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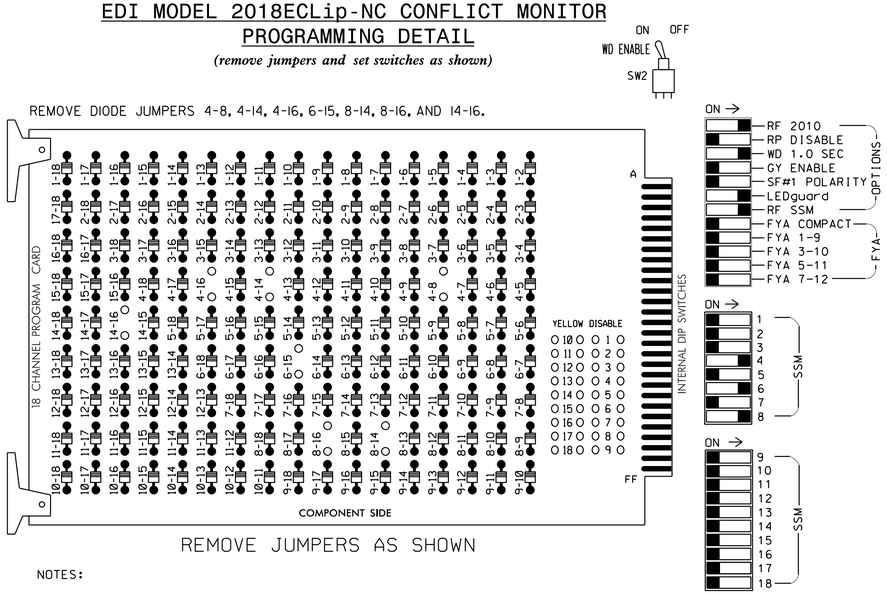
PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-17.1

EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE JUMPERS AS SHOWN

■ = DENOTES POSITION OF SWITCH

NOTES:

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

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Program controller to start up in phase 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 Plan.

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.....S5,S6,S8,S9,S11,S12
PHASES USED.....4,4PED,6,6PED,8,8PED
OVERLAP "A".....NOT USED
OVERLAP "B".....NOT USED
OVERLAP "C".....NOT USED
OVERLAP "D".....NOT USED

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	NU	NU	NU	NU	41,42	P41, P42	NU	61,62, 63,64	P61,P62, P63,P64	NU	81,82	P81, P82	NU	NU	NU	NU	NU	NU
RED					101			134			107							
YELLOW					102			135			108							
GREEN					103			136			109							
RED ARROW																		
YELLOW ARROW																		
GREEN ARROW																		
✋						104			119			110						
🚶						106			121			112						

NU = Not Used

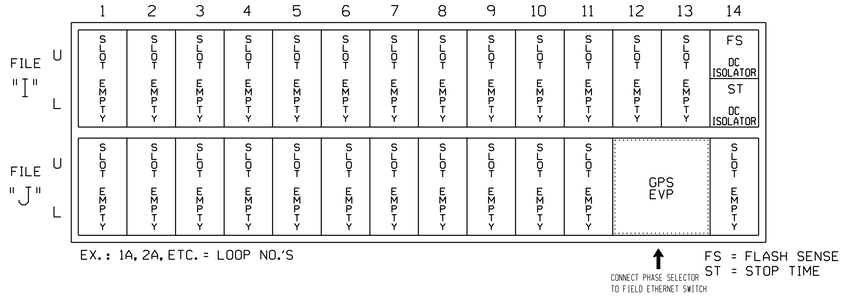
★ See pictorial of head wiring in detail this sheet.

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

INPUT FILE POSITION LAYOUT

(front view)



THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0193
DESIGNED: Dec 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail
Sheet 1 of 2

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ELECTRICAL AND PROGRAMMING DETAILS FOR:

US 70 Bus. WB (W. Morgan St.)
at
Foster St.

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32396 ENGINEER WILLIAM J. HAMILTON

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

SIG. INVENTORY NO. 05-0193

Prepared in the offices of:
RAMEY KEMP & ASSOCIATES, INC.
Transportation Engineers
5808 Faringdon Place, Suite 100
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919-872-5115 Tel, 919-878-0416 Fax,
www.rameykemp.com

NC Department of Transportation Mobility and Safety Division
Traffic Engineering Branch
Signals Management Section
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-17.2

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

ENABLE... YESIPMT OVRIDE..IINTERLOCK. NO
DET LOCK... XIDELAY..    OIINHIBIT...  O
OVERIDE FL. .IDURATION   OICLR-GRN... NO
TERM OLP.  NOIPC>YEL   YESITERM PH    NO
PED DARK.. NOITC RESRV  NOIDWELL FL  OFF
LINK PMT....OIX FLCOLR REDIEXIT OPT. OFF
X TMG PLN...OIRE-SERV..  OIFLT TYPE.HARD
FREE DUR PMTIR1  NOIR2  NOIR3  NOIR4  NO
--TIMING-----WALKIPED CLIMN GRI YELI RED
ENTRANCE TM.    1I    10I    1I25.5I25.5
-----------MIN GRIEXT GRIMX GRI YELI RED
TRACK CLEAR     OI     OI    OI25.5I25.5
-----------MIN DLIPMTEXTIMX TMI YELI RED
DWL/CYC-EXIT    7I   0.0I  120I25.5I25.5
PMT ACTIVE OUT..ON   PMT ACT DWELL...NO
OTHER - PRI PMT.OFF  NON-PRI PMT.....OFF
INH EXT TIME... 0.0  PED PR RETURN...OFF
PRIORITY RETURN.OFF  QUEUE DELAY.... OFF
COND DELAY......OFF
PHASES     1   2   3   4   5   6   7   8
PR RTN%    0   0   0   0   0   0   0   0
PHASES     9  10  11  12  13  14  15  16
PR RTN%    0   0   0   0   0   0   0   0
```

PROGRAM EXTEND TIME ON GPS DETECTOR UNIT FOR 2.0 SEC.

ECONOLITE ASC/3-2070 PREEMPT FILTERING PROGRAMMING DETAIL

(program controller as shown)

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

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0193
DESIGNED: Dec 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail
Sheet 2 of 2

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ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

US 70 Bus. WB (W. Morgan St.)
at
Foster St.

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32396 ENGINEER WILLIAM J. HAMILTON

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12/17/2018
05-0193_ele2.dgn
User:tspopelka

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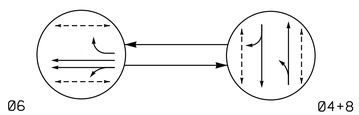
PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-16.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

EV PREEMPT PHASES

(Medium Priority)

PRE 3
(Ø6)

TABLE OF OPERATION

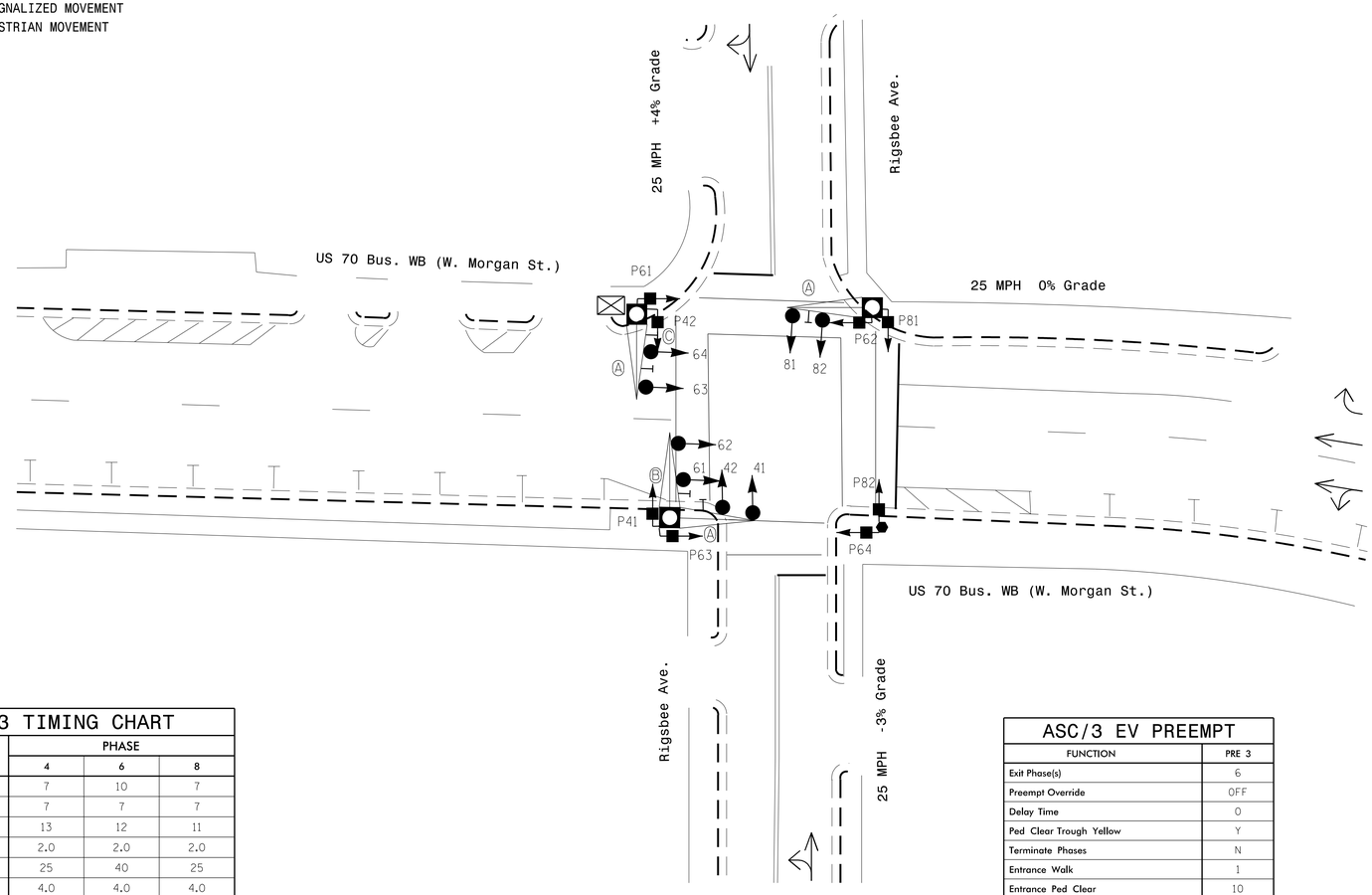
SIGNAL FACE	PHASE Ø6	PHASE Ø4+8	PHASE PRE3	PHASE FLASH
41, 42	R	G	R	R
61, 62, 63, 64	G	R	G	Y
81, 82	R	G	R	R
P41, P42	DW	W	DW	DRK
P61, P62, P63, P64	W	DW	DW	DRK
P81, P82	DW	W	DW	DRK

SIGNAL FACE I.D.

All Heads L.E.D.

41, 42
61, 62, 63, 64
81, 82

P41, P42
P61, P62, P63, P64
P81, P82



2 Phase
W/ EV Preemption
Pretimed
(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. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
4. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
5. Pavement markings are existing.
6. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
7. Reconnect heads in cabinet as indicated to match current NCDOT standards.
8. Install new cabinet on the existing cabinet foundation.
9. Install GPS emergency preemption system per manufacturer's instructions to achieve preemption needed, as shown in phasing diagram.
10. Remove existing optical detection equipment.

LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
	Type II Signal Pedestal	
	Metal Pole with Mastarm	
A	Street Name Sign (D3-1)	A
B	Post Office to Left Sign	B
C	Right Arrow "ONLY" Sign (R3-5R)	C

ASC/3 TIMING CHART

FEATURE	PHASE 4	PHASE 6	PHASE 8
Min Green *	7	10	7
Walk *	7	7	7
Ped Clear	13	12	11
Veh. Extension *	2.0	2.0	2.0
Max 1 *	25	40	25
Delayed Green *	4.0	4.0	4.0
Yellow	3.0	3.2	3.3
Red Clear	1.8	1.5	1.8
Actuations B4 Add *	-	-	-
Seconds /Actuation *	-	-	-
Max Initial *	-	-	-
Time Before Reduction *	-	-	-
Time To Reduce *	-	-	-
Minimum Gap	-	-	-
Locking Detector	-	-	-
Recall Position	PED/MAX	PED/MAX	PED/MAX
Dual Entry	-	-	-
Simultaneous Gap	X	X	X

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

ASC/3 EV PREEMPT

FUNCTION	PRE 3
Exit Phase(s)	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.

Prepared in the offices of:

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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'

US 70 Bus. WB (W. Morgan St.) at Rigsbee Ave.

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

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NORTH CAROLINA PROFESSIONAL SEAL 32396 ENGINEER WILLIAM J. HAMILTON

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SIG. INVENTORY NO. 05-0206

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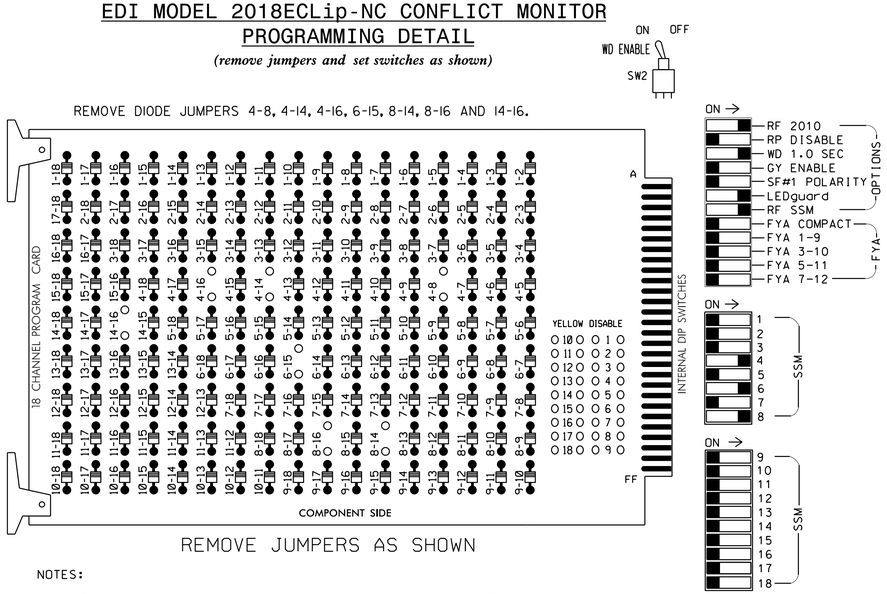
PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-18.1

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 6 Walk.
3. Program phase 2 for Red Flash.
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 Plan.

EQUIPMENT INFORMATION

CONTROLLER.....2070LX
CABINET.....332
SOFTWARE.....ECONOLITE ASC/3-2070
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...12
LOAD SWITCHES USED.....S5,S6,S8,S9,S11,S12
PHASES USED.....4,4PED,6,6PED,8,8PED
OVERLAPS.....NONE

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED
SIGNAL HEAD NO.	NU	NU	NU	NU	41,42	P41, P42	NU	61,62, 63,64	P61,P62, P63,P64	NU	81,82	P81, P82
RED					101			134			107	
YELLOW					102			135			108	
GREEN					103			136			109	
RED ARROW												
YELLOW ARROW												
GREEN ARROW												
✋						104			119			110
🚶						106			121			112

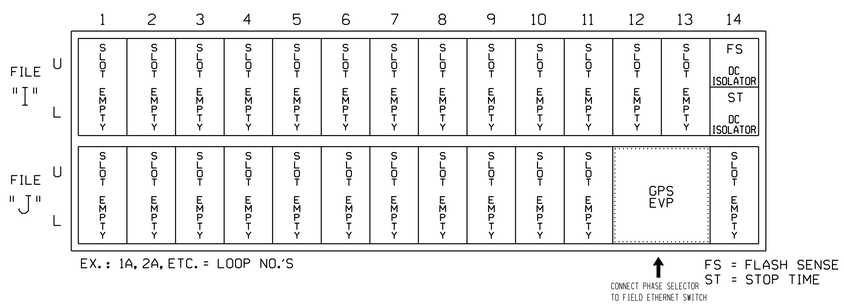
NU = Not Used

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

INPUT FILE POSITION LAYOUT

(front view)



THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0206
DESIGNED: Dec 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail
Sheet 1 of 2

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ELECTRICAL AND PROGRAMMING DETAILS FOR:

US 70 Bus. WB (W. Morgan St.)
at
Rigsbee Ave.

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

750 N.Greenfield Pkwy,Garner,NC 27529

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NORTH CAROLINA PROFESSIONAL SEAL 32396 ENGINEER WILLIAM J. HAMILTON

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PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-18.2

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

ENABLE... YES|PMT OVRIDE..|INTERLOCK. NO
DET LOCK... X|DELAY..    0|INHIBIT...  0
OVERIDE FL. .|DURATION   0|CLR-GRN... NO
TERM OLP.  NO|PC>YEL   YES|TERM PH    NO
PED DARK.. NO|TC RESRV  NO|DWELL FL  OFF
LINK PMT....0|X FLCOLR RED|EXIT OPT. OFF
X TMG PLN...0|RE-SERV..  0|FLT TYPE.HARD
FREE DUR PMT|R1  NO|R2  NO|R3  NO|R4  NO
--TIMING-----WALK|PED CL|MN GR| YEL| RED
ENTRANCE TM.    1|    10|    1|25.5|25.5
-----------MIN GR|EXT GR|MX GR| YEL| RED
TRACK CLEAR     0|     0|    0|25.5|25.5
-----------MIN DL|PMTEXT|MX TM| YEL| RED
DWL/CYC-EXIT    7|   0.0|  120|25.5|25.5
PMT ACTIVE OUT..ON   PMT ACT DWELL...NO
OTHER - PRI PMT.OFF  NON-PRI PMT.....OFF
INH EXT TIME... 0.0  PED PR RETURN...OFF
PRIORITY RETURN.OFF  QUEUE DELAY.... OFF
COND DELAY......OFF
PHASES     1   2   3   4   5   6   7   8
PR RTN%    0   0   0   0   0   0   0   0
PHASES     9  10  11  12  13  14  15  16
PR RTN%    0   0   0   0   0   0   0   0
```

PROGRAM EXTEND TIME ON GPS DETECTOR UNIT FOR 2.0 SEC.

ECONOLITE ASC/3-2070 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: 05-0206
DESIGNED: Dec 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail
Sheet 2 of 2

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ELECTRICAL AND PROGRAMMING DETAILS FOR:

US 70 Bus. WB (W. Morgan St.)
at
Rigsbee Ave.

