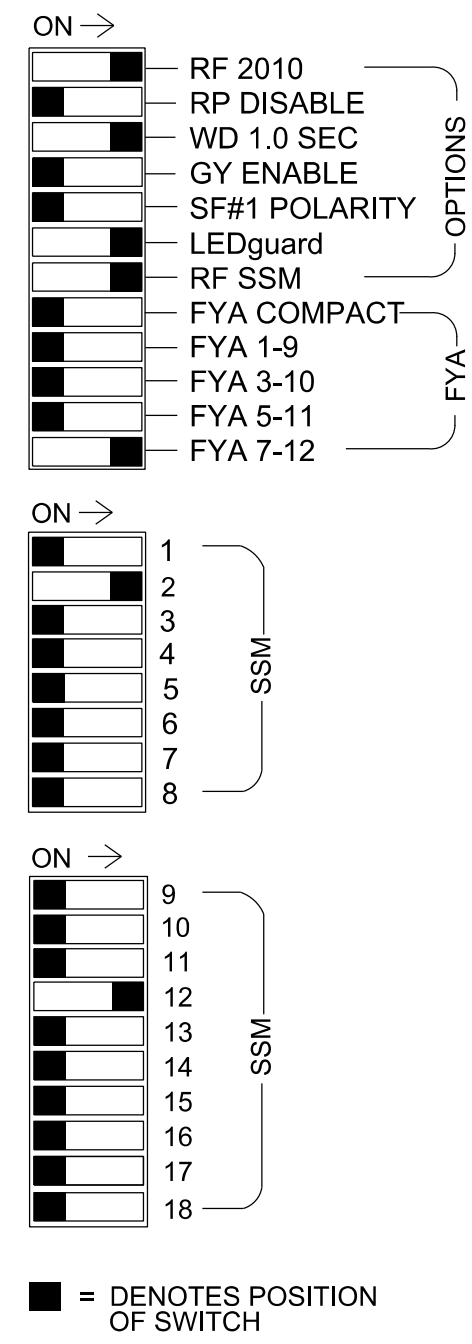
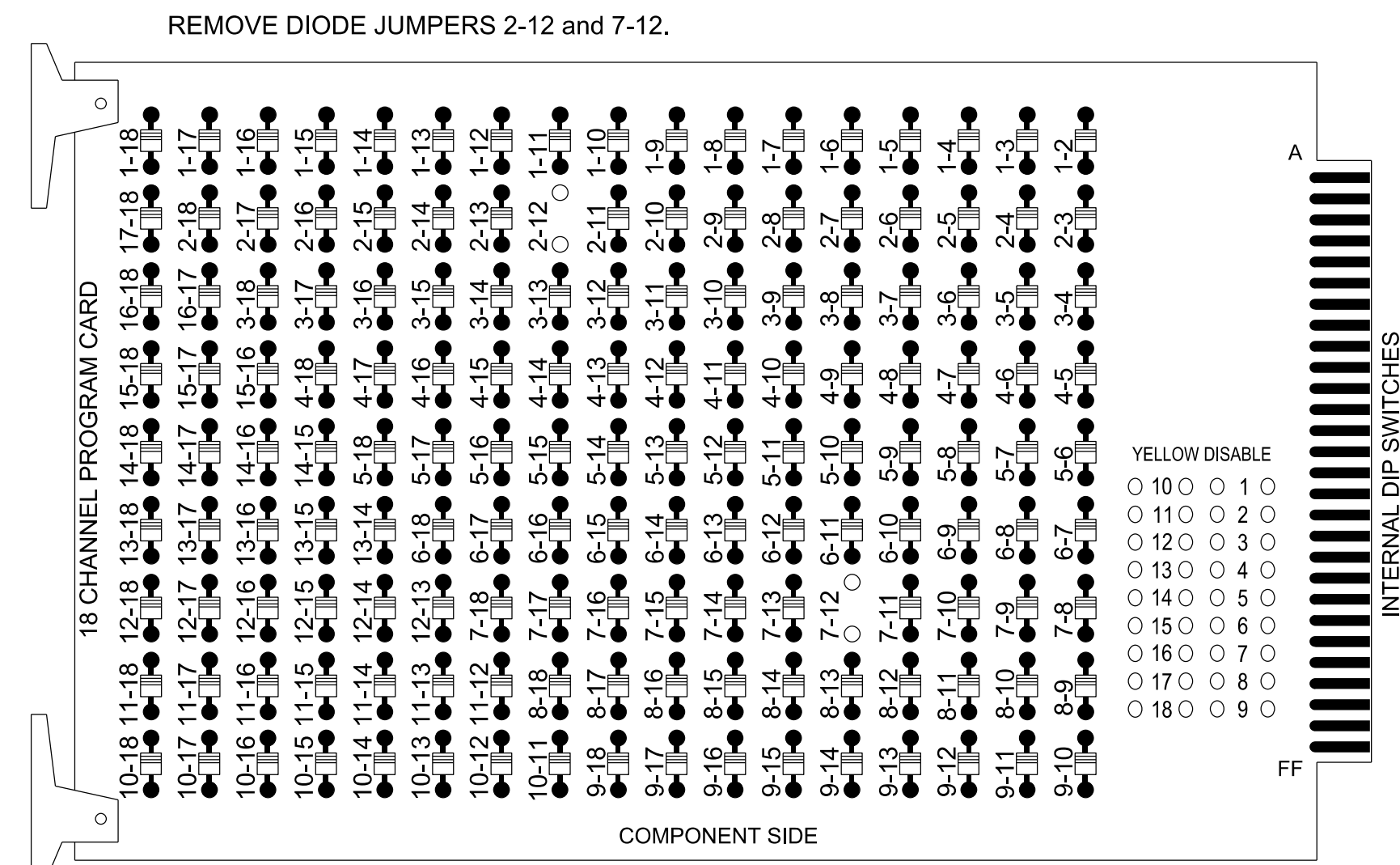


18 CHANNEL CONFLICT MONITOR PROGRAMMING DETAIL

(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. 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 plan.
2. Program controller to start up in phase 2 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.

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, S10, AUX S5
 Phases Used.....2,7
 Overlap "1".....NOT USED
 Overlap "2".....NOT USED
 Overlap "3".....NOT USED
 Overlap "4".....*

*See overlap programming detail on sheet 2.

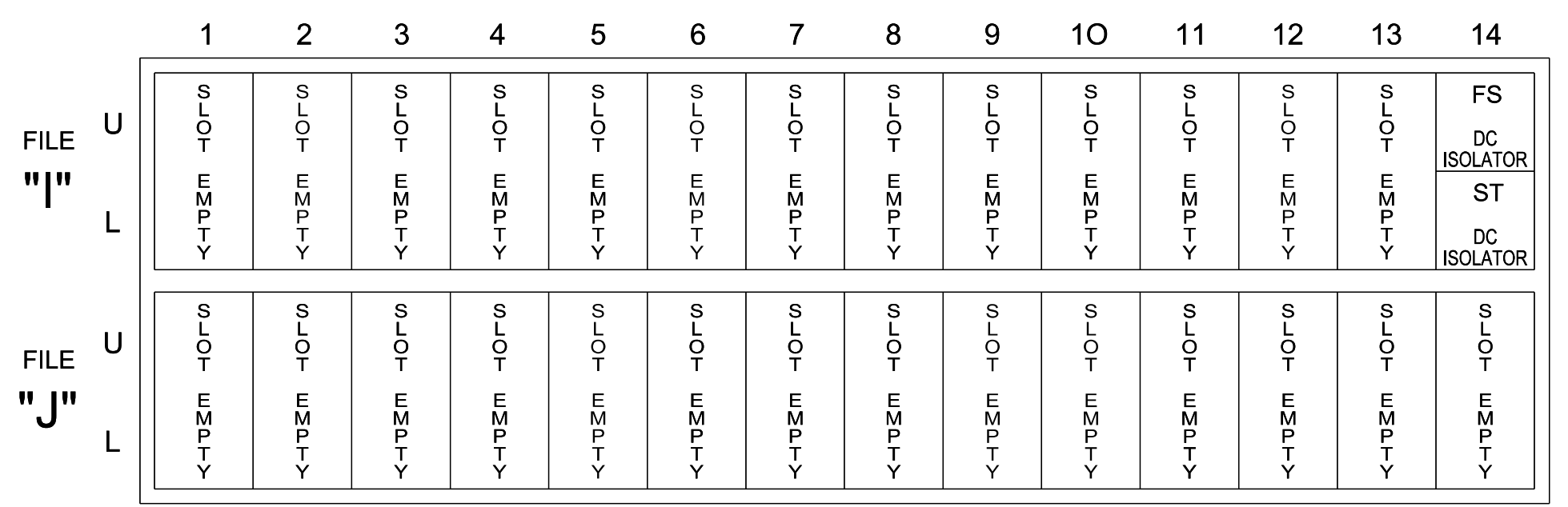
SIGNAL HEAD HOOK-UP CHART

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	NU	NU	NU	NU	71,72	*	NU	NU	NU	NU	NU	71,72	NU
RED		128																
YELLOW		129									*							
GREEN		130																
RED ARROW																		A101
YELLOW ARROW																		A102
FLASHING YELLOW ARROW																		A103
GREEN ARROW										124								

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

INPUT FILE POSITION LAYOUT

(front view)

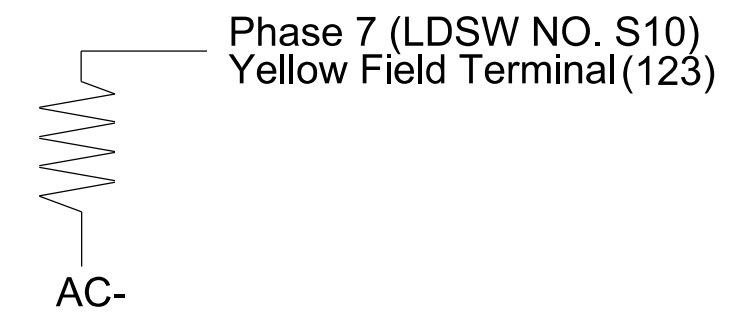


EX.: 1A, 2A, ETC. = LOOP NO.'S
 FS = FLASH SENSE
 ST = STOP TIME

LOAD RESISTOR INSTALLATION DETAIL

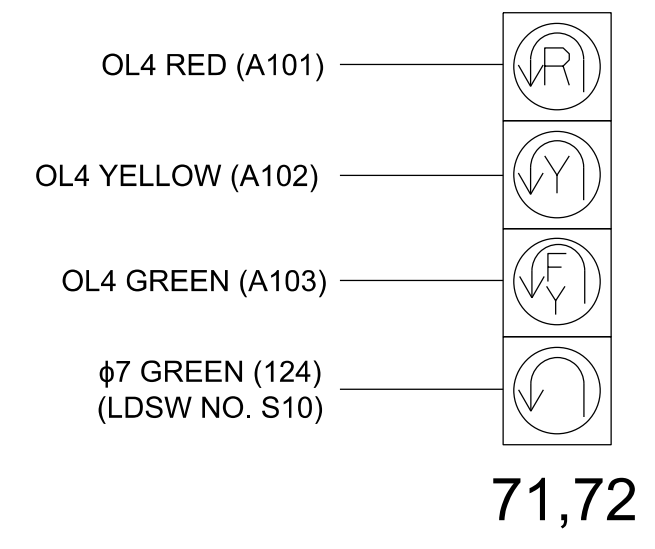
(install resistors as shown)

ACCEPTABLE VALUES	
Value (ohms)	Wattage
1.5K - 1.9K	25W (min)
2.0K - 3.0K	10W (min)



FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



MAXTIME OVERLAP PROGRAMMING DETAIL

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

Web Interface
 Home >Controller >Overlap Configuration >Overlaps

Overlap Plan 1

Overlap	4
Type	FYA 4 - Section
Included Phases	2
Modifier Phases	7
Trail Green	0
Trail Yellow	0.0
Trail Red	0.0

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 11-1461T1
 DESIGNED: May 2023
 SEALED: 5/24/2023
 REVISED: N/A

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.

Temporary Installation - Electrical Detail 1 of 1 (Phase 11)

US 421 - NC 16 at Addison Avenue/ Big Lots Entrance East U-Turn

Division 11 Wilkes County Wilkesboro

PLAN DATE: May 2023 REVIEWED BY: J. Ma
 PREPARED BY: M.L. Stygles REVIEWED BY: S.R. Chiluka

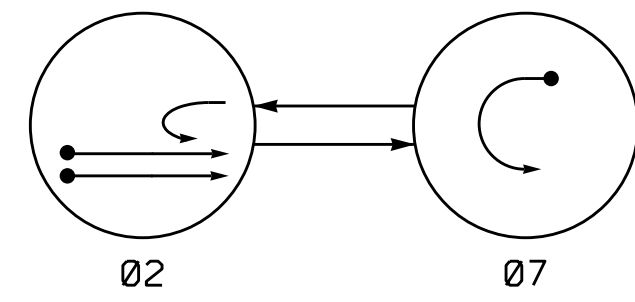
750 N. Greenfield Pkwy, Garner, NC 27529

Seal: NORTH CAROLINA PROFESSIONAL ENGINEER MATTHEW L. STYGLES

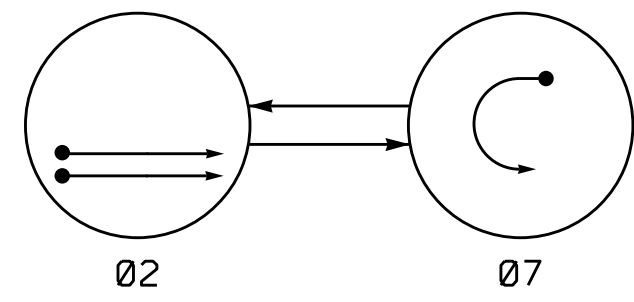
5/24/2023

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DEFAULT PHASING DIAGRAM



ALTERNATE PHASING DIAGRAM

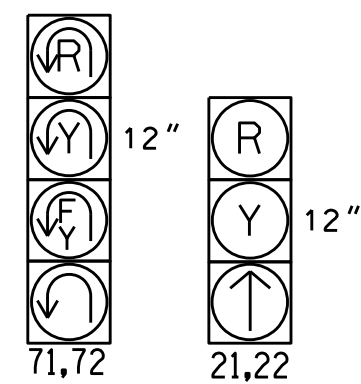


PHASING DIAGRAM DETECTION LEGEND

- ←●→ DETECTED MOVEMENT
- ←→ UNDETECTED MOVEMENT (OVERLAP)
- ←- - - UN SIGNALIZED MOVEMENT
- ←- - - PEDESTRIAN MOVEMENT

SIGNAL FACE I.D.

All Heads L.E.D.



SIGNAL FACE	PHASE		
	Ø2	Ø7	FLASH
21,22	↑	R	Y
71,72	↓	⊘	⊘

SIGNAL FACE	PHASE		
	Ø2	Ø7	FLASH
21,22	↑	R	Y
71,72	↓	⊘	⊘

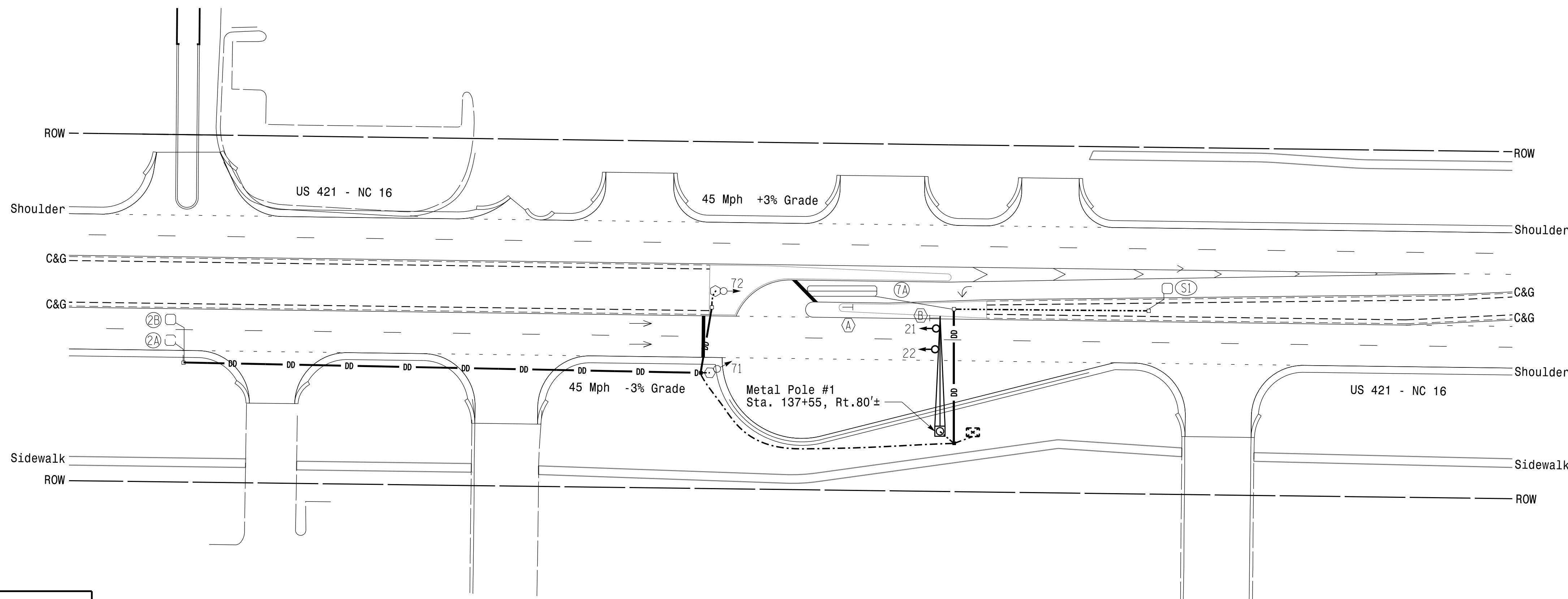
MAXTIME DETECTOR INSTALLATION CHART										
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING					
					CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL CALL	DELAY DURING GREEN
2A	6X6	300	5	X	2	-	-	X	X	X
2B	6X6	300	5	X	2	-	-	X	X	X
7A	6X40	0	2-4-2	X	7	15.0*	-	X	-	X
S1	6X6	200	3	X	-	-	-	-	-	X

* Disable delay during alternate phasing operation

2 Phase Fully Actuated W/ Alternate Phasing Operation Wilkesboro Closed Loop System

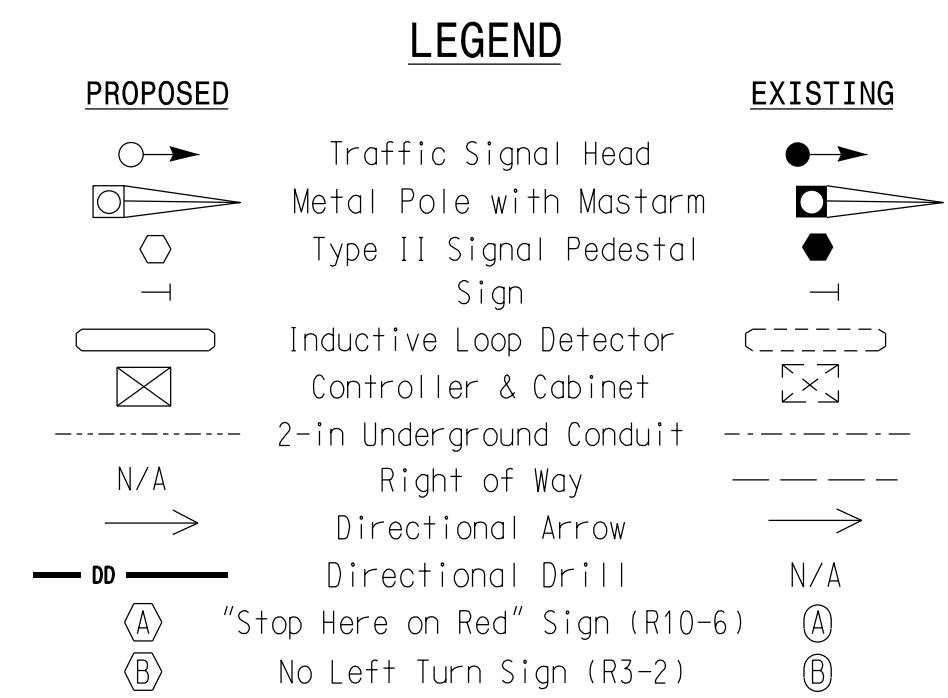
NOTES

- 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.
- Set all detector units to presence mode.
- The Division Traffic Engineer will determine the hours of use for each phasing plan.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- Refer to Pavement Marking Plans for proposed stop bar locations.



FEATURE	PHASE	
	2	7
Walk *	-	-
Ped Clear *	-	-
Min Green	12	7
Passage *	6.0	2.0
Max 1 *	60	30
Yellow Change	4.8	3.0
Red Clear	1.0	3.9
Added Initial *	1.5	-
Maximum Initial *	34	-
Time Before Reduction *	15	-
Time To Reduce *	30	-
Minimum Gap	3.4	-
Advance Walk	-	-
Non Lock Detector	-	X
Vehicle 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.



New Installation - Final Design

750 N. Greenfield Pkwy, Garner, NC 27529

US 421-NC 16 at Addison Avenue/ Big Lots Entrance

West U-Turn

Division 11 Wilkes County Wilkesboro

PLAN DATE: May 2023 REVIEWED BY: M. Stygles

PREPARED BY: S.R. Chiluka REVIEWED BY: J. Ma

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL

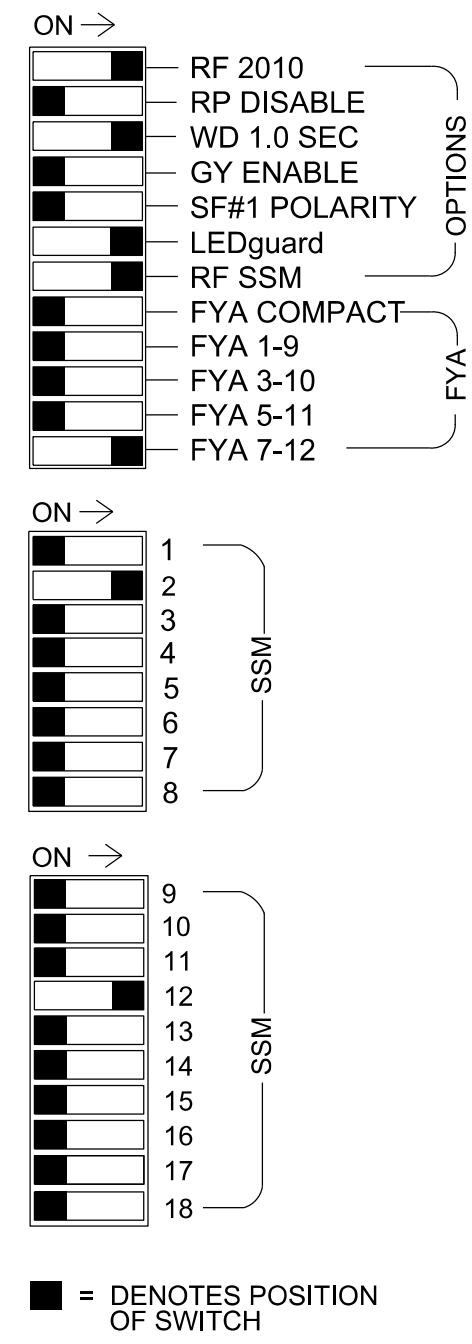
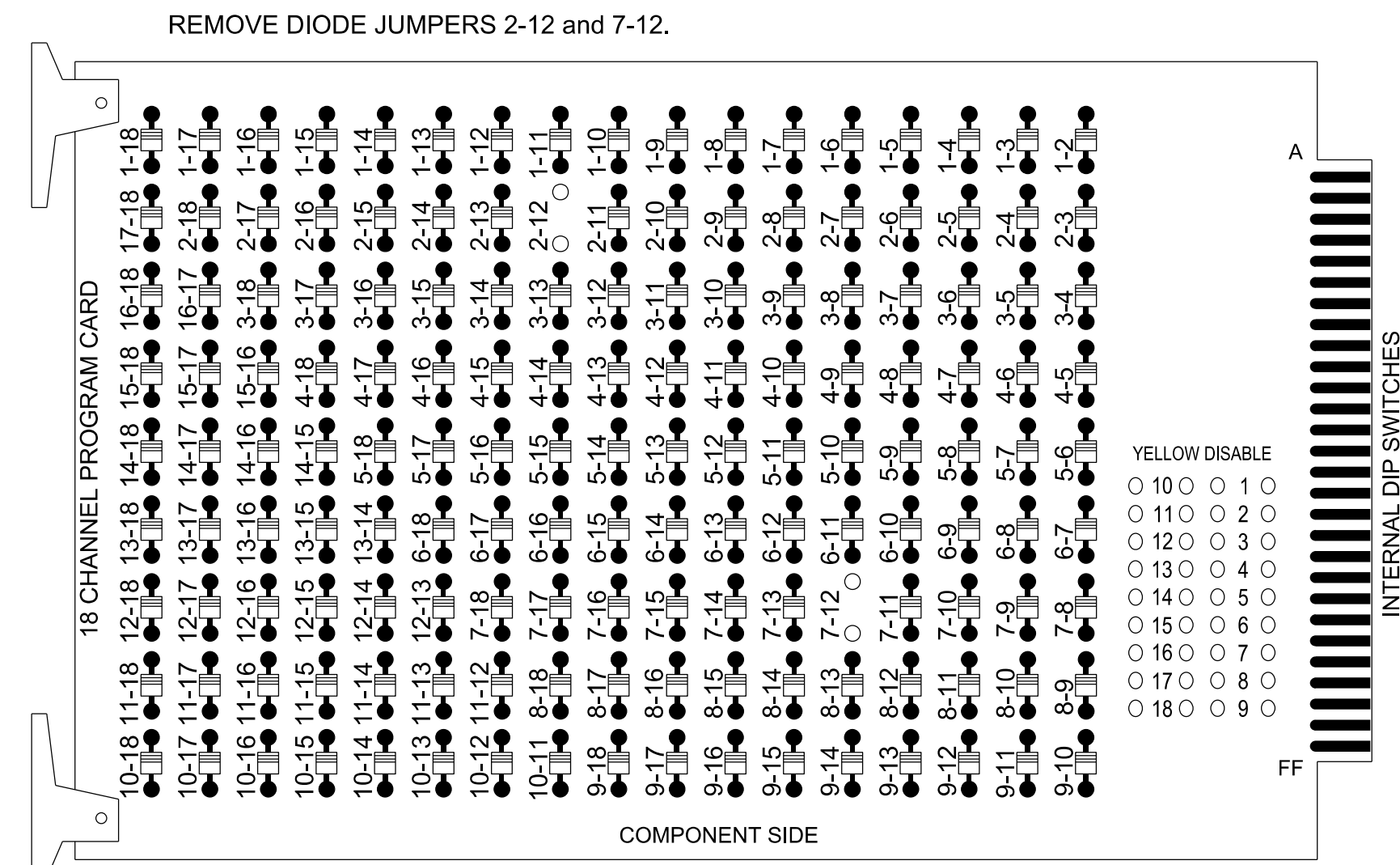
5/24/2023

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18 CHANNEL 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. 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 plan.
2. Program controller to start up in phase 2 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 Wilkesboro Closed Loop System.

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, S10, AUX S5
 Phases Used.....2,7
 Overlap "1".....NOT USED
 Overlap "2".....NOT USED
 Overlap "3".....NOT USED
 Overlap "4".....*

*See overlap programming detail on sheet 2.

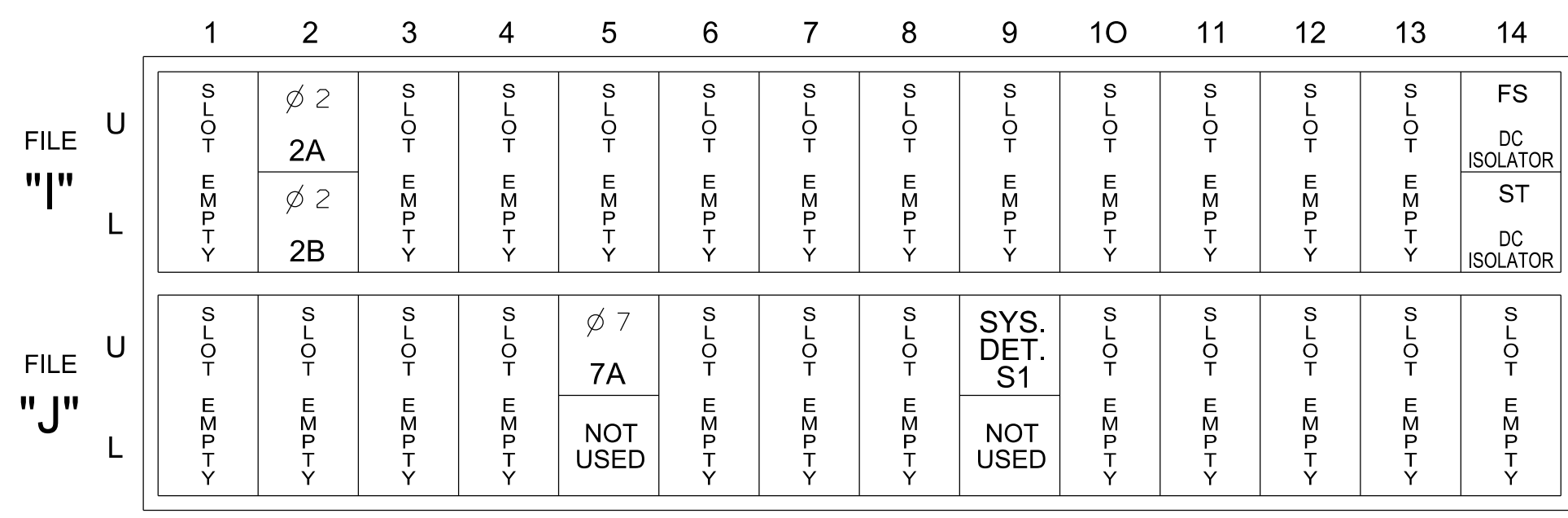
SIGNAL HEAD HOOK-UP CHART

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	PED	3	4	PED	5	6	PED	7	8	PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	NU	21,22	NU	NU	NU	NU	NU	NU	NU	71,72	*	NU	NU	NU	NU	NU	71,72	NU
RED		128																
YELLOW		129								*								
GREEN		130																
RED ARROW																		A101
YELLOW ARROW																		A102
FLASHING YELLOW ARROW																		A103
GREEN ARROW										124								

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

INPUT FILE POSITION LAYOUT

(front view)

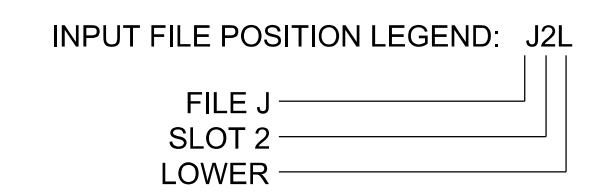


EX.: 1A, 2A, ETC. = LOOP NO.'S
 FS = FLASH SENSE
 ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

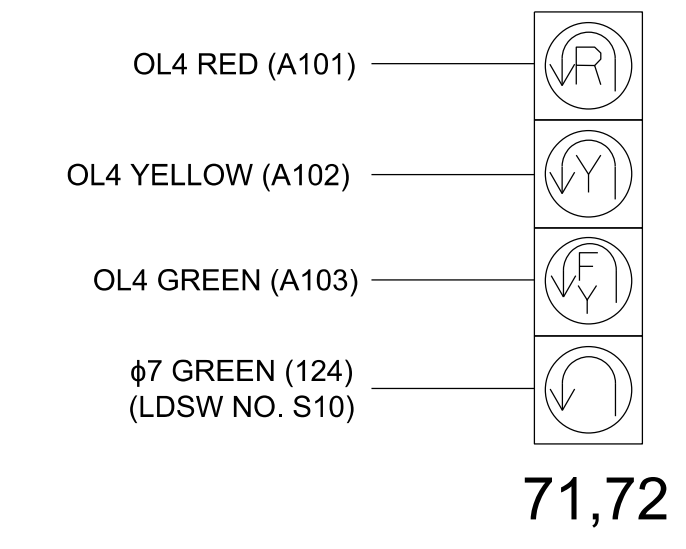
LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	QUEUE	CALL	DELAY DURING GREEN
2A	TB2-5.6	I2U	39	1	2	2			X	X		X	
2B	TB2-7.8	I2L	43	5	3	2			X	X		X	
7A	TB5-5.6	J5U	57	19	21	7	15		X			X	
*S1	TB7-9,10	J9U	59	21	27	SYS			X			X	

*System detector only. Remove any assigned vehicle phase.



FYA SIGNAL WIRING DETAIL

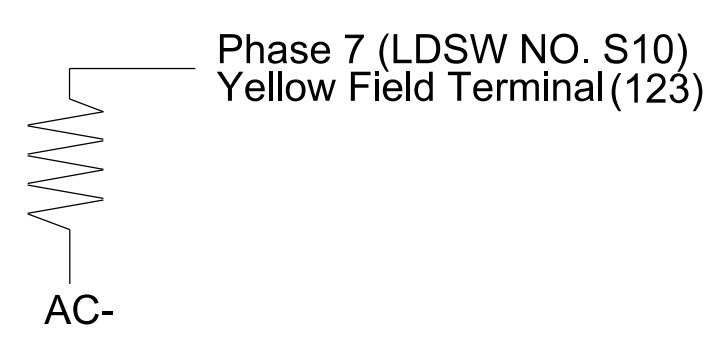
(wire signal heads as shown)



LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

ACCEPTABLE VALUES	Value (ohms)	Wattage
	1.5K - 1.9K	25W (min)
	2.0K - 3.0K	10W (min)



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 11-1461
 DESIGNED: May 2023
 SEALED: 5/24/2023
 REVISED: N/A



Electrical Detail Sheet 1 of 2

Electrical and Programming Details For: **US 421-NC 16 at Addison Avenue/ Big Lots Entrance West U-Turn**

Prepared for the Offices of:

Division 11 Wilkes County Wilkesboro

PLAN DATE: May 2023 REVIEWED BY: J. Ma
 PREPARED BY: M.L. Stygles REVIEWED BY: S.R. Chiluka

REVISIONS: _____ INIT. DATE

DocuSigned by: 5/24/2023

SIG. INVENTORY NO. 11-1461

5/23/2019 3:15:01 PM ***BDD:*** U-5312 Wilkes County Traffic Signal Design Plans U-5312_11-1461_Sig_ei_e.Addison Ave_West U Turn.dgn

MAXTIME OVERLAP PROGRAMMING DETAIL FOR DEFAULT PHASING

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

Overlap Plan 1

Overlap	4
Type	FYA 4 - Section
Included Phases	2
Modifier Phases	7
Trail Green	0
Trail Yellow	0.0
Trail Red	0.0

MAXTIME OVERLAP PROGRAMMING DETAIL FOR ALTERNATE PHASING

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

In the table view of the web interface, right click on "Overlap" in the top left corner of the table. Copy the entire contents of Overlap Plan 1. Paste Overlap Plan 1 into Overlap Plan 2. Modify Overlap Plan 2 as shown below and save changes.

Overlap Plan 2

Overlap	4
Type	FYA 4 - Section
Included Phases	-
Modifier Phases	7
Trail Green	0
Trail Yellow	0.0
Trail Red	0.0

← NOTICE INCLUDED PHASE

MAXTIME ALTERNATE PHASING ACTIVATION DETAIL

To run alternate phasing, select a Pattern that is programmed to run Overlap Plan 2 and Detector Plan 2. A Pattern can be selected through the scheduler or manually by changing the Operational Mode.

PHASING	OVERLAP PLAN	VEH DET PLAN
ACTIVE PLAN REQUIRED TO RUN DEFAULT PHASING	1	1
ACTIVE PLAN REQUIRED TO RUN ALTERNATE PHASING	2	2

ALTERNATE PHASING CHANGE SUMMARY

THE FOLLOWING IS A SUMMARY OF WHAT TAKES PLACE WHEN OVERLAP 2 AND VEHICLE DETECTOR PLAN 2 ACTIVATE TO CALL THE "ALTERNATE PHASING":

OVERLAP PLAN 2: Modifies overlap included phases for heads 71 and 72 to run protected turns only.

VEH DET PLAN 2: Reduces delay time for phase 7 call on loop 7A to 0 seconds.

MAXTIME DETECTOR PROGRAMMING DETAIL FOR ALTERNATE PHASING LOOP 7A

Front Panel
Main Menu >Controller >Detector >Veh Det Plans

Web Interface
Home >Controller >Detector Configuration >Vehicle Detectors

In the table view of web interface right click on "Detector" in the top left corner of the table. Copy the entire contents of Detector Plan 1. Paste Detector Plan 1 into Detector Plan 2. Modify Detector Plan 2 as shown below and save changes.

Plan 2

Detector	Call Phase	Delay
21	7	-

7A

MAXTIME ALTERNATE PHASING PATTERN PROGRAMMING DETAIL

Front Panel
Main Menu >Controller >Coordination >Patterns

Web Interface
Home >Controller >Coordination >Patterns

Pattern Parameters

Pattern	Veh Det Plan	Overlap Plan
*	2	2

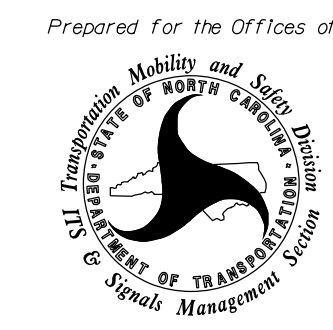
* The Pattern number(s) are to be determined by the Division and/or City Traffic Engineer.

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 11-1461
DESIGNED: May 2023
SEALED: 5/24/2023
REVISED: N/A



Electrical Detail Sheet 2 of 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:



750 N. Greenfield Pkwy, Garner, NC 27529

US 421-NC 16 at Addison Avenue/ Big Lots Entrance West U-Turn

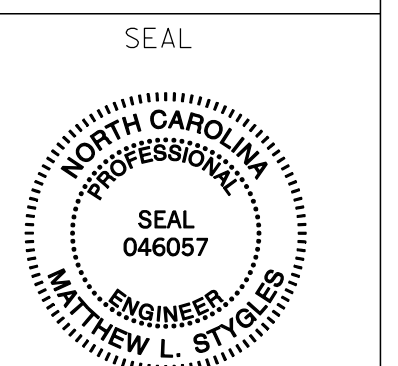
Division 11 Wilkes County Wilkesboro

PLAN DATE: May 2023 REVIEWED BY: J. Ma

PREPARED BY: M.L. Stygles REVIEWED BY: S.R. Chiluka

REVISIONS INIT. DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



DocuSigned by: M.L. Stygles 5/24/2023

SIGNATURE DATE

SIG. INVENTORY NO. 11-1461

METAL POLE No. 1

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	RIGID MOUNTED SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE	9.3 S.F.	25.5"W X 52.5"L	60 LBS
	SIGN RIGID MOUNTED	9.0 S.F.	36.0"W X 36.0"L	20 LBS
	STREET NAME SIGN RIGID MOUNTED	16.0 S.F.	24.0"W X 96.0"L	36 LBS

NOTES

DESIGN REFERENCE MATERIAL

- Design the traffic signal structure and foundation in accordance with:
 - The 6th Edition 2013 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
 - The 2018 NCDOT "Standard Specifications for Roads and Structures." The latest addenda to the specifications can be found in the traffic signal project special provisions.
 - The 2018 NCDOT Roadway Standard Drawings.
 - The traffic signal project plans and special provisions.
 - The NCDOT "Metal Pole Standards" located at the following NCDOT website:
<https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx>

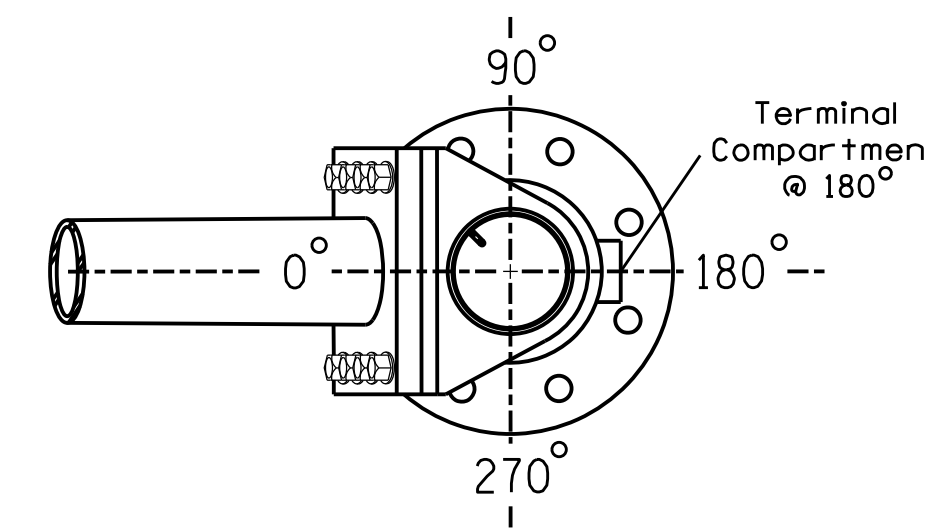
DESIGN REQUIREMENTS

- Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
- Design all signal supports using stress ratios that do not exceed 0.9.
- The camber design for the mast arm deflection should provide an appearance of a low pitched arch where the tip or the free end of the mast arm does not deflect below horizontal when fully loaded.
- A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements.
- Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
- The mast arm attachment height (H1) shown is based on the following design assumptions:
 - Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
 - Signal heads are rigidly mounted and vertically centered on the mast arm.
 - The roadway clearance height for design is as shown in the elevation views.
 - The top of the pole base plate is 0.75 feet above the ground elevation.
 - Refer to the Elevation Data Chart for the elevation differences between the proposed foundation ground level and the high point of the roadway.
- The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
 - Mast arm attachment height (H1) plus 2 feet, or
 - H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
- If pole location adjustments are required, the contractor must gain approval from the Engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signal Design Section Senior Structural Engineer for assistance at (919) 814-5000.
- The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
- The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

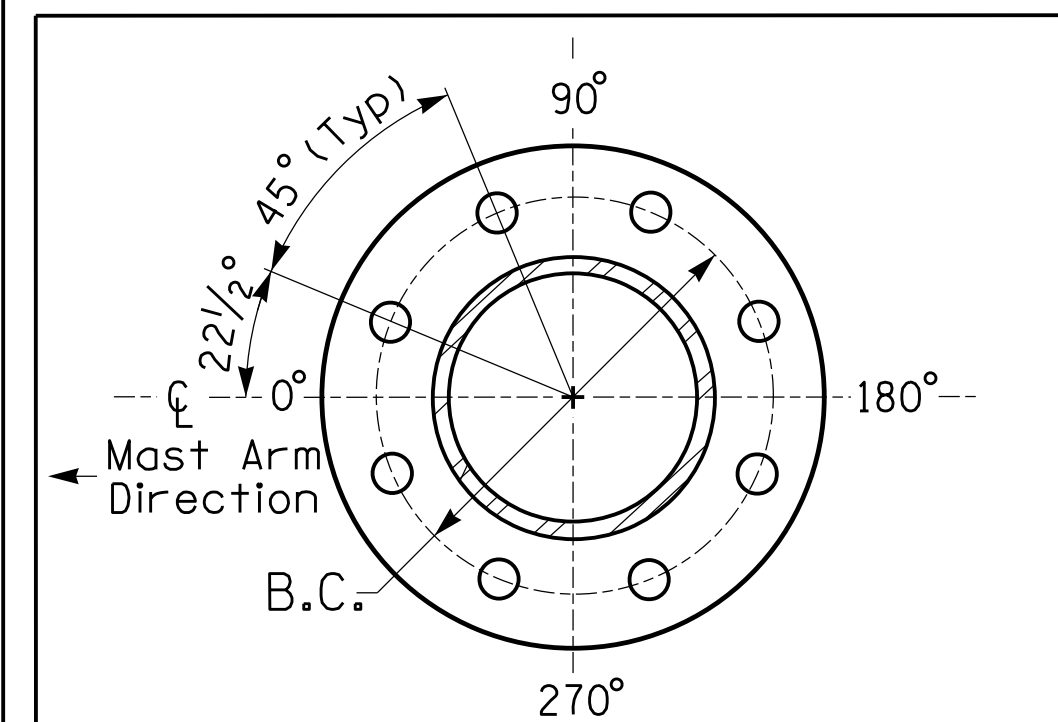
SPECIAL NOTE
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project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

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 1
Baseline reference point at ϕ Foundation @ ground level	0.0 ft.
Elevation difference at High point of roadway surface	-1.3 ft.
Elevation difference at Edge of travelway or face of curb	-2.3 ft.

