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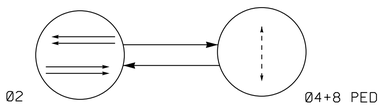
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-5968 | SIG.372.0 |

# 2 PHASE SEMI-ACTUATED PEDESTRIAN HYBRID BEACON (DURHAM SIGNAL SYSTEM)

## PHASING DIAGRAM




PHASING DIAGRAM DETECTION LEGEND

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

## TABLE OF OPERATION

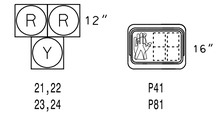
| SIGNAL FACE | PHASE | | | | | | |
|---|---|---|---|---|---|---|---|
| | Ø2 DARK | ACTIVATION | STEADY YELLOW | ALL RED | Ø4+8 WALK | PED CLEAR Ø4+8 | FLASH |
| 21,22 | DRK | FY | Y | R | R | FR* | Y |
| 23,24 | DRK | FY | Y | R | R | FR* | Y |
| P41 | DW | DW | DW | DW | W | DW | DRK |
| P81 | DW | DW | DW | DW | W | DW | DRK |

* Alternating Flash

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

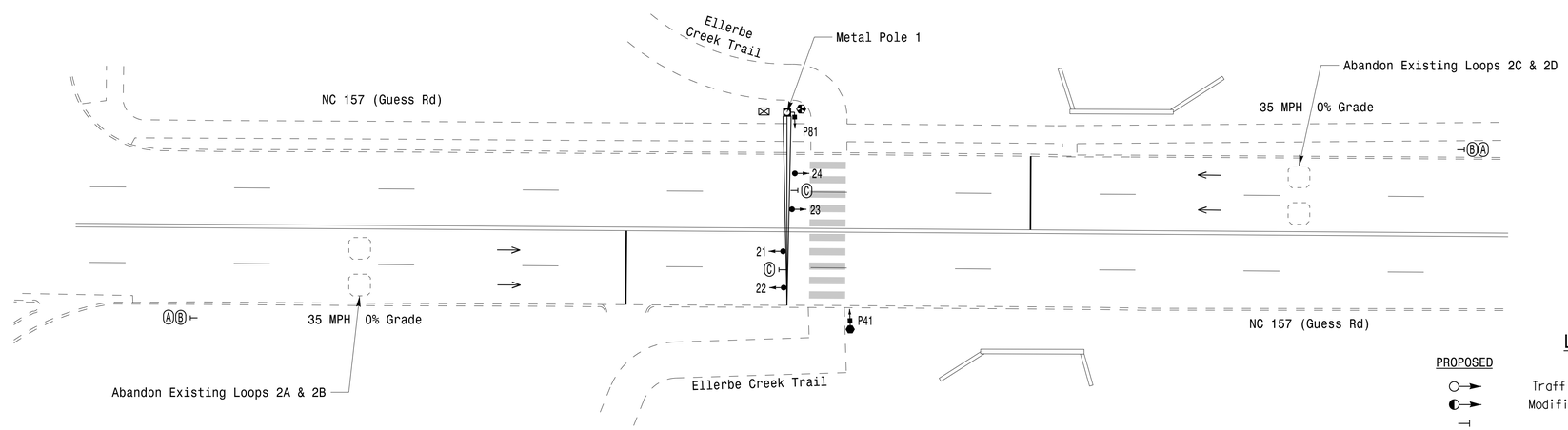
## SIGNAL FACE I.D.

All Heads L.E.D.




## NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Abandon existing loops 2A, 2B, 2C, and 2D.
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. Install new cabinet on the existing cabinet foundation.




## ASC/3 TIMING CHART

| FEATURE | PHASE 2 | 4 PED | 8 PED | OLA |
|---|---|---|---|---|
| Min Green * | 10 | 7 | 7 | 5 |
| Walk * | 7 | 7 | 7 | |
| Ped Clear | 5 | 10 | 10 | |
| Veh. Extension * | 0.0 | 0.0 | 0.0 | |
| Max 1 * | 15 | 7 | 7 | |
| Yellow | 5.0 | 3.0 | 3.0 | 5.0 |
| Red Clear | 5.0 | 0.0 | 0.0 | 5.0 |
| Actuations B4 Add * | - | - | - | |
| Seconds /Actuation * | - | - | - | |
| Max Initial * | - | - | - | |
| Time Before Reduction * | - | - | - | |
| Time To Reduce * | - | - | - | |
| Minimum Gap | - | - | - | |
| Locking Detector | X | - | - | |
| Recall Position | PED RECALL | - | - | |
| Dual Entry | - | X | X | |
| Simultaneous Gap | X | - | - | |

Serves as Flashing Yellow Time (Ped Clear)
Serves as Steady Yellow Clearance Time (Yellow)
Serves as All Red Clearance Time (Red Clear)

* 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.

## LEGEND

| PROPOSED | | EXISTING |
|---|---|---|
| | Traffic Signal Head | |
| | Modified Signal Head | N/A |
| | Sign | |
| | Pedestrian Signal Head With Push Button & Sign | |
| | Type I Pushbutton Post | |
| | Type II Signal Pedestal | |
| | Metal Pole with Mastarm | |
| | Inductive Loop Detector | |
| | Controller & Cabinet | |
| | Junction Box | |
| | 2-in Underground Conduit | |
| N/A | Right of Way | |
| | Directional Arrow | |
| N/A | Curb Ramp | |
| Ⓐ | Pedestrian Warning Sign (W11-2) with Downward Diagonal Arrow Plaque (W16-7P) | Ⓐ |
| Ⓑ | "AHEAD" Sign (W16-9P) | Ⓑ |
| Ⓒ | "CROSSWALK - STOP ON RED" Sign (R10-23) | Ⓒ |

Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

Pedestrian Hybrid Beacon on NC 157 (Guess Road) at Ellerbee Creek Trail

Division 5 Durham County Durham

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

SCALE 0 20 1"=20'

| REVISIONS | INIT. | DATE |
|---|---|---|
| | | |

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

DocuSigned by: 0C87A05ECD6B43... 12/19/2018
SIGNATURE DATE

SIG. INVENTORY NO. 05-2462

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

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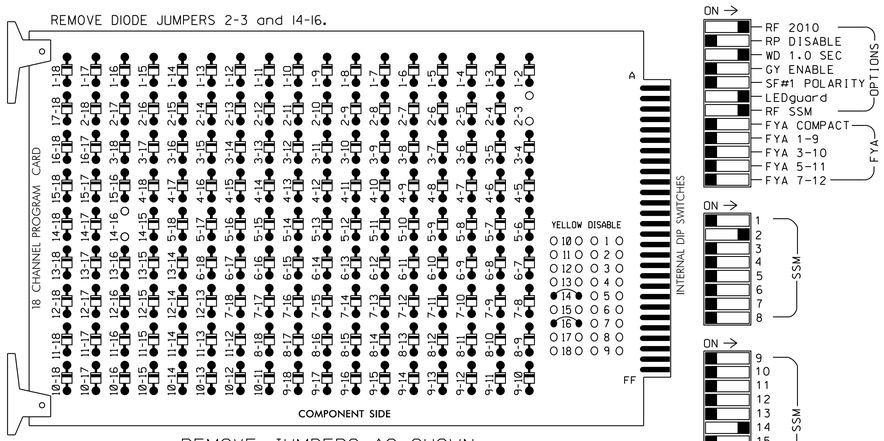
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-5968 | SIG.372.1 |

## EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

*(remove jumpers and set switches as shown)*




REMOVE JUMPERS AS SHOWN

NOTES:

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

## INPUT FILE POSITION LAYOUT

*(front view)*

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

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

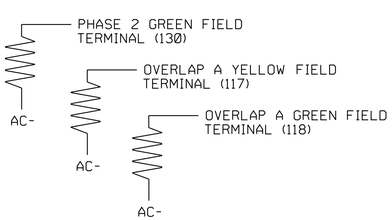
FS = FLASH SENSE
ST = STOP TIME

## LOAD RESISTOR INSTALLATION DETAIL

*(install resistors as shown)*

ACCEPTABLE VALUES

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




THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-2462
DESIGNED: JUNE 2018
SEALED: 12/19/2018
REVISED: N/A

## NOTES

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

## EQUIPMENT INFORMATION

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

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

## OPERATIONAL NOTES

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

## INPUT FILE CONNECTION & PROGRAMMING CHART

| LOOP NO. | LOOP TERMINAL | INPUT FILE POS. | PIN NO. | DETECTOR NO. | NEMA PHASE | CALL | EXTEND TIME | DELAY TIME | ADDED INITIAL | DETECTOR TYPE |
|---|---|---|---|---|---|---|---|---|---|---|
| PED PUSH BUTTONS | | | | | | | | | | |
| P41 | TB8-5,6 | I12L | 69 | PED 4 | 4 PED | | | | | |
| P81 | TB8-8,9 | I13L | 70 | PED 8 | 8 PED | | | | | |

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

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

PLANS PREPARED IN THE OFFICE OF:
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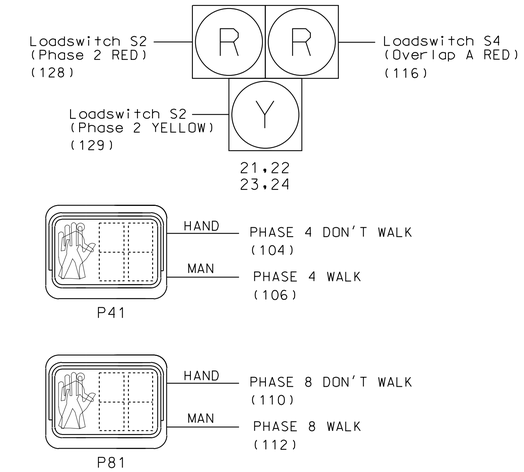
Raleigh, NC 27601
(919) 677-2000

## SIGNAL HEAD WIRING DETAIL

*(wire signal heads as shown)*




## ECONOLITE ASC/3-2070 LOAD SWITCH ASSIGNMENT DETAIL

*(program controller as shown)*

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

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

NOTICE OVERLAP A ASSIGNED TO LD SWITCH 3 →

LD SWITCH ASSIGN

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

← NOTICE FLASH COLOR RED

Electrical Detail - Sheet 1 of 2

**DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED**

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

Pedestrian Hybrid Beacon on NC 157 (Guess Road) at Ellerbee Creek Trail

Division 5 Durham County Durham

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

| REVISIONS | INIT. | DATE |
|---|---|---|
| | | |

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACIE L. PHILLIPS
DocuSigned by: 0C87A59ED60B437...
12/19/2018
SIGNATURE DATE
SIG. INVENTORY NO. 05-2462

12/19/2018
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| U-5968 | SIG.372.2 |

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

*(program controller as shown)*

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

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

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

## COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

# ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

*(program controller as shown)*

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

*OVERLAP A*

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

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

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

END PROGRAMMING

# ECONOLITE ASC/3-2070 LOGIC PROCESSOR PROGRAMMING DETAIL

*(program controller as shown)*

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

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

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

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

THEN  SIG SET PH YELLOW         2       ON

ELSE
```

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

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

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

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

THEN  SIG SET PHASE RED         2       OFF

ELSE
```

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

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

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

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

THEN  SIG SET OLP RED           1       OFF

ELSE
```

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

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

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

IF   PED ON PH PED CLR          2   IS  ON

THEN  SIG SET PH GREEN          2       OFF
```

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

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

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

ENABLE LOGIC PROCESSOR STATEMENTS 1 - 4 BY POSITIONING THE CURSOR OVER THE FIELDS SHOWN BELOW AND USING THE TOGGLE KEY TO ENABLE THEM.

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

END PROGRAMMING

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-2462
DESIGNED: JUNE 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail - Sheet 2 of 2

**DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED**

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

Pedestrian Hybrid Beacon on NC 157 (Guess Road) at Ellerbee Creek Trail

Division 5 Durham County Durham

| | | | |
|---|---|---|---|
| PLAN DATE: June 2018 | | REVIEWED BY: SL Phillips | |
| PREPARED BY: DA Waller | | REVIEWED BY: KP Baumann | |
| REVISIONS | | INIT. | DATE |

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

DocuSigned by: 0C87A56E0F08407... 12/19/2018

SIGNATURE DATE

SIG. INVENTORY NO. 05-2462

PLANS PREPARED IN THE OFFICE OF:
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12/19/2018
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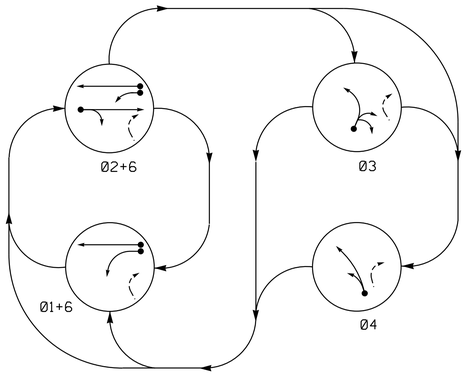
|---|---|
| U-5968 | Sig-373.0 |

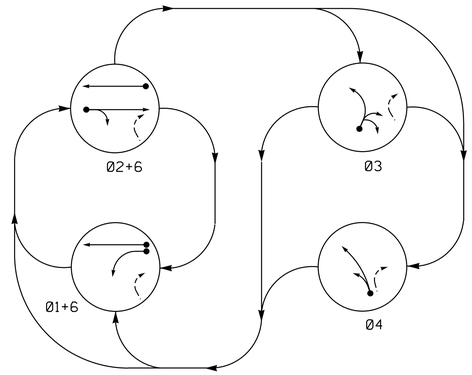
## DEFAULT PHASING DIAGRAM




## DEFAULT PHASING TABLE OF OPERATION

| SIGNAL FACE | PHASE 01+6 | PHASE 02+6 | PHASE 03 | PHASE 04 | FLASH |
|---|---|---|---|---|---|
| 11, 12 | ←- | F Y | R | R | Y |
| 21, 22, 23 | R | G | R | R | Y |
| 31 | R | R | G ← | R | R |
| 32 | R | R | G | R | R |
| 41 | R | R | R | G ← | R |
| 42 | R | R | R | G | R |
| 61, 62 | G | G | R | R | Y |

## ALTERNATE PHASING DIAGRAM




## ALTERNATE PHASING TABLE OF OPERATION

| SIGNAL FACE | PHASE 01+6 | PHASE 02+6 | PHASE 03 | PHASE 04 | FLASH |
|---|---|---|---|---|---|
| 11, 12 | ←- | R | R | R | Y |
| 21, 22, 23 | R | G | R | R | Y |
| 31 | R | R | G ← | R | R |
| 32 | R | R | G | R | R |
| 41 | R | R | R | G ← | R |
| 42 | R | R | R | G | R |
| 61, 62 | G | G | R | R | Y |

## ASC/3 DETECTOR INSTALLATION CHART

| DETECTOR | | | | | PROGRAMMING | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LOOP | SIZE (FT) | DISTANCE FROM STOPBAR (FT) | TURNS | NEW LOOP | PHASE | CALLING | EXTEND TIME | DELAY TIME | USE ADDED INITIAL | TYPE | SYSTEM LOOP | NEW CARD |
| 1A | 6X40 | 0 | 2-4-2 | - | 1 | Yes | - | *15 | - | S | - | X |
| | | | | | 6# | Yes | - | - | - | S | - | X |
| 2A | 6X6 | 70 | Exist | - | 2 | Yes | - | - | - | S | - | X |
| 3A | 6X40 | 0 | 2-4-2 | - | 3 | Yes | - | 3 | - | S | - | X |
| 4A | 6X40 | 0 | 2-4-2 | - | 4 | Yes | - | 3 | - | S | - | X |
| 6A | 6X6 | 70 | Exist | - | 6 | Yes | - | - | - | S | - | X |

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

## 4 Phase
## Fully Actuated
## (Durham Signal System)

## NOTES

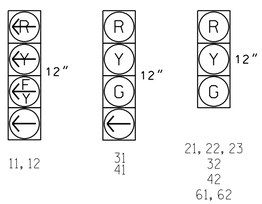
1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 may be lagged.
4. The order of phase 3 and phase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

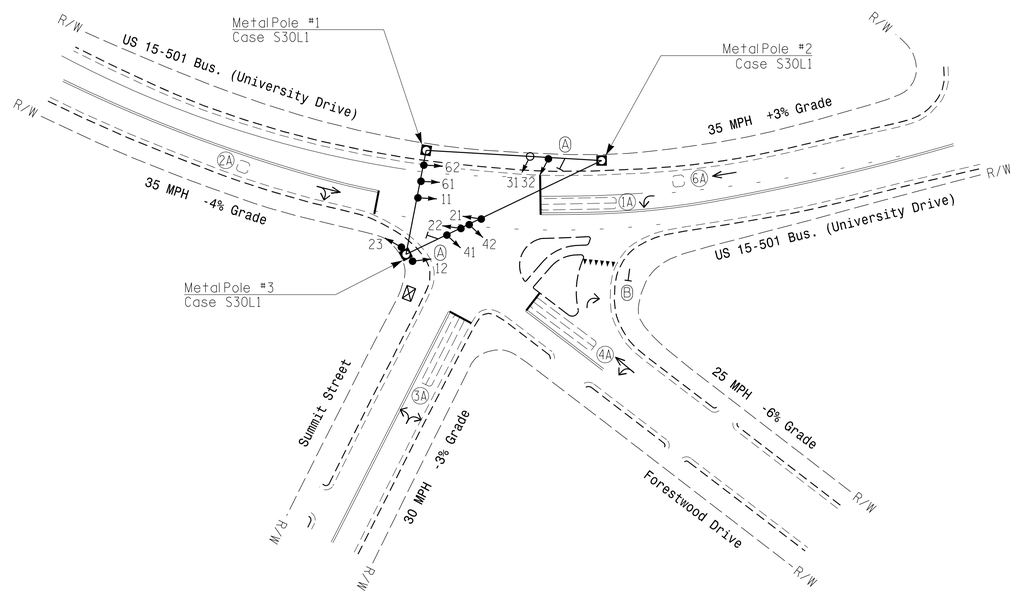
### PHASING DIAGRAM DETECTION LEGEND

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

## SIGNAL FACE I.D.

All Heads L.E.D.




## ASC/3 TIMING CHART

| FEATURE | PHASE 1 | PHASE 2 | PHASE 3 | PHASE 4 | PHASE 6 |
|---|---|---|---|---|---|
| Min Green * | 7 | 10 | 7 | 7 | 10 |
| Walk * | 0 | 0 | 0 | 0 | 0 |
| Ped Clear | 0 | 0 | 0 | 0 | 0 |
| Veh. Extension * | 2.0 | 3.0 | 2.0 | 2.0 | 3.0 |
| Max 1 * | 15 | 45 | 20 | 20 | 45 |
| Yellow | 3.0 | 4.1 | 3.0 | 3.5 | 4.1 |
| Red Clear | 2.3 | 1.6 | 2.3 | 2.4 | 1.6 |
| Actuations B4 Add * | - | - | - | - | - |
| Seconds /Actuation * | - | - | - | - | - |
| Max Initial * | - | - | - | - | - |
| Time Before Reduction * | - | - | - | - | - |
| Time To Reduce * | - | - | - | - | - |
| Minimum Gap | - | - | - | - | - |
| Locking Detector | - | X | - | - | X |
| Recall Position | - | VEH RECALL | - | - | VEH RECALL |
| Dual Entry | - | - | - | - | - |
| Simultaneous Gap | X | X | X | X | X |

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

## LEGEND

| PROPOSED | | EXISTING |
|---|---|---|
| | Traffic Signal Head | |
| | Modified Signal Head | N/A |
| | Sign | |
| | Pedestrian Signal Head With Push Button & Sign | |
| | Signal Pedestal | |
| | Signal Pole with Guy | |
| | Signal Pole with Sidewalk Guy | |
| | Inductive Loop Detector | |
| | Controller & Cabinet | |
| | Junction Box | |
| | 2-in Underground Conduit | |
| N/A | Right of Way | |
| | Directional Arrow | |
| | Metal Strain Pole | |
| A | No Turn On Red Sign (R10-11) | A |
| B | Yield Sign (R1-2) | B |

Signal Upgrade

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

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

SCALE 0 40 1"=40'

US 15-501 Bus. (University Dr.)
at
Summit St./ Forestwood Dr.

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
ENGINEER'S SIGNATURE DATE

SIG. INVENTORY NO. 05-2465

12/17/2018
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User:tpopelka

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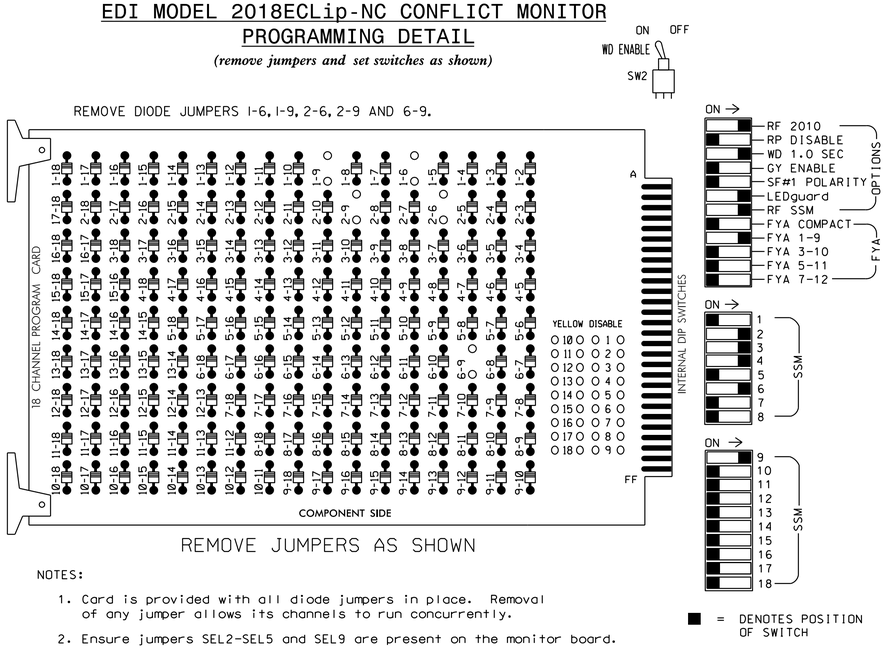
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-5968 | Sig-373.1 |

# EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

*(remove jumpers and set switches as shown)*




■ = DENOTES POSITION OF SWITCH

NOTES:

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

## NOTES

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

## EQUIPMENT INFORMATION

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

✳ See overlap programming on sheet 2.

## SIGNAL HEAD HOOK-UP CHART

| LOAD SWITCH NO. | S1 | S2 | S3 | S4 | | S5 | | S6 | S7 | S8 | S9 | S10 | S11 | S12 | AUX S1 | AUX S2 | AUX S3 | AUX S4 | AUX S5 | AUX S6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CMU CHANNEL NO. | 1 | 2 | 13 | 3 | | 4 | | 14 | 5 | 6 | 15 | 7 | 8 | 16 | 9 | 10 | 17 | 11 | 12 | 18 |
| PHASE | 1 | 2 | 2 PED | 3 | | 4 | | 4 PED | 5 | 6 | 6 PED | 7 | 8 | 8 PED | OLA | OLB | SPARE | OLC | OLD | SPARE |
| SIGNAL HEAD NO. | 11,12★ | 21,22, 23 | NU | 31 | 32 | 41 | 42 | NU | NU | 61,62 | NU | NU | NU | NU | 11,12★ | NU | NU | NU | NU | NU |
| RED | | 128 | | 116 | 116 | 101 | 101 | | | 134 | | | | | | | | | | |
| YELLOW | ✳ | 129 | | 117 | 117 | 102 | 102 | | | 135 | | | | | | | | | | |
| GREEN | | 130 | | 118 | 118 | 103 | 103 | | | 136 | | | | | | | | | | |
| RED ARROW | | | | | | | | | | | | | | | A121 | | | | | |
| YELLOW ARROW | | | | | | | | | | | | | | | A122 | | | | | |
| FLASHING YELLOW ARROW | | | | | | | | | | | | | | | A123 | | | | | |
| GREEN ARROW | 127 | | | 118 | | 103 | | | | | | | | | | | | | | |

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

★ See pictorial of head wiring in detail this sheet.

## INPUT FILE POSITION LAYOUT

*(front view)*

| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FILE "I" | U | Ø1 1A | Ø2 2A | SLOT EMPTY | SLOT EMPTY | Ø3 3A | Ø4 4A | SLOT EMPTY | SLOT EMPTY | SLOT EMPTY | SLOT EMPTY | SLOT EMPTY | SLOT EMPTY | SLOT EMPTY | FS DC ISOLATOR |
| | L | NOT USED | NOT USED | | | NOT USED | NOT USED | | | | | | | | ST DC ISOLATOR |
| FILE "J" | U | SLOT EMPTY | Ø6 6A | SLOT EMPTY | WIRED INPUT ⊗ | SLOT EMPTY | SLOT EMPTY | 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

⊗ Wired Input - Do not populate slot with detector card

## INPUT FILE CONNECTION & PROGRAMMING CHART

| LOOP NO. | LOOP TERMINAL | INPUT FILE POS. | PIN NO. | DETECTOR NO. | NEMA PHASE | CALL | EXTEND TIME | DELAY TIME | ADDED INITIAL | DETECTOR TYPE |
|---|---|---|---|---|---|---|---|---|---|---|
| 1A [1] | TB2-1,2 | I1U | 56 | 1 ★ | 1 | YES | | 15 | | S |
| | - | J4U | 48 | 26 ★ | 6 | YES | | | | S |
| 2A | TB2-5,6 | I2U | 39 | 2 | 2 | YES | | | | S |
| 3A | TB4-5,6 | I5U | 58 | 3 | 3 | YES | | 3 | | S |
| 4A | TB4-9,10 | I6U | 41 | 4 | 4 | YES | | 3 | | S |
| 6A | TB3-5,6 | J2U | 40 | 6 | 6 | YES | | | | S |

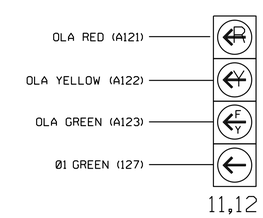
[1] Add jumper from I1-W to J4-W. on rear of input file.

★ For the detectors to work as shown on the signal design plan, see the Vehicle Detector Setup Programming Detail for Alternate Phasing on sheets 2 and 3.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

## FYA SIGNAL WIRING DETAIL

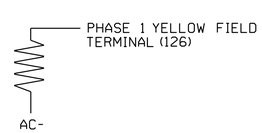
*(wire signal heads as shown)*




## LOAD RESISTOR INSTALLATION DETAIL

*(install resistor as shown)*

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




THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-2465
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:

US 15 / 501 Bus. (Univ. Dr.)
at
Summit St./
Forestwood Dr.

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. 05-2465

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750 N.Greenfield Pkwy,Garner,NC 27529

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| PROJECT REFERENCE NO. | SHEET NO. |
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| U-5968 | Sig-373.2 |

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

*(program controller as shown)*

## IMPORTANT!

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

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

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

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

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

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

← NOTICE VEH DET PLAN 2

← ENSURE DELAY IS SET TO '3'

↓

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

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

← NOTICE VEH DET PLAN 2

ENSURE PHASE IS SET TO "0" →

END PROGRAMMING

# ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

*(program controller as shown)*

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

*OVERLAP A*

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

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

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

FLASHING ARROW OUTPUT.....CH9  ISOLATE

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

← NOTICE ACTION PLAN SF BIT "1"

END PROGRAMMING

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-2465
DESIGNED: Dec 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail
Sheet 2 of 3

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ELECTRICAL AND PROGRAMMING DETAILS FOR:

US 15 / 501 Bus. (Univ. Dr.)
at
Summit St./
Forestwood Dr.

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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www.rameykemp.com

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

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32396 ENGINEER WILLIAM J. HAMILTON

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

SIG. INVENTORY NO. 05-2465

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| U-5968 | Sig-373.3 |

# 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.

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

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

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

## ALTERNATE PHASING CHANGE SUMMARY

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

SF BIT 1: Modifies overlap parent phases for heads 11 and 12 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.

# 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: 05-2465
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:

US 15 / 501 Bus. (Univ. Dr.)
at
Summit St./
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Division 5 Durham County Durham

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

| REVISIONS | INIT. | DATE |
|---|---|---|
| | | |

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32396 ENGINEER WILLIAM J. HAMILTON

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

SIG. INVENTORY NO. 05-2465

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750 N.Greenfield Pkwy,Garner,NC 27529

12/17/2018
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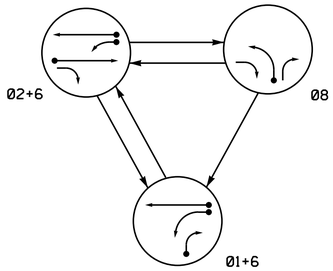
User:tpopelka

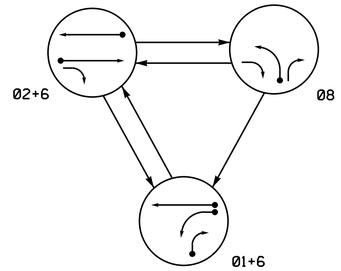
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-5968 | Sig.374.0 |

## DEFAULT PHASING DIAGRAM




| DEFAULT PHASING TABLE OF OPERATION | | | | |
|---|---|---|---|---|
| SIGNAL FACE | PHASE 01+6 | 02+6 | 08 | FLASH |
| 11 | — | ~~F Y~~ | ~~R~~ | ~~Y~~ |
| 21 | R | G | R | Y |
| 22 | R | G | R/— | Y |
| 61,62 | G | G | R | Y |
| 81,82 | ~~R~~ | ~~R~~ | — | ~~R~~ |
| 83 | — | R | — | R |

## ALTERNATE PHASING DIAGRAM




| ALTERNATE PHASING TABLE OF OPERATION | | | | |
|---|---|---|---|---|
| SIGNAL FACE | PHASE 01+6 | 02+6 | 08 | FLASH |
| 11 | — | ~~R~~ | ~~R~~ | ~~Y~~ |
| 21 | R | G | R | Y |
| 22 | R | G | R/— | Y |
| 61,62 | G | G | R | Y |
| 81,82 | ~~R~~ | ~~R~~ | — | ~~R~~ |
| 83 | — | R | — | R |

| ASC/3 DETECTOR INSTALLATION CHART | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DETECTOR | | | | | PROGRAMMING | | | | | | | |
| LOOP | SIZE (FT) | DISTANCE FROM STOPBAR (FT) | TURNS | NEW LOOP | PHASE | CALLING | EXTEND TIME | DELAY TIME | USE ADDED INITIAL | TYPE | SYSTEM LOOP | NEW CARD |
| 1A | 6X60 | +5 | EXIST | - | 1 | Yes | - | 15* | - | S | - | X |
| | | | | | 6# | Yes | - | - | - | S | - | X |
| 1B | 6X60 | +5 | EXIST | - | 1 | Yes | - | 15 | - | S | - | X |
| 1C | 6X15 | +5 | EXIST | - | 1 | Yes | - | 15 | - | S | - | X |
| 2A | 6X6 | 330 | EXIST | - | 2 | Yes | 2.1 | - | - | S | - | X |
| 2B | 6X8 | 90 | EXIST | - | 2 | Yes | - | - | - | S | - | X |
| 6A | 6X6 | 330 | EXIST | - | 6 | Yes | 2.1 | - | - | S | - | X |
| 6B | 6X6 | 90 | 4 | X | 6 | Yes | - | - | - | S | - | X |
| 8A | 6X60 | +5 | EXIST | - | 8 | Yes | - | 3 | - | S | - | X |

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

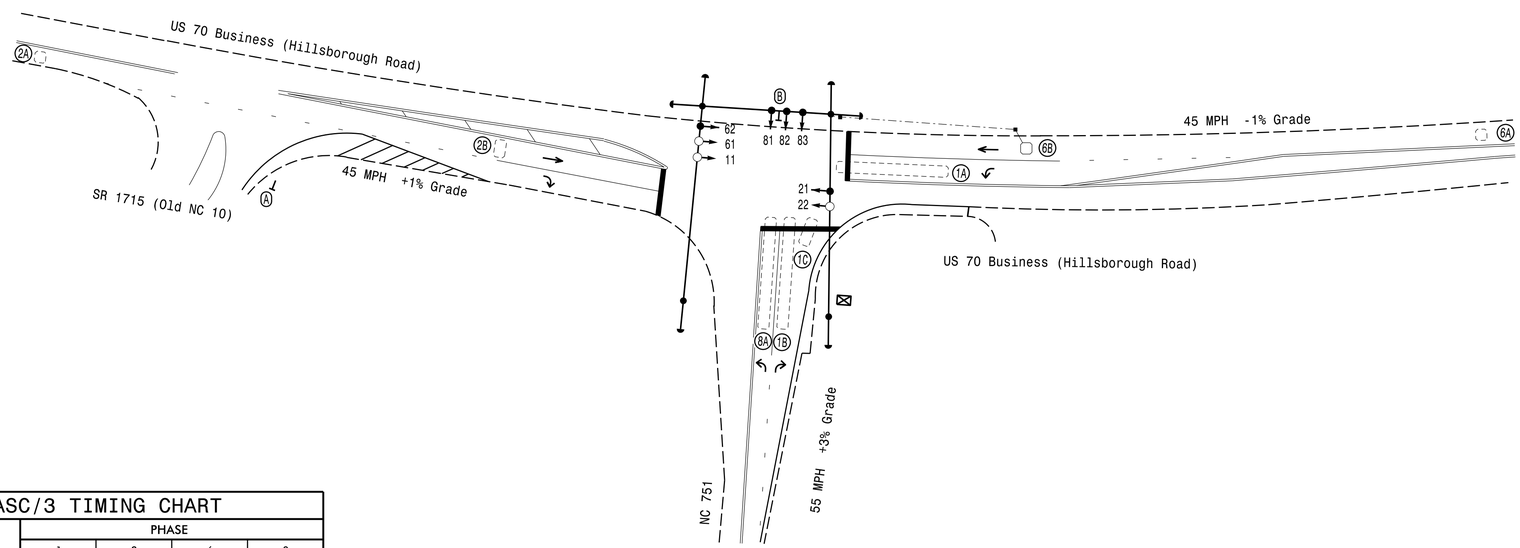
3 Phase
Fully Actuated
(Durham Signal System)

## NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 may be lagged.
4. Set all detector units to presence mode.
5. In the event of loop replacement, refer to the current ITS and Signals Design Manual and submit a Plan of Record to the Signal Design Section.
6. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
7. Remove existing "Right Turn Signal" sign (R10-10R).
8. Pavement markings are existing.
9. The Division (City) Traffic Engineer will determine the hours of use for each phasing plan.
10. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
11. Loop data based on previous plan and/or field observations.
12. Install new cabinet on the existing cabinet foundation.

PHASING DIAGRAM DETECTION LEGEND

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




## LEGEND

| PROPOSED | | EXISTING |
|---|---|---|
| | Traffic Signal Head | |
| | Modified Signal Head | N/A |
| | Sign | |
| | Pedestrian Signal Head With Push Button & Sign | |
| | Signal Pole with Guy | |
| | Signal Pole with Sidewalk Guy | |
| | Inductive Loop Detector | |
| | Controller & Cabinet | |
| | Junction Box | |
| | 2-in Underground Conduit | |
| N/A | Right of Way | |
| | Directional Arrow | |
| A | "STOP" Sign (R1-1) | A |
| B | Left Arrow "Only" Sign (R3-5L) | B |

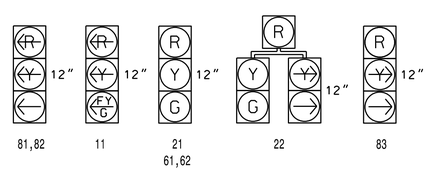
| ASC/3 TIMING CHART | | | | |
|---|---|---|---|---|
| FEATURE | PHASE 1 | 2 | 6 | 8 |
| Min Green * | 7 | 12 | 12 | 7 |
| Walk * | 0 | 0 | 0 | 0 |
| Ped Clear | 0 | 0 | 0 | 0 |
| Veh. Extension * | 1.0 | 2.0 | 2.0 | 1.0 |
| Max 1 * | 15 | 45 | 45 | 25 |
| Yellow | 3.0 | 4.6 | 4.6 | 3.0 |
| Red Clear | 2.1 | 1.3 | 1.3 | 1.9 |
| Actuations B4 Add * | - | - | - | - |
| Seconds /Actuation * | - | - | - | - |
| Max Initial * | - | - | - | - |
| Time Before Reduction * | - | - | - | - |
| Time To Reduce * | - | - | - | - |
| Minimum Gap | - | - | - | - |
| Locking Detector | - | X | X | - |
| Recall Position | - | VEH. RECALL | VEH. RECALL | - |
| Dual Entry | - | - | - | - |
| Simultaneous Gap | X | X | X | X |

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

## SIGNAL FACE I.D.

All Heads L.E.D.

FY G = Bimodal Section




Project #: 170905

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Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

US 70 Bus. (Hillsborough Road)
at
NC 751

Division 7 Orange County West of Durham

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

SCALE 0 40 1"=40'

| REVISIONS | INIT. | DATE |
|---|---|---|
| | | |

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NORTH CAROLINA PROFESSIONAL SEAL 032117 ENGINEER ROYAL HINSHAW

DocuSigned by: R. Royal Hinshaw 12/21/2018
SIGNATURE DATE

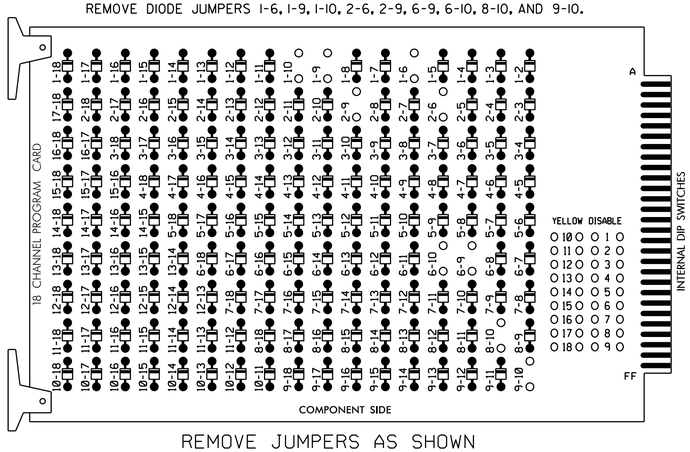
SIG. INVENTORY NO. 07-0886

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-5968 | Sig.374.1 |

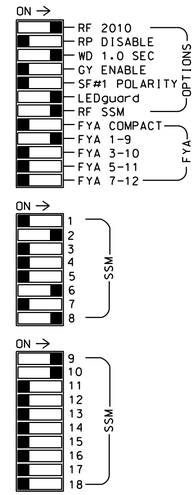
# EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

*(remove jumpers and set switches as shown)*

REMOVE DIODE JUMPERS 1-6, 1-9, 1-10, 2-6, 2-9, 6-9, 6-10, 8-10, AND 9-10.




