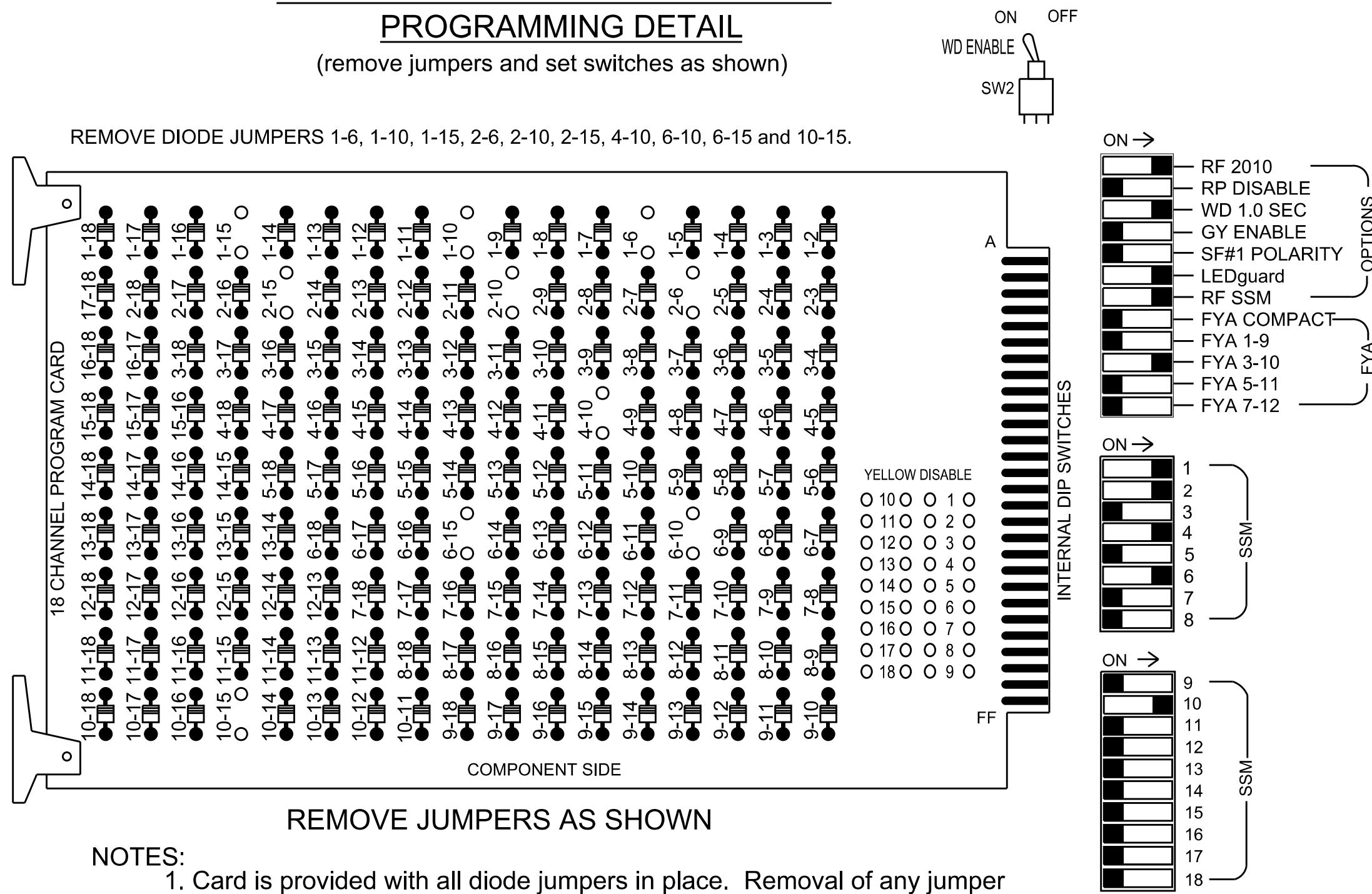


18 CHANNEL IP CONFLICT MONITOR

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 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 Signal System #: D10-43_Huntersville.

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, S5, S8, S9, AUX S2,
Phases Used.....	1,2, 4, 6, 6PED
Overlap "1".....	NOT USED
Overlap "2".....	*
Overlap "3".....	NOT USED
Overlap "4".....	NOT USED

*See overlap programming detail on sheet 2

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2		S3	S4	S5		S6	S7	S8		S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2		13	3	4		14	5	6		15	7	8	16	9	10	17	11	12	18
PHASE	1	2		2 PED	3	4		4 PED	5	6		6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	12,13	21	22	NU	NU	41,42	43	NU	NU	61	62,63	P61, P62	NU	NU	NU	NU	64★	NU	NU	NU	NU
RED		128	128			101				134		134					A124				
YELLOW		129	129							135		135									
GREEN			130							136											
RED ARROW	125					101															
YELLOW ARROW	126					102		102									A125				
FLASHING YELLOW ARROW																	A126				
GREEN ARROW	127	130				103		103		136											
												119									
												121									

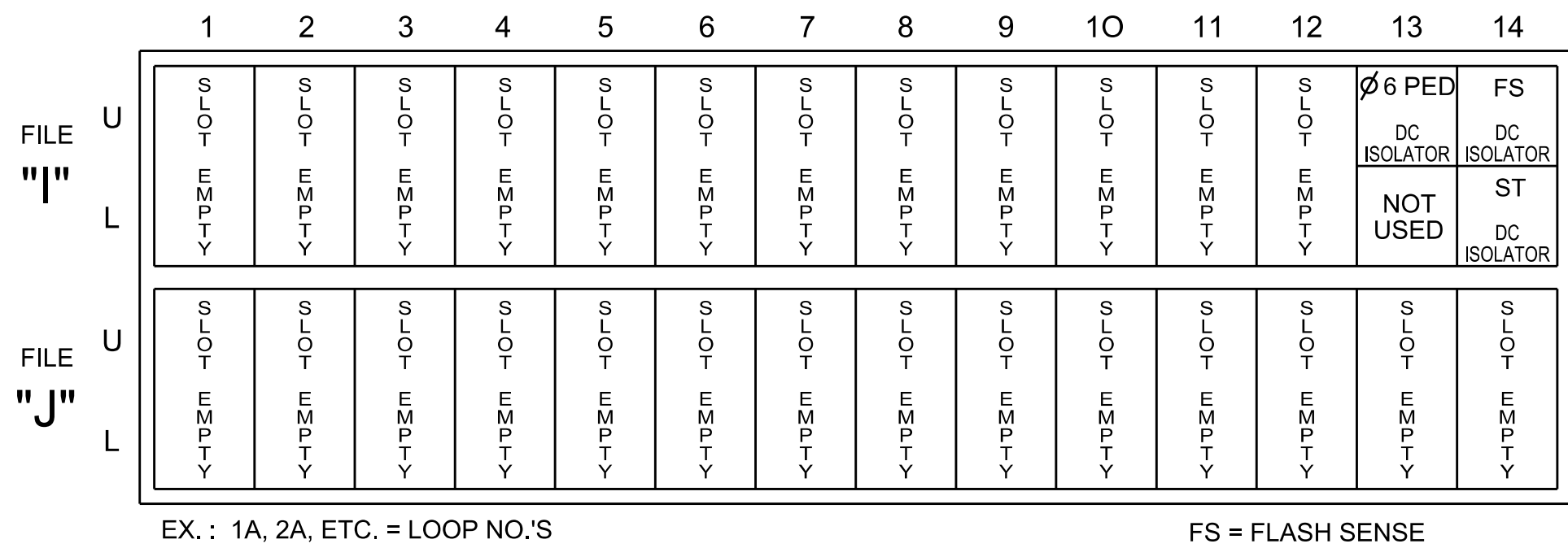
NU = Not Used

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

★ See pictorial of head wiring in detail this sheet.

INPUT FILE POSITION LAYOUT

(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
1B	-	-	-	★	49	1			X		X	
1C	-	-	-	★	59	1			X		X	
2A	-	-	-	★	38	2			X		X	
4A	-	-	-	★	44	4			X		X	
4B	-	-	-	★	45	4			X		X	
4C	-	-	-	★	46	4	15.0		X		X	
6A	-	-	-	★	54	6			X		X	
PED PUSH BUTTONS								NOTE: INSTALL DC ISOLATORS IN INPUT FILE SLOTS I13.				
P61,P62,P63	TB8-7,9	I13U	68	34	6	PED 6						

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

* For Input Point numbers, see SDLC Non-Intrusive Detection Chart detail on this sheet.

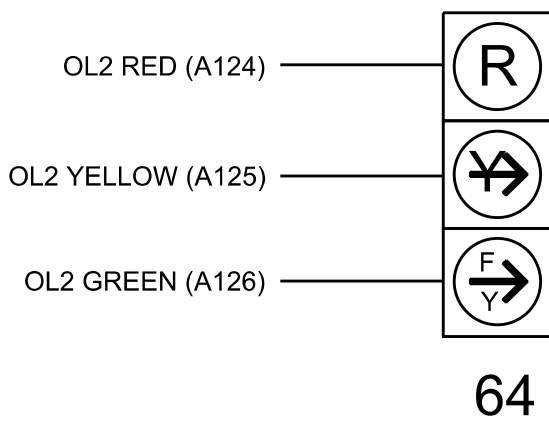
SDLC NON-INTRUSIVE DETECTION CHART

	Detector Rack #3		Detector Rack #4	
Input Point	Det # (Index)	Detector Zone	Det # (Index)	Detector Zone
1	33	NU	49	1B
2	34	NU	50	NU
3	35	NU	51	NU
4	36	NU	52	NU
5	37	NU	53	NU
6	38	2A	54	6A
7	39	NU	55	NU
8	40	NU	56	NU
9	41	NU	57	NU
10	42	NU	58	NU
11	43	NU	59	1C
12	44	4A	60	NU
13	45	4B	61	NU
14	46	4C	62	NU
15	47	NU	63	NU
16	48	NU	64	NU

NU = Not Used

INPUT FILE POSITION LEGEND: J2L

FILE J	_____	_____	_____
SLOT 2	_____	_____	_____
LOWER	_____	_____	_____

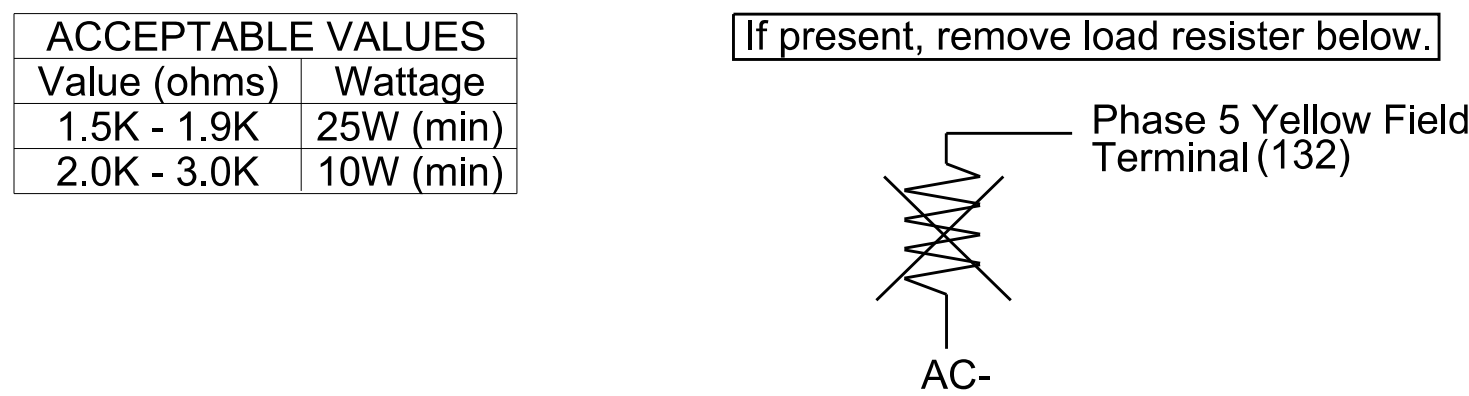


SPECIAL DETECTOR NOTE

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.

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)



FYA SIGNAL WIRING DETAIL

(wire signal head as shown)

Electrical Detail - Sheet 1 of 2

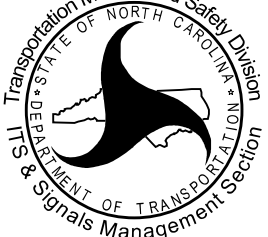
THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 10-1839T6
DESIGNED: June 2026
SEALED: 07-10-2026
REVISED: N/A

DOCUMENT NOT CONSIDERED
FINAL UNLESS ALL
SIGNATURES COMPLETED

SEAL

Electrical and Programming

Prepared in the Offices of:



750 N. Greenfield Pkwy, Garner, NC 27529

NC 73 (Sam Furr Rd)
at
Lindholm Drive

Division 10 Mecklenburg County Huntersville

PLAN DATE: July, 2026	REVIEWED BY: Z Wang
-----------------------	---------------------

PREPARED BY: K Hector	REVIEWED BY:
-----------------------	--------------

7/10/2026

DATE _____

SIG. INVENTORY NO. 10-1839T

SPECIAL DETECTION IO MODULE PROGRAMMING

The Enhanced Out of Pavement Detection requires adjustments to the IO Modules in use. Follow the programming instructions below to ensure desired operation.

Front Panel
Main Menu >Controller >More >Advanced IO >IO Modules

Web Interface
Home >Controller >Advanced IO >Cabinet Configuration >IO Modules

IO Module	Type	Fault Response
1	Caltrans 332	Default
2	TS2 DR3 BIU	Default
3	TS2 DR4 BIU	Default
4	TS2 MMU	Default

Advanced Cabinet Options

☒ Disable TS2 Cabinet Alarms

OVERLAP PROGRAMMING

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps
Overlap Plan 1

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

MAXTIME STARTUP AND SOFTWARE FLASH PROGRAMMING DETAIL

Front Panel
Main Menu >Controller >Unit

Web Interface
Home >Controller >Unit

Modify parameters as shown below and save changes.

Start Up Parameters

Unit Flash Parameters

StartUp Clearance Hold

6

All Red Flash Exit Time

6

OUTPUT CHANNEL CONFIGURATION

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

Web Interface
Home >Controller >Advanced IO>Channels>Channel 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	8				16
17	Overlap	5		X	X	17
18	Overlap	6		X		18

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 10-1839T6
DESIGNED: June 2026
SEALED: 07-10-2026
REVISED: N/A

Electrical Detail - Sheet 2 of 2

DOCUMENT NOT CONSIDERED
FINAL UNLESS ALL
SIGNATURES COMPLETED

Electrical and Programming
Details For:

Prepared in the Offices of:



Seal of the North Carolina Department of Transportation

NC 73 (Sam Furr Rd)
at
Lindholm Drive

Division 10 Mecklenburg County Huntersville

PLAN DATE: July, 2026REVIEWED BY: Z Wang

PREPARED BY: K HectorREVIEWED BY:

REVISIONS

INIT. DATE

750 N. Greenfield Pkwy, Garner, NC 27529

SEAL



Seal of Karl E. Hector, Professional Engineer, No. 039071

7/10/2026

DATE

SIG. INVENTORY NO. 10-1839T6

2 Phase
Fully Actuated
Signal System #: D10-43_Huntersville

NOTES

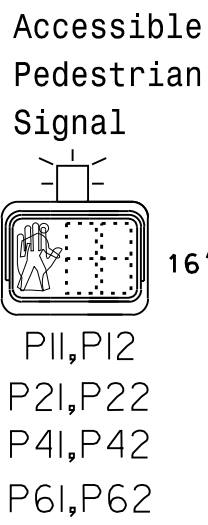
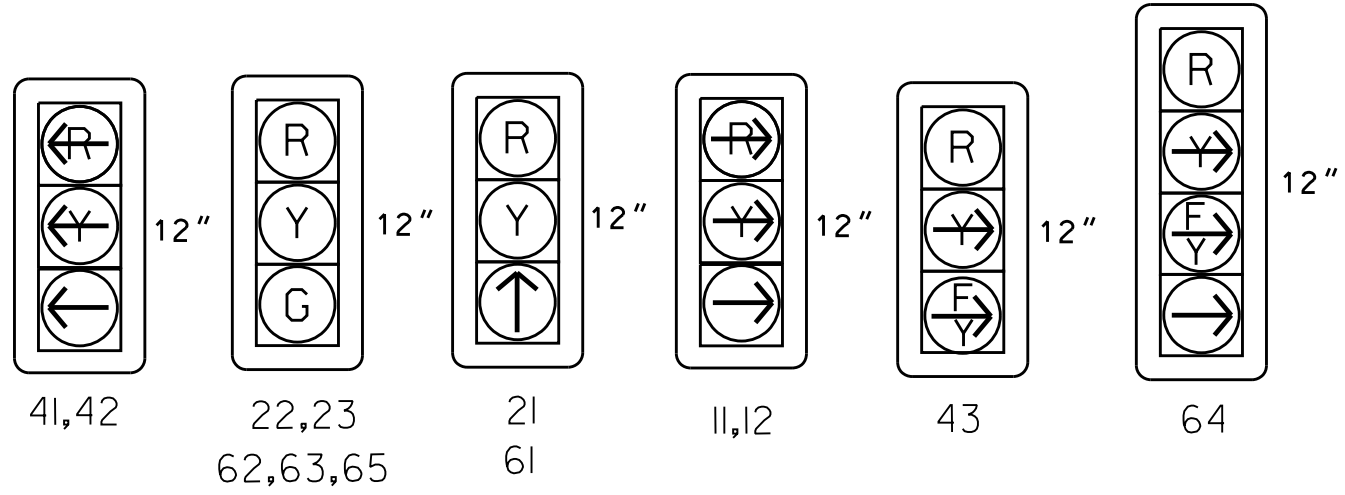
1. Refer to "Roadway Standard Drawings NCDOT" dated January 2024 and "Standard Specifications for Roads and Structures" dated January 2024.
2. Do not program signal for late night operation unless otherwise directed by the Engineer.
3. All signal heads shall have backplates with retro-reflective sheeting.
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. This intersection uses multi-zone microwave detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.
9. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
10. See pavement markings plans for stopline and crosswalk placement.

LEGEND	
PROPOSED	EXISTING
	N/A
N/A	
N/A	

MAXTIME TIMING CHART				
FEATURE	PHASE			
	1	2	4	6
Walk *	7	7	7	7
Ped Clear	9	23	11	20
Min Green *	7	12	7	12
Passage *	2.0	2.0	2.0	2.0
Max 1 *	25	90	25	90
Yellow Change	3.5	4.8	3.5	4.8
Red Clear	1.8	2.2	3.5	2.2
Added Initial *	-	-	-	-
Maximum Initial *	-	-	-	-
Time Before Reduction *	-	-	-	-
Time To Reduce *	-	-	-	-
Minimum Gap	-	-	-	-
Advance Walk	-	7	7	7
Non Lock Detector	X	-	X	-
Vehicle Recall	-	MIN RECALL	-	MIN RECALL
Dual Entry	-	-	-	-

* These values may be field adjusted. Do not adjust Min Green and Passage 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
P11	-	X	Walk	(Percussive Tone)
	X	-	Flashing Don't Walk / Don't Walk	Wait, wait to cross Sam Furr
P12	-	X	Walk	(Percussive Tone)
	X	-	Flashing Don't Walk / Don't Walk	Wait, wait to cross Sam Furr
P21	-	X	Walk	(Percussive Tone)
	X	-	Flashing Don't Walk / Don't Walk	Wait, wait to cross Lindholm
P22	-	X	Walk	(Percussive Tone)
	X	-	Flashing Don't Walk / Don't Walk	Wait, wait to cross Lindholm
P41	-	X	Walk	(Percussive Tone)
	X	-	Flashing Don't Walk / Don't Walk	Wait, wait to cross Sam Furr
P42	-	X	Walk	(Percussive Tone)
	X	-	Flashing Don't Walk / Don't Walk	Wait, wait to cross Sam Furr
P61	-	X	Walk	(Percussive Tone)
	X	-	Flashing Don't Walk / Don't Walk	Wait, wait to cross Lindholm
P62	-	X	Walk	(Percussive Tone)
	X	-	Flashing Don't Walk / Don't Walk	Wait, wait to cross Lindholm



Signal Upgrade - Final Design

Prepared for:
TRANSPORTATION MOBILITY AND SAFETY DIVISION
DEPARTMENT OF TRANSPORTATION
Signal Design Section

750 N. Greenfield Pkwy, Garner, NC 27529

NC 73 (Sam Furr Rd)
at
Lindholm Drive

Division 10 Mecklenburg County Huntersville

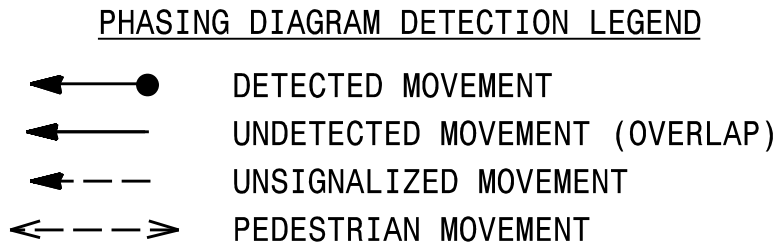
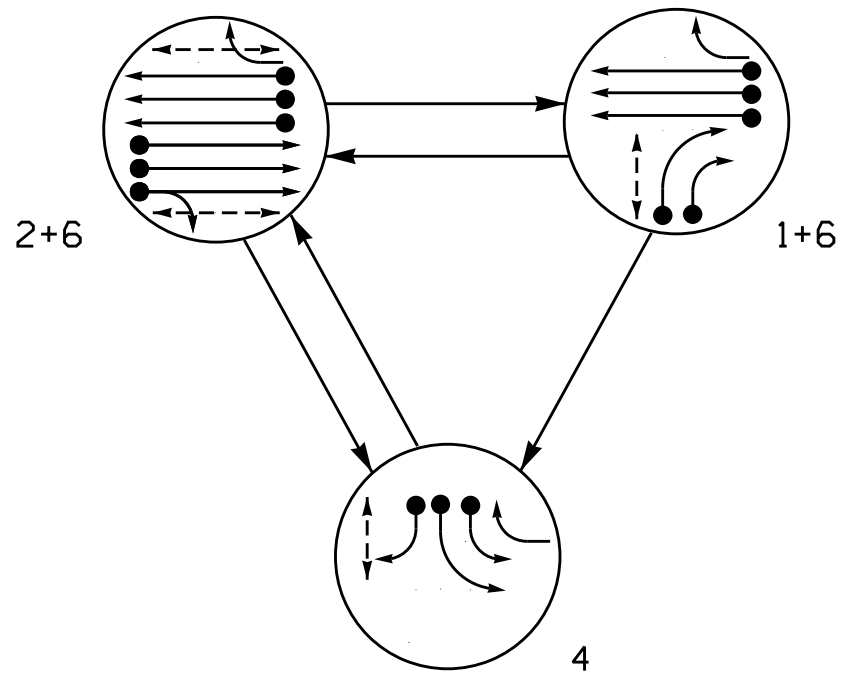
PLAN DATE: July 2026 REVIEWED BY: Z Wang

PREPARED BY: K Hector RKA PROJ. No.:
REVISIONS
INIT. DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER
KARL E. HECTOR
7/10/2026
SIGNATURE DATE
SIG. INVENTORY NO. 10-1839

PHASING DIAGRAM

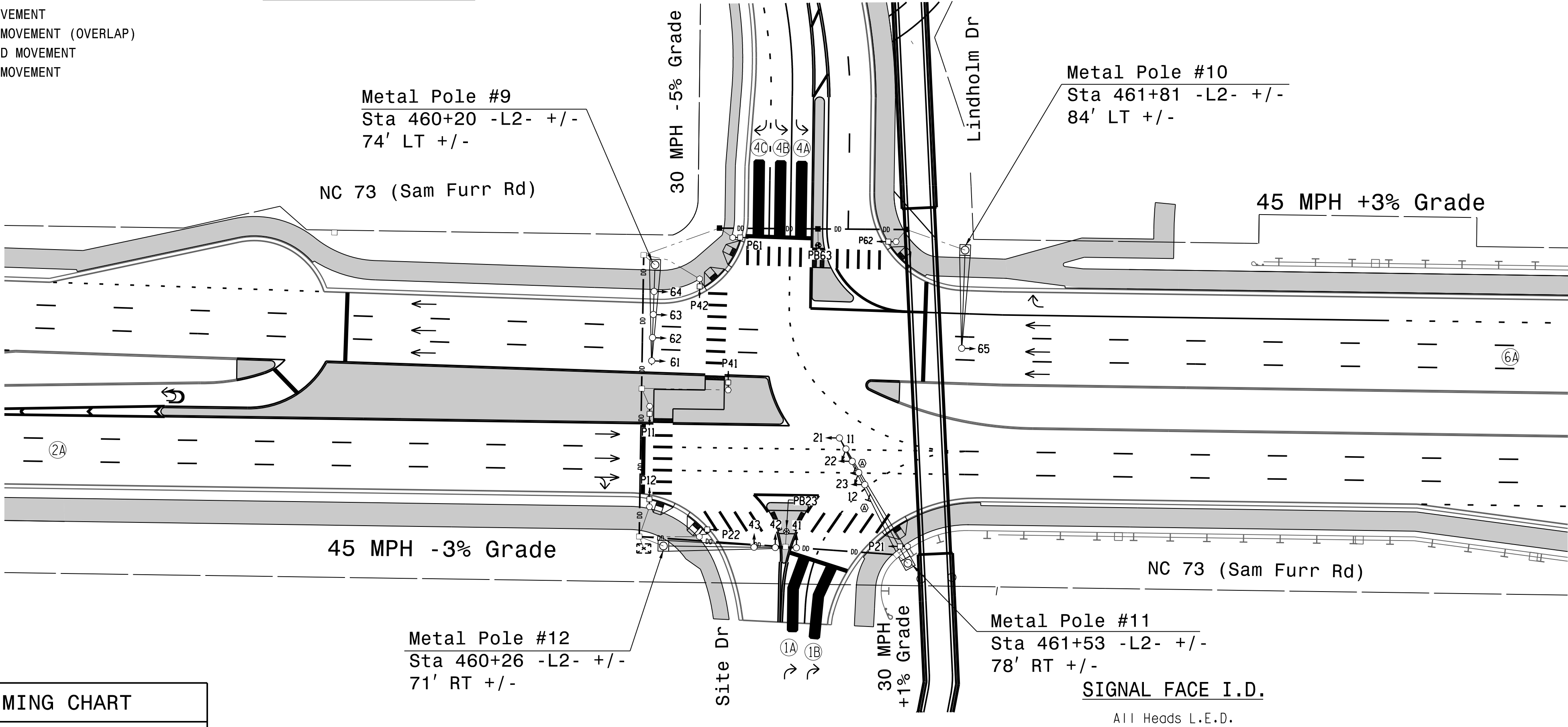


SIGNAL FACE	PHASE			
	1 + 6	2 + 6	4	FLASH HORN
11,12	→	←	←	→
21	R	↑	R	R
22,23	R	G	R	R
41,42	←	←	←	←
43	R	R	←	R
61	↑	↑	R	R
62,63,65	G	G	R	R
64	←	←	→	R
P11,P12	W	DW	DW	DRK
P21,P22	DW	W	DW	DRK
P41,P42	DW	DW	W	DRK
P61,P62	W	W	DW	DRK

Microwave Detection System				
FUNCTION	Sensor 1 (2A)		Sensor 2 (6A)	
Channel	1		2	
Phase	2		6	
Direction of Travel	EB		WB	
Type	Priority		Priority	
Level	2	QUEUE	2	QUEUE
Discovery Zone (ft)	<750	-	<750	-
Range (ft)	600-100	150-100	600-100	150-100
Enable Speed	Y	Y	Y	Y
Speed Range (mph)	35-100	1-35	35-100	1-35
Enable Estimated Time of Arrival	Y	N	Y	N
Estimated Time of Arrival (sec)	2.5-6.5	-	2.5-6.5	-

MAXTIME DETECTOR INSTALLATION CHART											
DETECTOR					PROGRAMMING						
DETECTOR ZONE	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	NEW CARD
1A	*	*	*	*	1	-	-	X	-	X	*
1B	*	*	*	*	1	-	-	X	-	X	*
2A	*	*	*	*	2	-	-	X	-	X	*
4A	*	*	*	*	4	-	-	X	-	X	*
4B	*	*	*	*	4	-	-	X	-	X	*
4C	*	*	*	*	4	15.0	-	X	-	X	*
6A	*	*	*	*	6	-	-	X	-	X	*

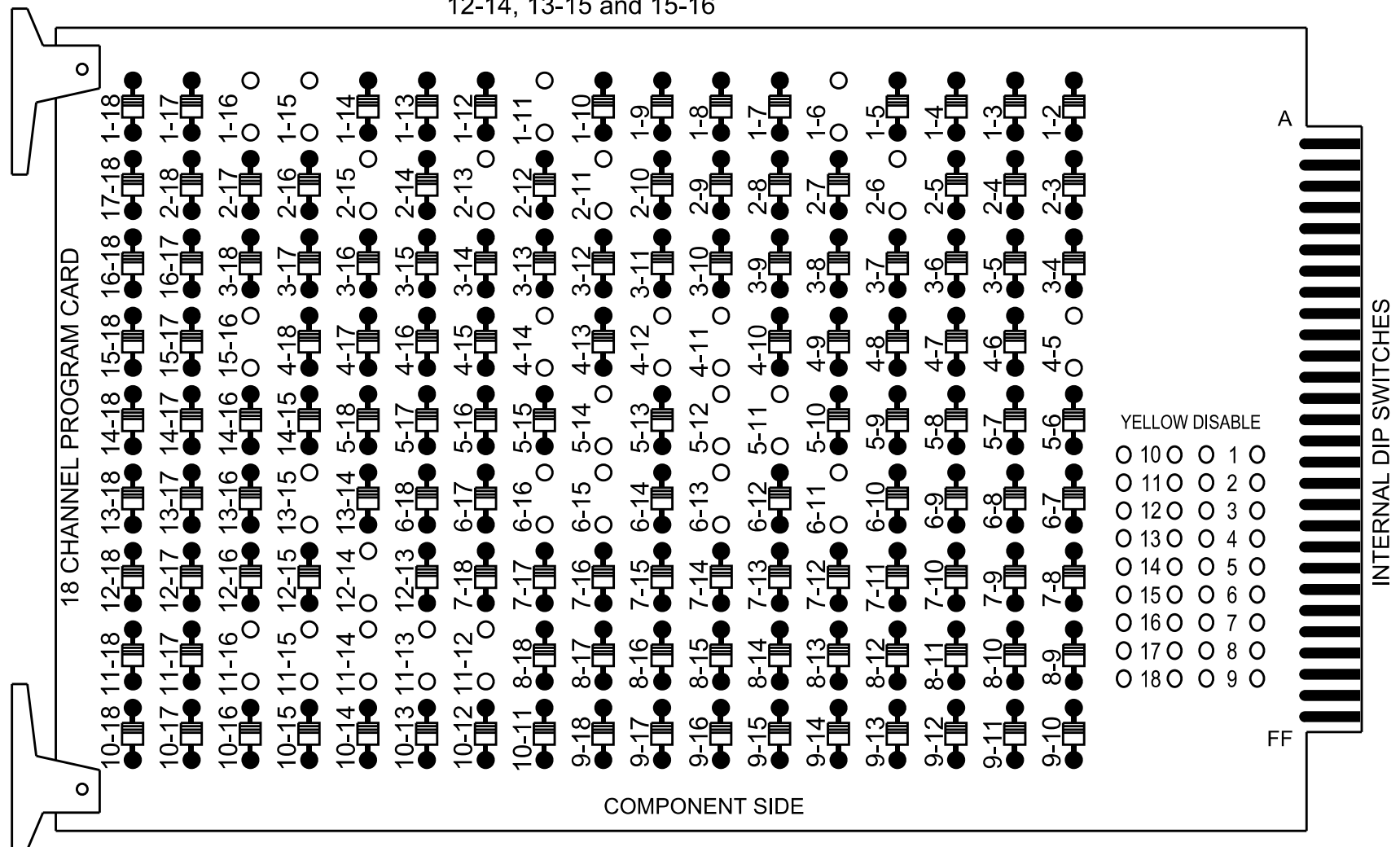
* Multi-zone Microwave Detection.