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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750 N.Greenfield Pkwy,Garner,NC 27529

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32396 ENGINEER WILLIAM J. HAMILTON

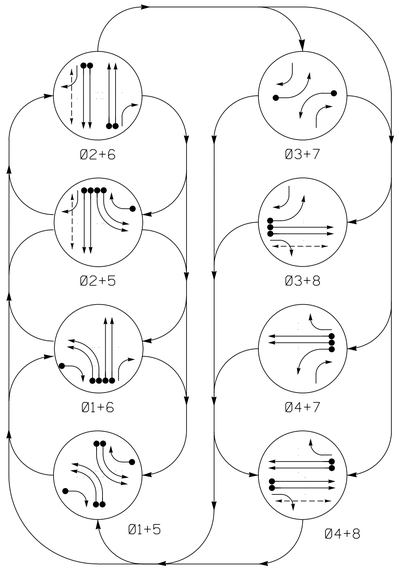
DocuSigned by: William J. Hamilton A0560D7D6A8A8A4... 12/19/2018
SIGNATURE DATE

SIG. INVENTORY NO. 05-0206

12/17/2018
ARCHIVE=05-0206_sig2.dgn
User=tpopelka

PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG.19.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

TABLE OF OPERATION

SIGNAL FACE	PHASE 01+05	01+06	02+05	02+06	03+07	03+08	04+07	04+08	FLASH
11, 12	←	←	↰R	↰R	↰R	↰R	↰R	↰R	↰R
21	R	R	G	G	R	R	R	R	Y
22	R	R	G	G	R↘	R↘	R	R	Y
31	↰R	↰R	↰R	↰R	←	↰R	↰R	↰R	↰R
41	R	R	R	R	R	R	G	G	R
42	R↘	R	R↘	R	R	R	G	G	R
51, 52	←	↰R	←	↰R	↰R	↰R	↰R	↰R	↰R
61	R	G	R	G	R	R	R	R	Y
62	R	G	R	G	R↘	R	R↘	R	Y
71	↰R	↰R	↰R	↰R	←	↰R	←	↰R	↰R
81	R	R	R	R	R	G	R	G	R
82	R↘	R↘	R	R	R	G	R	G	R
P21, P22	DW	DW	W	W	DW	DW	DW	DW	DRK
P81, P82	DW	DW	DW	DW	DW	W	DW	W	DRK

SIGNAL FACE I.D.

All Heads L.E.D.

11, 12, 31, 51, 52, 71 | 21, 41, 61, 81 | 22, 42, 62, 82 | P21, P22, P81, P82

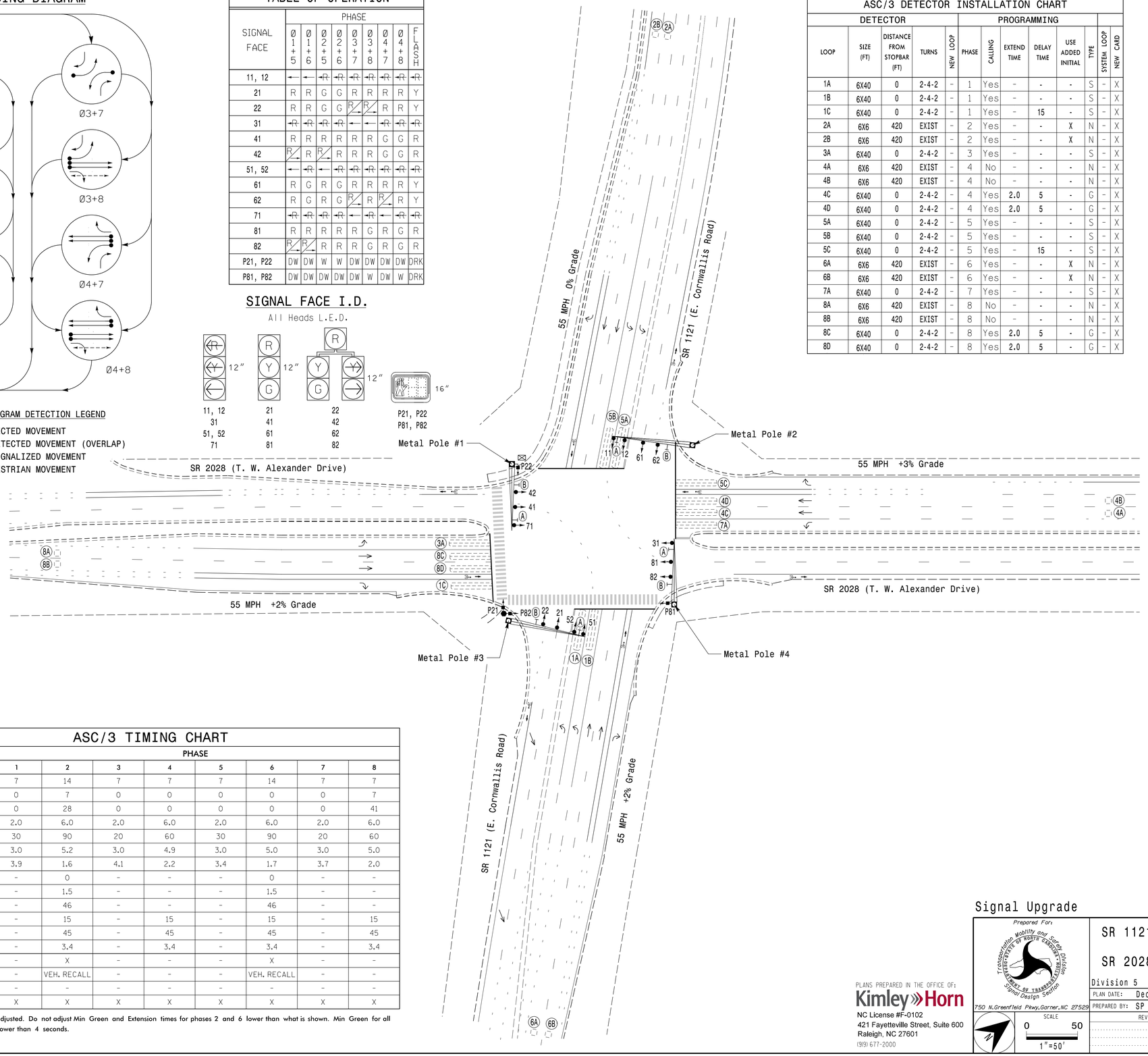
ASC/3 DETECTOR INSTALLATION CHART

DETECTOR					PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
1A	6X40	0	2-4-2	-	1	Yes	-	-	-	S	-	X
1B	6X40	0	2-4-2	-	1	Yes	-	-	-	S	-	X
1C	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
3A	6X40	0	2-4-2	-	3	Yes	-	-	-	S	-	X
4A	6X6	420	EXIST	-	4	No	-	-	-	N	-	X
4B	6X6	420	EXIST	-	4	No	-	-	-	N	-	X
4C	6X40	0	2-4-2	-	4	Yes	2.0	5	-	G	-	X
4D	6X40	0	2-4-2	-	4	Yes	2.0	5	-	G	-	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	420	EXIST	-	6	Yes	-	-	X	N	-	X
6B	6X6	420	EXIST	-	6	Yes	-	-	X	N	-	X
7A	6X40	0	2-4-2	-	7	Yes	-	-	-	S	-	X
8A	6X6	420	EXIST	-	8	No	-	-	-	N	-	X
8B	6X6	420	EXIST	-	8	No	-	-	-	N	-	X
8C	6X40	0	2-4-2	-	8	Yes	2.0	5	-	G	-	X
8D	6X40	0	2-4-2	-	8	Yes	2.0	5	-	G	-	X

8 Phase Fully Actuated (Durham Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. 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.



LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
	Pedestrian Signal Head With Push Button & Sign	
	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	→
Ⓐ	"U-TURN YIELD TO RIGHT TURN" Sign (R10-16)	Ⓐ
Ⓑ	Street Sign (D3-1)	Ⓑ

ASC/3 TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6	7	8
Min Green *	7	14	7	7	7	14	7	7
Walk *	0	7	0	0	0	0	0	7
Ped Clear	0	28	0	0	0	0	0	41
Veh. Extension *	2.0	6.0	2.0	6.0	2.0	6.0	2.0	6.0
Max 1 *	30	90	20	60	30	90	20	60
Yellow	3.0	5.2	3.0	4.9	3.0	5.0	3.0	5.0
Red Clear	3.9	1.6	4.1	2.2	3.4	1.7	3.7	2.0
Actuations B4 Add *	-	0	-	-	-	0	-	-
Seconds /Actuation *	-	1.5	-	-	-	1.5	-	-
Max Initial *	-	46	-	-	-	46	-	-
Time Before Reduction *	-	15	-	15	-	15	-	15
Time To Reduce *	-	45	-	45	-	45	-	45
Minimum Gap	-	3.4	-	3.4	-	3.4	-	3.4
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.

12/19/2018
K:\Traffic\Projects\U-5968_TIP\401036410 - Durham Signal System\Signals\54 - Signal Design\GROUP 1\U-5968_050227-2017.dgn
derrick.waller

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

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

SCALE 0 50 1"=50'

SR 1121 (E. Cornwallis Road) at SR 2028 (T. W. Alexander Dr.)

Division 5 Durham County RTP

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

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACY L. PHILLIPS

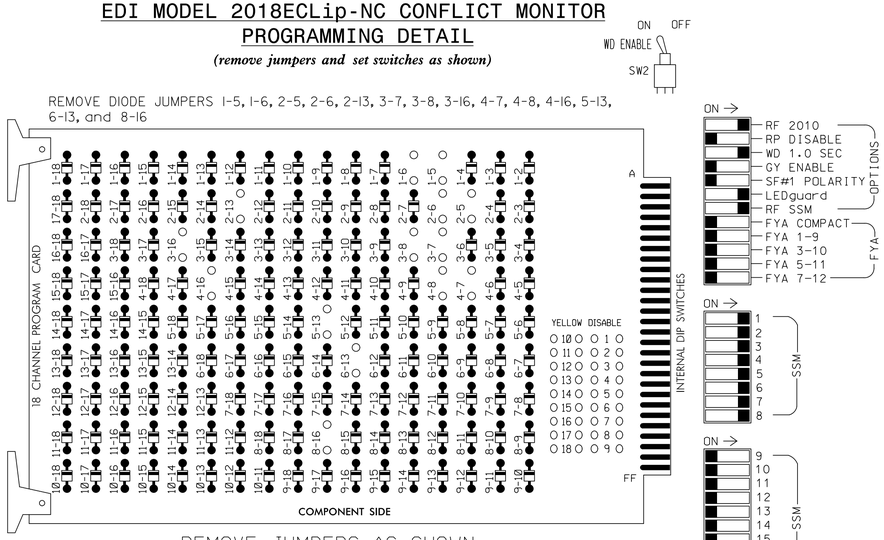
DocuSigned by: DCE7A59EDB0B437...
SIGNATURE 12/19/2018 DATE

SIG. INVENTORY NO. 05-0227

PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG.19.1

EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



■ = DENOTES POSITION OF SWITCH

NOTES:

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

NOTES

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

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,S7,S8,S10
S11,S12
PHASES USED.....1,2,2PED,3,4,5,6,7,8,8PED
OVERLAP "A".....NOT USED
OVERLAP "B".....NOT USED
OVERLAP "C".....NOT USED
OVERLAP "D".....NOT USED

SIGNAL HEAD HOOK-UP CHART

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

NU = Not Used

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

INPUT FILE POSITION LAYOUT

(front view)

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

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND TIME	DELAY TIME	ADDED INITIAL	DETECTOR TYPE
1A	TB2-1,2	I1U	56	1	1	YES				S
1B	TB6-9,10	I9U	60	11	1	YES				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				S
4A	TB4-9,10	I6U	41	4	4	NO				N
4B	TB4-11,12	I6L	45	14	4	NO				N
4C	TB6-1,2	I7U	65	34	4	YES	2.0	5		G
4D	TB6-3,4	I7L	78	44	4	YES	2.0	5		G
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				S
8A	TB5-9,10	J6U	42	8	8	NO				N
8B	TB5-11,12	J6L	46	18	8	NO				N
8C	TB7-1,2	J7U	66	38	8	YES	2.0	5		G
8D	TB7-3,4	J7L	79	48	8	YES	2.0	5		G
PED PUSH BUTTONS										
P21,P22	TB8-4,6	I12U	67	PED 2	2 PED					
P81,P82	TB8-8,9	I13L	70	PED 8	8 PED					

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

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0227
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

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 1121 (E. Cornwallis Road)
at
SR 2028 (T. W. Alexander Dr.)

Division 5 Durham County RTP

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

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: 0C87A59ED0D8437...
12/19/2018
SIGNATURE DATE

SIG. INVENTORY NO. 05-0227

12/19/2018
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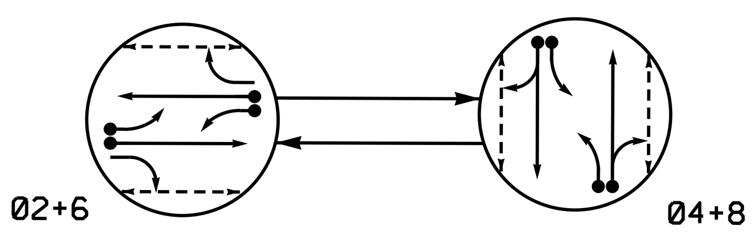
derrick.weller

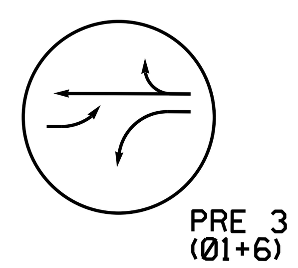
PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig 20.0

PHASING DIAGRAM



EV PREEMPT PHASES

(Medium Priority)



PHASING DIAGRAM DETECTION LEGEND

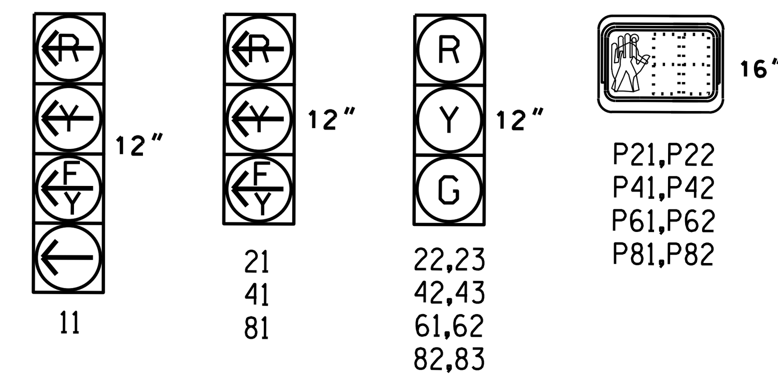
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2+6	Ø4+8	PRE 3	FLASH
11	←F/Y	←R	←	←Y
21	←F/Y	←R	←F/Y	←Y
22,23	G	R	R	Y
41	←R	←F/Y	←R	←R
42,43	R	G	R	R
61,62	G	R	G	Y
81	←R	←F/Y	←R	←R
82,83	R	G	R	R
P21,P22	W	DW	DW	DRK
P41,P42	DW	W	DW	DRK
P61,P62	W	DW	DW	DRK
P81,P82	DW	W	DW	DRK

SIGNAL FACE I.D.

All Heads L.E.D.



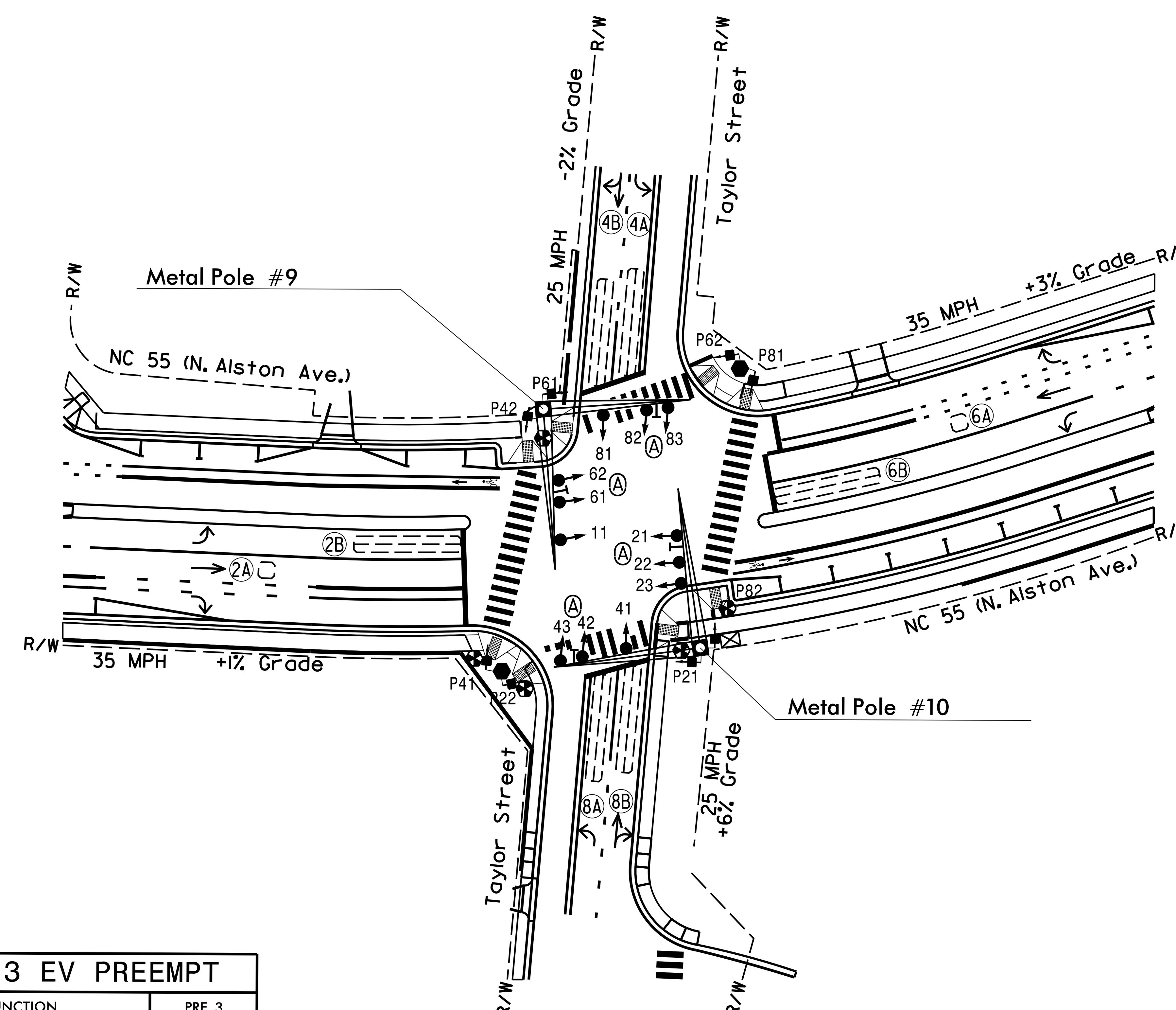
ASC/3 DETECTOR INSTALLATION CHART

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

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 supersede these values.
9. Loop data based on previous plan and/or field observations.
10. Install new cabinet on the existing cabinet foundation.
11. Install GPS emergency preemption system per manufacturer's instructions to achieve preemption needed, as shown in phasing diagram.
12. Remove existing optical detection equipment.



