ON OFF

RF 2010 RP DISABLE

GY ENABLE — SF#1 POLARITY 📮

- FYA COMPACT—

■— WD 1.0 SEC

_**II** — LEDguard _**II** — RF SSM

FYA 1-9 - FYA 3-10

FYA 5-11

15

16

= DENOTES POSITION OF SWITCH

WD ENABLE (

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 2-12 and 7-12. FYA 7-12 COMPONENT SIDE

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

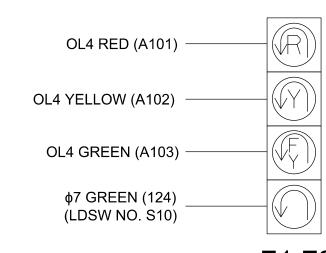
NU = Not Used

ARROW

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

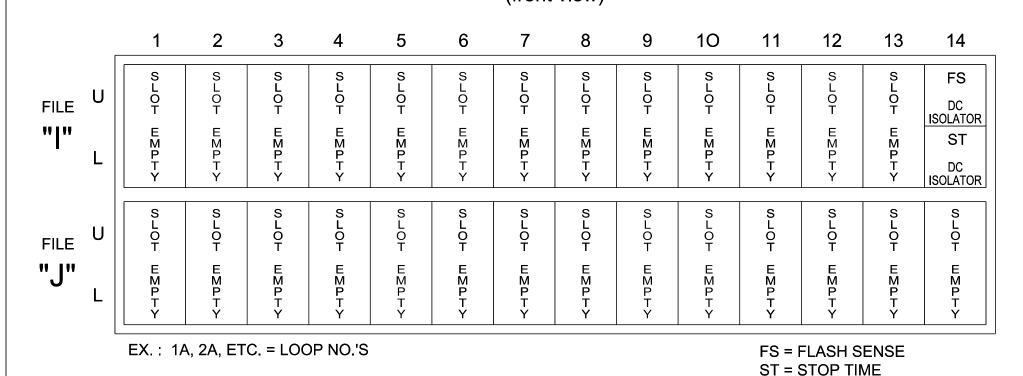
FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



71,72

INPUT FILE POSITION LAYOUT (front view)



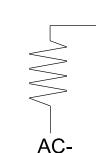
SPECIAL DETECTOR NOTE

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.

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)



Phase 7 (LDSW NO. S10) Yellow Field Terminal (123)

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	
Туре	FYA 4 - Section	
cluded Phases	2	
lodifier 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



PROJECT REFERENCE NO.

Sig. 5.1

U-5312

Temporary Installation - Electrical Detail 1 of 1 (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 Avenue/ Big Lots Entrance East U-Turn

Division 11 Wilkes County Wilkesboro May 2023 REVIEWED BY: J. Ma

PREPARED BY: M.L. Stygles REVIEWED BY: S.R. Chiluka REVISIONS INIT. DATE

046057 5/24/2023

SIG. INVENTORY NO. ||-|46|T|

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL

PHASING DIAGRAM DETECTION LEGEND

DETECTED MOVEMENT

← - - > PEDESTRIAN MOVEMENT

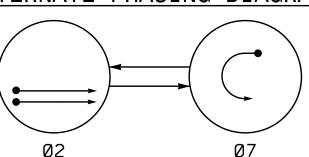
SIGNAL FACE I.D.

All Heads L.E.D.

UNSIGNALIZED MOVEMENT

UNDETECTED MOVEMENT (OVERLAP)

ALTERNATE PHASING DIAGRAM



EFAULT PHASING				ALTERNATE	PH/	4SI	NG
BLE OF O	PER	ATI	ON	TABLE OF O	PER	ATI	ON
	Р	HAS	E		Р	HAS	E
SIGNAL FACE	Ø۷	Ø 7	11日のエ	SIGNAL FACE	Ø2	Ø 7	FLGOI
21,22	←	R	Υ	21,22	1	R	Y
71,72	(F)	\bigcap	\widehat{Y}	71,72	₽R	\bigcirc	\widehat{Y}

	MAXTIME DETECTOR INSTALLATION CHART											
	DET	ECTOR				PR	OGRAM	IMI	NG			
L00P	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
2A	6X6	300	5	Χ	2	-	-	Χ	Х	Х	-	Х
2B	6X6	300	5	Χ	2	-		Χ	Χ	Χ	1	Х
7A	6X40	0	2-4-2	Χ	7	15.0*	_	Χ	_	Х		Х

* Disable delay during alternate phasing operation

6X6

200

2 Phase

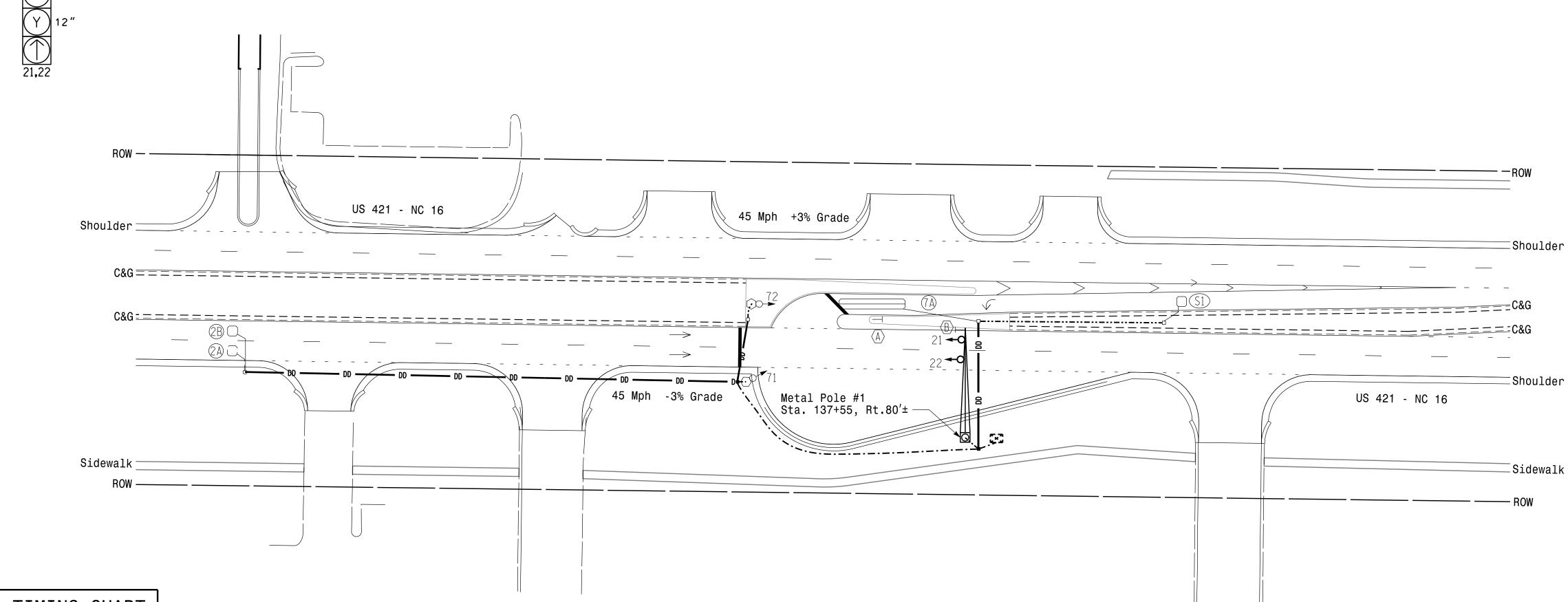
Sig.5.2 U-5312

Fully Actuated W/ Alternate Phasing Operation

<u>NOTES</u>

Wilkesboro Closed Loop System

- 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.
- 3. Set all detector units to presence mode.
- 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 T	IMING	CHART			
FEATURE	PHASE				
FEATURE	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	_	Х			
Vehicle Recall	MIN RECALL	_			
B 15 .					

* 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 <u>PROPOSED</u> **EXISTING** \bigcirc Traffic Signal Head Metal Pole with Mastarm Type II Signal Pedestal Sign Inductive Loop Detector Controller & Cabinet ----- 2-in Underground Conduit -----N/A Right of Way Directional Arrow Directional Drill "Stop Here on Red" Sign (R10-6) (A)

No Left Turn Sign (R3-2) B

New Installation - Final Design



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

Divsion 11 Wilkes County Wilkesboro May 2023 REVIEWED BY: M. Stygles

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

SEAL 047250

940 Main Campus Drive, Suite 500 Raleigh, NC 27606 919.829.0328

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SIGNATURE DATE SIG. INVENTORY NO.

22/2023 I2:II;36 PM \Traffic\Signals\Design hilika

- 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
Overlan "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 AUX S2 S3 S4 S5 S6 1 2 13 3 4 14 5 6 15 7 8 16 9 10 17 11 12 18 NU 21,22 NU NU NU NU NU NU NU NU 71,72 NU NU NU NU NU NU 71,72 NU 128 129 130

Sig 5 3

A101

A102

A103

U-5312

NU = Not Used

CMU CHANNEL NO.

YELLOW

GREEN

RED

ARROW

YELLOW

ARROW FLASHING

YELLOW

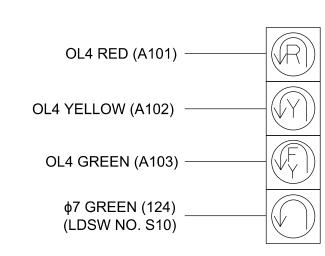
ARROW

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

FYA SIGNAL WIRING DETAIL

124

(wire signal heads as shown)



INPUT FILE POSITION LAYOUT (front view)

	Г	1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE	U	SLOT EMPT	Ø 2 2A Ø 2	010F EZPF	SLOT EMPT	SLOT EMPT	SLOT EMPT	S L O T E M P T	SLOT EMPT	S L O T E M P T	SLOT EMPT	S L O T E M P T	S L O T E M P T	SLOT EMPT	FS DC ISOLATOR ST DC
		Υ	2B	Y	Υ	Y	Y	Y	Y	Y	Y	Y	Y	Y	ISOLATOR
FILE	U	S L O T	S L O T	SLOT	S L O T	Ø 7 7A	S L O T	S L O T	S L O T	SYS. DET. S1	S L O T	S L O T	S L O T	S L O T	S L O T
"J"	L	E M P T Y	EMPTY	⊞∑₽⊢≻	E M P T Y	NOT USED	E M P T Y	E M P T Y	E M P T Y	NOT USED	E M P T Y	E M P T Y	E M P T Y	E M P T Y	E M P T Y
	L	EX.: 1A, 2A, ETC. = LOOP NO.'S FS = FLASH SENSE													

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.

FS = FLASH SENSE ST = STOP TIME

= DENOTES POSITION OF SWITCH

INPUT FILE CONNECTION & PROGRAMMING CHART

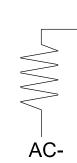
LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	QUEUE	CALL	DELAY DURING GREEN
2A	TB2-5,6	I2U	39	1	2	2			Х	Χ		Χ	
2B	TB2-7,8	I2L	43	5	3	2			X	Χ		Χ	
7A	TB5-5,6	J5U	57	19	21	7	15		Х			Х	
* S1	TB7-9,10	J9U	59	21	27	SYS			Х			Χ	

*System detector only. Remove any assigned vehicle phase

INPUT FILE POSITION LEGEND: J2L FILE J SLOT 2 LOWER

LOAD RESISTOR INSTALLATION DETAIL (install resistors as shown)

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



Phase 7 (LDSW NO. S10) Yellow Field Terminal (123)

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

Prepared for the Offices of:

ELECTRICAL AND PROGRAMMING

DETAILS FOR:

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

Division 11 Wilkes County Wilkesboro May 2023 REVIEWED BY: J. Ma PREPARED BY: M.L. Stygles REVIEWED BY: S.R. Chiluka

REVISIONS INIT. DATE

SEAL 5/24/2023

940 Main Campus Drive, Suite 500 Raleigh, NC 27606 919.829.0328

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SIG. INVENTORY NO.

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
Туре	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	<u> -</u>	NOTICE INCLUDED PHASE
Modifier Phases	7	
Trail Green	0	
Trail Yellow	0.0	
Trail Red	0.0	

MAXTIME DETECTOR PROGRAMMING DETAIL FOR ALTERNATE PHASING LOOP 7A

Front Panel

Main Menu >Controller >Detector >Veh Det Plans

Web Interface

Plan 2

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.

	Detector	Call Phase	Delay
A	21	7	<u> </u>

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 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.

OVERLAP PLAN	VEH DET PLAN
1	1
2	2
	OVERLAP PLAN 1 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.

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

DETAILS FOR:

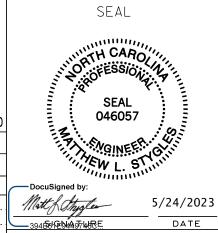
Prepared for the Offices of:

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

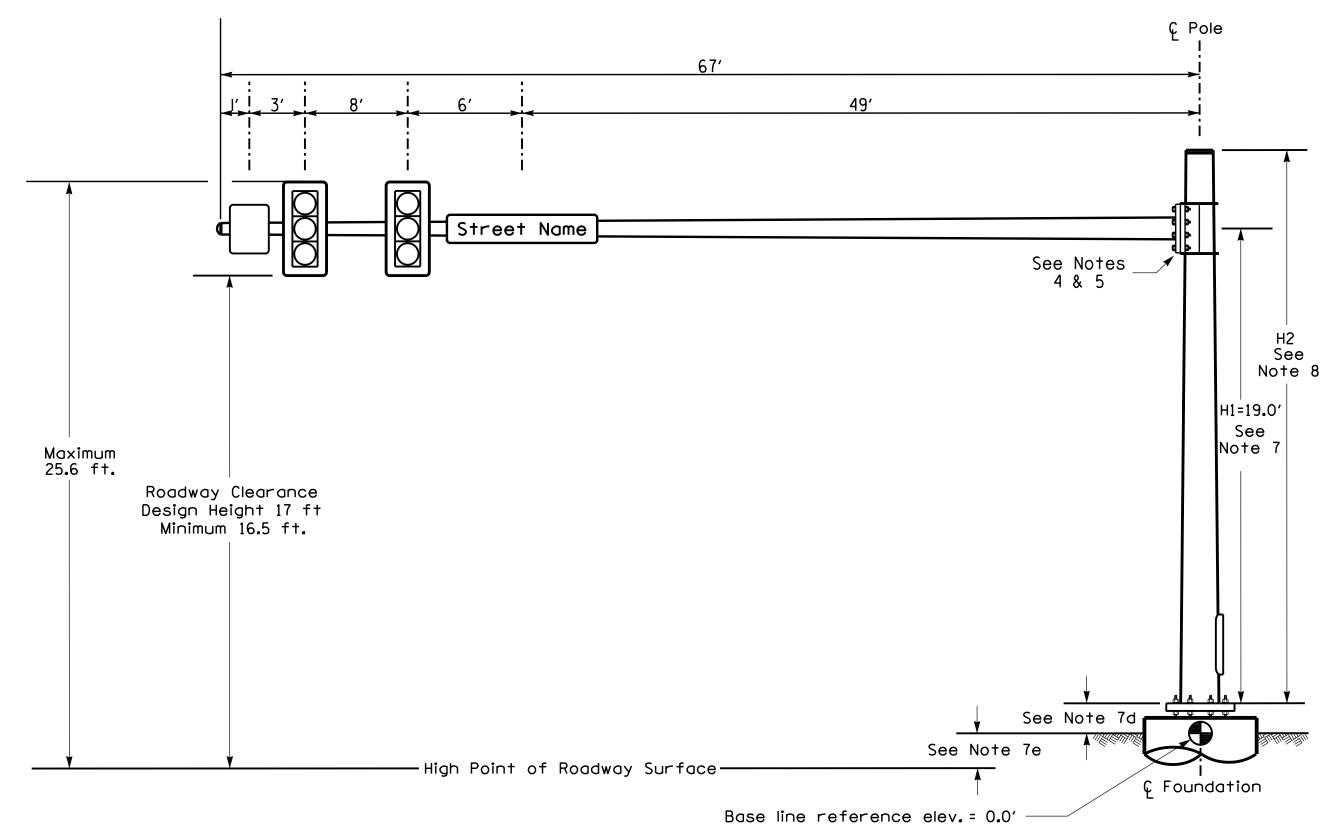
Division 11 Wilkes County Wilkesboro May 2023 REVIEWED BY: J. Ma REVISIONS

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

940 Main Campus Drive, Suite 500 Raleigh, NC 27606 919.829.0328 DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



SIG. INVENTORY NO. ||-|46|



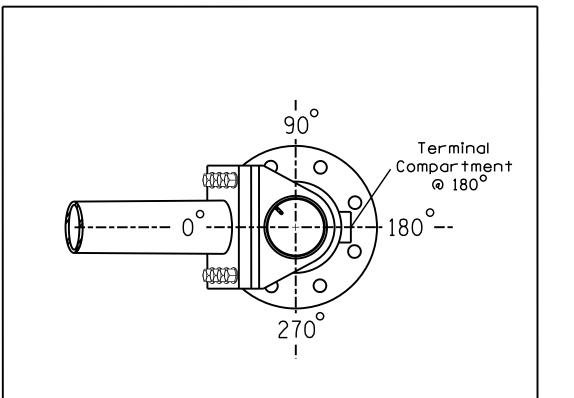
Elevation View

SPECIAL NOTE

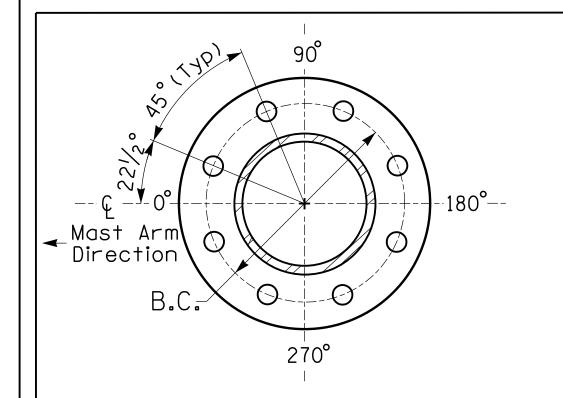
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

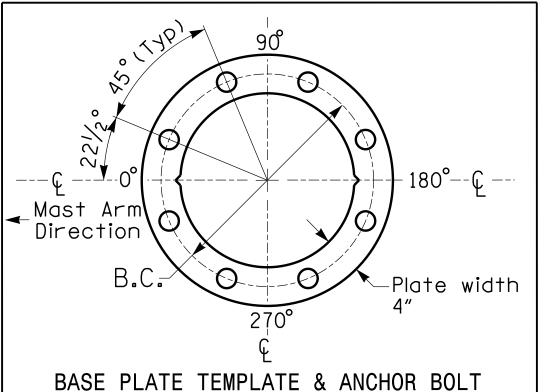
Elevation Differences for:	Pole 1
Baseline reference point at © Foundation @ ground level	0.0 ft.
Elevation difference at High point of roadway surface	-1.3 ft.
Elevation difference at Edge of travelway or face of curb	-2.3 ft.
<u> </u>	



POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL
See Note 6



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	STREET NAME SIGN RIGID MOUNTED	16.0 S.F.	24.0" W X 96.0" L	36 LBS									

NOTES

DESIGN REFERENCE MATERIAL

- 1. 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 "MetalPole Standards" located at the following NCDOT website: https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx

<u>DESIGN REQUIREMENTS</u>

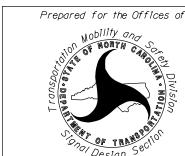
- 2. Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
- 3. Design all signal supports using stress ratios that do not exceed 0.9.
- 4. 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.
- 5. A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements.
- 6. Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
- 7. The mast arm attachment height (H1) shown is based on the following design assumptions:
 a. Mast arm slope and deflection are not considered in determining the arm attachment
- height as they are assumed to offset each other.
- b. Signalheads are rigidly mounted and vertically centered on the mast arm.
- c. The roadway clearance height for design is as shown in the elevation views. d. The top of the pole base plate is 0.75 feet above the ground elevation.
- e. Refer to the Elevation Data Chart for the elevation differences between the proposed foundation ground leveland the high point of the roadway.
- 8. 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.
- 9. If pole location adjustments are required, the contractor must gain approval from the Engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signal Design Section Senior Structural Engineer for assistance at (919) 814-5000.
- 10.The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
- 11. The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.