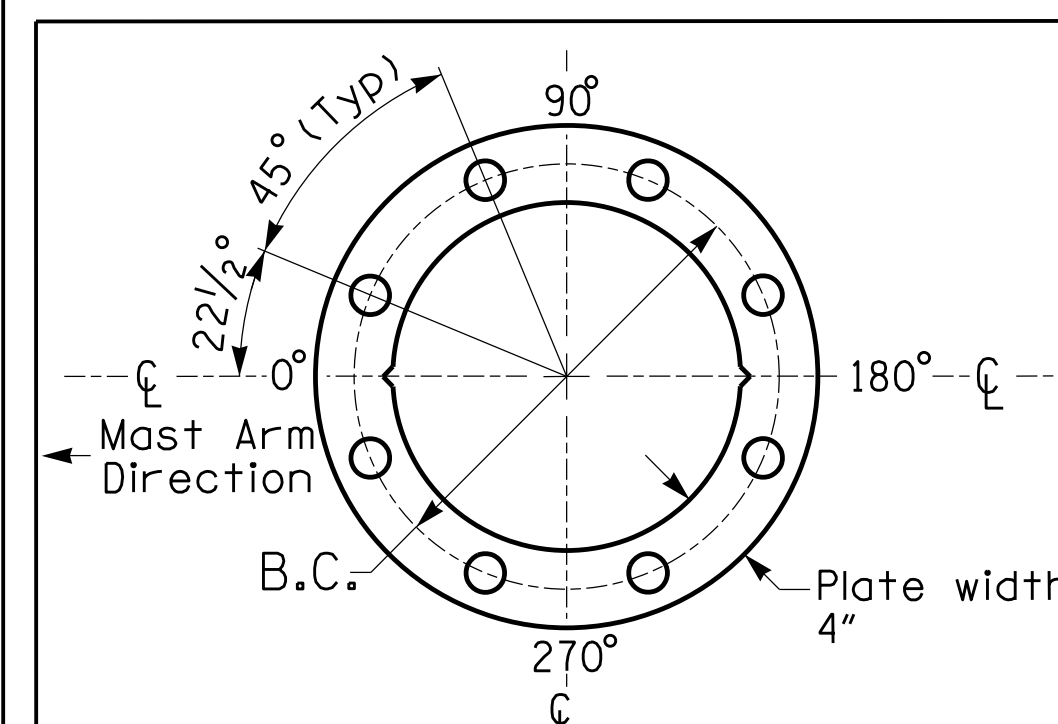


POLE RADIAL ORIENTATION



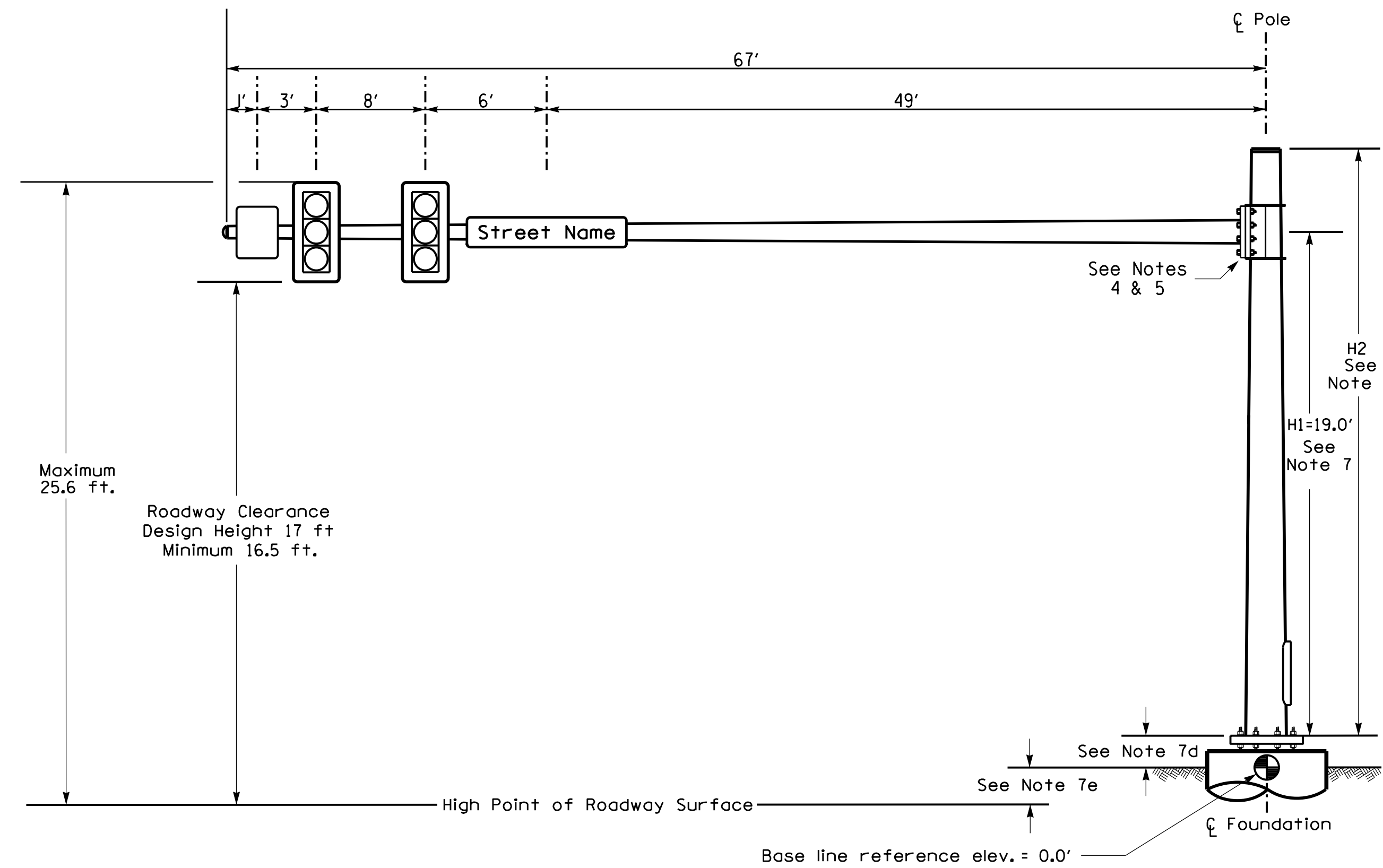
8 BOLT BASE PLATE DETAIL

See Note 6



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL
For 8 Bolt Base Plate

Design Loading for METAL POLE NO. 1



Elevation View

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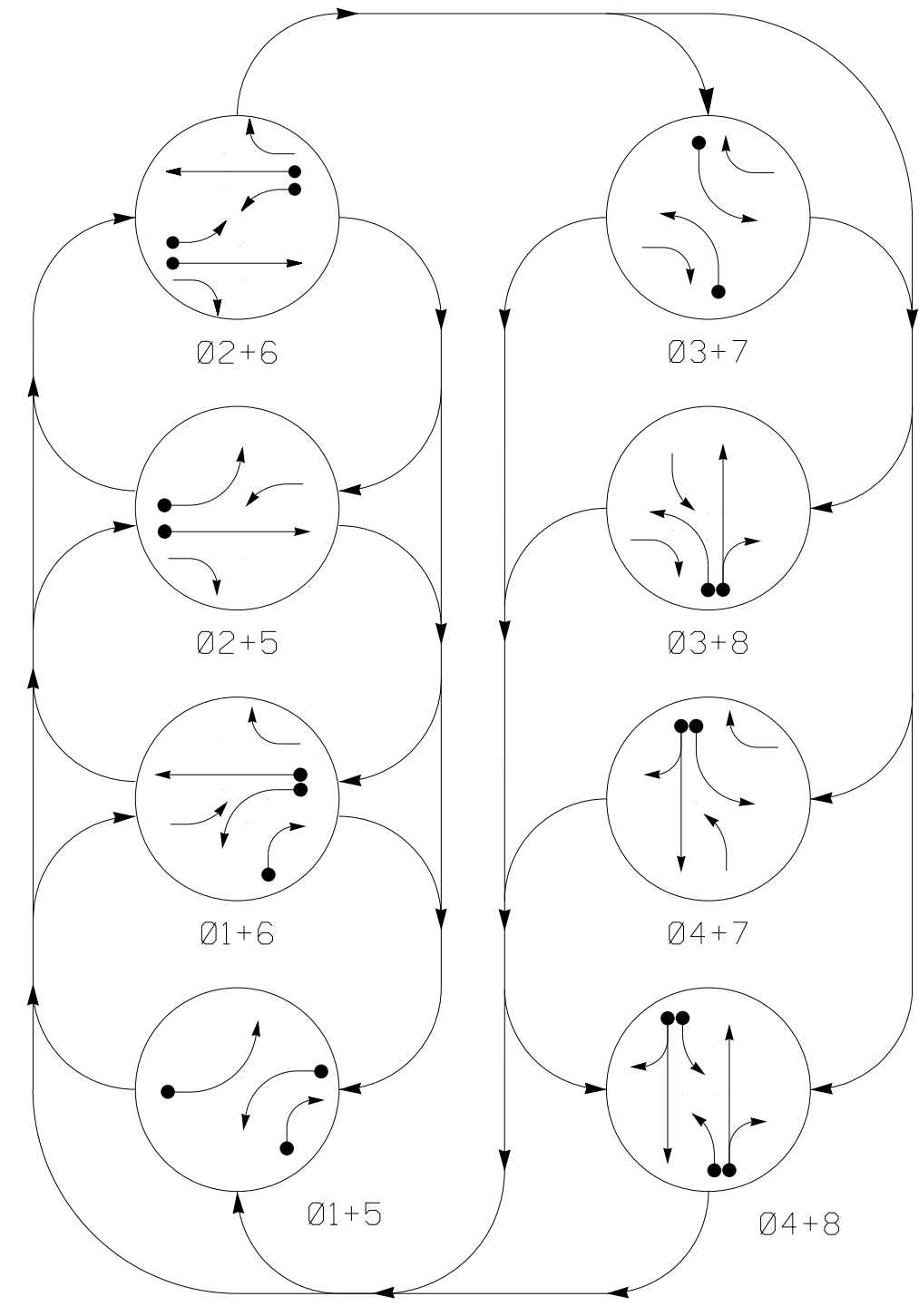
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NCDOT Wind Zone 4 (90 mph)

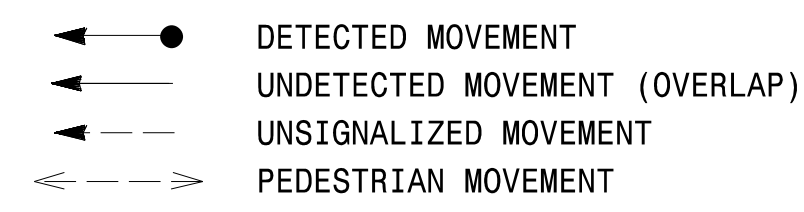
	Prepared For the Offices of: US 421-NC 16 at Addison Ave/ Big Lots Entrance West U-Turn		SEAL
	Division 11 PLAN DATE: May 2023 PREPARED BY: S.R. Chiluka	Wilkes County REVIEWED BY: M. Stygles REVIEWED BY: J. Ma	
750 N. Greenfield Pkwy, Garner, NC 27529 	SCALE: N/A	REVISIONS:	INIT. DATE:

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PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND



SIGNAL FACE I.D.

All Heads L.E.D.

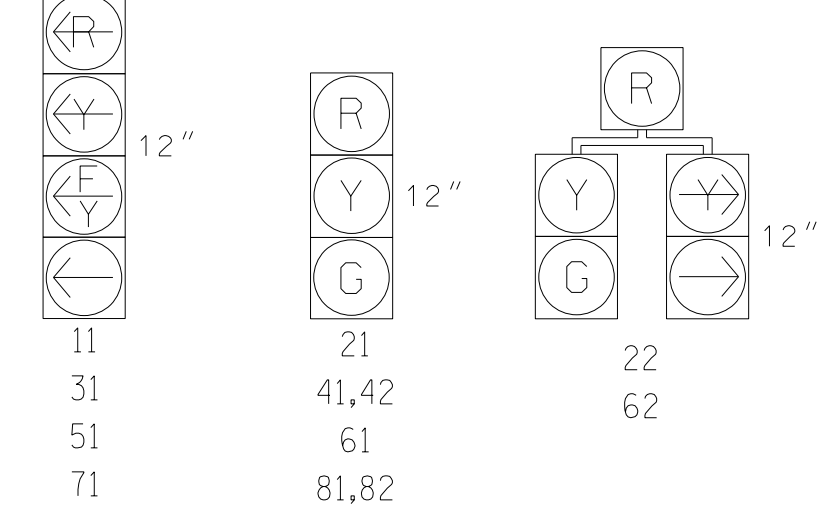


TABLE OF OPERATION

SIGNAL FACE	PHASE							
	Ø 1+5	Ø 1+6	Ø 2+5	Ø 2+6	Ø 3+7	Ø 3+8	Ø 4+7	Ø 4+8
11	←	←	←	←	←	←	←	←
21	R	R	G	G	R	R	R	Y
22	R	R	G	G	R	R	R	Y
31	R	R	R	R	←	←	←	←
41,42	R	R	R	R	R	G	G	R
51	←	←	←	←	←	←	←	←
61	R	G	R	G	R	R	R	Y
62	R	G	R	G	R	R	R	Y
71	R	R	R	R	←	←	←	←
81,82	R	R	R	R	R	G	G	R

MAXTIME DETECTOR INSTALLATION CHART

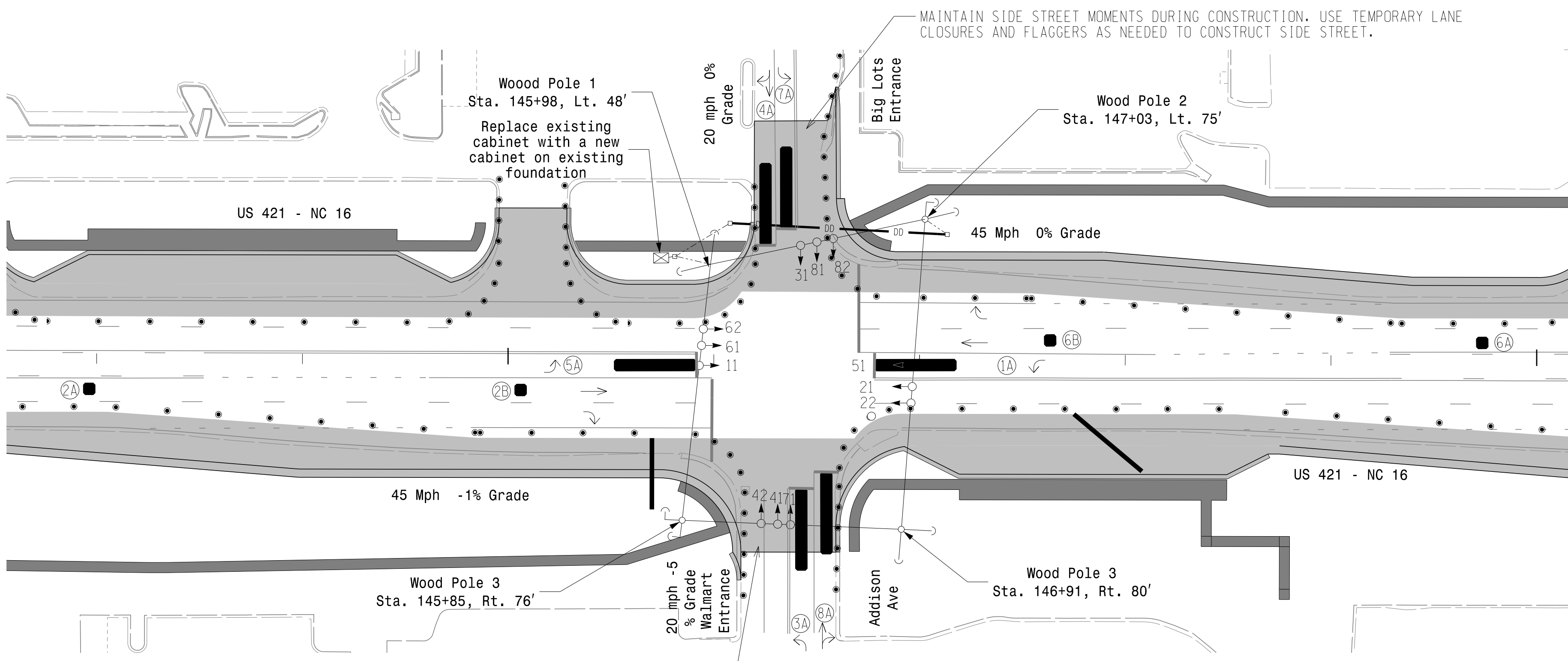
LOOP	DETECTOR		PROGRAMMING								
	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND INITIAL	ADDED INITIAL CALL	DELAY DURING GREEN	NEW CARD
1A	*	0	*	*	1	15.0	-	X	-	X	-
2A	*	300	*	*	2	-	1.6	X	-	X	-
2B	*	90	*	*	2	-	-	X	-	X	-
3A	*	0	*	*	3	15.0	-	X	-	X	-
4A	*	0	*	*	4	10.0	-	X	-	X	-
5A	*	0	*	*	5	15.0	-	X	-	X	-
6A	*	300	*	*	6	-	1.6	X	-	X	-
6B	*	90	*	*	6	-	-	X	-	X	-
7A	*	0	*	*	7	15.0	-	X	-	X	-
8A	*	0	*	*	8	10.0	-	X	-	X	-

*Video Detection Zone

8 Phase Fully Actuated (Isolated)

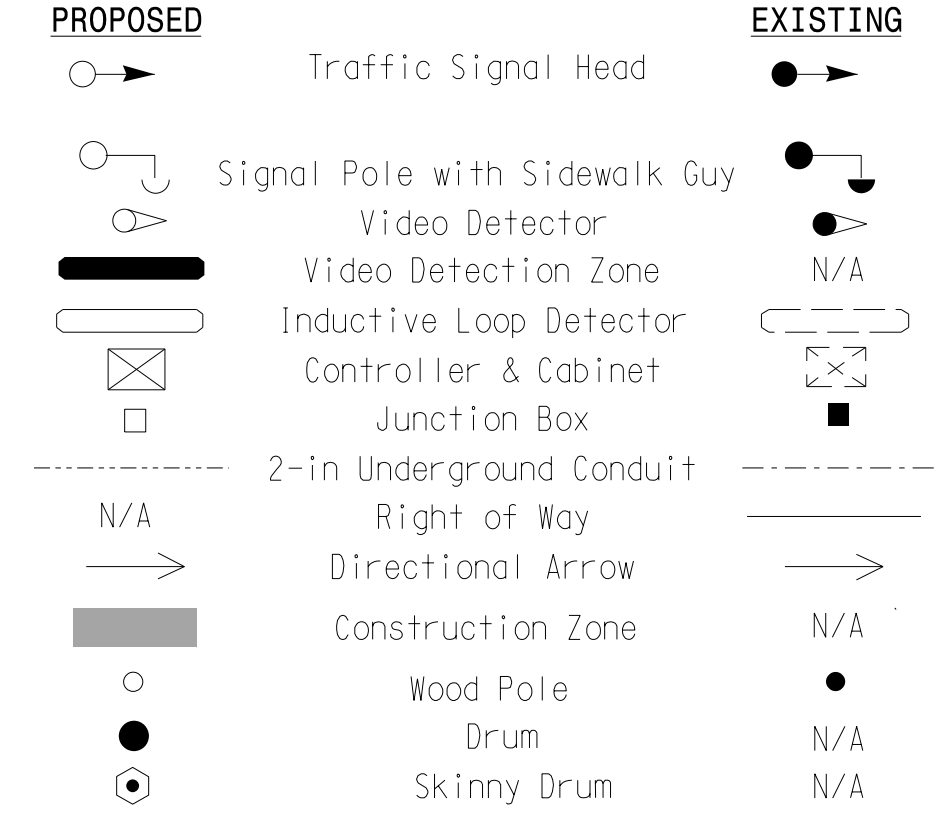
NOTES

- 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 operation unless otherwise directed by the Engineer.
- Set all detector units to presence mode.
- This intersection uses video detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.
- Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
- Refer to Pavement Marking Plans for proposed stop bar locations.



MAINTAIN SIDE STREET MOMENTS DURING CONSTRUCTION. USE TEMPORARY LANE CLOSURES AND FLAGGERS AS NEEDED TO CONSTRUCT SIDE STREET.

LEGEND



MAXTIME TIMING CHART

FEATURE	PHASE							
	1	2	3	4	5	6	7	8
Walk *	-	-	-	-	-	-	-	-
Ped Clear *	-	-	-	-	-	-	-	-
Min Green	7	12	7	7	7	12	7	7
Passage *	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Max 1 *	15	45	15	20	15	45	15	20
Yellow Change	3.0	4.6	3.1	3.0	3.0	4.5	3.0	3.0
Red Clear	1.8	1.0	2.6	3.2	2.3	1.0	2.8	2.9
Added Initial *	-	-	-	-	-	-	-	-
Maximum Initial *	-	-	-	-	-	-	-	-
Time Before Reduction *	-	-	-	-	-	-	-	-
Time To Reduce *	-	-	-	-	-	-	-	-
Minimum Gap	-	-	-	-	-	-	-	-
Advance Walk	-	-	-	-	-	-	-	-
Non Lock Detector	X	-	X	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.

Signal Upgrade - Temporary Design 1(Phase 10)

Prepared For the Offices of:

US 421-NC 16 at Addison Ave/Walmart Entrance

Division 11 Wilkes County Wilkesboro

PLAN DATE: May 2023 REVIEWED BY: M.L. Stygles

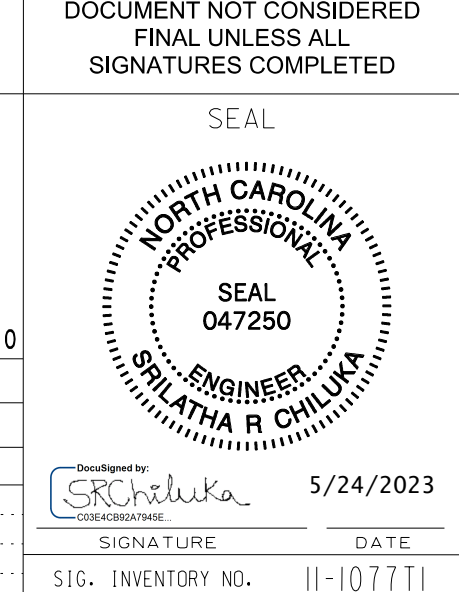
PREPARED BY: S.R. Chiluka REVIEWED BY: J. Ma

REVISIONS: _____ INIT. DATE

SCALE: 1"=40'

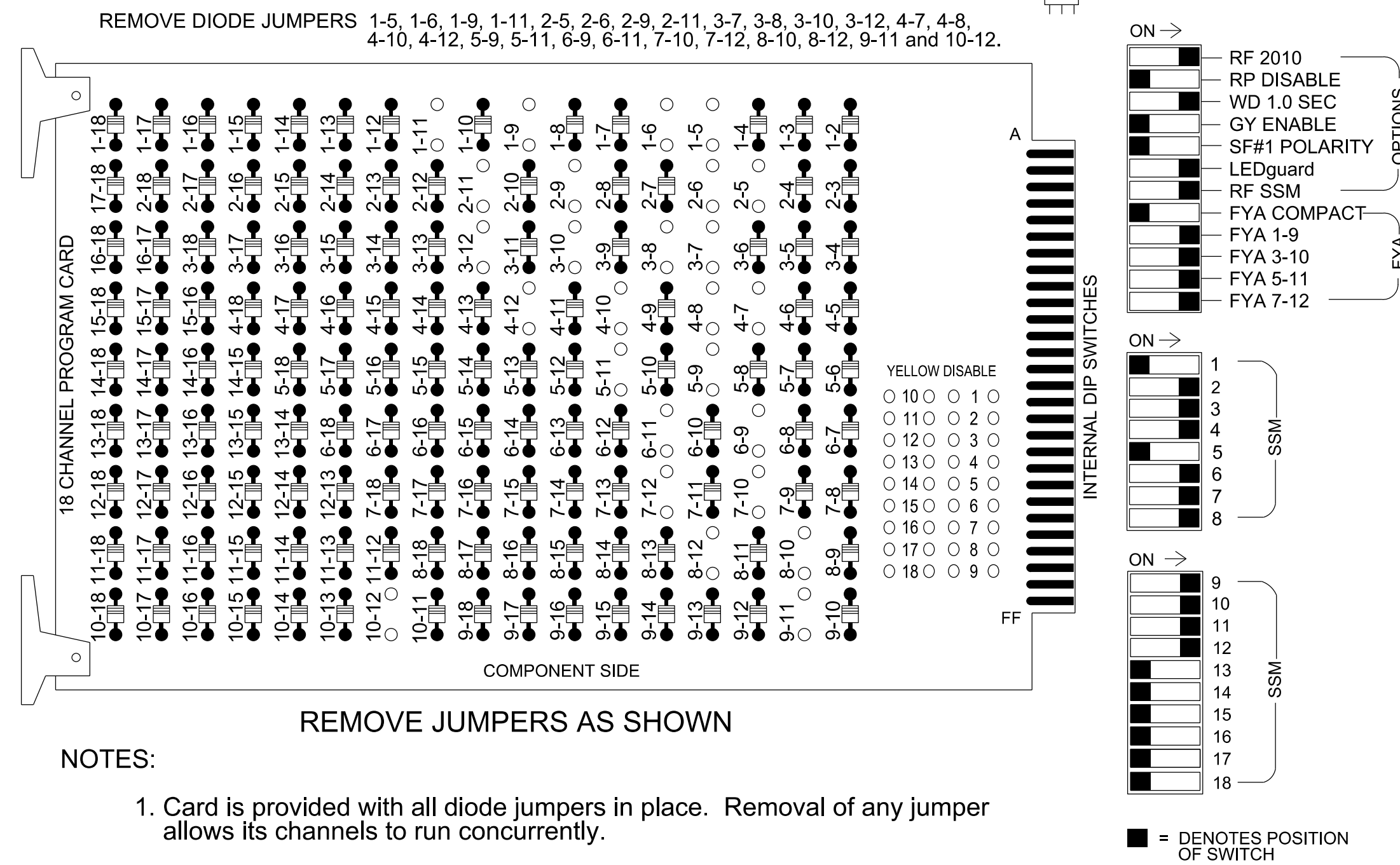
5/24/2023

SIG. INVENTORY NO. 11-107711



18 CHANNEL 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 plan.
- Program phases 4 and 8 for Dual Entry.
- 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.

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, S10, S11, AUX S1, AUX S2, AUX S4, AUX S5
 Phases Used.....1, 2, 3, 4, 5, 6, 7, 8
 Overlap "1".....*
 Overlap "2".....*
 Overlap "3".....*
 Overlap "4".....*

*See overlap programming detail on sheet 2

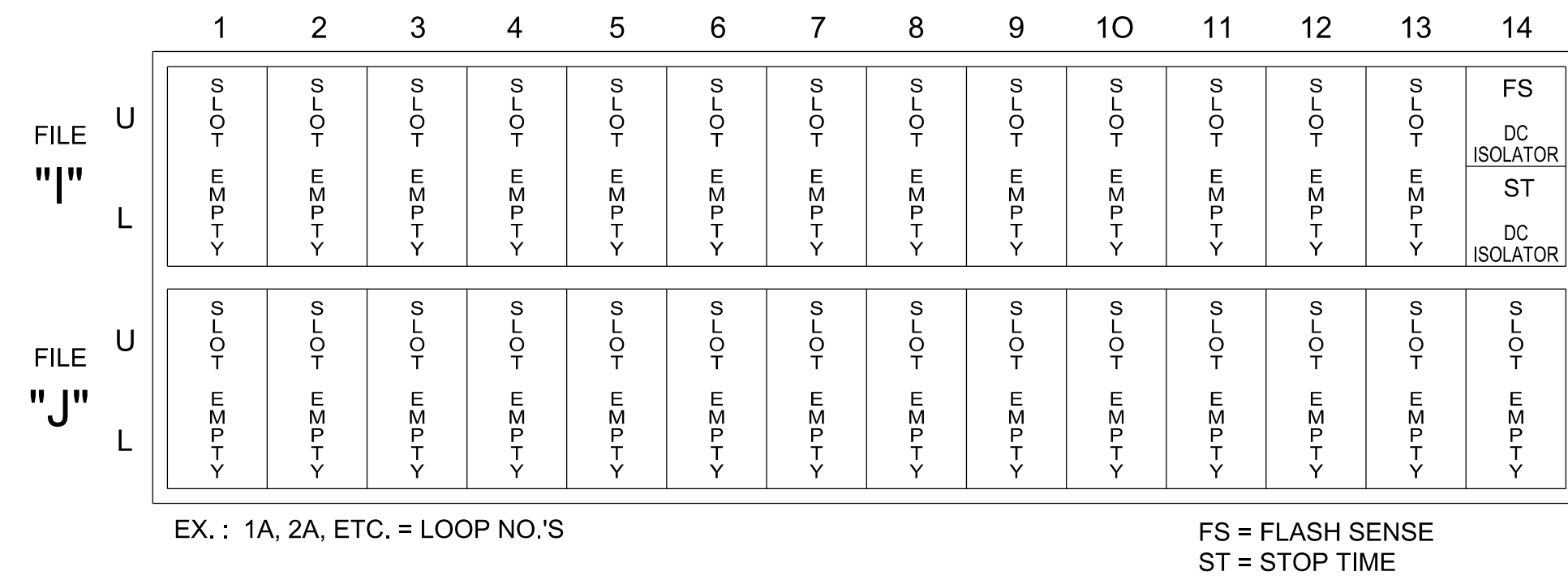
SIGNAL HEAD HOOK-UP CHART

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.	11*	21,22	NU	22	31*	41,42	NU	51*	61,62	NU	62	71*	81,82	NU	11*	31*	NU	51*	71*	NU
RED		128				101			134				107							
YELLOW	*	129			*	102		*	135			*	108							
GREEN		130				103			136				109							
RED ARROW															A121	A124		A114	A101	
YELLOW ARROW						117									A122	A125		A115	A102	
FLASHING YELLOW ARROW															A123	A126		A116	A103	
GREEN ARROW	127			118	118				133			124	124							

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)

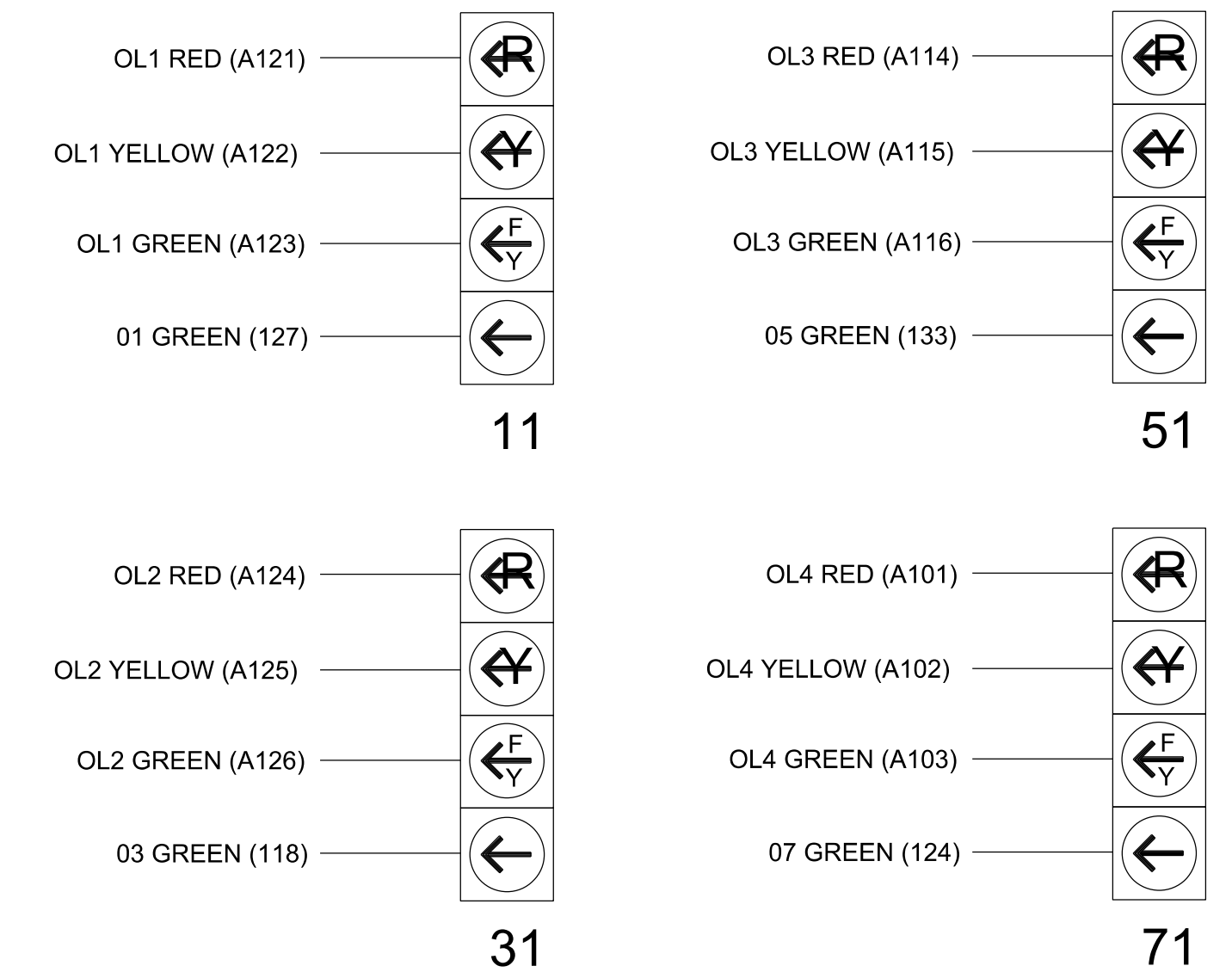


SPECIAL DETECTOR NOTE

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.

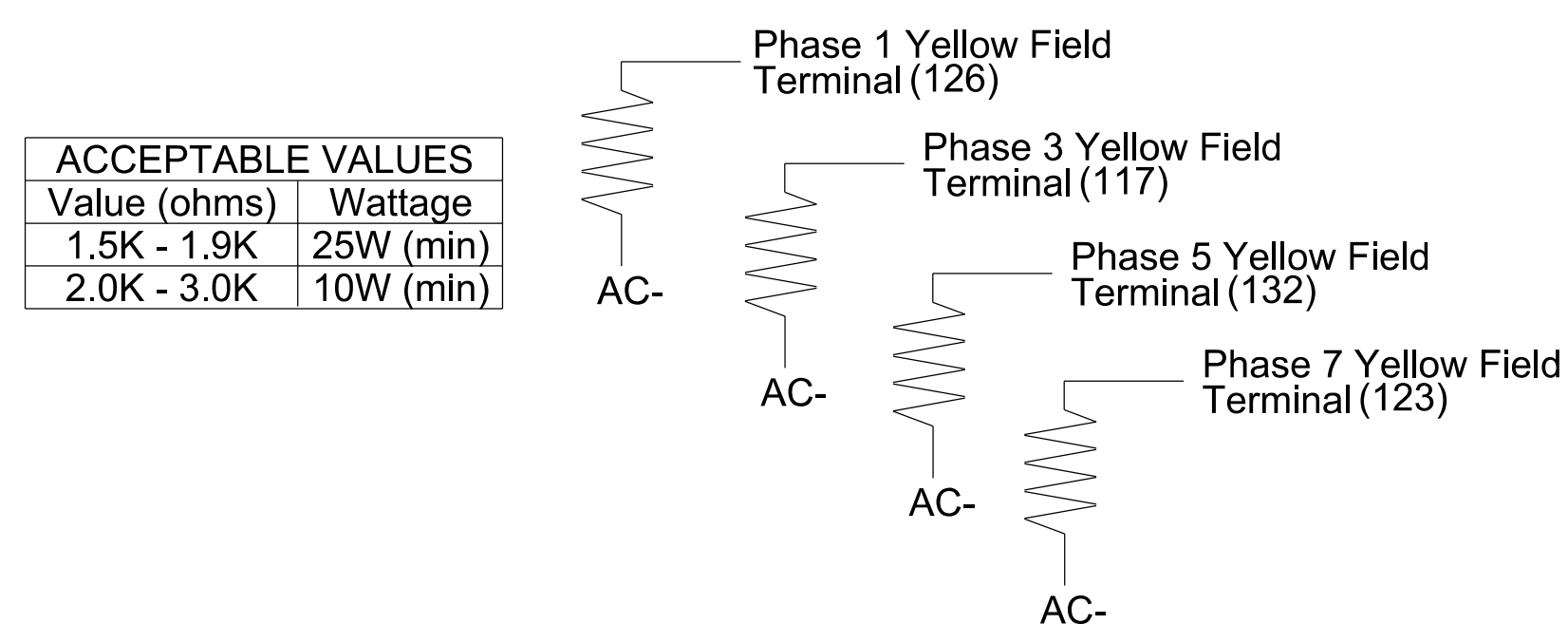
FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)



OVERLAP PROGRAMMING

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

Web Interface
 Home > Controller > Overlap Configuration > Overlaps

Overlap Plan 1

Overlap	1	2	3	4
Type	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section
Included Phases	2	4	6	8
Modifier Phases	1	3	5	7
Trail Green	0	0	0	0
Trail Yellow	0.0	0.0	0.0	0.0
Trail Red	0.0	0.0	0.0	0.0

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 11-107771
 DESIGNED: May 2023
 SEALED: 5/24/2023
 REVISED:

Temporary Installation - Electrical Detail 1 of 1 (Phase 10)

US 421 - NC 16 at Big Lots Entrance

Division 11 Wilkes County Wilkesboro

PLAN DATE: May 2023 REVIEWED BY: J.Ma
 PREPARED BY: M.L. Stygles REVIEWED BY: S.B. Chiluka

750 N. Greenfield Pkwy, Garner, NC 27529

DocuSigned by: M.L. Stygles 5/24/2023

919.829.0328

940 Main Campus Drive, Suite 500 Raleigh, NC 27606

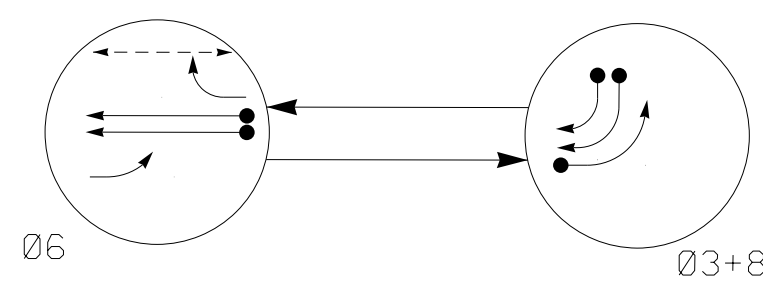
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DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

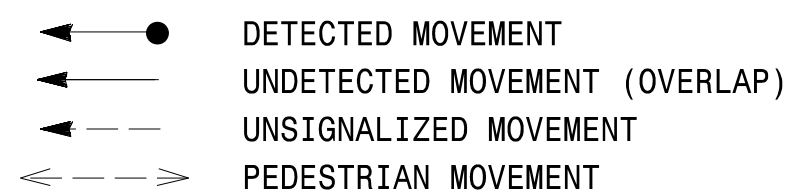
SEAL NORTH CAROLINA PROFESSIONAL ENGINEER MATTHEW L. STYGLES

SIG. INVENTORY NO. 11-107771

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND



SIGNAL FACE I.D.

All Heads L.E.D.

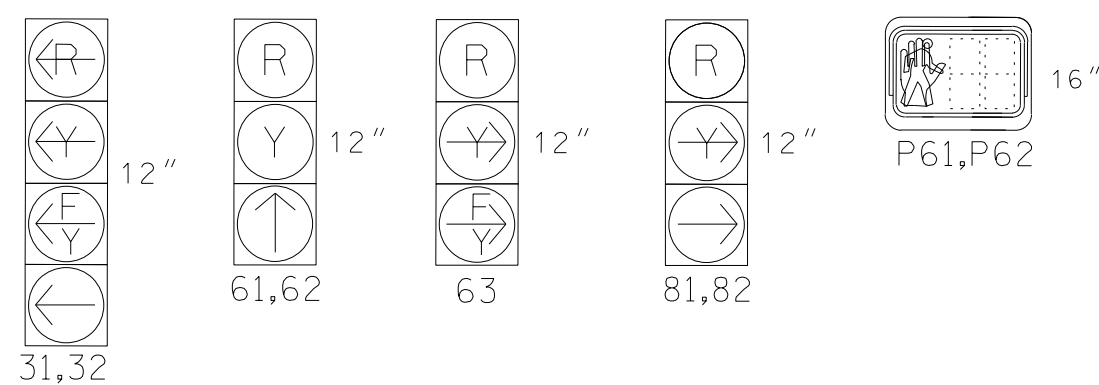


TABLE OF OPERATION

SIGNAL FACE	PHASE		
	06	03+8	03+8
31,32	←	→	→
61,62	↑	R	Y
63	←	R	→
81,82	R	→	R
P61,P62	W	DW	DRK

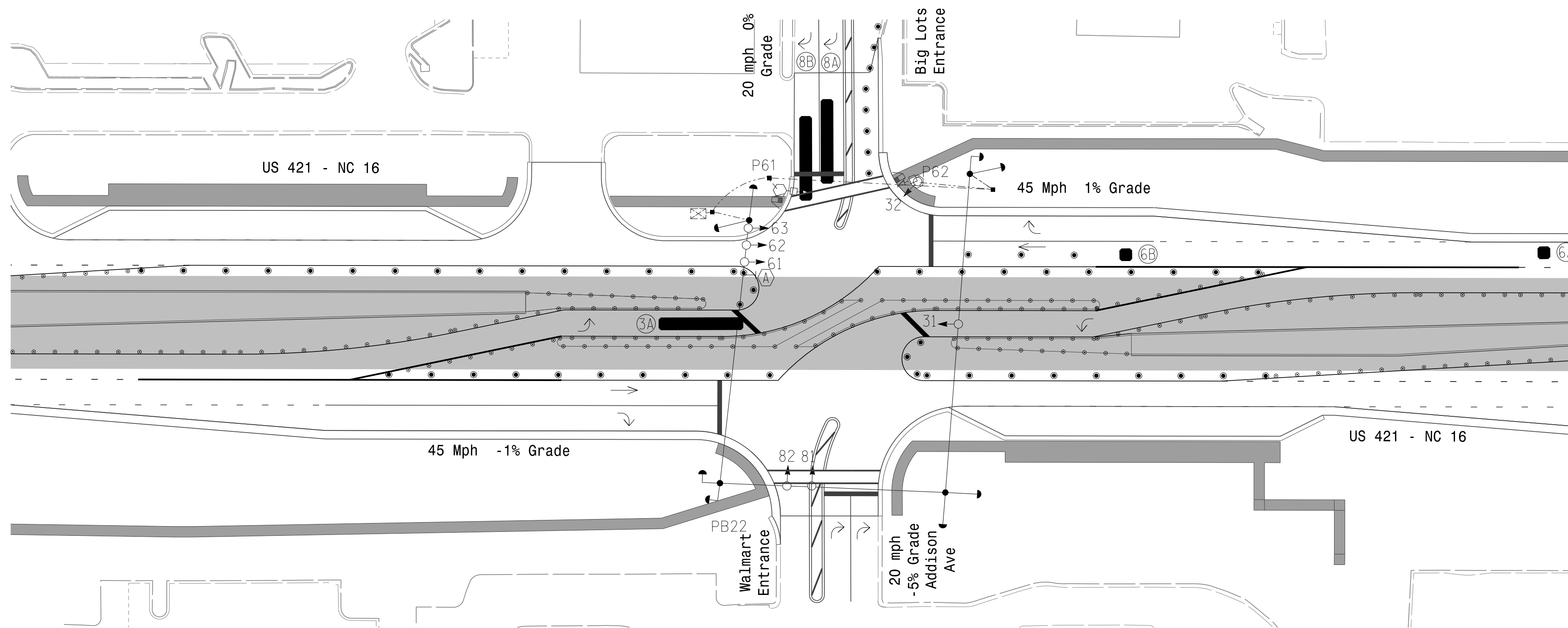
MAXTIME DETECTOR INSTALLATION CHART

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	
3A	*	0	*	*	3	15.0	-	X	-	X	-	*
6A	*	300	*	*	6	-	1.6	X	-	X	-	*
6B	*	90	*	*	6	-	-	X	-	X	-	*
8A	*	0	*	*	8	15.0	-	X	-	X	-	*
8B	*	0	*	*	8	15.0	-	X	-	X	-	*

*Video Detection Zone

8 Phase Fully Actuated US 421-NC 16 Closed Loop System 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 operation unless otherwise directed by the Engineer.
- Set all detector units to presence mode.
- This intersection uses video detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.
- Omit "walk" and flashing "Don't Walk" with no pedestrian calls.
- Program pedestrian heads to countdown the flashing "Don't Walk" time only.
- To provide a leading pedestrian interval on phase 6, program FYA heads 31, 32 and 63 to delay for 3 seconds after the start of the phase 6 walk interval. See electrical details.
- Refer to Pavement Marking Plans for proposed stop bar locations.
- Reposition existing signal heads as shown on this plan.



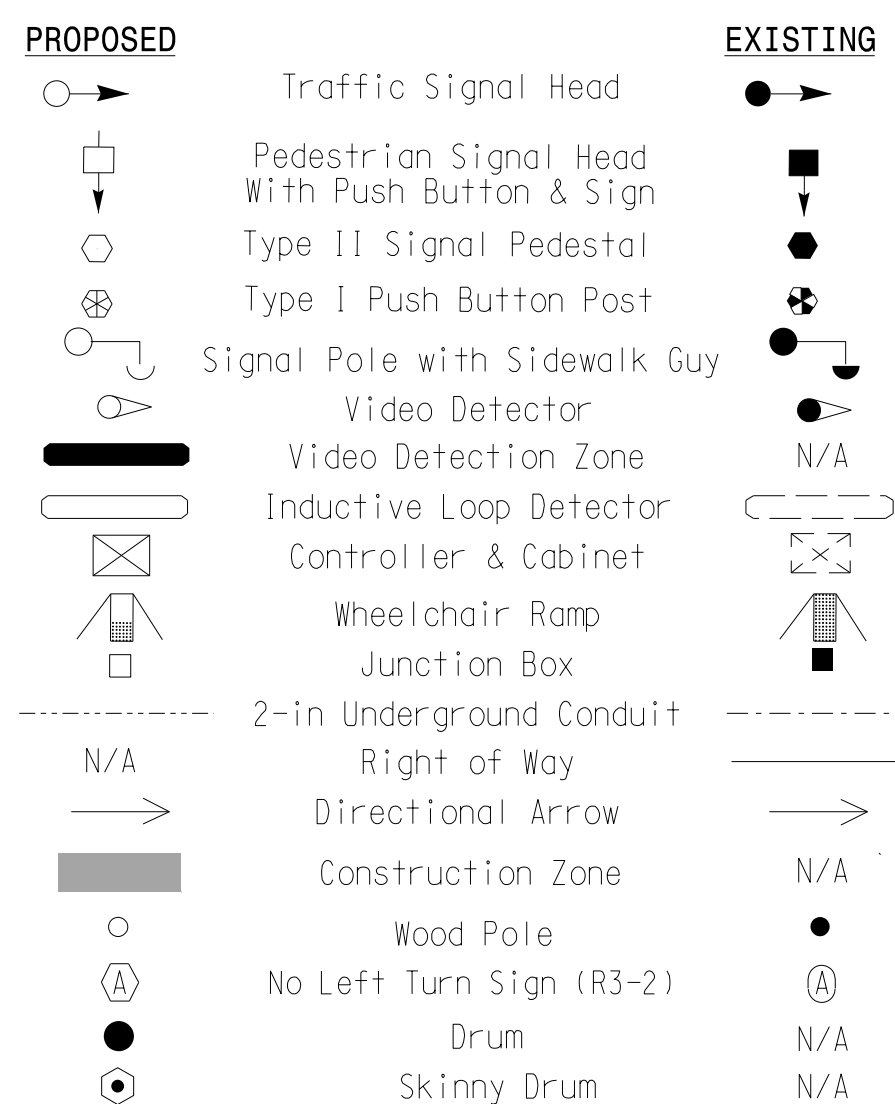
MAXTIME TIMING CHART

FEATURE	PHASE		
	3	6	8
Walk *	-	7	-
Ped Clear *	-	10	-
Min Green	7	12	7
Passage *	2.0	2.0	2.0
Max I *	30	60	30
Yellow Change	4.5	4.6	3.0
Red Clear	2.4	1.0	1.0
Added Initial *	-	-	-
Maximum Initial *	-	-	-
Time Before Reduction *	-	-	-
Time To Reduce *	-	-	-
Minimum Gap	-	-	-
Advance Walk	-	**	-
Non Lock Detector	X	-	X
Vehicle Recall	-	MIN RECALL	-
Dual Entry	X	-	X

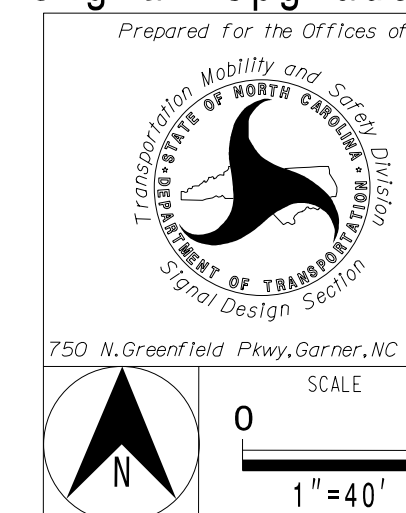
* These values may be field adjusted. Do not adjust Min Green and Extension times for phases 2 and 6 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.

