(BUS) Durham

SHEET NUMBER

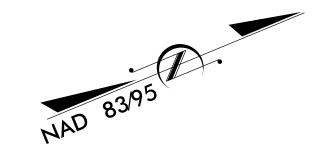
56 03

STATE OF NORTH CAROLINA DIVISION OF HIGHWAYS

DURHAM COUNTY

LOCATION: NC 55 (ALSTON AVE.) FROM NC 147 (I. L. "BUCK" DEAN FREEWAY) TO NORTH OF US 70 BUS/NC 98 (HOLLOWAY ST.)

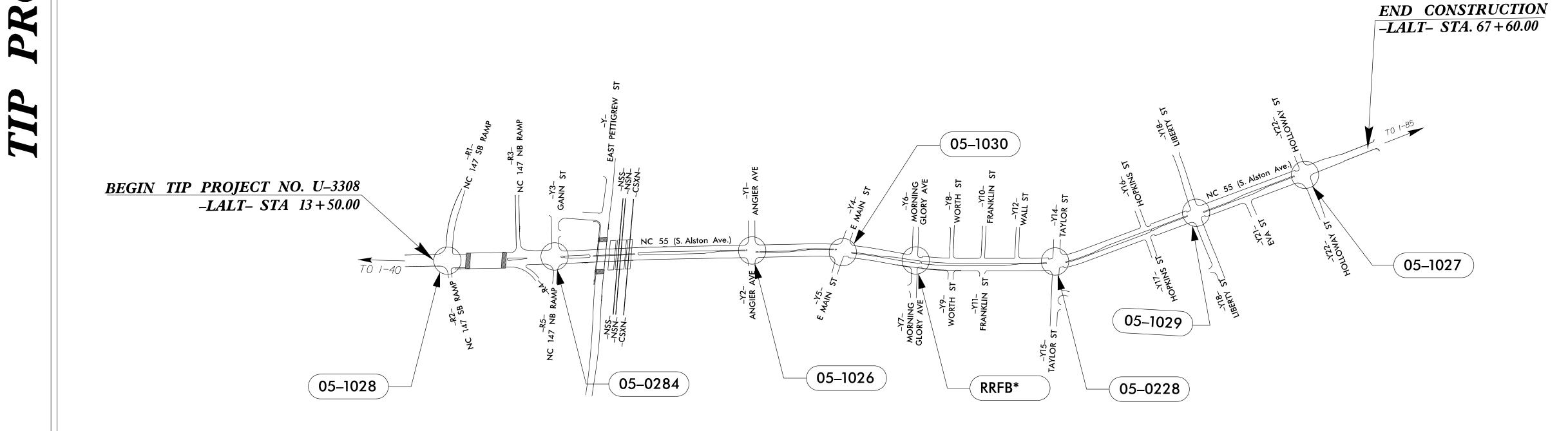
TYPE OF WORK: TRAFFIC SIGNALS AND SIGNAL COMMUNICATIONS



PROJECT REFERENCE NO. SHEET NO.

Sig.1.0

U-3308



INDEX OF PLANS

<u>SIGNAL INV.NUMBER</u>

VICINITY MAP

END PROJECT

BUS (70)

BEGIN PROJECT

| Sig.I.O | _ | Title Sheet |
|-------------------|---------|---|
| g.2.0 - Sig.5.4 | 05-1028 | NC 55 (South Alston Avenue) at NC 147 SB Ramps |
| g.6.0 - Sig.II.4 | 05-0284 | NC 55 (South Alston Avenue) at NC 147 NB Ramp/Gann Street |
| n.12.0 - Sig.16.4 | 05-1026 | NC 55 (South Alston Avenue) at SR 1926 (Angier Avenue) |
| g.17.0 - Sig.22.4 | 05-1030 | NC 55 (South / North Alston Avenue) at E Main Street |
| 23.0 - Sig. 30.4 | 05-0228 | NC 55 (North Alston Avenue) at Taylor Street |
| 1.31.0 - Sig.39.4 | 05-1029 | NC 55 (North Alston Avenue) at Liberty Street |
| 40.0 - Sig. 46.4 | 05-1027 | NC 55 (North Alston Avenue) at NC 98 (Holloway Street) |
| MI - M9 | _ | Metal Pole Design Plans |
| PI - P3 | _ | Pedestrian Standards |
| SCP.I - SCP.8 | _ | Communications Cable and Conduit/Wiring Plans |
| SCP.9 - SCP.18 | _ | Splice Details |

LOCATION / DESCRIPTION

*RRFB to be removed after project.

PLANS PREPARED BY:

JEFFREY HOCHANADEL, P.E. - PROJECT MANAGER

MATTHEW COPPLE, P.E. - PROJECT ENGINEER

CLIFTON LAWSON, E.I. - DESIGN ENGINEER

1025 Wade Avenue Raleigh, NC 27605 Tel:919-789-9977 Fax:919-789-9591 License #: C-2197

LEGEND



SIGNAL INVENTORY NUMBER

TRANSPORTATION PLANS PREPARED FOR:

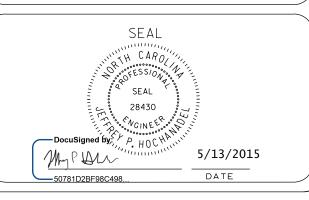
MOBILITY AND SAFETY DIVISION / ITS & SIGNALS UNIT ROBERT J. ZIEMBA, P.E. - CENTRAL REGION SIGNALS ENGINEER GEORGE C.BROWN, P.E. - SIGNAL EQUIPMENT DESIGN ENGINEER I.NEIL AVERY - SIGNAL COMMUNICATIONS PROJECT ENGINEER

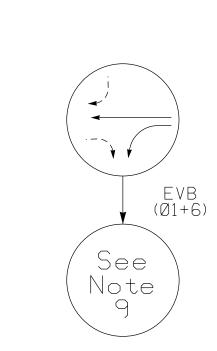


Refer to "Roadway Standard Drawings

NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012

> ALL DIMENSIONS IN THESE PLANS ARE IN FEET UNLESS OTHERWISE NOTED





35 Mph +5% Grade

| TABLE OF OPERATION | | | | | | | | | | |
|--------------------|------------------|----------------|-------------|----------|-----------------------|--|--|--|--|--|
| | | PHASE | | | | | | | | |
| SIGNAL FACE | Ø 1 + 6 | Ø2+6 | Ø 4 | E V B | F L A S H | | | | | |
| 1·1 | - | ▼ F | | ← | - ¥ | | | | | |
| 21,22 | R | G | R | R | Υ | | | | | |
| 41,42 | R | R | G | R | R | | | | | |
| 61,62 | G | G | R | G | Y | | | | | |

SIGNAL FACE I.D.

All Heads L.E.D.

* See Note 11

21,22 41,42* 61,62

DETECTOR PROGRAMMING INDUCTIVE LOOPS ATTRIBUTES ღ STATUS CARRY LOOP NO. STOPBAR PHASE DELAY 6X40 6×6 6×40 + - SEC. - SEC. - | - SEC. - SEC. - - - X - X - * 6×6 * | 70 |*|-| 6

35 Mph -3% Grade

NC 55 (S. Alston Avenue)

2033 SOFTWARE w/ 2070 CONTROLLER

LOOP & DETECTOR UNIT INSTALLATION CHART

* Video Detection Zone

DETECTED MOVEMENT

 $<\!\!--\!\!>$ PEDESTRIAN MOVEMENT

| DETECTED MOVEMENT | |
|-------------------------|--------|
| UNDETECTED MOVEMENT | (OVERL |

| PHASING | DIAGRAM | DETECTION | LEGEND |
|---------|---------|-----------|--------|
| | | | |

| UNDETECTED | MOVEMENT | (OVERLAP) |
|-------------|------------|-----------|
| UNSIGNALIZE | ED MOVEMEN | IT |
| | _ | |

| 2033 EV PREEMPTI | ON |
|------------------|------------------|
| FUNCTION | EVB (SECONDS) |

| | (0200.100) |
|--------------------------------|------------|
| DELAY BEFORE PREEMPT | 0 |
| MIN. PED. CLEAR BEFORE PREEMPT | 0 |
| MIN. GREEN BEFORE PREEMPT | 1 |
| CLEARANCE TIME | 2 |
| PREEMPT EXTEND** | 2.0 |
| | |

** Program Timing on Optical Detector Unit

| TIMING CHART 2033 SOFTWARE w/2070 CONTROLLER | | | | | | | | | | | |
|--|-----|------|---------|------|--------|--------|-------------|------|--|--|--|
| | | | | | | | | | | | |
| PHASE | Ø1 | | Ø2 | | Ø4 | | Ø6 | | | | |
| MINIMUM INITIAL * | 7 | SEC. | 10 | SEC. | 7 | SEC. | 10 | SEC. | | | |
| VEHICLE EXTENSION * | 2.0 | SEC. | 3.0 | SEC. | 2.0 | SEC. | 3.0 | SEC. | | | |
| YELLOW CHANGE INT. | 4.1 | SEC. | 4.1 | SEC. | 3.1 | SEC. | 4.1 | SEC. | | | |
| RED CLEARANCE | 2.6 | SEC. | 1.5 | SEC. | 1.5 | SEC. | 1.5 | SEC. | | | |
| MAXIMUM LIMIT * | 15 | SEC. | 50 | SEC. | 35 | SEC. | 50 | SEC. | | | |
| RECALL POSITION | ИОИ | 1E | VEH. RE | CALL | ИОИ | 1E | VEH. RECALL | | | | |
| VEHICLE CALL MEMORY | ИОИ | 1E | YELLOW | LOCK | ИОИ | 1E | YELLOW | LOCK | | | |
| DOUBLE ENTRY | OFI | = | OFF | = | OFF | • | OF | F | | | |
| WALK * | _ | SEC. | _ | SEC. | _ | - SEC. | | SEC. | | | |
| FLASHING DON'T WALK | _ | SEC. | _ | SEC. | _ | SEC. | _ | SEC. | | | |
| MIN PED CLEARANCE | _ | SEC. | _ | SEC. | _ | SEC. | _ | SEC. | | | |
| TYPE 3 LIMIT | _ | SEC. | _ | SEC. | _ | SEC. | _ | SEC. | | | |
| ALTERNATE EXTENSION | _ | SEC. | _ | SEC. | _ | SEC. | _ | SEC. | | | |
| ADD PER VEHICLE * | _ | SEC. | _ | SEC. | – SEC. | | _ | SEC. | | | |
| MAXIMUM INITIAL * | _ | SEC. | _ | SEC. | - SEC. | | _ | SEC. | | | |
| MAXIMUM GAP* | 2.0 | SEC. | 3.0 | SEC. | 2.0 | SEC. | 3.0 | SEC. | | | |
| REDUCE 0.1 SEC EVERY * | | SEC. | | SEC. | | SEC. | | SEC. | | | |
| MINIMUM GAP | 2.0 | SEC. | 3.0 | SEC. | 2.0 | SEC. | 3.0 | SEC. | | | |

* 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.

Sta. 13 + 93 + / - - LALT -58' +/- Lt. Sta. 14 + 71 + / - LALT -42′ +/– Lt.

→ 14

NC 55 (S. Alston Avenue)

22 ← __Direct Bury

Sta. 14 + 61 + / - - LALT -

57′ +/– Rt.

Sta. 13 + 96 + / - - LALT -54' +/- Rt.

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

NOTES

1. Refer to "Road Standard Drawings NCDOT" dated January 2012, "Standard Specifications for Roads and Structures" dated January 2012.

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. Locate new cabinet as to not obstruct sight distance of vehicles turning right on red.

PROJECT REFERENCE NO.

U-3308

Sig. 2.0

6. Program all timing information into phase banks 1,2, and 3 unless otherwise noted.

7. Set phase bank 3 maximum limit to 250 seconds for

phases used. 8. This intersection features an optical preemption system.

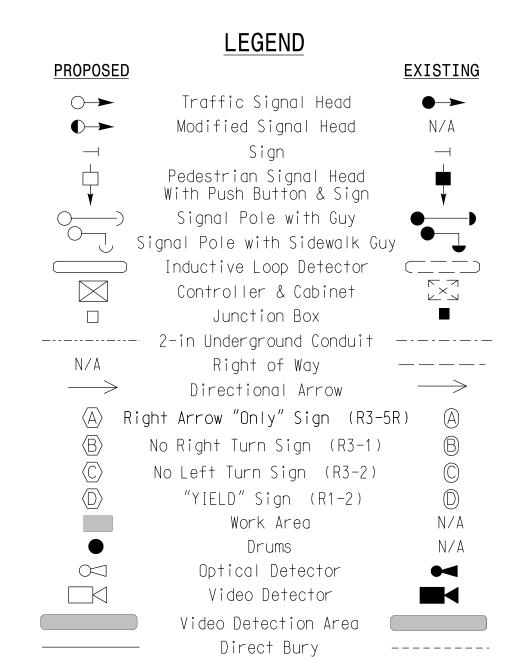
Shown locations of optical detectors are conceptual only. 9. Upon completion of Emergency Vehicle Preemtion, controller

returns to normal operation based on vehicle demand. 10. Maximum times shown in timing chart are for free-run

operation only. Coordinated signal system timing values supersede these values.

11. Reconnect and unbag signal heads #41 and #42 for Temporary Signal Design 3.

12. Poles are existing during Temporary Signal Design 3, TMP Phase 1, Steps 11-21.



Signal Upgrade - Temporary Design 1 (TMP Phase 1, Steps 1-10) Signal Upgrade - Temporary Design 3 (TMP Phase 1, Steps 11-21)



NC 55 (South Alston Avenue)

NC 147 SB Ramps

Division 5 Durham County Durham PLAN DATE: September 2014 REVIEWED BY: J Hochanadel 750 N.Greenfield Pkwy, Garner, NC 27529 PREPARED BY: R Drayton REVIEWED BY: REVISIONS INIT. DATE

1025 Wade Avenue Raleigh, NC 27605 Tel:919-789-9977 Fax:919-789-9591

License #: C-2197

MyPAL DATE SIG. INVENTORY NO. 05-102871/73

SEAL

SEAL

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL WD ENABLE (\ (remove jumpers and set switches as shown) SW2 REMOVE DIODE JUMPERS 1-6, 1-9, 2-6, 2-9, and 6-9. —RF 2010 RP DISABLE ____ wD 1.0 SEC GY ENABLE ⊩SF#1 POLARITY 🗔 ─LEDguard RF SSM FYA COMPACT— — FYA 1-9 FYA 3-10 FYA 5-11 FYA 7-12 REMOVE JUMPERS AS SHOWN NOTES: 1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently. DENOTES POSITION OF SWITCH 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.

(front view)

4. Ensure conflict monitor communicates with 2070.

NOTES

- 1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. Verify that signal heads flash in accordance with the signal plans.
- 2. Program controller to Start Up in phases 2 and 6 green.
- 3. Set power-up flash time to 0 seconds within the controller programming. The conflict monitor will govern startup flash. Ensure STARTUP "RED START" is set to 0 seconds.
- 4. Enable Simultaneous Gap-Out feature for all phases.
- 5. Program all timing information into phase banks 1, 2, and 3 unless otherwise noted.
- 6. Set phase bank 3 maximum limit to 250 seconds for phases
- 7. Ensure start up flash phases are coordinated with flash program block assignments.
- 8. Set the Red Revert interval on the controller to 1 second.
- 9. This cabinet and controller are part of the Durham

EQUIPMENT INFORMATION

CONTROLLER.....2070E CABINET MOUNT.....BASE OUTPUT FILE POSITIONS...18 WITH AUX FILE LOAD SWITCHES USED.....S1,S2,S5,S8,AUX S1 OVERLAP 1....* OVERLAP 2.....NOT USED OVERLAP 3.....NOT USED OVERLAP 4.....NOT USED

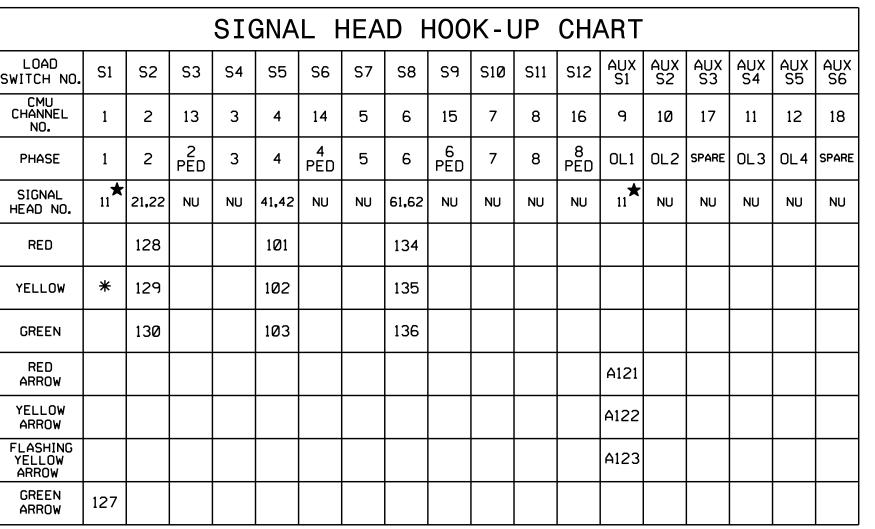
* See FYA PPLT Programming detail this sheet.

EMERGENCY VEHICLE PREEMPTION PROGRAMMING

EVB Clear = 2

2. Program general preemption parameters as follows: Main Menu - 2) PREEMPT - 6) MISC PREEMPTION PARAMETERS Min Time Before PE ForceOff = 1

> Program extend time on optical detector unit for 2.0 sec for EVB.



PROJECT REFERENCE NO.

U-3308

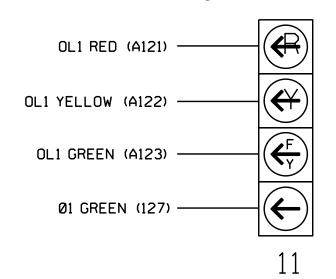
Sig. 2.1

NU = Not Used

- * Denotes install load resistor. See load resistor installation detail this sheet.
- ★ See pictorial of head wiring in detail below.

FYA SIGNAL WIRING DETAIL

(wire signal head as shown)



FYA PPLT PROGRAMMING

- 1. Program Flashing Yellow Arrow phases as follows: Main Menu - 1) PHASE - 2) PHASE FUNCTIONS PAGE TWO PPLT FYA = PHASE 1
- 2. Assign output pin for Flashing Yellow Arrow as follows: Main Menu - 6) OUTPUTS - F) FYA PPLT Phase 1 = 99
- 3. Redirect RED and YELLOW outputs for the left turn phases as follows:

Main Menu - 6) OUTPUTS - 8) REDIRECT PHASE Phase 1 RED = 97. Phase 1 YELLOW = 98

> THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-1028T1/T3 DESIGNED: September 2014 SEALED: 4/2/15 REVISED: N/A

Electrical Detail - Temporary Design 1 (TMP Phase 1, Steps 1-10) Electrical Detail - Temporary Design 3 (TMP Phase 1, Steps 11-21)

ELECTRICAL AND PROGRAMMING DETAILS FOR Prepared in the Offices of:

NC 55 (South Alston Avenue)

PLAN DATE: November 2014 REVIEWED BY: 978 PREPARED BY: S. Armstrong Reviewed By:

John T. Rowe, Jr. 4/2/2015

NC 147 SB Ramps

REVISIONS INIT. DATE 008453

SEAL

INPUT FILE POSITION LAYOUT

1. Program EVB preempt as follows: Main Menu - 2) PREEMPT - 4) EMERGENCY VEHICLE EVB Clearance Phases = 1.6

SPECIAL DETECTOR NOTE

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

FILE U1.

ПΤП

FILE

" J "

Install a video detection system for vehicle detection. Perform installation according to manufacturer's directions and NCDOT engineer approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.

ST = STOP TIME EVB = EMERGENCY VEHICLE PREEMPT 4 CHANNEL TOMAR OSP CARD INSERT CARD INTO SLOT J13 TYPICAL TOMAR FIELD WIRE DETAIL

FS = FLASH SENSE

12 13

CH. 3 | CH. 1

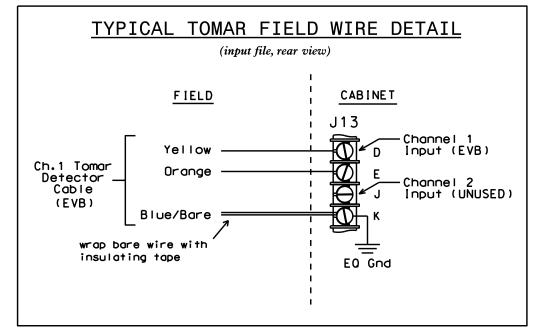
UNUSED EVB

CH. 4 | CH. 2 |

UNUSED UNUSED

DC ISOLATOR

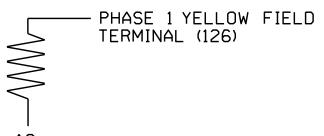
ST



LOAD RESISTOR INSTALLATION DETAIL

(install resistor as shown below)

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



Signal System.

AC-

SIG. INVENTORY NO. 05-1028T1/T

PHASING DIAGRAM DETECTION LEGEND

UNSIGNALIZED MOVEMENT

UNDETECTED MOVEMENT (OVERLAP)

DETECTED MOVEMENT

← − → PEDESTRIAN MOVEMENT

2033 EV PREEMPTION

FUNCTION

MIN. PED. CLEAR BEFORE PREEMPT

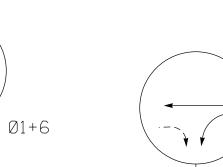
** Program Timing on Optical Detector Unit

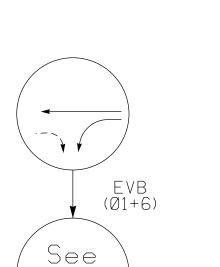
MIN. GREEN BEFORE PREEMPT

DELAY BEFORE PREEMPT

CLEARANCE TIME

PREEMPT EXTEND**

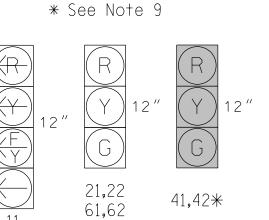




Note 8

| OPERATION | | | | | | | | | |
|------------------|--------------|--|--------------|--|--|--|--|--|--|
| | PHA | 4SE | | | | | | | |
| Ø 1 + 6 | Ø2+6 | E V B | FLASH | | | | | | |
| - | F | - | - | | | | | | |
| R | G | R | Y | | | | | | |
| G | G | G | Y | | | | | | |
| | Ø 1 + 6 R | PHA Ø Ø 1 2 + + 6 6 R G | PHASE Ø Ø E | | | | | | |

SIGNAL FACE I.D. All Heads L.E.D.



2033 SOFTWARE w/ 2070 CONTROLLER LOOP & DETECTOR UNIT INSTALLATION CHART DETECTOR PROGRAMMING

| | | | | | | | | | | DET | ECI | UK | PR | UGF | KAMI | NTN | G | | | | |
|----------|--------|--------|-----------------|--------|----------|-------|------|------|--------------|------------|------------------|------------------|----------|-------|-----------|------|---------|-----------|--------|-----|----------|
| | INDUCT | IVE LO | OPS | | | | | | | ATTRIBUTES | | | | | | | PS | STA | TUS | | |
| | | | | | | | I | IIM | NG | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 8 | | ,, |
| | SIZE | | DIST. FROM | | ပ္ | NEMA | | | | | TIME AY | NA. | 8 | ⊨ | Z O | က | 9 | ATE | | ≥ | <u>×</u> |
| LOOP NO. | (ft) | TURNS | STOPBAR (ft) | NEW | EXISTING | PHASE | DELA | Υ | CAR (STRE | | FULL TI DELA) | PEDESTRI CALL | RESERVED | COUNT | EXTENSION | TYPE | CALLING | ALTERNATE | SYSTEM | NEW | EXISTING |
| 1 A | 6X40 | * | | * | _ | 1 | 15 S | SEC. | - | SEC. | - | ı | - | ı | Χ | - | Χ | - | - | - | * |
| 1 A | 0240 | 不 | | 不 | | 6 | - S | SEC. | - | SEC. | ı | 1 | ı | ı | Χ | ı | Χ | _ | - | _ | * |
| 2A | 6×6 | * | 70 | * | - | 2 | - S | SEC. | - | SEC. | ı | ı | ı | I | Χ | ı | Χ | _ | _ | _ | * |
| 64 | 6×6 | * | 70 | * | - | 6 | - S | SEC. | - | SEC. | _ | - | _ | _ | Χ | _ | Χ | _ | _ | _ | * |

* Video Detection Zone

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

NOTES

PROJECT REFERENCE NO.

U-3308

EXISTING

Sig. 2.5

- 1. Refer to "Road Standard Drawings NCDOT" dated January 2012, "Standard Specifications for Roads and Structures" dated January 2012.
- 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. Program all timing information into phase banks 1,2, and 3 unless otherwise noted.
- 5. Set phase bank 3 maximum limit to 250 seconds for phases used.
- 6. This intersection features an optical preemption system. Shown locations of optical detectors are conceptual only.
- 7. Upon completion of Emergency Vehicle Preemtion, controller returns to normal operation based on vehicle demand.

LEGEND

- 8. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- 9. Bag and disconnect signal heads #41 and #42 during this phase of construction.

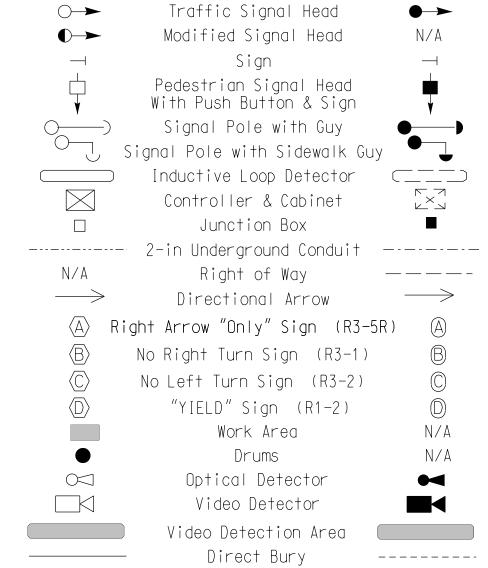
PROPOSED

| ON |
|------------------|
| EVB (SECONDS) |
| 0 |
| 0 |
| 1 |
| 2 |
| 2.0 |
| or Unit |
| |
| |
| |
| |
| |

| TI 2033 S0F1 | MING | | | OLLER | | | |
|------------------------|------|------|---------|-------|------------|--------|--|
| PHASE | Ø1 | | 02 | | Ø6 | ,) | |
| MINIMUM INITIAL * | 7 | SEC. | 10 | SEC. | 10 | SEC | |
| VEHICLE EXTENSION * | 2.0 | SEC. | 3.0 | SEC. | 3.0 | SEC | |
| YELLOW CHANGE INT. | 3.0 | SEC. | 3.6 | SEC. | 4.1 | SEC | |
| RED CLEARANCE | 2.6 | SEC. | 1.0 | SEC. | 1.5 | SEC | |
| MAXIMUM LIMIT * | 15 | SEC. | 50 | SEC. | 50 | SEC | |
| RECALL POSITION | ИОИ | 1E | VEH. RE | CALL | VEH. RECAL | | |
| VEHICLE CALL MEMORY | ИОИ | 1E | YELLOW | LOCK | YELLOW | LOC | |
| DOUBLE ENTRY | OFI | = | OFF | = | OFF | | |
| WALK * | _ | SEC. | _ | SEC. | _ | SEC | |
| FLASHING DON'T WALK | _ | SEC. | _ | SEC. | _ | SEC | |
| MIN PED CLEARANCE | _ | SEC. | _ | SEC. | _ | SEC | |
| TYPE 3 LIMIT | _ | SEC. | _ | SEC. | _ | SEC | |
| ALTERNATE EXTENSION | _ | SEC. | _ | SEC. | _ | SEC | |
| ADD PER VEHICLE * | _ | SEC. | _ | SEC. | _ | SEC | |
| MAXIMUM INITIAL * | _ | SEC. | _ | SEC. | _ | SEC | |
| MAXIMUM GAP* | 2.0 | SEC. | 3.0 | SEC. | 3.0 | SEC | |
| REDUCE 0.1 SEC EVERY * | _ | SEC. | _ | SEC. | _ | SEC | |
| MINIMUM GAP | 2.0 | SEC. | 3.0 | SEC. | 3.0 | SEC | |

| 2.0 SEC. | 3.0 SEC. | 3.0 SEC. * 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.

| R/W 35 Mph +5% Grade NC 55 (S. Alston Avenue) | NC 55 (S. Alston Avenue | 35 Mph +2% Grade | " 35 Mph -3% Crade |
|---|----------------------------|-----------------------------------|--|
| R/W — 35 Mph +5% Grade NC 55 (S. Alston Avenue) | R/W | | |
| R/W — | | 61 | 6) < |
| NC 147 SB MPh -2% | R/W — — — 35 Mph +5% Grade | SB Ramp 42 41 SB Ramp 7. Crade | н——— — ——————————————————————————————— |



Signal Upgrade - Temporary Design 2 (TMP Phase 1, Step 4A)



NC 55 (South Alston Avenue)

NC 147 SB Ramps Durham PLAN DATE: March 2015 REVIEWED BY: J Hochanadel

1025 Wade Avenue
Raleigh, NC 27605
Tel:919-789-9591

Scale

Output

Plan Date: March 2015
REVIEWED BY:
REVIEWED BY:

Plan Date: March 2015
REVIEWED BY:
REVIEWED BY:

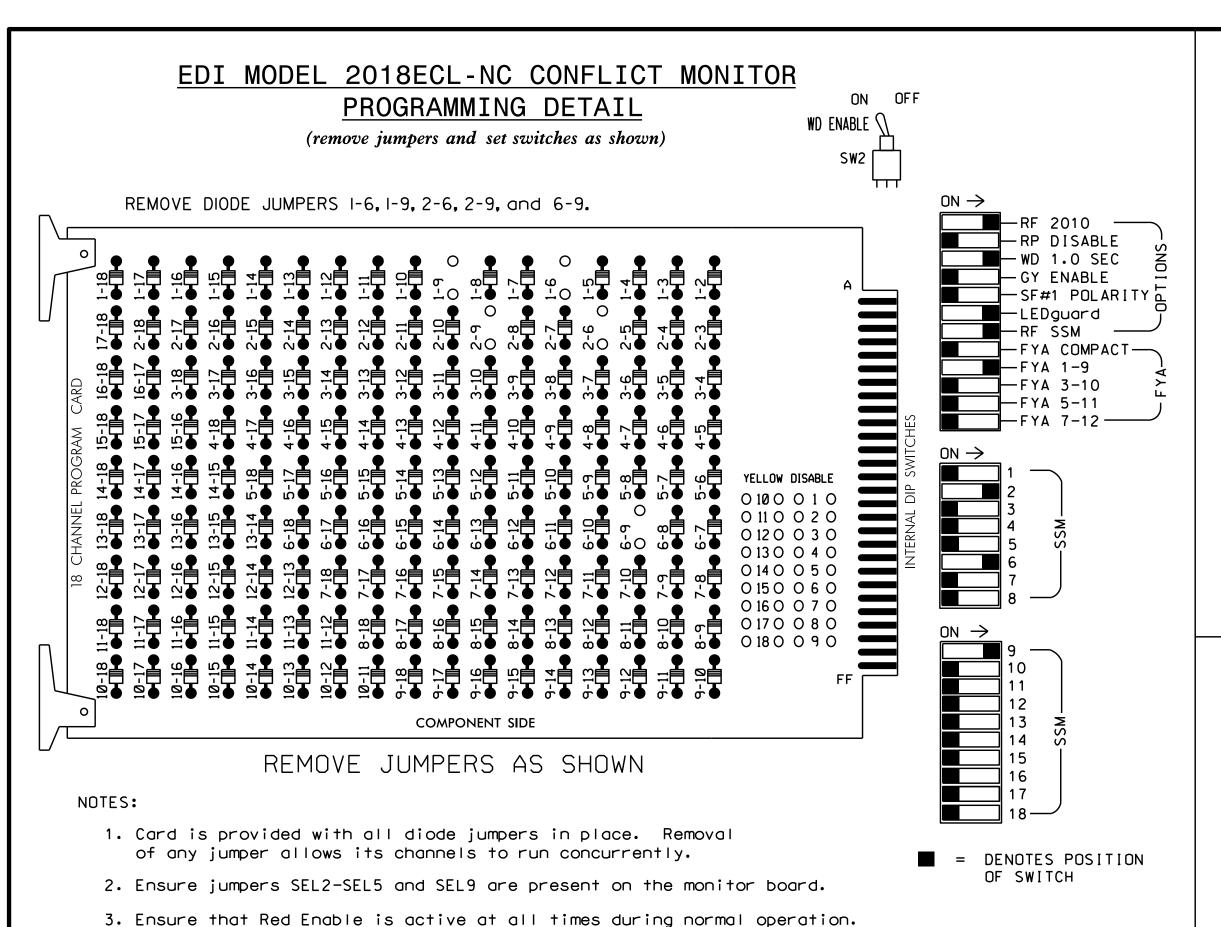
Output

Plan Date: March 2015
REVIEWED BY:
REVI INIT. DATE

Division 5 Durham County

4/02/15 DATE

MyPDL SIG. INVENTORY NO. 05-102872



INPUT FILE POSITION LAYOUT

(front view)

NOTES

- 1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. Verify that signal heads flash in accordance with the signal plans.
- 2. Program controller to Start Up in phases 2 and 6 green.
- 3. Set power-up flash time to 0 seconds within the controller programming. The conflict monitor will govern startup flash. Ensure STARTUP "RED START" is set to 0 seconds.
- 4. Enable Simultaneous Gap-Out feature for all phases.
- 5. Program all timing information into phase banks 1, 2, and 3 unless otherwise noted.
- 6. Set phase bank 3 maximum limit to 250 seconds for phases
- 7. Ensure start up flash phases are coordinated with flash program block assignments.
- 8. Set the Red Revert interval on the controller to 1 second.
- 9. This cabinet and controller are part of the Durham Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070E CABINET MOUNT.....BASE OUTPUT FILE POSITIONS...18 WITH AUX FILE LOAD SWITCHES USED.....S1,S2,S8,AUX S1 OVERLAP 1....* OVERLAP 2.....NOT USED OVERLAP 3.....NOT USED OVERLAP 4.....NOT USED

* See FYA PPLT Programming detail this sheet.

EMERGENCY VEHICLE PREEMPTION PROGRAMMING

1. Program EVB preempt as follows: Main Menu - 2) PREEMPT - 4) EMERGENCY VEHICLE EVB Clear = 2EVB Clearance Phases = 1.6

2. Program general preemption parameters as follows: Main Menu - 2) PREEMPT - 6) MISC PREEMPTION PARAMETERS Min Time Before PE ForceOff = 1

> Program extend time on optical detector unit for 2.0 sec for EVB.

SIGNAL HEAD HOOK-UP CHART CMU CHANNEL 15 8 RED OL1 OL2 SPARE OL3 OL4 SPARE PHASE ★ 21,22 NU NU NU NU NU 61,62 NU NU NU NU 11 NU HEAD NO. RED YELLOW GREEN ARROW YELLOW ARROW FLASHING YELLOW ARROW A123 GREEN ARROW

PROJECT REFERENCE NO.

U-3308

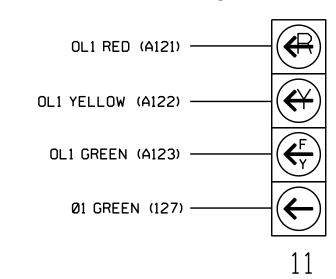
Sig. 2.6

NU = Not Used

- * Denotes install load resistor. See load resistor installation detail this sheet.
- ★ See pictorial of head wiring in detail below.

FYA SIGNAL WIRING DETAIL

(wire signal head as shown)



FYA PPLT PROGRAMMING

- 1. Program Flashing Yellow Arrow phases as follows: Main Menu - 1) PHASE - 2) PHASE FUNCTIONS PAGE TWO PPLT FYA = PHASE 1
- 2. Assign output pin for Flashing Yellow Arrow as follows: Main Menu - 6) OUTPUTS - F) FYA PPLT Phase 1 = 99
- 3. Redirect RED and YELLOW outputs for the left turn phases as follows: Main Menu - 6) OUTPUTS - 8) REDIRECT PHASE

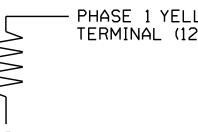
Phase 1 RED = 97. Phase 1 YELLOW = 98

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-1028T2 DESIGNED: March 2015 SEALED: 4/2/15 REVISED: N/A

LOAD RESISTOR INSTALLATION DETAIL

(install resistor as shown below)

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



Electrical Detail - Temporary Design 2 (TMP Phase 1, Step 4A) ELECTRICAL AND PROGRAMMING

DETAILS FOR Prepared in the Offices of:

NC 55 (South Alston Avenue)

NC 147 SB Ramps

ivision 5 PLAN DATE: March 2015 REVIEWED BY: 978 PREPARED BY: S. Armstrong REVIEWED BY: REVISIONS INIT. DATE

John T. Rowe, Jr. 4/2/2015 SIG. INVENTORY NO. 05-1028T2

SEAL

008453

FILE U 1.

ПΤП

FILE

" J "

TYPICAL TOMAR FIELD WIRE DETAIL (input file, rear view) Design Plans. CABINET <u>FIELD</u> J13 Channel 1 Input (EVB) Ch.1 Tomar Detector _ Cable Channel 2 Input (UNUSED) (EVB) Blue/Bare wrap bare wire with insulating tape EQ Gnd

SPECIAL DETECTOR NOTE

4. Ensure conflict monitor communicates with 2070.

Install a video detection system for vehicle detection. Perform installation according to manufacturer's directions and NCDOT engineer approved mounting locations to accomplish the detection schemes shown on the Signal

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

FS = FLASH SENSE ST = STOP TIME EVB = EMERGENCY VEHICLE PREEMPT

CH. 3 | CH. 1

UNUSED EVB

CH. 4 | CH. 2 |

UNUSED UNUSED

DC ISOLATOR

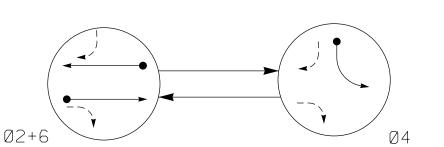
ST

4 CHANNEL TOMAR OSP CARD INSERT CARD INTO SLOT J13

TERMINAL (126)

PHASE 1 YELLOW FIELD

AC-



PHASING DIAGRAM DETECTION LEGEND

| _ | DETECTED | MOVEMENT. |
|---|----------|-----------|
| • | DETECTED | MOVEMENI |

UNDETECTED MOVEMENT (OVERLAP) UNSIGNALIZED MOVEMENT

 $<\!\!--\!\!>$ PEDESTRIAN MOVEMENT

| 2033 EV PREEMPT | ON |
|--------------------------------|------------------|
| FUNCTION | EVB (SECONDS) |
| DELAY BEFORE PREEMPT | 0 |
| MIN. PED. CLEAR BEFORE PREEMPT | 0 |
| MIN. GREEN BEFORE PREEMPT | 1 |
| CLEARANCE TIME | 2 |

^{**} Program Timing on Optical Detector Unit

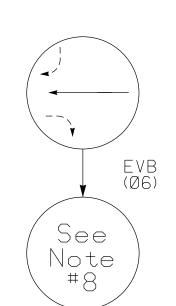
PREEMPT EXTEND**

2.0

| 2033 SOF | MING GWARE W | | | LLER | | |
|---|-----------------|-------------------------------|-----------------------|-------------------------------|---------|-------------------------------|
| PHASE | Ø2 | | Ø4 | | Ø6 | |
| MINIMUM INITIAL * | 10 | SEC. | 7 | SEC. | 10 | SEC. |
| VEHICLE EXTENSION * | 3.0 | SEC. | 2.0 | SEC. | 3.0 | SEC. |
| YELLOW CHANGE INT. | 3.5 | SEC. | 3.0 | SEC. | 4.0 | SEC. |
| RED CLEARANCE | 1.2 | SEC. | 1.4 | SEC. | 1.7 | SEC. |
| MAXIMUM LIMIT * | 50 | SEC. | 35 | SEC. | 50 | SEC. |
| RECALL POSITION | VEH. RE | CALL | NON | 1E | VEH. RE | CALL |
| VEHICLE CALL MEMORY | YELLOW | LOCK | NON | 1E | YELLOW | LOCK |
| | | | | | | |
| DOUBLE ENTRY | OFI | = | OFF | : | OF | F |
| DOUBLE ENTRY WALK * | OFI — | SEC. | OFF — | SEC. | OF _ | F SEC. |
| | | | | | OF | |
| WALK * | | SEC. | | SEC. | OF | SEC. |
| WALK * FLASHING DON'T WALK | | SEC. | | SEC. | _ | SEC. |
| WALK * FLASHING DON'T WALK MIN PED CLEARANCE | _ | SEC. SEC. | - - | SEC. SEC. | _ | SEC. SEC. |
| WALK * FLASHING DON'T WALK MIN PED CLEARANCE TYPE 3 LIMIT | _ | SEC. SEC. SEC. | - - | SEC. SEC. SEC. | _ | SEC. SEC. SEC. |
| WALK * FLASHING DON'T WALK MIN PED CLEARANCE TYPE 3 LIMIT ALTERNATE EXTENSION | _ | SEC. SEC. SEC. SEC. | - - | SEC. SEC. SEC. SEC. | _ | SEC. SEC. SEC. SEC. |
| WALK * FLASHING DON'T WALK MIN PED CLEARANCE TYPE 3 LIMIT ALTERNATE EXTENSION ADD PER VEHICLE * | _ | SEC. SEC. SEC. SEC. SEC. | - - | SEC. SEC. SEC. SEC. SEC. | _ | SEC. SEC. SEC. SEC. SEC. |
| WALK * FLASHING DON'T WALK MIN PED CLEARANCE TYPE 3 LIMIT ALTERNATE EXTENSION ADD PER VEHICLE * MAXIMUM INITIAL * | | SEC. SEC. SEC. SEC. SEC. SEC. | - - - - - | SEC. SEC. SEC. SEC. SEC. SEC. | | SEC. SEC. SEC. SEC. SEC. SEC. |

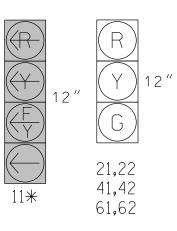
* These values may be field adjusted. Do not adjust Min Green and Extension times for phases 2 and 6 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.

EV PREEMPT PHASES



| TABLE OF | 0PI | ERA | TIO | N |
|----------------|------|--------|---------|-------|
| | | PHA | 4SE | |
| SIGNAL FACE | Ø2+6 | Ø 4 | ∐>® | LUGOI |
| 21,22 | G | R | R | Y |
| 41,42 | R | G | R | R |
| 61,62 | G | R | \odot | Y |

SIGNAL FACE I.D. AII Heads L.E.D. * - See Note 10.



2033 SOFTWARE w/ 2070 CONTROLLER LOOP & DETECTOR UNIT INSTALLATION CHART

| | | | | | | | | DET | ECT | OR | PR | OGF | RAM | MIN | G | | | | |
|----------|--------------|---------|-------------------------|-----|----------|---------------|--------|--------------------|--------------------|--------------------|----------|-------|-----------|--------|---------|-----------|----------|-----|----------|
| | INDUCT | IAF FOO | JPS . | | | | | | | ATTRIBUTES | | | | | | | | | TUS |
| | | | | | | | TIM | ING | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 0 | | ပ |
| LOOP NO. | SIZE (ft) | TURNS | DIST. FROM STOPBAR (ft) | NEW | EXISTING | NEMA PHASE | DELAY | CARRY (STRETCH) | FULL TIME DELAY | PEDESTRIAN CALL | RESERVED | COUNT | EXTENSION | TYPE 3 | CALLING | ALTERNATE | SYSTEM 1 | NEW | EXISTING |
| 2A | 6×6 | * | 70 | * | - | 2 | - SEC. | - SEC. | - | - | - | - | X | _ | Χ | - | - | - | * |
| 4 A | 6×40 | * | 0 | * | - | 4 | - SEC. | - SEC. | _ | - | - | - | Χ | - | Χ | - | - | - | * |
| 6 A | 6x6 | * | 70 | * | _ | 6 | - SEC. | - SEC. | _ | _ | _ | _ | X | _ | Χ | _ | _ | _ | * |

* Video Detection Zone

PROJECT REFERENCE NO. U-3308

Sig. 3.0

(Durham Signal System) NOTES

3 Phase

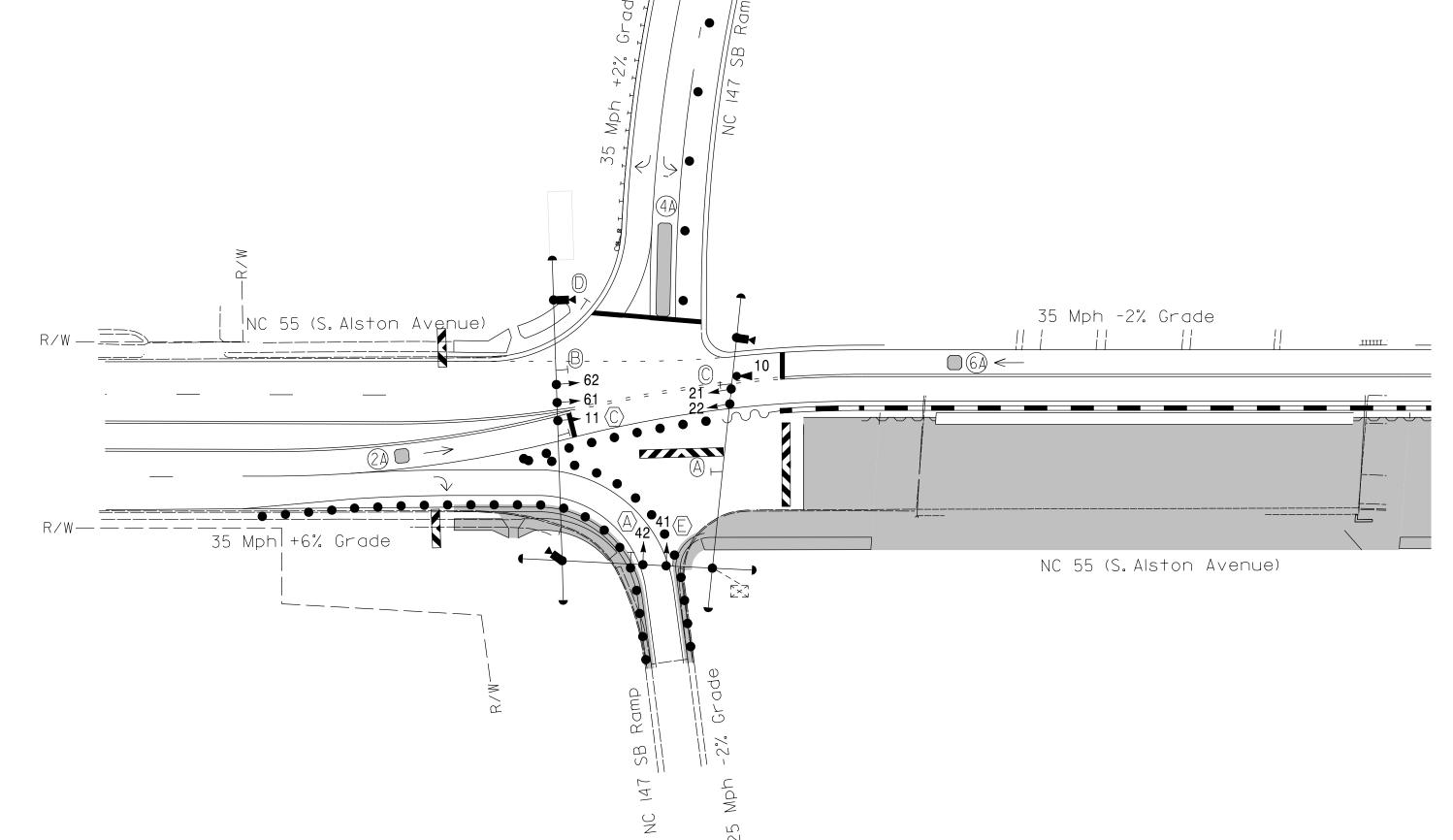
Fully Actuated

w/ EV Preemption

- 1. Refer to "Road Standard Drawings NCDOT" dated January 2012, "Standard Specifications for Roads and Structures" dated January 2012.
- 2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- 3. Reposition signal heads #11, #21, #22, #61, and #62 during this phase of construction.
- 4. Set all detector units to presence mode.
- 5. Program all timing information into phase banks 1,2, and 3 unless otherwise noted.
- 6. Set phase bank 3 maximum limit to 250 seconds for phases used.
- 7. This intersection features an optical preemption system.
- Shown locations of optical detectors are conceptual only. 8. Upon completion of Emergency Vehicle Preemtion, controller
- returns to normal operation based on vehicle demand. 9. Maximum times shown in timing chart are for free-run
- operation only. Coordinated signal system timing values supersede these values.
- 10. Bag and disconnect signal head #11 during this phase of construction.

| 11. Contractor | shall | adiust | video | detection | zones | as | required. |
|--------------------|--------|--------|-------|-----------|--------|----|------------|
| i i i oonici aocoi | JIIGII | aajaoc | VIGCO | ac cocton | 201100 | au | 1 Cquil Cu |

| | LEGEND | |
|------------------------------|---|-----------------|
| <u>PROPOSE</u> | <u></u> | <u>EXISTING</u> |
| \bigcirc | Traffic Signal Head | • |
| 0-> | Modified Signal Head | N/A |
| | Sign | ⊣ 1 |
| \Box | Pedestrian Signal Head With Push Button & Sign | • |
| |) Signal Pole with Guy | • |
| | Signal Pole with Sidewalk Guy | |
| | O Inductive Loop Detector | |
| | Controller & Cabinet | × |
| | Junction Box | |
| | 2-in Underground Conduit - | |
| N/A | Right of Way | |
| | Directional Arrow | |
| (A) | Right Arrow "Only" Sign (R3-5R | _ |
| (B) _ | No Right Turn Sign (R3-1) | B |
| $\langle \mathbb{C} \rangle$ | No Left Turn Sign (R3-2) | \bigcirc |
| $\langle \mathbb{D} \rangle$ | "YIELD" Sign (R1-2) | |
| E | Left Arrow "Only" Sign (R3-5L |) 🖹 |
| | Work Area | N/A |
| | Drums | N/A |
| \bigcirc | Optical Detector | • |
| | Video Detector | |
| | Video Detection Area 🗀 | |
| | — Direct Bury | |



Prepared for the Offices of:

NC 55 (South Alston Avenue)

NC 147 SB Ramps Division 5 Durham County PLAN DATE: September 2014 REVIEWED BY: J Hochanadel

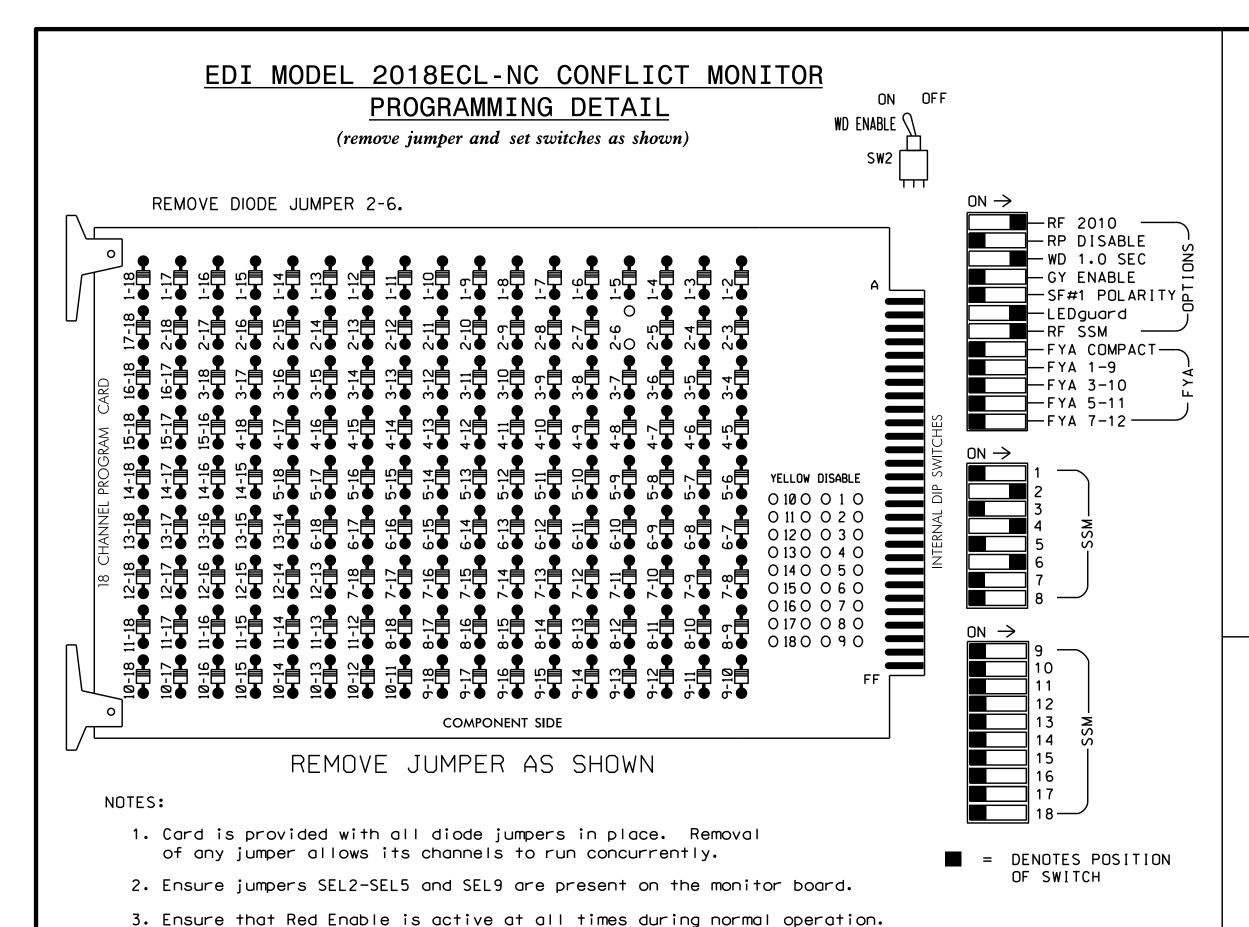
REVISIONS INIT. DATE

1025 Wade Avenue Raleigh, NC 27605 Tel:919-789-9977

750 N.Greenfield Pkwy, Garner, NC 27529 PREPARED BY: R Drayton REVIEWED BY:

Signal Upgrade - Temporary Design 4 (TMP Phase 2 , Steps 1-6)

DATE SIG. INVENTORY NO. 05-102874



INPUT FILE POSITION LAYOUT

(front view)

NOTES

- 1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. Verify that signal heads flash in accordance with the signal plans.
- 2. Program controller to Start Up in phases 2 and 6 green.
- 3. Set power-up flash time to 0 seconds within the controller programming. The conflict monitor will govern startup flash. Ensure STARTUP "RED START" is set to 0 seconds.
- 4. Enable Simultaneous Gap-Out feature for all phases.
- 5. Program all timing information into phase banks 1, 2, and 3 unless otherwise noted.
- 6. Set phase bank 3 maximum limit to 250 seconds for phases
- 7. Ensure start up flash phases are coordinated with flash program block assignments.
- 8. Set the Red Revert interval on the controller to 1 second.
- 9. This cabinet and controller are part of the Durham Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070E SOFTWARE...........McCAIN 2033 CABINET MOUNT.....BASE OUTPUT FILE POSITIONS...18 WITH AUX FILE LOAD SWITCHES USED.....S2,S5,S8 PHASES USED......2,4,6 OVERLAP 1.....NOT USED OVERLAP 2.....NOT USED OVERLAP 3.....NOT USED OVERLAP 4.....NOT USED

PROJECT REFERENCE NO. Sig 3 1 U-3308

| | | | | SI | GNA | L | ΗEA | D F | 100 | K-l | JP | CHA | ٩RT | ı | | | | |
|-----------------------------|----|-------|----------|----|-------|----------|------------|-------|------------|-----|-----|----------|-----------|-----------|-----------|-----------|-----------|-----------|
| LOAD SWITCH NO. | S1 | S2 | S3 | S4 | S5 | S6 | S 7 | S8 | S 9 | 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 | OL1 | OL2 | SPARE | OL3 | OL4 | SPARE |
| SIGNAL HEAD NO. | NU | 21,22 | NU | NU | 41,42 | NU | NU | 61,62 | NU | NU | NU | NU | NU | NU | NU | NU | NU | NU |
| RED | | 128 | | | 101 | | | 134 | | | | | | | | | | |
| YELLOW | | 129 | | | 102 | | | 135 | | | | | | | | | | |
| GREEN | | 130 | | | 103 | | | 136 | | | | | | | | | | |
| RED ARROW | | | | | | | | | | | | | | | | | | |
| YELLOW ARROW | | | | | | | | | | | | | | | | | | |
| FLASHING YELLOW ARROW | | | | | | | | | | | | | | | | | | |
| GREEN ARROW | | | | | | | | | | | | | | | | | | |

NU = Not Used

EMERGENCY VEHICLE PREEMPTION PROGRAMMING

1. Program EVB preempt as follows: Main Menu - 2) PREEMPT - 4) EMERGENCY VEHICLE EVB Clear = 2EVB Clearance Phases = 6

2. Program general preemption parameters as follows: Main Menu - 2) PREEMPT - 6) MISC PREEMPTION PARAMETERS Min Time Before PE ForceOff = 1

> Program extend time on optical detector unit for 2.0 sec for EVB.