U-5312

Sig. 5.5

NCDOT Wind Zone 4 (90 mph)



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

Divsion 11 Wilkes County Wilkesboro
PLAN DATE: May 2023 REVIEWED BY: M. Stygles
PREPARED BY: S.R. Chiluka REVIEWED BY: J. Ma

PLAN DATE: May 2023 REVIEWED BY: M. Stygles

750 N.Greenfield Pkwy, Garner, NC 27529 PREPARED BY: S.R. Chiluka REVIEWED BY: J. Ma

SCALE

O

N/A

SEAL

SEAL

O47250

SEAL

O47250

SOURCE

O47250

SEAL

O47250

SEAL

O47250

SEAL

O47250

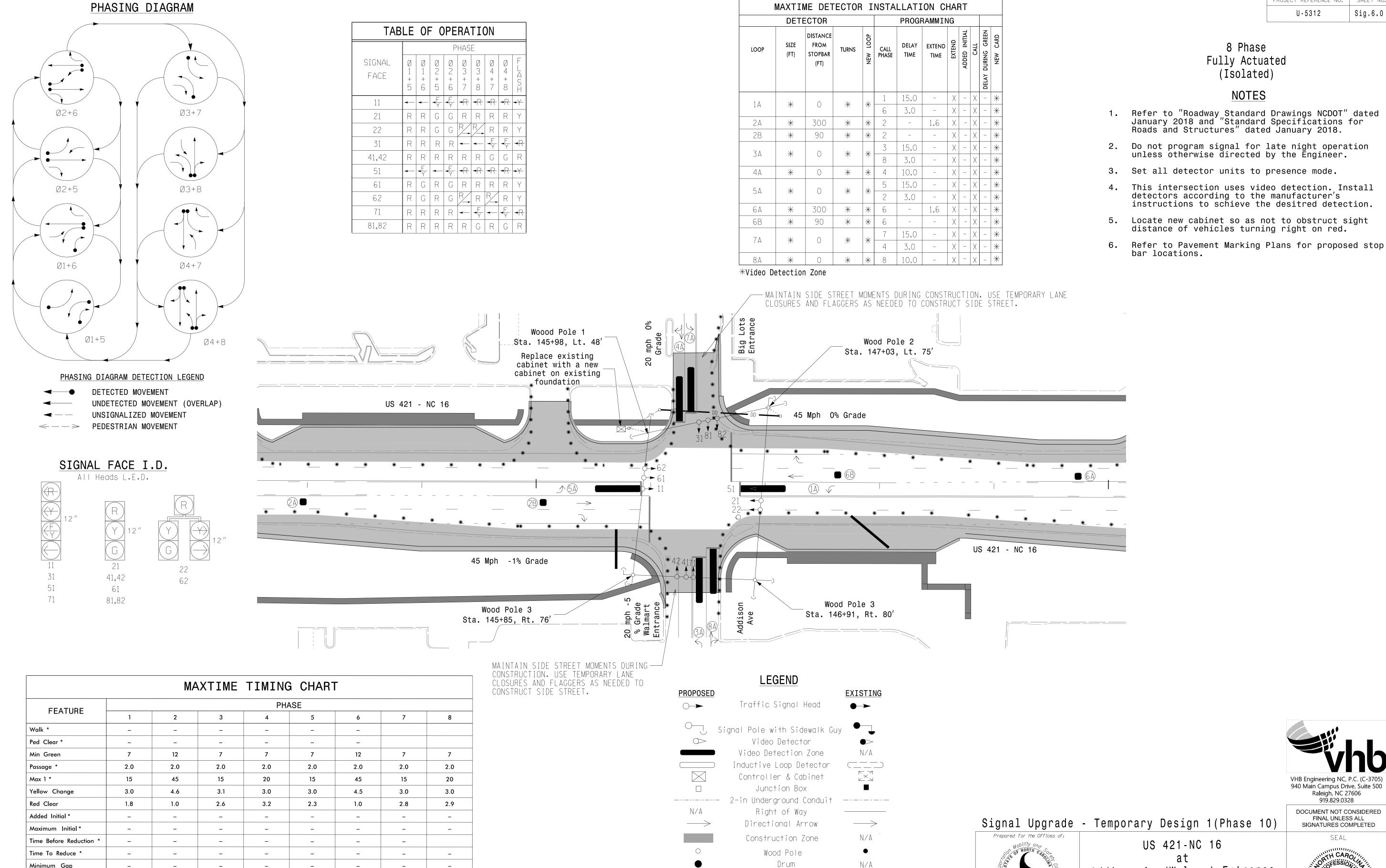
SIGNATURE SIG. INVENTORY NO.

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SIGNATURES COMPLETED

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PLATE TEMPLATE & ANCHOR BOY
LOCK PLATE DETAIL
For 8 Bolt Base Plate



N/A

1"=40'

Skinny Drum

_

_

Χ

_

Χ

/17/2023 |:40:22 PM \vhb\gb|\proj\Raleigh\ chiluka

Minimum Gap

Non Lock Detector

Advance Walk

Vehicle Recall

_

Χ

MIN RECALL

* 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.

_

Χ

MIN RECALL

WTH CARO! Addison Ave/Walmart Entrance 047250 Wilkes County Wilkesboro REVIEWED BY: M.L. Stygles May 2023 PREPARED BY: S.R. Chiluka | REVIEWED BY:

INIT. DATE SIG. INVENTORY NO. ||-|077T|

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

PROJECT REFERENCE NO.

U-5312

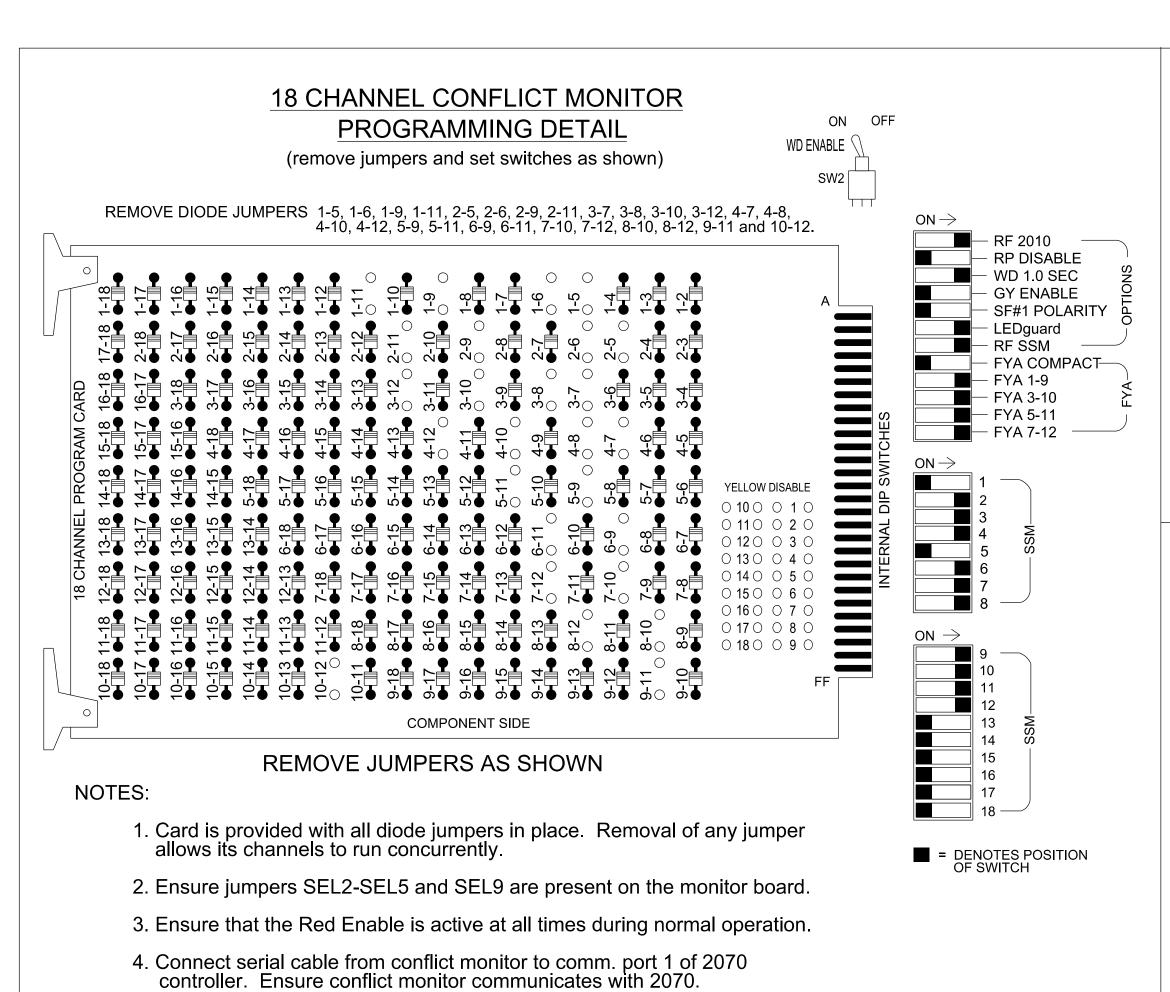
8 Phase

Fully Actuated

(Isolated)

NOTES

Sig.6.0



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

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"	*

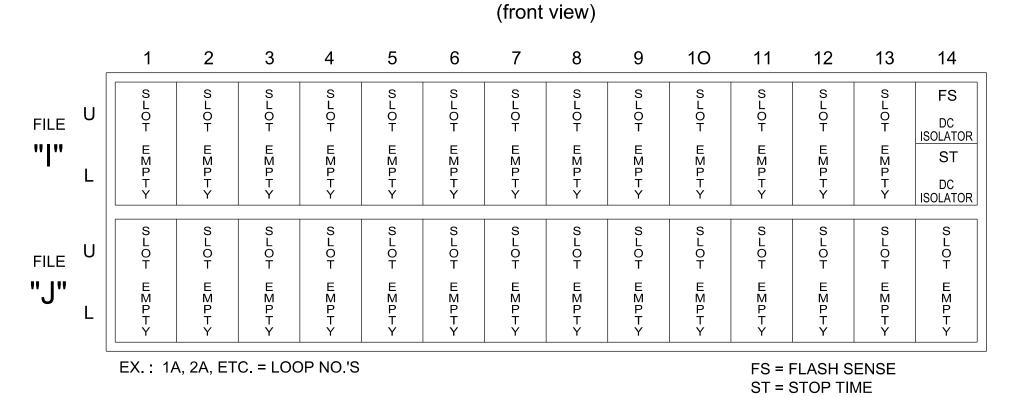
*See overlap programming detail on sheet 2

Overlap "2".....*

Overlap "3".....*

Overlap "4".....*

INPUT FILE POSITION LAYOUT



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)

Phase 1 Yellow Field

Terminal (126)

SPECIAL DETECTOR NOTE

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

OVERLAP 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
Туре	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section	FYA 4 - Secti
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

OJECT REFERENCE NO. SHEET NO. Sig.6.1

SIGNAL HEAD HOOK-UP CHART																				
LOAD SWITCH NO.	S1	S2	S3	S	3 4	S5	S6	S7	S8	S9	S	10	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		SPARE	OL3		SPARE
SIGNAL HEAD NO.	11	21,22	NU	22	★ 31	41,42	NU	★ 51	61,62	NU	62	★ 71	81,82	NU	★	★ 31	NU	★ 51	7 1★	NU
RED		128				101			134				107					٠		
YELLOW	*	129	٠		*	102		*	135			*	108			·		·		
GREEN		130	٠			103			136				109					٠		
RED ARROW			٠												A121	A124		A114	A101	
YELLOW ARROW	-		•	117							123			-	A122	A125	-	A115	A102	
FLASHING YELLOW ARROW								·							A123	A126		A116	A103	
GREEN ARROW	127			118	118			133			124	124				·				

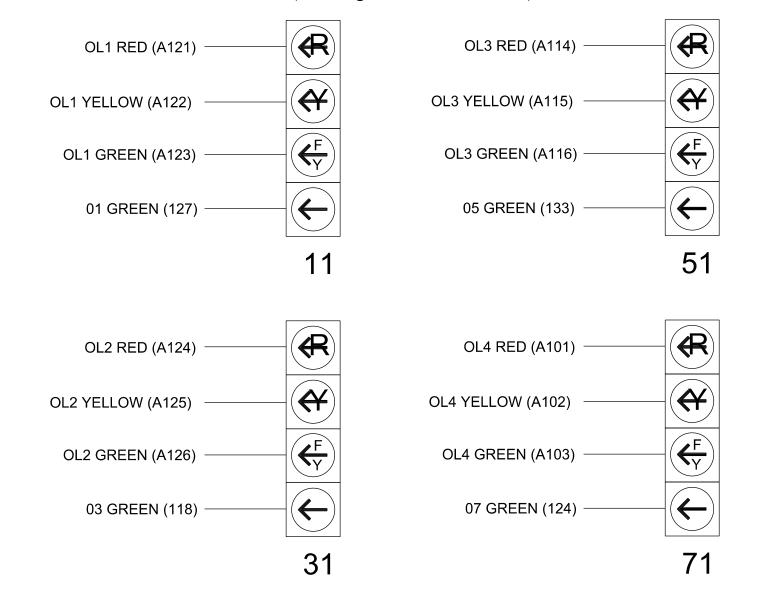
NU = Not Used

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

★See pictorial of head wiring in detail this sheet.

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 11-1077T1 DESIGNED: May 2023 SEALED: 5/24/2023 REVISED:

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

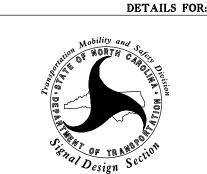
919.829.0328
DOCUMENT NOT CONSIDERED

FINAL UNLESS ALL

SIGNATURES COMPLETED

SEAL

Temporary Installation - Electrical Detail 1 of 1 (Phase 10) | ELECTRICAL AND PROGRAMMING |



50 N.Greenfield Pkwy,Garner,NC 27529

US 421 - NC 16 at Big Lots Entrance

		0			
Division	11	Wilkes	County	Will	kesbord
PLAN DATE:	Мау	2023	REVIEWED BY:	J.Ma	
PREPARED BY:	M.L.	Stygles	REVIEWED BY:	S.R. Chil	uka
	REVISIO	NS		INIT.	DATE

SEAL 046057

DocuSigned by:

Math Angle

SIGNATURE

DATE

SIG. INVENTORY NO. II-I077TI

Terminal (117)

Phase 5 Yellow Field Terminal (132)

Phase 7 Yellow Field Terminal (123)

AC-

AC-

Phase 3 Yellow Field

PHASING DIAGRAM DETECTION LEGEND

UNSIGNALIZED MOVEMENT

UNDETECTED MOVEMENT (OVERLAP)

DETECTED MOVEMENT

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

SIGNAL FACE I.D.

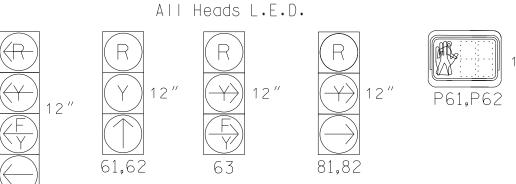


TABLE OF	OPERATION
	PHASE
SIGNAL FACE	Ø 8 H
31,32	F - Y
61,62	↑ R Y
63	F R +
81,82	$R \rightarrow R$
P61,P62	W DW DRK

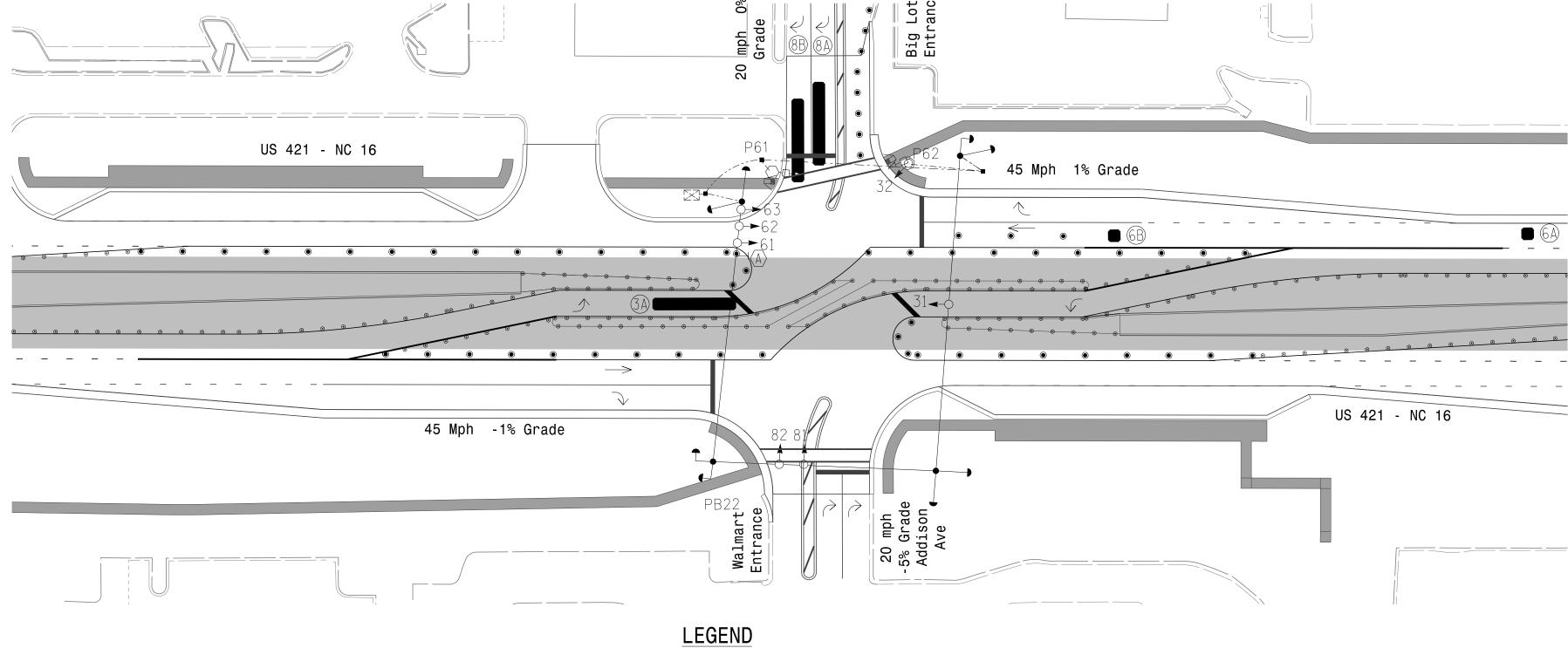
MAXTIME DETECTOR INSTALLATION CHART												
	DETI	ECTOR				PF	ROGRAM	IMI	NG			
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
3A	*	0	*	*	3	15.0	-	Χ	_	Χ	_	*
6A	*	300	*	*	6	-	1.6	Χ	-	Χ	-	*
6B	*	90	*	*	6	-	-	Χ	-	Χ	_	*
8A	*	0	*	*	8	15.0	-	Χ	-	Χ	-	*
8B	*	0	*	*	8	15.0	-	Χ	-	Χ	-	*

★Video Detection Zone

PROJECT REFERENCE NO. | SHEET NO. Sig. 6.2 U-5312

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.
- 3. Set all detector units to presence mode.
- 4. This intersection uses video detection. Install detectors according to the manufacturer's instructions to schieve the desitred detection.
- Omit "walk" and flashing "Don;t Walk" with no pedestrian calls.
- 6. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
- 7. 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.
- 9. Reposition existing signal heads as shown on this plan.



MAXTIME TIMING CHART									
FEATURE		PHASE							
FEATURE	3	6	8						
Walk *	_	7	_						
Ped Clear *	_	10	_						
Min Green	7	12	7						
Passage *	2.0	2.0	2.0						
Max 1 *	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	Х	_	Х						
Vehicle Recall	_	MIN RECALL	_						
Dual Entry	Х	_	Х						

* 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

/28/2023 8:15:14 PM \vhb\gbl\proj\Raleigh chiluka

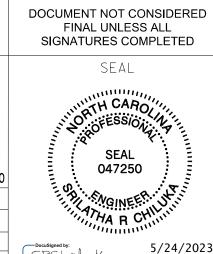
	LEGEND	
PROPOSED		EXISTING
\bigcirc	Traffic Signal Head	
↓	Pedestrian Signal Head With Push Button & Sign	Ţ
	Type II Signal Pedestal	
⊗	Type I Push Button Post	❸
N/A	Signal Pole with Sidewalk Guy Video Detector Video Detection Zone Inductive Loop Detector Controller & Cabinet Wheelchair Ramp Junction Box - 2-in Underground Conduit Right of Way Directional Arrow	N/A N/A X X X X X X X X X X X X X
	Construction Zone	N/A ·
0	Wood Pole	•
$\langle A \rangle$	No Left Turn Sign (R3-2)	\bigcirc
•	Drum Skinny Drum	N/A N/A
	SKITHIY DI GIH	IV/ A

VHB Engineering NC, P.C. (C-3705) 940 Main Campus Drive, Suite 500 Raleigh, NC 27606 919.829.0328 Signal Upgrade - Temporary Design 2 (Phase 11)

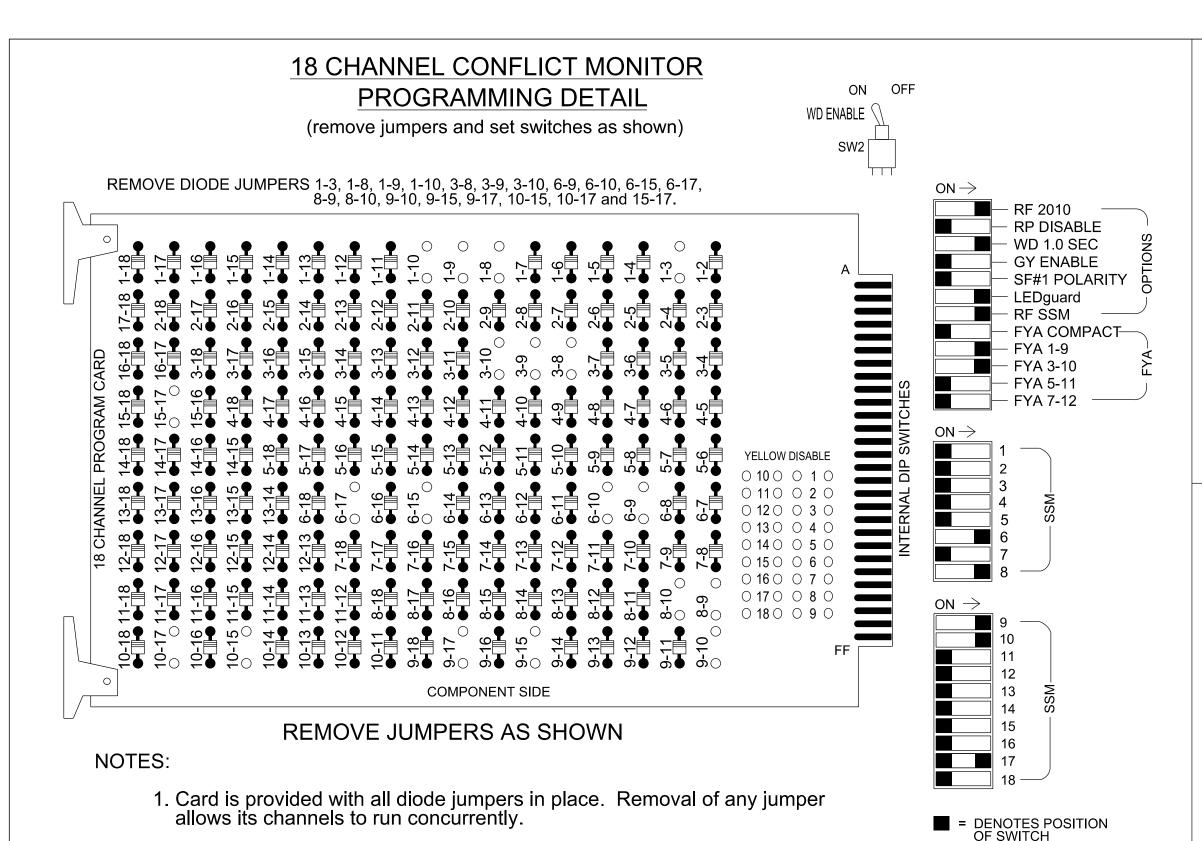
Prepared for the Offices of:

US 421-NC 16 Big Lots Entrance

		Divsion 1	1 Wilkes Co	unty	Wilk	kesboro
91	OF TRAMPS TON	PLAN DATE:	May 2023	REVIEWED BY:	M.L. St	ygles
if i	eld Pkwy,Garner,NC 27529	PREPARED BY:	S.R. Chiluka	REVIEWED BY:	J. N	a
\	SCALE		REVISIONS		INIT.	DATE



SRChiluka SIG. INVENTORY NO. ||-|077T2



- 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.

