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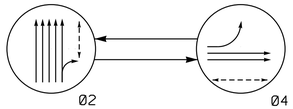
PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-170.0

PHASING DIAGRAM

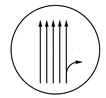


PHASING DIAGRAM DETECTION LEGEND

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

EV PREEMPT PHASES

(Medium Priority)



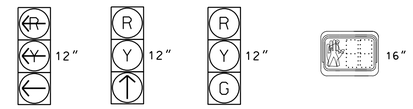
PRE 3
(02)

TABLE OF OPERATION

SIGNAL FACE	PHASE 02	PHASE 04	PHASE PRE3	FLASH
21, 22	↑	R	↑	Y
23, 24, 25	G	R	G	Y
41	~~R~~	←	~~R~~	~~R~~
42, 43	R	↑	R	R
P21, P22	W	DW	DW	DRK
P41, P42	DW	W	W	DRK

SIGNAL FACE I.D.

All Heads L.E.D.

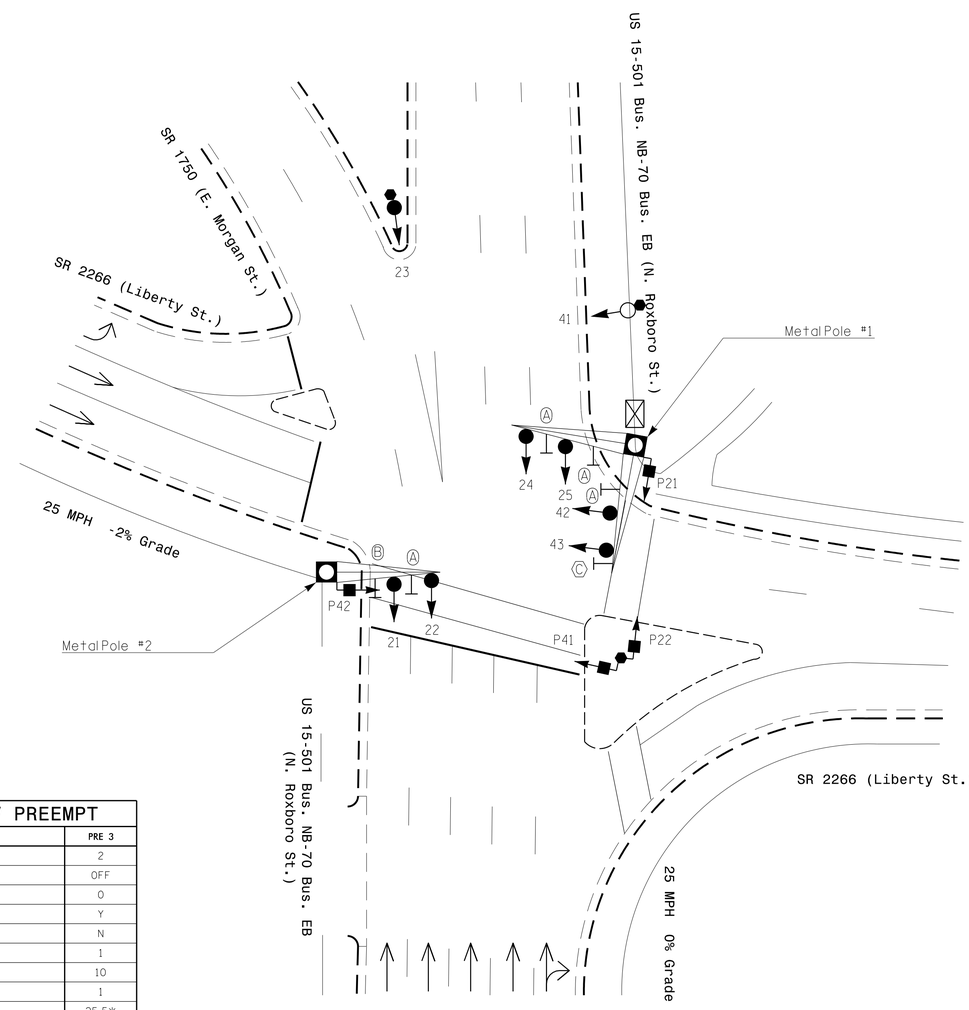


41 | 21, 22 42, 43 | 23,24,25 | P21, P22 P41, P42

2 Phase Pretimed 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. 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. Install new cabinet on the existing cabinet foundation.
8. Install GPS emergency preemption system per manufacturer's instructions to achieve preemption needed, as shown in phasing diagram.
9. Remove existing optical detection equipment.



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	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
	Metal Pole with Mastarm	
	Type II Signal Pedestal	
A	Street Name Sign (D3-1)	A
B	Parking Guide Sign	B
C	No Right Turn Sign (R3-1	C

ASC/3 TIMING CHART

FEATURE	PHASE 2	PHASE 4
Min Green *	10	7
Walk *	7	7
Ped Clear	6	14
Veh. Extension *	0.0	0.0
Max 1 *	40	40
Delayed Green *	4.0	4.0
Yellow	3.2	3.3
Red Clear	2.5	2.4
Actuations B4 Add *	-	-
Seconds /Actuation *	-	-
Max Initial *	-	-
Time Before Reduction *	-	-
Time To Reduce *	-	-
Minimum Gap	-	-
Locking Detector	-	-
Recall Position	PED/MAX	PED/MAX
Dual Entry	-	-
Simultaneous Gap	X	X

* 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.

ASC/3 EV PREEMPT

FUNCTION	PRE 3
Exit Phase(s)	2
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:

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

Signal Upgrade

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

SCALE 0 20 1"=20'

US 15-70-501 Bus.
(N. Roxboro St.)
at
SR 2266 (Liberty 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. 05-0997

12/17/2018
U:\U5968\Sig\05-0997_Sig.dgn
User:tpopelka

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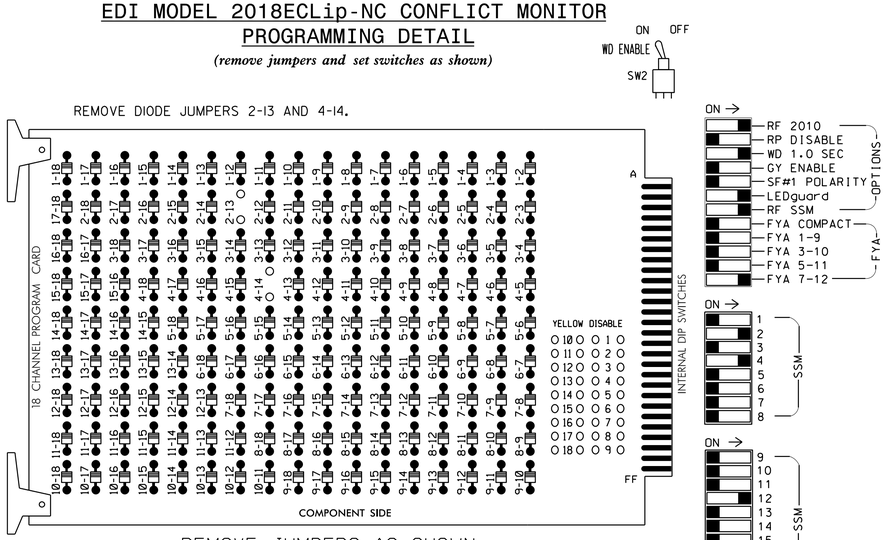
PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-170.1

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.
3. Program phase 6 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 scheme shown on the Signal Design Plan.

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2		S3	S4	S5		S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2		13	3	4		14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2		2 PED	3	4		4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	NU	21,22	23,24, 25	P21, P22	NU	41	42,43	P41, P42	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU
RED		128	128				101													
YELLOW		129	129				102													
GREEN			130																	
RED ARROW						101														
YELLOW ARROW						102														
GREEN ARROW		130				103	103													
✋				113				104												
🚶				115				106												

NU = Not Used

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
PHASES USED.....2,2PED,4,4PED
OVERLAP "A".....NOT USED
OVERLAP "B".....NOT USED
OVERLAP "C".....NOT USED
OVERLAP "D".....NOT USED

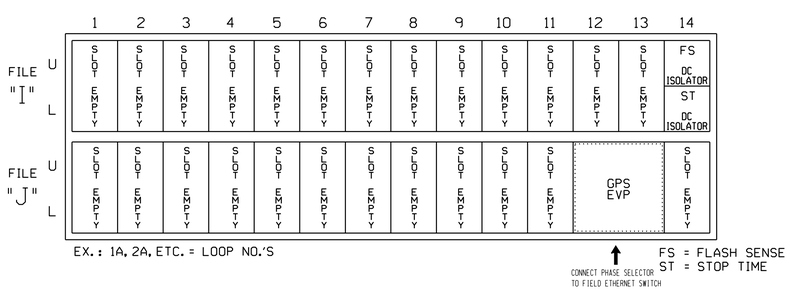
* See overlap programming on sheet 2.

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

INPUT FILE POSITION LAYOUT

(front view)



Electrical Detail
Sheet 1 of 2

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0997
DESIGNED: Dec 2018
SEALED: 12/19/2018
REVISED: N/A

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

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

US 15-70-501 Bus.
(N. Roxboro St.)
at
SR 2266 (Liberty 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
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SIGNATURE DATE

SIG. INVENTORY NO. 05-0997

12/17/2018
U-5968_sig-170.1_05-0997.ele.dgn
User:tpopelka

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PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-170.2

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

PROGRAM EXTEND TIME ON GPS DETECTOR UNIT FOR 2.0 SEC.

ECONOLITE ASC/3-2070 PREEMPT FILTERING PROGRAMMING DETAIL

(program controller as shown)

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

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0997
DESIGNED: Dec 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:

US 15-70-501 Bus.
(N. Roxboro St.)
at
SR 2266 (Liberty 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

DocuSign William J. Hamilton 12/19/2018
SIGNATURE DATE

SIG. INVENTORY NO. 05-0997

Prepared In the offices of:
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NC DEPARTMENT OF TRANSPORTATION
Transportation Mobility and Safety Division
Signals Management Section
750 N.Greenfield Pkwy,Garner,NC 27529

12/17/2018
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USER:tpopelka

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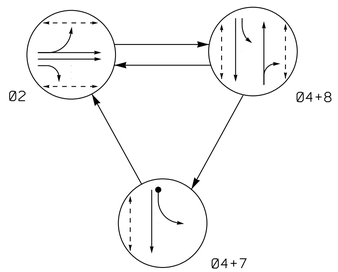
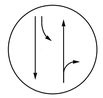
PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG.171.0

DEFAULT PHASING DIAGRAM



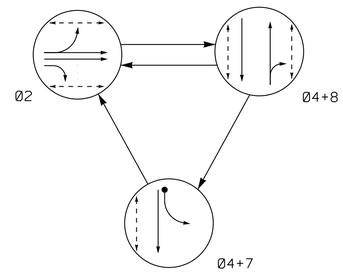
DEFAULT PHASING OVERHEIGHT PREEMPT PHASE



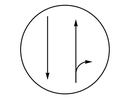
DEFAULT PHASING TABLE OF OPERATION					
SIGNAL FACE	PHASE				
	Ø2	Ø4+8	Ø4+7	PRE 2	FLASH
21, 22	G	R	R	R	Y
41, 42	R	G	G	G	R
71	~~R~~	~~F Y~~	~~—~~	~~F Y~~	~~R~~
81, 82	R	G	R	G	R
P21, P22	W	DW	DW	DW	DRK
P23, P24	W	DW	DW	DW	DRK
P41, P42	DW	W	W	DW	DRK
P81, P82	DW	W	DW	DW	DRK
SIGN A	*	*	*	*	*

*See Notes 10 & 11

ALTERNATE PHASING DIAGRAM



ALTERNATE PHASING OVERHEIGHT PREEMPT PHASE



ALTERNATE PHASING TABLE OF OPERATION					
SIGNAL FACE	PHASE				
	Ø2	Ø4+8	Ø4+7	PRE 2	FLASH
21, 22	G	R	R	R	Y
41, 42	R	G	G	G	R
71	~~R~~	~~R~~	~~—~~	~~R~~	~~R~~
81, 82	R	G	R	G	R
P21, P22	W	DW	DW	DW	DRK
P23, P24	W	DW	DW	DW	DRK
P41, P42	DW	W	W	DW	DRK
P81, P82	DW	W	DW	DW	DRK
SIGN A	*	*	*	*	*

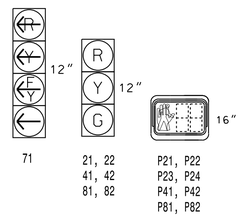
*See Notes 10 & 11

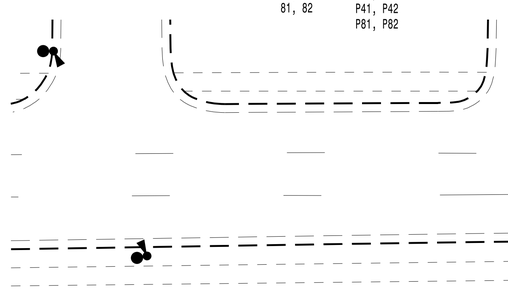
PHASING DIAGRAM DETECTION LEGEND

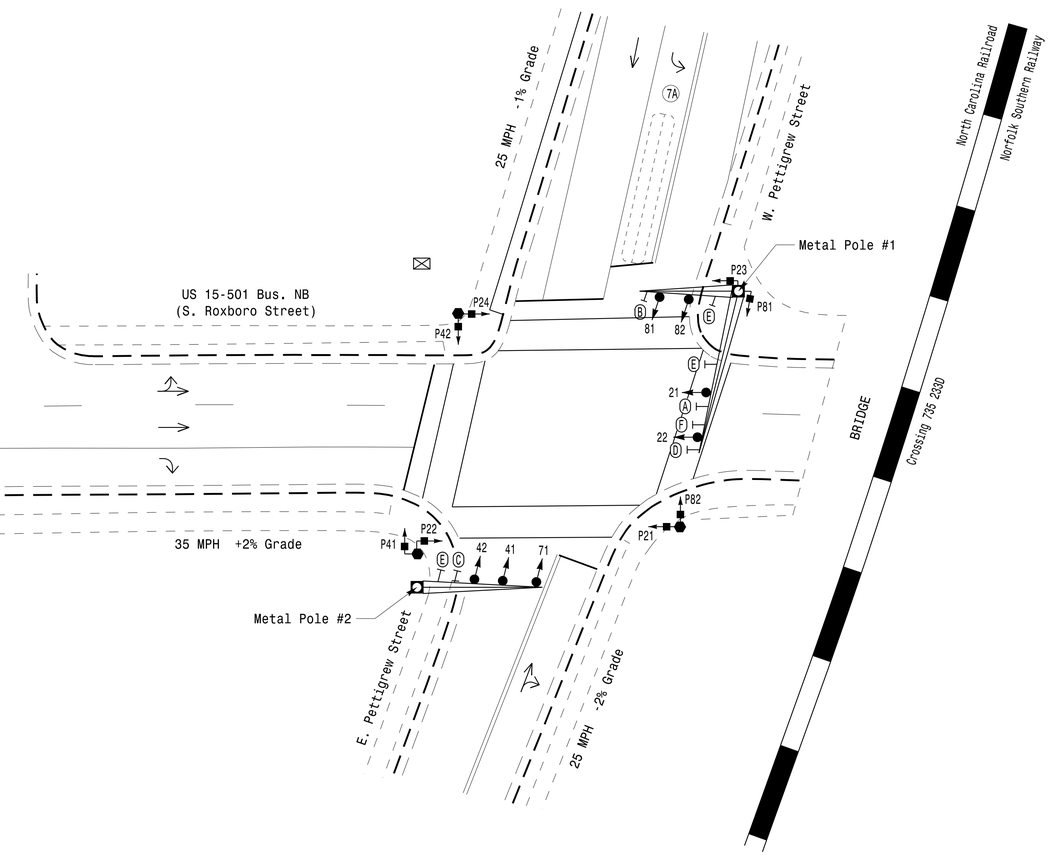
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

SIGNAL FACE I.D.

All Heads L.E.D.







3 PHASE SEMI-ACTUATED W/ OVERHEIGHT 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 7 may lead.
4. Set all detector units to presence mode.
5. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
6. 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. This intersection features an overheight vehicle detection preemption system. Shown location of overheight vehicle detectors are conceptual only.
10. Ensure flashing operation does not disable operation of blankout sign. If an overheight vehicle is detected during flash operation, the blankout sign shall illuminate solid (ON) for 10 seconds.
11. Blankout sign shall illuminate solid ON immediately upon detection of overheight vehicle and remain solid ON during preemption phase. Upon completion of preemption, FLASH blankout sign until the end of phase 2 green, then terminate to an OFF (dark) display.
12. Loop data based on previous plan and/or field observations.
13. 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	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Metal Pole with Mastarm	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
N/A	Railroad Tracks	
	Overheight Detector	
N/A	Curb Ramp	
A	"OVERHEIGHT MUST TURN" LED Blankout Sign	A
B	No Left Turn Sign (R3-2)	B
C	No Right Turn Sign (R3-1)	C
D	Right Arrow "ONLY" Sign (R3-5R)	D
E	Street Sign (D3-1)	E
F	"TRUCKS OVER 11'4" Sign	F

ASC/3 TIMING CHART

FEATURE	PHASE 2	PHASE 4	PHASE 7	PHASE 8
Min Green *	10	7	7	7
Walk *	4	4	0	4
Ped Clear*	13	10	0	9
Timing Plan 2 Walk	4	4	0	4
Timing Plan 2 Ped Clear	4	10	0	9
Veh. Extension *	2.0	2.0	2.0	2.0
Max 1 *	45	20	15	20
Delayed Green	4	4	-	4
Yellow	3.7	3.3	3.0	3.3
Red Clear	1.4	1.7	1.6	1.7
Actuations B4 Add *	-	-	-	-
Seconds /Actuation *	-	-	-	-
Max Initial *	-	-	-	-
Time Before Reduction *	-	-	-	-
Time To Reduce *	-	-	-	-
Minimum Gap	-	-	-	-
Locking Detector	-	-	-	-
Recall Position	MAX/PED RECALL	MAX/PED RECALL	-	MAX/PED RECALL
Dual Entry	-	X	-	X
Simultaneous Gap	X	X	X	X

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

ASC/3 OVERHEIGHT PREEMPT

FUNCTION	PRE 2
Exit Phase(s)	2
Preempt Override	ON
Delay Time	0
Ped Clear Trough Yellow	Y
Terminate Phases	N
Entrance Walk	1
Entrance Ped Clear	255
Entrance Min Green	1
Entrance Yellow Change	25.5*
Entrance Red Clear	25.5*
Track Clear Min Green	0
Track Clear Max Green	0
Min Dwell Time	25
Max Dwell Time	120
Track Clear Yellow Change	25.5*
Track Clear Red Clear	25.5*
Preempt Input Extension Time	0.0
Exit Yellow Change	25.5*
Exit Red Clear	25.5*

* Time defaults to time used for phase during normal operation.