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-1028T4 DESIGNED: September 2014 SEALED: 4/2/15 REVISED: N/A

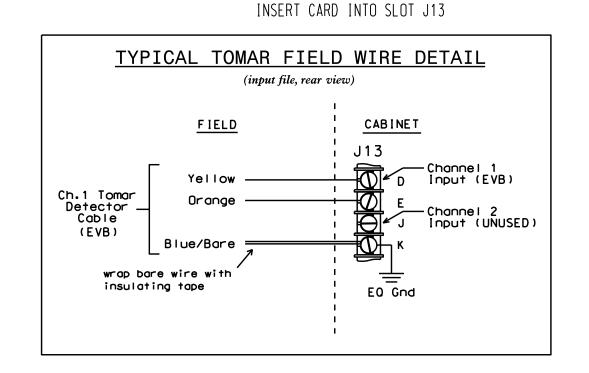
Install a video detection system for vehicle detection. Perform

SPECIAL DETECTOR NOTE

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

4. Ensure conflict monitor communicates with 2070.

installation according to manufacturer's directions and NCDOT engineer approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.



CH. 3 | CH. 1

UNUSED EVB

CH. 4 | CH. 2 | UNUSED UNUSED

EVB = EMERGENCY VEHICLE PREEMPT

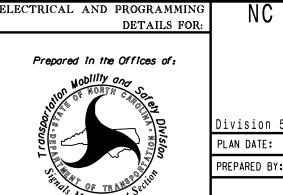
4 CHANNEL TOMAR OSP CARD

FS = FLASH SENSE ST = STOP TIME

DC ISOLATOR

ST

Electrical Detail - Temporary Design 4 (TMP Phase 2, Steps 1-6)



NC 55 (South Alston Avenue) NC 147 SB Ramps

ivision 5 PLAN DATE: November 2014 REVIEWED BY: QTR PREPARED BY: S. Armstrong Reviewed By:

John T. Rowe, Jr. 4/2/2015

SEAL

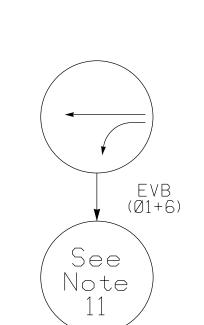
008453

REVISIONS INIT. DATE SIG. INVENTORY NO. 05-1028T4

FILE U

FILE

" J "



| TABLE 0 | BLE OF OPERATION | | | | | | | | | | | |
|------------------|------------------|---------------------|-------------|----------|----------|--|--|--|--|--|--|--|
| | PHASE | | | | | | | | | | | |
| SIGNAL FACE | Ø 1 + 6 | Ø 2 + 6 | Ø 4 | E V B | FLASH | | | | | | | |
| 1·1 | - | - F Y | | - | → | | | | | | | |
| 21,22 | R | G | R | R | Y | | | | | | | |
| 41,42 | R | R | G | R | R | | | | | | | |
| 61,62 | G | G | R | G | Y | | | | | | | |
| P21 , P22 | D·W | W | D·W | D·W | DRK | | | | | | | |
| P41,P42 | DW | DW | W | DW | DRK | | | | | | | |

SIGNAL FACE I.D.

All Heads L.E.D. * See Note 15

21,22 41,42 61,62

P21,P22 P41,P42

Fy 11*

| | | | | | | | | | | יבי | | 011 | | 31 | ., | | 5 | | | | |
|----------|--------------|-----------|-------------------------|--------------|----------|---------------|-----|------|------------|--------------|--------------------|--------------------|----------|-------|-----------|--------|---------|-----------|----------|-----|----------|
| | INDUCT | IAF FOO | JPS | | | | | | | | | | Α | TRI | BUT | ES | | | PS | STA | TUS |
| | | | | | | | | TIM | ING | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | LOOPS | | (0 |
| LOOP NO. | SIZE (ft) | TURNS | DIST. FROM STOPBAR (ft) | ZEX | EXISTING | NEMA PHASE | DEL | _AY | CA (STR | RRY ETCH) | FULL TIME DELAY | PEDESTRIAN CALL | RESERVED | COUNT | EXTENSION | TYPE 3 | CALLING | ALTERNATE | SYSTEM L | ZEX | EXISTING |
| 1 A | 6X40 | * | 0 | * | | 1 | 15 | SEC. | - | SEC. | _ | _ | _ | _ | Χ | _ | Χ | _ | _ | * | - |
| IA | 6/40 | <u></u> 木 | | 木 | | 6 | - | SEC. | - | SEC. | - | - | _ | _ | Χ | - | Χ | - | - | * | _ |
| 2A | 6×6 | * | 70 | * | - | 2 | - | SEC. | _ | SEC. | _ | _ | - | _ | Χ | - | Χ | - | - | * | - |
| 4A | 6×40 | * | 0 | - | * | 4 | - | SEC. | _ | SEC. | _ | ı | _ | ı | Χ | - | Χ | - | - | * | - |
| 4B | 6×40 | * | 0 | * | _ | 4 | 15 | SEC. | | | - | ı | - | ı | Χ | - | Χ | - | - | * | _ |
| 6A | 6×6 | * | 70 | * | - | 6 | - | SEC. | - | SEC. | - | ı | - | ı | Χ | - | Χ | - | - | * | _ |
| PEDES | TRIAN | DETECT | ION | | | | | | | | | | | | | | | | | | |
| P21,P22 | N/A | N/A | N/A | X | - | 2 | - | SEC. | _ | SEC. | - | Χ | - | ı | - | - | - | - | - | Χ | - |
| P41,P42 | N/A | N/A | N/A | Х | - | 4 | - | SEC. | _ | SEC. | - | Χ | - | - | - | - | - | - | - | Χ | - |

2033 SOFTWARE w/ 2070 CONTROLLER

LOOP & DETECTOR UNIT INSTALLATION CHART

DETECTOR PROGRAMMING

* Video Detection Zone

PHASING DIAGRAM DETECTION LEGEND

DETECTED MOVEMENT

UNDETECTED MOVEMENT (OVERLAP) UNSIGNALIZED MOVEMENT

 $<\!\!\!<\!\!\!--\!\!\!>$ PEDESTRIAN MOVEMENT

| 2033 EV PREEMPTI | ON |
|--------------------------------|------------------|
| FUNCTION | EVB (SECONDS) |
| DELAY BEFORE PREEMPT | 0 |
| MIN. PED. CLEAR BEFORE PREEMPT | * |
| MIN. GREEN BEFORE PREEMPT | 1 |
| CLEARANCE TIME | 2 |
| PREEMPT EXTEND** | 2.0 |

| * | See | limii | ng Cha | rt to | or Min | Ped | Clearance | |
|----|------|-------|--------|-------|--------|-------|-------------|--|
| ** | Prog | ram | Timing | on | Optice | al De | tector Unit | |

| TIMING CHART | | | | | | | | | |
|--|------------------|--------------------------|-----------------------|--------------------------|------------------------|--------------------------|------------------|--------------------------|--|
| 203 | 3 SOFTW | VARE | w/2070 | CONTF | ROLLER | | | | |
| PHASE | Ø1 | | 02 | | 04 | | Ø6 | | |
| MINIMUM INITIAL * | 7 | SEC. | 10 | SEC. | 7 | SEC. | 10 | SEC. | |
| VEHICLE EXTENSION * | 2.0 | SEC. | 3.0 | SEC. | 2.0 | SEC. | 3.0 | SEC. | |
| YELLOW CHANGE INT. | 4.0 | SEC. | 4.0 | SEC. | 3.7 | SEC. | 4.0 | SEC. | |
| RED CLEARANCE | 2.8 | SEC. | 1.9 | SEC. | 2.1 | SEC. | 1.9 | SEC. | |
| MAXIMUM LIMIT * | 15 | SEC. | 50 | SEC. | 35 | SEC. | 50 | SEC. | |
| RECALL POSITION | ИОИ | NONE | | VEH. RECALL | | 1E | VEH. RECALL | | |
| VEHICLE CALL MEMORY | ИОИ | 1E | YELLOW | LOCK | NON | 1E | YELLOW | LOCK | |
| DOUBLE ENTRY | OFF | = | OF | = | OFF | : | OFF | | |
| WALK * | _ | SEC. | 4 | SEC. | 4 | SEC. | _ | SEC. | |
| 1 | | JLC. | 7 | JLC. | ı | OLO. | | J_C. | |
| FLASHING DON'T WALK | _ | SEC. | 4 | SEC. | 15 | SEC. | _ | SEC. | |
| FLASHING DON'T WALK MIN PED CLEARANCE | | | | | | | | | |
| | _ | SEC. | 4 | SEC. | 15 | SEC. | _ | SEC. | |
| MIN PED CLEARANCE | _ | SEC. | 4 2 | SEC. | 15 | SEC. | _ | SEC. | |
| MIN PED CLEARANCE TYPE 3 LIMIT | _ | SEC. SEC. | 2 - | SEC. SEC. | 15 | SEC. SEC. | _ | SEC. SEC. | |
| MIN PED CLEARANCE TYPE 3 LIMIT ALTERNATE EXTENSION | _ _ _ _ | SEC. SEC. SEC. | 4 2 - - | SEC. SEC. SEC. | 15 8 - - | SEC. SEC. SEC. | _ _ _ _ | SEC. SEC. SEC. | |
| MIN PED CLEARANCE TYPE 3 LIMIT ALTERNATE EXTENSION ADD PER VEHICLE * | _ _ _ _ | SEC. SEC. SEC. SEC. | 4 2 - - | SEC. SEC. SEC. SEC. | 15 8 - - | SEC. SEC. SEC. SEC. | | SEC. SEC. SEC. SEC. | |
| MIN PED CLEARANCE TYPE 3 LIMIT ALTERNATE EXTENSION ADD PER VEHICLE * MAXIMUM INITIAL * | | SEC. SEC. SEC. SEC. SEC. | 4 2 - - - | SEC. SEC. SEC. SEC. SEC. | 15 8 - - - | SEC. SEC. SEC. SEC. SEC. | | SEC. SEC. SEC. SEC. SEC. | |

* 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.

| | | 35 Mph +2% Gr | | |
|---------------------------------------|---------------------------------------|---------------------|--------------------------|---|
| R/W — | Direct Bury NC 55 (S. Alston Avenue) | P42 B | 35 Mph -2% Grade | F |
| · · · · · · · · · · · · · · · · · · · | | 62 61 11 | | |
| R/W—===== | 35 Mph +6% Grade Direct Bury | P41 P22 Direct Bury | NC 55 (S. Alston Avenue) | = |

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

NOTES

1. Refer to "Road Standard Drawings NCDOT" dated January 2012, "Standard Specifications for Roads and Structures" dated January 2012.

PROJECT REFERENCE NO.

U-3308

Sig. 4.0

- 2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- 3. Phase 1 may be lagged.
- 4. Reposition signal heads #21 & #22 during this phase of construction.
- 5. Set all detector units to presence mode.
- 6. Program all timing information into phase banks 1,2, and 3 unless otherwise noted.
- 7. Set phase bank 3 maximum limit to 250 seconds for phases used.
- 8. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls
- 9. Program pedestrian heads to countdown the flashing "Don't Walk" time
- 10. This intersection features an optical preemption system. Shown locations of optical detectors are conceptual only.
- 11. Upon completion of Emergency Vehicle Preemtion, controller returns to normal operation based on vehicle
- 12. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- 13. Pedestrian Pedestals are conceptual and shown for reference only. See sheets P1-P3 for pushbutton location details
- 14. Contractor shall adjust video detection zones as required.
- 15. Reconnect and unbag signal head #11 during this phase of construction.

LEGEND

| PROPOSE | <u></u> | EXISTING |
|------------------------------|---|-------------------|
| \bigcirc | Traffic Signal Head | |
| () -> | Modified Signal Head | N/A |
| \dashv | Sign | \dashv |
| \ | Pedestrian Signal Head With Push Button & Sign | • |
| |) Signal Pole with Guy | |
| | Signal Pole with Sidewalk Guy | |
| | D Inductive Loop Detector | |
| | Controller & Cabinet | × × |
| | Junction Box | |
| N/A | 2-in Underground Conduit - | |
| 1N/ A | Right of Way - Directional Arrow | \longrightarrow |
| $\langle \mathbb{A} \rangle$ | Right Arrow "Only" Sign (R3-5R |) |
| (B) | | • |
| | No Right Turn Sign (R3-1) | B |
| <u>(C)</u> | No Left Turn Sign (R3-2) | O |
| (D) | "YIELD" Sign (R1-2) | (D) |
| | Work Area | N/A |
| | Drums | N/A |
| \bigcirc | Optical Detector | • |
| | Video Detector | |
| | □ Video Detection Area □ | |
| | — Direct Bury | |
| ⊗ | Type I Pushbutton Post | ♣ |

Signal Upgrade - Temporary Design 5 (TMP Phase 3)



NC 55 (South Alston Avenue)

at NC 147 SB Ramps

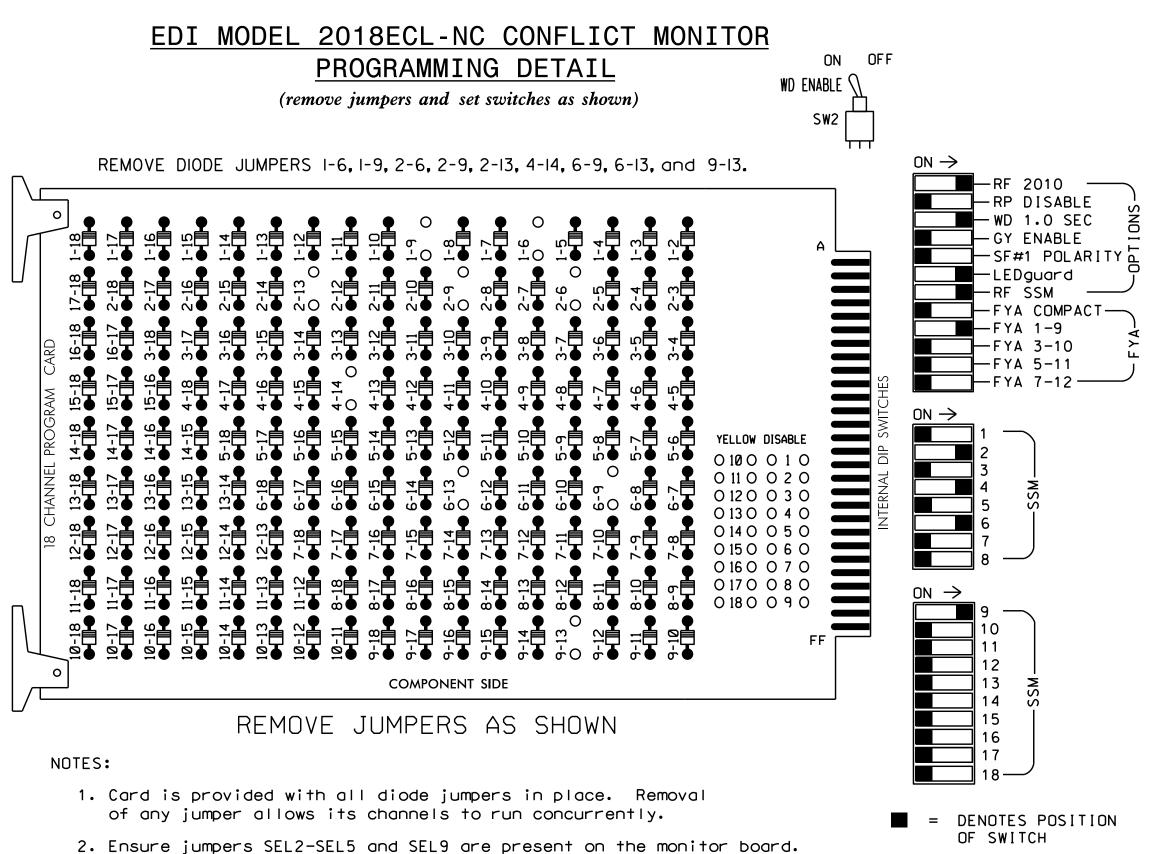
1025 Wade Avenue
Raleigh, NC 27605
Tel:919-789-9977
Fax:919-789-9591
License #: C-2197

PLAN DATE: September 2014 REVIEWED BY:
PREPARED BY: R Drayton REVIEWED BY:

1"=40'

Division 5 Durham County PLAN DATE: September 2014 REVIEWED BY: J Hochanadel INIT. DATE SIG. INVENTORY NO. 05-1028T5

4/02/15 DATE



NOTES

- 1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. Verify that signal heads flash in accordance with the signal plans.
- 2. Program controller to Start Up in phases 2 and 6 green.
- 3. Set power-up flash time to 0 seconds within the controller programming. The conflict monitor will govern startup flash. Ensure STARTUP "RED START" is set to 0 seconds.
- 4. Enable Simultaneous Gap-Out feature for all phases.
- 5. Program all timing information into phase banks 1, 2, and 3 unless otherwise noted.
- 6. Set phase bank 3 maximum limit to 250 seconds for phases
- 7. Ensure start up flash phases are coordinated with flash program block assignments.
- 8. Program Startup Ped Calls for phases 2 and 4.
- 9. Set the Red Revert interval on the controller to 1 second.
- 10. This cabinet and controller are part of the Durham Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070E SOFTWARE...........McCAIN 2033 CABINET MOUNT.....BASE OUTPUT FILE POSITIONS...18 WITH AUX FILE LOAD SWITCHES USED.....S1,S2,S3,S5,S6,S8,AUX S1 OVERLAP 1....* OVERLAP 2.....NOT USED OVERLAP 3.....NOT USED OVERLAP 4.....NOT USED

* See FYA PPLT Programming detail on sheet 2.

FYA SIGNAL WIRING DETAIL

SIGNAL HEAD HOOK-UP CHART

1 21,22 P21, NU 41,42 P41, NU 61,62 NU NU NU NU NU 11 NU

101

102

103 |

104

* Denotes install load resistor. See load resistor

★ See pictorial of head wiring in detail below.

installation detail this sheet.

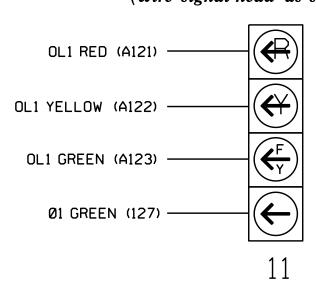
(wire signal head as shown)

PROJECT REFERENCE NO.

U-3308

8 RED OL1 OL2 SPARE OL3 OL4 SPARE

Sig. 4 1



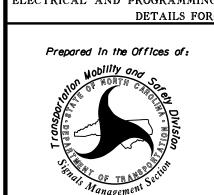
LOAD RESISTOR INSTALLATION DETAIL

(install resistor as shown below)

| ACCEPTABLE VALUES_ | | - PHASE 1 YELLOW FIELD |
|-----------------------|--------|------------------------|
| VALUE (ohms) WATTAGE | | TERMINAL (126) |
| 1.5K - 1.9K 25W (min) | | |
| 2.0K - 3.0K 10W (min) | \geq | |
| | \leq | |
| | | |
| | AC- | |

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-1028T5 DESIGNED: September 2014 SEALED: 4/2/15 REVISED: N/A

Electrical Detail - Temporary Design 5 (TMP Phase 3) - Sheet 1 of 2



NC 147 SB Ramps

ivision 5 PLAN DATE: November 2014 REVIEWED BY: 978

SEAL

008453

INPUT FILE CONNECTION & PROGRAMMING CHART

| LOOP NO. | LOOP TERMINAL | INPUT FILE POS. | DETECTOR NO. | PIN NO. | ATTRIBUTES | NEMA PHASE |
|---------------------|------------------|--------------------|-----------------|------------|------------|---------------|
| PED PUSH BUTTONS | | | | | | |
| P21,P22 | TB8-4,6 | I12U | 25 | 67 | 2 | 2 PED |
| P41,P42 | TB8-5,6 | I12L | 27 | 69 | 2 | 4 PED |
| | - | | | | - | |

NOTE: INSTALL DC ISOLATOR IN INPUT FILE SLOT

CMU CHANNEL

PHASE

HEAD NO.

RED

YELLOW

GREEN

ARROW

YELLOW

ARROW

FLASHING YELLOW ARROW

GREEN ARROW

NU = Not Used

***** 129

130

INPUT FILE POSITION LEGEND: J2L DETECTOR ATTRIBUTES LEGEND:

1-FULL TIME DELAY 2-PED CALL 3-RESERVED

4-COUNTING 5-EXTENSION 6-TYPE 3

7-CALLING 8-ALTERNATE

INSERT CARD INTO SLOT J13 (input file, rear view)

CH. 4 | CH. 2

UNUSED UNUSED

CABINET <u>FIELD</u> J13 Channel 1 Input (EVB) Ch.1 Tomar Detector -Cable — Channel 2 Input (UNUSED) (EVB) Blue/Bare wrap bare wire with insulating tape EQ Gnd

TYPICAL TOMAR FIELD WIRE DETAIL

FS = FLASH SENSE ST = STOP TIME EVB = EMERGENCY VEHICLE PREEMPT 4 CHANNEL TOMAR OSP CARD

DC ISOLATOR

ST

NOTE: PROGRAM DETECTOR DELAY AND CARRYOVER TIMES AS SPECIFIED ON SIGNAL DESIGN PLANS.

> FILE J SLOT 2-LOWER-

> > ELECTRICAL AND PROGRAMMING

NC 55 (South Alston Avenue)

PREPARED BY: S. Armstrong Reviewed BY:

REVISIONS INIT. DATE SIG. INVENTORY NO. 05-1028T5

Ø2PED DC ISOLATOR |Ø4 PED| CH. 3 | CH. 1 UNUSED EVB

INPUT FILE POSITION LAYOUT

(front view)

3. Ensure that Red Enable is active at all times during normal operation.

4. Ensure conflict monitor communicates with 2070.

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

SPECIAL DETECTOR NOTE

Install a video detection system for vehicle detection. Perform installation according to manufacturer's directions and NCDOT engineer approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.

FILE

"J"

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.

FYA PPLT PROGRAMMING

- 1. Program Flashing Yellow Arrow phases as follows: Main Menu - 1) PHASE - 2) PHASE FUNCTIONS PAGE TWO PPLT FYA = PHASE 1
- 2. Assign output pin for Flashing Yellow Arrow as follows: Main Menu - 6) OUTPUTS - F) FYA PPLT Phase 1 = 99
- 3. Redirect RED and YELLOW outputs for the left turn phases as follows: Main Menu - 6) OUTPUTS - 8) REDIRECT PHASE Phase 1 RED = 97, Phase 1 YELLOW = 98

PROJECT REFERENCE NO. Sig. 4.2 U-3308

EMERGENCY VEHICLE PREEMPTION PROGRAMMING

- 1. Program EVB preempt as follows: Main Menu - 2) PREEMPT - 4) EMERGENCY VEHICLE EVB Clear = 2EVB Clearance Phases = 1,6
- 2. Program general preemption parameters as follows: Main Menu - 2) PREEMPT - 6) MISC PREEMPTION PARAMETERS Min Time Before PE ForceOff = 1
- 3. Ped Clear Before Preempt is a pedestrian timing parameter, and is programmed as follows: Main Menu - 1) PHASE - 5) PEDESTRIAN TIMING PHASE 2 MIN FDW = 2PHASE 4 MIN FDW = 8

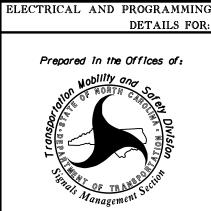
Program extend time on optical detector units for 2.0 sec for EVB.

MIN WALK DURING PREEMPTION PROGRAMMING

To disable MIN WALK pedestrian timing during preemption, program the controller as follows: Main Menu - 9) UTILITIES - 5) CONFIGURATION EXTRA TWO = 3

> THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-1028T5 DESIGNED: September 2014 SEALED: 4/2/15 REVISED: N/A

Electrical Detail - Temporary Design 5 (TMP Phase 3) - Sheet 2 of 2



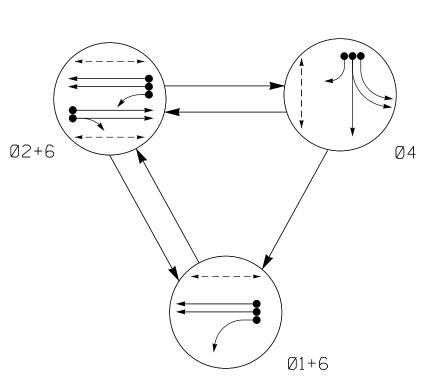
NC 55 (South Alston Avenue) NC 147 SB Ramps

PLAN DATE: November 2014 REVIEWED BY: 978 prepared by: S. Armstrong | reviewed by: 🖵

REVISIONS INIT. DATE



SIG. INVENTORY NO. 05-1028T5



PHASING DIAGRAM DETECTION LEGEND

DETECTED MOVEMENT UNDETECTED MOVEMENT (OVERLAP) UNSIGNALIZED MOVEMENT $<\!\!--\!\!>$ PEDESTRIAN MOVEMENT

| 2033 EV PREEMPTI | ON |
|--------------------------------|------------------|
| FUNCTION | EVB (SECONDS) |
| DELAY BEFORE PREEMPT | 0 |
| MIN. PED. CLEAR BEFORE PREEMPT | * |
| MIN. GREEN BEFORE PREEMPT | 1 |
| CLEARANCE TIME | 2 |
| PREEMPT EXTEND** | 2.0 |

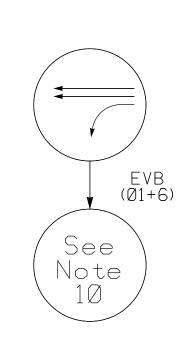
* See Timing Chart for Min Ped Clearance

** Program Timing on Optical Detector Unit

| | | T] | MING | i CH | IART | | | | |
|---|-----------------------|-------------------------------|----------------------------|-------------------------------|-----------------------------|-------------------------------|-----------------------------|-------------------------------|--|
| | 2033 | S0F | TWARE w | /2070 | CONTRO | LLER | | | |
| PHASE | Ø1 | | 02 | | 04 | | Ø6 | | |
| MINIMUM INITIAL * | 7 | SEC. | 10 | SEC. | 7 | SEC. | 10 | SEC. | |
| VEHICLE EXTENSION * | 2.0 | SEC. | 3.0 | SEC. | 2.0 | SEC. | 3.0 | SEC. | |
| YELLOW CHANGE INT. | 4.0 | SEC. | 4.0 | SEC. | 3.7 | SEC. | 4.0 | SEC. | |
| RED CLEARANCE | 2.8 | SEC. | 1.9 | SEC. | 2.0 | SEC. | 1.9 | SEC. | |
| MAXIMUM LIMIT * | 15 | SEC. | 50 | SEC. | 35 | SEC. | 50 | SEC. | |
| RECALL POSITION | 101 | 1E | VEH. RE | CALL | NON | 1E | VEH. RECALL | | |
| VEHICLE CALL MEMORY | ИОИ | 1E | YELLOW | LOCK | NON | 1E | YELLOW | LOCK | |
| DOUBLE ENTRY | OFI | E | OFF | _ | 0.55 | | OFF | | |
| | 011 | | Ori | • | OFF | | OF | F | |
| WALK * | - | SEC. | 4 | SEC. | 4 | SEC. | 4 | SEC. | |
| | | | | | | | | | |
| WALK * | _ | SEC. | 4 | SEC. | 4 | SEC. | 4 | SEC. | |
| WALK * FLASHING DON'T WALK | _ | SEC. | 4 | SEC. | 4 15 | SEC. | 4 12 | SEC. | |
| WALK * FLASHING DON'T WALK MIN PED CLEARANCE | _ _ _ | SEC. SEC. | 4 4 2 | SEC. SEC. | 4 15 8 | SEC. SEC. | 4 12 6 | SEC. SEC. | |
| WALK * FLASHING DON'T WALK MIN PED CLEARANCE TYPE 3 LIMIT | _ _ _ | SEC. SEC. SEC. | 4 4 2 | SEC. SEC. SEC. | 4 15 8 - | SEC. SEC. SEC. | 4 12 6 | SEC. SEC. SEC. | |
| WALK * FLASHING DON'T WALK MIN PED CLEARANCE TYPE 3 LIMIT ALTERNATE EXTENSION | _ _ _ _ _ | SEC. SEC. SEC. SEC. | 4 4 2 | SEC. SEC. SEC. SEC. | 4 15 8 - - | SEC. SEC. SEC. SEC. | 4 12 6 - | SEC. SEC. SEC. SEC. | |
| WALK * FLASHING DON'T WALK MIN PED CLEARANCE TYPE 3 LIMIT ALTERNATE EXTENSION ADD PER VEHICLE * | _ _ _ _ _ | SEC. SEC. SEC. SEC. SEC. | 4 4 2 | SEC. SEC. SEC. SEC. SEC. | 4 15 8 - - | SEC. SEC. SEC. SEC. SEC. | 4 12 6 - - | SEC. SEC. SEC. SEC. SEC. | |
| WALK * FLASHING DON'T WALK MIN PED CLEARANCE TYPE 3 LIMIT ALTERNATE EXTENSION ADD PER VEHICLE * MAXIMUM INITIAL * | | SEC. SEC. SEC. SEC. SEC. SEC. | 4 4 2 - - - | SEC. SEC. SEC. SEC. SEC. SEC. | 4 15 8 - - - | SEC. SEC. SEC. SEC. SEC. SEC. | 4 12 6 - - - | SEC. SEC. SEC. SEC. SEC. SEC. | |

* 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 than 4 seconds

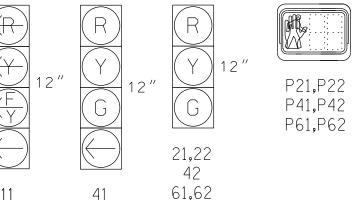
EV PREEMPT PHASES

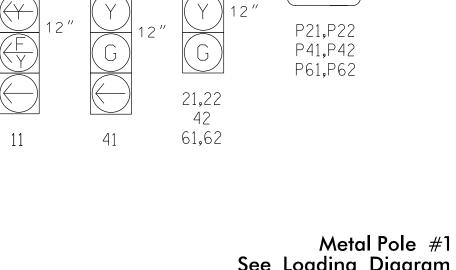


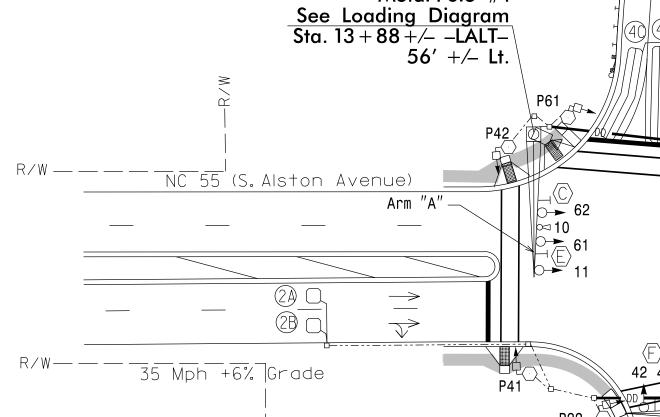
| TABLE OF OPERATION | | | | | | | | | | |
|--------------------|------------------|------|-------------|----------|----------|--|--|--|--|--|
| | PHASE | | | | | | | | | |
| SIGNAL FACE | Ø 1 + 6 | ØN+6 | Ø 4 | EVB | FLASH | | | | | |
| 11 | ← | ₹ | | ← | → | | | | | |
| 21,22 | R | G | R | R | Y | | | | | |
| 41 | R | R | ↓ ⊖ | R | R | | | | | |
| 42 | R | R | G | R | R | | | | | |
| 61,62 | G | G | R | G | Υ | | | | | |
| P21 , P22 | DW | W | DW | DW | DRK | | | | | |
| P41,P42 | DW | DW | W | DW | DRK | | | | | |
| P61,P62 | W | W | DW | DW | DRK | | | | | |

SIGNAL FACE I.D.

All Heads L.E.D.







| | | 1" | \L\nu |
|-------------------|---|----------|--|
| _ | $\stackrel{\longrightarrow}{\Rightarrow}$ | | 21 Arm "A" 22 |
| h +6% Grade | | 00 | 41 P2 1 |
| | | P22 | Arm "B" St |
| | M/W | Ramp | 0 de |
| | T. | 147 SB F | MPh -2% |
| | | 7 | \geq |

2033 SOFTWARE w/ 2070 CONTROLLER LOOP & DETECTOR UNIT INSTALLATION CHART

| | | | | | | | | ECTOR PROGRAMMING | | | | | | | | | | | | |
|------------------|--------------|--------|-------------------------|-----|----------|---------------|---------|-------------------|--------------|--------------------|--------------------|----------|-------|-----------|--------|---------|-----------|--------|-----|----------|
| INDUCTIVE LOOPS | | | | | /E LOOPS | | | | | | | Α¯ | ΓTRΙ | BUT | ES | | | PS | STA | TUS |
| | ı | T | I | | | 1 | TIMING | | | 1 | 1 2 3 | | 4 | 5 | 6 | 7 | 8 | LOOPS | | () |
| LOOP NO. | SIZE (ft) | TURNS | DIST. FROM STOPBAR (ft) | NEW | EXISTING | NEMA PHASE | DELAY | 1 | RRY ETCH) | FULL TIME DELAY | PEDESTRIAN CALL | RESERVED | COUNT | EXTENSION | TYPE 3 | CALLING | ALTERNATE | SYSTEM | NEW | EXISTING |
| 1 A | 6X30 | 2-4-2 | 0 | X | | 1 | 15 SEC. | _ | SEC. | _ | - | ı | - | Χ | _ | Χ | - | - | X | - |
| 1 A | 0/20 | 2 4 2 | | | | 6 | - SEC. | _ | SEC. | _ | _ | - | _ | Χ | _ | Χ | _ | _ | Χ | _ |
| 2A | 6×6 | 4 | 70 | X | - | 2 | - SEC. | _ | SEC. | _ | - | - | - | Χ | _ | X | _ | - | X | - |
| 2B | 6×6 | 4 | 70 | X | - | 2 | - SEC. | _ | SEC. | _ | _ | - | - | Χ | _ | Х | _ | - | Х | - |
| 4 A | 6×40 | 2-4-2 | 0 | X | - | 4 | - SEC. | _ | SEC. | _ | _ | - | - | Χ | _ | Χ | _ | - | Χ | _ |
| 4B | 6×40 | 2-4-2 | 0 | X | - | 4 | - SEC. | - | SEC. | - | - | - | - | Χ | _ | Χ | _ | - | Χ | _ |
| 4C | 6×40 | 2-4-2 | 0 | X | - | 4 | 10 SEC. | - | SEC. | _ | - | - | - | Χ | - | Χ | - | - | Χ | - |
| 6A | 6×6 | * | 70 | * | - | 6 | - SEC. | - | SEC. | _ | _ | - | - | Х | _ | Х | - | - | _ | * |
| 6B | 6x6 | * | 70 | * | - | 6 | - SEC. | - | SEC. | _ | _ | - | _ | Χ | - | Х | - | - | * | - |
| PEDESTR | RIAN DE | TECTIO | N | | | | | | | | | | | | | | | | | |
| P21 , P22 | N/A | N/A | N/A | X | - | 2 | - SEC. | _ | SEC. | _ | Х | - | - | _ | _ | _ | - | - | Х | - |
| P41,P42 | N/A | N/A | N/A | Х | - | 4 | - SEC. | - | SEC. | _ | Χ | - | - | - | - | - | - | - | Х | - |
| P61.P62 | N/A | N/A | N/A | X | _ | 6 | - SEC. | _ | SEC. | _ | Χ | _ | _ | _ | _ | _ | _ | _ | Χ | _ |

35 Mph -2% Grade

NC 55 (S. Alston Avenue)

* Video Detection Zone

(6B) ←

6A) ←

Metal Pole #2

See Loading Diagram

Sta. 14 + 66 +/- -LALT-61' +/- Rt.

3 Phase Fully Actuated w/ EV Preemption (Durham Signal System) PROJECT REFERENCE NO. Sig. 5.0 U-3308

NOTES

1. Refer to "Road Standard Drawings NCDOT" dated January 2012, "Standard Specifications for Roads and Structures" dated January 2012.

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. Program all timing information into phase banks 1,2, and 3 unless otherwise noted.

6. Set phase bank 3 maximum limit to 250 seconds for phases used.

7. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.

8. Program pedestrian heads to countdown the flashing "Don't Walk" time.

9. This intersection features an optical preemption system. Shown locations of optical detectors are conceptual only.

10. Upon completion of Emergency Vehicle Preemtion, controller returns to normal operation based on vehicle demand.

11. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.

12. Pedestrian pedestals are conceptual and shown for reference only. See sheets P1-P3 for pushbutton location details.

LEGEND

| PROPOSE | <u>====:+=</u> <u>:D</u> | <u>EXISTING</u> |
|------------------------------|---|-------------------|
| \bigcirc | Traffic Signal Head | |
| (-> | Modified Signal Head | N/A |
| | Sign | $\overline{}$ |
| + | 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 | |
| \longrightarrow | Directional Arrow | \longrightarrow |
| — DD — | Directional Drill | N/A |
| $\langle A \rangle$ | Left Arrow "ONLY" Sign (R3-5L) | \triangle |
| $\langle \mathbb{B} \rangle$ | Right Arrow "Only" Sign (R3-5R | () (B) |
| $\langle \mathbb{C} \rangle$ | No Right Turn Sign (R3-1) | () () |
| $\langle \mathbb{D} \rangle$ | No Left Turn Sign (R3-2) | |
| E | Street Name Sign | E |
| (F) | Combined Through and Left Arrow Sign (R3-6L) | Ē |
| \bigcirc | Type II Signal Pedestal | • |
| \bigcirc | Optical Detector | • |
| 0 | → Metal Pole with Mastarm | |
| | Video Detector | |
| | Video Detection Area (| |

Signal Upgrade - Final Design



NC 55 (South Alston Avenue)

NC 147 SB Ramps Division 5 Durham County Durham PLAN DATE: September 2014 REVIEWED BY: J Hochanadel

Raleigh, NC 27605
Tel: 919-789-9977

Tel: 919-789-9977

Tel: 919-789-9977

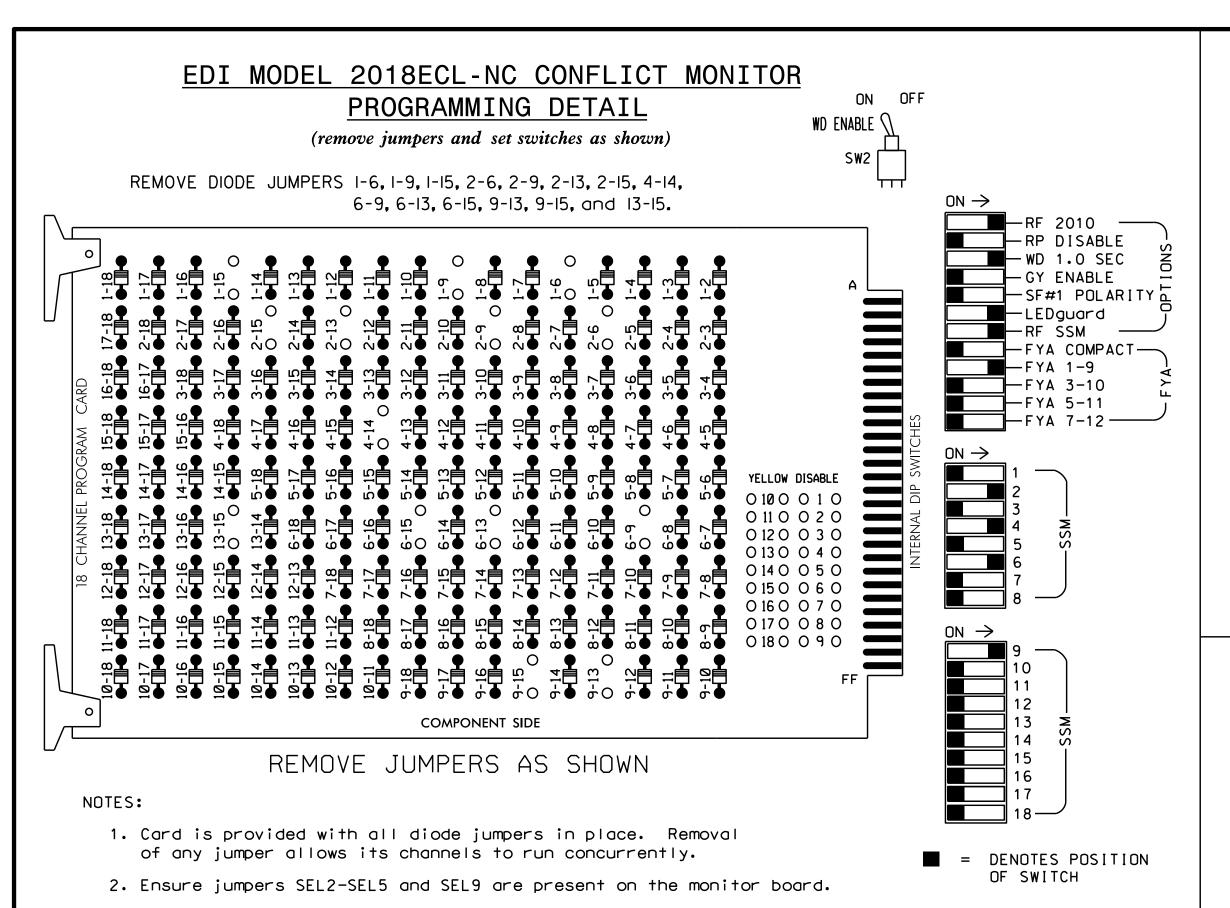
Tel: 919-789-9977

Tel: 919-789-9977 INIT. DATE

MyPALL DATE SIG. INVENTORY NO. 05-1028

1025 Wade Avenue

SEAL



NOTES

- 1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. Verify that signal heads flash in accordance with the signal plans.
- 2. Program controller to Start Up in phases 2 and 6 green.
- 3. Set power-up flash time to 0 seconds within the controller programming. The conflict monitor will govern startup flash. Ensure STARTUP "RED START" is set to 0 seconds.
- 4. Enable Simultaneous Gap-Out feature for all phases.
- 5. Program all timing information into phase banks 1, 2, and 3 unless otherwise noted.
- 6. Set phase bank 3 maximum limit to 250 seconds for phases
- 7. Ensure start up flash phases are coordinated with flash program block assignments.
- 8. Program Startup Ped Calls for phases 2, 4, and 6.
- 9. Set the Red Revert interval on the controller to 1 second.
- 10. This cabinet and controller are part of the Durham Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070E CABINET......332 W/ AUX CABINET MOUNT.....BASE OUTPUT FILE POSITIONS...18 WITH AUX FILE

LOAD SWITCHES USED......\$1,\$2,\$3,\$5,\$6,\$8,\$9,AUX \$1

56

56

39

43

41

45

65

25 | 67 | 2

69 2

68 2

5 7

5 7

5 7

5 7

5 7

5 7

5 7

5 7

5 7

2

6

NOTE:

6 PED | 112 AND 113.

2 PED INSTALL DC ISOLATORS

4 PED IN INPUT FILE SLOTS

OVERLAP 1....* OVERLAP 2.....NOT USED OVERLAP 3.....NOT USED OVERLAP 4.....NOT USED

I1U

I2U

I2L

I6U

I6L

I7U

I12U

I12L

I13U

TB2-1,2

TB2-5,6

TB2-7,8

TB4-9,10

TB4-11,12

TB6-1.2

TB8-4,6

TB8-5,6

TB8-7**,**9

2A

2B

* 6A

* 6B

PED PUSH

BUTTONS

P21,P22

P41,P42

P61,P62

7-CALLING

8-ALTERNATE

* See FYA PPLT Programming detail on sheet 2.

LOOP NO. TERMINAL FILE POS. NO. NO. ATTRIBUTES NEMA PHASE

14

10

5

3

7

23

27

26

* VIDEO DETECTION ZONE. SEE SPECIAL DETECTOR NOTE THIS PAGE.

| | SIGNAL HEAD HOOK-UP CHART | | | | | | | | | | | | | | | | | | |
|-----------------------------|---------------------------|-------|---------------------|----|-----|-----|-------------|------------|-------|---------------------|-----|-----|----------|-----------|-----------|-----------|-----------|-----------|-----------|
| LOAD SWITCH NO. | S1 | S2 | S3 | S4 | S | 5 | S6 | S 7 | 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 | 1 | 14 | 5 | 6 | 15 | 7 | 8 | 16 | 9 | 10 | 17 | 11 | 12 | 18 |
| PHASE | 1 | 2 | 2 PED | 3 | 4 | 4 P | | 5 | 6 | 6 PED | 7 | 8 | 8 PED | OL1 | | SPARE | 0L3 | OL4 | SPARE |
| SIGNAL HEAD NO. | 11 | 21,22 | P21 . P22 | NU | 41 | 42 | P41. P42 | NU | 61,62 | P61 . P62 | NU | NU | NU | 11 | NU | NU | NU | NU | NU |
| RED | | 128 | | | 101 | 101 | | | 134 | | | | | | | | | | |
| YELLOW | * | 129 | | | 102 | 102 | | | 135 | | | | | | | | | | |
| GREEN | | 130 | | | 103 | 103 | | | 136 | | | | | | | | | | |
| RED ARROW | | | | | | | | | | | | | | A121 | | | | | |
| YELLOW ARROW | | | | | | | | | | | | | | A122 | | | | | |
| FLASHING YELLOW ARROW | | | | | | | | | | | | | | A123 | | | | | |
| GREEN ARROW | 127 | | | | 103 | | | | | | | | | | | | | | |
| ₩ | | | 113 | | | | 104 | | | 119 | | | | | | | | | |
| Ķ | | | 115 | | | | 106 | | | 121 | | | | | | | | | |

PROJECT REFERENCE NO.

U-3308

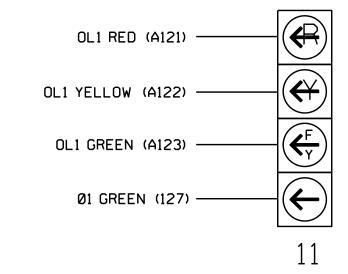
Sig 5 1

NU = Not Used

- * Denotes install load resistor. See load resistor installation detail this sheet.
- ★ See pictorial of head wiring in detail below.

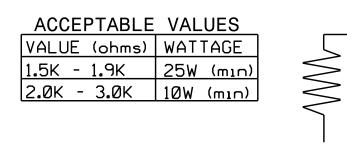
FYA SIGNAL WIRING DETAIL

(wire signal head as shown)



LOAD RESISTOR INSTALLATION DETAIL

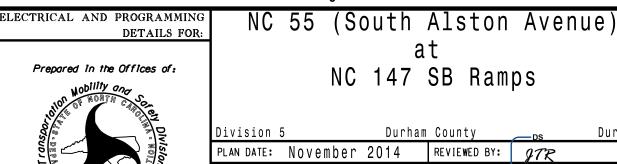
(install resistor as shown below)



- PHASE 1 YELLOW FIELD TERMINAL (126)

Electrical Detail - Final Design - Sheet 1 of 2

750 N.Greenfield Pkwy.Garner.NC 27529



PREPARED BY: S. Armstrong Reviewed By: REVISIONS INIT. DATE

John T. Rowe, Jr. 4/2/2015 SIG. INVENTORY NO. 05-1028

SEAL

008453

INPUT FILE POSITION LAYOUT INPUT FILE CONNECTION & PROGRAMMING CHART (front view)

| | | | | | | | ()10100 | , | | | | | | |
|--------------------|--------------------------|------------------------|------------|-------------|------------|------------------------|--------------------------|------------|------------|------------|------------|---------------------------------------|-----------------------|-------------------------------|
| r | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| file U "I" L | Ø 1 1A NOT USED | ø 2 2A ø 2 2B | SLOT EXPTY | 010F EXRF> | SLOT EXPTY | Ø 4 4A Ø 4 4B | Ø 4 4C NOT USED | SLOT EXPTY | SLOT EXPTY | SLOT EXPTY | SLOT EMPTY | Ø2PED DC ISOLATOR Ø4PED DC ISOLATOR | DC <u>ISOLATOR</u> | FS DC ISOLATOR ST DC ISOLATOR |
| FILE U | SLOT EMPTY | 010F EXPLY | SLOT EMPTY | ው መተሪካቸው ተላ | SLOT EMPTY | SLOT EMPTY | SLOT EXPTY | SLOT EMPTY | SLOT EMPTY | SLOT EMPTY | SLOT EMPTY | CH. 3 UNUSED CH. 4 UNUSED | EVB CH. 2 | SLOT EMPTY |

3. Ensure that Red Enable is active at all times during normal operation.

4. Ensure conflict monitor communicates with 2070.

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

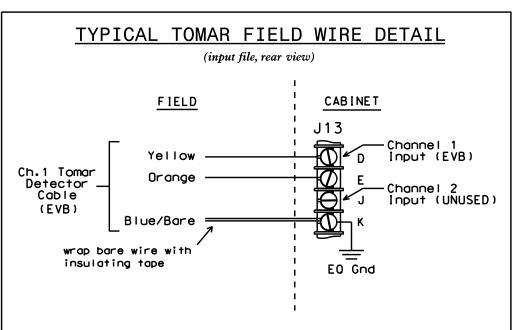
SPECIAL DETECTOR NOTE

Install a video detection system for vehicle detection for zones 6A and 6B.

Perform installation according to manufacturer's directions and NCDOT engineer approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.

FS = FLASH SENSE ST = STOP TIME EVB = EMERGENCY VEHICLE PREEMPT

> 4 CHANNEL TOMAR OSP CARD INSERT CARD INTO SLOT J13



NOTE: PROGRAM DETECTOR DELAY AND CARRYOVER TIMES AS SPECIFIED ON SIGNAL DESIGN PLANS. DETECTOR ATTRIBUTES LEGEND: INPUT FILE POSITION LEGEND: J2L

FILE J 1-FULL TIME DELAY 2-PED CALL LOWER 3-RESERVED 4-COUNTING 5-EXTENSION 6-TYPE 3

> THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-1028 DESIGNED: September 2014 SEALED: 4/2/15 REVISED: N/A

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.

