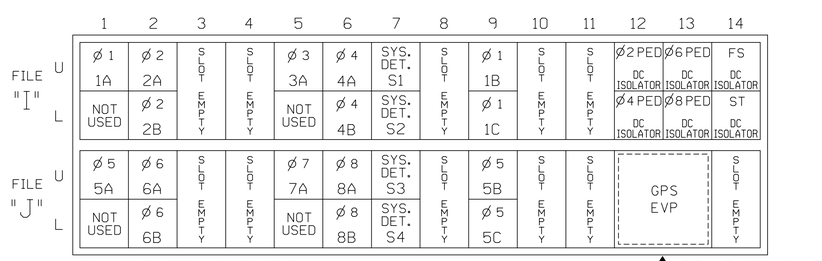
SIGNAL HEAD WIRING DETAIL

(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
1A	TB2-1,2	I1U	56	1	1	YES				S
1B	TB6-9,10	I9U	60	11	1	YES				S
1C	TB6-11,12	I9L	62	13	1	YES		15		S
2A	TB2-5,6	I2U	39	2	2	YES			X	N
2B	TB2-7,8	I2L	43	12	2	YES			X	N
3A	TB4-5,6	I5U	58	3	3	YES		3		S
4A	TB4-9,10	I6U	41	4	4	YES				S
4B	TB4-11,12	I6L	45	14	4	YES				S
5A	TB3-1,2	J1U	55	5	5	YES				S
5B	TB7-9,10	J9U	59	15	5	YES				S
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
7A	TB5-5,6	J5U	57	7	7	YES		3		S
8A	TB5-9,10	J6U	42	8	8	YES				S
8B	TB5-11,12	J6L	46	18	8	YES				S
✳ 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
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

✳ System detector only. Remove any assigned vehicle phase.

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

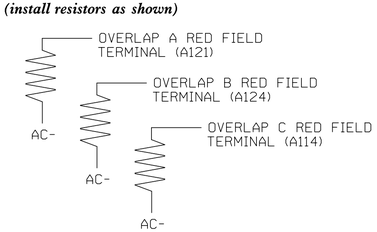
Countdown Ped Signals are required to display timing only during Ped Clearance Interval. Consult Ped Signal Module user's manual for instructions on selecting this feature.

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

ACCEPTABLE VALUES

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



THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0390
DESIGNED: DECEMBER 2017
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail - Sheet 1 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

NC 55
at
NC 54

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACIE L. PHILLIPS

DocuSigned by: 12/19/2018
0C87A59ED0B437...
SIGNATURE DATE

SIG. INVENTORY NO. 05-0390

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12/19/2018
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derrick.waller

PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG. 82.2

ECONOLITE ASC/3-2070 EMERGENCY VEHICLE PREEMPT PROGRAMMING DETAIL

(program controller as shown)

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

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

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

ENABLE... YES|PMT OVRIDE..|INTERLOCK. NO
DET LOCK... X|DELAY..    0|INHIBIT...  0
OVERIDE FL. .|DURATION   0|CLR-GRN... NO
TERM OLP.  NO|PC>YEL   YES|TERM PH    NO
PED DARK.. NO|TC RESRV  NO|DWELL FL  OFF
LINK PMT....0|X FLCOLR RED|EXIT OPT. OFF
X TMG PLN...0|RE-SERV..  0|FLT TYPE.HARD
FREE DUR PMT|R1  NO|R2  NO|R3  NO|R4  NO
--TIMING-----WALK|PED CL|MN GR| YEL| RED
ENTRANCE TM.   1|   20|   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 4. Then press the right cursor arrow and toggle the controller to YES. Next cursor down. This will select Emergency Vehicle Preempt #4.

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

ENABLE... YES|PMT OVRIDE..|INTERLOCK. NO
DET LOCK... X|DELAY..    0|INHIBIT...  0
OVERIDE FL. .|DURATION   0|CLR-GRN... NO
TERM OLP.  NO|PC>YEL   YES|TERM PH    NO
PED DARK.. NO|TC RESRV  NO|DWELL FL  OFF
LINK PMT....0|X FLCOLR RED|EXIT OPT. OFF
X TMG PLN...0|RE-SERV..  0|FLT TYPE.HARD
FREE DUR PMT|R1  NO|R2  NO|R3  NO|R4  NO
--TIMING-----WALK|PED CL|MN GR| YEL| RED
ENTRANCE TM.   1|   20|   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 . . . . . . . . . . . . . . . .
CYC VEH  . . . . . . . . . . . . . . . .
CYC PED  . . . . . . . . . . . . . . . .
CYC OLP  . . . . . . . . . . . . . . . .
EXIT PH  . . . X . . . X . . . . . . . .
EXIT CAL . . . . . . . . . . . . . . . .
SP FUNC  . . . . . . . . . . . . . . . .

ENABLE... YES|PMT OVRIDE..|INTERLOCK. NO
DET LOCK... X|DELAY..    0|INHIBIT...  0
OVERIDE FL. .|DURATION   0|CLR-GRN... NO
TERM OLP.  NO|PC>YEL   YES|TERM PH    NO
PED DARK.. NO|TC RESRV  NO|DWELL FL  OFF
LINK PMT....0|X FLCOLR RED|EXIT OPT. OFF
X TMG PLN...0|RE-SERV..  0|FLT TYPE.HARD
FREE DUR PMT|R1  NO|R2  NO|R3  NO|R4  NO
--TIMING-----WALK|PED CL|MN GR| YEL| RED
ENTRANCE TM.   1|   20|   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 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..
```

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 'NORMAL'

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

LAG GRN 0.0 YEL 0.0 RED 0.0
```

Toggle Once

↓

OVERLAP B

Select TMG VEH OVLP [B] and 'NORMAL'

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

LAG GRN 0.0 YEL 0.0 RED 0.0
```

Toggle Once

↓

OVERLAP C

Select TMG VEH OVLP [C] and 'NORMAL'

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

LAG GRN 0.0 YEL 0.0 RED 0.0
```

END PROGRAMMING

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0390
DESIGNED: DECEMBER 2017
SEALED: 12/19/2018
REVISED: N/A

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

Electrical Detail - Sheet 2 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

NC 55
at
NC 54

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 STACY L. PHILLIPS

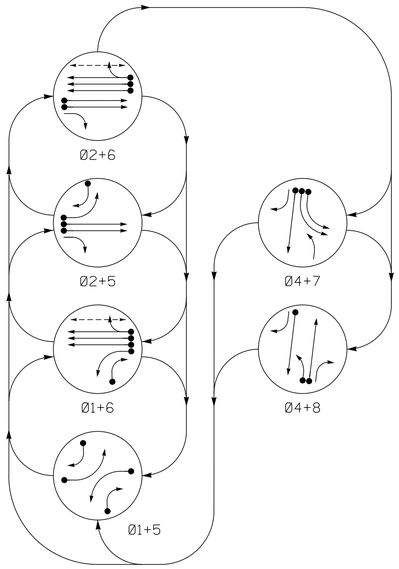
DocuSigned by:
12/19/2018
-DC7A8BEE9D8A47
SIGNATURE DATE

SIG. INVENTORY NO. 05-0390

12/19/2018
K:\RAL_TPD\U-5968_ITS\R011036410 - Durham Signal System\Signals\S4 - Signal Design\GROUP 1\U-5968_050390-2017e2.dgn
derrick.weller

PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG.83.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

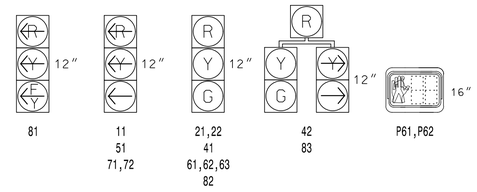
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE 01+5	01+6	02+5	02+6	04+7	04+8	FLASH
11	←	←	←R	←R	←R	←R	←R
21, 22	R	R	G	G	R	R	Y
41	R	R	R	R	G	G	R
42	R↘	R	R↘	R	G	G	R
51	←	←R	←	←R	←R	←R	←R
61,62,63	R	G	R	G	R	R	Y
71,72	←R	←R	←R	←R	←	←R	←R
81	←R	←R	←R	←R	F Y	F Y	←R
82	R	R	R	R	R	G	R
83	R↘	R↘	R	R	R	G	R
P61, P62	DW	W	DW	W	DW	DW	DRK

SIGNAL FACE I.D.

All Heads L.E.D.



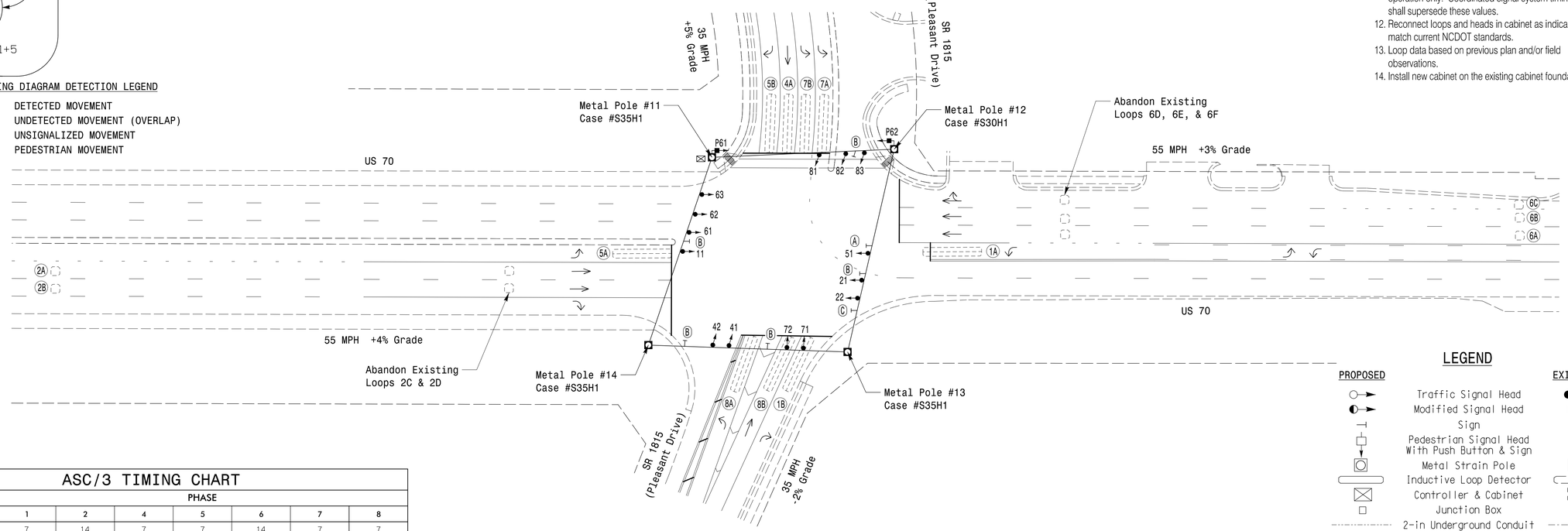
ASC/3 DETECTOR INSTALLATION CHART

DETECTOR					PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
1A	6X40	+5	2-4-2	-	1	Yes	-	3	-	S	-	X
1B	6X40	0	2-4-2	-	1	Yes	-	15	-	S	-	X
2A	6X6	420	EXIST	-	2	Yes	-	-	X	N	-	X
2B	6X6	420	EXIST	-	2	Yes	-	-	X	N	-	X
4A	6X40	0	2-4-2	-	4	Yes	-	-	-	S	-	X
5A	6X40	0	2-4-2	-	5	Yes	-	3	-	S	-	X
5B	6X40	0	2-4-2	-	5	Yes	-	15	-	S	-	X
6A	6X6	420	EXIST	-	6	Yes	-	-	X	N	-	X
6B	6X6	420	EXIST	-	6	Yes	-	-	X	N	-	X
6C	6X6	420	EXIST	-	6	Yes	-	-	X	N	-	X
7A	6X40	0	2-4-2	-	7	Yes	-	-	-	S	-	X
7B	6X40	0	2-4-2	-	7	Yes	-	-	-	S	-	X
8A	6X40	0	2-4-2	-	8	Yes	-	3	-	S	-	X
8B	6X40	0	2-4-2	-	8	Yes	-	-	-	S	-	X

6 Phase Fully Actuated (Durham Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 and/or phase 5 may be lagged.
4. Phase 7 may be lagged.
5. Abandon existing loops 2C, 2D, 6D, 6E, and 6F.
6. Set all detector units to presence mode.
7. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
8. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
9. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
10. Pavement markings are existing.
11. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
12. Reconnect loops and heads in cabinet as indicated to match current NCDOT standards.
13. Loop data based on previous plan and/or field observations.
14. Install new cabinet on the existing cabinet foundation.



LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Metal Strain Pole	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
N/A	Curb Ramp	
Ⓐ	"U-Turn Yield To Right Turn" Sign (R10-16)	Ⓐ
Ⓑ	Street Sign (D3-1)	Ⓑ
Ⓒ	Right Arrow "ONLY" Sign (R3-5R)	Ⓒ

ASC/3 TIMING CHART

FEATURE	PHASE 1	2	4	5	6	7	8
Min Green *	7	14	7	7	14	7	7
Walk *	0	0	0	0	7	0	0
Ped Clear	0	0	0	0	26	0	0
Veh. Extension *	2.0	6.0	2.0	2.0	6.0	2.0	2.0
Max 1 *	20	120	25	20	120	20	25
Yellow	3.0	4.8	4.0	3.0	4.9	3.0	4.0
Red Clear	3.9	1.4	2.5	3.8	1.5	3.1	2.5
Actuations B4 Add *	-	-	-	-	-	-	-
Seconds /Actuation *	-	1.5	-	-	1.0	-	-
Max Initial *	-	46	-	-	46	-	-
Time Before Reduction *	-	15	-	-	15	-	-
Time To Reduce *	-	45	-	-	45	-	-
Minimum Gap	-	3.4	-	-	3.4	-	-
Locking Detector	-	X	-	-	X	-	-
Recall Position	-	VEH. RECALL	-	-	VEH. RECALL	-	-
Dual Entry	-	-	X	-	-	-	-
Simultaneous Gap	X	X	X	X	X	X	X

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

12/19/2018
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derrick.waller

Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

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

SCALE 0 40 1"=40'

US 70 at SR 1815 (Pleasant Drive)

Division 5 Durham County Durham

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

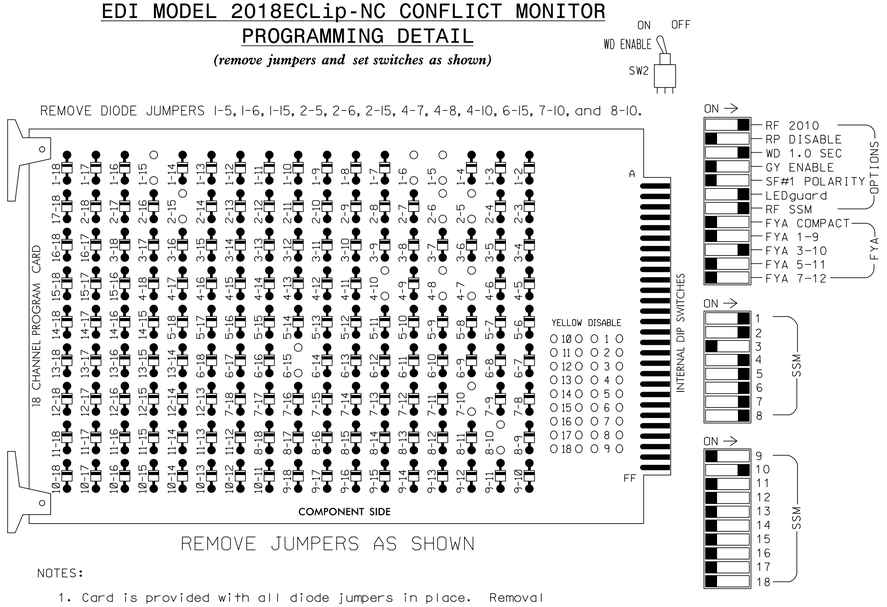
REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACE L. PHILLIPS
DocuSigned by: 0C87A59ED608437... 12/19/2018
SIGNATURE DATE
SIG. INVENTORY NO. 05-0393

PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG.83.1

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

EQUIPMENT INFORMATION

CONTROLLER.....2070LX
CABINET.....332 W/AUX
SOFTWARE.....ECONOLITE ASC/3-2070
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
LOAD SWITCHES USED.....S1,S2,S5,S7,S8,S9,S10,S11, AUX S2
PHASES USED.....1,2,4,5,6,6PED,7,8
OVERLAP "A".....NOT USED
OVERLAP "B".....*
OVERLAP "C".....NOT USED
OVERLAP "D".....NOT USED

* See overlap programming detail on sheet 2

SIGNAL HEAD HOOK-UP CHART

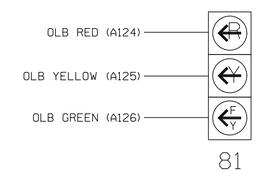
LOAD SWITCH NO.	S1		S2	S3	S4	S5	S6	S7		S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1		2	13	3	4	14	5		6	15	7	8	16	9	10	17	11	12	18
PHASE	1		2	2 PED	3	4	4 PED	5		6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	11	83	21,22	NU	NU	41,42	NU	42	51	61,62 63	P61, P62	71,72	82,83	NU	NU	★ 81	NU	NU	NU	NU
RED			128			101				134			107							
YELLOW			129			102				135			108							
GREEN			130			103				136			109							
RED ARROW	125								131			122				A124				
YELLOW ARROW	126	126						132	132			123				A125				
FLASHING YELLOW ARROW																A126				
GREEN ARROW	127	127						133	133			124								
✋											119									
🚶											121									

NU = Not Used

★ See pictorial of head wiring in detail this sheet.

FYA SIGNAL WIRING DETAIL

(wire signal head as shown)



INPUT FILE POSITION LAYOUT

(front view)

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

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND TIME	DELAY TIME	ADDED INITIAL	DETECTOR TYPE
1A	TB2-1,2	I1U	56	1	1	YES		3		S
1B	TB6-9,10	I9U	60	11	1	YES		15		S
2A	TB2-5,6	I2U	39	2	2	YES			X	N
2B	TB2-7,8	I2L	43	12	2	YES			X	N
4A	TB4-9,10	I6U	41	4	4	YES				S
5A	TB3-1,2	J1U	55	5	5	YES		3		S
5B	TB7-9,10	J9U	59	15	5	YES		15		S
6A	TB3-5,6	J2U	40	6	6	YES			X	N
6B	TB3-7,8	J2L	44	16	6	YES			X	N
6C	TB3-9,10	J3U	64	36	6	YES			X	N
7A	TB5-5,6	J5U	57	7	7	YES				S
7B	TB7-11,12	J9L	61	17	7	YES				S
8A	TB5-9,10	J6U	42	8	8	YES		3		S
8B	TB5-11,12	J6L	46	18	8	YES				S
PED PUSH BUTTONS										
P61,P62	TB8-7,9	I13U	68	PED 6	6 PED					

NOTE:
INSTALL DC ISOLATOR IN INPUT FILE SLOT I13.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0393
DESIGNED: DECEMBER 2017
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail - Sheet 1 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

US 70
at
SR 1815 (Pleasant Drive)

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACIE L. PHILLIPS

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

SIG. INVENTORY NO. 05-0393

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12/19/2018
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derrick.waller

PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG.83.2

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]

TOGGLE ONCE

OVERLAP B

Select TMG VEH OVLP [B] and (OTHER/ECONOLITE)

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

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

END PROGRAMMING

FLASHER CIRCUIT MODIFICATION DETAIL

IN ORDER TO 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: 05-0393
DESIGNED: DECEMBER 2017
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail - Sheet 2 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PLANS PREPARED IN THE OFFICE OF:
Kimley»Horn
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421 Fayetteville Street, Suite 600
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ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared For:

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

750 N.Greenfield Pkwy,Garner,NC 27529

US 70
at
SR 1815 (Pleasant Drive)

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACY L. PHILLIPS

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

SIG. INVENTORY NO. 05-0393

12/19/2018
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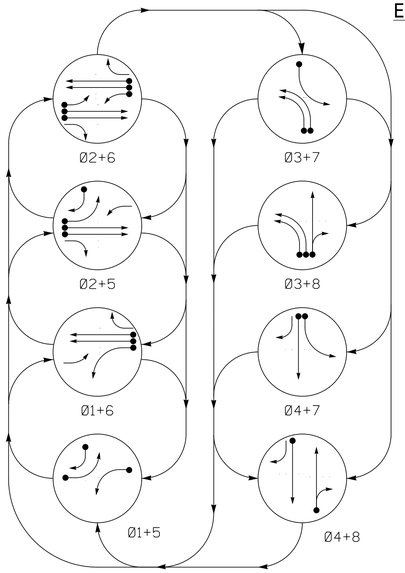
derrick.waller

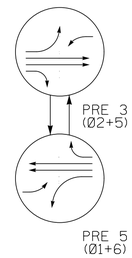
PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG.84.0

DEFAULT PHASING DIAGRAM



DEFAULT PHASING EV PREEMPT PHASES

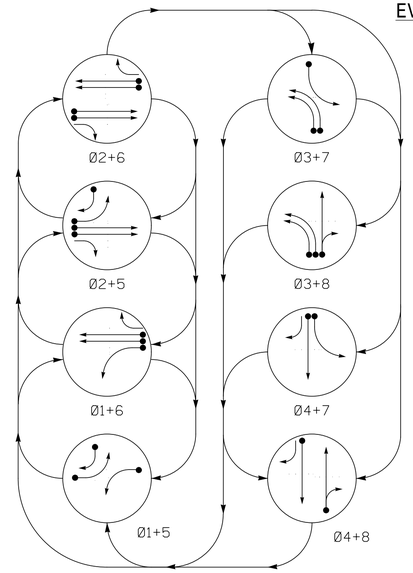
(Medium Priority)



DEFAULT PHASING TABLE OF OPERATION

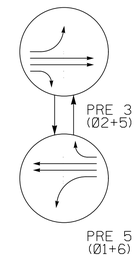
SIGNAL FACE	PHASE										
	Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3+7	Ø3+8	Ø4+7	Ø4+8	PRE3	PRE5	FLASH
11	←-	←-	F Y	F Y	-R	-R	-R	-R	F Y	←-	-Y
21, 22	R	R	G	G	R	R	R	G	R	R	Y
31, 32	-R	-R	-R	-R	←-	←-	-R	-R	-R	-R	-R
41	R	R	R	R	R	R	G	G	R	R	R
42	R	R	R	R	R	R	G	G	R	R	R
51	←-	F Y	←-	F Y	-R	-R	-R	-R	←-	F Y	-Y
61, 62	R	G	R	G	R	R	R	R	R	G	Y
71	-R	-R	-R	-R	←-	-R	←-	-R	-R	-R	-R
81, 82	R	R	R	R	R	G	R	G	R	R	R

