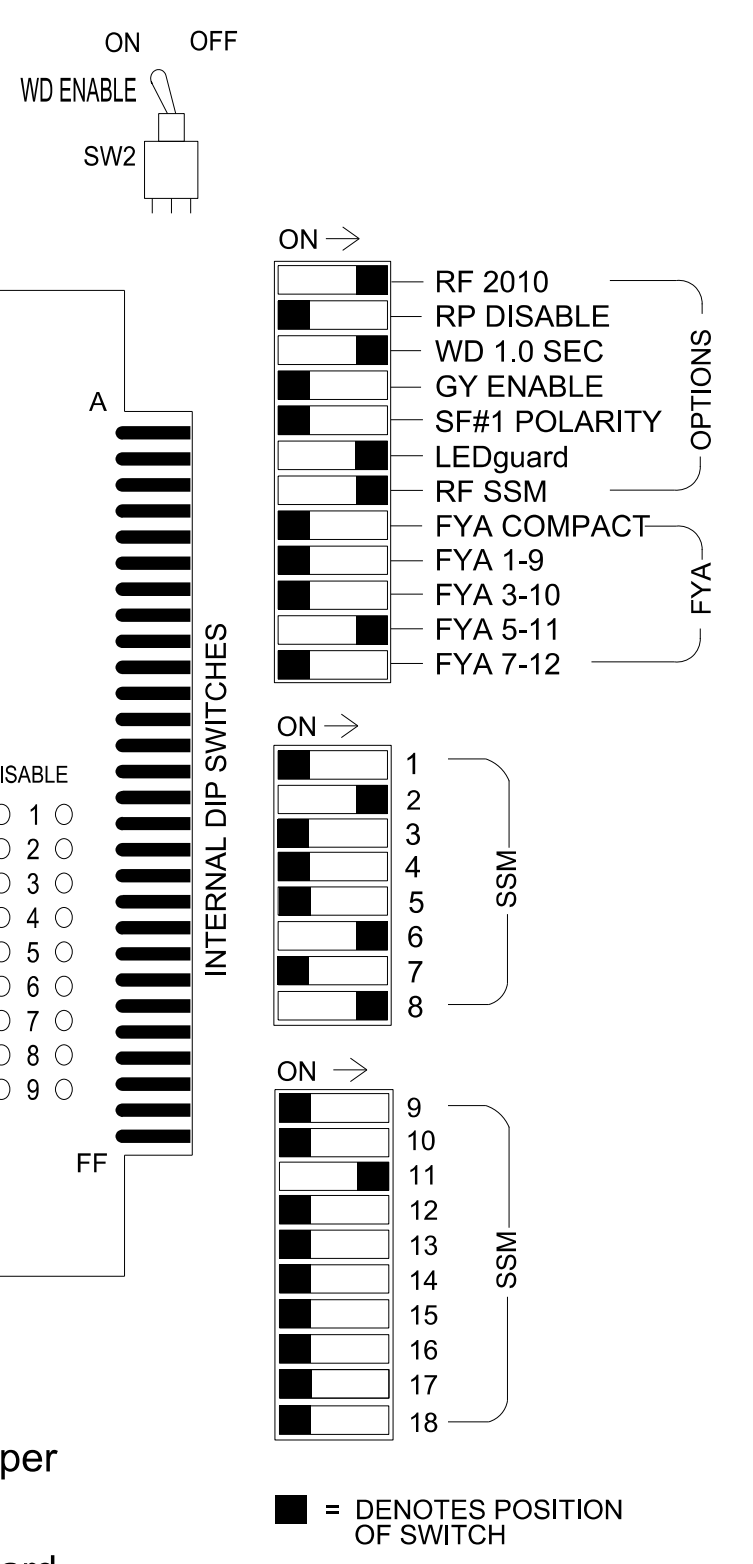
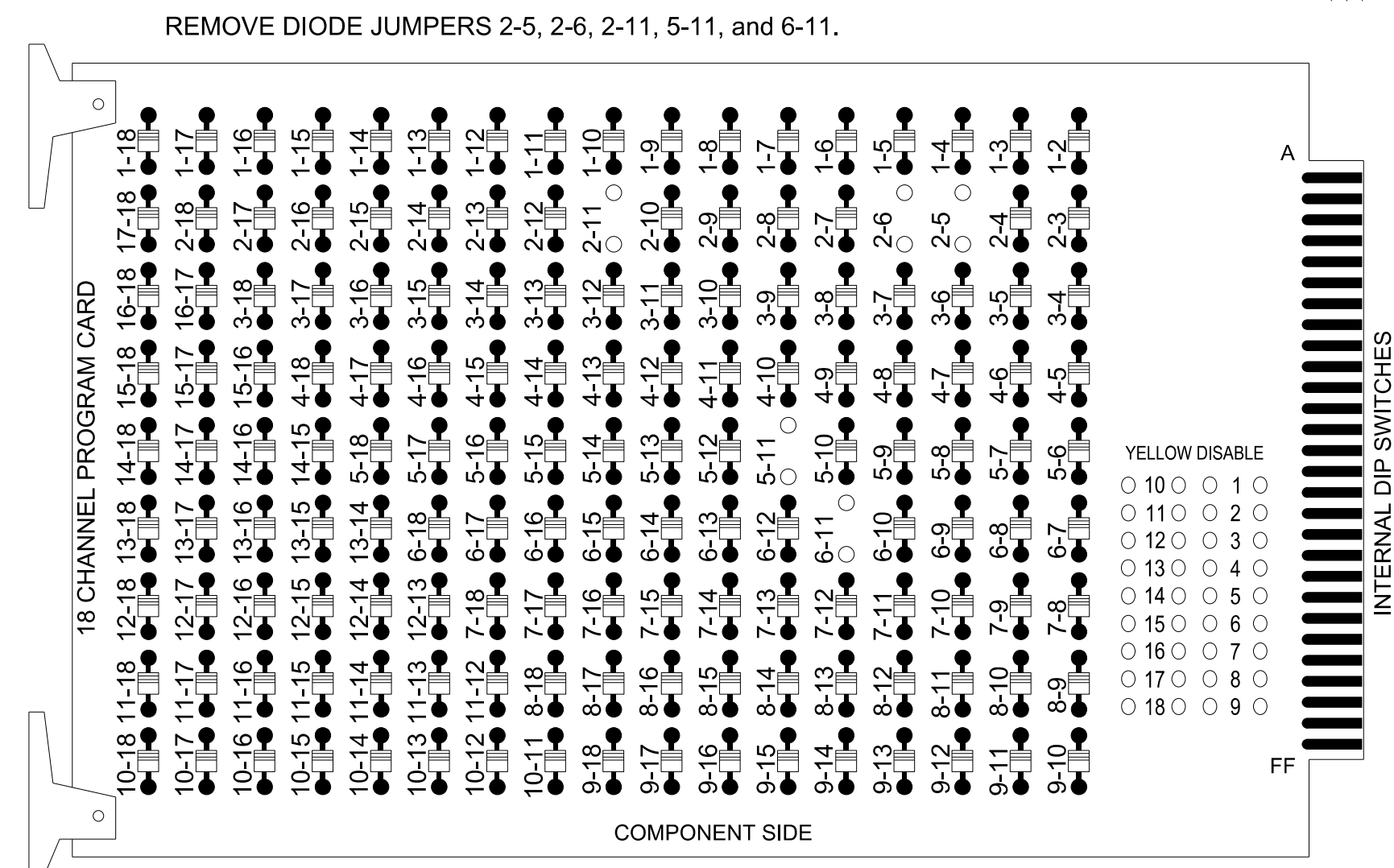


18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(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 the Red Enable is active at all times during normal operation.
 - Integrate monitor with Ethernet network in cabinet.

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 plan.
- Program controller to start up in phase 2 Green No Walk and 6 Green No Walk.
- If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
- The cabinet and controller are part of the NC 150 D12-02_Mooresville CLS.

EQUIPMENT INFORMATION

Controller.....2070LX
 Cabinet.....332 w/ Aux
 Software.....Q-Free MAXTIME
 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 "1".....NOT USED
 Overlap "2".....NOT USED
 Overlap "3".....*
 Overlap "4".....NOT USED

*See overlap programming detail on sheet 2

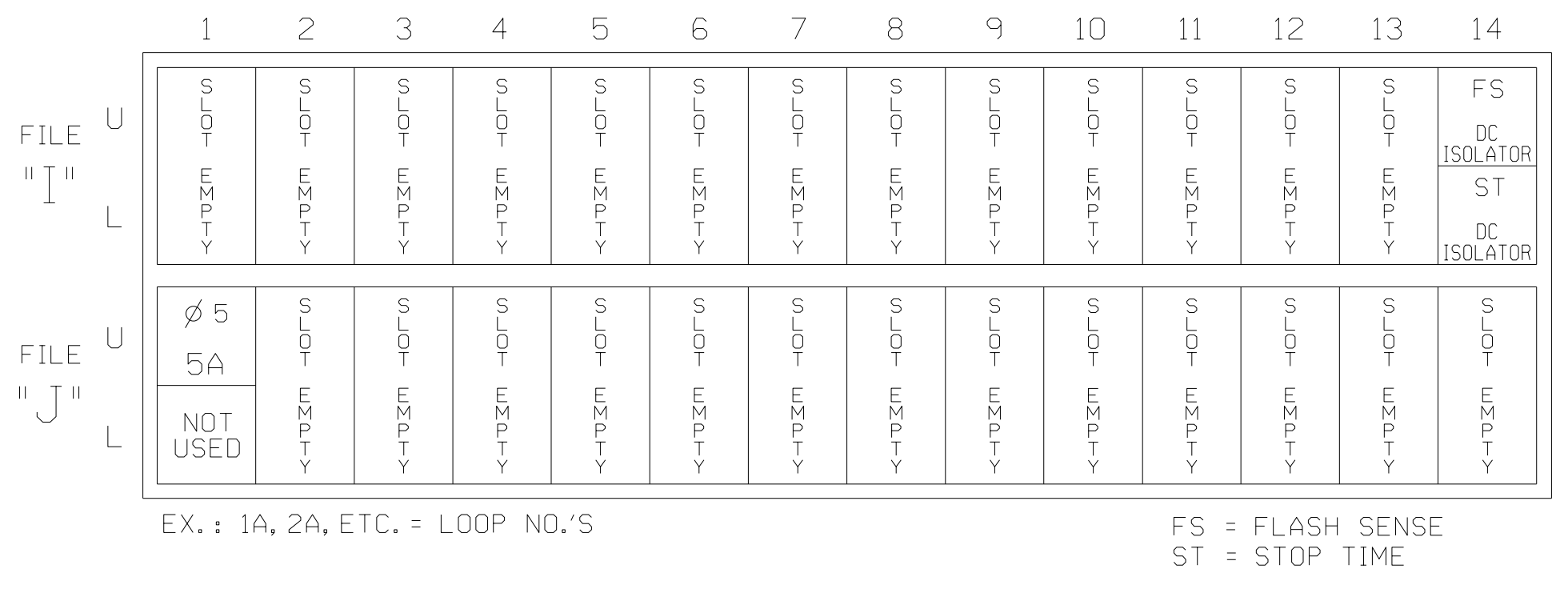
SIGNAL HEAD HOOK-UP CHART

| LOAD SWITCH NO. | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 | AUX S1 | AUX S2 | AUX S3 | AUX S4 | AUX S5 | AUX S6 |
|-----------------------|----|-----|-------|----|----|-------|-----|-----|-------|-----|----------|-------|--------|--------|--------|--------|--------|--------|
| CMU CHANNEL NO. | 1 | 2 | 13 | 3 | 4 | 14 | 5 | 6 | 15 | 7 | 8 | 16 | 9 | 10 | 17 | 11 | 12 | 18 |
| PHASE | 1 | 2 | 2 PED | 3 | 4 | 4 PED | 5 | 6 | 6 PED | 7 | 8 | 8 PED | OL1 | OL2 | SPARE | OL3 | OL4 | SPARE |
| SIGNAL HEAD NO. | NU | 21 | 22 | NU | NU | NU | 51* | 61 | 62 | NU | 81,82,83 | 84,85 | NU | NU | NU | 51* | NU | NU |
| RED | | 128 | 128 | | | | | | 134 | 134 | | 107 | 107 | | | | | |
| YELLOW | | 129 | 129 | | | | * | 135 | 135 | | 108 | | | | | | | |
| GREEN | | 130 | | | | | | | 136 | | 109 | | | | | | | |
| RED ARROW | | | | | | | | | | | | | | | | | | A114 |
| YELLOW ARROW | | | | | | | | | | | 108 | | | | | | | A115 |
| FLASHING YELLOW ARROW | | | | | | | | | | | | | | | | | | A116 |
| GREEN ARROW | | | 130 | | | | | 133 | 136 | | 109 | | | | | | | |

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

INPUT FILE POSITION LAYOUT

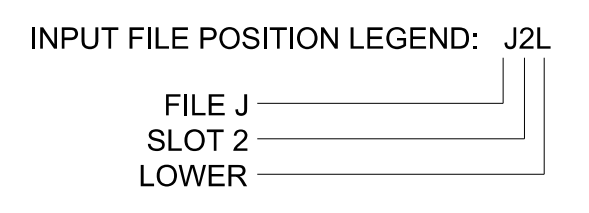
(front view)



INPUT FILE CONNECTION & PROGRAMMING CHART

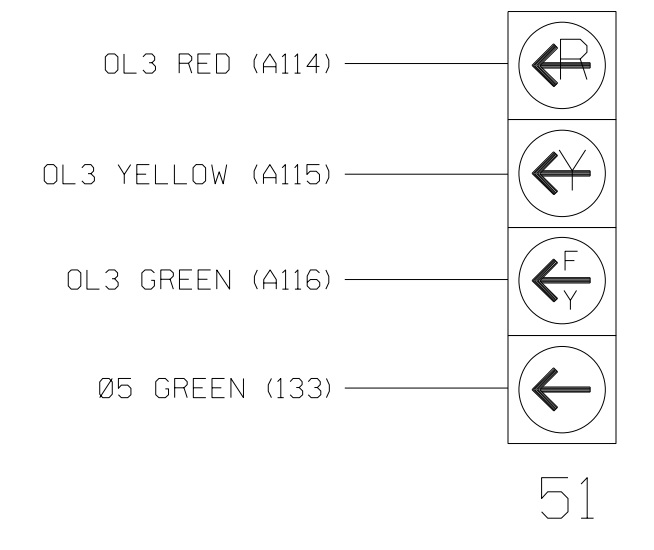
| LOOP NO. | LOOP TERMINAL | INPUT FILE POS. | PIN NO. | INPUT POINT | DETECTOR NO. | CALL PHASE | DELAY TIME | EXTEND TIME | EXTEND | ADDED INITIAL | CALL | DELAY DURING GREEN |
|----------|---------------|-----------------|---------|-------------|--------------|------------|------------|-------------|--------|---------------|------|--------------------|
| 5A | TB3-1,2 | J1U | 55 | 17 | 15 * | 5 | 15.0 | | X | | X | |
| | | | | - | 31 * | 2 | 3.0 | | X | | X | X |

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



FYA SIGNAL WIRING DETAIL

(wire signal head as shown)



DETECTOR NOTES

- For all loops install a video detection system for vehicle detection. Perform installation according to manufacturer's directions and NCDOT engineer-approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.
- For loop 5A detector card placements and slots reserved for wired inputs are typical for a NCDOT installation. Inputs associated with these slots are compatible with time of day instructions located on sheet 2 of this electrical detail.

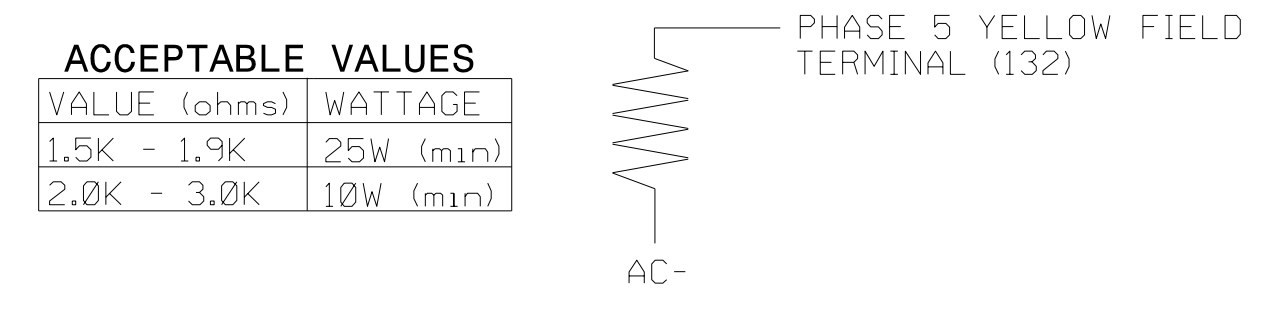
THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 12-1144T1
 DESIGNED: MAY 2024
 SEALED: 5/20/2024
 REVISED: N/A

Temporary Design 1 - TMP Phase I
 Electrical Detail - Sheet 1 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown below)



NC 150 at I-77 NB Ramps

Division 12 Iredell County Mooresville

PLAN DATE: May 2024 REVIEWED BY: J Galloway, PE

PREPARED BY: R M Muncey REVIEWED BY: R Muncey, PE

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

PHASING DIAGRAM

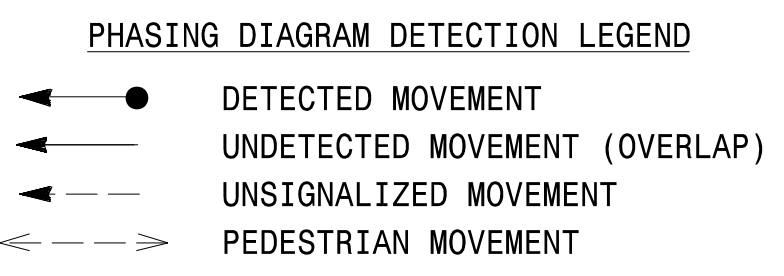
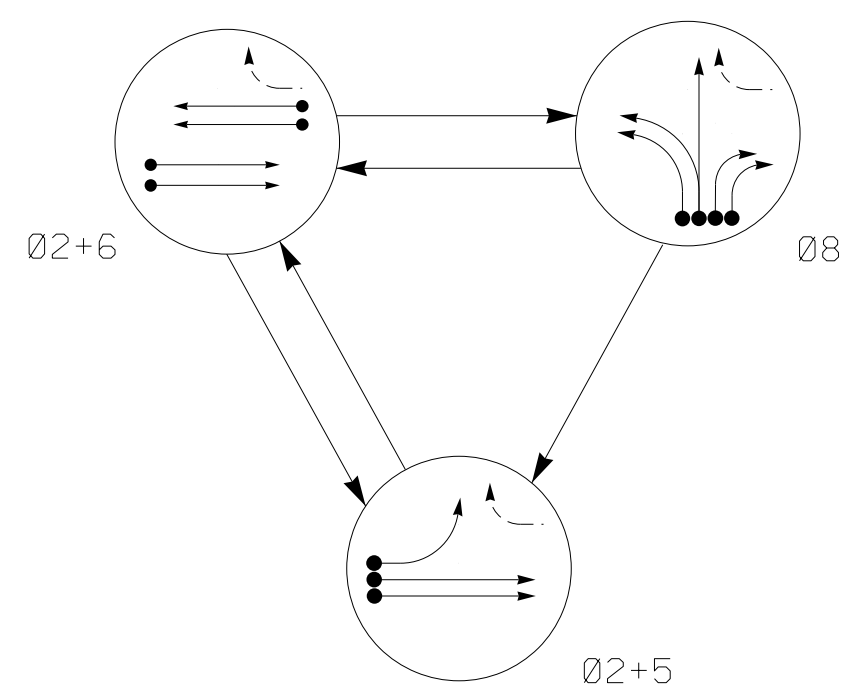
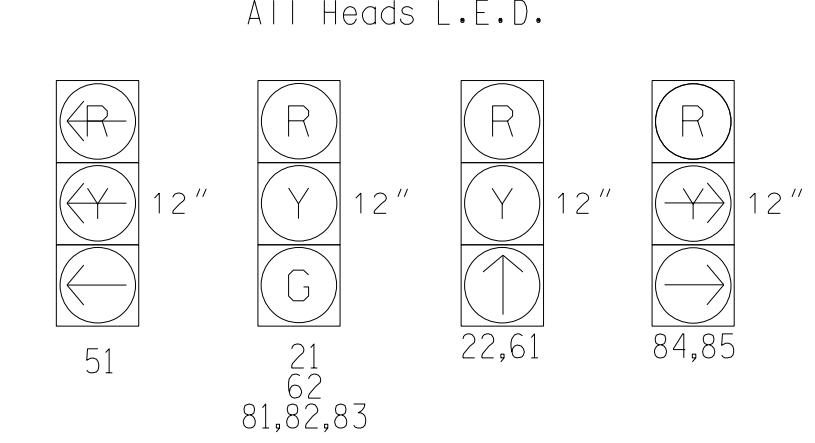


TABLE OF OPERATION

| SIGNAL FACE | PHASE | | | |
|-------------|-------|------|----|-------|
| | 02+5 | 02+6 | 08 | FLASH |
| 21 | G | G | R | R |
| 22 | ↑ | ↑ | R | R |
| 51 | ← | ← | ← | ← |
| 61 | R | ↑ | R | R |
| 62 | R | G | R | R |
| 81,82,83 | R | R | G | R |
| 84,85 | R | R | → | R |

SIGNAL FACE I.D.