FYA PPLT PROGRAMMING

- 1. Program Flashing Yellow Arrow phases as follows: Main Menu - 1) PHASE - 2) PHASE FUNCTIONS PAGE TWO PPLT FYA = PHASE 1
- 2. Assign output pin for Flashing Yellow Arrow as follows: Main Menu - 6) OUTPUTS - F) FYA PPLT Phase 1 = 99
- 3. Redirect RED and YELLOW outputs for the left turn phases as follows: Main Menu - 6) OUTPUTS - 8) REDIRECT PHASE

Phase 1 RED = 97, Phase 1 YELLOW = 98

PROJECT REFERENCE NO. Sig. 5.2 U-3308

EMERGENCY VEHICLE PREEMPTION PROGRAMMING

- 1. Program EVB preempt as follows: Main Menu - 2) PREEMPT - 4) EMERGENCY VEHICLE EVB Clear = 2 EVB Clearance Phases = 1,6
- 2. Program general preemption parameters as follows: Main Menu - 2) PREEMPT - 6) MISC PREEMPTION PARAMETERS Min Time Before PE ForceOff = 1
- 3. Ped Clear Before Preempt is a pedestrian timing parameter, and is programmed as follows: Main Menu - 1) PHASE - 5) PEDESTRIAN TIMING PHASE 2 MIN FDW = 2PHASE 4 MIN FDW = 8PHASE 6 MIN FDW = 6

Program extend time on optical detector units for 2.0 sec for EVB.

MIN WALK DURING PREEMPTION PROGRAMMING

To disable MIN WALK pedestrian timing during preemption. program the controller as follows: Main Menu - 9) UTILITIES - 5) CONFIGURATION EXTRA TWO = 3

> THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-1028 DESIGNED: September 2014 SEALED: 4/2/15 REVISED: N/A

Electrical Detail - Final Design - Sheet 2 of 2

ELECTRICAL AND PROGRAMMING DETAILS FOR: NC 55 (South Alston Avenue)

NC 147 SB Ramps

REVISIONS

PLAN DATE: November 2014 REVIEWED BY: 978 PREPARED BY: S. Armstrong Reviewed BY:

INIT. DATE

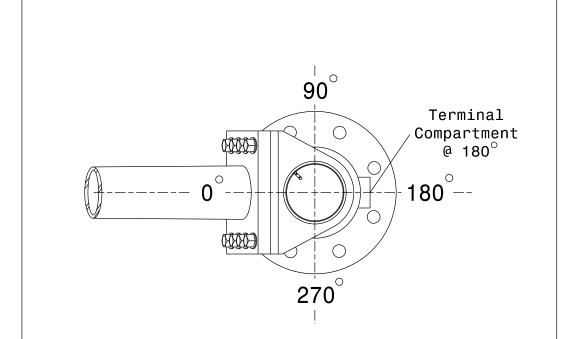
Elevation View @ 0

SPECIAL NOTE

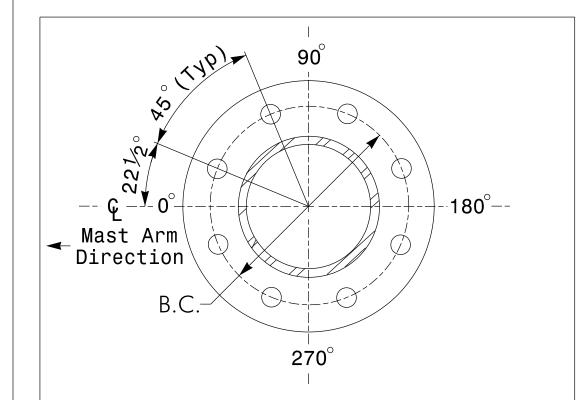
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

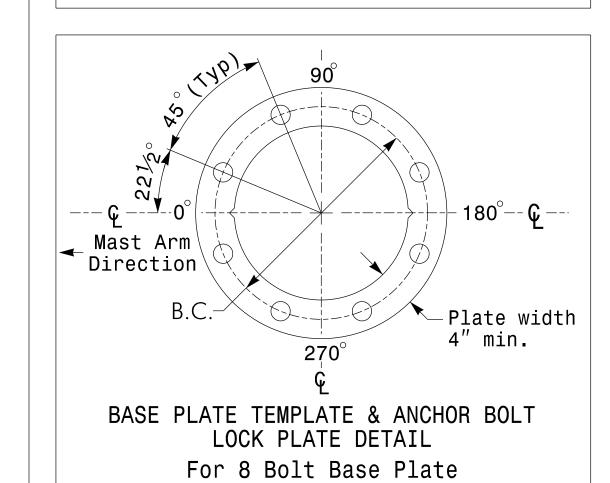
| Elevation Differences for: | Pole 1 | |
|--|-----------|--|
| Baseline reference point at © Foundation @ ground level | 0.0 ft. | |
| Elevation difference at High point of roadway surface | +0.06 ft. | |
| Elevation difference at Edge of travelway or face of curb | +0.13 ft. | |



POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL See Note 6



METAL POLE No. 1

| PROJECT REFERENCE NO. | SHEET NO. | | | | | | |
|-----------------------|-----------|--|--|--|--|--|--|
| U - 3308 | Sig. 5.3 | | | | | | |

| | MAST ARM LOADING SCH | EDUL | E | |
|-------------------|---|-----------|-------------------------|---------|
| LOADING SYMBOL | DESCRIPTION | AREA | SIZE | WEIGHT |
| | SIGNAL HEAD 12"–4 SECTION WITH 8" BACKPLATE RIGID MOUNTED | 15.8 S.F. | 31.5" W X 72.0" L | 78 LBS |
| | SIGNAL HEAD 12″–3 SECTION WITH 8″ BACKPLATE RIGID MOUNTED | 12.8 S.F. | 31.5" W X 58.5" L | 63 LBS |
| | SIGNAL HEAD 12″–5 SECTION WITH 8″ BACKPLATE RIGID MOUNTED | 20.7 S.F. | 48.0" W X 62.0" L | 107 LBS |
| STREET NAME SIGN | Street name sign rigid mounted | 12.0 S.F. | 18.0" W X 96.0" L | 27 LBS |
| | pedestrian signal head With mounting hardware | 2.2 S.F. | 18.5" W X 17.0" L | 21 LBS |
| | SIGN RIGID MOUNTED | 7.5 S.F. | 30.0" W X 36.0" L | 14 LBS |

NOTES

Design Reference Material

1. Design the traffic signal structure and foundation in accordance with:

- The 5th Edition 2009 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
- The 2012 NCDOT "Standard Specifications for Roads and Structures". The latest addenda to these specifications can be found in the traffic signal project special provisions.
- The 2012 NCDOT Roadway Standard Drawings.
- The traffic signal project plans and special provisions. • The NCDOT "Metal Pole Standards" located at the following NCDOT website:
- https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx

<u>Design Requirements</u>

- 2. Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "Design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the
- 3. Design all signal supports using stress ratios that do not exceed 0.9.
- 4. The camber design for mast arm deflection should provide an appearance of a low pitched arch where the tip or the free end of the mast arm does not deflect below horizontal when fully loaded.
- 5. A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements. This requires staggering the connections. Use elevation data for each arm to determine appropriate arm connection points.
- 6. Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
- 7. The mast arm attachment height (H1) shown is based on the following design assumptions: a.Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
- b. Signal heads attached to the mast arm are rigid mounted and vertically centered on the arm.
- c. The roadway clearance height for design is as shown in the elevation views.
- d. The top of the pole base plate is .75 feet above the ground elevation. e Refer to the Elevation Data chart for elevation differences between the proposed foundation
- ground level and the high point on the roadway. 8. The pole manufacturer will determine the total height (H2) of the pole using the greater of
- the following: • Mast arm attachment height (H1) plus 2 feet, or
- ullet H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
- 9. If pole location adjustments are required, the contractor must gain approval from the engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signal Design Structural Engineer for assistance at (919) 773-2800.
- 10. The contractor is responsible for verifying that the mast arm lengths shown will allow proper positioning of the signal heads over the roadway.
- 11. The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

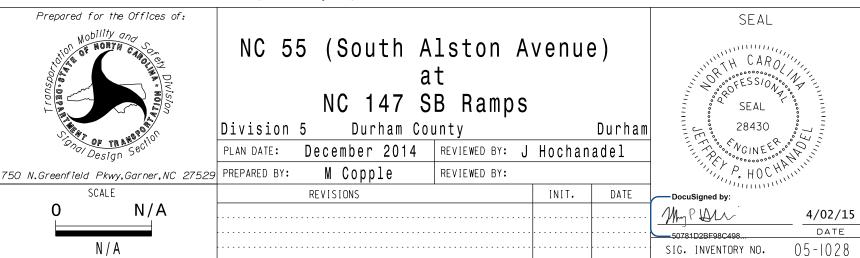


1025 Wade Avenue Raleigh, NC 27605 Tel:919-789-9977 Fax:919-789-9591 License #: C-2197

SIG. INVENTORY NO.

DATE

NCDOT Wind Zone 4 (90 mph)



Ç Pole

See Note 8

H1=21.0'

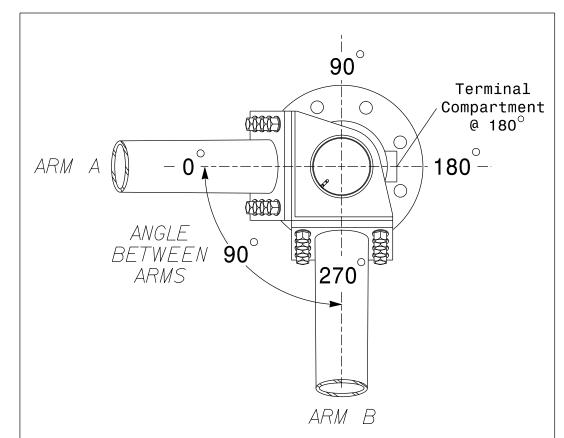
Note 7

See Notes 4 & 5

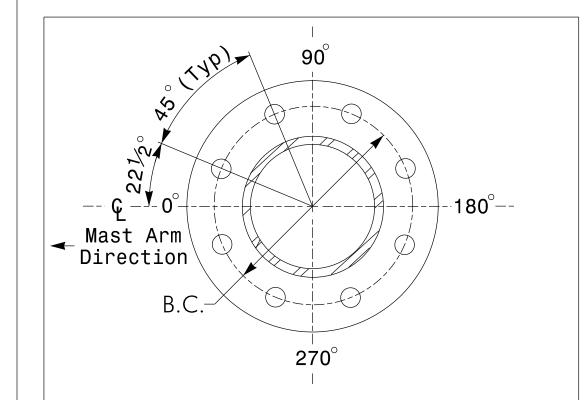
See Note 7d

Elevation Data for Mast Arm Attachment (H1)

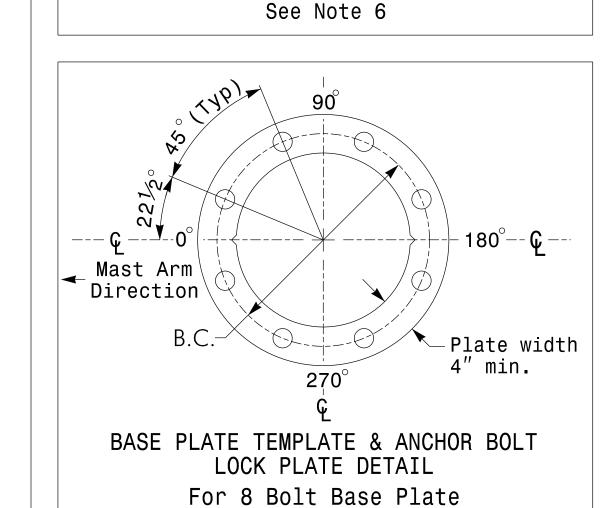
| Elevation Differences for: | Arm "A" | Arm "B" |
|--|-----------|-----------|
| Baseline reference point at & Foundation @ ground level | 0.0 ft. | 0.0 ft. |
| Elevation difference at High point of roadway surface | +2.07 ft. | +0.15 ft. |
| Elevation difference at Edge of travelway or face of curb | +0.84 ft. | +0.07 ft. |



POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL



METAL POLE No. 2

| U - 3308 | Sig. 5.4 |
|-----------------------|-----------|
| PROJECT REFERENCE NO. | SHEET NO. |

| | MAST ARM LOADING SCH | HEDUL | .E | |
|-------------------|---|-----------|-------------------------|---------|
| LOADING SYMBOL | DESCRIPTION | AREA | SIZE | WEIGHT |
| | SIGNAL HEAD 12"–4 SECTION WITH 8" BACKPLATE RIGID MOUNTED | 15.8 S.F. | 31.5" W X 72.0" L | 78 LBS |
| | SIGNAL HEAD 12″–3 SECTION WITH 8″ BACKPLATE RIGID MOUNTED | 12.8 S.F. | 31.5" W X 58.5" L | 63 LBS |
| | SIGNAL HEAD 12"–5 SECTION–WITH 8" BACKPLATE RIGID MOUNTED | 20.7 S.F. | 48.0" W X 62.0" L | 107 LBS |
| STREET NAME SIGN | Street name sign rigid mounted | 12.0 S.F. | 18.0" W X 96.0" L | 27 LBS |
| | pedestrian signal head With mounting hardware | 2.2 S.F. | 18.5" W X 17.0" L | 21 LBS |
| | SIGN RIGID MOUNTED | 7.5 S.F. | 30.0" W X 36.0" L | 14 LBS |

NOTES

Design Reference Material

- 1. Design the traffic signal structure and foundation in accordance with:
- The 5th Edition 2009 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
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- The NCDOT "Metal Pole Standards" located at the following NCDOT website: https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx

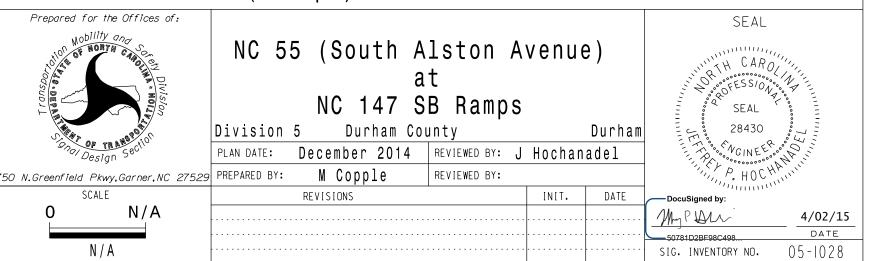
Design Requirements

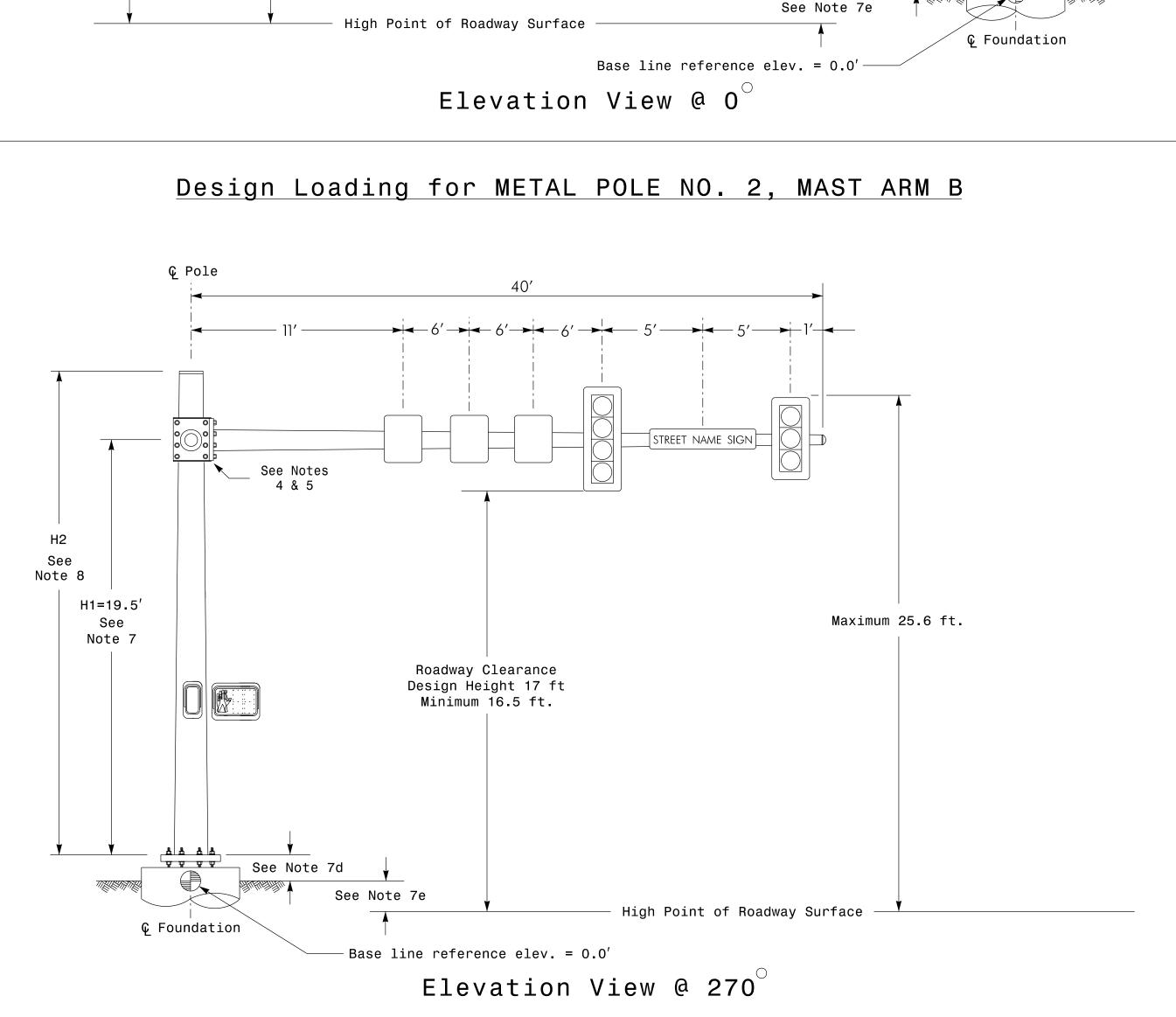
- 2. Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "Design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the
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- 4. The camber design for mast arm deflection should provide an appearance of a low pitched arch where the tip or the free end of the mast arm does not deflect below horizontal when fully loaded.
- 5. A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements. This requires staggering the connections. Use elevation data for each arm to determine appropriate arm connection points.
- 6. Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
- 7. The mast arm attachment height (H1) shown is based on the following design assumptions: a.Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
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- c. The roadway clearance height for design is as shown in the elevation views. d. The top of the pole base plate is .75 feet above the ground elevation.
- e Refer to the Elevation Data chart for elevation differences between the proposed foundation
- ground level and the high point on the roadway. 8. The pole manufacturer will determine the total height (H2) of the pole using the greater of
- the following: • Mast arm attachment height (H1) plus 2 feet, or
- \bullet H1 plus $\frac{1}{2}$ of the total height of the mast arm attachment assembly plus 1 foot.
- 9. If pole location adjustments are required, the contractor must gain approval from the engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signal Design Structural Engineer for assistance at (919) 773-2800.
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- 11. The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.



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NCDOT Wind Zone 4 (90 mph)





Design Loading for METAL POLE NO. 2, MAST ARM A

STREET NAME SIGN

Roadway Clearance

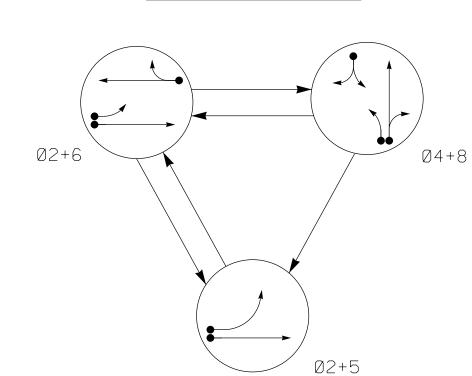
Design Height 17 ft

Minimum 16.5 ft

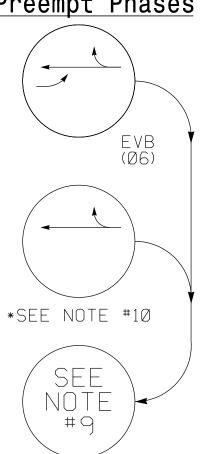
Maximum 25.6 ft.

PROJECT REFERENCE NO. Sig. 6.0 U-3308

PHASING DIAGRAM



EV



| , | D | Dhaaa |
|---|---------|----------------|
| | Preempt | <u> Pnases</u> |
| | | |

| tempt inases | |
|--------------|---|
| | |
| FVB | |
| EVB (Ø6) | |
| | |
| EE NOTE #10 | |
| | (|

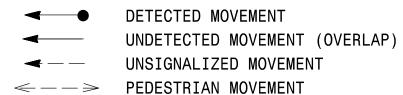
2033 SOFTWARE w/ 2070 CONTROLLER LOOP & DETECTOR UNIT INSTALLATION CHART

DETECTOR PROGRAMMING

| | | | | | | DETECTOR TROUBLING | | | | | | | | | | | | | | | |
|----------|--------------|--------|-------------------------|-----|----------|--------------------|-------|----|--------------|------------|--------------------|--------------------|----------|-------|-----------|--------|---------|-----------|----------|-----|----------|
| | INDUCT | IVE LO | OPS | | | | | | | ATTRIBUTES | | | | | | | PS | ي STA | | | |
| | | | | | | | TI/ | ΜI | NG | | 1 | 1 2 3 4 5 6 7 8 | | | | | 8 | 0 | | ,, | |
| LOOP NO. | SIZE (ft) | TURNS | DIST. FROM STOPBAR (ft) | ZEX | EXISTING | NEMA PHASE | DELAY | , | CAR (STRE | | FULL TIME DELAY | PEDESTRIAN CALL | RESERVED | COUNT | EXTENSION | TYPE 3 | CALLING | ALTERNATE | SYSTEM L | NEW | EXISTING |
| 2A | 6×6 | * | 70 | * | - | 2 | - SE(| C. | - | SEC. | _ | _ | ı | ı | Χ | _ | Χ | ı | - | * | _ |
| 4A | 6×40 | * | 0 | * | _ | 4 | 3 SE(| C. | - | SEC. | _ | _ | _ | - | Χ | _ | Χ | - | - | * | _ |
| 5A | 6×40 | * | 0 | * | _ | 5 | 15 SE | C. | _ | SEC. | _ | _ | - | - | Χ | - | Χ | - | - | * | _ |
| JA | 0 0 0 0 | 本 | 0 | 不 | | 2 | - SEO | C. | - | SEC. | _ | _ | ı | ı | Χ | - | Χ | ı | - | * | _ |
| 6A | 6×6 | * | 70 | * | - | 6 | - SE(| C. | - | SEC. | _ | _ | _ | - | Χ | _ | X | ı | - | * | _ |
| 8.4 | 6×40 | * | 0 | * | - | 8 | - SEO | c. | - | SEC. | _ | _ | ı | ı | Χ | - | Χ | ı | - | * | _ |
| 8B | 6×40 | * | 0 | * | _ | 8 | 10 SE | c. | - | SEC. | _ | - | - | _ | Χ | - | Χ | - | - | * | _ |

* Video Detection Zone

PHASING DIAGRAM DETECTION LEGEND



| 2033 EV PREEMPTI | ON |
|--------------------------------|------------------|
| FUNCTION | EVB (SECONDS) |
| DELAY BEFORE PREEMPT | 0 |
| MIN. PED. CLEAR BEFORE PREEMPT | 0 |
| MIN. GREEN BEFORE PREEMPT | 1 |
| CLEARANCE TIME | 2 |
| PREEMPT EXTEND** | 2.0 |

** Program Timing on Optical Detector Unit

SIGNAL FACE I.D.

All Heads L.E.D.

TABLE OF OPERATION

SIGNAL

FACE

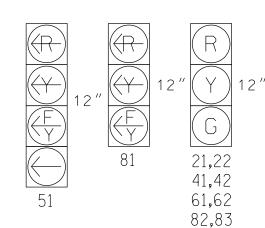
21,;22

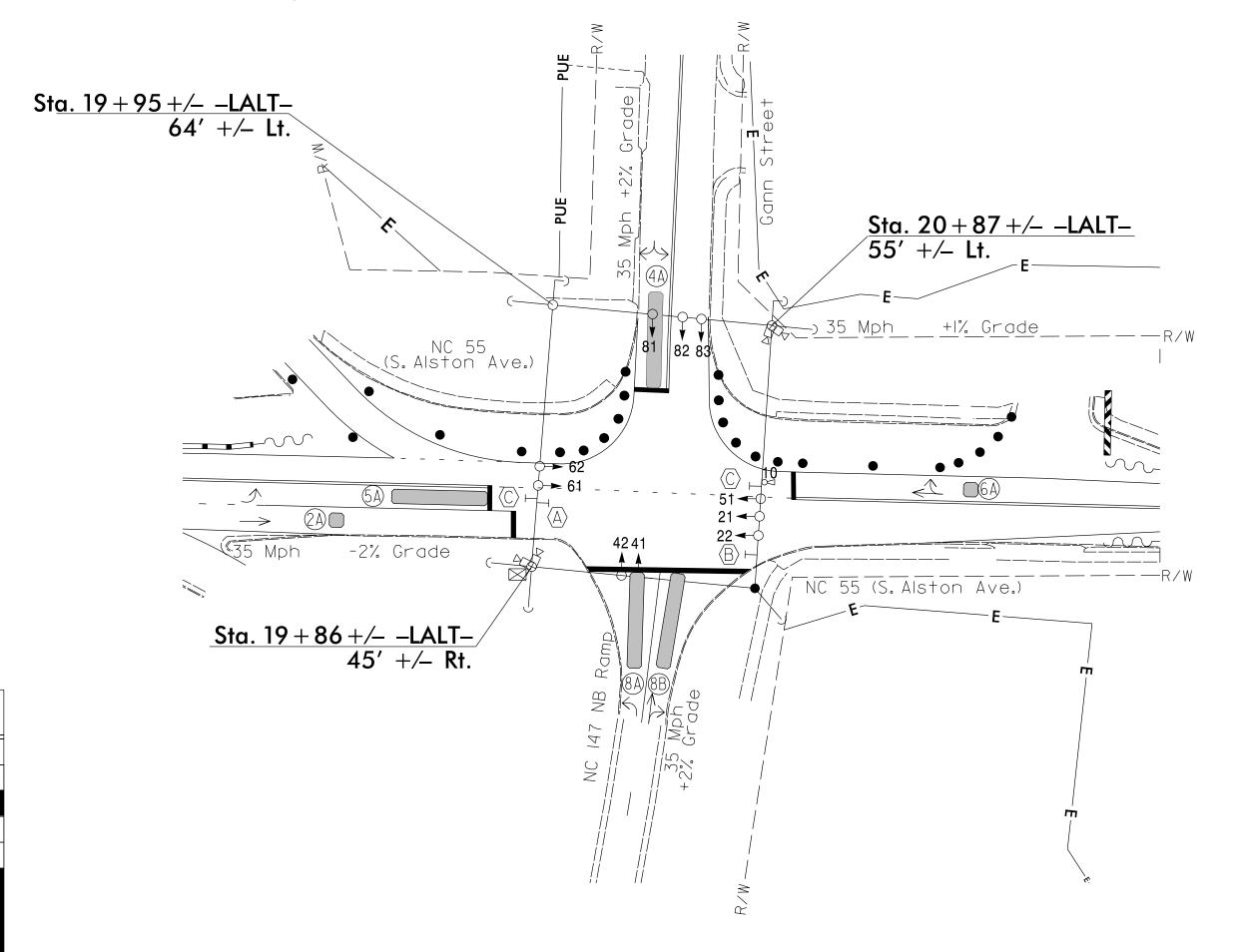
41,42

61,62

82,83

PHASE





NOTES

1. Refer to "Road Standard Drawings NCDOT" dated January 2012, "Standard Specifications for Roads and Structures" dated January 2012.

3 Phase

Fully Actuated

w/ EV Preemption

(Durham Signal System)

- 2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- 3. Phase 5 may be lagged.
- 4. Set all detector units to presence mode.
- 5. Locate new cabinet as to not obstruct sight distance of vehicles turning on red.
- 6. Program all timing information into phase banks 1,2, and 3 unless otherwise noted.
- 7. Set phase bank 3 maximum limit to 250 seconds for phases used.
- 8. This intersection features an optical preemption system. Shown locations of optical detectors are conceptual only.
- 9. Upon completion of Emergency Vehicle Preemption, controller returns to normal operation.
- 10. When EVB preemption initializes during side street service signal head 51 will display a red arrow.
- 11. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.

LEGEND

| <u>PROPOSED</u> | | EXISTING |
|--|---|-------------------|
| \bigcirc | Traffic Signal Head | |
| ()— | Modified Signal Head | N/A |
| \dashv | Sign | \dashv |
| † | Pedestrian Signal Head With Push Button & Sign | • |
| $\bigcirc \hspace{-1em} \bigcirc \hspace{-1em} \bigcirc$ | 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 | |
| \longrightarrow | Directional Arrow | \longrightarrow |
| \triangle | "No Left Turn" (R3-2) | \triangle |
| B | "No Right Turn" (R3-1) | B |
| <u>C</u> | Left Arrow "ONLY" Sign (R3-5L | \sim |
| _ | Work Area | N/A |
| | Drums | N/A |
| ——E— | Construction Easement | N/A |
| —— PUE — | — Permanent Utility Easement | N/A |
| | | N/A |
| | — Direct Bury | |
| \bigcirc | Optical Detector | • |
| | Video Detector | |
| | Video Detection Area | |

TIMING CHART 2033 SOFTWARE w/2070 CONTROLLER Ø2 Ø6 Ø8 OL2 PHASE MINIMUM INITIAL * 1 O **SEC**. SEC. 7 **SEC**. 3.0 **SEC**. 2.0 **SEC**. . O SEC. VEHICLE EXTENSION 4.0 **SEC**. 3.7 SEC. 4.0 SEC. . 7 **SEC**. 3.7 **SEC**. YELLOW CHANGE INT. 1.8 **SEC**. RED CLEARANCE 1.8 **SEC**. 2.8 **SEC**. 1.8 **SEC**. . 8 **SEC**. 1.8 **SEC**. 35 **SEC**. 15 **SEC**. 50 **SEC** 35 **SEC**. MAXIMUM LIMIT ' 50 **SEC**. RECALL POSITION VEH. RECALL NONE NONE VEH. RECALL NONE VEHICLE CALL MEMORY YELLOW LOCK YELLOW LOCK NONE DOUBLE ENTRY OFF OFF ON ON SEC. SEC. SEC. SEC. — SEC. FLASHING DON'T WALK SEC. SEC. SEC. — SEC. — SEC. MIN PED CLEARANCE SEC. SEC. SEC. — SEC. SEC. TYPE 3 LIMIT SEC. SEC. SEC. — SEC. — SEC. — SEC. ALTERNATE EXTENSION SEC. SEC. — SEC. — SEC. ADD PER VEHICLE * SEC. SEC. SEC. SEC. — SEC. MAXIMUM INITIAL * SEC. SEC. SEC. — SEC. SEC. MAXIMUM GAP* 3 . 0 **SEC**. 2 **.** 0 **SEC**. 2 • O **SEC**. 3 • 0 **sec**. 2 . 0 **SEC**. REDUCE 0.1 SEC EVERY * SEC. SEC. SEC. SEC. SEC. MINIMUM GAP 3 **.** 0 **SEC**. 3 • 0 **SEC**. 2 **.** () **SEC**. $2 \cdot 0$ sec.

* 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

1025 Wade Avenue Raleigh, NC 27605 Tel:919-789-9977

O N.Greenfield Pkwy,Garner,NC 27529 PREPARED BY: C Lawson

Prepared for the Offices of:

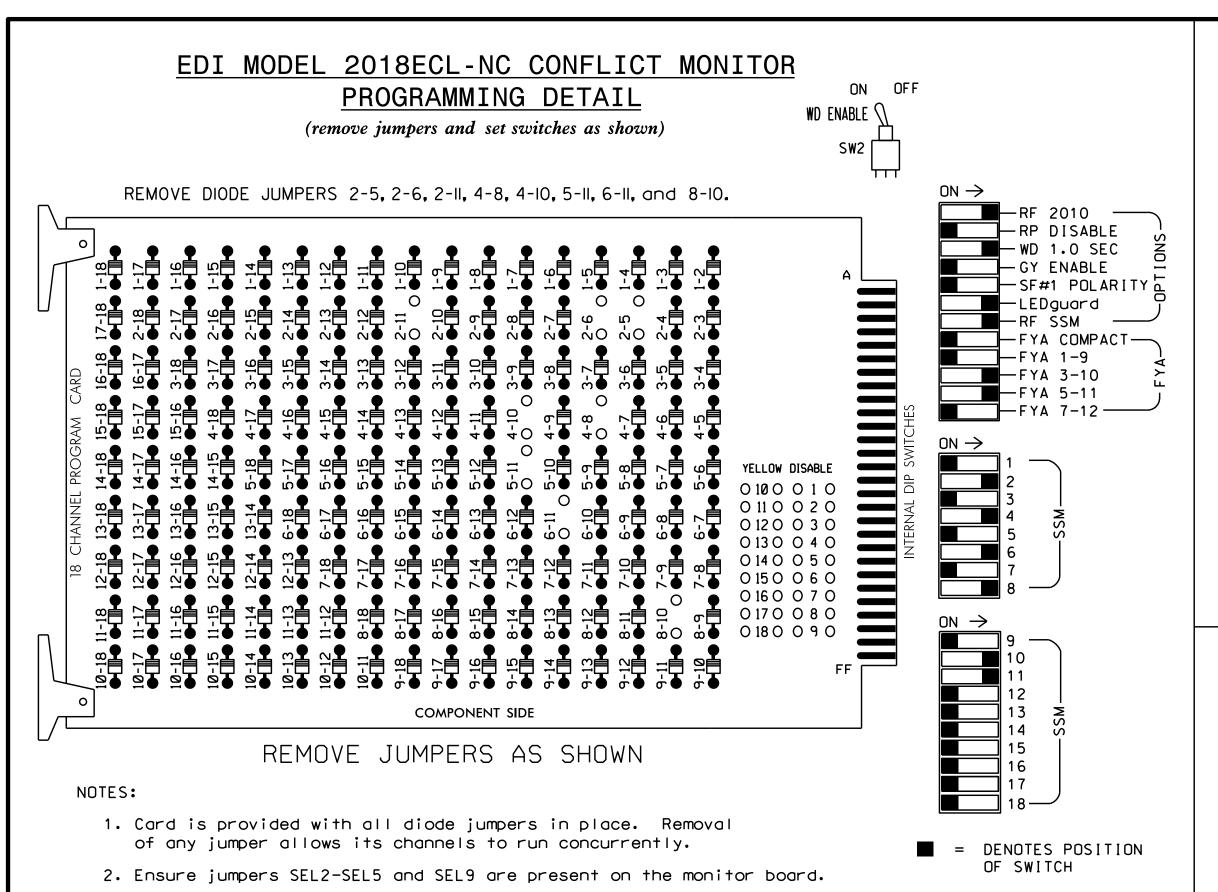
NC 147 NB Ramp / Gann Street Durham County

Signal Upgrade - Temporary Design 1 (TMP Phase 1, Steps 1-10)

NC 55 (South Alston Avenue)

PLAN DATE: September 2014 REVIEWED BY: J Hochanadel REVISIONS INIT. DATE

MyPAL DATE SIG. INVENTORY NO. 05-0284TI



3. Ensure that Red Enable is active at all times during normal operation.

4. Ensure conflict monitor communicates with 2070.

NOTES

- 1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. Verify that signal heads flash in accordance with the signal plans.
- 2. Program controller to Start Up in phases 2 and 6 green.
- 3. Set power-up flash time to 0 seconds within the controller programming. The conflict monitor will govern startup flash. Ensure STARTUP "RED START" is set to 0 seconds.
- 4. Enable Simultaneous Gap-Out feature for all phases.
- 5. Program all timing information into phase banks 1, 2, and 3 unless otherwise noted.
- 6. Set phase bank 3 maximum limit to 250 seconds for phases used.
- 7. Program phases 4 and 8 for Double Entry.
- 8. Ensure start up flash phases are coordinated with flash program block assignments.
- 9. Set the Red Revert interval on the controller to 1 second.
- 10. This cabinet and controller are part of the Durham Signal System.

EQUIPMENT INFORMATION

PROJECT REFERENCE NO. SHEET NO. U-3308 Sig. 6.1

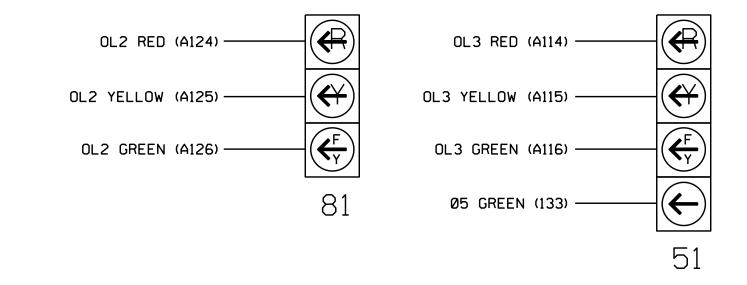
| | SIGNAL HEAD HOOK-UP CHART | | | | | | | | | | | | | | | | | |
|-----------------------------|---------------------------|-------|------------|----|-------|----------|----------------|-------|------------|-----|-------|----------|-----------|-----------|-----------|------------|-----------|-----------|
| LOAD SWITCH NO. | S1 | S2 | S 3 | S4 | S5 | S6 | S 7 | S8 | S 9 | 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 | OL1 | OL2 | SPARE | OL3 | OL4 | SPARE |
| SIGNAL HEAD NO. | NU | 21,22 | NU | NU | 41,42 | NU | ★ 51 | 61,62 | NU | NU | 82,83 | NU | NU | 81 | NU | 5 1 | NU | NU |
| RED | | 128 | | | 101 | | | 134 | | | 107 | | | | | | | |
| YELLOW | | 129 | | | 102 | | * | 135 | | | 108 | | | | | | | |
| GREEN | | 130 | | | 103 | | | 136 | | | 109 | | | | | | | |
| RED ARROW | | | | | | | | | | | | | | A124 | | A114 | | |
| YELLOW ARROW | | | | | | | | | | | | | | A125 | | A115 | | |
| FLASHING YELLOW ARROW | | | | | | | | | | | | | | A126 | | A116 | | |
| GREEN ARROW | | | | | | | 133 | | | | | | | | | | | |

NU = Not Used

- * Denotes install load resistor. See load resistor installation detail this sheet.
- ★ See pictorial of head wiring in detail below.

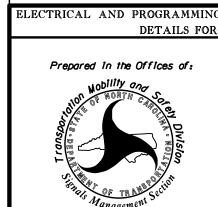
FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-0284T1 DESIGNED: September 2014 SEALED: 4/2/15 REVISED: N/A

Electrical Detail - Temporary Design 1 (TMP Phase 1, Steps 1-10) - Sheet 1 of 2



750 N.Greenfield Pkwy, Garner, NC 27529

NC 55 (South Alston Avenue) at NC 147 NB Ramp / Gann Street

Division 5 Durham County Ds Durham

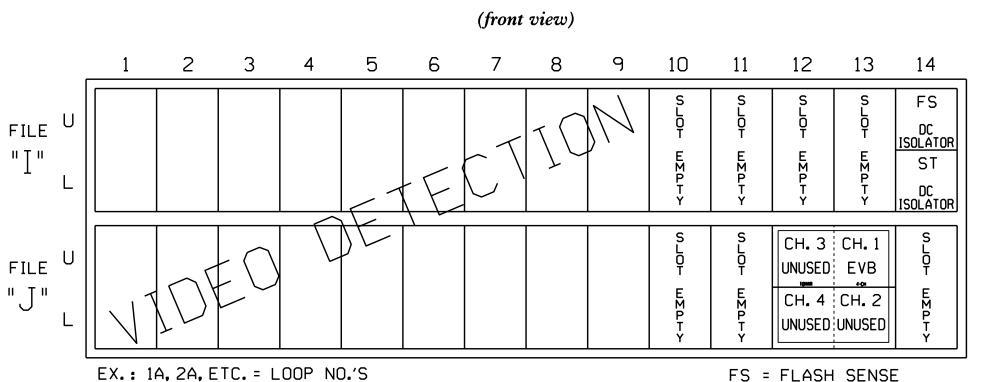
PLAN DATE: November 2014 REVIEWED BY: 978

PREPARED BY: S. Armstrong REVIEWED BY:

REVISIONS INIT. DATE

008453

INPUT FILE POSITION LAYOUT

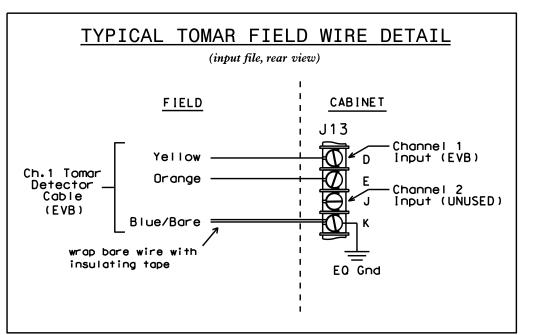


SPECIAL DETECTOR NOTE

Install a video detection system for vehicle detection. Perform installation according to manufacturer's directions and NCDOT engineer approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.

ST = STOP TIME EVB = EMERGENCY VEHICLE PREEMPT

4 CHANNEL TOMAR OSP CARD
INSERT CARD INTO SLOT J13



OVERLAP PROGRAMMING DETAIL

Program overlaps as follows: Main Menu - 4) OVERLAP

Press "+"

OVERLAP [2]:

LOADSWITCH = 10NOTE: For head 81 VEH SET 1 = 8YELLOW CLEARANCE = 3.7

END OF OVERLAP PROGRAMMING

RED CLEARANCE = 1.8

OVERLAP GREEN FLASH PROGRAMMING

DETAIL FOR 3-SECTION FYA HEAD

Main Menu - 1) PHASE - 2) PHASE FUNCTIONS PAGE TWO

The following will cause the overlap green outputs

to flash, which are wired to the flashing yellow

OLAP G FL = 2

arrows. Program as follows:

EMERGENCY VEHICLE PREEMPTION PROGRAMMING

- Program EVB preempt as follows: Main Menu - 2) PREEMPT - 4) EMERGENCY VEHICLE EVB Clear = 2
- 2. Program general preemption parameters as follows: Main Menu - 2) PREEMPT - 6) MISC PREEMPTION PARAMETERS Min Time Before PE ForceOff = 1

unit for 2.0 sec for EVB.

SPECIAL NOTE EV PREEMPT PROGRAMMING

Setting 'FYA DURING PREEMPT' to 'Y' eliminates yellow trap when transitioning to preempt from adjacent through phase. Main Menu - 9) UTILITIES - 9) MISC FYA DURING PREEMPT (Y/N) = Y

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-0284T1 DESIGNED: September 2014 SEALED: 4/2/15 REVISED: N/A

Electrical Detail - Temporary Design 1 (TMP Phase 1, Steps 1-10) - Sheet 2 of 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:

NC 55 (South Alston Avenue) NC 147 NB Ramp / Gann Street

PLAN DATE: November 2014 REVIEWED BY: 978 PREPARED BY: S. Armstrong Reviewed By: REVISIONS INIT. DATE

PROJECT REFERENCE NO.

U-3308

Sig. 6.2

EVB Clearance Phases = 6

Program extend time on optical detector

FYA PPLT PROGRAMMING

Main Menu - 1) PHASE - 2) PHASE FUNCTIONS PAGE TWO

2. Assign output pin for Flashing Yellow Arrow as follows:

3. Redirect RED and YELLOW outputs for the left turn phases

Phase 5 RED = 88, Phase 5 YELLOW = 89

1. Program Flashing Yellow Arrow phases as follows:

PPLT FYA = PHASE 5

Main Menu - 6) OUTPUTS - 8) REDIRECT PHASE

Main Menu - 6) OUTPUTS - F) FYA PPLT

Phase 5 = 90

FLASHER CIRCUIT MODIFICATION DETAIL

IN ORDER TO INSURE THAT SIGNALS FLASH CONCURRENTLY ON THE

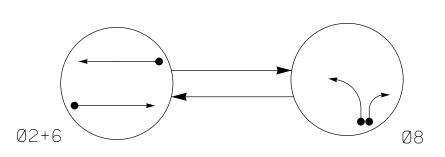
1. ON REAR OF PDA - REMOVE WIRE FROM TERM. T2-4 AND TERMINATE ON T2-2.

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

3. REMOVE FLASHER UNIT 2.

as follows:

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



PHASING DIAGRAM DETECTION LEGEND

DETECTED MOVEMENT

UNSIGNALIZED MOVEMENT

PEDESTRIAN MOVEMENT

2033 EV PREEMPTION

TIMING CHART 2033 SOFTWARE w/2070 CONTROLLER

VEH. RECALL VEH. RECALL

YELLOW LOCK YELLOW LOCK

1 () **SEC**.

SEC.

— SEC.

SEC.

SEC.

SEC.

SEC.

SEC.

3 . 0 **SEC**.

SEC.

3 **.** ○ **SEC**.

(SECONDS)

0

2.0

10 **SEC**. 7 **SEC**.

4.0 **SEC**. 3.8 **SEC**. 3.0 **SEC**. 3.0 **SEC**.

3.0 **SEC**. 3.0 **SEC**. 2.0 **SEC**.

1.6 SEC. 1.6 SEC. 1.4 SEC.

50 **SEC**. 50 **SEC**. 35 **SEC**.

SEC.

SEC.

SEC.

SEC.

— SEC.

— SEC.

— SEC.

3 **.** 0 **SEC**.

3 **.** 0 **SEC**.

SEC.

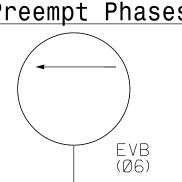
0L2

O SEC.

FUNCTION

UNDETECTED MOVEMENT (OVERLAP)

EV Preempt Phases





| TABLE OF | 0PI | ERA | TIO | N |
|----------------|------|--------|-----|---------------|
| | | PHA | 4SE | |
| SIGNAL FACE | Ø2+6 | Ø 8 | E>B | FLASH |
| 21,22 | () | R | R | Y |
| 61,62 | G | R | G | Υ |
| 81 | + | F | + | -R |
| 82;83 | R | G | R | R |

SIGNAL FACE I.D.

All Heads L.E.D.

| | * See | Note 9 | |
|-----|-------|--------------------|-------------------------|
| 12" | 12" | R Y 12" | R Y 12" |
| 51* | 81 | 41,42 * | 21,22 61,62 82,83 |

| |) | |
|---|-------------------------|----|
| | $\left(\gt\right)$ | 12 |
| | G | |
| (| 21,22 61,62 82,83 | |
| | | |

2033 SOFTWARE w/ 2070 CONTROLLER LOOP & DETECTOR UNIT INSTALLATION CHART

| | | | | | | | TECTOR PROGRAMMING | | | | | | | | | | | | | | |
|-----------------|------|-------|-----------------|-----|----------|-------|--------------------|------------|--------------|------|----------------|---------------|--------|-------|-----------|------|---------|-----------|--------|-----|----------|
| INDUCTIVE LOOPS | | | | | | | | ATTRIBUTES | | | | | PS | STA | TUS | | | | | | |
| | _ | | | | | | TIMING | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 0 | | ,, | |
| | SIZE | | DIST. FROM | > | NG | NEMA | | | | | TIME AY | TRIAN LL | SERVED | Ę | NO. | က | ა Z | VATE | | NEW | EXISTING |
| LOOP NO. | (ft) | TURNS | STOPBAR (ft) | NEW | EXISTING | PHASE | DEL | AY | CAF (STRE | | FULL T DELA | PEDEST CAL | RESER | COUNT | EXTENSION | TYPE | CALLING | ALTERNATE | SYSTEM | Ž | EXIS |
| 2A | 6×6 | * | 70 | - | * | 2 | - | SEC. | - | SEC. | - | 1 | - | _ | Χ | _ | Χ | - | - | 1 | * |
| 6A | 6×6 | * | 70 | - | * | 6 | _ | SEC. | - | SEC. | _ | 1 | - | _ | Χ | _ | Χ | - | - | 1 | * |
| 8.8 | 6×40 | * | 0 | - | * | 8 | 5 | SEC. | - | SEC. | _ | ı | ı | _ | Χ | İ | Χ | ı | - | ı | * |
| 8B | 6×40 | * | 0 | - | * | 8 | 10 | SEC. | - | SEC. | _ | I | ı | _ | Χ | _ | Χ | ı | - | ı | * |

* Video Detection Zone

PROJECT REFERENCE NO. Sig. 7.0 U-3308

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

NOTES

- 1. Refer to "Road Standard Drawings NCDOT" dated January 2012, "Standard Specifications for Roads and Structures" dated January 2012.
- 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. Program all timing information into phase banks 1,2, and 3 unless otherwise noted.
- 5. Set phase bank 3 maximum limit to 250 seconds for phases used.
- 6. This intersection features an optical preemption system. Shown locations of optical detectors are conceptual only.
- 7. Upon completion of Emergency Vehicle Preemption, controller returns to normal operation.
- 8. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- 9. Bag and disconnect signal heads #41,#42, and #51 during this phase of construction.
- 10. Contractor shall adjust video detection zones as required.

| S. Alston Ave.) | 81 82 Mph - 4% Grade | | +1% Grade | ———R/W |
|---|----------------------|--------------------------------------|------------|--------|
| 2A □ → (35 Mph -2% Grade) x 35 Mph -2% Grade | 92 | A 10 21 22 B NC 55 (S. Als | ston Ave.) | R/W |

LEGEND

| <u>PROPOSED</u> | | EXISTING |
|--|---|-----------------|
| \bigcirc | Traffic Signal Head | |
| (-> | Modified Signal Head | N/A |
| \dashv | Sign | \dashv |
| | Pedestrian Signal Head With Push Button & Sign | • |
| \bigcirc | Signal Pole with Guy | |
| Si | gnal Pole with Sidewalk Guy | |
| | Inductive Loop Detector | |
| | Controller & Cabinet | × |
| | Junction Box | |
| | 2-in Underground Conduit | |
| N/A | Right of Way | |
| \longrightarrow | Directional Arrow | |
| $\langle \underline{\mathbb{A}} \rangle$ | "No Left Turn" (R3-2) | |
| ⟨B⟩ | "No Right Turn" (R3-1) | B |
| \bigcirc | Optical Detector | |
| | Work Area | N/A |
| | Drums | N/A |
| ——E—— | Construction Easement | N/A |
| —— PUE —— F | Permanent Utility Easement | N/A |
| | Barricades | N/A |
| | Direct Bury | |
| | Video Detector | |
| | Video Detection Area | |

Signal Upgrade - Temporary Design 2 (TMP Phase 1, Steps 1-10)



NC 55 (South Alston Avenue)

NC 147 NB Ramp / Gann Street Division 5 Durham County PLAN DATE: September 2014 REVIEWED BY: J Hochanadel

750 N.Greenfield Pkwy,Garner,NC 27529 PREPARED BY: C Lawson REVISIONS INIT. DATE

MyPAL DATE SIG. INVENTORY NO. 05-0284T2

1025 Wade Avenue Raleigh, NC 27605 Tel:919-789-9977

^c 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.

SEC.

SEC.

SEC.

SEC.

— SEC.

SEC.

SEC.

SEC.

2 . O SEC.