REMOVE JUMPERS AS SHOWN




NOTES:

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

## NOTES

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

## 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,S8,S11,AUX S1,AUX S2
PHASES USED.....1,2,6,8
OVERLAP "A".....*
OVERLAP "B".....*
OVERLAP "C".....NOT USED
OVERLAP "D".....NOT USED

* See overlap programming detail on sheet 2

## SIGNAL HEAD HOOK-UP CHART

| LOAD SWITCH NO. | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | | S12 | AUX S1 | AUX S2 | AUX S3 | AUX S4 | AUX S5 | AUX S6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CMU CHANNEL NO. | 1 | 2 | 13 | 3 | 4 | 14 | 5 | 6 | 15 | 7 | 8 | | 16 | 9 | 10 | 17 | 11 | 12 | 18 |
| PHASE | 1 | 2 | 2 PED | 3 | 4 | 4 PED | 5 | 6 | 6 PED | 7 | 8 | | 8 PED | OLA | OLB | SPARE | OLC | OLD | SPARE |
| SIGNAL HEAD NO. | 11 ★ | 21,22 | NU | NU | NU | NU | NU | 61,62 | NU | NU | 81,82 | 22 | NU | 11 ★ | 83 | NU | NU | NU | NU |
| RED | | 128 | | | | | | 134 | | | | | | | A124 | | | | |
| YELLOW | * | 129 | | | | | | 135 | | | | | | | | | | | |
| GREEN | | 130 | | | | | | 136 | | | | | | | | | | | |
| RED ARROW | | | | | | | | | | | 107 | | | A121 | | | | | |
| YELLOW ARROW | | | | | | | | | | | 108 | 108 | | A122 | A125 | | | | |
| FLASHING YELLOW ARROW | | | | | | | | | | | | | | A123 | | | | | |
| GREEN ARROW | 127 | | | | | | | | | | 109 | 109 | | | A126 | | | | |

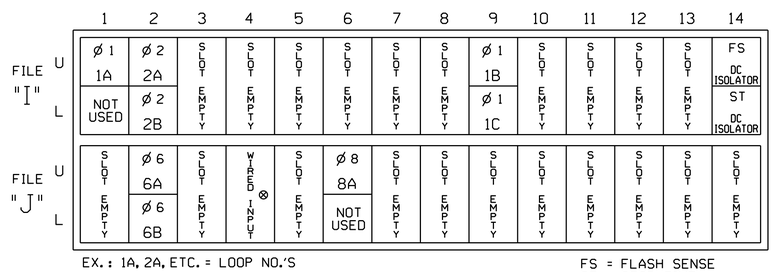
NU = Not Used

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

★ See pictorial of head wiring in detail this sheet.

## INPUT FILE POSITION LAYOUT

*(front view)*




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

FS = FLASH SENSE
ST = STOP TIME

⊗ Wired Input - Do not populate slot with detector card

## INPUT FILE CONNECTION & PROGRAMMING CHART

| LOOP NO. | LOOP TERMINAL | INPUT FILE POS. | PIN NO. | DETECTOR NO. | NEMA PHASE | CALL | EXTEND TIME | DELAY TIME | ADDED INITIAL | DETECTOR TYPE |
|---|---|---|---|---|---|---|---|---|---|---|
| 1A [1] | TB2-1,2 | I1U | 56 | 1 ★ | 1 | YES | - | 15 | - | S |
| | - | J4U | 48 | 26 ★ | 6 | YES | - | - | - | S |
| 1B | TB6-9,10 | I9U | 60 | 11 | 1 | YES | - | 15 | - | S |
| 1C | TB6-11,12 | I9L | 62 | 13 | 1 | YES | - | 15 | - | S |
| 2A | TB2-5,6 | I2U | 39 | 2 | 2 | YES | 2.1 | - | - | S |
| 2B | TB2-7,8 | I2L | 43 | 12 | 2 | YES | - | - | - | S |
| 6A | TB3-5,6 | J2U | 40 | 6 | 6 | YES | 2.1 | - | - | S |
| 6B | TB3-7,8 | J2L | 44 | 16 | 6 | YES | - | - | - | S |
| 8A | TB5-9,10 | J6U | 42 | 8 | 8 | YES | - | 3 | - | S |

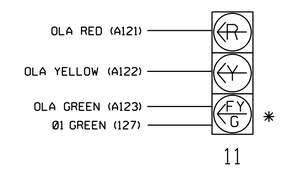
[1] Add jumper from I1-W to J4-W, on rear of input file.

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

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

## FYA SIGNAL WIRING DETAIL

*(wire signal head as shown)*



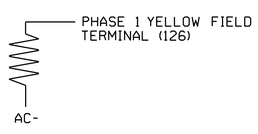

* Bimodal Section

## LOAD RESISTOR INSTALLATION DETAIL

*(install resistors as shown)*

ACCEPTABLE VALUES

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




THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-0886
DESIGNED: December 2018
SEALED: 12/21/2018
REVISED: N/A

Project #: 170905

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Electrical Detail - Sheet 1 of 3

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ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

US 70 Bus. (Hillsborough Road)
at
NC 751

Division 7 Orange County West of Durham

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

| REVISIONS | INIT. | DATE |
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| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-5968 | Sig.374.2 |

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

*(program controller as shown)*

## IMPORTANT!

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

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

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

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

- Place cursor in VEH DETECTOR [ ] position and enter "1".
- Set delay time to "0.0" seconds.

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

← NOTICE VEH DET PLAN 2

← ENSURE DELAY IS SET TO '0.0'

↓

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

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

← NOTICE VEH DET PLAN 2

ENSURE PHASE IS SET TO "0" →

END PROGRAMMING

# ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

*(program controller as shown)*

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

*OVERLAP A*

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

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

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

FLASHING ARROW OUTPUT.....CH9  ISOLATE

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

← NOTICE ACTION PLAN SF BIT "1"

↓

*OVERLAP B*

Select TMG VEH OVLP [B] and 'NORMAL'

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

LAG GRN 0.0 YEL 0.0 RED 0.0
```

END PROGRAMMING

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-0886
DESIGNED: December 2018
SEALED: 12/21/2018
REVISED: N/A

Project #: 170905

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Electrical Detail - Sheet 2 of 3

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ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for: NC Department of Transportation Mobility and Safety Division, Traffic Engineering & Signals Management Section

750 N.Greenfield Pkwy,Garner,NC 27529

US 70 Bus. (Hillsborough Road)
at
NC 751

Division 7 | Orange County | West of Durham

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

| REVISIONS | INIT. | DATE |
|---|---|---|
| | | |
| | | |
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DocuSigned by: R Royal Hinshaw 12/21/2018
SIGNATURE DATE

SIG. INVENTORY NO. 07-0886

# ALTERNATE PHASING ACTIVATION DETAIL

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

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

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

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

## ALTERNATE PHASING CHANGE SUMMARY

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

SF BIT 1: Modifies overlap parent phase for head 11 to run protected turns only.

VEH DET PLAN 2: Disables phase 6 call on loop 1A and reduces delay time for phase 1 call on loop 1A to 0.0 seconds.

# 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 .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
```

Electrical Detail - Sheet 3 of 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 07-0886
DESIGNED: December 2018
SEALED: 12/21/2018
REVISED: N/A

Project #: 170905


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ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

750 N.Greenfield Pkwy,Garner,NC 27529

US 70 Bus. (Hillsborough Road)
at
NC 751

Division 7 Orange County West of Durham

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

| REVISIONS | INIT. | DATE |
|---|---|---|
| | | |

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 032117 ENGINEER ROYAL HINSHAW

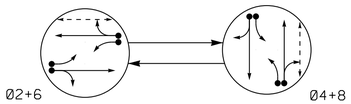
DocuSigned by: Royal Hinshaw 12/21/2018
SIGNATURE DATE

SIG. INVENTORY NO. 07-0886

DocuSign Envelope ID: 951D9A12-2460-4213-A071-EDF4330949F9

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-5968 | SIG.375.0 |

## PHASING DIAGRAM

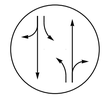



PHASING DIAGRAM DETECTION LEGEND

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

## EV PREEMPT PHASES

(Medium Priority)



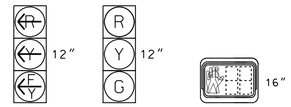
PRE 3
(Ø4+8)

## TABLE OF OPERATION

| SIGNAL FACE | PHASE Ø2+6 | PHASE Ø4+8 | PHASE PRE3 | FLASH |
|---|---|---|---|---|
| 21 | ~~F Y~~ | ~~R~~ | ~~R~~ | ~~Y~~ |
| 22,23,24 | G | R | R | Y |
| 41 | ~~R~~ | ~~F Y~~ | ~~F Y~~ | ~~R~~ |
| 42,43 | R | G | G | R |
| 61 | ~~F Y~~ | ~~R~~ | ~~R~~ | ~~Y~~ |
| 62,63 | G | R | R | Y |
| 81 | ~~R~~ | ~~F Y~~ | ~~F Y~~ | ~~R~~ |
| 82,83 | R | G | G | R |

## SIGNAL FACE I.D.

All Heads L.E.D.




| | | |
|---|---|---|
| 21 | 22,23,24 | P61,P62 |
| 41 | 42,43 | P81,P82 |
| 61 | 62,63 | |
| 81 | 82,83 | |

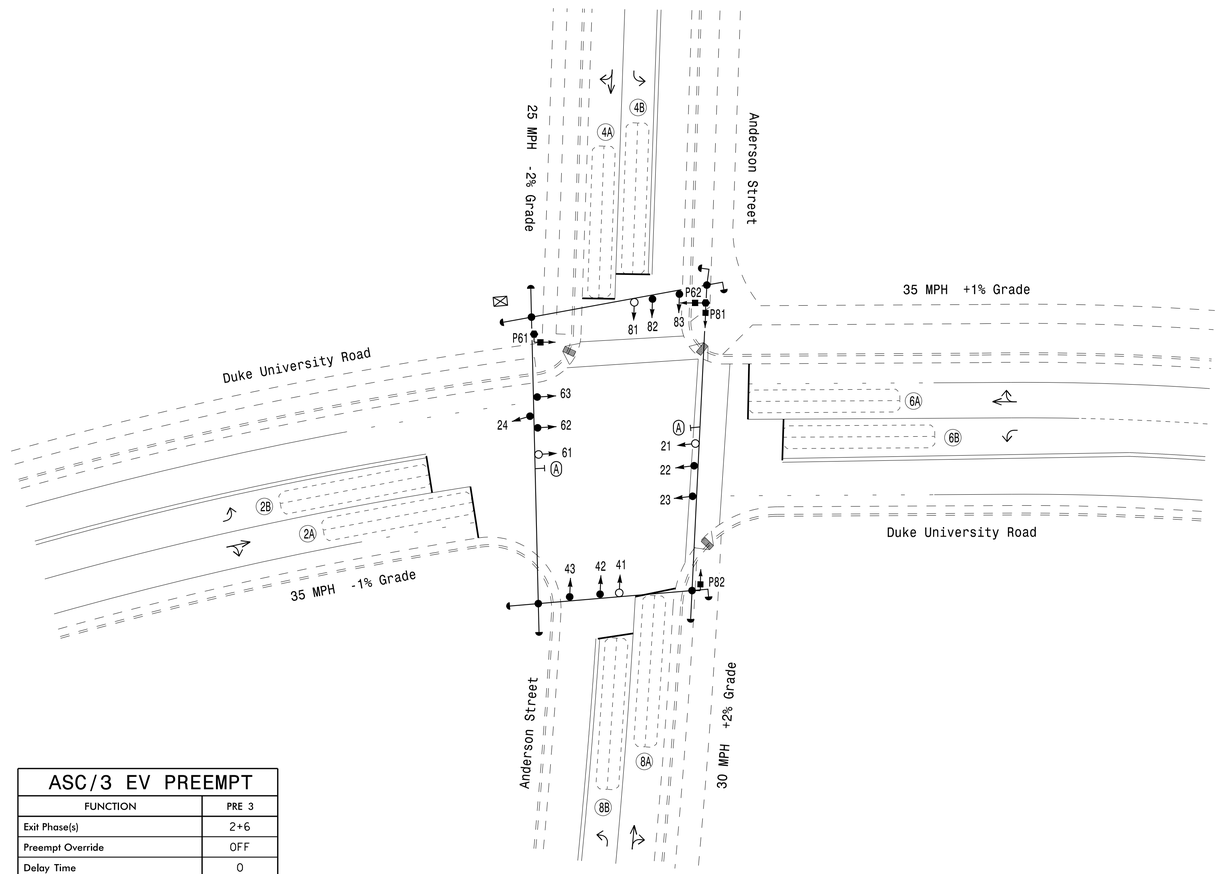
## ASC/3 DETECTOR INSTALLATION CHART

| DETECTOR | | | | | PROGRAMMING | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LOOP | SIZE (FT) | DISTANCE FROM STOPBAR (FT) | TURNS | NEW LOOP | PHASE | CALLING | EXTEND TIME | DELAY TIME | USE ADDED INITIAL | TYPE | SYSTEM LOOP | NEW CARD |
| 2A | 6X40 | 0 | 2-4-2 | - | 2 | Yes | - | - | - | S | - | X |
| 2B | 6X40 | 0 | 2-4-2 | - | 2 | Yes | - | - | - | S | - | X |
| 4A | 6X40 | 0 | 2-4-2 | - | 4 | Yes | - | 10 | - | S | - | X |
| 4B | 6X40 | 0 | 2-4-2 | - | 4 | Yes | - | 3 | - | S | - | X |
| 6A | 6X40 | 0 | 2-4-2 | - | 6 | Yes | - | - | - | S | - | X |
| 6B | 6X40 | 0 | 2-4-2 | - | 6 | Yes | - | - | - | S | - | X |
| 8A | 6X40 | 0 | 2-4-2 | - | 8 | Yes | - | 10 | - | S | - | X |
| 8B | 6X40 | 0 | 2-4-2 | - | 8 | Yes | - | 3 | - | S | - | X |

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

## NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Reposition existing signal heads numbered 22, 23, 42, 43, 62, 63, 82, and 83.
4. Set all detector units to presence mode.
5. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
6. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
7. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
8. Pavement markings are existing.
9. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
10. Loop data based on previous plan and/or field observations.
11. Install new cabinet on the existing cabinet foundation.
12. Existing signal heads 21, 22, 23, 41, 42, 61, 62, 81, and 82, have been relabeled to 22, 23, 24, 42, 43, 62, 63, 82, and 83, respectively.
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.
15. Existing Left Arrow "ONLY" Sign (R3-5L) may be removed at the discretion of the Regional Traffic Engineer.




## 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 | |
| | Inductive Loop Detector | |
| | Controller & Cabinet | |
| | Junction Box | |
| | 2-in Underground Conduit | |
| N/A | Right of Way | |
| | Directional Arrow | |
| N/A | Curb Ramp | |
| A | Left Arrow "ONLY" Sign (R3-5L) | A |

## ASC/3 TIMING CHART

| FEATURE | PHASE 2 | PHASE 4 | PHASE 6 | PHASE 8 |
|---|---|---|---|---|
| Min Green * | 10 | 7 | 10 | 7 |
| Walk * | 0 | 0 | 7 | 7 |
| Ped Clear | 0 | 0 | 7 | 13 |
| Veh. Extension * | 2.0 | 2.0 | 2.0 | 2.0 |
| Max 1 * | 40 | 30 | 40 | 30 |
| Yellow | 3.9 | 3.4 | 3.9 | 3.4 |
| Red Clear | 1.5 | 1.7 | 1.5 | 1.7 |
| Actuations B4 Add * | - | - | - | - |
| Seconds /Actuation * | - | - | - | - |
| Max Initial * | - | - | - | - |
| Time Before Reduction * | - | - | - | - |
| Time To Reduce * | - | - | - | - |
| Minimum Gap | - | - | - | - |
| Locking Detector | X | - | X | - |
| Recall Position | VEH. RECALL | - | VEH. RECALL | - |
| Dual Entry | - | X | - | X |
| Simultaneous Gap | X | X | X | X |

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

## ASC/3 EV PREEMPT

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

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

Signal Upgrade

**DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED**

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

DURHAM
1869
CITY OF MEDICINE

SCALE 0 20
1"=20'

# Duke University Road at Anderson Street

Division 5 Durham County Durham

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

| REVISIONS | INIT. | DATE |
|---|---|---|
| | | |

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACIE L. PHILLIPS

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

SIG. INVENTORY NO. D-0055

12/19/2018
k:\raln\duke\u-5968_its\011036410 - Durham Signal System\Signals\S4 - Signal Design\GROUP 5\U-5968_D0055-2018.dgn
derrick.waller

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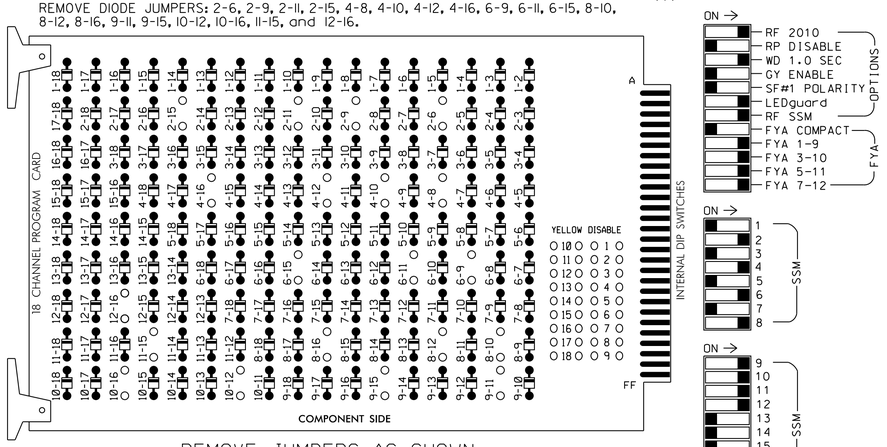
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-5968 | SIG.375.1 |

# EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

*(remove jumpers and set switches as shown)*




REMOVE JUMPERS AS SHOWN

■ = DENOTES POSITION OF SWITCH

NOTES:

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

## NOTES

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

## EQUIPMENT INFORMATION

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

* See overlap programming detail on sheet 2

## SIGNAL HEAD HOOK-UP CHART

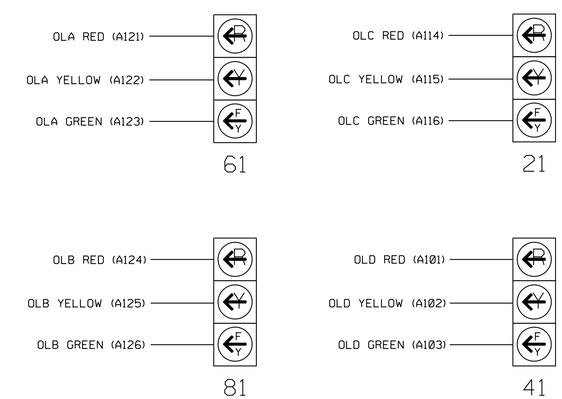
| LOAD SWITCH NO. | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 | AUX S1 | AUX S2 | AUX S3 | AUX S4 | AUX S5 | AUX S6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CMU CHANNEL NO. | 1 | 2 | 13 | 3 | 4 | 14 | 5 | 6 | 15 | 7 | 8 | 16 | 9 | 10 | 17 | 11 | 12 | 18 |
| PHASE | 1 | 2 | 2 PED | 3 | 4 | 4 PED | 5 | 6 | 6 PED | 7 | 8 | 8 PED | OLA | OLB | SPARE | OLC | OLD | SPARE |
| SIGNAL HEAD NO. | NU | 22,23, 24 | NU | NU | 42,43 | NU | NU | 62,63 | P61, P62 | NU | 82,83 | P81, P82 | 61 ★ | 81 ★ | NU | 21 ★ | 41 ★ | NU |
| RED | | 128 | | | 101 | | | 134 | | | 107 | | | | | | | |
| YELLOW | | 129 | | | 102 | | | 135 | | | 108 | | | | | | | |
| GREEN | | 130 | | | 103 | | | 136 | | | 109 | | | | | | | |
| RED ARROW | | | | | | | | | | | | | A121 | A124 | | A114 | A101 | |
| YELLOW ARROW | | | | | | | | | | | | | A122 | A125 | | A115 | A102 | |
| FLASHING YELLOW ARROW | | | | | | | | | | | | | A123 | A126 | | A116 | A103 | |
| GREEN ARROW | | | | | | | | | | | | | | | | | | |
| ✋ | | | | | | | | | 119 | | | 110 | | | | | | |
| 🚶 | | | | | | | | | 121 | | | 112 | | | | | | |

NU = Not Used

★ See pictorial of head wiring in detail this sheet.

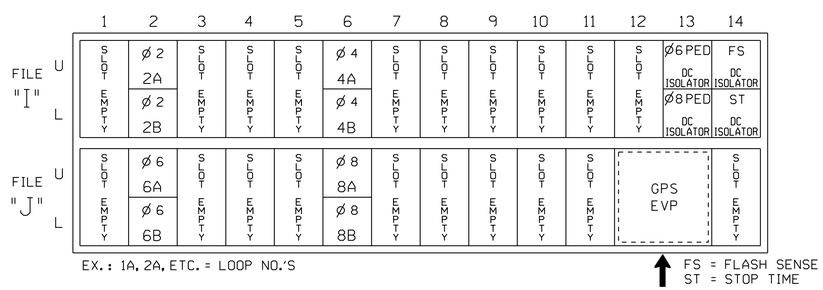
## FYA SIGNAL WIRING DETAIL

*(wire signal heads as shown)*




## INPUT FILE POSITION LAYOUT

*(front view)*




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

FS = FLASH SENSE
ST = STOP TIME

CONNECT PHASE SELECTOR TO FIELD ETHERNET SWITCH

## INPUT FILE CONNECTION & PROGRAMMING CHART

| LOOP NO. | LOOP TERMINAL | INPUT FILE POS. | PIN NO. | DETECTOR NO. | NEMA PHASE | CALL | EXTEND TIME | DELAY TIME | ADDED INITIAL | DETECTOR TYPE |
|---|---|---|---|---|---|---|---|---|---|---|
| 2A | TB2-5,6 | I2U | 39 | 2 | 2 | YES | | | | S |
| 2B | TB2-7,8 | I2L | 43 | 12 | 2 | YES | | | | S |
| 4A | TB4-9,10 | I6U | 41 | 4 | 4 | YES | | 10 | | S |
| 4B | TB4-11,12 | I6L | 45 | 14 | 4 | YES | | 3 | | S |
| 6A | TB3-5,6 | J2U | 40 | 6 | 6 | YES | | | | S |
| 6B | TB3-7,8 | J2L | 44 | 16 | 6 | YES | | | | S |
| 8A | TB5-9,10 | J6U | 42 | 8 | 8 | YES | | 10 | | S |
| 8B | TB5-11,12 | J6L | 46 | 18 | 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: D-0055
DESIGNED: APRIL 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:

DURHAM
1869
CITY OF MEDICINE

Duke University Road
at
Anderson Street

Division 5 Durham County Durham

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

| REVISIONS | INIT. | DATE |
|---|---|---|
| | | |

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACIE L. PHILLIPS
DocuSigned by: 0C87A56ED9D8437...
12/19/2018
SIGNATURE DATE
SIG. INVENTORY NO. D-0055

PLANS PREPARED IN THE OFFICE OF:
Kimley»Horn
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12/19/2018
K:\HAL_TPDM_LTS\011036410 - Durham Signal System\Signals\S4 - Signal Design\GROUP 5\U-5968_D0055-2018e1.dgn
derrick.waller

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| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-5968 | SIG.375.2 |

# ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

*(program controller as shown)*

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

*OVERLAP A*

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

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

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

Toggle Once

↓

*OVERLAP B*

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

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

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

Toggle Once

↓

*OVERLAP C*

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

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

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

Toggle Once

↓

*OVERLAP D*

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

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

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

END PROGRAMMING

# ECONOLITE ASC/3-2070 EMERGENCY VEHICLE PREEMPT PROGRAMMING DETAIL

*(program controller as shown)*

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

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

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

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

PROGRAM EXTEND TIME ON GPS DETECTOR UNITS FOR 2.0 SEC.

# COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

# ECONOLITE ASC/3-2070 PREEMPT FILTERING PROGRAMMING DETAIL

*(program controller as shown)*

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

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: D-0055
DESIGNED: APRIL 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:

DURHAM
1869
CITY OF MEDICINE

Duke University Road
at
Anderson Street

Division 5 Durham County Durham

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

| REVISIONS | INIT. | DATE |
|---|---|---|
| | | |

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACIE L. PHILLIPS

DocuSigned by: 0C87A5BE0408437...
12/19/2018
SIGNATURE DATE

SIG. INVENTORY NO. D-0055

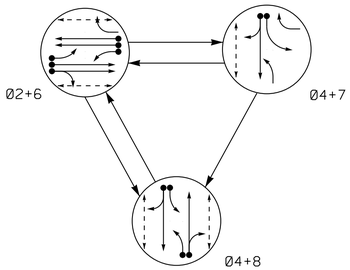
PLANS PREPARED IN THE OFFICE OF:
Kimley»Horn
NC License #F-0102
421 Fayetteville Street, Suite 600
Raleigh, NC 27601
(919) 677-2000

12/19/2018
K:\4BAL_TPD\Durham\Signals\54 - Signal Design\GROUP 5\U-5968.D0055-2018e2.dgn
derrick.waller

DocuSign Envelope ID: 951D9A12-2460-4213-A071-EDF4330949F9

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-5968 | SIG.376.0 |

## DEFAULT PHASING DIAGRAM




## DEFAULT PHASING EV PREEMPT PHASES

(Medium Priority)

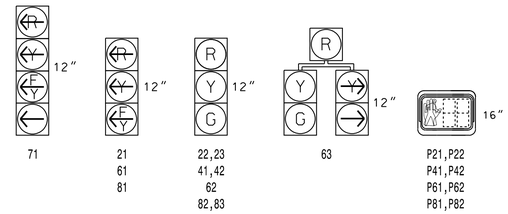
PRE 3
(Ø2+6)

## DEFAULT PHASING TABLE OF OPERATION

| SIGNAL FACE | PHASE 02+6 | 04+7 | 04+8 | PRE 3 | FLASH |
|---|---|---|---|---|---|
| 21 | ~~F Y~~ | ~~R~~ | ~~R~~ | ~~F Y~~ | ~~Y~~ |
| 22,23 | G | R | R | G | Y |
| 41,42 | R | G | G | R | R |
| 61 | ~~F Y~~ | ~~R~~ | ~~R~~ | ~~F Y~~ | ~~Y~~ |
| 62 | G | R | R | G | Y |
| 63 | G | R/— | R | G | Y |
| 71 | ~~R~~ | ~~—~~ | ~~F Y~~ | ~~R~~ | ~~R~~ |
| 81 | ~~R~~ | ~~F Y~~ | ~~F Y~~ | ~~R~~ | ~~R~~ |
| 82,83 | R | R | G | R | R |
| P21,P22 | W | DW | DW | DW | DRK |
| P41,P42 | DW | W | W | DW | DRK |
| P61,P62 | W | DW | DW | DW | DRK |
| P81,P82 | DW | DW | W | DW | DRK |

## SIGNAL FACE I.D.

All Heads L.E.D.




## ASC/3 DETECTOR INSTALLATION CHART

| DETECTOR | | | | | PROGRAMMING | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LOOP | SIZE (FT) | DISTANCE FROM STOPBAR (FT) | TURNS | NEW LOOP | PHASE | CALLING | EXTEND TIME | DELAY TIME | USE ADDED INITIAL | TYPE | SYSTEM LOOP | NEW CARD |
| 2A | 6X60 | 0 | 2-4-2 | - | 2 | Yes | - | - | - | S | - | X |
| 2B | 6X6 | 70 | EXIST | - | 2 | Yes | - | - | - | S | - | X |
| 2C | 6X6 | 70 | EXIST | - | 2 | Yes | - | - | - | S | - | X |
| 4A | 6X40 | 0 | 2-4-2 | - | 4 | Yes | - | 10 | - | S | - | X |
| 6A | 6X60 | 0 | 2-4-2 | - | 6 | Yes | - | - | - | S | - | X |
| 6B | 6X6 | 70 | EXIST | - | 6 | Yes | - | - | - | S | - | X |
| 6C | 6X6 | 70 | EXIST | - | 6 | Yes | - | - | - | S | - | X |
| 7A | 6X40 | 0 | 2-4-2 | - | 7 | Yes | - | 15* | - | S | - | X |
| | | | | | 4# | Yes | - | 3 | - | S | - | X |
| 8A | 6X40 | 0 | 2-4-2 | - | 8 | Yes | - | 3 | - | S | - | X |
| 8B | 6X40 | 0 | 2-4-2 | - | 8 | Yes | - | 10 | - | S | - | X |

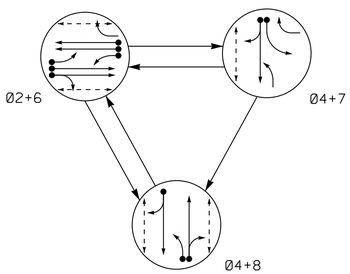
* Reduce Delay to 3 seconds during Alternate Phasing operation.
\# Disable Phase call for loop during Alternate Phasing operation.

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

## NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 7 may be lagged.
4. Reposition existing signal heads numbered 22, 23, 42, and 82.
5. Set all detector units to presence mode.
6. In the event of loop replacement, refer to the current ITS and Signal Design Manual and submit a Plan of Record to the Signal Design Section.
7. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
8. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls for phases 4 and 8.
9. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
10. Pavement markings are existing.
11. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
12. The Division (City) Traffic Engineer will determine the hours of use for each phasing plan.
13. Loop data based on previous plan and/or field observations.
14. Install new cabinet on the existing cabinet foundation.
15. Reconnect lead-in cable to separate loops 2B/2C & 6B/6C, as shown.
16. Existing signal heads 21, 22, 81, and 82, have been relabeled to 22, 23, 82, and 83, respectively.
17. Install GPS emergency preemption system per manufacturer's instructions to achieve preemption needed, as shown in phasing diagram.
18. Remove existing optical detection equipment.
19. Existing lane control signs may be removed at the discretion of the Regional Traffic Engineer.

## ALTERNATE PHASING DIAGRAM




## ALTERNATE PHASING EV PREEMPT PHASES

(Medium Priority)

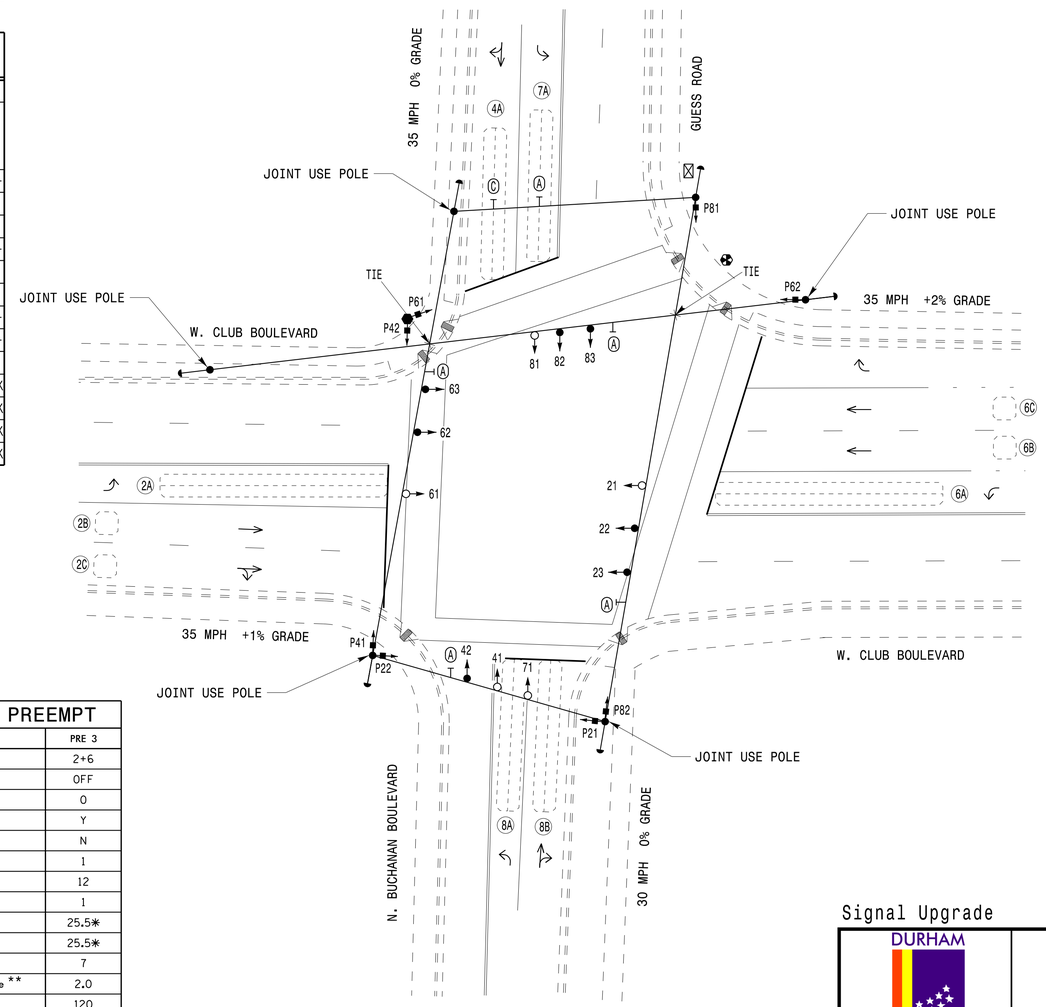
PRE 3
(Ø2+6)

## ALTERNATE PHASING TABLE OF OPERATION

| SIGNAL FACE | PHASE 02+6 | 04+7 | 04+8 | PRE 3 | FLASH |
|---|---|---|---|---|---|
| 21 | ~~F Y~~ | ~~R~~ | ~~R~~ | ~~F Y~~ | ~~Y~~ |
| 22,23 | G | R | R | G | Y |
| 41,42 | R | G | G | R | R |
| 61 | ~~F Y~~ | ~~R~~ | ~~R~~ | ~~F Y~~ | ~~Y~~ |
| 62 | G | R | R | G | Y |
| 63 | G | R/— | R | G | Y |
| 71 | ~~R~~ | ~~—~~ | ~~R~~ | ~~R~~ | ~~R~~ |
| 81 | ~~R~~ | ~~F Y~~ | ~~F Y~~ | ~~R~~ | ~~R~~ |
| 82,83 | R | R | G | R | R |
| P21,P22 | W | DW | DW | DW | DRK |
| P41,P42 | DW | W | W | DW | DRK |
| P61,P62 | W | DW | DW | DW | DRK |
| P81,P82 | DW | DW | W | DW | DRK |

PHASING DIAGRAM DETECTION LEGEND

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




## ASC/3 TIMING CHART

| FEATURE | PHASE 2 | 4 | 6 | 7 | 8 |
|---|---|---|---|---|---|
| Min Green * | 10 | 7 | 10 | 7 | 7 |
| Walk * | 7 | 7 | 7 | 0 | 7 |
| Ped Clear | 12 | 18 | 15 | 0 | 23 |
| Veh. Extension * | 3.0 | 2.0 | 3.0 | 2.0 | 2.0 |
| Max 1 * | 70 | 45 | 70 | 20 | 45 |
| Yellow | 3.8 | 3.8 | 3.8 | 3.0 | 3.8 |
| Red Clear | 1.9 | 2.3 | 1.9 | 2.6 | 2.3 |
| Actuations B4 Add * | - | - | - | - | - |
| Seconds /Actuation * | - | - | - | - | - |
| Max Initial * | - | - | - | - | - |
| Time Before Reduction * | - | - | - | - | - |
| Time To Reduce * | - | - | - | - | - |
| Minimum Gap | - | - | - | - | - |
| Locking Detector | X | - | X | - | - |
| Recall Position | MIN/PED RECALL | - | MIN/PED RECALL | - | - |
| Dual Entry | - | X | - | - | - |
| Simultaneous Gap | X | X | X | X | X |

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

## ASC/3 EV PREEMPT

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

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

## LEGEND

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

Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DURHAM 1869 CITY OF MEDICINE

W. Club Boulevard at N. Buchanan Boulevard/ Guess Road

Division 5 Durham County Durham

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

| REVISIONS | INIT. | DATE |
|---|---|---|
| | | |

SCALE 0 20 1"=20'

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

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACEY L. PHILLIPS

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

SIG. INVENTORY NO. D-0074

12/19/2018
kfarley1 USER
ITS#01103610 - Durham Signal System&Signals#54 - Signal Design#GROUP 5#U-5968_D0074-2018.dgn
derrick.waller

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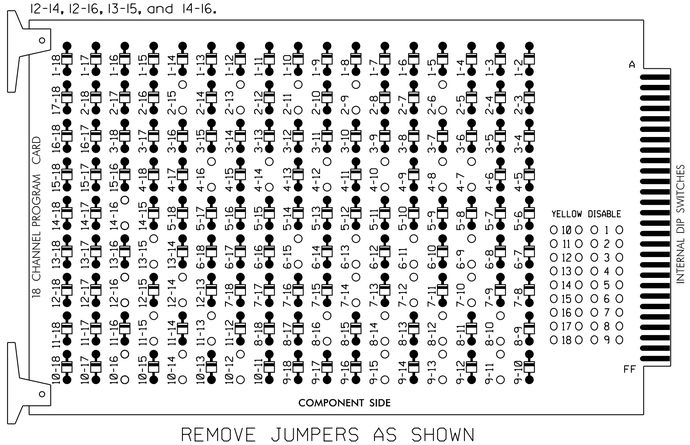
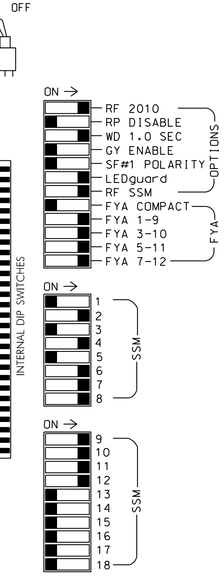
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-5968 | SIG.376.1 |

# EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

*(remove jumpers and set switches as shown)*

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




REMOVE JUMPERS AS SHOWN

NOTES:

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

## NOTES

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

## EQUIPMENT INFORMATION

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

* See overlap programming detail on sheet 2

## SIGNAL HEAD HOOK-UP CHART

| LOAD SWITCH NO. | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | | S11 | S12 | AUX S1 | AUX S2 | AUX S3 | AUX S4 | AUX S5 | AUX S6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CMU CHANNEL NO. | 1 | 2 | 13 | 3 | 4 | 14 | 5 | 6 | 15 | 7 | | 8 | 16 | 9 | 10 | 17 | 11 | 12 | 18 |
| PHASE | 1 | 2 | 2 PED | 3 | 4 | 4 PED | 5 | 6 | 6 PED | 7 | | 8 | 8 PED | OLA | OLB | SPARE | OLC | OLD | SPARE |
| SIGNAL HEAD NO. | NU | 22,23 | P21, P22 | NU | 41,42 | P41, P42 | NU | 62,63 | P61, P62 | 63 | 71★ | 82,83 | P81, P82 | 61★ | 81★ | NU | 21★ | 71★ | NU |
| RED | | 128 | | | 101 | | | 134 | | * | | 107 | | | | | | | |
| YELLOW | | 129 | | | 102 | | | 135 | | | | 108 | | | | | | | |
| GREEN | | 130 | | | 103 | | | 136 | | | | 109 | | | | | | | |
| RED ARROW | | | | | | | | | | | | | | A121 | A124 | | A114 | A101 | |
| YELLOW ARROW | | | | | | | | | | 123 | | | | A122 | A125 | | A115 | A102 | |
| FLASHING YELLOW ARROW | | | | | | | | | | | | | | A123 | A126 | | A116 | A103 | |
| GREEN ARROW | | | | | | | | | 124 | 124 | | | | | | | | | |
| ✋ | | | 113 | | | 104 | | | 119 | | | | 110 | | | | | | |
| 🚶 | | | 115 | | | 106 | | | 121 | | | | 112 | | | | | | |

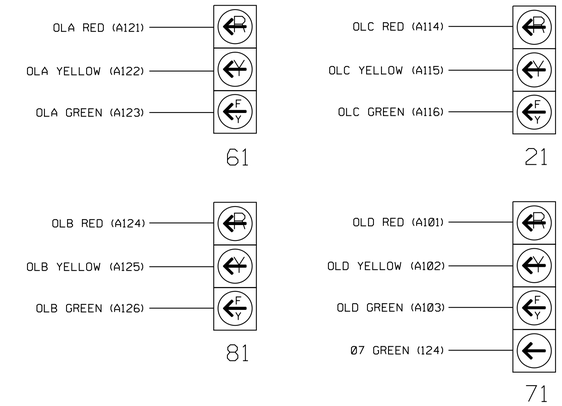
NU = Not Used

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

★ See pictorial of head wiring in detail this sheet.

