

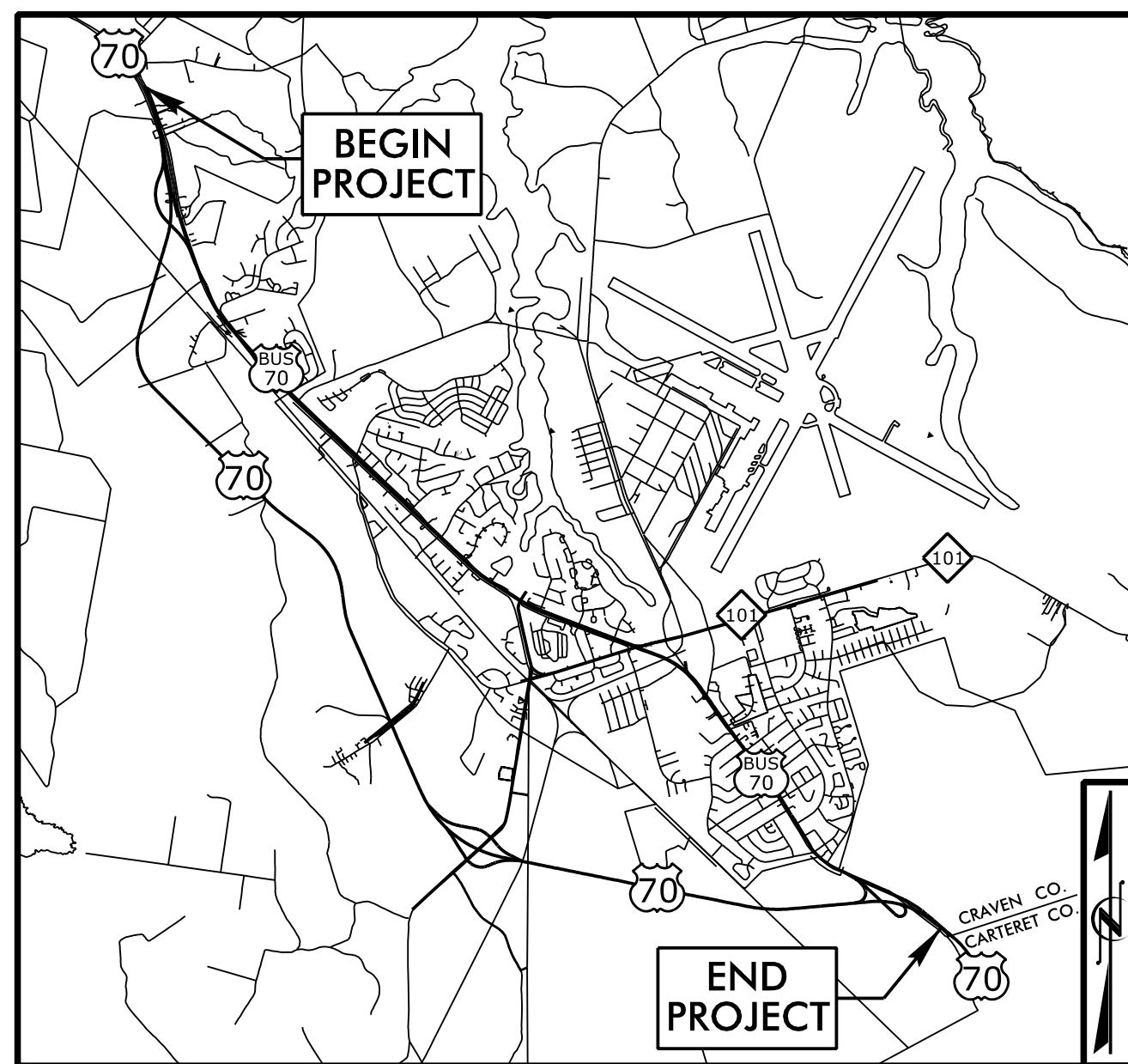
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Project: R-1015

Contract: C204177

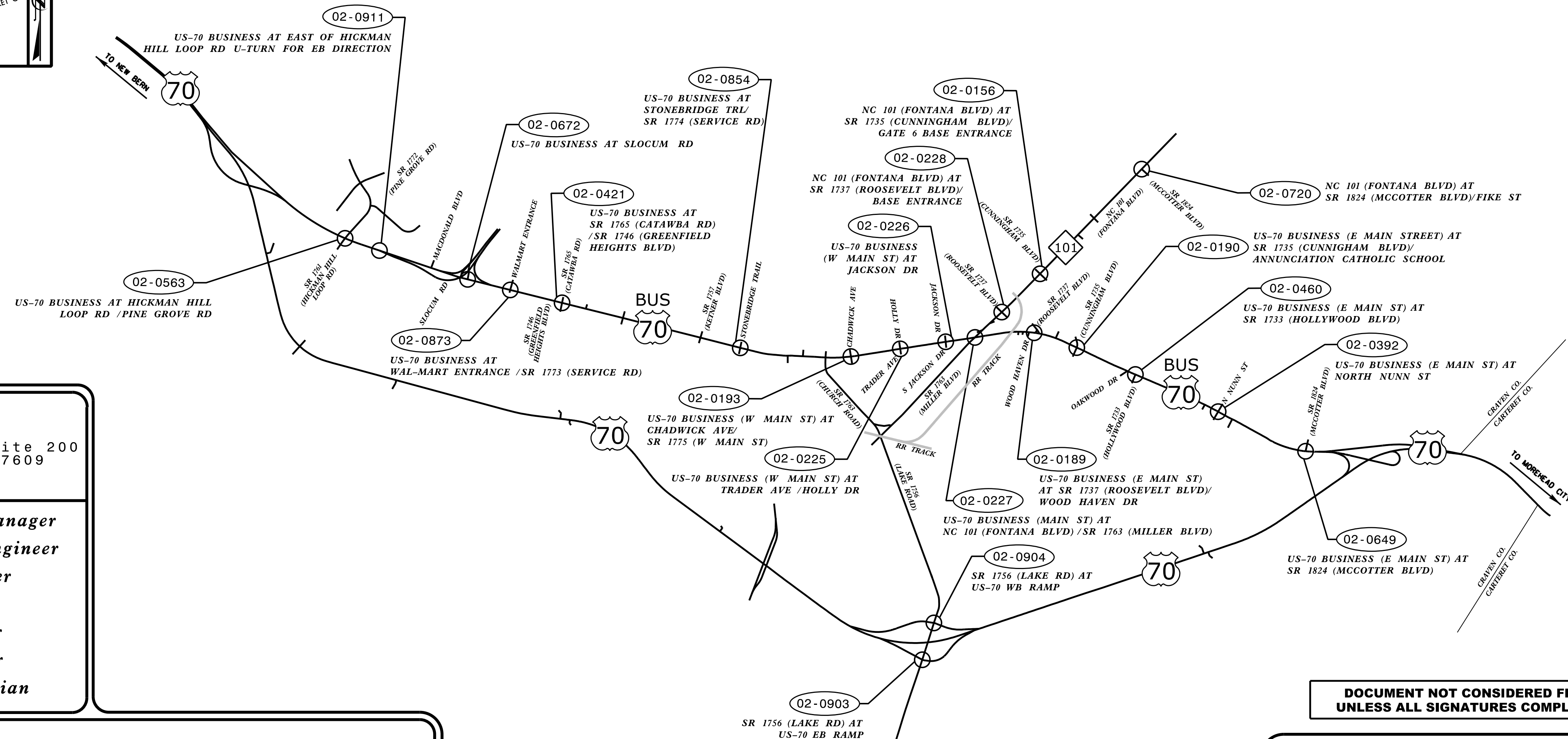


STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

CRAVEN AND CARTERET COUNTIES

**LOCATION: US 70 HAVELOCK BYPASS, NORTH OF SR 1772
(PINE GROVE RD)/SR 1761 (HICKMAN HILL LOOP RD)
TO NORTH OF COUNTY LINE**

**TYPE OF WORK: SIGNALS, CABLE ROUTING, CCTV CAMERAS &
DYNAMIC MESSAGE SIGN INSTALLATIONS**



HNTB HNTB NORTH CAROLINA, P.C.
343 E. Six Forks Road, Suite 200
Raleigh, North Carolina 27609
NC License No: C-1554
(919) 546-8997

- Natasha R. Simmons, PE, PTOE - Project Manager
- Andrew D. Klinksiek, PE, PTOE - Project Engineer
- Alex H. Thornburg, PE - Project Engineer
- John A. Wagner, PE - Design Engineer
- James T. Thibault, EI - Design Engineer
- Nicole K. Vlanich, EI - Design Engineer
- Tracey R. Terrell - Senior Design Technician

| Sheet # | Reference # | Index of Plans Location/Description |
|----------------|-------------|---|
| Sig. 1.0 | ----- | Title Sheet |
| Sig. 2.0-2.1 | 02-0873 | US-70 Business at Wal-Mart Entrance/SR 1773 (Service Road) |
| Sig. 3.0-3.1 | 02-0421 | US-70 Business at SR 1765 (Catawba Road)/SR 1746 (Greenfield Heights Boulevard) |
| Sig. 4.0-4.2 | 02-0854 | US-70 Business at Stonebridge Trail/SR 1774 (Service Road) |
| Sig. 5.0-5.1 | 02-0193 | US-70 Business (W Main Street) at Chadwick Avenue/SR 1775 (W Main Street) |
| Sig. 6.0-6.1 | 02-0225 | US-70 Business (W Main Street) at Trader Avenue/Holly Drive |
| Sig. 7.0-7.1 | 02-0226 | US-70 Business (W Main Street) at Jackson Drive |
| Sig. 8.0-8.1 | 02-0227 | US-70 Business (Main Street) at NC 101 (Fontana Boulevard)/SR 1763 (Miller Boulevard) |
| Sig. 9.0-9.1 | 02-0189 | US-70 Business (E Main Street) at SR 1737 (Roosevelt Boulevard)/Wood Haven Drive |
| Sig. 10.0-10.3 | 02-0190 | US-70 Business (E Main Street) at SR 1735 (Cunningham Boulevard)/Annunciation Catholic School |
| Sig. 11.0-11.1 | 02-0460 | US-70 Business (E Main Street) at SR 1733 (Hollywood Boulevard) |
| Sig. 12.0-12.1 | 02-0392 | US-70 Business (E Main Street) at North Nunn Street |
| Sig. 13.0-16.1 | 02-0649 | US-70 Business (E Main Street) at SR 1824 (McCotter Boulevard) |
| Sig. 17.0-17.2 | 02-0903 | SR 1756 (Lake Road) at US-70 EB Ramp |
| Sig. 18.0-18.2 | 02-0904 | SR 1756 (Lake Road) at US-70 WB Ramp |
| Sig. 19.0-19.1 | 02-0228 | NC 101 (Fontana Boulevard) at SR 1737 (Roosevelt Boulevard)/Base Entrance |
| Sig. 20.0-20.1 | 02-0156 | NC 101 (Fontana Boulevard) at SR 1735 (Cunningham Boulevard)/Gate 6 Base Entrance |
| Sig. 21.0-21.2 | 02-0720 | NC 101 (Fontana Boulevard) at SR 1824 (McCotter Boulevard)/Fike Street |
| Sig. 22.0 | ----- | Standard Drawing for Electrical Service Grounding and Wood Poles |
| Sig. 23.0 | ----- | Standard Drawing for Pedestals |
| Sig. M1-M8 | ----- | Standard Drawing for Metal Poles |
| SCP. 1-97 | ----- | Signal Communication Plans |

LEGEND

##-#### SIGNAL INVENTORY NUMBER

INTELLIGENT TRANSPORTATION AND SIGNALS UNIT

Contacts:

Meghan LeBlanc, PE - Eastern Region Signals Engineer
Todd Joyce, PE - Signal Equipment Design Engineer
Andrew Skuce - Signal Communications Project Engineer
Gregory Green - ITS Design Engineer

SEAL

DocuSigned by:
Natasha R. Simmons
12/7/2018

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

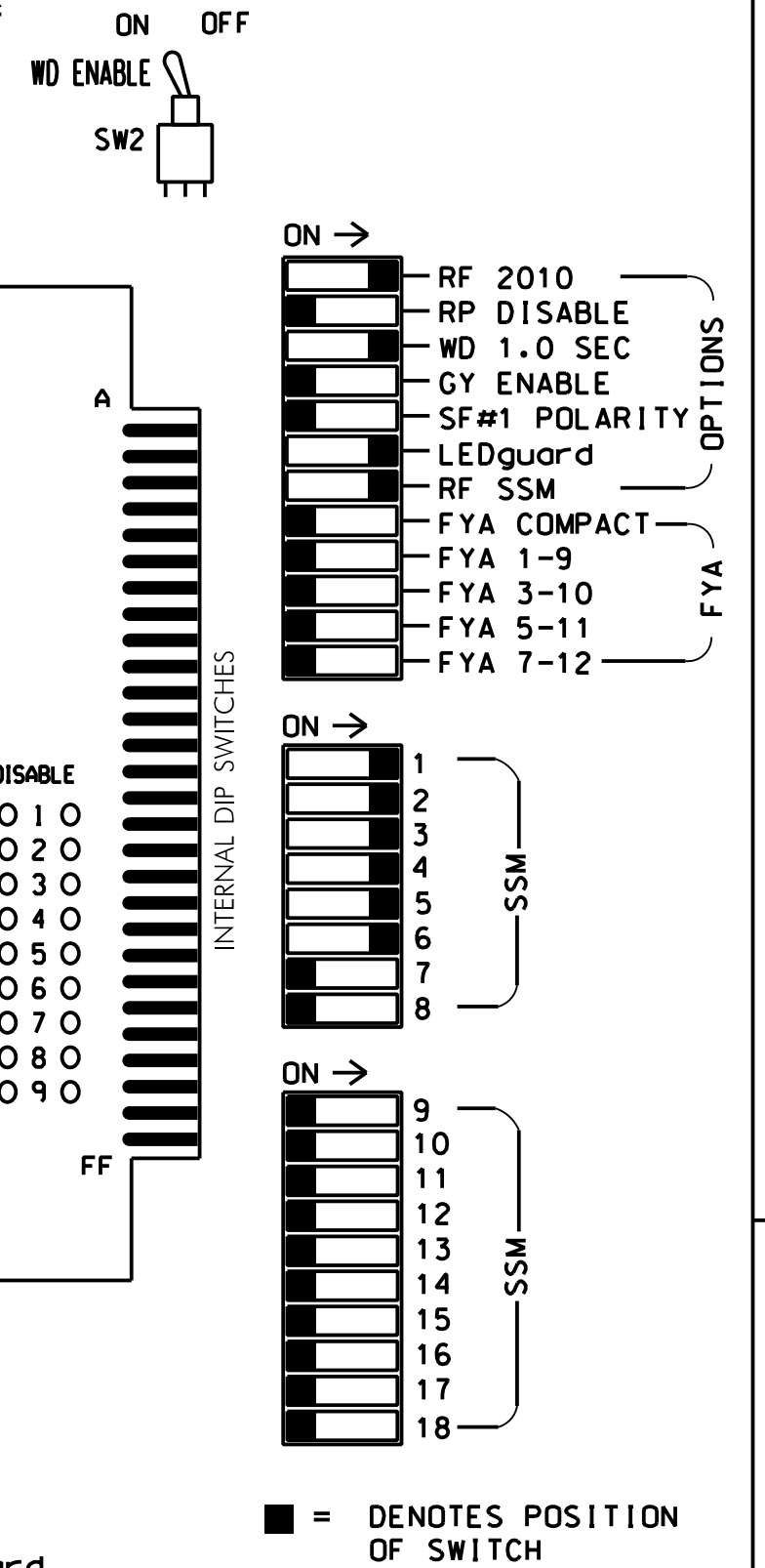
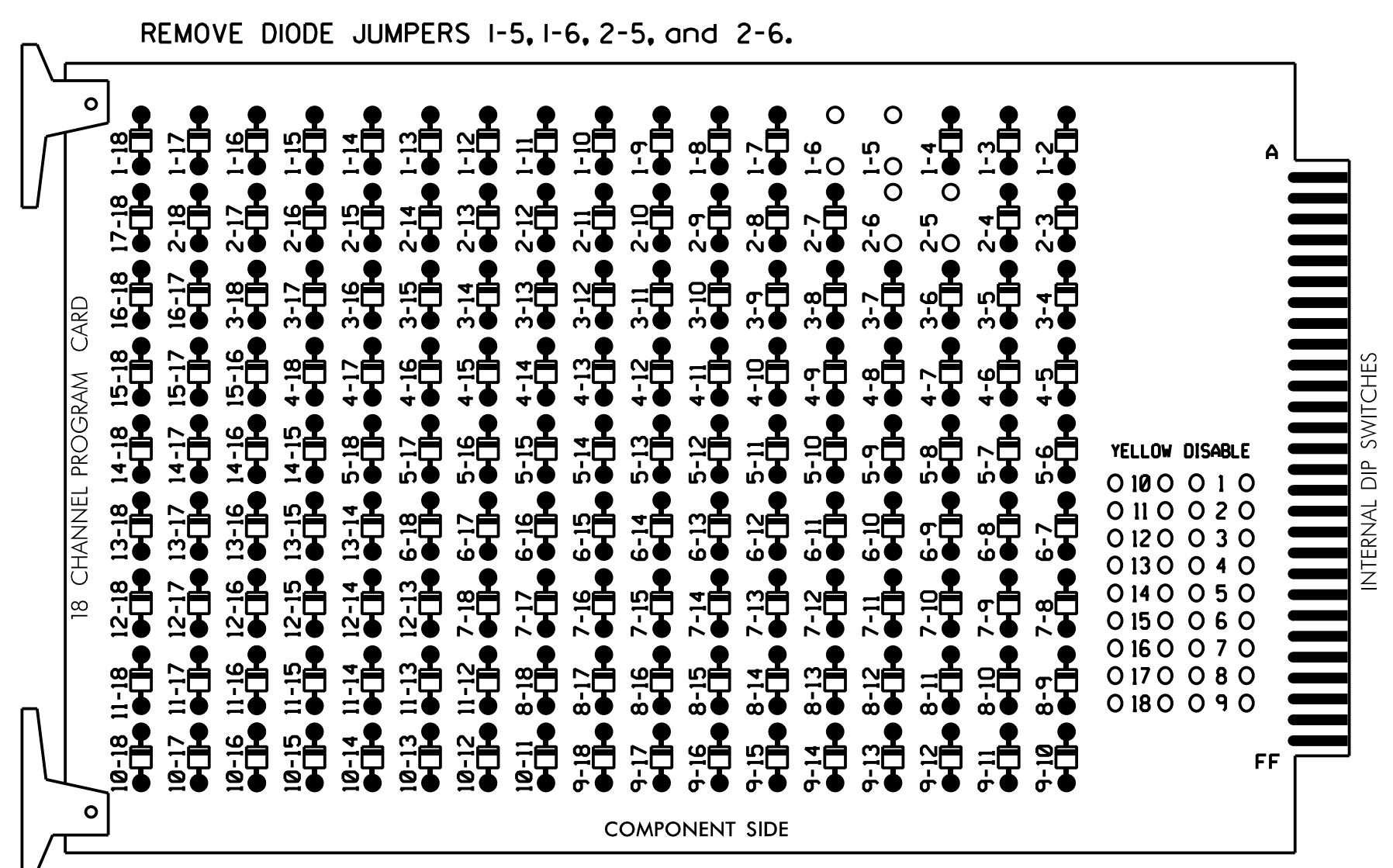
Refer to "Roadway Standard Drawings
NCDOT" dated January 2018 and
"Standard Specifications for Roads
and Structures" dated January 2018.

Prepared for the Office of:
DIVISION OF HIGHWAYS
TRANSPORTATION MOBILITY AND SAFETY
DIVISION

750 N. Greenfield Parkway, Garner, NC 27529

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



NOTES:

- Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
- Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
- Ensure that Red Enable is active at all times during normal operation.
- Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.

NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
- Enable Simultaneous Gap-Out for all Phases.
- Program phases 2 and 6 for Variable Initial and Gap Reduction.
- Program phases 2 and 6 for Startup In Green.
- Program phases 2 and 6 for Yellow Flash.
- The cabinet and controller are part of the Havelock US 70 Business Closed Loop Signal System.

SIGNAL HEAD HOOK-UP CHART

| LOAD SWITCH NO. | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 | AUX S1 | AUX S2 | AUX S3 | AUX S4 | AUX S5 | AUX S6 |
|-----------------|-----|-------|-------|-----|-----|-------|-----|-----|-------|-----|-----|-------|--------|--------|--------|--------|--------|--------|
| CMU CHANNEL NO. | 1 | 2 | 13 | 3 | 4 | 14 | 5 | 6 | 15 | 7 | 8 | 16 | 9 | 10 | 17 | 11 | 12 | 18 |
| PHASE | 1 | 2 | 2 PED | 3 | 4 | 4 PED | 5 | 6 | 6 PED | 7 | 8 | 8 PED | OLA | OLB | SPARE | OLC | OLD | SPARE |
| SIGNAL HEAD NO. | 11 | 21,22 | NU | 22 | 31 | 32 | 41 | 42 | 62 | NU | 42 | 51 | 61,62 | NU | NU | NU | NU | NU |
| RED | | 128 | | 116 | 116 | 101 | 101 | | | | | | 134 | | | | | |
| YELLOW | | 129 | | 117 | 117 | 102 | 102 | | | | | | 135 | | | | | |
| GREEN | | 130 | | 118 | 118 | 103 | 103 | | | | | | 136 | | | | | |
| RED ARROW | 125 | | | | | | | | | | | | 131 | | | | | |
| YELLOW ARROW | 126 | | | 117 | | | | 102 | | 132 | 132 | | | | | | | |
| GREEN ARROW | 127 | | | 118 | 118 | | | 103 | 103 | 133 | 133 | | | | | | | |

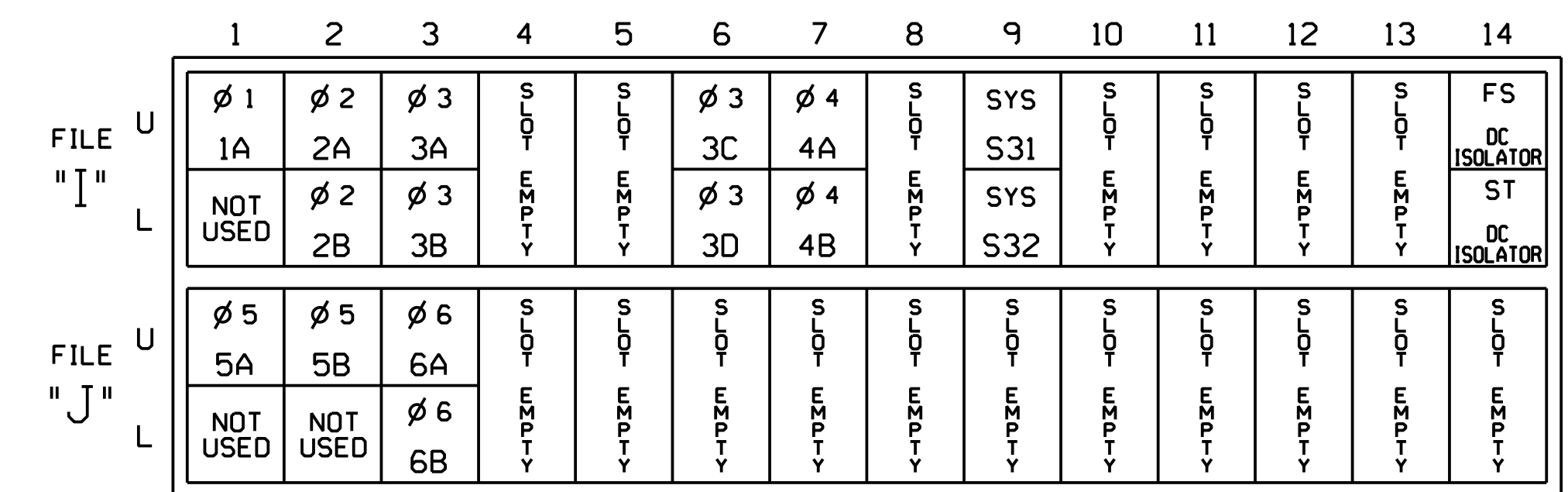
NU = Not Used

EQUIPMENT INFORMATION

CONTROLLER.....2070E
 CABINET.....332 W/AUX
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
 LOAD SWITCHES USED.....S1,S2,S4,S5,S7,S8
 PHASES USED.....1,2,3,4,5,6
 OVERLAPS.....NONE

INPUT FILE POSITION LAYOUT

(front view)



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

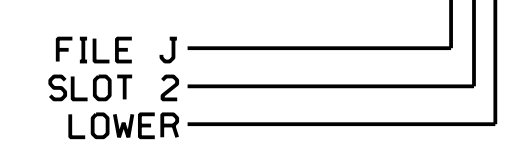
FS = FLASH SENSE
 ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

| LOOP NO. | LOOP TERMINAL | INPUT FILE POS. | PIN NO. | INPUT ASSIGNMENT NO. | DETECTOR NO. | NEMA PHASE | CALL | EXTEND | FULL TIME DELAY | STRETCH TIME | DELAY TIME |
|----------|---------------|-----------------|---------|----------------------|--------------|------------|------|--------|-----------------|--------------|------------|
| 1A | TB2-1,2 | I1U | 56 | 18 | 1 | 1 | Y | Y | | | |
| 2A | TB2-5,6 | I2U | 39 | 1 | 2 | 2 | Y | Y | | | |
| 2B | TB2-7,8 | I2L | 43 | 5 | 12 | 2 | Y | Y | | | |
| 3A | TB2-9,10 | I3U | 63 | 25 | 32 | 3 | Y | Y | | | |
| 3B | TB2-11,12 | I3L | 76 | 38 | 42 | 3 | Y | Y | | | 10 |
| 3C | TB4-9,10 | I6U | 41 | 3 | 4 | 3 | Y | Y | | 2.0 | |
| 3D | TB4-11,12 | I6L | 45 | 7 | 14 | 3 | Y | Y | | 1.0 | |
| 4A | TB6-1,2 | I7U | 65 | 27 | 34 | 4 | Y | Y | | | |
| 4B | TB6-3,4 | I7L | 78 | 40 | 44 | 4 | Y | Y | | | |
| * S31 | TB6-9,10 | I9U | 60 | 22 | 11 | SYS | | | | | |
| * S32 | TB6-11,12 | I9L | 62 | 24 | 13 | SYS | | | | | |
| 5A | TB3-1,2 | J1U | 55 | 17 | 5 | 5 | Y | Y | | | |
| 5B | TB3-5,6 | J2U | 40 | 2 | 6 | 5 | Y | Y | | | 15 |
| 6A | TB3-9,10 | J3U | 64 | 26 | 36 | 6 | Y | Y | | | |
| 6B | TB3-11,12 | J3L | 77 | 39 | 46 | 6 | Y | Y | | | |

* System detector only. Remove the vehicle phase assigned to this detector in the default programming.

INPUT FILE POSITION LEGEND: J2L



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 02-0873
 DESIGNED: March 2018
 SEALED: 12-7-18
 REVISED: N/A

Electrical Detail Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Prepared for:

US 70 Business at Wal-Mart Entrance/SR 1773 (Service Road)

| Division 02 | Craven Co. | Havelock |
|-----------------------------|-----------------------------|----------|
| PLAN DATE: March 2018 | REVIEWED BY: A.D. Klinksiek | |
| PREPARED BY: A.H. Thornburg | REVIEWED BY: N.B. Simmons | |
| REVISIONS | INIT. | DATE |
| | | |

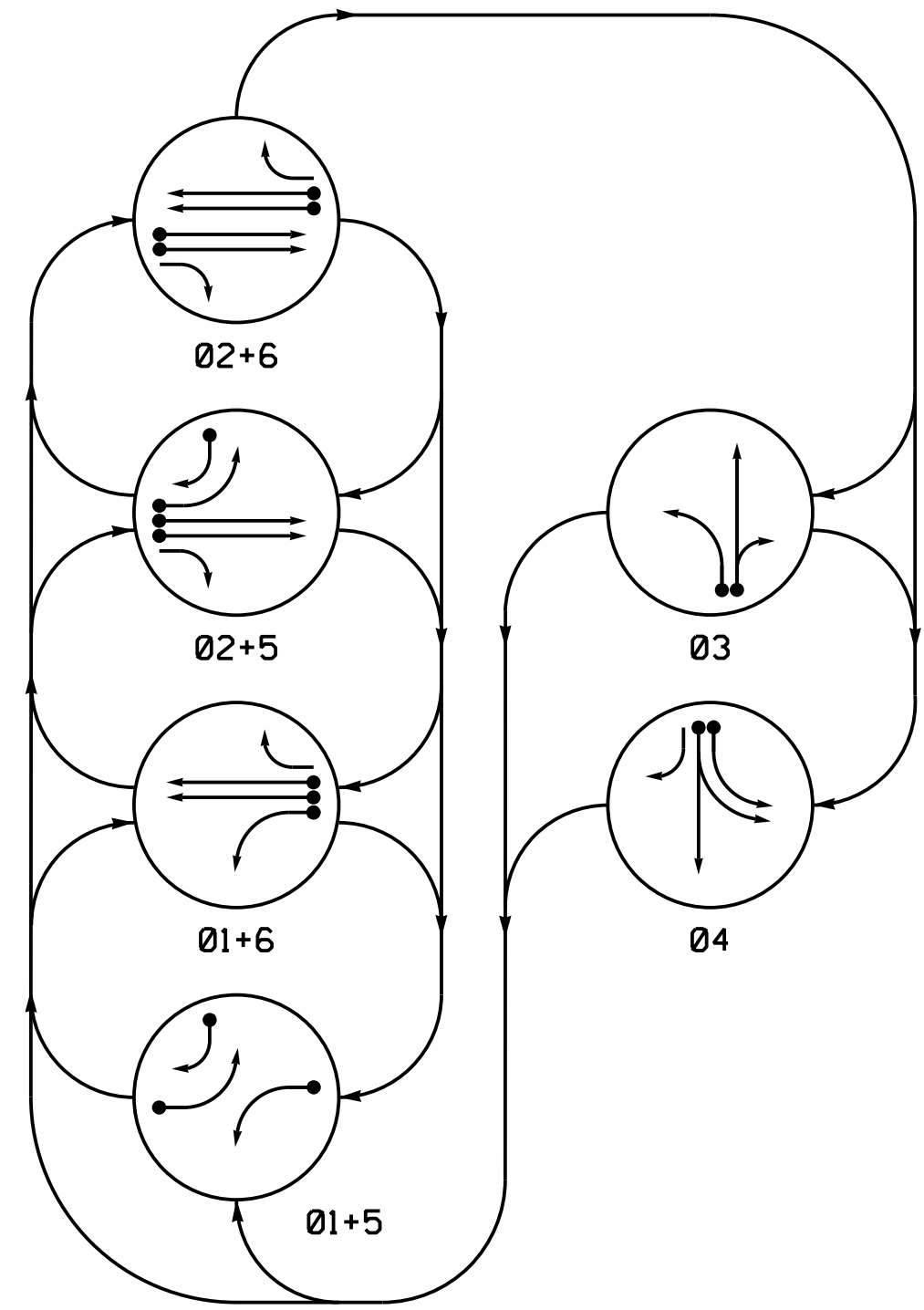
SEAL

 DocuSigned by:
 12/7/2018
 SIG. INVENTORY NO. 02-0873

HNTB HNTB NORTH CAROLINA, P.C.
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750 N. Greenfield Pkwy, Corner, NC 27529

PHASING DIAGRAM



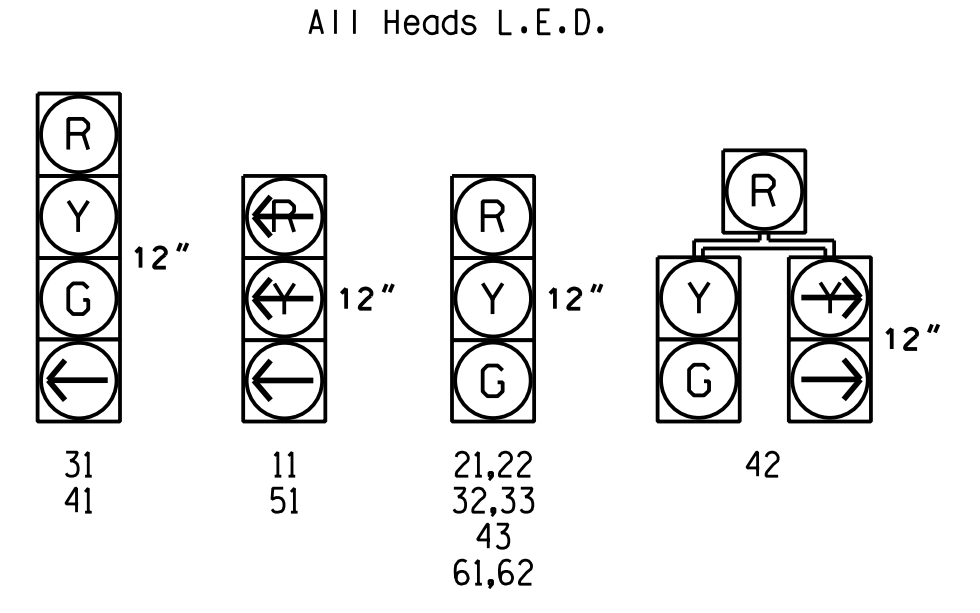
PHASING DIAGRAM DETECTION LEGEND

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

TABLE OF OPERATION

| SIGNAL FACE | PHASE | | | | | |
|-------------|-------|------|------|------|-----|-----|
| | 01+5 | 01+6 | 02+5 | 02+6 | 03 | 04 |
| 11 | --- | --- | --- | --- | --- | --- |
| 21,22 | R | R | G | G | R | Y |
| 31 | R | R | R | R | G | R |
| 32,33 | R | R | R | R | G | R |
| 41 | R | R | R | R | G | R |
| 42 | R | R | R | R | G | R |
| 43 | R | R | R | R | G | R |
| 51 | --- | --- | --- | --- | --- | --- |
| 61,62 | R | G | R | G | R | Y |

SIGNAL FACE I.D.



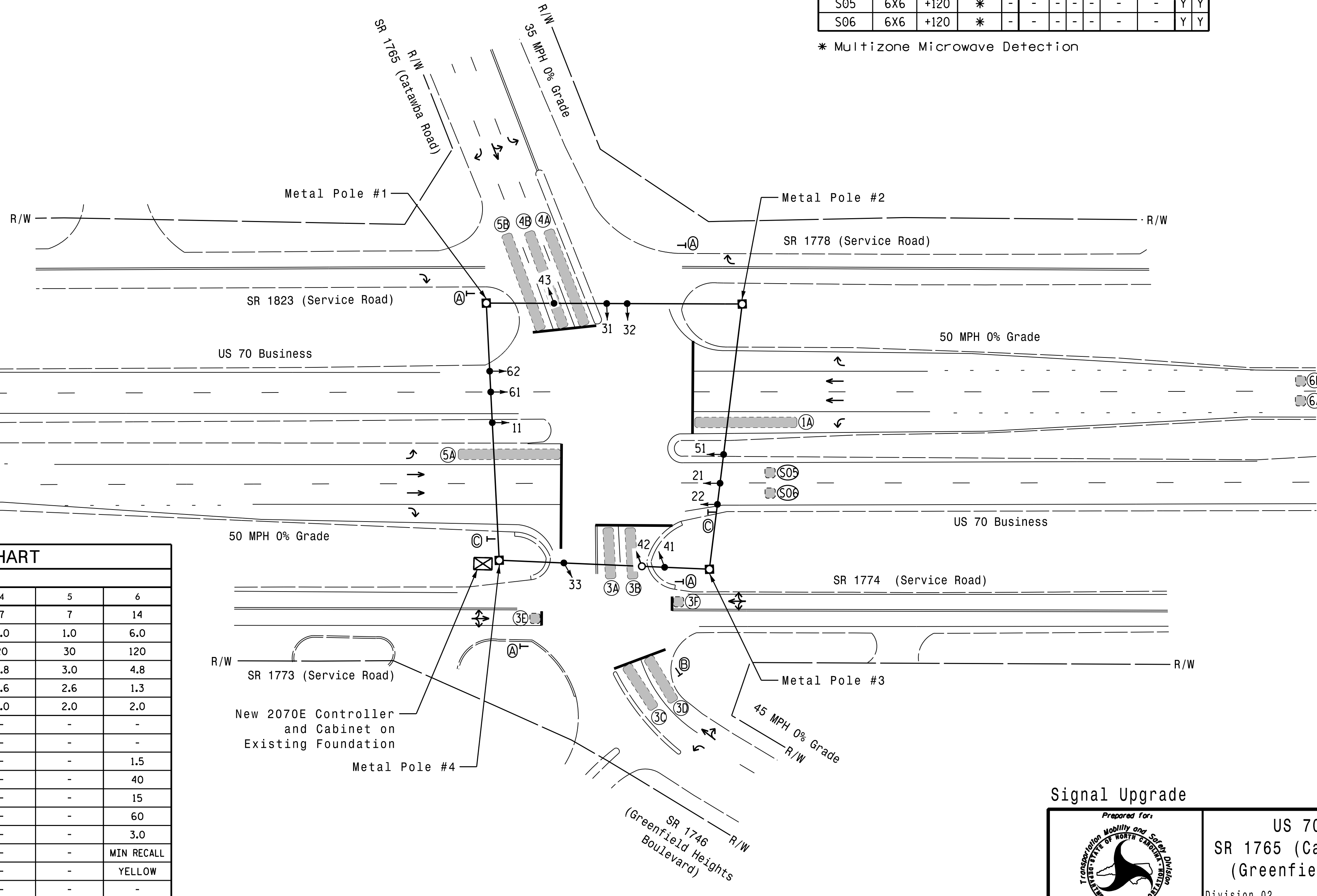
OASIS 2070 LOOP & DETECTOR INSTALLATION CHART

| LOOP | SIZE (FT) | DISTANCE FROM STOPBAR (FT) | TURNS | NEW LOOP | DETECTOR PROGRAMMING | | | | | SYSTEM LOOP | NEW CARD |
|------|-----------|----------------------------|-------|----------|----------------------|---------|-----------|-----------------|--------------|-------------|----------|
| | | | | | PHASE | CALLING | EXTENSION | FULL TIME DELAY | STRETCH TIME | | |
| 1A | 6X60 | 0 | * | - | 1 | Y | Y | - | - | - | Y |
| 2A | 6X6 | 355 | * | - | 2 | Y | Y | - | - | - | Y |
| 2B | 6X6 | 355 | * | - | 2 | Y | Y | - | - | - | Y |
| 3A | 6X30 | 0 | * | - | 3 | Y | Y | - | - | - | Y |
| 3B | 6X30 | 0 | * | - | 3 | Y | Y | - | - | 10 | Y |
| 3C | 6X30 | 0 | * | - | 3 | Y | Y | - | 2.0 | 10 | Y |
| 3D | 6X30 | 0 | * | - | 3 | Y | Y | - | 2.0 | 10 | Y |
| 3E | 6X6 | 0 | * | - | 3 | Y | Y | - | 2.0 | 15 | Y |
| 3F | 6X6 | 0 | * | - | 3 | Y | Y | - | 2.0 | 15 | Y |
| 4A | 6X60 | 0 | * | - | 4 | Y | Y | - | - | - | Y |
| 4B | 6X60 | 0 | * | - | 4 | Y | Y | - | - | - | Y |
| 5A | 6X60 | 0 | * | - | 5 | Y | Y | - | - | - | Y |
| 5B | 6X60 | 0 | * | - | 5 | Y | Y | - | - | 15 | Y |
| 6A | 6X6 | 355 | * | - | 6 | Y | Y | - | - | - | Y |
| 6B | 6X6 | 355 | * | - | 6 | Y | Y | - | - | - | Y |
| S05 | 6X6 | +120 | * | - | - | - | - | - | - | - | Y |
| S06 | 6X6 | +120 | * | - | - | - | - | - | - | - | Y |

* Multizone Microwave Detection

6 Phase Fully Actuated
Havelock US 70 Business CLS
NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 and/or 5 may be lagged.
4. The order of phase 3 and phase 4 may be reversed.
5. Reposition existing signal head numbered 41.
6. Set all detector units to presence mode.
7. The cabinet should be designed to include Auxiliary Output file for future use.
8. Incorporate Microwave Detection system for vehicle detection.
9. Provide the Engineer with the Manufacturer's approved Microwave Detection locations and mounting heights to obtain detection zones as shown.
10. Pavement markings are existing.
11. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
12. Closed loop system data: Controller Asset #0421



OASIS 2070 TIMING CHART

| FEATURE | PHASE | | | | | |
|------------------------|-------|------------|-----|-----|-----|------------|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| Min Green 1* | 7 | 14 | 7 | 7 | 7 | 14 |
| Extension 1* | 1.0 | 6.0 | 2.0 | 2.0 | 1.0 | 6.0 |
| Max Green 1* | 15 | 120 | 25 | 20 | 30 | 120 |
| Yellow Clearance | 3.0 | 4.8 | 4.5 | 3.8 | 3.0 | 4.8 |
| Red Clearance | 3.1 | 1.0 | 1.6 | 2.6 | 2.6 | 1.3 |
| Red Revert | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| Walk 1* | - | - | - | - | - | - |
| Don't Walk 1 | - | - | - | - | - | - |
| Seconds Per Actuation* | - | 1.5 | - | - | - | 1.5 |
| Max Variable Initial* | - | 40 | - | - | - | 40 |
| Time Before Reduction* | - | 15 | - | - | - | 15 |
| Time To Reduce* | - | 60 | - | - | - | 60 |
| Minimum Gap | - | 3.0 | - | - | - | 3.0 |
| Recall Mode | - | MIN RECALL | - | - | - | MIN RECALL |
| Vehicle Call Memory | - | YELLOW | - | - | - | YELLOW |
| Dual Entry | - | - | - | - | - | - |
| Simultaneous Gap | ON | ON | ON | ON | ON | ON |

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

LEGEND

| PROPOSED | EXISTING |
|--|--|
| ○→ Traffic Signal Head | ●→ N/A |
| ○→ Modified Signal Head | ○→ N/A |
| ⊥ Sign | ⊥ Sign |
| ⊥ Pedestrian Signal Head With Push Button & Sign | ⊥ Sign |
| ⊥ Signal Pole with Guy | ⊥ Sign |
| ⊥ Signal Pole with Sidewalk Guy | ⊥ Sign |
| ⊥ Inductive Loop Detector | ⊥ Sign |
| ⊥ Controller & Cabinet | ⊥ Sign |
| ⊥ Junction Box | ⊥ Sign |
| ⊥ 2-in Underground Conduit | ⊥ Sign |
| N/A Right of Way | → Directional Arrow |
| → Directional Arrow | → Directional Arrow |
| ▬ Microwave Detection Zone | ▬ Microwave Detection Zone |
| ⊠ Metal Strain Pole | ⊠ Metal Strain Pole |
| ⊠ "STOP" Sign (R1-1) | ⊠ "STOP" Sign (R1-1) |
| ⊠ "DO NOT BLOCK INTERSECTION" Sign (R10-7) | ⊠ "DO NOT BLOCK INTERSECTION" Sign (R10-7) |
| ⊠ "NO TURN ON RED" Sign (R10-11) w/ "730-830, 230-330 M-F" Panel | ⊠ "NO TURN ON RED" Sign (R10-11) w/ "730-830, 230-330 M-F" Panel |

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Signal Upgrade

HNTB NORTH CAROLINA, P.C.
343 E. Six Forks Road, Suite 200
Raleigh, North Carolina 27609
NC License No: C-1554
(919) 546-8997

US 70 Business at SR 1765 (Catawba Rd.)/SR 1746 (Greenfield Heights Blvd.)

Division 02 Craven Co. Havelock
 PLAN DATE: March 2018 REVIEWED BY: A.D. Klinksiek
 PREPARED BY: A.H. Thornburg REVIEWED BY: N.R. Simmons

SEAL

 SEAL
 NATASHA R. SIMMONS
 ENGINEER

Scale: 1" = 40'

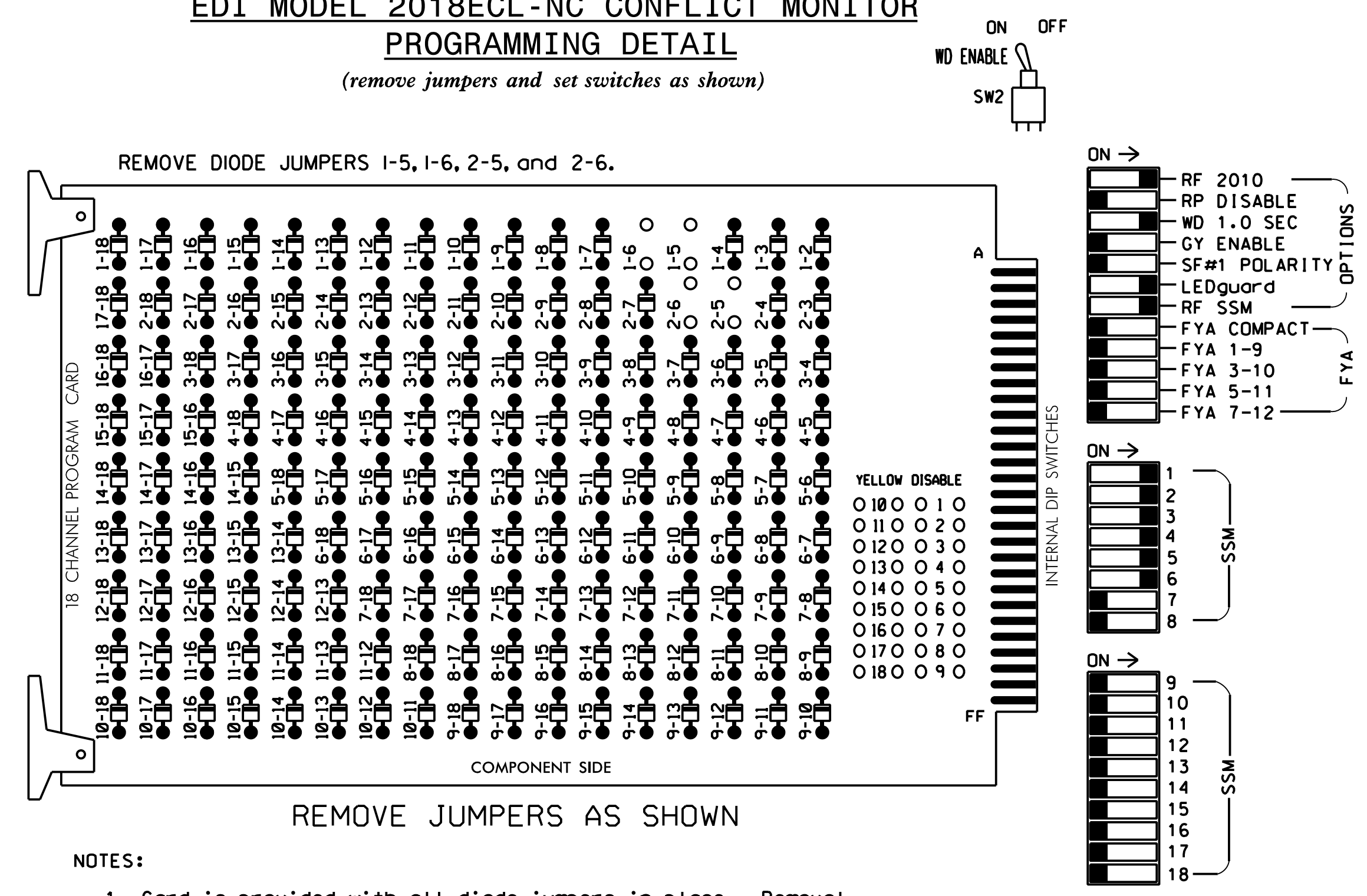
Revisions: _____

DocuSigned by: 12/7/2018

SIG. INVENTORY NO. 02-0421

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



NOTES:

- Card is provided with all diode jumpers in place. Removal of any jumper allows its channel to run concurrently.
- Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
- Ensure that Red Enable is active at all times during normal operation.
- Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.

NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
- Enable Simultaneous Gap-Out for all Phases.
- Program phases 2 and 6 for Variable Initial and Gap Reduction.
- Program phases 2 and 6 for Startup In Green.
- Program phases 2 and 6 for Yellow Flash.
- The cabinet and controller are part of the Havelock US 70 Business Closed Loop Signal System.

SIGNAL HEAD HOOK-UP CHART

| LOAD SWITCH NO. | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 | AUX S1 | AUX S2 | AUX S3 | AUX S4 | AUX S5 | AUX S6 |
|-----------------|-----|-------|-------|-----|-------|-------|-------|----|-------|-----|-------|-------|--------|--------|--------|--------|--------|--------|
| CMU CHANNEL NO. | 1 | 2 | 13 | 3 | 4 | 14 | 5 | 6 | 15 | 7 | 8 | 16 | 9 | 10 | 17 | 11 | 12 | 18 |
| PHASE | 1 | 2 | 2 PED | 3 | 4 | 4 PED | 5 | 6 | 6 PED | 7 | 8 | 8 PED | OLA | OLB | SPARE | OLC | OLD | SPARE |
| SIGNAL HEAD NO. | 11 | 21,22 | NU | 31 | 32,33 | 41 | 42,43 | NU | 42 | 51 | 61,62 | NU | NU | NU | NU | NU | NU | NU |
| RED | | 128 | | 116 | 116 | 101 | 101 | | | | 134 | | | | | | | |
| YELLOW | | 129 | | 117 | 117 | 102 | 102 | | | | 135 | | | | | | | |
| GREEN | | 130 | | 118 | 118 | 103 | 103 | | | | 136 | | | | | | | |
| RED ARROW | 125 | | | | | | | | | | 131 | | | | | | | |
| YELLOW ARROW | 126 | | | | | | | | | | 132 | 132 | | | | | | |
| GREEN ARROW | 127 | | | 118 | 103 | | | | | 133 | 133 | | | | | | | |

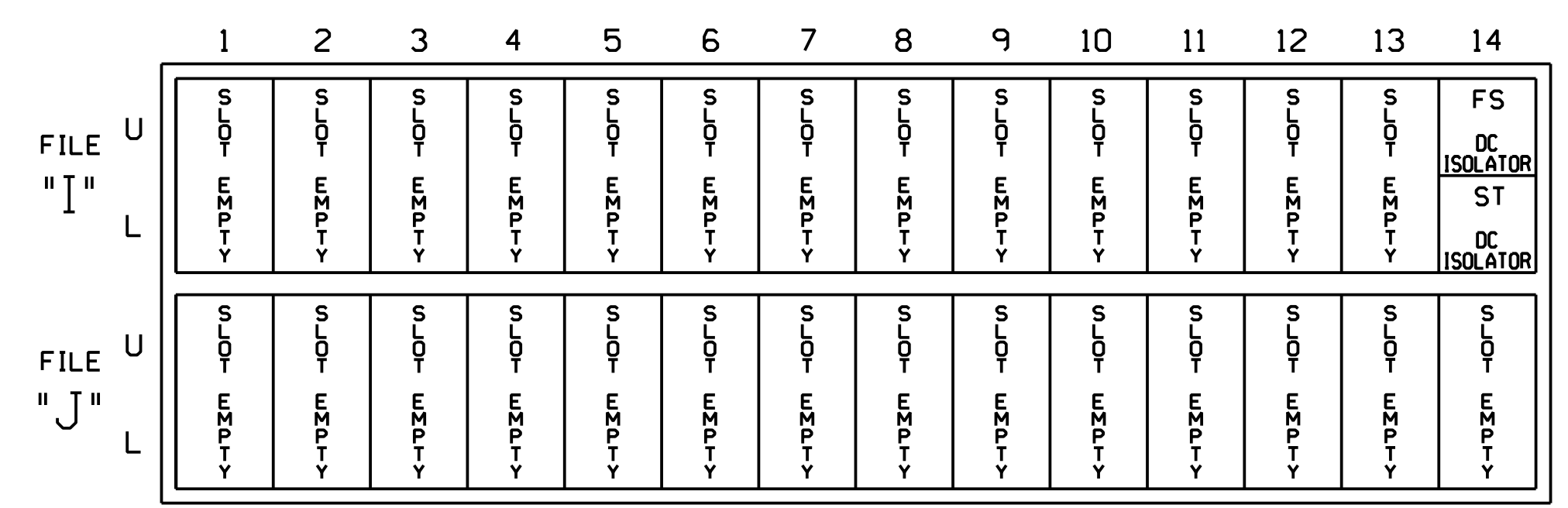
NU = Not Used

EQUIPMENT INFORMATION

CONTROLLER.....2070E
 CABINET.....332 W/AUX
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
 LOAD SWITCHES USED.....S1,S2,S4,S5,S7,S8
 PHASES USED.....1,2,3,4,5,6
 OVERLAPS.....NONE

INPUT FILE POSITION LAYOUT

(front view)



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

FS = FLASH SENSE
 ST = STOP TIME

SPECIAL DETECTOR NOTE

Install a microwave 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: 02-0421
 DESIGNED: March 2018
 SEALED: 12-7-18
 REVISED: N/A

Electrical Detail
 Signal Upgrade

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

Prepared for:

US 70 Business at
 SR 1765 (Catawba Rd.)/SR 1746
 (Greenfield Heights Blvd.)
 Division 02 Craven Co. Havelock
 PLAN DATE: March 2018 REVIEWED BY: A.D. Klinksiek
 PREPARED BY: A.H. Thornburg REVIEWED BY: N.R. Simmons

SEAL

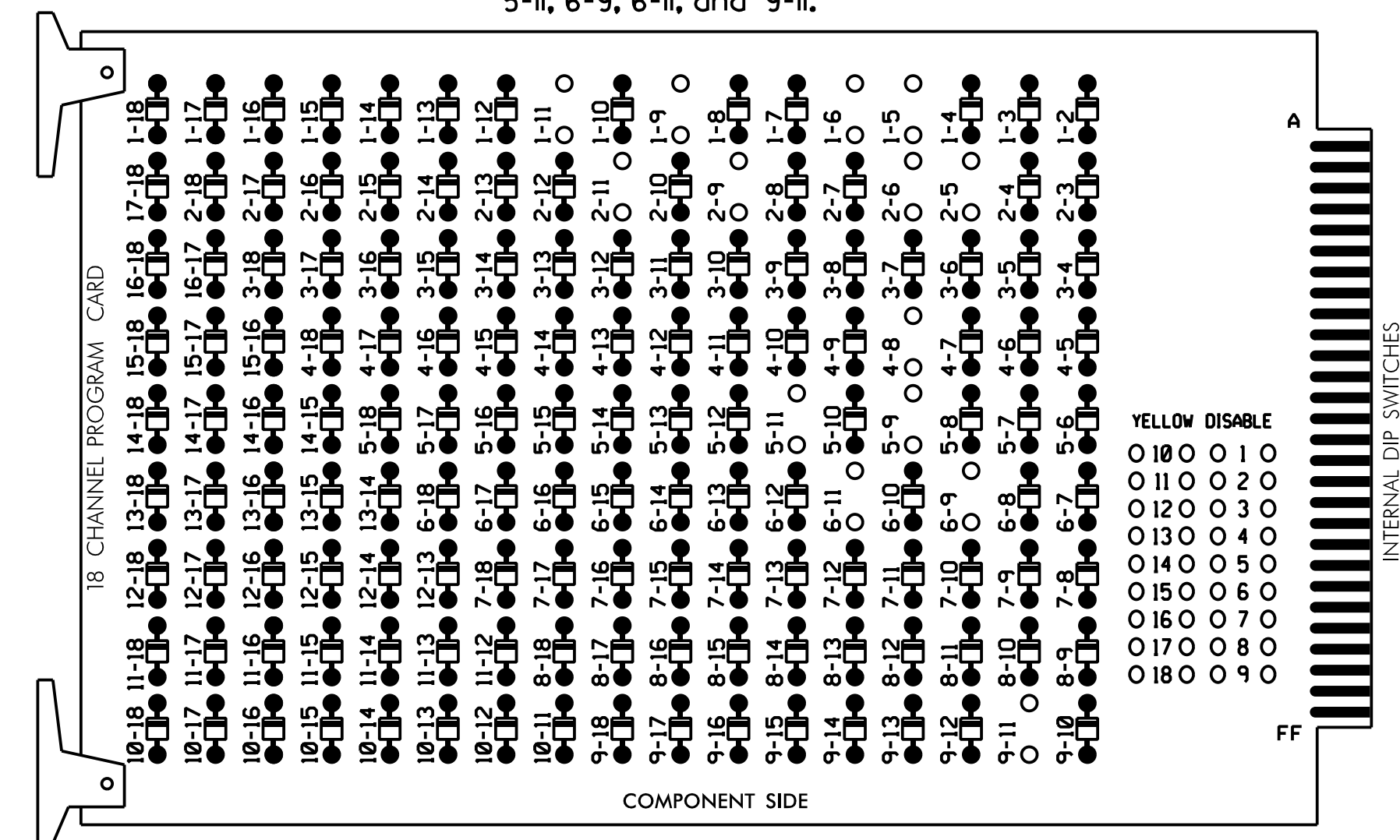
HNTB
 HNTB NORTH CAROLINA, P.C.
 343 E. Six Forks Road, Suite 200
 Raleigh, North Carolina 27609
 NC License No: C-1554
 (919) 546-8997

750 N. Greenfield Pkwy, Corner, NC 27529
 REVISIONS: INITI. DATE
 DocuSigned by: Natasha R. Simmons 12/7/2018
 SIGNATURE DATE
 SIG. INVENTORY NO. 02-0421

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

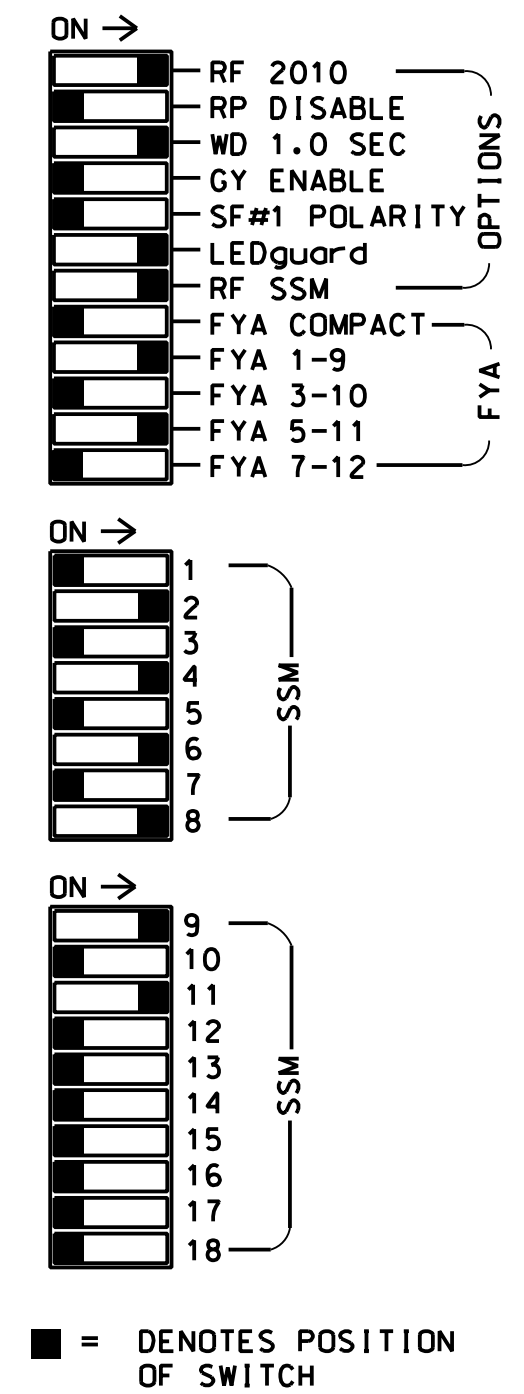
REMOVE DIODE JUMPERS 1-5, 1-6, 1-9, 1-11, 2-5, 2-6, 2-9, 2-11, 4-8, 5-9, 5-11, 6-9, 6-11, and 9-11.



REMOVE JUMPERS AS SHOWN

NOTES:

- Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
- Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
- Ensure that Red Enable is active at all times during normal operation.
- Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.



NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
- Program phases 4 and 8 for Dual Entry.
- Enable Simultaneous Gap-Out for all Phases.
- Program phases 2 and 6 for Variable Initial and Gap Reduction.
- Program phases 2 and 6 for Startup In Green.
- Program phases 2 and 6 for Yellow Flash, and overlap 1 as Wag Overlaps.
- The cabinet and controller are part of the Havelock US 70 Business Closed Loop Signal System.

EQUIPMENT INFORMATION

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

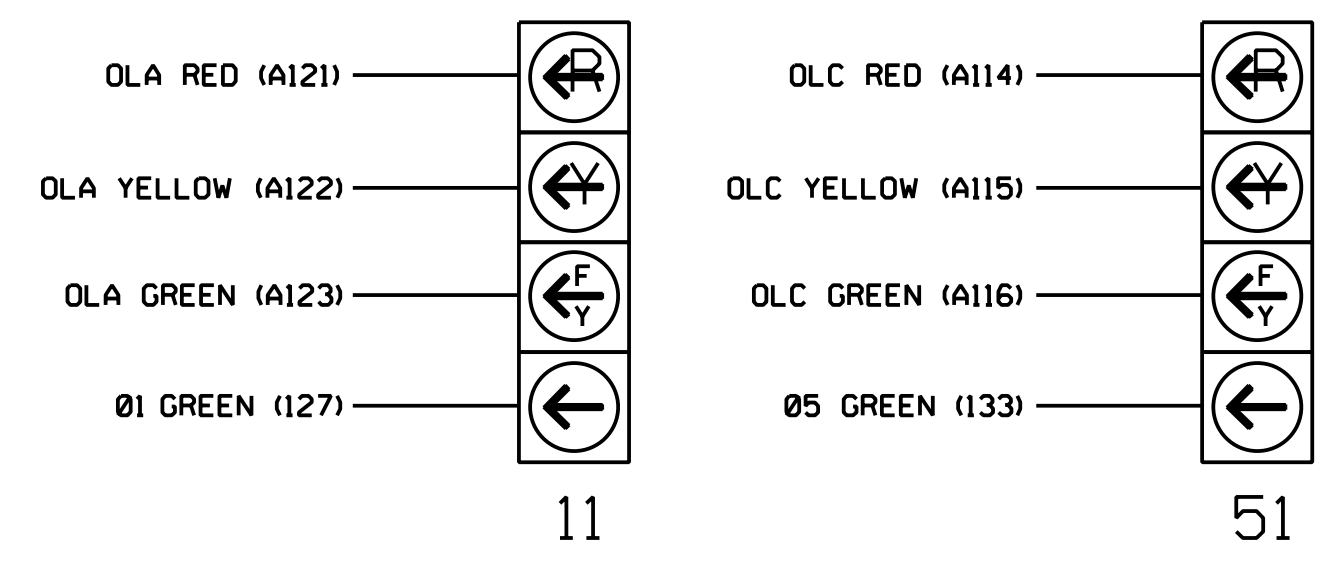
SIGNAL HEAD HOOK-UP CHART

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

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

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)

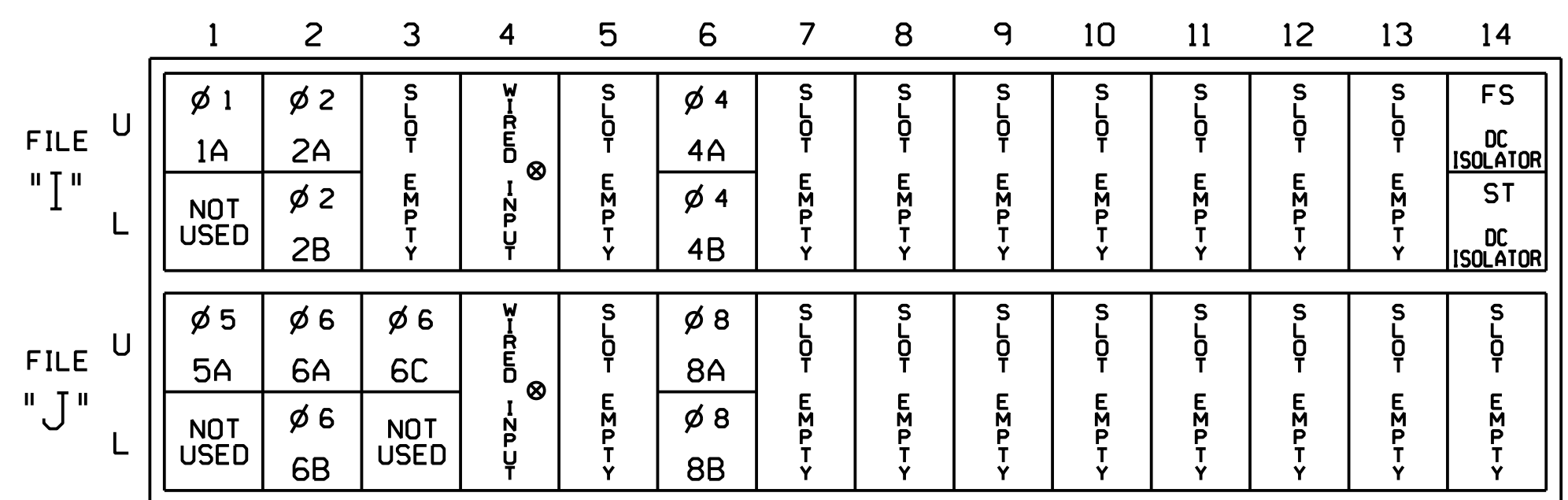


NOTE

The sequence display for signal heads 11 and 51 requires special logic programming. See sheet 2 for programming instructions.

INPUT FILE POSITION LAYOUT

(front view)



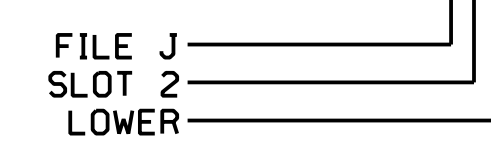
EX.: 1A, 2A, ETC. = LOOP NO.'S
 FS = FLASH SENSE
 ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

| LOOP NO. | LOOP TERMINAL | INPUT FILE POS. | PIN NO. | INPUT ASSIGNMENT NO. | DETECTOR NO. | NEMA PHASE | CALL | EXTEND | FULL TIME DELAY | STRETCH TIME | DELAY TIME |
|-----------------|---------------|-----------------|---------|----------------------|--------------|------------|------|--------|-----------------|--------------|------------|
| 1A ¹ | TB2-1,2 | J1U | 56 | 18 | 1 | 1 | Y | Y | | | 15 |
| | - | J4U | 48 | 10 | 26 | 6 | Y | Y | Y | | 3 |
| 2A | TB2-5,6 | J2U | 39 | 1 | 2 | 2 | Y | Y | | | |
| 2B | TB2-7,8 | J2L | 43 | 5 | 12 | 2 | Y | Y | | | |
| 4A | TB4-9,10 | J6U | 41 | 3 | 4 | 4 | Y | Y | | | 3 |
| 4B | TB4-11,12 | J6L | 45 | 7 | 14 | 4 | Y | Y | | | 10 |
| 5A ² | TB3-1,2 | J1U | 55 | 17 | 5 | 5 | Y | Y | | | 15 |
| | - | J4U | 47 | 9 | 22 | 2 | Y | Y | Y | | 3 |
| 6A | TB3-5,6 | J2U | 40 | 2 | 6 | 6 | Y | Y | | | |
| 6B | TB3-7,8 | J2L | 44 | 6 | 16 | 6 | Y | Y | | | |
| 6C | TB3-9,10 | J3U | 64 | 26 | 36 | 6 | Y | Y | | | |
| 8A | TB5-9,10 | J6U | 42 | 4 | 8 | 8 | Y | Y | | | 3 |
| 8B | TB5-11,12 | J6L | 46 | 8 | 18 | 8 | Y | Y | | | 10 |

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

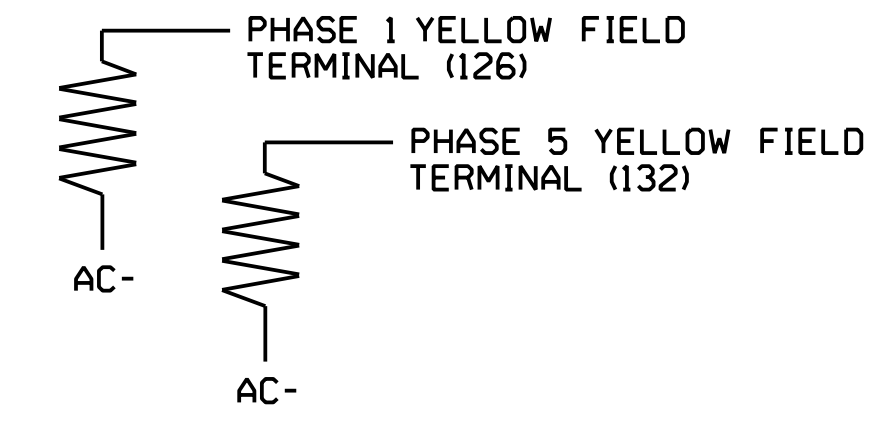
INPUT FILE POSITION LEGEND: J2L



LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown below)

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



Electrical Detail - Sheet 1 of 2
 Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

US 70 Business at Stonebridge Trail / SR 1774 (Service Road)

Division 02 Craven Co. Havelock

PLAN DATE: March 2018 REVIEWED BY: A.D. Klinksiek

PREPARED BY: A.H. Thornburg REVIEWED BY: N.R. Simmons

REVISIONS: INIT. DATE

DocuSigned by: *12/7/2018*
 Natasha R. Simmons
 SEAL INVENTORY NO. 02-0854

SEAL NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 031464 NATASHA R. SIMMONS

HNTB HNTB NORTH CAROLINA, P.C. 343 E. Six Forks Road, Suite 200 Raleigh, North Carolina 27609 NC License No: C-1554 (919) 546-8997

750 N. Greenfield Pkwy, Corner, NC 27529

LOGICAL I/O PROCESSOR PROGRAMMING DETAIL TO PRODUCE SPECIAL FYA-PPLT SIGNAL SEQUENCE

(program controller as shown below)

1. FROM MAIN MENU PRESS '2' (PHASE CONTROL), THEN '1' (PHASE CONTROL FUNCTIONS). SCROLL TO THE BOTTOM OF THE MENU AND ENABLE ACT LOGIC COMMANDS 1, 2, 3, 4, 5, and 6.
2. FROM MAIN MENU PRESS '6' (OUTPUTS), THEN '3' (LOGICAL I/O PROCESSOR).

```

LOGICAL I/O COMMAND #1 (+/-COMMAND#)
IF ACTIVE PHASE #1 IS ON
AND RED CLEAR ON PHASE #1 IS ON

      ↓
      SCROLL DOWN

THEN:
SET OUTPUT ASSIGNMENT #50 ON
SET OUTPUT ASSIGNMENT #51 OFF

      ↓
      PRESS '+'
    
```

NOTE: LOGIC FOR PHASE 1 RED CLEAR WHEN TRANSITIONING FROM PHASE 1 TO PHASE 2 (HEAD 11).

```

LOGICAL I/O COMMAND #2 (+/-COMMAND#)
IF ACTIVE PHASE #1 IS ON

      ↓
      SCROLL DOWN

THEN:
SET OUTPUT ASSIGNMENT #52 OFF

      ↓
      PRESS '+'
    
```

NOTE: LOGIC FOR SWITCHING FLASHING YELLOW ARROW OFF DURING PHASE 1 (HEAD 11).

```

LOGICAL I/O COMMAND #3 (+/-COMMAND#)
IF YELLOW ON PHASE #1 IS ON

      ↓
      SCROLL DOWN

THEN:
SET OUTPUT ASSIGNMENT #51 ON

      ↓
      PRESS '+'
    
```

NOTE: LOGIC FOR YELLOW ARROW CLEARANCE FROM PHASE 1 (HEAD 11).

```

LOGICAL I/O COMMAND #4 (+/-COMMAND#)
IF ACTIVE PHASE #5 IS ON
AND RED CLEAR ON PHASE #5 IS ON

      ↓
      SCROLL DOWN

THEN:
SET OUTPUT ASSIGNMENT #42 ON
SET OUTPUT ASSIGNMENT #43 OFF

      ↓
      PRESS '+'
    
```

NOTE: LOGIC FOR PHASE 5 RED CLEAR WHEN TRANSITIONING FROM PHASE 5 TO PHASE 6 (HEAD 51).

```

LOGICAL I/O COMMAND #5 (+/-COMMAND#)
IF ACTIVE PHASE #5 IS ON

      ↓
      SCROLL DOWN

THEN:
SET OUTPUT ASSIGNMENT #44 OFF

      ↓
      PRESS '+'
    
```

NOTE: LOGIC FOR SWITCHING FLASHING YELLOW ARROW OFF DURING PHASE 5 (HEAD 51).

```

LOGICAL I/O COMMAND #6 (+/-COMMAND#)
IF YELLOW ON PHASE #5 IS ON

      ↓
      SCROLL DOWN

THEN:
SET OUTPUT ASSIGNMENT #43 ON

      ↓
      PRESS '+'
    
```

NOTE: LOGIC FOR YELLOW ARROW CLEARANCE FROM PHASE 5 (HEAD 51).