DELAY BEFORE PREEMPT MIN. PED. CLEAR BEFORE PREEMPT MIN. GREEN BEFORE PREEMPT CLEARANCE TIME PREEMPT EXTEND** ** Program Timing on Optical Detector Unit MINIMUM INITIAL * **VEHICLE EXTENSION *** YELLOW CHANGE INT. RED CLEARANCE

FLASHING DON'T WALK

MIN PED CLEARANCE

ALTERNATE EXTENSION

ADD PER VEHICLE *

MAXIMUM INITIAL *

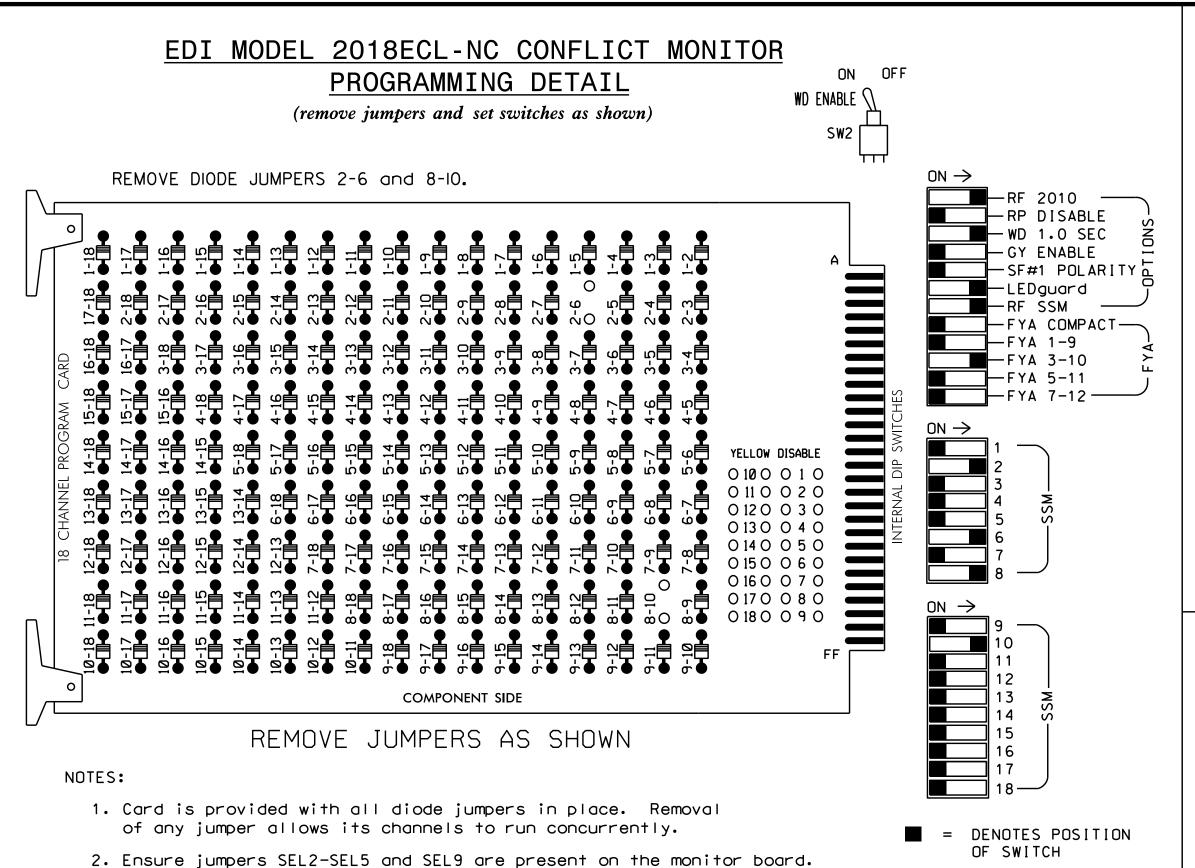
REDUCE 0.1 SEC EVERY

MAXIMUM GAP*

MINIMUM GAP

TYPE 3 LIMIT

MAXIMUM LIMIT * **RECALL POSITION** VEHICLE CALL MEMORY DOUBLE ENTRY



3. Ensure that Red Enable is active at all times during normal operation.

4. Ensure conflict monitor communicates with 2070.

NOTES

- 1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. Verify that signal heads flash in accordance with the signal plans.
- 2. Program controller to Start Up in phases 2 and 6 green.
- 3. Set power-up flash time to 0 seconds within the controller programming. The conflict monitor will govern startup flash. Ensure STARTUP "RED START" is set to 0 seconds.
- 4. Enable Simultaneous Gap-Out feature for all phases.
- 5. Program all timing information into phase banks 1, 2, and 3 unless otherwise noted.
- 6. Set phase bank 3 maximum limit to 250 seconds for phases used.
- Ensure start up flash phases are coordinated with flash program block assignments.
- 8. Set the Red Revert interval on the controller to 1 second.
- 9. This cabinet and controller are part of the Durham Signal System.

EQUIPMENT INFORMATION

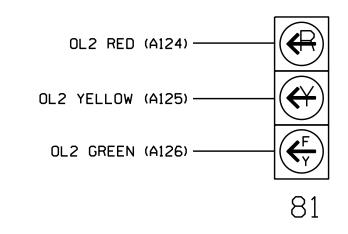
PROJECT REFERENCE NO. SHEET NO. U-3308 Sig. 7.1

SIGNAL HEAD HOOK-UP CHART CMU CHANNEL NO. l 15 ^l 8 8 OL1 OL2 SPARE OL3 OL4 SPARE PHASE NU 21,22 NU NU NU NU NU 61,62 NU NU 82,83 NU NU HEAD NO. 107 RED YELLOW 109 130 GREEN RED ARROW YELLOW ARROW FLASHING YELLOW ARROW GREEN ARROW

NU = Not Used

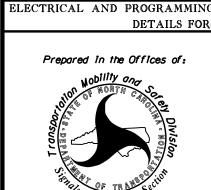
★ See pictorial of head wiring in detail below.

FYA SIGNAL WIRING DETAIL



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-0284T2 DESIGNED: September 2014 SEALED: 4/2/15 REVISED: N/A

Electrical Detail - Temporary Design 2 (TMP Phase 1, Steps 1-10) - Sheet 1 of 2



750 N.Greenfield Pkwy, Garner, NC 27529

NC 55 (South Alston Avenue) at NC 147 NB Ramp / Gann Street

Division 5 Durham County Ds Durham

PLAN DATE: November 2014 REVIEWED BY: 9772

PREPARED BY: S. Armstrong REVIEWED BY:

REVISIONS INIT. DATE

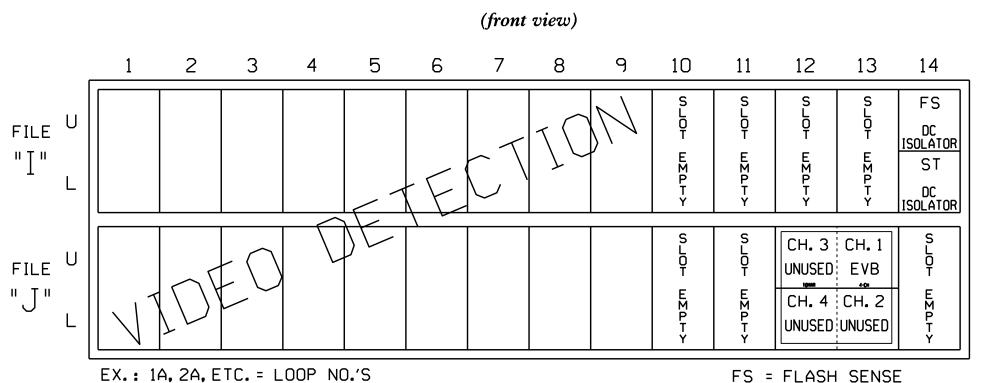
SEAL 008453

OF ES S/ON A SEAL ON A

INS INIT. DATE

| Docusigned by:
| John T. Rowe, Jr. 4/2/2015
| 641D60C145EE4F5... DATE
| SIG. INVENTORY NO. 05-0284T2

INPUT FILE POSITION LAYOUT



SPECIAL DETECTOR NOTE

Install a video detection system for vehicle detection. Perform installation according to manufacturer's directions and NCDOT engineer approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.

EVB = EMERGENCY VEHICLE PREEMPT

ST = STOP TIME

4 CHANNEL TOMAR OSP CARD INSERT CARD INTO SLOT J13

| | FIELD WIRE DETAIL file, rear view) |
|--|--|
| Ch.1 Tomar Detector Cable (EVB) Wrap bare wire with insulating tape | CABINET J13 Channel 1 Input (EVB) E Channel 2 Input (UNUSED) K E0 Gnd |

OVERLAP PROGRAMMING DETAIL

Program overlaps as follows: Main Menu - 4) OVERLAP

Press "+"

OVERLAP [2]:

LOADSWITCH = 10NOTE: For head 81 VEH SET 1 = 8YELLOW CLEARANCE = 3.0

END OF OVERLAP PROGRAMMING

RED CLEARANCE = 1.4

OVERLAP GREEN FLASH PROGRAMMING DETAIL FOR 3-SECTION FYA HEAD

The following will cause the overlap green outputs to flash, which are wired to the flashing yellow arrows. Program as follows:

Main Menu - 1) PHASE - 2) PHASE FUNCTIONS PAGE TWO OLAP G FL = 2

EMERGENCY VEHICLE PREEMPTION PROGRAMMING

- 1. Program EVB preempt as follows: Main Menu - 2) PREEMPT - 4) EMERGENCY VEHICLE EVB Clear = 2EVB Clearance Phases = 6
- 2. Program general preemption parameters as follows: Main Menu - 2) PREEMPT - 6) MISC PREEMPTION PARAMETERS Min Time Before PE ForceOff = 1

Program extend time on optical detector unit for 2.0 sec for EVB.

PROJECT REFERENCE NO. Sig. 7.2 U-3308

FLASHER CIRCUIT MODIFICATION DETAIL

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

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

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

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-0284T2 DESIGNED: September 2014 SEALED: 4/2/15 REVISED: N/A

Electrical Detail - Temporary Design 2 (TMP Phase 1, Steps 1-10) - Sheet 2 of 2

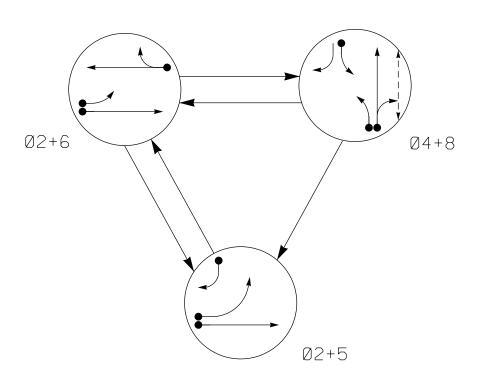
ELECTRICAL AND PROGRAMMING DETAILS FOR: Prepared in the Offices of:

NC 55 (South Alston Avenue) NC 147 NB Ramp / Gann Street

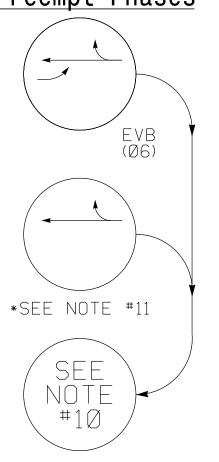
Durham County

PLAN DATE: November 2014 REVIEWED BY: 978 PREPARED BY: S. Armstrong Reviewed BY: REVISIONS INIT. DATE

PHASING DIAGRAM



EV Preempt Phases



| TABLE OF OPERATION | | | | | | | | | | |
|--------------------|-------------|-------------|------------------|--------------|------------------|--|--|--|--|--|
| | PHASE | | | | | | | | | |
| SIGNAL | Ø | Ø | Ø | F | F | | | | | |
| FACE | 02+5 | Ø2+6 | Ø 4 + 8 | E V B | L A S H | | | | | |
| 21, 22 | G | G | R | R | Y | | | | | |
| 41 | | # | F | | -R | | | | | |
| 42 | R | R | G | R | R | | | | | |
| 43 | R/ | R | G | R | R | | | | | |
| 51 | — | F }≻ | | F | → | | | | | |
| 61,62 | R | G | R | G | Y | | | | | |
| 81 | | # | F | | -R | | | | | |
| 82,83 | R | R | G | R | R | | | | | |
| P81 , P82 | D-W | DW | W | D·W | DRK | | | | | |

SIGNAL FACE I.D.

All Heads L.E.D. * See Note 14

| 2 | 03 | 3 SOFTWAR | E w/ | 2070 | CONTROLL | ER |
|------|----|-----------|------|------|----------|-------|
| L00P | & | DETECTOR | UNIT | INST | ALLATION | CHART |

DETECTOR PROGRAMMING

| TND.10TT.17 | | | | | DETECTOR PROGRAMMINISTING | | | | | | | | | | | | | | | |
|-----------------|--------------|--------|-------------------------------|-----|---------------------------|---------------|---------|-----|--------------|--------------------|--------------------|----------|-------|-----------|--------|---------|-----------|----------|-----|----------|
| INDUCTIVE LOOPS | | | | | | | | | | | Α٦ | TTRI | BUT | ES | | | SPS | STA | TUS | |
| | | | | | | | TIM | ING | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | LOOPS | | () |
| LOOP NO. | SIZE (ft) | TURNS | DIST. FROM STOPBAR (ft) | NEW | EXISTING | NEMA PHASE | DELAY | 1 | RRY ETCH) | FULL TIME DELAY | PEDESTRIAN CALL | RESERVED | COUNT | EXTENSION | TYPE 3 | CALLING | ALTERNATE | SYSTEM L | NEW | EXISTING |
| 2A | 6×6 | * | 70 | - | * | 2 | - SEC. | _ | SEC. | - | _ | _ | _ | Χ | - | X | _ | _ | _ | * |
| 4A | 6×40 | * | 0 | * | - | 4 | 3 SEC. | _ | SEC. | _ | _ | _ | _ | Χ | _ | Χ | _ | _ | _ | * |
| 5A | 6×40 | * | 0 | | * | 5 | 15 SEC. | _ | SEC. | _ | _ | _ | - | Χ | _ | Χ | _ | - | - | * |
| JA | 0 0 0 0 0 | 不 | U | | 不 | 2 | - SEC. | _ | SEC. | - | _ | _ | _ | Χ | - | Χ | _ | - | _ | * |
| 5B | 6×40 | * | 0 | * | - | 5 | 15 SEC. | - | SEC. | - | _ | _ | _ | Χ | _ | Χ | _ | - | * | - |
| 6A | 6×6 | * | 70 | - | * | 6 | - SEC. | _ | SEC. | - | - | - | _ | Χ | - | Χ | _ | - | - | * |
| 8.8 | 6×40 | * | 0 | - | * | 8 | - SEC. | _ | SEC. | - | _ | _ | _ | Χ | - | Χ | _ | _ | _ | * |
| 8B | 6×40 | * | 0 | - | * | 8 | 10 SEC. | _ | SEC. | _ | _ | _ | - | Χ | _ | Χ | _ | - | _ | * |
| PEDES | TRIAN | DETECT | ION | | | | | | | | | | | | | | | | | |
| P81,P82 | N/A | N/A | N/A | Х | _ | 8 | - SEC. | _ | SEC. | _ | Х | - | - | - | _ | _ | - | _ | Χ | _ |

* Video Detection Zone

PHASING DIAGRAM DETECTION LEGEND

DETECTED MOVEMENT

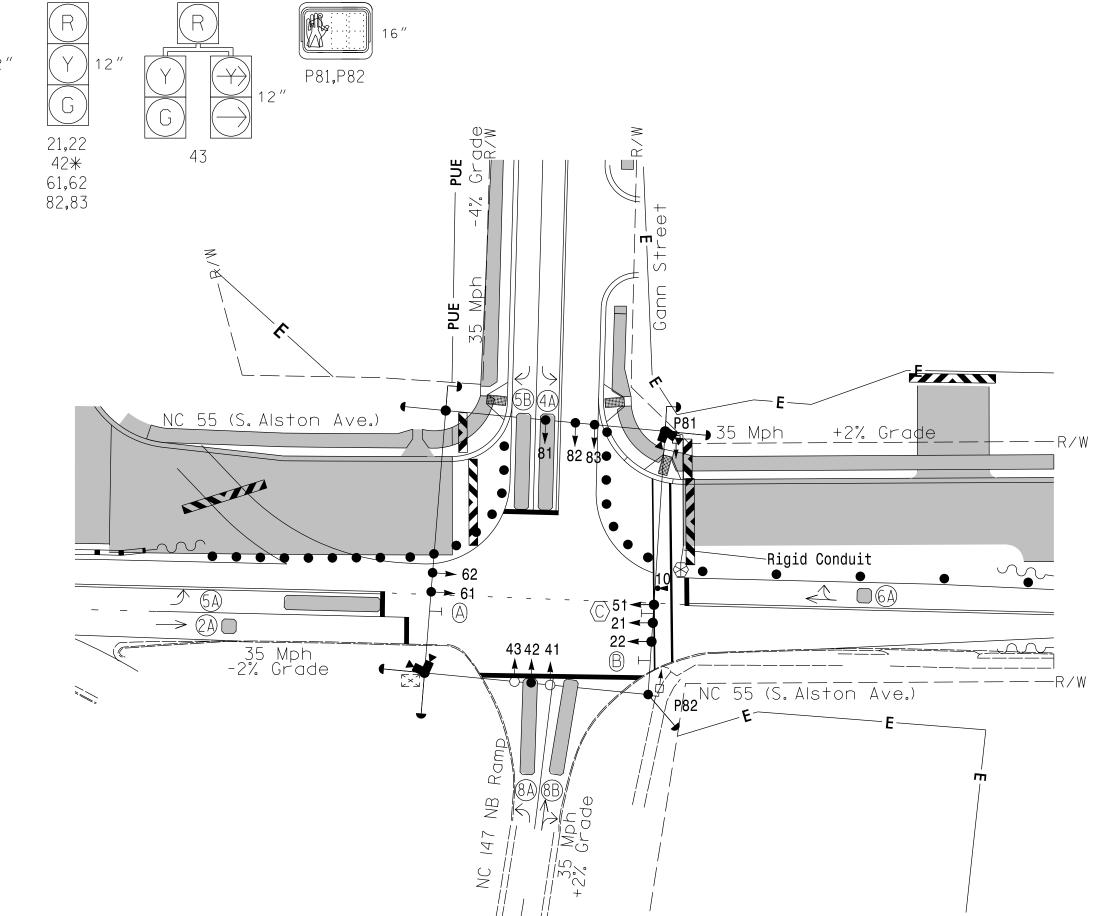
UNDETECTED MOVEMENT (OVERLAP) UNSIGNALIZED MOVEMENT

| <> | PEDESTRIAN | MOVEMENT | |
|----|------------|----------|--|
| | | | |

| 2033 EV PREEMPT | ON |
|--------------------------------|------------------|
| FUNCTION | EVB (SECONDS) |
| DELAY BEFORE PREEMPT | 0 |
| MIN. PED. CLEAR BEFORE PREEMPT | * |
| MIN. GREEN BEFORE PREEMPT | 1 |
| CLEARANCE TIME | 2 |
| PREEMPT EXTEND** | 2.0 |

* See Timing Chart for Min Ped Clearance

** Program Timing on Optical Detector Unit



| TIMING CHART 2033 SOFTWARE w/2070 CONTROLLER | | | | | | | | | |
|--|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|------------------|------------------|--|--|
| | T | 2033 SUF | I | 1 | <u> </u> | I | | | |
| HASE | Ø2 | 04 | Ø5 | Ø6 | Ø8 | OL2 | OL4 | | |
| MINIMUM INITIAL * | 1 () SEC . | 7 SEC . | 7 SEC . | 1 () SEC . | 7 SEC . | O SEC. | O SEC. | | |
| 'EHICLE EXTENSION * | 3.0 SEC . | 2.0 SEC . | 2.0 SEC . | 3.0 SEC . | 2.0 SEC . | | | | |
| ELLOW CHANGE INT. | 4.0 SEC . | 3.7 SEC . | 4.0 SEC . | 4.0 SEC . | 3.7 SEC . | 3.7 SEC . | 3.7 SEC . | | |
| ED CLEARANCE | 2.1 SEC . | 2.3 SEC . | 2.6 SEC . | 2.1 SEC . | 2.3 SEC . | 2.3 SEC . | 2.3 SEC . | | |
| MAXIMUM LIMIT * | 50 SEC . | 35 SEC . | 15 SEC . | 50 SEC . | 35 SEC . | | | | |
| ECALL POSITION | VEH. RECALL | NONE | NONE | VEH. RECALL | NONE | | | | |
| EHICLE CALL MEMORY | YELLOW LOCK | NONE | NONE | YELLOW LOCK | NONE | | | | |
| OUBLE ENTRY | OFF | ON | OFF | OFF | ON | | | | |
| VALK * | - SEC. | – SEC. | - SEC. | – SEC. | 4 SEC. | | | | |
| LASHING DON'T WALK | - SEC. | - SEC. | - SEC. | – SEC. | 8 SEC . | | | | |
| AIN PED CLEARANCE | - SEC. | – SEC. | – SEC. | – SEC. | 4 SEC. | | | | |
| YPE 3 LIMIT | - SEC. | – SEC. | - SEC. | - SEC. | - SEC. | | | | |
| LTERNATE EXTENSION | - SEC. | | | | |
| DD PER VEHICLE * | - SEC. | | | | |
| MAXIMUM INITIAL * | - SEC. | | | | |
| MAXIMUM GAP* | 3 . O SEC. | 2 . O SEC. | 2 . O SEC . | 3 . 0 SEC . | 2 . 0 SEC . | | | | |
| EDUCE 0.1 SEC EVERY * | - SEC. | | | | |
| AINIMUM GAP | 3 . 0 SEC . | 2 . 0 SEC . | 2 . 0 SEC . | 3 . 0 SEC . | 2 . 0 SEC . | | | | |

'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

1025 Wade Avenue Raleigh, NC 27605 Tel:919-789-9977 Fax:919-789-9591 License #: C-2197

Prepared for the Offices of:

NC 55 (South Alston Avenue)

NC 147 NB Ramp / Gann Street Division 5 Durham County PLAN DATE: September 2014 | REVIEWED BY: J Hochanadel

INIT. DATE

SEAL

Sig. 8.0

Fully Actuated w/ EV Preemption (Durham Signal System)

3 Phase

NOTES

- 1. Refer to "Road Standard Drawings NCDOT" dated January 2012, "Standard Specifications for Roads and Structures" dated January 2012.
- 2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- 3. Phase 5 may be lagged.
- 4. Set all detector units to presence mode.
- 5. Program all timing information into phase banks 1,2, and 3 unless otherwise noted.
- 6. Set phase bank 3 maximum limit to 250 seconds for phases used.
- 7. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls
- 8. Program pedestrian heads to countdown the flashing "Don't Walk" time.
- 9. This intersection features an optical preemption system. Shown locations of optical detectors are conceptual only.
- 10. Upon completion of Emergency Vehicle Preemption, controller returns to normal operation.
- 11. When EVB preemption initializes during side street service signal head 51 will display a red arrow.
- 12. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- 13. Pedestrian pedestals are conceptual and shown for reference only. See sheets P1-P3 for pushbutton location details
- 14. Reconnect and unbag signal heads #41, #42, and #51 during this phase of construction.
- 15. Contractor to maintain pedestrians through construction
- 16. Contractor shall adjust video detection zones as required.

PROPOSED

Traffic Signal Head

LEGEND

EXISTING

N/A

N/A

N/A

 \bigcirc **—** Modified Signal Head N/A Sign \rightarrow Pedestrian Signal Head With Push Button & Sign Signal Pole with Guy Signal Pole with Sidewalk Guy Inductive Loop Detector Controller & Cabinet Junction Box 2-in Underground Conduit -----____ N/A Right of Way _____ Directional Arrow "No Left Turn" (R3-2) "No Right Turn" (R3-1) Left Arrow "ONLY" Sign (R3-5L) Work Area N/A N/A Drums

—— Construction Easement

Barricades

Optical Detector

Type I Pushbutton Post Rigid Conduit

Video Detector

Video Detection Area

—— PUE —— Permanent Utility Easement

Signal Upgrade - Temporary Design 3 (TMP Phase 1, Steps 11-21)

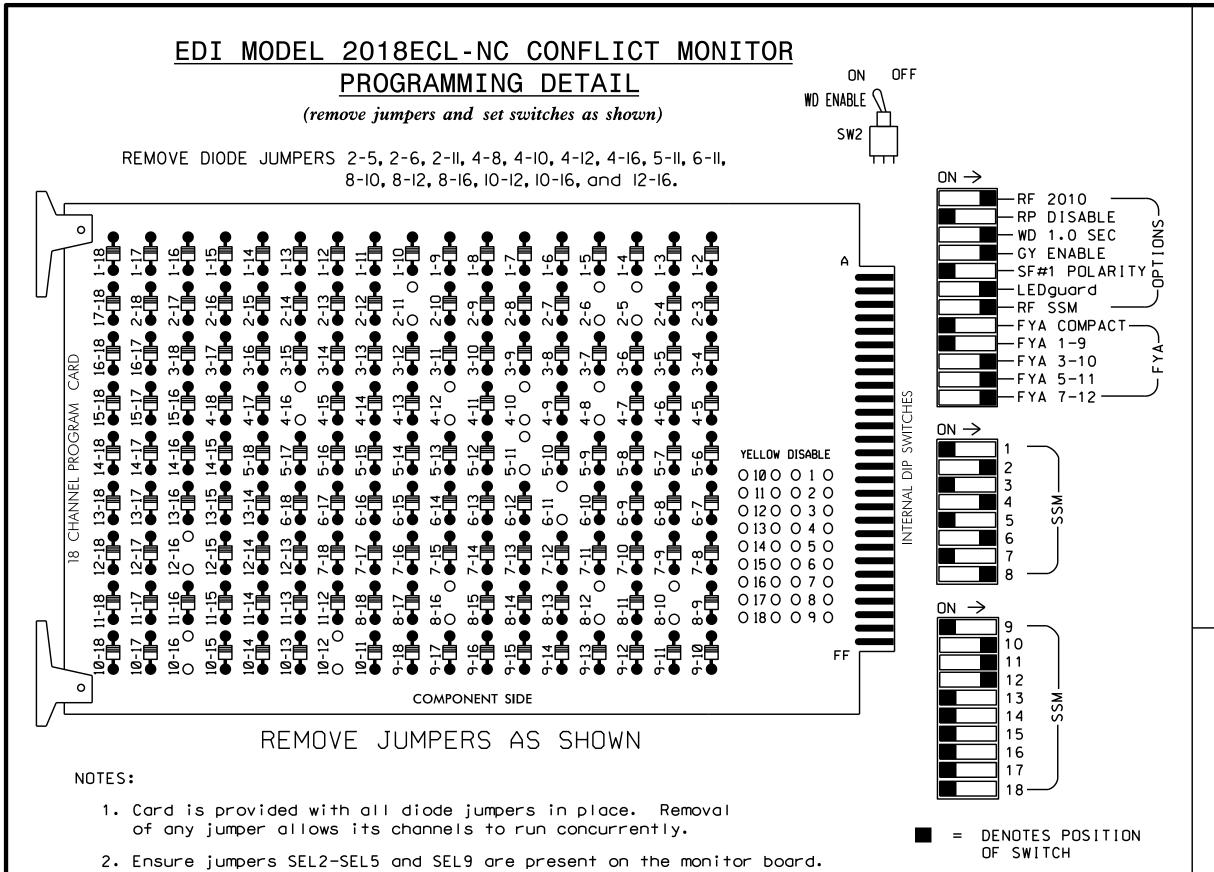
 \bigcirc

50 N.Greenfield Pkwy,Garner,NC 27529 PREPARED BY: C Lawson

MyPAN

SEAL

4/02/15 DATE SIG. INVENTORY NO. 05-0284T3



INPUT FILE POSITION LAYOUT

(front view)

1 2 3 4 5 6 7 8 9 10 11 12 13 14

3. Ensure that Red Enable is active at all times during normal operation.

4. Ensure conflict monitor communicates with 2070.

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

SPECIAL DETECTOR NOTE

Install a video detection system

for vehicle detection. Perform

installation according to manufacturer's directions and NCDOT engineer approved

Design Plans.

NOTES

- 1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. Verify that signal heads flash in accordance with the signal plans.
- 2. Program controller to Start Up in phases 2 and 6 green.
- 3. Set power-up flash time to 0 seconds within the controller programming. The conflict monitor will govern startup flash. Ensure STARTUP "RED START" is set to 0 seconds.
- 4. Enable Simultaneous Gap-Out feature for all phases.
- 5. Program all timing information into phase banks 1, 2, and 3 unless otherwise noted.
- 6. Set phase bank 3 maximum limit to 250 seconds for phases
- 7. Program phases 4 and 8 for Double Entry.
- 8. Ensure start up flash phases are coordinated with flash program block assignments.
- 9. Program Startup Ped Calls for phase 8.
- 10. Set the Red Revert interval on the controller to 1 second.
- 11. This cabinet and controller are part of the Durham Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070E SOFTWARE...........McCAIN 2033 CABINET MOUNT.....BASE OUTPUT FILE POSITIONS...18 WITH AUX FILE LOAD SWITCHES USED......\$2,\$5,\$7,\$8,\$11,\$12,AUX \$2, AUX S4, AUX S5

PHASES USED......2,4,5,6,8,8PED OVERLAP 1.....NOT USED

OVERLAP 2.....4+8 OVERLAP 3.....* OVERLAP 4.....4+8

* See FYA PPLT Programming detail on sheet 2.

SIGNAL HEAD HOOK-UP CHART LOAD SWITCH NO. S2 S3 S4 S5 S8 | S9 | S10 | S11 | S12 | S6 CMU CHANNEL | 17 | 11 | 12 | 18 15 7 13 8 OL1 OL2 SPARE OL3 OL4 SPARE 51 61,62 NU NU 82,83 P81, P82 SIGNAL HEAD NO. NU 21,22 NU NU 42,43 NU 43 128 101 134 RED 129 102 135 108 YELLOW 130 103 136 109 GREEN RED ARROW A124 A114 A101 YELLOW ARROW A115 A102 132 FLASHING YELLOW ARROW A126 A116 A103 GREEN ARROW 133 | 133 110

PROJECT REFERENCE NO.

U-3308

Sig 8 1

NU = Not Used

★ See pictorial of head wiring in detail below.

OL2 RED (A124) -

OL2 YELLOW (A125) -

OL2 GREEN (A126)

OL3 RED (A114)

OL3 YELLOW (A115)

OL3 GREEN (A116)

05 GREEN (133)

| PED PUSH BUTTONS | LOOP TERMINAL | | DETECTOR NO. | PIN NO. | ATTRIBUTES | NEMA PHASE |
|---------------------|------------------|------|-----------------|------------|------------|---------------|
| P81 , P82 | TB8-8,9 | I13L | 28 | 70 | 2 | 8 PED |

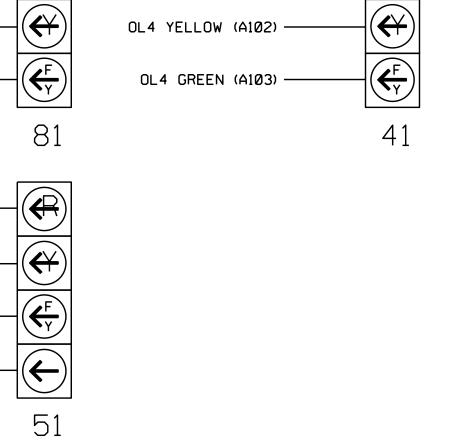
DETECTOR ATTRIBUTES LEGEND:

2-PED CALL 3-RESERVED 4-COUNTING 5-EXTENSION 6-TYPE 3

NOTE: INSTALL DC ISOLATOR IN INPUT FILE SLOT I13.

INPUT FILE POSITION LEGEND: J2L FILE J-SLOT 2-

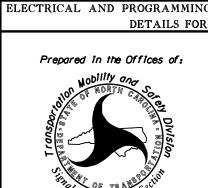
FYA SIGNAL WIRING DETAIL (wire signal heads as shown)



OL4 RED (A101)

112

Electrical Detail - Temporary Design 3 (TMP Phase 1, Steps 11-21) - Sheet 1 of 2



NC 55 (South Alston Avenue)

NC 147 NB Ramp / Gann Street ivision 5 Durham PLAN DATE: November 2014 REVIEWED BY:

PREPARED BY: S. Armstrong Reviewed BY: REVISIONS INIT. DATE

008453

mounting locations to accomplish the (input file, rear view) detection schemes shown on the Signal <u>FIELD</u> CABINET — Channel 1 Input (EVB) Ch.1 Tomar Detector -Cable — Channel 2 Input (UNUSED) (EVB) Blue/Bare wrap bare wire with insulating tape EQ Gnd

NOT USED

UNUSED EVB

CH. 4 CH. 2

UNUSED UNUSED

EVB = EMERGENCY VEHICLE PREEMPT

4 CHANNEL TOMAR OSP CARD

INSERT CARD INTO SLOT J13

FS = FLASH SENSE ST = STOP TIME

TYPICAL TOMAR FIELD WIRE DETAIL

INPUT FILE CONNECTION & PROGRAMMING CHART

| | PED PUSH BUTTONS | LOOP TERMINAL | INPUT FILE POS. | DETECTOR NO. | PIN NO. | ATTRIBUTES | NEMA PHASE |
|---|---------------------|------------------|--------------------|-----------------|------------|------------|---------------|
| [| P81 , P82 | TB8-8 , 9 | I13L | 28 | 70 | 2 | 8 PED |

1-FULL TIME DELAY

7-CALLING 8-ALTERNATE

LOWER-

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-0284T3 DESIGNED: September 2014 SEALED: 4/2/15

REVISED: N/A

FILE U 1

ПΤП

FILE

ΠТП

750 N.Greenfield Pkwy, Garner, NC 27529

SIG. INVENTORY NO. 05-0284T3

OVERLAP PROGRAMMING DETAIL

Program overlaps as follows:

Main Menu - 4) OVERLAP Press "+" OVERLAP [2]: LOADSWITCH = 10NOTE: For head 81 VEH SET 1 = 4.8YELLOW CLEARANCE = 3.7 RED CLEARANCE = 2.3Press "+" twice

NOTE: For head 41

LOADSWITCH = 12VEH SET 1 = 4.8YELLOW CLEARANCE = 3.7 RED CLEARANCE = 2.3

OVERLAP [4]:

END OF OVERLAP PROGRAMMING

EMERGENCY VEHICLE PREEMPTION PROGRAMMING

- 1. Program EVB preempt as follows: Main Menu - 2) PREEMPT - 4) EMERGENCY VEHICLE EVB Clear = 2 EVB Clearance Phases = 6
- 2. Program general preemption parameters as follows: Main Menu - 2) PREEMPT - 6) MISC PREEMPTION PARAMETERS Min Time Before PE ForceOff = 1
- 3. Ped Clear Before Preempt is a pedestrian timing parameter, and is programmed as follows: Main Menu - 1) PHASE - 5) PEDESTRIAN TIMING PHASE 8 MIN FDW = 4

Program extend time on optical detector unit for 2.0 sec for EVB.

FYA PPLT PROGRAMMING

PROJECT REFERENCE NO.

U-3308

Sig. 8.2

- 1. Program Flashing Yellow Arrow phases as follows: Main Menu - 1) PHASE - 2) PHASE FUNCTIONS PAGE TWO PPLT FYA = PHASE 5
- 2. Assign output pin for Flashing Yellow Arrow as follows: Main Menu - 6) OUTPUTS - F) FYA PPLT Phase 5 = 90
- 3. Redirect RED and YELLOW outputs for the left turn phases as follows: Main Menu - 6) OUTPUTS - 8) REDIRECT PHASE

Phase 5 RED = 88, Phase 5 YELLOW = 89

OVERLAP GREEN FLASH PROGRAMMING DETAIL FOR 3-SECTION FYA HEADS

The following will cause the overlap green outputs to flash, which are wired to the flashing yellow arrows. Program as follows:

Main Menu - 1) PHASE - 2) PHASE FUNCTIONS PAGE TWO OLAP G FL = 2.4

MIN WALK DURING PREEMPTION PROGRAMMING

To disable MIN WALK pedestrian timing during preemption, program the controller as follows: Main Menu - 9) UTILITIES - 5) CONFIGURATION EXTRA TWO = 3

SPECIAL NOTE EV PREEMPT PROGRAMMING

Setting 'FYA DURING PREEMPT' to 'Y' eliminates yellow trap when transitioning to preempt from adjacent through phase. Main Menu - 9) UTILITIES - 9) MISC FYA DURING PREEMPT (Y/N) = Y

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.

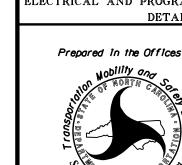
FLASHER CIRCUIT MODIFICATION DETAIL

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

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

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

Electrical Detail - Temporary Design 3 (TMP Phase 1, Steps 11-21) - Sheet 2 of 2 NC 55 (South Alston Avenue) ELECTRICAL AND PROGRAMMING DETAILS FOR



NC 147 NB Ramp / Gann Street

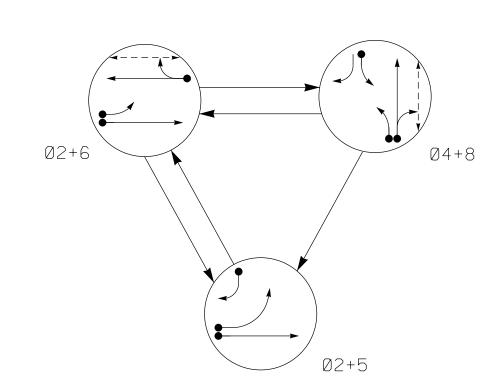
ivision 5 Durham PLAN DATE: November 2014 REVIEWED BY: PREPARED BY: S. Armstrong Reviewed BY:

REVISIONS

INIT. DATE

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-0284T3 DESIGNED: September 2014 SEALED: 4/2/15 REVISED: N/A

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

DETECTED MOVEMENT

UNSIGNALIZED MOVEMENT

PEDESTRIAN MOVEMENT

2033 EV PREEMPTION

FUNCTION

MIN. PED. CLEAR BEFORE PREEMPT

* See Timing Chart for Min Ped Clearance

** Program Timing on Optical Detector Unit

MIN. GREEN BEFORE PREEMPT

DELAY BEFORE PREEMPT

CLEARANCE TIME

PREEMPT EXTEND**

UNDETECTED MOVEMENT (OVERLAP)

EVB

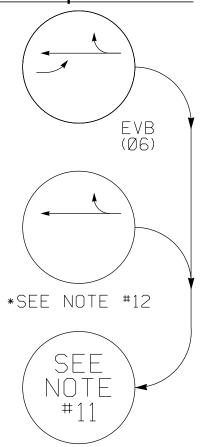
(SECONDS)

0

2

2.0

EV Preempt Phases



| TABLE OF OPERATION | | | | | | | | |
|--------------------|-------------|----------------|------------------|----------------|----------------|--|--|--|
| | | Р | HAS | E | | | | |
| SIGNAL FACE | Ø 2 + 5 | Ø2+6 | Ø 4 + 8 | E B B | FLASH | | | |
| 21, 22 | G | G | R | R | Υ | | | |
| 41 | | | - F | | | | | |
| 42 | R | R | G | R | R | | | |
| 43 | R/ | R | G | R | R | | | |
| 51 | - | - F | | - F | - Y | | | |
| 61,62 | R | G | R | G | Υ | | | |
| 81 | | | - F | | | | | |
| 82,83 | R | R | G | R | R | | | |
| P61,P62 | D:W | W | D·W | D:W | DRK | | | |
| P81,P82 | DW | DW | W | DW | DRK | | | |

CE I.D.

L.E.D. te 15

P81.P82

Direct Bury

| SIGNA | ۸L | FA | С |
|-------|------------|----|---|
| | Hec See | | |

21,22 42 61,62

82,83*

| 51 |
|----|
|----|

| 12" | (F) (F) 41 |
|-----|--|
| 51 | 81* |
| | |
| | |

| (F) | 12″ |
|------------------|-----|
| 51 | |
| | |
| | |
| | |
| | |

| | | | NC 55 | (S. Alston |
|----------|---|---------|-------|--------------------|
| | | • | | → • |
| | | | | |
| | | | | 35 Mph 4% Grade |
| |] | | | |
| OL4 SEC. | | | | |
| SEC. | | | | |
| 7 sec. | | | | |
| 6 SEC. | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

| | | | MING CH | IART CONTROLLER | | | |
|------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|------------------|------------------|
| PHASE | Ø2 | Ø4 | Ø5 | Ø6 | Ø8 | OL2 | OL4 |
| MINIMUM INITIAL * | 1 () SEC. | 7 SEC . | 7 SEC . | 1 () SEC . | 7 SEC . | O SEC. | O SEC. |
| VEHICLE EXTENSION * | 3.0 SEC . | 2.0 SEC . | 2.0 SEC . | 3.0 SEC . | 2.0 SEC . | | |
| YELLOW CHANGE INT. | 4.1 SEC. | 3.7 SEC . | 4.1 SEC . | 4.1 SEC . | 3.7 SEC . | 3.7 SEC . | 3.7 SEC . |
| RED CLEARANCE | 2.3 SEC . | 2.6 SEC . | 3.2 SEC . | 2.3 SEC . | 2.6 SEC . | 2.6 SEC . | 2.6 SEC . |
| MAXIMUM LIMIT * | 50 SEC . | 35 SEC . | 15 SEC . | 50 SEC . | 35 SEC . | | |
| RECALL POSITION | VEH. RECALL | NONE | NONE | VEH. RECALL | NONE | | |
| VEHICLE CALL MEMORY | YELLOW LOCK | NONE | NONE | YELLOW LOCK | NONE | | |
| DOUBLE ENTRY | OFF | ON | OFF | OFF | ON | | |
| WALK * | - SEC. | - SEC. | - SEC. | 4 SEC. | 4 SEC. | | |
| FLASHING DON'T WALK | - SEC. | - SEC. | - SEC. | 8 SEC . | 4 SEC. | | |
| MIN PED CLEARANCE | - SEC. | – SEC. | - SEC. | 4 SEC. | 2 SEC. | | |
| TYPE 3 LIMIT | - SEC. | – SEC. | – SEC. | – SEC. | - SEC. | | |
| ALTERNATE EXTENSION | - SEC. | – SEC. | - SEC. | - SEC. | - SEC. | | |
| ADD PER VEHICLE * | - SEC. | – SEC. | - SEC. | - SEC. | - SEC. | | |
| MAXIMUM INITIAL * | - SEC. | | |
| MAXIMUM GAP* | 3 . 0 SEC . | 2 . 0 SEC . | 2 . 0 SEC . | 3 . 0 sec . | 2 . 0 SEC . | | |
| REDUCE 0.1 SEC EVERY * | - SEC. | | |
| MINIMUM GAP | 3 . 0 SEC . | 2 . 0 SEC . | 2 . 0 SEC . | 3 . 0 SEC . | 2 . 0 SEC . | | |
| T | D | | | | 0 1 / 1 | | |

2033 SOFTWARE w/ 2070 CONTROLLER LOOP & DETECTOR UNIT INSTALLATION CHART

DETECTOR PROGRAMMING

| | | | | | | | | | | ו שט | LUI | Uh | ГΠ | oun | ı/\IVIII | NI T IA | G | | | | |
|----------|--------------|----------|-------------------------------|-----|----------|---------------|------|------|--------------|------|--------------------|--------------------|----------|-------|-----------|---------|---------|-----------|----------|-----|----------|
| | INDUCT | IVE LOC |)PS | | | | _ | | | | | | ΑΊ | TRI | BUTI | ES | | | LOOPS | STA | TUS |
| | | | | | | | ' | IIM | ING | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 8 | | |
| LOOP NO. | SIZE (ft) | TURNS | DIST. FROM STOPBAR (ft) | ZEW | EXISTING | NEMA PHASE | DELA | Υ | CAF (STRE | | FULL TIME DELAY | PEDESTRIAN CALL | RESERVED | COUNT | EXTENSION | TYPE 3 | CALLING | ALTERNATE | SYSTEM L | NEW | EXISTING |
| 2A | 6×6 | * | 70 | * | - | 2 | - S | SEC. | - | SEC. | _ | - | _ | _ | Χ | _ | Χ | - | - | - | * |
| 4A | 6×40 | * | 0 | * | _ | 4 | 3 S | SEC. | - | SEC. | _ | ı | 1 | _ | Χ | _ | Χ | - | - | _ | * |
| 5A | 6×40 | * | 0 | * | | 5 | 15 S | SEC. | - | SEC. | - | _ | - | - | Χ | _ | Χ | _ | - | _ | * |
| AC | 6840 | <u> </u> | | * | _ | 2 | - S | SEC. | - | SEC. | - | - | - | - | Χ | - | Χ | - | - | _ | * |
| 5B | 6×40 | * | 0 | * | - | 5 | 15 S | SEC. | - | SEC. | - | - | - | - | Χ | - | Χ | - | - | _ | * |
| 6A | 6×6 | * | 70 | * | - | 6 | - S | SEC. | - | SEC. | - | I | İ | - | X | _ | Χ | ı | _ | - | * |
| 8.8 | 6×40 | * | 0 | * | _ | 8 | - S | SEC. | - | SEC. | _ | 1 | İ | 1 | X | _ | Χ | ı | _ | - | * |
| 8B | 6×40 | * | 0 | * | - | 8 | 10 S | SEC. | - | SEC. | _ | - | 1 | _ | X | _ | Χ | ı | - | _ | * |
| PEDES | TRIAN | DETECT | ION | | | | | | | | | | | | | | | | | | |
| P61,P62 | N/A | N/A | N/A | X | _ | 6 | - S | SEC. | - | SEC. | - | Χ | - | - | - | - | - | - | _ | Χ | _ |
| P81,P82 | N/A | N/A | N/A | - | Χ | 8 | - S | SEC. | - | SEC. | - | Χ | - | - | - | - | - | - | - | _ | Х |

+2% Grade

 \square (6A)

55 (S. Alston Ave.)

* Video Detection Zone

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

NOTES

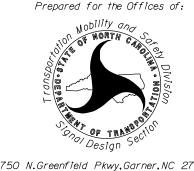
- 1. Refer to "Road Standard Drawings NCDOT" dated January 2012, "Standard Specifications for Roads and Structures" dated January 2012.
- 2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- 3. Phase 5 may be lagged.
- 4. Reposition existing signal heads #21, #22, #51, #61, #62, and optical detector #10 during this phase of construction.
- 5. Set all detector units to presence mode.
- 6. Program all timing information into phase banks 1,2, and 3 unless otherwise noted.
- 7. Set phase bank 3 maximum limit to 250 seconds for phases used.
- 8. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls
- 9. Program pedestrian heads to countdown the flashing "Don't Walk" time
- 10. This intersection features an optical preemption system. Shown locations of optical detectors are conceptual only.
- 11. Upon completion of Emergency Vehicle Preemption, controller returns to normal operation.

- 12. When EVB preemption initializes during side street service signal head 51 will display a red arrow.
- 13. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- 14. Pedestrian Pedestals are conceptual and shown for reference only. See sheets P1-P3 for pushbutton location details.
- 15. Reconnect and unbag signal heads #81, #82, and #83 during Temporary Signal Design 6 TMP Phase 2, Steps 7-12.
- 16. Contractor shall adjust video detection zones as required.
- 17. Contractor to maintain pedestrians through construction area.
- 18. Poles are existing during Temporary Signal Design 6 TMP Phase 2, Steps 7-12.

LEGEND

| <u>PROPOSED</u> | | EXISTING |
|--|---|-----------------|
| \bigcirc | Traffic Signal Head | • |
| O | Modified Signal Head | N/A |
| \dashv | Sign | \dashv |
| ↓ | Pedestrian Signal Head With Push Button & Sign | # |
| $\bigcirc \hspace{-1em} \bigcirc \hspace{-1em} \bigcirc$ | 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 | |
| \longrightarrow | Directional Arrow | |
| $\langle \underline{\mathbb{A}} \rangle$ | "No Left Turn" (R3-2) | \triangle |
| ⟨B⟩ | "No Right Turn" (R3-1) | B |
| \bigcirc | Optical Detector | • |
| | Work Area | N/A |
| | Drums | N/A |
| ——E—— | - Construction Easement | N/A |
| —— PUE —— | - Permanent Utility Easement | N/A |
| | Barricades | N/A |
| \bigoplus | Type I Pushbutton Post | ↔ |
| | Rigid Conduit - | |
| | Direct Bury | |
| | Video Detector | |
| | Video Detection Area | |

Signal Upgrade - Temporary Design 4 (TMP Phase 2, Steps 1-6) Signal Upgrade - Temporary Design 6 (TMP Phase 2, Steps 7-12)



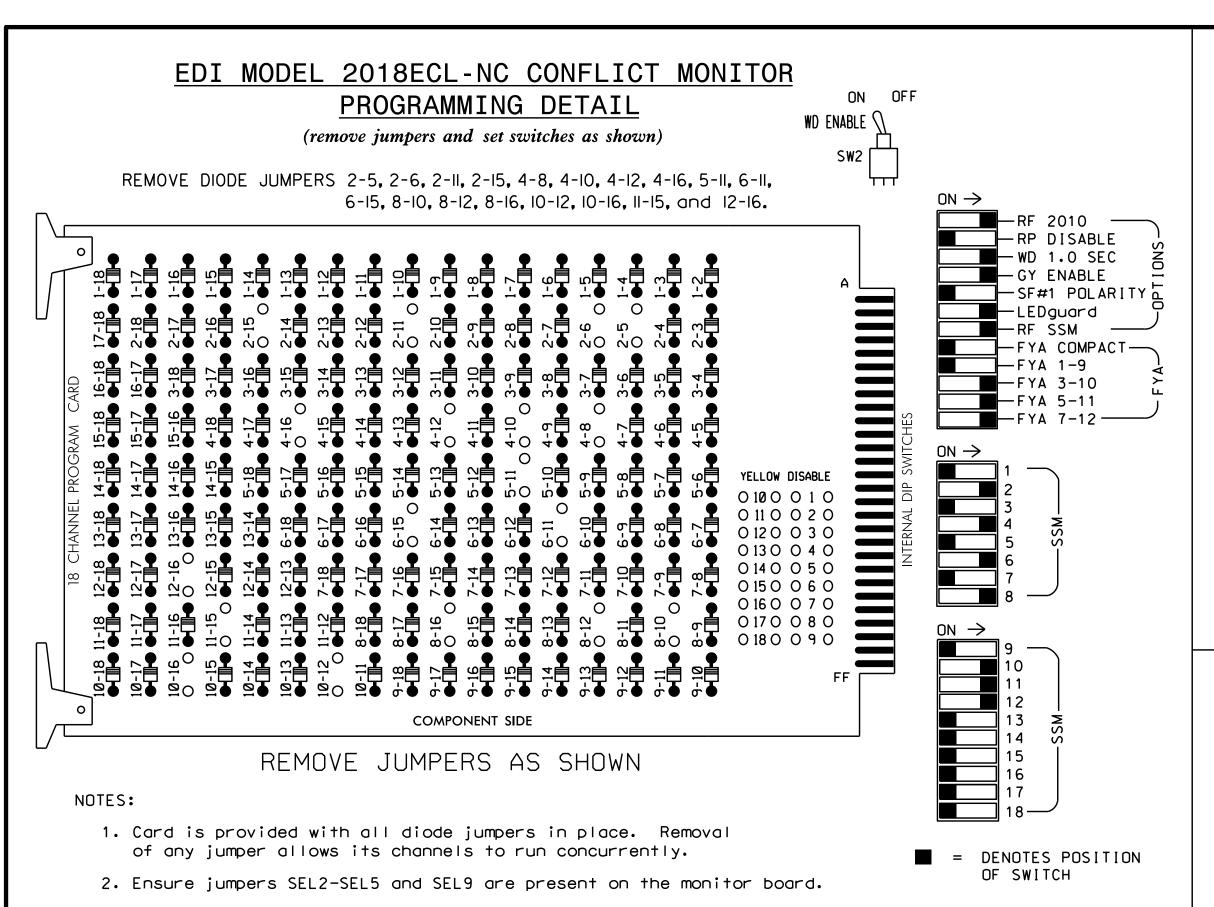
NC 55 (South Alston Avenue)

NC 147 NB Ramp / Gann Street Division 5 Durham County PLAN DATE: September 2014 REVIEWED BY: J Hochanadel

50 N.Greenfield Pkwy,Garner,NC 27529 PREPARED BY: C Lawson

MyPAL SIG. INVENTORY NO. 05-028474/T6

1025 Wade Avenue Raleigh, NC 27605 Tel:919-789-9977 Fax:919-789-9591



INPUT FILE POSITION LAYOUT

(front view)

3. Ensure that Red Enable is active at all times during normal operation.

4. Ensure conflict monitor communicates with 2070.

NOTES

- 1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. Verify that signal heads flash in accordance with the signal plans.
- 2. Program controller to Start Up in phases 2 and 6 green.
- 3. Set power-up flash time to 0 seconds within the controller programming. The conflict monitor will govern startup flash. Ensure STARTUP "RED START" is set to 0 seconds.
- 4. Enable Simultaneous Gap-Out feature for all phases.
- 5. Program all timing information into phase banks 1, 2, and 3 unless otherwise noted.
- 6. Set phase bank 3 maximum limit to 250 seconds for phases
- 7. Program phases 4 and 8 for Double Entry.
- 8. Ensure start up flash phases are coordinated with flash program block assignments.
- 9. Program Startup Ped Calls for phases 6 and 8.
- 10. Set the Red Revert interval on the controller to 1 second.
- 11. This cabinet and controller are part of the Durham Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070E CABINET MOUNT.....BASE OUTPUT FILE POSITIONS...18 WITH AUX FILE LOAD SWITCHES USED......\$2,\$5,\$7,\$8,\$9,\$11,\$12,AUX \$2, AUX S4, AUX S5 PHASES USED......2,4,5,6,6PED,8,8PED OVERLAP 1.....NOT USED OVERLAP 2.....4+8 OVERLAP 3....*

* See FYA PPLT Programming detail on sheet 2.

PROJECT REFERENCE NO. Sig. 9.1 U-3308

| | SIGNAL HEAD HOOK-UP CHART | | | | | | | | | | | | | | | | | | |
|-----------------------------|---------------------------|-------|------------|----|-------|----------|-----|-------------|-------|-------------|-----|-------|-------------|-----------|-----------|-----------|------------|-------------|-----------|
| LOAD SWITCH NO. | S1 | S2 | S 3 | S4 | S5 | S6 | S | 57 | S8 | S 9 | S10 | S11 | S12 | AUX S1 | AUX S2 | AUX S3 | AUX S4 | AUX S5 | AUX S6 |
| CMU CHANNEL NO. | 1 | 2 | 13 | 3 | 4 | 14 | í | 5 | 6 | 15 | 7 | 8 | 16 | 9 | 10 | 17 | 11 | 12 | 18 |
| PHASE | 1 | 2 | 2 PED | 3 | 4 | 4 PED | į | 5 | 6 | 6 PED | 7 | 8 | 8 PED | OL1 | 0L2 | SPARE | 0L3 | OL4 | SPARE |
| SIGNAL HEAD NO. | NU | 21,22 | NU | NU | 42,43 | NU | 43 | ★ 51 | 61,62 | P61. P62 | NU | 82,83 | P81, P82 | NU | 81 | NU | 5 1 | 41 ★ | NU |
| RED | | 128 | | | 101 | | | | 134 | | | 107 | | | | | | | |
| YELLOW | | 129 | | | 102 | | | | 135 | | | 108 | | | | | | | |
| GREEN | | 130 | | | 103 | | | | 136 | | | 109 | | | | | | | |
| RED ARROW | | | | | | | | | | | | | | | A124 | | A114 | A101 | |
| YELLOW ARROW | | | | | | | 132 | | | | | | | | A125 | | A115 | A102 | |
| FLASHING YELLOW ARROW | | | | | | | | | | | | | | | A126 | | A116 | A103 | |
| GREEN ARROW | | | | | | | 133 | 133 | | | | | | | | | | | |
| ₩ | | | | | | | | | | 119 | | | 110 | | | | | | |
| Ķ | | | | | | | | | | 121 | | | 112 | | | | | | |

NU = Not Used

★ See pictorial of head wiring in detail below.