MAXTIME DETECTOR INSTALLATION CHART

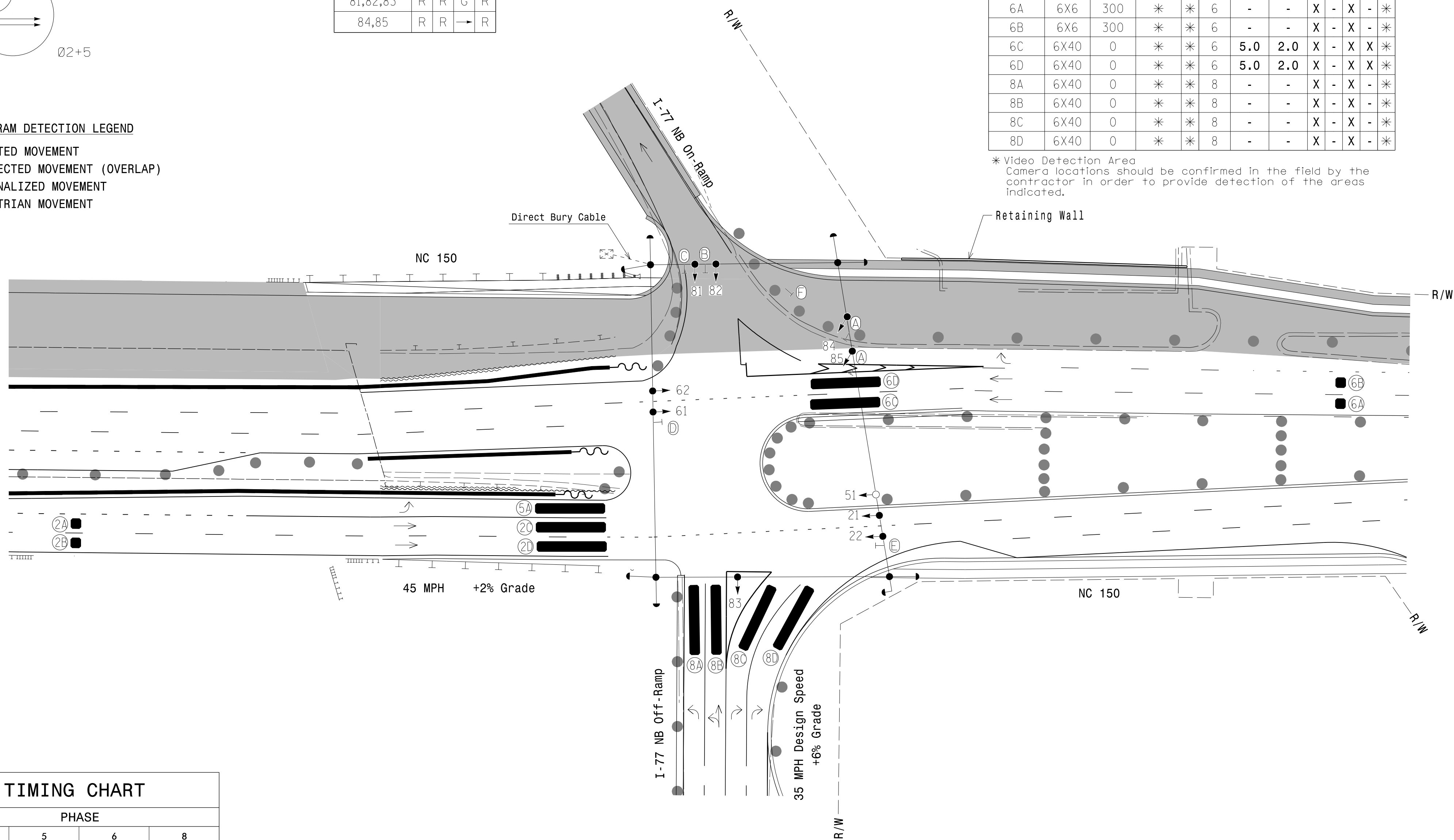
| LOOP | SIZE (FT) | DISTANCE FROM STOPBAR (FT) | TURNS | NEW LOOP | PROGRAMMING | | | | | CALL DURING GREEN | NEW CARD |
|------|-----------|----------------------------|-------|----------|-------------|------------|-------------|--------|---------------|-------------------|----------|
| | | | | | CALL PHASE | DELAY TIME | EXTEND TIME | EXTEND | ADDED INITIAL | | |
| 2A | 6X6 | 300 | * | * | 2 | - | - | X | - | X | * |
| 2B | 6X6 | 300 | * | * | 2 | - | - | X | - | X | * |
| 2C | 6X40 | 0 | * | * | 2 | 5.0 | 2.0 | X | - | X | * |
| 2D | 6X40 | 0 | * | * | 2 | 5.0 | 2.0 | X | - | X | * |
| 5A | 6X40 | 0 | * | * | 5 | - | - | X | - | X | * |
| 6A | 6X6 | 300 | * | * | 6 | - | - | X | - | X | * |
| 6B | 6X6 | 300 | * | * | 6 | - | - | X | - | X | * |
| 6C | 6X40 | 0 | * | * | 6 | 5.0 | 2.0 | X | - | X | * |
| 6D | 6X40 | 0 | * | * | 6 | 5.0 | 2.0 | X | - | X | * |
| 8A | 6X40 | 0 | * | * | 8 | - | - | X | - | X | * |
| 8B | 6X40 | 0 | * | * | 8 | - | - | X | - | X | * |
| 8C | 6X40 | 0 | * | * | 8 | - | - | X | - | X | * |
| 8D | 6X40 | 0 | * | * | 8 | - | - | X | - | X | * |

* Video Detection Area
Camera locations should be confirmed in the field by the contractor in order to provide detection of the areas indicated.

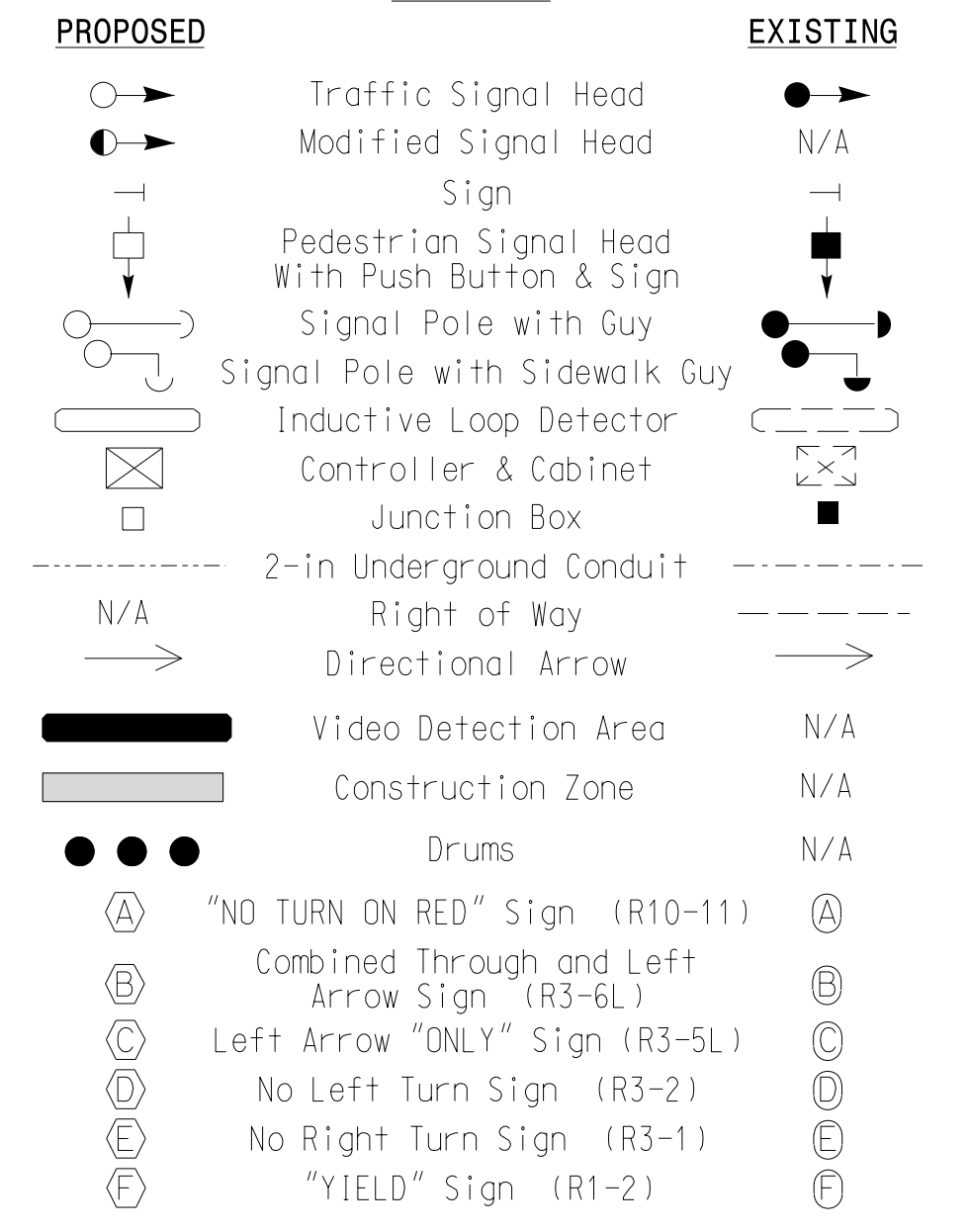
3 Phase Fully Actuated
NC 150 D12-02 MOORESVILLE
CLS

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2024 and "Standard Specifications for Roads and Structures" dated January 2024.
- 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, 61, and 62.
- Set all detector units to presence mode.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.



LEGEND



MAXTIME TIMING CHART

| FEATURE | PHASE | | | |
|-------------------------|------------|-----|------------|-----|
| | 2 | 5 | 6 | 8 |
| Walk * | - | - | - | - |
| Ped Clear * | - | - | - | - |
| Min Green | 12 | 7 | 12 | 7 |
| Passage * | 6.0 | 2.0 | 6.0 | 2.0 |
| Max 1 * | 90 | 20 | 90 | 35 |
| Yellow Change | 4.3 | 3.0 | 4.7 | 3.5 |
| Red Clear | 2.2 | 3.3 | 1.2 | 3.1 |
| Added Initial * | - | - | - | - |
| Maximum Initial * | - | - | - | - |
| Time Before Reduction * | 15 | - | 15 | - |
| Time To Reduce * | 30 | - | 30 | - |
| Minimum Gap | 3.0 | - | 3.0 | - |
| Advance Walk | - | - | - | - |
| Non Lock Detector | X | X | X | X |
| Vehicle Recall | MIN RECALL | - | MIN RECALL | - |
| Dual Entry | - | - | - | - |

* 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 - TMP Phase II

Stantec Consulting Services Inc.
801 Jones Franklin Road-Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
License No. F-0672

Prepared for the Offices of:

750 N. Greenfield Pkwy, Garner, NC 27529

NC 150
at
I-77 NB Ramps

Division 12 Iredell County Mooresville

PLAN DATE: May 2024 REVIEWED BY: J Galloway, PE

PREPARED BY: J Hambricht REVIEWED BY: R Muncey, PE

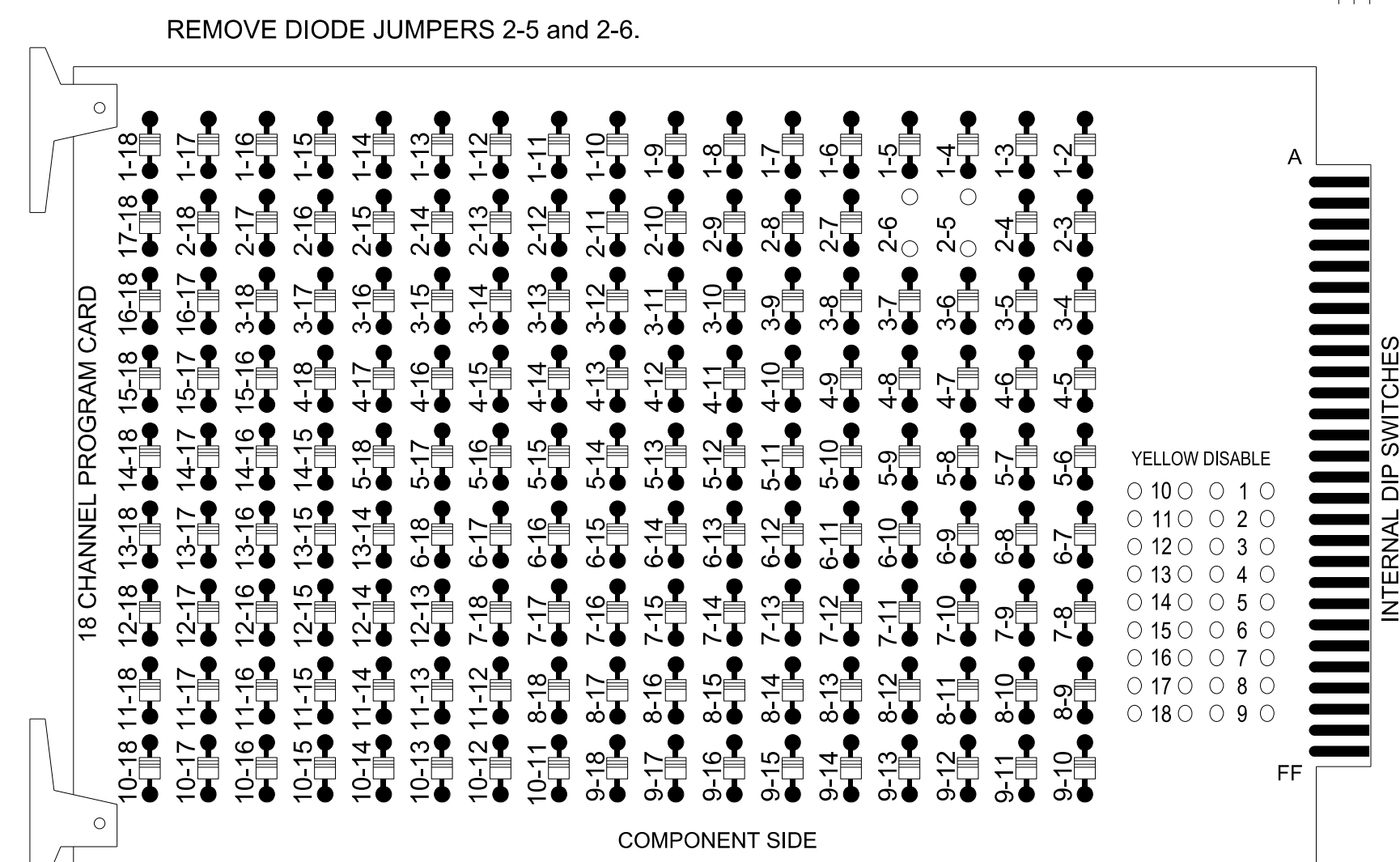
SEAL
JASON GALLOWAY
ENGINEER
029904

DocuSigned by: Jason Galloway 20/2024
10D1E2B40B4B46E DATE 12-1144T2

*****SDATE*****
 U:\Projects\Signal\Signal\Phase 2 TMP\Phase 2 - TMP Phase II.dgn
 User: JGalloway

18 CHANNEL IP 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 the Red Enable is active at all times during normal operation.
- Integrate monitor with Ethernet network in cabinet.

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 plan.
- Program controller to start up in phase 2 Green No Walk and 6 Green No Walk.
- If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
- The cabinet and controller are part of the NC 150 D12-02_Mooresville CLS.

EQUIPMENT INFORMATION

Controller.....2070LX
 Cabinet.....332 w/ Aux
 Software.....Q-Free MAXTIME
 Cabinet Mount.....Base
 Output File Positions.....18 With Aux. Output File
 Load Switches Used.....S2, S7, S8, S11
 Phases Used.....2, 5, 6, 8
 Overlap "1".....NOT USED
 Overlap "2".....NOT USED
 Overlap "3".....NOT USED
 Overlap "4".....NOT USED

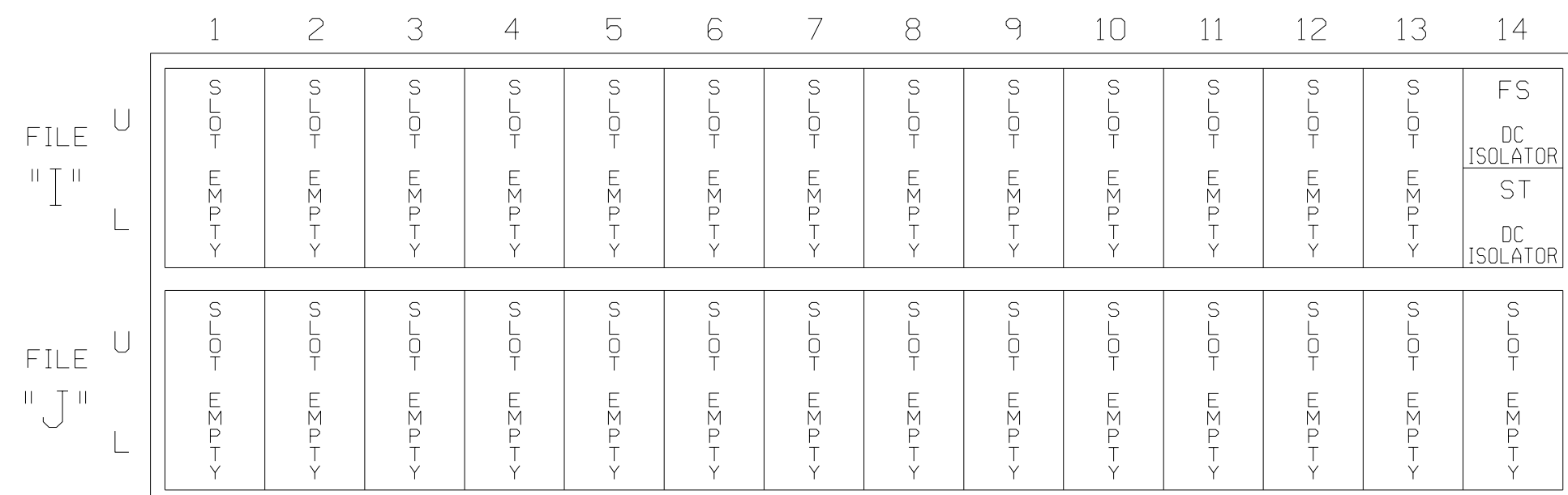
SIGNAL HEAD HOOK-UP CHART

| 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 | OL1 | OL2 | SPARE | OL3 | OL4 | SPARE |
| SIGNAL HEAD NO. | NU | 21 | 22 | NU | NU | NU | 51 | 61 | 62 | NU | 81,82,83 | 84,85 | NU | NU | NU | NU | NU | NU |
| RED | | 128 | 128 | | | | | | 134 | 134 | | 107 | 107 | | | | | |
| YELLOW | | 129 | 129 | | | | | | 135 | 135 | | 108 | | | | | | |
| GREEN | | 130 | | | | | | | | 136 | | 109 | | | | | | |
| RED ARROW | | | | | | | | 131 | | | | | | | | | | |
| YELLOW ARROW | | | | | | | | 132 | | | | 108 | | | | | | |
| FLASHING YELLOW ARROW | | | | | | | | | | | | | | | | | | |
| GREEN ARROW | | | 130 | | | | | 133 | 136 | | | 109 | | | | | | |

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)



DETECTOR NOTES

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

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 12-1144T2
 DESIGNED: MAY 2024
 SEALED: 5/20/2024
 REVISED: N/A

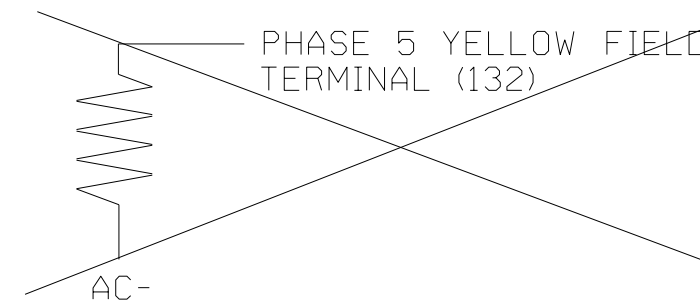
Temporary Design 2 - TMP Phase II Electrical Detail

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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) |



IMPORTANT! Remove resistor from field terminal as shown, if present.