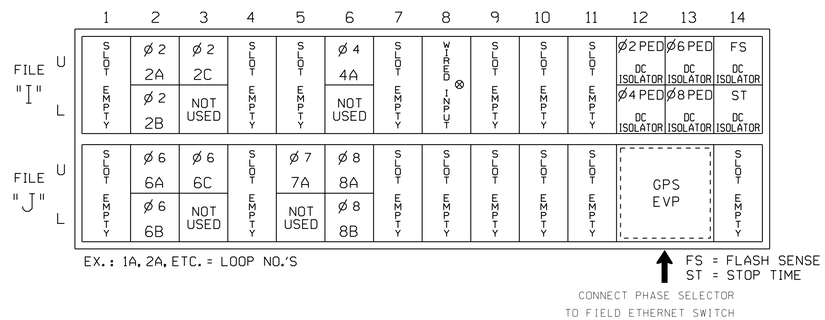
## FYA SIGNAL WIRING DETAIL

*(wire signal heads as shown)*




## INPUT FILE POSITION LAYOUT

*(front view)*




⊗ Wired Input - Do not populate slot with detector card

## INPUT FILE CONNECTION & PROGRAMMING CHART

| LOOP NO. | LOOP TERMINAL | INPUT FILE POS. | PIN NO. | DETECTOR NO. | NEMA PHASE | CALL | EXTEND TIME | DELAY TIME | ADDED INITIAL | DETECTOR TYPE |
|---|---|---|---|---|---|---|---|---|---|---|
| 2A | TB2-5,6 | I2U | 39 | 2 | 2 | YES | | | | S |
| 2B | TB2-7,8 | I2L | 43 | 12 | 2 | YES | | | | S |
| 2C | TB2-9,10 | I3U | 63 | 32 | 2 | YES | | | | S |
| 4A | TB4-9,10 | I6U | 41 | 4 | 4 | YES | | 10 | | S |
| 6A | TB3-5,6 | J2U | 40 | 6 | 6 | YES | | | | S |
| 6B | TB3-7,8 | J2L | 44 | 16 | 6 | YES | | | | S |
| 6C | TB3-9,10 | J3U | 64 | 36 | 6 | YES | | | | S |
| 7A[1] | TB5-5,6 | J5U | 57 | 7★ | 7 | YES | | 15 | | S |
| | - | I8U | 49 | 24★ | 4 | YES | | 3 | | S |
| 8A | TB5-9,10 | J6U | 42 | 8 | 8 | YES | | 3 | | S |
| 8B | 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 J5-W to I8-W, on rear of input file.

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

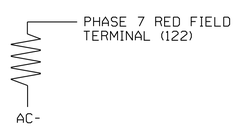
INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

## LOAD RESISTOR INSTALLATION DETAIL

*(install 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: D-0074
DESIGNED: APRIL 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail - Sheet 1 of 4

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

DURHAM
1869
CITY OF MEDICINE

W. Club Boulevard
at
N. Buchanan Boulevard/
Guess Road

Division 5 Durham County Durham

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

| REVISIONS | INIT. | DATE |
|---|---|---|
| | | |

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACIE L. PHILLIPS
DocuSigned by: 0C87A59ED60B437...
12/19/2018
SIGNATURE DATE
SIG. INVENTORY NO. D-0074

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

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| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-5968 | SIG.376.2 |

# ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

*(program controller as shown)*

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

*OVERLAP A*

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

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

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

Toggle Once

*OVERLAP B*

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

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

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

Toggle Once

*OVERLAP C*

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

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

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

Toggle Once

*OVERLAP D*

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

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

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

FLASHING ARROW OUTPUT.....CH12 ISOLATE

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

← NOTICE ACTION PLAN SF BIT "7"

END PROGRAMMING

# ECONOLITE ASC/3-2070 EMERGENCY VEHICLE PREEMPT PROGRAMMING DETAIL

*(program controller as shown)*

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

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

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

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

PROGRAM EXTEND TIME ON GPS DETECTOR UNITS FOR 2.0 SEC.

# FLASHER CIRCUIT MODIFICATION DETAIL

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

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

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

# COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

# ECONOLITE ASC/3-2070 PREEMPT FILTERING PROGRAMMING DETAIL

*(program controller as shown)*

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

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: D-0074
DESIGNED: APRIL 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail - Sheet 2 of 4

**DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED**

ELECTRICAL AND PROGRAMMING DETAILS FOR:

DURHAM
1869
CITY OF MEDICINE

W. Club Boulevard
at
N. Buchanan Boulevard/
Guess Road

Division 5 Durham County Durham

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

| REVISIONS | INIT. | DATE |
|---|---|---|
| | | |

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACIE L. PHILLIPS

DocuSigned by: 9C87A5BE0B0B437...
12/19/2018
SIGNATURE DATE

SIG. INVENTORY NO. D-0074

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

12/19/2018
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| U-5968 | SIG.376.3 |

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

*(program controller as shown)*

## IMPORTANT!

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

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

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

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

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

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

← NOTICE VEH DET PLAN 2

← ENSURE DELAY IS SET TO '3'

↓

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

ENSURE PHASE IS SET TO "0" →

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

← NOTICE VEH DET PLAN 2

END PROGRAMMING

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: D-0074
DESIGNED: APRIL 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail - Sheet 3 of 4

**DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED**

ELECTRICAL AND PROGRAMMING DETAILS FOR:

DURHAM
1869
CITY OF MEDICINE

W. Club Boulevard
at
N. Buchanan Boulevard/
Guess Road

Division 5 Durham County Durham

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

| REVISIONS | INIT. | DATE |
|---|---|---|
| | | |

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NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACIE L. PHILLIPS

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SIGNATURE DATE

SIG. INVENTORY NO. D-0074

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(919) 677-2000

12/19/2018
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# ALTERNATE PHASING ACTIVATION DETAIL

TO RUN ALT. PHASING DURING FREE RUN - PROGRAM CHANGES (SHOWN BELOW) IN A TIME BASED ACTION PLAN. SCHEDULE A DAY PLAN THAT INCLUDES THE ACTION PLAN PROGRAMMED TO SELECT VEH DET PLAN 2 AND ENABLE SF BIT 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: Disables phase 4 call on loop 7A and reduces delay time for phase 7 call on loop 7A to 3 seconds.

# ECONOLITE ASC/3-2070 ACTION PLAN PROGRAMMING DETAIL

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

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: D-0074
DESIGNED: APRIL 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail - Sheet 4 of 4

**DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED**

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ELECTRICAL AND PROGRAMMING DETAILS FOR:

DURHAM
1869
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W. Club Boulevard
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Division 5 Durham County Durham

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| PLAN DATE: | April 2018 | REVIEWED BY: | SL Phillips |
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| REVISIONS | INIT. | DATE |
|---|---|---|
| | | |

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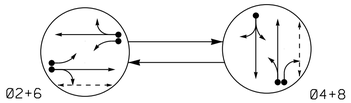
| U-5968 | SIG.377.0 |

## PHASING DIAGRAM

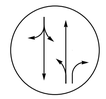



PHASING DIAGRAM DETECTION LEGEND

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

## EV PREEMPT PHASES

(Medium Priority)



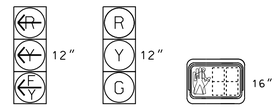
PRE 3
(Ø4+8)

## TABLE OF OPERATION

| SIGNAL FACE | PHASE Ø2+6 | PHASE Ø4+8 | PHASE PRE3 | PHASE FLASH |
|---|---|---|---|---|
| 21 | ~~F Y~~ | ~~R~~ | ~~R~~ | ~~Y~~ |
| 22,23 | G | R | R | Y |
| 41,42 | R | G | G | R |
| 61 | ~~F Y~~ | ~~R~~ | ~~R~~ | ~~Y~~ |
| 62,63 | G | R | R | Y |
| 81,82 | R | G | G | R |
| P21,P22 | W | DW | DW | DRK |
| P81,P82 | DW | W | DW | DRK |

## SIGNAL FACE I.D.

All Heads L.E.D.




21
61

22,23
41,42
62,63
81,82

P21,P22
P81,P82

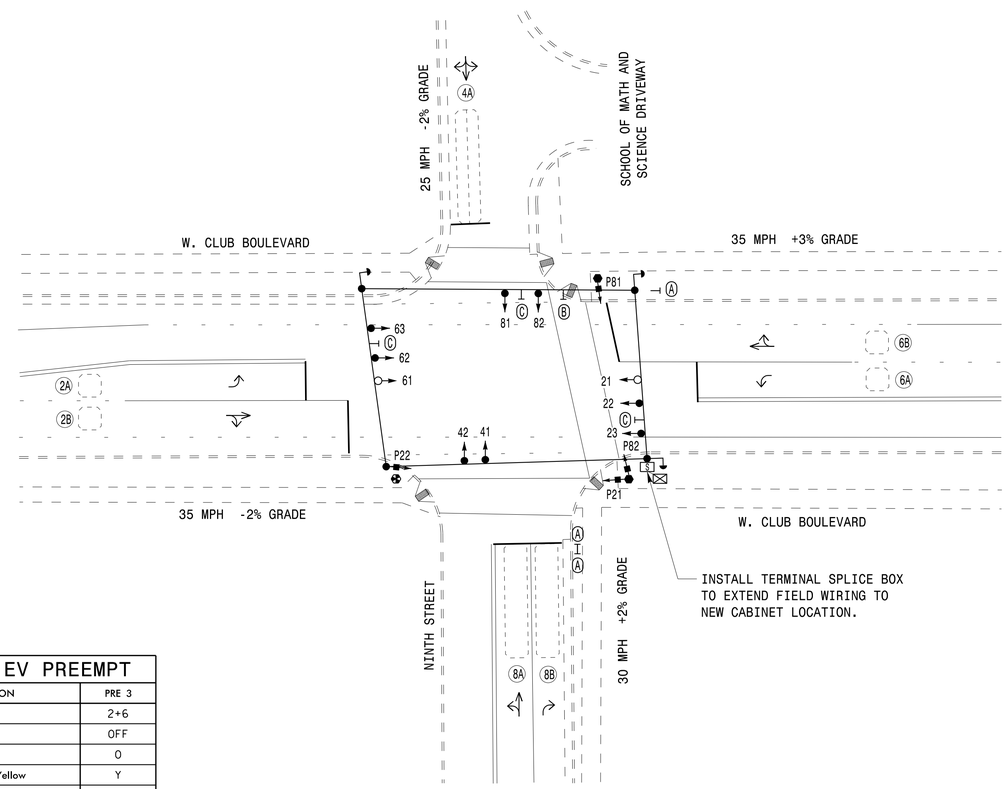
## ASC/3 DETECTOR INSTALLATION CHART

| DETECTOR | | | | | | PROGRAMMING | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LOOP | SIZE (FT) | DISTANCE FROM STOPBAR (FT) | TURNS | NEW LOOP | | PHASE | CALLING | EXTEND TIME | DELAY TIME | USE ADDED INITIAL | TYPE | SYSTEM LOOP | NEW CARD |
| 2A | 6X6 | 65 | EXIST | - | | 2 | Yes | - | - | - | S | - | X |
| 2B | 6X6 | 65 | EXIST | - | | 2 | Yes | - | - | - | S | - | X |
| 4A | 6X30 | 0 | 2-4-2 | - | | 4 | Yes | - | 5 | - | S | - | X |
| 6A | 6X6 | 44 | EXIST | - | | 6 | Yes | - | - | - | S | - | X |
| 6B | 6X6 | 65 | EXIST | - | | 6 | Yes | - | - | - | S | - | X |
| 8A | 6X30 | 0 | EXIST | - | | 8 | Yes | - | 3 | - | S | - | X |
| 8B | 6X30 | 0 | EXIST | - | | 8 | Yes | - | 15 | - | S | - | X |

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

## NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Reposition existing signal heads numbered 22, 23, 62 and 63.
4. Set all detector units to presence mode.
5. In the event of loop replacement, refer to the current ITS and Signal Design Manual and submit a Plan of Record to the Signal Design Section.
6. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
7. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
8. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
9. Pavement markings are existing.
10. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
11. Loop data based on previous plan and/or field observations.
12. Install new cabinet on the existing cabinet foundation.
13. Existing signal heads 21, 22, 61, and 62 have been relabeled to 22, 23, 62, and 63, respectively.
14. Install GPS emergency preemption system per manufacturer's instructions to achieve preemption needed, as shown in phasing diagram.
15. Remove existing optical detection equipment.




## LEGEND

| PROPOSED | | EXISTING |
|---|---|---|
| | Traffic Signal Head | |
| | Modified Signal Head | N/A |
| | Sign | |
| | Pedestrian Signal Head With Push Button & Sign | |
| | Type I Pushbutton Post | |
| | Type II Signal Pedestal | |
| | Signal Pole with Guy | |
| | Signal Pole with Sidewalk Guy | |
| | Inductive Loop Detector | |
| | Controller & Cabinet | |
| | Junction Box | |
| | 2-in Underground Conduit | |
| N/A | Right of Way | |
| | Directional Arrow | |
| N/A | Curb Ramp | |
| | Terminal Splice Box | |
| A | School Crossing Sign (S1-1) with Downward Diagonal Arrow Plaque (W16-7p) | A |
| B | "Turning Vehicles Yield to Peds" Sign (R10-15R) | B |
| C | Street Sign (D3-1) | C |

## ASC/3 TIMING CHART

| FEATURE | PHASE 2 | PHASE 4 | PHASE 6 | PHASE 8 |
|---|---|---|---|---|
| Min Green * | 10 | 7 | 10 | 7 |
| Walk * | 7 | 0 | 0 | 7 |
| Ped Clear | 8 | 0 | 0 | 11 |
| Veh. Extension * | 3.0 | 2.0 | 3.0 | 2.0 |
| Max 1 * | 30 | 15 | 30 | 15 |
| Yellow | 4.0 | 3.3 | 4.0 | 3.4 |
| Red Clear | 1.6 | 2.0 | 1.6 | 1.9 |
| Actuations B4 Add * | - | - | - | - |
| Seconds /Actuation * | - | - | - | - |
| Max Initial * | - | - | - | - |
| Time Before Reduction * | - | - | - | - |
| Time To Reduce * | - | - | - | - |
| Minimum Gap | - | - | - | - |
| Locking Detector | X | - | X | - |
| Recall Position | VEH. RECALL | - | VEH. RECALL | - |
| Dual Entry | - | X | - | X |
| Simultaneous Gap | X | X | X | X |

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

## ASC/3 EV PREEMPT

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

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

Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DURHAM 1869 CITY OF MEDICINE

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

SCALE 0 20 1"=20'

W. Club Boulevard at Ninth Street/School of Math and Science Driveway

Division 5 Durham County Durham

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

| REVISIONS | INIT. | DATE |
|---|---|---|
| | | |

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NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACE L. PHILLIPS
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SIGNATURE DATE

SIG. INVENTORY NO. D-0097

12/19/2018
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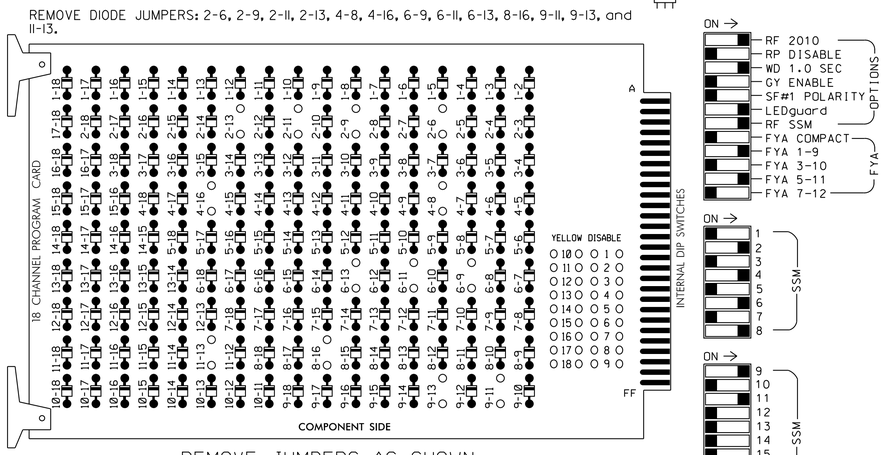
| U-5968 | SIG.377.1 |

# EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

*(remove jumpers and set switches as shown)*




■ = DENOTES POSITION OF SWITCH

NOTES:

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

## NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Program phases 4 and 8 for Dual Entry.
3. Program controller to start up in phase 2 Walk and 6 Green.
4. The cabinet and controller are part of the Durham Signal System.
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,S8,S11,S12,AUX S1, AUX S4
PHASES USED.....2,2PED,4,6,8,8PED
OVERLAP "A".....*
OVERLAP "B".....NOT USED
OVERLAP "C".....*
OVERLAP "D".....NOT USED

* See overlap programming detail on sheet 2

## SIGNAL HEAD HOOK-UP CHART

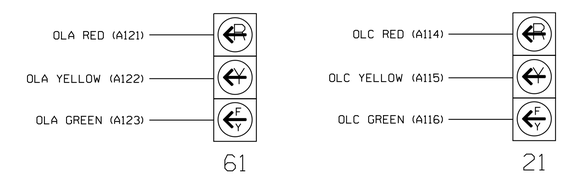
| LOAD SWITCH NO. | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 | AUX S1 | AUX S2 | AUX S3 | AUX S4 | AUX S5 | AUX S6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CMU CHANNEL NO. | 1 | 2 | 13 | 3 | 4 | 14 | 5 | 6 | 15 | 7 | 8 | 16 | 9 | 10 | 17 |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

NU = Not Used

★ See pictorial of head wiring in detail this sheet.

## FYA SIGNAL WIRING DETAIL

*(wire signal heads as shown)*




## INPUT FILE POSITION LAYOUT

*(front view)*

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

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

FS = FLASH SENSE
ST = STOP TIME

CONNECT PHASE SELECTOR TO FIELD ETHERNET SWITCH

## INPUT FILE CONNECTION & PROGRAMMING CHART

| LOOP NO. | LOOP TERMINAL | INPUT FILE POS. | PIN NO. | DETECTOR NO. | NEMA PHASE | CALL | EXTEND TIME | DELAY TIME | ADDED INITIAL | DETECTOR TYPE |
|---|---|---|---|---|---|---|---|---|---|---|
| 2A | TB2-5,6 | I2U | 39 | 2 | 2 | YES | | | | S |
| 2B | TB2-7,8 | I2L | 43 | 12 | 2 | YES | | | | S |
| 4A | TB4-9,10 | I6U | 41 | 4 | 4 | YES | | 5 | | S |
| 6A | TB3-5,6 | J2U | 40 | 6 | 6 | YES | | | | S |
| 6B | TB3-7,8 | J2L | 44 | 16 | 6 | YES | | | | S |
| 8A | TB5-9,10 | J6U | 42 | 8 | 8 | YES | | 3 | | S |
| 8B | TB5-11,12 | J6L | 46 | 18 | 8 | YES | | 15 | | S |
| PED PUSH BUTTONS | | | | | | | | | | |
| P21,P22 | TB8-4,6 | I12U | 67 | PED 2 | 2 PED | | | | | |
| P81,P82 | TB8-8,9 | I13L | 70 | PED 8 | 8 PED | | | | | |

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

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: D-0097
DESIGNED: APRIL 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:

DURHAM
1869
CITY OF MEDICINE

W. Club Boulevard
at
Ninth Street/School of
Math and Science Driveway

Division 5 Durham County Durham

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

| REVISIONS | INIT. | DATE |
|---|---|---|
| | | |

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACIE L. PHILLIPS

DocuSigned by: 0C87A56ED60B437... 12/19/2018
SIGNATURE DATE

SIG. INVENTORY NO. D-0097

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

12/19/2018
K:\4AALL\PTM_ITS\011036410 - Durham Signal System\Signals\S4 - Signal Design\GROUP 5\U-5968_D0097-2018e1.dgn
derrick.waller