18 CHANNEL IP CONFLICT MONITOR
PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 1-6, 1-11, 1-15, 1-16, 2-6, 2-11, 2-13, 2-15, 4-5, 4-11, 4-12, 4-14, 5-11, 5-12, 5-14, 6-11, 6-13, 6-15, 6-16, 11-12, 11-13, 11-14, 11-15, 11-16, 12-14, 13-15 and 15-16



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 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 Signal System #: D10-43_Huntersville

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, S7, S8, S9, S12, AUX S4, AUX S5
Phases Used.....1,1 PED, 2, 2 PED, 4, 4 PED, 6, 6 PED
Overlap "1".....NOT USED
Overlap "2".....NOT USED
Overlap "3".....*
Overlap "4".....*
Overlap "7".....*

*See overlap programming detail on sheet 2

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6	
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18	
PHASE	1	2	2 PED	3	4	4 PED	OL7	6	6 PED	7	8	1 PED	OL1	OL2	SPARE	OL3	OL4	SPARE	
SIGNAL HEAD NO.	11,12	21	22,23	P21, P22	NU	41,42	P41, P42	64	61	62,63 65	P61, P62	NU	NU	P11, P12	NU	NU	64	43	NU
RED		128	128					134	134							A114	A101		
YELLOW		129	129					★	135	135									
GREEN			130						136										
RED ARROW	125					101													
YELLOW ARROW	126					102										A115	A102		
FLASHING YELLOW ARROW																A116	A103		
GREEN ARROW	127	130				103		133	136										
				113		104			119			110							
				115		106			121			112							

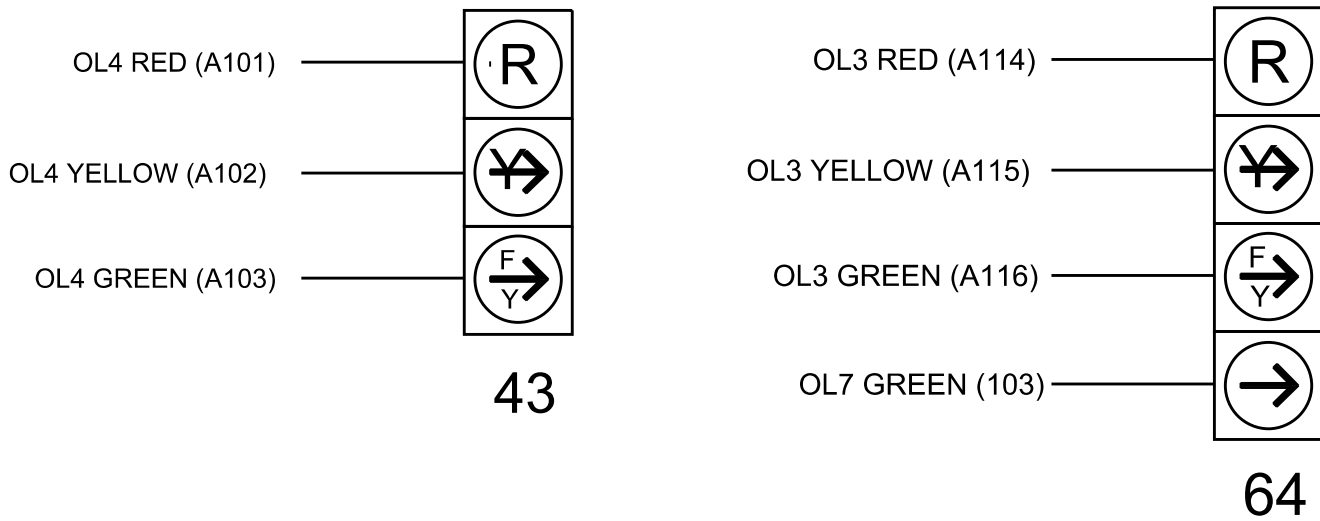
NU = Not Used

* 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)

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

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN
1A	-	-	-	*	33	1			X		X	
1B	-	-	-	*	49	1			X		X	
2A	-	-	-	*	38	2			X		X	
4A	-	-	-	*	44	4			X		X	
4B	-	-	-	*	45	4			X		X	
4C	-	-	-	*	46	4	15.0		X		X	
6A	-	-	-	*	54	6			X		X	
PED PUSH BUTTONS												
P11,P12	TB8-8,9	I13L	70	36	8	PED 1						
P21,P22,PB23	TB8-4,6	I12U	67	33	2	PED 2						
P41,P42	TB8-5,6	I12L	69	35	4	PED 4						
P61,P62,PB63	TB8-7,9	I13U	68	34	6	PED 6						

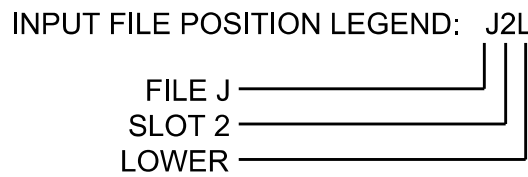
NOTE:
INSTALL DC ISOLATORS
IN INPUT FILE SLOTS
I12 AND I13.

* For Input Point numbers, see SDLC Non-Intrusive Detection Chart detail on this sheet.

SDLC NON-INTRUSIVE DETECTION CHART

	Detector Rack #3		Detector Rack #4	
Input Point	Det # (Index)	Detector Zone	Det # (Index)	Detector Zone
1	33	1A	49	1B
2	34	NU	50	NU
3	35	NU	51	NU
4	36	NU	52	NU
5	37	NU	53	NU
6	38	2A	54	6A
7	39	NU	55	NU
8	40	NU	56	NU
9	41	NU	57	NU
10	42	NU	58	NU
11	43	NU	59	NU
12	44	4A	60	NU
13	45	4B	61	NU
14	46	4C	62	NU
15	47	NU	63	NU
16	48	NU	64	NU

NU = Not Used



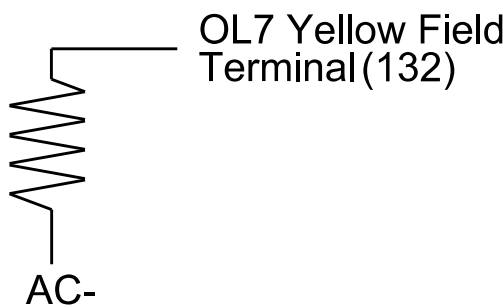
SPECIAL DETECTOR NOTE

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.

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)



FLASHER CIRCUIT MODIFICATION DETAIL

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

- ON REAR OF PDA - REMOVE WIRE FROM TERM. T2-4 AND TERMINATE ON T2-2.
- ON REAR OF PDA - REMOVE WIRE FROM TERM. T2-5 AND TERMINATE ON T2-3.
- 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: 10-1839
DESIGNED: June 2026
SEALED: 07-10-2026
REVISED: N/A

Electrical Detail - Sheet 1 of 2



NC 73 (Sam Furr Rd)
at
Lindholm Drive

Division 10 Mecklenburg County Huntersville

PLAN DATE: July 2026 REVIEWED BY: Z Wang

PREPARED BY: K Hector REVIEWED BY:

REVISIONS INIT. DATE

DATE

DOCUMENT NOT CONSIDERED
FINAL UNLESS ALL
SIGNATURES COMPLETED

SEAL



7/10/2026

DATE

SIG. INVENTORY NO. 10-1839

7/9/2026 11:22:59 AM D:\4***\projects\011\HDR_US_East_01\Documents\3322\10323293\46-0_CAD\BIM\46-2_WIP\Traffic\Signal\Sheet\4008_NC_73_L1.indd In Dr_10-1839_ELE.dgn

PED 1 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	-	1	0

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

NOTICE OVERLAP 7
ASSIGNED TO CHANNEL 5 →

NOTICE PHASE 1 PED
ASSIGNED TO CHANNEL 16 →

MAXTIME STARTUP AND SOFTWARE FLASH
PROGRAMMING DETAIL

Front Panel
Main Menu >Controller >Unit

Web Interface
Home >Controller >Unit

Modify parameters as shown below and save changes.

Start Up Parameters

StartUp Clearance Hold
6

Unit Flash Parameters

All Red Flash Exit Time
6

OVERLAP PROGRAMMING

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

Overlap Plan 1

Overlap	3	4	7
Type	FYA 4 - Section	FYA 4 - Section	Normal
Included Phases	6	4	4
Modifier Phases	4	-	-
Modifier Overlaps	-	-	-
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.
6. An APS push button station that is designed to work without the need for interfacing with a pedestrian signal head shall be installed for applications where a push button is installed in a median without a pedestrian signal head.
7. A push button with a single tactile arrow that points in both directions of travel shall be installed if the median separates two parallel crosswalks.

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.

HDR HDR Engineering, Inc. of the Carolinas
555 Fayetteville St, Suite 900 Raleigh, N.C. 27601
N.C.B.E.L.S. License Number: F-0116

SPECIAL DETECTION IO MODULE PROGRAMMING

The Enhanced Out of Pavement Detection requires adjustments to the IO Modules in use. Follow the programming instructions below to ensure desired operation.

Front Panel
Main Menu >Controller >More >Advanced IO >IO Modules

Web Interface
Home >Controller >Advanced IO >Cabinet Configuration >IO Modules

IO Module	Type	Fault Response
1	Caltrans 332	Default
2	TS2 DR3 BIU	Default
3	TS2 DR4 BIU	Default
4	TS2 MMU	Default

Advanced Cabinet Options

☒ Disable TS2 Cabinet Alarms

SEQUENCE DETAIL

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

Web Interface
Home >Controller >Sequence

Sequence 1

Ring	Sequence Data
1	2,1,a,4,b
2	6,a,b

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 10-1839
DESIGNED: June 2026
SEALED: 07-10-2026
REVISED: N/A

Electrical Detail - Sheet 2 of 2

DOCUMENT NOT CONSIDERED
FINAL UNLESS ALL
SIGNATURES COMPLETED

Electrical and Programming
Details For:

Prepared in the Offices of:



Seal of the State of North Carolina
Department of Transportation
Signal Management Division

NC 73 (Sam Furr Rd)
at
Lindholm Drive

Division 10 Mecklenburg County Huntersville

PLAN DATE: July 2026 REVIEWED BY: Z Wang

PREPARED BY: K Hector REVIEWED BY:

REVISIONS

INIT. DATE

SEAL
NORTH CAROLINA
PROFESSIONAL
ENGINEER
KARL E. HECOF
039071

7/10/2026

DATE

SIG. INVENTORY NO. 10-1839

[illegible][illegible]

HDR Engineering, Inc. of the Carolinas
555 Fayetteville St, Suite 900 Raleigh, N.C. 27601
N.C.B.E.L.S. License Number: F-0116

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 Differences for:	Pole 9	Pole 10
Baseline reference point at Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	+0.6 ft.	+0.9 ft.
Elevation difference at Edge of travelway or face of curb	-0.1 ft.	-0.2 ft.



See Note 5



PROJECT REFERENCE NO.	SHEET NO.
U-5765	Sig. 25.3

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	RIGID MOUNTED SIGNAL HEAD 12"x4 SECTION-WITH BACKPLATE	11.5 S.F.	25.5" W X 66.0" L	74 LBS
	RIGID MOUNTED SIGNAL HEAD 12"x3 SECTION-WITH BACKPLATE	9.3 S.F.	25.5" W X 52.5" L	60 LBS
	LUMINAIRE	EPA 0.87 S.F.	13.25" W X 26.25" L	35 LBS
	STREET NAME SIGN RIGID MOUNTED	16.0 S.F.	24.0" W X 96.0" L	36 LBS

DESIGN REFERENCE MATERIAL

1. Design the traffic signal structure and foundation in accordance with:
 - The 1st Edition 2015 AASHTO LRFD "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
 - The 2024 NCDOT "Standard Specifications for Roads and Structures." The latest addenda to the specifications can be found in the traffic signal project special provisions.
 - The 2024 NCDOT Roadway Standard Drawings.
 - The traffic signal project plans and special provisions.
 - The NCDOT "Metal Pole Standards" located at the following NCDOT website: <https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx>

DESIGN REQUIREMENTS

2. Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
3. Design all signal supports using force ratios that do not exceed 0.9.
4. 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.
5. Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
6. The mast arm attachment height (H1) shown is based on the following design assumptions:
 - a. 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.
 - b. Signal heads are rigidly mounted and vertically centered on the mast arm.
 - c. The roadway clearance height for design is as shown in the elevation views.
 - d. The top of the pole base plate is 0.75 feet above the ground elevation.
 - e. Refer to the Elevation Data Chart for the elevation differences between the proposed foundation ground level and the high point of the roadway.
 - f. 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.
7. The pole manufacturer will determine the total height (H2) of each pole based on the luminaire height requirement of 30 ft.
8. 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.
9. The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
10. The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.
11. Comply with NEC code 230.2(E) concerning service equipment disconnect.
12. Lighting fixture and luminaire arm represent a load condition to the pole and may not represent exactly how the fixtures will be mounted. The contractor is responsible for ensuring that any required factory preps for mounting fixtures to the pole are included on the shop drawings.
13. Design the luminaire support arm using design dimensions as shown on elevations views. Refer to the Radial Orientation Detail for attachment to the signal pole. Design arm end for a nominal 2 inch slip fit socket connection for light assembly.

ALL METAL POLES AND ARMS, PEDESTRIAN PEDESTALS, POSTS, BACKPLATES, LUMINAIRES AND SIGNAL HEADS SHOULD BE BLACK IN COLOR RAL-9005 (JET BLACK) OR EQUIVALENT IN COLOR. LUMINAIRES AS SPECIFIED IN THE PROJECT SPECIAL PROVISIONS.

Division 10 Mecklenburg County Huntersville	
PLAN DATE: July 2026	REVIEWED BY: Z Wang

29	PREPARED BY: K Hector	REVIEWED BY:
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REVISIONS	INIT.	DATE
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DOCUMENT NOT CONSIDERED
FINAL UNLESS ALL
SIGNATURES COMPLETED

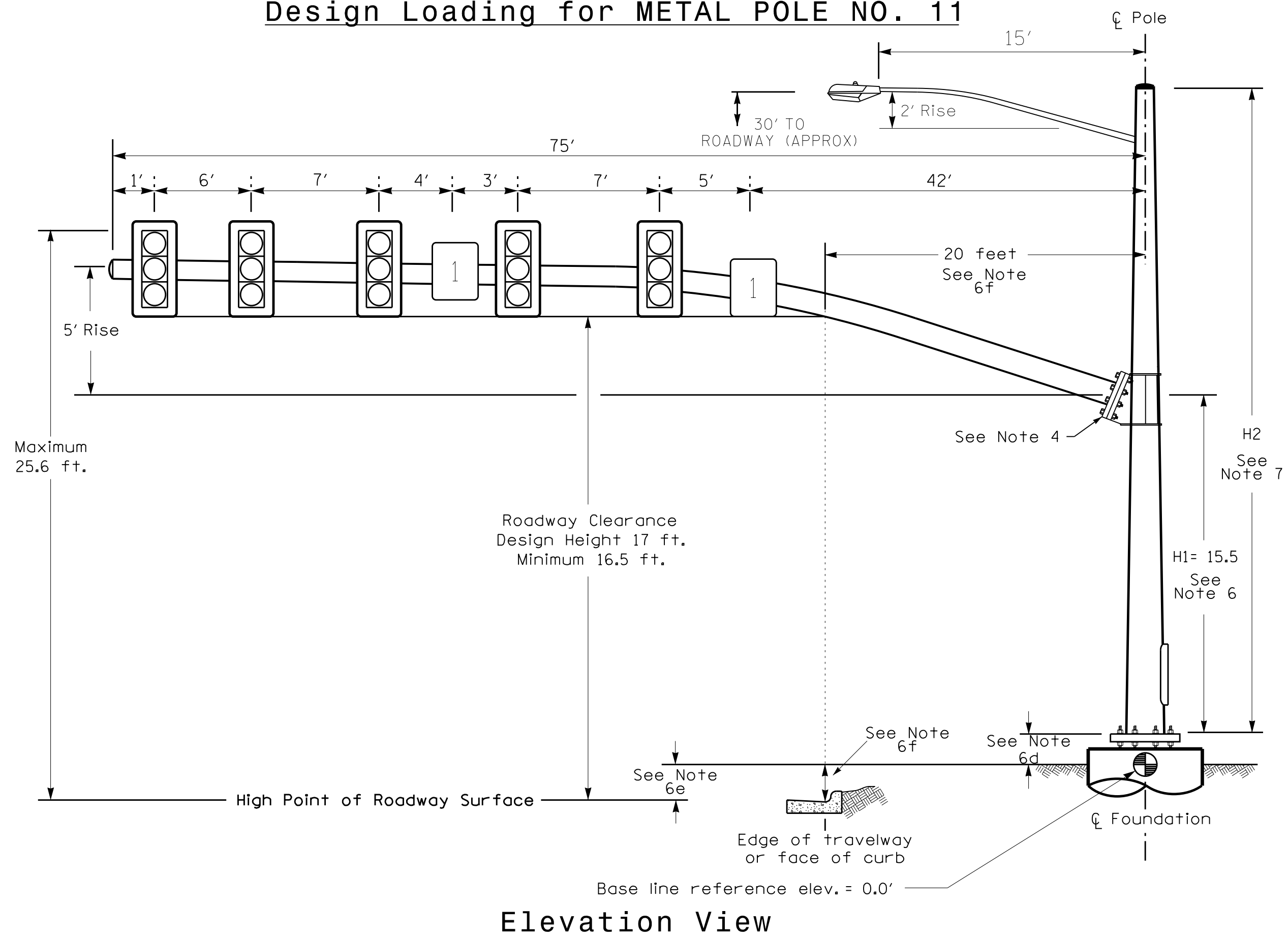
SEAL



7/10/2020

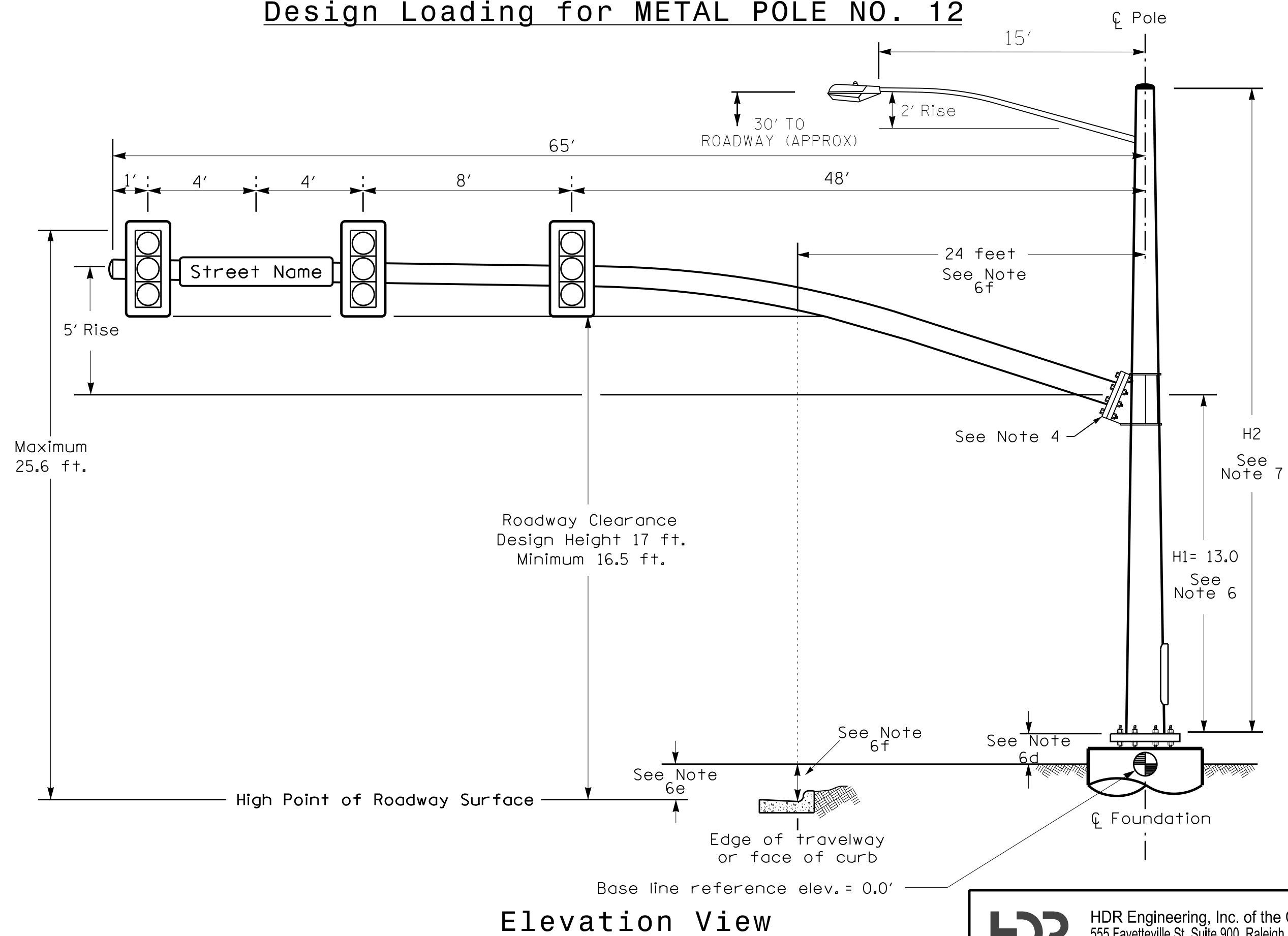
SIG	INVENTORY NO	DATE
		10-1839

Design Loading for METAL POLE NO. 11



Elevation View

Design Loading for METAL POLE NO. 12



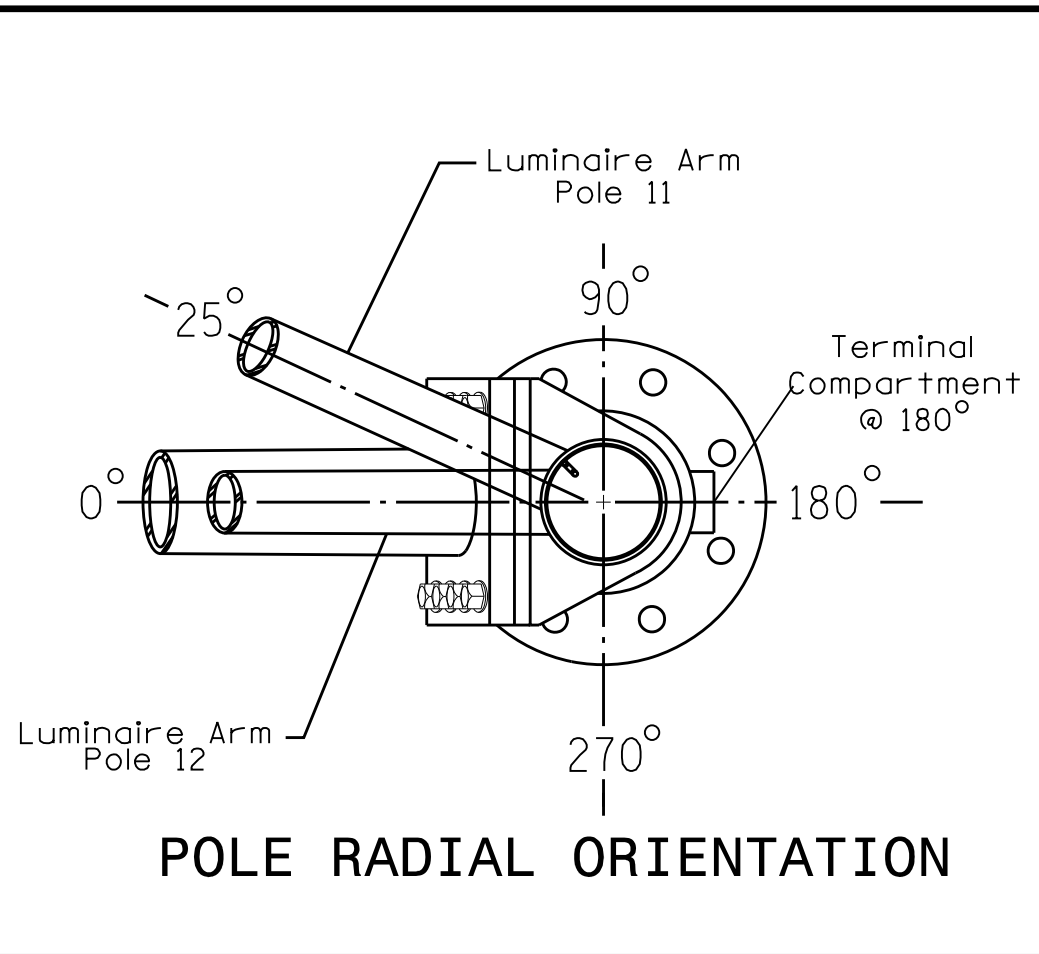
Elevation View

SPECIAL NOTE

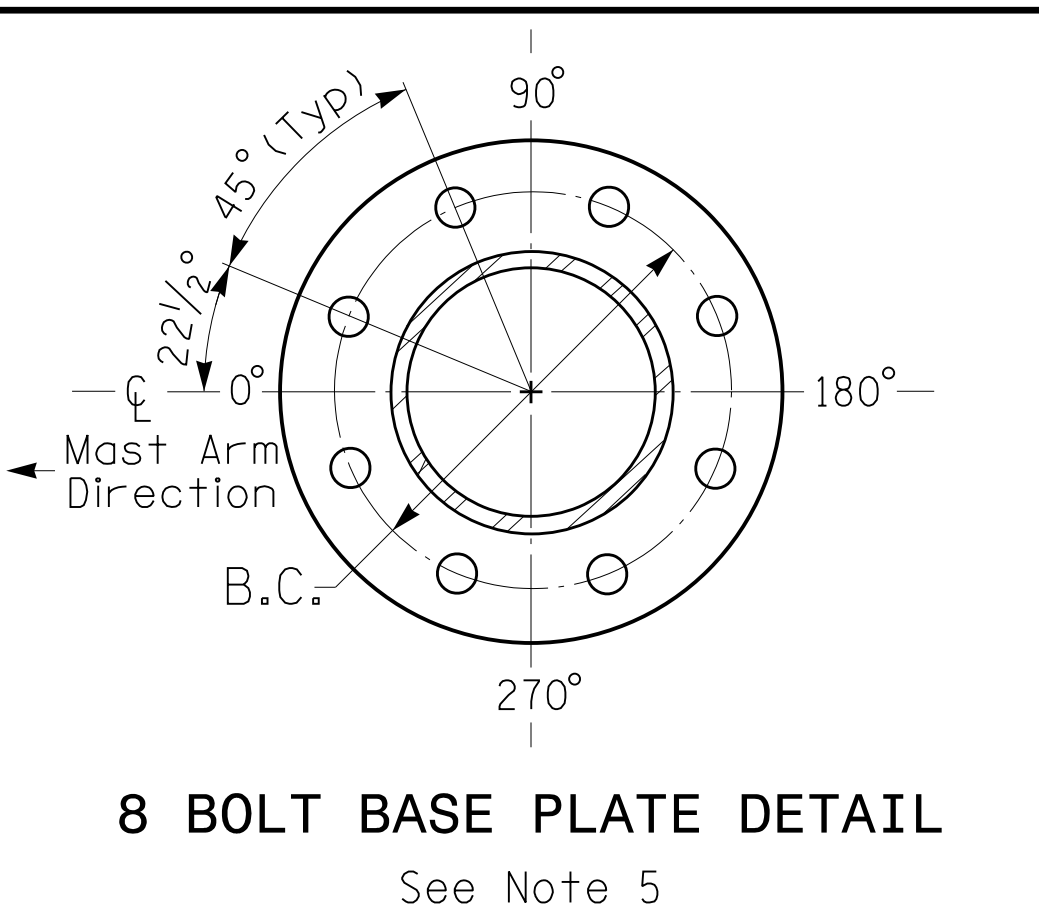
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 11	Pole 12
Baseline reference point at ϕ Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	+1.6 ft.	-0.7 ft.
Elevation difference at Edge of travelway or face of curb	-0.5 ft.	-0.8 ft.