Stantec Consulting Services Inc.
 801 Jones Franklin Road-Suite 300
 Raleigh, NC 27606
 Tel. (919) 851-6866
 Fax. (919) 851-7024
 www.stantec.com
 License No. F-0672

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for the Offices of:



750 N. Greenfield Pkwy, Garner, NC 27529

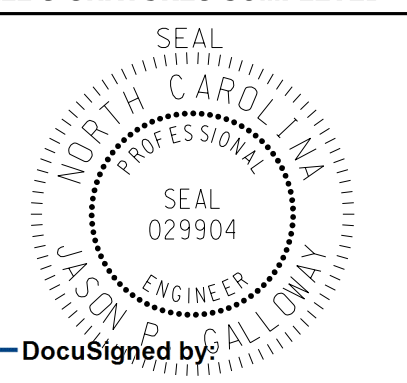
NC 150 at I-77 NB Ramps

Division 12 Iredell County Mooresville

PLAN DATE: May 2024 REVIEWED BY: J Galloway, PE

PREPARED BY: RMM/JPG REVIEWED BY: R Muncey, PE

REVISIONS INIT. DATE



DocuSigned by Jason R. Galloway

DATE 5/20/2024

1001E264084B46E 12-1144T2

PHASING DIAGRAM

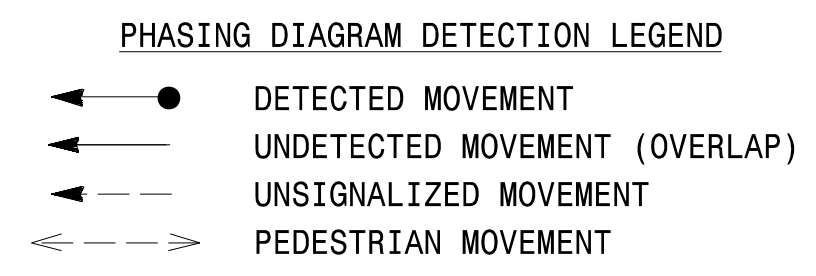
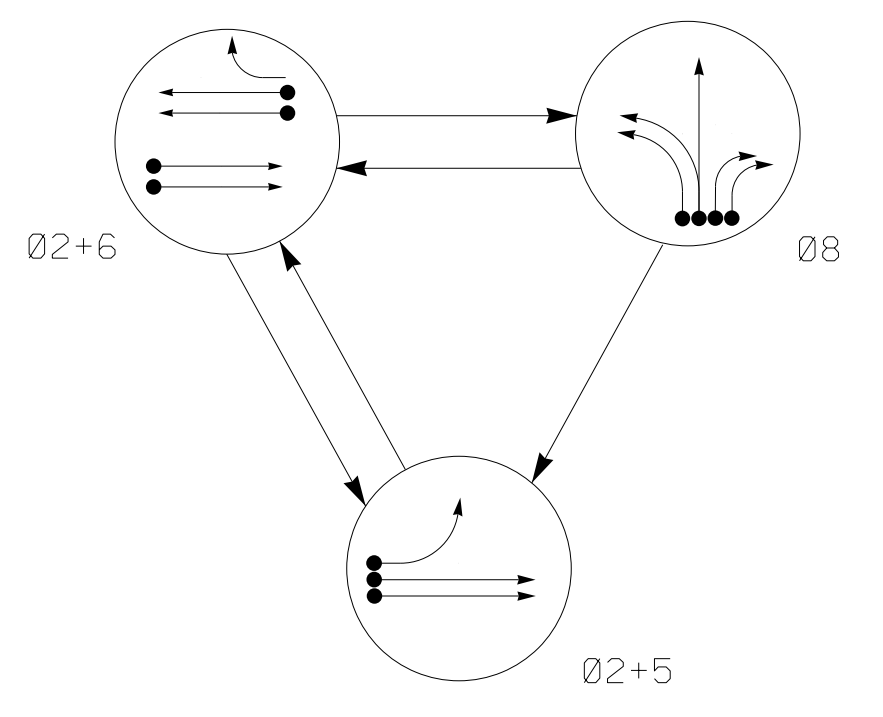
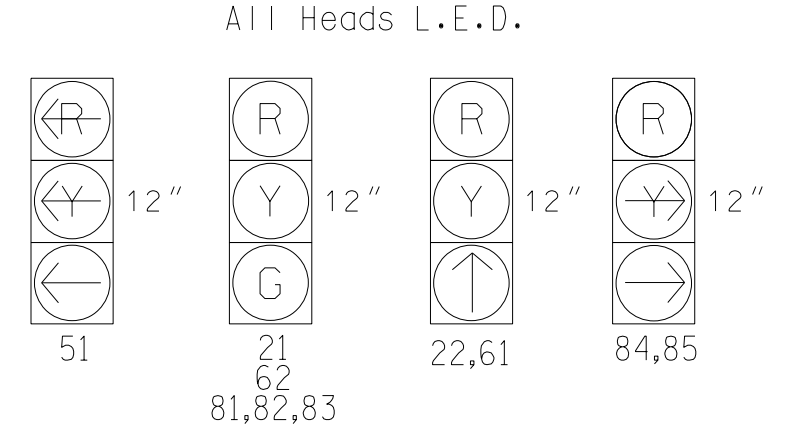


TABLE OF OPERATION

Table with columns: SIGNAL FACE, PHASE (02+5, 08, FLASH, H), and rows for signal faces 21, 22, 51, 61, 62, 81,82,83, 84,85.

SIGNAL FACE I.D.



MAXTIME DETECTOR INSTALLATION CHART

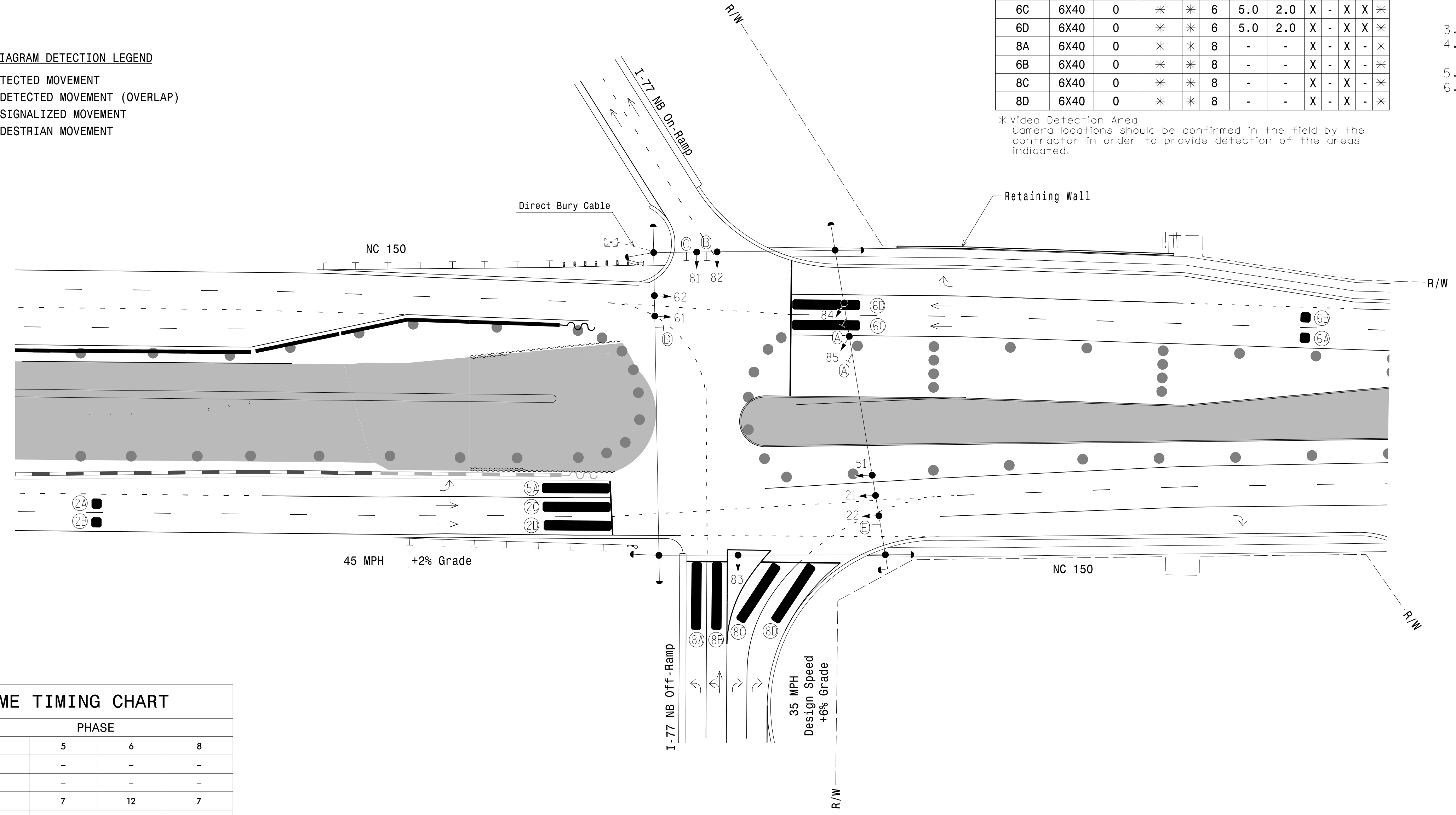
Table with columns: LOOP, SIZE, DISTANCE FROM STOPBAR, TURNS, NEW LOOP, CALL PHASE, DELAY TIME, EXTEND TIME, EXTEND INITIAL, ADDED INITIAL, CALL, DELAY DURING GREEN, NEW CARD.

* Video Detection Area Camera locations should be confirmed in the field by the contractor in order to provide detection of the areas indicated.

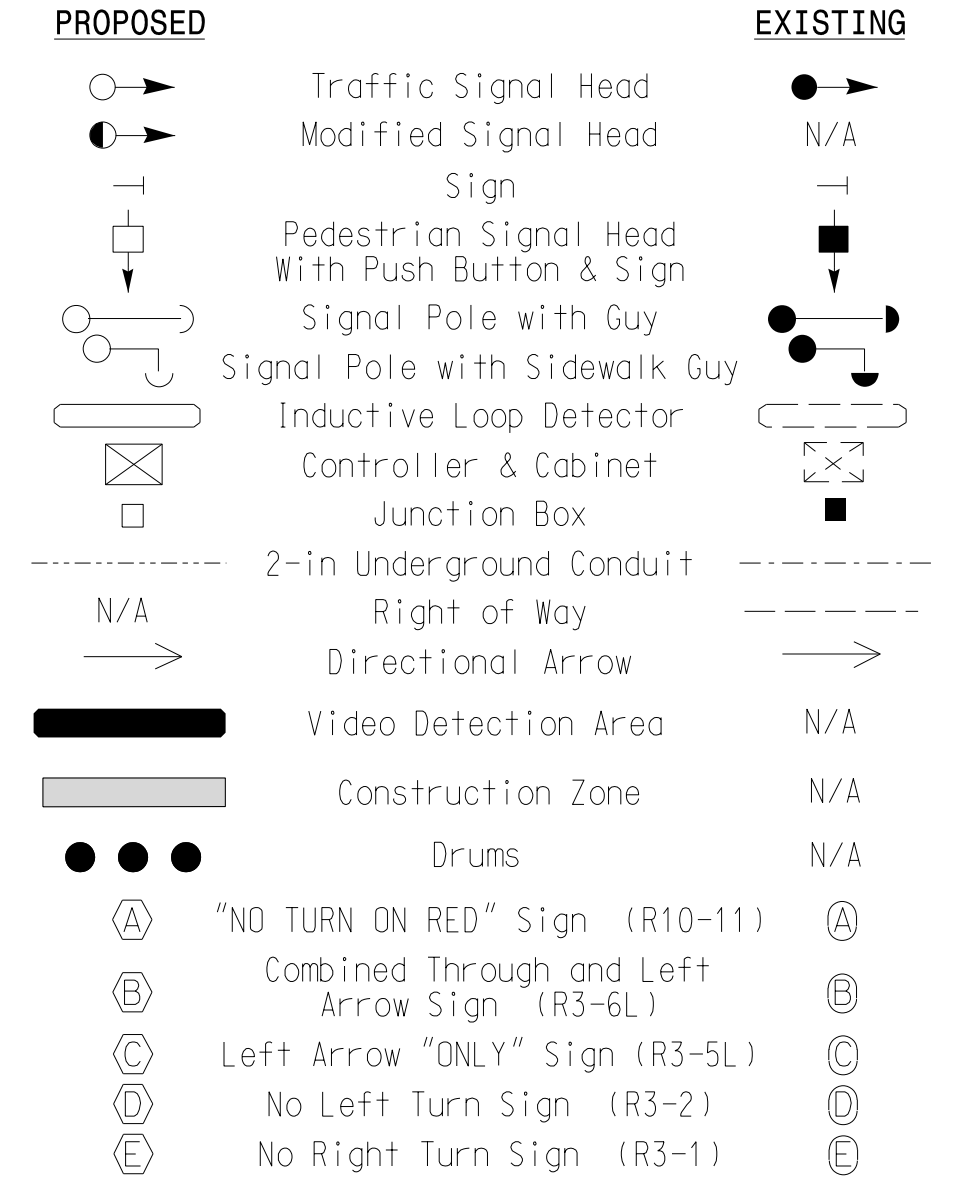
3 Phase Fully Actuated NC 150 D12-02 MOORESVILLE CLS

NOTES

- 1. Refer to "Roadway Standard Drawings NCDOT" dated January 2024 and "Standard Specifications for Roads and Structures" dated January 2024.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 5 may be lagged.
4. Reposition existing signal heads numbered #61, and 62.
5. Set all detector units to presence mode.
6. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.



LEGEND



MAXTIME TIMING CHART

Table with columns: FEATURE, PHASE (2, 5, 6, 8) and rows for Walk, Ped Clear, Min Green, Passage, Max I, Yellow Change, Red Clear, Added Initial, Maximum Initial, Time Before Reduction, Time To Reduce, Minimum Gap, Advance Walk, Non Lock Detector, Vehicle Recall, Dual Entry.

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

Signal Upgrade Temporary Design 3 - TMP Phase III

Stantec logo and contact information: Stantec Consulting Services Inc. 801 Jones Franklin Road-Suite 300 Raleigh, NC 27606

Professional Engineer Seal for Jason Galloway, State of North Carolina, License No. 029904.

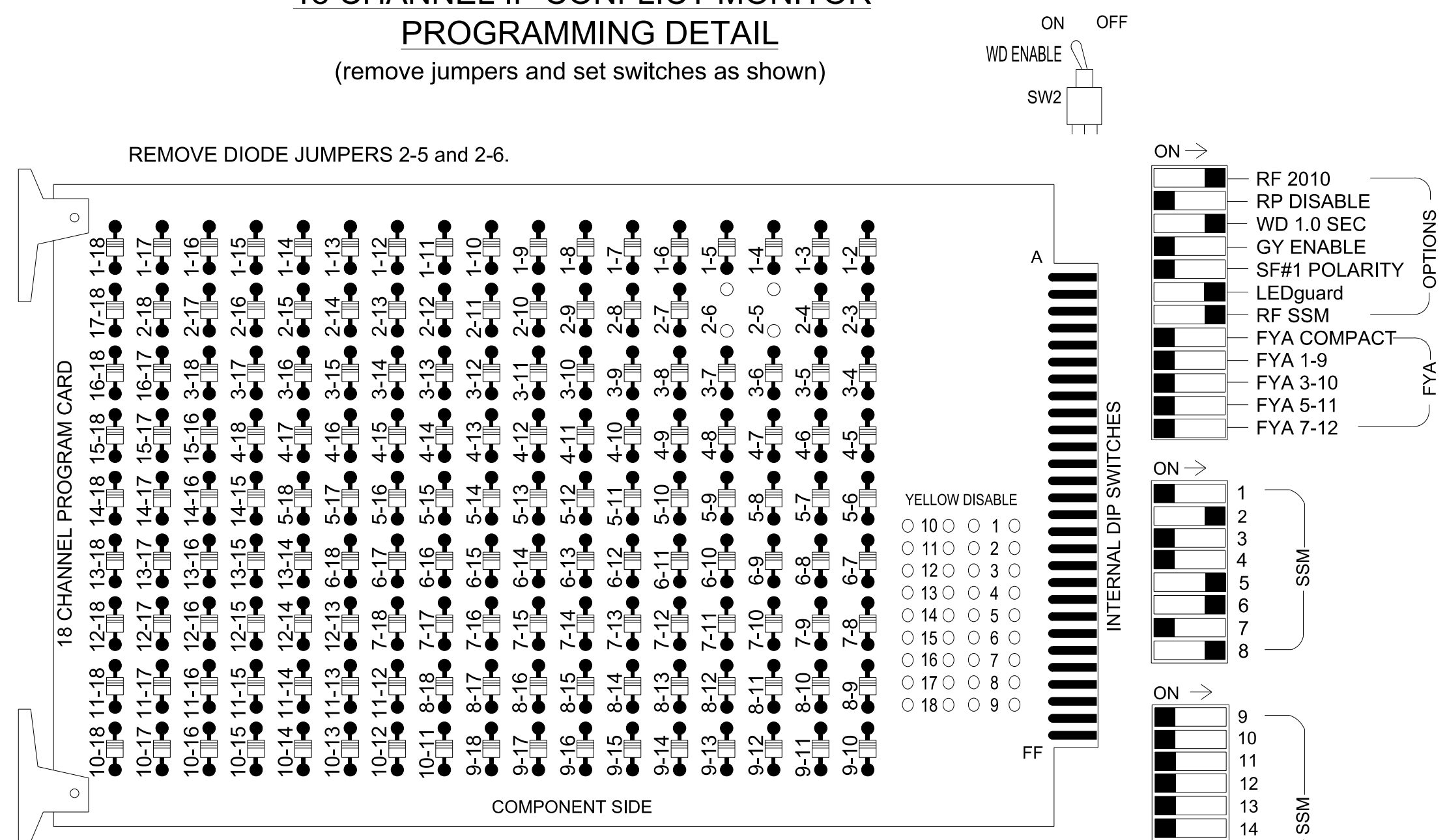
Project information: NC 150 at I-77 NB Ramps, Division 12 Iredell County Mooreville, PLAN DATE: May 2024, REVIEWED BY: J Galloway, PE, PREPARED BY: J Hambright, REVIEWED BY: R Muncey, PE.

Document information: DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED, Date: 20/2024, Scale: 1"=40'.

Vertical text on the left margin: 2388855.DSD, DATE: 5/15/24, User: JGalloway

18 CHANNEL IP 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 the Red Enable is active at all times during normal operation.
 4. Integrate monitor with Ethernet network in cabinet.

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the signal plan.
2. Program controller to start up in phase 2 Green No Walk and 6 Green No Walk.
3. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
4. The cabinet and controller are part of the NC 150 D12-02_Mooresville CLS.