OL2 RED (A124) -

OL2 YELLOW (A125)

OL2 GREEN (A126)

OL3 RED (A114)

OL3 YELLOW (A115)

OL3 GREEN (A116)

05 GREEN (133)

| | | _ | | | | |
|---------------------|------------------|--------------------|-----------------|------------|------------|---------------|
| PED PUSH BUTTONS | LOOP TERMINAL | INPUT FILE POS. | DETECTOR NO. | PIN NO. | ATTRIBUTES | NEMA PHASE |
| P61 , P62 | TB8-7 , 9 | I13U | 26 | 68 | 2 | 6 PED |
| P81 , P82 | TB8-8,9 | I13L | 28 | 70 | 2 | 8 PED |

INPUT FILE CONNECTION & PROGRAMMING CHART

7-CALLING

8-ALTERNATE

1-FULL TIME DELAY 2-PED CALL 3-RESERVED 4-COUNTING

NOTE: INSTALL DC ISOLATOR IN INPUT FILE SLOT 113.

INPUT FILE POSITION LEGEND: J2L FILE J SLOT 2-LOWER-

Electrical Detail - Temporary Design 4 (TMP Phase 2, Steps 1-6) - Sheet 1 of 2 Electrical Detail - Temporary Design 6 (TMP Phase 2, Steps 7-12) - Sheet 1 of 2

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)

⟨F Y

81

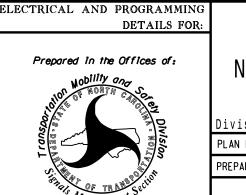
 (\mathfrak{F})

(F Y

OL4 RED (A101)

OL4 YELLOW (A102)

OL4 GREEN (A103)



750 N.Greenfield Pkwy, Garner, NC 27529

NC 55 (South Alston Avenue) NC 147 NB Ramp / Gann Street

ivision 5 PLAN DATE: November 2014 REVIEWED BY: 978 PREPARED BY: S. Armstrong Reviewed BY:

REVISIONS INIT. DATE

John T. Rowe, Jr. 4/2/2015 IG. INVENTORY NO. 05 - 0284T4/T

SEAL

008453

(F Y

41

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-0284T4/T6 DESIGNED: September 2014 SEALED: 4/2/15 REVISED: N/A

SPECIAL DETECTOR NOTE

FILE U

ПΤП

FILE

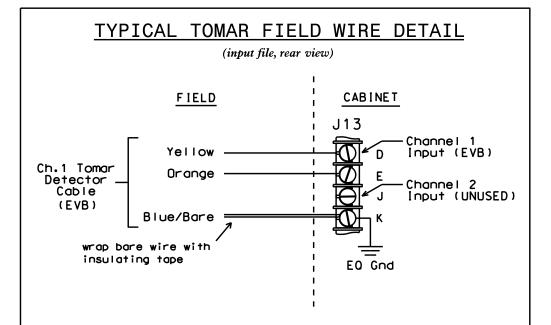
ΠТП

Install a video detection system for vehicle detection. Perform

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

installation according to manufacturer's directions and NCDOT engineer approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.

FS = FLASH SENSE ST = STOP TIME EVB = EMERGENCY VEHICLE PREEMPT 4 CHANNEL TOMAR OSP CARD INSERT CARD INTO SLOT J13 TYPICAL TOMAR FIELD WIRE DETAIL



UNUSED EVB

CH. 4 CH. 2

UNUSED UNUSED

1 2 3 4 5 6 7 8 9 10 11 12 13 14

| PED PUSH BUTTONS | LOOP TERMINAL | INPUT FILE POS. | DETECTOR NO. | PIN NO. | ATTRIBUTES | NEMA PHASE |
|---------------------|------------------|--------------------|-----------------|------------|------------|---------------|
| P61 , P62 | TB8-7 , 9 | I13U | 26 | 68 | 2 | 6 PED |
| P81 , P82 | TB8-8,9 | I13L | 28 | 70 | 2 | 8 PED |
| | | | | | | |

DETECTOR ATTRIBUTES LEGEND:

OVERLAP 4.....4+8

5-EXTENSION 6-TYPE 3

OVERLAP PROGRAMMING DETAIL

RED CLEARANCE = 2.6

RED CLEARANCE = 2.6

Program overlaps as follows: Main Menu - 4) OVERLAP

Press "+"

OVERLAP [2]:

LOADSWITCH = 10NOTE: For head 81 VEH SET 1 = 4.8YELLOW CLEARANCE = 3.7

Press "+" twice

OVERLAP [4]:

LOADSWITCH = 12NOTE: For head 41 VEH SET 1 = 4.8YELLOW CLEARANCE = 3.7

END OF OVERLAP PROGRAMMING

EMERGENCY VEHICLE PREEMPTION PROGRAMMING

 Program EVB preempt as follows: Main Menu - 2) PREEMPT - 4) EMERGENCY VEHICLE EVB Clear = 2 EVB Clearance Phases = 6

- 2. Program general preemption parameters as follows: Main Menu - 2) PREEMPT - 6) MISC PREEMPTION PARAMETERS Min Time Before PE ForceOff = 1
- 3. Ped Clear Before Preempt is a pedestrian timing parameter, and is programmed as follows: Main Menu - 1) PHASE - 5) PEDESTRIAN TIMING PHASE 6 MIN FDW = 4PHASE 8 MIN FDW = 2

Program extend time on optical detector unit for 2.0 sec for EVB.

FYA PPLT PROGRAMMING

PROJECT REFERENCE NO.

U-3308

Sig. 9.2

- 1. Program Flashing Yellow Arrow phases as follows: Main Menu - 1) PHASE - 2) PHASE FUNCTIONS PAGE TWO PPLT FYA = PHASE 5
- 2. Assign output pin for Flashing Yellow Arrow as follows: Main Menu - 6) OUTPUTS - F) FYA PPLT Phase 5 = 90
- 3. Redirect RED and YELLOW outputs for the left turn phases as follows:

Main Menu - 6) OUTPUTS - 8) REDIRECT PHASE Phase 5 RED = 88, Phase 5 YELLOW = 89

OVERLAP GREEN FLASH PROGRAMMING DETAIL FOR 3-SECTION FYA HEADS

The following will cause the overlap green outputs to flash, which are wired to the flashing yellow arrows. Program as follows:

Main Menu - 1) PHASE - 2) PHASE FUNCTIONS PAGE TWO OLAP G FL = 2.4

MIN WALK DURING PREEMPTION PROGRAMMING

To disable MIN WALK pedestrian timing during preemption. program the controller as follows: Main Menu - 9) UTILITIES - 5) CONFIGURATION EXTRA TWO = 3

SPECIAL NOTE EV PREEMPT PROGRAMMING

Setting 'FYA DURING PREEMPT' to 'Y' eliminates yellow trap when transitioning to preempt from adjacent through phase. Main Menu - 9) UTILITIES - 9) MISC FYA DURING PREEMPT (Y/N) = Y

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

> THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-0284T4/T6 DESIGNED: September 2014 SEALED: 4/2/15 REVISED: N/A

FLASHER CIRCUIT MODIFICATION DETAIL

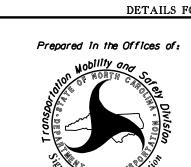
IN ORDER TO INSURE THAT SIGNALS FLASH CONCURRENTLY ON THE SAME APPROACH. MAKE THE FOLLOWING FLASHER CIRCUIT CHANGES:

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

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

Electrical Detail - Temporary Design 4 (TMP Phase 2, Steps 1-6) - Sheet 2 of 2

Electrical Detail - Temporary Design 6 (TMP Phase 2, Steps 7-12) - Sheet 2 of 2 ELECTRICAL AND PROGRAMMING NC 55 (South Alston Avenue) DETAILS FOR



NC 147 NB Ramp / Gann Street

ivision 5 PLAN DATE: November 2014 REVIEWED BY: GTR PREPARED BY: S. Armstrong REVIEWED BY: REVISIONS INIT. DATE

John T. Rowe, Jr. 4/2/2015 IG. INVENTORY NO. 05 - 0284T4/T

750 N.Greenfield Pkwy, Garner, NC 27529

PROJECT REFERENCE NO. |Sig. 10.0| U-3308

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

NOTES

- 1. Refer to "Road Standard Drawings NCDOT" dated January 2012, "Standard Specifications for Roads and Structures" dated January 2012.
- 2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- 3. Phase 5 may be lagged.
- 4. Set all detector units to presence mode. 5. Program all timing information into phase banks
- 1,2, and 3 unless otherwise noted.
- 6. Set phase bank 3 maximum limit to 250 seconds for phases used.
- 7. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls 8. Program pedestrian heads to countdown the flashing
- "Don't Walk" time. 9. This intersection features an optical preemption system. Shown locations of optical detectors
- are conceptual only. 10. Upon completion of Emergency Vehicle Preemption, controller returns to normal operation.
- 11. When EVB preemption initializes during side street service signal head 51 will display a red arrow.
- 12. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- 13. Pedestrain pedestals are conceptual and shown for reference only. See sheets P1-P3 for pushbutton location details.
- 14. Disconnect and bag signal heads #81, #82 and #83 during this phase of construction.

PROPOSED

____ N/A

 \bigcirc

- 15. Contractor shall adjust video detection zones as required.
- 16. Contractor shall maintain pedestrian access through construction zone.

LEGEND

Traffic Signal Head

Modified Signal Head

Sign

Pedestrian Signal Head With Push Button & Sign Signal Pole with Guy Signal Pole with Sidewalk Guy Inductive Loop Detector Controller & Cabinet

Junction Box

Right of Way

Directional Arrow

Optical Detector

Work Area

Drums

— Construction Easement

---- PUE ---- Permanent Utility Easement

"No Left Turn" (R3-2) "No Right Turn" (R3-1)

2-in Underground Conduit -----

EXISTING

—

N/A

 \rightarrow

(A) (B)

N/A

N/A

N/A

N/A

| | ₩ | Barricades Type I Pushbutto | | N/A ↔ | |
|------------------------------|---------------|---|---------|-----------------|---------|
| | | Rigid Condui Video Detecton Video Detection | or | | |
| Signal Upgrade - | Temporary Des | sign 5 (TMP | Phase 2 | 2, Steps | 1-6) |
| Prepared for the Offices of: | NC 55 (South | Alston Aver | nue) | SEAL | ARO//// |

NC 147 NB Ramp / Gann Street Division 5 Durham County

PLAN DATE: September 2014 | REVIEWED BY: J Hochanadel '50 N.Greenfield Pkwy,Garner,NC 27529 PREPARED BY: C Lawson

SEAL INIT. DATE MyPAL 4/02/15 DATE

2033 SOFTWARE w/ 2070 CONTROLLER LOOP & DETECTOR UNIT INSTALLATION CHART

DETECTOR PROGRAMMING

- SEC. - SEC. - X - - - - - X

- SEC. - SEC. - X - - - - - X

| | TINDOCT | IVE LO | JF 3 | | | | | | | | | | Α | TTRI | BUT | ES | | | LOOPS | STA | JT |
|----------|--------------|--------|-------------------------|-----|----------|---------------|-----|------|--------------|--------------|--------------------|--------------------|----------|-------|-----------|--------|---------|-----------|----------|-----|------------|
| | _ | | | | | | | TIM | ING | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |] 8 | | Ι. |
| LOOP NO. | SIZE (ft) | TURNS | DIST. FROM STOPBAR (ft) | NEW | EXISTING | NEMA PHASE | DEL | ΑY | CAI (STRI | RRY ETCH) | FULL TIME DELAY | PEDESTRIAN CALL | RESERVED | COUNT | EXTENSION | TYPE 3 | CALLING | ALTERNATE | SYSTEM L | NEW | O A E SIAL |
| 2A | 6×6 | * | 70 | - | * | 2 | _ | SEC. | - | SEC. | _ | _ | _ | _ | Χ | _ | Χ | _ | _ | _ | > |
| 4A | 6×40 | * | 0 | - | * | 4 | 3 | SEC. | - | SEC. | _ | _ | _ | - | Χ | _ | Χ | _ | - | _ | > |
| 5 A | 6×40 | * | 0 | | * | 5 | 15 | SEC. | _ | SEC. | _ | _ | _ | - | Χ | _ | Χ | _ | _ | _ | > |
| JA | 0 0 0 4 0 | * | | - | 木 | 2 | - | SEC. | - | SEC. | - | - | - | - | Χ | - | Χ | - | - | - | > |
| 5B | 6×40 | * | 0 | - | * | 5 | 15 | SEC. | - | SEC. | - | - | - | - | Χ | - | Χ | - | - | - | > |
| 6A | 6×6 | * | 70 | - | * | 6 | - | SEC. | - | SEC. | _ | - | _ | - | Χ | - | Χ | _ | - | - | > |
| | | | | | | • | • | | | | | | | | | | | | | | |

* Video Detection Zone

PHASING DIAGRAM DETECTION LEGEND

DETECTED MOVEMENT UNDETECTED MOVEMENT (OVERLAP)

UNSIGNALIZED MOVEMENT PEDESTRIAN MOVEMENT

PREEMPT EXTEND**

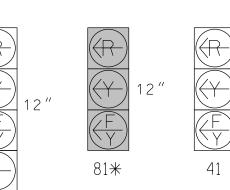
| 2033 EV PREEMPTI | ON |
|--------------------------------|------------------|
| FUNCTION | EVB (SECONDS) |
| DELAY BEFORE PREEMPT | 0 |
| MIN. PED. CLEAR BEFORE PREEMPT | * |
| MIN. GREEN BEFORE PREEMPT | 1 |
| CLEARANCE TIME | 2 |
| PREEMPT EXTEND** | 2.0 |

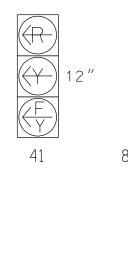
04+8

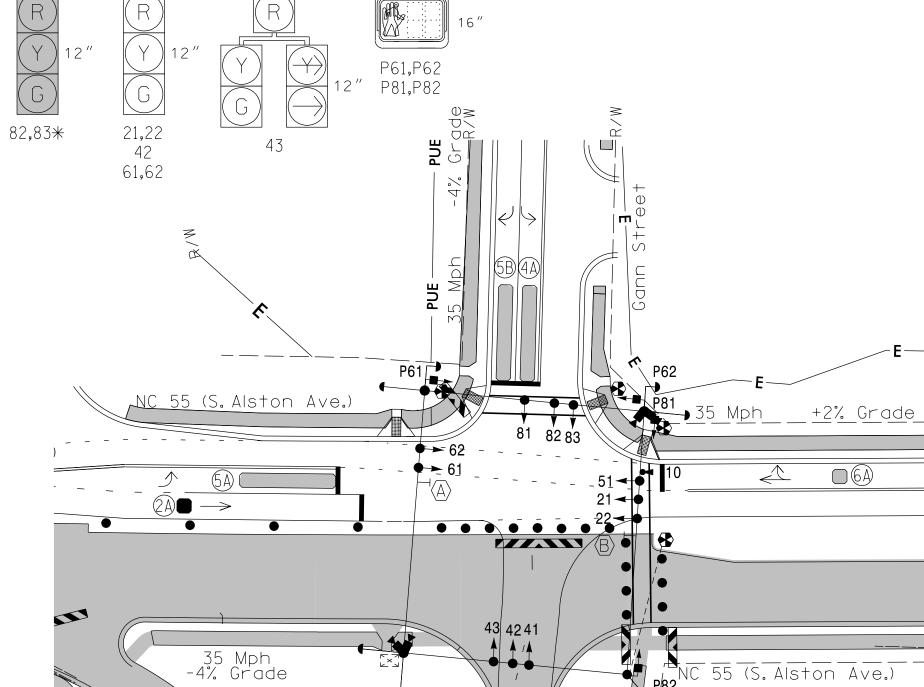
* See Timing Chart for Min Ped Clearance ** Program Timing on Optical Detector Unit



All Heads L.E.D. * See Note 14







| | 203 | | G CHART w/2070 CONT | | | |
|------------------------|---------------------------|---------------------------|---------------------------|---------------------------|------------------|------------------|
| PHASE | Ø2 | Ø4 | Ø5 | Ø6 | Ø8 | OL4 |
| MINIMUM INITIAL * | 1 () SEC. | 7 SEC . | 7 SEC . | 1 () SEC. | 1 SEC. | O SEC. |
| VEHICLE EXTENSION * | 3.0 SEC . | 2.0 SEC . | 2.0 SEC . | 3.0 SEC . | – SEC. | |
| YELLOW CHANGE INT. | 4.1 SEC. | 3.0 SEC . | 4 . 1 SEC. | 4.1 SEC. | 3.0 SEC . | 3.0 SEC . |
| RED CLEARANCE | 2.3 SEC . | 2.6 SEC . | 3.2 SEC . | 2.3 SEC . | O.O SEC. | 2.6 SEC . |
| MAXIMUM LIMIT * | 50 SEC . | 35 SEC . | 15 SEC . | 50 SEC . | – SEC. | |
| RECALL POSITION | VEH. RECALL | NONE | NONE | VEH. RECALL | NONE | |
| VEHICLE CALL MEMORY | YELLOW LOCK | NONE | NONE | YELLOW LOCK | NONE | |
| DOUBLE ENTRY | OFF | ON | OFF | OFF | ON | |
| WALK * | - SEC. | - SEC. | - SEC. | 4 SEC . | 4 SEC . | |
| FLASHING DON'T WALK | - SEC. | - SEC. | - SEC. | 8 SEC . | 4 SEC. | |
| MIN PED CLEARANCE | - SEC. | – SEC. | - SEC. | 4 SEC. | 2 SEC. | |
| TYPE 3 LIMIT | - SEC. | – SEC. | - SEC. | - SEC. | - SEC. | |
| ALTERNATE EXTENSION | - SEC. | - SEC. | - SEC. | - SEC. | - SEC. | |
| ADD PER VEHICLE * | - SEC. | - SEC. | - SEC. | - SEC. | - SEC. | |
| MAXIMUM INITIAL * | - SEC. | - SEC. | - SEC. | - SEC. | - SEC. | |
| MAXIMUM GAP* | 3 . 0 SEC . | 2 . 0 SEC . | 2 . 0 SEC . | 3 . 0 sec . | – SEC. | |
| REDUCE 0.1 SEC EVERY * | - SEC. | - SEC. | - SEC. | - SEC. | – SEC. | |
| MINIMUM GAP | 3 . 0 SEC. | 2 . 0 SEC . | 2 . 0 SEC . | 3 . 0 SEC . | - SEC. | |

* 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.

1025 Wade Avenue Raleigh, NC 27605 Tel:919-789-9977



License #: C-2197

SIG. INVENTORY NO. 05-0284T5

PHASING DIAGRAM

*SEE NOTE #11

NOTE

#10

EV Preempt Phases

21, 22 4.2 43 51 61,62 P61,P62 | DW | W | DW | DW | DRK |

SIGNAL FACE -R -R -F -R -R - - + + +

P81,P82 | DW | DW | W | DW | DRK |

TABLE OF OPERATION

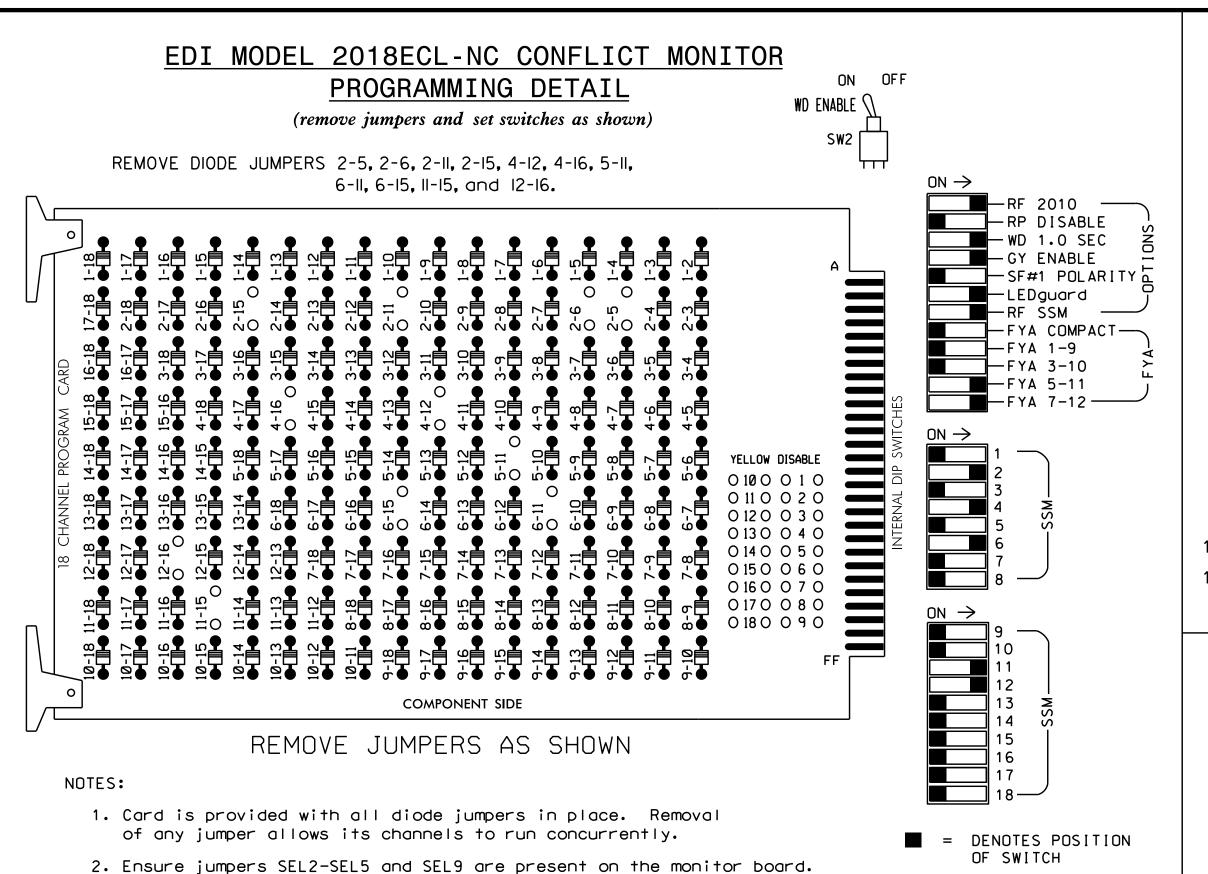
PHASE

INDUCTIVE LOOPS

PEDESTRIAN DETECTION

| P81,P82 | N/A | N/A | N/A | - | X | 8 |

| P61,P62 | N/A | N/A | N/A | - | X | 6 |



INPUT FILE POSITION LAYOUT

(front view)

1 2 3 4 5 6 7 8 9 10 11 12 13 14

3. Ensure that Red Enable is active at all times during normal operation.

4. Ensure conflict monitor communicates with 2070.

NOTES

- 1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. Verify that signal heads flash in accordance with the signal plans.
- 2. Program controller to Start Up in phases 2 and 6 green.
- 3. Set power-up flash time to 0 seconds within the controller programming. The conflict monitor will govern startup flash. Ensure STARTUP "RED START" is set to 0 seconds.
- 4. Enable Simultaneous Gap-Out feature for all phases.
- 5. Program all timing information into phase banks 1, 2, and 3 unless otherwise noted.
- 6. Set phase bank 3 maximum limit to 250 seconds for phases
- 7. Program phases 4 and 8 for Double Entry.
- 8. Ensure start up flash phases are coordinated with flash program block assignments.
- 9. Program Startup Ped Calls for phases 6 and 8.
- 10. Set the Red Revert interval on the controller to 1 second.
- 11. This cabinet and controller are part of the Durham Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070E CABINET MOUNT.....BASE OUTPUT FILE POSITIONS...18 WITH AUX FILE LOAD SWITCHES USED.....S2,S5,S7,S8,S9,S12, AUX S4, AUX S5 PHASES USED..........2,4,5,6,6PED,8PED OVERLAP 1.....NOT USED OVERLAP 2.....NOT USED OVERLAP 3....* OVERLAP 4.....4

* See FYA PPLT Programming detail on sheet 2.

PROJECT REFERENCE NO. Sig. 10. U-3308

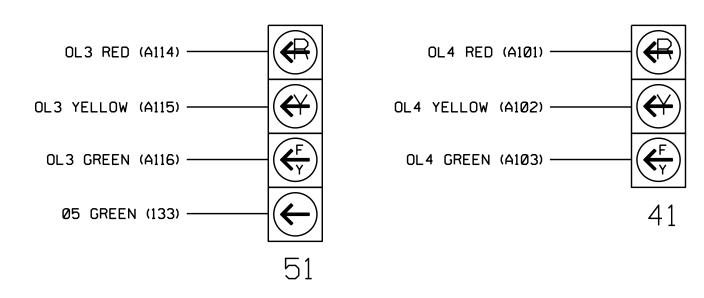
| | | | | SI | GNA | LH | HEA | D H | 00H | K-l | JP | CHA | 4RT | | | | | | |
|-----------------------------|----|-------|----------|----|-------|----------|-----|-------------|-------|-------------|-----|-----|-------------|-----------|-----------|-----------|-------------|-------------|-----------|
| LOAD SWITCH NO. | S1 | S2 | S3 | S4 | S5 | S6 | S | 57 | 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 | Ç | 5 | 6 | 15 | 7 | 8 | 16 | 9 | 10 | 17 | 11 | 12 | 18 |
| PHASE | 1 | 2 | 2 PED | 3 | 4 | 4 PED | Ç | 5 | 6 | 6 PED | 7 | 8 | 8 PED | OL1 | 0L2 | SPARE | 0L3 | OL4 | SPARE |
| SIGNAL HEAD NO. | NU | 21,22 | NU | NU | 42,43 | NU | 43 | ★ 51 | 61,62 | P61. P62 | NU | NU | P81, P82 | NU | NU | NU | ★ 51 | 41 ★ | NU |
| RED | | 128 | | | 101 | | | | 134 | | | | | | | | | | |
| YELLOW | | 129 | | | 102 | | | | 135 | | | | | | | | | | |
| GREEN | | 130 | | | 103 | | | | 136 | | | | | | | | | | |
| RED ARROW | | | | | | | | | | | | | | | | | A114 | A101 | |
| YELLOW ARROW | | | | | | | 132 | | | | | | | | | | A115 | A102 | |
| FLASHING YELLOW ARROW | | | | | | | | | | | | | | | | | A116 | A103 | |
| GREEN ARROW | | | | | | | 133 | 133 | | | | | | | | | | | |
| ₩ | | | | | | | | | | 119 | | | 110 | | | | | | |
| * | | | | | | | | | | 121 | | | 112 | | | | | | |

NU = Not Used

★ See pictorial of head wiring in detail below.

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



SPECIAL DETECTOR NOTE

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

FILE U

ПΤП

FILE

ΠТП

Install a video detection system for vehicle detection. Perform installation according to manufacturer's directions and NCDOT engineer approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.

FS = FLASH SENSE ST = STOP TIME EVB = EMERGENCY VEHICLE PREEMPT

Ø8PED ST

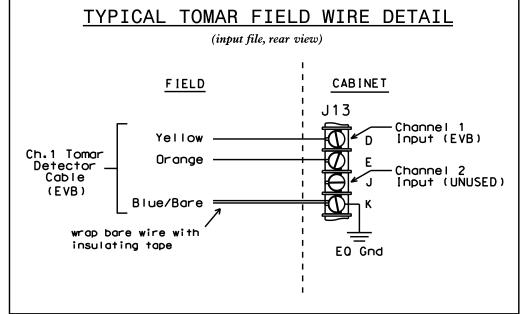
DC DC ISOLATOR ISOLATOR

4 CHANNEL TOMAR OSP CARD INSERT CARD INTO SLOT J13

UNUSED EVB

CH. 4 CH. 2

UNUSED UNUSED



INPUT FILE CONNECTION & PROGRAMMING CHART

| PED PUSH BUTTONS | LOOP TERMINAL | INPUT FILE POS. | DETECTOR NO. | PIN NO. | ATTRIBUTES | NEMA PHASE |
|---------------------|------------------|--------------------|-----------------|------------|------------|---------------|
| P61,P62 | TB8-7 , 9 | I13U | 26 | 68 | 2 | 6 PED |
| P81,P82 | TB8-8,9 | I13L | 28 | 70 | 2 | 8 PED |

DETECTOR ATTRIBUTES LEGEND:

1-FULL TIME DELAY 2-PED CALL

3-RESERVED 4-COUNTING

5-EXTENSION 6-TYPE 3 7-CALLING 8-ALTERNATE

INPUT FILE POSITION LEGEND: J2L

NOTE:

FILE J SLOT 2-LOWER-

INSTALL DC ISOLATOR

IN INPUT FILE SLOT I13.

Electrical Detail - Temporary Design 5 (TMP Phase 2, Steps 1-6) - Sheet 1 of 2 NC 55 (South Alston Avenue) ELECTRICAL AND PROGRAMMING DETAILS FOR

Prepared in the Offices of:

750 N.Greenfield Pkwy, Garner, NC 27529

NC 147 NB Ramp / Gann Street

ivision 5 PLAN DATE: November 2014 REVIEWED BY: 978 PREPARED BY: S. Armstrong Reviewed BY: REVISIONS

INIT. DATE John T. Rowe, Jr. 4/2/2015 IG. INVENTORY NO. 05-0284T5

008453

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-0284T5 DESIGNED: September 2014 SEALED: 4/2/15 REVISED: N/A

OVERLAP PROGRAMMING DETAIL

Program overlaps as follows: Main Menu - 4) OVERLAP

Press "+" three times

OVERLAP [4]:

LOADSWITCH = 12NOTE: For head 41 VEH SET 1 = 4YELLOW CLEARANCE = 3.0 RED CLEARANCE = 2.6

END OF OVERLAP PROGRAMMING

EMERGENCY VEHICLE PREEMPTION PROGRAMMING

 Program EVB preempt as follows: Main Menu - 2) PREEMPT - 4) EMERGENCY VEHICLE EVB Clear = 2 EVB Clearance Phases = 6

- 2. Program general preemption parameters as follows: Main Menu - 2) PREEMPT - 6) MISC PREEMPTION PARAMETERS Min Time Before PE ForceOff = 1
- 3. Ped Clear Before Preempt is a pedestrian timing parameter, and is programmed as follows: Main Menu - 1) PHASE - 5) PEDESTRIAN TIMING PHASE 6 MIN FDW = 4PHASE 8 MIN FDW = 2

Program extend time on optical detector unit for 2.0 sec for EVB.

FYA PPLT PROGRAMMING

PROJECT REFERENCE NO.

U-3308

Sig. 10.2

- 1. Program Flashing Yellow Arrow phases as follows: Main Menu - 1) PHASE - 2) PHASE FUNCTIONS PAGE TWO PPLT FYA = PHASE 5
- 2. Assign output pin for Flashing Yellow Arrow as follows: Main Menu - 6) OUTPUTS - F) FYA PPLT Phase 5 = 90
- 3. Redirect RED and YELLOW outputs for the left turn phases as follows: Main Menu - 6) OUTPUTS - 8) REDIRECT PHASE

Phase 5 RED = 88, Phase 5 YELLOW = 89

OVERLAP GREEN FLASH PROGRAMMING DETAIL FOR 3-SECTION FYA HEADS

The following will cause the overlap green outputs to flash, which are wired to the flashing yellow arrows. Program as follows:

Main Menu - 1) PHASE - 2) PHASE FUNCTIONS PAGE TWO OLAP G FL = 4

MIN WALK DURING PREEMPTION PROGRAMMING

To disable MIN WALK pedestrian timing during preemption, program the controller as follows: Main Menu - 9) UTILITIES - 5) CONFIGURATION EXTRA TWO = 3

SPECIAL NOTE EV PREEMPT PROGRAMMING

Setting 'FYA DURING PREEMPT' to 'Y' eliminates yellow trap when transitioning to preempt from adjacent through phase. Main Menu - 9) UTILITIES - 9) MISC FYA DURING PREEMPT (Y/N) = Y

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

> THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-0284T5 DESIGNED: September 2014 SEALED: 4/2/15 REVISED: N/A

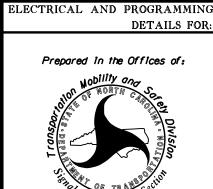
FLASHER CIRCUIT MODIFICATION DETAIL

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

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

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

Electrical Detail - Temporary Design 5 (TMP Phase 2, Steps 1-6) - Sheet 2 of 2



750 N.Greenfield Pkwy, Garner, NC 27529

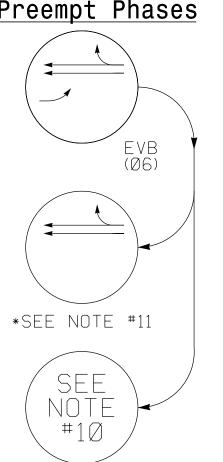
NC 55 (South Alston Avenue)

NC 147 NB Ramp / Gann Street ivision 5

PLAN DATE: November 2014 REVIEWED BY: QTR prepared by: S. Armstrong | Reviewed by: REVISIONS INIT. DATE

IG. INVENTORY NO. 05-0284T5

EV Preempt Phases



| TABLE OF OPERATION | | | | | | | | |
|--------------------|-------------|-------------|----------|-------------|-------------|--|--|--|
| | PHASE | | | | | | | |
| SIGNAL FACE | Ø2+5 | ØN+6 | Ø4+8 | E>B | LUANI | | | |
| 21, 22 | G | G | R | R | Y | | | |
| 41 | | | F | ₩ | | | | |
| 4.2 | R | R | G | R | R | | | |
| 43 | R/ | R | G | R | R | | | |
| 51 | • | F | # | F → | ~ | | | |
| 61,62 | R | G | R | G | Y | | | |
| 81 | ₩ | | └ | | | | | |
| 82,83 | R | R | \odot | R | R | | | |
| P21,P22 | W | W | D·W | D·W | DRK | | | |
| P41,P42 | D.W | D·W | W | D·W | DRK | | | |
| P61,P62 | D.W | W | D·W | D·W | DRK | | | |
| P81,P82 | D.W | D:W | W | D:W | DRK | | | |

2033 SOFTWARE w/ 2070 CONTROLLER LOOP & DETECTOR UNIT INSTALLATION CHART

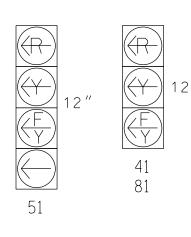
| | | | | | | DET | | | | TECTOR PROGRAMMING | | | | | | | | | | | | |
|------------------|------------------------|--------|-------------------------------|-----|--------------|---------------|-----|-------|--------------|--------------------|--------------------|-------------------|----------|-------|---------------|--------|---------|-----------|--------|-----|----------|--|
| | INDUCTIVE LOOPS TIMING | | | | ATTRIBUTES & | | | | | LOOPS | STA | TUS | | | | | | | | | | |
| | | | DICT EDOM | | . | | | 11//\ | ING | | 1 | 2 Z | 3 | 4 | 5 Z | 6 | 7 | 8 ш | loc | | <u>ق</u> | |
| LOOP NO. | SIZE (ft) | TURNS | DIST. FROM STOPBAR (ft) | NEW | EXISTING | NEMA PHASE | DEL | AY | CAF (STRE | | FULL TIME DELAY | PEDESTRIA CALL | RESERVED | COUNT | EXTENSION | TYPE 3 | CALLING | ALTERNATE | SYSTEM | NEW | EXISTING | |
| 2A | 6×6 | 4 | 70 | X | - | 2 | - | SEC. | - | SEC. | _ | _ | _ | _ | Χ | _ | Χ | _ | _ | Χ | - | |
| 2B | 6×6 | 4 | 70 | Χ | _ | 2 | _ | SEC. | - | SEC. | _ | ı | _ | _ | X | _ | Χ | _ | 1 | X | - | |
| 4A | 6×40 | 2-4-2 | 0 | Χ | _ | 4 | 3 | SEC. | - | SEC. | - | _ | _ | - | Χ | _ | Χ | _ | - | Χ | - | |
| 5A | FA C10 2.4.2 | 2-4-2 | 0 | Х | | 5 | 15 | SEC. | - | SEC. | - | - | - | ı | X | - | Χ | - | - | Χ | _ | |
| JA | 6×40 | 2 4 2 | O | ^ | | 2 | - | SEC. | - | SEC. | - | - | _ | _ | Χ | _ | Χ | - | _ | Χ | - | |
| 5B | 6×40 | 2-4-2 | 0 | Χ | _ | 5 | 15 | SEC. | - | SEC. | - | - | - | ı | X | _ | Χ | - | 1 | X | _ | |
| 6A | 6×6 | 4 | 70 | Χ | - | 6 | - | SEC. | - | SEC. | _ | - | _ | _ | X | _ | Χ | _ | - | Χ | - | |
| 6B | 6×6 | 4 | 70 | Χ | _ | 6 | _ | SEC. | - | SEC. | _ | ı | ı | 1 | X | _ | Χ | _ | _ | Χ | _ | |
| 8.8 | 6×20 | 2-4-2 | 0 | Χ | - | 8 | - | SEC. | - | SEC. | _ | 1 | - | - | X | _ | Χ | _ | 1 | X | - | |
| 8B | 6×40 | 2-4-2 | 0 | Χ | - | 8 | 10 | SEC. | - | SEC. | - | - | - | - | ı | - | - | - | - | X | _ | |
| PEDES | TRIAN | DETECT | ION | | | | | | | | | | | | | | | | | | | |
| P21 , P22 | N/A | N/A | N/A | Χ | - | 2 | - | SEC. | - | SEC. | - | Χ | - | - | - | _ | _ | _ | - | Χ | - | |
| P41 , P42 | N/A | N/A | N/A | Χ | _ | 4 | _ | SEC. | - | SEC. | - | Χ | _ | _ | ı | _ | _ | _ | 1 | Χ | - | |
| P61,P62 | N/A | N/A | N/A | Χ | _ | 6 | _ | SEC. | _ | SEC. | _ | Χ | - | _ | - | _ | _ | _ | _ | - | X | |
| P81,P82 | N/A | N/A | N/A | Χ | _ | 8 | _ | SEC. | _ | SEC. | - | Χ | - | _ | ı | - | - | - | _ | _ | Χ | |

PHASING DIAGRAM DETECTION LEGEND

DETECTED MOVEMENT UNDETECTED MOVEMENT (OVERLAP)

UNSIGNALIZED MOVEMENT PEDESTRIAN MOVEMENT

SIGNAL FACE I.D.



| (F) 41 81 | 12" | 21 461 82 |
|-----------------|-----|-----------------|
| | | |

| 2″ | (Y) | 12″ | Y |
|----|------------------|-----|----------------------------|
| | 41 81 | | 21,2 42 61,6 82,8 |
| | | | |

| FUNCTION | EVB (SECONDS) |
|--------------------------------|------------------|
| DELAY BEFORE PREEMPT | 0 |
| MIN. PED. CLEAR BEFORE PREEMPT | * |
| MIN. GREEN BEFORE PREEMPT | 1 |
| CLEARANCE TIME | 2 |
| PREEMPT EXTEND** | 2.0 |

2033 EV PREEMPTION

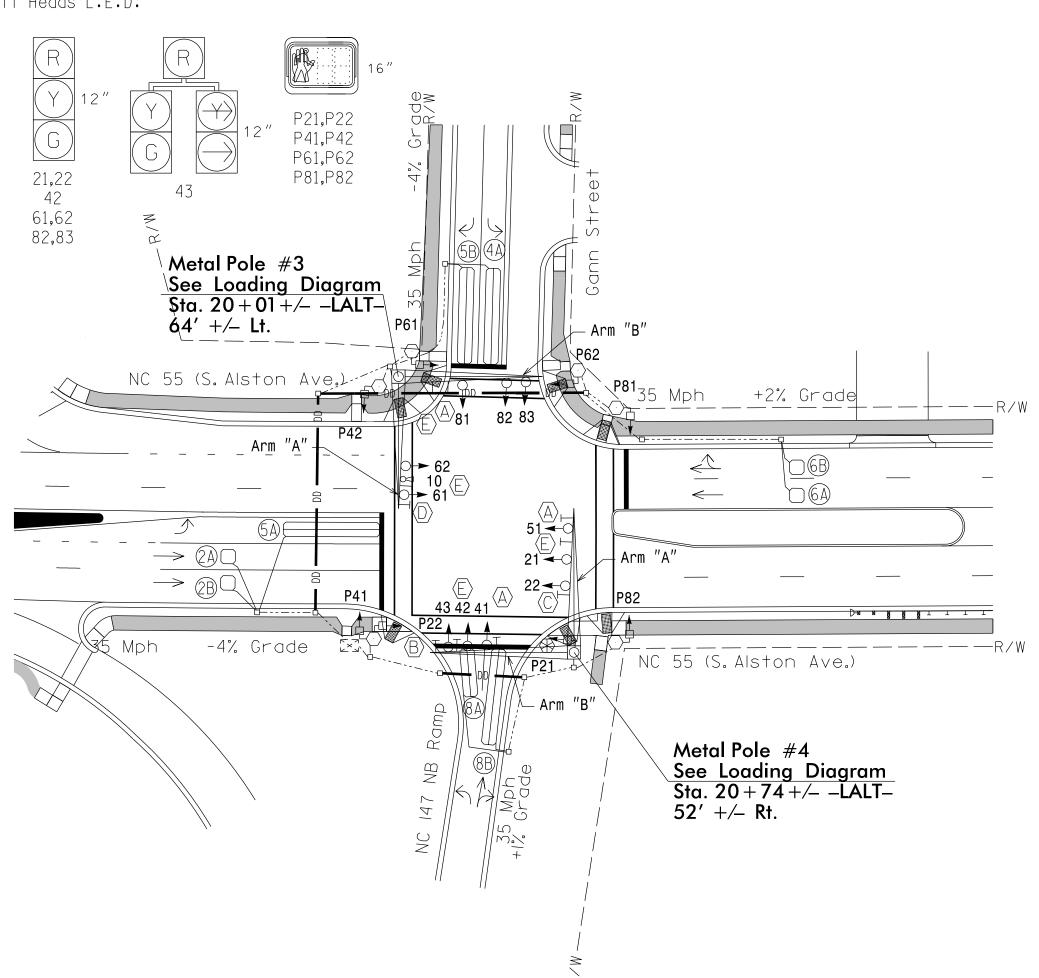
* See Timing Chart for Min Ped Clearance

** Program Timing on Optical Detector Unit

| TIMING CHART 2033 SOFTWARE w/2070 CONTROLLER | | | | | | | | | | | |
|--|--------------------|---------------------------|---------------------------|---------------------------|---------------------------|------------------|------------------|--|--|--|--|
| PHASE | Ø2 | <u>2033 30F1</u> | Ø5 | Ø6 | Ø8 | OL2 | OL4 | | | | |
| MINIMUM INITIAL * | 1 () SEC. | 7 SEC . | 7 SEC . | 1 () SEC. | 7 SEC . | O SEC. | O SEC. | | | | |
| VEHICLE EXTENSION * | 3.0 SEC. | 2.0 SEC . | 2.0 SEC. | 3.0 SEC. | 2.0 SEC. | 0 111 | 0 1111 | | | | |
| YELLOW CHANGE INT. | 4.1 SEC. | 3.8 SEC . | 3.0 SEC . | 4.1 SEC. | 3.8 SEC . | 3.8 SEC . | 3.8 SEC . | | | | |
| RED CLEARANCE | 1.8 SEC. | 3.4 SEC . | 2.8 SEC . | 1.8 SEC. | 3.4 SEC . | 3.4 SEC . | 3.4 SEC . | | | | |
| MAXIMUM LIMIT * | 50 SEC . | 35 SEC . | 15 SEC . | 50 SEC . | 35 SEC . | | | | | | |
| RECALL POSITION | VEH. RECALL | NONE | NONE | VEH. RECALL | NONE | | | | | | |
| VEHICLE CALL MEMORY | YELLOW LOCK | NONE | NONE | YELLOW LOCK | NONE | | | | | | |
| DOUBLE ENTRY | OFF | ON | OFF | OFF | ON | | | | | | |
| WALK * | 4 SEC. | 4 SEC. | - SEC. | 4 SEC. | 4 SEC. | | | | | | |
| FLASHING DON'T WALK | 1.4 SEC. | 22 SEC . | - SEC. | 8 SEC . | 17 SEC . | | | | | | |
| MIN PED CLEARANCE | 7 SEC . | 1 () SEC . | - SEC. | 4 SEC. | 9 SEC. | | | | | | |
| TYPE 3 LIMIT | - SEC. | - SEC. | - SEC. | - SEC. | - SEC. | | | | | | |
| ALTERNATE EXTENSION | - SEC. | - SEC. | - SEC. | - SEC. | - SEC. | | | | | | |
| ADD PER VEHICLE * | - SEC. | - SEC. | - SEC. | - SEC. | - SEC. | | | | | | |
| MAXIMUM INITIAL * | - SEC. | - SEC. | - SEC. | - SEC. | - SEC. | | | | | | |
| MAXIMUM GAP* | 3 . 0 SEC . | 2 . 0 SEC . | 2 . 0 SEC . | 3 . 0 SEC . | 2 . O SEC. | | | | | | |
| REDUCE 0.1 SEC EVERY * | - SEC. | – SEC. | - SEC. | - SEC. | - SEC. | | | | | | |
| MINIMUM GAP | 3 . O SEC. | 2 . O SEC . | 2 . 0 SEC . | 3 . 0 sec . | 2 . O SEC . | | | | | | |

* 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

All Heads L.E.D.



3 Phase Fully Actuated w/ EV Preemption

(Durham Signal System)

PROJECT REFERENCE NO.

U-3308

|Sig. 11.0|

NOTES

1. Refer to "Road Standard Drawings NCDOT" dated January 2012, "Standard Specifications for Roads and Structures" dated January 2012.

2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer

3. Phase 5 may be lagged.

4. Set all detector units to presence mode.

5. Program all timing information into phase banks 1,2, and 3 unless otherwise noted.

6. Set phase bank 3 maximum limit to 250 seconds for phases used.

7. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.

8. Program pedestrian heads to countdown the flashing "Don't Walk" time.

9. This intersection features an optical preemption system. Shown locations of optical detectors are conceptual only.

10. Upon completion of Emergency Vehicle Preemption, controller returns to normal operation.

11. When EVB preemption initializes during side street service signal head 51 will display a red arrow.

12. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.

13. Pedestrian pedestals are conceptual and shown for reference only. See sheets P1-P3 for pushbutton location details.

LEGEND

| <u>PROPOSE</u> | <u></u> | <u>EXISTING</u> |
|------------------------------|---|-------------------|
| \bigcirc | Traffic Signal Head | |
| 0- | Modified Signal Head | N/A |
| \dashv | Sign | $\overline{}$ |
| | Pedestrian Signal Head With Push Button & Sign | • |
| |) Signal Pole with Guy | |
| | Signal Pole with Sidewalk Guy | |
| | D Inductive Loop Detector | |
| | Controller & Cabinet | × |
| | Junction Box | |
| | 2-in Underground Conduit - | |
| N/A | Right of Way | |
| \longrightarrow | Directional Arrow | \longrightarrow |
| $\langle A \rangle$ | Left Arrow "ONLY" Sign (R3-5L) | \triangle |
| $\langle \mathbb{B} \rangle$ | Right Arrow "Only" Sign (R3-5R |) B |
| $\langle \mathbb{C} \rangle$ | No Right Turn Sign (R3-1) | |
| $\langle \mathbb{D} \rangle$ | No Left Turn Sign (R3-2) | |
| E | Street Name Sign | E |
| \bigcirc | Optical Detector | • |
| ⊗ | Type I Pushbutton Post | |
| | Type II Signal Pedestal | |
| 0 | Metal Pole with Mastarm | |

Signal Upgrade - Final Design



NC 55 (South Alston Avenue)

NC 147 NB Ramp / Gann Street

Division 5 Durham County PLAN DATE: September 2014 REVIEWED BY: J Hochanadel 750 N.Greenfield Pkwy, Garner, NC 27529 PREPARED BY: C Lawson REVIEWED BY:

INIT. DATE

1025 Wade Avenue Raleigh, NC 27605 Tel:919-789-9977 Fax:919-789-9591

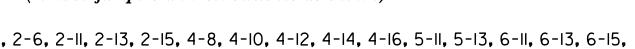
REVISIONS

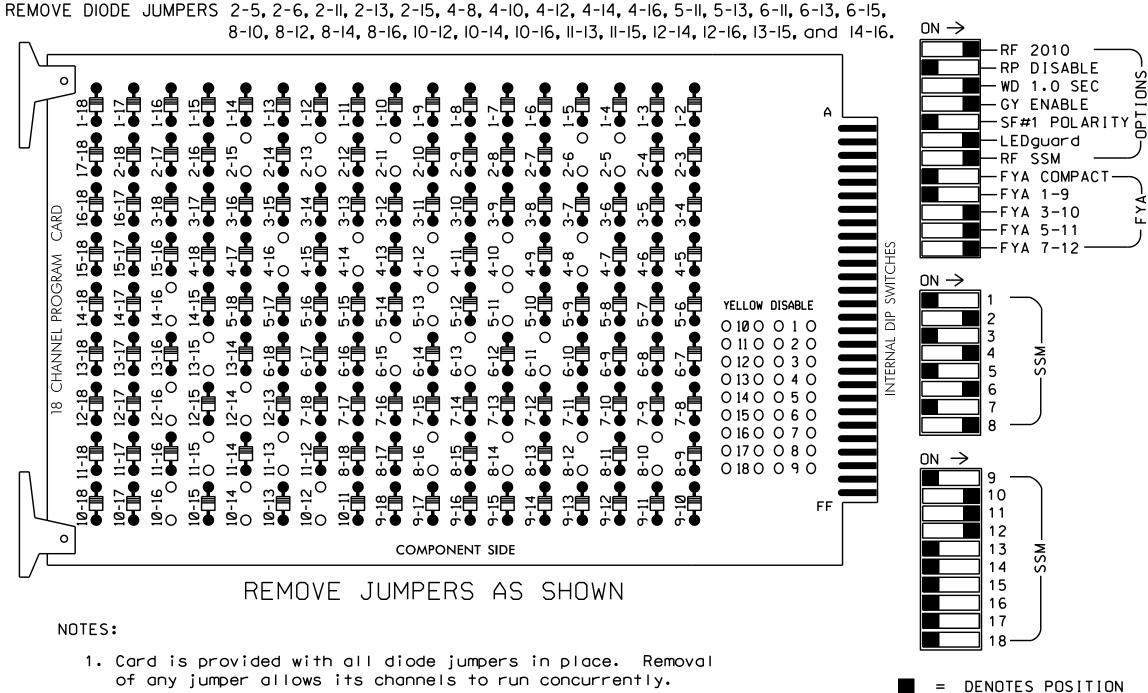
MyPALL DATE SIG. INVENTORY NO. 05-0284

SEAL

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)





NOTES

- 1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. Verify that signal heads flash in accordance with the signal plans.
- 2. Program controller to Start Up in phases 2 and 6 green.
- 3. Set power-up flash time to 0 seconds within the controller programming. The conflict monitor will govern startup flash. Ensure STARTUP "RED START" is set to 0 seconds.
- 4. Enable Simultaneous Gap-Out feature for all phases.
- 5. Program all timing information into phase banks 1, 2, and 3 unless otherwise noted.
- 6. Set phase bank 3 maximum limit to 250 seconds for phases
- 7. Program phases 4 and 8 for Double Entry.
- 8. Ensure start up flash phases are coordinated with flash program block assignments.
- 9. Program Startup Ped Calls for phases 2, 4, 6, and 8.
- 10. Set the Red Revert interval on the controller to 1 second.
- 11. This cabinet and controller are part of the Durham Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070E CABINET MOUNT.....BASE OUTPUT FILE POSITIONS...18 WITH AUX FILE LOAD SWITCHES USED......\$2,\$3,\$5,\$6,\$7,\$8,\$9,\$11,\$12, AUX S2, AUX S4, AUX S5 PHASES USED......2,2PED,4,4PED,5,6,6PED,8,8PED

OVERLAP 1.....NOT USED OVERLAP 2.....4+8

OVERLAP 3....* OVERLAP 4.....4+8

* See FYA PPLT Programming detail on sheet 2.

NU = Not Used* Denotes install load resistor. See load resistor installation detail this sheet.

LOAD SWITCH NO.

CMU CHANNEL

SIGNAL HEAD NO.

RED

YELLOW

GREEN

RED ARROW

YELLOW ARROW

FLASHING YELLOW ARROW

GREEN ARROW

FYA SIGNAL WIRING DETAIL

119

121

SIGNAL HEAD HOOK-UP CHART

134

135

136

S8 | S9 | S10 | S11 | S12 |

8

108

109

43 51 61,62 P61, NU 82,83 P81, P82 NU 81 NU 51 41 NU

110

15 7

S4 S5

101

102

103

132

104

★ See pictorial of head wiring in detail below.

133 | 133

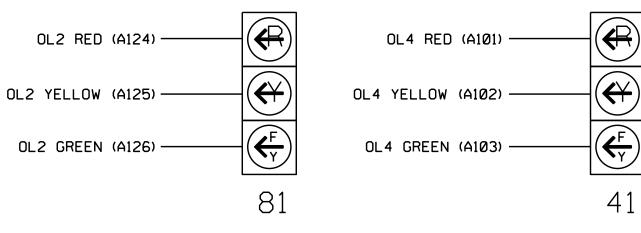
NU 21,22 P21, NU 42,43 P41, P42

128

129

130

(wire signal heads as shown)



OL3 RED (A114) (4) OL3 YELLOW (A115) OL3 GREEN (A116) 05 GREEN (133) — 51

> THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-0284 DESIGNED: September 2014 SEALED: 4/2/15 REVISED: N/A

PROJECT REFERENCE NO.

U-3308

8 PED OL1 OL2 SPARE OL3 OL4 SPARE

A124

A126

17 | 11 | 12 | 18

A114 A101

A115 A102

A116 A103

Sig. 11.