LEGEND

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

ASC/3 TIMING CHART

FEATURE	PHASE 1	2	4	6	8
Min Green *	0	10	7	10	7
Walk *	0	7	7	7	7
Ped Clear	0	10	16	11	16
Veh. Extension *	0	3.0	2.0	3.0	2.0
Max 1 *	0	50	35	50	35
Yellow	3.0	3.8	3.3	3.8	3.3
Red Clear	3.3	2.6	2.6	2.6	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
Exit Phase(s)	2,6
Preempt Override	OFF
Delay Time	0
Ped Clear Through Yellow	Y
Terminate Phases	N
Entrance Walk	1
Entrance Ped Clear	10
Entrance Min Green	1
Entrance Yellow Change	25.5*
Entrance Red Clear	25.5*
Minimum Dwell Time	7
Preempt Input Extension Time **	2
Preempt Max Time	120
Exit Yellow Change	25.5*
Exit Red Clear	25.5*

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

Signal Upgrade

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

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

SCALE 0 40
1"=40'

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

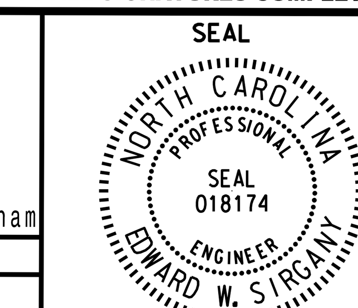
NC 55 (North Alston Avenue) at Taylor Street

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

SEAL



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

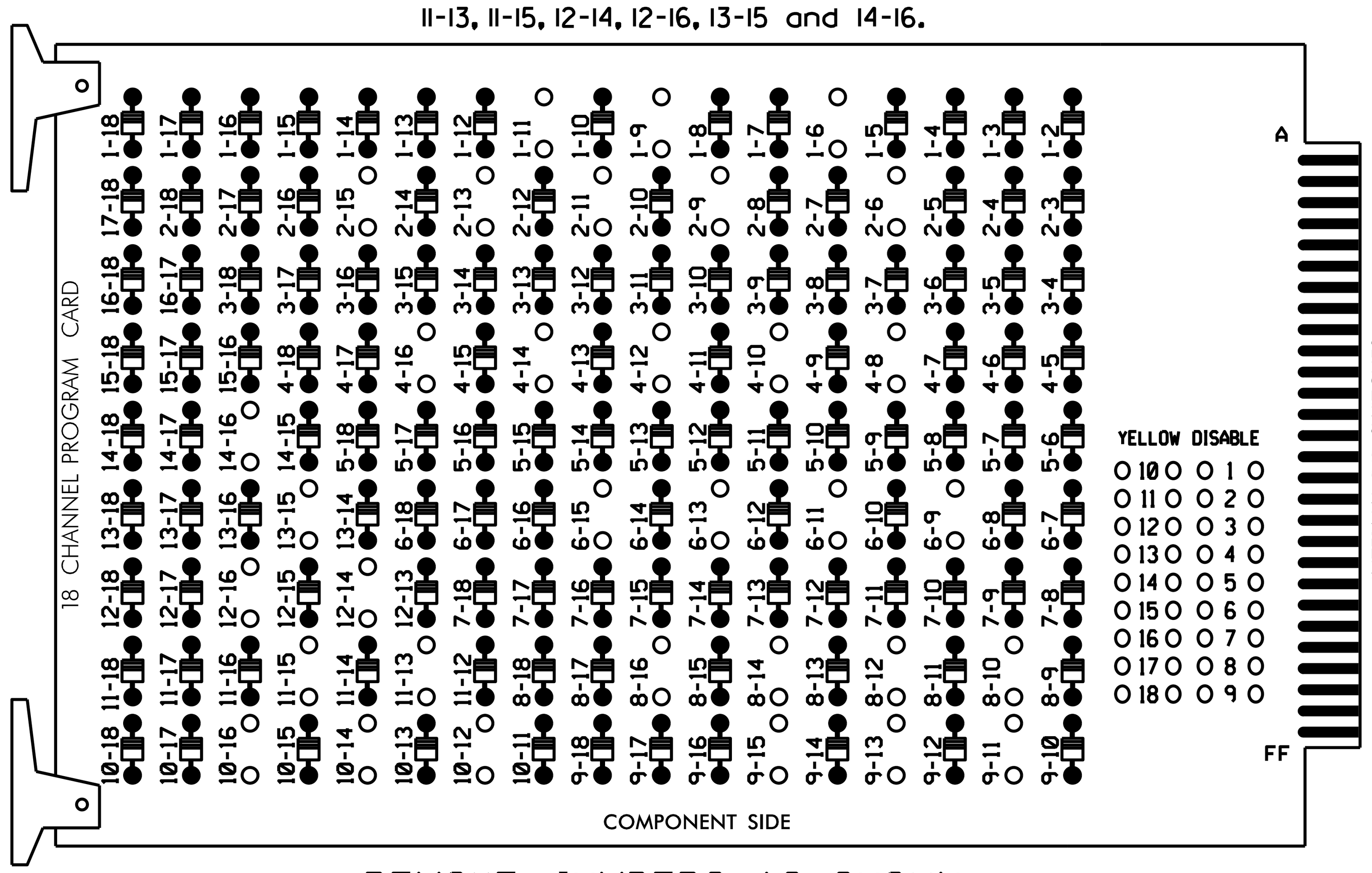
SIG. INVENTORY NO. 05-0228

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

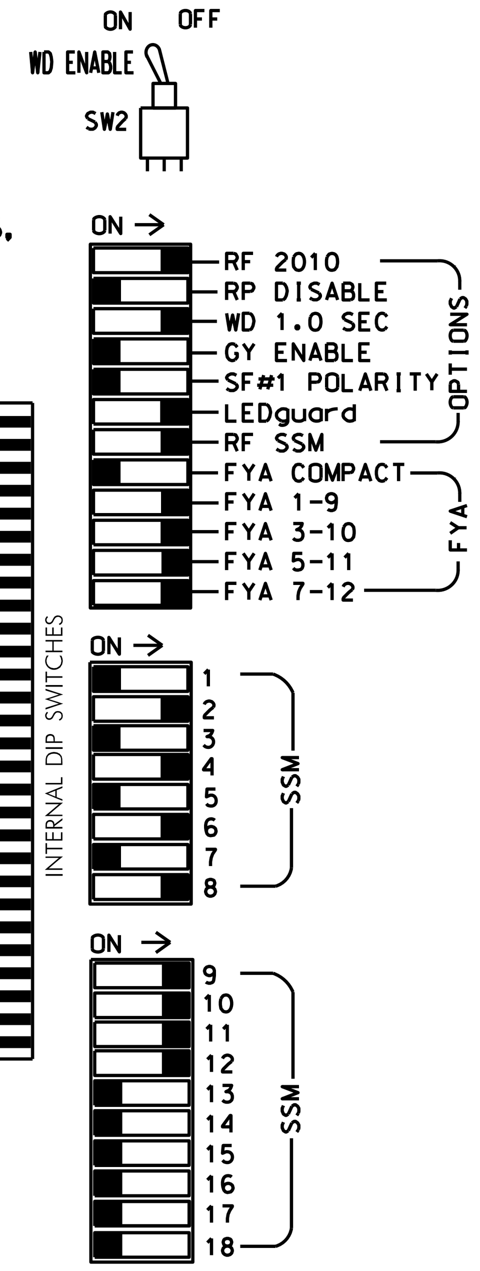
EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

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



REMOVE JUMPERS AS SHOWN



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,S8,S9,S11,S12, AUX S1,AUX S2,AUX S4,AUX S5
PHASES USED.............**1,2,2PED,4,4PED,6,6PED, 8,8PED
OVERLAP "A".............*
OVERLAP "B".............*
OVERLAP "C".............*
OVERLAP "D".............*

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

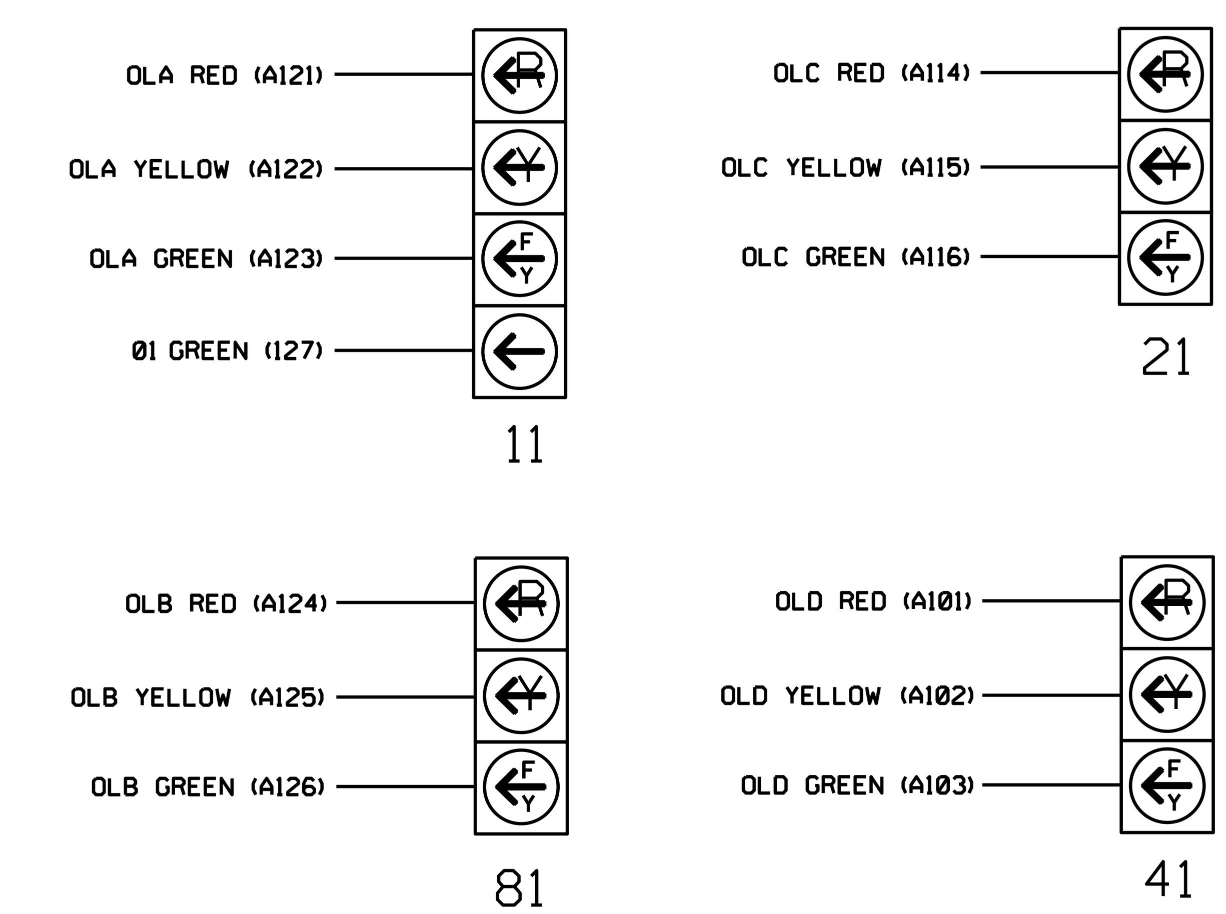
SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	11★	22,23	P21, P22	NU	42,43	P41, P42	NU	61,62	P61, P62	NU	82,83	P81, P82	11★	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	127																	
(Don't Walk hand)			113			104			119			110						
(Walk pedestrian)			115			106			121			112						

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

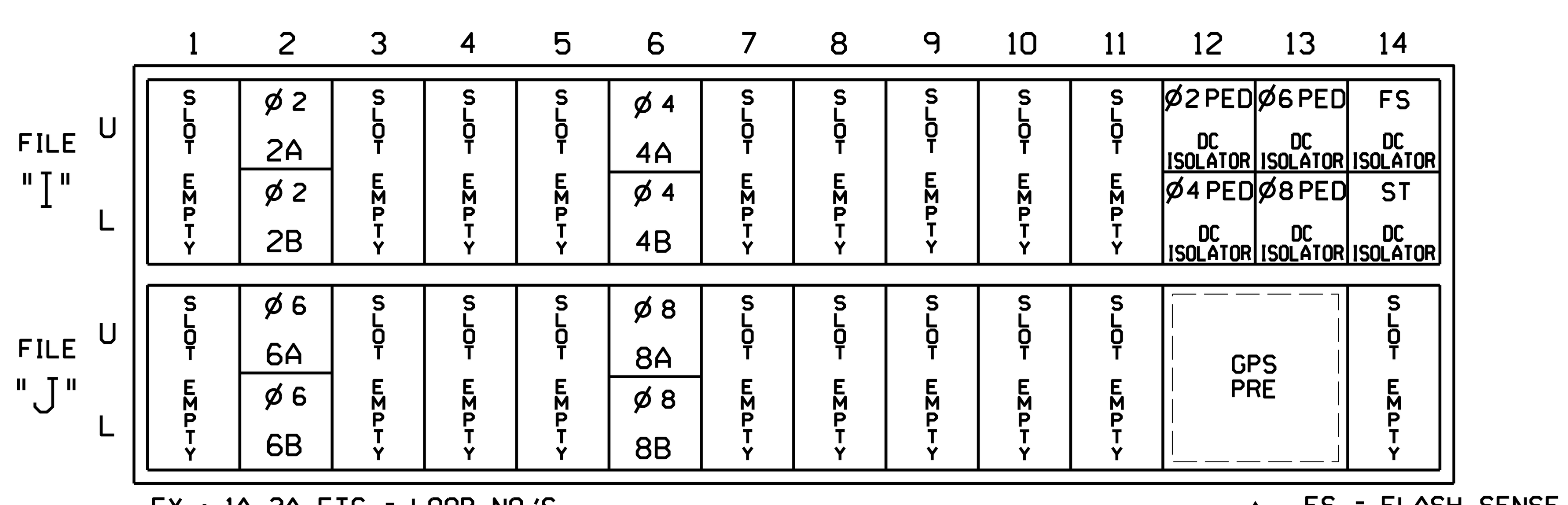
FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



INPUT FILE POSITION LAYOUT

(front view)



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

FS = FLASH SENSE
ST = STOP TIME

CONNECT PHASE SELECTOR TO FIELD ETHERNET SWITCH

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND TIME	DELAY TIME	ADDED INITIAL	DETECTOR TYPE
2A	TB2-5,6	I2U	39	2	2	YES				S
2B	TB2-7,8	I2L	43	12	2	YES				S
4A	TB4-9,10	I6U	41	4	4	YES		3		S
4B	TB4-11,12	I6L	45	14	4	YES		10		S
6A	TB3-5,6	J2U	40	6	6	YES				S
6B	TB3-7,8	J2L	44	16	6	YES				S
8A	TB5-9,10	J6U	42	8	8	YES		3		S
8B	TB5-11,12	J6L	46	18	8	YES		10		S
PED PUSH BUTTONS										
P21,P22	TB8-4,6	I12U	67	PED 2	2 PED					
P41,P42	TB8-5,6	I12L	69	PED 4	4 PED					
P61,P62	TB8-7,9	I13U	68	PED 6	6 PED					
P81,P82	TB8-8,9	I13L	70	PED 8	8 PED					

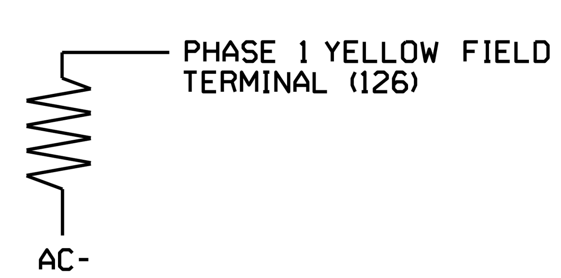
NOTE:
INSTALL DC ISOLATORS IN INPUT FILE SLOTS I12 AND I13.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

LOAD RESISTOR INSTALLATION DETAIL

(install resistor as shown below)

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



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-0228
DESIGNED: October 2018
SEALED: November 2, 2018
REVISED: N/A

Electrical Detail - Sheet 1 of 3

ELECTRICAL AND PROGRAMMING DETAILS FOR:

NC 55 (North Alston Avenue)
at
Taylor Street

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

REVISIONS | INIT. | DATE

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

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

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

SIG. INVENTORY NO. 05-0228

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 'OTHER/ECONOLITE'

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

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

Toggle Once

OVERLAP D

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

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

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

END PROGRAMMING

ECONOLITE ASC/3-2070 LOGIC PROCESSOR PROGRAMMING DETAIL FOR PHASE 1 OMIT

(program controller as shown)

The following logic processor programming ensures phase 1 is only serviced during preemption. This logic will ensure phase 1 is not served during startup.

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

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

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

LOGIC FOR OMITTING PHASE 1 WHILE NOT IN PREEMPT 3

END PROGRAMMING

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

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

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

END PROGRAMMING

FLASHER CIRCUIT MODIFICATION DETAIL

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

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

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

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-0228
DESIGNED: October 2018
SEALED: November 2, 2018
REVISED: N/A

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

Electrical Detail - Sheet 2 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

NC 55 (North Alston Avenue) at Taylor Street

Division 5 | Durham County | Durham

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

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 018174 ENGINEER EDWARD W. SIRGANY

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

SIG. INVENTORY NO. 05-0228

PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig 20.3

ECONOLITE ASC/3-2070 EMERGENCY VEHICLE PREEMPT PROGRAMMING DETAIL

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

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

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

ENABLE... 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.