DocuSign Envelope ID: 951D9A12-2460-4213-A071-EDF4330949F9

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-5968 | SIG.377.2 |

# ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

*(program controller as shown)*

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

*OVERLAP A*

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

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

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

Toggle Twice

↓

*OVERLAP C*

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

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

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

END PROGRAMMING

# ECONOLITE ASC/3-2070 EMERGENCY VEHICLE PREEMPT PROGRAMMING DETAIL

*(program controller as shown)*

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

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

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

ENABLE... YES|PMT OVRIDE..|INTERLOCK. NO
DET LOCK... X|DELAY..    0|INHIBIT...  0
OVERIDE FL. .|DURATION   0|CLR-GRN... NO
TERM OLP.  NO|PC>YEL   YES|TERM PH    NO
PED DARK.. NO|TC RESRV  NO|DWELL FL  OFF
LINK PMT....0|X FLCOLR RED|EXIT OPT. OFF
X TMG PLN...0|RE-SERV..  0|FLT TYPE.HARD
FREE DUR PMT|R1  NO|R2  NO|R3  NO|R4  NO
--TIMING-----WALK|PED CL|MN GR| YEL| RED
ENTRANCE TM.    1|    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 ..PREEMPT  4. ...BYPASSED..
       5 ..PREEMPT  5. ...BYPASSED..
       6 ..PREEMPT  6. ...BYPASSED..
       7 ...BYPASSED.. ...BYPASSED..
       8 ...BYPASSED.. ...BYPASSED..
       9 ...BYPASSED.. ...BYPASSED..
      10 ...BYPASSED.. ...BYPASSED..
```

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: D-0097
DESIGNED: APRIL 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:

DURHAM
1869
CITY OF MEDICINE

W. Club Boulevard
at
Ninth Street/School of
Math and Science Driveway

Division 5 Durham County Durham

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

| REVISIONS | INIT. | DATE |
|---|---|---|
| | | |

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACIE L. PHILLIPS

DocuSigned by: 12/19/2018
DC87A59ED008437
SIGNATURE DATE

SIG. INVENTORY NO. D-0097

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

12/19/2018
K:\RAL_TPTM_ITS\011036410 - Durham Signal System\Signals\S4 - Signal Design\GROUP 5\U-5968_D0097-2018s2.dgn
derrick.waller

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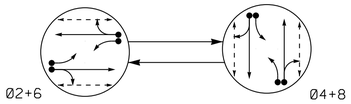
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-5968 | SIG.378.0 |

## PHASING DIAGRAM




PHASING DIAGRAM DETECTION LEGEND

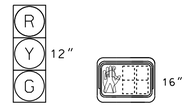
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

## 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 |
| P21,P22 | W | DW | DRK |
| P41,P42 | DW | W | DRK |
| P61,P62 | W | DW | DRK |
| P81,P82 | DW | W | DRK |

## SIGNAL FACE I.D.

All Heads L.E.D.




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

P21,P22
P41,P42
P61,P62
P81,P82

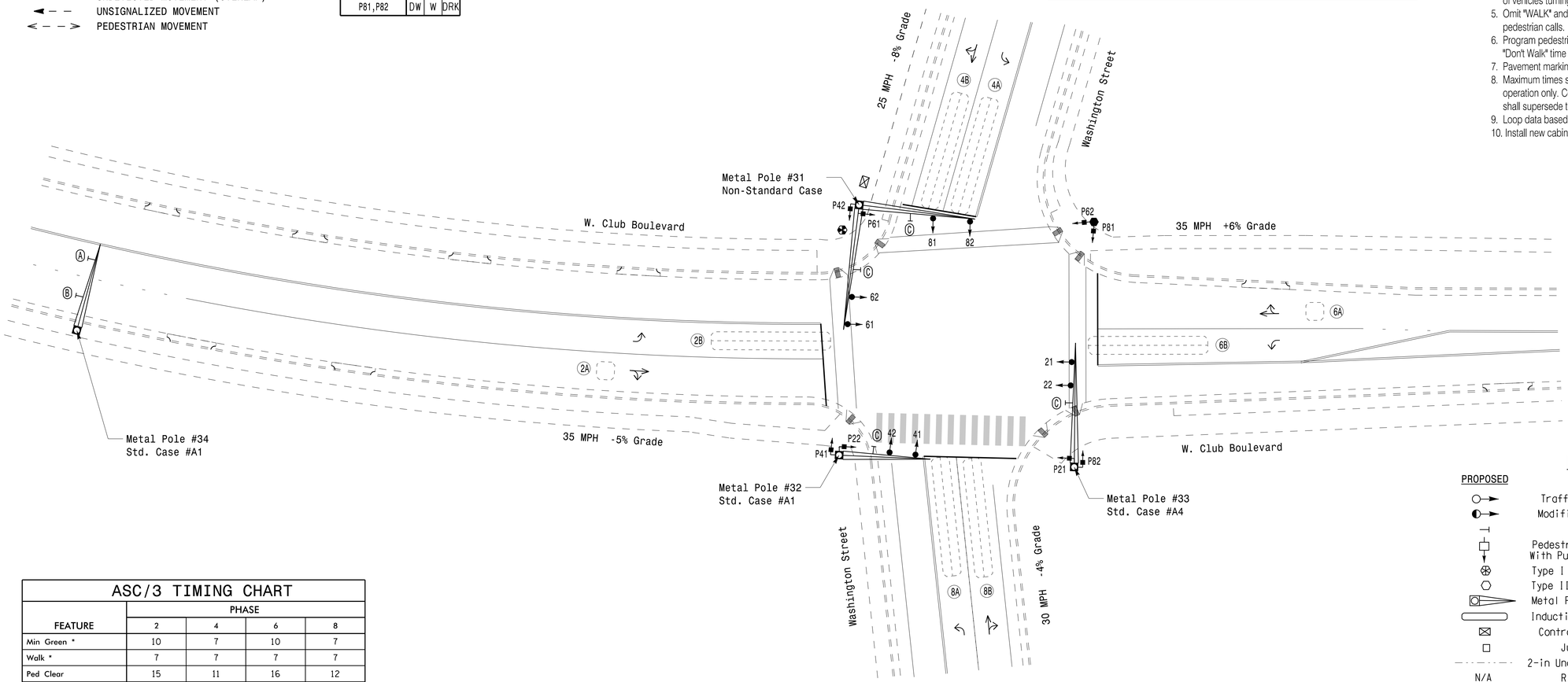
## ASC/3 DETECTOR INSTALLATION CHART

| DETECTOR | | | | | PROGRAMMING | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LOOP | SIZE (FT) | DISTANCE FROM STOPBAR (FT) | TURNS | NEW LOOP | PHASE | CALLING | EXTEND TIME | DELAY TIME | USE ADDED INITIAL | TYPE | SYSTEM LOOP | NEW CARD |
| 2A | 6X6 | 70 | EXIST | - | 2 | Yes | - | - | - | S | - | X |
| 2B | 6X40 | +3 | 2-4-2 | - | 2 | Yes | - | - | - | S | - | X |
| 4A | 6X40 | 0 | 2-4-2 | - | 4 | Yes | - | 3 | - | S | - | X |
| 4B | 6X40 | 0 | 2-4-2 | - | 4 | Yes | - | 10 | - | S | - | X |
| 6A | 6X6 | 70 | EXIST | - | 6 | Yes | - | - | - | S | - | X |
| 6B | 6X40 | +3 | 2-4-2 | - | 6 | Yes | - | - | - | S | - | X |
| 8A | 6X40 | 0 | 2-4-2 | - | 8 | Yes | - | 3 | - | S | - | X |
| 8B | 6X40 | 0 | 2-4-2 | - | 8 | Yes | - | 10 | - | S | - | X |

## 2 PHASE FULLY ACTUATED (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.




## ASC/3 TIMING CHART

| FEATURE | PHASE 2 | PHASE 4 | PHASE 6 | PHASE 8 |
|---|---|---|---|---|
| Min Green * | 10 | 7 | 10 | 7 |
| Walk * | 7 | 7 | 7 | 7 |
| Ped Clear | 15 | 11 | 16 | 12 |
| Veh. Extension * | 3.0 | 2.0 | 3.0 | 2.0 |
| Max 1 * | 50 | 20 | 50 | 20 |
| Yellow | 4.2 | 3.7 | 3.5 | 3.8 |
| Red Clear | 1.7 | 2.0 | 1.9 | 1.8 |
| Actuations B4 Add * | - | - | - | - |
| Seconds /Actuation * | - | - | - | - |
| Max Initial * | - | - | - | - |
| Time Before Reduction * | - | - | - | - |
| Time To Reduce * | - | - | - | - |
| Minimum Gap | - | - | - | - |
| Locking Detector | X | - | X | - |
| Recall Position | VEH. RECALL | - | VEH. RECALL | - |
| Dual Entry | - | X | - | X |
| Simultaneous Gap | X | X | X | X |

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

## LEGEND

| PROPOSED | | EXISTING |
|---|---|---|
| | Traffic Signal Head | |
| | Modified Signal Head | N/A |
| | Sign | |
| | Pedestrian Signal Head With Push Button & Sign | |
| | Type I Pushbutton Post | |
| | Type II Signal Pedestal | |
| | Metal Pole with Mastarm | |
| | Inductive Loop Detector | |
| | Controller & Cabinet | |
| | Junction Box | |
| | 2-in Underground Conduit | |
| N/A | Right of Way | |
| | Directional Arrow | |
| N/A | Curb Ramp | |
| A | Left Arrow "ONLY" Sign (R3-5L) | A |
| B | Combined Through and Right Arrow Sign (R3-6R) | B |
| C | Street Sign (D3-1) | C |

Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DURHAM 1869 CITY OF MEDICINE

# W. Club Boulevard at Washington Street

Division 5 Durham County Durham

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

| REVISIONS | INIT. | DATE |
|---|---|---|
| | | |

SCALE 0 20 1"=20'

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACIE L. PHILLIPS

DocuSigned by: DC87A59ED60B437

12/19/2018

SIGNATURE DATE

SIG. INVENTORY NO. D-0099

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

12/19/2018
K:\RAL_TMS\TMS\U-5968_ITS\01036410 - Durham Signal System\Signals\S4 - Signal Design\GROUP 5\U-5968_D0099-2018.dgn
derrick.waller

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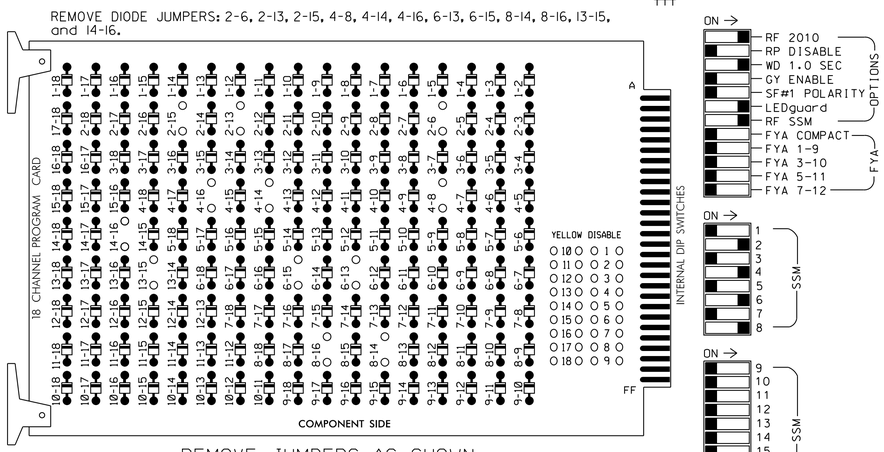
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-5968 | SIG.378.1 |

# EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

*(remove jumpers and set switches as shown)*




■ = DENOTES POSITION OF SWITCH

NOTES:

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

## NOTES

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

## EQUIPMENT INFORMATION

CONTROLLER.....2070LX
CABINET.....332
SOFTWARE.....ECONOLITE ASC/3-2070
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...12
LOAD SWITCHES USED.....S2,S3,S5,S6,S8,S9,S11,S12
PHASES USED.....2,2PED,4,4PED,6,6PED,8,8PED
OVERLAP "A".....NOT USED
OVERLAP "B".....NOT USED
OVERLAP "C".....NOT USED
OVERLAP "D".....NOT USED

## SIGNAL HEAD HOOK-UP CHART

| LOAD SWITCH NO. | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | P21, P22 | NU | 41,42 | P41, P42 | NU | 61,62 | P61, P62 | NU | 81,82 | P81, P82 |
| RED | | 128 | | | 101 | | | 134 | | | 107 | |
| YELLOW | | 129 | | | 102 | | | 135 | | | 108 | |
| GREEN | | 130 | | | 103 | | | 136 | | | 109 | |
| RED ARROW | | | | | | | | | | | | |
| YELLOW ARROW | | | | | | | | | | | | |
| GREEN ARROW | | | | | | | | | | | | |
| ✋ | | | 113 | | | 104 | | | 119 | | | 110 |
| 🚶 | | | 115 | | | 106 | | | 121 | | | 112 |

NU = Not Used

## INPUT FILE POSITION LAYOUT

*(front view)*

| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FILE "I" | U | SLOT | Ø 2 2A | SLOT | SLOT | SLOT | Ø 4 4A | SLOT | SLOT | SLOT | SLOT | SLOT | Ø2 PED DC ISOLATOR | Ø6 PED DC ISOLATOR | FS DC ISOLATOR |
| | L | EMPTY | Ø 2 2B | EMPTY | EMPTY | EMPTY | Ø 4 4B | EMPTY | EMPTY | EMPTY | EMPTY | EMPTY | Ø4 PED DC ISOLATOR | Ø8 PED DC ISOLATOR | ST DC ISOLATOR |
| FILE "J" | U | SLOT | Ø 6 6A | SLOT | SLOT | SLOT | Ø 8 8A | SLOT | SLOT | SLOT | SLOT | SLOT | SLOT | SLOT | SLOT |
| | L | EMPTY | Ø 6 6B | EMPTY | EMPTY | EMPTY | Ø 8 8B | EMPTY | EMPTY | EMPTY | EMPTY | EMPTY | EMPTY | EMPTY | EMPTY |

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

FS = FLASH SENSE
ST = STOP TIME

## INPUT FILE CONNECTION & PROGRAMMING CHART

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

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

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

## 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: D-0099
DESIGNED: APRIL 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail

**DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED**

ELECTRICAL AND PROGRAMMING DETAILS FOR:

DURHAM
1869
CITY OF MEDICINE

W. Club Boulevard
at
Washington Street

Division 5 Durham County Durham

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

| REVISIONS | INIT. | DATE |
|---|---|---|
| | | |

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACIE L. PHILLIPS

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

SIG. INVENTORY NO. D-0099

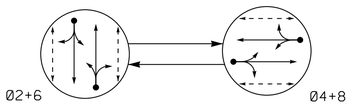
PLANS PREPARED IN THE OFFICE OF:
Kimley»Horn
NC License #F-0102
421 Fayetteville Street, Suite 600
Raleigh, NC 27601
(919) 677-2000

12/19/2018
K:\RAL_LPTD_ITS\011036410 - Durham Signal System\Signals\54 - Signal Design\GROUP 5\U-5968_D0099-2018e1.dgn
derrick.waller

DocuSign Envelope ID: 951D9A12-2460-4213-A071-EDF4330949F9

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-5968 | SIG.379.0 |

## PHASING DIAGRAM




PHASING DIAGRAM DETECTION LEGEND

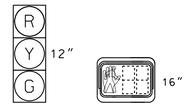
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

## 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 |
| P21,P22 | W | DW | DRK |
| P41,P42 | DW | W | DRK |
| P61,P62 | W | DW | DRK |
| P81,P82 | DW | W | DRK |

## SIGNAL FACE I.D.

All Heads L.E.D.




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

P21,P22
P41,P42
P61,P62
P81,P82

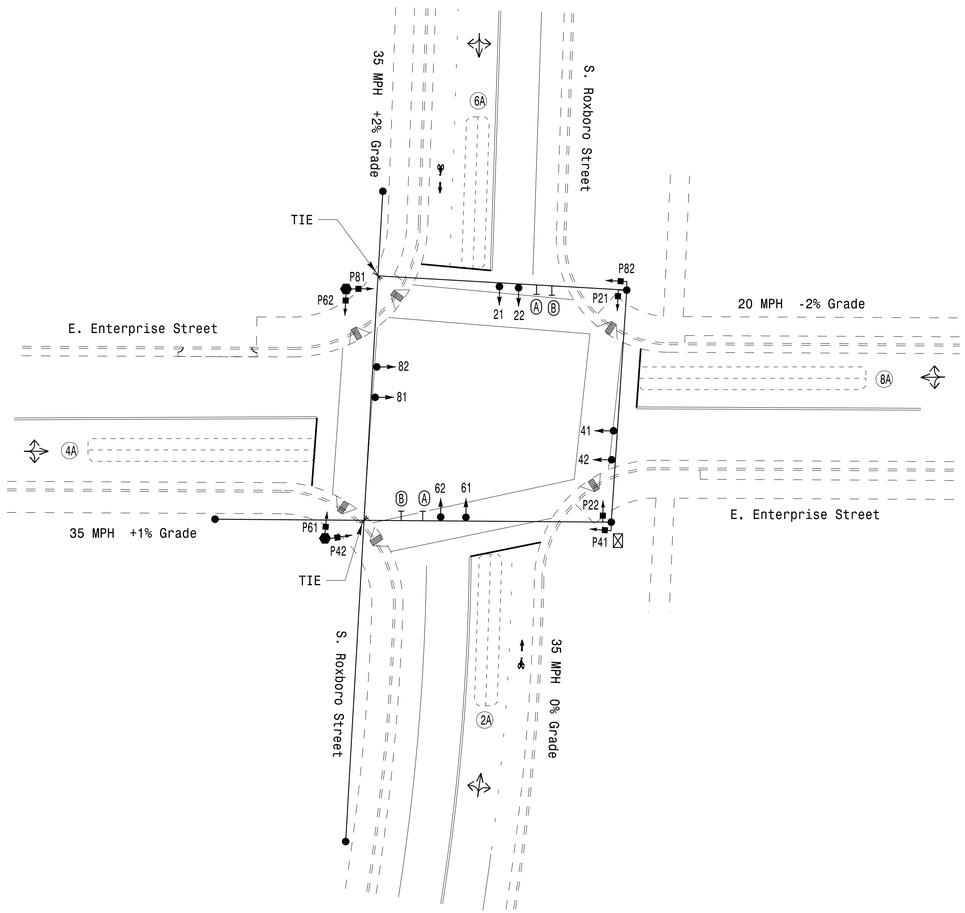
## ASC/3 DETECTOR INSTALLATION CHART

| DETECTOR | | | | | PROGRAMMING | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LOOP | SIZE (FT) | DISTANCE FROM STOPBAR (FT) | TURNS | NEW LOOP | PHASE | CALLING | EXTEND TIME | DELAY TIME | USE ADDED INITIAL | TYPE | SYSTEM LOOP | NEW CARD |
| 2A | 6X40 | 0 | EXIST | - | 2 | Yes | - | - | - | S | - | X |
| 4A | 6X60 | 0 | EXIST | - | 4 | Yes | - | 5 | - | S | - | X |
| 6A | 6X40 | 0 | EXIST | - | 6 | Yes | - | - | - | S | - | X |
| 8A | 6X60 | 0 | EXIST | - | 8 | Yes | - | 5 | - | S | - | X |

## 2 PHASE FULLY ACTUATED (DURHAM SIGNAL SYSTEM)

## NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Set all detector units to presence mode.
4. In the event of loop replacement, refer to the current ITS and Signal Design Manual and submit a Plan of Record to the Signal Design Section.
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 for phases 4 and 8.
7. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
8. Pavement markings are existing.
9. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
10. Loop data based on previous plan and/or field observations.
11. Install new cabinet on the existing cabinet foundation.
12. Reconnect loops and heads in cabinet as indicated to match current NCDOT standards.
13. Existing signal heads 23, 24, 43, and 44 have been relabeled to 61, 62, 81, and 82, respectively.




## ASC/3 TIMING CHART

| FEATURE | PHASE 2 | PHASE 4 | PHASE 6 | PHASE 8 |
|---|---|---|---|---|
| Min Green * | 10 | 7 | 10 | 7 |
| Walk * | 7 | 7 | 7 | 7 |
| Ped Clear | 10 | 14 | 11 | 13 |
| Veh. Extension * | 3.0 | 2.0 | 3.0 | 2.0 |
| Max 1 * | 60 | 15 | 60 | 15 |
| Yellow | 3.8 | 3.8 | 3.7 | 3.0 |
| Red Clear | 1.2 | 1.5 | 1.3 | 2.6 |
| Actuations B4 Add * | - | - | - | - |
| Seconds /Actuation * | - | - | - | - |
| Max Initial * | - | - | - | - |
| Time Before Reduction * | - | - | - | - |
| Time To Reduce * | - | - | - | - |
| Minimum Gap | - | - | - | - |
| Locking Detector | - | - | - | - |
| Recall Position | MIN/PED RECALL | - | MIN/PED RECALL | - |
| Dual Entry | - | X | - | X |
| Simultaneous Gap | X | X | X | X |

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

## LEGEND

| PROPOSED | | EXISTING |
|---|---|---|
| | Traffic Signal Head | |
| | Modified Signal Head | N/A |
| | Sign | |
| | Pedestrian Signal Head With Push Button & Sign | |
| | Type II Signal Pedestal | |
| | Signal Pole with Guy | |
| | Signal Pole with Sidewalk Guy | |
| | Inductive Loop Detector | |
| | Controller & Cabinet | |
| | Junction Box | |
| | 2-in Underground Conduit | |
| N/A | Right of Way | |
| | Directional Arrow | |
| N/A | Curb Ramp | |
| A | Turning Vehicles Yield to Peds Sign (R10-15R) | A |
| B | Street Sign (D3-1) | B |

Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DURHAM
1869
CITY OF MEDICINE

S. Roxboro Street
at
E. Enterprise Street

Division 5 Durham County Durham

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

| REVISIONS | INIT. | DATE |
|---|---|---|
| | | |

SCALE 1"=20' (0 – 20)

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

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

| SIGNATURE | DATE |
|---|---|
| | |

SIG. INVENTORY NO. D-0177

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

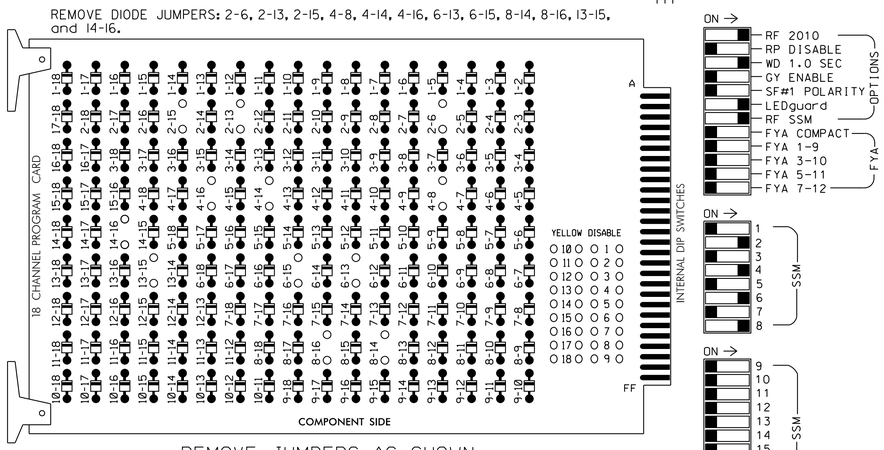
12/19/2018
K:\DUR_Traffic\U-5968_ITS\011036410 - Durham Signal Systems\Signals\S4 - Signal Design\GROUP SHU-5968_00177-2018.dgn
derrick.waller

DocuSign Envelope ID: 951D9A12-2460-4213-A071-EDF4330949F9

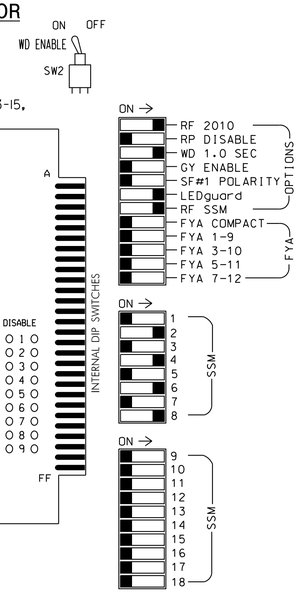
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-5968 | SIG.379.1 |

## EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

*(remove jumpers and set switches as shown)*




REMOVE JUMPERS AS SHOWN




NOTES:

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

## NOTES

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

## EQUIPMENT INFORMATION

CONTROLLER.....2070LX
CABINET.....332
SOFTWARE.....ECONOLITE ASC/3-2070
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...12
LOAD SWITCHES USED.....S2,S3,S5,S6,S8,S9,S11,S12
PHASES USED.....2,2PED,4,4PED,6,6PED,8,8PED
OVERLAP "A".....NOT USED
OVERLAP "B".....NOT USED
OVERLAP "C".....NOT USED
OVERLAP "D".....NOT USED

## SIGNAL HEAD HOOK-UP CHART

| LOAD SWITCH NO. | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | P21, P22 | NU | 41,42 | P41, P42 | NU | 61,62 | P61, P62 | NU | 81,82 | P81, P82 |
| RED | | 128 | | | 101 | | | 134 | | | 107 | |
| YELLOW | | 129 | | | 102 | | | 135 | | | 108 | |
| GREEN | | 130 | | | 103 | | | 136 | | | 109 | |
| RED ARROW | | | | | | | | | | | | |
| YELLOW ARROW | | | | | | | | | | | | |
| GREEN ARROW | | | | | | | | | | | | |
| ✋ | | | 113 | | | 104 | | | 119 | | | 110 |
| 🚶 | | | 115 | | | 106 | | | 121 | | | 112 |

NU = Not Used

## INPUT FILE POSITION LAYOUT

*(front view)*

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

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

FS = FLASH SENSE
ST = STOP TIME

## INPUT FILE CONNECTION & PROGRAMMING CHART

| LOOP NO. | LOOP TERMINAL | INPUT FILE POS. | PIN NO. | DETECTOR NO. | NEMA PHASE | CALL | EXTEND TIME | DELAY TIME | ADDED INITIAL | DETECTOR TYPE |
|---|---|---|---|---|---|---|---|---|---|---|
| 2A | TB2-5,6 | I2U | 39 | 2 | 2 | YES | | | | S |
| 4A | TB4-9,10 | I6U | 41 | 4 | 4 | YES | | 5 | | S |
| 6A | TB3-5,6 | J2U | 40 | 6 | 6 | YES | | | | S |
| 8A | TB5-9,10 | J6U | 42 | 8 | 8 | YES | | 5 | | S |
| PED PUSH BUTTONS | | | | | | | | | | |
| P21,P22 | TB8-4,6 | I12U | 67 | PED 2 | 2 PED | | | | | |
| P41,P42 | TB8-5,6 | I12L | 69 | PED 4 | 4 PED | | | | | |
| P61,P62 | TB8-7,9 | I13U | 68 | PED 6 | 6 PED | | | | | |
| P81,P82 | TB8-8,9 | I13L | 70 | PED 8 | 8 PED | | | | | |

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

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

## 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: D-0177
DESIGNED: APRIL 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail

**DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED**

ELECTRICAL AND PROGRAMMING DETAILS FOR:

DURHAM
1869
CITY OF MEDICINE

S. Roxboro Street
at
E. Enterprise Street

Division 5 Durham County Durham

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

| REVISIONS | INIT. | DATE |
|---|---|---|
| | | |

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACIE L. PHILLIPS

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

SIG. INVENTORY NO. D-0177

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

12/19/2018
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derrick.waller

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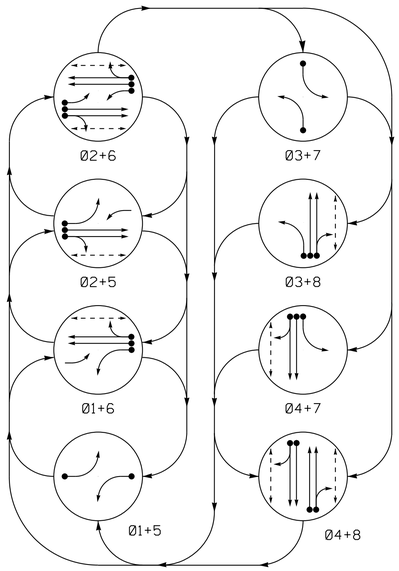
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-5968 | SIG.380.0 |

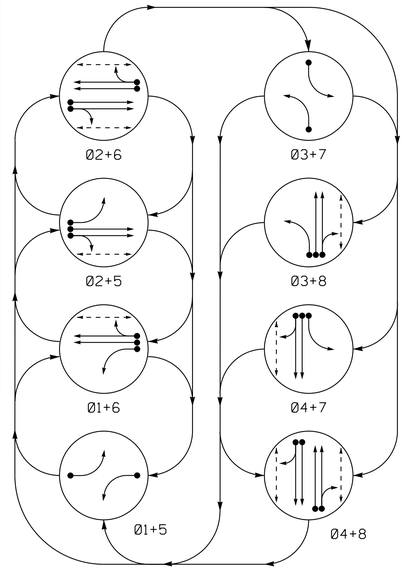
## DEFAULT PHASING DIAGRAM




## DEFAULT PHASING TABLE OF OPERATION

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

## ALTERNATE PHASING DIAGRAM




## ALTERNATE PHASING TABLE OF OPERATION

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

## ASC/3 DETECTOR INSTALLATION CHART

| DETECTOR: LOOP | SIZE (FT) | DISTANCE FROM STOPBAR (FT) | TURNS | NEW LOOP | PROGRAMMING: PHASE | CALLING | EXTEND TIME | DELAY TIME | USE ADDED INITIAL | TYPE | SYSTEM LOOP | NEW CARD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1A | 6X40 | 0 | 2-4-2 | - | 1 | Yes | - | 15* | - | S | - | X |
| | | | | | 6# | Yes | - | 3 | - | S | - | X |
| 2A | 6X6 | 70 | EXIST | - | 2 | Yes | - | - | - | S | - | X |
| 2B | 6X6 | 70 | EXIST | - | 2 | Yes | - | - | - | S | - | X |
| 3A | 6X40 | 0 | 2-4-2 | - | 3 | Yes | - | 3 | - | S | - | X |
| 4A | 6X40 | 0 | 2-4-2 | - | 4 | Yes | - | - | - | S | - | X |
| 4B | 6X40 | 0 | 2-4-2 | - | 4 | Yes | - | 5 | - | S | - | X |
| 5A | 6X40 | 0 | 2-4-2 | - | 5 | Yes | - | 15* | - | S | - | X |
| | | | | | 2# | Yes | - | 3 | - | S | - | X |
| 6A | 6X6 | 70 | EXIST | - | 6 | Yes | - | - | - | S | - | X |
| 6B | 6X6 | 70 | EXIST | - | 6 | Yes | - | - | - | S | - | X |
| 7A | 6X40 | 0 | 2-4-2 | - | 7 | Yes | - | 3 | - | S | - | X |
| 8A | 6X40 | 0 | 2-4-2 | - | 8 | Yes | - | - | - | S | - | X |
| 8B | 6X40 | 0 | 2-4-2 | - | 8 | Yes | - | 5 | - | S | - | X |

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

## 8 PHASE FULLY ACTUATED (DURHAM SIGNAL SYSTEM)

## NOTES

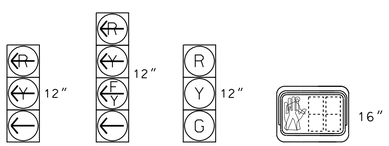
1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 and/or phase 5 may be lagged.
4. Phase 3 and/or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

PHASING DIAGRAM DETECTION LEGEND

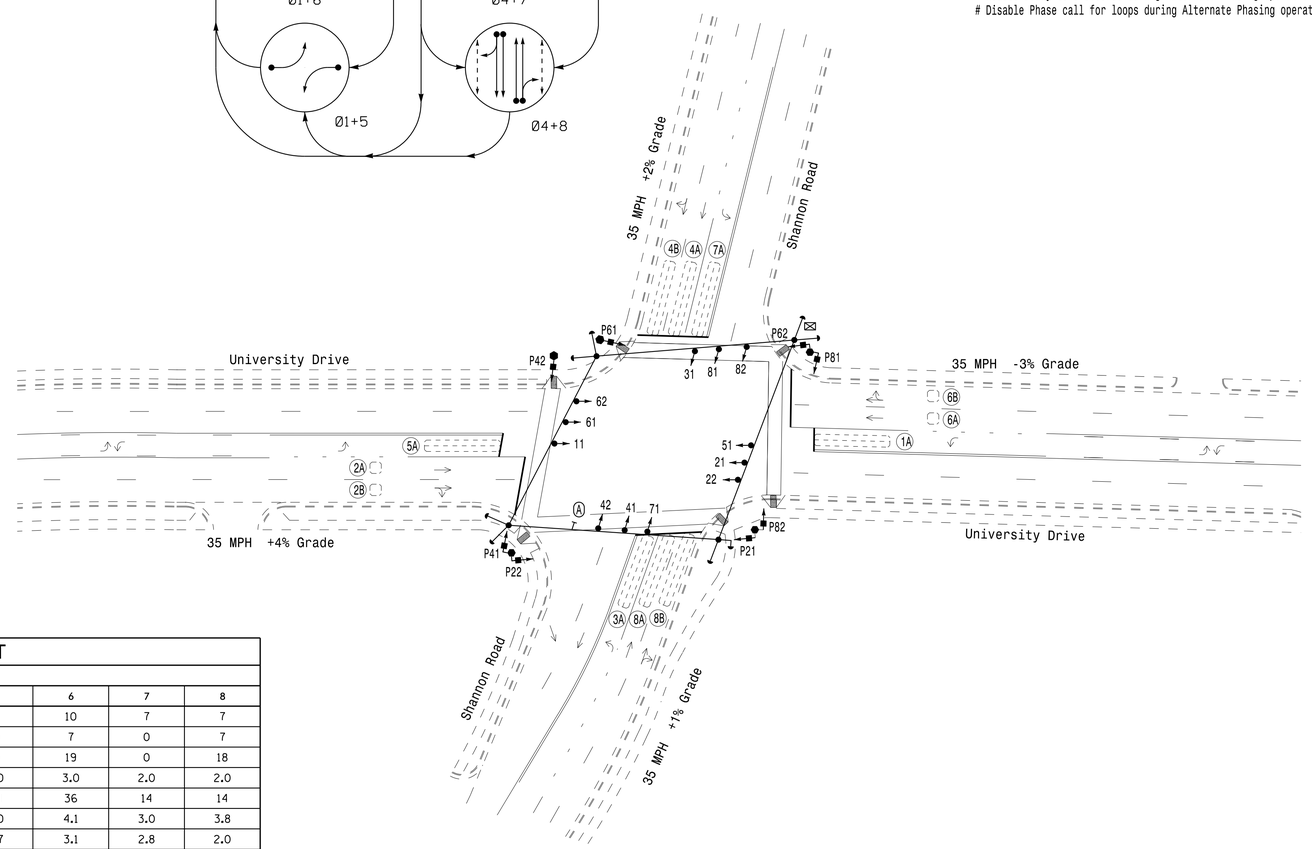
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

## SIGNAL FACE I.D.

All Heads L.E.D.




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




## ASC/3 TIMING CHART

| FEATURE | PHASE 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Min Green * | 7 | 10 | 7 | 7 | 7 | 10 | 7 | 7 |
| Walk * | 0 | 7 | 0 | 7 | 0 | 7 | 0 | 7 |
| Ped Clear | 0 | 27 | 0 | 18 | 0 | 19 | 0 | 18 |
| Veh. Extension * | 2.0 | 3.0 | 2.0 | 2.0 | 2.0 | 3.0 | 2.0 | 2.0 |
| Max 1 * | 23 | 36 | 24 | 14 | 14 | 36 | 14 | 14 |
| Yellow | 3.0 | 4.1 | 3.0 | 3.7 | 3.0 | 4.1 | 3.0 | 3.8 |
| Red Clear | 3.3 | 3.1 | 2.8 | 2.1 | 3.7 | 3.1 | 2.8 | 2.0 |
| Actuations B4 Add * | - | - | - | - | - | - | - | - |
| Seconds /Actuation * | - | - | - | - | - | - | - | - |
| Max Initial * | - | - | - | - | - | - | - | - |
| Time Before Reduction * | - | - | - | - | - | - | - | - |
| Time To Reduce * | - | - | - | - | - | - | - | - |
| Minimum Gap | - | - | - | - | - | - | - | - |
| Locking Detector | - | X | - | - | - | X | - | - |
| Recall Position | - | VEH. RECALL | - | - | - | VEH. RECALL | - | - |
| Dual Entry | - | - | - | - | - | - | - | - |
| Simultaneous Gap | X | X | X | X | X | X | X | X |

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

## LEGEND

| PROPOSED | | EXISTING |
|---|---|---|
| | Traffic Signal Head | |
| | Modified Signal Head | N/A |
| | Sign | |
| | Pedestrian Signal Head With Push Button & Sign | |
| | Signal Pole with Guy | |
| | Signal Pole with Sidewalk Guy | |
| | Inductive Loop Detector | |
| | Controller & Cabinet | |
| | Junction Box | |
| | 2-in Underground Conduit | |
| N/A | Right of Way | |
| | Directional Arrow | |
| N/A | Curb Ramp | |
| A | "TURNING VEHICLES YIELD TO PEDESTRIAN" Sign (R10-15) | A |

Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DURHAM 1869 CITY OF MEDICINE

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

SCALE 0 40 1"=40'

University Drive at Shannon Road

Division 5 Durham County Durham

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

| REVISIONS | INIT. | DATE |
|---|---|---|
| | | |

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

DocuSigned by: 12/19/2018
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SIG. INVENTORY NO. D-0222

12/19/2018
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derrick.waller

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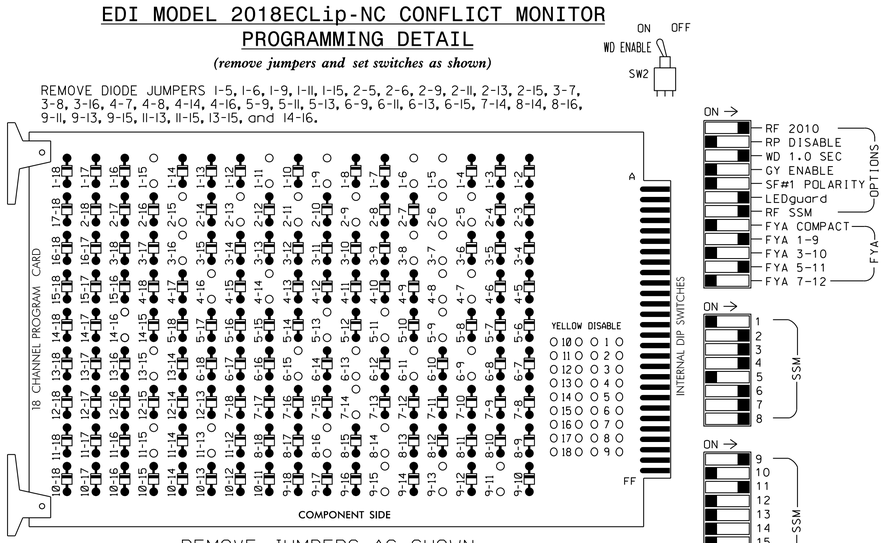
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-5968 | SIG.380.1 |

# EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

*(remove jumpers and set switches as shown)*

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




REMOVE JUMPERS AS SHOWN

NOTES:

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

## NOTES

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

## EQUIPMENT INFORMATION

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

* See overlap programming detail on sheet 2

## SIGNAL HEAD HOOK-UP CHART

| LOAD SWITCH NO. | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 | AUX S1 | AUX S2 | AUX S3 | AUX S4 | AUX S5 | AUX S6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CMU CHANNEL NO. | 1 | 2 | 13 | 3 | 4 | 14 | 5 | 6 | 15 | 7 | 8 | 16 | 9 | 10 | 17 | 11 | 12 | 18 |
| PHASE | 1 | 2 | 2 PED | 3 | 4 | 4 PED | 5 | 6 | 6 PED | 7 | 8 | 8 PED | OLA | OLB | SPARE | OLC | OLD | SPARE |
| SIGNAL HEAD NO. | 11★ | 21,22 | P21, P22 | 31 | 41,42 | P41, P42 | 51★ | 61,62 | P61, P62 | 71 | 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 | | | | 116 | | | | | | 122 | | | A121 | | | A114 | | |
| YELLOW ARROW | | | | 117 | | | | | | 123 | | | A122 | | | A115 | | |
| FLASHING YELLOW ARROW | | | | | | | | | | | | | A123 | | | A116 | | |
| GREEN ARROW | 127 | | | 118 | | | 133 | | | 124 | | | | | | | | |
| ✋ | | | 113 | | | 104 | | | 119 | | | 110 | | | | | | |
| 🚶 | | | 115 | | | 106 | | | 121 | | | 112 | | | | | | |

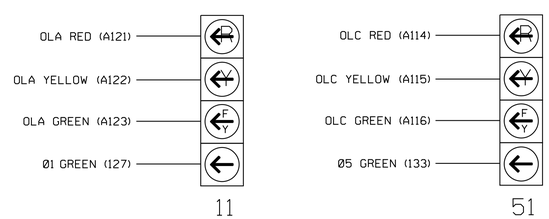
NU = Not Used

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

★ See pictorial of head wiring in detail this sheet.

## FYA SIGNAL WIRING DETAIL

*(wire signal heads as shown)*




## INPUT FILE POSITION LAYOUT

*(front view)*

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

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

FS = FLASH SENSE
ST = STOP TIME

⊗ Wired Input - Do not populate slot with detector card

## INPUT FILE CONNECTION & PROGRAMMING CHART

| LOOP NO. | LOOP TERMINAL | INPUT FILE POS. | PIN NO. | DETECTOR NO. | NEMA PHASE | CALL | EXTEND TIME | DELAY TIME | ADDED INITIAL | DETECTOR TYPE |
|---|---|---|---|---|---|---|---|---|---|---|
| 1A [1] | TB2-1,2 | I1U | 56 | 1★ | 1 | YES | | 15 | | S |
| | - | J4U | 48 | 26★ | 6 | YES | | 3 | | S |
| 2A | TB2-5,6 | I2U | 39 | 2 | 2 | YES | | | | S |
| 2B | TB2-7,8 | I2L | 43 | 12 | 2 | YES | | | | S |
| 3A | TB4-5,6 | I5U | 58 | 3 | 3 | YES | | 3 | | S |
| 4A | TB4-9,10 | I6U | 41 | 4 | 4 | YES | | | | S |
| 4B | TB4-11,12 | I6L | 45 | 14 | 4 | YES | | 5 | | S |
| 5A [2] | TB3-1,2 | J1U | 55 | 5★ | 5 | YES | | 15 | | S |
| | - | I4U | 47 | 22★ | 2 | YES | | 3 | | S |
| 6A | TB3-5,6 | J2U | 40 | 6 | 6 | YES | | | | S |
| 6B | TB3-7,8 | J2L | 44 | 16 | 6 | YES | | | | S |
| 7A | TB5-5,6 | J5U | 57 | 7 | 7 | YES | | 3 | | S |
| 8A | TB5-9,10 | J6U | 42 | 8 | 8 | YES | | | | S |
| 8B | TB5-11,12 | J6L | 46 | 18 | 8 | YES | | 5 | | S |
| PED PUSH BUTTONS | | | | | | | | | | |
| P21,P22 | TB8-4,6 | I12U | 67 | PED 2 | 2 PED | | | | | |
| P41,P42 | TB8-5,6 | I12L | 69 | PED 4 | 4 PED | | | | | |
| P61,P62 | TB8-7,9 | I13U | 68 | PED 6 | 6 PED | | | | | |
| P81,P82 | TB8-8,9 | I13L | 70 | PED 8 | 8 PED | | | | | |

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

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

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

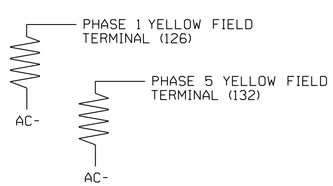
INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

## LOAD RESISTOR INSTALLATION DETAIL

*(install resistors as shown)*

ACCEPTABLE VALUES

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




THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: D-0222
DESIGNED: JANUARY 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail - Sheet 1 of 4

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

DURHAM
1869
CITY OF MEDICINE

University Drive
at
Shannon Road

Division 5 Durham County Durham

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

| REVISIONS | INIT. | DATE |
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SIG. INVENTORY NO. D-0222

PLANS PREPARED IN THE OFFICE OF:
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12/19/2018
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| PROJECT REFERENCE NO. | SHEET NO. |
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| U-5968 | SIG.380.2 |

# 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

## 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: D-0222
DESIGNED: JANUARY 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail - Sheet 2 of 4

**DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED**

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ELECTRICAL AND PROGRAMMING DETAILS FOR:

DURHAM
1869
CITY OF MEDICINE

University Drive
at
Shannon Road

Division 5 Durham County Durham

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

| REVISIONS | INIT. | DATE |
|---|---|---|
| | | |

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NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACIE L. PHILLIPS

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SIGNATURE DATE

SIG. INVENTORY NO. D-0222

12/19/2018
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| PROJECT REFERENCE NO. | SHEET NO. |
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| U-5968 | SIG.380.3 |

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

*(program controller as shown)*

## IMPORTANT!

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

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

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

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

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

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

NOTICE VEH DET PLAN 2

ENSURE DELAY IS SET TO '3'

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

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

NOTICE VEH DET PLAN 2

ENSURE PHASE IS SET TO "0"

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

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

NOTICE VEH DET PLAN 2

ENSURE DELAY IS SET TO '3'

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

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

NOTICE VEH DET PLAN 2

ENSURE PHASE IS SET TO "0"

END PROGRAMMING

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: D-0222
DESIGNED: JANUARY 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail - Sheet 3 of 4

**DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED**

ELECTRICAL AND PROGRAMMING DETAILS FOR:

DURHAM 1869 CITY OF MEDICINE

University Drive at Shannon Road

Division 5 Durham County Durham

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

| REVISIONS | INIT. | DATE |
|---|---|---|
| | | |

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACIE L. PHILLIPS

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

SIGNATURE DATE

SIG. INVENTORY NO. D-0222

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12/19/2018
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# ALTERNATE PHASING ACTIVATION DETAIL

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

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

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

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

## ALTERNATE PHASING CHANGE SUMMARY

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

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

VEH DET PLAN 2: Disables phase 6 call on loop 1A and reduces delay time for phase 1 call on loop 1A to 3 seconds.

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

# ECONOLITE ASC/3-2070 ACTION PLAN PROGRAMMING DETAIL

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

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: D-0222
DESIGNED: JANUARY 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail - Sheet 4 of 4

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED


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


ELECTRICAL AND PROGRAMMING DETAILS FOR:

DURHAM
1869
CITY OF MEDICINE

University Drive
at
Shannon Road

Division 5 Durham County Durham

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

| REVISIONS | INIT. | DATE |
|---|---|---|
| | | |

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACE L. PHILLIPS
DocuSigned by: DC87A59ED60B437...
12/19/2018
SIGNATURE DATE
SIG. INVENTORY NO. D-0222

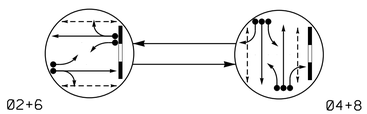
12/19/2018
k:\RAL_TPO_ITS\011036410 - Durham Signal System\Signals\S4 - Signal Design\GROUP 2\U-5968_D0222-2017e4.dgn
derrick.waller

DocuSign Envelope ID: 0B625E6A-8894-4C86-8F60-F8E5B91D2C75

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-5968 | Sig-381.0 |

# 2 Phase Fully Actuated W/ EV Preemption and RR Preemption (Durham Signal System)

## PHASING DIAGRAM

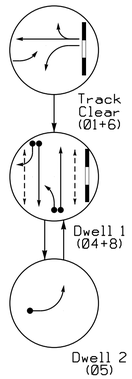



PHASING DIAGRAM DETECTION LEGEND

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

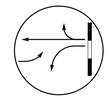
## RAIL PREEMPT PHASES

(High Priority)




## EV PREEMPT PHASES

(Medium Priority)




## TABLE OF OPERATION

| SIGNAL FACE | PHASE 02+6 | 04+8 | CLEARRR | DWELL1 | DWELL2 | PRE3 | FLASH |
|---|---|---|---|---|---|---|---|
| 11 | F Y | R | R | R | R | R | Y |
| 21, 22 | G | R | R | R | R | R | Y |
| 41 | R | F Y | R | R | R | R | R |
| 42, 43 | R | G | R | G | R | R | R |
| 51 | F Y | R | F Y | R | R | F Y | Y |
| 61, 62 | G | R | G | R | R | G | Y |
| 81 | R | F Y | R | F Y | R | R | R |
| 82, 83 | R | G | R | G | R | R | R |
| P21, P22 | W | DW | DW | DW | DW | DW | DRK |
| P41, P42 | DW | W | DW | W | DW | DW | DRK |
| P61, P62 | W | DW | DW | DW | DW | DW | DRK |
| P81, P82 | DW | W | DW | W | DW | DW | DRK |
| SIGN B | OFF | OFF | ON | ON | ON | OFF | * |

* See Note 16.

## ASC/3 DETECTOR INSTALLATION CHART

| DETECTOR | | | | | PROGRAMMING | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LOOP | SIZE (FT) | DISTANCE FROM STOPBAR (FT) | TURNS | NEW LOOP | PHASE | CALLING | EXTEND TIME | DELAY TIME | USE ADDED INITIAL | TYPE | SYSTEM LOOP | NEW CARD |
| 2A | 6X6 | 70 | Exist | - | 2 | Yes | - | - | - | S | - | X |
| 2B | 6X40 | 0 | 2-4-2 | - | 2 | Yes | - | - | - | S | - | X |
| 4A | 6X40 | +5 | 2-4-2 | - | 4 | Yes | - | 3 | - | S | - | X |
| 4B | 6X60 | +5 | 2-4-2 | - | 4 | Yes | - | - | - | S | - | X |
| 4C | 6X60 | +5 | 2-4-2 | - | 4 | Yes | - | 15 | - | S | - | X |
| 6A | 6X6 | 70 | Exist | - | 6 | Yes | - | - | - | S | - | X |
| 6B | 6X40 | 0 | 2-4-2 | - | 6 | Yes | - | - | - | S | - | X |
| 8A | 6X40 | +5 | 2-4-2 | - | 8 | Yes | - | 3 | - | S | - | X |
| 8B | 6X60 | +5 | 2-4-2 | - | 8 | Yes | - | - | - | S | - | X |
| 8C | 6X60 | +5 | 2-4-2 | - | 8 | Yes | - | 15 | - | S | - | X |

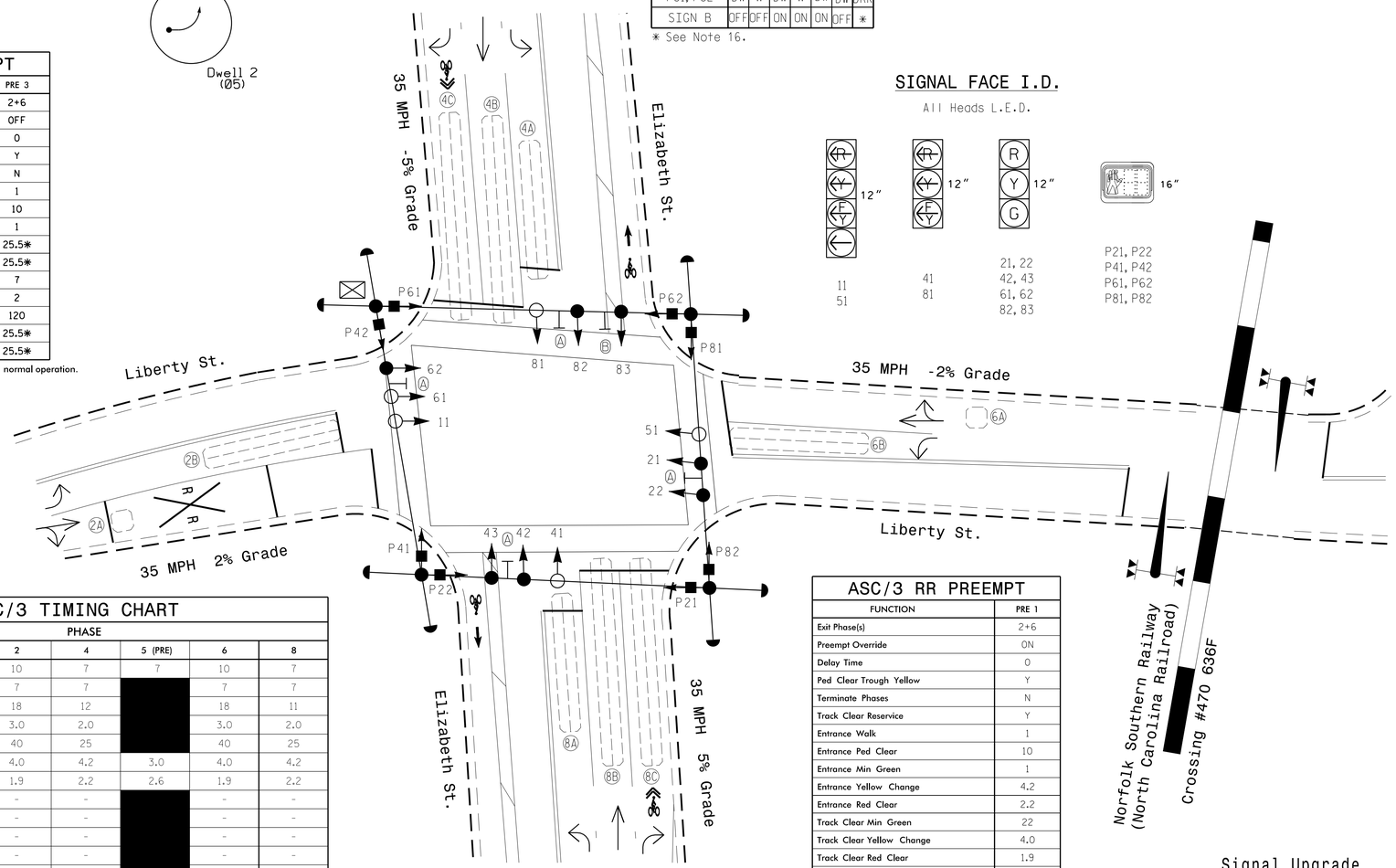
## NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. This location contains railroad preemption phasing. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Renumber existing signal heads 21, 22, 41, 42, 81 and 82 as 22, 23, 42, 43, 82 and 83 respectively.
4. Reposition existing signal heads numbered 22, 23, 42, 43, 62, 82 and 83.
5. Set all detector units to presence mode.
6. In the event of loop replacement, refer to the current ITS and Signals Design Manual and submit a Plan of Record to the Signal Design Section.
7. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
8. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
9. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
10. Pavement markings are existing.
11. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
12. Loop data based on previous plan and/or field observations.
13. Install new cabinet on the existing cabinet foundation.
14. Install GPS emergency preemption system per manufacturer's instructions to achieve preemption needed, as shown in phasing diagram.
15. Remove existing optical detection equipment.
16. Ensure flashing operation does not alter operation of blankout sign.
17. Remove existing blankout sign for southbound approach.

## ASC/3 EV PREEMPT

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

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




## SIGNAL FACE I.D.

All Heads L.E.D.




## ASC/3 TIMING CHART

| FEATURE | PHASE 1 (PRE) | 2 | 4 | 5 (PRE) | 6 | 8 |
|---|---|---|---|---|---|---|
| Min Green * | | 10 | 7 | 7 | 10 | 7 |
| Walk * | | 7 | 7 | | 7 | 7 |
| Ped Clear | | 18 | 12 | | 18 | 11 |
| Veh. Extension * | | 3.0 | 2.0 | | 3.0 | 2.0 |
| Max 1 * | | 40 | 25 | | 40 | 25 |
| Yellow | 3.0 | 4.0 | 4.2 | 3.0 | 4.0 | 4.2 |
| Red Clear | 2.3 | 1.9 | 2.2 | 2.6 | 1.9 | 2.2 |
| Actuations B4 Add * | | - | - | | - | - |
| Seconds /Actuation * | | - | - | | - | - |
| Max Initial * | | - | - | | - | - |
| Time Before Reduction * | | - | - | | - | - |
| Time To Reduce * | | - | - | | - | - |
| Minimum Gap | | - | - | | - | - |
| Locking Detector | | X | - | | X | - |
| Recall Position | | VEH RECALL | - | | VEH RECALL | - |
| Dual Entry | | - | 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 and 6 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.

## ASC/3 RR PREEMPT

| FUNCTION | PRE 1 |
|---|---|
| Exit Phase(s) | 2+6 |
| Preempt Override | ON |
| Delay Time | 0 |
| Ped Clear Trough Yellow | Y |
| Terminate Phases | N |
| Track Clear Reservice | Y |
| Entrance Walk | 1 |
| Entrance Ped Clear | 10 |
| Entrance Min Green | 1 |
| Entrance Yellow Change | 4.2 |
| Entrance Red Clear | 2.2 |
| Track Clear Min Green | 22 |
| Track Clear Yellow Change | 4.0 |
| Track Clear Red Clear | 1.9 |
| Min Dwell Time | 7 |
| Exit Yellow Change | 25.5✱ |
| Exit Red Clear | 25.5✱ |

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

This signal is designed for Simultaneous Preemption.

## 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 | |
| N/A | Railroad Tracks | |
| N/A | Railroad Gate and Flasher | |
| Ⓐ | Street Name Sign (D3-1) | Ⓐ |
| Ⓑ | "NO RIGHT TURN TRAIN" LED Blankout Sign | Ⓑ |

Signal Upgrade

Prepared for: DURHAM 1869 CITY OF MEDICINE

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'

Elizabeth St. at 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

Docu Sign Envelope ID: AD560D7D4A4A84 William J. Hamilton 12/20/2018

SIGNATURE DATE

SIG. INVENTORY NO. D-0236

12/20/2018
U-5968_Sig-0236_RD-0236_sig_dgn
User: tpopelko

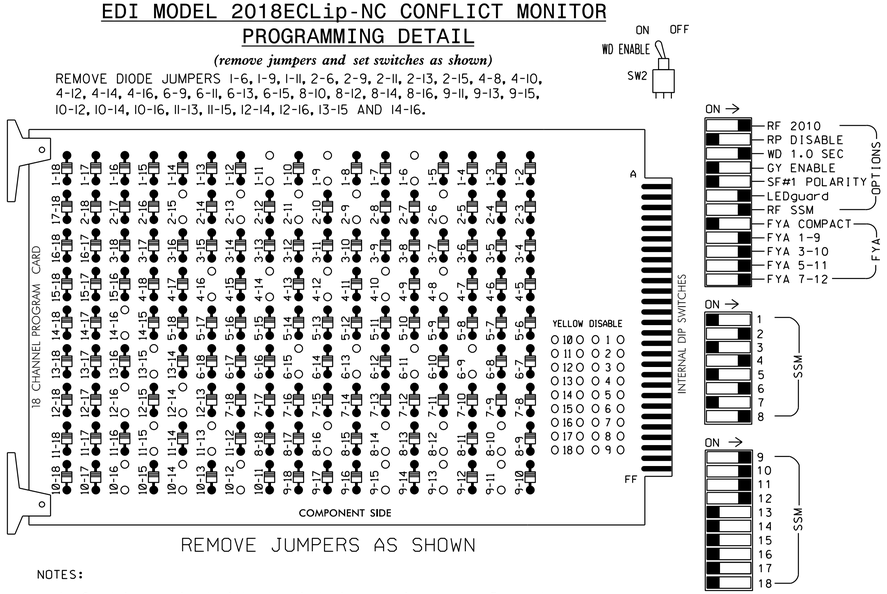
DocuSign Envelope ID: EE3DA65B-2411-431F-8459-D9725899AA92

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-5968 | Sig-318.1 |

# EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

*(remove jumpers and set switches as shown)*

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




REMOVE JUMPERS AS SHOWN

NOTES:

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

## NOTES

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

## EQUIPMENT INFORMATION

CONTROLLER.....2070LX
CABINET.....332 W/ AUX
SOFTWARE.....ECONOLITE ASC/3-2070
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
LOAD SWITCHES USED.....S1,S2,S3,S5,S6,S7,S8,S9,S11,S12, AUX S1,AUX S2,AUX S4,AUX S5
PHASES USED.....1*,2,2PED,4,4PED,5*,6,6PED,8,8PED
OVERLAP "A".....**
OVERLAP "B".....**
OVERLAP "C".....**
OVERLAP "D".....**
* Phases 1 and 5 only used during Preempt.
** See overlap programming on sheet 2.

## SIGNAL HEAD HOOK-UP CHART

| LOAD SWITCH NO. | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 | AUX S1 | AUX S2 | AUX S3 | AUX S4 | AUX S5 | AUX S6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CMU CHANNEL NO. | 1 | 2 | 13 | 3 | 4 | 14 | 5 | 6 | 15 | 7 | 8 | 16 | 9 | 10 | 17 | 11 | 12 | 18 |
| PHASE | 1 | 2 | 2 PED | 3 | 4 | 4 PED | 5 | 6 | 6 PED | 7 | 8 | 8 PED | OLA | OLB | SPARE | OLC | OLD | SPARE |
| SIGNAL HEAD NO. | 11★ | 21,22 | P21, P22 | NU | 42,43 | P41, P42 | 51★ | 61,62 | P61, P62 | NU | 82,83 | P81, P82 | 11★ | 81★ | NU | 51★ | 41★ | NU |
| RED | | 128 | | | 101 | | | 134 | | | 107 | | | | | | | |
| YELLOW | * | 129 | | | 102 | | * | 135 | | | 108 | | | | | | | |
| GREEN | | 130 | | | 103 | | | 136 | | | 109 | | | | | | | |
| RED ARROW | | | | | | | | | | | | | A121 | A124 | | A114 | A101 | |
| YELLOW ARROW | | | | | | | | | | | | | A122 | A125 | | A115 | A102 | |
| FLASHING YELLOW ARROW | | | | | | | | | | | | | A123 | A126 | | A116 | A103 | |
| GREEN ARROW | 127 | | | | | | 133 | | | | | | | | | | | |
| ✋ | | | 113 | | | 104 | | | 119 | | | 110 | | | | | | |
| 🚶 | | | 115 | | | 106 | | | 121 | | | 112 | | | | | | |

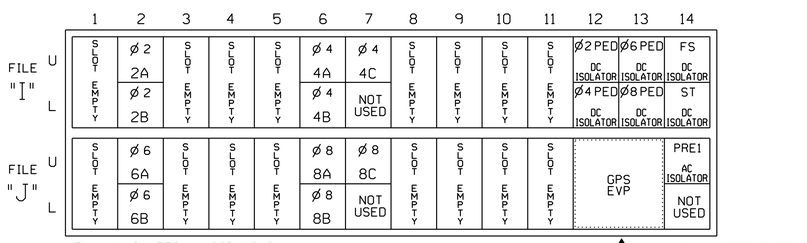
NU = Not Used

* 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)*




## INPUT FILE CONNECTION & PROGRAMMING CHART

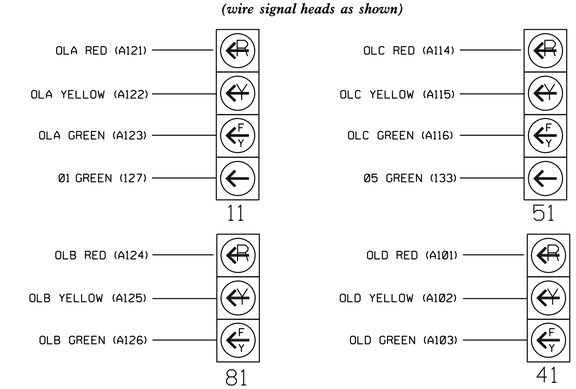
| LOOP NO. | LOOP TERMINAL | INPUT FILE POS. | PIN NO. | DETECTOR NO. | NEMA PHASE | CALL | EXTEND TIME | DELAY TIME | ADDED INITIAL | DETECTOR TYPE |
|---|---|---|---|---|---|---|---|---|---|---|
| 2A | TB2-5,6 | I2U | 39 | 2 | 2 | YES | | | | S |
| 2B | TB2-7,8 | I2L | 43 | 12 | 2 | YES | | | | S |
| 4A | TB4-9,10 | I6U | 41 | 4 | 4 | YES | | 3 | | S |
| 4B | TB4-11,12 | I6L | 45 | 14 | 4 | YES | | | | S |
| 4C | TB6-1,2 | I7U | 65 | 34 | 4 | YES | | 15 | | S |
| 6A | TB3-5,6 | J2U | 40 | 6 | 6 | YES | | | | S |
| 6B | TB3-7,8 | J2L | 44 | 16 | 6 | YES | | | | S |
| 8A | TB5-9,10 | J6U | 42 | 8 | 8 | YES | | 3 | | S |
| 8B | TB5-11,12 | J6L | 46 | 18 | 8 | YES | | | | S |
| 8C | TB7-1,2 | J7U | 66 | 38 | 8 | YES | | 15 | | S |
| PED PUSH BUTTONS | | | | | | | | | | |
| P21,P22 | TB8-4,6 | I12U | 67 | PED 2 | 2 PED | | | | | |
| P41,P42 | TB8-5,6 | I12L | 69 | PED 4 | 4 PED | | | | | |
| P61,P62 | TB8-7,9 | I13U | 68 | PED 6 | 6 PED | | | | | |
| P81,P82 | TB8-8,9 | I13L | 70 | PED 8 | 8 PED | | | | | |

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

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

## SIGNAL HEAD WIRING DETAIL

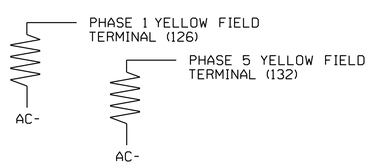
*(wire signal heads as shown)*




## LOAD RESISTOR INSTALLATION DETAIL

*(install resistors as shown)*

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




## 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: D-0236
DESIGNED: Dec 2018
SEALED: 12/20/2018
REVISED: N/A

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

Electrical Detail
Sheet 1 of 5

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:
DURHAM 1869 CITY OF MEDICINE

Elizabeth St.
at
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
DocuSigned by: William J. Hamilton 12/20/2018
SIGNATURE DATE
SIG. INVENTORY NO. D-0236

12/19/2018
U-5968_Sig-318.1_D-0236_dele.dgn
User:tpopelka

DocuSign Envelope ID: EE3DA65B-2411-431F-8459-D9725899AA92

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-5968 | Sig-381.2 |

# 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........... 0
```

