

# REMOVE

## BACKUP PREVENTION PROGRAMMING

Front Panel  
Main Menu > Controller > Sequence & Phs Config > Backup Prevention > Backup Protection Plan

Web Interface  
Home > Controller > Backup Prevention > Backup Protection Plan

### Sequence 1

No Backup Phase	1	2	3	4	5	6	7	8
Serve Phase 1	-	-	-	-	-	-	-	-
Serve Phase 2	X	-	-	-	-	-	-	-
Serve Phase 3	-	-	-	-	-	-	-	-
Serve Phase 4	-	-	-	-	-	-	-	-
Serve Phase 5	-	-	-	-	-	-	-	-
Serve Phase 6	-	-	-	-	-	-	-	-
Serve Phase 7	-	-	-	-	-	-	-	-
Serve Phase 8	-	-	-	-	-	-	-	-

## ACCESSIBLE PEDESTRIAN SIGNAL (APS) INSTALLATION NOTES

1. Install push buttons and APS equipment per manufacturer's instructions.
2. Provide a dedicated cable to each push button per manufacturer's instructions.
3. If APS equipment is mounted in cabinet, use filtered power (i.e., Controller Receptacle) to power APS equipment. Do not use Equipment Receptacle, which is a GFCI outlet.
4. Never attempt to operate a standard contact closure push button with the APS system unless cabinet is re-wired for standard button operation or unless explicitly allowed by the manufacturer.
5. Place manufacturer's instructions in cabinet with cabinet prints, signal plans, and electrical details.

## COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

## OVERLAP PROGRAMMING

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

Web Interface  
Home > Controller > Overlap Configuration > Overlaps

### Overlap Plan 1

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

THIS ELECTRICAL DETAIL IS FOR  
THE SIGNAL DESIGN: 14-0587T2  
DESIGNED: Apr 2023  
SEALED: 04/11/2023  
REVISED: N/A

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



ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared For:

750 N. Greenfield Pkwy, Garner, NC 27529

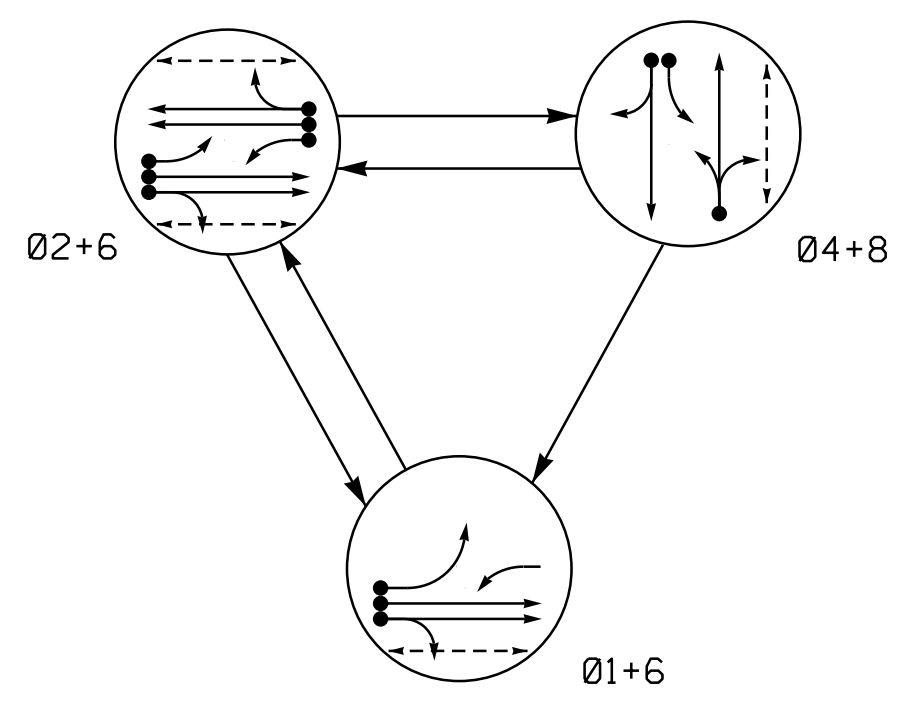
US 276 (Russ Avenue) at Shopping Center Entrance/ Lee Street	
Division 14	Haywood County Waynesville
PLAN DATE: April 2023	REVIEWED BY: WJ Hamilton
PREPARED BY: TS Popelka	RKA PROJ. NO: 16085 (040)
REVISIONS	INIT. DATE

DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED

SEAL

William J. Hamilton  
 04/11/2023  
 SIGNATURE DATE  
 SIG. INVENTORY NO. 14-0587T2

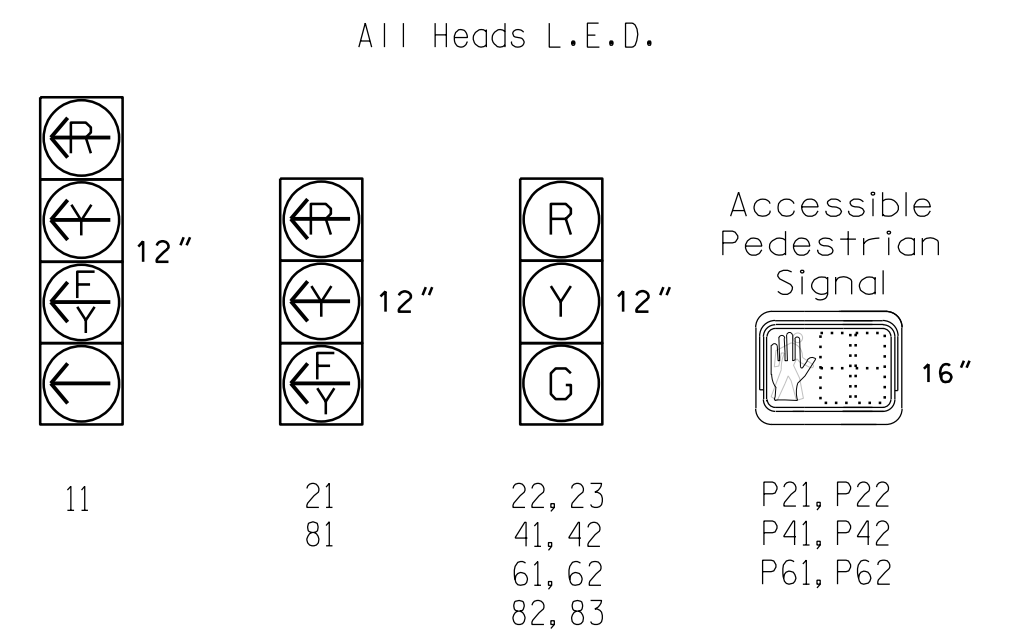
**PHASING DIAGRAM**



**TABLE OF OPERATION**

SIGNAL FACE	PHASE				
	01+6	02+6	04+8	F L S H	DRK
11	←	←	←	←	←
21	←	←	←	←	←
22, 23	R	G	R	Y	
41, 42	R	R	G	R	Y
61, 62	G	G	R	Y	
81	←	←	←	←	←
82, 83	R	R	G	R	
P21, P22	DW	W	DW	DRK	
P41, P42	DW	DW	W	DRK	
P61, P62	W	W	DW	DRK	

**SIGNAL FACE I.D.**



**MAXTIME DETECTOR INSTALLATION CHART**

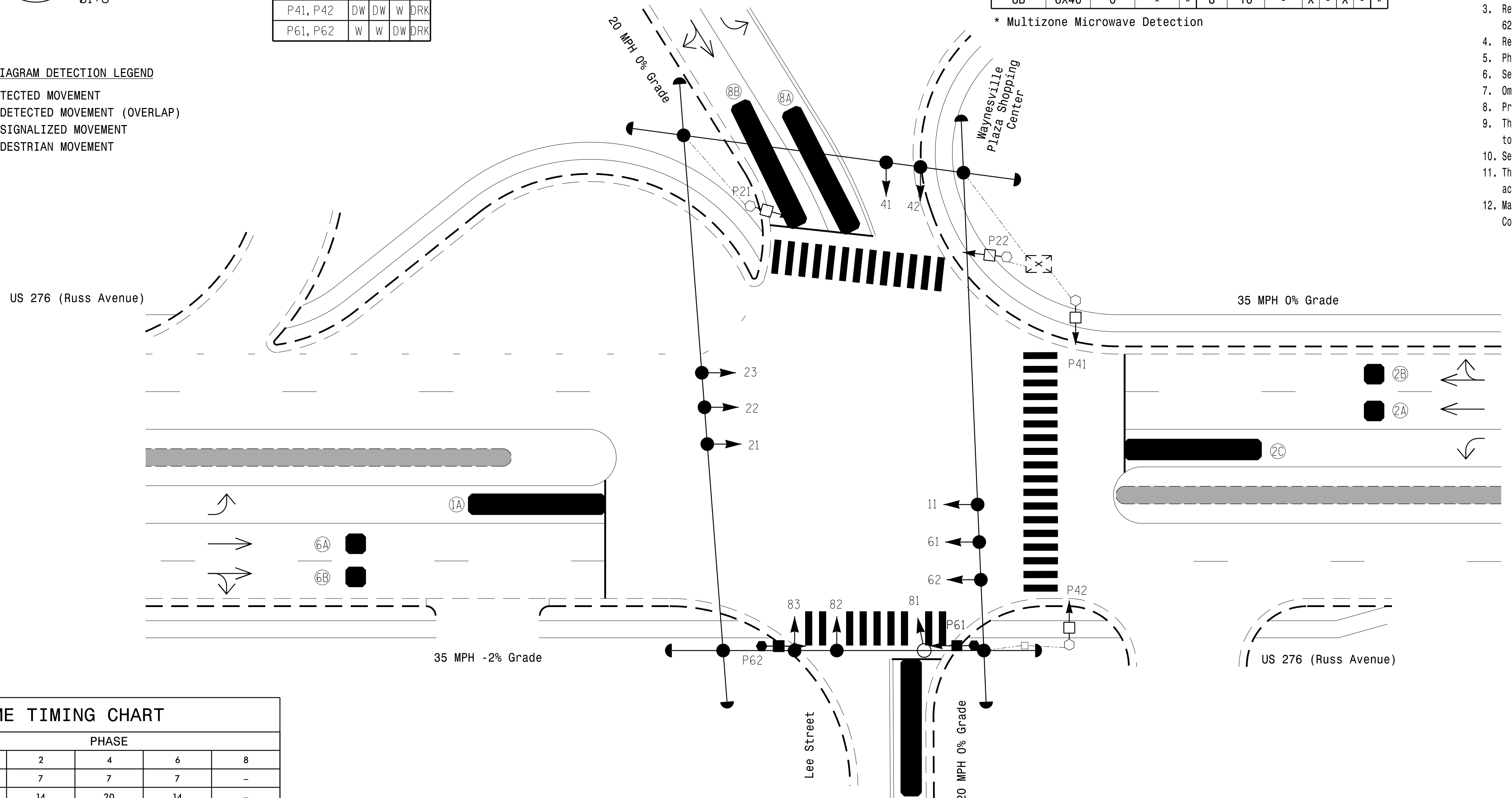
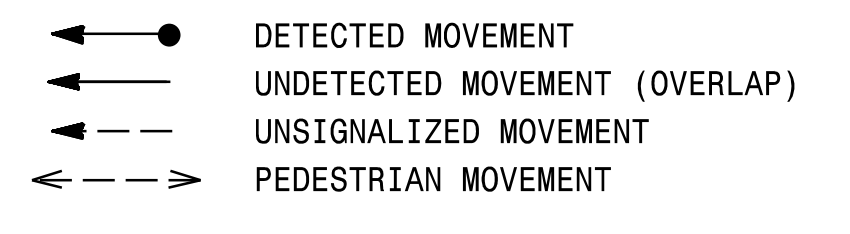
ZONE	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING							
					CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
1A	6X40	0	*	*	1	15	-	X	-	X	-	*
2A	6X6	70	*	*	2	-	-	X	-	X	-	*
2B	6X6	70	*	*	2	-	-	X	-	X	-	*
2C	6X40	0	*	*	2	-	-	X	-	X	-	*
4A	6X40	0	*	*	4	10	-	X	-	X	-	*
6A	6X6	70	*	*	6	-	-	X	-	X	-	*
6B	6X6	70	*	*	6	-	-	X	-	X	-	*
8A	6X40	0	*	*	8	3	-	X	-	X	-	*
8B	6X40	0	*	*	8	10	-	X	-	X	-	*

3 Phase Fully Actuated D14-12\_Waynesville

**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.
- Reposition existing signal heads numbered 11, 21, 22, 23, 61, 62 and 81.
- Renumber existing signal heads 81 and 82 to 82 and 83.
- Phase 1 may be lagged.
- Set all detector units to presence mode.
- Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
- Program pedestrian heads to countdown the flashing "Don't Walk" time only.
- This intersection features accessible pedestrian signals utilizing percussive tone walk indications and/or speech messages.
- See traffic control plans for stop bar and crosswalk locations.
- This intersection uses multizone microwave detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.

**PHASING DIAGRAM DETECTION LEGEND**



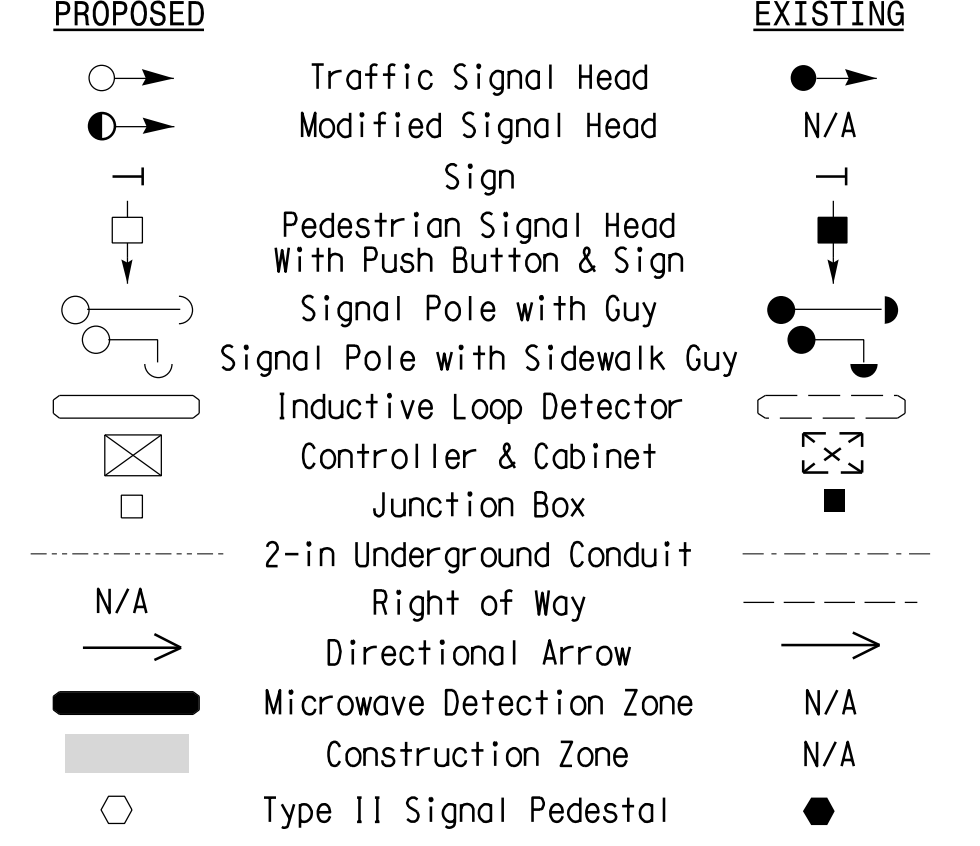
**MAXTIME TIMING CHART**

FEATURE	PHASE				
	1	2	4	6	8
Walk *	-	7	7	7	-
Ped Clear *	-	14	20	14	-
Min Green	7	10	7	10	7
Passage *	2.0	3.0	3.0	3.0	2.0
Max I *	15	45	20	45	20
Yellow Change	3.0	4.0	3.0	4.0	3.0
Red Clear	3.4	2.5	3.4	2.5	3.5
Added Initial *	-	-	-	-	-
Maximum Initial *	-	-	-	-	-
Time Before Reduction *	-	-	-	-	-
Time To Reduce *	-	-	-	-	-
Minimum Gap	-	-	-	-	-
Advance Walk	-	-	-	-	-
Non Lock Detector	X	-	X	-	X
Vehicle Recall	-	MIN RECALL	-	MIN RECALL	-
Dual Entry	-	-	X	-	X

**ACCESSIBLE PEDESTRIAN SIGNAL OPERATION**

SIGNAL FACE	VOICE TONES	INTERVAL	SPEECH MESSAGE
P21	- X	Walk	(Percussive Tone)
X	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Waynesville Plaza.
P22	- X	Walk	(Percussive Tone)
X	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Waynesville Plaza.
P41	- X	Walk	(Percussive Tone)
X	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Russ.
P42	- X	Walk	(Percussive Tone)
X	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Russ.
P61	- X	Walk	(Percussive Tone)
X	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Lee.
P62	- X	Walk	(Percussive Tone)
X	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Lee.

**LEGEND**



Signal Upgrade Temporary Design 3 - (TMP Phase III)

Infrastructure Consulting Services, Inc.

RAMEY KEMP ASSOCIATES  
8210 University Executive Park Drive Suite 220 Charlotte, North Carolina 28226  
Phone: 704-549-4260 | www.rameykemp.com | NC License No. F-1489

US 276 (Russ Avenue) at Shopping Center Entrance/ Lee Street

Division 14 Haywood County Waynesville

PLAN DATE: April 2023 REVIEWED BY: WJ Hamilton

PREPARED BY: TS Popelka RKA PROJ. NO.: 16085 (040)

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

William J. Hamilton  
04/11/2023  
DATE

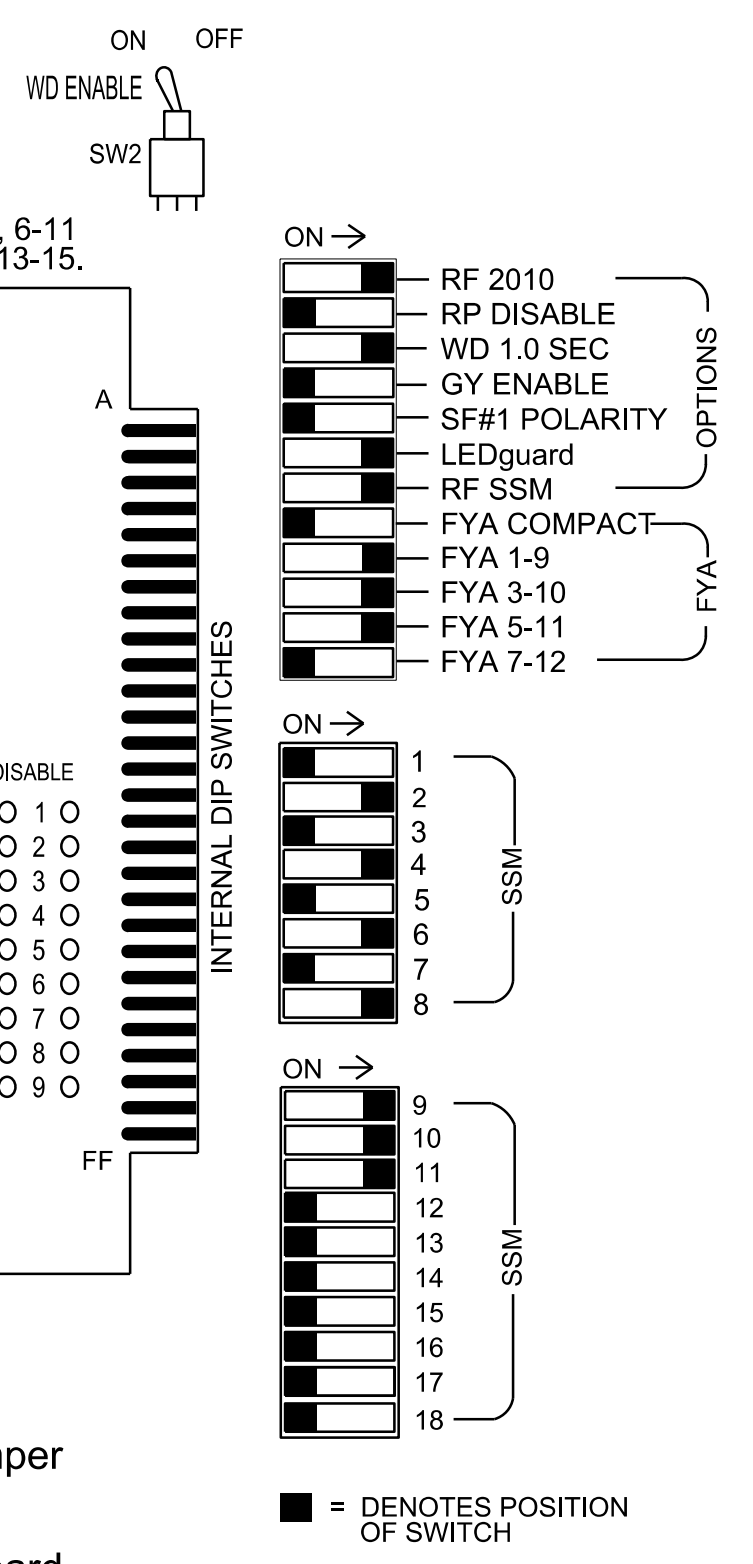
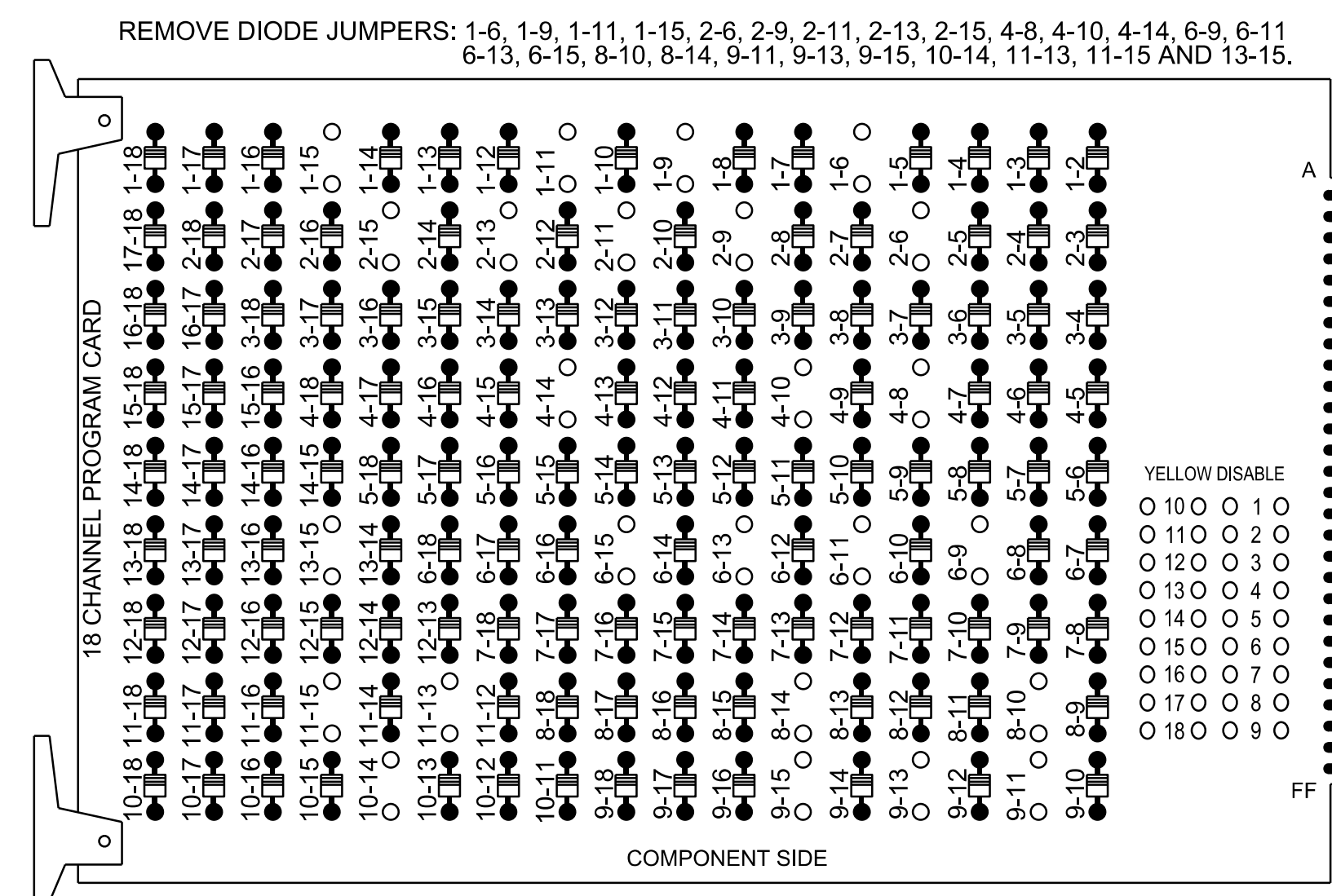
REVISIONS	INIT.	DATE

4/12/2023 10:58:17.3 as: ts.dsn\_2020mtd.dgn User: j.wend

\* 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.

### 18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



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

### NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the signal plan.
- Program phases 4 and 8 for Dual Entry.
- Program controller to start up in phase 2 Green Walk and 6 Green Walk.
- If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
- The cabinet and controller are part of the D14-12 Waynesville Signal System.

### EQUIPMENT INFORMATION

Controller.....2070LX  
 Cabinet.....332 w/ Aux  
 Software.....Q-Free MAXTIME  
 Cabinet Mount.....Base  
 Output File Positions.....18 With Aux. Output File  
 Load Switches Used.....S1, S2, S3, S5, S6, S8, S9, S11, AUX S1, AUX S2, AUX S4  
 Phases Used.....1, 2, 2PED, 4, 4PED, 6, 6PED, 8  
 Overlap "1".....\*  
 Overlap "2".....\*  
 Overlap "3".....\*  
 Overlap "4".....NOT USED

\*See overlap programming detail on sheet 2

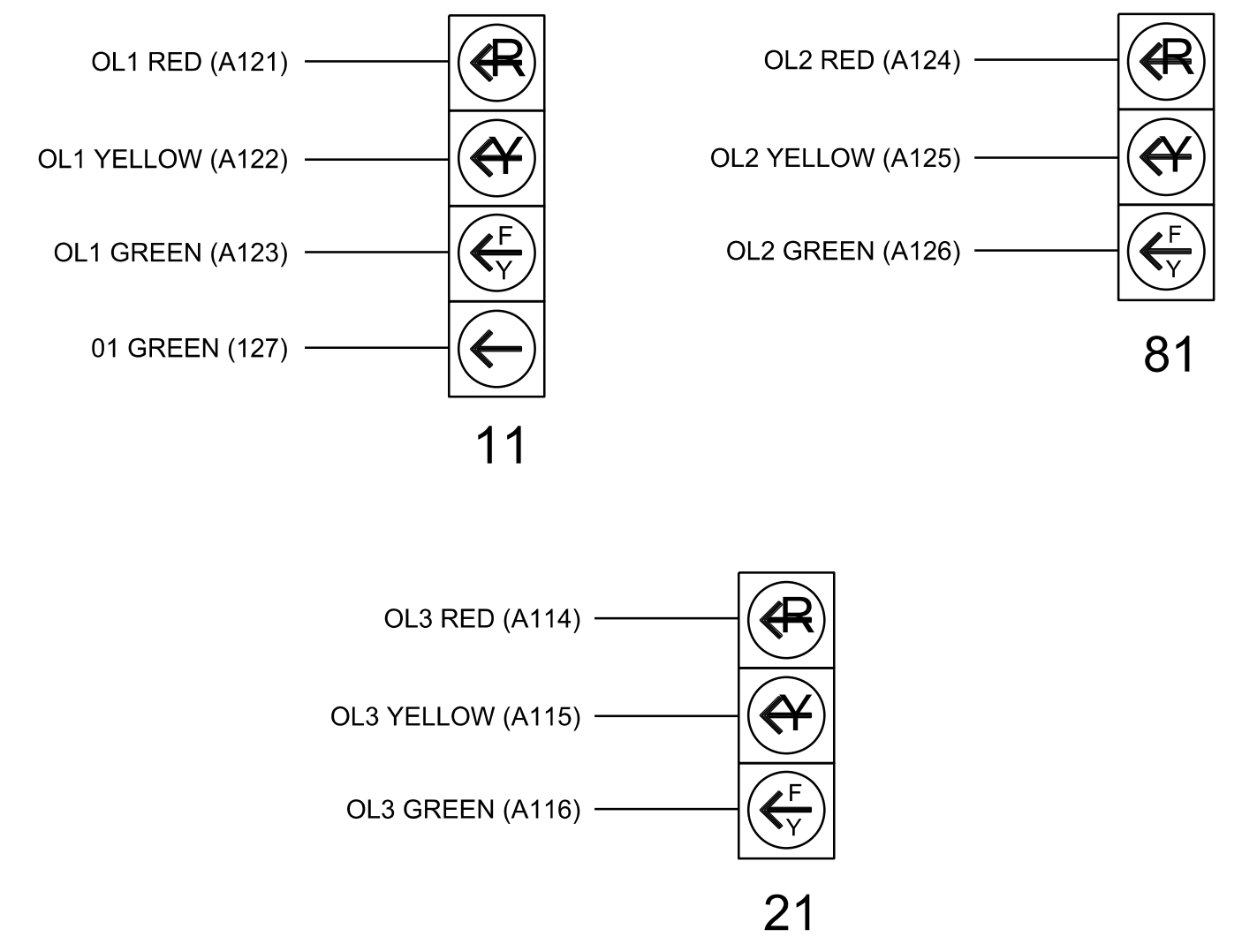
### SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	11	22,23	P21, P22	NU	41,42	P41, P42	NU	61,62	P61, P62	NU	82,83	NU	11	81	NU	21	NU	NU
RED		128			101			134			107							
YELLOW	*	129			102			135			108							
GREEN		130			103			136			109							
RED ARROW													A121	A124		A114		
YELLOW ARROW													A122	A125		A115		
FLASHING YELLOW ARROW													A123	A126		A116		
GREEN ARROW	127																	
Hand				113			104			119								
Walker				115			106			121								

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

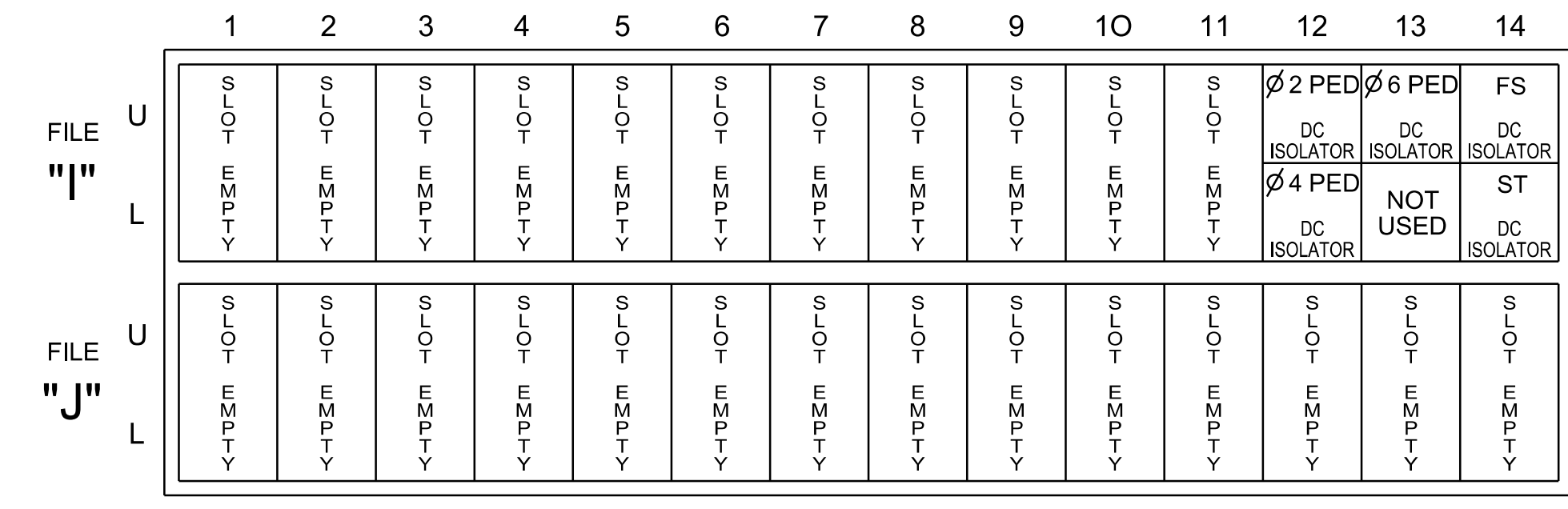
### FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



### INPUT FILE POSITION LAYOUT

(front view)



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

FS = FLASH SENSE  
 ST = STOP TIME

### SPECIAL DETECTOR NOTE

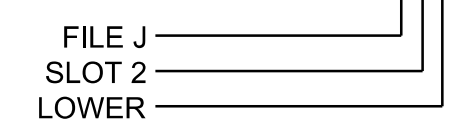
Install a multizone microwave detection system for vehicle detection. Perform installation according to manufacturer's directions and NCDOT engineer-approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.

### INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN
PED PUSH BUTTONS												
P21,P22	TB8-4,6	I12U	67	33	2	PED 2						
P41,P42	TB8-5,6	I12L	69	35	4	PED 4						
P61,P62	TB8-7,9	I13U	68	34	6	PED 6						

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

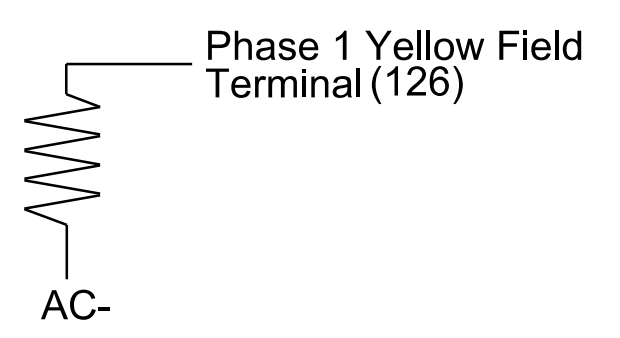
INPUT FILE POSITION LEGEND: J2L



### LOAD RESISTOR INSTALLATION DETAIL

(install resistor as shown)

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



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

US 276 (Russ Avenue) at Shopping Center Entrance/ Lee Street  
 Division 14 Haywood County Waynesville

Prepared For:

Prepared By: TS Popelka RKA PROJ. NO: 16085 (040)

Reviewed By: WJ Hamilton

Plan Date: April 2023

Sealed: 04/11/2023

Revised: N/A

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 14-0587T3

REVISIONS: \_\_\_\_\_ INIT. DATE

Signature:

DATE: 04/11/2023

SIGNATURE: \_\_\_\_\_ DATE: \_\_\_\_\_

SIG. INVENTORY NO. 14-0587T3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

### 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
Type	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section
Included Phases	2	4	6
Modifier Phases	1	-	-
Trail Green	0	0	0
Trail Yellow	0.0	0.0	0.0
Trail Red	0.0	0.0	0.0

### ACCESSIBLE PEDESTRIAN SIGNAL (APS) INSTALLATION NOTES

1. Install push buttons and APS equipment per manufacturer's instructions.
2. Provide a dedicated cable to each push button per manufacturer's instructions.
3. If APS equipment is mounted in cabinet, use filtered power (i.e., Controller Receptacle) to power APS equipment. Do not use Equipment Receptacle, which is a GFCI outlet.
4. Never attempt to operate a standard contact closure push button with the APS system unless cabinet is re-wired for standard button operation or unless explicitly allowed by the manufacturer.
5. Place manufacturer's instructions in cabinet with cabinet prints, signal plans, and electrical details.

### COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

### FLASHER CIRCUIT MODIFICATION DETAIL

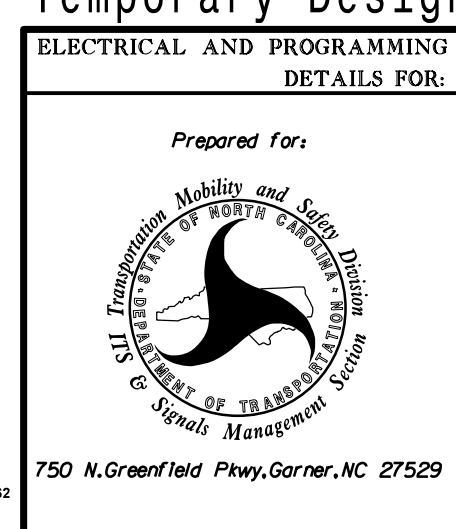
IN ORDER TO INSURE THAT SIGNALS FLASH CONCURRENTLY ON THE SAME APPROACH, MAKE THE FOLLOWING FLASHER CIRCUIT CHANGES:

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

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

THIS ELECTRICAL DETAIL IS FOR  
THE SIGNAL DESIGN: 14-0587T3  
DESIGNED: Apr 2023  
SEALED: 04/11/2023  
REVISED: N/A

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



ELECTRICAL AND PROGRAMMING DETAILS FOR:		US 276 (Russ Avenue) at Shopping Center Entrance/ Lee Street	
Division 14		Haywood County Waynesville	
PLAN DATE:	April 2023	REVIEWED BY:	WJ Hamilton
PREPARED BY:	TS Popelka	RKA PROJ. NO.:	16085 (040)
REVISIONS	INIT.	DATE	

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	
SEAL	DATE
	04/11/2023
SIGNATURE	DATE
SIG. INVENTORY NO.	14-0587T3

PHASING DIAGRAM

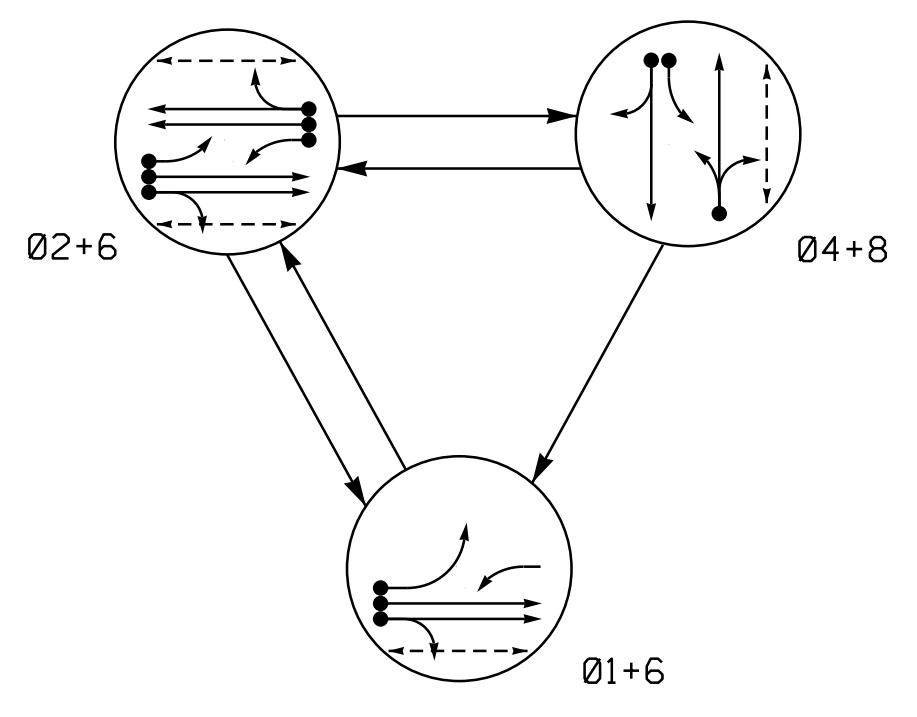
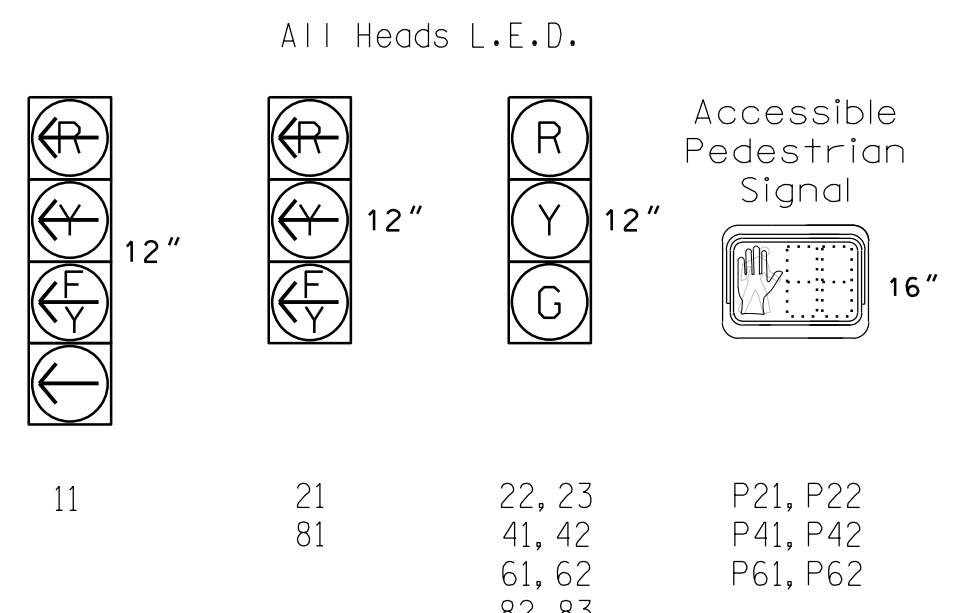


TABLE OF OPERATION table with columns for SIGNAL FACE, PHASE, and signal timing details.

SIGNAL FACE I.D.



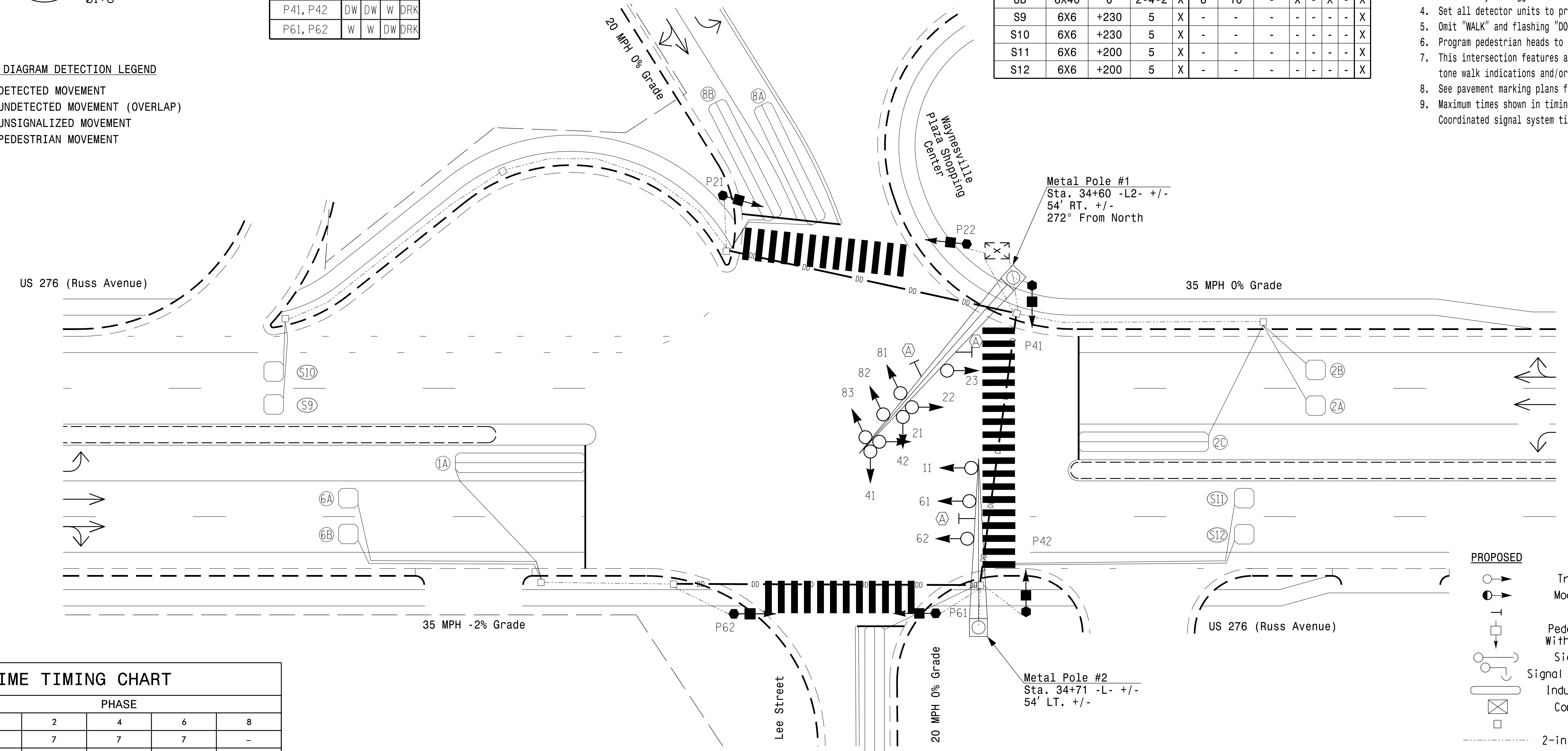
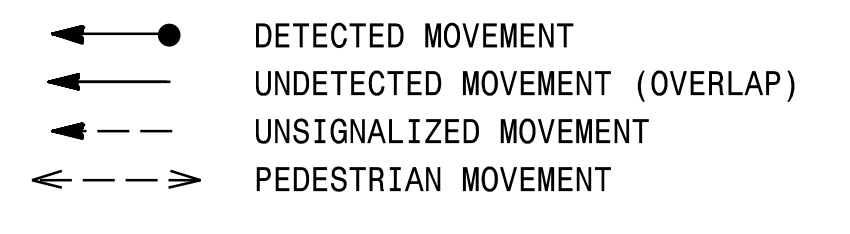
MAXTIME DETECTOR INSTALLATION CHART table with columns for LOOP, SIZE, DISTANCE, TURNS, NEW LOOP, CALL PHASE, DELAY TIME, EXTEND TIME, EXTEND, ADDED INITIAL, CALL, DELAY DURING GREEN, and NEW CARD.

3 Phase Fully Actuated D14-12\_Waynesville

NOTES

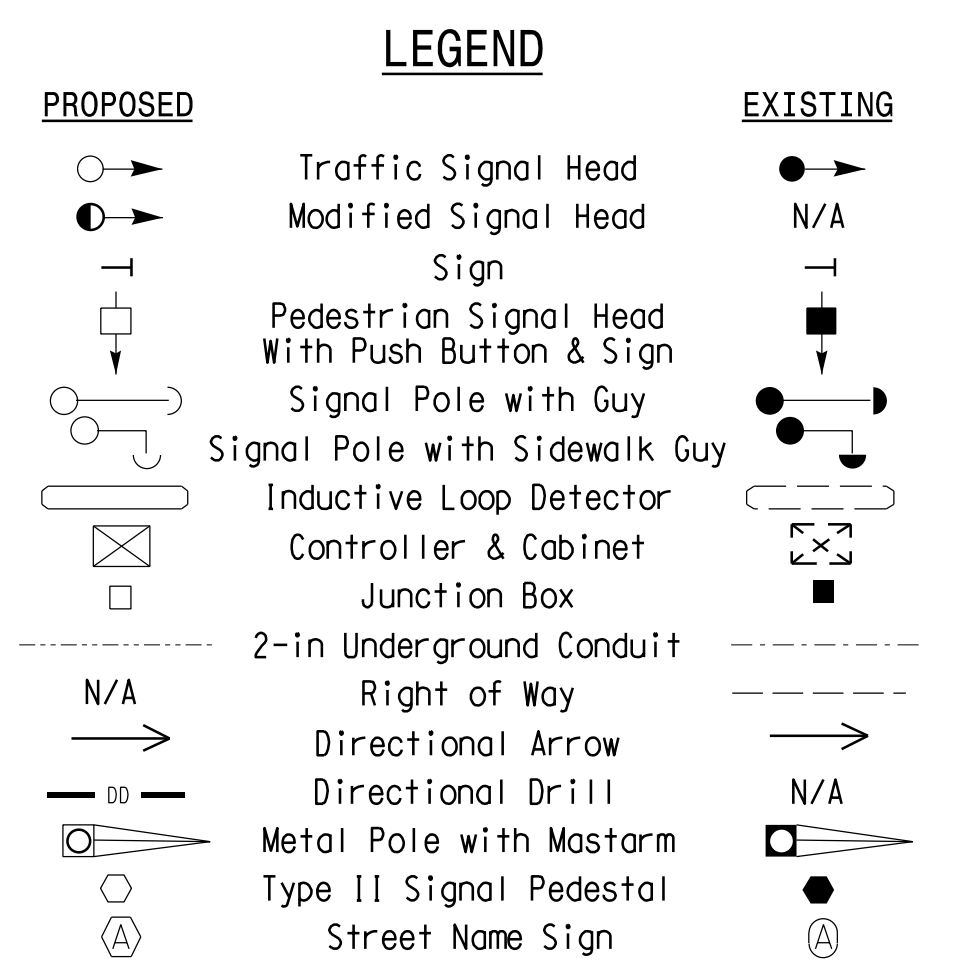
- 1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 may be lagged.
4. Set all detector units to presence mode.
5. 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. This intersection features accessible pedestrian signals utilizing percussive tone walk indications and/or speech messages.
8. See pavement marking plans for stop bar and crosswalk locations.
9. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.

PHASING DIAGRAM DETECTION LEGEND



MAXTIME TIMING CHART table with columns for FEATURE and PHASE (1, 2, 4, 6, 8) showing timing values for various traffic features.

ACCESSIBLE PEDESTRIAN SIGNAL OPERATION table with columns for SIGNAL FACE, VOICE TONES, INTERVAL, and SPEECH MESSAGE.



Signal Upgrade - Final Design

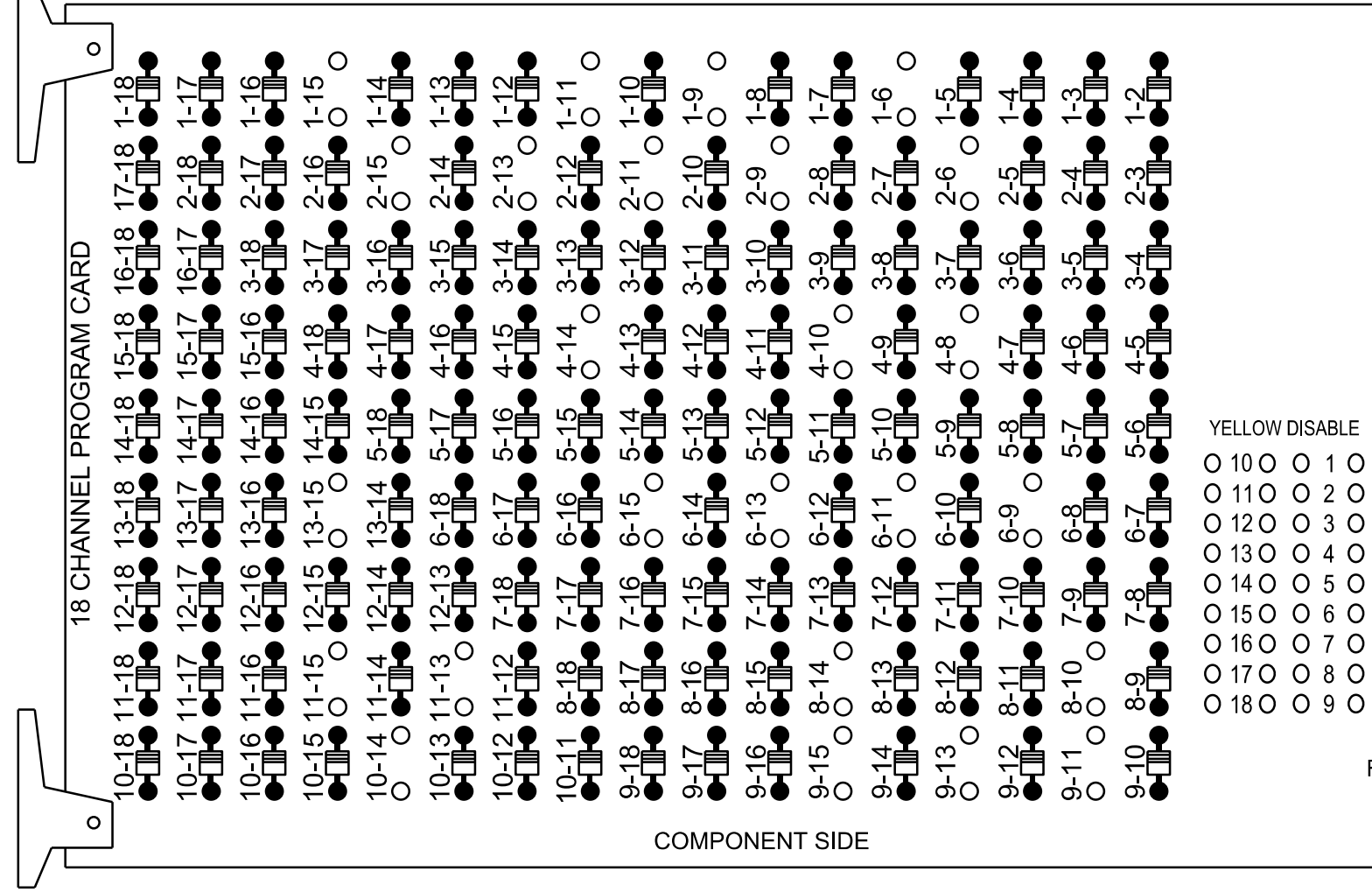
Project information block including logos for RKA (Ramey Kemp Associates), project title 'US 276 (Russ Avenue) at Shopping Center Entrance/ Lee Street', division 'Division 14 Haywood County Waynesville', dates, and signatures.

4/19/2023 10:58:17 AM tsig.dsn:2020mtd.dgn User: jwincd

### 18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

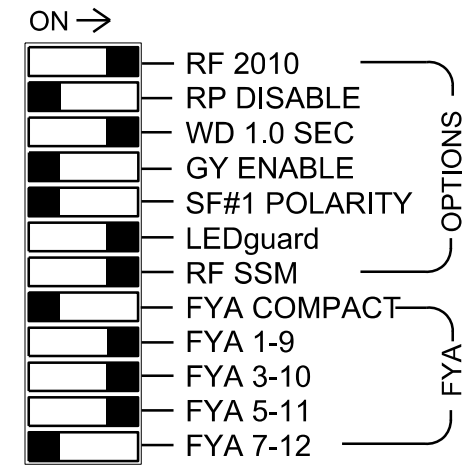
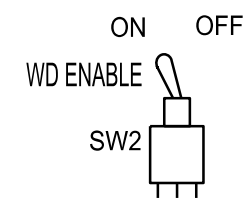
REMOVE DIODE JUMPERS: 1-6, 1-9, 1-11, 1-15, 2-6, 2-9, 2-11, 2-13, 2-15, 4-8, 4-10, 4-14, 6-9, 6-11, 6-13, 6-15, 8-10, 8-14, 9-11, 9-13, 9-15, 10-14, 11-13, 11-15 AND 13-15.



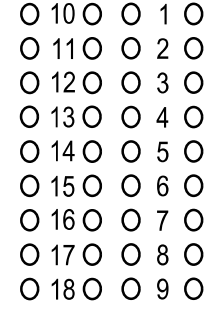
REMOVE JUMPERS AS SHOWN

**NOTES:**

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



YELLOW DISABLE



■ = DENOTES POSITION OF SWITCH

### NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the signal plan.
- Program phases 4 and 8 for Dual Entry.
- Program controller to start up in phase 2 Green Walk and 6 Green Walk.
- If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
- The cabinet and controller are part of the D14-12 Waynesville Signal System.

### EQUIPMENT INFORMATION

Controller.....2070LX  
 Cabinet.....332 w/ Aux  
 Software.....Q-Free MAXTIME  
 Cabinet Mount.....Base  
 Output File Positions.....18 With Aux. Output File  
 Load Switches Used.....S1, S2, S3, S5, S6, S8, S9, S11, AUX S1, AUX S2, AUX S4  
 Phases Used.....1, 2, 2PED, 4, 4PED, 6, 6PED, 8  
 Overlap "1".....\*  
 Overlap "2".....\*  
 Overlap "3".....\*  
 Overlap "4".....NOT USED

\*See overlap programming detail on sheet 2

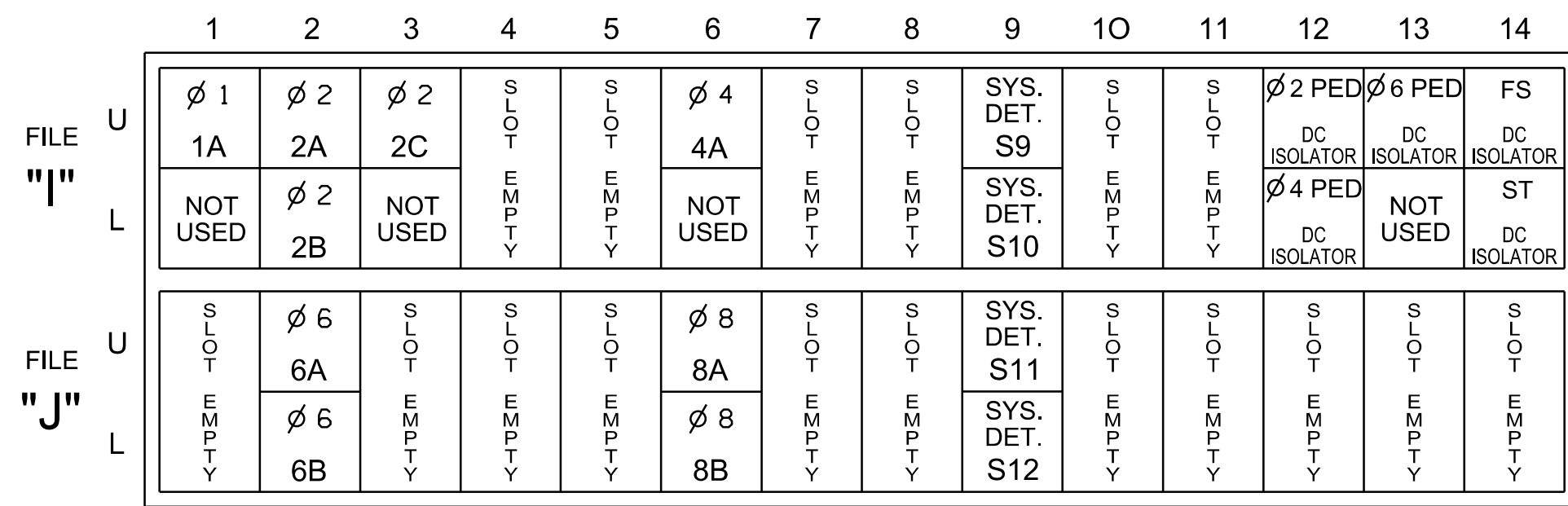
### SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	11	22,23	P21, P22	NU	41,42	P41, P42	NU	61,62	P61, P62	NU	82,83	NU	11	81	NU	21	NU	NU
RED		128			101			134			107							
YELLOW	*	129			102			135			108							
GREEN		130			103			136			109							
RED ARROW													A121	A124		A114		
YELLOW ARROW													A122	A125		A115		
FLASHING YELLOW ARROW													A123	A126		A116		
GREEN ARROW	127																	
Hand				113			104			119								
Walker				115			106			121								

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

### INPUT FILE POSITION LAYOUT

(front view)



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

FS = FLASH SENSE  
 ST = STOP TIME

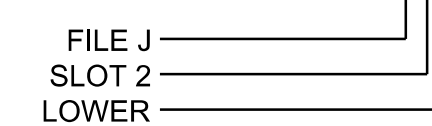
### INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN
1A	TB2-1,2	I1U	56	18	1	1	15		X		X	
2A	TB2-5,6	I2U	39	1	2	2			X		X	
2B	TB2-7,8	I2L	43	5	3	2			X		X	
2C	TB2-9,10	I3U	63	29	4	2			X		X	
4A	TB4-9,10	I6U	41	3	8	4	10		X		X	
*S9	TB6-9,10	I9U	60	22	13	SYS			X			
*S10	TB6-11,12	I9L	62	24	14	SYS			X			
6A	TB3-5,6	J2U	40	2	16	6			X		X	
6B	TB3-7,8	J2L	44	6	17	6			X		X	
8A	TB5-9,10	J6U	42	4	22	8	3		X		X	
8B	TB5-11,12	J6L	46	8	23	8	10		X		X	
*S11	TB7-9,10	J9U	59	21	27							
*S12	TB7-11,12	J9L	61	23	28							
PED PUSH BUTTONS												
P21,P22	TB8-4,6	I12U	67	33	2	PED 2						
P41,P42	TB8-5,6	I12L	69	35	4	PED 4						
P61,P62	TB8-7,9	I13U	68	34	6	PED 6						

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

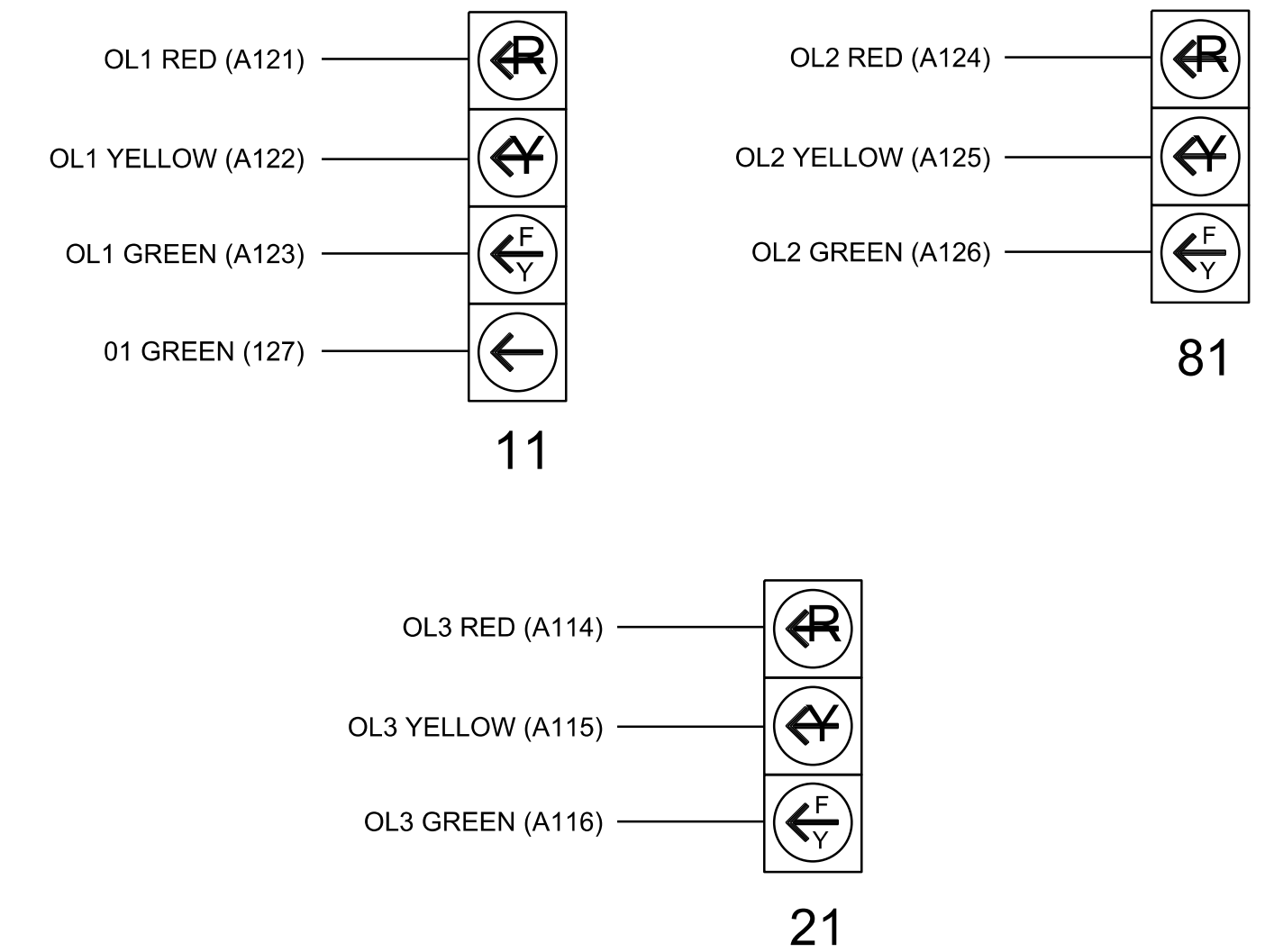
\*System detector only. Remove any assigned vehicle phase.