** See Note 7

LEGEND



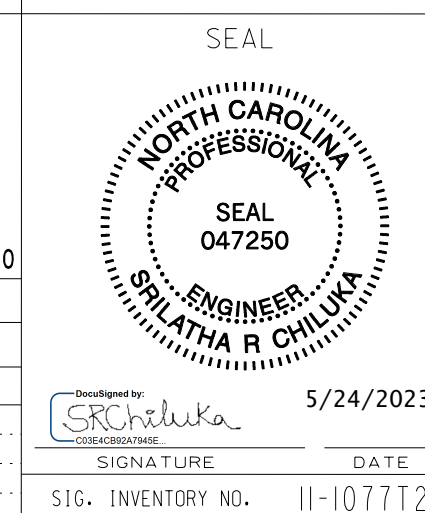
Signal Upgrade - Temporary Design 2 (Phase 11)



US 421-NC 16 at Big Lots Entrance	
Division 11	Wilkes County
PLAN DATE: May 2023	REVIEWED BY: M.L. Stygles
PREPARED BY: S.R. Chiluka	REVIEWED BY: J. Ma
REVISIONS	INIT. DATE



DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

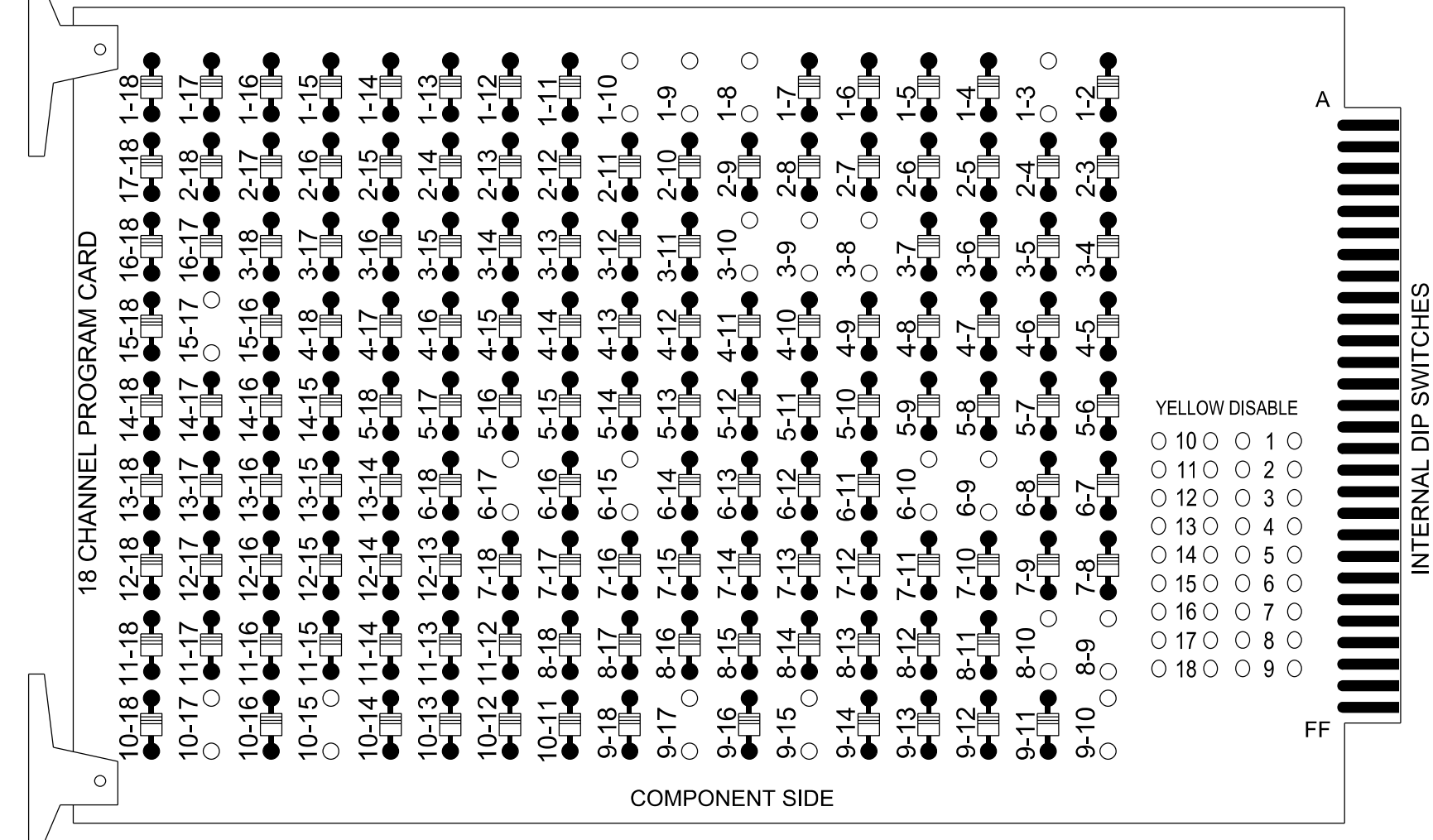


3/28/2023 8:15:14 PM \\v\p\proj\raleigh\38621.03 NCDOT U-5312 Wilkes Co\NCDOT\Traffic\Signals\Design\Signals\00% Design Plans\Temporary Signal Design\107772.sig _dsn_202305.dgn schiluka

18 CHANNEL CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 1-3, 1-8, 1-9, 1-10, 3-8, 3-9, 3-10, 6-9, 6-10, 6-15, 6-17, 8-9, 8-10, 9-10, 9-15, 9-17, 10-15, 10-17 and 15-17.

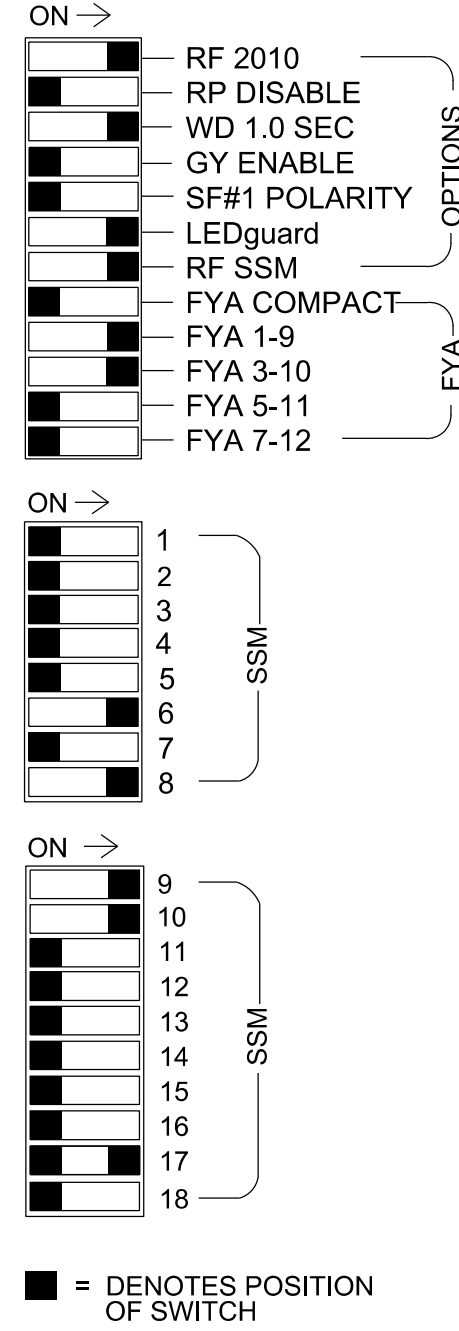


REMOVE JUMPERS AS SHOWN

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.
- Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.

ON OFF



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 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.

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,S4,S8,S9,S11,AUX S1,AUX S2,AUX S3
 Phases Used.....3,6,6 PED,8
 Overlap "1".....*
 Overlap "2".....*
 Overlap "3".....NOT USED
 Overlap "4".....NOT USED
 Overlap "5".....*
 Overlap "7".....*

*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	OL7	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	OL5	OL3	OL4	SPARE
SIGNAL HEAD NO.	32*	NU	NU	31*	NU	NU	NU	61,62	P61, P62	NU	81,82	NU	32*	31*	63*	NU	NU	NU
RED								134		107					A111			
YELLOW	*			*				135										
GREEN																		
RED ARROW													A121	A124				
YELLOW ARROW										108			A122	A125	A112			
FLASHING YELLOW ARROW													A123	A126	A113			
GREEN ARROW	127			118				136		109								
Hand										119								
Walker										121								

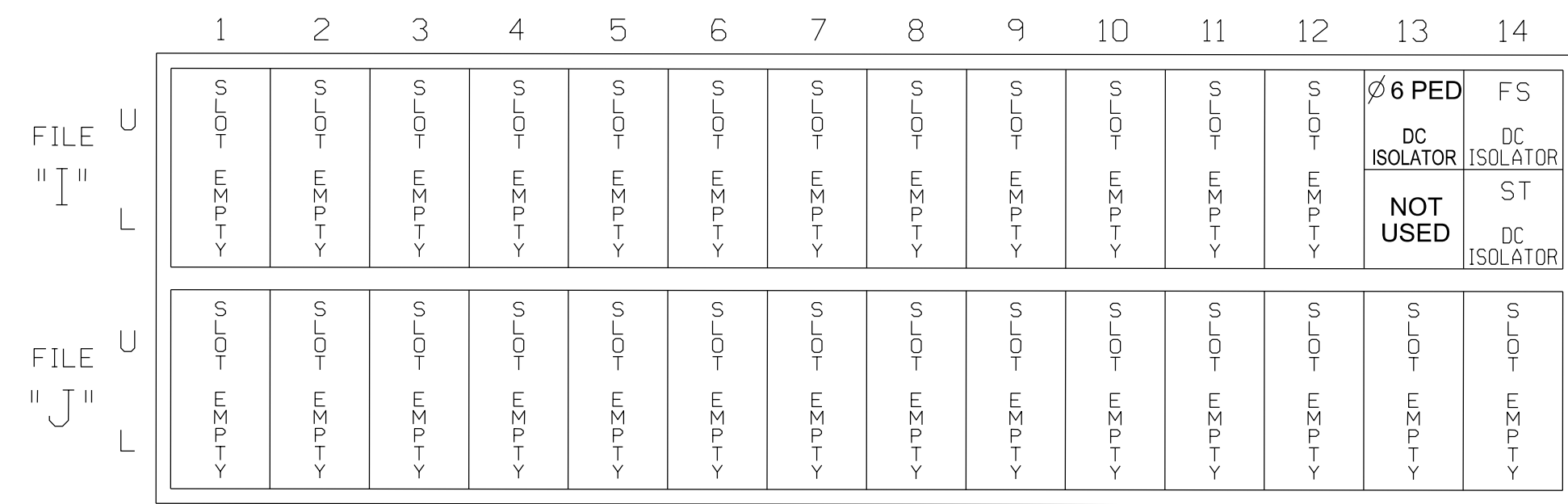
NU = Not Used

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

★ See pictorial of head wiring in detail this sheet.

INPUT FILE POSITION LAYOUT

(front view)



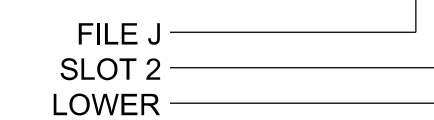
EX. : 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE
 ST = STOP TIME

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	QUEUE	CALL	DELAY DURING GREEN
PED PUSH BUTTONS P61,P62	TB8-7,9	I13U	68	34	6	PED 6							

NOTE: INSTALL DC ISOLATOR IN INPUT FILE SLOT I13.
 INPUT FILE POSITION LEGEND: J2L



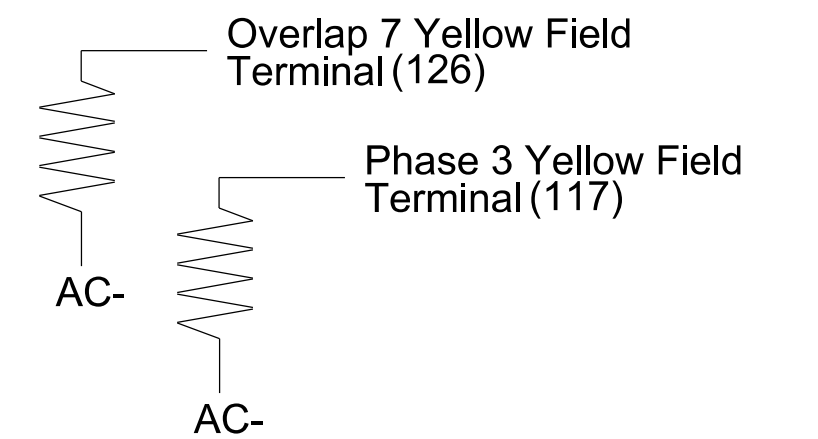
SPECIAL DETECTOR NOTE

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.

LOAD RESISTOR INSTALLATION DETAIL

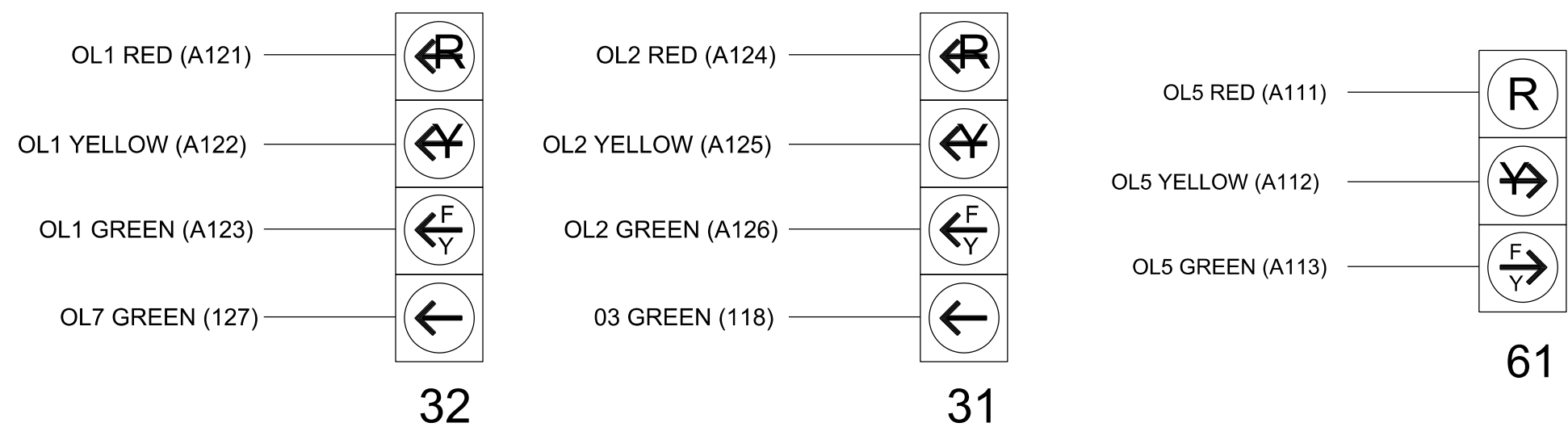
(install resistors as shown)

ACCEPTABLE VALUES	
Value (ohms)	Wattage
1.5K - 1.9K	25W (min)
2.0K - 3.0K	10W (min)



FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



5/23/2019 3:15:01 PM
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 sch1lukg

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 11-107772
 DESIGNED: May 2023
 SEALED: 5/24/2023
 REVISED: N/A

Temporary Installation - Electrical Detail 1 of 2 (Phase 11)

<p>Prepared for the Offices of:</p>	<p>US 421-NC 16 at Addison Ave/Big Lots Entrance</p>		<p>DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED</p> <p>SEAL</p>
	<p>Division 11 Wilkes County Wilkesboro</p>		
	<p>PLAN DATE: May 2023</p>	<p>REVIEWED BY: J. Ma</p>	
	<p>PREPARED BY: M.L. Stygles</p>	<p>REVIEWED BY: S.R. Chiluka</p>	
<p>REVISIONS</p>	<p>INIT.</p>	<p>DATE</p>	<p>DocuSigned by: M.L. Stygles DATE 5/24/2023</p>

SIGNAL HEAD HOOK-UP CHART
 11-107772

MAXTIME OVERLAP PROGRAMMING DETAIL FOR DEFAULT PHASING

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

Overlap Plan 1

Overlap	1	2	5	7
Type	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section	Normal
Included Phases	6	6	6	3
Modifier Phases	3	3	-	-
Trail Green	0	0	0	0
Trail Yellow	0.0	0.0	0.0	0.0
Trail Red	0.0	0.0	0.0	0.0
FYA Ped Delay	3.0	3.0	3.0	0.0

OUTPUT CHANNEL CONFIGURATION

Front Panel
Main Menu >Controller >More>Channels>Channels Config

Web Interface
Home >Controller >Advanced IO>Channels>Channels Configuration

Channel Configuration

Channel	Control Type	Control Source	Flash Yellow	Flash Red	Flash Alt	MMU Channel
1	Overlap	7	-	X	X	1
2	Phase Vehicle	2	X	-	-	2
3	Phase Vehicle	3	-	X	X	3
4	Phase Vehicle	4	-	X	-	4
5	Phase Vehicle	5	-	X	-	5
6	Phase Vehicle	6	X	-	X	6
7	Phase Vehicle	7	-	X	-	7
8	Phase Vehicle	8	-	X	X	8
9	Overlap	1	X	-	X	9
10	Overlap	2	X	-	X	10
11	Overlap	3	X	-	-	11
12	Overlap	4	-	X	-	12
13	Phase Ped	2	-	-	-	13
14	Phase Ped	4	-	-	-	14
15	Phase Ped	6	-	-	-	15
16	Phase Ped	8	-	-	-	16
17	Overlap	5	X	-	X	17
18	Overlap	6	-	X	-	18

ASSIGN
CHANNEL 1 TO
OVERLAP 7 →

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 11-1077T2
DESIGNED: May 2023
SEALED: 5/24/2023
REVISED: N/A



Temporary Installation - Electrical Detail 2 of 2 (Phase 11)

ELECTRICAL AND PROGRAMMING
DETAILS FOR:

Prepared for the Offices of:

750 N. Greenfield Pkwy, Garner, NC 27529

US 421-NC 16
at
Addison Ave/Big Lots Entrance

Division 11 Wilkes County Wilkesboro

PLAN DATE: May 2023 REVIEWED BY: J. Ma

PREPARED BY: M.L. Stygles REVIEWED BY: S.R. Chiluka

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED
FINAL UNLESS ALL
SIGNATURES COMPLETED

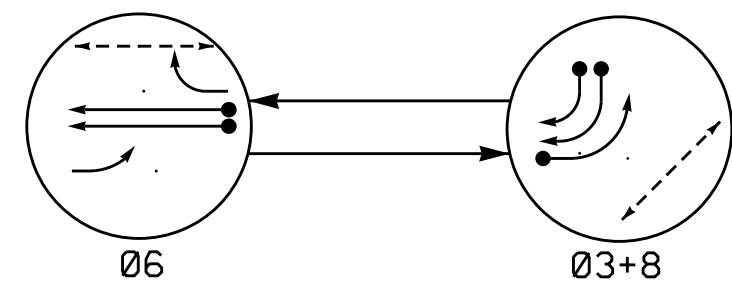
SEAL

DocuSigned by:
Matthew L. Stygles
5/24/2023

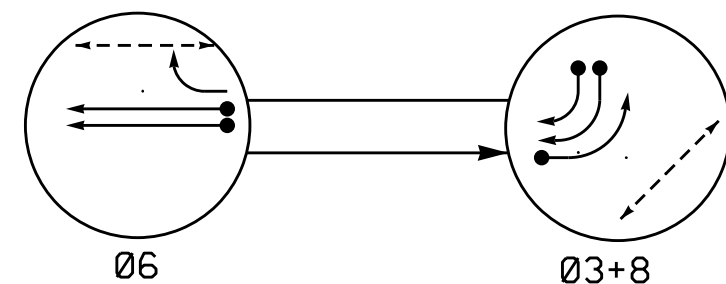
SIG. INVENTORY NO. 11-1077T2

2 Phase Fully Actuated W/ Alternate Phasing Operation Wilkesboro Closed Loop System

DEFAULT PHASING DIAGRAM



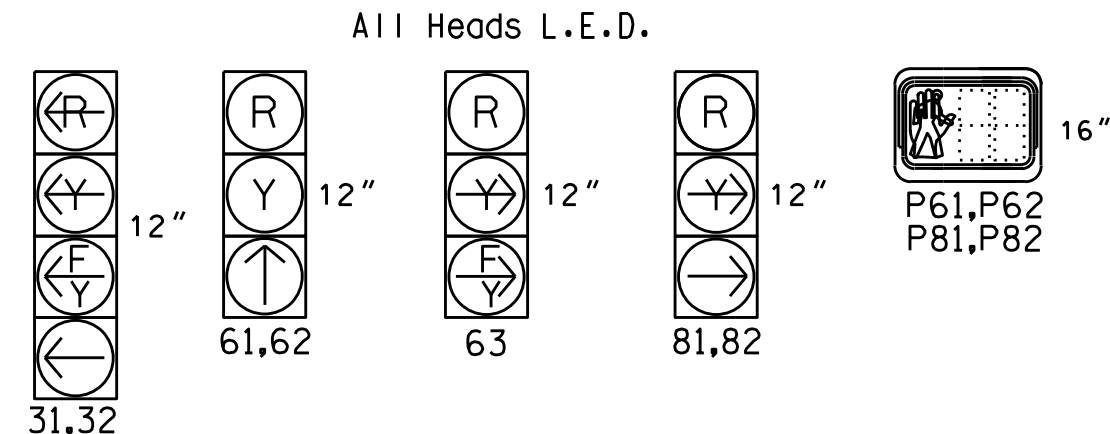
ALTERNATE PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

SIGNAL FACE I.D.



DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE		
	06	03+8	FLASH
31,32	F	Y	Y
61,62	↑	R	Y
63	F	R	Y
81,82	R	→	R
P61,P62	W	DW	DRK
P81,P82	DW	W	DRK

ALTERNATE PHASING TABLE OF OPERATION

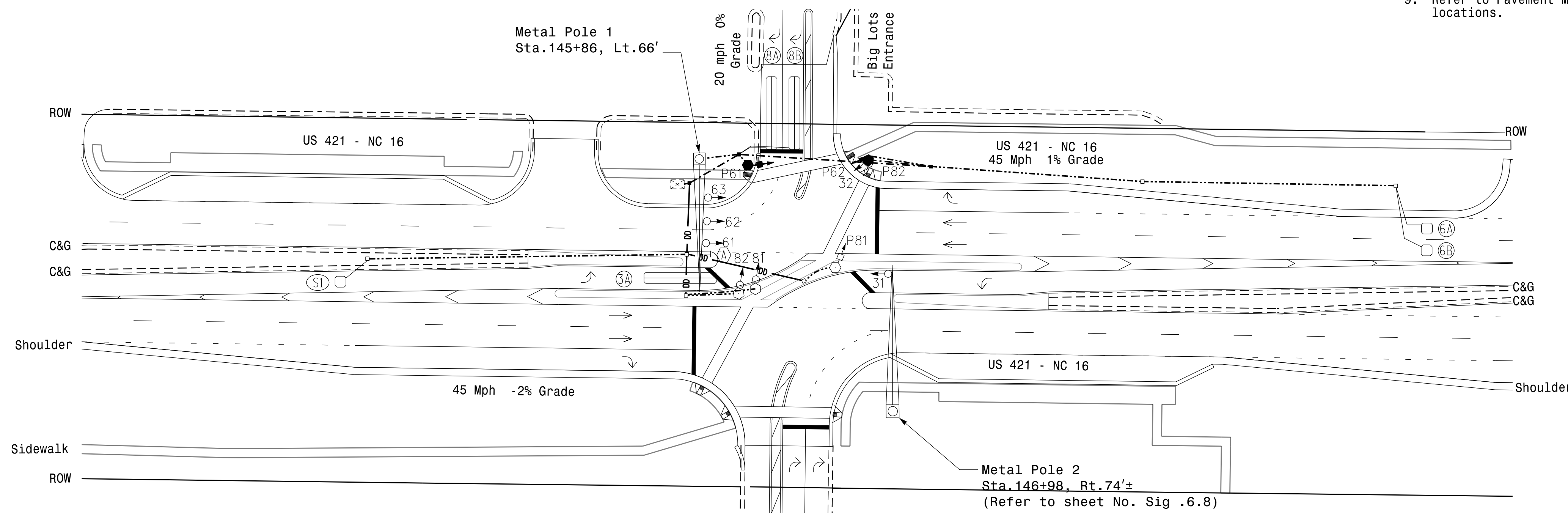
SIGNAL FACE	PHASE		
	06	03+8	FLASH
31,32	↑	Y	Y
61,62	↑	R	Y
63	F	R	Y
81,82	R	→	R
P61,P62	W	DW	DRK
P81,P82	DW	W	DRK

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
3A	6X40	0	2-4-2	X	3	15.0*	-	X	-	X	-	X
6A	6X6	300	5	X	6	-	-	X	X	X	-	X
6B	6X6	300	5	X	6	-	-	X	X	X	-	X
8A	6X40	0	2-4-2	X	8	15.0	-	X	-	X	-	X
S1	6X6	200	3	X	-	-	-	-	-	-	-	X

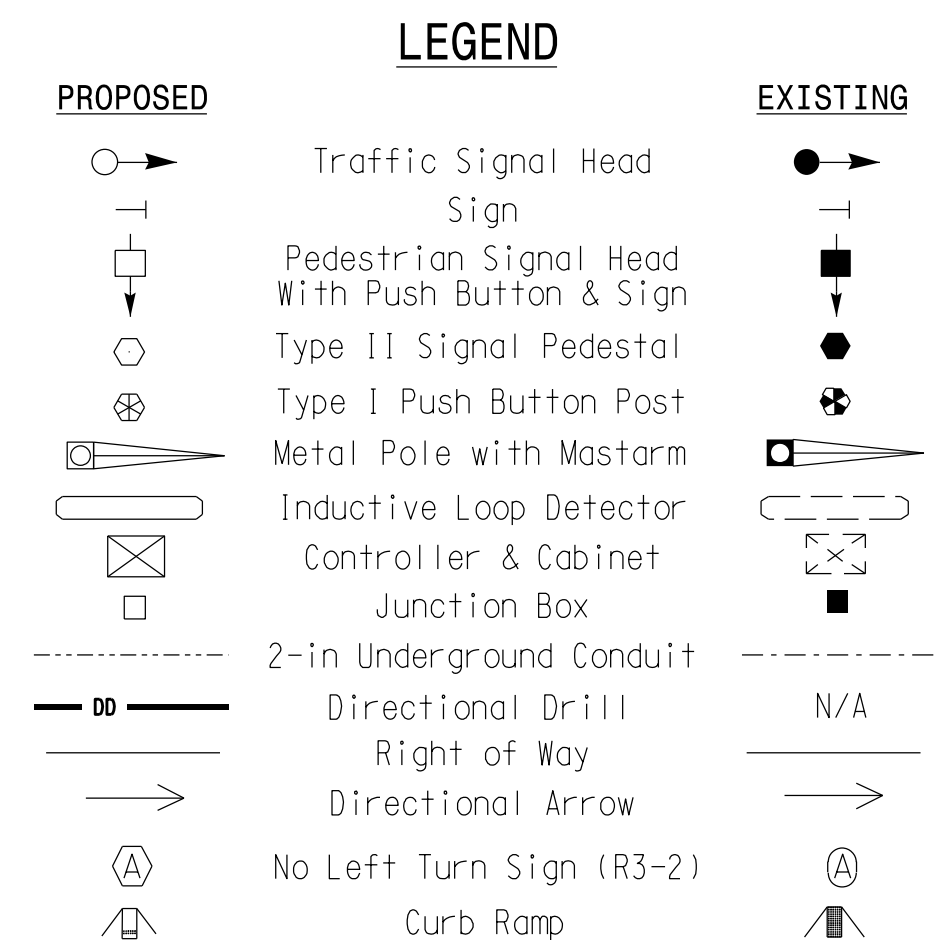
* Disable delay during alternate phasing operation

- 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.
 - 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.
 - To provide a leading pedestrian interval on phase 6, program FYA heads 31, 32, and 63 to delay for 3 seconds after the start of the phase 6 walk interval. See electrical details.
 - The Division Traffic Engineer will determine the hours of use for each phasing plan.
 - Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
 - Refer to Pavement Marking Plans for proposed stop bar locations.



MAXTIME TIMING CHART

FEATURE	PHASE		
	3	6	8
Walk *	-	7	7
Ped Clear *	-	10	10
Min Green	7	12	7
Passage *	2.0	6.0	2.0
Max 1 *	30	60	30
Yellow Change	3.0	4.4	3.0
Red Clear	2.4	1.0	1.0
Added Initial *	-	1.5	-
Maximum Initial *	-	34	-
Time Before Reduction *	-	15	-
Time To Reduce *	-	30	-
Minimum Gap	-	3.4	-
Advance Walk	-	**	-
Non Lock Detector	X	-	X
Vehicle 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.
 ** See note 6

Signal Upgrade - Final Design

US 421-NC 16 at Addison Ave/Big Lots Entrance

Division 11 Wilkes County Wilkesboro

PLAN DATE: May 2023 REVIEWED BY: M. Stygles

PREPARED BY: S.R. Chiluka REVIEWED BY: J. Ma

750 N. Greenfield Pkwy, Garner, NC 27529

SCALE 0 40

REVISIONS

INIT. DATE

SEAL

NORTH CAROLINA PROFESSIONAL ENGINEER

SRI LATHA R. CHILUKA

047250

5/24/2023

SIG. INVENTORY NO. 11-1077

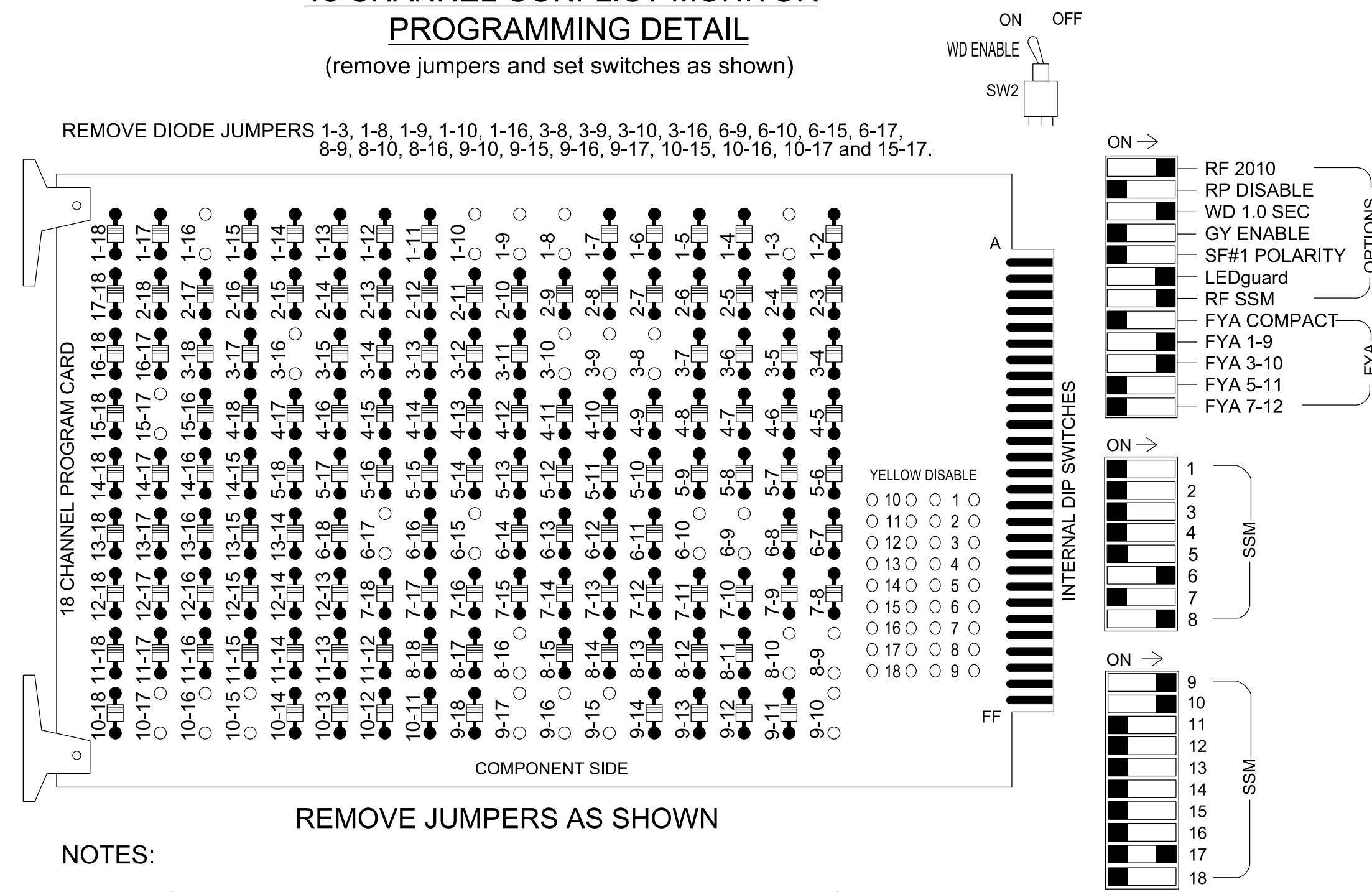
5/23/2023 5:47:00 PM R:\Traffic\Signals\Design\Plans\110777_sig_dsn_202305.dgn schiluka



18 CHANNEL 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. 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 plan.
- 2. Program phases 3 and 8 for Dual Entry.
- 3. Program controller to start up in phase 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 Wilkesboro Closed Loop System.

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,S4,S8,S9,S11,S16,AUX S1,AUX S2, AUX S3
- Phases Used.....3,6,6 PED,8,8 PED
- Overlap "1".....*
- Overlap "2".....*
- Overlap "3".....NOT USED
- Overlap "4".....NOT USED
- Overlap "5".....*
- Overlap "7".....*

*See overlap programming detail on sheet 2.

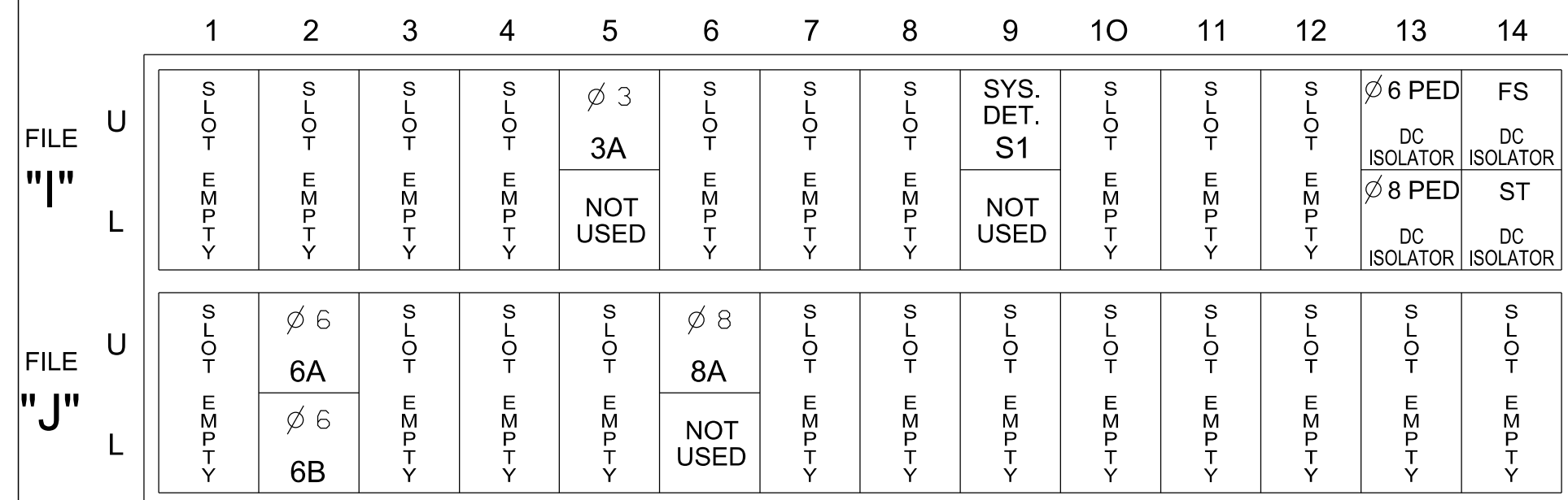
SIGNAL HEAD HOOK-UP CHART

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	OL7	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	OL5	OL3	OL4	SPARE
SIGNAL HEAD NO.	32	NU	NU	31	NU	NU	NU	61,62	P61, P62	NU	81,82	P81, P82	32	31	63	NU	NU	NU
RED									134			107				A111		
YELLOW	*			*					135									
GREEN																		
RED ARROW																A121	A124	
YELLOW ARROW										108			A122	A125	A112			
FLASHING YELLOW ARROW													A123	A126	A113			
GREEN ARROW	127				118				136		109							
Hand icon											119		104					
Person icon													121		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)



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

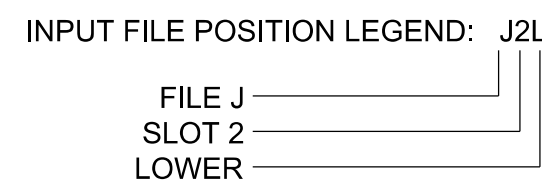
FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	QUEUE	CALL	DELAY DURING GREEN
3A	TB4-5,6	I5U	58	20	7	3	15			X		X	
*S1	TB6-9,10	I9U	60	22	13	SYS				X		X	
6A	TB3-5,6	J2U	40	2	16	6				X	X	X	
6B	TB3-7,8	J2L	44	6	17	6				X	X	X	
8A	TB5-9,10	J6U	42	4	22	8	15			X		X	
PED PUSH BUTTONS													
P61,P62	TB8-7,9	I13U	68	34	6	PED 6							
P81,P82	TB8-8,9	I13L	70	36	8	PED 8							

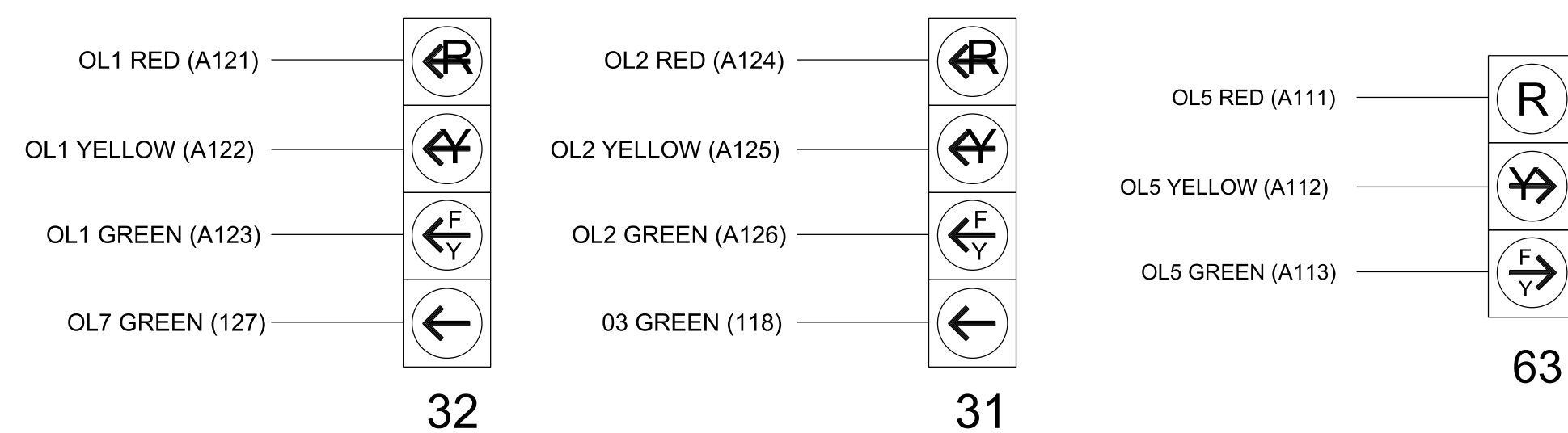
NOTE: INSTALL DC ISOLATOR IN INPUT FILE SLOT I13.

*System detector only. Remove any assigned vehicle phase.



FYA SIGNAL WIRING DETAIL

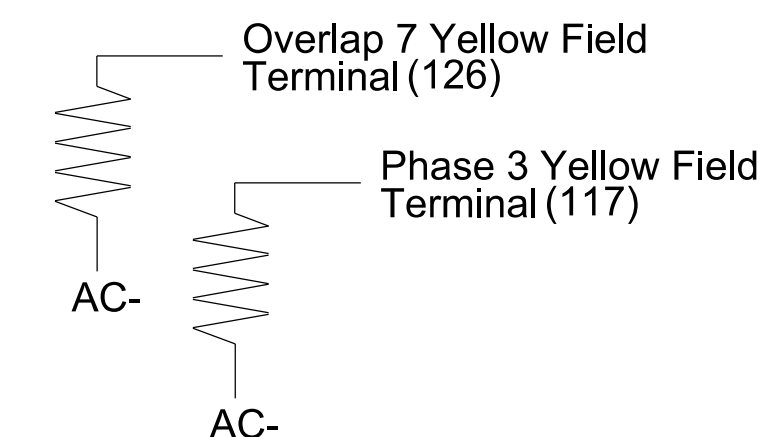
(wire signal heads as shown)



LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

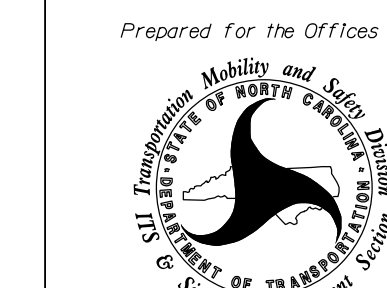
ACCEPTABLE VALUES	
Value (ohms)	Wattage
1.5K - 1.9K	25W (min)
2.0K - 3.0K	10W (min)



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 11-1463
DESIGNED: May 2023
SEALED: 5/24/2023
REVISED: N/A

Electrical Detail - Sheet 1 of 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:



750 N. Greenfield Pkwy, Garner, NC 27529

US 421-NC 16	
at	
Addison Ave/Big Lots Entrance	
Division 11	Wilkes County
PLANNED BY: May 2023	REVIEWED BY: J. Ma
PREPARED BY: M.L. Stygles	REVIEWED BY: S.R. Chiluka
REVISIONS	INIT. DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Seal of Matthew L. Stygles, North Carolina Professional Engineer, License No. 046057.

DocSigned by: [Signature] 5/24/2023
DATE: [Signature] 5/24/2023
SIGNATURE: [Signature]
INVENTORY NO. 11-1077

VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606
919.829.0328

MAXTIME ALTERNATE PHASING ACTIVATION DETAIL

To run alternate phasing, select a Pattern that is programmed to run Overlap Plan 2 and Detector Plan 2. A Pattern can be selected through the scheduler or manually by changing the Operational Mode.

PHASING	OVERLAP PLAN	VEH DET PLAN
ACTIVE PLAN REQUIRED TO RUN DEFAULT PHASING	1	1
ACTIVE PLAN REQUIRED TO RUN ALTERNATE PHASING	2	2

ALTERNATE PHASING CHANGE SUMMARY

THE FOLLOWING IS A SUMMARY OF WHAT TAKES PLACE WHEN OVERLAP 2 AND VEHICLE DETECTOR PLAN 2 ACTIVATE TO CALL THE "ALTERNATE PHASING":

OVERLAP PLAN 2: Modifies overlap included phases for heads 31 and 32 to run protected turns only.

VEH DET PLAN 2: Reduces delay time for phase 3 call on loop 3A to 0 seconds.

OUTPUT CHANNEL CONFIGURATION

Front Panel
Main Menu >Controller >More>Channels>Channels Config

Web Interface
Home >Controller >Advanced IO>Channels>Channels Configuration

Channel Configuration

ASSIGN CHANNEL 1 TO OVERLAP 7 →

Channel	Control Type	Control Source	Flash Yellow	Flash Red	Flash Alt	MMU Channel
1	Overlap	7		X	X	1
2	Phase Vehicle	2	X			2
3	Phase Vehicle	3		X	X	3
4	Phase Vehicle	4		X		4
5	Phase Vehicle	5		X		5
6	Phase Vehicle	6	X		X	6
7	Phase Vehicle	7		X		7
8	Phase Vehicle	8		X	X	8
9	Overlap	1	X		X	9
10	Overlap	2	X		X	10
11	Overlap	3	X			11
12	Overlap	4		X		12
13	Phase Ped	2				13
14	Phase Ped	4				14
15	Phase Ped	6				15
16	Phase Ped	8				16
17	Overlap	5	X		X	17
18	Overlap	6		X		18

MAXTIME ALTERNATE PHASING PATTERN PROGRAMMING DETAIL

Front Panel
Main Menu >Controller >Coordination >Patterns

Web Interface
Home >Controller >Coordination >Patterns

Pattern Parameters

Pattern	Veh Det Plan	Overlap Plan
*	2	2

*The Pattern number(s) are to be determined by the Division and/or City Traffic Engineer.

MAXTIME DETECTOR PROGRAMMING DETAIL FOR ALTERNATE PHASING LOOP 3A

Front Panel
Main Menu >Controller >Detector >Veh Det Plans

Web Interface
Home >Controller >Detector Configuration >Vehicle Detectors

In the table view of web interface right click on "Detector" in the top left corner of the table. Copy the entire contents of Detector Plan 1. Paste Detector Plan 1 into Detector Plan 2. Modify Detector Plan 2 as shown below and save changes.

Plan 2

Detector	Call Phase	Delay
3A	7	3
		-

MAXTIME OVERLAP PROGRAMMING DETAIL FOR DEFAULT PHASING

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

Overlap Plan 1

Overlap	1	2	5	7
Type	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section	Normal
Included Phases	6	6	6	3
Modifier Phases	3	3	-	-
Trail Green	0	0	0	0
Trail Yellow	0.0	0.0	0.0	0.0
Trail Red	0.0	0.0	0.0	0.0
FYA Ped Delay	3.0	3.0	3.0	0.0

MAXTIME OVERLAP PROGRAMMING DETAIL FOR ALTERNATE PHASING

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

In the table view of the web interface, right click on "Overlap" in the top left corner of the table. Copy the entire contents of Overlap Plan 1. Paste Overlap Plan 1 into Overlap Plan 2. Modify Overlap Plan 2 as shown below and save changes.