LOGIC I/O PROCESSOR PROGRAMMING COMPLETE

OVERLAP PROGRAMMING DETAIL

(program controller as shown below)

FROM MAIN MENU PRESS '8' (OVERLAPS), THEN '1' (VEHICLE OVERLAP SETTINGS).

```

PAGE 1: VEHICLE OVERLAP 'A' SETTINGS
PHASE: :12345678910111213141516
VEH OVL PARENTS: :XX
VEH OVL NOT VEH: :
VEH OVL NOT PED: :
VEH OVL GRN EXT: :
STARTUP COLOR: - RED - YELLOW - GREEN
FLASH COLORS: - RED - YELLOW X GREEN
SELECT VEHICLE OVERLAP OPTIONS: (Y/N)
FLASH YELLOW IN CONTROLLER FLASH?...Y
GREEN EXTENSION (0-255 SEC)...0
YELLOW CLEAR (0=PARENT,3-25.5 SEC)...0.0
RED CLEAR (0=PARENT,0.1-25.5 SEC)...0.0
OUTPUT AS PHASE # (0=NONE, 1-16)...0
    
```

← NOTICE GREEN FLASH

PRESS '+' TWICE

```

PAGE 1: VEHICLE OVERLAP 'C' SETTINGS
PHASE: :12345678910111213141516
VEH OVL PARENTS: : XX
VEH OVL NOT VEH: :
VEH OVL NOT PED: :
VEH OVL GRN EXT: :
STARTUP COLOR: - RED - YELLOW - GREEN
FLASH COLORS: - RED - YELLOW X GREEN
SELECT VEHICLE OVERLAP OPTIONS: (Y/N)
FLASH YELLOW IN CONTROLLER FLASH?...Y
GREEN EXTENSION (0-255 SEC)...0
YELLOW CLEAR (0=PARENT,3-25.5 SEC)...0.0
RED CLEAR (0=PARENT,0.1-25.5 SEC)...0.0
OUTPUT AS PHASE # (0=NONE, 1-16)...0
    
```

← NOTICE GREEN FLASH

OVERLAP PROGRAMMING COMPLETE

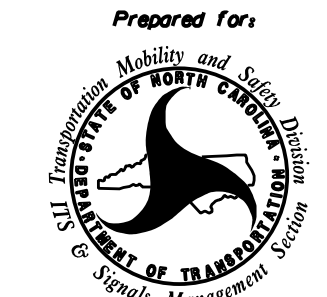
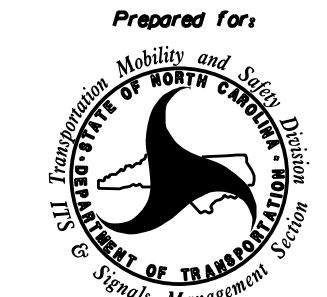
| OUTPUT REFERENCE SCHEDULE | |
|----------------------------------|------------------|
| USE TO INTERPRET LOGIC PROCESSOR | |
| OUTPUT 42 = | Overlap C Red |
| OUTPUT 43 = | Overlap C Yellow |
| OUTPUT 44 = | Overlap C Green |
| OUTPUT 50 = | Overlap A Red |
| OUTPUT 51 = | Overlap A Yellow |
| OUTPUT 52 = | Overlap A Green |

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 02-0854
DESIGNED: March 2018
SEALED: 12-7-18
REVISED: N/A

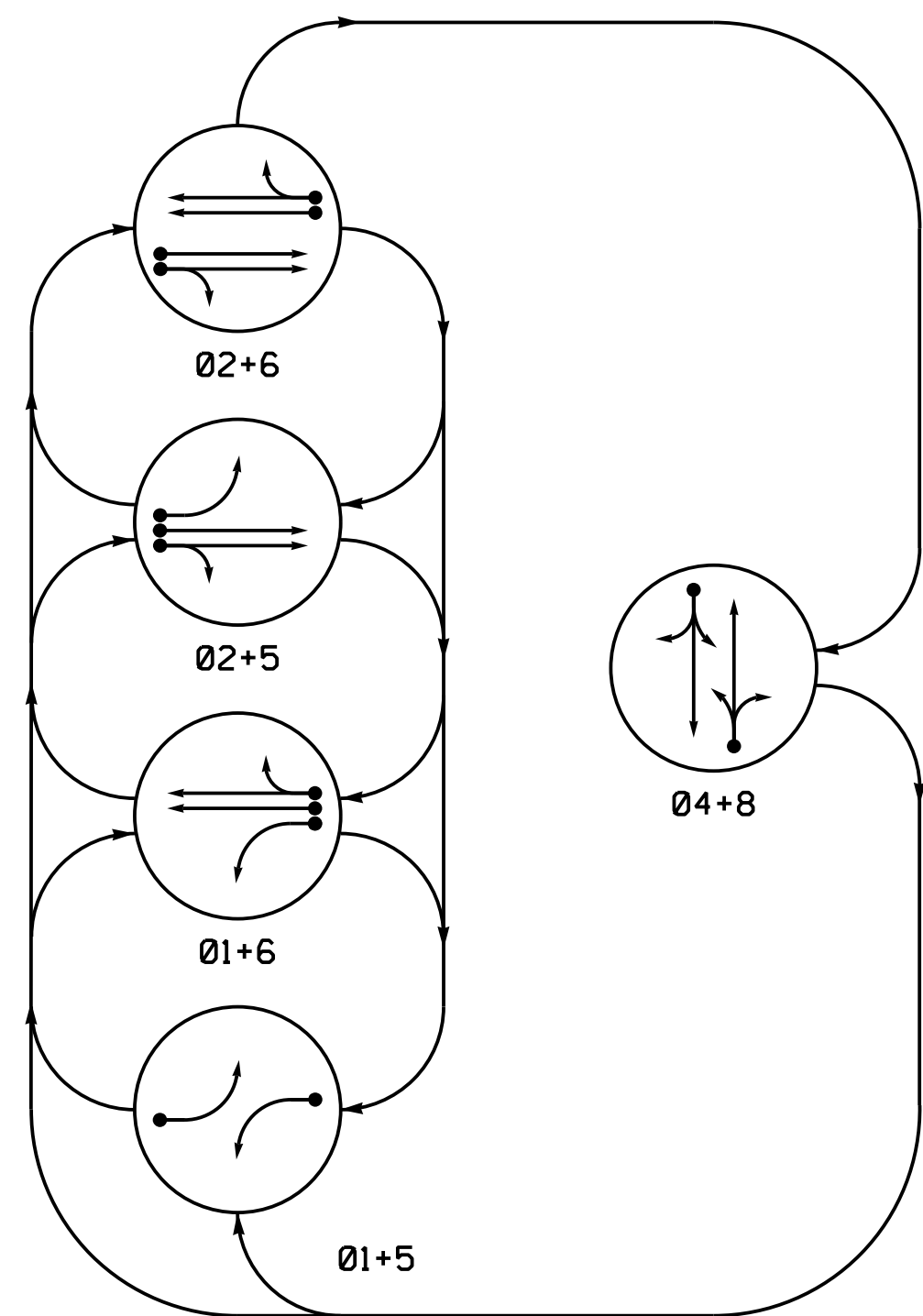
Electrical Detail - Sheet 2 of 2
Signal Upgrade

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

HNTB HNTB NORTH CAROLINA, P.C.
343 E. Six Forks Road, Suite 200
Raleigh, North Carolina 27609
NC License No: C-1554
(919) 546-8997

| | | |
|--|--|--|
|  | US 70 Business at Stonebridge Trail / SR 1774 (Service Road) | SEAL NORTH CAROLINA PROFESSIONAL ENGINEER NATASHA R. SIMMONS |
| Prepared for:  | Division 02 Craven Co. Havelock | SEAL 031464 |
| PLAN DATE: March 2018 | REVIEWED BY: A.D. Klinksiek | DocuSigned by: Natasha R. Simmons |
| PREPARED BY: A.H. Thornburg | REVIEWED BY: N.R. Simmons | DATE: 12/7/2018 |
| REVISIONS | INIT. DATE | DATE |
| 1750 N. Greenfield Pkwy, Corner, NC 27529 | SIGNATURE | DATE |
| SIG. INVENTORY NO. 02-0854 | | |

PHASING DIAGRAM



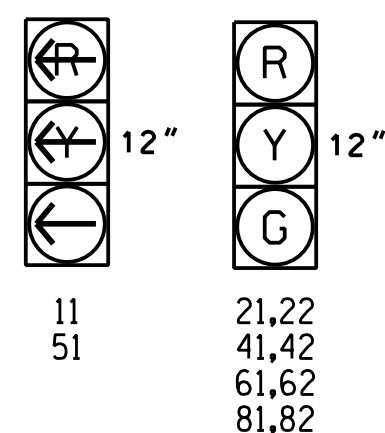
PHASING DIAGRAM DETECTION LEGEND

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

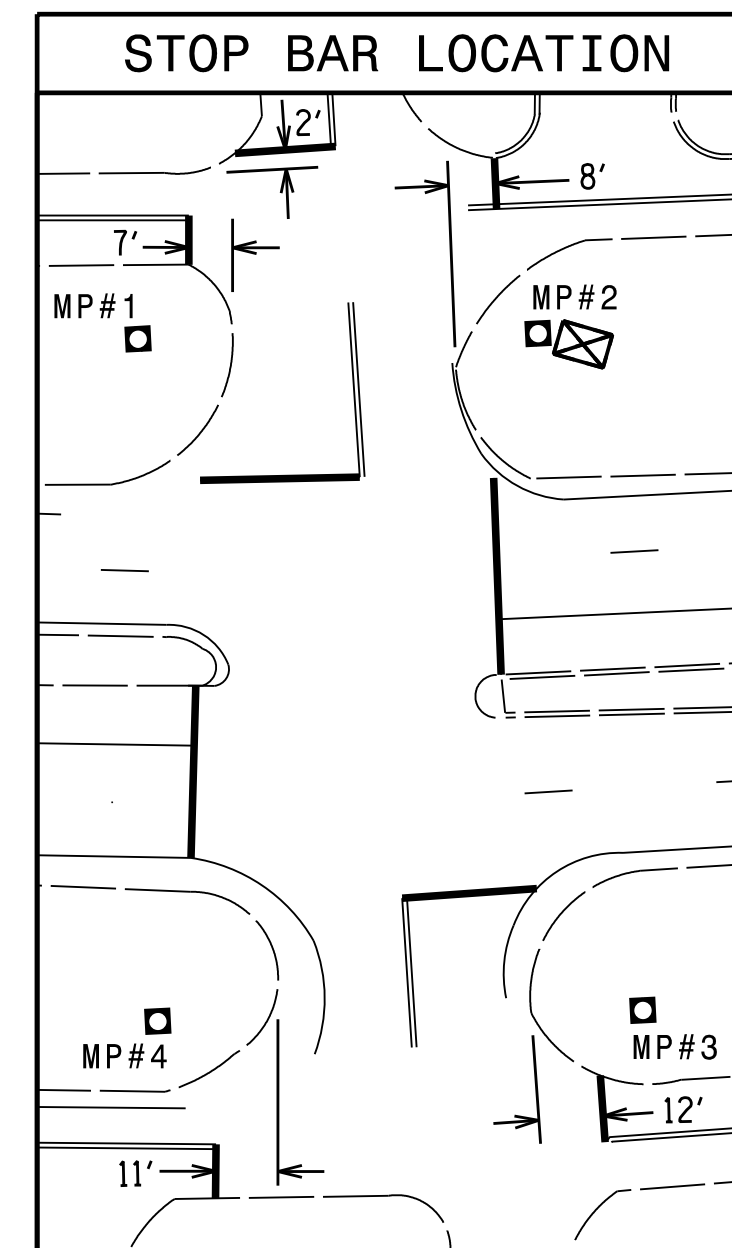
| SIGNAL FACE | PHASE | | | | | | | |
|-------------|-------|------|------|------|------|---|---|---|
| | 01+5 | 01+6 | 02+5 | 02+6 | 04+8 | H | S | F |
| 11 | - | - | R | R | R | R | R | R |
| 21,22 | R | R | G | G | R | Y | | |
| 41,42 | R | R | R | R | G | R | | |
| 51 | - | R | - | - | R | R | R | R |
| 61,62 | R | G | R | G | R | Y | | |
| 81,82 | R | R | R | R | G | R | | |

SIGNAL FACE I.D.

All Heads L.E.D.



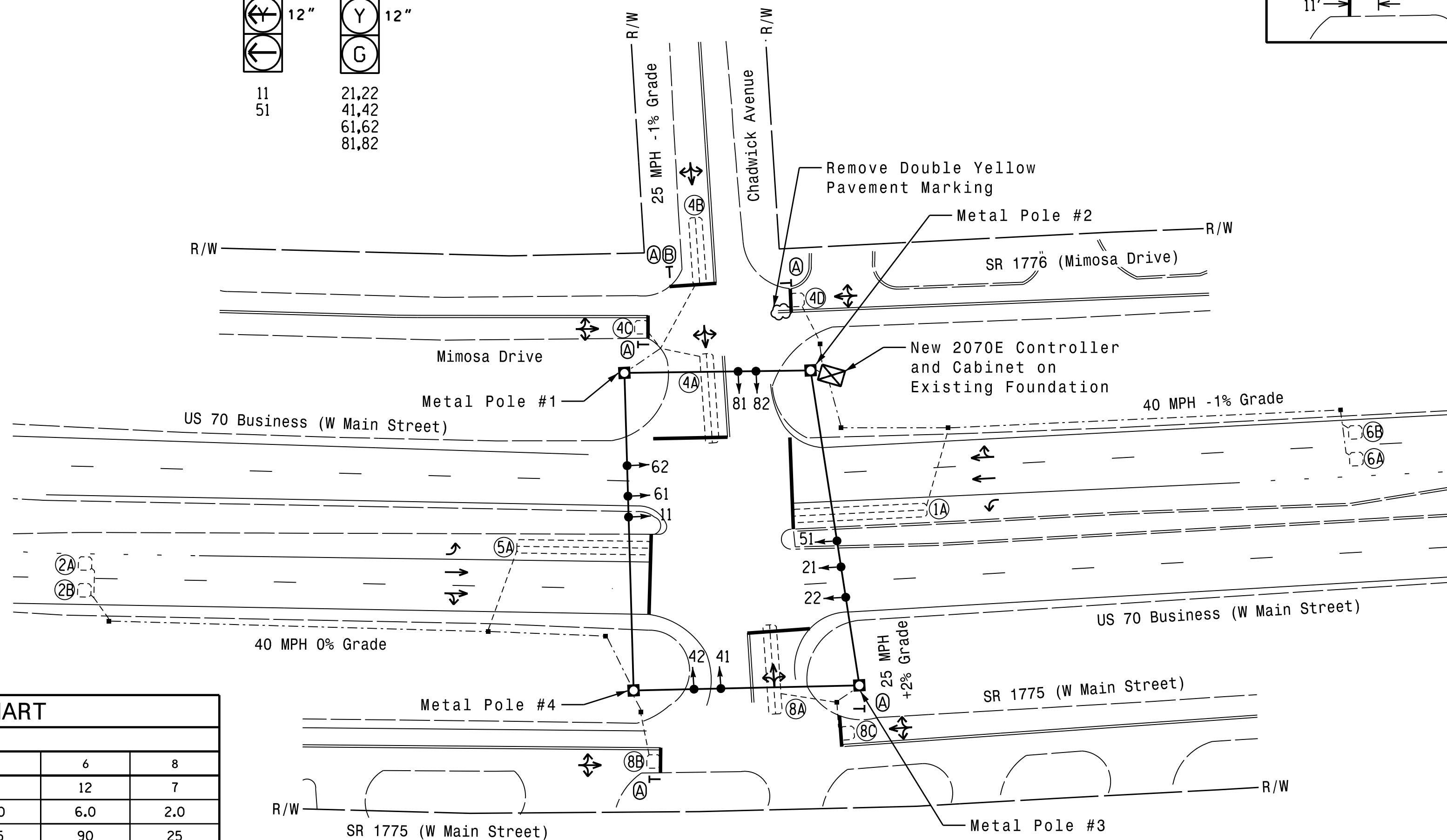
| OASIS 2070 LOOP & DETECTOR INSTALLATION CHART | | | | | | | | | | | | | |
|---|-----------|----------------------------|-------|----------|----------------------|---------|-----------|-----------------|--------------|------------|-------------|----------|---|
| LOOP | SIZE (FT) | DISTANCE FROM STOPBAR (FT) | TURNS | NEW LOOP | DETECTOR PROGRAMMING | | | | | | | | |
| | | | | | PHASE | CALLING | EXTENSION | FULL TIME DELAY | STRETCH TIME | DELAY TIME | SYSTEM LOOP | NEW CARD | |
| 1A | 6X60 | 0 | 2-4-2 | - | 1 | Y | Y | - | - | - | - | - | Y |
| 2A | 6X6 | 250 | 4 | - | 2 | Y | Y | - | - | - | - | - | Y |
| 2B | 6X6 | 250 | 4 | - | 2 | Y | Y | - | - | - | - | - | Y |
| 4A | 6X40 | +5 | 2-4-2 | - | 4 | Y | Y | - | - | 3 | - | - | Y |
| 4B | 6X30 | 0 | 2-4-2 | - | 4 | Y | Y | - | 2.0 | 5 | - | - | Y |
| 4C | 6X6 | 0 | 4 | - | 4 | Y | Y | - | 2.0 | 15 | - | - | Y |
| 4D | 6X6 | 0 | 4 | - | 4 | Y | Y | - | 2.0 | 15 | - | - | Y |
| 5A | 6X60 | 0 | 2-4-2 | - | 5 | Y | Y | - | - | - | - | - | Y |
| 6A | 6X6 | 250 | 4 | - | 6 | Y | Y | - | - | - | - | - | Y |
| 6B | 6X6 | 250 | 4 | - | 6 | Y | Y | - | - | - | - | - | Y |
| 8A | 6X40 | +5 | 2-4-2 | - | 8 | Y | Y | - | - | 3 | - | - | Y |
| 8B | 6X6 | 0 | 4 | - | 8 | Y | Y | - | 2.0 | 15 | - | - | Y |
| 8C | 6X6 | 0 | 4 | - | 8 | Y | Y | - | 2.0 | 15 | - | - | Y |



5 Phase Fully Actuated Havelock US 70 Business CLS

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 and/or 5 may be lagged.
4. Set all detector units to presence mode.
5. In the event of loop replacement, refer to the current ITS and Signals Design Manual and submit a Plan of Record to the Signal Design Section.
6. The cabinet should be designed to include Auxiliary Output file for future use.
7. Revise pavement markings as shown.
8. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
9. Closed loop system data: Controller Asset #0193



| OASIS 2070 TIMING CHART | | | | | | |
|-------------------------|-------|------------|-----|-----|------------|-----|
| FEATURE | PHASE | | | | | |
| | 1 | 2 | 4 | 5 | 6 | 8 |
| Min Green 1 * | 7 | 12 | 7 | 7 | 12 | 7 |
| Extension 1 * | 1.0 | 6.0 | 2.0 | 1.0 | 6.0 | 2.0 |
| Max Green 1 * | 25 | 90 | 25 | 25 | 90 | 25 |
| Yellow Clearance | 3.0 | 4.2 | 3.2 | 3.0 | 4.2 | 3.1 |
| Red Clearance | 1.9 | 1.2 | 2.2 | 2.3 | 1.1 | 2.5 |
| Red Revert | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| Walk 1 * | - | - | - | - | - | - |
| Don't Walk 1 | - | - | - | - | - | - |
| Seconds Per Actuation * | - | 1.5 | - | - | 1.5 | - |
| Max Variable Initial * | - | 29 | - | - | 29 | - |
| Time Before Reduction * | - | 15 | - | - | 15 | - |
| Time To Reduce * | - | 45 | - | - | 45 | - |
| Minimum Gap | - | 3.0 | - | - | 3.0 | - |
| Recall Mode | - | MIN RECALL | - | - | MIN RECALL | - |
| Vehicle Call Memory | - | YELLOW | - | - | YELLOW | - |
| Dual Entry | - | - | ON | - | - | ON |
| Simultaneous Gap | ON | ON | ON | ON | ON | ON |

* 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.

| PROPOSED | EXISTING |
|----------|----------|
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
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| | |
| | |

Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

| | | | | |
|--|---|---|--|--|
| | US 70 Business (W Main Street) at Chadwick Avenue / SR 1775 (W Main Street) | | | |
| | Division 02 Craven Co. Havelock | PLAN DATE: March 2018 REVIEWED BY: A.D. Klinksiek | | |
| | PREPARED BY: A.H. Thornburg | REVIEWED BY: N.R. Simmons | | |

Scale: 1" = 40'

Revisions Table:

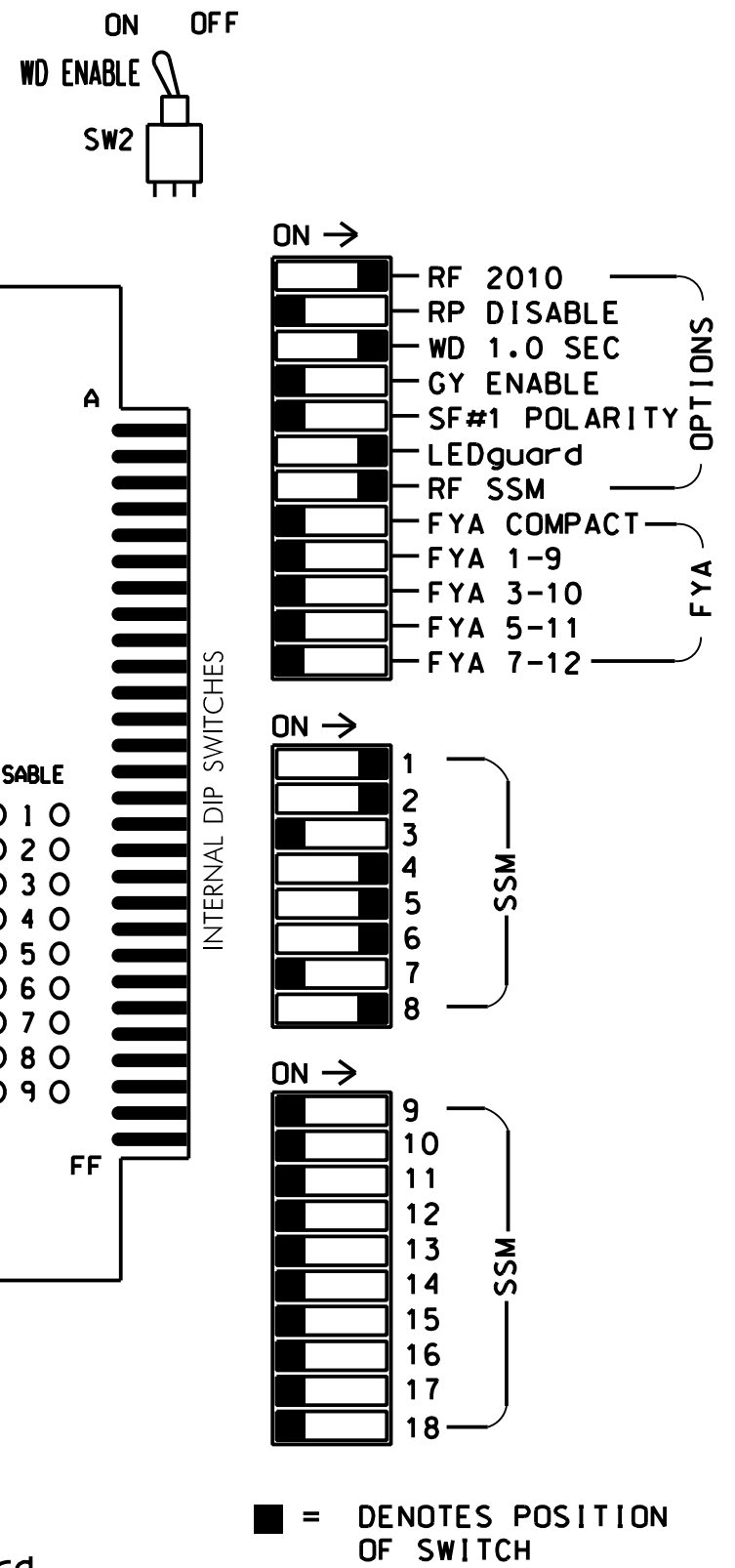
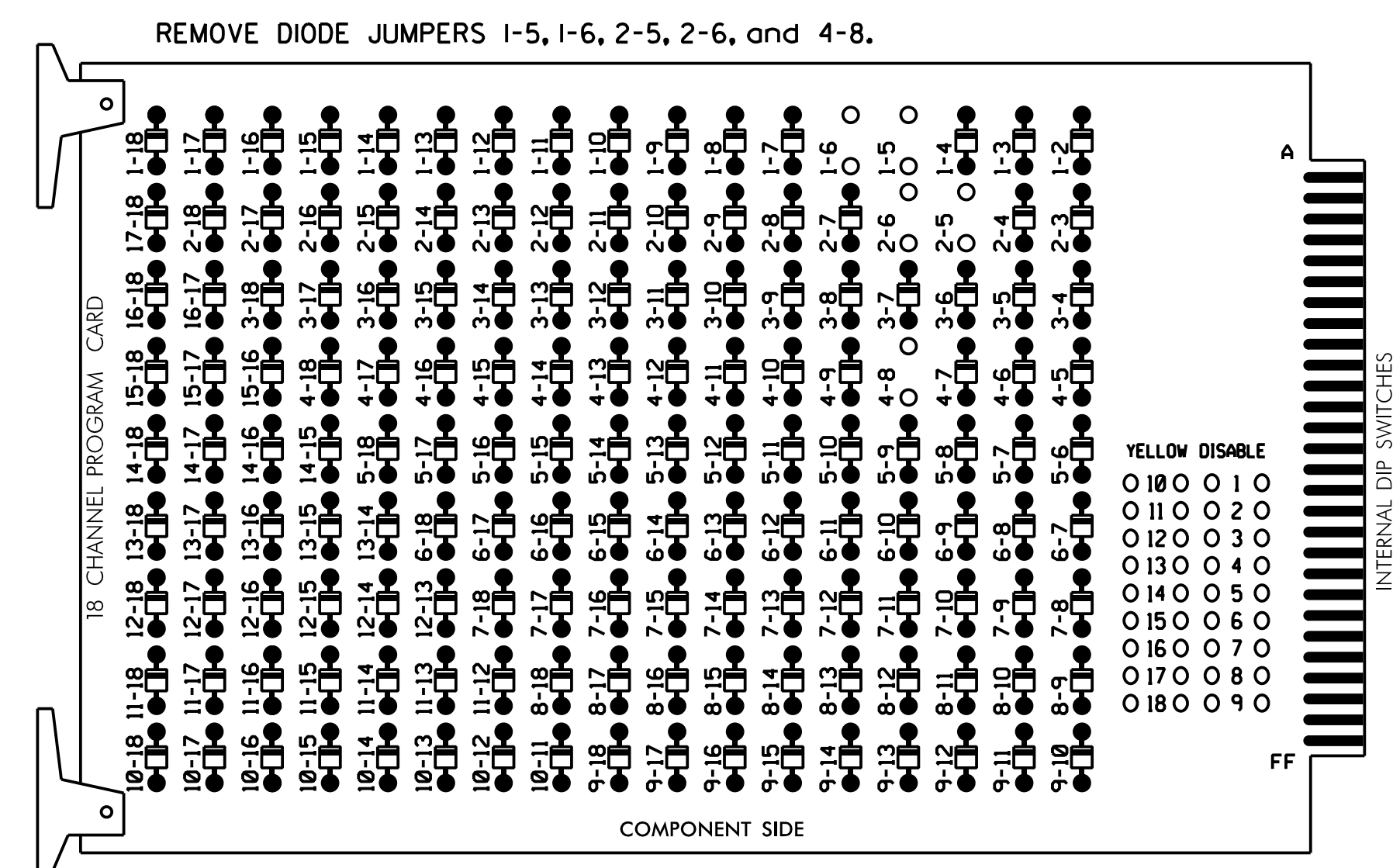
| REVISIONS | INIT. | DATE |
|-----------|-------|------|
| | | |

DocuSigned by: *Natasha R. Simmons* 12/7/2018

SIG. INVENTORY NO. 02-0193

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



NOTES:

- Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
- Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
- Ensure that Red Enable is active at all times during normal operation.
- Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.

NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
- Enable Simultaneous Gap-Out for all Phases.
- Program phases 4 and 8 for Dual Entry.
- Program phases 2 and 6 for Variable Initial and Gap Reduction.
- Program phases 2 and 6 for Startup In Green.
- Program phases 2 and 6 for Yellow Flash.
- The cabinet and controller are part of the Havelock US 70 Business Closed Loop Signal System.

SIGNAL HEAD HOOK-UP CHART

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

NU = Not Used

EQUIPMENT INFORMATION

CONTROLLER.....2070E
 CABINET.....332 W/AUX
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
 LOAD SWITCHES USED.....S1,S2,S5,S7,S8,S11
 PHASES USED.....1,2,4,5,6,8
 OVERLAPS.....NONE

INPUT FILE POSITION LAYOUT

(front view)

| FILE "I" | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------------|
| U | ∅ 1 | ∅ 2 | ∅ S | ∅ S | ∅ S | ∅ 4 | ∅ 4 | ∅ S | ∅ S | ∅ S | ∅ S | ∅ S | ∅ S | FS |
| L | 1A | 2A | 2B | 2B | 2B | 4A | 4C | 4B | 4D | 4B | 4D | 4B | 4D | DC ISOLATOR |
| U | ∅ 5 | ∅ 6 | ∅ S | ∅ S | ∅ S | ∅ 8 | ∅ 8 | ∅ S | ∅ S | ∅ S | ∅ S | ∅ S | ∅ S | ∅ S |
| L | 5A | 6A | 6B | 6B | 6B | 8A | 8C | 8B | 8B | 8B | 8B | 8B | 8B | DC ISOLATOR |

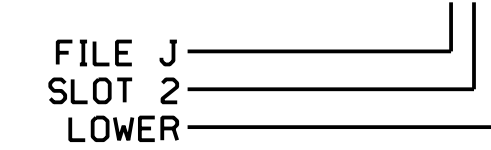
EX. : 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE
 ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

| LOOP NO. | LOOP TERMINAL | INPUT FILE POS. | PIN NO. | INPUT ASSIGNMENT NO. | DETECTOR NO. | NEMA PHASE | CALL | EXTEND | FULL TIME DELAY | STRETCH TIME | DELAY TIME |
|----------|---------------|-----------------|---------|----------------------|--------------|------------|------|--------|-----------------|--------------|------------|
| 1A | TB2-1,2 | I1U | 56 | 18 | 1 | 1 | Y | Y | | | |
| 2A | TB2-5,6 | I2U | 39 | 1 | 2 | 2 | Y | Y | | | |
| 2B | TB2-7,8 | I2L | 43 | 5 | 12 | 2 | Y | Y | | | |
| 4A | TB4-9,10 | I6U | 41 | 3 | 4 | 4 | Y | Y | | | 3 |
| 4B | TB4-11,12 | I6L | 45 | 7 | 14 | 4 | Y | Y | | 2.0 | 5 |
| 4C | TB6-1,2 | I7U | 65 | 27 | 34 | 4 | Y | Y | | 2.0 | 15 |
| 4D | TB6-3,4 | I7L | 78 | 40 | 44 | 4 | Y | Y | | 2.0 | 15 |
| 5A | TB3-1,2 | J1U | 55 | 17 | 5 | 5 | Y | Y | | | |
| 6A | TB3-5,6 | J2U | 40 | 2 | 6 | 6 | Y | Y | | | |
| 6B | TB3-7,8 | J2L | 44 | 6 | 16 | 6 | Y | Y | | | |
| 8A | TB5-9,10 | J6U | 42 | 4 | 8 | 8 | Y | Y | | | 3 |
| 8B | TB5-11,12 | J6L | 46 | 8 | 18 | 8 | Y | Y | | 2.0 | 15 |
| 8C | TB7-1,2 | J7U | 66 | 28 | 38 | 8 | Y | Y | | 2.0 | 15 |

INPUT FILE POSITION LEGEND: J2L



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 02-0193
 DESIGNED: March 2018
 SEALED: 12-7-18
 REVISED: N/A

Electrical Detail Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Prepared for:

US 70 Business (W Main Street) at Chadwick Avenue / SR 1775 (W Main Street)

Division 02 Craven Co. Havelock

PLAN DATE: March 2018 REVIEWED BY: A.D. Klinksiek

PREPARED BY: A.H. Thornburg REVIEWED BY: N.R. Simmons

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

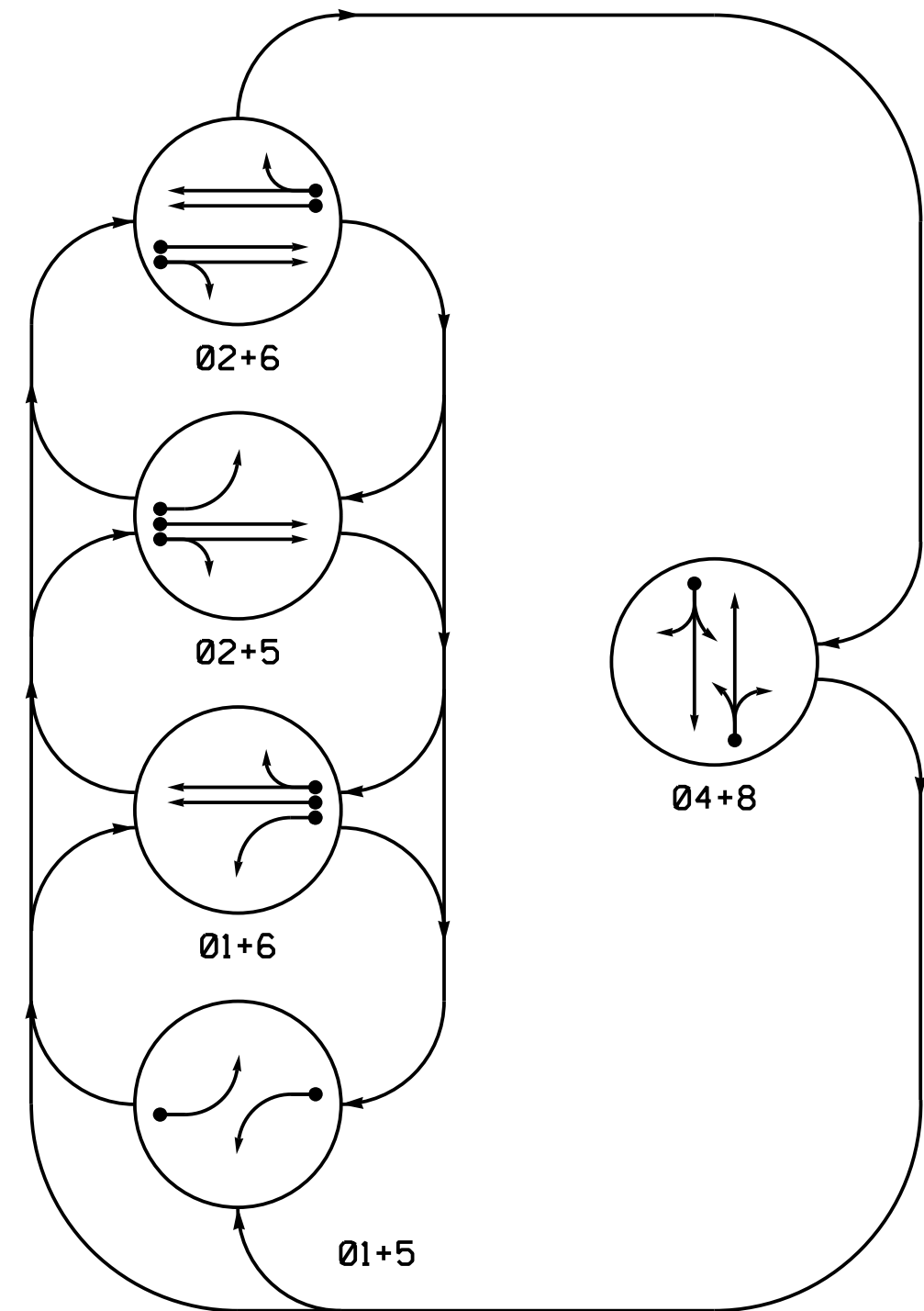
SEAL

HNTB HNTB NORTH CAROLINA, P.C.
 343 E. Six Forks Road, Suite 200
 Raleigh, North Carolina 27609
 NC License No: C-1554
 (919) 546-8997

750 N. Greenfield Pkwy, Corner, NC 27529

DocuSigned by: 12/7/2018
 Natasha R. Simmons
 SIGNATURE DATE
 SIG. INVENTORY NO. 02-0193

PHASING DIAGRAM



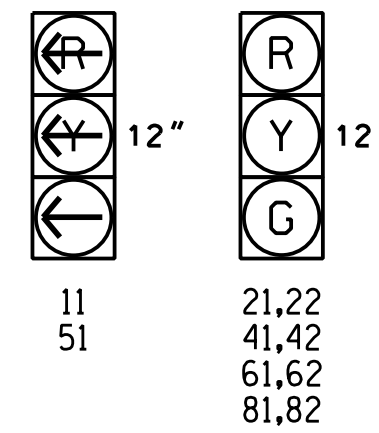
PHASING DIAGRAM DETECTION LEGEND

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

TABLE OF OPERATION table with columns for SIGNAL FACE and PHASE (01+5, 01+6, 02+5, 02+6, 04+8, FLSH).

SIGNAL FACE I.D.

All Heads L.E.D.

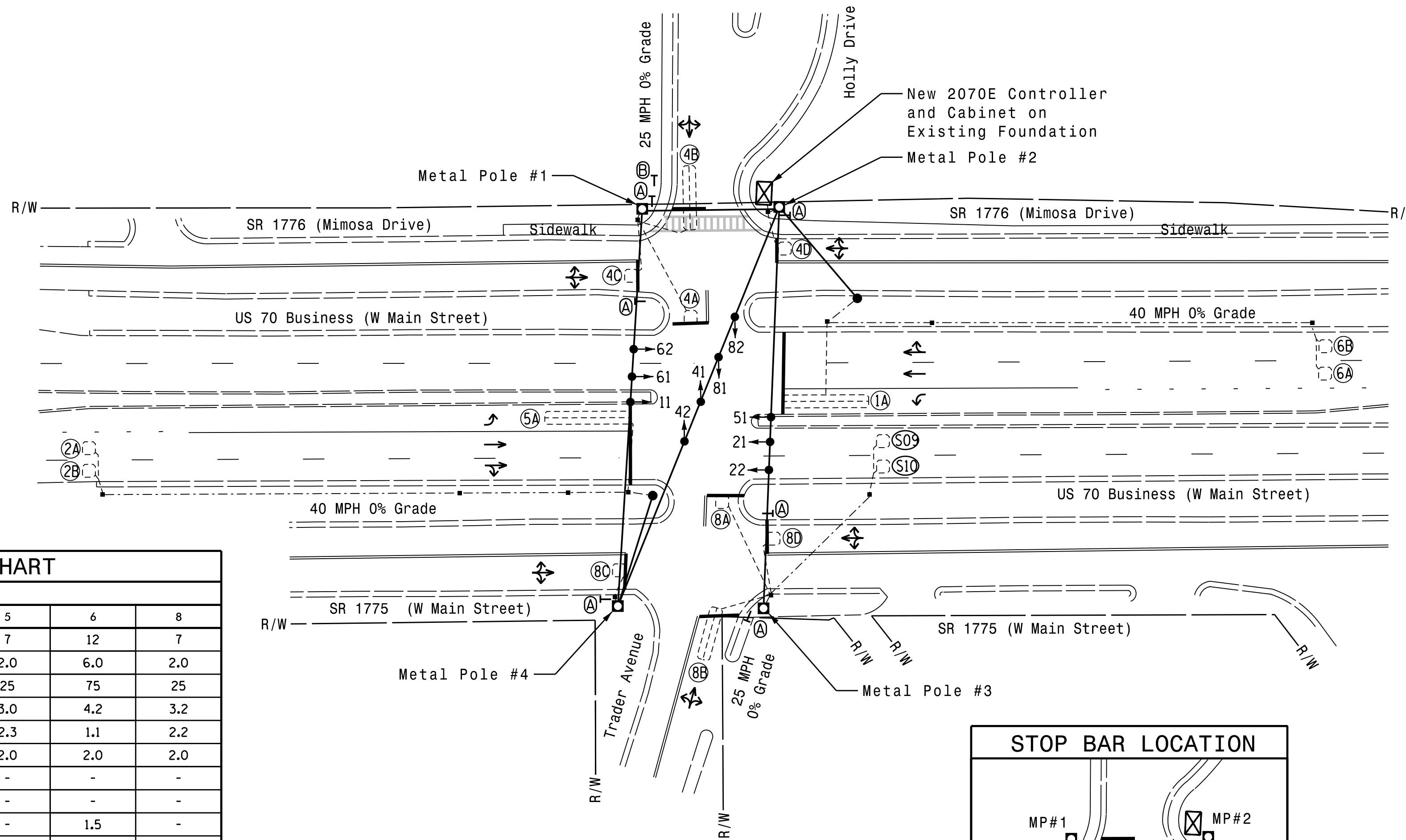


OASIS 2070 LOOP & DETECTOR INSTALLATION CHART table with columns for LOOP, SIZE, DISTANCE FROM STOPBAR, TURNS, NEW LOOP, PHASE, CALLING, EXTENSION, FULL TIME DELAY, STRETCH TIME, DELAY TIME, SYSTEM LOOP, NEW CARD.

5 Phase Fully Actuated Havelock US 70 Business CLS

NOTES

- 1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018...
2. Do not program signal for late night flashing operation...
3. Phase 1 and/or 5 may be lagged.
4. Set all detector units to presence mode.
5. In the event of loop replacement, refer to the current ITS and Signals Design Manual...
6. The cabinet should be designed to include Auxiliary Output file for future use.
7. Repaint pavement markings as shown.
8. Maximum times shown in timing chart are for free-run operation only.
9. Closed loop system data: Controller Asset #0225

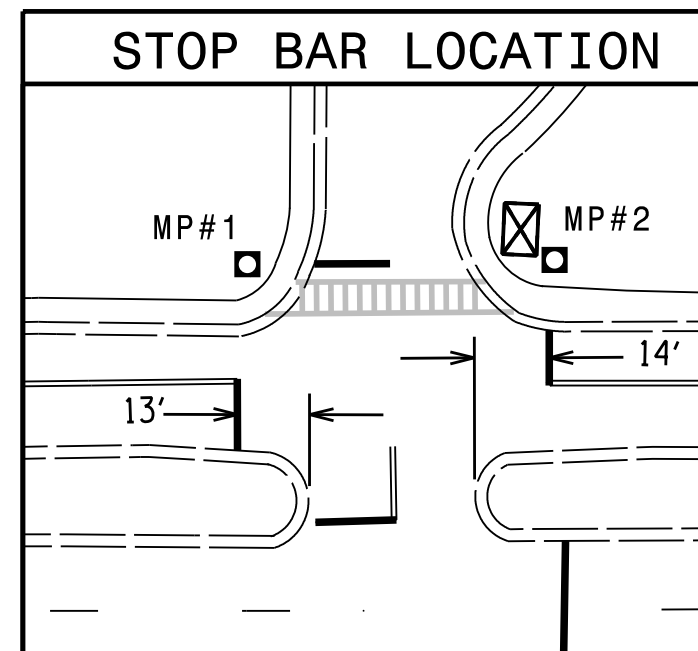


LEGEND

- PROPOSED: Traffic Signal Head, Modified Signal Head, Pedestrian Signal Head, Signal Pole with Guy, Inductive Loop Detector, Junction Box, 2-in Underground Conduit, Directional Arrow, Metal Strain Pole, "STOP" Sign (R1-1), "DO NOT BLOCK INTERSECTION" Sign (R10-7)
EXISTING: N/A

OASIS 2070 TIMING CHART table with columns for FEATURE and PHASE (1, 2, 4, 5, 6, 8).

* 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.



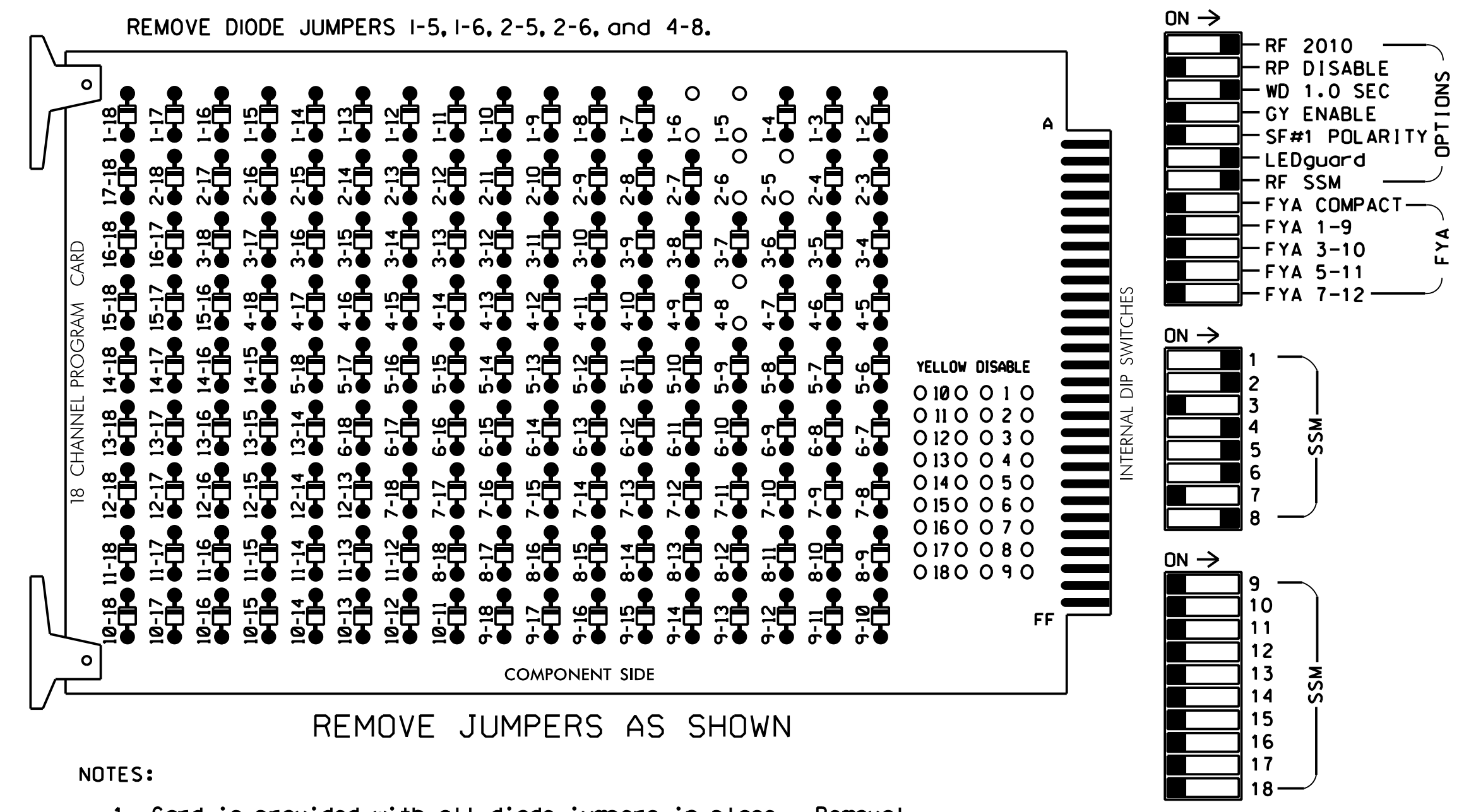
HNTB NORTH CAROLINA, P.C. 343 E. Six Forks Road, Suite 200 Raleigh, North Carolina 27609 NC License No: C-1554 (919) 546-8997

Signal Upgrade

Project information block including: DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED, US 70 Business (W Main Street) at Trader Avenue / Holly Drive, Division 02 Craven Co. Havelock, PLAN DATE: March 2018, REVIEWED BY: A.D. Klinsky, PREPARED BY: A.H. Thornburg, REVIEWED BY: N.R. Simmons, and professional seals.

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



NOTES:

- Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
- Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
- Ensure that Red Enable is active at all times during normal operation.
- Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.

NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
- Enable Simultaneous Gap-Out for all Phases.
- Program phases 4 and 8 for Dual Entry.
- Program phases 2 and 6 for Variable Initial and Gap Reduction.
- Program phases 2 and 6 for Startup In Green.
- Program phases 2 and 6 for Yellow Flash.
- The cabinet and controller are part of the Havelock US 70 Business Closed Loop Signal System.

SIGNAL HEAD HOOK-UP CHART

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

NU = Not Used

EQUIPMENT INFORMATION

CONTROLLER.....2070E
 CABINET.....332 W/AUX
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
 LOAD SWITCHES USED.....S1,S2,S5,S7,S8,S11
 PHASES USED.....1,2,4,5,6,8
 OVERLAPS.....NONE

INPUT FILE POSITION LAYOUT

(front view)

| FILE "I" | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|----------|----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------------|
| U | ∅ 1 | ∅ 2 | ∅ 3 | S | ∅ 4 | ∅ 4 | S | SYS | S | S | S | S | S | FS |
| L | 1A | 2A | ∅ 2 | ∅ 3 | ∅ 4 | ∅ 4 | ∅ 3 | S09 | ∅ 4 | ∅ 4 | ∅ 3 | ∅ 4 | ∅ 3 | DC ISOLATOR |
| U | NOT USED | 2B | ∅ 3 | ∅ 4 | ∅ 4 | ∅ 4 | ∅ 3 | SYS | ∅ 4 | ∅ 4 | ∅ 3 | ∅ 4 | ∅ 3 | ST |
| L | 5A | 6A | ∅ 3 | ∅ 4 | ∅ 4 | ∅ 4 | ∅ 3 | S10 | ∅ 4 | ∅ 4 | ∅ 3 | ∅ 4 | ∅ 3 | DC ISOLATOR |
| U | ∅ 5 | ∅ 6 | ∅ 3 | ∅ 4 | ∅ 4 | ∅ 4 | ∅ 3 | ∅ 3 | ∅ 4 | ∅ 4 | ∅ 3 | ∅ 4 | ∅ 3 | ∅ 3 |
| L | 5A | 6A | ∅ 3 | ∅ 4 | ∅ 4 | ∅ 4 | ∅ 3 | ∅ 3 | ∅ 4 | ∅ 4 | ∅ 3 | ∅ 4 | ∅ 3 | ∅ 3 |
| U | NOT USED | ∅ 6 | ∅ 3 | ∅ 4 | ∅ 4 | ∅ 4 | ∅ 3 | ∅ 3 | ∅ 4 | ∅ 4 | ∅ 3 | ∅ 4 | ∅ 3 | ∅ 3 |
| L | 5A | 6A | ∅ 3 | ∅ 4 | ∅ 4 | ∅ 4 | ∅ 3 | ∅ 3 | ∅ 4 | ∅ 4 | ∅ 3 | ∅ 4 | ∅ 3 | ∅ 3 |

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

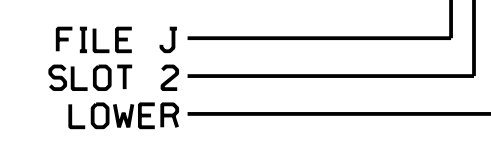
FS = FLASH SENSE
 ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

| LOOP NO. | LOOP TERMINAL | INPUT FILE POS. | PIN NO. | INPUT ASSIGNMENT NO. | DETECTOR NO. | NEMA PHASE | CALL | EXTEND | FULL TIME DELAY | STRETCH TIME | DELAY TIME |
|----------|---------------|-----------------|---------|----------------------|--------------|------------|------|--------|-----------------|--------------|------------|
| 1A | TB2-1,2 | 11U | 56 | 18 | 1 | 1 | Y | Y | | | |
| 2A | TB2-5,6 | 12U | 39 | 1 | 2 | 2 | Y | Y | | | |
| 2B | TB2-7,8 | 12L | 43 | 5 | 12 | 2 | Y | Y | | | |
| 4A | TB4-9,10 | 16U | 41 | 3 | 4 | 4 | Y | Y | | | 3 |
| 4B | TB4-11,12 | 16L | 45 | 7 | 14 | 4 | Y | Y | | 2.0 | 10 |
| 4C | TB6-1,2 | 17U | 65 | 27 | 34 | 4 | Y | Y | | 2.0 | 15 |
| 4D | TB6-3,4 | 17L | 78 | 40 | 44 | 4 | Y | Y | | 2.0 | 15 |
| * S09 | TB6-9,10 | 19U | 60 | 22 | 11 | SYS | | | | | |
| * S10 | TB6-11,12 | 19L | 62 | 24 | 13 | SYS | | | | | |
| 5A | TB3-1,2 | J1U | 55 | 17 | 5 | 5 | Y | Y | | | |
| 6A | TB3-5,6 | J2U | 40 | 2 | 6 | 6 | Y | Y | | | |
| 6B | TB3-7,8 | J2L | 44 | 6 | 16 | 6 | Y | Y | | | |
| 8A | TB5-9,10 | J6U | 42 | 4 | 8 | 8 | Y | Y | | | 3 |
| 8B | TB5-11,12 | J6L | 46 | 8 | 18 | 8 | Y | Y | | 2.0 | 10 |
| 8C | TB7-1,2 | J7U | 66 | 28 | 38 | 8 | Y | Y | | 2.0 | 15 |
| 8D | TB7-3,4 | J7L | 79 | 41 | 48 | 8 | Y | Y | | 2.0 | 15 |

* System detector only. Remove the vehicle phase assigned to this detector in the default programming.

INPUT FILE POSITION LEGEND: J2L



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 02-0225
 DESIGNED: March 2018
 SEALED: 12-7-18
 REVISED: N/A

Electrical Detail Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Prepared for: **US 70 Business (W Main Street) at Trader Avenue / Holly Drive**

Division 02 Craven Co. Havelock

PLAN DATE: March 2018 REVIEWED BY: A.D. Klinksiek

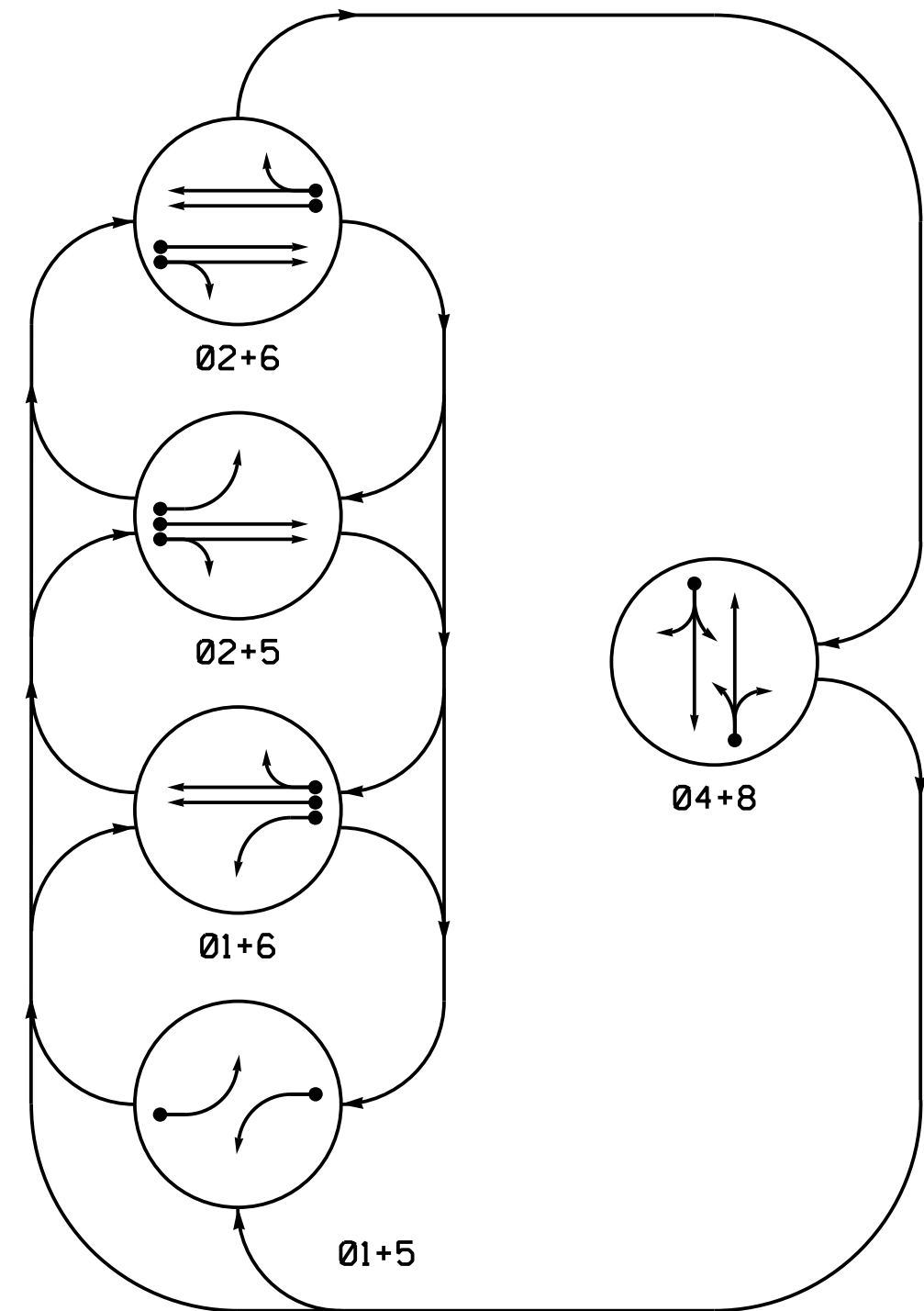
PREPARED BY: A.H. Thornburg REVIEWED BY: N.R. Simmons

REVISIONS: _____ INITI: _____ DATE: _____

DocuSigned by: **Natasha R. Simmons** 12/7/2018

SIG. INVENTORY NO. 02-0225

PHASING DIAGRAM



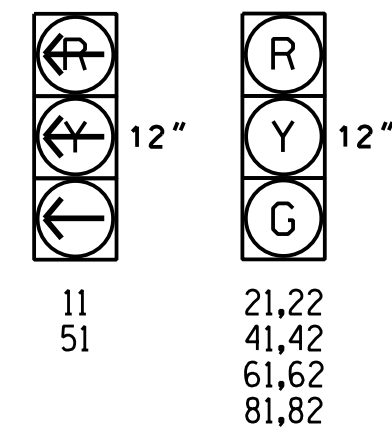
PHASING DIAGRAM DETECTION LEGEND

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

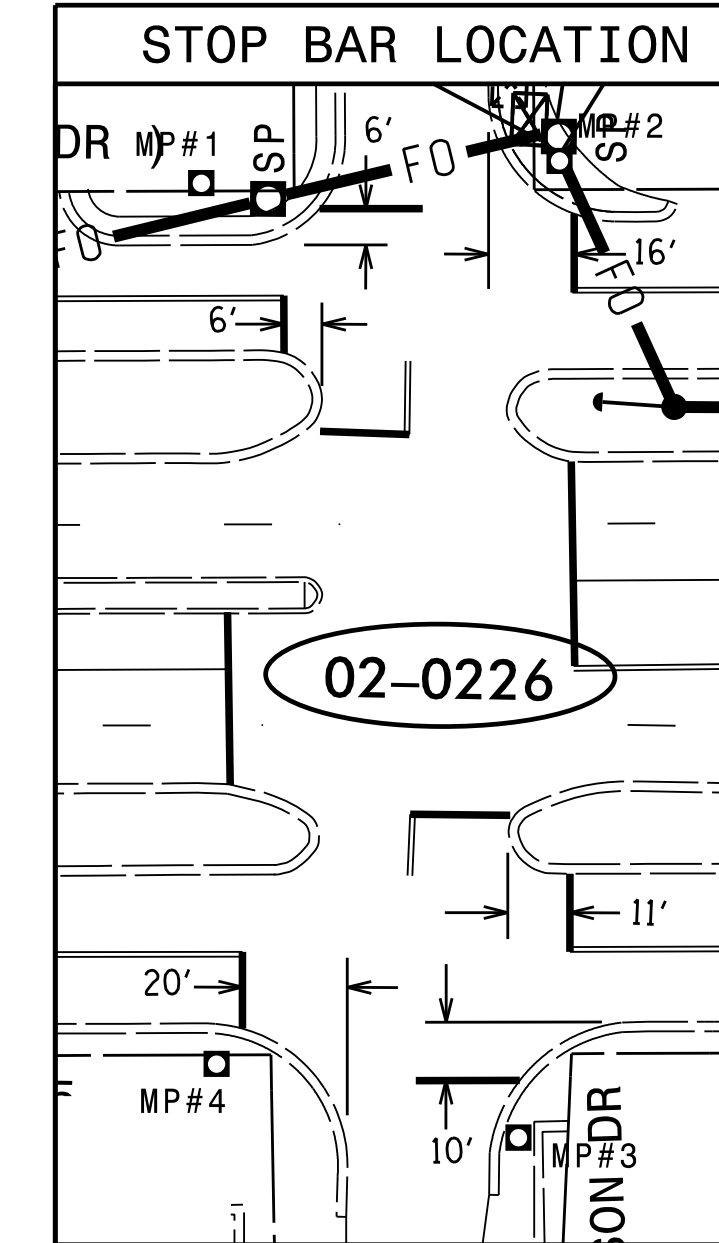
| SIGNAL FACE | PHASE | | | | |
|-------------|-------|------|------|------|------|
| | 01+5 | 01+6 | 02+5 | 02+6 | 04+8 |
| 11 | --- | --- | --- | --- | --- |
| 21,22 | R | R | G | G | R |
| 41,42 | R | R | R | R | G |
| 51 | --- | --- | --- | --- | --- |
| 61,62 | R | G | R | G | R |
| 81,82 | R | R | R | R | G |

SIGNAL FACE I.D.

All Heads L.E.D.



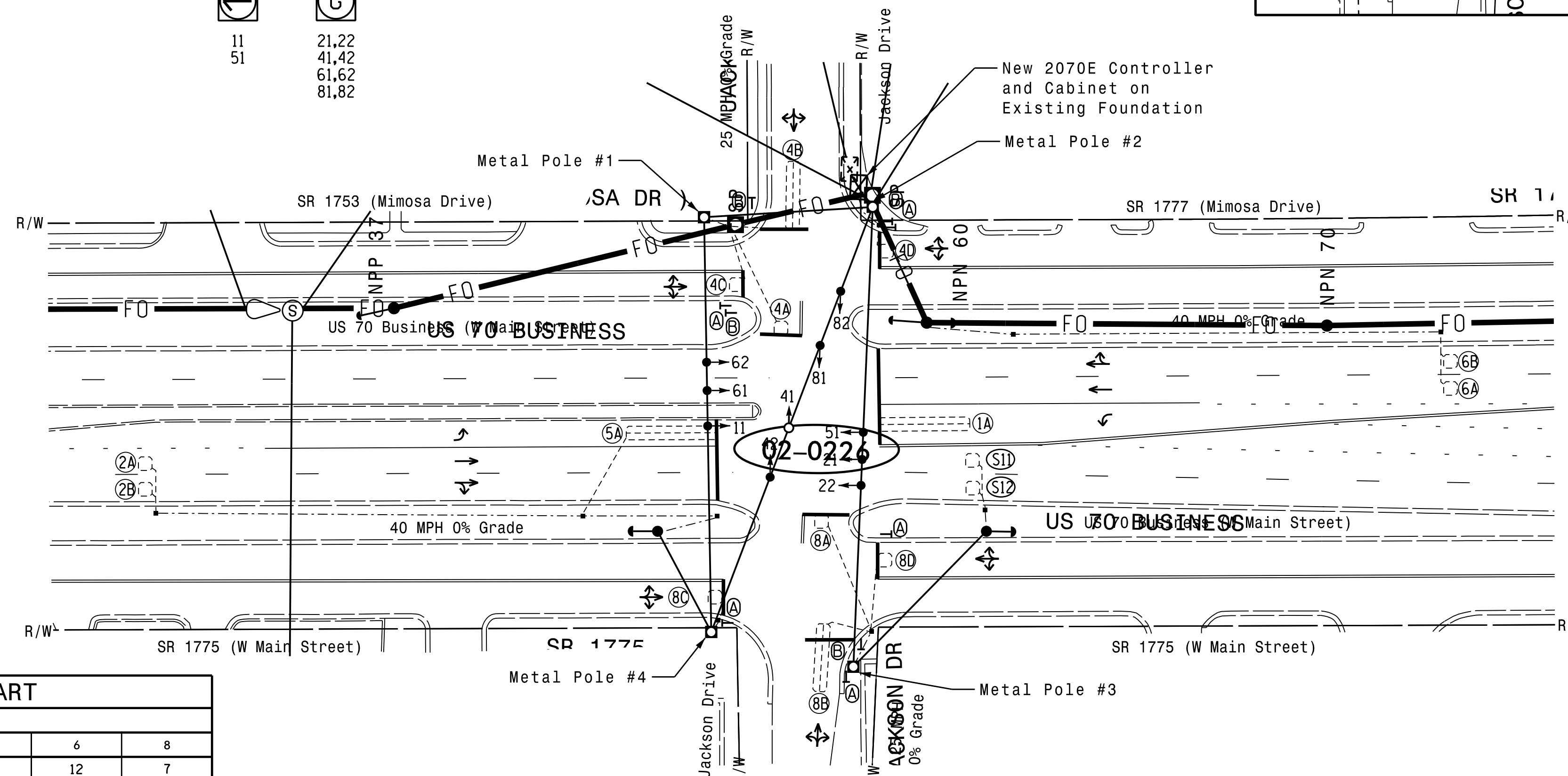
| INDUCTIVE LOOPS | | | | DETECTOR PROGRAMMING | | | | | | | | |
|-----------------|-----------|----------------------------|-------|----------------------|-------|---------|-----------|-----------------|--------------|------------|-------------|----------|
| LOOP | SIZE (FT) | DISTANCE FROM STOPBAR (FT) | TURNS | NEW LOOP | PHASE | CALLING | EXTENSION | FULL TIME DELAY | STRETCH TIME | DELAY TIME | SYSTEM LOOP | NEW CARD |
| 1A | 6X40 | 0 | 2-4-2 | - | 1 | Y | Y | - | - | - | - | Y |
| 2A | 6X6 | 250 | 4 | - | 2 | Y | Y | - | - | - | - | Y |
| 2B | 6X6 | 250 | 4 | - | 2 | Y | Y | - | - | - | - | Y |
| 4A | 6X6 | 0 | 4 | - | 4 | Y | Y | - | - | 5 | - | Y |
| 4B | 6X30 | 45 | 2-4-2 | - | 4 | Y | Y | - | 1.0 | 5 | - | Y |
| 4C | 6X6 | 0 | 4 | - | 4 | Y | Y | - | 2.0 | 15 | - | Y |
| 4D | 6X6 | 0 | 4 | - | 4 | Y | Y | - | 2.0 | 15 | - | Y |
| 5A | 6X40 | 0 | 2-4-2 | - | 5 | Y | Y | - | - | - | - | Y |
| 6A | 6X6 | 255 | 4 | - | 6 | Y | Y | - | - | - | - | Y |
| 6B | 6X6 | 255 | 4 | - | 6 | Y | Y | - | - | - | - | Y |
| 8A | 6X6 | 0 | 4 | - | 8 | Y | Y | - | - | 5 | - | Y |
| 8B | 6X30 | +5 | 2-4-2 | - | 8 | Y | Y | - | 1.0 | 5 | - | Y |
| 8C | 6X6 | 0 | 4 | - | 8 | Y | Y | - | 2.0 | 15 | - | Y |
| 8D | 6X6 | 0 | 4 | - | 8 | Y | Y | - | 2.0 | 15 | - | Y |
| S11 | 6X6 | +110 | 4 | - | - | - | - | - | - | - | Y | Y |
| S12 | 6X6 | +110 | 4 | - | - | - | - | - | - | - | Y | Y |



5 Phase Fully Actuated Havelock US 70 Business CLS

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Phase 1 and/or 5 may be lagged.
- Set all detector units to presence mode.
- In the event of loop replacement, refer to the current ITS and Signals Design Manual and submit a Plan of Record to the Signal Design Section.
- The cabinet should be designed to include Auxiliary Output file for future use.
- Repaint pavement markings as shown.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- Closed loop system data: Controller Asset #0226



| FEATURE | PHASE | | | | | |
|-------------------------|-------|------------|-----|-----|------------|-----|
| | 1 | 2 | 4 | 5 | 6 | 8 |
| Min Green 1 * | 7 | 12 | 7 | 7 | 12 | 7 |
| Extension 1 * | 2.0 | 6.0 | 2.0 | 2.0 | 6.0 | 2.0 |
| Max Green 1 * | 20 | 75 | 25 | 15 | 75 | 25 |
| Yellow Clearance | 3.0 | 4.2 | 3.2 | 3.0 | 4.2 | 3.2 |
| Red Clearance | 2.1 | 1.2 | 2.2 | 2.3 | 1.0 | 2.2 |
| Red Revert | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| Walk 1 * | - | - | - | - | - | - |
| Don't Walk 1 | - | - | - | - | - | - |
| Seconds Per Actuation * | - | 1.5 | - | - | 1.5 | - |
| Max Variable Initial * | - | 29 | - | - | 30 | - |
| Time Before Reduction * | - | 15 | - | - | 15 | - |
| Time To Reduce * | - | 45 | - | - | 45 | - |
| Minimum Gap | - | 3.0 | - | - | 3.0 | - |
| Recall Mode | - | MIN RECALL | - | - | MIN RECALL | - |
| Vehicle Call Memory | - | YELLOW | - | - | YELLOW | - |
| Dual Entry | - | - | ON | - | - | ON |
| Simultaneous Gap | ON | ON | ON | ON | ON | ON |

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

LEGEND

- | PROPOSED | EXISTING |
|--|-----------|
| ○ → Traffic Signal Head | ● → N/A |
| ○ → Modified Signal Head | ○ → N/A |
| ○ → Pedestrian Signal Head With Push Button & Sign | ○ → N/A |
| ○ → Signal Pole with Guy | ○ → N/A |
| ○ → Signal Pole with Sidewalk Guy | ○ → N/A |
| □ → Inductive Loop Detector | □ → N/A |
| □ → Controller & Cabinet | □ → N/A |
| □ → Junction Box | □ → N/A |
| □ → 2-in Underground Conduit | □ → N/A |
| N/A → Right of Way | N/A → N/A |
| → → Directional Arrow | → → N/A |
| ○ → Metal Strain Pole | ○ → N/A |
| Ⓐ → "STOP" Sign (R1-1) | Ⓐ → N/A |
| Ⓑ → "DO NOT BLOCK INTERSECTION" Sign (R10-7) | Ⓑ → N/A |

Signal Upgrade

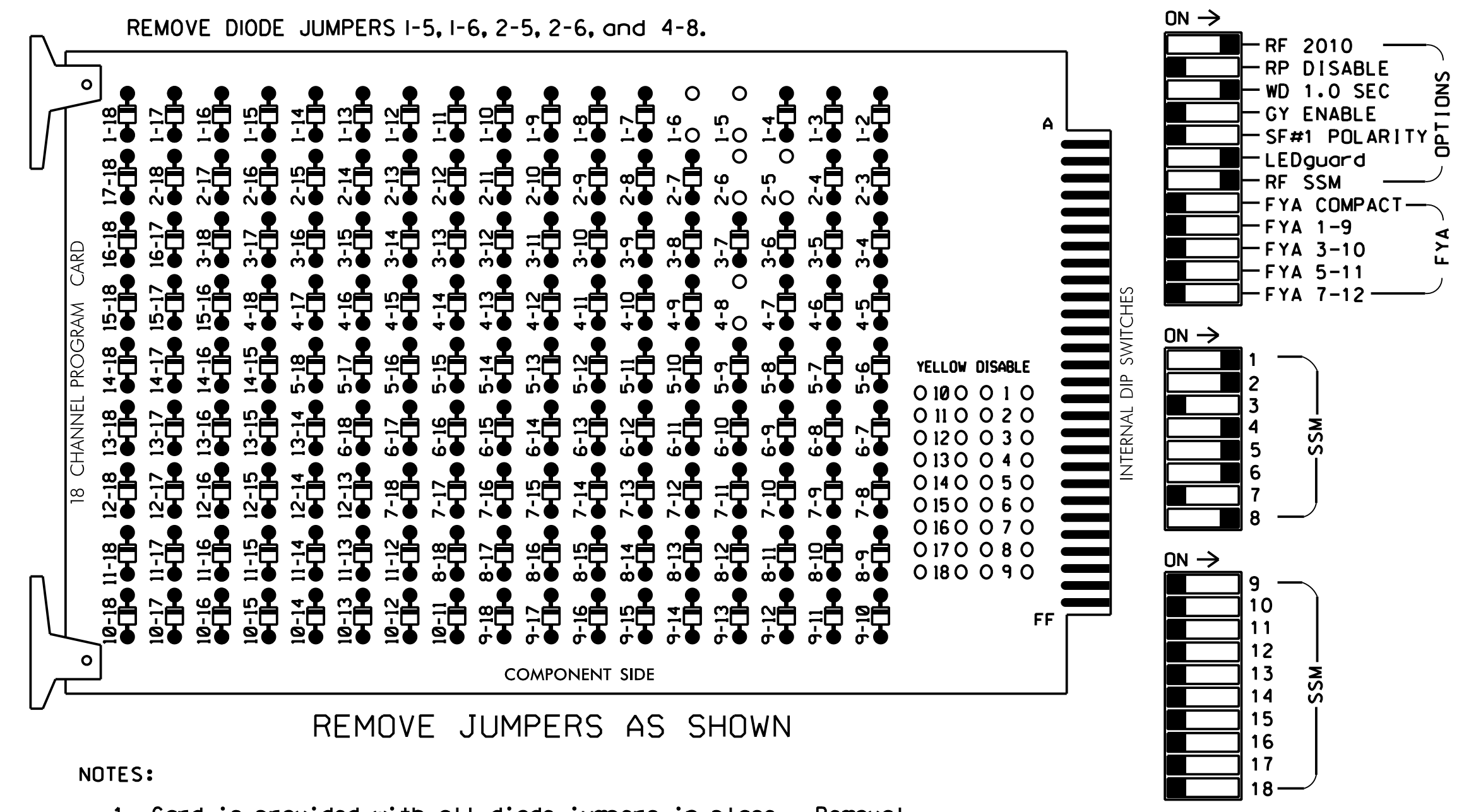
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

| | | | |
|-------------------|---|---|---|
| | US 70 Business (W Main Street) at Jackson Drive | | |
| | Division 02 Craven Co. Havelock | PLAN DATE: March 2018 REVIEWED BY: A.D. Klinskiak | |
| SCALE 0 40 1"=40' | REVISIONS | INIT. DATE | DocuSigned by: Natasha R. Simmons 12/7/2018 |

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EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that Red Enable is active at all times during normal operation.
4. Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. 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. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Enable Simultaneous Gap-Out for all Phases.
3. Program phases 4 and 8 for Dual Entry.
4. Program phases 2 and 6 for Variable Initial and Gap Reduction.
5. Program phases 2 and 6 for Startup In Green.
6. Program phases 2 and 6 for Yellow Flash.
7. The cabinet and controller are part of the Havelock US 70 Business Closed Loop Signal System.