#### INPUT FILE POSITION LEGEND: J2L



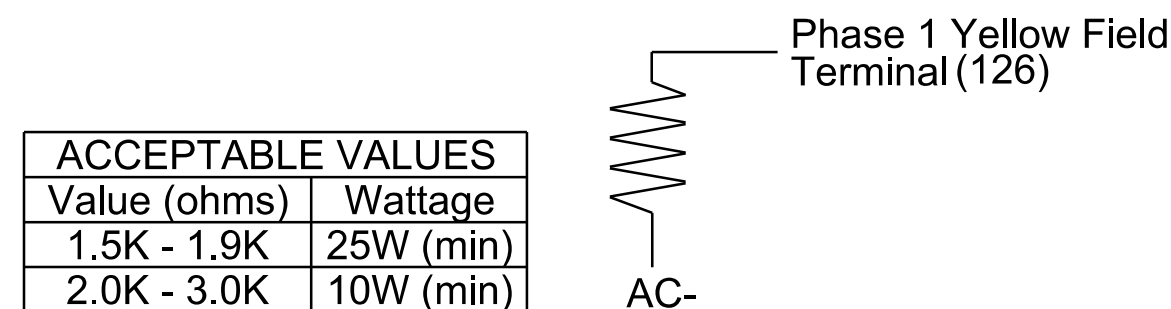
### FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



### LOAD RESISTOR INSTALLATION DETAIL

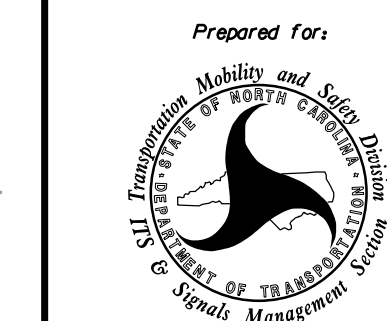
(install resistor as shown)



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

Electrical Detail - Sheet 1 of 2  
 Final Design

ELECTRICAL AND PROGRAMMING DETAILS FOR:



US 276 (Russ Avenue)  
 at  
 Shopping Center Entrance/  
 Lee Street  
 Division 14 Haywood County Waynesville

PLAN DATE: April 2023 REVIEWED BY: WJ Hamilton  
 PREPARED BY: TS Popelka RKA PROJ. NO: 16085 (040)

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL  
 NORTH CAROLINA PROFESSIONAL SEAL 32396  
 ENGINEER  
 William J. Hamilton  
 04/11/2023  
 SIGNATURE DATE  
 SIG. INVENTORY NO. 14-0587

### 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
Type	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section
Included Phases	2	4	6
Modifier Phases	1	-	-
Trail Green	0	0	0
Trail Yellow	0.0	0.0	0.0
Trail Red	0.0	0.0	0.0

### ACCESSIBLE PEDESTRIAN SIGNAL (APS) INSTALLATION NOTES

1. Install push buttons and APS equipment per manufacturer's instructions.
2. Provide a dedicated cable to each push button per manufacturer's instructions.
3. If APS equipment is mounted in cabinet, use filtered power (i.e., Controller Receptacle) to power APS equipment. Do not use Equipment Receptacle, which is a GFCI outlet.
4. Never attempt to operate a standard contact closure push button with the APS system unless cabinet is re-wired for standard button operation or unless explicitly allowed by the manufacturer.
5. Place manufacturer's instructions in cabinet with cabinet prints, signal plans, and electrical details.

### COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

### FLASHER CIRCUIT MODIFICATION DETAIL

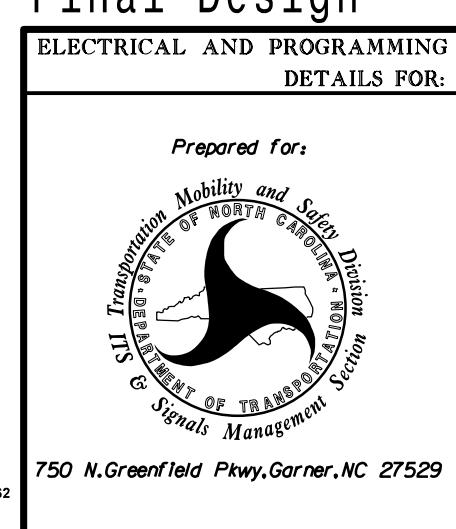
IN ORDER TO INSURE THAT SIGNALS FLASH CONCURRENTLY ON THE SAME APPROACH, MAKE THE FOLLOWING FLASHER CIRCUIT CHANGES:

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

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

THIS ELECTRICAL DETAIL IS FOR  
THE SIGNAL DESIGN: 14-0587  
DESIGNED: Apr 2023  
SEALED: 04/11/2023  
REVISED: N/A

Electrical Detail - Sheet 2 of 2  
Final Design



ELECTRICAL AND PROGRAMMING DETAILS FOR:		US 276 (Russ Avenue) at Shopping Center Entrance/ Lee Street	
Division 14		Haywood County	Waynesville
PLAN DATE:	April 2023	REVIEWED BY:	WJ Hamilton
PREPARED BY:	TS Popelka	RKA PROJ. NO.:	16085 (040)
REVISIONS	INIT.	DATE	

DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED

SEAL

SEAL  
32396  
ENGINEER  
WILLIAM J. HAMILTON

DocuSign  
*William J. Hamilton*  
SIGNATURE

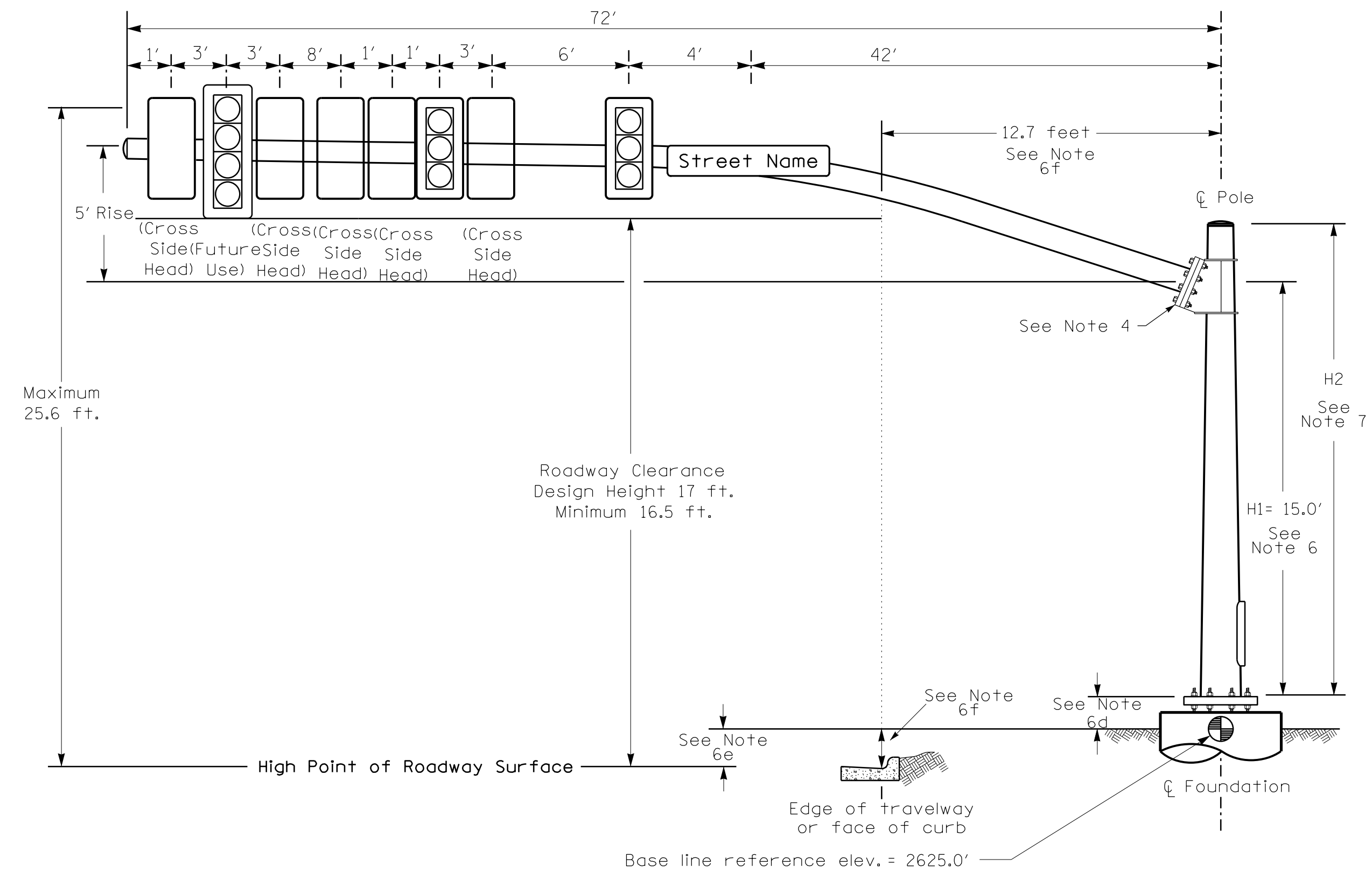
04/11/2023  
DATE

SIG. INVENTORY NO. 14-0587

METAL POLE No. 1 & 2

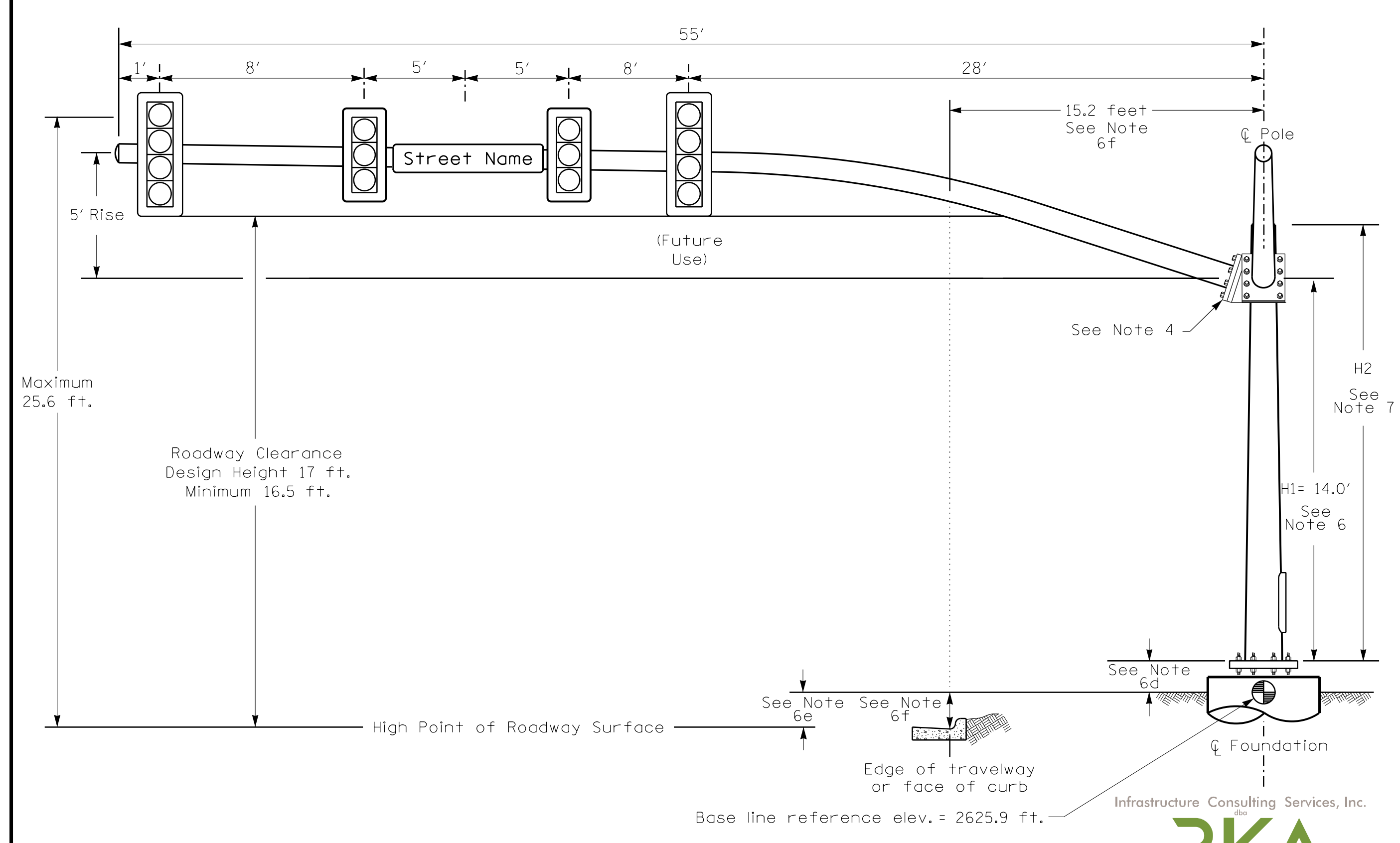
PROJECT REFERENCE NO.	SHEET NO.
U-5839	Sig 5.11

Design Loading for METAL POLE NO. 1



Elevation View

Design Loading for METAL POLE NO. 2



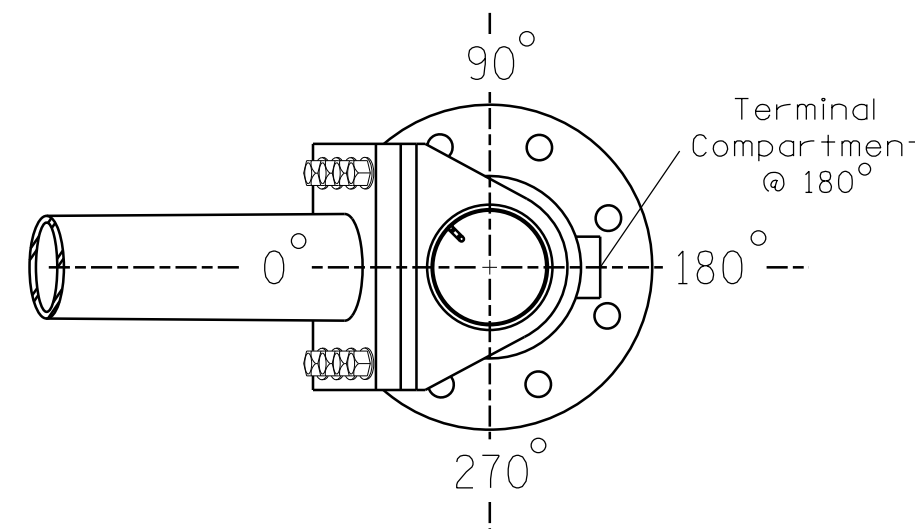
Elevation View

SPECIAL NOTE

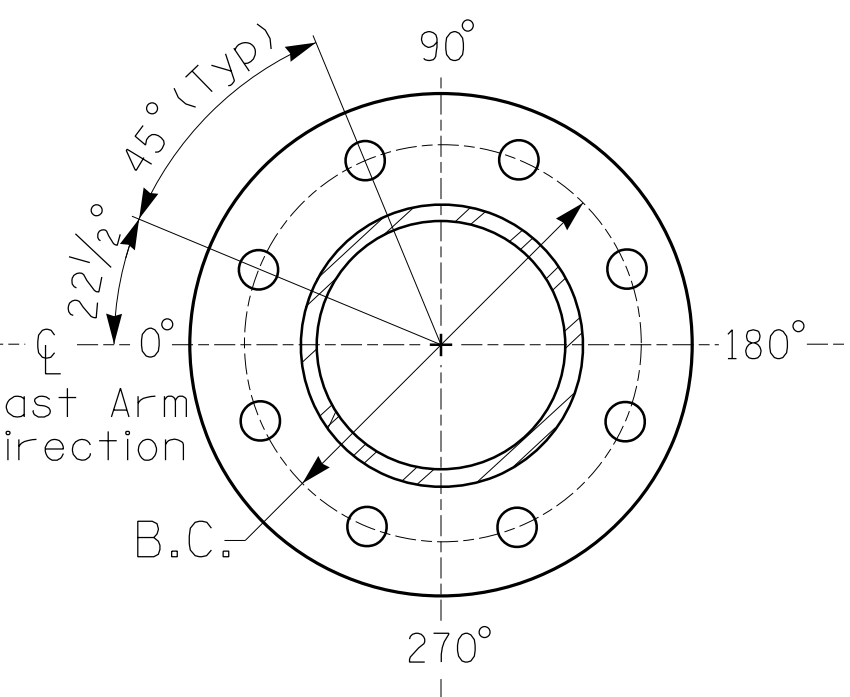
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

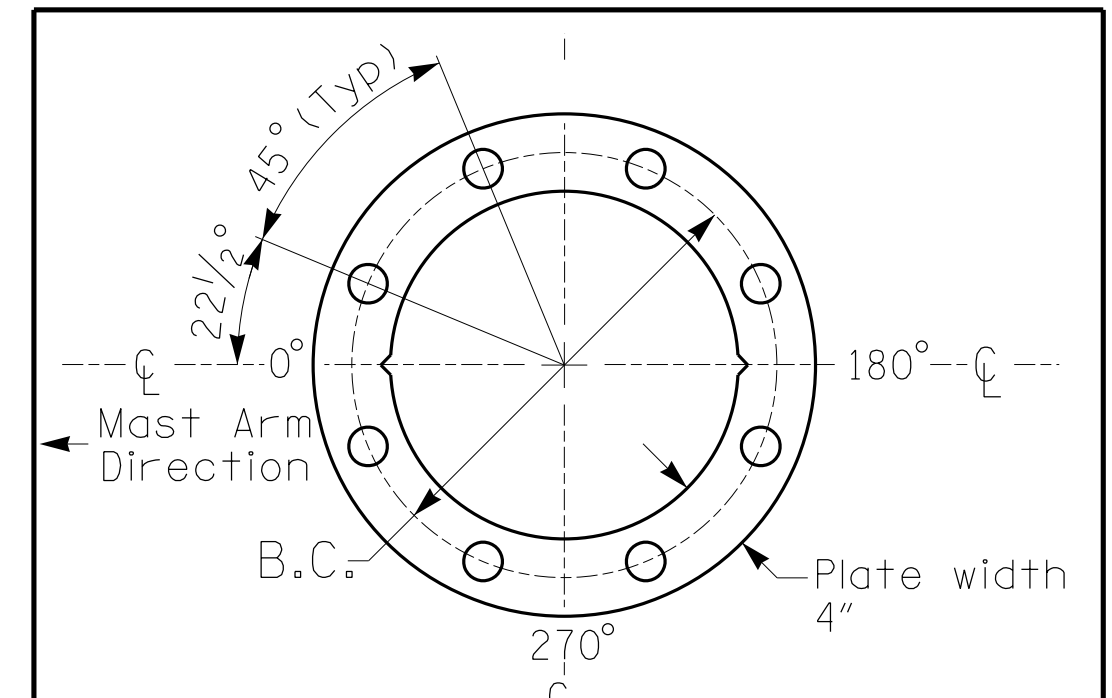
Elevation Differences for:	Pole 1	Pole 2
Baseline reference point at $\phi$ Foundation @ ground level	2625.0 ft.	2625.9 ft.
Elevation difference at High point of roadway surface	+0.9 ft.	0.0 ft.
Elevation difference at Edge of travelway or face of curb	+0.7 ft.	+0.1 ft.



POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL



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

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
	RIGID MOUNTED SIGNAL HEAD 12"-4 SECTION-WITH BACKPLATE	11.5 S.F.	25.5" W X 66.0" L	74 LBS
	STREET NAME SIGN RIGID MOUNTED	12.0 S.F.	18.0" W X 96.0" L	27 LBS

NOTES

DESIGN REFERENCE MATERIAL

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

DESIGN REQUIREMENTS

- Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
- Design all signal supports using stress ratios that do not exceed 0.9.
- A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements.
- Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
- The mast arm attachment height (H1) shown is based on the following design assumptions:
  - Nominal vertical rise in mast arm is 5 feet as measured from the centerline of the arm base to the centerline of the free end of the arm.
  - Signal heads are rigidly mounted and vertically centered on the mast arm.
  - The roadway clearance height for design is as shown in the elevation views.
  - The top of the pole base plate is 0.75 feet above the ground elevation.
  - Refer to the Elevation Data Chart for the elevation differences between the proposed foundation ground level and the high point of the roadway.
  - Provide horizontal distance from the proposed centerline of the foundation to the edge of travelway. Refer to the Elevation Data Chart for elevation difference between the proposed foundation ground level and the edge of travelway. This information is necessary to ensure that the roadway clearance is maintained at the edge of the travelway and to aid in the camber design of the arm.
- The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
  - Mast arm attachment height (H1) plus 2 feet, or
  - H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
- If pole location adjustments are required, the contractor must gain approval from the Engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signal Design Section Senior Structural Engineer for assistance at (919) 814-5000.
- The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
- The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

All metal poles and arms should be Hunter Green in color as specified in the project special provisions.

NCDOT Wind Zone 5 (120 mph)

	US 276 (Russ Avenue) at Shopping Center Entrance / Lee Street		SEAL 
	Division 14 Haywood County Waynesville	PLAN DATE: April 2023 PREPARED BY: TS Popelka	
SCALE 0 N/A N/A	REVISIONS INIT. DATE	DATE	SIGNATURE DATE SIG. INVENTORY NO. 14-0587



PHASING DIAGRAM

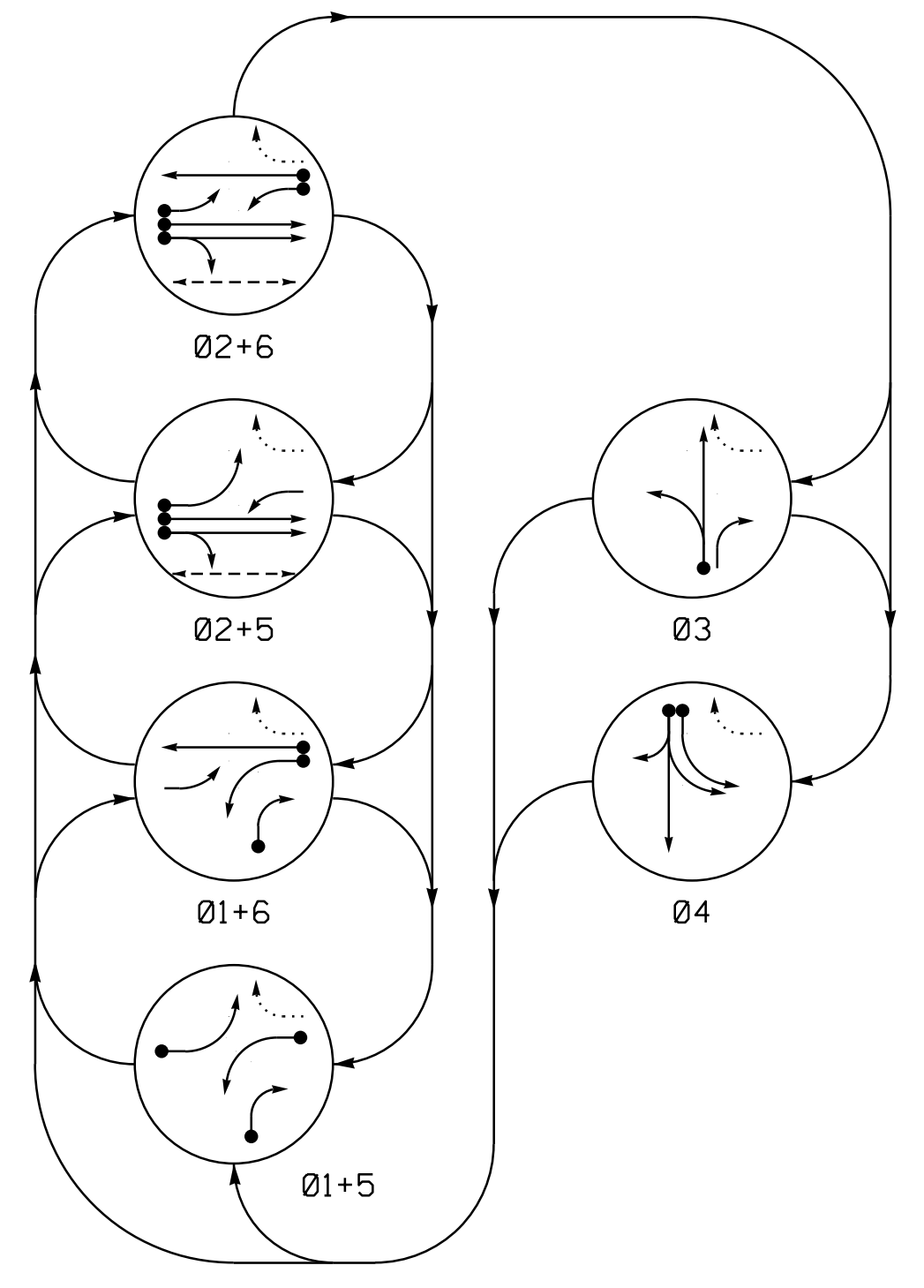
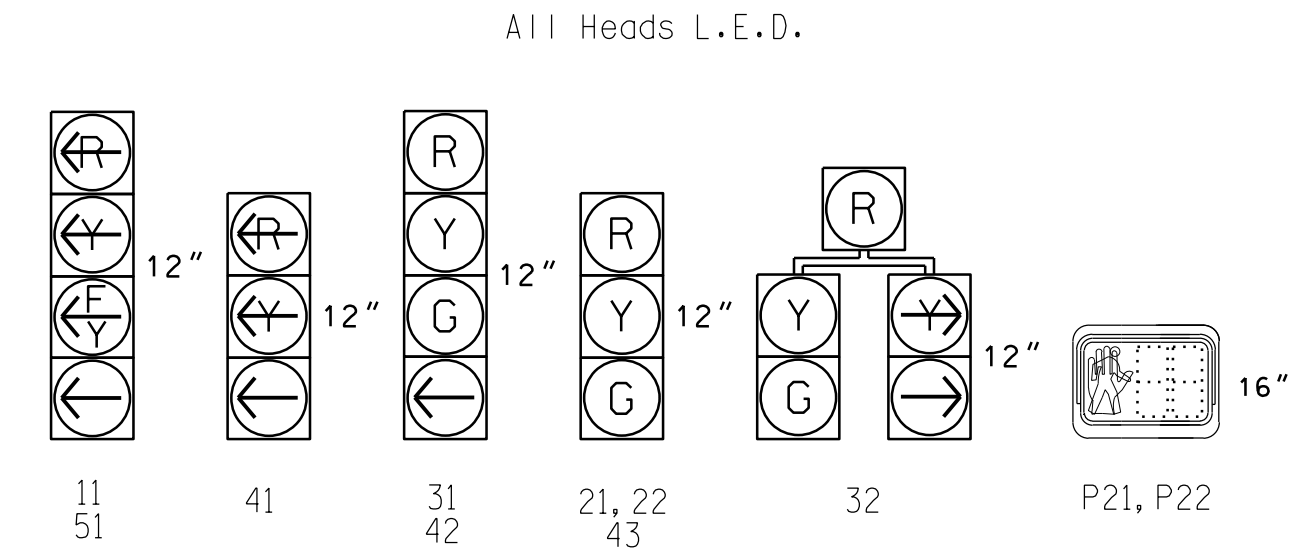


TABLE OF OPERATION

Table with columns for SIGNAL FACE and PHASE (01+5, 01+6, 02+5, 02+6, 03, 04, FLD, HSD, Y). It lists signal face configurations for various phases.

SIGNAL FACE I.D.



MAXTIME DETECTOR INSTALLATION CHART

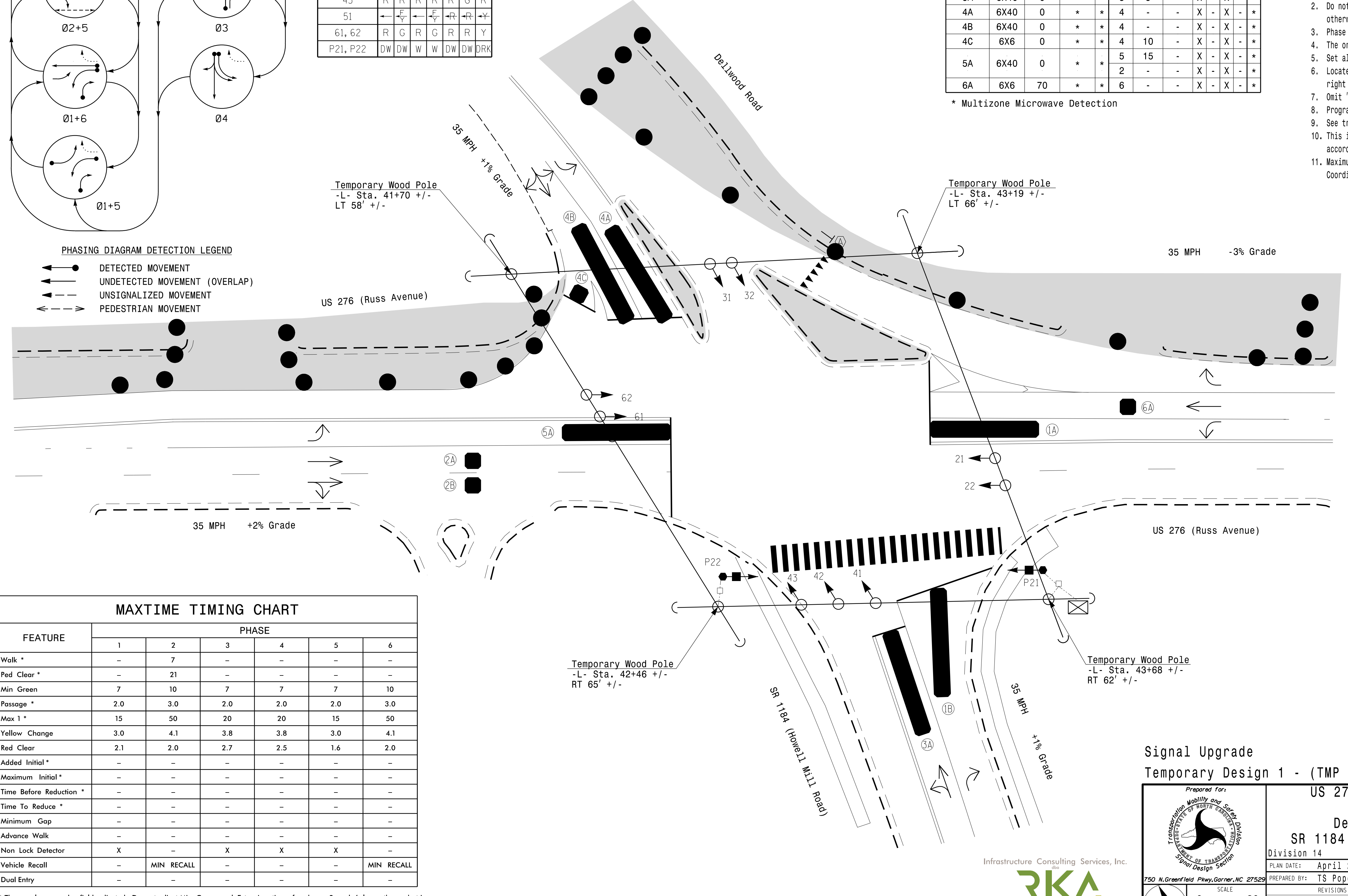
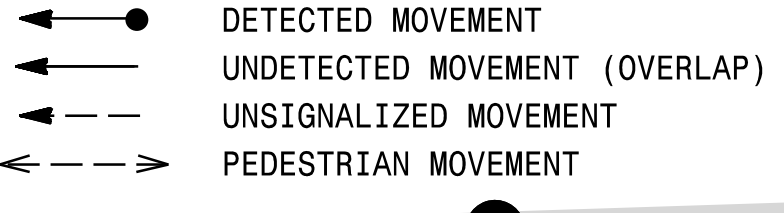
Table with columns for DETECTOR (ZONE, SIZE, DISTANCE, TURNS) and PROGRAMMING (CALL PHASE, DELAY TIME, EXTEND TIME, etc.). It lists detector zones 1A through 6A.

6 Phase Fully Actuated D14-12\_Waynesville

NOTES

- List of 11 notes providing technical specifications and instructions for signal installation and timing, such as 'Refer to Roadway Standard Drawings NCDOT dated January 2018'.

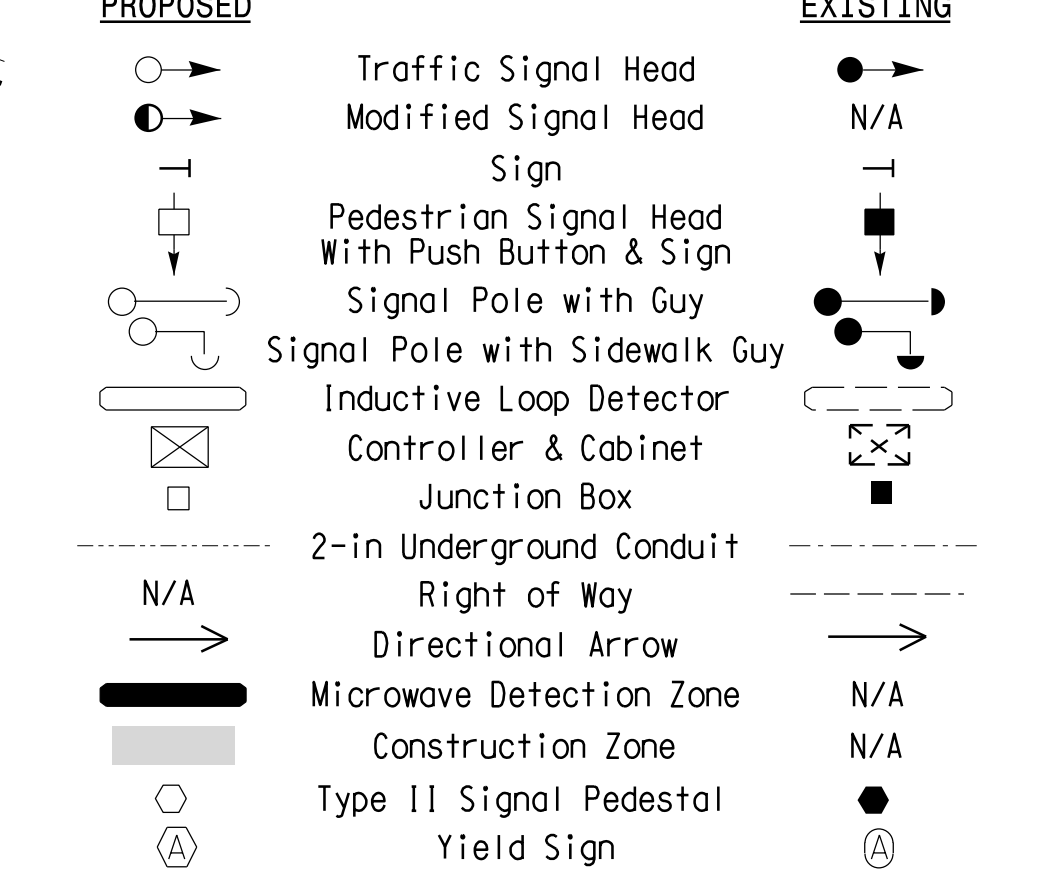
PHASING DIAGRAM DETECTION LEGEND



MAXTIME TIMING CHART

Table with columns for FEATURE and PHASE (1 through 6). It lists timing parameters such as Walk, Ped Clear, Min Green, Passage, Max I, Yellow Change, Red Clear, and Added Initial.

LEGEND



Signal Upgrade Temporary Design 1 - (TMP Phase I)

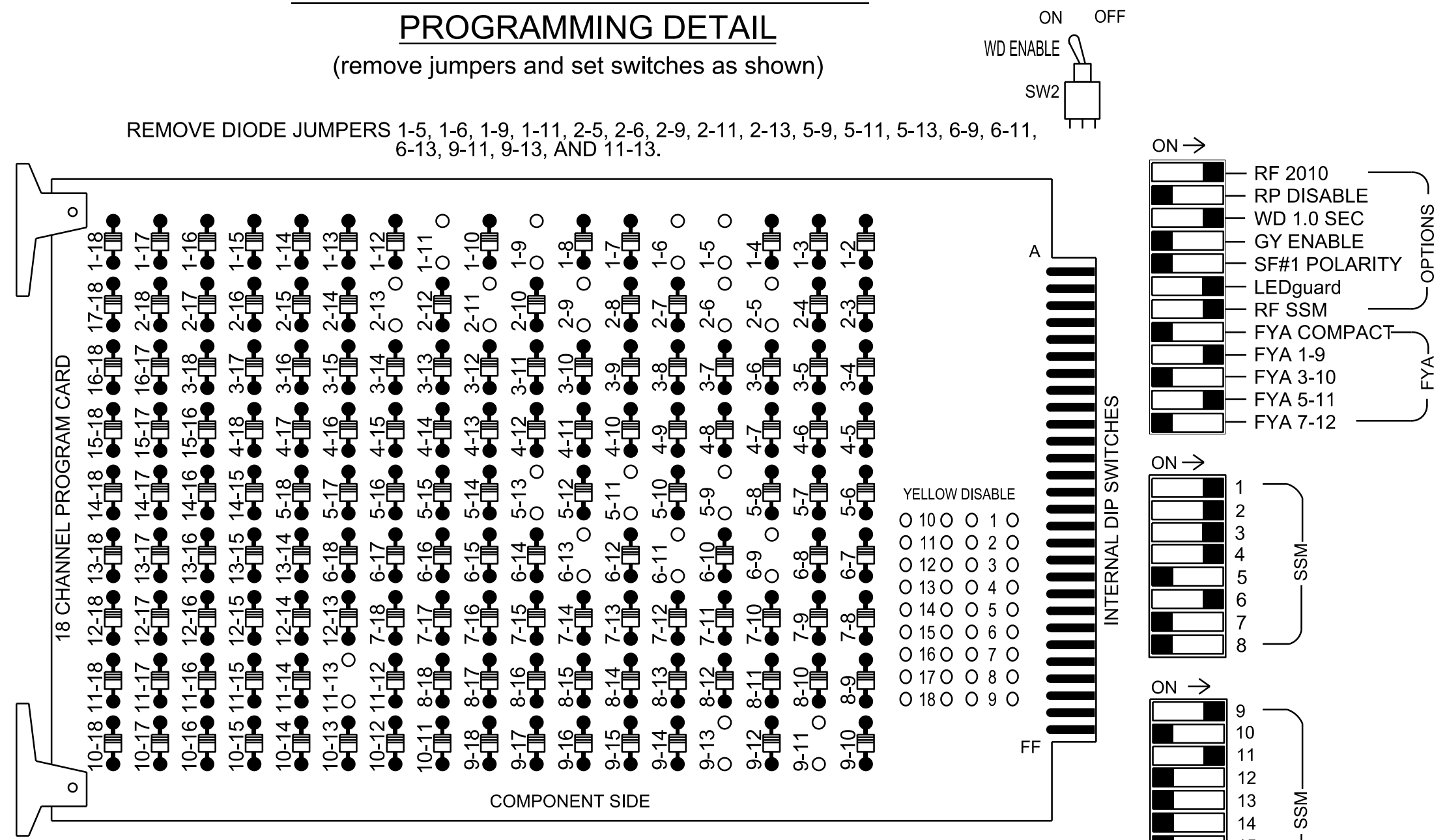
Professional seal and title block for William J. Hamilton, Engineer, dated April 2023. Includes project information for US 276 at Dellwood Road and SR 1184.

\* 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.



### 18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



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

### NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the signal plan.
- Program controller to start up in phase 2 Walk and 6 Green No Walk.
- If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
- The cabinet and controller are part of the D14-12 Waynesville Signal System.

### EQUIPMENT INFORMATION

Controller.....2070LX  
 Cabinet.....332 w/ Aux  
 Software.....Q-Free MAXTIME  
 Cabinet Mount.....Base  
 Output File Positions.....18 With Aux. Output File  
 Load Switches Used.....S1, S2, S3, S4, S5, S7, S8, AUX S1, AUX S4  
 Phases Used.....1, 2, 2PED, 3, 4, 5, 6  
 Overlap "1".....\*  
 Overlap "2".....NOT USED  
 Overlap "3".....\*  
 Overlap "4".....NOT USED

\*See overlap programming detail on sheet 2

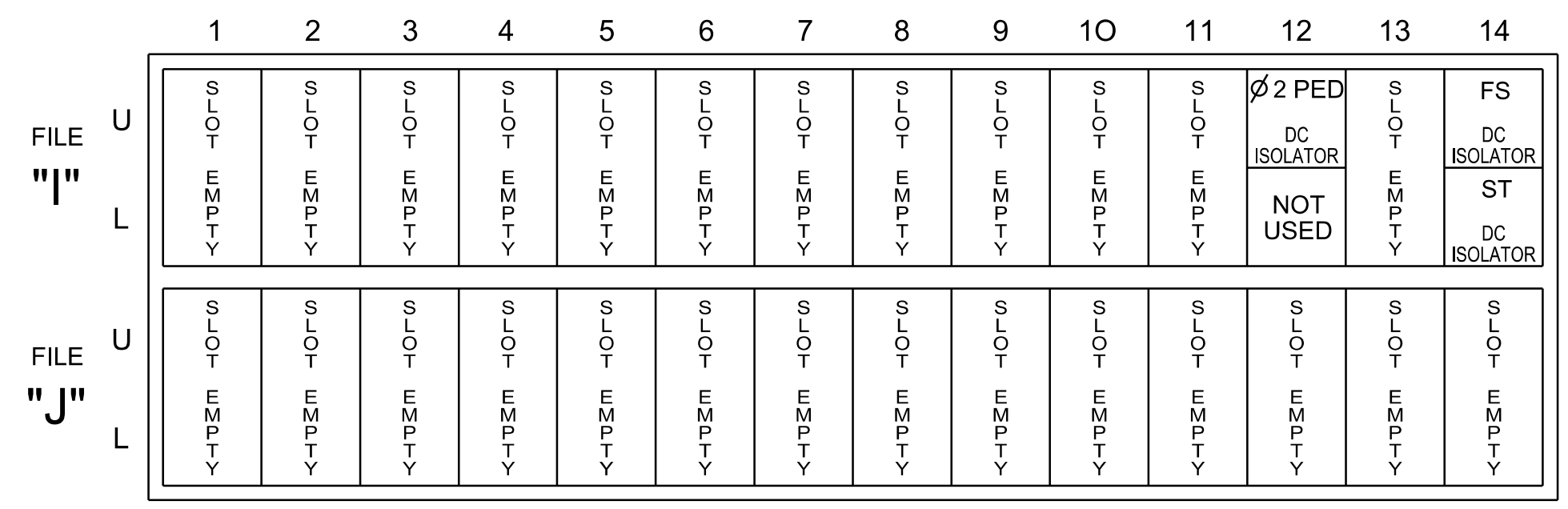
### SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6	
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18	
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE	
SIGNAL HEAD NO.	11*	32	21,22	P21, P22	31	32	41	42	43	NU	51*	61,62	NU	NU	NU	11*	NU	51*	NU
RED	*	128		116	116	101	101					134							
YELLOW		129		117	117	102	102	*	135										
GREEN		130		118	118	103	103		136										
RED ARROW						101							A121					A114	
YELLOW ARROW		126				102							A122					A115	
FLASHING YELLOW ARROW													A123					A116	
GREEN ARROW	127	127		118	103	103		133											
Hand																			
Walking Person																			

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

### INPUT FILE POSITION LAYOUT

(front view)



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

FS = FLASH SENSE  
ST = STOP TIME

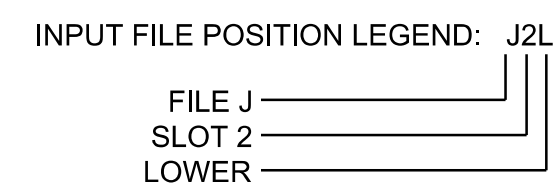
### SPECIAL DETECTOR NOTE

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

### INPUT FILE CONNECTION & PROGRAMMING CHART

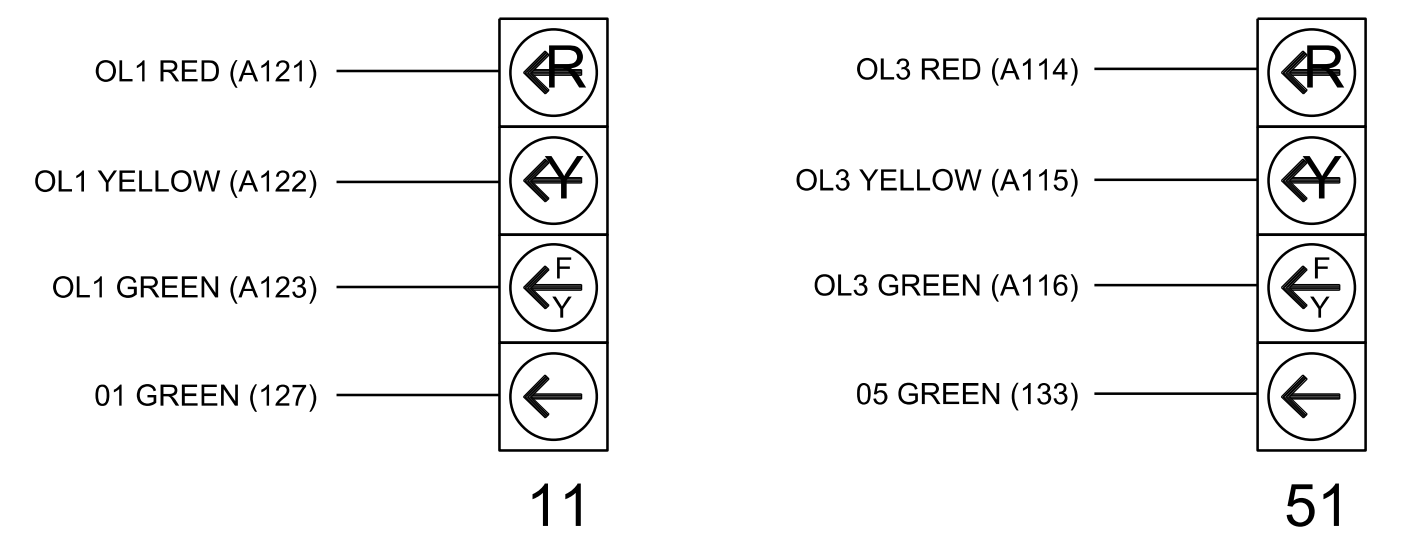
LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN
PED PUSH BUTTONS												
P21,P22	TB8-4,6	I12U	67	33	2	PED 2						

NOTE: INSTALL DC ISOLATOR IN INPUT FILE SLOT I12.



### FYA SIGNAL WIRING DETAIL

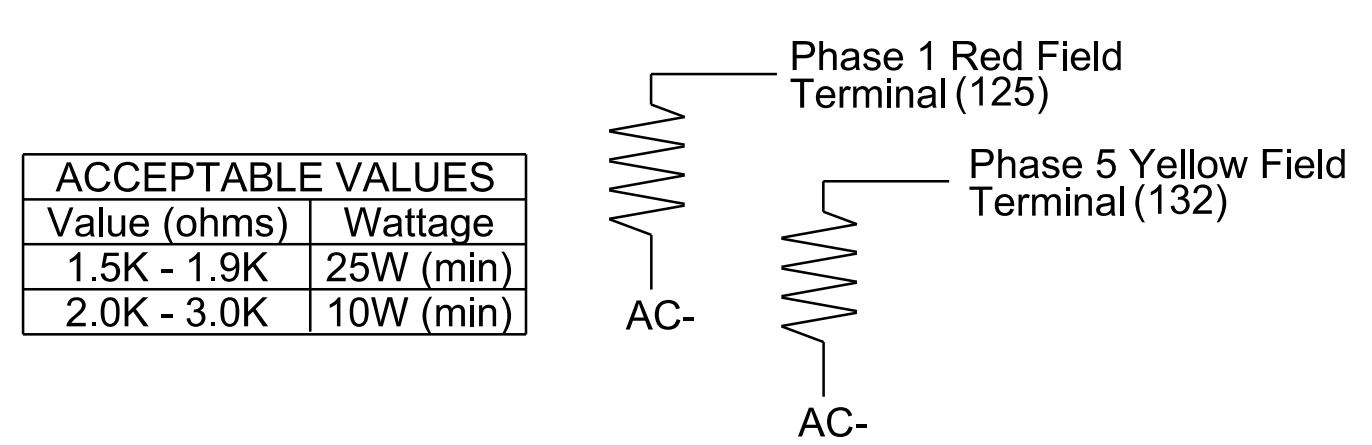
(wire signal heads as shown)



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 14-0359T1  
 DESIGNED: Apr 2023  
 SEALED: 04/11/2023  
 REVISED: N/A

### LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)



### COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

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

Prepared For:

US 276 (Russ Avenue) at Dellwood Road/ SR 1184 (Howell Mill Road)  
 Division 14 Haywood County Waynesville

PLAN DATE: April 2023 REVIEWED BY: WJ Hamilton  
 PREPARED BY: TS Popelka RKA PROJ. NO: 16085 (040)

REVISIONS: \_\_\_\_\_ INIT. DATE \_\_\_\_\_

Seal:

04/11/2023  
 SIGNATURE: \_\_\_\_\_ DATE: \_\_\_\_\_  
 SIG. INVENTORY NO. 14-0359T1

### OVERLAP PROGRAMMING

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

Web Interface  
Home >Controller >Overlap Configuration >Overlaps

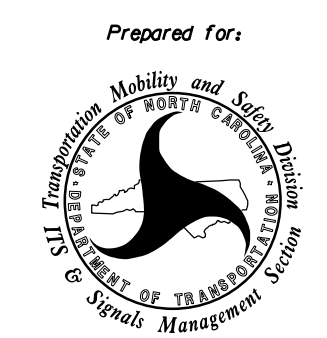
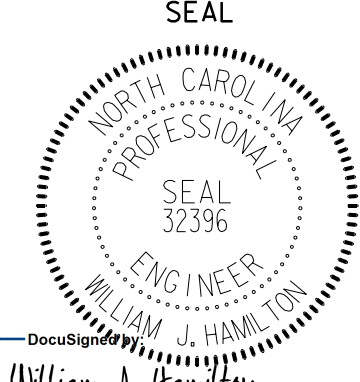

Overlap Plan 1

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

THIS ELECTRICAL DETAIL IS FOR  
THE SIGNAL DESIGN: 14-0359T1  
DESIGNED: Apr 2023  
SEALED: 04/11/2023  
REVISED: N/A

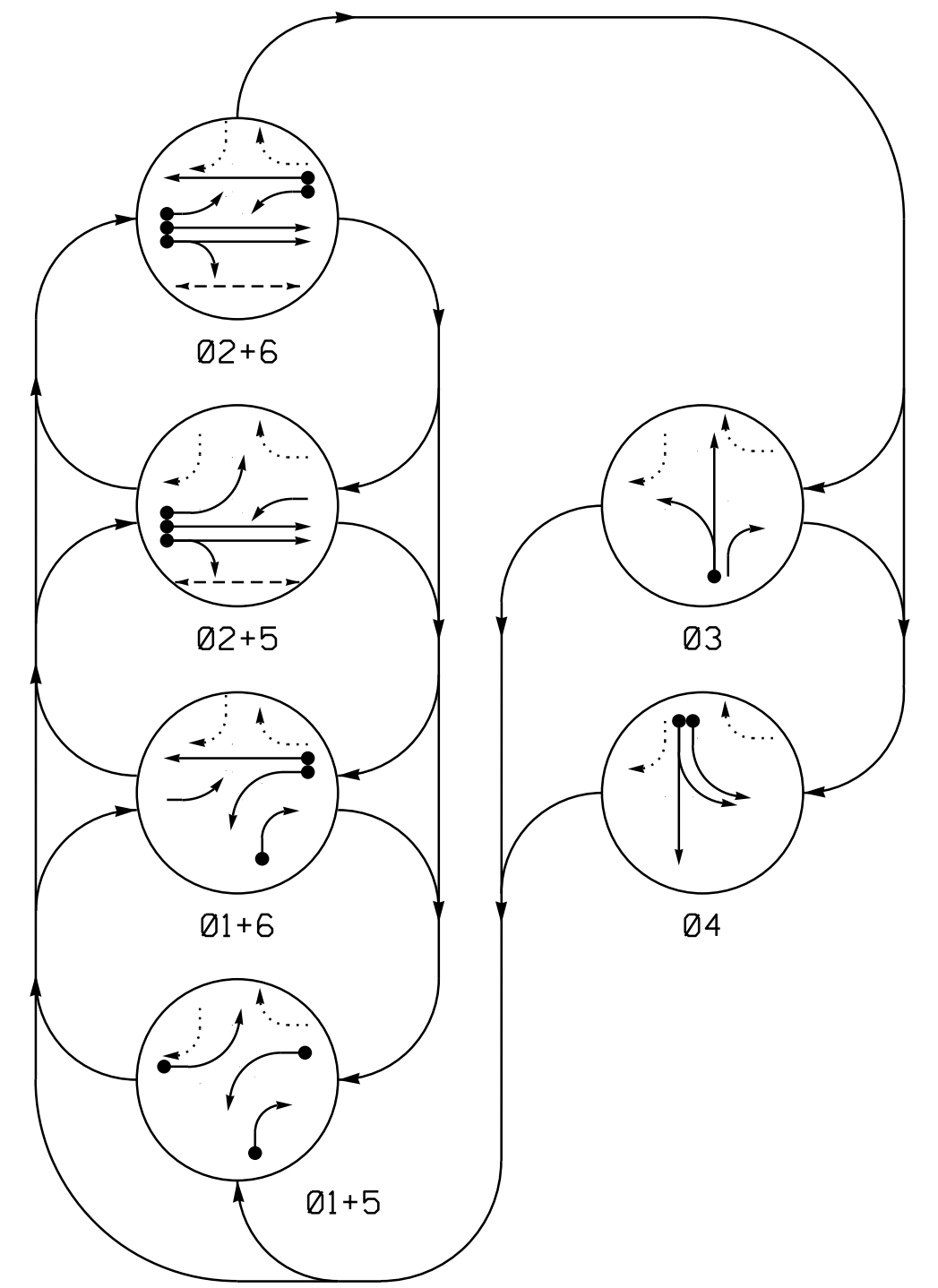
Electrical Detail - Sheet 2 of 2  
Temporary Design 1 - (TMP Phase I)

DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED

<p>ELECTRICAL AND PROGRAMMING DETAILS FOR:</p> <div style="text-align: center;"> <p><i>Prepared For:</i></p>  </div> <p style="font-size: small;">750 N. Greenfield Pkwy, Garner, NC 27529</p>	<p><b>US 276 (Russ Avenue)</b> at <b>Dellwood Road/ SR 1184 (Howell Mill Road)</b> Division 14 Haywood County Waynesville</p> <table style="width: 100%; font-size: x-small;"> <tr> <td>PLAN DATE: April 2023</td> <td>REVIEWED BY: WJ Hamilton</td> </tr> <tr> <td>PREPARED BY: TS Popelka</td> <td>RKA PROJ. NO: 16085 (040)</td> </tr> </table>	PLAN DATE: April 2023	REVIEWED BY: WJ Hamilton	PREPARED BY: TS Popelka	RKA PROJ. NO: 16085 (040)	<p style="text-align: center;">SEAL</p>  <p style="font-size: x-small;">SEAL 32396 WILLIAM J. HAMILTON ENGINEER</p>								
PLAN DATE: April 2023	REVIEWED BY: WJ Hamilton													
PREPARED BY: TS Popelka	RKA PROJ. NO: 16085 (040)													
 <p style="font-size: x-small;">Infrastructure Consulting Services, Inc. <b>RKA</b> RAMEY KEMP ASSOCIATES 8210 University Executive Park Drive Suite 220 Charlotte, North Carolina 28223 Phone: 704-548-4200   www.rameykemp.com   NC License No. F-1489</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>REVISIONS</th> <th>INIT.</th> <th>DATE</th> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> </table>	REVISIONS	INIT.	DATE										<p style="font-size: x-small;">DocuSign <i>William J. Hamilton</i> SIGNATURE DATE 04/11/2023</p> <p style="font-size: x-small;">SIG. INVENTORY NO. 14-0359T1</p>
REVISIONS	INIT.	DATE												

4/11/2023  
14-0359T1\_sml.ele\_2020mmda.dgn  
User: jwendt

**PHASING DIAGRAM**



**PHASING DIAGRAM DETECTION LEGEND**

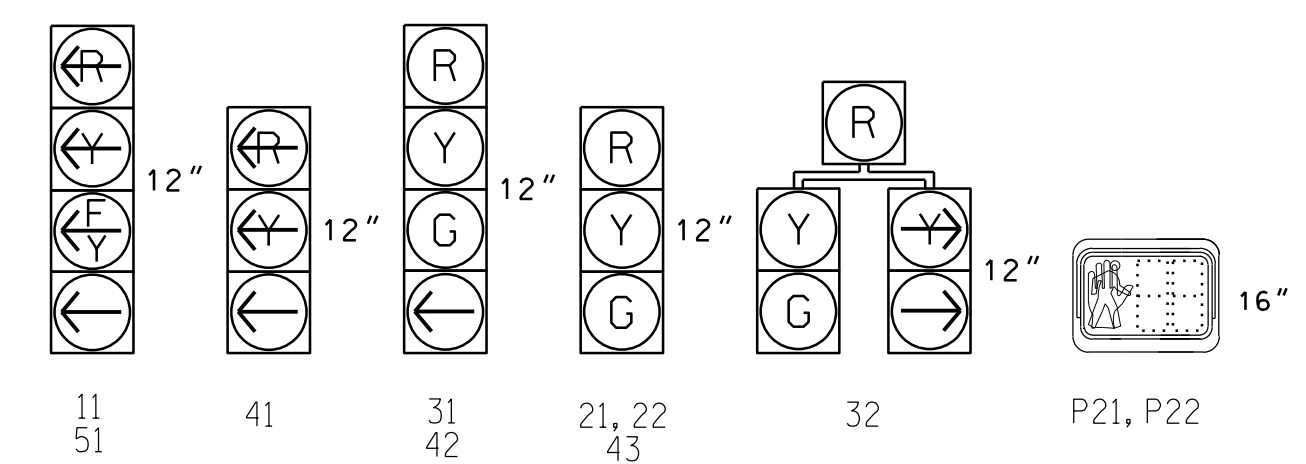
- ← ● DETECTED MOVEMENT
- ← ○ UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- ← → PEDESTRIAN MOVEMENT

**TABLE OF OPERATION**

SIGNAL FACE	PHASE					
	01+5	01+6	02+5	02+6	03	04
11	-	-	F	F	R	Y
21, 22	R	R	G	G	R	Y
31	R	R	R	R	G	R
32	R	R	R	R	G	R
41	R	R	R	R	G	R
42	R	R	R	R	G	R
43	R	R	R	R	G	R
51	-	F	-	F	R	Y
61, 62	R	G	R	G	R	Y
P21, P22	DW	DW	W	W	DW	DRK

**SIGNAL FACE I.D.**

All Heads L.E.D.



**MAXTIME DETECTOR INSTALLATION CHART**

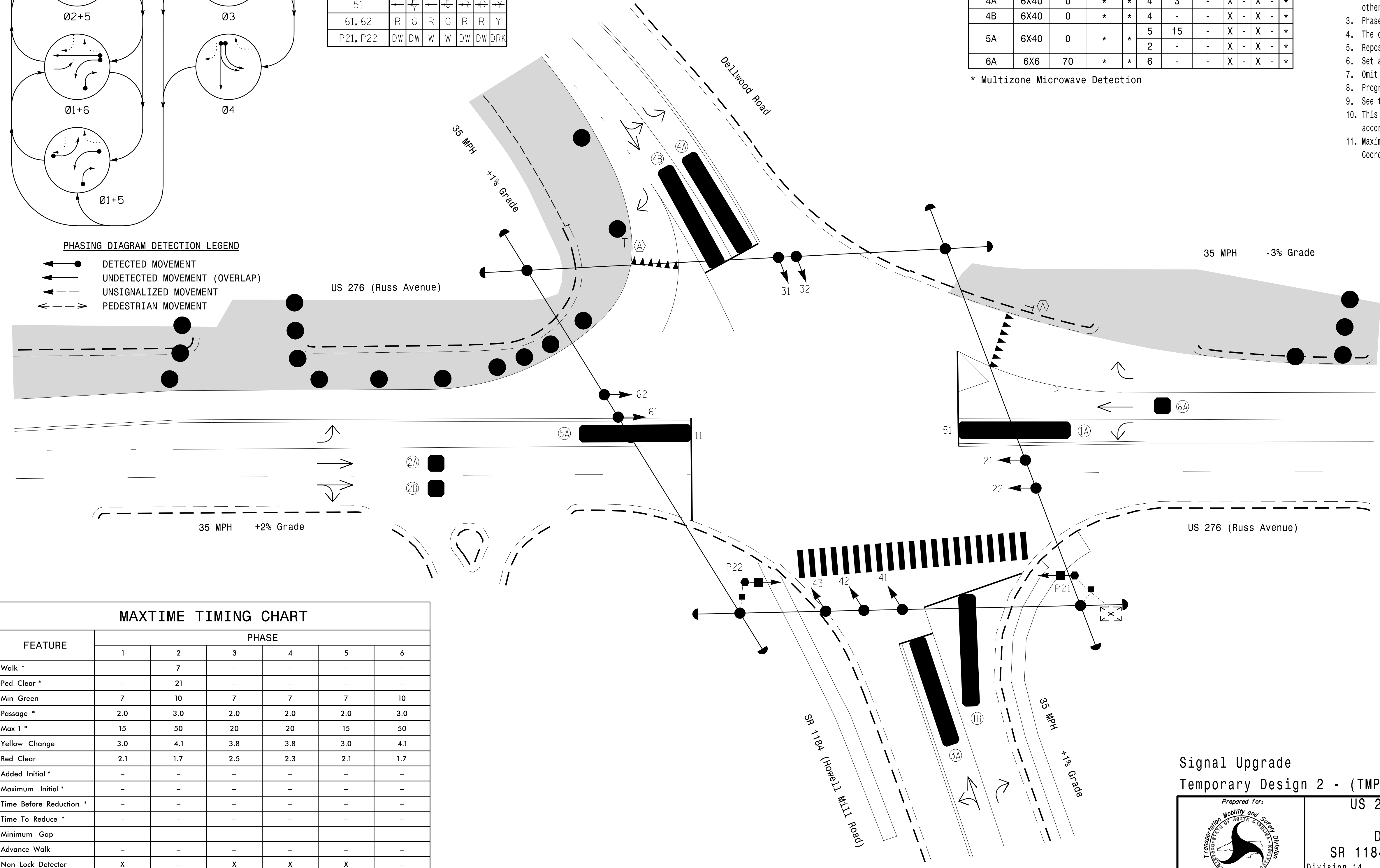
ZONE	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING						
					CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	RECALL DURING GREEN
1A	6X40	0	*	*	1	15	-	X	X	-	*
1B	6X40	0	*	*	1	15	-	X	X	-	*
2A	6X6	70	*	*	2	-	-	X	X	-	*
2B	6X6	70	*	*	2	-	-	X	X	-	*
3A	6X40	0	*	*	3	3	-	X	X	-	*
4A	6X40	0	*	*	4	3	-	X	X	-	*
4B	6X40	0	*	*	4	-	-	X	X	-	*
5A	6X40	0	*	*	5	15	-	X	X	-	*
6A	6X6	70	*	*	6	-	-	X	X	-	*

\* Multizone Microwave Detection

**6 Phase Fully Actuated D14-12\_Waynesville**

**NOTES**

- Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Phase 1 and/or phase 5 may be lagged.
- The order of phase 3 and phase 4 may be reversed.
- Reposition existing signal heads numbered 31 and 32.
- 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.
- See traffic control plans for stop bar locations.
- This intersection uses multi-zone microwave detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.



**MAXTIME TIMING CHART**

FEATURE	PHASE					
	1	2	3	4	5	6
Walk *	-	7	-	-	-	-
Ped Clear *	-	21	-	-	-	-
Min Green	7	10	7	7	7	10
Passage *	2.0	3.0	2.0	2.0	2.0	3.0
Max 1 *	15	50	20	20	15	50
Yellow Change	3.0	4.1	3.8	3.8	3.0	4.1
Red Clear	2.1	1.7	2.5	2.3	2.1	1.7
Added Initial *	-	-	-	-	-	-
Maximum Initial *	-	-	-	-	-	-
Time Before Reduction *	-	-	-	-	-	-
Time To Reduce *	-	-	-	-	-	-
Minimum Gap	-	-	-	-	-	-
Advance Walk	-	-	-	-	-	-
Non Lock Detector	X	-	X	X	X	-
Vehicle Recall	-	MIN RECALL	-	-	-	MIN RECALL
Dual Entry	-	-	-	-	-	-

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

**LEGEND**

- |  |                 |
|--|-----------------|
| <b>PROPOSED</b>                                    | <b>EXISTING</b> |
| ○ → Traffic Signal Head                            | ● → N/A         |
| ○ → Modified Signal Head                           | ○ → N/A         |
| ○ → Sign   | ○ → N/A         |
| ○ → Pedestrian Signal Head With Push Button & Sign | ○ → N/A         |
| ○ → Signal Pole with Guy                           | ○ → N/A         |
| ○ → Signal Pole with Sidewalk Guy                  | ○ → N/A         |
| ○ → Inductive Loop Detector                        | ○ → N/A         |
| ○ → Controller & Cabinet                           | ○ → N/A         |
| ○ → Junction Box                                   | ○ → N/A         |
| ○ → 2-in Underground Conduit                       | ○ → N/A         |
| ○ → Right of Way                                   | ○ → N/A         |
| ○ → Directional Arrow                              | ○ → N/A         |
| ○ → Microwave Detection Zone                       | ○ → N/A         |
| ○ → Construction Zone                              | ○ → N/A         |
| ○ → Type II Signal Pedestal                        | ○ → N/A         |
| ○ → Yield Sign                                     | ○ → N/A         |

**Signal Upgrade Temporary Design 2 - (TMP Phase I, Step 2)**

	<p>US 276 (Russ Avenue) at Dellwood Road/ SR 1184 (Howell Mill Road)</p>	
	<p>Division 14 Haywood County</p>	<p>Waynesville</p>
<p>PLAN DATE: April 2023</p>	<p>REVIEWED BY: WJ Hamilton</p>	<p>PREPARED BY: TS Popelka</p>
<p>750 N. Greenfield Pkwy, Garner, NC 27529</p>	<p>RKA PROJ. NO.: 16085 (040)</p>	<p>SCALE: 1" = 20'</p>
<p>REVISIONS</p>	<p>INIT.</p>	<p>DATE</p>
<p>SIGNATURE</p>	<p>DATE</p>	<p>DATE</p>
<p>SIG. INVENTORY NO. 14-0359T2</p>	<p>04/11/2023</p>	<p>04/11/2023</p>

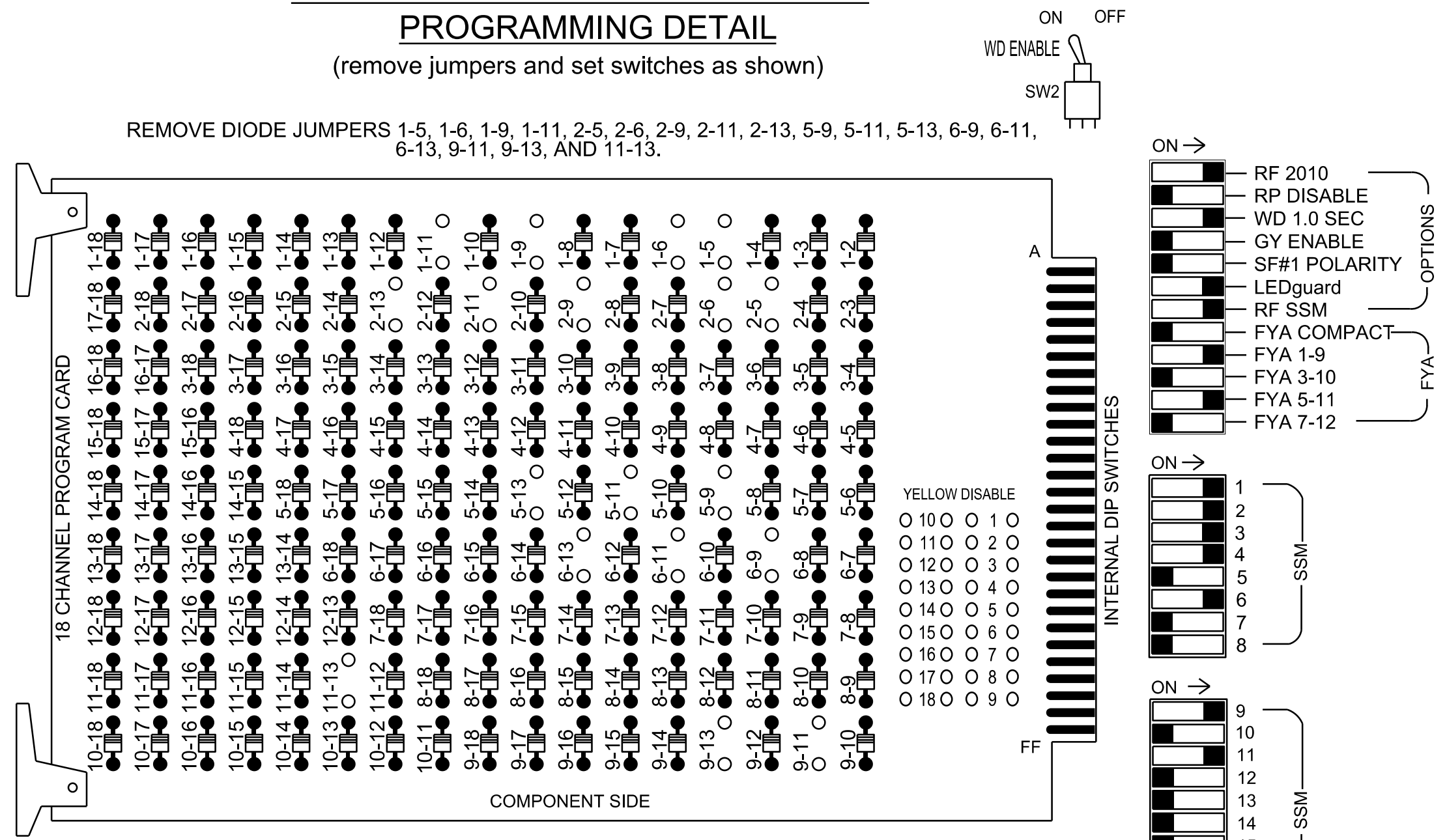
Infrastructure Consulting Services, Inc. **RKA** RAMEY KEMP ASSOCIATES

8210 University Executive Park Drive Suite 228 Charlotte, North Carolina 28262  
Phone: 704-549-4260 | www.rameykemp.com | NC License No. F-1489

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

### 18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



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

### NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the signal plan.
- Program controller to start up in phase 2 Green Walk and 6 Green No Walk.
- If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
- The cabinet and controller are part of the D14-12 Waynesville Signal System.