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
7A	6X40	0	2-4-2	-	7	Yes	-	15*	-	S	-	X

* Reduce Delay to 3 seconds during Alternate Phasing operation.

PLANS PREPARED IN THE OFFICE OF:
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NC License #F-0102
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Signal Upgrade

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

US 15-501 Business NB (S. Roxboro Street) at Pettigrew Street

Division 5 Durham County Durham

PLAN DATE:	June 2018	REVIEWED BY:	SL Phillips
PREPARED BY:	SP Pennington	REVIEWED BY:	KP Baumann

SCALE 0 20 1"=20'

REVISIONS	INIT.	DATE

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

DocuSigned by: DC87A59EC8D3A37... 12/19/2018

SIGNATURE DATE

SIG. INVENTORY NO. 05-0998

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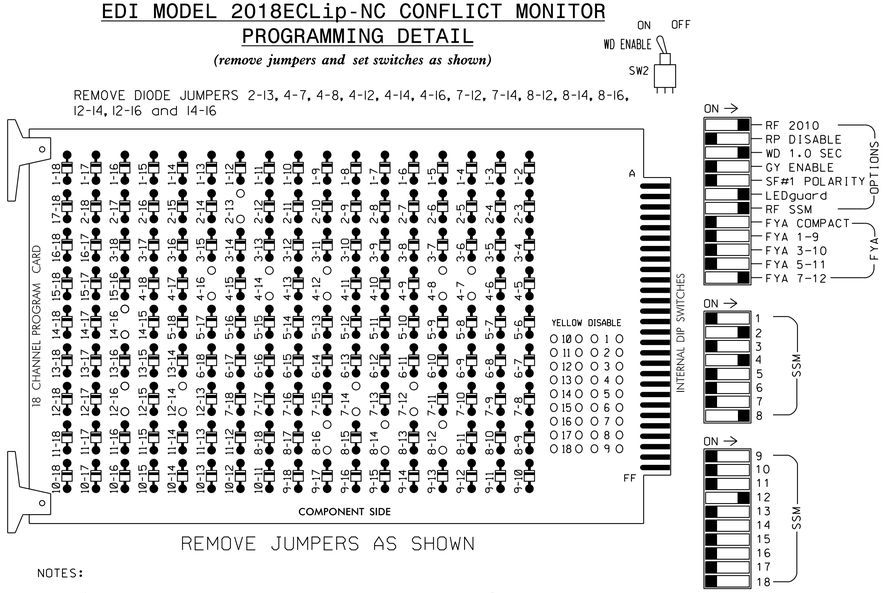
PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG.171.1

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

EQUIPMENT INFORMATION

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

* See overlap programming detail on sheet 2

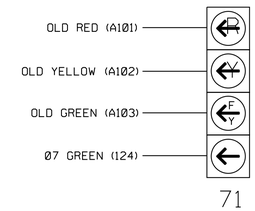
SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	NU	21,22	P21,P22 P23,P24	NU	41,42	P41, P42	NU	NU	NU	71★	81,82	P81, P82	NU	NU	NU	NU	71★	NU
RED		128			101						107							
YELLOW		129			102					*	108							
GREEN		130			103						109							
RED ARROW																	A101	
YELLOW ARROW																	A102	
FLASHING YELLOW ARROW																	A103	
GREEN ARROW										124								
✋			113			104						110						
PED YELLOW												**						
🚶			115			106						112						

NU = Not Used
★ See pictorial of head wiring in detail this sheet.
* Denotes install load resistor. See load resistor installation detail this sheet.
** A blankout sign is wired to S12Y (8 PED YELLOW). See wiring and programming details on sheets 3 and 4.

FYA SIGNAL WIRING DETAIL

(wire signal head as shown)



INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	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	FS / DC ISOLATOR
	L														ST / DC ISOLATOR
FILE "J"	U	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	Ø 7 / 7A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	NOT USED
	L					NOT USED									PRE2 / AC ISOLATOR

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

FS = FLASH SENSE
ST = STOP TIME
PRE = PREEMPT

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
7A	TB5-5,6	J5U	57	7 ★	7	YES		15		S

★ For the detector to work as shown on the signal design plan, see the Vehicle Detector Setup Programming Detail for Alternate Phasing on sheet 5.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

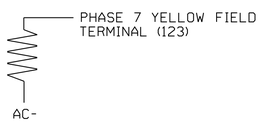
Countdown Ped Signals are required to display timing only during Ped Clearance Interval. Consult Ped Signal Module user's manual for instructions on selecting this feature.

LOAD RESISTOR INSTALLATION DETAIL

(install resistor as shown)

ACCEPTABLE VALUES

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



THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0998
DESIGNED: JUNE 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail - Sheet 1 of 5

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

US 15-501 Business NB
(S. Roxboro Street)
at
Pettigrew Street

Division 5 Durham County Durham

PLAN DATE: June 2018		REVIEWED BY:	SL Phillips
PREPARED BY: SP Pennington		REVIEWED BY:	KP Baumann

REVISIONS	INIT.	DATE

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

PLANS PREPARED IN THE OFFICE OF:
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NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACIE L. PHILLIPS
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SIGNATURE DATE
SIG. INVENTORY NO. 05-0998

12/19/2018
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PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG.171.2

ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

(program controller as shown)

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

Toggle Three Times

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 CONTROLLER SEQUENCE PROGRAMMING DETAIL

(program controller as shown)

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

```
CONTROLLER SEQUENCE [ 1]
SEQUENCE COMMANDS  . HW ALT SEQ ENA.          NO.
   01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16
BC-B  -  B  -  B  -  -  -  -  -  -  -  -  -  -  -
R1-:.  02: . 04:.  .  .  .  .  .  .  .  .  .  .  .
R2-:.  . :08 07:.  .  .  .  .  .  .  .  .  .  .  .
R3-:.  . :.  . :.  .  .  .  .  .  .  .  .  .  .  .
R4-:.  . :.  . :.  .  .  .  .  .  .  .  .  .  .  .

R1-R4=RING 1-4, DATA ENTRY, PHASES 1-16
BC=BARRIER CONTROL, VALUES: B,C
B=BARRIER MODE
C=COMPATIBILITY MODE
```

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

END PROGRAMMING

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

ECONOLITE ASC/3-2070 LOGIC PROCESSOR PROGRAMMING DETAIL

(program controller as shown)

The following logic processor configuration turns on blankout sign immediately upon detection of overheight vehicle. The sign remains on during the preemption phase. Upon completion of preemption, the logic processor configuration flashes the blankout sign until the end of phase 2 green, then terminates the sign to an off display. If overheight violation is during flash operation, Overheight sign shall illuminate for 10 seconds. Also, the following logic processor configuration holds the FYA on signal head 71 red for the duration of the delayed green time (leading ped interval) when serving a ped call on the opposing through phase.

1. From Main Menu select [1. CONFIGURATION]
2. From CONFIGURATION Submenu select [8. LOGIC PROCESSOR]
3. From 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 INPUT                2   IS  ON

THEN   LP SET LOGIC FLAG        1       ON
       LP SET LOGIC FLAG        2       ON
       TOD SET TMG PLN ON       2
```

TURNS ON LOGIC FLAGS 1, 2, AND TIMING PLAN 2 UPON DETECTION OF OVERHEIGHT VEHICLE.

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

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

IF     LP FLAG                  2   IS  ON

THEN   LP DELAY FOR 15 SECONDS
       LP SET LOGIC FLAG        3       ON
       LP SET LOGIC FLAG        2       OFF
```

TURNS ON LOGIC FLAG 3 ONCE PREEMPT IS ACTIVE. THE DELAY ENSURES THAT PREEMPT IS ACTIVE.

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

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

IF     LP FLAG                  3   IS  ON
AND    PMT PREEMPT ACTIVE       2   IS  OFF

THEN   LP SET LOGIC FLAG        4       ON
       LP SET LOGIC FLAG        1       OFF
       LP SET LOGIC FLAG        3       OFF
```

TURNS ON LOGIC FLAG 4 UPON COMPLETION OF PREEMPTION.

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

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

IF     LP FLAG                  4   IS  ON
AND    LP COB CODE ON         546

THEN   SIG SET PH PED CLR       8       ON

ELSE   SIG SET PH PED CLR       8       OFF
```

FLASHES BLANKOUT SIGN UPON COMPLETION OF PREEMPTION UNTIL THE END OF PHASE 2.

ENTER A "5" IN THE LP# FIELD, PRESS 'ENTER', AND PROGRAM AS SHOWN.

```
LP#:   5  COPY FROM:   5  ACTIVE:  M   (T/F)

IF     LP FLAG                  1   IS  ON

THEN   SIG SET PH PED CLR       8       ON
```

TURNS ON BLANKOUT SIGN UPON DETECTION OF OVERHEIGHT VEHICLE AND DURING PREEMPTION.

ENTER A "6" IN THE LP# FIELD, PRESS 'ENTER', AND PROGRAM AS SHOWN.

```
LP#:   6  COPY FROM:   6  ACTIVE:  M   (T/F)

IF  LP FLAG                     4   IS  ON

AND    VEH YELLOW ON PHASE      2       ON

THEN   LP SET LOGIC FLAG        4       OFF
```

TURNS OFF LOGIC FLAG 4 AT THE END OF PHASE 2 GREEN TO TURN OFF BLANKOUT SIGN.

ENTER A "7" IN THE LP# FIELD, PRESS 'ENTER', AND PROGRAM AS SHOWN.

```
LP#:   7  COPY FROM:   7  ACTIVE:  M   (T/F)

IF     PED ON PH WALK           8   IS  ON
AND    VEH GREEN ON PH          8   IS  OFF

THEN   SIG SET OLP RED          4       ON
       SIG SET OLP YELLOW       4       OFF
       SIG SET OLP GREEN        4       OFF
```

HOLDS SIGNAL HEAD 71 FYA RED DURING THE PHASE 8 DELAYED GREEN TIME (LEADING PED INTERVAL)

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

ENABLE LOGIC PROCESSOR STATEMENTS 1 - 7 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  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: 05-0998
DESIGNED: JUNE 2018
SEALED: 12/19/2018
REVISED: N/A

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

Electrical Detail - Sheet 2 of 5

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

US 15-501 Business NB
(S. Roxboro Street)
at
Pettigrew Street

Division 5 Durham County Durham

PLAN DATE:	June 2018	REVIEWED BY:	SL Phillips
PREPARED BY:	SP Pennington	REVIEWED BY:	KP Baumann

REVISIONS	INIT.	DATE

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACIE L. PHILLIPS

DocuSigned by: 0C87A56E0B9A47...
12/19/2018
SIGNATURE DATE

SIG. INVENTORY NO. 05-0998

12/19/2018
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PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG.171.3

ECONOLITE ASC/3-2070 PREEMPT FILTERING PROGRAMMING DETAIL

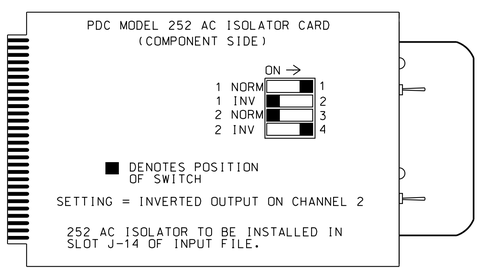
(program controller as shown)

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

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

PREEMPT 2 AC ISOLATOR (MODEL 252) OUTPUT PROGRAMMING DETAIL

(set DIP switches as shown below)



NOTE: IF ANOTHER MANUFACTURER TYPE OF AC ISOLATOR IS USED, OUTPUT PROGRAMMING IS LIKELY NOT TO EQUATE TO THAT SHOWN ABOVE.

ECONOLITE ASC/3-2070 TIMING PLAN SETUP FOR OVERHEIGHT PREEMPTION PROGRAMMING DETAIL

IMPORTANT!

Program all timing information into Timing Plan 1 Before Preceeding.

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

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

4. From Main Menu select [2. CONTROLLER]
5. From CONTROLLER Submenu select [1. TIMING PLANS]
6. Place cursor in TIMING PLAN [ ] position and enter "2".

- Set Phase 2 PED CLR to "4".

TIMING PLAN [2] PHASE DATA ← NOTICE TIMING PLAN 2

PHASE	1	2	3	4	5	6	7	8
DLY GRN	0	4	0	4	0	4	0	4
WALK	0	4	0	4	0	0	0	4
WALK2	0	0	0	0	0	0	0	0
WLK MAX	0	0	0	0	0	0	0	0
PED CLR	0	4	0	10	0	0	0	9
PD CLR2	0	0	0	0	0	0	0	0

← ENSURE PHASE 2 PED CLR IS SET TO '4'

END PROGRAMMING

ECONOLITE ASC/3-2070 OVERHEIGHT 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 2. Then press the right cursor arrow and toggle the controller to YES. Next cursor down. This will select Emergency Vehicle Preempt #2.

```
PREEMPT PLAN [  2]     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 . . . . . . . . . . . . . .
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 CLIMN GRI YEL| RED
ENTRANCE TM.    1|   255|    1|25.5|25.5
-----------MIN GRI|EXT GRI|MX GRI YEL| RED
TRACK CLEAR     0|     0|    0|25.5|25.5
-----------MIN DLI|PMT|EXT|IMX TMI YEL| RED
DWL/CYC-EXIT   25|   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
```

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0998
DESIGNED: JUNE 2018
SEALED: 12/19/2018
REVISED: N/A

PLANS PREPARED IN THE OFFICE OF:
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Electrical Detail - Sheet 3 of 5

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 15-501 Business NB
(S. Roxboro Street)
at
Pettigrew Street

Division 5 Durham County Durham

PLAN DATE:	June 2018	REVIEWED BY:	SL Phillips
PREPARED BY:	SP Pennington	REVIEWED BY:	KP Baumann

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACIE L. PHILLIPS

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12/19/2018
SIGNATURE DATE

SIG. INVENTORY NO. 05-0998

12/19/2018
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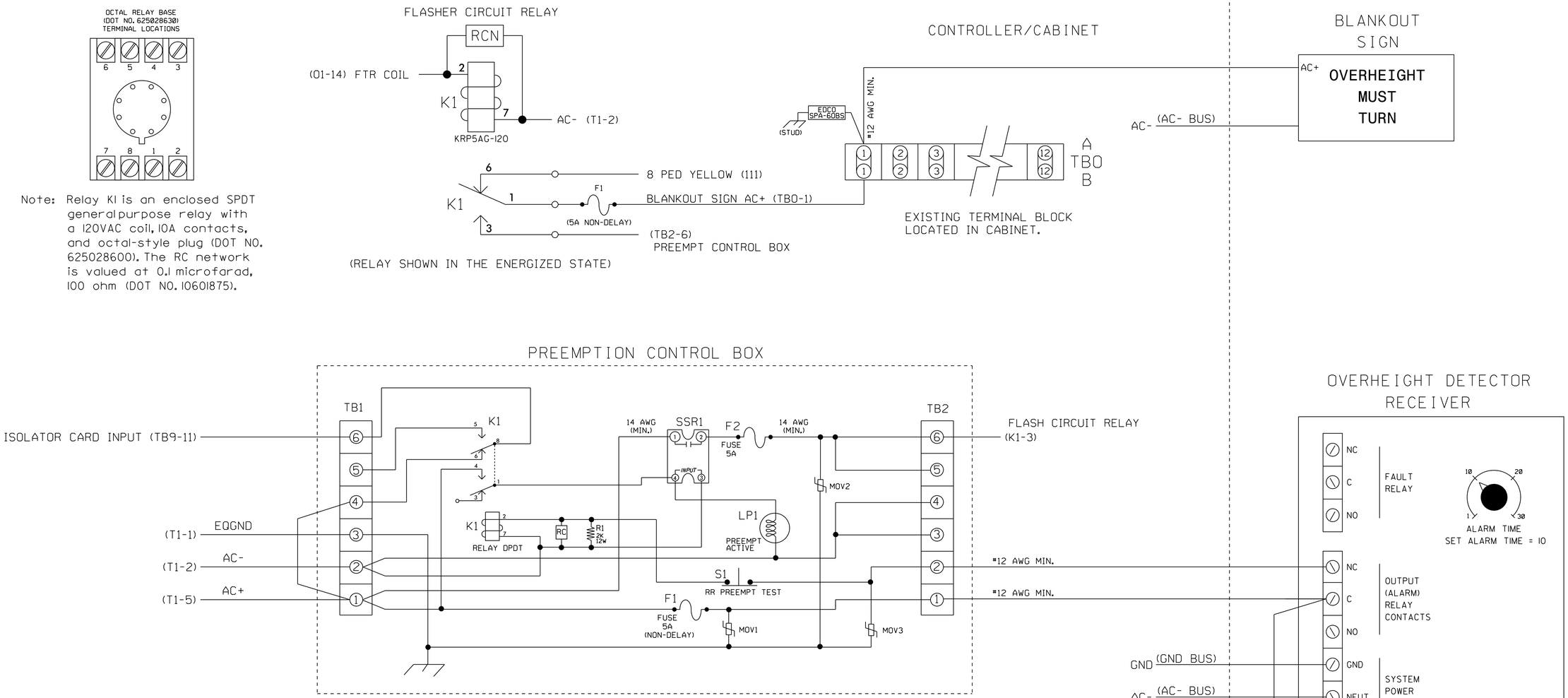
PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG.171.4

OVERHEIGHT DETECTION WIRING DETAIL

(wire as shown below)



Note: Relay K1 is an enclosed SPDT general purpose relay with a 120VAC coil, 10A contacts, and octal-style plug (DOT NO. 625028600). The RC network is valued at 0.1 microfarad, 100 ohm (DOT NO. 10601875).