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: 05-0228
DESIGNED: October 2018
SEALED: November 2, 2018
REVISED: N/A

Electrical Detail - Sheet 3 of 3

Prepared in the Office of:

SUMMIT
DESIGN AND ENGINEERING SERVICES

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
ITS & Signals Management Section
750 N.Greenfield Pkwy,Garner,NC 27529

NC 55 (North Alston Avenue)
at
Taylor Street

Division 5 | Durham County | Durham

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

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 018174 ENGINEER EDWARD W. SIRGANY

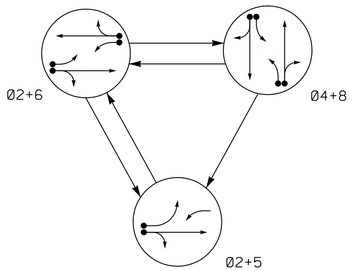
DocuSigned by: Edward W Sirgany 11/2/2018
DATE

SIG. INVENTORY NO. 05-0228

DocuSign Envelope ID: 7ED792E1-37FB-46EC-BDEC-98B94155DB60

PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG. 21.0

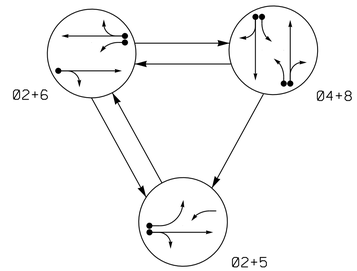
DEFAULT PHASING DIAGRAM



DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE 02+5	PHASE 02+6	PHASE 04+8	FLASH
21,22	G	G	R	Y
41,42	R	R	G	R
51	←	F Y	~~R~~	~~Y~~
61	~~F Y~~	~~F Y~~	~~R~~	~~Y~~
62,63	R	G	R	Y
81,82	R	R	G	R

ALTERNATE PHASING DIAGRAM



ALTERNATE PHASING TABLE OF OPERATION

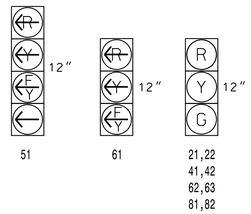
SIGNAL FACE	PHASE 02+5	PHASE 02+6	PHASE 04+8	FLASH
21,22	G	G	R	Y
41,42	R	R	G	R
51	←	~~R~~	~~R~~	~~Y~~
61	~~F Y~~	~~F Y~~	~~R~~	~~Y~~
62,63	R	G	R	Y
81,82	R	R	G	R

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

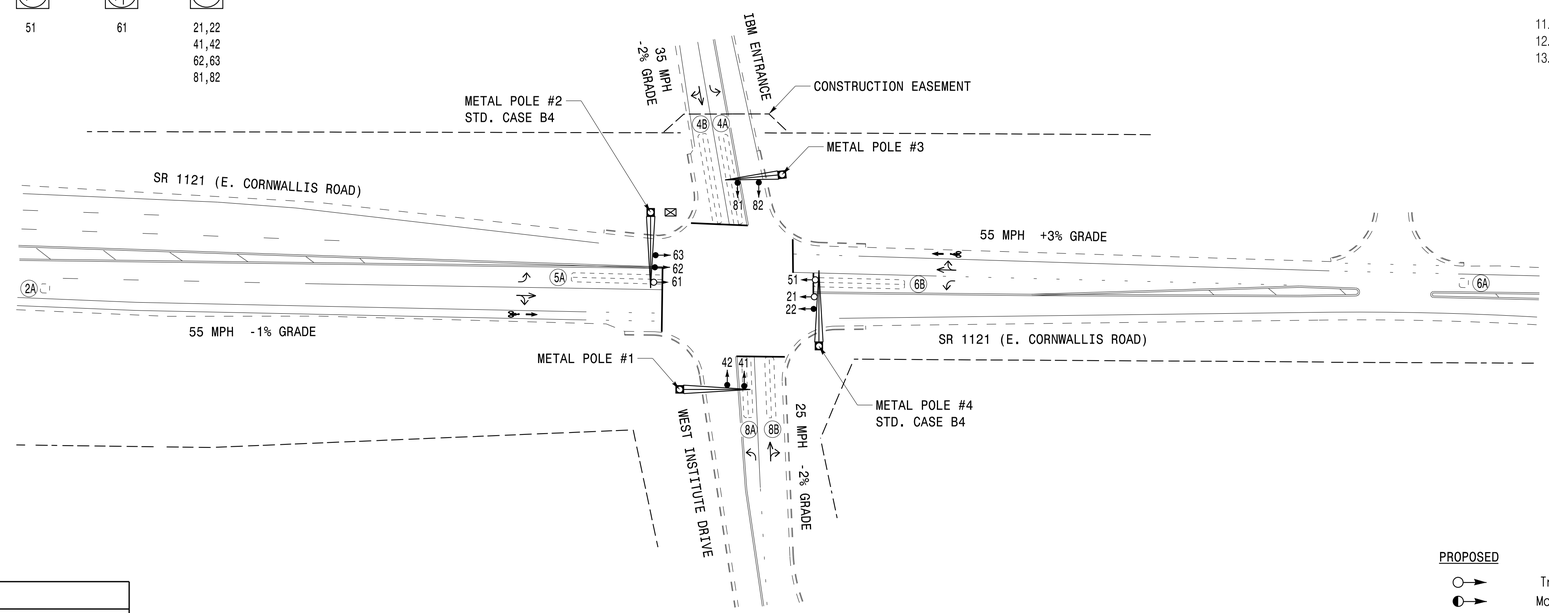
DETECTOR					PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
2A	6X6	420	EXIST	-	2	Yes	-	-	X	N	-	X
4A	6X60	0	2-4-2	-	4	Yes	-	3	-	S	-	X
4B	6X60	0	2-4-2	-	4	Yes	-	10	-	S	-	X
5A	6X60	0	2-4-2	-	5	Yes	-	15*	-	S	-	X
				-	2#	Yes	-	3	-	G	-	X
6A	6X6	420	EXIST	-	6	Yes	-	-	X	N	-	X
6B	6X60	0	2-4-2	-	6	Yes	-	3	-	G	-	X
8A	6X40	0	2-4-2	-	8	Yes	-	3	-	S	-	X
8B	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.

3 PHASE FULLY ACTUATED (DURHAM SIGNAL SYSTEM)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 5 may be lagged.
4. Reposition existing signal heads numbered 22, 62, and 63.
5. Set all detector units to presence mode.
6. 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.
7. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
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. Existing signal heads 61 and 62 have been relabeled to 62 and 63, respectively.



LEGEND

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

ASC/3 TIMING CHART

FEATURE	PHASE 2	PHASE 4	PHASE 5	PHASE 6	PHASE 8
Min Green *	14	7	7	14	7
Walk *	0	0	0	0	0
Ped Clear	0	0	0	0	0
Veh. Extension *	6.0	1.0	1.0	6.0	2.0
Max 1 *	70	30	20	70	30
Yellow	5.3	4.0	3.0	5.3	3.3
Red Clear	1.0	1.5	2.4	1.0	2.1
Actuations B4 Add *	-	-	-	-	-
Seconds /Actuation *	2.5	-	-	2.5	-
Max Initial *	46	-	-	46	-
Time Before Reduction *	15	-	-	15	-
Time To Reduce *	45	-	-	45	-
Minimum Gap	3.4	-	-	3.4	-
Locking Detector	X	-	-	X	-
Recall Position	VEH. RECALL	-	-	VEH. RECALL	-
Dual Entry	-	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 ower than what is shown. Min Green for all other phases should not be lower than 4 seconds.

Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

SR 1121 (E. Cornwallis Road) at West Institute Drive/ IBM Entrance

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

SCALE 0 50 1"=50'

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACE L. PHILLIPS
DocuSigned by: 12/19/2018
SIGNATURE DATE
SIG. INVENTORY NO. 05-0234

PLANS PREPARED IN THE OFFICE OF:
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12/19/2018
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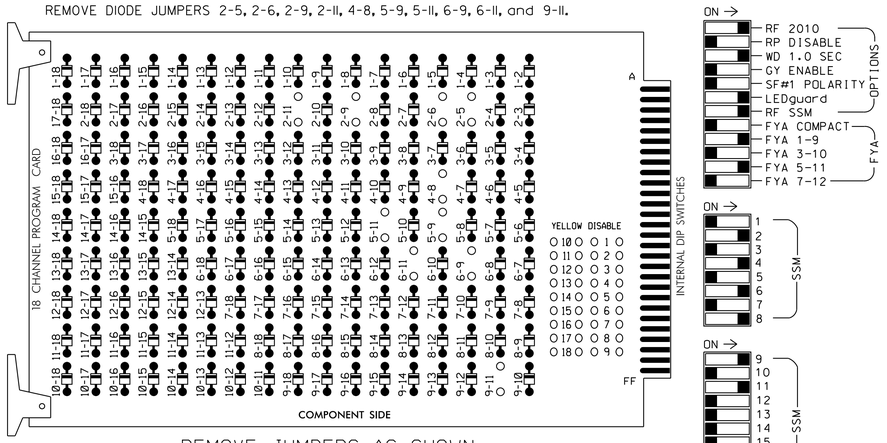
PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG. 21.1

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,S7,S8,S11,AUX S1,AUX S4
PHASES USED.....2,4,5,6,8
OVERLAP "A".....✳
OVERLAP "B".....NOT USED
OVERLAP "C".....✳
OVERLAP "D".....NOT USED

✳ See overlap programming detail on sheet 2

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	NU	21,22	NU	NU	41,42	NU	51★	62,63	NU	NU	81,82	NU	61★	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													A122			A115		
FLASHING YELLOW ARROW													A123			A116		
GREEN ARROW							133											

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

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			X	N
4A	TB4-9,10	I6U	41	4	4	YES		3		S
4B	TB4-11,12	I6L	45	14	4	YES		10		S
5A[1]	TB3-1,2	J1U	55	5★	5	YES		15		S
	-	I4U	47	22★	2	YES		3		G
6A	TB3-5,6	J2U	40	6	6	YES			X	N
6B	TB3-7,8	J2L	44	16	6	YES		3		G
8A	TB5-9,10	J6U	42	8	8	YES		3		S
8B	TB5-11,12	J6L	46	18	8	YES		10		S

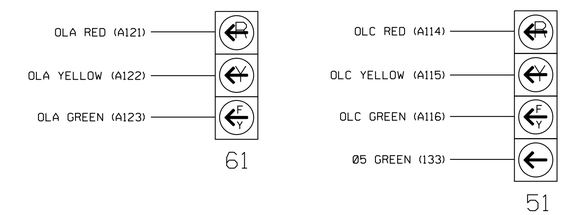
[1]Add jumper from J1-W to I4-W, on rear of input file.

★ 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)

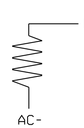


LOAD RESISTOR INSTALLATION DETAIL

(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: 05-0234
DESIGNED: JULY 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:

SR 1121 (E. Cornwallis Road) at West Institute Drive/ IBM Entrance

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

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

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACIE L. PHILLIPS
DocuSigned by: DC87A59ED60B437...
12/19/2018
SIGNATURE DATE
SIG. INVENTORY NO. 05-0234

PLANS PREPARED IN THE OFFICE OF:
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12/19/2018
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derrick.waller

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PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG. 21.2

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 "3".

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

NOTICE VEH DET PLAN 2

ENSURE DELAY IS SET TO '3'

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

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

NOTICE VEH DET PLAN 2

ENSURE PHASE IS SET TO "0"

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 'OTHER/ECONOLITE'

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

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

Toggle Twice

OVERLAP C

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

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

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

FLASHING ARROW OUTPUT.....CH11 ISOLATE

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

NOTICE ACTION PLAN SF BIT "5"

END PROGRAMMING

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0234
DESIGNED: JULY 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail - Sheet 2 of 3

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

SR 1121 (E. Cornwallis Road) at West Institute Drive/ IBM Entrance

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACIE L. PHILLIPS

DocuSigned by: 12/19/2018
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SIGNATURE DATE

SIG. INVENTORY NO. 05-0234

12/19/2018
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ALTERNATE PHASING ACTIVATION DETAIL

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

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: 05-0234
DESIGNED: JULY 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail - Sheet 3 of 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

SR 1121 (E. Cornwallis Road) at West Institute Drive/ IBM Entrance

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

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NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACIE L. PHILLIPS

DocuSigned by: 12/19/2018
DC57A56ED6DB437
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SIG. INVENTORY NO. 05-0234

12/19/2018
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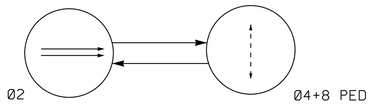
PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG. 22.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

TABLE OF OPERATION

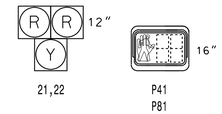
SIGNAL FACE	PHASE						
	Ø2 DARK	ACTIVATION	STEADY Y	ALL RED	Ø4+8 WALK	PED CLEAR	FLASH
21,22	DRK	FY	Y	R	R	FR*	Y
P41	DW	DW	DW	DW	W	DW	DRK
P81	DW	DW	DW	DW	W	DW	DRK

* Alternating Flash

Y - Steady Yellow
FY - Flashing Yellow
R - Steady Red
FR - Flashing Red
W - Walk
DW - Don't Walk
DRK - Dark

SIGNAL FACE I.D.

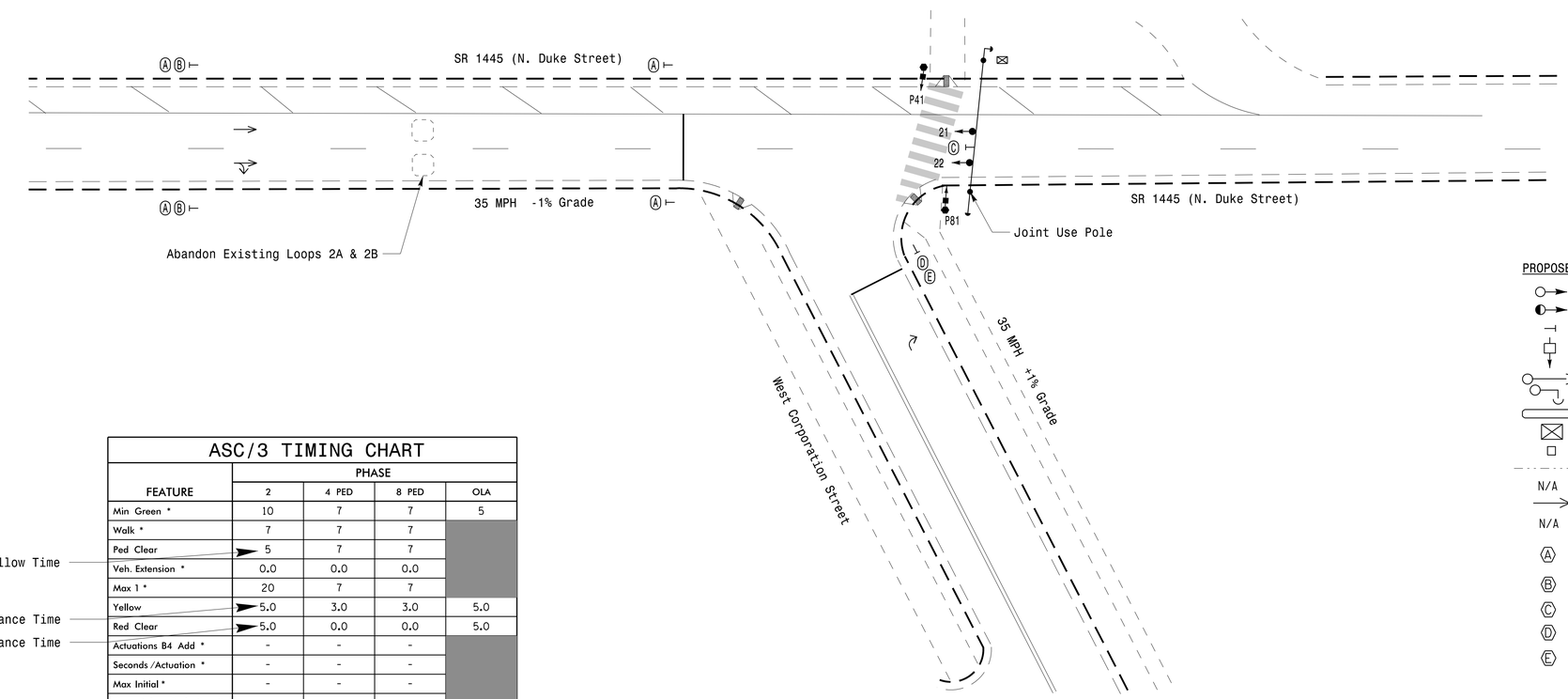
All Heads L.E.D.



2 PHASE SEMI-ACTUATED PEDESTRIAN HYBRID BEACON (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. Set all detector units to presence mode.
3. Abandon existing loops 2A & 2B.
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. Install new cabinet on the existing cabinet foundation.



LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
N/A	Curb Ramp	
Ⓐ	Pedestrian Warning Sign (W11-2) with Downward Diagonal Arrow Plaque (W16-7P)	Ⓐ
Ⓑ	"AHEAD" Sign (W16-9P)	Ⓑ
Ⓒ	"CROSSWALK - STOP ON RED" Sign (R10-23)	Ⓒ
Ⓓ	"STOP" Sign (R1-1)	Ⓓ
Ⓔ	Right "TURNING VEHICLES" Yield "TO" Pedestrians Sign (R10-15R)	Ⓔ

ASC/3 TIMING CHART

FEATURE	PHASE 2	4 PED	8 PED	OLA
Min Green *	10	7	7	5
Walk *	7	7	7	
Ped Clear	5	7	7	
Veh. Extension *	0.0	0.0	0.0	
Max 1 *	20	7	7	
Yellow	5.0	3.0	3.0	5.0
Red Clear	5.0	0.0	0.0	5.0
Actuations B4 Add *	-	-	-	
Seconds /Actuation *	-	-	-	
Max Initial *	-	-	-	
Time Before Reduction *	-	-	-	
Time To Reduce *	-	-	-	
Minimum Gap	-	-	-	
Locking Detector	X	-	-	
Recall Position	PED RECALL	-	-	
Dual Entry	-	X	X	
Simultaneous Gap	X	-	-	

Serves as Flashing Yellow Time

Serves as Steady Yellow Clearance Time

Serves as All Red Clearance Time

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

Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

PLANS PREPARED IN THE OFFICE OF:
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SCALE 0 20 1"=20'

Pedestrian Hybrid Beacon on SR 1445 (N. Duke Street) at West Corporation Street

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

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

DocuSigned by: 0C87A596ED0B437... 12/19/2018
SIGNATURE DATE

SIG. INVENTORY NO. 05-0238

12/19/2018
L:\Kimley-Horn_ITS\011036410 - Durham Signal System\Signals\C4 - Signal Design\GROUP 7\U-5968_050238-2018.dgn
derrick.waller

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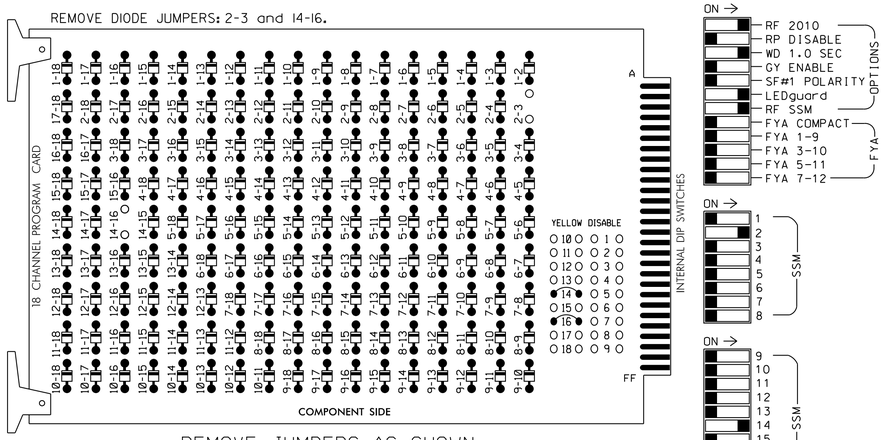
PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG. 22.1

EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



■ = DENOTES POSITION OF SWITCH

NOTES:

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

NOTES

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

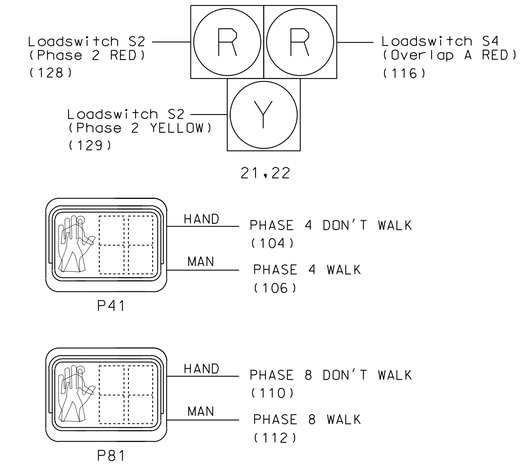
EQUIPMENT INFORMATION

CONTROLLER.....2070LX
CABINET.....332
SOFTWARE.....ECONOLITE ASC/3-2070
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...12
LOAD SWITCHES USED.....S2,S4,S6,S12
PHASES USED.....2,2PED*,4*,4PED,8*,8PED
OVERLAP "A".....#

* For timing purposes only
\# See overlap programming detail on Sheet 2

SIGNAL HEAD WIRING DETAIL

(wire signal heads as shown)



OPERATIONAL NOTES

1. In order for the controller to perform the Pedestrian Hybrid Beacon (HAWK signal) sequence, special logic programming is necessary. Refer to sheet 2 for the Econolite ASC/3-2070 Logic Processor Programming Detail.
2. For operational purposes, Phase 2 runs a dummy pedestrian phase that is required to produce the correct HAWK signal sequence. There are no Phase 2 pedestrian heads.
3. The only Overlap A load switch output that is being used drives one of the red signal faces of each signal head.
4. The Logic Processor flashes Phase 2 Yellow during the Phase 2 pedestrian clearance phase, and Phase 2 Yellow drives the solid Yellow signal faces during Phase 2 vehicle Yellow clear.
5. The Phase 2 and Overlap A Red outputs drive the solid Red displays during Phase 2 and Overlap A Red. The Logic Processor flashes the Phase 2 and Overlap A Red outputs in a wig-wag pattern during the Phase 4+8 Ped Clear and thru Phase 4+8 vehicle Yellow and Red clear.
6. The controller must be programmed for Ped Clear Thru Red for Pedestrian Phases 4 and 8 so that the Red displays continue to flash during Phases 4 and 8 Yellow and Red clear.
7. Make sure that all Phase 2 and Overlap A clearance timings match each other, and that all Phase 4 and Phase 8 timings match each other, and Overlap A Green and Phase 2 Yellow are the same.
8. The Ped 4 ped push button is programmed to call Ped 4 and Ped 8, and the Ped 8 push button is programmed to call Ped 8 and Ped 4.