Overlap Plan 2

Overlap	1	2	5	7
Type	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section	Normal
Included Phases	-	-	6	3
Modifier Phases	3	3	-	-
Trail Green	0	0	0	0
Trail Yellow	0.0	0.0	0.0	0.0
Trail Red	0.0	0.0	0.0	0.0
FYA Ped Delay	3.0	3.0	3.0	0.0

← NOTICE INCLUDED PHASE

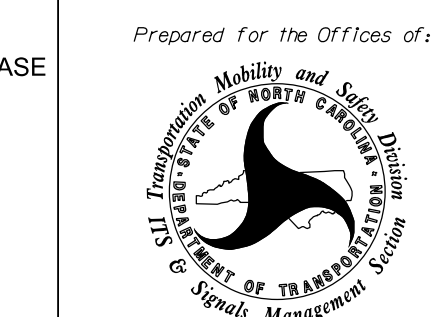
THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 11-1463
DESIGNED: May 2023
SEALED: 5/24/2023
REVISED: N/A



DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

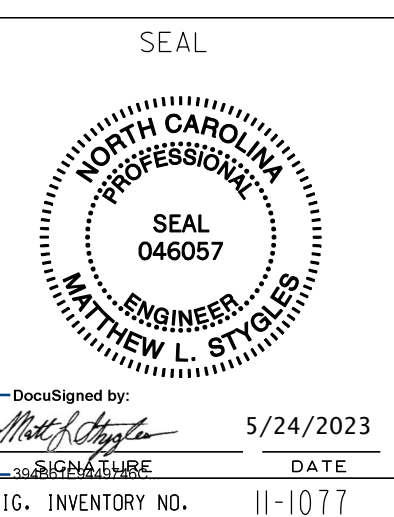
Electrical Detail - Sheet 2 of 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:



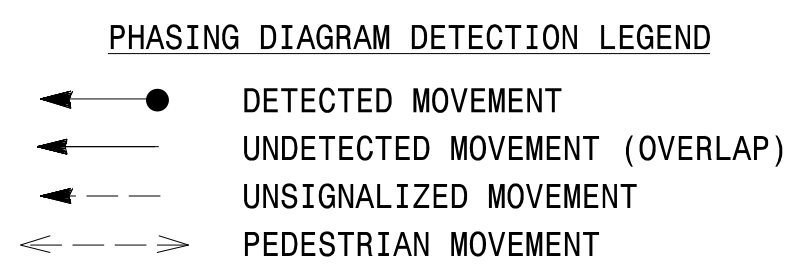
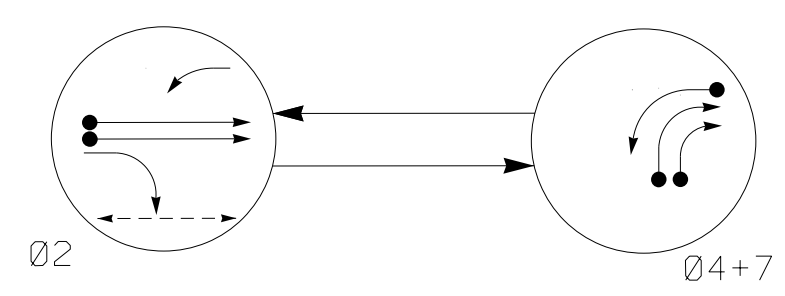
750 N. Greenfield Pkwy, Garner, NC 27529

US 421-NC 16 at Addison Ave/Big Lots Entrance	
Division 11 Wilkes County	Wilkesboro
PLAN DATE: May 2023	REVIEWED BY: J. Ma
PREPARED BY: M.L. Stygles	REVIEWED BY: S.R. Chiluka
REVISIONS	INIT. DATE



DocuSigned by: *Matthew L. Stygles* 5/24/2023
DATE
SIG. INVENTORY NO. 11-1077

PHASING DIAGRAM



SIGNAL FACE I.D.

All Heads L.E.D.

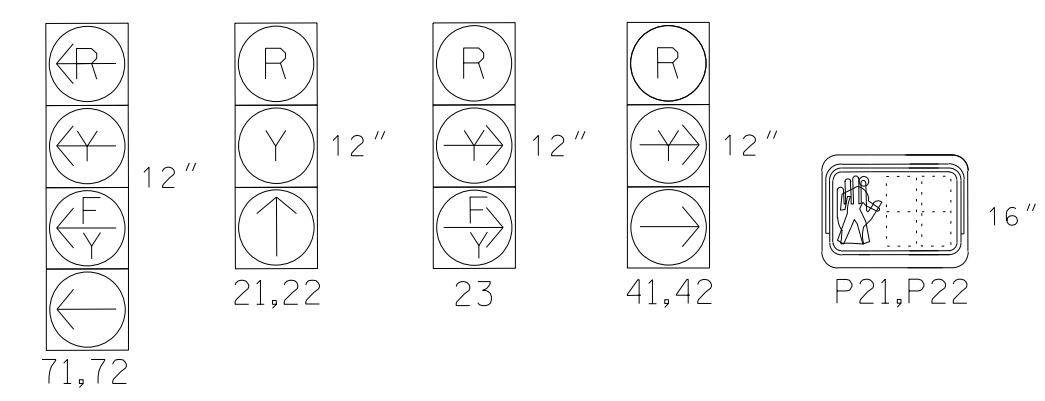


TABLE OF OPERATION

SIGNAL FACE	PHASE		
	02	04+7	FLIGHT
21,22	↑	R	Y
23	↓	R	Y
41,42	R	→	R
71,72	↓	←	Y
P21,P22	W	DW	DRK

MAXTIME DETECTOR INSTALLATION CHART

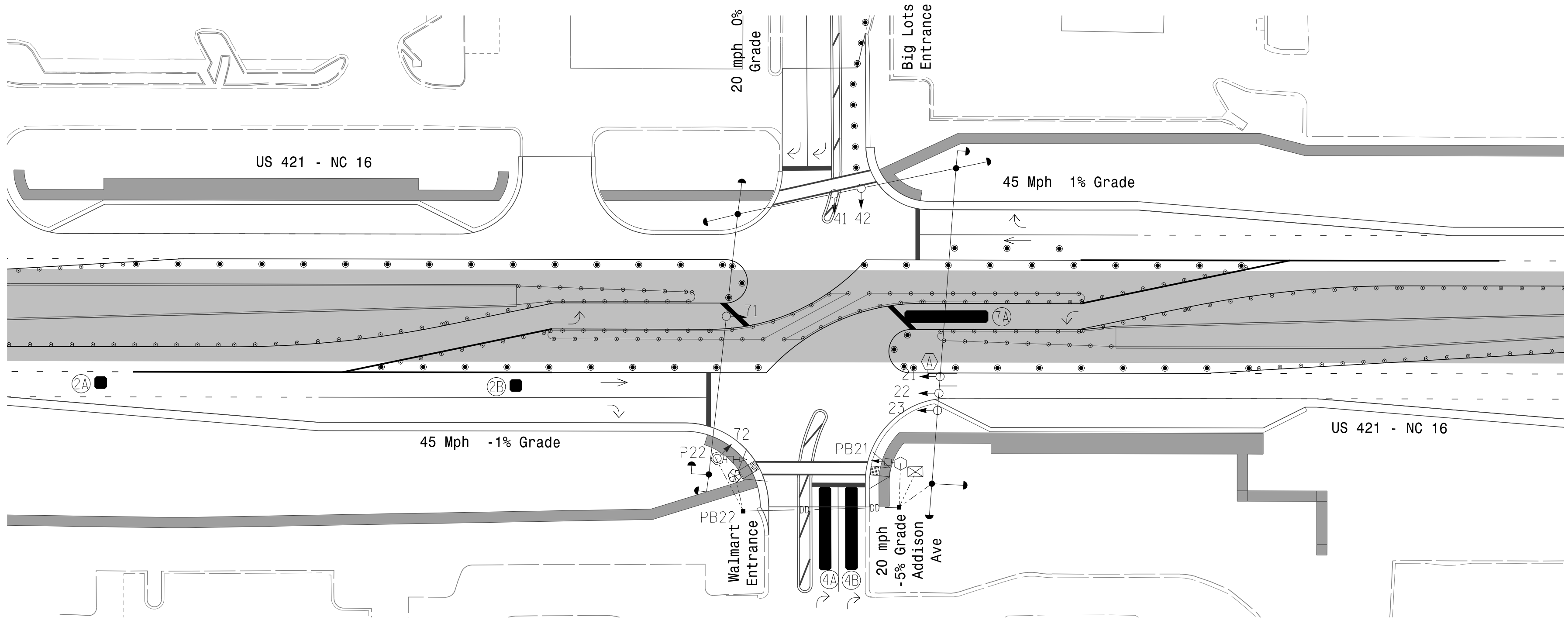
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING							
					CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
2A	*	300	*	*	2	-	1.6	X	-	-	-	*
2B	*	90	*	*	2	-	-	X	-	-	-	*
4A	*	0	*	*	4	15.0	-	X	-	X	-	*
4B	*	0	*	*	4	15.0	-	X	-	X	-	*
7A	*	0	*	*	7	15.0	-	X	-	X	-	*

*Video Detection Zone

8 Phase Fully Actuated US 421-NC 16 Closed Loop System

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 operation unless otherwise directed by the Engineer.
- Set all detector units to presence mode.
- This intersection uses video detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.
- Omit "walk" and flashing "Don't Walk" with no pedestrian calls.
- Program pedestrian heads to countdown the flashing "Don't Walk" time only.
- To provide a leading pedestrian interval on phase 6, program FYA heads 71,72 and 22 to delay for 3 seconds after the start of the phase 6 walk interval. See electrical details.
- Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
- Refer to Pavement Marking Plans for proposed stop bar locations.

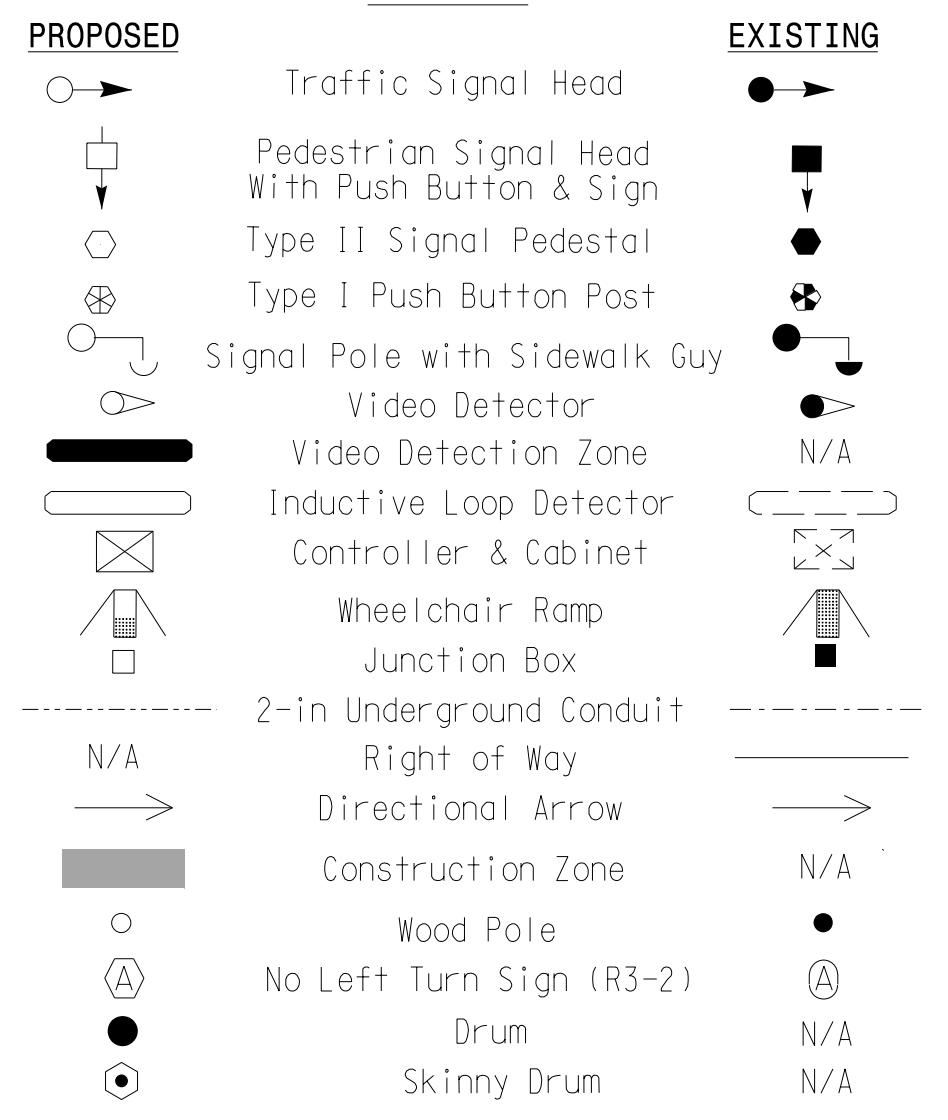


MAXTIME TIMING CHART

FEATURE	PHASE		
	2	4	7
Walk *	7	-	-
Ped Clear *	12	-	-
Min Green	12	7	7
Passage *	2.0	2.0	2.0
Max I *	60	30	30
Yellow Change	4.6	3.0	3.0
Red Clear	1.2	2.1	2.4
Added Initial *	-	-	-
Maximum Initial *	-	-	-
Time Before Reduction *	-	-	-
Time To Reduce *	-	-	-
Minimum Gap	-	-	-
Advance Walk	**	-	-
Non Lock Detector	-	X	X
Vehicle 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.
 ** See note 7

LEGEND



New Installation - Temporary Design 1 (Phase 11)

Prepared For the Offices of:

750 N. Greenfield Pkwy, Garner, NC 27529

US 421-NC 16 at Addison Ave/Walmart Entrance

Division 11 Wilkes County Wilkesboro

PLAN DATE: May 2023 REVIEWED BY: M.L. Stygles

PREPARED BY: S.R. Chiluka REVIEWED BY: J. Ma

SEAL

DocuSigned by: S. R. Chiluka 5/26/2023

SCALE 0 40 1"=40'

REVISIONS	INIT.	DATE

SIG. INVENTORY NO. II-1463TI

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OUTPUT CHANNEL CONFIGURATION

Front Panel
Main Menu >Controller >More>Channels>Channels Config

Web Interface
Home >Controller >Advanced IO>Channels>Channels Configuration

Channel Configuration

ASSIGN CHANNEL 5 TO OVERLAP 7 →

Channel	Control Type	Control Source	Flash Yellow	Flash Red	Flash Alt	MMU Channel
1	Phase Vehicle	1	-	X	X	1
2	Phase Vehicle	2	X	-	-	2
3	Phase Vehicle	3	-	X	X	3
4	Phase Vehicle	4	-	X	-	4
5	Overlap	7	-	X	-	5
6	Phase Vehicle	6	X	-	X	6
7	Phase Vehicle	7	-	X	-	7
8	Phase Vehicle	8	-	X	X	8
9	Overlap	1	X	-	X	9
10	Overlap	2	-	X	X	10
11	Overlap	3	X	-	-	11
12	Overlap	4	X	-	-	12
13	Phase Ped	2	-	-	-	13
14	Phase Ped	4	-	-	-	14
15	Phase Ped	6	-	-	-	15
16	Phase Ped	8	-	-	-	16
17	Overlap	5	-	X	X	17
18	Overlap	6	X	-	-	18

MAXTIME OVERLAP PROGRAMMING DETAIL

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

Overlap Plan 1

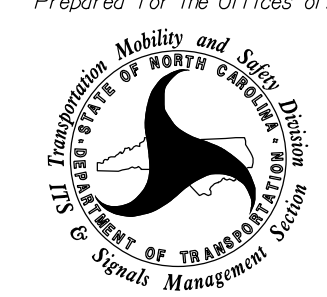
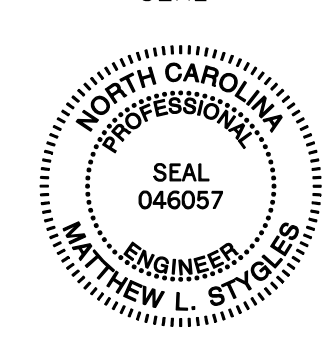
Overlap	3	4	6	7
Type	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section	Normal
Included Phases	2	2	2	7
Modifier Phases	7	7	-	-
Trail Green	0	0	0	0
Trail Yellow	0.0	0.0	0.0	0.0
Trail Red	0.0	0.0	0.0	0.0
FYA Ped Delay	3.0	3.0	3.0	0.0

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 11-1462T1
DESIGNED: May 2023
SEALED: 5/26/2023
REVISED: N/A

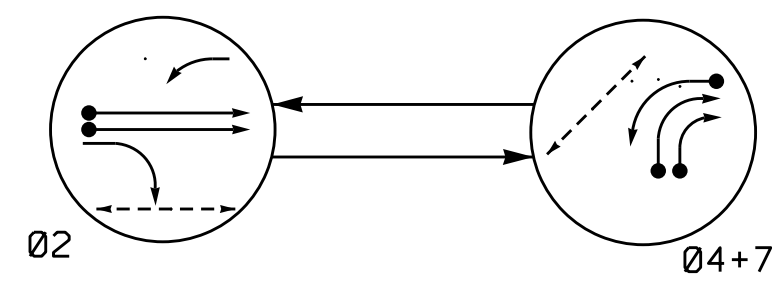


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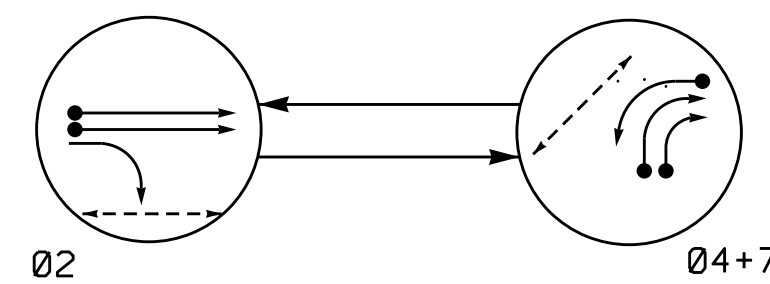
Temporary Installation - Electrical Detail 2 of 2 (Phase 11)

 Prepared for the Offices of: Mobility and Safety Division STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION Signal Management Section 750 N. Greenfield Pkwy, Garner, NC 27529	US 421-NC 16 at Addison Ave/Walmart Entrance		DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED SEAL  SEAL 046057 MATTHEW L. STYGLES ENGINEER
	Division 11 Wilkes County Wilkesboro PLAN DATE: May 2023 REVIEWED BY: J. Ma PREPARED BY: M.L. Stygles REVIEWED BY: S.R. Chiluka		
REVISIONS _____ _____ _____		INIT. DATE _____ _____ _____	Documented by: M.L. Stygles 5/26/2023 DATE _____ _____ _____ SIG. INVENTORY NO. 11-1463T1

DEFAULT PHASING DIAGRAM



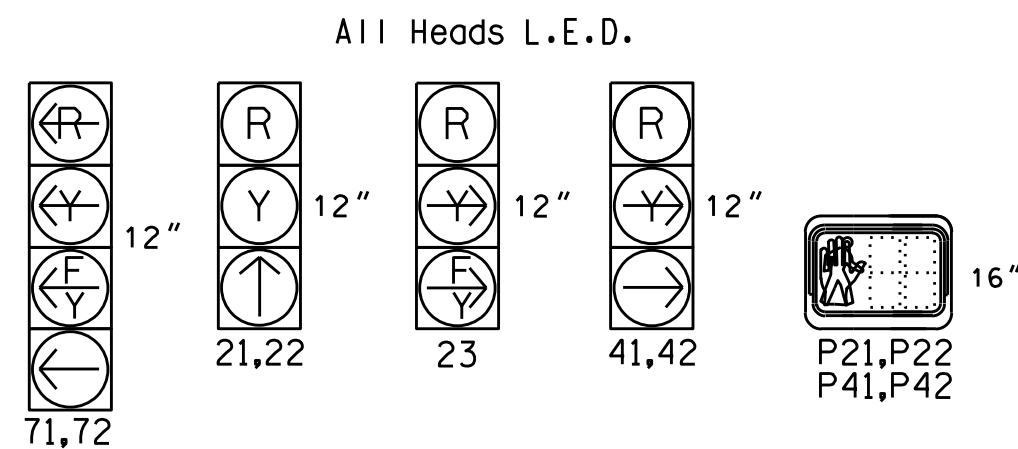
ALTERNATE PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

SIGNAL FACE I.D.



DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE		
	02	04+7	FLASH
21,22	↑	R	Y
23	↓	R	Y
41,42	R	→	R
71,72	↓	→	Y
P21,P22	W	DW	DRK
P41,P42	DW	W	DRK

ALTERNATE PHASING TABLE OF OPERATION

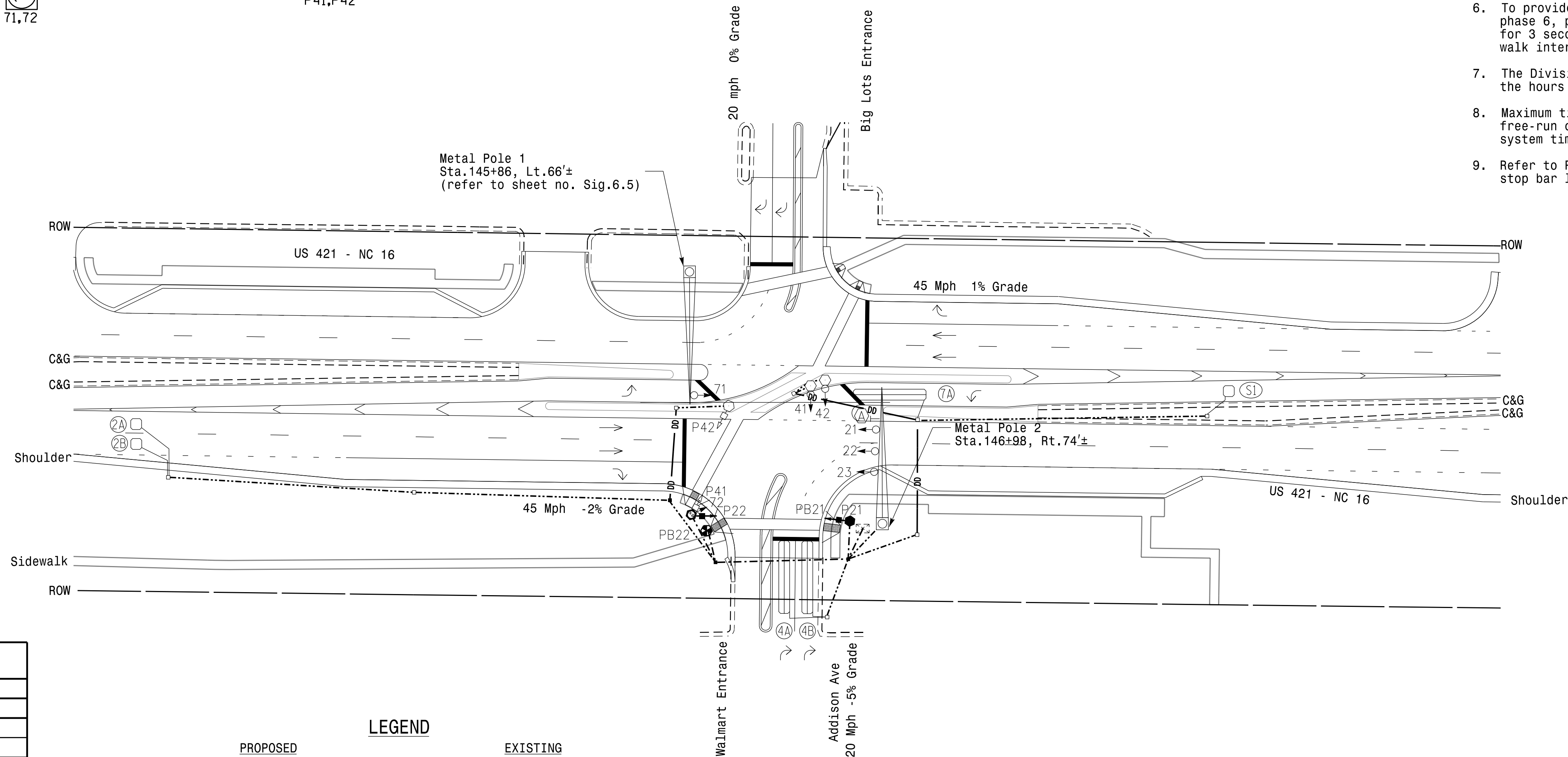
SIGNAL FACE	PHASE		
	02	04+7	FLASH
21,22	↑	R	Y
23	↓	R	Y
41,42	R	→	R
71,72	↓	→	Y
P21,P22	W	DW	DRK
P41,P42	DW	W	DRK

MAXTIME DETECTOR INSTALLATION CHART											
DETECTOR				PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN
2A	6X6	300	5	X	2	-	-	X	X	X	-
2B	6X6	300	5	X	2	-	-	X	X	X	-
4A	6X40	0	2-4-2	X	4	15.0	-	X	-	X	-
4B	6X40	0	2-4-2	X	4	15.0	-	X	-	X	-
7A	6X40	0	2-4-2	X	7	15.0	-	X	-	X	-
S1	6X6	200	4	X	-	-	-	-	-	-	-

* Disable delay during alternate phasing operation

2 Phase Fully Actuated W/ Alternate Phasing Operation Wilkesboro Closed Loop System NOTES

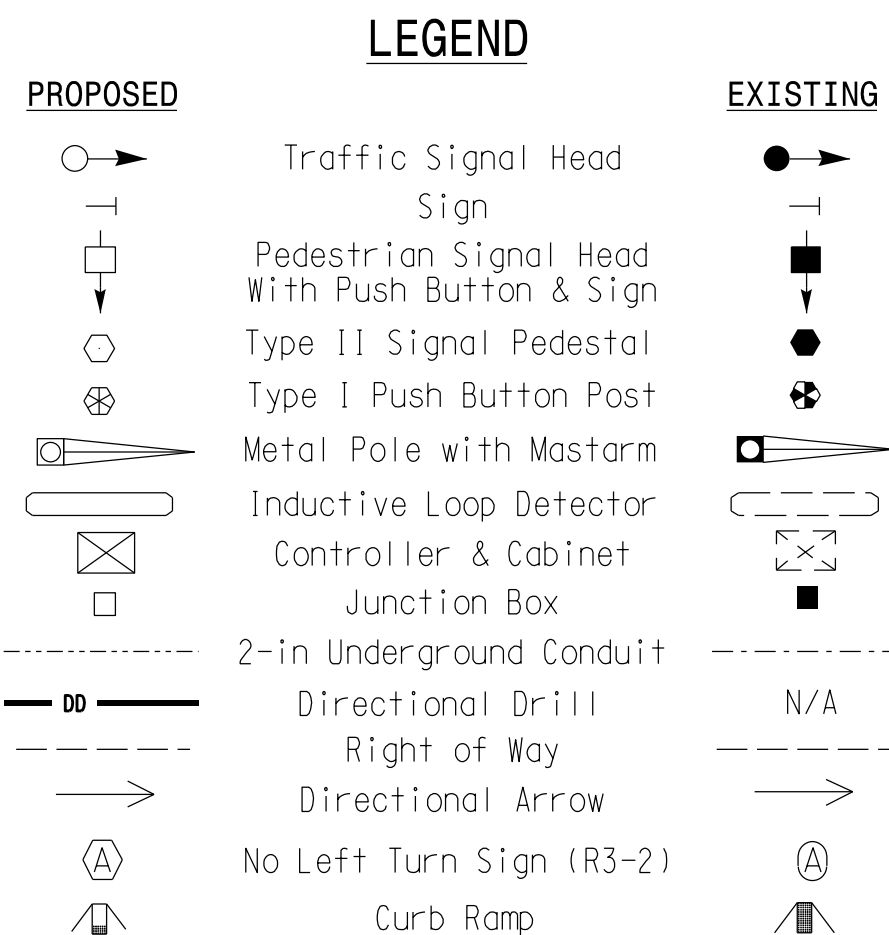
- Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Set all detector units to presence mode.
- Omit "Walk" and flashing "Don't Walk" with no pedestrian calls.
- Program pedestrian heads to countdown the flashing "Don't Walk" time only.
- To provide a leading pedestrian interval on phase 6, program FYA heads 71 and 23 to delay for 3 seconds after the start of the phase 6 walk interval. See electrical details.
- The Division Traffic Engineer will determine the hours of use for each phasing plan.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- Refer to Pavement Marking Plans for proposed stop bar locations.



FEATURE	PHASE		
	2	4	7
Walk *	7	7	-
Ped Clear *	12	12	-
Min Green	12	7	7
Passage *	6.0	2.0	2.0
Passage 2 *	0.0	0.0	0.0
Max 1 *	60	30	30
Yellow Change	4.7	3.0	3.0
Red Clear	1.2	1.0	2.4
Added Initial *	1.5	-	-
Maximum Initial *	34	-	-
Time Before Reduction *	15	-	-
Time To Reduce *	30	-	-
Minimum Gap	3.4	-	-
Advance Walk	**	-	-
Non Lock Detector	-	X	X
Vehicle 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.

** See note 6



Signal Upgrade - Final Design

US 421-NC 16 at Addison Ave/Walmart Entrance	
Division 11 Wilkes County Wilkesboro	
PLAN DATE: May 2023	REVIEWED BY: M. Stygles
PREPARED BY: S.R. Chiluka	REVIEWED BY: J. Ma
REVISIONS	INIT. DATE



DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL

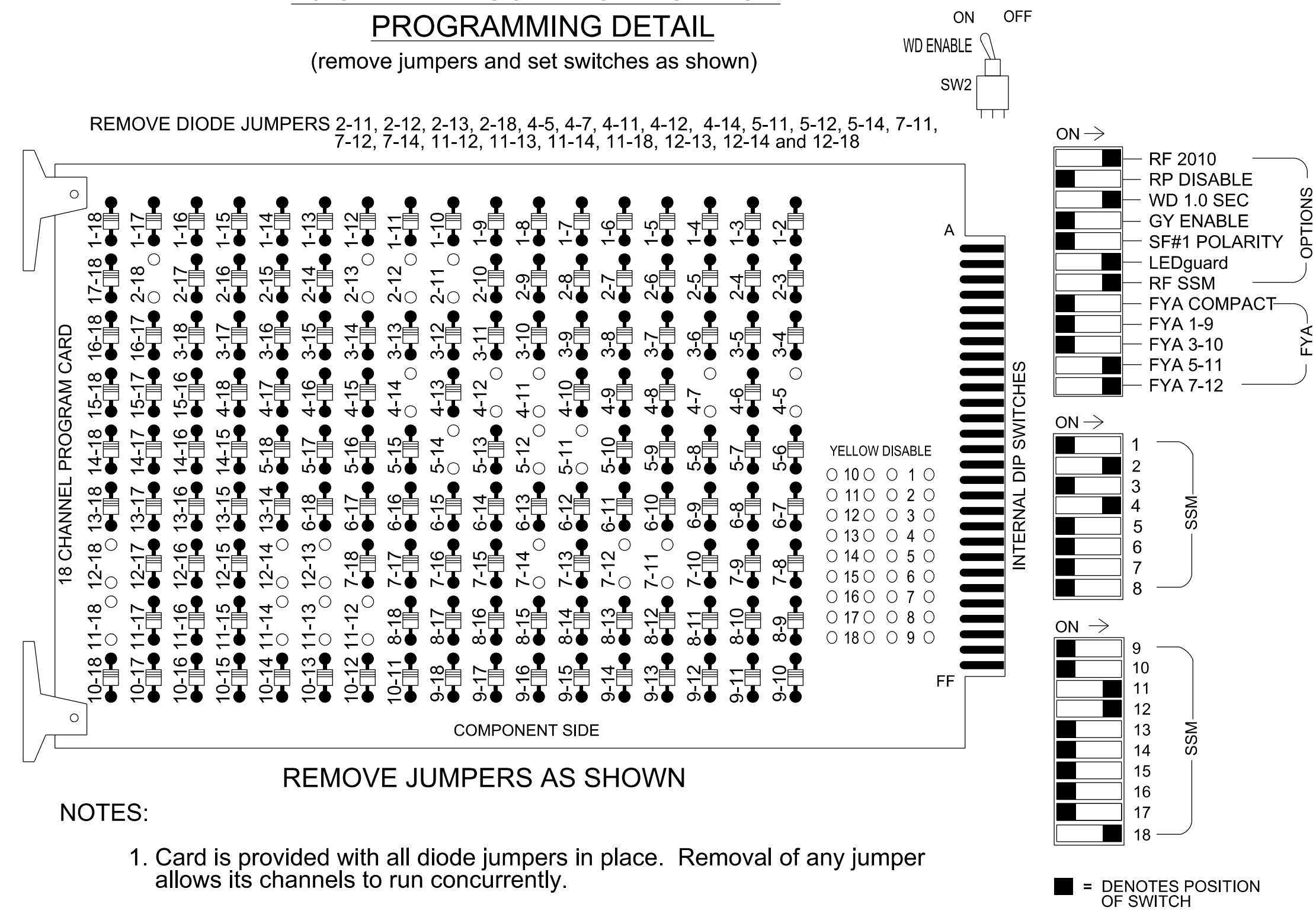
5/24/2023

SIGNATURE DATE

SIG. INVENTORY NO. 11-1463

18 CHANNEL 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 plan.
- Program phases 4 and 7 for Dual Entry.
- Program controller to start up in phase 2 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 Wilkesboro Closed Loop System.

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,S5,S6,S7,S10,AUX S4,AUX S5, AUX S6
 Phases Used.....2, 2PED, 4, 4PED, 7
 Overlap "1".....NOT USED
 Overlap "2".....NOT USED
 Overlap "3".....*
 Overlap "4".....*
 Overlap "6".....*
 Overlap "7".....*

*See overlap programming detail on sheet 2.

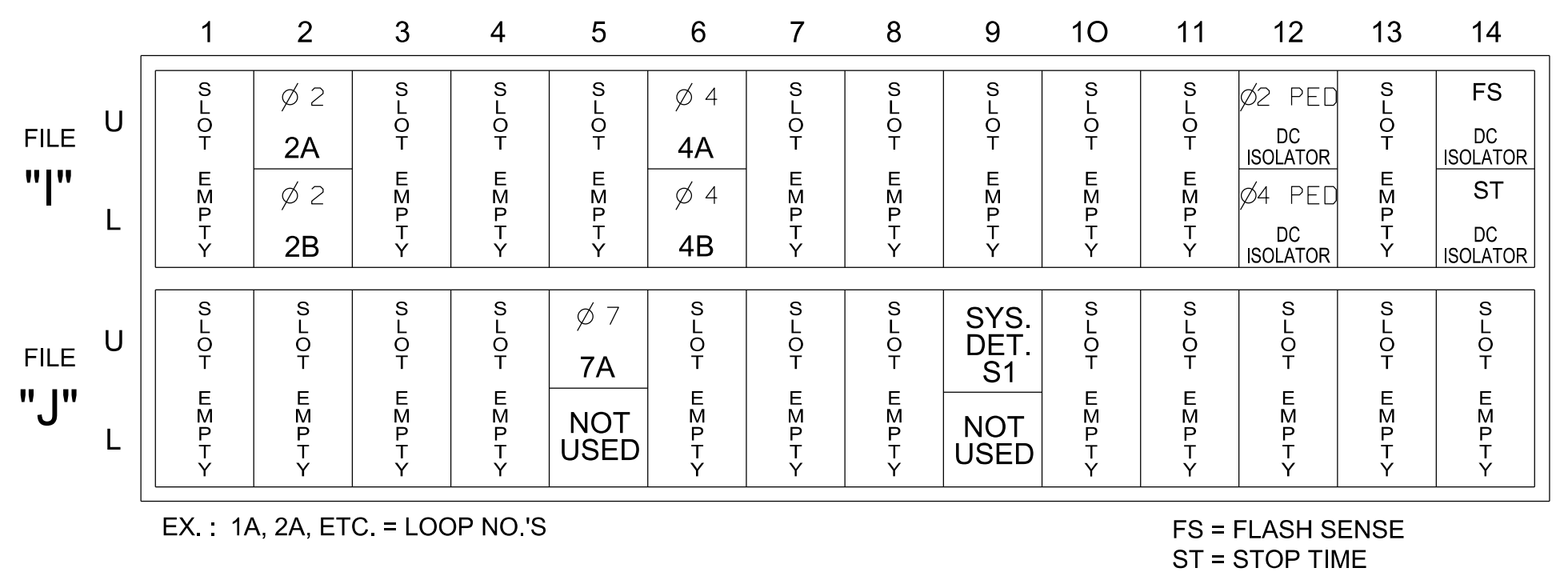
SIGNAL HEAD HOOK-UP CHART

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	OL7	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	OL6
SIGNAL HEAD NO.	NU	21,22	P21, P22	NU	41,42	P41, P42	72*	NU	NU	71*	NU	NU	NU	NU	NU	72*	71*	23*
RED		128			101													A104
YELLOW		129					*			*								
GREEN																		
RED ARROW																		A114 A101
YELLOW ARROW						102												A115 A102 A105
FLASHING YELLOW ARROW																		A116 A103 A106
GREEN ARROW		130			103		133			124								
Hand icon				113		104												
Walking person icon				115		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)



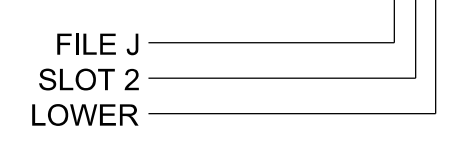
INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	QUEUE	CALL	DELAY DURING GREEN
2A	TB2-5,6	I2U	39	1	2	2			X	X		X	
2B	TB2-7,8	I2L	43	5	3	2			X	X		X	
4A	TB4-9,10	I6U	41	3	8	4	15		X			X	
4B	TB4-11,12	I6L	45	7	9	4			X			X	
7A	TB5-5,6	J5U	57	19	21	7	15		X			X	
*S1	TB7-9,10	J9U	59	21	27	SYS			X			X	
PED PUSH BUTTONS													
P21,P22	TB8-4,6	I12U	67	33	2	PED 2							
P41,P42	TB8-5,6	I12L	69	35	4	PED 4							

NOTE: INSTALL DC ISOLATOR IN INPUT FILE SLOT I12.

*System detector only. Remove any assigned vehicle phase.

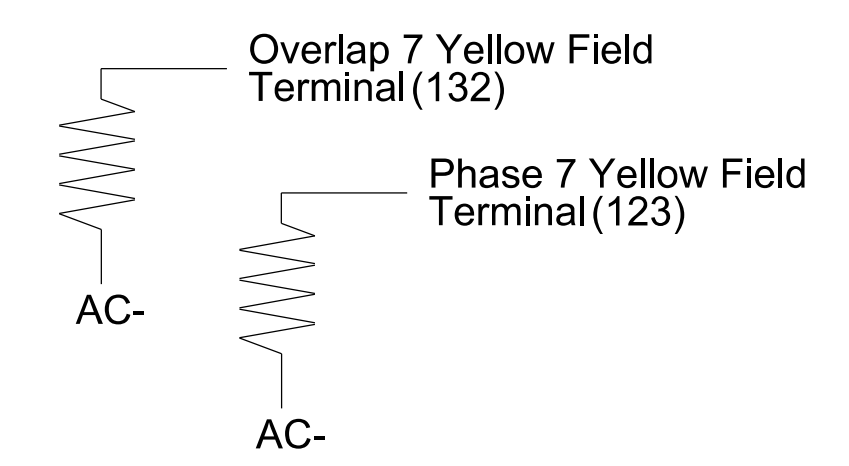
INPUT FILE POSITION LEGEND: J2L



LOAD RESISTOR INSTALLATION DETAIL

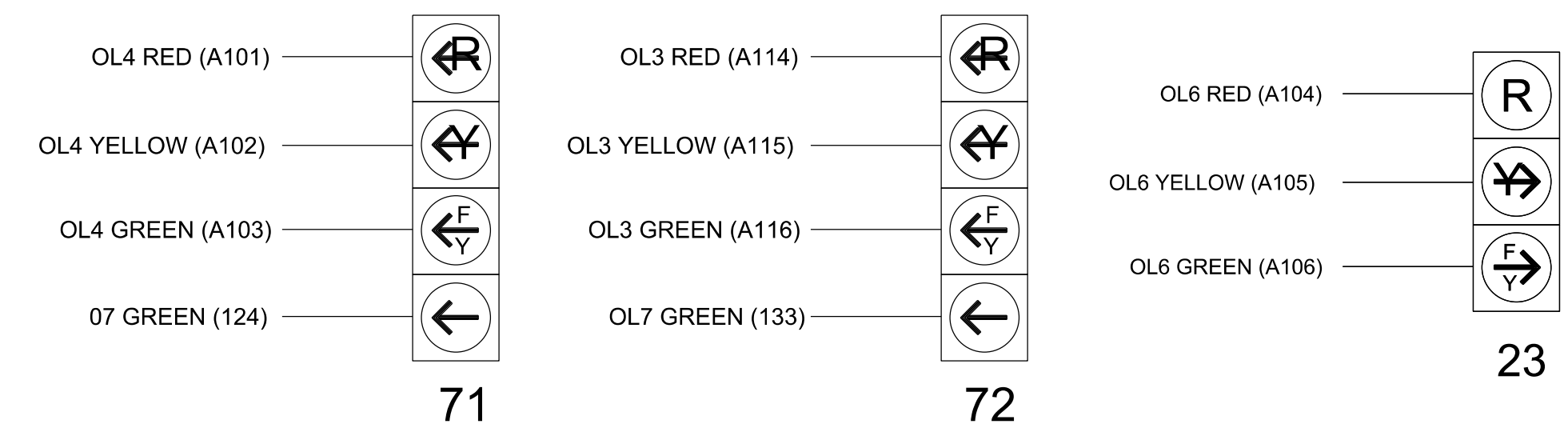
(install resistors as shown)

ACCEPTABLE VALUES	
Value (ohms)	Wattage
1.5K - 1.9K	25W (min)
2.0K - 3.0K	10W (min)



FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 11-1463
 DESIGNED: May 2023
 SEALED: 5/24/2023
 REVISED: N/A

Electrical Detail - Sheet 1 of 2

Electrical and Programming Details For:

US 421-NC 16 at Addison Ave/Walmart Entrance

Division 11 Wilkes County Wilkesboro

Prepared for the Offices of:

750 N. Greenfield Pkwy, Garner, NC 27529

Plan Date: May 2023
 Reviewed By: J. Ma

Prepared By: M.L. Stygles
 Reviewed By: S.R. Chiluka

Revisions: _____ Init. _____ Date _____

Seal: NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 046057 MATTHEW L. STYGLES

Documented by: _____ Date: 5/24/2023

SIG. INVENTORY NO. 11-1463



5/23/2019 3:15:01 PM ***BDDP ***PCJ ***0161gn38621.03 NDDOT U-5312 Wilkes Co#NDDOT#Traffic#Signal#490% Design Plans#U5312_11-1462_Sig_Le_Addi son Ave.dgn sch11.dwg

MAXTIME ALTERNATE PHASING ACTIVATION DETAIL

To run alternate phasing, select a Pattern that is programmed to run Overlap Plan 2 and Detector Plan 2. A Pattern can be selected through the scheduler or manually by changing the Operational Mode.

PHASING	OVERLAP PLAN	VEH DET PLAN
ACTIVE PLAN REQUIRED TO RUN DEFAULT PHASING	1	1
ACTIVE PLAN REQUIRED TO RUN ALTERNATE PHASING	2	2

ALTERNATE PHASING CHANGE SUMMARY

THE FOLLOWING IS A SUMMARY OF WHAT TAKES PLACE WHEN OVERLAP 2 AND VEHICLE DETECTOR PLAN 2 ACTIVATE TO CALL THE "ALTERNATE PHASING":

OVERLAP PLAN 2: Modifies overlap included phases for heads 71 and 72 to run protected turns only.

VEH DET PLAN 2: Reduces delay time for phase 7 call on loop 7A to 0 seconds.

OUTPUT CHANNEL CONFIGURATION

Front Panel
Main Menu >Controller >More>Channels>Channels Config

Web Interface
Home >Controller >Advanced IO>Channels>Channels Configuration

Channel Configuration

Channel	Control Type	Control Source	Flash Yellow	Flash Red	Flash Alt	MMU Channel
1	Phase Vehicle	1	-	X	X	1
2	Phase Vehicle	2	X	-	-	2
3	Phase Vehicle	3	-	X	X	3
4	Phase Vehicle	4	-	X	-	4
5	Overlap	7	-	X	-	5
6	Phase Vehicle	6	X	-	X	6
7	Phase Vehicle	7	-	X	-	7
8	Phase Vehicle	8	-	X	X	8
9	Overlap	1	X	-	X	9
10	Overlap	2	-	X	X	10
11	Overlap	3	X	-	-	11
12	Overlap	4	X	-	-	12
13	Phase Ped	2	-	-	-	13
14	Phase Ped	4	-	-	-	14
15	Phase Ped	6	-	-	-	15
16	Phase Ped	8	-	-	-	16
17	Overlap	5	-	X	X	17
18	Overlap	6	X	-	-	18

ASSIGN CHANNEL 5 TO OVERLAP 7 →

MAXTIME ALTERNATE PHASING PATTERN PROGRAMMING DETAIL

Front Panel
Main Menu >Controller >Coordination >Patterns

Web Interface
Home >Controller >Coordination >Patterns

Pattern Parameters

Pattern	Veh Det Plan	Overlap Plan
*	2	2

*The Pattern number(s) are to be determined by the Division and/or City Traffic Engineer.

MAXTIME DETECTOR PROGRAMMING DETAIL FOR ALTERNATE PHASING LOOP 7A

Front Panel
Main Menu >Controller >Detector >Veh Det Plans

Web Interface
Home >Controller >Detector Configuration >Vehicle Detectors

In the table view of web interface right click on "Detector" in the top left corner of the table. Copy the entire contents of Detector Plan 1. Paste Detector Plan 1 into Detector Plan 2. Modify Detector Plan 2 as shown below and save changes.

Plan 2

Detector	Call Phase	Delay
7A	21	7

MAXTIME OVERLAP PROGRAMMING DETAIL FOR DEFAULT PHASING

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

Overlap Plan 1

Overlap	3	4	6	7
Type	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section	Normal
Included Phases	2	2	2	7
Modifier Phases	7	7	-	-
Trail Green	0	0	0	0
Trail Yellow	0.0	0.0	0.0	0.0
Trail Red	0.0	0.0	0.0	0.0
FYA Ped Delay	3.0	3.0	3.0	0.0

MAXTIME OVERLAP PROGRAMMING DETAIL FOR ALTERNATE PHASING

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

In the table view of the web interface, right click on "Overlap" in the top left corner of the table. Copy the entire contents of Overlap Plan 1. Paste Overlap Plan 1 into Overlap Plan 2. Modify Overlap Plan 2 as shown below and save changes.