NOTES

1. Relay K1 is shown in the energized (Preempt not active) normal operation state.
2. Relay K1 is a DPDT with 120VAC coil with octal base.
3. Relay SSR1 is a SPST (normally open) Solid State Relay with AC input and AC (25 amp) output.
4. AC Isolator Card shall activate preemption upon removal of AC+ from the input (as shown above). To accomplish this set invert dip switch on AC Isolator Card.
5. IMPORTANT!! A jumper must be added between input file terminals J14-E and J14-K if not already present. Also, terminal TB9-12 (on input panel) shall be connected to AC neutral (jumper may have to be added).

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0998
DESIGNED: JUNE 2018
SEALED: 12/19/2018
REVISED: N/A

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

Electrical Detail - Sheet 4 of 5

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

US 15-501 Business NB
(S. Roxboro Street)
at
Pettigrew Street

Division 5 Durham County Durham

PLAN DATE:	June 2018	REVIEWED BY:	SL Phillips
PREPARED BY:	SP Pennington	REVIEWED BY:	KP Baumann

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACIE L. PHILLIPS
DocuSigned by: 0C87A59ED9D8437...
12/19/2018
SIGNATURE DATE
SIG. INVENTORY NO. 05-0998

12/19/2018
K:\WRAL_TIP\U-5968_ITS\011036410 - Durham Signal System\Signals\S4 - Signal Design\MGROUP 7\U-5968_050998-20180\4.dgn
derrick.waller

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PROJECT REFERENCE NO.	SHEET NO.
U-5968	SIG.171.5

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

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 "7".
- Set delay time to "3".

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

← NOTICE VEH DET PLAN 2

← ENSURE DELAY IS SET TO '3'

END PROGRAMMING

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 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 BIT 7.

PHASING	VEH DET PLAN	SF BITS ENABLED
ACTIONS REQUIRED TO RUN DEFAULT PHASING	1	NONE
ACTIONS REQUIRED TO RUN ALTERNATE PHASING	2	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 BIT 7 AND VEH DET PLAN 2 ACTIVATE TO CALL THE "ALTERNATE PHASING":

SF BIT 7: Modifies overlap parent phases for head 71 to run protected turns only.

VEH DET PLAN 2: Reduces delay time for phase 7 call on loop 7A to 3 seconds.