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+7	Ø3+8	Ø4+7	Ø4+8	PRE3	PRE5	FLASH
11	←-	←-	-R	-R	-R	-R	-R	-R	-R	←-	-Y
21, 22	R	R	G	G	R	R	R	R	G	R	Y
31, 32	-R	-R	-R	-R	←-	←-	-R	-R	-R	-R	-R
41	R	R	R	R	R	R	G	G	R	R	R
42	R	R	R	R	R	R	G	G	R	R	R
51	←-	-R	←-	-R	-R	-R	-R	-R	←-	-R	-Y
61, 62	R	G	R	G	R	R	R	R	R	G	Y
71	-R	-R	-R	-R	←-	-R	←-	-R	-R	-R	-R
81, 82	R	R	R	R	R	G	R	G	R	R	R

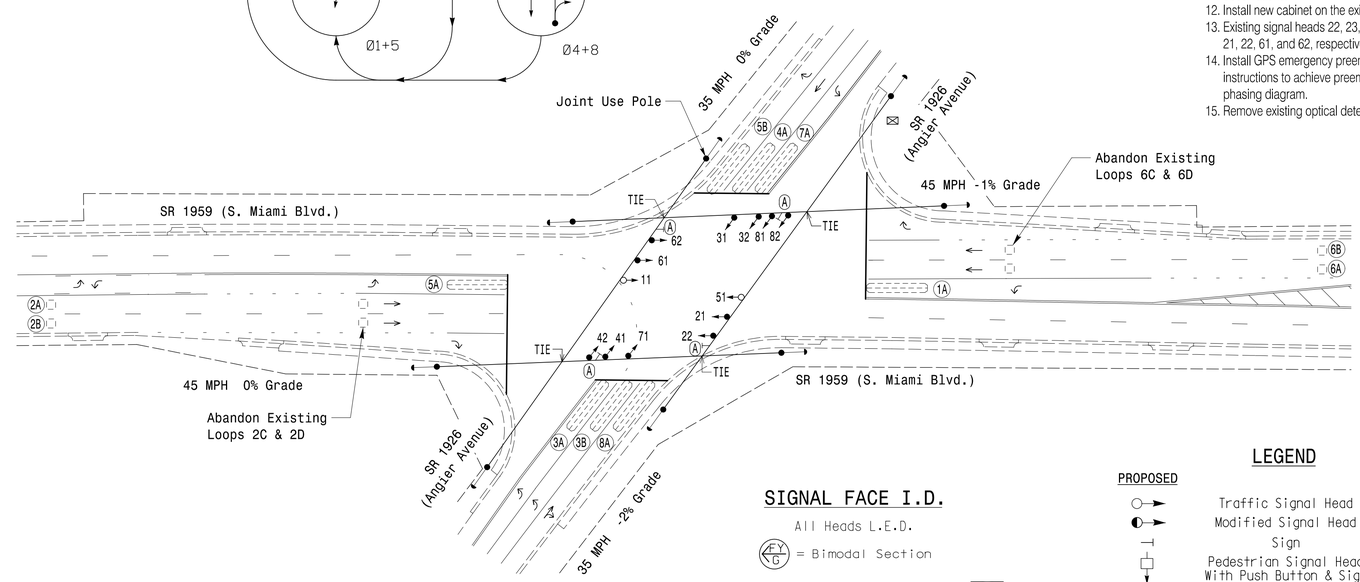
8 PHASE FULLY ACTUATED W/ EMERGENCY PREEMPTION (DURHAM SIGNAL SYSTEM)

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. Phase 3 and/or phase 7 may be lagged.
5. Abandon existing loops 2C, 2D, 6C, and 6D.
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 22, 23, 63, and 64 have been relabeled to 21, 22, 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



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.

ASC/3 TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6	7	8
Min Green *	7	12	7	7	7	12	7	7
Walk *	0	0	0	0	0	0	0	0
Ped Clear	0	0	0	0	0	0	0	0
Veh. Extension *	2.0	6.0	2.0	2.0	2.0	6.0	2.0	2.0
Max 1 *	20	45	20	30	20	45	20	30
Yellow	3.0	4.6	3.0	3.8	3.0	4.6	3.0	4.0
Red Clear	4.4	3.0	2.9	2.6	4.5	3.0	2.6	2.8
Actuations B4 Add *	-	-	-	-	-	-	-	-
Seconds /Actuation *	-	1.5	-	-	-	1.5	-	-
Max Initial *	-	34	-	-	-	34	-	-
Time Before Reduction *	-	15	-	-	-	15	-	-
Time To Reduce *	-	45	-	-	-	45	-	-
Minimum Gap	-	3.0	-	-	-	3.0	-	-
Locking Detector	-	X	-	-	-	X	-	-
Recall Position	-	VEH. RECALL	-	-	-	VEH. RECALL	-	-
Dual Entry	-	-	-	-	-	-	-	-
Simultaneous Gap	X	X	X	X	X	X	X	X

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

ASC/3 DETECTOR INSTALLATION CHART

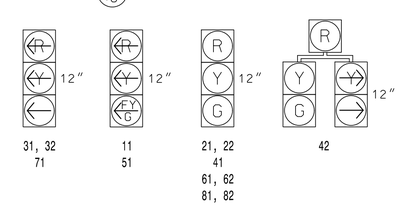
DETECTOR					PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
1A	6X40	0	2-4-2	-	1	Yes	-	15*	-	S	-	X
					6#	Yes	-	3	-	G	-	X
2A	6X6	300	EXIST	-	2	Yes	-	-	X	N	-	X
2B	6X6	300	EXIST	-	2	Yes	-	-	X	N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

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

SIGNAL FACE I.D.

All Heads L.E.D.

F Y G = Bimodal Section



LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
	Street Sign (D3-1)	

Signal Upgrade

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

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 50 1"=50'

SR 1959 (South Miami Boulevard) at SR 1926 (Angier 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: 12/19/2018
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SIGNATURE DATE
SIG. INVENTORY NO. 05-0394

12/19/2018
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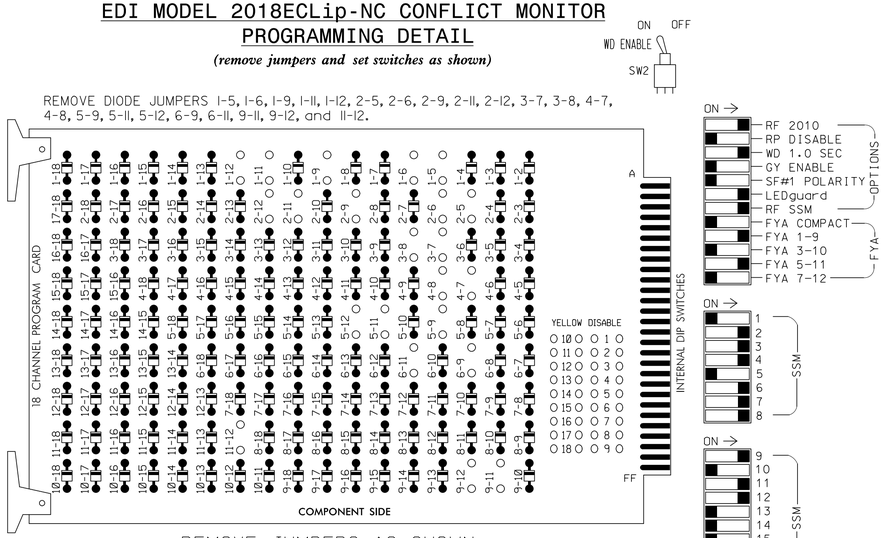
PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG. 84.1

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

EQUIPMENT INFORMATION

CONTROLLER.....2070LX
CABINET.....332 W/AUX
SOFTWARE.....ECONOLITE ASC/3-2070
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
LOAD SWITCHES USED.....S1,S2,S4,S5,S7,S8,S10,S11,AUX S1, AUX S4,AUX S5
PHASES USED.....1,2,3,4,5,6,7,8
OVERLAP "A".....*
OVERLAP "B".....NOT USED
OVERLAP "C".....*
OVERLAP "D".....*

* See overlap programming detail on sheet 2

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	11★	21,22	NU	31,32	41,42	NU	51★	61,62	NU	71	81,82	NU	11★	NU	NU	51★	42★	NU
RED		128			101			134			107						*	
YELLOW	*	129			102		*	135			108							
GREEN		130			103			136			109							
RED ARROW				116						122			A121			A114		
YELLOW ARROW				117						123			A122			A115	A102	
FLASHING YELLOW ARROW													A123			A116		
GREEN ARROW	127			118			133			124							A103	

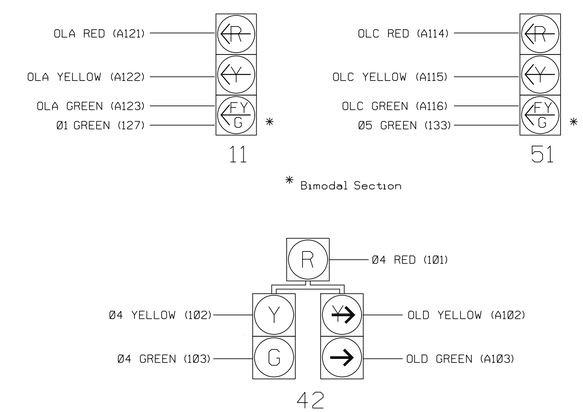
NU = Not Used

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

★ See pictorial of head wiring in detail this sheet.

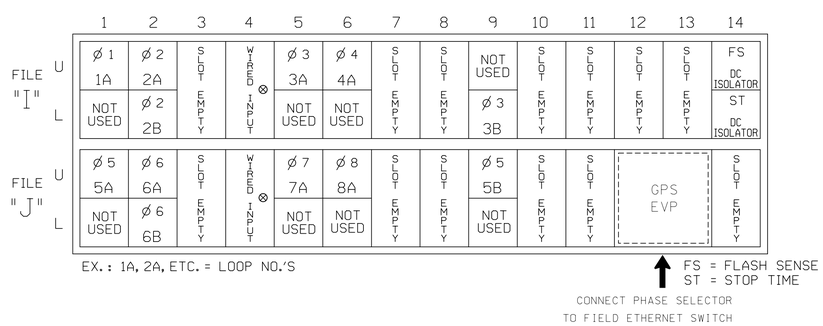
SIGNAL HEAD WIRING DETAIL

(wire signal heads as shown)



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				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
6A	TB3-5,6	J2U	40	6	6	YES			X	N
6B	TB3-7,8	J2L	44	16	6	YES			X	N
7A	TB3-5,6	J5U	57	7	7	YES		3		S
8A	TB5-9,10	J6U	42	8	8	YES		10		S

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

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

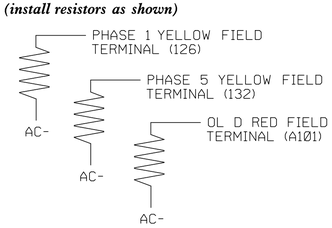
★ For the detectors to work as shown on the signal design plan, see the Vehicle Detector Setup Programming Detail for Alternate Phasing on sheet 3.

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: 05-0394
DESIGNED: DECEMBER 2017
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail - Sheet 1 of 4

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 1959 (South Miami Boulevard)
at
SR 1926 (Angier Avenue)

Division 5 Durham County Durham

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

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

REVISIONS	INIT.	DATE

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

DocuSigned by: SLPh 12/19/2018
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SIG. INVENTORY NO. 05-0394

PLANS PREPARED IN THE OFFICE OF:
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derrick.waller

PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG. 84.2

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|PMTEXT|IMX TM| YEL| RED
DWL/CYC-EXIT    7|   0.0|  120|25.5|25.5
PMT ACTIVE OUT..ON   PMT ACT DWELL...NO
OTHER - PRI PMT.OFF  NON-PRI PMT.....OFF
INH EXT TIME... 0.0  PED PR RETURN...OFF
PRIORITY RETURN.OFF  QUEUE DELAY.... OFF
COND DELAY......OFF
PHASES     1   2   3   4   5   6   7   8
PR RTN%    0   0   0   0   0   0   0   0
PHASES     9  10  11  12  13  14  15  16
PR RTN%    0   0   0   0   0   0   0   0
```

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 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|PMTEXT|IMX TM| YEL| RED
DWL/CYC-EXIT    7|   0.0|  120|25.5|25.5
PMT ACTIVE OUT..ON   PMT ACT DWELL...NO
OTHER - PRI PMT.OFF  NON-PRI PMT.....OFF
INH EXT TIME... 0.0  PED PR RETURN...OFF
PRIORITY RETURN.OFF  QUEUE DELAY.... OFF
COND DELAY......OFF
PHASES     1   2   3   4   5   6   7   8
PR RTN%    0   0   0   0   0   0   0   0
PHASES     9  10  11  12  13  14  15  16
PR RTN%    0   0   0   0   0   0   0   0
```

PROGRAM EXTEND TIME ON GPS DETECTOR 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 Twice

OVERLAP C

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

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

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

FLASHING ARROW OUTPUT.....CH11 ISOLATE

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

← NOTICE ACTION PLAN SF BIT "5"

Toggle Once

OVERLAP D

Select TMG VEH OVLP [D] and 'NORMAL'

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

LAG GRN 0.0 YEL 0.0 RED 0.0
```

END PROGRAMMING

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0394
DESIGNED: DECEMBER 2017
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:

SR 1959 (South Miami Boulevard)
at
SR 1926 (Angier Avenue)

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

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

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

DocuSigned by:
0CB7A59ED0DB437...
12/19/2018
SIGNATURE DATE

SIG. INVENTORY NO. 05-0394

12/19/2018
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derrick.waller

PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG. 84.3

ECONOLITE ASC/3-2070 PREEMPT FILTERING PROGRAMMING DETAIL

(program controller as shown)

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

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

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

(program controller as shown)

IMPORTANT!

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

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

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

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

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

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

← NOTICE VEH DET PLAN 2

← ENSURE DELAY IS SET TO '3'

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

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 "3".

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

← NOTICE VEH DET PLAN 2

← ENSURE DELAY IS SET TO '3'

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

ENSURE PHASE IS SET TO "0" →

```
VEH DETECTOR [22]   VEH DET PLAN [ 2]
TYPE: 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: 05-0394
DESIGNED: DECEMBER 2017
SEALED: 12/19/2018
REVISED: N/A

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

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 1959 (South Miami Boulevard) at SR 1926 (Angier Avenue)

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

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

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACIE L. PHILLIPS

DocuSigned by: 0C87A05E0D0B437...
12/19/2018
SIGNATURE DATE

SIG. INVENTORY NO. 05-0394

12/19/2018
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derrick.waller

ALTERNATE PHASING ACTIVATION DETAIL

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

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

ECONOLITE ASC/3-2070 ACTION PLAN PROGRAMMING DETAIL

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

```
ACTION PLAN...[ 1]
PATTERN..........AUTO   SYS OVERRIDE.... NO
TIMING PLAN........ 0   SEQUENCE........  0
VEH DETECTOR PLAN.. 2   DET LOG........NONE
FLASH...........   --   RED REST........ NO
VEH DET DIAG PLN... 0   PED DET DIAG PLN..0
DIMMING ENABLE..   NO   PRIORITY RETURN. NO
PED PR RETURN..    NO   QUEUE DELAY..... NO
PMT COND DELAY     NO
  PHASE   1  2  3  4  5  6  7  8  9  0  1  2  3  4  5  6
PED RCL   .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
WALK 2    .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
VEX 2     .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
VEH RCL   .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
MAX RCL   .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
MAX 2     .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
  PHASE   1  2  3  4  5  6  7  8  9  0  1  2  3  4  5  6
MAX 3     .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
CS INH    .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
OMIT      .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
SPC FCT   X  .  .  .  X  .  .  .  (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: 05-0394
DESIGNED: DECEMBER 2017
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail - Sheet 4 of 4

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

SR 1959 (South Miami Boulevard)
at
SR 1926 (Angier Avenue)

Division 5 Durham County Durham

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

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

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACIE L. PHILLIPS

DocuSigned by:
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12/19/2018
SIGNATURE DATE

SIG. INVENTORY NO. 05-0394

12/19/2018
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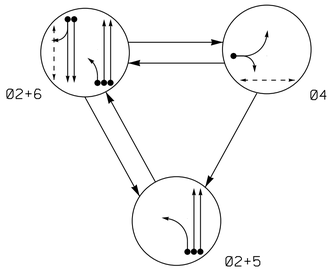
PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG. 85.0

DEFAULT PHASING DIAGRAM



DEFAULT PHASING EV PREEMPT PHASES

(Medium Priority)

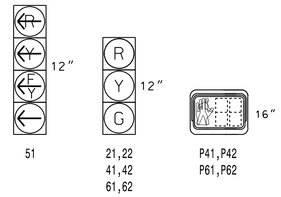
PRE 3
(Ø2+5)

DEFAULT PHASING TABLE OF OPERATION

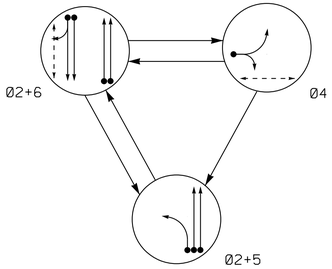
SIGNAL FACE	PHASE Ø2+5	Ø2+6	Ø4	PRE 3	FLASH
21,22	G	G	R	G	Y
41,42	R	R	G	R	R
51	←	~~Y~~	~~R~~	←	~~Y~~
61,62	R	G	R	R	Y
P41,P42	DW	DW	W	DW	DRK
P61,P62	DW	W	DW	DW	DRK

SIGNAL FACE I.D.

All Heads L.E.D.



ALTERNATE PHASING DIAGRAM



ALTERNATE PHASING EV PREEMPT PHASES

(Medium Priority)

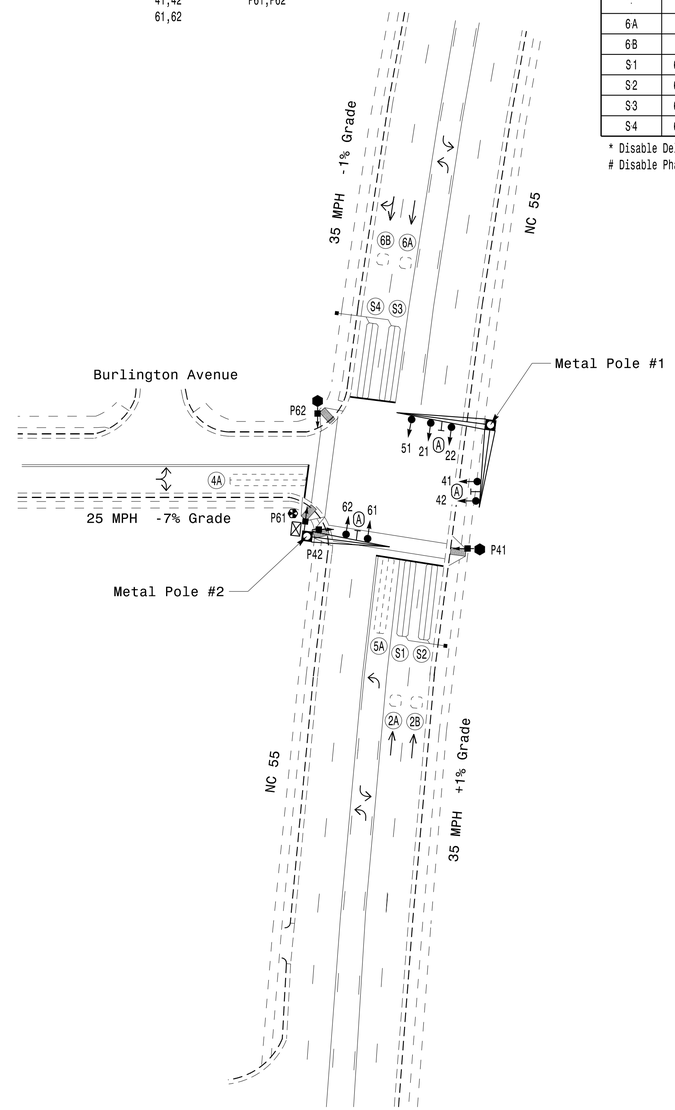
PRE 3
(Ø2+5)

ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2+5	Ø2+6	Ø4	PRE 3	FLASH
21,22	G	G	R	G	Y
41,42	R	R	G	R	R
51	←	~~R~~	~~R~~	←	~~Y~~
61,62	R	G	R	R	Y
P41,P42	DW	DW	W	DW	DRK
P61,P62	DW	W	DW	DW	DRK

PHASING DIAGRAM DETECTION LEGEND

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



ASC/3 DETECTOR INSTALLATION CHART

DETECTOR: LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING: PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
2A	6X6	70	EXIST	-	2	Yes	-	-	-	S	-	X
2B	6X6	70	EXIST	-	2	Yes	-	-	-	S	-	X
4A	6X40	0	2-4-2	-	4	Yes	-	10	-	S	-	X
5A	6X40	0	EXIST	-	5	Yes	-	15*	-	S	-	X
				-	2#	Yes	-	-	-	S	-	X
6A	6X6	70	EXIST	-	6	Yes	-	-	-	S	-	X
6B	6X6	70	EXIST	-	6	Yes	-	-	-	S	-	X
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.

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

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 5 may be lagged.
4. 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 shall supersede these values.
11. Loop data based on previous plan and/or field observations.
12. Install new cabinet on the existing cabinet foundation.
13. Install GPS emergency preemption system per manufacturer's instructions to achieve preemption needed, as shown in phasing diagram.
14. Remove existing optical detection equipment.

ASC/3 TIMING CHART

FEATURE	PHASE 2	4	5	6
Min Green *	10	7	7	10
Walk *	0	7	0	7
Ped Clear	0	17	0	11
Veh. Extension *	3.0	2.0	2.0	3.0
Max 1 *	60	25	15	60
Delayed Green*	-	4	-	4
Yellow	3.9	3.2	3.0	3.9
Red Clear	1.5	2.4	2.3	1.5
Actuations B4 Add *	-	-	-	-
Seconds /Actuation *	-	-	-	-
Max Initial *	-	-	-	-
Time Before Reduction *	-	-	-	-
Time To Reduce *	-	-	-	-
Minimum Gap	-	-	-	-
Locking Detector	X	-	-	X
Recall Position	VEH. RECALL	-	-	VEH. RECALL
Dual Entry	-	-	-	-
Simultaneous Gap	X	X	X	X

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

ASC/3 EV PREEMPT

FUNCTION	PRE 3
Exit Phase(s)	2+6
Preempt Override	OFF
Delay Time	0
Ped Clear Through Yellow	Y
Terminate Phases	N
Entrance Walk	1
Entrance Ped Clear	10
Entrance Min Green	1
Entrance Yellow Change	25.5*
Entrance Red Clear	25.5*
Minimum Dwell Time	7
Preempt Input Extension Time **	2.0
Preempt Max Time	120
Exit Yellow Change	25.5*
Exit Red Clear	25.5*

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

LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Type I Pushbutton Post	
	Type II Signal Pedestal	
	Metal Pole with Mastarm	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
N/A	Curb Ramp	
	Street Sign (D3-1)	

Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

NC 55
at
Burlington Avenue

Division 5 Durham County Durham

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

SCALE 0 40 1"=40'

REVISIONS	INIT.	DATE

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

DocuSigned by: 0C87A59ED60D437... 12/19/2018
SIGNATURE DATE

SIG. INVENTORY NO. 05-0395

PLANS PREPARED IN THE OFFICE OF:
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12/19/2018
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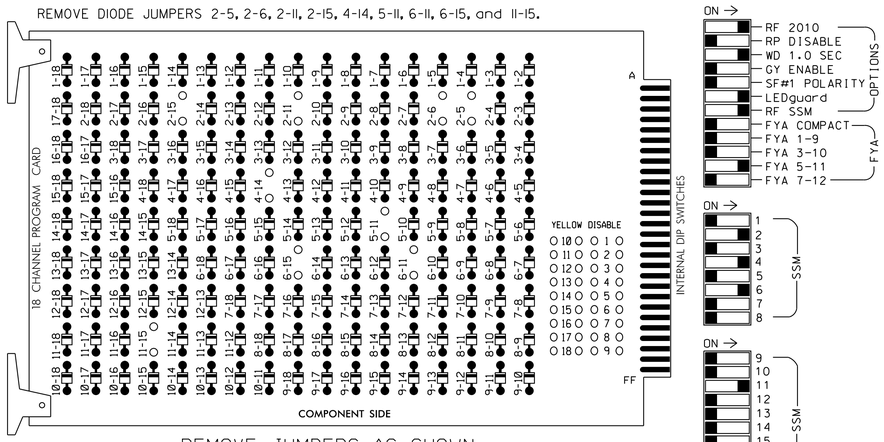
PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG. 85.1

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,S6,S7,S8,S9,AUX S4
PHASES USED.....2,4,4PED,5,6,6PED
OVERLAP "A".....NOT USED
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	21,22	NU	NU	41,42	P41, P42	51★	61,62	P61, P62	NU	NU	NU	NU	NU	NU	51★	NU	NU
RED		128			101			134										
YELLOW		129			102		✱	135										
GREEN		130			103			136										
RED ARROW																A114		
YELLOW ARROW																A115		
FLASHING YELLOW ARROW																A116		
GREEN ARROW							133											
✋						104			119									
🚶						106			121									

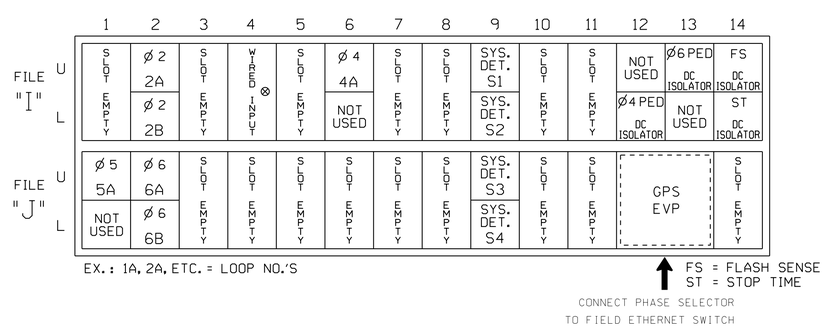
NU = Not Used

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

★ See pictorial of head wiring in detail this sheet.

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
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		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
✱ S1	TB6-9,10	I9U	60	11	SYS	NO				N
✱ S2	TB6-11,12	I9L	62	13	SYS	NO				N
✱ S3	TB7-9,10	J9U	59	15	SYS	NO				N
✱ S4	TB7-11,12	J9L	61	17	SYS	NO				N
PED PUSH BUTTONS										
P41,P42	TB8-5,6	I12L	69	PED 4	4 PED					
P61,P62	TB8-7,9	I13U	68	PED 6	6 PED					

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

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

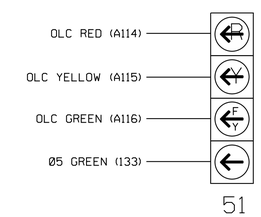
★ For the detectors to work as shown on the signal design plan, see the Vehicle Detector Setup Programming Detail for Alternate Phasing on sheet 2.

✱ 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)

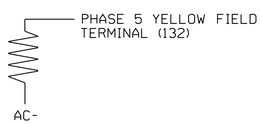


LOAD RESISTOR INSTALLATION DETAIL

(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: 05-0395
DESIGNED: MAY 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:
State of North Carolina Department of Transportation Mobility and Safety Division Signals Management Section
750 N.Greenfield Pkwy,Garner,NC 27529

NC 55 at Burlington Avenue

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACIE L. PHILLIPS
DocuSigned by: DC87A59ED008437
SIGNATURE 12/19/2018 DATE
SIG. INVENTORY NO. 05-0395

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.85.2

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

IMPORTANT!

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

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

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

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

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

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

← NOTICE VEH DET PLAN 2

← ENSURE DELAY IS SET TO '0'

↓

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