Electrical Detail - Final Design - Sheet 1 of 2

DETAILS FOR Prepared in the Offices of: NC 147 NB Ramp / Gann Street ivision 5 Durham County

PLAN DATE: November 2014 | REVIEWED BY: | 978 PREPARED BY: S. Armstrong Reviewed BY: REVISIONS INIT. DATE

John T. Rowe, Jr. 4/2/2015

SEAL

008453

750 N.Greenfield Pkwy, Garner, NC 27529

ELECTRICAL AND PROGRAMMIN

NC 55 (South Alston Avenue)

SIG. INVENTORY NO. 05-0284

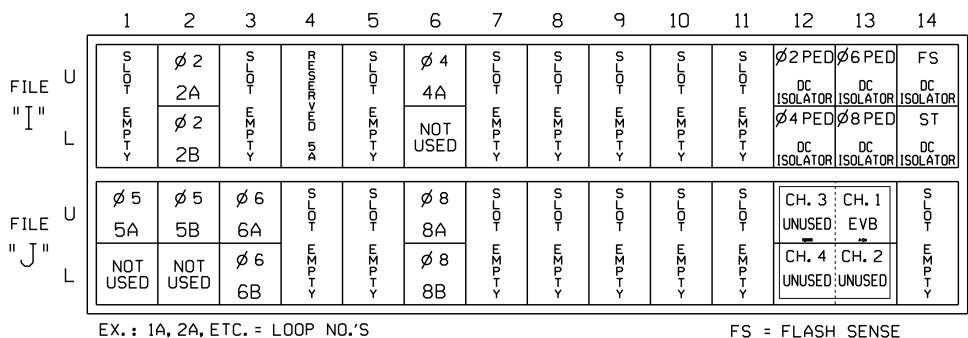
INPUT FILE POSITION LAYOUT

(front view)

2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.

4. Ensure conflict monitor communicates with 2070.

3. Ensure that Red Enable is active at all times during normal operation.



FS = FLASH SENSE ST = STOP TIME

EVB = EMERGENCY VEHICLE PREEMPT

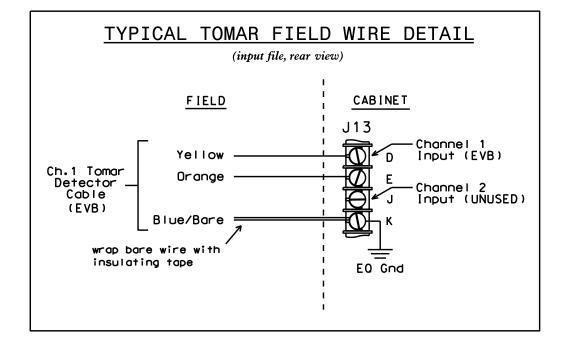
OF SWITCH

4 CHANNEL TOMAR OSP CARD INSERT CARD INTO SLOT J13

ON OFF

WD ENABLE ⟨\

SW2



INPUT FILE CONNECTION & PROGRAMMING CHART

| LOOP NO. | LOOP TERMINAL | INPUT FILE POS. | DETECTOR NO. | PIN NO. | ATTRIBU | TES | NEMA PHASE |
|---------------------|--------------------|--------------------|-----------------|------------|---------|-----|---------------|
| 2A | TB2-5 , 6 | I2U | 1 | 39 | 5 | 7 | 2 |
| 2B | TB2-7,8 | I2L | 5 | 43 | 5 | 7 | 2 |
| 4A | TB4-9,10 | I6U | 3 | 41 | IJ | 7 | 4 |
| 5A | TB3-1,2 | J1U | 13 | 55 | Б | 7 | 5 |
| O 11 | 100 112 | 0.0 | g | 55 | IJ | 7 | 2 |
| 5B | TB3-5 , 6 | J2U | 2 | 40 | IJ | 7 | 5 |
| 6A | TB3-9,10 | J3U | 22 | 64 | 15 | 7 | 6 |
| 6B | TB3-11,12 | J3L | 30 | 77 | 15 | 7 | 6 |
| 8A | TB5-9,10 | J6U | 4 | 42 | IJ | 7 | 8 |
| 8B | TB5-11 , 12 | J6L | 8 | 46 | Б | 7 | 8 |
| PED PUSH BUTTONS | | | | | | | |
| P21,P22 | TB8-4,6 | I12U | 25 | 67 | 2 | | 2 PED |
| P41,P42 | TB8-5,6 | I12L | 27 | 69 | 2 | | 4 PED |
| P61 , P62 | TB8-7 , 9 | I13U | 26 | 68 | 2 | | 6 PED |
| P81,P82 | TB8-8,9 | I13L | 28 | 70 | 2 | | 8 PED |

DETECTOR ATTRIBUTES LEGEND:

1-FULL TIME DELAY 2-PED CALL

3-RESERVED 4-COUNTING 5-EXTENSION 6-TYPE 3 7-CALLING

INPUT FILE POSITION LEGEND: FILE J-SLOT 2-8-ALTERNATE LOWER —

NOTE:

INSTALL DC ISOLATORS

IN INPUT FILE SLOTS

I12 AND I13.

OVERLAP PROGRAMMING DETAIL

RED CLEARANCE = 3.4

Program overlaps as follows: Main Menu - 4) OVERLAP

Press "+"

OVERLAP [2]:

LOADSWITCH = 10NOTE: For head 81 VEH SET 1 = 4.8YELLOW CLEARANCE = 3.8

Press "+" twice

OVERLAP [4]:

LOADSWITCH = 12NOTE: For head 41 VEH SET 1 = 4.8YELLOW CLEARANCE = 3.8 RED CLEARANCE = 3.4

END OF OVERLAP PROGRAMMING

EMERGENCY VEHICLE PREEMPTION PROGRAMMING

 Program EVB preempt as follows: Main Menu - 2) PREEMPT - 4) EMERGENCY VEHICLE EVB Clear = 2 EVB Clearance Phases = 6

2. Program general preemption parameters as follows: Main Menu - 2) PREEMPT - 6) MISC PREEMPTION PARAMETERS Min Time Before PE ForceOff = 1

3. Ped Clear Before Preempt is a pedestrian timing parameter, and is programmed as follows: Main Menu - 1) PHASE - 5) PEDESTRIAN TIMING PHASE 2 MIN FDW = 7PHASE 4 MIN FDW = 10PHASE 6 MIN FDW = 4PHASE 8 MIN FDW = 9

> Program extend time on optical detector unit for 2.0 sec for EVB.

FYA PPLT PROGRAMMING

PROJECT REFERENCE NO.

U-3308

Sig. 11.2

- 1. Program Flashing Yellow Arrow phases as follows: Main Menu - 1) PHASE - 2) PHASE FUNCTIONS PAGE TWO PPLT FYA = PHASE 5
- 2. Assign output pin for Flashing Yellow Arrow as follows: Main Menu - 6) OUTPUTS - F) FYA PPLT Phase 5 = 90
- 3. Redirect RED and YELLOW outputs for the left turn phases as follows:

Main Menu - 6) OUTPUTS - 8) REDIRECT PHASE Phase 5 RED = 88, Phase 5 YELLOW = 89

OVERLAP GREEN FLASH PROGRAMMING DETAIL FOR 3-SECTION FYA HEADS

The following will cause the overlap green outputs to flash, which are wired to the flashing yellow arrows. Program as follows:

Main Menu - 1) PHASE - 2) PHASE FUNCTIONS PAGE TWO OLAP G FL = 2.4

MIN WALK DURING PREEMPTION PROGRAMMING

To disable MIN WALK pedestrian timing during preemption. program the controller as follows: Main Menu - 9) UTILITIES - 5) CONFIGURATION EXTRA TWO = 3

SPECIAL NOTE EV PREEMPT PROGRAMMING

Setting 'FYA DURING PREEMPT' to 'Y' eliminates yellow trap when transitioning to preempt from adjacent through phase. Main Menu - 9) UTILITIES - 9) MISC FYA DURING PREEMPT (Y/N) = Y

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

> THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-0284 DESIGNED: September 2014 SEALED: 4/2/15 REVISED: N/A

FLASHER CIRCUIT MODIFICATION DETAIL

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

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

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

Electrical Detail - Final Design - Sheet 2 of 2

ELECTRICAL AND PROGRAMMING DETAILS FOR

NC 55 (South Alston Avenue) NC 147 NB Ramp / Gann Street

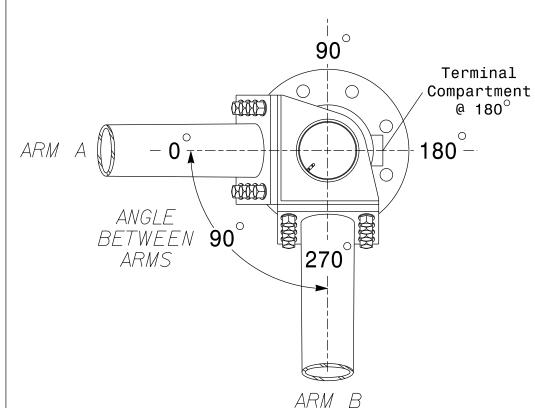
PLAN DATE: November 2014 REVIEWED BY: ATR PREPARED BY: S. Armstrong REVIEWED BY: REVISIONS INIT. DATE

750 N.Greenfield Pkwy, Garner, NC 27529

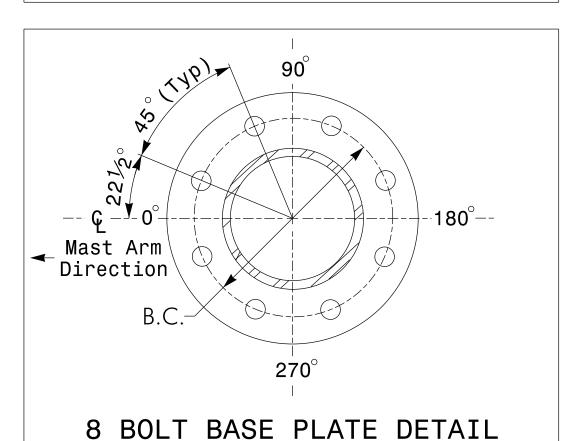
Maximum 25.6 ft.

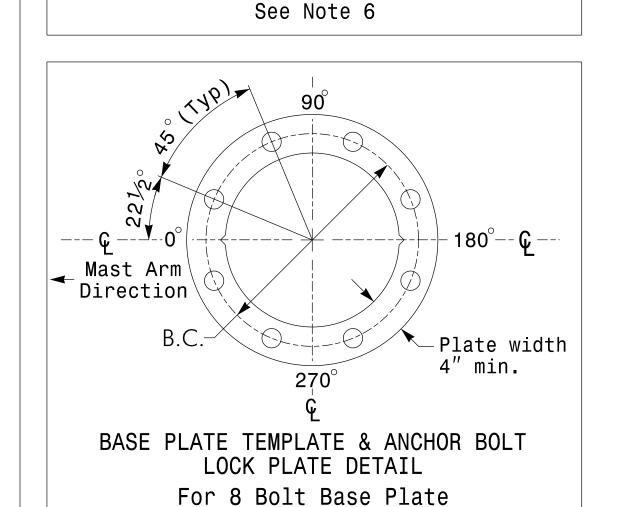
SPECIAL NOTE The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data. Elevation Data for Mast Arm Attachment (H1)

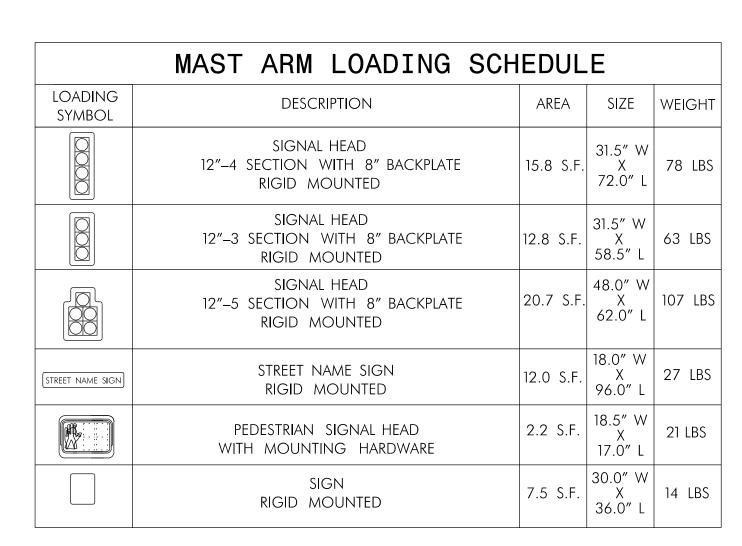
Arm "A" | Arm "B" Elevation Differences for: Baseline reference point at 0.0 ft. 0.0 ft. C Foundation @ ground level Elevation difference at +2.05 ft. | +1.37 ft High point of roadway surface Elevation difference at +0.86 ft. +0.60 ft Edge of travelway or face of curb



POLE RADIAL ORIENTATION







NOTES

Design Reference Material

- 1. Design the traffic signal structure and foundation in accordance with:
- The 5th Edition 2009 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
- The 2012 NCDOT "Standard Specifications for Roads and Structures". The latest addenda to these specifications can be found in the traffic signal project special provisions.
- The 2012 NCDOT Roadway Standard Drawings.
- The traffic signal project plans and special provisions.
- The NCDOT "Metal Pole Standards" located at the following NCDOT website:

https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx

Design Requirements

- 2. Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "Design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the
- 3. Design all signal supports using stress ratios that do not exceed 0.9.
- 4. The camber design for mast arm deflection should provide an appearance of a low pitched arch where the tip or the free end of the mast arm does not deflect below horizontal when fully loaded.
- 5. A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements. This requires staggering the connections. Use elevation data for each arm to determine appropriate arm connection points.
- 6. Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
- 7. The mast arm attachment height (H1) shown is based on the following design assumptions: a.Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
- b. Signal heads attached to the mast arm are rigid mounted and vertically centered on the arm.
- c. The roadway clearance height for design is as shown in the elevation views. d. The top of the pole base plate is .75 feet above the ground elevation.
- e Refer to the Elevation Data chart for elevation differences between the proposed foundation ground level and the high point on the roadway.
- 8. The pole manufacturer will determine the total height (H2) of the pole using the greater of the following:
- Mast arm attachment height (H1) plus 2 feet, or
- \bullet H1 plus $\frac{1}{2}$ of the total height of the mast arm attachment assembly plus 1 foot. 9. If pole location adjustments are required, the contractor must gain approval from the engineer as this may affect the mast arm lengths and arm attachment heights. The

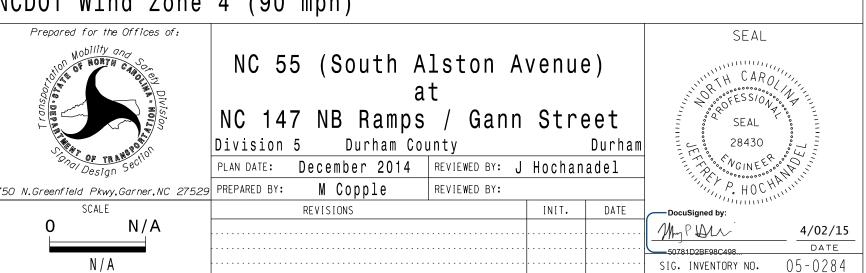
contractor may contact the Signal Design Structural Engineer for assistance at

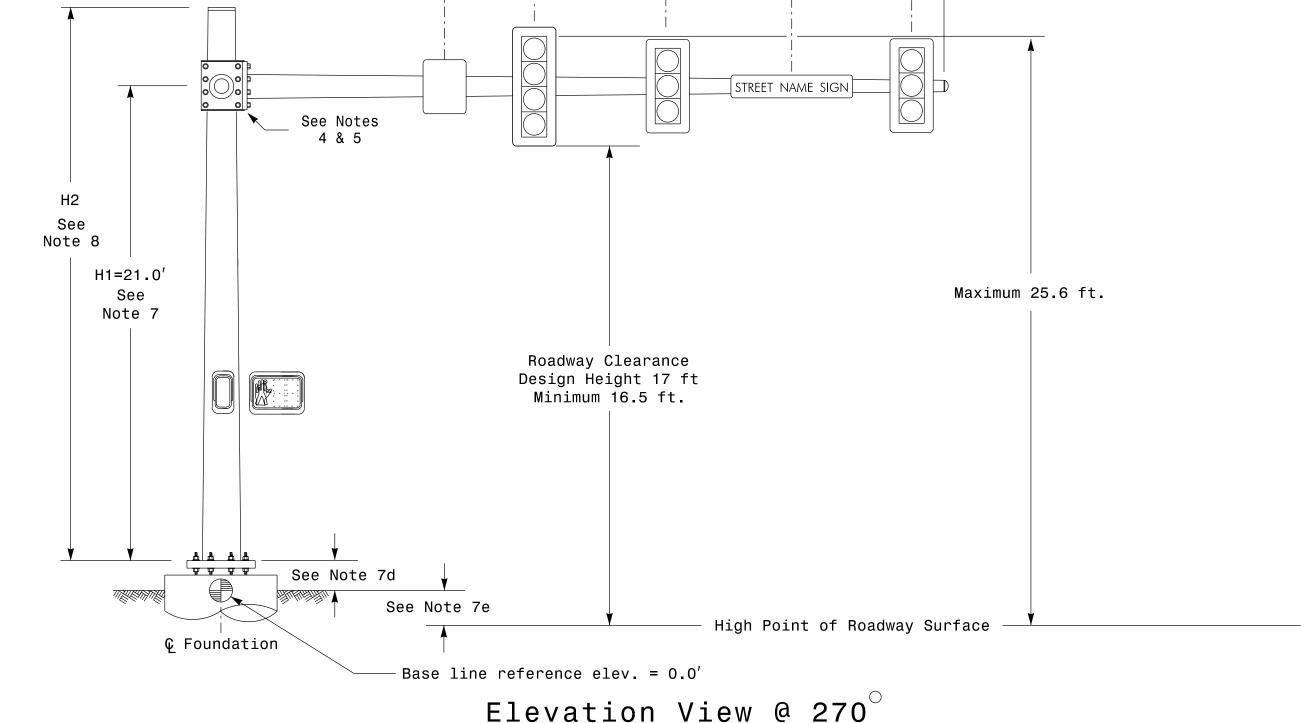
- (919) 773-2800. 10. The contractor is responsible for verifying that the mast arm lengths shown will allow proper positioning of the signal heads over the roadway.
- 11. The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.



1025 Wade Avenue Raleigh, NC 27605 Tel:919-789-9977 Fax:919-789-9591 License #: C-2197

NCDOT Wind Zone 4 (90 mph)





Design Loading for METAL POLE NO. 3, MAST ARM A

STREET NAME SIGN

High Point of Roadway Surface

55'

Roadway Clearance

Design Height 17 ft

Minimum 16 5 ft

Elevation View @ 0

Design Loading for METAL POLE NO. 3, MAST ARM B

Ç Pole

H2

See

Note 8

H1=21.0'

Note 7

See Notes

4 & 5

See Note 7d

© Foundation

See Note 7e

Base line reference elev. = 0.0'

Maximum 25.6 ft.

Roadway Clearance

Design Height 17 ft

Minimum 16.5 ft

WEIGHT

AREA SIZE

31.5" W

15.8 S.F. X 78 LBS 72.0" L

SIGNAL HEAD 12"-3 SECTION WITH 8" BACKPLATE 12.8 S.F. X 63 LBS 58.5" L RIGID MOUNTED 48.0" W SIGNAL HEAD 20.7 S.F. X 107 LBS 12"-5 SECTION WITH 8" BACKPLATE 62.0" L RIGID MOUNTED 18.0″ W STREET NAME SIGN 12.0 S.F. X 27 LBS STREET NAME SIGN RIGID MOUNTED 96.0″ L 18.5" W 2.2 S.F. PEDESTRIAN SIGNAL HEAD 21 LBS WITH MOUNTING HARDWARE 17.0" L 30.0" W 7.5 S.F. X 14 LBS RIGID MOUNTED 36.0" L NOTES Design Reference Material Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions. these specifications can be found in the traffic signal project special provisions. • The traffic signal project plans and special provisions.

MAST ARM LOADING SCHEDULE

DESCRIPTION

SIGNAL HEAD

RIGID MOUNTED

12"-4 SECTION WITH 8" BACKPLATE

1. Design the traffic signal structure and foundation in accordance with:

- The 5th Edition 2009 AASHTO "Standard Specifications for Structural Supports for Highway
- The 2012 NCDOT "Standard Specifications for Roads and Structures". The latest addenda to
- The 2012 NCDOT Roadway Standard Drawings.
- The NCDOT "Metal Pole Standards" located at the following NCDOT website:
- https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx

Design Requirements 2. Design the traffic signal structure using the loading conditions shown in the elevation

LOADING

SYMBOL

- views. These are anticipated worst case "Design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the
- 3. Design all signal supports using stress ratios that do not exceed 0.9.
- 4. The camber design for mast arm deflection should provide an appearance of a low pitched arch where the tip or the free end of the mast arm does not deflect below horizontal when fully loaded.
- 5. A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements. This requires staggering the connections. Use elevation data for each arm to determine appropriate arm connection points.
- 6. Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
- 7. The mast arm attachment height (H1) shown is based on the following design assumptions: a. Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
- b. Signal heads attached to the mast arm are rigid mounted and vertically centered on the arm. c. The roadway clearance height for design is as shown in the elevation views.
- d. The top of the pole base plate is .75 feet above the ground elevation. e Refer to the Elevation Data chart for elevation differences between the proposed foundation
- ground level and the high point on the roadway. 8. The pole manufacturer will determine the total height (H2) of the pole using the greater of
- the following: • Mast arm attachment height (H1) plus 2 feet, or
- \bullet H1 plus $\frac{1}{2}$ of the total height of the mast arm attachment assembly plus 1 foot.
- 9. If pole location adjustments are required, the contractor must gain approval from the engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signal Design Structural Engineer for assistance at (919) 773-2800.
- 10. The contractor is responsible for verifying that the mast arm lengths shown will allow proper positioning of the signal heads over the roadway.
- 11. The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

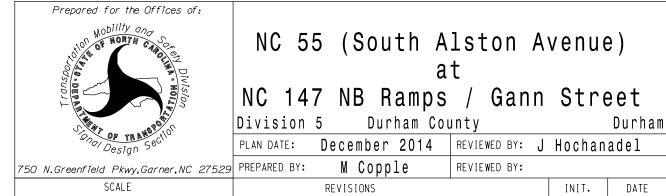


1025 Wade Avenue Raleigh, NC 27605 Tel:919-789-9977 Fax:919-789-9591 License #: C-2197

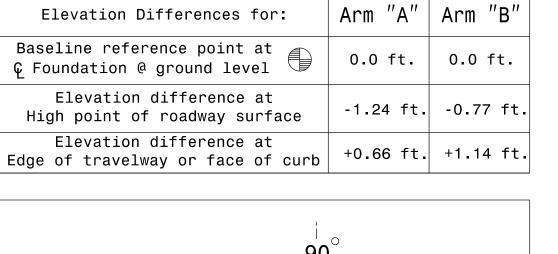
SEAL

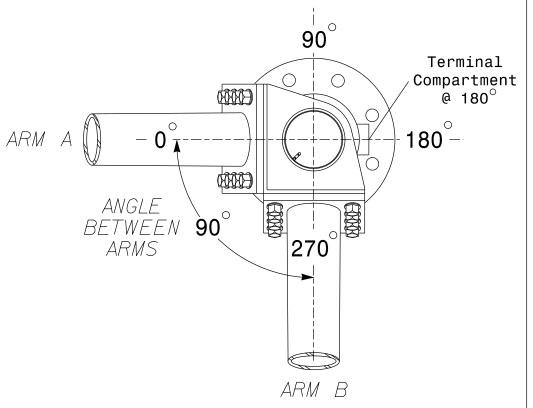
NCDOT Wind Zone 4 (90 mph)

N/A

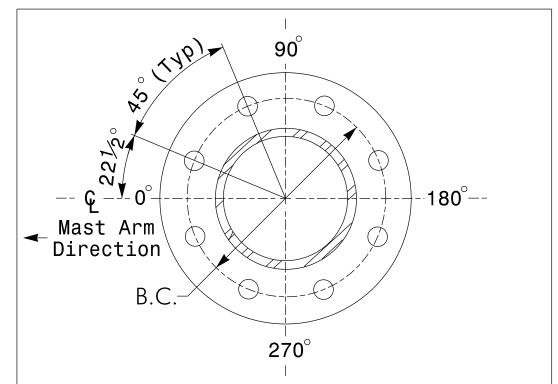


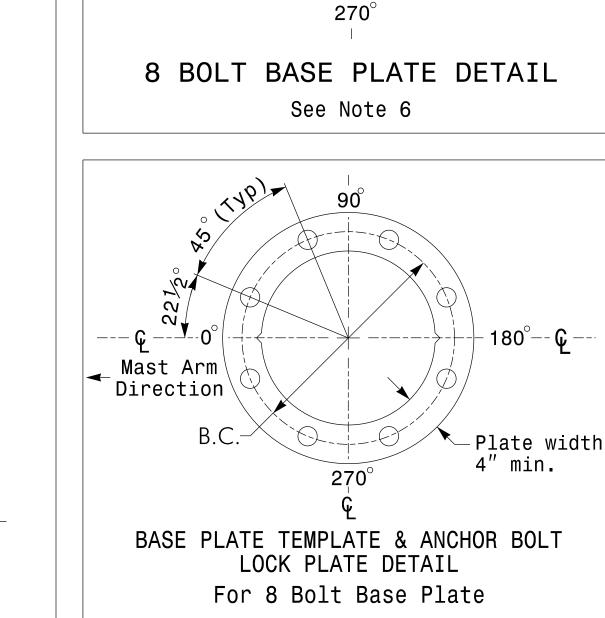
SPECIAL NOTE The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data. Elevation Data for Mast Arm Attachment (H1) Arm "A" | Arm "B"

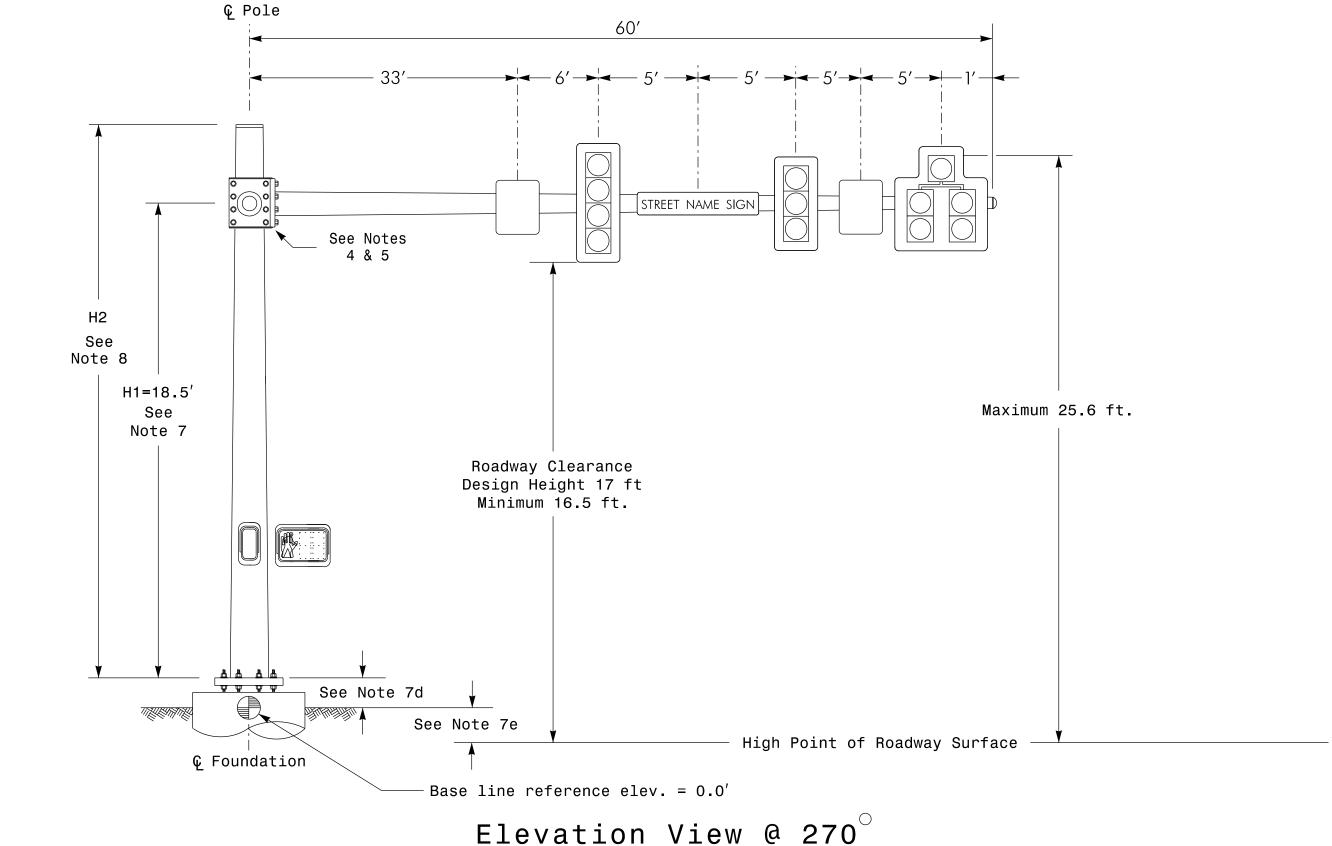




POLE RADIAL ORIENTATION







Elevation View @ 0°

Design Loading for METAL POLE NO. 4, MAST ARM B

Design Loading for METAL POLE NO. 4, MAST ARM A

Street name sign

High Point of Roadway Surface

Ç Pole

H2

See

Note 8

H1=18.0'

Note 7

See Notes

4 & 5

See Note 7d

© Foundation

See Note 7e

Base line reference elev. = 0.0'

MyPAL 4/02/15 DATE SIG. INVENTORY NO. 05-0284

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

- 2. Do not program signal for late night
- 3. Phase 1 may be lagged.
- 4. Set all detector units to presence mode.
- 5. Locate new cabinet as to not obstruct sight distance
- 6. Program all timing information into phase banks
- 8. Omit "WALK" and flashing "DON'T WALK" with no pedestrian
- 9. Program pedestrian heads to countdown the flashing
- 11. This intersection features an optical preemption system. Shown locations of optical detectors
- 12. Upon completion of Emergency Vehicle Preemption,
- 13. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing

| THOI GOLD | | LATOTING |
|---------------------|---|-------------------|
| \bigcirc | Traffic Signal Head | |
| | Modified Signal Head | N/A |
| | Sign | |
| | Pedestrian Signal Head With Push Button & Sign | • |
| <u> </u> | 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 | |
| \longrightarrow | Directional Arrow | \longrightarrow |
| $\langle A \rangle$ | "No Left Turn" (R3-2) | \triangle |
| B | "No Right Turn" (R3-1) | lack |
| $\langle C \rangle$ | "Dual Turn Arrows" (R10-21) | |
| <u>©</u> / | w/ Flags | - |
| | Work Area | N/A |
| | Drums | N/A |
| ——E— | Construction Easement | N/A |
| — PDE — | — Permanent Drainage Easement | N/A |
| | _ | N/A |
| | — Direct Bury | |
| \bigcirc | Optical Detector | • |
| | Video Detector | |
| | Video Detection Area | |

NOTES

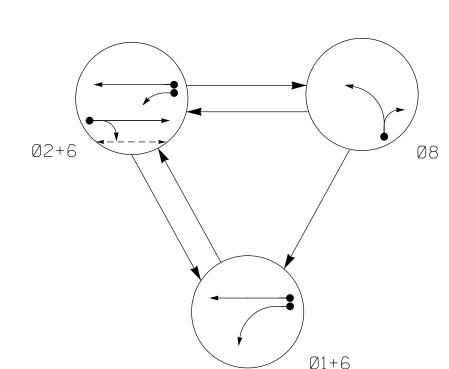
- 1. Refer to "Road Standard Drawings NCDOT" dated January 2012, "Standard Specifications for Roads and Structures" dated January 2012.
- flashing operation unless otherwise directed by the Engineer

- of vehicles turning right on red.
- 1,2, and 3 unless otherwise noted.
- 7. Set phase bank 3 maximum limit to 250 seconds for
- "Don't Walk" time.
- 10. Pavement markings are existing.
- are conceptual only.
- controller returns to normal operation.
- values supersede these values.
- 14. Disconnect and bag pedestrian signal heads #P41 and #P82 during this phase of construction.

LEGEND

| <u>PROPOSED</u> | | EXISTING |
|----------------------------------|---|-------------------|
| \bigcirc | Traffic Signal Head | |
| ()—> | Modified Signal Head | N/A |
| \dashv | Sign | \dashv |
| | Pedestrian Signal Head With Push Button & Sign | |
| $\bigcirc \hspace{1cm} \bigcirc$ | 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 | |
| \longrightarrow | Directional Arrow | \longrightarrow |
| $\langle \Delta \rangle$ | "No Left Turn" (R3-2) | \triangle |
| $\langle \mathbb{B} \rangle$ | "No Right Turn" (R3-1) | B |
| (C) | "Dual Turn Arrows" (R10-21) w/ Flags | |
| | Work Area | N/A |
| • | Drums | N/A |
| ——E—— | - Construction Easement | N/A |
| — PDE — | -Permanent Drainage Easement | N/A |
| | Barricades | N/A |
| | - Direct Bury | |
| \bigcirc | Optical Detector | • |
| | Video Detector | |
| | Video Detection Area | |

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

DETECTED MOVEMENT

UNSIGNALIZED MOVEMENT

2033 EV PREEMPTION

(SECONDS)

0

*

2.0

FUNCTION

MIN. PED. CLEAR BEFORE PREEMPT

* See Timing Chart for Min Ped Clearance

** Program Timing on Optical Detector Unit

TIMING CHART 2033 SOFTWARE w/2070 CONTROLLER

15 **SEC**.

SEC.

2 . O **SEC**.

SEC.

2 **.** 0 **SEC**.

1 () **SEC**.

50 **SEC**.

SEC.

SEC.

2 **.** 0 **SEC**.

SEC.

MIN. GREEN BEFORE PREEMPT

DELAY BEFORE PREEMPT

CLEARANCE TIME

MINIMUM INITIAL *

VEHICLE EXTENSION

RED CLEARANCE

MAXIMUM LIMIT

DOUBLE ENTRY

TYPE 3 LIMIT

MAXIMUM INITIAL

REDUCE 0.1 SEC EVERY *

MAXIMUM GAP*

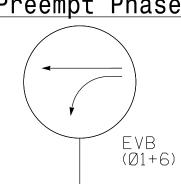
YELLOW CHANGE INT.

PREEMPT EXTEND**

PEDESTRIAN MOVEMENT

UNDETECTED MOVEMENT (OVERLAP)

EV Preempt Phases



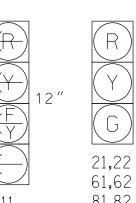


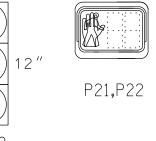
| TABLE OF OPERATION | | | | | | | | | |
|--------------------|------------------|------|------------------|-------------|-----------------------|--|--|--|--|
| | PHASE | | | | | | | | |
| SIGNAL FACE | Ø 1 + 6 | Ø2+6 | Ø 4 + 8 | E V B | F L A S H | | | | |
| 11 | — | F | - R | - | - Y | | | | |
| 21,22 | R | G | R | R | Υ | | | | |
| 61,62 | G | G | R | G | Y | | | | |
| 81,82 | R | R | G | R | R | | | | |
| P21;P22 | D·W | W | D·W | D·W | DRK | | | | |

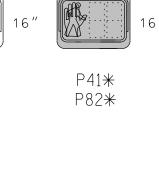
| 61,62 | G | G | R | G | Y |
|---------|-----|---|-----|-----|-----|
| 81,82 | R | R | G | R | R |
| P21;P22 | D·W | W | D·W | D·W | DRK |
| | | | | | |
| | | | | | |
| | | | | | |

SIGNAL FACE I.D.

All Heads L.E.D. * See Note 14









Sta. 30 + 97 + / - LALT -47′₋+/- Lt.

• • • • •

2.0 **SEC**. 3.0 **SEC**. 3.0 **SEC**. 4.3 **SEC**. | 4.3 **SEC**. | 4.3 **SEC**. 1.8 SEC. | 1.2 SEC. | 1.2 SEC. | 1.9 SEC. 50 **SEC**. 35 **SEC**.

RECALL POSITION VEH. RECALL VEH. RECALL VEHICLE CALL MEMORY YELLOW LOCK YELLOW LOCK OFF OFF 4 **SEC**. — SEC. — SEC. SEC. FLASHING DON'T WALK — SEC. — SEC. 9 **SEC**. SEC. MIN PED CLEARANCE — SEC. — SEC. - SEC. — SEC. SEC. - SEC. ALTERNATE EXTENSION SEC. SEC. - SEC. - SEC. ADD PER VEHICLE — SEC. SEC. SEC.

SEC.

3 . 0 **SEC**.

SEC.

3 **.** 0 **SEC**.

2 and 6 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds

SEC.

3 . 0 **SEC**.

3 **.** 0 **SEC**.

SEC.

2033 SOFTWARE w/ 2070 CONTROLLER

LOOP & DETECTOR UNIT INSTALLATION CHART

PHASE | DELAY

P21,P22 N/A N/A N/A X - 2 - SEC. - SEC. - X - - - - - -

↓[⊥]**↓** 81 82

22

0 | * | - | 8 | 10 SEC.

INDUCTIVE LOOPS

TURNS STOPBAR

70 |

SIZE

6×40

6×6

6×6

6×40

* Video Detection Zone

PEDESTRIAN DETECTION

LOOP NO.

2Α

DETECTOR PROGRAMMING

∕Direct Bury

47' +/- Lt.

□(6A)<

Sta. 32 + 04 + / - LALT -

NC 55 (S. Alston Ave.)

+2% Grade

1025 Wade Avenue Raleigh, NC 27605 Tel:919-789-9977

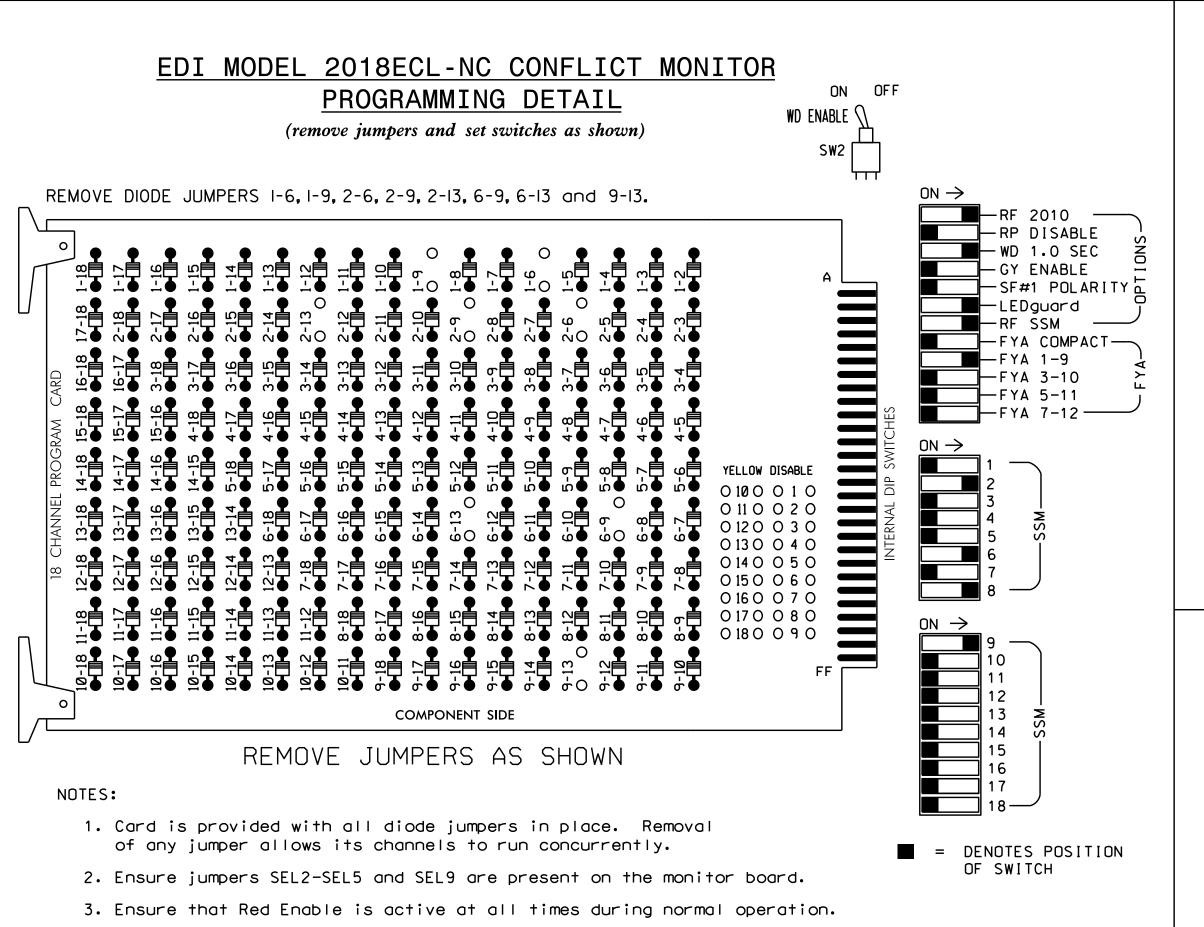
SR 1926 (Angier Avenue) Division 5 Durham County PLAN DATE: September 2014 | REVIEWED BY: J Hochanadel 50 N.Greenfield Pkwy,Garner,NC 27529 PREPARED BY: C Lawson INIT. DATE

Signal Upgrade - Temporary Design 1 (TMP Phase I, Steps 1-10)

NC 55 (South Alston Avenue)

MyPAL DATE SIG. INVENTORY NO. 05-1026T1





INPUT FILE POSITION LAYOUT

(front view)

4. Ensure conflict monitor communicates with 2070.

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

NOTES

- 1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. Verify that signal heads flash in accordance with the signal plans.
- 2. Program controller to Start Up in phases 2 and 6 green.
- 3. Set power-up flash time to 0 seconds within the controller programming. The conflict monitor will govern startup flash. Ensure STARTUP "RED START" is set to 0 seconds.
- 4. Enable Simultaneous Gap-Out feature for all phases.
- 5. Program all timing information into phase banks 1, 2, and 3 unless otherwise noted.
- 6. Set phase bank 3 maximum limit to 250 seconds for phases
- 7. Ensure start up flash phases are coordinated with flash program block assignments.
- 8. Program Startup Ped Calls for phase 2.
- 9. Set the Red Revert interval on the controller to 1 second.
- 10. This cabinet and controller are part of the Durham Signal System.

EQUIPMENT INFORMATION

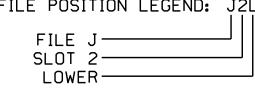
| CONTROLLER2070E |
|--|
| CABINET |
| SOFTWAREMcCAIN 2033 |
| CABINET MOUNTBASE |
| OUTPUT FILE POSITIONS18 WITH AUX FILE |
| LOAD SWITCHES USEDS1,S2,S3,S8,S11,AUX S1 |
| PHASES USED |
| OVERLAP 1* |
| OVERLAP 2NOT USED |
| OVERLAP 3NOT USED |
| OVERLAP 4NOT USED |
| |

* See FYA PPLT Programming Detail on Sheet 2.

INPUT FILE CONNECTION & PROGRAMMING CHART

| | PED PUSH BUTTONS | LOOP TERMINAL | INPUT FILE POS. | DETECTOR NO. | PIN NO. | ATTRIBUTES | NEMA PHASE | NOTE: INSTALL DC ISOLATORS |
|-------|---------------------|------------------|--------------------|-----------------|------------|---------------|---------------|-------------------------------|
| | P21 , P22 | TB8-4,6 | I12U | 25 | 67 | 2 | 2 PED | IN INPUT FILE SLOT I12. |
| DETEC | TOR ATTR | IBUTES LE | GEND: | INPUT FIL | _E P(| OSITION LEGEN | ID: JŻĻ | |
| | 4 = | TIME DEL A | | | | _ , | | |

1-FULL TIME DELAY 2-PED CALL 3-RESERVED 4-COUNTING 5-EXTENSION 6-TYPE 3 7-CALLING 8-ALTERNATE



ST = STOP TIME EVx = EMERGENCY VEHICLE PREEMPT

4 CHANNEL TOMAR OSP CARD

INSERT CARD INTO SLOT J13

DC ISOLATOR

ST

10 11 12 13 14

NOT

USED

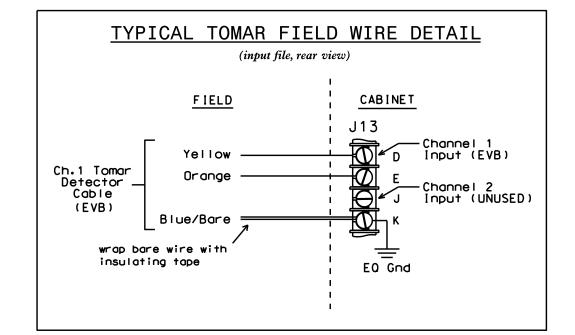
CH. 3 | CH. 1

UNUSED EVB

CH. 4 | CH. 2

UNUSED UNUSED

FS = FLASH SENSE



SPECIAL DETECTOR NOTE

Install a video detection system for vehicle detection. Perform installation according to manufacturer's directions and NCDOT engineer-approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.

PROJECT REFERENCE NO. |Sig. 12.1 U-3308

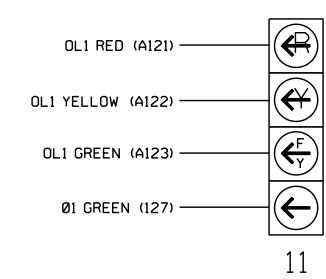
| | | | | SIC | GNA | LH | HEA | D F | 100 | K-l | JP | CHA | 4RT | | | | | |
|-----------------------------|-----|-------|-------------|-----|-----|----------|------------|-------|------------|-----|-------|----------|-----------|-----------|-----------|-----------|-----------|-----------|
| LOAD SWITCH NO. | S1 | S2 | S 3 | S4 | S5 | S6 | S 7 | S8 | S 9 | 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 | OL1 | 0L2 | SPARE | 0L3 | OL4 | SPARE |
| SIGNAL HEAD NO. | 11 | 21,22 | P21. P22 | NU | NU | NU | NU | 61,62 | NU | NU | 81,82 | NU | 11 | NU | NU | NU | NU | NU |
| RED | | 128 | | | | | | 134 | | | 107 | | | | | | | |
| YELLOW | * | 129 | | | | | | 135 | | | 108 | | | | | | | |
| GREEN | | 130 | | | | | | 136 | | | 109 | | | | | | | |
| RED ARROW | | | | | | | | | | | | | A121 | | | | | |
| YELLOW ARROW | | | | | | | | | | | | | A122 | | | | | |
| FLASHING YELLOW ARROW | | | | | | | | | | | | | A123 | | | | | |
| GREEN ARROW | 127 | | | | | | | | | | | | | | | | | |
| ₩ | | | 113 | | | | | | | | | | | | | | | |
| * | | | 115 | | | | | | | | | | | | | | | |

NU = Not Used

- * Denotes install load resistor. See load resistor installation detail this sheet.
- ★ See pictorial of head wiring in detail below.

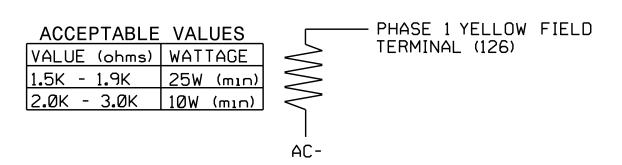
FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



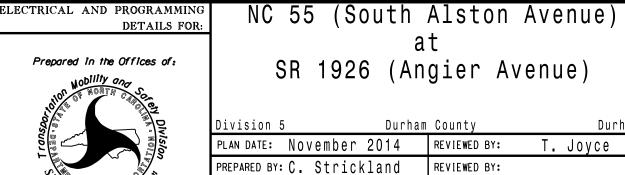
LOAD RESISTOR INSTALLATION DETAIL

(install resistor as shown below)



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-1026T1 DESIGNED: September 2014 SEALED: 04/02/2015 REVISED: N/A

Electrical Detail - Temporary 1 - Sheet 1 of 2



REVISIONS

SEAL

Durham

INIT. DATE SIG. INVENTORY NO. 05-1026T1

750 N.Greenfield Pkwy, Garner, NC 27529

FILE

пΤп

FILE

"J"

FYA PPLT PROGRAMMING (SIGNAL HEAD 11)

- 2. Assign output pin for Flashing Yellow Arrow as follows:

 Main Menu 6) OUTPUTS F) FYA PPLT

 Phase 1 = 99
- 3. Redirect RED and YELLOW outputs for the left turn phases as follows:

 Main Menu 6) OUTPUTS 8) REDIRECT PHASE

 Phase 1 RED = 97, Phase 1 YELLOW = 98

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.

PROJECT REFERENCE NO. SHEET NO. U-3308 Sig. 12.2

EMERGENCY VEHICLE PREEMPTION PROGRAMMING

- 1. Program EVB preempt as follows:
 Main Menu 2) PREEMPT 4) EMERGENCY VEHICLE
 EVB Clear = 2
 EVB Clearance Phases = 1.6
- 2. Program general preemption parameters as follows: Main Menu - 2) PREEMPT - 6) MISC PREEMPTION PARAMETERS Min Time Before PE ForceOff = 1
- 3. Ped Clear Before Preempt is a pedestrian timing parameter, and is programmed as follows:
 Main Menu 1) PHASE 5) PEDESTRIAN TIMING
 PHASE 2 MIN FDW = 5

Program extend time on optical detector units for 2.0 sec for EVB.

SPECIAL NOTES EV PREEMPT PROGRAMMING

Setting 'FYA DURING PREEMPT' to 'Y' eliminates yellow trap when transitioning to preempt from adjacent through phase. Main Menu - 9) UTILITIES - 9) MISC FYA DURING PREEMPT (Y/N) = Y

MIN WALK DURING PREEMPTION PROGRAMMING

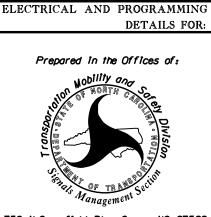
To disable MIN WALK pedestrian timing during preemption, program the controller as follows:

Main Menu - 9) UTILITIES - 5) CONFIGURATION

EXTRA TWO = 3

Electrical Detail - Temporary 1 - Sheet 2 of 2

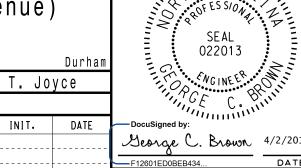
THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-1026T1 DESIGNED: September 2014 SEALED: 04/02/2015 REVISED: N/A



NC 55 (South Alston Avenue) at SR 1926 (Angier Avenue)

REVISIONS

Division 5 Durham County Durham
PLAN DATE: November 2014 REVIEWED BY: T. Joyce
PREPARED BY: C. Strickland REVIEWED BY:



SIG. INVENTORY NO. 05-1026T1

SEAL

Ø2/2Ø15 A -

3 Phase Fully Actuated W/ EV Preemption

- 1. Refer to "Road Standard Drawings NCDOT" dated January 2012, "Standard Specifications for
- 2. Do not program signal for late night flashing operation unless otherwise directed
- 3. Phase 1 may be lagged.
- 4. Set all detector units to presence mode.
- 5. Program all timing information into phase banks
- 6. Set phase bank 3 maximum limit to 250 seconds for
- 7. Omit "WALK" and flashing "DON'T WALK" with no pedestrian
- 8. Program pedestrian heads to countdown the flashing "Don't Walk" time.
- 9. This intersection features an optical preemption system. Shown locations of optical detectors are conceptual only.
- 10. Upon completion of Emergency Vehicle Preemption, controller returns to normal operation.
- operation only. Coordinated signal system timing
- 12. Reconnect and unbag pedestrian signal head #P41 during this phase of construction.
- 13. Pedestrian signal head #P82 shall remain bagged and
- required

LEGEND

Traffic Signal Head

EXISTING

●

MyPAN

SIG. INVENTORY NO. 05-1026T2

4/02/15 DATE

| ○→ 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 — | |
| \longrightarrow Directional Arrow | \longrightarrow |
| Work Area | N/A |
| Drums | N/A |
| E Construction Easement | N/A |
| | N/A |
| Barricades | N/A |
| ————— Direct Bury | |
| Optical Detector | • |
| | |
| Video Detection Area | |

(Durham Signal System)

NOTES

- Roads and Structures" dated January 2012.
- by the Engineer

PROPOSED

 \bigcirc

- 1,2, and 3 unless otherwise noted.
- phases used.
- calls.