ECONOLITE ASC/3-2070 ACTION PLAN PROGRAMMING DETAIL

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

```
ACTION PLAN...[  1]
PATTERN..........AUTO   SYS OVERRIDE.... NO
TIMING PLAN........ 0   SEQUENCE........  0
VEH DETECTOR PLAN.. 2   DET LOG........NONE
FLASH...........   --   RED REST........ NO
VEH DET DIAG PLN... 0   PED DET DIAG PLN..0
DIMMING ENABLE..   NO   PRIORITY RETURN. NO
PED PR RETURN..    NO   QUEUE DELAY..... NO
PMT COND DELAY     NO
  PHASE   1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
PED RCL   . . . . . . . . . . . . . . . .
WALK 2    . . . . . . . . . . . . . . . .
VEX 2     . . . . . . . . . . . . . . . .
VEH RCL   . . . . . . . . . . . . . . . .
MAX RCL   . . . . . . . . . . . . . . . .
MAX 2     . . . . . . . . . . . . . . . .
  PHASE   1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
MAX 3     . . . . . . . . . . . . . . . .
CS INH    . . . . . . . . . . . . . . . .
OMIT      . . . . . . . . . . . . . . . .
SPC FCT   . . . . . . X . (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: 05-0998
DESIGNED: JUNE 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail - Sheet 5 of 5

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

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

US 15-501 Business NB
(S. Roxboro Street)
at
Pettigrew Street

Division 5 Durham County Durham

PLAN DATE:	June 2018	REVIEWED BY:	SL Phillips
PREPARED BY:	SP Pennington	REVIEWED BY:	KP Baumann

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACIE L. PHILLIPS

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12/19/2018
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SIG. INVENTORY NO. 05-0998

12/19/2018
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derrick.waller

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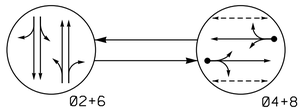
PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-172.0

PHASING DIAGRAM

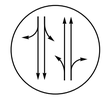


PHASING DIAGRAM DETECTION LEGEND

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

EV PREEMPT PHASES

(Medium Priority)



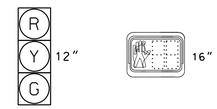
PRE 3
(Ø2+6)

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2+6	Ø4+8	PRE3	FLASH
21, 22	G	R	G	Y
41, 42	R	G	R	R
61, 62	G	R	G	Y
81, 82	R	G	R	R
P41, P42	DW	W	DW	DRK
P81, P82	DW	W	DW	DRK

SIGNAL FACE I.D.

All Heads L.E.D.



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

P41, P42
P81, P82

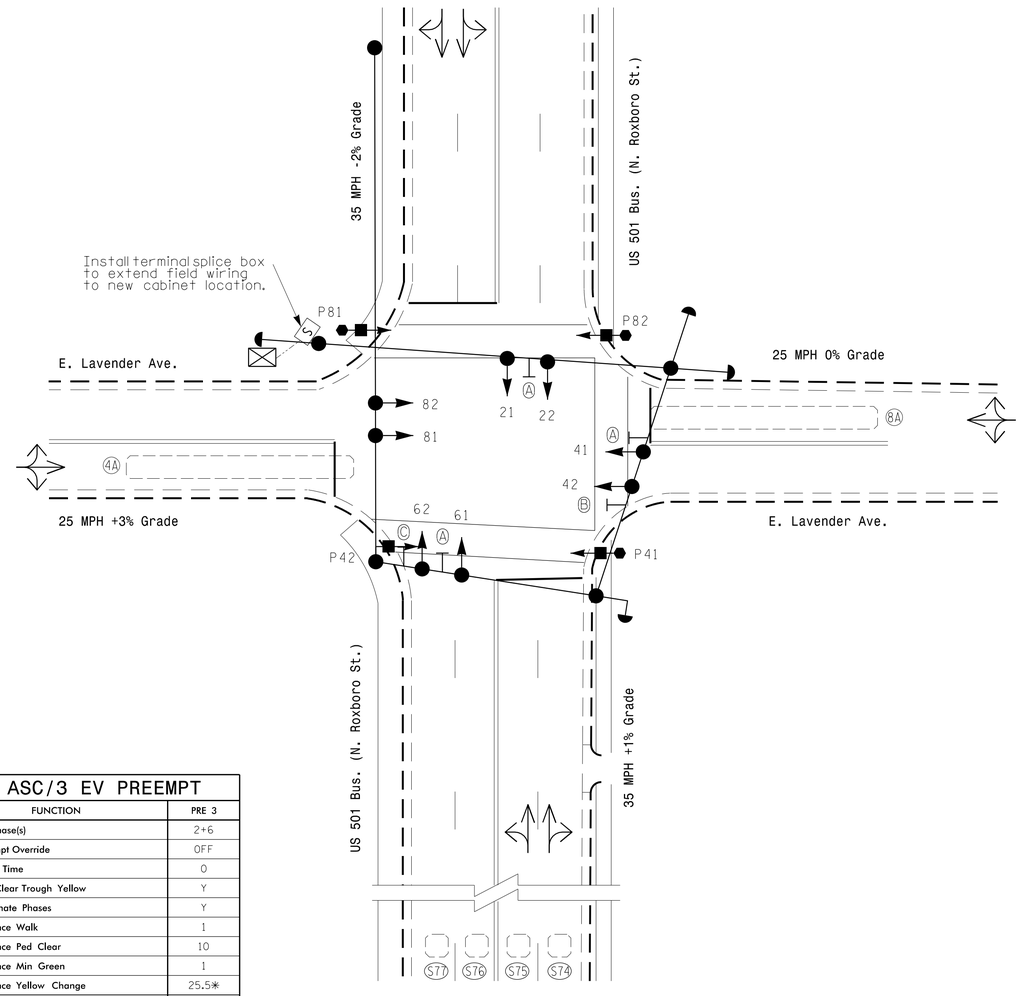
ASC/3 DETECTOR INSTALLATION CHART

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
4A	6X60	0	Exist	-	4	Yes	-	-	-	S	-	X
8A	6X60	0	Exist	-	8	Yes	-	10	-	S	-	X
S74	6X6	620	Exist	-	-	-	-	-	-	N	X	X
S75	6X6	620	Exist	-	-	-	-	-	-	N	X	X
S76	6X6	+695	Exist	-	-	-	-	-	-	N	X	X
S77	6X6	+695	Exist	-	-	-	-	-	-	N	X	X

2 Phase Semi-Actuated W/ EV Preemption (Durham Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Set all detector units to presence mode.
4. In the event of loop replacement, refer to the current ITS and Signals Design Manual and submit a Plan of Record to the Signal Design Section.
5. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
6. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
7. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
8. Pavement markings are existing.
9. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
10. 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	
	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
	Type II Signal Pedestal	
A	Street Name Sign (D3-1)	A
B	"NO TURN ON RED" Sign (10-11a)	B
C	"TURNING TRAFFIC YIELD TO PEDESTRIANS" Sign (R10-15)	C

ASC/3 TIMING CHART

FEATURE	PHASE 2	4	6	8
Min Green *	10	7	10	7
Walk *	0	7	0	7
Ped Clear	0	13	0	14
Veh. Extension *	0.0	2.0	0.0	2.0
Max 1 *	40	40	40	40
Yellow	3.8	3.1	4.0	3.2
Red Clear	1.2	2.0	1.2	1.8
Actuations B4 Add *	-	-	-	-
Seconds /Actuation *	-	-	-	-
Max Initial *	-	-	-	-
Time Before Reduction *	-	-	-	-
Time To Reduce *	-	-	-	-
Minimum Gap	-	-	-	-
Locking Detector	-	-	-	-
Recall Position	MAX RECALL	-	MAX RECALL	-
Dual Entry	-	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 Trough Yellow	Y
Terminate Phases	Y
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.

12/13/2018
\\rk5-fs01\DWG\U5-1000\Sig-1000.sig-dgn
User:tpopelka

Signal Upgrade

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

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

N
SCALE 0 20
1"=20'

US 501 Bus. (N. Roxboro St.)
at
E. Lavender Ave.

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

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SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32396 ENGINEER WILLIAM J. HAMILTON

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

SIG. INVENTORY NO. 05-1000

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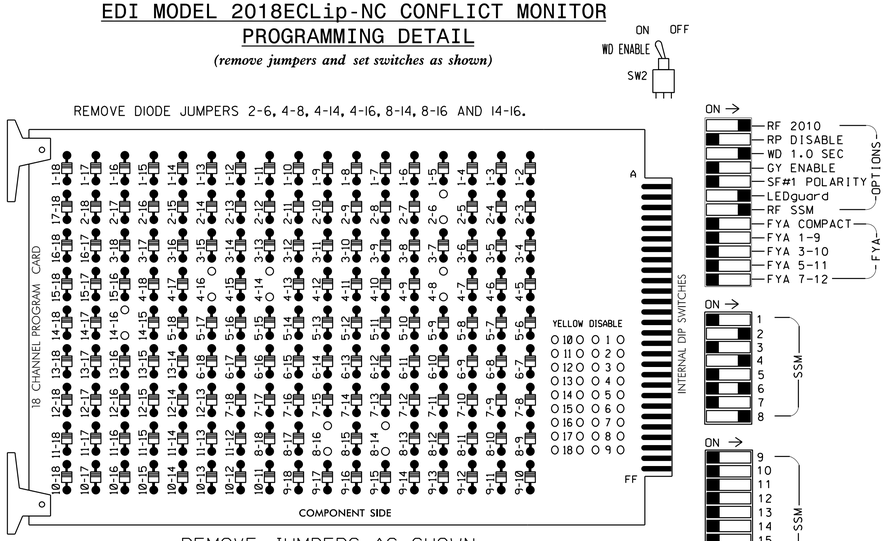
PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-172.1

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.
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
SOFTWARE.....ECONOLITE ASC/3-2070
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...12
LOAD SWITCHES USED.....S2,S5,S6,S8,S11,S12
PHASES USED.....2,4,4PED,6,8,8PED
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	21,22	NU	NU	41,42	P41, P42	NU	61,62	NU	NU	81,82	P81, P82
RED		128			101			134			107	
YELLOW		129			102			135			108	
GREEN		130			103			136			109	
RED ARROW												
YELLOW ARROW												
GREEN ARROW												
✋						104						110
🚶						106						112

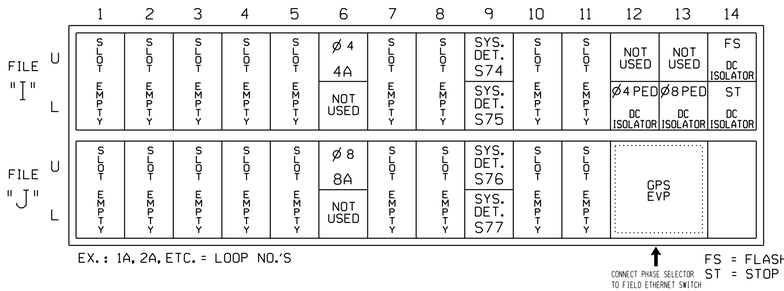
NU = Not Used

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)



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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND TIME	DELAY TIME	ADDED INITIAL	DETECTOR TYPE
4A	TB4-9,10	I6U	41	4	4	YES				S
✱S74	TB6-9,10	I9U	60	11	SYS	NO				N
✱S75	TB6-11,12	I9L	62	13	SYS	NO				N
8A	TB5-9,10	J6U	42	8	8	YES		10		S
✱S76	TB7-9,10	J9U	59	15	SYS	NO				N
✱S77	TB7-11,12	J9L	61	17	SYS	NO				N
PED PUSH BUTTONS										
P41,P42	TB8-5,6	I12L	69	PED 4	4 PED					
P81,P82	TB8-8,9	I13L	70	PED 8	8 PED					

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

✱ System detector only. Remove any assigned vehicle phase.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1000
DESIGNED: Dec 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail
Sheet 1 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

US 501 Bus. (N. Roxboro St.)
at
E. Lavender Ave.

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32396 ENGINEER WILLIAM J. HAMILTON

DocuSigned by: William J. Hamilton 12/19/2018
A66E0D7A4A4A4F4... SIGNATURE DATE

SIG. INVENTORY NO. 05-1000

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12/17/2018
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User:tspopelka

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PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-172.2

ECONOLITE ASC/3-2070 EMERGENCY VEHICLE PREEMPT PROGRAMMING DETAIL

(program controller as shown)

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

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

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

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

PROGRAM EXTEND TIME ON GPS DETECTOR UNIT FOR 2.0 SEC.

ECONOLITE ASC/3-2070 PREEMPT FILTERING PROGRAMMING DETAIL

(program controller as shown)

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

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1000
DESIGNED: Dec 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail
Sheet 2 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

US 501 Bus. (N. Roxboro St.)
at
E. Lavender Ave.

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32396 ENGINEER WILLIAM J. HAMILTON

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

SIG. INVENTORY NO. 05-1000

12/17/2018
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User:tpopelka

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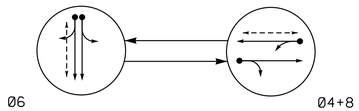
PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-173.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

TABLE OF OPERATION

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

SIGNAL FACE I.D.

All Heads L.E.D.

41, 42
61, 62, 63
81, 82

P61,P62
P81,P82

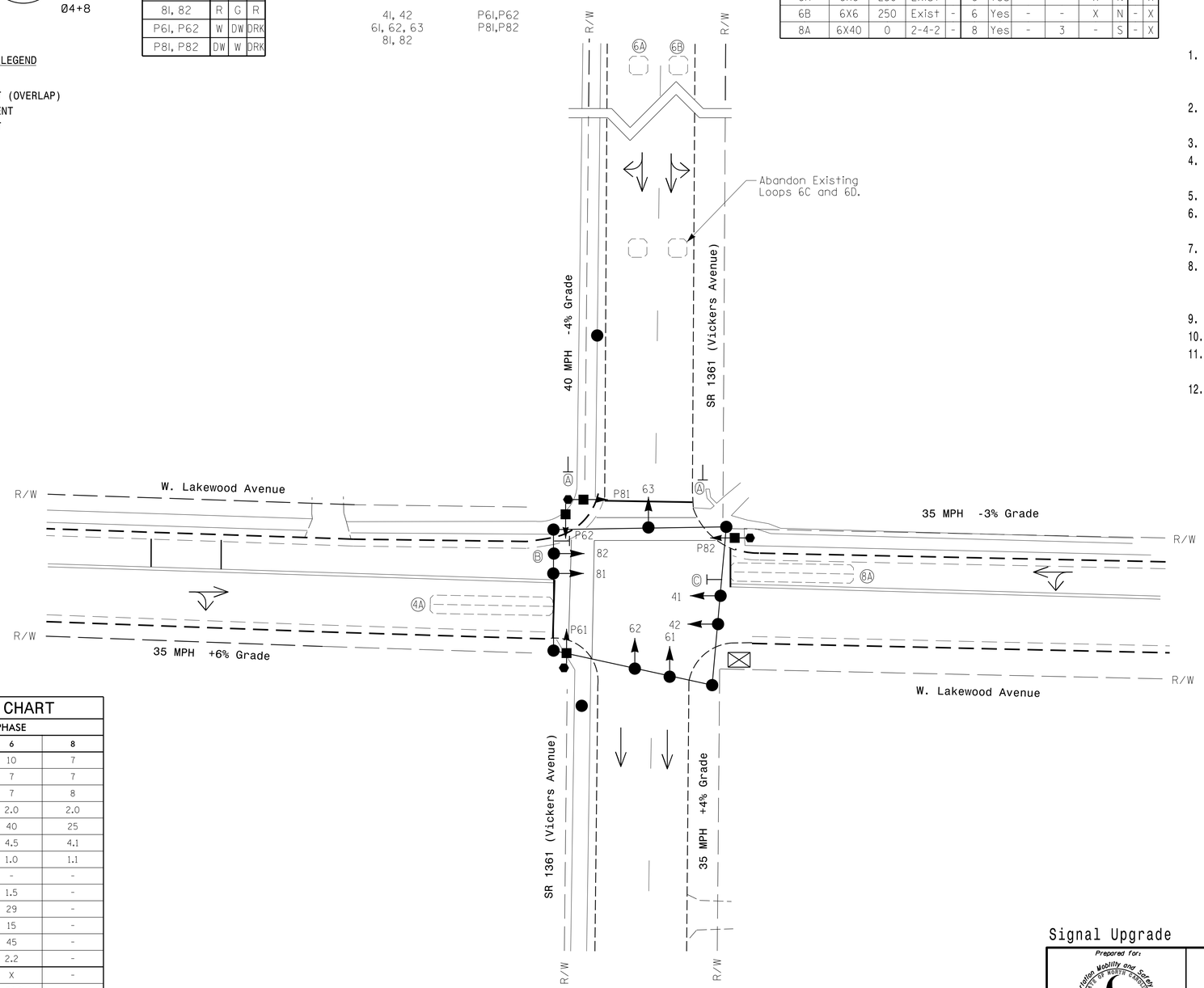
ASC/3 DETECTOR INSTALLATION CHART

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
4A	6X40	0	2-4-2	-	4	Yes	-	10	-	S	-	X
6A	6X6	250	Exist	-	6	Yes	-	-	X	N	-	X
6B	6X6	250	Exist	-	6	Yes	-	-	X	N	-	X
8A	6X40	0	2-4-2	-	8	Yes	-	3	-	S	-	X

2 Phase
Fully Actuated
(Durham Signal System)

NOTES

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



ASC/3 TIMING CHART

FEATURE	PHASE 4	PHASE 6	PHASE 8
Min Green *	7	10	7
Walk *	0	7	7
Ped Clear	0	7	8
Veh. Extension *	2.0	2.0	2.0
Max 1 *	25	40	25
Yellow	3.5	4.5	4.1
Red Clear	1.0	1.0	1.1
Actuations B4 Add *	-	-	-
Seconds /Actuation *	-	1.5	-
Max Initial *	-	29	-
Time Before Reduction *	-	15	-
Time To Reduce *	-	45	-
Minimum Gap	-	2.2	-
Locking Detector	-	X	-
Recall Position	-	VEH RECALL	-
Dual Entry	X	-	X
Simultaneous Gap	X	X	X

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

LEGEND

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

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

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SCALE 0 20 1"=20'

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

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

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SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32396 ENGINEER WILLIAM J. HAMILTON

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SIGNATURE DATE

SIG. INVENTORY NO. 05-1001

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User:tpopelka

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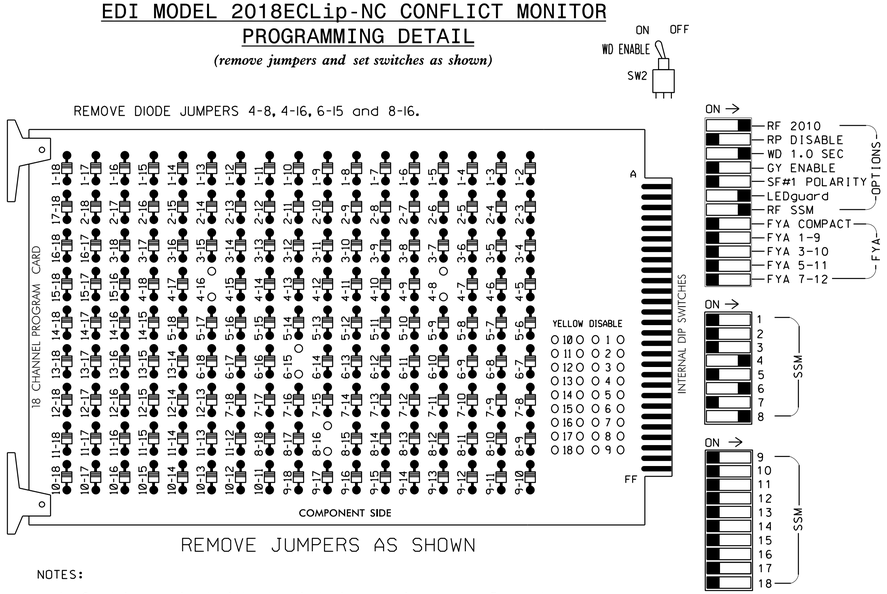
PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-173.1

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

SIGNAL HEAD HOOK-UP CHART

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

NU = Not Used

EQUIPMENT INFORMATION

CONTROLLER.....2070LX
CABINET.....332
SOFTWARE.....ECONOLITE ASC/3-2070
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...12
LOAD SWITCHES USED.....S5,S8,S9,S11,S12
PHASES USED.....4,6,6PED,8,8PED

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	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	Ø 4 / 4A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	Ø 6 PED DC ISOLATOR	FS DC ISOLATOR
	L						NOT USED							Ø 8 PED DC ISOLATOR	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				NOT USED								

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND TIME	DELAY TIME	ADDED INITIAL	DETECTOR TYPE
4A	TB4-9,10	I6U	41	4	4	YES		10		S
6A	TB3-5,6	J2U	40	6	6	YES			X	N
6B	TB3-7,8	J2L	44	16	6	YES			X	N
8A	TB5-9,10	J6U	42	8	8	YES		3		S
PED PUSH BUTTONS										
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 SLOT I13.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1001
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 1361 (Vickers Avenue)
at
W. Lakewood Avenue

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32396 ENGINEER WILLIAM J. HAMILTON

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

SIG. INVENTORY NO. 05-1001

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919-872-5115 Tel, 919-878-5416 Fax,
www.rameykemp.com

SII 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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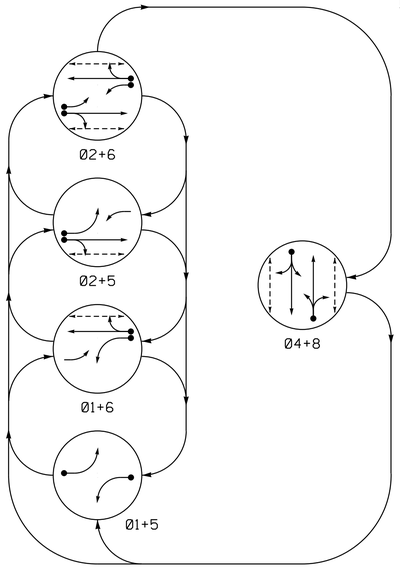
PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-174.0

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

DEFAULT PHASING DIAGRAM



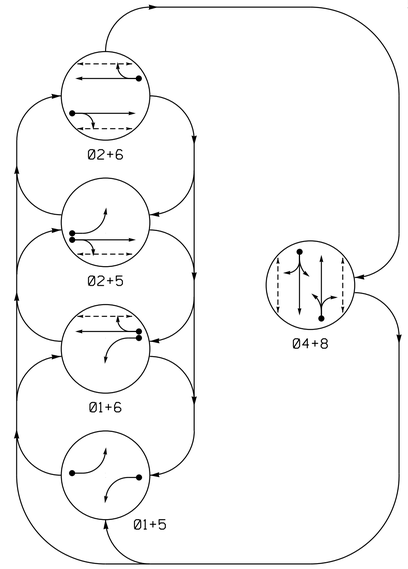
DEFAULT EV PREEMPT PHASES
(Medium Priority)

PRE 3
(Ø2+5)

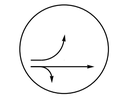
DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE 01+5	01+6	02+5	02+6	04+8	PRE3	FLASH
11	←●	←	F Y	F Y	R	F Y	Y
21, 22, 23	R	R	G	G	R	G	Y
41, 42	R	R	R	R	G	R	R
51	←●	F Y	←	F Y	R	←	Y
61, 62, 63	R	G	R	G	R	R	Y
81, 82	R	R	R	R	G	R	R
P21, P22	DW	DW	W	W	DW	DW	DRK
P41, P42	DW	DW	DW	DW	W	DW	DRK
P61, P62	DW	W	DW	W	DW	DW	DRK
P81, P82	DW	DW	DW	DW	W	DW	DRK

ALTERNATE PHASING DIAGRAM



ALTERNATE EV PREEMPT PHASES
(Medium Priority)



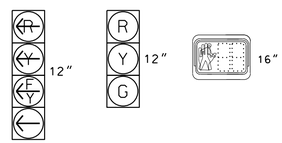
PRE 3
(Ø2+5)

ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE 01+5	01+6	02+5	02+6	04+8	PRE3	FLASH
11	←●	←	R	R	R	R	Y
21, 22, 23	R	R	G	G	R	G	Y
41, 42	R	R	R	R	G	R	R
51	←	R	←	R	R	←	Y
61, 62, 63	R	G	R	G	R	R	Y
81, 82	R	R	R	R	G	R	R
P21, P22	DW	DW	W	W	DW	DW	DRK
P41, P42	DW	DW	DW	DW	W	DW	DRK
P61, P62	DW	W	DW	W	DW	DW	DRK
P81, P82	DW	DW	DW	DW	W	DW	DRK

SIGNAL FACE I.D.

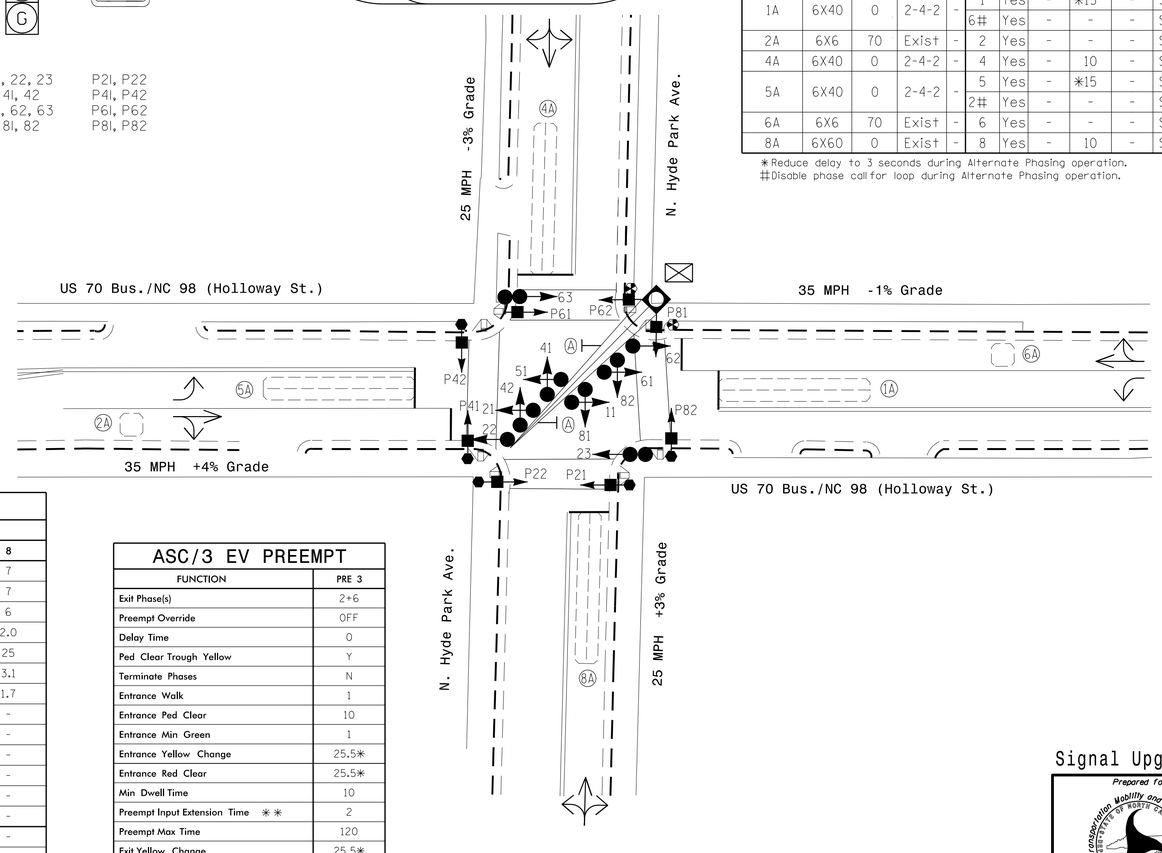
All Heads L.E.D.



11 51	21, 22, 23 41, 42 61, 62, 63 81, 82	P21, P22 P41, P42 P61, P62 P81, P82

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	-	*15	-	S	-	X
					6#	Yes	-	-	-	S	-	X
2A	6X6	70	Exist	-	2	Yes	-	-	-	S	-	X
4A	6X40	0	2-4-2	-	4	Yes	-	10	-	S	-	X
5A	6X40	0	2-4-2	-	5	Yes	-	*15	-	S	-	X
					2#	Yes	-	-	-	S	-	X
6A	6X6	70	Exist	-	6	Yes	-	-	-	S	-	X
8A	6X60	0	Exist	-	8	Yes	-	10	-	S	-	X

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

NOTES

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

LEGEND

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

ASC/3 TIMING CHART

FEATURE	PHASE 1	2	4	5	6	8
Min Green *	7	10	7	7	10	7
Walk *	0	7	7	0	7	7
Ped Clear	0	5	6	0	5	6
Veh. Extension *	2.0	3.0	2.0	2.0	3.0	2.0
Max 1 *	25	40	25	25	40	25
Yellow	3.0	3.9	3.3	3.0	3.9	3.1
Red Clear	1.8	1.2	1.5	1.8	1.2	1.7
Actuations B4 Add *	-	-	-	-	-	-
Seconds /Actuation *	-	-	-	-	-	-
Max Initial *	-	-	-	-	-	-
Time Before Reduction *	-	-	-	-	-	-
Time To Reduce *	-	-	-	-	-	-
Minimum Gap	-	-	-	-	-	-
Locking Detector	-	X	-	-	X	-
Recall Position	-	VEH RECALL	-	-	VEH RECALL	-
Dual Entry	-	-	X	-	-	X
Simultaneous Gap	X	X	X	X	X	X

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

ASC/3 EV PREEMPT

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

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

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N
SCALE 0 20
1"=20'

US 70 Bus./NC 98 (Holloway St.) at N. Hyde Park Ave.

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32396 ENGINEER WILLIAM J. HAMILTON
DocuSigned by: William J. Hamilton 2/19/2018
ACCEPTANCE SIGNATURE DATE
SIG. INVENTORY NO. 05-1002

12/17/2018
05-1002_Sig-Ø5-1002_Sig.dgn
User:tpopelka

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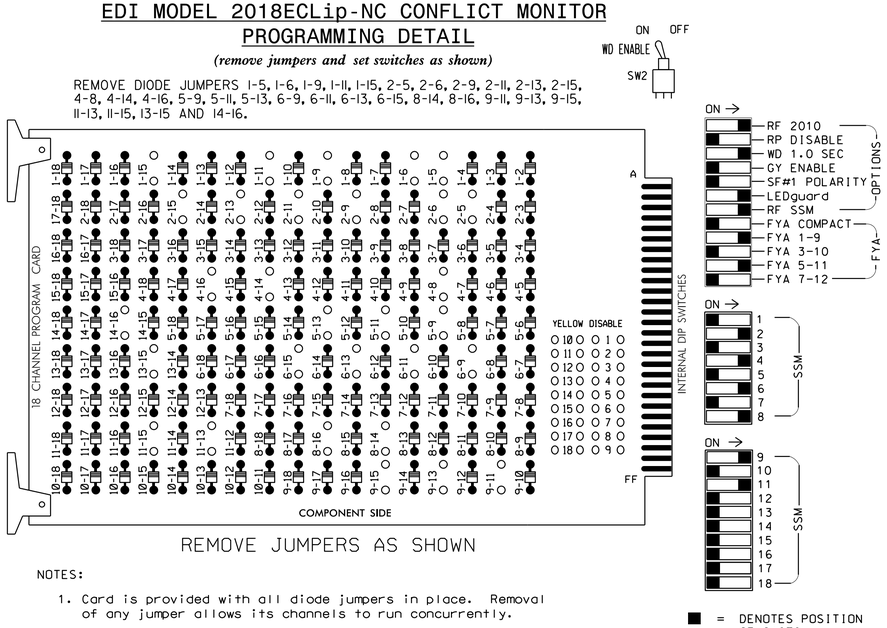
PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-174.1

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, 4-8, 4-14, 4-16, 5-9, 5-11, 5-13, 6-9, 6-11, 6-13, 6-15, 8-14, 8-16, 9-11, 9-13, 9-15, 11-13, 11-15, 13-15 AND 14-16.



REMOVE JUMPERS AS SHOWN

■ = DENOTES POSITION OF SWITCH

NOTES:

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

NOTES

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

EQUIPMENT INFORMATION

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

* See overlap programming on sheet 2.

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	11★	21,22, 23	P21, P22	NU	41,42	P41, P42	51★	61,62, 63	P61, P62	NU	81,82	P81, P82	11★	NU	NU	51★	NU	NU
RED		128			101			134			107							
YELLOW	*	129			102		*	135			108							
GREEN		130			103			136			109							
RED ARROW													A121			A114		
YELLOW ARROW													A122			A115		
FLASHING YELLOW ARROW													A123			A116		
GREEN ARROW	127						133											
✋			113			104			119			110						
🚶			115			106			121			112						

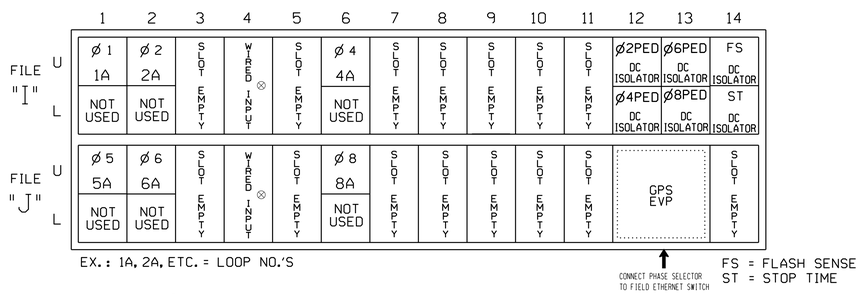
NU = Not Used

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

★ See pictorial of head wiring in detail this sheet.

INPUT FILE POSITION LAYOUT

(front view)



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

FS = FLASH SENSE
ST = STOP TIME

⊗ Wired Input - Do not populate slot with detector card

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND TIME	DELAY TIME	ADDED INITIAL	DETECTOR TYPE
1A [1]	TB2-1,2	I1U	56	1★	1	YES		15		S
	-	J4U	48	26★	6	YES				S
2A	TB2-5,6	I2U	39	2	2	YES				S
4A	TB4-9,10	I6U	41	4	4	YES		10		S
5A [2]	TB3-1,2	J1U	55	5★	5	YES		15		S
	-	I4U	47	22★	2	YES				S
6A	TB3-5,6	J2U	40	6	6	YES				S
8A	TB5-9,10	J6U	42	8	8	YES		10		S
PED PUSH BUTTONS										
P21,P22	TB8-4,6	I12U	67	PED 2	2 PED					
P41,P42	TB8-5,6	I12L	69	PED 4	4 PED					
P61,P62	TB8-7,9	I13U	68	PED 6	6 PED					
P81,P82	TB8-8,9	I13L	70	PED 8	8 PED					

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

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

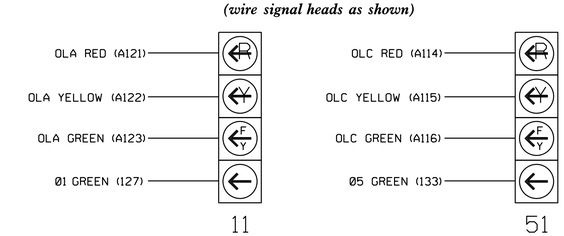
[2] Add jumper from J1-W to I4-W, on rear of input file.

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

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)

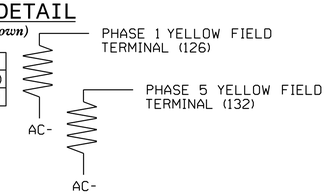


THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1002
DESIGNED: Dec 2018
SEALED: 12/19/2018
REVISED: N/A

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

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



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.

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Electrical Detail
Sheet 1 of 4

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

US 70 Bus./NC 98 (Holloway St.) at N. Hyde Park Ave.

Division 5 Durham County Durham