```
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

ECONOLITE ASC/3-2070 EMERGENCY VEHICLE PREEMPT PROGRAMMING DETAIL

(program controller as shown)

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

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

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

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0395
DESIGNED: MAY 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]

Toggle Twice

OVERLAP C

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

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

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

FLASHING ARROW OUTPUT.....CH11 ISOLATE

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

← NOTICE ACTION PLAN SF BIT "5"

END PROGRAMMING

ECONOLITE ASC/3-2070 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 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

PLANS PREPARED IN THE OFFICE OF:
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NC 55 at Burlington Avenue

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

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SIG. INVENTORY NO. 05-0395

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PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG.85.3

ALTERNATE PHASING ACTIVATION DETAIL

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

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

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

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

ALTERNATE PHASING CHANGE SUMMARY

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

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

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

ECONOLITE ASC/3-2070 ACTION PLAN PROGRAMMING DETAIL

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

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0395
DESIGNED: MAY 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail - Sheet 3 of 4

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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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
Burlington Avenue

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

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SIG. INVENTORY NO. 05-0395

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PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG.85.4

ECONOLITE ASC/3-2070 LOGIC PROCESSOR PROGRAMMING DETAIL FOR LEADING PED INTERVAL (DELAYED GREEN)

(program controller as shown)

The following logic processor configuration holds the FYA on signal head 51 red for the duration of the delayed green time (leading ped interval) when serving a ped call on the opposing through phase.

1. From Main Menu select 1. CONFIGURATION
2. From CONFIGURATION Submenu select 8. LOGIC PROCESSOR
3. From the 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    PED ON PH WALK        6     IS   ON
AND   VEH GREEN ON PH       6     IS   OFF

THEN  SIG SET OLP RED       3          ON
      SIG SET OLP YELLOW    3          OFF
      SIG SET OVLP GREEN    3          OFF