SIGNAL HEAD HOOK-UP CHART

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

NU = Not Used

EQUIPMENT INFORMATION

CONTROLLER.....2070E
 CABINET.....332 W/AUX
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
 LOAD SWITCHES USED.....S1,S2,S5,S7,S8,S11
 PHASES USED.....1,2,4,5,6,8
 OVERLAPS.....NONE

INPUT FILE POSITION LAYOUT

(front view)

| FILE "I" | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|----------|----------|-----|----|----|----|-----|-----|----|-----|----|----|----|----|-------------|
| U | ∅ 1 | ∅ 2 | S | S | S | ∅ 4 | ∅ 4 | S | SYS | S | S | S | S | FS |
| I | 1A | 2A | TO | TO | TO | 4A | 4C | TO | S11 | TO | TO | TO | TO | DC ISOLATOR |
| L | NOT USED | 2B | TO | TO | TO | 4B | 4D | TO | SYS | TO | TO | TO | TO | ST |
| U | ∅ 5 | ∅ 6 | S | S | S | ∅ 8 | ∅ 8 | S | S | S | S | S | S | S |
| I | 5A | 6A | TO | TO | TO | 8A | 8C | TO | TO | TO | TO | TO | TO | TO |
| L | NOT USED | 6B | TO | TO | TO | 8B | 8D | TO | TO | TO | TO | TO | TO | TO |

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

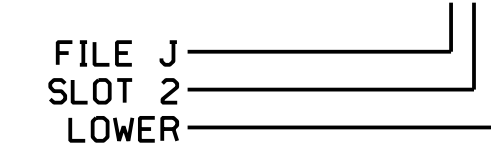
FS = FLASH SENSE
 ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

| LOOP NO. | LOOP TERMINAL | INPUT FILE POS. | PIN NO. | INPUT ASSIGNMENT NO. | DETECTOR NO. | NEMA PHASE | CALL | EXTEND | FULL TIME DELAY | STRETCH TIME | DELAY TIME |
|----------|---------------|-----------------|---------|----------------------|--------------|------------|------|--------|-----------------|--------------|------------|
| 1A | TB2-1,2 | I1U | 56 | 18 | 1 | 1 | Y | Y | | | |
| 2A | TB2-5,6 | I2U | 39 | 1 | 2 | 2 | Y | Y | | | |
| 2B | TB2-7,8 | I2L | 43 | 5 | 12 | 2 | Y | Y | | | |
| 4A | TB4-9,10 | I6U | 41 | 3 | 4 | 4 | Y | Y | | | 5 |
| 4B | TB4-11,12 | I6L | 45 | 7 | 14 | 4 | Y | Y | | 1.0 | 5 |
| 4C | TB6-1,2 | I7U | 65 | 27 | 34 | 4 | Y | Y | | 2.0 | 15 |
| 4D | TB6-3,4 | I7L | 78 | 40 | 44 | 4 | Y | Y | | 2.0 | 15 |
| * S11 | TB6-9,10 | I9U | 60 | 22 | 11 | SYS | | | | | |
| * S12 | TB6-11,12 | I9L | 62 | 24 | 13 | SYS | | | | | |
| 5A | TB3-1,2 | J1U | 55 | 17 | 5 | 5 | Y | Y | | | |
| 6A | TB3-5,6 | J2U | 40 | 2 | 6 | 6 | Y | Y | | | |
| 6B | TB3-7,8 | J2L | 44 | 6 | 16 | 6 | Y | Y | | | |
| 8A | TB5-9,10 | J6U | 42 | 4 | 8 | 8 | Y | Y | | | 5 |
| 8B | TB5-11,12 | J6L | 46 | 8 | 18 | 8 | Y | Y | | 1.0 | 5 |
| 8C | TB7-1,2 | J7U | 66 | 28 | 38 | 8 | Y | Y | | 2.0 | 15 |
| 8D | TB7-3,4 | J7L | 79 | 41 | 48 | 8 | Y | Y | | 2.0 | 15 |

* System detector only. Remove the vehicle phase assigned to this detector in the default programming.

INPUT FILE POSITION LEGEND: J2L



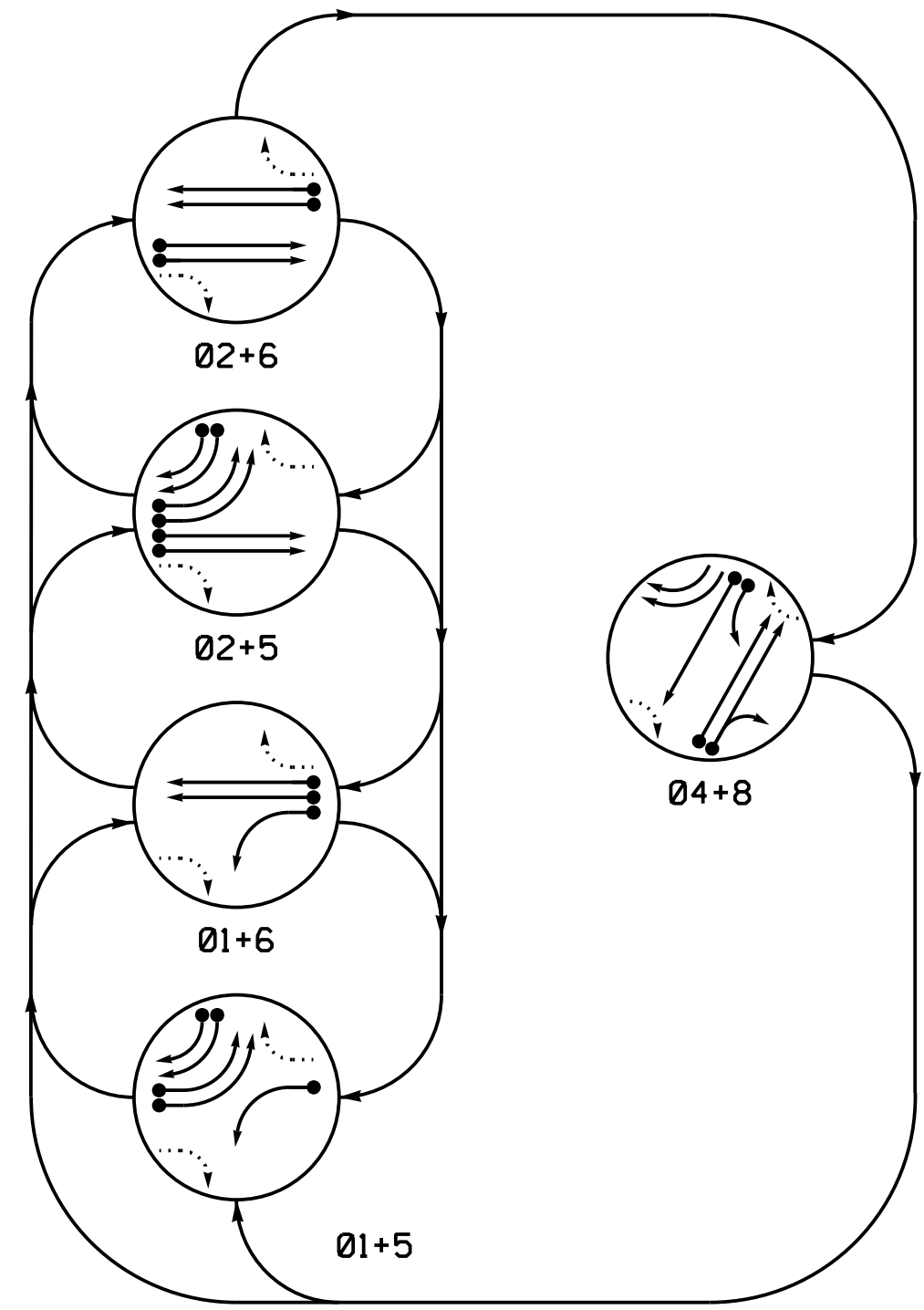
THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 02-0226
 DESIGNED: March 2018
 SEALED: 12-7-18
 REVISED: N/A

Electrical Detail Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

| | | | |
|--|--|--------------------------|---|
| | Prepared for: US 70 Business (W Main Street) at Jackson Drive | | |
| | Division 02 Craven Co. | Havelock | |
| PLAN DATE: March 2018 PREPARED BY: A.H. Thornburg | REVIEWED BY: A.D. Klinksiek REVIEWED BY: N.R. Simmons | REVISIONS INITI. DATE | DocuSigned by: Natasha R. Simmons 12/7/2018 SIGNATURE DATE SIG. INVENTORY NO. 02-0226 |

PHASING DIAGRAM



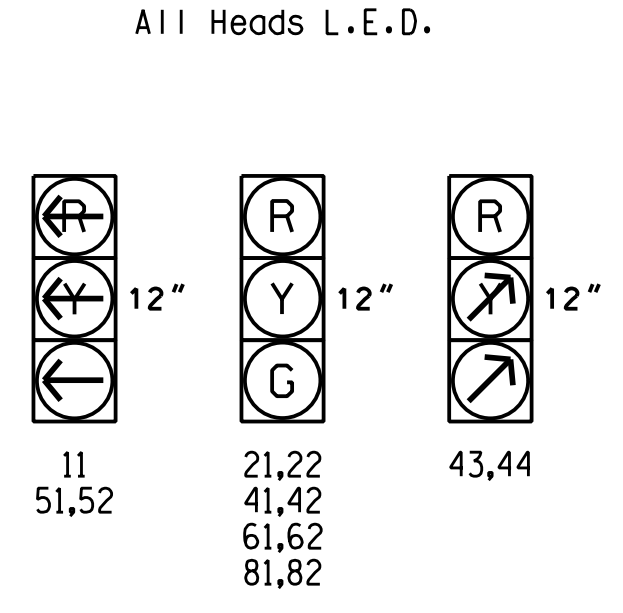
PHASING DIAGRAM DETECTION LEGEND

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

TABLE OF OPERATION

| SIGNAL FACE | PHASE | | | | | | | |
|-------------|-------|------|------|------|------|-----|-----|-----|
| | 01+5 | 01+6 | 02+5 | 02+6 | 04+8 | F | H | S |
| 11 | --- | --- | --- | --- | --- | --- | --- | --- |
| 21,22 | R | R | G | G | R | Y | | |
| 41,42 | R | R | R | R | G | R | | |
| 43,44 | / | / | / | / | R | | | |
| 51,52 | --- | --- | --- | --- | --- | --- | --- | --- |
| 61,62 | R | G | R | G | R | Y | | |
| 81,82 | R | R | R | R | G | R | | |

SIGNAL FACE I.D.



OASIS 2070 LOOP & DETECTOR INSTALLATION CHART

| LOOP | SIZE (FT) | DISTANCE FROM STOPBAR (FT) | TURNS | NEW LOOP | DETECTOR PROGRAMMING | | | | SYSTEM LOOP | NEW CARD | |
|------|-----------|----------------------------|-------|----------|----------------------|---------|-----------|-----------------|-------------|----------|--------------|
| | | | | | PHASE | CALLING | EXTENSION | FULL TIME DELAY | | | STRETCH TIME |
| 1A | 6X40 | 0 | 2-4-2 | - | 1 | Y | Y | - | - | - | Y |
| 2A | 6X6 | 250 | 4 | - | 2 | Y | Y | - | - | - | Y |
| 2B | 6X6 | 250 | 4 | - | 2 | Y | Y | - | - | - | Y |
| 4A | 6X40 | 0 | 2-4-2 | - | 4 | Y | Y | - | - | - | Y |
| 4B | 6X40 | 0 | 2-4-2 | - | 4 | Y | Y | - | - | - | Y |
| 5A | 6X40 | 0 | 2-4-2 | - | 5 | Y | Y | - | - | - | Y |
| 5B | 6X40 | 0 | 2-4-2 | - | 5 | Y | Y | - | - | - | Y |
| 5C | 6X40 | 0 | 2-4-2 | - | 5 | Y | Y | - | - | - | Y |
| 5D | 6X40 | 0 | 2-4-2 | - | 5 | Y | Y | - | - | - | Y |
| 6A | 6X6 | 310 | 5 | - | 6 | Y | Y | - | - | - | Y |
| 6B | 6X6 | 310 | 5 | - | 6 | Y | Y | - | - | - | Y |
| 8A | 6X40 | +5 | 2-4-2 | - | 8 | Y | Y | - | - | - | Y |
| 8B | 6X40 | +5 | 2-4-2 | - | 8 | Y | Y | - | - | 10 | Y |
| S13 | 6X6 | +300 | 6 | - | - | - | - | - | - | - | Y |
| S14 | 6X6 | +300 | 6 | - | - | - | - | - | - | - | Y |

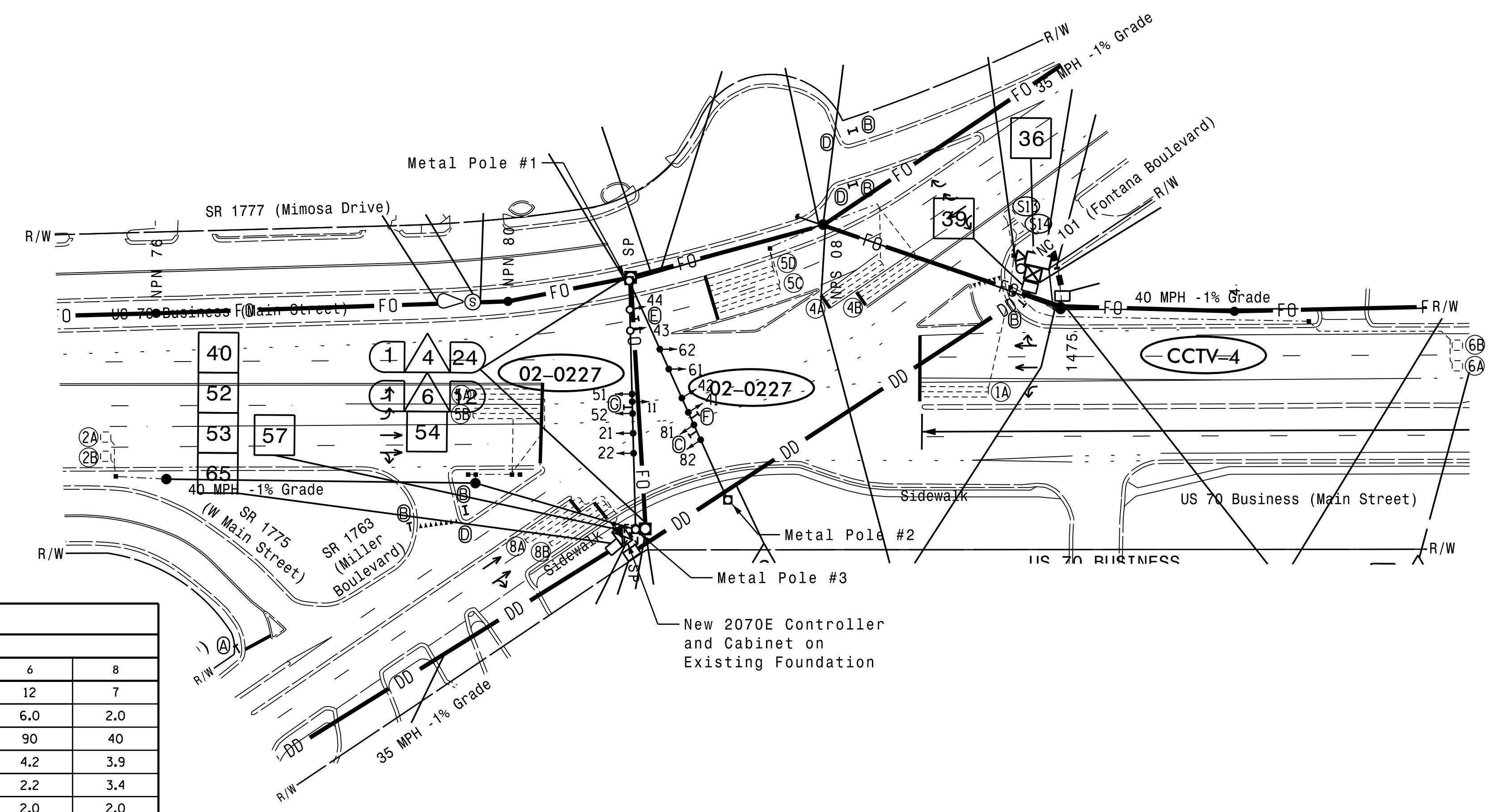
5 Phase Fully Actuated Havelock US 70 Business CLS

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Phase 1 and/or 5 may be lagged.
- Set all detector units to presence mode.
- In the event of loop replacement, refer to the current ITS and Signals Design Manual and submit a Plan of Record to the Signal Design Section.
- The cabinet should be designed to include Auxiliary Output file for future use.
- Pavement markings are existing.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- Closed loop system data: Master Asset #10201 Controller Asset #0227

LEGEND

- | PROPOSED | EXISTING |
|--|--|
| ○→ Traffic Signal Head | ●→ N/A |
| ○→ Modified Signal Head | ○→ N/A |
| ⊥ Sign | ⊥ Sign |
| ⊥ Pedestrian Signal Head With Push Button & Sign | ⊥ Pedestrian Signal Head With Push Button & Sign |
| ⊥ Signal Pole with Guy | ⊥ Signal Pole with Guy |
| ⊥ Signal Pole with Sidewalk Guy | ⊥ Signal Pole with Sidewalk Guy |
| ⊥ Inductive Loop Detector | ⊥ Inductive Loop Detector |
| ⊥ Controller & Cabinet | ⊥ Controller & Cabinet |
| ⊥ Junction Box | ⊥ Junction Box |
| ⊥ 2-in Underground Conduit | ⊥ 2-in Underground Conduit |
| N/A Right of Way | N/A Right of Way |
| → Directional Arrow | → Directional Arrow |
| ⊠ Metal Strain Pole | ⊠ Metal Strain Pole |
| Ⓐ "STOP" Sign (R1-1) | Ⓐ "STOP" Sign (R1-1) |
| Ⓑ "YIELD" Sign (R1-2) | Ⓑ "YIELD" Sign (R1-2) |
| Ⓒ No Left Turn Sign (R3-2) | Ⓒ No Left Turn Sign (R3-2) |
| Ⓓ "DO NOT ENTER" Sign (R5-1) | Ⓓ "DO NOT ENTER" Sign (R5-1) |
| Ⓔ "NO TURN ON RED" Sign (R10-11) | Ⓔ "NO TURN ON RED" Sign (R10-11) |
| Ⓕ Left Arrow "ONLY" Sign (R3-5L) | Ⓕ Left Arrow "ONLY" Sign (R3-5L) |
| Ⓖ "DO NOT BLOCK INTERSECTION" Sign (R10-7) | Ⓖ "DO NOT BLOCK INTERSECTION" Sign (R10-7) |



OASIS 2070 TIMING CHART

| FEATURE | PHASE | | | | | |
|-------------------------|-------|------------|-----|-----|------------|-----|
| | 1 | 2 | 4 | 5 | 6 | 8 |
| Min Green 1 * | 7 | 12 | 7 | 7 | 12 | 7 |
| Extension 1 * | 2.0 | 6.0 | 2.0 | 2.0 | 6.0 | 2.0 |
| Max Green 1 * | 20 | 90 | 40 | 50 | 90 | 40 |
| Yellow Clearance | 3.0 | 4.2 | 3.9 | 3.0 | 4.2 | 3.9 |
| Red Clearance | 4.8 | 2.1 | 3.4 | 5.0 | 2.2 | 3.4 |
| Red Revert | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| Walk 1 * | - | - | - | - | - | - |
| Don't Walk 1 | - | - | - | - | - | - |
| Seconds Per Actuation * | - | 1.5 | - | - | 1.5 | - |
| Max Variable Initial * | - | 29 | - | - | 33 | - |
| Time Before Reduction * | - | 15 | - | - | 15 | - |
| Time To Reduce * | - | 45 | - | - | 45 | - |
| Minimum Gap | - | 3.0 | - | - | 3.0 | - |
| Recall Mode | - | MIN RECALL | - | - | MIN RECALL | - |
| Vehicle Call Memory | - | YELLOW | - | - | YELLOW | - |
| Dual Entry | - | - | ON | - | - | ON |
| Simultaneous Gap | ON | ON | ON | ON | ON | ON |

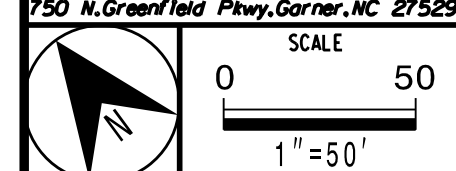
* These values may be field adjusted. Do not adjust Min Green and Extension times for phases 2 and 6 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.

Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

| | | | |
|-----------------------------|---|-----------------------|------------------|
| | US 70 Business (Main Street) at NC 101 (Fontana Boulevard) / SR 1763 (Miller Boulevard) | | |
| | Division 02 Craven Co. Havelock | PLAN DATE: March 2018 | |
| PREPARED BY: A.H. Thornburg | REVIEWED BY: N.R. Simmons | DATE: 12/7/2018 | SIGNATURE: _____ |

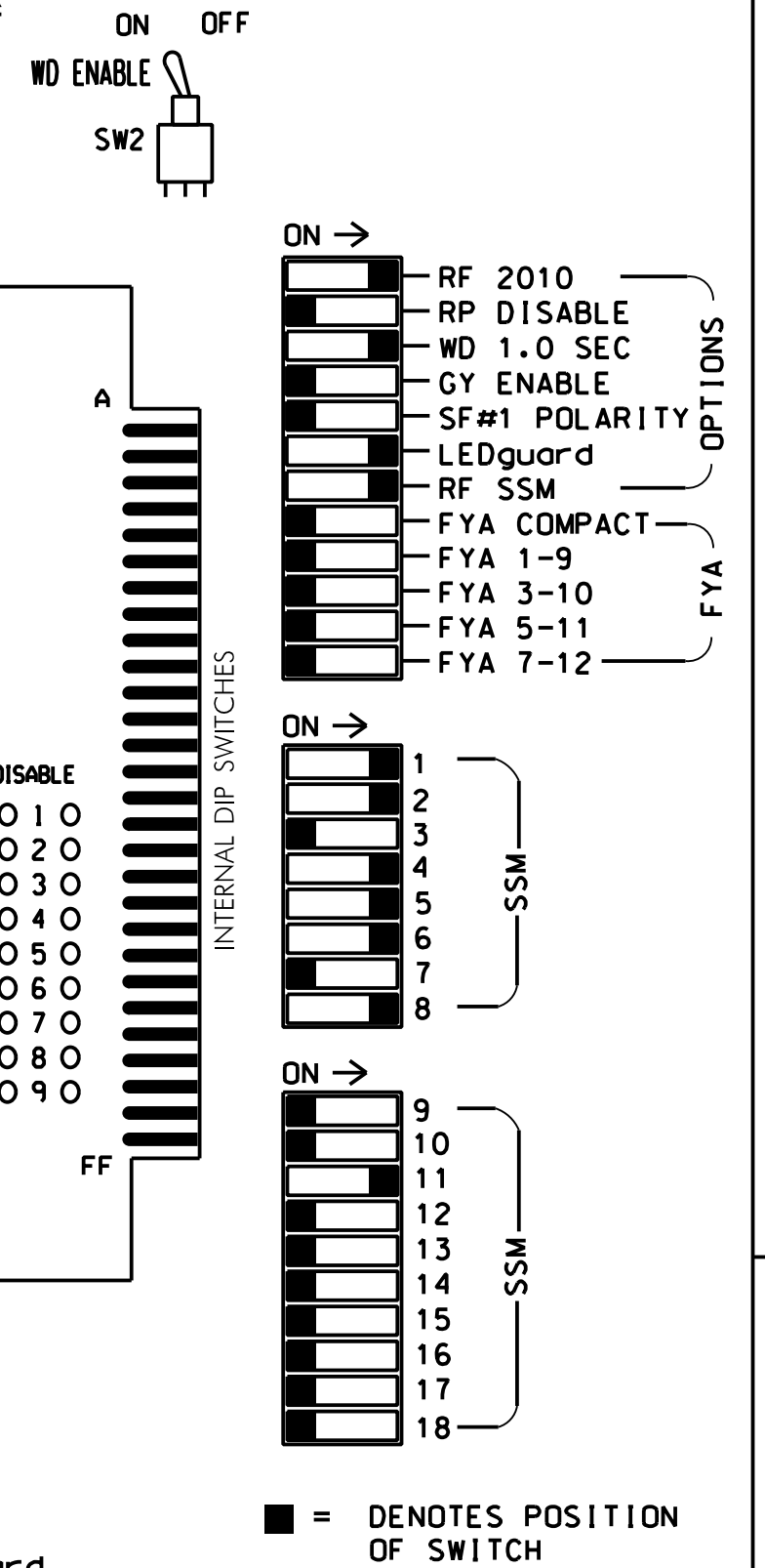
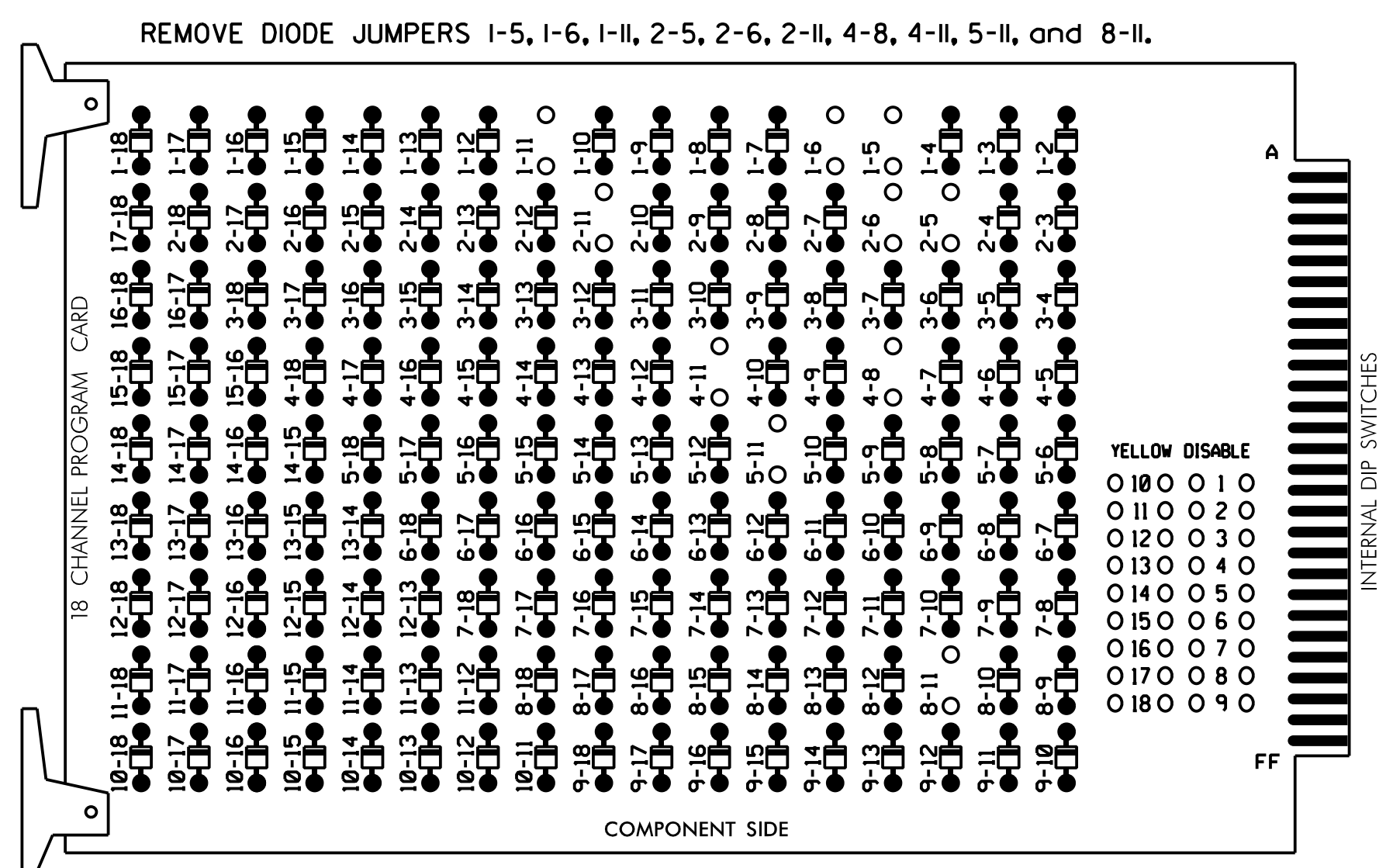
HNTB HNTB NORTH CAROLINA, P.C. 343 E. Six Forks Road, Suite 200 Raleigh, North Carolina 27609 NC License No: C-1554 (919) 546-8997



DocuSigned by: Natasha R. Simmons 12/7/2018

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



NOTES:

- Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
- Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
- Ensure that Red Enable is active at all times during normal operation.
- Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.

NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
- Enable Simultaneous Gap-Out for all Phases.
- Program phases 4 and 8 for Dual Entry.
- Program phases 2 and 6 for Variable Initial and Gap Reduction.
- Program phases 2 and 6 for Startup In Green.
- Program phases 2 and 6 for Yellow Flash.
- The cabinet and controller are part of the Havelock US 70 Business Closed Loop Signal System.

SIGNAL HEAD HOOK-UP CHART

| LOAD SWITCH NO. | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 | AUX S1 | AUX S2 | AUX S3 | AUX S4 | AUX S5 | AUX S6 |
|-----------------------|-----|-------|-------|----|-------|-------|-------|-------|-------|-----|-------|-------|--------|--------|--------|--------|--------|--------|
| CMU CHANNEL NO. | 1 | 2 | 13 | 3 | 4 | 14 | 5 | 6 | 15 | 7 | 8 | 16 | 9 | 10 | 17 | 11 | 12 | 18 |
| PHASE | 1 | 2 | 2 PED | 3 | 4 | 4 PED | 5 | 6 | 6 PED | 7 | 8 | 8 PED | OLA | OLB | SPARE | OLC | OLD | SPARE |
| SIGNAL HEAD NO. | 11 | 21,22 | NU | NU | 41,42 | NU | 51,52 | 61,62 | NU | NU | 81,82 | NU | NU | NU | NU | 43,44 | NU | NU |
| RED | | 128 | | | 101 | | | 134 | | | 107 | | | | | A114 | | |
| YELLOW | | 129 | | | 102 | | | 135 | | | 108 | | | | | | | |
| GREEN | | 130 | | | 103 | | | 136 | | | 109 | | | | | | | |
| RED ARROW | 125 | | | | | | | 131 | | | | | | | | | | |
| YELLOW ARROW | 126 | | | | | | | 132 | | | | | | | | A115 | | |
| FLASHING YELLOW ARROW | | | | | | | | | | | | | | | | | | |
| GREEN ARROW | 127 | | | | | | | 133 | | | | | | | | A116 | | |

NU = Not Used

EQUIPMENT INFORMATION

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

OVERLAP PROGRAMMING DETAIL

(program controller as shown below)
 FROM MAIN MENU PRESS '8' (OVERLAPS), THEN '1' (VEHICLE OVERLAP SETTINGS).
 PRESS '+' TWICE

PAGE 1: VEHICLE OVERLAP 'C' SETTINGS
 PHASE: 12345678910111213141516
 VEH OVL PARENTS: XX
 VEH OVL NOT VEH:
 VEH OVL NOT PED:
 VEH OVL GRN EXT:
 STARTUP COLOR: - RED - YELLOW - GREEN
 FLASH COLORS: - RED - YELLOW - GREEN
 SELECT VEHICLE OVERLAP OPTIONS: (Y/N)
 FLASH YELLOW IN CONTROLLER FLASH?...N
 GREEN EXTENSION (0-255 SEC).....0
 YELLOW CLEAR (0=PARENT,3-25.5 SEC)...3.9
 RED CLEAR (0=PARENT,0.1-25.5 SEC)...3.4
 OUTPUT AS PHASE # (0=NONE, 1-16).....0

OVERLAP PROGRAMMING COMPLETE

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 02-0227
 DESIGNED: March 2018
 SEALED: 12-7-18
 REVISED: N/A

INPUT FILE POSITION LAYOUT

(front view)

| FILE "I" | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|----------|----------|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|-------------|
| U | ∅ 1 | ∅ 2 | ∅ 3 | ∅ 4 | ∅ 5 | ∅ 6 | ∅ 7 | ∅ 8 | ∅ 9 | ∅ 10 | ∅ 11 | ∅ 12 | ∅ 13 | ∅ 14 |
| L | 1A | 2A | 2B | 4A | 4B | S13 | S14 | S15 | S16 | S17 | S18 | S19 | S20 | FS |
| | NOT USED | 2B | | 4B | | S13 | S14 | | | | | | | DC ISOLATOR |
| U | ∅ 5 | ∅ 5 | ∅ 6 | ∅ 8 | ∅ 8 | ∅ 8 | ∅ 8 | ∅ 8 | ∅ 8 | ∅ 8 | ∅ 8 | ∅ 8 | ∅ 8 | ∅ 8 |
| L | 5A | 5C | 6A | 8A | 8B | 8B | 8B | 8B | 8B | 8B | 8B | 8B | 8B | 8B |

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

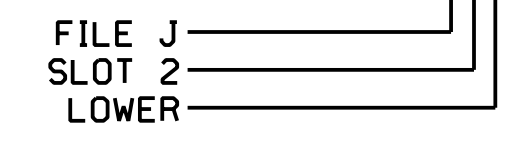
FS = FLASH SENSE
 ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

| LOOP NO. | LOOP TERMINAL | INPUT FILE POS. | PIN NO. | INPUT ASSIGNMENT NO. | DETECTOR NO. | NEMA PHASE | CALL | EXTEND | FULL TIME DELAY | STRETCH TIME | DELAY TIME |
|----------|---------------|-----------------|---------|----------------------|--------------|------------|------|--------|-----------------|--------------|------------|
| 1A | TB2-1,2 | I1U | 56 | 18 | 1 | 1 | Y | Y | | | |
| 2A | TB2-5,6 | I2U | 39 | 1 | 2 | 2 | Y | Y | | | |
| 2B | TB2-7,8 | I2L | 43 | 5 | 12 | 2 | Y | Y | | | |
| 4A | TB4-9,10 | I6U | 41 | 3 | 4 | 4 | Y | Y | | | |
| 4B | TB4-11,12 | I6L | 45 | 7 | 14 | 4 | Y | Y | | | |
| * S13 | TB6-9,10 | I9U | 60 | 22 | 11 | SYS | | | | | |
| * S14 | TB6-11,12 | I9L | 62 | 24 | 13 | SYS | | | | | |
| 5A | TB3-1,2 | J1U | 55 | 17 | 5 | 5 | Y | Y | | | |
| 5B | TB3-3,4 | J1L | 55 | 17 | 5 | 5 | Y | Y | | | |
| 5C | TB3-5,6 | J2U | 40 | 2 | 6 | 5 | Y | Y | | | |
| 5D | TB3-7,8 | J2L | 44 | 6 | 16 | 5 | Y | Y | | | |
| 6A | TB3-9,10 | J3U | 64 | 26 | 36 | 6 | Y | Y | | | |
| 6B | TB3-11,12 | J3L | 77 | 39 | 46 | 6 | Y | Y | | | |
| 8A | TB5-9,10 | J6U | 42 | 4 | 8 | 8 | Y | Y | | | |
| 8B | TB5-11,12 | J6L | 46 | 8 | 18 | 8 | Y | Y | | | 10 |

* System detector only. Remove the vehicle phase assigned to this detector in the default programming.

INPUT FILE POSITION LEGEND: J2L



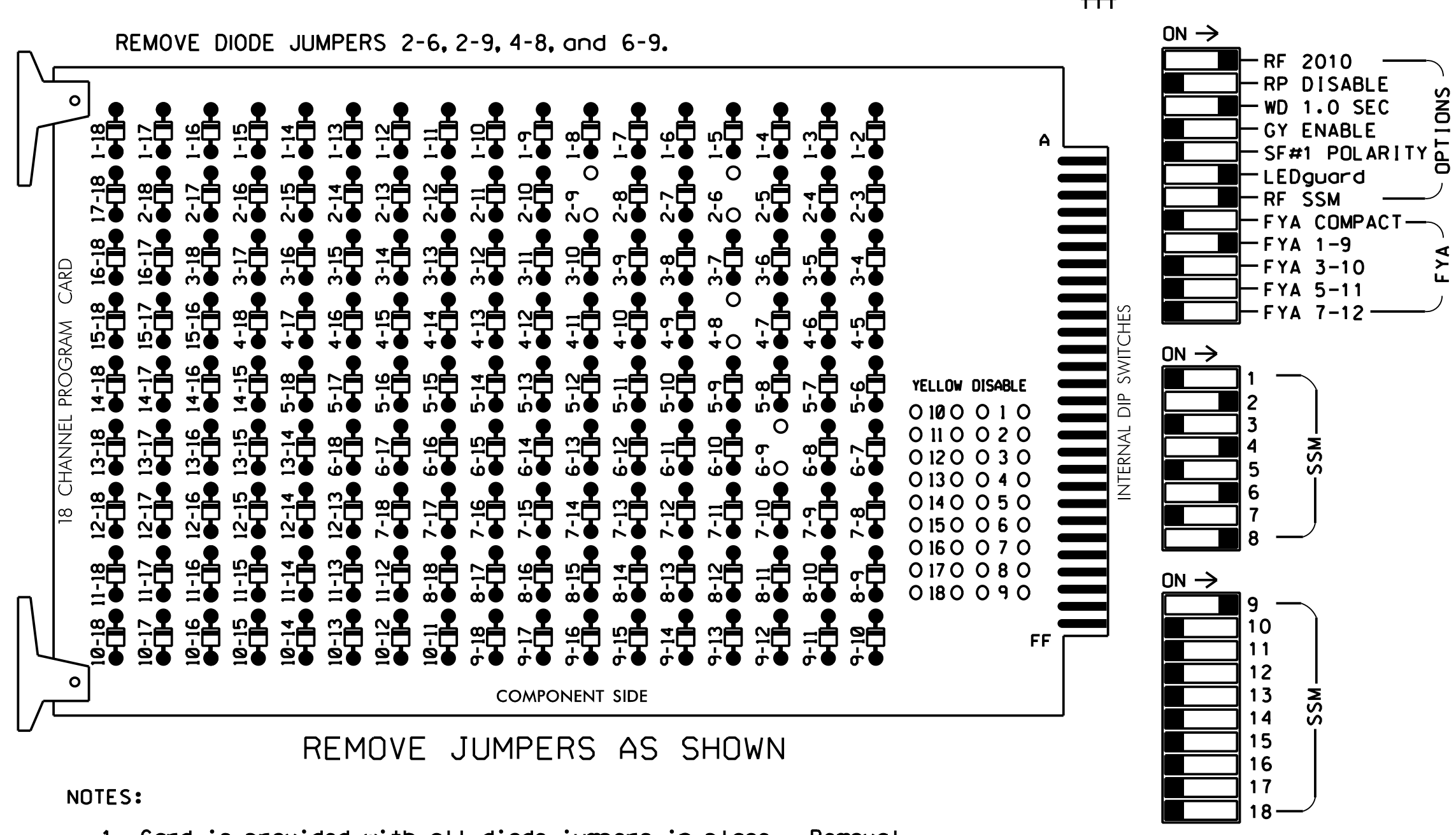
Electrical Detail Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

| | | |
|---|---|--|
| | Prepared for: US 70 Business (Main Street) at NC 101 (Fontana Boulevard)/ SR 1763 (Miller Boulevard) | SEAL |
| | Division 02 Craven Co. Havelock PLAN DATE: March 2018 REVIEWED BY: A.D. Klinksiek PREPARED BY: A.H. Thornburg REVIEWED BY: N.R. Simmons | |
| HNTB HNTB NORTH CAROLINA, P.C. 343 E. Six Forks Road, Suite 200 Raleigh, North Carolina 27609 NC License No: C-1554 (919) 546-8997 | REVISIONS INITI. DATE 12/7/2018 Natasha R. Simmons DATE SIG. INVENTORY NO. 02-0227 | SEAL 750 N. Greenfield Pkwy, Corner, NC 27529 |

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



NOTES:

- Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
- Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
- Ensure that Red Enable is active at all times during normal operation.
- Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.

NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
- Enable Simultaneous Gap-Out for all Phases.
- Program phases 4 and 8 for Dual Entry.
- Program phases 2 and 6 for Variable Initial and Gap Reduction.
- Program phases 2 and 6 for Startup In Green.
- Program phases 2 and 6 for Yellow Flash, and overlap 1 as Wag Overlaps.
- The cabinet and controller are part of the Havelock US 70 Business Closed Loop Signal System.

SIGNAL HEAD HOOK-UP CHART

| LOAD SWITCH NO. | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 | AUX S1 | AUX S2 | AUX S3 | AUX S4 | AUX S5 | AUX S6 |
|-----------------------|----|-------------|-------|----|-------|-------|----|-------------|-------|-----|-------|-------|--------|--------|--------|--------|--------|--------|
| CMU CHANNEL NO. | 1 | 2 | 13 | 3 | 4 | 14 | 5 | 6 | 15 | 7 | 8 | 16 | 9 | 10 | 17 | 11 | 12 | 18 |
| PHASE | 1 | 2 | 2 PED | 3 | 4 | 4 PED | 5 | 6 | 6 PED | 7 | 8 | 8 PED | OLA | OLB | SPARE | OLC | OLD | SPARE |
| SIGNAL HEAD NO. | NU | 21,22,23,24 | NU | NU | 41,42 | NU | NU | 62,63,65,66 | NU | NU | 81,82 | NU | 61,64 | NU | NU | NU | NU | NU |
| RED | | 128 | | | 101 | | | 134 | | | 107 | | | | | | | |
| YELLOW | | 129 | | | 102 | | | 135 | | | 108 | | | | | | | |
| GREEN | | 130 | | | 103 | | | 136 | | | 109 | | | | | | | |
| RED ARROW | | | | | | | | | | | | | A121 | | | | | |
| YELLOW ARROW | | | | | | | | | | | | | | A122 | | | | |
| FLASHING YELLOW ARROW | | | | | | | | | | | | | | A123 | | | | |
| GREEN ARROW | | | | | | | | | | | | | | | | | | |

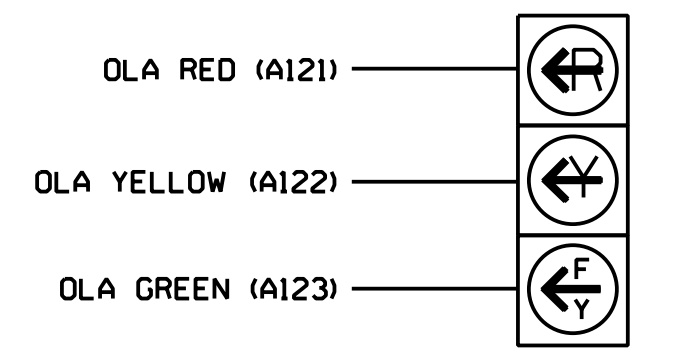
NU = Not Used
 ★ See pictorial of head wiring in detail this sheet.

EQUIPMENT INFORMATION

CONTROLLER.....2070E
 CABINET.....332 W/AUX
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
 LOAD SWITCHES USED.....S2,S5,S8,S11,AUX S1
 PHASES USED.....2,4,6,8
 OVERLAP "A".....2
 OVERLAP "B".....NOT USED
 OVERLAP "C".....NOT USED
 OVERLAP "D".....NOT USED

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



61,64

INPUT FILE POSITION LAYOUT

(front view)

| FILE "I" | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|----------|----------|-----|-----|----------|----|-----|-----|-----|-------------|----|-------------|----|----|----|
| U | S | ∅ 2 | ∅ 2 | S | S | ∅ 4 | S | S | SYS | S | S | S | S | FS |
| L | 2A | 2C | 2B | 2D | 4A | 4B | S28 | S29 | DC ISOLATOR | ST | DC ISOLATOR | | | |
| U | ∅ 6 | ∅ 6 | ∅ 6 | ∅ 6 | S | ∅ 8 | S | S | S | S | S | S | S | S |
| L | 6A | 6B | 6D | 6F | 8A | 8B | | | | | | | | |
| U | NOT USED | ∅ 6 | ∅ 6 | NOT USED | | | | | | | | | | |
| L | 6C | 6E | | | | | | | | | | | | |

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

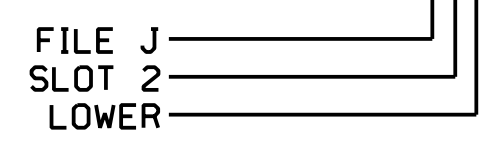
FS = FLASH SENSE
 ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

| LOOP NO. | LOOP TERMINAL | INPUT FILE POS. | PIN NO. | INPUT ASSIGNMENT NO. | DETECTOR NO. | NEMA PHASE | CALL | EXTEND | FULL TIME DELAY | STRETCH TIME | DELAY TIME |
|----------|---------------|-----------------|---------|----------------------|--------------|------------|------|--------|-----------------|--------------|------------|
| 2A | TB2-5,6 | I2U | 39 | 1 | 2 | 2 | Y | Y | | | |
| 2B | TB2-7,8 | I2L | 43 | 5 | 12 | 2 | Y | Y | | | |
| 2C | TB2-9,10 | I3U | 63 | 25 | 32 | 2 | Y | Y | | | |
| 2D | TB2-11,12 | I3L | 76 | 38 | 42 | 2 | Y | Y | | | |
| 4A | TB4-9,10 | I6U | 41 | 3 | 4 | 4 | Y | Y | | | |
| 4B | TB4-11,12 | I6L | 45 | 7 | 14 | 4 | Y | Y | | | |
| *S28 | TB6-9,10 | I9U | 60 | 22 | 11 | SYS | | | | | |
| *S29 | TB6-11,12 | I9L | 62 | 24 | 13 | SYS | | | | | |
| 6A | TB3-1,2 | J1U | 55 | 17 | 5 | 6 | Y | Y | | | |
| 6B | TB3-5,6 | J2U | 40 | 2 | 6 | 6 | Y | Y | | | |
| 6C | TB3-7,8 | J2L | 44 | 6 | 16 | 6 | Y | Y | | | |
| 6D | TB3-9,10 | J3U | 64 | 26 | 36 | 6 | Y | Y | | | |
| 6E | TB3-11,12 | J3L | 77 | 39 | 46 | 6 | Y | Y | | | |
| 6F | TB5-1,2 | J4U | 48 | 10 | 26 | 6 | Y | Y | | | |
| 8A | TB5-9,10 | J6U | 42 | 4 | 8 | 8 | Y | Y | | | |
| 8B | TB5-11,12 | J6L | 46 | 8 | 18 | 8 | Y | Y | | | 15 |

* System detector only. Remove the vehicle phase assigned to this detector in the default programming.

INPUT FILE POSITION LEGEND: J2L



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 02-0189
 DESIGNED: March 2018
 SEALED: 12-7-18
 REVISED: N/A

OVERLAP PROGRAMMING DETAIL FOR DEFAULT PHASING

(program controller as shown below)

FROM MAIN MENU PRESS '8' (OVERLAPS), THEN '1' (VEHICLE OVERLAP SETTINGS).

PAGE 1: VEHICLE OVERLAP 'A' SETTINGS
 PHASE: :12345678910111213141516
 VEH OVL PARENTS: X
 VEH OVL NOT VEH: :
 VEH OVL NOT PED: :
 VEH OVL GRN EXT: :
 STARTUP COLOR: - RED - YELLOW - GREEN
 FLASH COLORS: - RED - YELLOW X GREEN
 SELECT VEHICLE OVERLAP OPTIONS: (Y/N)
 FLASH YELLOW IN CONTROLLER FLASH?...Y
 GREEN EXTENSION (0=25.5 SEC)...0.0
 YELLOW CLEAR (0=PARENT,3-25.5 SEC)...0.0
 RED CLEAR (0=PARENT,0.1-25.5 SEC)...0.0
 OUTPUT AS PHASE # (0=NONE, 1-16)...0

← NOTICE GREEN FLASH

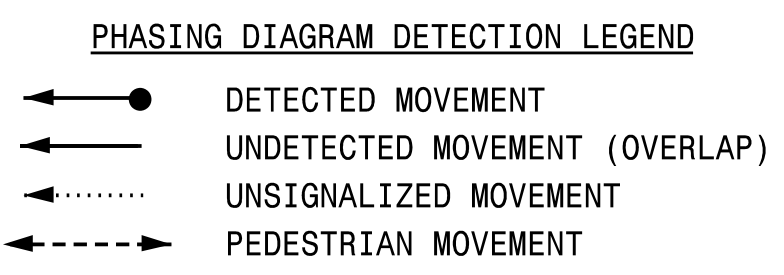
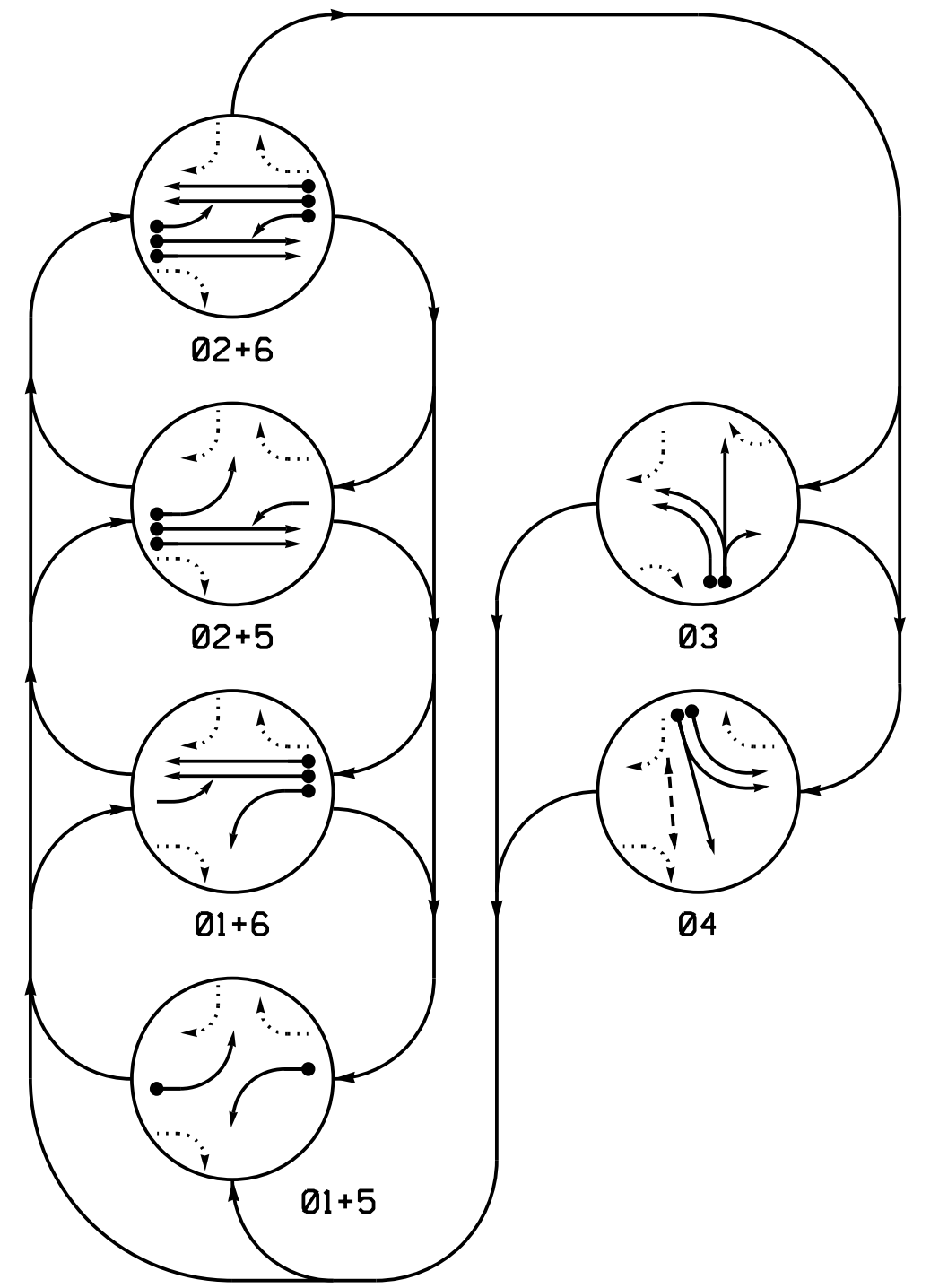
OVERLAP PROGRAMMING COMPLETE

Electrical Detail Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

| | | | |
|--|---|--|----------|
| | Prepared for: US 70 Business (E Main Street) at SR 1737 (Roosevelt Boulevard)/Woodhaven Drive | | SEAL |
| | Division 02 PLAN DATE: March 2018 PREPARED BY: A.H. Thornburg | Craven Co. REVIEWED BY: A.D. Klinksiek REVIEWED BY: N.R. Simmons | |

PHASING DIAGRAM



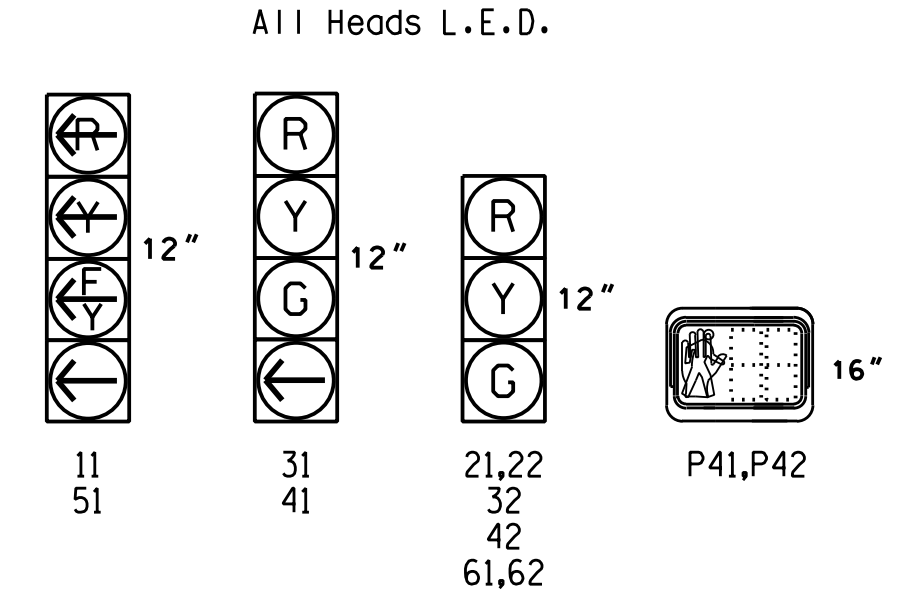
EV PREEMPT PHASES
(Medium Priority)



TABLE OF OPERATION

| SIGNAL FACE | PHASE | | | | | | | | | | | |
|-------------|-------|------|------|------|----|----|------|-----|------|-----|-----|---|
| | 01+5 | 01+6 | 02+5 | 02+6 | 03 | 04 | PREF | FL | ISOL | DRK | DRK | |
| 11 | - | - | F | F | R | R | R | R | - | - | - | - |
| 21,22 | R | R | G | G | R | R | R | R | Y | - | - | - |
| 31 | R | R | R | R | G | R | R | R | - | - | - | - |
| 32 | R | R | R | R | G | R | R | R | - | - | - | - |
| 41 | R | R | R | R | R | G | G | R | - | - | - | - |
| 42 | R | R | R | R | R | G | G | R | - | - | - | - |
| 51 | - | F | - | F | R | R | R | R | - | - | - | - |
| 61,62 | R | G | R | G | R | R | R | Y | - | - | - | - |
| P41,P42 | DW | DW | DW | DW | DW | W | DW | DRK | - | - | - | - |

SIGNAL FACE I.D.



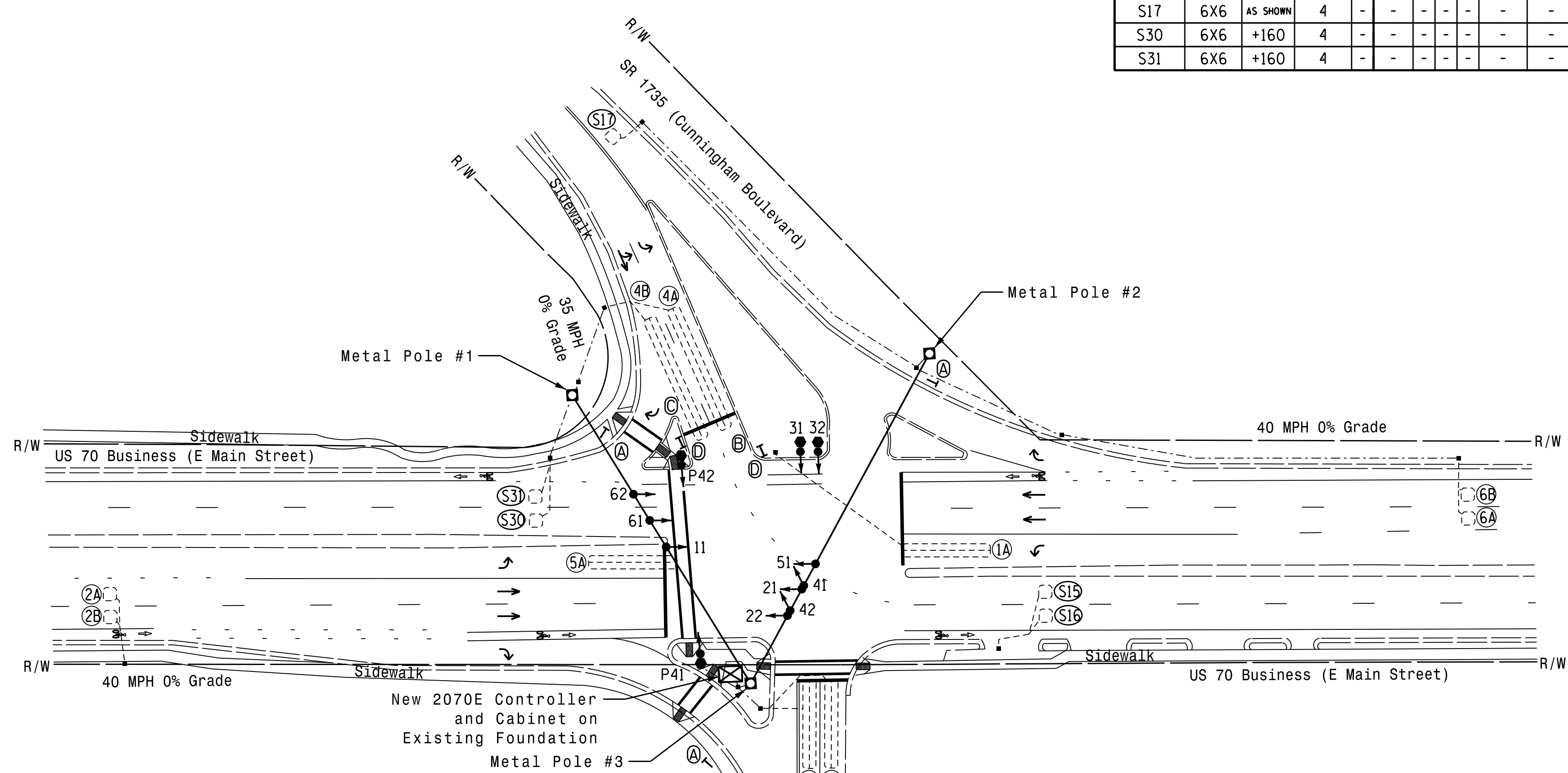
OASIS 2070 LOOP & DETECTOR INSTALLATION CHART

| LOOP | SIZE (FT) | DISTANCE FROM STOPBAR (FT) | TURNS | NEW LOOP | DETECTOR PROGRAMMING | | | | SYSTEM LOOP | NEW CARD | |
|-------|-----------|----------------------------|-------|----------|----------------------|---------|-----------|-----------------|-------------|----------|---|
| | | | | | PHASE | CALLING | EXTENSION | FULL TIME DELAY | | | |
| 1A | 6X40 | 0 | 2-4-2 | - | 1 | Y | Y | - | 15 | - | Y |
| 2A,2B | 6X6 | 250 | 4 | - | 2 | Y | Y | - | 3 | - | Y |
| 3A | 6X40 | 0 | 2-4-2 | - | 3 | Y | Y | - | - | - | Y |
| 3B | 6X40 | 0 | 2-4-2 | - | 3 | Y | Y | - | 5 | - | Y |
| 4A | 6X60 | +5 | 2-4-2 | - | 4 | Y | Y | - | - | - | Y |
| 4B | 6X60 | +5 | 2-4-2 | - | 4 | Y | Y | - | 5 | - | Y |
| 5A | 6X40 | +5 | 2-4-2 | - | 5 | Y | Y | - | 15 | - | Y |
| 6A,6B | 6X6 | 255 | 4 | - | 6 | Y | Y | - | - | - | Y |
| S15 | 6X6 | +170 | 4 | - | - | - | - | - | - | - | Y |
| S16 | 6X6 | +170 | 4 | - | - | - | - | - | - | - | Y |
| S17 | 6X6 | AS SHOWN | 4 | - | - | - | - | - | - | - | Y |
| S30 | 6X6 | +160 | 4 | - | - | - | - | - | - | - | Y |
| S31 | 6X6 | +160 | 4 | - | - | - | - | - | - | - | Y |

6 Phase Fully Actuated w/ EV Preempt Havelock US 70 Business CLS

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Phase 1 and/or phase 5 may be lagged.
- The order of phase 3 and phase 4 may be reversed.
- Set all detector units to presence mode.
- In the event of loop replacement, refer to the current ITS and Signals Design Manual and submit a Plan of Record to the Signal Design Section.
- Renumber existing loops 2B,2C,6B, and 6C as 2A,2B,6A, and 6B, respectively.
- Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
- Program pedestrian heads to countdown the flashing "DON'T WALK" time only.
- Pavement markings are existing.
- The Division Traffic Engineer will determine the Delay before Preempt and Preempt Dwell Min Green time for the emergency vehicle preemption timing.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- Closed loop system data: Controller Asset #0190



OASIS 2070 TIMING CHART

| FEATURE | PHASE | | | | | |
|-------------------------|-------|------------|-----|-----|-----|------------|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| Min Green 1 * | 7 | 12 | 7 | 7 | 7 | 12 |
| Extension 1 * | 2.0 | 6.0 | 3.0 | 3.0 | 2.0 | 6.0 |
| Max Green 1 * | 20 | 75 | 35 | 35 | 20 | 75 |
| Yellow Clearance | 3.0 | 4.2 | 3.2 | 3.8 | 3.0 | 4.2 |
| Red Clearance | 2.4 | 1.9 | 3.2 | 2.6 | 3.1 | 1.9 |
| Red Revert | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| Walk 1 * | - | - | - | 7 | - | - |
| Don't Walk 1 | - | - | - | 20 | - | - |
| Seconds Per Actuation * | - | 1.5 | - | - | - | 1.5 |
| Max Variable Initial * | - | 29 | - | - | - | 30 |
| Time Before Reduction * | - | 15 | - | - | - | 15 |
| Time To Reduce * | - | 45 | - | - | - | 45 |
| Minimum Gap | - | 3.0 | - | - | - | 3.0 |
| Recall Mode | - | MIN RECALL | - | - | - | MIN RECALL |
| Vehicle Call Memory | - | YELLOW | - | - | - | YELLOW |
| Dual Entry | - | - | - | - | - | - |
| Simultaneous Gap | ON | ON | ON | ON | ON | ON |

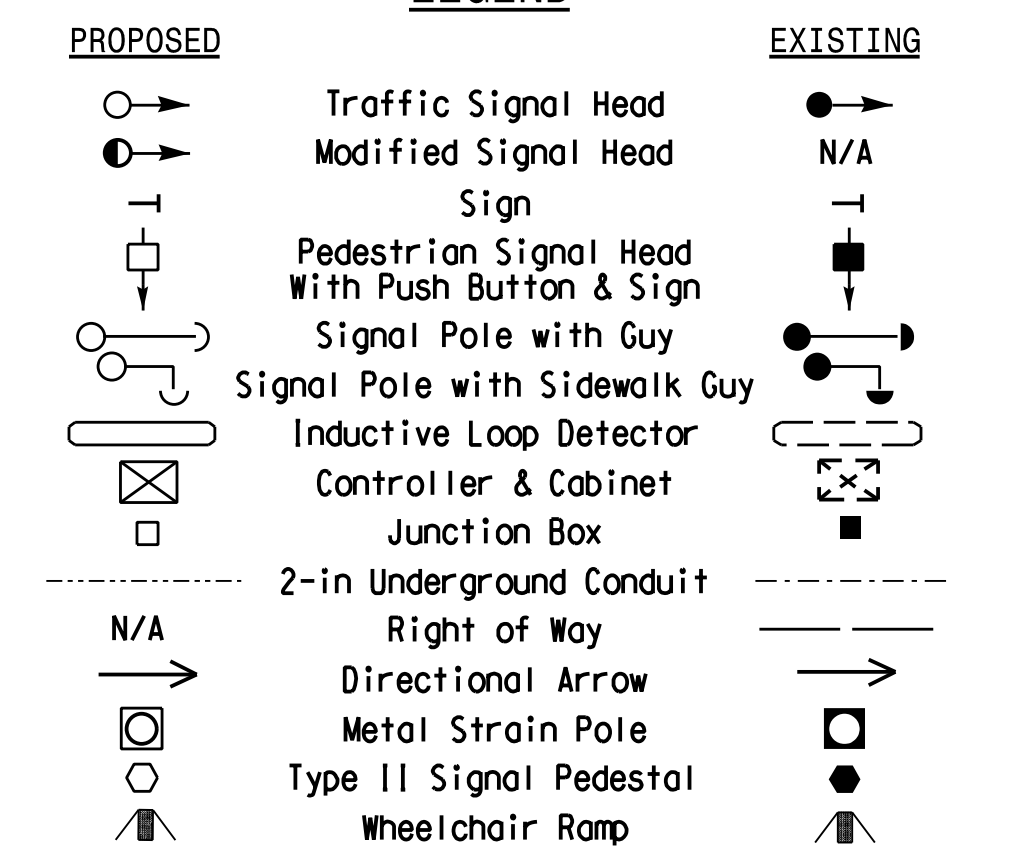
* These values may be field adjusted. Do not adjust Min Green and Extension times for phases 2 and 6 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.