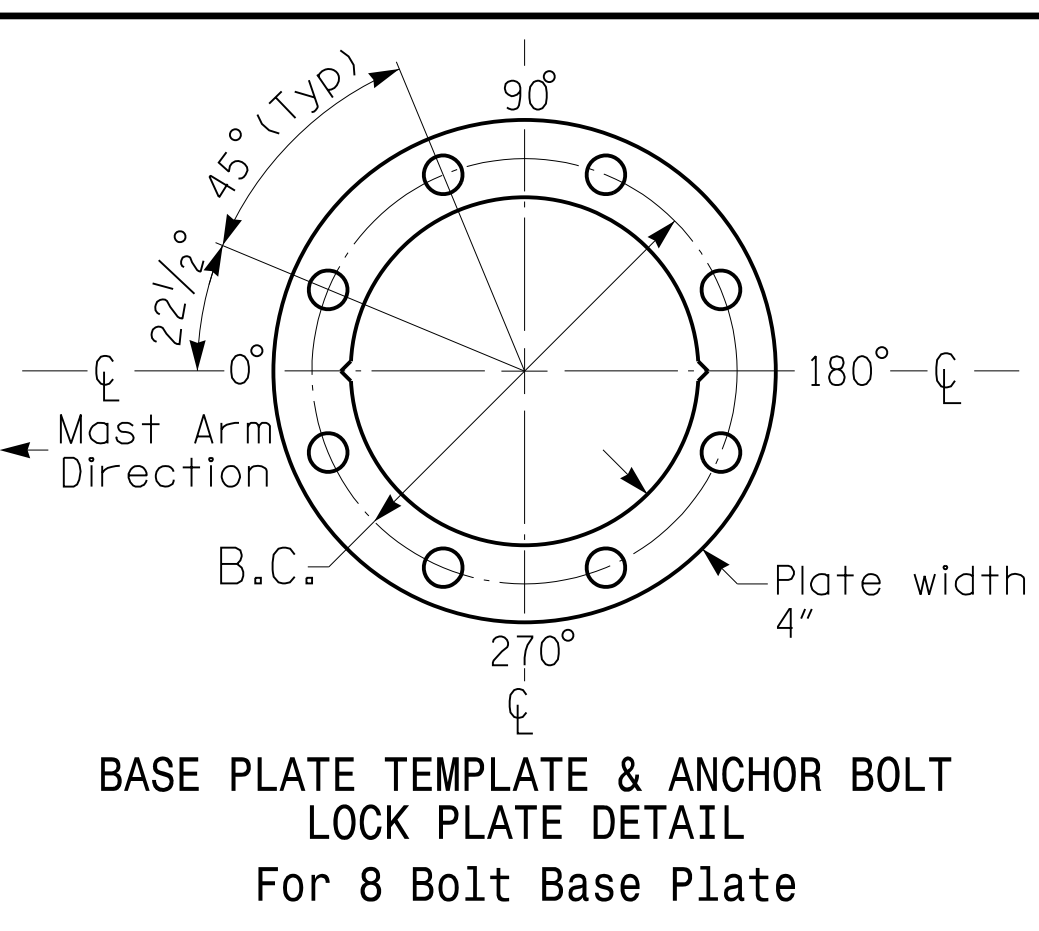


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 5



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

METAL POLE No. 11 and 12

PROJECT REFERENCE NO.	SHEET NO.
U-5765	Sig. 25.4

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	RIGID MOUNTED SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE	9.3 S.F.	25.5"W X 52.5"L	60 LBS
	SIGN RIGID MOUNTED	5.0 S.F.	24.0"W X 30.0"L	11 LBS
	LUMINAIRE	EPA 0.87 S.F.	13.25"W X 26.25"L	35 LBS
	STREET NAME SIGN RIGID MOUNTED	16.0 S.F.	24.0"W X 96.0"L	36 LBS

NOTES

DESIGN REFERENCE MATERIAL

- Design the traffic signal structure and foundation in accordance with:
 - The 1st Edition 2015 AASHTO LRFD "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
 - The 2024 NCDOT "Standard Specifications for Roads and Structures." The latest addenda to the specifications can be found in the traffic signal project special provisions.
 - The 2024 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 force 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 based on the luminaire height requirement of 30 ft.
- 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.
- Comply with NEC code 230.2(E) concerning service equipment disconnect.
- Lighting fixture and luminaire arm represent a load condition to the pole and may not represent exactly how the fixtures will be mounted. The contractor is responsible for ensuring that any required factory preps for mounting fixtures to the pole are included on the shop drawings.
- Design the luminaire support arm using design dimensions as shown on elevations views. Refer to the Radial Orientation Detail for attachment to the signal pole. Design arm end for a nominal 2 inch slip fit socket connection for light assembly.

ALL METAL POLES AND ARMS, PEDESTRIAN PEDESTALS, POSTS, BACKPLATES, LUMINAIRES AND SIGNAL HEADS SHOULD BE BLACK IN COLOR RAL-9005 (JET BLACK) OR EQUIVALENT IN COLOR. LUMINAIRES AS SPECIFIED IN THE PROJECT SPECIAL PROVISIONS.

NCDOT Wind Zone 5 (110 mph)

	NC 73 (Sam Furr Rd) at Lindholm Drive		
	Division 10 Mecklenburg County	Huntersville	
PLAN DATE: July 2026	REVIEWED BY: Z Wang	PREPARED BY: K Hector	REVIEWED BY:
750 N. Greenfield Pkwy, Garner, NC 27529	REVISIONS	INIT.	DATE
0 SCALE N/A			
N/A			

SIG. INVENTORY NO. 10-1839

8 Phase Fully Actuated Signal System #: D10-43_Huntersville NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2024 and "Standard Specifications for Roads and Structures" dated January 2024.
2. Do not program signal for late night operation unless otherwise directed by the Engineer.
3. Set all detector units to presence mode.
4. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
5. 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. The Division Traffic Engineer will determine the hours of use for each phasing plan.
8. This intersection uses multi-zone microwave detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.
9. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
10. See traffic control plans for stop line and crosswalk placement.

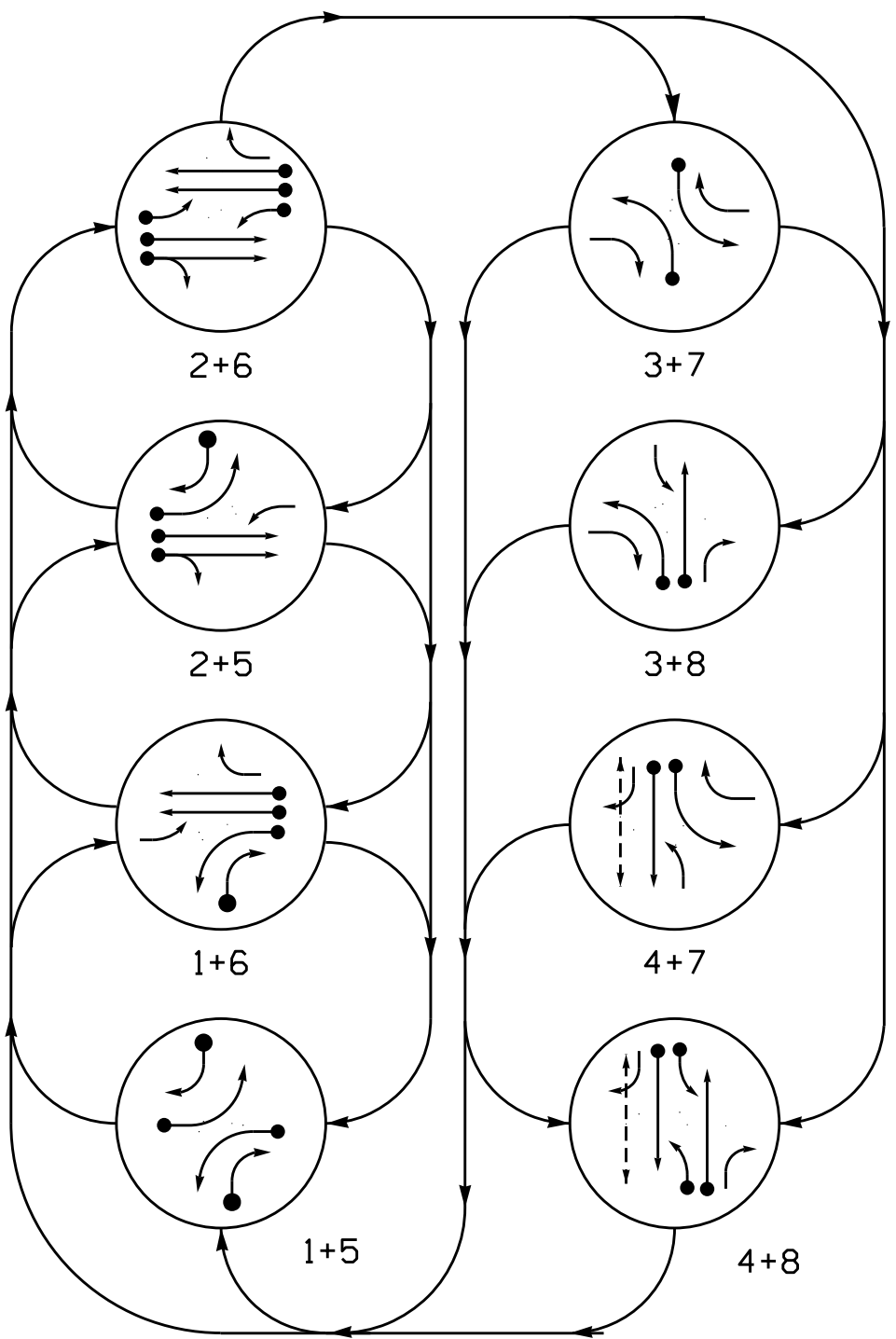
MAXTIME DETECTOR INSTALLATION CHART										
DETECTOR					PROGRAMMING					
DETECTOR ZONE	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL DELAY DURING GREEN
1A	*	*	*	*	1 6 #	15.0 **	-	X	X	X
1B	*	*	*	*	1	15.0	-	X	X	-
2A	*	*	*	*	2	-	-	X	X	-
3A	*	*	*	*	3	15.0	-	X	X	-
4A	*	*	*	*	4	-	-	X	X	-
5A	*	*	*	*	5 2 #	15.0 **	-	X	X	X
5B	*	*	*	*	5	15.0	-	X	X	-
6A	*	*	*	*	6	-	-	X	X	-
7A	*	*	*	*	7	15.0	-	X	X	-
8A	*	*	*	*	8	3.0	-	X	X	-

* Multi-zone Microwave Detection.
** Reduce Delay to 3 Seconds During Alternative Phasing Operation.
Disable Delay During Alternate Phasing Operation.

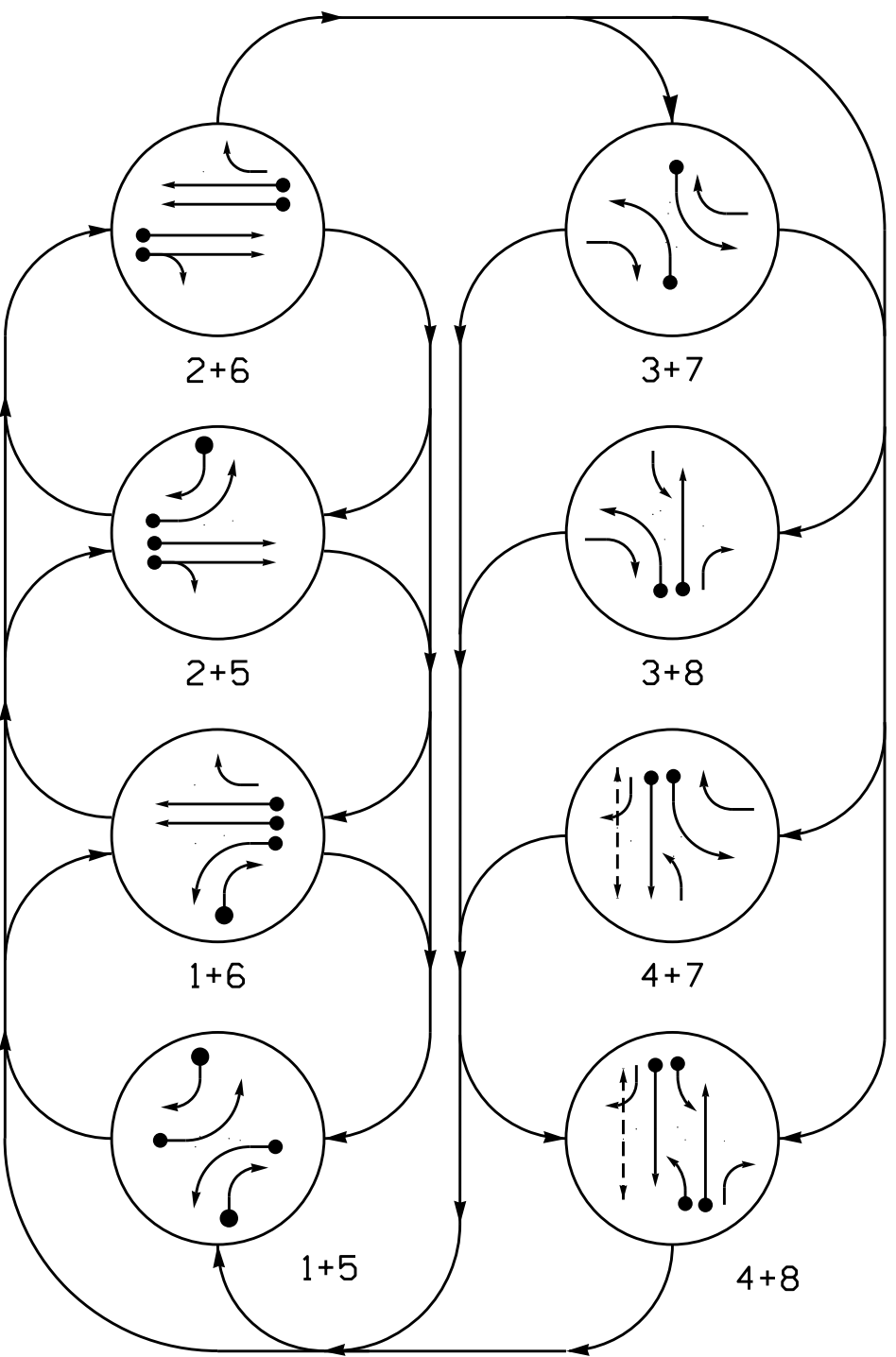
DEFAULT PHASE TABLE OF OPERATION										
SIGNAL FACE	PHASE								FLASH	H
	1 + 5	1 + 6	2 + 5	2 + 6	3 + 7	3 + 8	4 + 7	4 + 8		
11	←	←	←	←	←	←	←	←	←	←
21	R	R	G	G	R	R	R	R	R	R
22	R	R	G	G	R	R	R	R	R	R
31	←	←	←	←	←	←	←	←	←	←
41	R	R	R	R	R	R	G	G	R	R
42	R	R	R	R	R	R	G	G	R	R
51	←	←	←	←	←	←	←	←	←	←
61	R	G	R	G	R	R	R	R	R	R
62	R	G	R	G	R	R	R	R	R	R
71	←	←	←	←	←	←	←	←	←	←
81	R	R	R	R	R	G	R	G	R	R
82	R	R	R	R	R	G	R	G	R	R
P41,P42	DW	DW	DW	DW	DW	DW	W	W	DRK	DRK

ALTERNATE PHASE TABLE OF OPERATION										
SIGNAL FACE	PHASE								FLASH	H
	1 + 5	1 + 6	2 + 5	2 + 6	3 + 7	3 + 8	4 + 7	4 + 8		
11	←	←	←	←	←	←	←	←	←	←
21	R	R	G	G	R	R	R	R	R	R
22	R	R	G	G	R	R	R	R	R	R
31	←	←	←	←	←	←	←	←	←	←
41	R	R	R	R	R	R	G	G	R	R
42	R	R	R	R	R	R	G	G	R	R
51	←	←	←	←	←	←	←	←	←	←
61	R	G	R	G	R	R	R	R	R	R
62	R	G	R	G	R	R	R	R	R	R
71	←	←	←	←	←	←	←	←	←	←
81	R	R	R	R	R	G	R	G	R	R
82	R	R	R	R	R	G	R	G	R	R
P41,P42	DW	DW	DW	DW	DW	DW	W	W	DRK	DRK

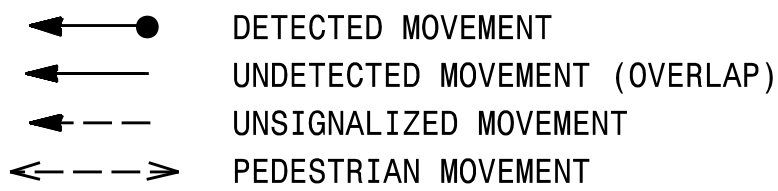
DEFAULT PHASING DIAGRAM



ALTERNATE PHASING DIAGRAM

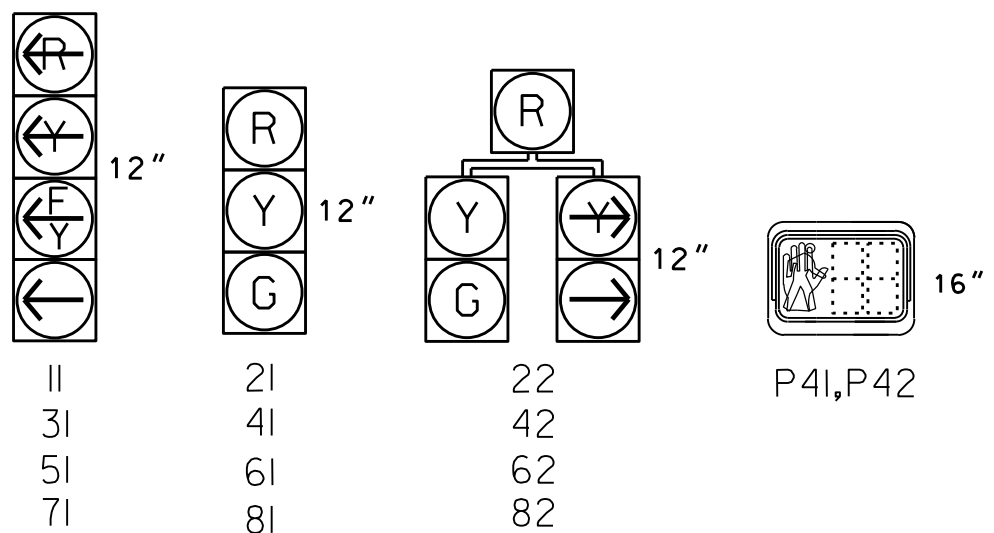


PHASING DIAGRAM DETECTION LEGEND



SIGNAL FACE I.D.

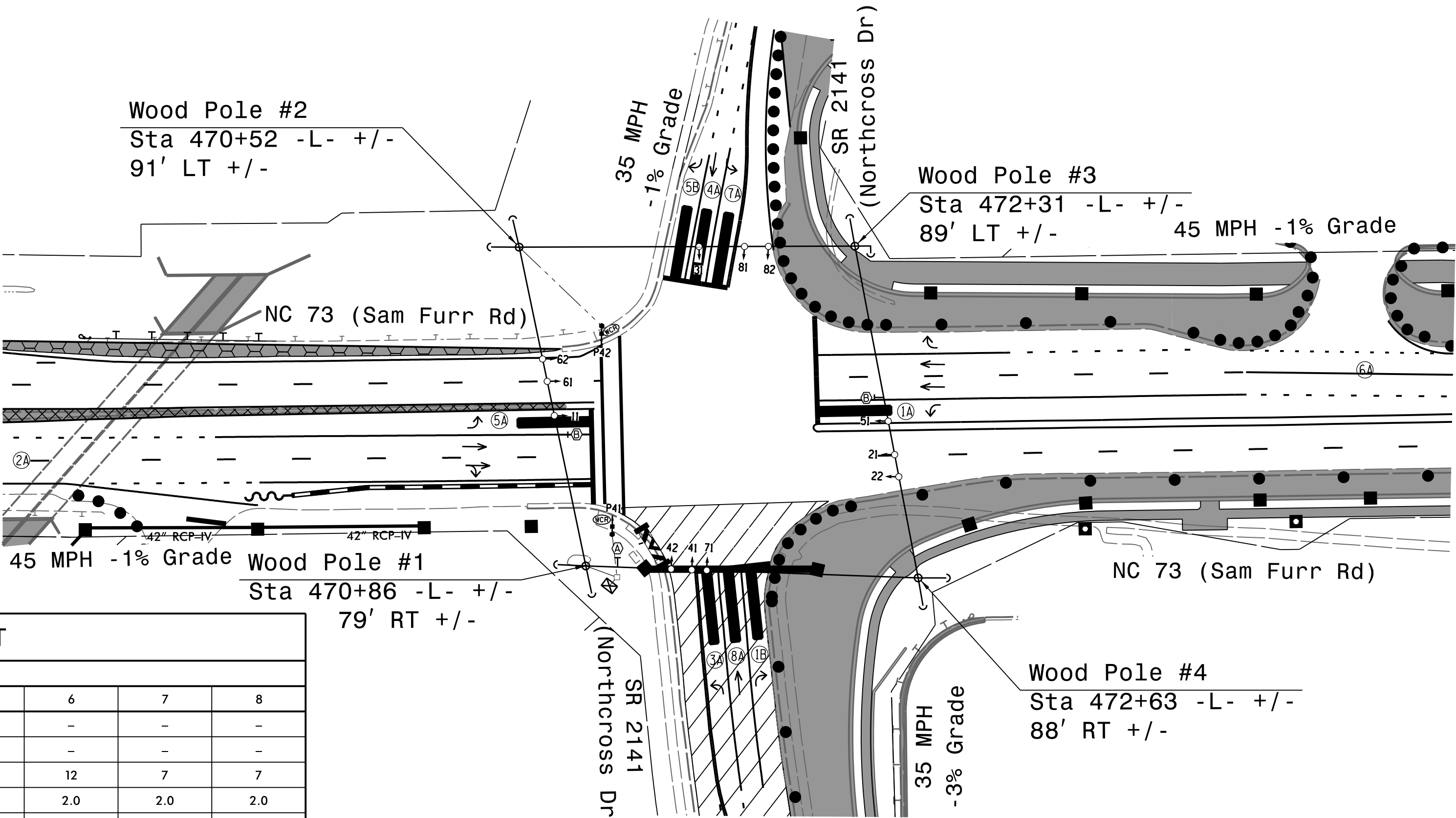
All Heads L.E.D.



MAXTIME TIMING CHART

FEATURE	PHASE							
	1	2	3	4	5	6	7	8
Walk *	-	-	-	7	-	-	-	-
Ped Clear	-	-	-	24	-	-	-	-
Min Green *	7	12	7	7	7	12	7	7
Passage *	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Max 1 *	20	90	15	35	20	90	15	35
Yellow Change	3.2	4.6	3.3	4.1	3.2	4.6	3.2	4.1
Red Clear	2.8	1.6	2.9	2.7	2.6	1.6	2.4	2.7
Added Initial *	-	-	-	-	-	-	-	-
Maximum Initial *	-	-	-	-	-	-	-	-
Time Before Reduction *	-	-	-	-	-	-	-	-
Time To Reduce *	-	-	-	-	-	-	-	-
Minimum Gap	-	-	-	-	-	-	-	-
Advance Walk	-	-	-	7	-	-	-	-
Non Lock Detector	X	-	X	X	X	-	X	X
Vehicle Recall	-	MIN RECALL	-	-	-	MIN RECALL	-	-
Dual Entry	-	-	-	X	-	-	-	X

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



Microwave Detection System

FUNCTION			
Sensor 1 (2A)		Sensor 2 (6A)	
Channel	1	2	
Phase	2	6	
Direction of Travel	EB		WB
Type	Priority		Priority
Level	2	QUEUE	2
Discovery Zone (ft)	<750		<750
Range (ft)	600-100	150-100	600-100
Enable Speed	Y	Y	Y
Speed Range (mph)	35-100	1-35	35-100
Enable Estimated Time of Arrival	Y	N	N
Estimated Time of Arrival (sec)	2.5-6.5	-	2.5-6.5

Temporary Design #1 (TMP Phase 1 Step 1)

Prepared for:

750 N. Greenfield Pkwy, Garner, NC 27529

NC 73 (Sam Furr Rd) at SR 2316 / SR 2141 (Northcross Dr)

Division 10 Mecklenburg County Huntersville

PLAN DATE: July 2026 REVIEWED BY: Z Wang

PREPARED BY: K Hector RKA PROJ. No.:

REVISIONS

INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039071

7/10/2026

SIGNATURE DATE

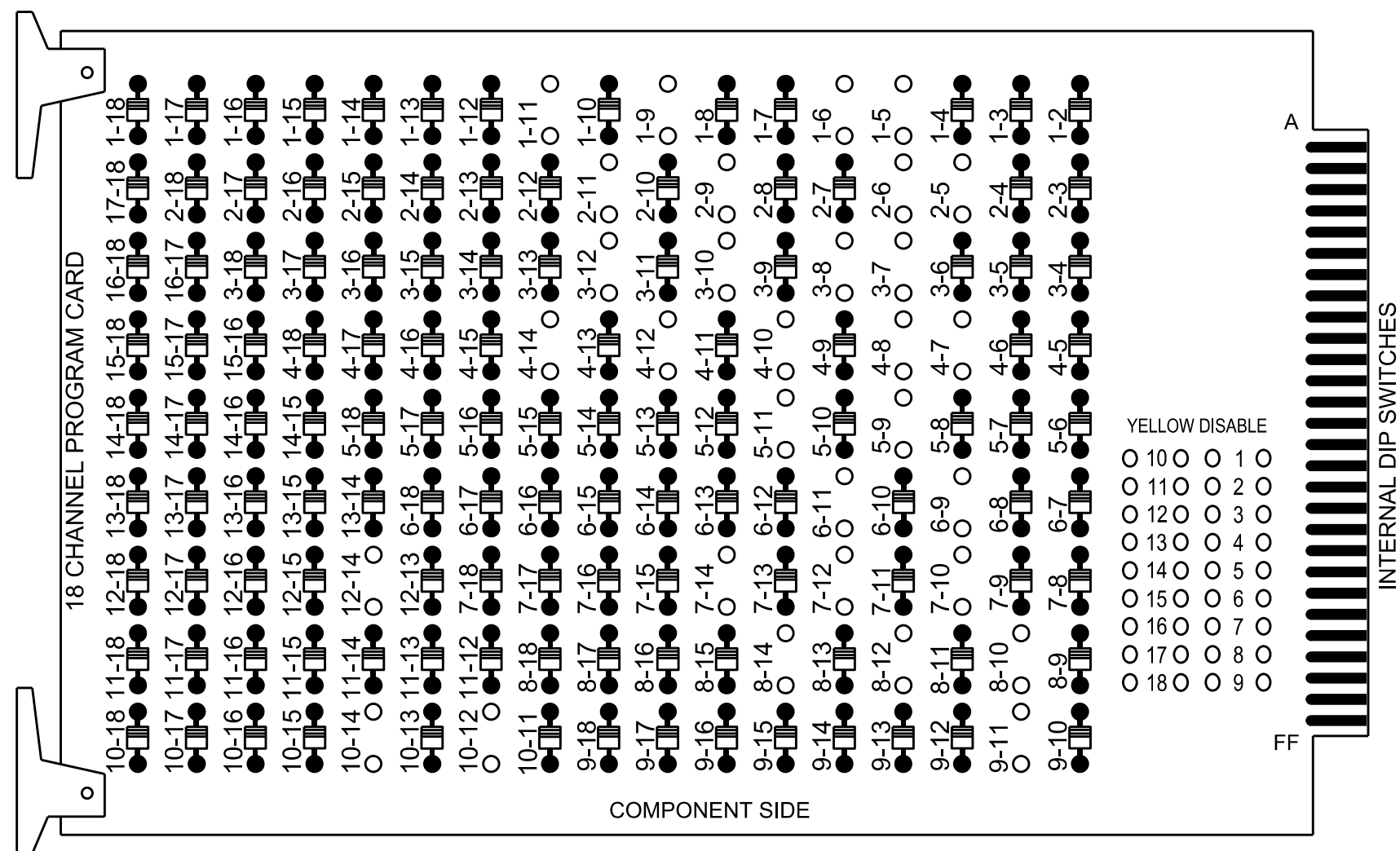
SIG. INVENTORY NO. 10-168611

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, 3-7, 3-8, 3-10, 3-12, 4-7, 4-8, 4-10, 4-12, 4-14, 5-9, 5-11, 6-9, 6-11, 7-10, 7-12, 7-14, 8-10, 8-12, 8-14, 9-11, 10-12, 10-14 and 12-14



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 vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the signal plan.
- Program phases 4 and 8 for Dual Entry .
- Program controller to start up in phase 2 Green No Walk and 6 Green No Walk.
- If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
- The cabinet and controller are part of the Signal System #: D10-43_Huntersville.