ELSE
```

HOLD SIGNAL HEAD 51 FYA RED DURING THE PHASE 6 DELAYED GREEN TIME (LEADING PED INTERVAL)

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

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

LOGIC STATEMENT CONTROL

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

END PROGRAMMING

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0395
DESIGNED: MAY 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail - Sheet 4 of 4

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

NC 55
at
Burlington Avenue

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACIE L. PHILLIPS

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SIG. INVENTORY NO. 05-0395

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PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig.86.0

ASC/3 DETECTOR INSTALLATION CHART

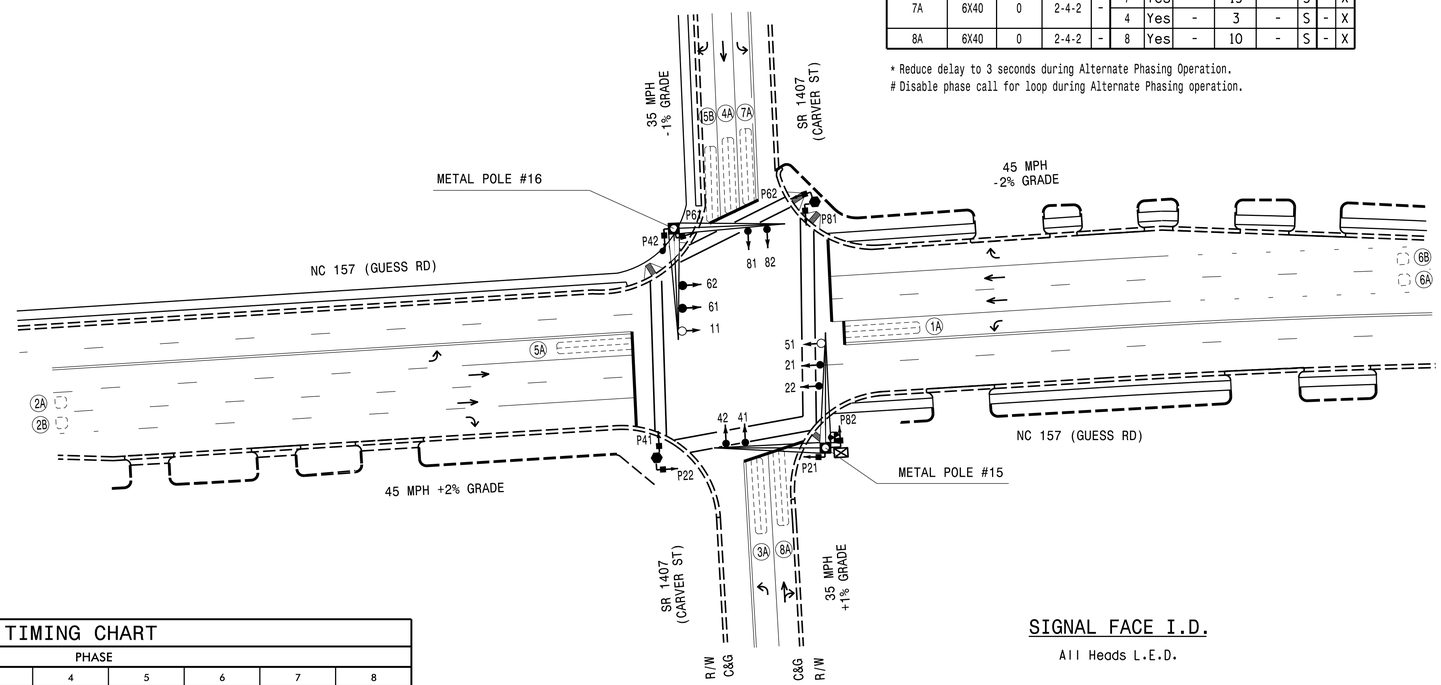
DETECTOR					PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
1A	6X40	0	2-4-2	-	1	Yes	-	15*	-	S	-	X
					6#	Yes	-	3	-	G	-	X
2A	6X6	300	4	-	2	Yes	-	-	X	N	-	X
2B	6X6	300	4	-	2	Yes	-	-	X	N	-	X
3A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

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

8 Phase Fully Actuated (Durham Signal System)

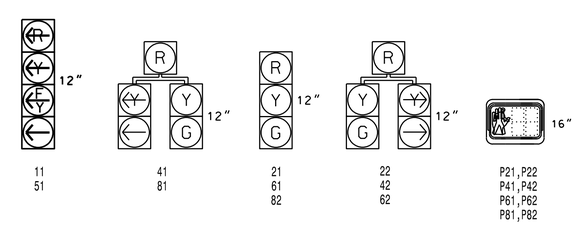
NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Omit phase 3 during phase 4 on.
4. Omit phase 7 during phase 8 on.
5. Phase 1 and/ or phase 5 may be lagged.
6. Set all detector units to presence mode.
7. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
8. Omit "WALK" and Flashing "DON'T WALK" with no pedestrian calls.
9. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
10. Pavement markings are existing.
11. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
12. Loop data based on previous plan and/or field observations.
13. Install new cabinet on the existing cabinet foundation.
14. Reconnect lead-in cable to separate loops 2A, 2B, 6A, and 6B as shown.



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	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
	Type I Pushbutton Post	
	Type II Signal Pedestal	
N/A	Curb Ramp	
	Metal Pole with Mastarm	

ASC/3 TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6	7	8
Min Green *	7	12	7	7	7	12	7	7
Walk *	0	7	0	7	0	7	0	7
Ped Clear	0	15	0	18	0	12	0	24
Veh. Extension *	2.0	6.0	2.0	2.0	2.0	6.0	2.0	2.0
Max 1 *	25	90	25	25	25	90	25	25
Yellow	3.0	4.7	3.0	3.9	3.0	4.7	3.0	3.8
Red Clear	2.8	2.0	3.1	2.3	3.3	2.0	2.8	2.4
Red Revert	2.0	5.0	2.0	2.0	2.0	5.0	2.0	2.0
Actuations B4 Add *	-	-	-	-	-	-	-	-
Seconds /Actuation *	-	1.5	-	-	-	1.5	-	-
Max Initial *	-	34	-	-	-	34	-	-
Time Before Reduction *	-	15	-	-	-	15	-	-
Time To Reduce *	-	30	-	-	-	30	-	-
Minimum Gap	-	3.0	-	-	-	3.0	-	-
Locking Detector	-	X	-	-	-	X	-	-
Recall Position	-	VEH. RECALL	-	-	-	VEH. RECALL	-	-
Dual Entry	-	-	-	X	-	-	-	X
Simultaneous Gap	X	X	X	X	X	X	X	X

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

Signal Upgrade - Sheet 1 of 2

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Project #: 170905

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NCBELS FIRM LICENSE NO. C-2522

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

SCALE 0 40 1" = 40'

NC 157 (Guess Road) at SR 1407 (Carver Street)

Division 5 Durham County Durham

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

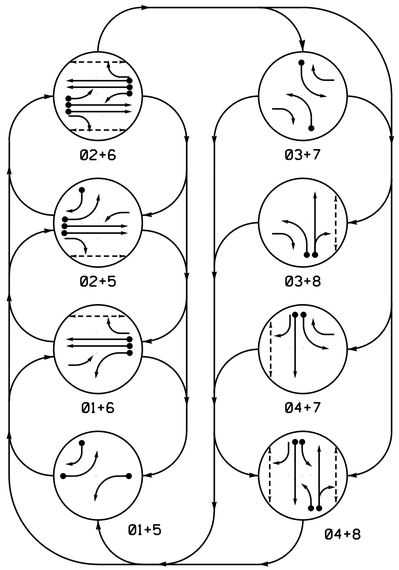
REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 044157 ENGINEER ANDREW D HAYES

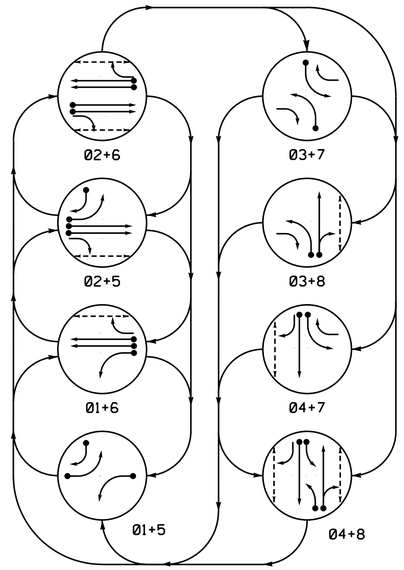
DocuSigned by: Andrew Hayes
SIGNATURE 12/21/2018 DATE
PROFESSIONAL ENGINEER
SIG. INVENTORY NO. 05-0396

PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig.86.1

DEFAULT PHASING DIAGRAM



ALTERNATE PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE 01+5	01+6	02+5	02+6	03+7	03+8	04+7	04+8	FLASH
11	—	—	F Y	F Y	~~R~~	~~R~~	~~R~~	~~R~~	~~Y~~
21	R	R	G	G	R	R	R	R	Y
22	R	R	G	G	R/—	R/—	R	R	Y
41	R	R	R	R	—\R	R	—\G	G	R
42	R/—	R	R/—	R	R	R	G	G	R
51	—	F Y	—	F Y	~~R~~	~~R~~	~~R~~	~~R~~	~~Y~~
61	R	G	R	G	R	R	R	R	Y
62	R	G	R	G	R/—	R	R/—	R	Y
81	R	R	R	R	—\R	—\G	R	G	R
82	R	R	R	R	R	G	R	G	R
P21,P22	DW	DW	W	W	DW	DW	DW	DW	DRK
P41,P42	DW	DW	DW	DW	DW	DW	W	W	DRK
P61,P62	DW	W	DW	W	DW	DW	DW	DW	DRK
P81,P82	DW	DW	DW	DW	DW	W	DW	W	DRK

ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE 01+5	01+6	02+5	02+6	03+7	03+8	04+7	04+8	FLASH
11	—	—	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~Y~~
21	R	R	G	G	R	R	R	R	Y
22	R	R	G	G	R/—	R/—	R	R	Y
41	R	R	R	R	—\R	R	—\G	G	R
42	R/—	R	R/—	R	R	R	G	G	R
51	—	~~R~~	—	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~Y~~
61	R	G	R	G	R	R	R	R	Y
62	R	G	R	G	R/—	R	R/—	R	Y
81	R	R	R	R	—\R	—\G	R	G	R
82	R	R	R	R	R	G	R	G	R
P21,P22	DW	DW	W	W	DW	DW	DW	DW	DRK
P41,P42	DW	DW	DW	DW	DW	DW	W	W	DRK
P61,P62	DW	W	DW	W	DW	DW	DW	DW	DRK
P81,P82	DW	DW	DW	DW	DW	W	DW	W	DRK

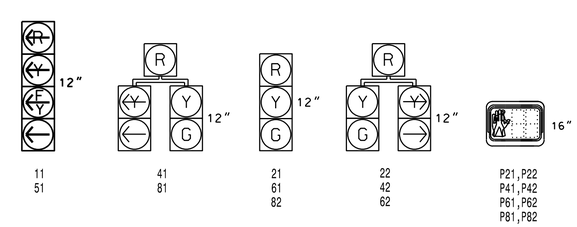
8 Phase
Fully Actuated
(Durham Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Omit phase 3 during phase 4 on.
4. Omit phase 7 during phase 8 on.
5. Enable Backup Protect for phase 2 + 6 to allow the controller to clear from phase 2 + 6 to phase 1 and/or 5 by progressing through on all red display.
6. Set all detector units to presence mode.
7. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
8. Omit "WALK" and Flashing "DON'T WALK" with no pedestrian calls.
9. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
10. Pavement markings are existing.
11. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
12. Loop data based on previous plan and/or field observations.
13. Install new cabinet on the existing cabinet foundation.
14. Reconnect lead-in cable to separate loops 2A, 2B, 6A, and 6B as shown.

SIGNAL FACE I.D.

All Heads L.E.D.



Signal Upgrade - Sheet 2 of 2

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Project #: 170905

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NCBELS FIRM LICENSE NO. C-2522

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

SCALE 0 40 1" = 40'

NC 157 (Guess Road)
at
SR 1407 (Carver Street)

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 044157 ENGINEER ANDREW D HAYES

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

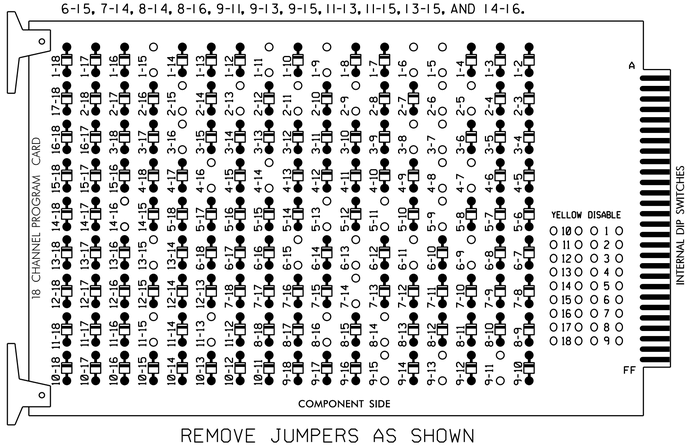
SIG. INVENTORY NO. 05-0396

PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig.86.2

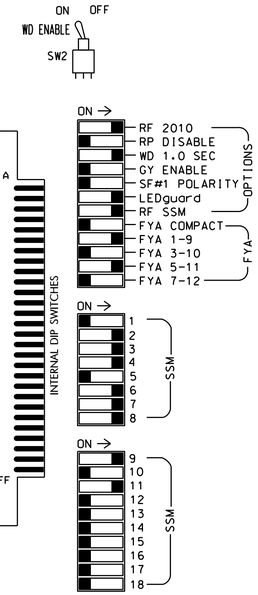
EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS I-5, I-6, I-9, I-11, I-15, 2-5, 2-6, 2-9, 2-11, 2-13, 2-15, 3-7, 3-8, 3-16, 4-7, 4-8, 4-14, 4-16, 5-9, 5-11, 5-13, 6-9, 6-11, 6-13, 6-15, 7-14, 8-14, 8-16, 9-11, 9-13, 9-15, 11-13, 11-15, 13-15, AND 14-16.



REMOVE JUMPERS AS SHOWN



NOTES:

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

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Program phases 4 and 8 for Dual Entry.
3. Program controller to start up in phase 2 Walk and 6 Walk.
4. The cabinet and controller are part of the Durham Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070LX
CABINET.....332 W/AUX
SOFTWARE.....ECONOLITE ASC/3-2070
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
LOAD SWITCHES USED.....S1,S2,S3,S4,S5,S6,S7,S8,S9 S10,S11,S12,AUX S1,AUX S4
PHASES USED.....1,2,2PED,3,4,4PED,5,6,6PED, 7,8,8PED
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.	11★	21,22	P21, P22	22	81	41,42	P41, P42	51★	42	61,62	P61, P62	41	62	81,82	P81, P82	11★	NU	NU	51★	NU	NU
RED		128		✱		101			✱	134			✱	107							
YELLOW	✱	129				102				135				108							
GREEN		130				103				136				109							
RED ARROW																A121			A114		
YELLOW ARROW				117	117				132			123	123			A122			A115		
FLASHING YELLOW ARROW																A123			A116		
GREEN ARROW	127			118	118			133	133			124	124								
✋			113				104				119				110						
🚶			115				106				121				112						

NU = Not Used

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

★ See pictorial of head wiring in detail this sheet.

INPUT FILE POSITION LAYOUT

(front view)

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

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

FS = FLASH SENSE
ST = STOP TIME

⊗ Wired Input - Do not populate slot with detector card

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND TIME	DELAY TIME	ADDED INITIAL	DETECTOR TYPE
1A [1]	TB2-1,2	I1U	56	1★	1	YES	-	15	-	S
	-	J4U	48	26★	6	YES	-	3	-	S
2A	TB2-5,6	I2U	39	2	2	YES	-	-	X	N
2B	TB2-7,8	I2L	43	12	2	YES	-	-	X	N
3A [2]	TB4-5,6	I5U	58	3	3	YES	-	15	-	S
	-	J8U	50	28	8	YES	-	3	-	S
4A	TB4-9,10	I6U	41	4	4	YES	-	-	-	S
5A [3]	TB3-1,2	J1U	55	5★	5	YES	-	15	-	S
	-	I4U	47	22★	2	YES	-	3	-	S
5B	TB7-9,10	J9U	59	15	5	YES	-	15	-	S
6A	TB3-5,6	J2U	40	6	6	YES	-	-	X	N
6B	TB3-7,8	J2L	44	16	6	YES	-	-	X	N
7A [4]	TB5-5,6	J5U	57	7	7	YES	-	15	-	S
	-	I8U	49	24	4	YES	-	3	-	S
8A	TB5-9,10	J6U	42	8	8	YES	-	10	-	S
PED PUSH BUTTONS										
P21,P22	TB8-4,6	I12U	67	PED 2	2 PED					
P41,P42	TB8-5,6	I12L	69	PED 4	4 PED					
P61,P62	TB8-7,9	I13U	68	PED 6	6 PED					
P81,P82	TB8-8,9	I13L	70	PED 8	8 PED					

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

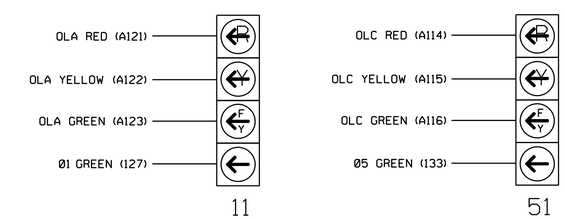
[1] Add jumper from I1-W to J4-W, on rear of input file.
[2] Add jumper from I5-W to J8-W, on rear of input file.
[3] Add jumper from J1-W to I4-W, on rear of input file.
[4] Add jumper from J5-W to I8-W, on rear of input file.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

★ 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.

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)

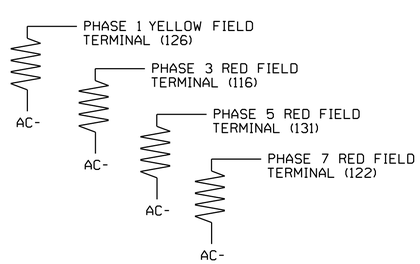


LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

ACCEPTABLE VALUES

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



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-0396
DESIGNED: December 2018
SEALED: 12/21/2018
REVISED: N/A

Project #: 170905

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Electrical Detail - Sheet 1 of 3

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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 157 (Guess Road)
at
SR 1407 (Carver Street)

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

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NORTH CAROLINA PROFESSIONAL SEAL 044157 ENGINEER ANDREW D HAYES

DocuSigned by:
Andrew Hayes
SIGNATURE
12/21/2018
DATE
SIG. INVENTORY NO. 05-0396

PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig.86.3

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 "3.0 seconds".

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

NOTICE VEH DET PLAN 2

ENSURE DELAY IS SET TO '3.0'

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

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

NOTICE VEH DET PLAN 2

ENSURE PHASE IS SET TO "0"

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

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

NOTICE VEH DET PLAN 2

ENSURE DELAY IS SET TO '3.0'

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

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

NOTICE VEH DET PLAN 2

ENSURE PHASE IS SET TO "0"

END PROGRAMMING

ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

(program controller as shown)

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

OVERLAP A

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

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

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

FLASHING ARROW OUTPUT.....CH9  ISOLATE

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

NOTICE ACTION PLAN SF BIT "1"

Toggle Twice

OVERLAP C

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

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

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

FLASHING ARROW OUTPUT.....CH11 ISOLATE

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

NOTICE ACTION PLAN SF BIT "5"

END PROGRAMMING

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0396
DESIGNED: December 2018
SEALED: 12/21/2018
REVISED: N/A

Project #: 170905

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NCBELS FIRM LICENSE NO. C-2522

Electrical Detail - Sheet 2 of 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

NC 157 (Guess Road)
at
SR 1407 (Carver Street)

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

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

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 044157 ENGINEER ANDREW D HAYES

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

SIG. INVENTORY NO. 05-0396

PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig.86.4

ALTERNATE PHASING ACTIVATION DETAIL

TO RUN ALT. PHASING DURING FREE RUN - PROGRAM CHANGES (SHOWN BELOW) IN A TIME BASED ACTION PLAN. SCHEDULE A DAY PLAN THAT INCLUDES THE ACTION PLAN PROGRAMMED TO SELECT VEH DET PLAN 2 AND ENABLE SF BITS 1 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, 3, 5, AND 7 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 3.0 seconds.

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

ECONOLITE ASC/3-2070 ACTION PLAN PROGRAMMING DETAIL

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

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

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0396
DESIGNED: December 2018
SEALED: 12/21/2018
REVISED: N/A

Project #: 170905

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NCBELS FIRM LICENSE NO. C-2522

Electrical Detail - Sheet 3 of 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

NC 157 (Guess Road)
at
SR 1407 (Carver Street)

Division 5 Durham County Durham

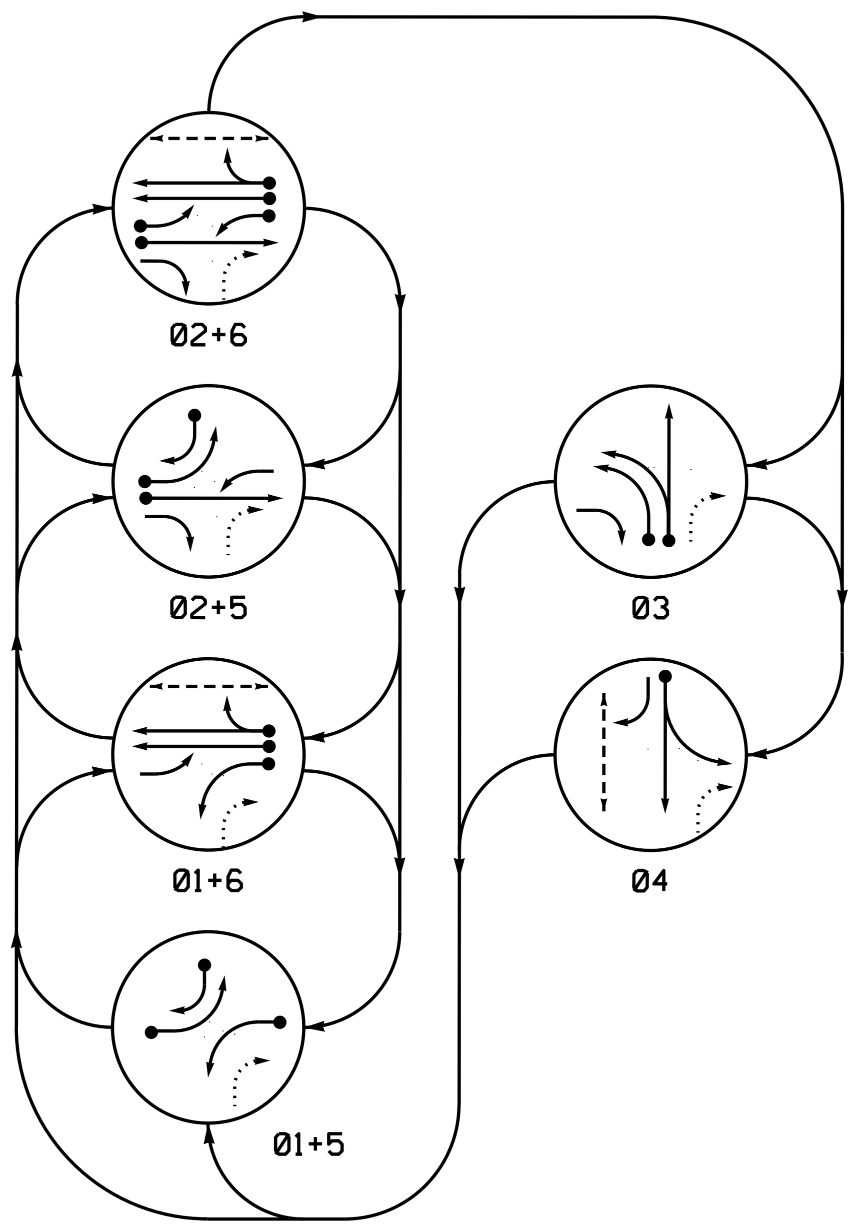
PLAN DATE:	December 2018	REVIEWED BY:	A. D. Hayes
PREPARED BY:	A. Ravipati	REVIEWED BY:	L. Boyer

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 044157 ENGINEER ANDREW D HAYES

DocuSigned by: Andrew Hayes 12/21/2018
SIGNATURE DATE
F0D0D0A0F0D4A1...
SIG. INVENTORY NO. 05-0396

DEFAULT PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

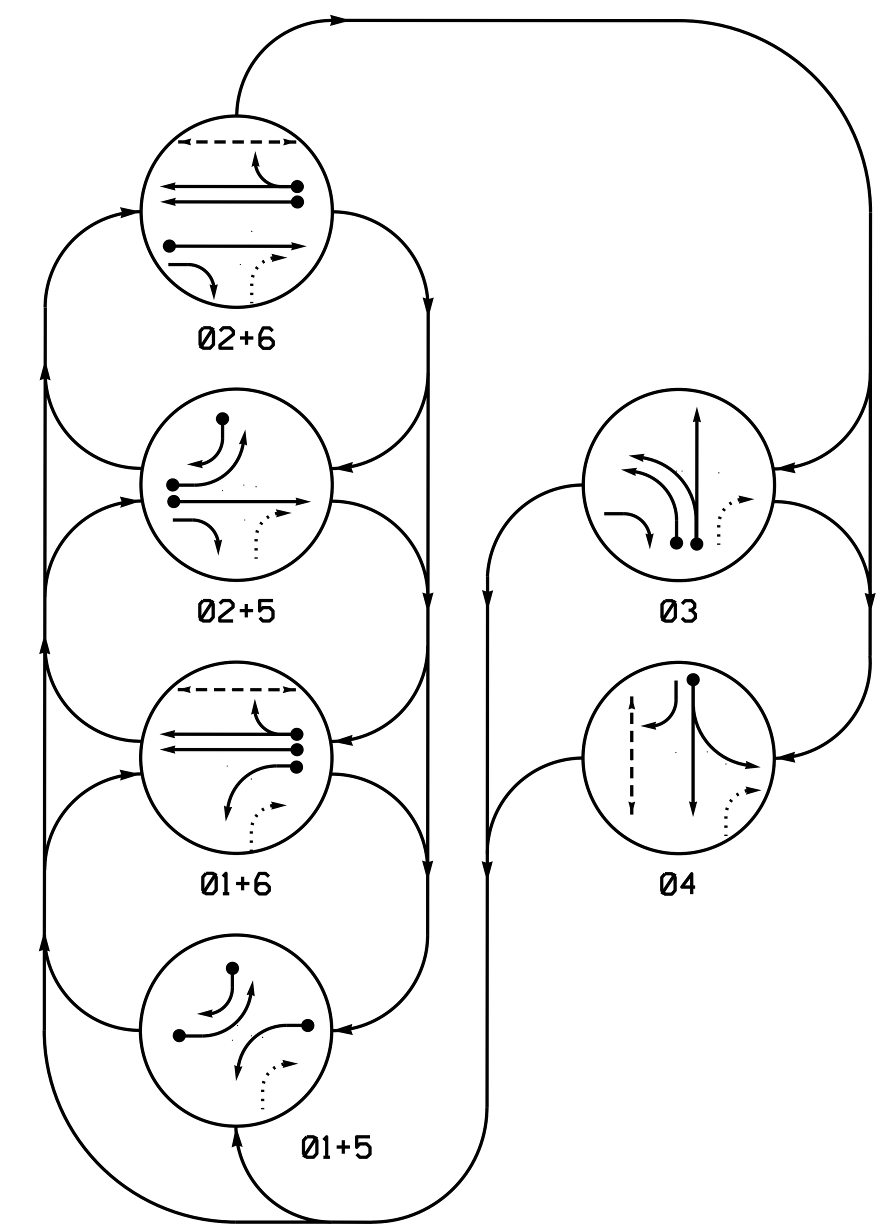
DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3	Ø4	FLASH
11	←	←	F/Y ←	F/Y ←	←R	←R	←Y
21	R	R	G	G	R	R	Y
22	R	R	G	G	R/→	R	Y
31	R	R	R	R	G ←	R	R
32	R	R	R	R	G	R	R
41	R	R	R	R	R	G ←	R
42	R/→	R	R/→	R	R	G	R
51	←	F/Y ←	←	F/Y ←	←R	←R	←Y
61, 62	R	G	R	G	R	R	Y
P41, P42	DW	DW	DW	DW	DW	W	DRK
P61, P62	DW	W	DW	W	DW	DW	DRK

ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3	Ø4	FLASH
11	←	←	←R	←R	←R	←R	←Y
21	R	R	G	G	R	R	Y
22	R	R	G	G	R/→	R	Y
31	R	R	R	R	G ←	R	R
32	R	R	R	R	G	R	R
41	R	R	R	R	R	G ←	R
42	R/→	R	R/→	R	R	G	R
51	←	←R	←	←R	←R	←R	←Y
61, 62	R	G	R	G	R	R	Y
P41, P42	DW	DW	DW	DW	DW	W	DRK
P61, P62	DW	W	DW	W	DW	DW	DRK

ALTERNATE PHASING DIAGRAM



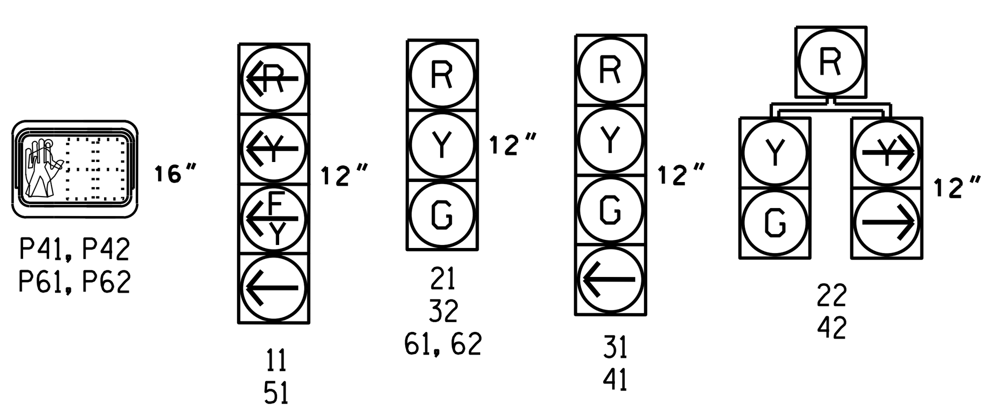
6 Phase
Fully Actuated
(Durham Signal System)

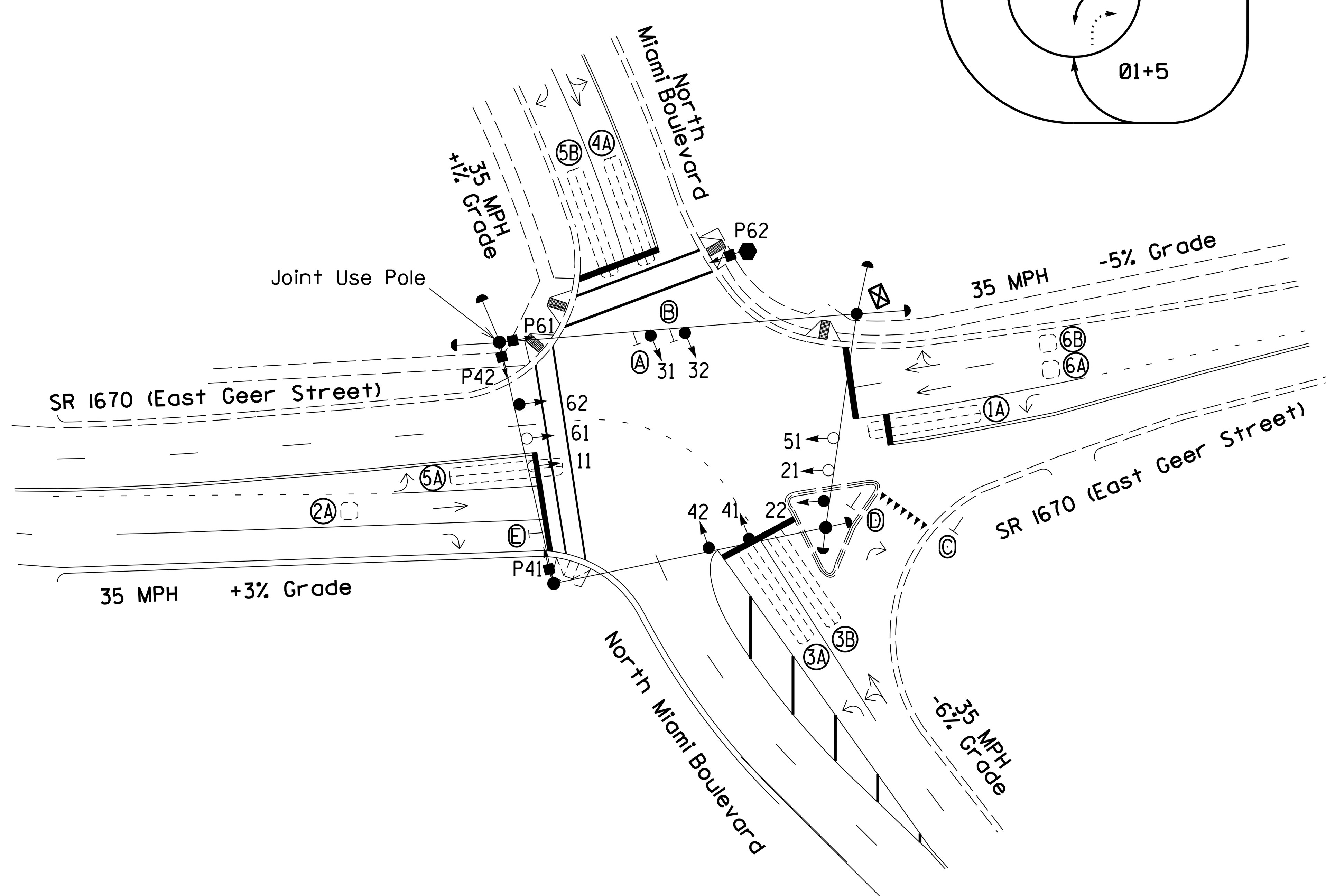
NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 and/or phase 5 may be lagged.
4. The order of phase 3 and phase 4 may be reversed.
5. Reposition existing signal head number 62.
6. Set all detector units to presence mode.
7. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
8. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
9. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
10. Pavement markings are existing.
11. The Division (City) Traffic Engineer will determine the hours of use for each phasing plan.
12. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
13. Loop data based on previous plan and/or field observations.
14. Install new cabinet on existing cabinet foundation.
15. Reconnect loops and heads in cabinet as indicated to match current NCDOT standards.
16. Remove existing "LEFT TURN ON GREEN" (R10-12) signs.

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	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
N/A	Curb Ramp	
	Type II Signal Pedestal	
(A)	Left Arrow "Only" Sign (R3-5L)	(A)
(B)	Combined Through and Left Arrow Sign (R3-6L)	(B)
(C)	"Yield" Sign (R1-2)	(C)
(D)	No Left Turn Sign (R3-2)	(D)
(E)	Right Arrow "ONLY" Sign (R3-5R)	(E)

ASC/3 TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6
Min Green *	7	10	7	7	7	10
Walk *	0	0	0	7	0	7
Ped Clear	0	0	0	20	0	12
Veh. Extension *	2.0	3.0	2.0	2.0	2.0	3.0
Max 1 *	15	50	20	15	15	50
Yellow	3.1	4.2	4.3	3.8	3.0	4.2
Red Clear	2.8	2.2	1.9	2.3	2.9	2.2
Actuations B4 Add *	-	-	-	-	-	-
Seconds /Actuation *	-	-	-	-	-	-
Max Initial *	-	-	-	-	-	-
Time Before Reduction *	-	-	-	-	-	-
Time To Reduce *	-	-	-	-	-	-
Minimum Gap	-	-	-	-	-	-
Locking Detector	-	X	-	-	-	X
Recall Position	-	VEH. RECALL	-	-	-	VEH. RECALL
Dual Entry	-	-	-	-	-	-
Simultaneous Gap	X	X	X	X	X	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 LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
1A	6X40	+5	2-4-2	-	1	Yes	-	•15	-	S	-	X
					#6	Yes	-	-	-	S	-	X
2A	6X6	65	4	-	2	Yes	-	-	-	S	-	X
3A	6X40	0	2-4-2	-	3	Yes	-	3	-	S	-	X
3B	6X40	0	2-4-2	-	3	Yes	-	-	-	S	-	X
4A	6X40	+5	2-4-2	-	4	Yes	-	3	-	S	-	X
5A	6X40	+8	2-4-2	-	5	Yes	-	•15	-	S	-	X
					#2	Yes	-	-	-	S	-	X
5B	6X40	+5	2-4-2	-	5	Yes	-	15	-	S	-	X
6A	6X6	70	3	-	6	Yes	-	-	-	S	-	X
6B	6X6	70	3	-	6	Yes	-	-	-	S	-	X

• Reduce Delay to 3 Seconds During Alternate Phasing operation.

Disable phase call for loop during Alternate Phasing operation.

Signal Upgrade

Prepared in the Office of:

SUMMIT DESIGN AND ENGINEERING SERVICES

NC FIRM LICENSE No: P-0339
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(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 40 1"=40'

SR 1670 (East Geer Street)
at
North Miami Boulevard

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 11/2/2018
DATE

PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig 87.0

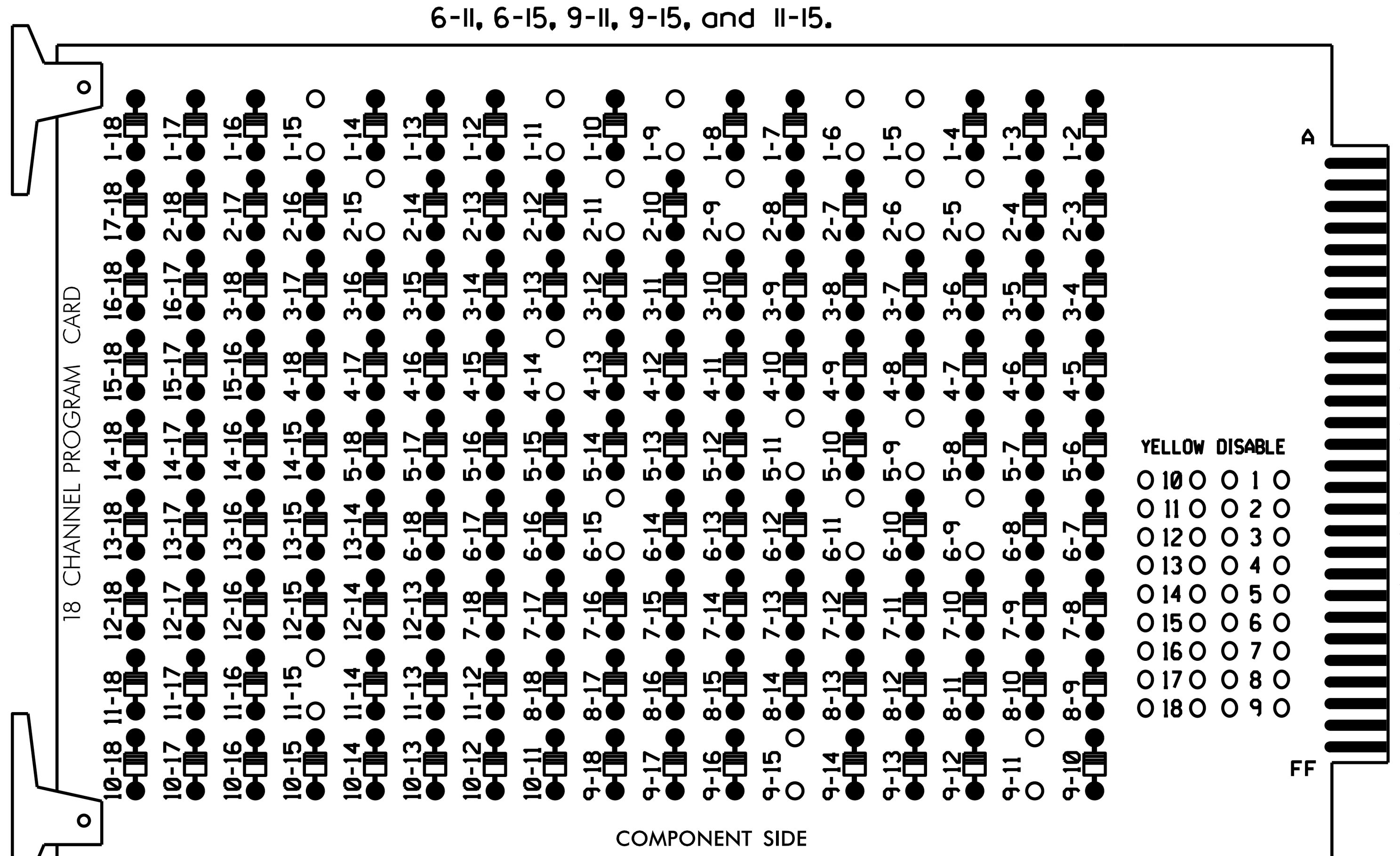
SIG. INVENTORY NO. 05-0397

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

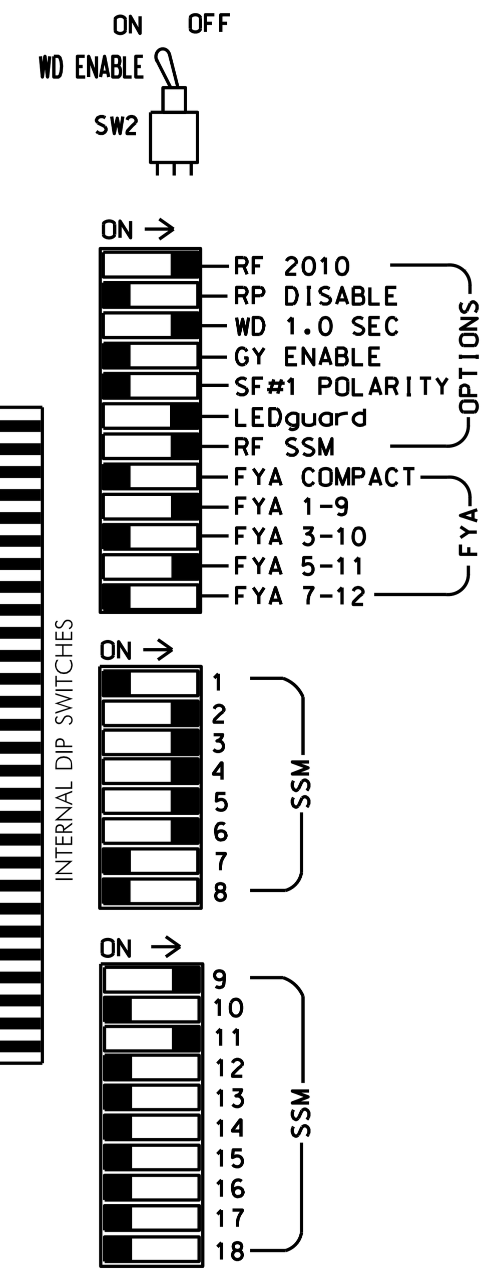
EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

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



REMOVE JUMPERS AS SHOWN



■ = DENOTES POSITION OF SWITCH

NOTES:

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

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Program controller to start up in phase 2 Green and 6 Walk.
3. The cabinet and controller are part of the Durham Signal System.

EQUIPMENT INFORMATION

CONTROLLER..............2070LX
CABINET.................332 w/Aux
SOFTWARE................ECONOLITE ASC/3-2070
CABINET MOUNT...........BASE
OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
LOAD SWITCHES USED......S1, S2, S4, S5, S6, S7, S8, S9, AUX S1, AUX S4
PHASES USED.............1, 2, 3, 4, 4PED, 5, 6, 6PED
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 87.1

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.	11★	21,22	NU	22	31	32	41	42	P41, P42	42	51★	61,62	P61, P62	NU	NU	NU	11★	NU	NU	51★	NU	NU
RED		128			116	116	101	101			✱	134										
YELLOW	✱	129			117	117	102	102				135										
GREEN		130			118	118	103	103				136										
RED ARROW																	A121			A114		
YELLOW ARROW				117						132							A122			A115		
FLASHING YELLOW ARROW																	A123			A116		
GREEN ARROW	127			118	118		103			133	133											
(Don't Walk symbol)									104				119									
(Walk symbol)									106				121									

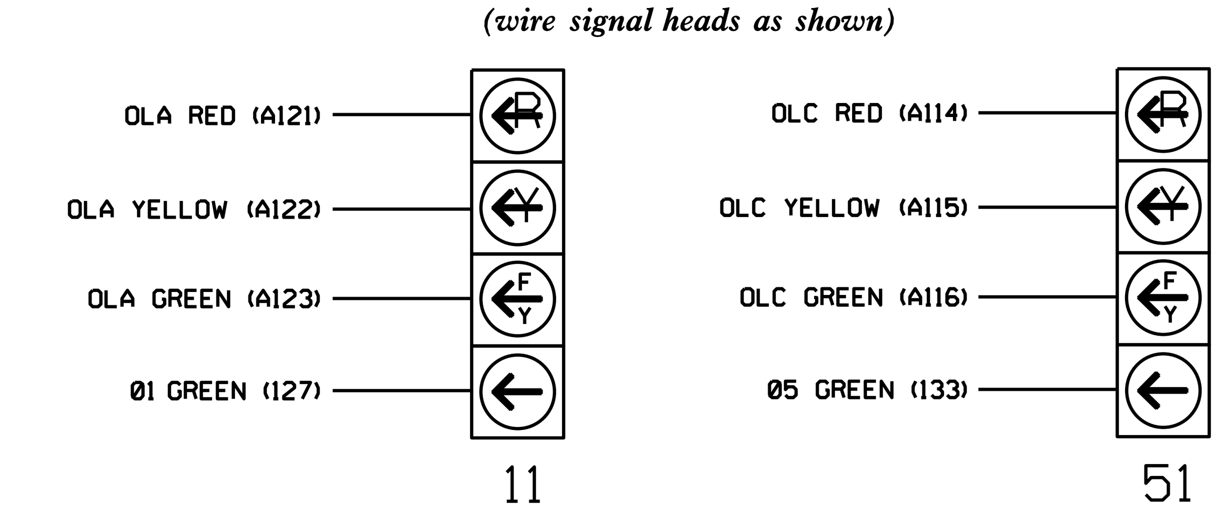
NU = Not Used

✱ 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)

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

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

FS = FLASH SENSE
ST = STOP TIME

⊗ Wired Input - Do not populate slot with detector card

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND TIME	DELAY TIME	ADDED INITIAL	DETECTOR TYPE
1A[1]	TB2-1,2	I1U	56	1 ★	1	YES		15		S
	-	J4U	48	26 ★	6	YES				S
2A	TB2-5,6	I2U	39	2	2	YES				S
3A	TB4-5,6	I5U	58	3	3	YES		3		S
3B	TB6-11,12	I9L	62	13	3	YES				S
4A	TB4-9,10	I6U	41	4	4	YES		3		S
5A[2]	TB3-1,2	J1U	55	5 ★	5	YES		15		S
	-	I4U	47	22 ★	2	YES				S
5B	TB7-9,10	J9U	59	15	5	YES		15		S
6A	TB3-5,6	J2U	40	6	6	YES				S
6B	TB3-7,8	J2L	44	16	6	YES				S
PED PUSH BUTTONS										
P41,P42	TB8-5,6	I12L	69	PED 4	4 PED					
P61,P62	TB8-7,9	I13U	68	PED 6	6 PED					

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

[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.

★ See vehicle detector setup programming detail for alternate phasing on sheet 2.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

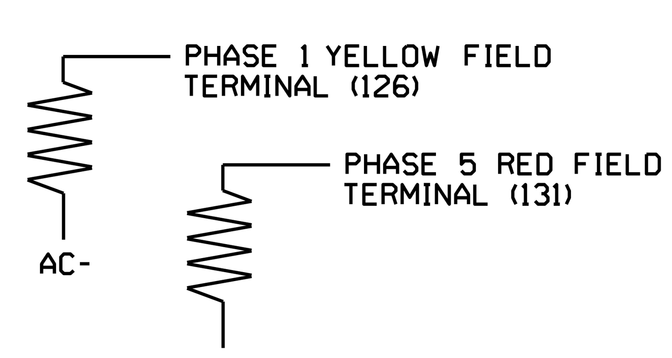
Countdown Ped Signals are required to display timing only during Ped Clearance Interval. Consult Ped Signal Module user's manual for instructions on selecting this feature.

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown 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: 05-0397
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
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(919) 732-6676 (FAX)

Electrical Detail - Sheet 1 of 3

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

SR 1670 (East Geer Street)
at
North Miami Boulevard

Division 5 | Durham County | Durham

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

REVISIONS	INIT.	DATE

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SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 018174 EDWARD W. SIRGANY

DocuSigned by: Edward W Sirgany 11/2/2018
39DF9C86A6684E9...
DATE

SIG. INVENTORY NO. 05-0397

PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig 87.2

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 "3".

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

NOTICE VEH DET PLAN 2

ENSURE DELAY IS SET TO '3'

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

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

NOTICE VEH DET PLAN 2

ENSURE PHASE IS SET TO '0'

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

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

NOTICE VEH DET PLAN 2

ENSURE DELAY IS SET TO '3'

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