OASIS 2070 EV PREEMPT

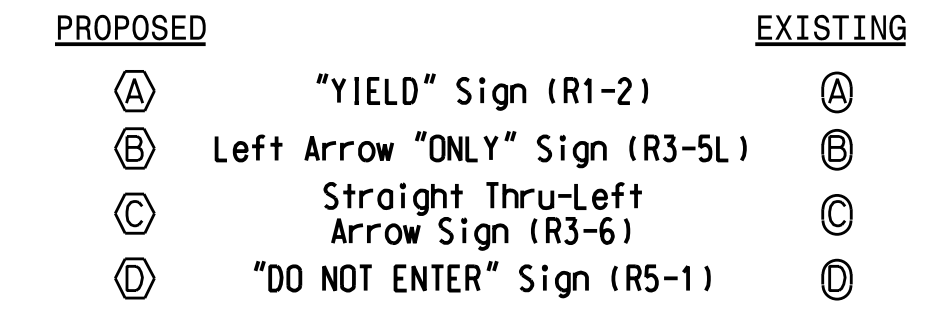
| FUNCTION | PRE 2 |
|---------------------------|--------|
| Interval 1 - Dwell Green | 255 |
| Interval 1 - Dwell Yellow | 0.0* |
| Interval 1 - Dwell Red | 0.0* |
| Interval 5 - Exit Green | 1 |
| Interval 5 - Yellow | 0.0 |
| Interval 5 - Red | 0.0 |
| Exit Phase(s) | 2,6 |
| Priority | Medium |
| Delay Time | ** |
| Min Green Before Pre | 1 |
| Ped Clear Before Pre | 0* |
| Yellow Clear Before Pre | 0.0* |
| Red Clear Before Pre | 0.0* |
| Dwell Min Time | ** |
| Enable Backup Protection | N |
| Ped Clear Through Yellow | Y |
| Omit Overlaps | - |
| Preempt Extend | - |

** Time defaults to time used for phase during normal operation See Note 10

LEGEND



SIGNS



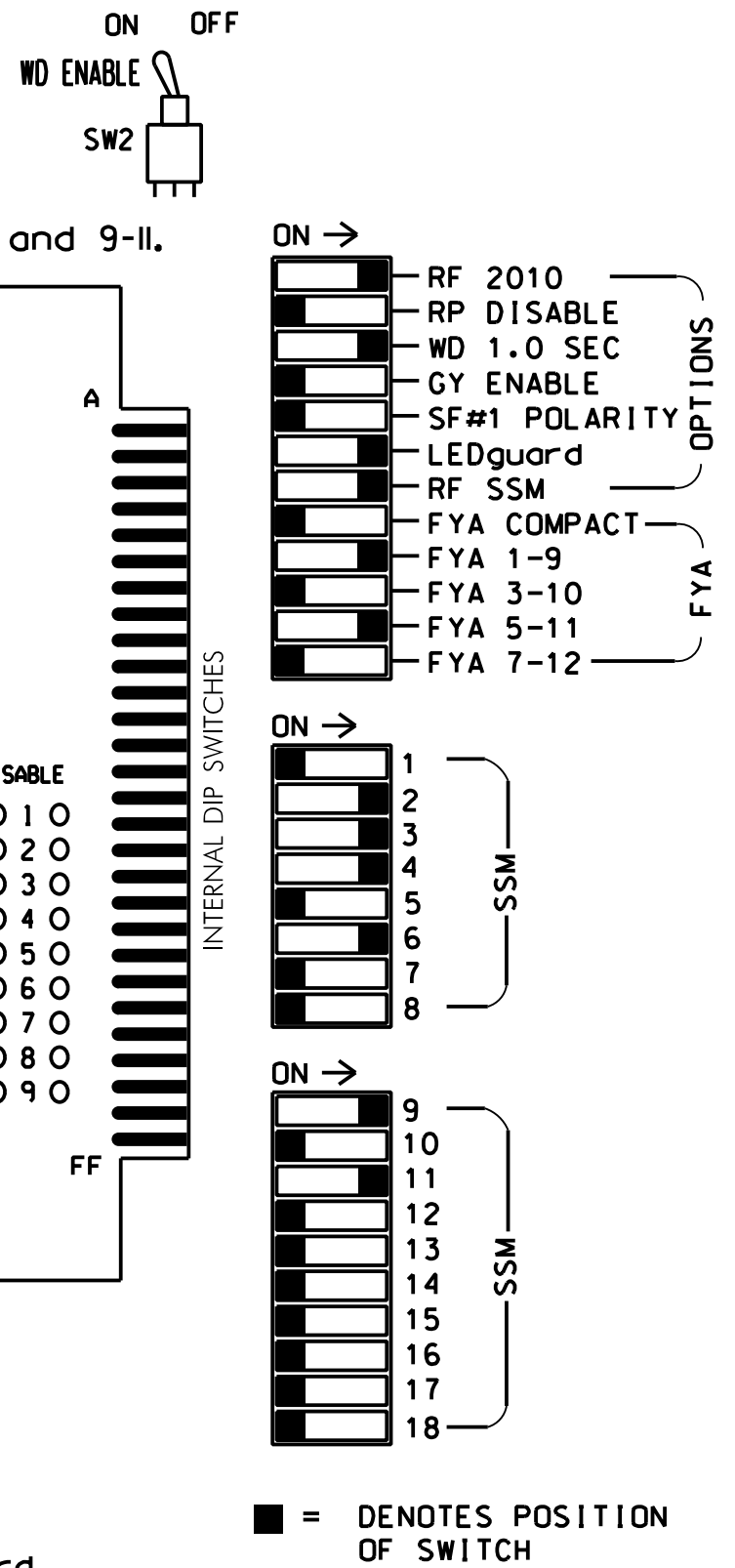
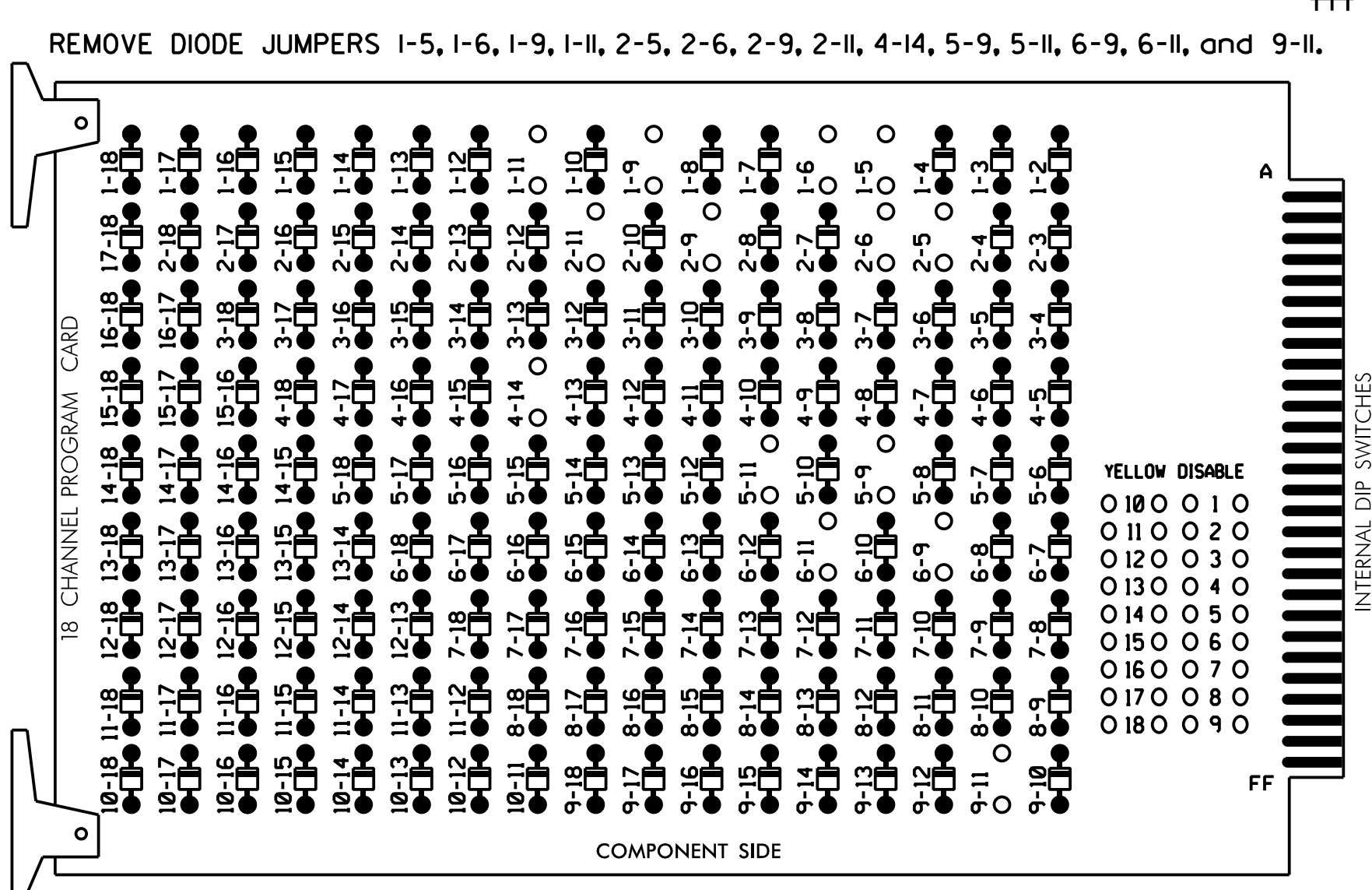
Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

| | | | |
|-----------------------------|--|-----------------------|------------------|
| | US 70 Business (E Main St) at SR 1735 (Cunningham Boulevard)/ Annunciation Catholic School | | |
| | Division 02 Craven Co. Havelock | PLAN DATE: March 2018 | |
| PREPARED BY: A.H. Thornburg | REVIEWED BY: N.R. Simmons | DATE: 12/7/2018 | SIGNATURE: _____ |
| SCALE: 1"=40' | REVISIONS: _____ | INITI: _____ | DATE: _____ |

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



NOTES:

- Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
- Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
- Ensure that Red Enable is active at all times during normal operation.
- Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.

NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
- Enable Simultaneous Gap-Out for all Phases.
- Program phases 2 and 6 for Variable Initial and Gap Reduction.
- Program phases 2 and 6 for Startup In Green.
- Program phase 4 for Startup Ped Call.
- Program phases 2 and 6 for Yellow Flash, and overlap 1 as Wag Overlaps.
- The cabinet and controller are part of the Havelock US 70 Business Closed Loop Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070E
 CABINET.....332 W/AUX
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE AUX S1,AUX S4
 LOAD SWITCHES USED.....S1,S2,S3*,S4,S5,S6,S7,S8
 PHASES USED.....1,2,3,4,4 PED,5,6
 OVERLAP "A".....1+2
 OVERLAP "B".....NOT USED
 OVERLAP "C".....5+6
 OVERLAP "D".....NOT USED
 *USED FOR FIRE STATION PILOT LAMP CONTROL

SIGNAL HEAD HOOK-UP CHART

| LOAD SWITCH NO. | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 | AUX S1 | AUX S2 | AUX S3 | AUX S4 | AUX S5 | AUX S6 |
|-----------------------|-----|-------|-----------------|-----|-----|-------|-----|----------|-------|-------|-----|-------|--------|--------|--------|--------|--------|--------|
| CMU CHANNEL NO. | 1 | 2 | 13 | 3 | 4 | 14 | 5 | 6 | 15 | 7 | 8 | 16 | 9 | 10 | 17 | 11 | 12 | 18 |
| PHASE | 1 | 2 | 2 PED | 3 | 4 | 4 PED | 5 | 6 | 6 PED | 7 | 8 | 8 PED | OLA | OLB | SPARE | OLC | OLD | SPARE |
| SIGNAL HEAD NO. | 11* | 21,22 | FIRE PILOT LAMP | 31 | 32 | 41 | 42 | P41, P42 | 51* | 61,62 | NU | NU | NU | NU | NU | 51* | NU | NU |
| RED | 128 | | 116 | 116 | 101 | 101 | | | 134 | | | | | | | | | |
| YELLOW | * | 129 | | 117 | 117 | 102 | 102 | | * | 135 | | | | | | | | |
| GREEN | | 130 | | 118 | 118 | 103 | 103 | | 136 | | | | | | | | | |
| RED ARROW | | | | | | | | | | | | | A121 | | | | A114 | |
| YELLOW ARROW | | | | | | | | | | | | | A122 | | | | A115 | |
| FLASHING YELLOW ARROW | | | | | | | | | | | | | A123 | | | | A116 | |
| GREEN ARROW | 127 | | | 118 | 103 | | | | 133 | | | | | | | | | |
| PED YELLOW | | | | | | | | | 104 | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | 106 |

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

INPUT FILE POSITION LAYOUT

(front view)

| FILE "I" | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|----------|-----------|--------------|------------|------------|------------|-----------|------------|------------|---------------------|----------------|----------------|----------------|----------------|----------------|
| U | ∅ 1 1A | ∅ 2 2A,2B | ∅ 3 3A | ∅ 3 3B | ∅ 4 4A | ∅ 4 4B | SYS S15 | SYS S16 | NOT USED ∅ 4 PED | FS ISOLATOR | FS ISOLATOR | FS ISOLATOR | FS ISOLATOR | FS ISOLATOR |
| L | NOT USED | NOT USED | NOT USED | NOT USED | NOT USED | NOT USED | NOT USED | NOT USED | NOT USED | NOT USED | NOT USED | NOT USED | NOT USED | NOT USED |
| U | ∅ 5 5A | ∅ 6 6A,6B | SYS S17 | SYS S30 | SYS S31 | NOT USED | NOT USED | NOT USED | NOT USED | NOT USED | NOT USED | NOT USED | NOT USED | NOT USED |
| L | NOT USED | NOT USED | NOT USED | NOT USED | NOT USED | NOT USED | NOT USED | NOT USED | NOT USED | NOT USED | NOT USED | NOT USED | NOT USED | NOT USED |

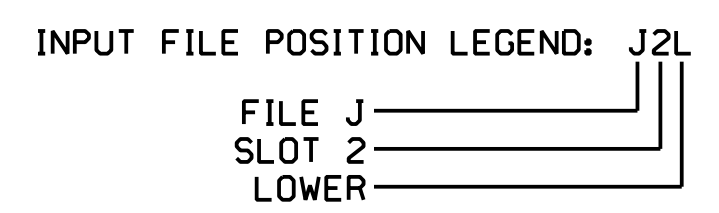
EX. : 1A, 2A, ETC. = LOOP NO.'S
 FS = FLASH SENSE
 ST = STOP TIME
 PRE2 = EV PREEMPT
 * Wired Input - Do not populate slot with detector card

INPUT FILE CONNECTION & PROGRAMMING CHART

| LOOP NO. | LOOP TERMINAL | INPUT FILE POS. | PIN NO. | INPUT ASSIGNMENT NO. | DETECTOR NO. | NEMA PHASE | CALL | EXTEND | FULL TIME DELAY | STRETCH TIME | DELAY TIME |
|------------------|---------------|-----------------|---------|----------------------|--------------|------------|------|--------|-----------------|--------------|------------|
| 1A ¹ | TB2-1,2 | I1U | 56 | 18 | 1 | 1 | Y | Y | | | 15 |
| | | J4U | 48 | 10 | 26 | 6 | Y | Y | Y | | 3 |
| 2A,2B | TB2-5,6 | I2U | 39 | 1 | 2 | 2 | Y | Y | | | |
| 3A | TB4-5,6 | I5U | 58 | 20 | 3 | 3 | Y | Y | | | |
| 3B | TB4-9,10 | I6U | 41 | 3 | 4 | 3 | Y | Y | | | 5 |
| 4A | TB6-1,2 | I7U | 65 | 27 | 34 | 4 | Y | Y | | | |
| 4B | TB6-3,4 | I7L | 78 | 40 | 44 | 4 | Y | Y | | | 5 |
| 5A ² | TB3-1,2 | J1U | 55 | 17 | 5 | 5 | Y | Y | | | 15 |
| | | I4U | 47 | 9 | 22 | 2 | Y | Y | Y | | 3 |
| * S15 | TB6-9,10 | I9U | 60 | 22 | 11 | SYS | | | | | |
| * S16 | TB6-11,12 | I9L | 62 | 24 | 13 | SYS | | | | | |
| 6A,6B | TB3-5,6 | J2U | 40 | 2 | 6 | 6 | Y | Y | | | |
| * S17 | TB7-1,2 | J7U | 66 | 28 | 38 | SYS | Y | Y | | | |
| * S30 | TB7-9,10 | J9U | 59 | 21 | 15 | SYS | | | | | |
| * S31 | TB7-11,12 | J9L | 61 | 23 | 17 | SYS | | | | | |
| PED PUSH BUTTONS | | | | | | | | | | | |
| P41,P42 | TB8-5,6 | I12L | 69 | 31 | PED 4 | 4 PED | | | | | |

NOTE:
 INSTALL DC ISOLATOR IN INPUT FILE SLOT I12.

- Add jumper from I1-W to J4-W. on rear of input file.
 - Add jumper from J1-W to I4-W. on rear of input file.
- * System detector only. Remove the vehicle phase assigned to this detector in the default programming.

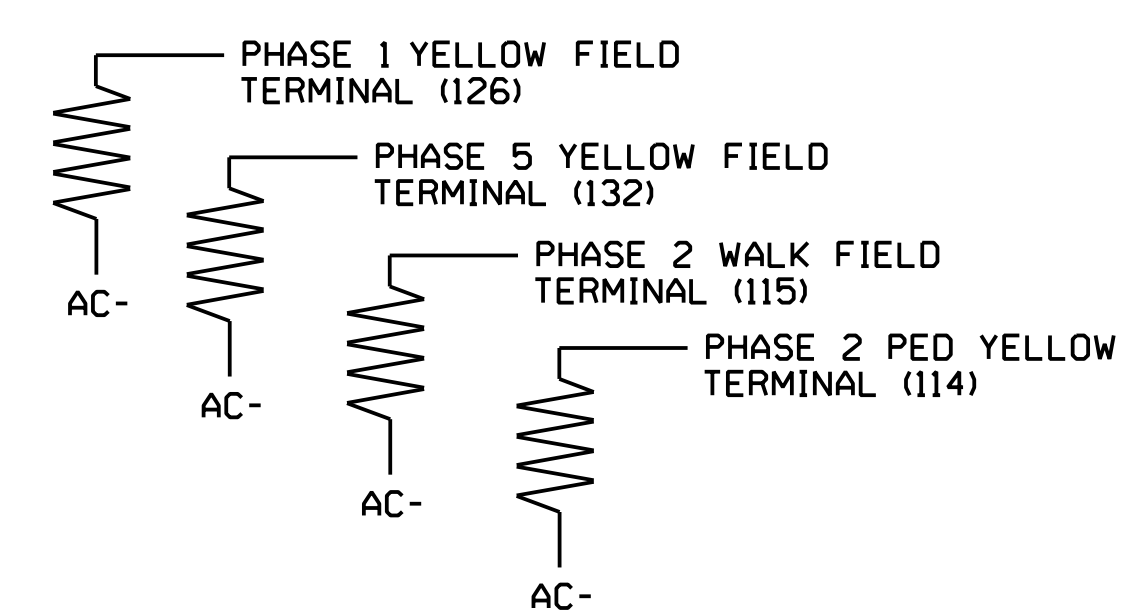


LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown below)

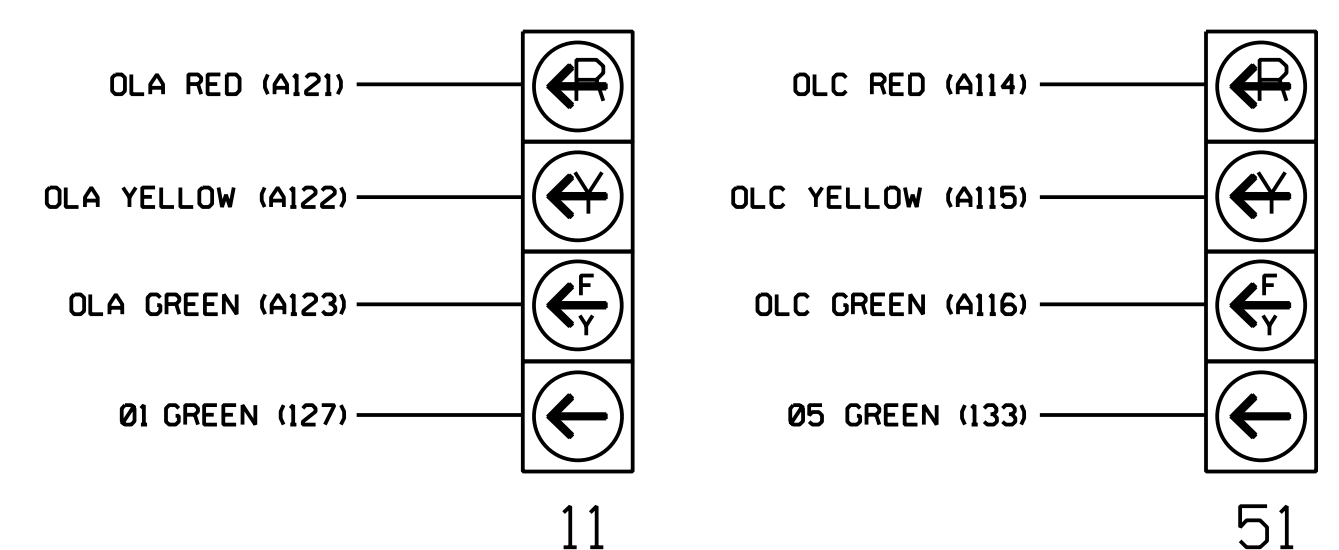
ACCEPTABLE VALUES

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



FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



NOTE

The sequence display for signal heads 11 and 51 requires special logic programming. See sheet 2 for programming instructions.

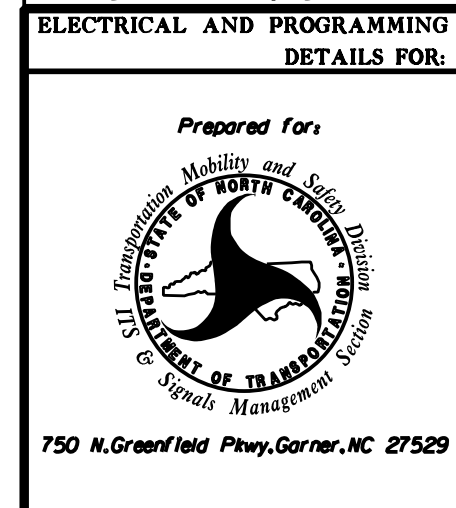
COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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: 02-0190
 DESIGNED: March 2018
 SEALED: 12-7-18
 REVISED: N/A

Electrical Detail - Sheet 1 of 3
 Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

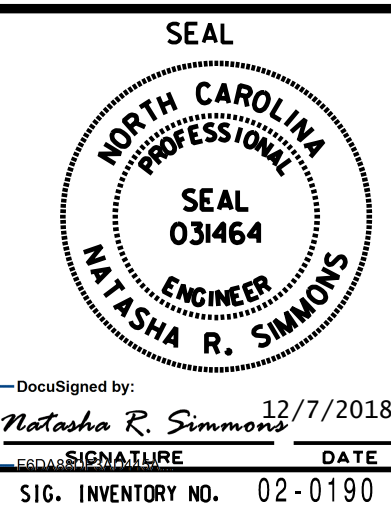


US 70 Business (E Main St) at SR 1735 (Cunningham Boulevard)/ Annunciation Catholic School

Division 02 Craven Co. Havelock

| | |
|-----------------------------|-----------------------------|
| PLAN DATE: March 2018 | REVIEWED BY: A.D. Klinksiek |
| PREPARED BY: A.H. Thornburg | REVIEWED BY: N.R. Simmons |

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



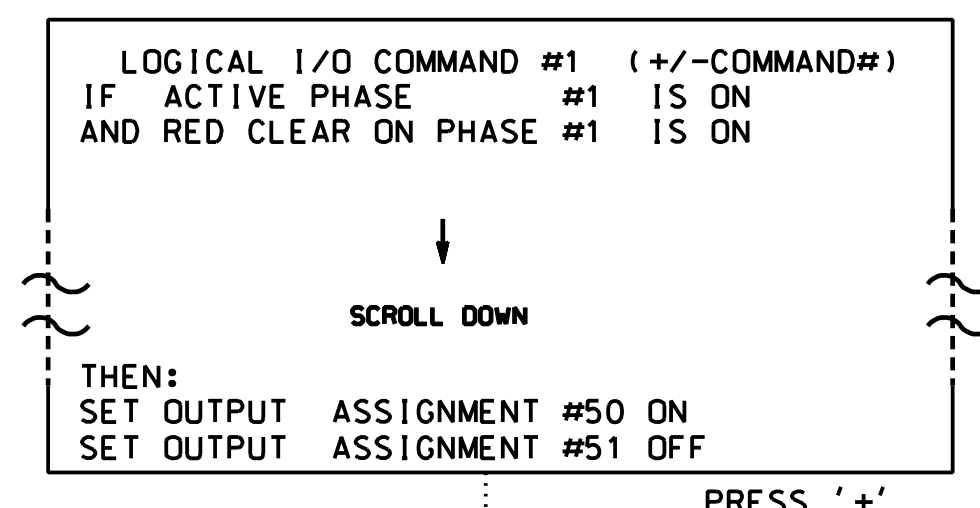
HNTB HNTB NORTH CAROLINA, P.C.
 343 E. Six Forks Road, Suite 200
 Raleigh, North Carolina 27609
 NC License No: C-1554
 (919) 546-8997

DocuSigned by: Natasha R. Simmons
 12/7/2018
 DATE
 SIGNATURE
 S1G. INVENTORY NO. 02-0190

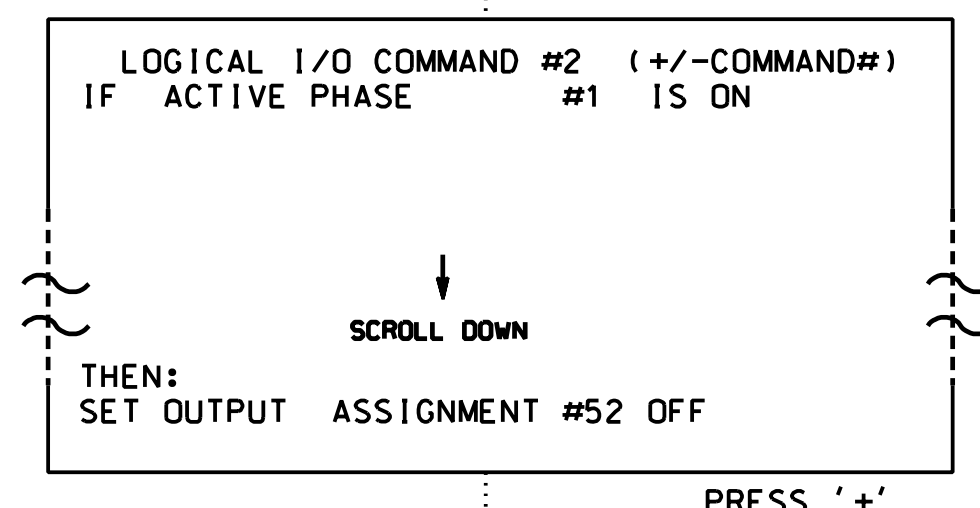
LOGICAL I/O PROCESSOR PROGRAMMING DETAIL TO PRODUCE SPECIAL FYA-PPLT SIGNAL SEQUENCE

(program controller as shown below)

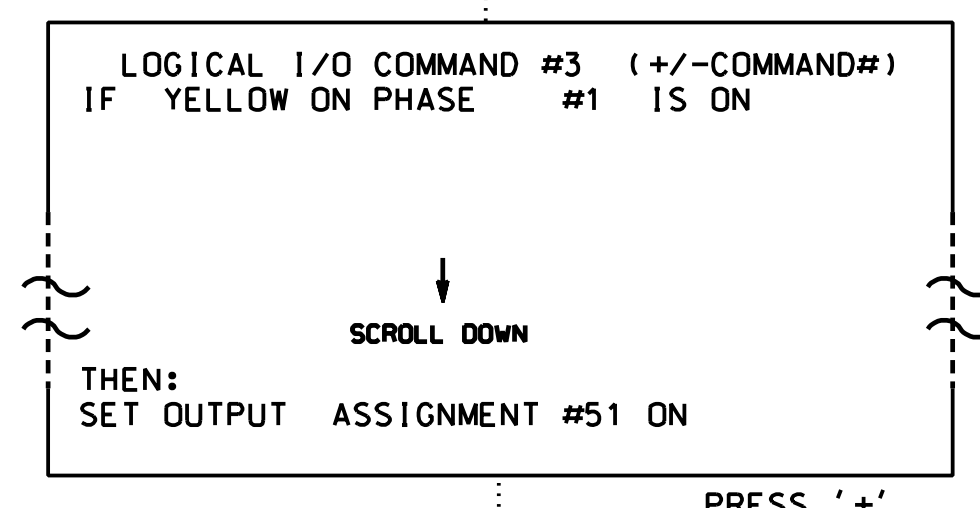
- FROM MAIN MENU PRESS '2' (PHASE CONTROL), THEN '1' (PHASE CONTROL FUNCTIONS). SCROLL TO THE BOTTOM OF THE MENU AND ENABLE ACT LOGIC COMMANDS 1, 2, 3, 4, 5, 6, 7, AND 8.
- FROM MAIN MENU PRESS '6' (OUTPUTS), THEN '3' (LOGICAL I/O PROCESSOR).



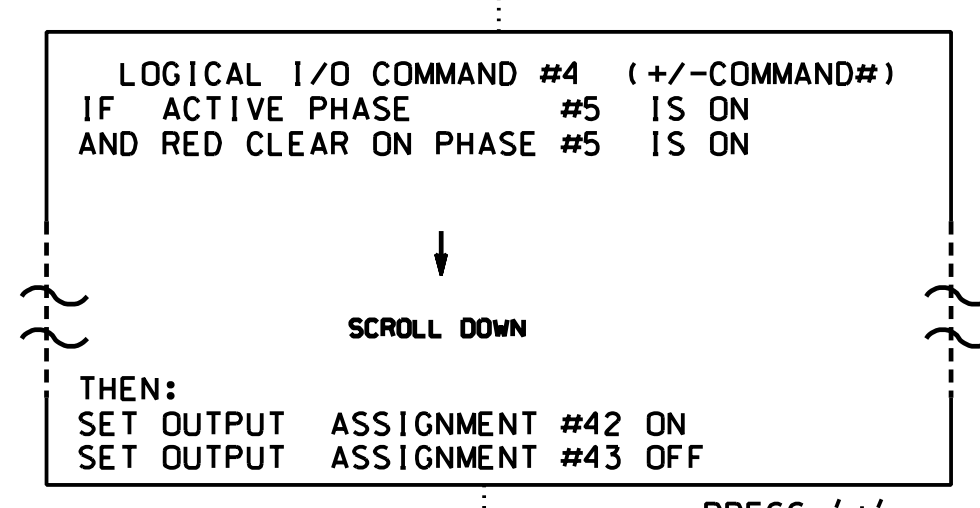
NOTE: LOGIC FOR PHASE 1 RED CLEAR WHEN TRANSITIONING FROM PHASE 1 TO PHASE 2 (HEAD 11).



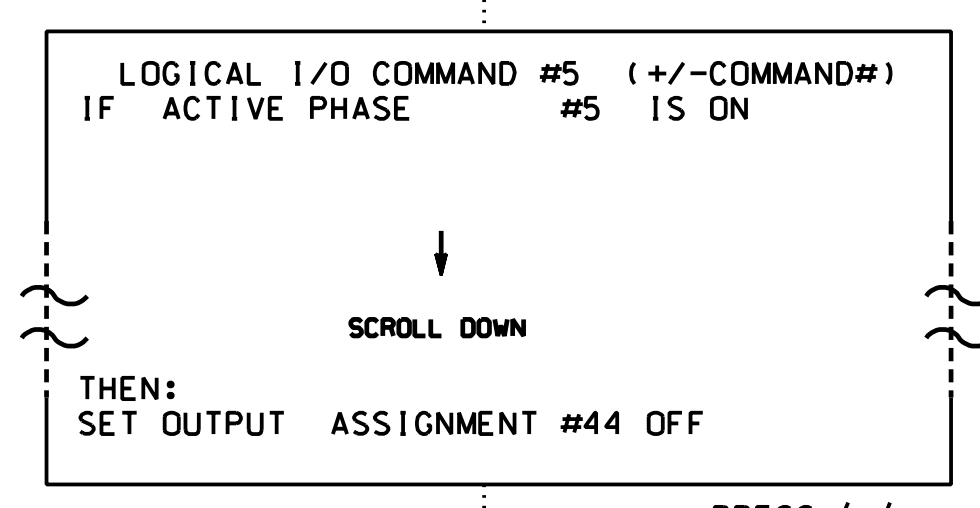
NOTE: LOGIC FOR SWITCHING FLASHING YELLOW ARROW OFF DURING PHASE 1 (HEAD 11).



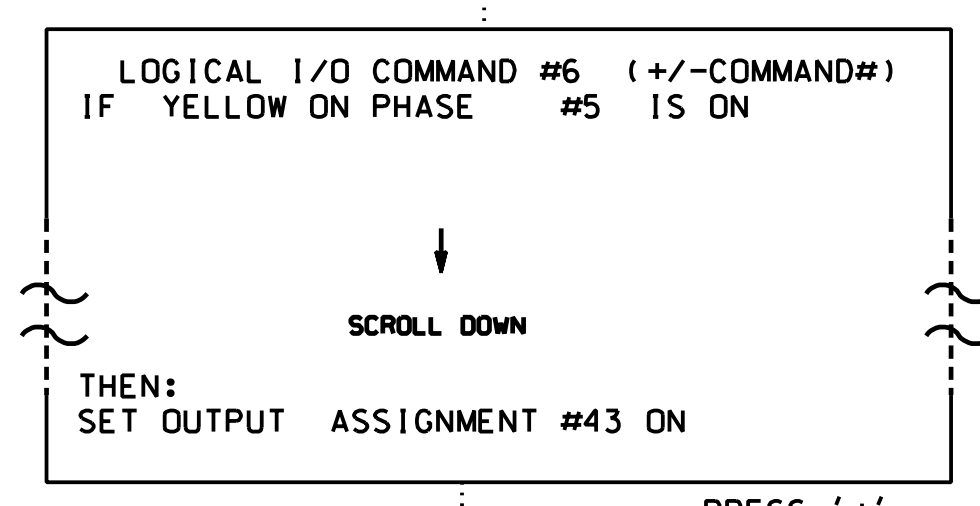
NOTE: LOGIC FOR YELLOW ARROW CLEARANCE FROM PHASE 1 (HEAD 11).



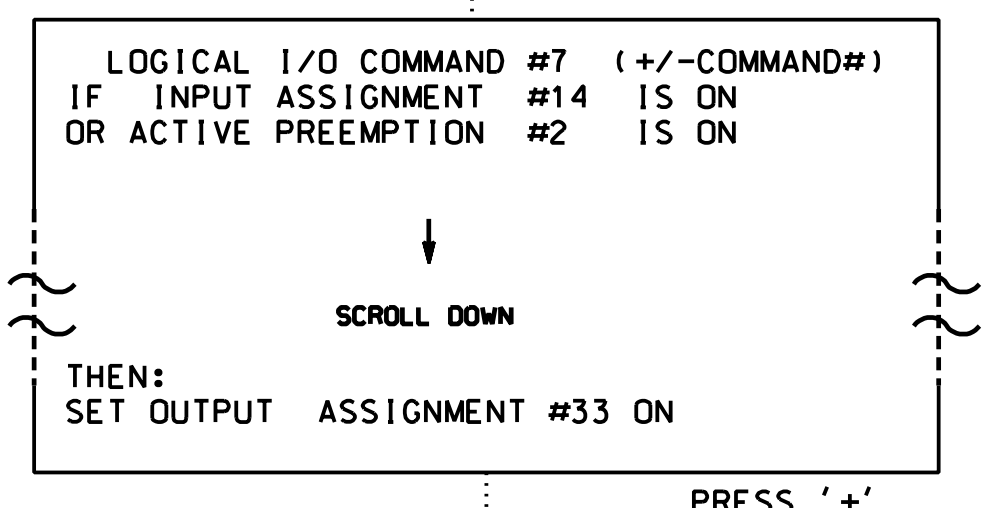
NOTE: LOGIC FOR PHASE 5 RED CLEAR WHEN TRANSITIONING FROM PHASE 5 TO PHASE 6 (HEAD 51).



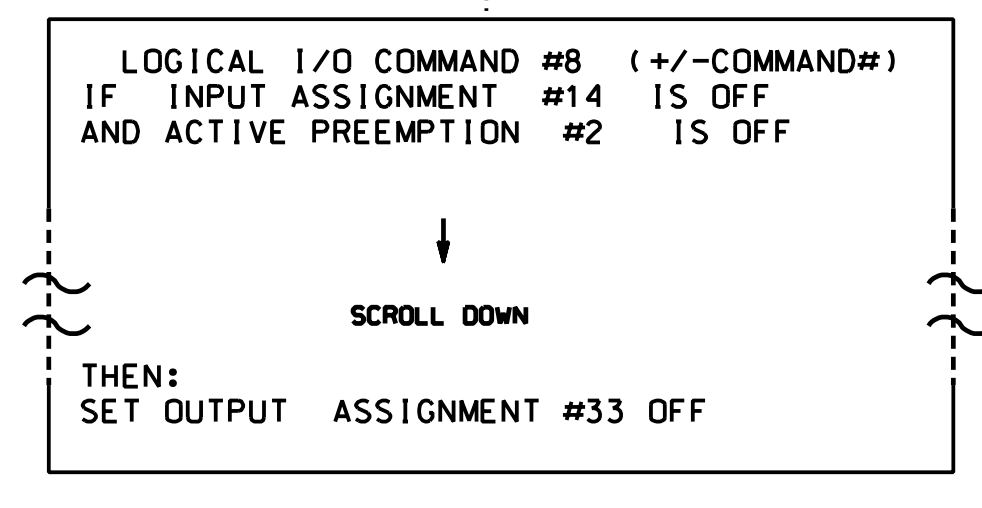
NOTE: LOGIC FOR SWITCHING FLASHING YELLOW ARROW OFF DURING PHASE 5 (HEAD 51).



NOTE: LOGIC FOR YELLOW ARROW CLEARANCE FROM PHASE 5 (HEAD 51).



NOTE: FIRE STATION PILOT LAMP LOGIC



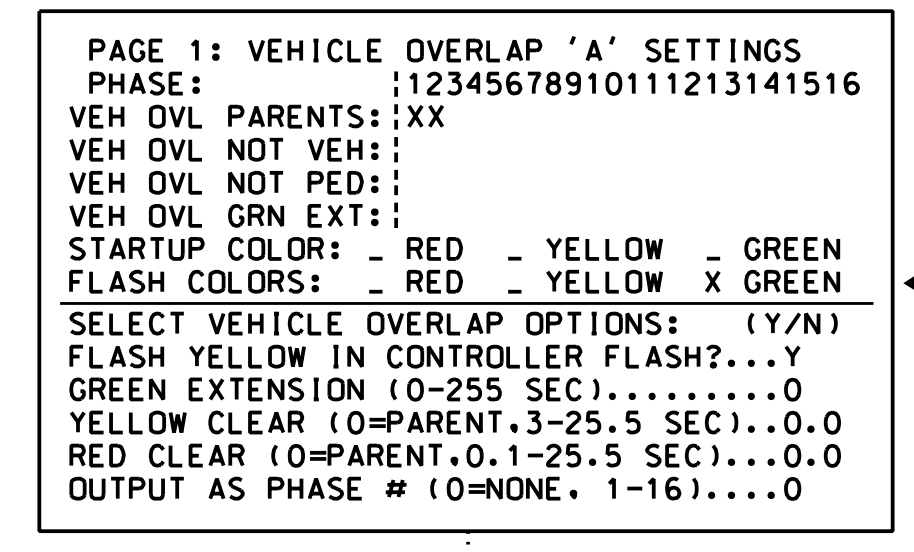
NOTE: FIRE STATION PILOT LAMP LOGIC

LOGIC I/O PROCESSOR PROGRAMMING COMPLETE

OVERLAP PROGRAMMING DETAIL

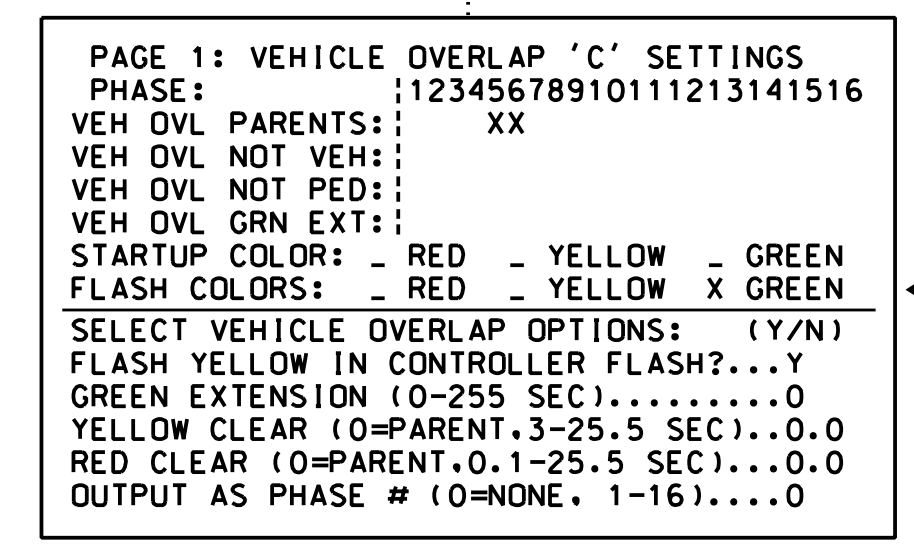
(program controller as shown below)

FROM MAIN MENU PRESS '8' (OVERLAPS), THEN '1' (VEHICLE OVERLAP SETTINGS).



NOTICE GREEN FLASH

PRESS '+' TWICE



NOTICE GREEN FLASH

OVERLAP PROGRAMMING COMPLETE

OUTPUT REFERENCE SCHEDULE

USE TO INTERPRET LOGIC PROCESSOR

- INPUT 14 = Preempt 2 Input
- OUTPUT 33 = Phase 2 Ped Yellow
- OUTPUT 42 = Overlap C Red
- OUTPUT 43 = Overlap C Yellow
- OUTPUT 44 = Overlap C Green
- OUTPUT 50 = Overlap A Red
- OUTPUT 51 = Overlap A Yellow
- OUTPUT 52 = Overlap A Green

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 02-0190
DESIGNED: March 2018
SEALED: 12-7-18
REVISED: N/A

Electrical Detail - Sheet 2 of 3
Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Prepared for:

750 N. Greenfield Pkwy, Corner, NC 27629

| US 70 Business (E Main St) at SR 1735 (Cunningham Boulevard)/ Annunciation Catholic School | | |
|--|-----------------------------|------|
| Division 02 | Craven Co. Havelock | |
| PLAN DATE: March 2018 | REVIEWED BY: A.D. Klinksiek | |
| PREPARED BY: A.H. Thornburg | REVIEWED BY: N.R. Simmons | |
| REVISIONS | INIT. | DATE |
| | | |

SEAL

DocuSigned by: **Natasha R. Simmons** 12/7/2018

SIGNATURE DATE

SIG. INVENTORY NO. 02-0190

HNTB NORTH CAROLINA, P.C.
343 E. Six Forks Road, Suite 200
Raleigh, North Carolina 27609
NC License No: C-1554
(919) 546-8997

EMERGENCY VEHICLE PREEMPTION PROGRAMMING DETAIL

(program controller as shown below)

From Main Menu press 'A' (Preemption), then '1' (Standard Preemptions). Press 'NEXT' to advance to Preemption #2.

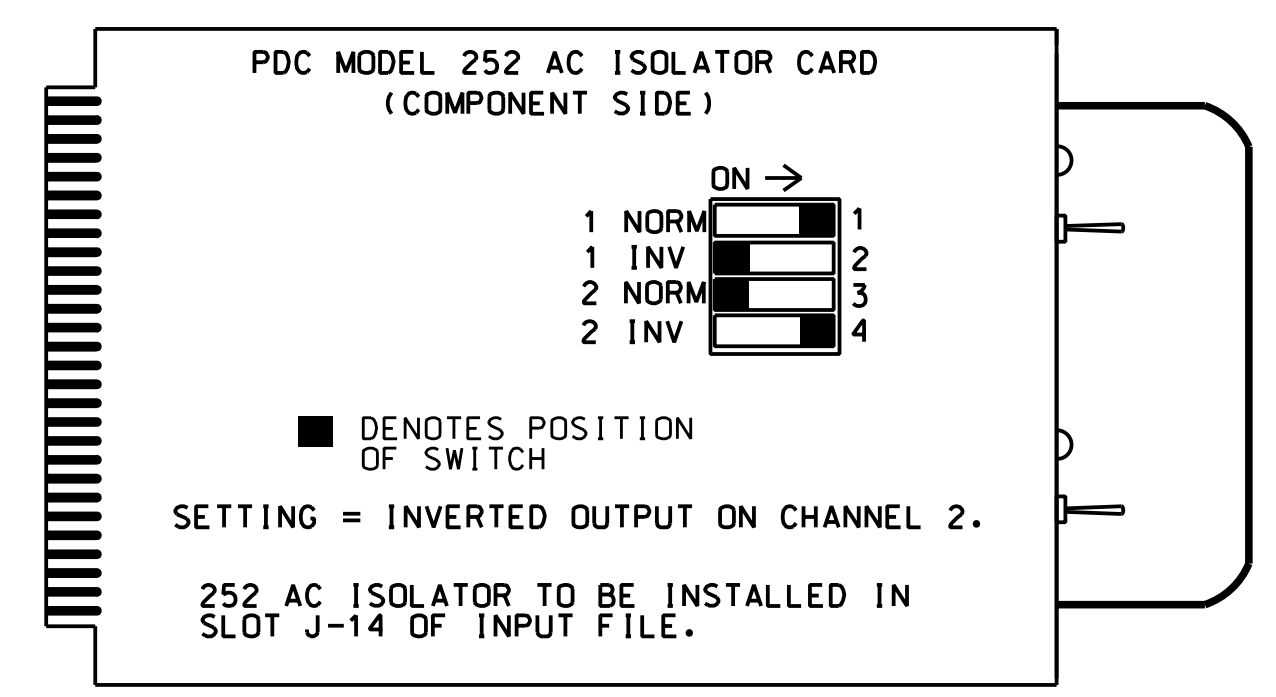
| PREEMPTION #2 | SETTINGS (NEXT:1-10) |
|-----------------|-------------------------|
| INTERVAL/TIMING | CLEAR/DWELL PHASES |
| GRN YEL RED | 12345678910111213141516 |
| 1 255 3.8 2.6 | X |
| 2 0 0.0 0.0 | |
| 3 0 0.0 0.0 | |
| 4 0 0.0 0.0 | |
| 5 1 0.0 0.0 | X X |

| EXIT CALLS | OPTIONS |
|---|------------------|
| PRIORITY (Y/N TO SELECT) | MED |
| DELAY TIMER (0-255 SEC) | * |
| MIN GREEN BEFORE PRE (0= DEFAULT)... | 1 |
| PED CLEAR BEFORE PRE (0= DEFAULT)... | 0 |
| YELLOW CLEAR BEFORE PRE (0= DEFAULT)... | 0 |
| RED CLEAR BEFORE PRE (0= DEFAULT)... | 0 |
| DWELL MIN TIMER (0-255 SEC) | * |
| DWELL MAX TIMER (0=OFF,1-255MIN) | 0 |
| DWELL HOLD-OVER TIMER (0-255) | 0 |
| LATCH CALL? | Y |
| LINK TO NEXT PREEMPT? | N |
| ENABLE BACKUP PROTECTION? | N |
| HOLD CLEAR 1 PHASES DURING DELAY? .. | N |
| FAST GREEN FLASH DWELL PHASES? | N |
| PED CLEARANCE THROUGH YELLOW? | Y |
| INHIBIT OVERLAP GREEN EXTENSION? .. | N |
| SERVICE DURING SOFTWARE FLASH? | N |
| REST IN RED DURING DWELL INTERVAL? .. | N |
| FLASH DWELL INTERVAL? | N |
| ALLOW PEDS IN DWELL INTERVAL? | N |
| RE-TIME DWELL INTERVAL? | Y |
| OVERLAPS: | ABCDEFGHIJKLMNOP |
| DWELL INT FLASH YELLOW | |
| OMIT OVERLAPS: | |

* Denotes timing to be determined in field.

PREEMPT 2 AC ISOLATOR (MODEL 252) OUTPUT PROGRAMMING DETAIL

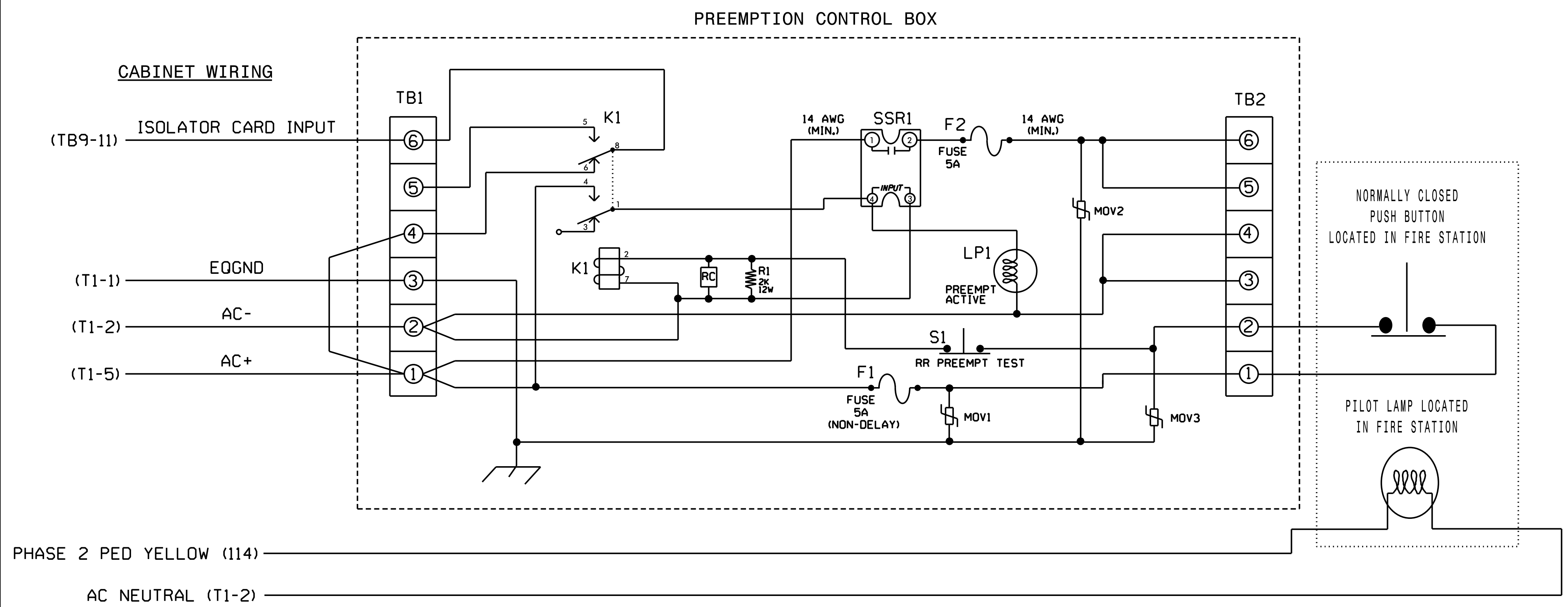
(set DIP switches as shown below)



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

EV Preemption Control Box Wiring Detail

(wire as shown below)



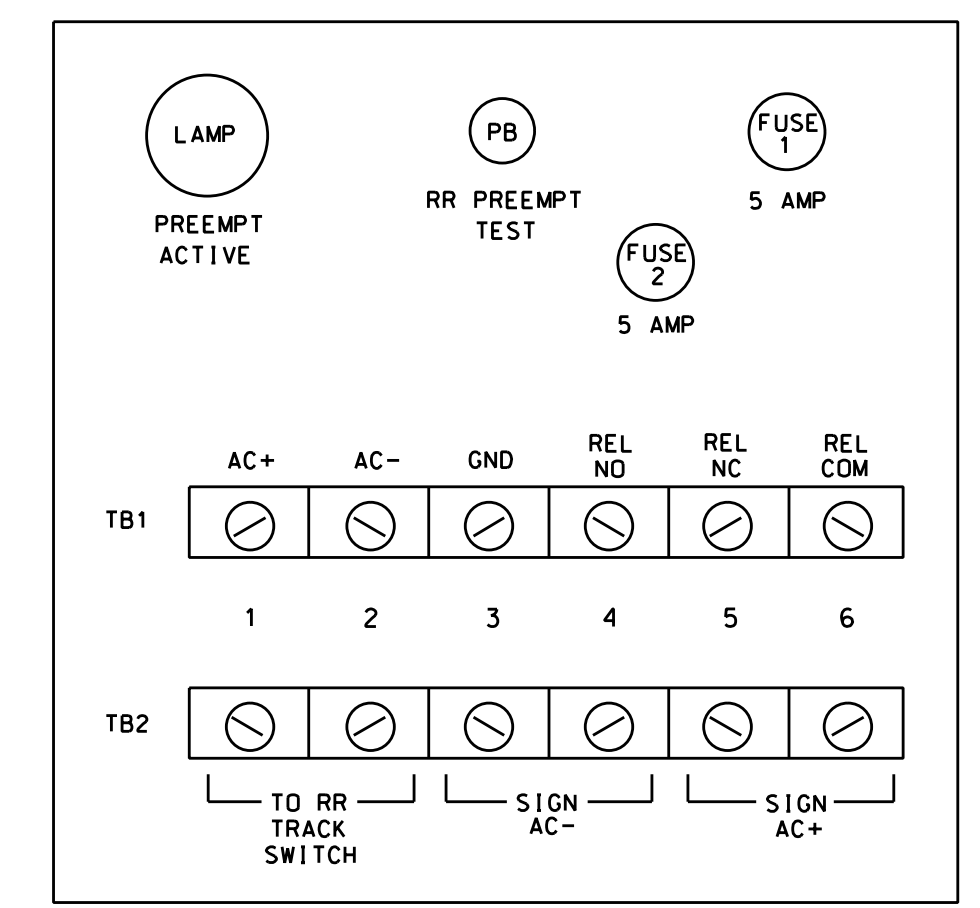
NOTES

- Relay K1 is shown in the energized (Preempt not active) normal operation state.
- Relay 'K1' is an enclosed DPDT general purpose relay with a 120VAC coil, 10A contacts, and octal-style plug.
- Relay SSR1 is a SPST (normally open) Solid State Relay with AC input and AC (25 amp) output.
- AC Isolator Card shall activate preemption upon removal of AC+ from the input (as shown above). To accomplish this, set invert dip switch on AC Isolator Card.
- IMPORTANT!!** Terminal TB9-12 (on input panel) shall be connected to AC neutral (jumper may have to be added).

LAMP NOTES

- If field terminal 114 has a conflict monitor wire attached, remove, tape, and label wire.
- Make sure load resistors are in place as shown in the Load Resistor Installation Detail on Sheet 1.
- Install a loadswitch in Output File Slot S3.

FRONT VIEW



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 02-0190
 DESIGNED: March 2018
 SEALED: 12-7-18
 REVISED: N/A

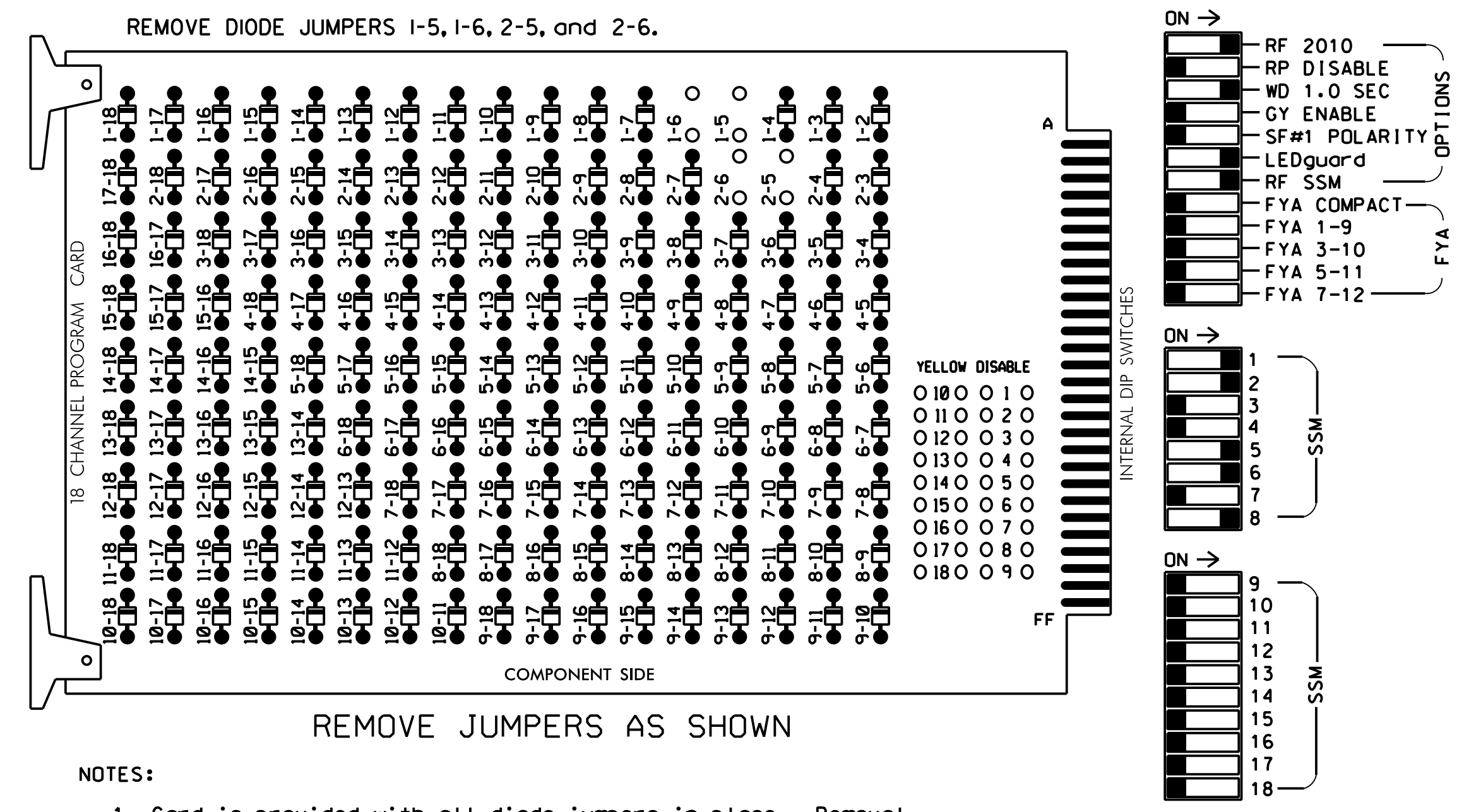
Electrical Detail - Sheet 3 of 3
 Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

| | | |
|-------------------------|---|----------------------------|
| | Prepared for: US 70 Business (E Main St) at SR 1735 (Cunningham Boulevard)/ Annunciation Catholic School | SEAL |
| | Division 02 Craven Co. Havelock PLAN DATE: March 2018 REVIEWED BY: A.D. Klinksiek PREPARED BY: A.H. Thornburg REVIEWED BY: N.R. Simmons | |
| REVISIONS INIT. DATE | DocuSigned by: Natasha R. Simmons DATE: 12/7/2018 | SIG. INVENTORY NO. 02-0190 |

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



NOTES:

- Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
- Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
- Ensure that Red Enable is active at all times during normal operation.
- Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.

NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
- Enable Simultaneous Gap-Out for all Phases.
- Program phases 2 and 6 for Variable Initial and Gap Reduction.
- Program phases 2 and 6 for Startup In Green.
- Program phases 2 and 6 for Yellow Flash.
- The cabinet and controller are part of the Havelock US 70 Business Closed Loop Signal System.

SIGNAL HEAD HOOK-UP CHART

| LOAD SWITCH NO. | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 | AUX S1 | AUX S2 | AUX S3 | AUX S4 | AUX S5 | AUX S6 |
|-----------------------|-----|-------|-------|----|----|-------|----|-------|-------|-----|-------|-------|--------|--------|--------|--------|--------|--------|
| EMU CHANNEL NO. | 1 | 2 | 13 | 3 | 4 | 14 | 5 | 6 | 15 | 7 | 8 | 16 | 9 | 10 | 17 | 11 | 12 | 18 |
| PHASE | 1 | 2 | 2 PED | 3 | 4 | 4 PED | 5 | 6 | 6 PED | 7 | 8 | 8 PED | OLA | OLB | SPARE | OLC | OLD | SPARE |
| SIGNAL HEAD NO. | 11 | 21,22 | NU | NU | NU | NU | 51 | 61,62 | NU | NU | 81,82 | NU | NU | NU | NU | NU | NU | NU |
| RED | | 128 | | | | | | 134 | | | 107 | | | | | | | |
| YELLOW | | 129 | | | | | | 135 | | | 108 | | | | | | | |
| GREEN | | 130 | | | | | | 136 | | | 109 | | | | | | | |
| RED ARROW | 125 | | | | | | | 131 | | | | | | | | | | |
| YELLOW ARROW | 126 | | | | | | | 132 | | | | | | | | | | |
| FLASHING YELLOW ARROW | | | | | | | | | | | | | | | | | | |
| GREEN ARROW | 127 | | | | | | | 133 | | | | | | | | | | |

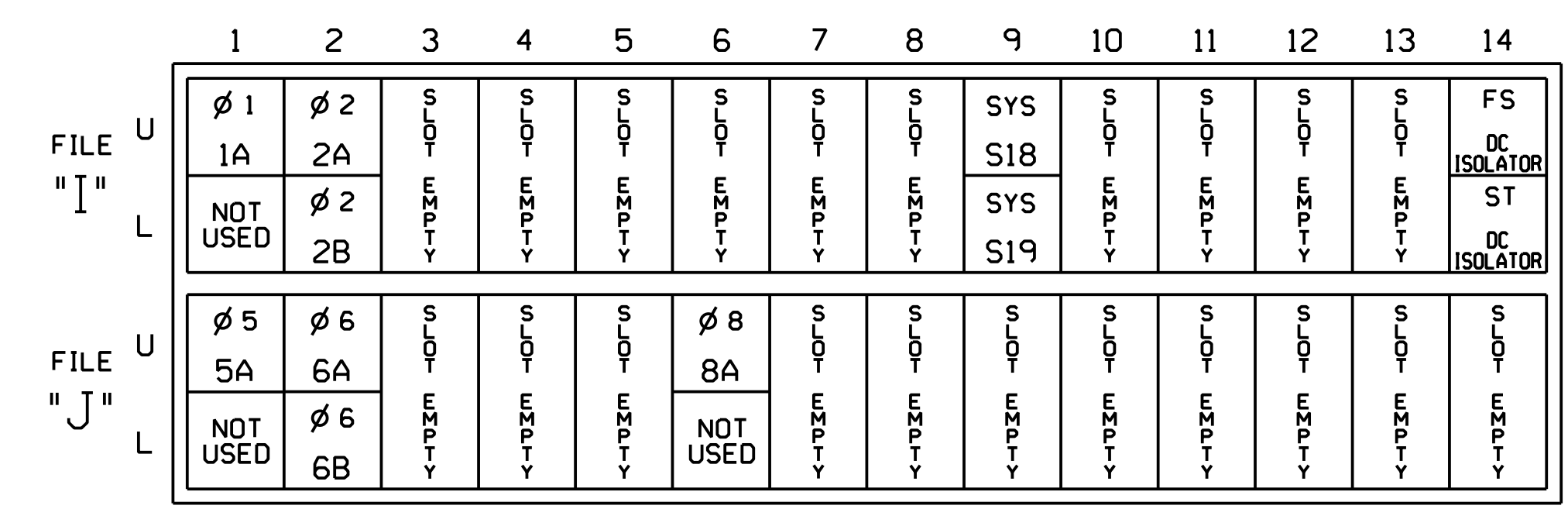
NU = Not Used

EQUIPMENT INFORMATION

CONTROLLER.....2070E
 CABINET.....332 W/AUX
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
 LOAD SWITCHES USED.....S1,S2,S7,S8,S11
 PHASES USED.....1,2,5,6,8
 OVERLAPS.....NONE

INPUT FILE POSITION LAYOUT

(front view)



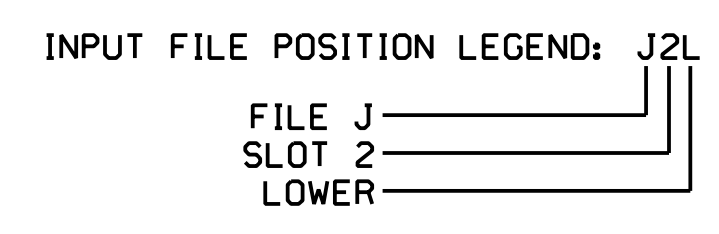
EX. : 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE
 ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

| LOOP NO. | LOOP TERMINAL | INPUT FILE POS. | PIN NO. | INPUT ASSIGNMENT NO. | DETECTOR NO. | NEMA PHASE | CALL | EXTEND | FULL TIME DELAY | STRETCH TIME | DELAY TIME |
|----------|---------------|-----------------|---------|----------------------|--------------|------------|------|--------|-----------------|--------------|------------|
| 1A | TB2-1,2 | 11U | 56 | 18 | 1 | 1 | Y | Y | | | |
| 2A | TB2-5,6 | 12U | 39 | 1 | 2 | 2 | Y | Y | | | |
| 2B | TB2-7,8 | 12L | 43 | 5 | 12 | 2 | Y | Y | | | |
| *S18 | TB6-9,10 | 19U | 60 | 22 | 11 | SYS | | | | | |
| *S19 | TB6-11,12 | 19L | 62 | 24 | 13 | SYS | | | | | |
| 5A | TB3-1,2 | J1U | 55 | 17 | 5 | 5 | Y | Y | | | |
| 6A | TB3-5,6 | J2U | 40 | 2 | 6 | 6 | Y | Y | | | |
| 6B | TB3-7,8 | J2L | 44 | 6 | 16 | 6 | Y | Y | | | |
| 8A | TB5-9,10 | J6U | 42 | 4 | 8 | 8 | Y | Y | | | 10 |

* System detector only. Remove the vehicle phase assigned to this detector in the default programming.