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"	
Overlap "5"	.*
Overlap "7"	

*See overlap programming detail on sheet 2.

PROJECT REFERENCE NO.	SHEET NO
U - 5312	Sig.6.3

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	٠		109							
₩									119									
×									121									

NU = Not Used

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

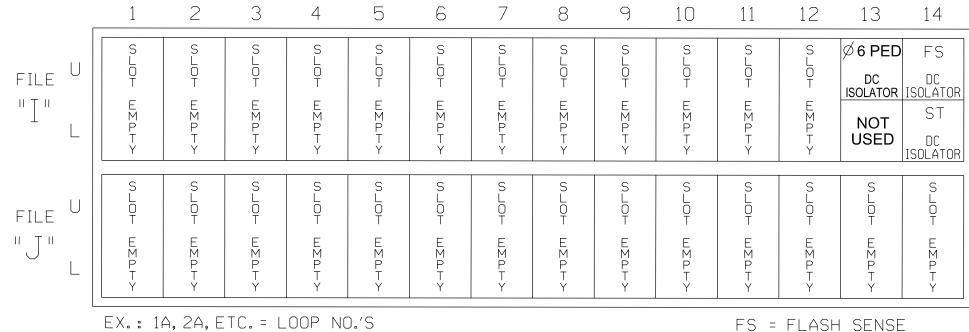
INPUT FILE POSITION LAYOUT

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.

(front view)



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							NOTE: INSTAL	L DC ISOLA	ATOR	INPUT FII	_E POSITI	ON LEGE	END: J2L
P61,P62	TB8-7,9	I13U	68	34	6	PED 6	IN INPL	JT FILE SLO	T I13.	FILE J —			
										S	SLOT 2 —		
										Le	OWER —		

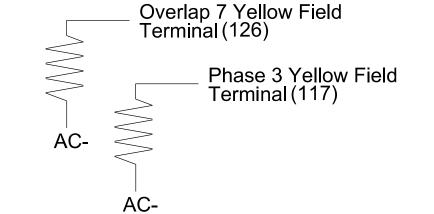
SPECIAL DETECTOR NOTE

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)



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 11-1077T2

DESIGNED: May 2023

SEALED: 5/24/2023

REVISED: N/A



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

Prepared for the Offices of:

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

FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL

OCCUPATION

SEAL

046057

Docusigned by:

Math Angle

394866373748E

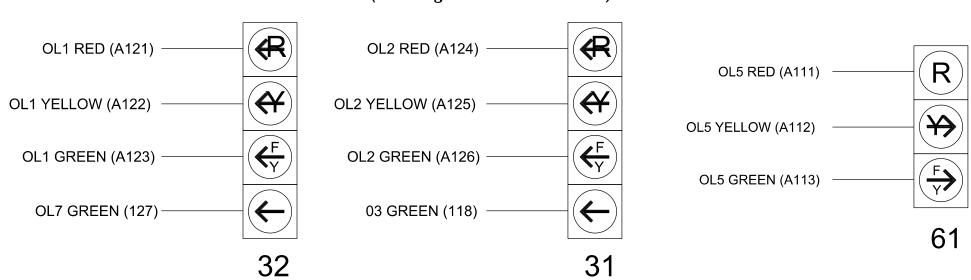
DATE

SIG. INVENTORY NO. ||-|07772

DOCUMENT NOT CONSIDERED

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



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
Туре	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section	Normal
Included Phases	6	6	6	3
Modifier Phases	3	3	4	÷
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

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

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

DETAILS FOR:



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

ELECTRICAL AND PROGRAMMING

Prepared for the Offices of:

US 421-NC 16 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

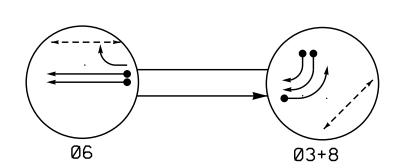
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED SEAL 5/24/2023 SIG. INVENTORY NO. ||-|077T2

PHASING DIAGRAM DETECTION LEGEND

DETECTED MOVEMENT UNDETECTED MOVEMENT (OVERLAP)

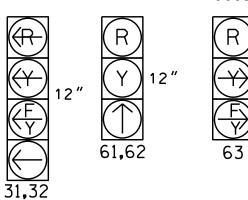
UNSIGNALIZED MOVEMENT PEDESTRIAN MOVEMENT

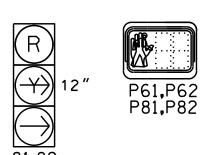
ALTERNATE PHASING DIAGRAM



SIGNAL FACE I.D.

All Heads L.E.D.





DEFAULT F				
TABLE OF O				
SIGNAL				
FACE	Ø 6	Ø 3 +	HUANI	
		8	Н	
31,32	Ŧ		- ¥	
61,62	1	R	Υ	
63	F	R	-Y-	
81,82	R		R	
P61,P62	V	D₩	DRK	
P81 , P82	D₩	W	DRK	

ALTERNATE	PH/	ASI	NG
TABLE OF 0	PER	ATI	ON
	Р	HAS	E
SIGNAL FACE	Θ ω	⊗n + ∞	FLANT
31,32	#	ļ	≺
61,62	1	R	Υ
63	F∳	R	-Y-
81,82	R		R
P61 , P62	W	DW	DRK
P81 , P82	DW	W	DRK

*	Disable	e delav	durina	alternat	e phasing	operation

 $0 | 2-4-2| X | 3 | 15.0^*|$

TURNS

5

MAXTIME DETECTOR INSTALLATION CHART

PROGRAMMING

CALL DELAY EXTEND

DETECTOR

SIZE

6X6

6X6

6X6

DISTANCE

FROM

STOPBAR | (FT)

300

300

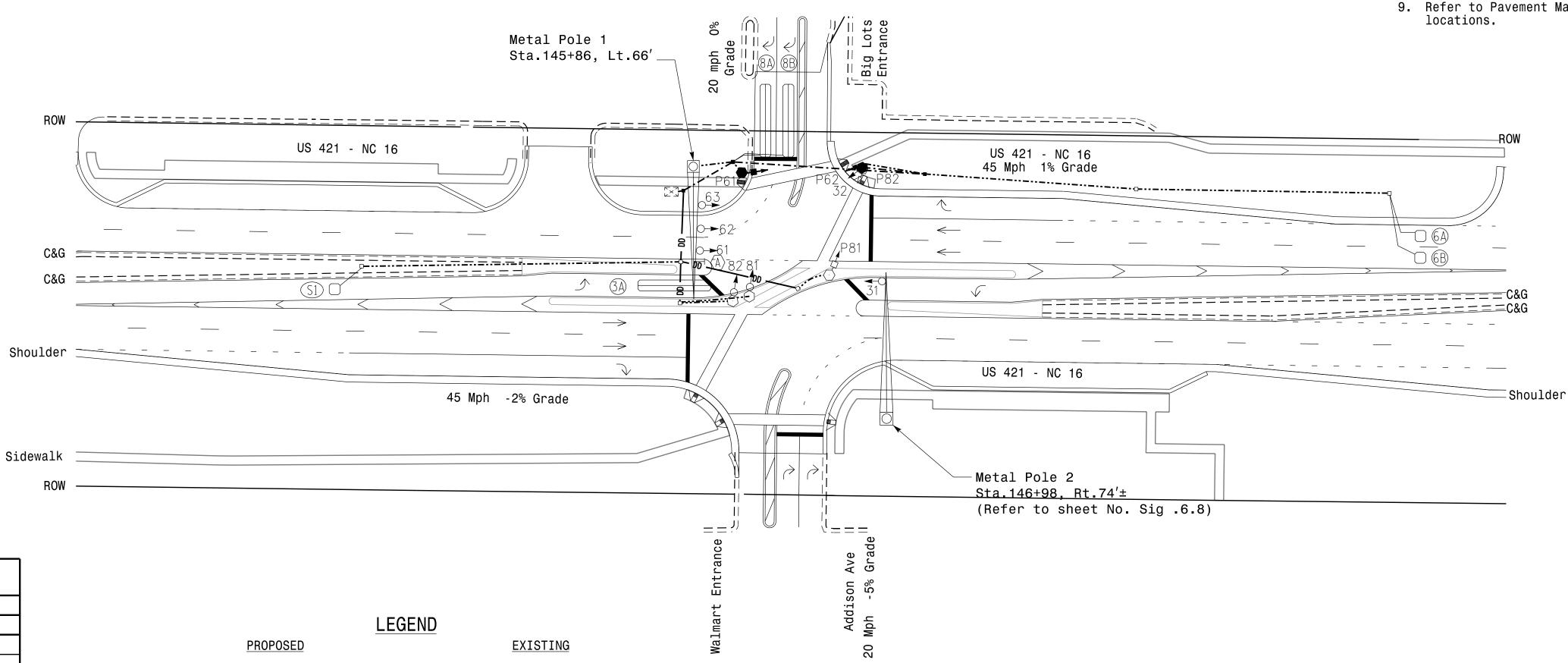
2 Phase

PROJECT REFERENCE NO. U-5312 Sig 6.5

Fully Actuated W/ Alternate Phasing Operation Wilkesboro Closed Loop System

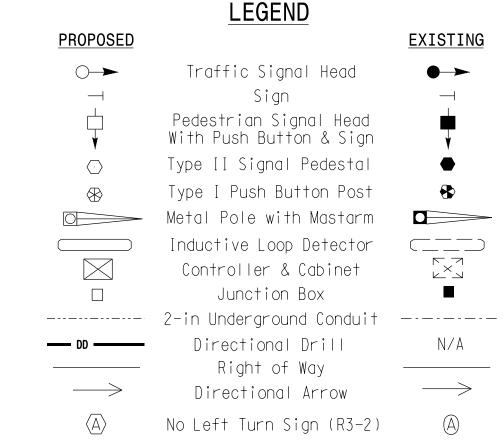
NOTES

- 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.
- 3. Set all detector units to presence mode.
- 4. Omit "Walk" and flashing "Don't Walk" with no pedestrian calls.
- Program pedestrian heads to countdown the flashing "Don't Walk" time only.
- 6. 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.
- 7. The Division Traffic Engineer will determine the hours of use for each phasing plan.
- 8. 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.



MAXTIM	E TIMING CHART							
FEATURE		PHASE						
FEATURE	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	Х	_	Х					
Vehicle Recall	_	MIN RECALL	_					
Dual Entry	Х	_	Х					

* 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.



Curb Ramp

Signal Upgrade - Final Design



US 421-NC 16 Addison Ave/Big Lots Entrance

Divsion 11 Wilkes County Wilkesboro May 2023 REVIEWED BY: M. Stygles 750 N. Greenfield Pkwy, Garner, NC 27529 PREPARED BY: S.R. Chiluka REVIEWED BY:

5RChiluka DATE 11-1077 SIG. INVENTORY NO.

940 Main Campus Drive, Suite 500 Raleigh, NC 27606 919.829.0328

DOCUMENT NOT CONSIDERED

FINAL UNLESS ALL

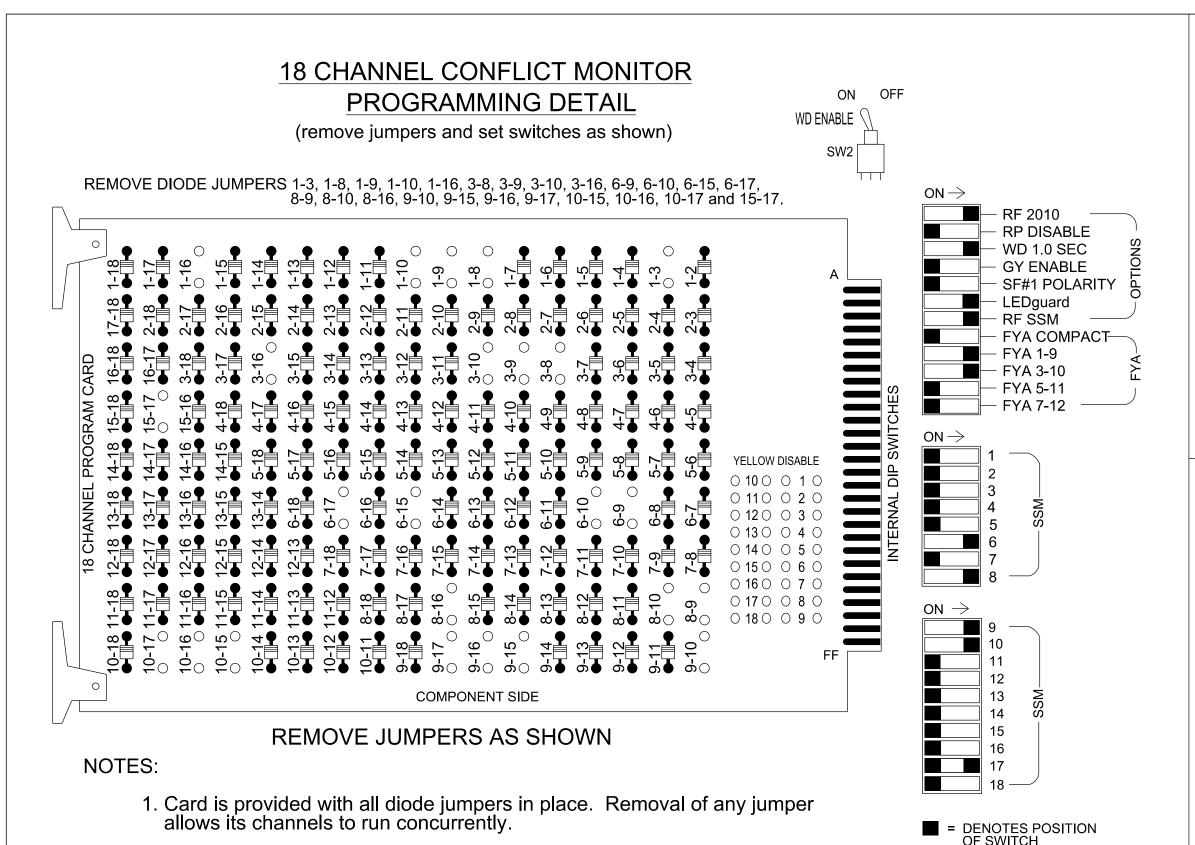
SIGNATURES COMPLETED

SEAL

WYH CARO!

047250

* * See note 6



- 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

*See overlap programming detail on sheet 2.

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"	

Sig 6 6 U-5312

SWITCH NO. SI SZ S3 S4 S5 S6 SI SI SI SI SI SI SI					SIC	3N/	۱ علا	ΙEΑ	D H	00	K-L	IP C	HA	RT					
CHANNEL 1 2 13 3 4 14 5 6 15 7 8 16 9 10 17 11 12 18 PHASE OL7 2 PED 3 4 PED 5 6 6 PED 7 8 PED OL1 OL2 OL5 OL3 OL4 SPA SIGNAL HEAD NO. 32 NU NU 31 NU NU NU NU 61,62 P61, P62 NU 81,82 P81, P82 32 31 63 NU NU NU NU RED 134 107 A111 YELLOW * 135 GREEN A121 A124 YELLOW ARROW ARRO		S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3			AUX S6
SIGNAL HEAD NO. 32 NU NU 31 NU NU NU 61,62 P61, NU 81,82 P82, 32 31 63 NU NU NU NU NU NU NU N	CHANNEL	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
RED 134 107 A111 YELLOW * * 135 GREEN A121 A124 RED ARROW A121 A124 YELLOW ARROW 108 A122 A125 A112 FLASHING YELLOW ARROW A123 A126 A113	PHASE	OL7	2	2 PED	3	4	4 PED	5	6		7	8	8 PED					OL4	SPARE
YELLOW * 135 <td></td> <td>★ 32</td> <td>ŊU</td> <td>NU</td> <td>★ 31</td> <td>NU</td> <td>NU</td> <td>NU</td> <td>61,62</td> <td></td> <td>NU</td> <td>81,82</td> <td></td> <td>32★</td> <td>★ 31</td> <td>63[*]</td> <td>NU</td> <td>NU</td> <td>NU</td>		★ 32	ŊU	NU	★ 31	NU	NU	NU	61,62		NU	81,82		32 ★	★ 31	63 [*]	NU	NU	NU
GREEN A121 A124 RED ARROW A121 A124 YELLOW ARROW 108 A122 A125 A112 FLASHING YELLOW ARROW A123 A126 A113	RED								134	٠		107				A111			
RED ARROW A121 A124 YELLOW ARROW 108 A122 A125 A112 FLASHING YELLOW ARROW A123 A126 A113	YELLOW	*			*				135	٠									
ARROW A121 A124 YELLOW ARROW 108 A122 A125 A112 FLASHING YELLOW ARROW A123 A126 A113	GREEN																		
ARROW FLASHING YELLOW ARROW ARROW A123 A126 A113						,								A121	A124				
YELLOW ARROW ARROW A123 A126 A113												108		A122	A125	A112			
	YELLOW		·			÷				÷	·		·	A123	A126	A113	·		
GREEN ARROW 127 118 136 109 109		127			118	,			136			109							
119 104	*									119			104						
† 121 106	×									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)

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.

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE	U	S L O T	S L O T	S L O T	S L O T	øз 3 А	S L OT	S L O T	S L O T	SYS. DET. S1	SLOT	S L O T	S L O T	Ø 6 PED DC ISOLATOR	DC
" "	L	E M P T Y	E M P T Y	E M P T Y	E M P T Y	NOT USED	E M P T Y	E M P T Y	E M P T Y	NOT USED	E M P T Y	E M P T Y	E M P T Y	Ø 8 PED DC ISOLATOR	DC
FILE	U	S L O T	Ø 6 6A	S L O T	S L O T	S L O T	Ø 8 8A	S L O T	S L O T	S L O T	S L O T	S L O T	S L O T	S L O T	S L O T
' J"	L	E M P T Y	Ø 6 6B	E M P T Y	E M P T Y	E M P T Y	NOT USED	E M P T Y	E M P T Y	E M P T Y	E M P T Y	E M P T Y	E M P T Y	E M P T Y	E M P T Y
		EX.: 1/	4, 2A, ET	C. = LOC	OP NO.'S	<u> </u>						FS = I	FLASH S	SENSE	

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)

⟨¥) **⟨**F **⟨**Y

OL2 RED (A124)

OL2 YELLOW (A125)

OL2 GREEN (A126)

03 GREEN (118)

FS = FLASH SENSE ST = STOP TIME

OL5 RED (A111)

 $\overline{\left(\begin{array}{c} F \\ Y \end{array}\right)}$

63

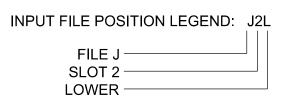
OL5 YELLOW (A112)

OL5 GREEN (A113)

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		Х			Х	
* S1	TB6-9,10	I9U	60	22	13	SYS			Х			Х	
6A	TB3-5,6	J2U	40	2	16	6			Х	Х		Х	
6B	TB3-7,8	J2L	44	6	17	6			Х	Х		Х	
8A	TB5-9,10	J6U	42	4	22	8	15		X			Χ	
PED PUSH BUTTONS							NOTE: INSTALL DC ISOLATOR IN INPUT FILE SLOT I13.						
P61,P62	TB8-7,9	I13U	68	34	6	PED 6							
P81,P82	TB8-8,9	I13L	70	36	8	PED 8							

*System detector only. Remove any assigned vehicle phase.



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 11-1463 DESIGNED: May 2023

ACCEPTABLE VALUES

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



Electrical Detail - Sheet 1 of 2

Prepared for the Offices of:

750 N.Greenfield Pkwy, Garner, NC 27529

SEALED: 5/24/2023

REVISED: N/A

US 421-NC 16

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

Overlap 7 Yellow Field Terminal (126)

Phase 3 Yellow Field Terminal (117)

Division 11 Wilkes County Wilkesboro May 2023 REVIEWED BY: J. Ma PREPARED BY: M.L. Stygles | REVIEWED BY: S.R. Chiluka REVISIONS INIT. DATE

SEAL 046057 Matt f Strygler 39481919AJHRE 5/24/2023 DATE

11-1077

SIG. INVENTORY NO.