```
VEH DETECTOR [22]   VEH DET PLAN [ 2]
TYPE: 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

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 SPECIAL FUNCTION BIT "1"

Toggle Twice

OVERLAP C

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

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

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

FLASHING ARROW OUTPUT.....CH11 ISOLATE

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

NOTICE SPECIAL FUNCTION BIT "5"

END PROGRAMMING

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0397
DESIGNED: October 2018
SEALED: November 2, 2018
REVISED: N/A

Electrical Detail - Sheet 2 of 3

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:

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

750 N.Greenfield Pkwy,Garner,NC 27529

SR 1670 (East Geer Street)
at
North Miami Boulevard

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
DATE

SIG. INVENTORY NO. 05-0397

$$$$$SYSTIME$$$$$
$$$$$USERNAME$$$$$

PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig 87.3

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 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 PAGE 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 3 seconds.

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

ECONOLITE ASC/3-2070 ACTION PLAN PROGRAMMING DETAIL

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

```
ACTION PLAN...[  1]
PATTERN..........AUTO   SYS OVERRIDE.... NO
TIMING PLAN........ 0   SEQUENCE........  0
VEH DETECTOR PLAN.. 2   DET LOG........NONE
FLASH...........   --   RED REST........ NO
VEH DET DIAG PLN... 0   PED DET DIAG PLN..0
DIMMING ENABLE..   NO   PRIORITY RETURN. NO
PED PR RETURN..    NO   QUEUE DELAY..... NO
PMT COND DELAY     NO
  PHASE   1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
PED RCL   . . . . . . . . . . . . . . . .
WALK 2    . . . . . . . . . . . . . . . .
VEX 2     . . . . . . . . . . . . . . . .
VEH RCL   . . . . . . . . . . . . . . . .
MAX RCL   . . . . . . . . . . . . . . . .
MAX 2     . . . . . . . . . . . . . . . .
  PHASE   1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
MAX 3     . . . . . . . . . . . . . . . .
CS INH    . . . . . . . . . . . . . . . .
OMIT      . . . . . . . . . . . . . . . .
SPC FCT   X . . . X . . . (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 BITS "1" and "5"

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0397
DESIGNED: October 2018
SEALED: November 2, 2018
REVISED: N/A

Electrical Detail - Sheet 3 of 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Prepared in the Office of:
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NC FIRM LICENSE No: P-0339
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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

SR 1670 (East Geer Street)
at
North Miami Boulevard

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
"NOTICE" MANDATED DATE

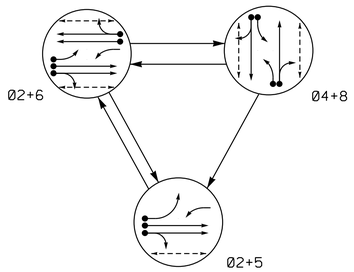
SIG. INVENTORY NO. 05-0397

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

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

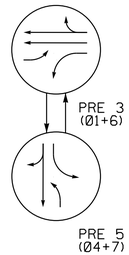
PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-88.0

DEFAULT PHASING DIAGRAM



DEFAULT EV PREEMPT PHASES

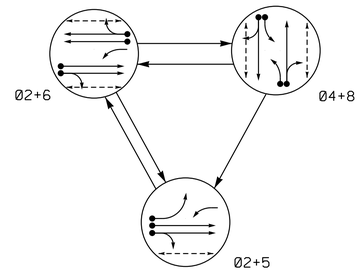
(Medium Priority)



DEFAULT PHASING TABLE OF OPERATION

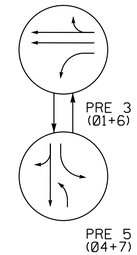
SIGNAL FACE	PHASE 02+5	02+6	04+8	EVP3	EVP5	FLASH
21, 22	G	G	R	R	R	Y
41	~~R~~	~~R~~	~~F Y~~	~~R~~	~~—~~	~~R~~
42, 43	R	R	G	R	G	R
51	~~—~~	~~F Y~~	~~R~~	~~F Y~~	~~R~~	~~Y~~
61	~~F Y~~	~~F Y~~	~~R~~	~~—~~	~~R~~	~~Y~~
62, 63	R	G	R	G	R	Y
81	~~R~~	~~R~~	~~F Y~~	~~R~~	~~F Y~~	~~R~~
82, 83	R	R	G	R	R	R
P21,P22	W	W	DW	DW	DW	DRK
P41,P42	DW	DW	W	DW	DW	DRK
P61,P62	DW	W	DW	DW	DW	DRK
P81,P82	DW	DW	W	DW	DW	DRK

ALTERNATE PHASING DIAGRAM



ALTERNATE EV PREEMPT PHASES

(Medium Priority)



ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE 02+5	02+6	04+8	EVP3	EVP5	FLASH
21, 22	G	G	R	R	R	Y
41	~~R~~	~~R~~	~~F Y~~	~~R~~	~~—~~	~~R~~
42, 43	R	R	G	R	G	R
51	~~—~~	~~R~~	~~R~~	~~R~~	~~R~~	~~Y~~
61	~~F Y~~	~~F Y~~	~~R~~	~~—~~	~~R~~	~~Y~~
62, 63	R	G	R	G	R	Y
81	~~R~~	~~R~~	~~F Y~~	~~R~~	~~F Y~~	~~R~~
82, 83	R	R	G	R	R	R
P21,P22	W	W	DW	DW	DW	DRK
P41,P42	DW	DW	W	DW	DW	DRK
P61,P62	DW	W	DW	DW	DW	DRK
P81,P82	DW	DW	W	DW	DW	DRK

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

NOTES

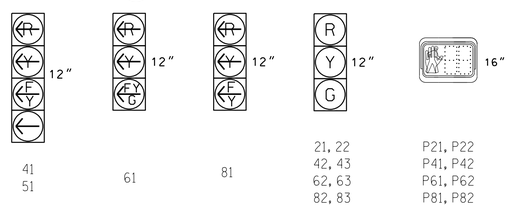
1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 5 may be lagged.
4. Renumber existing signal heads 11, 41, 42, 61, 62 and 71 as 61, 42, 43, 62, 63 and 41 respectively.
5. Set all detector units to presence mode.
6. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
7. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
8. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
9. Pavement markings are existing.
10. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
11. The Division (City) Traffic Engineer will determine the hours of use for each phasing plan.
12. Loop data based on previous plan and/or field observations.
13. Install new cabinet on the existing cabinet foundation.
14. Install GPS emergency preemption system per manufacturer's instructions to achieve preemption needed, as shown in phasing diagram.
15. Remove existing optical detection equipment.

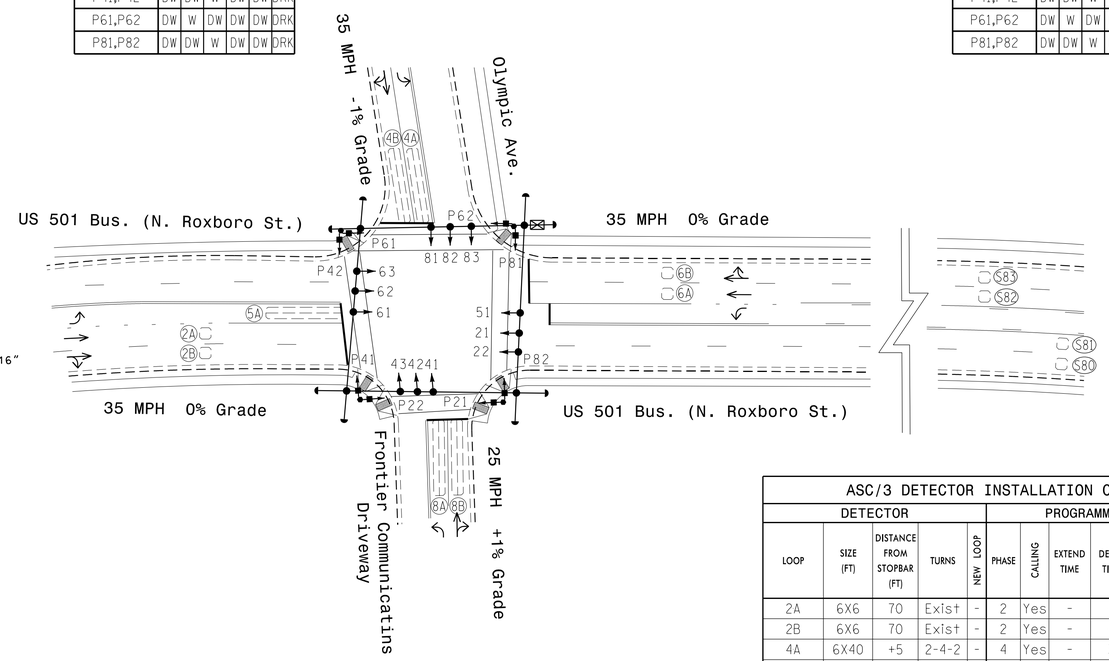
PHASING DIAGRAM DETECTION LEGEND

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

SIGNAL FACE I.D.

All Heads L.E.D.
= Bimodal Section





ASC/3 DETECTOR INSTALLATION CHART

DETECTOR: LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING: PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
2A	6X6	70	Exist	-	2	Yes	-	-	-	S	-	X
2B	6X6	70	Exist	-	2	Yes	-	-	-	S	-	X
4A	6X40	+5	2-4-2	-	4	Yes	-	3	-	S	-	X
4B	6X40	+5	2-4-2	-	4	Yes	-	10	-	S	-	X
5A	6X40	0	2-4-2	-	5	Yes	-	*15	-	S	-	X
					2 #	Yes	-	-	-	S	-	X
6A	6X6	70	Exist	-	6	Yes	-	-	-	S	-	X
6B	6X6	70	Exist	-	6	Yes	-	-	-	S	-	X
8A	6X40	0	2-4-2	-	8	Yes	-	3	-	S	-	X
8B	6X40	0	2-4-2	-	8	Yes	-	10	-	S	-	X
S80	6X6	+660	Exist	-	-	-	-	-	-	N	X	X
S81	6X6	+660	Exist	-	-	-	-	-	-	N	X	X
S82	6X6	570	Exist	-	-	-	-	-	-	N	X	X
S83	6X6	570	Exist	-	-	-	-	-	-	N	X	X

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

LEGEND

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

ASC/3 TIMING CHART

FEATURE	PHASE 1	2	4	5	6	7	8
Min Green *	7	10	7	7	10	7	7
Walk *	0	7	7	0	7	0	7
Ped Clear	0	10	17	0	17	0	17
Veh. Extension *	-	3.0	2.0	2.0	3.0	-	2.0
Max 1 *	120	45	25	25	45	120	5
Yellow	3.0	3.8	3.9	3.0	3.8	3.0	3.9
Red Clear	2.9	2.1	2.6	2.3	2.1	2.4	2.6
Actuations B4 Add *	-	-	-	-	-	-	-
Seconds /Actuation *	-	-	-	-	-	-	-
Max Initial *	-	-	-	-	-	-	-
Time Before Reduction *	-	-	-	-	-	-	-
Time To Reduce *	-	-	-	-	-	-	-
Minimum Gap	-	-	-	-	-	-	-
Locking Detector	-	X	-	-	X	-	-
Recall Position	-	VEH RECALL	-	-	VEH RECALL	-	-
Dual Entry	-	-	X	-	-	-	X
Simultaneous Gap	-	X	X	X	X	-	X

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

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 Trough Yellow	Y	Y
Terminate Phases	N	N
Entrance Walk	1	1
Entrance Ped Clear	10	10
Entrance Min Green	1	1
Entrance Yellow Change	25.5*	25.5*
Entrance Red Clear	25.5*	25.5*
Min Dwell Time	7	7
Preempt Input Extension Time **	2	2
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 Detection Units.

Signal Upgrade

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

Prepared in the offices of:
RAMEY KEMP & ASSOCIATES, INC.
Transportation Engineers
5808 Faringdon Place, Suite 100
Raleigh, North Carolina 27609
919-872-5115 Tel. 919-878-6416 Fax.
www.rameykemp.com

SCALE 0 40
1"=40'

US 501 Bus. (N. Roxboro St.)
at
Olympic Ave./
Frontier Communications Dwy.

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32396 ENGINEER WILLIAM J. HAMILTON

DocuSigned by: William J. Hamilton 12/19/2018
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SIG. INVENTORY NO. 05-0398

12/18/2018
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User:tpopelka

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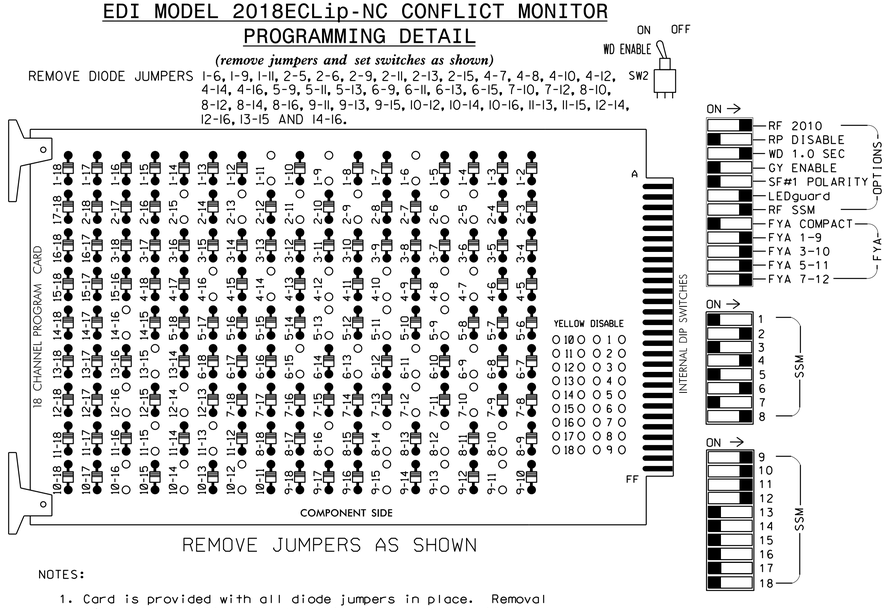
PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-88.1

EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 1-6, 1-9, 1-11, 2-5, 2-6, 2-9, 2-11, 2-13, 2-15, 4-7, 4-8, 4-10, 4-12, 4-14, 4-16, 5-9, 5-11, 5-13, 6-9, 6-11, 6-13, 6-15, 7-10, 7-12, 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.....S1,S2,S3,S5,S6,S7,S8,S9, S10,S11,S12,AUX S1,AUX S2, AUX S4,AUX S5
PHASES USED.....1*,2,2PED,4,4PED,5,6,6PED, 7*,8,8PED
OVERLAP "A".....**
OVERLAP "B".....**
OVERLAP "C".....**
OVERLAP "D".....**

* Phases 1 and 7 used only during Preempt.
** 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.	61★	21,22	P21, P22	NU	42,43	P41, P42	51★	62,63	P61, P62	41★	82,83	P81, P82	61★	81★	NU	51★	41★	NU
RED		128			101			134			107							
YELLOW	*	129			102		*	135		*	108							
GREEN		130			103			136			109							
RED ARROW													A121	A124		A114	A101	
YELLOW ARROW													A122	A125		A115	A102	
FLASHING YELLOW ARROW													A123	A126		A116	A103	
GREEN ARROW	127						133			124								
✋			113			104			119			110						
🚶			115			106			121			112						

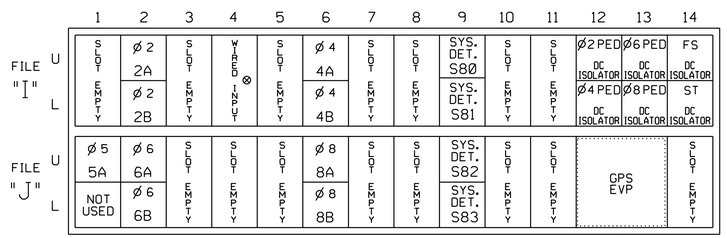
NU = Not Used

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

★ See pictorial of head wiring in detail this sheet.

INPUT FILE POSITION LAYOUT

(front view)



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

⊗ Wired Input - Do not populate slot with detector card

CONNECT PHASE SELECTOR TO FIELD ETHERNET SWITCH

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND TIME	DELAY TIME	ADDED INITIAL	DETECTOR TYPE
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
*S80	TB6-9,10	I9U	60	11	SYS	NO				N
*S81	TB6-11,12	I9L	62	13	SYS	NO				N
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
8A	TB5-9,10	J6U	42	8	8	YES		3		S
8B	TB5-11,12	J6L	46	18	8	YES		10		S
*S82	TB7-9,10	J9U	59	15	SYS	NO				N
*S83	TB7-11,12	J9L	61	17	SYS	NO				N
PED PUSH BUTTONS										
P21,P22	TB8-4,6	I12U	67	PED 2	2 PED					
P41,P42	TB8-5,6	I12L	69	PED 4	4 PED					
P61,P62	TB8-7,9	I13U	68	PED 6	6 PED					
P81,P82	TB8-8,9	I13L	70	PED 8	8 PED					

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

* System detector only. Remove any assigned vehicle phase.

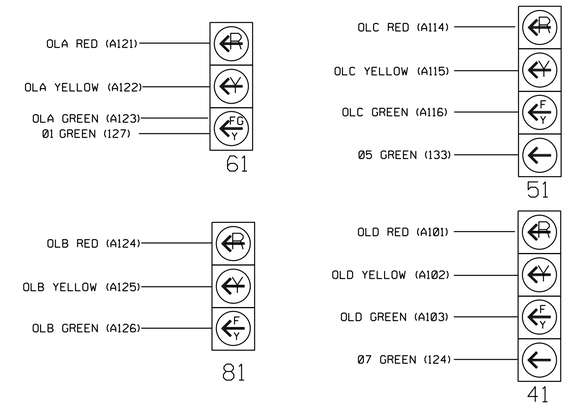
[1]Add jumper from J1-W to I4-W, on rear of input file.

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

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)

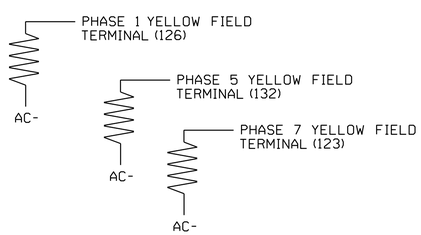


THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0398
DESIGNED: Dec 2018
SEALED: 12/19/2018
REVISED: N/A

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

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



Electrical Detail
Sheet 1 of 5

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

US 501 Bus. (N. Roxboro St.)
at
Olympic Ave./
Frontier Communications Dwy.

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

SIGNATURE DATE
SIG. INVENTORY NO. 05-0398

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32396 ENGINEER WILLIAM J. HAMILTON

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

Prepared in the offices of:
RAMEY KEMP & ASSOCIATES, INC.
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750 N.Greenfield Pkwy,Garner,NC 27529

12/18/2018
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User:tpopelka

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

PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-88.2

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

(program controller as shown)

IMPORTANT!

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

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

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

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

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

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

← NOTICE VEH DET PLAN 2

← ENSURE DELAY IS SET TO '3'

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