### EQUIPMENT INFORMATION

Controller.....2070LX  
 Cabinet.....332 w/ Aux  
 Software.....Q-Free MAXTIME  
 Cabinet Mount.....Base  
 Output File Positions.....18 With Aux. Output File  
 Load Switches Used.....S1, S2, S3, S4, S5, S7, S8, AUX S1, AUX S4  
 Phases Used.....1, 2, 2PED, 3, 4, 5, 6  
 Overlap "1".....\*  
 Overlap "2".....NOT USED  
 Overlap "3".....\*  
 Overlap "4".....NOT USED

\*See overlap programming detail on sheet 2

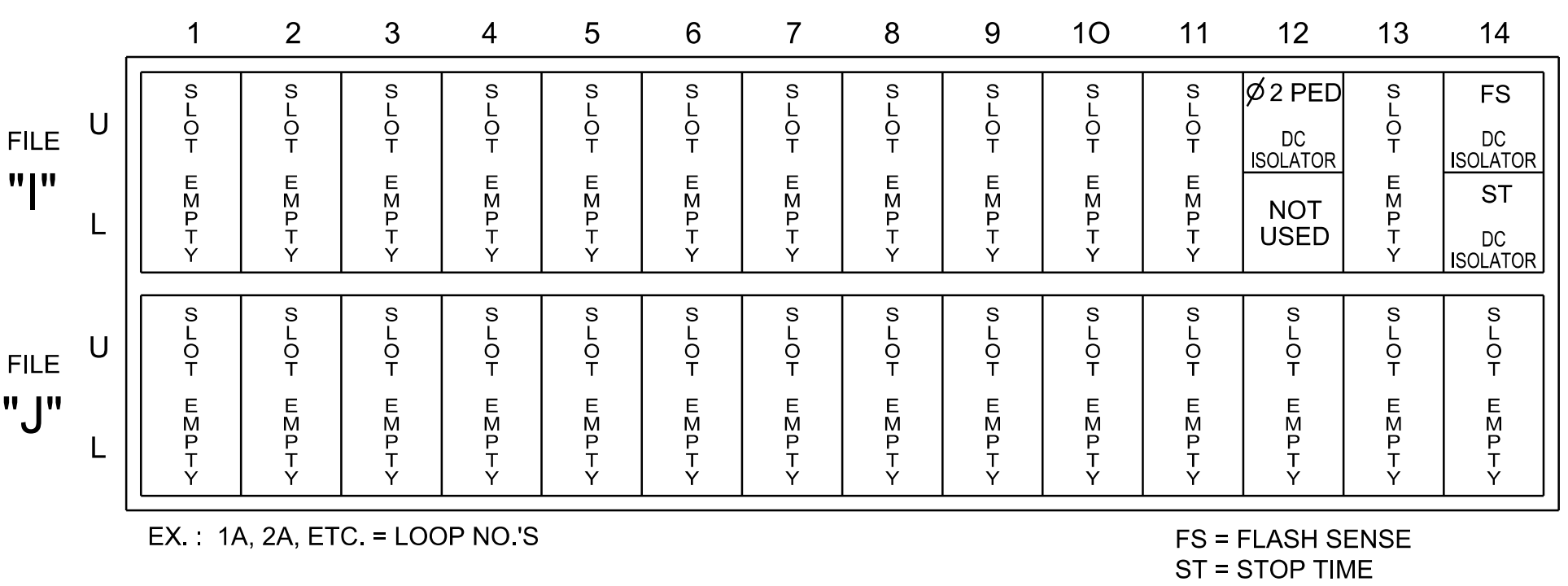
### SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6	
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18	
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE	
SIGNAL HEAD NO.	11*	32	21,22	P21, P22	31	32	41	42	43	NU	51*	61,62	NU	NU	NU	11*	NU	51*	NU
RED	*	128		116	116	101	101					134							
YELLOW		129		117	117	102	102	*	135										
GREEN		130		118	118	103	103		136										
RED ARROW						101										A121		A114	
YELLOW ARROW		126				102										A122		A115	
FLASHING YELLOW ARROW																A123		A116	
GREEN ARROW	127	127		118	103	103		133											
Hand							113												
Walking Person							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

(front view)



### SPECIAL DETECTOR NOTE

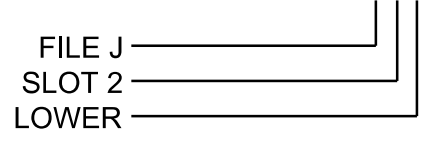
Install a multizone microwave detection system for vehicle detection. Perform installation according to manufacturer's directions and NCDOT engineer-approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.

### INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN
PED PUSH BUTTONS												
P21,P22	TB8-4,6	I12U	67	33	2	PED 2						

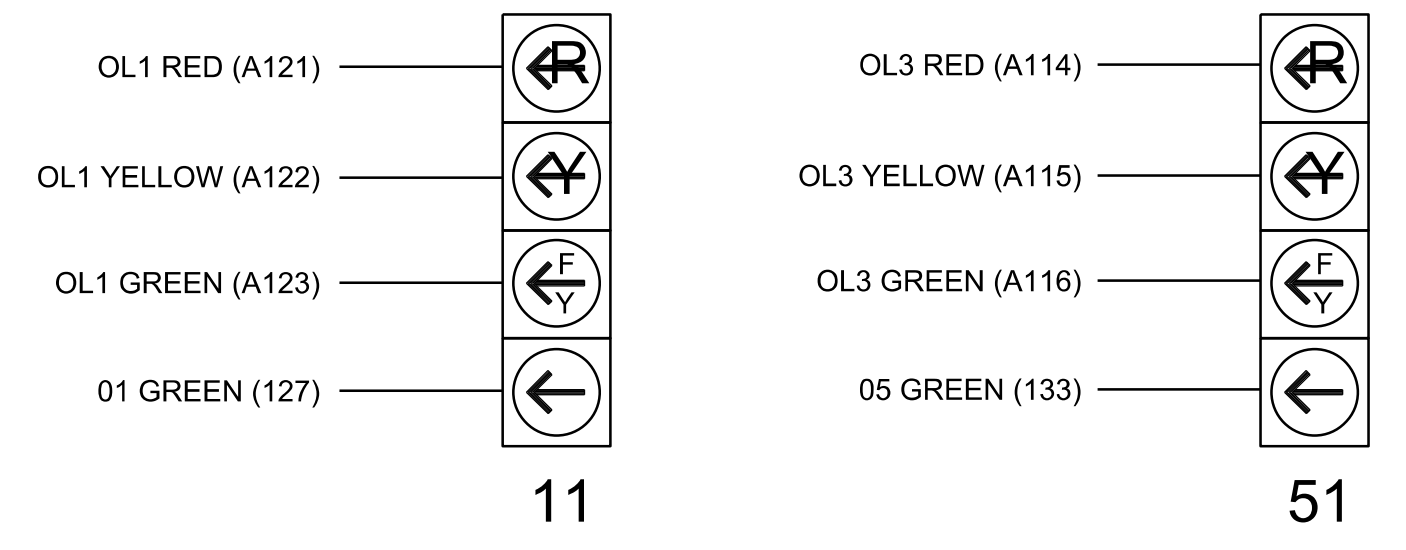
NOTE: INSTALL DC ISOLATOR IN INPUT FILE SLOT I12.

### INPUT FILE POSITION LEGEND: J2L



### FYA SIGNAL WIRING DETAIL

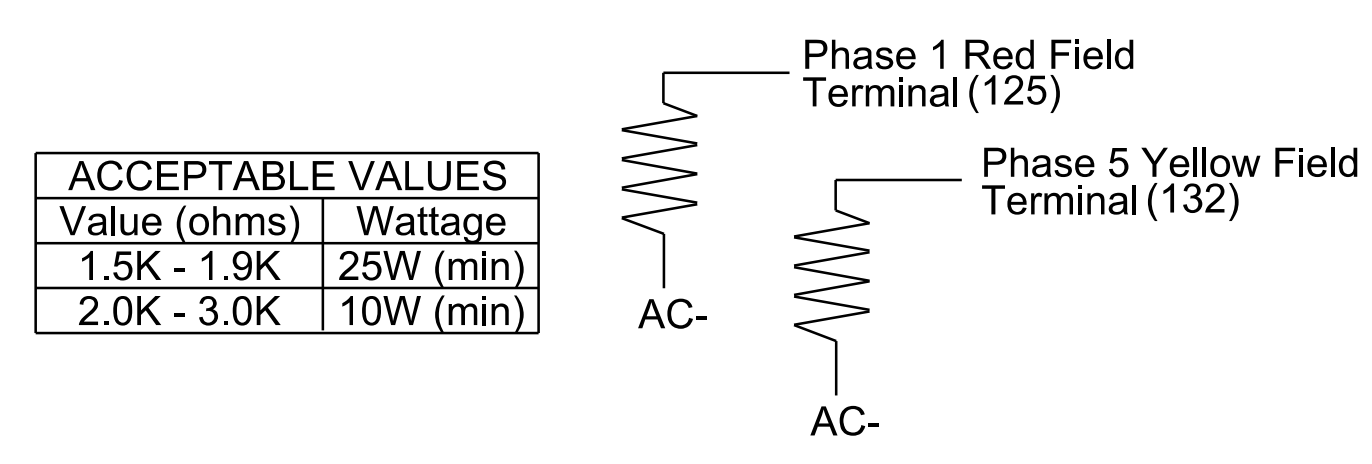
(wire signal heads as shown)



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 14-0359T2  
 DESIGNED: Apr 2023  
 SEALED: 04/11/2023  
 REVISED: N/A

### LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)



### COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

Electrical Detail - Sheet 1 of 2  
 Temporary Design 2 - (TMP Phase I, Step 2)

	Prepared For: 		US 276 (Russ Avenue) at Dellwood Road/ SR 1184 (Howell Mill Road) Division 14 Haywood County Waynesville		
	PLAN DATE: April 2023 PREPARED BY: TS Popelka	REVIEWED BY: WJ Hamilton RKA PROJ. NO: 16085 (040)	REVISIONS INIT. DATE	DATE	

750 N. Greenfield Pkwy, Garner, NC 27529

SIG. INVENTORY NO. 14-0359T2

### OVERLAP PROGRAMMING

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

Web Interface  
Home >Controller >Overlap Configuration >Overlaps

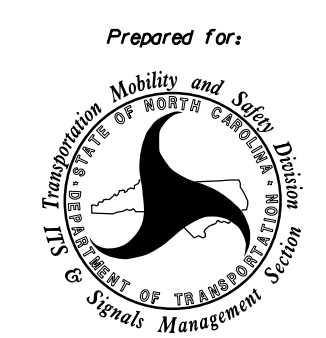
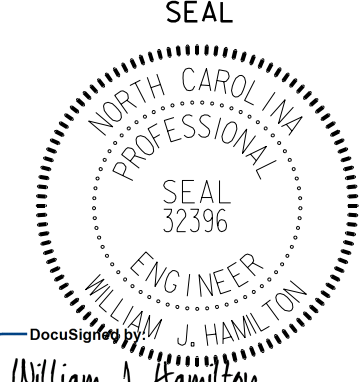
Overlap Plan 1

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

THIS ELECTRICAL DETAIL IS FOR  
THE SIGNAL DESIGN: 14-0359T2  
DESIGNED: Apr 2023  
SEALED: 04/11/2023  
REVISED: N/A

Electrical Detail - Sheet 2 of 2  
Temporary Design 2 - (TMP Phase I, Step 2)

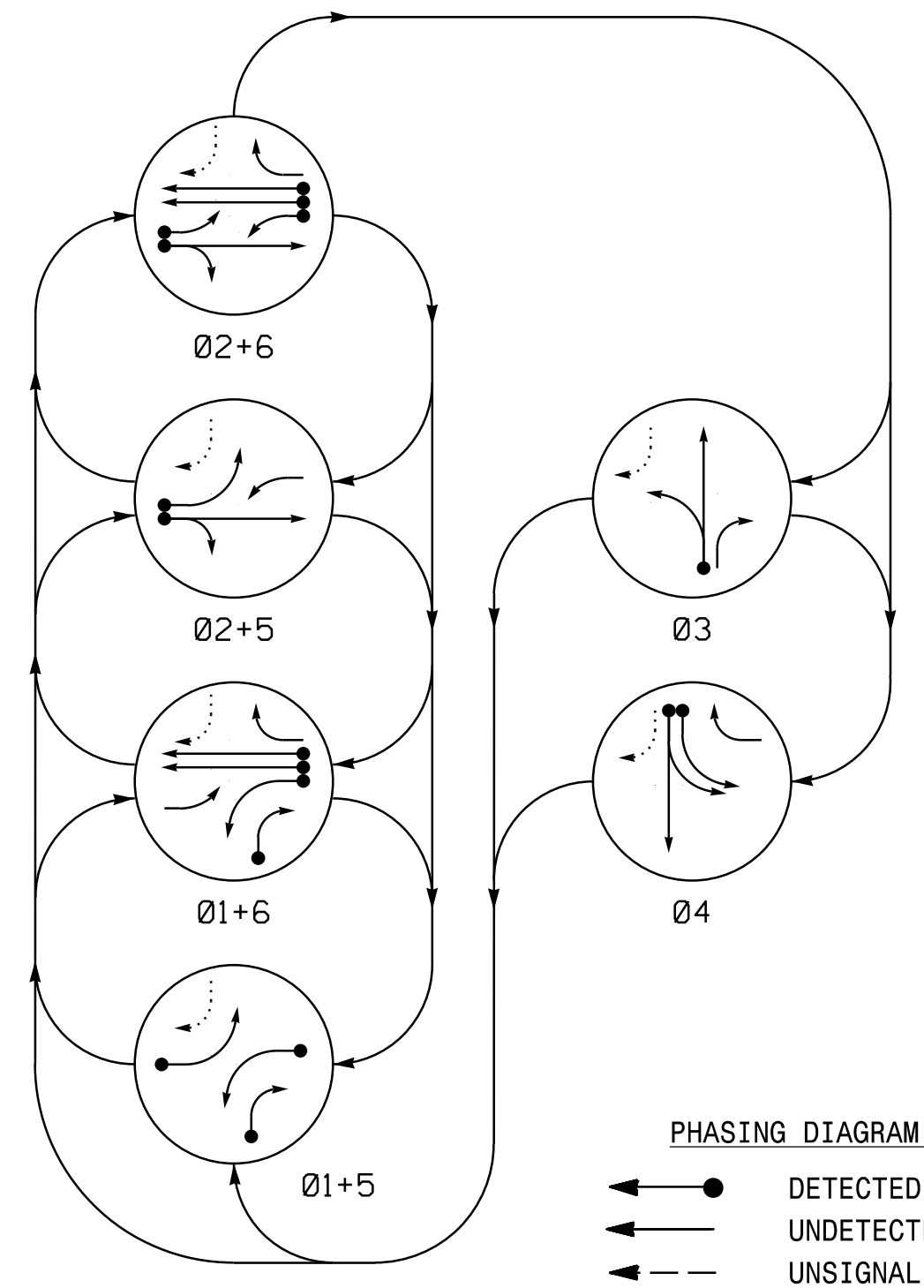
DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED

<p style="font-size: x-small;">ELECTRICAL AND PROGRAMMING DETAILS FOR:</p> <div style="text-align: center;"> <p style="font-size: x-small;">Prepared For:</p>  </div> <p style="font-size: x-small;">750 N. Greenfield Pkwy, Garner, NC 27529</p>	<p><b>US 276 (Russ Avenue)</b> at <b>Dellwood Road/ SR 1184 (Howell Mill Road)</b> Division 14 Haywood County Waynesville</p> <p style="font-size: x-small;">PLAN DATE: April 2023    REVIEWED BY: WJ Hamilton PREPARED BY: TS Popelka    RKA PROJ. NO: 16085 (040)</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="font-size: x-small;">REVISIONS</th> <th style="font-size: x-small;">INIT.</th> <th style="font-size: x-small;">DATE</th> </tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> </tbody> </table>	REVISIONS	INIT.	DATE										<p style="text-align: center; font-size: x-small;">SEAL</p> <div style="text-align: center;">  <p style="font-size: x-small;">WILLIAM J. HAMILTON ENGINEER 04/11/2023</p> </div> <p style="font-size: x-small;">SIGNATURE    DATE SIG. INVENTORY NO. 14-0359T2</p>
REVISIONS	INIT.	DATE												



4/11/2023  
...410359T2...sm.ele.2020mmda.dgn  
User: J.Wendt

**PHASING DIAGRAM**

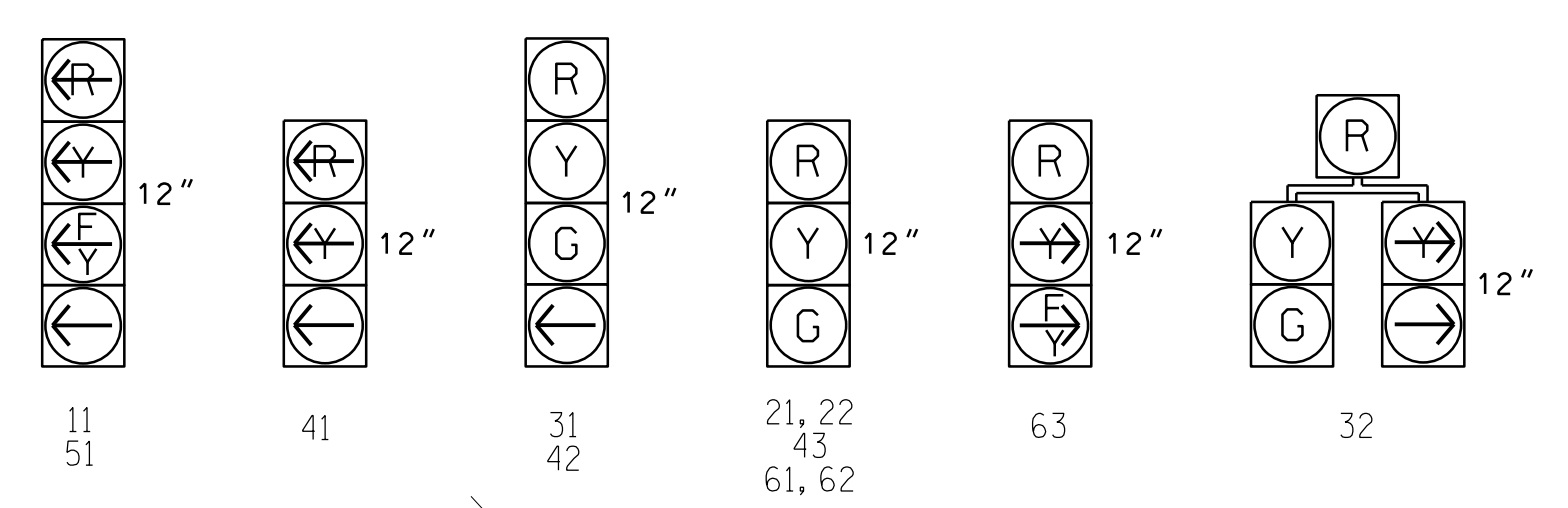


**TABLE OF OPERATION**

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

**SIGNAL FACE I.D.**

All Heads L.E.D.



**MAXTIME DETECTOR INSTALLATION CHART**

ZONE	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING					
					CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND ADDED INITIAL	CALL DURING GREEN	NEW CARD
1A	6X40	0	*	*	1	15	-	X	X	*
1B	6X40	0	*	*	6	-	-	X	X	*
2A	6X6	70	*	*	2	-	-	X	X	*
2B	6X6	70	*	*	2	-	-	X	X	*
3A	6X40	0	*	*	3	3	-	X	X	*
4A	6X40	0	*	*	4	3	-	X	X	*
4B	6X40	0	*	*	4	-	-	X	X	*
5A	6X40	0	*	*	5	15	-	X	X	*
6A	6X6	70	*	*	2	-	-	X	X	*
6B	6X6	70	*	*	6	-	-	X	X	*

\* Multizone Microwave Detection

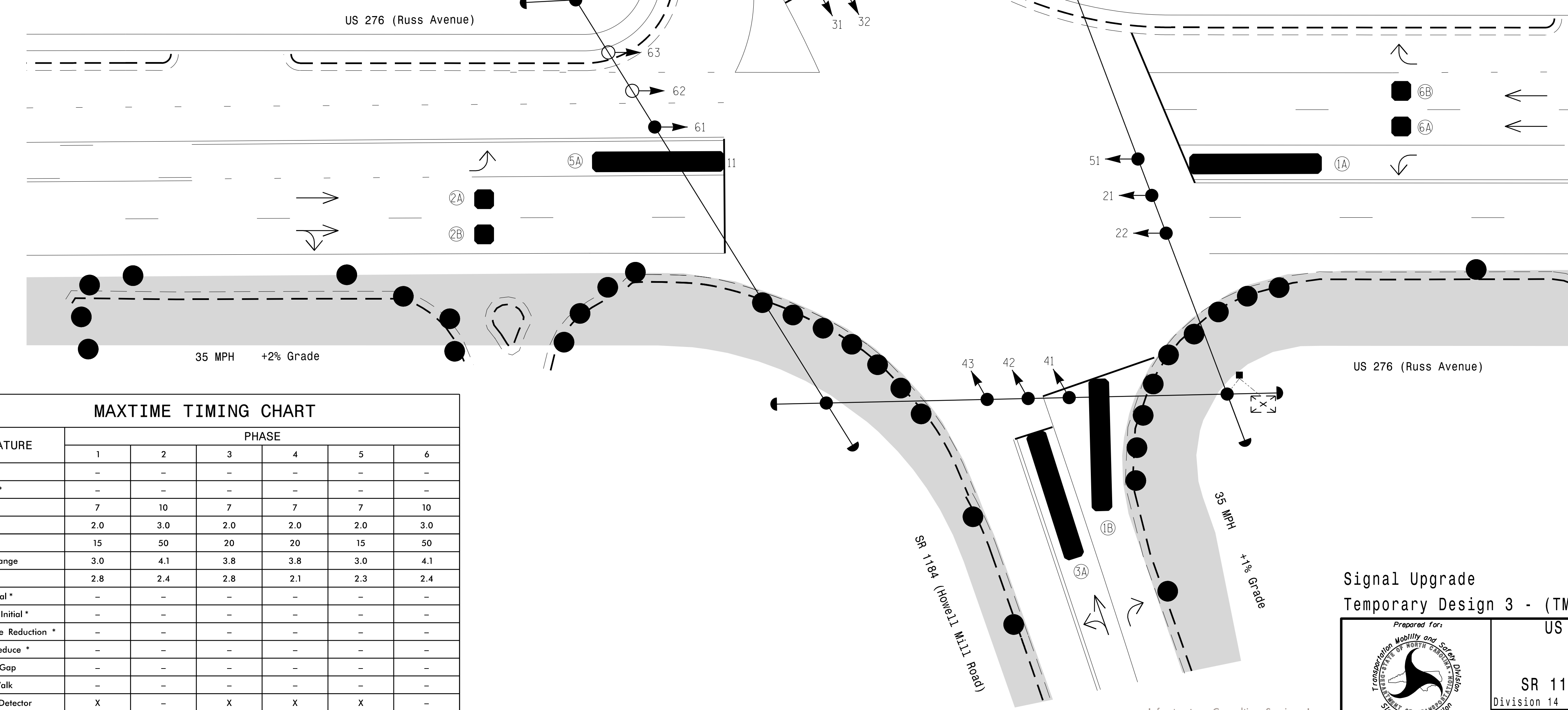
**6 Phase Fully Actuated D14-12\_Waynesville**

**NOTES**

- Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Phase 1 and/or phase 5 may be lagged.
- The order of phase 3 and phase 4 may be reversed.
- Reposition existing signal heads numbered 11, 21, 22, 41, 42, 51, and 61.
- Set all detector units to presence mode.
- See traffic control plans for stop bar locations.
- This intersection uses multizone microwave detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.

**PHASING DIAGRAM DETECTION LEGEND**

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



**MAXTIME TIMING CHART**

FEATURE	PHASE					
	1	2	3	4	5	6
Walk *	-	-	-	-	-	-
Ped Clear *	-	-	-	-	-	-
Min Green	7	10	7	7	7	10
Passage *	2.0	3.0	2.0	2.0	2.0	3.0
Max 1 *	15	50	20	20	15	50
Yellow Change	3.0	4.1	3.8	3.8	3.0	4.1
Red Clear	2.8	2.4	2.8	2.1	2.3	2.4
Added Initial *	-	-	-	-	-	-
Maximum Initial *	-	-	-	-	-	-
Time Before Reduction *	-	-	-	-	-	-
Time To Reduce *	-	-	-	-	-	-
Minimum Gap	-	-	-	-	-	-
Advance Walk	-	-	-	-	-	-
Non Lock Detector	X	-	X	X	X	-
Vehicle Recall	-	MIN RECALL	-	-	-	MIN RECALL
Dual Entry	-	-	-	-	-	-

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

**LEGEND**

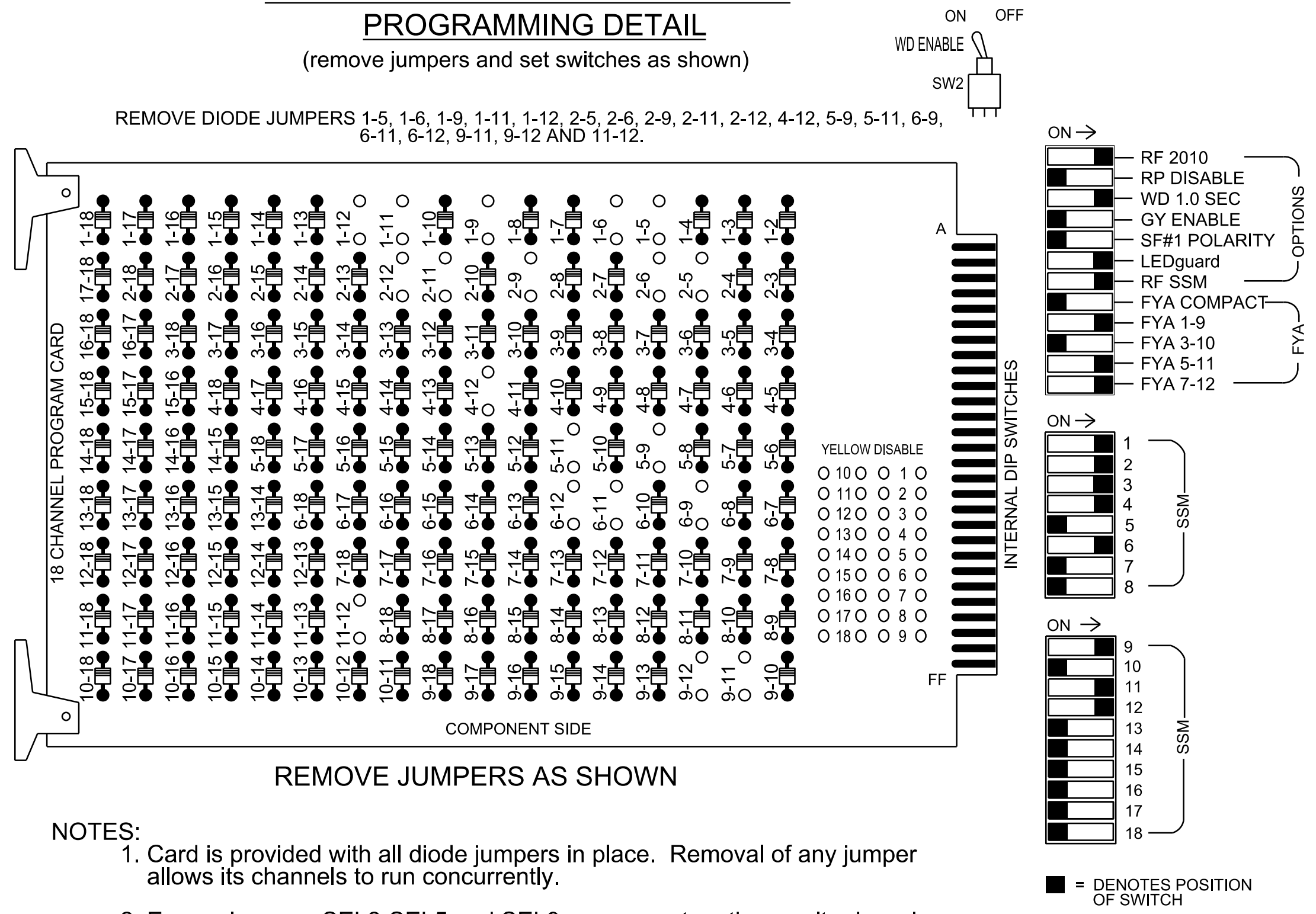
- PROPOSED**
  - Traffic Signal Head
  - Modified Signal Head
  - Sign
  - Pedestrian Signal Head With Push Button & Sign
  - Signal Pole with Guy
  - Signal Pole with Sidewalk Guy
  - Inductive Loop Detector
  - Controller & Cabinet
  - Junction Box
  - 2-in Underground Conduit
  - Right of Way
  - Directional Arrow
  - Microwave Detection Zone
  - Construction Zone
  - Yield Sign
- EXISTING**
  - N/A
  - N/A
  - N/A
  - N/A
  - N/A
  - N/A
  - N/A
  - N/A
  - N/A
  - N/A
  - N/A
  - N/A
  - N/A
  - N/A
  - N/A
  - N/A

**Signal Upgrade Temporary Design 3 - (TMP Phase II, Step 1)**

<p>Infrastructure Consulting Services, Inc.</p> <p>RKA RAMEY KEMP ASSOCIATES</p> <p>8210 University Executive Park Drive Suite 228 Charlotte, North Carolina 28226 Phone: 704-549-4260   www.rameykemp.com   NC License No. F-1489</p>	<p>US 276 (Russ Avenue) at Dellwood Road/ SR 1184 (Howell Mill Road)</p> <p>Division 14 Haywood County Waynesville</p> <p>PLAN DATE: April 2023 REVIEWED BY: WJ Hamilton</p> <p>PREPARED BY: TS Popelka RKA PROJ. NO.: 16085 (040)</p>	<p>SEAL</p> <p>WILLIAM J. HAMILTON</p> <p>ENGINEER</p> <p>SEAL 32396</p> <p>DATE: 04/11/2023</p>								
	<p>750 N. Greenfield Pkwy, Garner, NC 27529</p> <p>SCALE: 1" = 20'</p>	<p>REVISIONS</p> <table border="1"> <tr> <th>NO.</th> <th>DATE</th> <th>INIT.</th> <th>DATE</th> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </table>	NO.	DATE	INIT.	DATE				
NO.	DATE	INIT.	DATE							

### 18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



### NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the signal plan.
- Program controller to start up in phase 2 Green No Walk and 6 Green No Walk.
- If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
- The cabinet and controller are part of the D14-12 Waynesville Signal System.

### EQUIPMENT INFORMATION

Controller.....2070LX  
 Cabinet.....332 w/ Aux  
 Software.....Q-Free MAXTIME  
 Cabinet Mount.....Base  
 Output File Positions.....18 With Aux. Output File  
 Load Switches Used.....S1, S2, S4, S5, S7, S8, AUX S1, AUX S4, AUX S5

Phases Used.....1, 2, 3, 4, 5, 6  
 Overlap "1".....\*  
 Overlap "2".....NOT USED  
 Overlap "3".....\*  
 Overlap "4".....\*

\*See overlap programming detail on sheet 2

### SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6		
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18		
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE		
SIGNAL HEAD NO.	11*	32	21.22	NU	31	32	41	42	43	NU	51*	61,62	NU	NU	NU	11*	NU	51*	63*	NU
RED	*	128		116	116	101	101					134							A101	
YELLOW		129		117	117	102	102	*	135											
GREEN		130		118	118	103	103		136											
RED ARROW						101							A121					A114		
YELLOW ARROW		126				102							A122					A115	A102	
FLASHING YELLOW ARROW													A123					A116	A103	
GREEN ARROW	127	127		118	103	103		133												

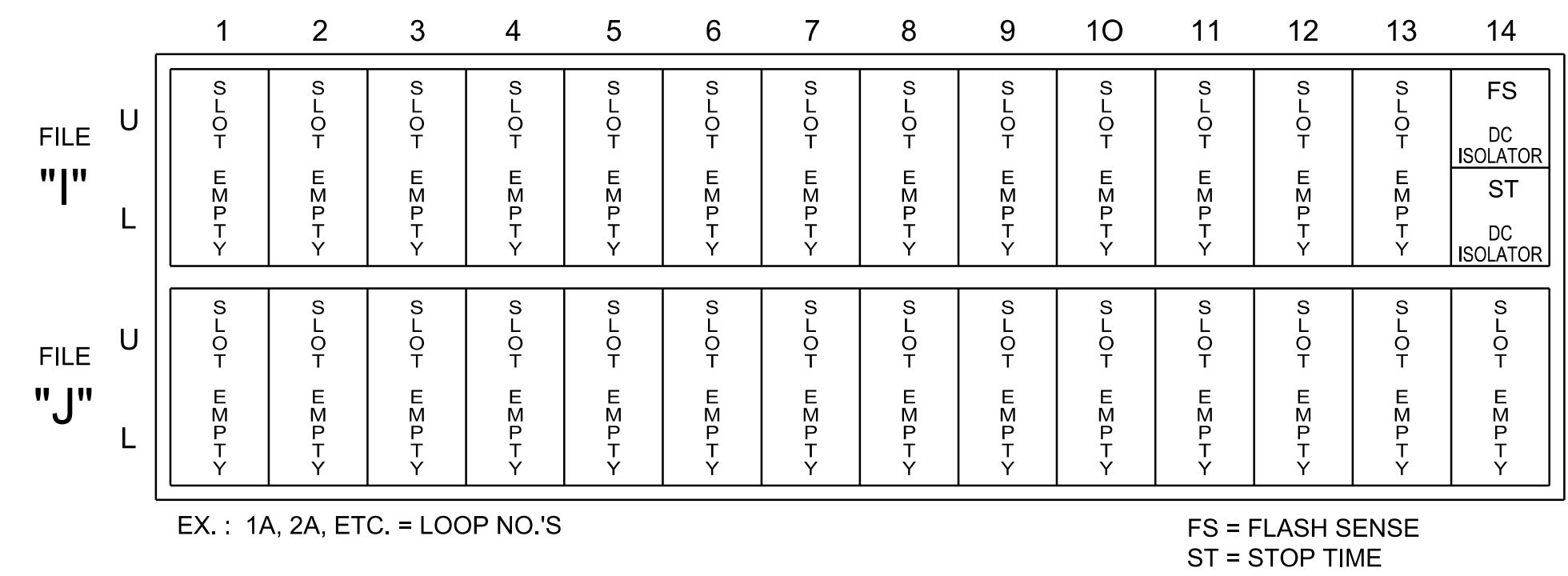
NU = Not Used  
 \* Denotes install load resistor. See load resistor installation detail this sheet.  
 \* See pictorial of head wiring in detail this sheet.

### SPECIAL DETECTOR NOTE

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

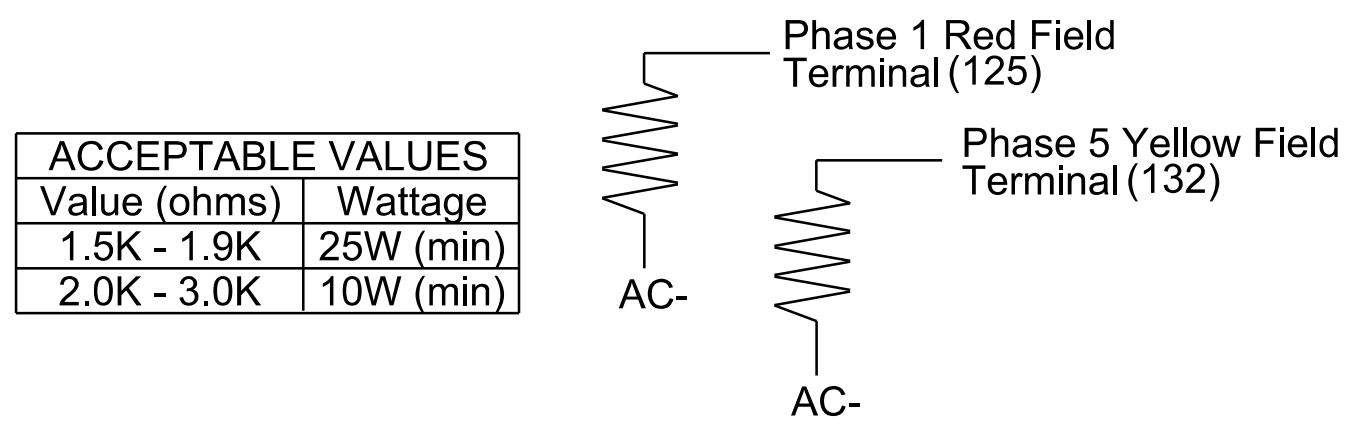
### INPUT FILE POSITION LAYOUT

(front view)



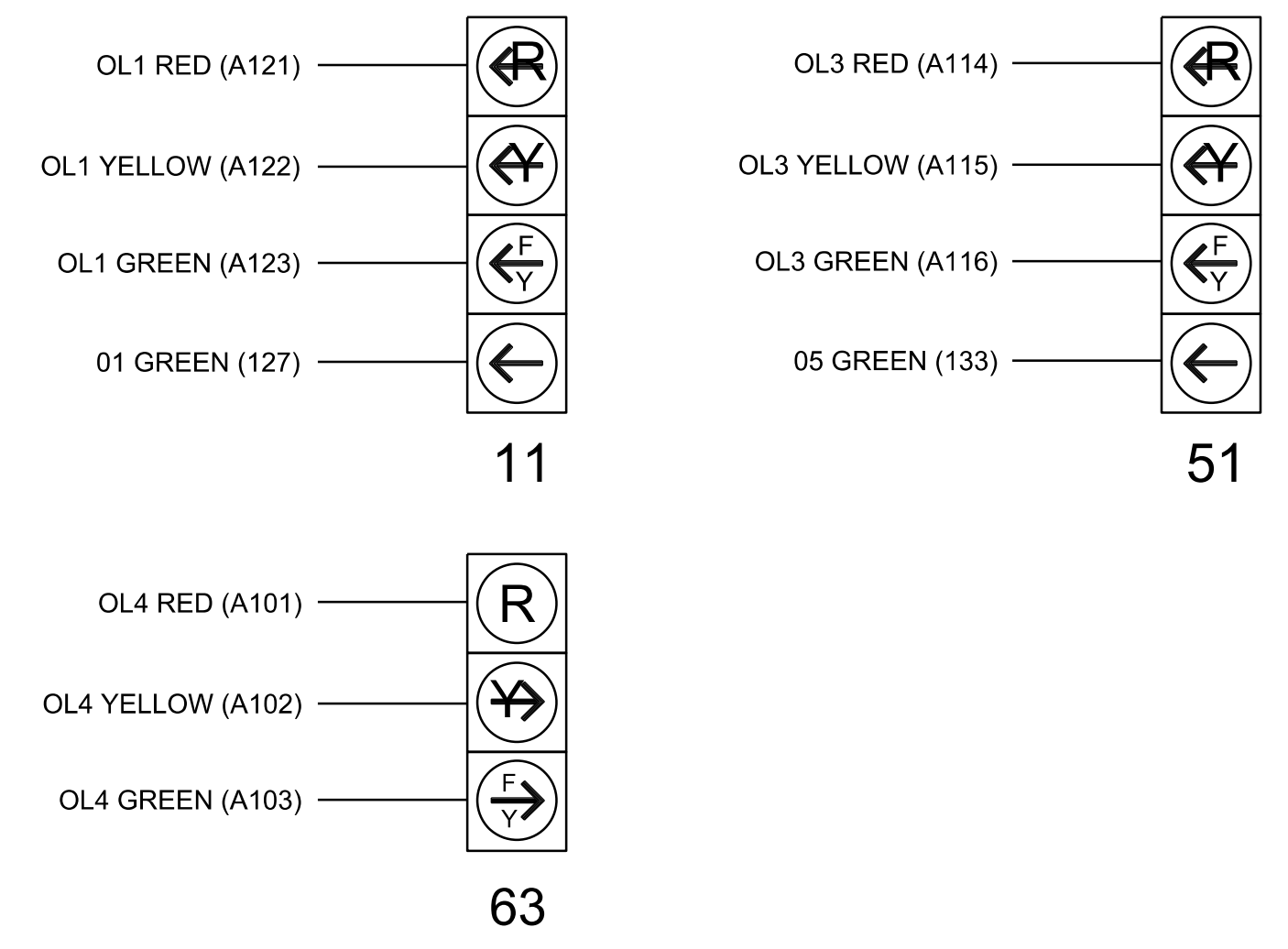
### LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)



### FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 14-0359T3  
 DESIGNED: Apr 2023  
 SEALED: 04/11/2023  
 REVISED: N/A

Electrical Detail - Sheet 1 of 2  
 Temporary Design 3 - (TMP Phase II, Step 1)

ELECTRICAL AND PROGRAMMING DETAILS FOR: RAMEY KEMP ASSOCIATES 8210 University Executive Park Drive Suite 220 Charlotte, North Carolina 28262 Phone: 704-543-4262   www.rkainc.com   NC License No. F-1469	Prepared For: US 276 (Russ Avenue) at Dellwood Road/ SR 1184 (Howell Mill Road) Division 14 Haywood County Waynesville	SEAL SEAL 32396 WILLIAM J. HAMILTON ENGINEER 04/11/2023
	PLAN DATE: April 2023 REVIEWED BY: WJ Hamilton PREPARED BY: TS Popelka RKA PROJ. NO: 16085 (040)	REVISIONS INIT. DATE



### OVERLAP PROGRAMMING

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

Web Interface  
Home >Controller >Overlap Configuration >Overlaps

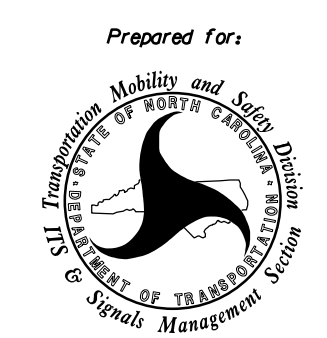


#### Overlap Plan 1

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

THIS ELECTRICAL DETAIL IS FOR  
THE SIGNAL DESIGN: 14-0359T3  
DESIGNED: Apr 2023  
SEALED: 04/11/2023  
REVISED: N/A

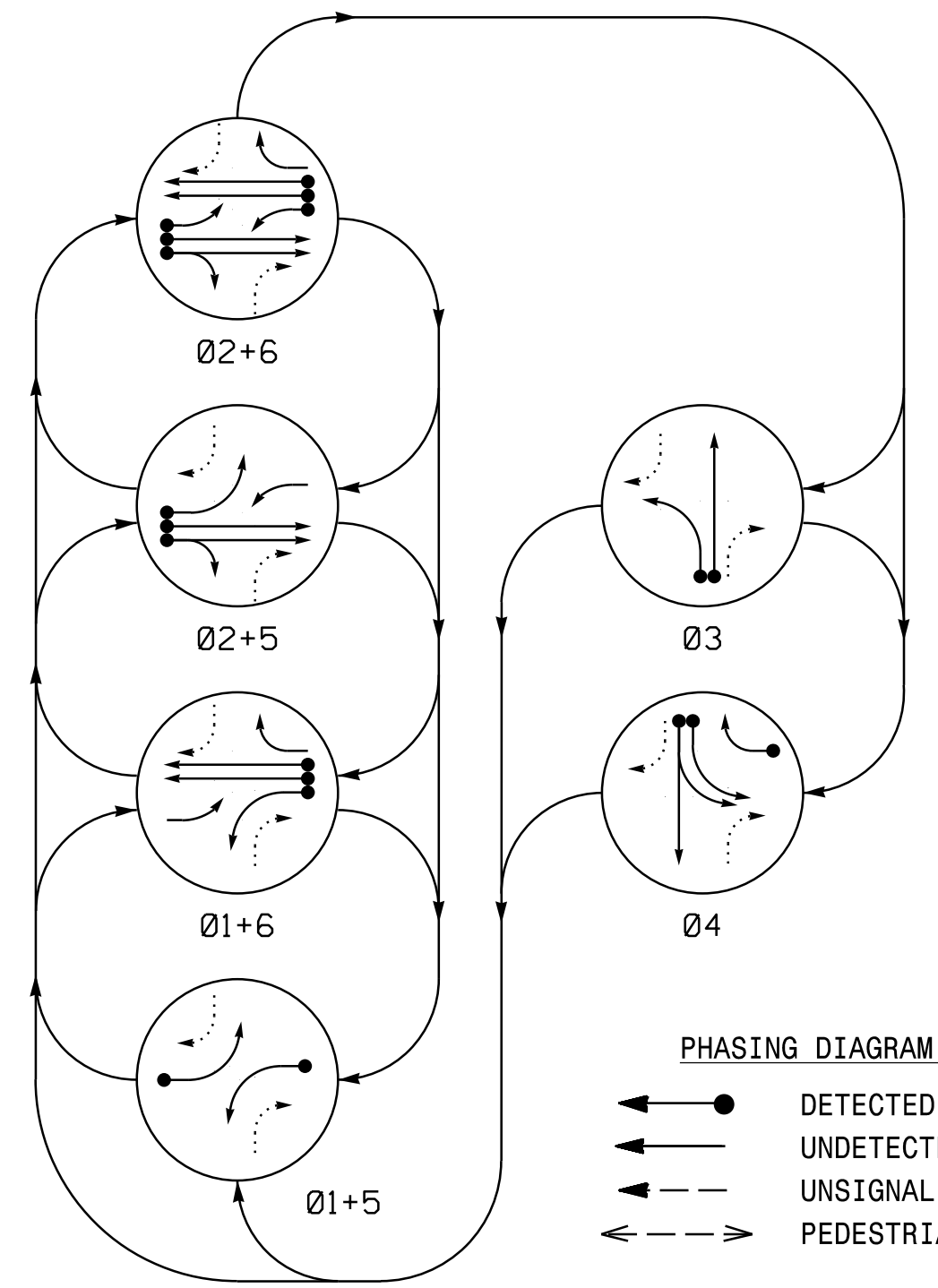
Electrical Detail - Sheet 2 of 2  
Temporary Design 3 - (TMP Phase II, Step 1)

DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:  	US 276 (Russ Avenue) at Dellwood Road/ SR 1184 (Howell Mill Road) Division 14 Haywood County Waynesville		SEAL 
	Prepared For: 	PLAN DATE: April 2023 PREPARED BY: TS Popelka RKA PROJ. NO: 16085 (040)	
REVISIONS _____ _____ _____		INIT. _____ _____ _____	DATE _____ _____ _____
750 N. Greenfield Pkwy, Garner, NC 27529 <small>Infrastructure Consulting Services, Inc. RAMEY KEMP ASSOCIATES 8210 University Executive Park Drive Suite 220 Charlotte, North Carolina 28262 Phone: 704-543-4262   www.rameykemp.com   NC License No. F-1489</small>		SIG. INVENTORY NO. 14-0359T3	

4/11/2023  
14-0359T3\_sml.ele\_2020mmda.dgn  
User: jwendt

**PHASING DIAGRAM**

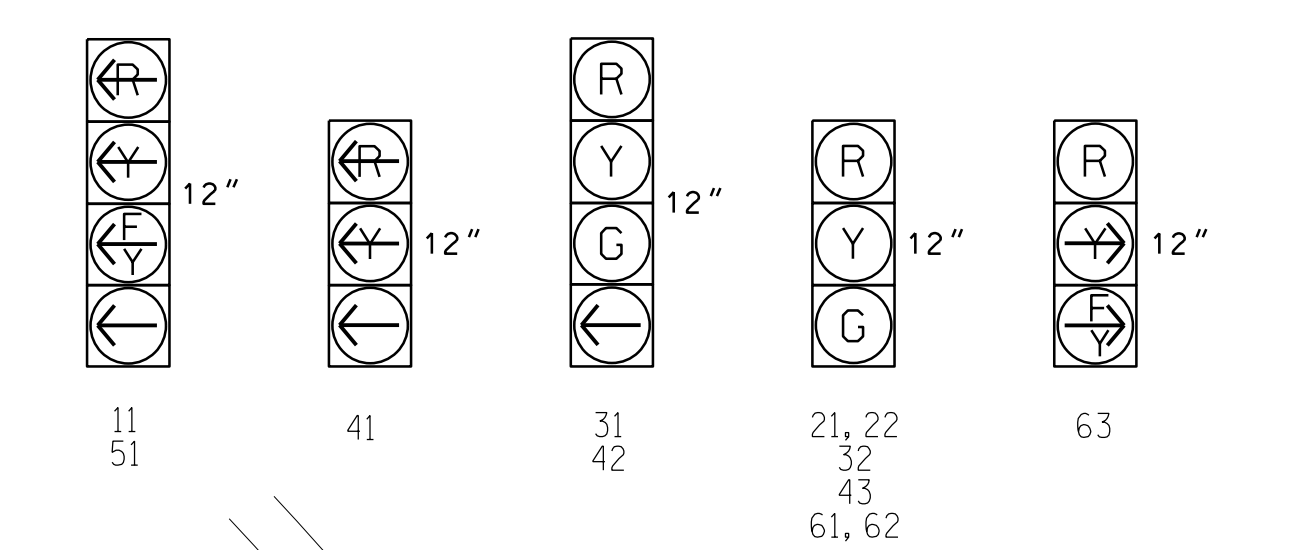


**TABLE OF OPERATION**

SIGNAL FACE	PHASE					
	Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3	Ø4
11	-	-	F	F	R	Y
21, 22	R	R	G	G	R	Y
31	R	R	R	R	G	R
32	R	R	R	R	G	R
41	R	R	R	R	G	R
42	R	R	R	R	G	R
43	R	R	R	R	G	R
51	-	F	-	F	R	Y
61, 62	R	G	R	G	R	Y
63	R	F	R	F	R	Y

**SIGNAL FACE I.D.**

All Heads L.E.D.



**MAXTIME DETECTOR INSTALLATION CHART**

ZONE	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING						
					CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND ADDED INITIAL	CALL DURING GREEN	NEW CARD	
1A	6X40	0	*	*	1	15	-	X	X	-	*
2A	6X6	70	*	*	2	-	-	X	X	-	*
2B	6X6	70	*	*	2	-	-	X	X	-	*
3A	6X40	0	*	*	3	3	-	X	X	-	*
3B	6X40	0	*	*	3	-	-	X	X	-	*
4A	6X40	0	*	*	4	3	-	X	X	-	*
4B	6X40	0	*	*	4	-	-	X	X	-	*
5A	6X40	0	*	*	5	15	-	X	X	-	*
6A	6X6	70	*	*	6	-	-	X	X	-	*
6B	6X6	70	*	*	6	-	-	X	X	-	*

\* Multizone Microwave Detection

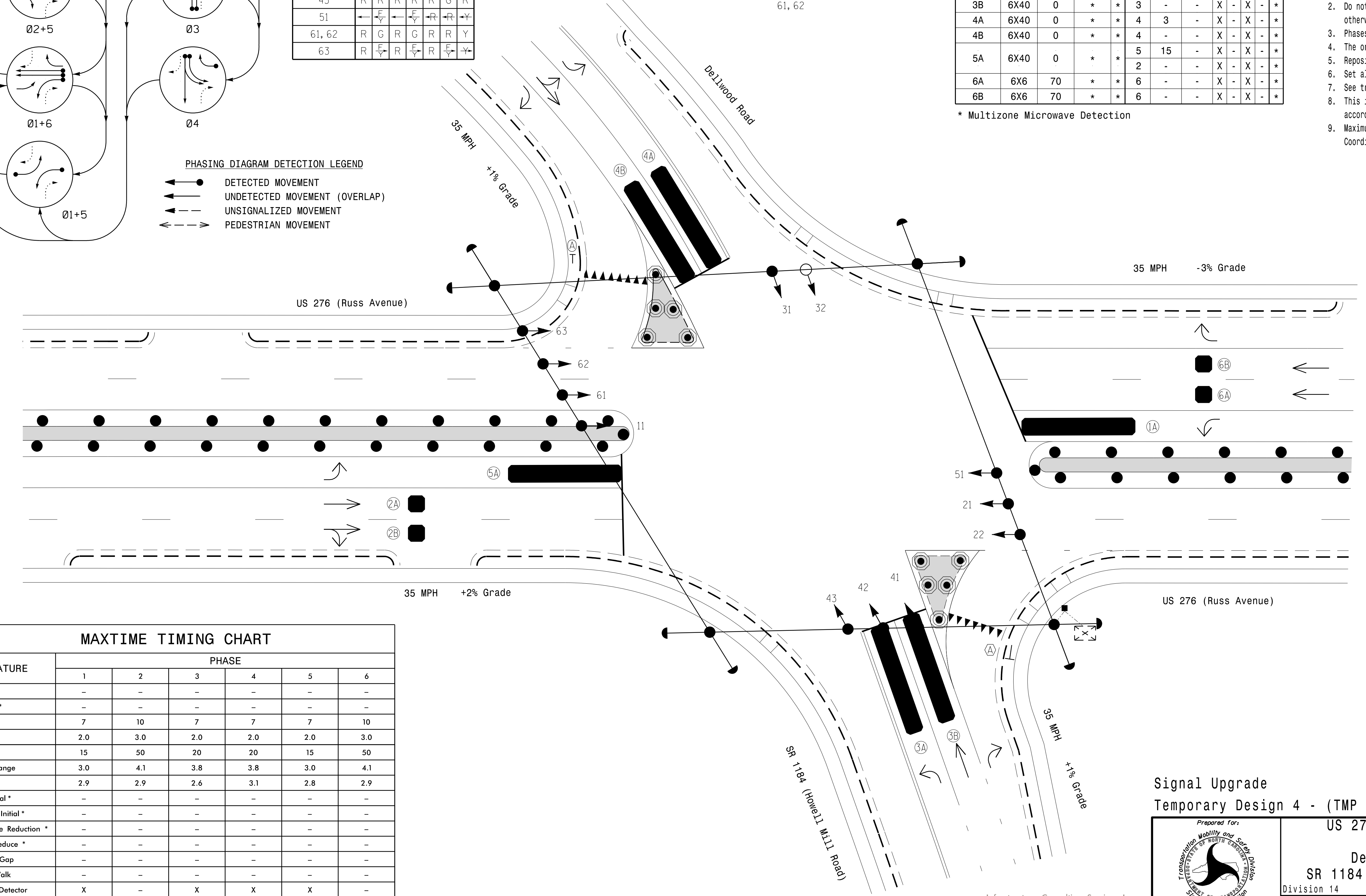
**6 Phase Fully Actuated D14-12\_Waynesville**

**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.
- Phases 1 and/or 5 may be lagged.
- The order of phase 3 and phase 4 may be reversed.
- Reposition existing signal heads numbered 22 and 41.
- Set all detector units to presence mode.
- See traffic control plans for stop bar locations.
- This intersection uses multizone microwave detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.

**PHASING DIAGRAM DETECTION LEGEND**

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



**MAXTIME TIMING CHART**

FEATURE	PHASE					
	1	2	3	4	5	6
Walk *	-	-	-	-	-	-
Ped Clear *	-	-	-	-	-	-
Min Green	7	10	7	7	7	10
Passage *	2.0	3.0	2.0	2.0	2.0	3.0
Max I *	15	50	20	20	15	50
Yellow Change	3.0	4.1	3.8	3.8	3.0	4.1
Red Clear	2.9	2.9	2.6	3.1	2.8	2.9
Added Initial *	-	-	-	-	-	-
Maximum Initial *	-	-	-	-	-	-
Time Before Reduction *	-	-	-	-	-	-
Time To Reduce *	-	-	-	-	-	-
Minimum Gap	-	-	-	-	-	-
Advance Walk	-	-	-	-	-	-
Non Lock Detector	X	-	X	X	X	-
Vehicle Recall	-	MIN RECALL	-	-	-	MIN RECALL
Dual Entry	-	-	-	-	-	-

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

**LEGEND**

PROPOSED	EXISTING
○ Traffic Signal Head	● N/A
○ Modified Signal Head	○ N/A
⊥ Sign	⊥ N/A
⊥ Pedestrian Signal Head With Push Button & Sign	⊥ N/A
○ Signal Pole with Guy	○ N/A
○ Signal Pole with Sidewalk Guy	○ N/A
⊠ Inductive Loop Detector	⊠ N/A
⊠ Controller & Cabinet	⊠ N/A
⊠ Junction Box	⊠ N/A
--- 2-in Underground Conduit	--- N/A
--- Right of Way	--- N/A
→ Directional Arrow	→ N/A
■ Microwave Detection Zone	■ N/A
■ Construction Zone	■ N/A
○ Construction Zone Drums	○ N/A
○ Skinny Drums	○ N/A
○ Type II Signal Pedestal	○ N/A
○ Yield Sign	○ N/A

**Signal Upgrade Temporary Design 4 - (TMP Phase III)**

Prepared for:  
  
 750 N. Greenfield Pkwy, Garner, NC 27529  
 Infrastructure Consulting Services, Inc.  
  
 8210 University Executive Park Drive Suite 228 Charlotte, North Carolina 28226  
 Phone: 704-549-4260 | www.ramkemp.com | NC License No. F-1489

**US 276 (Russ Avenue)  
 at  
 Dellwood Road/  
 SR 1184(Howell Mill Road)**  
 Division 14 Haywood County Waynesville  
 PLAN DATE: April 2023 REVIEWED BY: WJ Hamilton  
 PREPARED BY: TS Popelka RKA PROJ. NO.: 16085 (040)

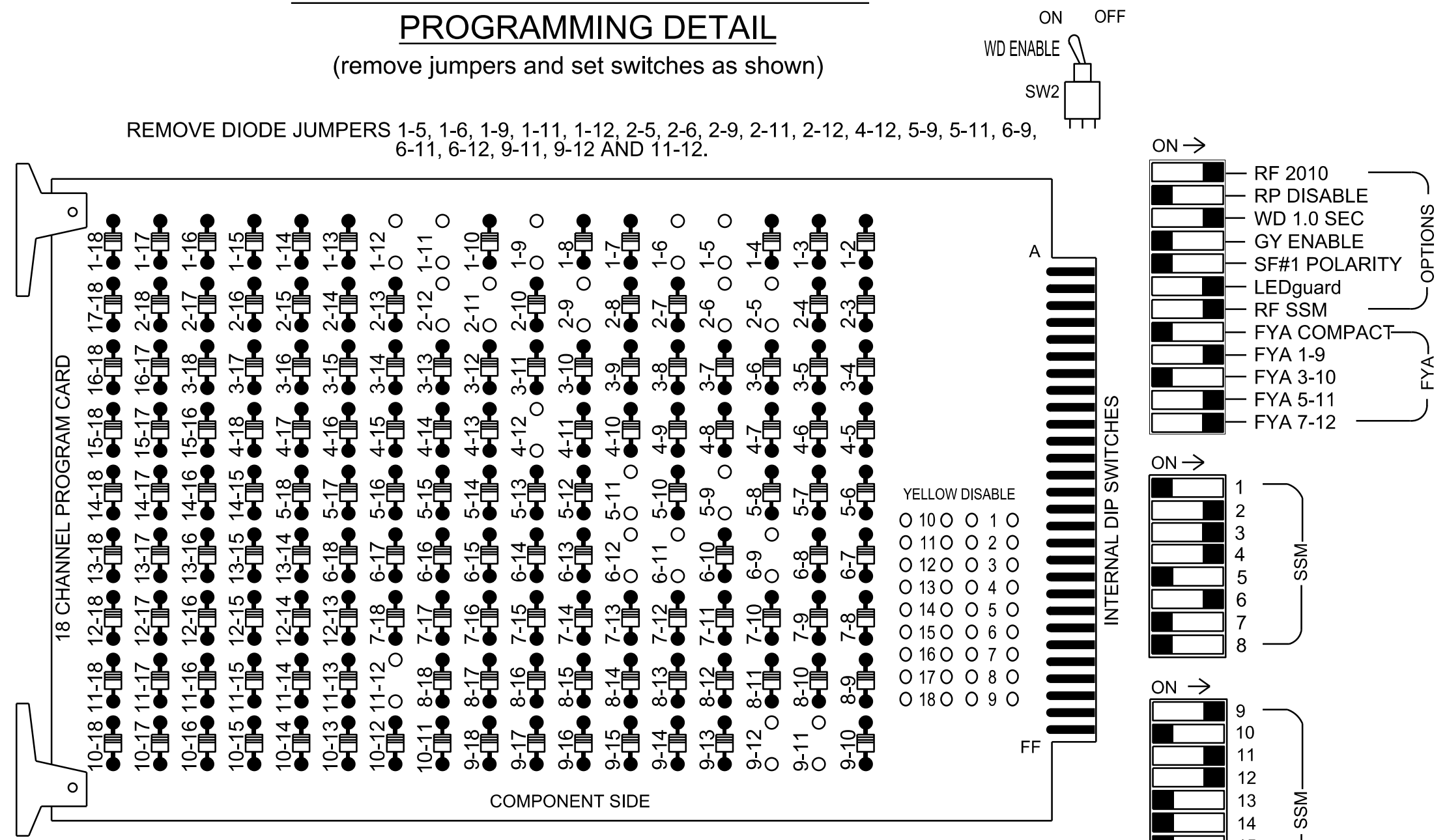
DOCUMENT NOT CONSIDERED FINAL  
 UNLESS ALL SIGNATURES COMPLETED

SEAL  
  
 William J. Hamilton  
 04/11/2023  
 DATE

REVISIONS	INIT.	DATE

### 18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



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

### NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the signal plan.
- Program controller to start up in phase 2 Green No Walk and 6 Green No Walk.
- If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
- The cabinet and controller are part of the D14-12 Waynesville Signal System.