DOCUMENT NOT CONSIDERED

FINAL UNLESS ALL

SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Addison Ave/Big Lots Entrance

OL1 YELLOW (A122)

OL1 RED (A121)

OL1 GREEN (A123)

OL7 GREEN (127)

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

ASSIGN CHANNEL 1 TO OVERLAP 7

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		Χ	X	1
	2	Phase Vehicle	2	Х			2
	3	Phase Vehicle	3		Χ	Χ	3
	4	Phase Vehicle	4		Х		4
	5	Phase Vehicle	5		Х		5
	6	Phase Vehicle	6	Χ		Χ	6
	7	Phase Vehicle	7		Х		7
	8	Phase Vehicle	8		Х	Х	8
	9	Overlap	1	Χ		Χ	9
	10	Overlap	2	Χ		Χ	10
	11	Overlap	3	Χ			11
	12	Overlap	4		Х		12
	13	Phase Ped	2				13
	14	Phase Ped	4				14
	15	Phase Ped	6				15
	16	Phase Ped	8				16
	17	Overlap	5	Χ		Х	17
	18	Overlap	6		Х		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

3A

I Iaii Z		
Detector	Call Phase	Delay
7	3	<u>.</u>

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
Туре	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section	Normal
Included Phases	6	6	6	3
Modifier Phases	3	3	4	4
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
Туре	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section	Normal
Included Phases	÷	÷	6	3
Modifier Phases	3	3	<u> </u>	-
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

ELECTRICAL AND PROGRAMMING

NOTICE INCLUDED PHASE

DETAILS FOR: Prepared for the Offices of:

Electrical Detail - Sheet 2 of 2

THIS ELECTRICAL DETAIL IS FOR

THE SIGNAL DESIGN: 11-1463

DESIGNED: May 2023

SEALED: 5/24/2023

REVISED: N/A

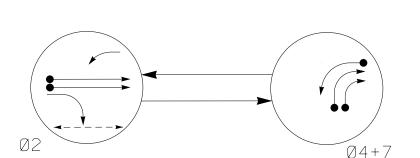
US 421-NC 16 Addison Ave/Big Lots Entrance

Division 11 Wilkes County Wilkesboro May 2023 REVIEWED BY: J. Ma PREPARED BY: M.L. Stygles REVIEWED BY: S.R. Chiluka REVISIONS INIT. DATE

SEAL 5/24/2023 Matt & Stroles DATE SIG. INVENTORY NO. ||-|077

940 Main Campus Drive, Suite 500 Raleigh, NC 27606 919.829.0328

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



PHASING DIAGRAM DETECTION LEGEND

DETECTED MOVEMENT

UNDETECTED MOVEMENT (OVERLAP) UNSIGNALIZED MOVEMENT

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

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

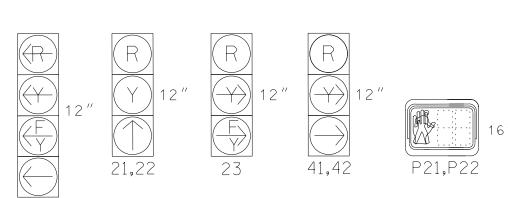


TABLE OF	0PEF	RAT]	ON
	P	'HAS	E
SIGNAL FACE	Ø 2	Ø 4 + 7	FLASH
21,22	\uparrow	R	Υ
23	F	R	→
41,42	R	-	R
71,72	F	•	¥
P21 , P22	W	DW	DRK

MAXTIME DETECTOR INSTALLATION CHART												
	DET	ECTOR			PROGRAMMING							
L00P	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
2A	*	300	*	*	2	-	1.6	Χ	-	-	-	*
2B	*	90	*	*	2	-	-	Χ	-	-	-	*
4A	*	0	*	*	4	15.0	-	Χ	-	Χ	-	*
4B	*	0	*	*	4	15.0	-	Χ	-	Χ	-	*
7A	*	0	*	*	7	15.0	-	Χ	_	Χ	_	*

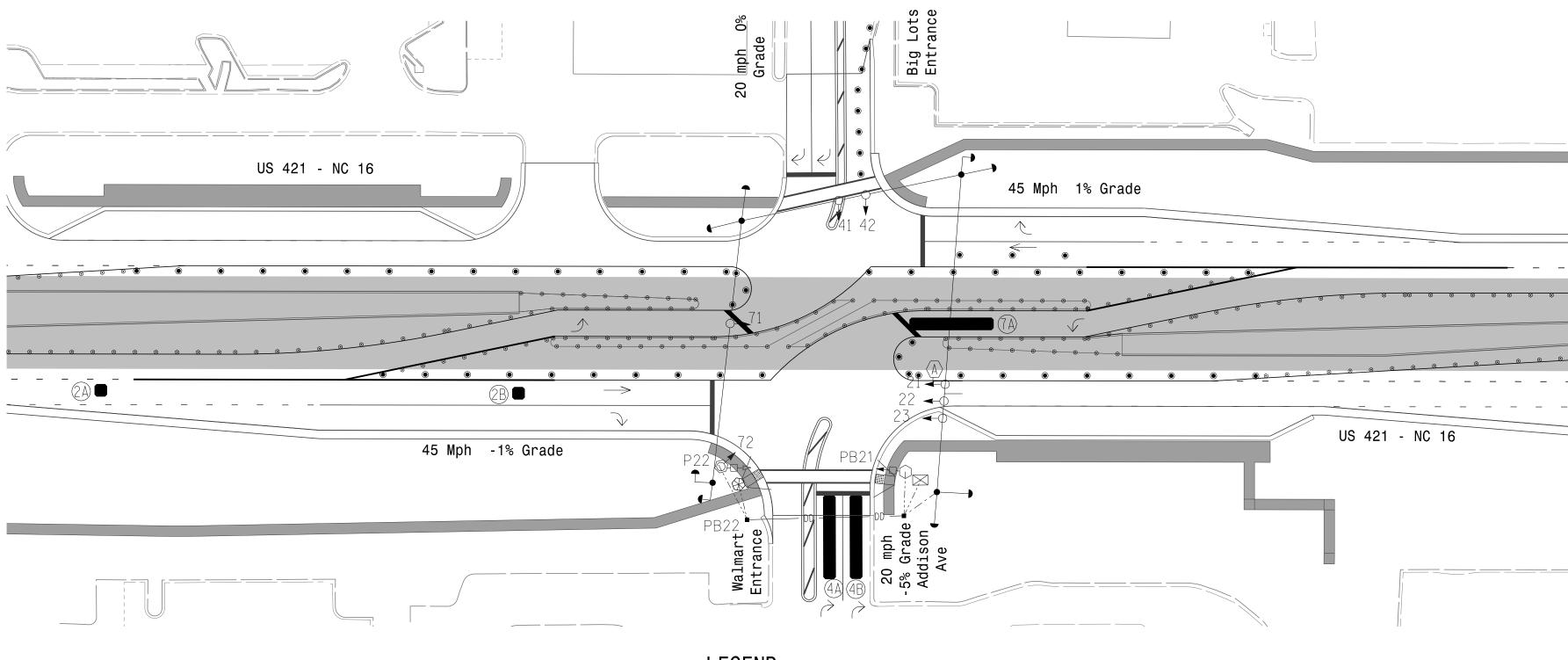
*Video Detection Zone

PROJECT REFERENCE NO. SHEET NO. Sig. 6.8 U-5312

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

NOTES

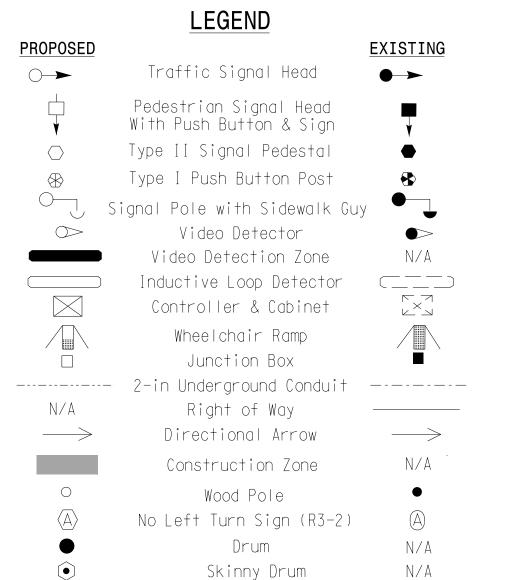
- Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
- Do not program signal for late night operation unless otherwise directed by the Engineer.
- 3. Set all detector units to presence mode.
- 4. This intersection uses video detection. Install detectors according to the manufacturer's instructions to schieve the desitred detection.
- Omit "walk" and flashing "Don't Walk" with no pedestrian calls.
- 6. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
- 7. 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.
- 9. Refer to Pavement Marking Plans for proposed stop bar locations

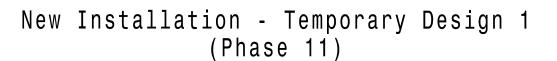


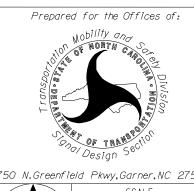
MAXTIME TIMING CHART						
FEATURE	PHASE					
FEATURE	2	4	7			
Walk *	7	_	_			
Ped Clear *	12	_	_			
Min Green	12	7	7			
Passage *	2.0	2.0	2.0			
Max 1 *	60	30	30			
Yellow Change	4.6	3.0	3.0			
Red Clear	1.2	2.1	2.4			
Added Initial *	-	_	_			
Maximum Initial *	_	_	_			
Time Before Reduction *	_	_	_			
Time To Reduce *	_	_	_			
Minimum Gap	_	_	_			
Advance Walk	**	_	_			
Non Lock Detector	-	Х	Х			
Vehicle Recall	MIN RECALL	_	_			

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







US 421-NC 16

Divsion 11 Wilkes County May 2023 REVIEWED BY: M.L. Stygles 750 N.Greenfield Pkwy,Garner,NC 27529 PREPARED BY: S.R. Chiluka REVIEWED BY: INIT. DATE REVISIONS

Addison Ave/Walmart Entrance 047250 Wilkesboro

SRChiluKax26/2023 SIG. INVENTORY NO. ||-|463T|

940 Main Campus Drive, Suite 500 Raleigh, NC 27606 919.829.0328

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL

Dual Entry

/2023 |2:47:39 PM affic\Signals\De uka

- 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

Phases Used Overlap "1" Overlap "2" Overlap "3" Overlap "4" Overlap "6"	332 w/ Aux Q-Free MAXTIME Base 18 With Aux. Output File S2,S3,S5,S7,S10,AUX S4,AUX S5,AUX S6 2, 2 PED, 4, 7 NOT USED NOT USED				
Overlap "7"					
*See overlap programming detail on sheet 2.					

PROJECT REFERENCE NO. U-5312 Sig 6 9

				014								\	D.T.					
	1			SI	GNA	AL F	1EA	υн	00	K-U	PC	НА	ΚI					
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	1.7	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	OL7	6	6 PED	7	8	8 PÉD	OL1	OL2	SPARE		OL4	OL6
SIGNAL HEAD NO.	NU	21,22	P21, P22	NU	41,42	NU	7 2★	NU	NU	★ 71	NU	NU	NU	NU	NU	7 2★	71	★ 23
RED		128			101													A104
YELLOW		129		·		·	*	·	·	*		-			-	·		٠
GREEN																		
RED ARROW											·		·		-	A114	A101	
YELLOW ARROW					102											A115	A102	A105
FLASHING YELLOW ARROW																A116	A103	A106
GREEN ARROW		130			103		133			124	·		·		-	·	·	
*			113															
×			115															

NU = Not Used

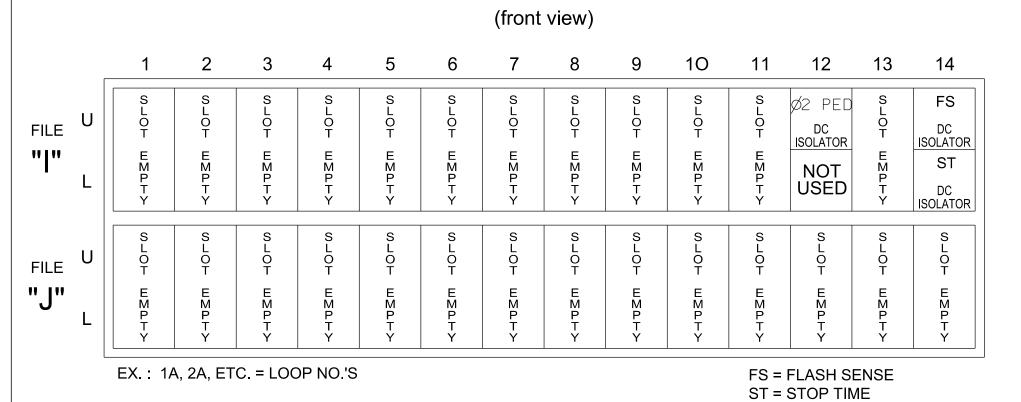
- * Denotes install load resistor. See load resistor installation detail this sheet.
- ★ See pictorial of head wiring in detail this sheet.

INPUT FILE POSITION LAYOUT

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.



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							NOTE:	1 50 1001		NPUT FILE	E POSITIC	N LEGEN	ND: J2L
P21,P22	TB8-4,6	I12U	67	33	2	PED 2	│ INSTALL DC ISOLATOR │ IN INPUT FILE SLOT I12. FILE J						
										SL	.OT 2 —		
										LO	WER		

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

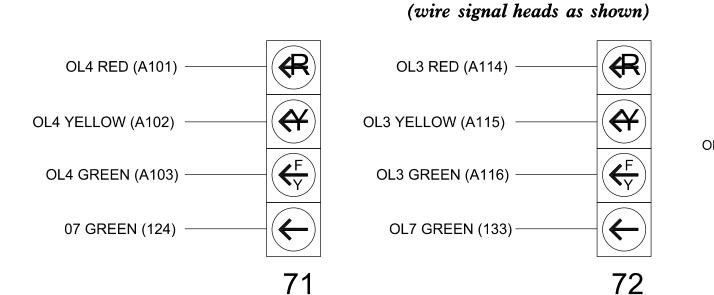
(install resistors as shown)

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

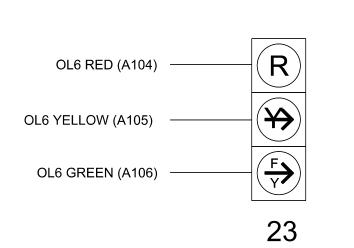
Overlap 7 Yellow Field Terminal (132) Phase 7 Yellow Field Terminal (123)



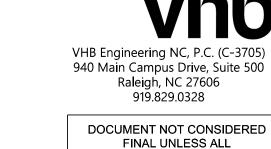
= DENOTES POSITION OF SWITCH



FYA SIGNAL WIRING DETAIL



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



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

DETAILS FOR: Prepared for the Offices of:

750 N.Greenfield Pkwy, Garner, NC 27529

	US	42	21 -	NC	16	
			at			
Addison	Αve	e / V	Nal	mar	٦t	Entranc

	·			
Division	11 Wilkes Co	unty	Will	kesboro
PLAN DATE:	May 2023	REVIEWED BY:	J. M	a
PREPARED BY:	M.L. Stygles	REVIEWED BY:	S.R. Chi	iluka
	REVISIONS		INIT.	DATE

SEAL - Docusing ... Matt & Stroler 5/26/2023 DATE SIG. INVENTORY NO. ||-|463T|

SIGNATURES COMPLETED

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 Channe
	1	Phase Vehicle	1		Χ	X	1
	2	Phase Vehicle	2	X			2
	3	Phase Vehicle	3		Х	X	3
ASSIGN _	4	Phase Vehicle	4		Х	·	4
CHANNEL 5 TO	5	Overlap	7		Х		5
OVERLAP 7	6	Phase Vehicle	6	X		X	6
	7	Phase Vehicle	7		Х		7
	8	Phase Vehicle	8		Χ	X	8
	9	Overlap	1	X		X	9
	10	Overlap	2	·	Х	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		Χ	X	17
	18	Overlap	6	Χ			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
Туре	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



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

ELECTRICAL AND PROGRAMMING

DETAILS FOR: Prepared for the Offices of:

Addison Ave/Walmart Entrance

US 421-NC 16

Division 11 Wilkes County Wilkesboro PLAN DATE: May 2023 REVIEWED BY: J. Ma PREPARED BY: M.L. Stygles REVIEWED BY: S.R. Chiluka REVISIONS 750 N.Greenfield Pkwy, Garner, NC 27529

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED SEAL 5/26/2023 SIG. INVENTORY NO. ||-|463T|

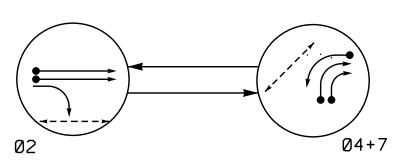
PHASING DIAGRAM DETECTION LEGEND

DETECTED MOVEMENT

UNDETECTED MOVEMENT (OVERLAP) UNSIGNALIZED MOVEMENT

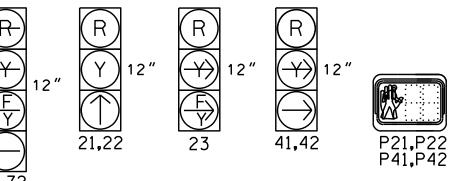
PEDESTRIAN MOVEMENT

ALTERNATE PHASING DIAGRAM



SIGNAL FACE I.D.

All Heads L.E.D.



DEFAULT	DEFAULT PHASING				ALTERNATE	PH	ASI	NG
TABLE OF OPERATION			[ON		TABLE OF O	PER	AT]	ON
	Р	HAS	E			Р	HAS	E
SIGNAL FACE	Ø 2	Ø 4 + 7	FLAST		SIGNAL FACE	Ø 2	Ø 4 + 7	FLGST
21,22	1	R	Υ		21,22	1	R	Υ
23	F	R	Y-		23	F	R	Y-
41,42	R	<u></u>	R		41,42	R	<u></u>	R
71,72	₹	—	-Y		71,72	-R	—	-Υ
P21 , P22	W	DW	DRK		P21 , P22	W	DW	DRK
P41 , P42	DW	W	DRK		P41,P42	DW	W	DRK

* Disable	e delav	durina	alternate	phasing	operatio

TURNS

5

2-4-2

|2-4-2|X

2-4-2)

4

MAXTIME DETECTOR INSTALLATION CHART

PROGRAMMING

- |x|x|x|-**|**x

CALL DELAY EXTEND E

4 | 15.0 |

4 | 15.0 |

DETECTOR

6X6 300

6X6

6X40

6X40

6X40

6X6

2B

S1

DISTANCE

FROM

STOPBAR

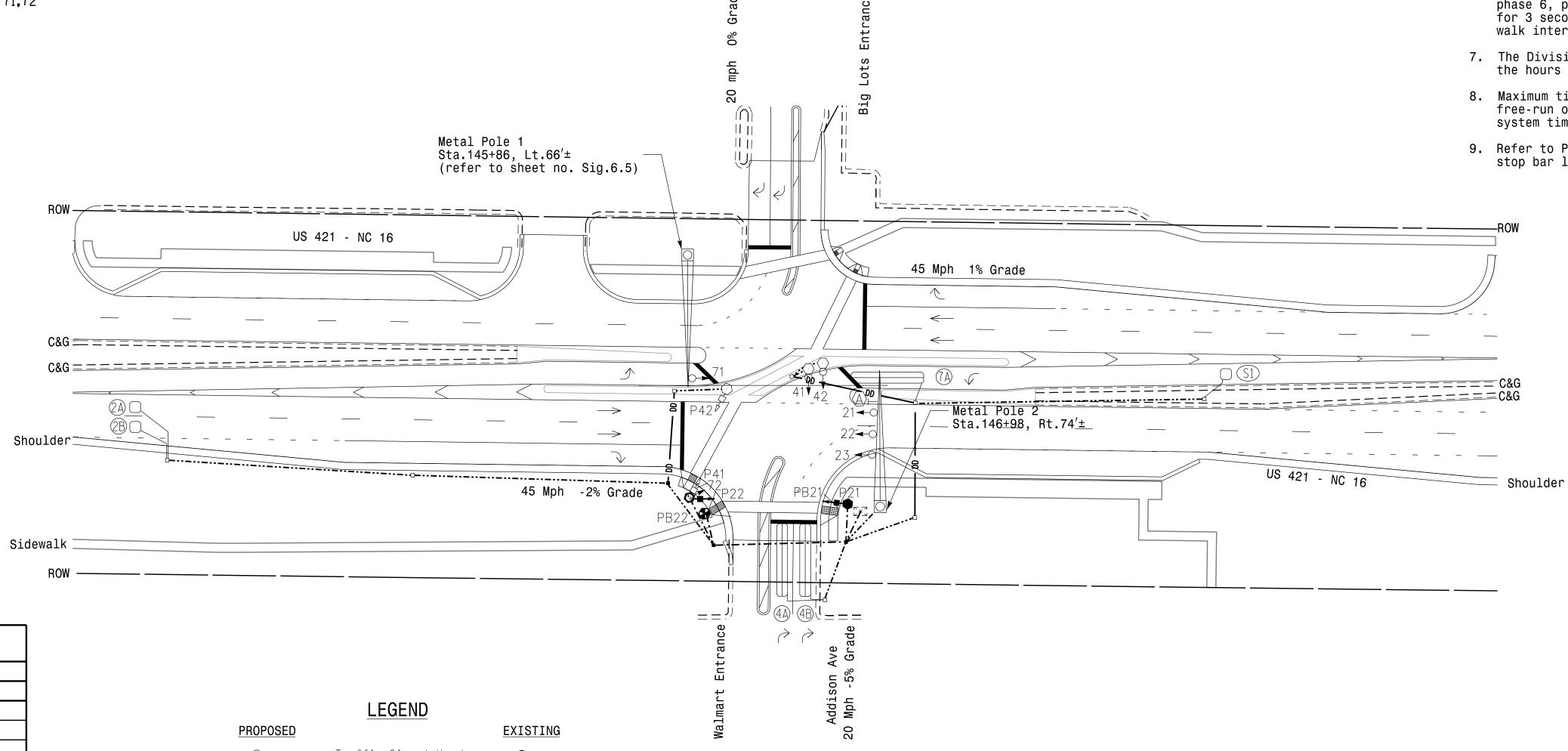
300

200

PROJECT REFERENCE NO. Sig.6.11 U-5312 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.
- 3. 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.
- 6. 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.
- 9. Refer to Pavement Marking Plans for proposed stop bar locations.



MAXTIME TIMING CHART					
FEATURE		PHASE			
FEATURE	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	_	Х	х		
Vehicle Recall	MIN RECALL	_	_		
Dual Entry	_	Х	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.

<u>PROPOSED</u>	LEGEND	<u>EXISTING</u>
\bigcirc	Traffic Signal Head	•
\dashv	Sign	\rightarrow
+	Pedestrian Signal Head With Push Button & Sign	•
$\langle \cdot \rangle$	Type II Signal Pedestal	
₩	Type I Push Button Post	↔
0	Metal Pole with Mastarm	0
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
—— DD ———	Directional Drill	N/A
	Right of Way	
\longrightarrow	Directional Arrow	\longrightarrow
$\langle A \rangle$	No Left Turn Sign (R3-2)	
	Curb Ramp	

Signal Upgrade - Final Design



US 421-NC 16 Addison Ave/Walmart Entrance

TO THE PARTY OF TH	Divsion 11	Wilkes Co	unty	Wilkesboro		
Onal Design Section	PLAN DATE:	May 2023	REVIEWED BY:	M. Sty	gles	
nfield Pkwy,Garner,NC 27529	PREPARED BY:	S.R. Chiluka	REVIEWED BY:	J. M	a	
SCALE		REVISIONS		INIT.	DATE	_
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DOCUMENT NOT CONSIDERED

SRChiluka SIG. INVENTORY NO.