↓ Toggle Once

*OVERLAP B*

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

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

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

↓ Toggle Once

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........... 0
```

↓ Toggle Once

*OVERLAP D*

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

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

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

END PROGRAMMING

# FLASHER CIRCUIT MODIFICATION DETAIL

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

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

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: D-0236
DESIGNED: Dec 2018
SEALED: 12/20/2018
REVISED: N/A

Electrical Detail
Sheet 2 of 5

ELECTRICAL AND PROGRAMMING DETAILS FOR:

DURHAM
1869
CITY OF MEDICINE

Elizabeth St.
at
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 |
|---|---|---|
| | | |

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

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SEAL

NORTH CAROLINA PROFESSIONAL SEAL 32396 ENGINEER WILLIAM J. HAMILTON

DocuSigned by: William J. Hamilton 12/20/2018
A0560D704648484...
SIGNATURE DATE

SIG. INVENTORY NO. D-0236

12/19/2018
ecs_ATC_D-0236_ele2.dgn
User:tpopelka

DocuSign Envelope ID: EE3DA65B-2411-431F-8459-D9725899AA92

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-5968 | Sig-381.3 |

# 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 OLPF1 .F1 . . . . . . . . . . . . .
CYC VEH  . . . . . . . . . . . . . . . .
CYC PED  . . . . . . . . . . . . . . . .
CYC OLP  . . . . . . . . . . . . . . . .
EXIT PH  . X . . . X . . . . . . . . . .
EXIT CAL . . . . . . . . . . . . . . . .
SP FUNC  . . . . . . . . . . . . . . . .

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

PROGRAM EXTEND TIME ON GPS DETECTOR UNITS FOR 2.0 SEC.

# ECONOLITE ASC/3-2070 PREEMPT FILTERING PROGRAMMING DETAIL

*(program controller as shown)*

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

```
ENABLE PREEMPT FILTERING & TSP/SCP
FILTERED     SOLID         PULSING
       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: D-0236
DESIGNED: Dec 2018
SEALED: 12/20/2018
REVISED: N/A

Electrical Detail
Sheet 3 of 5

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ELECTRICAL AND PROGRAMMING DETAILS FOR:
DURHAM
1869
CITY OF MEDICINE

Elizabeth St.
at
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

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

SIG. INVENTORY NO. D-0236

12/19/2018
Sig-381.3_D-0236_0103.dgn
User: tspopelka

DocuSign Envelope ID: EE3DA65B-2411-431F-8459-D9725899AA92

| PROJECT REFERENCE NO. | SHEET NO. |
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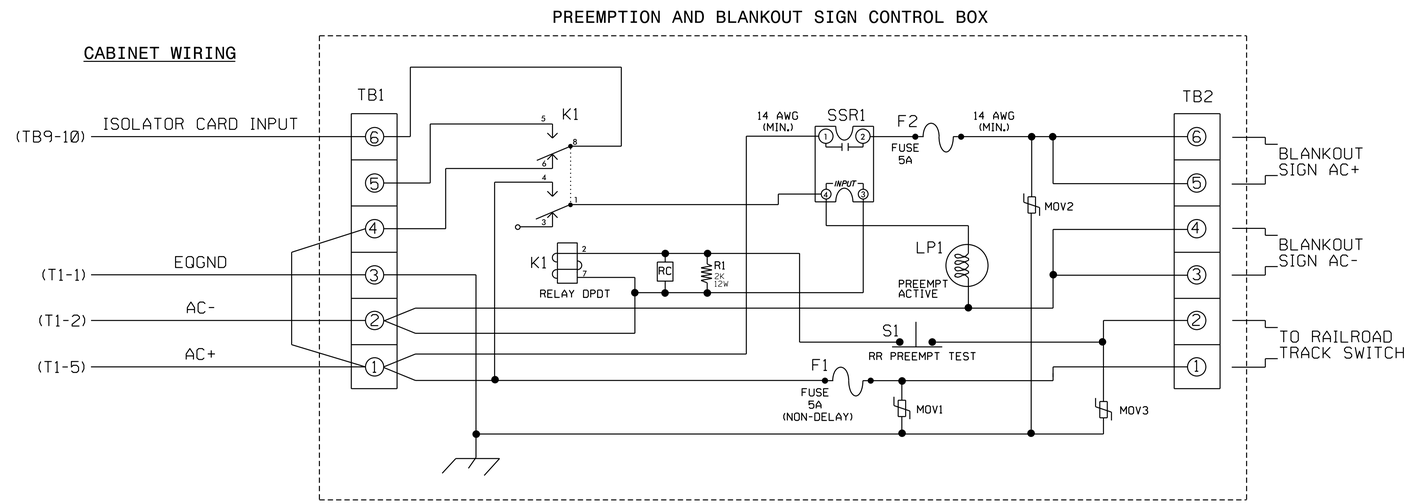
| U-5968 | Sig-381.4 |

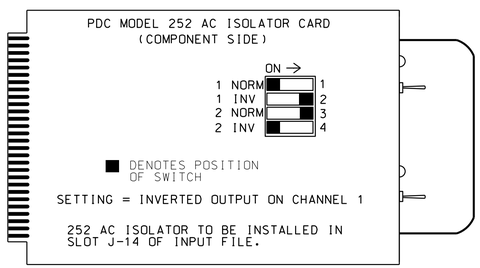
# RAILROAD PREEMPTION WIRING DETAIL

*(wire as shown below)*




## PREEMPT 1 AC ISOLATOR (MODEL 252) OUTPUT PROGRAMMING DETAIL

*(set DIP switches as shown below)*

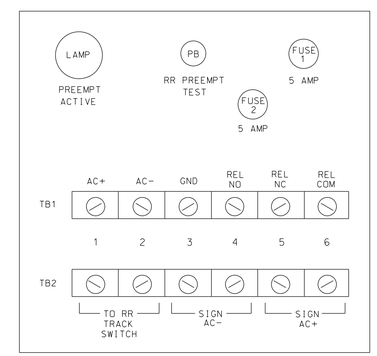



NOTE: IF ANOTHER MANUFACTURER TYPE OF AC ISOLATOR IS USED. OUTPUT PROGRAMMING IS LIKELY NOT TO EQUATE TO THAT SHOWN ABOVE.

## 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).

## FRONT VIEW




THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: D-0236
DESIGNED: Dec 2018
SEALED: 12/20/2018
REVISED: N/A

Electrical Detail
Sheet 4 of 5

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ELECTRICAL AND PROGRAMMING DETAILS FOR:

DURHAM
1869
CITY OF MEDICINE

Elizabeth St.
at
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 |
|---|---|---|
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| | | |

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32396 ENGINEER WILLIAM J. HAMILTON

DocuSigned by: William J. Hamilton 12/20/2018
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SIG. INVENTORY NO. D-0236

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|---|---|
| U-5968 | Sig-381.5 |

# ECONOLITE ASC/3-2070 RAILROAD 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 1. Then press the right cursor arrow and toggle the controller to YES. Next cursor down. This will select Railroad Preempt #1.

```
PREEMPT PLAN [  1]    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 X . . . . X . . . . . . . . . .
TRKCLR OF1 .F1 . . . . . . . . . . . . .
ENA TRL  . . . . . . . . . . . . . . . .
DWEL VEH . . . . . . . . . . . . . . . .
DWEL PED . . . . . . . . . . . . . . . .
DWEL OLP . . . . . . . . . . . . . . . .
CYC VEH  . . . X X . . X . . . . . . . .
CYC PED  . . . X . . . X . . . . . . . .
CYC OLP  .F1 . . . . . . . . . . . . . .
EXIT PH  . X . . . . X . . . . . . . . .
EXIT CAL . . . . . . . . . . . . . . . .
SP FUNC  . . . . . . . . . . . . . . . .

ENABLE... YESIPMT OVRIDE.XIINTERLOCK. NO
DET LOCK... XIDELAY..    OIINHIBIT...  O
OVERIDE FL. .IDURATION   OICLR-GRN... NO
TERM OLP.  NOIPC>YEL   YESITERM PH    NO
PED DARK.. NOITC RESRV YESIDWELL FL   OFF
LINK PMT....OIX FLCOLR REDIEXIT OPT. OFF
X TMG PLN...OIRE-SERV..  OIFLT TYPE.HARD
FREE DUR PMTIR1  NOIR2  NOIR3  NOIR4  NO
--TIMING-----WALKIPED CLIMN GRI YELI RED
ENTRANCE TM.    1I    10I    1I 4.2I 2.2
-----------MIN GRIEXT GRIMX GRI YELI RED
TRACK CLEAR    22I     0I    0I 4.0I 1.9
-----------MIN DLIPMTEXTIMX TMI YELI RED
DWL/CYC-EXIT    7I   0.0I    0I25.5I25.5
PMT ACTIVE OUT..ON   PMT ACT DWELL...NO
OTHER - PRI PMT.OFF  NON-PRI PMT.....OFF
INH EXT TIME... 0.0  PED PR RETURN...OFF
PRIORITY RETURN.OFF  QUEUE DELAY.... OFF
COND DELAY......OFF
PHASES     1   2   3   4   5   6   7   8
PR RTN%    0   0   0   0   0   0   0   0
PHASES     9  10  11  12  13  14  15  16
PR RTN%    0   0   0   0   0   0   0   0
```