### EQUIPMENT INFORMATION

Controller.....2070LX  
 Cabinet.....332 w/ Aux  
 Software.....Q-Free MAXTIME  
 Cabinet Mount.....Base  
 Output File Positions.....18 With Aux. Output File  
 Load Switches Used.....S1, S2, S4, S5, S7, S8, AUX S1, AUX S4, AUX S5  
 Phases Used.....1, 2, 3, 4, 5, 6  
 Overlap "1".....\*  
 Overlap "2".....NOT USED  
 Overlap "3".....\*  
 Overlap "4".....\*

\*See overlap programming detail on this sheet

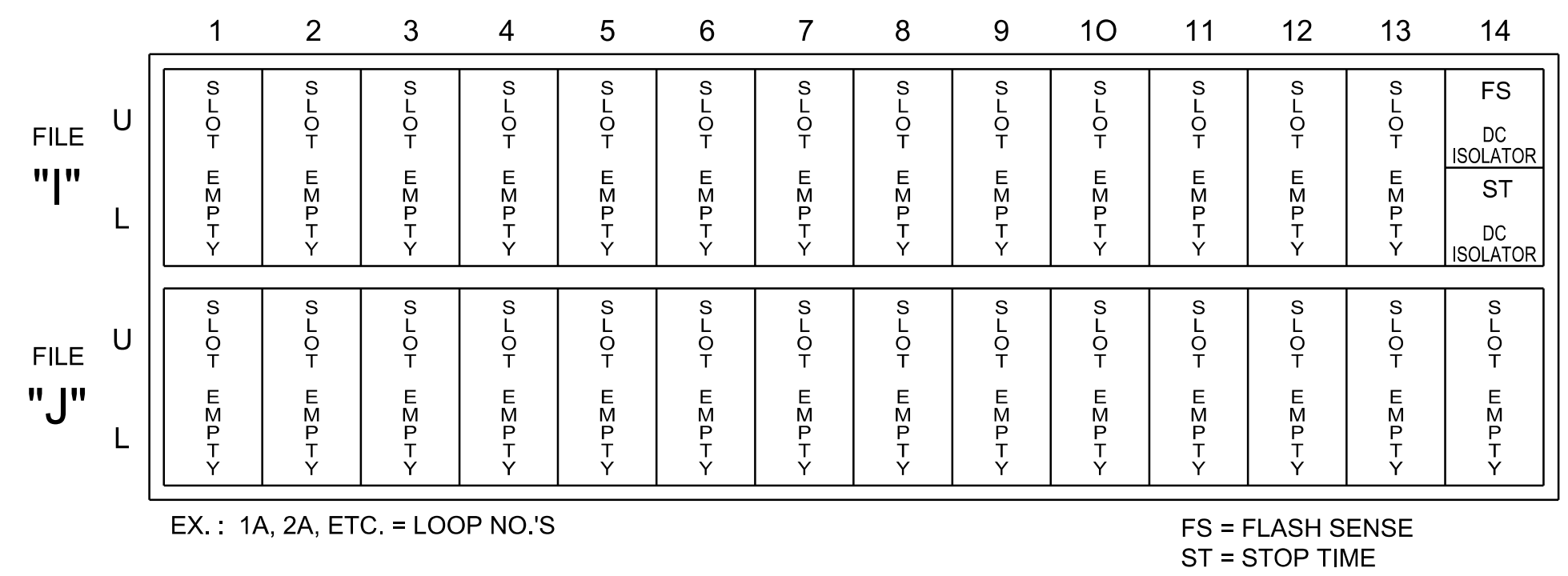
### SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6			
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18			
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE			
SIGNAL HEAD NO.	11*	21.22	NU	31	32	41	42	43	NU	51*	61.62	NU	NU	NU	11*	NU	NU	51*	63*	NU	
RED		128		116	116		101	101			134									A101	
YELLOW	*	129		117	117		102	102		*	135										
GREEN		130		118	118		103	103			136										
RED ARROW							101						A121						A114		
YELLOW ARROW							102						A122						A115	A102	
FLASHING YELLOW ARROW													A123						A116	A103	
GREEN ARROW	127			118	103	103			133												

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

### INPUT FILE POSITION LAYOUT

(front view)

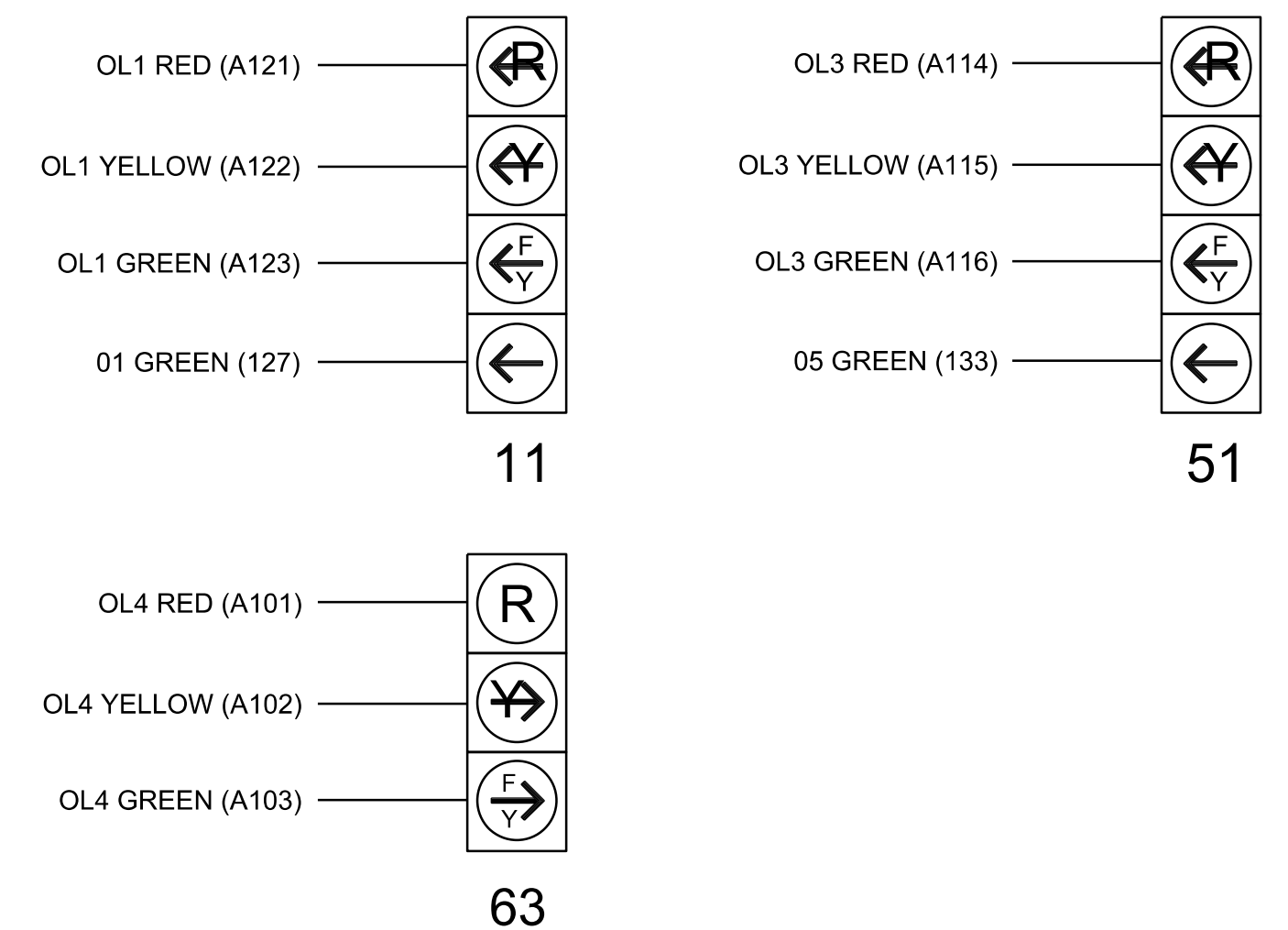


### SPECIAL DETECTOR NOTE

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

### FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



### OVERLAP PROGRAMMING

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

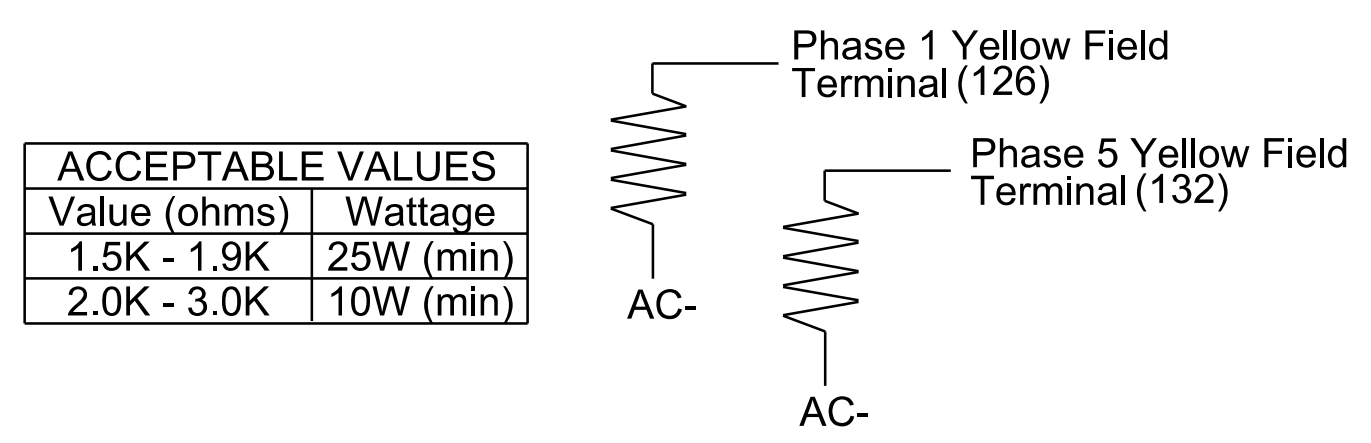
Web Interface  
 Home > Controller > Overlap Configuration > Overlaps

Overlap Plan 1

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

### LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)



### Electrical Detail Temporary Design 4 - (TMP Phase III)

US 276 (Russ Avenue) at Dellwood Road/ SR 1184 (Howell Mill Road) Division 14 Haywood County Waynesville

Prepared For: Infrastructure Consulting Services, Inc. RKA RAMEY KEMP ASSOCIATES

750 N. Greenfield Pkwy, Garner, NC 27529

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 14-0359T4  
 DESIGNED: Apr 2023  
 SEALED: 04/11/2023  
 REVISED: N/A

Electrical and Programming Details For: PLAN DATE: April 2023 REVIEWED BY: WJ Hamilton PREPARED BY: TS Popelka RKA PROJ. NO: 16085 (040)

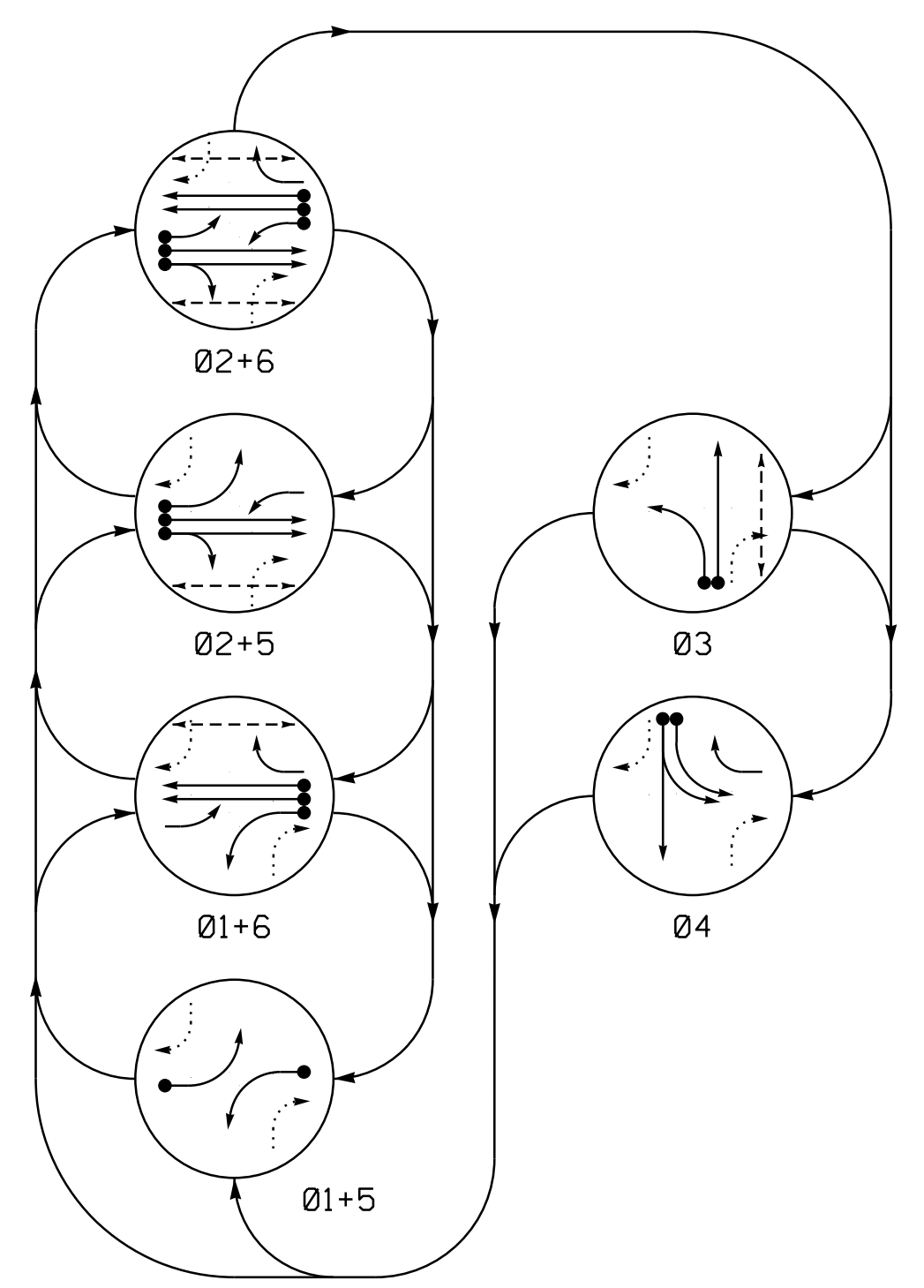
REVISIONS: INIT. DATE

Seal: NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 32396 WILLIAM J. HAMILTON

4/11/2023

SIG. INVENTORY NO. 14-0359T4

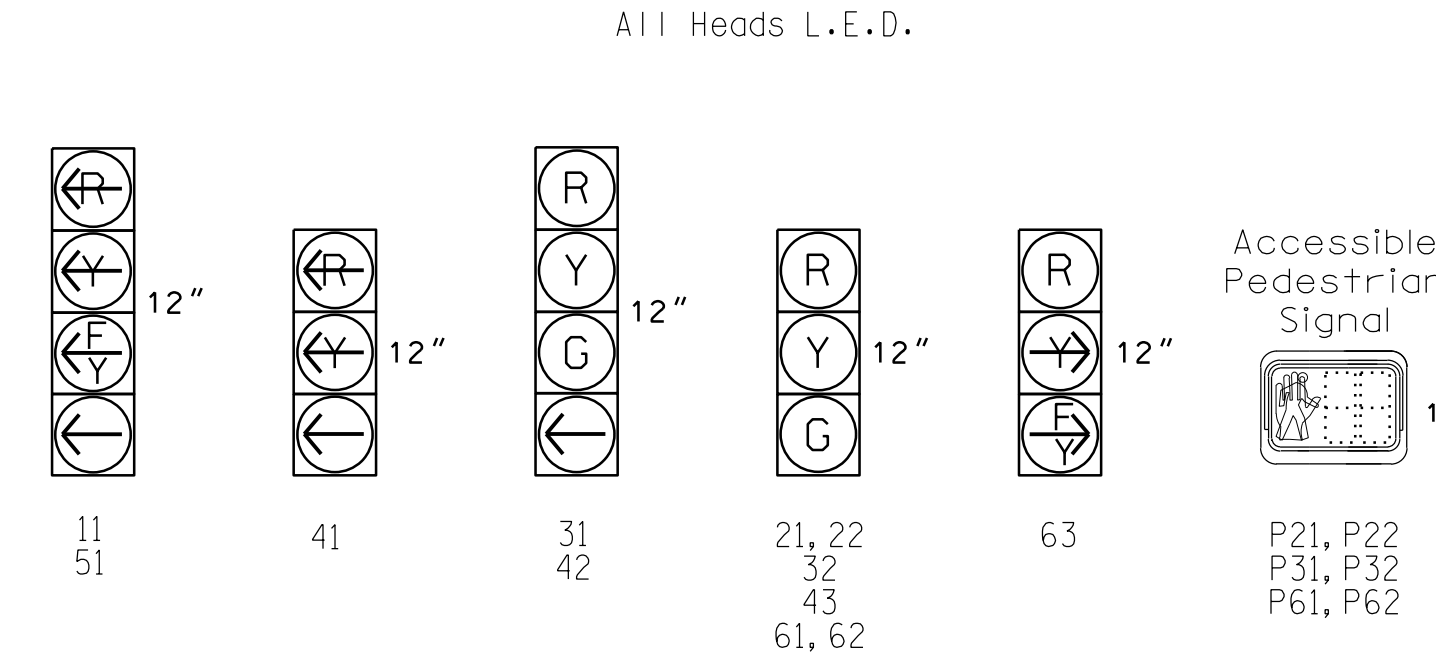
**PHASING DIAGRAM**



**TABLE OF OPERATION**

SIGNAL FACE	PHASE					
	Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3	Ø4
11	-	-	F	F	R	R
21, 22	R	R	G	G	R	R
31	R	R	R	R	G	R
32	R	R	R	R	G	R
41	-R	-R	-R	-R	-	-R
42	R	R	R	R	G	R
43	R	R	R	R	G	R
51	-	F	-	F	-R	-R
61, 62	R	G	R	G	R	R
63	R	F	R	F	R	R
P21, P22	DW	DW	W	W	DW	DRK
P31, P32	DW	DW	DW	DW	W	DRK
P61, P62	DW	W	DW	W	DW	DRK

**SIGNAL FACE I.D.**



**MAXTIME DETECTOR INSTALLATION CHART**

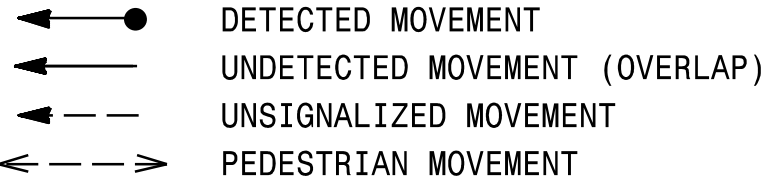
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING							
					CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY BURNING GREEN	NEW CARD
1A	6X40	0	2-4-2	X	1	15	-	X	-	X	-	X
2A	6X6	70	5	X	2	-	-	X	-	X	-	X
2B	6X6	70	5	X	2	-	-	X	-	X	-	X
3A	6X40	0	2-4-2	X	3	3	-	X	-	X	-	X
3B	6X40	0	2-4-2	X	3	-	-	X	-	X	-	X
4A	6X40	0	2-4-2	X	4	3	-	X	-	X	-	X
4B	6X40	0	2-4-2	X	4	-	-	X	-	X	-	X
5A	6X40	0	2-4-2	X	5	15	-	X	-	X	-	X
6A	6X6	70	5	X	6	-	-	X	-	X	-	X
6B	6X6	70	5	X	6	-	-	X	-	X	-	X
S13	6X6	+150	5	X	-	-	-	-	-	-	-	X
S14	6X6	+150	5	X	-	-	-	-	-	-	-	X
S15	6X6	+175	5	X	-	-	-	-	-	-	-	X
S16	6X6	+175	5	X	-	-	-	-	-	-	-	X

**6 Phase Fully Actuated D14-12\_Waynesville**

**NOTES**

- Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Phase 1 and/or phase 5 may be lagged.
- The order of phase 3 and phase 4 may be reversed.
- Set all detector units to presence mode.
- Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
- Program pedestrian heads to countdown the flashing "Don't Walk" time only.
- This intersection features accessible pedestrian signals utilizing percussive tone walk indications and/or speech messages.
- See pavement marking plans for stop bar and crosswalk locations.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.

**PHASING DIAGRAM DETECTION LEGEND**



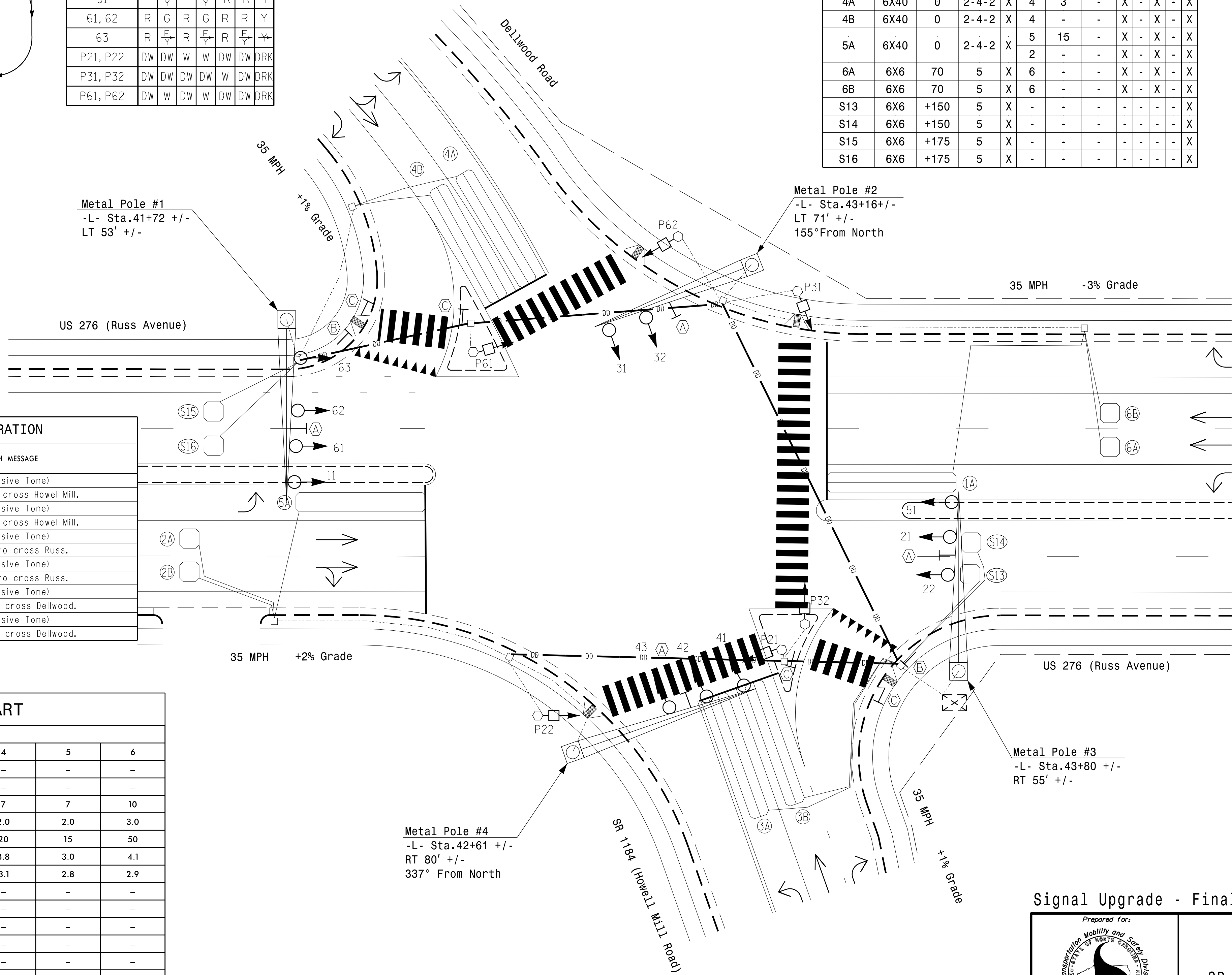
**ACCESSIBLE PEDESTRIAN SIGNAL OPERATION**

SIGNAL FACE	VOICE TONES	INTERVAL	SPEECH MESSAGE
P21	- X	Walk	(Percussive Tone)
X	-	Flashing Don't Walk / Don't Walk	Wait, Wait to cross Howell Mill.
P22	- X	Walk	(Percussive Tone)
X	-	Flashing Don't Walk / Don't Walk	Wait, Wait to cross Howell Mill.
P31	- X	Walk	(Percussive Tone)
X	-	Flashing Don't Walk / Don't Walk	Wait, Wait to cross Russ.
P32	- X	Walk	(Percussive Tone)
X	-	Flashing Don't Walk / Don't Walk	Wait, Wait to cross Russ.
P61	- X	Walk	(Percussive Tone)
X	-	Flashing Don't Walk / Don't Walk	Wait, Wait to cross Dellwood.
P62	- X	Walk	(Percussive Tone)
X	-	Flashing Don't Walk / Don't Walk	Wait, Wait to cross Dellwood.

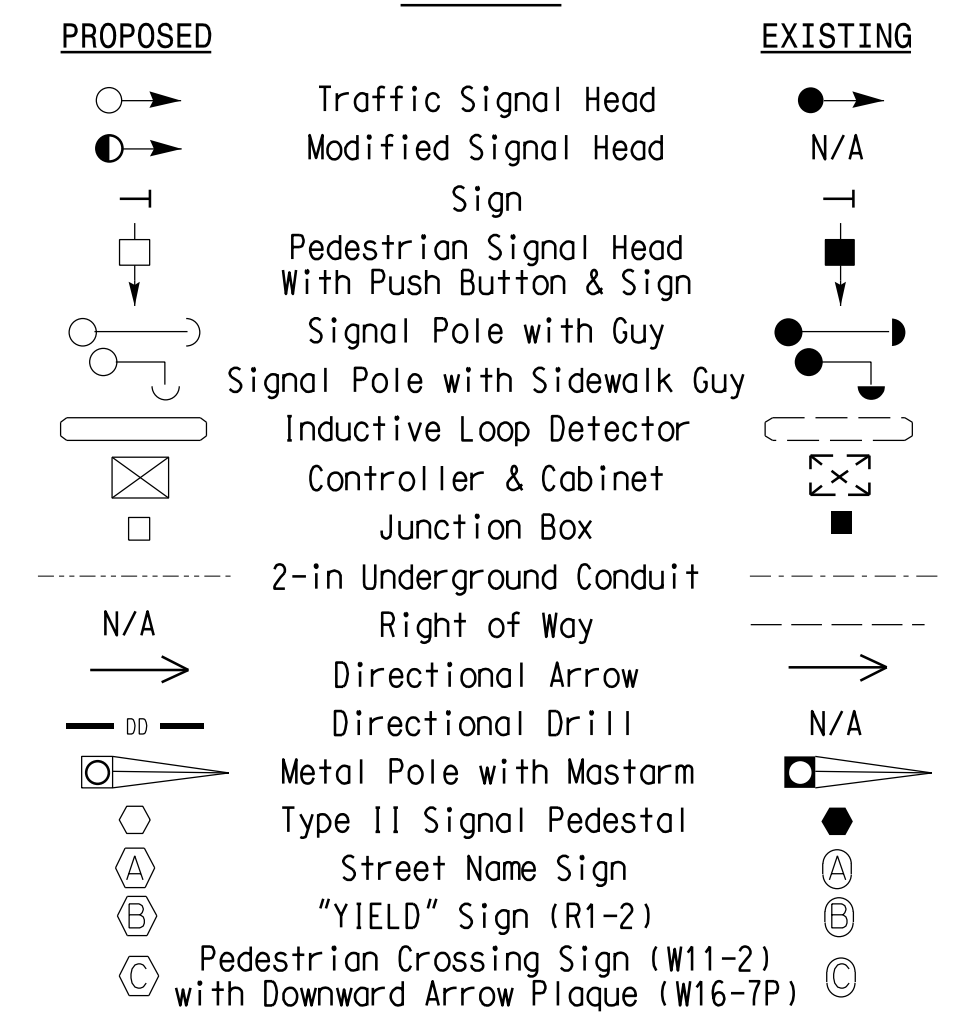
**MAXTIME TIMING CHART**

FEATURE	PHASE					
	1	2	3	4	5	6
Walk *	-	-	-	-	-	-
Ped Clear *	-	-	-	-	-	-
Min Green	7	10	7	7	7	10
Passage *	2.0	3.0	2.0	2.0	2.0	3.0
Max I *	15	50	20	20	15	50
Yellow Change	3.0	4.1	3.8	3.8	3.0	4.1
Red Clear	2.9	2.9	2.6	3.1	2.8	2.9
Added Initial *	-	-	-	-	-	-
Maximum Initial *	-	-	-	-	-	-
Time Before Reduction *	-	-	-	-	-	-
Time To Reduce *	-	-	-	-	-	-
Minimum Gap	-	-	-	-	-	-
Advance Walk	-	-	-	-	-	-
Non Lock Detector	X	-	X	X	X	-
Vehicle Recall	-	MIN RECALL	-	-	-	MIN RECALL
Dual Entry	-	-	-	-	-	-

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



**LEGEND**



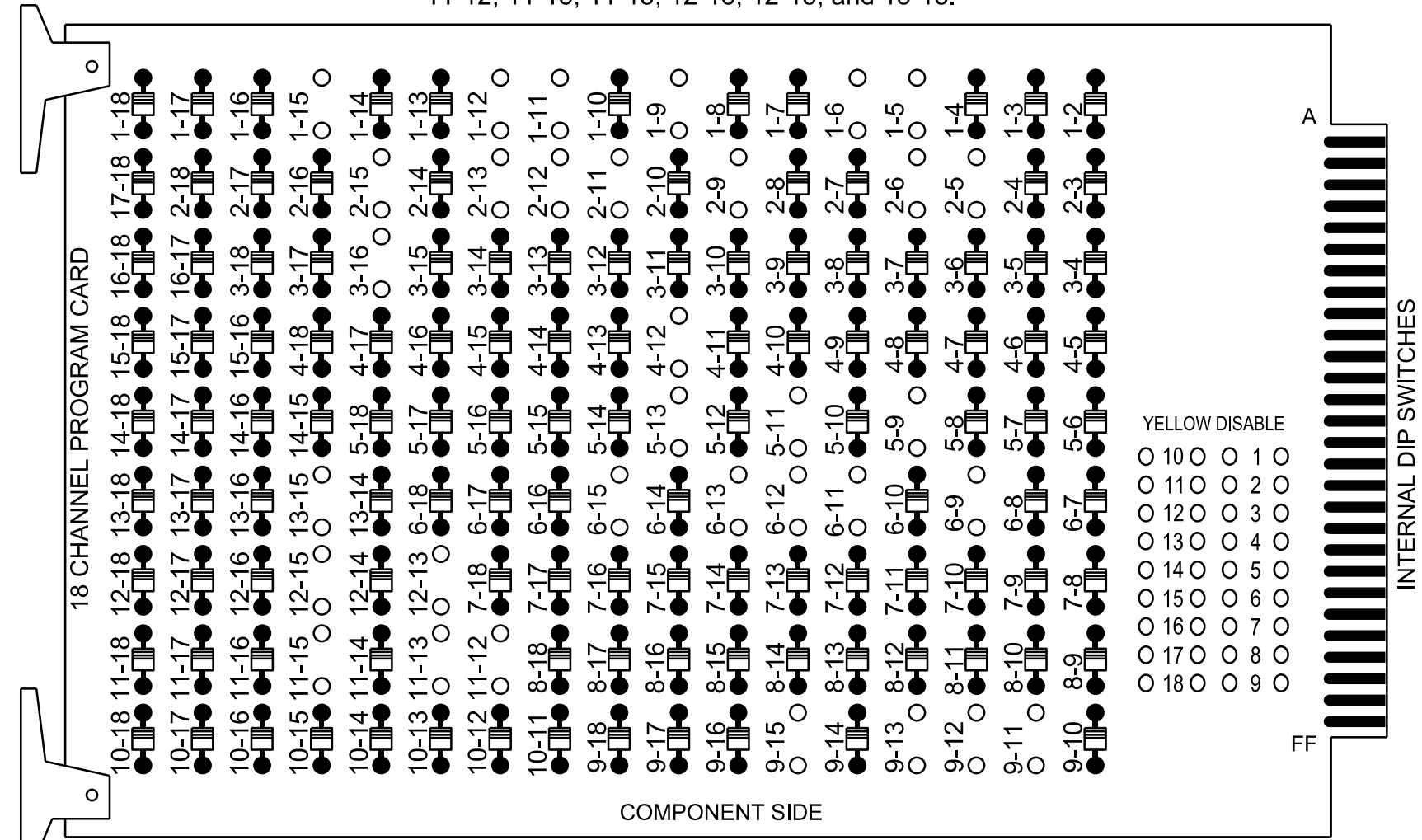
**Signal Upgrade - Final Design**

	<p>US 276 (Russ Avenue) at Dellwood Road/ SR 1184 (Howell Mill Road)</p>		<p>Division 14 Haywood County Waynesville</p>
	<p>PLAN DATE: April 2023</p>	<p>REVIEWED BY: WJ Hamilton</p>	
<p>750 N. Greenfield Pkwy, Garner, NC 27529</p>	<p>SCALE: 0" = 20'</p>	<p>RKA PROJ. NO.: 16085 (040)</p>	<p>DATE: 04/11/2023</p>

### 18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

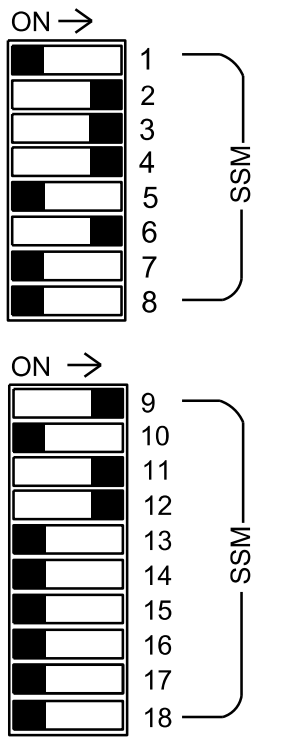
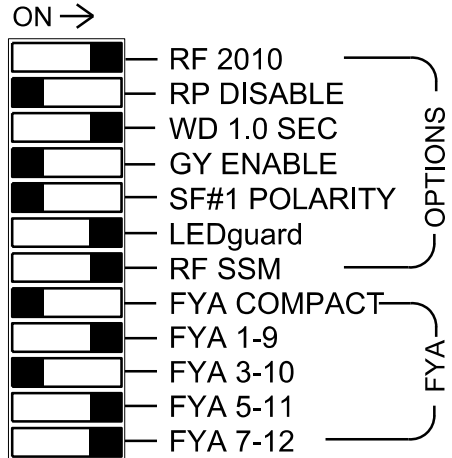
REMOVE DIODE JUMPERS 1-5, 1-6, 1-9, 1-11, 1-12, 1-15, 2-5, 2-6, 2-9, 2-11, 2-12, 2-13, 2-15, 3-16, 4-12, 5-9, 5-11, 5-13, 6-9, 6-11, 6-12, 6-13, 6-15, 9-11, 9-12, 9-13, 9-15, 11-12, 11-13, 11-15, 12-13, 12-15, and 13-15.



REMOVE JUMPERS AS SHOWN

**NOTES:**

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



■ = DENOTES POSITION OF SWITCH

### NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the signal plan.
2. Program controller to start up in phase 2 Green Walk and 6 Green 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 D14-12 Waynesville Signal System.

### EQUIPMENT INFORMATION

Controller.....2070LX  
 Cabinet.....332 w/ Aux  
 Software.....Q-Free MAXTIME  
 Cabinet Mount.....Base  
 Output File Positions.....18 With Aux. Output File  
 Load Switches Used.....S1, S2, S3, S4, S5, S7, S8, S9,  
 S12, AUX S1, AUX S4, AUX S5

Phases Used.....1, 2, 2PED, 3, 3PED, 4, 5, 6,  
 6PED  
 Overlap "1".....\*  
 Overlap "2".....NOT USED  
 Overlap "3".....\*  
 Overlap "4".....\*

\*See overlap programming detail on sheet 2

### SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6																		
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18																		
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	3 PED	OL1	OL2	SPARE	OL3	OL4	SPARE																		
SIGNAL HEAD NO.	11*	21,22	P21, P22	31	32	41	42	43	NU	51*	61,62	P61, P62	NU	NU	P31, P32	11*	NU	51*	63*	NU																
RED	128			116	101	101			134											A101																
YELLOW	*	129		117	102	102			*	135																										
GREEN		130		118	103	103			136																											
RED ARROW				116	101															A121																
YELLOW ARROW				117	102																	A122														
FLASHING YELLOW ARROW																																				
GREEN ARROW	127			118	103	103			133																											
Hand icon				113																																
Walking person icon				115																																

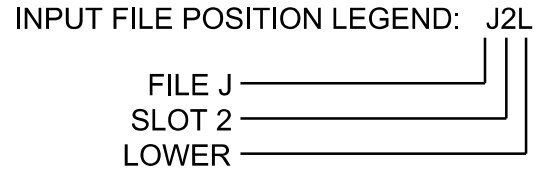
NU = Not Used  
 \* Denotes install load resistor. See load resistor installation detail this sheet.  
 \* See pictorial of head wiring in detail this sheet.

### INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN
1A	TB2-1,2	I1U	56	18	1	1	15		X		X	
2A	TB2-5,6	I2U	39	-	29	6			X		X	
2B	TB2-7,8	I2L	43	5	3	2			X		X	
3A	TB4-5,6	I5U	58	20	7	3	3		X		X	
3B	TB4-9,10	I6U	41	3	8	3			X		X	
4A	TB6-1,2	I7U	65	31	10	4	3		X		X	
4B	TB6-3,4	I7L	78	44	11	4			X		X	
* S13	TB6-9,10	I9U	60	22	13							
* S14	TB6-11,12	I9L	62	24	14							
5A	TB3-1,2	J1U	55	17	15	5	15		X		X	
6A	TB3-5,6	J2U	40	2	16	6			X		X	
6B	TB3-7,8	J2L	44	6	17	6			X		X	
* S15	TB7-9,10	J9U	59	21	27							
* S16	TB7-11,12	J9L	61	23	28							
PED PUSH BUTTONS												
P21,P22	TB8-4,6	I12U	67	33	2	PED 2						
P31,P32	TB8-8,9	I13L	70	36	8	PED 3						
P41,P42	TB8-5,6	I12L	69	35	4	PED 4						

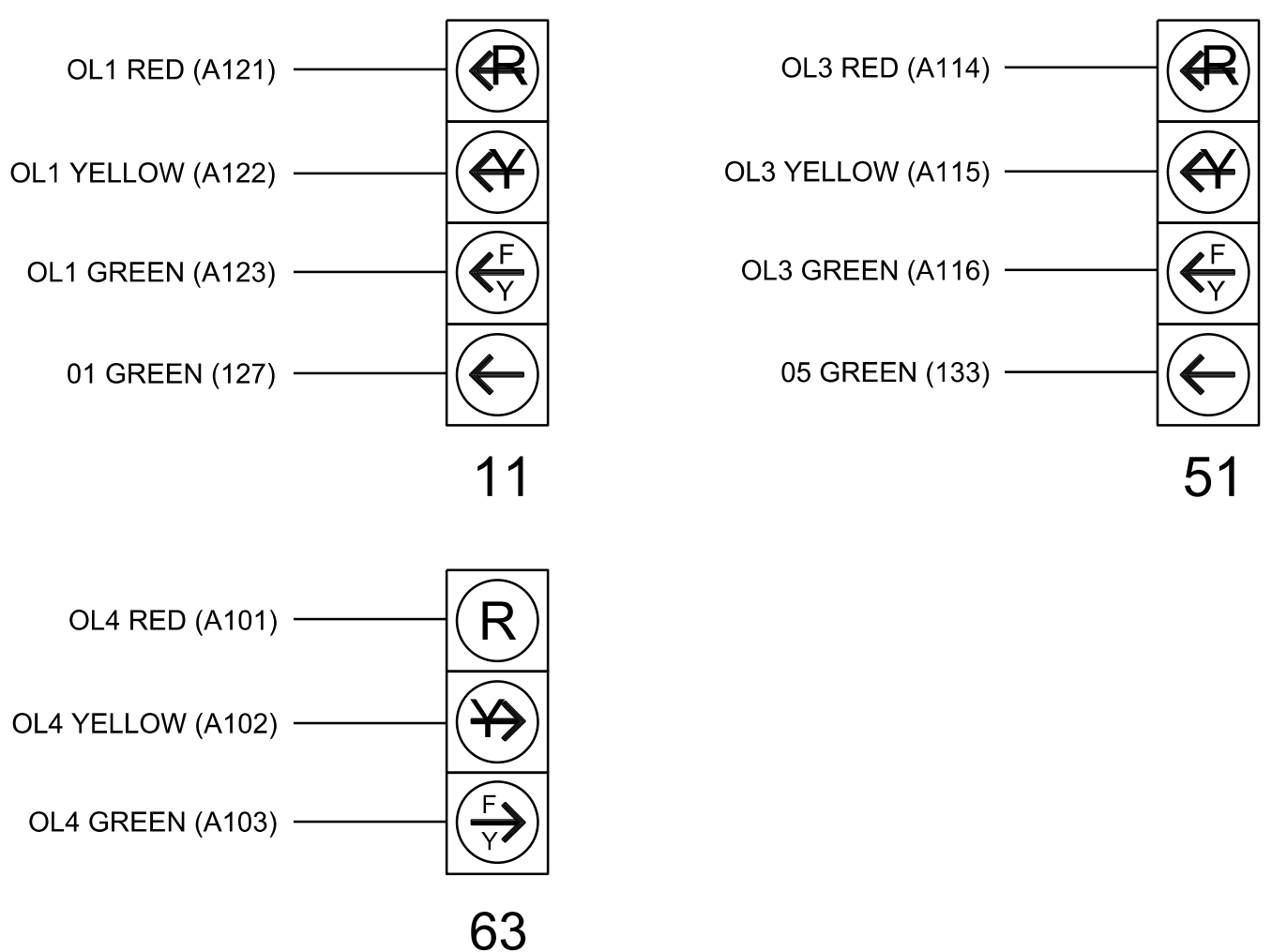
NOTE: INSTALL DC ISOLATORS IN INPUT FILE SLOTS I12 AND I13.

\*System detector only. Remove any assigned vehicle phase.

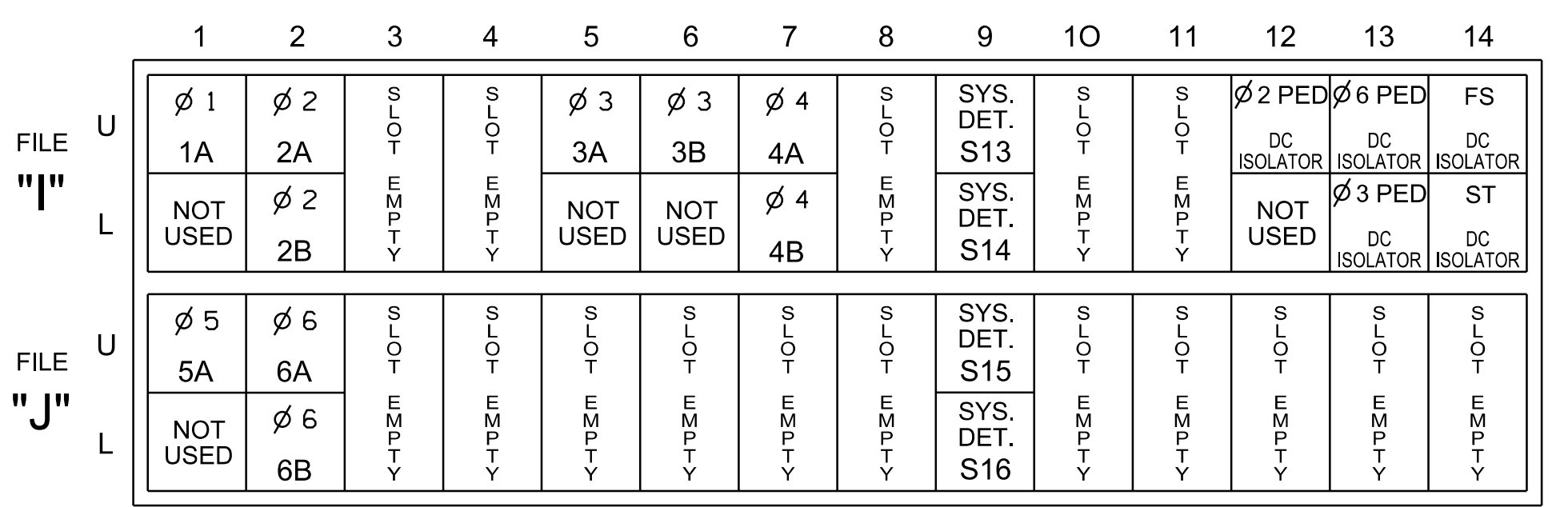


### FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



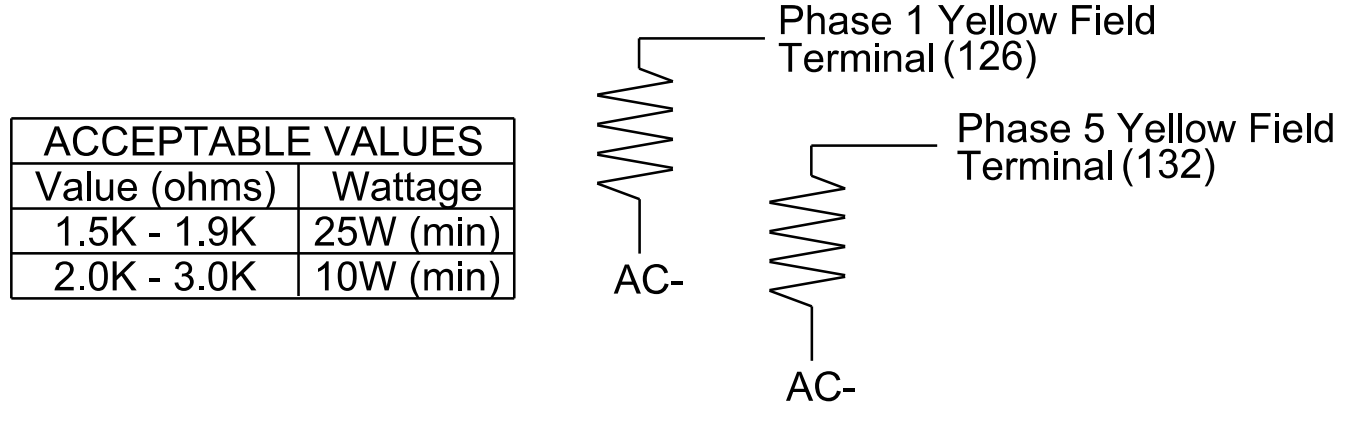
### INPUT FILE POSITION LAYOUT (front view)



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

### LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)



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

Electrical Detail - Sheet 1 of 2  
 Final Design

ELECTRICAL AND PROGRAMMING DETAILS FOR:  RAMEY KEMP ASSOCIATES <small>6210 University Executive Park Drive Suite 230 Charlotte, North Carolina 28222                  Phone: 704-548-4280   www.rameykemp.com   NC License No. F-1489</small>	Prepared for:  US 276 (Russ Avenue) at Dellwood Road/ SR 1184 (Howell Mill Road) Division 14 Haywood County Waynesville		SEAL  William J. Hamilton ENGINEER 04/11/2023
	PLAN DATE: April 2023 PREPARED BY: TS Popelka REVIEWED BY: WJ Hamilton RKA PROJ. NO: 16085 (040)		
	REVISIONS INIT. DATE		

4/12/2023  
 User: jwrench

### ACCESSIBLE PEDESTRIAN SIGNAL (APS) INSTALLATION NOTES

1. Install push buttons and APS equipment per manufacturer's instructions.
2. Provide a dedicated cable to each push button per manufacturer's instructions.
3. If APS equipment is mounted in cabinet, use filtered power (i.e., Controller Receptacle) to power APS equipment. Do not use Equipment Receptacle, which is a GFCI outlet.
4. Never attempt to operate a standard contact closure push button with the APS system unless cabinet is re-wired for standard button operation or unless explicitly allowed by the manufacturer.
5. Place manufacturer's instructions in cabinet with cabinet prints, signal plans, and electrical details.

### OVERLAP PROGRAMMING

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

Web Interface  
Home >Controller >Overlap Configuration >Overlaps

Overlap Plan 1

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

### COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

### PED 3 PROGRAMMING DETAIL

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

Web Interface  
Home >Controller >Detector Configuration >Pedestrian Detector

#### Plan 1

Detector	Description	Call Phase	Call Overlap
2		2	0
4		4	0
6		6	0
8		3	0

NOTICE PHASE 3 PED  
ASSIGNED TO  
DETECTOR 8 PED →

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

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


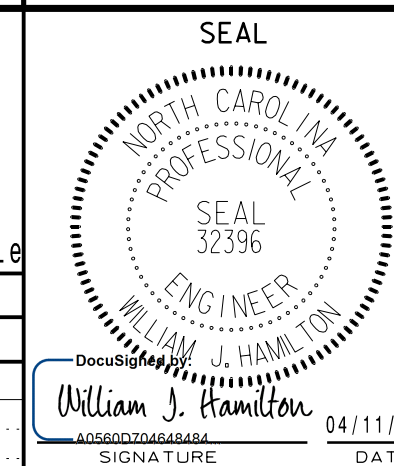
#### Channel Configuration

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

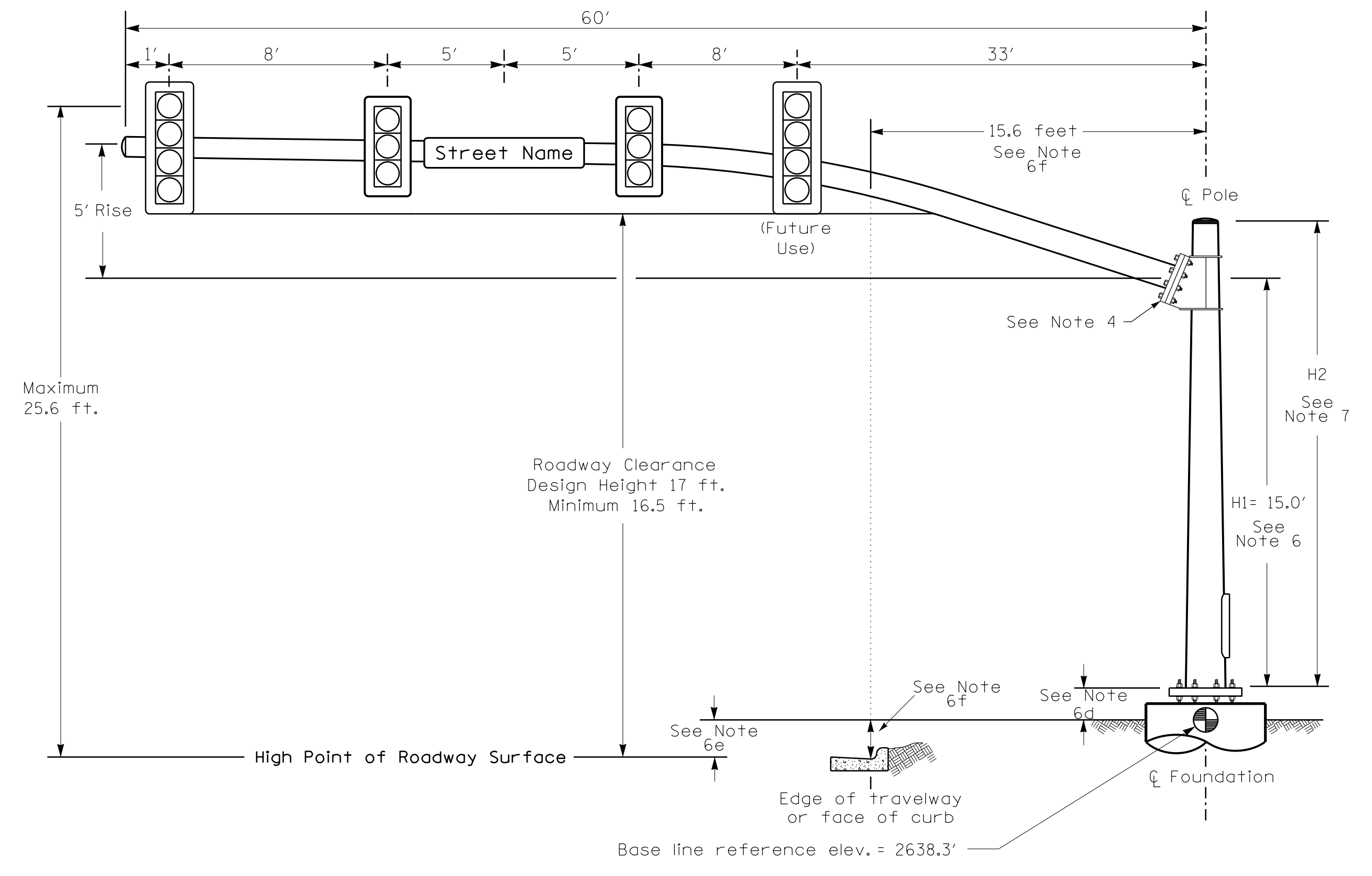
NOTICE PHASE 3 PED  
ASSIGNED TO CHANNEL 16 →

THIS ELECTRICAL DETAIL IS FOR  
THE SIGNAL DESIGN: 14-0359  
DESIGNED: Apr 2023  
SEALED: 04/11/2023  
REVISED: N/A

Electrical Detail - Sheet 2 of 2  
Final Design

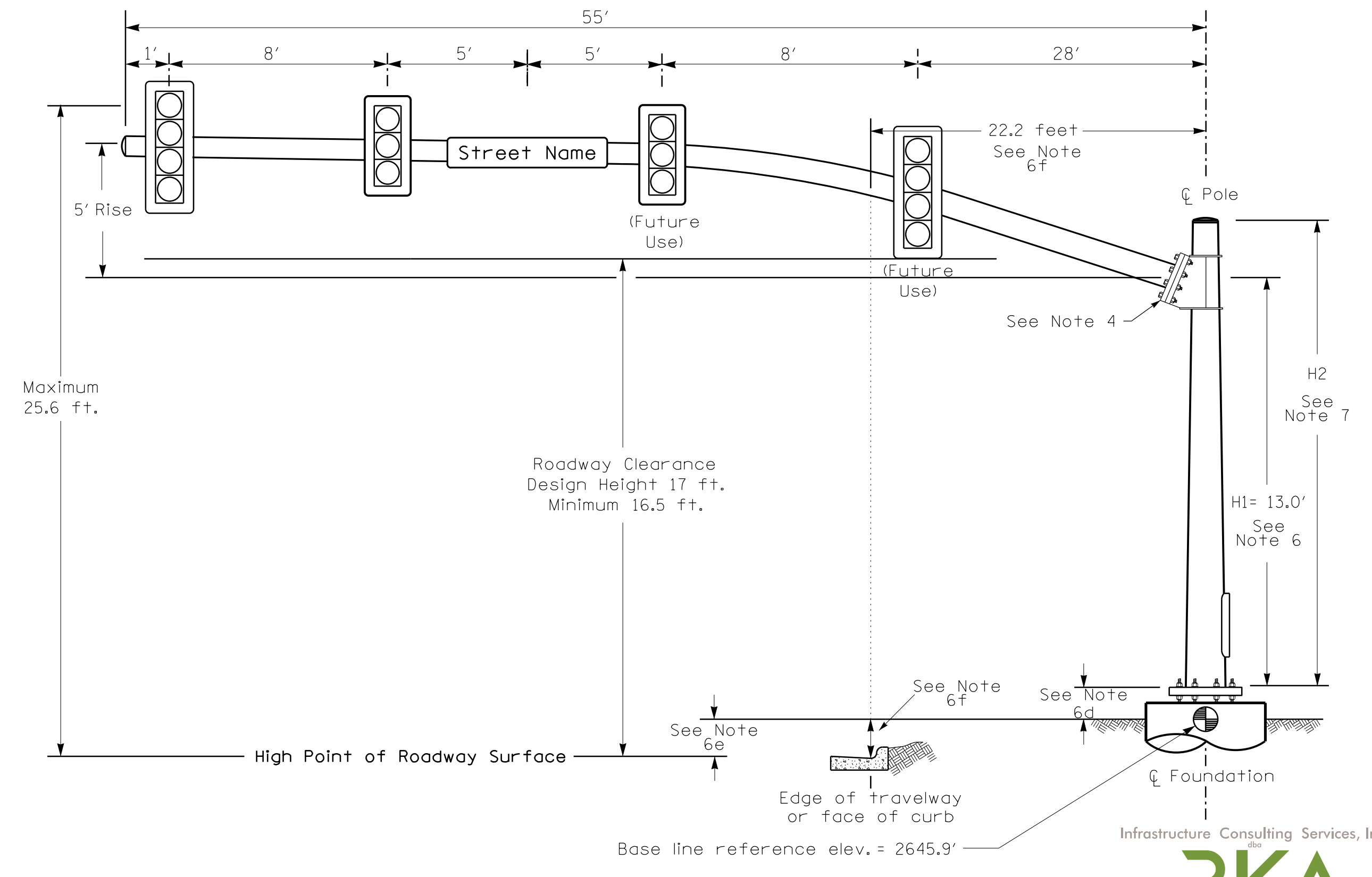
<p style="font-size: small;">ELECTRICAL AND PROGRAMMING DETAILS FOR:</p> <p style="font-size: x-small;">Prepared For:  750 N. Greenfield Pkwy, Garner, NC 27529</p>	<p>US 276 (Russ Avenue) at Dellwood Road/ SR 1184 (Howell Mill Road) Division 14 Haywood County Waynesville</p> <p style="font-size: x-small;">PLAN DATE: April 2023    REVIEWED BY: WJ Hamilton PREPARED BY: TS Popelka    RKA PROJ. NO: 16085 (040)</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="font-size: x-small;">REVISIONS</th> <th style="font-size: x-small;">INIT.</th> <th style="font-size: x-small;">DATE</th> </tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> </tbody> </table>	REVISIONS	INIT.	DATE										<p style="font-size: x-small;">DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED</p> <div style="text-align: center;"> <p>SEAL</p>  <p>William J. Hamilton Professional Engineer No. 32396 04/11/2023</p> </div> <p style="font-size: x-small;">SIGNATURE    DATE</p> <p style="font-size: x-small;">SIG. INVENTORY NO.    14-0359</p>
REVISIONS	INIT.	DATE												

**Design Loading for METAL POLE NO. 1**



Elevation View

**Design Loading for METAL POLE NO. 2**



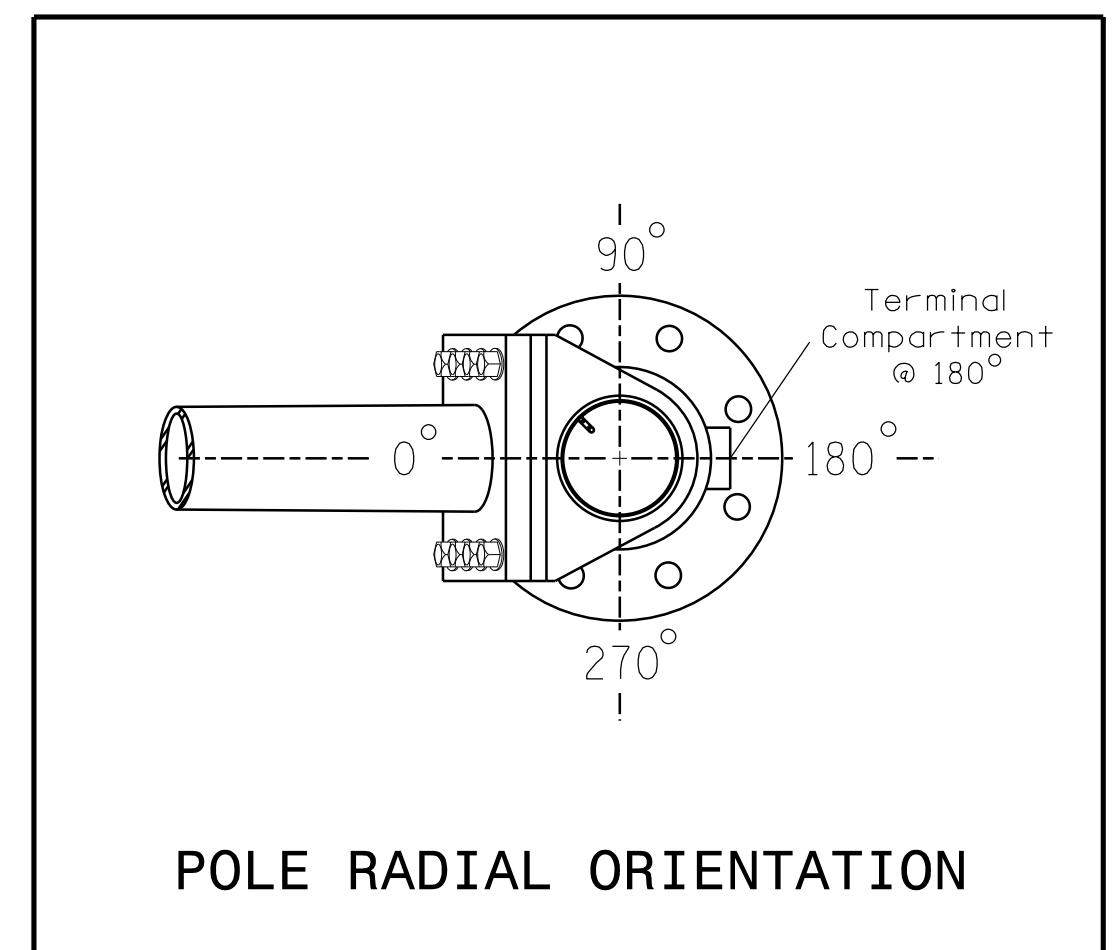
Elevation View

**SPECIAL NOTE**

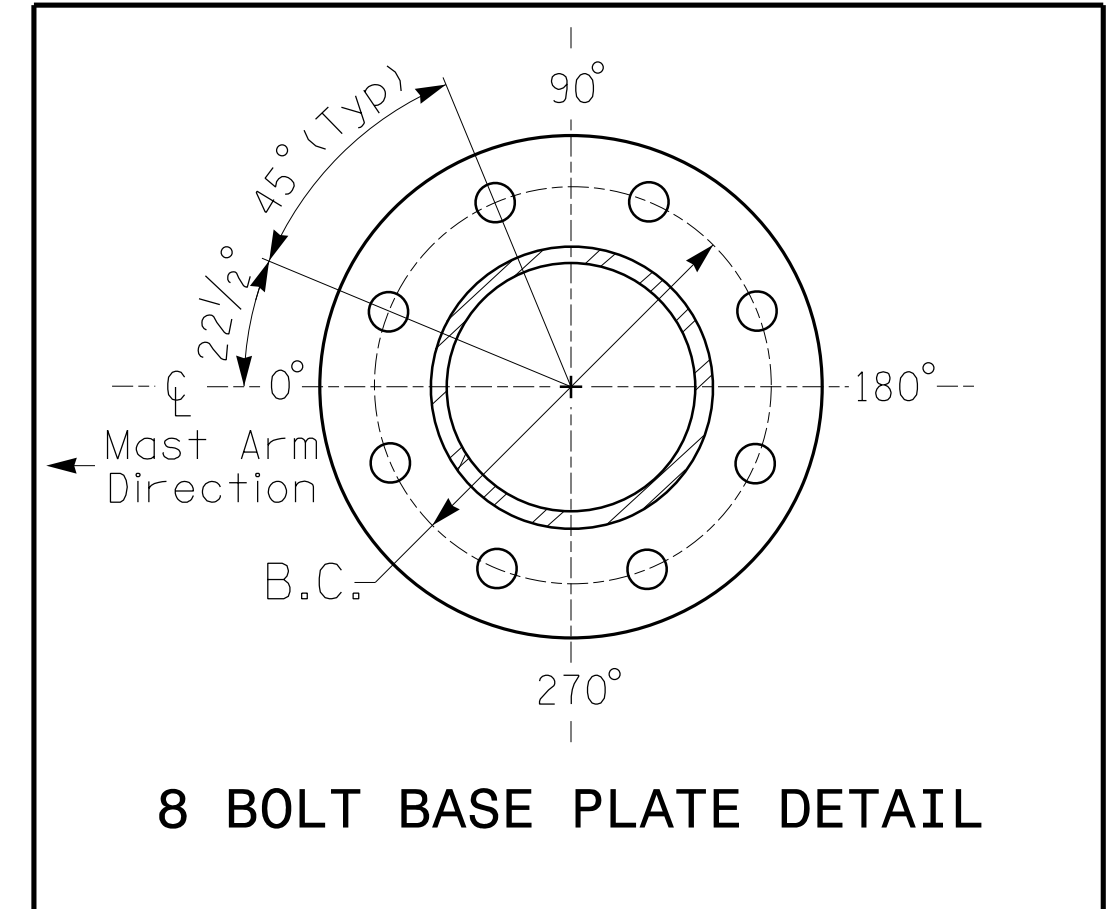
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

**Elevation Data for Mast Arm Attachment (H1)**

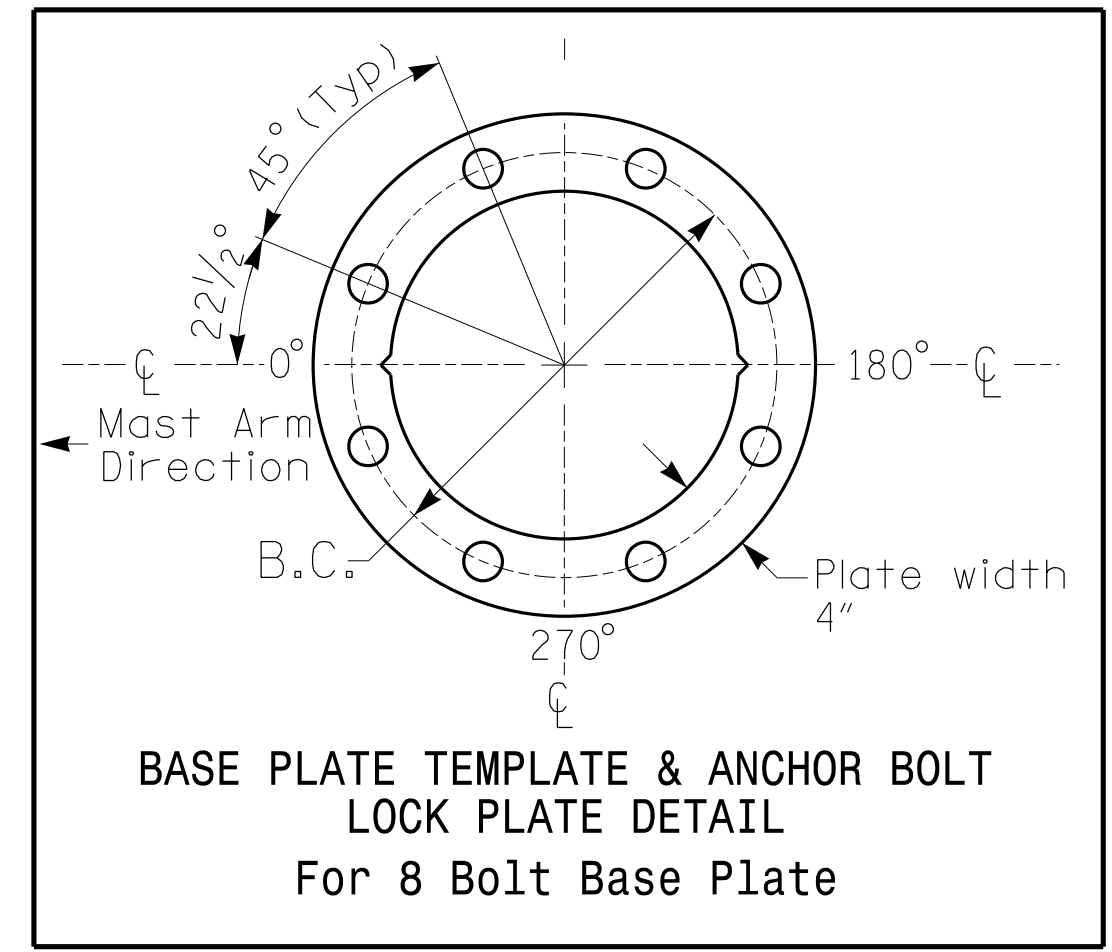
Elevation Differences for:	Pole 1	Pole 2
Baseline reference point at $\phi$ Foundation @ ground level	2638.3 ft.	2645.9 ft.
Elevation difference at High point of roadway surface	+0.9 ft.	-1.3 ft.
Elevation difference at Edge of travelway or face of curb	-0.3 ft.	-1.3 ft.



POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL



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

MAST ARM LOADING SCHEDULE				
LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	RIGID MOUNTED SIGNAL HEAD 12"-4 SECTION-WITH BACKPLATE	11.5 S.F.	25.5" W X 66.0" L	74 LBS
	RIGID MOUNTED SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE	9.3 S.F.	25.5" W X 52.5" L	60 LBS
	STREET NAME SIGN RIGID MOUNTED	12.0 S.F.	18.0" W X 96.0" L	27 LBS

**NOTES**

**DESIGN REFERENCE MATERIAL**

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

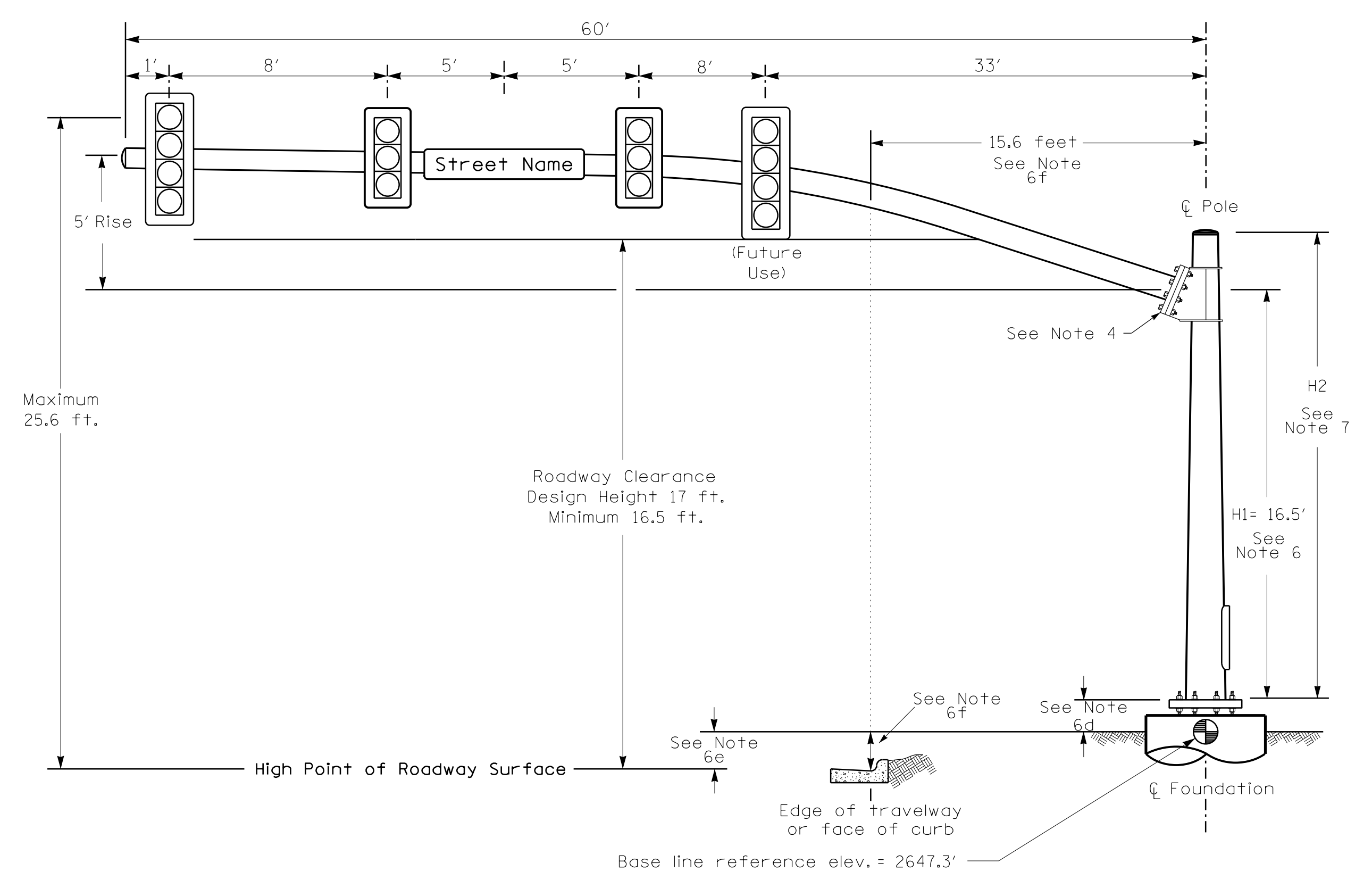
**DESIGN REQUIREMENTS**

- Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
- Design all signal supports using stress ratios that do not exceed 0.9.
- A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements.
- Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
- The mast arm attachment height (H1) shown is based on the following design assumptions:
  - Nominal vertical rise in mast arm is 5 feet as measured from the centerline of the arm base to the centerline of the free end of the arm.
  - Signal heads are rigidly mounted and vertically centered on the mast arm.
  - The roadway clearance height for design is as shown in the elevation views.
  - The top of the pole base plate is 0.75 feet above the ground elevation.
  - Refer to the Elevation Data Chart for the elevation differences between the proposed foundation ground level and the high point of the roadway.
  - Provide horizontal distance from the proposed centerline of the foundation to the edge of travelway. Refer to the Elevation Data Chart for elevation difference between the proposed foundation ground level and the edge of travelway. This information is necessary to ensure that the roadway clearance is maintained at the edge of the travelway and to aid in the camber design of the arm.
- The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
  - Mast arm attachment height (H1) plus 2 feet, or
  - H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
- If pole location adjustments are required, the contractor must gain approval from the Engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signal Design Section Senior Structural Engineer for assistance at (919) 814-5000.
- The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
- The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

All metal poles and arms should be Hunter Green in color as specified in the project special provisions.

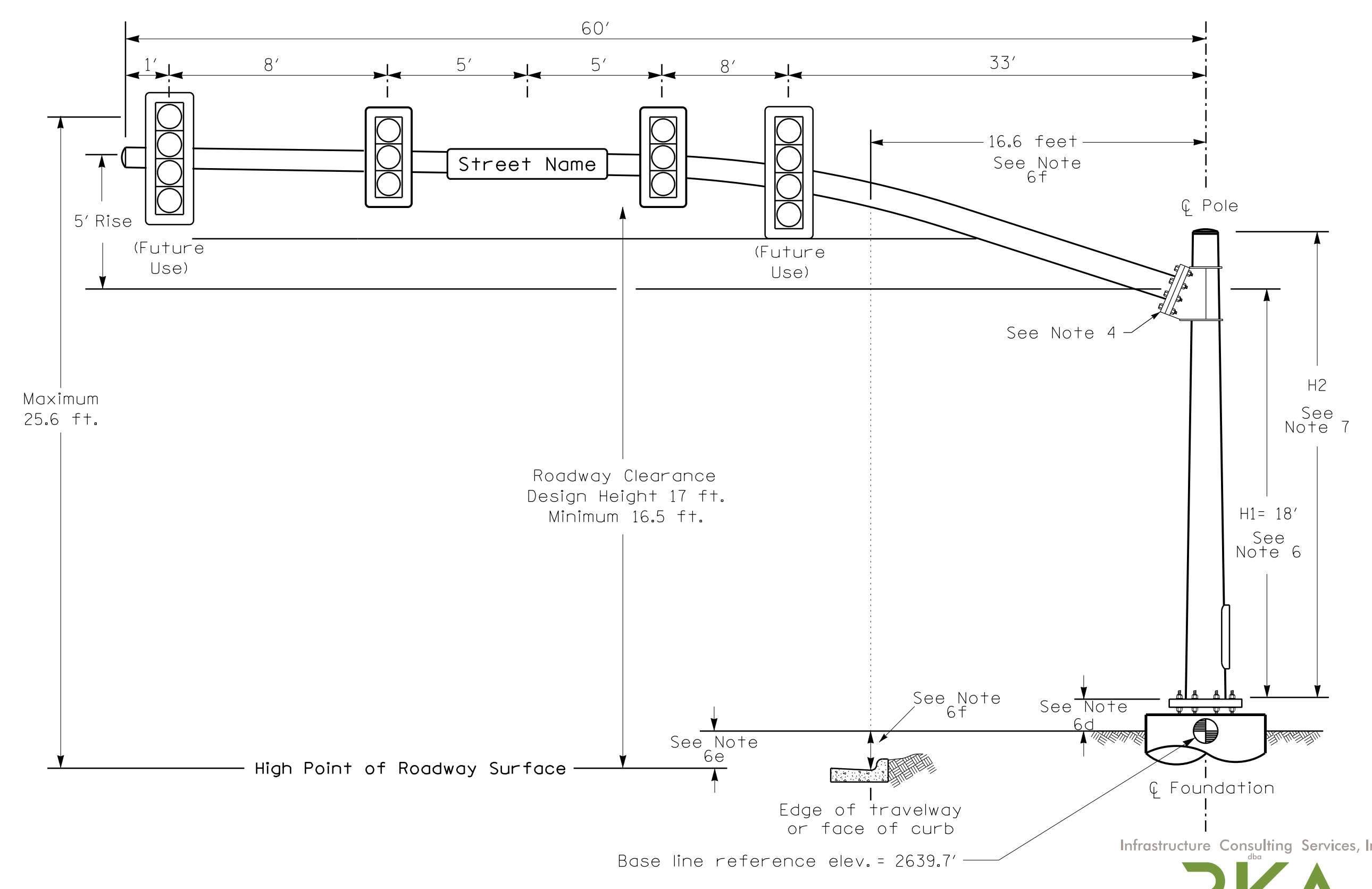
<p>NCDOT Wind Zone 5 (120 mph)</p>		<p>DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED</p>	
<p>Prepared For:  </p>		<p>US 276 (Russ Avenue)                  at                  Dellwood Road /                  SR 1184 (Howell Mill Road)                  Division 14 Haywood County Waynesville</p>	
<p>PLAN DATE: April 2023</p>		<p>REVIEWED BY: WJ Hamilton</p>	
<p>PREPARED BY: TS Popelka</p>		<p>REVIEWED BY: 16085 (040)</p>	
<p>SCALE: 0 N/A</p>		<p>REVISIONS: INIT. DATE</p>	
<p>750 N. Greenfield Pkwy, Garner, NC 27529</p>		<p>SEAL                    WILLIAM J. HAMILTON                  PROFESSIONAL ENGINEER                  SIGNATURE:  DATE: 04/11/2023                  SIG. INVENTORY NO. 14-0359</p>	

**Design Loading for METAL POLE NO. 3**



Elevation View

**Design Loading for METAL POLE NO. 4**



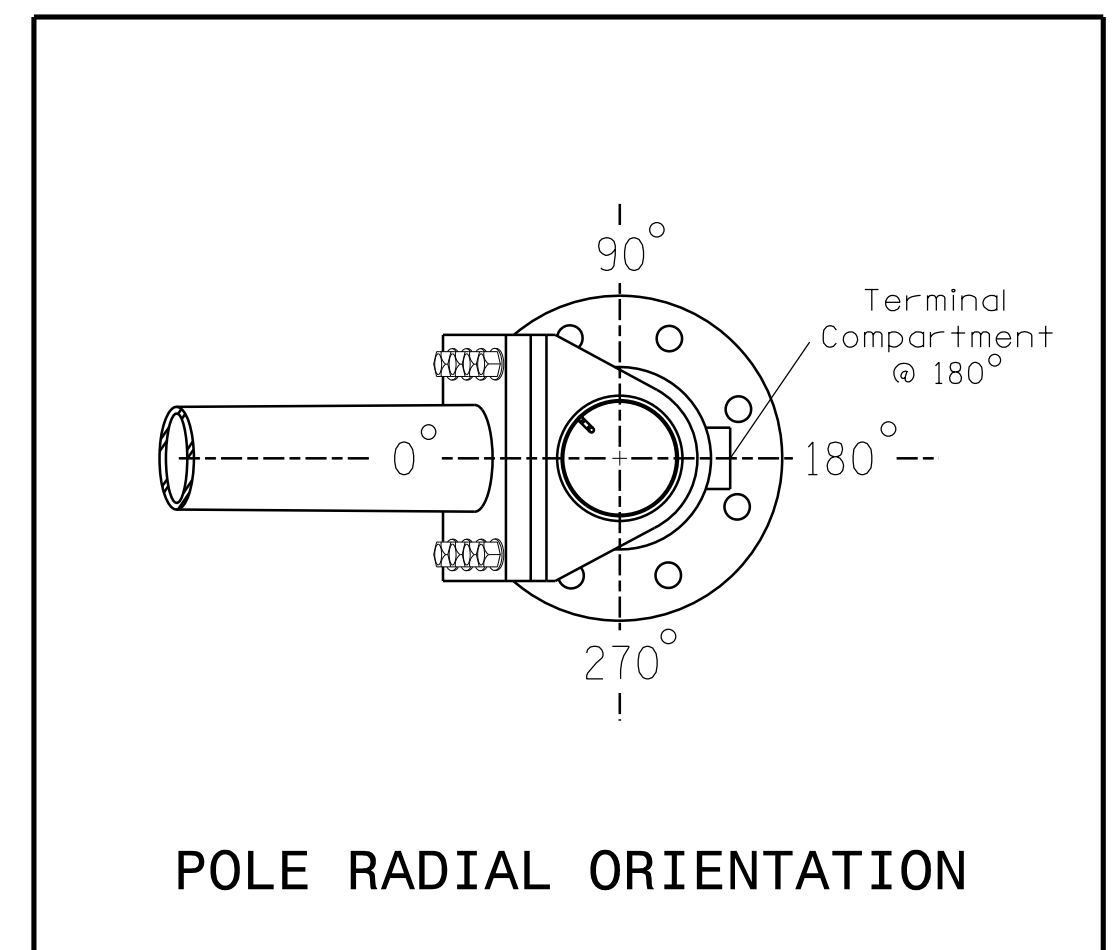
Elevation View

**SPECIAL NOTE**

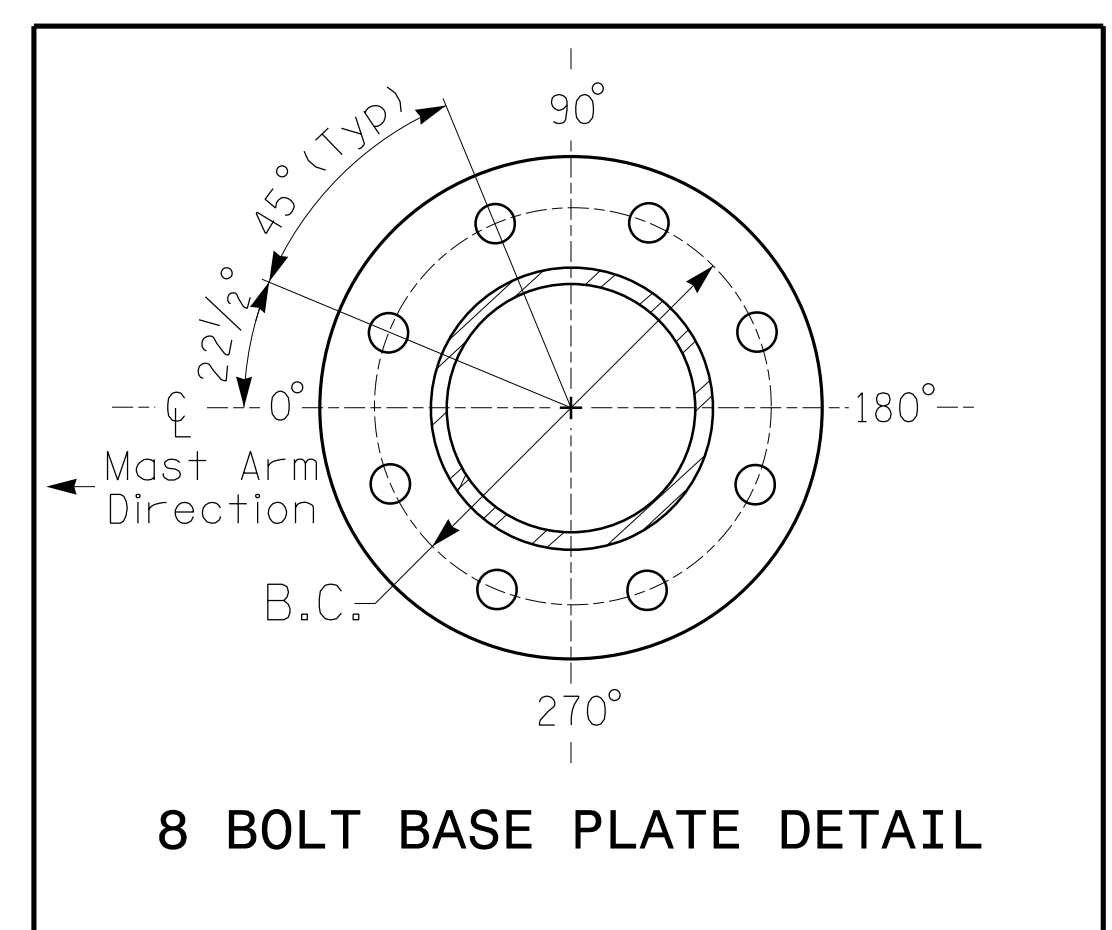
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

**Elevation Data for Mast Arm Attachment (H1)**

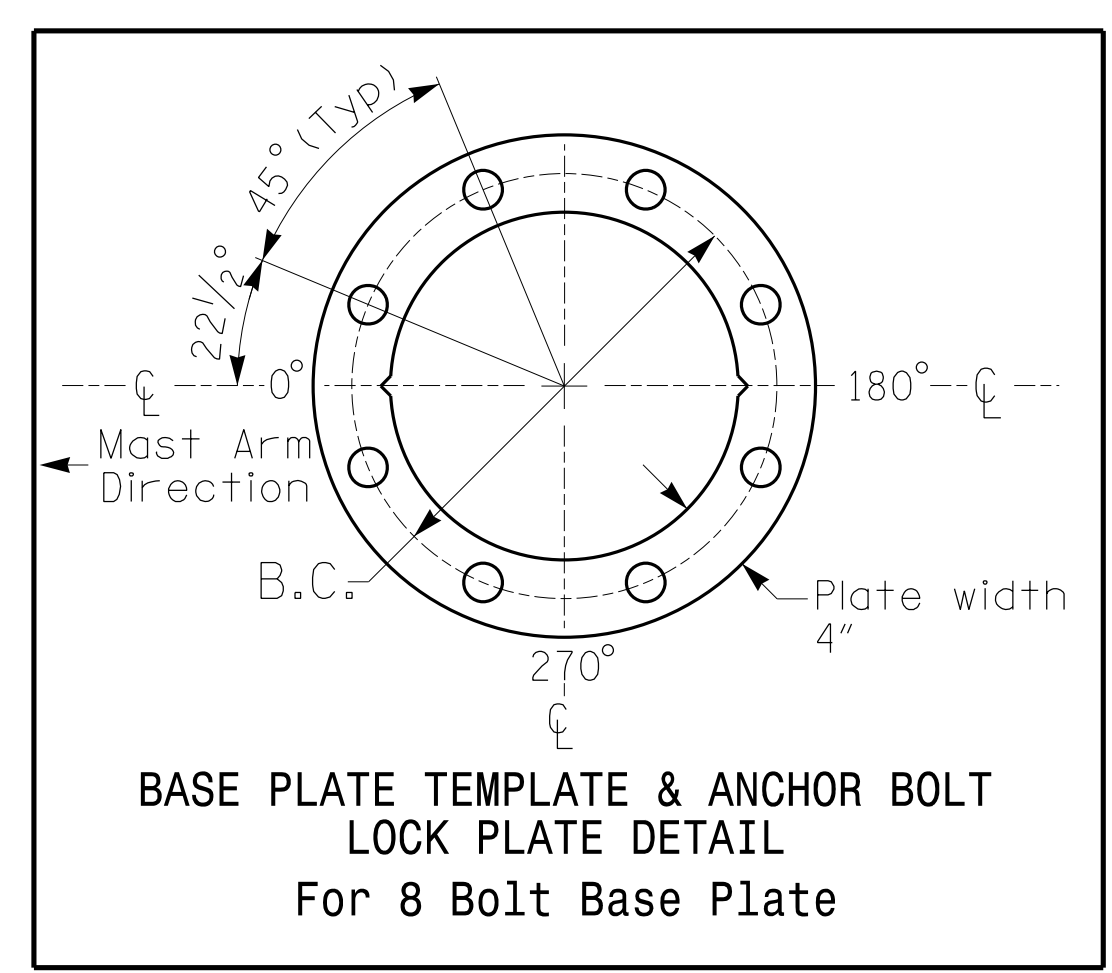
Elevation Differences for:	Pole 3	Pole 4
Baseline reference point at $\phi$ Foundation @ ground level	2647.3 ft.	2639.7 ft.
Elevation difference at High point of roadway surface	+2.5 ft.	+3.6 ft.
Elevation difference at Edge of travelway or face of curb	+1.5 ft.	+0.5 ft.



POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL



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

MAST ARM LOADING SCHEDULE				
LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	RIGID MOUNTED SIGNAL HEAD 12"-4 SECTION-WITH BACKPLATE	11.5 S.F.	25.5" W X 66.0" L	74 LBS
	RIGID MOUNTED SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE	9.3 S.F.	25.5" W X 52.5" L	60 LBS
	STREET NAME SIGN RIGID MOUNTED	12.0 S.F.	18.0" W X 96.0" L	27 LBS

**NOTES**

**DESIGN REFERENCE MATERIAL**

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

**DESIGN REQUIREMENTS**

- Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
- Design all signal supports using stress ratios that do not exceed 0.9.
- A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements.
- Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
- The mast arm attachment height (H1) shown is based on the following design assumptions:
  - Nominal vertical rise in mast arm is 5 feet as measured from the centerline of the arm base to the centerline of the free end of the arm.
  - Signal heads are rigidly mounted and vertically centered on the mast arm.
  - The roadway clearance height for design is as shown in the elevation views.
  - The top of the pole base plate is 0.75 feet above the ground elevation.
  - Refer to the Elevation Data Chart for the elevation differences between the proposed foundation ground level and the high point of the roadway.
  - Provide horizontal distance from the proposed centerline of the foundation to the edge of travelway. Refer to the Elevation Data Chart for elevation difference between the proposed foundation ground level and the edge of the travelway. This information is necessary to ensure that the roadway clearance is maintained at the edge of the travelway and to aid in the camber design of the arm.
- The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
  - Mast arm attachment height (H1) plus 2 feet, or
  - H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
- If pole location adjustments are required, the contractor must gain approval from the Engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signal Design Section Senior Structural Engineer for assistance at (919) 814-5000.
- The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
- The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

All metal poles and arms should be Hunter Green in color as specified in the project special provisions.

**NCDOT Wind Zone 5 (120 mph)**

	US 276 (Russ Avenue) at Dellwood Road / SR 1184 (Howell Mill Road)		SEAL 
	Division 14 Haywood County PLAN DATE: April 2023 PREPARED BY: TS Popelka	Waynesville REVIEWED BY: WJ Hamilton REVIEWED BY: 16085 (040)	



PHASING DIAGRAM

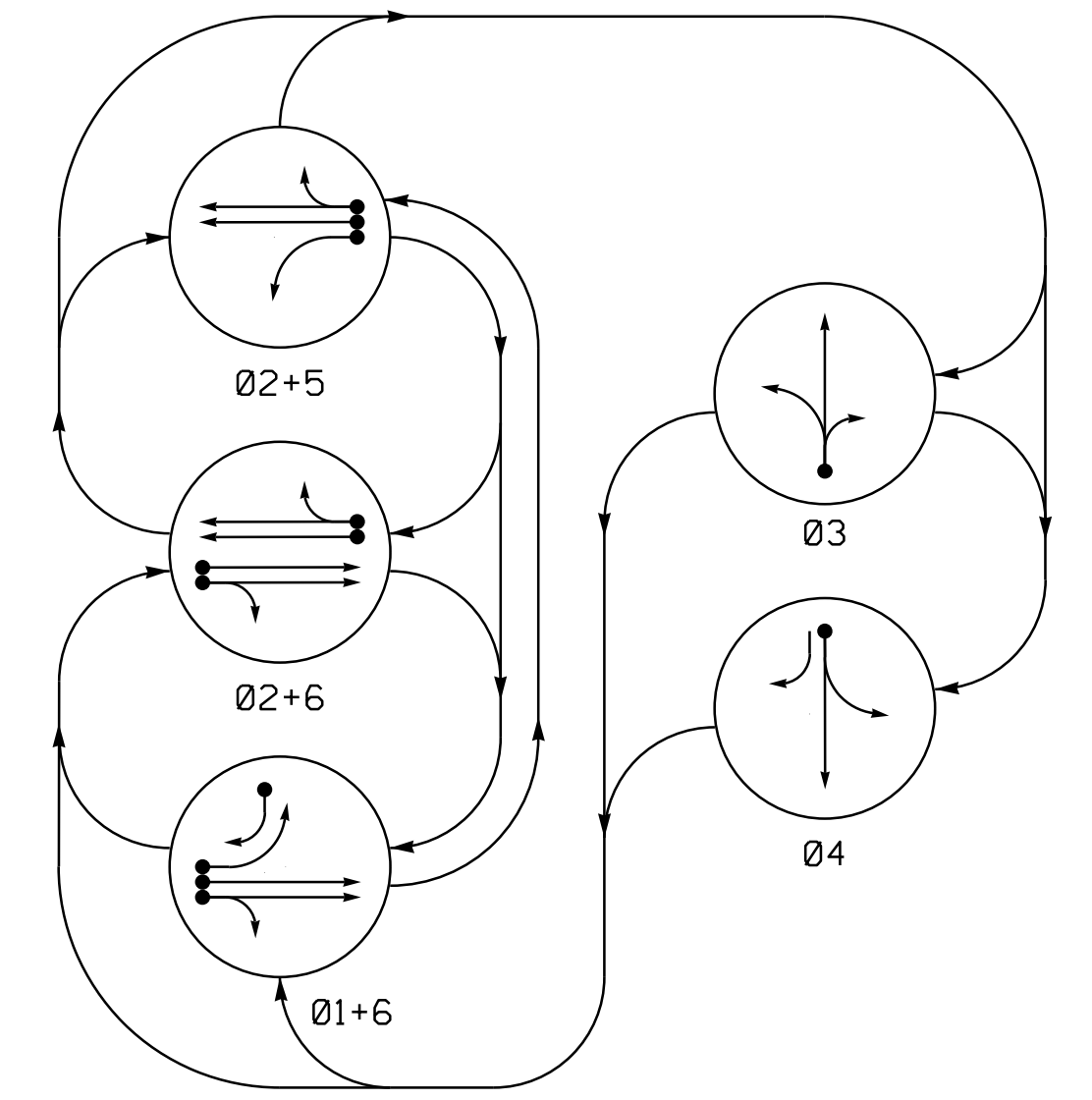
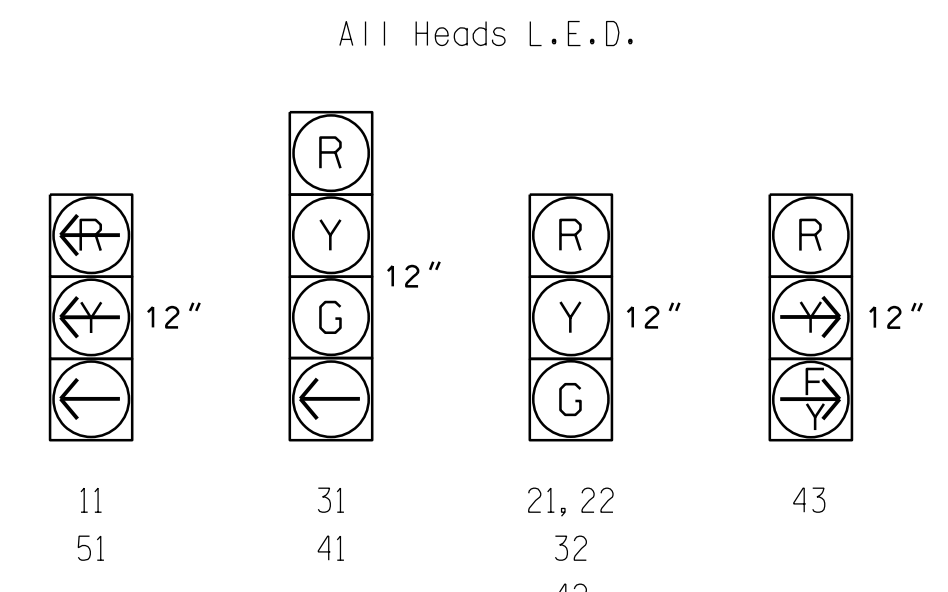


TABLE OF OPERATION

SIGNAL FACE	PHASE					
	01+6	02+6	02+5	03	04	ESB/RT
11	←	←	←	←	←	←
21, 22	R	G	G	R	R	Y
31	R	R	R	G	R	R
32	R	R	R	G	R	R
41	R	R	R	R	C	R
42	←	R	R	R	G	R
43	←	R	R	R	R	R
51	←	←	←	←	←	←
61, 62	G	G	R	R	R	Y

SIGNAL FACE I.D.



MAXTIME DETECTOR INSTALLATION CHART

ZONE	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING							
					CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	RELAY DURING GREEN	NEW CARD
1A	6X40	0	*	*	1	3	-	X	-	X	-	*
1B	6X40	0	*	*	1	15	-	X	-	X	-	*
2A	6X6	70	*	*	2	-	-	X	-	X	-	*
2B	6X6	70	*	*	2	-	-	X	-	X	-	*
3A	6X40	0	*	*	3	10	-	X	-	X	-	*
4A	6X40	0	*	*	4	3	-	X	-	X	-	*
5A	6X40	0	*	*	5	3	-	X	-	X	-	*
6A	6X6	70	*	*	6	-	-	X	-	X	-	*
6B	6X6	70	*	*	6	-	-	X	-	X	-	*

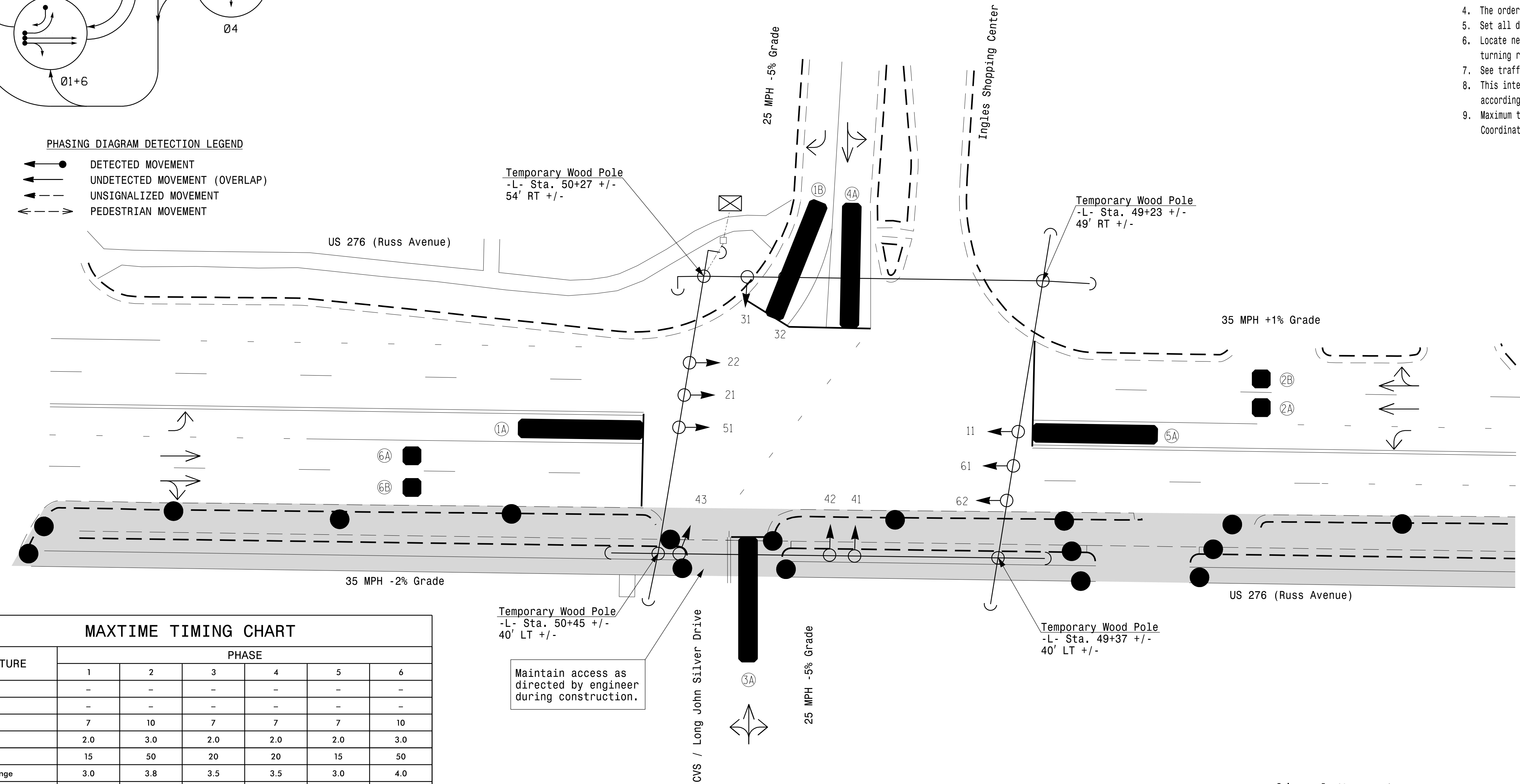
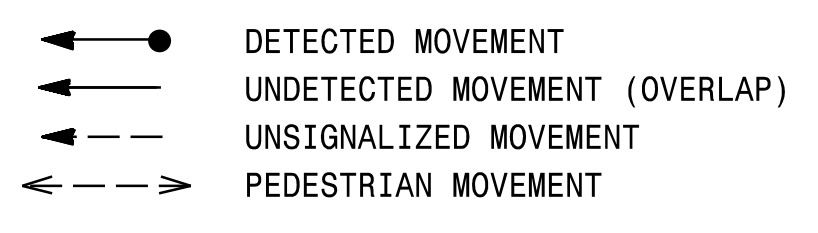
\* Multizone Microwave Detection

5 Phase Fully Actuated D14-12\_Waynesville

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- The order of Phase 1+6 and phase 2+5 may be reversed.
- The order of Phase 3 and phase 4 may be reversed.
- Set all detector units to presence mode.
- Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
- See traffic control plans for stop bar and crosswalk locations.
- This intersection uses multizone microwave detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.

PHASING DIAGRAM DETECTION LEGEND

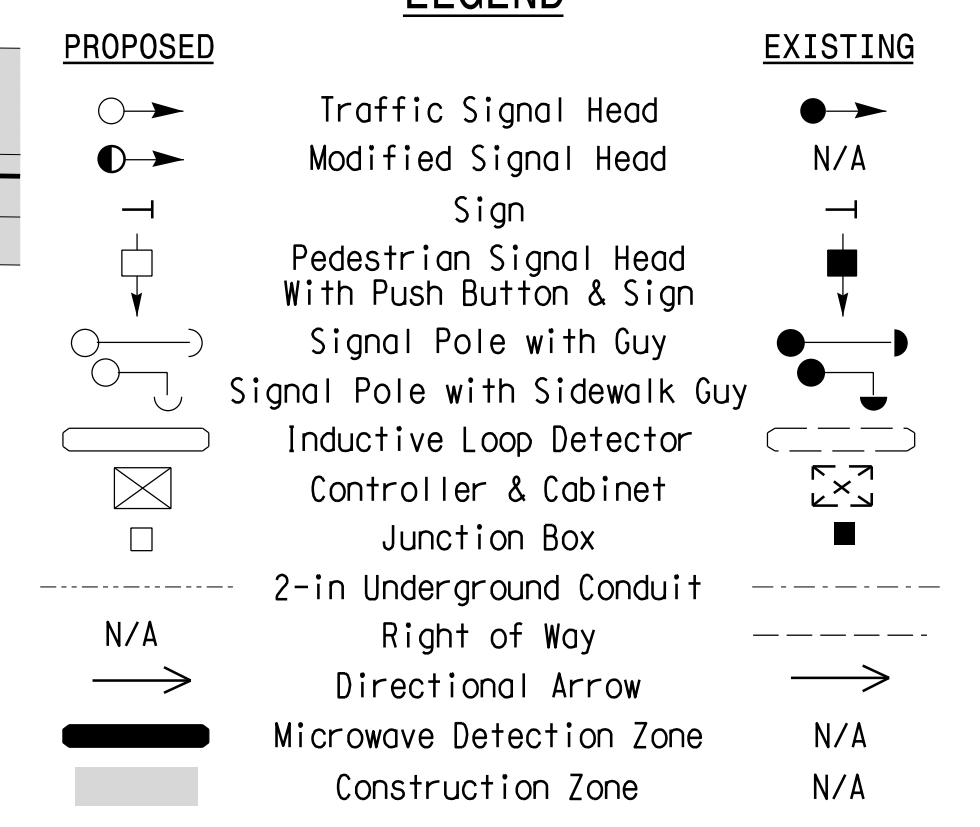


MAXTIME TIMING CHART

FEATURE	PHASE					
	1	2	3	4	5	6
Walk *	-	-	-	-	-	-
Ped Clear *	-	-	-	-	-	-
Min Green	7	10	7	7	7	10
Passage *	2.0	3.0	2.0	2.0	2.0	3.0
Max I *	15	50	20	20	15	50
Yellow Change	3.0	3.8	3.5	3.5	3.0	4.0
Red Clear	2.9	2.5	2.1	2.1	3.3	2.0
Added Initial *	-	-	-	-	-	-
Maximum Initial *	-	-	-	-	-	-
Time Before Reduction *	-	-	-	-	-	-
Time To Reduce *	-	-	-	-	-	-
Minimum Gap	-	-	-	-	-	-
Advance Walk	-	-	-	-	-	-
Non Lock Detector	X	-	X	X	X	-
Vehicle Recall	-	MIN RECALL	-	-	-	MIN RECALL
Dual Entry	-	-	-	-	-	-

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

LEGEND



Signal Upgrade Temporary Design 1 - (TMP Phase I)



US 276 (Russ Avenue) at Ingles Shopping Center / Long John Silver Drive

Division 14 Haywood County Waynesville

PLAN DATE: April 2023 REVIEWED BY: WJ Hamilton

PREPARED BY: TS Popelka RKA PROJ. NO.: 16085 (040)

750 N. Greenfield Pkwy, Garner, NC 27529

SCALE: 0 20 1"=20'

REVISIONS: [Table with columns for REVISIONS, INIT., and DATE]

SEAL: NORTH CAROLINA PROFESSIONAL ENGINEER, WILLIAM J. HAMILTON, No. 32396

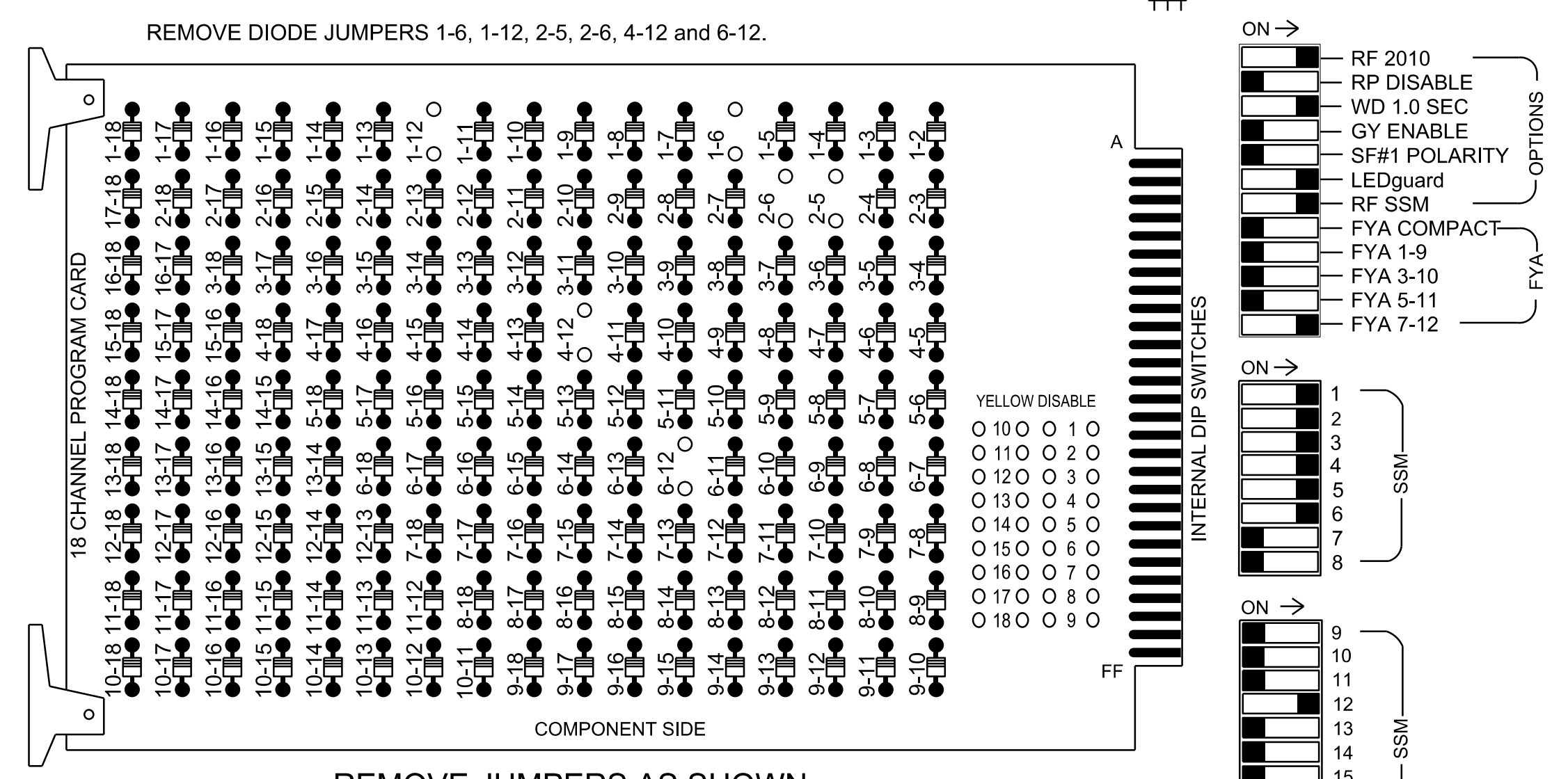
SIGNATURE: William J. Hamilton DATE: 04/11/2023

SIG. INVENTORY NO. 14-068911

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

### 18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



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

### NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the signal plan.
2. Program controller to start up in phase 2 Green No Walk and 6 Green No Walk.
3. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
4. The cabinet and controller are part of the D14-12 Waynesville Signal System.

### EQUIPMENT INFORMATION

Controller.....2070LX  
 Cabinet.....332 w/ Aux  
 Software.....Q-Free MAXTIME  
 Cabinet Mount.....Base  
 Output File Positions.....18 With Aux. Output File  
 Load Switches Used.....S1, S2, S4, S5, S7, S8, AUX S5  
 Phases Used.....1, 2, 3, 4, 5, 6  
 Overlap "1".....NOT USED  
 Overlap "2".....NOT USED  
 Overlap "3".....NOT USED  
 Overlap "4".....\*

\*See overlap programming detail on sheet 2

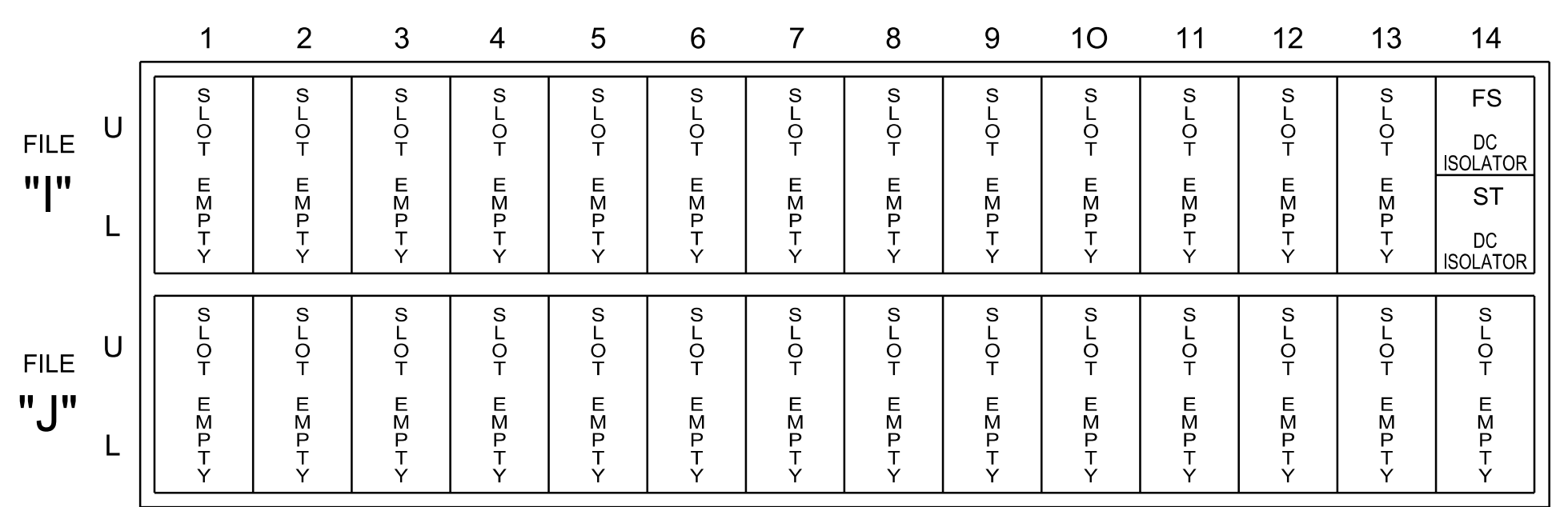
### SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	11	21,22	NU	31	32	41	42	NU	51	61,62	NU	NU	NU	NU	NU	NU	43	NU
RED		128		116	116	101	101			134								A101
YELLOW		129		117	117	102	102			135								
GREEN		130		118	118	103	103			136								
RED ARROW	125									131								
YELLOW ARROW	126									132								A102
FLASHING YELLOW ARROW																		A103
GREEN ARROW	127			118		103				133								

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

### INPUT FILE POSITION LAYOUT

(front view)



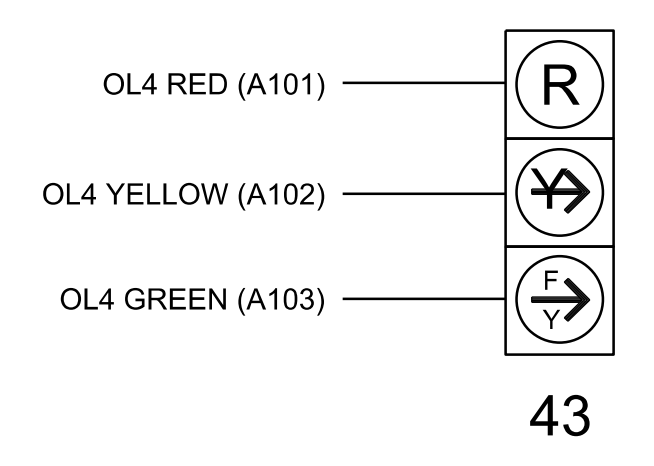
EX.: 1A, 2A, ETC. = LOOP NO.'S  
 FS = FLASH SENSE  
 ST = STOP TIME

### SPECIAL DETECTOR NOTE

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

### FYA SIGNAL WIRING DETAIL

(wire signal head as shown)



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 14-0689T1  
 DESIGNED: Apr 2023  
 SEALED: 04/11/2023  
 REVISED: N/A

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

ELECTRICAL AND PROGRAMMING DETAILS FOR: Prepared For:  RAMEY KEMP ASSOCIATES 8210 University Executive Park Drive Suite 220 Charlotte, North Carolina 28223 Phone: 704-548-4200   www.rameykemp.com   NC License No. F-1489	US 276 (Russ Avenue) at Ingles Shopping Center / Long John Silver Drive Division 14 Haywood County Waynesville		SEAL  William J. Hamilton ENGINEER 04/11/2023 DATE
	PLAN DATE: April 2023 PREPARED BY: TS Popelka	REVIEWED BY: WJ Hamilton RKA PROJ. NO: 16085 (040)	

### OVERLAP PROGRAMMING

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

Web Interface  
Home >Controller >Overlap Configuration >Overlaps

Overlap Plan 1

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

### SEQUENCE DETAIL

Front Panel  
Main Menu >Controller >Sequence & Phs Config>Sequences

Web Interface  
Home >Controller >Sequence

Sequence 1

Ring	Sequence Data
1	1,2,a,3,4,b
2	6,5,a,7,8,b

### COMPATIBILITY

Front Panel  
Main Menu >Controller >Sequence & Phs Config>No Served Phase Plans

Web Interface  
Home >Controller >Phase Configuration>No Served Phase Plans

Sequence 1

Phase	No Serve Phase
1	5
2	
3	
4	
5	
6	
7	
8	

### FLASHER CIRCUIT MODIFICATION DETAIL


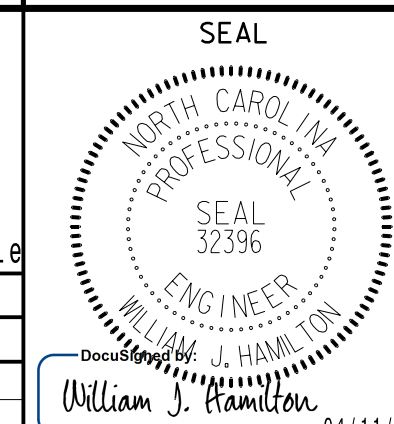
IN ORDER TO INSURE THAT SIGNALS FLASH CONCURRENTLY ON THE SAME APPROACH, MAKE THE FOLLOWING FLASHER CIRCUIT CHANGES:

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

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

THIS ELECTRICAL DETAIL IS FOR  
 THE SIGNAL DESIGN: 14-0689T1  
 DESIGNED: Apr 2023  
 SEALED: 04/11/2023  
 REVISED: N/A

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

ELECTRICAL AND PROGRAMMING DETAILS FOR:   RKA RAMEY KEMP ASSOCIATES <small>8210 University Executive Park Drive Suite 220 Charlotte, North Carolina 28223 Phone: 704-548-4200   www.rameykemp.com   NC License No. F-1489</small>	US 276 (Russ Avenue) at Ingles Shopping Center / Long John Silver Drive Division 14 Haywood County Waynesville	DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED   SEAL NORTH CAROLINA PROFESSIONAL ENGINEER WILLIAM J. HAMILTON 32396 04/11/2023 SIGNATURE DATE SIG. INVENTORY NO. 14-0689T1
	Prepared for: Prepared by: TS Popelka RKA PROJ. NO: 16085 (040)	

PHASING DIAGRAM

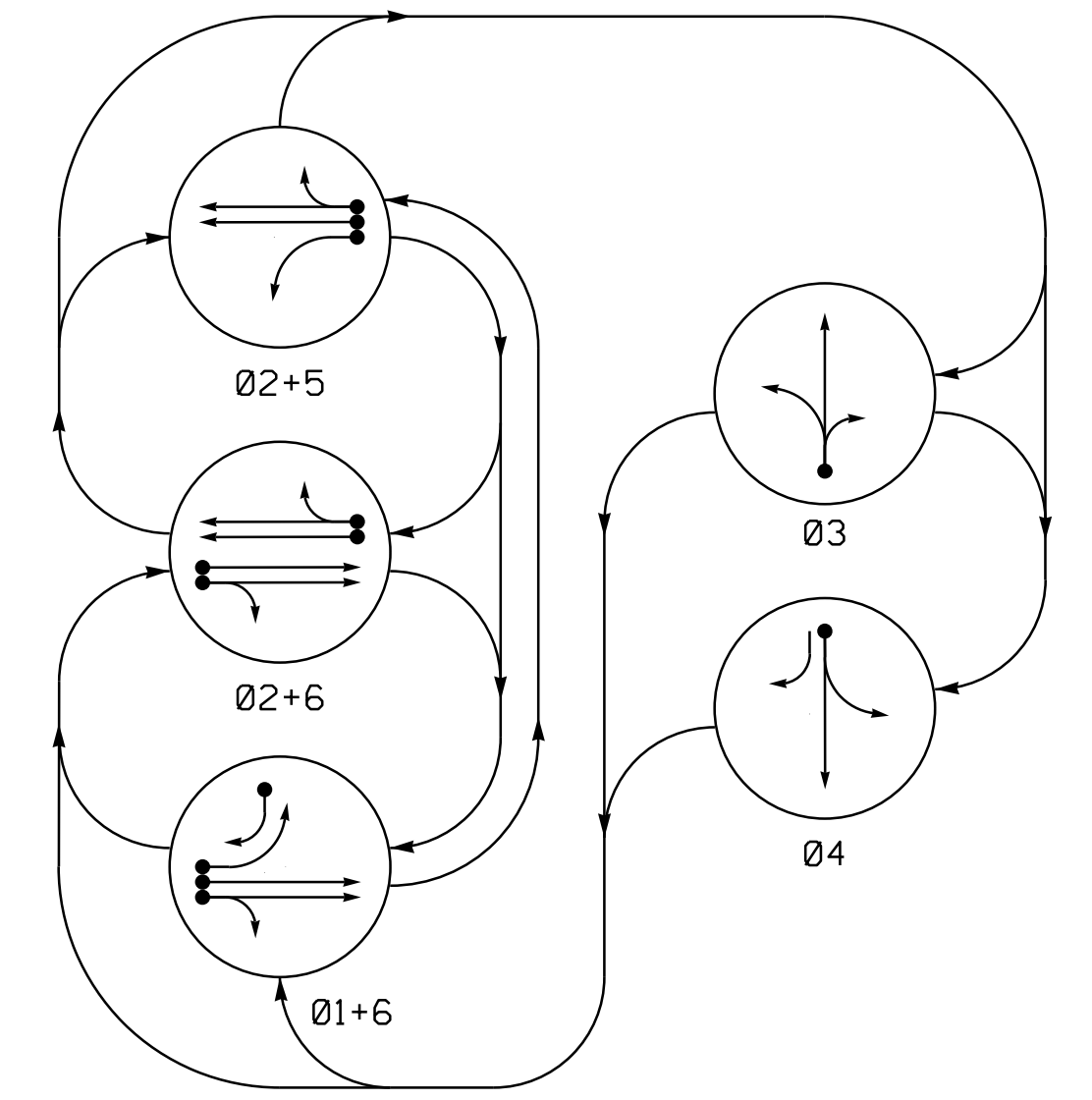
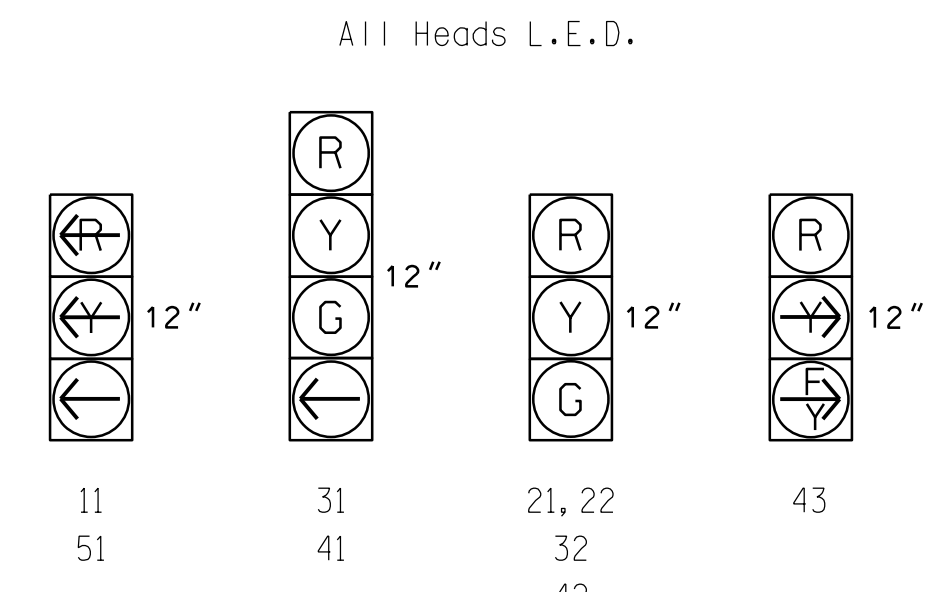


TABLE OF OPERATION

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

SIGNAL FACE I.D.



MAXTIME DETECTOR INSTALLATION CHART

ZONE	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING							
					CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	RELAY DURING GREEN	NEW CARD
1A	6X40	0	*	*	1	3	-	X	-	X	-	*
1B	6X40	0	*	*	1	15	-	X	-	X	-	*
2A	6X6	70	*	*	2	-	-	X	-	X	-	*
2B	6X6	70	*	*	2	-	-	X	-	X	-	*
3A	6X40	0	*	*	3	10	-	X	-	X	-	*
4A	6X40	0	*	*	4	3	-	X	-	X	-	*
5A	6X40	0	*	*	5	3	-	X	-	X	-	*
6A	6X6	70	*	*	6	-	-	X	-	X	-	*
6B	6X6	70	*	*	6	-	-	X	-	X	-	*

\* Multizone Microwave Detection

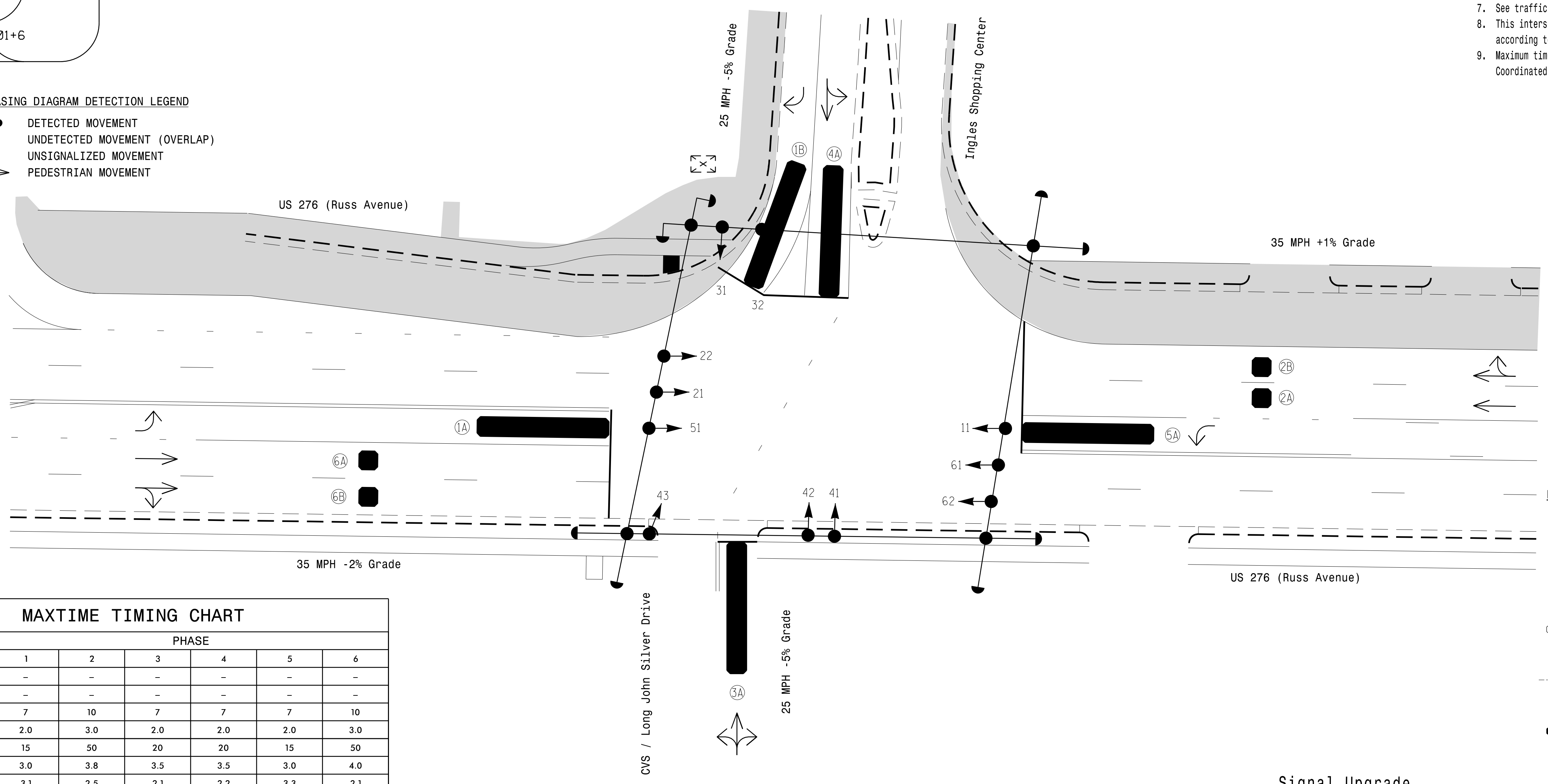
5 Phase Fully Actuated D14-12\_Waynesville

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- The order of Phase 1+6 and phase 2+5 may be reversed.
- The order of Phase 3 and phase 4 may be reversed.
- Reposition existing signal heads numbered 11, 21, 22, 51, 61 and 62.
- Set all detector units to presence mode.
- See traffic control plans for stop bar and crosswalk locations.
- This intersection uses multizone microwave detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.

PHASING DIAGRAM DETECTION LEGEND

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



MAXTIME TIMING CHART

FEATURE	PHASE					
	1	2	3	4	5	6
Walk *	-	-	-	-	-	-
Ped Clear *	-	-	-	-	-	-
Min Green	7	10	7	7	7	10
Passage *	2.0	3.0	2.0	2.0	2.0	3.0
Max I *	15	50	20	20	15	50
Yellow Change	3.0	3.8	3.5	3.5	3.0	4.0
Red Clear	3.1	2.5	2.1	2.2	3.3	2.1
Added Initial *	-	-	-	-	-	-
Maximum Initial *	-	-	-	-	-	-
Time Before Reduction *	-	-	-	-	-	-
Time To Reduce *	-	-	-	-	-	-
Minimum Gap	-	-	-	-	-	-
Advance Walk	-	-	-	-	-	-
Non Lock Detector	X	-	X	X	X	-
Vehicle Recall	-	MIN RECALL	-	-	-	MIN RECALL
Dual Entry	-	-	-	-	-	-

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

LEGEND

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

Signal Upgrade Temporary Design 2 - (TMP Phase II)



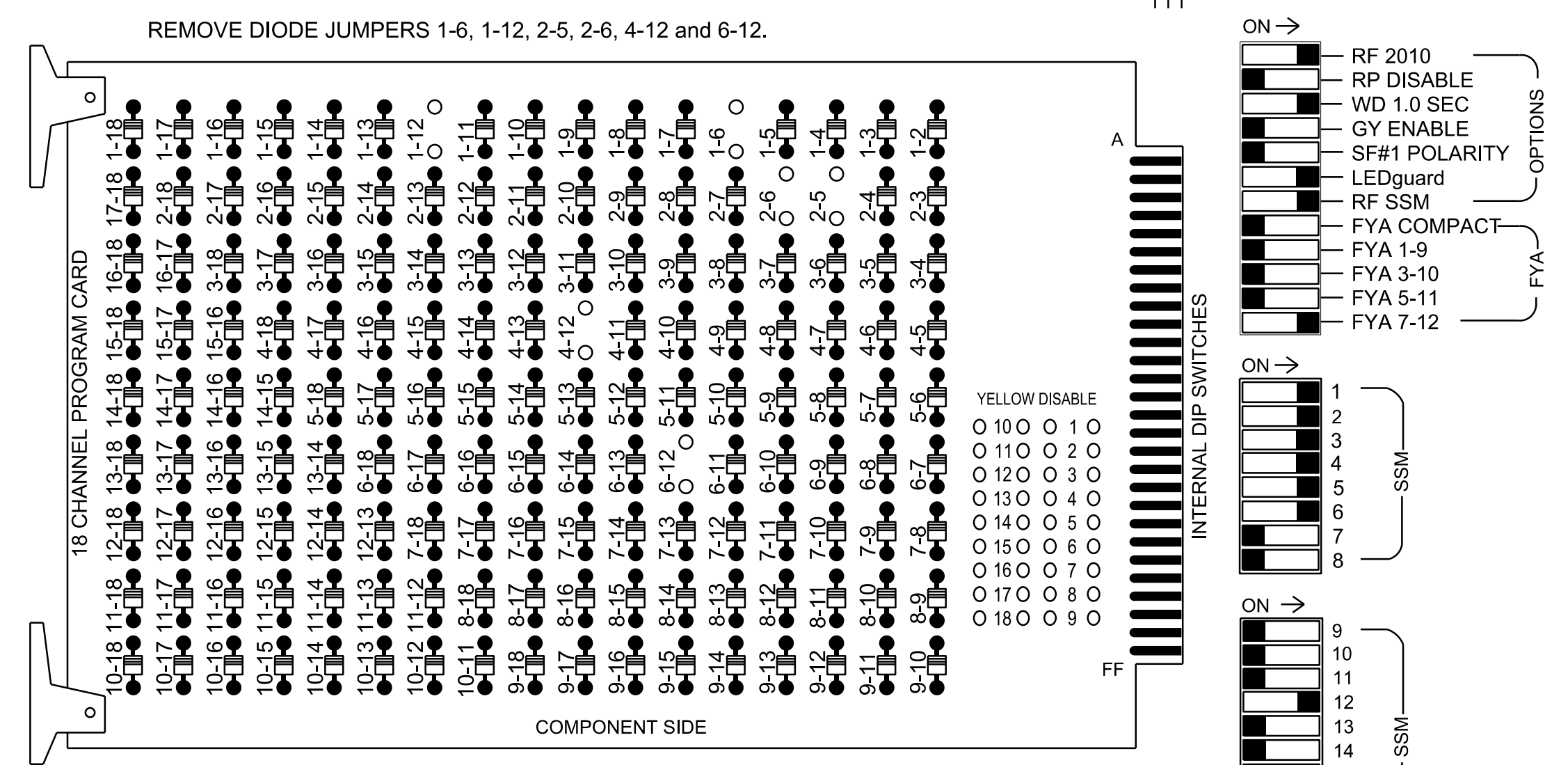
	US 276 (Russ Avenue) at Ingles Shopping Center / Long John Silver Drive		
	Division 14 Haywood County Waynesville	PLAN DATE: April 2023 PREPARED BY: TS Popelka	
REVISIONS	INIT.	DATE	SEAL 04/11/2023 DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SIG. INVENTORY NO. 14-068972

### 18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



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

### NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the signal plan.
- Program controller to start up in phase 2 Green No Walk and 6 Green No Walk.
- If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
- The cabinet and controller are part of the D14-12 Waynesville Signal System.