** See note 6

2023 5:46:20 PM affic\Signals\Desid

- 1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the signal plan.
- 2. Program phases 4 and 7 for Dual Entry.
- 3. Program controller to start up in phase 2 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

*See overlap programming detail on sheet 2.

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"	
•	
•	

U-5312 Sig 6 12

	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	1.7	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	OL7	6	6 PED	7	8	8 PÉD	OL1	OL2	SPARE	OL3	OL4	OL6
SIGNAL HEAD NO	NU	21,22	P21, P22	NU	41,42	P41, P42	7 ·2	NU	NU	7 1	NU	NU	NU	NU	NU	7:2 [★]	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								
*			113			104												
Κ̈́			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.

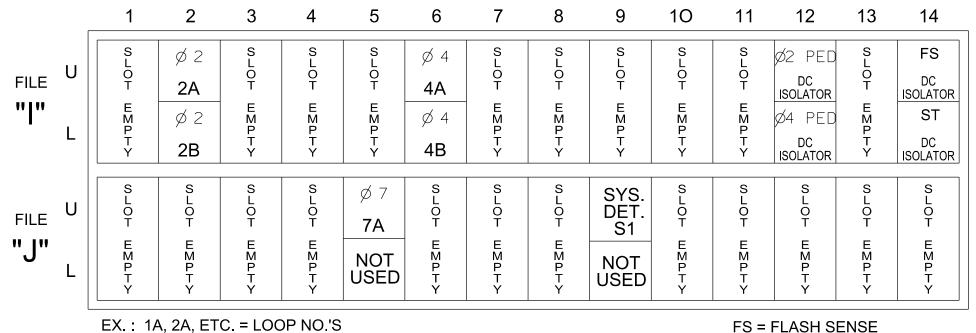
INPUT FILE POSITION LAYOUT

(front view)

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.



FS = FLASH SENSE ST = STOP TIME

= DENOTES POSITION OF SWITCH

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP	N 1/ N	LOOP RMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	QUEUE	CALL	DELAY DURING GREEN
2A	Т	B2-5,6	I2U	39	1	2	2			Х	Х		Х	
2B	Т	B2-7,8	I2L	43	5	3	2			Х	Х		Х	
4A	TI	B4 - 9,10	I6U	41	3	8	4	15		Х			Χ	
4B	TE	34-11,12	I6L	45	7	9	4			X			Χ	
7A	T	B5-5,6	J5U	57	19	21	7	15		Х			Χ	
* S1	Ti	B7 - 9,10	J9U	59	21	27	SYS			Х			Χ	
PED PU BUTTO								NOTE:						
P21;P	² 22 T	B8-4,6	I12U	67	33	2	PED 2	INSTAL	L DC ISOL					
P41;P	² 42 T	B8-5,6	l12L	69	35	4	PED 4	IN INPUT FILE SLOT I12.						

*System detector only. Remove any assigned vehicle phase.

INPUT FILE POSITION LEGEND: J2L

SLOT 2 LOWER

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

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

Overlap 7 Yellow Field Terminal (132) Phase 7 Yellow Field Terminal (123)

OL4 RED (A101) OL3 RED (A114) OL4 YELLOW (A102) OL3 YELLOW (A115) OL4 GREEN (A103) OL3 GREEN (A116) 07 GREEN (124) OL7 GREEN (133) -

OL6 RED (A104) OL6 YELLOW (A105) OL6 GREEN (A106) 23

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: Prepared for the Offices of:

US 421-NC 16 Addison Ave/Walmart Entrance

Division 11 Wilkes County Wilkesboro May 2023 REVIEWED BY: J. Ma PREPARED BY: M.L. Stygles REVIEWED BY: S.R. Chiluka REVISIONS INIT. DATE

FINAL UNLESS ALL SIGNATURES COMPLETED SEAL 046057

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DOCUMENT NOT CONSIDERED

5/24/2023 DATE SIG. INVENTORY NO.

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	·	Х	Х	1
	2	Phase Vehicle	2	Х	·		2
	3	Phase Vehicle	3	·	Х	Х	3
ASSIGN	4	Phase Vehicle	4		Х		4
CHANNEL 5 TO	5	Overlap	7	·	Х	·	5
OVERLAP 7	6	Phase Vehicle	6	Х		Х	6
	7	Phase Vehicle	7	·	X		7
	8	Phase Vehicle	8	·	Х	Х	8
	9	Overlap	1	Х		Х	9
	10	Overlap	2		Х	Х	10
	11	Overlap	3	Х			11
	12	Overlap	4	Х			12
	13	Phase Ped	2				13
	14	Phase Ped	4				14
	15	Phase Ped	6			·	15
	16	Phase Ped	8				16
	17	Overlap	5		Х	Х	17
	18	Overlap	6	Х			18

MAXTIME ALTERNATE PHASING PATTERN PROGRAMMING DETAIL

Front Panel

Main Menu >Controller >Coordination >Patterns

Web Interface

Home >Controller >Coordination >Patterns

Pattern Parameters

rattern raiameters										
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

7A

Detector	Call Phase	Delay
21	7	<u> -</u>

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	4	-
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	
Туре	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section	Normal	
Included Phases	÷	÷	2	7	NOTICE INCLUDED PHASE
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: 11-1463 DESIGNED: May 2023 SEALED: 5/24/2023 REVISED: N/A

Electrical Detail - Sheet 2 of 2

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

US 421-NC 16 Addison Ave/Walmart Entrance

Division 11 Wilkes County Wilkesboro May 2023 REVIEWED BY: J. Ma PREPARED BY: M.L. Stygles REVIEWED BY: S.R. Chiluka REVISIONS INIT. DATE

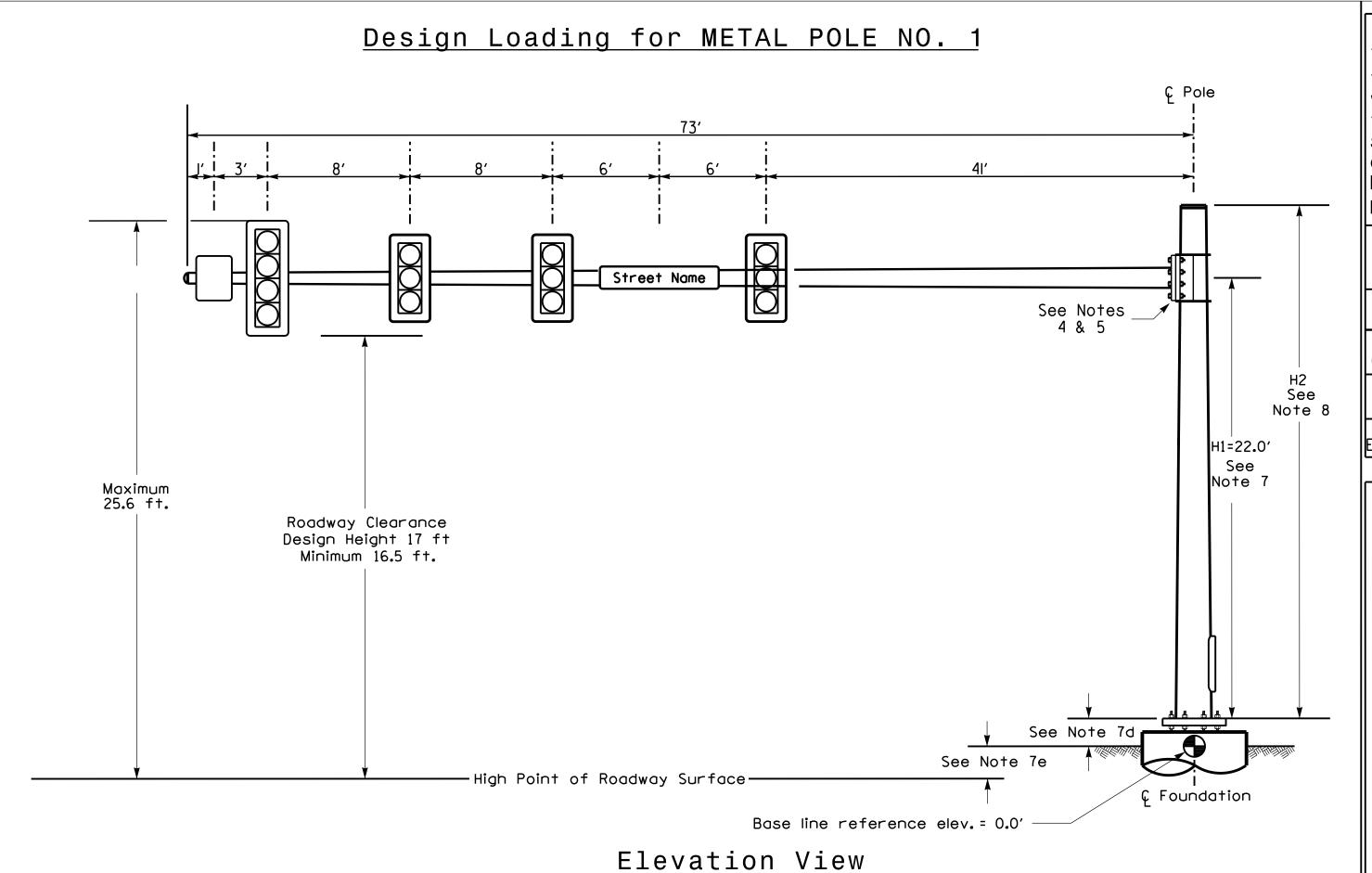
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SEAL

5/24/2023 DATE SIG. INVENTORY NO. 11-1463

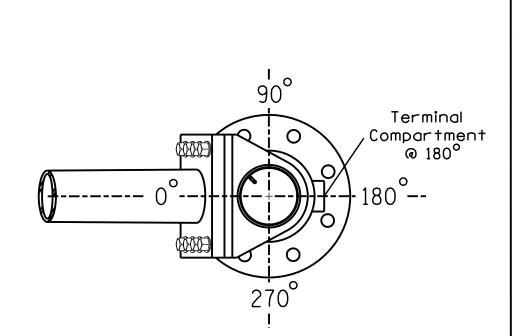


SPECIAL NOTE

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 © 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.

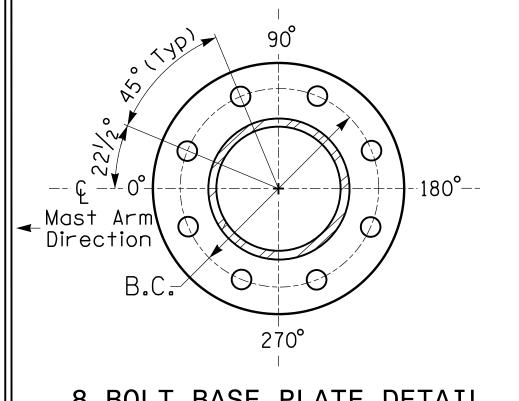


POLE RADIAL ORIENTATION

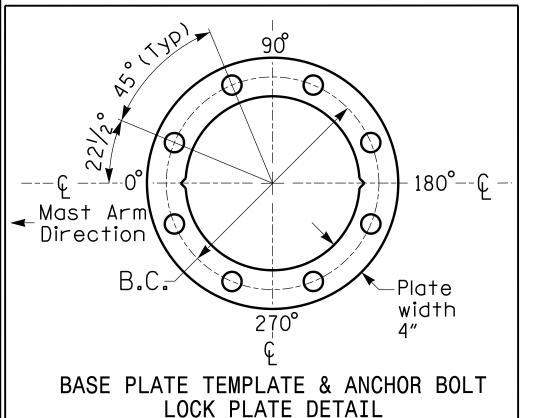
Design Loading for METAL POLE NO. 2 44' Street Name See Notes 4 & 5 Note 8 H1=22.5' See Note 7 Maximum 25.6 ft. Roadway Clearance Design Height 17 ft Minimum 16.5 ft. See Note 7d See Note 7e ·High Point of Roadway Surface· ¢ Foundation Base line reference elev. = 0.0'

Elevation View

10/31/2022 8:48:46 AM R:\Traffic\Signals\De schiluka



8 BOLT BASE PLATE DETAIL See Note 6



For 8 Bolt Base Plate

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	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

- 1. Design the traffic signalstructure 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

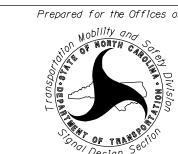
- 2. Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
- 3. Design all signal supports using stress ratios that do not exceed 0.9.
- 4. 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.
- 5. A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements.
- 6. Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
- 7. The mast arm attachment height (H1) shown is based on the following design assumptions: a. Mast arm slope and deflection are not considered in determining the arm attachment
- height as they are assumed to offset each other.
- b. Signalheads are rigidly mounted and vertically centered on the mast arm.
- c. The roadway clearance height for design is as shown in the elevation views.
- d. The top of the pole base plate is 0.75 feet above the ground elevation. e. Refer to the Elevation Data Chart for the elevation differences between the proposed
- foundation ground leveland the high point of the roadway. 8. 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.
- 9. If pole location adjustments are required, the contractor must gain approval from the Engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signal Design Section Senior Structural Engineer for assistance at (919) 814-5000.
- 10. The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signalheads over the roadway.
- 11. The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.



U-5312

Sig.6.14

NCDOT Wind Zone 4 (90 mph)



US 421-NC 16 Addison Ave/Biglots Entrance

Divsion 11 Wilkes County Wilkesboro May 2023 REVIEWED BY: M. Stygles J. Ma

SEAL CARO! 047250

DOCUMENT NOT CONSIDERED

FINAL UNLESS ALL

SIGNATURES COMPLETED

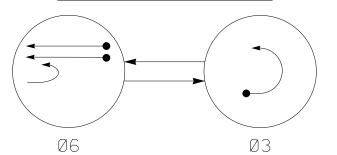
SIGNATURE SIG. INVENTORY NO. ||-|077/|463

750 N.Greenfield Pkwy, Garner, NC 27529 PREPARED BY: S.R. Chiluka REVIEWED BY: INIT. DATE REVISIONS

Sig.7.0

PROJECT REFERENCE NO.

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

DETECTED MOVEMENT

UNDETECTED MOVEMENT (OVERLAP) UNSIGNALIZED MOVEMENT

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

SIGNAL FACE I.D.

All Heads L.E.D.

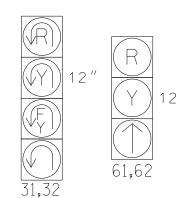
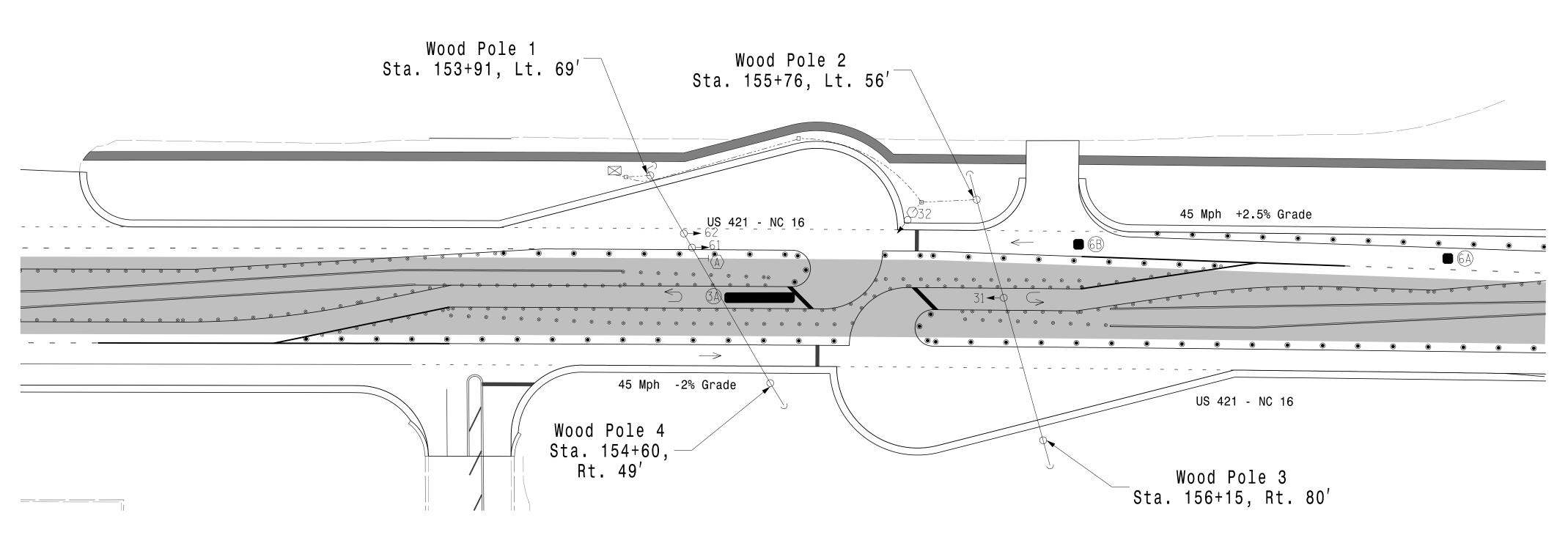


TABLE OF	OPERAT	ION		MAX.	TIME D	ETECT	OR	INS	TALLA	ATION	C	HAF	RT	
	PHAS			DETI	ECTOR				PF	ROGRAM	ΜI	NG		
SIGNAL FACE 31,32	Ø Ø 3 6	F L A S H	LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN NEW CARD
61,62	R	Υ	3A	*	0	*	*	3	15.0	-	Χ	-	Χ	- *
			6A	*	300	*	*	6	-	1.6	Χ	-	Χ	- *
			6B	*	90	*	*	6	-	-	Χ	-	Χ	- *

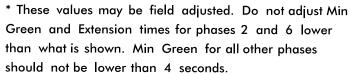
* Video Detection Zone

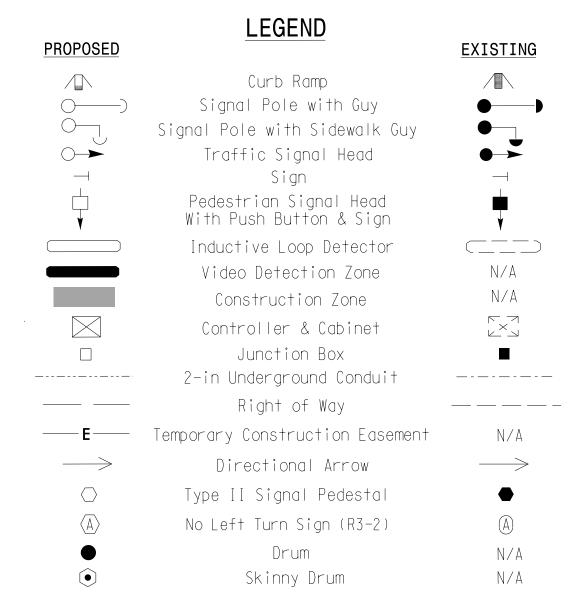
2 Phase Fully Actuated (Isolated) NOTES

- 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.



IMING	CHART
PH	HASE
3	6
_	_
_	-
7	12
2.0	2.0
30	60
3.0	4.3
1.0	1.0
-	_
_	_
_	_
_	_
_	_
_	-
Х	-
_	MIN RECALL
_	_
	3 - - 7 2.0 30 3.0 1.0 - - - - -









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

Divsion 11 Wilkes County Wilkesboro May 2023 REVIEWED BY: M.L. Stygles

750 N.Greenfield Pkwy, Garner, NC 27529 PREPARED BY: S.R. Chiluka REVIEWED BY: INIT. DATE

SEAL SEAL 047250

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

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5/24/2023 DATE SIG. INVENTORY NO. ||-|464T|

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1"=40'

- 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.

SIGNAL HEAD HOOK-UP CHART S1 S2 S3 S4 S5 S6 S7 S8 S9 S10 S11 S12 AUX S1 AUX S2 AUX S3 AUX S4 AUX S5 S6 CMU CHANNEL NO. 1 2 13 3 4 14 5 6 15 7 8 16 9 10 17 11 12 18 PHASE NU NU NU 31,32 NU NU NU 61,62 NU NU NU NU NU 31,32 NU NU NU NU 135 YELLOW GREEN 136 RED A124 ARROW YELLOW A125 FLASHING A126 YELLOW ARROW GREEN 118 ARROW

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... ..332 w/ Aux Cabinet... ...Q-Free MAXTIME Cabinet Mount. .Base Output File Positions. ...18 With Aux. Output File Load Switches Used. ...\$4, \$8, AUX \$2 Phases Used. Overlap "1"..... ...NOT USED Overlap "2"..... Overlap "3".... ...NOT USED Overlap "4"..... ...NOT USED

*See overlap programming detail on sheet 2.

NOTES:

REMOVE DIODE JUMPERS 3-10 and 6-10.

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

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.

COMPONENT SIDE

REMOVE JUMPERS AS SHOWN

18 CHANNEL CONFLICT MONITOR

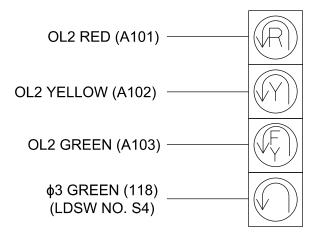
PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

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.