```
VEH DETECTOR [22]   VEH DET PLAN [ 2]
TYPE: 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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0398
DESIGNED: Dec 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........... 0
```

Toggle Once

OVERLAP B

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

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

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

Toggle Once

OVERLAP C

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

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

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

FLASHING ARROW OUTPUT.....CH11 ISOLATE

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

← NOTICE ACTION PLAN SF BIT "5"

Toggle Once

OVERLAP D

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

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

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

FLASHING ARROW OUTPUT.....CH12 ISOLATE

DELAY START OF: FYA..0.0 CLEARANCE..0.0
ACTION PLAN SF BIT DISABLE........... 0
```

END PROGRAMMING

Electrical Detail
Sheet 2 of 5

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

US 501 Bus. (N. Roxboro St.)
at
Olympic Ave./
Frontier Communications Dwy.

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

Prepared in the offices of:

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

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

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32396 ENGINEER WILLIAM J. HAMILTON

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

SIG. INVENTORY NO. 05-0398

12/18/2018
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User:tpopelka

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ALTERNATE PHASING ACTIVATION DETAIL

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

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

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

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

ALTERNATE PHASING CHANGE SUMMARY

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

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

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

FLASHER CIRCUIT MODIFICATION DETAIL

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

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

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

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

ECONOLITE ASC/3-2070 ACTION PLAN PROGRAMMING DETAIL

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

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0398
DESIGNED: Dec 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail
Sheet 3 of 5

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Prepared in the offices of:
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Transportation Engineers
5808 Faringdon Place, Suite 100
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919-872-5115 Tel, 919-878-5416 Fax,
www.rameykemp.com

ELECTRICAL AND PROGRAMMING DETAILS FOR:

SIT Transportation Mobility and Safety Division
Traffic Engineering Branch
STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION
Signals Management Section
750 N.Greenfield Pkwy,Garner,NC 27529

US 501 Bus. (N. Roxboro St.)
at
Olympic Ave./
Frontier Communications Dwy.

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. 05-0398

12/18/2018
05-0398_Sig-88.3.dgn
User:tpopelka

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PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-88.4

ECONOLITE ASC/3-2070 EMERGENCY VEHICLE PREEMPT PROGRAMMING DETAIL

(program controller as shown)

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

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

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

ENABLE... YES|PMT OVRIDE..|INTERLOCK. NO
DET LOCK... X|DELAY..    0|INHIBIT...  0
OVERIDE FL. .|DURATION   0|CLR-GRN... NO
TERM OLP.  NO|PC>YEL   YES|TERM PH    NO
PED DARK.. NO|TC RESRV  NO|DWELL FL  OFF
LINK PMT....0|X FLCOLR RED|EXIT OPT. OFF
X TMG PLN...0|RE-SERV..  0|FLT TYPE.HARD
FREE DUR PMT|R1  NO|R2  NO|R3  NO|R4  NO
--TIMING-----WALK|PED CL|MN GR| YEL| RED
ENTRANCE TM.    1|    10|    1|25.5|25.5
-----------MIN GR|EXT GR|MX GR| YEL| RED
TRACK CLEAR     0|     0|    0|25.5|25.5
-----------MIN DL|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 3. 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 .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   YES|TERM PH    NO
PED DARK.. NO|TC RESRV  NO|DWELL FL  OFF
LINK PMT....0|X FLCOLR RED|EXIT OPT. OFF
X TMG PLN...0|RE-SERV..  0|FLT TYPE.HARD
FREE DUR PMT|R1  NO|R2  NO|R3  NO|R4  NO
--TIMING-----WALK|PED CL|MN GR| YEL| RED
ENTRANCE TM.    1|    10|    1|25.5|25.5
-----------MIN GR|EXT GR|MX GR| YEL| RED
TRACK CLEAR     0|     0|    0|25.5|25.5
-----------MIN DL|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 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 ..PREEMPT  5. ...BYPASSED..
       6 ...BYPASSED.. ...BYPASSED..
       7 ...BYPASSED.. ...BYPASSED..
       8 ...BYPASSED.. ...BYPASSED..
       9 ...BYPASSED.. ...BYPASSED..
      10 ...BYPASSED.. ...BYPASSED..
```

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0398
DESIGNED: Dec 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail
Sheet 4 of 5

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Prepared in the offices of:
RAMEY KEMP & ASSOCIATES, INC.
Transportation Engineers
5808 Faringdon Place, Suite 100
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www.rameykemp.com

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

US 501 Bus. (N. Roxboro St.)
at
Olympic Ave./
Frontier Communications Dwy.

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. 05-0398

12/18/2018
U:\Projects\05-0398_05-0398_e04.dgn
User:tspopelka

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

PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-88.5

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

(program controller as shown)

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     PREEMPT ACTIVE          3   IS  OFF
THEN   CTR OMIT PHASE          1       ON

ELSE
```