Overlap Plan 2

Overlap	3	4	6	7
Type	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section	Normal
Included Phases	-	-	2	7
Modifier Phases	7	7	-	-
Trail Green	0	0	0	0
Trail Yellow	0.0	0.0	0.0	0.0
Trail Red	0.0	0.0	0.0	0.0
FYA Ped Delay	3.0	3.0	3.0	0.0

← NOTICE INCLUDED PHASE

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 11-1463
DESIGNED: May 2023
SEALED: 5/24/2023
REVISED: N/A



Electrical Detail - Sheet 2 of 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:

US 421-NC 16

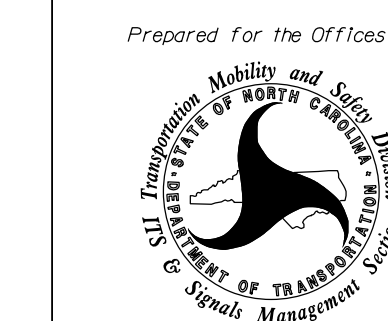
at
Addison Ave/Walmart Entrance

Division 11 Wilkes County Wilkesboro

PLAN DATE: May 2023 REVIEWED BY: J. Ma

PREPARED BY: M.L. Stygles REVIEWED BY: S.R. Chiluka

REVISIONS	INIT.	DATE

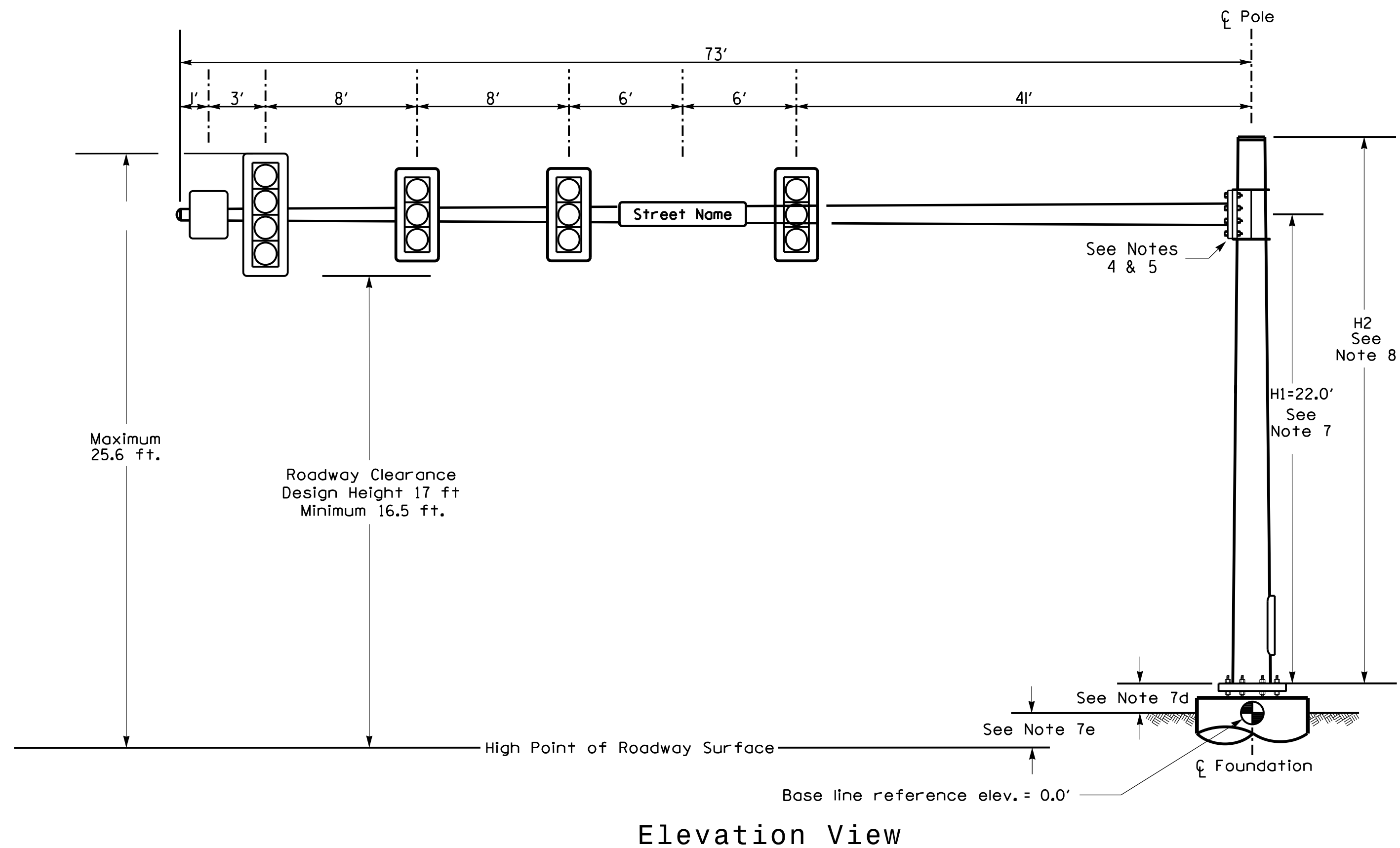


750 N. Greenfield Pkwy, Garner, NC 27529

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER
SEAL 046057
MATTHEW L. STYGLES
DocuSigned by: M.L. Stygles 5/24/2023
DATE
SIG. INVENTORY NO. 11-1463

Design Loading for METAL POLE NO. 1



Elevation View

SPECIAL NOTE

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

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 1	Pole 2
Baseline reference point at ϕ Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	+1.5 ft.	+1.7 ft.
Elevation difference at Edge of travelway or face of curb	+0.6 ft.	+0.8 ft.

METAL POLE No. 1 and 2

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	RIGID MOUNTED SIGNAL HEAD 12"-4 SECTION-WITH BACKPLATE	11.5 S.F.	25.5"W X 66.0"L	74 LBS
	RIGID MOUNTED SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE	9.3 S.F.	25.5"W X 52.5"L	60 LBS
	STREET NAME SIGN RIGID MOUNTED	16.0 S.F.	24.0"W X 96.0"L	36 LBS
	SIGN RIGID MOUNTED	9.0 S.F.	36.0"W X 36.0"L	20 LBS

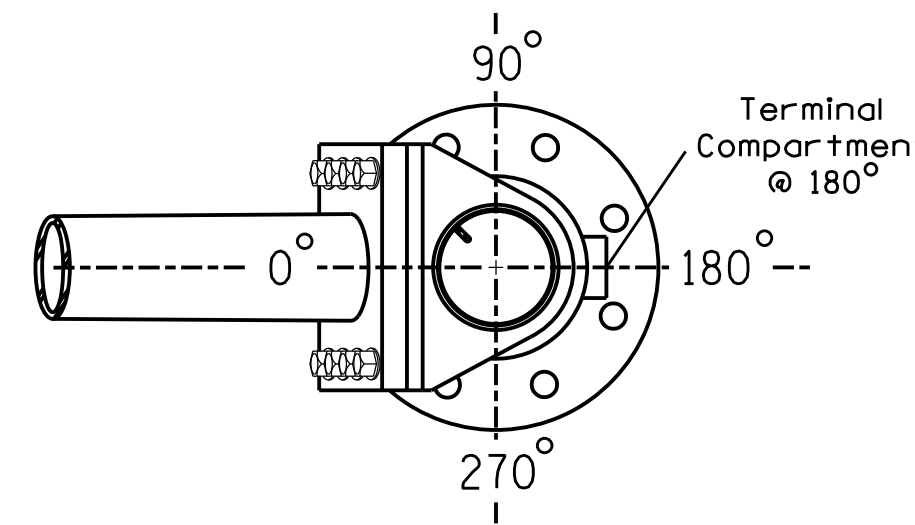
NOTES

DESIGN REFERENCE MATERIAL

- Design the traffic signal structure and foundation in accordance with:
 - The 6th Edition 2013 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
 - The 2018 NCDOT "Standard Specifications for Roads and Structures." The latest addenda to the specifications can be found in the traffic signal project special provisions.
 - The 2018 NCDOT Roadway Standard Drawings.
 - The traffic signal project plans and special provisions.
 - The NCDOT "Metal Pole Standards" located at the following NCDOT website: <https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx>

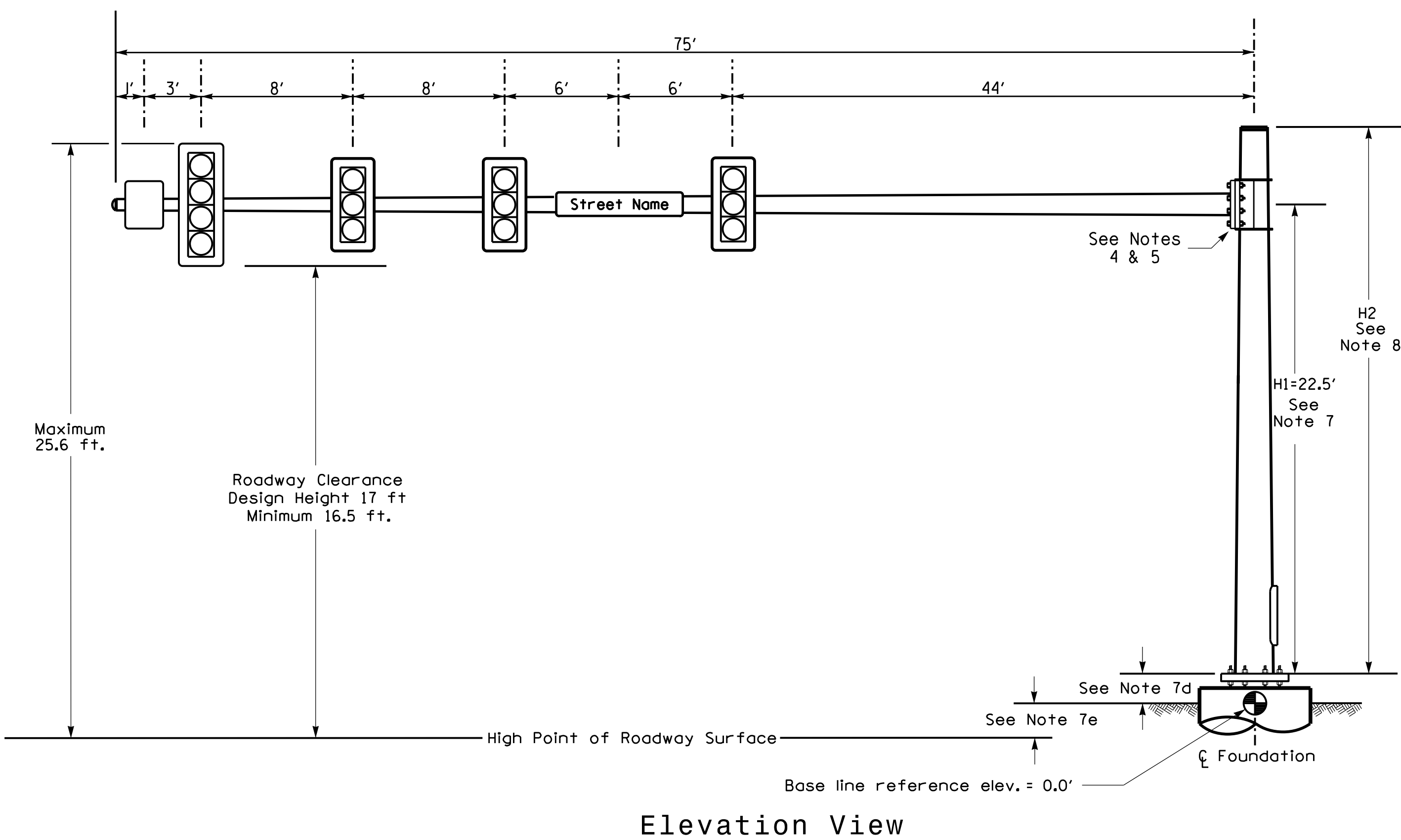
DESIGN REQUIREMENTS

- Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
- Design all signal supports using stress ratios that do not exceed 0.9.
- The camber design for the mast arm deflection should provide an appearance of a low pitched arch where the tip or the free end of the mast arm does not deflect below horizontal when fully loaded.
- A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements.
- Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
- The mast arm attachment height (H1) shown is based on the following design assumptions:
 - Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
 - Signal heads are rigidly mounted and vertically centered on the mast arm.
 - The roadway clearance height for design is as shown in the elevation views.
 - The top of the pole base plate is 0.75 feet above the ground elevation.
- Refer to the Elevation Data Chart for the elevation differences between the proposed foundation ground level and the high point of the roadway.
- The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
 - Mast arm attachment height (H1) plus 2 feet, or
 - H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
- If pole location adjustments are required, the contractor must gain approval from the Engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signal Design Section Senior Structural Engineer for assistance at (919) 814-5000.
- The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
- The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

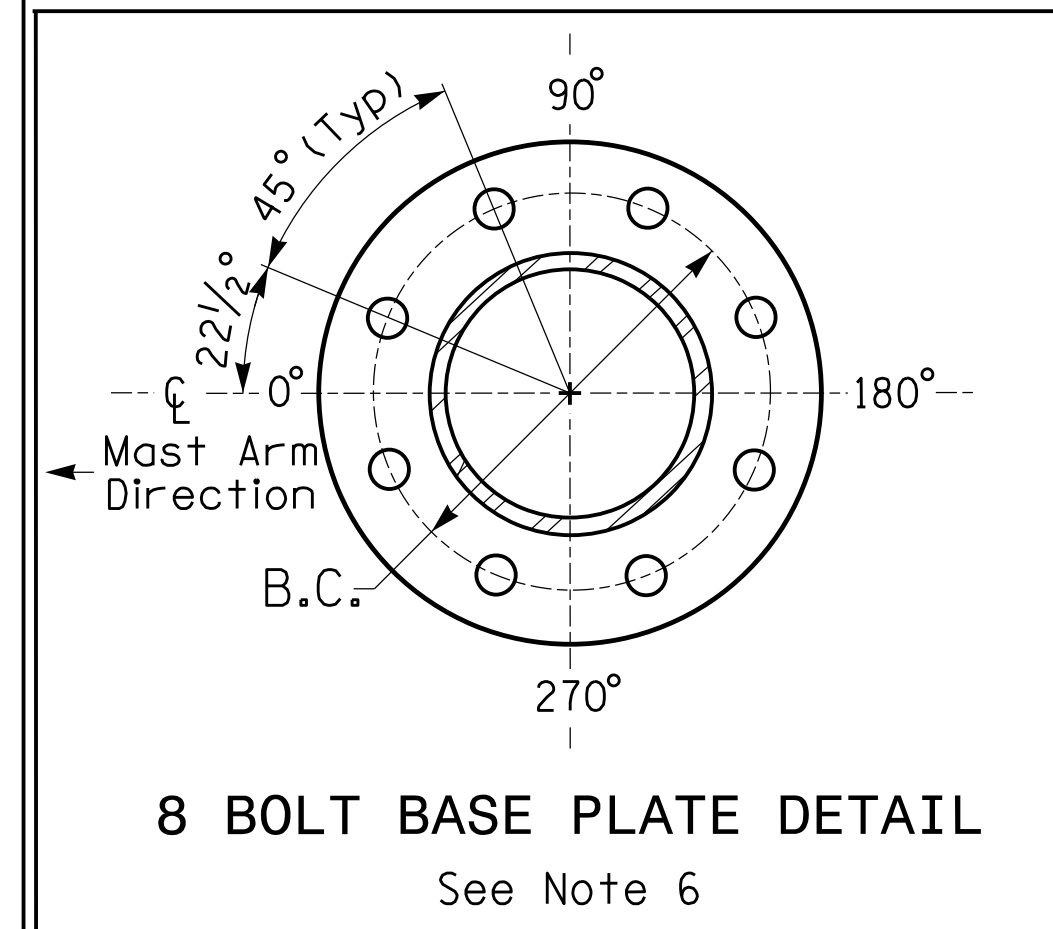


POLE RADIAL ORIENTATION

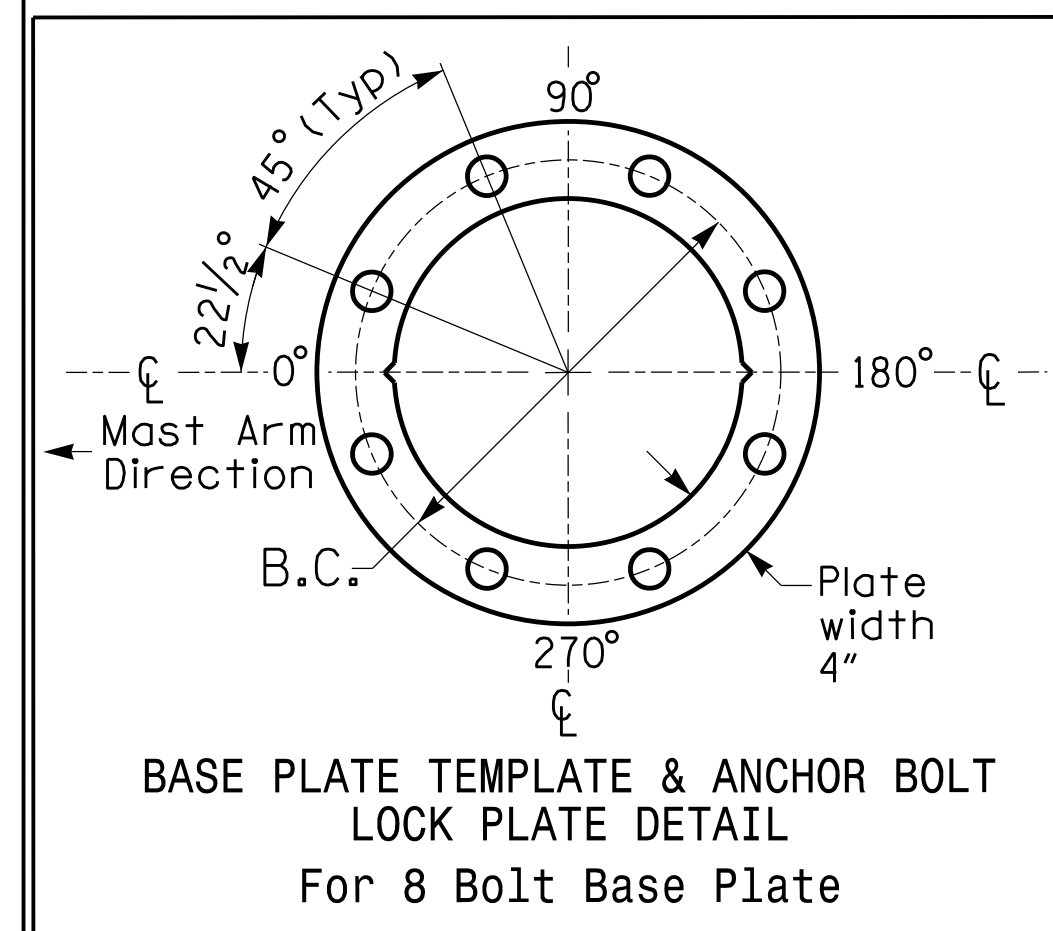
Design Loading for METAL POLE NO. 2



Elevation View



8 BOLT BASE PLATE DETAIL



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL For 8 Bolt Base Plate

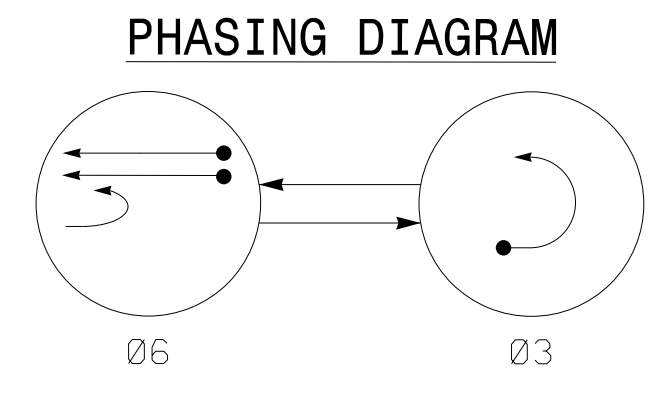


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NCDOT Wind Zone 4 (90 mph)

	US 421-NC 16 at Addison Ave/Biglots Entrance		
	Division 11 Wilkes County Wilkesboro PLAN DATE: May 2023 REVIEWED BY: M. Stygles PREPARED BY: S.R. Chiluka REVIEWED BY: J. Ma	SCALE: 0 N/A REVISIONS: _____ SIGNATURE: _____ DATE: 5/24/2023	

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PHASING DIAGRAM DETECTION LEGEND
 ● DETECTED MOVEMENT
 ◄ UNDETECTED MOVEMENT (OVERLAP)
 ◄ UNSIGNALIZED MOVEMENT
 ◄ PEDESTRIAN MOVEMENT

SIGNAL FACE I.D.

All Heads L.E.D.

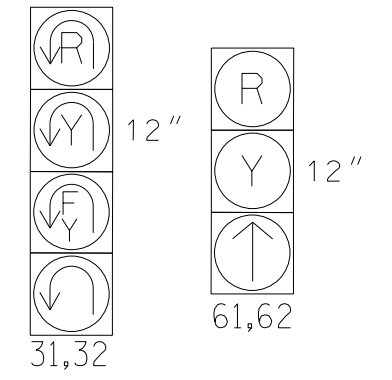


TABLE OF OPERATION

SIGNAL FACE	PHASE		
	03	06	U-TURN
31,32	R	Y	Y
61,62	R	Y	Y

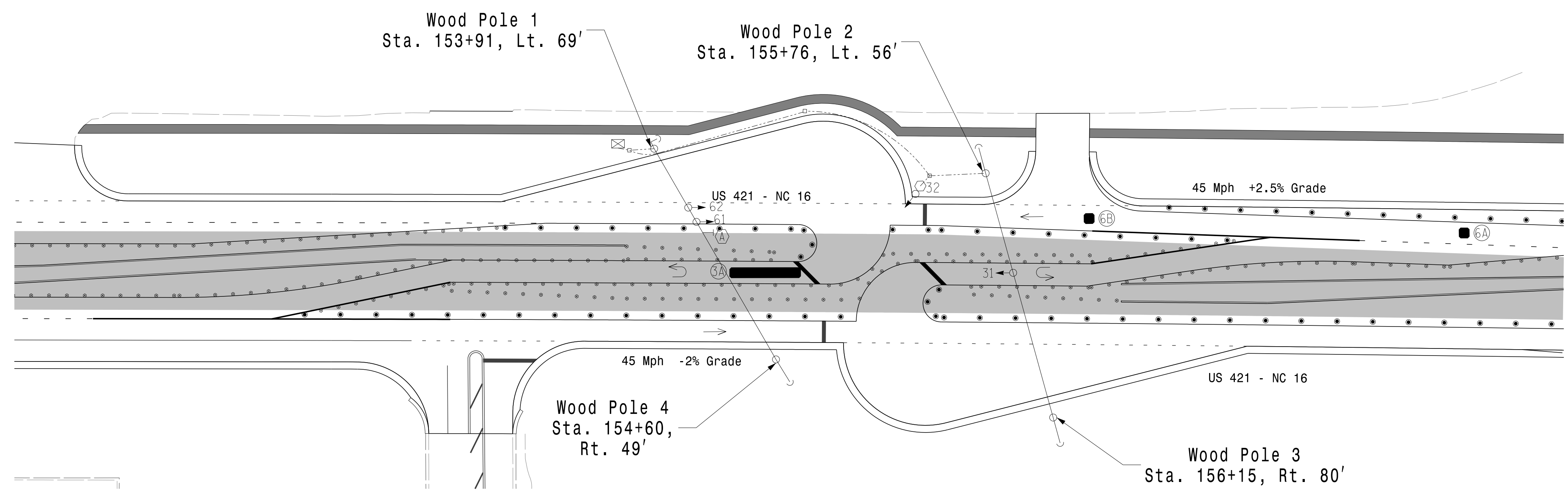
MAXTIME DETECTOR INSTALLATION CHART

LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	PROGRAMMING								
			TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND INITIAL	CALL	NEW CARD	
3A	*	0	*	*	3	15.0	-	X	X	-	*
6A	*	300	*	*	6	-	1.6	X	X	-	*
6B	*	90	*	*	6	-	-	X	X	-	*

*Video Detection Zone

2 Phase Fully Actuated (Isolated) 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 operation unless otherwise directed by the Engineer.
3. Set all detector units to presence mode.
4. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
5. This intersection uses video detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.
6. Refer to Pavement Marking Plans for proposed stop bar locations.



MAXTIME TIMING CHART

FEATURE	PHASE	
	3	6
Walk *	-	-
Ped Clear *	-	-
Min Green	7	12
Passage *	2.0	2.0
Max I *	30	60
Yellow Change	3.0	4.3
Red Clear	1.0	1.0
Added Initial *	-	-
Maximum Initial *	-	-
Time Before Reduction *	-	-
Time To Reduce *	-	-
Minimum Gap	-	-
Advance Walk	-	-
Non Lock Detector	X	-
Vehicle 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.

PROPOSED	LEGEND	EXISTING
	Curb Ramp	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Traffic Signal Head	
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Inductive Loop Detector	
	Video Detection Zone	N/A
	Construction Zone	N/A
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
	Right of Way	
	Temporary Construction Easement	N/A
	Directional Arrow	
	Type II Signal Pedestal	
	No Left Turn Sign (R3-2)	
	Drum	N/A
	Skinny Drum	N/A

New Installation - Temporary Design 1 (Phase 11)

US 421-NC 16 at Addison Avenue/ Big Lots Entrance East U-Turn

Division 11 Wilkes County Wilkesboro

PLAN DATE: May 2023 REVIEWED BY: M.L. Stygles

PREPARED BY: S.R. Chiluka REVIEWED BY: J. Ma

750 N. Greenfield Pkwy, Garner, NC 27529

SCALE: 1" = 40'

5/24/2023

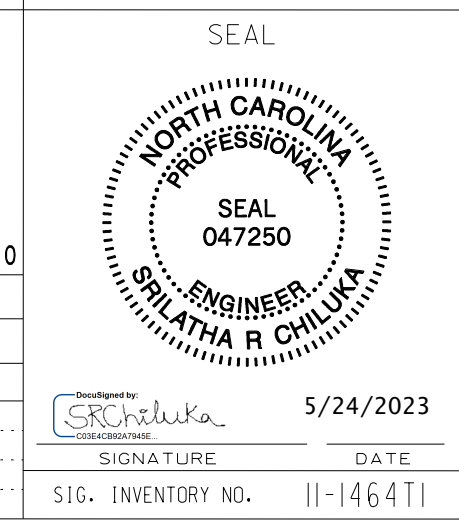
SIGNATURE: S.R. Chiluka

SIG. INVENTORY NO. 11-1464T1

3/28/2023 12:55:23 PM R:\Traffic\Signals\Design\100%\Design Plans\Temporary Signal Design\11464T1_sfg_dsn_202305.dgn schiluka



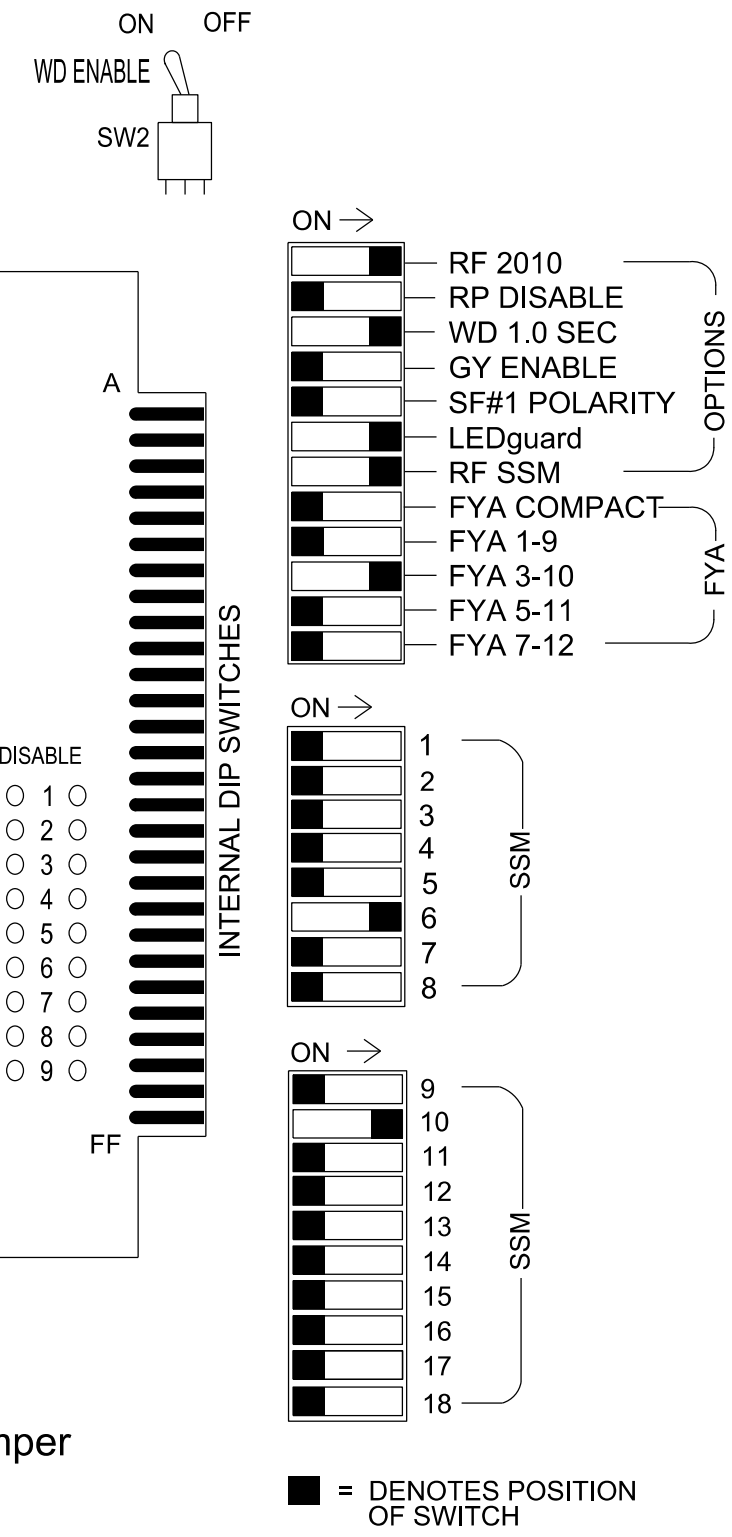
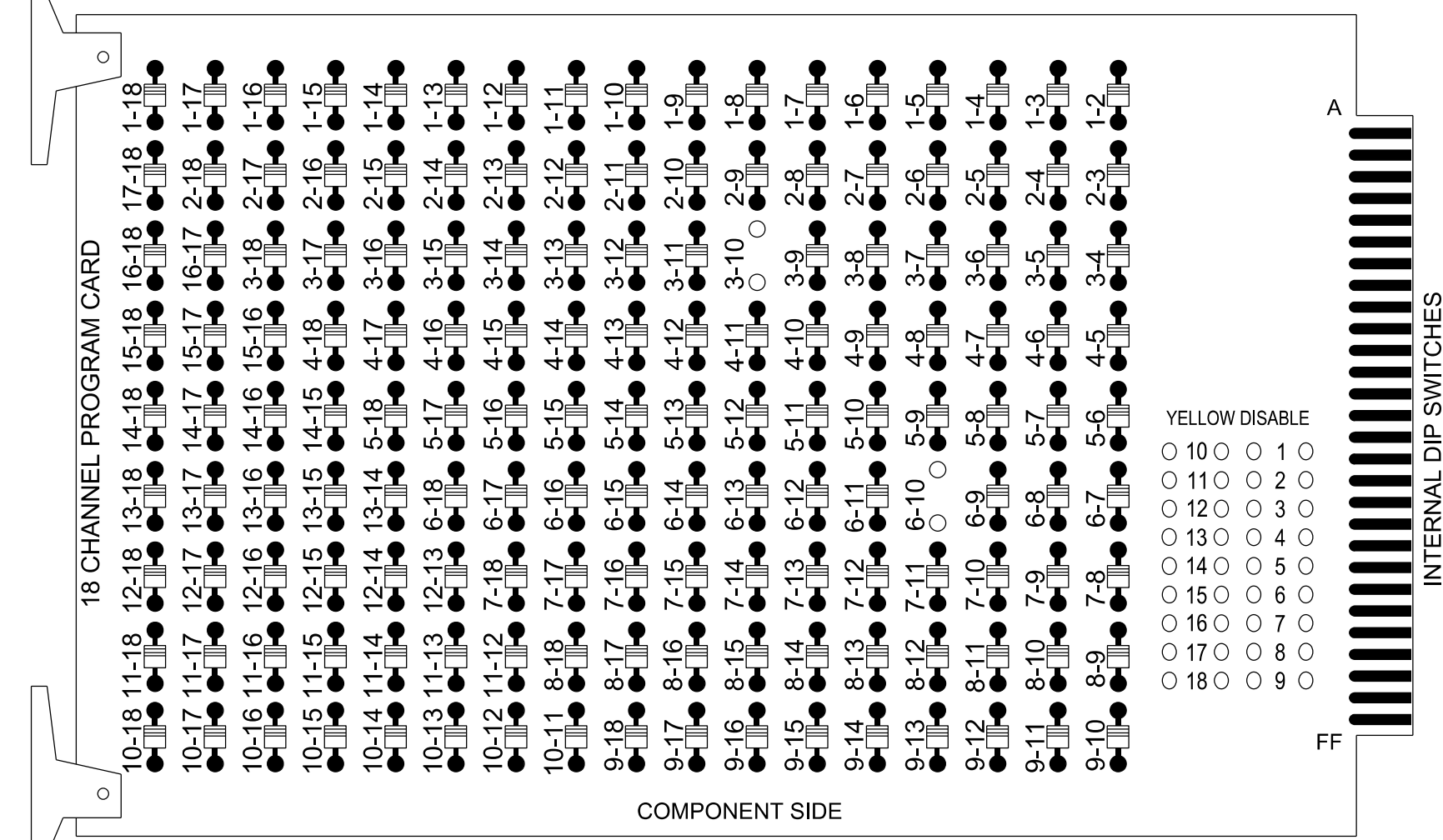
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



**18 CHANNEL CONFLICT MONITOR
PROGRAMMING DETAIL**

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 3-10 and 6-10.



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.
- 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 plan.
- Program controller to start up in phase 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.

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	NU	NU	31,32*	NU	NU	NU	61,62	NU	NU	NU	NU	NU	31,32*	NU	NU	NU	NU	
RED								134											
YELLOW				*				135											
GREEN								136											
RED ARROW																		A124	
YELLOW ARROW																			A125
FLASHING YELLOW ARROW																			A126
GREEN ARROW				118															

NU = Not Used

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

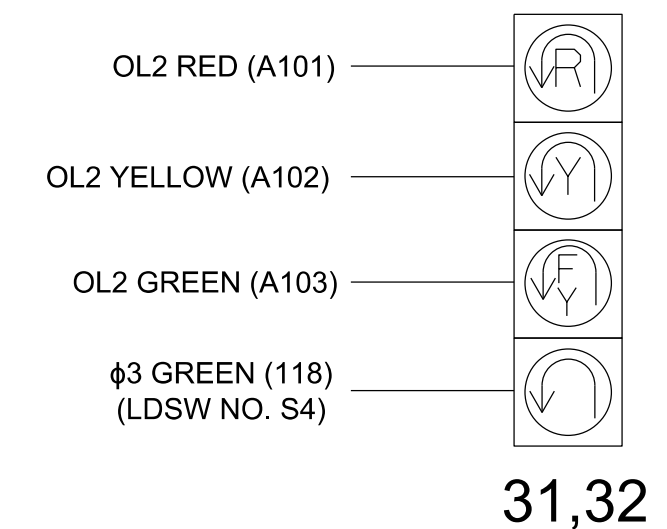
EQUIPMENT INFORMATION

Controller.....2070LX
Cabinet.....332 w/ Aux
Software.....Q-Free MAXTIME
Cabinet Mount.....Base
Output File Positions.....18 With Aux. Output File
Load Switches Used.....S4, S8, AUX S2
Phases Used.....3,6
Overlap "1".....NOT USED
Overlap "2".....*
Overlap "3".....NOT USED
Overlap "4".....NOT USED

*See overlap programming detail on sheet 2.

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



INPUT FILE POSITION LAYOUT

(front view)

FILE U	1	2	3	4	5	6	7	8	9	10	11	12	13	14	FILE L
"I"	- >S	- >S	- >S	- >S	- >S	- >S	- >S	- >S	- >S	- >S	- >S	- >S	- >S	- >S	FS DC ISOLATOR ST DC ISOLATOR
"J"	- >S	- >S	- >S	- >S	- >S	- >S	- >S	- >S	- >S	- >S	- >S	- >S	- >S	- >S	

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.

**MAXTIME OVERLAP PROGRAMMING DETAIL
FOR DEFAULT PHASING**

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

Web Interface
Home > Controller > Overlap Configuration > Overlaps

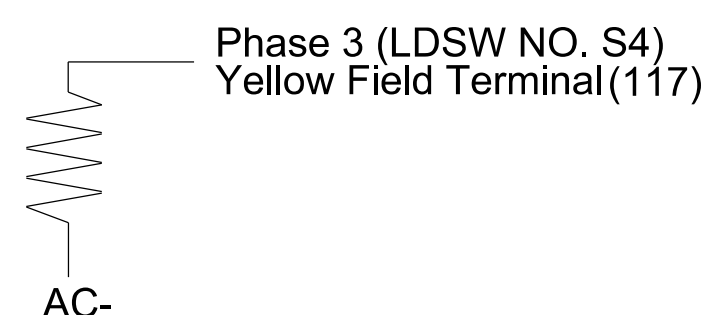
Overlap Plan 1

Overlap	2
Type	FYA 4 - Section
Included Phases	6
Modifier Phases	3
Trail Green	0
Trail Yellow	0.0
Trail Red	0.0

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

ACCEPTABLE VALUES	
Value (ohms)	Wattage
1.5K - 1.9K	25W (min)
2.0K - 3.0K	10W (min)



5/23/2019 3:15:01 PM
R:\tr\off\cas\signal\signal\5312_11-XXXXT1_Ph_11_Sig_Ele_Addison Ave East_U Turn.dgn U Turn.dgn
sch:luka

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 11-1464T1
DESIGNED: May 2023
SEALED: 5/24/2023
REVISED: N/A



Temporary Installation - Electrical Detail (Phases 11 & 12)

ELECTRICAL AND PROGRAMMING DETAILS FOR:
US 421 - NC 16 at Addison Avenue/ Big Lots Entrance East U-Turn

Division 11 Wilkes County Wilkesboro

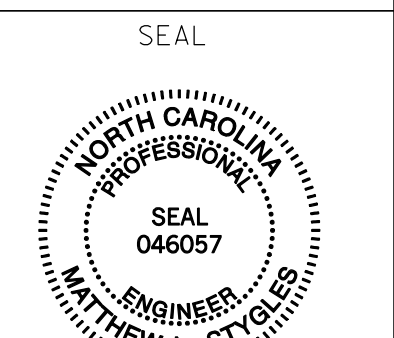
PLAN DATE: May 2023 REVIEWED BY: J. Ma
PREPARED BY: M.L. Stygles REVIEWED BY: S.R. Chiluka

REVISIONS INIT. DATE

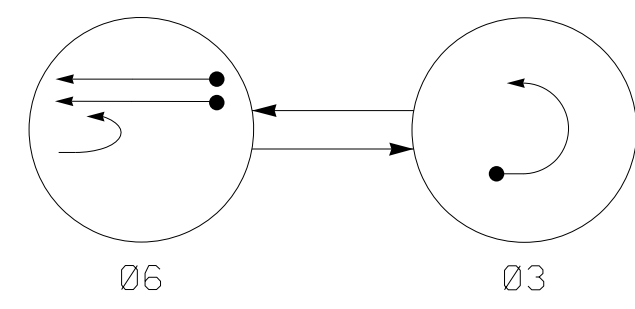
DocuSigned by: Matthew L. Stygles
DATE: 5/24/2023

SIG. INVENTORY NO. 11-1464T1

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



PHASING DIAGRAM

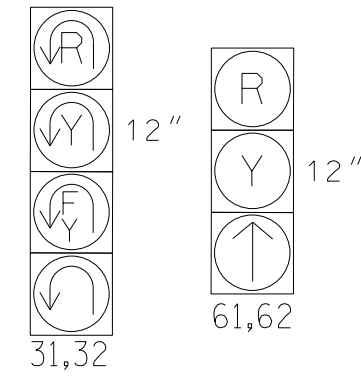


PHASING DIAGRAM DETECTION LEGEND

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

SIGNAL FACE I.D.

All Heads L.E.D.



SIGNAL FACE	PHASE		
	03	06	U
31,32	R	Y	U
61,62	R	Y	U

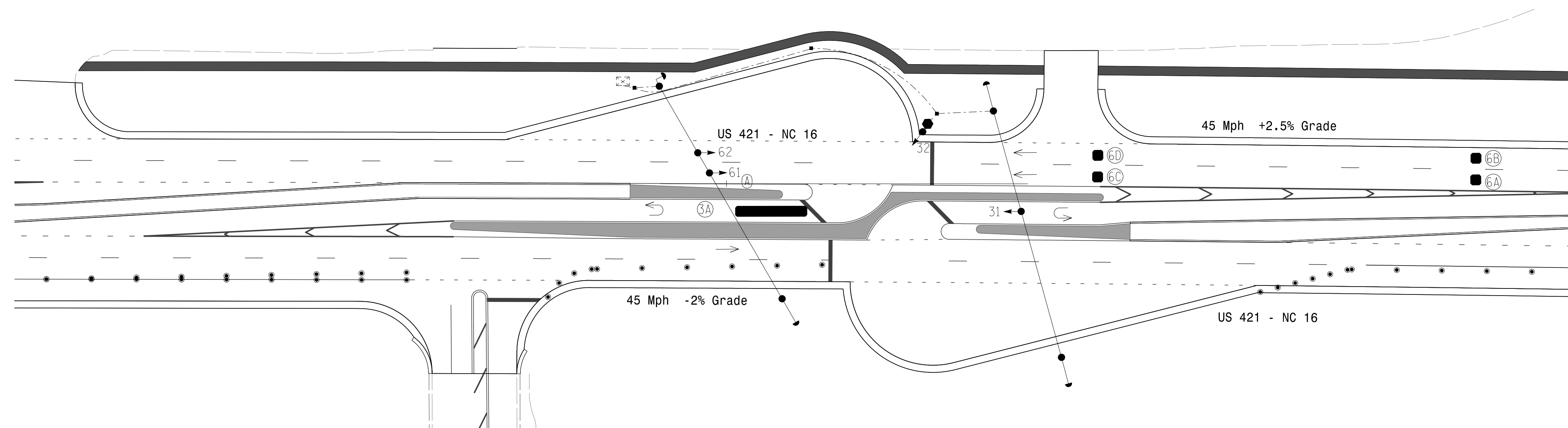
MAXTIME DETECTOR INSTALLATION CHART											
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING						
					CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND INITIAL	CALL	DELAY DURING GREEN	NEW CARD
3A	*	0	*	*	3	15.0	-	X	-	X	*
6A,6B	*	300	*	*	6	-	1.6	X	-	X	*
6C,6D	*	90	*	*	6	-	-	X	-	X	*

*Video Detection Zone

2 Phase Fully Actuated (Isolated)

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 operation unless otherwise directed by the Engineer.
- Set all detector units to presence mode.
- This intersection uses video detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.
- Refer to Pavement Marking Plans for proposed stop bar locations.



MAXTIME TIMING CHART

FEATURE	PHASE	
	3	6
Walk *	-	-
Ped Clear *	-	-
Min Green	7	12
Passage *	2.0	2.0
Max I *	30	60
Yellow Change	3.0	4.3
Red Clear	1.0	1.0
Added Initial *	-	-
Maximum Initial *	-	-
Time Before Reduction *	-	-
Time To Reduce *	-	-
Minimum Gap	-	-
Advance Walk	-	-
Non Lock Detector	X	-
Vehicle 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
	Curb Ramp	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Traffic Signal Head	
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Inductive Loop Detector	
	Video Detection Zone	N/A
	Construction Zone	N/A
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
	Right of Way	
	Temporary Construction Easement	N/A
	Directional Arrow	
	Type II Signal Pedestal	
	No Left Turn Sign (R3-2)	
	Drum	N/A
	Skinny Drum	N/A

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DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Signal Upgrade - Temporary Design 2(Phase 13)

750 N. Greenfield Pkwy, Garner, NC 27529

US 421-NC 16 at Addison Avenue/ Big Lots Entrance East U-Turn

Division 11 Wilkes County Wilkesboro

PLAN DATE: May 2023 REVIEWED BY: M.L. Stygles

PREPARED BY: S.R. Chiluka REVIEWED BY: J. Ma

SEAL

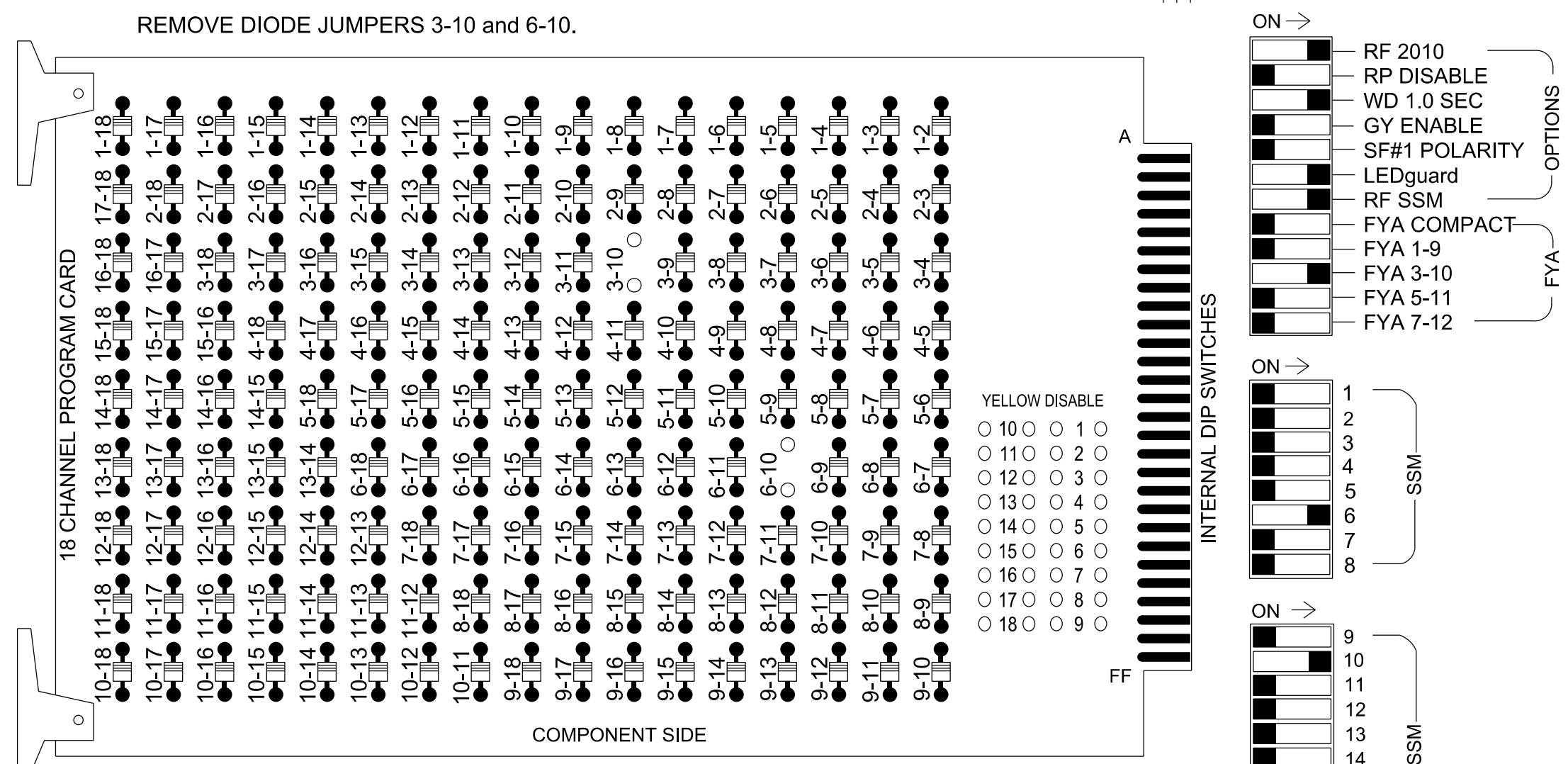
DATE: 5/24/2023

SCALE: 1" = 40'

REVISIONS	INIT.	DATE

18 CHANNEL CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE JUMPERS AS SHOWN

NOTES:

- 1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
- 2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
- 3. Ensure that the 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

- 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 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.