- 11. Maximum times shown in timing chart are for free-run
- values supersede these values.
- disconnected during this phase of construction.
- 14. Contractor shall adjust video detection zones as

| | | | | | | | | | | DET | ECT | OR | PR | OGF | AMN | MIN | G | | | | |
|------------------|--------------|--------|--------------|-----|----------|---------------|-------|--------|--------------|------|--------------------|--------------------|----------|-------|-----------|--------|---------|-----------|--------|-----|----------|
| | INDUCT | IVE LO | OPS | | | TIAAI | | TIMING | | | ATTRIBUTES | | | | | | | | | STA | TUS |
| | | | DIST. FROM | | U | | l IIW | | | | | 2 Z | 3 | 4 | 5 Z | 6 | 7 | LE œ | LOOPS | | ပ္ခ |
| LOOP NO. | SIZE (ft) | TURNS | STOPBAR (ft) | NEW | EXISTING | NEMA PHASE | DEL | AY. | CAI (STRI | | FULL TIME DELAY | PEDESTRIAN CALL | RESERVED | COUNT | EXTENSION | TYPE 3 | CALLING | ALTERNATE | SYSTEM | NEW | EXISTING |
| 1 Λ | C \ 10 | * | 0 | | N/ | 1 | 15 | SEC. | - | SEC. | - | _ | _ | - | Χ | _ | Χ | - | _ | _ | * |
| 1 A | 6×40 | * | 0 | - | * | 6 | - | SEC. | - | SEC. | - | - | - | - | Χ | _ | Χ | _ | _ | _ | * |
| 2A | 6×6 | * | 70 | - | * | 2 | - | SEC. | - | SEC. | _ | - | - | _ | Χ | _ | Χ | - | _ | _ | * |
| 2B | 6×40 | * | 0 | * | - | 2 | - | SEC. | - | SEC. | _ | _ | - | - | Χ | _ | Χ | - | _ | * | - |
| 4 A | 6×40 | * | 0 | * | - | 4 | 10 | SEC. | - | SEC. | - | - | - | - | Χ | _ | Χ | - | _ | * | - |
| 6 A | 6×6 | * | 70 | - | * | 6 | - | SEC. | - | SEC. | - | _ | - | - | Χ | - | Χ | 1 | - | - | * |
| 8.8 | 6×40 | * | 0 | - | * | 8 | 10 | SEC. | - | SEC. | - | - | - | - | Χ | _ | Χ | ı | _ | - | * |
| PEDES | TRIAN | DETECT | ION | • | | | | • | | | • | | | | | | • | | • | | |
| P21 , P22 | N/A | N/A | N/A | - | X | 2 | - | SEC. | - | SEC. | _ | Χ | - | - | - | _ | _ | - | - | _ | X |
| P41,P42 | N/A | N/A | N/A | X | - | 4 | - | SEC. | - | SEC. | - | Χ | - | - | - | - | _ | _ | _ | Χ | - |

PHASING DIAGRAM DETECTION LEGEND

PHASING DIAGRAM

DETECTED MOVEMENT UNDETECTED MOVEMENT (OVERLAP) UNSIGNALIZED MOVEMENT

 \leftarrow - > PEDESTRIAN MOVEMENT

| 2033 EV PREEMPTI | ON |
|--------------------------------|------------------|
| FUNCTION | EVB (SECONDS) |
| DELAY BEFORE PREEMPT | 0 |
| MIN. PED. CLEAR BEFORE PREEMPT | * |
| MIN. GREEN BEFORE PREEMPT | 1 |
| CLEARANCE TIME | 2 |
| PREEMPT EXTEND** | 2.0 |

* See Timing Chart for Min Ped Clearance ** Program Timing on Optical Detector Unit

| MIN. GREEN BEFORE PREEMPT | 1 |
|---------------------------|-----|
| CLEARANCE TIME | 2 |
| PREEMPT EXTEND** | 2 0 |
| TREEMIT EXTEND | 2.0 |

| | | | 0 | | | |
|------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|------------------|
| | 203 | I LMIN(3 SOFTWARE N | G CHART N/2070 CONTI | ROLLER | | |
| PHASE | Ø1 | Ø2 | Ø4 | Ø6 | Ø8 | OL3 |
| MINIMUM INITIAL * | 7 SEC . | 1 () SEC . | 7 SEC . | 1 () SEC . | 7 SEC . | O SEC. |
| VEHICLE EXTENSION * | 2.0 SEC . | 3.0 SEC . | 2.0 SEC . | 3.0 SEC . | 2.0 SEC . | |
| YELLOW CHANGE INT. | 4.3 SEC . | 4.3 SEC . | 3.4 SEC . | 4.3 SEC . | 4.1 SEC . | 4.3 SEC . |
| RED CLEARANCE | 2.1 SEC . | 1.6 SEC . | 1.8 SEC . | 1.6 SEC . | 1.2 SEC . | 1.6 SEC . |
| MAXIMUM LIMIT * | 15 SEC . | 50 SEC . | 35 SEC . | 50 SEC . | 35 SEC . | |
| RECALL POSITION | NONE | VEH. RECALL | NONE | VEH. RECALL | NONE | |
| VEHICLE CALL MEMORY | NONE | | | YELLOW LOCK | NONE | |
| DOUBLE ENTRY | OFF | OFF | ON | OFF | ON | |
| WALK * | – SEC. | 4 SEC. | 4 sec. | - SEC. | – SEC. | |
| FLASHING DON'T WALK | - SEC. | 9 SEC. | 21 SEC . | - SEC. | – SEC. | |
| MIN PED CLEARANCE | - SEC. | 5 SEC . | 1 1 SEC. | - SEC. | - SEC. | |
| TYPE 3 LIMIT | - SEC. | - SEC. | – SEC. | - SEC. | – SEC. | |
| ALTERNATE EXTENSION | - SEC. | - SEC. | - SEC. | - SEC. | – SEC. | |
| ADD PER VEHICLE * | - SEC. | |
| MAXIMUM INITIAL * | - SEC. | – SEC. | - SEC. | - SEC. | - SEC. | |
| MAXIMUM GAP* | 2 . O SEC . | 3 . 0 SEC . | 2 . 0 SEC . | 3 . 0 SEC . | 2 . 0 SEC . | |
| REDUCE 0.1 SEC EVERY * | - SEC. | - SEC. | - SEC. | - SEC. | - SEC. | |
| | 0 0 | | 0 0 | 7 0 | 0 0 | |

1025 Wade Avenue Raleigh, NC 27605 Tel:919-789-9977 Fax:919-789-9591

+2% Grade

NC 55 (S. Alston Ave.)

SR 1926 (Angier Avenue) Division 5 Durham County PLAN DATE: September 2014 REVIEWED BY: J Hochanadel 50 N.Greenfield Pkwy, Garner, NC 27529 PREPARED BY: C Lawson

Signal Upgrade - Temporary Design 2 (TMP Phase I, Steps 11-21)

NC 55 (South Alston Avenue)

2.0 SEC. 3.0 SEC. 2.0 SEC. 3.0 SEC. 2.0 SEC. shown. Min Green for all other phases should not be lower than 4 seconds.

TABLE OF OPERATION

SIGNAL

FACE

21

22,23

41,42

61,62

81,82

P21**,**P22

PHASE

|DW|W|DW|DW|DRK

P41,P42 | DW | DW | W | DW | DRK

SIGNAL FACE I.D.

All Heads L.E.D.

* See Note 12

** See Note 13

22,23

41,42

61,62

81,82

P21**,**P22

P41**,P42

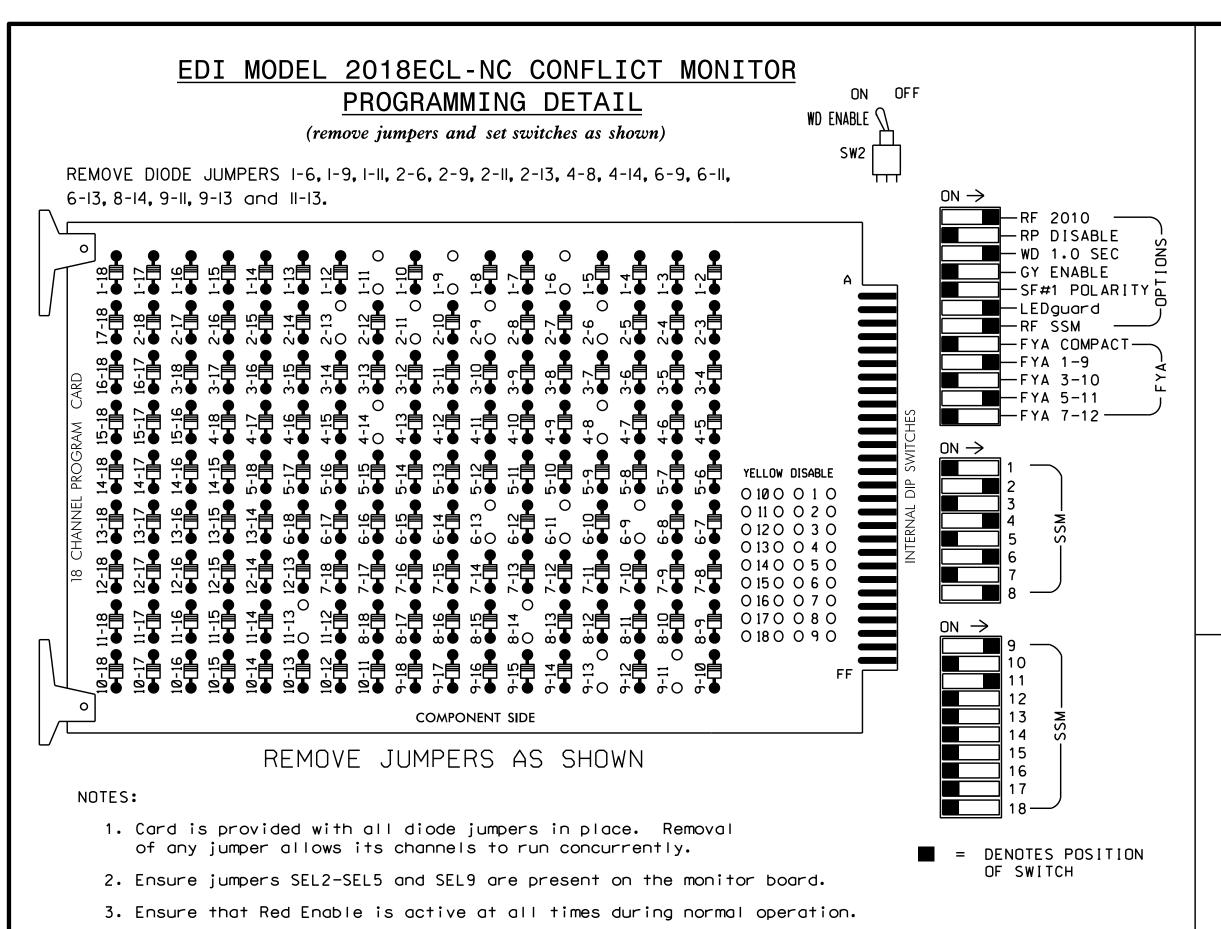
P82₩

R/W — — _ NC 55 (S. Alston Ave.)

P22

EV Preempt Phases

#10



NOTES

- 1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. Verify that signal heads flash in accordance with the signal plans.
- 2. Program controller to Start Up in phases 2 and 6 green.
- 3. Set power-up flash time to 0 seconds within the controller programming. The conflict monitor will govern startup flash. Ensure STARTUP "RED START" is set to 0 seconds.
- 4. Enable Simultaneous Gap-Out feature for all phases.
- 5. Program all timing information into phase banks 1, 2, and 3 unless otherwise noted.
- 6. Set phase bank 3 maximum limit to 250 seconds for phases used.
- 7. Program phases 4 and 8 for Double Entry.

* See FYA PPLT Programming Detail on Sheet 2.

I12U

I12L

- 8. Ensure start up flash phases are coordinated with flash program block assignments.
- 9. Program Startup Ped Calls for phases 2 and 4.
- 10. Set the Red Revert interval on the controller to 1 second.
- 11. This cabinet and controller are part of the Durham Signal System.

EQUIPMENT INFORMATION

CONTROLLER..........2070E SOFTWARE...........McCAIN 2033 CABINET MOUNT.....BASE OUTPUT FILE POSITIONS...18 WITH AUX FILE LOAD SWITCHES USED.....\$1,\$2,\$3,\$5,\$6,\$8,\$11,AUX \$1, AUX S4 OVERLAP 1....* OVERLAP 2.....NOT USED OVERLAP 3.....2+6 OVERLAP 4.....NOT USED

67 2

69 2

SLOT 2 LOWER-

INPUT FILE POSITION LEGEND: J2L

25

27

FYA SIGNAL WIRING DETAIL

SIGNAL HEAD HOOK-UP CHART

NU 41,42 P41, P42 NU 61,62 NU NU 81,82 NU

134

135

136

PED

104

106

* Denotes install load resistor. See load resistor

★ See pictorial of head wiring in detail below.

101

102

103

 S4
 S5
 S6
 S7
 S8
 S9
 S10
 S11
 S12
 AUX S1
 AUX S2
 AUX S3
 AUX S4
 AUX S5
 S6

107

108

109

A121

A122

A123

LOAD SWITCH NO.

CMU CHANNEL NO.

PHASE

SIGNAL HEAD NO.

YELLOW

GREEN

ARROW

YELLOW

ARROW

FLASHING YELLOW ARROW

GREEN ARROW

NU = Not Used

22,23 P21,

128

129

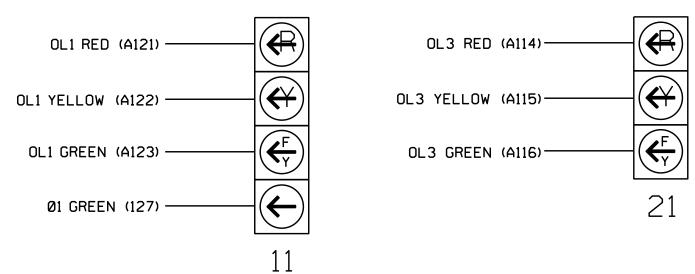
130

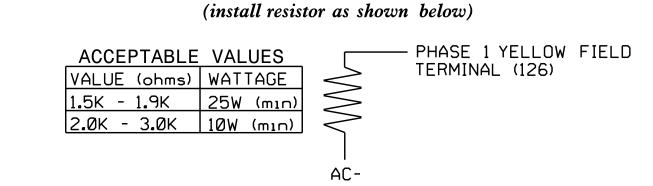
113

115

installation detail this sheet.

(wire signal heads as shown)





LOAD RESISTOR INSTALLATION DETAIL

Electrical Detail - Temporary 2 - Sheet 1 of 2



750 N.Greenfield Pkwy,Garner,NC 27529

SR 1926 (Angier Avenue) Durham County

Durham PLAN DATE: November 2014 REVIEWED BY: T. Joyce PREPARED BY: C. Strickland Reviewed BY: REVISIONS INIT. DATE

George C. Brown 4/2/2015 IG. INVENTORY NO. 05-1026T2

SEAL

022013

PROJECT REFERENCE NO.

U-3308

8 | 16 | 9 | 10 | 17 | 11 | 12 | 18

8 RED OL1 OL2 SPARE OL3 OL4 SPARE

11 NU NU 21 ★

A114

A115

A116

|Sig. 13.1



P21**,**P22

P41,P42

2-PED CALL

3-RESERVED 4-COUNTING 5-EXTENSION 6-TYPE 3 7-CALLING

8-ALTERNATE

DETECTOR ATTRIBUTES LEGEND:

1-FULL TIME DELAY

TB8-4,6

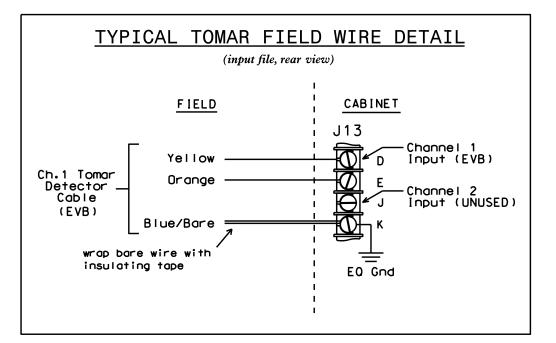
TB8-5,6

| _ | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|--------|--------|----------|---------|-------|---------------|---|---|---|---|------------|------------|---|--------------|-------------------------------|
| FILE U | | | | | | | | | | WIOH WEDHY | WHOT EMPTY | Ø2PED DC ISOLATOR Ø4 PED DC ISOLATOR | SLOT EXPTY | FS DC ISOLATOR ST DC ISOLATOR |
| FILE U | | | | | | | | | | SLOT EXPTY | SLOT EMPTY | CH. 3 UNUSED CH. 4 UNUSED | EVB CH. 2 | SLOT EMPTY |
| ١ | EX.: 1 | A, 2A, E | TC. = L | 00P N | O . ′S | | | | | | . • | = FLASH = STOP | | E |

4. Ensure conflict monitor communicates with 2070.

EVx = EMERGENCY VEHICLE PREEMPT

4 CHANNEL TOMAR OSP CARD INSERT CARD INTO SLOT J13



Install a video detection system for vehicle detection. Perform installation according to manufacturer's directions and NCDOT engineer-approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.

SPECIAL DETECTOR NOTE

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-1026T2 DESIGNED: September 2014 SEALED: 04/02/2015 REVISED: N/A

2 PED | INSTALL DC ISOLATORS

4 PED | IN INPUT FILE SLOTS

I12 AND I13.

NOTE: FOR SIGNAL HEAD 21

(SIGNAL HEAD 11)

- 1. Program Flashing Yellow Arrow phases as follows: Main Menu - 1) PHASE - 2) PHASE FUNCTIONS PAGE TWO
- 2. Assign output pin for Flashing Yellow Arrow as follows: Main Menu - 6) OUTPUTS - F) FYA PPLT
- 3. Redirect RED and YELLOW outputs for the left turn phases as follows: Main Menu - 6) OUTPUTS - 8) REDIRECT PHASE Phase 1 RED = 97, Phase 1 YELLOW = 98

FYA PPLT PROGRAMMING

PPLT FYA = PHASE 1

Phase 1 = 99

OVERLAP GREEN FLASH PROGRAMMING FOR 3 SECTION FYA

OVERLAP [3] PROGRAMMING DETAIL

LOADSWITCH = 11

VEH SET 1 = 2+6

YELLOW CLEARANCE = 4.3

END OF OVERLAP PROGRAMMING

RED CLEARANCE = 1.6

Program overlap as follows:

Main Menu - 4) OVERLAP

PRESS '+' TWICE

OVERLAP [3]:

The following will cause the overlap green output to flash, which is wired to the flashing yellow arrow. Program as follows:

Main Menu - 1) PHASE - 2) PHASE FUNCTIONS PAGE TWO OLAP G FL = 3

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.

EMERGENCY VEHICLE PREEMPTION PROGRAMMING

 Program EVB preempt as follows: Main Menu - 2) PREEMPT - 4) EMERGENCY VEHICLE EVB Clear = 2 EVB Clearance Phases = 1.6

2. Program general preemption parameters as follows: Main Menu - 2) PREEMPT - 6) MISC PREEMPTION PARAMETERS Min Time Before PE ForceOff = 1

3. Ped Clear Before Preempt is a pedestrian timing parameter, and is programmed as follows: Main Menu - 1) PHASE - 5) PEDESTRIAN TIMING

> PHASE 2 MIN FDW = 5PHASE 4 MIN FDW = 11

Program extend time on optical detector units for 2.0 sec for EVB.

SPECIAL NOTES EV PREEMPT PROGRAMMING

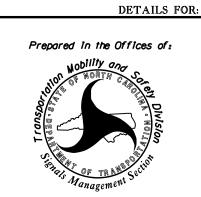
Setting 'FYA DURING PREEMPT' to 'Y' eliminates yellow trap when transitioning to preempt from adjacent through phase. Main Menu - 9) UTILITIES - 9) MISC FYA DURING PREEMPT (Y/N) = Y

MIN WALK DURING PREEMPTION PROGRAMMING

To disable MIN WALK pedestrian timing during preemption, program the controller as follows: Main Menu - 9) UTILITIES - 5) CONFIGURATION EXTRA TWO = 3

Electrical Detail - Temporary 2 - Sheet 2 of 2

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-1026T2 DESIGNED: September 2014 SEALED: 04/02/2015 REVISED: N/A



NC 55 (South Alston Avenue) ELECTRICAL AND PROGRAMMING SR 1926 (Angier Avenue)

Durham County PLAN DATE: November 2014 REVIEWED BY: T. Joyce PREPARED BY: C. Strickland REVIEWED BY:

INIT. DATE

SEAL

PROJECT REFERENCE NO.

U-3308

Sig. 13.2

REVISIONS

SIG. INVENTORY NO. 05-1026T2

PROJECT REFERENCE NO. U-3308 |Sig. 14.0|

3 Phase

- 2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- 3. Phase 1 may be lagged.
- 4. Reposition signal heads #11, #21, #22, #23, #61, #62 and optical detector #10.
- 5. Set all detector units to presence mode. 6. Program all timing information into phase banks
- 1,2, and 3 unless otherwise noted. 7. Set phase bank 3 maximum limit to 250 seconds for
- phases used.
- 9. Program pedestrian heads to countdown the flashing "Don't Walk" time.
- system. Shown locations of optical detectors are conceptual only.
- 11. Upon completion of Emergency Vehicle Preemption, controller returns to normal operation.
- 12. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- 15. Contractor shall adjust video detection zones as

| o i nasc | |
|-----------------------|---|
| Fully Actuated | |
| W/ EV Preemption | |
| (Durham Signal System |) |
| | |
| | |

NOTES

- 1. Refer to "Road Standard Drawings NCDOT" dated January 2012, "Standard Specifications for Roads and Structures" dated January 2012.

<u>PROPOSED</u>

N/A

 \bigcirc

- 8. Omit "WALK" and flashing "DON'T WALK" with no pedestrian
- calls.
- 10. This intersection features an optical preemption

- 13. Pedestrian pedestals are conceptual and shown for reference only. See sheets P1-P3 for pushbutton location details
- 14. Pedestrian signal head #P82 shall remain bagged and disconnected during this phase of construction.

LEGEND

Traffic Signal Head

Modified Signal Head Sign Pedestrian Signal Head With Push Button & Sign Signal Pole with Guy Signal Pole with Sidewalk Guy

Inductive Loop Detector

Controller & Cabinet

Junction Box

Right of Way

Directional Arrow

Type I Pushbutton Post

Work Area

Drums

Barricades

Rigid Conduit

Optical Detector

Video Detector

Video Detection Area

---- E---- Construction Easement

---- PDE ----- Permanent Drainage Easement

2-in Underground Conduit -----

EXISTING

●→

 \longrightarrow

 \blacksquare

N/A

N/A N/A

N/A

N/A

4/02/15 DATE

required.

| | L00 | OP & | DETE | C | ГС | R U | NI. | Τ : | INS | STA | LL | AT | Γ | N | Cl | HA | RT | | | | |
|------------|--------------|--------|--------------|-----|----------|---------------|-----|--------|-----|------------|--------------------|--------------------|----------|-------|---------------|--------|---------|-----------|--------|-----|----------|
| | | | | | | | | | | DET | ECT | OR. | PR | OGF | RAMI | MIN | G | | | | |
| | INDUCT: | IVE LO | OPS | | | TIMING | | | | ATTRIBUTES | | | | | | | | | STA | | |
| | | | DIST. FROM | | () | | | TIMING | | | 1 w | 2 Z | 3 | 4 | 5 Z | 6 | 7 | В Е | ğ | | ပ္ခ |
| LOOP NO. | SIZE (ft) | TURNS | STOPBAR (ft) | NEW | EXISTING | NEMA PHASE | DEL | ΑY | | | FULL TIME DELAY | PEDESTRIAN CALL | RESERVED | COUNT | EXTENSION | TYPE 3 | CALLING | ALTERNATE | SYSTEM | NEW | EXISTING |
| 1 15 SEC S | | | | | | | | | | | | - | - | _ | Χ | - | Χ | - | _ | - | * |
| 1 A | 6×40 | * | 0 | * | 1 | 6 | - | SEC. | - | SEC. | - | _ | - | - | Χ | _ | Χ | - | - | - | * |
| 2A | 6×6 | * | 70 | * | - | 2 | - | SEC. | - | SEC. | _ | _ | - | - | Χ | _ | Χ | ı | - | - | * |
| 2B | 6×40 | * | 0 | * | _ | 2 | _ | SEC. | 1 | SEC. | _ | _ | _ | - | Χ | _ | Χ | - | _ | - | * |
| 4 A | 6×40 | * | 0 | * | - | 4 | 10 | SEC. | ı | SEC. | - | - | - | - | Χ | - | Χ | 1 | - | - | * |
| 6A | 6×6 | * | 70 | * | - | 6 | - | SEC. | ı | SEC. | - | - | - | - | Χ | - | Χ | 1 | - | - | * |
| 8.8 | 8 | 10 | SEC. | - | SEC. | - | _ | - | - | Χ | _ | Χ | ı | - | - | * | | | | | |
| PEDES | TRIAN | DETECT | ION | | | • | • | | | | • | • | | | | • | • | | • | | |
| P41,P42 | N/A | N/A | N/A | 4 | _ | SEC. | - | SEC. | _ | X | _ | - | _ | _ | _ | _ | - | - | X | | |

P61,P62 N/A N/A X - 6 - SEC. - SEC. - X - - - - - X -

* Video Detection Zone

2033 SOFTWARE W/ 2070 CONTROLLER

TABLE OF OPERATION

SIGNAL

FACE

11

21

22,23

41,42

61,62

81,82

P41,P42

PHASE

DW DW W DW DRK

P61,P62 | W | W | DW | DRK

SIGNAL FACE I.D.

All Heads L.E.D.

* See Note 14

22,23

41,42

61,62

81,82

EV Preempt Phases

#11

PHASING DIAGRAM DETECTION LEGEND

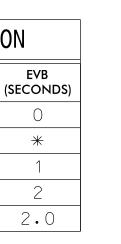
PHASING DIAGRAM

DETECTED MOVEMENT UNDETECTED MOVEMENT (OVERLAP) UNSIGNALIZED MOVEMENT

| > | PEDESTRIAN MOVEMENT | |
|---|---------------------|--|
| | | |
| | | |
| | | |

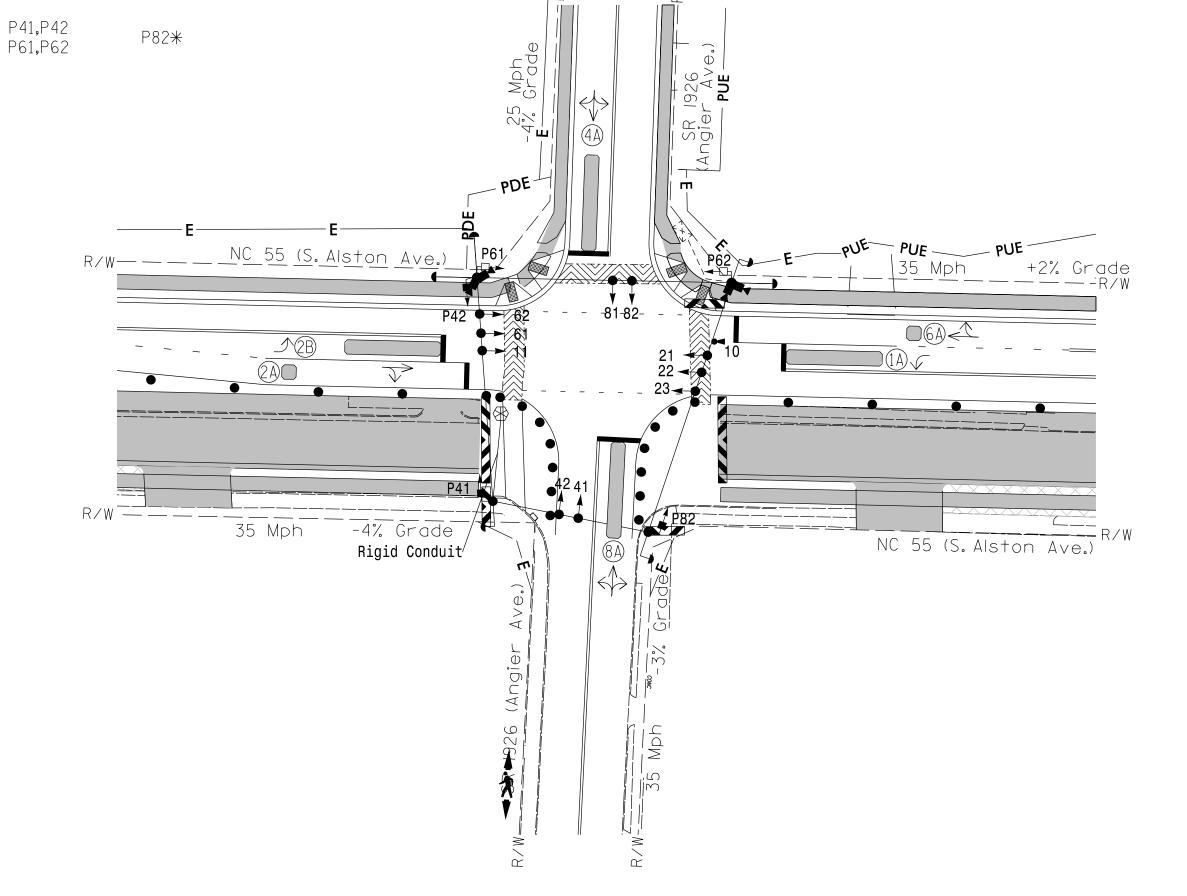
| 2033 EV PREEMPT | ION |
|--------------------------------|------------------|
| | |
| FUNCTION | EVB (SECONDS) |
| DELAY BEFORE PREEMPT | 0 |
| MIN. PED. CLEAR BEFORE PREEMPT | * |
| MIN. GREEN BEFORE PREEMPT | 1 |
| CLEARANCE TIME | 2 |
| PREEMPT EXTEND** | 2.0 |

* See Timing Chart for Min Ped Clearance ** Program Timing on Optical Detector Unit



| | TIMING CHART 2033 SOFTWARE w/2070 CONTROLLER | | | | | | | | | | | |
|------------------------|--|------|--------|--------|-----|------|--------|--------|-----|------|-----|------|
| PHASE | Ø1 | 1 | Ø | 2 | Ø | 4 | Ø | 6 | Ø | 8 | 0 | L3 |
| MINIMUM INITIAL * | 7 | SEC. | 10 | SEC. | 7 | SEC. | 10 | SEC. | 7 | SEC. | 0 | SEC. |
| VEHICLE EXTENSION * | 2.0 | SEC. | 3.0 | SEC. | 2.0 | SEC. | 3.0 | SEC. | 2.0 | SEC. | | |
| YELLOW CHANGE INT. | 4.1 | SEC. | 4.1 | SEC. | 3.4 | SEC. | 4.1 | SEC. | 4.1 | SEC. | 4.1 | SEC. |
| RED CLEARANCE | 2.8 | SEC. | 2.1 | SEC. | 1.7 | SEC. | 2.1 | SEC. | 1.3 | SEC. | 2.1 | SEC. |
| MAXIMUM LIMIT * | 15 | SEC. | 50 | SEC. | 35 | SEC. | 50 | SEC. | 35 | SEC. | | |
| RECALL POSITION | 10/1 | NE | VEH. I | RECALL | NC | NE | VEH. F | RECALL | NC | ONE | | |
| VEHICLE CALL MEMORY | 10/1 | NE | YELLOW | / LOCK | NC | NE | YELLOW | / LOCK | NC | ONE | | |
| DOUBLE ENTRY | OF | F | 0 | FF | 0 | N | 0 | FF | С | N | | |
| WALK * | _ | SEC. | _ | SEC. | 4 | SEC. | 4 | SEC. | _ | SEC. | | |
| FLASHING DON'T WALK | _ | SEC. | _ | SEC. | 7 | SEC. | 8 | SEC. | _ | SEC. | | |
| MIN PED CLEARANCE | _ | SEC. | _ | SEC. | 4 | SEC. | 4 | SEC. | _ | SEC. | | |
| TYPE 3 LIMIT | _ | SEC. | _ | SEC. | _ | SEC. | _ | SEC. | _ | SEC. | | |
| ALTERNATE EXTENSION | _ | SEC. | _ | SEC. | _ | SEC. | _ | SEC. | _ | SEC. | | |
| ADD PER VEHICLE * | _ | SEC. | _ | SEC. | _ | SEC. | _ | SEC. | _ | SEC. | | |
| MAXIMUM INITIAL * | _ | SEC. | _ | SEC. | _ | SEC. | _ | SEC. | _ | SEC. | | |
| MAXIMUM GAP* | 2.0 | SEC. | 3.0 | SEC. | 2.0 | SEC. | 3.0 | SEC. | 2.0 | SEC. | | |
| REDUCE 0.1 SEC EVERY * | _ | SEC. | _ | SEC. | _ | SEC. | _ | SEC. | _ | SEC. | | |
| MINIMUM GAP | 2.0 | SEC. | 3.0 | SEC. | 2.0 | SEC. | 3.0 | SEC. | 2.0 | SEC. | | |

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 - Temporary Design 3 (TMP Phase 2, Steps 1-6)

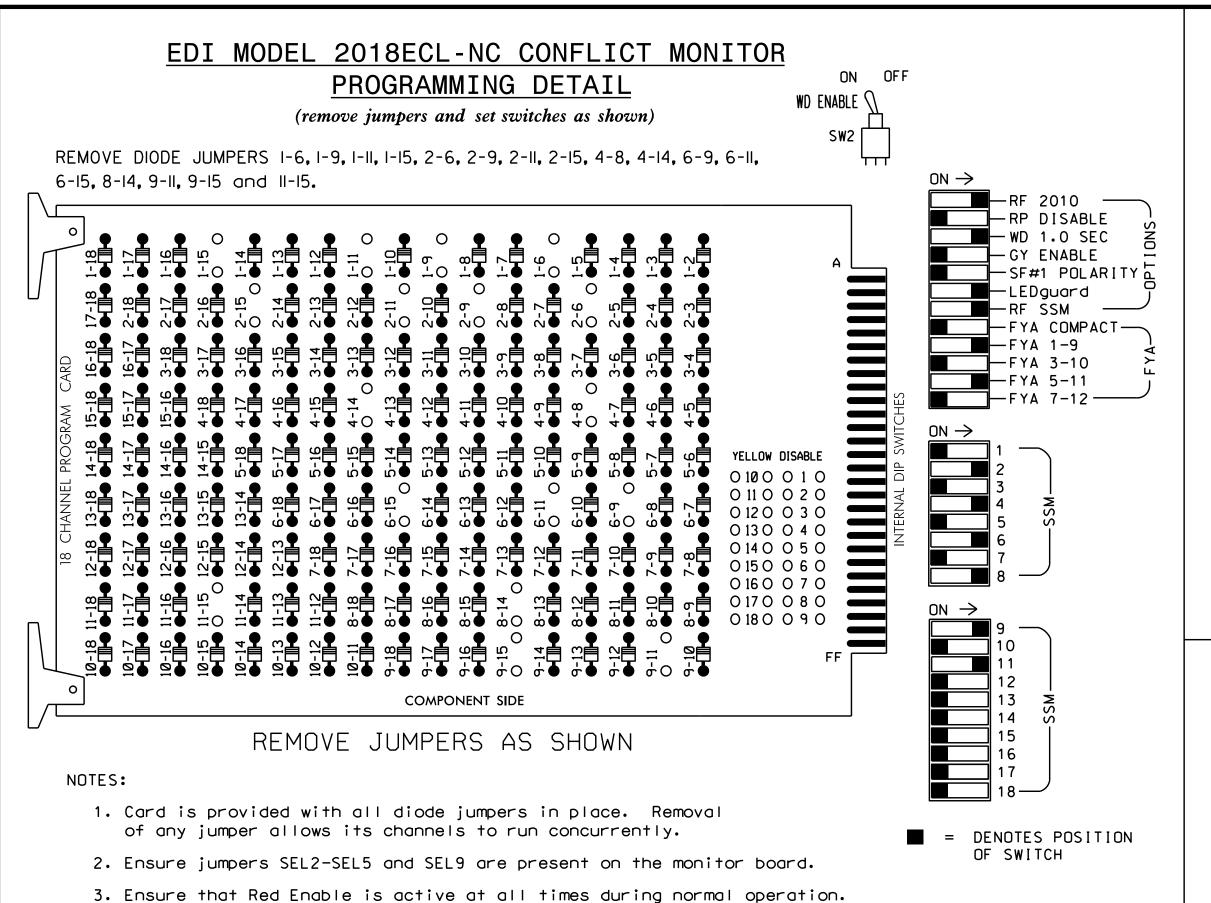


NC 55 (South Alston Avenue)

SR 1926 (Angier Avenue) Division 5 Durham County

1025 Wade Avenue Raleigh, NC 27605 Tel:919-789-9977 Fax:919-789-9591 License #: C-2197

PLAN DATE: September 2014 REVIEWED BY: J Hochanadel 750 N.Greenfield Pkwy,Garner,NC 27529 PREPARED BY: C Lawson INIT. DATE MyPDW SIG. INVENTORY NO. 05-1026T3



INPUT FILE POSITION LAYOUT

10 11 12 13 14

NOT USED

Ø4 PED

DC ISOLATOR

CH. 3 | CH. 1

UNUSED: EVB

CH. 4 | CH. 2

UNUSED UNUSED

FS = FLASH SENSE

ST = STOP TIME

CABINET

E0 Gnd

TYPICAL TOMAR FIELD WIRE DETAIL
(input file, rear view)

<u>FIELD</u>

Blue/Bare

wrap bare wire with

insulating tape

Ch.1 Tomar Detector -Cable

(EVB)

USED

EVx = EMERGENCY VEHICLE PREEMPT

4 CHANNEL TOMAR OSP CARD

INSERT CARD INTO SLOT J13

Channel 1 D Input (EVB)

Channel 2 Input (UNUSED)

(front view)

5 6 7 8 9

4. Ensure conflict monitor communicates with 2070.

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

NOTES

- 1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. Verify that signal heads flash in accordance with the signal plans.
- 2. Program controller to Start Up in phases 2 and 6 green.
- 3. Set power-up flash time to 0 seconds within the controller programming. The conflict monitor will govern startup flash. Ensure STARTUP "RED START" is set to 0 seconds.
- 4. Enable Simultaneous Gap-Out feature for all phases.
- 5. Program all timing information into phase banks 1, 2, and 3 unless otherwise noted.
- 6. Set phase bank 3 maximum limit to 250 seconds for phases used.
- 7. Program phases 4 and 8 for Double Entry.
- 8. Ensure start up flash phases are coordinated with flash program block assignments.
- 9. Program Startup Ped Calls for phases 4 and 6.
- 10. Set the Red Revert interval on the controller to 1 second.
- 11. This cabinet and controller are part of the Durham Signal System.

EQUIPMENT INFORMATION

SIGNAL HEAD HOOK-UP CHART LOAD SWITCH NO. S4 S5 S6 S7 S8 S9 S10 S11 S12 AUX S1 AUX S2 AUX S3 AUX S4 AUX S5 S6 CMU CHANNEL NO. | 16 | 9 | 10 | 17 | 4 PED 8 RED OL1 OL2 SPARE OL3 OL4 SPARE PHASE NU 41,42 P41, P42 NU 61,62 P61, P62 NU 81,82 NU 11[★] NU NU SIGNAL HEAD NO. 11 22,23 NU 101 107 134 YELLOW 129 102 108 135 103 109 130 136 GREEN RED ARROW A121 A114 YELLOW A122 A115 ARROW FLASHING YELLOW ARROW A123 GREEN ARROW 104 119 106 121

PROJECT REFERENCE NO.

U-3308

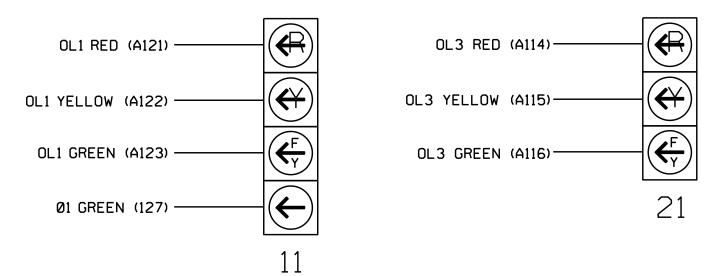
|Sig. 14.

NU = Not Used

- * Denotes install load resistor. See load resistor installation detail this sheet.
- ★ See pictorial of head wiring in detail below.

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



INPUT FILE CONNECTION & PROGRAMMING CHART

| PED PUSH BUTTONS | LOOP TERMINAL | INPUT FILE POS. | DETECTOR NO. | PIN NO. | ATTRIBUTES | NEMA PHASE | NOTE: INSTALL DC ISOLATORS |
|---------------------|------------------|--------------------|-----------------|------------|------------|---------------|-------------------------------|
| P41 , P42 | TB8-5 , 6 | I12L | 27 | 69 | 2 | 4 PED | IN INPUT FILE SLOTS |
| P61 , P62 | TB8-7 , 9 | I13U | 26 | 68 | 2 | 6 PED | I12 AND I13. |
| | | | | | | | |

DETECTOR ATTRIBUTES LEGEND: INPUT FILE POSIT 1-FULL TIME DELAY FILE J

2-PED CALL
3-RESERVED
4-COUNTING
5-EXTENSION
6-TYPE 3
7-CALLING
8-ALTERNATE

FILE J
SLOT 2
LOWER

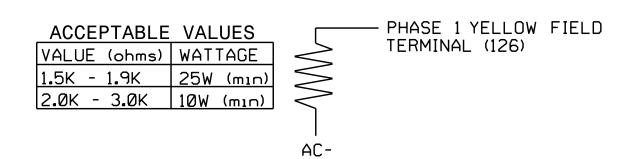
SPECIAL DETECTOR NOTE

Install a video detection system for vehicle detection. Perform installation according to manufacturer's directions and NCDOT engineer-approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1026T3
DESIGNED: September 2014
SEALED: 04/02/2015
REVISED: N/A

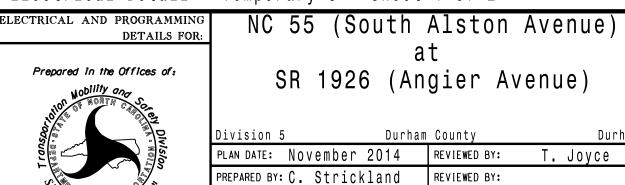


(install resistor as shown below)



Electrical Detail - Temporary 3 - Sheet 1 of 2

750 N.Greenfield Pkwy,Garner,NC 27529



SEAL

SEAL

OZZO13

SEAL

OZZO13

Docusigned by:

Meorge C. Brown 4/2/2015

REVISIONS

INIT. DATE

Docusigned by:

Description of the content of the cont



FILE

пΤп

FILE

"J"

OVERLAP [3] PROGRAMMING DETAIL

Program overlap as follows:
Main Menu - 4) OVERLAP

PRESS '+' TWICE

OVERLAP [3]:

LOADSWITCH = 11 NOTE: FOR SIGNAL HEAD 21

VEH SET 1 = 2+6

YELLOW CLEARANCE = 4.1

RED CLEARANCE = 2.1

END OF OVERLAP PROGRAMMING

FYA PPLT PROGRAMMING (SIGNAL HEAD 11)

- 2. Assign output pin for Flashing Yellow Arrow as follows: Main Menu - 6) OUTPUTS - F) FYA PPLT Phase 1 = 99
- 3. Redirect RED and YELLOW outputs for the left turn phases as follows:

 Main Menu 6) OUTPUTS 8) REDIRECT PHASE

 Phase 1 RED = 97, Phase 1 YELLOW = 98

EMERGENCY VEHICLE PREEMPTION PROGRAMMING

- 1. Program EVB preempt as follows:
 Main Menu 2) PREEMPT 4) EMERGENCY VEHICLE
 EVB Clear = 2
 EVB Clearance Phases = 1.6
- 2. Program general preemption parameters as follows: Main Menu - 2) PREEMPT - 6) MISC PREEMPTION PARAMETERS Min Time Before PE ForceOff = 1
- 3. Ped Clear Before Preempt is a pedestrian timing parameter, and is programmed as follows:
 Main Menu 1) PHASE 5) PEDESTRIAN TIMING
 PHASE 4 MIN FDW = 4
 PHASE 6 MIN FDW = 4

Program extend time on optical detector units for 2.0 sec for EVB.

OVERLAP GREEN FLASH PROGRAMMING FOR 3 SECTION FYA

The following will cause the overlap green outputs to flash, which are wired to the flashing yellow arrow. Program as follows:

Main Menu - 1) PHASE - 2) PHASE FUNCTIONS PAGE TWO
OLAP G FL = 3

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.

SPECIAL NOTES EV PREEMPT PROGRAMMING

Setting 'FYA DURING PREEMPT' to 'Y' eliminates yellow trap when transitioning to preempt from adjacent through phase. Main Menu - 9) UTILITIES - 9) MISC FYA DURING PREEMPT (Y/N) = Y

MIN WALK DURING PREEMPTION PROGRAMMING

To disable MIN WALK pedestrian timing during preemption, program the controller as follows:

Main Menu - 9) UTILITIES - 5) CONFIGURATION

EXTRA TWO = 3

REVISIONS

Electrical Detail - Temporary 3 - Sheet 2 of 2



Prepared in the Offices of:

SR 1926 (Angier Avenue)

SR 1926 (Angier Avenue)

Division 5 Durham County Durham
PLAN DATE: November 2014 REVIEWED BY: T. Joyce
PREPARED BY: C. Strickland REVIEWED BY:

Docusigned by:

Heorge C. Brown 4/2/2015

F12601ED0BEB434... DATE

SIG. INVENTORY NO. 05-1026T3

INIT. DATE

SEAL

PROJECT REFERENCE NO.

U-3308

Sig. 14.2

01-APR-2015 13:40 S:*ITS&SU*ITS Signals*Workgroups*

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1026T3
DESIGNED: September 2014
SEALED: 04/02/2015
REVISED: N/A

PROJECT REFERENCE NO. |Sig. 15.0| U-3308

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

NOTES

- 1. Refer to "Road Standard Drawings NCDOT" dated January 2012, "Standard Specifications for Roads and Structures" dated January 2012.
- 2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- 4. Program all timing information into phase banks 1,2, and 3 unless otherwise noted.
- 7. Program pedestrian heads to countdown the flashing
- "Don't Walk" time. 8. This intersection features an optical preemption
- system. Shown locations of optical detectors are conceptual only.
- 9. Upon completion of Emergency Vehicle Preemption, controller returns to normal operation.
- operation only. Coordinated signal system timing values supersede these values.
- 12. Pedestrian signal head #P82 shall remain bagged and
- 13. Contractor shall adjust video detection zones as required

| | 2033 SOFTWARE w/ 2070 CONTROLLER LOOP & DETECTOR UNIT INSTALLATION CHART | | | | | | | | | | | | | | | | | | | | |
|---------|--|--------|-------------------------|-----|----------|---------------|-----|------|--------------|--------------|--------------------|--------------------|----------|-------|-----------|--------|---------|-----------|--------|-----|----------|
| | DETECTOR PROGRAMMING | | | | | | | | | | | | | | | | | | | | |
| | INDUCT: | IVE LO | OPS | | | | | TIAA | INIC | | | | A٦ | TRI | виті | ES | | | LOOPS | STA | TUS |
| | | | DICT FROM | Ι | | | | HM | ING | | 1 | 2 Z | 3 | 4 | 5 | 6 | 7 | 8 ш | 001 | | ს ე |
| OOP NO. | SIZE (ft) | TURNS | DIST. FROM STOPBAR (ft) | NEW | EXISTING | NEMA PHASE | DEL | ΑY | CAI (STRI | RRY ETCH) | FULL TIME DELAY | PEDESTRIAN CALL | RESERVED | COUNT | EXTENSION | TYPE 3 | CALLING | ALTERNATE | SYSTEM | NEW | EXISTING |
| 2A | 6×6 | * | 70 | * | - | 2 | _ | SEC. | - | SEC. | - | _ | - | - | Χ | - | Χ | ı | - | - | * |
| 2B | 6×40 | * | 0 | * | - | 2 | _ | SEC. | - | SEC. | _ | _ | - | - | Χ | - | Χ | ı | - | - | * |
| 4 A | 6×40 | * | 0 | - | * | 4 | 10 | SEC. | - | SEC. | - | _ | - | _ | Χ | _ | Χ | ı | - | - | * |
| 6A | 6×6 | * | 70 | _ | * | 6 | _ | SEC. | _ | SEC. | _ | _ | - | - | Χ | - | Χ | - | - | - | * |
| PEDES | PEDESTRIAN DETECTION | | | | | | | | | | | | | | | | | | | | |
| P61,P62 | N/A | N/A | N/A | - | Χ | 6 | _ | SEC. | _ | SEC. | _ | X | - | - | _ | - | - | ı | - | - | Х |

0

| · · | | | |
|---------|--------|--------|----|
| | | | |
| * Video | Detect | ion Zo | ne |

35 Mph

-4% Grade

SIGNAL FACE I.D. All Heads L.E.D. * See Note 11

| W | DW | DW | DRK

TABLE OF OPERATION

SIGNAL

FACE

21

22,23

41,42

61,62

P61,P62

PHASE

EV Preempt Phases

9

| | | _ | ee Note See Note |
|-----|--------------------|----|---------------------|
| 12″ | (F) 1 | 2" | R Y 12 |
| | 21 | | 22,23 |

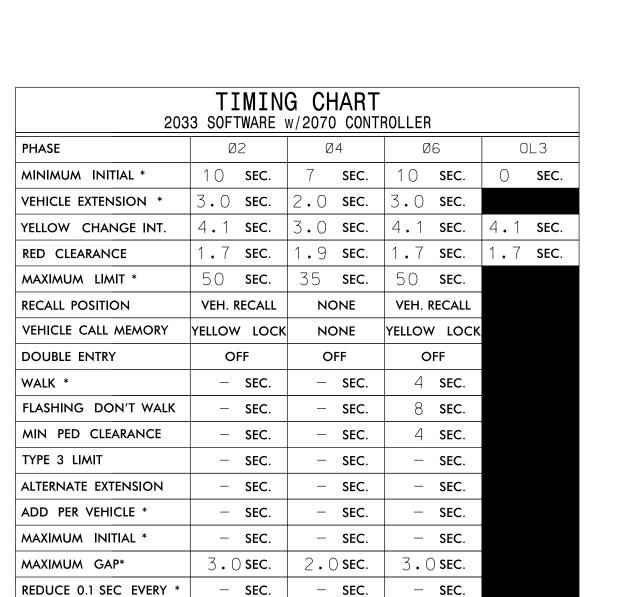
| see Note 12 | |
|-------------------------|------------|
| R Y 12" | R Y 12" |
| 22,23 41,42 61,62 | 81,82* |





P41,P42*

P82₩₩



PHASING DIAGRAM

PHASING DIAGRAM DETECTION LEGEND

UNSIGNALIZED MOVEMENT

UNDETECTED MOVEMENT (OVERLAP)

2033 EV PREEMPTION

(SECONDS)

2.0

FUNCTION

MIN. PED. CLEAR BEFORE PREEMPT

* See Timing Chart for Min Ped Clearance

** Program Timing on Optical Detector Unit

MIN. GREEN BEFORE PREEMPT

DELAY BEFORE PREEMPT

CLEARANCE TIME

PREEMPT EXTEND**

DETECTED MOVEMENT

 $<\!\!--\!\!>$ PEDESTRIAN MOVEMENT

* 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

1025 Wade Avenue Raleigh, NC 27605 Tel:919-789-9977

NC 55 (S. Alston Ave.)

NC 55 (South Alston Avenue)

SR 1926 (Angier Avenue) Division 5 Durham County PLAN DATE: September 2014 | REVIEWED BY: J Hochanadel

SEAL MyPAL

SIG. INVENTORY NO. 05-1026T4

DATE

3. Set all detector units to presence mode.

5. Set phase bank 3 maximum limit to 250 seconds for

6. Omit "WALK" and flashing "DON'T WALK" with no pedestrian

10. Maximum times shown in timing chart are for free-run

11. Disconnect and bag signal head #11, #81, #82 and pedestrian signal heads #P41 and #P42 during this phase of construction.

disconnected during this phase of construction.

PROPOSED Traffic Signal Head \bigcirc Modified Signal Head

N/A

 \bigcirc

Pedestrian Signal Head With Push Button & Sign Signal Pole with Guy Signal Pole with Sidewalk Guy Inductive Loop Detector Controller & Cabinet

LEGEND

EXISTING

-

N/A

 \longrightarrow

 \triangle

 $^{\odot}$

N/A

N/A

N/A

N/A

N/A

Junction Box 2-in Underground Conduit -----Right of Way Directional Arrow "No Left Turn" (R3-2)

"No Right Turn" (R3-1) "Dual Turn Arrows" (R10-21) w/ Flags

Work Area Drums Construction Easement

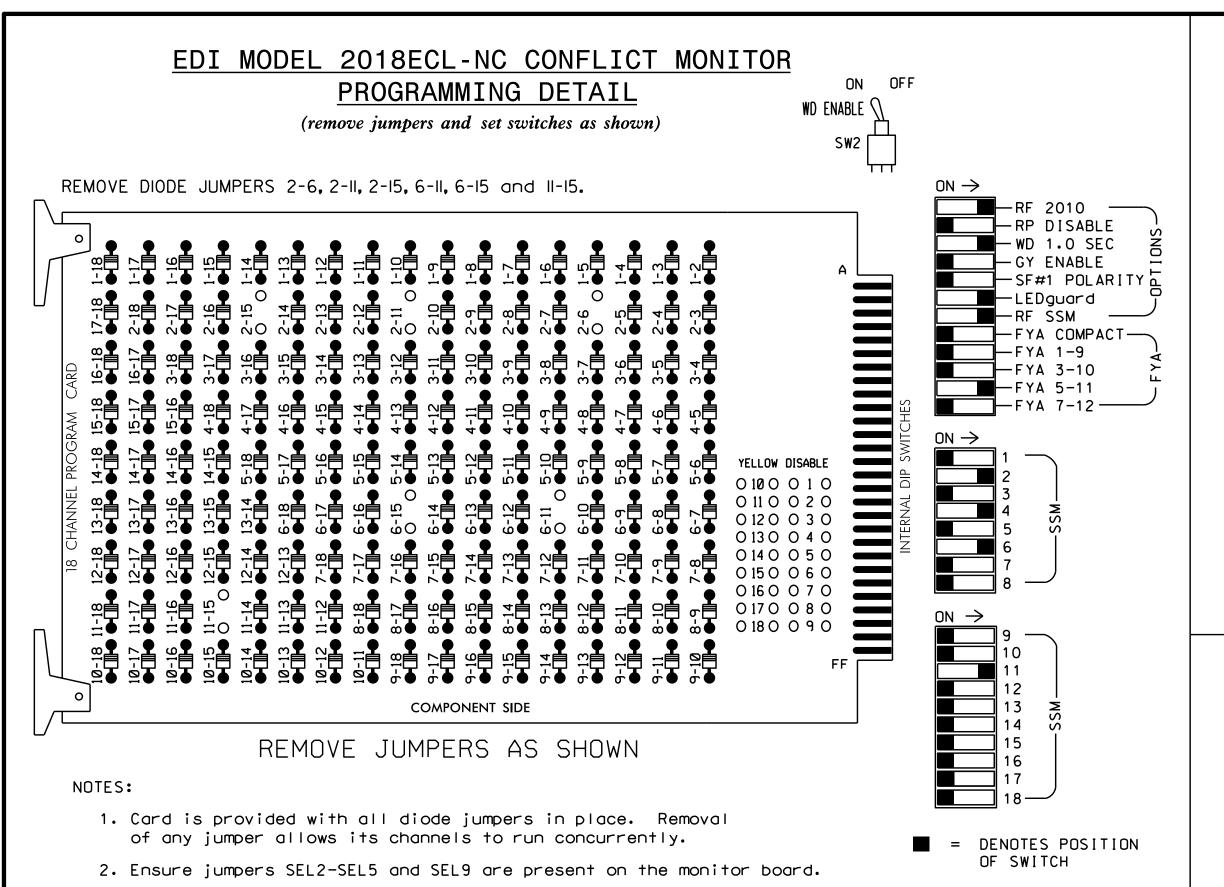
—— PDE —— Permanent Drainage Easement Barricades Direct Bury

Optical Detector Video Detector

Video Detection Area Signal Upgrade - Temporary Design 4 (TMP Phase II, Steps 7-12)

'50 N.Greenfield Pkwy,Garner,NC 27529 PREPARED BY: C Lawson INIT. DATE

SEC. SEC. SEC. 3 . 0 **SEC**. 2 **.** 0 **SEC**. be lower than 4 seconds.