LOGIC FOR OMITTING PHASE 1 AT STARTUP AND/OR NOT IN PREEMPT

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

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

IF     PREEMPT ACTIVE          5   IS  OFF
THEN   CTR OMIT PHASE          7       ON

ELSE
```

LOGIC FOR OMITTING PHASE 7 AT STARTUP AND/OR NOT IN PREEMPT

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 STATEMENTS 1 AND 2 BY POSITIONING THE CURSOR OVER THE FIELDS SHOWN BELOW AND USING THE TOGGLE KEY TO ENABLE THEM.

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

END PROGRAMMING

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0398
DESIGNED: Dec 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail
Sheet 5 of 5

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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

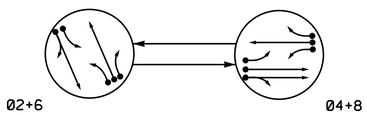
DocuSigned by: William J. Hamilton 12/19/2018
A05E0D7D6A84484...
SIGNATURE DATE

SIG. INVENTORY NO. 05-0398

12/18/2018
12:49:27 PM
U:\Projects\R\R05-0398_elels.dgn
User:tpopelka

PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig. 89.0

DEFAULT PHASING DIAGRAM

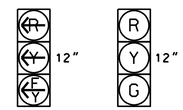


PHASING DIAGRAM DETECTION LEGEND

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

SIGNAL FACE I.D.

All Heads L.E.D.



21	22,23
41	42,43
61	62,63
81	82,83

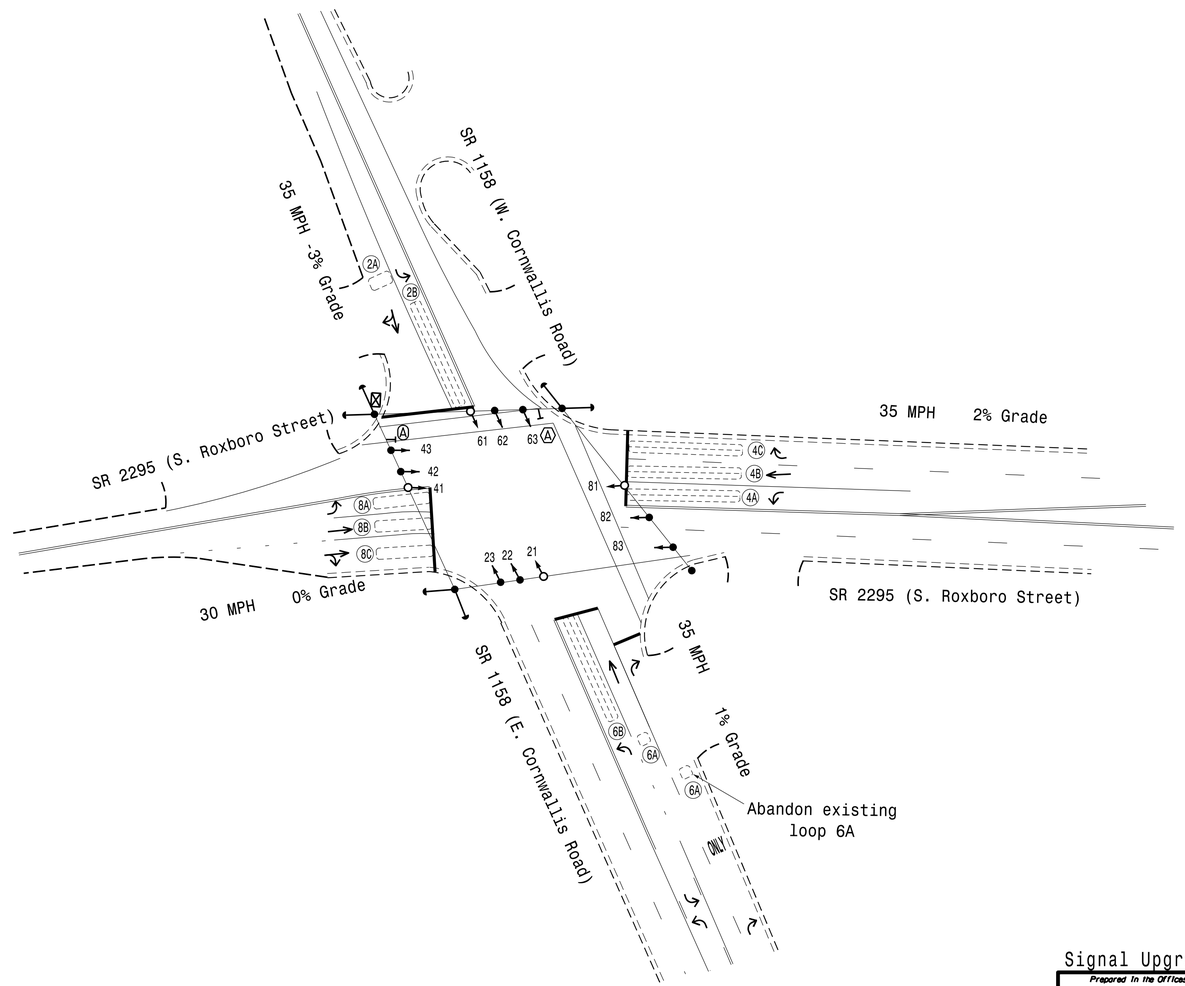
ASC/3 DETECTOR INSTALLATION CHART												
DETECTOR					PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
2A	6X15	70	4	-	2	Yes	-	-	-	S	-	X
2B	6X60	0	2-4-2	-	2	Yes	-	-	-	S	-	X
4A	6X60	0	2-4-2	-	4	Yes	-	3	-	S	-	X
4B	6X60	0	2-4-2	-	4	Yes	-	-	-	S	-	X
4C	6X60	0	2-4-2	-	4	Yes	-	15	-	S	-	X
6A	6X6	70	4	-	6	Yes	-	-	-	S	-	X
6B	6X60	0	2-4-2	-	6	Yes	-	-	-	S	-	X
8A	6X30	0	2	-	8	Yes	-	3	-	S	-	X
8B	6X30	0	2	-	8	Yes	-	-	-	S	-	X
8C	6X60	0	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 22, 23, 42, 43, 62, 63, 82, and 83.
4. Set all detector units to presence mode.
5. In the event of a loop replacement, refer to the current ITS and Signals Design Manual and submit a Plan of Record to the Signal Design Section.
6. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
7. Pavement markings are existing.
8. Existing "Left Arrow ONLY" (R3-5L)."Through Arrow ONLY" (R3-5a), and "Combined Through and Right Arrow" (R3-6R) signs may be removed at the direction of the Engineer.
9. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
10. Loop data based on previous plan and/or field observations.
11. Install new cabinet on the existing cabinet foundation.
12. Reconnect loops and heads in cabinet as indicated to match current NCDOT standards.
13. Reconnect lead-in cable to separate loops 4B, 4C, 8B, and 8C as shown.

TABLE OF OPERATION			
SIGNAL FACE	PHASE		
	02+6	04+8	FLASH
21	F/Y	~~R~~	~~Y~~
22,23	G	R	Y
41	~~R~~	F/Y	~~R~~
42,43	R	G	R
61	F/Y	~~R~~	~~Y~~
62,63	G	R	Y
81	~~R~~	F/Y	~~R~~
82,83	R	G	R



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	
	Right Arrow "ONLY" Sign (R3-5R)	

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	25	50	25
Yellow	4.1	3.7	4.1	3.7
Red Clear	2.5	2.1	2.5	2.1
Actuations B4 Add *	-	-	-	-
Seconds /Actuation *	-	-	-	-
Max Initial *	-	-	-	-
Time Before Reduction *	-	-	-	-
Time To Reduce *	-	-	-	-
Minimum Gap	-	-	-	-
Locking Detector	X	-	X	-
Recall Position	VEH. RECALL	-	VEH. RECALL	-
Dual Entry	-	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.

Project #: 170905

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Signal Upgrade

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

SCALE 0 40 1"=40'

SR 1158 (Cornwallis Road)
at
SR 2295 (S. Roxboro Street)

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 044157 ENGINEER ANDREW D HAYES

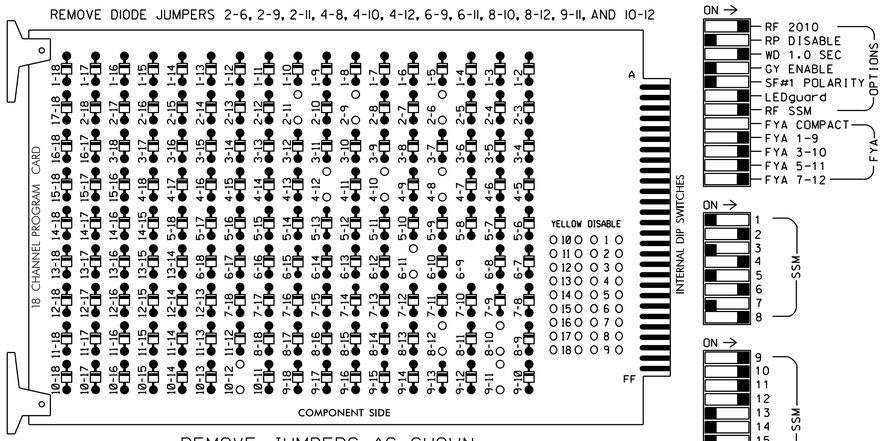
DocuSigned by: Andrew Hayes 12/21/2018
SIGNATURE DATE

SIG. INVENTORY NO. 05-0401

PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig. 89.1

EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



■ = DENOTES POSITION OF SWITCH

NOTES:

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

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Program phases 4 and 8 for Dual Entry.
3. Program controller to start up in phase 2 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 S2,AUX S4,AUX S5
PHASES USED.....2,4,6,8
OVERLAP "A".....*
OVERLAP "B".....*
OVERLAP "C".....*
OVERLAP "D".....*

* See overlap programming detail on sheet 2

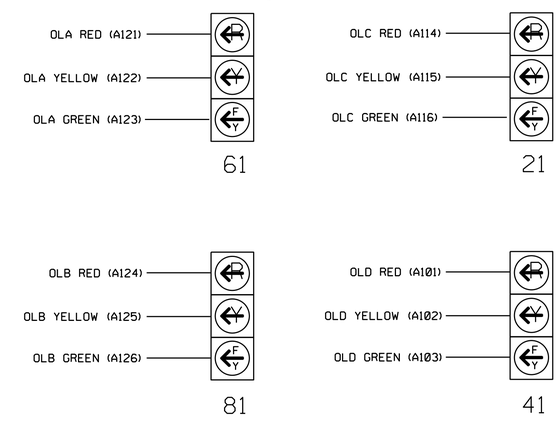
SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	NU	22,23	NU	NU	42,43	NU	NU	62,63	NU	NU	82,83	NU	61★	81★	NU	21★	41★	NU
RED		128			101			134			107							
YELLOW		129			102			135			108							
GREEN		130			103			136			109							
RED ARROW													A121	A124		A114	A101	
YELLOW ARROW													A122	A125		A115	A102	
FLASHING YELLOW ARROW													A123	A126		A116	A103	
GREEN ARROW																		
✋																		
🚶																		

NU = Not Used
★ See pictorial of head wiring in detail this sheet

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	SLOT	Ø2 2A	SLOT	SLOT	SLOT	Ø4 4A	Ø4 4C	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	FS DC ISOLATOR
	L	EMPTY	Ø2 2B	EMPTY	EMPTY	EMPTY	Ø4 4B	NOT USED	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	ST DC ISOLATOR
FILE "J"	U	SLOT	Ø6 6A	SLOT	SLOT	SLOT	Ø8 8A	Ø8 8C	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT
	L	EMPTY	Ø6 6B	EMPTY	EMPTY	EMPTY	Ø8 8B	NOT USED	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	DETECTOR TYPE
2A	TB2-5,6	I2U	39	2	2	YES			S
2B	TB2-7,8	I2L	43	12	2	YES			S
4A	TB4-9,10	I6U	41	4	4	YES		3	S
4B	TB4-11,12	I6L	45	14	4	YES			S
4C	TB6-1,2	I7U	65	34	4	YES		15	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			S
8C	TB7-1,2	J7U	66	38	8	YES		10	S

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0401
DESIGNED: December 2018
SEALED: 12/21/2018
REVISED: N/A

Electrical Detail - Sheet 1 of 2

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Project #: 170905

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336.744.1636 www.davenportworld.com
NCBELS FIRM LICENSE NO. C-2522

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

SR 1158 (Cornwallis Road)
at
SR 2295 (S. Roxboro Street)

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 044157 ENGINEER ANDREW D HAYES

DocuSigned by: Andrew Hayes
SIGNATURE 12/21/2018 DATE
DOCUSIGNED BY
SIG. INVENTORY NO. 05-0401

PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig. 89.2

ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

(program controller as shown)

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

OVERLAP A

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

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

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

Toggle Once

↓

OVERLAP B

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

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

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

Toggle Once

↓

OVERLAP C

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

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

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

Toggle Once

↓

OVERLAP D

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

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

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

END PROGRAMMING

FLASHER CIRCUIT MODIFICATION DETAIL

IN ORDER TO 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: 05-0401
DESIGNED: December 2018
SEALED: 12/21/2018
REVISED: N/A

Project #: 170905

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Electrical Detail - Sheet 2 of 2

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ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

SR 1158 (Cornwallis Road)
at
SR 2295 (S. Roxboro Street)

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 044157 ENGINEER ANDREW D HAYES

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

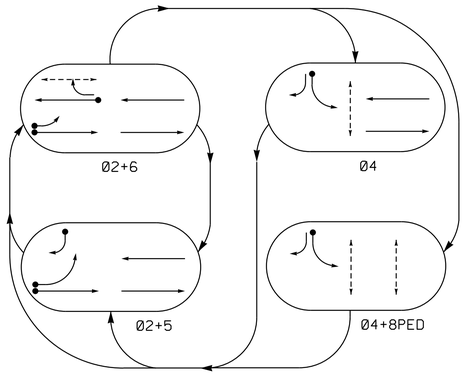
SIG. INVENTORY NO. 05-0401

DocuSign Envelope ID: 33F4F66F-25C0-44F0-BFC6-77C7DCA438CB

PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-90.0

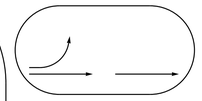
3 Phase Fully Actuated W/ EV Preemption (Durham Signal System)

DEFAULT PHASING DIAGRAM



DEFAULT EV PREEMPT PHASES

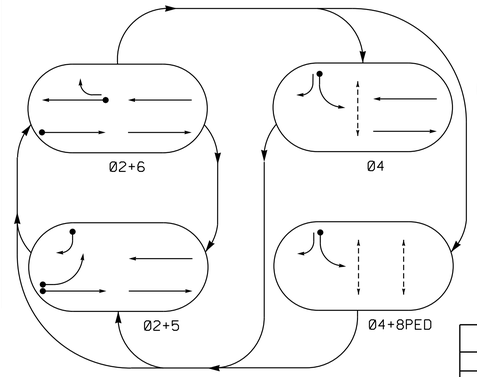
(Medium Priority)



DEFAULT PHASING TABLE OF OPERATION

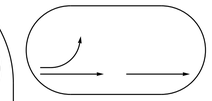
SIGNAL FACE	PHASE Ø2+5	Ø2+6	Ø4	Ø4+PED	PRE3	FLASH
21, 22, 23	G	G	R	R	G	Y
24, 25	G	G	G	R	G	Y
41	R	R	G	G	R	R
42	R	R	G	G	R	R
51	←	~~F Y~~	~~R~~	~~R~~	←	~~Y~~
61, 62	R	G	R	R	R	Y
63, 64	G	G	G	R	R	Y
P41, P42	DW	DW	W	W	DW	DRK
P61, P62	DW	W	DW	DW	DW	DRK
P81, P82	DW	DW	DW	W	DW	DRK

ALTERNATE PHASING DIAGRAM



ALTERNATE EV PREEMPT PHASES

(Medium Priority)



ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2+5	Ø2+6	Ø4	Ø4+PED	PRE3	FLASH
21, 22, 23	G	G	R	R	G	Y
24, 25	G	G	G	R	G	Y
41	R	R	G	G	R	R
42	R	R	G	G	R	R
51	←	~~R~~	~~R~~	~~R~~	←	~~Y~~
61, 62	R	G	R	R	R	Y
63, 64	G	G	G	R	R	Y
P41, P42	DW	DW	W	W	DW	DRK
P61, P62	DW	W	DW	DW	DW	DRK
P81, P82	DW	DW	DW	W	DW	DRK

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. 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 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

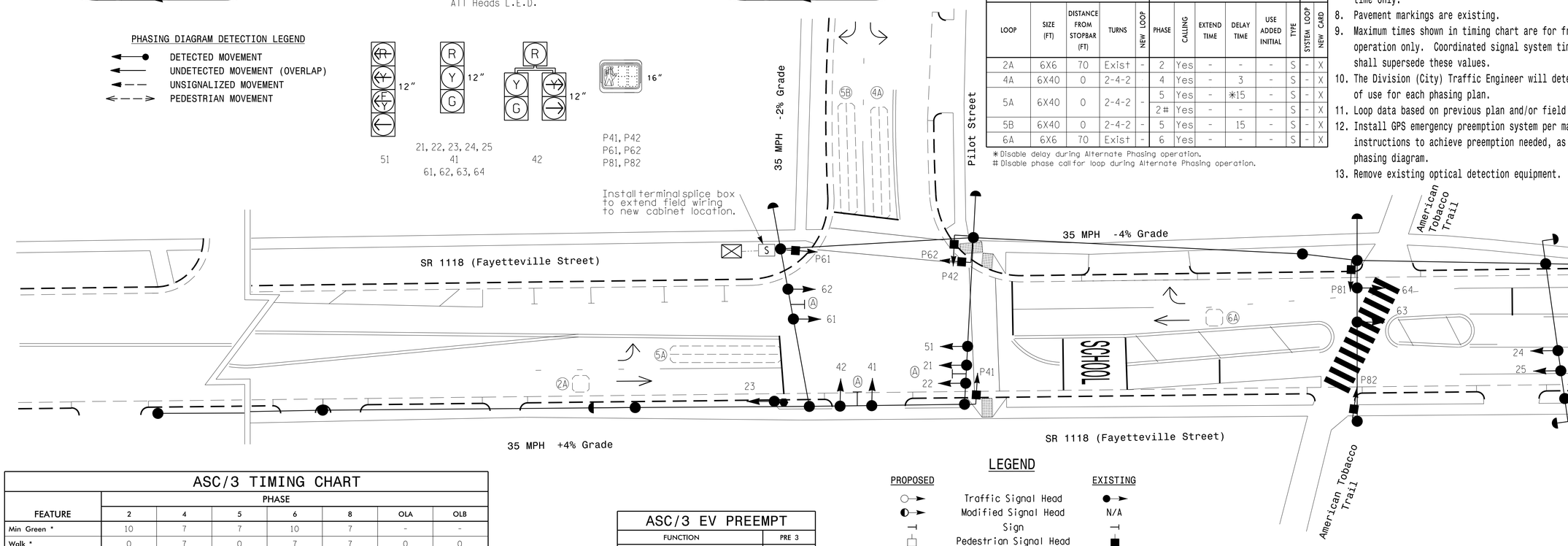
SIGNAL FACE I.D.

All Heads L.E.D.

ASC/3 DETECTOR INSTALLATION CHART

DETECTOR LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
2A	6X6	70	Exist	-	2	Yes	-	-	-	S	-	X
4A	6X40	0	2-4-2		4	Yes	-	3	-	S	-	X
5A	6X40	0	2-4-2	-	5	Yes	-	*15	-	S	-	X
					2#	Yes	-	-	-	S	-	X
5B	6X40	0	2-4-2	-	5	Yes	-	15	-	S	-	X
6A	6X6	70	Exist	-	6	Yes	-	-	-	S	-	X

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



ASC/3 TIMING CHART

FEATURE	PHASE 2	4	5	6	8	OLA	OLB
Min Green *	10	7	7	10	7	-	-
Walk *	0	7	0	7	7	0	0
Ped Clear	0	10	0	11	10	0	0
Veh. Extension *	3.0	2.0	2.0	3.0	0.0		
Max 1 *	45	30	15	45	-		
Yellow	4.1	3.0	3.0	4.1	3.0	4.1	4.1
Red Clear	1.5	2.4	2.1	1.5	0.0	1.5	1.5
Actuations B4 Add *	-	-	-	-	-		
Seconds /Actuation *	-	-	-	-	-		
Max Initial *	-	-	-	-	-		
Time Before Reduction *	-	-	-	-	-		
Time To Reduce *	-	-	-	-	-		
Minimum Gap	-	-	-	-	-		
Locking Detector	X	-	-	X	-		
Recall Position	VEH RECALL	-	-	VEH RECALL	-		
Dual Entry	-	X	-	-	-		
Simultaneous Gap	X	X	X	X	X		

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

ASC/3 EV PREEMPT

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

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

LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pedestal	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
	Type II Signal Pedestal	
S	Terminal Splice Box	S
A	Street Name Sign (D3-1)	A

Prepared in the offices of:

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

Signal Upgrade

Prepared for: Transportation Mobility and Safety Division, Signal Design Section

750 N.Greenfield Pkwy,Garner,NC 27529

SCALE 0 20 1"=20'

SR 1118 (Fayetteville St.) at Pilot St.

Division 5 Durham County Durham

PLAN DATE: December 2018 REVIEWED BY: WJ Hamilton

PREPARED BY: TS Popelka RKA PROJ. NO.: 17287 (040)

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 32396 ENGINEER WILLIAM J. HAMILTON

DocuSigned by: William J. Hamilton 12/20/2018

ASSISTANT ENGINEER SIGNATURE DATE

SIG. INVENTORY NO. 05-0402

12/20/2018
U-5968_Sig-0402_05-0402.sig.dgn
User:tpopelka

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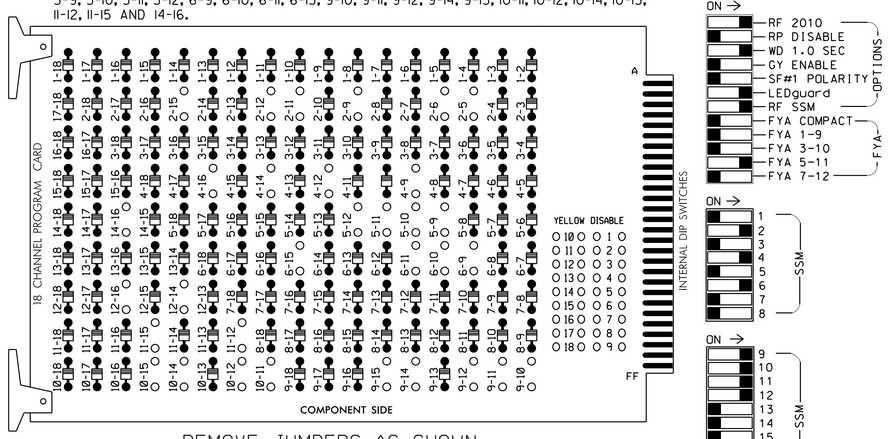
PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-90.1

EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 2-5, 2-6, 2-9, 2-10, 2-11, 2-12, 2-15, 4-9, 4-10, 4-12, 4-14, 4-16, 5-9, 5-10, 5-11, 5-12, 6-9, 6-10, 6-11, 6-15, 9-10, 9-11, 9-12, 9-14, 9-15, 10-11, 10-12, 10-14, 10-15, 11-12, 11-15 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 phase 4 for Dual Entry.
3. Program controller to start up in phase 2 Green 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,S5,S6,S7,S8,S9,S12,
AUX S1,AUX S2,AUX S4,AUX S5
PHASES USED.....2,4,4PED,5,6,6PED,8*,8PED
OVERLAP "A".....*
OVERLAP "B".....*
OVERLAP "C".....*
OVERLAP "D".....*

* Phase used for timing purposes only.
** See overlap programming on sheet 2.

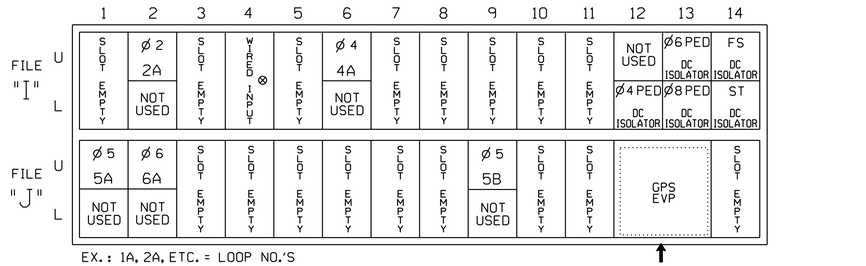
SIGNAL HEAD HOOK-UP CHART

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	P41, P42	51★	61,62	P61, P62	NU	NC	P81, P82	24,25	63,64	NU	51★	42	NU
RED		128			101			134					A121	A124			*	
YELLOW		129			102		*	135					A122	A125				
GREEN		130			103			136					A123	A126				
RED ARROW																A114		
YELLOW ARROW																A115	A102	
FLASHING YELLOW ARROW																A116		
GREEN ARROW							133										A103	
✋						104			119			110						
🚶						106			121			112						

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

INPUT FILE POSITION LAYOUT

(front view)



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

FS = FLASH SENSE
ST = STOP TIME

⊗ Wired Input - Do not populate slot with detector card

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND TIME	DELAY TIME	ADDED INITIAL	DETECTOR TYPE
2A	TB2-5,6	I2U	39	2	2	YES				S
4A	TB4-9,10	I6U	41	4	4	YES		3		S
5A[1]	TB3-1,2	J1U	55	5★	5	YES		15		S
	-	I4U	47	22★	2	YES				S
5B	TB7-9,10	J9U	59	15	5	YES		15		S
6A	TB3-5,6	J2U	40	6	6	YES				S
PED PUSH BUTTONS										
P41,P42	TB8-5,6	I12L	69	PED 4	4 PED					
P61,P62	TB8-7,9	I13U	68	PED 6	6 PED					
P81,P82	TB8-8,9	I13L	70	PED 8	8 PED					

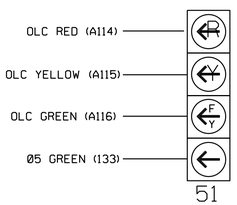
NOTE:
INSTALL DC ISOLATORS IN INPUT FILE SLOTS I12 AND I13.

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

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

SIGNAL WIRING DETAIL

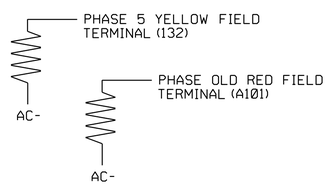
(wire signal head as shown)



LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

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



INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0402
DESIGNED: Dec 2018
SEALED: 12/20/2018
REVISED: N/A

Prepared in the offices of:
RAMEY KEMP & ASSOCIATES, INC.
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Electrical Detail
Sheet 1 of 4

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ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

SR 1118 (Fayetteville St.) at Pilot St.

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

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NORTH CAROLINA PROFESSIONAL SEAL 32396 ENGINEER WILLIAM J. HAMILTON

DocuSigned by: William J. Hamilton 12/20/2018
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PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-90.2

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

(program controller as shown)

IMPORTANT!

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

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

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

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

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

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

← NOTICE VEH DET PLAN 2

← ENSURE DELAY IS SET TO '0'

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

```
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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0402
DESIGNED: Dec 2018
SEALED: 12/20/2018
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 'OTHER/ECONOLITE'

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

LAG GRN 0.1 YEL 4.1 RED 1.5 ADV GRN 0.0
```

Toggle Once

↓

OVERLAP B

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

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

LAG GRN 0.1 YEL 4.1 RED 1.5 ADV GRN 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"

Toggle Once

↓

OVERLAP D

Select TMG VEH OVLP [D] and 'NORMAL'

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

LAG GRN 0.0 YEL 0.0 RED 0.0
```

END PROGRAMMING

Electrical Detail
Sheet 2 of 4

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ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

SR 1118 (Fayetteville St.)
at
Pilot St.

Division 5 | Durham County | Durham

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

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32396 ENGINEER WILLIAM J. HAMILTON

DocuSigned by: William J. Hamilton A0560D704648484... 12/20/2018
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SIG. INVENTORY NO. 05-0402

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User:tpopelka

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PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-90.3

ALTERNATE PHASING ACTIVATION DETAIL

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

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

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

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

ALTERNATE PHASING CHANGE SUMMARY

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

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

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

ECONOLITE ASC/3-2070 ACTION PLAN PROGRAMMING DETAIL

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

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

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

ECONOLITE ASC/3-2070 PREEMPT FILTERING PROGRAMMING DETAIL

(program controller as shown)

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

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0402
DESIGNED: Dec 2018
SEALED: 12/20/2018
REVISED: N/A

Electrical Detail
Sheet 3 of 4

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 1118 (Fayetteville St.) at Pilot St.

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32396 ENGINEER WILLIAM J. HAMILTON

SIGNATURE William J. Hamilton DocuSign envelope ID: A056ED7D4848484... 12/20/2018
DATE
SIG. INVENTORY NO. 05-0402

Prepared in the offices of:
RAMEY KEMP & ASSOCIATES, INC.
Transportation Engineers
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919-872-2315 Tel, 919-878-0416 Fax.
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NC Department of Transportation Mobility and Safety Division Signals Management Section
750 N.Greenfield Pkwy,Garner,NC 27529

12/20/2018
05-0402_sig03.dgn
User:tpopelka

DocuSign Envelope ID: 33F4F66F-25C0-44F0-BFC6-77C7DCA438CB

PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-90.4

ECONOLITE ASC/3-2070 EMERGENCY VEHICLE PREEMPT

PROGRAMMING DETAIL

(program controller as shown)