# 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          1   IS  OFF
OR     PREEMPT ACTIVE          3   IS  OFF
THEN   CTR OMIT PHASE          1       ON
THEN   CTR OMIT PHASE          5       ON
ELSE
```

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

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

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

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

END PROGRAMMING

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: D-0236
DESIGNED: Dec 2018
SEALED: 12/20/2018
REVISED: N/A

Electrical Detail
Sheet 5 of 5

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ELECTRICAL AND PROGRAMMING DETAILS FOR:

DURHAM
1869
CITY OF MEDICINE

Elizabeth St.
at
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

DocuSigned by: William J. Hamilton A0560D704848484 12/20/2018
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SIG. INVENTORY NO. D-0236

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12/20/2018
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User: tpopelka

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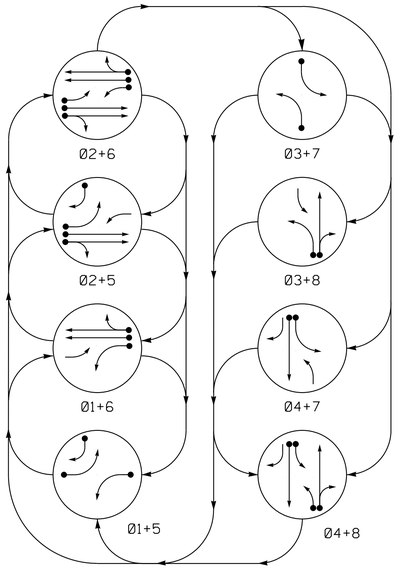
| U-5968 | SIG.382.0 |

## DEFAULT PHASING DIAGRAM




PHASING DIAGRAM DETECTION LEGEND

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

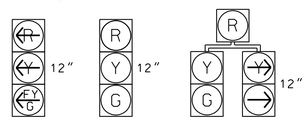
## DEFAULT PHASING TABLE OF OPERATION

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

## SIGNAL FACE I.D.

All Heads L.E.D.

F Y G = Bimodal Section

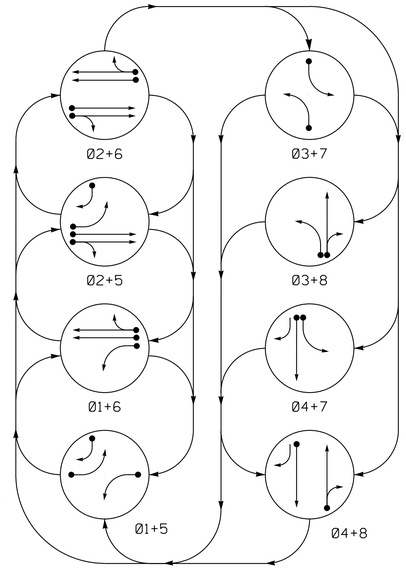



11
31
51
71

21,22
41
61,62
81,82

42

## ALTERNATE PHASING DIAGRAM




## ALTERNATE PHASING TABLE OF OPERATION

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

## ASC/3 DETECTOR INSTALLATION CHART

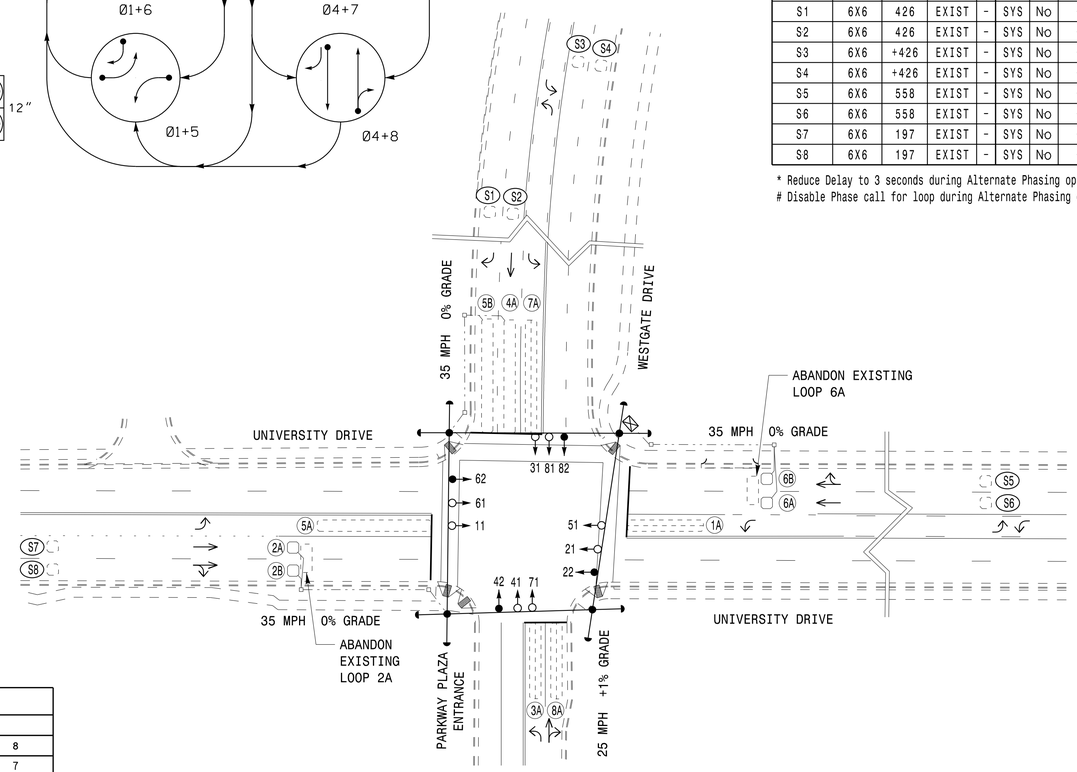
| DETECTOR | | | | | PROGRAMMING | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LOOP | SIZE (FT) | DISTANCE FROM STOPBAR (FT) | TURNS | NEW LOOP | PHASE | CALLING | EXTEND TIME | DELAY TIME | USE ADDED INITIAL | TYPE | SYSTEM LOOP | NEW CARD |
| 1A | 6X40 | 0 | 2-4-2 | - | 1 | Yes | - | 15* | - | S | - | X |
| | | | | | 6# | Yes | - | - | - | S | - | X |
| 2A | 6X6 | 70 | 6 | X | 2 | Yes | - | - | - | S | - | X |
| 2B | 6X6 | 70 | 6 | X | 2 | Yes | - | - | - | S | - | X |
| 3A | 6X40 | 0 | 2-4-2 | - | 3 | Yes | - | 15* | - | S | - | X |
| | | | | | 8# | Yes | - | 3 | - | S | - | X |
| 4A | 6X60 | 0 | EXIST | - | 4 | Yes | - | - | - | S | - | X |
| 5A | 6X60 | 0 | EXIST | - | 5 | Yes | - | 15* | - | S | - | X |
| | | | | | 2# | Yes | - | - | - | S | - | X |
| 5B | 6X60 | 0 | EXIST | - | 5 | Yes | - | 15 | - | S | - | X |
| 6A | 6X6 | 70 | 6 | X | 6 | Yes | - | - | - | S | - | X |
| 6B | 6X6 | 70 | 6 | X | 6 | Yes | - | - | - | S | - | X |
| 7A | 6X60 | 0 | 2-4-2 | - | 7 | Yes | - | 15* | - | S | - | X |
| | | | | | 4# | Yes | - | 3 | - | S | - | X |
| 8A | 6X40 | 0 | 2-4-2 | - | 8 | Yes | - | 10 | - | S | - | X |
| S1 | 6X6 | 426 | EXIST | - | SYS | No | - | - | - | N | X | X |
| S2 | 6X6 | 426 | EXIST | - | SYS | No | - | - | - | N | X | X |
| S3 | 6X6 | +426 | EXIST | - | SYS | No | - | - | - | N | X | X |
| S4 | 6X6 | +426 | EXIST | - | SYS | No | - | - | - | N | X | X |
| S5 | 6X6 | 558 | EXIST | - | SYS | No | - | - | - | N | X | X |
| S6 | 6X6 | 558 | EXIST | - | SYS | No | - | - | - | N | X | X |
| S7 | 6X6 | 197 | EXIST | - | SYS | No | - | - | - | N | X | X |
| S8 | 6X6 | 197 | EXIST | - | SYS | No | - | - | - | N | X | X |

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

## 8 PHASE FULLY ACTUATED (DURHAM SIGNAL SYSTEM)

## NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 and/or phase 5 may be lagged.
4. Phase 3 and/or phase 7 may be lagged.
5. Reposition existing signal heads numbered 22, 62, and 82.
6. Abandon existing loops 2A and 6A.
7. Set all detector units to presence mode.
8. In the event of loop replacement, refer to the current ITS and Signal Design Manual and submit a Plan of Record to the Signal Design Section.
9. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
10. Remove existing "Left Turn Yield on Green" ball signs-(R10-12).
11. Pavement markings are existing.
12. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
13. The Division (City) Traffic Engineer will determine the hours of use for each phasing plan.
14. Loop data based on previous plan and/or field observations.
15. Install new cabinet on the existing cabinet foundation.
16. Reconnect lead-in cable to separate loops 4A and 5B, as shown.




## LEGEND

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

## ASC/3 TIMING CHART

| FEATURE | PHASE 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Min Green * | 7 | 10 | 7 | 7 | 7 | 10 | 7 | 7 |
| Walk * | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped Clear | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Veh. Extension * | 2.0 | 3.0 | 2.0 | 1.0 | 1.0 | 3.0 | 1.0 | 2.0 |
| Max 1 * | 15 | 90 | 20 | 35 | 15 | 90 | 20 | 35 |
| Yellow | 3.0 | 3.8 | 3.0 | 3.8 | 3.0 | 3.8 | 3.0 | 3.8 |
| Red Clear | 2.4 | 1.8 | 2.6 | 2.5 | 2.6 | 1.8 | 2.4 | 2.5 |
| Actuations B4 Add * | - | - | - | - | - | - | - | - |
| Seconds /Actuation * | - | - | - | - | - | - | - | - |
| Max Initial * | - | - | - | - | - | - | - | - |
| Time Before Reduction * | - | - | - | - | - | - | - | - |
| Time To Reduce * | - | - | - | - | - | - | - | - |
| Minimum Gap | - | - | - | - | - | - | - | - |
| Locking Detector | - | X | - | - | - | X | - | - |
| Recall Position | - | VEH. RECALL | - | - | - | VEH. RECALL | - | - |
| Dual Entry | - | - | - | X | - | - | - | X |
| Simultaneous Gap | X | X | X | X | 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.

PLANS PREPARED IN THE OFFICE OF:
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Signal Upgrade

DURHAM 1869 CITY OF MEDICINE

SCALE 0 40 1"=40'

University Drive at Westgate Drive/ Parkway Place Entrance

Division 5 Durham County Durham

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

| REVISIONS | INIT. | DATE |
|---|---|---|
| | | |

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACIE L. PHILLIPS

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

SIG. INVENTORY NO. D-0256

12/19/2018
kimley-horn\ITS\M01036410 - Durham Signal System\Signals\54 - Signal Design\GROUP SKU-5968.D0256-2018.dgn
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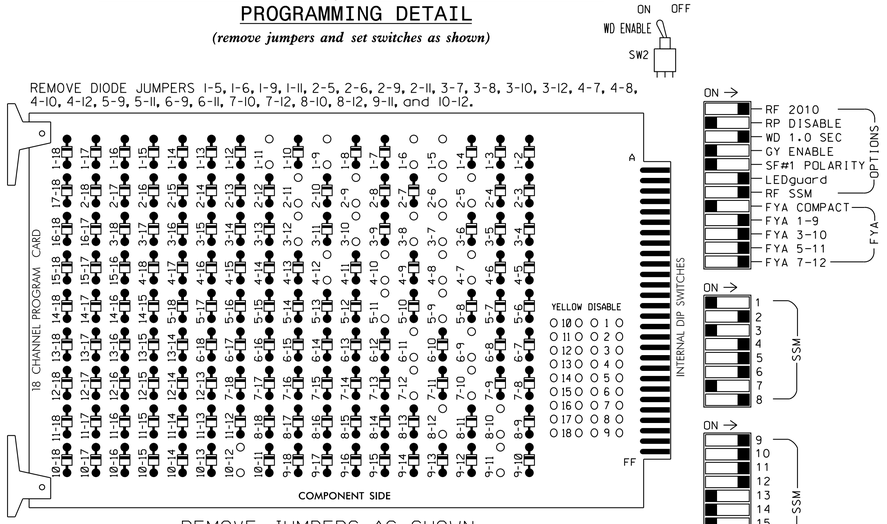
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-5968 | SIG.382.1 |

# EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

*(remove jumpers and set switches as shown)*




NOTES:

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

## NOTES

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

## EQUIPMENT INFORMATION

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

* See overlap programming detail on sheet 2

## SIGNAL HEAD HOOK-UP CHART

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

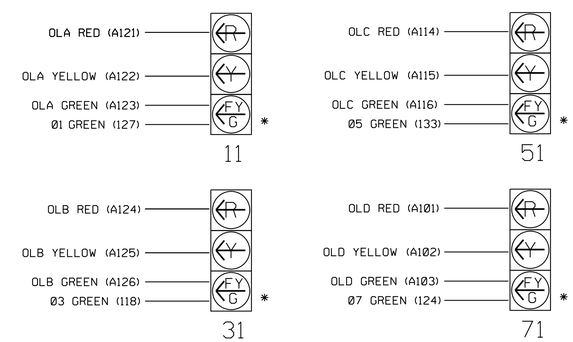
NU = Not Used

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

★ See pictorial of head wiring in detail this sheet.

## FYA SIGNAL WIRING DETAIL

*(wire signal heads as shown)*




* Bimodal Section

## INPUT FILE POSITION LAYOUT

*(front view)*

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

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

⊗ 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 |
| 2B | TB2-7,8 | I2L | 43 | 12 | 2 | YES | | | | S |
| 3A [2] | TB4-5,6 | I5U | 58 | 3★ | 3 | YES | | 15 | | S |
| | - | J8U | 50 | 28★ | 8 | YES | | 3 | | S |
| 4A | TB4-9,10 | I6U | 41 | 4 | 4 | YES | | | | S |
| 5A [3] | TB3-1,2 | J1U | 55 | 5★ | 5 | YES | | 15 | | S |
| | - | I4U | 47 | 22★ | 2 | YES | | | | S |
| 5B | TB7-9,10 | J9U | 59 | 15 | 5 | YES | | 15 | | S |
| 6A | TB3-5,6 | J2U | 40 | 6 | 6 | YES | | | | S |
| 6B | TB3-7,8 | J2L | 44 | 16 | 6 | YES | | | | S |
| 7A [4] | TB5-5,6 | J5U | 57 | 7★ | 7 | YES | | 15 | | S |
| | - | I8U | 49 | 24★ | 4 | YES | | 3 | | S |
| 8A | TB5-9,10 | J6U | 42 | 8 | 8 | YES | | 10 | | S |
| * S1 | TB6-9,10 | I9U | 60 | 11 | SYS | NO | | | | N |
| * S2 | TB6-11,12 | I9L | 62 | 13 | SYS | NO | | | | N |
| * S3 | TB3-9,10 | J3U | 64 | 36 | SYS | NO | | | | N |
| * S4 | TB3-11,12 | J3L | 77 | 46 | SYS | NO | | | | N |
| * S5 | TB6-1,2 | I7U | 65 | 34 | SYS | NO | | | | N |
| * S6 | TB6-3,4 | I7L | 78 | 44 | SYS | NO | | | | N |
| * S7 | TB7-1,2 | J7U | 66 | 38 | SYS | NO | | | | N |
| * S8 | TB7-3,4 | J7L | 79 | 48 | SYS | NO | | | | N |

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

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

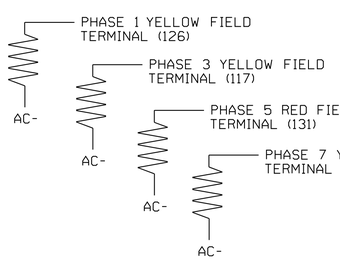
INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

## LOAD RESISTOR INSTALLATION DETAIL

*(install resistors as shown)*

ACCEPTABLE VALUES

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




THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: D-0256
DESIGNED: APRIL 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail - Sheet 1 of 4

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

DURHAM
1869
CITY OF MEDICINE

University Drive
at
Westgate Drive/
Parkway Place Entrance

Division 5 Durham County Durham

| | | | |
|---|---|---|---|
| PLAN DATE: April 2018 | | REVIEWED BY: SL Phillips | |
| PREPARED BY: DA Waller | | REVIEWED BY: KP Baumann | |
| REVISIONS | | INIT. | DATE |

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACIE L. PHILLIPS

DocuSigned by:
DC87A59ED9D8437...
12/19/2018
SIGNATURE DATE

SIG. INVENTORY NO. D-0256

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12/19/2018
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| U-5968 | SIG.382.2 |

# ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

*(program controller as shown)*

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

*OVERLAP A*

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

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

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

FLASHING ARROW OUTPUT.....CH9  ISOLATE

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

← NOTICE ACTION PLAN SF BIT "1"

Toggle Once

↓

*OVERLAP B*

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

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

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

FLASHING ARROW OUTPUT.....CH10 ISOLATE

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

← NOTICE ACTION PLAN SF BIT "3"

Toggle Once

↓

*OVERLAP C*

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

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

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

FLASHING ARROW OUTPUT.....CH11 ISOLATE

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

← NOTICE ACTION PLAN SF BIT "5"

Toggle Once

↓

*OVERLAP D*

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

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

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

FLASHING ARROW OUTPUT.....CH12 ISOLATE

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

← NOTICE ACTION PLAN SF BIT "7"

END PROGRAMMING

## FLASHER CIRCUIT MODIFICATION DETAIL

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

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

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: D-0256
DESIGNED: APRIL 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail - Sheet 2 of 4

**DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED**

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

DURHAM
1869
CITY OF MEDICINE

University Drive
at
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Parkway Place Entrance

Division 5 Durham County Durham

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

| REVISIONS | INIT. | DATE |
|---|---|---|
| | | |

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACIE L. PHILLIPS

DocuSigned by:
SLPh
0C87A59E0608437...
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SIG. INVENTORY NO. D-0256

12/19/2018
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derrick.waller

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| U-5968 | SIG.382.3 |

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

*(program controller as shown)*

## IMPORTANT!

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

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

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

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

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

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

← NOTICE VEH DET PLAN 2

← ENSURE DELAY IS SET TO '3'

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

ENSURE PHASE IS SET TO "0" →

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

← NOTICE VEH DET PLAN 2

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

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

← NOTICE VEH DET PLAN 2

← ENSURE DELAY IS SET TO '3'

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

ENSURE PHASE IS SET TO "0" →

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

← NOTICE VEH DET PLAN 2

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

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

← NOTICE VEH DET PLAN 2

← ENSURE DELAY IS SET TO '3'

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

ENSURE PHASE IS SET TO "0" →

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

← NOTICE VEH DET PLAN 2

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

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

← NOTICE VEH DET PLAN 2

← ENSURE DELAY IS SET TO '3'

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

ENSURE PHASE IS SET TO "0" →

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

← NOTICE VEH DET PLAN 2

END PROGRAMMING

Electrical Detail - Sheet 3 of 4

**DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED**

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: D-0256
DESIGNED: APRIL 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 AND PROGRAMMING DETAILS FOR:

DURHAM
1869
CITY OF MEDICINE

University Drive
at
Westgate Drive/
Parkway Place Entrance

Division 5 Durham County Durham

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

| REVISIONS | INIT. | DATE |
|---|---|---|
| | | |

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACIE L. PHILLIPS

DocuSigned by: DC87A56ED608437... 12/19/2018

SIGNATURE DATE

SIG. INVENTORY NO. D-0256

12/19/2018
K:\MAL_TPTO_ITS\M011036410 - Durham Signal System\Signals\S4 - Signal Design\GROUP 5\U-5968_D0256-2018e3.dgn
jdarrick,wallier

DocuSign Envelope ID: 951D9A12-2460-4213-A071-EDF4330949F9

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-5968 | SIG.382.4 |

# ALTERNATE PHASING ACTIVATION DETAIL

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

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

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

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

## ALTERNATE PHASING CHANGE SUMMARY

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

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

VEH DET PLAN 2: Disables phase 6 call on loop 1A and reduces delay time for phase 1 call on loop 1A to 3 seconds.

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

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

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

# ECONOLITE ASC/3-2070 ACTION PLAN PROGRAMMING DETAIL

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

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: D-0256
DESIGNED: APRIL 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail - Sheet 4 of 4

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

ELECTRICAL AND PROGRAMMING DETAILS FOR:

DURHAM
1869
CITY OF MEDICINE

University Drive
at
Westgate Drive/
Parkway Place Entrance

Division 5 Durham County Durham

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

| REVISIONS | INIT. | DATE |
|---|---|---|
| | | |

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACE L. PHILLIPS

DocuSigned by:
SC87A59ED608437...
12/19/2018
SIGNATURE DATE

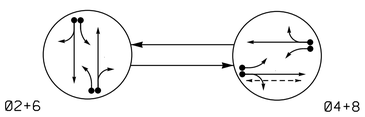
SIG. INVENTORY NO. D-0256

12/19/2018
k:\RAL_ITS\dw_ITS#01036410 - Durham Signal System$signals$4 - Signal Design#GROUP 5#U-5968_D0256-201804.dgn
derrick.waller

DocuSign Envelope ID: EE3DA65B-2411-431F-8459-D9725899AA92

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-5968 | Sig-383.0 |

## PHASING DIAGRAM




PHASING DIAGRAM DETECTION LEGEND

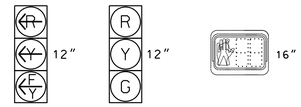
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

## TABLE OF OPERATION

| SIGNAL FACE | PHASE 02+6 | PHASE 04+8 | FLASH |
|---|---|---|---|
| 21 | ~~F Y~~ | ~~R~~ | ~~Y~~ |
| 22, 23 | G | R | Y |
| 41 | ~~R~~ | ~~F Y~~ | ~~R~~ |
| 42, 43 | R | G | R |
| 61 | ~~F Y~~ | ~~R~~ | ~~Y~~ |
| 62, 63 | G | R | Y |
| 81 | ~~R~~ | ~~F Y~~ | ~~R~~ |
| 82, 83 | R | G | R |
| P41, P42 | DW | W | DRK |

## SIGNAL FACE I.D.

All Heads L.E.D.




21
41
61
81

22, 23
42, 43
62, 63
82, 83

P41, P42

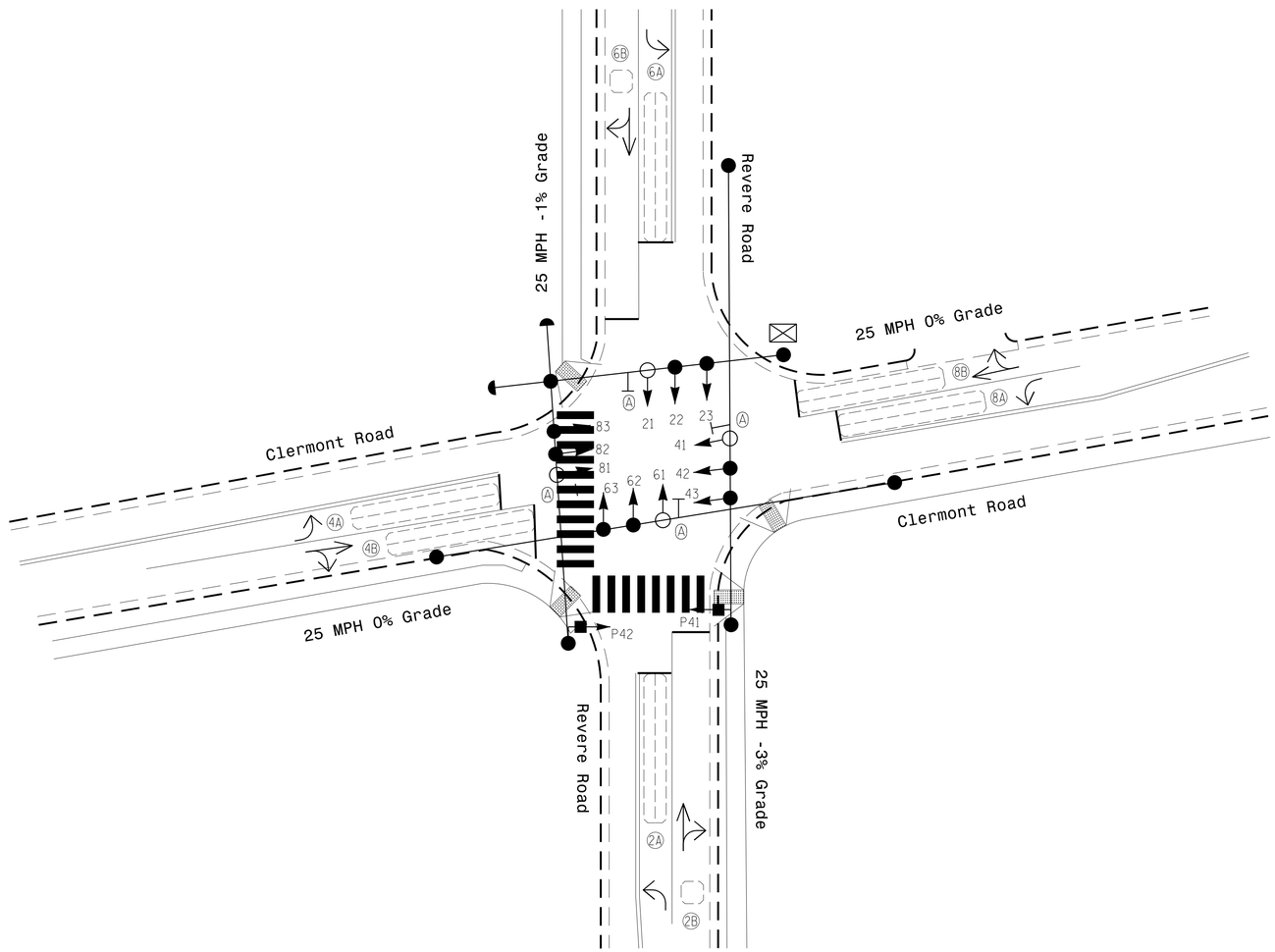
## ASC/3 DETECTOR INSTALLATION CHART

| DETECTOR | | | | | PROGRAMMING | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LOOP | SIZE (FT) | DISTANCE FROM STOPBAR (FT) | TURNS | NEW LOOP | PHASE | CALLING | EXTEND TIME | DELAY TIME | USE ADDED INITIAL | TYPE | SYSTEM LOOP | NEW CARD |
| 2A | 6X6 | 70 | Exist | - | 2 | Yes | - | - | - | S | - | X |
| 2B | 6X60 | 0 | 2-4-2 | - | 2 | Yes | - | - | - | S | - | X |
| 4A | 6X40 | 0 | 2-4-2 | - | 4 | Yes | - | 3 | - | S | - | X |
| 4B | 6X40 | 0 | 2-4-2 | - | 4 | Yes | - | 10 | - | S | - | X |
| 6A | 6X6 | 70 | Exist | - | 6 | Yes | - | - | - | S | - | X |
| 6B | 6X40 | 0 | 2-4-2 | - | 6 | Yes | - | - | - | S | - | X |
| 8A | 6X40 | 0 | 2-4-2 | - | 8 | Yes | - | 3 | - | S | - | X |
| 8B | 6X40 | 0 | 2-4-2 | - | 8 | Yes | - | 10 | - | S | - | X |

## 2 Phase
## Fully Actuated
## (Durham Signal System)

## NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Renumber existing signal heads numbered 21, 22, 41, 42, 61, 62, 81 and 82 as 22, 23, 42, 43, 62, 63, 82 and 83 respectively.
4. Reposition existing signal heads numbered 22, 23, 42, 43, 62, 63, 82 and 83.
5. Set all detector units to presence mode.
6. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
7. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
8. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
9. Pavement markings are existing.
10. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
11. Loop data based on previous plan and/or field observations.
12. Reconnect loops and heads in cabinet as indicated to match current NCDOT standards.
13. Existing Left Arrow "ONLY" (R3-5L) signs may be removed at the direction of the Engineer.




## ASC/3 TIMING CHART

| FEATURE | PHASE 2 | PHASE 4 | PHASE 6 | PHASE 8 |
|---|---|---|---|---|
| Min Green * | 10 | 7 | 10 | 7 |
| Walk * | 0 | 7 | 0 | 0 |
| Ped Clear | 0 | 9 | 0 | 0 |
| Veh. Extension * | 3.0 | 2.0 | 3.0 | 2.0 |
| Max 1 * | 45 | 25 | 45 | 25 |
| Yellow | 3.3 | 3.2 | 3.3 | 3.2 |
| Red Clear | 2.1 | 2.2 | 2.1 | 2.2 |
| Actuations B4 Add * | - | - | - | - |
| Seconds /Actuation * | - | - | - | - |
| Max Initial * | - | - | - | - |
| Time Before Reduction * | - | - | - | - |
| Time To Reduce * | - | - | - | - |
| Minimum Gap | - | - | - | - |
| Locking Detector | X | - | X | - |
| Recall Position | VEH RECALL | - | VEH RECALL | - |
| Dual Entry | - | X | - | X |
| Simultaneous Gap | X | X | X | X |

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

## LEGEND

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

Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Prepared for: DURHAM 1869 CITY OF MEDICINE

Revere Rd.
at
Clermont Rd.

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 |
|---|---|---|
| | | |

SEAL: NORTH CAROLINA PROFESSIONAL SEAL 32396 ENGINEER WILLIAM J. HAMILTON

DocuSigned by: William J. Hamilton 12/20/2018
A05B9D7D4E4B4FA... SIGNATURE DATE

SIG. INVENTORY NO. D-0814

Prepared in the offices of:
RAMEY KEMP & ASSOCIATES, INC.
Transportation Engineers
5808 Faringdon Place, Suite 100
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Phone: 919-872-5115
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12/19/2018
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| PROJECT REFERENCE NO. | SHEET NO. |
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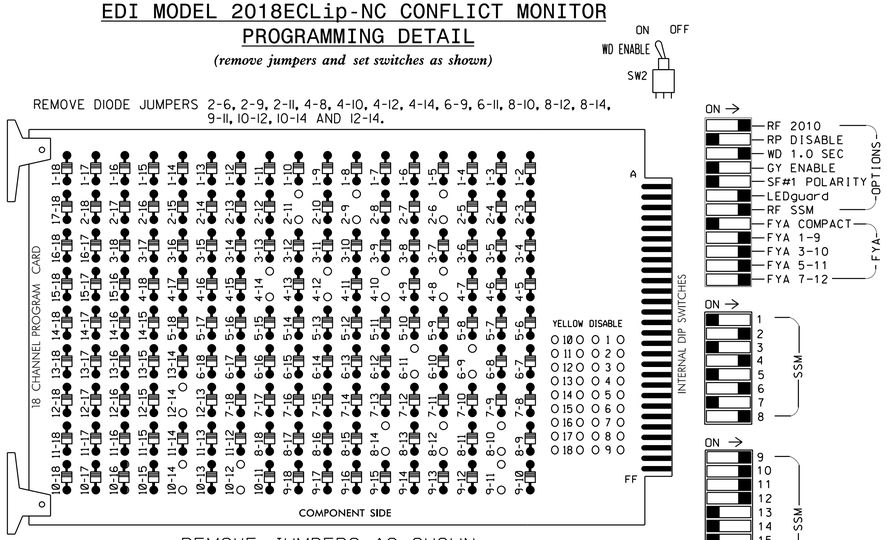
| U-5968 | Sig-383.1 |

## EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

*(remove jumpers and set switches as shown)*




■ = DENOTES POSITION OF SWITCH

NOTES:

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

## NOTES

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

## EQUIPMENT INFORMATION

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

* See overlap programming on sheet 2.

## SIGNAL HEAD HOOK-UP CHART

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

NU = Not Used

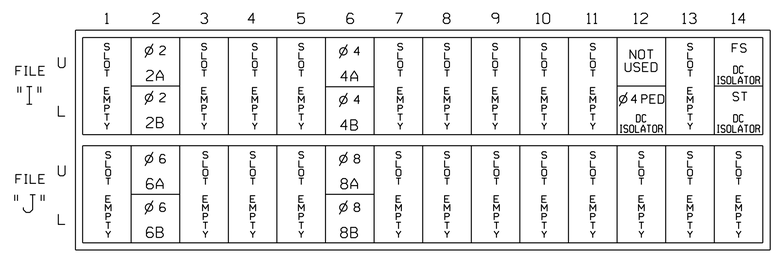
★ See pictorial of head wiring in detail this sheet.

## COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

## INPUT FILE POSITION LAYOUT

*(front view)*




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

FS = FLASH SENSE
ST = STOP TIME

## INPUT FILE CONNECTION & PROGRAMMING CHART

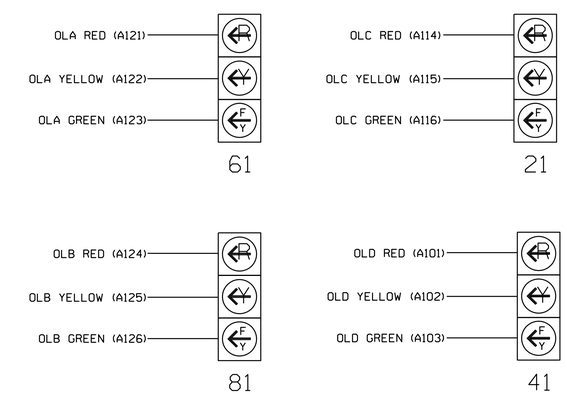
| LOOP NO. | LOOP TERMINAL | INPUT FILE POS. | PIN NO. | DETECTOR NO. | NEMA PHASE | CALL | EXTEND TIME | DELAY TIME | ADDED INITIAL | DETECTOR TYPE |
|---|---|---|---|---|---|---|---|---|---|---|
| 2A | TB2-5,6 | I2U | 39 | 2 | 2 | YES | | | | S |
| 2B | TB2-7,8 | I2L | 43 | 12 | 2 | YES | | | | S |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

NOTE:
INSTALL DC ISOLATOR IN INPUT FILE SLOT I12.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

## FYA SIGNAL WIRING DETAIL

*(wire signal heads as shown)*




Electrical Detail
Sheet 1 of 2

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: D-0814
DESIGNED: Dec 2018
SEALED: 12/20/2018
REVISED: N/A

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

ELECTRICAL AND PROGRAMMING DETAILS FOR:
DURHAM
1869
CITY OF MEDICINE

Revere Rd.
at
Clermont Rd.

Division 5 Durham County Durham

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

| REVISIONS | INIT. | DATE |
|---|---|---|
| | | |

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32396 ENGINEER WILLIAM J. HAMILTON

DocuSigned by: William J. Hamilton 12/20/2018
A05600704A8484...
SIGNATURE DATE

SIG. INVENTORY NO. D-0814

12/19/2018
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User: tpopelka

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| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-5968 | Sig-383.2 |

# ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

***(program controller as shown)***

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

*OVERLAP A*

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

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

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

Toggle Once

↓

*OVERLAP B*

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

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

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

Toggle Once

↓

*OVERLAP C*

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

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

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

Toggle Once

↓

*OVERLAP D*

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

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

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

END PROGRAMMING

# FLASHER CIRCUIT MODIFICATION DETAIL

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

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

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: D-0814
DESIGNED: Dec 2018
SEALED: 12/20/2018
REVISED: N/A

Electrical Detail
Sheet 2 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

DURHAM
1869
CITY OF MEDICINE

Revere Rd.
at
Clermont Rd.

Division 5 Durham County Durham

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

| REVISIONS | INIT. | DATE |
|---|---|---|
| | | |

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32396 ENGINEER WILLIAM J. HAMILTON

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

SIG. INVENTORY NO. D-0814

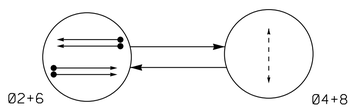
Prepared in the offices of:
RAMEY KEMP & ASSOCIATES, INC.
Transportation Engineers
5808 Faringdon Place, Suite 100
Raleigh, North Carolina 27609
919-872-5115 Tel, 919-878-5416 Fax,
www.rameykemp.com

12/19/2018
R:\Signals\D-0814_elec2.dgn
User:tspopelka

DocuSign Envelope ID: 951D9A12-2460-4213-A071-EDF4330949F9

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-5968 | SIG.384.0 |

## PHASING DIAGRAM




PHASING DIAGRAM DETECTION LEGEND

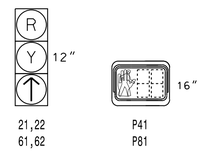
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

## TABLE OF OPERATION

| SIGNAL FACE | PHASE Ø2+6 | PHASE Ø4+8 | FLASH |
|---|---|---|---|
| 21,22 | ↑ | R | Y |
| 61,62 | ↑ | R | Y |
| P41 | DW | W | DRK |
| P81 | DW | W | DRK |

## SIGNAL FACE I.D.

All Heads L.E.D.



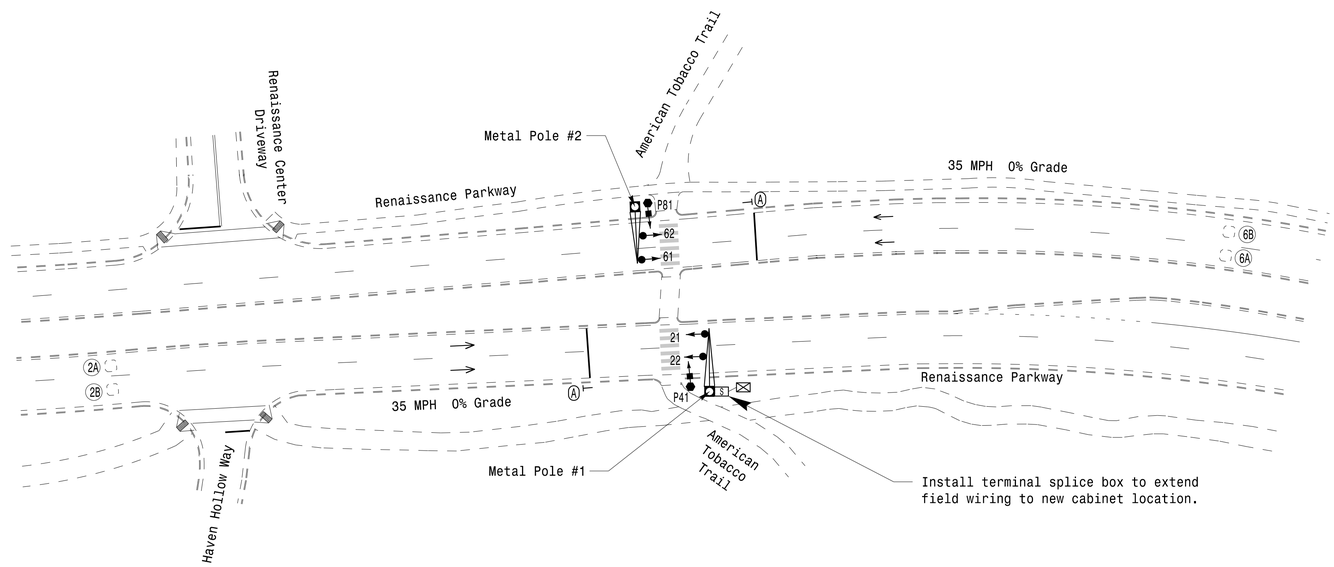

## ASC/3 DETECTOR INSTALLATION CHART

| DETECTOR | | | | | PROGRAMMING | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LOOP | SIZE (FT) | DISTANCE FROM STOPBAR (FT) | TURNS | NEW LOOP | PHASE | CALLING | EXTEND TIME | DELAY TIME | USE ADDED INITIAL | TYPE | SYSTEM LOOP | NEW CARD |
| 2A | 6X6 | 250 | EXIST | - | 2 | Yes | - | - | - | N | - | X |
| 2B | 6X6 | 250 | EXIST | - | 2 | Yes | - | - | - | N | - | X |
| 6A | 6X6 | 250 | EXIST | - | 6 | Yes | - | - | - | N | - | X |
| 6B | 6X6 | 250 | EXIST | - | 6 | Yes | - | - | - | N | - | 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.




## ASC/3 TIMING CHART

| FEATURE | PHASE 2 | PHASE 4 | PHASE 6 | PHASE 8 |
|---|---|---|---|---|
| Min Green * | 90 | 7 | 90 | 7 |
| Walk * | 0 | 7 | 0 | 7 |
| Ped Clear | 0 | 22 | 0 | 22 |
| Veh. Extension * | 5.0 | 1.0 | 5.0 | 1.0 |
| Max 1 * | 120 | 0 | 120 | 0 |
| Yellow | 3.8 | 3.0 | 3.8 | 3.0 |
| Red Clear | 1.0 | 1.0 | 1.0 | 1.0 |
| Actuations B4 Add * | - | - | - | - |
| Seconds /Actuation * | - | - | - | - |
| Max Initial * | - | - | - | - |
| Time Before Reduction * | - | - | - | - |
| Time To Reduce * | - | - | - | - |
| Minimum Gap | - | - | - | - |
| Locking Detector | X | - | X | - |
| Recall Position | VEH. RECALL | - | VEH. RECALL | - |
| Dual Entry | - | - | - | - |
| Simultaneous Gap | X | X | X | X |

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

## LEGEND

| PROPOSED | | EXISTING |
|---|---|---|
| | Traffic Signal Head | |
| | Modified Signal Head | N/A |
| | Sign | |
| | Pedestrian Signal Head With Push Button & Sign | |
| | Type II Signal Pedestal | |
| | Metal Pole with Mastarm | |
| | Inductive Loop Detector | |
| | Controller & Cabinet | |
| | Junction Box | |
| | 2-in Underground Conduit | |
| N/A | Right of Way | |
| | Directional Arrow | |
| N/A | Curb Ramp | |
| | "Stop Here on Red" Sign (R10-6) | |

Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DURHAM 1869 CITY OF MEDICINE

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

SCALE 0 40 1"=40'

Renaissance Parkway at American Tobacco Trail Crossing

Division 5 Durham County Durham

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

| REVISIONS | INIT. | DATE |
|---|---|---|
| | | |

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACIE L. PHILLIPS
DocuSigned by: 12/19/2018
DC6FA9BE9D8B437...
SIGNATURE DATE
SIG. INVENTORY NO. D-0922

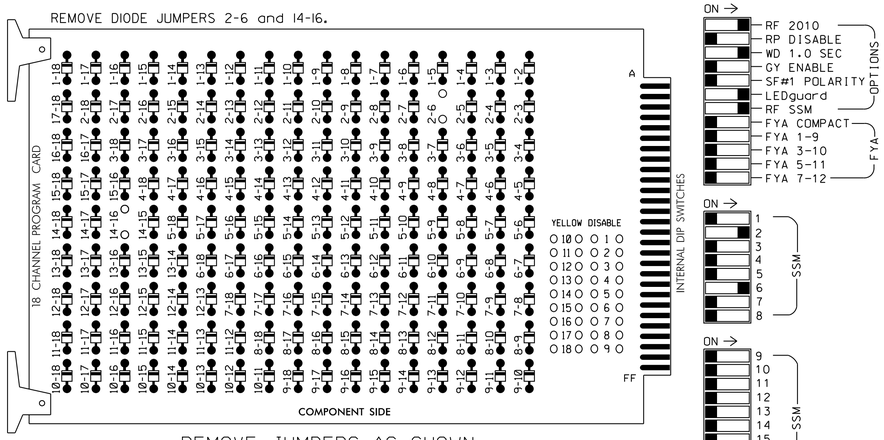
12/19/2018
K:\RAL_TPB\096115036410 - Durham Signal Systems\Signals\S4 - Signal Design\GROUP S4U-5968_00922-2018.dgn
derrick.waller

DocuSign Envelope ID: 951D9A12-2460-4213-A071-EDF4330949F9

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-5968 | SIG.384.1 |

# EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

*(remove jumpers and set switches as shown)*




REMOVE JUMPERS AS SHOWN

■ = DENOTES POSITION OF SWITCH

NOTES:

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

## NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Program controller to start up in phase 2 Green and 6 Green.
3. 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,S6,S8,S12
PHASES USED.....2,4*,4PED,6,8*,8PED
OVERLAP "A".....NOT USED
OVERLAP "B".....NOT USED
OVERLAP "C".....NOT USED
OVERLAP "D".....NOT USED

* Used for timing purposes only.

## 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 | NC | P41 | NU | 61,62 | NU | NU | NC | P81 |
| RED | | 128 | | | | | | 134 | | | | |
| YELLOW | | 129 | | | | | | 135 | | | | |
| GREEN | | | | | | | | | | | | |
| RED ARROW | | | | | | | | | | | | |
| YELLOW ARROW | | | | | | | | | | | | |
| GREEN ARROW | | 130 | | | | | | 136 | | | | |
| ✋ | | | | | | 104 | | | | | | 110 |
| 🚶 | | | | | | 106 | | | | | | 112 |

NU = Not Used
NC = No Connection

## INPUT FILE POSITION LAYOUT

*(front view)*

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

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

FS = FLASH SENSE
ST = STOP TIME

## 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 | | | | N |
| 2B | TB2-7,8 | I2L | 43 | 12 | 2 | YES | | | | N |
| 6A | TB3-5,6 | J2U | 40 | 6 | 6 | YES | | | | N |
| 6B | TB3-7,8 | J2L | 44 | 16 | 6 | YES | | | | N |
| PED PUSH BUTTONS | | | | | | | | | | |
| P41 | TB8-5,6 | I12L | 69 | PED 4 | 4 PED | | | | | |
| P81 | TB8-8,9 | I13L | 70 | PED 8 | 8 PED | | | | | |

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

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: D-0922
DESIGNED: APRIL 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail

**DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED**

ELECTRICAL AND PROGRAMMING DETAILS FOR:

DURHAM
1869
CITY OF MEDICINE

Renaissance Parkway
at
American Tobacco Trail Crossing

Division 5 Durham County Durham

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

| REVISIONS | INIT. | DATE |
|---|---|---|
| | | |

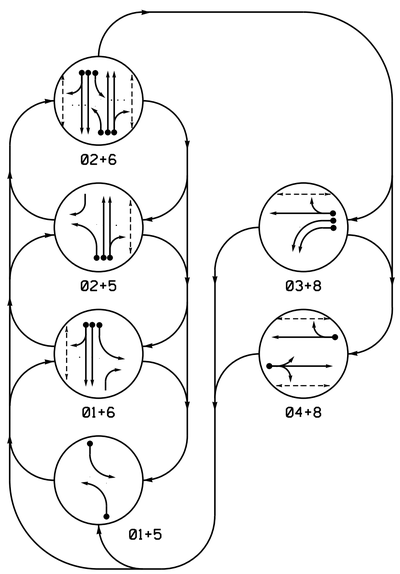
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACIE L. PHILLIPS