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

REVISIONS | INIT. | DATE

750 N.Greenfield Pkwy,Garner,NC 27529

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32396 ENGINEER WILLIAM J. HAMILTON

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

SIG. INVENTORY NO. 05-1002

12/17/2018
U-5968_Sig-174.1_05-1002_ele.dgn
User:tspopelka

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PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-174.2

ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

(program controller as shown)

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

OVERLAP A

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

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

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

FLASHING ARROW OUTPUT.....CH9  ISOLATE

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

← NOTICE ACTION PLAN SF BIT "1"

Toggle Twice

OVERLAP C

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

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

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

FLASHING ARROW OUTPUT.....CH11 ISOLATE

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

← NOTICE ACTION PLAN SF BIT "5"

END PROGRAMMING

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

(program controller as shown)

IMPORTANT!

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

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

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

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

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

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

← NOTICE VEH DET PLAN 2

← ENSURE DELAY IS SET TO '3'

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

ENSURE PHASE IS SET TO "0" →

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

← NOTICE VEH DET PLAN 2

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

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

← NOTICE VEH DET PLAN 2

← ENSURE DELAY IS SET TO '3'

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

ENSURE PHASE IS SET TO "0" →

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

← NOTICE VEH DET PLAN 2

END PROGRAMMING

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1002
DESIGNED: Dec 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail
Sheet 2 of 4

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ELECTRICAL AND PROGRAMMING DETAILS FOR:

US 70 Bus./NC 98 (Holloway St.)
at
N. Hyde Park Ave.

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

750 N.Greenfield Pkwy,Garner,NC 27529

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32396 ENGINEER WILLIAM J. HAMILTON

DocuSigned by: William J. Hamilton A06E0D7D4E4E4A... 12/19/2018
SIGNATURE DATE

SIG. INVENTORY NO. 05-1002

12/17/2018
Sig-174.2 05-1002.dgn
User:tpopelka

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PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-174.3

ALTERNATE PHASING ACTIVATION DETAIL

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

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

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: 05-1002
DESIGNED: Dec 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail
Sheet 3 of 4

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ELECTRICAL AND PROGRAMMING DETAILS FOR:

US 70 Bus./NC 98 (Holloway St.)
at
N. Hyde Park Ave.

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32396 ENGINEER WILLIAM J. HAMILTON

DocuSigned by: William J. Hamilton 12/19/2018
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SIG. INVENTORY NO. 05-1002

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

12/19/2018
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PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-174.4

ECONOLITE ASC/3-2070 EMERGENCY VEHICLE PREEMPT PROGRAMMING DETAIL

(program controller as shown)

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

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

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

ENABLE... YES|PMT OVRIDE..|INTERLOCK. NO
DET LOCK... X|DELAY..    0|INHIBIT...  0
OVERIDE FL. .|DURATION   0|CLR-GRN... NO
TERM OLP.  NO|PC>YEL   YES|TERM PH    NO
PED DARK.. NO|TC RESRV  NO|DWELL FL  OFF
LINK PMT....0|X FLCOLR RED|EXIT OPT. OFF
X TMG PLN...0|RE-SERV..  0|FLT TYPE.HARD
FREE DUR PMT|R1  NO|R2  NO|R3  NO|R4  NO
--TIMING-----WALK|PED CL|MN GR| YEL| RED
ENTRANCE TM.    1|    10|    1|25.5|25.5
-----------MIN GR|EXT GR|MX GR| YEL| RED
TRACK CLEAR     0|     0|    0|25.5|25.5
-----------MIN DL|PMTEXT|MX TM| YEL| RED
DWL/CYC-EXIT   10|   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: 05-1002
DESIGNED: Dec 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail
Sheet 4 of 4

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ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

DocuSigned by: William J. Hamilton A0660D7046484B4... 12/19/2018
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SIG. INVENTORY NO. 05-1002

12/17/2018
ASCE3-2070-05-1002.dgn
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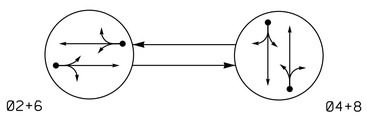
PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-175.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

TABLE OF OPERATION

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

SIGNAL FACE I.D.

All Heads L.E.D.

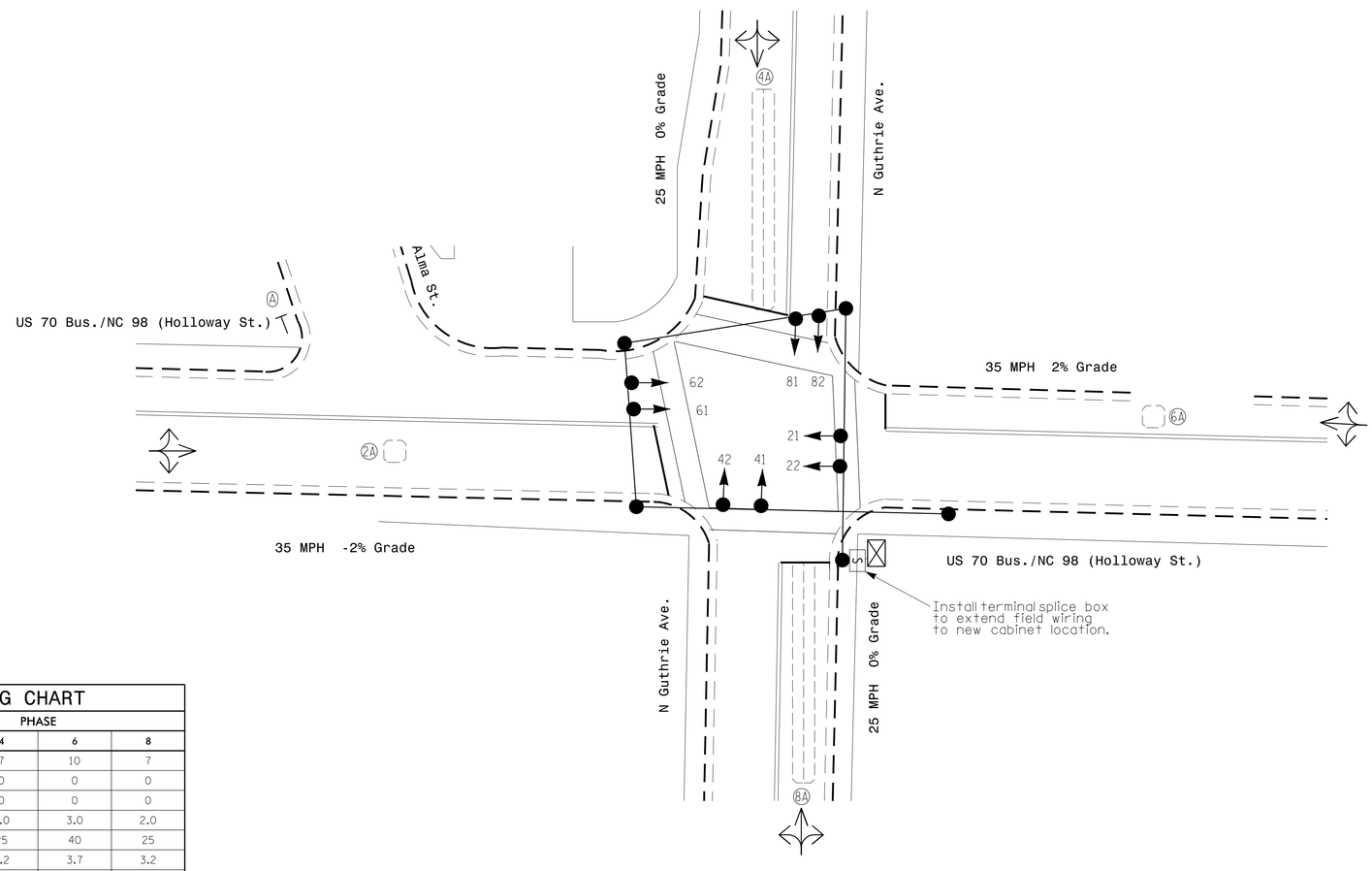
ASC/3 DETECTOR INSTALLATION CHART

DETECTOR					PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
2A	6X6	70	Exist	-	2	Yes	-	-	-	S	-	X
4A	6X60	0	2-4-2	-	4	Yes	-	10	-	S	-	X
6A	6X6	70	Exist	-	6	Yes	-	-	-	S	-	X
8A	6X60	0	2-4-2	-	8	Yes	-	10	-	S	-	X

2 Phase
Fully Actuated
(Durham Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Set all detector units to presence mode.
4. In the event of loop replacement, refer to the current ITS and Signals Design Manual and submit a Plan of Record to the Signal Design Section.
5. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
6. Pavement markings are existing.
7. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
8. Loop data based on previous plan and/or field observations.
9. Reconnect loops and heads in cabinet as indicated to match current NCDOT standards.



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	Stop Sign (R1-1)	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	4.0	3.2	3.7	3.2
Red Clear	1.1	1.6	1.1	1.7
Actuations B4 Add *	-	-	-	-
Seconds /Actuation *	-	-	-	-
Max Initial *	-	-	-	-
Time Before Reduction *	-	-	-	-
Time To Reduce *	-	-	-	-
Minimum Gap	-	-	-	-
Locking Detector	-	-	-	-
Recall Position	VEH RECALL	-	VEH RECALL	-
Dual Entry	-	X	-	X
Simultaneous Gap	X	X	X	X

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

12/17/2018
\\rka-fs03\W25-1003\05-1003_sig.dgn
User:tpopelka

Prepared in the offices of:

RAMEY KEMP & ASSOCIATES, INC.
Transportation Engineers
5808 Farlington Place, Suite 100
Raleigh, North Carolina 27609
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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

US 70 Bus./NC 98 (Holloway St.) at N. Guthrie Ave.

Division 5 Durham County Durham

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

SCALE 0 20 1"=20'

REVISIONS	INIT.	DATE

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SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32396 ENGINEER WILLIAM J. HAMILTON

DocuSigned by:
William J. Hamilton
A6569D7D6D6D4A4...
SIGNATURE 12/19/2018
DATE

SIG. INVENTORY NO. 05-1003

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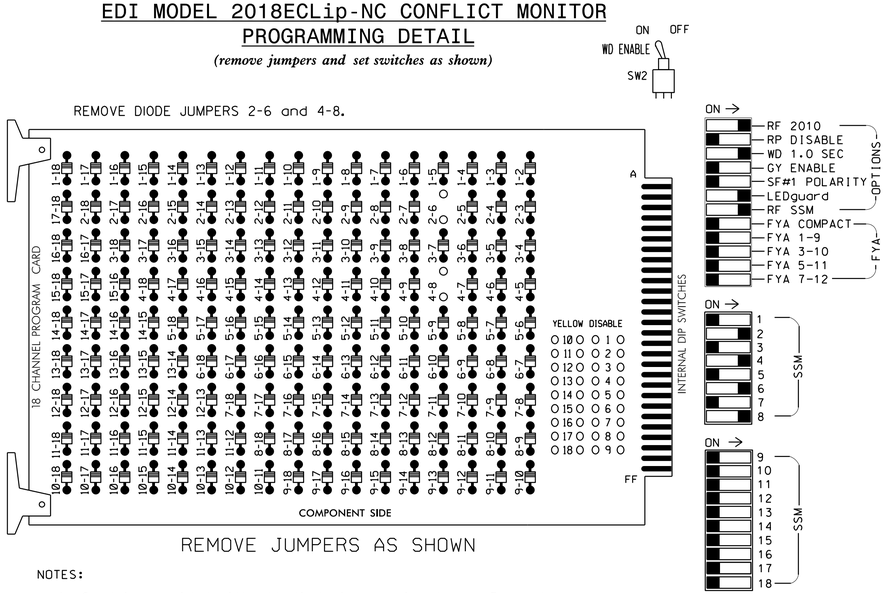
PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-175.1

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

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED
SIGNAL HEAD NO.	NU	21,22	NU	NU	41,42	NU	NU	61,62	NU	NU	81,82	NU
RED		128			101			134			107	
YELLOW		129			102			135			108	
GREEN		130			103			136			109	
RED ARROW												
YELLOW ARROW												
GREEN ARROW												

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)

		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		NOT USED				NOT USED								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		NOT USED				NOT USED								

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

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

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1003
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:

US 70 Bus./NC 98 (Holloway St.)
at
N. Guthrie Ave.

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32396 ENGINEER WILLIAM J. HAMILTON

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

SIG. INVENTORY NO. 05-1003

Prepared in the offices of:
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www.rameykemp.com

750 N.Greenfield Pkwy,Garner,NC 27529

12/17/2018
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User:tspopelka

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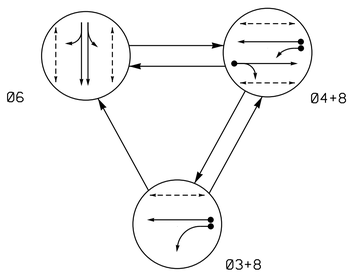
PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-176.0

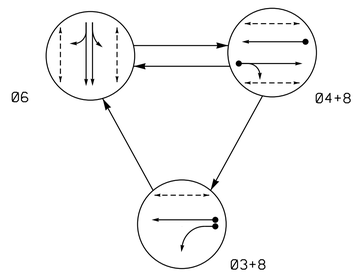
DEFAULT PHASING DIAGRAM



DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE 06	PHASE 04+8	PHASE 03+8	FLASH
3I	~~R~~	~~Y~~	←	~~R~~
4I, 42	R	G	R	R
6I, 62	G	R	R	Y
8I, 82	R	G	G	R
P4I, P42	DW	W	DW	DRK
P6I, P62, P63, P64	W	DW	DW	DRK
P8I, P82	DW	W	W	DRK

ALTERNATE PHASING DIAGRAM



ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE 06	PHASE 04+8	PHASE 03+8	FLASH
3I	~~R~~	~~R~~	←	~~R~~
4I, 42	R	G	R	R
6I, 62	G	R	R	Y
8I, 82	R	G	G	R
P4I, P42	DW	W	DW	DRK
P6I, P62, P63, P64	W	DW	DW	DRK
P8I, P82	DW	W	W	DRK

ASC/3 DETECTOR INSTALLATION CHART

DETECTOR					PROGRAMMING						
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTEND TIME	DELAY TIME	TYPE	SYSTEM LOOP	NEW CARD
3A	6X60	+5	Exist	-	3	Yes	-	*15	S	-	X
					8 #	Yes	-	-	S	-	X
4A	6X60	+5	Exist	-	4	Yes	-	10	S	-	X
8A	6X16	70	Exist	-	8	Yes	-	-	S	-	X
S226	6X6	82	Exist	-	-	Yes	-	-	N	X	X
S227	6X6	82	Exist	-	-	Yes	-	-	N	X	X

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

3 Phase
Semi-Actuated
(Durham Signal System)

NOTES

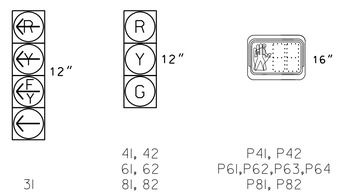
1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 3 may be lagged.
4. Reposition existing signal head numbered 82.
5. Set all detector units to presence mode.
6. In the event of loop replacement, refer to the current ITS and Signals Design Manual and submit a Plan of Record to the Signal Design Section.
7. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
8. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
9. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
10. Pavement markings are existing.
11. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
12. The Division (City) Traffic Engineer will determine the hours of use for each phasing plan.
13. Loop data based on previous plan and/or field observations.

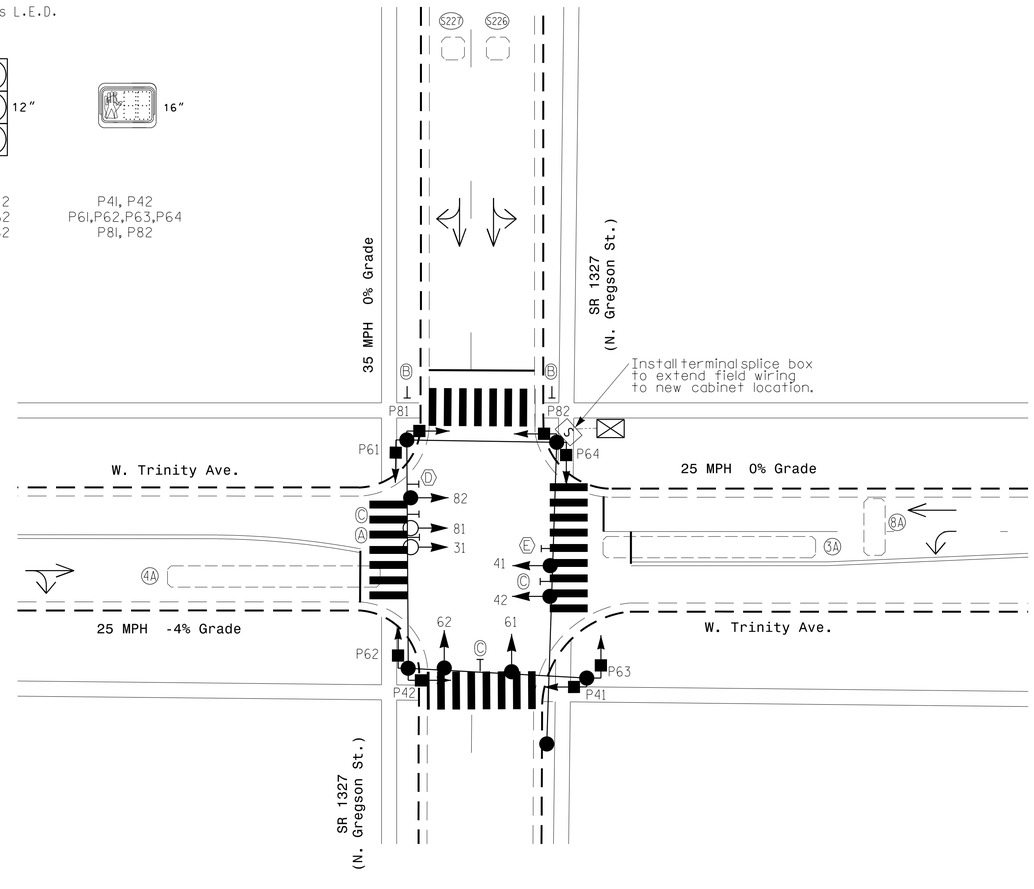
PHASING DIAGRAM DETECTION LEGEND

- 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	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
S	Terminal Splice Box	S
A	Left Arrow "ONLY" Sign (R3-5L)	A
B	"DO NOT ENTER" Sign (R5-1)	B
C	Street Name Sign	C
D	No Right Turn Sign (R3-1)	D
E	No Left Turn Sign (R3-2)	E

ASC/3 TIMING CHART

FEATURE	PHASE 3	PHASE 4	PHASE 6	PHASE 8
Min Green *	7	7	10	7
Walk *	0	7	7	7
Ped Clear	0	6	8	6
Veh. Extension *	2.0	2.0	0.0	2.0
Max 1 *	25	40	40	25
Yellow	3.0	3.4	3.8	3.4
Red Clear	1.6	1.5	1.6	1.5
Actuations B4 Add *	-	-	-	-
Seconds /Actuation *	-	-	-	-
Max Initial *	-	-	-	-
Time Before Reduction *	-	-	-	-
Time To Reduce *	-	-	-	-
Minimum Gap	-	-	-	-
Locking Detector	-	-	-	-
Recall Position	-	-	MAX RECALL	-
Dual Entry	-	X	-	X
Simultaneous Gap	X	X	X	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 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

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

SR 1327 (N. Gregson St.)
at
W. Trinity Ave.

Division 5 Durham County Durham

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

SCALE 0 20 1"=20'

REVISIONS	INIT.	DATE

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SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32396 ENGINEER WILLIAM J. HAMILTON

DocuSigned by: William J. Hamilton 2/19/2018
ASSOCIATE ENGINEER DATE

SIG. INVENTORY NO. 05-1004

12/17/2018
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User:tpopelka

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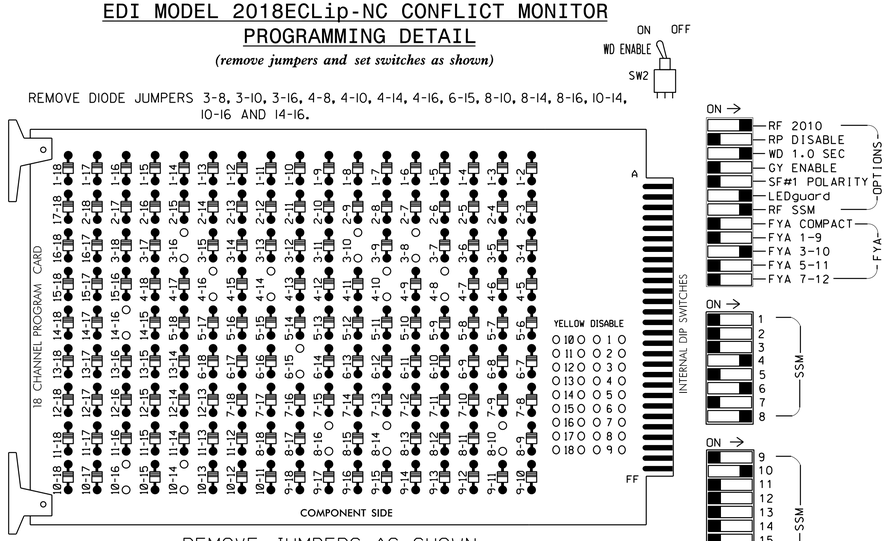
PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-176.1

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 phase 2 for Red Flash.
4. Program controller to start up in phase 6 Walk.
5. 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.....S4,S5,S6,S8,S9,S11,S12,AUX S2
PHASES USED.....3,4,4PED,6,6PED,8,8PED
OVERLAP "A".....NOT USED
OVERLAP "B".....✱
OVERLAP "C".....NOT USED
OVERLAP "D".....NOT USED
✱ See overlap programming on sheet 2.

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	NU	NU	NU	31★	41,42	P41, P42	NU	61,62	P61,P62, P63,P64	NU	81,82	P81, P82	NU	31★	NU	NU	NU	NU
RED					101			134			107							
YELLOW				✱	102			135			108							
GREEN					103			136			109							
RED ARROW														A124				
YELLOW ARROW														A125				
FLASHING YELLOW ARROW														A126				
GREEN ARROW				118														
✋						104			119			110						
🚶						106			121			112						

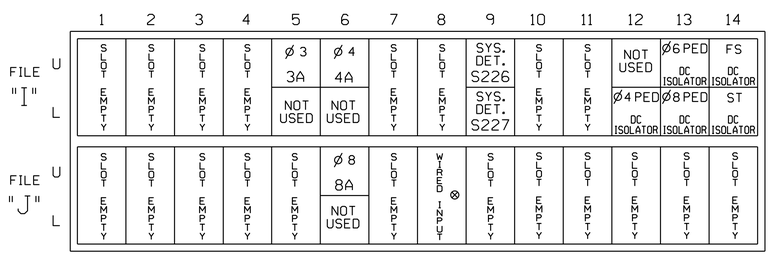
NU = Not Used

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

★ See pictorial of head wiring in detail this sheet.

INPUT FILE POSITION LAYOUT

(front view)



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

FS = FLASH SENSE
ST = STOP TIME

⊗ Wired Input - Do not populate slot with detector card

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND TIME	DELAY TIME	ADDED INITIAL	DETECTOR TYPE
3A[1]	TB4-5,6	I5U	58	3★	3	YES		15		S
	-	J8U	50	28★	8	YES				S
4A	TB4-9,10	I6U	41	4	4	YES		10		S
✱S226	TB6-9,10	I9U	60	11	SYS	NO				N
✱S227	TB6-11,12	I9L	62	13	SYS	NO				N
8A	TB5-9,10	J6U	42	8	8	YES				S
PED PUSH BUTTONS										
P41,P42	TB8-5,6	I12L	69	PED 4	4 PED					
P61,P62, P61,P64	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.

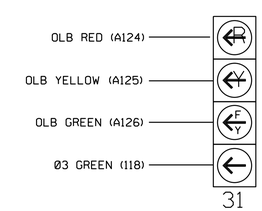
[1] Add jumper from I5-W to J8-W, on rear of input file.

★ 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

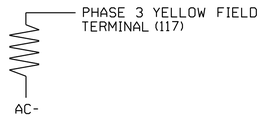
(wire signal head as shown)



LOAD RESISTOR INSTALLATION DETAIL

(install resistor as shown)

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



COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1004
DESIGNED: Dec 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 1327 (N. Gregson St.)
at
W. Trinity Ave.

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32396 ENGINEER WILLIAM J. HAMILTON

DocuSigned by: William J. Hamilton A0660D7D4A4A4A4... 12/19/2018
SIGNATURE DATE
SIG. INVENTORY NO. 05-1004

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PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-176.2

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

(program controller as shown)

IMPORTANT!

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

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

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

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

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

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

← NOTICE VEH DET PLAN 2

← ENSURE DELAY IS SET TO '3'

↓

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

ENSURE PHASE IS SET TO "0" →

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

← NOTICE VEH DET PLAN 2

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]

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"

END PROGRAMMING

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1004
DESIGNED: Dec 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail
Sheet 2 of 3

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SEAL

NORTH CAROLINA PROFESSIONAL SEAL 32396 ENGINEER WILLIAM J. HAMILTON

DocuSigned by: William J. Hamilton 12/19/2018
A0560D704A4A4A4

SIGNATURE	DATE

SIG. INVENTORY NO. 05-1004

ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 1327 (N. Gregson St.)
at
W. Trinity 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

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

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

12/17/2018
R:\Signals\05-1004_Sig\05-1004_elec2.dgn
User:tspopelka

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PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-176.3

ALTERNATE PHASING ACTIVATION DETAIL

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

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 3.

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

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

SF BIT 3: Modifies overlap parent phases for head 31 to run protected turns only.

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

FLASHER CIRCUIT MODIFICATION DETAIL

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

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

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

ECONOLITE ASC/3-2070 ACTION PLAN PROGRAMMING DETAIL

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