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, S6, S7, S8, S10, S11, AUX S1, AUX S2, AUX S4, AUX S5
Phases Used.....1, 2, 3, 4, 4PED, 5, 6, 7, 8
Overlap "1".....*
Overlap "2".....*
Overlap "3".....*
Overlap "4".....*
*See overlap programming detail on sheet 2

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6				
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18				
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE				
SIGNAL HEAD NO.	11★	82	21,22	NU	31★	22	41,42	P41, P42	51★	42	61,62	NU	71★	62	81,82	NU	11★	31★	NU	51★	71★	NU
RED		★	128		★	101		★	134		★	107										
YELLOW			129			102			135			108										
GREEN			130			103			136			109										
RED ARROW													A121	A124		A114	A101					
YELLOW ARROW		126			117			132			123		A122	A125		A115	A102					
FLASHING YELLOW ARROW													A123	A126		A116	A103					
GREEN ARROW	127	127		118	118			133	133		124	124										
						104																
						106																

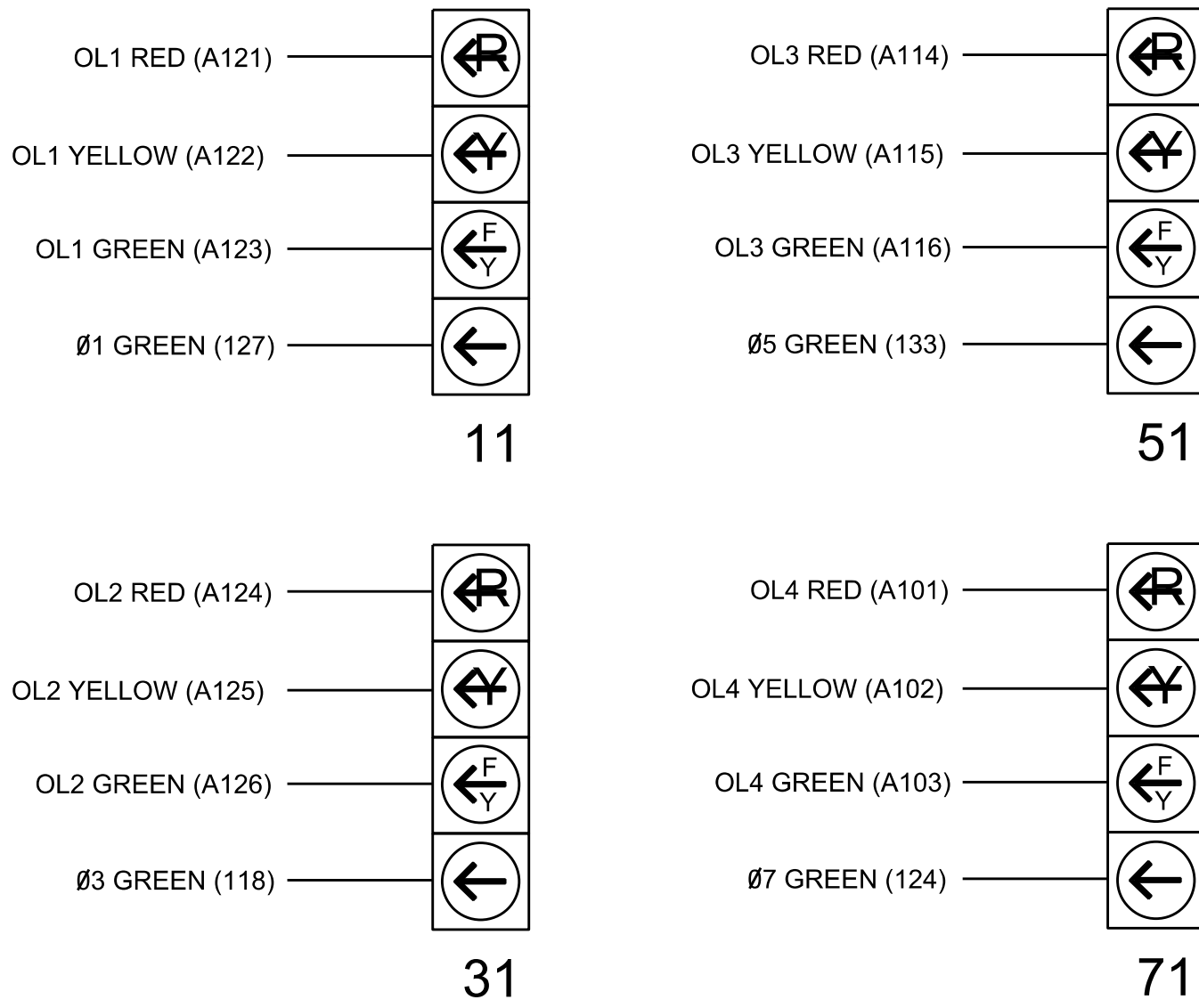
NU = Not Used

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

*See pictorial of head wiring in detail this sheet.

FYA SIGNAL WIRING DETAIL

(wire signal heads 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.

MAXTIME STARTUP AND SOFTWARE FLASH PROGRAMMING DETAIL

Front Panel
Main Menu >Controller >Unit

Web Interface
Home >Controller >Unit

Modify parameters as shown below and save changes.

Start Up Parameters	Unit Flash Parameters
StartUp Clearance Hold	All Red Flash Exit Time
6	6

LOGIC PROCESSOR PROGRAMMING

Front Panel
Main Menu >Controller >More >User Programs >Definition

Web Interface
Home >Controller >User Programs Configuration >User Programs Definition

Program 1

Statement	Result	Index	Operation	Parameter A	Index	Parameter B	Index	Delay	Ext
1	Veh Detector Call	125	Is Module A input B ON	Number	2	Number	1	0.0	0.0
2	Veh Detector Call	126	Is Module A input B ON	Number	2	Number	2	0.0	0.0
3	Veh Detector Call	127	Is Module A input B ON	Number	2	Number	3	0.0	0.0
4	Veh Detector Call	128	Is Module A input B ON	Number	2	Number	4	0.0	0.0

LOGIC STATEMENT DESCRIPTION

Statement 1 Description: Mirrors vehicle detector 33 to vehicle detector 125

Statement 2 Description: Mirrors vehicle detector 34 to vehicle detector 126

Statement 3 Description: Mirrors vehicle detector 35 to vehicle detector 127

Statement 4 Description: Mirrors vehicle detector 36 to vehicle detector 128

OUTPUT CHANNEL CONFIGURATION

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

Web Interface
Home >Controller >Advanced IO>Channels>Channel 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	8				16
17	Overlap	5		X	X	17
18	Overlap	6		X		18

SPECIAL DETECTION IO MODULE PROGRAMMING

The Enhanced Out of Pavement Detection requires adjustments to the IO Modules in use. Follow the programming instructions below to ensure desired operation.

Front Panel
Main Menu >Controller >More >Advanced IO >IO Modules

Web Interface
Home >Controller >Advanced IO >Cabinet Configuration >IO Modules

IO Module	Type	Fault Response
1	Caltrans 332	Default
2	TS2 DR3 BIU	Default
3	TS2 DR4 BIU	Default
4	TS2 MMU	Default

Advanced Cabinet Options

☒ Disable TS2 Cabinet Alarms

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 10-1686T1
DESIGNED: June 2026
SEALED: 07-10-2026
REVISED: N/A

Electrical Detail - Sheet 3 of 3



HDR Engineering, Inc. of the Carolinas
555 Fayetteville St, Suite 900 Raleigh, N.C. 27601
N.C.B.E.L.S. License Number: F-0116

Electrical and Programming Details For:

Prepared in the Offices of:



750 N. Greenfield Pkwy, Garner, NC 27529

NC 73 (Sam Furr Rd)
at
SR 2316 / SR 2141
(Northcross Dr)

Division 10 Mecklenburg County Huntersville

PLAN DATE: July, 2026REVIEWED BY: Z Wang

PREPARED BY: K HectorREVIEWED BY:

REVISIONS

INIT. DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL



7/10/2026

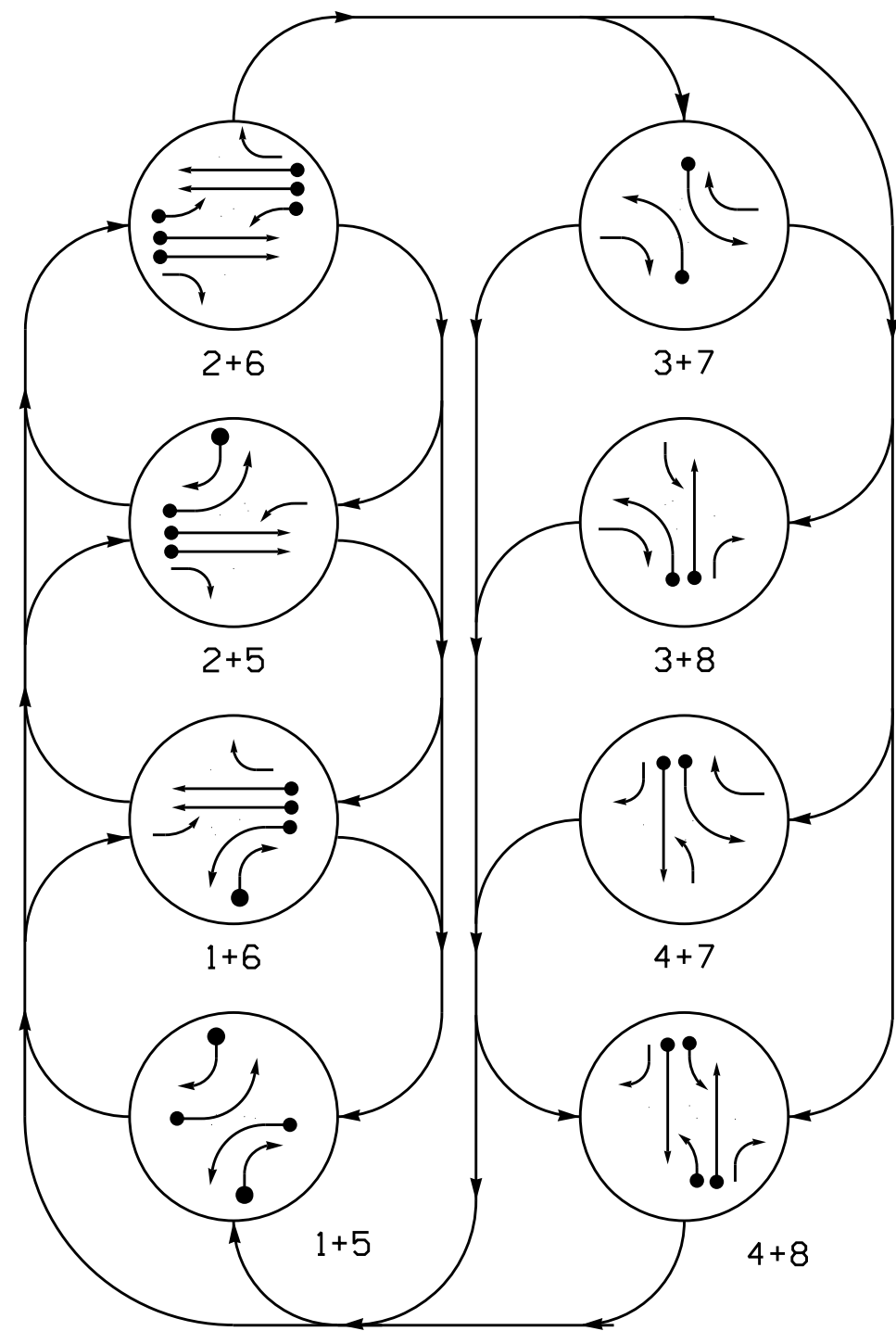
DATE

SIG. INVENTORY NO. 10-1686T1

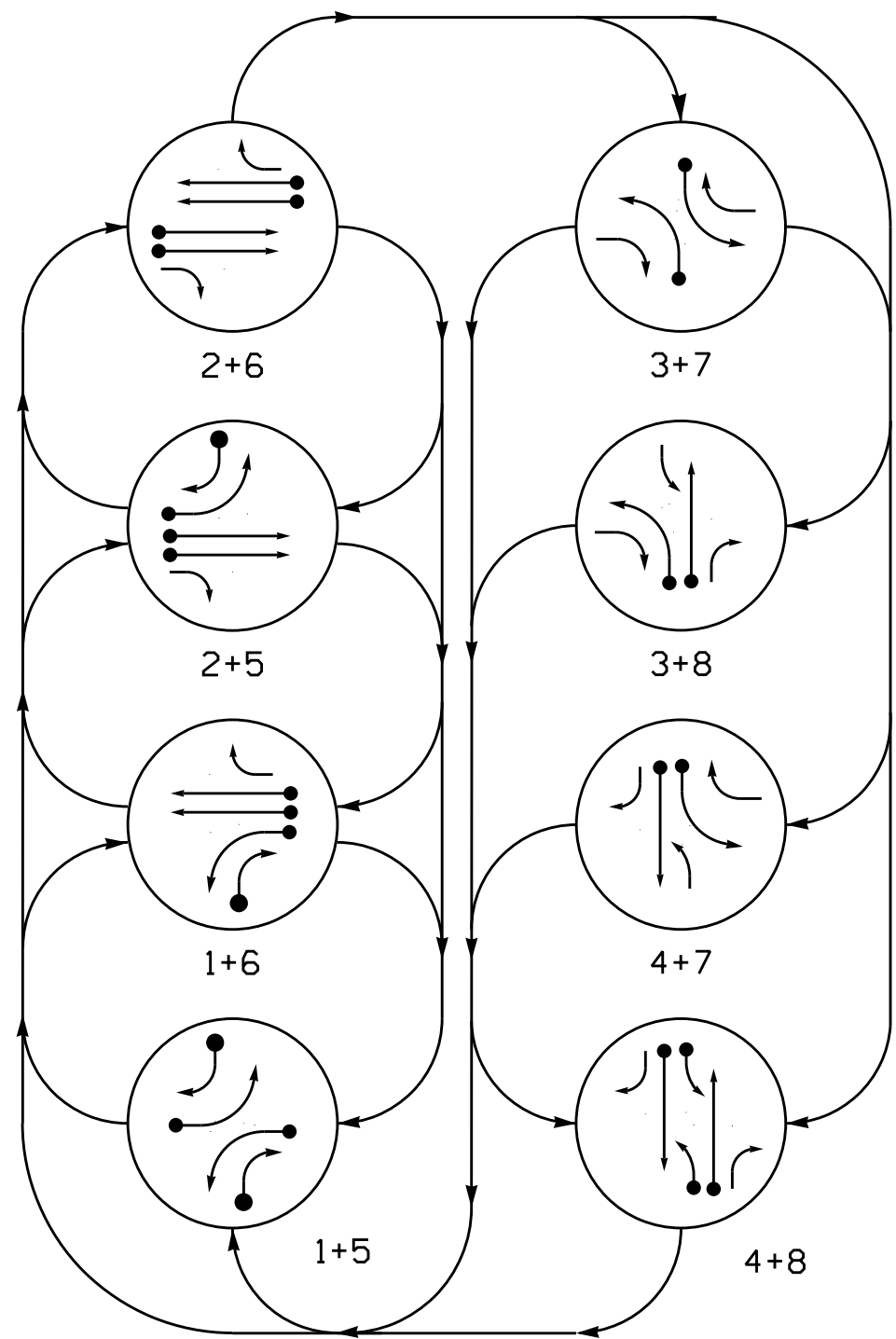
8 Phase
Fully Actuated
Signal System #: D10-43_Huntersville
NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2024 and "Standard Specifications for Roads and Structures" dated January 2024.
2. Do not program signal for late night operation unless otherwise directed by the Engineer.
3. Set all detector units to presence mode.
4. The Division Traffic Engineer will determine the hours of use for each phasing plan.
5. This intersection uses multi-zone microwave detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.
6. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
7. See traffic control plans for stop line and crosswalk placement.

DEFAULT PHASING DIAGRAM



ALTERNATE PHASING DIAGRAM



DEFAULT PHASE TABLE OF OPERATION

SIGNAL FACE	PHASE								
	1 + 5	1 + 6	2 + 5	2 + 6	3 + 7	3 + 8	4 + 7	4 + 8	F L A S H
11	←	←	$\frac{F}{Y}$	$\frac{F}{Y}$	←	←	←	←	
21	R	R	G	G	R	R	R	R	R
22	R	R	G	G	$\frac{R}{Y}$	$\frac{R}{Y}$	R	R	R
31	←	←	←	←	←	←	$\frac{F}{Y}$	$\frac{F}{Y}$	
41	R	R	R	R	R	R	G	G	R
42	$\frac{R}{Y}$		$\frac{R}{Y}$		R	R	G	G	R
51	←	$\frac{F}{Y}$	←	$\frac{F}{Y}$	←	←	←	←	←
61	R	G	R	G	R	R	R	R	R
62	R	G	R	G	$\frac{R}{Y}$		$\frac{R}{Y}$		R
71	←	←	←	←	←	←	$\frac{F}{Y}$	←	$\frac{F}{Y}$
81	R	R	R	R	R	G	R	G	R
82	$\frac{R}{Y}$	$\frac{R}{Y}$	R	R	R	G	R	G	R

ALTERNATE PHASE TABLE OF OPERATION

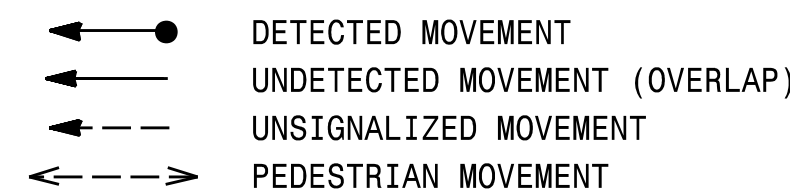
SIGNAL FACE	PHASE								
	1 + 5	1 + 6	2 + 5	2 + 6	3 + 7	3 + 8	4 + 7	4 + 8	F L A S H
11	←	←	→	→	→	→	→	→	→
21	R	R	G	G	R	R	R	R	R
22	R	R	G	G	R	R	R	R	R
31	→	→	→	→	←	←	←	←	←
41	R	R	R	R	R	R	G	G	R
42	R	R	R	R	R	R	G	G	R
51	←	→	←	→	→	→	→	→	→
61	R	G	R	G	R	R	R	R	R
62	R	G	R	G	R	R	R	R	R
71	→	→	→	→	←	←	←	←	←
81	R	R	R	R	R	G	G	G	R
82	R	R	R	R	R	G	G	G	R

MAXTIME DETECTOR INSTALLATION CHART

DETECTOR					PROGRAMMING							
DETECTOR ZONE	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
1A	*	*	*	*	1	15.0 ^{**}	-	X	-	X	-	*
1B	*	*	*	*	6 #	3.0	-	X	-	X	X	*
2A	*	*	*	*	2	15.0	-	X	-	X	-	*
3A	*	*	*	*	1	-	-	X	-	X	-	*
4A	*	*	*	*	3	15.0	-	X	-	X	-	*
5A	*	*	*	*	8	3.0	-	X	-	X	-	*
6A	*	*	*	*	4	-	-	X	-	X	-	*
7A	*	*	*	*	5	15.0 ^{**}	-	X	-	X	-	*
8A	*	*	*	*	2 #	3.0	-	X	-	X	X	*
1B	*	*	*	*	5	15.0	-	X	-	X	-	*
2A	*	*	*	*	5	-	-	X	-	X	-	*
3A	*	*	*	*	6	-	-	X	-	X	-	*
4A	*	*	*	*	7	15.0	-	X	-	X	-	*
5A	*	*	*	*	4	3.0	-	X	-	X	-	*
6A	*	*	*	*	8	-	-	X	-	X	-	*

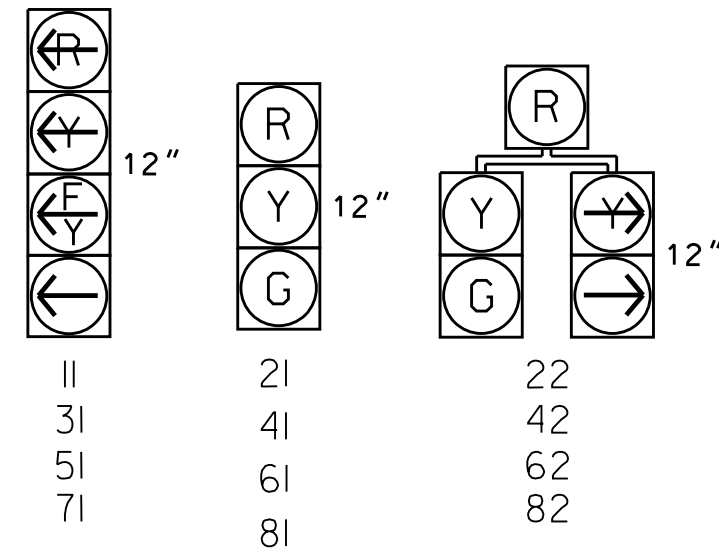
- * Multi-zone Microwave Detection.
- ** Reduce Delay to 3 Seconds During Alternative Phasing Operation.
- # Disable Delay During Alternate Phasing Operation.

PHASING DIAGRAM DETECTION LEGEND



SIGNAL FACE I.D.

All Heads L.E.D.



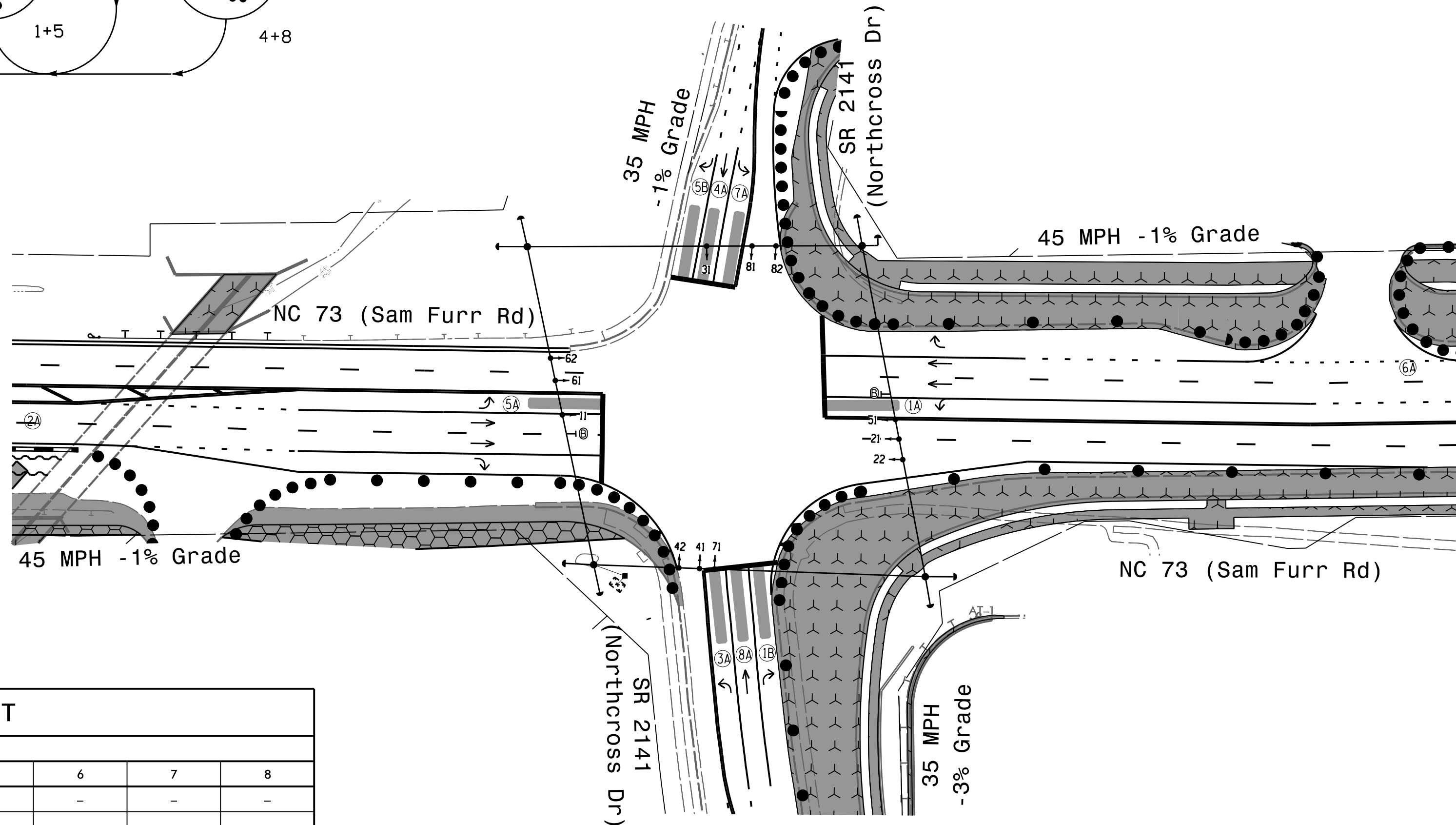
MAXTIME TIMING CHART

FEATURE	PHASE							
	1	2	3	4	5	6	7	8
Walk *	–	–	–	–	–	–	–	–
Ped Clear	–	–	–	–	–	–	–	–
Min Green *	7	12	7	7	7	12	7	7
Passage *	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Max 1 *	20	90	15	35	20	90	15	35
Yellow Change	3.2	4.6	3.3	4.1	3.2	4.6	3.2	4.1
Red Clear	2.8	1.5	2.9	2.7	2.4	1.5	2.2	2.7
Added Initial *	–	–	–	–	–	–	–	–
Maximum Initial *	–	–	–	–	–	–	–	–
Time Before Reduction *	–	–	–	–	–	–	–	–
Time To Reduce *	–	–	–	–	–	–	–	–
Minimum Gap	–	–	–	–	–	–	–	–
Advance Walk	–	–	–	–	–	–	–	–
Non Lock Detector	X	–	X	X	X	–	X	X
Vehicle Recall	–	MIN RECALL	–	–	–	MIN RECALL	–	–
Dual Entry	–	–	–	X	–	–	–	X

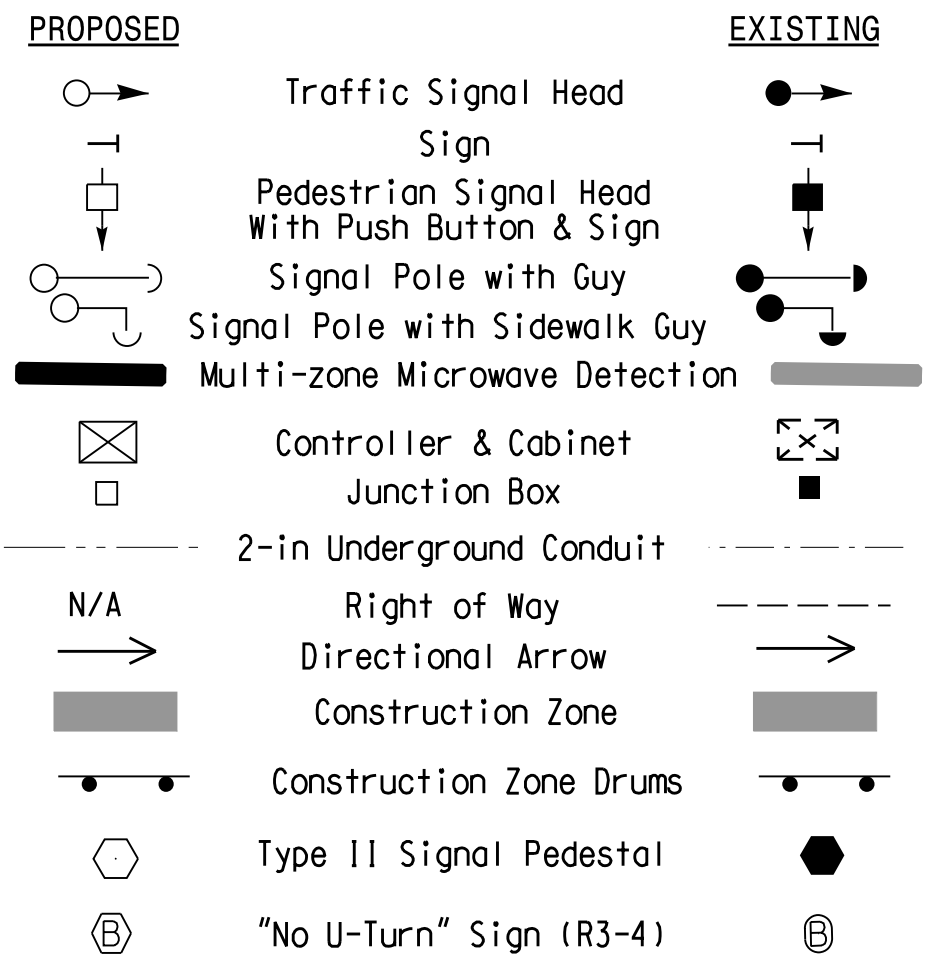
* These values may be field adjusted. Do not adjust Min Green and Passage times for phases 2 and 6 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.

Microwave Detection System

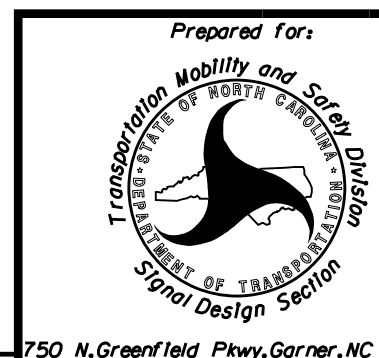
FUNCTION	Sensor 1 (2A)		Sensor 2 (6A)	
Channel	1		2	
Phase	2		6	
Direction of Travel	EB		WB	
Type	Priority		Priority	
Level	2	QUEUE	2	QUEUE
Discovery Zone (ft)	<750	-	<750	-
Range (ft)	600-100	150-100	600-100	150-100
Enable Speed	Y	Y	Y	Y
Speed Range (mph)	35-100	1-35	35-100	1-35
Enable Estimated Time of Arrival	Y	N	Y	N
Estimated Time of Arrival (sec)	2.5-6.5	-	2.5-6.5	-



LEGEND



Temporary Design #2
(TMP Phase 1 Step 2)



NC 73 (Sam Furr Rd)
at
SR 2316 / SR 2141
(Northcross Dr)

Division 10 Mecklenburg County Huntersville

PLAN DATE:	July 2026
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REVIEWED BY: Z Wang

PREPARED BY: K Hector

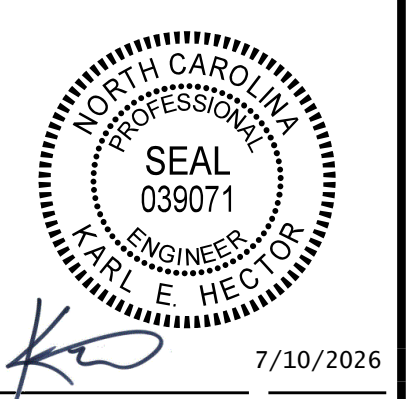
RKA PROJ. No.:

REVISIONS

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SIGNATURES COMPLETED

SEAL

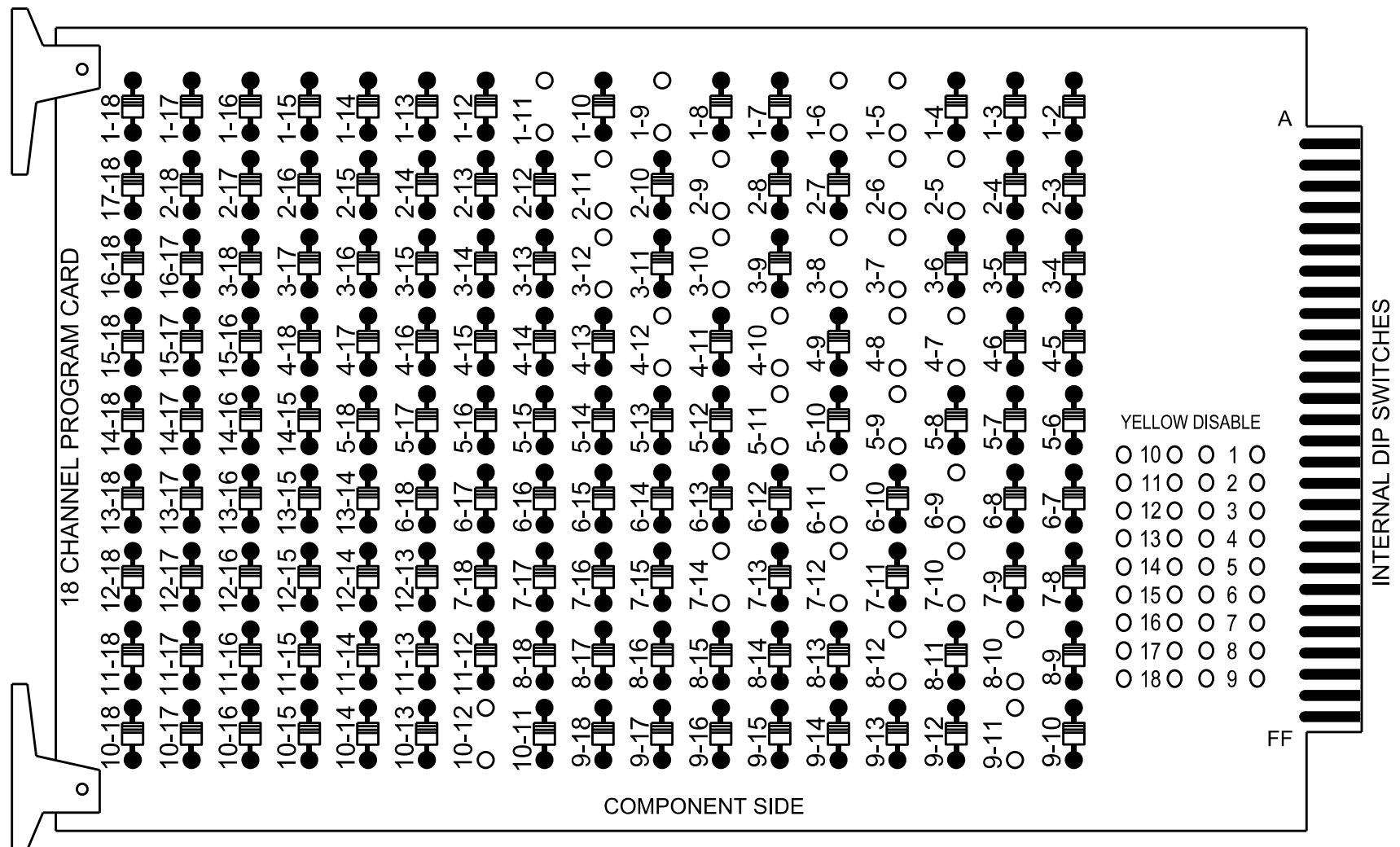


SIGNATURE	DATE
SIG. INVENTORY NO.	10-1686T2

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, 3-7, 3-8, 3-10, 3-12, 4-7, 4-8, 4-10, 4-12, 5-9, 5-11, 6-9, 6-11, 7-10, 7-12, 7-14, 8-10, 8-12, 9-11 and 10-12



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.

NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the signal plan.
- Program phases 4 and 8 for Dual Entry .
- Program controller to start up in phase 2 Green No Walk and 6 Green No Walk.
- If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
- The cabinet and controller are part of the Signal System #: D10-43_Huntersville.

EQUIPMENT INFORMATION

Controller.....2070LX
Cabinet.....332 w/ Aux
Software.....Q-Free MAXTIME
Cabinet Mount.....Base
Output File Positions.....18 With Aux. Output File
Load Switches Used.....S1, S2, S4, S5, S7, S8, S10, S11, AUX S1, AUX S2, AUX S4, AUX S5
Phases Used.....1, 2, 3, 4, 5, 6, 7, 8
Overlap "1".....*
Overlap "2".....*
Overlap "3".....*
Overlap "4".....*
*See overlap programming detail on sheet 2

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	11★	82	21,22	31★	22	41,42	51★	42	61,62	71★	62	81,82	11★	31★	NU	51★	71★	NU
RED	★	128		★	101		★	134		★	107							
YELLOW		129			102			135			108							
GREEN		130			103			136			109							
RED ARROW													A121	A124		A114	A101	
YELLOW ARROW	126			117				132		123			A122	A125		A115	A102	
FLASHING YELLOW ARROW													A123	A126		A116	A103	
GREEN ARROW	127	127		118	118		133	133		124	124							

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

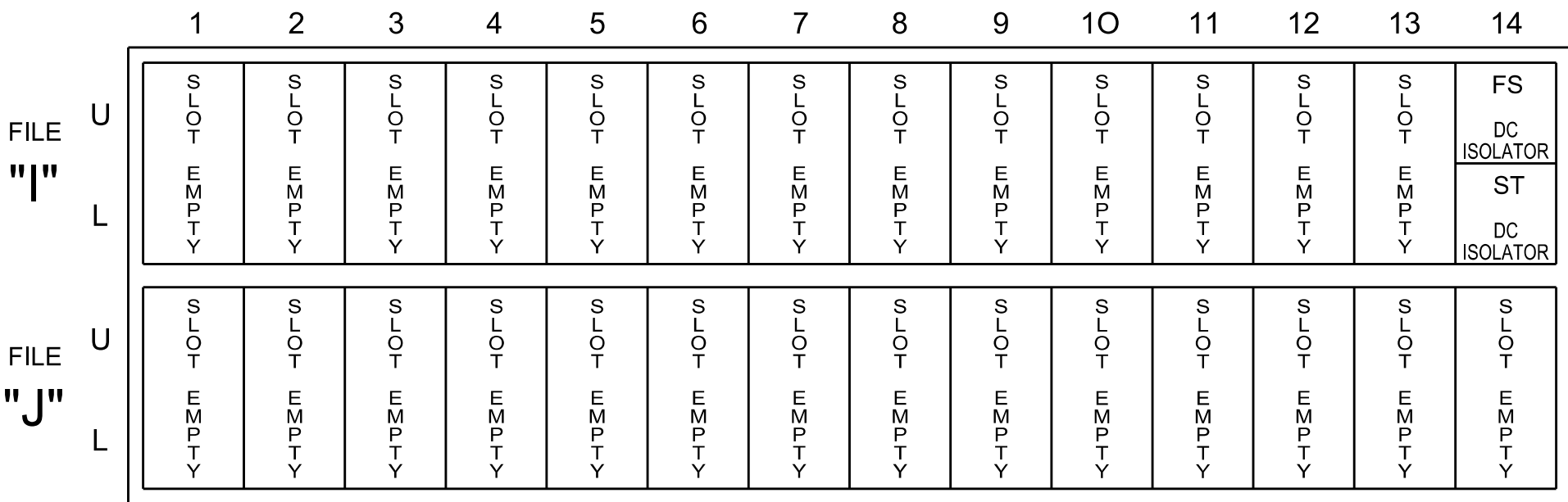
INPUT FILE CONNECTION & PROGRAMMING CHART

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	.	.	.	★	33★	1	15.0		X		X	
1B	-	-	-	★	125★	6	3.0		X		X	X
2A	.	.	.	★	49	1	15.0		X		X	
3A	.	.	.	★	34	2	15.0		X		X	
4A	-	-	-	★	126	8	3.0		X		X	
5A	.	.	.	★	44	4			X		X	
5B	.	.	.	★	35★	5	15.0		X		X	
6A	-	-	-	★	127★	2	3.0		X		X	X
7A	.	.	.	★	51	5	15.0		X		X	
8A	-	-	-	★	54	6			X		X	
				★	36	7	15.0		X		X	
				★	128	4	3.0		X		X	
				★	60	8			X		X	

- * For the detectors to work as shown on the signal plan see the Detector Programming Detail for Alternate Phasing on Sheet 2 of this plan.
* For Input Point numbers, see SDLC Non-Intrusive Detection Chart detail on this sheet.

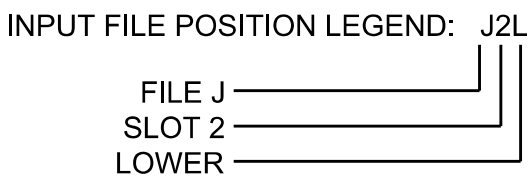
INPUT FILE POSITION LAYOUT

(front view)



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

FS = FLASH SENSE
ST = STOP TIME



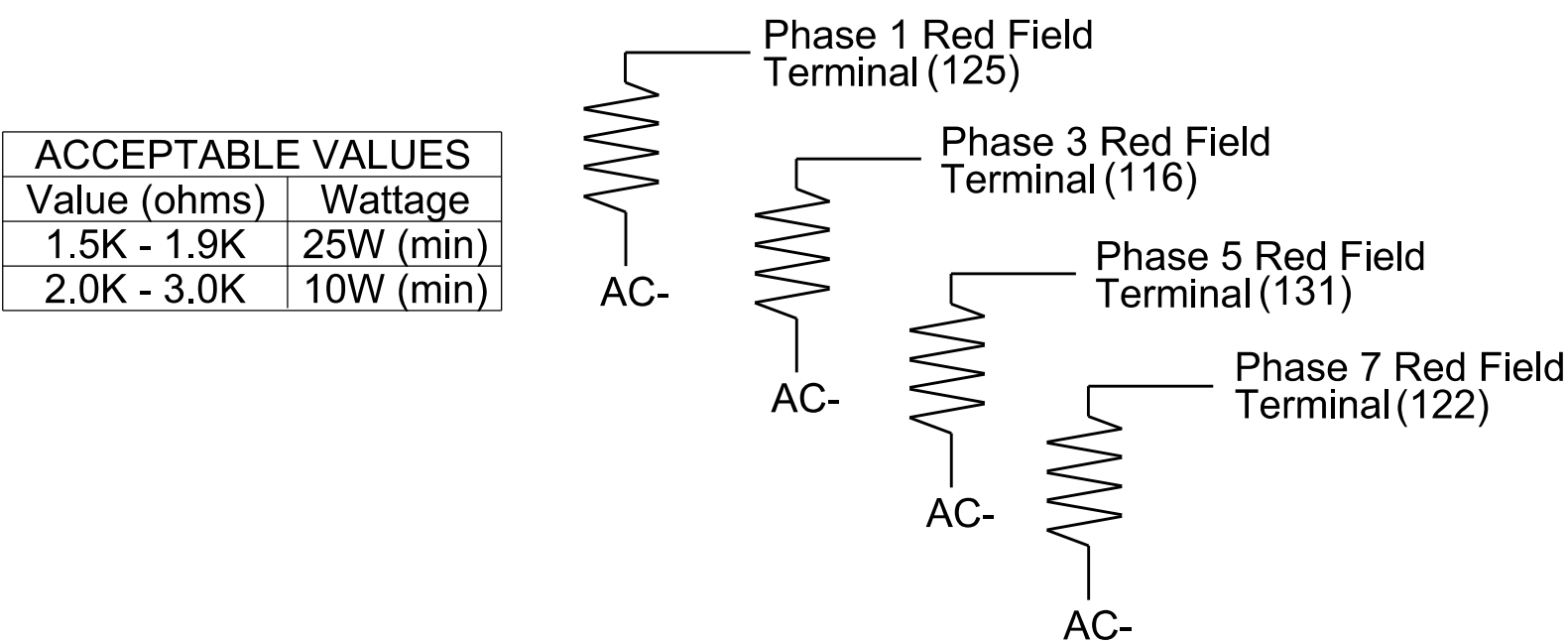
SDLC NON-INTRUSIVE DETECTION CHART

Input Point	Detector Rack #3		Detector Rack #4	
	Det # (Index)	Detector Zone	Det # (Index)	Detector Zone
1	33	1A	49	1B
2	34	3A	50	NU
3	35	5A	51	5B
4	36	7A	52	NU
5	37	NU	53	NU
6	38	2A	54	6A
7	39	NU	55	NU
8	40	NU	56	NU
9	41	NU	57	NU
10	42	NU	58	NU
11	43	NU	59	NU
12	44	4A	60	8A
13	45	NU	61	NU
14	46	NU	62	NU
15	47	NU	63	NU
16	48	NU	64	NU

NU = Not Used

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)



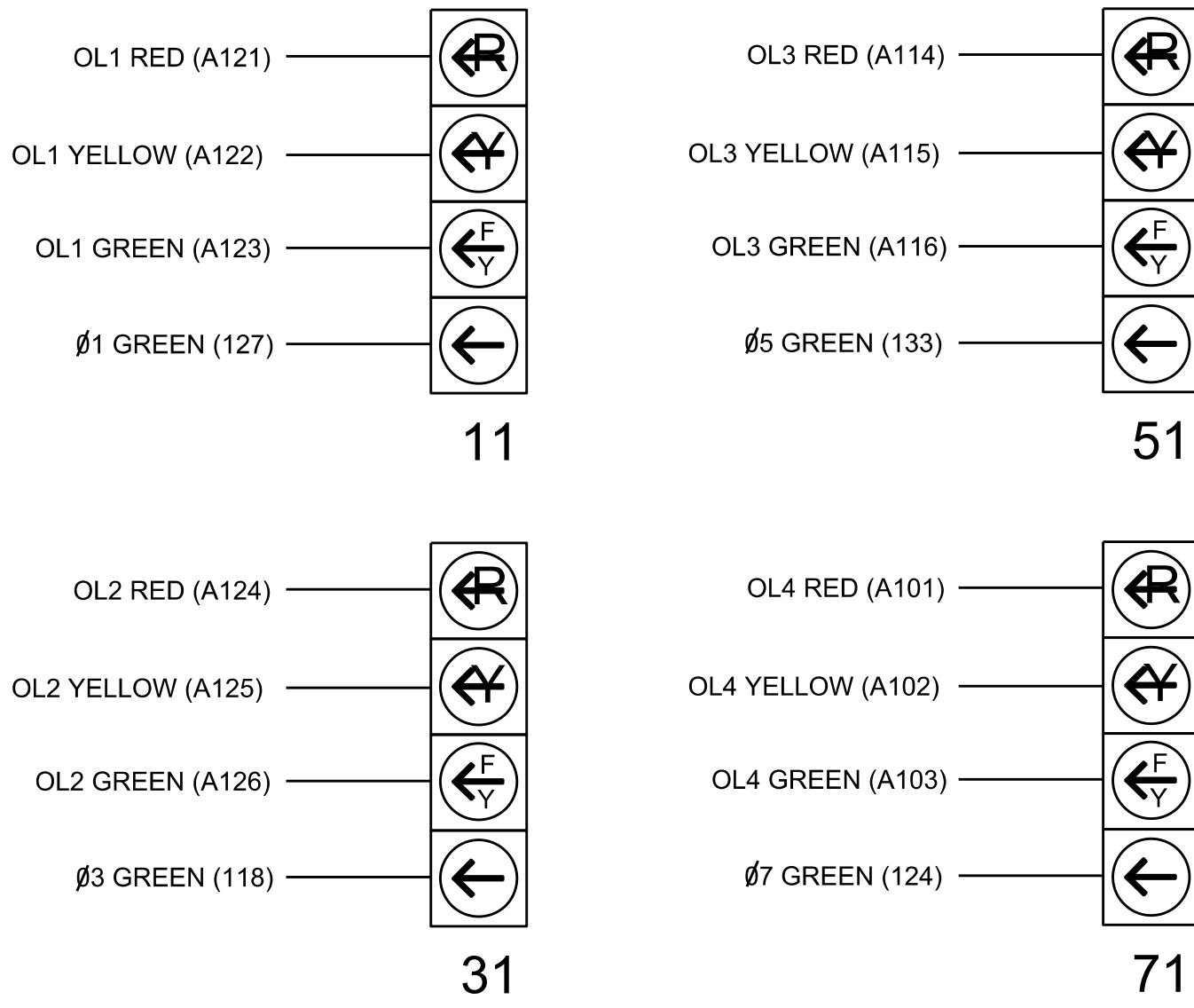
ACCEPTABLE VALUES	
Value (ohms)	Wattage
1.5K - 1.9K	25W (min)
2.0K - 3.0K	10W (min)

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)



THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 10-1686T2
DESIGNED: June 2026
SEALED: 07-10-2026
REVISED: N/A

Electrical Detail - Sheet 1 of 3

Electrical and Programming Details For:
Prepared in the Offices of:
750 N. Greenfield Pkwy, Garner, NC 27529

NC 73 (Sam Furr Rd)
at
SR 2316 / SR 2141
(Northcross Dr)
Division 10 Mecklenburg County Huntersville
PLAN DATE: July, 2026
REVIEWED BY: Z Wang
PREPARED BY: K Hector
REVIEWED BY:
REVISIONS
INIT.
DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER
SEAL 039071
K. Hector
7/10/2026
DATE
SIG. INVENTORY NO. 10-1686T2

7/9/2025
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11:09:59 PM

MAXTIME ALTERNATE PHASING ACTIVATION DETAIL

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

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

ALTERNATE PHASING CHANGE SUMMARY

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

OVERLAP PLAN 2: Modifies overlap included phases
for heads 11 and 51 to
run protected turns only.

VEH DET PLAN 2: Disables phase 6 call on detection zone 1A
and reduces delay time for phase 1
call on detection zone 1A to 3 seconds.

Disables phase 2 call on detection zone 5A
and reduces delay time for phase 5
call on detection zone 5A to 3 seconds.

MAXTIME ALTERNATE PHASING PATTERN
PROGRAMMING DETAIL

Front Panel
Main Menu >Controller >Coordination >Patterns

Web Interface
Home >Controller >Coordination >Patterns

Pattern Parameters

Pattern	Veh Det Plan	Overlap Plan
*	2	2

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

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.

MAXTIME DETECTOR PROGRAMMING DETAIL
FOR ALTERNATE PHASING LOOPS 1A & 5A

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

Web Interface
Home >Controller >Detector Configuration >Vehicle Detectors

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

Plan 2

Detector	Call Phase	Delay
33	1	3.0
125	0	0.0

1A

Detector	Call Phase	Delay
35	5	3.0
127	0	0.0

5A

MAXTIME OVERLAP PROGRAMMING DETAIL
FOR DEFAULT PHASING

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

Overlap Plan 1

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

MAXTIME OVERLAP PROGRAMMING DETAIL
FOR ALTERNATE PHASING

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

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

Overlap Plan 2

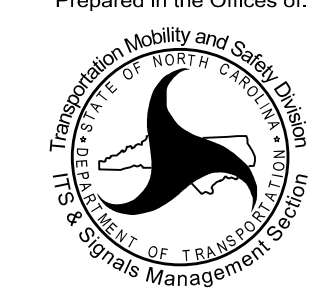
Overlap	1	2	3	4
Type	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section
Included Phases	-	4	-	8
Modifier Phases	1	3	5	7
Modifier Overlaps	-	-	-	-
Trail Green	0	0	0	0
Trail Yellow	0.0	0.0	0.0	0.0
Trail Red	0.0	0.0	0.0	0.0
FYA Ped Delay	0.0	0.0	0.0	0.0

NOTICE
INCLUDED
PHASE

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 10-1686T2
DESIGNED: June 2026
SEALED: 07-10-2026
REVISED: N/A

Electrical Detail - Sheet 2 of 3

DOCUMENT NOT CONSIDERED
FINAL UNLESS ALL
SIGNATURES COMPLETED

Electrical and Programming Details For:	NC 73 (Sam Furr Rd) at SR 2316 / SR 2141 (Northcross Dr)	SEAL	
Prepared in the Offices of:	Division 10 Mecklenburg County Huntersville		
	PLAN DATE: July, 2026		REVIEWED BY: Z Wang
	PREPARED BY: K Hector		REVIEWED BY:
	REVISIONS		
	INIT. DATE		
750 N. Greenfield Pkwy, Garner, NC 27529		DATE	
		SIG. INVENTORY NO. 10-1686T2	

 HDR Engineering, Inc. of the Carolinas
555 Fayetteville St, Suite 900, Raleigh, N.C. 27601
N.C.B.E.L.S. License Number: F-0116

MAXTIME STARTUP AND SOFTWARE FLASH
PROGRAMMING DETAIL

Front Panel
Main Menu >Controller >Unit

Web Interface
Home >Controller >Unit

Modify parameters as shown below and save changes.

Start Up Parameters

StartUp Clearance Hold
6

Unit Flash Parameters

All Red Flash Exit Time
6

LOGIC PROCESSOR PROGRAMMING

Front Panel
Main Menu >Controller >More >User Programs >Definition

Web Interface
Home >Controller >User Programs Configuration >User Programs Definition

Program 1

Statement	Result	Index	Operation	Parameter A	Index	Parameter B	Index	Delay	Ext
1	Veh Detector Call	125	Is Module A input B ON	Number	2	Number	1	0.0	0.0
2	Veh Detector Call	126	Is Module A input B ON	Number	2	Number	2	0.0	0.0
3	Veh Detector Call	127	Is Module A input B ON	Number	2	Number	3	0.0	0.0
4	Veh Detector Call	128	Is Module A input B ON	Number	2	Number	4	0.0	0.0

LOGIC STATEMENT DESCRIPTION

Statement 1 Description: Mirrors vehicle detector 33 to vehicle detector 125

Statement 2 Description: Mirrors vehicle detector 34 to vehicle detector 126

Statement 3 Description: Mirrors vehicle detector 35 to vehicle detector 127

Statement 4 Description: Mirrors vehicle detector 36 to vehicle detector 128

OUTPUT CHANNEL CONFIGURATION

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

Web Interface
Home >Controller >Advanced IO>Channels>Channel 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	8				16
17	Overlap	5		X	X	17
18	Overlap	6		X		18

SPECIAL DETECTION IO MODULE PROGRAMMING

The Enhanced Out of Pavement Detection requires adjustments to the IO Modules in use. Follow the programming instructions below to ensure desired operation.

Front Panel
Main Menu >Controller >More >Advanced IO >IO Modules

Web Interface
Home >Controller >Advanced IO >Cabinet Configuration >IO Modules

IO Module	Type	Fault Response
1	Caltrans 332	Default
2	TS2 DR3 BIU	Default
3	TS2 DR4 BIU	Default
4	TS2 MMU	Default

Advanced Cabinet Options

☒ Disable TS2 Cabinet Alarms

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 10-1686T2
DESIGNED: June 2026
SEALED: 07-10-2026
REVISED: N/A

Electrical Detail - Sheet 3 of 3

DOCUMENT NOT CONSIDERED
FINAL UNLESS ALL
SIGNATURES COMPLETED

Electrical and Programming
Details For:

Prepared in the Offices of:

Seal of the State of North Carolina

Department of Transportation

Division of Traffic Management

Seal of the State of North Carolina

Department of Transportation

Division of Traffic Management

NC 73 (Sam Furr Rd)
at
SR 2316 / SR 2141
(Northcross Dr)

Division 10 Mecklenburg County Huntersville

PLAN DATE: July, 2026REVIEWED BY: Z Wang

PREPARED BY: K HectorREVIEWED BY:

REVISIONS

INIT. DATE

DATE

Seal of the State of North Carolina

Professional Engineer
SEAL
039071
KARL E. HEC

7/10/2026

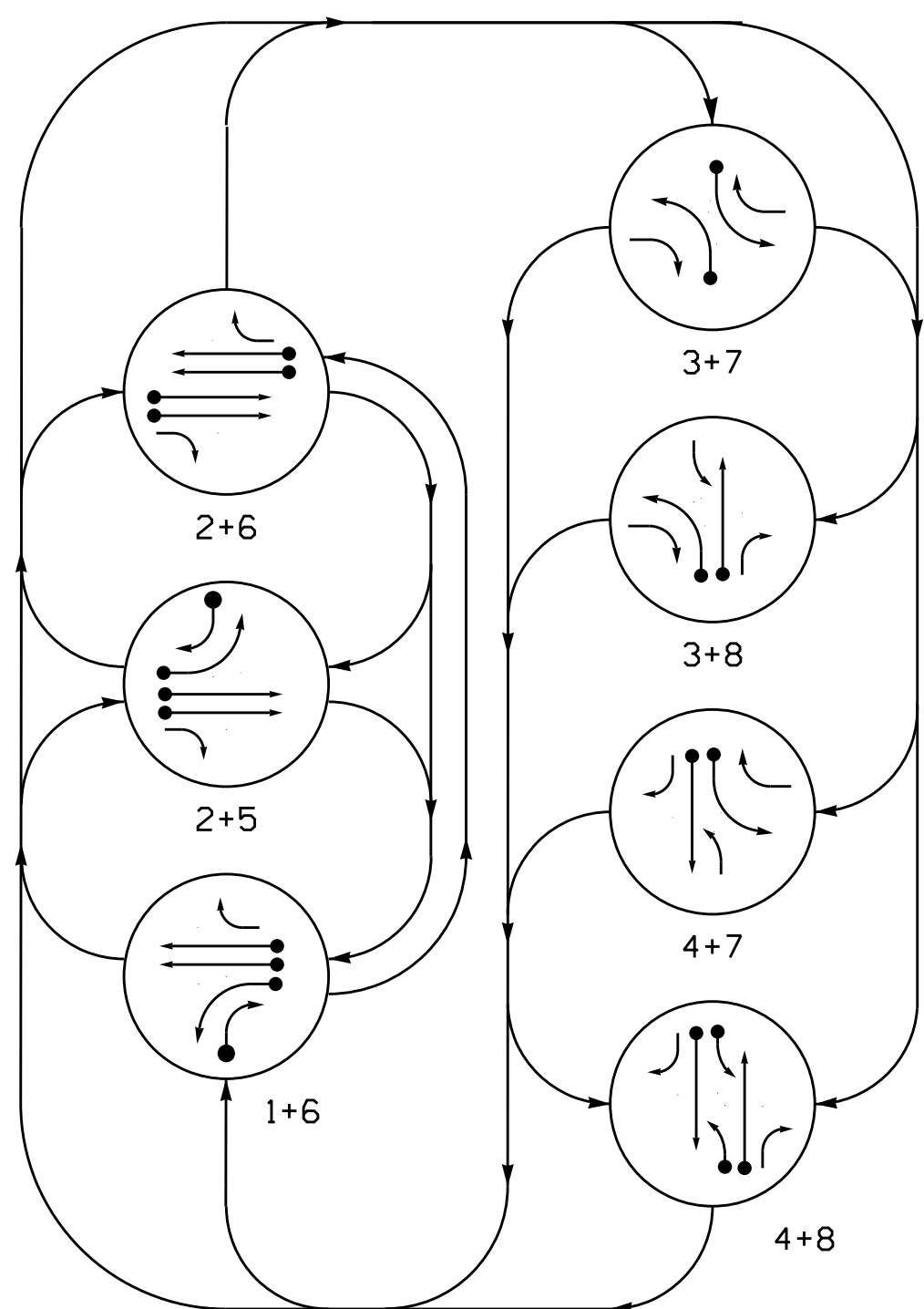
DATE

SIG. INVENTORY NO. 10-1686T2

7 Phase
Fully Actuated
Signal System #: D10-43_Huntersville
NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2024 and "Standard Specifications for Roads and Structures" dated January 2024.
2. Do not program signal for late night operation unless otherwise directed by the Engineer.
3. The order of phase 1 and phase 5 may be reversed, but phase 1 and phase 5 shall not operate simultaneously.
4. Reposition existing signal heads numbered # 21,22, 31,41,42,61,62,71,81,82.
5. Set all detector units to presence mode.
6. The Division Traffic Engineer will determine the hours of use for each phasing plan.
7. This intersection uses multi-zone microwave detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.
8. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
9. See traffic control plans for stop line and crosswalk placement.

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

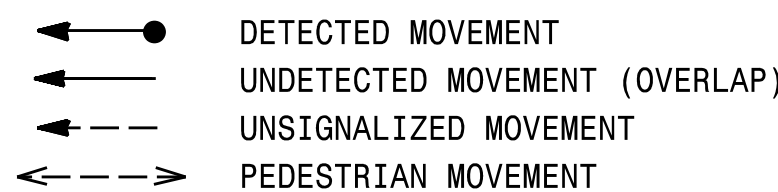
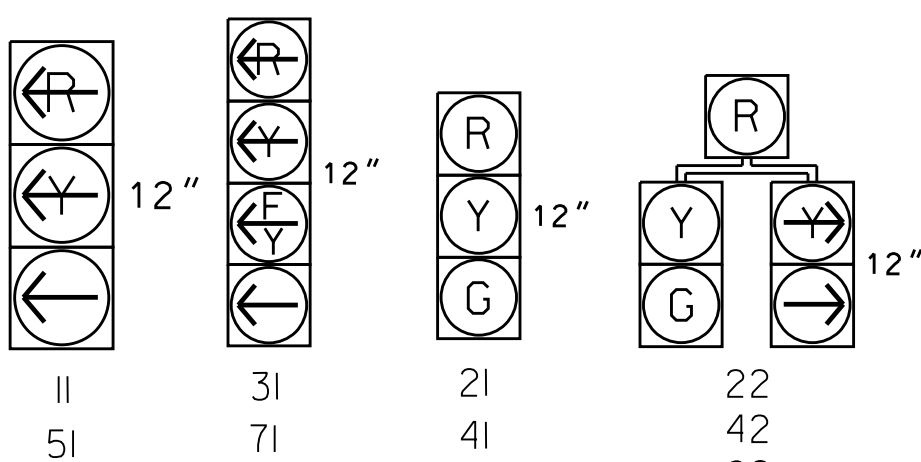


TABLE OF OPERATION

SIGNAL FACE	PHASE							
	1 + 6	2 + 5	2 + 6	3 + 7	3 + 8	4 + 7	4 + 8	F L A S H
11	→	←	←	→	→	→	→	→
21	R	G	G	R	R	R	R	R
22	R	G	G	R	R	R	R	R
31	←	→	→	←	←	←	←	←
41	R	R	R	R	R	G	G	R
42	R	R	R	R	R	G	G	R
51	←	←	←	←	←	←	←	←
61	G	R	G	R	R	R	R	R
62	G	R	G	R	R	R	R	R
71	R	R	←	←	←	←	←	←
81	R	R	R	R	G	G	G	R
82	R	R	R	R	G	G	G	R

SIGNAL FACE I.D.