### EQUIPMENT INFORMATION

Controller.....2070LX  
 Cabinet.....332 w/ Aux  
 Software.....Q-Free MAXTIME  
 Cabinet Mount.....Base  
 Output File Positions.....18 With Aux. Output File  
 Load Switches Used.....S1, S2, S4, S5, S7, S8, AUX S5  
 Phases Used.....1, 2, 3, 4, 5, 6  
 Overlap "1".....NOT USED  
 Overlap "2".....NOT USED  
 Overlap "3".....NOT USED  
 Overlap "4".....\*

\*See overlap programming detail on sheet 2

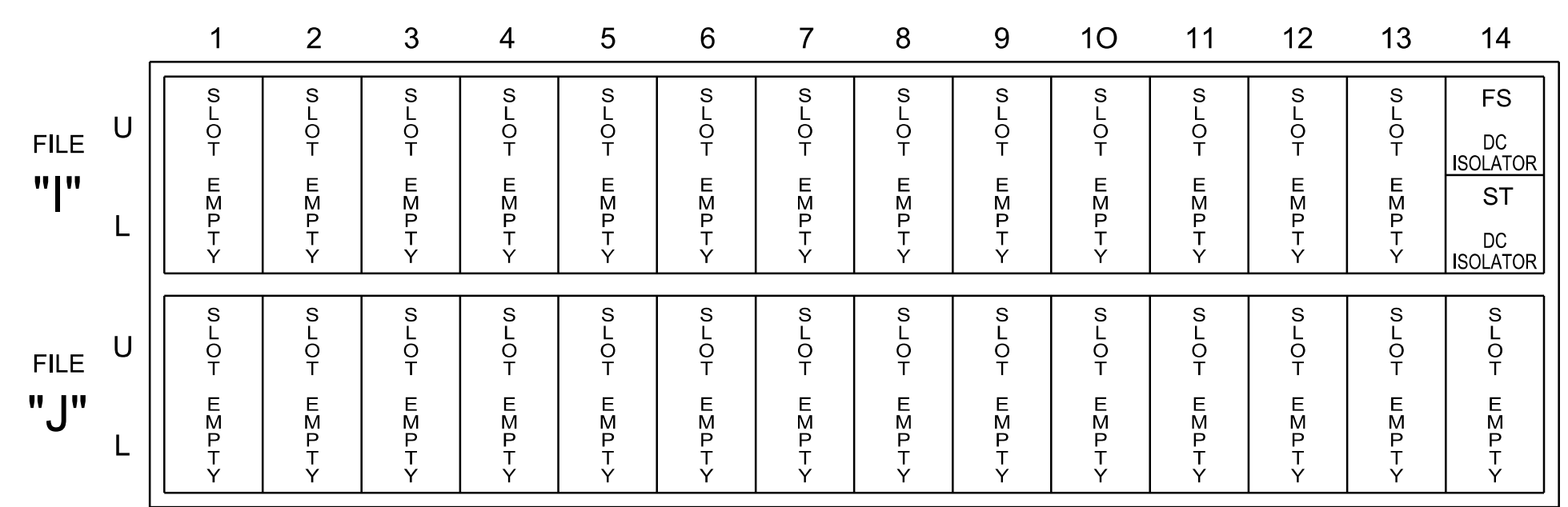
### SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	11	21,22	NU	31	32	41	42	NU	51	61,62	NU	NU	NU	NU	NU	NU	43	NU
RED		128		116	116	101	101			134								A101
YELLOW		129		117	117	102	102			135								
GREEN		130		118	118	103	103			136								
RED ARROW	125								131									
YELLOW ARROW	126								132									A102
FLASHING YELLOW ARROW																		A103
GREEN ARROW	127			118	103			133										

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

### INPUT FILE POSITION LAYOUT

(front view)

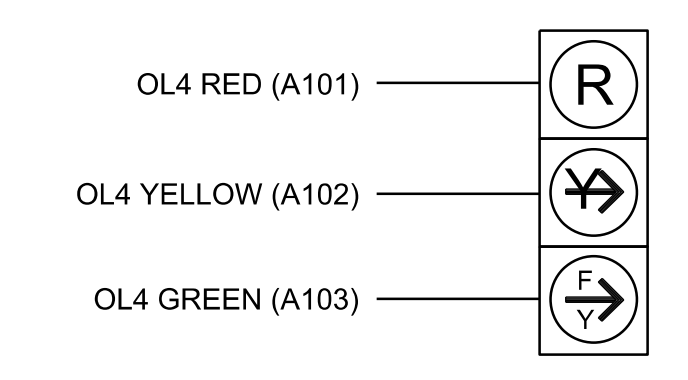


### SPECIAL DETECTOR NOTE

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

### FYA SIGNAL WIRING DETAIL

(wire signal head as shown)



43

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 14-0689T2  
 DESIGNED: Apr 2023  
 SEALED: 04/11/2023  
 REVISED: N/A

Electrical Detail  
 Temporary Design 2 - (TMP Phase II)

ELECTRICAL AND PROGRAMMING DETAILS FOR: US 276 (Russ Avenue) at Ingles Shopping Center / Long John Silver Drive, Division 14, Haywood County, Waynesville

Prepared by: [Signature]

PLAN DATE: April 2023 REVIEWED BY: WJ Hamilton  
 PREPARED BY: TS Popelka RKA PROJ. NO: 16085 (04)

REVISIONS: [Table with columns for REVISIONS, INIT., DATE]

750 N. Greenfield Pkwy, Garner, NC 27529

Infrastructure Consulting Services, Inc. and RKA RAMEY KEMP ASSOCIATES

8210 University Executive Park Drive Suite 220 Charlotte, North Carolina 28262 Phone: 704-548-4200 | www.rameykemp.com | NC License No. F-1489

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL: NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 32396 WILLIAM J. HAMILTON

SIGNATURE: William J. Hamilton DATE: 04/11/2023

SIG. INVENTORY NO. 14-0689T2

### OVERLAP PROGRAMMING

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

Web Interface  
Home >Controller >Overlap Configuration >Overlaps

Overlap Plan 1

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

### SEQUENCE DETAIL

Front Panel  
Main Menu >Controller >Sequence & Phs Config>Sequences

Web Interface  
Home >Controller >Sequence

Sequence 1

Ring	Sequence Data
1	1,2,a,3,4,b
2	6,5,a,7,8,b

### FLASHER CIRCUIT MODIFICATION DETAIL

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

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

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

### COMPATIBILITY

Front Panel  
Main Menu >Controller >Sequence & Phs Config>No Served Phase Plans

Web Interface  
Home >Controller >Phase Configuration>No Served Phase Plans

Sequence 1

Phase	No Serve Phase
1	5
2	
3	
4	
5	
6	
7	
8	

THIS ELECTRICAL DETAIL IS FOR  
 THE SIGNAL DESIGN: 14-0689T2  
 DESIGNED: Apr 2023  
 SEALED: 04/11/2023  
 REVISED: N/A

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

DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING  
DETAILS FOR:

750 N. Greenfield Pkwy, Garner, NC 27529

Prepared For:  
 US 276 (Russ Avenue)  
 ay  
 Ingles Shopping Center /  
 Long John Silver Drive  
 Division 14 Haywood County Waynesville

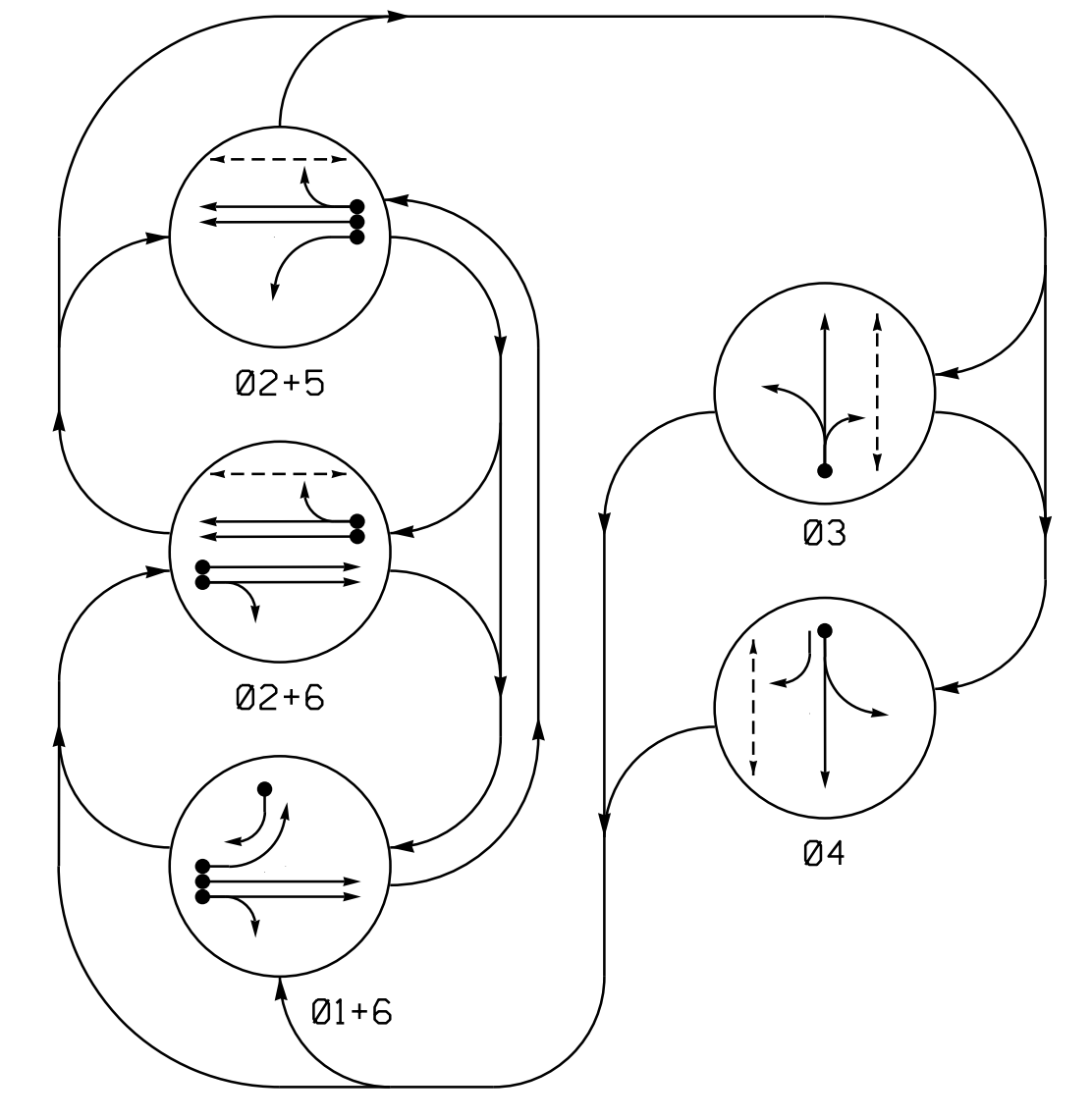
PLAN DATE: April 2023 REVIEWED BY: WJ Hamilton  
 PREPARED BY: TS Popelka RKA PROJ. NO: 16085 (040)

REVISIONS	INIT.	DATE

SEAL  
 NORTH CAROLINA  
 PROFESSIONAL  
 SEAL  
 32396  
 ENGINEER  
 WILLIAM J. HAMILTON

DocuSign  
 William J. Hamilton  
 04/11/2023  
 SIGNATURE DATE  
 SIG. INVENTORY NO. 14-0689T2

**PHASING DIAGRAM**



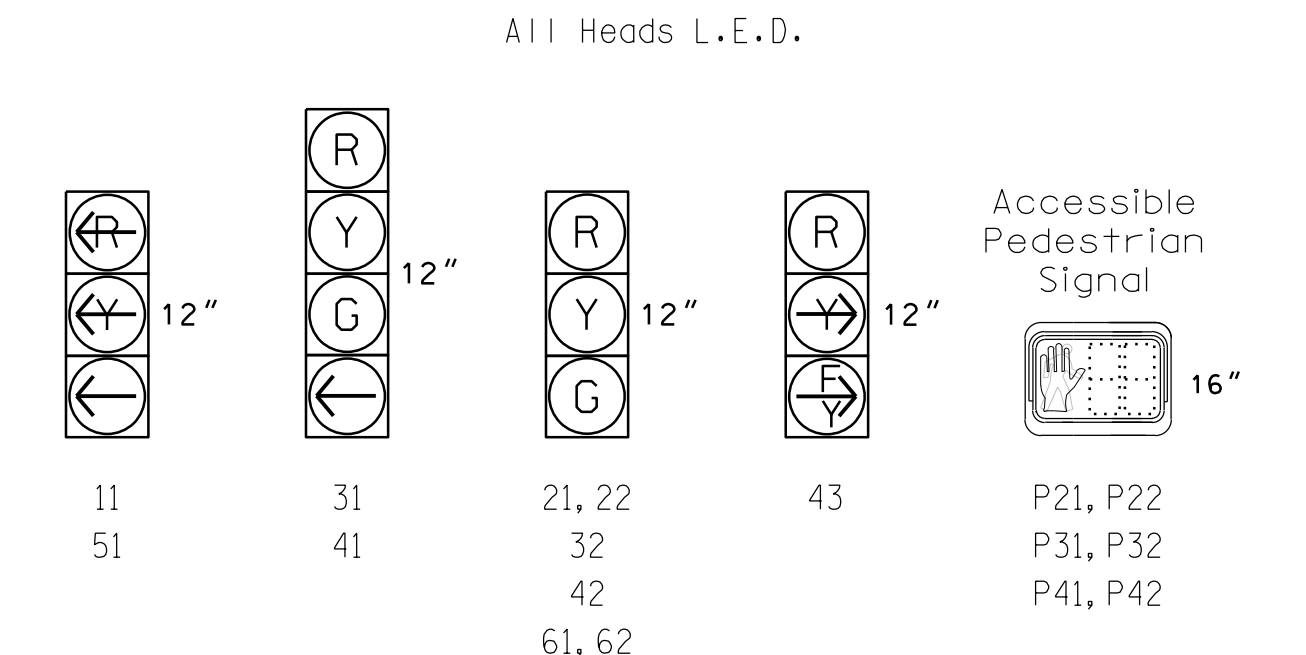
**PHASING DIAGRAM DETECTION LEGEND**

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

**TABLE OF OPERATION**

SIGNAL FACE	PHASE					
	01+6	02+6	02+5	03	04	FL
11	←	→	→	→	→	→
21, 22	R	G	G	R	R	Y
31	R	R	R	G	R	R
32	R	R	R	G	R	R
41	R	R	R	R	G	R
42	R	R	R	R	G	R
43	←	←	←	←	←	←
51	←	←	←	←	←	←
61, 62	G	G	R	R	R	Y
P21, P22	DW	W	W	DW	DW	DRK
P31, P32	DW	DW	DW	W	DW	DRK
P41, P42	DW	DW	DW	DW	W	DRK

**SIGNAL FACE I.D.**



**MAXTIME DETECTOR INSTALLATION CHART**

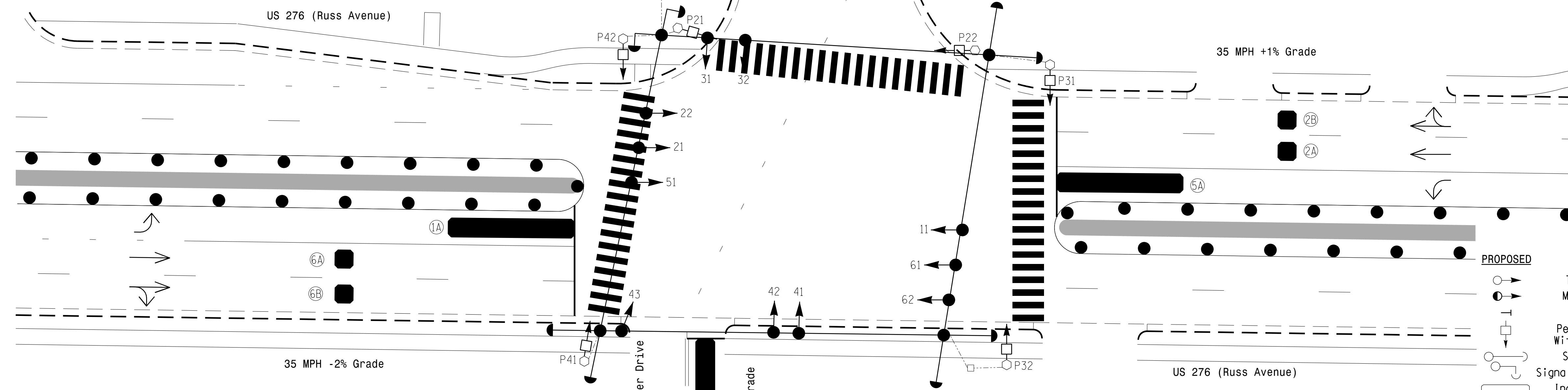
ZONE	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING							
					CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	RECALL DURING GREEN	NEW CARD
1A	6X40	0	*	*	1	3	-	X	-	X	-	*
1B	6X40	0	*	*	1	15	-	X	-	X	-	*
2A	6X6	70	*	*	2	-	-	X	-	X	-	*
2B	6X6	70	*	*	2	-	-	X	-	X	-	*
3A	6X40	0	*	*	3	10	-	X	-	X	-	*
4A	6X40	0	*	*	4	-	-	X	-	X	-	*
5A	6X40	0	*	*	5	3	-	X	-	X	-	*
6A	6X6	70	*	*	6	-	-	X	-	X	-	*
6B	6X6	70	*	*	6	-	-	X	-	X	-	*

\* Multizone Microwave Detection

**5 Phase Fully Actuated D14-12\_Waynesville**

**NOTES**

- Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- The order of Phase 1+6 and phase 2+5 may be reversed.
- The order of Phase 3 and phase 4 may be reversed.
- Reposition existing signal heads numbered 21, 22, 41, 42, and 51.
- 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.
- This intersection features accessible pedestrian signals utilizing percussive tone walk indications and/or speech messages.
- See traffic control plans for stop bar and crosswalk locations.
- This intersection uses multizone microwave detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.



**MAXTIME TIMING CHART**

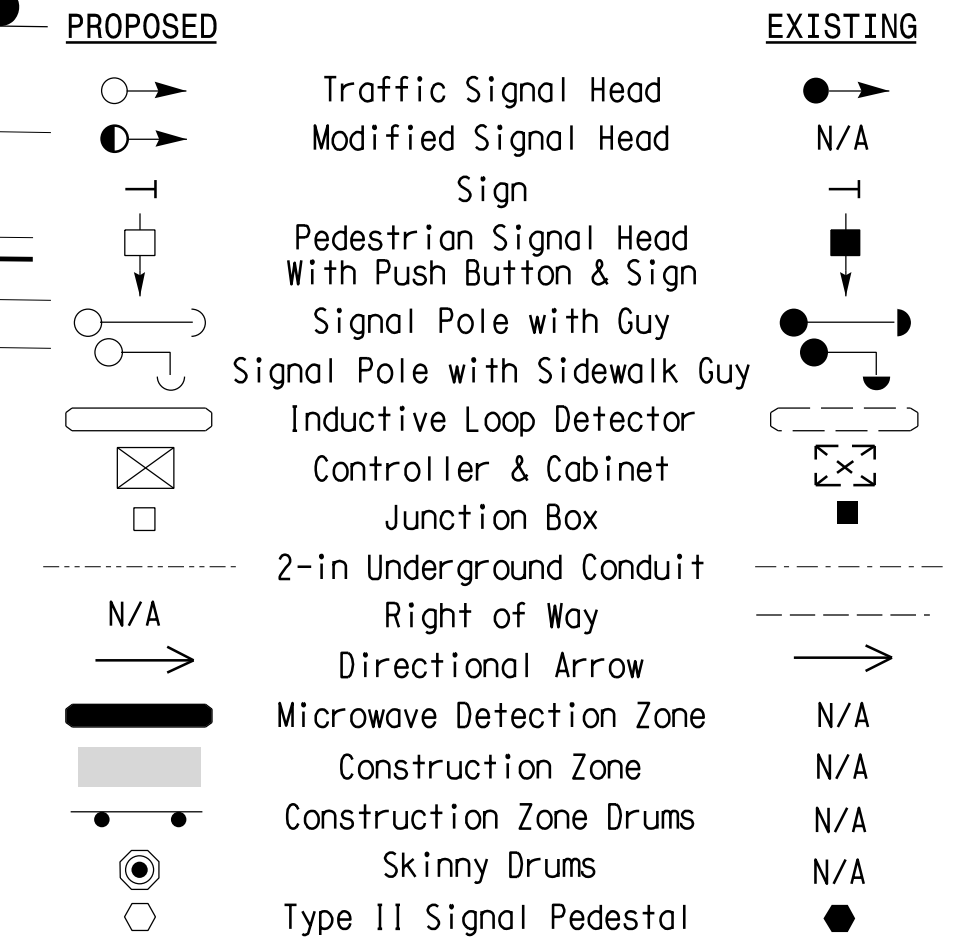
FEATURE	PHASE					
	1	2	3	4	5	6
Walk *	-	7	7	7	-	-
Ped Clear *	-	24	18	18	-	-
Min Green	7	10	7	7	7	10
Passage *	2.0	3.0	2.0	2.0	2.0	3.0
Max I *	15	50	20	20	15	50
Yellow Change	3.0	3.8	3.5	3.5	3.0	4.0
Red Clear	3.3	3.0	2.8	3.2	3.8	2.8
Added Initial *	-	-	-	-	-	-
Maximum Initial *	-	-	-	-	-	-
Time Before Reduction *	-	-	-	-	-	-
Time To Reduce *	-	-	-	-	-	-
Minimum Gap	-	-	-	-	-	-
Advance Walk	-	-	-	-	-	-
Non Lock Detector	X	-	X	X	X	-
Vehicle Recall	-	MIN RECALL	-	-	-	MIN RECALL
Dual Entry	-	-	-	-	-	-

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

**ACCESSIBLE PEDESTRIAN SIGNAL OPERATION**

SIGNAL FACE	VOICE TONES	INTERVAL	SPEECH MESSAGE
P21	- X	Walk	(Percussive Tone)
	X -	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Ingles.
	- X	Walk	(Percussive Tone)
P22	- X	Walk	(Percussive Tone)
	X -	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Ingles.
	- X	Walk	(Percussive Tone)
P31	- X	Walk	(Percussive Tone)
	X -	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Russ.
	- X	Walk	(Percussive Tone)
P32	- X	Walk	(Percussive Tone)
	X -	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Russ.
	- X	Walk	(Percussive Tone)
P41	- X	Walk	(Percussive Tone)
	X -	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Russ.
	- X	Walk	(Percussive Tone)
P42	- X	Walk	(Percussive Tone)
	X -	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Russ.
	- X	Walk	(Percussive Tone)

**LEGEND**



**Signal Upgrade Temporary Design 3 - (TMP Phase III)**



	<p>US 276 (Russ Avenue) at Ingles Shopping Center / Long John Silver Drive</p>		<p>SEAL NORTH CAROLINA PROFESSIONAL ENGINEER WILLIAM J. HAMILTON LICENSE NO. 32396</p>
	<p>Division 14 Haywood County Waynesville</p>	<p>PLAN DATE: April 2023 REVIEWED BY: WJ Hamilton</p>	
<p>750 N. Greenfield Pkwy, Garner, NC 27529</p>	<p>PREPARED BY: TS Popelka RKA PROJ. NO.: 16085 (040)</p>	<p>DATE</p>	<p>DATE</p>
<p>SCALE 0 20 1"=20'</p>	<p>INIT.</p>	<p>DATE</p>	<p>DATE</p>

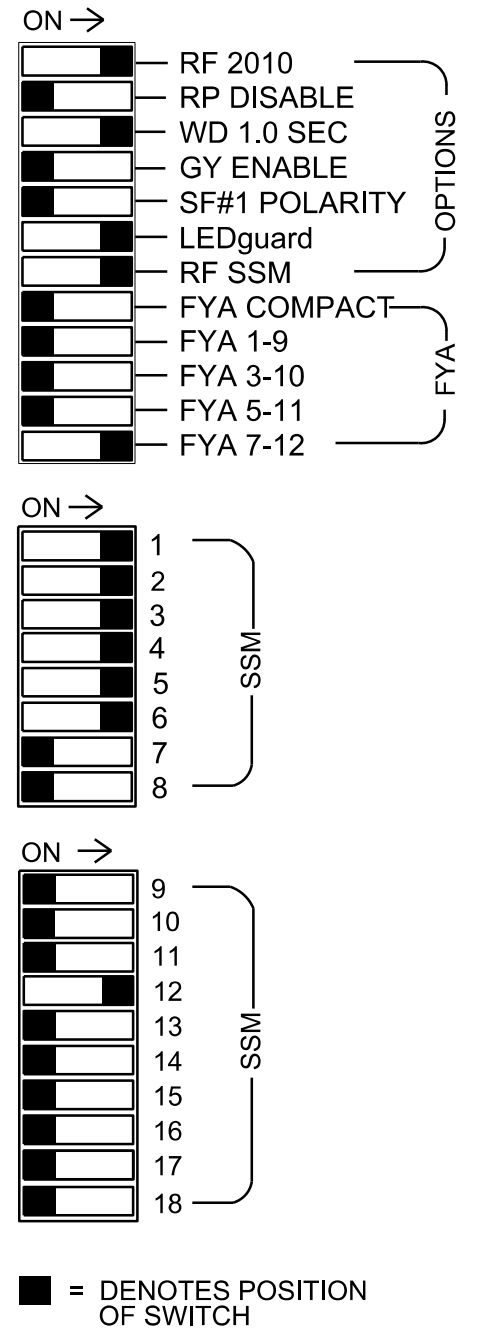
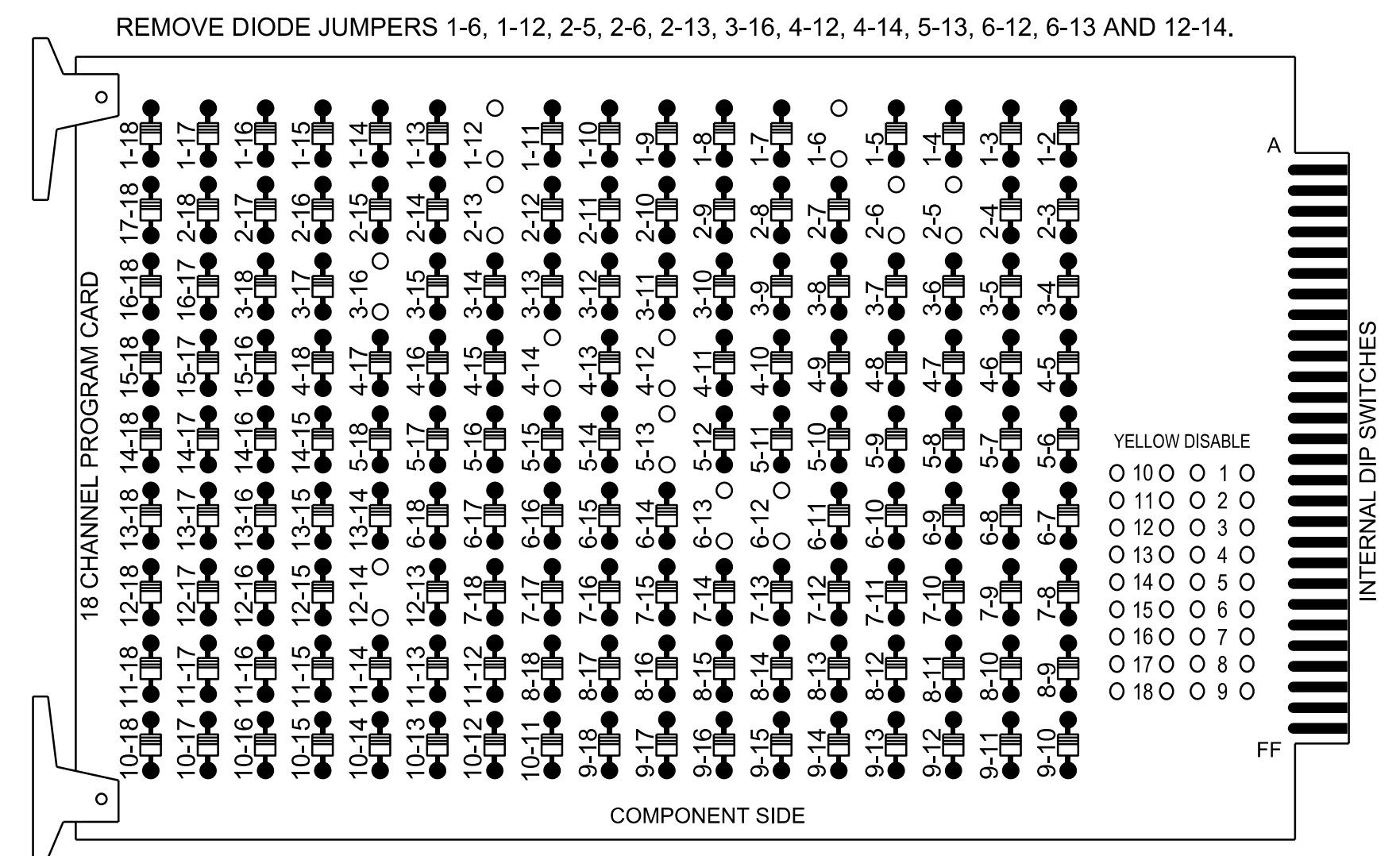
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

William J. Hamilton  
04/11/2023  
DATE

SIG. INVENTORY NO. 14-0689T3

### 18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



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

### NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the signal plan.
2. Program controller to start up in phase 2 Green Walk and 6 Green No Walk.
3. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
4. The cabinet and controller are part of the D14-12 Waynesville Signal System.

### EQUIPMENT INFORMATION

Controller.....2070LX  
 Cabinet.....332 w/ Aux  
 Software.....Q-Free MAXTIME  
 Cabinet Mount.....Base  
 Output File Positions.....18 With Aux. Output File  
 Load Switches Used.....S1, S2, S3, S4, S5, S6, S7, S8, S12, AUX S5  
 Phases Used.....1, 2, 2PED, 3, 3PED, 4, 4PED, 5, 6  
 Overlap "1".....NOT USED  
 Overlap "2".....NOT USED  
 Overlap "3".....NOT USED  
 Overlap "4".....\*

\*See overlap programming detail on sheet 2

### SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	3 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	11	21,22	P21, P22	31	32	41	42	P41, P42	51	61,62	NU	NU	P31, P32	NU	NU	NU	43	NU
RED		128		116	116	101	101			134								A101
YELLOW		129		117	117	102	102			135								
GREEN		130		118	118	103	103			136								
RED ARROW	125									131								
YELLOW ARROW	126									132								A102
FLASHING YELLOW ARROW																		A103
GREEN ARROW	127			118		103				133								
Hand				113						104								110
Walker				115						106								112

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

### INPUT FILE POSITION LAYOUT

(front view)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	S O L T	S O L T	S O L T	S O L T	S O L T	S O L T	S O L T	S O L T	S O L T	S O L T	S O L T	Ø 2 PED DC ISOLATOR	NOT USED	FS DC ISOLATOR
FILE "J"	S O L T	S O L T	S O L T	S O L T	S O L T	S O L T	S O L T	S O L T	S O L T	S O L T	S O L T	Ø 4 PED DC ISOLATOR	Ø 3 PED DC ISOLATOR	ST DC ISOLATOR

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

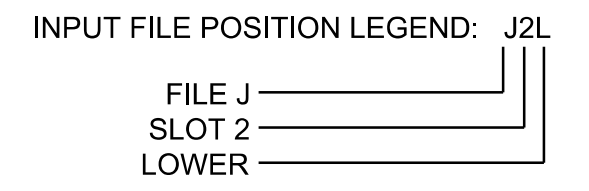
### SPECIAL DETECTOR NOTE

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

### INPUT FILE CONNECTION & PROGRAMMING CHART

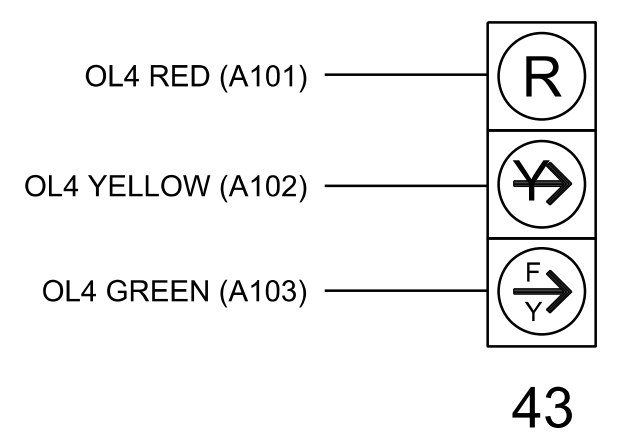
LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN
PED PUSH BUTTONS												
P21,P22	TB8-4,6	I12J	67	33	2	PED 2						
P31,P32	TB8-8,9	I13L	70	36	8	PED 3						
P41,P42	TB8-5,6	I12L	69	35	4	PED 4						

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



### FYA SIGNAL WIRING DETAIL

(wire signal head as shown)



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 14-0689T3  
 DESIGNED: Apr 2023  
 SEALED: 04/11/2023  
 REVISED: N/A

### COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

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

ELECTRICAL AND PROGRAMMING DETAILS FOR: RAMEY KEMP ASSOCIATES 2750 N. Greenfield Pkwy, Garner, NC 27529	Prepared for: US 276 (Russ Avenue) at Ingles Shopping Center / Long John Silver Drive		SEAL William J. Hamilton 04/11/2023
	PLAN DATE: April 2023 PREPARED BY: TS Popelka	REVIEWED BY: WJ Hamilton RKA PROJ. NO: 16085 (040)	



### PED 3 PROGRAMMING DETAIL

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

Web Interface  
Home >Controller >Detector Configuration >Pedestrian Detector

Plan 1

Detector	Description	Call Phase	Call Overlap
2		2	0
4		4	0
6		6	0
8		3	0

NOTICE PHASE 3 PED  
ASSIGNED TO  
DETECTOR 8 PED →

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

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

Channel Configuration

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

NOTICE PHASE 3 PED  
ASSIGNED TO CHANNEL 16 →

### OVERLAP PROGRAMMING

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

Web Interface  
Home >Controller >Overlap Configuration >Overlaps

Overlap Plan 1

Overlap	Value
Overlap	4
Type	FYA 4 - Section
Included Phases	1,4
Modifier Phases	-
Trail Green	0
Trail Yellow	0.0
Trail Red	0.0

### SEQUENCE DETAIL

Front Panel  
Main Menu >Controller >Sequence & Phs Config>Sequences

Web Interface  
Home >Controller >Sequence

Sequence 1

Ring	Sequence Data
1	1,2,a,3,4,b
2	6,5,a,7,8,b

### FLASHER CIRCUIT MODIFICATION DETAIL

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

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

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

### COMPATIBILITY

Front Panel  
Main Menu >Controller >Sequence & Phs Config>No Served Phase Plans

Web Interface  
Home >Controller >Phase Configuration>No Served Phase Plans

Sequence 1


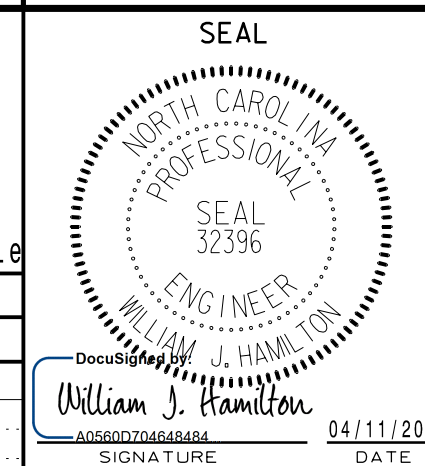
Phase	No Serve Phase
1	5
2	
3	
4	
5	
6	
7	
8	

### ACCESSIBLE PEDESTRIAN SIGNAL (APS) INSTALLATION NOTES

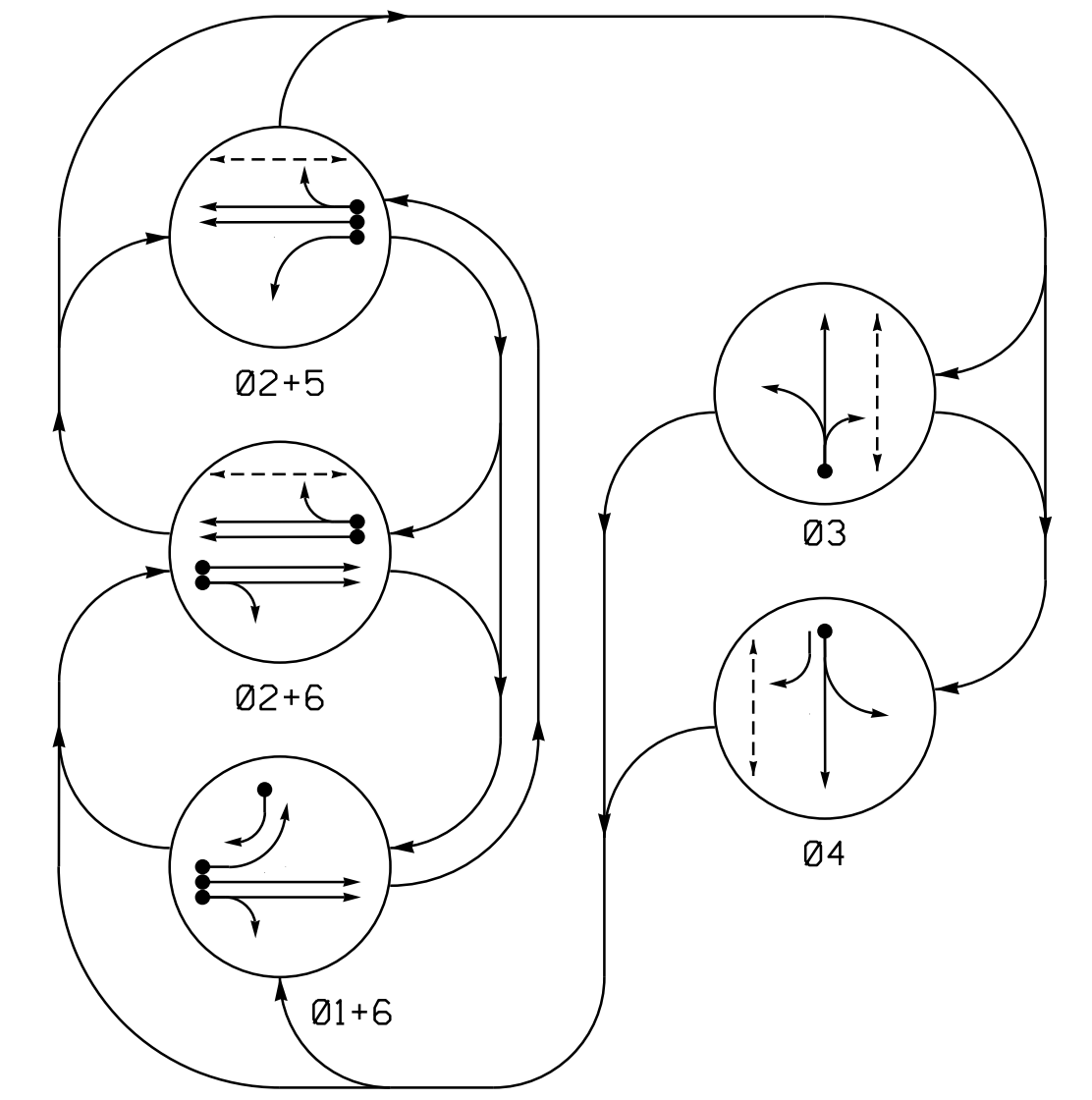
1. Install push buttons and APS equipment per manufacturer's instructions.
2. Provide a dedicated cable to each push button per manufacturer's instructions.
3. If APS equipment is mounted in cabinet, use filtered power (i.e., Controller Receptacle) to power APS equipment. Do not use Equipment Receptacle, which is a GFCI outlet.
4. Never attempt to operate a standard contact closure push button with the APS system unless cabinet is re-wired for standard button operation or unless explicitly allowed by the manufacturer.
5. Place manufacturer's instructions in cabinet with cabinet prints, signal plans, and electrical details.

THIS ELECTRICAL DETAIL IS FOR  
THE SIGNAL DESIGN: 14-0689T3  
DESIGNED: Apr 2023  
SEALED: 04/11/2023  
REVISED: N/A

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

ELECTRICAL AND PROGRAMMING DETAILS FOR:  Prepared for: 	US 276 (Russ Avenue) at Ingles Shopping Center / Long John Silver Drive Division 14 Haywood County Waynesville		SEAL 
	PLAN DATE: April 2023 PREPARED BY: TS Popelka	REVIEWED BY: WJ Hamilton RKA PROJ. NO: 16085 (040)	

### PHASING DIAGRAM



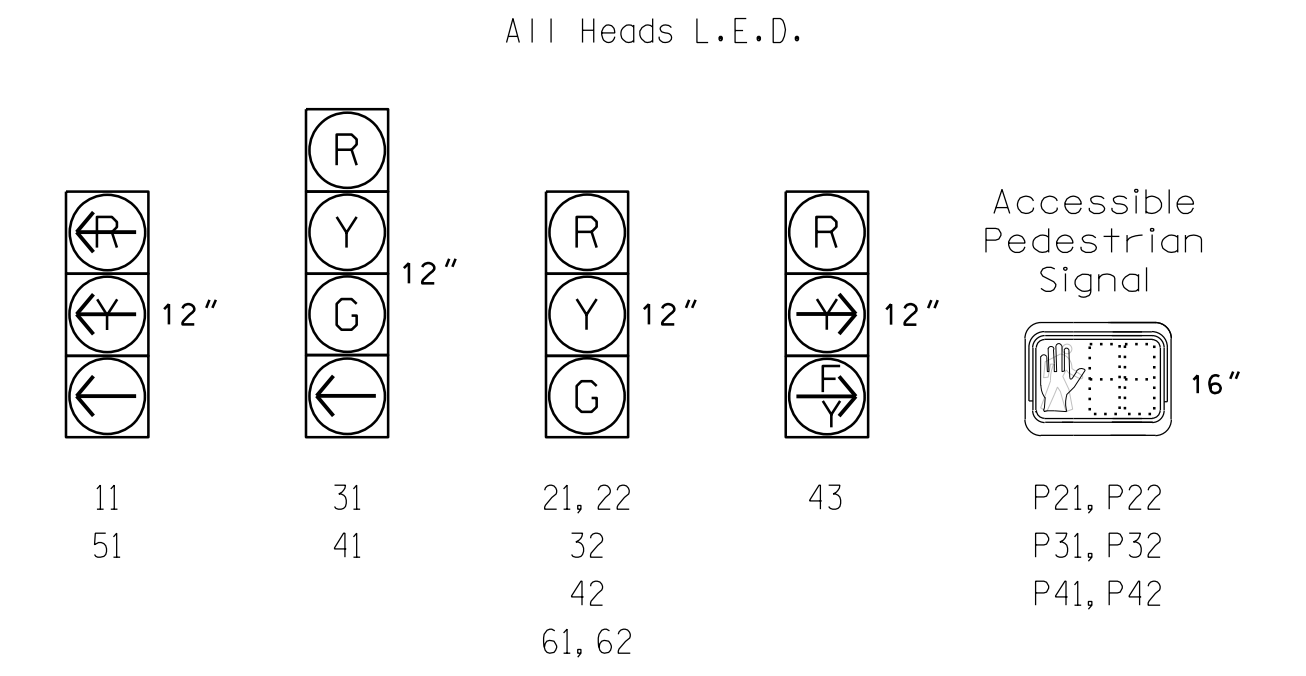
**PHASING DIAGRAM DETECTION LEGEND**  

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

### TABLE OF OPERATION

SIGNAL FACE	PHASE					
	01+6	02+6	02+5	03	04	FLUSH
11	←	→	→	→	→	→
21, 22	R	G	G	R	R	Y
31	R	R	R	G	R	R
32	R	R	R	G	R	R
41	R	R	R	R	G	R
42	R	R	R	R	G	R
43	R	R	R	R	G	R
51	←	→	→	→	→	→
61, 62	G	G	R	R	R	Y
P21, P22	DW	W	W	DW	DW	DRK
P31, P32	DW	DW	DW	W	DW	DRK
P41, P42	DW	DW	DW	DW	W	DRK

### SIGNAL FACE I.D.



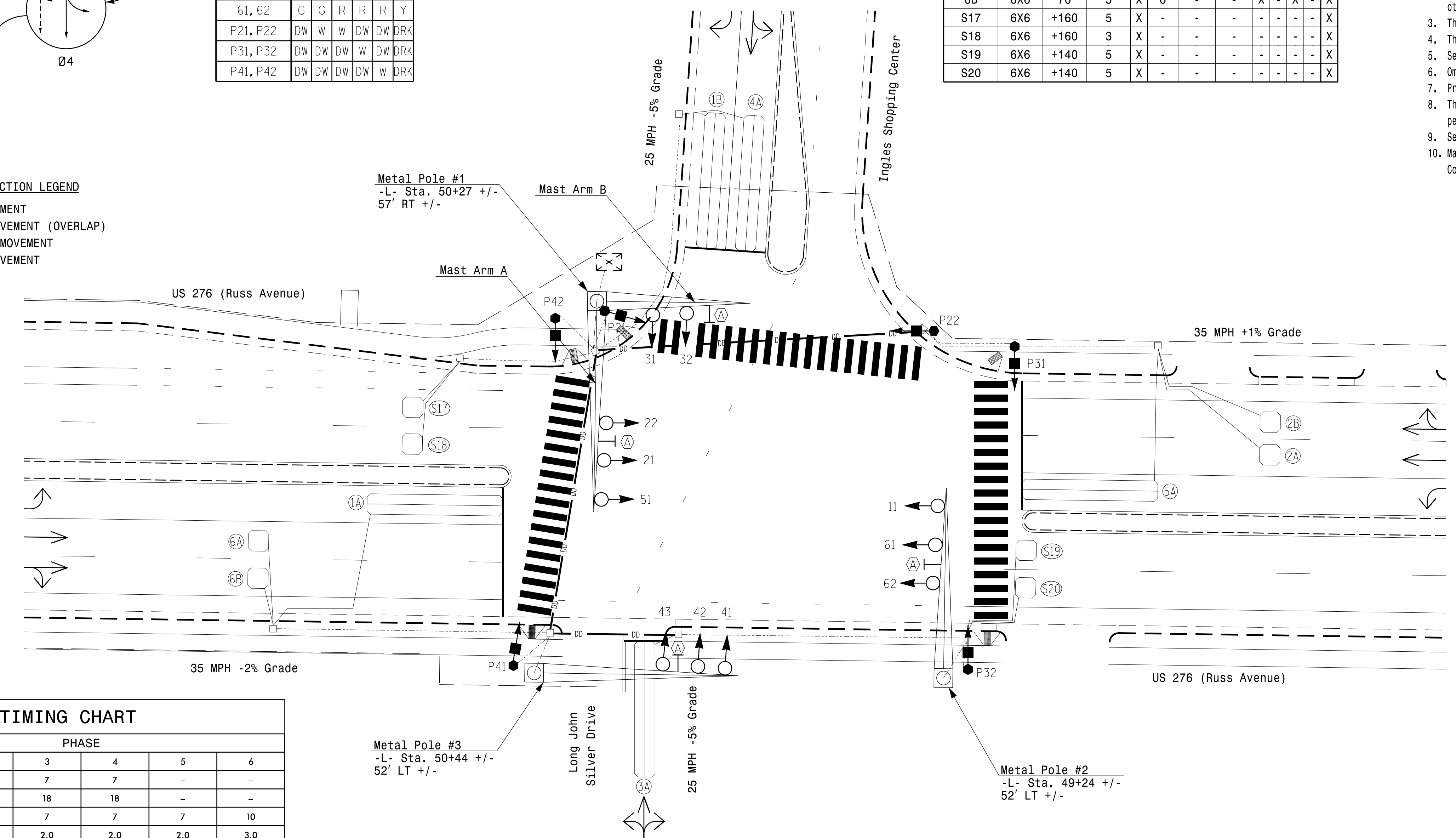
### MAXTIME DETECTOR INSTALLATION CHART

LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING								
					CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	RELAY DURING GREEN	NEW CARD	
1A	6X40	0	2-4-2	X	1	-	-	-	X	-	X	-	X
1B	6X40	0	2-4-2	X	1	15	-	-	X	-	X	-	X
2A	6X6	70	5	X	2	-	-	-	X	-	X	-	X
2B	6X6	70	5	X	2	-	-	-	X	-	X	-	X
3A	6X40	0	2-4-2	X	3	10	-	-	X	-	X	-	X
4A	6X40	0	2-4-2	X	4	-	-	-	X	-	X	-	X
5A	6X40	0	2-4-2	X	5	-	-	-	X	-	X	-	X
6A	6X6	70	5	X	6	-	-	-	X	-	X	-	X
6B	6X6	70	5	X	6	-	-	-	X	-	X	-	X
S17	6X6	+160	5	X	-	-	-	-	-	-	-	-	X
S18	6X6	+160	3	X	-	-	-	-	-	-	-	-	X
S19	6X6	+140	5	X	-	-	-	-	-	-	-	-	X
S20	6X6	+140	5	X	-	-	-	-	-	-	-	-	X

### 5 Phase Fully Actuated D14-12\_Waynesville

### NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- The order of phase 1+6 and phase 2+5 may be reversed.
- The order of phase 3 and phase 4 may be reversed.
- 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.
- This intersection features accessible pedestrian signals utilizing percussive tone walk indications and/or speech messages.
- See pavement marking plans for stop bar and crosswalk locations.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.



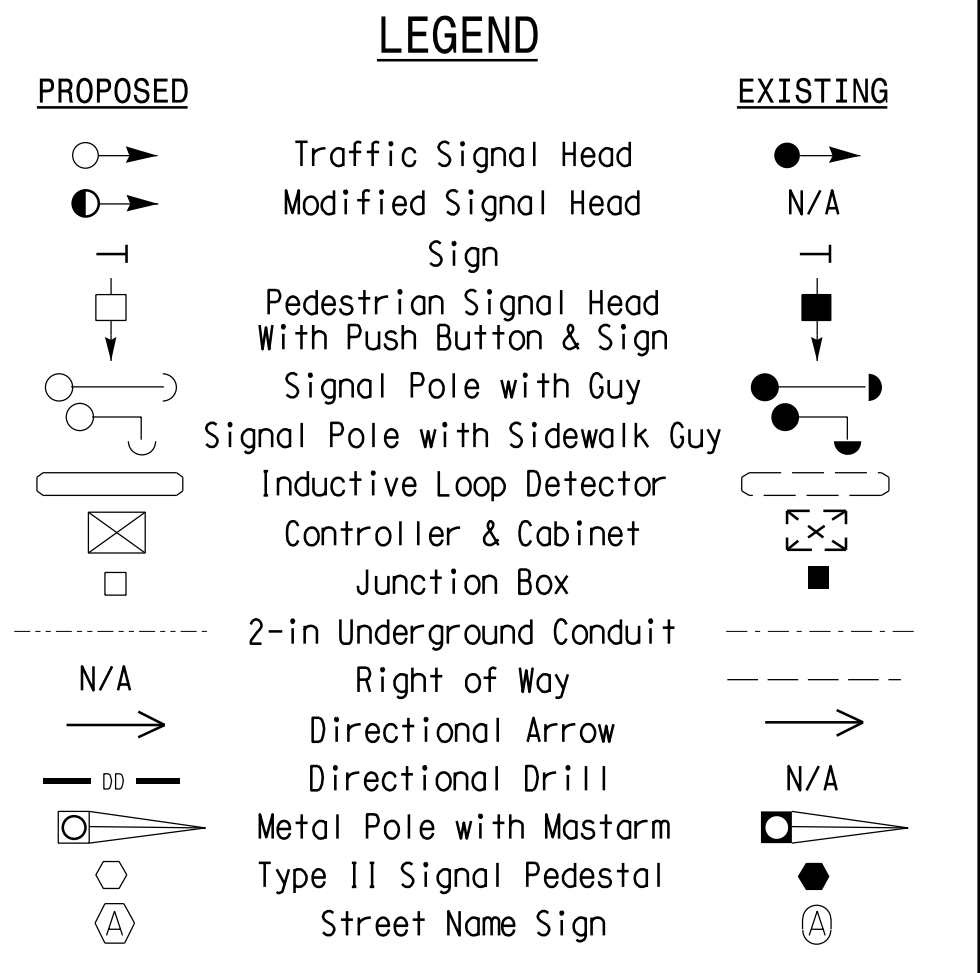
### MAXTIME TIMING CHART

FEATURE	PHASE					
	1	2	3	4	5	6
Walk *	-	7	7	7	-	-
Ped Clear *	-	24	18	18	-	-
Min Green	7	10	7	7	7	10
Passage *	2.0	3.0	2.0	2.0	2.0	3.0
Max I *	15	50	20	20	15	50
Yellow Change	3.0	3.8	3.5	3.5	3.0	4.0
Red Clear	3.3	3.0	2.8	3.2	3.8	2.8
Added Initial *	-	-	-	-	-	-
Maximum Initial *	-	-	-	-	-	-
Time Before Reduction *	-	-	-	-	-	-
Time To Reduce *	-	-	-	-	-	-
Minimum Gap	-	-	-	-	-	-
Advance Walk	-	-	-	-	-	-
Non Lock Detector	X	-	X	X	X	-
Vehicle Recall	-	MIN RECALL	-	-	-	MIN RECALL
Dual Entry	-	-	-	-	-	-

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

### ACCESSIBLE PEDESTRIAN SIGNAL OPERATION

SIGNAL FACE	VOICE TONES	INTERVAL	SPEECH MESSAGE
P21	- X	Walk	(Percussive Tone)
	X -	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Ingles.
P22	- X	Walk	(Percussive Tone)
	X -	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Ingles.
P31	- X	Walk	(Percussive Tone)
	X -	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Russ.
P32	- X	Walk	(Percussive Tone)
	X -	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Russ.
P41	- X	Walk	(Percussive Tone)
	X -	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Russ.
P42	- X	Walk	(Percussive Tone)
	X -	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Russ.



### Signal Upgrade - Final Design

Infrastructure Consulting Services, Inc.  
**RKA**  
 RAMEY KEMP ASSOCIATES  
 8210 University Executive Park Drive Suite 220 Charlotte, North Carolina 28226  
 Phone: 704-548-4300 | www.rameykemp.com | NC License No. F-1489

**US 276 Russ Avenue**  
**at**  
**Ingles Shopping Center /**  
**Long John Silver Drive**

Division 14 Haywood County Waynesville

PLAN DATE: April 2023 REVIEWED BY: WJ Hamilton  
 PREPARED BY: TS Popelka RKA PROJ. NO.: 16085 (040)

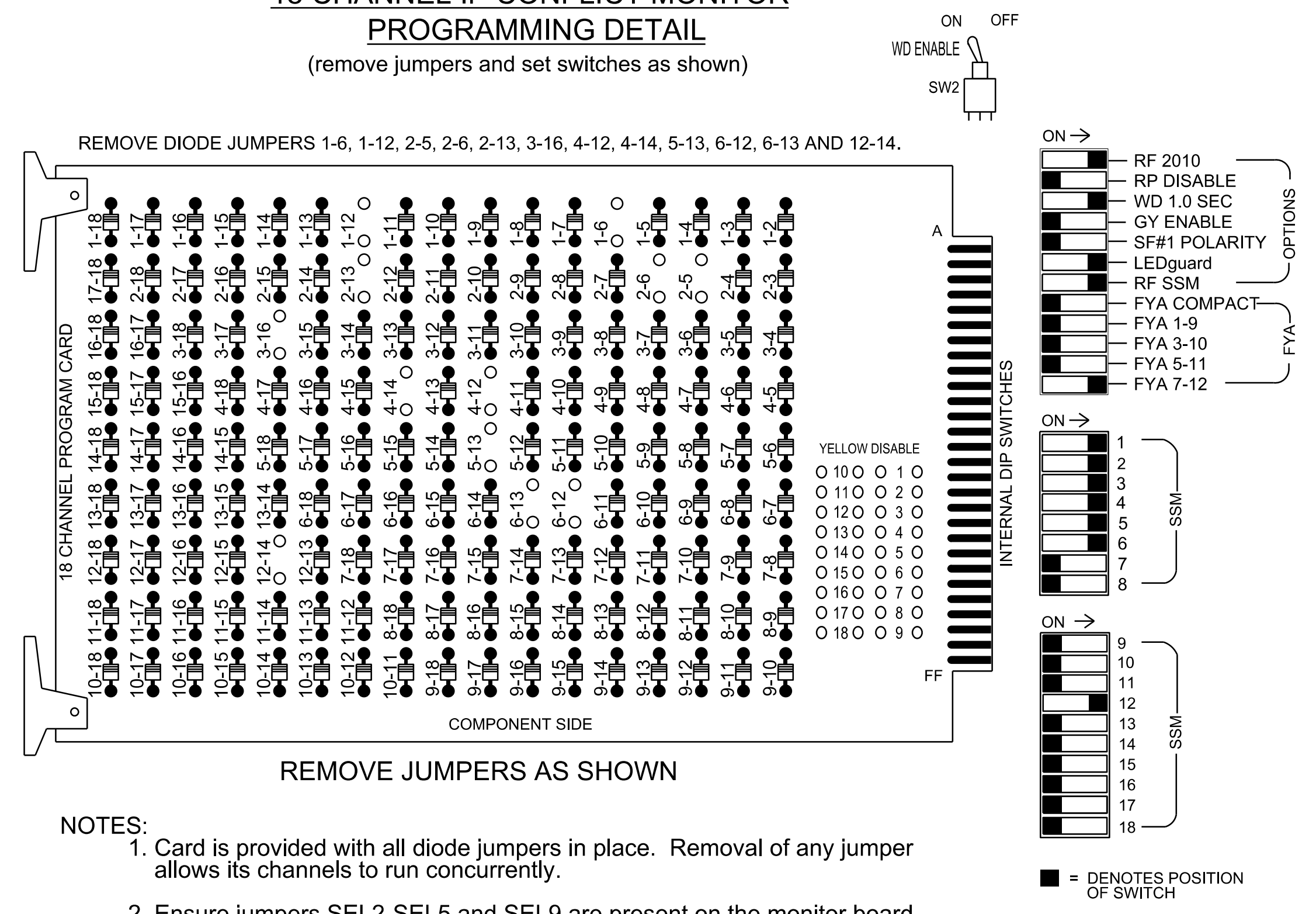
REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL  
 NORTH CAROLINA PROFESSIONAL ENGINEER  
 SEAL 32396  
 WILLIAM J. HAMILTON  
 William J. Hamilton  
 04/11/2023  
 DATE  
 SIG. INVENTORY NO. 14-0689

### 18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



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

### NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the signal plan.
2. Program controller to start up in phase 2 Green Walk and 6 Green No Walk.
3. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
4. The cabinet and controller are part of the D14-12 Waynesville Signal System.

### EQUIPMENT INFORMATION

Controller.....2070LX  
 Cabinet.....332 w/ Aux  
 Software.....Q-Free MAXTIME  
 Cabinet Mount.....Base  
 Output File Positions.....18 With Aux. Output File  
 Load Switches Used.....S1, S2, S3, S4, S5, S6, S7, S8, S12, AUX S5  
 Phases Used.....1, 2, 2PED, 3, 3PED, 4, 4PED, 5, 6  
 Overlap "1".....NOT USED  
 Overlap "2".....NOT USED  
 Overlap "3".....NOT USED  
 Overlap "4".....\*

\*See overlap programming detail on sheet 2

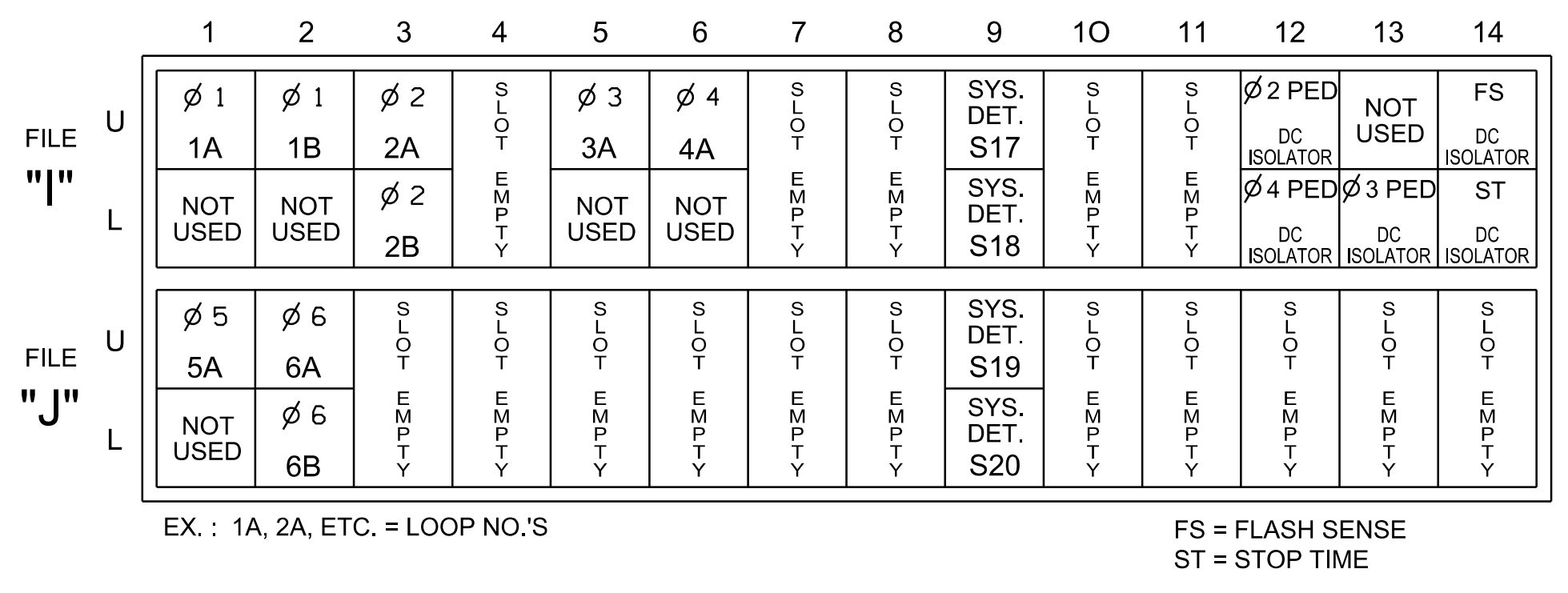
### SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	3 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	11	21,22	P21, P22	31	32	41	42	P41, P42	51	61,62	NU	NU	P31, P32	NU	NU	NU	43	NU
RED		128		116	116	101	101			134								A101
YELLOW		129		117	117	102	102			135								
GREEN		130		118	118	103	103			136								
RED ARROW	125									131								
YELLOW ARROW	126									132								A102
FLASHING YELLOW ARROW																		A103
GREEN ARROW	127			118		103				133								
Hand				113				104				110						
Walking				115				106				112						

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

### INPUT FILE POSITION LAYOUT

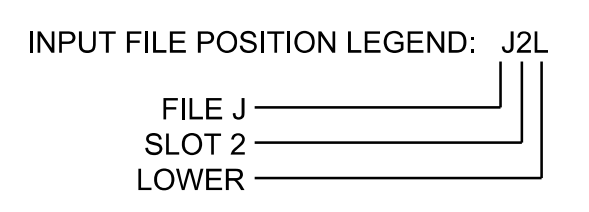
(front view)



### INPUT FILE CONNECTION & PROGRAMMING CHART

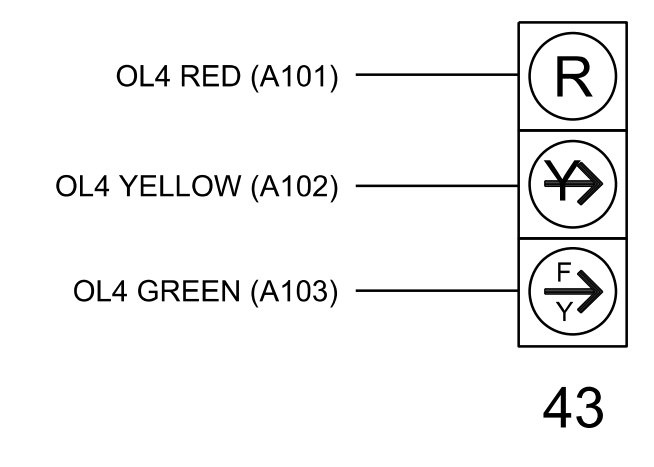
LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN
1A	TB2-1,2	I1U	56	18	1	1			X		X	
1B	TB2-5,6	I2U	39	1	2	1	15		X		X	
2A	TB2-9,10	I3U	63	29	4	2			X		X	
2B	TB2-11,12	I3L	76	42	5	2			X		X	
3A	TB4-5,6	I5U	58	20	7	3	10		X		X	
4A	TB4-9,10	I6U	41	3	8	4			X		X	
*S17	TB6-9,10	I9U	60	22	13							
*S18	TB6-11,12	I9L	62	24	14							
5A	TB3-1,2	J1U	55	17	15	5			X		X	
6A	TB3-5,6	J2U	40	2	16	6			X		X	
6B	TB3-7,8	J2L	44	6	17	6			X		X	
*S19	TB7-9,10	J9U	59	21	27							
*S20	TB7-11,12	J9L	61	23	28							
PED PUSH BUTTONS												
P21,P22	TB8-4,6	I12U	67	33	2	PED 2						
P31,P32	TB8-8,9	I13L	70	36	8	PED 3						
P41,P42	TB8-5,6	I12L	69	35	4	PED 4						

NOTE: INSTALL DC ISOLATORS IN INPUT FILE SLOTS I12 AND I13.  
 \*System detector only. Remove any assigned vehicle phase.