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 02-0460
 DESIGNED: March 2018
 SEALED: 12-7-18
 REVISED: N/A

Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Prepared for:

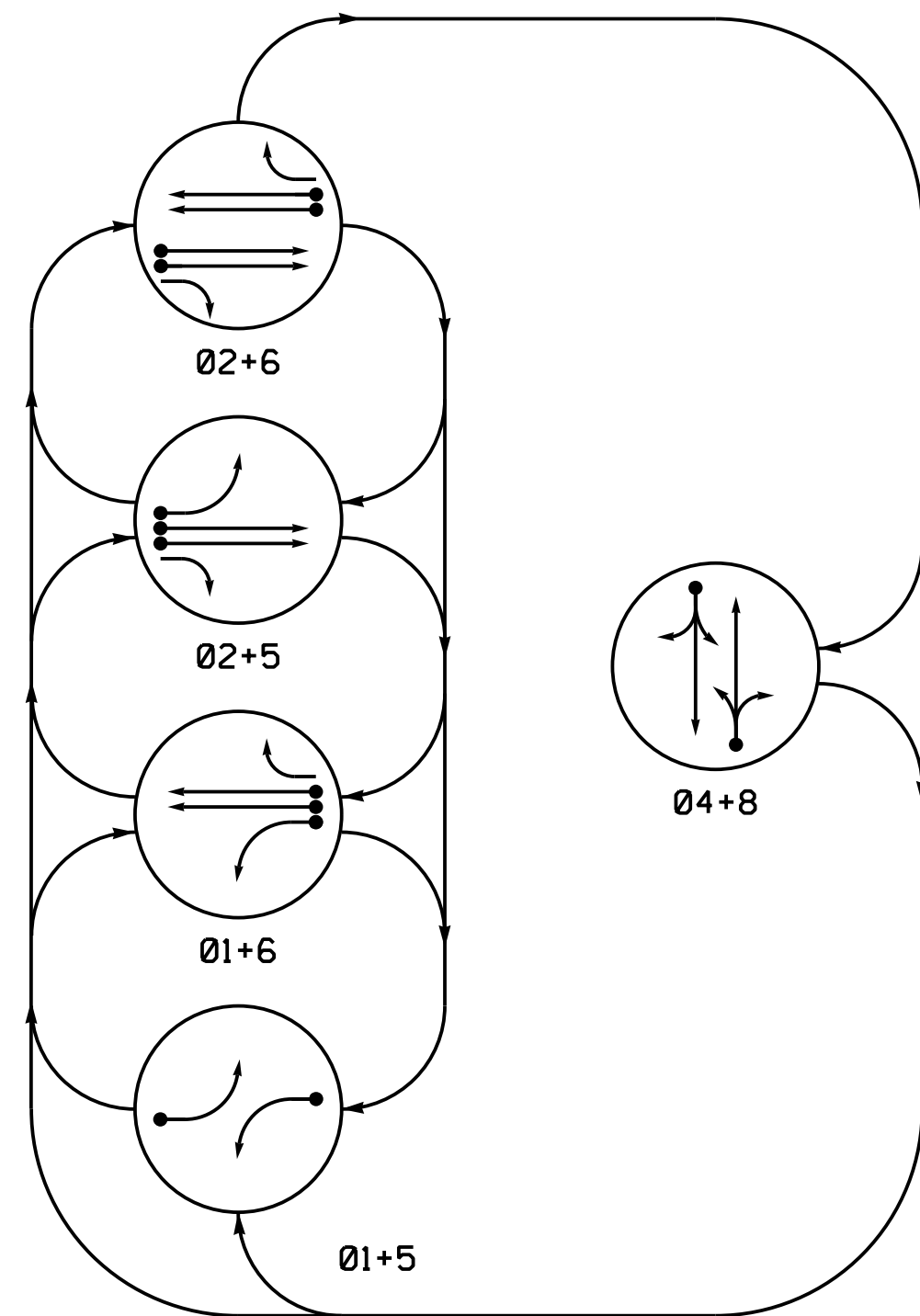
US 70 Business (E Main Street) at SR 1733 (Hollywood Boulevard)
 Division 02 Craven Co. Havelock

PLAN DATE: March 2018 REVIEWED BY: A.D. Klinksiek
 PREPARED BY: A.H. Thornburg REVIEWED BY: N.R. Simmons

REVISIONS: _____ INITI: _____ DATE: _____

DocuSigned by:
 12/7/2018
 SIGNATURE DATE
 SIG. INVENTORY NO. 02-0460

PHASING DIAGRAM

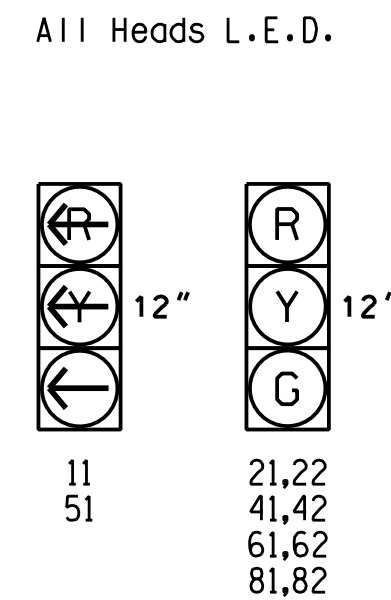


PHASING DIAGRAM DETECTION LEGEND

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

| SIGNAL FACE | PHASE | | | | | | | |
|-------------|-------|------|------|------|------|------|------|------|
| | 01+5 | 01+6 | 02+5 | 02+6 | 04+8 | 05+8 | 06+8 | 07+8 |
| 11 | --- | --- | --- | --- | --- | --- | --- | --- |
| 21,22 | R | R | G | G | R | Y | | |
| 41,42 | R | R | R | R | G | R | | |
| 51 | --- | --- | --- | --- | --- | --- | --- | --- |
| 61,62 | R | G | R | G | R | Y | | |
| 81,82 | R | R | R | R | G | R | | |

SIGNAL FACE I.D.

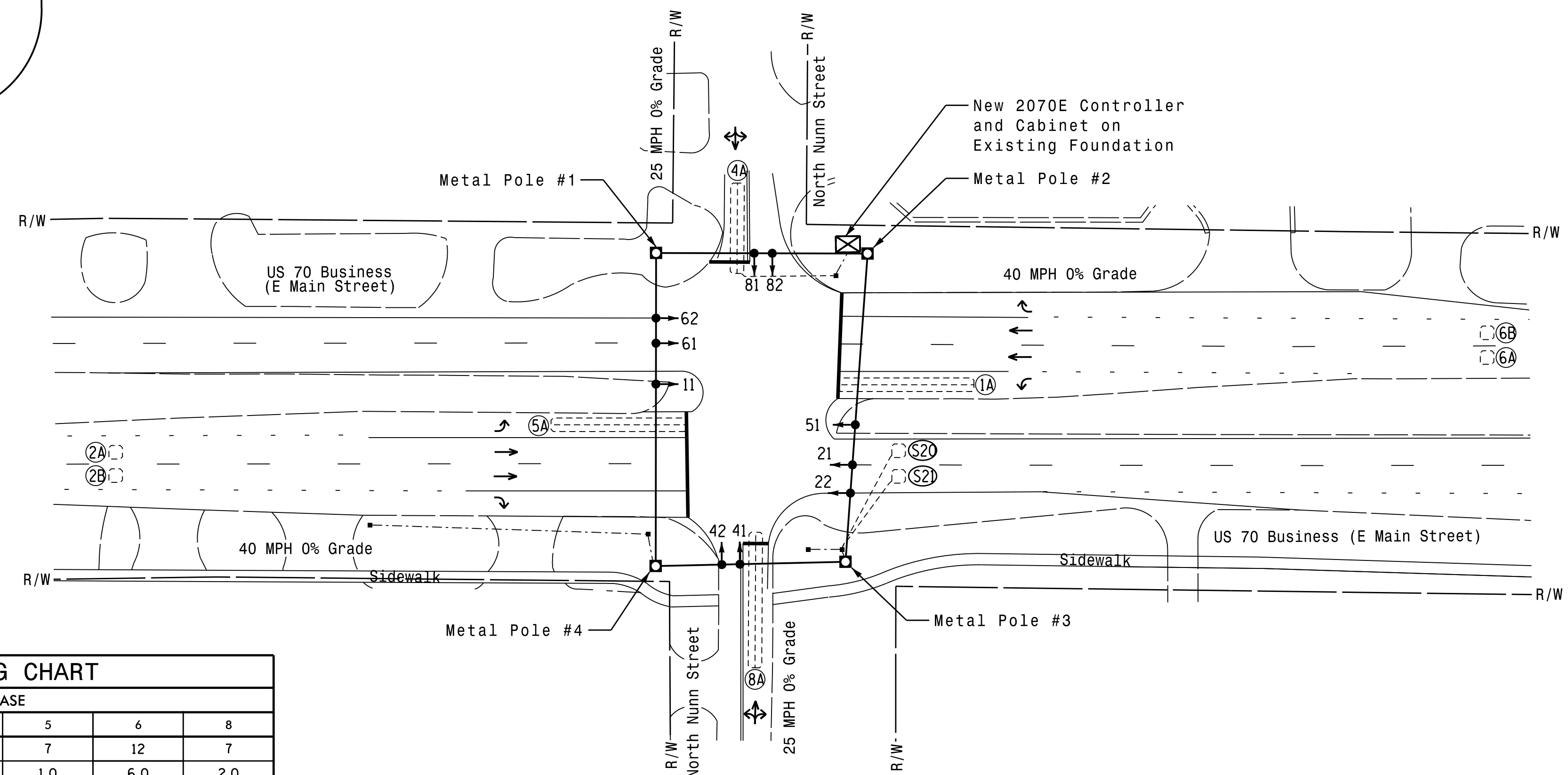


| OASIS 2070 LOOP & DETECTOR INSTALLATION CHART | | | | | | | | | | | | |
|---|-----------|----------------------------|-------|----------|----------------------|---------|-----------|-----------------|--------------|------------|-------------|----------|
| LOOP | SIZE (FT) | DISTANCE FROM STOPBAR (FT) | TURNS | NEW LOOP | DETECTOR PROGRAMMING | | | | | | SYSTEM LOOP | NEW CARD |
| | | | | | PHASE | CALLING | EXTENSION | FULL TIME DELAY | STRETCH TIME | DELAY TIME | | |
| 1A | 6X60 | 0 | 2-4-2 | - | 1 | Y | Y | - | - | - | - | Y |
| 2A | 6X6 | 250 | 5 | - | 2 | Y | Y | - | - | - | - | Y |
| 2B | 6X6 | 250 | 5 | - | 2 | Y | Y | - | - | - | - | Y |
| 4A | 6X60 | +5 | 2-4-2 | - | 4 | Y | Y | - | - | - | - | Y |
| 5A | 6X60 | 0 | 2-4-2 | - | 5 | Y | Y | - | - | - | - | Y |
| 6A | 6X6 | 285 | 4 | - | 6 | Y | Y | - | - | - | - | Y |
| 6B | 6X6 | 285 | 4 | - | 6 | Y | Y | - | - | - | - | Y |
| 8A | 6X60 | +5 | 2-4-2 | - | 8 | Y | Y | - | - | - | - | Y |
| S20 | 6X6 | +105 | 4 | - | - | - | - | - | - | - | - | Y |
| S21 | 6X6 | +105 | 4 | - | - | - | - | - | - | - | - | Y |

5 Phase Fully Actuated Havelock US 70 Business CLS

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 and/or 5 may be lagged.
4. Set all detector units to presence mode.
5. In the event of loop replacement, refer to the current ITS and Signals Design Manual and submit a Plan of Record to the Signal Design Section.
6. The cabinet should be designed to include Auxiliary Output file for future use.
7. Pavement markings are existing.
8. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
9. Closed loop system data: Controller Asset #0392



| OASIS 2070 TIMING CHART | | | | | | | |
|-------------------------|-------|------------|-----|-----|------------|-----|--|
| FEATURE | PHASE | | | | | | |
| | 1 | 2 | 4 | 5 | 6 | 8 | |
| Min Green 1 * | 7 | 12 | 7 | 7 | 12 | 7 | |
| Extension 1 * | 1.0 | 6.0 | 2.0 | 1.0 | 6.0 | 2.0 | |
| Max Green 1 * | 25 | 75 | 25 | 25 | 75 | 25 | |
| Yellow Clearance | 3.0 | 4.2 | 3.2 | 3.0 | 4.2 | 3.2 | |
| Red Clearance | 2.8 | 1.0 | 3.1 | 2.4 | 1.0 | 3.1 | |
| Red Revert | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | |
| Walk 1 * | - | - | - | - | - | - | |
| Don't Walk 1 | - | - | - | - | - | - | |
| Seconds Per Actuation * | - | 1.5 | - | - | 1.5 | - | |
| Max Variable Initial * | - | 29 | - | - | 33 | - | |
| Time Before Reduction * | - | 15 | - | - | 15 | - | |
| Time To Reduce * | - | 45 | - | - | 45 | - | |
| Minimum Gap | - | 3.0 | - | - | 3.0 | - | |
| Recall Mode | - | MIN RECALL | - | - | MIN RECALL | - | |
| Vehicle Call Memory | - | YELLOW | - | - | YELLOW | - | |
| Dual Entry | - | - | ON | - | - | ON | |
| Simultaneous Gap | ON | ON | ON | ON | ON | ON | |

* 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.

| PROPOSED | EXISTING |
|----------|----------|
| | |
| | N/A |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| N/A | |
| | |
| | |

Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

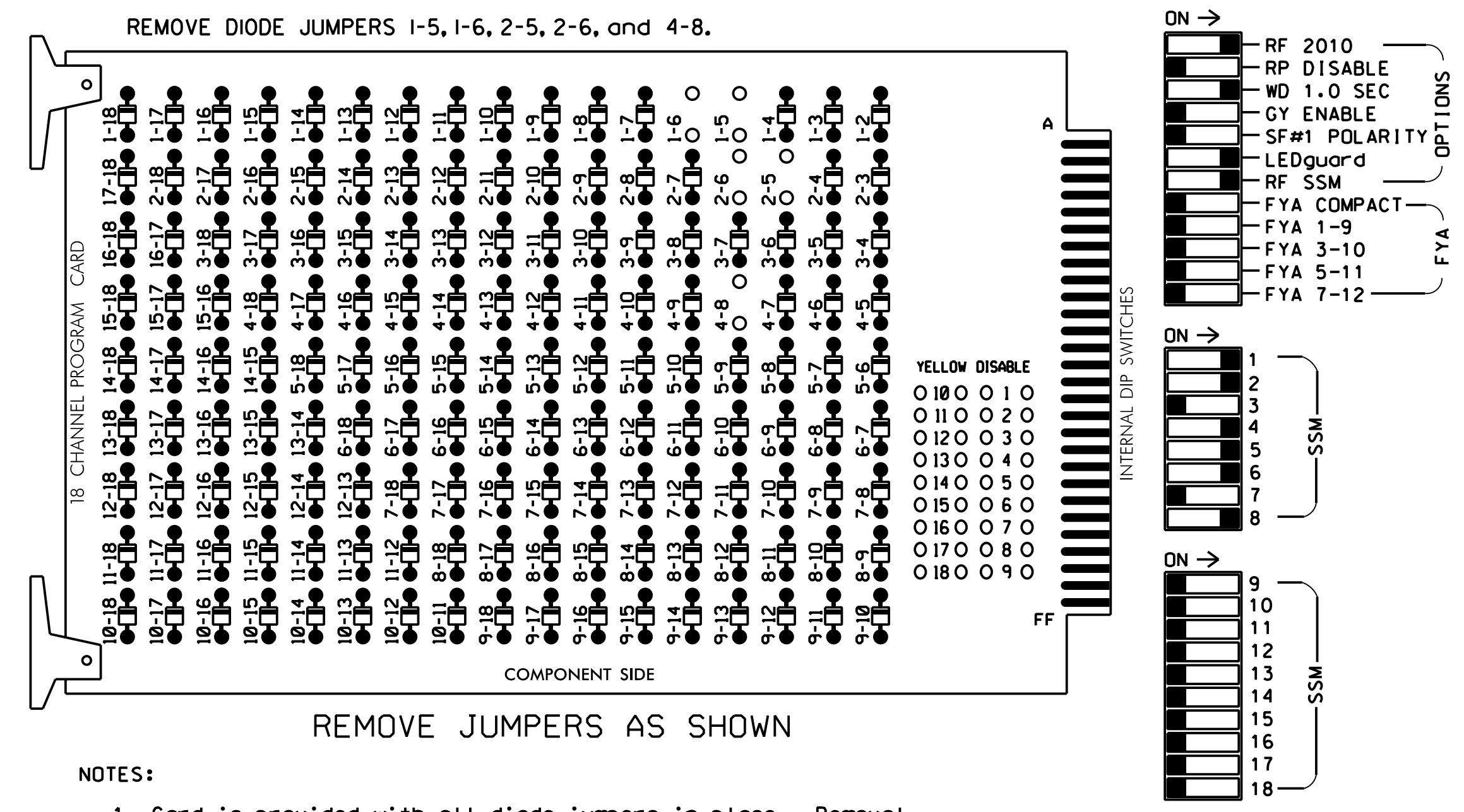
| <p>Prepared For: TRANSPORTATION MOBILITY AND SAFETY CENTER STATE OF NORTH CAROLINA Signal Design Section 750 N. Greenfield Pkwy, Corner, NC 27529</p> | <p>US 70 Business (E Main Street) at North Nunn Street</p> | | | | | | | | | | |
|---|--|------------------------------------|--|-----|------|-------|------|--|--|--|--|
| | <p>Division 02 Craven Co. Havelock</p> | | | | | | | | | | |
| | <p>PLAN DATE: March 2018</p> | <p>REVIEWED BY: A.D. Klinksiek</p> | | | | | | | | | |
| <p>SCALE: 0 40 1"=40'</p> | <p>PREPARED BY: A.H. Thornburg</p> | <p>REVIEWED BY: N.R. Simmons</p> | <p>REVISIONS</p> <table border="1"> <thead> <tr> <th>NO.</th> <th>DATE</th> <th>INIT.</th> <th>DATE</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table> | NO. | DATE | INIT. | DATE | | | | |
| NO. | DATE | INIT. | DATE | | | | | | | | |
| | | | | | | | | | | | |

HNTB HNTB NORTH CAROLINA, P.C.
343 E. Six Forks Road, Suite 200
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NC License No: C-1554
(919) 546-8997

DocuSigned by:
Natasha R. Simmons
12/7/2018
SIG. INVENTORY NO. 02-0392

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that Red Enable is active at all times during normal operation.
4. Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. 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. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Enable Simultaneous Gap-Out for all Phases.
3. Program phases 4 and 8 for Dual Entry.
4. Program phases 2 and 6 for Variable Initial and Gap Reduction.
5. Program phases 2 and 6 for Startup In Green.
6. Program phases 2 and 6 for Yellow Flash.
7. The cabinet and controller are part of the Havelock US 70 Business Closed Loop Signal System.

SIGNAL HEAD HOOK-UP CHART

| LOAD SWITCH NO. | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 | AUX S1 | AUX S2 | AUX S3 | AUX S4 | AUX S5 | AUX S6 |
|-----------------------|-----|-------|-------|----|-------|-------|----|-------|-------|-----|-------|-------|--------|--------|--------|--------|--------|--------|
| EMU CHANNEL NO. | 1 | 2 | 13 | 3 | 4 | 14 | 5 | 6 | 15 | 7 | 8 | 16 | 9 | 10 | 17 | 11 | 12 | 18 |
| PHASE | 1 | 2 | 2 PED | 3 | 4 | 4 PED | 5 | 6 | 6 PED | 7 | 8 | 8 PED | OLA | OLB | SPARE | OLC | OLD | SPARE |
| SIGNAL HEAD NO. | 11 | 21,22 | NU | NU | 41,42 | NU | 51 | 61,62 | NU | NU | 81,82 | NU | NU | NU | NU | NU | NU | NU |
| RED | | 128 | | | 101 | | | 134 | | | 107 | | | | | | | |
| YELLOW | | 129 | | | 102 | | | 135 | | | 108 | | | | | | | |
| GREEN | | 130 | | | 103 | | | 136 | | | 109 | | | | | | | |
| RED ARROW | 125 | | | | | | | 131 | | | | | | | | | | |
| YELLOW ARROW | 126 | | | | | | | 132 | | | | | | | | | | |
| FLASHING YELLOW ARROW | | | | | | | | | | | | | | | | | | |
| GREEN ARROW | 127 | | | | | | | 133 | | | | | | | | | | |

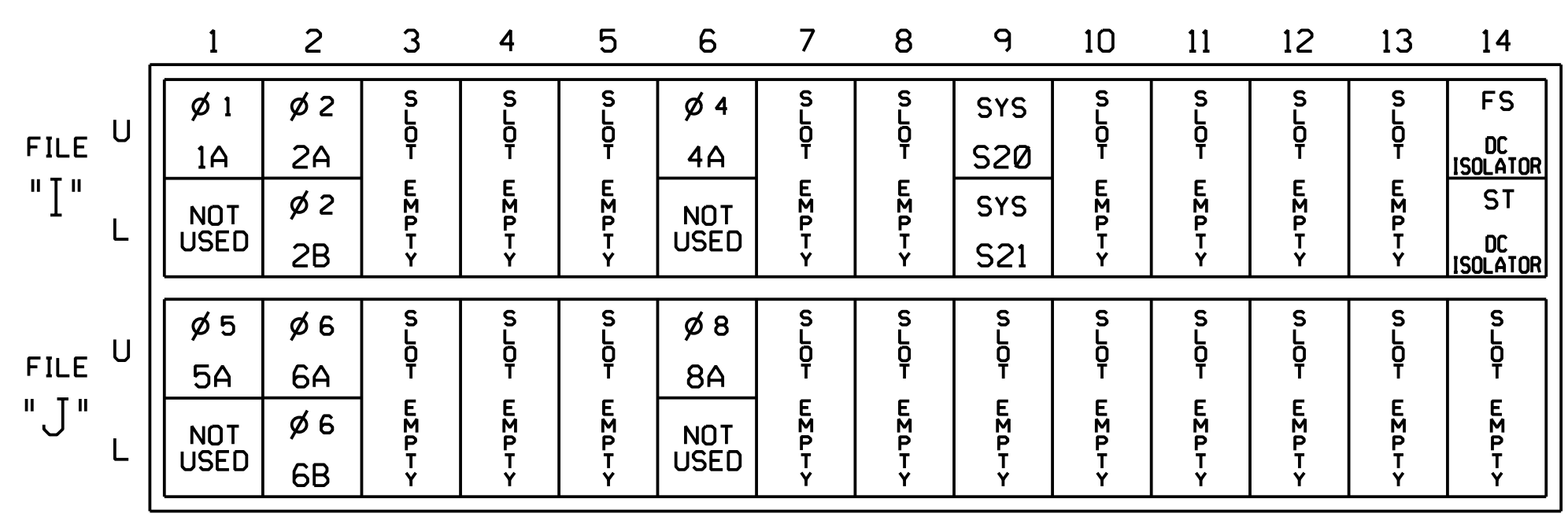
NU = Not Used

EQUIPMENT INFORMATION

CONTROLLER.....2070E
 CABINET.....332 W/AUX
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
 LOAD SWITCHES USED.....S1,S2,S5,S7,S8,S11
 PHASES USED.....1,2,4,5,6,8
 OVERLAPS.....NONE

INPUT FILE POSITION LAYOUT

(front view)



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

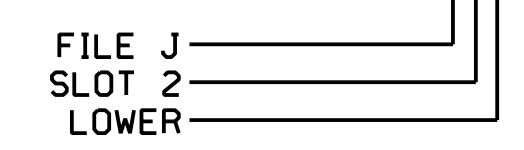
FS = FLASH SENSE
 ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

| LOOP NO. | LOOP TERMINAL | INPUT FILE POS. | PIN NO. | INPUT ASSIGNMENT NO. | DETECTOR NO. | NEMA PHASE | CALL | EXTEND | FULL TIME DELAY | STRETCH TIME | DELAY TIME |
|----------|---------------|-----------------|---------|----------------------|--------------|------------|------|--------|-----------------|--------------|------------|
| 1A | TB2-1,2 | I1U | 56 | 18 | 1 | 1 | Y | Y | | | |
| 2A | TB2-5,6 | I2U | 39 | 1 | 2 | 2 | Y | Y | | | |
| 2B | TB2-7,8 | I2L | 43 | 5 | 12 | 2 | Y | Y | | | |
| 4A | TB4-9,10 | I6U | 41 | 3 | 4 | 4 | Y | Y | | | |
| * S20 | TB6-9,10 | I9U | 60 | 22 | 11 | SYS | | | | | |
| * S21 | TB6-11,12 | I9L | 62 | 24 | 13 | SYS | | | | | |
| 5A | TB3-1,2 | J1U | 55 | 17 | 5 | 5 | Y | Y | | | |
| 6A | TB3-5,6 | J2U | 40 | 2 | 6 | 6 | Y | Y | | | |
| 6B | TB3-7,8 | J2L | 44 | 6 | 16 | 6 | Y | Y | | | |
| 8A | TB5-9,10 | J6U | 42 | 4 | 8 | 8 | Y | Y | | | |

* System detector only. Remove the vehicle phase assigned to this detector in the default programming.

INPUT FILE POSITION LEGEND: J2L



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 02-0392
 DESIGNED: March 2018
 SEALED: 12-7-18
 REVISED: N/A

Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Electrical and Programming Details For: US 70 Business (E Main Street) at North Nunn Street

Division 02 Craven Co. Havelock

PLAN DATE: March 2018 REVIEWED BY: A.D. Klinksiek

PREPARED BY: A.H. Thornburg REVIEWED BY: N.R. Simmons

REVISIONS: INIT. DATE

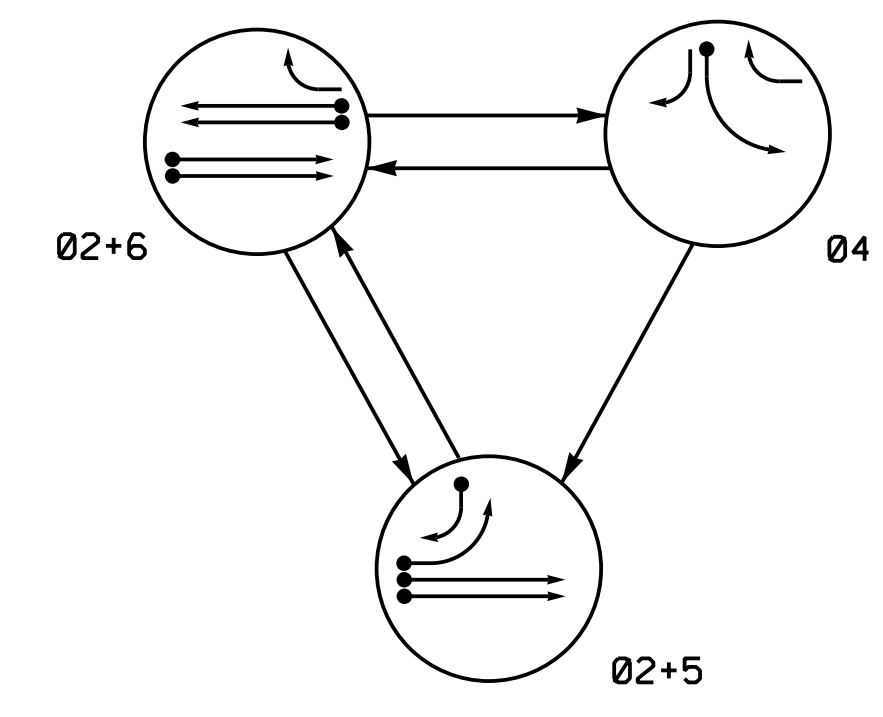
DocuSigned by: 12/7/2018
 Natasha R. Simmons
 SEAL 031464
 NORTH CAROLINA PROFESSIONAL ENGINEER
 W. TASHA R. SIMMONS

750 N. Greenfield Pkwy, Corner, NC 27529

HNTB HNTB NORTH CAROLINA, P.C.
 343 E. Six Forks Road, Suite 200
 Raleigh, North Carolina 27609
 NC License No: C-1554
 (919) 546-8997

SIG. INVENTORY NO. 02-0392

PHASING DIAGRAM

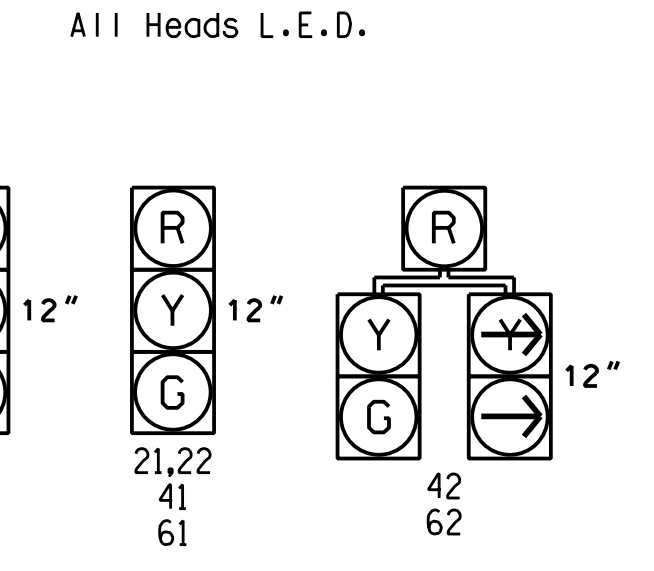


PHASING DIAGRAM DETECTION LEGEND

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

| SIGNAL FACE | PHASE | | | |
|-------------|-------|------|----|-------|
| | 02+5 | 02+6 | 04 | FLASH |
| 21,22 | G | G | R | Y |
| 41 | R | R | G | R |
| 42 | R | R | G | R |
| 51 | - | R | R | R |
| 61 | R | G | R | Y |
| 62 | R | G | R | Y |

SIGNAL FACE I.D.



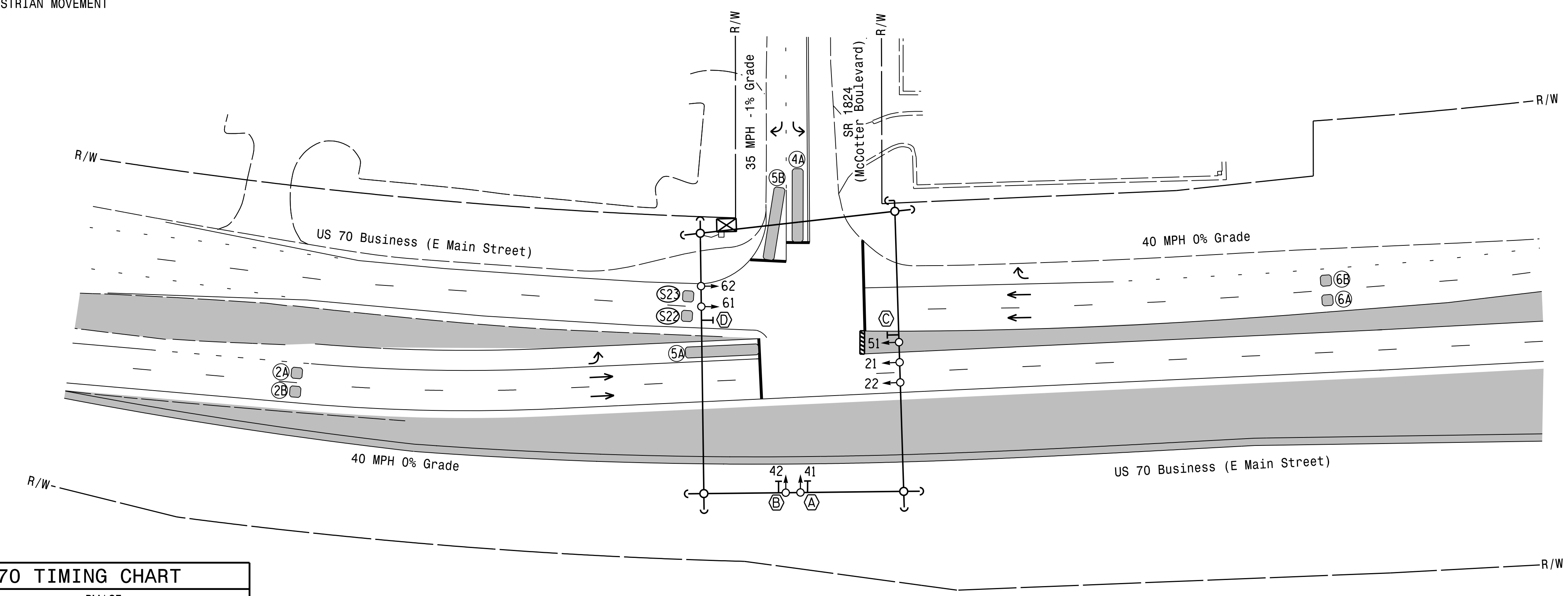
| OASIS 2070 LOOP & DETECTOR INSTALLATION CHART | | | | | | | | | | | | |
|---|-----------|----------------------------|-------|----------|----------------------|---------|-----------|-----------------|--------------|------------|-------------|----------|
| INDUCTIVE LOOPS | | | | | DETECTOR PROGRAMMING | | | | | | | |
| LOOP | SIZE (FT) | DISTANCE FROM STOPBAR (FT) | TURNS | NEW LOOP | PHASE | CALLING | EXTENSION | FULL TIME DELAY | STRETCH TIME | DELAY TIME | SYSTEM LOOP | NEW CARD |
| 2A | 6X6 | 250 | * | Y | 2 | Y | Y | - | - | - | - | Y |
| 2B | 6X6 | 250 | * | Y | 2 | Y | Y | - | - | - | - | Y |
| 4A | 6X40 | 0 | * | Y | 4 | Y | Y | - | - | 3 | - | Y |
| 5A | 6X40 | 0 | * | Y | 5 | Y | Y | - | - | - | - | Y |
| 5B | 6X40 | 0 | * | Y | 5 | Y | Y | - | - | 15 | - | Y |
| 6A | 6X6 | 250 | * | Y | 6 | Y | Y | - | - | - | - | Y |
| 6B | 6X6 | 250 | * | Y | 6 | Y | Y | - | - | - | - | Y |
| S22 | 6X6 | +100 | * | Y | - | - | - | - | - | - | - | Y |
| S23 | 6X6 | +100 | * | Y | - | - | - | - | - | - | - | Y |

* Multizone Microwave Detection

3 Phase Fully Actuated Havelock US 70 Business CLS

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Phase 5 may be lagged.
- Set all detector units to presence mode.
- Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
- The cabinet should be designed to include Auxiliary Output file for future use.
- Incorporate Microwave Detection system for vehicle detection.
- Provide the Engineer with the Manufacturer's approved Microwave Detection locations and mounting heights to obtain detection zones as shown.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- Signal system data: Controller Asset #0649



| OASIS 2070 TIMING CHART | | | | |
|-------------------------|------------|-----|-----|------------|
| FEATURE | PHASE | | | |
| | 2 | 4 | 5 | 6 |
| Min Green 1 * | 12 | 7 | 7 | 12 |
| Extension 1 * | 6.0 | 2.0 | 2.0 | 6.0 |
| Max Green 1 * | 90 | 20 | 15 | 90 |
| Yellow Clearance | 4.2 | 3.0 | 3.0 | 4.2 |
| Red Clearance | 1.0 | 2.4 | 2.3 | 1.1 |
| Red Revert | 2.0 | 2.0 | 2.0 | 2.0 |
| Walk 1 * | - | - | - | - |
| Don't Walk 1 | - | - | - | - |
| Seconds Per Actuation * | 1.5 | - | - | 1.5 |
| Max Variable Initial * | 29 | - | - | 29 |
| Time Before Reduction * | 15 | - | - | 15 |
| Time To Reduce * | 45 | - | - | 45 |
| Minimum Gap | 3.0 | - | - | 3.0 |
| Recall Mode | MIN RECALL | - | - | MIN RECALL |
| Vehicle Call Memory | YELLOW | - | - | YELLOW |
| Dual Entry | - | - | - | - |
| Simultaneous Gap | ON | ON | ON | ON |

* 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.

| PROPOSED | | EXISTING | |
|----------|--|----------|-----|
| ○→ | Traffic Signal Head | ●→ | N/A |
| ○→ | Modified Signal Head | ○→ | N/A |
| ○→ | Sign | ○→ | N/A |
| ○→ | Pedestrian Signal Head With Push Button & Sign | ○→ | N/A |
| ○→ | Signal Pole with Guy | ○→ | N/A |
| ○→ | Signal Pole with Sidewalk Guy | ○→ | N/A |
| ○→ | Inductive Loop Detector | ○→ | N/A |
| ○→ | Controller & Cabinet | ○→ | N/A |
| ○→ | Junction Box | ○→ | N/A |
| ○→ | 2-in Underground Conduit | ○→ | N/A |
| ○→ | Right of Way | ○→ | N/A |
| ○→ | Directional Arrow | ○→ | N/A |
| ○→ | Metal Strain Pole | ○→ | N/A |
| ○→ | Microwave Detection Zone | ○→ | N/A |
| ○→ | Construction Zone | ○→ | N/A |
| ○→ | Construction Barricade | ○→ | N/A |
| ○→ | Left Arrow "ONLY" Sign (R3-5L) | ○→ | (A) |
| ○→ | Right Arrow "ONLY" Sign (R3-5R) | ○→ | (B) |
| ○→ | "U-TURN YIELD TO RIGHT TURN" Sign (R10-16) | ○→ | (C) |
| ○→ | No U-turn Sign (R3-4) | ○→ | (D) |

Signal Upgrade Temporary Design 1 Construction Phase 1, Step 3

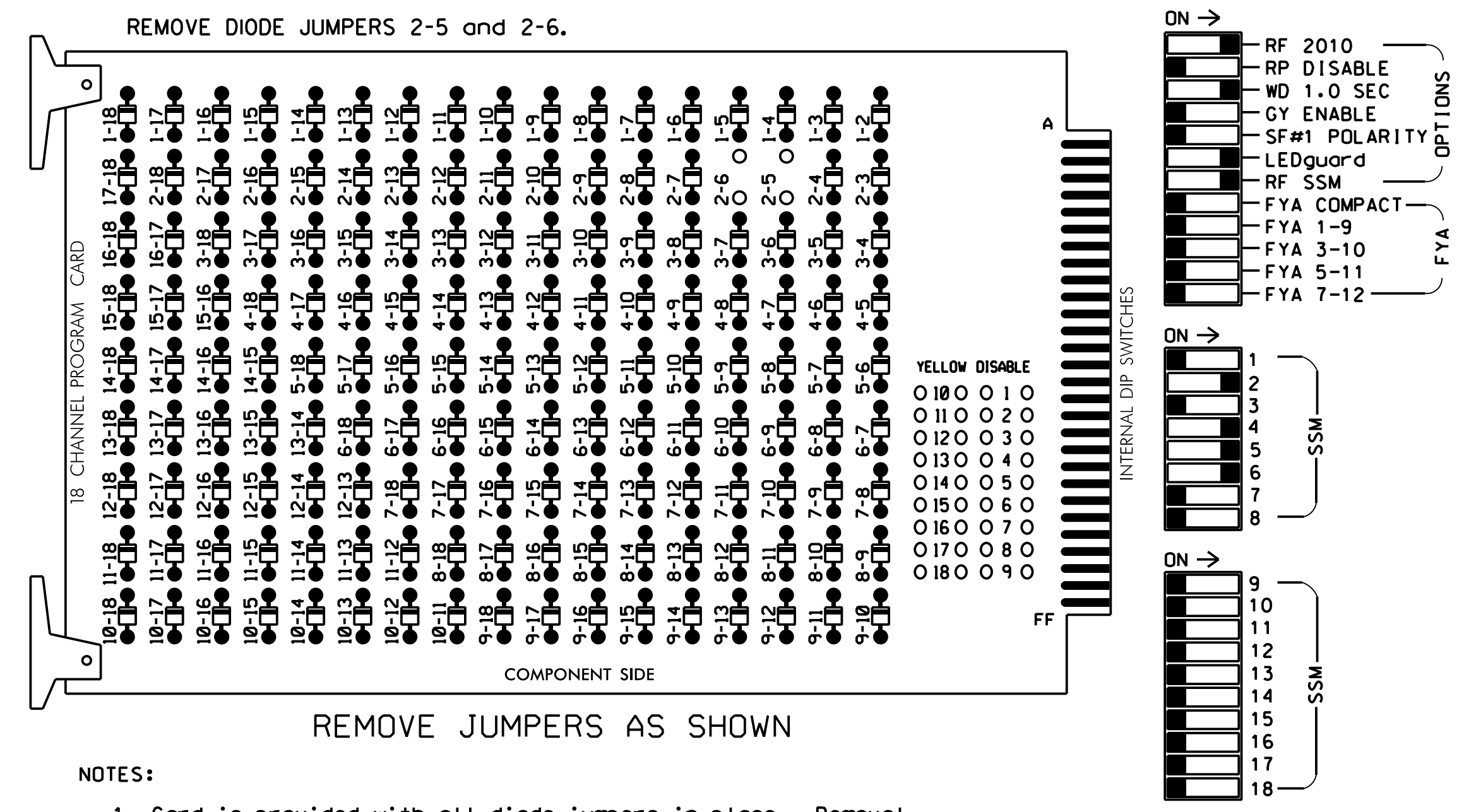
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

| | | | |
|--|---|---|--|
| | Prepared for: TRANSPORTATION MOBILITY AND SAFETY GROUP UNIVERSITY OF NORTH CAROLINA STATE OF NORTH CAROLINA SIGNAL DESIGN SECTION | US 70 Business (E Main Street) at SR 1824 (McCotter Boulevard) | SEAL |
| | 750 N. Greenfield Pkwy, Garner, NC 27525 SCALE: 0 40 1"=40' | Division 02 Craven Co. Havelock PLAN DATE: March 2018 REVIEWED BY: A.D. Klinskiak PREPARED BY: A.H. Thornburg REVIEWED BY: N.R. Simmons | REVISIONS INIT. DATE DocuSigned by: Natasha R. Simmons DATE: 12/7/2018 SIG. INVENTORY NO. 02-0649T1 |

HNTB HNTB NORTH CAROLINA, P.C.
 343 E. Six Forks Road, Suite 200
 Raleigh, North Carolina 27609
 NC License No: C-1554
 (919) 546-8997

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



NOTES:

- Card is provided with all diode jumpers in place. Removal of any jumper allows its channel to run concurrently.
- Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
- Ensure that Red Enable is active at all times during normal operation.
- Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.

■ = DENOTES POSITION OF SWITCH

NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
- Enable Simultaneous Gap-Out for all Phases.
- Program phases 2 and 6 for Variable Initial and Gap Reduction.
- Program phases 2 and 6 for Startup In Green.
- Program phases 2 and 6 for Yellow Flash.
- The cabinet and controller are part of the Havelock US 70 Business Closed Loop Signal System.

SIGNAL HEAD HOOK-UP CHART

| LOAD SWITCH NO. | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 | AUX S1 | AUX S2 | AUX S3 | AUX S4 | AUX S5 | AUX S6 |
|-----------------------|----|-------|-------|----|-------|-------|-----|-----|-------|-------|-----|-------|--------|--------|--------|--------|--------|--------|
| CMU CHANNEL NO. | 1 | 2 | 13 | 3 | 4 | 14 | 5 | 6 | 15 | 7 | 8 | 16 | 9 | 10 | 17 | 11 | 12 | 18 |
| PHASE | 1 | 2 | 2 PED | 3 | 4 | 4 PED | 5 | 6 | 6 PED | 7 | 8 | 8 PED | OLA | OLB | SPARE | OLC | OLD | SPARE |
| SIGNAL HEAD NO. | NU | 21,22 | NU | NU | 41,42 | 62 | NU | 42 | 51 | 61,62 | NU | NU | NU | NU | NU | NU | NU | NU |
| RED | | 128 | | | 101 | | | | | 134 | | | | | | | | |
| YELLOW | | 129 | | | 102 | | | | | 135 | | | | | | | | |
| GREEN | | 130 | | | 103 | | | | | 136 | | | | | | | | |
| RED ARROW | | | | | | | | | | 131 | | | | | | | | |
| YELLOW ARROW | | | | | 102 | | 132 | 132 | | | | | | | | | | |
| FLASHING YELLOW ARROW | | | | | | | | | | | | | | | | | | |
| GREEN ARROW | | | | | 103 | | 133 | 133 | | | | | | | | | | |

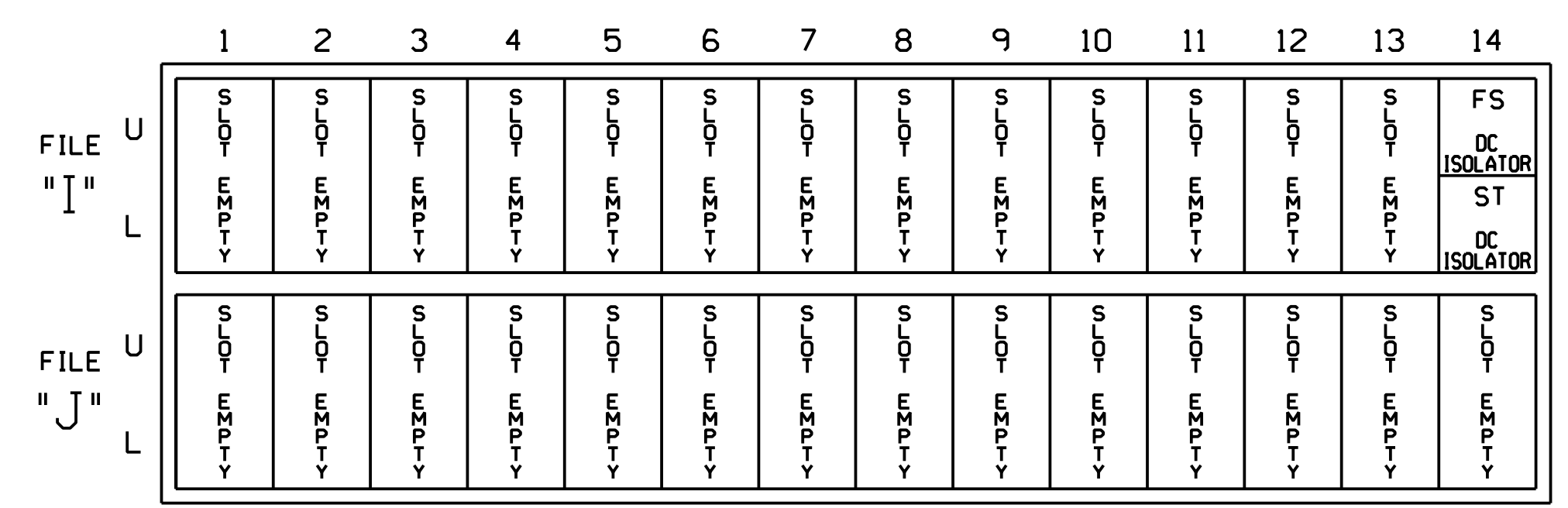
NU = Not Used

EQUIPMENT INFORMATION

CONTROLLER.....2070E
 CABINET.....332 W/AUX
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
 LOAD SWITCHES USED.....S2,S5,S7,S8
 PHASES USED.....2,4,5,6
 OVERLAPS.....NONE

INPUT FILE POSITION LAYOUT

(front view)



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

FS = FLASH SENSE
 ST = STOP TIME

SPECIAL DETECTOR NOTE

Install a microwave 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: 02-0649T1
 DESIGNED: March 2018
 SEALED: 12-7-18
 REVISED: N/A

Electrical Detail
 Signal Upgrade
 Temporary Design 1

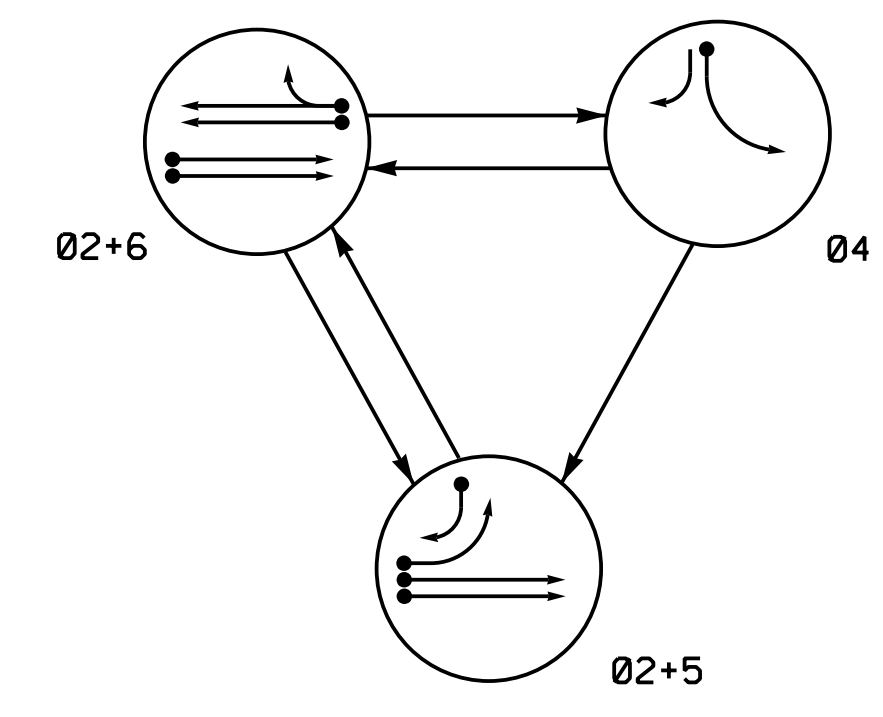
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

| | | | |
|--|--|---|-------------------------|
| | Prepared for: | US 70 Business (E Main Street) at SR 1824 (McCotter Boulevard) Division 02 Craven Co. Havelock | SEAL |
| | PLAN DATE: March 2018 PREPARED BY: A.H. Thornburg | REVIEWED BY: A.D. Klinskyk REVIEWED BY: N.R. Simmons | REVISIONS INIT. DATE |

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PHASING DIAGRAM



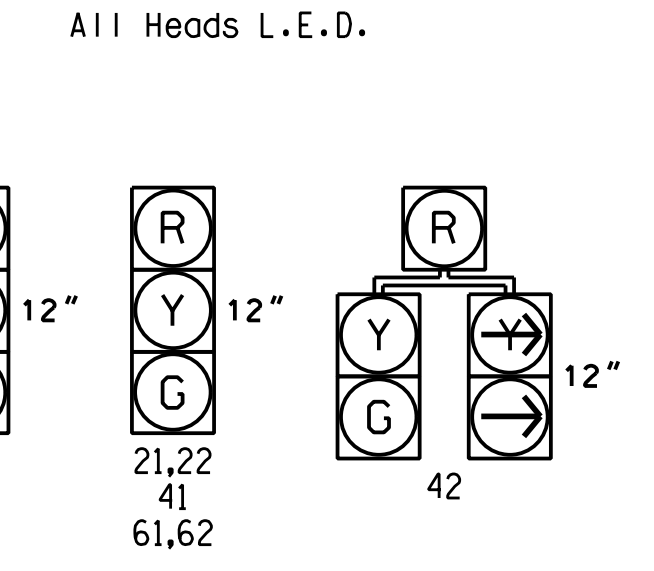
PHASING DIAGRAM DETECTION LEGEND

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

TABLE OF OPERATION

| SIGNAL FACE | PHASE | | | |
|-------------|-------|------|----|-------|
| | 02+5 | 02+6 | 04 | FLASH |
| 21,22 | G | G | R | Y |
| 41 | R | R | G | R |
| 42 | R | R | G | R |
| 51 | - | -R | -R | -R |
| 61,62 | R | G | R | Y |

SIGNAL FACE I.D.



OASIS 2070 LOOP & DETECTOR INSTALLATION CHART

| LOOP | SIZE (FT) | DISTANCE FROM STOPBAR (FT) | TURNS | NEW LOOP | DETECTOR PROGRAMMING | | | | | SYSTEM LOOP | NEW CARD |
|------|-----------|----------------------------|-------|----------|----------------------|---------|-----------|-----------------|--------------|-------------|----------|
| | | | | | PHASE | CALLING | EXTENSION | FULL TIME DELAY | STRETCH TIME | | |
| 2A | 6X6 | 250 | * | Y | 2 | Y | Y | - | - | - | - |
| 2B | 6X6 | 250 | * | Y | 2 | Y | Y | - | - | - | - |
| 4A | 6X40 | 0 | * | - | 4 | Y | Y | - | - | 3 | - |
| 5A | 6X40 | 0 | * | Y | 5 | Y | Y | - | - | - | - |
| 5B | 6X40 | 0 | * | - | 5 | Y | Y | - | - | 15 | - |
| 6A | 6X6 | 250 | * | Y | 6 | Y | Y | - | - | - | - |
| 6B | 6X6 | 250 | * | Y | 6 | Y | Y | - | - | - | - |
| S22 | 6X6 | +100 | * | Y | - | - | - | - | - | - | Y |
| S23 | 6X6 | +100 | * | Y | - | - | - | - | - | - | Y |

* Multizone Microwave Detection

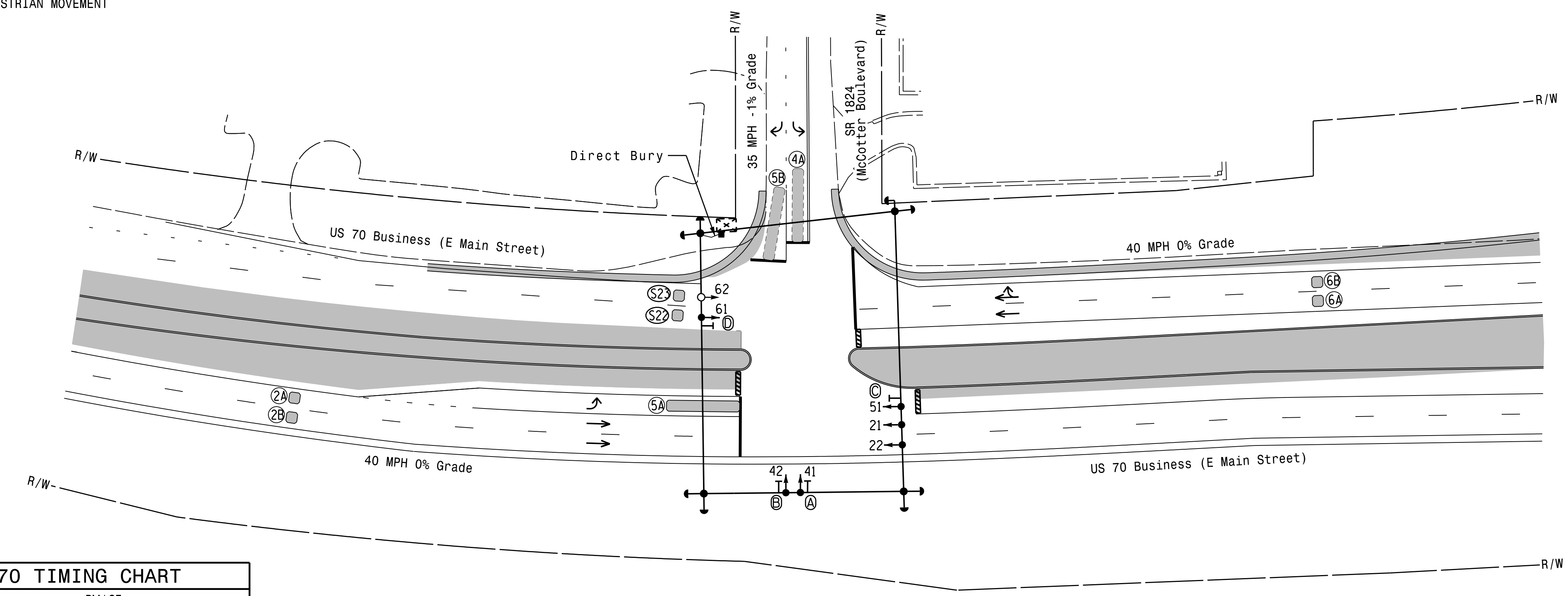
3 Phase Fully Actuated
Havelock US 70 Business CLS

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Phase 5 may be lagged.
- Reposition existing signal heads numbered 21,22,51,61, and signs (C) and (D).
- Set all detector units to presence mode.
- Incorporate Microwave Detection system for vehicle detection.
- Provide the Engineer with the Manufacturer's approved Microwave Detection locations and mounting heights to obtain detection zones as shown.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- Signal system data: Controller Asset #0649

LEGEND

| PROPOSED | EXISTING |
|--|--|
| ○ → Traffic Signal Head | ● → N/A |
| ○ → Modified Signal Head | ○ → N/A |
| ○ → Sign | ○ → N/A |
| ○ → Pedestrian Signal Head With Push Button & Sign | ○ → N/A |
| ○ → Signal Pole with Guy | ○ → N/A |
| ○ → Signal Pole with Sidewalk Guy | ○ → N/A |
| ○ → Inductive Loop Detector | ○ → N/A |
| ○ → Controller & Cabinet | ○ → N/A |
| ○ → Junction Box | ○ → N/A |
| ○ → 2-in Underground Conduit | ○ → N/A |
| N/A → Right of Way | N/A → N/A |
| ○ → Directional Arrow | ○ → N/A |
| ○ → Metal Strain Pole | ○ → N/A |
| ○ → Microwave Detection Zone | ○ → N/A |
| ○ → Construction Zone | ○ → N/A |
| ○ → Construction Barricade | ○ → N/A |
| (A) Left Arrow "ONLY" Sign (R3-5L) | (A) Left Arrow "ONLY" Sign (R3-5L) |
| (B) Right Arrow "ONLY" Sign (R3-5R) | (B) Right Arrow "ONLY" Sign (R3-5R) |
| (C) "U-TURN YIELD TO RIGHT TURN" Sign (R10-16) | (C) "U-TURN YIELD TO RIGHT TURN" Sign (R10-16) |
| (D) No U-turn Sign (R3-4) | (D) No U-turn Sign (R3-4) |



OASIS 2070 TIMING CHART

| FEATURE | PHASE | | | |
|-------------------------|------------|-----|-----|------------|
| | 2 | 4 | 5 | 6 |
| Min Green 1 * | 12 | 7 | 7 | 12 |
| Extension 1 * | 6.0 | 2.0 | 2.0 | 6.0 |
| Max Green 1 * | 90 | 20 | 15 | 90 |
| Yellow Clearance | 4.2 | 3.0 | 3.0 | 4.2 |
| Red Clearance | 1.2 | 3.3 | 2.9 | 1.0 |
| Red Revert | 2.0 | 2.0 | 2.0 | 2.0 |
| Walk 1 * | - | - | - | - |
| Don't Walk 1 | - | - | - | - |
| Seconds Per Actuation * | 1.5 | - | - | 1.5 |
| Max Variable Initial * | 29 | - | - | 29 |
| Time Before Reduction * | 15 | - | - | 15 |
| Time To Reduce * | 45 | - | - | 45 |
| Minimum Gap | 3.0 | - | - | 3.0 |
| Recall Mode | MIN RECALL | - | - | MIN RECALL |
| Vehicle Call Memory | YELLOW | - | - | YELLOW |
| Dual Entry | - | - | - | - |
| Simultaneous Gap | ON | ON | ON | ON |

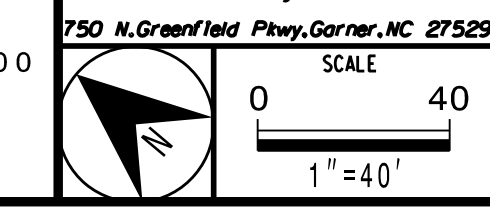
* These values may be field adjusted. Do not adjust Min Green and Extension times for phases 2 and 6 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.

Signal Upgrade
Temporary Design 2
Construction Phase 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

| | | | |
|--|--|---|--|
| | US 70 Business (E Main Street) at SR 1824 (McCotter Boulevard) | | |
| | Division 02 Craven Co. Havelock PLAN DATE: March 2018 REVIEWED BY: A.D. Klinskyk PREPARED BY: A.H. Thornburg REVIEWED BY: N.R. Simmons | REVISIONS: _____ INITI: _____ DATE: _____ _____ _____ | |

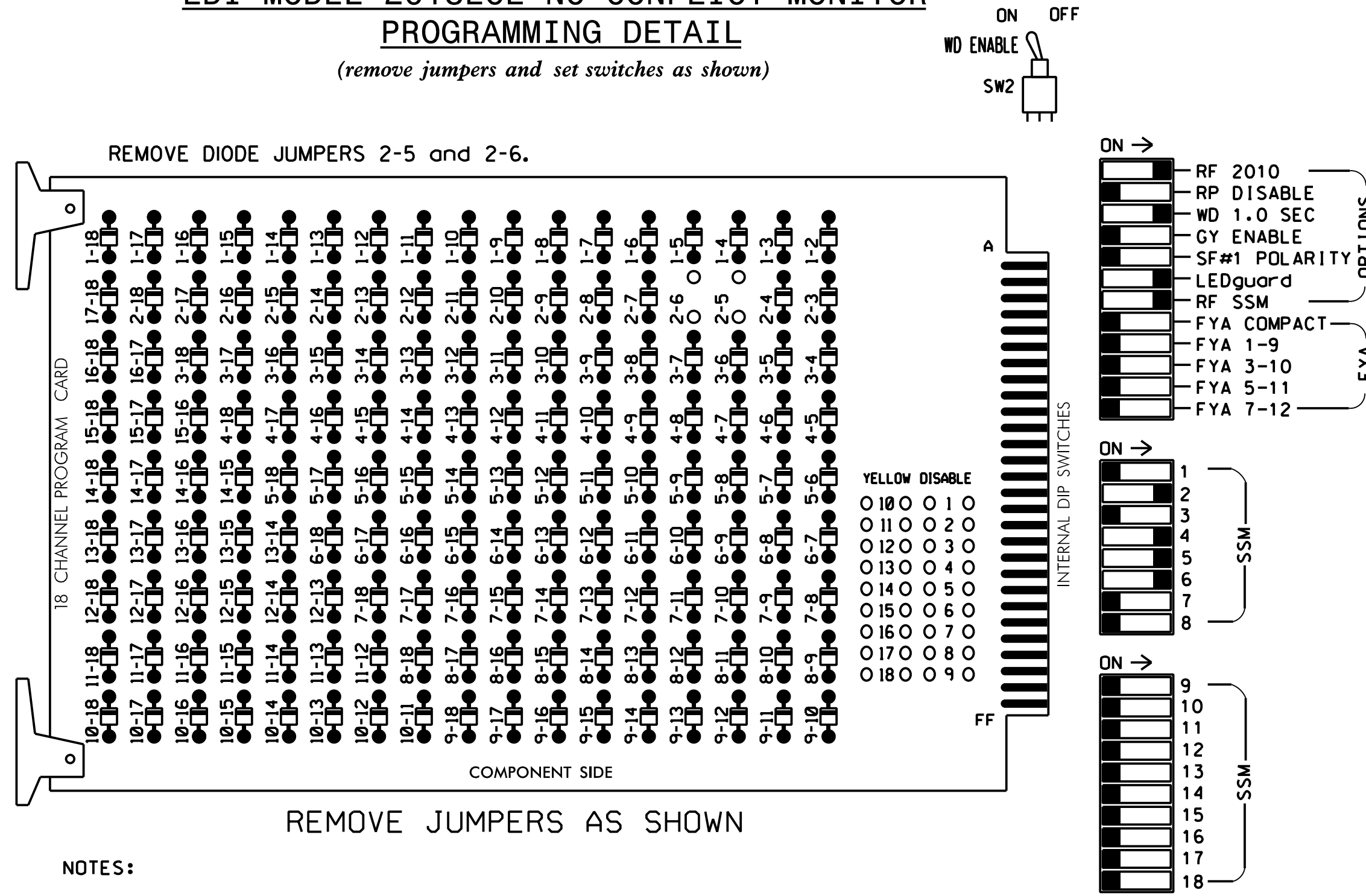
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343 E. Six Forks Road, Suite 200
Raleigh, North Carolina 27609
NC License No: C-1554
(919) 546-8997



DocuSigned by:
Natasha R. Simmons
12/7/2018
DATE
SIG. INVENTORY NO. 02-0649T2

**EDI MODEL 2018ECL-NC CONFLICT MONITOR
PROGRAMMING DETAIL**

(remove jumpers and set switches as shown)



NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channelly.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that Red Enable is active at all times during normal operation.
4. Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.

■ = DENOTES POSITION OF SWITCH

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Enable Simultaneous Gap-Out for all Phases.
3. Program phases 2 and 6 for Variable Initial and Gap Reduction.
4. Program phases 2 and 6 for Startup In Green.
5. Program phases 2 and 6 for Yellow Flash.
6. The cabinet and controller are part of the Havelock US 70 Business Closed Loop Signal System.

SIGNAL HEAD HOOK-UP CHART

| LOAD SWITCH NO. | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 | AUX S1 | AUX S2 | AUX S3 | AUX S4 | AUX S5 | AUX S6 |
|-----------------------|----|-------|-------|----|-------|-------|----|-----|-------|-----|-----|-------|--------|--------|--------|--------|--------|--------|
| CMU CHANNEL NO. | 1 | 2 | 13 | 3 | 4 | 14 | 5 | 6 | 15 | 7 | 8 | 16 | 9 | 10 | 17 | 11 | 12 | 18 |
| PHASE | 1 | 2 | 2 PED | 3 | 4 | 4 PED | 5 | 6 | 6 PED | 7 | 8 | 8 PED | OLA | OLB | SPARE | OLC | OLD | SPARE |
| SIGNAL HEAD NO. | NU | 21,22 | NU | NU | 41,42 | NU | 42 | 51 | 61,62 | NU | NU | NU | NU | NU | NU | NU | NU | NU |
| RED | | 128 | | | 101 | | | | 134 | | | | | | | | | |
| YELLOW | | 129 | | | 102 | | | | 135 | | | | | | | | | |
| GREEN | | 130 | | | 103 | | | | 136 | | | | | | | | | |
| RED ARROW | | | | | | | | | 131 | | | | | | | | | |
| YELLOW ARROW | | | | | | | | | 132 | 132 | | | | | | | | |
| FLASHING YELLOW ARROW | | | | | | | | | | | | | | | | | | |
| GREEN ARROW | | | | | | | | 133 | 133 | | | | | | | | | |

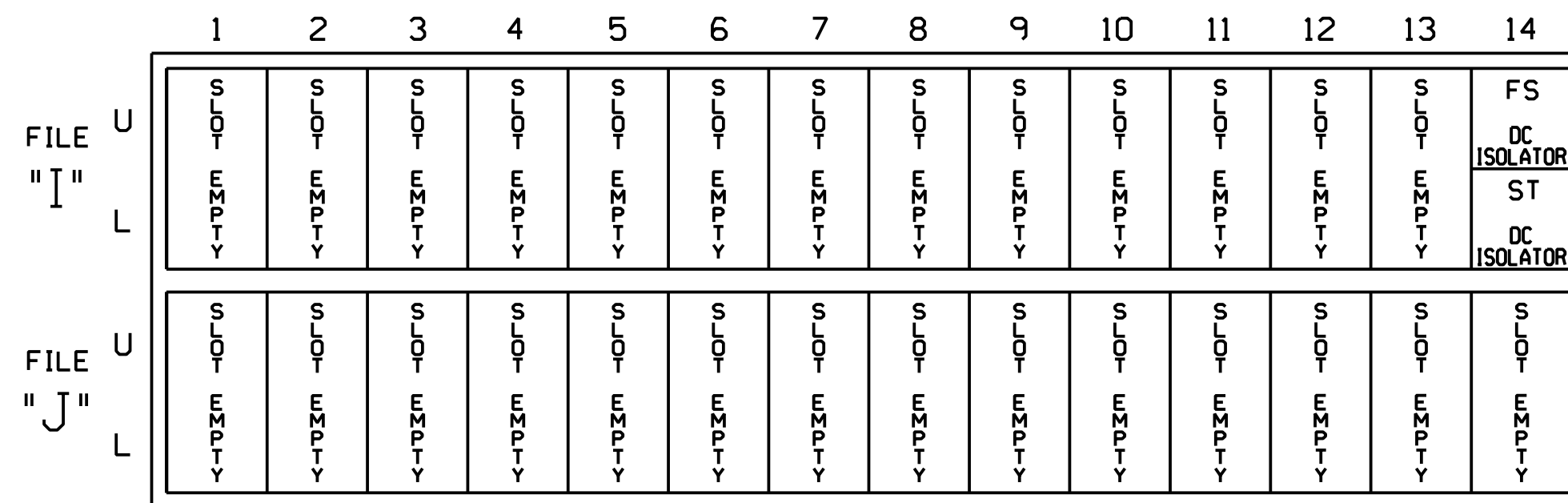
NU = Not Used

EQUIPMENT INFORMATION

CONTROLLER.....2070E
 CABINET.....332 W/AUX
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
 LOAD SWITCHES USED.....S2,S5,S7,S8
 PHASES USED.....2,4,5,6
 OVERLAPS.....NONE

INPUT FILE POSITION LAYOUT

(front view)



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

FS = FLASH SENSE
 ST = STOP TIME

SPECIAL DETECTOR NOTE

Install a microwave 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: 02-0649T2
 DESIGNED: March 2018
 SEALED: 12-7-18
 REVISED: N/A

Electrical Detail
 Signal Upgrade
 Temporary Design 2

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

ELECTRICAL AND PROGRAMMING DETAILS FOR: US 70 Business (E Main Street) at SR 1824 (McCotter Boulevard)

Division 02 Craven Co. Havelock

PLAN DATE: March 2018 REVIEWED BY: A.D. Klinksiek

PREPARED BY: A.H. Thornburg REVIEWED BY: N.R. Simmons

REVISIONS INIT. DATE

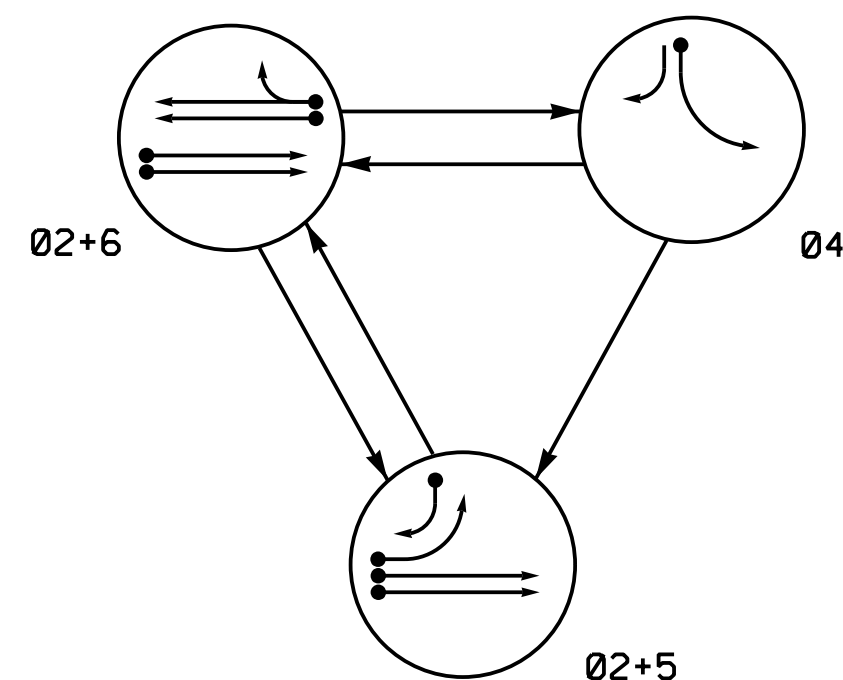
DocuSigned by: 12/7/2018
 Natasha R. Simmons
 SEAL
 NORTH CAROLINA PROFESSIONAL ENGINEER
 SEAL 031464
 NATASHA R. SIMMONS

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750 N. Greenfield Pkwy, Corner, NC 27529

SIG. INVENTORY NO. 02-0649T2

PHASING DIAGRAM



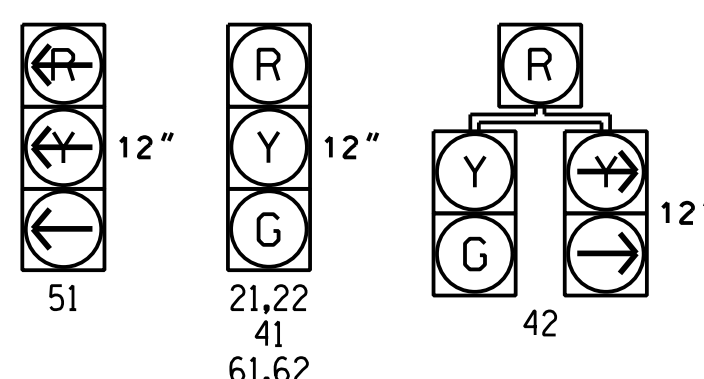
PHASING DIAGRAM DETECTION LEGEND

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

| SIGNAL FACE | PHASE | | | |
|-------------|-------|------|----|-------|
| | 02+5 | 02+6 | 04 | FLASH |
| 21,22 | G | G | R | Y |
| 41 | R | R | G | R |
| 42 | R | R | G | R |
| 51 | - | -R | -R | -R |
| 61,62 | R | G | R | Y |

SIGNAL FACE I.D.

All Heads L.E.D.