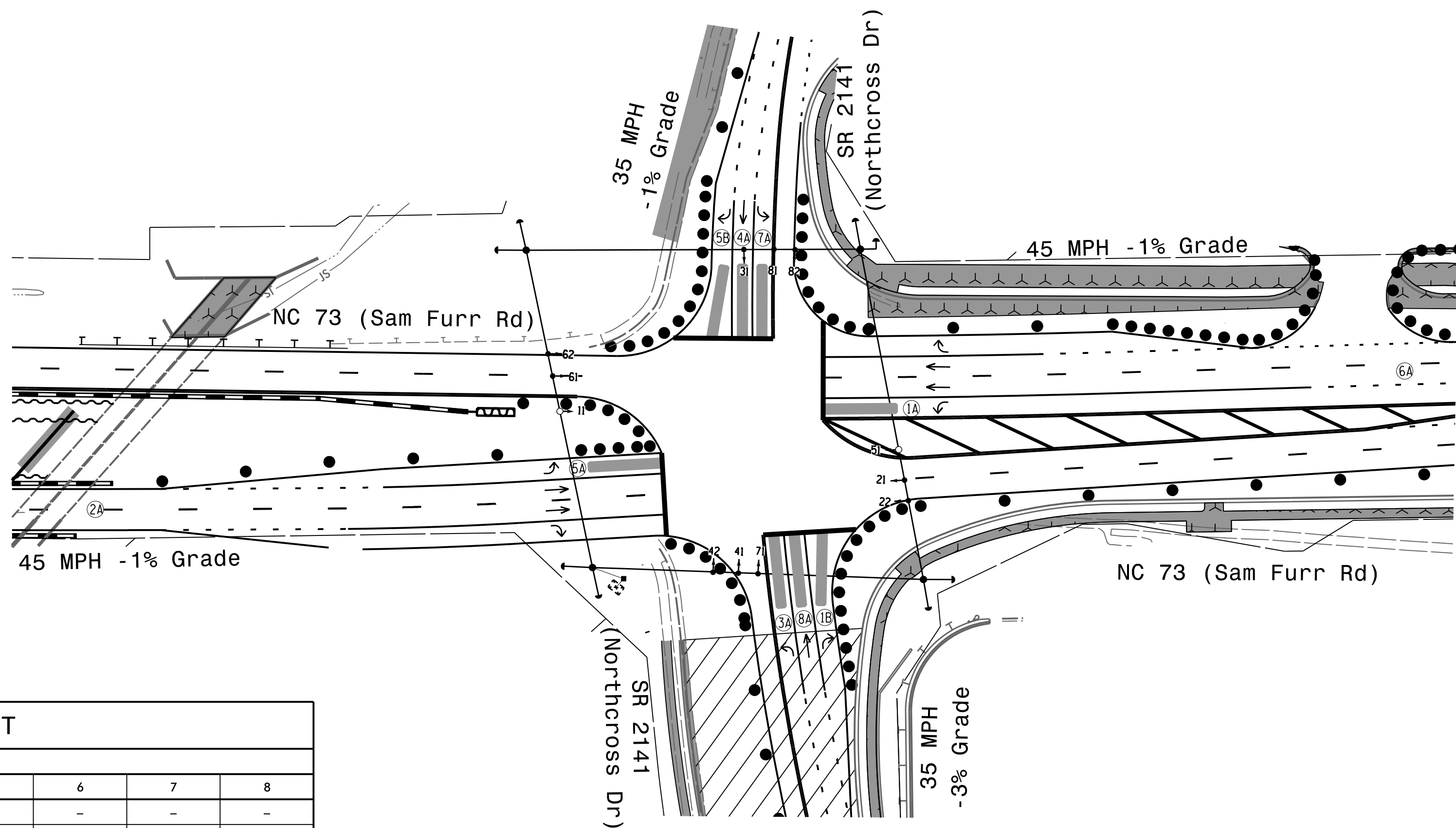
All Heads L.E.D.



MAXTIME DETECTOR INSTALLATION CHART

DETECTOR					PROGRAMMING							
DETECTOR ZONE	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
1A	*	*	*	*	1	-	-	X	-	X	-	*
1B	*	*	*	*	1	15.0	-	X	-	X	-	*
2A	*	*	*	*	2	-	-	X	-	X	-	*
3A	*	*	*	*	3	15.0	-	X	-	X	-	*
					8	3.0	-	X	-	X	-	*
4A	*	*	*	*	4	-	-	X	-	X	-	*
5A	*	*	*	*	5	15.0	-	X	-	X	-	*
5B	*	*	*	*	5	15.0	-	X	-	X	-	*
6A	*	*	*	*	6	-	-	X	-	X	-	*
7A	*	*	*	*	7	15.0	-	X	-	X	-	*
					4	3.0	-	X	-	X	-	*
8A	*	*	*	*	8	-	-	X	-	X	-	*

* Multi-zone Microwave Detection



MAXTIME TIMING CHART

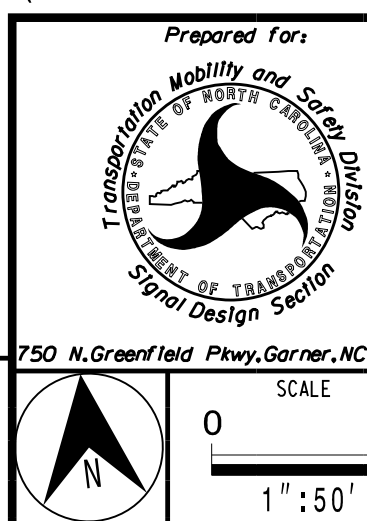
FEATURE	PHASE							
	1	2	3	4	5	6	7	8
Walk *	–	–	–	–	–	–	–	–
Ped Clear	–	–	–	–	–	–	–	–
Min Green *	7	12	7	7	7	12	7	7
Passage *	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Max l *	20	90	15	35	20	90	15	35
Yellow Change	3.2	4.6	3.3	4.1	3.2	4.6	3.2	4.1
Red Clear	2.2	1.6	2.6	2.3	2.9	1.6	2.5	2.3
Added Initial *	–	–	–	–	–	–	–	–
Maximum Initial *	–	–	–	–	–	–	–	–
Time Before Reduction *	–	–	–	–	–	–	–	–
Time To Reduce *	–	–	–	–	–	–	–	–
Minimum Gap	–	–	–	–	–	–	–	–
Advance Walk	–	–	–	–	–	–	–	–
Non Lock Detector	X	–	X	X	X	–	X	X
Vehicle Recall	–	MIN RECALL	–	–	–	MIN RECALL	–	–
Dual Entry	–	–	–	X	–	–	–	X

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

Microwave Detection System

FUNCTION	Sensor 1 (2A)		Sensor 2 (6A)	
Channel	1		2	
Phase	2		6	
Direction of Travel	EB		WB	
Type	Priority		Priority	
Level	2	QUEUE	2	QUEUE
Discovery Zone (ft)	<750	-	<750	-
Range (ft)	600-100	150-100	600-100	150-100
Enable Speed	Y	Y	Y	Y
Speed Range (mph)	35-100	1-35	35-100	1-35
Enable Estimated Time of Arrival	Y	N	Y	N
Estimated Time of Arrival (sec)	2.5-6.5	-	2.5-6.5	-

Temporary Design #3
(TMP Phase 1 Step 3)



NC 73 (Sam Furr Rd)
at
SR 2316 / SR 2141
(Northcross Dr)

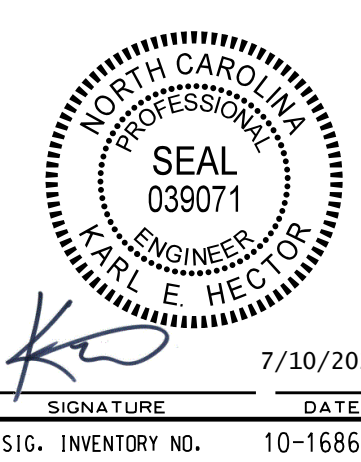
Division 10 Mecklenburg County		Huntersville
PLAN DATE:	July 2026	REVIEWED BY: Z Wang

PREPARED BY: K Hector		RKA PROJ. No.:	
REVISIONS		INIT.	DATE

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SIGNATURES COMPLETED

SEAL



7/10/20

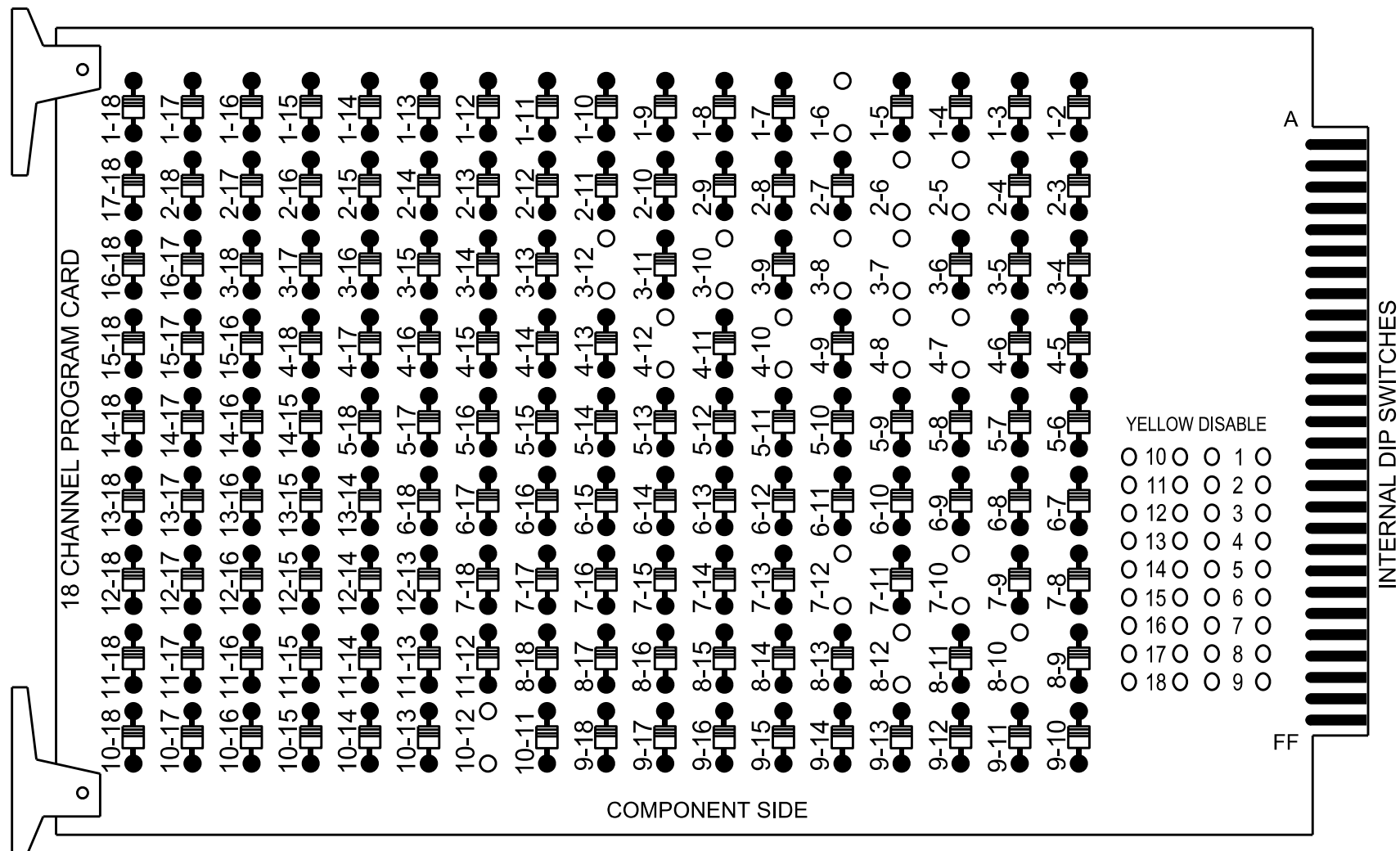
SIGNATURE _____ DATE _____

SIG. INVENTORY NO. 10-1686

18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 1-6, 2-5, 2-6, 3-7, 3-8, 3-10, 3-12, 4-7, 4-8, 4-10, 4-12, 7-10, 7-12, 8-10, 8-12 and 10-12



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.

NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the signal plan.
- Program phases 4 and 8 for Dual Entry .
- Program controller to start up in phase 2 Green No Walk and 6 Green No Walk.
- If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
- The cabinet and controller are part of the Signal System #: D10-43_Huntersville.

EQUIPMENT INFORMATION

Controller.....2070LX
Cabinet.....332 w/ Aux
Software.....Q-Free MAXTIME
Cabinet Mount.....Base
Output File Positions.....18 With Aux. Output File
Load Switches Used.....S1, S2, S4, S5, S7, S8, S10, S11,AUX S2, AUX S5
Phases Used.....1, 2, 3, 4, 5, 6, 7, 8
Overlap "1".....NOT USED
Overlap "2".....*
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	82	21,22	31*	22	41,42	51	42	61,62	71*	62	81,82	NU	31*	NU	NU	71*	NU
RED			128		*	101			134		*	107						
YELLOW			129			102			135			108						
GREEN			130			103			136			109						
RED ARROW	125							131						A124			A101	
YELLOW ARROW	126	126			117			132	132			123		A125			A102	
FLASHING YELLOW ARROW														A126			A103	
GREEN ARROW	127	127		118	118			133	133			124	124					

* 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	-	-	-	*	33	1	15.0		X		X	
1B	-	-	-	*	49	1	15.0		X		X	
2A	-	-	-	*	38	2			X		X	
3A	-	-	-	*	34	3	15.0		X		X	
4A	-	-	-	*	128	8	3.0		X		X	
5A	-	-	-	*	44	4			X		X	
5A	-	-	-	*	35	5	15.0		X		X	
5B	-	-	-	*	51	5	15.0		X		X	
6A	-	-	-	*	54	6			X		X	
7A	-	-	-	*	36	7	15.0		X		X	
8A	-	-	-	*	128	4	3.0		X		X	
8A	-	-	-	*	60	8			X		X	

* For Input Point numbers, see SDLC Non-Intrusive Detection Chart detail on this sheet.

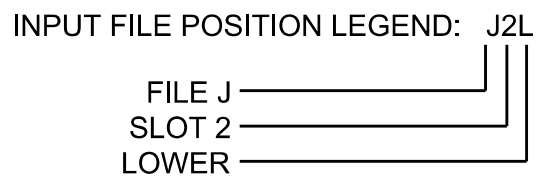
INPUT FILE POSITION LAYOUT

(front view)

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

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

FS = FLASH SENSE
ST = STOP TIME



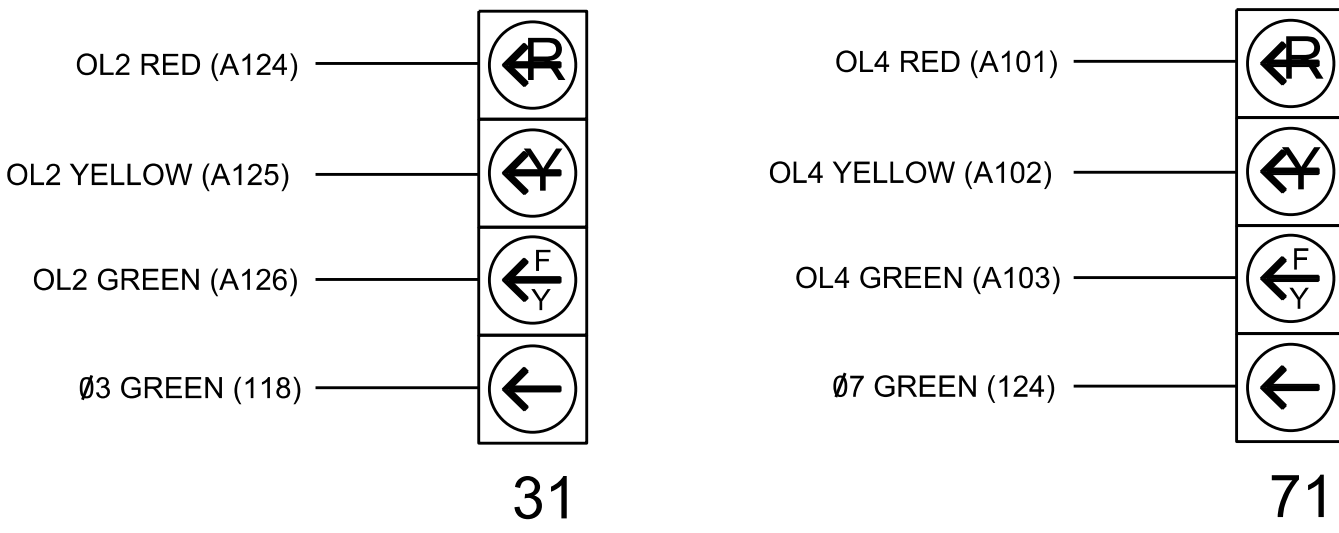
SDLC NON-INTRUSIVE DETECTION CHART

Input Point	Detector Rack #3		Detector Rack #4	
	Det # (Index)	Detector Zone	Det # (Index)	Detector Zone
1	33	1A	49	1B
2	34	3A	50	NU
3	35	5A	51	5B
4	36	7A	52	NU
5	37	NU	53	NU
6	38	2A	54	6A
7	39	NU	55	NU
8	40	NU	56	NU
9	41	NU	57	NU
10	42	NU	58	NU
11	43	NU	59	NU
12	44	4A	60	8A
13	45	NU	61	NU
14	46	NU	62	NU
15	47	NU	63	NU
16	48	NU	64	NU

NU = Not Used

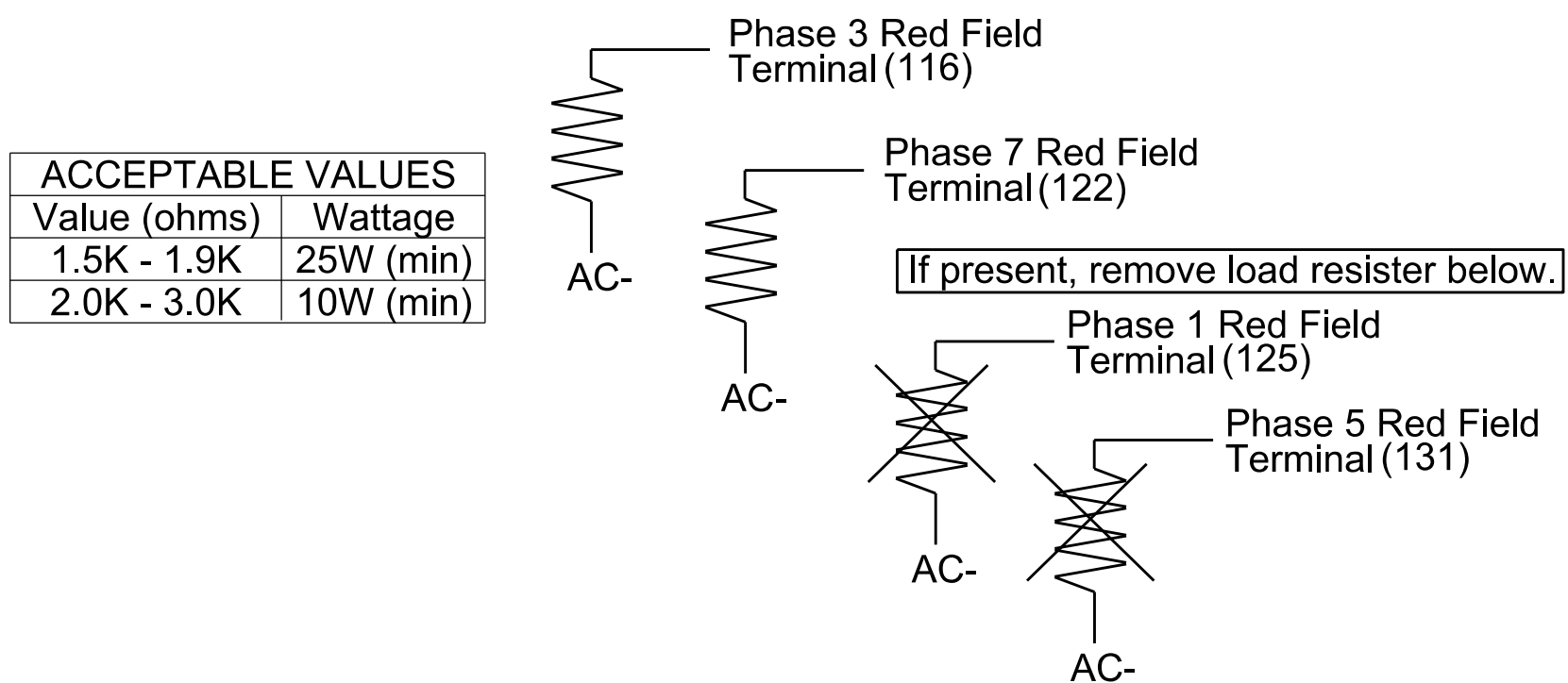
FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)



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.

HDR Engineering, Inc. of the Carolinas
555 Fayetteville St, Suite 900 Raleigh, N.C. 27601
N.C.B.E.L.S. License Number: F-0116

Electrical Detail - Sheet 1 of 2

Electrical and Programming Details For:

750 N. Greenfield Pkwy, Garner, NC 27529

Prepared in the Offices of:

750 N. Greenfield Pkwy, Garner, NC 27529

NC 73 (Sam Furr Rd)
at
SR 2316 / SR 2141
(Northcross Dr)
Division 10 Mecklenburg County Huntersville
PLAN DATE: July, 2026
DESIGNED: June 2026
PREPARED BY: K Hector
REVIEWED BY: Z Wang
REVISIONS
INIT. DATE
10-1686T3

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER
SEAL 039071
K. HEC
7/10/2026
DATE
SIG. INVENTORY NO.

7/9/2026
D:\4**\Hector\user001\HQR_LIS_East_01\Documents\3322\10323293\4g-0_CAD\BIM\4g-2_WIP\Trcf\cse5\gna\8\5\sheet1a\Northcross Dr\10-1686T3_ELE.dgn
1:10:29 PM

LOGIC PROCESSOR PROGRAMMING

Front Panel
Main Menu >Controller >More >User Programs >Definition

Web Interface
Home >Controller >User Programs Configuration >User Programs Definition

Program 1

Statement	Result	Index	Operation	Parameter A	Index	Parameter B	Index	Delay	Ext
1	Veh Detector Call	126	Is Module A input B ON	Number	2	Number	2	0.0	0.0
2	Veh Detector Call	128	Is Module A input B ON	Number	2	Number	4	0.0	0.0

LOGIC STATEMENT DESCRIPTION

Statement 1 Description: Mirrors vehicle detector 34 to vehicle detector 126

Statement 2 Description: Mirrors vehicle detector 36 to vehicle detector 128

MAXTIME STARTUP AND SOFTWARE FLASH PROGRAMMING DETAIL

Front Panel
Main Menu >Controller >Unit

Web Interface
Home >Controller >Unit

Modify parameters as shown below and save changes.

Start Up Parameters

StartUp Clearance Hold
6

Unit Flash Parameters

All Red Flash Exit Time
6

MAXTIME OVERLAP PROGRAMMING DETAIL FOR DEFAULT PHASING

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

Overlap Plan 1

Overlap	1	2	3	4
Type	Off	FYA 4 - Section	Off	FYA 4 - Section
Included Phases	-	4	-	8
Modifier Phases	-	3	-	7
Modifier Overlaps	-	-	-	-
Trail Green	0	0	0	0
Trail Yellow	0.0	0.0	0.0	0.0
Trail Red	0.0	0.0	0.0	0.0
FYA Ped Delay	0.0	0.0	0.0	0.0

OUTPUT CHANNEL CONFIGURATION

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

Web Interface
Home >Controller >Advanced IO>Channels>Channel 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	8				16
17	Overlap	5		X	X	17
18	Overlap	6		X		18

SPECIAL DETECTION IO MODULE PROGRAMMING

The Enhanced Out of Pavement Detection requires adjustments to the IO Modules in use. Follow the programming instructions below to ensure desired operation.

Front Panel
Main Menu >Controller >More >Advanced IO >IO Modules

Web Interface
Home >Controller >Advanced IO >Cabinet Configuration >IO Modules

IO Module	Type	Fault Response
1	Caltrans 332	Default
2	TS2 DR3 BIU	Default
3	TS2 DR4 BIU	Default
4	TS2 MMU	Default

Advanced Cabinet Options

☒ Disable TS2 Cabinet Alarms

FLASHER CIRCUIT MODIFICATION DETAIL

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

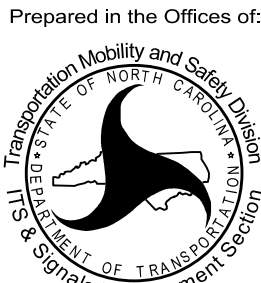
- ON REAR OF PDA - REMOVE WIRE FROM TERM. T2-4 AND TERMINATE ON T2-2.
- ON REAR OF PDA - REMOVE WIRE FROM TERM. T2-5 AND TERMINATE ON T2-3.
- REMOVE FLASHER UNIT 2.

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 10-1686T3
DESIGNED: June 2026
SEALED: 07-10-2026
REVISED: N/A

Electrical Detail - Sheet 2 of 2

Electrical and Programming
Details For:



750 N. Greenfield Pkwy, Garner, NC 27529

NC 73 (Sam Furr Rd)
at
SR 2316 / SR 2141
(Northcross Dr)

Division 10 Mecklenburg County Huntersville

PLAN DATE: July, 2026 REVIEWED BY: Z Wang

PREPARED BY: K Hector REVIEWED BY:

REVISIONS INIT. DATE

DOCUMENT NOT CONSIDERED
FINAL UNLESS ALL
SIGNATURES COMPLETED

SEAL



7/10/2026

DATE

SIG. INVENTORY NO. 10-1686T3

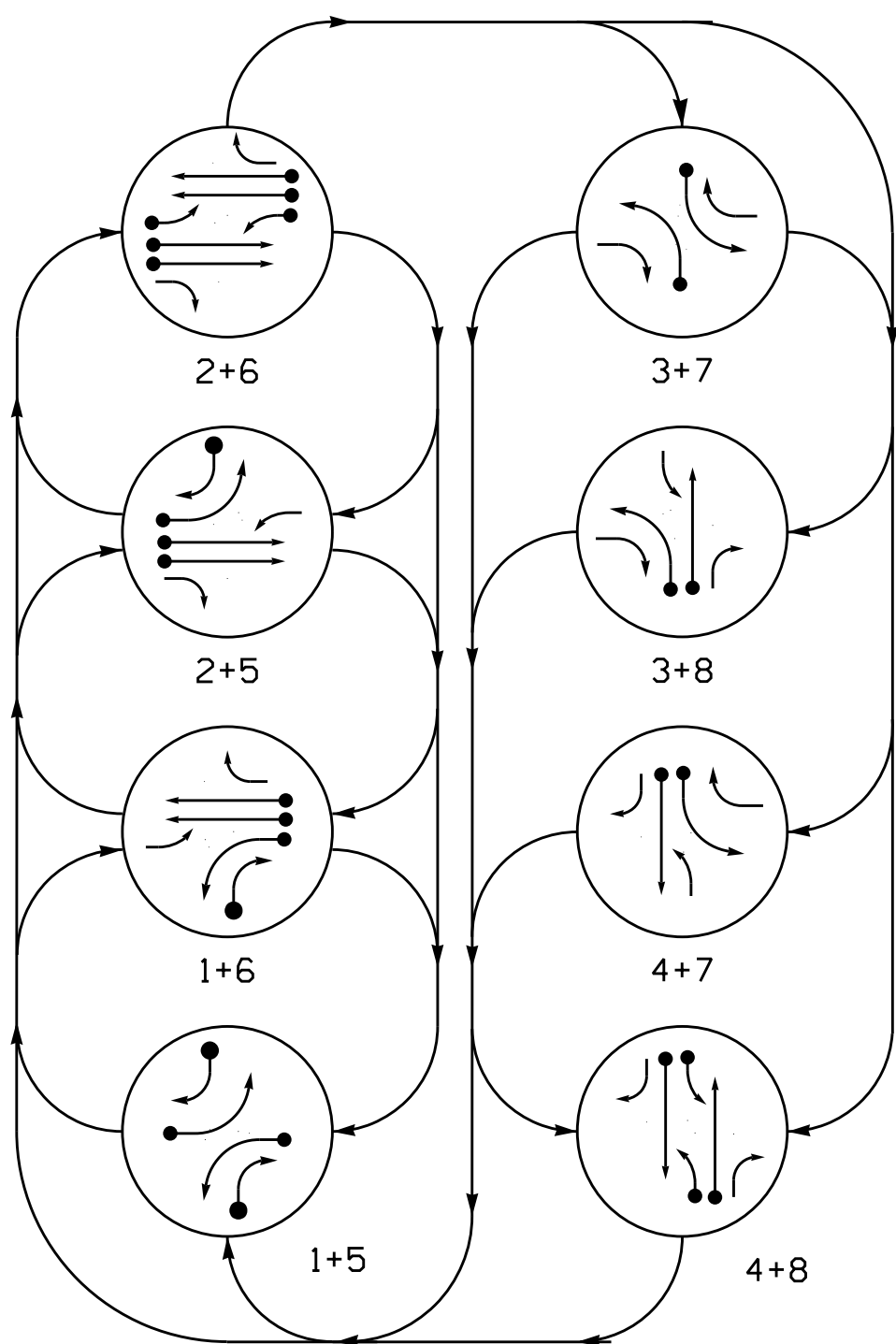


HDR Engineering, Inc. of the Carolinas
555 Fayetteville St, Suite 900, Raleigh, N.C. 27601
N.C.B.E.L.S. License Number: F-0116

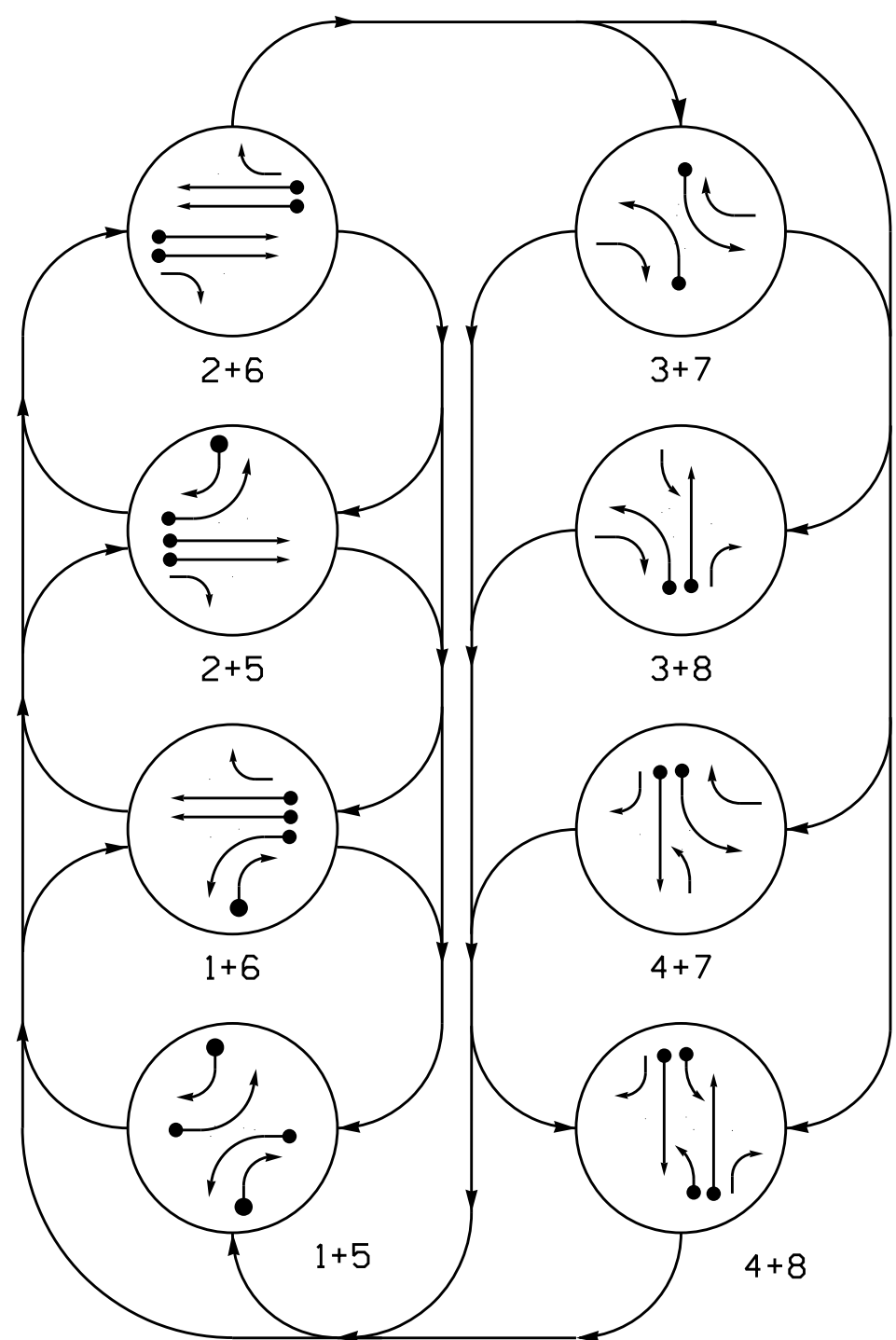
8 Phase
Fully Actuated
Signal System #: D10-43_Huntersville
NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2024 and "Standard Specifications for Roads and Structures" dated January 2024.
2. Do not program signal for late night operation unless otherwise directed by the Engineer.
3. Reposition existing signal heads numbered # 11,41,42, 61,62.
4. Set all detector units to presence mode.
5. The Division Traffic Engineer will determine the hours of use for each phasing plan.
6. This intersection uses multi-zone microwave detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.
7. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
8. See traffic control plans for stop line and crosswalk placement.