```
ACTION PLAN...[  1]
PATTERN..........AUTO   SYS OVERRIDE.... NO
TIMING PLAN........ 0   SEQUENCE........  0
VEH DETECTOR PLAN.. 2   DET LOG........NONE
FLASH...........   --   RED REST........ NO
VEH DET DIAG PLN... 0   PED DET DIAG PLN..0
DIMMING ENABLE..   NO   PRIORITY RETURN. NO
PED PR RETURN..    NO   QUEUE DELAY..... NO
PMT COND DELAY     NO
  PHASE   1  2  3  4  5  6  7  8  9  0  1  2  3  4  5  6
PED RCL   .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
WALK 2    .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
VEX 2     .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
VEH RCL   .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
MAX RCL   .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
MAX 2     .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
  PHASE   1  2  3  4  5  6  7  8  9  0  1  2  3  4  5  6
MAX 3     .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
CS INH    .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
OMIT      .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
SPC FCT   .  .  X  .  .  .  .  .  (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: 05-1004
DESIGNED: Dec 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail
Sheet 3 of 3

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Transportation Engineers
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www.rameykemp.com

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

SR 1327 (N. Gregson St.)
at
W. Trinity Ave.

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32396 ENGINEER WILLIAM J. HAMILTON
DocuSigned by: William J. Hamilton 12/19/2018
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SIG. INVENTORY NO. 05-1004

12/17/2018
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User:tspopelka

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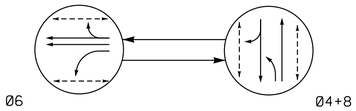
PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-177.0

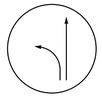
PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

EV PREEMPT PHASES



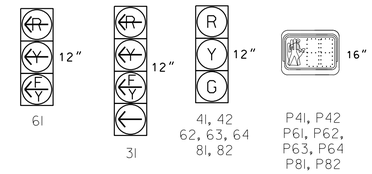
PRE3
(Ø3+8)

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø6	PHASE Ø4+8	PHASE PRE3	PHASE FLASH
3I	~~R~~	~~F Y~~	~~←~~	~~R~~
4I, 42	R	G	R	R
6I	~~F Y~~	~~R~~	~~R~~	~~Y~~
62, 63, 64	G	R	R	Y
8I, 82	R	G	G	R
P4I, P42	DW	W	DW	DRK
P6I, P62, P63, P64	W	DW	DW	DRK
P8I, P82	DW	W	DW	DRK

SIGNAL FACE I.D.

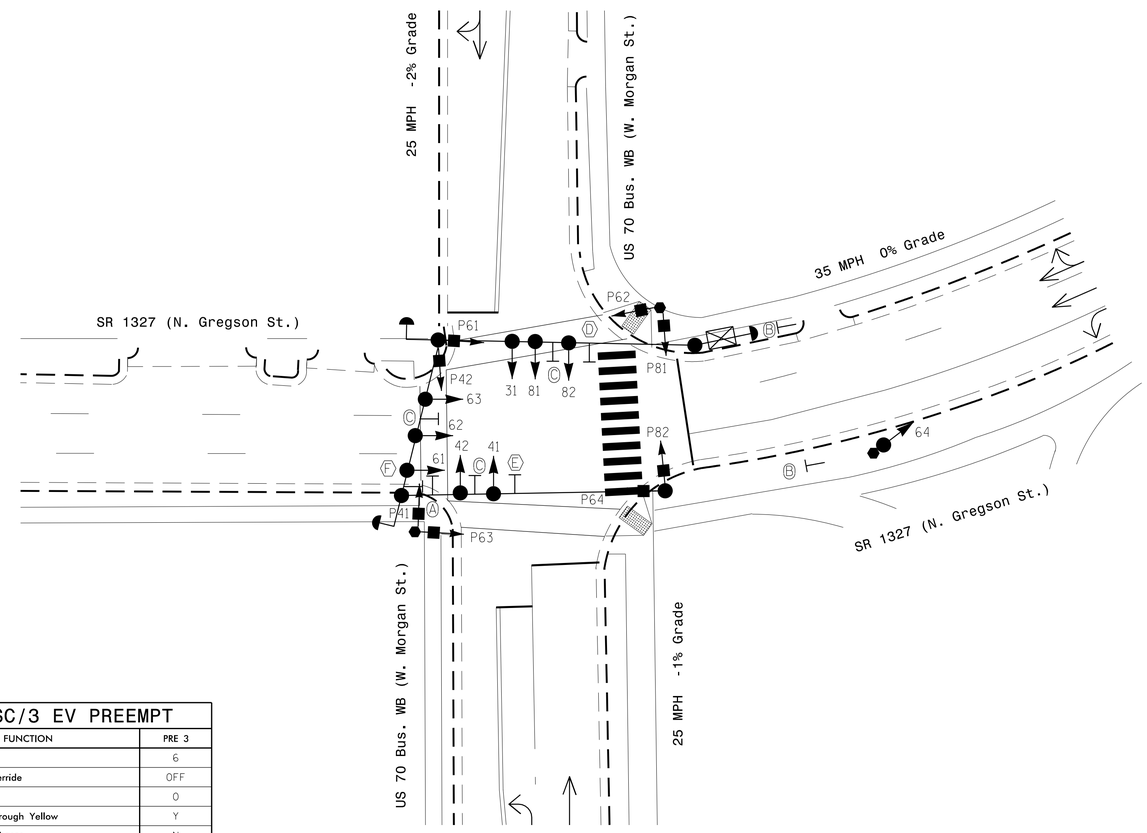
All Heads L.E.D.



2 Phase
Pretimed
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. 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. Install new cabinet on the existing cabinet foundation.
8. Install GPS emergency preemption system per manufacturer's instructions to achieve preemption needed, as shown in phasing diagram.
9. Remove existing optical detection equipment.



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	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
	Type II Signal Pedestal	
N/A	Curb Ramp	
Ⓐ	"NO TURN ON RED" Sign (R10-11)	Ⓐ
Ⓑ	"DO NOT ENTER" Sign (R5-1)	Ⓑ
Ⓒ	Street Name Sign (D3-1)	Ⓒ
Ⓓ	No Right Turn Sign (R3-1)	Ⓓ
Ⓔ	No Left Turn Sign (R3-2)	Ⓔ
Ⓕ	Left Arrow "ONLY" Sign (R3-5L)	Ⓕ

ASC/3 TIMING CHART

FEATURE	PHASE 3	PHASE 4	PHASE 6	PHASE 8
Min Green *	7	7	10	7
Walk *	0	7	7	7
Ped Clear	0	6	10	10
Veh. Extension *	0.0	0.0	0.0	0.0
Max 1 *	15	25	40	25
Delayed Green *	0.0	4.0	4.0	4.0
Yellow	3.0	3.3	3.8	3.3
Red Clear	1.4	1.7	1.3	1.7
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	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.

12/17/2018
U-5968_MOD5106_W05-1005_sig-dgn
User:tpopelka

Signal Upgrade

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

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

SCALE 0 20
1"=20'

SR 1327 (N. Gregson St.)
at
US 70 Bus. WB (W. Morgan St.)

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

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NORTH CAROLINA PROFESSIONAL SEAL 32396 ENGINEER WILLIAM J. HAMILTON

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

SIG. INVENTORY NO. 05-1005

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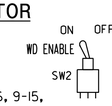
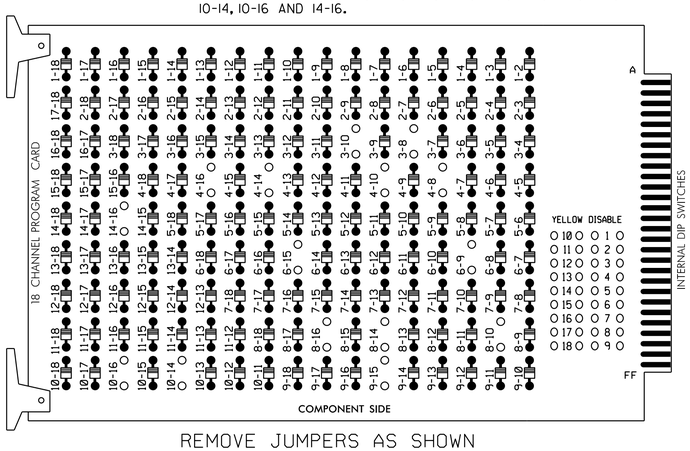
PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-177.1

EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

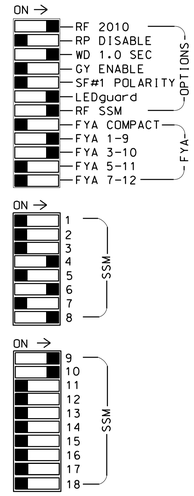
(remove jumpers and set switches as shown)



REMOVE DIODE JUMPERS 3-8, 3-10, 4-8, 4-10, 4-14, 4-16, 6-9, 6-15, 8-10, 8-14, 8-16, 9-15, 10-14, 10-16 AND 14-16.



REMOVE JUMPERS AS SHOWN



■ = DENOTES POSITION OF SWITCH

NOTES:

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

NOTES

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

EQUIPMENT INFORMATION

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

* See overlap programming on sheet 2.
** Phase 3 used for preemption only.