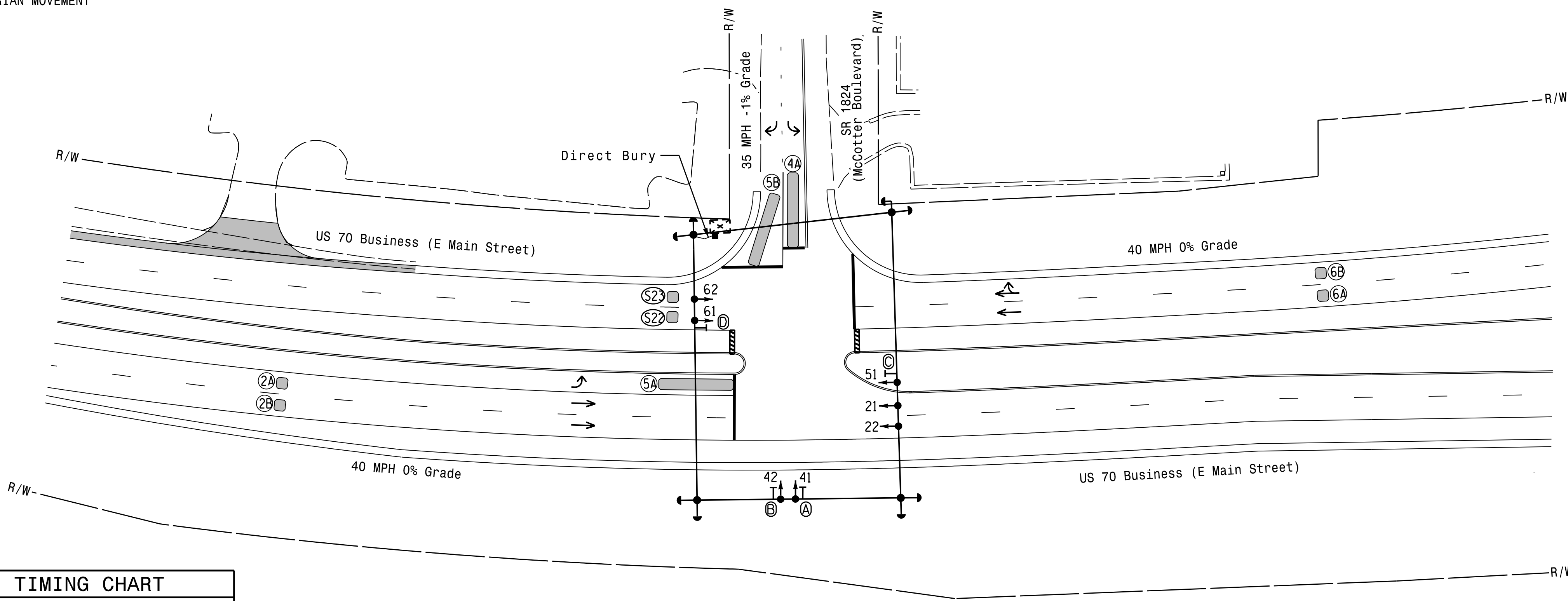
| OASIS 2070 LOOP & DETECTOR INSTALLATION CHART | | | | | | | | | | | | |
|---|-----------|----------------------------|-------|----------|-------|----------------------|-----------|-----------------|--------------|------------|-------------|----------|
| LOOP | SIZE (FT) | DISTANCE FROM STOPBAR (FT) | TURNS | NEW LOOP | PHASE | DETECTOR PROGRAMMING | | | | | SYSTEM LOOP | NEW CARD |
| | | | | | | CALLING | EXTENSION | FULL TIME DELAY | STRETCH TIME | DELAY TIME | | |
| 2A | 6X6 | 250 | * | Y | 2 | Y | Y | - | - | - | - | - |
| 2B | 6X6 | 250 | * | Y | 2 | Y | Y | - | - | - | - | - |
| 4A | 6X40 | 0 | * | Y | 4 | Y | Y | - | - | - | 3 | - |
| 5A | 6X40 | 0 | * | Y | 5 | Y | Y | - | - | - | - | - |
| 5B | 6X40 | 0 | * | Y | 5 | Y | Y | - | - | 15 | - | - |
| 6A | 6X6 | 250 | * | Y | 6 | Y | Y | - | - | - | - | - |
| 6B | 6X6 | 250 | * | Y | 6 | Y | Y | - | - | - | - | - |
| S22 | 6X6 | +100 | * | Y | - | - | - | - | - | - | - | Y |
| S23 | 6X6 | +100 | * | Y | - | - | - | - | - | - | - | Y |

* Multizone Microwave Detection

3 Phase Fully Actuated Havelock US 70 Business CLS

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Phase 5 may be lagged.
- Reposition existing signal heads numbered 21,22,51, and sign 0.
- Set all detector units to presence mode.
- Incorporate Microwave Detection system for vehicle detection.
- Provide the Engineer with the Manufacturer's approved Microwave Detection locations and mounting heights to obtain detection zones as shown.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- Signal system data: Controller Asset #0649



LEGEND

- | PROPOSED | EXISTING |
|----------|----------|
| | |
| | N/A |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| N/A | |
| | |
| | |
| | |
| | N/A |
| | N/A |
| | |
| | |
| | |
| | |

OASIS 2070 TIMING CHART

| FEATURE | PHASE | | | |
|-------------------------|------------|-----|-----|------------|
| | 2 | 4 | 5 | 6 |
| Min Green 1 * | 12 | 7 | 7 | 12 |
| Extension 1 * | 6.0 | 2.0 | 2.0 | 6.0 |
| Max Green 1 * | 90 | 20 | 15 | 90 |
| Yellow Clearance | 4.2 | 3.0 | 3.0 | 4.2 |
| Red Clearance | 1.2 | 2.9 | 2.6 | 1.2 |
| Red Revert | 2.0 | 2.0 | 2.0 | 2.0 |
| Walk 1 * | - | - | - | - |
| Don't Walk 1 | - | - | - | - |
| Seconds Per Actuation * | 1.5 | - | - | 1.5 |
| Max Variable Initial * | 29 | - | - | 29 |
| Time Before Reduction * | 15 | - | - | 15 |
| Time To Reduce * | 45 | - | - | 45 |
| Minimum Gap | 3.0 | - | - | 3.0 |
| Recall Mode | MIN RECALL | - | - | MIN RECALL |
| Vehicle Call Memory | YELLOW | - | - | YELLOW |
| Dual Entry | - | - | - | - |
| Simultaneous Gap | ON | ON | ON | ON |

* 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.

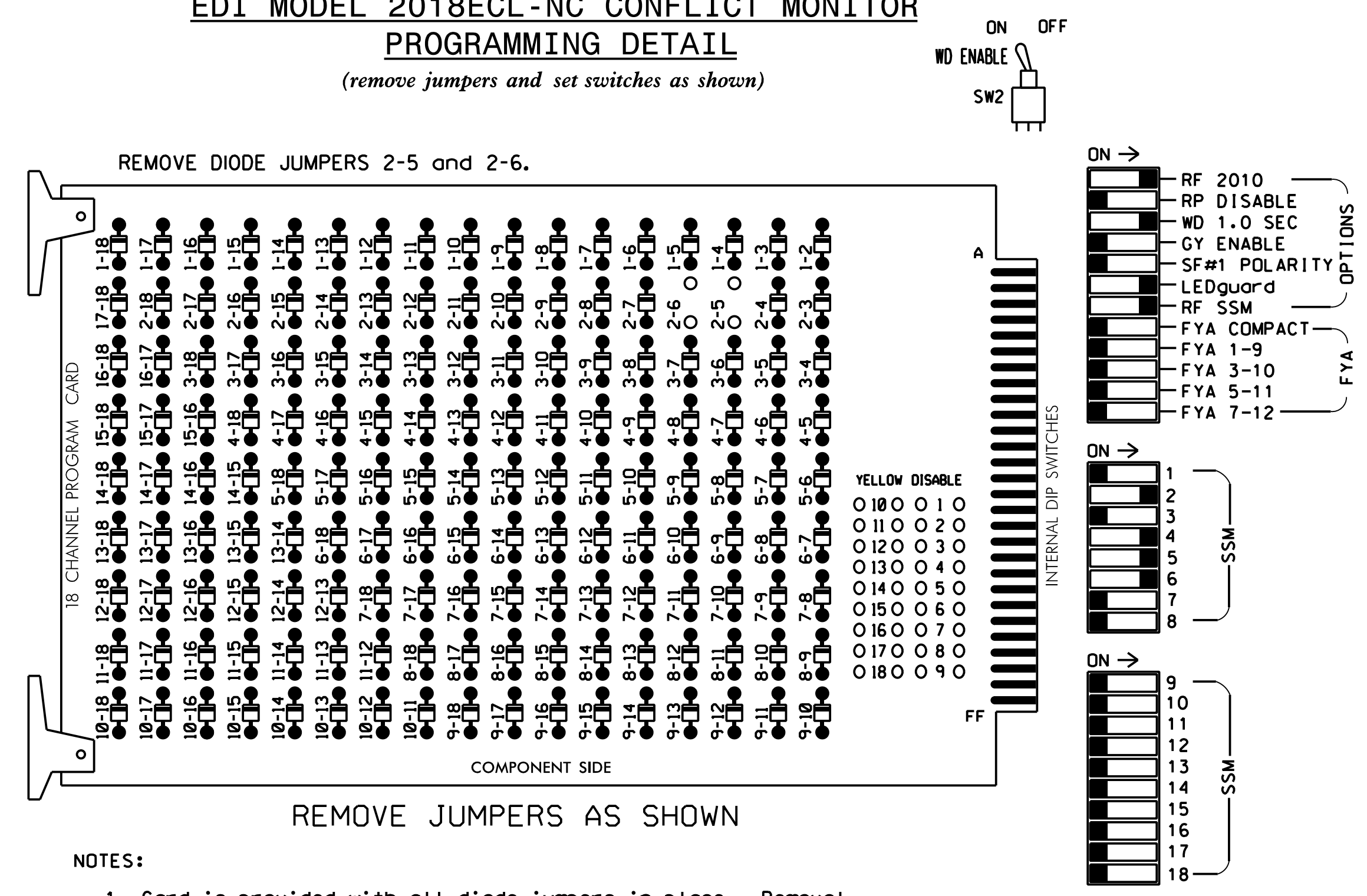
Signal Upgrade
Temporary Design 3
Construction Phase 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

| | | | |
|-------------------------|---|---|--|
| | US 70 Business (E Main Street) at SR 1824 (McCotter Boulevard) | | |
| | Division 02 Craven Co. Havelock PLAN DATE: March 2018 REVIEWED BY: A.D. Klinskiak PREPARED BY: A.H. Thornburg REVIEWED BY: N.R. Simmons | REVISIONS INIT. DATE _____ _____ | |
| SCALE 0 40 1"=40' | | | DocuSigned by: Natasha R. Simmons DATE: 12/7/2018 SIGNATURE: _____ DATE: _____ |

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(919) 546-8997

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL
(remove jumpers and set switches as shown)



- NOTES:**
- Card is provided with all diode jumpers in place. Removal of any jumper allows its channel to run concurrently.
 - Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
 - Ensure that Red Enable is active at all times during normal operation.
 - Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.

NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
- Enable Simultaneous Gap-Out for all Phases.
- Program phases 2 and 6 for Variable Initial and Gap Reduction.
- Program phases 2 and 6 for Startup In Green.
- Program phases 2 and 6 for Yellow Flash.
- The cabinet and controller are part of the Havelock US 70 Business Closed Loop Signal System.

SIGNAL HEAD HOOK-UP CHART

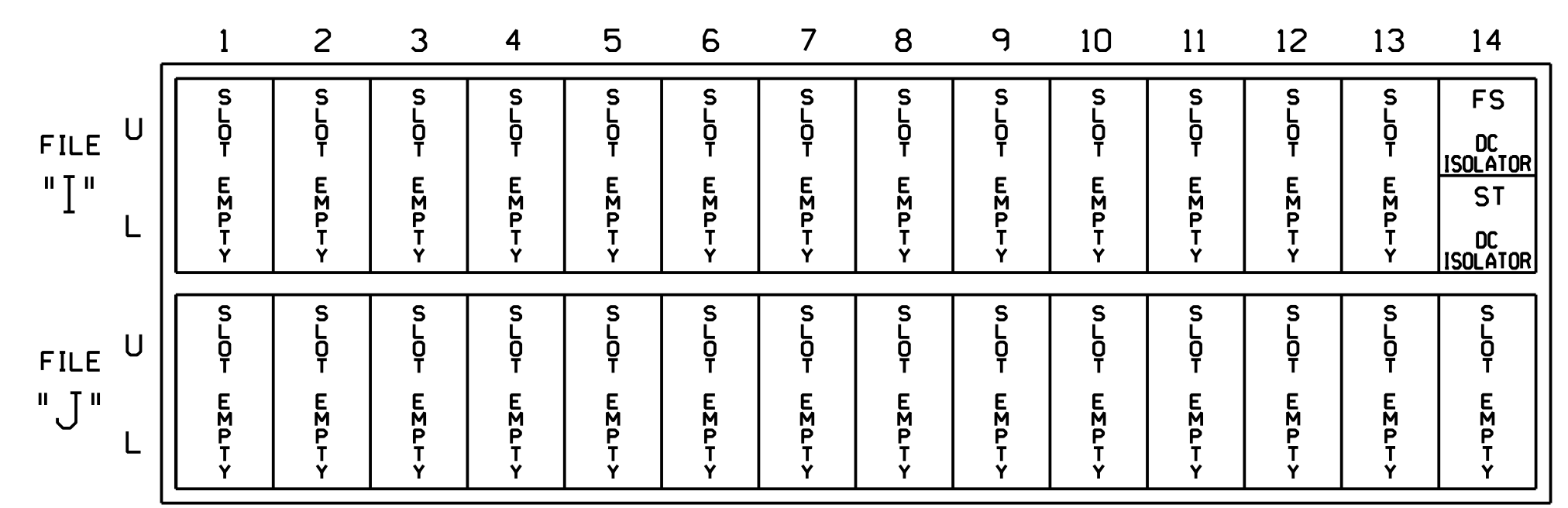
| LOAD SWITCH NO. | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 | AUX S1 | AUX S2 | AUX S3 | AUX S4 | AUX S5 | AUX S6 |
|-----------------------|----|-------|-------|----|-------|-------|----|-----|-------|-----|-----|-------|--------|--------|--------|--------|--------|--------|
| CMU CHANNEL NO. | 1 | 2 | 13 | 3 | 4 | 14 | 5 | 6 | 15 | 7 | 8 | 16 | 9 | 10 | 17 | 11 | 12 | 18 |
| PHASE | 1 | 2 | 2 PED | 3 | 4 | 4 PED | 5 | 6 | 6 PED | 7 | 8 | 8 PED | OLA | OLB | SPARE | OLC | OLD | SPARE |
| SIGNAL HEAD NO. | NU | 21,22 | NU | NU | 41,42 | NU | 42 | 51 | 61,62 | NU | NU | NU | NU | NU | NU | NU | NU | NU |
| RED | | 128 | | | 101 | | | | 134 | | | | | | | | | |
| YELLOW | | 129 | | | 102 | | | | 135 | | | | | | | | | |
| GREEN | | 130 | | | 103 | | | | 136 | | | | | | | | | |
| RED ARROW | | | | | | | | | 131 | | | | | | | | | |
| YELLOW ARROW | | | | | | | | | 132 | 132 | | | | | | | | |
| FLASHING YELLOW ARROW | | | | | | | | | | | | | | | | | | |
| GREEN ARROW | | | | | | | | 133 | 133 | | | | | | | | | |

NU = Not Used

EQUIPMENT INFORMATION

CONTROLLER.....2070E
 CABINET.....332 W/AUX
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
 LOAD SWITCHES USED.....S2,S5,S7,S8
 PHASES USED.....2,4,5,6
 OVERLAPS.....NONE

INPUT FILE POSITION LAYOUT
(front view)



EX.: 1A, 2A, ETC. = LOOP NO.'S
 FS = FLASH SENSE
 ST = STOP TIME

SPECIAL DETECTOR NOTE

Install a microwave 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: 02-0649T3
 DESIGNED: March 2018
 SEALED: 12-7-18
 REVISED: N/A

Electrical Detail
 Signal Upgrade
 Temporary Design 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

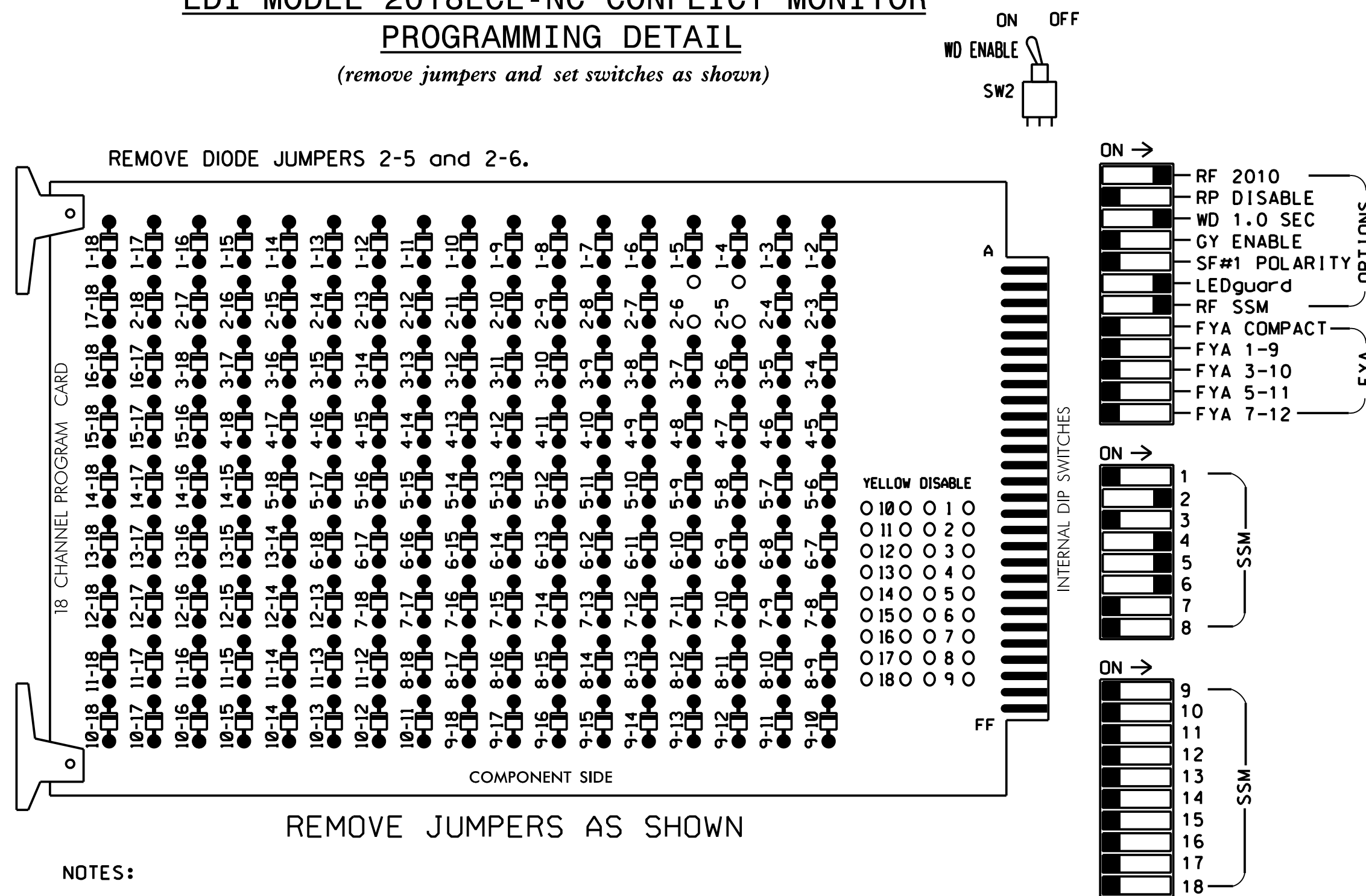
| | | | |
|--|--|---|-----------------------------------|
| | Prepared for: | US 70 Business (E Main Street) at SR 1824 (McCotter Boulevard) Division 02 Craven Co. Havelock | SEAL |
| | PLAN DATE: March 2018 PREPARED BY: A.H. Thornburg | REVIEWED BY: A.D. Klinksiek REVIEWED BY: N.R. Simmons | REVISIONS INITI. DATE _____ |

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EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



NOTES:

- Card is provided with all diode jumpers in place. Removal of any jumper allows its channel to run concurrently.
- Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
- Ensure that Red Enable is active at all times during normal operation.
- Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.

NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
- Enable Simultaneous Gap-Out for all Phases.
- Program phases 2 and 6 for Variable Initial and Gap Reduction.
- Program phases 2 and 6 for Startup In Green.
- Program phases 2 and 6 for Yellow Flash.
- The cabinet and controller are part of the Havelock US 70 Business Closed Loop Signal System.

SIGNAL HEAD HOOK-UP CHART

| LOAD SWITCH NO. | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 | AUX S1 | AUX S2 | AUX S3 | AUX S4 | AUX S5 | AUX S6 |
|-----------------------|----|----------|-------|----|-------|-------|----|----|----------|-----|-----|-------|--------|--------|--------|--------|--------|--------|
| CMU CHANNEL NO. | 1 | 2 | 13 | 3 | 4 | 14 | 5 | 6 | 15 | 7 | 8 | 16 | 9 | 10 | 17 | 11 | 12 | 18 |
| PHASE | 1 | 2 | 2 PED | 3 | 4 | 4 PED | 5 | 6 | 6 PED | 7 | 8 | 8 PED | OLA | OLB | SPARE | OLC | OLD | SPARE |
| SIGNAL HEAD NO. | NU | 21,22,23 | NU | NU | 41,42 | NU | 42 | 51 | 61,62,63 | NU | NU | NU | NU | NU | NU | NU | NU | NU |
| RED | | 128 | | | 101 | | | | 134 | | | | | | | | | |
| YELLOW | | 129 | | | 102 | | | | 135 | | | | | | | | | |
| GREEN | | 130 | | | 103 | | | | 136 | | | | | | | | | |
| RED ARROW | | | | | | | | | 131 | | | | | | | | | |
| YELLOW ARROW | | | | | | | | | 132 | 132 | | | | | | | | |
| FLASHING YELLOW ARROW | | | | | | | | | | | | | | | | | | |
| GREEN ARROW | | | | | | | | | 133 | 133 | | | | | | | | |

NU = Not Used

EQUIPMENT INFORMATION

CONTROLLER.....2070E
 CABINET.....332 W/AUX
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
 LOAD SWITCHES USED.....S2,S5,S7,S8
 PHASES USED.....2,4,5,6
 OVERLAPS.....NONE

INPUT FILE POSITION LAYOUT

(front view)

| FILE | U | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|------|---|-----|-----|----------|-----|----------|-----|---|---|---|----|----|----|----|-------------|
| "I" | U | ∅ 2 | ∅ 2 | ∅ 2 | ∅ 4 | ∅ 4 | SYS | S | S | S | S | S | S | S | FS |
| | | 2A | 2C | NOT USED | 4A | NOT USED | S22 | S | S | S | S | S | S | S | DC ISOLATOR |
| "J" | L | ∅ 5 | ∅ 5 | ∅ 6 | ∅ 6 | ∅ 6 | SYS | S | S | S | S | S | S | S | S |
| | | 5A | 5B | 6B | 6A | 6C | S33 | S | S | S | S | S | S | S | DC ISOLATOR |

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

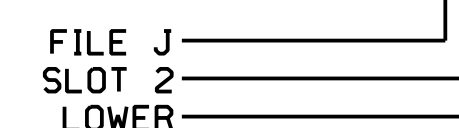
FS = FLASH SENSE
 ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

| LOOP NO. | LOOP TERMINAL | INPUT FILE POS. | PIN NO. | INPUT ASSIGNMENT NO. | DETECTOR NO. | NEMA PHASE | CALL | EXTEND | FULL TIME DELAY | STRETCH TIME | DELAY TIME |
|----------|---------------|-----------------|---------|----------------------|--------------|------------|------|--------|-----------------|--------------|------------|
| 2A | TB2-5,6 | I2U | 39 | 1 | 2 | 2 | Y | Y | | | |
| 2B | TB2-7,8 | I2L | 43 | 5 | 12 | 2 | Y | Y | | | |
| 2C | TB2-9,10 | I3U | 63 | 25 | 32 | 2 | Y | Y | | | |
| 4A | TB4-9,10 | I6U | 41 | 3 | 4 | 4 | Y | Y | | | 3 |
| *S22 | TB6-9,10 | I9U | 60 | 22 | 11 | SYS | | | | | |
| *S23 | TB6-11,12 | I9L | 62 | 24 | 13 | SYS | | | | | |
| 5A | TB3-1,2 | J1U | 55 | 17 | 5 | 5 | Y | Y | | | |
| 5B | TB3-5,6 | J2U | 40 | 2 | 6 | 5 | Y | Y | | | 15 |
| 6A | TB3-7,8 | J2L | 44 | 6 | 16 | 6 | Y | Y | | | |
| 6B | TB3-9,10 | J3U | 64 | 26 | 36 | 6 | Y | Y | | | |
| 6C | TB3-11,12 | J3L | 77 | 39 | 46 | 6 | Y | Y | | | |
| *S33 | TB7-9,10 | J9U | 59 | 21 | 15 | SYS | | | | | |

* System detector only. Remove the vehicle phase assigned to this detector in the default programming.

INPUT FILE POSITION LEGEND: J2L



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 02-0649
 DESIGNED: March 2018
 SEALED: 12-7-18
 REVISED: N/A

Electrical Detail
 Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

| | | | |
|---|---|---|--|
| | Prepared for: US 70 Business (E Main Street) at SR 1824 (McCotter Boulevard) | | |
| | Division 02 PLAN DATE: March 2018 PREPARED BY: A.H. Thornburg | Craven Co. Havelock REVIEWED BY: A.D. Klinksiek REVIEWED BY: N.R. Simmons | |
| HNTB NORTH CAROLINA, P.C. 343 E. Six Forks Road, Suite 200 Raleigh, North Carolina 27609 NC License No: C-1554 (919) 546-8997 | | REVISIONS: _____ INITI: _____ DATE: _____ DocuSigned by: _____ 12/7/2018 SIGNATURE: _____ DATE: _____ SIG. INVENTORY NO. 02-0649 | |

PHASING DIAGRAM

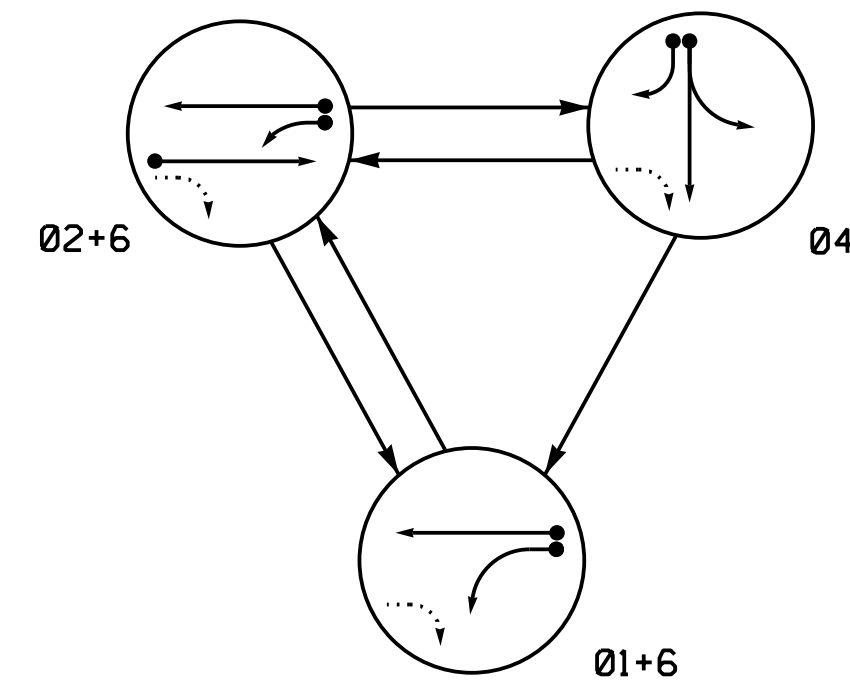
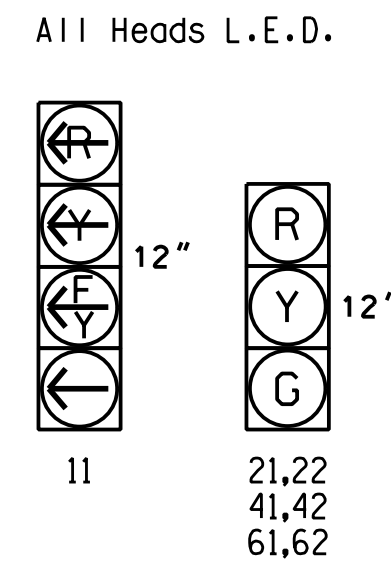


TABLE OF OPERATION table with columns for SIGNAL FACE, PHASE (01+6, 02+6, 04, FLASHT), and values for 11, 21,22, 41,42, 61,62.

SIGNAL FACE I.D.



OASIS 2070 LOOP & DETECTOR INSTALLATION CHART table with columns for LOOP, SIZE (FT), DISTANCE FROM STOPBAR (FT), TURNS, NEW LOOP, PHASE, CALLING, EXTENSION, FULL TIME DELAY, STRETCH TIME, DELAY TIME, SYSTEM LOOP, NEW CARD.

* Multizone Microwave Detection

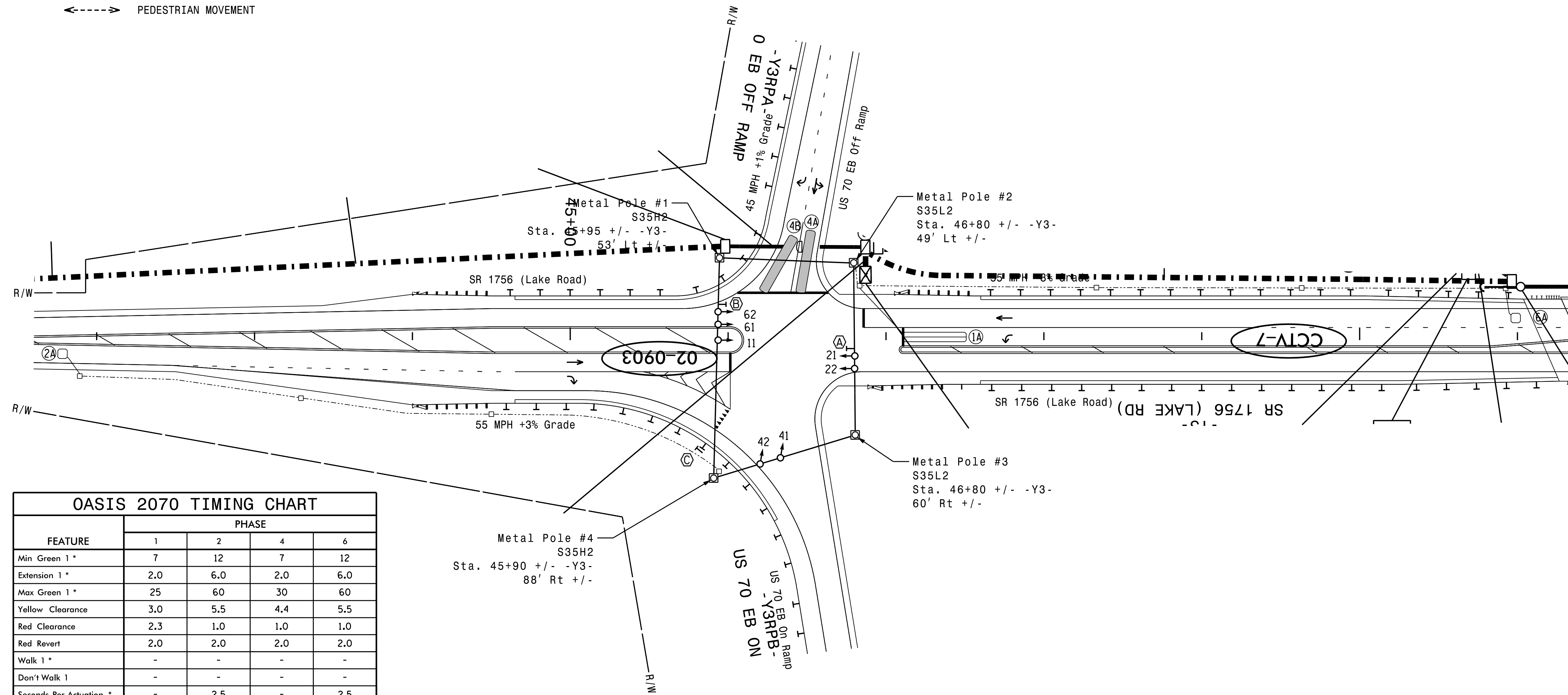
3 Phase Fully Actuated Havelock US 70 Business CLS

NOTES

- 1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 may be lagged.
4. Set all detector units to presence mode.
5. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
6. Incorporate Microwave Detection system for vehicle detection.
7. Provide the Engineer with the Manufacturer's approved Microwave Detection locations and mounting heights to obtain detection zones as shown.
8. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
9. Signal system data: Controller Asset #0903

PHASING DIAGRAM DETECTION LEGEND

- DETECTED MOVEMENT (arrow with dot)
UNDETECTED MOVEMENT (OVERLAP) (arrow with line)
UNSIGNALIZED MOVEMENT (dotted arrow)
PEDESTRIAN MOVEMENT (arrow with person icon)



OASIS 2070 TIMING CHART table with columns for FEATURE and PHASE (1, 2, 4, 6) and rows for Min Green 1*, Extension 1*, Max Green 1*, Yellow Clearance, Red Clearance, Red Revert, Walk 1*, Don't Walk 1, Seconds Per Actuation, Max Variable Initial, Time Before Reduction, Time To Reduce, Minimum Gap, Recall Mode, Vehicle Call Memory, Dual Entry, Simultaneous Gap.

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

LEGEND table with columns for PROPOSED and EXISTING, listing symbols for Traffic Signal Head, Modified Signal Head, Pedestrian Signal Head, Signal Pole with Guy, Inductive Loop Detector, Junction Box, 2-in Underground Conduit, Right of Way, Directional Arrow, Metal Strain Pole, Guardrail, Microwave Detection Zone, and various signs.

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

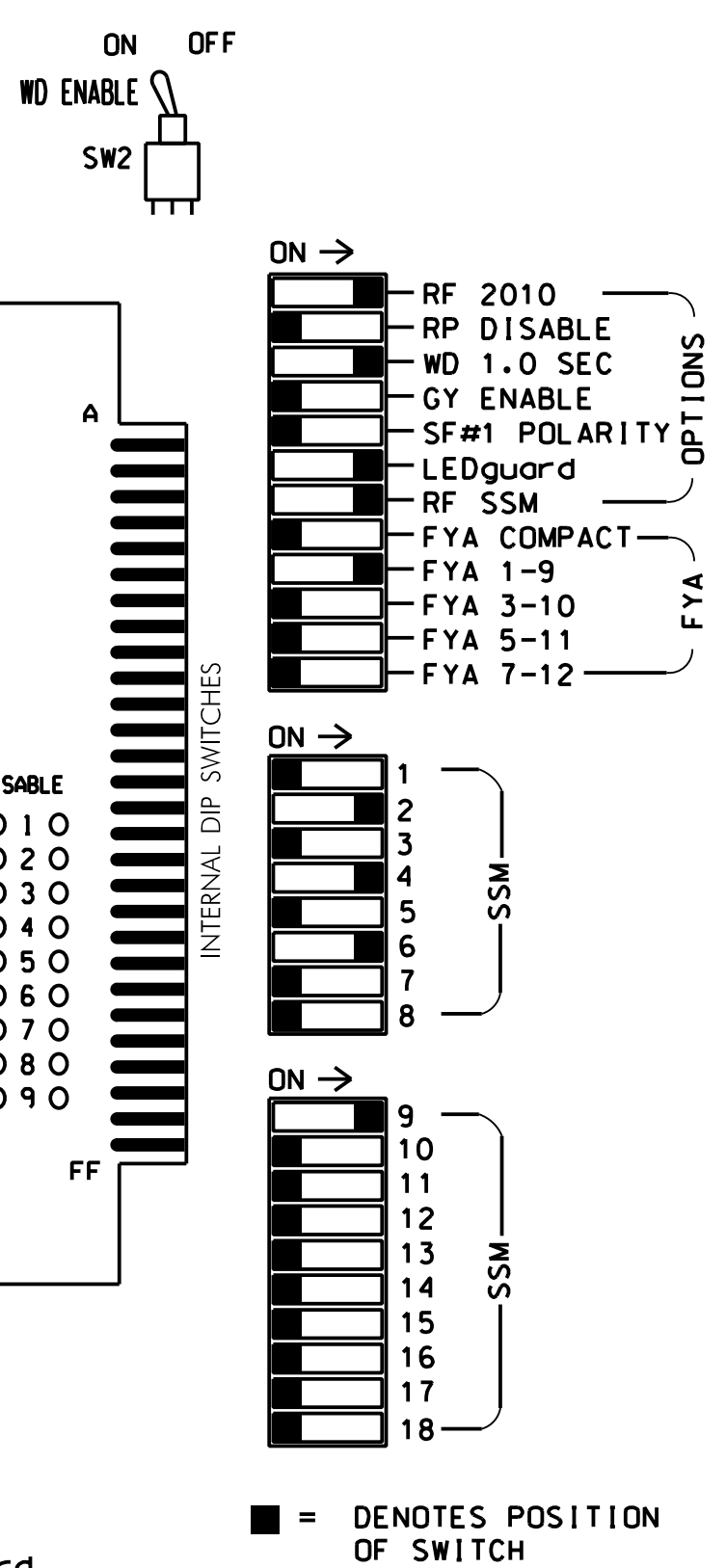
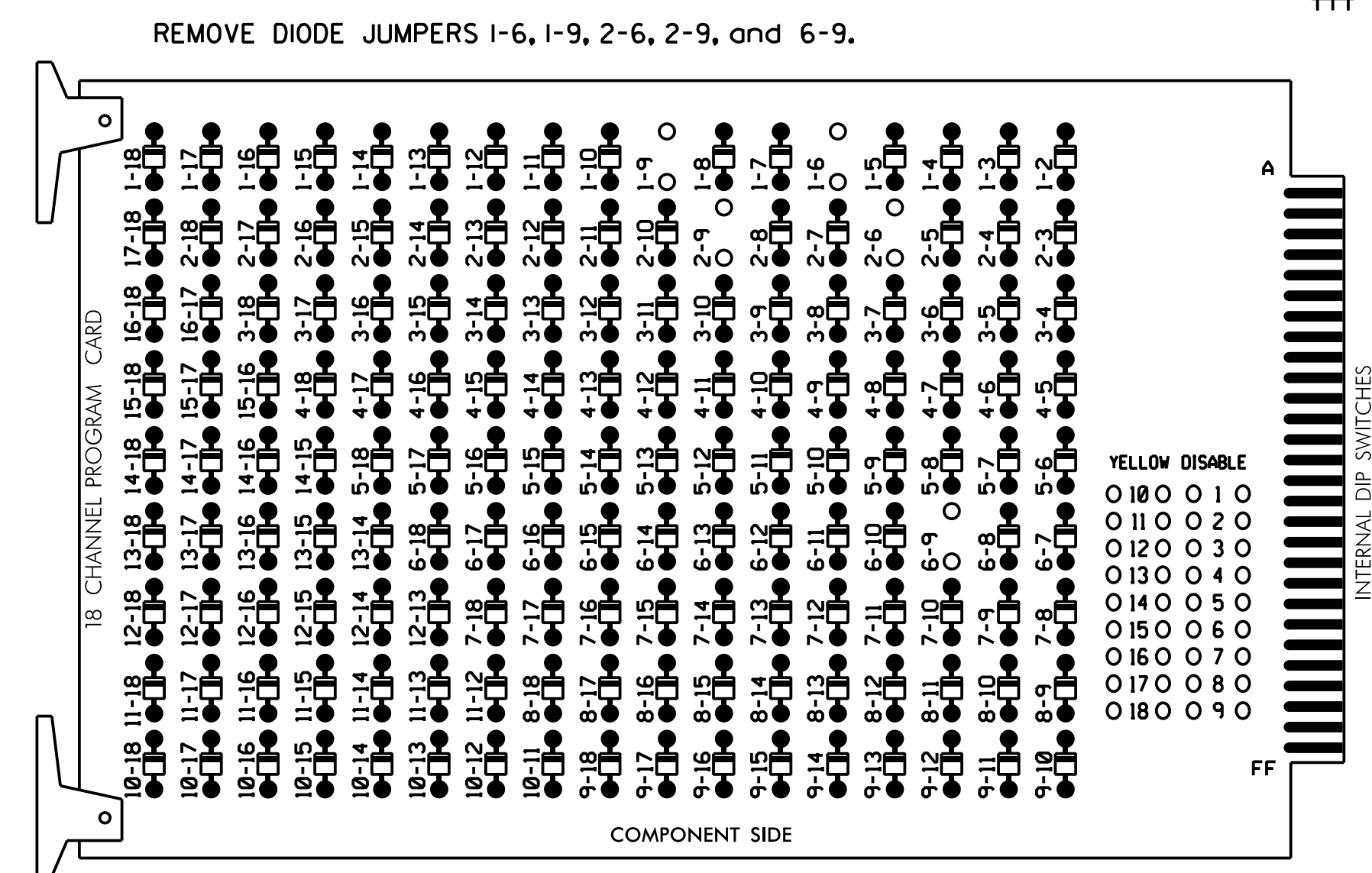
New Installation

Professional seal and title block area containing HNTB logo, project name (SR 1756 (Lake Road) at US 70 EB Ramp), division (Division 02 Craven Co. Havelock), plan date (March 2018), reviewer (A.D. Klinskies), and signature (N.R. Simmons) with date (12/7/2018).

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EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
- Enable Simultaneous Gap-Out for all Phases.
- Program phases 2 and 6 for Variable Initial and Gap Reduction.
- Program phases 2 and 6 for Startup In Green.
- Program phases 2 and 6 for Yellow Flash, and overlap 1 as Wag Overlaps.
- The cabinet and controller are part of the Havelock US 70 Business Closed Loop Signal System.

EQUIPMENT INFORMATION

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

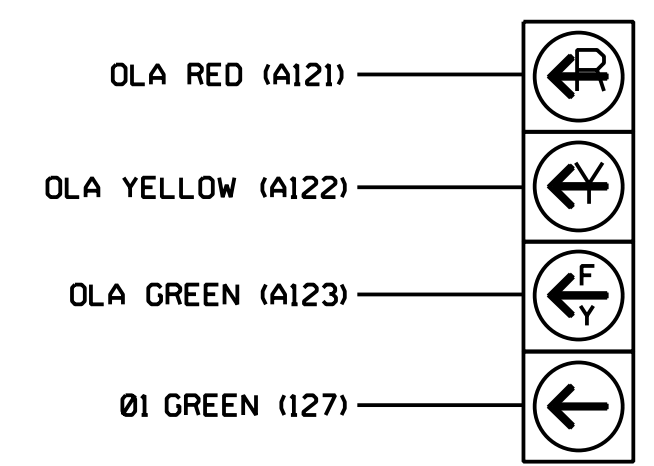
SIGNAL HEAD HOOK-UP CHART

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

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

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



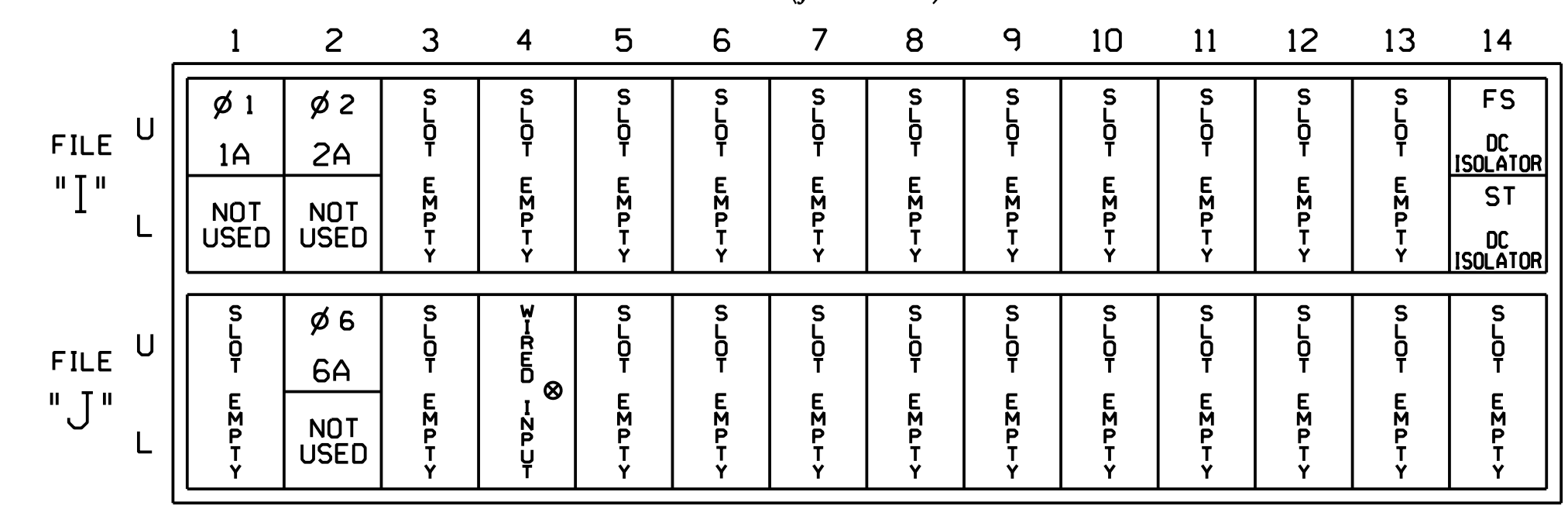
11

NOTE

The sequence display for signal head 11 requires special logic programming. See sheet 2 for programming instructions.

INPUT FILE POSITION LAYOUT

(front view)



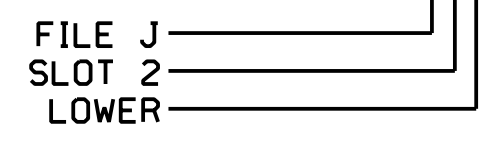
EX.: 1A, 2A, ETC. = LOOP NO.'S
 FS = FLASH SENSE
 ST = STOP TIME
 ⊗ Wired Input - Do not populate slot with detector cord

INPUT FILE CONNECTION & PROGRAMMING CHART

| LOOP NO. | LOOP TERMINAL | INPUT FILE POS. | PIN NO. | INPUT ASSIGNMENT NO. | DETECTOR NO. | NEMA PHASE | CALL | EXTEND | FULL TIME DELAY | STRETCH TIME | DELAY TIME |
|----------|---------------|-----------------|---------|----------------------|--------------|------------|------|--------|-----------------|--------------|------------|
| 1A' | TB2-1,2 | I1U | 56 | 18 | 1 | 1 | Y | Y | | | 15 |
| 2A | TB2-5,6 | J4U | 48 | 10 | 26 | 6 | Y | Y | Y | | 3 |
| 6A | TB3-5,6 | J2U | 40 | 2 | 6 | 6 | Y | Y | | | |

*Add jumper from I1-W to J4-W, on rear of input file.

INPUT FILE POSITION LEGEND: J2L



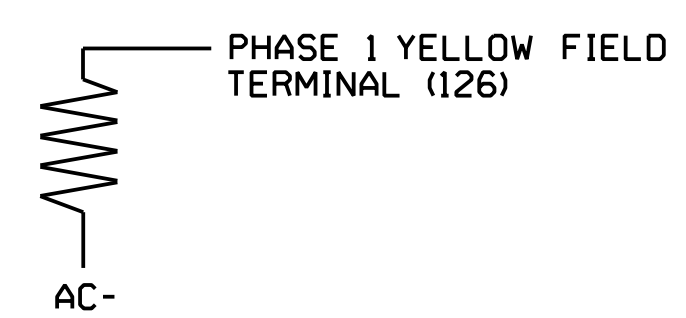
SPECIAL DETECTOR NOTE

For zones 4A and 4B, install a microwave 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.

LOAD RESISTOR INSTALLATION DETAIL

(install resistor as shown below)

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



Electrical Detail - Sheet 1 of 2
 Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Prepared for:

SR 1756 (Lake Road) at US 70 EB Ramp

Division 02 Craven Co. Havelock

PLAN DATE: March 2018 REVIEWED BY: A.D. Klinksiek

PREPARED BY: A.H. Thornburg REVIEWED BY: N.R. Simmons

SEAL: NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 031464 NATASHA R. SIMMONS

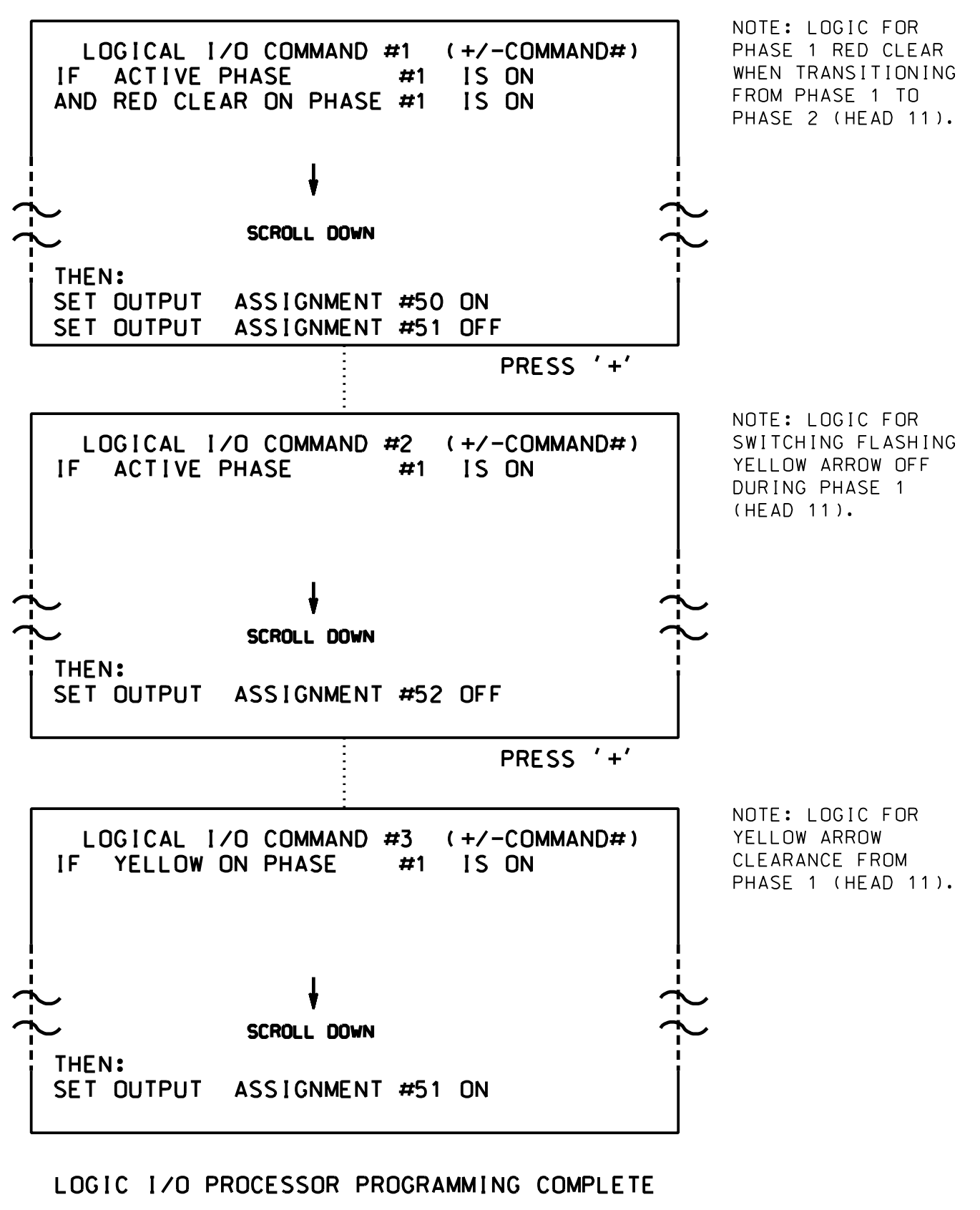
DocuSigned by: 12/7/2018

SIG. INVENTORY NO. 02-0903

LOGICAL I/O PROCESSOR PROGRAMMING DETAIL TO PRODUCE SPECIAL FYA-PPLT SIGNAL SEQUENCE

(program controller as shown below)

- FROM MAIN MENU PRESS '2' (PHASE CONTROL), THEN '1' (PHASE CONTROL FUNCTIONS). SCROLL TO THE BOTTOM OF THE MENU AND ENABLE ACT LOGIC COMMANDS 1, 2, and 3.
- FROM MAIN MENU PRESS '6' (OUTPUTS), THEN '3' (LOGICAL I/O PROCESSOR).



| <u>OUTPUT REFERENCE SCHEDULE</u> | |
|----------------------------------|--|
| USE TO INTERPRET LOGIC PROCESSOR | |
| OUTPUT 50 = Overlap A Red | |
| OUTPUT 51 = Overlap A Yellow | |
| OUTPUT 52 = Overlap A Green | |

OVERLAP PROGRAMMING DETAIL

(program controller as shown below)

FROM MAIN MENU PRESS '8' (OVERLAPS), THEN '1' (VEHICLE OVERLAP SETTINGS).

PAGE 1: VEHICLE OVERLAP 'A' SETTINGS
 PHASE: :12345678910111213141516
 VEH OVL PARENTS: :XX
 VEH OVL NOT VEH: :
 VEH OVL NOT PED: :
 VEH OVL GRN EXT: :
 STARTUP COLOR: - RED - YELLOW - GREEN
 FLASH COLORS: - RED - YELLOW X GREEN
 SELECT VEHICLE OVERLAP OPTIONS: (Y/N)
 FLASH YELLOW IN CONTROLLER FLASH?...Y
 GREEN EXTENSION (0-25.5 SEC)...0.0
 YELLOW CLEAR (0=PARENT,3-25.5 SEC)...0.0
 RED CLEAR (0=PARENT,0.1-25.5 SEC)...0.0
 OUTPUT AS PHASE # (0=NONE, 1-16)...0

← NOTICE GREEN FLASH

OVERLAP PROGRAMMING COMPLETE

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 02-0903
 DESIGNED: March 2018
 SEALED: 12-7-18
 REVISED: N/A

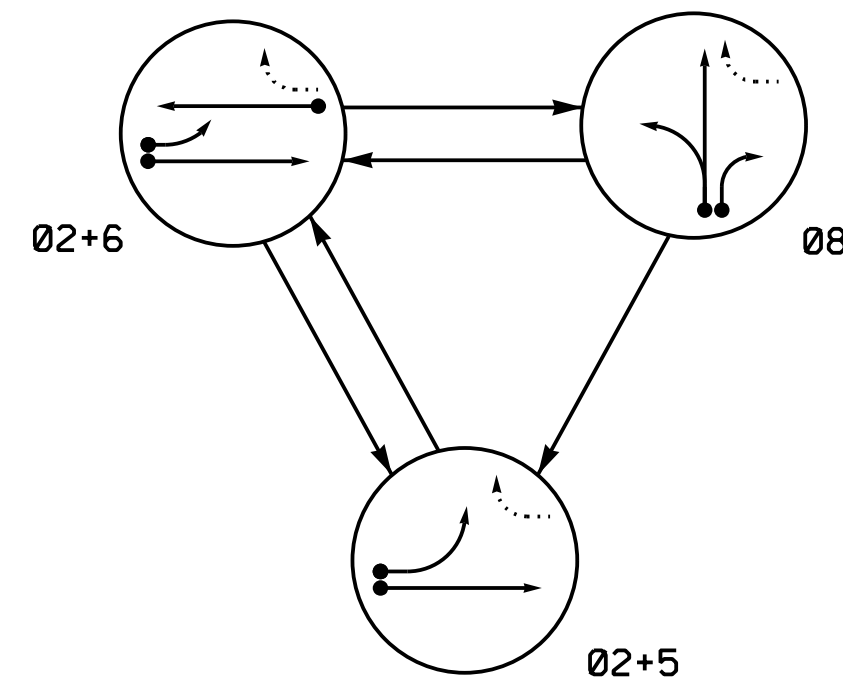
Electrical Detail - Sheet 2 of 2
Signal Upgrade

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| <p style="font-size: 6px;">ELECTRICAL AND PROGRAMMING DETAILS FOR:</p> <p style="font-size: 6px;">Prepared for:</p> <p style="font-size: 6px;">750 N. Greenfield Pkwy, Corner, NC 27529</p> | <p>SR 1756 (Lake Road) at US 70 EB Ramp</p> <p>Division 02 Craven Co. Havelock</p> <p>PLAN DATE: March 2018 REVIEWED BY: A.D. Klinksiek</p> <p>PREPARED BY: A.H. Thornburg REVIEWED BY: N.R. Simmons</p> | <p>SEAL</p> <p>SEAL 031464 NATASHA R. SIMMONS ENGINEER</p> | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>REVISIONS</th> <th>INIT.</th> <th>DATE</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table> <p style="font-size: 6px;">DocuSigned by: Natasha R. Simmons 12/7/2018</p> <p style="font-size: 6px;">SIGNATURE DATE</p> <p style="font-size: 6px;">SIG. INVENTORY NO. 02-0903</p> | REVISIONS | INIT. | DATE | | | | | | |
|---|--|--|---|-----------|-------|------|--|--|--|--|--|--|
| REVISIONS | INIT. | DATE | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |

PHASING DIAGRAM

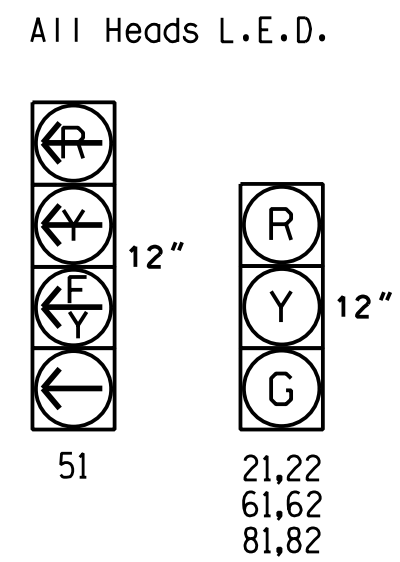


PHASING DIAGRAM DETECTION LEGEND

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

| SIGNAL FACE | PHASE | | | |
|-------------|-------|------|----|-------|
| | 02+5 | 02+6 | 08 | FLASH |
| 21,22 | G | G | R | Y |
| 51 | - | F | R | Y |
| 61,62 | R | G | R | Y |
| 81,82 | R | R | G | R |

SIGNAL FACE I.D.



| INDUCTIVE LOOPS | | DETECTOR PROGRAMMING | | | | | | | | | | |
|-----------------|-----------|----------------------------|-------|----------|-------|---------|-----------|-----------------|--------------|------------|-------------|----------|
| LOOP | SIZE (FT) | DISTANCE FROM STOPBAR (FT) | TURNS | NEW LOOP | PHASE | CALLING | EXTENSION | FULL TIME DELAY | STRETCH TIME | DELAY TIME | SYSTEM LOOP | NEW CARD |
| 2A | 6X6 | 420 | 6 | Y | 2 | Y | Y | - | - | - | - | Y |
| 5A | 6X40 | 0 | 2-4-2 | Y | 5 | Y | Y | - | - | 15 | - | Y |
| 6A | 6X6 | 420 | 6 | Y | 6 | Y | Y | - | - | - | - | Y |
| 8A | 6X40 | 0 | * | Y | 8 | Y | Y | - | - | - | - | Y |
| 8B | 6X40 | 0 | * | Y | 8 | Y | Y | - | - | 15 | - | Y |

* Multizone Microwave Detection

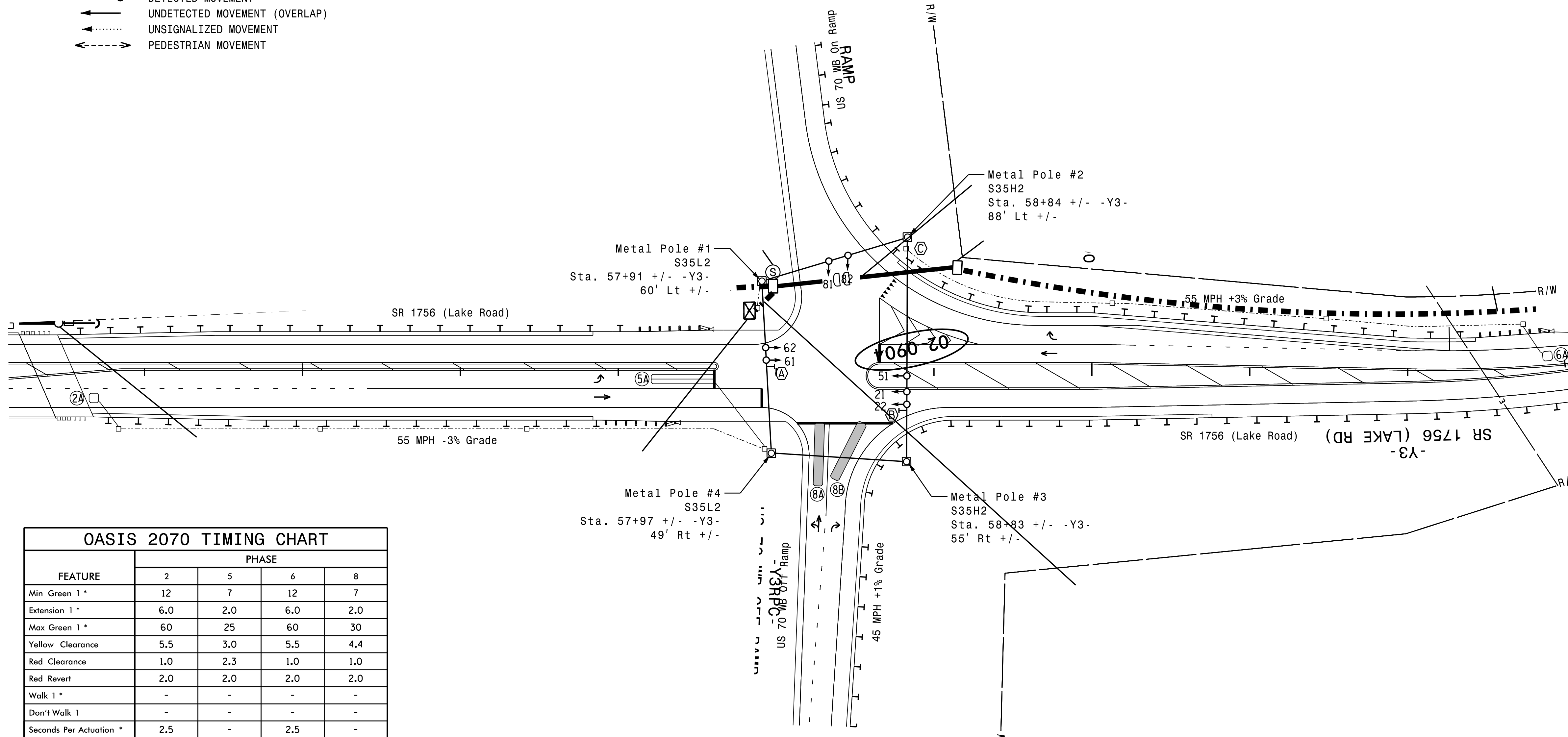
3 Phase Fully Actuated Havelock US 70 Business CLS

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Phase 5 may be lagged.
- Set all detector units to presence mode.
- Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
- Incorporate Microwave Detection system for vehicle detection.
- Provide the Engineer with the Manufacturer's approved Microwave Detection locations and mounting heights to obtain detection zones as shown.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- Signal system data: Controller Asset #0904

LEGEND

- | PROPOSED | EXISTING |
|--|--|
| ○ → Traffic Signal Head | ● → N/A |
| ○ → Modified Signal Head | ○ → N/A |
| ⊥ Sign | ⊥ Sign |
| ⊥ Pedestrian Signal Head With Push Button & Sign | ⊥ Pedestrian Signal Head With Push Button & Sign |
| ⊥ Signal Pole with Guy | ⊥ Signal Pole with Guy |
| ⊥ Signal Pole with Sidewalk Guy | ⊥ Signal Pole with Sidewalk Guy |
| ⊥ Inductive Loop Detector | ⊥ Inductive Loop Detector |
| ⊥ Controller & Cabinet | ⊥ Controller & Cabinet |
| ⊥ Junction Box | ⊥ Junction Box |
| ⊥ 2-in Underground Conduit | ⊥ 2-in Underground Conduit |
| N/A → Right of Way | → Right of Way |
| → Directional Arrow | → Directional Arrow |
| ○ Metal Strain Pole | ○ Metal Strain Pole |
| ⊥ Guardrail | ⊥ Guardrail |
| ⊥ Microwave Detection Zone | ⊥ Microwave Detection Zone |
| (A) No U-Turn/No Left Turn Sign (R3-18) | (A) No U-Turn/No Left Turn Sign (R3-18) |
| (B) No Right Turn Sign (R3-1) | (B) No Right Turn Sign (R3-1) |
| (C) "YIELD" Sign (R1-2) | (C) "YIELD" Sign (R1-2) |



| FEATURE | PHASE | | | |
|-------------------------|------------|-----|------------|-----|
| | 2 | 5 | 6 | 8 |
| Min Green 1 * | 12 | 7 | 12 | 7 |
| Extension 1 * | 6.0 | 2.0 | 6.0 | 2.0 |
| Max Green 1 * | 60 | 25 | 60 | 30 |
| Yellow Clearance | 5.5 | 3.0 | 5.5 | 4.4 |
| Red Clearance | 1.0 | 2.3 | 1.0 | 1.0 |
| Red Revert | 2.0 | 2.0 | 2.0 | 2.0 |
| Walk 1 * | - | - | - | - |
| Don't Walk 1 | - | - | - | - |
| Seconds Per Actuation * | 2.5 | - | 2.5 | - |
| Max Variable Initial * | 46 | - | 46 | - |
| Time Before Reduction * | 15 | - | 15 | - |
| Time To Reduce * | 30 | - | 30 | - |
| Minimum Gap | 3.0 | - | 3.0 | - |
| Recall Mode | MIN RECALL | - | MIN RECALL | - |
| Vehicle Call Memory | YELLOW | - | YELLOW | - |
| Dual Entry | - | - | - | - |
| Simultaneous Gap | ON | ON | ON | ON |

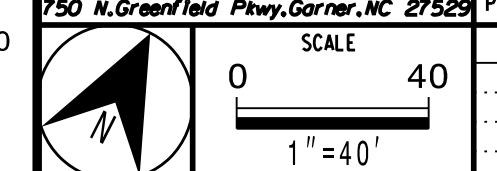
* These values may be field adjusted. Do not adjust Min Green and Extension times for phases 2 and 6 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.