DocuSigned by: 0C87A59ED60B437...
12/19/2018
SIGNATURE DATE
SIG. INVENTORY NO. D-0922

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

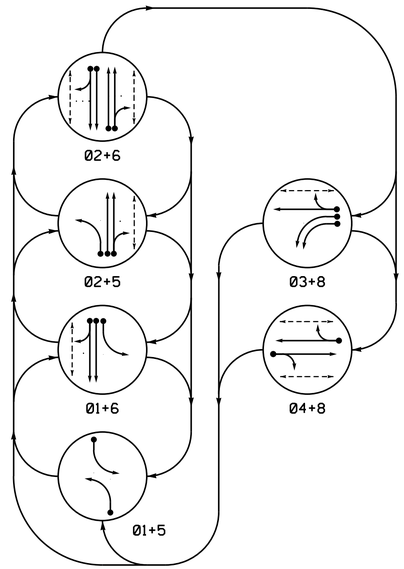
12/19/2018
K:\RAL_LPTM_ITS\011036410 - Durham Signal System\Signals\S4 - Signal Design\GROUP 5\U-5968_D0922-2018e1.dgn
derrick.waller

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-5968 | Sig.385.0 |

## DEFAULT PHASING DIAGRAM




## ALTERNATE PHASING DIAGRAM




PHASING DIAGRAM DETECTION LEGEND

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

## DEFAULT PHASING TABLE OF OPERATION

| SIGNAL FACE | PHASE 01+5 | 01+6 | 02+5 | 02+6 | 03+8 | 04+8 | FLASH |
|---|---|---|---|---|---|---|---|
| 11 | ~~—~~ | ~~—~~ | ~~F Y~~ | ~~F Y~~ | ~~R~~ | ~~R~~ | ~~Y~~ |
| 21,22 | R | R | G | G | R | R | Y |
| 31, 32 | ~~R~~ | ~~R~~ | ~~R~~ | ~~R~~ | ~~—~~ | ~~R~~ | ~~R~~ |
| 41, 42 | R | R | R | R | R | G | R |
| 51 | ~~—~~ | ~~F Y~~ | ~~—~~ | ~~F Y~~ | ~~R~~ | ~~R~~ | ~~Y~~ |
| 61,62 | R | G | R | G | R | R | Y |
| 81, 82 | R | R | R | R | G | G | R |
| P21, P22 | DW | DW | W | W | DW | DW | DRK |
| P41, P42 | DW | DW | DW | DW | DW | W | DRK |
| P61, P62 | DW | W | DW | W | DW | DW | DRK |
| P81, P82 | DW | DW | DW | DW | W | W | DRK |

## ALTERNATE PHASING TABLE OF OPERATION

| SIGNAL FACE | PHASE 01+5 | 01+6 | 02+5 | 02+6 | 03+8 | 04+8 | FLASH |
|---|---|---|---|---|---|---|---|
| 11 | ~~—~~ | ~~—~~ | ~~R~~ | ~~R~~ | ~~R~~ | ~~R~~ | ~~Y~~ |
| 21,22 | R | R | G | G | R | R | Y |
| 31, 32 | ~~R~~ | ~~R~~ | ~~R~~ | ~~R~~ | ~~—~~ | ~~R~~ | ~~R~~ |
| 41, 42 | R | R | R | R | R | G | R |
| 51 | ~~—~~ | ~~R~~ | ~~—~~ | ~~R~~ | ~~R~~ | ~~R~~ | ~~Y~~ |
| 61,62 | R | G | R | G | R | R | Y |
| 81, 82 | R | R | R | R | G | G | R |
| P21, P22 | DW | DW | W | W | DW | DW | DRK |
| P41, P42 | DW | DW | DW | DW | DW | W | DRK |
| P61, P62 | DW | W | DW | W | DW | DW | DRK |
| P81, P82 | DW | DW | DW | DW | W | W | DRK |

## ASC/3 DETECTOR INSTALLATION CHART

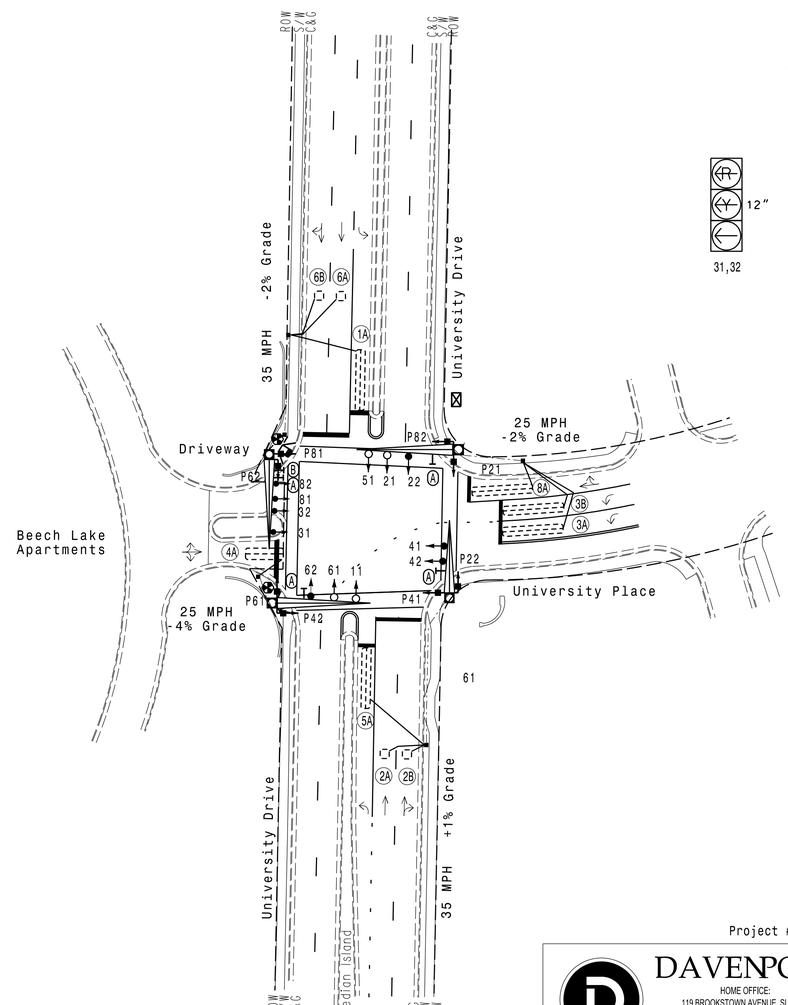
| DETECTOR | | | | | PROGRAMMING | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LOOP | SIZE (FT) | DISTANCE FROM STOPBAR (FT) | TURNS | NEW LOOP | PHASE | CALLING | EXTEND TIME | DELAY TIME | USE ADDED INITIAL | TYPE | SYSTEM LOOP | NEW CARD |
| 1A | 6X40 | 0 | 2-4-2 | - | 1 | Yes | - | 15 | - | S | - | X |
| | | | | | 6# | Yes | - | - | - | S | - | X |
| 2A | 6X6 | 70 | 2 | - | 2 | Yes | - | - | - | S | - | X |
| 2B | 6X6 | 70 | 2 | - | 2 | Yes | - | - | - | S | - | X |
| 3A | 6X40 | 0 | 2-4-2 | - | 3 | Yes | - | 3 | - | S | - | X |
| 3B | 6X40 | 0 | 2-4-2 | - | 3 | Yes | - | - | - | S | - | X |
| 4A | 6X20 | +5 | EXIST | - | 4 | Yes | - | 10 | - | S | - | X |
| 5A | 6X40 | 0 | 2-4-2 | - | 5 | Yes | - | 15 | - | S | - | X |
| | | | | | 5# | Yes | - | - | - | S | - | X |
| 6A | 6X6 | 70 | 3 | - | 6 | Yes | - | - | - | S | - | X |
| 6B | 6X6 | 70 | 3 | - | 6 | Yes | - | - | - | S | - | X |
| 8A | 6X40 | 0 | 2-4-2 | - | 8 | Yes | - | 10 | - | S | - | X |

* Diasble delay during Alternate Phasing Operation.
\# Disable Phase call for loop during Alternate Phasing Operation.

6 Phase
Fully Actuated
(Durham Signal System)

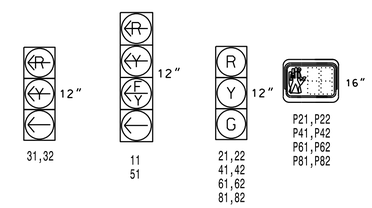
## NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Omit phase 3 during phase 4 on.
4. Phase 1 and/or phase 5 may be lagged.
5. Reposition existing signal heads numbered 22 and 62.
6. Set all detector units to presence mode.
7. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
8. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
9. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
10. Pavement markings are existing.
11. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
12. Loop data based on previous plan and/or field observations.
13. Install new cabinet on the existing cabinet foundation.




## SIGNAL FACE I.D.

All Heads L.E.D.




## LEGEND

| PROPOSED | | EXISTING |
|---|---|---|
| | Traffic Signal Head | |
| | Modified Signal Head | N/A |
| | Sign | |
| | Pedestrian Signal Head With Push Button & Sign | |
| | Signal Pole with Guy | |
| | Signal Pole with Sidewalk Guy | |
| | Inductive Loop Detector | |
| | Controller & Cabinet | |
| | Junction Box | |
| | 2-in Underground Conduit | |
| N/A | Right of Way | |
| | Directional Arrow | |
| | Type I Pushbutton Post | |
| | Metal Pole with Mastarm | |
| N/A | Curb Ramp | |
| A | Street Name Sign (D3-1) | A |
| B | Turning Traffic Must Yield to Pedestrians Sign (R10-15) | B |

## ASC/3 TIMING CHART

| FEATURE | PHASE 1 | 2 | 3 | 4 | 5 | 6 | 8 |
|---|---|---|---|---|---|---|---|
| Min Green * | 7 | 10 | 7 | 7 | 7 | 10 | 7 |
| Walk * | 0 | 7 | 0 | 7 | 0 | 7 | 7 |
| Ped Clear | 0 | 14 | 0 | 17 | 0 | 19 | 20 |
| Veh. Extension * | 2.0 | 3.0 | 2.0 | 2.0 | 2.0 | 3.0 | 2.0 |
| Max 1 * | 15 | 45 | 20 | 15 | 15 | 45 | 15 |
| Yellow | 3.0 | 3.8 | 3.0 | 3.4 | 3.0 | 4.0 | 3.3 |
| Red Clear | 2.9 | 2.1 | 3.4 | 2.5 | 2.9 | 1.9 | 2.5 |
| Actuations B4 Add * | - | - | - | - | - | - | - |
| Seconds /Actuation * | - | - | - | - | - | - | - |
| Max Initial * | - | - | - | - | - | - | - |
| Time Before Reduction * | - | - | - | - | - | - | - |
| Time To Reduce * | - | - | - | - | - | - | - |
| Minimum Gap | - | - | - | - | - | - | - |
| Locking Detector | - | X | - | - | - | X | - |
| Recall Position | - | VEH RECALL | - | - | - | VEH RECALL | - |
| Dual Entry | - | - | - | - | - | - | X |
| Simultaneous Gap | X | X | X | X | X | X | X |

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

Signal Upgrade

Project #: 170905

DAVENPORT
HOME OFFICE:
119 BROOKSTOWN AVENUE, SUITE PH1
WINSTON-SALEM, NC 27101
336.744.1636 www.davenportworld.com
NCBELS FIRM LICENSE NO. C-2522

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

SCALE 0 40
1"=40'

# University Drive at University Place

Division 5 Durham County Durham

| | | | |
|---|---|---|---|
| PLAN DATE: | December 2018 | REVIEWED BY: | A. Ravipati |
| PREPARED BY: | T. S. Warren | REVIEWED BY: | L. Boyer |

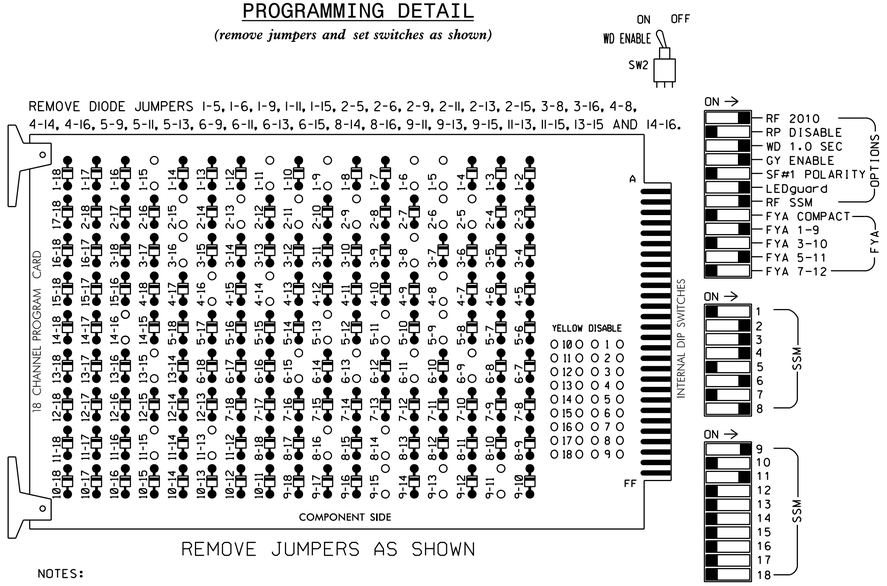
| REVISIONS | INIT. | DATE |
|---|---|---|
| | | |

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 030912 ENGINEER LORI M. BOYER
DocuSigned by: Lori M. Boyer
12/21/2018
SIGNATURE DATE
SIG. INVENTORY NO. D-0943

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-5968 | Sig.385.1 |

# EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

*(remove jumpers and set switches as shown)*




■ = DENOTES POSITION OF SWITCH

NOTES:

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

## NOTES

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

## EQUIPMENT INFORMATION

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

## SIGNAL HEAD HOOK-UP CHART

| LOAD SWITCH NO. | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 | AUX S1 | AUX S2 | AUX S3 | AUX S4 | AUX S5 | AUX S6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CMU CHANNEL NO. | 1 | 2 | 13 | 3 | 4 | 14 | 5 | 6 | 15 | 7 | 8 | 16 | 9 | 10 | 17 | 11 | 12 | 18 |
| PHASE | 1 | 2 | 2 PED | 3 | 4 | 4 PED | 5 | 6 | 6 PED | 7 | 8 | 8 PED | OLA | OLB | SPARE | OLC | OLD | SPARE |
| SIGNAL HEAD NO. | 11★ | 21,22 | P21, P22 | 31,32 | 41,42 | P41, P42 | 51★ | 61,62 | 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 | | | | 116 | | | | | | | | | A121 | | | A114 | | |
| YELLOW ARROW | | | | 117 | | | | | | | | | A122 | | | A115 | | |
| FLASHING YELLOW ARROW | | | | | | | | | | | | | A123 | | | A116 | | |
| GREEN ARROW | 127 | | | 118 | | | 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)*

| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FILE "I" | U | Ø1 1A | Ø2 2A | SLOT EMPTY | WIRED INPUT ⊗ | Ø3 3A | Ø4 4A | SLOT EMPTY | SLOT EMPTY | NOT USED | SLOT EMPTY | SLOT EMPTY | Ø2 PED DC ISOLATOR | Ø6 PED DC ISOLATOR | FS DC ISOLATOR |
| | L | NOT USED | Ø2 2B | | | NOT USED | NOT USED | | | Ø3 3B | | | Ø4 PED DC ISOLATOR | Ø8 PED DC ISOLATOR | ST DC ISOLATOR |
| FILE "J" | U | Ø5 5A | Ø6 6A | SLOT EMPTY | WIRED INPUT ⊗ | SLOT EMPTY | Ø8 8A | SLOT EMPTY | SLOT EMPTY | SLOT EMPTY | SLOT EMPTY | SLOT EMPTY | SLOT EMPTY | SLOT EMPTY | SLOT EMPTY |
| | L | NOT USED | Ø6 6B | | | | NOT USED | | | | | | | | |

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

FS = FLASH SENSE
ST = STOP TIME

⊗ Wired Input - Do not populate slot with detector card

## INPUT FILE CONNECTION & PROGRAMMING CHART

| LOOP NO. | LOOP TERMINAL | INPUT FILE POS. | PIN NO. | DETECTOR NO. | NEMA PHASE | CALL | EXTEND TIME | DELAY TIME | ADDED INITIAL | DETECTOR TYPE |
|---|---|---|---|---|---|---|---|---|---|---|
| 1A [1] | TB2-1,2 | I1U | 56 | 1★ | 1 | YES | - | 15 | - | S |
| | - | J4U | 48 | 26★ | 6 | YES | - | - | - | S |
| 2A | TB2-5,6 | I2U | 39 | 2 | 2 | YES | - | - | - | S |
| 2B | TB2-7,8 | I2L | 43 | 12 | 2 | YES | - | - | - | S |
| 3A | TB4-5,6 | I5U | 58 | 3 | 3 | YES | - | 3 | - | S |
| 3B | TB6-11,12 | I9L | 62 | 13 | 3 | YES | - | - | - | S |
| 4A | TB4-9,10 | I6U | 41 | 4 | 4 | YES | - | 10 | - | S |
| 5A [3] | TB3-1,2 | J1U | 55 | 5★ | 5 | YES | - | 15 | - | S |
| | - | I4U | 47 | 22★ | 2 | YES | - | - | - | S |
| 6A | TB3-5,6 | J2U | 40 | 6 | 6 | YES | - | - | - | S |
| 6B | TB3-7,8 | J2L | 44 | 16 | 6 | YES | - | - | - | S |
| 8A | TB5-9,10 | J6U | 42 | 8 | 8 | YES | - | 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.

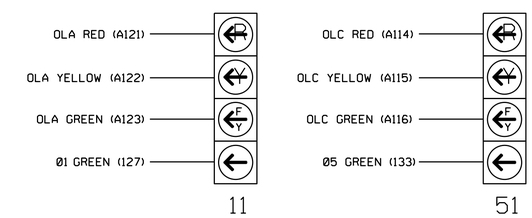
[2] Add jumper from J1-W to I4-W, on rear of input file.

★ 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)*

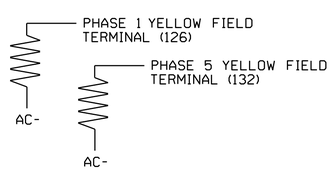



## LOAD RESISTOR INSTALLATION DETAIL

*(install resistors as shown)*

ACCEPTABLE VALUES

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




THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: D-0943
DESIGNED: December 2018
SEALED: 12/21/2018
REVISED: N/A

Project #: 170905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Electrical Detail- Sheet 1 of 3

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ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

750 N.Greenfield Pkwy,Garner,NC 27529

University Drive at University Place

Division 5 Durham County Durham

| PLAN DATE: | December 2018 | REVIEWED BY: | A Ravipati |
|---|---|---|---|
| PREPARED BY: | TS Warren | REVIEWED BY: | L Boyer |

| REVISIONS | INIT. | DATE |
|---|---|---|
| | | |

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

SIG. INVENTORY NO. D-0943

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-5968 | Sig.385.2 |

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

*(program controller as shown)*

## IMPORTANT!

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

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

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

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

- Place cursor in VEH DETECTOR [ ] position and enter "1".
- Set delay time to "0.0 seconds".

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

NOTICE VEH DET PLAN 2

ENSURE DELAY IS SET TO '0.0'

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

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

NOTICE VEH DET PLAN 2

ENSURE PHASE IS SET TO "0"

- Place cursor in VEH DETECTOR [ ] position and enter "5".
- Set delay time to "0.0 seconds".

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

NOTICE VEH DET PLAN 2

ENSURE DELAY IS SET TO '0.0'

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

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

NOTICE VEH DET PLAN 2

ENSURE PHASE IS SET TO "0"

END PROGRAMMING

# ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

*(program controller as shown)*

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

*OVERLAP A*

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

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

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

FLASHING ARROW OUTPUT.....CH9 ISOLATE

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

NOTICE ACTION PLAN SF BIT "1"

Toggle Twice

*OVERLAP C*

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

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

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

FLASHING ARROW OUTPUT.....CH11 ISOLATE

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

NOTICE ACTION PLAN SF BIT "5"

END PROGRAMMING

Electrical Detail - Sheet 2 of 3

**DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED**

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: D-0943
DESIGNED: December 2018
SEALED: 12/21/2018
REVISED: N/A

Project #: 170905

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ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for: Transportation Mobility and Safety Division Signal & Signal Management Section NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

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University Drive
at
University Place

Division 5 Durham County Durham

| | | | |
|---|---|---|---|
| PLAN DATE: | December 2018 | REVIEWED BY: | A Ravipati |
| PREPARED BY: | TS Warren | REVIEWED BY: | L Boyer |

| REVISIONS | INIT. | DATE |
|---|---|---|
| | | |

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 030912 ENGINEER LORI M. BOYER

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

SIG. INVENTORY NO. D-0943

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-5968 | Sig.385.3 |

# 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 BITS 1 and 5.

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

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

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

### ALTERNATE PHASING CHANGE SUMMARY

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

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

VEH DET PLAN 2: Disables phase 6 call on loop 1A and reduces delay time for phase 1 call on loop 1A to 0.0 seconds.

Disables phase 2 call on loop 5A and reduces delay time for phase 5 call on loop 5A to 0.0 seconds.

# ECONOLITE ASC/3-2070 ACTION PLAN PROGRAMMING DETAIL

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

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

## COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: D-0943
DESIGNED: December 2018
SEALED: 12/21/2018
REVISED: N/A

Project #: 170905

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Electrical Detail - Sheet 3 of 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

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at
University Place

Division 5 Durham County Durham

| | | | |
|---|---|---|---|
| PLAN DATE: | December 2018 | REVIEWED BY: | A Ravipati |
| PREPARED BY: | TS Warren | REVIEWED BY: | L Boyer |

| REVISIONS | INIT. | DATE |
|---|---|---|
| | | |
| | | |
| | | |

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 030912 ENGINEER LORI M. BOYER

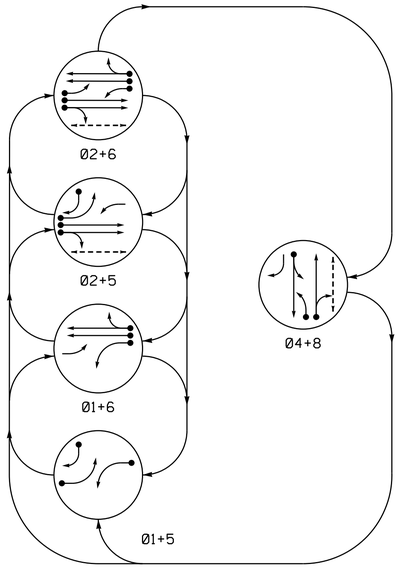
DocuSigned by: Lori M. Boyer 12/21/2018

SIGNATURE DATE

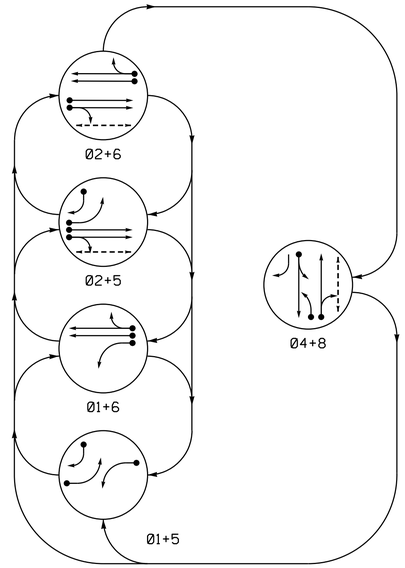
SIG. INVENTORY NO. D-0943

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-5968 | Sig.386.0 |

## DEFAULT PHASING DIAGRAM




## ALTERNATE PHASING DIAGRAM




### DEFAULT PHASING TABLE OF OPERATION

| SIGNAL FACE | PHASE 1+5 | 1+6 | 2+5 | 2+6 | 4+8 | FLASH |
|---|---|---|---|---|---|---|
| 11 | ~~—~~ | ~~—~~ | ~~F Y~~ | ~~F Y~~ | ~~R~~ | ~~Y~~ |
| 21,22 | R | R | G | G | R | Y |
| 41 | R | R | R | R | G | R |
| 42 | R/— | R | R/— | R | G | R |
| 51 | ~~—~~ | ~~F Y~~ | ~~—~~ | ~~F Y~~ | ~~R~~ | ~~Y~~ |
| 61,62 | R | G | R | G | R | Y |
| 81 | ~~R~~ | ~~R~~ | ~~R~~ | ~~R~~ | ~~F Y~~ | ~~R~~ |
| 82,83 | R | R | R | R | G | R |
| P21,P22 | DW | DW | W | W | DW | DRK |
| P81,P82 | DW | DW | DW | DW | W | DRK |

### ALTERNATE PHASING TABLE OF OPERATION

| SIGNAL FACE | PHASE 1+5 | 1+6 | 2+5 | 2+6 | 4+8 | FLASH |
|---|---|---|---|---|---|---|
| 11 | ~~—~~ | ~~—~~ | ~~R~~ | ~~R~~ | ~~R~~ | ~~Y~~ |
| 21,22 | R | R | G | G | R | Y |
| 41 | R | R | R | R | G | R |
| 42 | R/— | R | R/— | R | G | R |
| 51 | ~~—~~ | ~~R~~ | ~~—~~ | ~~R~~ | ~~R~~ | ~~Y~~ |
| 61,62 | R | G | R | G | R | Y |
| 81 | ~~R~~ | ~~R~~ | ~~R~~ | ~~R~~ | ~~F Y~~ | ~~R~~ |
| 82,83 | R | R | R | R | G | R |
| P21,P22 | DW | DW | W | W | DW | DRK |
| P81,P82 | DW | DW | DW | DW | W | DRK |

### PHASING DIAGRAM DETECTION LEGEND

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

### ASC/3 TIMING CHART

| FEATURE | PHASE 1 | 2 | 4 | 5 | 6 | 8 |
|---|---|---|---|---|---|---|
| Min Green * | 7 | 10 | 7 | 7 | 10 | 7 |
| Walk * | 0 | 7 | 0 | 0 | 0 | 7 |
| Ped Clear | 0 | 10 | 0 | 0 | 0 | 16 |
| Veh. Extension * | 2.0 | 3.0 | 2.0 | 2.0 | 3.0 | 2.0 |
| Max 1 * | 15 | 30 | 20 | 15 | 30 | 20 |
| Yellow | 3.0 | 4.1 | 3.0 | 3.0 | 4.1 | 3.0 |
| Red Clear | 2.6 | 1.5 | 3.9 | 1.8 | 1.5 | 3.9 |
| Actuations B4 Add * | - | - | - | - | - | - |
| Seconds /Actuation * | - | - | - | - | - | - |
| Max Initial * | - | - | - | - | - | - |
| Time Before Reduction * | - | - | - | - | - | - |
| Time To Reduce * | - | - | - | - | - | - |
| Minimum Gap | - | - | - | - | - | - |
| Locking Detector | - | X | - | - | X | - |
| Recall Position | - | VEH. RECALL | - | - | VEH. RECALL | - |
| Dual Entry | - | - | X | - | - | X |
| Simultaneous Gap | X | X | X | X | X | X |

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

### ASC/3 DETECTOR INSTALLATION CHART

| DETECTOR | | | | | PROGRAMMING | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LOOP | SIZE (FT) | DISTANCE FROM STOPBAR (FT) | TURNS | NEW LOOP | PHASE | CALLING | EXTEND TIME | DELAY TIME | USE ADDED INITIAL | TYPE | SYSTEM LOOP | NEW CARD |
| 1A | 6X40 | 0 | 2-4-2 | - | 1 | Yes | - | 15* | - | S | - | X |
| | | | | | 6# | Yes | - | - | - | S | - | X |
| 2A | 6X6 | 70 | 3 | - | 2 | Yes | - | - | - | S | - | X |
| 2B | 6X6 | 70 | 3 | - | 2 | Yes | - | - | - | S | - | X |
| 4A | 6X25 | +5 | 2 | - | 4 | Yes | - | 3 | - | S | - | X |
| 5A | 6X40 | 0 | 2-4-2 | - | 5 | Yes | - | 15* | - | S | - | X |
| | | | | | 2# | Yes | - | - | - | S | - | X |
| 5B | 6X25 | +5 | 2 | - | 5 | Yes | - | 10 | - | S | - | X |
| 6A | 6X6 | 70 | 4 | - | 6 | Yes | - | - | - | S | - | X |
| 6B | 6X6 | 70 | 4 | - | 6 | Yes | - | - | - | S | - | X |
| 8A | 6X25 | +5 | 2 | - | 8 | Yes | - | 3 | - | S | - | X |
| 8B | 6X25 | +5 | 2 | - | 8 | Yes | - | 10 | - | S | - | X |

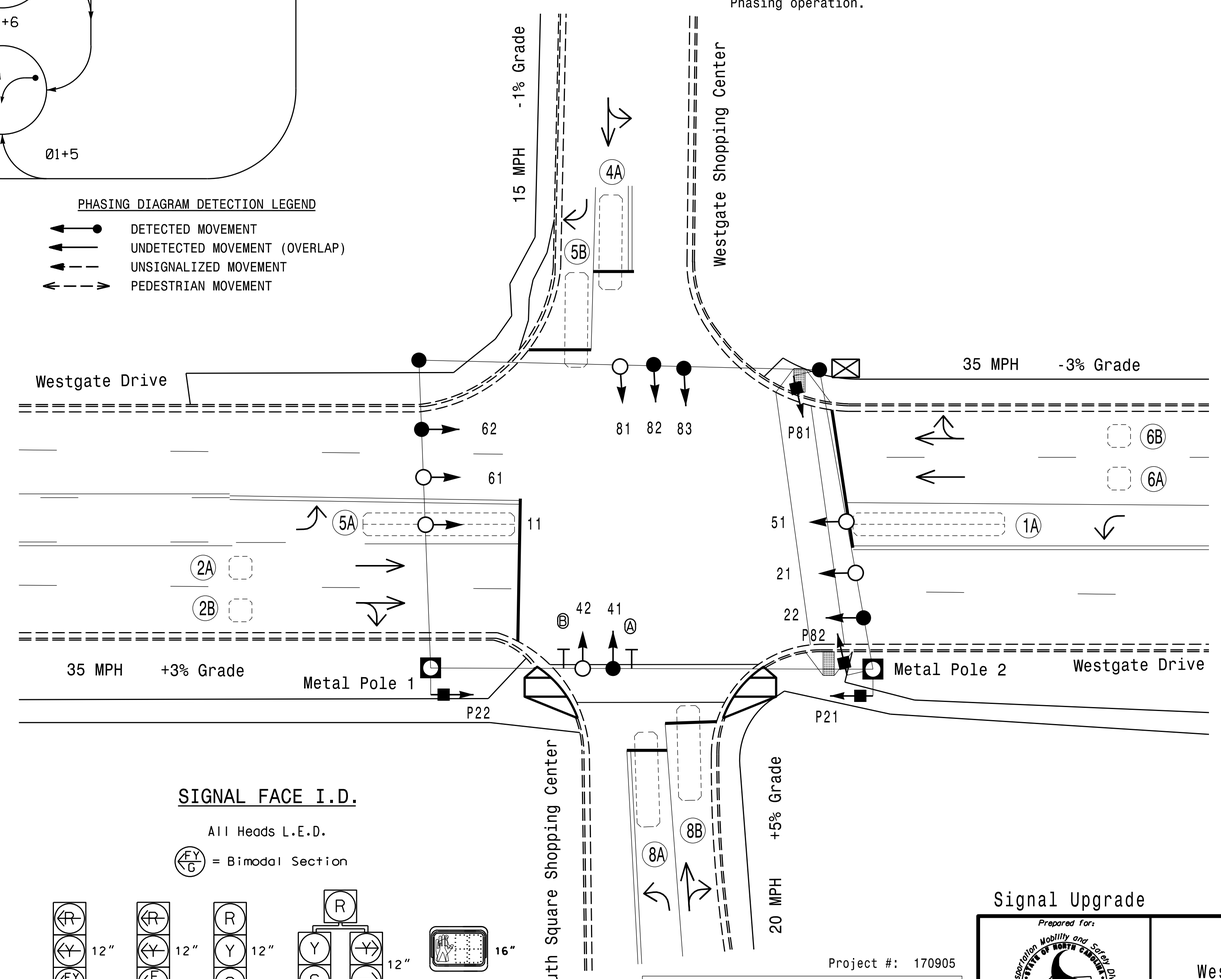
* Reduce delay to 3 seconds during Alternate Phasing Operation.

\# Disable Phase call(s) for loop(s) during Alternate Phasing operation.

## 5 Phase Fully Actuated (Durham Signal System)

## NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 and/or 5 may be lagged.
4. Reposition existing signal heads 22, 62, 82, and 83.
5. Set all detector units to presence mode.
6. Locate new cabinet so as not to obstructe sight distance of vehicles turning right on red.
7. Remove Existing "Left Turn Yield on Green" ball sign-(R10-12).
8. Remove existing Left Turn "Only" sign-(R3-5L).
9. Pavement markings are existing.
10. The Division (City) Traffic Engineer will determine the hours of each phasing plan.
11. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timings values supersede these values.
12. Loop data based on previous plan and/or field observations.
13. Install new cabinet on the existing cabinet foundation.
14. Reconnect lead-in cable to separate loops 2A, 2B, 4A, 4B, 6A, 6B, 8A, and 8B as shown.



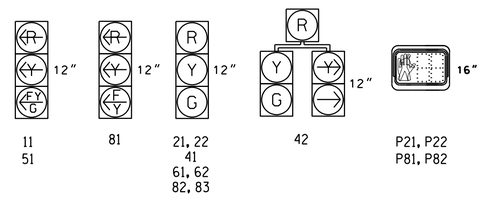

## LEGEND

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

## SIGNAL FACE I.D.

All Heads L.E.D.

F Y G = Bimodal Section




Project #: 170905

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Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

Westgate Drive at Westgate Shopping Center and South Square Shopping Center

Division 5 Durham County Durham

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

SCALE 0 20 1"=20'

| REVISIONS | INIT. | DATE |
|---|---|---|
| | | |

SEAL: NORTH CAROLINA PROFESSIONAL SEAL 032117 ENGINEER ROYAL HINSHAW

DocuSigned by: R Royal Hinshaw 12/21/2018
SIGNATURE DATE

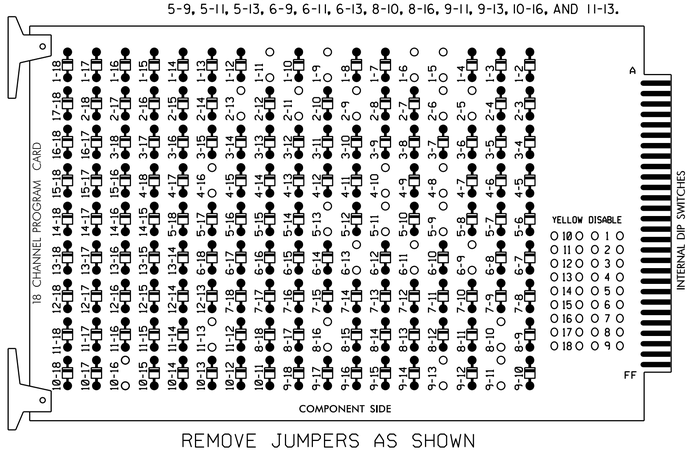
SIG. INVENTORY NO. D-0944

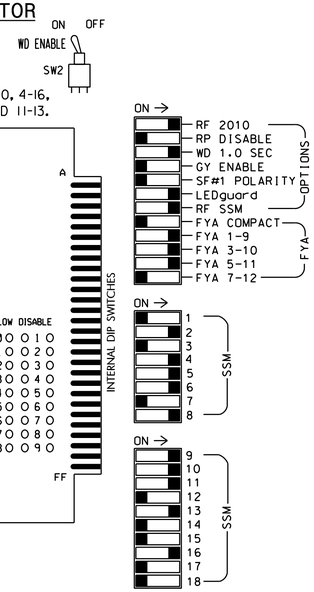
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-5968 | Sig.386.1 |

# 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, 2-5, 2-6, 2-9, 2-11, 2-13, 4-8, 4-10, 4-16, 5-9, 5-11, 5-13, 6-9, 6-11, 6-13, 8-10, 8-16, 9-11, 9-13, 10-16, AND 11-13.




REMOVE JUMPERS AS SHOWN

NOTES:

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

## NOTES

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

## EQUIPMENT INFORMATION

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

* See overlap programming detail on sheet 2

## SIGNAL HEAD HOOK-UP CHART

| LOAD SWITCH NO. | S1 | S2 | S3 | S4 | S5 | S6 | S7 | | S8 | S9 | S10 | S11 | S12 | AUX S1 | AUX S2 | AUX S3 | AUX S4 | AUX S5 | AUX S6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CMU CHANNEL NO. | 1 | 2 | 13 | 3 | 4 | 14 | 5 | | 6 | 15 | 7 | 8 | 16 | 9 | 10 | 17 | 11 | 12 | 18 |
| PHASE | 1 | 2 | 2 PED | 3 | 4 | 4 PED | 5 | | 6 | 6 PED | 7 | 8 | 8 PED | OLA | OLB | SPARE | OLC | OLD | SPARE |
| SIGNAL HEAD NO. | 11★ | 21,22 | P21 P22 | NU | 41,42 | NU | 51★ | 42 | 61,62 | NU | NU | 82,83 | P81 P82 | 11★ | 81★ | NU | 51★ | NU | NU |
| RED | | 128 | | | 101 | | | * | 134 | | | 107 | | | | | | | |
| YELLOW | * | 129 | | | 102 | | | | 135 | | | 108 | | | | | | | |
| GREEN | | 130 | | | 103 | | | | 136 | | | 109 | | | | | | | |
| RED ARROW | | | | | | | | | | | | | | A121 | A124 | | A114 | | |
| YELLOW ARROW | | | | | | | | 132 | | | | | | A122 | A125 | | A115 | | |
| FLASHING YELLOW ARROW | | | | | | | | | | | | | | A123 | A126 | | A116 | | |
| GREEN ARROW | 127 | | | | | | 133 | 133 | | | | | | | | | | | |
| ✋ | | | 113 | | | | | | | | | | 110 | | | | | | |
| 🚶 | | | 115 | | | | | | | | | | 112 | | | | | | |

NU = Not Used

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

★ See pictorial of head wiring in detail this sheet.

## INPUT FILE POSITION LAYOUT

*(front view)*

| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FILE "I" | U | Ø1 1A | Ø2 2A | SLOT EMPTY | WIRED INPUT ⊗ | SLOT EMPTY | Ø4 4A | SLOT EMPTY | SLOT EMPTY | SLOT EMPTY | SLOT EMPTY | SLOT EMPTY | Ø2 PED DC ISOLATOR | NOT USED | FS DC ISOLATOR |
| | L | NOT USED | Ø2 2B | | | | NOT USED | | | | | | NOT USED | Ø8 PED DC ISOLATOR | ST DC ISOLATOR |
| FILE "J" | U | Ø5 5A | Ø6 6A | SLOT EMPTY | WIRED INPUT ⊗ | SLOT EMPTY | Ø8 8A | SLOT EMPTY | SLOT EMPTY | Ø5 5B | SLOT EMPTY | SLOT EMPTY | SLOT EMPTY | SLOT EMPTY | SLOT EMPTY |
| | L | NOT USED | Ø6 6B | | | | Ø8 8B | | | NOT USED | | | | | |

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

FS = FLASH SENSE
ST = STOP TIME

⊗ Wired Input - Do not populate slot with detector card

## INPUT FILE CONNECTION & PROGRAMMING CHART

| LOOP NO. | LOOP TERMINAL | INPUT FILE POS. | PIN NO. | DETECTOR NO. | NEMA PHASE | CALL | EXTEND TIME | DELAY TIME | ADDED INITIAL | DETECTOR TYPE |
|---|---|---|---|---|---|---|---|---|---|---|
| 1A [1] | TB2-1,2 | I1U | 56 | 1 ★ | 1 | YES | - | 15 | - | S |
| | - | J4U | 48 | 26★ | 6 | YES | - | - | - | S |
| 2A | TB2-5,6 | I2U | 39 | 2 | 2 | YES | - | - | - | S |
| 2B | TB2-7,8 | I2L | 43 | 12 | 2 | YES | - | - | - | S |
| 4A | TB4-9,10 | I6U | 41 | 4 | 4 | YES | - | 3 | - | S |
| 5A [2] | TB3-1,2 | J1U | 55 | 5 ★ | 5 | YES | - | 15 | - | S |
| | - | I4U | 47 | 22★ | 2 | YES | - | - | - | S |
| 5B | TB7-9,10 | J9U | 59 | 15 | 5 | YES | - | 10 | - | S |
| 6A | TB3-5,6 | J2U | 40 | 6 | 6 | YES | - | - | - | S |
| 6B | TB3-7,8 | J2L | 44 | 16 | 6 | YES | - | - | - | S |
| 8A | TB5-9,10 | J6U | 42 | 8 | 8 | YES | - | 3 | - | S |
| 8B | TB5-11,12 | J6L | 46 | 18 | 8 | YES | - | 10 | - | S |
| PED PUSH BUTTONS | | | | | | | | | | |
| P21,P22 | TB8-4,6 | I12U | 67 | PED 2 | 2 PED | | | | | |
| P81,P82 | TB8-8,9 | I13L | 70 | PED 8 | 8 PED | | | | | |

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

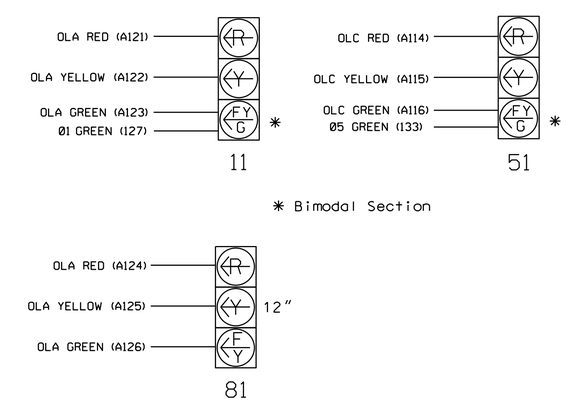
[1] Add jumper from I1-W to J4-W, on rear of input file.
[2] Add jumper from J1-W to I4-W, on rear of input file.

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

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

## FYA SIGNAL WIRING DETAIL

*(wire signal heads as shown)*

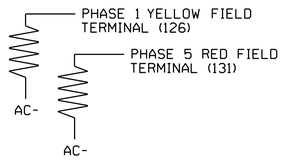



## LOAD RESISTOR INSTALLATION DETAIL

*(install resistors as shown)*

ACCEPTABLE VALUES

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




Electrical Detail - Sheet 1 of 4

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ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

Westgate Drive
at
Westgate Shopping Center

Division 5 Durham County Durham

| PLAN DATE: | December 2018 | REVIEWED BY: | L Boyer |
|---|---|---|---|
| PREPARED BY: | AD Hayes | REVIEWED BY: | TS Warren |

| REVISIONS | INIT. | DATE |
|---|---|---|
| | | |

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 032117 ENGINEER ROYAL HINSHAW

DocuSigned by: R. Royal Hinshaw 12/21/2018
SIGNATURE DATE
SIG. INVENTORY NO. D-0944

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: D-0944
DESIGNED: December 2018
SEALED: 12/21/2018
REVISED: N/A

Project #: 170905

DAVENPORT
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NCBELS FIRM LICENSE NO. C-2522

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-5968 | Sig.386.2 |

# ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

*(program controller as shown)*

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

*OVERLAP A*

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

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

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

FLASHING ARROW OUTPUT.....CH9  ISOLATE

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

← NOTICE ACTION PLAN SF BIT "1"

↓ Toggle Once

*OVERLAP B*

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

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

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

↓ Toggle Once

*OVERLAP C*

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

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

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

FLASHING ARROW OUTPUT.....CH11 ISOLATE

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

← NOTICE ACTION PLAN SF BIT "5"

END PROGRAMMING

## COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

## FLASHER CIRCUIT MODIFICATION DETAIL

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

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

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: D-0944
DESIGNED: December 2018
SEALED: 12/21/2018
REVISED: N/A

Project #: 170905

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Electrical Detail - Sheet 2 of 4

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

750 N.Greenfield Pkwy,Garner,NC 27529

Westgate Drive
at
Westgate Shopping Center

Division 5 Durham County Durham

| | | | |
|---|---|---|---|
| PLAN DATE: | December 2018 | REVIEWED BY: | L. Boyer |
| PREPARED BY: | AD Hayes | REVIEWED BY: | TS Warren |

| REVISIONS | INIT. | DATE |
|---|---|---|
| | | |

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 032117 ENGINEER ROYAL WINSHIP

DocuSigned by: 12/21/2018
SIGNATURE DATE

SIG. INVENTORY NO. D-0944

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-5968 | Sig.386.3 |

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

*(program controller as shown)*

## IMPORTANT!

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

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

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

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

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

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

NOTICE VEH DET PLAN 2

ENSURE DELAY IS SET TO '3.0'

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

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 "3.0" seconds.

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

NOTICE VEH DET PLAN 2

ENSURE DELAY IS SET TO '3.0'

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

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: D-0944
DESIGNED: December 2018
SEALED: 12/21/2018
REVISED: N/A

Project #: 170905

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Electrical Detail - Sheet 3 of 4

**DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED**

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for: 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

Westgate Drive
at
Westgate Shopping Center

Division 5 Durham County Durham

| | | | |
|---|---|---|---|
| PLAN DATE: | December 2018 | REVIEWED BY: | L. Boyer |
| PREPARED BY: | AD Hayes | REVIEWED BY: | TS Warren |

| REVISIONS | INIT. | DATE |
|---|---|---|
| | | |

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 032117 ENGINEER ROYAL WINSHAW

DocuSigned by: R. Royal Winshaw 12/21/2018
SIGNATURE DATE

SIG. INVENTORY NO. D-0944

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-5968 | Sig.386.4 |

# ALTERNATE PHASING ACTIVATION DETAIL

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

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

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

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

### ALTERNATE PHASING CHANGE SUMMARY

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

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

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

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

# ECONOLITE ASC/3-2070 ACTION PLAN PROGRAMMING DETAIL

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

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: D-0944
DESIGNED: December 2018
SEALED: 12/21/2018
REVISED: N/A

Project #: 170905

DAVENPORT
HOME OFFICE:
119 BROOKSTOWN AVENUE, SUITE PH1
WINSTON-SALEM, NC 27101
336.744.1636 www.davenportworld.com
NCBELS FIRM LICENSE NO. C-2522

Electrical Detail - Sheet 4 of 4

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

Westgate Drive
at
Westgate Shopping Center

Division 5 Durham County Durham

| PLAN DATE: December 2018 | REVIEWED BY: L. Boyer |
|---|---|