EQUIPMENT INFORMATION

Controller.....2070LX
 Cabinet.....332 w/ Aux
 Software.....Q-Free MAXTIME
 Cabinet Mount.....Base
 Output File Positions.....18 With Aux. Output File
 Load Switches Used.....S2, S7, S8, S11
 Phases Used.....2, 5, 6, 8
 Overlap "1".....NOT USED
 Overlap "2".....NOT USED
 Overlap "3".....NOT USED
 Overlap "4".....NOT USED

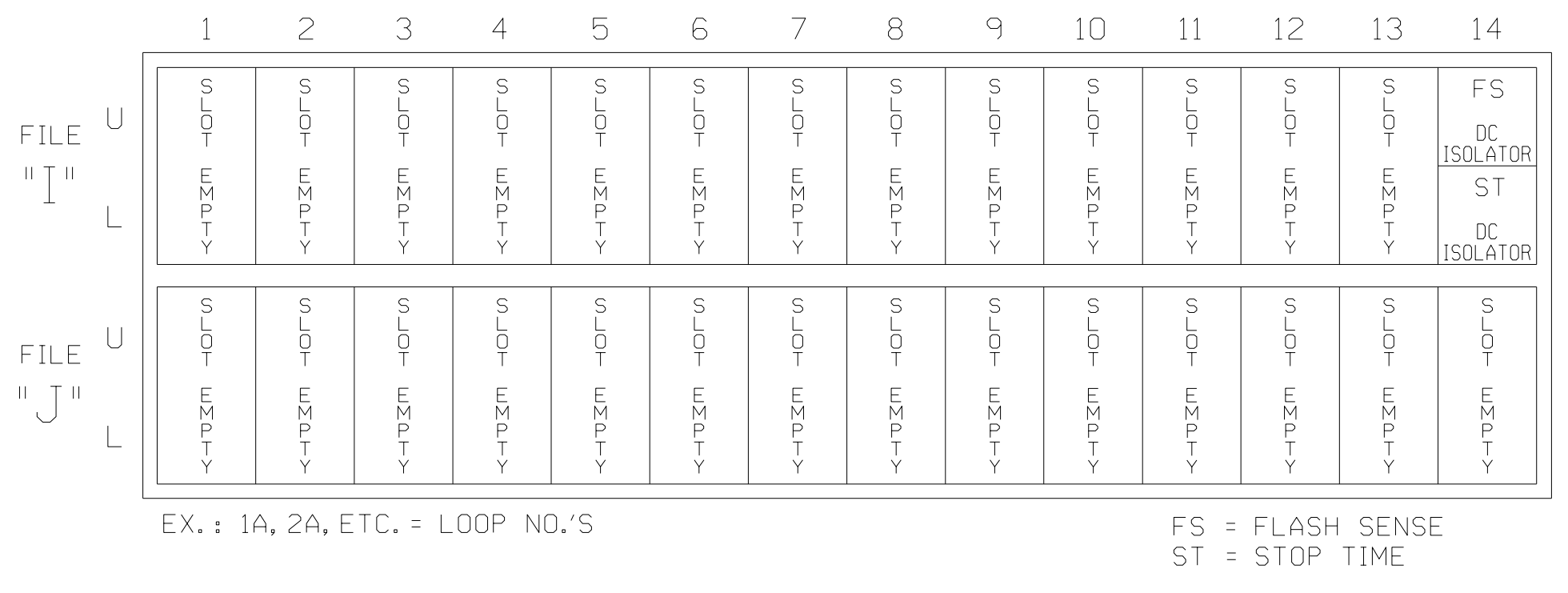
SIGNAL HEAD HOOK-UP CHART

| 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 | OL1 | OL2 | SPARE | OL3 | OL4 | SPARE |
| SIGNAL HEAD NO. | NU | 21 | 22 | NU | NU | NU | 51 | 61 | 62 | NU | 81,82,83 | 84,85 | NU | NU | NU | NU | NU | NU |
| RED | | 128 | 128 | | | | | | | 134 | 134 | | 107 | 107 | | | | |
| YELLOW | | 129 | 129 | | | | | | | 135 | 135 | | 108 | | | | | |
| GREEN | | 130 | | | | | | | | 136 | | | 109 | | | | | |
| RED ARROW | | | | | | | | 131 | | | | | | | | | | |
| YELLOW ARROW | | | | | | | | 132 | | | | | 108 | | | | | |
| FLASHING YELLOW ARROW | | | | | | | | | | | | | | | | | | |
| GREEN ARROW | | | 130 | | | | | 133 | 136 | | | | 109 | | | | | |

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)



DETECTOR NOTES

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

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: I2-1144T3
 DESIGNED: MAY 2024
 SEALED: 5/20/2024
 REVISED: N/A

Temporary Design 3 - TMP Phase III Electrical Detail

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Stantec Consulting Services Inc.
 801 Jones Franklin Road-Suite 300
 Raleigh, NC 27606
 Tel. (919) 851-6866
 Fax. (919) 851-7024
 www.stantec.com
 License No. F-0672

Prepared for the Offices of:

750 N. Greenfield Pkwy, Garner, NC 27529

NC 150
 at
 I-77 NB Ramps

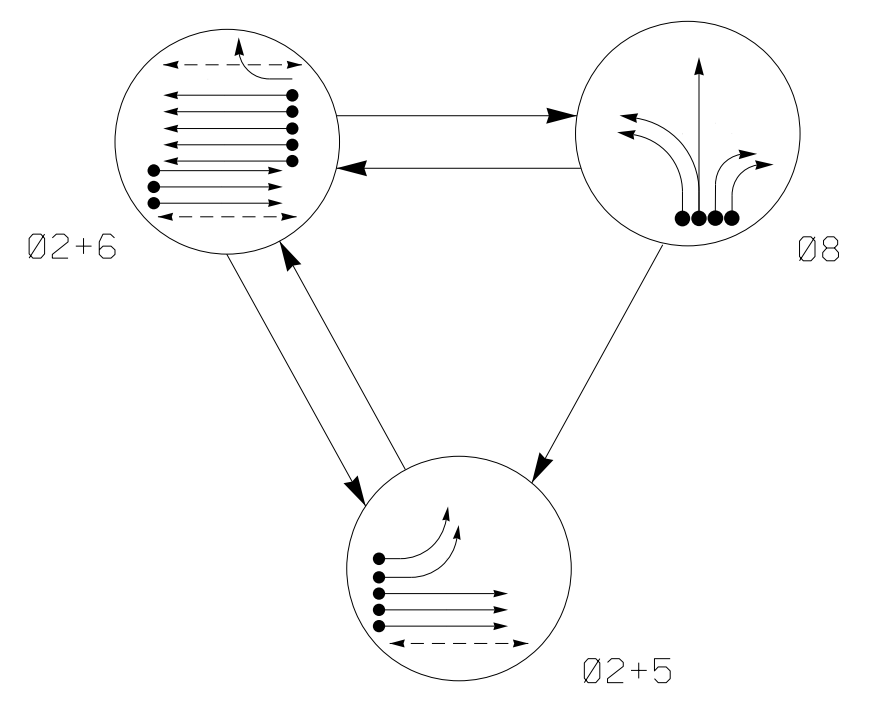
Division 12 Iredell County Mooresville

PLAN DATE: May 2024 REVIEWED BY: J Galloway, PE
 PREPARED BY: RMM/JPG REVIEWED BY: R Muncey, PE

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

DocuSigned by:
 Jason Galloway, PE
 1001E264084B46E
 DATE: 5/20/2024
 SIG. INVENTORY NO.: I2-1144T3

PHASING DIAGRAM

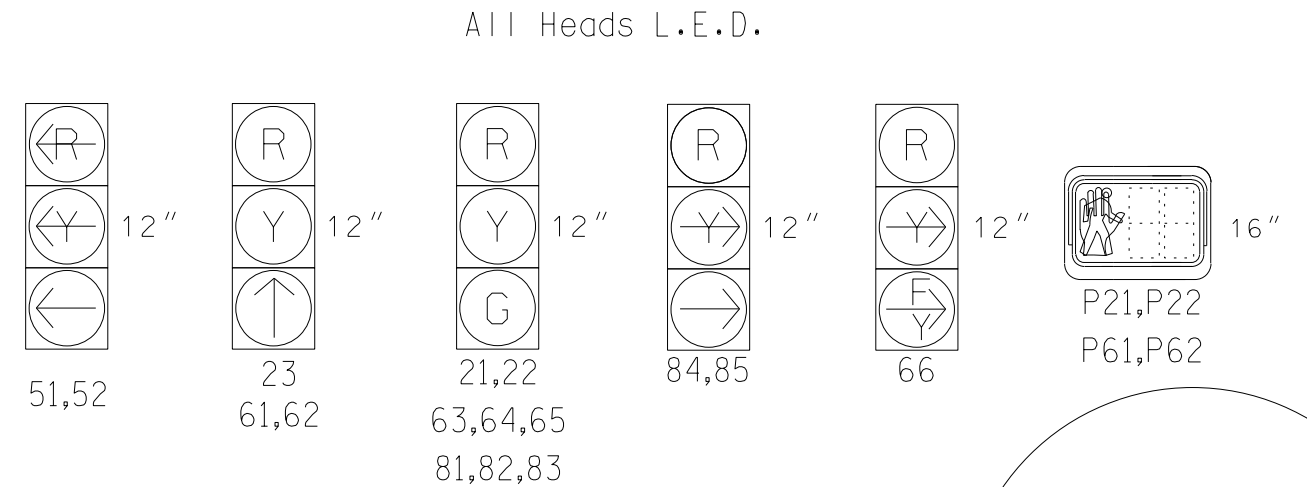


PHASING DIAGRAM DETECTION LEGEND

 ● DETECTED MOVEMENT
 ◀ UNDETECTED MOVEMENT (OVERLAP)
 ▶ UNSIGNALIZED MOVEMENT
 ⇄ PEDESTRIAN MOVEMENT

| SIGNAL FACE | PHASE | | | |
|-------------|-------|------|----|--------|
| | 02+5 | 02+6 | 08 | FL/DRK |
| 21,22 | G | G | R | R |
| 23 | ↑ | ↑ | ↑ | ↑ |
| 51,52 | ← | ← | ← | ← |
| 61,62 | R | ↑ | R | R |
| 63,64,65 | R | G | R | R |
| 66 | R | ↑ | R | R |
| 81,82,83 | R | R | G | R |
| 84,85 | R | R | → | R |
| P21,P22 | W | W | DW | DRK |
| P61,P62 | DW | W | DW | DRK |

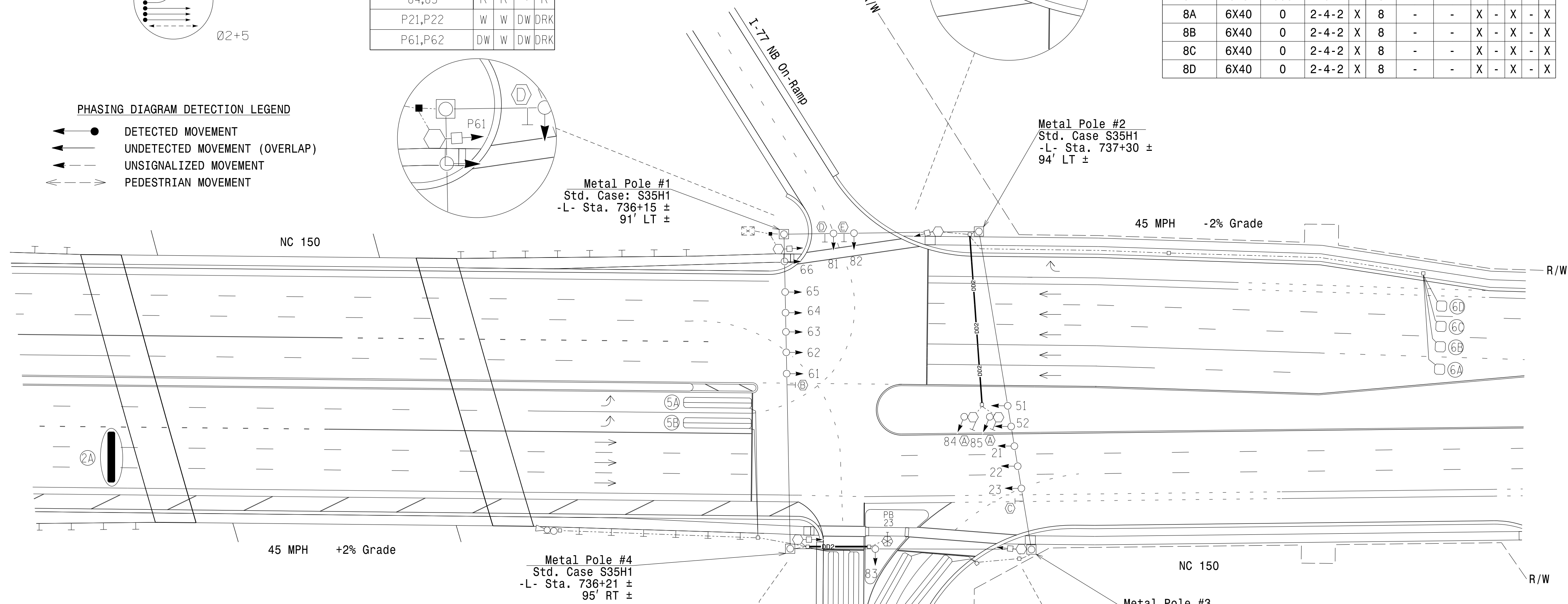
SIGNAL FACE I.D.



| MAXTIME DETECTOR INSTALLATION CHART | | | | | | | | | |
|-------------------------------------|-----------|----------------------------|-------|----------|-------------|------------|-------------|----------------|----------|
| DETECTOR | | | | | PROGRAMMING | | | | |
| LOOP | SIZE (FT) | DISTANCE FROM STOPBAR (FT) | TURNS | NEW LOOP | CALL PHASE | DELAY TIME | EXTEND TIME | EXTEND INITIAL | NEW CARD |
| 5A | 6X40 | 0 | 2-4-2 | X | 5 | - | - | X | X |
| 5B | 6X40 | 0 | 2-4-2 | X | 5 | - | - | X | X |
| 6A | 6X6 | 300 | 5 | X | 6 | - | - | X | X |
| 6B | 6X6 | 300 | 5 | X | 6 | - | - | X | X |
| 6C | 6X6 | 300 | 5 | X | 6 | - | - | X | X |
| 6D | 6X6 | 300 | 5 | X | 6 | - | - | X | X |
| 8A | 6X40 | 0 | 2-4-2 | X | 8 | - | - | X | X |
| 8B | 6X40 | 0 | 2-4-2 | X | 8 | - | - | X | X |
| 8C | 6X40 | 0 | 2-4-2 | X | 8 | - | - | X | X |
| 8D | 6X40 | 0 | 2-4-2 | X | 8 | - | - | X | X |

3 Phase Fully Actuated NC 150 D12-02 MOORESVILLE CLS NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2024 and "Standard Specifications for Roads and Structures" dated January 2024.
- 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.
- Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
- Program pedestrian heads to countdown the flashing "Don't Walk" time only.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- Pedestrian pedestals are conceptual and shown for reference only. See 2024 NCDOT Roadway Standard Drawings for push button location details.
- Tether all signal heads on spanwire.
- This intersection uses multi-zone microwave detection. Install detectors according to manufacturer's instructions to achieve the desired detection.

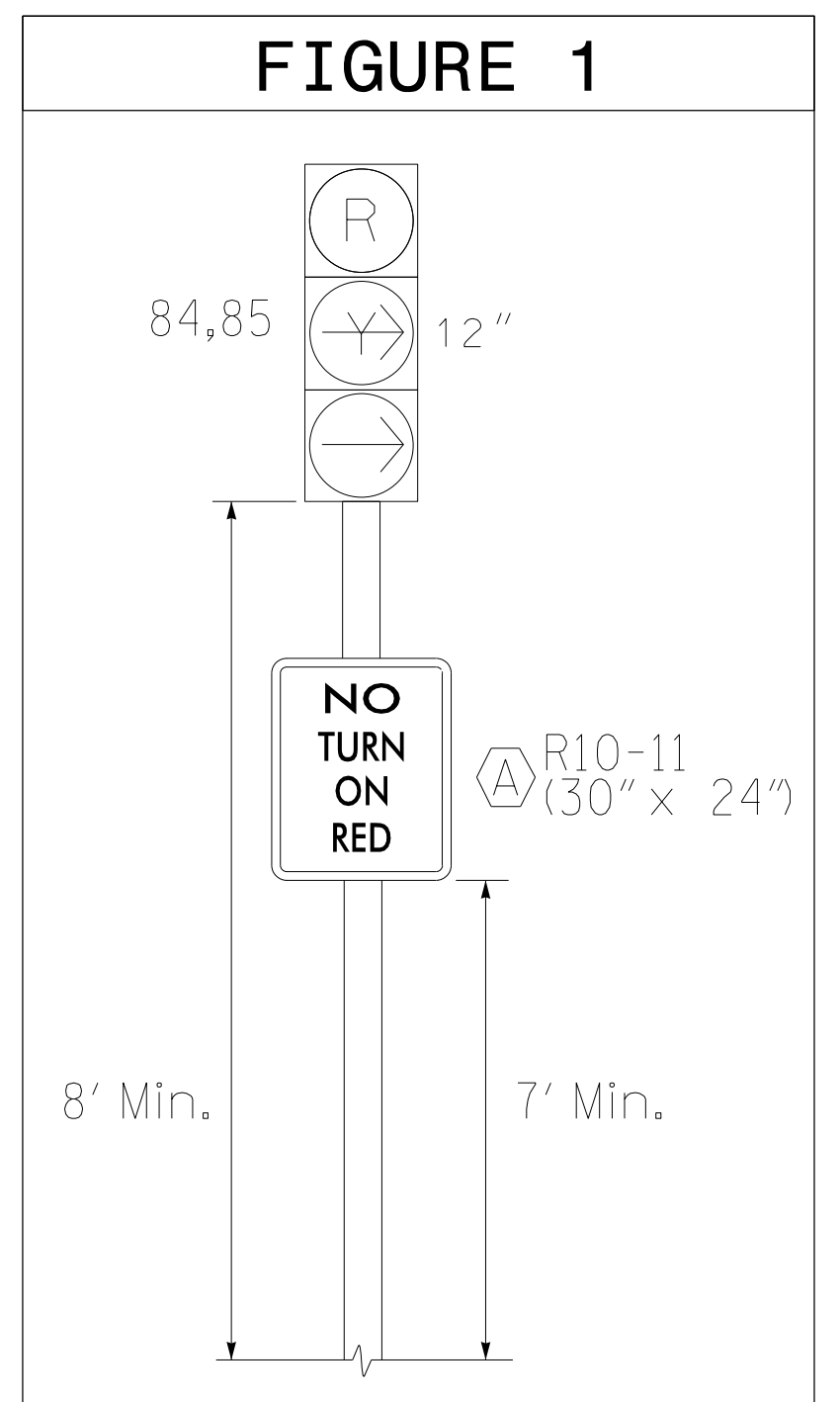


| PROPOSED | | EXISTING | |
|----------|--|----------|---|
| | Traffic Signal Head | | Traffic Signal Head |
| | Modified Signal Head | | N/A |
| | Sign | | N/A |
| | Pedestrian Signal Head With Push Button & Sign | | Pedestrian Signal Head |
| | Signal Pole with Guy | | Signal Pole with Guy |
| | Signal Pole with Sidewalk Guy | | Signal Pole with Sidewalk Guy |
| | Inductive Loop Detector | | Inductive Loop Detector |
| | Controller & Cabinet Junction Box | | Controller & Cabinet Junction Box |
| | 2-in Underground Conduit | | 2-in Underground Conduit |
| | Right of Way | | Right of Way |
| | Directional Arrow | | Directional Arrow |
| | Metal Strain Pole | | Metal Strain Pole |
| | Directional Drill (#) x 2" Conduit | | N/A |
| | Type I Pushbutton Post | | Type I Pushbutton Post |
| | Type II Signal Pedestal | | Type II Signal Pedestal |
| | No Turn on Red Sign (R10-11) (SEE FIGURE 1) | | No Turn on Red Sign (R10-11) |
| | No Left/U-Turn Sign (R3-18) | | No Left/U-Turn Sign (R3-18) |
| | No Right Turn Sign (R3-1) | | No Right Turn Sign (R3-1) |
| | Left Arrow "ONLY" Sign (R3-5L) | | Left Arrow "ONLY" Sign (R3-5L) |
| | Combined Thru and Left Arrow Sign (R3-6L) | | Combined Thru and Left Arrow Sign (R3-6L) |
| | Microwave Detection Area | | N/A |
| | Out of Pavement Detector | | Out of Pavement Detector |

| MULTIZONE MICROWAVE DETECTION SYSTEM | |
|--------------------------------------|---------------|
| FUNCTION | Sensor 1 (2A) |
| Channel | 1 |
| Phase | 2 |
| Direction of Travel | WB |
| Detection Zone (ft) | 100-600 |
| Enable Speed | Y |
| Speed Range (mph) | 35-100 |
| Enable Estimated Time of Arrival | Y |
| Estimated Time of Arrival (sec) | 2.5-6.5 |

| FEATURE | PHASE | | | |
|-------------------------|------------|-----|------------|-----|
| | 2 | 5 | 6 | 8 |
| Walk * | 7 | - | 14 | - |
| Ped Clear * | 27 | - | 14 | - |
| Min Green | 12 | 7 | 12 | 7 |
| Passage * | 6.0 | 2.0 | 6.0 | 2.0 |
| Max 1 * | 90 | 15 | 90 | 35 |
| Yellow Change | 4.3 | 3.0 | 4.7 | 3.5 |
| Red Clear | 2.5 | 3.6 | 1.1 | 3.4 |
| Added Initial * | 1.0 | - | 1.0 | - |
| Maximum Initial * | 46 | - | 34 | - |
| Time Before Reduction * | 15 | - | 15 | - |
| Time To Reduce * | 30 | - | 30 | - |
| Minimum Gap | 3.5 | - | 3.0 | - |
| Advance Walk | - | - | 7 | - |
| Non Lock Detector | - | X | - | X |
| Vehicle Recall | MIN RECALL | - | MIN RECALL | - |
| Dual Entry | - | - | - | X |

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



33888855.DSDATE\$\$\$\$\$
 U:\Projects\2307B\Signal\Des\gn\2307B_sig.dgn,12-11-24.dgn
 User: JGalloway

Signal Upgrade - Final Design

Stantec
 Stantec Consulting Services Inc.
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 License No. F-0672

Prepared for the Offices of:

 TRANSPORTATION MOBILITY AND SAFETY DIVISION
 STATE ENGINEER OF NORTH CAROLINA
 JASON GALLOWAY
 Signal Design Section

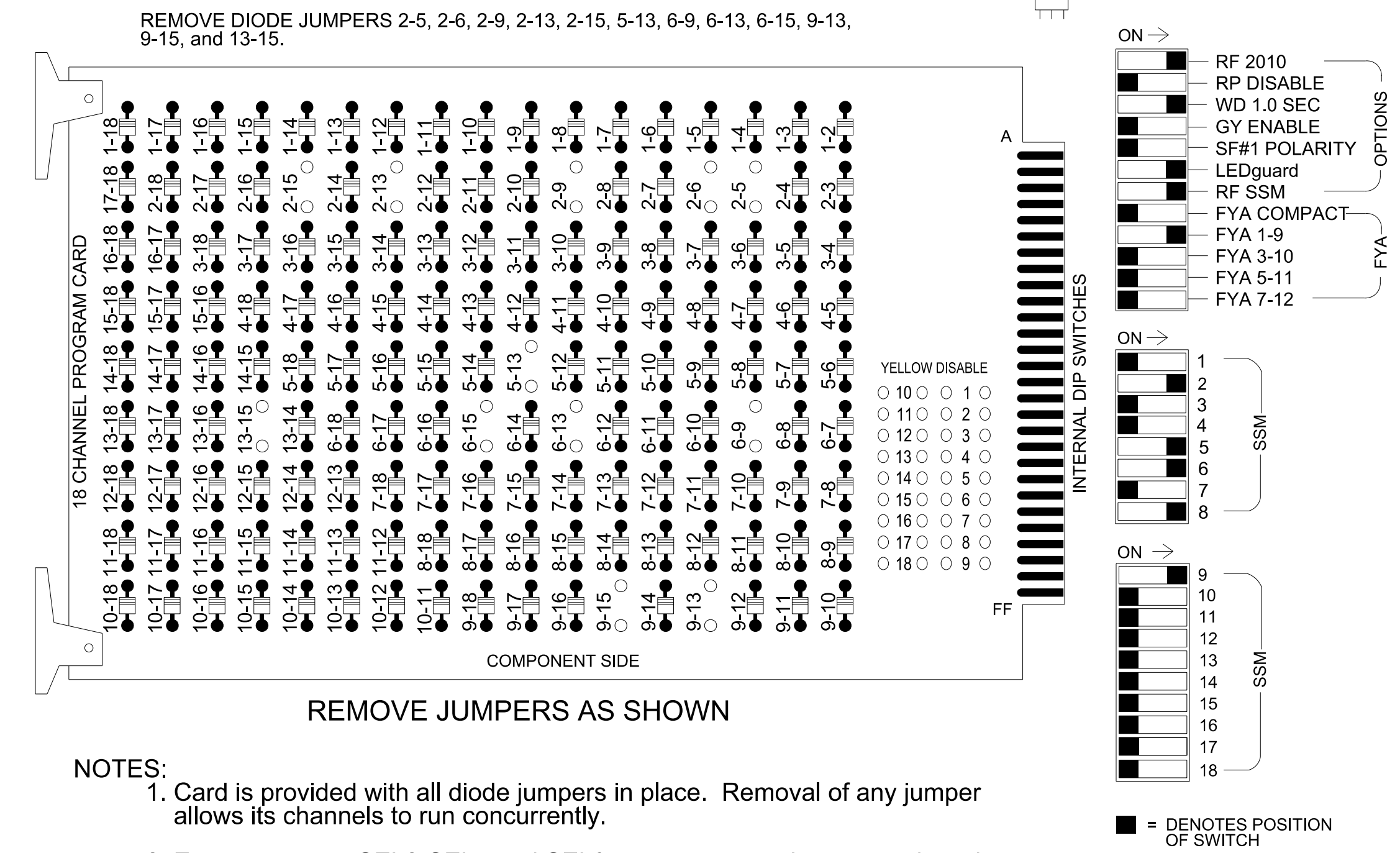
NC 150 at I-77 NB Ramps
 Division 12 Iredell County Mooresville
 PLAN DATE: May 2024 REVIEWED BY: J Galloway, PE
 PREPARED BY: J Hambricht REVIEWED BY: R Muncey, PE
 REVISIONS: _____

SEAL
 JASON GALLOWAY
 PROFESSIONAL ENGINEER
 SEAL 029904
 STATE OF NORTH CAROLINA
 TRANSPORTATION MOBILITY AND SAFETY DIVISION
 STATE ENGINEER OF NORTH CAROLINA
 DocuSigned by: Jason Galloway 20/2024
 10D1E2B40B4B46E DATE 12-11-24
 SIG. INVENTORY NO. 12-1144

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



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 the Red Enable is active at all times during normal operation.
 - Integrate monitor with Ethernet network in cabinet.

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 plan.
- Program controller to start up in phase 2 Green No Walk and 6 Green No Walk.
- If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
- The cabinet and controller are part of the NC 150 D12-02_Mooresville CLS.

EQUIPMENT INFORMATION

Controller.....2070LX
 Cabinet.....332 w/ Aux
 Software.....Q-Free MAXTIME
 Cabinet Mount.....Base
 Output File Positions.....18 With Aux. Output File
 Load Switches Used.....S2, S3, S7, S8, S9, S11, AUX S1
 Phases Used.....2, 2PED, 6, 5, 6PED, 8
 Overlap "1".....*
 Overlap "2".....NOT USED
 Overlap "3".....NOT USED
 Overlap "4".....NOT USED

*See overlap programming detail on this sheet

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 | OL1 | OL2 | SPARE | OL3 | OL4 | SPARE |
| SIGNAL HEAD NO. | NU | 21,22 | 23 | P21, P22 | NU | NU | 51,52 | 61,62 | 63,64, 65 | P61, P62 | NU | 81,82, 83 | 84,85 | NU | 66 | NU | NU | NU |
| RED | 128 | 128 | | | | | | 134 | 134 | | | 107 | 107 | | A121 | | | |
| YELLOW | 129 | 129 | | | | | | 135 | 135 | | | 108 | | | | | | |
| GREEN | 130 | | | | | | | 136 | | | | 109 | | | | | | |
| RED ARROW | | | | | | | 131 | | | | | | | | | | | |
| YELLOW ARROW | | | | | | | 132 | | | | | 108 | | | A122 | | | |
| FLASHING YELLOW ARROW | | | | | | | | | | | | | | | A123 | | | |
| GREEN ARROW | | 130 | | | | | 133 | 136 | | | | 109 | | | | | | |
| Hand icon | | | | 113 | | | | | | 119 | | | | | | | | |
| Walking person icon | | | | 115 | | | | | | 121 | | | | | | | | |

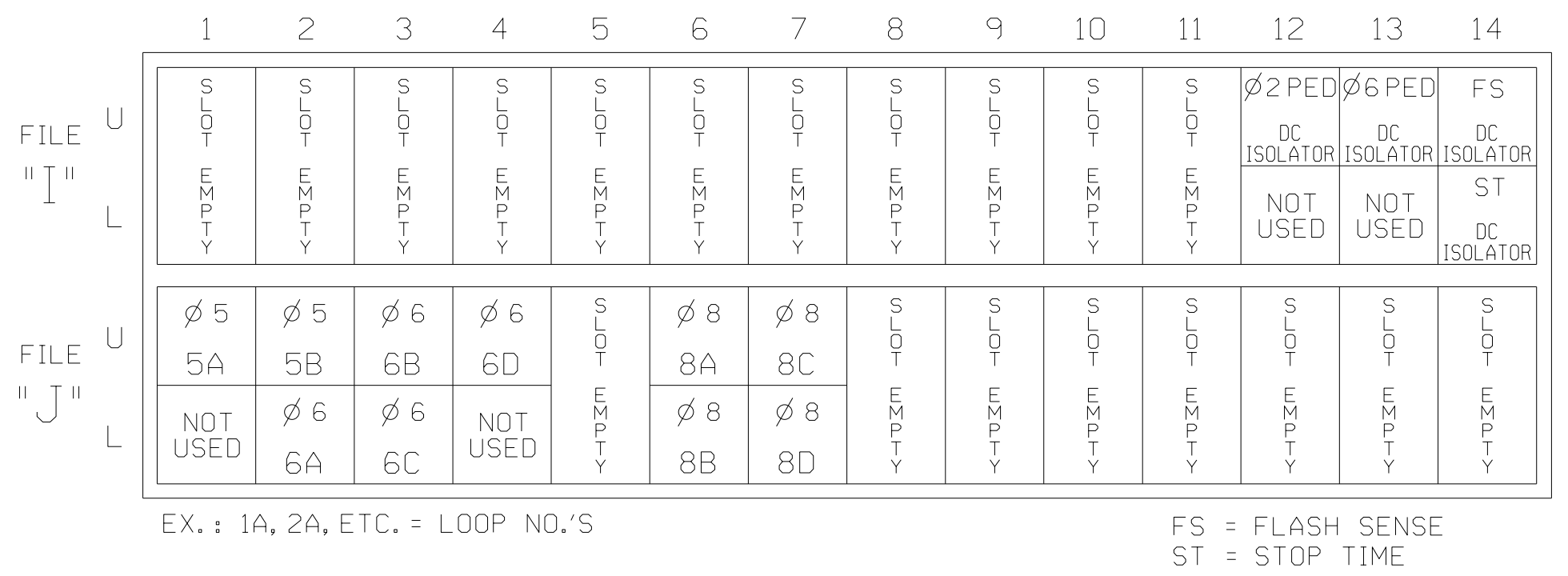
NU = Not Used
 ★ See pictorial of head wiring in detail this sheet.

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

INPUT FILE POSITION LAYOUT

(front view)



INPUT FILE CONNECTION & PROGRAMMING CHART

| LOOP NO. | LOOP TERMINAL | INPUT FILE POS. | PIN NO. | INPUT POINT | DETECTOR NO. | CALL PHASE | DELAY TIME | EXTEND TIME | EXTEND | ADDED INITIAL | CALL | DELAY DURING GREEN |
|------------------|---------------|-----------------|---------|-------------|--------------|------------|------------|-------------|--------|---------------|------|--------------------|
| 5A | TB3-1,2 | J1U | 55 | 17 | 15 | 5 | | | | X | X | |
| 5B | TB3-5,6 | J2U | 40 | 2 | 16 | 5 | | | | X | X | |
| 6A | TB3-7,8 | J2L | 44 | 6 | 17 | 6 | | | X | X | X | |
| 6B | TB3-9,10 | J3U | 64 | 30 | 18 | 6 | | | X | X | X | |
| 6C | TB3-11,12 | J3L | 77 | 43 | 19 | 6 | | | X | X | X | |
| 6D | TB5-1,2 | J4U | 48 | 10 | 20 | 6 | | | X | X | X | |
| 8A | TB5-9,10 | J6U | 42 | 4 | 22 | 8 | | | X | X | X | |
| 8B | TB5-11,12 | J6L | 46 | 8 | 23 | 8 | | | X | X | X | |
| 8C | TB7-1,2 | J7U | 66 | 32 | 24 | 8 | | | X | X | X | |
| 8D | TB7-3,4 | J7L | 79 | 45 | 25 | 8 | | | X | X | X | |
| PED PUSH BUTTONS | | | | | | | | | | | | |
| P21,P22,PB23 | TB8-4,6 | I12U | 67 | 33 | 2 | PED 2 | | | | | | |
| P61,P62 | TB8-7,9 | I13U | 68 | 34 | 6 | PED 6 | | | | | | |

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

INPUT FILE POSITION LEGEND: J2L
 FILE J
 SLOT 2
 LOWER

OVERLAP PROGRAMMING

Front Panel
 Main Menu > Controller > Overlap > Overlap Parameters/Overlap Timings

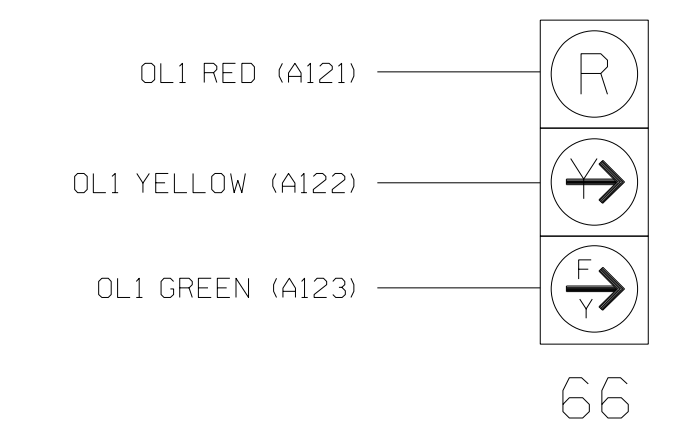
Web Interface
 Home > Controller > Overlap Configuration > Overlaps

Overlap Plan 1

| Overlap | 1 |
|-------------------|-----------------|
| Type | FYA 4 - Section |
| Included Phases | 6 |
| Modifier Phases | - |
| Modifier Overlaps | - |
| Trail Green | 0 |
| Trail Yellow | 0.0 |
| Trail Red | 0.0 |

FYA SIGNAL WIRING DETAIL

(wire signal head as shown)



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 12-1144
 DESIGNED: MAY 2024
 SEALED: 5/20/2024
 REVISED: N/A

Final Design Electrical Detail

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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Prepared for the Offices of:

1001 E 26th St, Suite 466
 Mooresville, NC 28052

NC 150 at I-77 NB Ramps

Division 12 Iredell County Mooresville

PLAN DATE: May 2024 REVIEWED BY: J Galloway, PE

PREPARED BY: RMM/JPG REVIEWED BY: R Muncey, PE

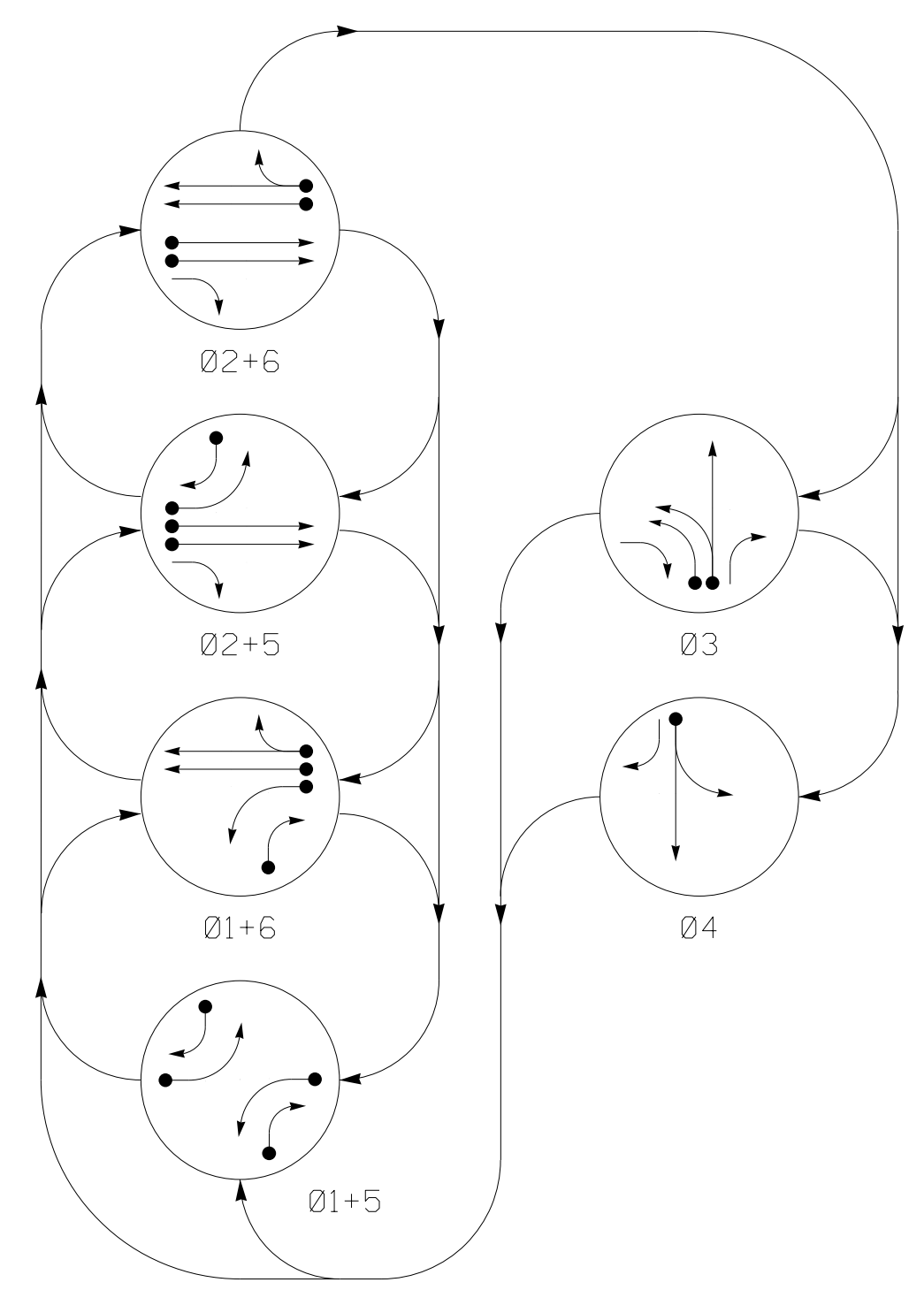
REVISIONS INIT. DATE

Seal of North Carolina Professional Engineer Jason P. Galloway License No. 029904

DocuSigned by Jason Galloway 5/20/2024

1001 E 26th St, Suite 466 Mooresville, NC 28052

PHASING DIAGRAM



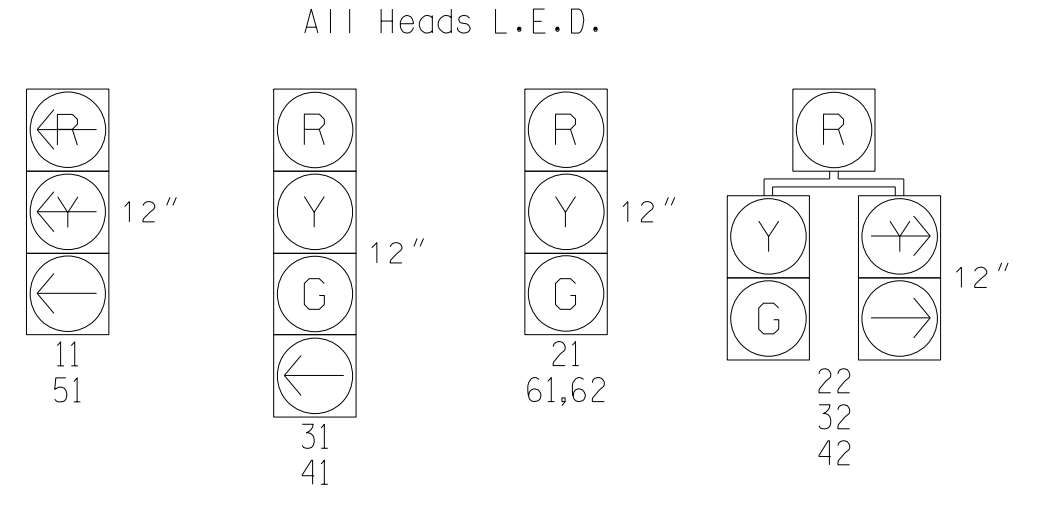
PHASING DIAGRAM DETECTION LEGEND

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

TABLE OF OPERATION

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

SIGNAL FACE I.D.