FYA SIGNAL WIRING DETAIL (wire signal heads as shown)



31,32

INPUT FILE POSITION LAYOUT

(front view)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE U	SLOT EMP	SLOT EMP	S L O T E M	S L O T E M P	SLOT EMP	S L O T E M P	S L O T E M P	SLOT EMP	S L O T E M P	S L O T E M	S L O T E M P	S L O T E M P	S L O T E M	FS DC ISOLATOR ST
· L	Y S	P T Y	P T Y	P T Y	P T Y	P T Y	P T Y	Y S	P T Y	P T Y	Y	Y S	P T Y	DC ISOLATOR
FILE U	OT EMPT	OT EMPT	LOT EMPT	OT EMPT	OT EMPT	OT EMPT	OT EMPT	LOT EMPT	OT EMPT	OT EMPT	OT EMPT	OT EMPT	OT EMPT	LOT EMPT
	Ý	Ý	Ý	Ý	Ý	Ý	Ý	Ý	Ý	Ý	Ý	Ý	Ý	Ý

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

FS = FLASH SENSE ST = STOP TIME

Phase 3 (LDSW NO. S4) Yellow Field Terminal (117)

ON OFF

- RF 2010 RP DISABLE

■ LEDguard

RF SSM

- FYA 1-9 FYA 3-10

— FYA 5-11

FYA 5-11
FYA 7-12

12

] 14

___ 18 –

= DENOTES POSITION OF SWITCH

WD 1.0 SEC

- GY ENABLE

─ SF#1 POLARITY 📮

- FYA COMPACT-

WD ENABLE \

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
Туре	FYA 4 - Section
Included Phases	6
Modifier Phases	3
Trail Green	0
Trail Yellow	0.0
Trail Red	0.0

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: Prepared for the Offices of:

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

Division 11 Wilkes County Wilkesboro May 2023 REVIEWED BY: J. Ma PREPARED BY: M.L. Stygles REVIEWED BY: S.R. Chiluka

046057 Matt & Strigter 5/24/2023 SIG. INVENTORY NO. ||-|464T|

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

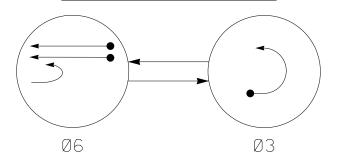
SEAL

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

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

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	0	PER	ATI	ON
		Р	HAS	E
SIGNAL FACE		Ø 3	Ø 6	FLASH
31,32			FY	$ \widehat{\mathbf{Y}} $
61,62		R	\uparrow	Y

	DETECTOR						PROGRAMMING							
L00P	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD		
ЗА	*	0	*	*	3	15.0	-	Χ	-	Χ	_	*		
6A,6B	*	300	*	*	6	-	1.6	Χ	-	Χ	-	*		
6C,6D	*	90	*	*	6	-	-	Χ	-	Χ	-	*		

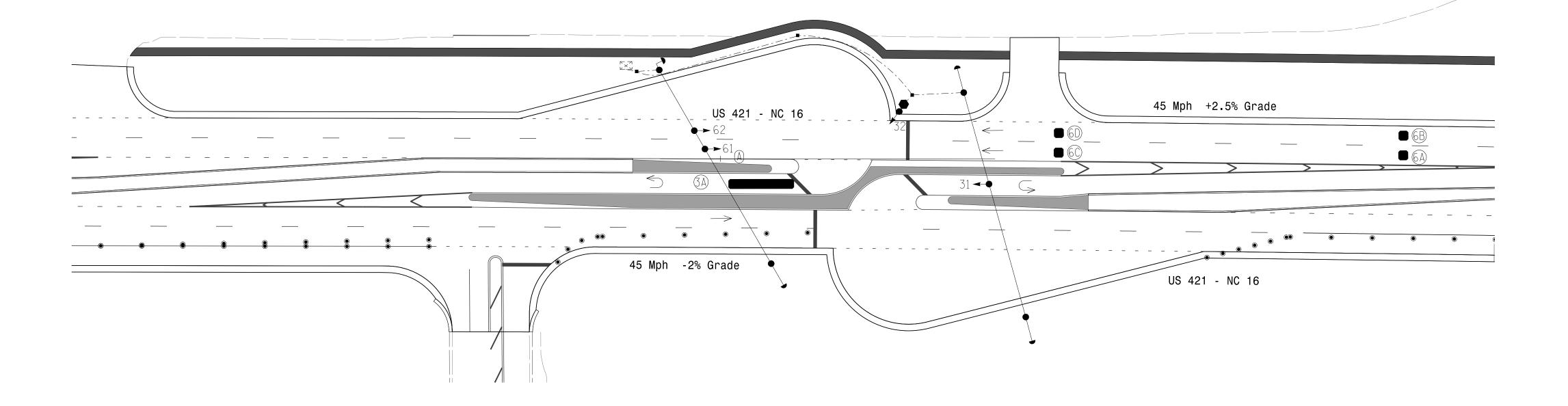
MAXTIME DETECTOR INSTALLATION CHART

***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.
- 3. Set all detector units to presence mode.
- 4. This intersection uses video detection. Install detectors according to the manufacturer's instructions to schieve the desitred detection.
- Refer to Pavement Marking Plans for proposed stop bar locations.



MAXTIME T	IMING	CHART
FEATURE	Pł	HASE
ILATORE	3	6
Walk *	_	_
Ped Clear *	_	-
Min Green	7	12
Passage *	2.0	2.0
Max 1 *	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	Х	-
Vehicle Recall	_	MIN RECALL
Dual Entry	_	_

4/18/2023 II:14:14 AM R:\Traffic\Signals\Design\ schiluka

	LEGEND	
PROPOSED		EXISTING
	Curb Ramp	
<u> </u>	Signal Pole with Guy	•
	Signal Pole with Sidewalk Guy	
\bigcirc	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	
——E——	Temporary Construction Easement	N/A
\longrightarrow	Directional Arrow	\longrightarrow
\bigcirc	Type II Signal Pedestal	•
$\langle \overline{\mathbb{A}} \rangle$	No Left Turn Sign (R3-2)	A
•	Drum	N/A
•	Skinny Drum	N/A





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

Divsion 11 Wilkes County Wilkesboro May 2023 REVIEWED BY: M.L. Stygles

750 N.Greenfield Pkwy, Garner, NC 27529 PREPARED BY: S.R. Chiluka REVIEWED BY: INIT. DATE

SEAL SEAL 047250

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

SIG. INVENTORY NO. 11-146472

* 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.

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 3-10 and 6-10.

REMOVE JUMPERS AS SHOWN

NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.

COMPONENT SIDE

- 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.

EQUIPMENT INFORMATION

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

*See overlap programming detail on sheet 2.

PROJECT REFERENCE NO. U-5312 Sig 7.3

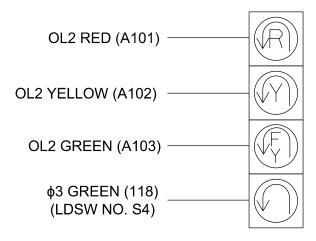
	SIGNAL HEAD HOOK-UP CHART																	
LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO	NU	NU	NU	3 1,32	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)



31,32

INPUT FILE POSITION LAYOUT

								(front	view)						
	г	1	2	3	4	5	6	7	8	9	10	11	12	13	14
ILE	U	S L O T	S L O T	S L O T	S L O T	S L O T	SLOT	S L O T	S L O T	S L O T	S L O T	S L O T	S L O T	S L O T	FS DC ISOLATOR
' "	L	E M P T Y	E M P T Y	E M P T Y	E M P T Y	E M P T Y	E M P T Y	E M P T Y	ST DC ISOLATOR						
ILE	U	S L OT	S L O T	S L O T	S L O T	S L O T	S L O T	S L O T							
J"	L	E M P T Y													

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

FS = FLASH SENSE ST = STOP TIME

ON OFF

RF 2010 RP DISABLE WD 1.0 SEC

GY ENABLE

____ LEDguard ___ RF SSM

____ 12

____ 18 —

= DENOTES POSITION OF SWITCH

- FYA 1-9 FYA 3-10 — FYA 5-11 − FYA 7-12

- SF#1 POLARITY 📮

- FYA COMPACT—

WD ENABLE (

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
Туре	FYA 4 - Section
Included Phases	6
Modifier Phases	3
Trail Green	0
Trail Yellow	0.0
Trail Red	0.0

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



FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL

DOCUMENT NOT CONSIDERED Temporary Installation - Electrical Detail 1 of 1 (Phase 13) ELECTRICAL AND PROGRAMMING

REVISIONS

DETAILS FOR: Prepared for the Offices of:

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

Division 11 Wilkes County Wilkesboro May 2023 REVIEWED BY: J. Ma PREPARED BY: M.L. Stygles REVIEWED BY: S.R. Chiluka

5/24/2023 SIG. INVENTORY NO. 11-1464T3

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

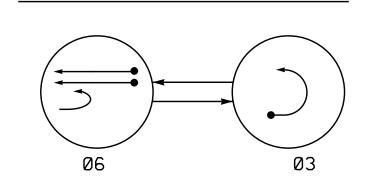
LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

Phase 3 (LDSW NO. S4)

Yellow Field Terminal (117)

DEFAULT PHASING DIAGRAM



←	DETECTED MOVEMENT
←	UNDETECTED MOVEMENT (OVERLAP)
◄	UNSIGNALIZED MOVEMENT
← >	PEDESTRIAN MOVEMENT

ALTERNATE PHASING DIAGRAM

	DEFAULT F	PHA:	SIN	G
	TABLE OF 0	PER	ATI	ON
		Р	HAS	E
	SIGNAL FACE	Ø 3	90	エのひて1
03	31,32	$\overline{}$	Ð	
		<u>† </u>	ΥΥI	* Y
	61,62	R	1	Υ

ALTERNATE	PH/	ASI	NG	
TABLE OF 0	PER	AT I	ON	
	Р	HAS	E	
SIGNAL	w@	© 6	F	
FACE	3	Ь	LASH	
31,32	Ç	R	P	
61,62	R	1	Υ	

	DET	ECTOR		PF	OGRAN	ΙMΙ	NG					
L00P	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
ЗА	6X40	0	2-4-2	Х	3	15.0*	1	Χ	ı	Χ	ı	Χ
6A	6X6	300	5	Χ	6	-	-	Χ	Χ	Χ	-	Χ
6B	6X6	300	5	Χ	6	-	-	Χ	Χ	Χ	-	Χ
S1	6X6	200	3	Χ	-	-	-	-	-	-	-	Χ

MAXTIME DETECTOR INSTALLATION CHART

* Disable delay during alternate phasing.

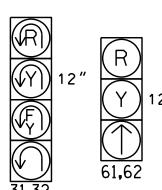
2 Phase Fully Actuated W/ Alternate Phasing Operation

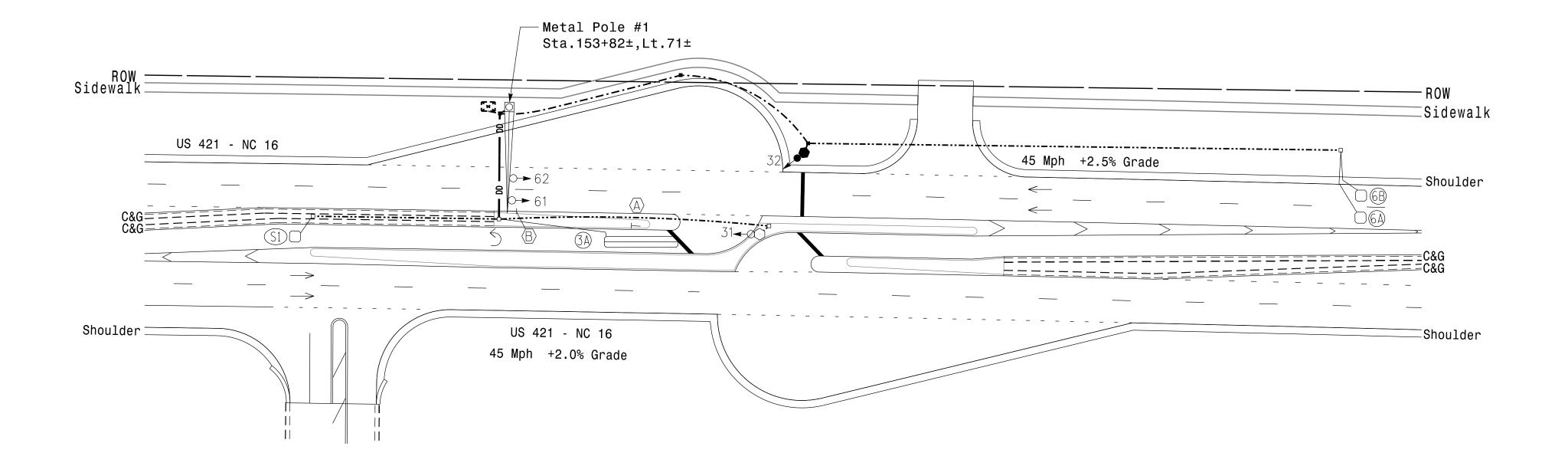
NOTES

Wilkesboro Closed Loop System

- 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.
- 3. 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.

SIGNA	L FA	ACE	I.D	
All	Heads	L.E.	D.	

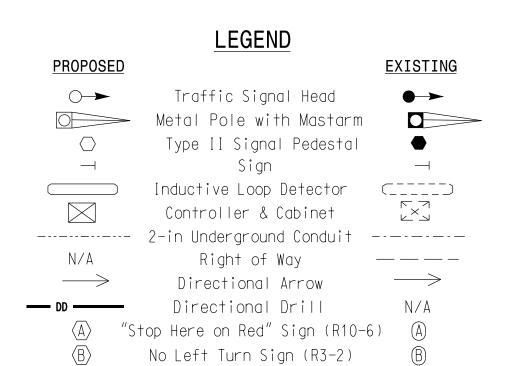




MAXTIME T	IMING	CHART				
FFATURE	PHASE					
FEATURE	3	6				
Walk *	_	_				
Ped Clear *	_	_				
Min Green	7	12				
Passage *	2.0	6.0				
Max 1 *	30	60				
Yellow Change	3.0	4.3				
Red Clear	1.0	1.0				
Added Initial *	-	1.5				
Maximum Initial *	_	34				
Time Before Reduction *	_	15				
Time To Reduce *	_	30				
Minimum Gap	-	3.4				
Advance Walk	_	_				
Non Lock Detector	Х	_				
Vehicle Recall	_	MIN RECALL				
Dual Entry	-	_				

Dual Entry	-	_
* These values may be field Green and Extension times than what is shown. Min G should not be lower than 4	for phases 2 ar freen for all othe	nd 6 lower

5/23/2023 5:38:13 PM R:\Traffic\Signals\Design\Si schiluka



New Installation - Final Design

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

Divsion 11 Wilkes County Wilkesboro May 2023 REVIEWED BY: M. Stygles

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

047250 SRChiluka SIGNATURE

SIG. INVENTORY NO. ||-|464

940 Main Campus Drive, Suite 500 Raleigh, NC 27606 919.829.0328

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL

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.

INPUT FILE POSITION LAYOUT

(front view)

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

NOT USED

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
Overlan "4"	NOTHEED

*See overlap programming detail on sheet 2.

Sig.7.5 U-5312

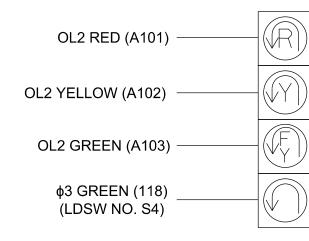
				SIC	3NA	\L H	ΙΕΑ	DH	00	K-U	PC	HA	RT					
LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	NU	NU	NU	★ 31,32	NU	NU	NU	61,62	NU	NU	NU	NU	NU	★ 31,32	NU	NU	NU	NU
RED								134			٠							
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)



31,32

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		Х			Х	
* S1	TB6-9,10	I9U	60	22	13	SYS			Х			Х	
6A	TB3-5,6	J2U	40	2	16	6			Х	Х		Х	
6B	TB3-7,8	J2L	44	6	17	6			Х	Х		Х	

INPUT FILE CONNECTION & PROGRAMMING CHART

★System detector only. Remove any assigned vehicle phase.

INPUT FILE POSITION LEGEND: J2L FILE J SLOT 2 LOWER

= DENOTES POSITION OF SWITCH

ST

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)

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

Phase 3 (LDSW NO. S4) Yellow Field Terminal (117)

FS = FLASH SENSE

ST = STOP TIME

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

Division 11 Wilkes County May 2023 REVIEWED BY: J. Ma PREPARED BY: M.L. Stygles REVIEWED BY: S.R. Chiluka

Wilkesboro REVISIONS INIT. DATE

FINAL UNLESS ALL SIGNATURES COMPLETED SEAL 046057 5/24/2023 SIG. INVENTORY NO. ||-|464

VHB Engineering NC, P.C. (C-3705)

940 Main Campus Drive, Suite 500 Raleigh, NC 27606 919.829.0328

DOCUMENT NOT CONSIDERED

FILE

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
Туре	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	<u> -</u>	NOTICE INCLUDED PHASE
Modifier Phases	3	
Trail Green	0	
Trail Yellow	0.0	
Trail Red	0.0	

MAXTIME DETECTOR PROGRAMMING DETAIL FOR ALTERNATE PHASING LOOP 7A

Front Panel

Main Menu >Controller >Detector >Veh Det Plans

Web Interface

Plan 2

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.

	Detector	Call Phase	Delay
Α	7	3	<u> </u>

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 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.

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

Electrical Detail Sheet 2 of 2

DETAILS FOR:

Prepared for the Offices of:

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

Division 11 Wilkes County Wilkesboro May 2023 REVIEWED BY: J. Ma

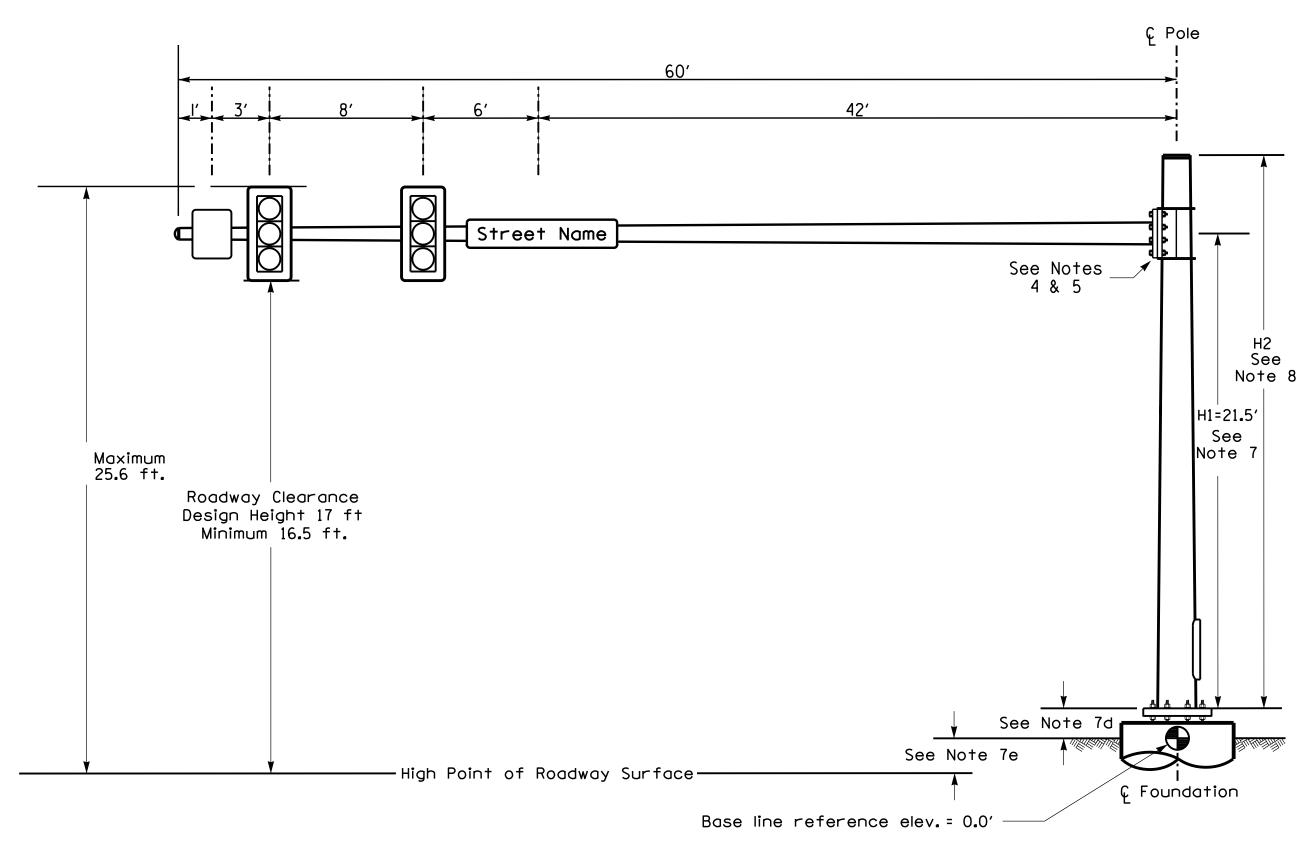
PREPARED BY: M.L. Stygles REVIEWED BY: S.R. Chiluka REVISIONS INIT. DATE

940 Main Campus Drive, Suite 500 Raleigh, NC 27606 919.829.0328

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL

DATE SIG. INVENTORY NO. ||-|464



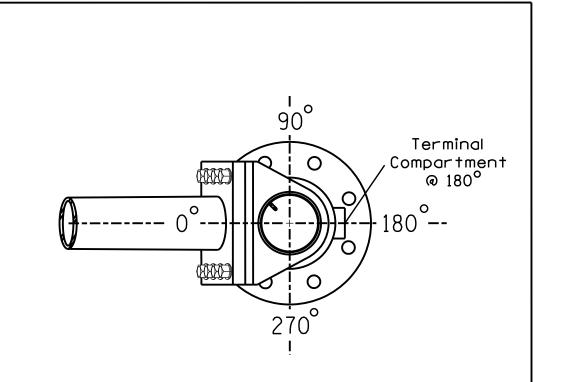
Elevation View

SPECIAL NOTE

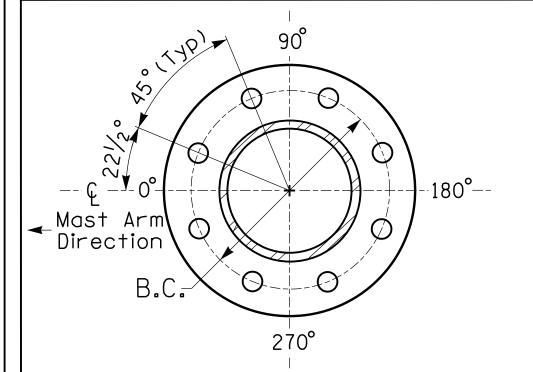
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

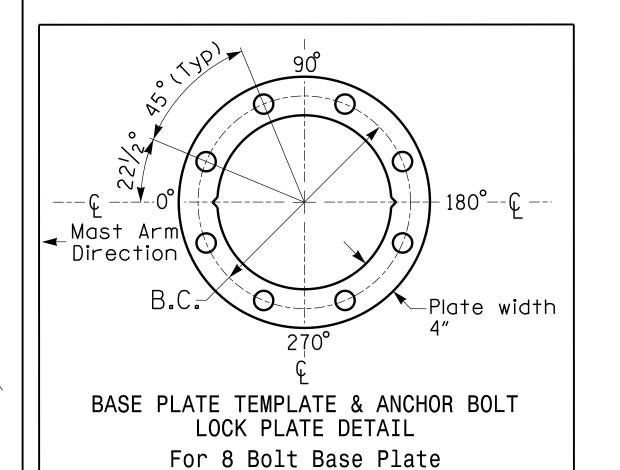
Elevation Differences for:	Pole 1
Baseline reference point at & Foundation @ ground level	0.0 ft.
Elevation difference at High point of roadway surface	+1.5 ft.
Elevation difference at Edge of travelway or face of curb	+0.75 ft.



POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL See Note 6



METAL POLE No. 1

	MAST ARM LOADING SC	HEDU	LE	
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	STREET NAME SIGN RIGID MOUNTED	16.0 S.F.	24.0" W X 96.0"L	36 LBS

NOTES

DESIGN REFERENCE MATERIAL

- 1. Design the traffic signalstructure 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

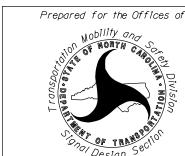
- 2. Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signalplans for the actualloads that will be applied at the time of the installation.
- 3. Design all signal supports using stress ratios that do not exceed 0.9.
- 4. 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.
- 5. A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements.
- 6. Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
- 7. The mast arm attachment height (H1) shown is based on the following design assumptions: a. Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
- b. Signalheads are rigidly mounted and vertically centered on the mast arm.
- c. The roadway clearance height for design is as shown in the elevation views.
- d. The top of the pole base plate is 0.75 feet above the ground elevation.
- e. Refer to the Elevation Data Chart for the elevation differences between the proposed foundation ground leveland the high point of the roadway.
- 8. 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.
- 9. If pole location adjustments are required, the contractor must gain approval from the Engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signal Design Section Senior Structural Engineer for assistance at (919) 814-5000.
- 10. The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signalheads over the roadway.
- 11. The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.



U-5312

Sig.7.7

NCDOT Wind Zone 4 (90 mph)



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

Divsion 11 Wilkes County Wilkesboro May 2023 REVIEWED BY: M. Stygles J. Ma

750 N.Greenfield Pkwy,Garner,NC 27529 PREPARED BY: S.R. Chiluka REVIEWED BY: INIT. DATE REVISIONS

SEAL 047250 5RChiluka SIGNATURE

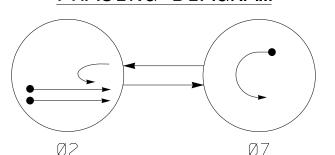
SIG. INVENTORY NO. |- |464

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL

SIGNATURES COMPLETED

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PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

-	UNDETECTED	MOVEMENT	(OVERLAP
◄ — —	UNSIGNALIZE	ED MOVEMEN	ΙΤ

SIGNAL FACE I.D.

All Heads L.E.D.

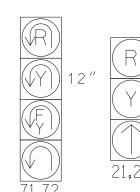


TABLE OF (0	PER	ATI	ON
		Р	HAS	E
SIGNAL FACE		Ø 2	Ø 7	FJAST
21,22		\uparrow	R	Y
71,72		√ FY	$\overline{\mathbf{r}}$	Y

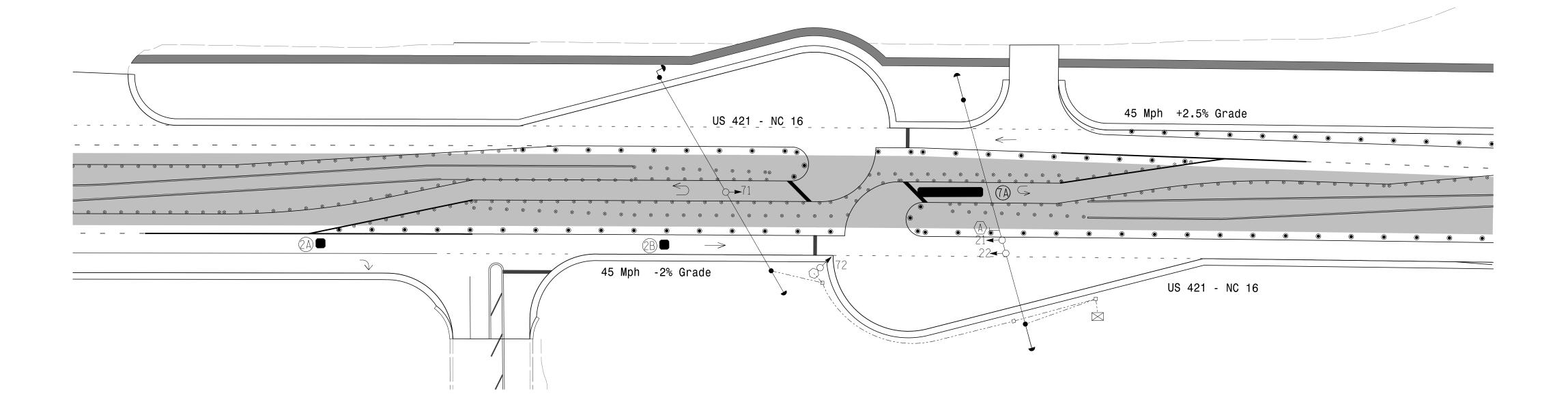
MAXTIME DETECTOR INSTALLATION CHART												
	DET	ECTOR				PF	ROGRAM	MI	NG			
L00P	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
2A	*	300	*	*	2	-	1.6	Χ	-	Χ	-	*
2B	*	90	*	*	2	-	-	Χ	-	Χ	-	*
7A	*	0	*	*	7	15.0	-	Χ	-	Χ	-	*

*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.
- 3. Set all detector units to presence mode.
- 4. This intersection uses video detection. Install detectors according to the manufacturer's instructions to schieve the desitred detection.
- 5. Refer to Pavement Marking Plans for proposed stop bar locations
- Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red



MAXTIME T	IMING	CHART				
FEATURE	PHASE					
PEATURE	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	_	Х				
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

	LEGEND	
<u>PROPOSED</u>		<u>EXISTING</u>
	Curb Ramp	
<u> </u>	Signal Pole with Guy	•
	Signal Pole with Sidewalk Guy	
\bigcirc	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	
——E——	Temporary Construction Easement	N/A
\longrightarrow	Directional Arrow	\longrightarrow
\bigcirc	Type II Signal Pedestal	•
$\langle A \rangle$	No Left Turn Sign (R3-2)	A
•	Drum	N/A
•	Skinny Drum	N/A





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

Divsion 11 Wilkes County Wilkesboro May 2023 REVIEWED BY: M.L. Stygles

750 N.Greenfield Pkwy, Garner, NC 27529 PREPARED BY: S.R. Chiluka REVIEWED BY: INIT. DATE

SEAL 047250

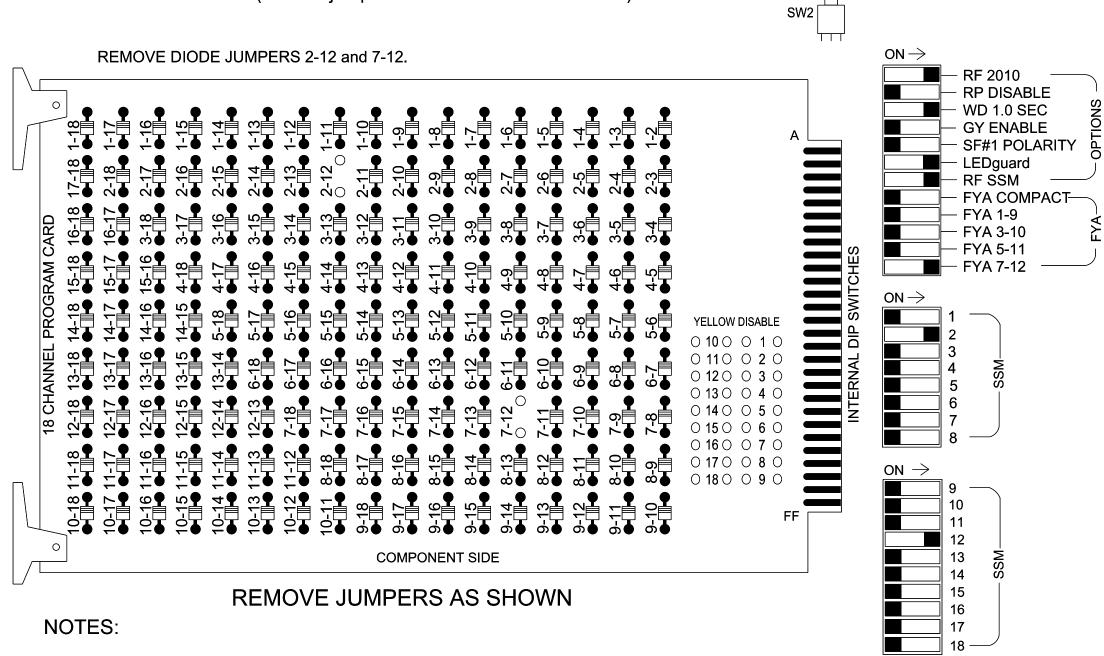
VHB Engineering NC, P.C. (C-3705) 940 Main Campus Drive, Suite 500 Raleigh, NC 27606 919.829.0328

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SIG. INVENTORY NO. ||-|462T|

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should not be lower than 4 seconds.



ON OFF

= DENOTES POSITION OF SWITCH

WD ENABLE (

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 SUITCH NO. S1 S2 S3 S4 S5 S6 S7 S8 S9 S10 S11 S12 AUX AUX S2 S3 S4 S5 S6 S6 2 | 13 | 3 | 4 | 14 | 5 | 6 | 15 | 7 | 8 | 16 | 9 | 10 | 17 | 11 | 12 | 18 NU 21,22 NU NU NU NU NU NU NU NU NU 71,72 NU NU NU NU NU NU NU 71,72 NU A101

Sig.8.1

A102

A103

U-5312

NU = Not Used

CMU CHANNEL NO.

YELLOW

GREEN

ARROW

YELLOW

ARROW FLASHING

YELLOW

ARROW

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

★ See pictorial of head wiring in detail this sheet.

128

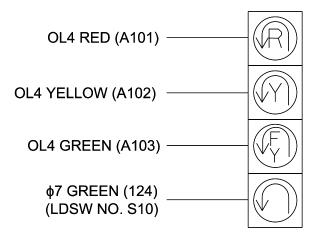
129

130

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)

124



71,72

INPUT FILE POSITION LAYOUT

(front view)

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.

	ſ	1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE	U	S L O T	S L O T	S L O T	S L O T	S L O T	FS DC								
" "	L	E M P T Y	E M P T Y	E M P T Y	E M P T Y	E M P T Y	ST DC ISOLATOR								
FILE	U	S L O T	S L O T	S L O T	S L O T	S L O T	S L O T	S L O T	S L O T	S L O T	S L O T	S L O T	S L O T	S L O T	S L O T
"J"	L	E M P T Y	E M P T Y	E M P T Y	EMPTY	E M P T Y	EMPTY	E M P T Y							
	l	EX.: 1/	۸, 2A, ET	C. = LOC	P NO.'S								FLASH S STOP TIN		

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	4
Туре	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: 11-1462T1 DESIGNED: May 2023 SEALED: 5/24/2023 REVISED: N/A

Temporary Installation - Electrical Detail 1 of 1

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

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

Division 11 Wilkes County Wilkesboro May 2023 REVIEWED BY: J. Ma

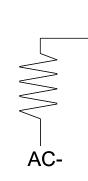
SEAL 046057 5/24/2023

940 Main Campus Drive, Suite 500 Raleigh, NC 27606 919.829.0328

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL

SIGNATURES COMPLETED

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



LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

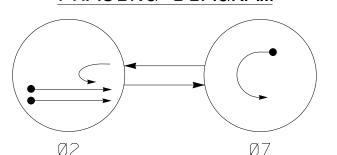
Phase 7 (LDSW NO. S10) Yellow Field Terminal (123)

(Phases 11, 12 & 13)

PREPARED BY: M.L. Stygles REVIEWED BY: S.R. Chiluka REVISIONS INIT. DATE

Matt & Strigter SIG. INVENTORY NO. ||-|462T|

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

-	UNDETECTED	MOVEMENT	(OVERLAP)
◀ — —	UNSIGNALIZE	ED MOVEMEN	IT

SIGNAL FACE I.D.

All Heads L.E.D.

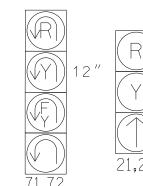


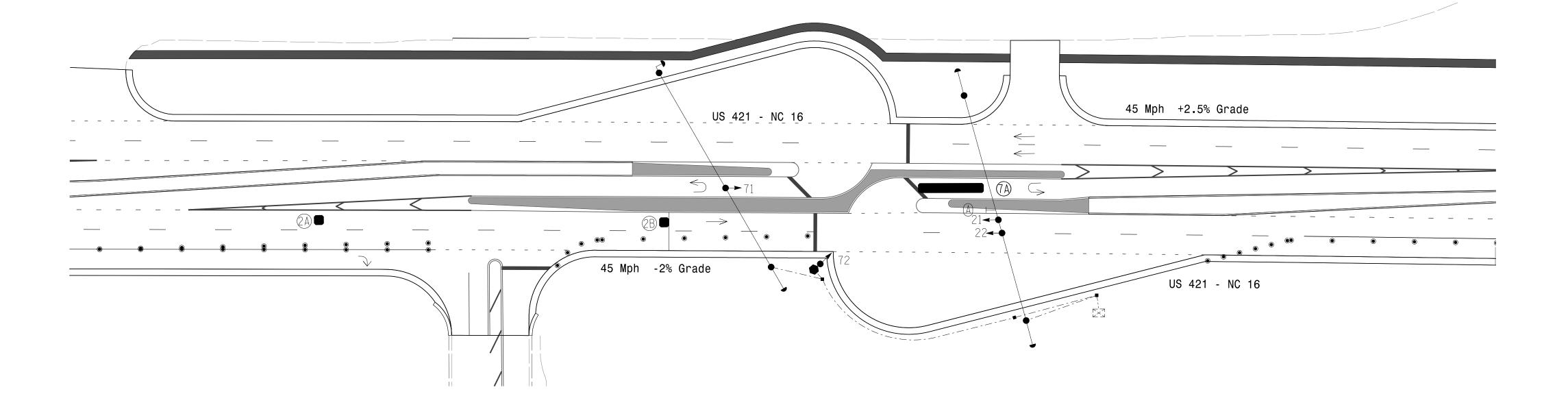
TABLE OF	OPERATION
	PHASE
SIGNAL FACE	Ø Ø F L A S H
21,22	↑ R Y
71,72	F N

	DET	ECTOR		PROGRAMMING								
L00P	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
2A	*	300	*	*	2		1.6	Χ	-	Χ	-	*
2B	*	90	*	*	2	-	-	Χ	•	Χ	-	*
7A	*	0	*	*	7	15.0	_	Χ	_	Χ	_	*

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.
- 3. Set all detector units to presence mode.
- 4. This intersection uses video detection. Install detectors according to the manufacturer's instructions to schieve the desitred detection.
- Refer to Pavement Marking Plans for proposed stop bar locations.



MAXTIME T	IMING	CHART			
FEATURE	PH	IASE			
FEATURE	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	_	Х			
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		<u>EXISTING</u>
	Curb Ramp	
<u> </u>	Signal Pole with Guy	•
	Signal Pole with Sidewalk Guy	
\bigcirc	Traffic Signal Head	—
— 	Sign	— <u>—</u>
\	Pedestrian Signal Head With Push Button & Sign	T
	Inductive Loop Detector	
	Video Detection Zone	N/A
	Construction Zone	N/A
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
	Right of Way	
——E——	Temporary Construction Easement	N/A
\longrightarrow	Directional Arrow	\longrightarrow
\bigcirc	Type II Signal Pedestal	•
$\langle A \rangle$	No Left Turn Sign (R3-2)	A
	Drum	N/A
•	Skinny Drum	N/A



DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Signal Upgrade - Temporary Design 2 (Phase 13)

US 421-NC 16 at

SR 1322 (Winkler Mill Road)/

Stonecrest Oaks Pkwy West U-Turn

Divsion 11 Wilkes County Wilkesboro May 2023 REVIEWED BY: M.L. Stygles

750 N.Greenfield Pkwy, Garner, NC 27529 PREPARED BY: S.R. Chiluka REVIEWED BY: INIT. DATE

SEAL SEAL 047250

SIG. INVENTORY NO. 11-146272

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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.

COMPONENT SIDE

- 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.

RF 2010 - RP DISABLE ─ WD 1.0 SEC

GY ENABLE ├─ SF#1 POLARITY 📮

- FYA COMPACT-

■— LEDguard ■— RF SSM

FYA 5-11 FYA 7-12

____ 16

= DENOTES POSITION OF SWITCH

- FYA 1-9 — FYA 3-10 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
Overlan "4"	*

*See overlap programming detail on sheet 2.

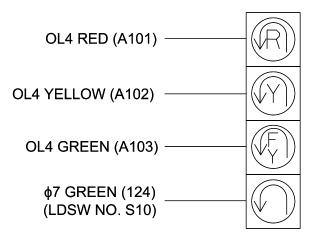
				SIC	3N/	YL H	ΙΕΑ	D H	00	K-U	PC	CHA	RT					
LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	1.7	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	7	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	NU	21,22	NU	NU	NU	NU	NU	NU	NU	71,72	NU	NU	NU	NU	NU	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)



71,72

INPUT FILE POSITION LAYOUT

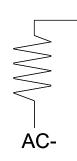
(front view)

	ſ	1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE	U	S L O T	S L O T	FS DC											
	L	E M P T Y	ST DC ISOLATOR												
FILE	U	S L O T													
"J"	L	E M P T Y													
	Į	EX.: 1 <i>A</i>	A, 2A, ET	C. = LOC	P NO.'S			FS = FLASH SENSE							

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)



Phase 7 (LDSW NO. S10) Yellow Field Terminal (123)

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

Front Panel

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

Web Interface

Home >Controller >Overlap Configuration >Overlaps

Overlap Plan 1

Overlap	4	
Туре	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: 11-1462T2 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:

Prepared for the Offices of:

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

Division 11 Wilkes County Wilkesboro May 2023 REVIEWED BY: J. Ma PREPARED BY: M.L. Stygles REVIEWED BY: S.R. Chiluka REVISIONS INIT. DATE

SEAL 046057

940 Main Campus Drive, Suite 500 Raleigh, NC 27606 919.829.0328

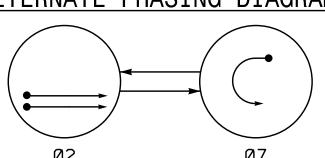
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Sig 8 3

U-5312

Matt J. Otygler 39481919AJHRE 5/24/2023 DATE SIG. INVENTORY NO. ||-|46272

ALTERNATE PHASING DIAGRAM



DEFAULT F	PHA	SIN	G	ALTERNATE	PH/	4SI
BLE OF O	PER	AT I	ON	TABLE OF C)PER	AT:
	Р	HAS	E		Р	HAS
SIGNAL	02	<u> </u>	۲-	SIGNAL	0 2	Q
FACE	2	/	IODE	FACE	2	/
			Н			
21,22	1	R	Υ	21,22	1	R
71,72	$\langle F \rangle$	\bigcap	P	71,72	₽ R	\bigcap

MAXTIME DETECTOR INSTALLATION CHART												
	DETE	ECTOR		PR	OGRAM	ΜI	NG					
L00P	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
2A	6X6	300	5	Χ	2	-	ı	Χ	Χ	Χ	1	Χ
2B	6X6	300	5	Χ	2	ı	Ī	Χ	Χ	Χ	1	Χ
7A	6X40	0	2-4-2	Χ	7	15.0*	-	Χ	-	Χ	ı	Χ
S1	6X6	200	4	Χ	-	-	-	-	-			Χ
* Disab	le del	ay dur	ing al	Lte	rnat	e pha	sing	op	er	at	ior	1

2 Phase

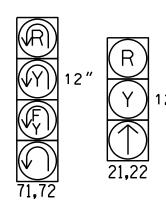
Sig.8.4 U-5312

Fully Actuated W/ Alternate Phasing Operation Wilkesboro Closed Loop System

- 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.
- 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.

SIGNAL FACE I.D.

All Heads L.E.D.



Sidewalk				———— ROW ——————Sidewalk
		US 421 - NC 16	45 Mph +2.5% Grade	
C&G ====================================	2A	72 72	7A S 21 - DD US 421 - NC 16 B 22 - O Metal Pole #1 Sta.156+47±,Rt.76±	

MAXTIME T	IMING	CHART
FEATURE	PH	ASE
FEATURE	2	7
Walk *	-	-
Ped Clear *	-	_
Min Green	12	7
Passage *	6.0	2.0
Max 1 *	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	_	Х
Vehicle Recall	MIN RECALL	_
Dual Entry	-	_

2023 2:03:38 AM -affic\Signals\Design\Sigr

* 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		<u>EXISTING</u>
\bigcirc	Traffic Signal Head	
0	Metal Pole with Mastarm	
\bigcirc	Type II Signal Pedestal	
\dashv	Sign	\dashv
	Inductive Loop Detector	
	Controller & Cabinet	
	2-in Underground Conduit	
N/A	Right of Way	
\longrightarrow	Directional Arrow	\longrightarrow
—— DD ———	Directional Drill	N/A
(A) "S	top Here on Red" Sign (R10-	6) <u>(</u> A)
$\langle \mathbb{B} \rangle$	No Left Turn Sign (R3-2)	B





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

		WESLL	<i>)</i> - U	
	Divsion 11	Wilkes Co	unty	Wilkesboro
	PLAN DATE:	May 2023	REVIEWED BY:	M. Stygles
29	PREPARED BY:	S.R. Chiluka	REVIEWED BY:	J. Ma

REVISIONS

047250

SIG. INVENTORY NO.