| PREPARED BY: AD Hayes | REVIEWED BY: TS Warren |

| REVISIONS | INIT. | DATE |
|---|---|---|
| | | |

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 032117 ENGINEER ROYAL HINSHAW

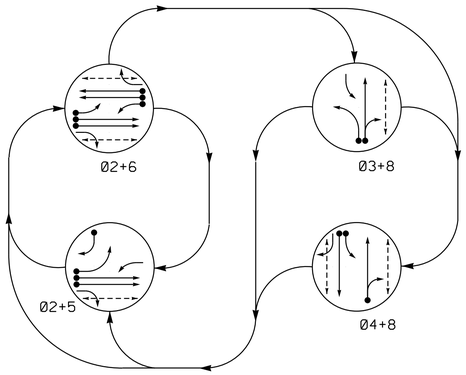
DocuSigned by: R Royal Hinshaw 12/21/2018
SIGNATURE DATE

SIG. INVENTORY NO. D-0944

DocuSign Envelope ID: 326A2739-55EC-403C-8273-2E36555ACAF3

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-5968 | Sig-387.0 |

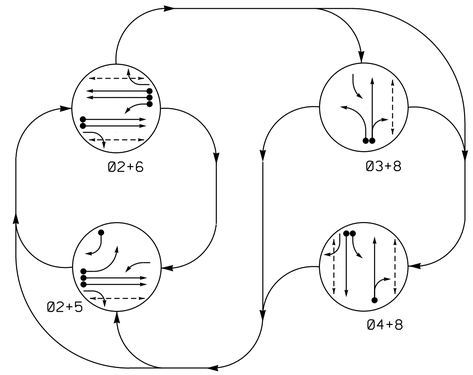
## DEFAULT PHASING DIAGRAM




### DEFAULT PHASING TABLE OF OPERATION

| SIGNAL FACE | PHASE 02+5 | 02+6 | 03+8 | 04+8 | FLASH |
|---|---|---|---|---|---|
| 21, 22 | G | G | R | R | Y |
| 31 | ←R | ←R | ←R | ←R | ←R |
| 41 | ←R | ←R | ←R | ←Y | ←R |
| 42 | R | R | R | G | R |
| 43 | R/→ | R | R | G | R |
| 51 | ← | ←Y | ←R | ←R | ←Y |
| 61 | ←Y | ←Y | ←R | ←R | ←Y |
| 62, 63 | R | G | R | R | Y |
| 81, 82 | R | R | G | G | R |
| P21, P22 | W | W | DW | DW | DRK |
| P41, P42 | DW | DW | DW | W | DRK |
| P61, P62 | DW | W | DW | DW | DRK |
| P81, P82 | DW | DW | W | W | DRK |

## ALTERNATE PHASING DIAGRAM




### ALTERNATE PHASING TABLE OF OPERATION

| SIGNAL FACE | PHASE 02+5 | 02+6 | 03+8 | 04+8 | FLASH |
|---|---|---|---|---|---|
| 21, 22 | G | G | R | R | Y |
| 31 | ←R | ←R | ← | ←R | ←R |
| 41 | ←R | ←R | ←R | ←Y | ←R |
| 42 | R | R | R | G | R |
| 43 | R/→ | R | R | G | R |
| 51 | ← | ←R | ←R | ←R | ←Y |
| 61 | ←Y | ←Y | ←R | ←R | ←Y |
| 62, 63 | R | G | R | R | Y |
| 81, 82 | R | R | G | G | R |
| P21, P22 | W | W | DW | DW | DRK |
| P41, P42 | DW | DW | DW | W | DRK |
| P61, P62 | DW | W | DW | DW | DRK |
| P81, P82 | DW | 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 | USE ADDED INITIAL | TYPE | SYSTEM LOOP | NEW CARD |
| 2A | 6X6 | 70 | Exist | - | 2 | Yes | - | - | - | S | - | X |
| 2B | 6X6 | 70 | Exist | - | 2 | Yes | - | - | - | S | - | X |
| 3A | 6X40 | 0 | 2-4-2 | - | 3 | Yes | - | 3 | - | S | - | X |
| 4A | 6X40 | 0 | 2-4-2 | - | 4 | Yes | - | 3 | - | S | - | X |
| 4B | 6X40 | 0 | 2-4-2 | - | 4 | Yes | - | - | - | S | - | X |
| 5A | 6X40 | 0 | 2-4-2 | - | 5 | Yes | - | *15 | - | S | - | X |
| | | | | | 2# | Yes | - | - | - | S | - | X |
| 5B | 6X40 | 0 | 2-4-2 | - | 5 | Yes | - | 15 | - | S | - | X |
| 6A | 6X40 | 0 | 2-4-2 | - | 6 | Yes | - | 3 | - | S | - | X |
| 6B | 6X6 | 70 | Exist | - | 6 | Yes | - | - | - | S | - | X |
| 6C | 6X6 | 70 | Exist | - | 6 | Yes | - | - | - | S | - | X |
| 8A | 6X40 | 0 | 2-4-2 | - | 8 | Yes | - | 10 | - | S | - | X |
| S118 | ** | 625 | Exist | - | - | - | - | - | - | N | X | X |
| S119 | ** | +715 | Exist | - | - | - | - | - | - | N | X | X |
| S144 | ** | 615 | Exist | - | - | - | - | - | - | N | X | X |
| S145 | ** | +725 | Exist | - | - | - | - | - | - | N | X | X |

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

## 4 Phase
## Fully Actuated
## (Durham Signal System)

## NOTES

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

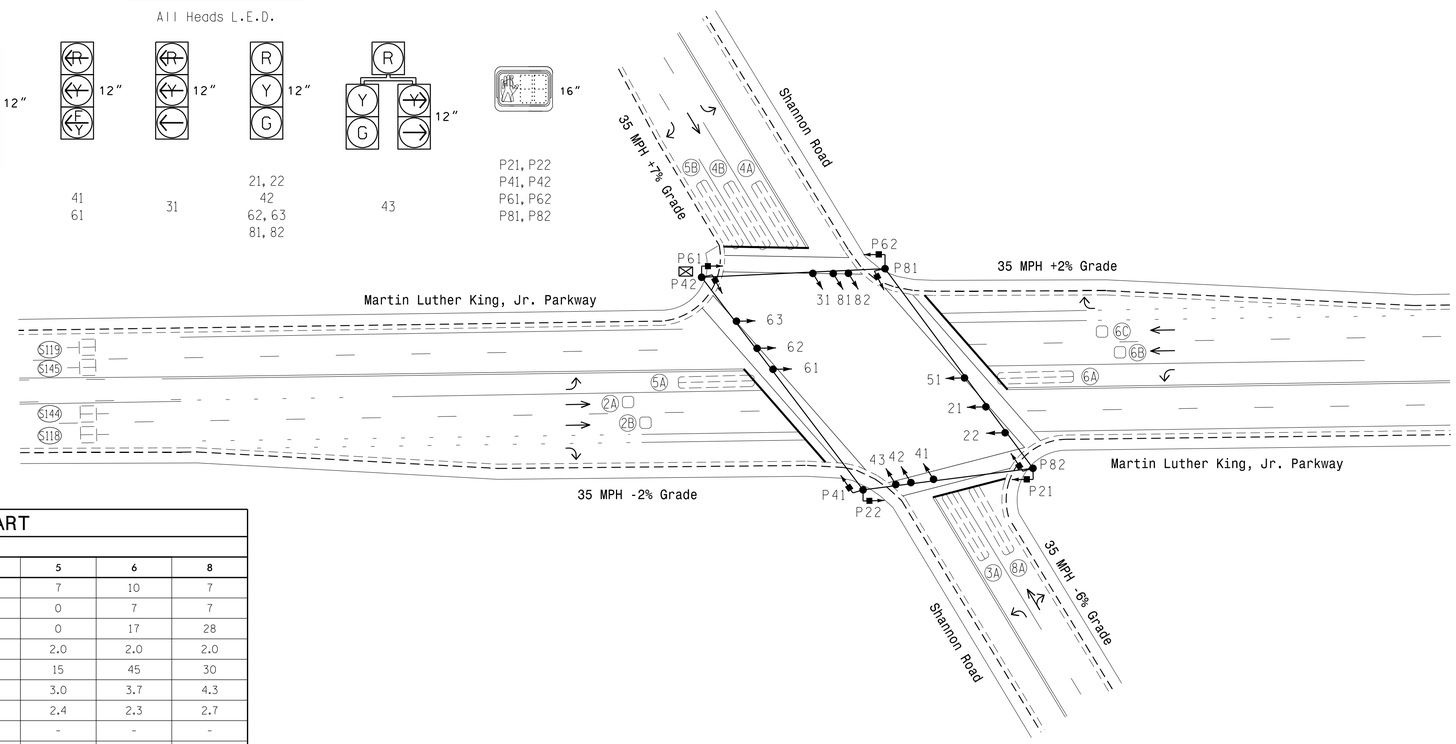
### PHASING DIAGRAM DETECTION LEGEND

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

## SIGNAL FACE I.D.

All Heads L.E.D.




### ASC/3 TIMING CHART

| FEATURE | PHASE 2 | 3 | 4 | 5 | 6 | 8 |
|---|---|---|---|---|---|---|
| Min Green * | 10 | 7 | 7 | 7 | 10 | 7 |
| Walk * | 7 | 0 | 7 | 0 | 7 | 7 |
| Ped Clear | 15 | 0 | 30 | 0 | 17 | 28 |
| Veh. Extension * | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| Max 1 * | 45 | 15 | 30 | 15 | 45 | 30 |
| Yellow | 4.0 | 3.1 | 3.5 | 3.0 | 3.7 | 4.3 |
| Red Clear | 2.3 | 3.5 | 3.3 | 2.4 | 2.3 | 2.7 |
| 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 |
| 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.

## LEGEND

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

Signal Upgrade

Prepared for: DURHAM 1869 CITY OF MEDICINE

Martin Luther King, Jr. Pkwy. at Shannon Rd.

Division 5 Durham County Durham

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

REVISIONS | INIT. | DATE

SCALE 0 40 1"=40'

Prepared in the offices of:
RAMEY KEMP & ASSOCIATES, INC.
Transportation Engineers
5808 Faringdon Place, Suite 100
Raleigh, North Carolina 27609
919-872-5115 Tel. 919-876-6416 Fax.
www.rameykemp.com

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SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32396 ENGINEER WILLIAM J. HAMILTON

DocuSigned by: William J. Hamilton 12/19/2018
A05609D1D6B4D8... SIGNATURE DATE

SIG. INVENTORY NO. D-0949

12/13/2018
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User:tpopelka

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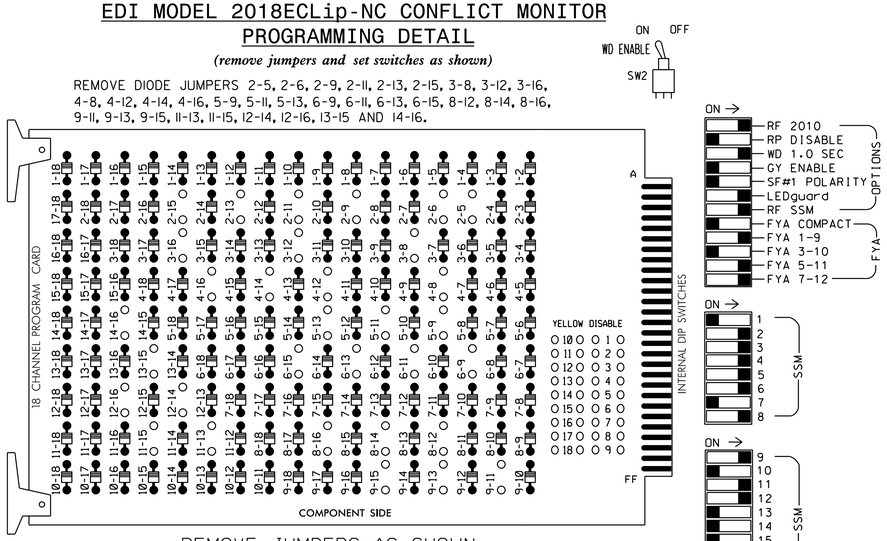
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-5968 | Sig-387.1 |

## EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

*(remove jumpers and set switches as shown)*

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




REMOVE JUMPERS AS SHOWN

■ = DENOTES POSITION OF SWITCH

NOTES:

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

## NOTES

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

## EQUIPMENT INFORMATION

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

* See overlap programming on sheet 2.

## SIGNAL HEAD HOOK-UP CHART

| LOAD SWITCH NO. | S1 | S2 | S3 | S4 | S5 | S6 | S7 | | S8 | S9 | S10 | S11 | S12 | AUX S1 | AUX S2 | AUX S3 | AUX S4 | AUX S5 | AUX S6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CMU CHANNEL NO. | 1 | 2 | 13 | 3 | 4 | 14 | 5 | | 6 | 15 | 7 | 8 | 16 | 9 | 10 | 17 | 11 | 12 | 18 |
| PHASE | 1 | 2 | 2 PED | 3 | 4 | 4 PED | 5 | | 6 | 6 PED | 7 | 8 | 8 PED | OLA | OLB | SPARE | OLC | OLD | SPARE |
| SIGNAL HEAD NO. | NU | 21,22 | P21, P22 | 31 | 42,43 | P41, P42 | 43 | 51★ | 62,63 | P61, P62 | NU | 81,82 | P81, P82 | 61★ | NU | NU | 51★ | 41★ | NU |
| RED | | 128 | | | 101 | | * | | 134 | | | 107 | | | | | | | |
| YELLOW | | 129 | | | 102 | | | | 135 | | | 108 | | | | | | | |
| GREEN | | 130 | | | 103 | | | | 136 | | | 109 | | | | | | | |
| RED ARROW | | | | 116 | | | | | | | | | | A121 | | | A114 | A101 | |
| YELLOW ARROW | | | | 117 | | | 132 | | | | | | | A122 | | | A115 | A102 | |
| FLASHING YELLOW ARROW | | | | | | | | | | | | | | A123 | | | A116 | A103 | |
| GREEN ARROW | | | | 118 | | | 133 | 133 | | | | | | | | | | | |
| ✋ | | | 113 | | | 104 | | | | 119 | | | 110 | | | | | | |
| 🚶 | | | 115 | | | 106 | | | | 121 | | | 112 | | | | | | |

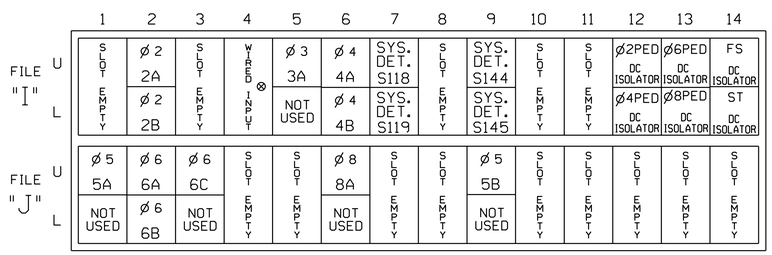
NU = Not Used

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

★ See pictorial of head wiring in detail this sheet.

## INPUT FILE POSITION LAYOUT

*(front view)*




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

FS = FLASH SENSE
ST = STOP TIME

⊗ Wired Input - Do not populate slot with detector card

## INPUT FILE CONNECTION & PROGRAMMING CHART

| LOOP NO. | LOOP TERMINAL | INPUT FILE POS. | PIN NO. | DETECTOR NO. | NEMA PHASE | CALL | EXTEND TIME | DELAY TIME | ADDED INITIAL | DETECTOR TYPE |
|---|---|---|---|---|---|---|---|---|---|---|
| 2A | TB2-5,6 | I2U | 39 | 2 | 2 | YES | | | | S |
| 2B | TB2-7,8 | I2L | 43 | 12 | 2 | YES | | | | S |
| 3A | TB4-5,6 | I5U | 58 | 3 | 3 | YES | | 3 | | S |
| 4A | TB4-9,10 | I6U | 41 | 4 | 4 | YES | | 3 | | S |
| 4B | TB4-11,12 | I6L | 45 | 14 | 4 | YES | | | | S |
| 5A[1] | TB3-1,2 | J1U | 55 | 5★ | 5 | YES | | 15 | | S |
| | - | I4U | 47 | 22★ | 2 | YES | | | | S |
| 5B | TB7-9,10 | J9U | 59 | 15 | 5 | YES | | 15 | | S |
| 6A | TB3-5,6 | J2U | 40 | 6 | 6 | YES | | 3 | | S |
| 6B | TB3-7,8 | J2L | 44 | 16 | 6 | YES | | | | S |
| 6C | TB3-9,10 | J3U | 64 | 36 | 6 | YES | | | | S |
| 8A | TB5-9,10 | J6U | 42 | 8 | 8 | YES | | 10 | | S |
| * S118 | TB6-1,2 | I7U | 65 | 34 | SYS | NO | | | | N |
| * S119 | TB6-3,4 | I7L | 78 | 44 | SYS | NO | | | | N |
| * S144 | TB6-9,10 | I9U | 60 | 11 | SYS | NO | | | | N |
| * S145 | TB6-11,12 | I9L | 62 | 13 | SYS | NO | | | | N |
| PED PUSH BUTTONS | | | | | | | | | | |
| P21,P22 | TB8-4,6 | I12U | 67 | PED 2 | 2 PED | | | | | |
| P41,P42 | TB8-5,6 | I12L | 69 | PED 4 | 4 PED | | | | | |
| P61,P62 | TB8-7,9 | I13U | 68 | PED 6 | 6 PED | | | | | |
| P81,P82 | TB8-8,9 | I13L | 70 | PED 8 | 8 PED | | | | | |

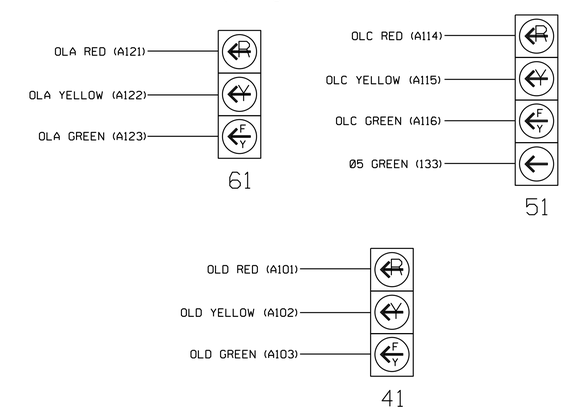
NOTE:
INSTALL DC ISOLATORS IN INPUT FILE SLOTS I12 AND I13.

[1] Add jumper from J1-W to I4-W. on rear of input file.
★ For the detectors to work as shown on the signal design plan, see the Vehicle Detector Setup Programming Detail for Alternate Phasing on sheet 2.
* System detector only. Remove any assigned vehicle phase.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

## FYA SIGNAL WIRING DETAIL

*(wire signal heads as shown)*



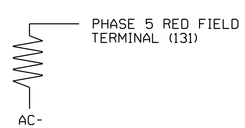

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: D-0949
DESIGNED: Dec 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail
Sheet 1 of 3

## 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.

Prepared in the offices of:
RAMEY KEMP & ASSOCIATES, INC.
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ELECTRICAL AND PROGRAMMING DETAILS FOR:
DURHAM
1869
CITY OF MEDICINE

Martin Luther King, Jr. Pkwy.
at
Shannon Rd.

Division 5 Durham County Durham

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

| REVISIONS | INIT. | DATE |
|---|---|---|
| | | |

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32396 ENGINEER WILLIAM J. HAMILTON

DocuSigned by: William J. Hamilton 12/19/2018
A0660D706454E4E...
SIGNATURE DATE

SIG. INVENTORY NO. D-0949

12/17/2018
U-5968_Sig-387_D-0949_ele.dgn
User:tpopelka

DocuSign Envelope ID: 326A2739-55EC-403C-8273-2E36555ACAF3

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-5968 | Sig-387.2 |

# ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

*(program controller as shown)*

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

*OVERLAP A*

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

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

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

Toggle Twice

*OVERLAP C*

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

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

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

FLASHING ARROW OUTPUT.....CH11 ISOLATE

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

← NOTICE ACTION PLAN SF BIT "5"

Toggle Once

*OVERLAP D*

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

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

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

END PROGRAMMING

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

*(program controller as shown)*

## IMPORTANT!

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

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

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

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

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

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

← NOTICE VEH DET PLAN 2

← ENSURE DELAY IS SET TO '3'

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

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

← NOTICE VEH DET PLAN 2

→ ENSURE PHASE IS SET TO "0"

END PROGRAMMING

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: D-0949
DESIGNED: Dec 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail
Sheet 2 of 3

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ELECTRICAL AND PROGRAMMING DETAILS FOR:
DURHAM 1869 CITY OF MEDICINE

Martin Luther King, Jr. Pkwy.
at
Shannon Rd.

Division 5 Durham County Durham

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

| REVISIONS | INIT. | DATE |
|---|---|---|
| | | |

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NORTH CAROLINA PROFESSIONAL SEAL 32396 ENGINEER WILLIAM J. HAMILTON

DocuSigned by: William J. Hamilton 12/19/2018
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SIG. INVENTORY NO. D-0949

12/17/2018
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User:tpopelka

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| U-5968 | Sig-387.3 |

# ALTERNATE PHASING ACTIVATION DETAIL

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

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

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

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

### ALTERNATE PHASING CHANGE SUMMARY

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

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

VEH DET PLAN 2: Disables phase 2 call on loop 5A and reduces delay time for phase 5 call on loop 5A to 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: D-0949
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:

DURHAM 1869 CITY OF MEDICINE

Martin Luther King, Jr. Pkwy.
at
Shannon Rd.

Division 5 Durham County Durham

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

| REVISIONS | INIT. | DATE |
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SEAL
NORTH CAROLINA PROFESSIONAL SEAL 32396 ENGINEER WILLIAM J. HAMILTON

DocuSigned by: William J. Hamilton 12/19/2018
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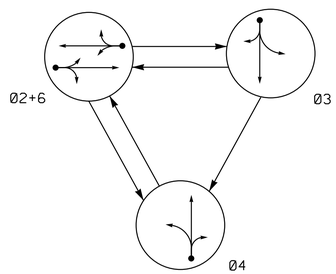
## PHASING DIAGRAM




PHASING DIAGRAM DETECTION LEGEND

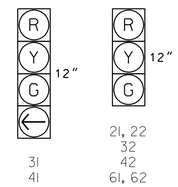
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

## TABLE OF OPERATION

| SIGNAL FACE | PHASE Ø2+6 | PHASE Ø3 | PHASE Ø4 | FLASH |
|---|---|---|---|---|
| 21, 22 | G | R | R | Y |
| 31 | R | G | R | R |
| 32 | R | G | R | R |
| 41 | R | R | G | R |
| 42 | R | R | G | R |
| 61, 62 | G | R | R | Y |

## SIGNAL FACE I.D.

All Heads L.E.D.



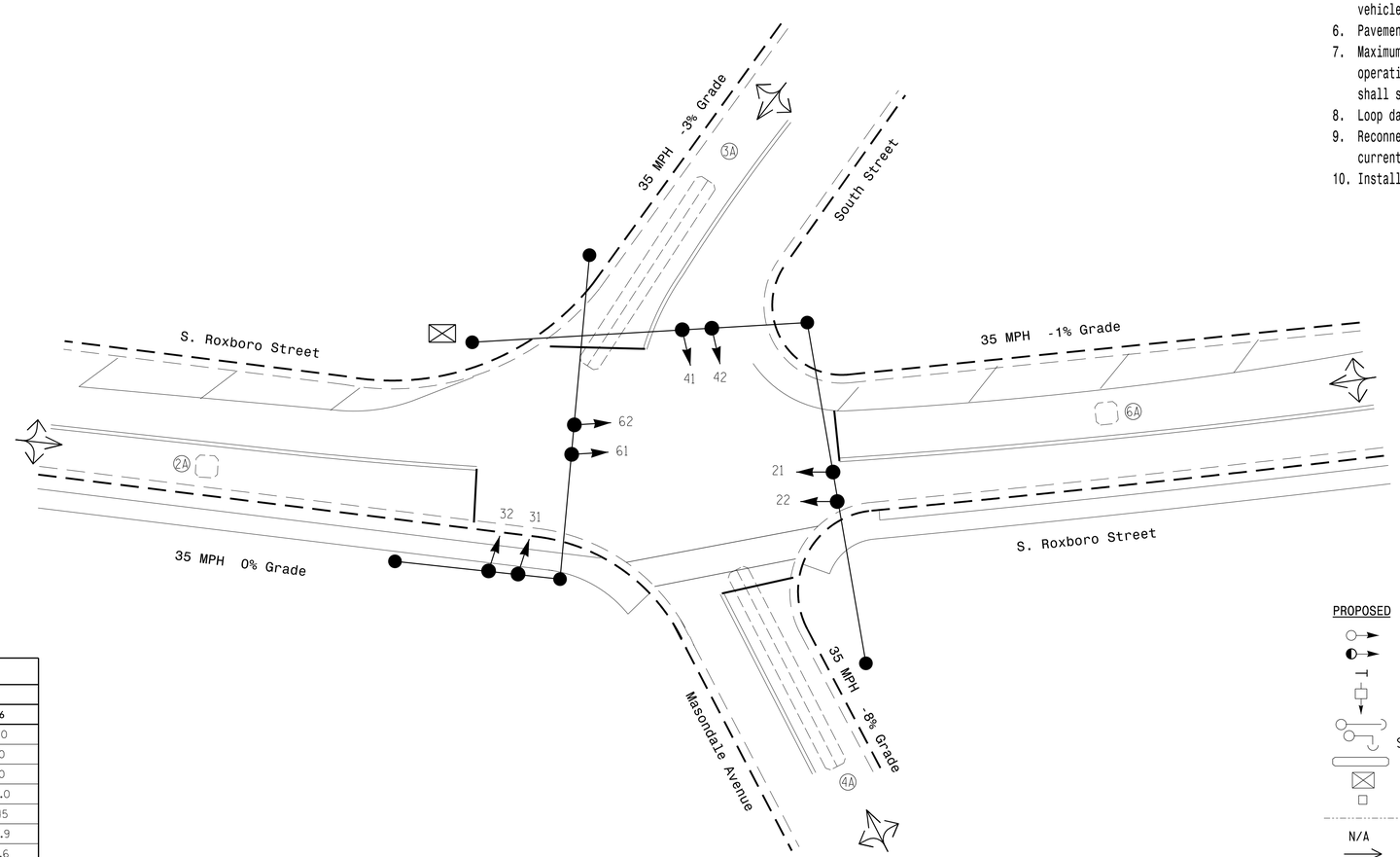

## ASC/3 DETECTOR INSTALLATION CHART

| DETECTOR: LOOP | SIZE (FT) | DISTANCE FROM STOPBAR (FT) | TURNS | NEW LOOP | PROGRAMMING: PHASE | CALLING | EXTEND TIME | DELAY TIME | USE ADDED INITIAL | TYPE | SYSTEM LOOP | NEW CARD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2A | 6X6 | 70 | Exist | - | 2 | Yes | - | - | - | S | - | X |
| 3A | 6X60 | +5 | 2-4-2 | - | 3 | Yes | - | 10 | - | S | - | X |
| 4A | 6X60 | +5 | 2-4-2 | - | 4 | Yes | - | 10 | - | S | - | X |
| 6A | 6X6 | 70 | Exist | - | 6 | Yes | - | - | - | S | - | X |

3 Phase
Fully Actuated
(Durham Signal System)

## NOTES

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




## 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 | |

## ASC/3 TIMING CHART

| FEATURE | PHASE 2 | PHASE 3 | PHASE 4 | PHASE 6 |
|---|---|---|---|---|
| Min Green * | 10 | 7 | 7 | 10 |
| Walk * | 0 | 0 | 0 | 0 |
| Ped Clear | 0 | 0 | 0 | 0 |
| Veh. Extension * | 2.0 | 2.0 | 2.0 | 2.0 |
| Max 1 * | 45 | 25 | 25 | 45 |
| Yellow | 3.8 | 4.1 | 4.5 | 3.9 |
| Red Clear | 1.7 | 1.5 | 1.4 | 1.6 |
| Actuations B4 Add * | - | - | - | - |
| Seconds /Actuation * | - | - | - | - |
| Max Initial * | - | - | - | - |
| Time Before Reduction * | - | - | - | - |
| Time To Reduce * | - | - | - | - |
| Minimum Gap | - | - | - | - |
| Locking Detector | X | - | - | X |
| Recall Position | VEH RECALL | - | - | VEH RECALL |
| Dual Entry | - | - | - | - |
| Simultaneous Gap | X | X | X | X |

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

Signal Upgrade

Prepared for: DURHAM 1869 CITY OF MEDICINE

S. Roxboro St.
at
Masondale Ave./South St.

Division 5 Durham County Durham

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

SCALE 0 20 1"=20'

| REVISIONS | INIT. | DATE |
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NORTH CAROLINA PROFESSIONAL SEAL 32396 ENGINEER WILLIAM J. HAMILTON

DocuSigned by: William J. Hamilton 12/19/2018
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SIG. INVENTORY NO. D-0954

12/17/2018
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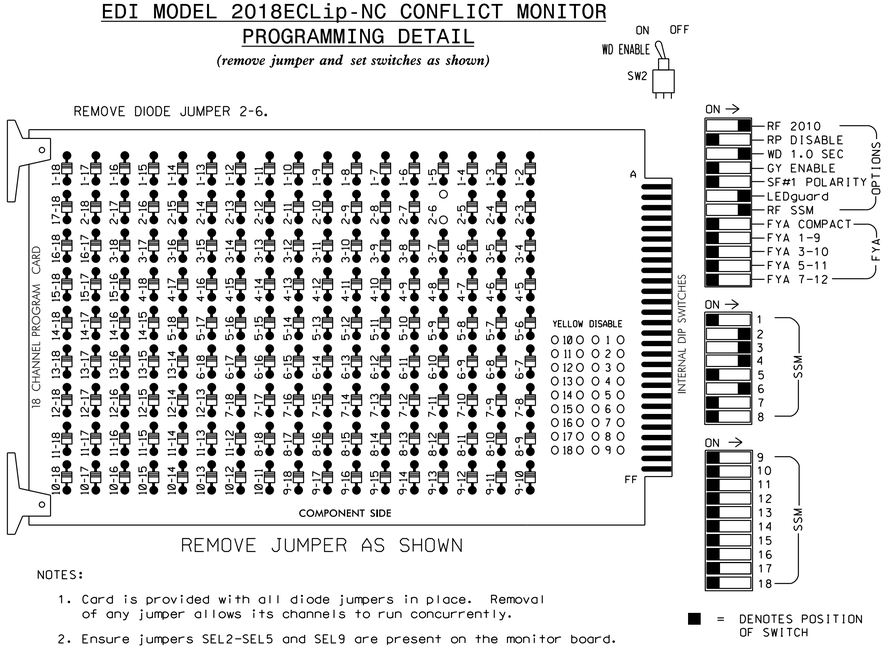
| U-5968 | Sig-388.1 |

# EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

*(remove jumper and set switches as shown)*




■ = DENOTES POSITION OF SWITCH

NOTES:

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

## NOTES

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

## EQUIPMENT INFORMATION

CONTROLLER.....2070LX
CABINET.....332
SOFTWARE.....ECONOLITE ASC/3-2070
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...12
LOAD SWITCHES USED.....S2,S4,S5,S8
PHASES USED.....2,3,4,6
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 | 31 | 32 | 41 | 42 | NU | NU | 61,62 | NU | NU | NU | NU |
| RED | | 128 | | 116 | 116 | 101 | 101 | | | 134 | | | | |
| YELLOW | | 129 | | 117 | 117 | 102 | 102 | | | 135 | | | | |
| GREEN | | 130 | | 118 | 118 | 103 | 103 | | | 136 | | | | |
| RED ARROW | | | | | | | | | | | | | | |
| YELLOW ARROW | | | | | | | | | | | | | | |
| GREEN ARROW | | | | 118 | | 103 | | | | | | | | |

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 | Ø 2 / 2A | SLOT | SLOT | Ø 3 / 3A | Ø 4 / 4A | SLOT | SLOT | SLOT | SLOT | SLOT | SLOT | SLOT | FS / DC ISOLATOR |
| | L | EMPTY | NOT USED | EMPTY | EMPTY | NOT USED | NOT USED | EMPTY | EMPTY | EMPTY | EMPTY | EMPTY | EMPTY | EMPTY | ST / DC ISOLATOR |
| FILE "J" | U | SLOT | Ø 6 / 6A | SLOT | SLOT | SLOT | SLOT | SLOT | SLOT | SLOT | SLOT | SLOT | SLOT | SLOT | SLOT |
| | L | EMPTY | NOT USED | EMPTY | EMPTY | EMPTY | EMPTY | EMPTY | EMPTY | EMPTY | EMPTY | EMPTY | EMPTY | EMPTY | EMPTY |

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

FS = FLASH SENSE
ST = STOP TIME

## INPUT FILE CONNECTION & PROGRAMMING CHART

| LOOP NO. | LOOP TERMINAL | INPUT FILE POS. | PIN NO. | DETECTOR NO. | NEMA PHASE | CALL | EXTEND TIME | DELAY TIME | ADDED INITIAL | DETECTOR TYPE |
|---|---|---|---|---|---|---|---|---|---|---|
| 2A | TB2-5,6 | I2U | 39 | 2 | 2 | YES | | | | S |
| 3A | TB4-5,6 | I5U | 58 | 3 | 3 | YES | | 10 | | S |
| 4A | TB4-9,10 | I6U | 41 | 4 | 4 | YES | | 10 | | S |
| 6A | TB3-5,6 | J2U | 40 | 6 | 6 | YES | | | | S |

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: D-0954
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:

DURHAM 1869 CITY OF MEDICINE

S. Roxboro St.
at
Masondale Ave./South 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
ASSISTANT ENGINEER SIGNATURE DATE

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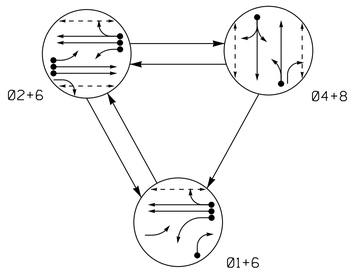
## DEFAULT PHASING DIAGRAM



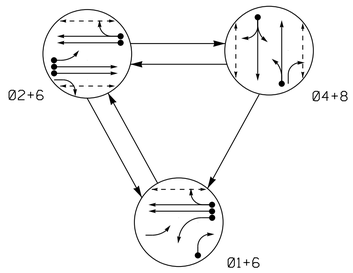

PHASING DIAGRAM DETECTION LEGEND

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

### DEFAULT PHASING TABLE OF OPERATION

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

## ALTERNATE PHASING DIAGRAM




### ALTERNATE PHASING TABLE OF OPERATION

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

### ASC/3 DETECTOR INSTALLATION CHART

| DETECTOR | | | | | PROGRAMMING | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LOOP | SIZE (FT) | DISTANCE FROM STOPBAR (FT) | TURNS | NEW LOOP | PHASE | CALLING | EXTEND TIME | DELAY TIME | USE ADDED INITIAL | TYPE | SYSTEM LOOP | NEW CARD |
| 1A | 6X60 | 0 | 2-4-2 | - | 1 | Yes | - | 15* | - | S | - | X |
| | | | | - | 6# | Yes | - | - | - | S | - | X |
| 1B | 6X60 | 0 | EXIST | - | 1 | Yes | - | 15 | - | S | - | X |
| 2A | 6X6 | 70 | EXIST | - | 2 | Yes | - | - | - | S | - | X |
| 2B | 6X6 | 70 | EXIST | - | 2 | Yes | - | - | - | S | - | X |
| 2C | 6X40 | 0 | 2-4-2 | - | 2 | Yes | - | - | - | S | - | X |
| 4A | 6X60 | 0 | EXIST | - | 4 | Yes | - | 5 | - | S | - | X |
| 6A | 6X6 | 70 | 6 | X | 6 | Yes | - | - | - | S | - | X |
| 6B | 6X6 | 70 | 6 | X | 6 | Yes | - | - | - | S | - | X |
| 8A | 6X60 | 0 | EXIST | - | 8 | Yes | - | - | - | S | - | X |

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

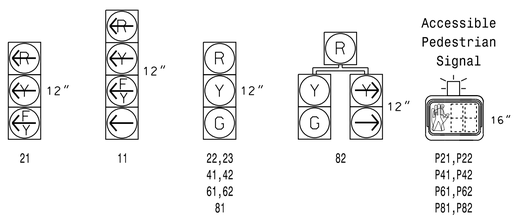
## 3 PHASE FULLY ACTUATED (DURHAM SIGNAL SYSTEM)

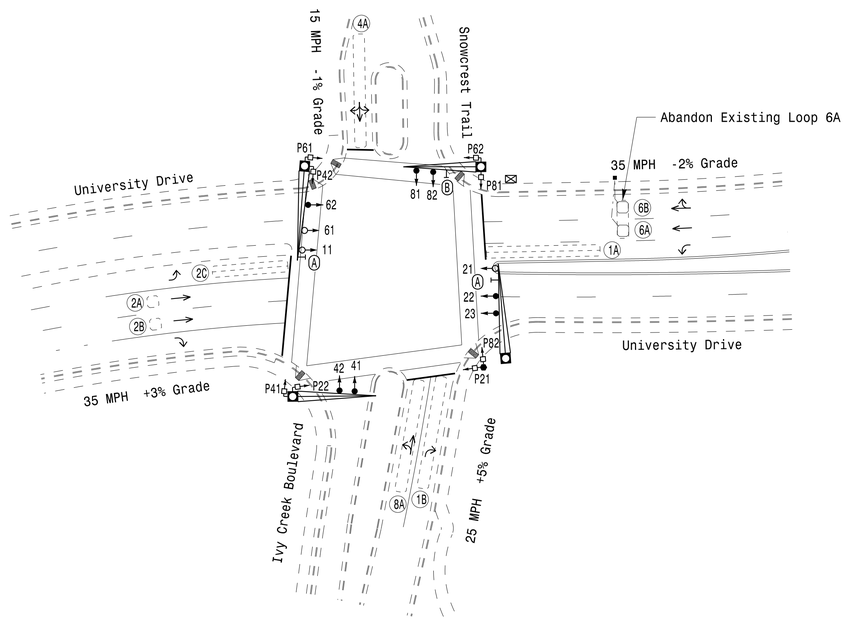
## NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 may be lagged.
4. Reposition existing signal head numbered 62.
5. Abandon existing loop 6A.
6. Set all detector units to presence mode.
7. In the event of loop replacement, refer to the current ITS and Signal Design Manual and submit a Plan of Record to the Signal Design Section.
8. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
9. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
10. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
11. Remove existing "Left Turn Yield on Green" ball signs - (R10-12).
12. Pavement markings are existing.
13. The Division (City) Traffic Engineer will determine the hours of use for each phasing plan.
14. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
15. This intersection features accessible pedestrian signals utilizing a percussive tone walk indication. Refer to section 4E.11 of the 2009 MUTCD for tone rate and frequency requirements.
16. Loop data based on previous plan and/or field observations.
17. Install new cabinet on the existing cabinet foundation.
18. Existing lane control signs may be removed at discretion of the Engineer.

## 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 | |
| | Type II Signal Pedestal | |
| | Metal Pole with Mastarm | |
| | Inductive Loop Detector | |
| | Controller & Cabinet | |
| | Junction Box | |
| | 2-in Underground Conduit | |
| N/A | Right of Way | |
| | Directional Arrow | |
| N/A | Curb Ramp | |
| Ⓐ | Left Arrow "ONLY" Sign (R3-5L) | Ⓐ |
| Ⓑ | Right Arrow "ONLY" Sign (R3-5R) | Ⓑ |

### ASC/3 TIMING CHART

| FEATURE | PHASE 1 | PHASE 2 | PHASE 4 | PHASE 6 | PHASE 8 |
|---|---|---|---|---|---|
| Min Green * | 7 | 10 | 7 | 10 | 7 |
| Walk * | 0 | 7 | 7 | 7 | 7 |
| Ped Clear | 0 | 24 | 26 | 15 | 25 |
| Veh. Extension * | 1.0 | 3.0 | 1.0 | 3.0 | 1.0 |
| Max 1 * | 15 | 45 | 15 | 45 | 15 |
| Yellow | 3.0 | 4.0 | 3.0 | 4.0 | 3.0 |
| Red Clear | 2.9 | 2.2 | 4.2 | 2.2 | 3.2 |
| Actuations B4 Add * | - | - | - | - | - |
| Seconds /Actuation * | - | - | - | - | - |
| Max Initial * | - | - | - | - | - |
| Time Before Reduction * | - | - | - | - | - |
| Time To Reduce * | - | - | - | - | - |
| Minimum Gap | - | - | - | - | - |
| Locking Detector | - | X | - | X | - |
| Recall Position | - | VEH. RECALL | - | VEH. RECALL | - |
| Dual Entry | - | - | X | - | X |
| Simultaneous Gap | X | X | X | X | X |

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

### ACCESSIBLE PEDESTRIAN SIGNAL OPERATION

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

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

Signal Upgrade

**DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED**

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

DURHAM 1869 CITY OF MEDICINE

SCALE 0 40 1"=40'

University Drive at Snowcrest Trail/ Ivy Creek Boulevard
Division 5 Durham County Durham

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

| REVISIONS | INIT. | DATE |
|---|---|---|
| | | |

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACIE L. PHILLIPS
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DC87A59ED9D8437
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SIG. INVENTORY NO. D-0957

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derrick.waller

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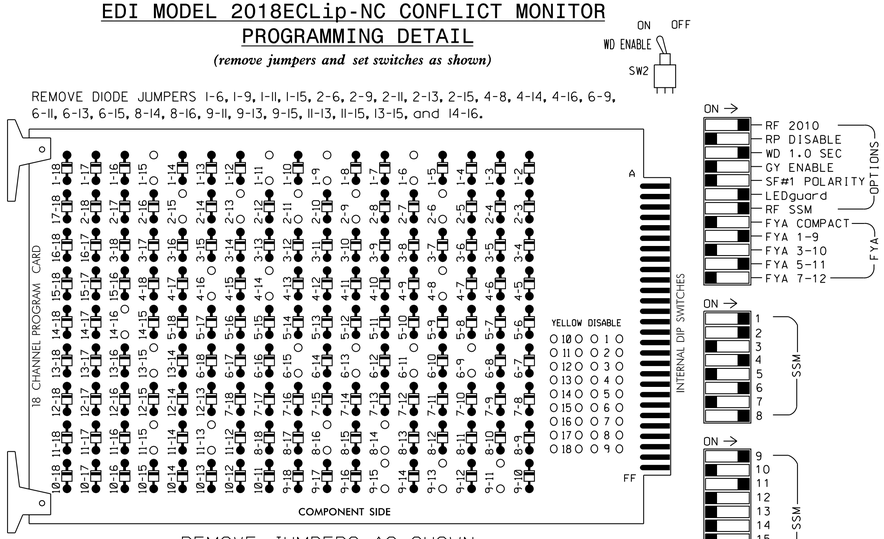
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-5968 | SIG.389.1 |

# EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

*(remove jumpers and set switches as shown)*




NOTES:

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

# NOTES

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

# EQUIPMENT INFORMATION

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

✳ See overlap programming detail on sheet 2

# SIGNAL HEAD HOOK-UP CHART

| LOAD SWITCH NO. | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 | AUX S1 | AUX S2 | AUX S3 | AUX S4 | AUX S5 | AUX S6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CMU CHANNEL NO. | 1 | 2 | 13 | 3 | 4 | 14 | 5 | 6 | 15 | 7 | 8 | 16 | 9 | 10 | 17 | 11 | 12 | 18 |
| PHASE | 1 | 2 | 2 PED | 3 | 4 | 4 PED | 5 | 6 | 6 PED | 7 | 8 | 8 PED | OLA | OLB | SPARE | OLC | OLD | SPARE |
| SIGNAL HEAD NO. | 11★ | 82 | 22,23 | P21, P22 | NU | 41,42 | P41, P42 | NU | 61,62 | P61, P62 | NU | 81,82 | P81, P82 | 11★ | NU | NU | 21★ | NU | NU |
| RED | | ✳ | 128 | | | 101 | | | 134 | | | 107 | | | | | | | |
| YELLOW | | | 129 | | | 102 | | | 135 | | | 108 | | | | | | | |
| GREEN | | | 130 | | | 103 | | | 136 | | | 109 | | | | | | | |
| RED ARROW | | | | | | | | | | | | | A121 | | | A114 | | | |
| YELLOW ARROW | | 126 | | | | | | | | | | | A122 | | | A115 | | | |
| FLASHING YELLOW ARROW | | | | | | | | | | | | | A123 | | | A116 | | | |
| GREEN ARROW | 127 | 127 | | | | | | | | | | | | | | | | | |
| ✋ | | | | 113 | | | 104 | | | 119 | | | 110 | | | | | | |
| 🚶 | | | | 115 | | | 106 | | | 121 | | | 112 | | | | | | |

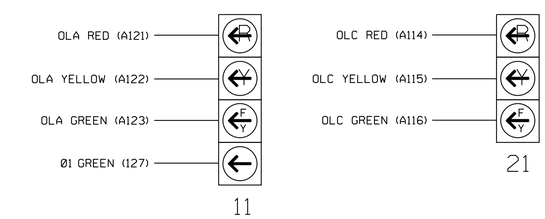
NU = Not Used

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

★ See pictorial of head wiring in detail this sheet.

# FYA SIGNAL WIRING DETAIL

*(wire signal heads as shown)*




# INPUT FILE POSITION LAYOUT

*(front view)*

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

⊗ Wired Input - Do not populate slot with detector card

# INPUT FILE CONNECTION & PROGRAMMING CHART

| LOOP NO. | LOOP TERMINAL | INPUT FILE POS. | PIN NO. | DETECTOR NO. | NEMA PHASE | CALL | EXTEND TIME | DELAY TIME | ADDED INITIAL | DETECTOR TYPE |
|---|---|---|---|---|---|---|---|---|---|---|
| 1A [1] | TB2-1,2 | I1U | 56 | 1★ | 1 | YES | | 15 | | S |
| | - | J4U | 48 | 26★ | 6 | YES | | | | S |
| 1B | TB6-9,10 | I9U | 60 | 11 | 1 | YES | | 15 | | S |
| 2A | TB2-5,6 | I2U | 39 | 2 | 2 | YES | | | | S |
| 2B | TB2-7,8 | I2L | 43 | 12 | 2 | YES | | | | S |
| 2C | TB2-9,10 | I3U | 63 | 32 | 2 | YES | | | | S |
| 4A | TB4-9,10 | I6U | 41 | 4 | 4 | YES | | 5 | | S |
| 6A | TB3-5,6 | J2U | 40 | 6 | 6 | YES | | | | S |
| 6B | TB3-7,8 | J2L | 44 | 16 | 6 | YES | | | | S |
| 8A | TB5-9,10 | J6U | 42 | 8 | 8 | YES | | | | 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.

★ 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.

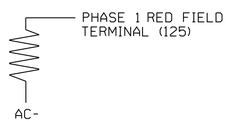
INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

# 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: D-0957
DESIGNED: MAY 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:

DURHAM
1869
CITY OF MEDICINE

University Drive
at
Snowcrest Trail/
Ivy Creek Boulevard

Division 5 Durham County Durham

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

| REVISIONS | INIT. | DATE |
|---|---|---|
| | | |

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACIE L. PHILLIPS

DocuSigned by: 9C87A5DED6DB437
12/19/2018
SIGNATURE DATE

SIG. INVENTORY NO. D-0957

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

12/19/2018
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derrick.waller

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| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-5968 | SIG.389.2 |

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

## IMPORTANT!

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

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

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

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

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

END PROGRAMMING

# ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

*(program controller as shown)*

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

*OVERLAP A*

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

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

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

FLASHING ARROW OUTPUT.....CH9  ISOLATE

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

NOTICE ACTION PLAN SF BIT "1"

Toggle Twice

*OVERLAP C*

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

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

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

END PROGRAMMING

# 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: D-0957
DESIGNED: MAY 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail - Sheet 2 of 3

**DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED**

PLANS PREPARED IN THE OFFICE OF:
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Raleigh, NC 27601
(919) 677-2000

ELECTRICAL AND PROGRAMMING DETAILS FOR:

DURHAM
1869
CITY OF MEDICINE

University Drive
at
Snowcrest Trail/
Ivy Creek Boulevard

Division 5 Durham County Durham

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

| REVISIONS | INIT. | DATE |
|---|---|---|
| | | |

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACIE L. PHILLIPS

DocuSigned by:
DC87A59ED9D8437...
12/19/2018

SIGNATURE DATE

SIG. INVENTORY NO. D-0957

12/19/2018
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derrick.waller

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| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-5968 | SIG.389.3 |

# 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.

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

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

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

## ALTERNATE PHASING CHANGE SUMMARY

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

SF BIT 1: Modifies overlap parent phases for head 11 to run protected turns only.

VEH DET PLAN 2: Disables phase 6 call on loop 1A and reduces delay time for phase 1 call on loop 1A to 3 seconds.

# ECONOLITE ASC/3-2070 ACTION PLAN PROGRAMMING DETAIL

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

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: D-0957
DESIGNED: MAY 2018
SEALED: 12/19/2018
REVISED: N/A

Electrical Detail - Sheet 3 of 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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ELECTRICAL AND PROGRAMMING DETAILS FOR:
DURHAM
1869
CITY OF MEDICINE

University Drive
at
Snowcrest Trail/
Ivy Creek Boulevard

Division 5 Durham County Durham

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

| REVISIONS | INIT. | DATE |
|---|---|---|
| | | |

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACIE L. PHILLIPS
DocuSigned by:
DC87A59ED9D8437...
12/19/2018
SIGNATURE DATE
SIG. INVENTORY NO. D-0957

12/19/2018
K:\4DA_TP\Dm_ITS\011036410 - Durham Signal System\Signals\C4 - Signal Design\GROUP 6\U-5968_D-0957-2018a3.dgn
derrick.waller