MAXTIME DETECTOR INSTALLATION CHART

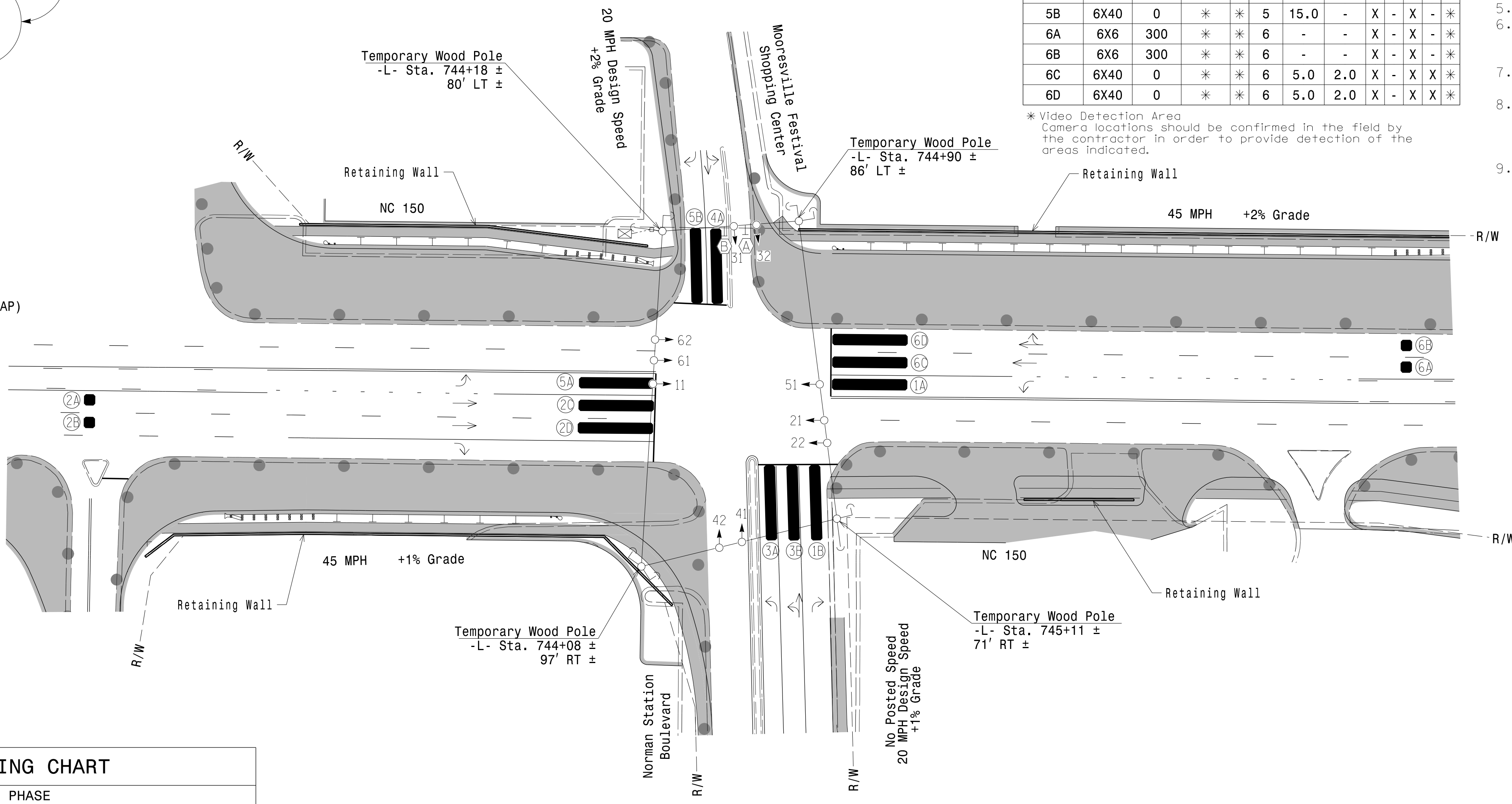
| LOOP | SIZE (FT) | DISTANCE FROM STOPBAR (FT) | PROGRAMMING | | | | | | | | | |
|------|-----------|----------------------------|-------------|----------|------------|------------|-------------|--------|--------------------|--------------------|---|---|
| | | | TURN | NEW LOOP | CALL PHASE | DELAY TIME | EXTEND TIME | EXTEND | ADDED INITIAL CALL | DELAY DURING GREEN | | |
| 1A | 6X40 | 0 | * | * | 1 | 3.0 | - | X | - | X | - | * |
| 1B | 6X40 | 0 | * | * | 1 | 15.0 | - | X | - | X | - | * |
| 2A | 6X6 | 300 | * | * | 2 | - | - | X | - | X | - | * |
| 2B | 6X6 | 300 | * | * | 2 | - | - | X | - | X | - | * |
| 2C | 6X40 | 0 | * | * | 2 | 5.0 | 2.0 | X | - | X | X | * |
| 2D | 6X40 | 0 | * | * | 2 | 5.0 | 2.0 | X | - | X | X | * |
| 3A | 6X40 | 0 | * | * | 3 | - | - | X | - | X | - | * |
| 3B | 6X40 | 0 | * | * | 3 | - | - | X | - | X | - | * |
| 4A | 6X40 | 0 | * | * | 4 | - | - | X | - | X | - | * |
| 5A | 6X40 | 0 | * | * | 5 | 3.0 | - | X | - | X | - | * |
| 5B | 6X40 | 0 | * | * | 5 | 15.0 | - | X | - | X | - | * |
| 6A | 6X6 | 300 | * | * | 6 | - | - | X | - | X | - | * |
| 6B | 6X6 | 300 | * | * | 6 | - | - | X | - | X | - | * |
| 6C | 6X40 | 0 | * | * | 6 | 5.0 | 2.0 | X | - | X | X | * |
| 6D | 6X40 | 0 | * | * | 6 | 5.0 | 2.0 | X | - | X | X | * |

* Video Detection Area Camera locations should be confirmed in the field by the contractor in order to provide detection of the areas indicated.

6 Phase Fully Actuated NC 150 D12-02 MOORESVILLE CLS

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2024 and "Standard Specifications for Roads and Structures" dated January 2024.
- 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.
- Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
- The cabinet should be designed to include an Auxiliary Output File for future use.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- Field adjust temporary poles as needed.



MAXTIME TIMING CHART

| FEATURE | PHASE | | | | | |
|-------------------------|-------|------------|-----|-----|-----|------------|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| Walk * | - | - | - | - | - | - |
| Ped Clear * | - | - | - | - | - | - |
| Min Green | 7 | 12 | 7 | 7 | 7 | 12 |
| Passage * | 2.0 | 6.0 | 2.0 | 2.0 | 2.0 | 6.0 |
| Max 1 * | 15 | 90 | 35 | 35 | 15 | 90 |
| Yellow Change | 3.0 | 4.4 | 3.0 | 3.0 | 3.0 | 4.3 |
| Red Clear | 2.3 | 1.4 | 3.1 | 2.9 | 1.9 | 1.3 |
| Added Initial * | - | - | - | - | - | - |
| Maximum Initial * | - | - | - | - | - | - |
| Time Before Reduction * | - | 15 | - | - | - | 15 |
| Time To Reduce * | - | 30 | - | - | - | 30 |
| Minimum Gap | - | 3.0 | - | - | - | 3.0 |
| Advance Walk | - | - | - | - | - | - |
| Non Lock Detector | X | X | X | X | X | X |
| Vehicle Recall | - | MIN RECALL | - | - | - | MIN RECALL |
| Dual Entry | - | - | - | - | - | - |

* 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 | ● → Traffic Signal Head |
| ○ → Modified Signal Head | N/A |
| ○ → Pedestrian Signal Head | N/A |
| ○ → Sign With Push Button & Sign | N/A |
| ○ → 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 |
| ■ Video Detection Area | N/A |
| ■ Construction Zone | N/A |
| ● Drums | N/A |
| ⓐ Combined Through and Left Arrow Sign (R3-6L) | ⓐ Combined Through and Left Arrow Sign (R3-6L) |
| ⓑ Left Arrow "ONLY" Sign (R3-5L) | ⓑ Left Arrow "ONLY" Sign (R3-5L) |

Signal Upgrade Temporary Design 1 - TMP Phase I

NC 150 at Norman Station Boulevard/ Mooresville Festival

Division 12 Iredell County Mooresville

PLAN DATE: May 2024 REVIEWED BY: J Galloway, PE

PREPARED BY: J Hambricht REVIEWED BY: R Muncey, PE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

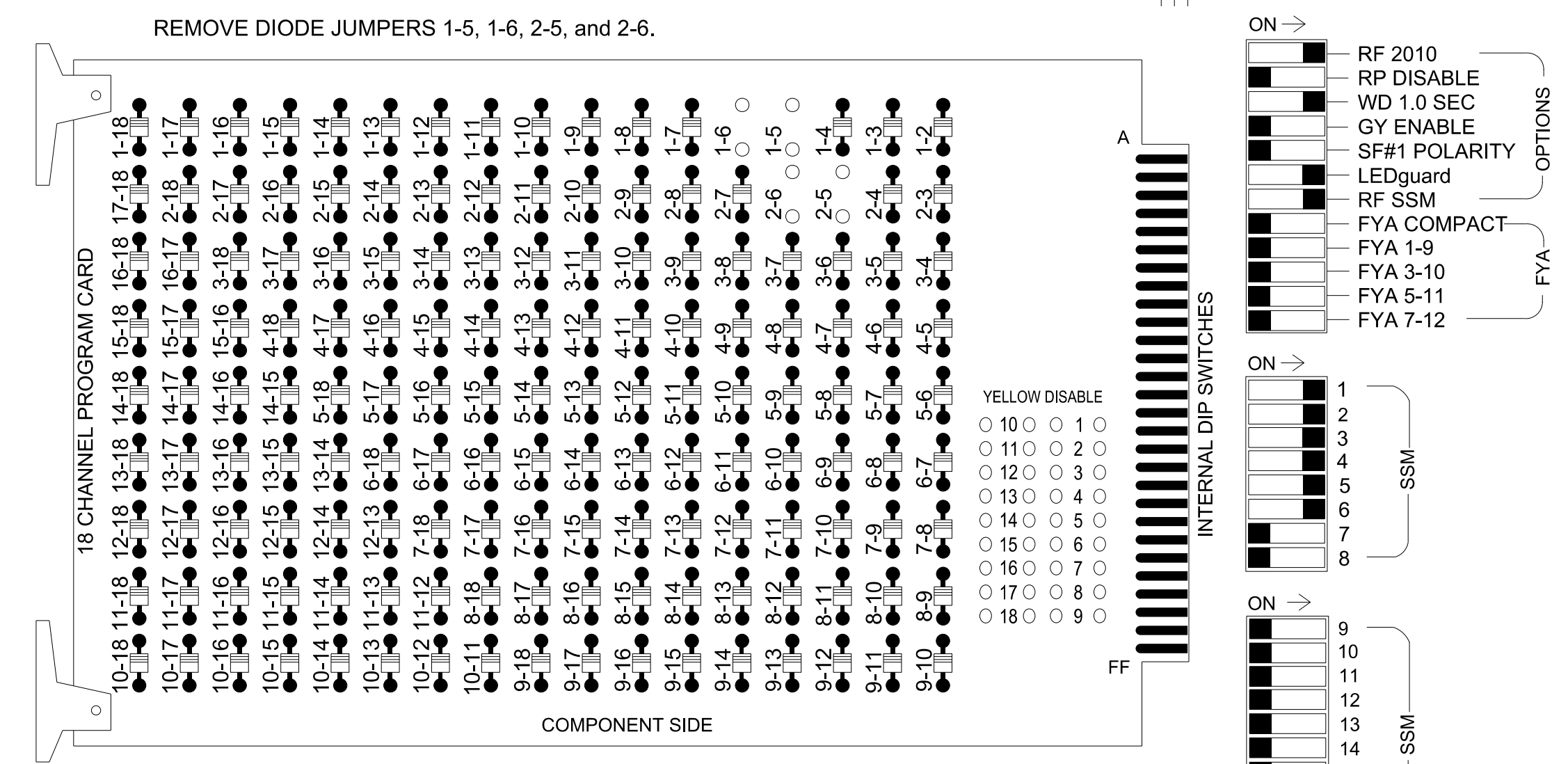
DocuSigned by: Jason Galloway 20/2024

10D1E2B40B4B46E DATE 12-1330T1

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 User: jgalloway

18 CHANNEL IP 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 the Red Enable is active at all times during normal operation.
4. Integrate monitor with Ethernet network in cabinet.

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the signal plan.
2. Program controller to start up in phase 2 Green No Walk and 6 Green No Walk.
3. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
4. The cabinet and controller are part of the NC 150 D12-02_Mooresville CLS.

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 | OL1 | OL2 | SPARE | OL3 | OL4 | SPARE |
| SIGNAL HEAD NO. | 11 | 32 | 21,22 | NU | 22 | 31 | 32 | 41 | 42 | 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 | 126 | | 117 | | | | | 132 | 132 | | | | | | | | |
| GREEN ARROW | 127 | 127 | | 118 | 118 | 103 | | | 133 | 133 | | | | | | | | |

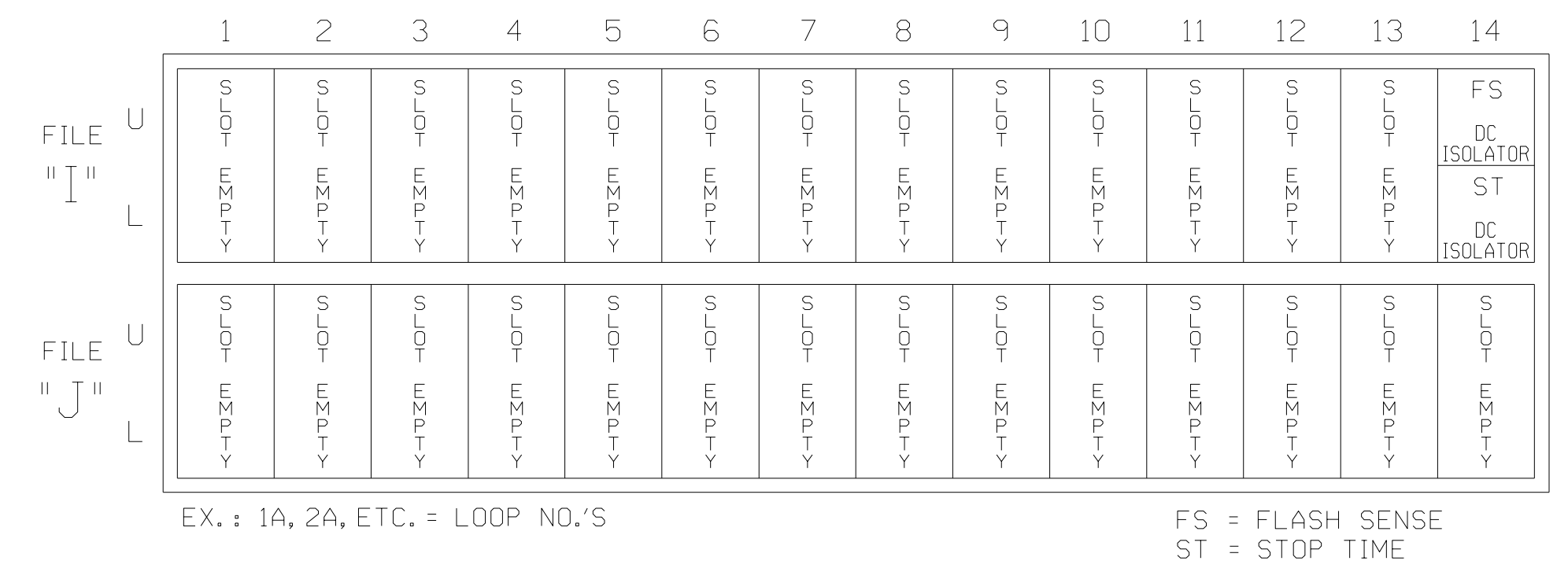
NU = Not Used

EQUIPMENT INFORMATION

Controller.....2070LX
 Cabinet.....332 w/ Aux
 Software.....Q-Free MAXTIME
 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
 Overlap "1".....NOT USED
 Overlap "2".....NOT USED
 Overlap "3".....NOT USED
 Overlap "4".....NOT USED

INPUT FILE POSITION LAYOUT

(front view)



SPECIAL DETECTOR NOTE

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

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 12-1330T1
 DESIGNED: MAY 2024
 SEALED: 5/20/2024
 REVISED: N/A

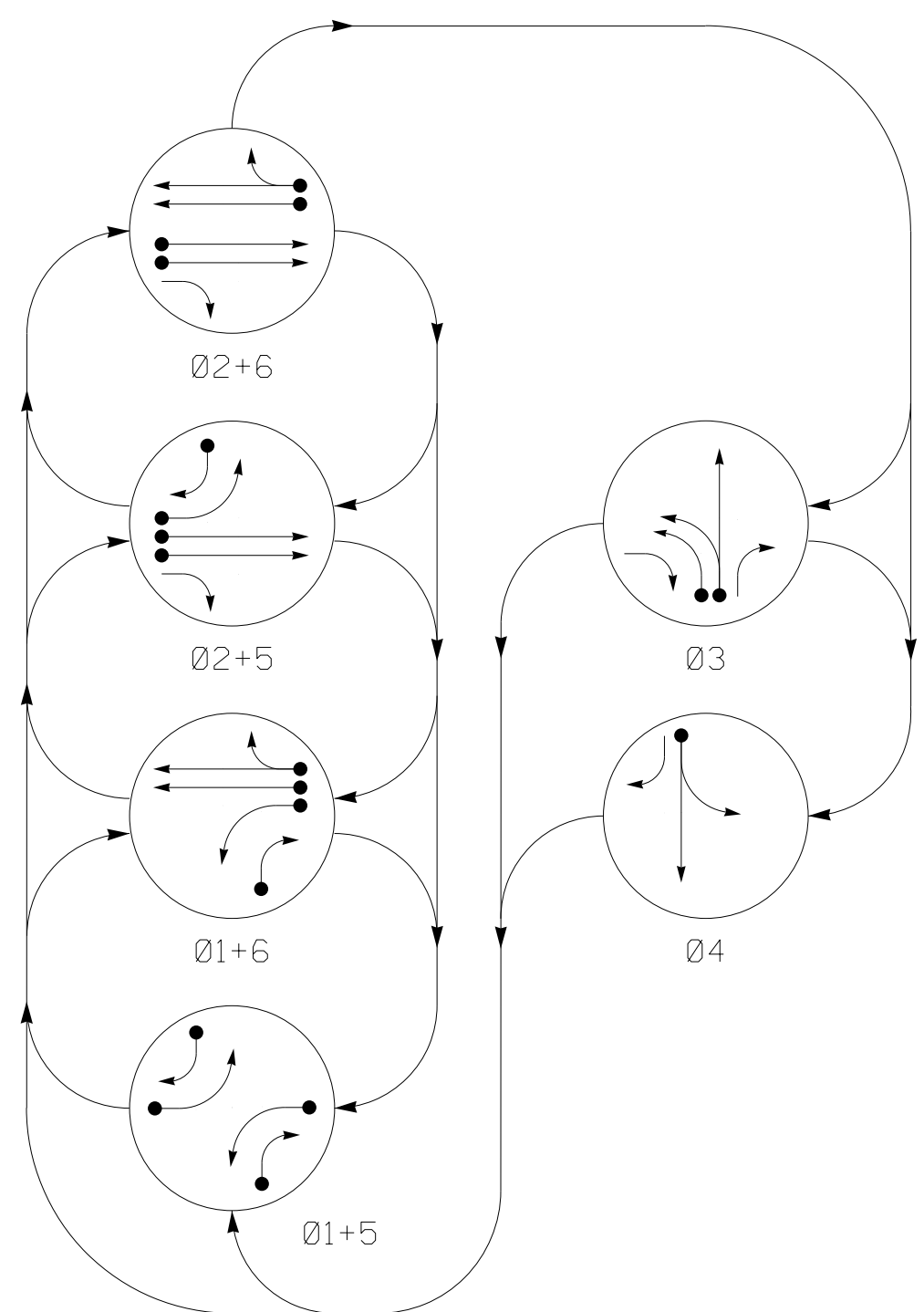
Temporary Design 1 - TMP Phase I
 Electrical Detail

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

| | |
|--|-----------------------------|
| NC 150 at Norman Station Boulevard/ Mooresville Festival | |
| Division 12 Iredell County | Mooresville |
| PLAN DATE: May 2024 | REVIEWED BY: J Galloway, PE |
| PREPARED BY: RMM/JPG | REVIEWED BY: R Muncey, PE |
| REVISIONS | INIT. DATE |
| | |

DocuSigned by: Jason Galloway 5/20/2024

PHASING DIAGRAM



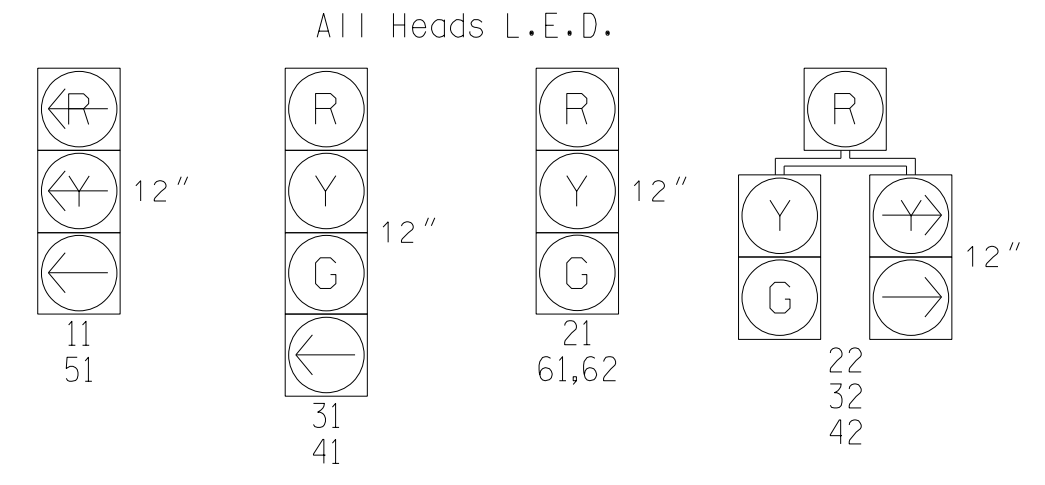
PHASING DIAGRAM DETECTION LEGEND

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

TABLE OF OPERATION

| SIGNAL FACE | PHASE | | | | | |
|-------------|-------|-------|-------|-------|-----|-----|
| | Ø 1+5 | Ø 1+6 | Ø 2+5 | Ø 2+6 | Ø 3 | Ø 4 |
| 11 | ← | ← | ← | ← | ← | ← |
| 21 | R | R | G | G | R | R |
| 22 | R | R | G | G | R | R |
| 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 | ← | ← | ← | ← | ← | ← |
| 61,62 | R | G | R | G | R | R |

SIGNAL FACE I.D.