ECONOLITE ASC/3-2070 LOAD SWITCH ASSIGNMENT DETAIL

(program controller as shown)

To assign load switch S4 as OLA, program LD SWITCH 3 as OVLP '1' TYPE 'O' as shown below.

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

NOTICE OVERLAP A ASSIGNED TO LD SWITCH 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	1	O	.	.	.	+	A	R	X
4	4	V	.	.	.	+	A	R	.
5	5	V	.	.	.	−	A	R	.
6	6	V	.	.	.	−	A	R	X
7	7	V	.	.	.	−	A	R	.
8	8	V	.	.	.	−	A	R	X
9	1	O	.	.	.	+	A	R	X
10	2	O	.	.	.	+	A	R	X
11	3	O	.	.	.	−	A	R	.
12	4	O	.	.	.	−	A	R	.
13	2	P	.	.	.	+	A	.	.
14	4	P	.	.	.	−	A	.	.
15	6	P	.	.	.	+	A	.	.
16	8	P	.	.	.	−	A	.	.

← NOTICE FLASH COLOR RED

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	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	NOT USED	NOT USED	FS DC ISOLATOR
	L												Ø4 PED DC ISOLATOR	Ø8 PED DC ISOLATOR	ST DC ISOLATOR
FILE "J"	U	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L														

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

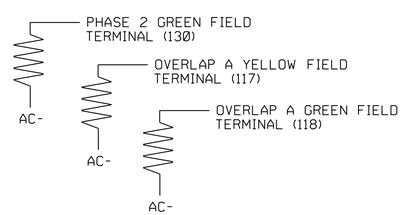
FS = FLASH SENSE
ST = STOP TIME

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)



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
PED PUSH BUTTONS										
P41	TB8-5,6	I12L	69	PED 4	4 PED					
P81	TB8-8,9	I13L	70	PED 8	8 PED					

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

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-0238
DESIGNED: JUNE 2018
SEALED: 12/19/2018
REVISED: N/A

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

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 1 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

Pedestrian Hybrid Beacon on SR 1445 (N. Duke Street) at West Corporation Street

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACIE L. PHILLIPS
DocuSigned by: 0C87A59ED60B437...
12/19/2018
SIGNATURE DATE
SIG. INVENTORY NO. 05-0238

12/19/2018
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derrick.waller

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PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG. 22.2

ECONOLITE ASC/3-2070 PEDESTRIAN DETECTOR PHASE ASSIGNMENT PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select 6. DETECTORS
2. From DETECTOR Submenu select 3. PED DETECTOR INPUT ASSIGNMENT
3. Press the TOGGLE key to select ECONOLITE MODE and press ENTER.

```
PED DET PHASE ASSIGNMENT MODE:ECONOLITEv
PHASE  1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
  D  1 X . . . . . . . . . . . . . . .
  E  2 . X . . . . . . . . . . . . . .
  T  3 . . X . . . . . . . . . . . . .
  E  4 . . . X . . . X . . . . . . . .
  C  5 . . . . X . . . . . . . . . . .
  T  6 . . . . . X . . . . . . . . . .
  O  7 . . . . . . X . . . . . . . . .
  R  8 . . . X . . . X . . . . . . . .
     9 . . . . . . . . X . . . . . . .
    10 . . . . . . . . . X . . . . . .
    11 . . . . . . . . . . X . . . . .
    12 . . . . . . . . . . . X . . . .
    13 . . . . . . . . . . . . X . . .
    14 . . . . . . . . . . . . . X . .
    15 . . . . . . . . . . . . . . X .
    16 . . . . . . . . . . . . . . . X
```

"." = No assignment, disabled
X = Assigns Pedestrian Push Button (PPB) to call the phase or phases
2 = Call for Ped timing 2
B = Allows for the PPB to call for Min Green 2 (BIKE GREEN)

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 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 . . . X . . . X . . . . . . . .
NOT OVLP . . . . . . . . . . . . . . . .
FLSH GRN . . . . . . . . . . . . . . . .
LAG X PH . . . . . . . . . . . . . . . .
LAG 2 PH . . . . . . . . . . . . . . . .

LAG GRN 5.0 YEL 5.0 RED 5.0 ADV GRN 0.0
```

END PROGRAMMING

ECONOLITE ASC/3-2070 LOGIC PROCESSOR PROGRAMMING DETAIL

(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   PED ON PH PED CLR          2   IS  ON
AND  LP COB CODE ON                     546

THEN  SIG SET PH YELLOW         2       ON

ELSE
```

LOGIC TO FLASH YELLOW SIGNAL FACES AFTER A PED CALL IS PLACED.

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

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

IF   PED ON PH PED CLR          4   IS  ON
AND  LP COB CODE ON                     546

THEN  SIG SET PHASE RED         2       OFF

ELSE
```

LOGIC FOR ALTERNATING FLASH ON THE RED SIGNAL FACES DURING THE PHASE 4 PED CLEAR (FORCES PHASE 2 RED OFF).

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

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

IF   PED ON PH PED CLR          4   IS  ON
AND  LP COB CODE OFF                    546

THEN  SIG SET OLP RED           1       OFF

ELSE
```

LOGIC FOR ALTERNATING FLASH ON THE RED SIGNAL FACES DURING THE PHASE 4 PED CLEAR (FORCES OLA RED OFF).

ENTER A "4" IN THE LP# FIELD, PRESS 'ENTER', AND PROGRAM AS SHOWN.

```
LP#:   4  COPY FROM:   4  ACTIVE:  M   (T/F)

IF   PED ON PH PED CLR          2   IS  ON

THEN  SIG SET PH GREEN          2       OFF
```

TURNS LOAD SWITCH 2 GREEN OFF DURING PHASE 2 PED CLEAR TO PREVENT DUAL INDICATION.

NOTE: COB CODE 546 is a 1Hz 50% Duty Cycle internal logic processor reference.

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

ENABLE LOGIC PROCESSOR STATEMENTS 1 - 4 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 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: 05-0238
DESIGNED: JUNE 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail - Sheet 2 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

Pedestrian Hybrid Beacon on SR 1445 (N. Duke Street) at West Corporation Street

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

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

DocuSigned by: 0C87A56E0F0B4A7... 12/19/2018

SIGNATURE DATE

SIG. INVENTORY NO. 05-0238

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

12/19/2018
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derrick.waller

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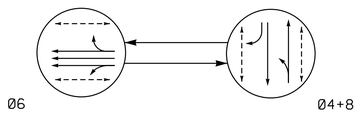
PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-23.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

TABLE OF OPERATION

SIGNAL FACE	PHASE 06	PHASE 04+8	FLASH
41, 42	R	G	R
61, 62, 63, 64	G	R	Y
81, 82	R	G	R
P41, P42	DW	W	DRK
P61, P62, P63, P64	W	DW	DRK
P81, P82	DW	W	DRK

SIGNAL FACE I.D.

All Heads L.E.D.

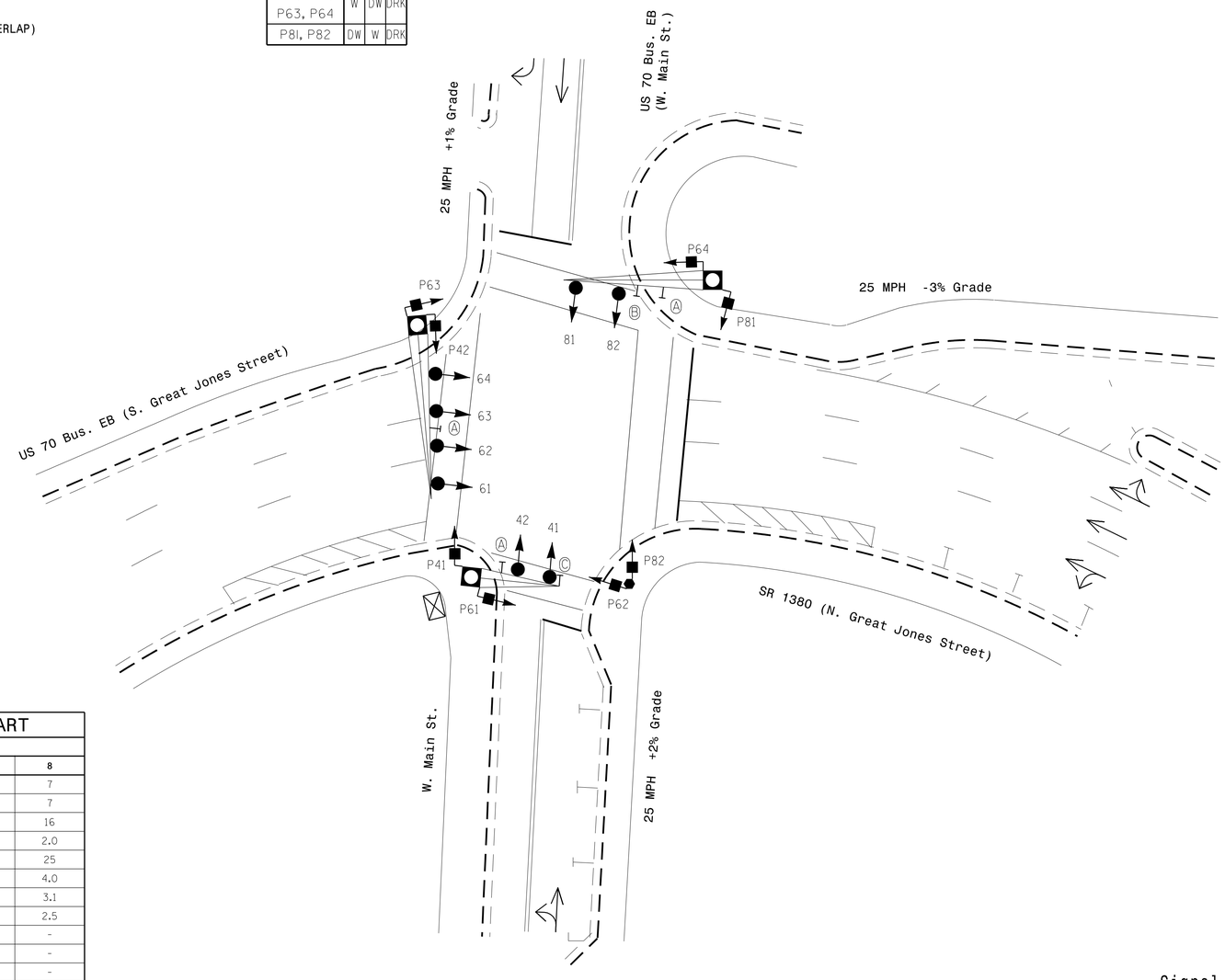
41, 42
61, 62, 63 ,64
81, 82

P41, P42
P61, P62, P63, P64
P81, P82

2 Phase
Pretimed
(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. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
4. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
5. Pavement markings are existing.
6. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
7. Reconnect heads in cabinet as indicated to match current NCDOT standards.
8. Install new cabinet on the existing cabinet foundation.



LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
	Type II Signal Pedestal	
	Metal Pole with Mastarm	
A	Street Name Sign (D3-1)	A
B	No Right Turn Sign (R3-1)	B
C	No Left Turn Sign (R3-2)	C

ASC/3 TIMING CHART

FEATURE	PHASE 4	PHASE 6	PHASE 8
Min Green *	7	10	7
Walk *	7	7	7
Ped Clear	16	11	16
Veh. Extension *	2.0	2.0	2.0
Max 1 *	25	40	25
Delayed Green *	4.0	4.0	4.0
Yellow	3.1	3.3	3.1
Red Clear	2.6	1.8	2.5
Actuations B4 Add *	-	-	-
Seconds /Actuation *	-	-	-
Max Initial *	-	-	-
Time Before Reduction *	-	-	-
Time To Reduce *	-	-	-
Minimum Gap	-	-	-
Locking Detector	-	-	-
Recall Position	PED/MAX	PED/MAX	PED/MAX
Dual Entry	-	-	-
Simultaneous Gap	X	X	X

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

Signal Upgrade

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

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

SCALE 0 20 1"=20'

SR 1380 (Great Jones St.)
at
US 70 Bus. EB (W. Main St.)

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32396 ENGINEER WILLIAM J. HAMILTON

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

SIG. INVENTORY NO. 05-0250

12/17/2018
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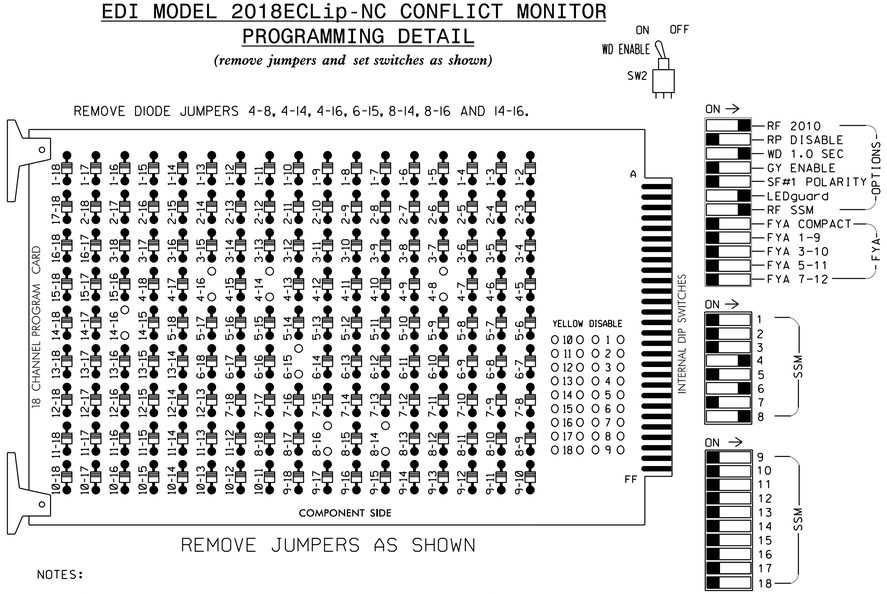
PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-23.1

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.

INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	FS DC ISOLATOR
	L	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	ST DC ISOLATOR
FILE "J"	U	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT
	L	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY

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

FS = FLASH SENSE
ST = STOP TIME
PRE = PREEMPT

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 6 Walk.
3. Program phase 2 for Red Flash.
4. The cabinet and controller are part of the Durham Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070LX
CABINET.....332
SOFTWARE.....ECONOLITE ASC/3-2070
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...12
LOAD SWITCHES USED.....S5,S6,S8,S9,S11,S12
PHASES USED.....4,4PED,6,6PED,8,8PED
OVERLAPS.....NONE

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED
SIGNAL HEAD NO.	NU	NU	NU	NU	41,42	P41, P42	NU	61,62, 63,64	P61,P62, P63,P64	NU	81,82	P81, P82
RED					101			134			107	
YELLOW					102			135			108	
GREEN					103			136			109	
RED ARROW												
YELLOW ARROW												
GREEN ARROW												
✋						104			119			110
🚶						106			121			112

NU = Not Used

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0250
DESIGNED: Dec 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 1380 (Great Jones St.)
at
US 70 Bus. EB (W. Main St.)