New Installation

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

| | | | |
|--|---|--|--|
| | SR 1756 (Lake Road) at US 70 WB Ramp | | |
| | Division 02 Craven Co. Havelock PLAN DATE: March 2018 PREPARED BY: A.H. Thornburg REVISIONS: _____ | REVIEWED BY: A.D. Klinskies REVIEWED BY: N.R. Simmons INITIALS: _____ DATE: _____ | |

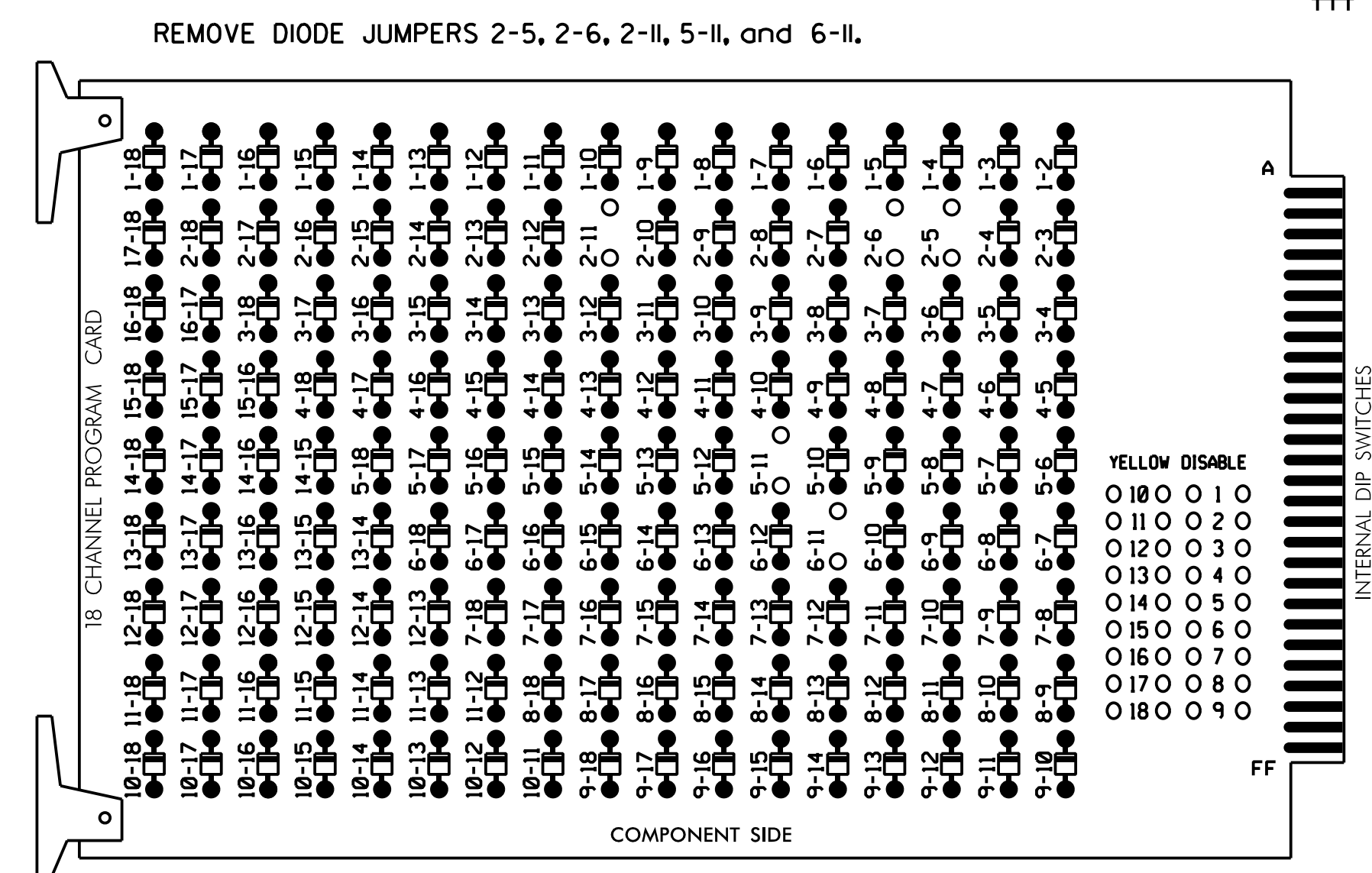
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DocuSigned by:
Natasha R. Simmons
12/7/2018
DATE
SIG. INVENTORY NO. 02-0904

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that Red Enable is active at all times during normal operation.
4. Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. 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. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Enable Simultaneous Gap-Out for all Phases.
3. Program phases 2 and 6 for Variable Initial and Gap Reduction.
4. Program phases 2 and 6 for Startup In Green.
5. Program phases 2 and 6 for Yellow Flash.
6. The cabinet and controller are part of the Havelock US 70 Business Closed Loop Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070E
 CABINET.....332 W/AUX
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
 LOAD SWITCHES USED.....S2,S7,S8,S11,AUX S4
 PHASES USED.....2,5,6,8
 OVERLAP "A".....NOT USED
 OVERLAP "B".....NOT USED
 OVERLAP "C".....5+6
 OVERLAP "D".....NOT USED

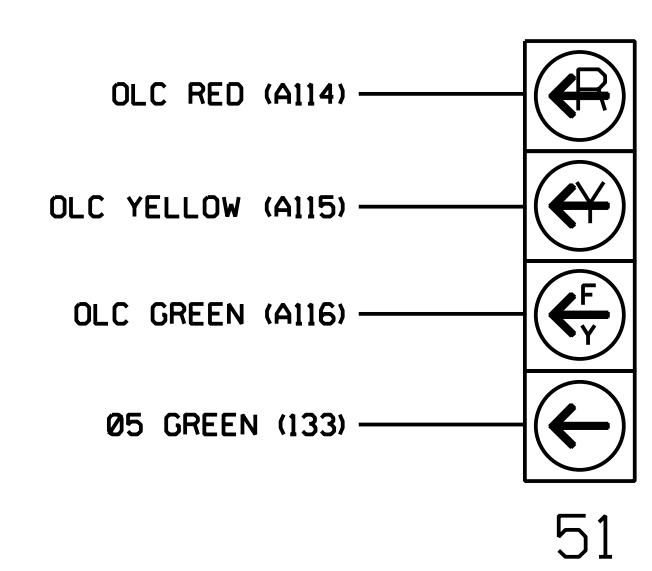
SIGNAL HEAD HOOK-UP CHART

| LOAD SWITCH NO. | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 | AUX S1 | AUX S2 | AUX S3 | AUX S4 | AUX S5 | AUX S6 | |
|-----------------------|----|-------|-------|----|----|-------|-----|-------|-------|-----|-------|-------|--------|--------|--------|--------|--------|--------|------|
| CMU CHANNEL NO. | 1 | 2 | 13 | 3 | 4 | 14 | 5 | 6 | 15 | 7 | 8 | 16 | 9 | 10 | 17 | 11 | 12 | 18 | |
| PHASE | 1 | 2 | 2 PED | 3 | 4 | 4 PED | 5 | 6 | 6 PED | 7 | 8 | 8 PED | OLA | OLB | SPARE | OLC | OLD | SPARE | |
| SIGNAL HEAD NO. | NU | 21,22 | NU | NU | NU | NU | 51* | 61,62 | NU | NU | 81,82 | NU | NU | NU | NU | 51* | NU | NU | |
| RED | | 128 | | | | | | 134 | | | 107 | | | | | | | | |
| YELLOW | | 129 | | | | | * | 135 | | | 108 | | | | | | | | |
| GREEN | | 130 | | | | | | 136 | | | 109 | | | | | | | | |
| RED ARROW | | | | | | | | | | | | | | | | | | A114 | |
| YELLOW ARROW | | | | | | | | | | | | | | | | | | | A115 |
| FLASHING YELLOW ARROW | | | | | | | | | | | | | | | | | | | A116 |
| GREEN ARROW | | | | | | | | 133 | | | | | | | | | | | |

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

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



NOTE

The sequence display for signal head 51 requires special logic programming. See sheet 2 for programming instructions.

INPUT FILE POSITION LAYOUT

(front view)

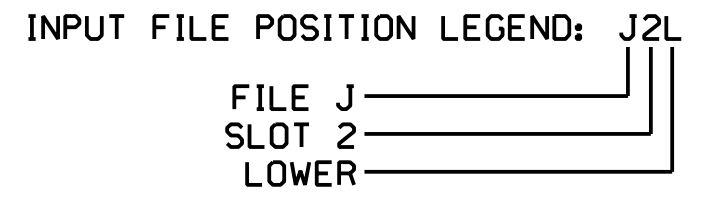
| FILE "I" | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | FS |
|----------|----------|----------|-----|-----|-----|------|------|------|------|------|------|------|------|------|-------------|
| U | S | ∅ 2 | ∅ 3 | ∅ 4 | ∅ 5 | ∅ 6 | ∅ 7 | ∅ 8 | ∅ 9 | ∅ 10 | ∅ 11 | ∅ 12 | ∅ 13 | ∅ 14 | DC ISOLATOR |
| L | Y | NOT USED | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | ST |
| U | ∅ 5 | ∅ 6 | ∅ 7 | ∅ 8 | ∅ 9 | ∅ 10 | ∅ 11 | ∅ 12 | ∅ 13 | ∅ 14 | ∅ 15 | ∅ 16 | ∅ 17 | ∅ 18 | DC ISOLATOR |
| L | 5A | 6A | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | |
| | NOT USED | NOT USED | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | |

EX.: 1A, 2A, ETC. = LOOP NO.'S
 FS = FLASH SENSE
 ST = STOP TIME
 ⊗ Wired Input - Do not populate slot with detector cord

INPUT FILE CONNECTION & PROGRAMMING CHART

| LOOP NO. | LOOP TERMINAL | INPUT FILE POS. | PIN NO. | INPUT ASSIGNMENT NO. | DETECTOR NO. | NEMA PHASE | CALL | EXTEND | FULL TIME DELAY | STRETCH TIME | DELAY TIME |
|-----------------|---------------|-----------------|---------|----------------------|--------------|------------|------|--------|-----------------|--------------|------------|
| 2A | TB2-5,6 | I2U | 39 | 1 | 2 | 2 | Y | Y | | | |
| 5A ¹ | TB3-1,2 | J1U | 55 | 17 | 5 | 5 | Y | Y | | | 15 |
| | - | I4U | 47 | 9 | 22 | 2 | Y | Y | Y | | 3 |
| 6A | TB3-5,6 | J2U | 40 | 2 | 6 | 6 | Y | Y | | | |

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



SPECIAL DETECTOR NOTE

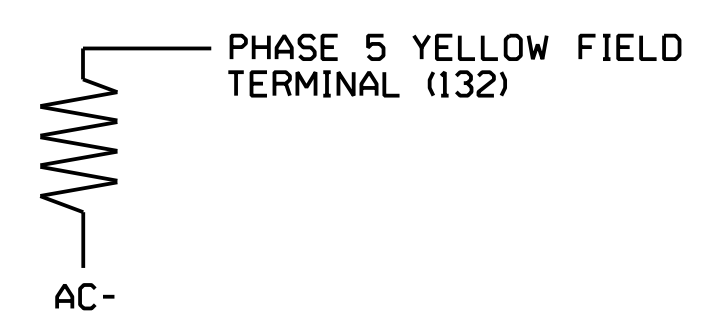
For zones 8A and 8B, install a microwave detection system for vehicle detection. Perform installation according to manufacturer's directions and NCDOT engineer-approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.

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 - Sheet 1 of 2
 Signal Upgrade

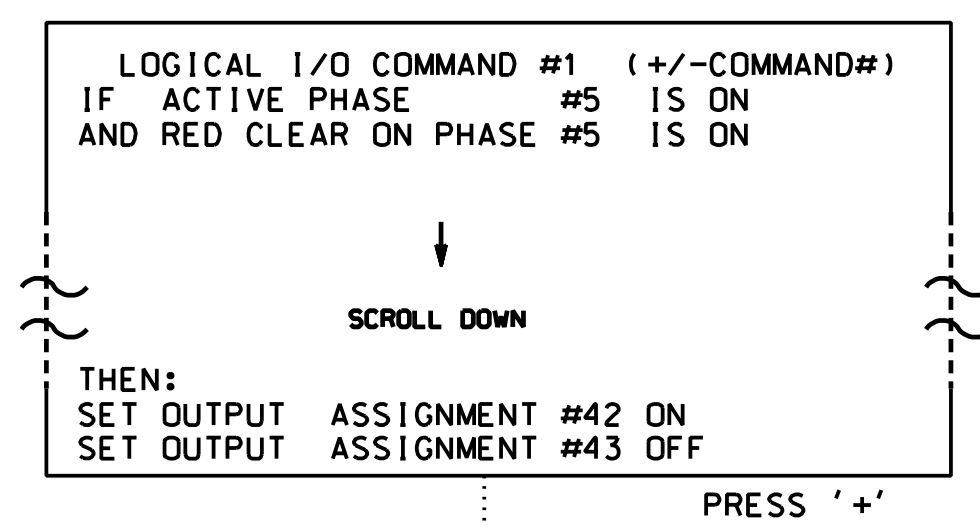
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| | | | | | |
|---|---------------------------------|-------------------------|---|---|--|
| | Prepared for: | | SR 1756 (Lake Road) at US 70 WB Ramp | | |
| | Division 02 Craven Co. Havelock | | PLAN DATE: March 2018 REVIEWED BY: A.D. Klinskyk PREPARED BY: A.H. Thornburg REVIEWED BY: N.R. Simmons | | |
| HNTB NORTH CAROLINA, P.C. 343 E. Six Forks Road, Suite 200 Raleigh, North Carolina 27609 NC License No: C-1554 (919) 546-8997 | | REVISIONS INIT. DATE | | DocuSigned by: Natasha R. Simmons 12/7/2018 DATE SIG. INVENTORY NO. 02-0904 | |

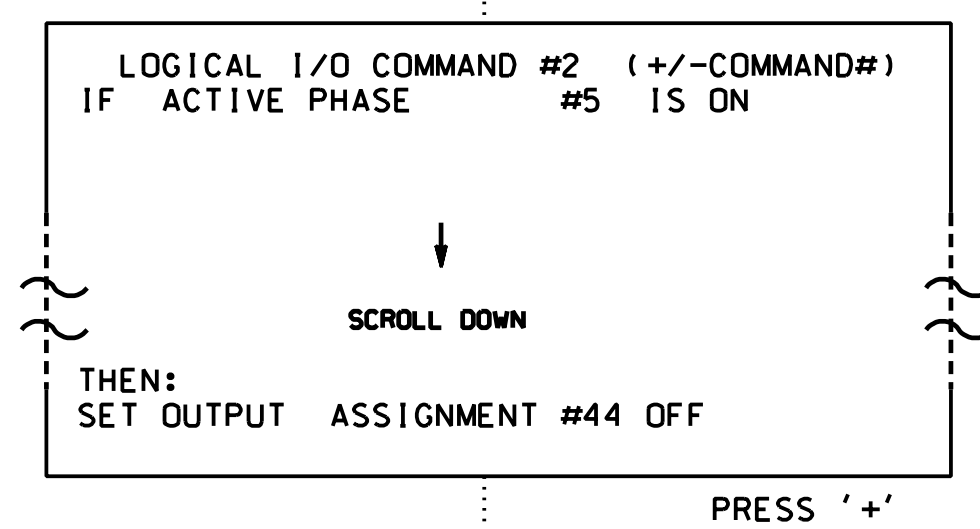
LOGICAL I/O PROCESSOR PROGRAMMING DETAIL TO PRODUCE SPECIAL FYA-PPLT SIGNAL SEQUENCE

(program controller as shown below)

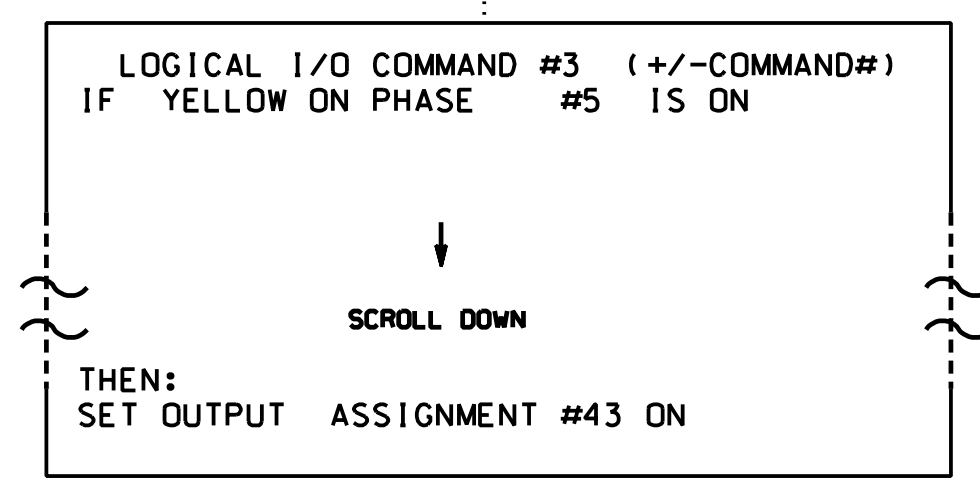
1. FROM MAIN MENU PRESS '2' (PHASE CONTROL), THEN '1' (PHASE CONTROL FUNCTIONS). SCROLL TO THE BOTTOM OF THE MENU AND ENABLE ACT LOGIC COMMANDS 1, 2, and 3.
2. FROM MAIN MENU PRESS '6' (OUTPUTS), THEN '3' (LOGICAL I/O PROCESSOR).



NOTE: LOGIC FOR PHASE 5 RED CLEAR WHEN TRANSITIONING FROM PHASE 5 TO PHASE 6 (HEAD 51).



NOTE: LOGIC FOR SWITCHING FLASHING YELLOW ARROW OFF DURING PHASE 5 (HEAD 51).



NOTE: LOGIC FOR YELLOW ARROW CLEARANCE FROM PHASE 5 (HEAD 51).

LOGIC I/O PROCESSOR PROGRAMMING COMPLETE

| OUTPUT REFERENCE SCHEDULE | |
|----------------------------------|------------------|
| USE TO INTERPRET LOGIC PROCESSOR | |
| OUTPUT 42 = | Overlap C Red |
| OUTPUT 43 = | Overlap C Yellow |
| OUTPUT 44 = | Overlap C Green |

OVERLAP PROGRAMMING DETAIL

(program controller as shown below)

FROM MAIN MENU PRESS '8' (OVERLAPS), THEN '1' (VEHICLE OVERLAP SETTINGS).
PRESS '+' TWICE

```

PAGE 1: VEHICLE OVERLAP 'C' SETTINGS
PHASE: :12345678910111213141516
VEH OVL PARENTS: : XX
VEH OVL NOT VEH: :
VEH OVL NOT PED: :
VEH OVL GRN EXT: :
STARTUP COLOR: - RED - YELLOW - GREEN
FLASH COLORS: - RED - YELLOW X GREEN
SELECT VEHICLE OVERLAP OPTIONS: (Y/N)
FLASH YELLOW IN CONTROLLER FLASH?...Y
GREEN EXTENSION (0-255 SEC)...0
YELLOW CLEAR (0=PARENT,3-25.5 SEC)...0.0
RED CLEAR (0=PARENT,0.1-25.5 SEC)...0.0
OUTPUT AS PHASE # (0=NONE, 1-16)...0
  
```

← NOTICE GREEN FLASH

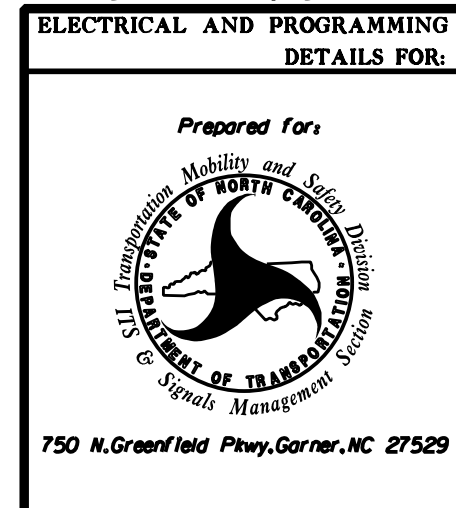
OVERLAP PROGRAMMING COMPLETE

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 02-0904
DESIGNED: March 2018
SEALED: 12-7-18
REVISED: N/A

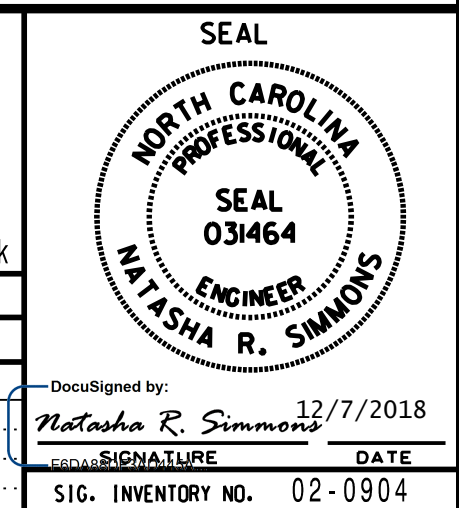
Electrical Detail - Sheet 2 of 2
Signal Upgrade

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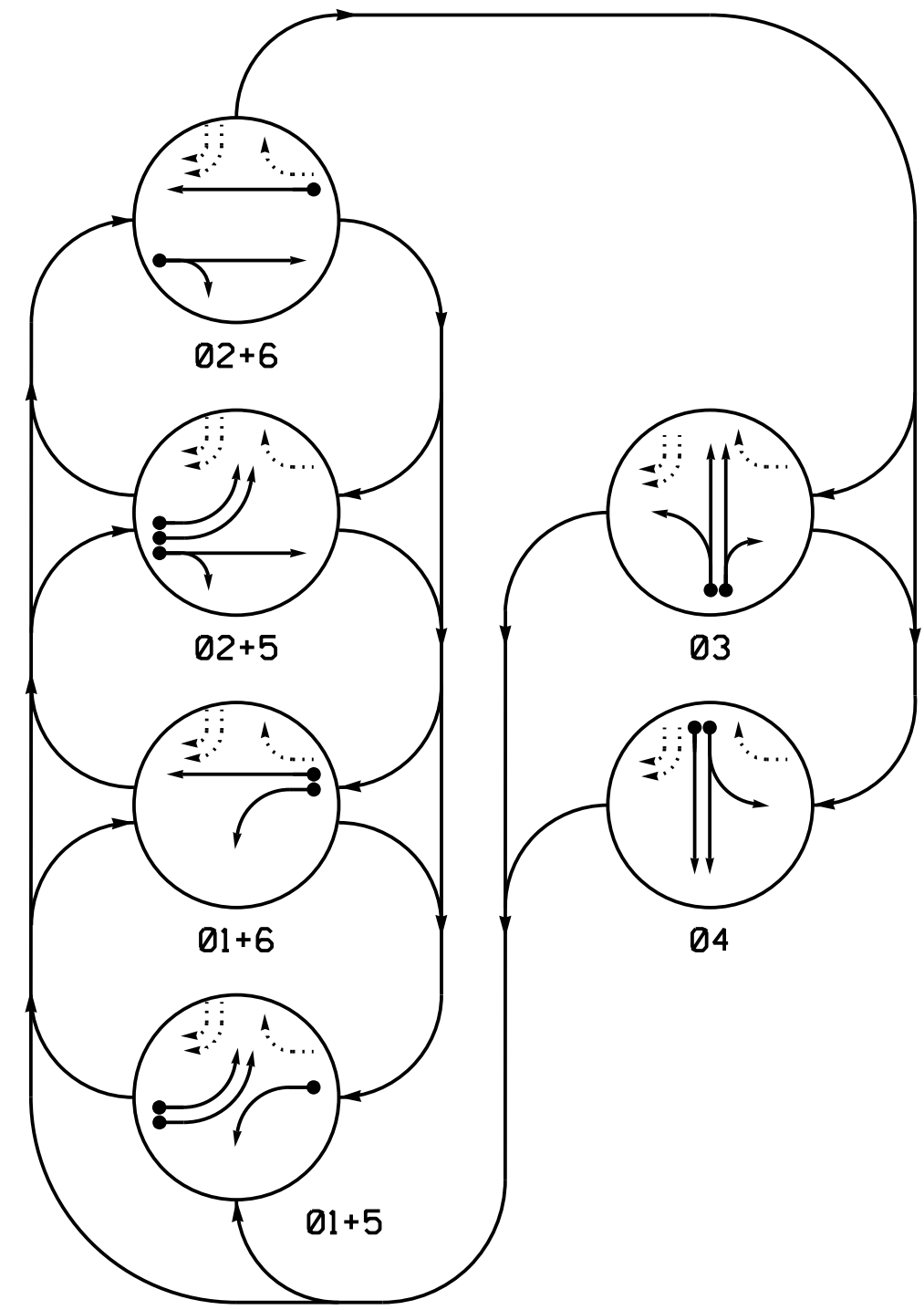


| Prepared for: | | SR 1756 (Lake Road) at US 70 WB Ramp | |
|---------------------------------|-----------------------------|--|--|
| Division 02 Craven Co. Havelock | | | |
| PLAN DATE: March 2018 | REVIEWED BY: A.D. Klinksiek | | |
| PREPARED BY: A.H. Thornburg | REVIEWED BY: N.R. Simmons | | |
| REVISIONS | INIT. | DATE | |
| | | | |
| | | | |
| | | | |



DocuSigned by:
Natasha R. Simmons
12/7/2018
SIG. INVENTORY NO. 02-0904

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

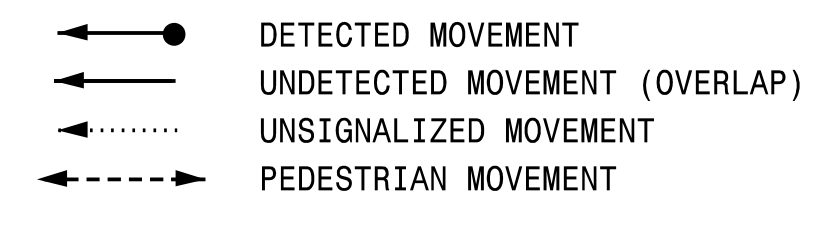
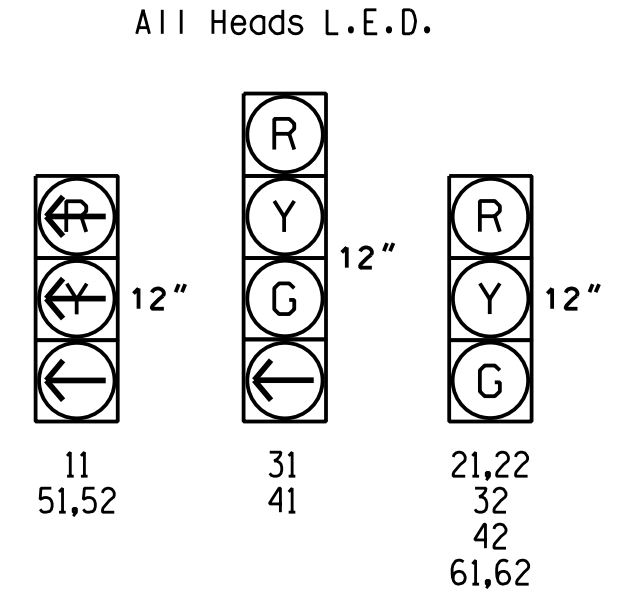


TABLE OF OPERATION

| SIGNAL FACE | PHASE | | | | | |
|-------------|-------|------|------|------|----|----|
| | 01+5 | 01+6 | 02+5 | 02+6 | 03 | 04 |
| 11 | - | - | - | - | - | - |
| 21,22 | R | R | G | G | R | Y |
| 31 | R | R | R | R | G | R |
| 32 | R | R | R | R | G | R |
| 41 | R | R | R | R | G | R |
| 42 | R | R | R | R | G | R |
| 51,52 | - | - | - | - | - | - |
| 61,62 | R | G | R | G | R | Y |

SIGNAL FACE I.D.



OASIS 2070 LOOP & DETECTOR INSTALLATION CHART

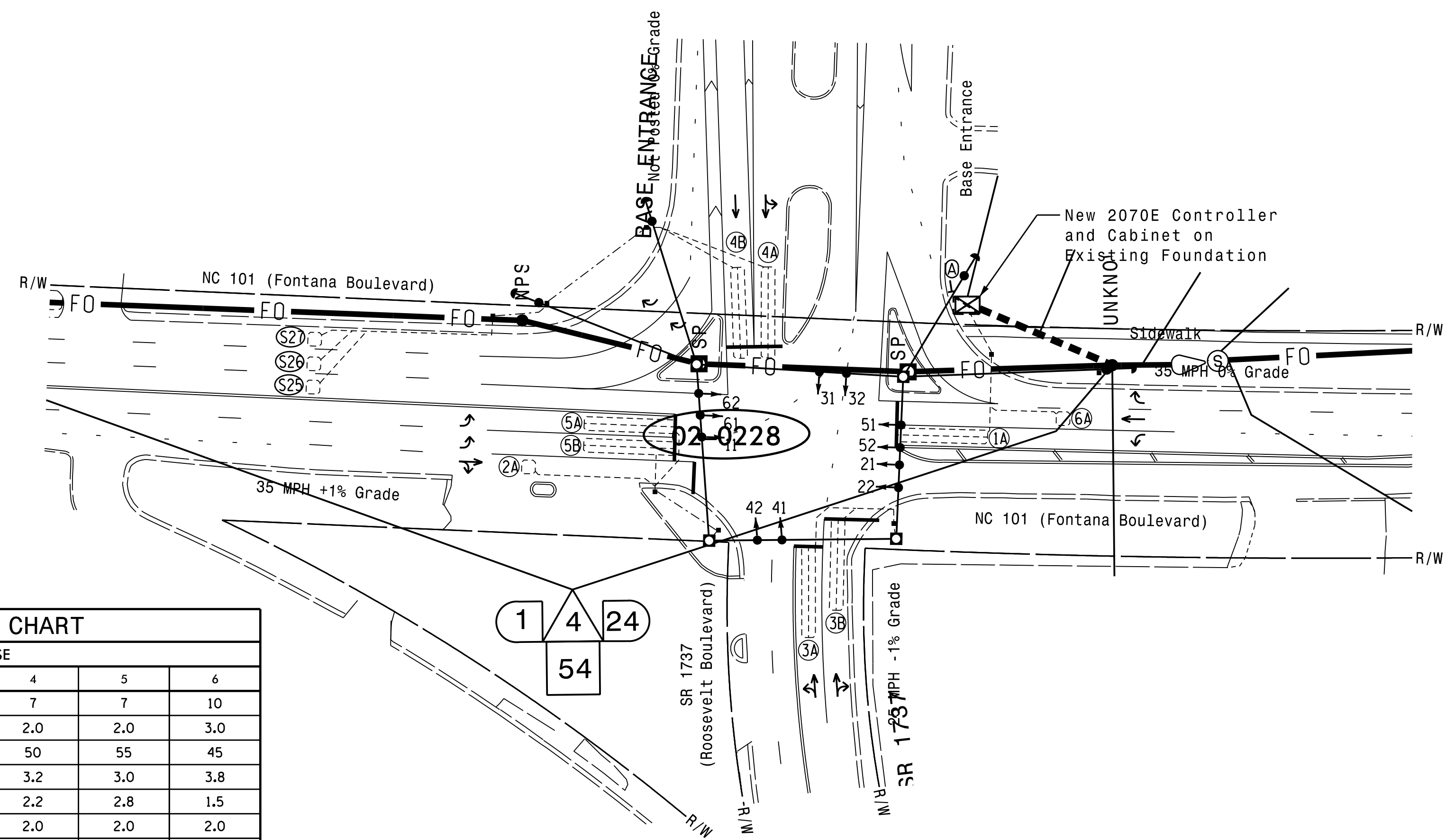
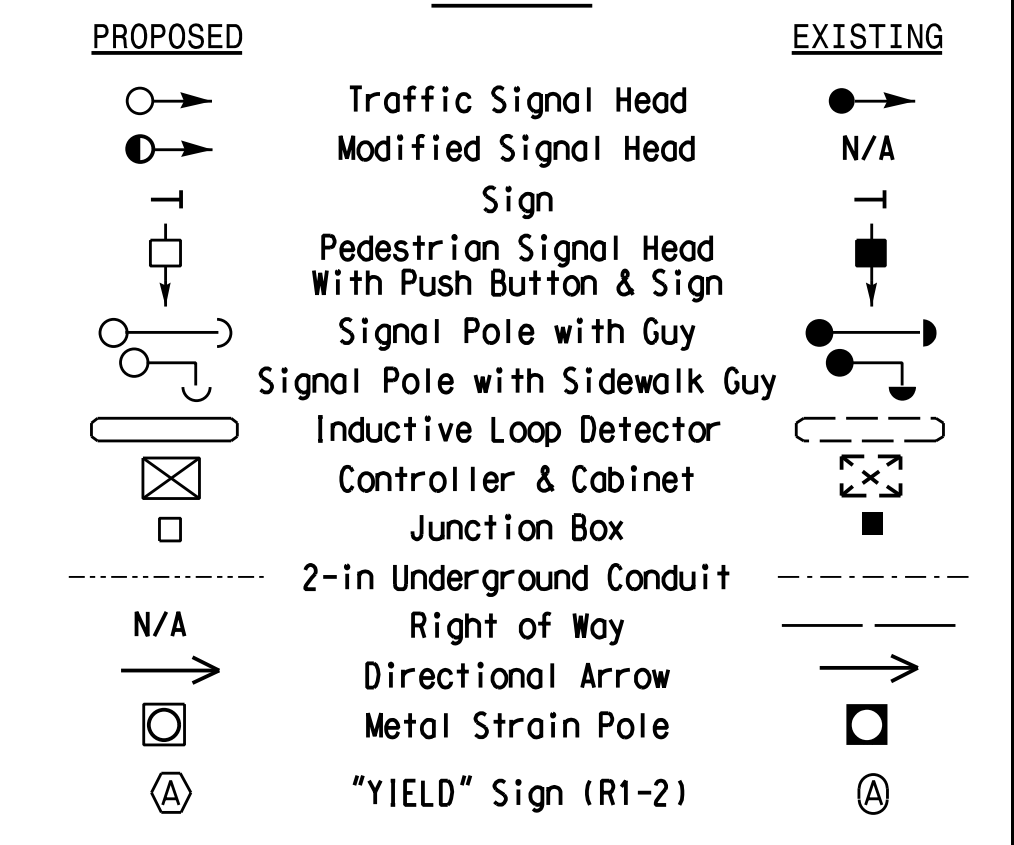
| LOOP | SIZE (FT) | DISTANCE FROM STOPBAR (FT) | TURNS | NEW LOOP | DETECTOR PROGRAMMING | | | | | SYSTEM LOOP | NEW CARD |
|------|-----------|----------------------------|-------|----------|----------------------|---------|-----------|-----------------|--------------|-------------|----------|
| | | | | | PHASE | CALLING | EXTENSION | FULL TIME DELAY | STRETCH TIME | | |
| 1A | 6X40 | 0 | 2-4-2 | - | 1 | Y | Y | - | - | - | Y |
| 2A | 6X6 | 70 | 4 | - | 2 | Y | Y | - | - | - | Y |
| 3A | 6X40 | 0 | 2-4-2 | - | 3 | Y | Y | - | - | - | Y |
| 3B | 6X40 | 0 | 2-4-2 | - | 3 | Y | Y | - | - | - | Y |
| 4A | 6X40 | +5 | 2-4-2 | - | 4 | Y | Y | - | - | - | Y |
| 4B | 6X40 | +5 | 2-4-2 | - | 4 | Y | Y | - | - | - | Y |
| 5A | 6X40 | 0 | 2-4-2 | - | 5 | Y | Y | - | - | 3 | Y |
| 5B | 6X40 | 0 | 2-4-2 | - | 5 | Y | Y | - | - | - | Y |
| 6A | 6X6 | 70 | 4 | - | 6 | Y | Y | - | - | - | Y |
| S25 | 6X6 | +260 | 5 | - | - | - | - | - | - | - | Y |
| S26 | 6X6 | +260 | 5 | - | - | - | - | - | - | - | Y |
| S27 | 6X6 | +260 | 5 | - | - | - | - | - | - | - | Y |

6 Phase Fully Actuated Havelock US 70 Business CLS

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Phase 1 and/or 5 may be lagged.
- The order of phase 3 and phase 4 may be reversed.
- Set all detector units to presence mode.
- In the event of loop replacement, refer to the current ITS and Signals Design Manual and submit a Plan of Record to the Signal Design Section.
- The cabinet should be designed to include Auxiliary Output file for future use.
- Pavement markings are existing.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- Closed loop system data: Controller Asset #0228

LEGEND



OASIS 2070 TIMING CHART

| FEATURE | PHASE | | | | | |
|-------------------------|-------|-------------|-----|-----|-----|-------------|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| Min Green 1 * | 7 | 10 | 7 | 7 | 7 | 10 |
| Extension 1 * | 2.0 | 3.0 | 2.0 | 2.0 | 2.0 | 3.0 |
| Max Green 1 * | 15 | 45 | 35 | 50 | 55 | 45 |
| Yellow Clearance | 3.0 | 3.8 | 3.2 | 3.2 | 3.0 | 3.8 |
| Red Clearance | 1.9 | 1.5 | 2.4 | 2.2 | 2.8 | 1.5 |
| Red Revert | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| Walk 1 * | - | - | - | - | - | - |
| Don't Walk 1 | - | - | - | - | - | - |
| Seconds Per Actuation * | - | - | - | - | - | - |
| Max Variable Initial * | - | - | - | - | - | - |
| Time Before Reduction * | - | - | - | - | - | - |
| Time To Reduce * | - | - | - | - | - | - |
| Minimum Gap | - | - | - | - | - | - |
| Recall Mode | - | SOFT RECALL | - | - | - | SOFT RECALL |
| Vehicle Call Memory | - | YELLOW | - | - | - | YELLOW |
| Dual Entry | - | - | - | - | - | - |
| Simultaneous Gap | ON | ON | ON | ON | ON | ON |

* 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

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

HNTB NORTH CAROLINA, P.C.
343 E. Six Forks Road, Suite 200
Raleigh, North Carolina 27609
NC License No: C-1554
(919) 546-8997

Prepared For: **NC 101 (Fontana Boulevard) at SR 1737 (Roosevelt Boulevard) / Base Entrance**

Division 02 Craven Co. Havelock

PLAN DATE: March 2018 REVIEWED BY: A.D. Klinsky

PREPARED BY: A.H. Thornburg REVIEWED BY: N.R. Simmons

750 N. Greenfield Pkwy, Corner, NC 27528

SEAL

REVISIONS

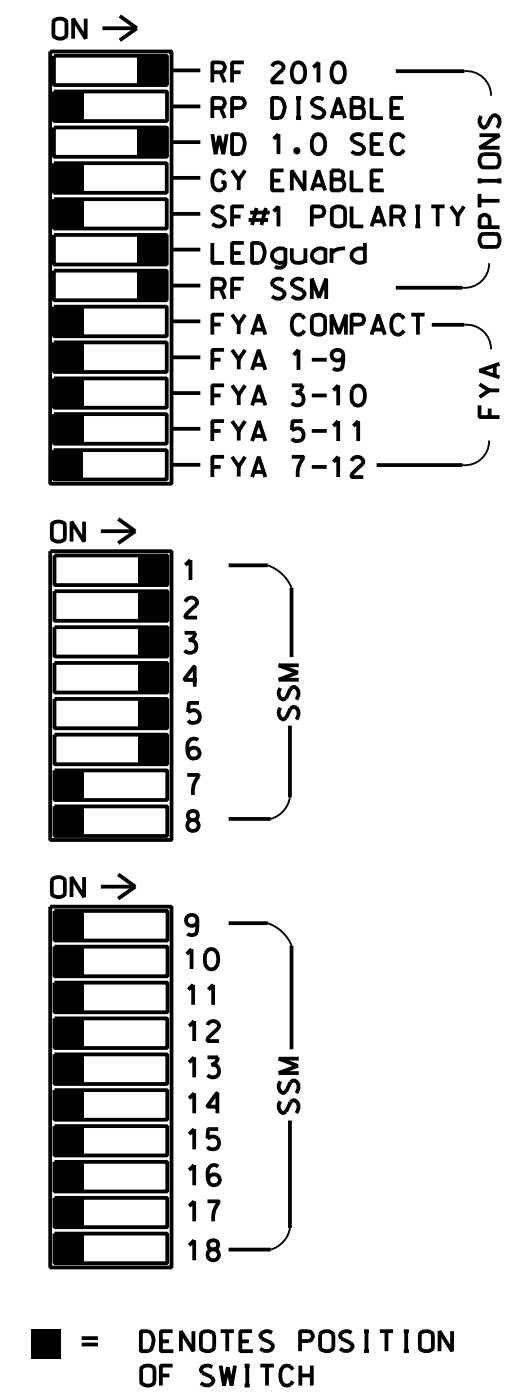
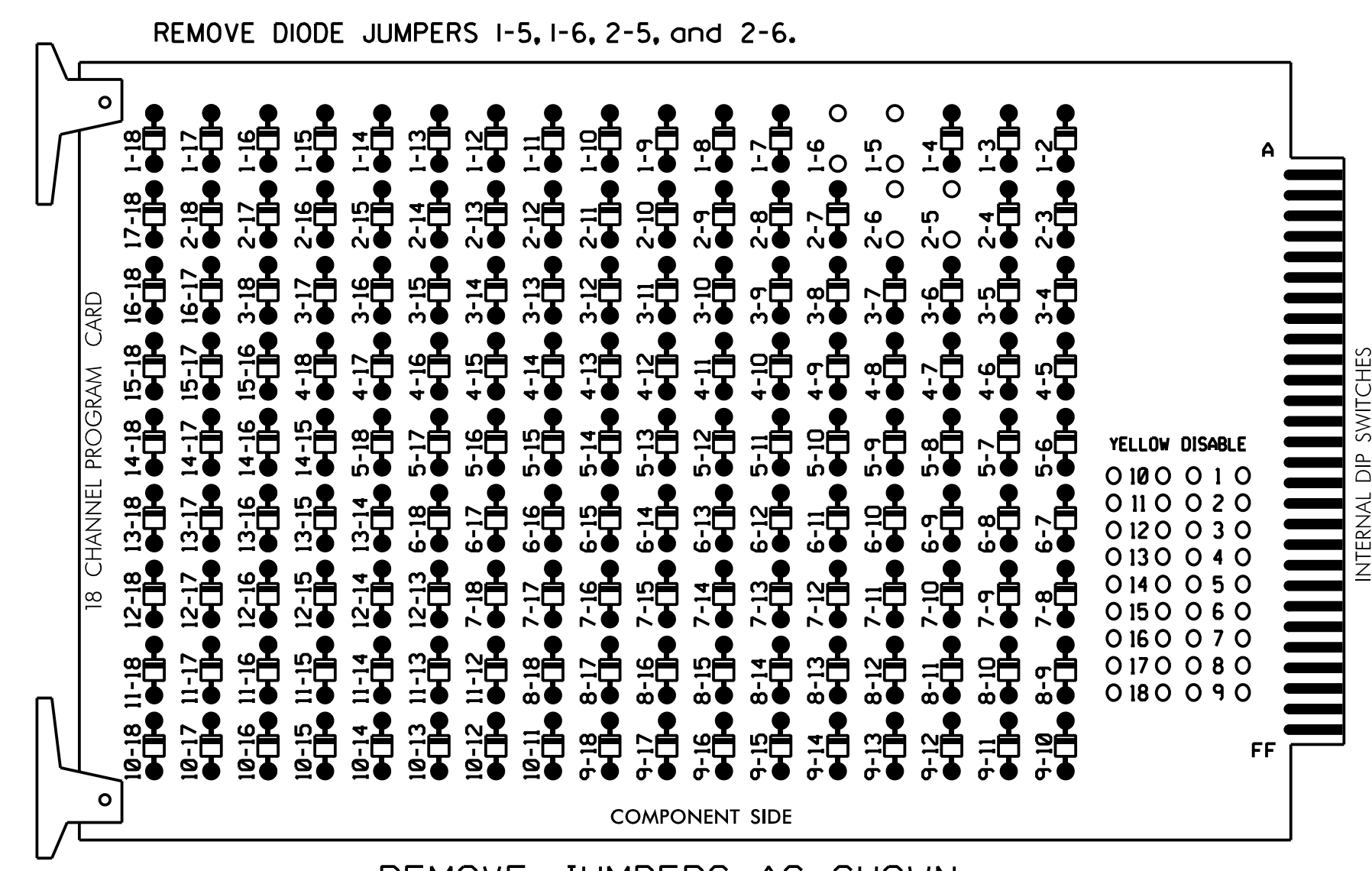
| REVISIONS | INIT. | DATE |
|-----------|-------|------|
| | | |

DocuSigned by: *Natasha R. Simmons* 12/7/2018

SIG. INVENTORY NO. 02-0228

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



NOTES:

- Card is provided with all diode jumpers in place. Removal of any jumper allows its channel to run concurrently.
- Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
- Ensure that Red Enable is active at all times during normal operation.
- Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.

NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
- Enable Simultaneous Gap-Out for all Phases.
- Program phases 2 and 6 for Startup In Green.
- Program phases 2 and 6 for Yellow Flash.
- The cabinet and controller are part of the Havelock US 70 Business Closed Loop Signal System.

SIGNAL HEAD HOOK-UP CHART

| LOAD SWITCH NO. | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 | AUX S1 | AUX S2 | AUX S3 | AUX S4 | AUX S5 | AUX S6 |
|-----------------------|-----|-------|-------|-----|-----|-------|-----|----|-------|-------|-----|-------|--------|--------|--------|--------|--------|--------|
| CMU CHANNEL NO. | 1 | 2 | 13 | 3 | 4 | 14 | 5 | 6 | 15 | 7 | 8 | 16 | 9 | 10 | 17 | 11 | 12 | 18 |
| PHASE | 1 | 2 | 2 PED | 3 | 4 | 4 PED | 5 | 6 | 6 PED | 7 | 8 | 8 PED | OLA | OLB | SPARE | OLC | OLD | SPARE |
| SIGNAL HEAD NO. | 11 | 21,22 | NU | 31 | 32 | 41 | 42 | NU | 51,52 | 61,62 | NU | NU | NU | NU | NU | NU | NU | NU |
| RED | | 128 | | 116 | 116 | 101 | 101 | | | 134 | | | | | | | | |
| YELLOW | | 129 | | 117 | 117 | 102 | 102 | | | 135 | | | | | | | | |
| GREEN | | 130 | | 118 | 118 | 103 | 103 | | | 136 | | | | | | | | |
| RED ARROW | 125 | | | | | | | | | 131 | | | | | | | | |
| YELLOW ARROW | 126 | | | | | | | | | 132 | | | | | | | | |
| FLASHING YELLOW ARROW | | | | | | | | | | | | | | | | | | |
| GREEN ARROW | 127 | | | 118 | | 103 | | | | 133 | | | | | | | | |

NU = Not Used

EQUIPMENT INFORMATION

CONTROLLER.....2070E
 CABINET.....332 W/AUX
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
 LOAD SWITCHES USED.....S1,S2,S4,S5,S7,S8
 PHASES USED.....1,2,3,4,5,6
 OVERLAPS.....NONE

INPUT FILE POSITION LAYOUT

(front view)

| FILE | U | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|------|---|----------|----------|----------|-----|-----|-----|-----|---|-----|----|----|----|----|-------------|
| "I" | U | ∅ 1 | ∅ 2 | S | S | S | ∅ 3 | ∅ 4 | S | SYS | S | S | S | S | FS |
| | L | NOT USED | NOT USED | ∅ 3 | ∅ 4 | ∅ 3 | ∅ 4 | S | S | S25 | S | S | S | S | DC ISOLATOR |
| "J" | U | ∅ 5 | ∅ 5 | ∅ 6 | S | S | S | S | S | SYS | S | S | S | S | S |
| | L | NOT USED | NOT USED | NOT USED | ∅ 5 | ∅ 6 | ∅ 5 | ∅ 6 | S | S27 | S | S | S | S | DC ISOLATOR |

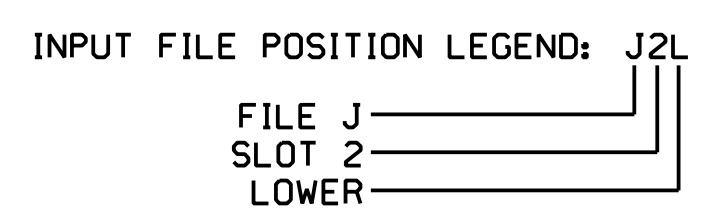
EX.: 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE
 ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

| LOOP NO. | LOOP TERMINAL | INPUT FILE POS. | PIN NO. | INPUT ASSIGNMENT NO. | DETECTOR NO. | NEMA PHASE | CALL | EXTEND | FULL TIME DELAY | STRETCH TIME | DELAY TIME |
|----------|---------------|-----------------|---------|----------------------|--------------|------------|------|--------|-----------------|--------------|------------|
| 1A | TB2-1,2 | I1U | 56 | 18 | 1 | 1 | Y | Y | | | |
| 2A | TB2-5,6 | I2U | 39 | 1 | 2 | 2 | Y | Y | | | |
| 3A | TB4-9,10 | I6U | 41 | 3 | 4 | 3 | Y | Y | | | |
| 3B | TB4-11,12 | I6L | 45 | 7 | 14 | 3 | Y | Y | | | |
| 4A | TB6-1,2 | I7U | 65 | 27 | 34 | 4 | Y | Y | | | |
| 4B | TB6-3,4 | I7L | 78 | 40 | 44 | 4 | Y | Y | | | |
| * S25 | TB6-9,10 | I9U | 60 | 22 | 11 | SYS | | | | | |
| * S26 | TB6-11,12 | I9L | 62 | 24 | 13 | SYS | | | | | |
| 5A | TB3-1,2 | J1U | 55 | 17 | 5 | 5 | Y | Y | | | 3 |
| 5B | TB3-5,6 | J2U | 40 | 2 | 6 | 5 | Y | Y | | | |
| 6A | TB3-9,10 | J3U | 64 | 26 | 36 | 6 | Y | Y | | | |
| * S27 | TB7-9,10 | J9U | 59 | 21 | 15 | SYS | | | | | |

* System detector only. Remove the vehicle phase assigned to this detector in the default programming.



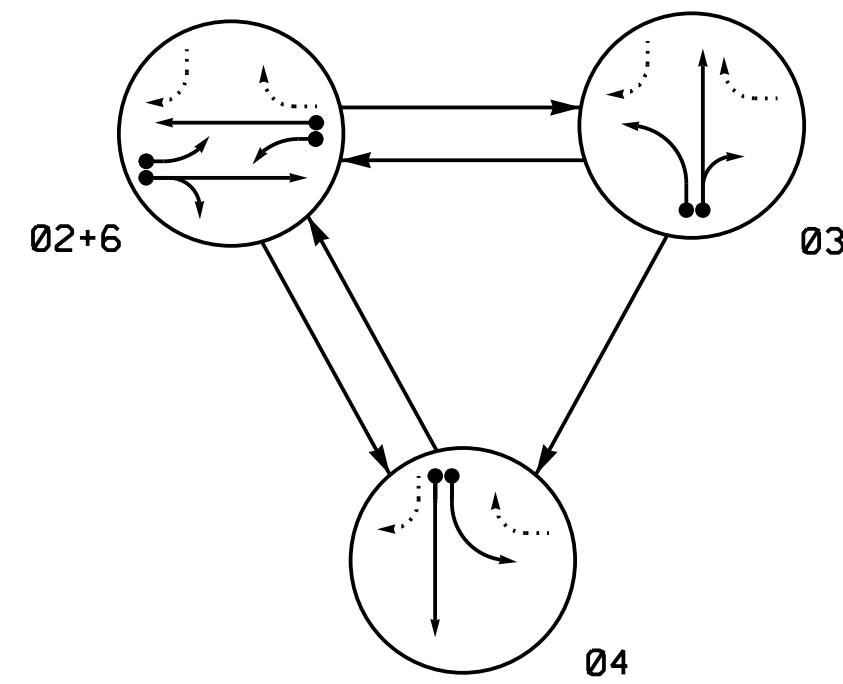
THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 02-0228
 DESIGNED: March 2018
 SEALED: 12-7-18
 REVISED: N/A

Electrical Detail Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

| | | | | | |
|---|---|--|--|--|--|
| | Prepared for: NORTH CAROLINA DEPARTMENT OF TRANSPORTATION Mobility and Safety Division Signal Management Section | | NC 101 (Fontana Boulevard) at SR 1737 (Roosevelt Boulevard)/ Base Entrance | | |
| | Division 02 Craven Co. | Havelock | PLAN DATE: March 2018 PREPARED BY: A.H. Thornburg | REVIEWED BY: A.D. Klinksiek REVIEWED BY: N.R. Simmons | |
| REVISIONS | | INIT. | DATE | DocuSigned by: Natasha R. Simmons 12/7/2018 | |
| HNTB NORTH CAROLINA, P.C. 343 E. Six Forks Road, Suite 200 Raleigh, North Carolina 27609 NC License No: C-1554 (919) 546-8997 | | 750 N. Greenfield Pkwy, Corner, NC 27529 | | SIG. INVENTORY NO. 02-0228 | |

PHASING DIAGRAM

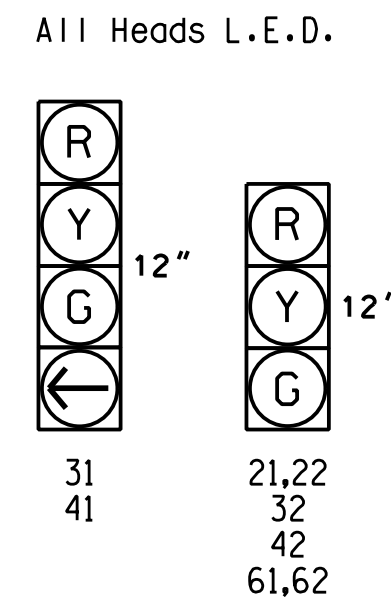


PHASING DIAGRAM DETECTION LEGEND

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

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

SIGNAL FACE I.D.

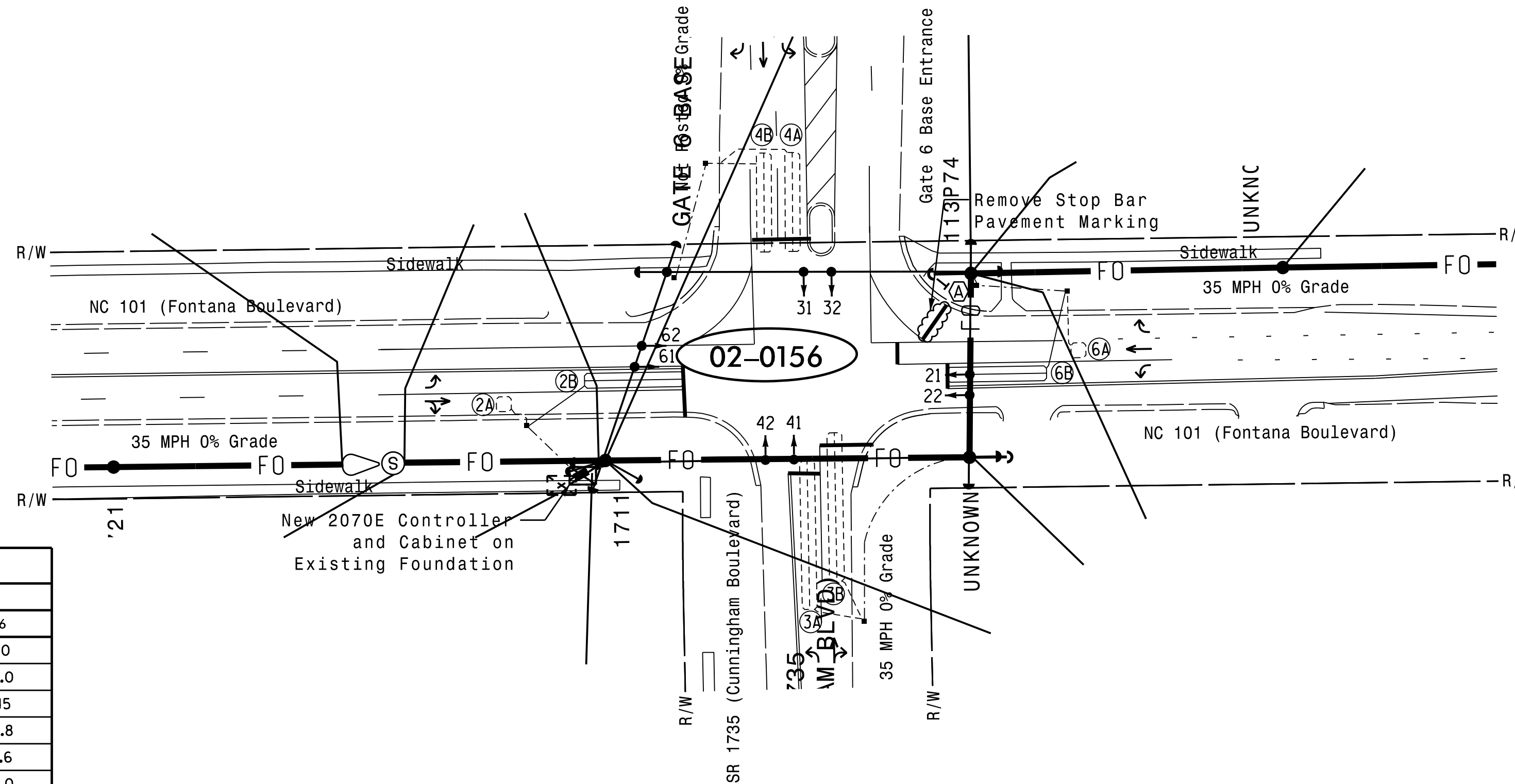


| OASIS 2070 LOOP & DETECTOR INSTALLATION CHART | | | | | | | | | | | | |
|---|-----------|----------------------------|-------|----------|----------------------|---------|-----------|-----------------|--------------|-------------|----------|------------|
| LOOP | SIZE (FT) | DISTANCE FROM STOPBAR (FT) | TURNS | NEW LOOP | DETECTOR PROGRAMMING | | | | | SYSTEM LOOP | NEW CARD | |
| | | | | | PHASE | CALLING | EXTENSION | FULL TIME DELAY | STRETCH TIME | | | DELAY TIME |
| 2A | 6X6 | 70 | 4 | - | 2 | Y | Y | - | - | - | - | Y |
| 2B | 6X40 | 0 | 2-4-2 | Y | 2 | Y | Y | - | - | 3 | - | Y |
| 3A | 6X60 | +5 | 2-4-2 | - | 3 | Y | Y | - | - | 3 | - | Y |
| 3B | 6X60 | +5 | 2-4-2 | - | 3 | Y | Y | - | - | - | - | Y |
| 4A | 6X40 | +5 | 2-4-2 | - | 4 | Y | Y | - | - | - | - | Y |
| 4B | 6X40 | +5 | 2-4-2 | - | 4 | Y | Y | - | - | - | - | Y |
| 6A | 6X6 | 70 | 4 | - | 6 | Y | Y | - | - | - | - | Y |
| 6B | 6X40 | 0 | 2-4-2 | Y | 6 | Y | Y | - | - | 3 | - | Y |

3 Phase Fully Actuated Havelock US 70 Business CLS

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- The order of phase 3 and phase 4 may be reversed.
- Set all detector units to presence mode.
- In the event of loop replacement, refer to the current ITS and Signals Design Manual and submit a Plan of Record to the Signal Design Section.
- The cabinet should be designed to include Auxiliary Output file for future use.
- Remove Stop Bar as shown.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- Closed loop system data: Controller Asset #0156



| FEATURE | PHASE | | | |
|-------------------------|------------|-----|-----|------------|
| | 2 | 3 | 4 | 6 |
| Min Green 1 * | 10 | 7 | 7 | 10 |
| Extension 1 * | 3.0 | 1.0 | 2.0 | 3.0 |
| Max Green 1 * | 45 | 40 | 40 | 45 |
| Yellow Clearance | 3.8 | 3.8 | 3.2 | 3.8 |
| Red Clearance | 1.5 | 1.1 | 2.2 | 1.6 |
| Red Revert | 2.0 | 2.0 | 2.0 | 2.0 |
| Walk 1 * | - | - | - | - |
| Don't Walk 1 | - | - | - | - |
| Seconds Per Actuation * | - | - | - | - |
| Max Variable Initial * | - | - | - | - |
| Time Before Reduction * | - | - | - | - |
| Time To Reduce * | - | - | - | - |
| Minimum Gap | - | - | - | - |
| Recall Mode | MIN RECALL | - | - | MIN RECALL |
| Vehicle Call Memory | YELLOW | - | - | YELLOW |
| Dual Entry | - | - | - | - |
| Simultaneous Gap | ON | ON | ON | ON |

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

LEGEND

- | PROPOSED | EXISTING |
|--|-----------|
| ○ → Traffic Signal Head | ● → N/A |
| ○ → Modified Signal Head | ○ → N/A |
| □ → Sign | □ → N/A |
| □ → Pedestrian Signal Head With Push Button & Sign | □ → N/A |
| □ → Signal Pole with Guy | □ → N/A |
| □ → Signal Pole with Sidewalk Guy | □ → N/A |
| □ → Inductive Loop Detector | □ → N/A |
| □ → Controller & Cabinet | □ → N/A |
| □ → Junction Box | □ → N/A |
| □ → 2-in Underground Conduit | □ → N/A |
| N/A → Right of Way | N/A → N/A |
| → Directional Arrow | → N/A |
| (A) Right Entering Added Lane Sign (W4-6) | (A) N/A |

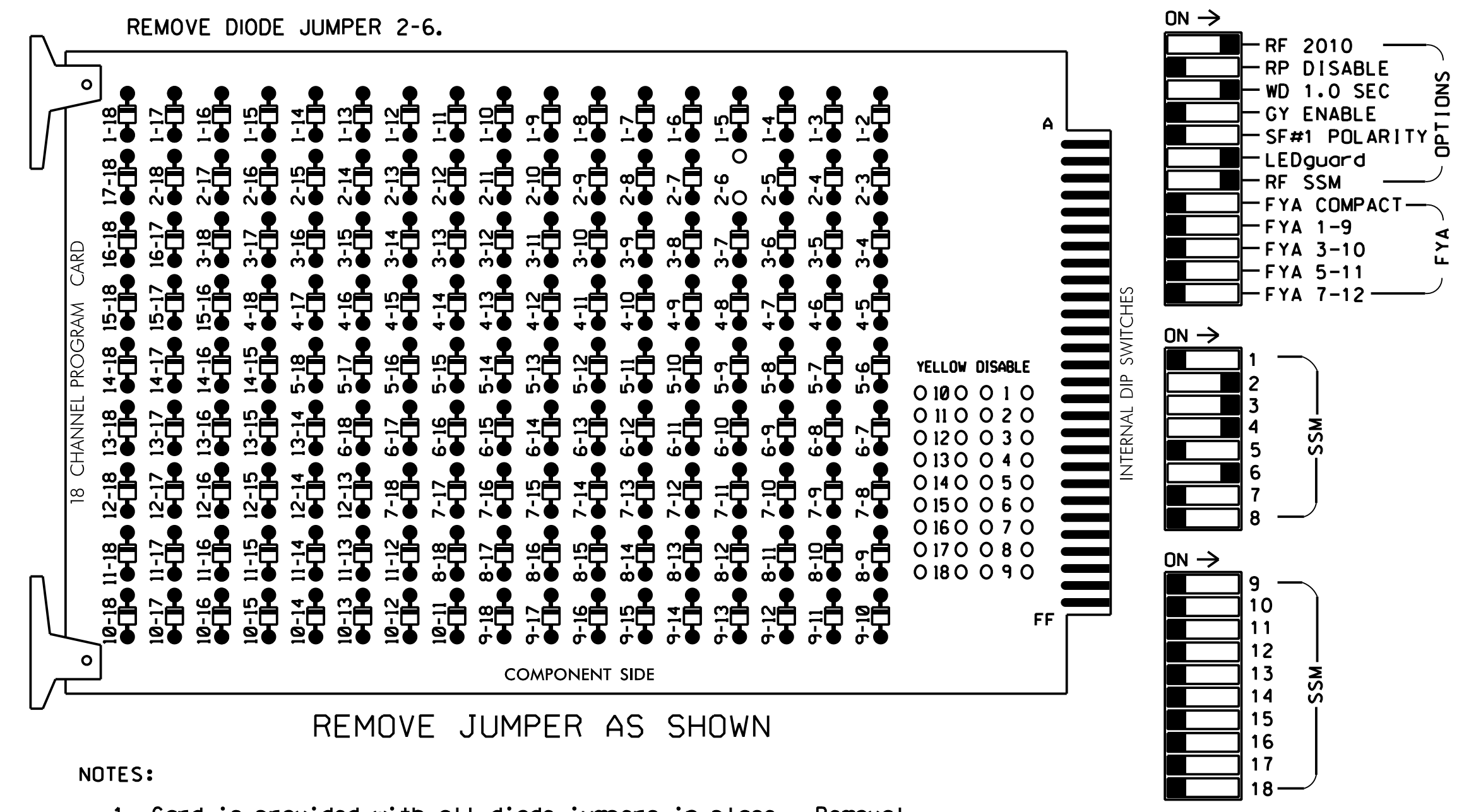
Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

| | | | |
|-----------------------------|---|-----------------------|--------------------------------------|
| | NC 101 (Fontana Boulevard) at SR 1735 (Cunningham Boulevard) / Gate 6 Base Entrance | | |
| | Division 02 Craven Co. Havelock | PLAN DATE: March 2018 | |
| PREPARED BY: A.H. Thornburg | REVIEWED BY: N.R. Simmons | DATE: 12/7/2018 | SIGNATURE: <i>Natasha R. Simmons</i> |
| SCALE: 1"=40' | REVISIONS: | INIT. DATE | SIG. INVENTORY NO. 02-0156 |

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumper and set switches as shown)



NOTES:

- Card is provided with all diode jumpers in place. Removal of any jumper allows its channel to run concurrently.
- Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
- Ensure that Red Enable is active at all times during normal operation.
- Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.

NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
- Enable Simultaneous Gap-Out for all Phases.
- Program phases 2 and 6 for Startup In Green.
- Program phases 2 and 6 for Yellow Flash.
- The cabinet and controller are part of the Havelock US 70 Business Closed Loop Signal System.

SIGNAL HEAD HOOK-UP CHART

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

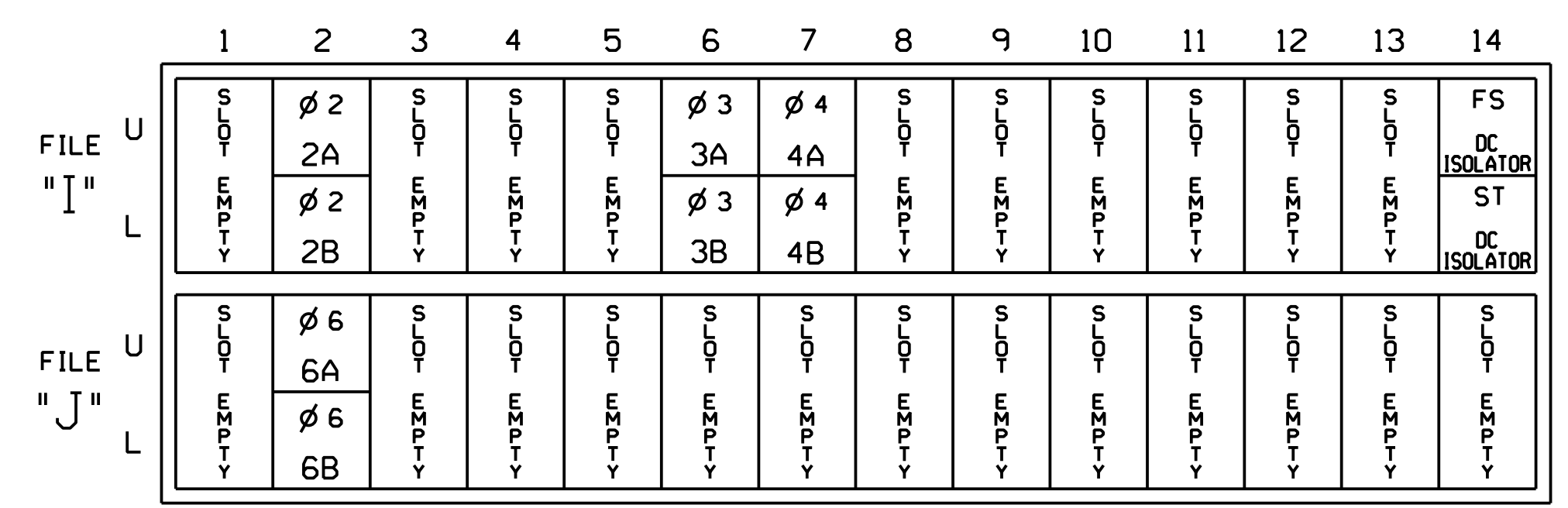
NU = Not Used

EQUIPMENT INFORMATION

CONTROLLER.....2070E
 CABINET.....332 W/AUX
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
 LOAD SWITCHES USED.....S2,S4,S5,S8
 PHASES USED.....2,3,4,6
 OVERLAPS.....NONE

INPUT FILE POSITION LAYOUT

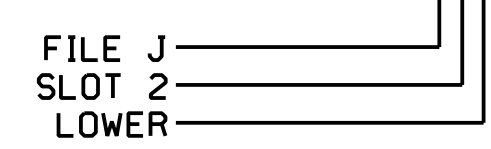
(front view)



INPUT FILE CONNECTION & PROGRAMMING CHART

| LOOP NO. | LOOP TERMINAL | INPUT FILE POS. | PIN NO. | INPUT ASSIGNMENT NO. | DETECTOR NO. | NEMA PHASE | CALL | EXTEND | FULL TIME DELAY | STRETCH TIME | DELAY TIME |
|----------|---------------|-----------------|---------|----------------------|--------------|------------|------|--------|-----------------|--------------|------------|
| 2A | TB2-5,6 | I2U | 39 | 1 | 2 | 2 | Y | Y | | | |
| 2B | TB2-7,8 | I2L | 43 | 5 | 12 | 2 | Y | Y | | | 3 |
| 3A | TB4-9,10 | I6U | 41 | 3 | 4 | 3 | Y | Y | | | 3 |
| 3B | TB4-11,12 | I6L | 45 | 7 | 14 | 3 | Y | Y | | | |
| 4A | TB6-1,2 | I7U | 65 | 27 | 34 | 4 | Y | Y | | | |
| 4B | TB6-3,4 | I7L | 78 | 40 | 44 | 4 | Y | Y | | | |
| 6A | TB3-5,6 | J2U | 40 | 2 | 6 | 6 | Y | Y | | | |
| 6B | TB3-7,8 | J2L | 44 | 6 | 16 | 6 | Y | Y | | | 3 |

INPUT FILE POSITION LEGEND: J2L



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 02-0156
 DESIGNED: March 2018
 SEALED: 12-7-18
 REVISED: N/A

Electrical Detail Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Electrical and Programming Details For: NC 101 (Fontana Boulevard) at SR 1735 (Cunningham Boulevard)/ Gate 6 Base Entrance

Division 02 Craven Co. Havelock

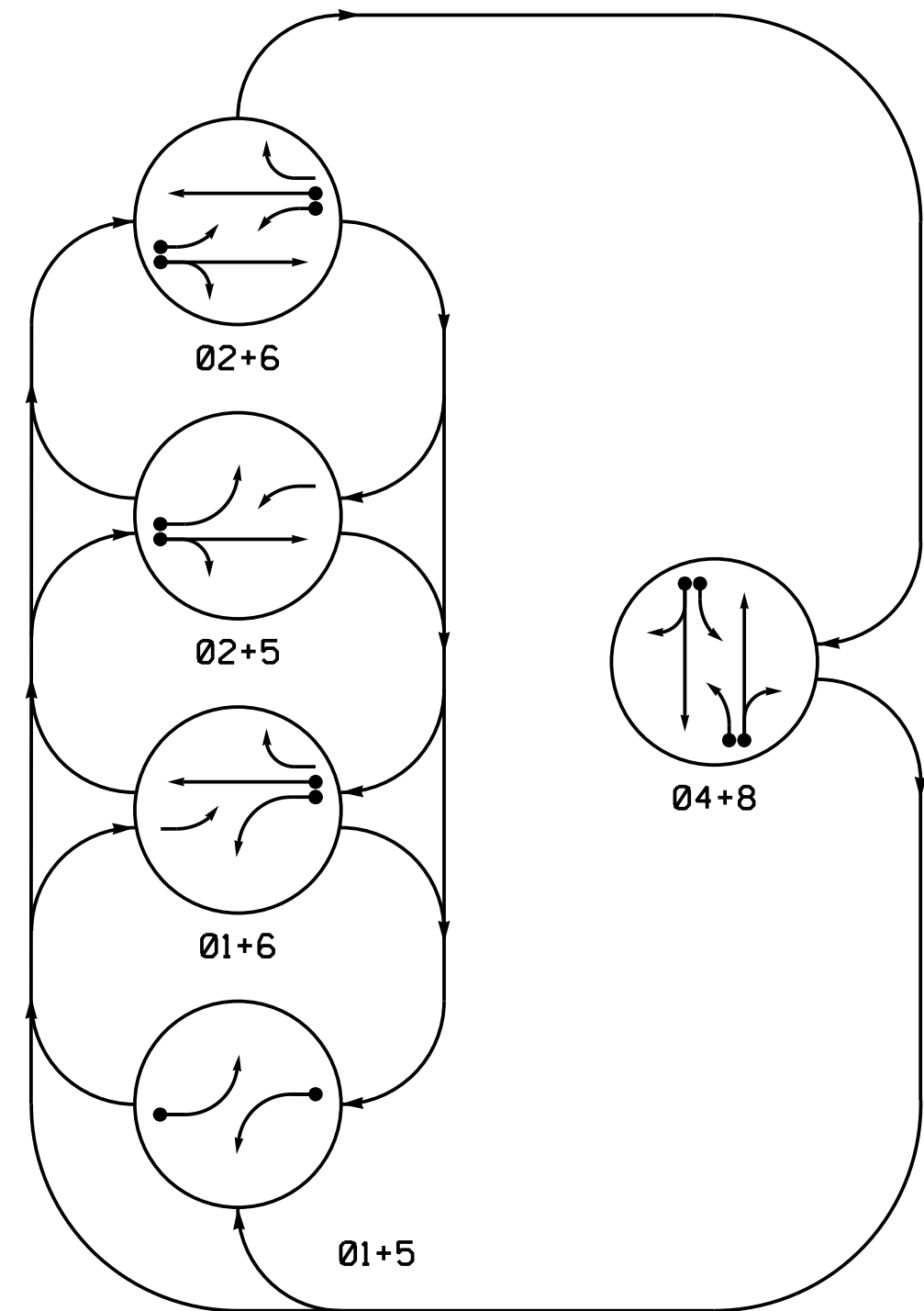
PLAN DATE: March 2018 REVIEWED BY: A.D. Klinksiek

PREPARED BY: A.H. Thornburg REVIEWED BY: N.R. Simmons

REVISIONS INIT. DATE

DocuSigned by: 12/7/2018
 Natasha R. Simmons
 SEAL 031464
 NORTH CAROLINA PROFESSIONAL ENGINEER
 SEAL 031464
 NATASHA R. SIMMONS
 SIG. INVENTORY NO. 02-0156

PHASING DIAGRAM

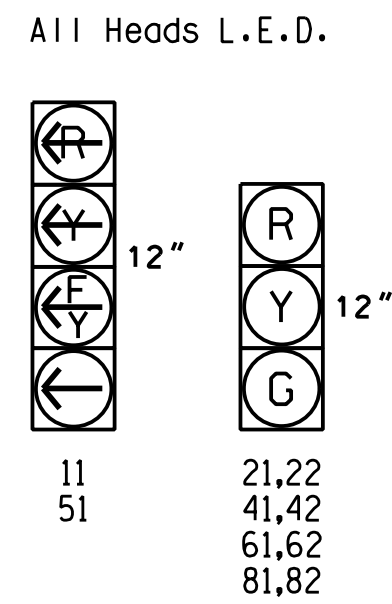


PHASING DIAGRAM DETECTION LEGEND

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

| SIGNAL FACE | PHASE | | | | | F L S H |
|-------------|-------|------|------|------|------|---------|
| | 01+5 | 01+6 | 02+5 | 02+6 | 04+8 | |
| 11 | --- | --- | --- | --- | --- | --- |
| 21,22 | R | R | G | G | R | Y |
| 41,42 | R | R | R | R | G | R |
| 51 | --- | --- | --- | --- | --- | --- |
| 61,62 | R | G | R | G | R | Y |
| 81,82 | R | R | R | R | G | R |

SIGNAL FACE I.D.