MAXTIME DETECTOR INSTALLATION CHART

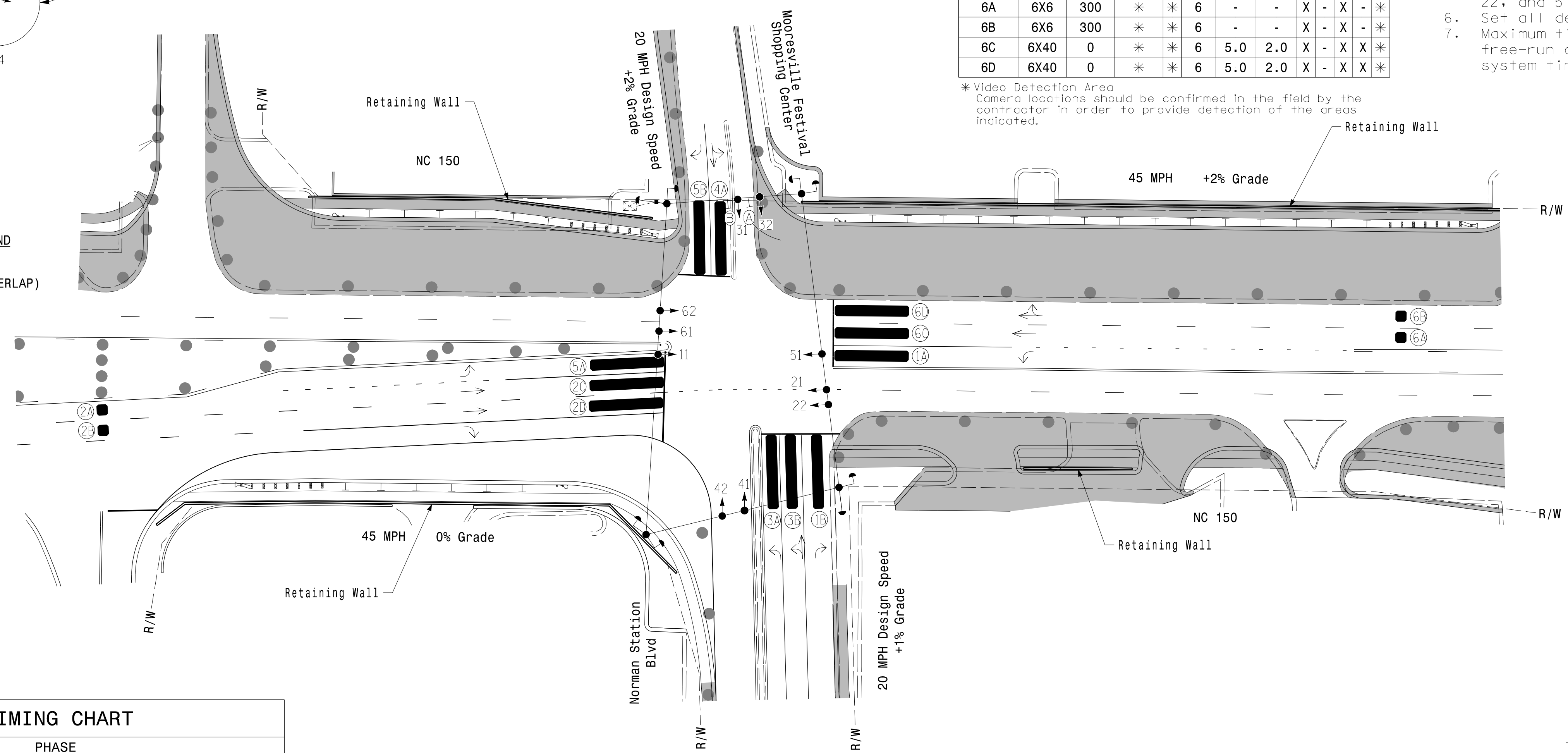
| LOOP | SIZE (FT) | DISTANCE FROM STOPBAR (FT) | TURNS | NEW LOOP | PROGRAMMING | | | | | | | |
|------|-----------|----------------------------|-------|----------|-------------|------------|-------------|--------|---------------|-------------------|----------|---|
| | | | | | CALL PHASE | DELAY TIME | EXTEND TIME | EXTEND | ADDED INITIAL | CALL DURING GREEN | NEW CARD | |
| 1A | 6X40 | 0 | * | * | 1 | 3.0 | - | X | - | X | - | * |
| 1B | 6X40 | 0 | * | * | 1 | 15.0 | - | X | - | X | - | * |
| 2A | 6X6 | 300 | * | * | 2 | - | - | X | - | X | - | * |
| 2B | 6X6 | 300 | * | * | 2 | - | - | X | - | X | - | * |
| 2C | 6X40 | 0 | * | * | 2 | 5.0 | 2.0 | X | - | X | X | * |
| 2D | 6X40 | 0 | * | * | 2 | 5.0 | 2.0 | X | - | X | X | * |
| 3A | 6X40 | 0 | * | * | 3 | - | - | X | - | X | - | * |
| 3B | 6X40 | 0 | * | * | 3 | - | - | X | - | X | - | * |
| 4A | 6X40 | 0 | * | * | 4 | - | - | X | - | X | - | * |
| 5A | 6X40 | 0 | * | * | 5 | - | - | X | - | X | - | * |
| 5B | 6X40 | 0 | * | * | 5 | 15.0 | - | X | - | X | - | * |
| 6A | 6X6 | 300 | * | * | 6 | - | - | X | - | X | - | * |
| 6B | 6X6 | 300 | * | * | 6 | - | - | X | - | X | - | * |
| 6C | 6X40 | 0 | * | * | 6 | 5.0 | 2.0 | X | - | X | X | * |
| 6D | 6X40 | 0 | * | * | 6 | 5.0 | 2.0 | X | - | X | X | * |

* Video Detection Area
Camera locations should be confirmed in the field by the contractor in order to provide detection of the areas indicated.

6 Phase Fully Actuated NC 150 D12-02 MOORESVILLE CLS

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2024 and "Standard Specifications for Roads and Structures" dated January 2024.
- 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.
- Reposition existing signal heads numbered # 21, 22, and 51.
- Set all detector units to presence mode.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.



MAXTIME TIMING CHART

| FEATURE | PHASE | | | | | |
|-------------------------|-------|------------|-----|-----|-----|------------|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| Walk * | - | - | - | - | - | - |
| Ped Clear * | - | - | - | - | - | - |
| Min Green | 7 | 12 | 7 | 7 | 7 | 12 |
| Passage * | 2.0 | 6.0 | 2.0 | 2.0 | 2.0 | 6.0 |
| Max 1 * | 15 | 90 | 35 | 35 | 15 | 90 |
| Yellow Change | 3.0 | 4.5 | 3.0 | 3.0 | 3.0 | 4.3 |
| Red Clear | 2.3 | 1.4 | 3.1 | 2.9 | 1.9 | 1.3 |
| Added Initial * | - | - | - | - | - | - |
| Maximum Initial * | - | - | - | - | - | - |
| Time Before Reduction * | - | 15 | - | - | - | 15 |
| Time To Reduce * | - | 30 | - | - | - | 30 |
| Minimum Gap | - | 3.0 | - | - | - | 3.0 |
| Advance Walk | - | - | - | - | - | - |
| Non Lock Detector | X | X | X | X | X | X |
| Vehicle Recall | - | MIN RECALL | - | - | - | MIN RECALL |
| Dual Entry | - | - | - | - | - | - |

* 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 | ● → Traffic Signal Head |
| ○ → Modified Signal Head | N/A |
| ○ → Pedestrian Signal Head | N/A |
| ○ → Signal Pole with Sign | N/A |
| ○ → Signal Pole with Guy | N/A |
| ○ → Signal Pole with Sidewalk Guy | N/A |
| □ → 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 |
| → Directional Arrow | → Directional Arrow |
| ▬ Video Detection Area | N/A |
| ▬ Construction Zone | N/A |
| ● Drums | N/A |
| ⓐ Combined Through and Left Arrow Sign (R3-6L) | ⓐ Combined Through and Left Arrow Sign (R3-6L) |
| ⓑ Left Arrow "ONLY" Sign (R3-5L) | ⓑ Left Arrow "ONLY" Sign (R3-5L) |

Signal Upgrade Temporary Design 2 - TMP Phase II

NC 150 at Norman Station Boulevard/ Mooresville Festival

Division 12 Iredell County Mooresville

PLAN DATE: May 2024 REVIEWED BY: J Galloway, PE

PREPARED BY: J Hambricht REVIEWED BY: R Muncey, PE

REVISIONS: _____

INITIALS: _____ DATE: _____

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

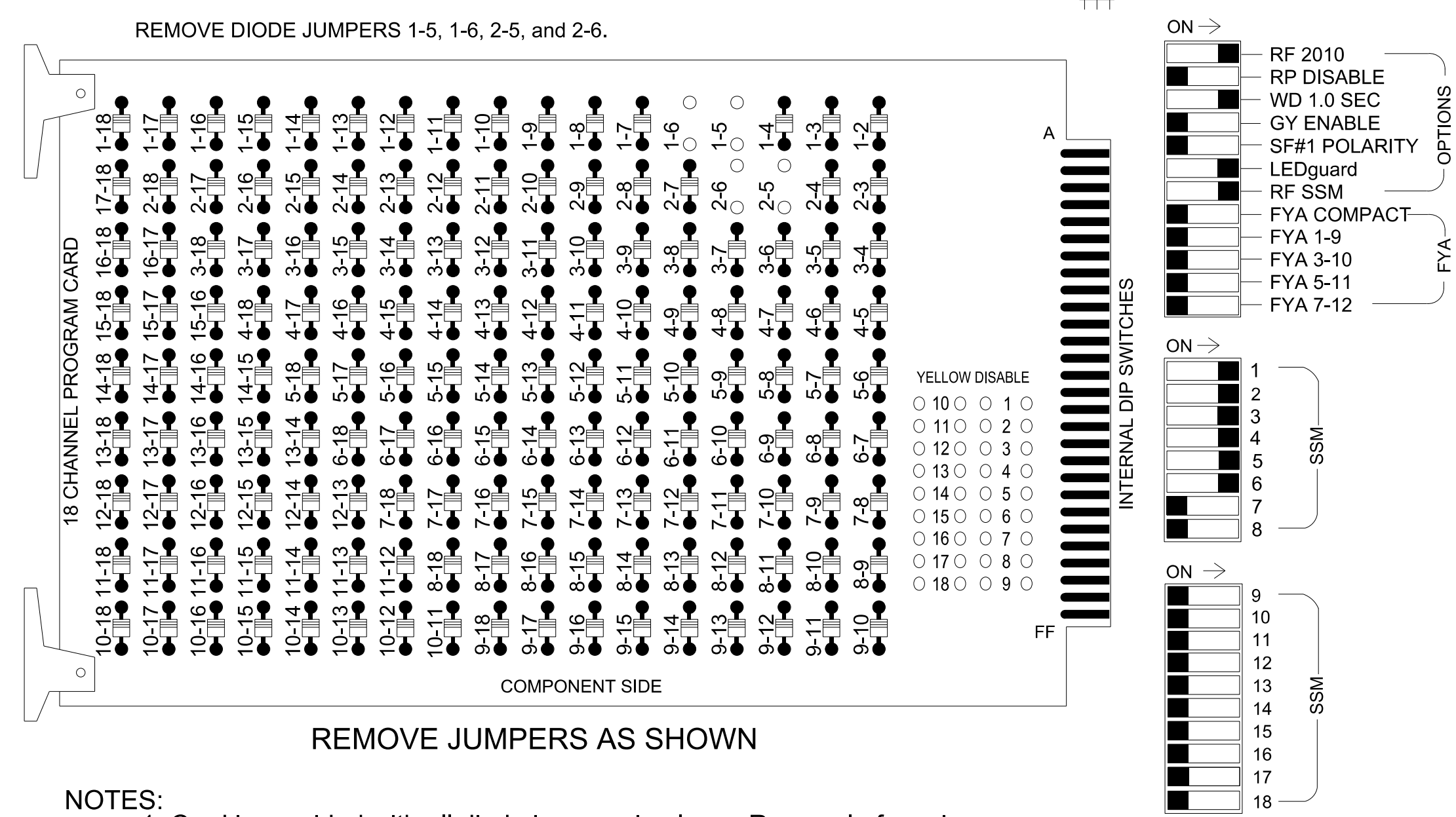
DocuSigned by: Jason Galloway 20/2024

10D1E2B40B4B6E DATE 12-1330T2

\p\projects\2307B\Drawings\Signal Design\Temporary Design\Phase 2_Temp-2307B.sig.dwg, 12-1330T2.dgn
 User: jgalloway

18 CHANNEL IP 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 the Red Enable is active at all times during normal operation.
 - Integrate monitor with Ethernet network in cabinet.

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 plan.
- Program controller to start up in phase 2 Green No Walk and 6 Green No Walk.
- If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
- The cabinet and controller are part of the NC 150 D12-02_Mooresville CLS.

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 | OL1 | OL2 | SPARE | OL3 | OL4 | SPARE |
| SIGNAL HEAD NO. | 11 | 32 | 21,22 | NU | 22 | 31 | 32 | 41 | 42 | 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 | 126 | | 117 | | | | | 132 | 132 | | | | | | | | |
| GREEN ARROW | 127 | 127 | | 118 | 118 | 103 | | | 133 | 133 | | | | | | | | |

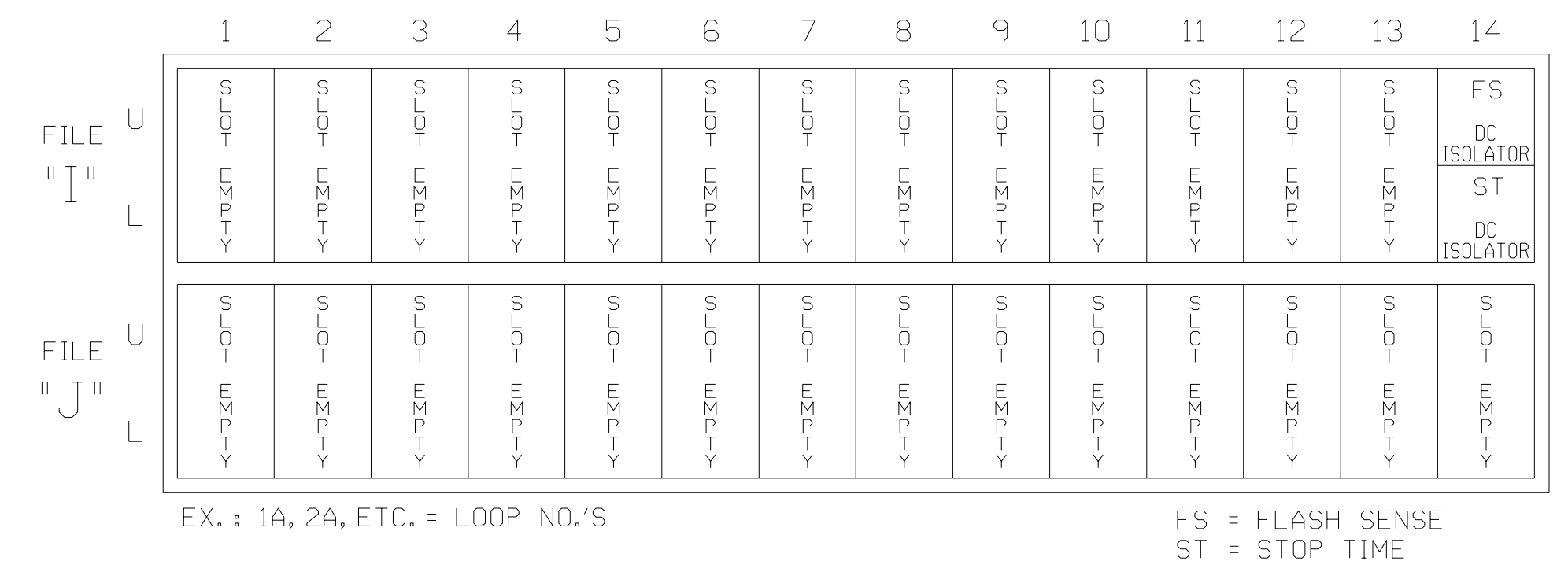
NU = Not Used

EQUIPMENT INFORMATION

Controller.....2070LX
 Cabinet.....332 w/ Aux
 Software.....Q-Free MAXTIME
 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
 Overlap "1".....NOT USED
 Overlap "2".....NOT USED
 Overlap "3".....NOT USED
 Overlap "4".....NOT USED

INPUT FILE POSITION LAYOUT

(front view)



SPECIAL DETECTOR NOTE

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

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 12-1330T2
 DESIGNED: MAY 2024
 SEALED: 5/20/2024
 REVISED: N/A

Temporary Design 2 - TMP Phase II Electrical Detail

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Stantec Consulting Services Inc.
 801 Jones Franklin Road-Suite 300
 Raleigh, NC 27606
 Tel. (919) 851-6866
 Fax. (919) 851-7024
 www.stantec.com
 License No. F-0672

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for the Offices of:

750 N. Greenfield Pkwy, Garner, NC 27529

NC 150 at Norman Station Boulevard/ Mooresville Festival

Division 12 Iredell County Mooresville

PLAN DATE: May 2024 REVIEWED BY: J Galloway, PE

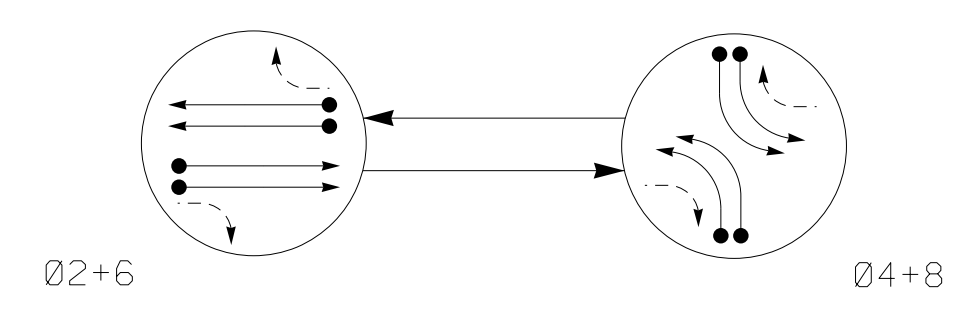
PREPARED BY: RMM/JPG REVIEWED BY: R Muncey, PE

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

DocuSigned by Jason P. Galloway

1001E264084B46E DATE 5/20/2024

PHASING DIAGRAM



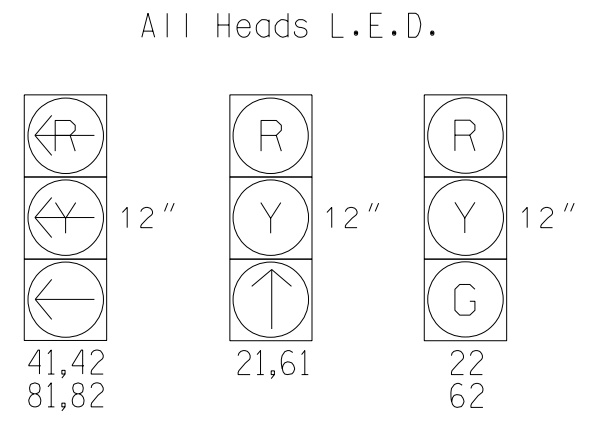
PHASING DIAGRAM DETECTION LEGEND

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

TABLE OF OPERATION

| SIGNAL FACE | PHASE | | |
|-------------|-------|------|-------|
| | 02+6 | 04+8 | FLASH |
| 21 | ↑ | R | R |
| 22 | G | R | R |
| 41,42 | ← | ← | ← |
| 61 | ↑ | R | R |
| 62 | G | R | R |
| 81,82 | ← | ← | ← |

SIGNAL FACE I.D.