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

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SEAL

PHASING DIAGRAM DETECTION LEGEND DETECTED MOVEMENT

UNSIGNALIZED MOVEMENT ← - - > PEDESTRIAN MOVEMENT

UNDETECTED MOVEMENT (OVERLAP)

NOTES

3. Set all detector units to presence mode.

The Division Traffic Engineer will determine the hours of use for each phasing plan.

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.

INPUT FILE POSITION LAYOUT

(front view)

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

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

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

NOTES

- 1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. 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
Overlan "4"	*

*See overlap programming detail on sheet 2.

Sig.8.5 U-5312

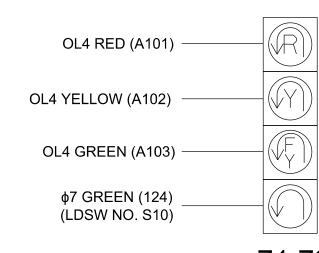
				SIC	3NA	AL H	ΙΕΑ	DΗ	00	K-U	PC	HA	RT					
LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PÉD	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	NU	21,22	NU	NU	NU	NU	NU	NU	NU	71,72	NU	NU	NU	NU	ПN	NU	7 1,72	NU
RED	٠	128	·		·									·				
YELLOW	·	129			·					*	÷	-						·
GREEN		130									4							
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)



71,72

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			Х	Х		Х	
2B	TB2-7,8	I2L	43	5	3	2			Х	Х		Х	
7A	TB5-5,6	J5U	57	19	21	7	15		Х			Х	
* S1	TB7-9,10	J9U	59	21	27	SYS			Х			Х	

*System detector only. Remove any assigned vehicle phase.

INPUT FILE POSITION LEGEND: J2L FILE J SLOT 2 LOWER

= DENOTES POSITION OF SWITCH

ST

FS = FLASH SENSE

ST = STOP TIME

LOAD RESISTOR INSTALLATION DETAIL

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:

Prepared for the Offices of:

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

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

046057 5/24/2023 DATE

SIG. INVENTORY NO. ||-|462

VHB Engineering NC, P.C. (C-3705)

940 Main Campus Drive, Suite 500 Raleigh, NC 27606 919.829.0328

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Division 11 Wilkes County REVISIONS

(install resistors as shown) Phase 7 (LDSW NO. S10) Yellow Field Terminal (123) ACCEPTABLE VALUES Value (ohms) Wattage 1.5K - 1.9K 25W (min) 2.0K - 3.0K | 10W (min)

NOT USED

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
Туре	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	<u> -</u>	NOTICE INCLUDED PHASE
Modifier Phases	7	
Trail Green	0	
Trail Yellow	0.0	
Trail Red	0.0	

MAXTIME DETECTOR PROGRAMMING DETAIL FOR ALTERNATE PHASING LOOP 7A

Front Panel

Main Menu >Controller >Detector >Veh Det Plans

Web Interface

Plan 2

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.

	Detector	Call Phase	Delay
7A	21	7	<u> </u>

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 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.

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



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

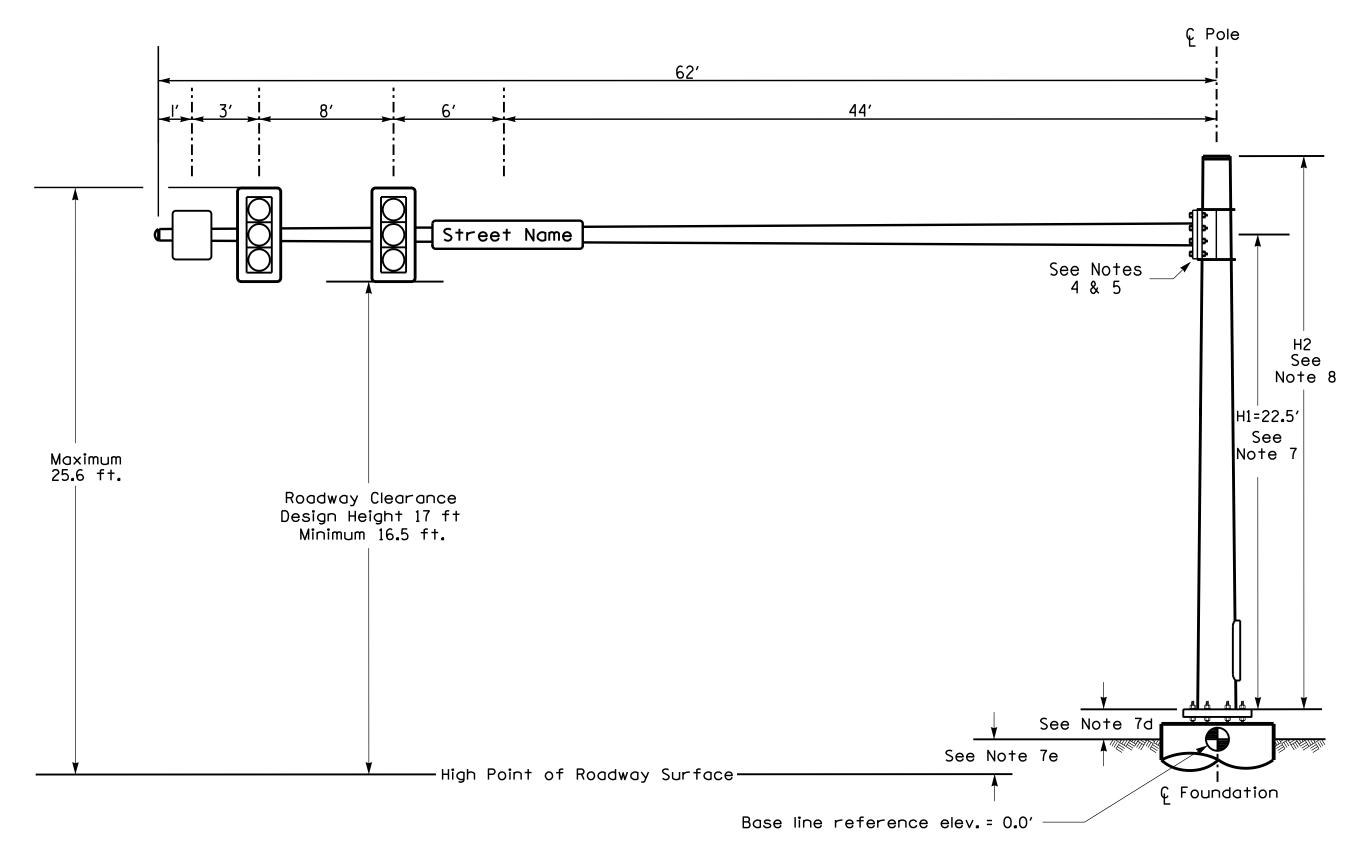
Division 11 Wilkes County Wilkesboro May 2023 REVIEWED BY: J. Ma PREPARED BY: M.L. Stygles REVIEWED BY: S.R. Chiluka REVISIONS INIT. DATE

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

940 Main Campus Drive, Suite 500 Raleigh, NC 27606 919.829.0328

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SEAL



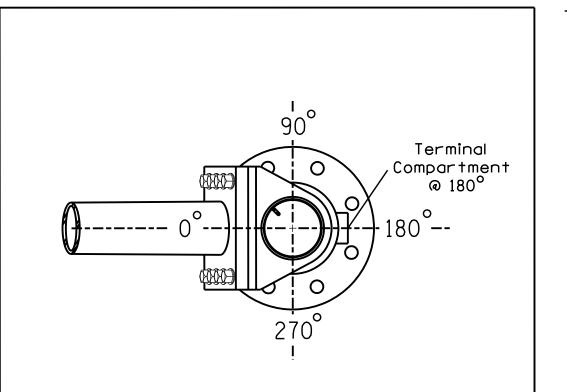
Elevation View

SPECIAL NOTE

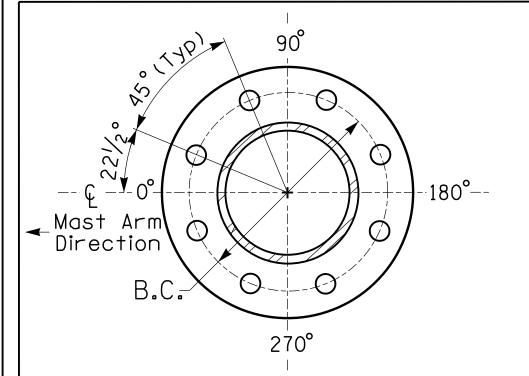
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 1
Baseline reference point at © 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.

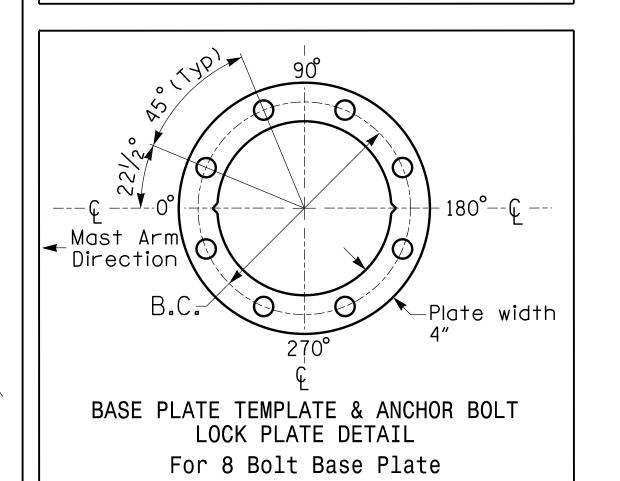


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



METAL POLE No. 1

DESCRIPTION

SIGN RIGID MOUNTED

STREET NAME SIGN

RIGID MOUNTED

U-5312 MAST ARM LOADING SCHEDULE AREA SIZE WEIGHT 9.3 S.F. 25.5" W RIGID MOUNTED SIGNAL HEAD 60 LBS 12"-3 SECTION-WITH BACKPLATE 52**.**Ŝ"L 36**.**0" W 9.0 S.F. 20 LBS X 36.0"L

16.0 S.F. 24.0" W 96.0" L 36 LBS

Sig.8.7

NOTES

DESIGN REFERENCE MATERIAL

LOADING

SYMBOL

Street Name

- 1. 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 "MetalPole Standards" located at the following NCDOT website: https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx

DESIGN REQUIREMENTS

- 2. Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
- 3. Design all signal supports using stress ratios that do not exceed 0.9.
- 4. 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.
- 5. A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements.
- 6. Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
- 7. The mast arm attachment height (H1) shown is based on the following design assumptions: a. Mast arm slope and deflection are not considered in determining the arm attachment
- height as they are assumed to offset each other. b. Signalheads are rigidly mounted and vertically centered on the mast arm.
- c. The roadway clearance height for design is as shown in the elevation views.
- d. The top of the pole base plate is 0.75 feet above the around elevation.
- e. Refer to the Elevation Data Chart for the elevation differences between the proposed foundation ground leveland the high point of the roadway.
- 8. 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.
- 9. If pole location adjustments are required, the contractor must gain approval from the Engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signal Design Section Senior Structural Engineer for assistance at (919) 814-5000.
- 10. The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
- 11. The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.



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

Divsion 11 Wilkes County Wilkesboro May 2023 REVIEWED BY: M. Stygles J. Ma

750 N.Greenfield Pkwy, Garner, NC 27529 PREPARED BY: S.R. Chiluka REVIEWED BY: INIT. DATE REVISIONS

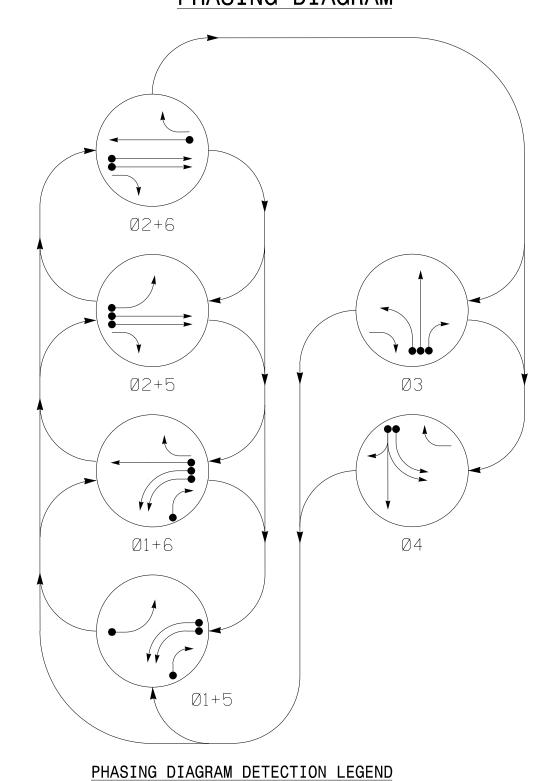
SEAL 047250

—DocuSigned by: SRChilluKa SIGNATURE SIG. INVENTORY NO. 11-1462

10/31/2022 8:48:46 AM R:\Traffic\Signals\Desia schiluka

Sig. 9.0

PHASING DIAGRAM



DETECTED MOVEMENT

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

UNSIGNALIZED MOVEMENT

UNDETECTED MOVEMENT (OVERLAP)

SIGNAL FACE I.D.

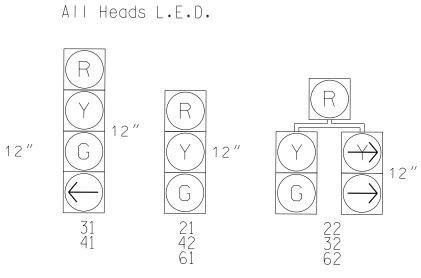


TABLE OF OPERATION														
	PHASE													
SIGNAL FACE	Ø 1 + 5	Ø 1 + 6	®N+15	Ø21+60	Ø 3	Ø 4	INDLT							
11, 12	-	-	₩	₩	₩	₩	#							
21	R	R	G	G	R	R	Y							
22	R	R	G	G	R/	R	Y							
31	R	R	R	R	G ↓	R	R							
32	<u>R/</u>	<u>R</u> /	R	R	G	R	R							
41	R	R	R	R	R	IJ.	R							
42	R	R	R	R	R	G	R							
51	-	₩	•	+	₩	#	₩							
61	R	G	R	G	R	R	Y							
6.2	R	G	R	G	R	R/_	Y							

stVideo	Detection	Zone
---------	-----------	------

OASIS 2070 LOOP & DETECTOR INSTALLATION CHART

INDUCTIVE LOOPS

(FT)

LOOP

1A,1B

2A

2B,2C

3 A 3B

4A

4B

5 A

6 A

6B

FROM

STOPBAR

+5

300

90

+5

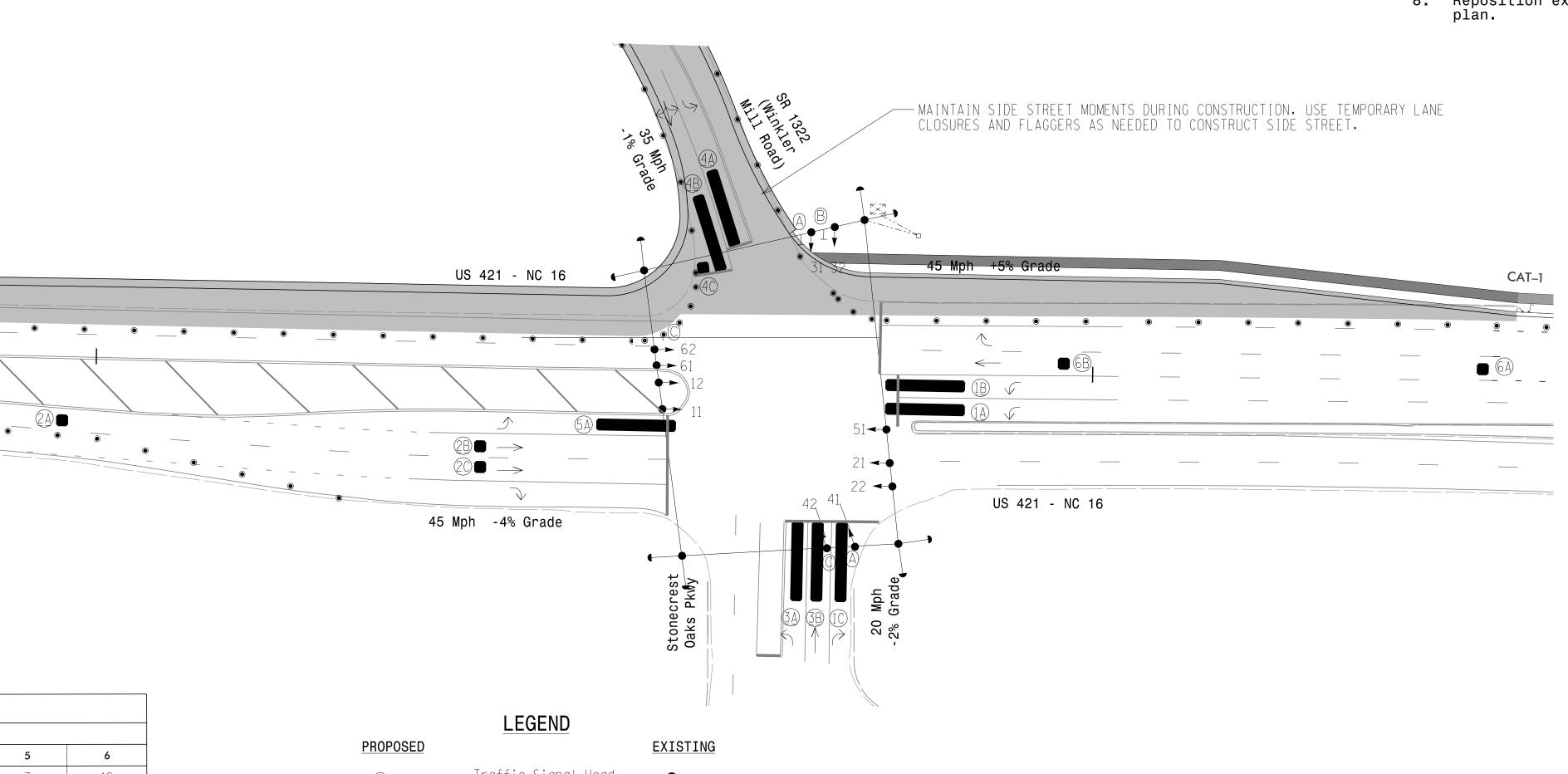
90

DETECTOR PROGRAMMING

15

6 Phase Fully Actuated (Isolated)
NOTES
dway Standard Drawi and "Standard Speci

- 1. Refer to "Roady January 2018 a awings NCDOT" dated ecifications for Roads and Structures" dated January 2018.
- Do not program signal for late night operation unless otherwise directed by the Engineer.
- 3. Phase 1 and/or 5 may be lagged.
- 4. The order of phase 3 an 4 may be reversed.
- 5. Set all detector units to presence mode.
- 6. This intersection uses video detection. Install detectors according to the manufacturer's instructions to schieve the desitred detection.
- 7. Refer to Pavement Marking Plans for proposed stop bar locations
- Reposition existing signal heads as shown on this



	OASIS	3 2070	TIMIN	G CHAR	Γ									
	PHASE													
FEATURE	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.

Traffic Signal Head Signal Pole with Sidewalk Guy Video Detection Zone Inductive Loop Detector Controller & Cabinet Junction Box 2-in Underground Conduit -----N/A Right of Way Directional Arrow Construction Zone N/A Wood Pole Left Arrow "Only" Sign (R3-5L) (A) Combined Through and Left Arrow Sign (R3-6L) Right Arrow "Only" Sign (R3-5R) (Drum N/A

Skinny Drum

N/A

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED New Installation - Temporary Design 1(Phase 10)



1"=40'

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

Divsion 11 Wilkes County May 2023

REVIEWED BY: M.L. Stygles 750 N.Greenfield Pkwy, Garner, NC 27529 PREPARED BY: S.R. Chiluka REVIEWED BY: INIT. DATE

SRChiluka II-I044TI SIG. INVENTORY NO.

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

SEAL

047250

1/2012 6:30:44 AM Traffic\Signals\D

- 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	.\$1,\$2,\$3,\$4,\$5,\$6
PHASES USED	.1,2,3,4,5,6
OVERLAPS	NONE

PROJECT REFERENCE NO. SHEET NO. Sig 9 1 U-5312

SIGNAL HEAD HOOK-UP CHART																									
LOAD SWITCH NO.	S	1	S2	S2P		S3			S4		S4P	S5	S6	S6P	S7	S8	S8P	S9	S1Ø	S11	S12	S13	S14		
PHASE	1	l	2	2 PED		3			4		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	NU	NU	NU	NU	NU		
RED			128			116	116	1Ø1	1Ø1				134												
YELLOW			129			117	117	102	10/2				135												
GREEN			13Ø			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													
*																									
×																									

NU = Not Used

INPUT FILE POSITION LAYOUT

FS = FLASH SENSE

ST = STOP TIME

(front view)

_	1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE U " " L	S L O T E M P T Y	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR DC ISOLATOR
FILE U "J" L	SLOT EMPTY	S L O T E M P T Y	SLOT EMPTY	S L O T E M P T Y	SLOT EMPTY	SLOT EMPTY								

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

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

SPECIAL DETECTOR NOTE

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

> THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 11-1044T1 DESIGNED: May 2023 SEALED: 5/24/2023 REVISED: N/A

VHB Engineering NC, P.C. (C-3705) 940 Main Campus Drive, Suite 500 Raleigh, NC 27606
919.829.0328
DOCUMENT NOT CONSIDERED

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

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

US 421 - NC 16

INIT. DATE

5/24/2023

FINAL UNLESS ALL

SIGNATURES COMPLETED

SEAL

23/2019 3:15:01 PM \Traffic\Signals\De

750 N.Greenfield Pkwy,Garner,NC 27529

SIG. INVENTORY NO. ||-|044T|