DEFAULT PHASING DIAGRAM



ALTERNATE PHASING DIAGRAM



DEFAULT PHASE TABLE OF OPERATION

SIGNAL FACE	PHASE								
	1 + 5	1 + 6	2 + 5	2 + 6	3 + 7	3 + 8	4 + 7	4 + 8	FLASH
11	←	←	$\frac{F}{Y}$	$\frac{F}{Y}$	→	→	→	→	→
21	R	R	G	G	R	R	R	R	R
22	R	R	G	G	$\frac{R}{Y}$	$\frac{R}{Y}$	R	R	R
31	→	→	→	→	←	←	$\frac{F}{Y}$	$\frac{F}{Y}$	→
41	R	R	R	R	R	R	G	G	R
42	$\frac{R}{Y}$	$\frac{R}{Y}$	$\frac{R}{Y}$	R	R	R	G	G	R
51	←	$\frac{F}{Y}$	←	$\frac{F}{Y}$	→	→	→	→	→
61	R	G	R	G	R	R	R	R	R
62	R	G	R	G	$\frac{R}{Y}$	$\frac{R}{Y}$	R	R	R
71	→	→	→	→	←	$\frac{F}{Y}$	←	$\frac{F}{Y}$	→
81	R	R	R	R	R	G	R	G	R
82	$\frac{R}{Y}$	$\frac{R}{Y}$	$\frac{R}{Y}$	R	R	G	R	G	R

ALTERNATE PHASE
TABLE OF OPERATION

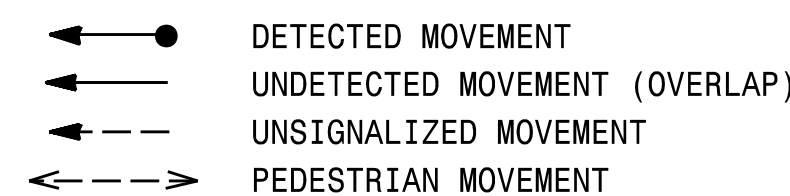
SIGNAL FACE	PHASE								
	1 + 5	1 + 6	2 + 5	2 + 6	3 + 7	3 + 8	4 + 7	4 + 8	F L A S H
11	←	←	→	→	→	→	→	→	
21	R	R	G	G	R	R	R	R	R
22	R	R	G	G	R	R	R	R	R
31	→	→	→	→	←	←	←	←	
41	R	R	R	R	R	R	G	G	R
42	R	R	R	R	R	R	G	G	R
51	←	←	←	←	→	→	→	→	
61	R	G	R	G	R	R	R	R	R
62	R	G	R	G	R	R	R	R	R
71	→	→	→	→	←	←	←	←	
81	R	R	R	R	R	G	G	G	R
82	R	R	R	R	R	G	G	G	R

MAXTIME DETECTOR INSTALLATION CHART

DETECTOR					PROGRAMMING							
DETECTOR ZONE	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
1A	*	*	*	*	1	15.0**	-	X	-	X	-	*
					6 #	3.0	-	X	-	X	X	*
1B	*	*	*	*	2	15.0	-	X	-	X	-	*
2A	*	*	*	*	1	-	-	X	-	X	-	*
					3	15.0	-	X	-	X	-	*
					8	3.0	-	X	-	X	-	*
4A	*	*	*	*	4	-	-	X	-	X	-	*
					5	15.0**	-	X	-	X	-	*
5A	*	*	*	*	2 #	3.0	-	X	-	X	X	*
5B	*	*	*	*	5	15.0	-	X	-	X	-	*
6A	*	*	*	*	6	-	-	X	-	X	-	*
					7	15.0	-	X	-	X	-	*
7A	*	*	*	*	4	3.0	-	X	-	X	-	*
8A	*	*	*	*	8	-	-	X	-	X	-	*

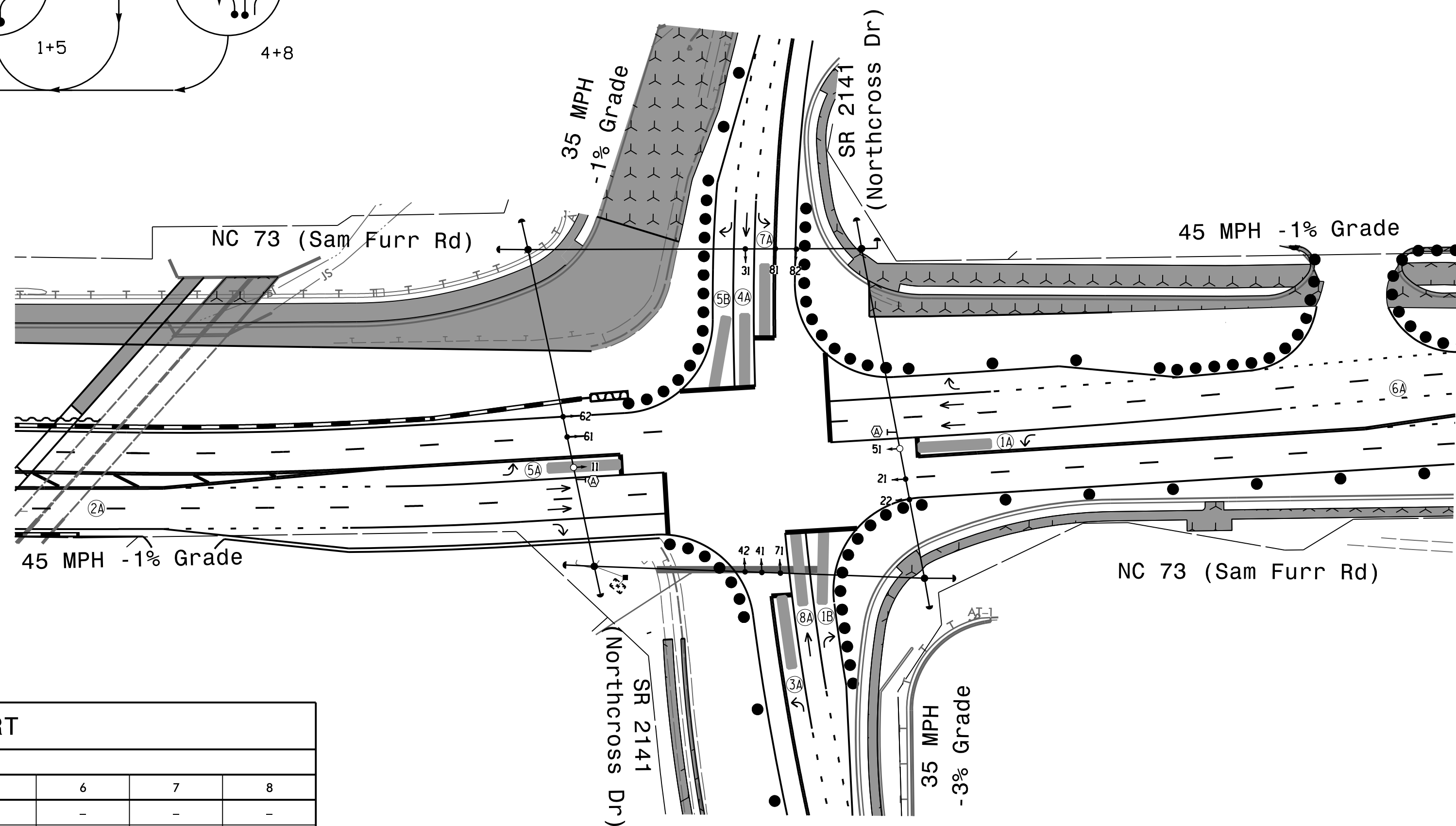
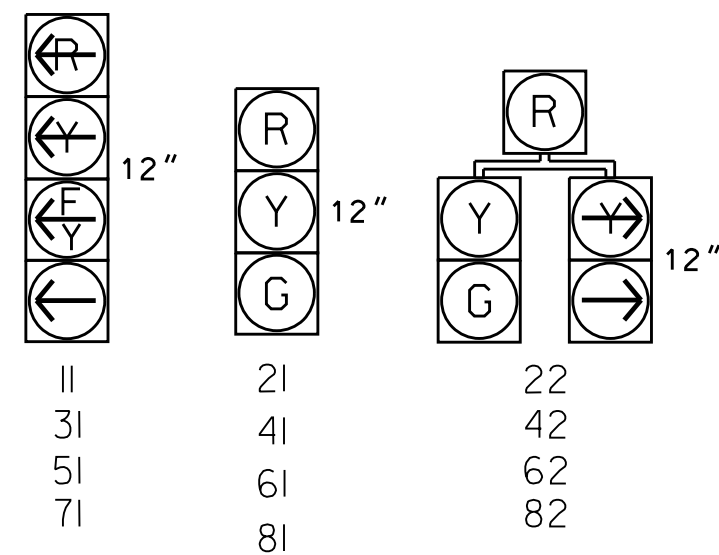
- * Multi-zone Microwave Detection.
- ** Reduce Delay to 3 Seconds During Alternative Phasing Operation.
- # Disable Delay During Alternate Phasing Operation.

PHASING DIAGRAM DETECTION LEGEND



SIGNAL FACE I.D.

All Heads L.E.D.



MAXTIME TIMING CHART

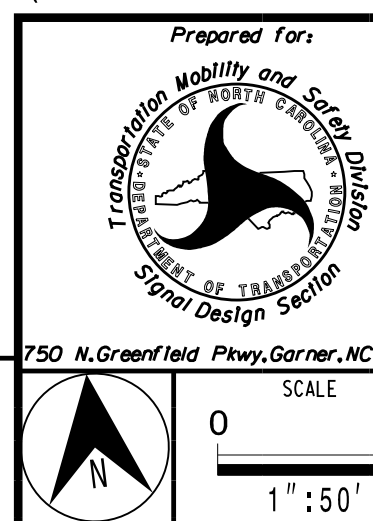
FEATURE	PHASE							
	1	2	3	4	5	6	7	8
Walk *	–	–	–	–	–	–	–	–
Ped Clear	–	–	–	–	–	–	–	–
Min Green *	7	12	7	7	7	12	7	7
Passage *	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Max 1 *	20	90	15	35	20	90	15	35
Yellow Change	3.2	4.6	3.3	4.1	3.2	4.6	3.2	4.1
Red Clear	2.8	1.6	2.8	2.0	2.8	1.6	2.6	2.0
Added Initial *	–	–	–	–	–	–	–	–
Maximum Initial *	–	–	–	–	–	–	–	–
Time Before Reduction *	–	–	–	–	–	–	–	–
Time To Reduce *	–	–	–	–	–	–	–	–
Minimum Gap	–	–	–	–	–	–	–	–
Advance Walk	–	–	–	–	–	–	–	–
Non Lock Detector	X	–	X	X	X	–	X	X
Vehicle Recall	–	MIN RECALL	–	–	–	MIN RECALL	–	–
Dual Entry	–	–	–	X	–	–	–	X

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

Microwave Detection System

FUNCTION	Sensor 1 (2A)		Sensor 2 (6A)	
Channel	1		2	
Phase	2		6	
Direction of Travel	EB		WB	
Type	Priority		Priority	
Level	2	QUEUE	2	QUEUE
Discovery Zone (ft)	<750	-	<750	-
Range (ft)	600-100	150-100	600-100	150-100
Enable Speed	Y	Y	Y	Y
Speed Range (mph)	35-100	1-35	35-100	1-35
Enable Estimated Time of Arrival	Y	N	Y	N
Estimated Time of Arrival (sec)	2.5-6.5	-	2.5-6.5	-

Temporary Design #4
(TMP Phase 1 Step 4)



NC 73 (Sam Furr Rd)
at
SR 2316 / SR 2141
(Northcross Dr)

Division 10 Mecklenburg County		Huntersville
PLAN DATE:	July 2026	REVIEWED BY: Z Wang

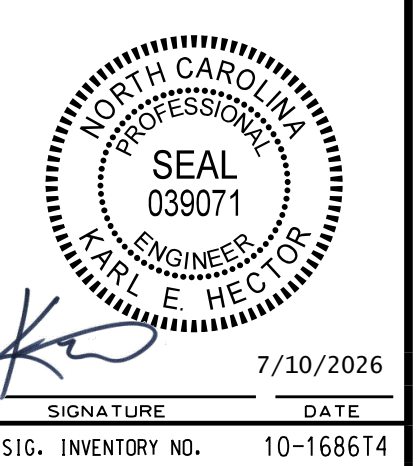
PREPARED BY:	K Hector	RKA PROJ. No.:
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REVISIONS

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DOCUMENT NOT CONSIDERED
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SIGNATURES COMPLETED

SEAL

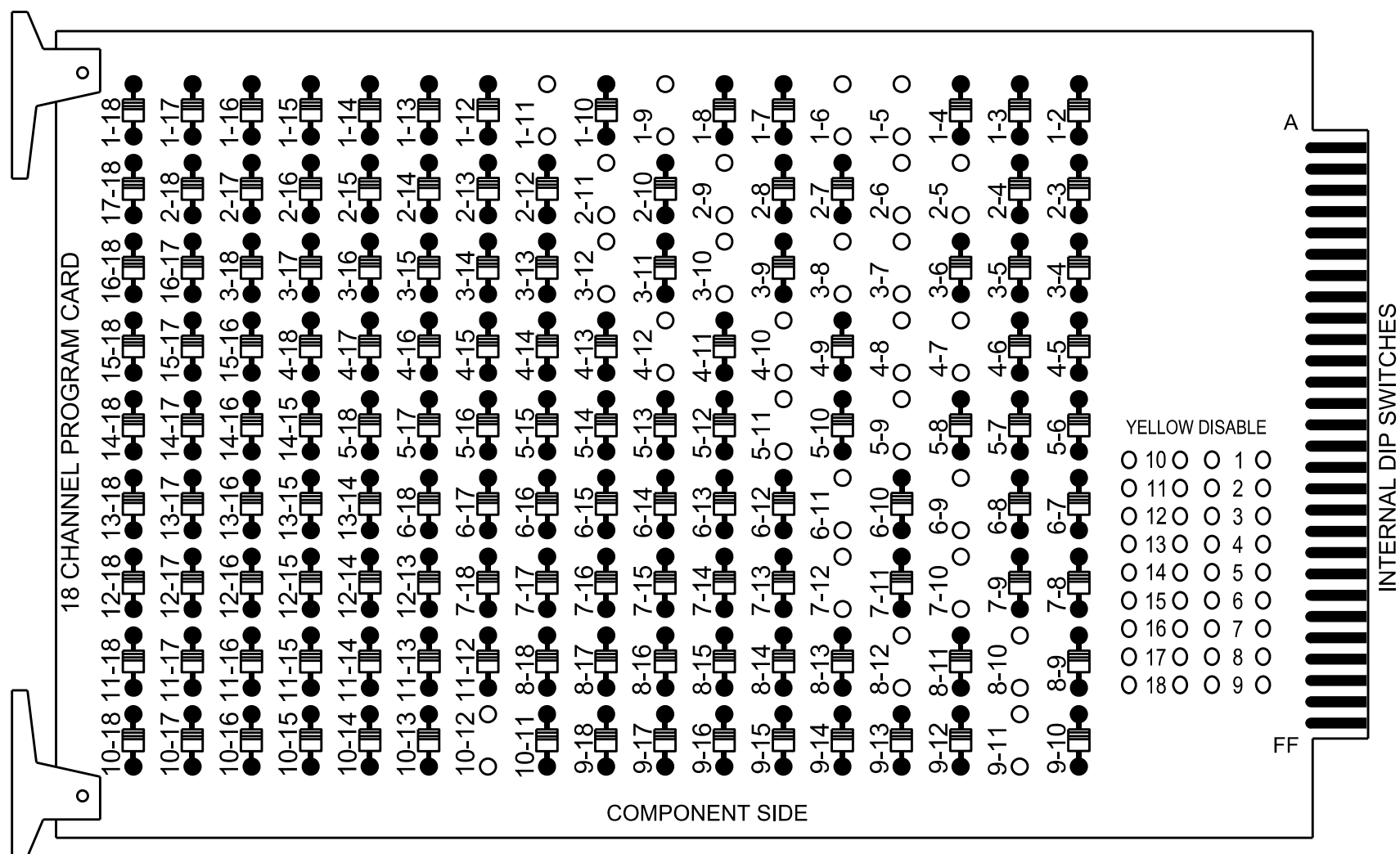


SIGNATURE	DATE
SIG. INVENTORY NO.	10-1686T4

18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

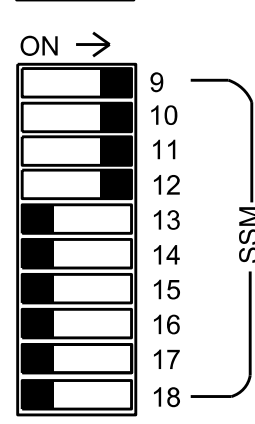
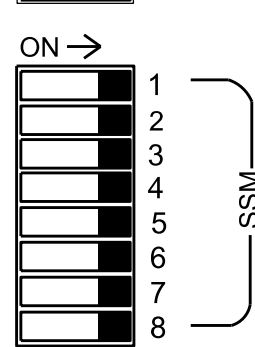
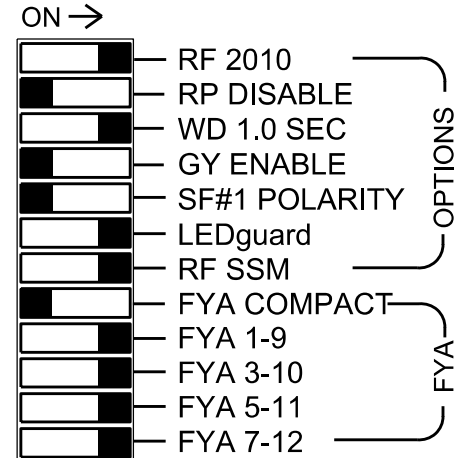
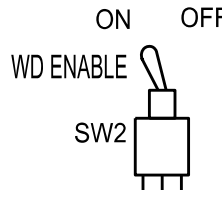
REMOVE DIODE JUMPERS 1-5, 1-6, 1-9, 1-11, 2-5, 2-6, 2-9, 2-11, 3-7, 3-8, 3-10, 3-12, 4-7, 4-8, 4-10, 4-12, 5-9, 5-11, 6-9, 6-11, 7-10, 7-12, 8-10, 8-12, 9-11 and 10-12



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 vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the signal plan.
- Program phases 4 and 8 for Dual Entry .
- Program controller to start up in phase 2 Green No Walk and 6 Green No Walk.
- If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
- The cabinet and controller are part of the Signal System #: D10-43_Huntersville.

EQUIPMENT INFORMATION

Controller.....2070LX
Cabinet.....332 w/ Aux
Software.....Q-Free MAXTIME
Cabinet Mount.....Base
Output File Positions.....18 With Aux. Output File
Load Switches Used.....S1, S2, S4, S5, S7, S8, S10, S11, AUX S1, AUX S2, AUX S4, AUX S5
Phases Used.....1, 2, 3, 4, 5, 6, 7, 8
Overlap "1".....*
Overlap "2".....*
Overlap "3".....*
Overlap "4".....*
*See overlap programming detail on sheet 2

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	.	.	.	*	33*	1	15.0		X		X	
1B	-	-	-	*	125*	6	3.0		X		X	X
2A	.	.	.	*	49	1	15.0		X		X	
3A	.	.	.	*	38	2			X		X	
4A	.	.	.	*	34	3	15.0		X		X	
5A	.	.	.	*	126	8	3.0		X		X	
6A	.	.	.	*	44	4			X		X	
7A	.	.	.	*	35*	5	15.0		X		X	
8A	.	.	.	*	127*	2	3.0		X		X	X
9A	.	.	.	*	51	5	15.0		X		X	
10A	.	.	.	*	54	6			X		X	
11A	.	.	.	*	36	7	15.0		X		X	
12A	.	.	.	*	128	4	3.0		X		X	
13A	.	.	.	*	60	8			X		X	

7/9/2026
D:***\Projects\011\HDR_US_East_01\Documents\3322\10323293\46-0_CAD\BIM\46-2_MIP\Traffic\Signal\Sheet14\Northcross Dr\10-1686T4_ELE.dgn
11:10:53 PM

MAXTIME ALTERNATE PHASING ACTIVATION DETAIL

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

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

ALTERNATE PHASING CHANGE SUMMARY

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

OVERLAP PLAN 2: Modifies overlap included phases
for heads 11 and 51 to
run protected turns only.

VEH DET PLAN 2: Disables phase 6 call on detection zone 1A
and reduces delay time for phase 1
call on detection zone 1A to 3 seconds.

Disables phase 2 call on detection zone 5A
and reduces delay time for phase 5
call on detection zone 5A to 3 seconds.

MAXTIME ALTERNATE PHASING PATTERN
PROGRAMMING DETAIL

Front Panel
Main Menu >Controller >Coordination >Patterns

Web Interface
Home >Controller >Coordination >Patterns

Pattern Parameters

Pattern	Veh Det Plan	Overlap Plan
*	2	2

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

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.

MAXTIME DETECTOR PROGRAMMING DETAIL
FOR ALTERNATE PHASING LOOPS 1A & 5A

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

Web Interface
Home >Controller >Detector Configuration >Vehicle Detectors

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

Plan 2

Detector	Call Phase	Delay
33	1	3.0
125	0	0.0

1A

Detector	Call Phase	Delay
35	5	3.0
127	0	0.0

5A

MAXTIME OVERLAP PROGRAMMING DETAIL
FOR DEFAULT PHASING

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

Overlap Plan 1

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

MAXTIME OVERLAP PROGRAMMING DETAIL
FOR ALTERNATE PHASING

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

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

Overlap Plan 2

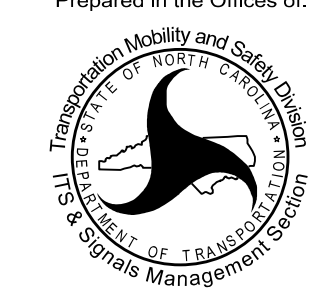
Overlap	1	2	3	4
Type	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section
Included Phases	-	4	-	8
Modifier Phases	1	3	5	7
Modifier Overlaps	-	-	-	-
Trail Green	0	0	0	0
Trail Yellow	0.0	0.0	0.0	0.0
Trail Red	0.0	0.0	0.0	0.0
FYA Ped Delay	0.0	0.0	0.0	0.0

NOTICE
INCLUDED
PHASE

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 10-1686T4
DESIGNED: June 2026
SEALED: 07-10-2026
REVISED: N/A

Electrical Detail - Sheet 2 of 3

DOCUMENT NOT CONSIDERED
FINAL UNLESS ALL
SIGNATURES COMPLETED

Electrical and Programming Details For:	NC 73 (Sam Furr Rd) at SR 2316 / SR 2141 (Northcross Dr)	SEAL	
Prepared in the Offices of:	Division 10 Mecklenburg County Huntersville		
	PLAN DATE: July, 2026		REVIEWED BY: Z Wang
	PREPARED BY: K Hector		REVIEWED BY:
	REVISIONS		
	INIT. DATE		
750 N. Greenfield Pkwy, Garner, NC 27529		DATE 7/10/2026	
HDR Engineering, Inc. of the Carolinas 555 Fayetteville St, Suite 900 Raleigh, N.C. 27601 N.C.B.E.L.S. License Number: F-0116		SIG. INVENTORY NO. 10-1686T4	

MAXTIME STARTUP AND SOFTWARE FLASH
PROGRAMMING DETAIL

Front Panel
Main Menu >Controller >Unit

Web Interface
Home >Controller >Unit

Modify parameters as shown below and save changes.

Start Up Parameters	Unit Flash Parameters
StartUp Clearance Hold	All Red Flash Exit Time
6	6

LOGIC PROCESSOR PROGRAMMING

Front Panel
Main Menu >Controller >More >User Programs >Definition

Web Interface
Home >Controller >User Programs Configuration >User Programs Definition

Program 1

Statement	Result	Index	Operation	Parameter A	Index	Parameter B	Index	Delay	Ext
1	Veh Detector Call	125	Is Module A input B ON	Number	2	Number	1	0.0	0.0
2	Veh Detector Call	126	Is Module A input B ON	Number	2	Number	2	0.0	0.0
3	Veh Detector Call	127	Is Module A input B ON	Number	2	Number	3	0.0	0.0
4	Veh Detector Call	128	Is Module A input B ON	Number	2	Number	4	0.0	0.0

LOGIC STATEMENT DESCRIPTION

Statement 1 Description: Mirrors vehicle detector 33 to vehicle detector 125

Statement 2 Description: Mirrors vehicle detector 34 to vehicle detector 126

Statement 3 Description: Mirrors vehicle detector 35 to vehicle detector 127

Statement 4 Description: Mirrors vehicle detector 36 to vehicle detector 128

OUTPUT CHANNEL CONFIGURATION

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

Web Interface
Home >Controller >Advanced IO>Channels>Channel 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	8				16
17	Overlap	5		X	X	17
18	Overlap	6		X		18

SPECIAL DETECTION IO MODULE PROGRAMMING

The Enhanced Out of Pavement Detection requires adjustments to the IO Modules in use. Follow the programming instructions below to ensure desired operation.

Front Panel
Main Menu >Controller >More >Advanced IO >IO Modules

Web Interface
Home >Controller >Advanced IO >Cabinet Configuration >IO Modules

IO Module	Type	Fault Response
1	Caltrans 332	Default
2	TS2 DR3 BIU	Default
3	TS2 DR4 BIU	Default
4	TS2 MMU	Default

Advanced Cabinet Options

☒ Disable TS2 Cabinet Alarms

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 10-1686T4
DESIGNED: June 2026
SEALED: 07-10-2026
REVISED: N/A

Electrical Detail - Sheet 3 of 3

HDR Engineering, Inc. of the Carolinas
555 Fayetteville St, Suite 900 Raleigh, N.C. 27601
N.C.B.E.L.S. License Number: F-0116

Electrical and Programming
Details For:

Prepared in the Offices of:

750 N. Greenfield Pkwy, Garner, NC 27529

NC 73 (Sam Furr Rd)
at
SR 2316 / SR 2141
(Northcross Dr)

Division 10 Mecklenburg County Huntersville

PLAN DATE: July, 2026REVIEWED BY: Z Wang

PREPARED BY: K HectorREVIEWED BY:

REVISIONS

INIT. DATE

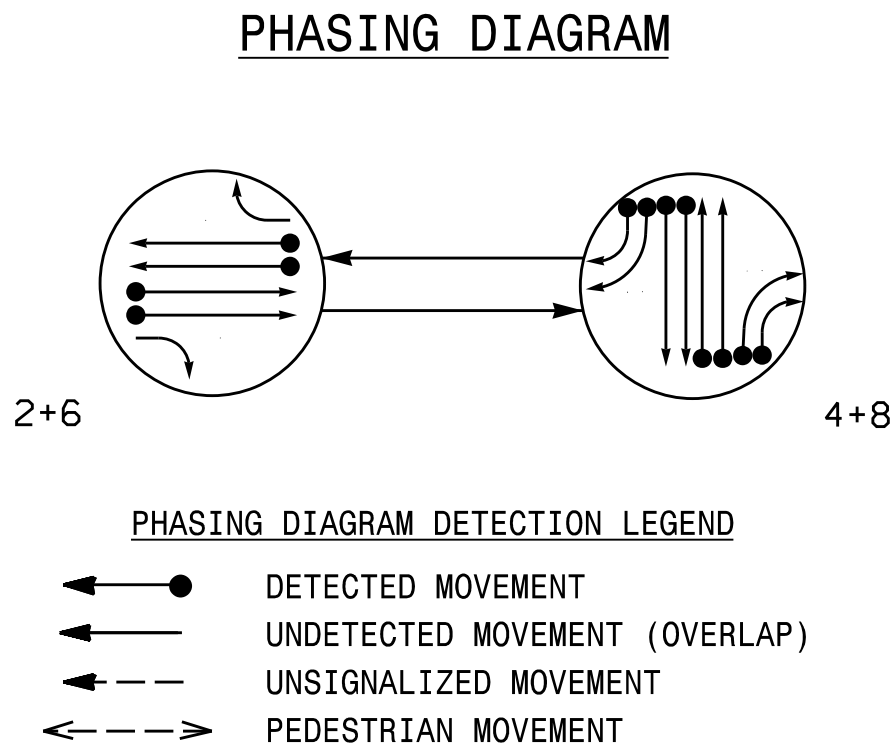
SEAL
NORTH CAROLINA
PROFESSIONAL
ENGINEER
039071
KARL E. HEC, O.E.