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.....S4, S8, AUX S2
 Phases Used.....3,6
 Overlap "1".....NOT USED
 Overlap "2".....*
 Overlap "3".....NOT USED
 Overlap "4".....NOT USED

*See overlap programming detail on sheet 2.

SIGNAL HEAD HOOK-UP CHART

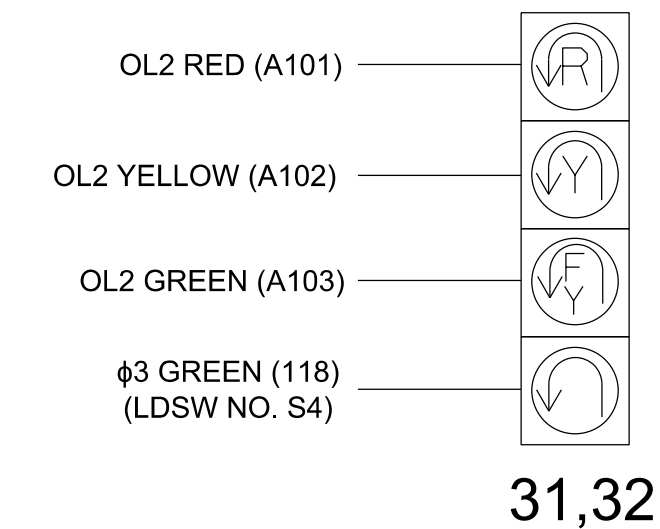
LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	PED	3	4	PED	5	6	PED	7	8	PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	NU	NU	NU	31,32	NU	NU	NU	61,62	NU	NU	NU	NU	NU	31,32	NU	NU	NU	NU
RED								134										
YELLOW				*				135										
GREEN								136										
RED ARROW														A124				
YELLOW ARROW														A125				
FLASHING YELLOW ARROW														A126				
GREEN ARROW				118														

NU = Not Used

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

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



INPUT FILE POSITION LAYOUT

(front view)

FILE	U	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
		-O-S	-O-S	-O-S	-O-S	-O-S	-O-S	-O-S	-O-S	-O-S	-O-S	-O-S	-O-S	-O-S	-O-S	FS
		-O-S	-O-S	-O-S	-O-S	-O-S	-O-S	-O-S	-O-S	-O-S	-O-S	-O-S	-O-S	-O-S	-O-S	DC ISOLATOR
		-O-S	-O-S	-O-S	-O-S	-O-S	-O-S	-O-S	-O-S	-O-S	-O-S	-O-S	-O-S	-O-S	-O-S	ST
		-O-S	-O-S	-O-S	-O-S	-O-S	-O-S	-O-S	-O-S	-O-S	-O-S	-O-S	-O-S	-O-S	-O-S	DC ISOLATOR

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.

MAXTIME OVERLAP PROGRAMMING DETAIL FOR DEFAULT PHASING

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

Web Interface
 Home > Controller > Overlap Configuration > Overlaps

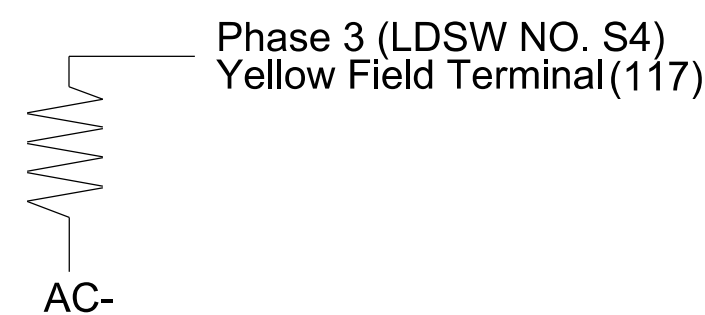
Overlap Plan 1

Overlap	2
Type	FYA 4 - Section
Included Phases	6
Modifier Phases	3
Trail Green	0
Trail Yellow	0.0
Trail Red	0.0

LOAD RESISTOR INSTALLATION DETAIL

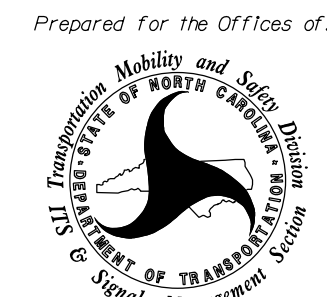
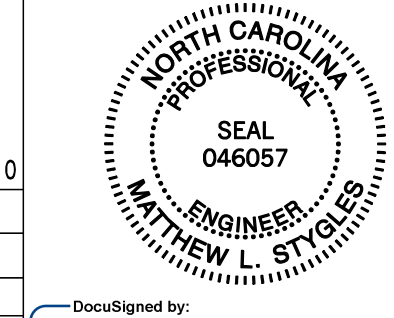
(install resistors as shown)

ACCEPTABLE VALUES	
Value (ohms)	Wattage
1.5K - 1.9K	25W (min)
2.0K - 3.0K	10W (min)



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 11-1464T3
 DESIGNED: May 2023
 SEALED: 5/24/2023
 REVISED: N/A

Temporary Installation - Electrical Detail 1 of 1 (Phase 13)

ELECTRICAL AND PROGRAMMING DETAILS FOR:	US 421 - NC 16 at Addison Avenue/Big Lots Entrance East U-Turn		
Prepared For the Offices of:	Division 11 Wilkes County Wilkesboro		
	PLAN DATE: May 2023	REVIEWED BY: J. Ma	DATE: 5/24/2023
	PREPARED BY: M.L. Stygles	REVIEWED BY: S.R. Chiluka	DATE: 5/24/2023
REVISIONS	INIT.	DATE	
			
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED			

2 Phase Fully Actuated W/ Alternate Phasing Operation Wilkesboro Closed Loop System

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Set all detector units to presence mode.
4. The Division Traffic Engineer will determine the hours of use for each phasing plan.
5. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
6. Refer to Pavement Marking Plans for proposed stop bar locations.

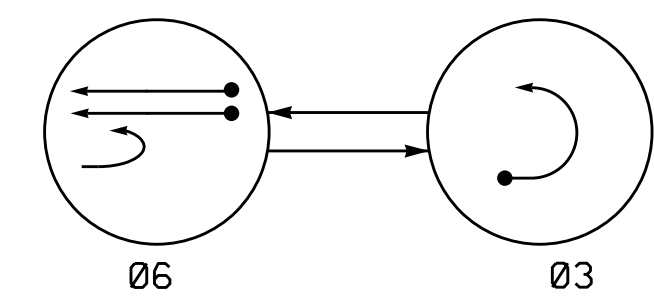
MAXTIME DETECTOR INSTALLATION CHART										
DETECTOR					PROGRAMMING					
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND ADDED INITIAL	CALL DURING GREEN	NEW CARD
3A	6X40	0	2-4-2	X	3	15.0*	-	X	X	X
6A	6X6	300	5	X	6	-	-	X	X	X
6B	6X6	300	5	X	6	-	-	X	X	X
S1	6X6	200	3	X	-	-	-	-	-	-

* Disable delay during alternate phasing.

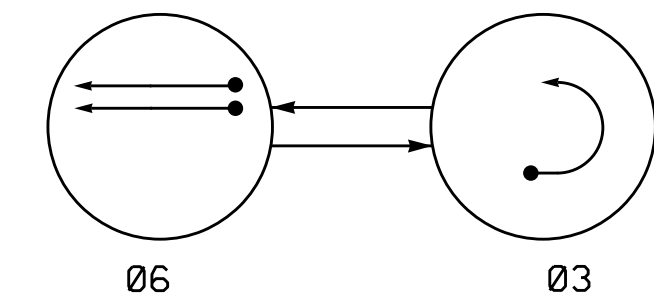
DEFAULT PHASING TABLE OF OPERATION			
SIGNAL FACE	PHASE		
	Ø3	Ø6	FLASH
31,32	↔	↔	↔
61,62	R	↑	Y

ALTERNATE PHASING TABLE OF OPERATION			
SIGNAL FACE	PHASE		
	Ø3	Ø6	FLASH
31,32	↔	R	↑
61,62	R	↑	Y

DEFAULT PHASING DIAGRAM

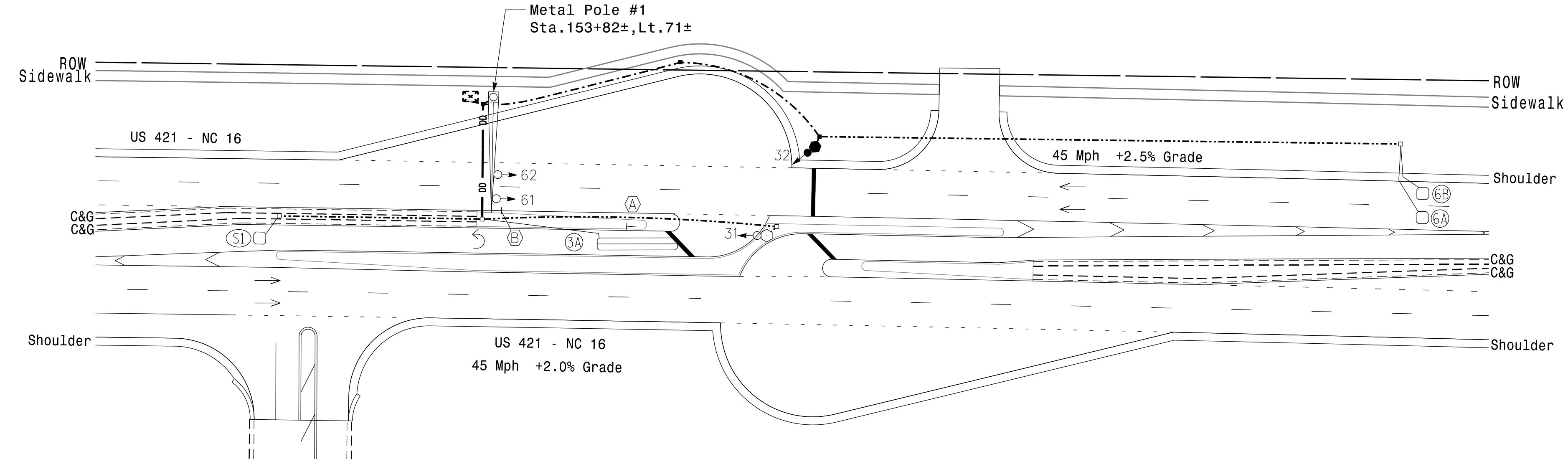
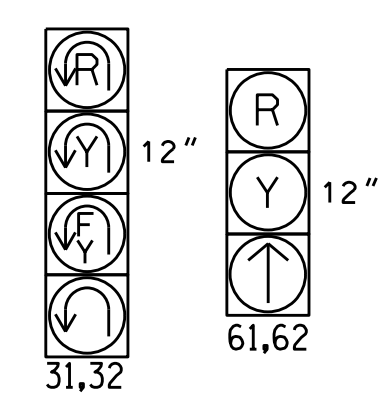


ALTERNATE PHASING DIAGRAM



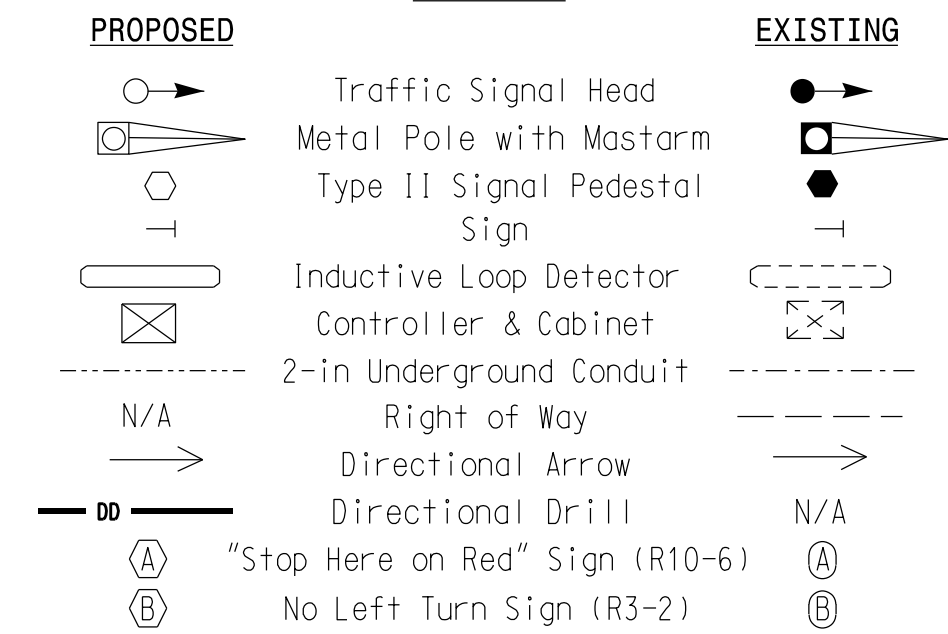
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

SIGNAL FACE I.D.



FEATURE	PHASE	
	3	6
Walk *	-	-
Ped Clear *	-	-
Min Green	7	12
Passage *	2.0	6.0
Max I *	30	60
Yellow Change	3.0	4.3
Red Clear	1.0	1.0
Added Initial *	-	1.5
Maximum Initial *	-	34
Time Before Reduction *	-	15
Time To Reduce *	-	30
Minimum Gap	-	3.4
Advance Walk	-	-
Non Lock Detector	X	-
Vehicle Recall	-	MIN RECALL
Dual Entry	-	-

LEGEND



* 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.

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New Installation - Final Design

US 421-NC 16 at Addison Ave/ Big Lots Entrance East U-Turn

Division 11 Wilkes County Wilkesboro

PLAN DATE: May 2023 REVIEWED BY: M. Stygles

PREPARED BY: S.R. Chiluka REVIEWED BY: J. Ma

750 N. Greenfield Pkwy, Garner, NC 27529

SCALE 0 40

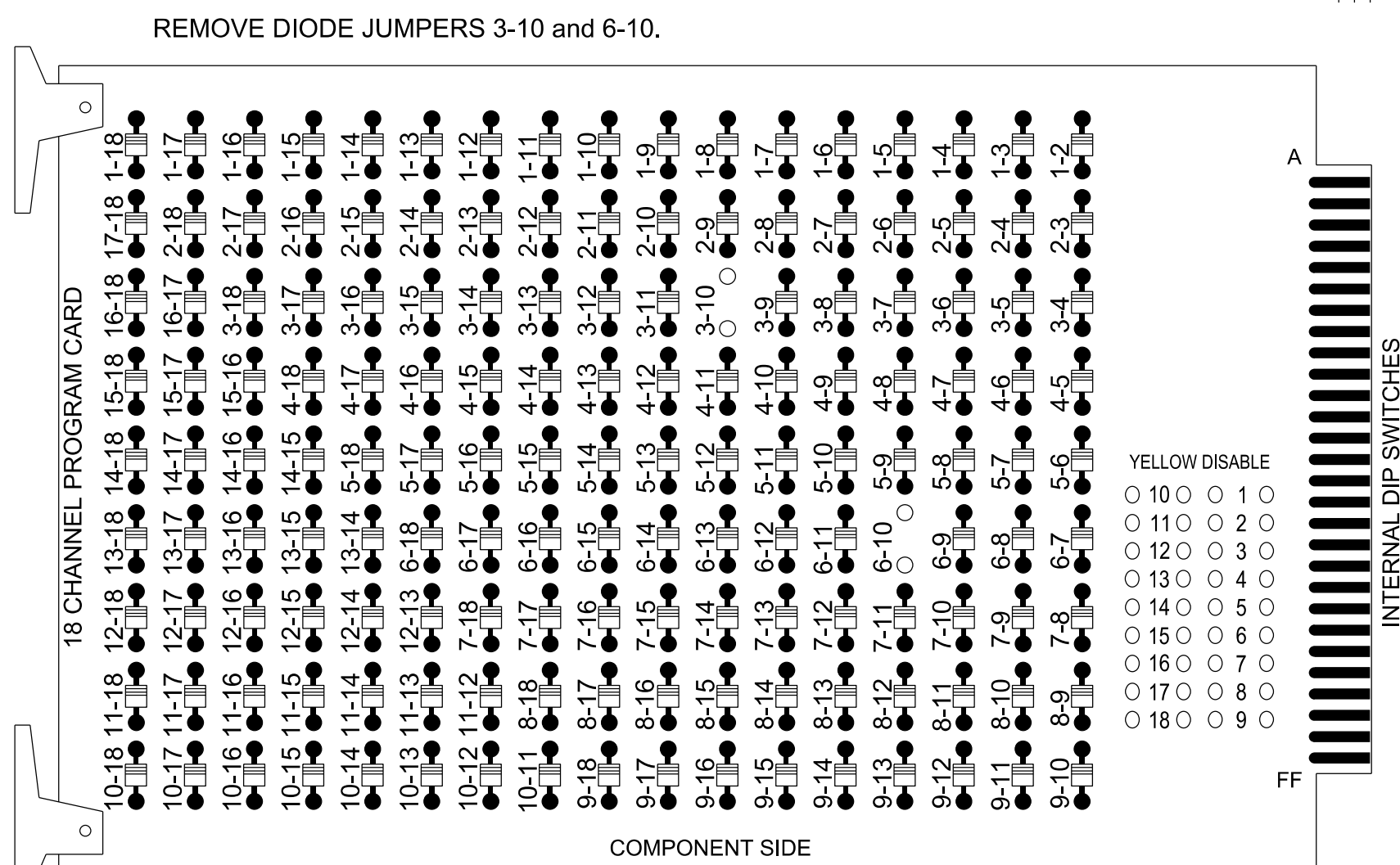
SEAL NORTH CAROLINA PROFESSIONAL ENGINEER SRI LATHA R CHILUKA 047250

SIGNATURE DATE 5/24/2023

SIG. INVENTORY NO. 11-1464

18 CHANNEL CONFLICT MONITOR PROGRAMMING DETAIL

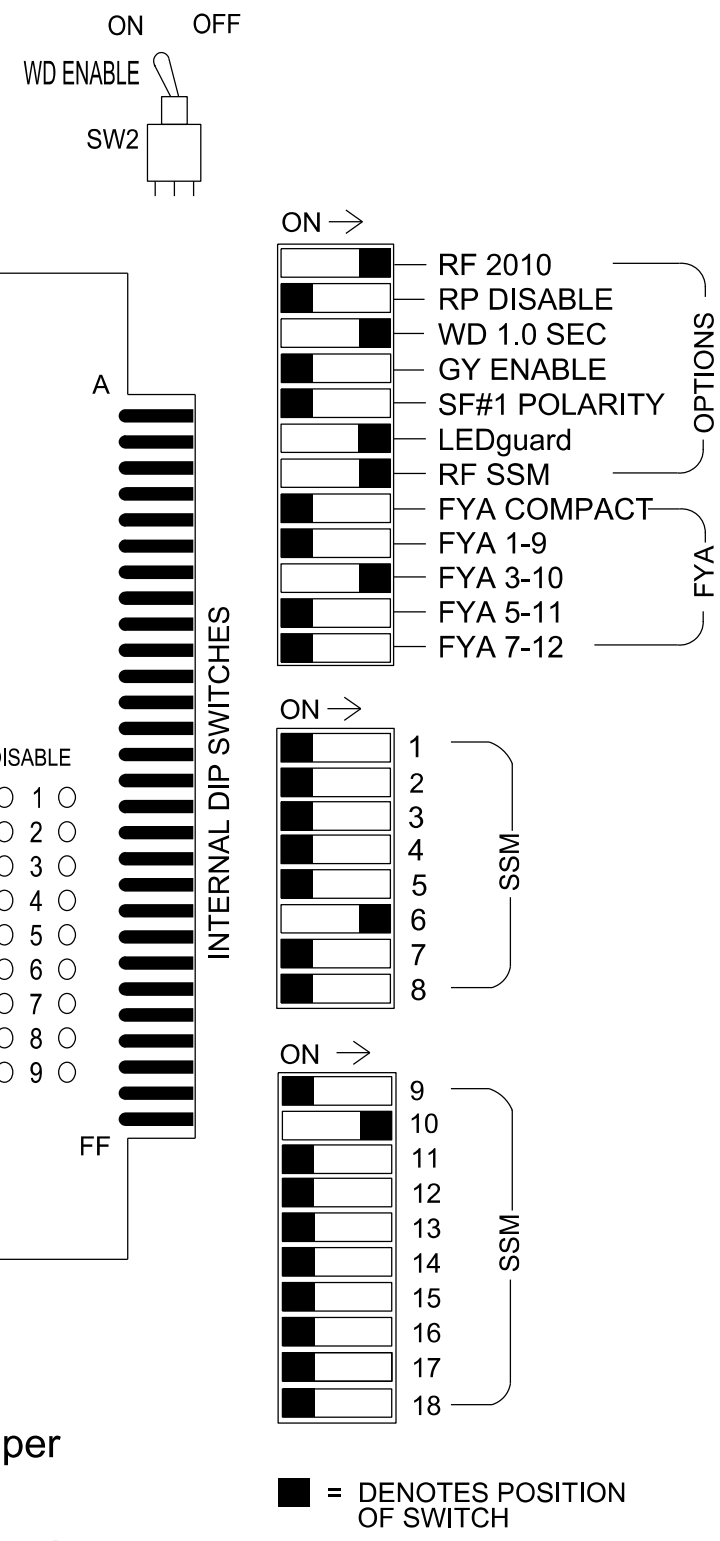
(remove jumpers and set switches as shown)



REMOVE JUMPERS AS SHOWN

NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that the 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 plan.
2. Program controller to start up in phase 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 Wilkesboro Closed Loop System.

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.....S4, S8, AUX S2
 Phases Used.....3,6
 Overlap "1".....NOT USED
 Overlap "2".....*
 Overlap "3".....NOT USED
 Overlap "4".....NOT USED

*See overlap programming detail on sheet 2.

SIGNAL HEAD HOOK-UP CHART

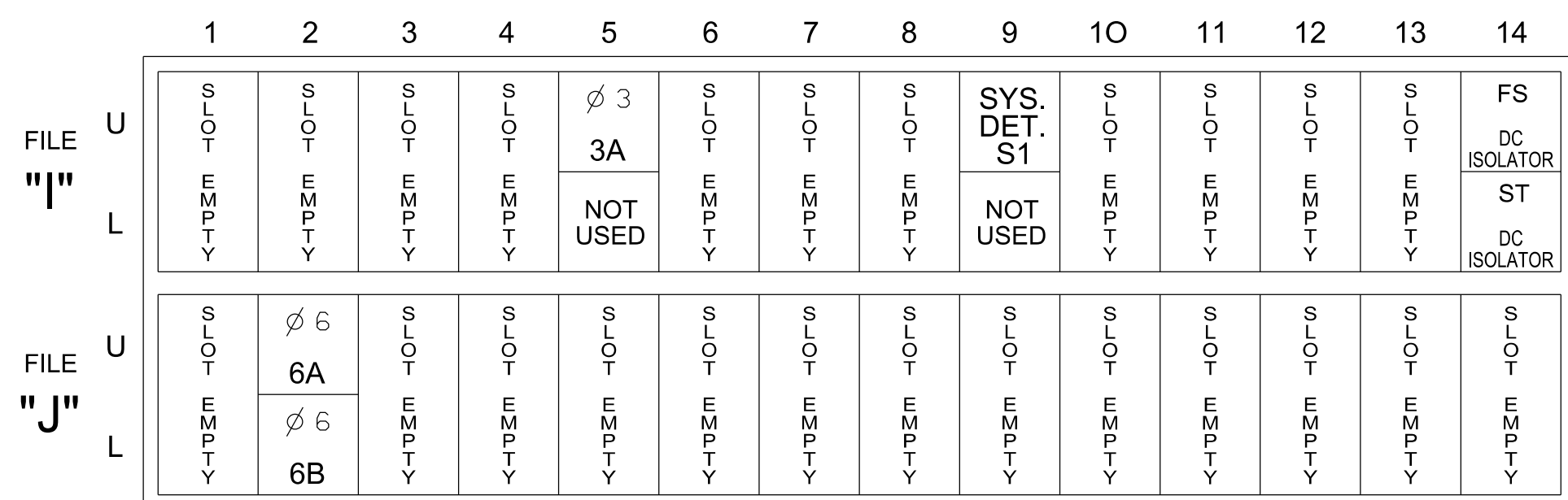
LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6	
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18	
PHASE	1	2	PED	3	4	PED	5	6	PED	7	8	PED	OL1	OL2	SPARE	OL3	OL4	SPARE	
SIGNAL HEAD NO.	NU	NU	NU	31,32*	NU	NU	NU	61,62	NU	NU	NU	NU	NU	31,32*	NU	NU	NU	NU	
RED								134											
YELLOW				*				135											
GREEN								136											
RED ARROW																		A124	
YELLOW ARROW																			A125
FLASHING YELLOW ARROW																			A126
GREEN ARROW				118															

NU = Not Used

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

INPUT FILE POSITION LAYOUT

(front view)



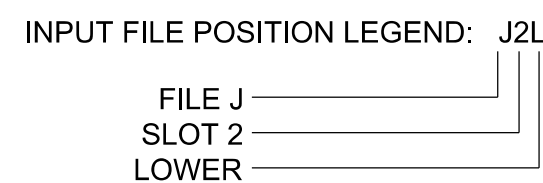
EX.: 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE
 ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

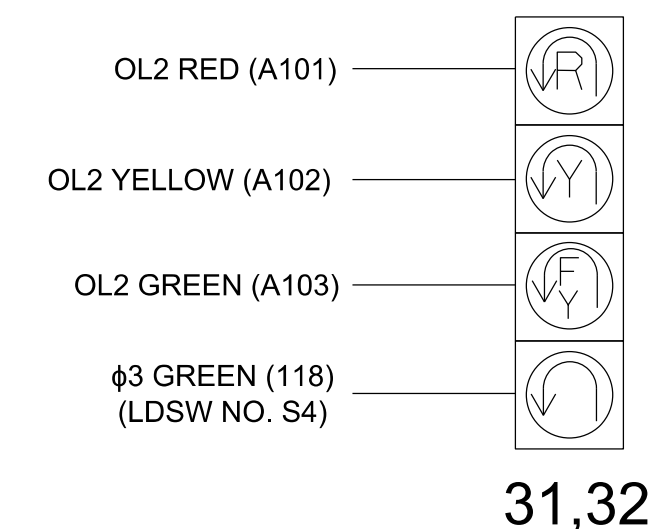
LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	QUEUE	CALL	DELAY DURING GREEN
3A	TB4-5.6	ISU	58	20	7	3	15		X			X	
*S1	TB6-9.10	I9U	60	22	13	SYS			X			X	
6A	TB3-5.6	J2U	40	2	16	6			X	X		X	
6B	TB3-7.8	J2L	44	6	17	6			X	X		X	

*System detector only. Remove any assigned vehicle phase.



FYA SIGNAL WIRING DETAIL

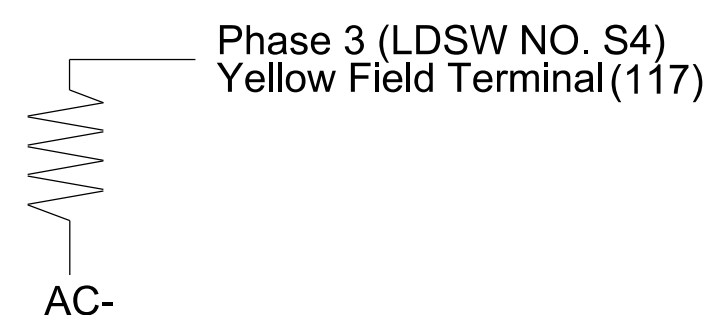
(wire signal heads as shown)



LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

ACCEPTABLE VALUES	
Value (ohms)	Wattage
1.5K - 1.9K	25W (min)
2.0K - 3.0K	10W (min)



5/23/2019 3:15:01 PM ***BDD: MPO: R0161938621.03 NDDOT U-5312 Wilkes Co#NDDOT#Traffic#Signal#490% Design Plans#U5312_11-XXXX_Sig_ei_e.Addison Ave.East U Turn.dgn sch1.luk

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 11-1464
 DESIGNED: May 2023
 SEALED: 5/24/2023
 REVISED: N/A



Electrical Detail Sheet 1 of 2

ELECTRICAL AND PROGRAMMING DETAILS FOR: Prepared for the Offices of: 	US 421-NC 16 at Addison Ave/ Big Lots Entrance East U-Turn		DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED SEAL
	Division 11 Wilkes County Wilkesboro PLAN DATE: May 2023 REVIEWED BY: J. Ma PREPARED BY: M.L. Styles REVIEWED BY: S.R. Chiluka	REVISIONS INIT. DATE	

MAXTIME OVERLAP PROGRAMMING DETAIL FOR DEFAULT PHASING

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

Overlap Plan 1

Overlap	2
Type	FYA 4 - Section
Included Phases	6
Modifier Phases	3
Trail Green	0
Trail Yellow	0.0
Trail Red	0.0

MAXTIME OVERLAP PROGRAMMING DETAIL FOR ALTERNATE PHASING

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

In the table view of the web interface, right click on "Overlap" in the top left corner of the table. Copy the entire contents of Overlap Plan 1. Paste Overlap Plan 1 into Overlap Plan 2. Modify Overlap Plan 2 as shown below and save changes.

Overlap Plan 2

Overlap	2
Type	FYA 4 - Section
Included Phases	-
Modifier Phases	3
Trail Green	0
Trail Yellow	0.0
Trail Red	0.0

← NOTICE INCLUDED PHASE

MAXTIME ALTERNATE PHASING ACTIVATION DETAIL

To run alternate phasing, select a Pattern that is programmed to run Overlap Plan 2 and Detector Plan 2. A Pattern can be selected through the scheduler or manually by changing the Operational Mode.

PHASING	OVERLAP PLAN	VEH DET PLAN
ACTIVE PLAN REQUIRED TO RUN DEFAULT PHASING	1	1
ACTIVE PLAN REQUIRED TO RUN ALTERNATE PHASING	2	2

ALTERNATE PHASING CHANGE SUMMARY

THE FOLLOWING IS A SUMMARY OF WHAT TAKES PLACE WHEN OVERLAP 2 AND VEHICLE DETECTOR PLAN 2 ACTIVATE TO CALL THE "ALTERNATE PHASING":

OVERLAP PLAN 2: Modifies overlap included phases for heads 31 and 32 to run protected turns only.

VEH DET PLAN 2: Reduces delay time for phase 3 call on loop 3A to 0 seconds.

MAXTIME DETECTOR PROGRAMMING DETAIL FOR ALTERNATE PHASING LOOP 7A

Front Panel
Main Menu >Controller >Detector >Veh Det Plans

Web Interface
Home >Controller >Detector Configuration >Vehicle Detectors

In the table view of web interface right click on "Detector" in the top left corner of the table. Copy the entire contents of Detector Plan 1. Paste Detector Plan 1 into Detector Plan 2. Modify Detector Plan 2 as shown below and save changes.

Plan 2

Detector	Call Phase	Delay
7	3	-

3A

MAXTIME ALTERNATE PHASING PATTERN PROGRAMMING DETAIL

Front Panel
Main Menu >Controller >Coordination >Patterns

Web Interface
Home >Controller >Coordination >Patterns

Pattern Parameters

Pattern	Veh Det Plan	Overlap Plan
*	2	2

* The Pattern number(s) are to be determined by the Division and/or City Traffic Engineer.

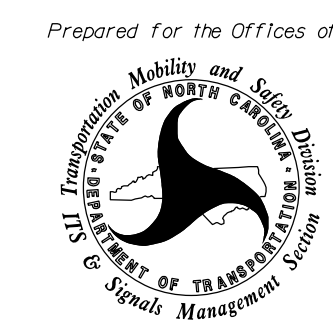
THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 11-1464
DESIGNED: May 2023
SEALED: 5/24/2023
REVISED: N/A



DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Electrical Detail Sheet 2 of 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:



750 N. Greenfield Pkwy, Garner, NC 27529

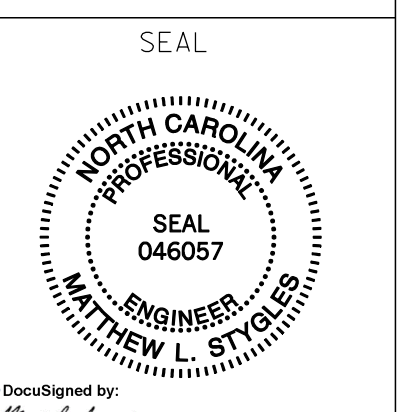
US 421-NC 16 at Addison Ave/ Big Lots Entrance East U-Turn

Division 11 Wilkes County Wilkesboro

PLAN DATE: May 2023 REVIEWED BY: J. Ma

PREPARED BY: M.L. Stygles REVIEWED BY: S.R. Chiluka

REVISIONS	INIT.	DATE



DocuSigned by: Matthew L. Stygles 5/24/2023

SIG. INVENTORY NO. 11-1464

METAL POLE No. 1

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	RIGID MOUNTED SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE	9.3 S.F.	25.5" W X 52.5" L	60 LBS
	SIGN RIGID MOUNTED	9.0 S.F.	36.0" W X 36.0" L	20 LBS
	STREET NAME SIGN RIGID MOUNTED	16.0 S.F.	24.0" W X 96.0" L	36 LBS

NOTES

DESIGN REFERENCE MATERIAL

- Design the traffic signal structure and foundation in accordance with:
 - The 6th Edition 2013 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
 - The 2018 NCDOT "Standard Specifications for Roads and Structures." The latest addenda to the specifications can be found in the traffic signal project special provisions.
 - The 2018 NCDOT Roadway Standard Drawings.
 - The traffic signal project plans and special provisions.
 - The NCDOT "Metal Pole Standards" located at the following NCDOT website: <https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx>

DESIGN REQUIREMENTS

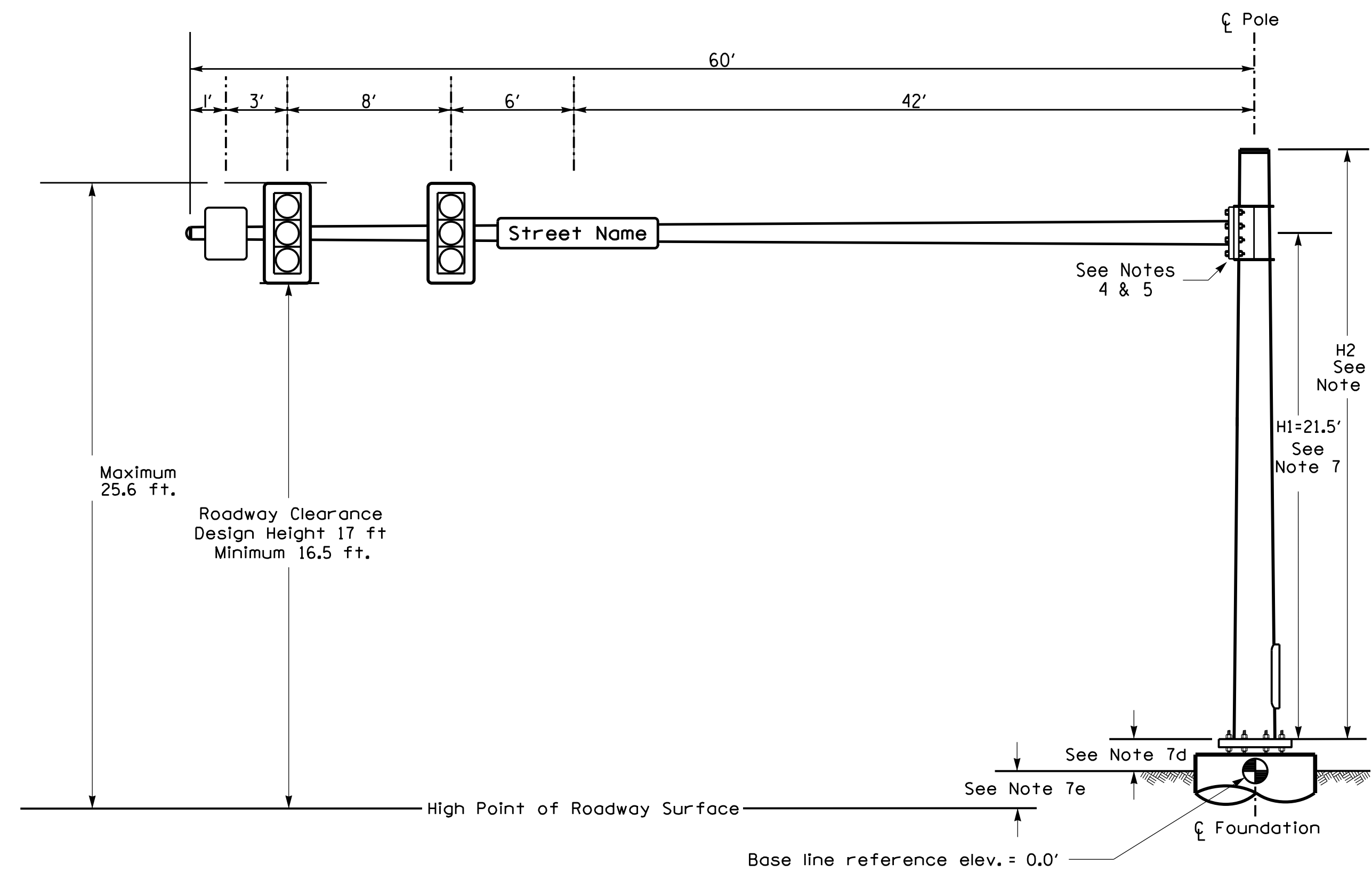
- Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
- Design all signal supports using stress ratios that do not exceed 0.9.
- The camber design for the mast arm deflection should provide an appearance of a low pitched arch where the tip or the free end of the mast arm does not deflect below horizontal when fully loaded.
- A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements.
- Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
- The mast arm attachment height (H1) shown is based on the following design assumptions:
 - Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
 - Signal heads are rigidly mounted and vertically centered on the mast arm.
 - The roadway clearance height for design is as shown in the elevation views.
 - The top of the pole base plate is 0.75 feet above the ground elevation.
 - Refer to the Elevation Data Chart for the elevation differences between the proposed foundation ground level and the high point of the roadway.
- The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
 - Mast arm attachment height (H1) plus 2 feet, or
 - H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
- If pole location adjustments are required, the contractor must gain approval from the Engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signal Design Section Senior Structural Engineer for assistance at (919) 814-5000.
- The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
- The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

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

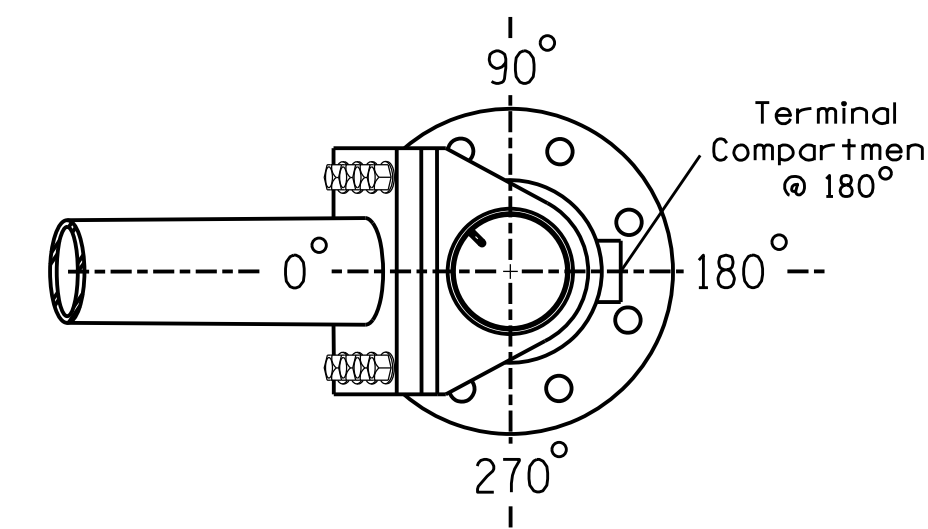
Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 1
Baseline reference point at ϕ Foundation @ ground level	0.0 ft.
Elevation difference at High point of roadway surface	+1.5 ft.
Elevation difference at Edge of travelway or face of curb	+0.75 ft.

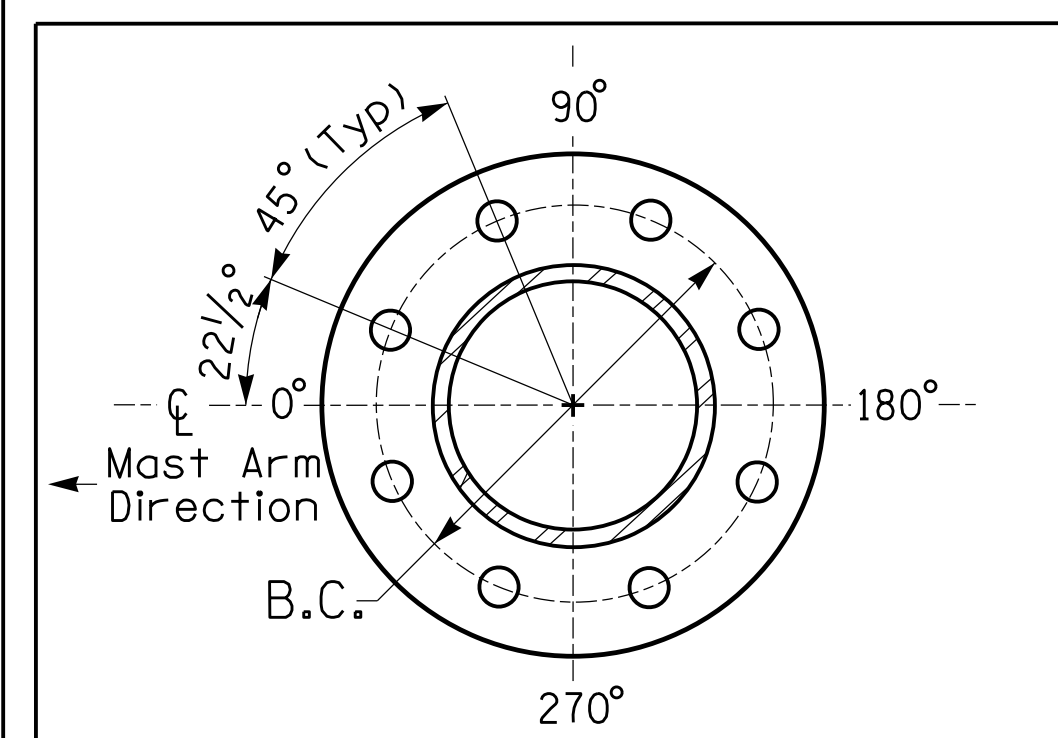
Design Loading for METAL POLE NO. 1



Elevation View

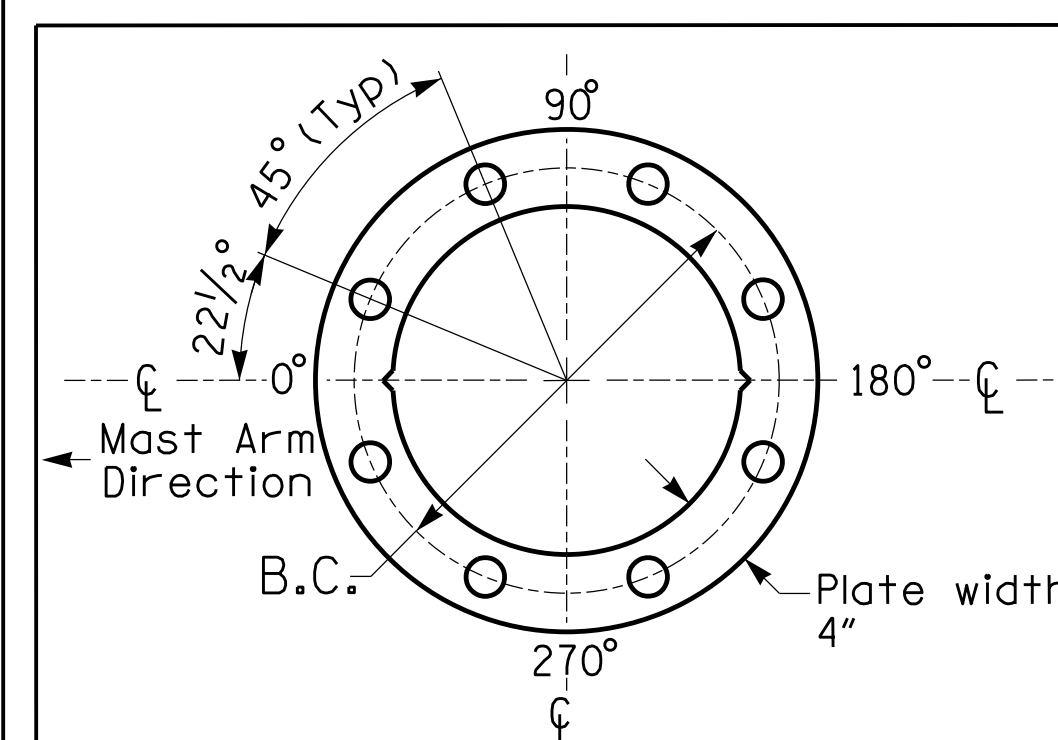


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL
For 8 Bolt Base Plate

10/31/2022 8:48:46 AM R:\Traffic\Signals\Design\100%\Design Plans\100%\Design Plans\100%\11464_sig_ml_202305.dgn schiluka

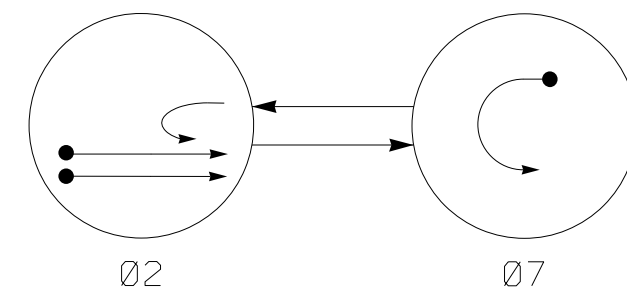


DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NCDOT Wind Zone 4 (90 mph)

	Prepared For the Offices of: US 421-NC 16 at Addison Ave/ Big Lots Entrance East U-Turn		SEAL
	Division 11 PLAN DATE: May 2023 PREPARED BY: S.R. Chiluka	Wilkes County REVIEWED BY: M. Stygles REVIEWED BY: J. Ma	
SCALE: N/A	REVISIONS:	INIT.:	DATE:

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

SIGNAL FACE I.D.

All Heads L.E.D.