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

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

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

ENABLE... YES|PMT OVRIDE..|INTERLOCK. NO
DET LOCK... X|DELAY..    0|INHIBIT...  0
OVERIDE FL. .|DURATION   0|CLR-GRN... NO
TERM OLP.  NO|PC>YEL   YES|TERM PH    NO
PED DARK.. NO|TC RESRV  NO|DWELL FL  OFF
LINK PMT....0|X FLCOLR RED|EXIT OPT. OFF
X TMG PLN...0|RE-SERV..  0|FLT TYPE.HARD
FREE DUR PMT|R1  NO|R2  NO|R3  NO|R4  NO
--TIMING-----WALK|PED CL|MN GR| YEL| RED
ENTRANCE TM.    1|    10|    1|25.5|25.5
-----------MIN GR|EXT GR|MX GR| YEL| RED
TRACK CLEAR     0|     0|    0|25.5|25.5
-----------MIN DL|PMTEXT|MX TM| YEL| RED
DWL/CYC-EXIT    7|   0.0|  120|25.5|25.5
PMT ACTIVE OUT..ON   PMT ACT DWELL...NO
OTHER - PRI PMT.OFF  NON-PRI PMT.....OFF
INH EXT TIME... 0.0  PED PR RETURN...OFF
PRIORITY RETURN.OFF  QUEUE DELAY.... OFF
COND DELAY......OFF
PHASES     1   2   3   4   5   6   7   8
PR RTN%    0   0   0   0   0   0   0   0
PHASES     9  10  11  12  13  14  15  16
PR RTN%    0   0   0   0   0   0   0   0
```

PROGRAM EXTEND TIME ON GPS DETECTOR UNITS FOR 2.0 SEC.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0402
DESIGNED: Dec 2018
SEALED: 12/20/2018
REVISED: N/A

Electrical Detail
Sheet 4 of 4

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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Transportation Engineers
5808 Faringdon Place, Suite 100
Raleigh, North Carolina 27609
919-872-2212 Tel, 919-878-5416 Fax
www.rameykemp.com

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

SR 1118 (Fayetteville St.)
at
Pilot St.

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32396 ENGINEER WILLIAM J. HAMILTON

DocuSigned by: William J. Hamilton 12/20/2018
SIGNATURE DATE

SIG. INVENTORY NO. 05-0402

12/20/2018
05-0402_sig90.4.dgn
User:tpopelka

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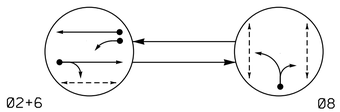
PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-91.0

PHASING DIAGRAM

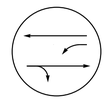


PHASING DIAGRAM DETECTION LEGEND

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

EV PREEMPT PHASES

(Medium Priority)



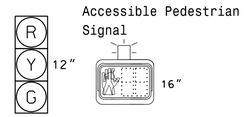
PRE 3 (Ø2+6)

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2+6	PHASE Ø8	PHASE PRE 3	PHASE FLASH
21, 22	G	R	G	Y
61, 62	G	R	G	Y
81, 82	R	G	R	R
P21, P22	W	DW	DW	DRK
P81, P82, P83, P84	DW	W	DW	DRK

SIGNAL FACE I.D.

All Heads L.E.D.



21, 22
61, 62
81, 82

P21, P22
P81, P82, P83, P84

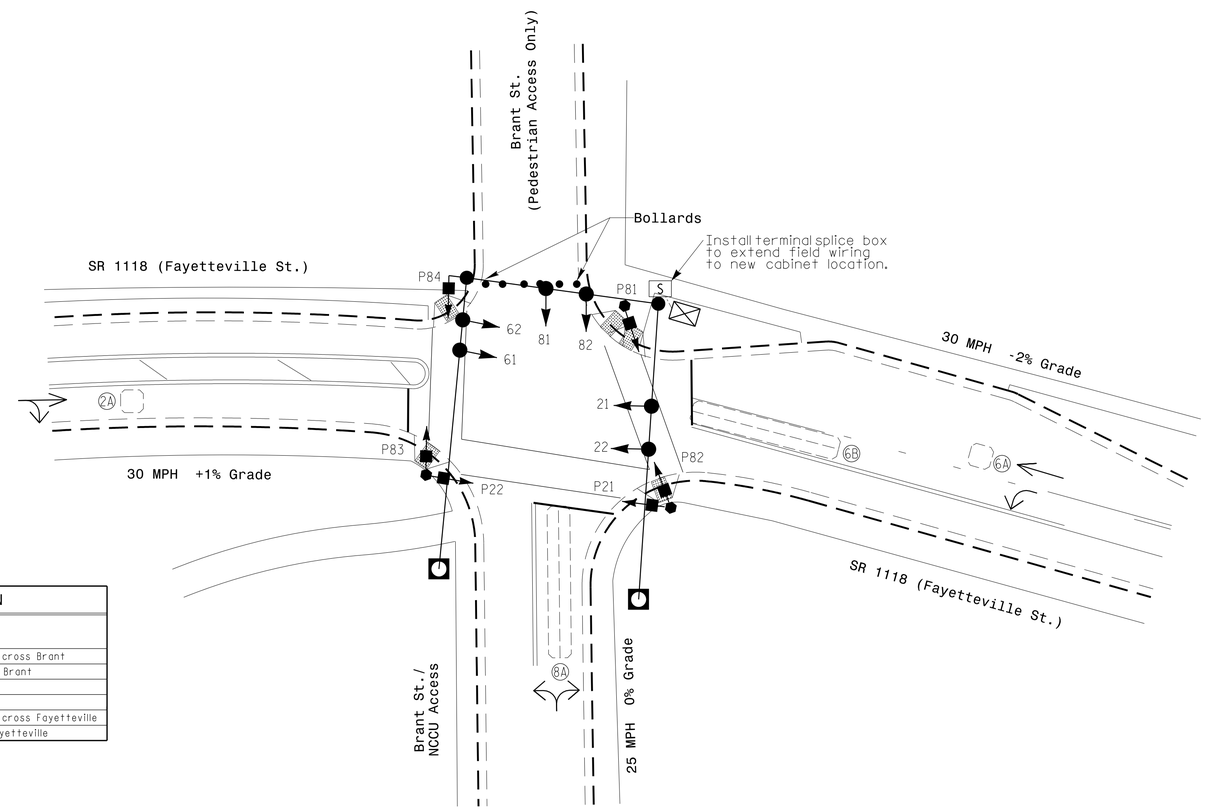
ASC/3 DETECTOR INSTALLATION CHART

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

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

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Set all detector units to presence mode.
4. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
5. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
6. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
7. Pavement markings are existing.
8. 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. Reconnect loops and heads in cabinet as indicated to match current NCDOT standards.
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.



ACCESSIBLE PEDESTRIAN SIGNAL OPERATION

SIGNAL FACE	VOICE	TONES	INTERVAL	SPEECH MESSAGE
P21,P22	X	-	Walk	Brant, Walk sign is on to cross Brant
			Flashing Don't Walk / Don't Walk	Wait, Wait to cross Brant
P81,P84	-	X	Walk	(Rapid Ticks)
			Flashing Don't Walk / Don't Walk	-
P82,P83	X	-	Walk	Fayetteville, Walk sign is on to cross Fayetteville
			Flashing Don't Walk / Don't Walk	Wait, Wait to cross Fayetteville

ASC/3 TIMING CHART

FEATURE	PHASE 2	PHASE 6	PHASE 8
Min Green *	10	10	7
Walk *	7	0	7
Ped Clear	13	0	9
Veh. Extension *	3.0	3.0	2.0
Max 1 *	45	45	25
Yellow	3.6	3.6	3.0
Red Clear	1.5	1.5	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	-	-	-
Simultaneous Gap	X	X	X

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

ASC/3 EV PREEMPT

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

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

LEGEND

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

Signal Upgrade

Prepared for: Transportation Mobility and Safety Division, Signal Design Section, Department of Transportation, State of North Carolina

750 N.Greenfield Pkwy,Garner,NC 27529

Prepared in the offices of:

RAMEY KEMP & ASSOCIATES, INC.
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5808 Faringdon Place, Suite 100
Raleigh, North Carolina 27609
Phone: 919-872-5115
www.rameykemp.com

SCALE 1"=20' (0 – 20)

SR 1118 (Fayetteville St.) at Brant St./NCCU Access

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

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NORTH CAROLINA PROFESSIONAL SEAL 32396 ENGINEER WILLIAM J. HAMILTON

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

SIG. INVENTORY NO. 05-0404

12/17/2018
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User:tpopelka

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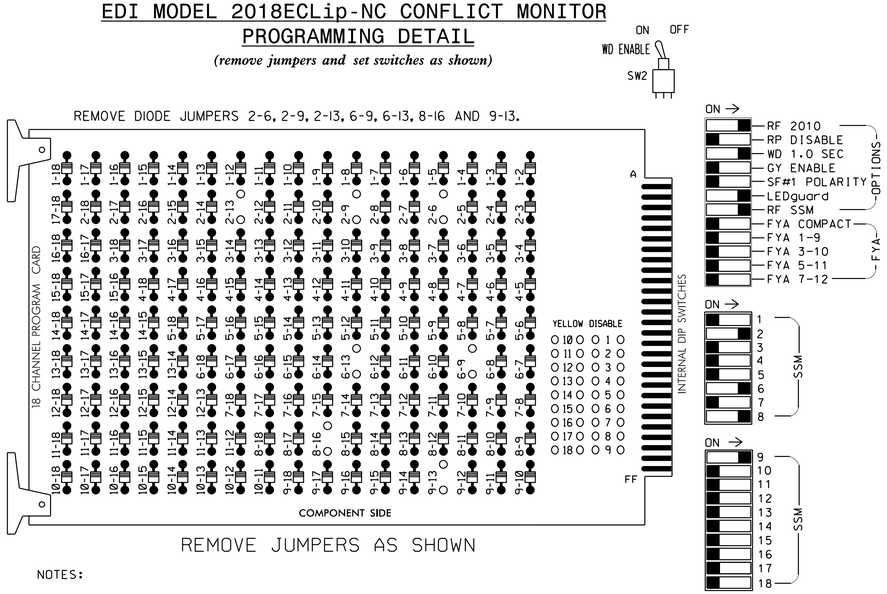
PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-91.1

EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



NOTES:

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

■ = DENOTES POSITION OF SWITCH

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Program controller to start up in phase 2 Walk and 6 Green.
3. The cabinet and controller are part of the Durham Signal System.
4. Install GPS preemption system. Perform installation according to manufacturer's directions and NCDOT engineer-approved mounting location to accomplish the preemption schemes shown on the Signal Design Plans.

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	NU	21,22	P21, P22	NU	NU	NU	NU	62,63	NU	NU	81,82	P81,P82 P83,P84	NU	NU	NU	NU	NU	NU
RED		128						134			107							
YELLOW		129						135			108							
GREEN		130						136			109							
RED ARROW																		
YELLOW ARROW																		
FLASHING YELLOW ARROW																		
GREEN ARROW																		
✋			113									110						
🚶			115									112						

NU = Not Used

★ See pictorial of head wiring in detail this sheet.

EQUIPMENT INFORMATION

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

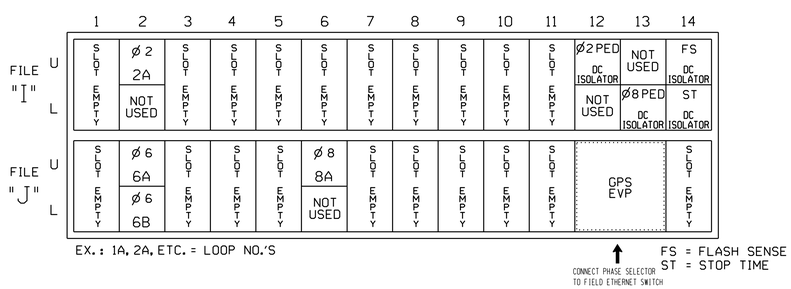
✱ See overlap programming on sheet 2.

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

INPUT FILE POSITION LAYOUT

(front view)



INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND TIME	DELAY TIME	ADDED INITIAL	DETECTOR TYPE
2A	TB2-5,6	I2U	39	2	2	YES				S
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		10		S
PED PUSH BUTTONS										
P21,P22	TB8-4,6	I12U	67	PED 2	2 PED					
P81,P82, P83,P84	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

ACCESSIBLE PEDESTRIAN SIGNAL (APS) INSTALLATION NOTES

1. Install push buttons and APS equipment per manufacturer's instructions.
2. Provide a dedicated cable to each push button per manufacturer's instructions.
3. If APS equipment is mounted in cabinet, use filtered power (i.e., Controller Receptacle) to power APS equipment. Do not use Equipment Receptacle, which is a GFCI outlet.
4. Never attempt to operate a standard contact closure push button with the APS system unless cabinet is re-wired for standard button operation or unless explicitly allowed by the manufacturer.
5. Place manufacturer's instructions in cabinet with cabinet prints, signal plans, and electrical details.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0404
DESIGNED: Dec 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail
Sheet 1 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 1118 (Fayetteville St.)
at
Brant St./NCCU Access

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

William J. Hamilton 12/19/2018
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SIGNATURE DATE

SIG. INVENTORY NO. 05-0404

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750 N.Greenfield Pkwy,Garner,NC 27529

12/17/2018
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User:tspopelka

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PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-91.2

ECONOLITE ASC/3-2070 EMERGENCY VEHICLE PREEMPT PROGRAMMING DETAIL

(program controller as shown)

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

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

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

ENABLE... YES|PMT OVRIDE..|INTERLOCK. NO
DET LOCK... X|DELAY..    0|INHIBIT...  0
OVERIDE FL. .|DURATION   0|CLR-GRN... NO
TERM OLP.  NO|PC>YEL    YES|TERM PH    NO
PED DARK.. NO|TC RESRV  NO|DWELL FL  OFF
LINK PMT....0|X FLCOLR RED|EXIT OPT. OFF
X TMG PLN...0|RE-SERV..  0|FLT TYPE.HARD
FREE DUR PMT|R1  NO|R2  NO|R3  NO|R4  NO
--TIMING-----WALK|PED CL|MN GR| YEL| RED
ENTRANCE TM.    1|    10|    1|25.5|25.5
-----------MIN GR|EXT GR|MX GR| YEL| RED
TRACK CLEAR     0|     0|    0|25.5|25.5
-----------MIN DL|PMTEXT|IMX TM| YEL| RED
DWL/CYC-EXIT    7|   0.0|   120|25.5|25.5
PMT ACTIVE OUT..ON   PMT ACT DWELL...NO
OTHER - PRI PMT.OFF  NON-PRI PMT.....OFF
INH EXT TIME... 0.0  PED PR RETURN...OFF
PRIORITY RETURN.OFF  QUEUE DELAY.... OFF
COND DELAY......OFF
PHASES     1   2   3   4   5   6   7   8
PR RTN%    0   0   0   0   0   0   0   0
PHASES     9  10  11  12  13  14  15  16
PR RTN%    0   0   0   0   0   0   0   0
```

PROGRAM EXTEND TIME ON GPS DETECTOR UNIT FOR 2.0 SEC.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0404
DESIGNED: Dec 2018
SEALED: 12/19/2018
REVISED: N/A

ECONOLITE ASC/3-2070 PREEMPT FILTERING PROGRAMMING DETAIL

(program controller as shown)

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

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

Electrical Detail
Sheet 2 of 2

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Prepared in the offices of:
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Transportation Engineers
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www.rameykemp.com

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

SR 1118 (Fayetteville St.)
at
Brant St./NCCU Access

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

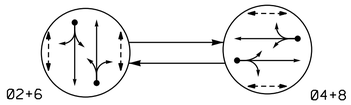
DocuSigned by: William J. Hamilton 12/19/2018
A056DBDD6A6E84FE
SIGNATURE DATE

SIG. INVENTORY NO. 05-0404

12/17/2018
ecolite_asc3-2070_05-0404_elec2.dgn
User:tpopelko

PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig. 92.0

PHASING DIAGRAM

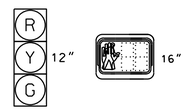


PHASING DIAGRAM DETECTION LEGEND

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

SIGNAL FACE I.D.

All Heads L.E.D.

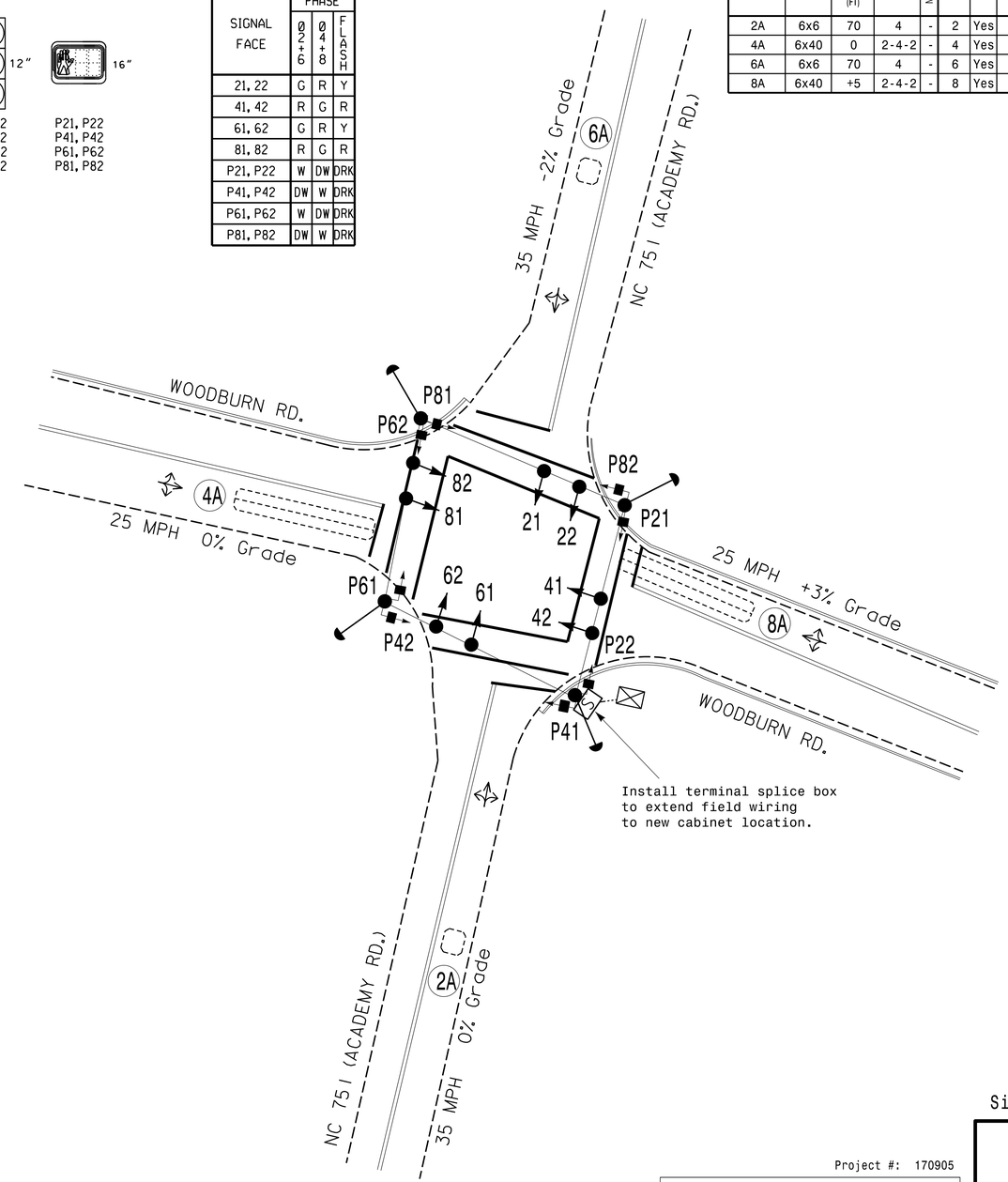


21, 22
41, 42
61, 62
81, 82

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

TABLE OF OPERATION			
SIGNAL FACE	PHASE 02+6	PHASE 04+8	FLASH
21, 22	G	R	Y
41, 42	R	G	R
61, 62	G	R	Y
81, 82	R	G	R
P21, P22	W	DW	DRK
P41, P42	DW	W	DRK
P61, P62	W	DW	DRK
P81, P82	DW	W	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	-	5	-	S	-	X
6A	6x6	70	4	-	6	Yes	-	-	-	S	-	X
8A	6x40	+5	2-4-2	-	8	Yes	-	5	-	S	-	X



Install terminal splice box
to extend field wiring
to new cabinet location.

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. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
6. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls for phase 4 and phase 8.
7. Pavement markings are existing.
8. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
9. Loop data based on previous plan and / or field observations.
10. Reconnect loops and heads in cabinet as indicated to match current NCDOT standards.

ASC/3 TIMING CHART				
FEATURE	PHASE 2	PHASE 4	PHASE 6	PHASE 8
Min Green *	10	7	10	7
Walk *	7	7	7	7
Ped Clear	10	12	9	12
Veh. Extension *	3.0	2.0	3.0	2.0
Max 1 *	60	30	60	30
Yellow	3.8	3.2	4.0	3.1
Red Clear	1.1	1.7	1.2	1.7
Actuations B4 Add *	-	-	-	-
Seconds /Actuation *	-	-	-	-
Max Initial *	-	-	-	-
Time Before Reduction *	-	-	-	-
Time To Reduce *	-	-	-	-
Minimum Gap	-	-	-	-
Locking Detector	X	-	X	-
Recall Position	VEH/PED RECALL	-	VEH/PED 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	

Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Project #: 170905

DAVENPORT
HOME OFFICE:
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NCBELS FIRM LICENSE NO. C-2522

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 20 1"=20'

NC 751 (Academy Road)
at
Woodburn Road

Division 5 Durham County Durham

PLAN DATE:	December 2018	REVIEWED BY:	R. Hinshaw
PREPARED BY:	A. D. Hayes	REVIEWED BY:	T. Smith

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 032117 ENGINEER ROYAL HINSHAW

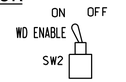
DocuSigned by:
R. Royal Hinshaw 12/20/2018
SIGNATURE DATE

SIG. INVENTORY NO. 05-0405

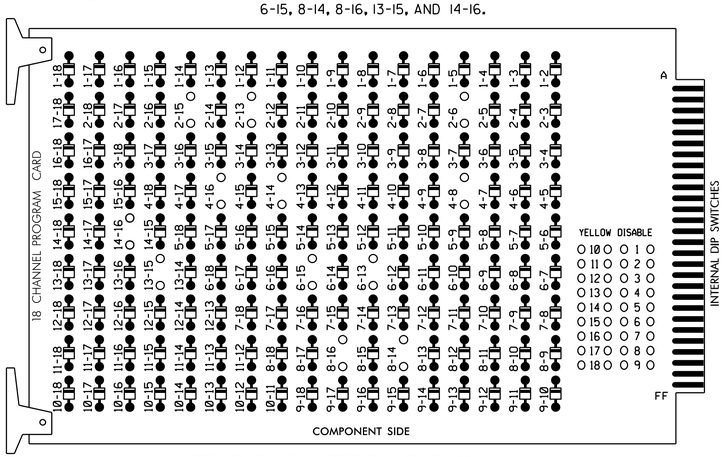
PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig. 92.1

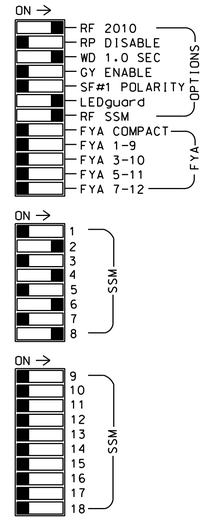
EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE DIODE JUMPERS 2-6, 2-13, 2-15, 4-8, 4-14, 4-16, 6-13, 6-15, 8-14, 8-16, 13-15, AND 14-16.





REMOVE JUMPERS AS SHOWN

NOTES:

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

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Program phases 4 and 8 for Dual Entry.
3. Program controller to start up in phase 2 Walk and 6 Walk.
4. The cabinet and controller are part of the Durham Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070LX
CABINET.....332
SOFTWARE.....ECONOLITE ASC/3-2070
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...12
LOAD SWITCHES USED.....S2,S3,S5,S6,S8,S9,S11,S12
PHASES USED.....2,2 PED,4,4 PED,6,6 PED,8,8 PED
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.		21,22	P21, P22	NU	41,42	P41, P42	NU	61,62	P61, P62	NU	81,82	P81, P82
RED		128			101			134			107	
YELLOW		129			102			135			108	
GREEN		130			103			136			109	
RED ARROW												
YELLOW ARROW												
GREEN ARROW												
✋			113			104			119			110
🚶			115			106			121			112

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	SLOT EMPTY	Ø2 2A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	Ø4 4A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	NOT USED	NOT USED	FS DC ISOLATOR
	L		NOT USED				NOT USED						Ø4 PED DC ISOLATOR	Ø8 PED DC ISOLATOR	ST DC ISOLATOR
FILE "J"	U	SLOT EMPTY	Ø6 6A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	Ø8 8A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L		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
PED PUSH BUTTONS										
P41,P42	TB8-5,6	I12L	69	PED 4	4 PED					
P81,P82	TB8-8,9	I13L	70	PED 8	8 PED					

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

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

Electrical Detail

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ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

NC 751 (Academy Road) at Woodburn Road

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 032117 ENGINEER ROYAL HINSHAW

DocuSigned by:
R. Royal Hinshaw 12/20/2018
SIGNATURE DATE
PROFESSIONAL ENGINEER
SIG. INVENTORY NO. 05-0405

Project #: 170905

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0405
DESIGNED: December 2018
SEALED: 12/20/2018
REVISED: N/A

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