MAXTIME DETECTOR INSTALLATION CHART

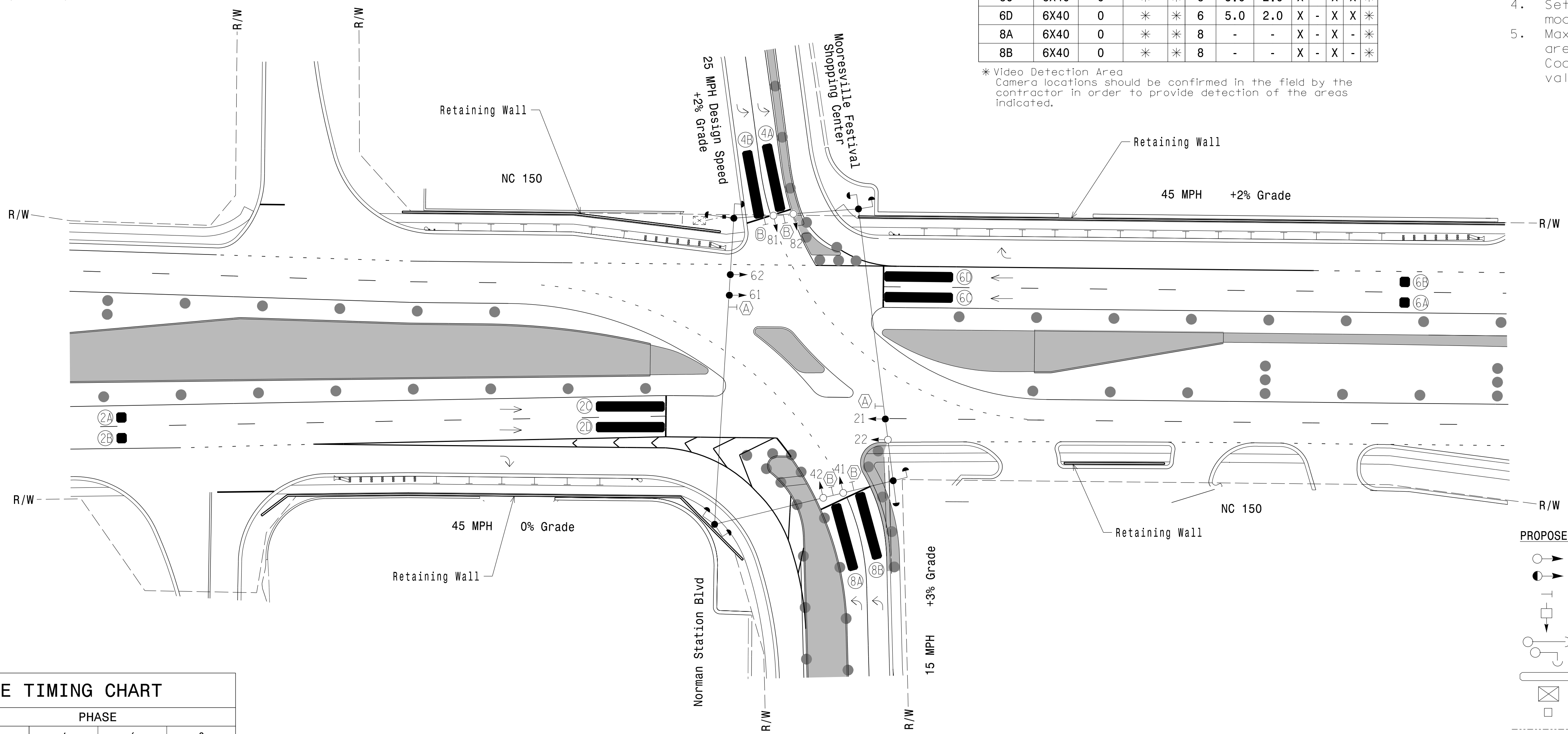
| LOOP | SIZE (FT) | DISTANCE FROM STOPBAR (FT) | TURNS | NEW LOOP | PROGRAMMING | | | | | | |
|------|-----------|----------------------------|-------|----------|-------------|------------|-------------|--------|--------------------|--------------------|----------|
| | | | | | CALL PHASE | DELAY TIME | EXTEND TIME | EXTEND | ADDED INITIAL CALL | DELAY DURING GREEN | NEW CARD |
| 2A | 6X6 | 300 | * | * | 2 | - | - | X | X | - | * |
| 2B | 6X6 | 300 | * | * | 2 | - | - | X | X | - | * |
| 2C | 6X40 | 0 | * | * | 2 | 5.0 | 2.0 | X | X | X | * |
| 2D | 6X40 | 0 | * | * | 2 | 5.0 | 2.0 | X | X | X | * |
| 4A | 6X40 | 0 | * | * | 4 | - | - | X | X | - | * |
| 4B | 6X40 | 0 | * | * | 4 | - | - | X | X | - | * |
| 6A | 6X6 | 300 | * | * | 6 | - | - | X | X | - | * |
| 6B | 6X6 | 300 | * | * | 6 | - | - | X | X | - | * |
| 6C | 6X40 | 0 | * | * | 6 | 5.0 | 2.0 | X | X | X | * |
| 6D | 6X40 | 0 | * | * | 6 | 5.0 | 2.0 | X | X | X | * |
| 8A | 6X40 | 0 | * | * | 8 | - | - | X | X | - | * |
| 8B | 6X40 | 0 | * | * | 8 | - | - | X | X | - | * |

* Video Detection Area Camera locations should be confirmed in the field by the contractor in order to provide detection of the areas indicated.

2 Phase Fully Actuated NC 150 D12-02 MOORESVILLE CLS

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2024 and "Standard Specifications for Roads and Structures" dated January 2024
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Reposition existing signal heads numbered #21, 22, 61 and 62.
- Set all detector units to presence mode.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.

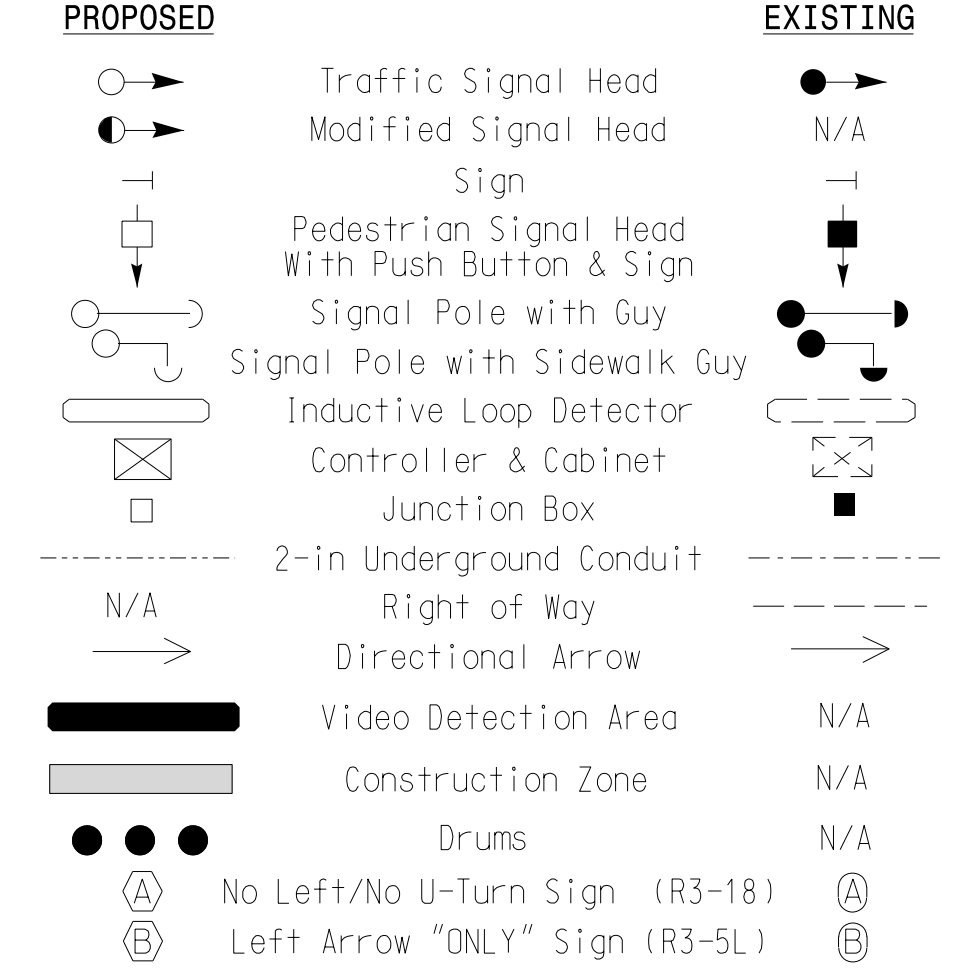


MAXTIME TIMING CHART

| FEATURE | PHASE | | | |
|-------------------------|------------|-----|------------|-----|
| | 2 | 4 | 6 | 8 |
| Walk * | - | - | - | - |
| Ped Clear * | - | - | - | - |
| Min Green | 12 | 7 | 12 | 7 |
| Passage * | 6.0 | 2.0 | 6.0 | 2.0 |
| Max I * | 90 | 35 | 90 | 35 |
| Yellow Change | 4.5 | 3.0 | 4.3 | 3.0 |
| Red Clear | 1.6 | 3.9 | 1.2 | 4.2 |
| Added Initial * | - | - | - | - |
| Maximum Initial * | - | - | - | - |
| Time Before Reduction * | 15 | - | 15 | - |
| Time To Reduce * | 30 | - | 30 | - |
| Minimum Gap | 3.0 | - | 3.0 | - |
| Advance Walk | - | - | - | - |
| Non Lock Detector | X | X | X | X |
| Vehicle Recall | MIN RECALL | - | MIN RECALL | - |
| Dual Entry | - | X | - | X |

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

LEGEND



Signal Upgrade Temporary Design 3 - TMP Phase III

NC 150 at Norman Station Boulevard/ Moore'sville Festival

Division 12 Iredell County Moore'sville

PLAN DATE: May 2024 REVIEWED BY: J Galloway, PE

PREPARED BY: J Hambricht REVIEWED BY: R Muncey, PE

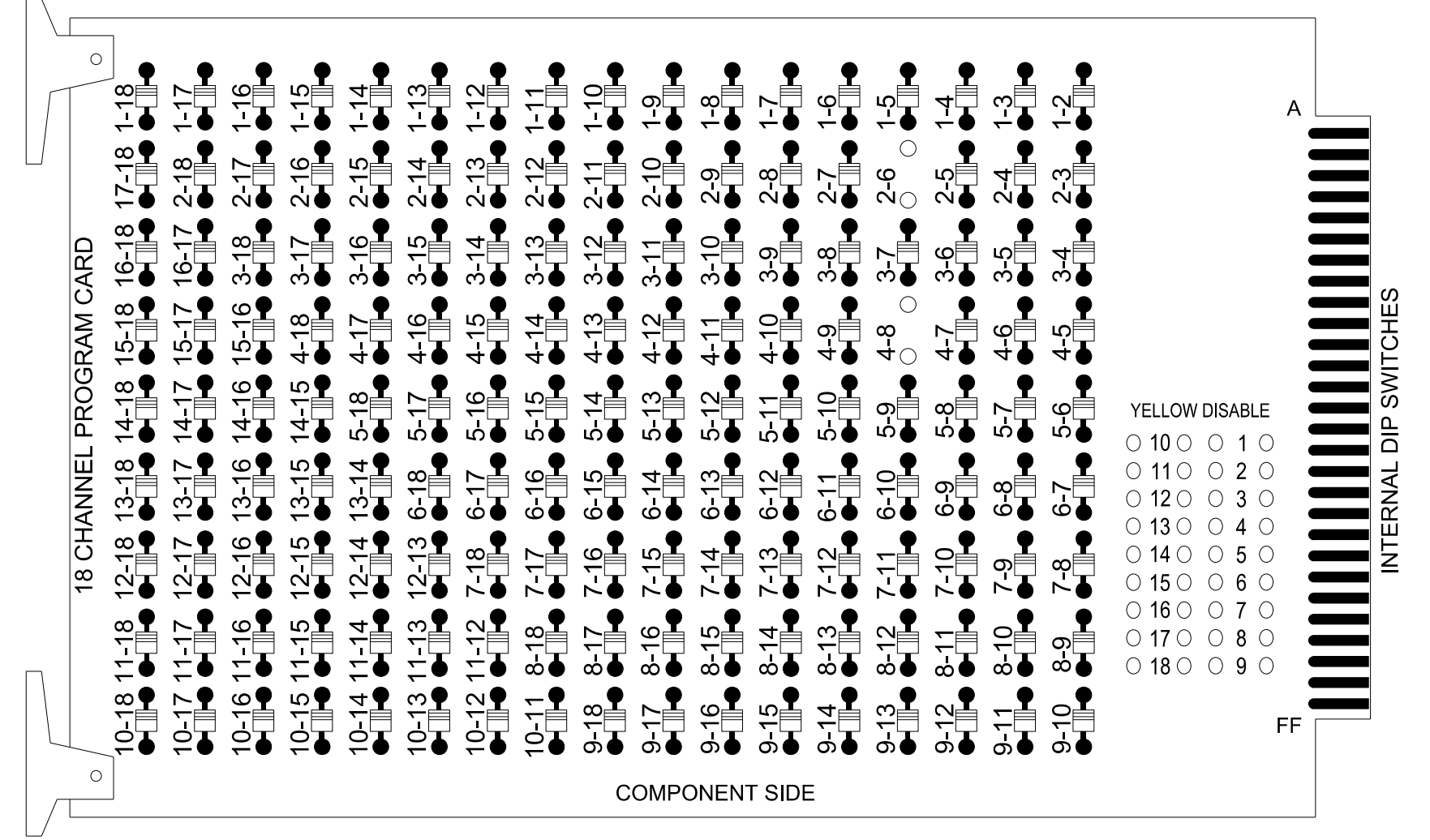
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

10/23/2024 10:58:55 AM SD:ATE:999999
 User: JGalloway
 C:\Users\jgalloway\Documents\Projects\2307B\Signal Design\Phase 3_TMP\Phase 3_TMP_Phase III.dgn

18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

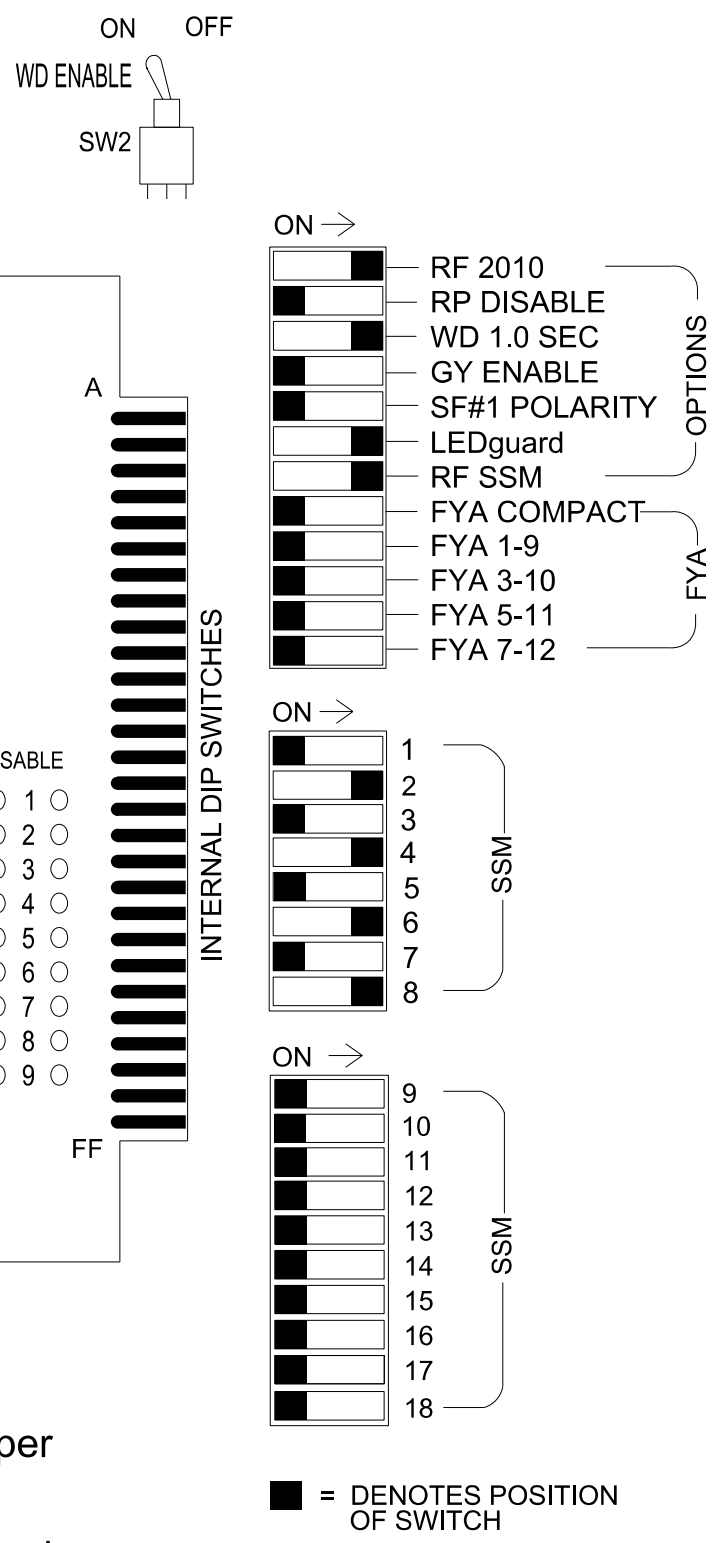
REMOVE DIODE JUMPERS 2-6 and 4-8.



REMOVE JUMPERS AS SHOWN

NOTES:

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



NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the signal plan.
2. Program phases 4 and 8 for Dual Entry.
3. Program controller to start up in phase 2 Green No Walk and 6 Green No Walk.
4. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
5. The cabinet and controller are part of the NC 150 D12-02_Mooresville CLS.

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 | OL1 | OL2 | SPARE | OL3 | OL4 | SPARE |
| SIGNAL HEAD NO. | NU | 21 | 22 | NU | NU | 41,42 | NU | NU | 61 | 62 | NU | NU | 81,82 | NU | NU | NU | NU | NU |
| RED | | 128 | 128 | | | | | | 134 | 134 | | | | | | | | |
| YELLOW | | 129 | 129 | | | | | | 135 | 135 | | | | | | | | |
| GREEN | | | 130 | | | | | | | 136 | | | | | | | | |
| RED ARROW | | | | | | 101 | | | | | | | 107 | | | | | |
| YELLOW ARROW | | | | | | 102 | | | | | | | 108 | | | | | |
| GREEN ARROW | | 130 | | | | 103 | | | 136 | | | | 109 | | | | | |

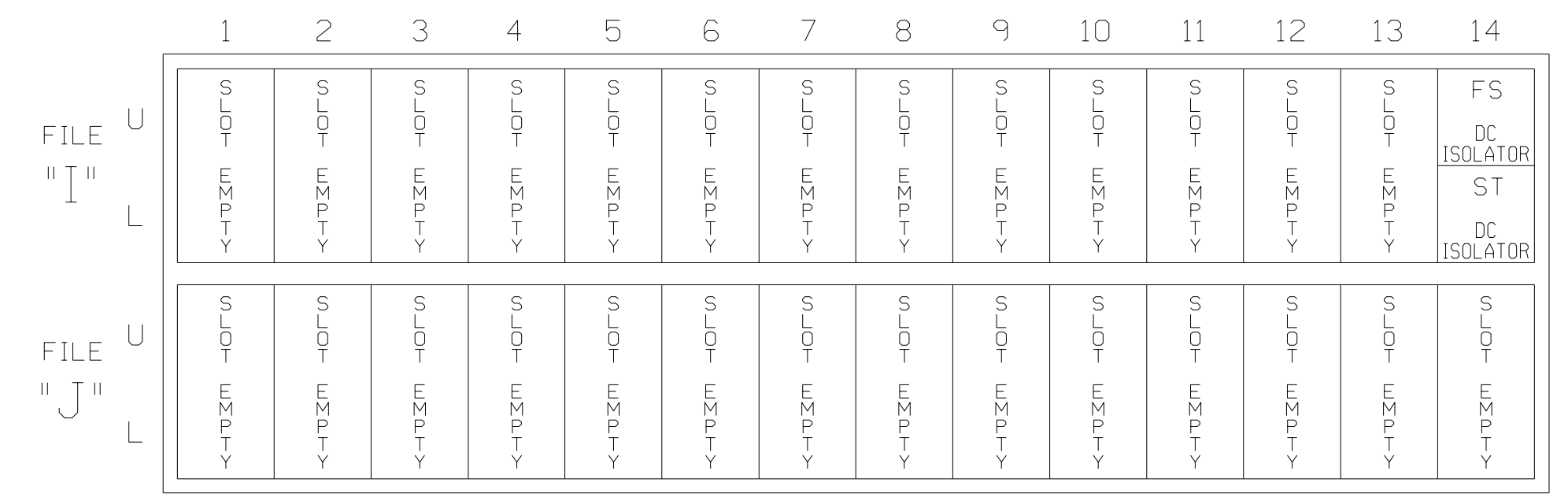
NU = Not Used

EQUIPMENT INFORMATION

Controller.....2070LX
 Cabinet.....332 w/ Aux
 Software.....Q-Free MAXTIME
 Cabinet Mount.....Base
 Output File Positions.....18 With Aux. Output File
 Load Switches Used.....S2, S5, S8, S11
 Phases Used.....2, 4, 6, 8
 Overlap "1".....NOT USED
 Overlap "2".....NOT USED
 Overlap "3".....NOT USED
 Overlap "4".....NOT USED

INPUT FILE POSITION LAYOUT

(front view)



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

FS = FLASH SENSE
ST = STOP TIME

SPECIAL DETECTOR NOTE

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

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 12-1330T3
 DESIGNED: MAY 2024
 SEALED: 5/20/2024
 REVISED: N/A

Temporary Design 3 - TMP Phase III Electrical Detail

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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License No. F-0672

Prepared for the Offices of:

750 N. Greenfield Pkwy, Garner, NC 27529

NC 150
at
Norman Station Boulevard/
Mooresville Festival

Division 12 Iredell County Mooresville

PLAN DATE: May 2024 REVIEWED BY: J Galloway, PE
 PREPARED BY: RMM/JPG REVIEWED BY: R Muncey, PE

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

DocuSigned by:
Jason Galloway, PE
1001E264084B46E
DATE: 5/20/2024
SIG. INVENTORY NO. 12-1330T3