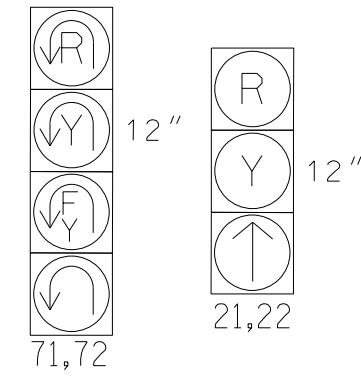


TABLE OF OPERATION

SIGNAL FACE	PHASE		
	02	07	FLASH
21,22	↑	R	Y
71,72	↶	↷	↶

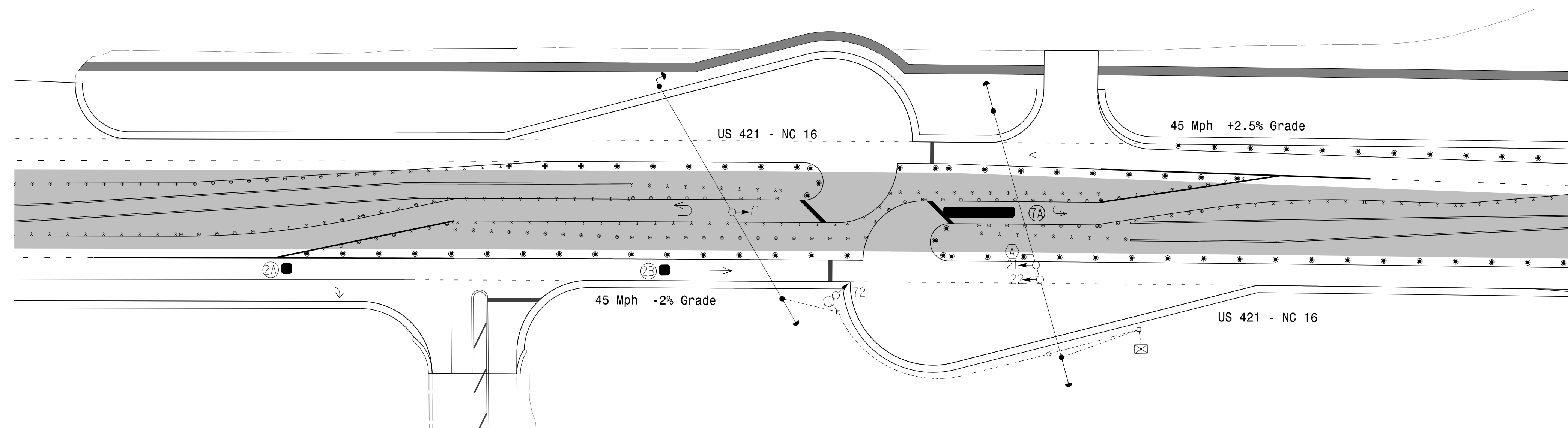
MAXTIME DETECTOR INSTALLATION CHART												
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING							
					CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
2A	*	300	*	*	2	-	1.6	X	-	X	-	*
2B	*	90	*	*	2	-	-	X	-	X	-	*
7A	*	0	*	*	7	15.0	-	X	-	X	-	*

*Video Detection Zone

2 Phase Fully Actuated (Isolated)

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 operation unless otherwise directed by the Engineer.
3. Set all detector units to presence mode.
4. This intersection uses video detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.
5. Refer to Pavement Marking Plans for proposed stop bar locations.
6. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red



MAXTIME TIMING CHART

FEATURE	PHASE	
	2	7
Walk *	-	-
Ped Clear *	-	-
Min Green	12	7
Passage *	2.0	2.0
Max 1 *	60	30
Yellow Change	4.7	3.0
Red Clear	1.1	3.9
Added Initial *	-	-
Maximum Initial *	-	-
Time Before Reduction *	-	-
Time To Reduce *	-	-
Minimum Gap	-	-
Advance Walk	-	-
Non Lock Detector	-	X
Vehicle 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.

PROPOSED	LEGEND	EXISTING
	Curb Ramp	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Traffic Signal Head	
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Inductive Loop Detector	
	Video Detection Zone	N/A
	Construction Zone	N/A
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
	Right of Way	
	Temporary Construction Easement	N/A
	Directional Arrow	
	Type II Signal Pedestal	
	No Left Turn Sign (R3-2)	
	Drum	
	Skinny Drum	

New Installation - Temporary Design 1 (Phases 11)

750 N. Greenfield Pkwy, Garner, NC 27529

US 421-NC 16 at
SR 1322 (Winkler Mill Road)/
Stonecrest Oaks Pkwy
West U-Turn

Division 11 Wilkes County Wilkesboro

PLAN DATE: May 2023 REVIEWED BY: M.L. Stygles

PREPARED BY: S.R. Chiluka REVIEWED BY: J. Ma

SEAL

SEAL 047250

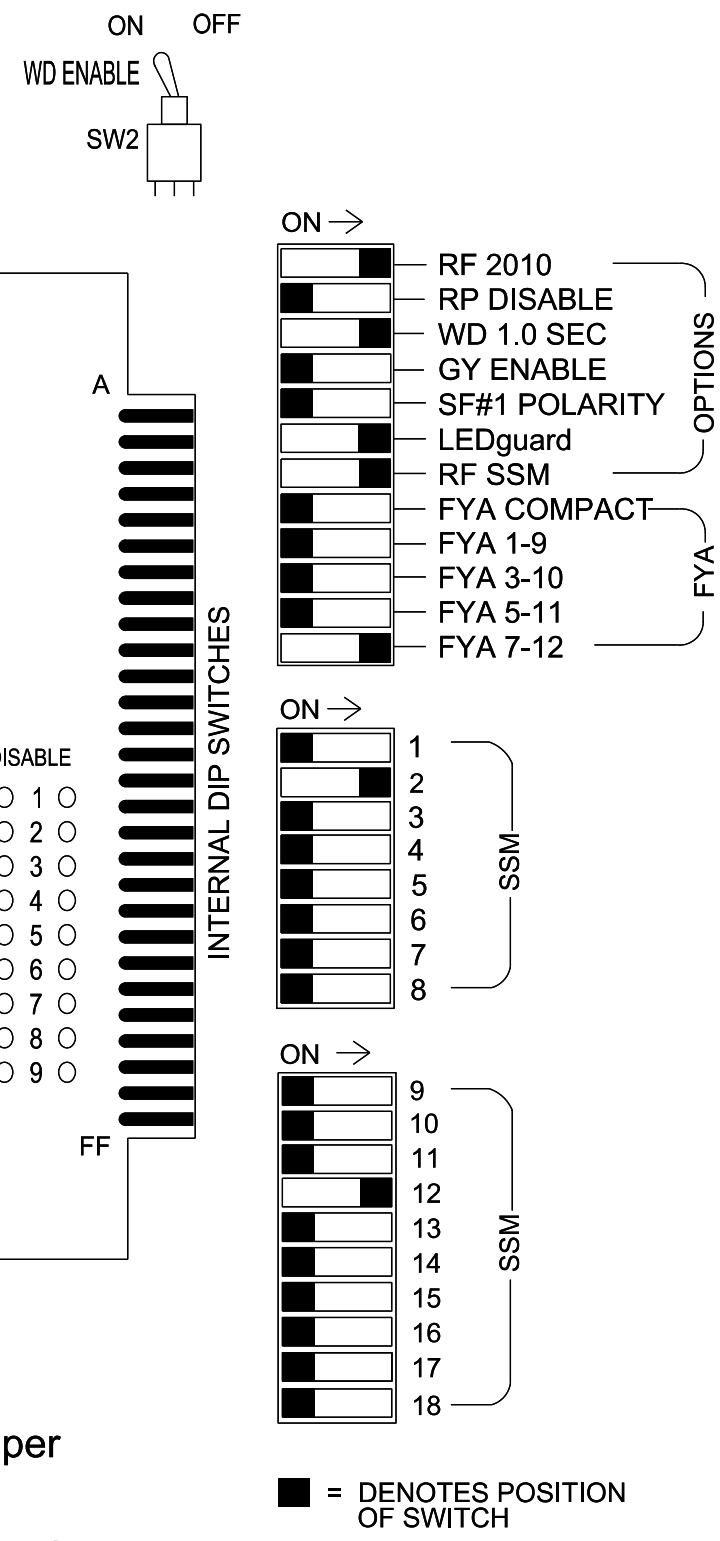
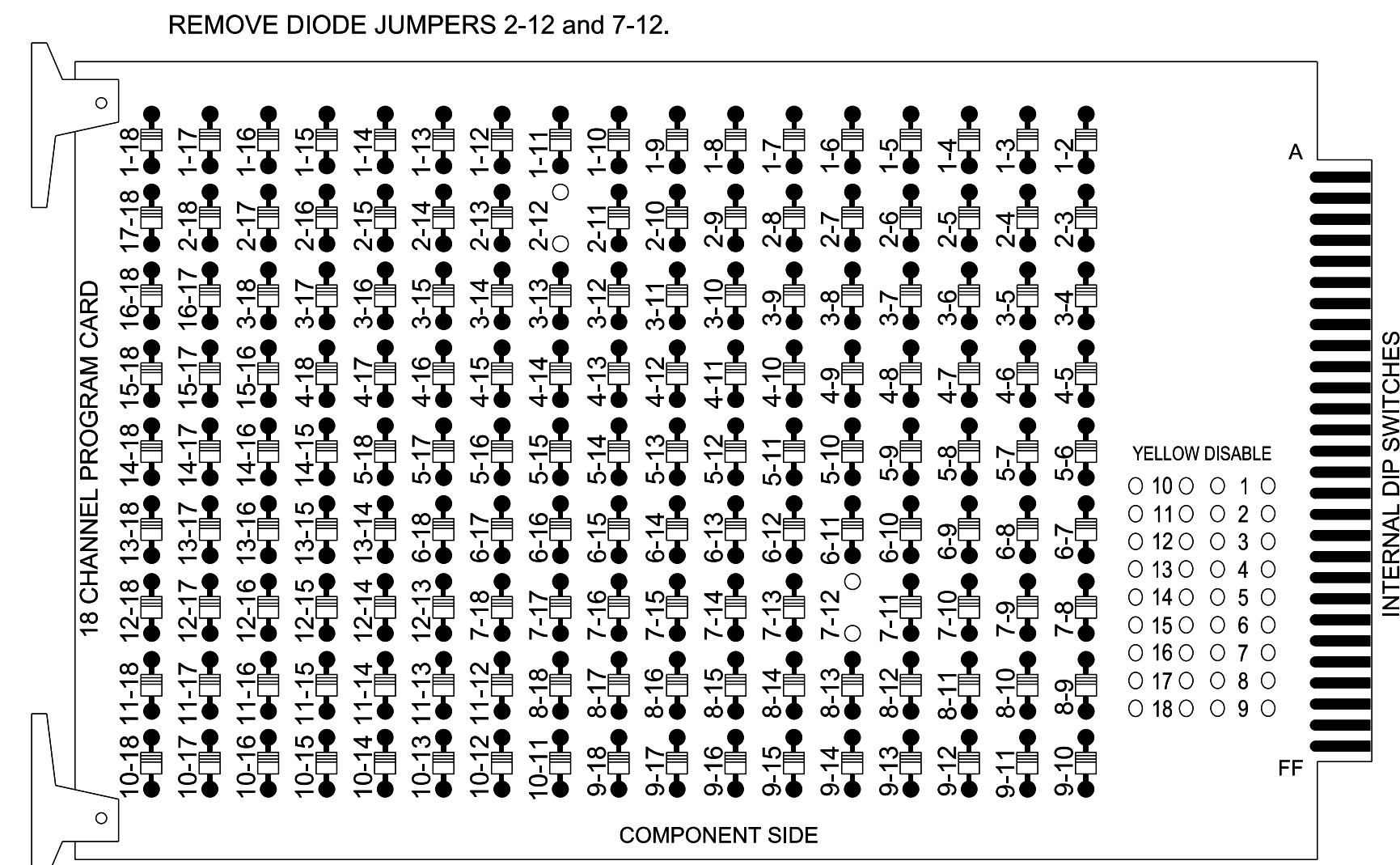
DATE 5/24/2023

REVISIONS: _____ INIT. DATE

SIGNATURE: _____ DATE

SIG. INVENTORY NO. 11-146211

18 CHANNEL 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 plan.
- Program controller to start up in phase 2 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.

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, S10, AUX S5
 Phases Used.....2,7
 Overlap "1".....NOT USED
 Overlap "2".....NOT USED
 Overlap "3".....NOT USED
 Overlap "4".....*

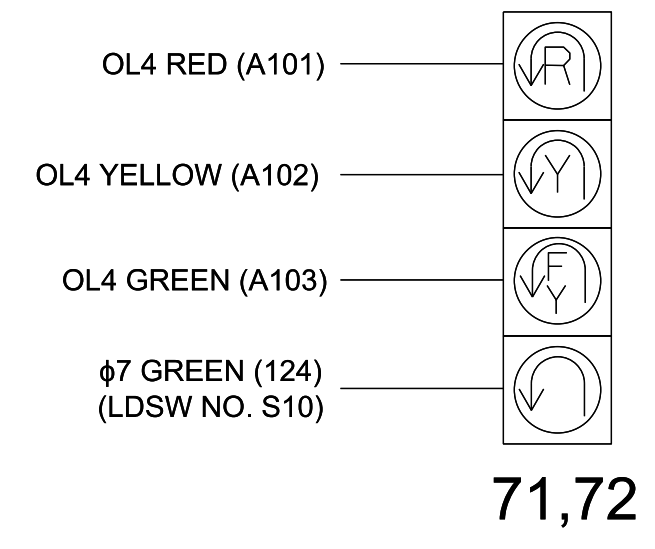
*See overlap programming detail on sheet 2.

SIGNAL HEAD HOOK-UP CHART

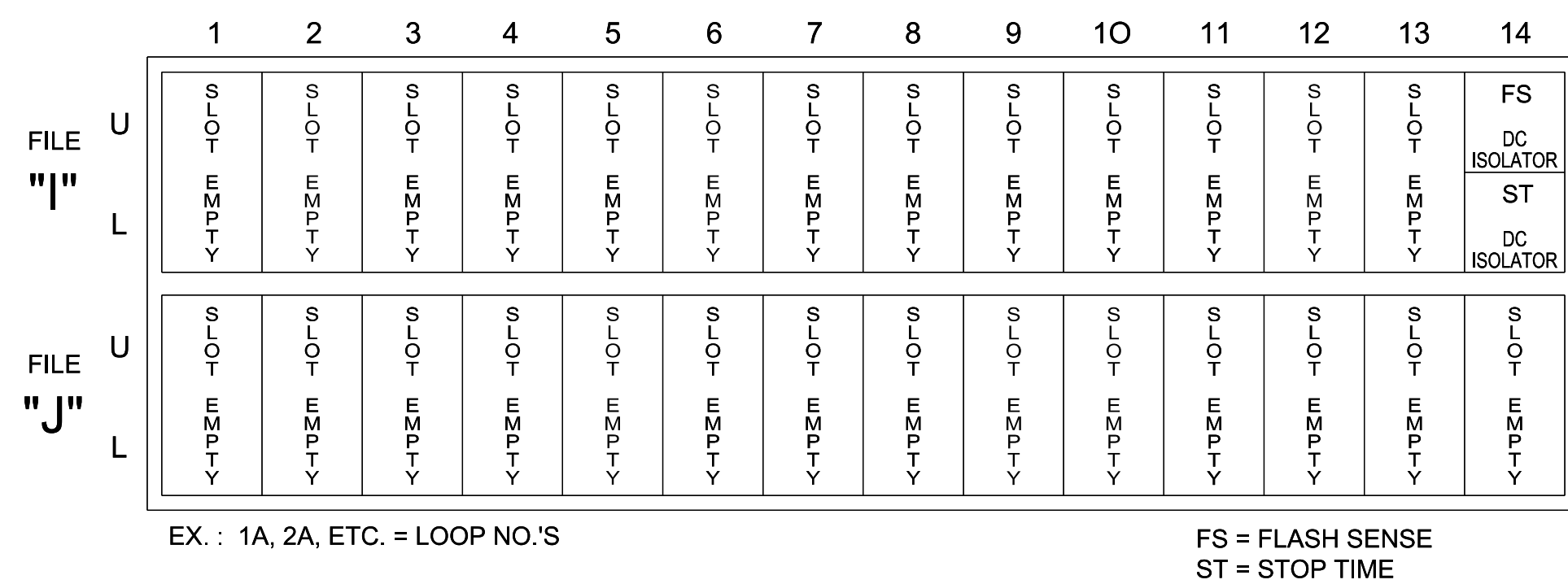
LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6		
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18		
PHASE	1	2	PED	3	4	PED	5	6	PED	7	8	PED	OL1	OL2	SPARE	OL3	OL4	SPARE		
SIGNAL HEAD NO.	NU	21,22	NU	NU	NU	NU	NU	NU	NU	71,72	*	NU	NU	NU	NU	NU	71,72	*	NU	
RED		128																		
YELLOW		129								*										
GREEN		130																		
RED ARROW																				A101
YELLOW ARROW																				A102
FLASHING YELLOW ARROW																				A103
GREEN ARROW										124										

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

FYA SIGNAL WIRING DETAIL
(wire signal heads as shown)



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.

MAXTIME OVERLAP PROGRAMMING DETAIL

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

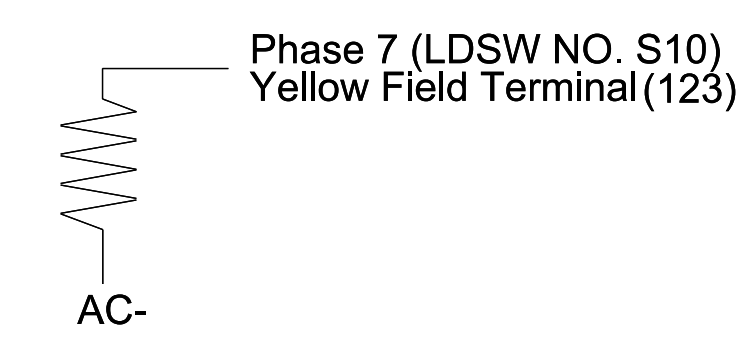
Web Interface
Home >Controller >Overlap Configuration >Overlaps

Overlap Plan 1

Overlap	
Overlap	4
Type	FYA 4 - Section
Included Phases	2
Modifier Phases	7
Trail Green	0
Trail Yellow	0.0
Trail Red	0.0

LOAD RESISTOR INSTALLATION DETAIL
(install resistors as shown)

ACCEPTABLE VALUES	
Value (ohms)	Wattage
1.5K - 1.9K	25W (min)
2.0K - 3.0K	10W (min)



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 11-1462T1
 DESIGNED: May 2023
 SEALED: 5/24/2023
 REVISED: N/A

Temporary Installation - Electrical Detail 1 of 1
(Phases 11, 12 & 13)

ELECTRICAL AND PROGRAMMING DETAILS FOR:

US 421-NC 16 at
 SR 1322 (Winkler Mill Rd)/
 Stonecrest Oaks Pkwy
 West U-Turn

Division 11 Wilkes County Wilkesboro

PLAN DATE: May 2023 REVIEWED BY: J. Ma
 PREPARED BY: M.L. Stygles REVIEWED BY: S.R. Chiluka

REVISIONS INIT. DATE

750 N.Greenfield Pkwy, Garner, NC 27529

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL

SEAL 046057

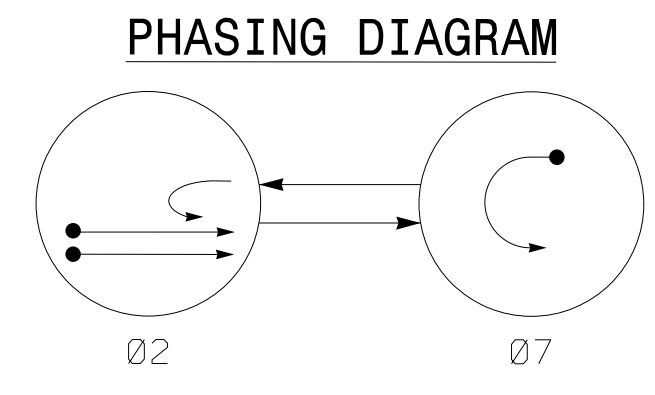
Matthew L. Stygles

5/24/2023

SIG. INVENTORY NO. 11-1462T1



5/23/2019 3:15:01 PM ***750500 ***C:\p01\619\38621_03 NCDOT U-5312 Wilkes Co\NCDOT\Traffic\Signal\490\Signal\490\Design\Plans\U5312_11-XXXX_Sig_ele\file\Fnkler Mill West U Turn.dgn sch1.luk



PHASING DIAGRAM DETECTION LEGEND

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

SIGNAL FACE I.D.

All Heads L.E.D.

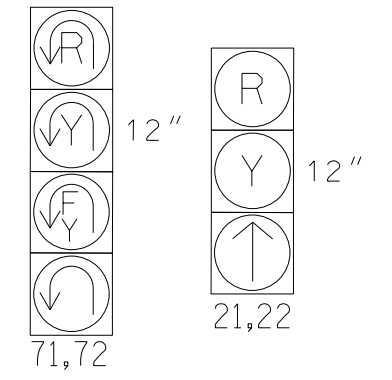


TABLE OF OPERATION

SIGNAL FACE	PHASE		
	02	07	FLASH
21,22	↑	R	Y
71,72	↶	↷	↷

MAXTIME DETECTOR INSTALLATION CHART

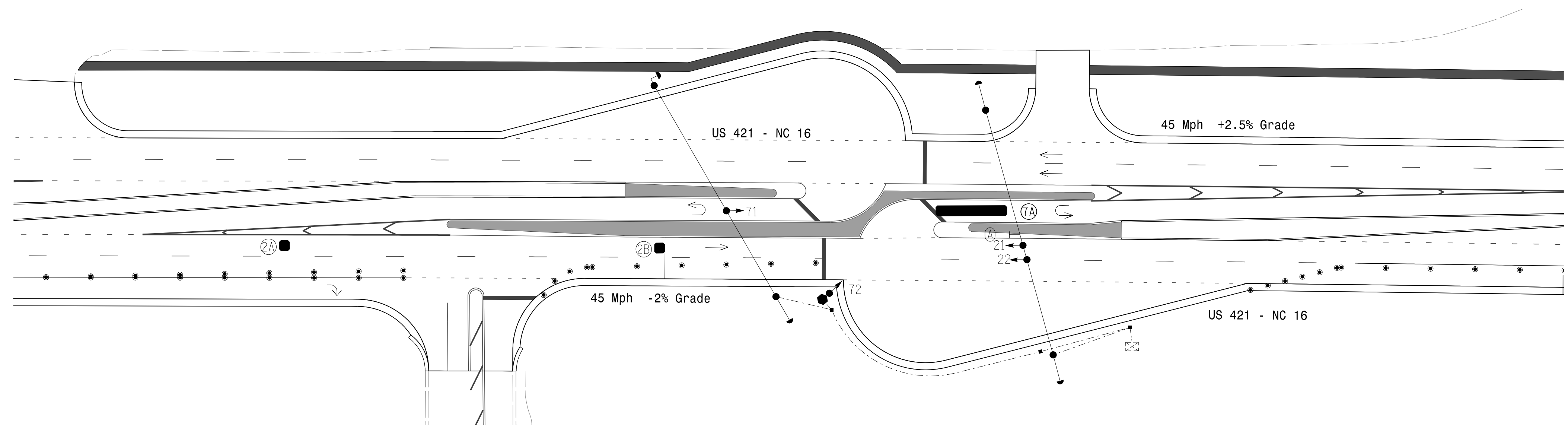
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING							
					CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL CALL	DELAY DURING GREEN	NEW CARD	
2A	*	300	*	*	2	-	1.6	X	-	X	-	*
2B	*	90	*	*	2	-	-	X	-	X	-	*
7A	*	0	*	*	7	15.0	-	X	-	X	-	*

*Video Detection Zone

2 Phase Fully Actuated (Isolated)

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 operation unless otherwise directed by the Engineer.
3. Set all detector units to presence mode.
4. This intersection uses video detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.
5. Refer to Pavement Marking Plans for proposed stop bar locations.



MAXTIME TIMING CHART

FEATURE	PHASE	
	2	7
Walk *	-	-
Ped Clear *	-	-
Min Green	12	7
Passage *	2.0	2.0
Max 1 *	60	30
Yellow Change	4.7	3.0
Red Clear	1.1	3.9
Added Initial *	-	-
Maximum Initial *	-	-
Time Before Reduction *	-	-
Time To Reduce *	-	-
Minimum Gap	-	-
Advance Walk	-	-
Non Lock Detector	-	X
Vehicle 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.

PROPOSED	LEGEND	EXISTING
	Curb Ramp	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Traffic Signal Head	
	Sign	
	Pedestrian Signal Head	
	Pedestrian Signal Head With Push Button & Sign	
	Inductive Loop Detector	
	Video Detection Zone	N/A
	Construction Zone	N/A
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
	Right of Way	
	Temporary Construction Easement	N/A
	Directional Arrow	
	Type II Signal Pedestal	
	No Left Turn Sign (R3-2)	
	Drum	N/A
	Skinny Drum	N/A

Signal Upgrade - Temporary Design 2 (Phase 13)

Prepared For the Offices of:

US 421-NC 16 at SR 1322 (Winkler Mill Road) / Stonecrest Oaks Pkwy West U-Turn

Division 11 Wilkes County Wilkesboro

PLAN DATE: May 2023 REVIEWED BY: M.L. Stygles

PREPARED BY: S.R. Chiluka REVIEWED BY: J. Ma

REVISIONS	INIT.	DATE

750 N. Greenfield Pkwy, Garner, NC 27529

SCALE: 1" = 40'

VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606
919.829.0328

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL

DATE: 5/24/2023

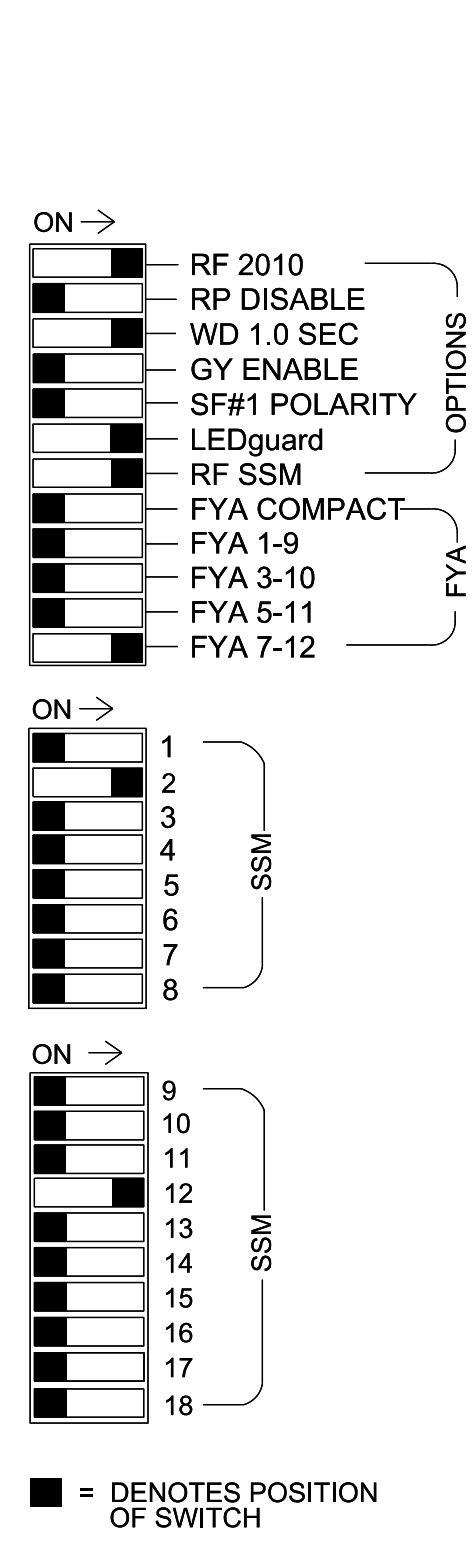
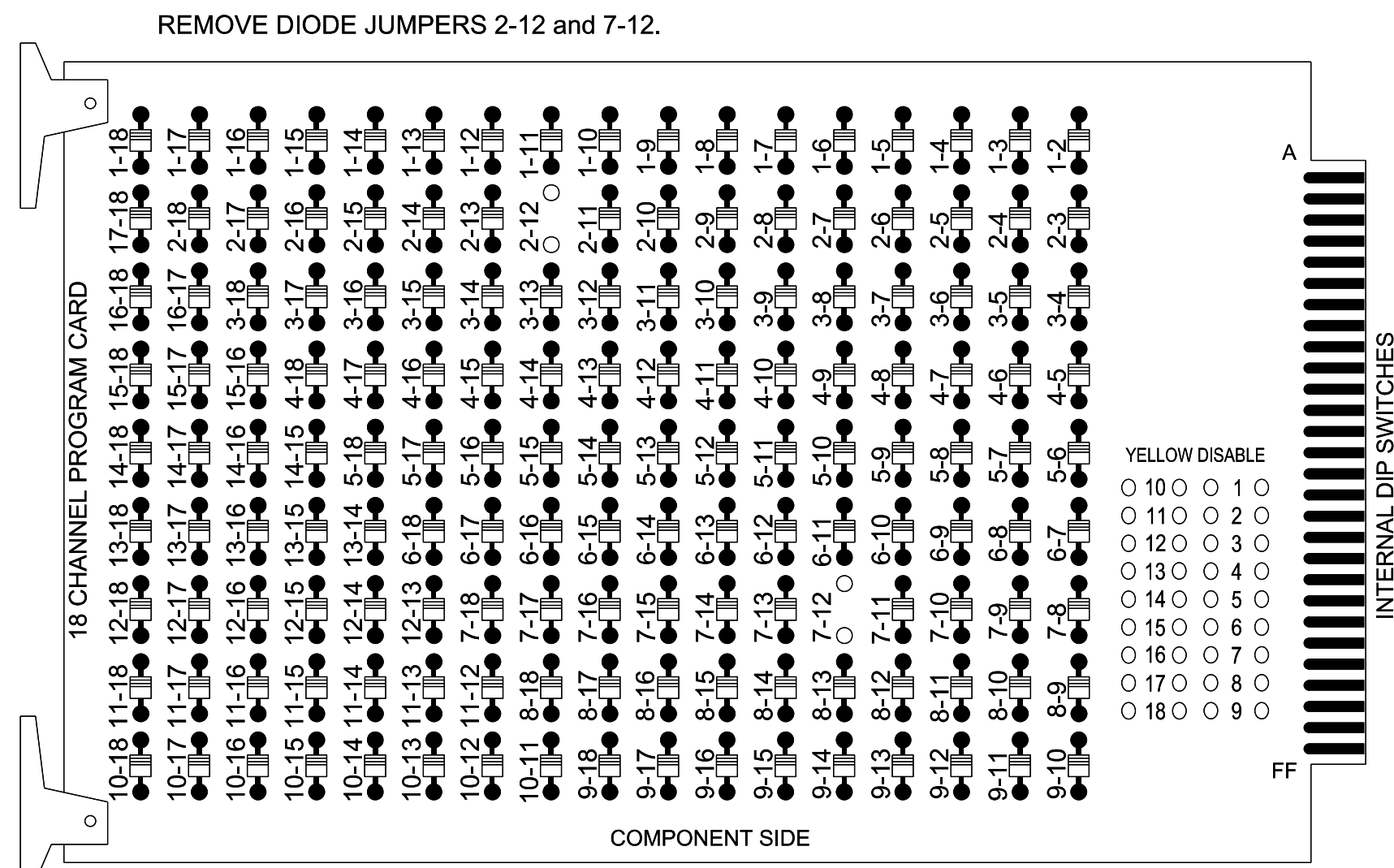
SIGNATURE: S. R. Chiluka

SIG. INVENTORY NO. II-146212

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18 CHANNEL 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.
 - 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 plan.
- Program controller to start up in phase 2 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.

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, S10, AUX S5
 Phases Used.....2,7
 Overlap "1".....NOT USED
 Overlap "2".....NOT USED
 Overlap "3".....NOT USED
 Overlap "4".....*

*See overlap programming detail on sheet 2.

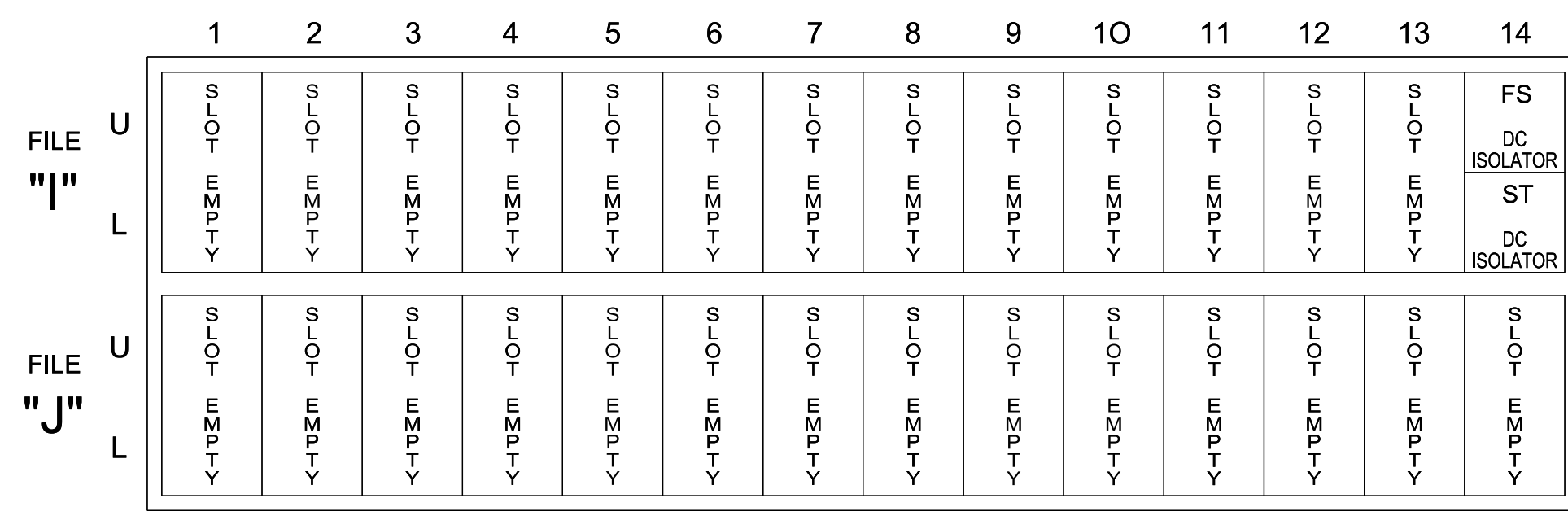
SIGNAL HEAD HOOK-UP CHART

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	3	4	5	6	7	8	9	10	11	12	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	NU	21,22	NU	NU	NU	NU	NU	NU	NU	71,72	NU	NU	NU	NU	NU	NU	71,72	NU
RED		128																
YELLOW		129								*								
GREEN		130																
RED ARROW																		A101
YELLOW ARROW																		A102
FLASHING YELLOW ARROW																		A103
GREEN ARROW										124								

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

INPUT FILE POSITION LAYOUT

(front view)



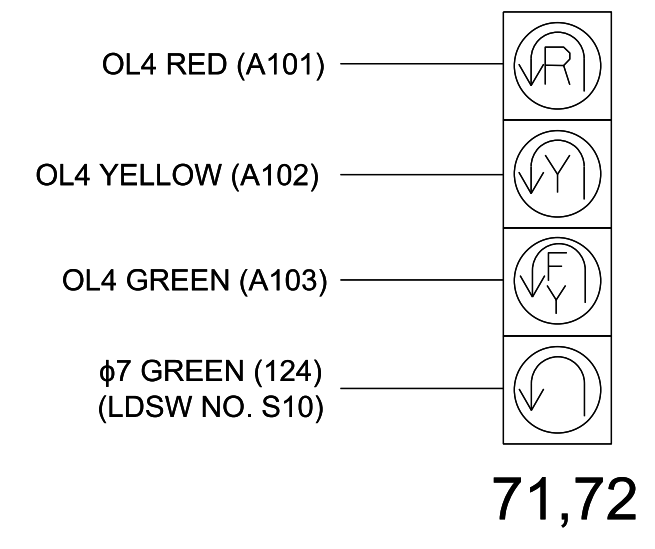
EX.: 1A, 2A, ETC. = LOOP NO.'S
 FS = FLASH SENSE
 ST = STOP TIME

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.

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



MAXTIME OVERLAP PROGRAMMING DETAIL

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

Web Interface
 Home >Controller >Overlap Configuration >Overlaps

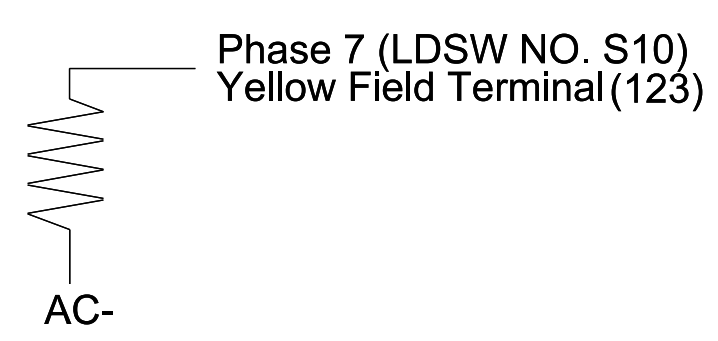
Overlap Plan 1

Overlap	4
Type	FYA 4 - Section
Included Phases	2
Modifier Phases	7
Trail Green	0
Trail Yellow	0.0
Trail Red	0.0

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

ACCEPTABLE VALUES	
Value (ohms)	Wattage
1.5K - 1.9K	25W (min)
2.0K - 3.0K	10W (min)



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 11-1462T2
 DESIGNED: May 2023
 SEALED: 5/24/2023
 REVISED: N/A

Temporary Installation - Electrical Detail 1 of 1
 (Phases 11, 12 & 13)

ELECTRICAL AND PROGRAMMING DETAILS FOR:

US 421-NC 16 at
 SR 1322 (Winkler Mill Rd)/
 Stonecrest Oaks Pkwy
 West U-Turn

Division 11 Wilkes County Wilkesboro

PLAN DATE: May 2023 REVIEWED BY: J. Ma
 PREPARED BY: M.L. Stygles REVIEWED BY: S.R. Chiluka

REVISIONS: _____ INIT. DATE

Seal: NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 046057 MATTHEW L. STYGLES

Documented by: _____ 5/24/2023
 SIGNATURE DATE

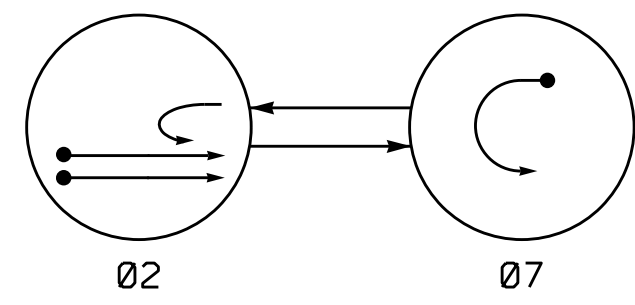
SIG. INVENTORY NO. 11-1462T2



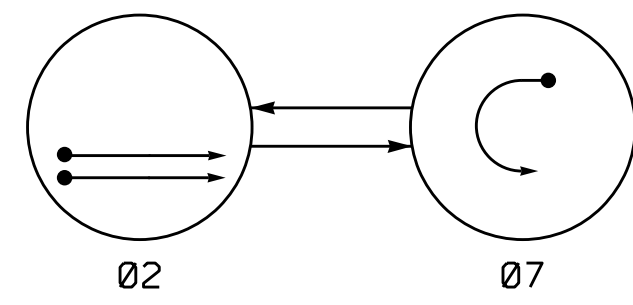
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

5/23/2019 3:15:01 PM ***70500 ***CJ ***01610938621.03 NCDOT U-5312 Wilkes Co NCDOT Traffic Signal Design Plans U-5312_11-XXXX_Sig_Le_Mfrk_Let_M11_Web_U_Turn.dgn sch11.dwg

DEFAULT PHASING DIAGRAM



ALTERNATE PHASING DIAGRAM

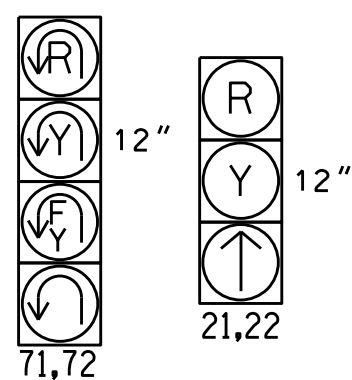


PHASING DIAGRAM DETECTION LEGEND

- ←● DETECTED MOVEMENT
- ← UNDETECTED MOVEMENT (OVERLAP)
- ←- UN SIGNALIZED MOVEMENT
- ←- - PEDESTRIAN MOVEMENT

SIGNAL FACE I.D.

All Heads L.E.D.



DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE		
	02	07	FLASH
21,22	↑	R	Y
71,72	←	←	←

ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE		
	02	07	FLASH
21,22	↑	R	Y
71,72	←	←	←

MAXTIME DETECTOR INSTALLATION CHART

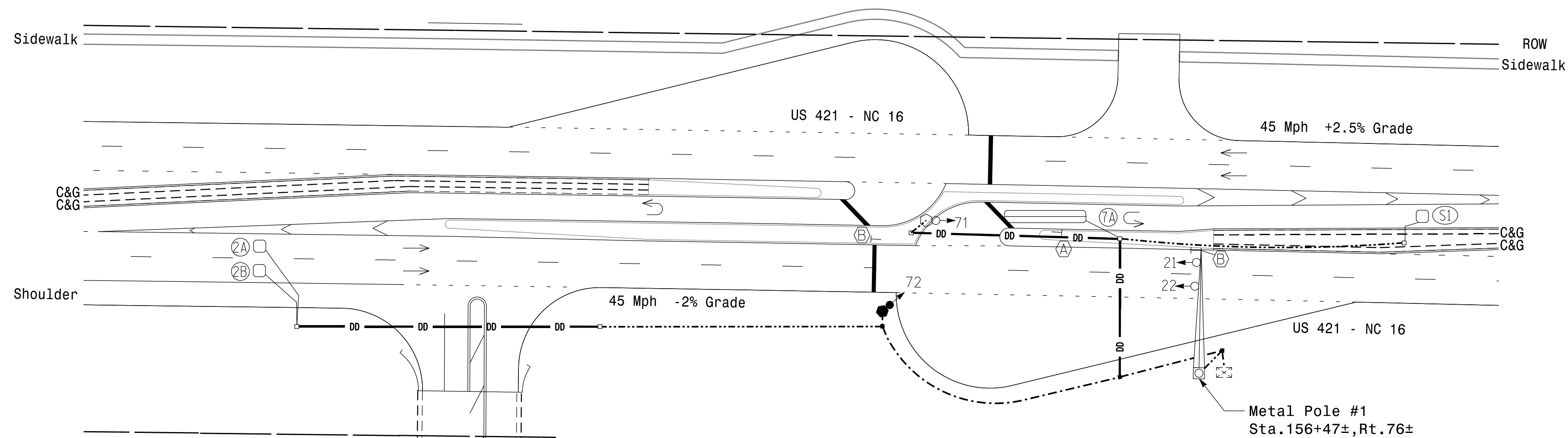
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING							
					CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND INITIAL	ADDED INITIAL	CALL DURING GREEN	NEW CARD	
2A	6X6	300	5	X	2	-	-	X	X	X	-	X
2B	6X6	300	5	X	2	-	-	X	X	X	-	X
7A	6X40	0	2-4-2	X	7	15.0*	-	X	-	X	-	X
S1	6X6	200	4	X	-	-	-	-	-	-	-	X

* Disable delay during alternate phasing operation

2 Phase Fully Actuated W/ Alternate Phasing Operation Wilkesboro Closed Loop System

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Set all detector units to presence mode.
4. The Division Traffic Engineer will determine the hours of use for each phasing plan.
5. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
6. Refer to Pavement Marking Plans for proposed stop bar locations.



MAXTIME TIMING CHART

FEATURE	PHASE	
	2	7
Walk *	-	-
Ped Clear *	-	-
Min Green	12	7
Passage *	6.0	2.0
Max I *	60	30
Yellow Change	4.7	3.0
Red Clear	1.1	3.9
Added Initial *	1.5	-
Maximum Initial *	34	-
Time Before Reduction *	15	-
Time To Reduce *	30	-
Minimum Gap	3.4	-
Advance Walk	-	-
Non Lock Detector	-	X
Vehicle 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

5/4/2023 2:03:38 AM R:\Traffic\Signals\Design\100%\Design Plans\11462_sig -dsn_202305.dgn schiluka



New Installation - Final Design

Prepared for the Offices of:

US 421-NC 16 at SR 1322 (Winkler Mill Road)/ Stonecrest Oaks Pkwy West U-Turn

Division 11 Wilkes County Wilkesboro

PLAN DATE: May 2023 REVIEWED BY: M. Stygles

PREPARED BY: S.R. Chiluka REVIEWED BY: J. Ma

750 N. Greenfield Pkwy, Garner, NC 27529

SCALE 0 40

REVISIONS

INIT. DATE

SEAL

S. R. CHILUKA

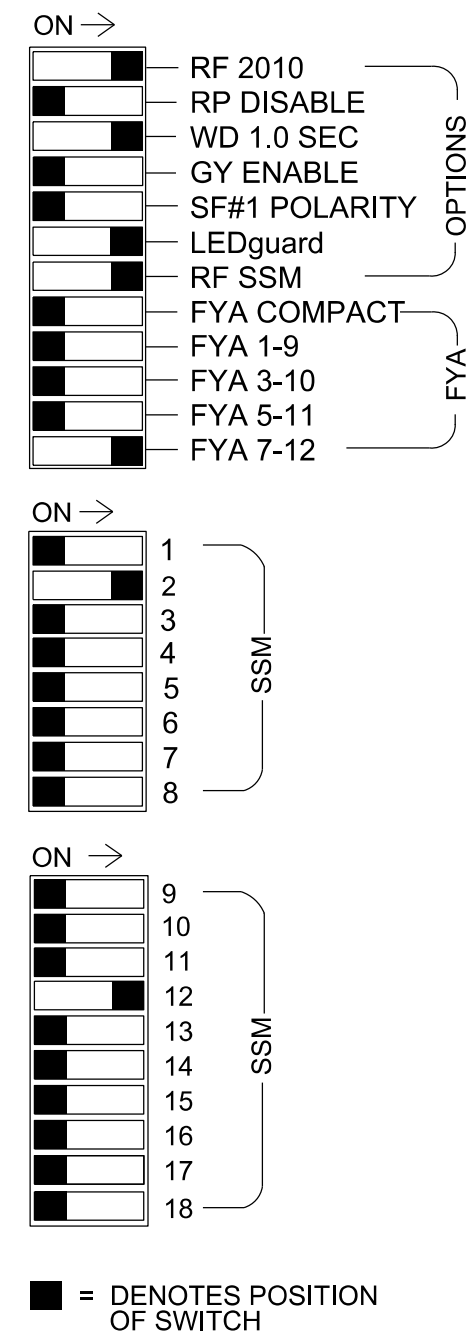
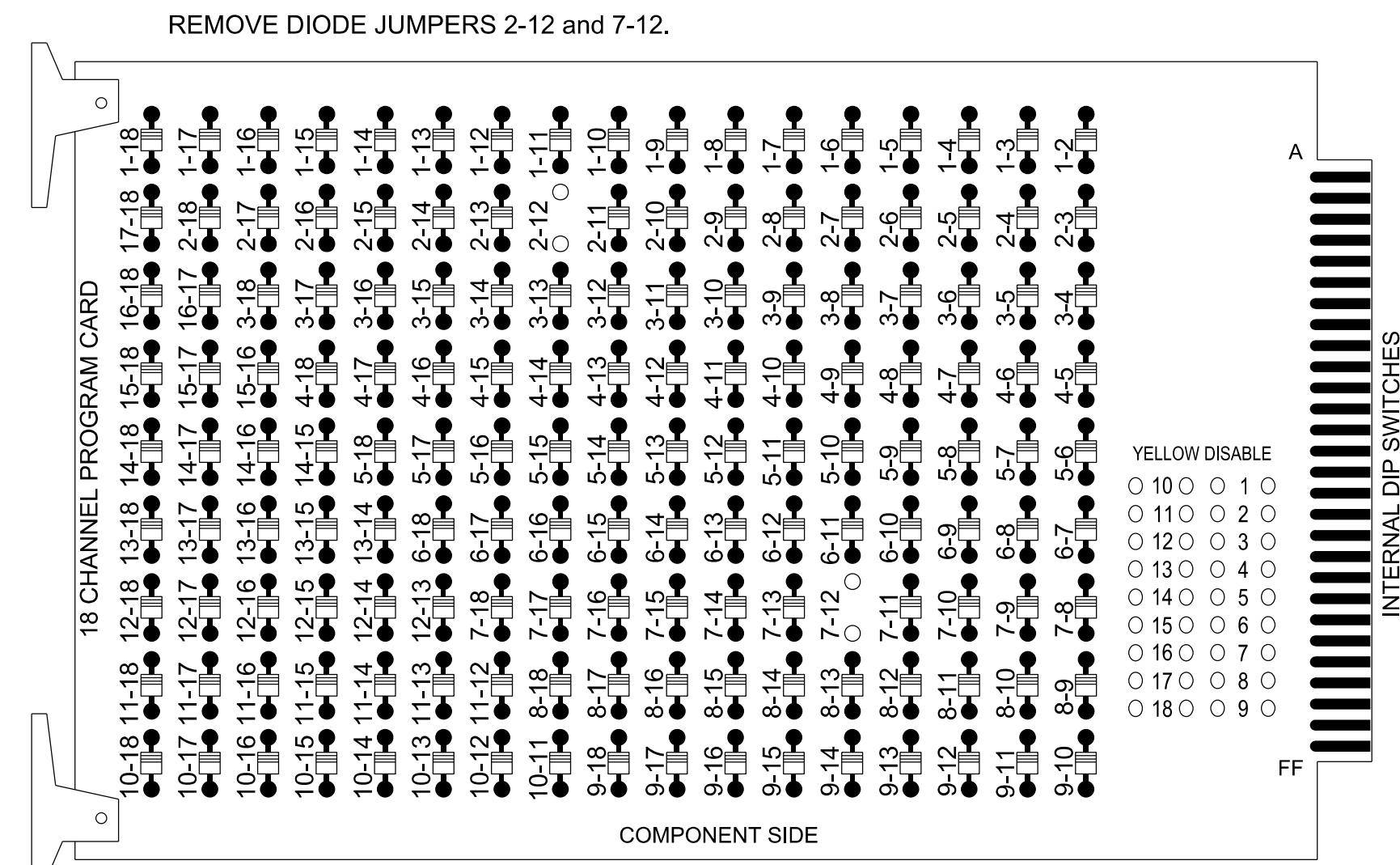
PROFESSIONAL ENGINEER

047250

5/24/2023

SIG. INVENTORY NO. 11-1462

18 CHANNEL 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.
 - 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 plan.
- Program controller to start up in phase 2 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 Wilkesboro Closed Loop System.