NOTES

- 1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. Verify that signal heads flash in accordance with the signal plans.
- 2. Program controller to Start Up in phases 2 and 6 green.
- 3. Set power-up flash time to 0 seconds within the controller programming. The conflict monitor will govern startup flash. Ensure STARTUP "RED START" is set to 0 seconds.
- 4. Enable Simultaneous Gap-Out feature for all phases.
- 5. Program all timing information into phase banks 1, 2, and 3 unless otherwise noted.
- 6. Set phase bank 3 maximum limit to 250 seconds for phases used.
- 7. Ensure start up flash phases are coordinated with flash program block assignments.
- 8. Program Startup Ped Call for phase 6.
- 9. Set the Red Revert interval on the controller to 1 second.
- 10. This cabinet and controller are part of the Durham Signal System.

EQUIPMENT INFORMATION

SIGNAL HEAD HOOK-UP CHART LOAD SWITCH NO. S4 S5 S6 S7 S8 S9 S10 S11 S12 AUX S1 AUX S2 AUX S3 AUX S4 AUX S5 S6 CMU CHANNEL NO. | 16 | 9 | 10 | 17 | 8 RED OL1 OL2 SPARE OL3 OL4 SPARE PHASE NU 41,42 NU NU 61,62 P61. NU NU NU NU NU NU SIGNAL HEAD NO. 22,23 NU 128 101 134 129 102 YELLOW 135 103 130 136 GREEN RED A114 ARROW YELLOW A115 ARROW FLASHING YELLOW ARROW GREEN ARROW 119 121

PROJECT REFERENCE NO.

U-3308

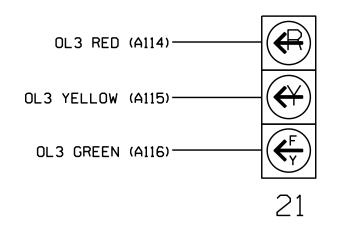
|Sig. 15.

NU = Not Used

★ See pictorial of head wiring in detail below.

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)

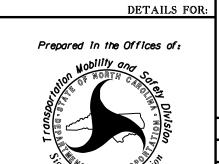


COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1026T4
DESIGNED: September 2014
SEALED: 04/02/2015
REVISED: N/A

| Electrical Detail - Temporary 4 - Sheet 1 of 2



ELECTRICAL AND PROGRAMMING

NC 55 (South Alston Avenue) at SR 1926 (Angier Avenue)

Division 5 Durham County Durham
PLAN DATE: November 2014 REVIEWED BY: T. Joyce

PLAN DATE: November 2014 REVIEWED BY: T. Joyce

PREPARED BY: C. Strickland REVIEWED BY:

REVISIONS

INIT. DATE

Docusigned by:

Leonge C. Brown

SEAL

022013

INPUT FILE POSITION LAYOUT

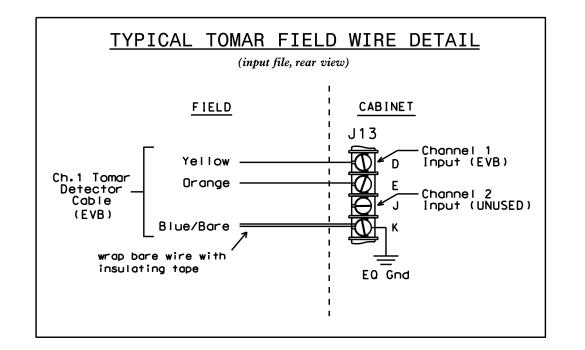
(front view)

3. Ensure that Red Enable is active at all times during normal operation.

4. Ensure conflict monitor communicates with 2070.

T
4 CHANNEL TOMAR OSP CARD
INSERT CARD INTO SLOT J13

EVx = EMERGENCY VEHICLE PREEMPT



INPUT FILE CONNECTION & PROGRAMMING CHART

| PED PUSH BUTTONS | LOOP TERMINAL | INPUT FILE POS. | DETECTOR NO. | PIN NO. | ATTRIBUTES | NEMA PHASE | NOTE: |
|---------------------|------------------|--------------------|-----------------|------------|------------|---------------|-------------------------|
| P61 , P62 | TB8-7 , 9 | I13U | 26 | 68 | 2 | 6 PED | INSTALL DC ISOLATORS |
| | | | | | | | IN INPUT FILE SLOT I13. |

DETECTOR ATTRIBUTES LEGEND: INPUT FILE POSITION LEGEND: J2L

1-FULL TIME DELAY
2-PED CALL
3-RESERVED
4-COUNTING
5-EXTENSION
6-TYPE 3
7-CALLING

8-ALTERNATE

SPECIAL DETECTOR NOTE

Install a video detection system for vehicle detection. Perform installation according to manufacturer's directions and NCDOT engineer-approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.

OVERLAP [3] PROGRAMMING DETAIL

Program overlaps as follows: Main Menu - 4) OVERLAP

PRESS '+' TWICE

OVERLAP [3]:

LOADSWITCH = 11NOTE: FOR SIGNAL HEAD 21 VEH SET 1 = 2+6YELLOW CLEARANCE = 4.1RED CLEARANCE = 1.7

END OF OVERLAP PROGRAMMING

OVERLAP GREEN FLASH PROGRAMMING FOR 3 SECTION FYA

The following will cause the overlap green outputs to flash, which are wired to the flashing yellow arrow. Program as follows:

Main Menu - 1) PHASE - 2) PHASE FUNCTIONS PAGE TWO OLAP G FL = 3

EMERGENCY VEHICLE PREEMPTION PROGRAMMING

- Program EVB preempt as follows: Main Menu - 2) PREEMPT - 4) EMERGENCY VEHICLE EVB Clear = 2EVB Clearance Phases = 6
- 2. Program general preemption parameters as follows: Main Menu - 2) PREEMPT - 6) MISC PREEMPTION PARAMETERS Min Time Before PE ForceOff = 1
- 3. Ped Clear Before Preempt is a pedestrian timing parameter, and is programmed as follows: Main Menu - 1) PHASE - 5) PEDESTRIAN TIMING PHASE 6 MIN FDW = 4

Program extend time on optical detector units for 2.0 sec for EVB.

MIN WALK DURING PREEMPTION PROGRAMMING

To disable MIN WALK pedestrian timing during preemption, program the controller as follows: Main Menu - 9) UTILITIES - 5) CONFIGURATION EXTRA TWO = 3

Electrical Detail - Temporary 4 - Sheet 2 of 2

Prepared in the Offices of:

ELECTRICAL AND PROGRAMMING NC 55 (South Alston Avenue) DETAILS FOR: SR 1926 (Angier Avenue)

Durham County Durham PLAN DATE: November 2014 REVIEWED BY: T. Joyce PREPARED BY: C. Strickland REVIEWED BY: REVISIONS INIT. DATE

SIG. INVENTORY NO. 05-1026T4

SEAL

PROJECT REFERENCE NO.

U-3308

Sig. 15.2

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-1026T4 DESIGNED: September 2014 SEALED: 04/02/2015 REVISED: N/A

PROJECT REFERENCE NO. |Sig. 15.5| U-3308

3 Phase Actuated reemption

- ard Drawings NCDOT" dated ard Specifications for
- #62 and optical detector #10.

- system. Shown locations of optical detectors are conceptual only.
- controller returns to normal operation.
- operation only. Coordinated signal system timing values supersede these values.
- reference only. See sheets P1-P3 for pushbutton location details.
- pedestrian signal heads #P41, #P42 and #P82 during

LEGEND

EXISTING

15. Contractor shall adjust video detection zones as

| | 3 P |
|---|-----------------------|
| | Fully A |
| | W/ EV Pr |
| | (Durham Siç |
| | |
| | <u>NOTES</u> |
| • | Refer to "Road Standa |
| | January 2012, "Standa |
| | Roads and Structures" |
| | Do not program signal |
| | flashing operation un |
| | by the Engineer. |

| 2. | Do not program signal for late night |
|----|---|
| | flashing operation unless otherwise directe |
| | by the Engineer. |
| 3 | Phase 1 may be langed |

5. Set all detector units to presence mode.

7. Set phase bank 3 maximum limit to 250 seconds for

8. Omit "WALK" and flashing "DON'T WALK" with no pedestrian

"Don't Walk" time.

11. Upon completion of Emergency Vehicle Preemption,

12. Maximum times shown in timing chart are for free-run

14. Reconnect and unbag signal head #11, #81, #82 and

required.

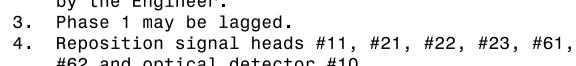
dated January 2012.

6. Program all timing information into phase banks 1,2, and 3 unless otherwise noted.

10. This intersection features an optical preemption

13. Pedestrian pedestals are conceptual and shown for

ignal System)



9. Program pedestrian heads to countdown the flashing

this phase of construction.

PROPOSED

P41,P42* P61,P62 P81 P82₩ NC 55 (S. Alston Ave.) 81 82 23 ← -4% Grade 35 Mph NC 55 (S. Alston Ave.)

2033 SOFTWARE w/ 2070 CONTROLLER

LOOP & DETECTOR UNIT INSTALLATION CHART

- | X | 8 | - SEC. | - SEC. | - | X |

PHASE | DELAY

INDUCTIVE LOOPS

TURNS

STOPBAR

70 |*|-

P41,P42 | N/A | N/A | N/A | - | X | 4 | - SEC. | - SEC. | - | X |

| P61.P62 | N/A | N/A | N/A | X | - | 6 | - | SEC. | - | SEC. | - | X |

SIZE

6×40

6×6

6×40

6×40

6×6

6×40

PEDESTRIAN DETECTION

| P81,P82 | N/A | N/A | N/A

* Video Detection Zone

LOOP NO.

2Α

6A

DETECTOR PROGRAMMING

TABLE OF OPERATION

SIGNAL

FACE

11

21

22,23

41,42

61,62

81,82

P41,P42

P61,P62

11*

PHASE

DW|DW|W|DW|DRK

W | W | DW | DW | DRK

P81,P82 | DW | DW | W | DW | DRK

SIGNAL FACE I.D.

All Heads L.E.D.

* See Note 14

22,23

41,42

61,62

81,82*

EV Preempt Phases

#11

PHASING DIAGRAM DETECTION LEGEND

PHASING DIAGRAM

02+6

DETECTED MOVEMENT UNDETECTED MOVEMENT (OVERLAP) UNSIGNALIZED MOVEMENT PEDESTRIAN MOVEMENT

| 2033 EV PREEMPTI | ON |
|--------------------------------|------------------|
| FUNCTION | EVB (SECONDS) |
| DELAY BEFORE PREEMPT | 0 |
| MIN. PED. CLEAR BEFORE PREEMPT | * |
| MIN. GREEN BEFORE PREEMPT | 1 |

* See Timing Chart for Min Ped Clearance ** Program Timing on Optical Detector Unit

CLEARANCE TIME

PREEMPT EXTEND**

| | 203 | TIMINO 3 SOFTWARE | G CHART w/2070 CONTI | ROLLER | | |
|------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|------------------|
| PHASE | Ø1 | Ø2 | Ø4 | Ø6 | Ø8 | OL3 |
| MINIMUM INITIAL * | 7 SEC . | 10 SEC . | 7 SEC . | 1 () SEC . | 7 SEC . | O SEC. |
| VEHICLE EXTENSION * | 2.0 SEC . | 3.0 SEC . | 2.0 SEC . | 3.0 SEC . | 2.0 SEC . | |
| YELLOW CHANGE INT. | 3.0 SEC . | 4.1 SEC . | 3.4 SEC . | 4.1 SEC . | 4 . 1 SEC. | 4.1 SEC . |
| RED CLEARANCE | 2.8 SEC . | 2.1 SEC . | 2.0 SEC . | 2.1 SEC . | 1.3 SEC . | 2.1 SEC . |
| MAXIMUM LIMIT * | 15 SEC . | 50 SEC . | 35 SEC . | 50 SEC . | 35 SEC . | |
| RECALL POSITION | NONE | VEH. RECALL | NONE | VEH. RECALL | NONE | |
| VEHICLE CALL MEMORY | NONE | YELLOW LOCK | NONE | YELLOW LOCK | NONE | |
| DOUBLE ENTRY | OFF | OFF | ON | OFF | ON | |
| WALK * | - SEC. | - SEC. | 4 SEC. | 4 SEC . | 4 SEC. | |
| FLASHING DON'T WALK | - SEC. | - SEC. | 17 SEC . | 8 SEC . | 16 SEC . | |
| MIN PED CLEARANCE | - SEC. | - SEC. | 9 sec. | 4 SEC . | 8 SEC . | |
| TYPE 3 LIMIT | – SEC. | - SEC. | - SEC. | - SEC. | - SEC. | |
| ALTERNATE EXTENSION | - SEC. | |
| ADD PER VEHICLE * | - SEC. | |
| MAXIMUM INITIAL * | - SEC. | |
| MAXIMUM GAP* | 2 . O SEC . | 3 . 0 SEC . | 2 . 0 SEC . | 3 . 0 SEC . | 2 . 0 SEC . | |
| REDUCE 0.1 SEC EVERY * | - SEC. | - SEC. | - SEC. | - SEC. | – SEC. | |
| MINIMUM GAP | 2 . O SEC . | 3 . 0 SEC . | 2 . O SEC . | 3 . 0 SEC . | 2 . O SEC . | |

2.0

shown. Min Green for all other phases should not be lower than 4 seconds.

Traffic Signal Head **●** \bigcirc Modified Signal Head 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 \longrightarrow Type I Pushbutton Post Work Area N/A Drums N/A ----E---- Construction Easement N/A ---- PDE ----- Permanent Drainage Easement N/A N/A Barricades Rigid Conduit ----- \bigcirc Optical Detector Video Detector

Video Detection Area

Signal Upgrade - Temporary Design 5 (TMP Phase 2, Steps 7-12)

NC 55 (South Alston Avenue)

Prepared for the Offices of:

SR 1926 (Angier Avenue) Division 5 Durham County PLAN DATE: March 2015 REVIEWED BY: J Hochanadel

MyPAL SIG. INVENTORY NO. 05-1026T5

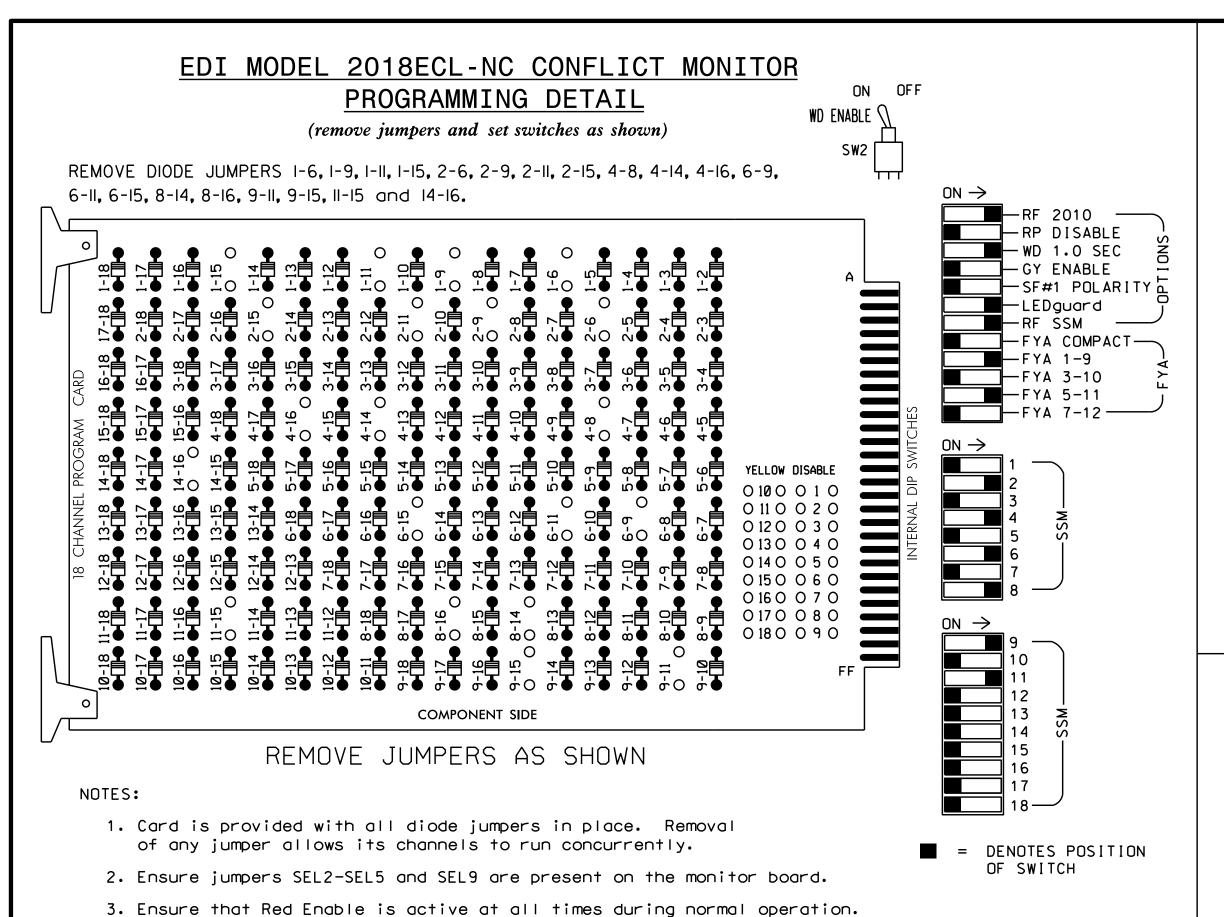
SEAL

SEAL

4/02/15 DATE

50 N.Greenfield Pkwy,Garner,NC 27529 PREPARED BY: C Lawson INIT. DATE

1025 Wade Avenue Raleigh, NC 27605 Tel:919-789-9977 Fax:919-789-9591 License #: C-2197



INPUT FILE POSITION LAYOUT

9

10 11 12 13 14

NOT USED

Ø6PED FS

EVx = EMERGENCY VEHICLE PREEMPT

4 CHANNEL TOMAR OSP CARD

INSERT CARD INTO SLOT J13

Ø4PEDØ8PED ST

CH. 3 | CH. 1

UNUSED: EVB

CH. 4 | CH. 2 |

UNUSED UNUSED

FS = FLASH SENSE

ST = STOP TIME

(front view)

4. Ensure conflict monitor communicates with 2070.

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

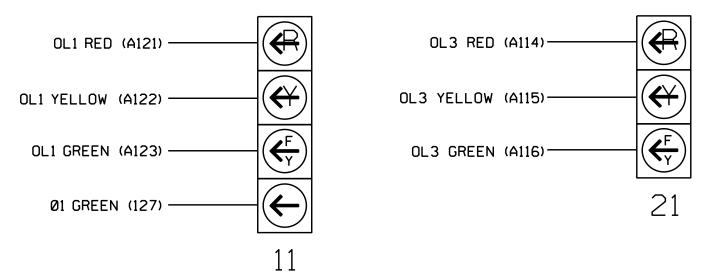
NOTES

- 1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. Verify that signal heads flash in accordance with the signal plans.
- 2. Program controller to Start Up in phases 2 and 6 green.
- 3. Set power-up flash time to 0 seconds within the controller programming. The conflict monitor will govern startup flash. Ensure STARTUP "RED START" is set to 0 seconds.
- 4. Enable Simultaneous Gap-Out feature for all phases.
- 5. Program all timing information into phase banks 1, 2, and 3 unless otherwise noted.
- 6. Set phase bank 3 maximum limit to 250 seconds for phases
- 7. Program phases 4 and 8 for Double Entry.
- 8. Ensure start up flash phases are coordinated with flash program block assignments.
- 9. Program Startup Ped Calls for phases 4, 6, and 8.
- 10. Set the Red Revert interval on the controller to 1 second.
- 11. This cabinet and controller are part of the Durham Signal System.

EQUIPMENT INFORMATION

| CONTROLLER | |
|---|--|
| PHASES USED | |
| * See FYA PPLT Programming Detail on Sheet 2. | |

(wire signal heads as shown)



SIGNAL HEAD HOOK-UP CHART

61,62 P61, P62

134

135

136

119

121

FYA SIGNAL WIRING DETAIL

S8

S7

41,42 P41, P42

101

102

103

104

106

* Denotes install load resistor. See load resistor

★ See pictorial of head wiring in detail below.

installation detail this sheet.

LOAD SWITCH NO.

CMU CHANNEL NO.

PHASE

SIGNAL HEAD NO.

RED

YELLOW

GREEN

RED ARROW

YELLOW

ARROW

FLASHING YELLOW ARROW

GREEN ARROW

NU = Not Used

22**,**23 NU

129

130

INPUT FILE CONNECTION & PROGRAMMING CHART

| PED PUSH BUTTONS | LOOP TERMINAL | | DETECTOR NO. | PIN NO. | | NEMA PHASE | NOTE: |
|---------------------|------------------|------|-----------------|------------|---|---------------|----------------------|
| P41,P42 | TB8-5,6 | I12L | 27 | 69 | 2 | 4 PED | INSTALL DC ISOLATORS |
| P61,P62 | TB8-7 , 9 | I13U | 26 | 68 | 2 | 6 PED | IN INPUT FILE SLOTS |
| P81 , P82 | TB8-8,9 | I13L | 28 | 70 | 2 | 8 PED | I12 AND I13. |

DETECTOR ATTRIBUTES LEGEND: INPUT FILE POSITION LEGEND: J2L 1-FULL TIME DELAY

2-PED CALL 3-RESERVED 4-COUNTING 5-EXTENSION 6-TYPE 3 7-CALLING

8-ALTERNATE

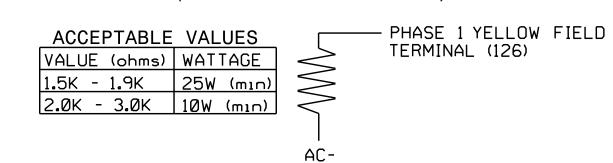
SLOT 2-LOWER-

SPECIAL DETECTOR NOTE

Install a video detection system for vehicle detection. Perform installation according to manufacturer's directions and NCDOT engineer-approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.

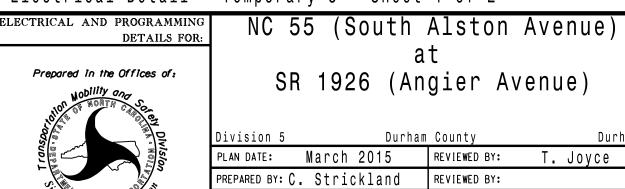
> THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-1026T5 DESIGNED: March 2015 SEALED: 04/02/2015 REVISED: N/A





Electrical Detail - Temporary 5 - Sheet 1 of 2

750 N.Greenfield Pkwy,Garner,NC 27529



REVISIONS

SEAL 022013

IG. INVENTORY NO. 05-1026T5

INIT. DATE

PROJECT REFERENCE NO.

U-3308

8 OL1 OL2 SPARE OL3 OL4 SPARE

NU

A114

A115

A116

NU

 S9
 S10
 S11
 S12
 AUX S1
 AUX S2
 AUX S3
 AUX AUX S5
 AUX S6

A121

A122

A123

110

112

NU 81,82 P81, P82

107

108

109

|Sig. 15.6

TYPICAL TOMAR FIELD WIRE DETAIL (input file, rear view) <u>FIELD</u> CABINET Channel 1 D Input (EVB) Ch.1 Tomar Detector -Cable Channel 2 J Input (UNUSED) (EVB) Blue/Bare wrap bare wire with insulating tape E0 Gnd

FILE

пΤп

FILE

"J"

OVERLAP [3] PROGRAMMING DETAIL

Program overlap as follows:
Main Menu - 4) OVERLAP

PRESS '+' TWICE

OVERLAP [3]:

LOADSWITCH = 11 NOTE: FOR SIGNAL HEAD 21

VEH SET 1 = 2+6

YELLOW CLEARANCE = 4.1

RED CLEARANCE = 2.1

END OF OVERLAP PROGRAMMING

FYA PPLT PROGRAMMING (SIGNAL HEAD 11)

- 1. Program Flashing Yellow Arrow phases as follows: Main Menu - 1) PHASE - 2) PHASE FUNCTIONS PAGE TWO PPLT FYA = PHASE 1
- 2. Assign output pin for Flashing Yellow Arrow as follows: Main Menu - 6) OUTPUTS - F) FYA PPLT Phase 1 = 99
- 3. Redirect RED and YELLOW outputs for the left turn phases as follows:

 Main Menu 6) OUTPUTS 8) REDIRECT PHASE

 Phase 1 RED = 97, Phase 1 YELLOW = 98

EMERGENCY VEHICLE PREEMPTION PROGRAMMING

- 1. Program EVB preempt as follows:
 Main Menu 2) PREEMPT 4) EMERGENCY VEHICLE
 EVB Clear = 2
 EVB Clearance Phases = 1.6
- 2. Program general preemption parameters as follows: Main Menu - 2) PREEMPT - 6) MISC PREEMPTION PARAMETERS Min Time Before PE ForceOff = 1
- 3. Ped Clear Before Preempt is a pedestrian timing parameter, and is programmed as follows: Main Menu - 1) PHASE - 5) PEDESTRIAN TIMING PHASE 4 MIN FDW = 9 PHASE 6 MIN FDW = 4 PHASE 8 MIN FDW = 8

Program extend time on optical detector units for 2.0 sec for EVB.

OVERLAP GREEN FLASH PROGRAMMING FOR 3 SECTION FYA

The following will cause the overlap green outputs to flash, which are wired to the flashing yellow arrow. Program as follows:

Main Menu - 1) PHASE - 2) PHASE FUNCTIONS PAGE TWO
OLAP G FL = 3

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.

SPECIAL NOTES EV PREEMPT PROGRAMMING

Setting 'FYA DURING PREEMPT' to 'Y' eliminates yellow trap when transitioning to preempt from adjacent through phase. Main Menu - 9) UTILITIES - 9) MISC FYA DURING PREEMPT (Y/N) = Y

MIN WALK DURING PREEMPTION PROGRAMMING

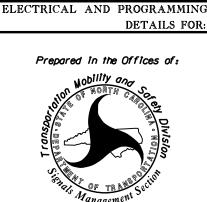
To disable MIN WALK pedestrian timing during preemption, program the controller as follows:

Main Menu - 9) UTILITIES - 5) CONFIGURATION

EXTRA TWO = 3

Electrical Detail - Temporary 5 - Sheet 2 of 2

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1026T5
DESIGNED: March 2015
SEALED: 04/02/2015
REVISED: N/A



NC 55 (South Alston Avenue)
at
SR 1926 (Angier Avenue)

REVISIONS

Division 5 Durham County Durham
PLAN DATE: March 2015 REVIEWED BY: T. Joyce
PREPARED BY: C. Strickland REVIEWED BY:

Docusigned by:

SIG. INVENTORY NO. 05-1026T5

INIT. DATE

SEAL

PROJECT REFERENCE NO.

U-3308

Sig. 15.7

N.Greenfield Pkwy.Garner.NC 27529

01-APR-2015 13:46 S:*ITS&SU*ITS Signals*Workgroups*Sig Man*S cestrickland PHASING DIAGRAM

PHASING DIAGRAM DETECTION LEGEND

DETECTED MOVEMENT

UNSIGNALIZED MOVEMENT

PEDESTRIAN MOVEMENT

2033 EV PREEMPTION

FUNCTION

MIN. PED. CLEAR BEFORE PREEMPT

* See Timing Chart for Min Ped Clearance ** Program Timing on Optical Detector Unit

MIN. GREEN BEFORE PREEMPT

DELAY BEFORE PREEMPT

CLEARANCE TIME

PREEMPT EXTEND**

UNDETECTED MOVEMENT (OVERLAP)

EVB (SECONDS)

0

*

1

2

2.0

02+6

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

NOTES

- 1. Refer to "Road Standard Drawings NCDOT" dated January 2012, "Standard Specifications for
- flashing operation unless otherwise directed by the Engineer
- 5. Program all timing information into phase banks
- 7. Omit "WALK" and flashing "DON'T WALK" with no pedestrian
- 8. Program pedestrian heads to countdown the flashing
- system. Shown locations of optical detectors are conceptual only.
- controller returns to normal operation.
- operation only. Coordinated signal system timing
- reference only. See sheets P1-P3 for pushbutton

1,2, and 3 unless otherwise noted.

calls.

11. Maximum times shown in timing chart are for free-run

Roads and Structures" dated January 2012. 2. Do not program signal for late night

6. Set phase bank 3 maximum limit to 250 seconds for phases used.

"Don't Walk" time. 9. This intersection features an optical preemption

values supersede these values.

location details.

12. Pedestrian pedestals are conceptual and shown for

3. Phase 1 may be lagged. 4. Set all detector units to presence mode.

10. Upon completion of Emergency Vehicle Preemption,

LEGEND

| <u>PROPOSED</u> | | EXISTING |
|------------------------------|---|-------------------|
| \bigcirc | Traffic Signal Head | |
| (-> | Modified Signal Head | N/A |
| \rightarrow | Sign | \dashv |
| ↓ | Pedestrian Signal Head With Push Button & Sign | |
| \bigcirc | Signal Pole with Guy | |
| Si | gnal Pole with Sidewalk Guy | |
| | Inductive Loop Detector | |
| | Controller & Cabinet | |
| | Junction Box | |
| | 2-in Underground Conduit | |
| N/A | Right of Way | |
| \longrightarrow | Directional Arrow | \longrightarrow |
| ⟨A⟩ Le | ft Arrow "ONLY" Sign (R3-5L |) (A) |
| $\langle \mathbb{B} \rangle$ | Street Name Sign | B |
| ₩ | Type I Pushbutton Post | |
| \bigcirc | Type II Signal Pedestal | |
| | Metal Pole with Mastarm | |
| \bigcirc | Optical Detector | • |
| | | |

2033 SOFTWARE w/ 2070 CONTROLLER TABLE OF OPERATION LOOP & DETECTOR UNIT INSTALLATION CHART EV Preempt Phases

INDUCTIVE LOOPS

6×40 | 2-4-2 |

TURNS STOPBAR

PHASE | DELAY

8 3 SEC.

- | 6 | - SEC.| - SEC.| - | X |

|X|-| 8 | 10 SEC.

| P21,P22 | N/A | N/A | N/A | X | - | 2 | - SEC. | - SEC. | - | X |

P81, P82 | N/A | N/A | N/A | X | - | 8 | - SEC. | - | X

SIZE

6×6

6×6

6×40

6×40

6×40

6×6

PEDESTRIAN DETECTION

P41,P42 | N/A | N/A | N/A

Metal Pole #5

52′ +/– Lt.

35 Mph

See Loading Diagram

Sta. 31 + 13 +/- -LALT-

NC 55 (S. Alston Ave.) P42

Arm "A"─

-4% Grade

P61,P62 N/A N/A N/A X -

| 6×40 | 2-4-2 | 0

6×40 2-4-2 0

LOOP NO.

2A

4 A

4B

6A

PHASE SIGNAL FACE 11 21 22,23

#10

| 41 | | -R | - F | | |
|---------|-------------|---------------|----------------|-------------|-------------|
| 42;43 | R | R | G | R | R |
| 61,62 | G | G | R | G | Υ |
| 81 | | | F Y | | |
| 82,83 | R | R | G | R | R |
| P21,P22 | D-W | W | D-W | D·W | DRK |
| P41,P42 | D·W | D·W | W | D·W | DRK |
| P61,P62 | W | W | D-W | D·W | DRK |
| P81,P82 | D·W | D·W | W | D·W | DRK |

SIGNAL FACE I.D.

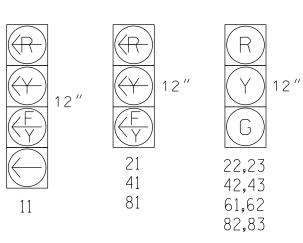
All Heads L.E.D.

P21**,**P22

P41,P42

P61,P62

P81,P82



| 12" | |
|-----|--|
|-----|--|

| | | | | IMING CH | | | | , |
|------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|------------------|------------------|------------------|
| PHASE | Ø1 | Ø2 | Ø4 | Ø6 | Ø8 | OL2 | OL3 | OL4 |
| MINIMUM INITIAL * | 7 SEC . | 1 () SEC . | 7 SEC . | 1 () SEC. | 7 SEC . | O SEC. | O SEC. | O SEC. |
| VEHICLE EXTENSION * | 2.0 SEC . | 3.0 SEC . | 2.0 SEC . | 3.0 SEC . | 2.0 SEC . | | | |
| YELLOW CHANGE INT. | 4.1 SEC. | 4.1 SEC. | 4.1 SEC. | 4.1 SEC. |
| RED CLEARANCE | 3.1 SEC . | 2.4 SEC . | 2.9 SEC . | 2.4 SEC. | 2.9 SEC . | 2.9 SEC . | 2.4 SEC . | 2.9 SEC . |
| MAXIMUM LIMIT * | 15 SEC . | 50 SEC . | 35 SEC . | 50 SEC . | 35 SEC . | | | |
| RECALL POSITION | NONE | VEH. RECALL | NONE | VEH. RECALL | NONE | | | |
| VEHICLE CALL MEMORY | NONE | YELLOW LOCK | NONE | YELLOW LOCK | NONE | | | |
| DOUBLE ENTRY | OFF | OFF | ON | OFF | ON | | | |
| WALK * | - SEC. | 4 SEC. | 4 SEC. | 4 SEC. | 4 SEC. | | | |
| FLASHING DON'T WALK | - SEC. | 9 SEC . | 17 SEC . | 8 SEC . | 16 SEC . | | | |
| MIN PED CLEARANCE | - SEC. | 5 SEC . | 9 SEC. | 4 SEC. | 8 SEC . | | | |
| TYPE 3 LIMIT | - SEC. | | | |
| ALTERNATE EXTENSION | - SEC. | | | |
| ADD PER VEHICLE * | - SEC. | | | |
| MAXIMUM INITIAL * | - SEC. | | | |
| MAXIMUM GAP* | 2 . O SEC . | 3 . 0 SEC . | 2 . 0 SEC . | 3 . 0 SEC . | 2 . O SEC . | | | |
| REDUCE 0.1 SEC EVERY * | - SEC. | - SEC. | - SEC. | - SEC. | - SEC. | | | |
| MINIMUM GAP | 2 . O SEC . | 3 . 0 SEC . | 2 . 0 SEC . | 3 . 0 SEC . | 2 . O SEC . | | | |

* 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 - Final Design



NC 55 (South Alston Avenue)

SR 1926 (Angier Avenue) Division 5 Durham County PLAN DATE: September 2014 | REVIEWED BY: J Hochanadel

INIT. DATE MyPAL DATE 05-1026 SIG. INVENTORY NO.

SEAL

1025 Wade Avenue

DETECTOR PROGRAMMING

Arm "B"

+2% Grade

NC 55 (S. Alston Ave.)

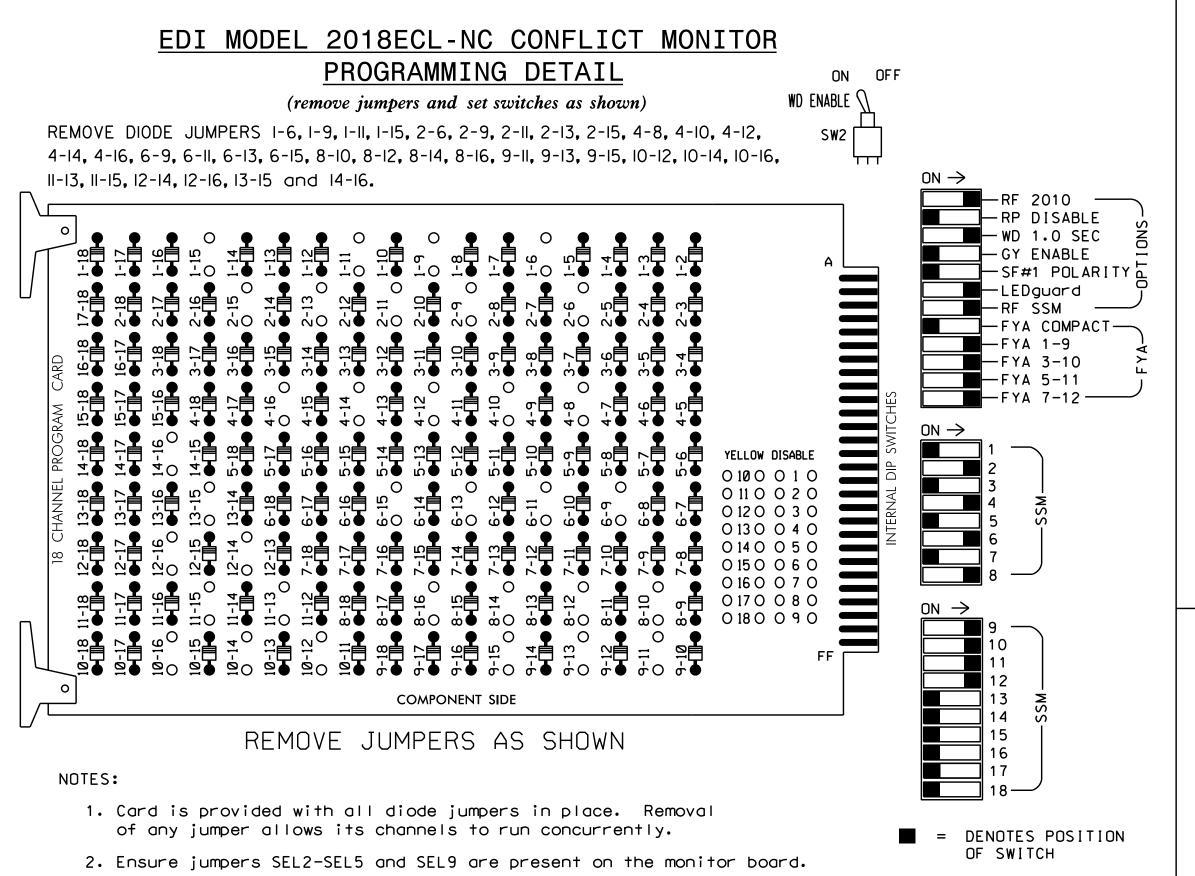
See Loading Diagram
Sta. 31+90+/- -LALT-

Metal Pole #6

50′ +∕− Rt.

Raleigh, NC 27605 Tel:919-789-9977 Fax:919-789-9591

50 N.Greenfield Pkwy,Garner,NC 27529 PREPARED BY: C Lawson



NOTES

- 1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. Verify that signal heads flash in accordance with the signal plans.
- 2. Program controller to Start Up in phases 2 and 6 green.
- 3. Set power-up flash time to 0 seconds within the controller programming. The conflict monitor will govern startup flash. Ensure STARTUP "RED START" is set to 0 seconds.
- 4. Enable Simultaneous Gap-Out feature for all phases.
- 5. Program all timing information into phase banks 1, 2, and 3 unless otherwise noted.
- 6. Set phase bank 3 maximum limit to 250 seconds for phases
- 7. Program phases 4 and 8 for Double Entry.
- 8. Ensure start up flash phases are coordinated with flash program block assignments.
- 9. Program Startup Ped Calls for phases 2, 4, 6, and 8.
- 10. Set the Red Revert interval on the controller to 1 second.
- 11. This cabinet and controller are part of the Durham Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070E SOFTWARE..........McCAIN 2033 CABINET MOUNT.....BASE

OUTPUT FILE POSITIONS...18 WITH AUX FILE

LOAD SWITCHES USED......\$1,\$2,\$3,\$5,\$6,\$8,\$9,\$11,\$12, AUX S1, AUX S2, AUX S4, AUX S5

PHASES USED......1,2,2 PED,4,4 PED,6,6 PED,8,8 PED

OVERLAP 1....* OVERLAP 2.....4+8 OVERLAP 3....2+6

OVERLAP 4.....4+8

* See FYA PPLT Programming Detail on Sheet 2.

INPUT FILE POSITION LAYOUT

(front view)

| , | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|--------------------|-------------|------------------------|-------------|--------------------------------------|------------------|------------------------|------------------|------------------|------------------|------------------|------------------|--------------------------|--------------------------|------------|
| FILE U | Ø 1 1A | ø 2 2A | ø 2 2C | SLOT | S L O T | Ø 4 4A | S L O T | S L O T | S L O T | S L O T | S L O T | DC | Ø6 PED DC ISOLATOR | DC |
| "I" _ | NOT USED | ø 2 2B | NOT USED | EX₽⊢≻ | EMPTY | ø 4 4B | E M P T Y | EMPTY | EMPTY | EMPTY | EMPTY | Ø4 PED | Ø8PED DC ISOLATOR | ST DC |
| file U "J" L | SLOT EXPTY | ø 6 6A ø 6 6B | SLOT EXPTY | ₽ ► О П< З ПОПЗ | SLOT EXPTY | ø 8 8A ø 8 8B | SLOT EMPTY | SLOT EMPTY | SLOT EMPTY | SLOT EMPTY | SLOT EMPTY | CH. 3 UNUSED CH. 4 | CH. 1 | SLOT EXPTY |

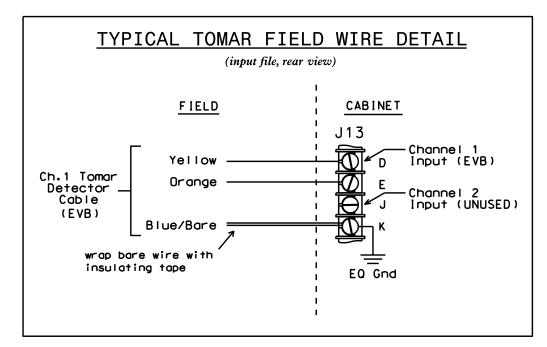
3. Ensure that Red Enable is active at all times during normal operation.

4. Ensure conflict monitor communicates with 2070.

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

FS = FLASH SENSE ST = STOP TIME EVx = EMERGENCY VEHICLE PREEMPT

> 4 CHANNEL TOMAR OSP CARD INSERT CARD INTO SLOT J13



INPUT FILE CONNECTION & PROGRAMMING CHART

| LOOP NO. | LOOP TERMINAL | INPUT FILE POS. | DETECTOR NO. | PIN NO. | ATTRIBU | TES | NEMA PHASE |
|---------------------|------------------|--------------------|-----------------|------------|---------|-----|---------------|
| 1.0 | TD2 1 2 | 7111 | 14 | 56 | 5 | 7 | 1 |
| 1A | TB2-1,2 | I1U | 10 | 56 | 5 | 7 | 6 |
| 2A | TB2-5,6 | I2U | 1 | 39 | 5 | 7 | 2 |
| 2B | TB2-7,8 | I2L | 5 | 43 | 5 | 7 | 2 |
| 2C | TB2-9,10 | I3U | 21 | 63 | 5 | 7 | 2 |
| 4A | TB4-9,10 | I6U | 3 | 41 | 5 | 7 | 4 |
| 4B | TB4-11,12 | I6L | 7 | 45 | 5 | 7 | 4 |
| 6A | TB3-5,6 | J2U | 2 | 40 | 5 | 7 | 6 |
| 6B | TB3-7,8 | J2L | 6 | 44 | 5 | 7 | 6 |
| 8A | TB5-9,10 | J6U | 4 | 42 | 5 | 7 | 8 |
| 8B | TB5-11,12 | J6L | 8 | 46 | 5 | 7 | 8 |
| PED PUSH BUTTONS | | | | | | | |
| P21 , P22 | TB8-4,6 | I12U | 25 | 67 | 2 | | 2 PED |
| P41 , P42 | TB8-5,6 | I12L | 27 | 69 | 2 | | 4 PED |
| P61 , P62 | TB8-7,9 | I13U | 26 | 68 | 2 | | 6 PED |
| P81 , P82 | TB8-8,9 | I13L | 28 | 70 | 2 | | 8 PED |

D IN INPUT FILE SLOTS D I12 AND I13. NOTE: PROGRAM DETECTOR DELAY AND CARRYOVER TIMES

DETECTOR ATTRIBUTES LEGEND: INPUT FILE POSITION LEGEND:

AS SPECIFIED ON SIGNAL DESIGN PLANS.

1-FULL TIME DELAY 2-PED CALL

3-RESERVED

4-COUNTING 5-EXTENSION

6-TYPE 3

7-CALLING 8-ALTERNATE

FILE J-SLOT 2-LOWER —

> THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-1026 DESIGNED: September 2014 SEALED: 04/02/2015 REVISED: N/A

NOTE:

INSTALL DC ISOLATORS

PROJECT REFERENCE NO. |Sig. 16.1 U-3308

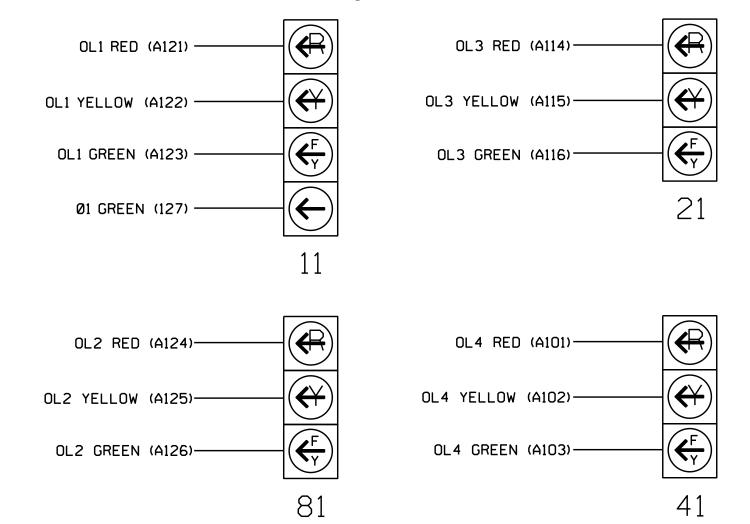
| | | | | SI | GNA | L | HEA | D F | 100 | K-l | JP | CHA | 4RT | ı | | | | |
|-----------------------------|-----|-------|-------------|----|-------|-------------|------------|-------|-------------|-----|-------|-------------|-----------|------------|-----------|-----------|-------------|-----------|
| LOAD SWITCH NO. | S1 | S2 | S 3 | S4 | S5 | S6 | S 7 | S8 | S 9 | 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 | OL1 | OL2 | SPARE | 0L3 | OL4 | SPARE |
| SIGNAL HEAD NO. | 11 | 22,23 | P21, P22 | NU | 42,43 | P41, P42 | NU | 61,62 | P61, P62 | NU | 82,83 | P81, P82 | 11 | 8 1 | NU | 21 | 41 ★ | NU |
| RED | | 128 | | | 101 | | | 134 | | | 107 | | | | | | | |
| YELLOW | * | 129 | | | 102 | | | 135 | | | 108 | | | | | | | |
| GREEN | | 130 | | | 103 | | | 136 | | | 109 | | | | | | | |
| RED ARROW | | | | | | | | | | | | | A121 | A124 | | A114 | A1Ø1 | |
| YELLOW ARROW | | | | | | | | | | | | | A122 | A125 | | A115 | A102 | |
| FLASHING YELLOW ARROW | | | | | | | | | | | | | A123 | A126 | | A116 | A103 | |
| GREEN ARROW | 127 | | | | | | | | | | | | | | | | | |
| ₩ | | | 113 | | | 104 | | | 119 | | | 110 | | | | | | |
| 於 | | | 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 below.

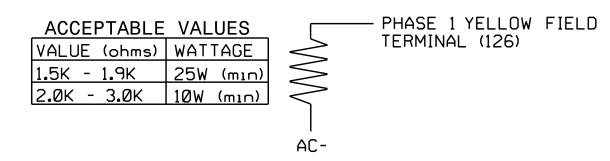
FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



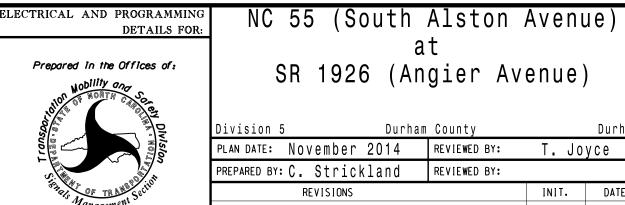
LOAD RESISTOR INSTALLATION DETAIL

(install resistor as shown below)



Electrical Detail - Sheet 1 of 2

750 N.Greenfield Pkwy,Garner,NC 27529



SEAL 022013

INIT. DATE SIG. INVENTORY NO. 05-1026

Program overlaps as follows: Main Menu - 4) OVERLAP

PRESS '+'

OVERLAP [2]:

LOADSWITCH = 10VEH SET 1 = 4+8 NOTE: FOR SIGNAL HEAD 81

NOTE: FOR SIGNAL HEAD 21

NOTE: FOR SIGNAL HEAD 41

YELLOW CLEARANCE = 4.1RED CLEARANCE = 2.9

PRESS '+'

OVERLAP [3]:

LOADSWITCH = 11

VEH SET 1 = 2+6

YELLOW CLEARANCE = 4.1RFD CLEARANCE = 2.4

PRESS '+'

OVERLAP [4]:

LOADSWITCH = 12

VEH SET 1 = 4+8

YELLOW CLEARANCE = 4.1RED CLEARANCE = 2.9

END OF OVERLAP PROGRAMMING

OVERLAP GREEN FLASH PROGRAMMING FOR 3 SECTION FYA

The following will cause the overlap green outputs to flash, which are wired to the flashing yellow arrow. Program as follows:

Main Menu - 1) PHASE - 2) PHASE FUNCTIONS PAGE TWO OLAP G FL = 2, 3, 4

FYA PPLT PROGRAMMING (SIGNAL HEAD 11)

- 1. Program Flashing Yellow Arrow phases as follows: Main Menu - 1) PHASE - 2) PHASE FUNCTIONS PAGE TWO PPITFYA = PHASF1
- 2. Assign output pin for Flashing Yellow Arrow as follows: Main Menu - 6) OUTPUTS - F) FYA PPLT Phase 1 = 99
- 3. Redirect RED and YELLOW outputs for the left turn phases as follows: Main Menu - 6) OUTPUTS - 8) REDIRECT PHASE

Phase 1 RED = 97, Phase 1 YELLOW = 98

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 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.

EMERGENCY VEHICLE PREEMPTION PROGRAMMING

- 1. Program EVB preempt as follows: Main Menu - 2) PREEMPT - 4) EMERGENCY VEHICLE EVB Clear = 2EVB Clearance Phases = 1.6
- 2. Program general preemption parameters as follows: Main Menu - 2) PREEMPT - 6) MISC PREEMPTION PARAMETERS Min Time Before PE ForceOff = 1
- 3. Ped Clear Before Preempt is a pedestrian timing parameter, and is programmed as follows: Main Menu - 1) PHASE - 5) PEDESTRIAN TIMING PHASE 2 MIN FDW = 5PHASE 4 MIN FDW = 9PHASE 6 MIN FDW = 4PHASE 8 MIN FDW = 8

Program extend time on optical detector units for 2.0 sec for EVB.

SPECIAL NOTES EV PREEMPT PROGRAMMING

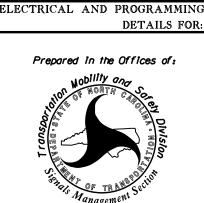
Setting 'FYA DURING PREEMPT' to 'Y' eliminates yellow trap when transitioning to preempt from adjacent through phase. Main Menu - 9) UTILITIES - 9) MISC FYA DURING PREEMPT (Y/N) = Y

MIN WALK DURING PREEMPTION PROGRAMMING

To disable MIN WALK pedestrian timing during preemption, program the controller as follows: Main Menu - 9) UTILITIES - 5) CONFIGURATION EXTRA TWO = 3

Electrical Detail - Sheet 2 of 2

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-1026 DESIGNED: September 2014 SEALED: 04/02/2015 REVISED: N/A



NC 55 (South Alston Avenue) SR 1926 (Angier Avenue)

Durham County PLAN DATE: November 2014 REVIEWED BY: T. Joyce

INIT. DATE

PROJECT REFERENCE NO.

U-3308

Sig. 16.2

PREPARED BY: C. Strickland REVIEWED BY:

REVISIONS

SIG. INVENTORY NO. 05-1026

SEAL