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32396 ENGINEER WILLIAM J. HAMILTON

DocuSigned by: William J. Hamilton 12/19/2018
A056DD704648484
SIGNATURE DATE

SIG. INVENTORY NO. 05-0250

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

12/17/2018
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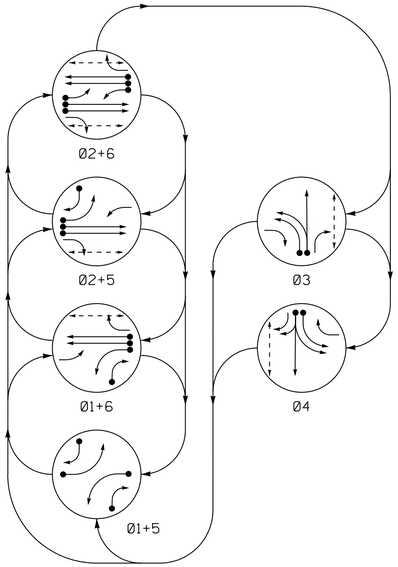
PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG. 24.0

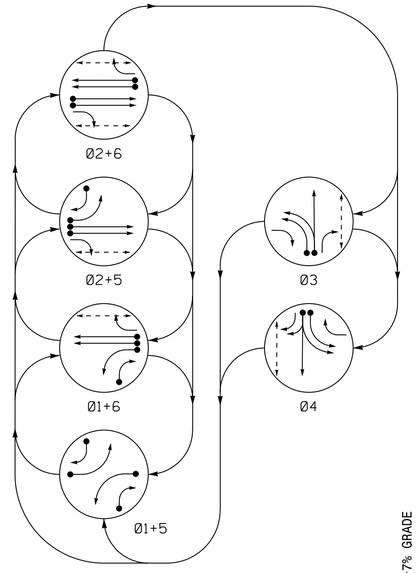
DEFAULT PHASING DIAGRAM



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	R	G	R	G	R	R	Y
62	R	G	R	G	R	R/←	Y
P21,P22	DW	DW	W	W	DW	DW	DRK
P31,P32	DW	DW	DW	DW	W	DW	DRK
P41,P42	DW	DW	DW	DW	DW	W	DRK
P61,P62	DW	W	DW	W	DW	DW	DRK

ALTERNATE PHASING DIAGRAM



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	R	G	R	G	R	R	Y
62	R	G	R	G	R	R/←	Y
P21,P22	DW	DW	W	W	DW	DW	DRK
P31,P32	DW	DW	DW	DW	W	DW	DRK
P41,P42	DW	DW	DW	DW	DW	W	DRK
P61,P62	DW	W	DW	W	DW	DW	DRK

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	+4	2-4-2	-	1	Yes	-	15*	-	S	-	X
				-	6#	Yes	-	-	-	S	-	X
1B	6X40	0	2-4-2	-	1	Yes	-	15	-	S	-	X
2A	6X6	70	6	X	2	Yes	-	-	-	S	-	X
2B	6X6	70	6	X	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	6X60	0	2-4-2	-	4	Yes	-	3	-	S	-	X
4B	6X60	0	2-4-2	-	4	Yes	-	-	-	S	-	X
5A	6X60	+5	2-4-2	-	5	Yes	-	15*	-	S	-	X
					2#	Yes	-	-	-	S	-	X
5B	6X60	0	2-4-2	-	5	Yes	-	15	-	S	-	X
6A	6X6	70	EXIST	-	6	Yes	-	-	-	S	-	X
6B	6X6	70	EXIST	-	6	Yes	-	-	-	S	-	X

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

6 PHASE FULLY ACTUATED (DURHAM SIGNAL SYSTEM)

NOTES

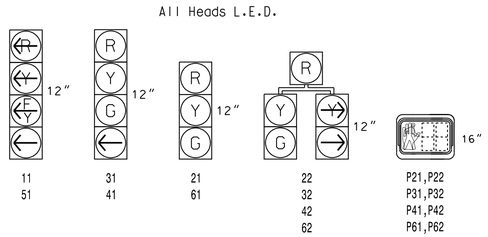
1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 and/or phase 5 may be lagged.
4. The order of phase 3 and phase 4 may be reversed.
5. Abandon existing loop 2A.
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 shall supersede these values.
13. Loop data based on previous plan and/or field observations.
14. Install new cabinet on the existing cabinet foundation.

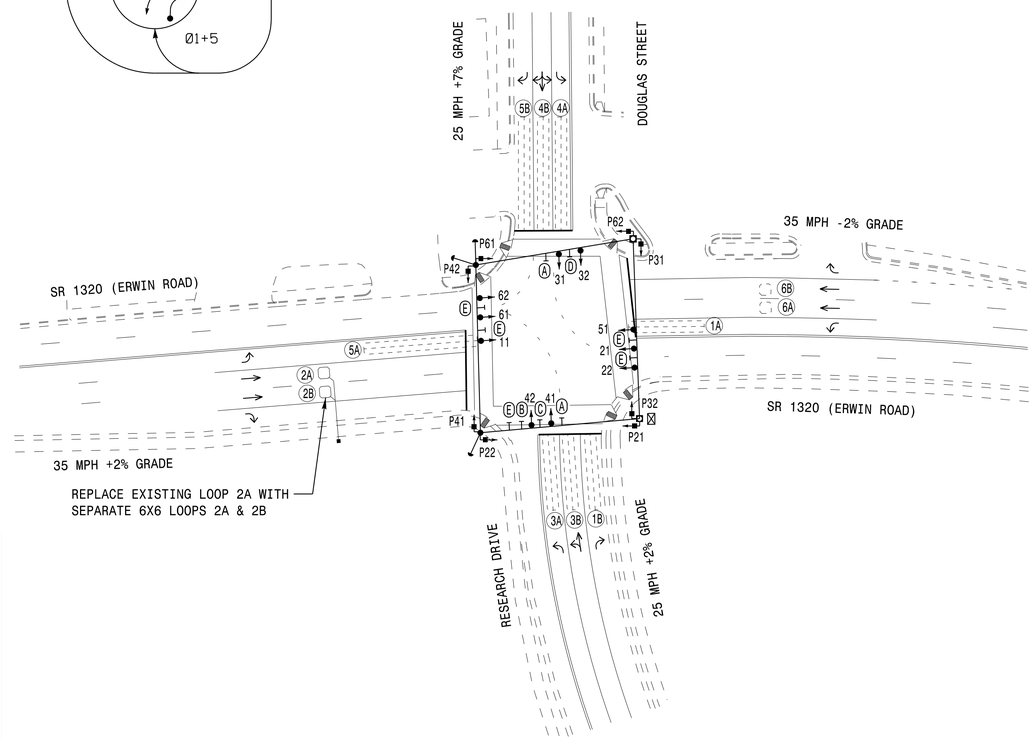
PHASING DIAGRAM DETECTION LEGEND

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

SIGNAL FACE I.D.

All Heads L.E.D.





LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Metal Strain Pole	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
N/A	Curb Ramp	
Ⓐ	Left Arrow "ONLY" Sign (R3-5L)	Ⓐ
Ⓑ	Right Arrow "ONLY" Sign (R3-5R)	Ⓑ
Ⓒ	Dual Turn and Through Arrows Sign	Ⓒ
Ⓓ	Combined Through and Left Arrow Sign (R3-6L)	Ⓓ
Ⓔ	Street Sign (D3-1)	Ⓔ

ASC/3 TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6
Min Green *	7	10	7	7	7	10
Walk *	0	7	7	7	0	7
Ped Clear	0	17	20	19	0	14
Veh. Extension *	2.0	3.0	2.0	1.0	1.0	3.0
Max 1 *	20	60	20	20	20	60
Delayed Green *	-	-	-	4	-	-
Yellow	3.0	4.0	3.1	3.0	3.0	4.0
Red Clear	2.4	2.1	2.7	2.8	2.8	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	-	-	-	-	-	-
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.

12/19/2018
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derrick.waller

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 — State of North Carolina Department of Transportation
750 N.Greenfield Pkwy,Garner,NC 27529

SCALE 0 40 — 1"=40'

SR 1320 (Erwin Road) at Douglas Street/Research Drive

Division 5 Durham County Durham

PLAN DATE:	January 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
SIGNATURE DATE
SIG. INVENTORY NO. 05-0251

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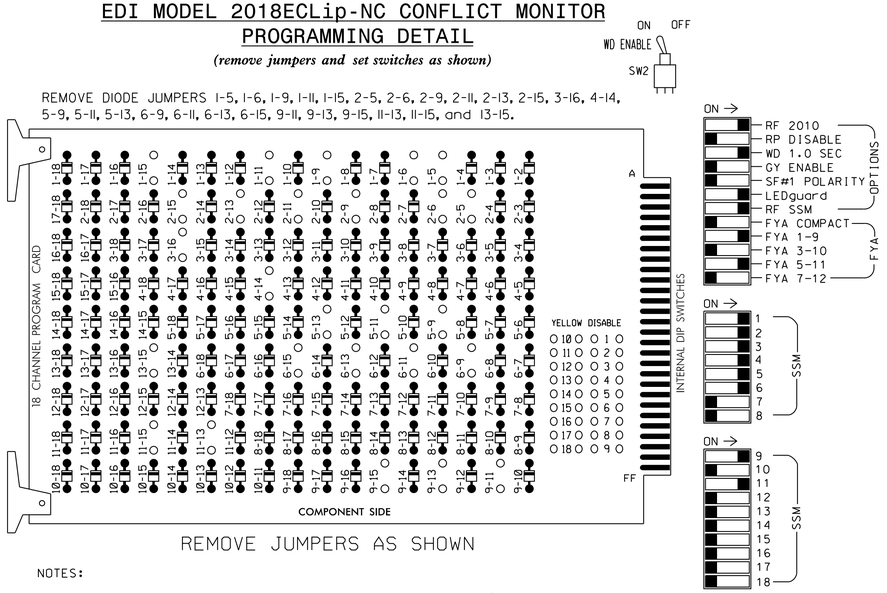
PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG.24.1

EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE JUMPERS AS SHOWN

■ = DENOTES POSITION OF SWITCH

NOTES:

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

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Program 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, S12,AUX S1,AUX S4
PHASES USED.....1,2,2PED,3,3PED,4,4PED,5,6, 6PED
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	3 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	11★	32	21,22	P21, P22	22	31	32	41	42	62	P41, P42	42	51★	61,62	P61, P62	NU	NU	P31, P32	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		126			117					102		132							A122			A115		
FLASHING YELLOW ARROW																			A123			A116		
GREEN ARROW	127	127			118	118		103		103		133	133											
✋				113							104				119			110						
🚶				115							106				121			112						

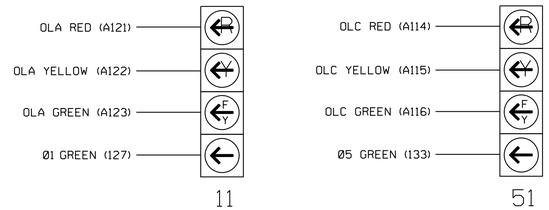
NU = Not Used

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

★ See pictorial of head wiring in detail this sheet.

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	Ø1 1A	Ø2 2A	SLOT EMPTY	WIRED INPUT ⊗	Ø3 3A	Ø4 4A	SLOT EMPTY	SLOT EMPTY	Ø1 1B	SLOT EMPTY	SLOT EMPTY	Ø2 PED DC ISOLATOR	Ø6 PED DC ISOLATOR	FS DC ISOLATOR
	L	NOT USED	Ø2 2B			NOT USED	Ø4 4B			Ø3 3B			Ø4 PED DC ISOLATOR	Ø3 PED DC ISOLATOR	ST DC ISOLATOR
FILE "J"	U	Ø5 5A	Ø6 6A	SLOT EMPTY	WIRED INPUT ⊗	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	Ø5 5B	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L	NOT USED	Ø6 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
1B	TB6-9,10	I9U	60	11	1	YES		15		S
2A	TB2-5,6	I2U	39	2	2	YES				S
2B	TB2-7,8	I2L	43	12	2	YES				S
3A	TB4-5,6	I5U	58	3	3	YES		3		S
3B	TB6-11,12	I9L	62	13	3	YES				S
4A	TB4-9,10	I6U	41	4	4	YES		3		S
4B	TB4-11,12	I6L	45	14	4	YES				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										
P21,P22	TB8-4,6	I12U	67	PED 2	2 PED					
P41,P42	TB8-5,6	I12L	69	PED 4	4 PED					
P61,P62	TB8-7,9	I13U	68	PED 6	6 PED					
P31,P32	TB8-8,9	I13L	70	PED 8	3 PED					

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

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

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

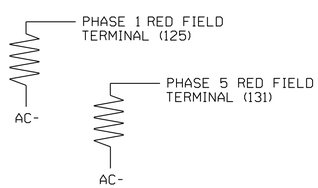
INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

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: 05-0251
DESIGNED: JANUARY 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:
S.T. Transportation Mobility and Safety Division
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signals Management Section
750 N.Greenfield Pkwy,Garner,NC 27529

SR 1320 (Erwin Road)
at
Douglas Street/Research Drive

Division 5 Durham County Durham

PLAN DATE:	January 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

DocuSigned by: 12/19/2018
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SIGNATURE DATE

SIG. INVENTORY NO. 05-0251

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12/19/2018
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ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

(program controller as shown)

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

OVERLAP A

Select TMG VEH OVLP [A] and '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

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 PED 3 PROGRAMMING ASSIGNMENT DETAIL

(program controller as shown)

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

PED DET PHASE ASSIGNMENT MODE: NTCIP

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

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

← NOTICE PED DETECTOR 8 ASSIGNED TO PHASE 3

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

LD SWITCH ASSIGN

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

NOTICE PHASE 3 PED ASSIGNED TO LD SWITCH 16 →

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0251
DESIGNED: JANUARY 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail - Sheet 2 of 4

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

SR 1320 (Erwin Road)
at
Douglas Street/Research Drive

Division 5 Durham County Durham

PLAN DATE:	January 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. 05-0251

12/19/2018
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PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG.24.3