EQUIPMENT INFORMATION

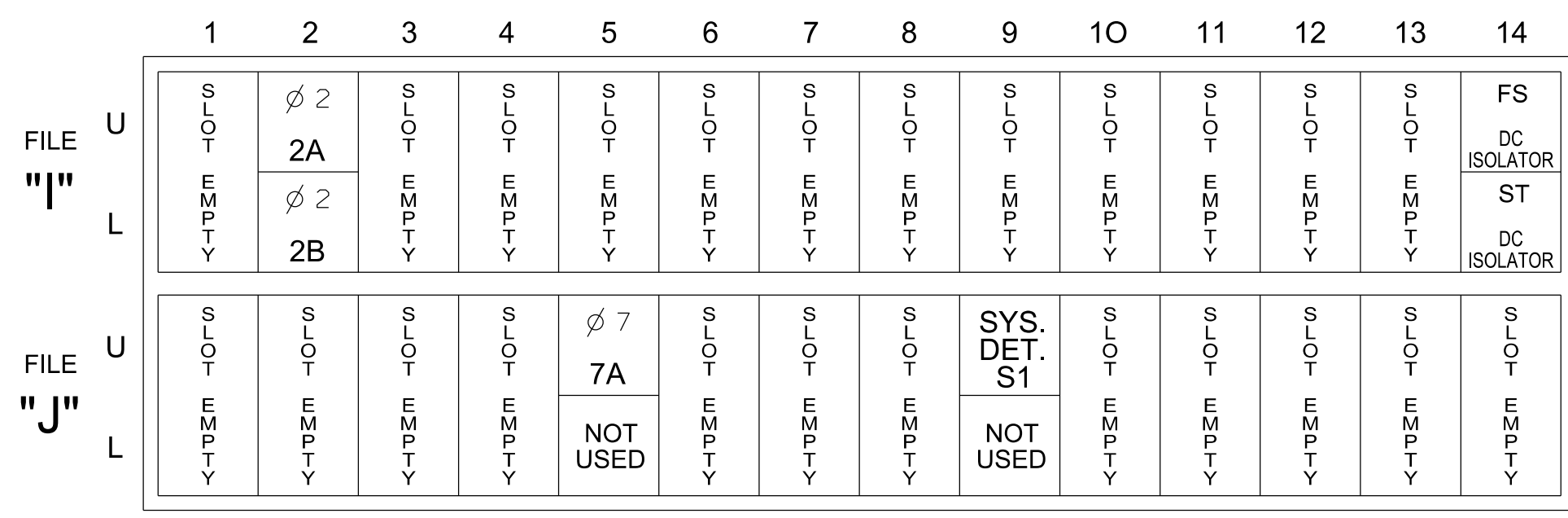
Controller.....2070LX
 Cabinet.....332 w/ Aux
 Software.....Q-Free MAXTIME
 Cabinet Mount.....Base
 Output File Positions.....18 With Aux. Output File
 Load Switches Used.....S2, S10, AUX S5
 Phases Used.....2,7
 Overlap "1".....NOT USED
 Overlap "2".....NOT USED
 Overlap "3".....NOT USED
 Overlap "4".....*
 *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	PED	3	4	PED	5	6	PED	7	8	PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	NU	21,22	NU	NU	NU	NU	NU	NU	NU	71,72	*	NU	NU	NU	NU	NU	71,72	NU
RED		128																
YELLOW		129								*								
GREEN		130																
RED ARROW																		A101
YELLOW ARROW																		A102
FLASHING YELLOW ARROW																		A103
GREEN ARROW										124								

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

INPUT FILE POSITION LAYOUT
(front view)

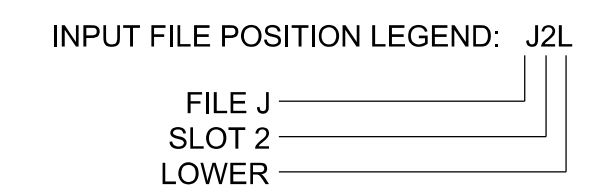


EX.: 1A, 2A, ETC. = LOOP NO.'S
 FS = FLASH SENSE
 ST = STOP TIME

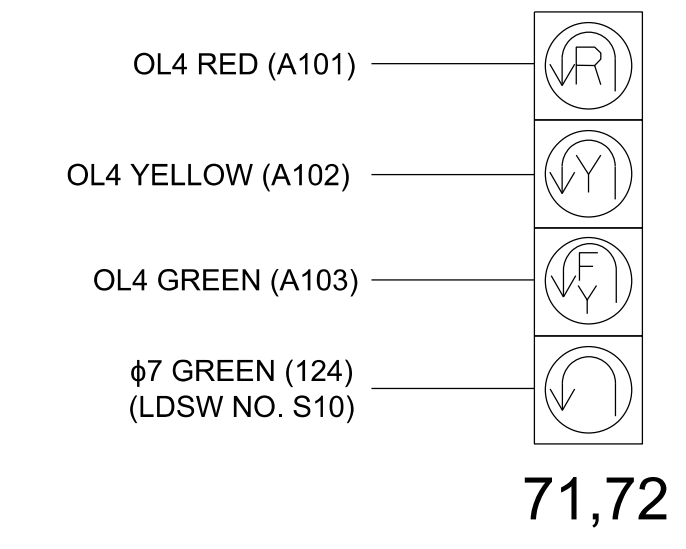
INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	QUEUE	CALL	DELAY DURING GREEN
2A	TB2-5.6	I2U	39	1	2	2			X	X		X	
2B	TB2-7.8	I2L	43	5	3	2			X	X		X	
7A	TB5-5.6	J5U	57	19	21	7	15		X			X	
*S1	TB7-9.10	J9U	59	21	27	SYS			X			X	

*System detector only. Remove any assigned vehicle phase.

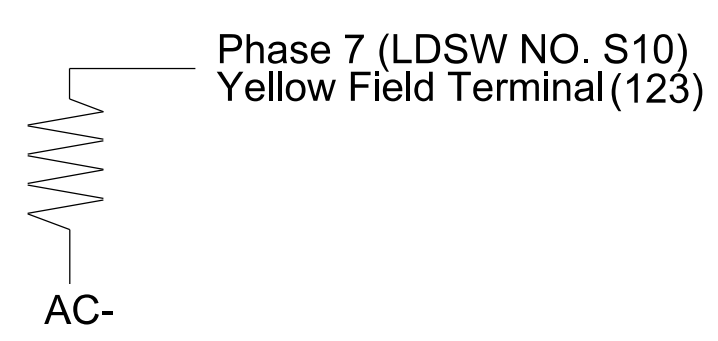


FYA SIGNAL WIRING DETAIL
(wire signal heads as shown)



LOAD RESISTOR INSTALLATION DETAIL
(install resistors as shown)

ACCEPTABLE VALUES	Value (ohms)	Wattage
	1.5K - 1.9K	25W (min)
	2.0K - 3.0K	10W (min)

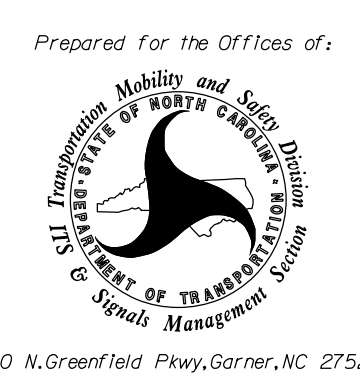


THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 11-1462
 DESIGNED: May 2023
 SEALED: 5/24/2023
 REVISED: N/A



Electrical Detail Sheet 1 of 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:



US 421-NC 16 at SR 1322 (Winkler Mill Rd)/ Stonecrest Oaks Pkwy West U-Turn	
Division 11 Wilkes County	Wilkesboro
PLAN DATE: May 2023	REVIEWED BY: J. Ma
PREPARED BY: M.L. Styles	REVIEWED BY: S.R. Chiluka
REVISIONS	INIT. DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL	5/24/2023
DATE	
SIG. INVENTORY NO.	11-1462

5/23/2019 3:15:01 PM ***BDD: MLC: J: 6/19/2023 11:00:00 AM: C:\Users\mstyles\Documents\Projects\11-1462\Sigs\11-1462_Sig_8.5.dwg: M.L. Styles: U Turn.dgn

MAXTIME OVERLAP PROGRAMMING DETAIL FOR DEFAULT PHASING

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

Overlap Plan 1

Overlap	4
Type	FYA 4 - Section
Included Phases	2
Modifier Phases	7
Trail Green	0
Trail Yellow	0.0
Trail Red	0.0

MAXTIME OVERLAP PROGRAMMING DETAIL FOR ALTERNATE PHASING

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

In the table view of the web interface, right click on "Overlap" in the top left corner of the table. Copy the entire contents of Overlap Plan 1. Paste Overlap Plan 1 into Overlap Plan 2. Modify Overlap Plan 2 as shown below and save changes.

Overlap Plan 2

Overlap	4
Type	FYA 4 - Section
Included Phases	-
Modifier Phases	7
Trail Green	0
Trail Yellow	0.0
Trail Red	0.0

← NOTICE INCLUDED PHASE

MAXTIME ALTERNATE PHASING ACTIVATION DETAIL

To run alternate phasing, select a Pattern that is programmed to run Overlap Plan 2 and Detector Plan 2. A Pattern can be selected through the scheduler or manually by changing the Operational Mode.

PHASING	OVERLAP PLAN	VEH DET PLAN
ACTIVE PLAN REQUIRED TO RUN DEFAULT PHASING	1	1
ACTIVE PLAN REQUIRED TO RUN ALTERNATE PHASING	2	2

ALTERNATE PHASING CHANGE SUMMARY

THE FOLLOWING IS A SUMMARY OF WHAT TAKES PLACE WHEN OVERLAP 2 AND VEHICLE DETECTOR PLAN 2 ACTIVATE TO CALL THE "ALTERNATE PHASING":

OVERLAP PLAN 2: Modifies overlap included phases for heads 71 and 72 to run protected turns only.

VEH DET PLAN 2: Reduces delay time for phase 7 call on loop 7A to 0 seconds.

MAXTIME DETECTOR PROGRAMMING DETAIL FOR ALTERNATE PHASING LOOP 7A

Front Panel
Main Menu >Controller >Detector >Veh Det Plans

Web Interface
Home >Controller >Detector Configuration >Vehicle Detectors

In the table view of web interface right click on "Detector" in the top left corner of the table. Copy the entire contents of Detector Plan 1. Paste Detector Plan 1 into Detector Plan 2. Modify Detector Plan 2 as shown below and save changes.

Plan 2

Detector	Call Phase	Delay
21	7	-

7A

MAXTIME ALTERNATE PHASING PATTERN PROGRAMMING DETAIL

Front Panel
Main Menu >Controller >Coordination >Patterns

Web Interface
Home >Controller >Coordination >Patterns

Pattern Parameters

Pattern	Veh Det Plan	Overlap Plan
*	2	2

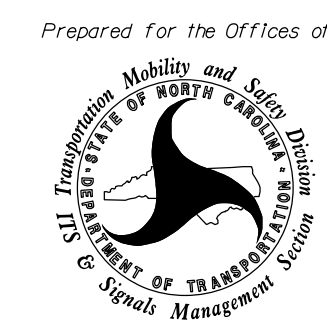
* The Pattern number(s) are to be determined by the Division and/or City Traffic Engineer.

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 11-1462
DESIGNED: May 2023
SEALED: 5/24/2023
REVISED: N/A



Electrical Detail Sheet 2 of 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:



750 N. Greenfield Pkwy, Garner, NC 27529

US 421-NC 16 at SR 1322 (Winkler Mill Rd)/ Stonecrest Oaks Pkwy West U-Turn

Division 11 Wilkes County Wilkesboro

PLAN DATE: May 2023 REVIEWED BY: J. Ma

PREPARED BY: M.L. Stygles REVIEWED BY: S.R. Chiluka

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL

SEAL 046057

Matthew L. Stygles

5/24/2023

SIG. INVENTORY NO. 11-1462

METAL POLE No. 1

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	RIGID MOUNTED SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE	9.3 S.F.	25.5"W X 52.5"L	60 LBS
	SIGN RIGID MOUNTED	9.0 S.F.	36.0"W X 36.0"L	20 LBS
	STREET NAME SIGN RIGID MOUNTED	16.0 S.F.	24.0"W X 96.0"L	36 LBS

NOTES

DESIGN REFERENCE MATERIAL

- Design the traffic signal structure and foundation in accordance with:
 - The 6th Edition 2013 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
 - The 2018 NCDOT "Standard Specifications for Roads and Structures." The latest addenda to the specifications can be found in the traffic signal project special provisions.
 - The 2018 NCDOT Roadway Standard Drawings.
 - The traffic signal project plans and special provisions.
 - The NCDOT "Metal Pole Standards" located at the following NCDOT website: <https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx>

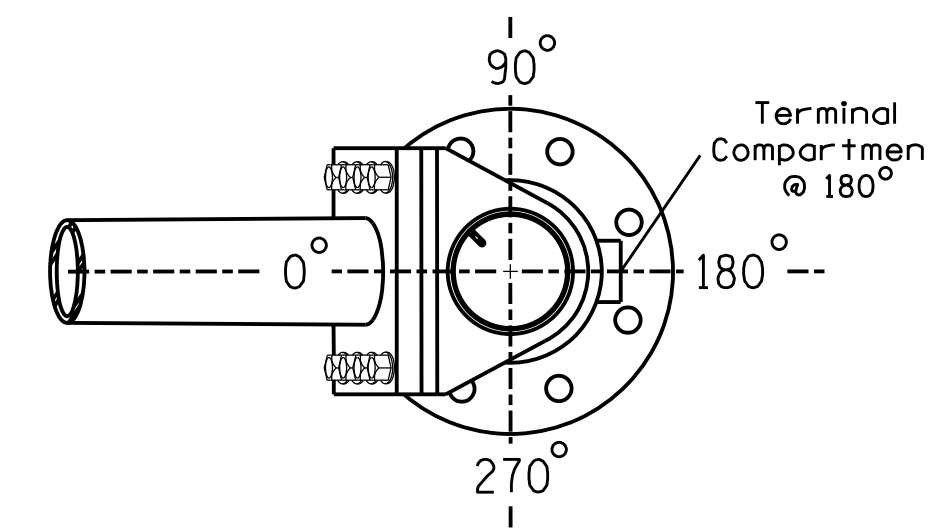
DESIGN REQUIREMENTS

- Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
- Design all signal supports using stress ratios that do not exceed 0.9.
- The camber design for the mast arm deflection should provide an appearance of a low pitched arch where the tip or the free end of the mast arm does not deflect below horizontal when fully loaded.
- A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements.
- Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
- The mast arm attachment height (H1) shown is based on the following design assumptions:
 - Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
 - Signal heads are rigidly mounted and vertically centered on the mast arm.
 - The roadway clearance design is as shown in the elevation views.
 - The top of the pole base plate is 0.75 feet above the ground elevation.
 - Refer to the Elevation Data Chart for the elevation differences between the proposed foundation ground level and the high point of the roadway.
- The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
 - Mast arm attachment height (H1) plus 2 feet, or
 - H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
- If pole location adjustments are required, the contractor must gain approval from the Engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signal Design Section Senior Structural Engineer for assistance at (919) 814-5000.
- The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
- The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

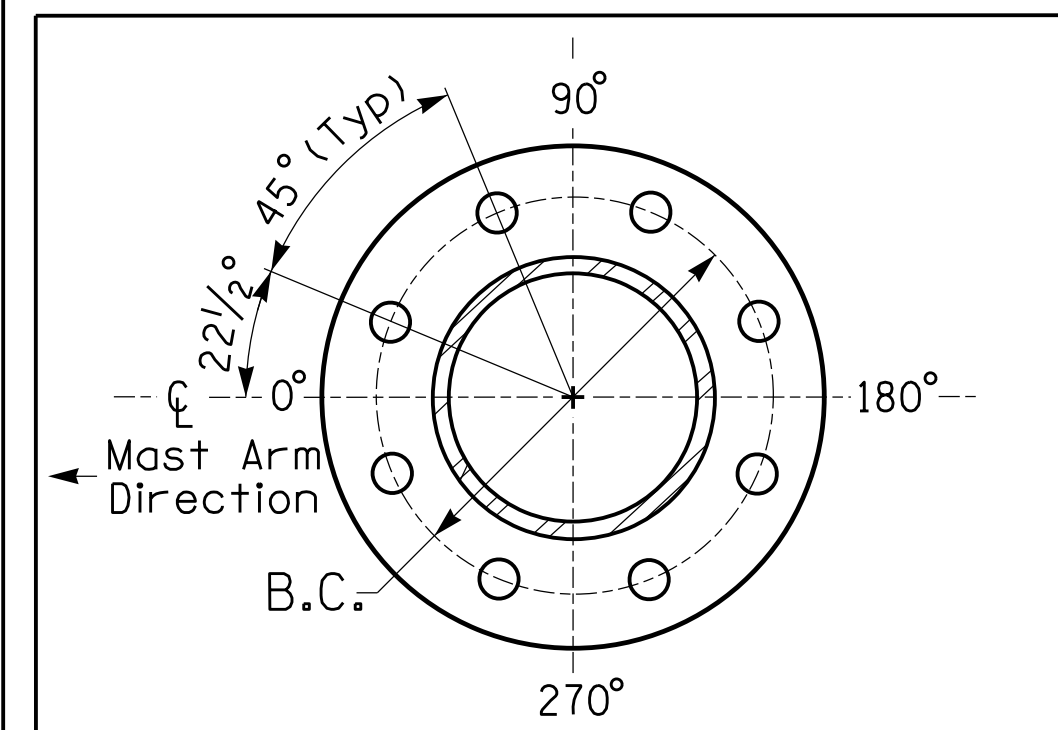
SPECIAL NOTE
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project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

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 1
Baseline reference point at ϕ Foundation @ ground level	0.0 ft.
Elevation difference at High point of roadway surface	+2.5 ft.
Elevation difference at Edge of travelway or face of curb	+1.7 ft.

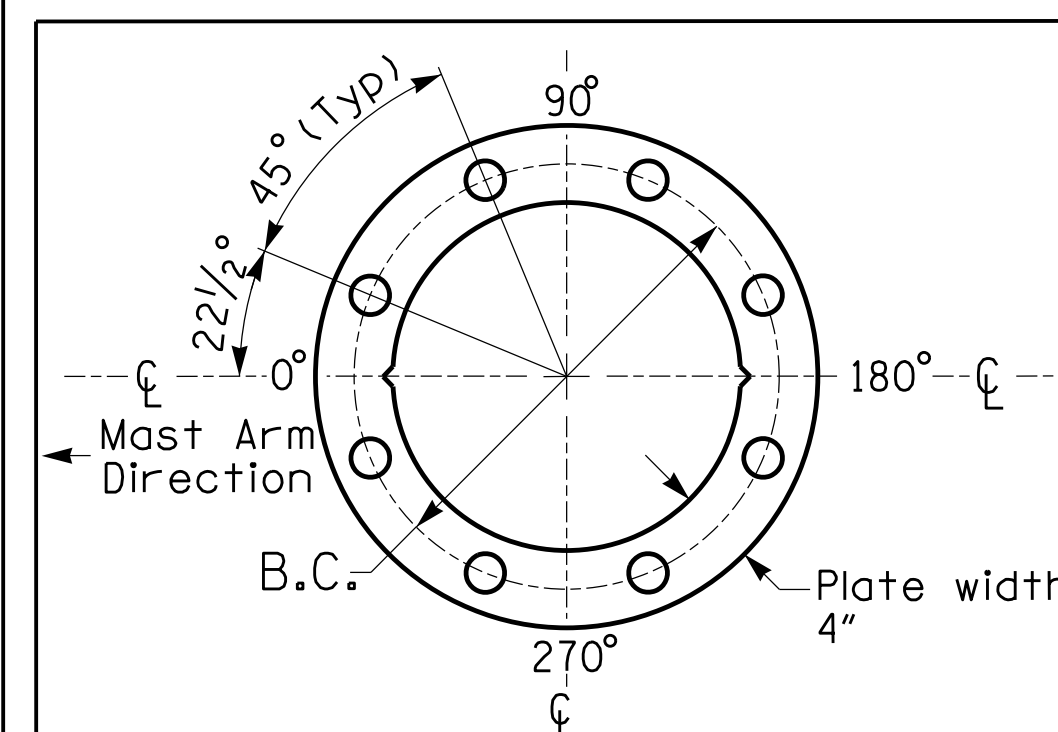


POLE RADIAL ORIENTATION



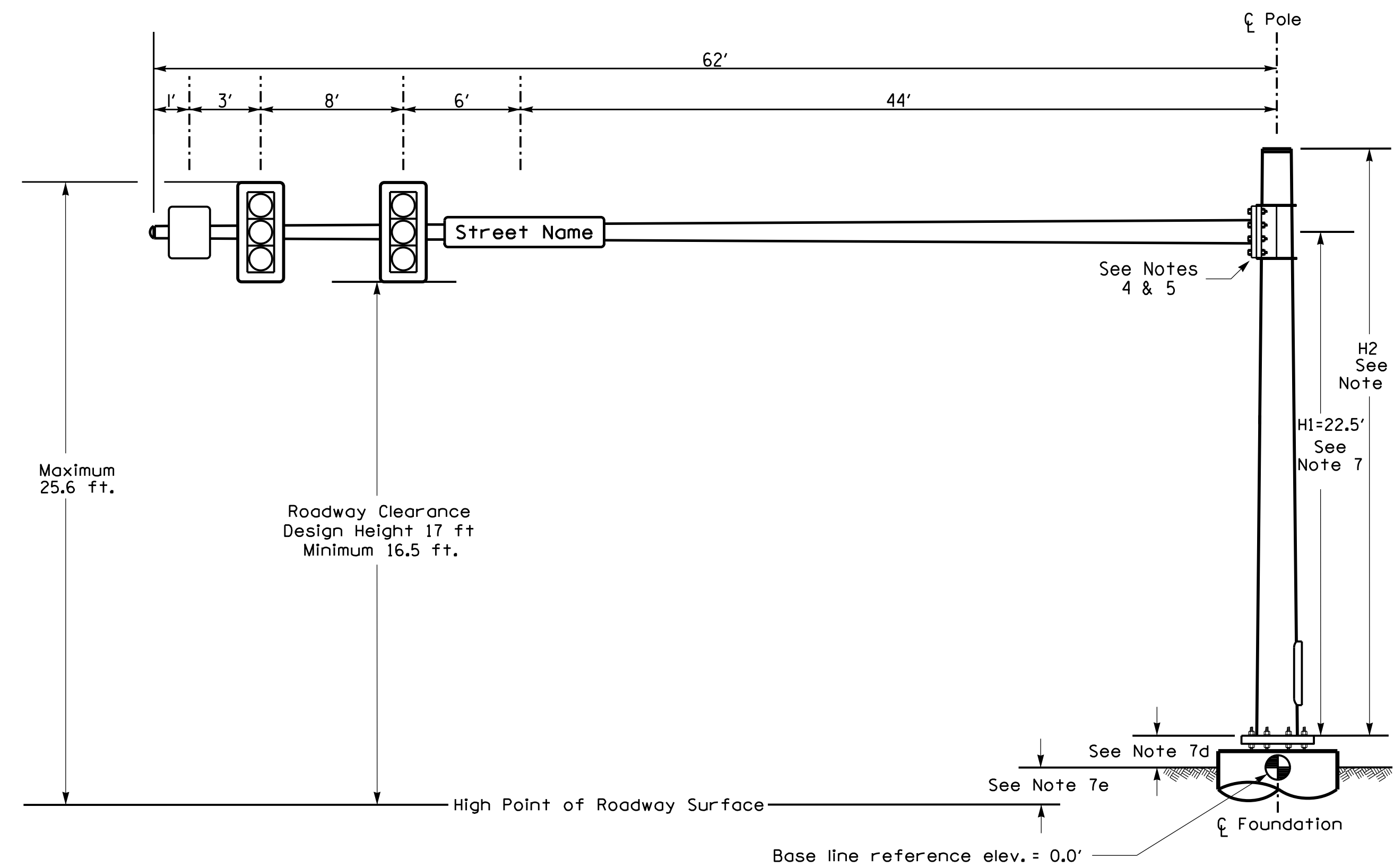
8 BOLT BASE PLATE DETAIL

See Note 6



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL
For 8 Bolt Base Plate

Design Loading for METAL POLE NO. 1



Elevation View

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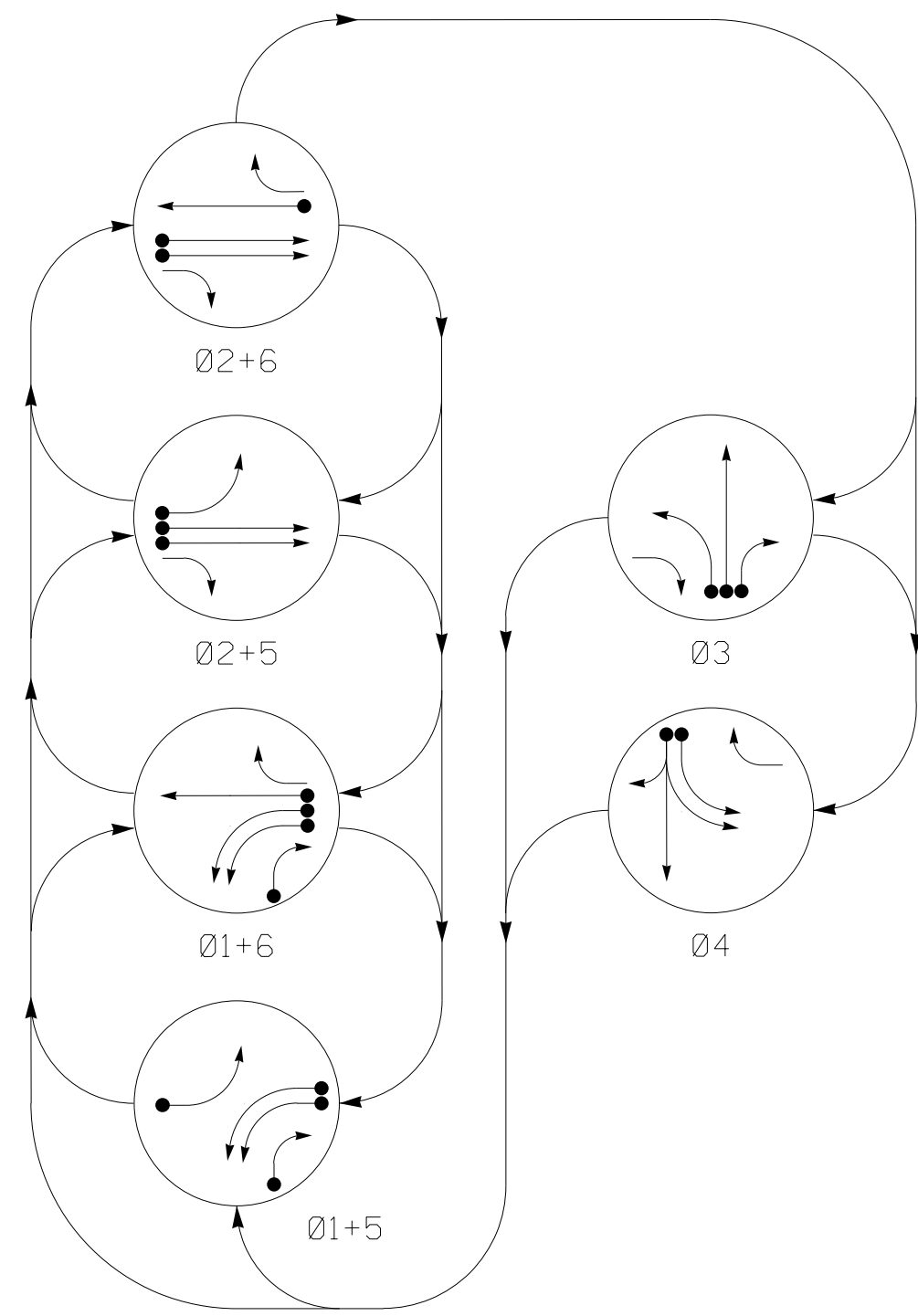


DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NCDOT Wind Zone 4 (90 mph)

	Prepared For the Offices of: US 421-NC 16 at SR 1322 (Winkler Mill Rd)/ Stonecrest Oaks Pkwy West U-Turn		SEAL
	Division 11 PLAN DATE: May 2023 PREPARED BY: S.R. Chiluka	Wilkes County REVIEWED BY: M. Stygles REVIEWED BY: J. Ma	

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

SIGNAL FACE I.D.

All Heads L.E.D.

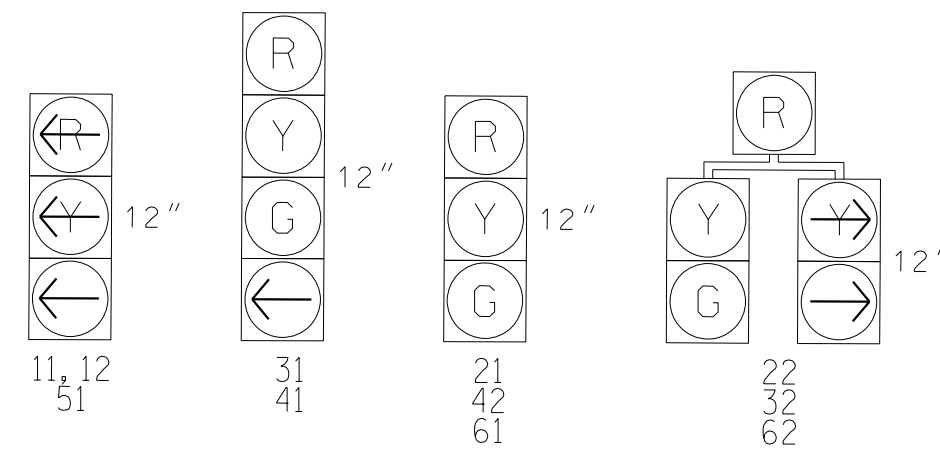


TABLE OF OPERATION

SIGNAL FACE	PHASE						FLASH
	01+5	01+6	02+5	02+6	03	04	
11, 12	←	←	←	←	←	←	
21	R	R	G	G	R	R	Y
22	R	R	G	G	R	R	Y
31	R	R	R	R	G	R	R
32	R	R	R	R	G	R	R
41	R	R	R	R	R	G	R
42	R	R	R	R	R	G	R
51	←	←	←	←	←	←	
61	R	G	R	G	R	R	Y
62	R	G	R	G	R	R	Y

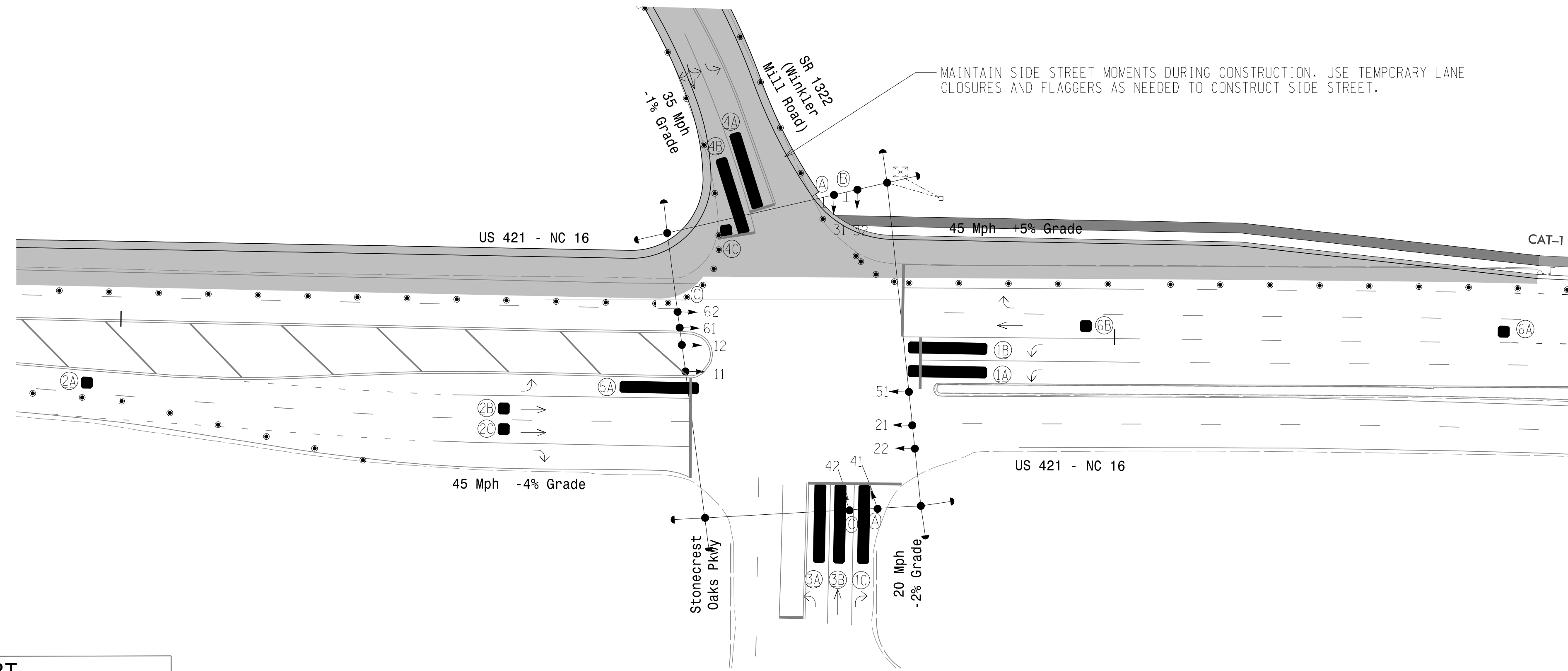
OASIS 2070 LOOP & DETECTOR INSTALLATION CHART

LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	DETECTOR PROGRAMMING								
				NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
1A, 1B	*	+5	*	*	1	Y	Y	-	-	-	-	*
1C	*	0	*	*	1	Y	Y	-	-	15	-	*
2A	*	300	*	*	2	Y	Y	-	1.6	-	-	*
2B, 2C	*	90	*	*	2	Y	Y	-	-	-	-	*
3A	*	0	*	*	3	Y	Y	-	-	3	-	*
3B	*	0	*	*	3	Y	Y	-	-	-	-	*
4A	*	0	*	*	4	Y	Y	-	-	3	-	*
4B	*	0	*	*	4	Y	Y	-	-	10	-	*
4C	*	0	*	*	4	Y	Y	-	-	15	-	*
5A	*	+5	*	*	5	Y	Y	-	-	-	-	*
6A	*	300	*	*	6	Y	Y	-	1.6	-	-	*
6B	*	90	*	*	6	Y	Y	-	-	-	-	*

*Video Detection Zone

6 Phase Fully Actuated (Isolated)
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 operation unless otherwise directed by the Engineer.
- Phase 1 and/or 5 may be lagged.
- The order of phase 3 and 4 may be reversed.
- Set all detector units to presence mode.
- This intersection uses video detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.
- Refer to Pavement Marking Plans for proposed stop bar locations.
- Reposition existing signal heads as shown on this plan.



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	2.0	2.0	2.0	2.0	2.0
Max Green 1 *	25	60	15	15	25	60
Yellow Clearance	3.0	4.9	3.0	3.8	3.0	4.1
Red Clearance	3.4	1.5	3.3	2.4	2.9	1.5
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	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 | ● → Traffic Signal Head |
| ○ → Signal Pole with Sidewalk Guy | ● → Signal Pole with Sidewalk Guy |
| ▬ Video Detection Zone | 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 | N/A Right of Way |
| → Directional Arrow | → Directional Arrow |
| ▬ Construction Zone | N/A |
| ○ Wood Pole | ● Wood Pole |
| (A) Left Arrow "Only" Sign (R3-5L) | (A) Left Arrow "Only" Sign (R3-5L) |
| (B) Combined Through and Left Arrow Sign (R3-6L) | (B) Combined Through and Left Arrow Sign (R3-6L) |
| (C) Right Arrow "Only" Sign (R3-5R) | (C) Right Arrow "Only" Sign (R3-5R) |
| ● Drum | N/A |
| ○ Skinny Drum | N/A |

New Installation - Temporary Design 1(Phase 10)

US 421 - NC 16
at
SR 1322 (Winkler Mill Road) / Stonecrest Oaks Pkwy

Division 11 Wilkes County Wilkesboro

PLAN DATE: May 2023 REVIEWED BY: M.L. Stygles

PREPARED BY: S.R. Chiluka REVIEWED BY: J. Ma

SEAL

SEAL 047250

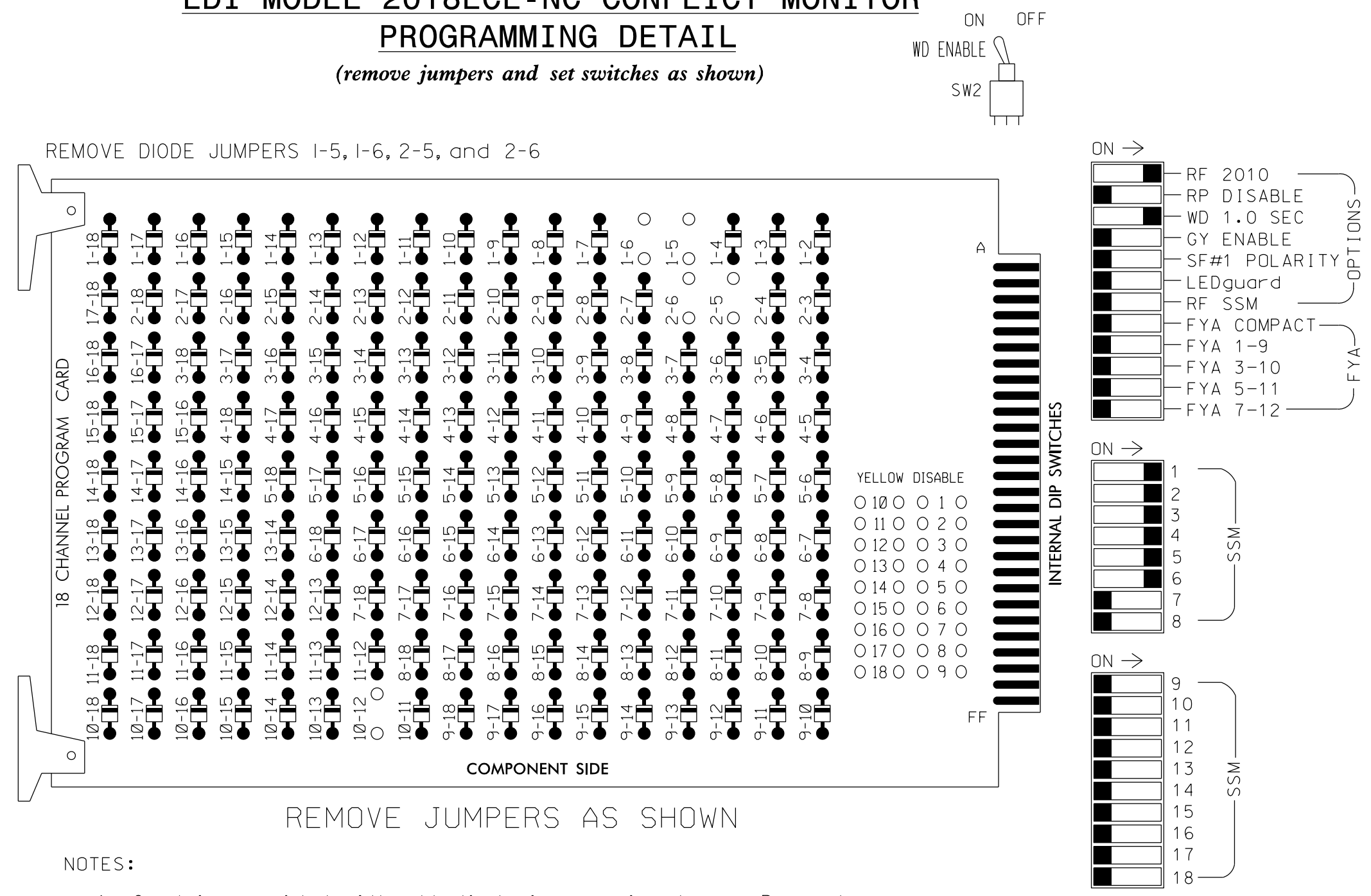
DATE: 5/24/2023

750 N. Greenfield Pkwy, Garner, NC 27529

SCALE: 0 40
1" = 40'

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 Startup in Green.
4. Program phase 2 and 6 for Yellow Flash.
5. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.

EQUIPMENT INFORMATION

CONTROLLER.....2070
 CABINET.....332 W/ AUX
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
 LOAD SWITCHES USED.....S1,S2,S3,S4,S5,S6
 PHASES USED.....1,2,3,4,5,6
 OVERLAPS.....NONE

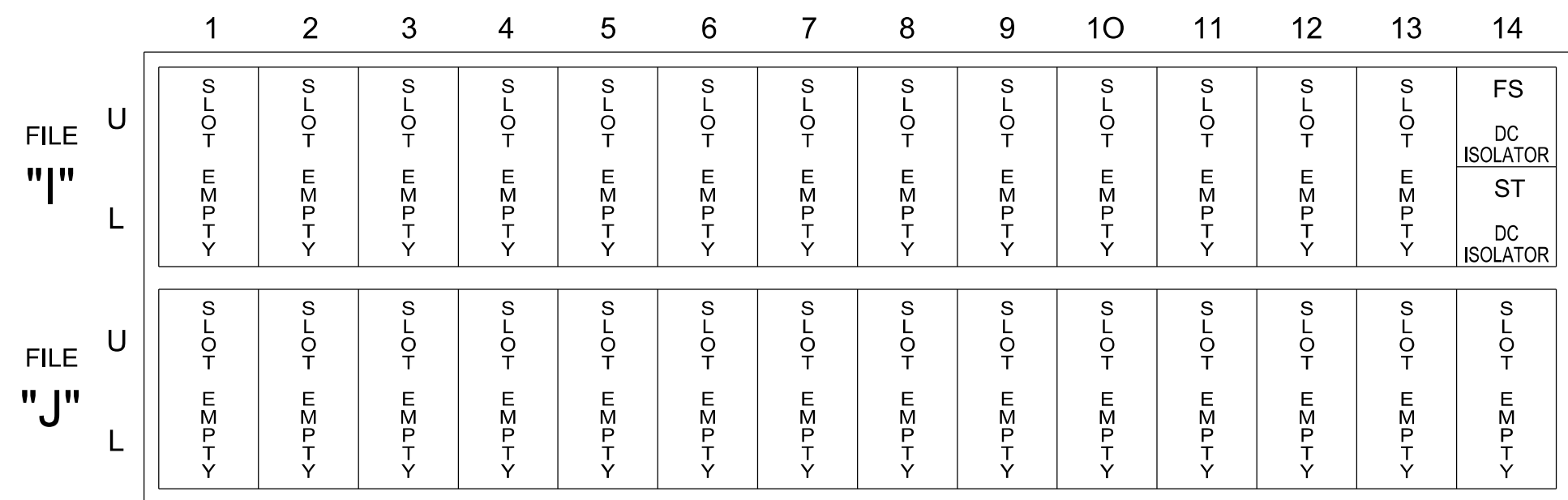
SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S2P	S3	S4	S4P	S5	S6	S6P	S7	S8	S8P	S9	S10	S11	S12	S13	S14
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	11,12	32	21,22	NU	22	31	32	41	42	62	NU	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				102		132								
GREEN ARROW	127	127		118	118		103	103		133								
Hand icon																		
Person icon																		

NU = 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: 11-1044T1
 DESIGNED: May 2023
 SEALED: 5/24/2023
 REVISED: N/A

Temporary Installation - Electrical Detail 1 of 1 (Phase 10)

ELECTRICAL AND PROGRAMMING DETAILS FOR:

US 421 - NC 16
 at
SR 1322 (Winkler Mill Road) / Stonecrest Oaks Pkwy
 Division 11 Wilkes County Wilkesboro

PLAN DATE: May 2023 REVIEWED BY: M.L.Stygles
 PREPARED BY: S.R.Chiluka REVIEWED BY: J.Ma

REVISIONS: _____ INIT. DATE

DocuSigned by: *Mattew L Stygles* 5/24/2023
 sig@vhb.com DATE

SIG. INVENTORY NO. 11-1044T1



DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