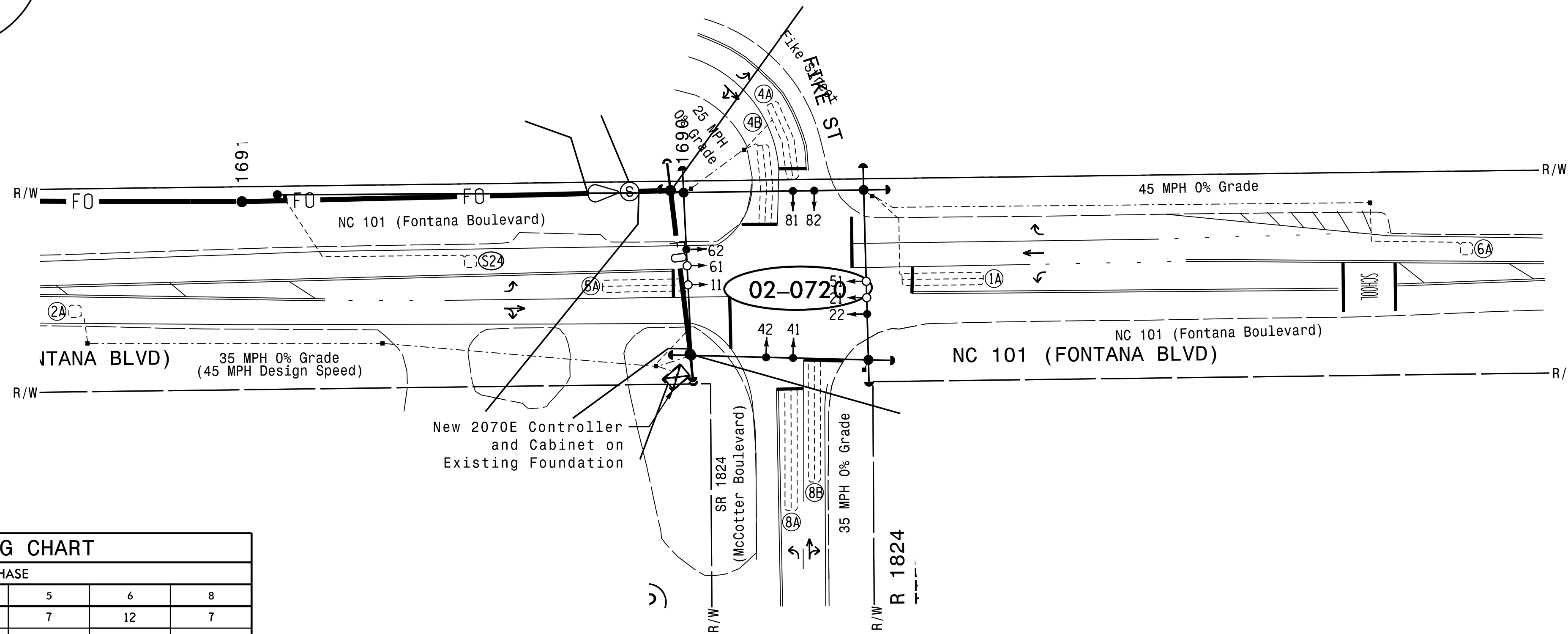


| INDUCTIVE LOOPS | | DETECTOR PROGRAMMING | | | | | | | | | | |
|-----------------|-----------|----------------------------|-------|----------|-------|---------|-----------|-----------------|--------------|------------|-------------|----------|
| LOOP | SIZE (FT) | DISTANCE FROM STOPBAR (FT) | TURNS | NEW LOOP | PHASE | CALLING | EXTENSION | FULL TIME DELAY | STRETCH TIME | DELAY TIME | SYSTEM LOOP | NEW CARD |
| 1A | 6X40 | +5 | 2-4-2 | - | 1 | Y | Y | - | - | 15 | - | Y |
| 2A | 6X6 | 320 | 4 | - | 2 | Y | Y | Y | - | 3 | - | Y |
| 4A | 6X40 | +5 | 2-4-2 | - | 4 | Y | Y | - | - | 3 | - | Y |
| 4B | 6X40 | 0 | 2-4-2 | - | 4 | Y | Y | - | - | 10 | - | Y |
| 5A | 6X40 | +5 | 2-4-2 | - | 5 | Y | Y | - | - | 15 | - | Y |
| 6A | 6X6 | 300 | 5 | - | 6 | Y | Y | - | - | - | - | Y |
| 8A | 6X60 | 0 | 2-4-2 | - | 8 | Y | Y | - | - | 3 | - | Y |
| 8B | 6X60 | 0 | 2-4-2 | - | 8 | Y | Y | - | - | 10 | - | Y |
| S24 | 6X6 | +185 | 4 | - | - | - | - | - | - | - | - | Y |

5 Phase Fully Actuated Havelock US 70 Business CLS

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Phase 1 and/or 5 may be lagged.
- Set all detector units to presence mode.
- Reposition existing signal heads numbered 22 and 62.
- In the event of loop replacement, refer to the current ITS and Signals Design Manual and submit a Plan of Record to the Signal Design Section.
- Pavement markings are existing.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- Closed loop system data: Controller Asset #0720



LEGEND

- | PROPOSED | EXISTING |
|---|----------------------|
| ○→ Traffic Signal Head | ●→ N/A |
| ○→ Modified Signal Head | ○→ N/A |
| ○→ Pedestrian Signal Head With Push Button & Sign | ○→ N/A |
| ○→ Signal Pole with Guy | ○→ N/A |
| ○→ Signal Pole with Sidewalk Guy | ○→ N/A |
| □→ Inductive Loop Detector | □→ N/A |
| □→ Junction Box | □→ N/A |
| □→ 2-in Underground Conduit | □→ N/A |
| → N/A Right of Way | → N/A Right of Way |
| ○→ Directional Arrow | ○→ Directional Arrow |
| ○→ Metal Strain Pole | ○→ Metal Strain Pole |

| FEATURE | PHASE | | | | | |
|-------------------------|-------|------------|-----|-----|------------|-----|
| | 1 | 2 | 4 | 5 | 6 | 8 |
| Min Green 1 * | 7 | 12 | 7 | 7 | 12 | 7 |
| Extension 1 * | 2.0 | 6.0 | 2.0 | 2.0 | 6.0 | 1.0 |
| Max Green 1 * | 15 | 100 | 25 | 15 | 100 | 25 |
| Yellow Clearance | 3.0 | 4.5 | 3.2 | 3.0 | 4.5 | 3.8 |
| Red Clearance | 2.6 | 2.0 | 2.2 | 2.8 | 2.0 | 1.5 |
| Red Revert | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| Walk 1 * | - | - | - | - | - | - |
| Don't Walk 1 | - | - | - | - | - | - |
| Seconds Per Actuation * | - | 2.5 | - | - | 2.5 | - |
| Max Variable Initial * | - | 36 | - | - | 34 | - |
| Time Before Reduction * | - | 15 | - | - | 15 | - |
| Time To Reduce * | - | 45 | - | - | 45 | - |
| Minimum Gap | - | 3.0 | - | - | 3.0 | - |
| Recall Mode | - | MIN RECALL | - | - | MIN RECALL | - |
| Vehicle Call Memory | - | YELLOW | - | - | YELLOW | - |
| Dual Entry | - | - | ON | - | - | ON |
| Simultaneous Gap | ON | ON | ON | ON | ON | ON |

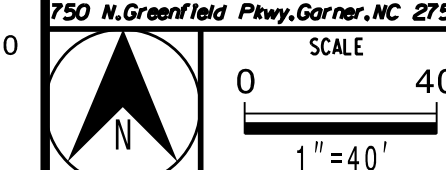
* These values may be field adjusted. Do not adjust Min Green and Extension times for phases 2 and 6 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.

Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

| | | | |
|-----------------------------|--|-----------------------|--------------------------------------|
| | NC 101 (Fontana Boulevard) at SR 1824 (McCotter Boulevard) / Fike Street | | |
| | Division 02 Craven Co. Havelock | PLAN DATE: March 2018 | |
| PREPARED BY: A.H. Thornburg | REVIEWED BY: N.R. Simmons | DATE: 12/7/2018 | SIGNATURE: <i>Natasha R. Simmons</i> |

HNTB HNTB NORTH CAROLINA, P.C. 343 E. Six Forks Road, Suite 200 Raleigh, North Carolina 27609 NC License No: C-1554 (919) 546-8997

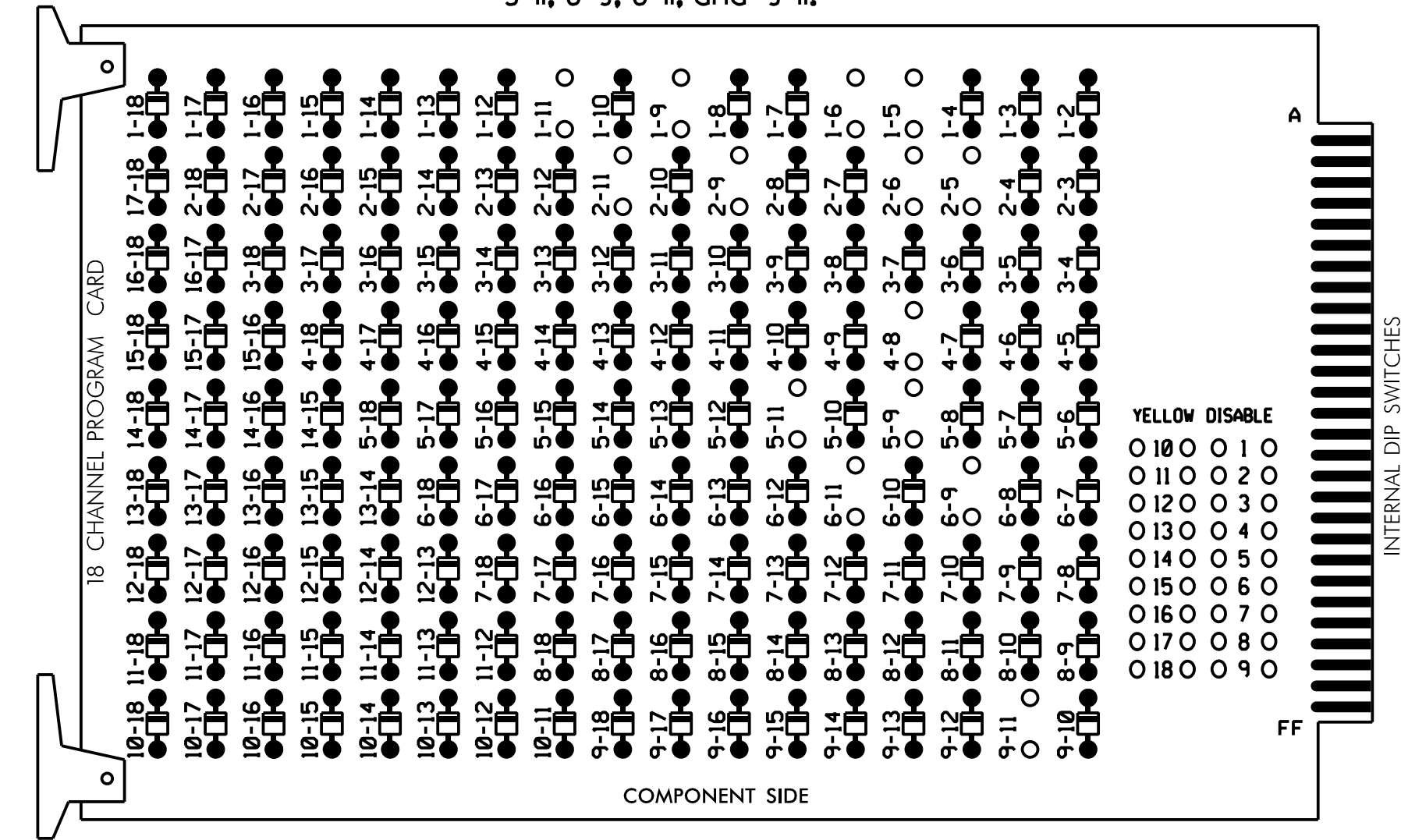


DocuSigned by: Natasha R. Simmons DATE 12/7/2018 SIG. INVENTORY NO. 02-0720

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

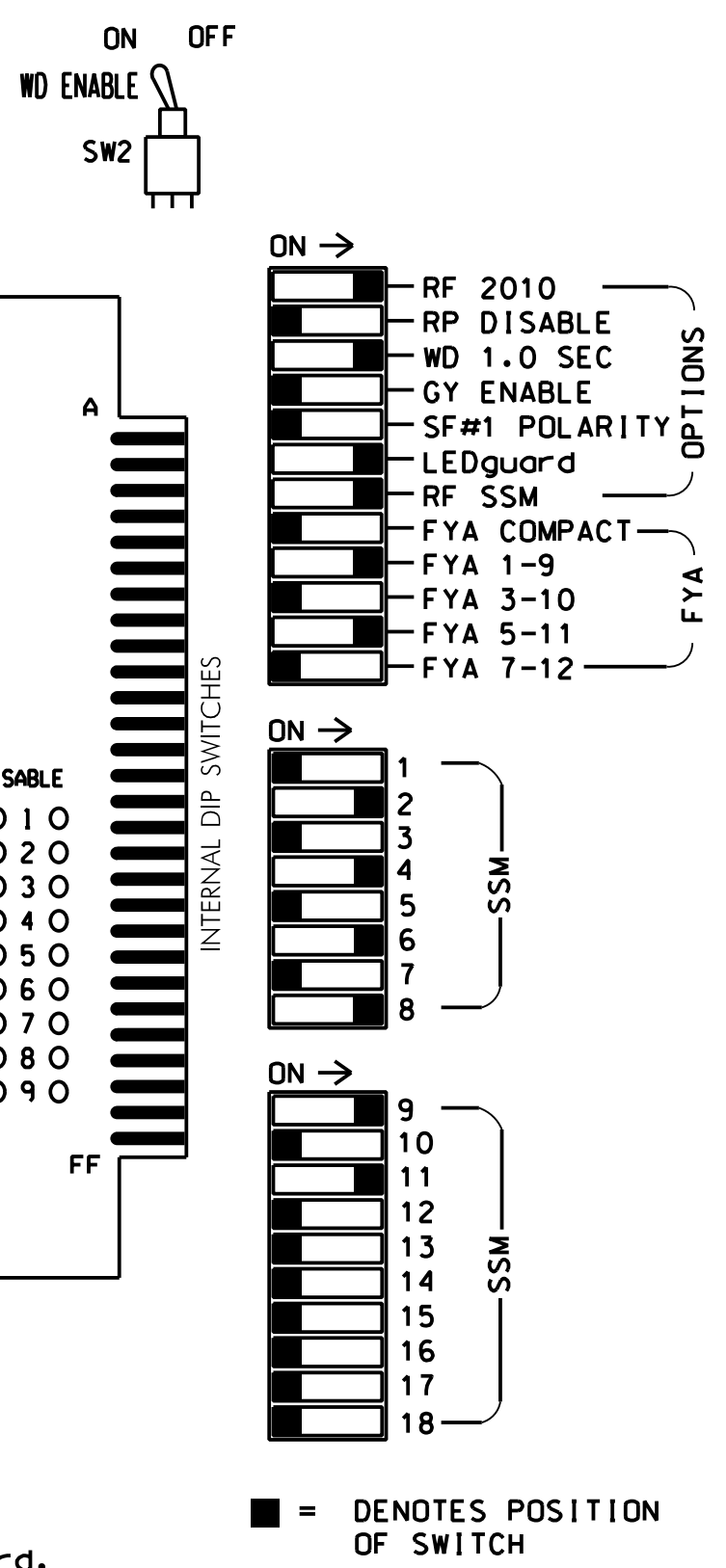
REMOVE DIODE JUMPERS 1-5, 1-6, 1-9, 1-11, 2-5, 2-6, 2-9, 2-11, 4-8, 5-9, 5-11, 6-9, 6-11, and 9-11.



REMOVE JUMPERS AS SHOWN

NOTES:

- Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
- Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
- Ensure that Red Enable is active at all times during normal operation.
- Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.



■ = DENOTES POSITION OF SWITCH

NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
- Enable Simultaneous Gap-Out for all Phases.
- Program phases 4 and 8 for Dual Entry.
- Program phases 2 and 6 for Variable Initial and Gap Reduction.
- Program phases 2 and 6 for Startup In Green.
- Program phases 2 and 6 for Yellow Flash, and overlap 1 as Wag Overlaps.
- The cabinet and controller are part of the Havelock US 70 Business Closed Loop Signal System.

EQUIPMENT INFORMATION

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

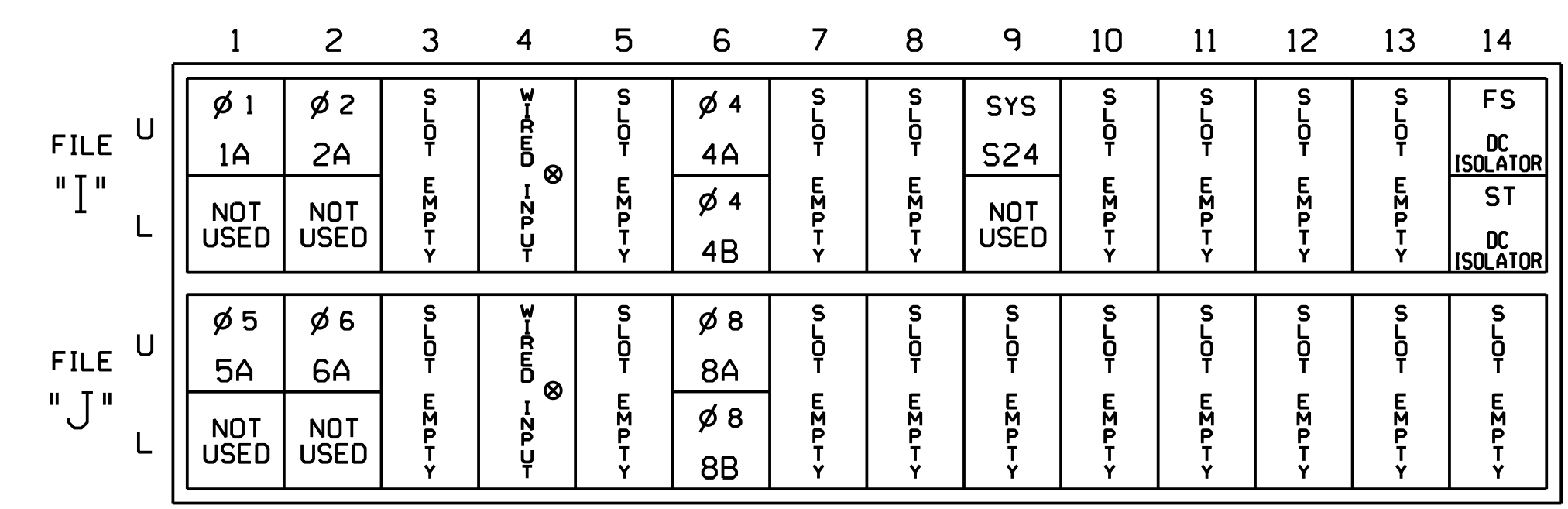
SIGNAL HEAD HOOK-UP CHART

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

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

INPUT FILE POSITION LAYOUT

(front view)



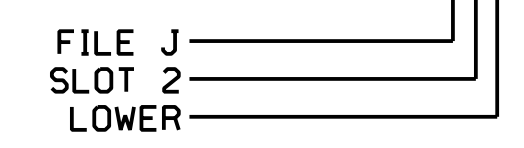
EX.: 1A, 2A, ETC. = LOOP NO.'S
 FS = FLASH SENSE
 DC ISOLATOR = Do not populate slot with detector card
 ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

| LOOP NO. | LOOP TERMINAL | INPUT FILE POS. | PIN NO. | INPUT ASSIGNMENT NO. | DETECTOR NO. | NEMA PHASE | CALL | EXTEND | FULL TIME DELAY | STRETCH TIME | DELAY TIME |
|-----------------|---------------|-----------------|---------|----------------------|--------------|------------|------|--------|-----------------|--------------|------------|
| 1A ¹ | TB2-1,2 | J1U | 56 | 18 | 1 | 1 | Y | Y | | | 15 |
| | - | J4U | 48 | 10 | 26 | 6 | Y | Y | Y | | 3 |
| 2A | TB2-5,6 | J2U | 39 | 1 | 2 | 2 | Y | Y | | | |
| 4A | TB4-9,10 | J6U | 41 | 3 | 4 | 4 | Y | Y | | | 3 |
| 4B | TB4-11,12 | J6L | 45 | 7 | 14 | 4 | Y | Y | | | 10 |
| *S24 | TB6-9,10 | J9U | 60 | 22 | 11 | SYS | | | | | |
| 5A ² | TB3-1,2 | J1U | 55 | 17 | 5 | 5 | Y | Y | | | 15 |
| | - | J4U | 47 | 9 | 22 | 2 | Y | Y | Y | | 3 |
| 6A | TB3-5,6 | J2U | 40 | 2 | 6 | 6 | Y | Y | | | |
| 8A | TB5-9,10 | J6U | 42 | 4 | 8 | 8 | Y | Y | | | 3 |
| 8B | TB5-11,12 | J6L | 46 | 8 | 18 | 8 | Y | Y | | | 10 |

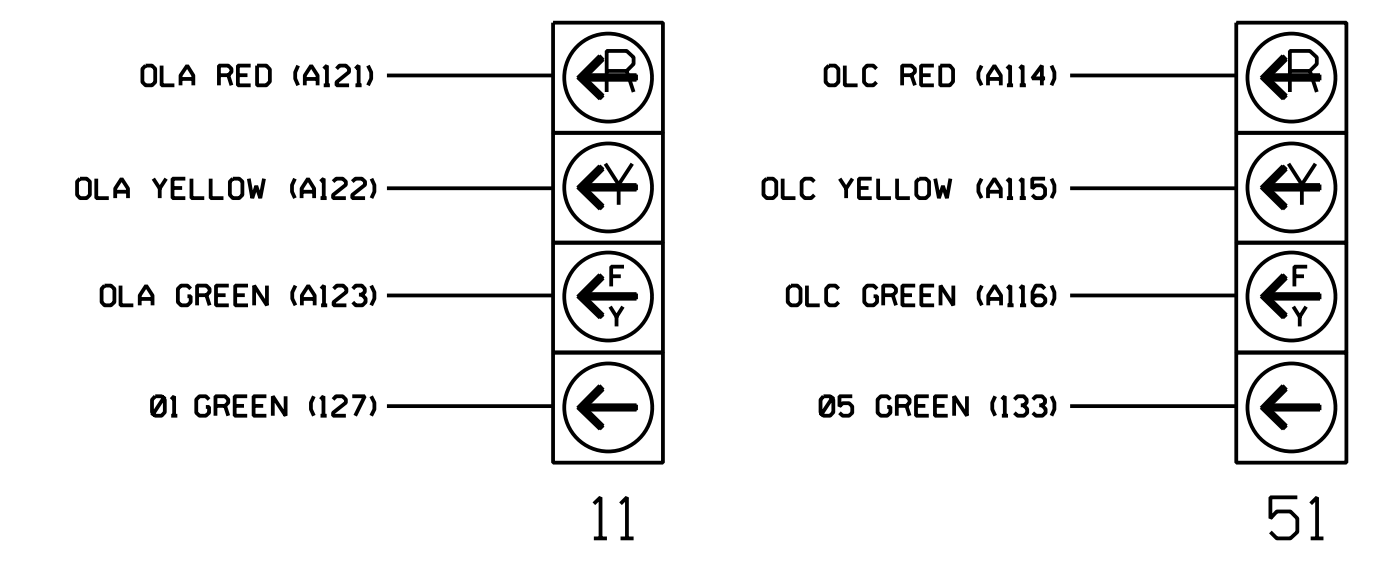
- Add jumper from J1-W to J4-W, on rear of input file.
 - Add jumper from J1-W to J4-W, on rear of input file.
- * System detector only. Remove the vehicle phase assigned to this detector in the default programming.

INPUT FILE POSITION LEGEND: J2L



FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



NOTE

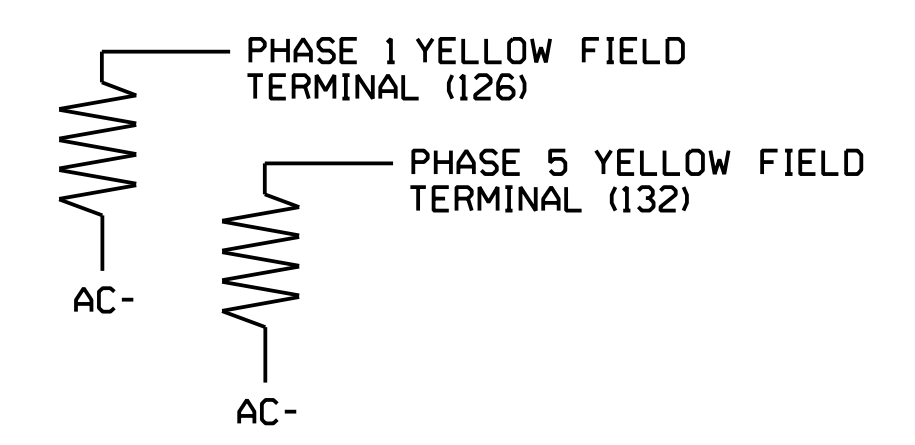
The sequence display for signal heads 11 and 51 requires special logic programming. See sheet 2 for programming instructions.

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 02-0720
 DESIGNED: March 2018
 SEALED: 12-7-18
 REVISED: N/A

LOAD RESISTOR INSTALLATION DETAIL

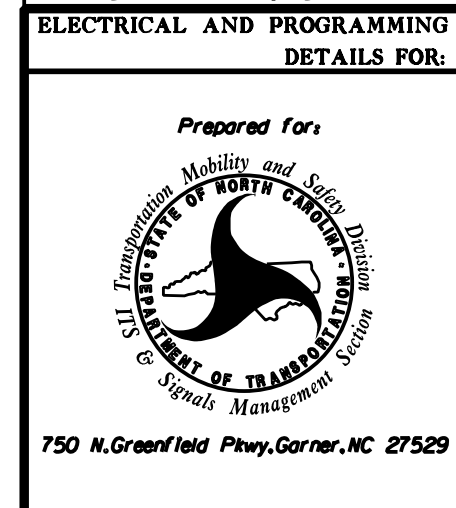
(install resistors as shown below)

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



Electrical Detail - Sheet 1 of 2
 Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



NC 101 (Fontana Boulevard) at SR 1824 (McCotter Boulevard) / Fike Street

Division 02 Craven Co. Havelock

PLAN DATE: March 2018 REVIEWED BY: A.D. Klinksiek

PREPARED BY: A.H. Thornburg REVIEWED BY: N.R. Simmons

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

SEAL

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 031464

W. T. SHAW R. SIMMONS

DocuSigned by: Natasha R. Simmons 12/7/2018

SIGNATURE DATE

SIG. INVENTORY NO. 02-0720

HNTB HNTB NORTH CAROLINA, P.C.
 343 E. Six Forks Road, Suite 200
 Raleigh, North Carolina 27609
 NC License No: C-1554
 (919) 546-8997

LOGICAL I/O PROCESSOR PROGRAMMING DETAIL TO PRODUCE SPECIAL FYA-PPLT SIGNAL SEQUENCE

(program controller as shown below)

1. FROM MAIN MENU PRESS '2' (PHASE CONTROL), THEN '1' (PHASE CONTROL FUNCTIONS). SCROLL TO THE BOTTOM OF THE MENU AND ENABLE ACT LOGIC COMMANDS 1, 2, 3, 4, 5, and 6.
2. FROM MAIN MENU PRESS '6' (OUTPUTS), THEN '3' (LOGICAL I/O PROCESSOR).

```

LOGICAL I/O COMMAND #1 (+/-COMMAND#)
IF ACTIVE PHASE #1 IS ON
AND RED CLEAR ON PHASE #1 IS ON

        ↓
        SCROLL DOWN

THEN:
SET OUTPUT ASSIGNMENT #50 ON
SET OUTPUT ASSIGNMENT #51 OFF

        ↓
        PRESS '+'
    
```

NOTE: LOGIC FOR PHASE 1 RED CLEAR WHEN TRANSITIONING FROM PHASE 1 TO PHASE 2 (HEAD 11).

```

LOGICAL I/O COMMAND #2 (+/-COMMAND#)
IF ACTIVE PHASE #1 IS ON

        ↓
        SCROLL DOWN

THEN:
SET OUTPUT ASSIGNMENT #52 OFF

        ↓
        PRESS '+'
    
```

NOTE: LOGIC FOR SWITCHING FLASHING YELLOW ARROW OFF DURING PHASE 1 (HEAD 11).

```

LOGICAL I/O COMMAND #3 (+/-COMMAND#)
IF YELLOW ON PHASE #1 IS ON

        ↓
        SCROLL DOWN

THEN:
SET OUTPUT ASSIGNMENT #51 ON

        ↓
        PRESS '+'
    
```

NOTE: LOGIC FOR YELLOW ARROW CLEARANCE FROM PHASE 1 (HEAD 11).

```

LOGICAL I/O COMMAND #4 (+/-COMMAND#)
IF ACTIVE PHASE #5 IS ON
AND RED CLEAR ON PHASE #5 IS ON

        ↓
        SCROLL DOWN

THEN:
SET OUTPUT ASSIGNMENT #42 ON
SET OUTPUT ASSIGNMENT #43 OFF

        ↓
        PRESS '+'
    
```

NOTE: LOGIC FOR PHASE 5 RED CLEAR WHEN TRANSITIONING FROM PHASE 5 TO PHASE 6 (HEAD 51).

```

LOGICAL I/O COMMAND #5 (+/-COMMAND#)
IF ACTIVE PHASE #5 IS ON

        ↓
        SCROLL DOWN

THEN:
SET OUTPUT ASSIGNMENT #44 OFF

        ↓
        PRESS '+'
    
```

NOTE: LOGIC FOR SWITCHING FLASHING YELLOW ARROW OFF DURING PHASE 5 (HEAD 51).

```

LOGICAL I/O COMMAND #6 (+/-COMMAND#)
IF YELLOW ON PHASE #5 IS ON

        ↓
        SCROLL DOWN

THEN:
SET OUTPUT ASSIGNMENT #43 ON

        ↓
        PRESS '+'
    
```

NOTE: LOGIC FOR YELLOW ARROW CLEARANCE FROM PHASE 5 (HEAD 51).

LOGIC I/O PROCESSOR PROGRAMMING COMPLETE

OVERLAP PROGRAMMING DETAIL

(program controller as shown below)

FROM MAIN MENU PRESS '8' (OVERLAPS), THEN '1' (VEHICLE OVERLAP SETTINGS).

```

PAGE 1: VEHICLE OVERLAP 'A' SETTINGS
PHASE:      :12345678910111213141516
VEH OVL PARENTS: :XX
VEH OVL NOT VEH: :
VEH OVL NOT PED: :
VEH OVL GRN EXT: :
STARTUP COLOR: - RED - YELLOW - GREEN
FLASH COLORS:  - RED - YELLOW X GREEN
SELECT VEHICLE OVERLAP OPTIONS: (Y/N)
FLASH YELLOW IN CONTROLLER FLASH?...Y
GREEN EXTENSION (0-255 SEC)...0
YELLOW CLEAR (0=PARENT,3-25.5 SEC)...0.0
RED CLEAR (0=PARENT,0.1-25.5 SEC)...0.0
OUTPUT AS PHASE # (0=NONE, 1-16)...0
    
```

← NOTICE GREEN FLASH

PRESS '+' TWICE

```

PAGE 1: VEHICLE OVERLAP 'C' SETTINGS
PHASE:      :12345678910111213141516
VEH OVL PARENTS: :XX
VEH OVL NOT VEH: :
VEH OVL NOT PED: :
VEH OVL GRN EXT: :
STARTUP COLOR: - RED - YELLOW - GREEN
FLASH COLORS:  - RED - YELLOW X GREEN
SELECT VEHICLE OVERLAP OPTIONS: (Y/N)
FLASH YELLOW IN CONTROLLER FLASH?...Y
GREEN EXTENSION (0-255 SEC)...0
YELLOW CLEAR (0=PARENT,3-25.5 SEC)...0.0
RED CLEAR (0=PARENT,0.1-25.5 SEC)...0.0
OUTPUT AS PHASE # (0=NONE, 1-16)...0
    
```

← NOTICE GREEN FLASH

OVERLAP PROGRAMMING COMPLETE

OUTPUT REFERENCE SCHEDULE
USE TO INTERPRET LOGIC PROCESSOR

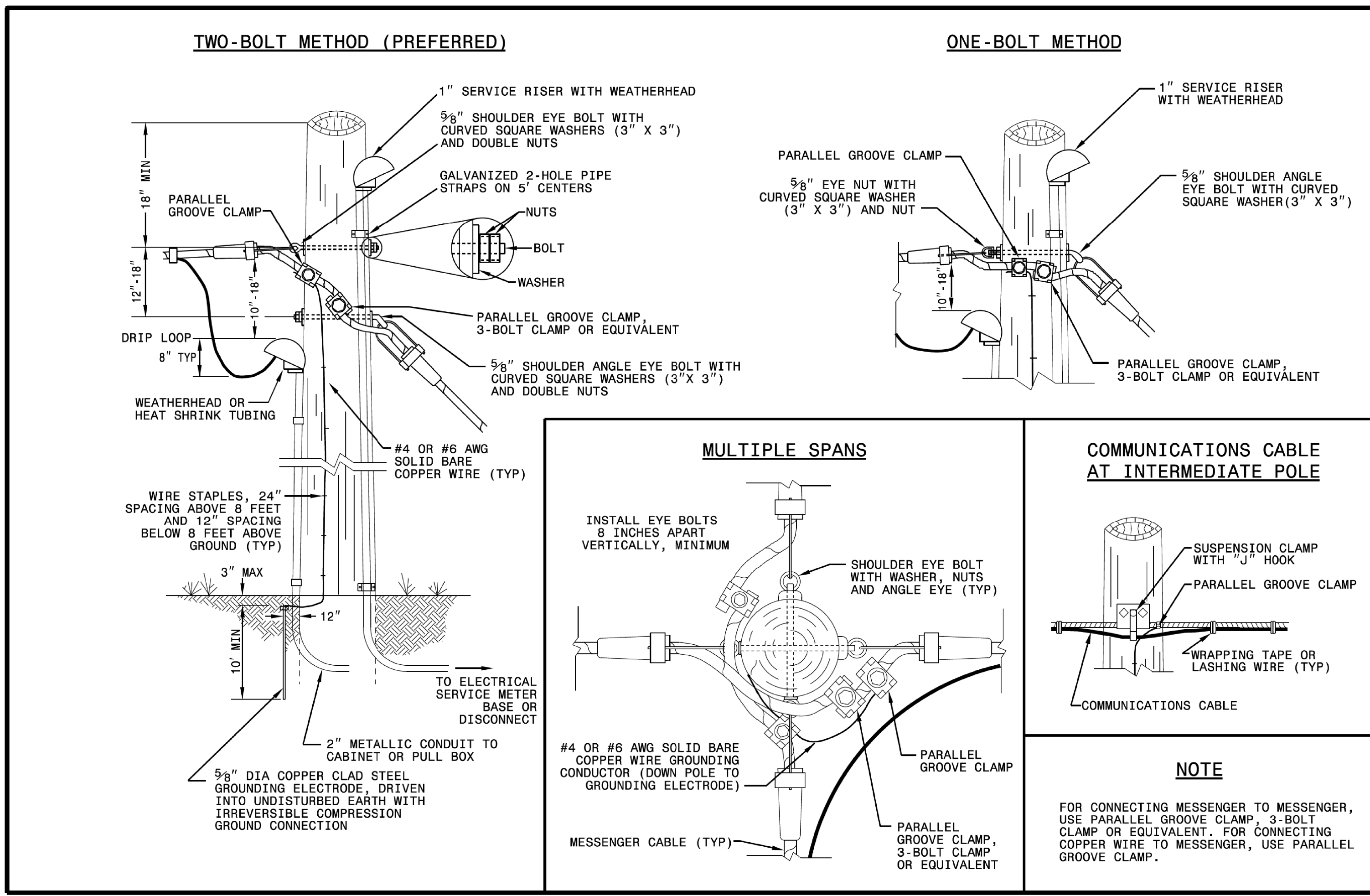
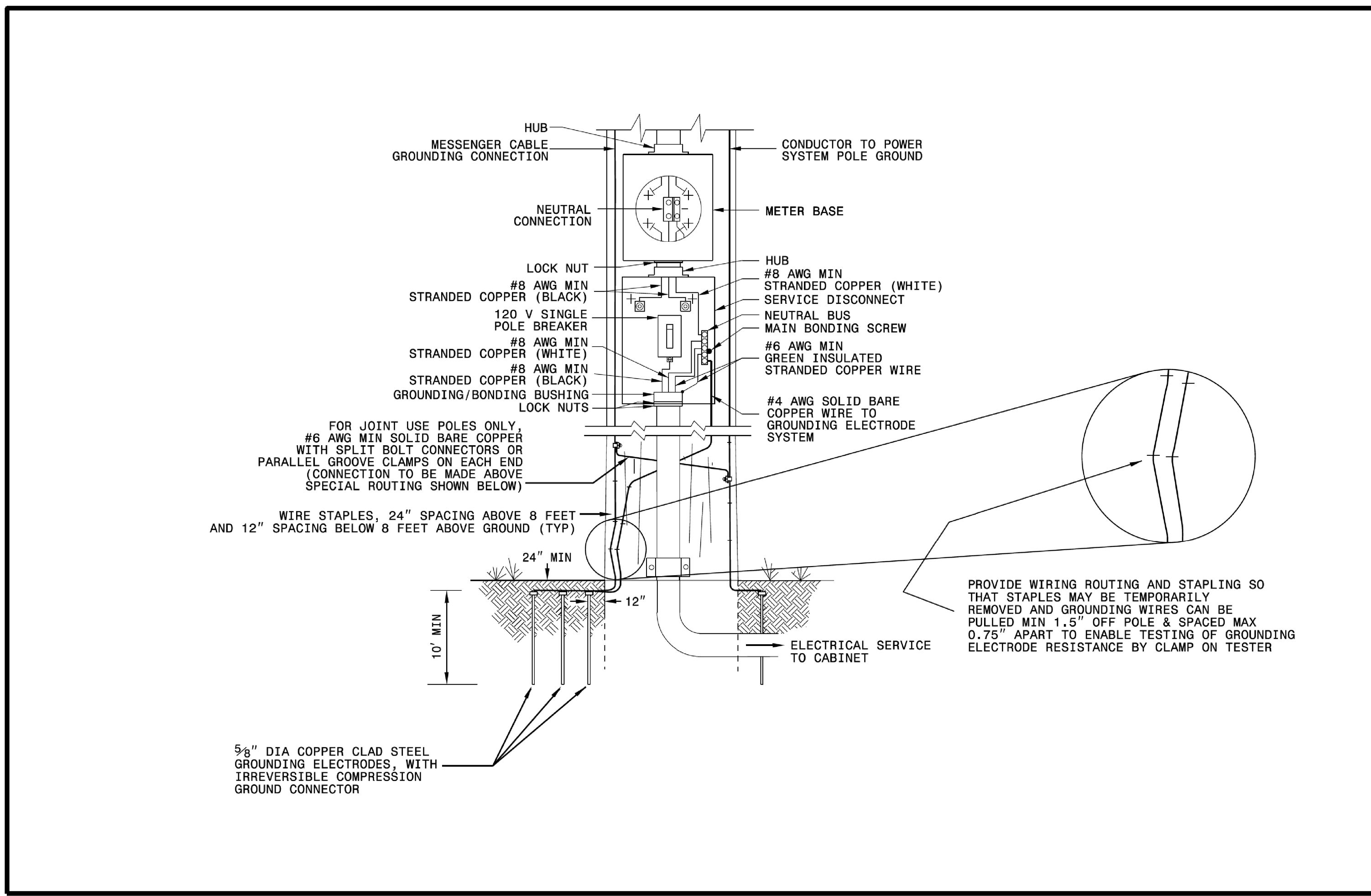
OUTPUT 42 = Overlap C Red
 OUTPUT 43 = Overlap C Yellow
 OUTPUT 44 = Overlap C Green
 OUTPUT 50 = Overlap A Red
 OUTPUT 51 = Overlap A Yellow
 OUTPUT 52 = Overlap A Green

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 02-0720
DESIGNED: March 2018
SEALED: 12-7-18
REVISED: N/A

Electrical Detail - Sheet 2 of 2
Signal Upgrade

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

| | | |
|--|--|--|
| | Prepared for: HNTB NORTH CAROLINA, P.C. 343 E. Six Forks Road, Suite 200 Raleigh, North Carolina 27609 NC License No: C-1554 (919) 546-8997 | Division 02 Craven Co. Havelock NC 101 (Fontana Boulevard) at SR 1824 (McCotter Boulevard)/ Fike Street PLAN DATE: March 2018 REVIEWED BY: A.D. Klinksiek PREPARED BY: A.H. Thornburg REVIEWED BY: N.R. Simmons |
| | SEAL NORTH CAROLINA PROFESSIONAL ENGINEER NATASHA R. SIMMONS SEAL 031464 | DocuSigned by: 12/7/2018 _____ SIGNATURE DATE _____ _____ SIG. INVENTORY NO. 02-0720 |



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11-2018-2018_544 DocuSign\Plate Sheets\2018_Plate Sheet -dgn
r.wrough

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SIGNATURES COMPLETED

See Plate for Title

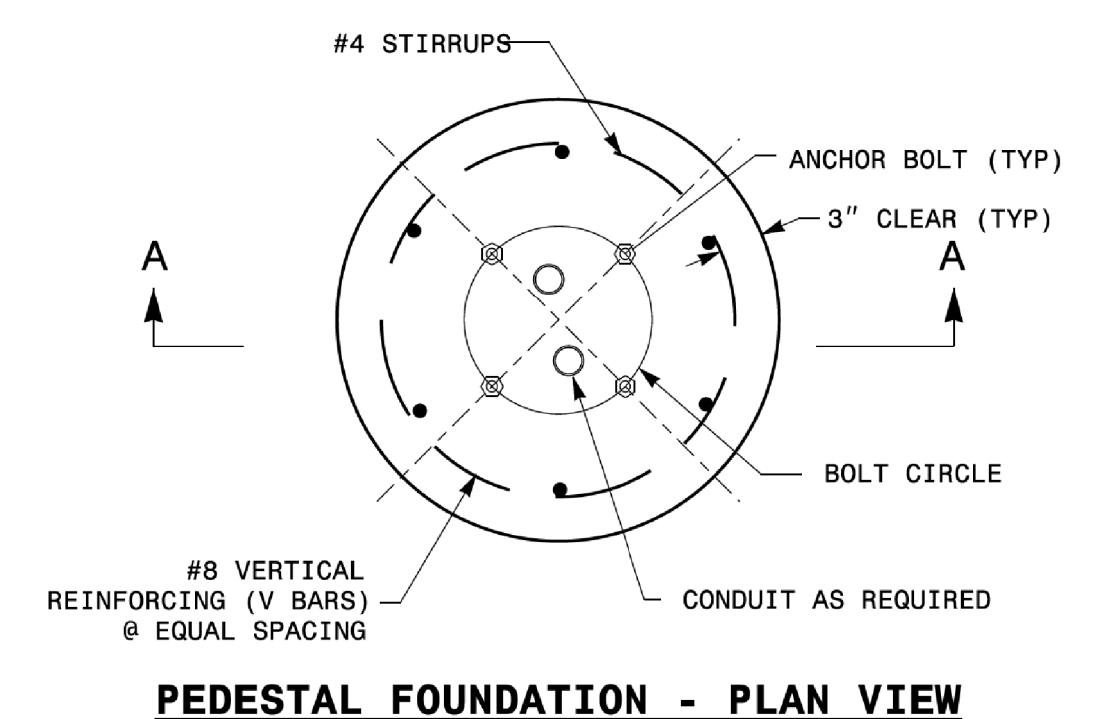
Prepared in the Offices of:

750 N. Greenfield Parkway
Garner, NC 27529

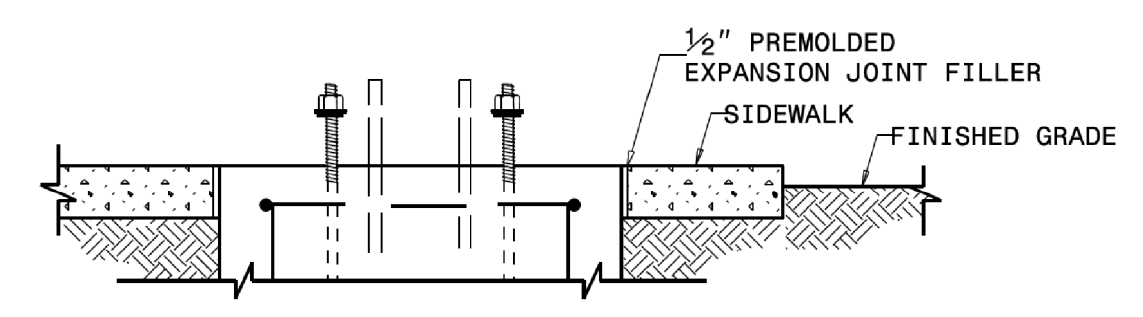
SEAL

DocuSigned by:
Mohd Aslami

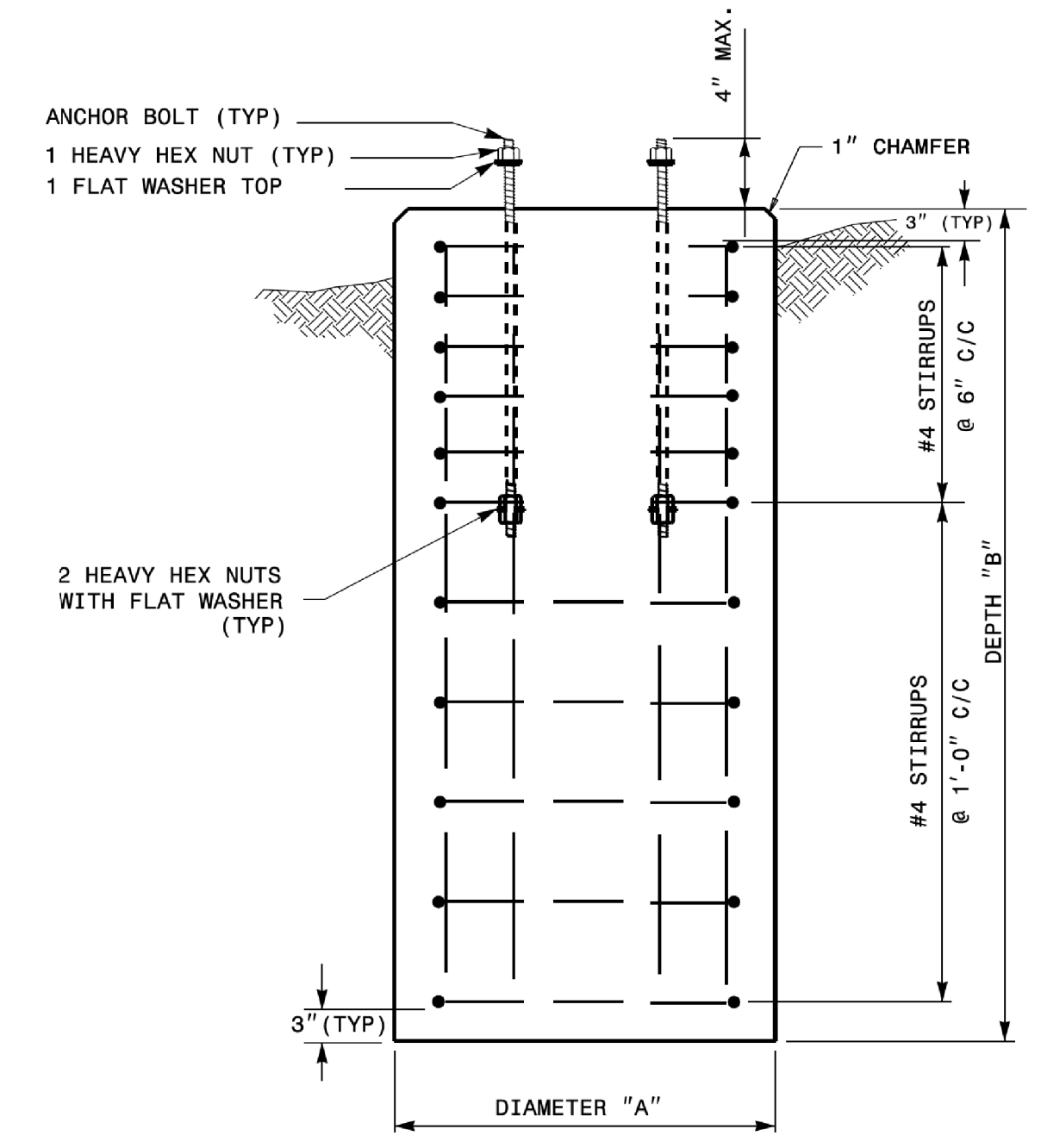
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DATE



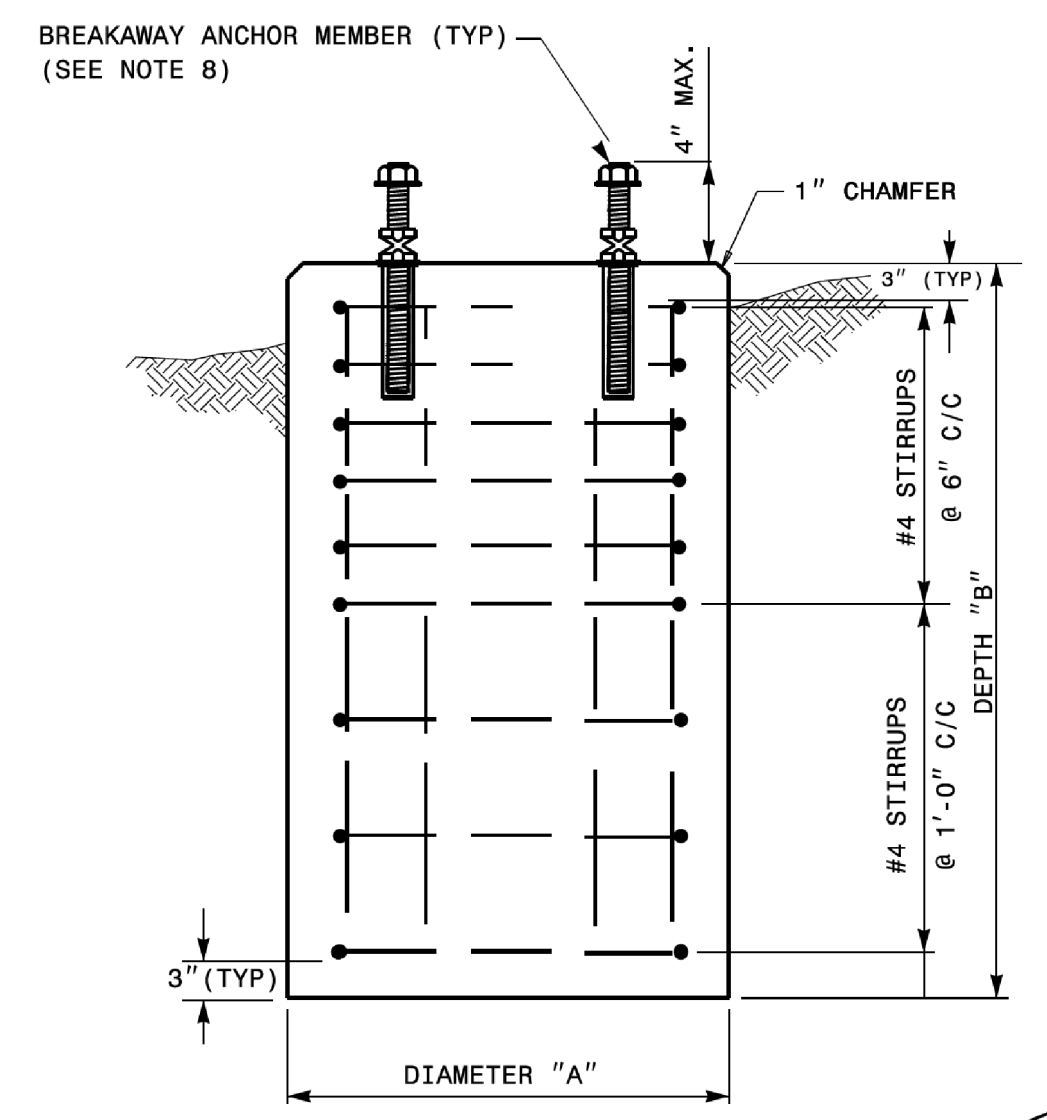
PEDESTAL FOUNDATION - PLAN VIEW



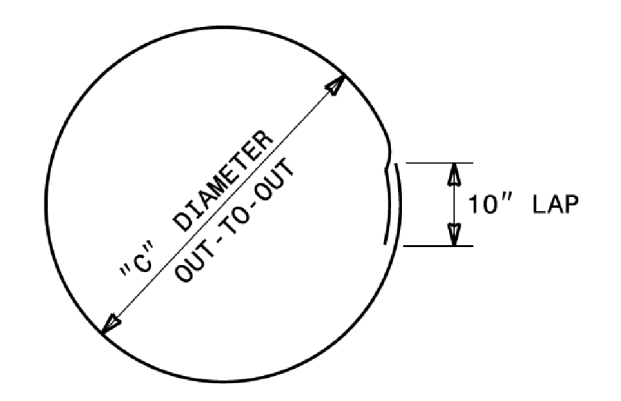
PEDESTAL FOUNDATION DETAILS FOR SIDEWALK



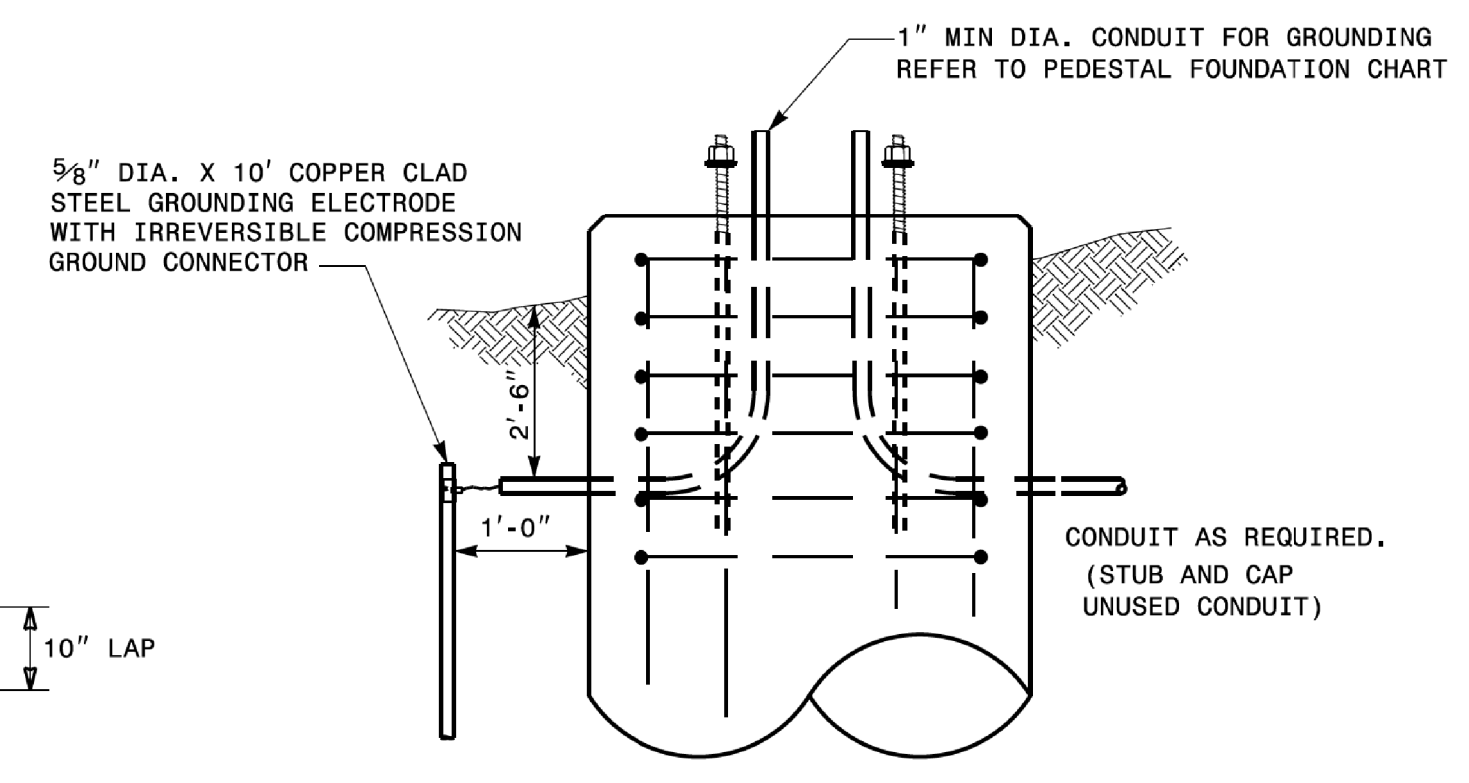
**TYPES I, II & III
SECTION A-A**



**TYPES I & II ONLY
SECTION A-A**



CLOSED HOOPS



GROUNDING & CONDUIT DETAIL

NOTES:

- CAST FOUNDATION AGAINST UNDISTURBED SOIL WHEREVER CONDITIONS PERMIT. IN UNSTABLE SOIL, CAST-IN-PLACE TUBE FORMS ARE ALLOWED WITH APPROVAL.
- COMPLY WITH APPLICABLE PROVISIONS OF SECTION 825 FOR CONCRETE CONSTRUCTION.
- USE CLASS "A" CONCRETE THAT MEETS THE REQUIREMENTS OF SECTION 1000 WITH A COMPRESSION STRENGTH AT 28 DAYS OF $F'c = 3000$ PSI (MIN.).
- USE ASTM GRADE 60 DEFORMED BARS FOR ALL REINFORCING STEEL.
- GRADE IS ASSUMED TO BE (8H:1V) OR FLATTER. FOUNDATION SIZE AND DEPTHS ARE BASED ON THE FOLLOWING SOIL DESIGN PARAMETERS:
 - A. SANDY TYPE SOIL
 - B. NO GROUND WATER WITHIN 5'-0" OF SURFACE ELEVATION
 - C. WIND SPEED NOT TO EXCEED 140 MPH
 IF ACTUAL CONDITIONS VARY SUBSTANTIALLY FROM THOSE ASSUMED, THE FOUNDATION DEPTH MAY BE ADJUSTED. IN THIS CASE, CONTACT THE ENGINEER.
- MAINTAIN AT LEAST 3" COVER ON ALL REINFORCEMENT.
- ORIENT CONDUIT AS REQUIRED BY THE DESIGN OR AS DICTATED BY FIELD CONDITIONS.
- USE ADHESIVE ANCHOR FOR THREADED COUPLING INSERT. FOR TYPE I MINIMUM DEPTH NECESSARY IS 0'-4 1/2" AND FOR TYPE II MINIMUM DEPTH NECESSARY IS 0'-6 5/8". FOLLOW MANUFACTURER'S INSTALLATION INSTRUCTIONS.

| PEDESTAL FOUNDATION TYPE AND SIZE | | | | | | | |
|-----------------------------------|-----------------------|-----------------|--------------|--------------------|--------------------|--------------|-----------------------------------|
| TYPE | PEDESTAL DESCRIPTION | SIZE | | | ANCHOR BOLT | | INSTALL GROUNDING SYSTEM (YES/NO) |
| | | DIAMETER "A" FT | DEPTH "B" FT | CONCRETE VOLUME CY | DIAMETER (MIN.) IN | LENGTH FT-IN | |
| I | PEDESTRIAN PUSHBUTTON | 2'-0" | 3'-6" | .41 | 1/2 | 1'-6" | NO |
| II | NORMAL-DUTY | 2'-0" | 5'-0" | .58 | 3/4 | 2'-0" | YES |
| III | HEAVY-DUTY | 2'-6" | 7'-0" | 1.27 | 1 | 4'-0" | YES |

| REINFORCING STEEL SCHEDULE | | | | | | | | | | | | | |
|----------------------------|--------|-----|--------|------------|---------|---------------|----------------|-------|--------|-----------------|--------------|------------|------------------------|
| TYPE | V-BAR | | | | STIRRUP | | | | | | | | |
| | SIZE # | QTY | LENGTH | WEIGHT LBS | SIZE # | QUANTITY | | | LENGTH | DIAMETER "C" FT | OVERLAP MIN. | WEIGHT LBS | TOTAL STEEL WEIGHT LBS |
| | | | | | | ON 6" CENTERS | ON 12" CENTERS | TOTAL | | | | | |
| I | 8 | 6 | 3'-0" | 56 | 4 | 0 | 4 | 4 | 5'-7" | 1'-6" | 0'-10" | 15 | 71 |
| II | 8 | 6 | 4'-6" | 86 | 4 | 5 | 3 | 8 | 5'-7" | 1'-6" | 0'-10" | 30 | 116 |
| III | 8 | 6 | 6'-6" | 122 | 4 | 7 | 4 | 11 | 7'-2" | 2'-0" | 0'-10" | 53 | 175 |

STATE OF NORTH CAROLINA
 DEPT. OF TRANSPORTATION
 DIVISION OF HIGHWAYS
 RALEIGH, N.C.

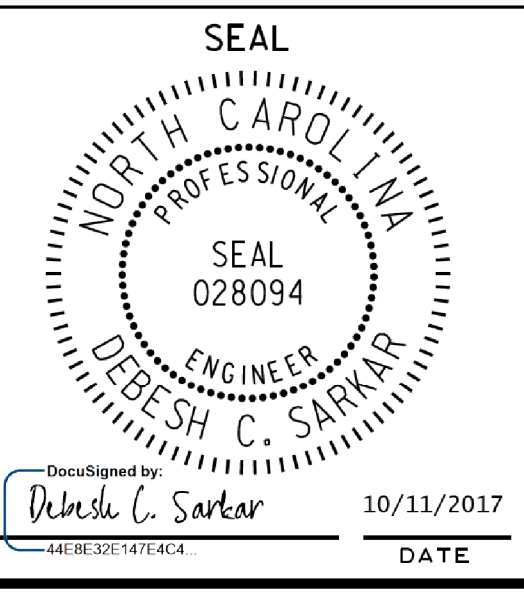
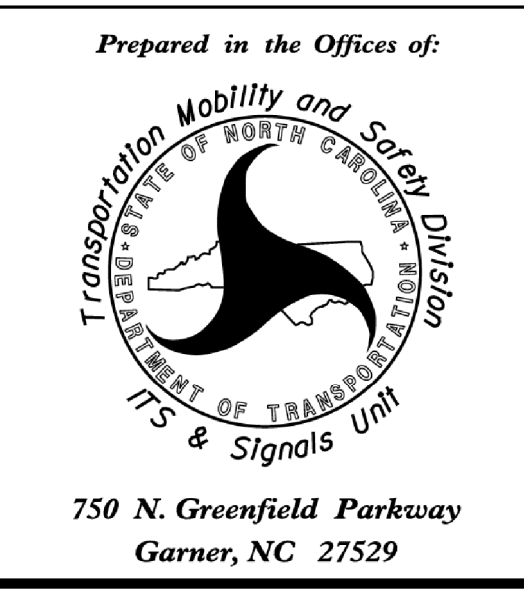
ENGLISH STANDARD DRAWING FOR
PEDESTALS
 FOUNDATIONS

SHEET 1 OF 1
1743D01

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See Plate for Title

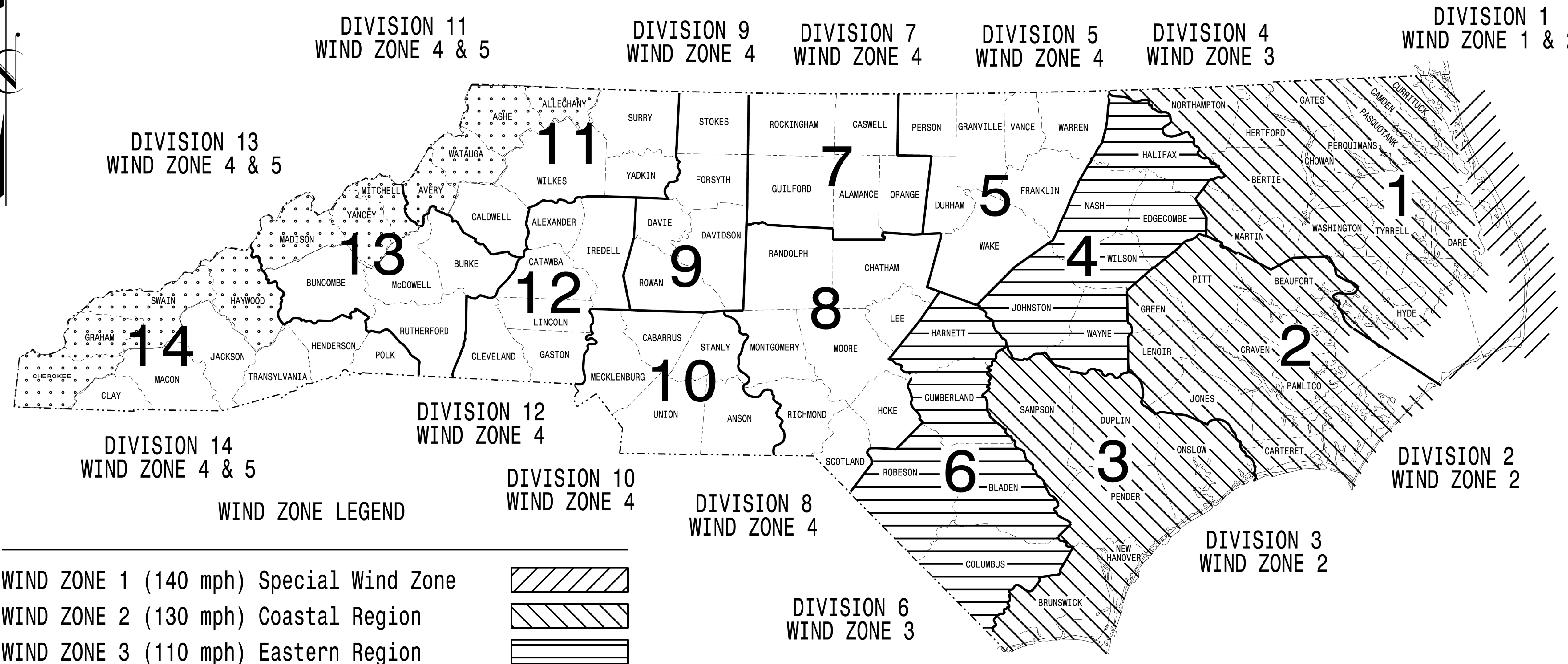


NCDOT METAL POLE STANDARDS

**STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS**

| | |
|------------------------------|---------------------|
| PROJECT I.D. NO. R - 1015 | SHEET NO. Sig.M1 |
|------------------------------|---------------------|

STANDARD DRAWINGS FOR ALL METAL POLES



WIND ZONE LEGEND

| | | |
|--|--|--|
| WIND ZONE 1 (140 mph) Special Wind Zone | | |
| WIND ZONE 2 (130 mph) Coastal Region | | |
| WIND ZONE 3 (110 mph) Eastern Region | | |
| WIND ZONE 4 (90 mph) Central & Mtn. Region | | |
| WIND ZONE 5 (120 mph) Special Wind Zone | | |

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

Prepared In the Offices of:

750, N. Greenfield Pkwy.
Garner, NC 27529

Designed in conformance with the latest 2015 Interim to the 6th Edition 2013

AASHTO

Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals

INDEX OF PLANS

| DRAWING NUMBER | DESCRIPTION |
|----------------|---|
| Sig. M 1 | Statewide Wind Zone Map |
| Sig. M 2 | Typical Fabrication Details-All Metal Poles |
| Sig. M 3 | Typical Fabrication Details-Strain Poles |
| Sig. M 4 | Typical Fabrication Details-Mast Arm Poles |
| Sig. M 5 | Typical Fabrication Details-Mast Arm Connection |
| Sig. M 6 | Typical Fabrication Details-Strain Pole Attachments |
| Sig. M 7 | Construction Details-Foundations |
| Sig. M 8 | Standard Strain Pole Foundation-All Soil Conditions |

NCDOT CONTACTS:

MOBILITY AND SAFETY DIVISION - ITS AND SIGNALS UNIT

M.M. MCDIARMID, P.E. - STATE ITS AND SIGNALS ENGINEER

J. P. GALLOWAY, P.E. - STATE SIGNALS ENGINEER

D.C. SARKAR, P.E. - ITS AND SIGNALS SENIOR STRUCTURAL ENGINEER

SEAL

DESIGNED BY: Debesh C. Sarkar DATE: 10/11/2017