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".

```
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

Electrical Detail - Sheet 3 of 4

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0251
DESIGNED: JANUARY 2018
SEALED: 12/19/2018
REVISED: N/A

PLANS PREPARED IN THE OFFICE OF:
Kimley»Horn
NC License #F-0102
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(919) 677-2000

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

SR 1320 (Erwin Road)
at
Douglas Street/Research Drive

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACIE L. PHILLIPS

DocuSigned by:
12/19/2018
SIGNATURE DATE

SIG. INVENTORY NO. 05-0251

12/19/2018
K:\ATL_TPD_ITS\011036410 - Durham Signal System\Signals\54 - Signal Design\GROUP 2\U-5968.050251-20173.dgn
derrick.waller

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ALTERNATE PHASING ACTIVATION DETAIL

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

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

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

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

ALTERNATE PHASING CHANGE SUMMARY

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

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

VEH DET PLAN 2: Disables phase 6 call on loop 1A and reduces delay time for phase 1 call on loop 1A to 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: 05-0251
DESIGNED: JANUARY 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
Division of Highways
State of North Carolina
750 N.Greenfield Pkwy,Garner,NC 27529

SR 1320 (Erwin Road)
at
Douglas Street/Research Drive

Division 5 Durham County Durham

PLAN DATE:	January 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: 9C87A56ED6D8437...
12/19/2018
SIGNATURE DATE
SIG. INVENTORY NO. 05-0251

12/19/2018
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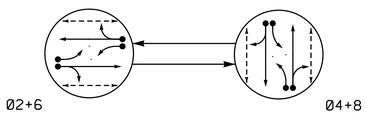
derrick.waller

PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig.25.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

EV PREEMPT PHASE

PRE 3
(Ø2+6)

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	65	4	-	2	Yes	-	-	-	S	-	X
2B	6X40	0	2-4-2	-	2	Yes	-	-	-	S	-	X
4A	6X40	+12	2-4-2	-	4	Yes	-	3	-	S	-	X
4B	6X40	+3	2-4-2	-	4	Yes	-	10	-	S	-	X
6A	6X6	57	4	-	6	Yes	-	-	-	S	-	X
6B	6X40	0	2-4-2	-	6	Yes	-	-	-	S	-	X
8A	6X40	+5	2-4-2	-	8	Yes	-	3	-	S	-	X
8B	6X40	0	2-4-2	-	8	Yes	-	10	-	S	-	X

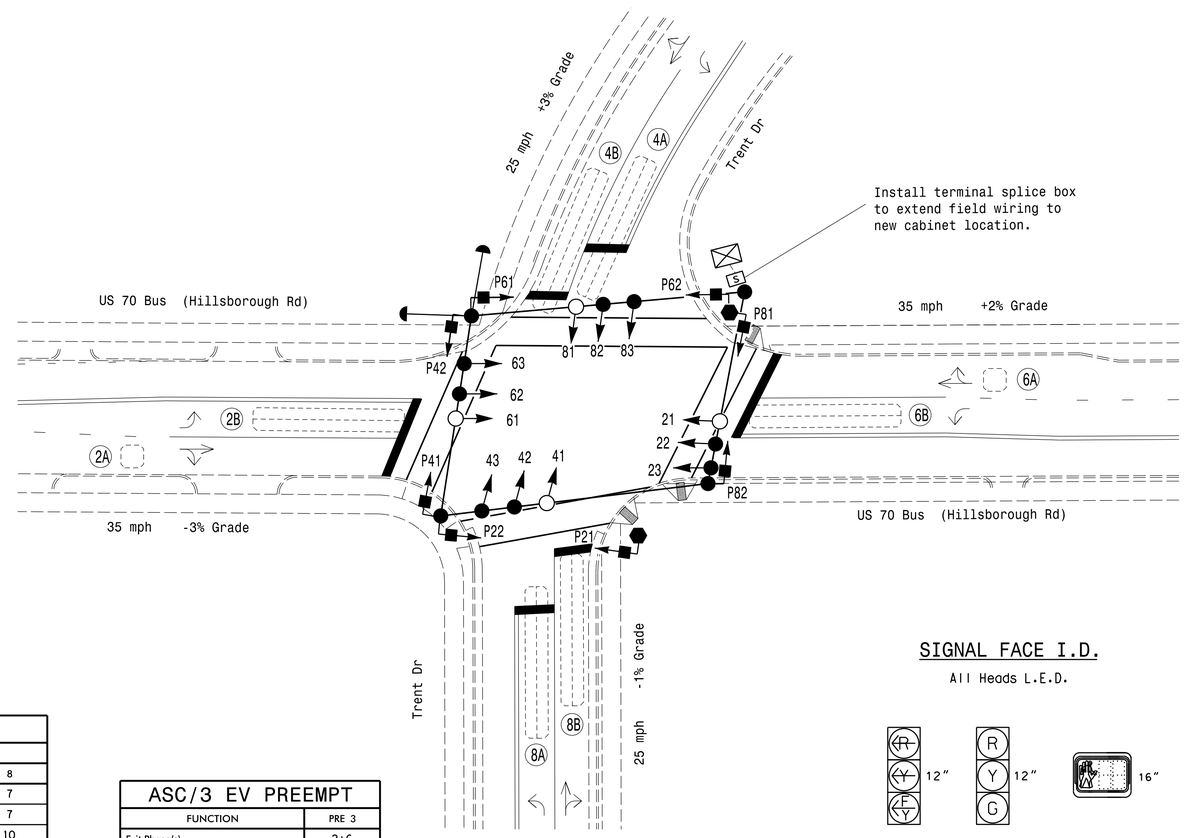
2 Phase
Fully Actuated
w/ Emergency Vehicle Preemption
(Durham Signal System)

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. Reposition existing signal heads numbered 22, 23, 42, 43, 62, 63, 82, and 83.
4. Set all detector units to presence mode.
5. In the event of loop replacement, refer to the current ITS and Signals Design Manual and submit a Plan of Record to the Signal Design Section.
6. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
7. Omit "WALK" and Flashing "DON'T WALK" with no pedestrian calls.
8. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
9. Remove existing Left Arrow "ONLY" sign(s) (R3-5L)".
10. Pavement markings are existing.
11. 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 GPS emergency preemption system per manufacturer's instructions to achieve the preemption needed, as shown in the phasing diagram.
13. Remove existing optical detection equipment.

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2+6	PHASE Ø4+8	PHASE PRE 3	PHASE FLASH
21	~~F Y~~	~~R~~	~~F Y~~	~~Y~~
22,23	G	R	G	Y
41	~~R~~	~~F Y~~	~~R~~	~~R~~
42,43	R	G	R	R
61	~~F Y~~	~~R~~	~~F Y~~	~~Y~~
62,63	G	R	G	Y
81	~~R~~	~~F Y~~	~~R~~	~~R~~
82,83	R	G	R	R
P21,P22	W	DW	DW	DRK
P41,P42	DW	W	DW	DRK
P61,P62	W	DW	DW	DRK
P81,P82	DW	W	DW	DRK



SIGNAL FACE I.D.

All Heads L.E.D.

21	22,23	P21,P22
41	42,43	P41,P42
61	62,63	P61,P62
81	82,83	P81,P82

LEGEND

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

ASC/3 TIMING CHART

FEATURE	PHASE 2	PHASE 4	PHASE 6	PHASE 8
Min Green *	10	7	10	7
Walk *	7	7	7	7
Ped Clear	9	10	14	10
Veh. Extension *	3.0	2.0	3.0	2.0
Max 1 *	40	25	40	25
Yellow	4.1	3.2	4.1	3.2
Red Clear	1.7	1.9	1.7	1.9
Actuations B4 Add *	-	-	-	-
Seconds /Actuation *	-	-	-	-
Max Initial *	-	-	-	-
Time Before Reduction *	-	-	-	-
Time To Reduce *	-	-	-	-
Minimum Gap	-	-	-	-
Locking Detector	X	-	X	-
Recall Position	VEH. RECALL	-	VEH. RECALL	-
Dual Entry	-	X	-	X
Simultaneous Gap	X	X	X	X

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

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	10
Preempt Input Extension Time**	2
Preempt Max Time	120
Exit Yellow Change	25.5 *
Exit Red Clear	25.5 *

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

Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Project #: 170905

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NCBELS FIRM LICENSE NO. C-2522

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

SCALE 0 20
1"=20'

US 70 Business
(Hillsborough Road) at
Trent Drive

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 044157 ENGINEER ANDREW D HAYES

DocuSigned by:
Andrew Hayes 12/20/2018
SIGNATURE DATE

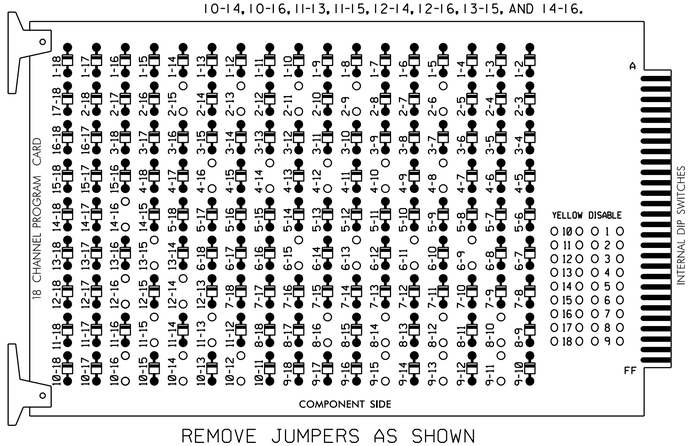
SIG. INVENTORY NO. 05-0254

PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig. 25.1

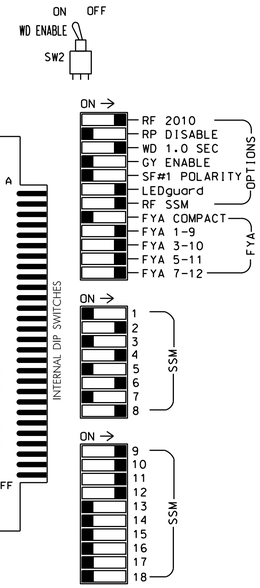
EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

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



REMOVE JUMPERS AS SHOWN



NOTES:

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

NOTES

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

EQUIPMENT INFORMATION

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

* See overlap programming detail on sheet 2

SIGNAL HEAD HOOK-UP CHART

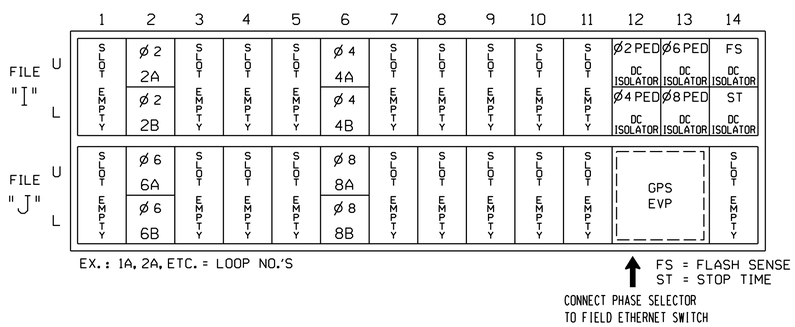
LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	NU	22,23	P21, P22	NU	42,43	P41, P42	NU	62,63	P61, P62	NU	82,83	P81, P82	61 ★	81 ★	NU	21 ★	41 ★	NU
RED		128			101			134			107							
YELLOW		129			102			135			108							
GREEN		130			103			136			109							
RED ARROW													A121	A124		A114	A101	
YELLOW ARROW													A122	A125		A115	A102	
FLASHING YELLOW ARROW													A123	A126		A116	A103	
GREEN ARROW																		
✋			113			104			119			110						
🚶			115			106			121			112						

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

CONNECT PHASE SELECTOR TO FIELD ETHERNET SWITCH

INPUT FILE CONNECTION & PROGRAMMING CHART

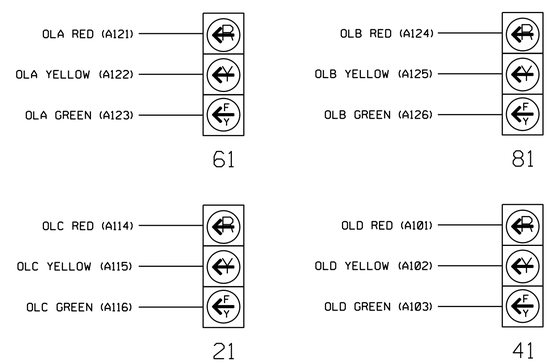
LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND TIME	DELAY TIME	ADDED INITIAL	DETECTOR TYPE
2A	TB2-5,6	I2U	39	2	2	YES	-	-	-	S
2B	TB2-7,8	I2L	43	12	2	YES	-	-	-	S
4A	TB4-9,10	I6U	41	4	4	YES	-	3	-	S
4B	TB4-11,12	I6L	45	14	4	YES	-	10	-	S
6A	TB3-5,6	J2U	40	6	6	YES	-	-	-	S
6B	TB3-7,8	J2L	44	16	6	YES	-	-	-	S
8A	TB5-9,10	J6U	42	8	8	YES	-	3	-	S
8B	TB5-11,12	J6L	46	18	8	YES	-	10	-	S
PED PUSH BUTTONS										
P21,P22	TB8-4,6	I12U	67	PED 2	2 PED					
P41,P42	TB8-5,6	I12L	69	PED 4	4 PED					
P61,P62	TB8-7,9	I13U	68	PED 6	6 PED					
P81,P82	TB8-8,9	I13L	70	PED 8	8 PED					

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

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0254
DESIGNED: December 2018
SEALED: 12/20/2018
REVISED: N/A

Project #: 170905

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Electrical Detail - Sheet 1 of 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

US 70 Business
(Hillsborough Road) at
Trent Drive

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 044157 ENGINEER ANDREW D HAYES

DocuSigned by: Andrew Hayes 12/20/2018
SIGNATURE DATE
Andrew D. Hayes, P.E.
SIG. INVENTORY NO. 05-0254

PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig. 25.2

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 .F1 . . . . . . . . . . . . .
CYC VEH  . . . . . . . . . . . . . . . .
CYC PED  . . . . . . . . . . . . . . . .
CYC OLP  . . . . . . . . . . . . . . . .
EXIT PH  . X . . . X . . . . . . . . . .
EXIT CAL . . . . . . . . . . . . . . . .
SP FUNC  . . . . . . . . . . . . . . . .

ENABLE... YESIPMT OVRIDE..IINTERLOCK. NO
DET LOCK... XIDELAY..    OIINHIBIT...  O
OVERIDE FL. .IDURATION   OICLR-GRN... NO
TERM OLP.  NOIPC>YEL   YESITERM PH    NO
PED DARK.. NOITC RESRV  NOIDWELL FL  OFF
LINK PMT....OIX FLCOLR REDIEXIT OPT. OFF
X TMG PLN...OIRE-SERV..  OIFLT TYPE.HARD
FREE DUR PMTIR1  NOIR2  NOIR3  NOIR4  NO
--TIMING-----WALKIPED CLIMN GRI YELI RED
ENTRANCE TM.    1I    10I    1I25.5I25.5
-----------MIN GRIEXT GRIMX GRI YELI RED
TRACK CLEAR     OI     OI    OI25.5I25.5
-----------MIN DLIPMTEXTIMX TMI YELI RED
DWL/CYC-EXIT    7I   0.0I  12OI25.5I25.5
PMT ACTIVE OUT..ON   PMT ACT DWELL...NO
OTHER - PRI PMT.OFF  NON-PRI PMT.....OFF
INH EXT TIME... 0.0  PED PR RETURN...OFF
PRIORITY RETURN.OFF  QUEUE DELAY.... OFF
COND DELAY......OFF
PHASES     1   2   3   4   5   6   7   8
PR RTN%    0   0   0   0   0   0   0   0
PHASES     9  10  11  12  13  14  15  16
PR RTN%    0   0   0   0   0   0   0   0
```

PROGRAM EXTEND TIME ON GPS DETECTOR UNIT FOR 2.0 SEC.

ECONOLITE ASC/3-2070 PREEMPT FILTERING PROGRAMMING DETAIL

(program controller as shown)

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

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0254
DESIGNED: December 2018
SEALED: 12/20/2018
REVISED: N/A

Electrical Detail - Sheet 2 of 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Project #: 170905

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NCBELS FIRM LICENSE NO. C-2522

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

US 70 Business
(Hillsborough Road) at
Trent Drive

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 044157 ENGINEER ANDREW D HAYES

DocuSigned by:
Andrew Hayes
SIGNATURE
12/20/2018
DATE

STG. INVENTORY No. 05-0254

PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig. 25.3

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

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

FLASHER CIRCUIT MODIFICATION DETAIL

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

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

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0254
DESIGNED: December 2018
SEALED: 12/20/2018
REVISED: N/A

Project #: 170905

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Electrical Detail - Sheet 3 of 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for:

750 N.Greenfield Pkwy,Garner,NC 27529

US 70 Business
(Hillsborough Road) at
Trent Drive

Division 5 Durham County Durham

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

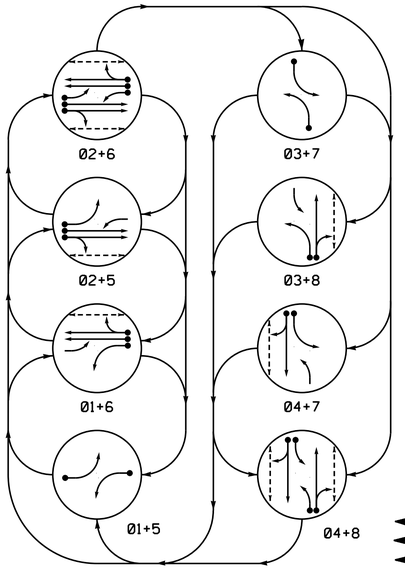
REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 044157 ENGINEER ANDREW D HAYES

DocuSigned by: Andrew Hayes
SIGNATURE 12/20/2018
DATE
PRELIMINARY
SIG. INVENTORY NO. 05-0254

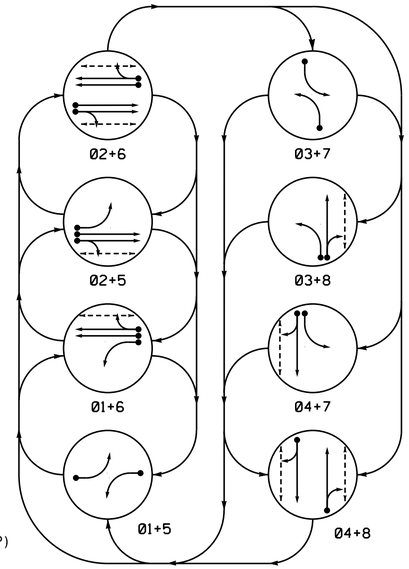
PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig. 26.0

DEFAULT PHASING DIAGRAM

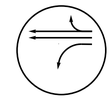


DEFAULT EV PREEMPT PHASES

ALTERNATE PHASING DIAGRAM



ALTERNATE EV PREEMPT PHASES



PHASING DIAGRAM DETECTION LEGEND

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

ASC/3 DETECTOR INSTALLATION CHART

DETECTOR					PROGRAMMING							
LOOP	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	-	10*	-	S	-	X
					6#	Yes	-	-	-	S	-	X
2A	6X6	70	4	-	2	Yes	-	-	-	S	-	X
2B	6X6	70	4	-	2	Yes	-	-	-	S	-	X
3A	6X40	0	2-4-2	-	3	Yes	-	10*	-	S	-	X
					8#	Yes	-	3	-	S	-	X
4A	6X40	0	2-4-2	-	4	Yes	-	5	-	S	-	X
5A	6X40	0	2-4-2	-	5	Yes	-	10*	-	S	-	X
					2#	Yes	-	-	-	S	-	X
6A	6X6	70	4	-	6	Yes	-	-	-	S	-	X
6B	6X6	70	4	-	6	Yes	-	-	-	S	-	X
7A	6X40	0	2-4-2	-	7	Yes	-	10*	-	S	-	X
					4#	Yes	-	3	-	S	-	X
8A	6X40	0	2-4-2	-	8	Yes	-	5	-	S	-	X
S1	6X6	+165	4	-	-	-	-	-	-	N	X	X
S2	6X6	+165	4	-	-	-	-	-	-	N	X	X

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

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

NOTES

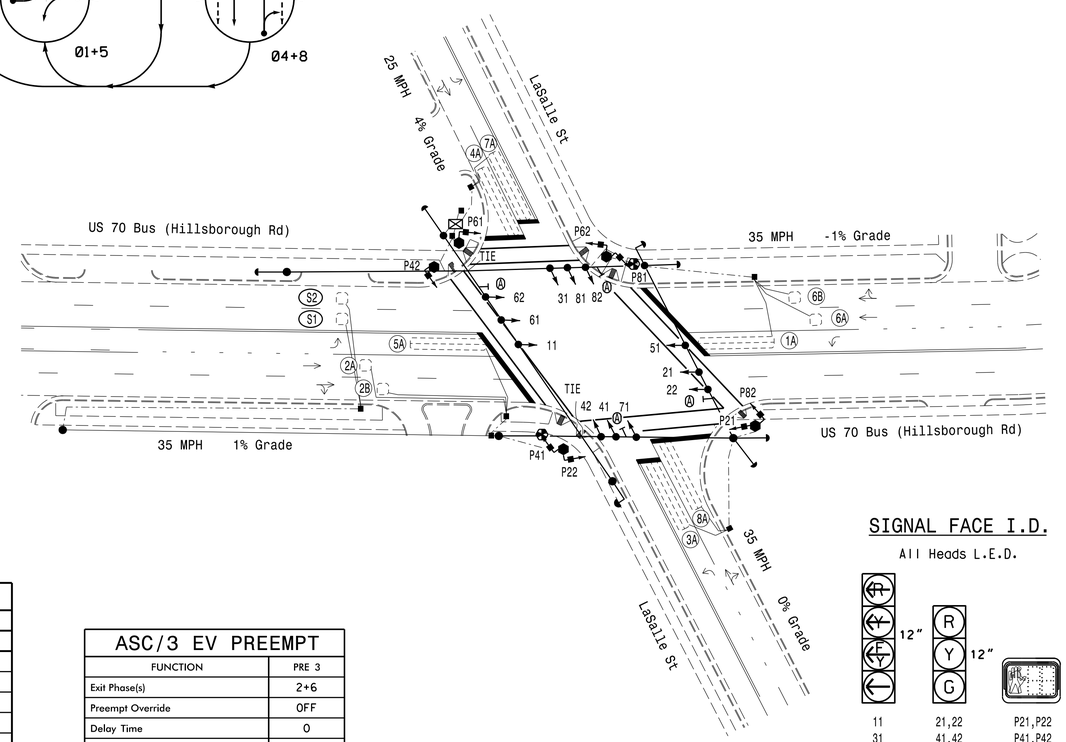
1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 and/or phase 5 may be lagged.
4. Phase 3 and/or 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. The Division (City) Traffic Engineer will determine the hours of use for each phasing plan.
11. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values..
12. Loop data based on previous 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 the preemption needed, as shown in the phasing diagram.
15. Remove existing optical detection equipment.

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
41,42	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

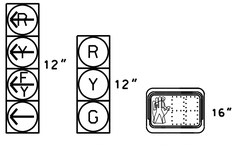
ALTERNATE PHASING TABLE OF OPERATION

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
41,42	R	R	R	R	R	R	G	G	R	R
51	—	R	—	R	R	R	R	R	R	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



SIGNAL FACE I.D.

All Heads L.E.D.