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	31★	41,42	P41, P42	NU	62,63, 64	P61,P62, P63,P64	NU	81,82	P81, P82	61★	31★	NU	NU	NU	NU
RED					101			134			107							
YELLOW				*	102			135			108							
GREEN					103			136			109							
RED ARROW													A121	A124				
YELLOW ARROW													A122	A125				
FLASHING YELLOW ARROW													A123	A126				
GREEN ARROW				118														
✋						104			119			110						
🚶						106			121			112						

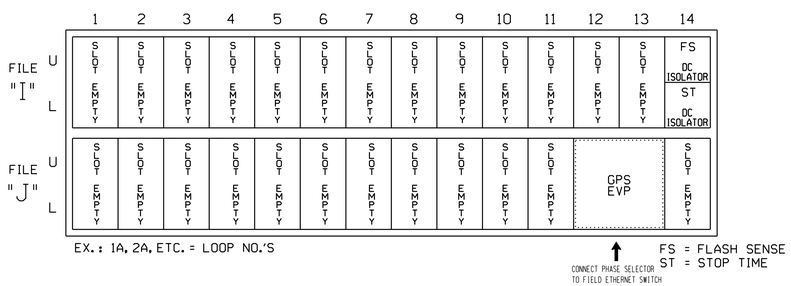
NU = Not Used

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

★ See pictorial of head wiring in detail this sheet.

INPUT FILE POSITION LAYOUT

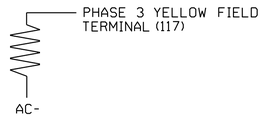
(front view)



LOAD RESISTOR INSTALLATION DETAIL

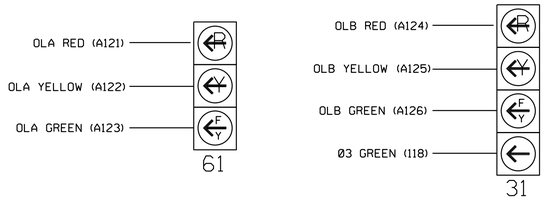
(install resistor as shown)

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



FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1005
DESIGNED: Dec 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 1327 (N. Gregson St.)
at
US 70 Bus. WB (W. Morgan St.)

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32396 ENGINEER WILLIAM J. HAMILTON

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

SIG. INVENTORY NO. 05-1005

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

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PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-177.2

ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

(program controller as shown)

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

OVERLAP A

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

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

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

Toggle Once

↓

OVERLAP B

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

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

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

FLASHING ARROW OUTPUT.....CH10 ISOLATE

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

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.

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 LOGIC PROCESSOR PROGRAMMING DETAIL FOR PREEMPT ONLY PHASE OMIT

(program controller as shown)

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

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

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

IF    PREEMPT ACTIVE          3   IS  OFF
THEN  CTR OMIT PHASE          3       ON

ELSE
```

LOGIC FOR OMITTING PHASE 3 AT STARTUP AND/OR NOT IN PREEMPT

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

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

IF   PED ON PH WALK           6   IS  ON
AND VEH GREEN ON PH           6   IS  OFF

THEN  SIG SET OLP RED         1       ON
      SIG SET OLP YELLOW      1       OFF
      SIG SET OLP GREEN       1       OFF
```

HOLD SIGNAL HEAD 61 FYA RED DURING THE PHASE 6 DELAYED GREEN TIME (LEADING PED INTERVAL)

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

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

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

END PROGRAMMING

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1005
DESIGNED: Dec 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail
Sheet 2 of 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 1327 (N. Gregson St.)
at
US 70 Bus. WB (W. Morgan 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

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

SIG. INVENTORY NO. 05-1005

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

Traffic Engineering Branch — Mobility and Safety Division — NORTH CAROLINA DEPARTMENT OF TRANSPORTATION — 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-177.3

ECONOLITE ASC/3-2070 EMERGENCY VEHICLE PREEMPT

PROGRAMMING DETAIL

(program controller as shown)

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

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

```
PREEMPT PLAN [  3]    ENABLE....YES
 VEH/PED 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 OVERLAP A B C D E F G H I J K L M N O P
TRKCLR V . . . . . . . . . . . . . . . .
TRKCLR O . . . . . . . . . . . . . . . .
ENA TRL  . . . . . . . . . . . . . . . .
DWEL VEH . . X . . . . X . . . . . . . .
DWEL PED . . . . . . . . . . . . . . . .
DWEL OLP .F1 . . . . . . . . . . . . . .
CYC VEH  . . . . . . . . . . . . . . . .
CYC PED  . . . . . . . . . . . . . . . .
CYC OLP  . . . . . . . . . . . . . . . .
EXIT PH  . . . . . X . . . . . . . . . .
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 CLIMN GR| YEL| RED
ENTRANCE TM.    1|    10|    1|25.5|25.5
-----------MIN GR|EXT GR|MX GR| YEL| RED
TRACK CLEAR     0|     0|    0|25.5|25.5
-----------MIN DL|PMTEXT|IMX TM| YEL| RED
DWL/CYC-EXIT    7|   0.0|  120|25.5|25.5
PMT ACTIVE OUT..ON   PMT ACT DWELL...NO
OTHER - PRI PMT.OFF  NON-PRI PMT.....OFF
INH EXT TIME... 0.0  PED PR RETURN...OFF
PRIORITY RETURN.OFF  QUEUE DELAY.... OFF
COND DELAY......OFF
PHASES     1   2   3   4   5   6   7   8
PR RTN%    0   0   0   0   0   0   0   0
PHASES     9  10  11  12  13  14  15  16
PR RTN%    0   0   0   0   0   0   0   0
```

PROGRAM EXTEND TIME ON GPS DETECTOR 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: 05-1005
DESIGNED: Dec 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail
Sheet 3 of 3

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ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

SR 1327 (N. Gregson St.)
at
US 70 Bus. WB (W. Morgan 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
A6B6D7A6A6A64... 12/19/2018
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SIG. INVENTORY NO. 05-1005

12/17/2018
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User:tspopelka

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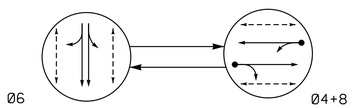
PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-178.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

TABLE OF OPERATION

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

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

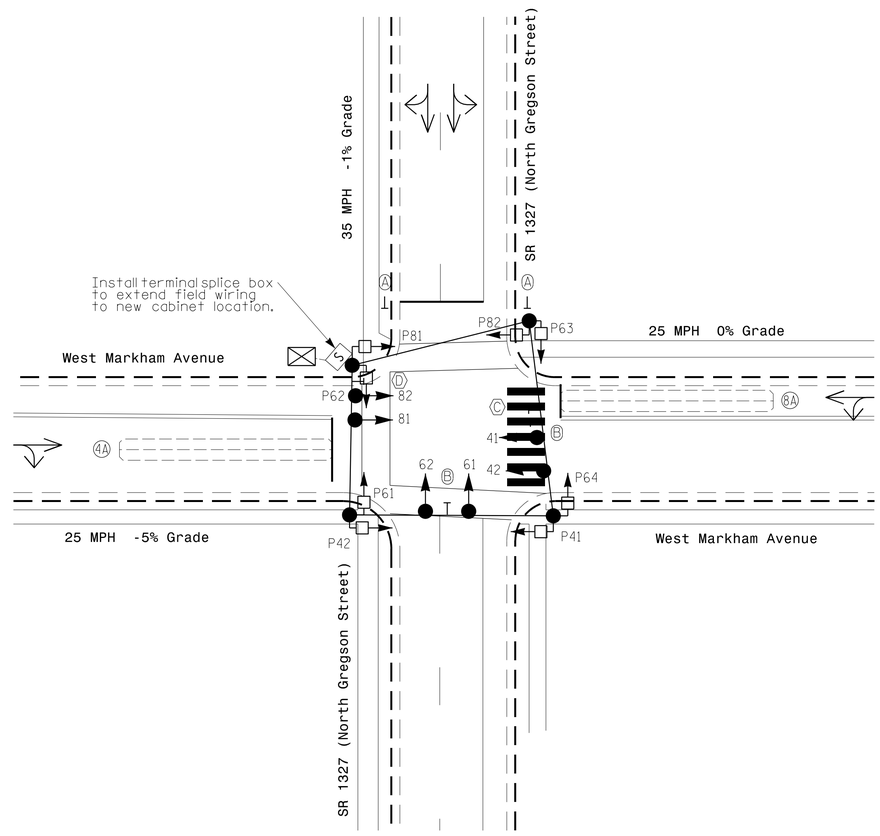
ASC/3 DETECTOR INSTALLATION CHART

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
4A	6X60	0	2-4-2	-	4	Yes	-	10	-	S	-	X
8A	6X60	0	2-4-2	-	8	Yes	-	3	-	S	-	X

2 Phase
Semi-Actuated
(Durham Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Set all detector units to presence mode.
4. In the event of loop replacement, refer to the current ITS and Signals Design Manual and submit a Plan of Record to the Signal Design Section.
5. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
6. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
7. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
8. Pavement markings are existing.
9. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
10. Loop data based on previous plan and/or field observations.
11. Reconnect loops and heads in cabinet as indicated to match current NCDOT standards.



ASC/3 TIMING CHART

FEATURE	PHASE 4	PHASE 6	PHASE 8
Min Green *	7	10	7
Walk *	7	7	7
Ped Clear	8	7	7
Veh. Extension *	2.0	0.0	2.0
Max 1 *	25	40	25
Yellow	3.5	3.9	3.2
Red Clear	1.4	1.0	1.4
Actuations B4 Add *	-	-	-
Seconds /Actuation *	-	-	-
Max Initial *	-	-	-
Time Before Reduction *	-	-	-
Time To Reduce *	-	-	-
Minimum Gap	-	-	-
Locking Detector	-	-	-
Recall Position	-	MAX RECALL	-
Dual Entry	X	-	X
Simultaneous Gap	X	X	X

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

LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
A	"DO NOT ENTER" Sign (R5-1)	A
B	Street Name Sign (D3-1)	B
C	No Left Turn Sign (R3-2)	C
D	No Right Turn Sign (R3-1)	D

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.
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SCALE 0 20 1"=20'

SR 1327 (North Gregson St.)
at
West Markham Ave.

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

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SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32396 ENGINEER WILLIAM J. HAMILTON

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SIGNATURE DATE

SIG. INVENTORY NO. 05-1006

12/13/2018
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User:tpopelka

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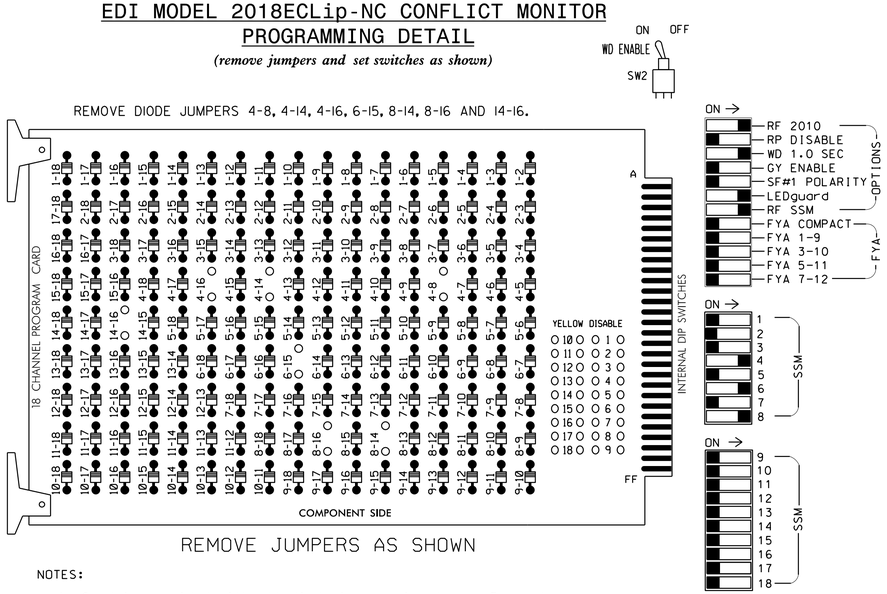
PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-178.1

EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



NOTES:

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

■ = DENOTES POSITION OF SWITCH

NOTES

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

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED
SIGNAL HEAD NO.	NU	NU	NU	NU	41,42	P41, P42	NU	61,62	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

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

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	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	Ø 4 / 4A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	NOT USED	Ø 6 PED / DC ISOLATOR	FS / DC ISOLATOR
	L						NOT USED						Ø 4 PED / DC ISOLATOR	Ø 8 PED / DC ISOLATOR	ST / DC ISOLATOR
FILE "J"	U	SLOT EMPTY	SLOT EMPTY	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						NOT USED								

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND TIME	DELAY TIME	ADDED INITIAL	DETECTOR TYPE
4A	TB4-9,10	I6U	41	4	4	YES		10		S
8A	TB5-9,10	J6U	42	8	8	YES		3		S
PED PUSH BUTTONS										
P41,P42	TB8-5,6	I12L	69	PED 4	4 PED					
P61,P62, P63,P64	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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1006
DESIGNED: Dec 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail

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ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 1327 (North Gregson St.)
at
West Markham Ave.

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32396 ENGINEER WILLIAM J. HAMILTON

DocuSigned by: William J. Hamilton A05600706A95484... 12/19/2018
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SIG. INVENTORY NO. 05-1006

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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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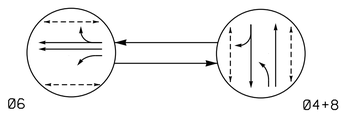
PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-179.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

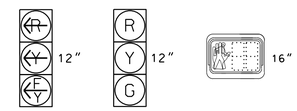
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE 06	PHASE 04+8	FLASH
41, 42	R	G	R
61	~~F Y~~	~~R~~	~~R~~
62, 63	G	R	Y
81	~~R~~	~~F Y~~	~~R~~
82, 83	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.

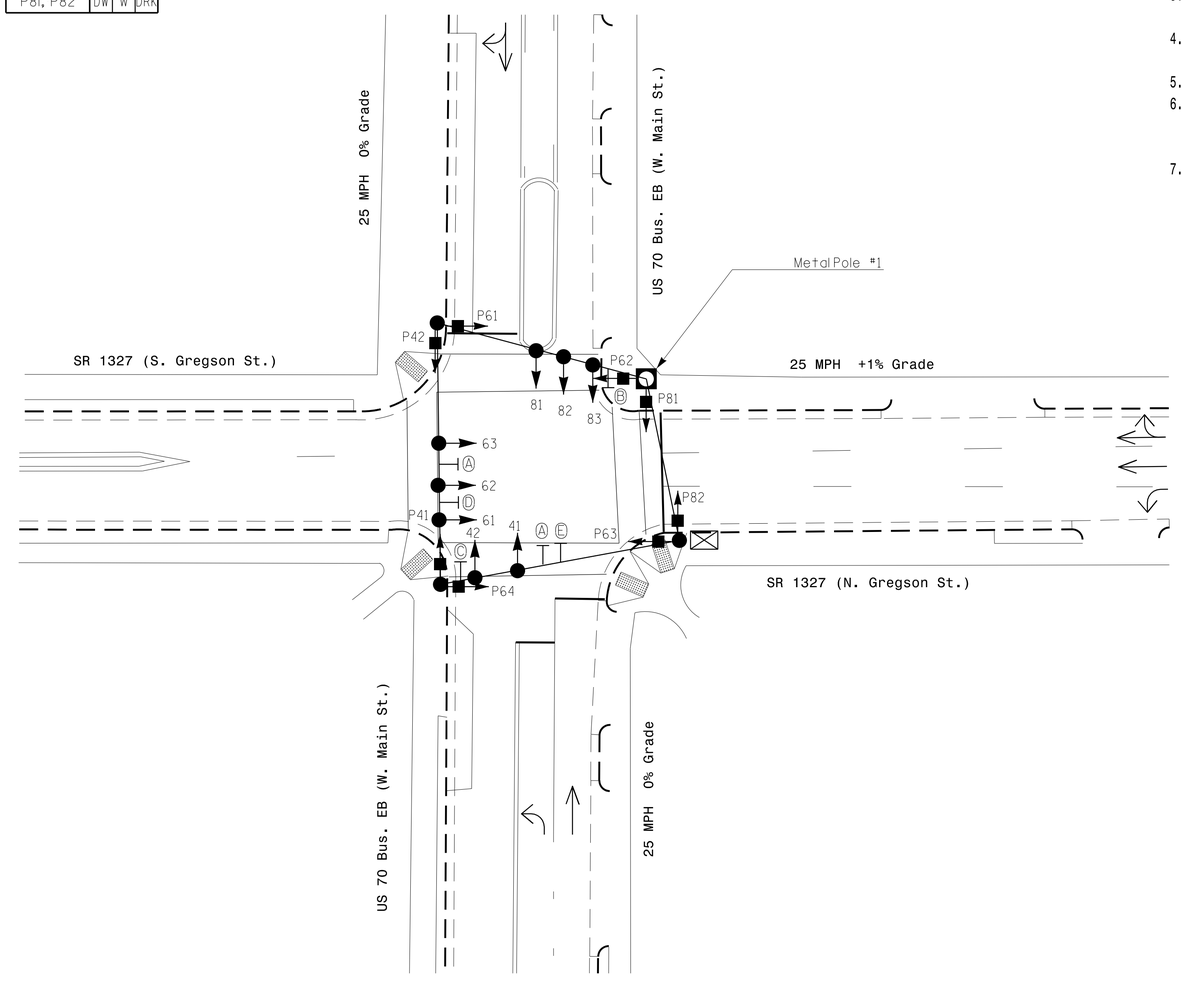


61, 81 — 41, 42, 62, 63, 82, 83 — P41, P42, P61, P62, P63, P64, P81, P82

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. Install new cabinet on the existing cabinet foundation.



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	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
	Metal Strain Pole	
	Type II Signal Pedestal	
N/A	Curb Ramp	
A	Street Name Sign (D3-1)	A
B	No Right Turn Sign (R3-1)	B
C	"NO TURN ON RED" Sign (R10-11)	C
D	Left "TURNING VEHICLES" Yield "TO" Pedestrians Sign (R10-15L)	D
E	No Left Turn Sign (R3-2)	E

ASC/3 TIMING CHART

FEATURE	PHASE 4	PHASE 6	PHASE 8
Min Green *	7	10	7
Walk *	7	7	7
Ped Clear	7	10	7
Veh. Extension *	0.0	0.0	0.0
Max 1 *	40	40	40
Delayed Green *	0.0	4.0	0.0
Yellow	3.2	3.8	3.2
Red Clear	1.7	1.2	1.7
Actuations B4 Add *	-	-	-
Seconds /Actuation *	-	-	-
Max Initial *	-	-	-
Time Before Reduction *	-	-	-
Time To Reduce *	-	-	-
Minimum Gap	-	-	-
Locking Detector	-	-	-
Recall Position	MAX/PED	MAX/PED	MAX/PED
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.