### FYA SIGNAL WIRING DETAIL

(wire signal head as shown)



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 14-0689  
 DESIGNED: Apr 2023  
 SEALED: 04/11/2023  
 REVISED: N/A

### COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

Electrical Detail - Sheet 1 of 2  
 Final Design

ELECTRICAL AND PROGRAMMING DETAILS FOR: RAMEY KEMP ASSOCIATES 8210 University Executive Park Drive Suite 220 Charlotte, North Carolina 28226 Phone: 704-548-4200   www.rameykemp.com   NC License No. F-1489	US 276 (Russ Avenue) at Ingles Shopping Center / Long John Silver Drive Division 14 Haywood County Waynesville		SEAL WILLIAM J. HAMILTON ENGINEER 04/11/2023
	Prepared for: CITY OF WAYNESVILLE Mobility and Signal Management	PREPARED BY: TS Popelka RKA PROJ. NO: 16085 (040)	

### PED 3 PROGRAMMING DETAIL

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

Web Interface  
Home >Controller >Detector Configuration >Pedestrian Detector

Plan 1

Detector	Description	Call Phase	Call Overlap
2		2	0
4		4	0
6		6	0
8		3	0

NOTICE PHASE 3 PED  
ASSIGNED TO  
DETECTOR 8 PED →

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

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

Channel Configuration

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

NOTICE PHASE 3 PED  
ASSIGNED TO CHANNEL 16 →

### OVERLAP PROGRAMMING

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

Web Interface  
Home >Controller >Overlap Configuration >Overlaps

Overlap Plan 1

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

### SEQUENCE DETAIL

Front Panel  
Main Menu >Controller >Sequence & Phs Config>Sequences

Web Interface  
Home >Controller >Sequence

Sequence 1

Ring	Sequence Data
1	1,2,a,3,4,b
2	6,5,a,7,8,b

### FLASHER CIRCUIT MODIFICATION DETAIL

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

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

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

### COMPATIBILITY

Front Panel  
Main Menu >Controller >Sequence & Phs Config>No Served Phase Plans

Web Interface  
Home >Controller >Phase Configuration>No Served Phase Plans

Sequence 1

Phase	No Serve Phase
1	5
2	
3	
4	
5	
6	
7	
8	

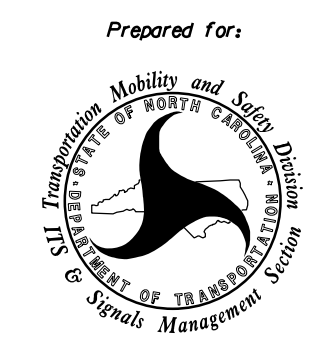
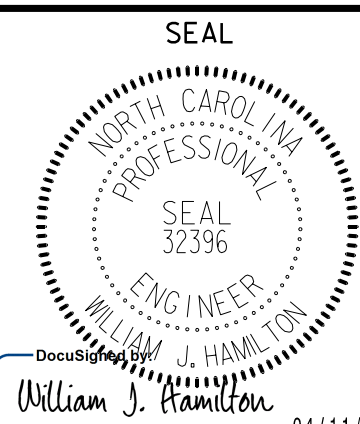
### ACCESSIBLE PEDESTRIAN SIGNAL (APS) INSTALLATION NOTES

1. Install push buttons and APS equipment per manufacturer's instructions.
2. Provide a dedicated cable to each push button per manufacturer's instructions.
3. If APS equipment is mounted in cabinet, use filtered power (i.e., Controller Receptacle) to power APS equipment. Do not use Equipment Receptacle, which is a GFCI outlet.
4. Never attempt to operate a standard contact closure push button with the APS system unless cabinet is re-wired for standard button operation or unless explicitly allowed by the manufacturer.
5. Place manufacturer's instructions in cabinet with cabinet prints, signal plans, and electrical details.

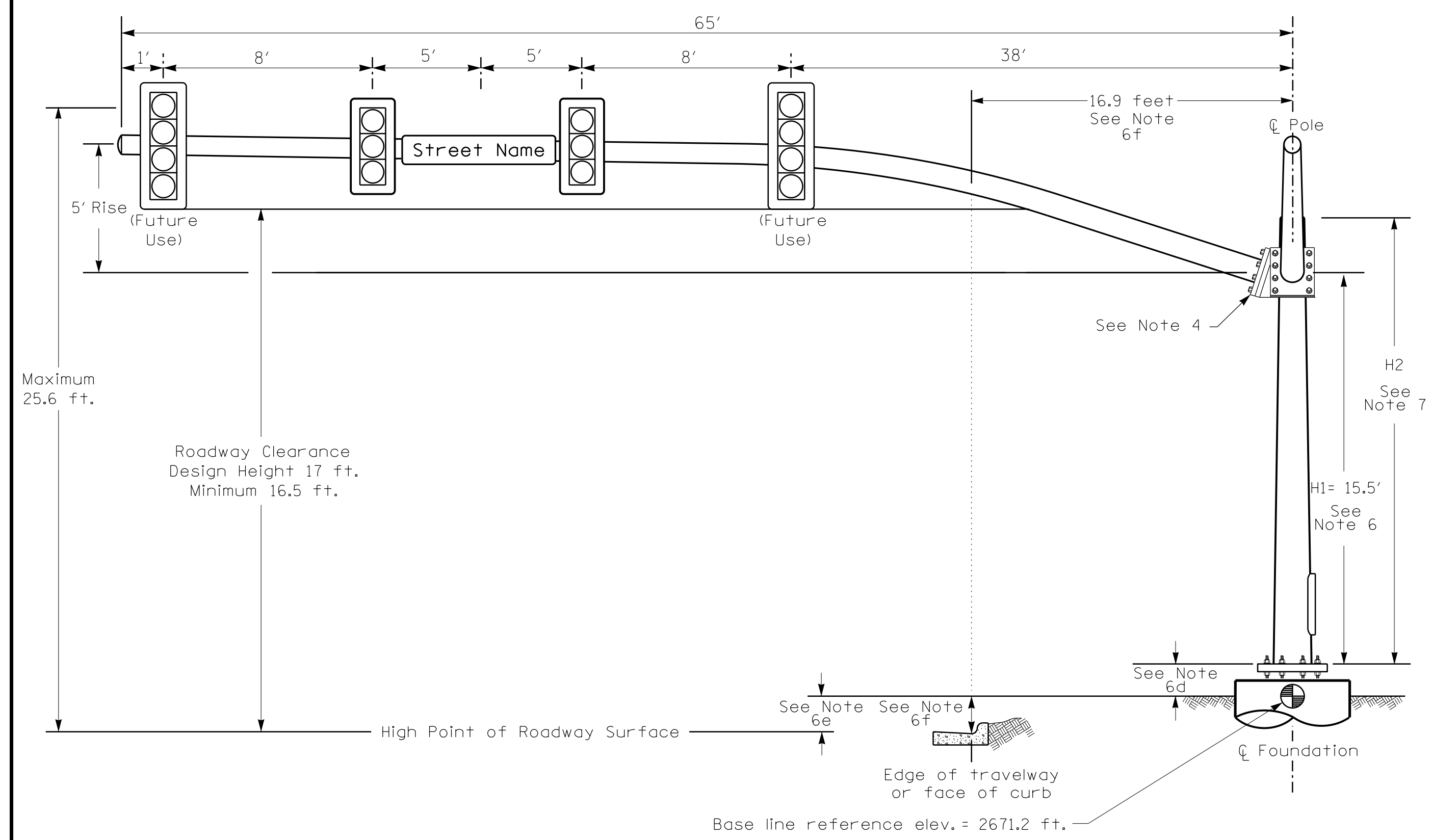
THIS ELECTRICAL DETAIL IS FOR  
THE SIGNAL DESIGN: 14-0689  
DESIGNED: Apr 2023  
SEALED: 04/11/2023  
REVISED: N/A

Electrical Detail - Sheet 2 of 2  
Final Design

DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED

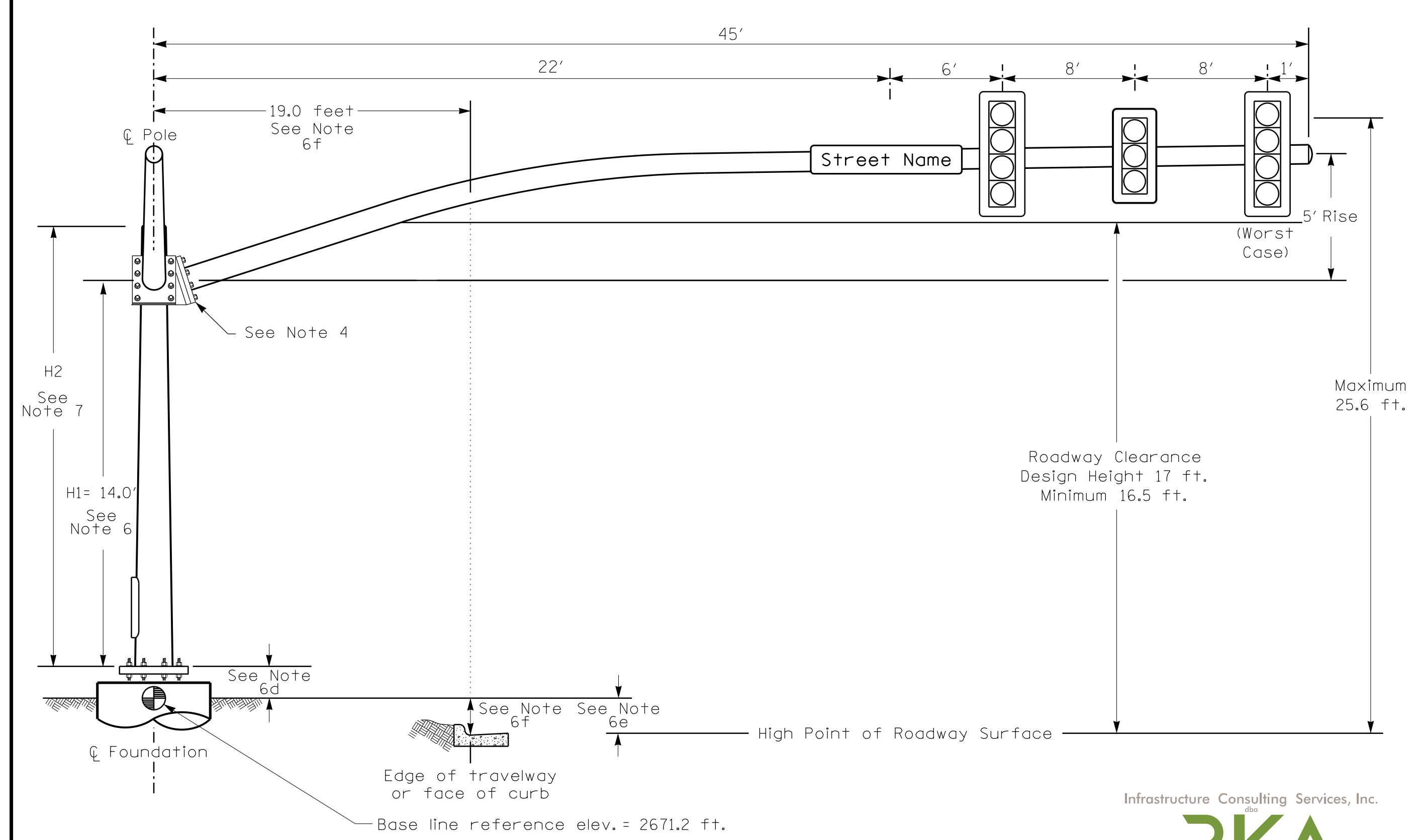
ELECTRICAL AND PROGRAMMING DETAILS FOR:  Prepared for: 	US 276 (Russ Avenue) at Ingles Shopping Center / Long John Silver Drive Division 14 Haywood County Waynesville		SEAL 
	PLAN DATE: April 2023 PREPARED BY: TS Popelka	REVIEWED BY: WJ Hamilton RKA PROJ. NO: 16085 (040)	
RAMEY KEMP ASSOCIATES 8210 University Executive Park Drive Suite 220 Charlotte, North Carolina 28223 Phone: 704-548-4200   www.rameykemp.com   NC License No. F-1489			SIG. INVENTORY NO. 14-0689

**Design Loading for METAL POLE NO. 1, MAST ARM A**



Elevation View @ 270°

**Design Loading for METAL POLE NO. 1, MAST ARM B**



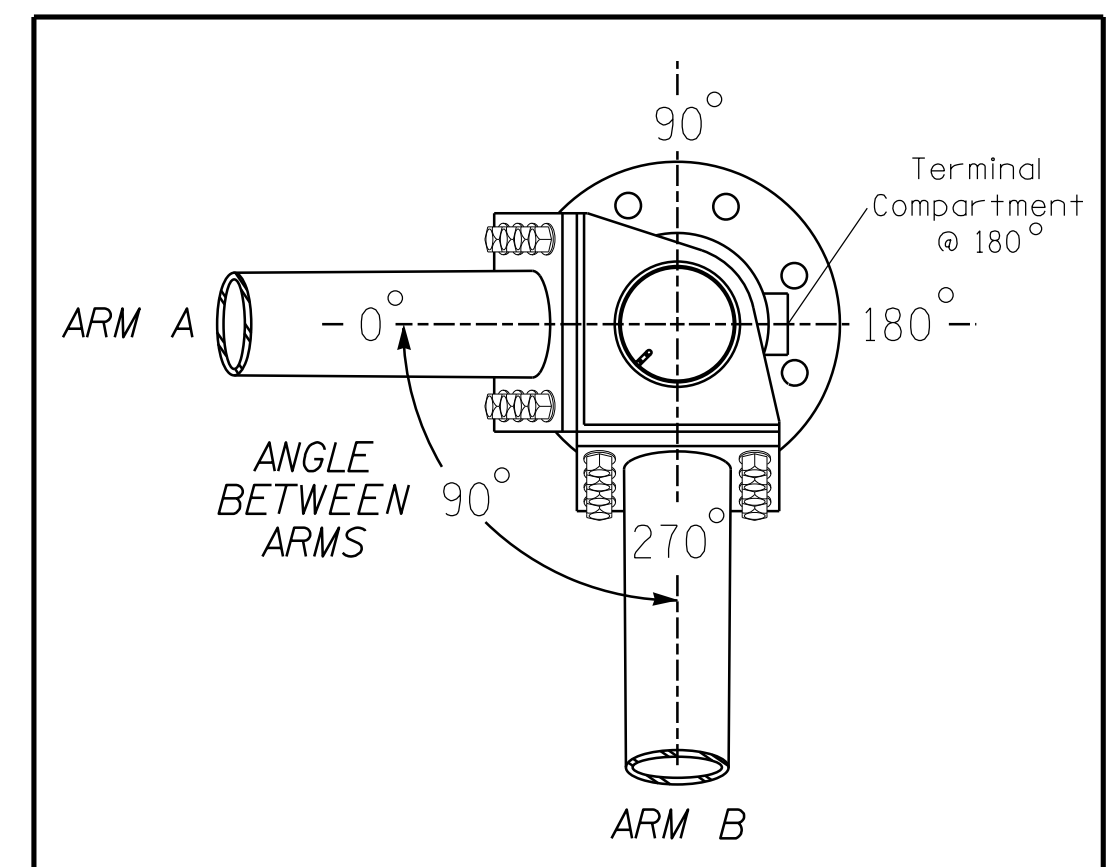
Elevation View @ 0°

**SPECIAL NOTE**

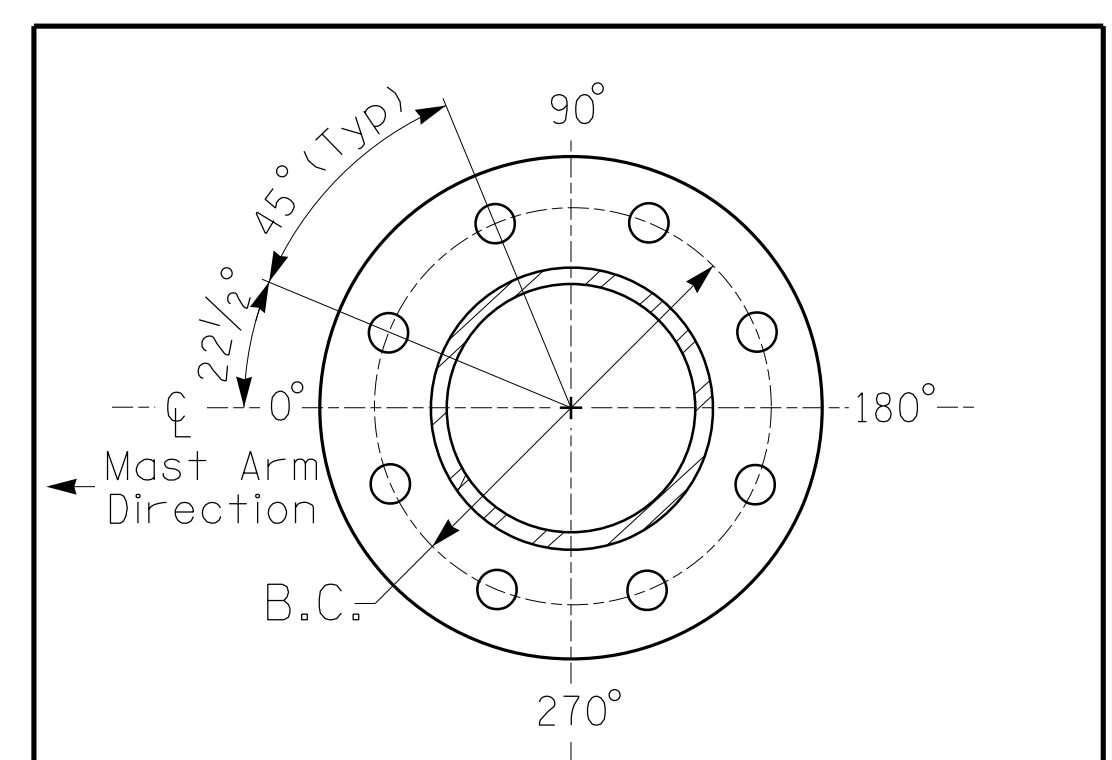
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

**Elevation Data for Mast Arm Attachment (H1)**

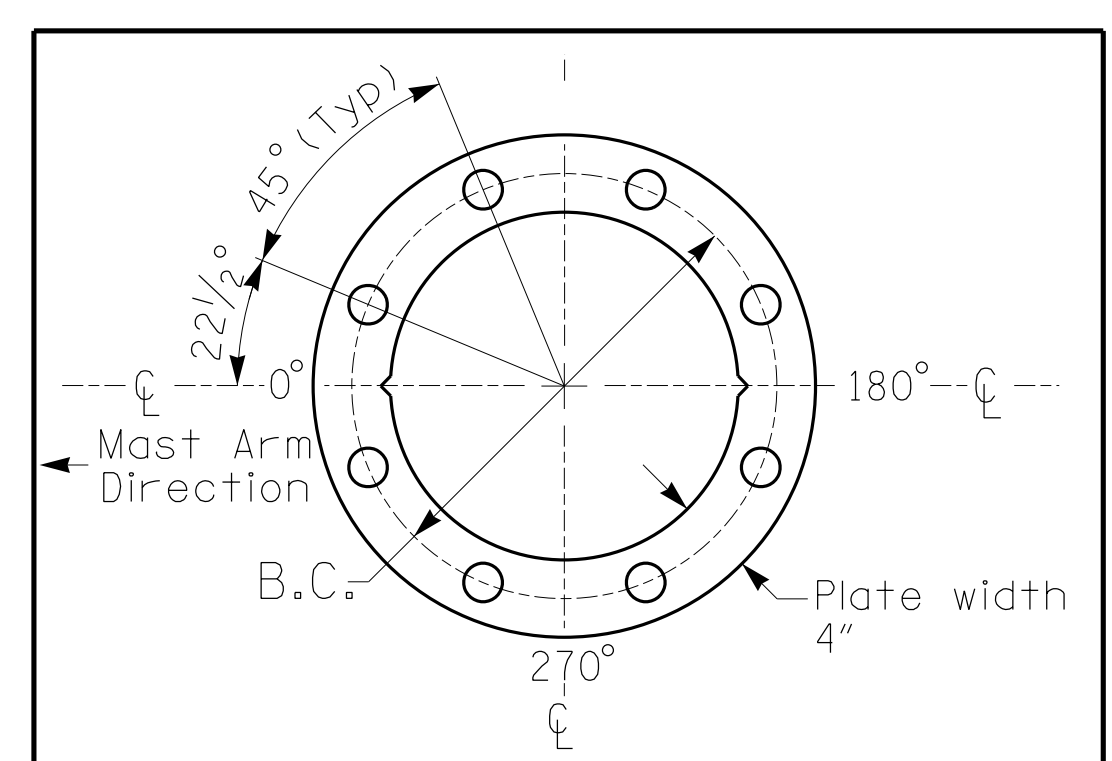
Elevation Differences for:	Arm A	Arm B
Baseline reference point at $\odot$ Foundation @ ground level	2671.2 ft.	2671.2 ft.
Elevation difference at High point of roadway surface	+1.4 ft.	-0.2 ft.
Elevation difference at Edge of travelway or face of curb	+0.4 ft.	-0.2 ft.



POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL



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

**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
	RIGID MOUNTED SIGNAL HEAD 12"-4 SECTION-WITH BACKPLATE	11.5 S.F.	25.5" W X 66.0" L	74 LBS
	STREET NAME SIGN RIGID MOUNTED	12.0 S.F.	18.0" W X 96.0" L	27 LBS

**NOTES**

**DESIGN REFERENCE MATERIAL**

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

**DESIGN REQUIREMENTS**

- Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
- Design all signal supports using stress ratios that do not exceed 0.9.
- A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements.
- Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
- The mast arm attachment height (H1) shown is based on the following design assumptions:
  - Nominal vertical rise in mast arm is 5 feet as measured from the centerline of the arm base to the centerline of the free end of the arm.
  - Signal heads are rigidly mounted and vertically centered on the mast arm.
  - The roadway clearance height for design is as shown in the elevation views.
  - The top of the pole base plate is 0.75 feet above the ground elevation.
  - Refer to the Elevation Data Chart for the elevation differences between the proposed foundation ground level and the high point of the roadway.
  - Provide horizontal distance from the proposed centerline of the foundation to the edge of travelway. Refer to the Elevation Data Chart for elevation difference between the proposed foundation ground level and the edge of travelway. This information is necessary to ensure that the roadway clearance is maintained at the edge of the travelway and to aid in the camber design of the arm.
- The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
  - Mast arm attachment height (H1) plus 2 feet, or
  - H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
- If pole location adjustments are required, the contractor must gain approval from the Engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signal Design Section Senior Structural Engineer for assistance at (919) 814-5000.
- The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
- The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

All metal poles and arms should be Hunter Green in color as specified in the project special provisions.

NCDOT Wind Zone 5 (120 mph)

US 276 (Russ Avenue)  
at  
Ingles Shopping Center /  
Long John Silver Drive

Division 14 Haywood County Waynesville

PLAN DATE: April 2023 REVIEWED BY: WJ Hamilton

PREPARED BY: TS Popeika REVIEWED BY: 16085 (040)

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

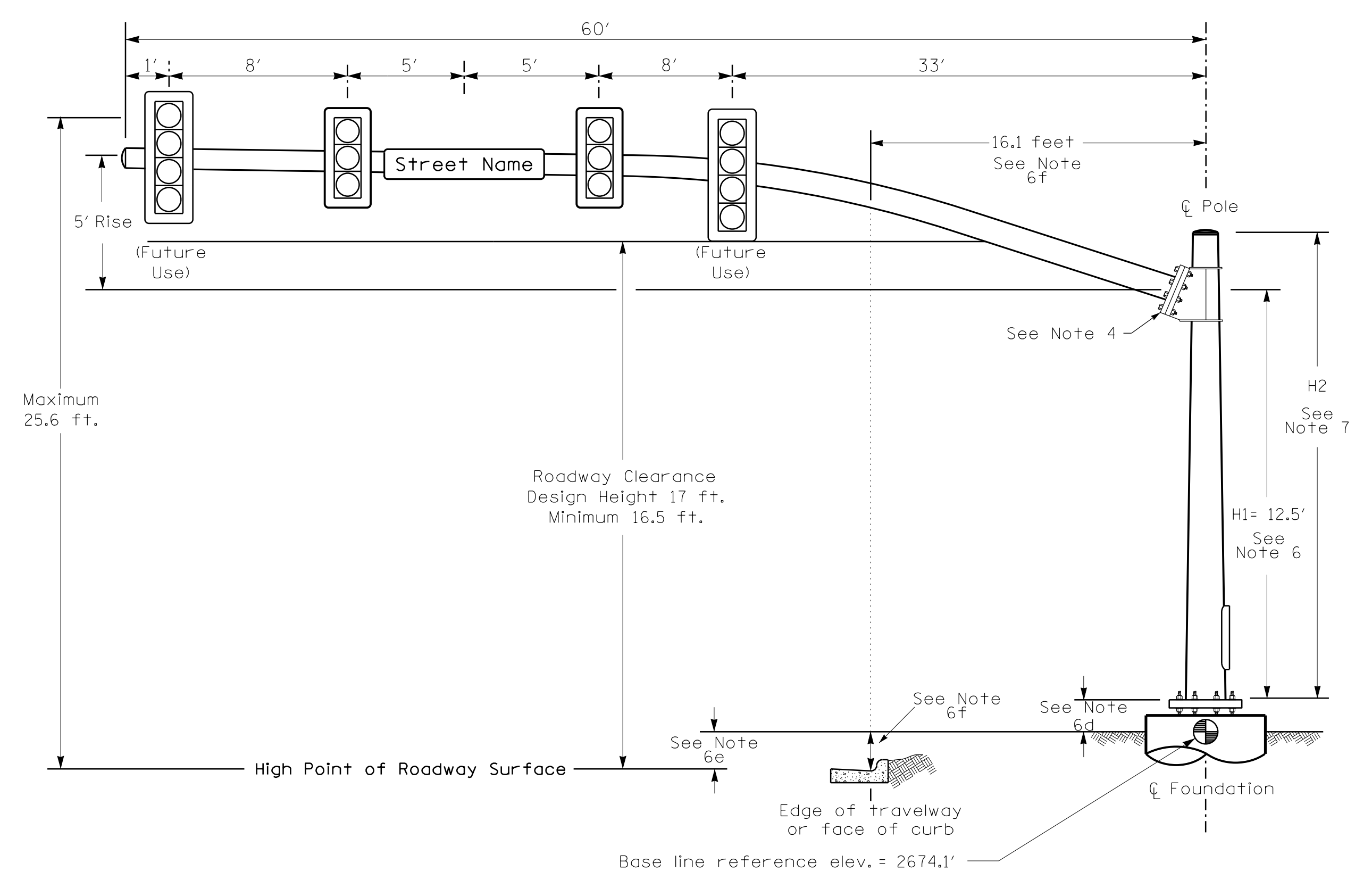
SEAL

WILLIAM J. HAMILTON  
PROFESSIONAL ENGINEER  
STATE OF NORTH CAROLINA  
LICENSE NO. 32396

04/11/2023

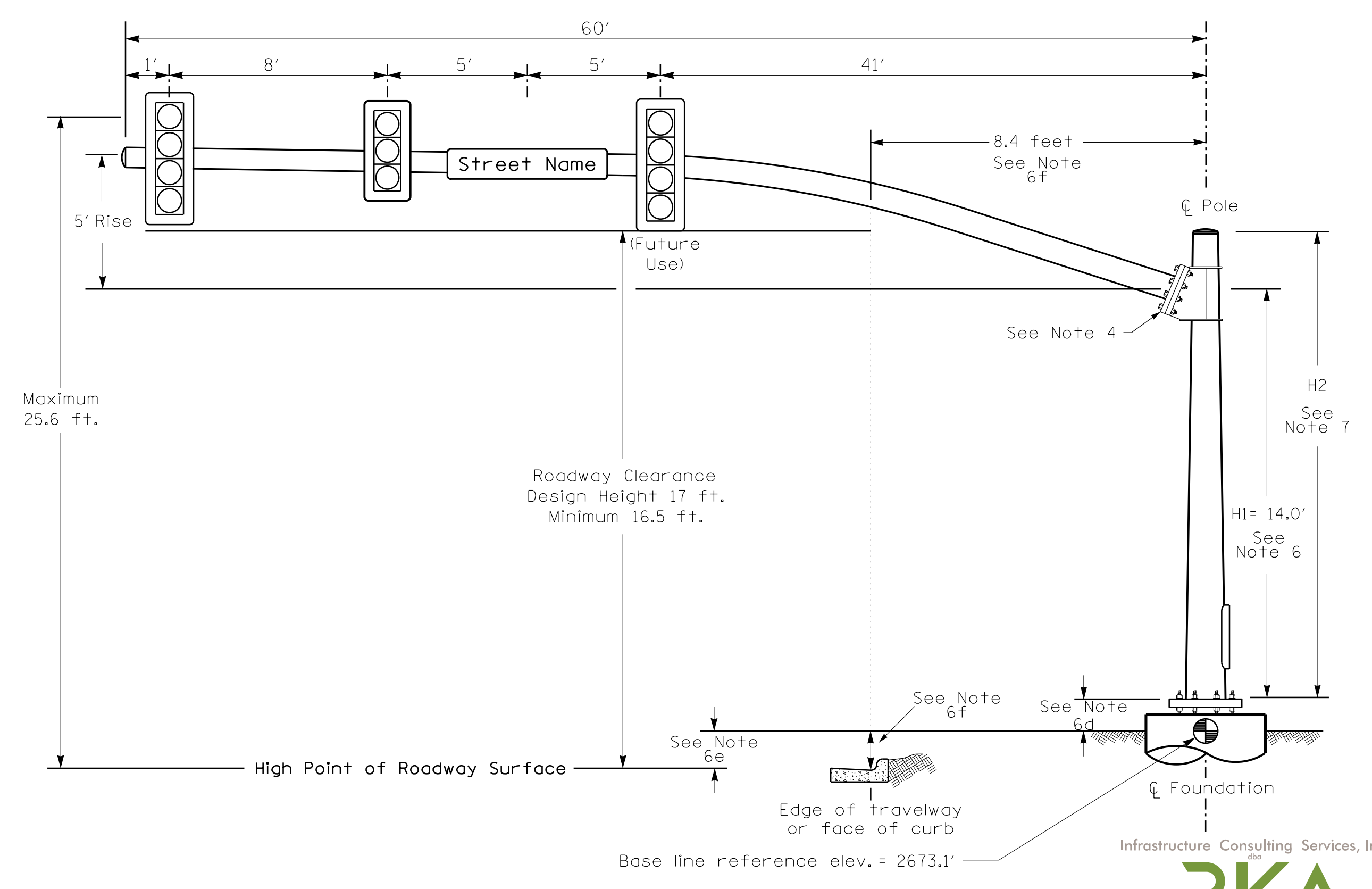
SIG. INVENTORY NO. 14-0689

**Design Loading for METAL POLE NO. 2**



Elevation View

**Design Loading for METAL POLE NO. 3**



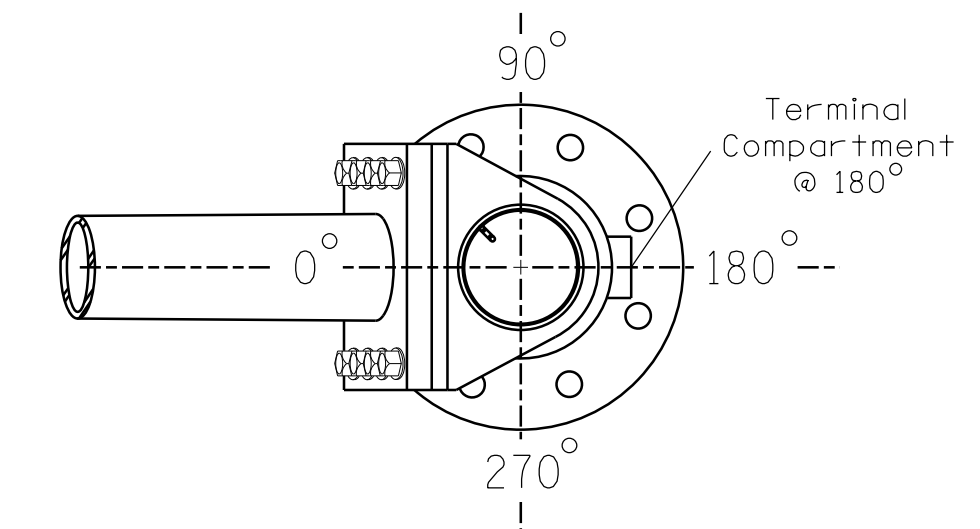
Elevation View

**SPECIAL NOTE**

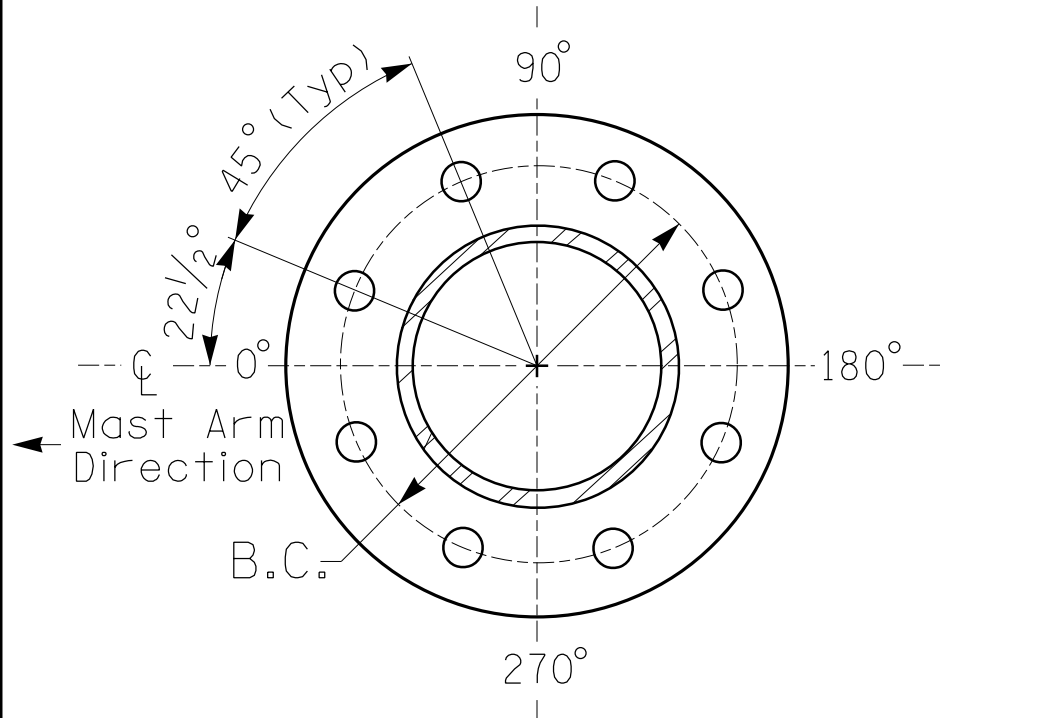
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

**Elevation Data for Mast Arm Attachment (H1)**

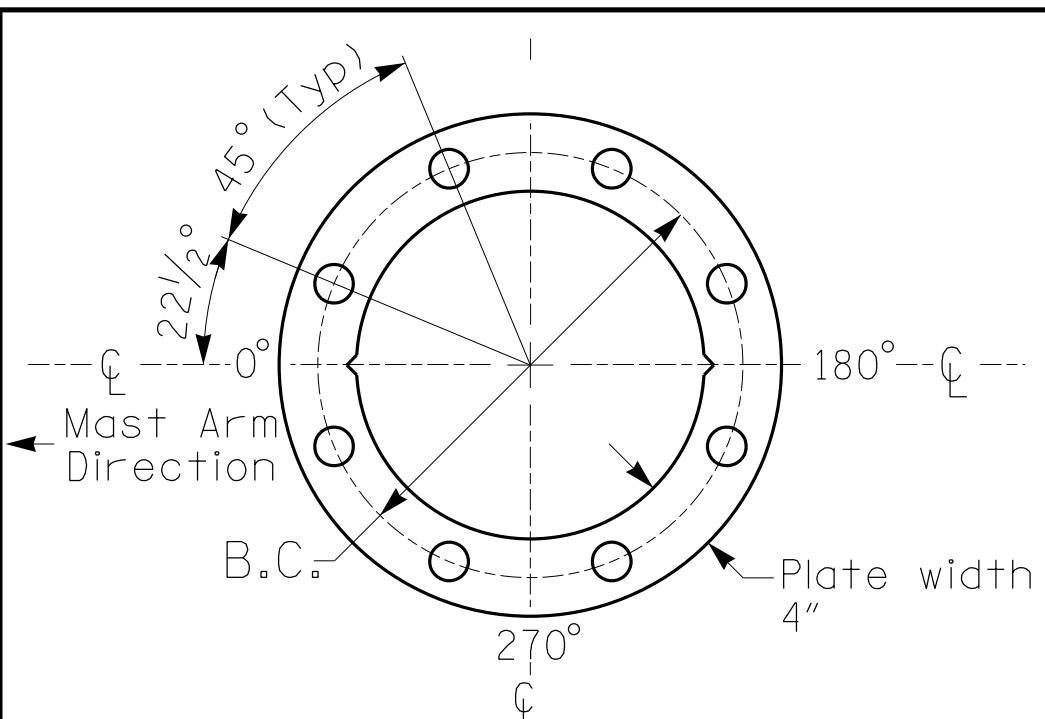
Elevation Differences for:	Pole 2	Pole 3
Baseline reference point at $\phi$ Foundation @ ground level	2674.1 ft.	2673.1 ft.
Elevation difference at High point of roadway surface	-1.7 ft.	-0.1 ft.
Elevation difference at Edge of travelway or face of curb	-0.8 ft.	+0.6 ft.



POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL



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

**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
	RIGID MOUNTED SIGNAL HEAD 12"-4 SECTION-WITH BACKPLATE	11.5 S.F.	25.5" W X 66.0" L	74 LBS
	STREET NAME SIGN RIGID MOUNTED	12.0 S.F.	18.0" W X 96.0" L	27 LBS

**NOTES**

**DESIGN REFERENCE MATERIAL**

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

**DESIGN REQUIREMENTS**

- Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
- Design all signal supports using stress ratios that do not exceed 0.9.
- A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements.
- Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
- The mast arm attachment height (H1) shown is based on the following design assumptions:
  - Nominal vertical rise in mast arm is 5 feet as measured from the centerline of the arm base to the centerline of the free end of the arm.
  - Signal heads are rigidly mounted and vertically centered on the mast arm.
  - The roadway clearance height for design is as shown in the elevation views.
  - The top of the pole base plate is 0.75 feet above the ground elevation.
  - Refer to the Elevation Data Chart for the elevation differences between the proposed foundation ground level and the high point of the roadway.
  - Provide horizontal distance from the proposed centerline of the foundation to the edge of travelway. Refer to the Elevation Data Chart for elevation difference between the proposed foundation ground level and the edge of travelway. This information is necessary to ensure that the roadway clearance is maintained at the edge of the travelway and to aid in the camber design of the arm.
- The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
  - Mast arm attachment height (H1) plus 2 feet, or
  - H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
- If pole location adjustments are required, the contractor must gain approval from the Engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signal Design Section Senior Structural Engineer for assistance at (919) 814-5000.
- The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
- The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

All metal poles and arms should be Hunter Green in color as specified in the project special provisions.

NCDOT Wind Zone 5 (120 mph)

US 276 (Russ Avenue)  
at  
Ingles Shopping Center /  
Long John Silvers Drive  
Division 14 Haywood County Waynesville  
PLAN DATE: April 2023 REVIEWED BY: WJ Hamilton  
PREPARED BY: TS Popeika REVIEWED BY: 16085 (040)

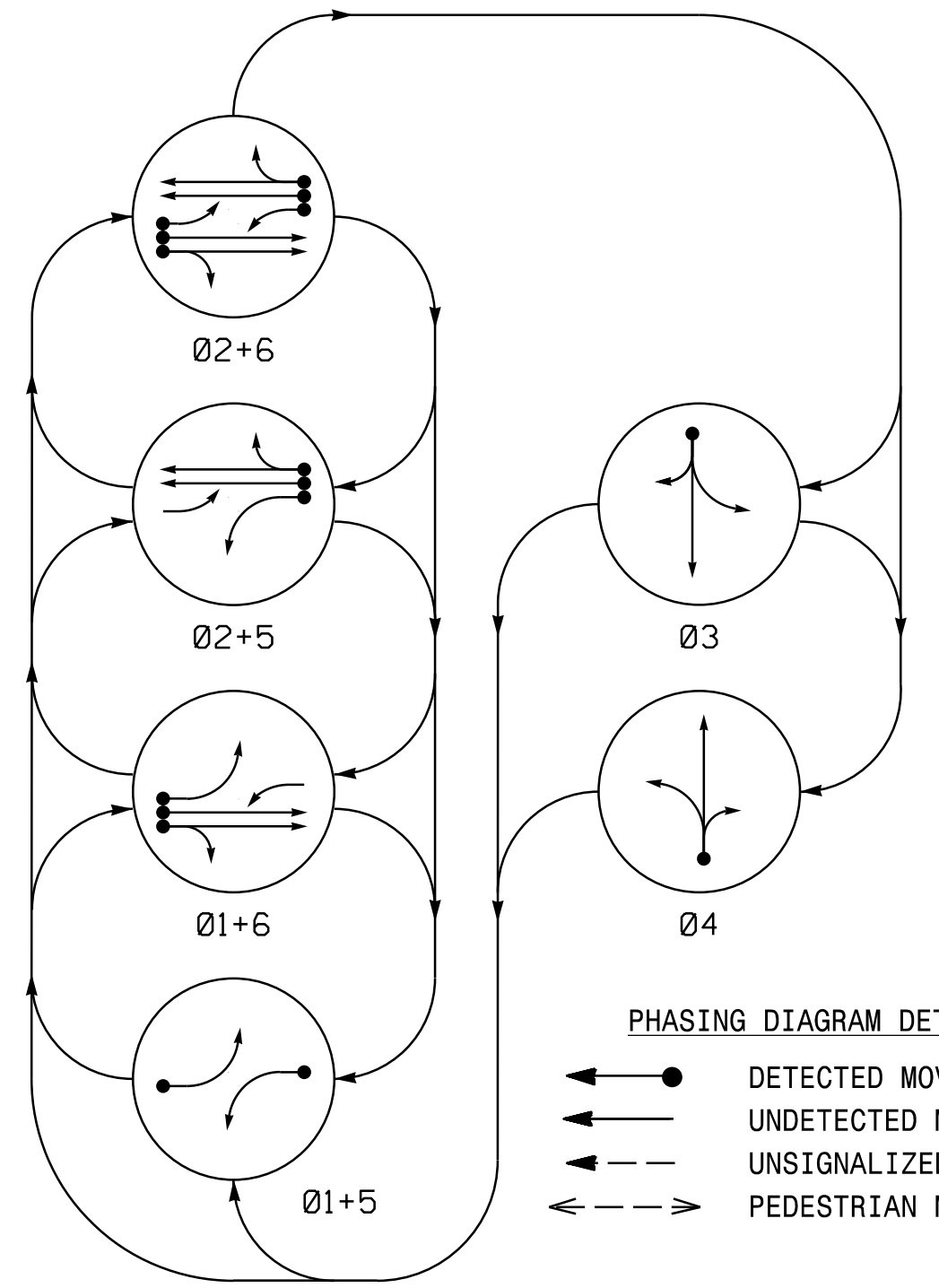
REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL

William J. Hamilton  
Professional Engineer  
License No. 32396  
04/11/2023  
SIG. INVENTORY NO. 14-0689

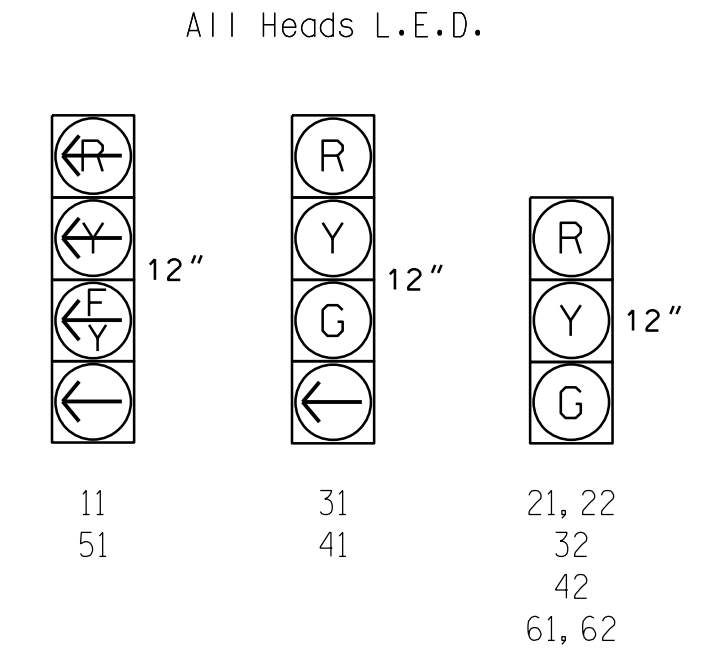
**PHASING DIAGRAM**



**TABLE OF OPERATION**

SIGNAL FACE	PHASE						FLASH
	Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3	Ø4	
11	-	-	-	-	-	-	Y
21, 22	R	R	G	G	R	R	Y
31	R	R	R	G	R	R	
32	R	R	R	G	R	R	
41	R	R	R	R	G	R	
42	R	R	R	R	G	R	
51	-	-	-	-	-	-	Y
61, 62	R	G	R	G	R	Y	

**SIGNAL FACE I.D.**



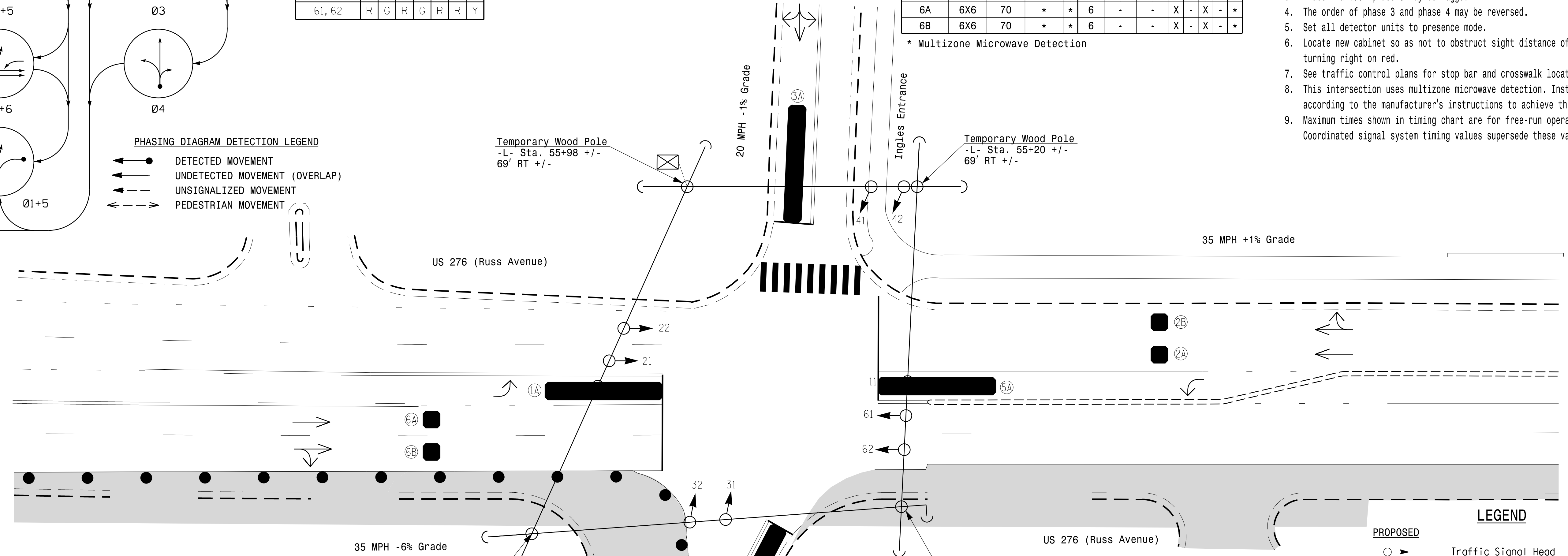
**MAXTIME DETECTOR INSTALLATION CHART**

ZONE	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING							
					CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
1A	6X40	0	*	*	1	15	-	X	-	X	-	*
2A	6X6	70	*	*	2	-	-	X	-	X	-	*
2B	6X6	70	*	*	2	-	-	X	-	X	-	*
3A	6X40	0	*	*	3	10	-	X	-	X	-	*
4A	6X40	0	*	*	4	10	-	X	-	X	-	*
5A	6X40	0	*	*	5	15	-	X	-	X	-	*
6A	6X6	70	*	*	2	3	-	X	-	X	-	*
6B	6X6	70	*	*	6	-	-	X	-	X	-	*

**6 Phase Fully Actuated D14-12\_Waynesville**

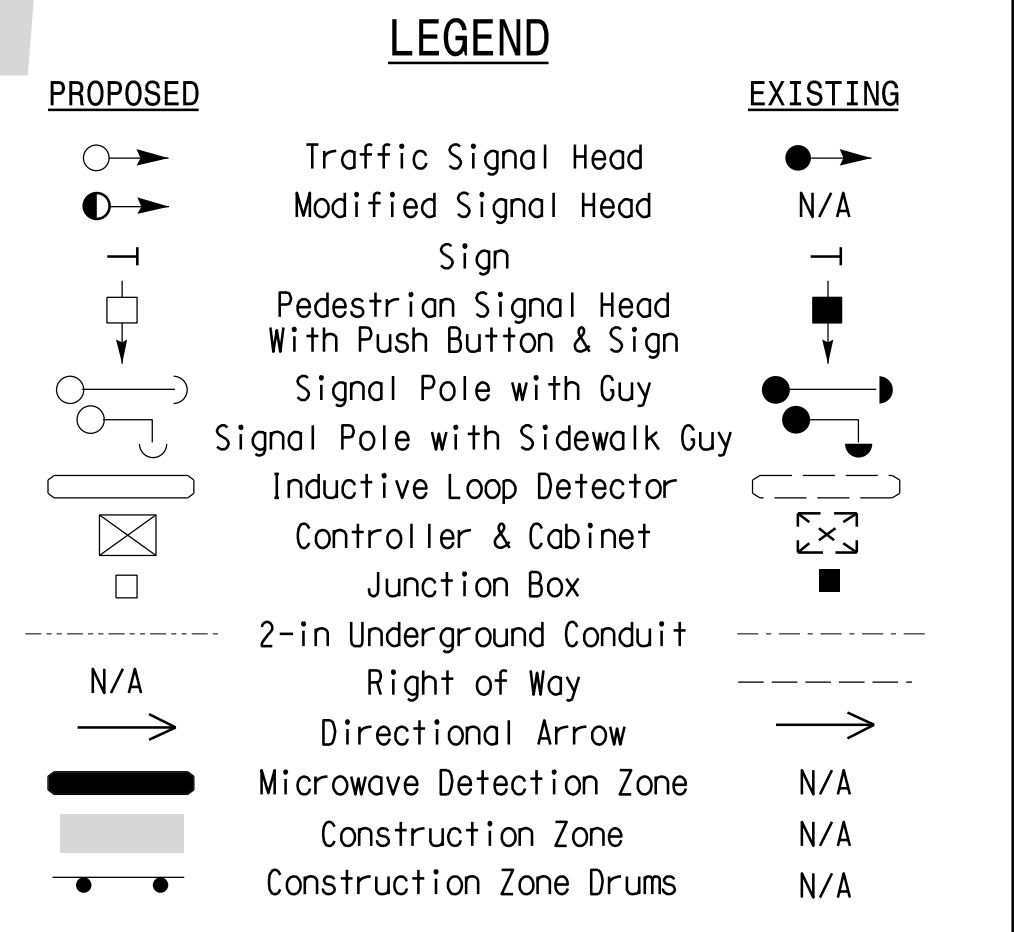
**NOTES**

- Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Phase 1 and/or phase 5 may be lagged.
- The order of phase 3 and phase 4 may be reversed.
- Set all detector units to presence mode.
- Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
- See traffic control plans for stop bar and crosswalk locations.
- This intersection uses multizone microwave detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.



**MAXTIME TIMING CHART**

FEATURE	PHASE					
	1	2	3	4	5	6
Walk *	-	-	-	-	-	-
Ped Clear *	-	-	-	-	-	-
Min Green	7	10	7	7	7	10
Passage *	2.0	3.0	2.0	2.0	2.0	3.0
Max I *	15	50	20	20	15	50
Yellow Change	3.1	4.3	3.0	3.3	3.0	4.3
Red Clear	2.3	1.1	3.1	2.4	1.6	1.1
Added Initial *	-	-	-	-	-	-
Maximum Initial *	-	-	-	-	-	-
Time Before Reduction *	-	-	-	-	-	-
Time To Reduce *	-	-	-	-	-	-
Minimum Gap	-	-	-	-	-	-
Advance Walk	-	-	-	-	-	-
Non Lock Detector	X	-	X	X	X	-
Vehicle Recall	-	MIN RECALL	-	-	-	MIN RECALL
Dual Entry	-	-	-	-	-	-



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

**Signal Upgrade Temporary Design 1 - (TMP Phase I)**

Infrastructure Consulting Services, Inc. **RKA** RAMEY KEMP ASSOCIATES  
 8210 University Executive Park Drive Suite 220 Charlotte, North Carolina 28226  
 Phone: 704-548-4202 | www.rkainc.com | NC License No. F-1489

Prepared For: Transportation Mobility and Safety Solutions  
 NORTH CAROLINA PROFESSIONAL ENGINEER  
 WILLIAM J. HAMILTON  
 SEAL 32396  
 04/11/2023  
 SIGNATURE DATE  
 SIG. INVENTORY NO. 14-1075T1

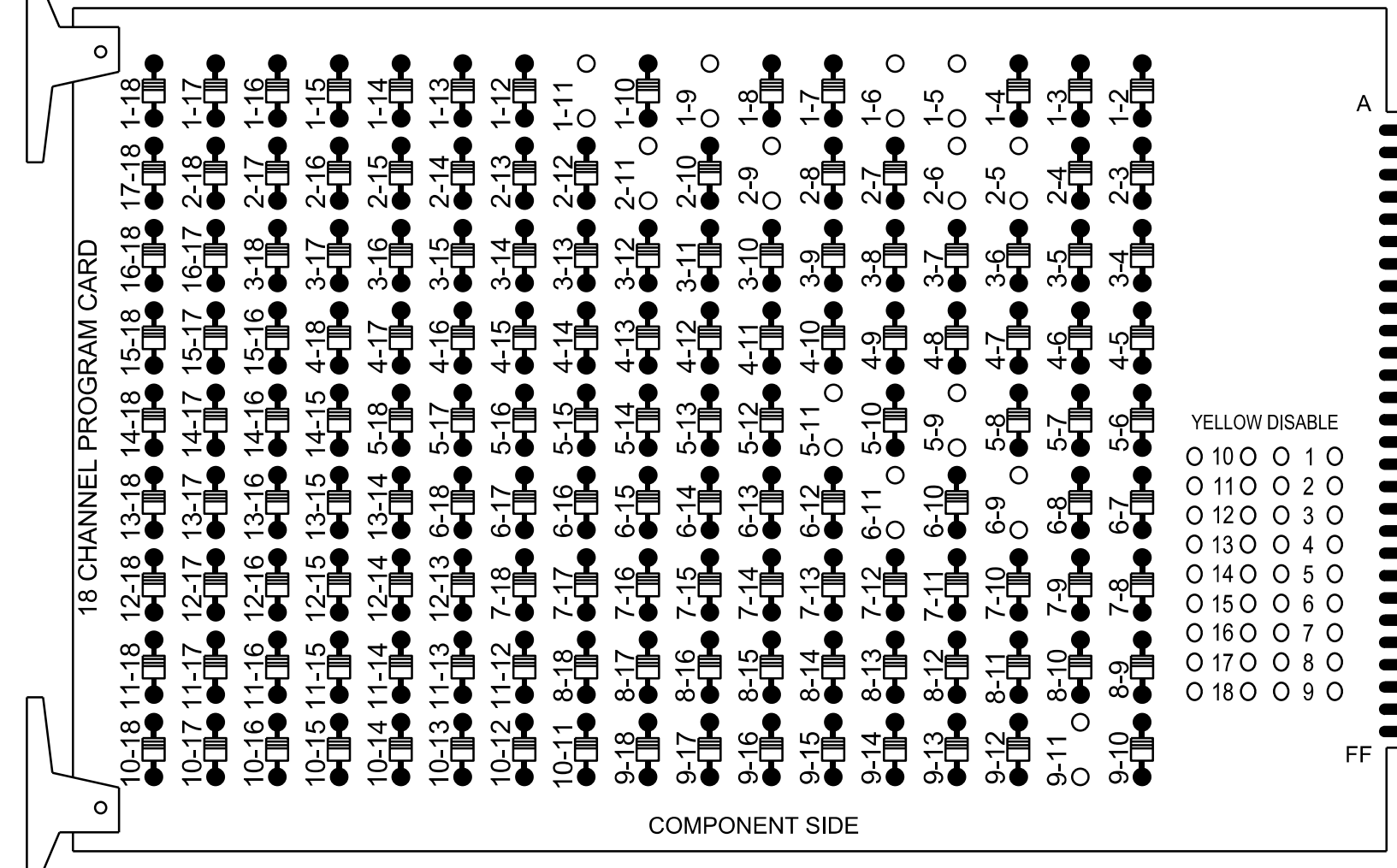
US 276 (Russ Avenue) at Frazier Street / Ingles Entrance  
 Division 14 Haywood County Waynesville  
 PLAN DATE: April 2023 REVIEWED BY: WJ Hamilton  
 PREPARED BY: TS Popelka RKA PROJ. NO.: 16085 (040)  
 REVISIONS INIT. DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED  
 SEAL  
 NORTH CAROLINA PROFESSIONAL ENGINEER  
 WILLIAM J. HAMILTON  
 SEAL 32396  
 04/11/2023  
 SIGNATURE DATE  
 SIG. INVENTORY NO. 14-1075T1

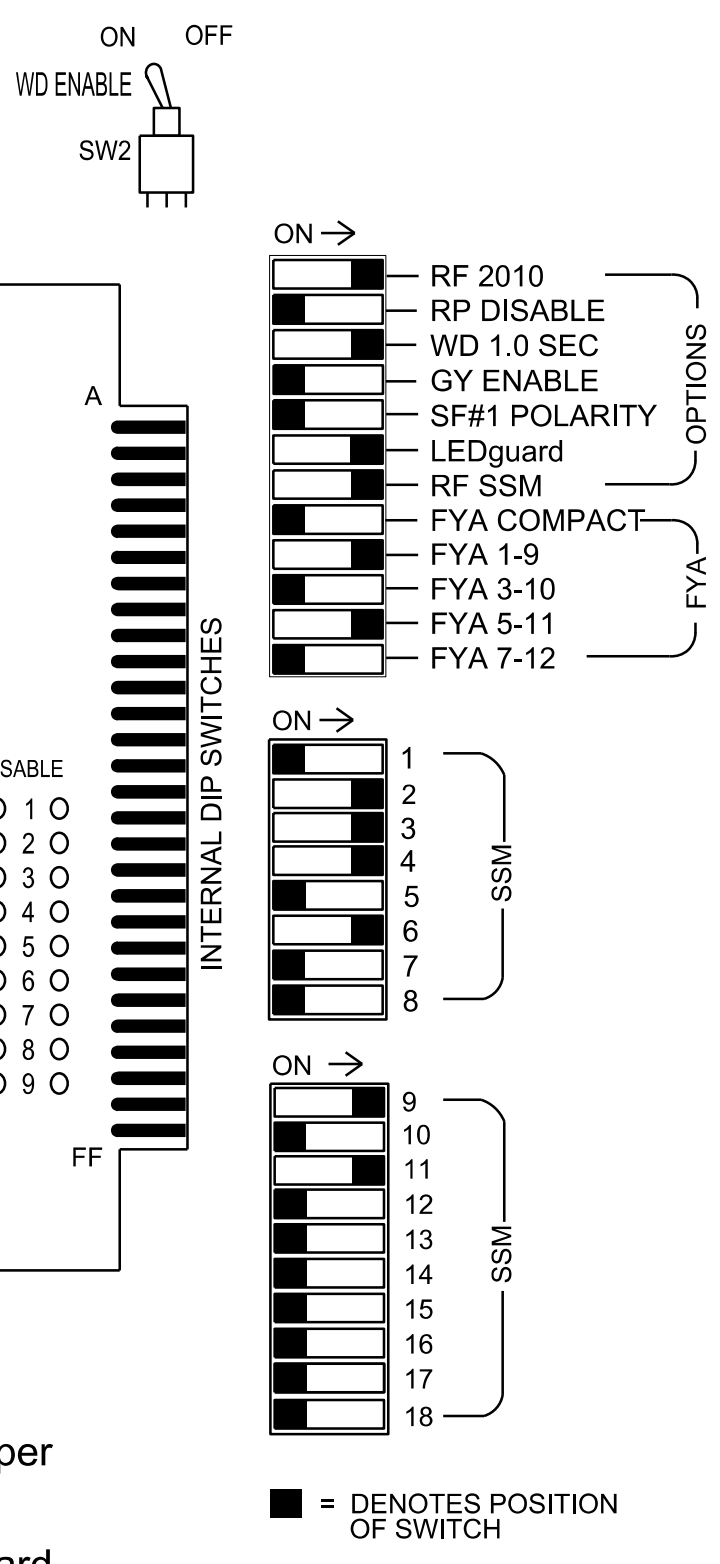
### 18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 1-5, 1-6, 1-9, 1-11, 2-5, 2-6, 2-9, 2-11, 5-9, 5-11, 6-9, 6-11 AND 9-11.



REMOVE JUMPERS AS SHOWN



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

### NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the signal plan.
- Program controller to start up in phase 2 Green No Walk and 6 Green No Walk.
- If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
- The cabinet and controller are part of the D14-12 Waynesville Signal System.

### EQUIPMENT INFORMATION

Controller.....2070LX  
 Cabinet.....332 w/ Aux  
 Software.....Q-Free MAXTIME  
 Cabinet Mount.....Base  
 Output File Positions.....18 With Aux. Output File  
 Load Switches Used.....S1, S2, S4, S5, S7, S8, AUX S1, AUX S4  
 Phases Used.....1, 2, 3, 4, 5, 6  
 Overlap "1".....\*  
 Overlap "2".....NOT USED  
 Overlap "3".....\*  
 Overlap "4".....NOT USED

\*See overlap programming detail on this sheet

### SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6			
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18			
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE			
SIGNAL HEAD NO.	11	21,22	NU	31	32	41	42	NU	51	61,62	NU	NU	NU	NU	11	NU	NU	51	NU	NU	
RED		128		116	116	101	101			134											
YELLOW	*	129		117	117	102	102		*	135											
GREEN		130		118	118	103	103			136											
RED ARROW																A121			A114		
YELLOW ARROW																A122			A115		
FLASHING YELLOW ARROW																A123			A116		
GREEN ARROW	127			118	103			133													

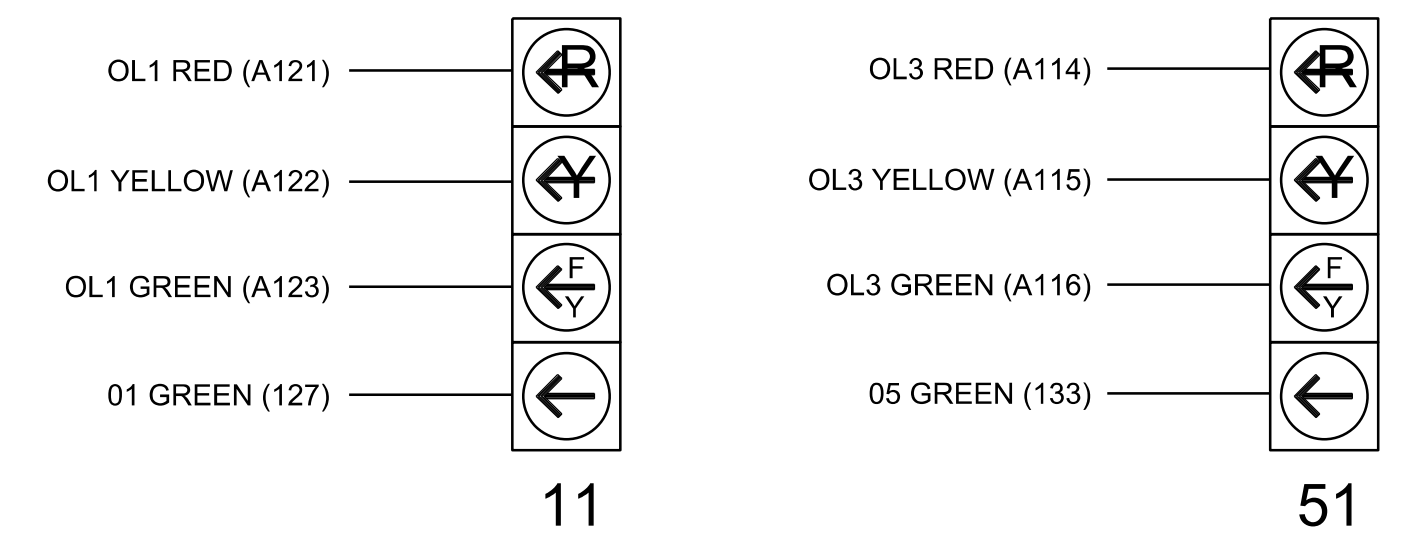
NU = Not Used  
 \* Denotes install load resistor. See load resistor installation detail this sheet.  
 \* See pictorial of head wiring in detail this sheet.