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

LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Pull Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
	Type I Pushbutton Post	
	Type II Signal Pedestal	
N/A	Curb Ramp	
	Turning Vehicles Yield to Peds Sign (R10-15)	

ASC/3 TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6	7	8
Min Green *	7	10	7	7	7	10	7	7
Walk *	0	7	0	7	0	7	0	7
Ped Clear	0	20	0	25	0	14	0	25
Veh. Extension *	2.0	3.0	2.0	2.0	2.0	3.0	2.0	2.0
Max 1 *	15	45	15	30	15	45	15	30
Yellow	3.0	3.9	3.0	3.8	3.0	3.9	3.0	3.8
Red Clear	2.1	1.9	3.3	3.4	2.1	1.9	3.4	3.4
Actuations B4 Add *	-	-	-	-	-	-	-	-
Seconds /Actuation *	-	-	-	-	-	-	-	-
Max Initial *	-	-	-	-	-	-	-	-
Time Before Reduction *	-	-	-	-	-	-	-	-
Time To Reduce *	-	-	-	-	-	-	-	-
Minimum Gap	-	-	-	-	-	-	-	-
Locking Detector	-	X	-	-	-	X	-	-
Recall Position	-	VEH. RECALL	-	-	-	VEH. RECALL	-	-
Dual Entry	-	-	-	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	13
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

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

SCALE 0 40 1"=40'

US 70 Business
(Hillsborough Road)
at
LaSalle Street

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 044157 ENGINEER ANDREW D HAYES

DocuSigned by:
Andrew Hayes
SIGNATURE
12/20/2018
DATE

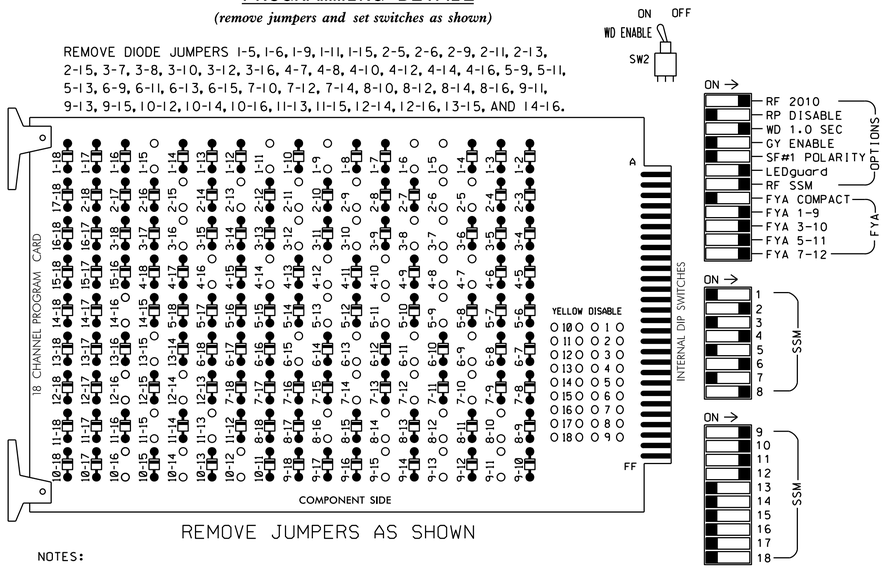
STIG. INVENTORY NO. 05-0265

PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig. 26.1

EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

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



REMOVE JUMPERS AS SHOWN

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.....1,2,2 PED,3,4,4 PED,5,6,6 PED,7, 8,8 PED
OVERLAP "A".....*
OVERLAP "B".....*
OVERLAP "C".....*
OVERLAP "D".....*

* See overlap programming detail on sheet 2

SIGNAL HEAD HOOK-UP CHART

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

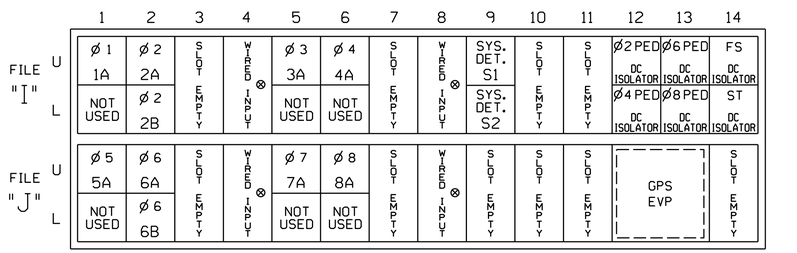
NU = Not Used

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

★ See pictorial of head wiring in detail this sheet.

INPUT FILE POSITION LAYOUT

(front view)



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

⊗ Wired Input - Do not populate slot with detector card

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 [1]	TB2-1,2	I1U	56	1 ★	1	YES	-	10	-	S
	-	J4U	48	26★	6	YES	-	-	-	S
2A	TB2-5,6	I2U	39	2	2	YES	-	-	-	S
2B	TB2-7,8	I2L	43	12	2	YES	-	-	-	S
3A [2]	TB4-5,6	I5U	58	3 ★	3	YES	-	10	-	S
	-	J8U	50	28★	8	YES	-	3	-	S
4A	TB4-9,10	I6U	41	4	4	YES	-	5	-	S
* S1	TB6-9,10	I9U	60	11	SYS	NO	-	-	-	N
* S2	TB6-11,12	I9L	62	13	SYS	NO	-	-	-	N
5A [3]	TB3-1,2	J1U	55	5 ★	5	YES	-	10	-	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
7A [4]	TB5-5,6	J5U	57	7 ★	7	YES	-	10	-	S
	-	I8U	49	24★	4	YES	-	3	-	S
8A	TB5-9,10	J6U	42	8	8	YES	-	5	-	S
PED PUSH BUTTONS										
P21,P22	TB8-4,6	I12U	67	PED 2	2 PED					
P41,P42	TB8-5,6	I12L	69	PED 4	4 PED					
P61,P62	TB8-7,9	I13U	68	PED 6	6 PED					
P81,P82	TB8-8,9	I13L	70	PED 8	8 PED					

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

* System detector only. Remove any assigned vehicle phase.

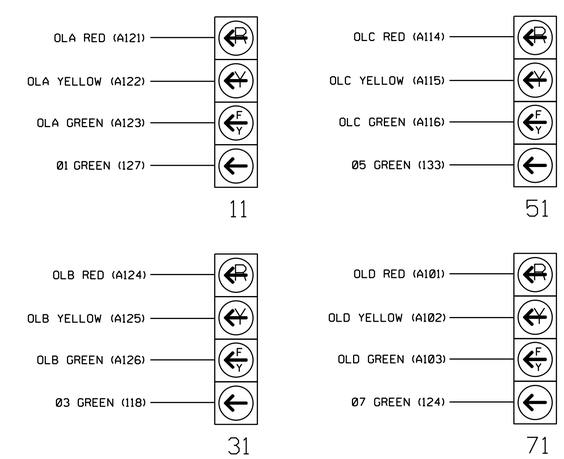
[1] Add jumper from I1-W to J4-W, on rear of input file.
[2] Add jumper from I5-W to J8-W, on rear of input file.
[3] Add jumper from J1-W to I4-W, on rear of input file.
[4] Add jumper from J5-W to I8-W, on rear of input file.

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 3.

FYA SIGNAL WIRING DETAIL

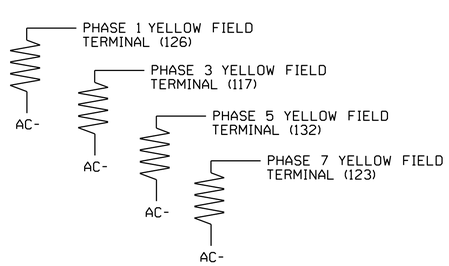
(wire signal heads as shown)



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: 05-0265
DESIGNED: December 2018
SEALED: 12/20/2018
REVISED: N/A

Project #: 170905

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Electrical Detail - Sheet 1 of 4

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ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

US 70 Business
(Hillsborough Road)
at
LaSalle Street

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 044157 ENGINEER ANDREW D HAYES

DocuSigned by: Andrew Hayes
SIGNATURE 12/20/2018
DATE

SIG. INVENTORY NO. 05-0265

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|    13|    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 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 '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 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: 05-0265
DESIGNED: December 2018
SEALED: 12/20/2018
REVISED: N/A

Project #: 170905

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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
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Traffic Engineering & Signal Management Section
750 N.Greenfield Pkwy,Garner,NC 27529

US 70 Business
(Hillsborough Road)
at
LaSalle Street

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 044157 ENGINEER ANDREW D HAYES

DocuSigned by: Andrew Hayes 12/20/2018
SIGNATURE DATE

SIG. INVENTORY NO. 05-0265

PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig. 26.3

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

(program controller as shown)

IMPORTANT!

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

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

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

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

- Place cursor in VEH DETECTOR [ ] position and enter "1".
- Set delay time to "3.0 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" →

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

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

← NOTICE VEH DET PLAN 2

← ENSURE DELAY IS SET TO '3.0'

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

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

← NOTICE VEH DET PLAN 2

ENSURE PHASE IS SET TO "0" →

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

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

← NOTICE VEH DET PLAN 2

← ENSURE DELAY IS SET TO '3.0'

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

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

← NOTICE VEH DET PLAN 2

ENSURE PHASE IS SET TO "0" →

END PROGRAMMING

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0265
DESIGNED: December 2018
SEALED: 12/20/2018
REVISED: N/A

Project #: 170905

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Electrical Detail - Sheet 3 of 4

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ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

750 N.Greenfield Pkwy,Garner,NC 27529

US 70 Business
(Hillsborough Road)
at
LaSalle Street

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 044157 ENGINEER ANDREW D HAYES

DocuSigned by: Andrew Hayes 12/20/2018
SIGNATURE DATE

SIG. INVENTORY NO. 05-0265

PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig. 26.4

ALTERNATE PHASING ACTIVATION DETAIL

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

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

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

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

ALTERNATE PHASING CHANGE SUMMARY

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

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

VEH DET PLAN 2: Disables phase 6 call on loop 1A and reduces delay time for phase 1 call on loop 1A to 3.0 seconds.

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

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

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

ECONOLITE ASC/3-2070 ACTION PLAN PROGRAMMING DETAIL

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

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

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

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: 05-0265
DESIGNED: December 2018
SEALED: 12/20/2018
REVISED: N/A

Project #: 170905

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Electrical Detail - Sheet 4 of 4

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

US 70 Business
(Hillsborough Road)
at
LaSalle Street

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 044157 ENGINEER ANDREW D HAYES

DocuSigned by: Andrew Hayes 12/20/2018
SIGNATURE DATE
SIG. INVENTORY NO. 05-0265

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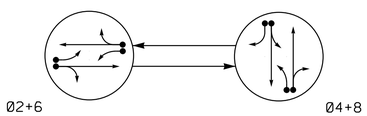
PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-27.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

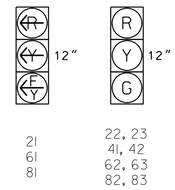
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

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

SIGNAL FACE I.D.

All Heads L.E.D.



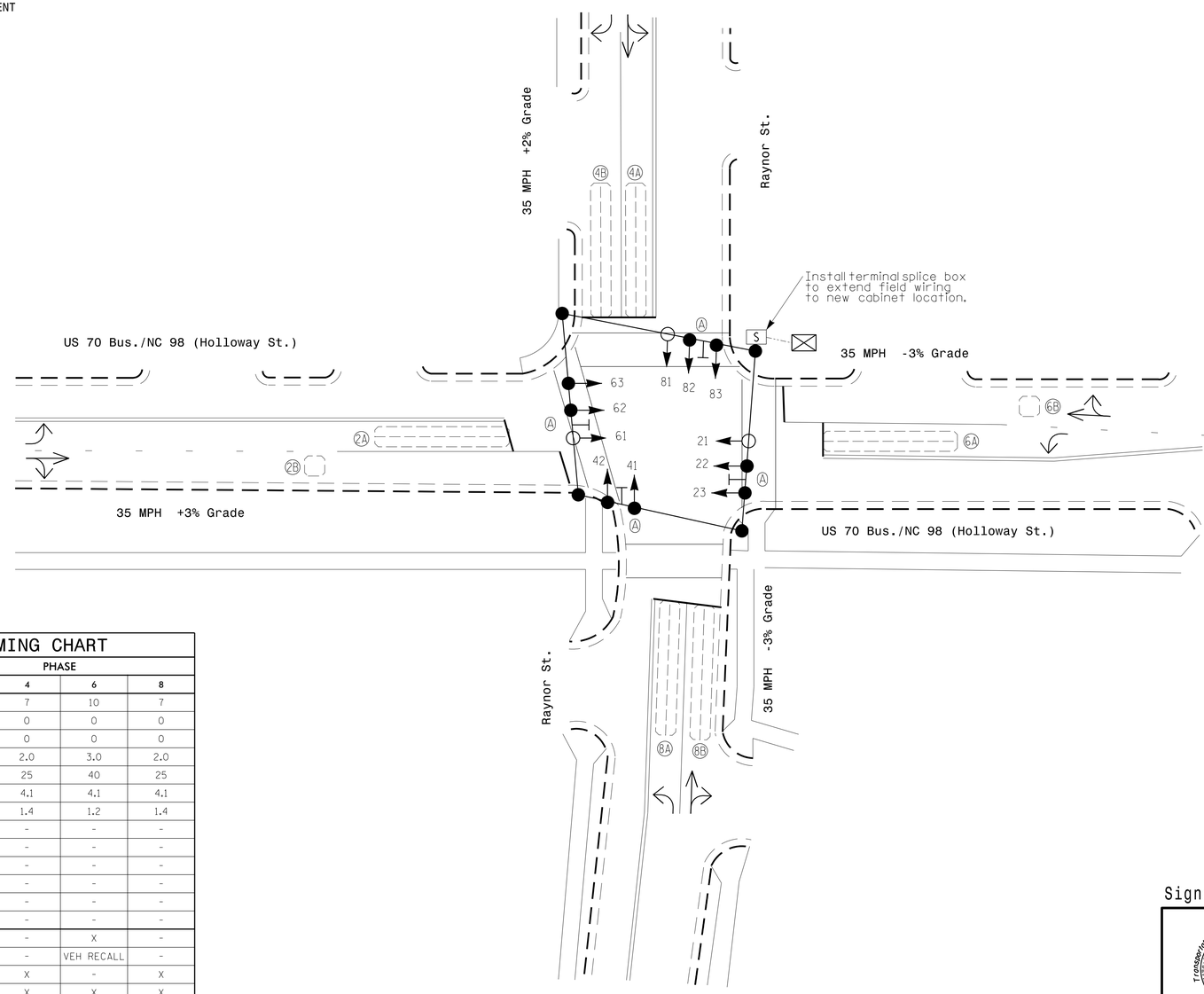
ASC/3 DETECTOR INSTALLATION CHART

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

2 Phase
Fully Actuated
(Durham Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Renumber existing signal heads 21, 22, 61, 62, 81 and 82 as 22, 23, 62, 63, 82 and 83 respectively.
4. Reposition existing signal heads 22, 23, 62, 63, 82 and 83.
5. Set all detector units to presence mode.
6. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
7. Pavement markings are existing.
8. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
9. Loop data based on previous plan and/or field observations.
10. Reconnect loops in cabinet as indicated to match current NCDOT standards.



LEGEND

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

ASC/3 TIMING CHART

FEATURE	PHASE 2	PHASE 4	PHASE 6	PHASE 8
Min Green *	10	7	10	7
Walk *	0	0	0	0
Ped Clear	0	0	0	0
Veh. Extension *	3.0	2.0	3.0	2.0
Max 1 *	40	25	40	25
Yellow	4.1	4.1	4.1	4.1
Red Clear	1.2	1.4	1.2	1.4
Actuations B4 Add *	-	-	-	-
Seconds /Actuation *	-	-	-	-
Max Initial *	-	-	-	-
Time Before Reduction *	-	-	-	-
Time To Reduce *	-	-	-	-
Minimum Gap	-	-	-	-
Locking Detector	X	-	X	-
Recall Position	VEH RECALL	-	VEH RECALL	-
Dual Entry	-	X	-	X
Simultaneous Gap	X	X	X	X

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

Signal Upgrade

Prepared for: Transportation Mobility and Safety Division, Signal Design Section, State of North Carolina Department of Transportation
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, 919-878-5416 Fax.
www.rameykemp.com

SCALE 0 20 1"=20'

US 70 Bus./NC 98
(Holloway St.)
at
Raynor St.

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32396 ENGINEER WILLIAM J. HAMILTON

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

SIG. INVENTORY NO. 05-0271

12/17/2018
05-0271_Sig-27.dgn
User:tpopelka

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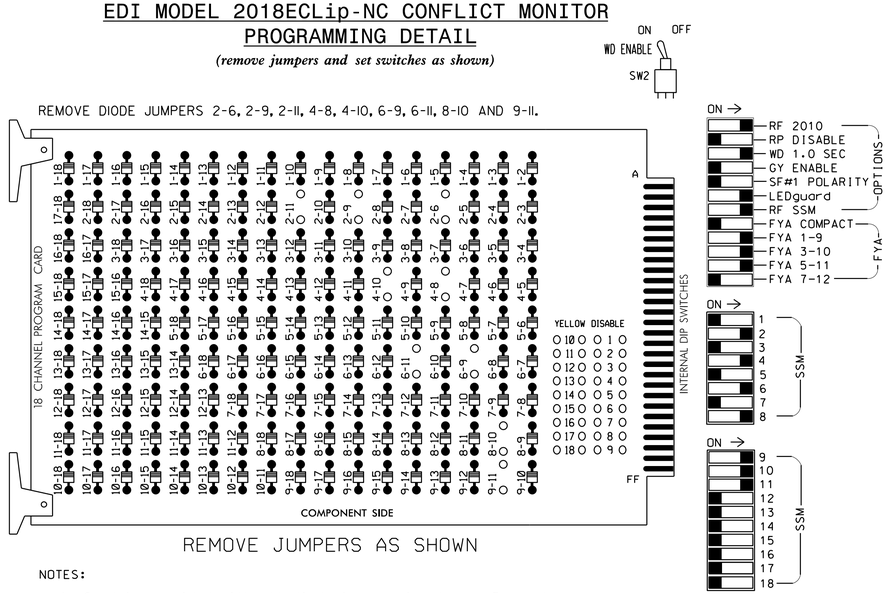
PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-27.1

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
PHASES USED.....2,4,6,8
OVERLAP "A".....*
OVERLAP "B".....*
OVERLAP "C".....*
OVERLAP "D".....NOT USED

* See overlap programming on sheet 2.

SIGNAL HEAD HOOK-UP CHART

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

NU = Not Used

★ 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	SLOT EMPTY	Ø 2 / 2A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	Ø 4 / 4A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS / DC ISOLATOR
	L		Ø 2 / 2B				Ø 4 / 4B								ST / DC ISOLATOR
FILE "J"	U	SLOT EMPTY	Ø 6 / 6A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	Ø 8 / 8A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L		Ø 6 / 6B				Ø 8 / 8B								

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

FS = FLASH SENSE
ST = STOP TIME

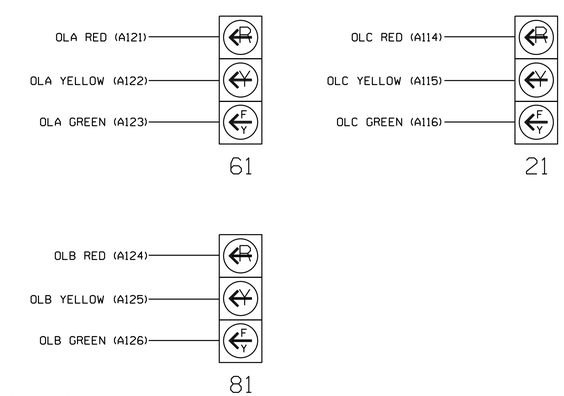
INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	NEMA PHASE	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		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		10		S

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



Electrical Detail
Sheet 1 of 2

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0271
DESIGNED: Dec 2018
SEALED: 12/19/2018
REVISED: N/A

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

ELECTRICAL AND PROGRAMMING DETAILS FOR:

750 N.Greenfield Pkwy,Garner,NC 27529

US 70 Bus./NC 98
(Holloway St.)
at
Raynor 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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SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32396 ENGINEER WILLIAM J. HAMILTON

DocuSigned by: William J. Hamilton 12/19/2018
A05600704648484
SIGNATURE DATE
SIG. INVENTORY NO. 05-0271

12/17/2018
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User:tspopelka

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ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

(program controller as shown)

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

OVERLAP A

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

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

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

Toggle 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
```

END PROGRAMMING

FLASHER CIRCUIT MODIFICATION DETAIL

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

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

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0271
DESIGNED: Dec 2018
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REVISED: N/A

Electrical Detail
Sheet 2 of 2

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NORTH CAROLINA PROFESSIONAL SEAL 32396 ENGINEER WILLIAM J. HAMILTON

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Traffic Engineering Mobility and Safety Division
Signal Management Section
DEPARTMENT OF TRANSPORTATION
STATE OF NORTH CAROLINA

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12/17/2018
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