12/17/2018
U-5968_MOD-1001_MOD-1007_sig-dgn
User:tpope ka

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:
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SCALE 0 20 1"=20'

SR 1327 (Gregson 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

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SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32396 ENGINEER WILLIAM J. HAMILTON

DocuSigned by: William J. Hamilton 12/19/2018
ACC6BD7DA4DA4BE... DATE

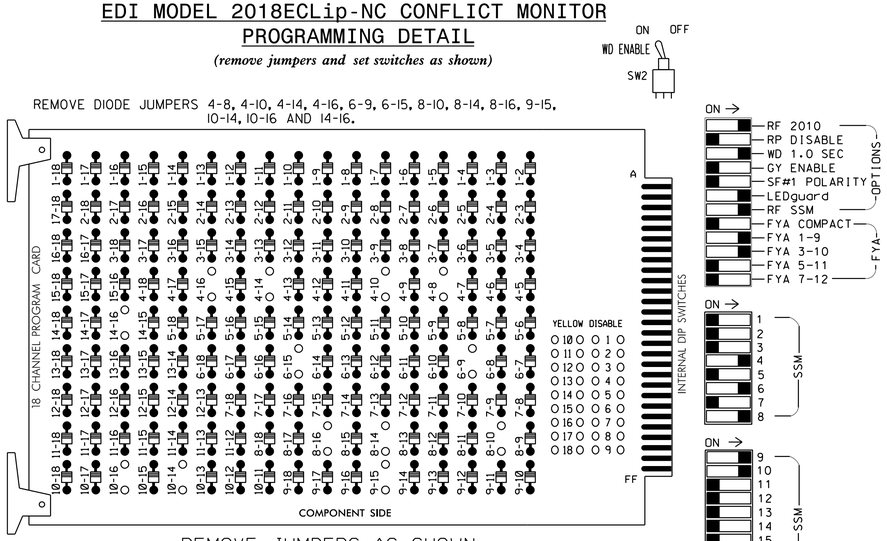
SIG. INVENTORY NO. 05-1007

DocuSign Envelope ID: C4E289E0-C212-4FF1-9F4F-E00E074D4D5C

PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-179.1

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 Green.
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 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,AUX S1, AUX S2
PHASES USED.....4,4PED,6,6PED,8,8PED
OVERLAP "A".....*
OVERLAP "B".....*
OVERLAP "C".....NOT USED
OVERLAP "D".....NOT USED

* See overlap programming on sheet 2.

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	NU	NU	NU	NU	41,42	P41, P42	NU	62,63	P61,P62, P63,P64	NU	82,83	P81, P82	61★	81★	NU	NU	NU	NU
RED					101			134			107							
YELLOW					102			135			108							
GREEN					103			136			109							
RED ARROW													A121	A124				
YELLOW ARROW													A122	A125				
FLASHING YELLOW ARROW													A123	A126				
GREEN ARROW																		
✋						104			119			110						
🚶						106			121			112						

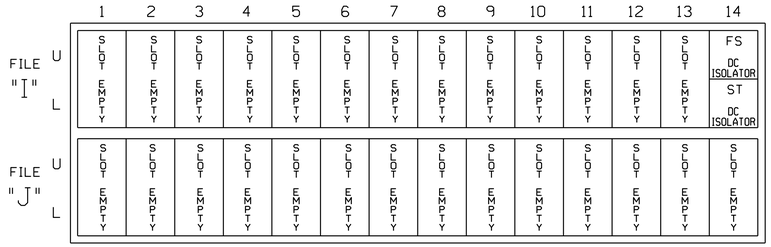
NU = Not Used
★ See pictorial of head wiring in detail this sheet.

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)



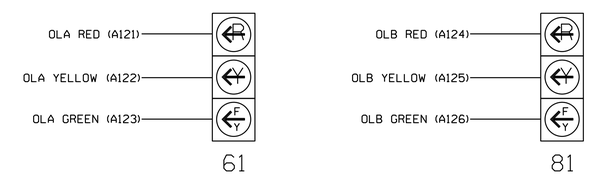
EX.: 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE
ST = STOP TIME

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1007
DESIGNED: Dec 2018
SEALED: 12/19/2018
REVISED: N/A

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



Electrical Detail
Sheet 1 of 2

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ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 1327 (Gregson 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
SIGNATURE DATE
SIG. INVENTORY NO. 05-1007

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

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

12/17/2018
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User:tpopelka

DocuSign Envelope ID: C4E289E0-C212-4FF1-9F4F-E00E074D4D5C

PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig-179.2

ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

(program controller as shown)

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

OVERLAP A

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

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

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

Toggle Once

↓

OVERLAP B

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

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

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

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.

Electrical Detail
Sheet 2 of 2

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1007
DESIGNED: Dec 2018
SEALED: 12/19/2018
REVISED: N/A

Prepared in the offices of:

RAMEY KEMP & ASSOCIATES, INC.
Transportation Engineers
5808 Farlington Place, Suite 100
Raleigh, North Carolina 27609
919-872-5115 Tel, 919-878-5415 Fax,
www.rameykemp.com

ELECTRICAL AND PROGRAMMING DETAILS FOR:

NC Department of Transportation — Transportation Mobility and Safety Division — Traffic Engineering & Signals Management Section

750 N.Greenfield Pkwy,Garner,NC 27529

SR 1327 (Gregson 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

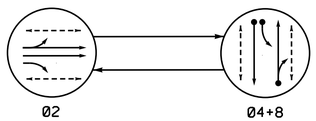
DocuSigned by: William J. Hamilton 12/19/2018
AUTHENTICATION SIGNATURE DATE

SIG. INVENTORY NO. 05-1007

12/19/2018
ecs05-1007_sig-179.2.dgn
User:tpopelka

PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig 180.0

PHASING DIAGRAM

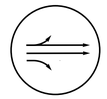


PHASING DIAGRAM DETECTION LEGEND

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

EV PREEMPT PHASES

(Medium Priority)



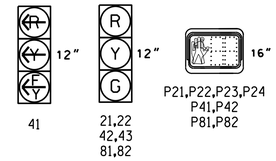
PRE 3 (Ø2)

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2	PHASE Ø4+8	PHASE PRE3	PHASE FLASH
21,22	G	R	G	Y
41	~~R~~	~~F Y~~	~~R~~	~~R~~
42,43	R	G	R	R
81,82	R	G	R	R
P21,P22,P23,P24	W	DW	DW	DRK
P41,P42	DW	W	DW	DRK
P81,P82	DW	W	DW	DRK

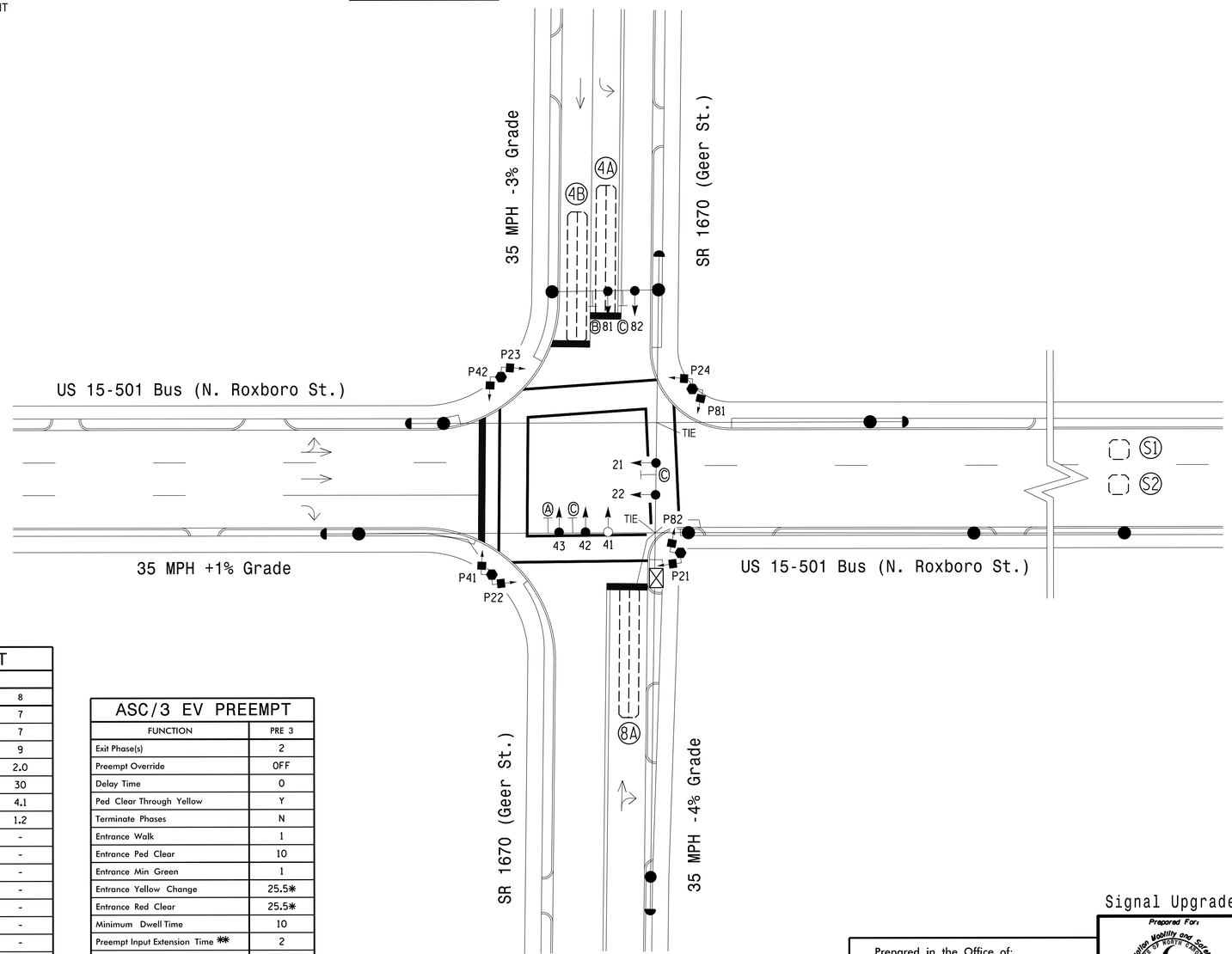
SIGNAL FACE I.D.

All Heads L.E.D.



ASC/3 DETECTOR INSTALLATION CHART

DETECTOR					PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
4A	6X40	0	2-4-2	-	4	Yes	-	3	-	S	-	X
4B	6X40	0	2-4-2	-	4	Yes	-	-	-	S	-	X
8A	6X40	0	2-4-2	-	8	Yes	-	5	-	S	-	X
S1	6X6	+285	4	-	-	NO	-	-	-	N	X	X
S2	6X6	+285	4	-	-	NO	-	-	-	N	X	X



ASC/3 TIMING CHART

FEATURE	PHASE 2	PHASE 4	PHASE 8
Min Green *	10	7	7
Walk *	7	7	7
Ped Clear	11	12	9
Veh. Extension *	0.0	2.0	2.0
Max 1 *	60	30	30
Yellow	3.8	4.1	4.1
Red Clear	1.1	1.2	1.2
Actuations B4 Add *	-	-	-
Seconds /Actuation *	-	-	-
Max Initial *	-	-	-
Time Before Reduction *	-	-	-
Time To Reduce *	-	-	-
Minimum Gap	-	-	-
Locking Detector	-	-	-
Recall Position	MAX/PED RECALL	-	-
Dual Entry	-	X	X
Simultaneous Gap	X	X	X

* These values may be field adjusted. Do not adjust Min Green and Extension times for phase 2 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
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

2 Phase
Semi-Actuated
W/ EV Preemption
(Durham Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Reposition existing signal heads numbered 42 and 43.
4. Set all detector units to presence mode.
5. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
6. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
7. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
8. Pavement markings are existing.
9. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
10. Loop data based on previous plan and/or field observations.
11. Install new cabinet on the existing cabinet foundation.
12. Reconnect loops and heads in cabinet as indicated to match current NCDOT standards.
13. Install GPS emergency preemption system per manufacturer's instructions to achieve preemption needed. as shown in phasing diagram.
14. Remove existing optical detection equipment.

LEGEND

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

Signal Upgrade

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Prepared in the Office of:

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

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

SCALE 0 20 1"=20'

US 15-501 Business
(North Roxboro Street)
at
SR 1670 (Geer Street)

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 018174 ENGINEER EDWARD W. SIRGANY

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

SIG. INVENTORY NO. 05-1008

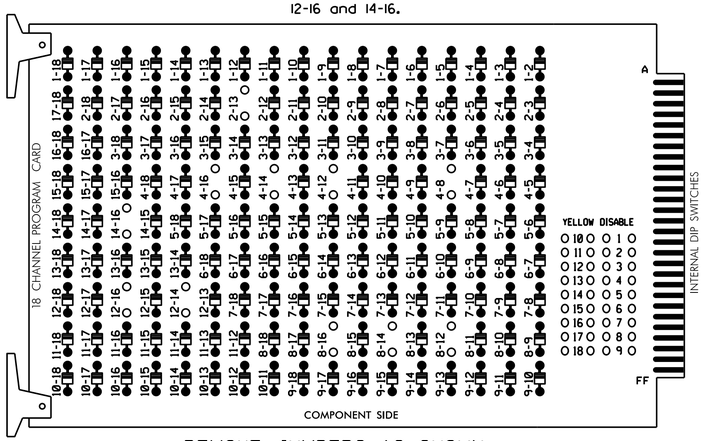
$$$$SYSTIME$$$$
$$$$SYSTIME$$$$
$$$$SYSTIME$$$$DOM
$$$$SYSTIME$$$$

PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig 180.1

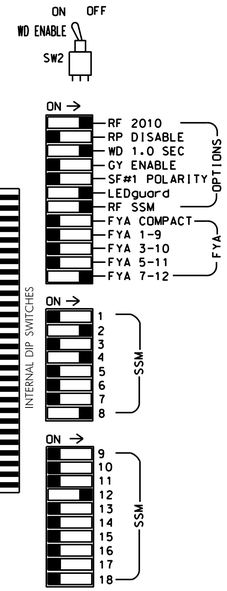
EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 2-13, 4-8, 4-12, 4-14, 4-16, 8-12, 8-14, 8-16, 12-14, 12-16 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.
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,S11,S12,AUX S5
PHASES USED.....2,2PED,4,4PED,8,8PED
OVERLAP "A".....NOT USED
OVERLAP "B".....NOT USED
OVERLAP "C".....NOT USED
OVERLAP "D".....*

* See overlap programming detail on sheet 2

SIGNAL HEAD HOOK-UP CHART

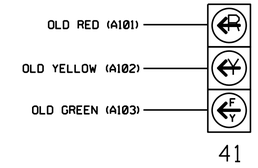
LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	NU	21,22	P21,P22 P23,P24	NU	42,43	P41, P42	NU	NU	NU	NU	81,82	P81, P82	NU	NU	NU	NU	41 ★	NU
RED		128			101						107							
YELLOW		129			102						108							
GREEN		130			103						109							
RED ARROW																	A101	
YELLOW ARROW																	A102	
FLASHING YELLOW ARROW																	A103	
GREEN ARROW																		
✋			113			104						110						
🚶			115			106						112						

NU = Not Used

★ See pictorial of head wiring in detail below.

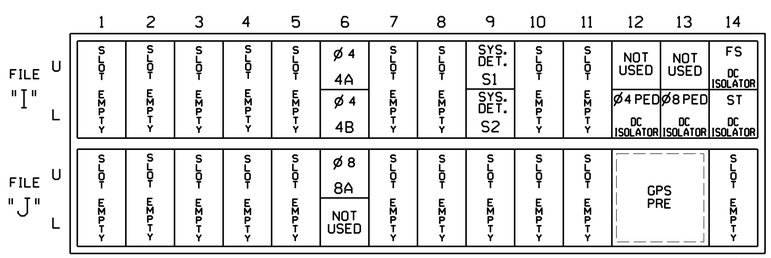
FYA SIGNAL WIRING DETAIL

(wire signal head 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
4A	TB4-9,10	I6U	41	4	4	YES		3		S
4B	TB4-11,12	I6L	45	14	4	YES				S
* S1	TB6-9,10	I9U	60	11	SYS	NO				N
* S2	TB6-11,12	I9L	62	13	SYS	NO				N
8A	TB5-9,10	J6U	42	8	8	YES		5		S
PED PUSH BUTTONS										
P41,P42	TB8-5,6	I12L	69	PED 4	4 PED					
P81,P82	TB8-8,9	I13L	70	PED 8	8 PED					

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

* System detector only. Remove any assigned vehicle phase.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1008
DESIGNED: October 2018
SEALED: November 2, 2018
REVISED: N/A

Electrical Detail - Sheet 1 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

US 15-501 Business
(North Roxboro Street)
at
SR 1670 (Geer Street)

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 018174 ENGINEER EDWARD W. SIRGANY

DocuSigned by: Edward W Sirgany 11/2/2018
39CF9C86A6B4E3...
DATE

SIG. INVENTORY NO. 05-1008

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

PROJECT REFERENCE NO.	SHEET NO.
U-5968	Sig 180.2

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

PROGRAM EXTEND TIME ON GPS DETECTOR UNITS FOR 2.0 SEC.

ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

(program controller as shown)

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

OVERLAP 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 PREEMPT FILTERING PROGRAMMING DETAIL

(program controller as shown)

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

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

Electrical Detail - Sheet 2 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1008
DESIGNED: October 2018
SEALED: November 2, 2018
REVISED: N/A

Prepared in the Office of:

SUMMIT DESIGN AND ENGINEERING SERVICES

NC FIRM LICENSE No: P-0339
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ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

US 15-501 Business
(North Roxboro Street)
at
SR 1670 (Geer Street)

Division 5 Durham County Durham

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

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 018174 ENGINEER EDWARD W. SIRGANY

DocuSigned by: Edward W Sirgany 11/2/2018
HDEBC9EA6A9E4E5...
DATE

SIG. INVENTORY NO. 05-1008

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