### SPECIAL DETECTOR NOTE

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

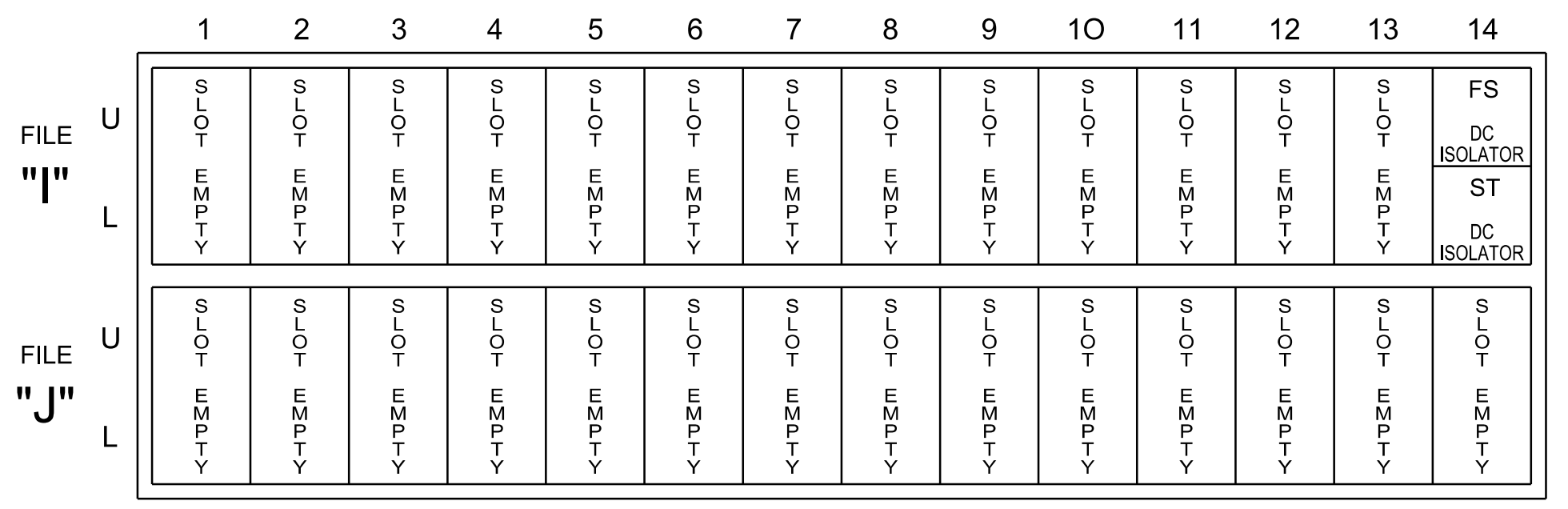
### FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



### INPUT FILE POSITION LAYOUT

(front view)



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

### OVERLAP PROGRAMMING

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

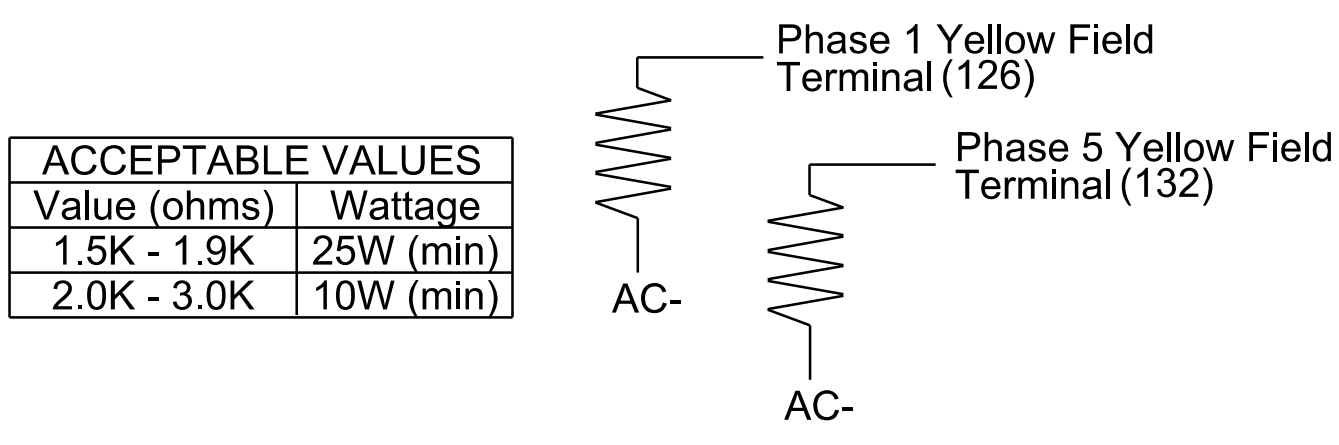
Web Interface  
 Home > Controller > Overlap Configuration > Overlaps

Overlap Plan 1

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

### LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)



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

### Electrical Detail Temporary Design 1 - (TMP Phase I)

Prepared For:

Infrastructure Consulting Services, Inc. **RKA** RAMEY KEMP ASSOCIATES

750 N. Greenfield Pkwy, Garner, NC 27529

US 276 (Russ Avenue) at Frazier Street / Ingles Entrance

Division 14 Haywood County Waynesville

PLAN DATE: April 2023 REVIEWED BY: WJ Hamilton  
 PREPARED BY: TS Popelka RKA PROJ. NO: 16085 (040)

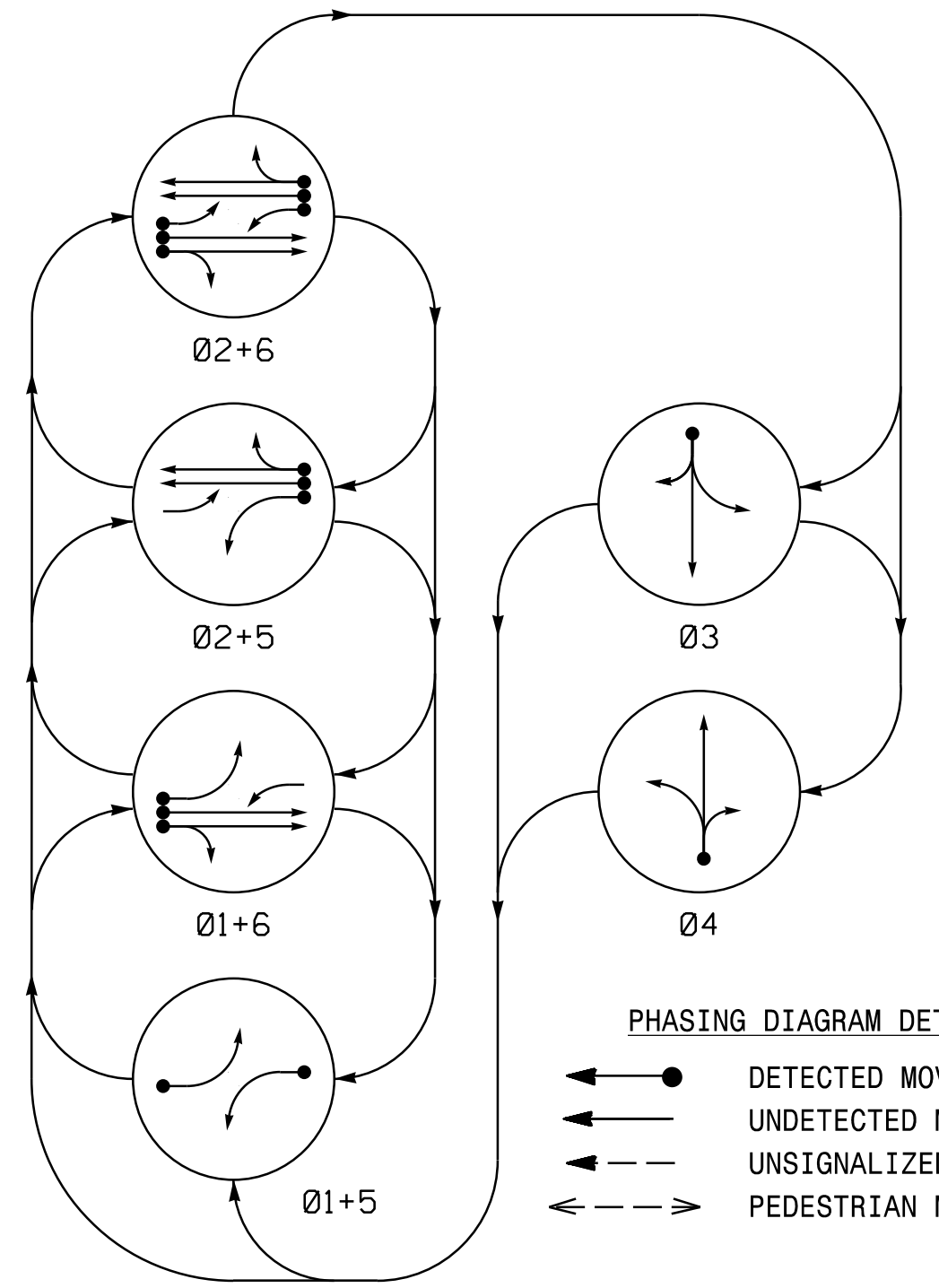
THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 14-1075T1  
 DESIGNED: Apr 2023  
 SEALED: 04/11/2023  
 REVISED: N/A

Seal of William J. Hamilton, Professional Engineer, License No. 32396

4/11/2023  
 SIG. INVENTORY NO. 14-1075T1



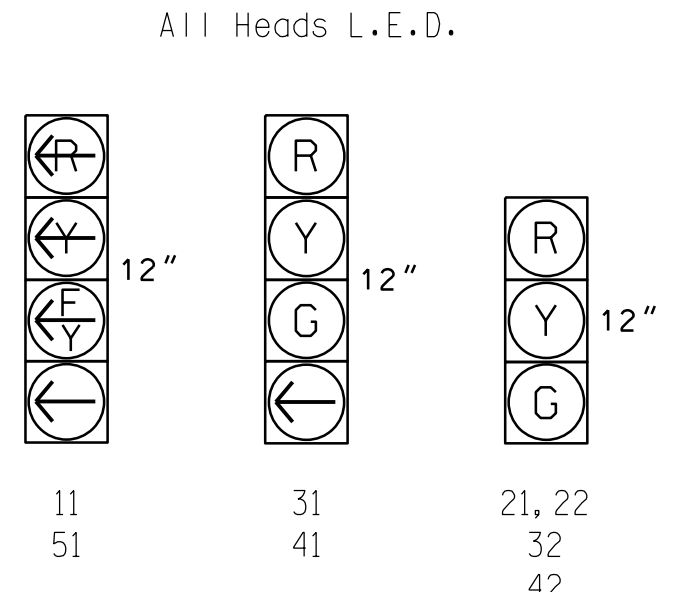
**PHASING DIAGRAM**



**TABLE OF OPERATION**

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

**SIGNAL FACE I.D.**



**MAXTIME DETECTOR INSTALLATION CHART**

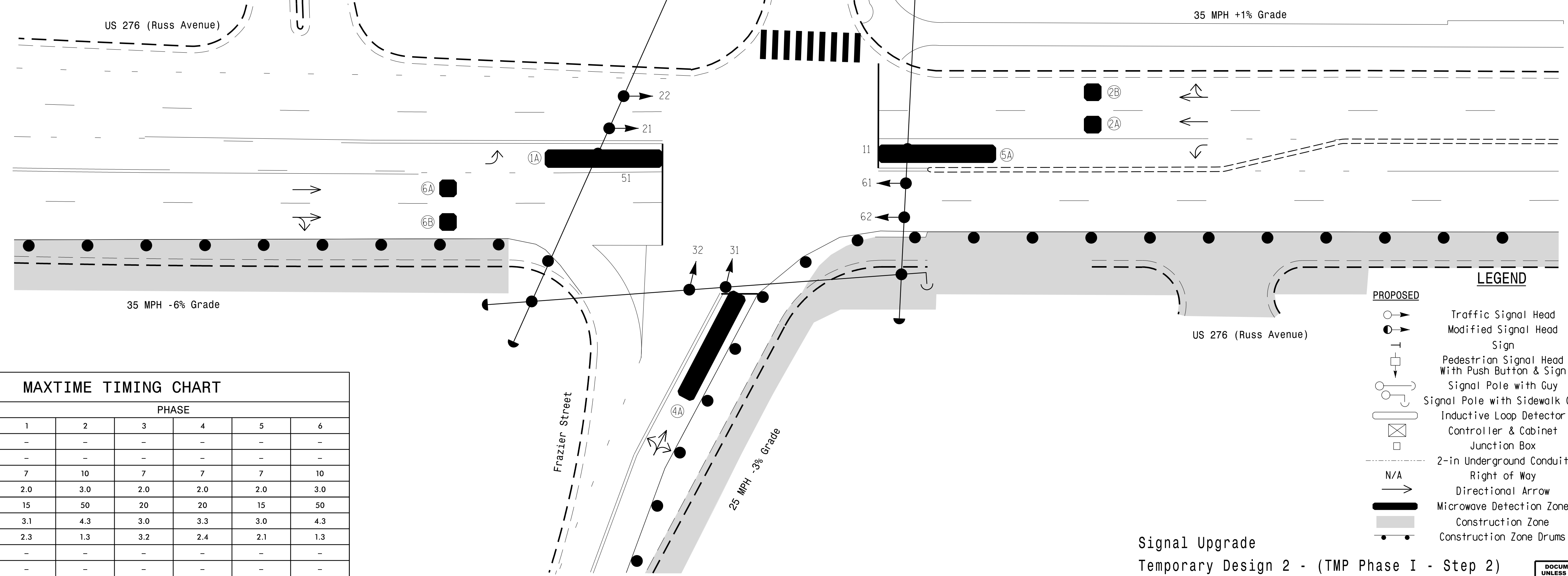
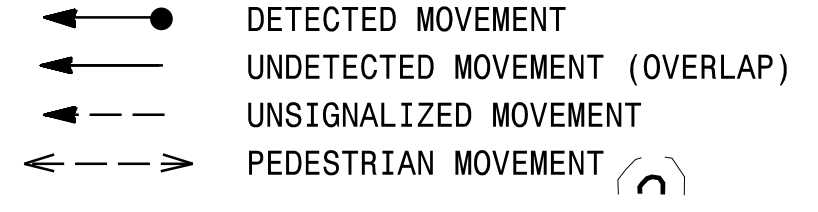
ZONE	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING							
					CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
1A	6X40	0	*	*	1	15	-	X	-	X	-	*
2A	6X6	70	*	*	2	-	-	X	-	X	-	*
2B	6X6	70	*	*	2	-	-	X	-	X	-	*
3A	6X40	0	*	*	3	10	-	X	-	X	-	*
4A	6X40	0	*	*	4	10	-	X	-	X	-	*
5A	6X40	0	*	*	5	15	-	X	-	X	-	*
6A	6X6	70	*	*	2	3	-	X	-	X	-	*
6B	6X6	70	*	*	6	-	-	X	-	X	-	*

**6 Phase Fully Actuated D14-12\_Waynesville**

**NOTES**

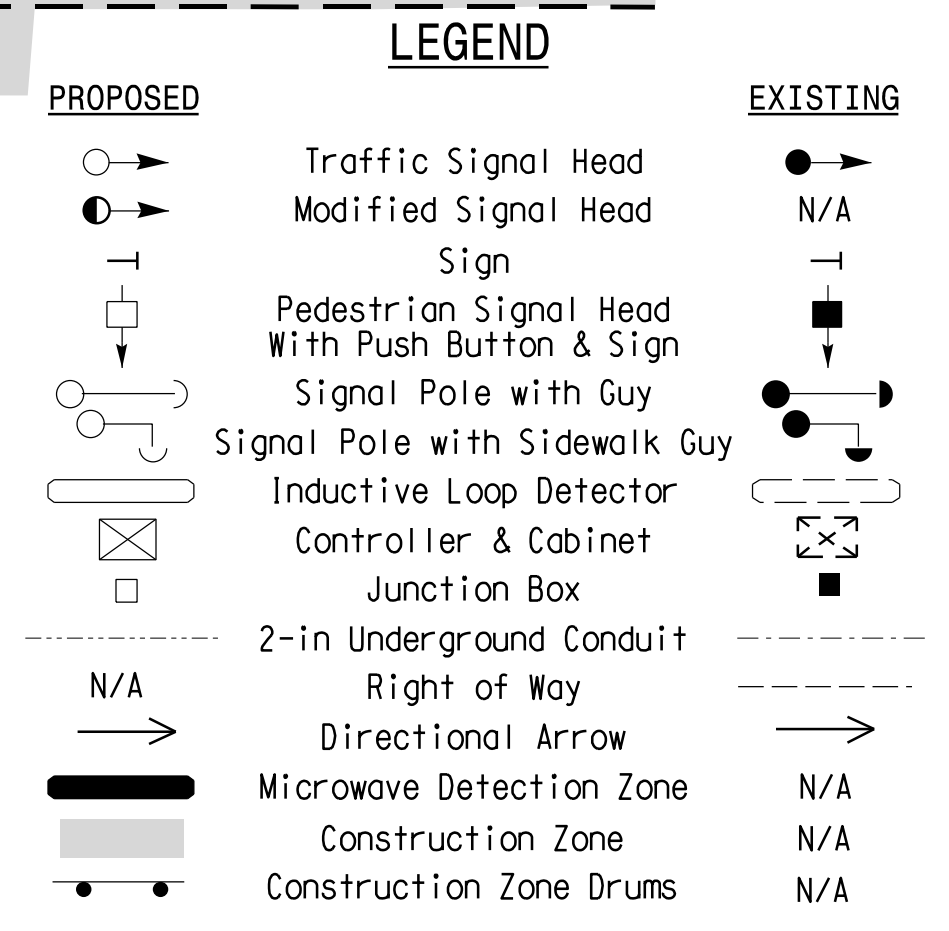
- Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Phase 1 and/or phase 5 may be lagged.
- The order of phase 3 and phase 4 may be reversed.
- Reposition existing signal heads numbered 41 and 42.
- Set all detector units to presence mode.
- See traffic control plans for stop bar and crosswalk locations.
- This intersection uses multizone microwave detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.

**PHASING DIAGRAM DETECTION LEGEND**



**MAXTIME TIMING CHART**

FEATURE	PHASE					
	1	2	3	4	5	6
Walk *	-	-	-	-	-	-
Ped Clear *	-	-	-	-	-	-
Min Green	7	10	7	7	7	10
Passage *	2.0	3.0	2.0	2.0	2.0	3.0
Max I *	15	50	20	20	15	50
Yellow Change	3.1	4.3	3.0	3.3	3.0	4.3
Red Clear	2.3	1.3	3.2	2.4	2.1	1.3
Added Initial *	-	-	-	-	-	-
Maximum Initial *	-	-	-	-	-	-
Time Before Reduction *	-	-	-	-	-	-
Time To Reduce *	-	-	-	-	-	-
Minimum Gap	-	-	-	-	-	-
Advance Walk	-	-	-	-	-	-
Non Lock Detector	X	-	X	X	X	-
Vehicle Recall	-	MIN RECALL	-	-	-	MIN RECALL
Dual Entry	-	-	-	-	-	-



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

**Signal Upgrade Temporary Design 2 - (TMP Phase I - Step 2)**



US 276 (Russ Avenue) at Frazier Street / Ingles Entrance

Division 14 Haywood County Waynesville

PLAN DATE: April 2023 REVIEWED BY: WJ Hamilton

PREPARED BY: TS Popelka RKA PROJ. NO.: 16085 (040)

750 N. Greenfield Pkwy, Garner, NC 27529

SCALE: 1" = 20'

REVISIONS: [Table with columns for REVISIONS, INIT., DATE]

SEAL: NORTH CAROLINA PROFESSIONAL ENGINEER WILLIAM J. HAMILTON 32396

SIGNATURE: William J. Hamilton DATE: 04/11/2023

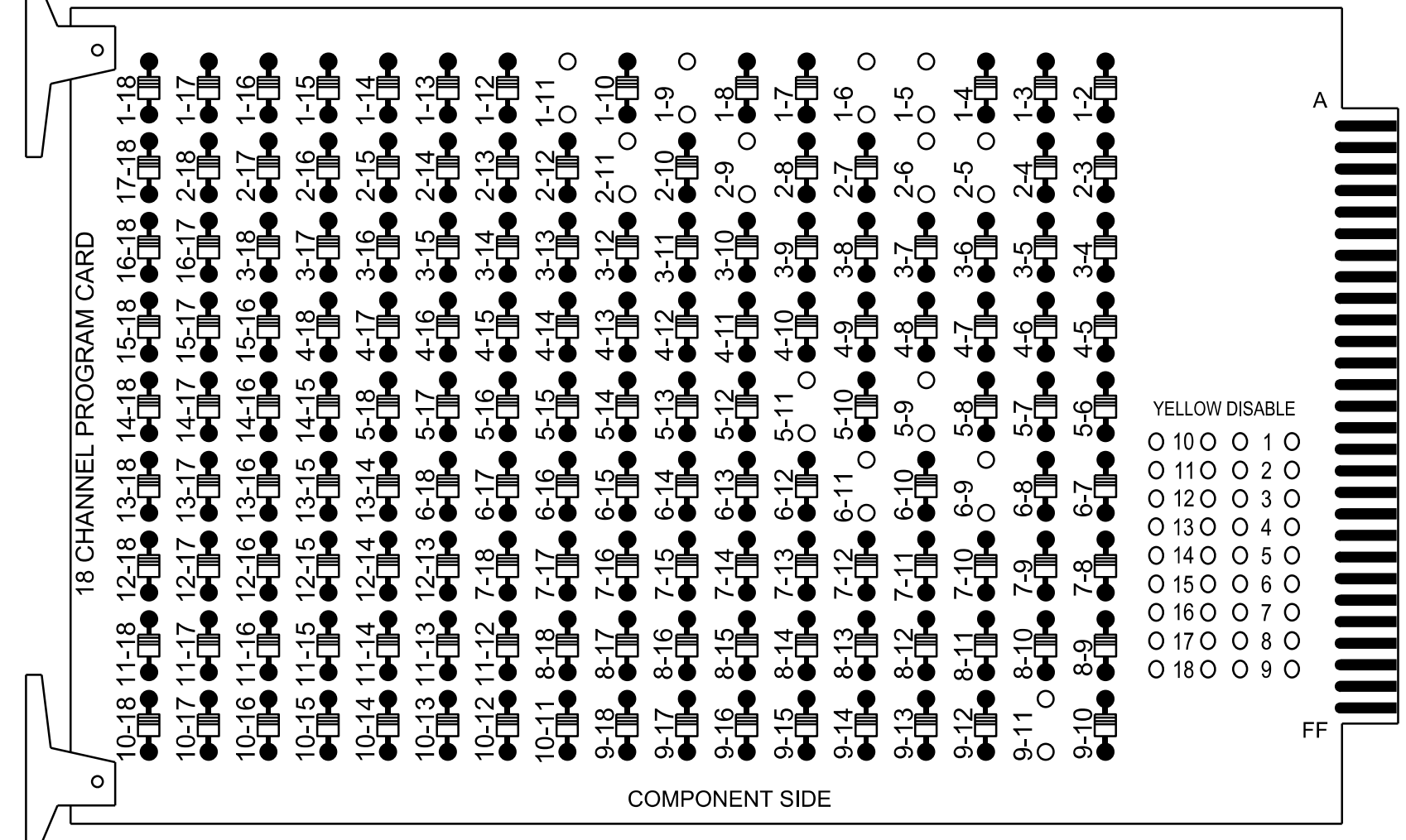
SIG. INVENTORY NO. 14-107512

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

### 18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

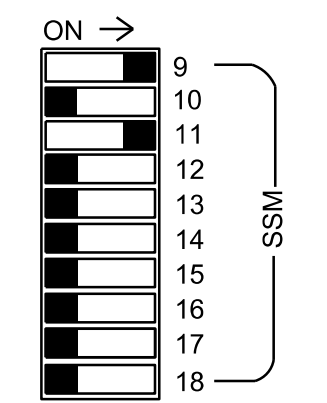
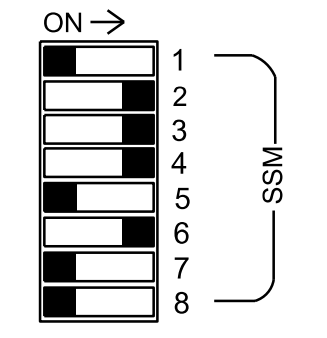
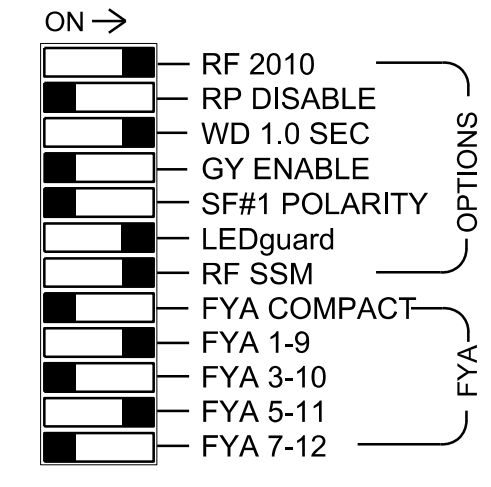
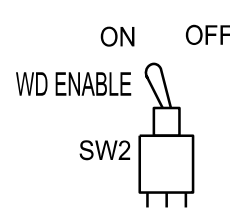
REMOVE DIODE JUMPERS: 1-5, 1-6, 1-9, 1-11, 2-5, 2-6, 2-9, 2-11, 5-9, 5-11, 6-9, 6-11 AND 9-11.



REMOVE JUMPERS AS SHOWN

**NOTES:**

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



■ = DENOTES POSITION OF SWITCH

### NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the signal plan.
- Program controller to start up in phase 2 Green No Walk and 6 Green No Walk.
- If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
- The cabinet and controller are part of the D14-12 Waynesville Signal System.

### EQUIPMENT INFORMATION

Controller.....2070LX  
 Cabinet.....332 w/ Aux  
 Software.....Q-Free MAXTIME  
 Cabinet Mount.....Base  
 Output File Positions.....18 With Aux. Output File  
 Load Switches Used.....S1, S2, S4, S5, S7, S8, AUX S1, AUX S4  
 Phases Used.....1, 2, 3, 4, 5, 6  
 Overlap "1".....\*  
 Overlap "2".....NOT USED  
 Overlap "3".....\*  
 Overlap "4".....NOT USED

\*See overlap programming detail on this sheet

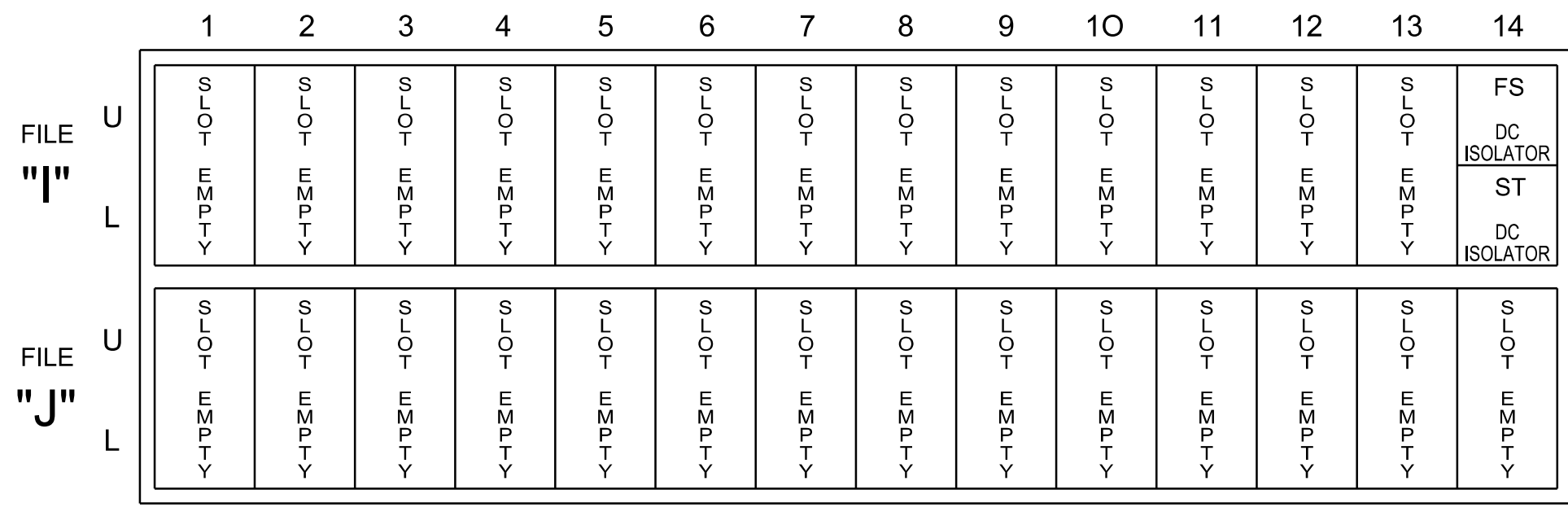
### SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6				
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18				
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE				
SIGNAL HEAD NO.	11	21,22	NU	31	32	41	42	NU	51	61,62	NU	NU	NU	NU	11	NU	NU	51	NU	NU		
RED		128		116	116	101	101			134												
YELLOW	*	129		117	117	102	102		*	135												
GREEN		130		118	118	103	103			136												
RED ARROW															A121						A114	
YELLOW ARROW															A122							A115
FLASHING YELLOW ARROW															A123							A116
GREEN ARROW	127			118		103				133												

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

### INPUT FILE POSITION LAYOUT

(front view)



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

FS = FLASH SENSE  
 ST = STOP TIME

### SPECIAL DETECTOR NOTE

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

### OVERLAP PROGRAMMING

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

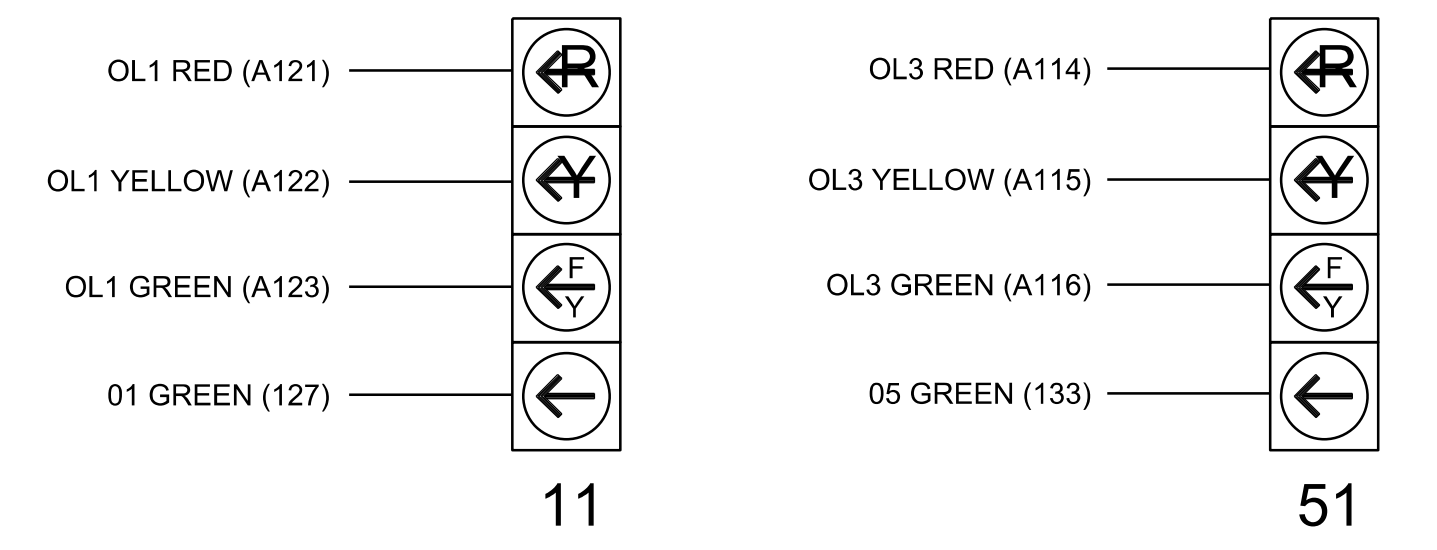
Web Interface  
 Home > Controller > Overlap Configuration > Overlaps

Overlap Plan 1

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

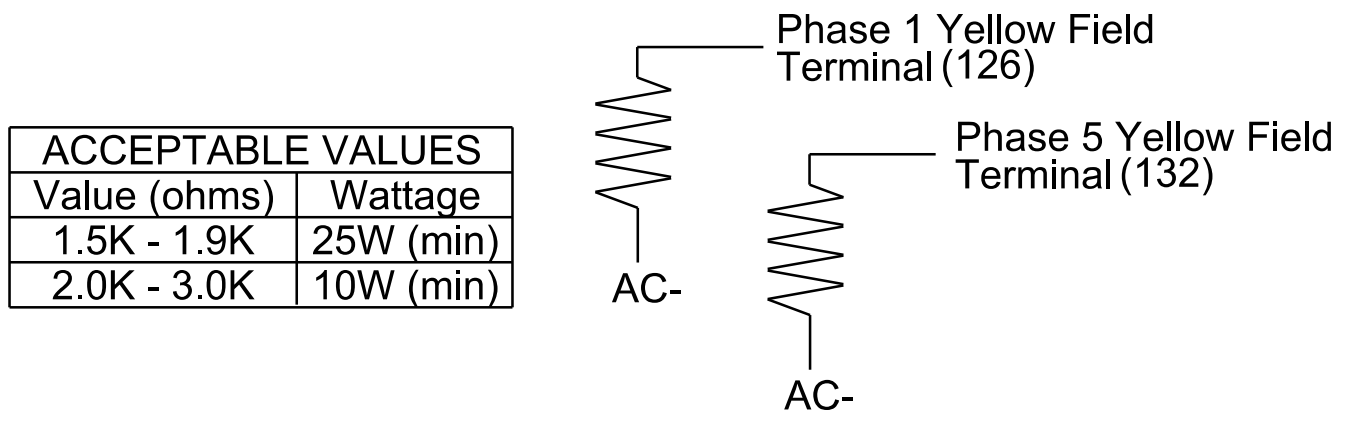
### FYA SIGNAL WIRING DETAIL

(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)

### Electrical Detail Temporary Design 2 - (TMP Phase I - Step 2)

US 276 (Russ Avenue) at Frazier Street / Ingles Entrance

Division 14 Haywood County Waynesville

Prepared For: RAMEY KEMP ASSOCIATES

Plan Date: April 2023 Reviewed By: WJ Hamilton

Prepared By: TS Popelka RKA PROJ. NO: 16085 (040)

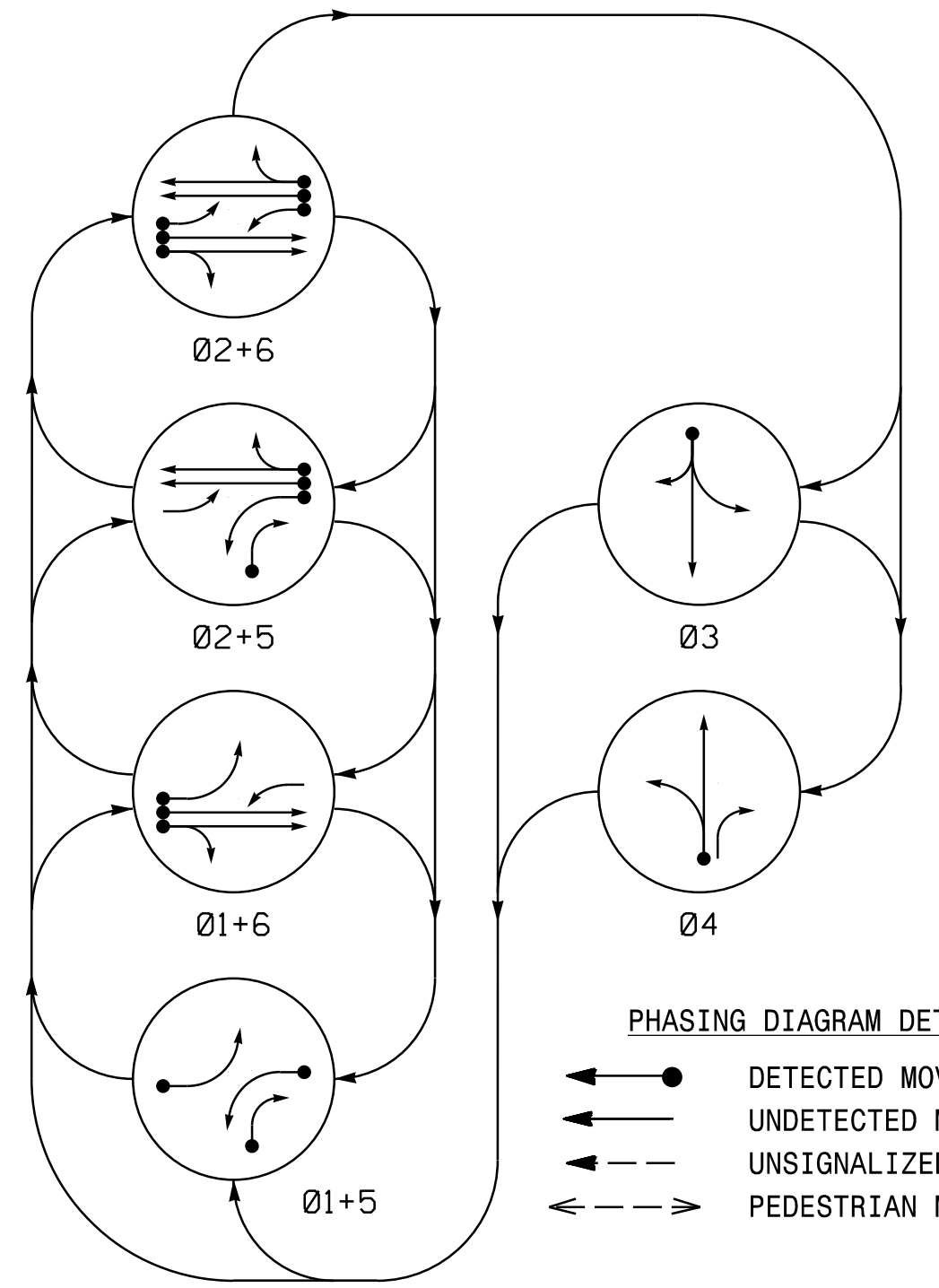
750 N. Greenfield Pkwy, Garner, NC 27529

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 14-1075T2  
 DESIGNED: Apr 2023  
 SEALED: 04/11/2023  
 REVISED: N/A

William J. Hamilton, Professional Engineer, Seal 32396

04/11/2023

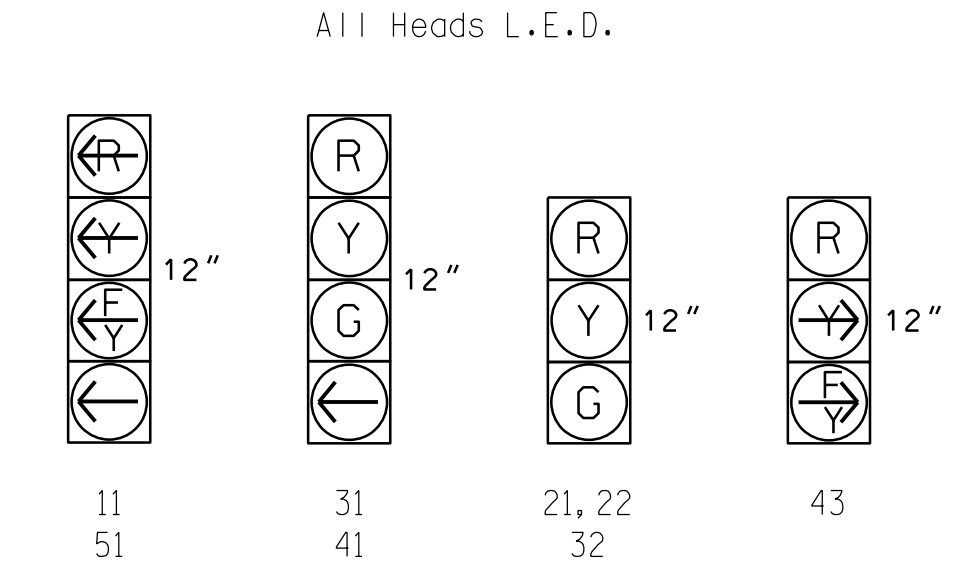
**PHASING DIAGRAM**



**TABLE OF OPERATION**

SIGNAL FACE	PHASE					
	Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3	Ø4
11	-	-	F	F	R	R
21, 22	R	R	G	G	R	R
31	R	R	R	R	G	R
32	R	R	R	R	G	R
41	R	R	R	R	R	G
42	R	R	R	R	R	G
43	F	R	F	R	R	F
51	-	F	-	F	R	R
61, 62	R	G	R	G	R	R

**SIGNAL FACE I.D.**



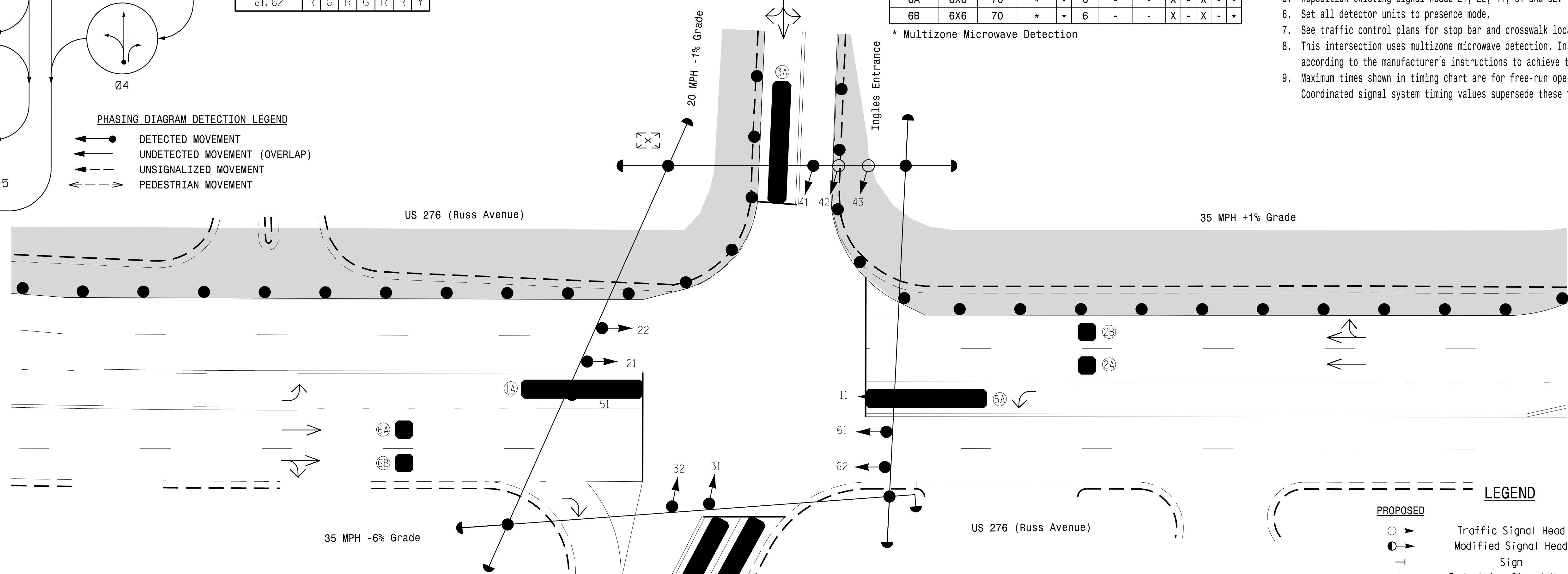
**MAXTIME DETECTOR INSTALLATION CHART**

ZONE	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING							
					CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
1A	6X40	0	*	*	1	15	-	X	-	X	-	*
2A	6X6	70	*	*	2	-	-	X	-	X	-	*
2B	6X6	70	*	*	2	-	-	X	-	X	-	*
3A	6X40	0	*	*	3	10	-	X	-	X	-	*
4A	6X40	0	*	*	4	3	-	X	-	X	-	*
5A	6X40	0	*	*	5	15	-	X	-	X	-	*
5B	6X40	0	*	*	5	15	-	X	-	X	-	*
6A	6X6	70	*	*	6	-	-	X	-	X	-	*
6B	6X6	70	*	*	6	-	-	X	-	X	-	*

**6 Phase Fully Actuated D14-12\_Waynesville**

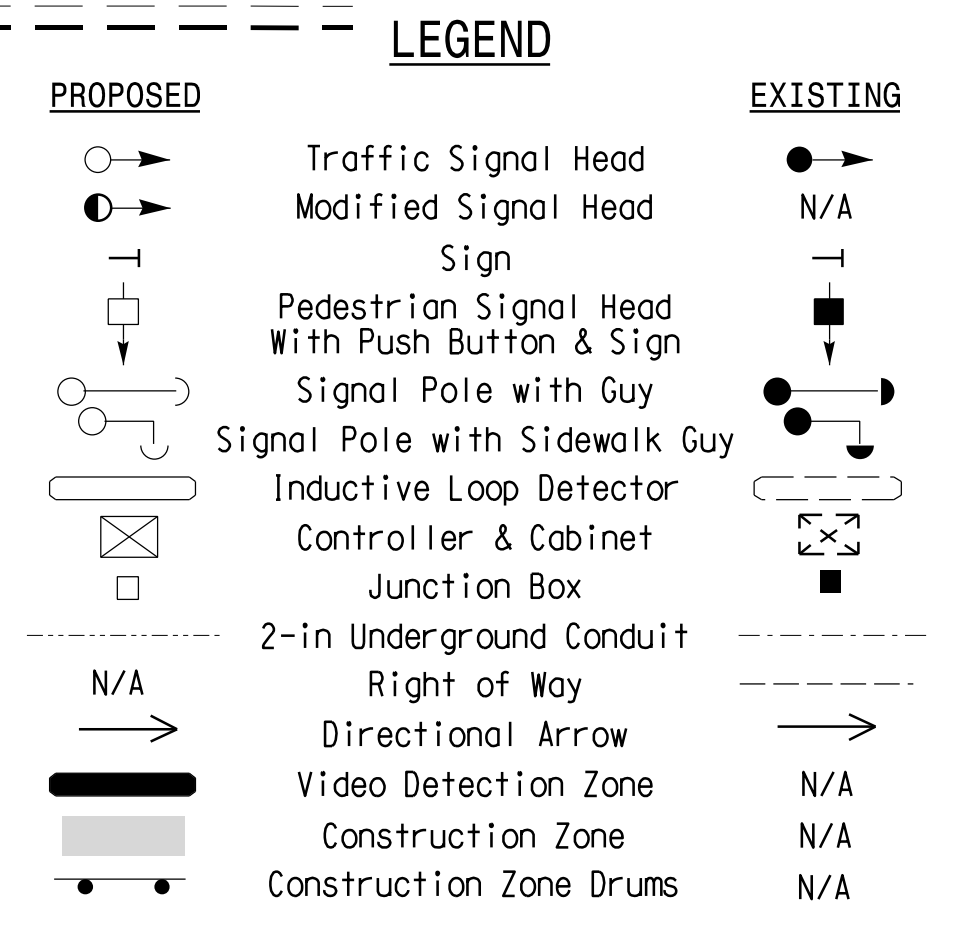
**NOTES**

- Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Phase 1 and/or phase 5 may be lagged.
- The order of phase 3 and phase 4 may be reversed.
- Reposition existing signal heads 21, 22, 41, 61 and 62.
- Set all detector units to presence mode.
- See traffic control plans for stop bar and crosswalk locations.
- This intersection uses multizone microwave detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.



**MAXTIME TIMING CHART**

FEATURE	PHASE					
	1	2	3	4	5	6
Walk *	-	-	-	-	-	-
Ped Clear *	-	-	-	-	-	-
Min Green	7	10	7	7	7	10
Passage *	2.0	3.0	2.0	2.0	2.0	3.0
Max I *	15	50	20	20	15	50
Yellow Change	3.1	4.3	3.0	3.3	3.0	4.3
Red Clear	2.1	1.3	3.3	2.1	2.1	1.3
Added Initial *	-	-	-	-	-	-
Maximum Initial *	-	-	-	-	-	-
Time Before Reduction *	-	-	-	-	-	-
Time To Reduce *	-	-	-	-	-	-
Minimum Gap	-	-	-	-	-	-
Advance Walk	-	-	-	-	-	-
Non Lock Detector	X	-	X	X	X	-
Vehicle Recall	-	MIN RECALL	-	-	-	MIN RECALL
Dual Entry	-	-	-	-	-	-



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

**Signal Upgrade Temporary Design 3 - (TMP Phase II)**

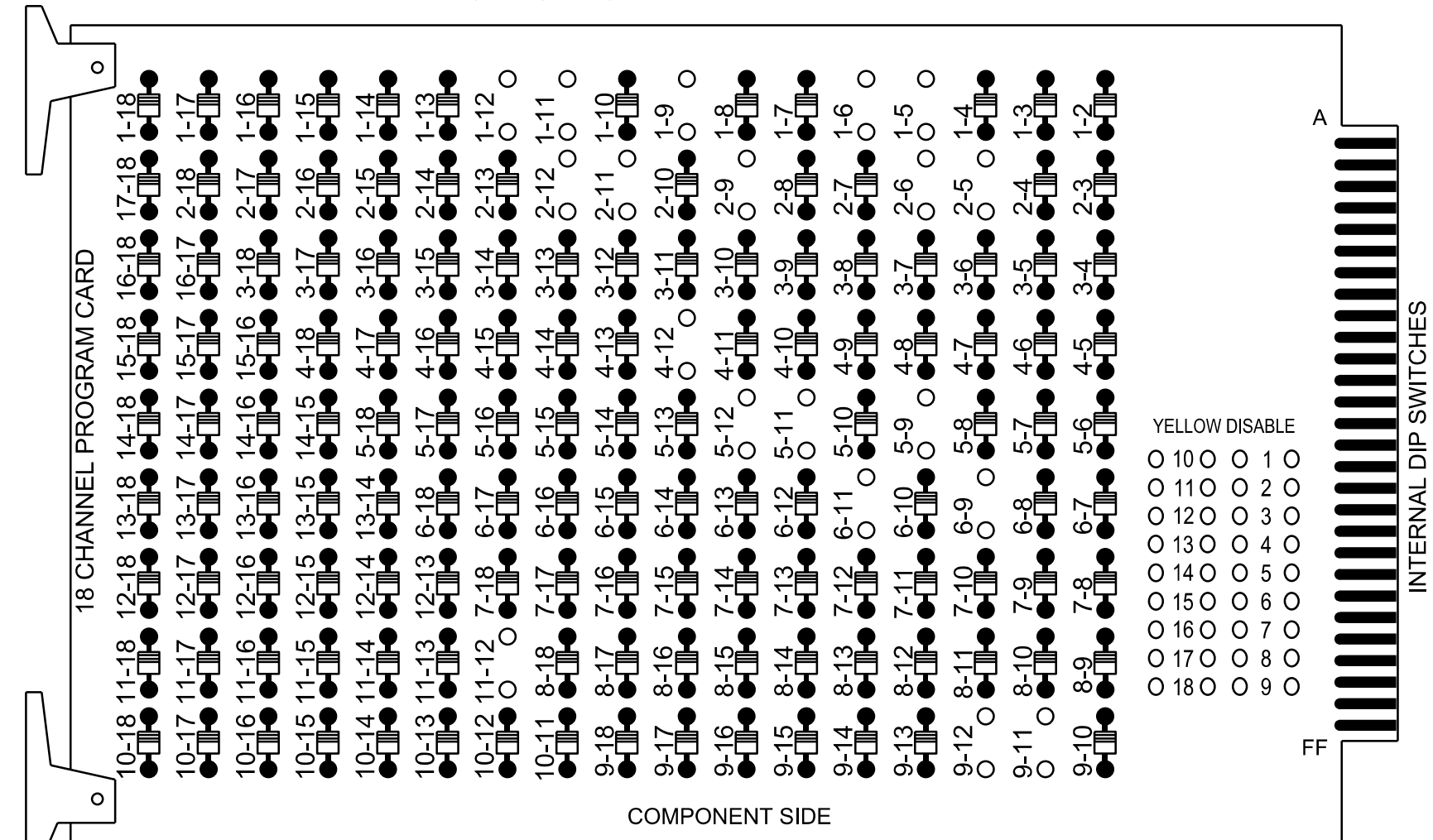


	Prepared For: <b>US 276 (Russ Avenue) at Frazier Street / Ingles Entrance</b>		SEAL 
	Division 14 Haywood County Waynesville		
PLAN DATE: April 2023	REVIEWED BY: WJ Hamilton	PREPARED BY: TS Popelka	RKA PROJ. NO.: 16085 (040)
REVISIONS	INIT.	DATE	SIGNATURE
SCALE: 1"=20'	0 20	DATE: 04/11/2023	SIG. INVENTORY NO. 14-1075T3

### 18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

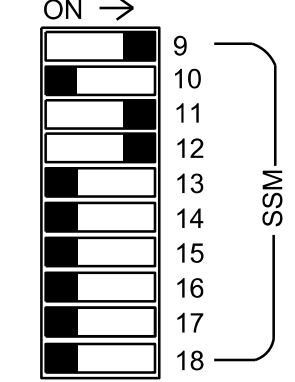
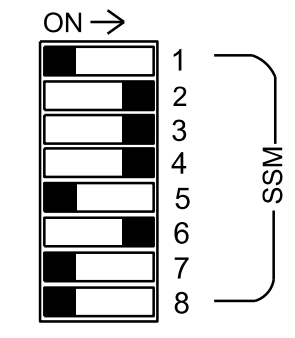
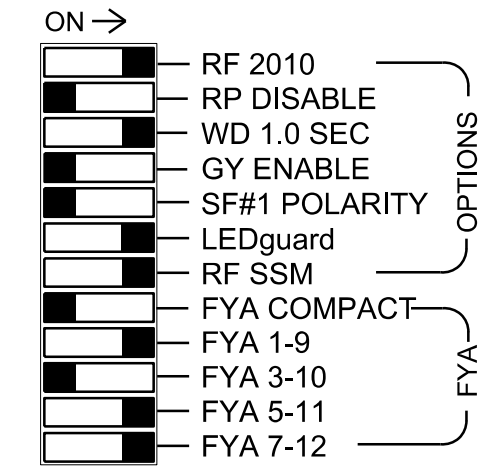
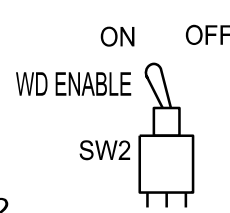
(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 1-5, 1-6, 1-9, 1-11, 1-12, 2-5, 2-6, 2-9, 2-11, 2-12, 4-12, 5-9, 5-11, 5-12, 6-9, 6-11, 9-11, 9-12 AND 11-12.



REMOVE JUMPERS AS SHOWN

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



■ = DENOTES POSITION OF SWITCH

### NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the signal plan.
- Program controller to start up in phase 2 Green No Walk and 6 Green No Walk.
- If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
- The cabinet and controller are part of the D14-12 Waynesville Signal System.

### EQUIPMENT INFORMATION

Controller.....2070LX  
 Cabinet.....332 w/ Aux  
 Software.....Q-Free MAXTIME  
 Cabinet Mount.....Base  
 Output File Positions.....18 With Aux. Output File  
 Load Switches Used.....S1, S2, S4, S5, S7, S8, AUX S1, AUX S4, AUX S5  
 Phases Used.....1, 2, 3, 4, 5, 6  
 Overlap "1".....\*  
 Overlap "2".....NOT USED  
 Overlap "3".....\*  
 Overlap "4".....\*  
 \*See overlap programming detail on sheet 2

### SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	11	21,22	NU	31	32	41	42	NU	51	61,62	NU	NU	NU	11	NU	51	43	NU
RED		128		116	116	101	101			134								A101
YELLOW	*	129		117	117	102	102		*	135								
GREEN		130		118	118	103	103			136								
RED ARROW														A121			A114	
YELLOW ARROW														A122			A115	A102
FLASHING YELLOW ARROW														A123			A116	A103
GREEN ARROW	127			118		103			133									

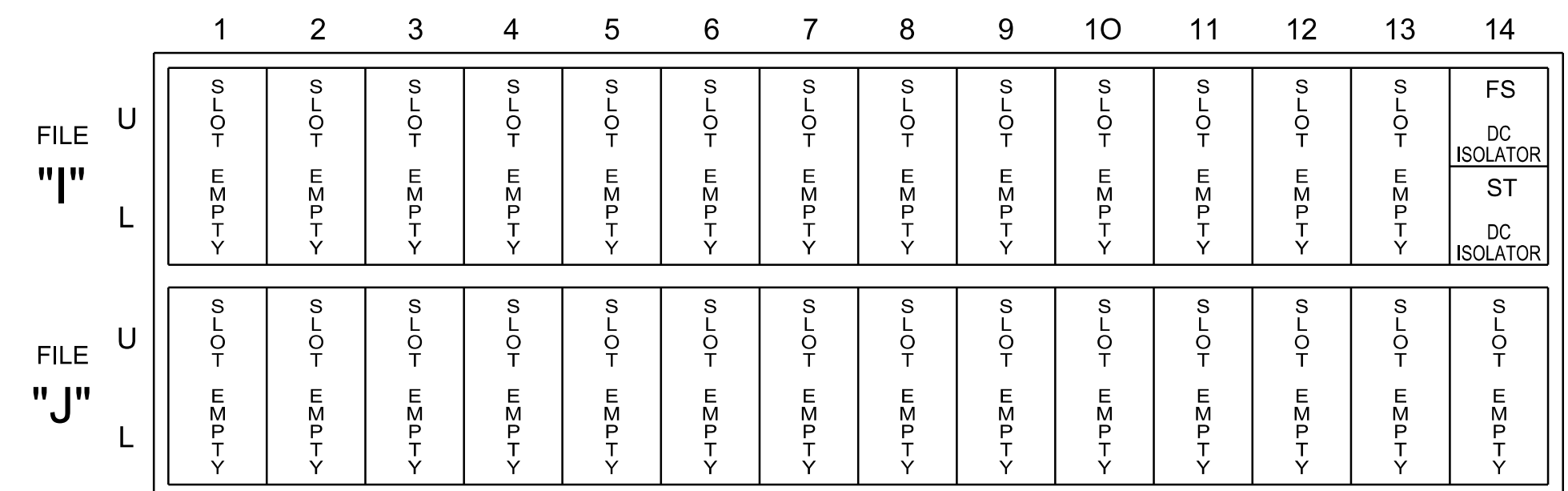
NU = Not Used  
 \* Denotes install load resistor. See load resistor installation detail this sheet.  
 \* See pictorial of head wiring in detail this sheet.

### SPECIAL DETECTOR NOTE

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

### INPUT FILE POSITION LAYOUT

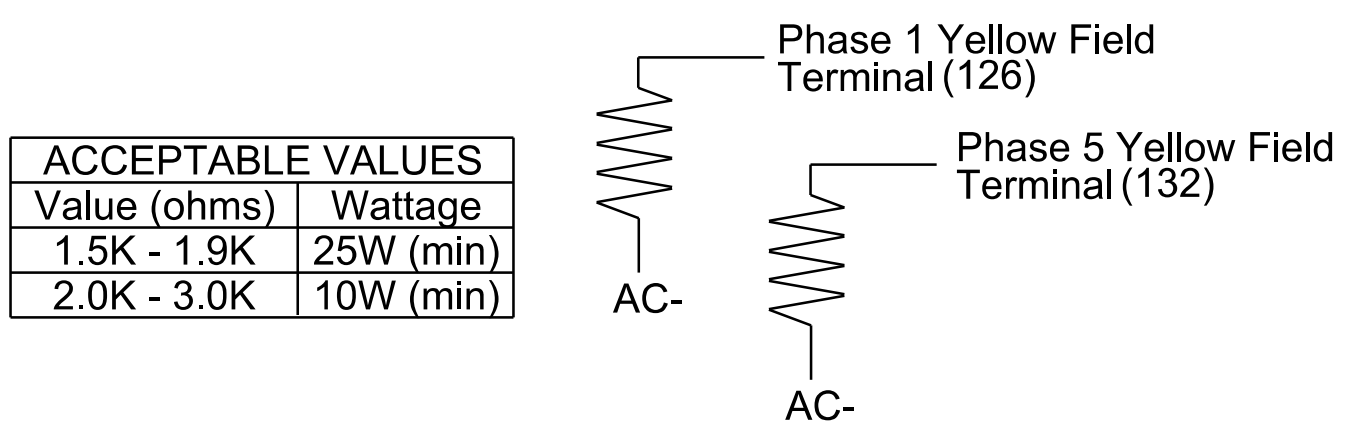
(front view)



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

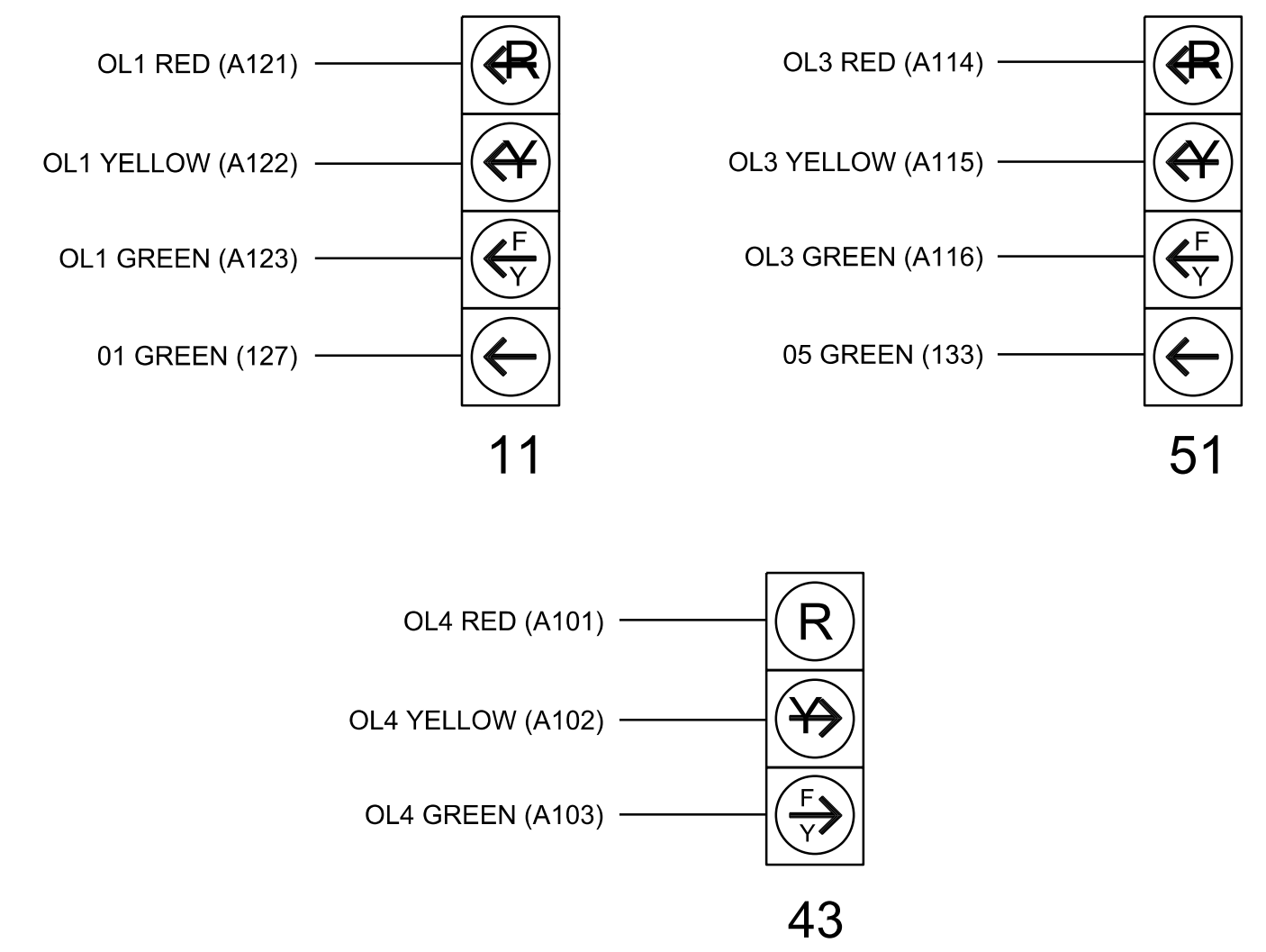
### LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)



### FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 14-1075T3  
 DESIGNED: Apr 2023  
 SEALED: 04/11/2023  
 REVISED: N/A

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

ELECTRICAL AND PROGRAMMING DETAILS FOR: Prepared For: RAMEY KEMP ASSOCIATES 8210 University Executive Park Drive Suite 220 Charlotte, North Carolina 28262 Phone: 704-548-4200   www.rameykemp.com   NC License No. F-1489	US 276 (Russ Avenue) at Frazier Street / Ingles Entrance Division 14 Haywood County Waynesville	SEAL WILLIAM J. HAMILTON ENGINEER
	PLAN DATE: April 2023 PREPARED BY: TS Popelka	REVIEWED BY: WJ Hamilton RKA PROJ. NO: 16085 (040)

### OVERLAP PROGRAMMING

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

Web Interface  
Home >Controller >Overlap Configuration >Overlaps

Overlap Plan 1

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

### FLASHER CIRCUIT MODIFICATION DETAIL

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


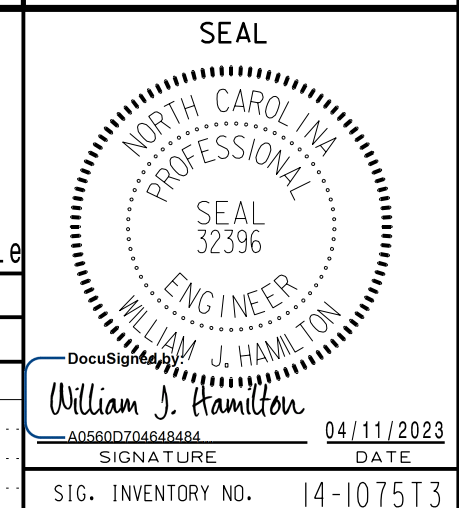
1. ON REAR OF PDA - REMOVE WIRE FROM TERM. T2-4 AND TERMINATE ON T2-2.
2. ON REAR OF PDA - REMOVE WIRE FROM TERM. T2-5 AND TERMINATE ON T2-3.
3. REMOVE FLASHER UNIT 2.

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

THIS ELECTRICAL DETAIL IS FOR  
THE SIGNAL DESIGN: 14-1075T3  
DESIGNED: Apr 2023  
SEALED: 04/11/2023  
REVISED: N/A

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

DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:  Prepared For:  750 N.Greenfield Pkwy, Garner, NC 27529	US 276 (Russ Avenue) at Frazier Street / Ingles Entrance Division 14 Haywood County Waynesville	SEAL  WILLIAM J. HAMILTON ENGINEER 04/11/2023
	PLAN DATE: April 2023 PREPARED BY: TS Popelka RKA PROJ. NO: 16085 (040)	
REVISIONS _____ INIT. DATE _____ _____		SIGNATURE: <i>William J. Hamilton</i> DATE: 04/11/2023 SIG. INVENTORY NO. 14-1075T3

4/11/2023  
 14-1075T3\_sml.ele\_20230mdd.dgn  
 User: J.Wendt