7/10/2026
DATE

SIG. INVENTORY NO. 10-1686T4

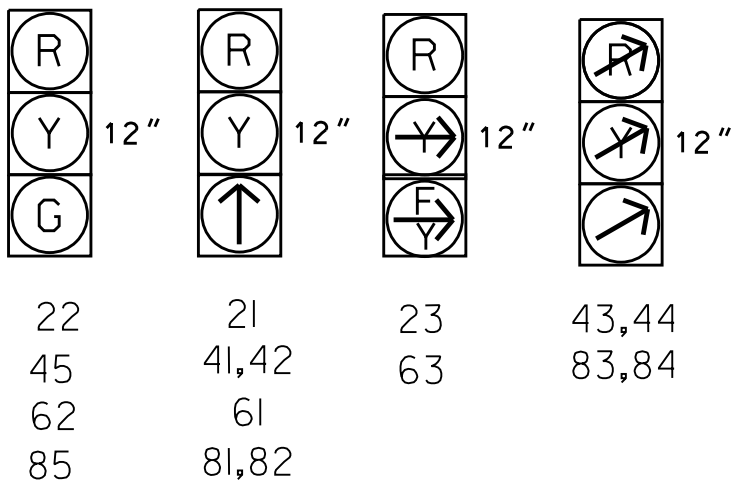
2 Phase
Fully Actuated
Signal System #: D10-43_Huntersville
NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2024 and "Standard Specifications for Roads and Structures" dated January 2024.
- Do not program signal for late night operation unless otherwise directed by the Engineer.
- Reposition existing signal heads numbered # 21,22,41 42,61,62,81,82.
- Set all detector units to presence mode.
- Disable Loop Detector Zones 4A and 8A when constructing median along Northcross Dr
- 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.
- See traffic control plans for stop line and crosswalk placement.



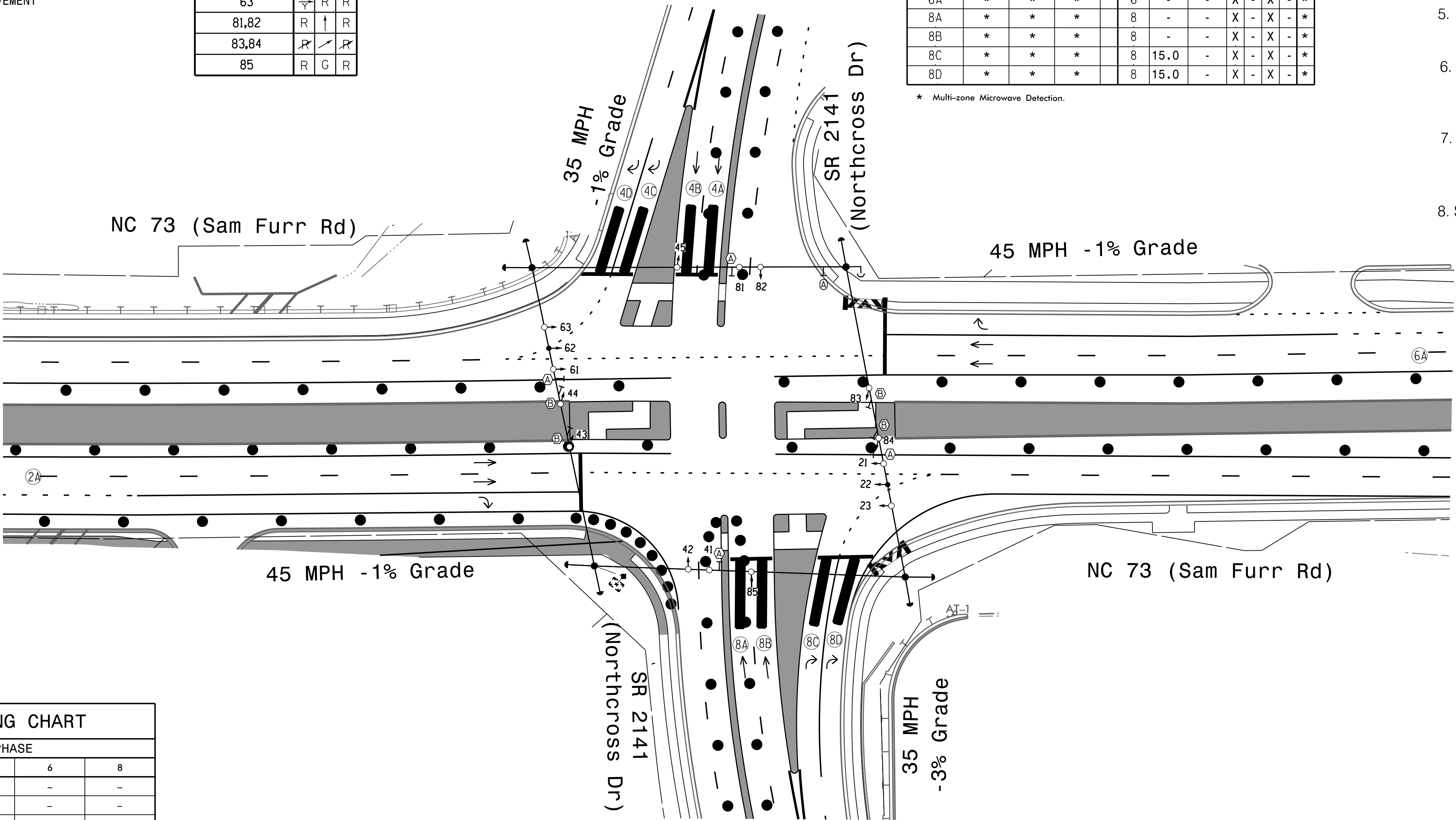
SIGNAL FACE	PHASE		
	2+6	4+8	FLASH
21	↑	R	R
22	G	R	R
23	↖	R	R
41,42	R	↑	R
43,44	↗	R	R
45	R	G	R
61	↑	R	R
62	G	R	R
63	↖	R	R
81,82	R	↑	R
83,84	↗	R	R
85	R	G	R

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



MAXTIME DETECTOR INSTALLATION CHART											
DETECTOR					PROGRAMMING						
DETECTOR ZONE	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	URNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN
2A	*	*	*		2	-	-	X	-	X	-
4A	*	*	*		4	-	-	X	-	X	-
4B	*	*	*		4	-	-	X	-	X	-
4C	*	*	*		4	15.0	-	X	-	X	-
4D	*	*	*		4	15.0	-	X	-	X	-
6A	*	*	*		6	-	-	X	-	X	-
8A	*	*	*		8	-	-	X	-	X	-
8B	*	*	*		8	-	-	X	-	X	-
8C	*	*	*		8	15.0	-	X	-	X	-
8D	*	*	*		8	15.0	-	X	-	X	-

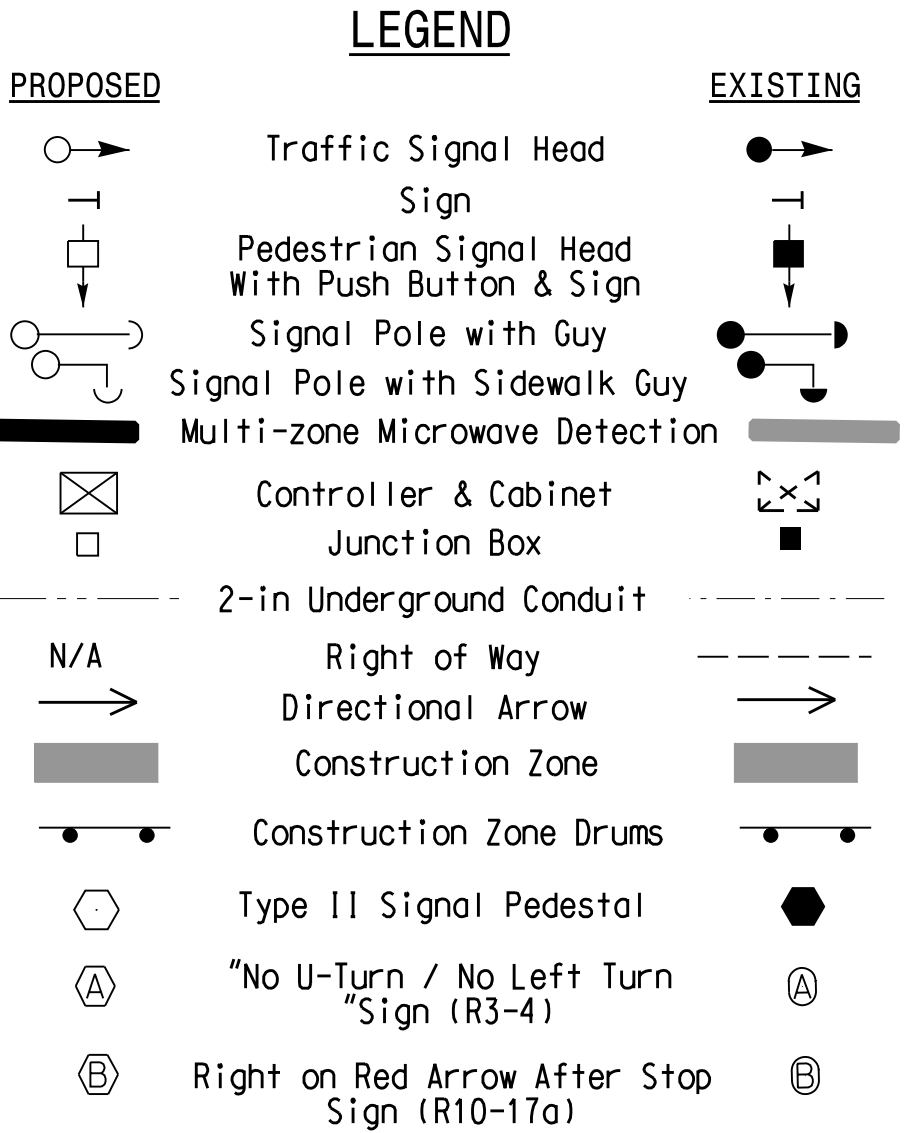
* Multi-zone Microwave Detection.



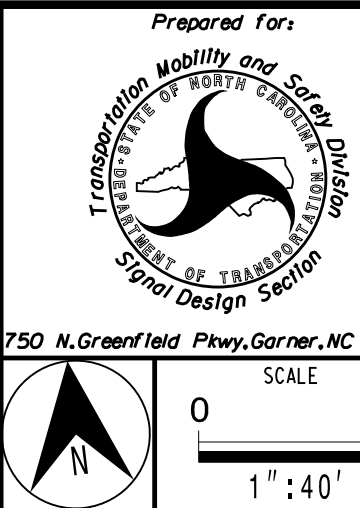
MAXTIME TIMING CHART				
FEATURE	PHASE			
	2	4	6	8
Walk *	-	-	-	-
Ped Clear	-	-	-	-
Min Green *	12	7	12	7
Passage *	2.0	2.0	2.0	2.0
Max l *	90	25	90	25
Yellow Change	4.6	4.1	4.6	4.1
Red Clear	2.7	2.9	2.7	2.9
Added Initial *	-	-	-	-
Maximum Initial *	-	-	-	-
Time Before Reduction *	-	-	-	-
Time To Reduce *	-	-	-	-
Minimum Gap	-	-	-	-
Advance Walk	-	-	-	-
Non Lock Detector	-	X	-	X
Vehicle Recall	MIN RECALL	-	MIN RECALL	-
Dual Entry	-	X	-	X

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

Microwave Detection System				
FUNCTION		Sensor 1 (2A)	Sensor 2 (6A)	
Channel		1	2	
Phase		2	6	
Direction of Travel		EB	WB	
Type		Priority	Priority	
Level		2	2	QUEUE
Discovery Zone (ft)		<750	<750	-
Range (ft)		600-100	150-100	600-100
Enable Speed		Y	Y	Y
Speed Range (mph)		35-100	1-35	35-100
Enable Estimated Time of Arrival		Y	N	Y
Estimated Time of Arrival (sec)		2.5-6.5	-	2.5-6.5



Temporary Design #5
(TMP Phase 2)



HDR Engineering, Inc. of the Carolinas
555 Fayetteville St, Suite 900, Raleigh, N.C. 27601
N.C.B.E.L.S. License Number: F-0116

NC 73 (Sam Furr Rd) at SR 2316 / SR 2141 (Northcross Dr)		Division 10 Mecklenburg County Huntersville	
PLAN DATE: July 2026	REVIEWED BY: Z Wang	PREPARED BY: K Hector	RKA PROJ. No.:
REVISIONS		INIT.	DATE

DOCUMENT NOT CONSIDERED
FINAL UNLESS ALL
SIGNATURES COMPLETED

SEAL

NORTH CAROLINA
PROFESSIONAL
ENGINEER
SEAL
039071
KARL E. HECHEM

7/10/2026

SIGNATURE DATE

SIG. INVENTORY NO. 10-168675

MAXTIME OVERLAP PROGRAMMING DETAIL
FOR DEFAULT PHASING

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

Overlap Plan 1

Overlap	1	2	3	4
Type	Off	FYA 4 - Section	off	FYA 4 - Section
Included Phases	-	2	-	6
Modifier Phases	-	-	-	-
Modifier Overlaps	-	-	-	-
Trail Green	0	0	0	0
Trail Yellow	0.0	0.0	0.0	0.0
Trail Red	0.0	0.0	0.0	0.0
FYA Ped Delay	0.0	0.0	0.0	0.0

MAXTIME STARTUP AND SOFTWARE FLASH
PROGRAMMING DETAIL

Front Panel
Main Menu >Controller >Unit

Web Interface
Home >Controller >Unit

Modify parameters as shown below and save changes.

Start Up Parameters

StartUp Clearance Hold
6

Unit Flash Parameters

All Red Flash Exit Time
6

OUTPUT CHANNEL CONFIGURATION

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

Web Interface
Home >Controller >Advanced IO>Channels>Channel 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	8				16
17	Overlap	5		X	X	17
18	Overlap	6		X		18

SPECIAL DETECTION IO MODULE PROGRAMMING

The Enhanced Out of Pavement Detection requires adjustments to the IO Modules in use. Follow the programming instructions below to ensure desired operation.

Front Panel
Main Menu >Controller >More >Advanced IO >IO Modules

Web Interface
Home >Controller >Advanced IO >Cabinet Configuration >IO Modules

IO Module	Type	Fault Response
1	Caltrans 332	Default
2	TS2 DR3 BIU	Default
3	TS2 DR4 BIU	Default
4	TS2 MMU	Default

Advanced Cabinet Options

☒ Disable TS2 Cabinet Alarms

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 10-1686T5
DESIGNED: June 2026
SEALED: 07-10-2026
REVISED: N/A

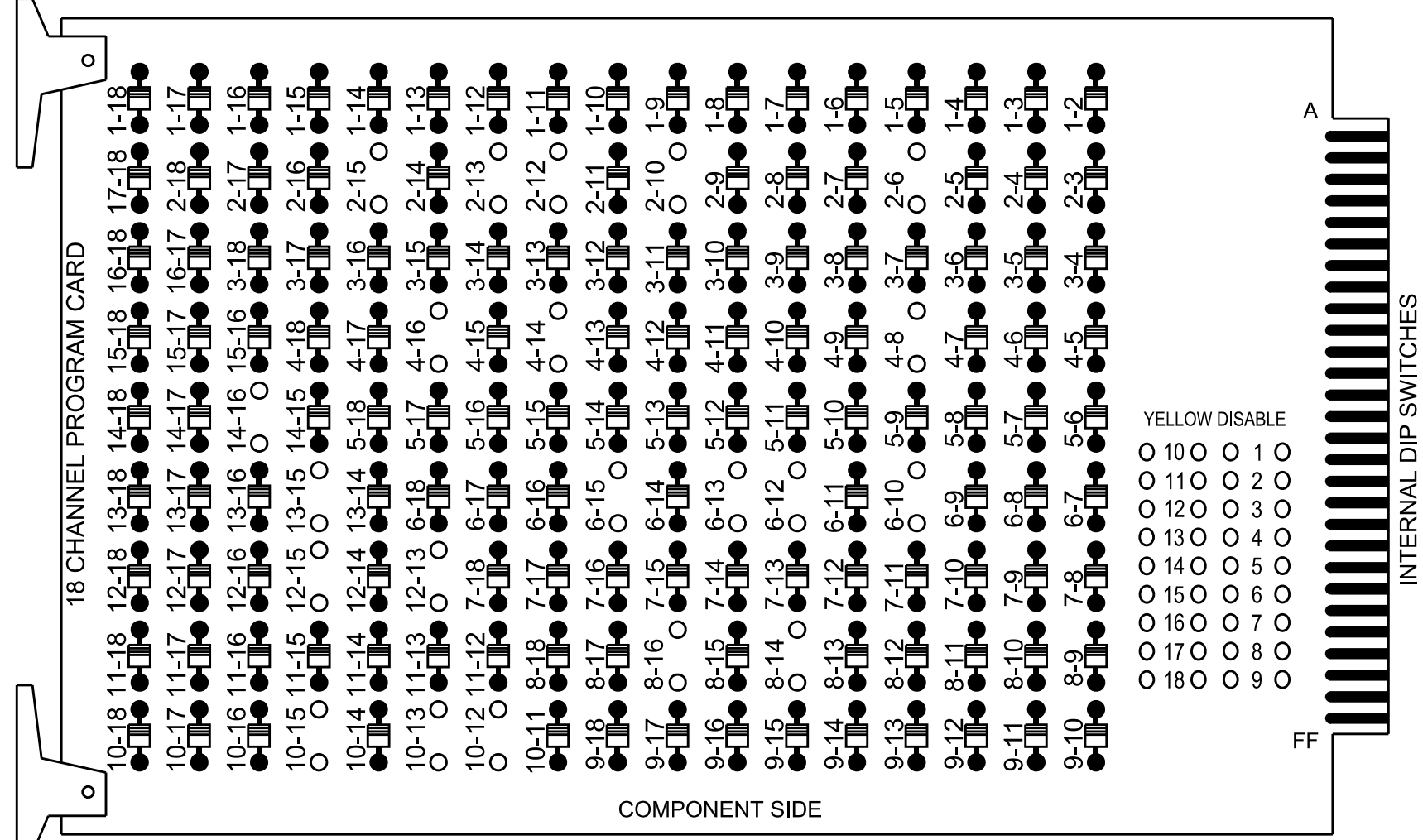
Electrical Detail - Sheet 2 of 2

7/9/2026
D:\4**\Pdr\uses011\HDR_US_East_01\Documents\3322*10323293*46-0_CAD_01\MM6-2_WIP\Tr of f i c e\Signal&Sheets\Northcross Dr*10-1686_ELE_NC 73 _Northcross Dr-.dgn
11:23:35 AM

18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

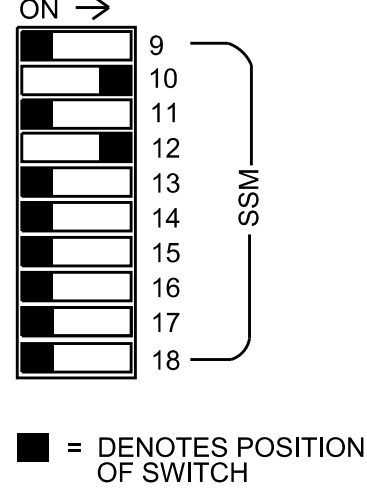
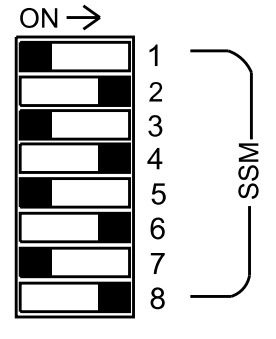
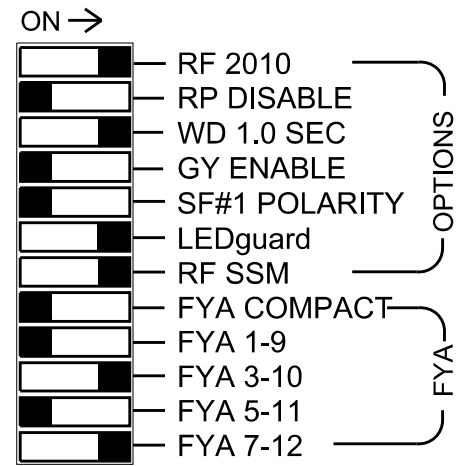
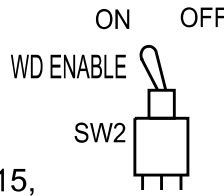
REMOVE DIODE JUMPERS 2-6, 2-10, 2-12, 2-13, 2-15, 4-8, 4-14, 4-16, 6-10, 6-12, 6-13, 6-15,
8-14, 8-16, 10-12, 10-13, 10-15, 12-13, 12-15, 13-15 and 14-16



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 vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the signal plan.
- Program phases 4 and 8 for Dual Entry.
- Program controller to start up in phase 2 Green No Walk and 6 Green No Walk.
- If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
- The cabinet and controller are part of the Signal System #: D10-43_Huntersville

EQUIPMENT INFORMATION

Controller.....2070LX
Cabinet.....332 w/ Aux
Software.....Q-Free MAXTIME
Cabinet Mount.....Base
Output File Positions.....18 With Aux. Output File
Load Switches Used.....S2, S3, S5, S6, S8, S9, S11, S12, AUX S2 , AUX S5
Phases Used.....2, 2PED, 4, 4PED, 6, 6PED, 8, 8PED,
Overlap "1".....NOT USED
Overlap "2".....*
Overlap "3".....NOT USED
Overlap "4".....*

*See overlap programming detail on sheet 2

SIGNAL HEAD HOOK-UP CHART

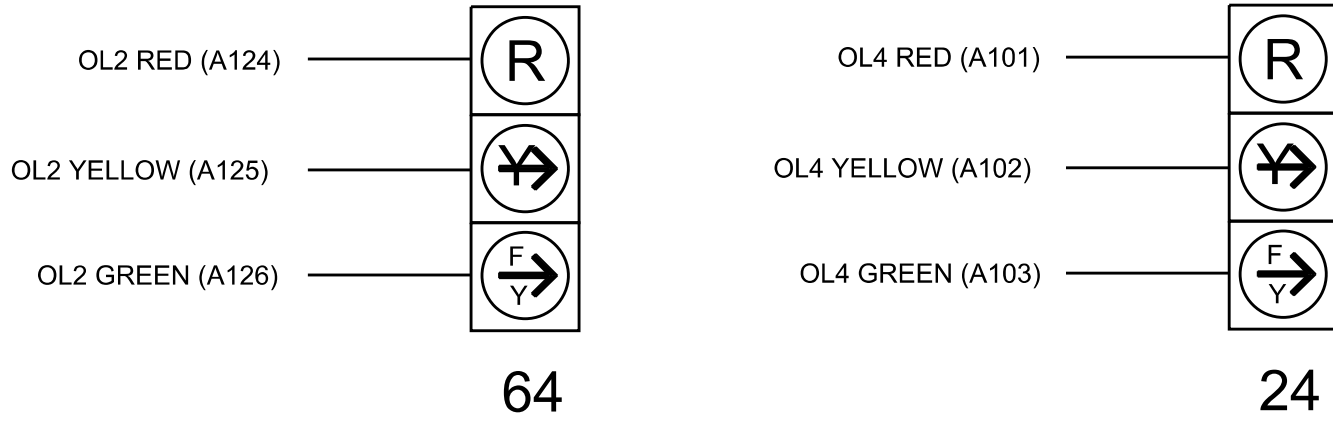
LOAD SWITCH NO.	S1	S2	S3	S4	S5		S6	S7	S8	S9	S10	S11		S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6							
CMU CHANNEL NO.	1	2	13	3	4		14	5	6	15	7	8		16	9	10	17	11	12	18							
PHASE	1	2	2 PED		3		4		4 PED		5	6		6 PED		7	8		8 PED		OL1	OL2	SPARE	OL3	OL4	SPARE	
SIGNAL HEAD NO.	NU	21	22,23	P21,P22 P23,P24		NU	41,42	43,44	45	P41,P42 P43,P44		NU	61	62,63	P61,P62 P63,P64		NU	81,82	83,84	85	P81,P82 P83,P84		NU	64★	NU	24★	NU
RED		128	128				101		101				134	134				107		107				A124			A101
YELLOW		129	129				102		102				135	135				108		108							
GREEN			130						103				136						109								
RED ARROW							101											107									
YELLOW ARROW							102											108						A125			A102
FLASHING YELLOW ARROW																								A126			A103
GREEN ARROW		130					103	103					136					109	109								
				113					104					119						110							
				115					106					121						112							

NU = Not Used

★ See pictorial of head wiring in detail this sheet.

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



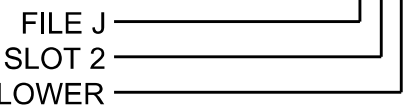
INPUT FILE CONNECTION & PROGRAMMING CHART

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
2A	-	-	-	★	38	2			X		X	
4A	-	-	-	★	44	4			X		X	
4B	-	-	-	★	45	4			X		X	
4C	-	-	-	★	46	4			X		X	
4D	-	-	-	★	47	4			X		X	
6A	-	-	-	★	54	6			X		X	
8A	-	-	-	★	60	8			X		X	
8B	-	-	-	★	61	8			X		X	
8C	-	-	-	★	62	8			X		X	
8D	-	-	-	★	63	8			X		X	
PED PUSH BUTTONS												
P21,P22,P23,P24	TB8-4,6	I12U	67	33	2	PED 2						
P41,P42,P43,P44	TB8-5,6	I12L	69	35	4	PED 4						
P61,P62,P63,P64	TB8-7,9	I13U	68	34	6	PED 6						
P81,P82,P83,P84	TB8-8,9	I13L	70	36	8	PED 8						

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

INPUT FILE POSITION LEGEND: J2L

* For Input Point numbers, see SDLC Non-Intrusive Detection Chart detail on this sheet.



SDLC NON-INTRUSIVE DETECTION CHART

Input Point	Detector Rack #3		Detector Rack #4	
	Det # (Index)	Detector Zone	Det # (Index)	Detector Zone
1	33	NU	49	NU
2	34	NU	50	NU
3	35	NU	51	NU
4	36	NU	52	NU
5	37	NU	53	NU
6	38	2A	54	6A
7	39	NU	55	NU
8	40	NU	56	NU
9	41	NU	57	NU
10	42	NU	58	NU
11	43	NU	59	NU
12	44	4A	60	8A
13	45	4B	61	8B
14	46	4C	62	8C
15	47	4D	63	8D
16	48	NU	64	NU

NU = Not Used

SPECIAL DETECTOR NOTE

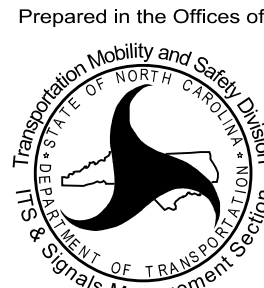
Install a multizone microwave detection system for vehicle detection. Perform installation according to manufacturer's directions and NCDOT engineer-approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.



HDR Engineering, Inc. of the Carolinas
555 Fayetteville St, Suite 900 Raleigh, N.C. 27601
N.C.B.E.L.S. License Number: F-0116

Electrical Detail - Sheet 1 of 2

Electrical and Programming
Details For:



NC 73 (Sam Furr Rd)
at
Northcross Drive

Division 10 Mecklenburg County Huntersville

PLAN DATE: July 2026 REVIEWED BY: Z Wang

PREPARED BY: K Hector REVIEWED BY:

REVISIONS

INIT. DATE

750 N. Greenfield Pkwy, Garner, NC 27529

DOCUMENT NOT CONSIDERED
FINAL UNLESS ALL
SIGNATURES COMPLETED

SEAL



7/10/2026

DATE

SIG. INVENTORY NO.

10-1686

MAXTIME OVERLAP PROGRAMMING DETAIL
FOR DEFAULT PHASING

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

Overlap Plan 1

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

MAXTIME STARTUP AND SOFTWARE FLASH
PROGRAMMING DETAIL

Front Panel
Main Menu >Controller >Unit

Web Interface
Home >Controller >Unit

Modify parameters as shown below and save changes.

Start Up Parameters

StartUp Clearance Hold
6

Unit Flash Parameters

All Red Flash Exit Time
6

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.
6. An APS push button station that is designed to work without the need for interfacing with a pedestrian signal head shall be installed for applications where a push button is installed in a median without a pedestrian signal head.
7. A push button with a single tactile arrow that points in both directions of travel shall be installed if the median separates two parallel crosswalks.

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.

OUTPUT CHANNEL CONFIGURATION

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

Web Interface
Home >Controller >Advanced IO>Channels>Channel 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	8				16
17	Overlap	5		X	X	17
18	Overlap	6		X		18

SPECIAL DETECTION IO MODULE PROGRAMMING

The Enhanced Out of Pavement Detection requires adjustments to the IO Modules in use. Follow the programming instructions below to ensure desired operation.

Front Panel
Main Menu >Controller >More >Advanced IO >IO Modules

Web Interface
Home >Controller >Advanced IO >Cabinet Configuration >IO Modules

IO Module	Type	Fault Response
1	Caltrans 332	Default
2	TS2 DR3 BIU	Default
3	TS2 DR4 BIU	Default
4	TS2 MMU	Default

Advanced Cabinet Options

☒ Disable TS2 Cabinet Alarms

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 10-1686
DESIGNED: June 2026
SEALED: 07-10-2026
REVISED: N/A

Electrical Detail - Sheet 2 of 2

Electrical and Programming
Details For:

Prepared in the Offices of:

TRANSPORTATION MOBILITY AND SAFETY DIVISION
DEPARTMENT OF TRANSPORTATION
STATE OF NORTH CAROLINA
Signal Management Section



750 N. Greenfield Pkwy, Garner, NC 27529

HDR Engineering, Inc. of the Carolinas
555 Fayetteville St, Suite 900, Raleigh, N.C. 27601
N.C.B.E.L.S. License Number: F-0116

NC 73 (Sam Furr Rd)
at
Northcross Drive

Division 10 Mecklenburg County Huntersville

PLAN DATE: July 2026REVIEWED BY: Z Wang

PREPARED BY: K HectorREVIEWED BY:

REVISIONS

INIT. DATE

DATE

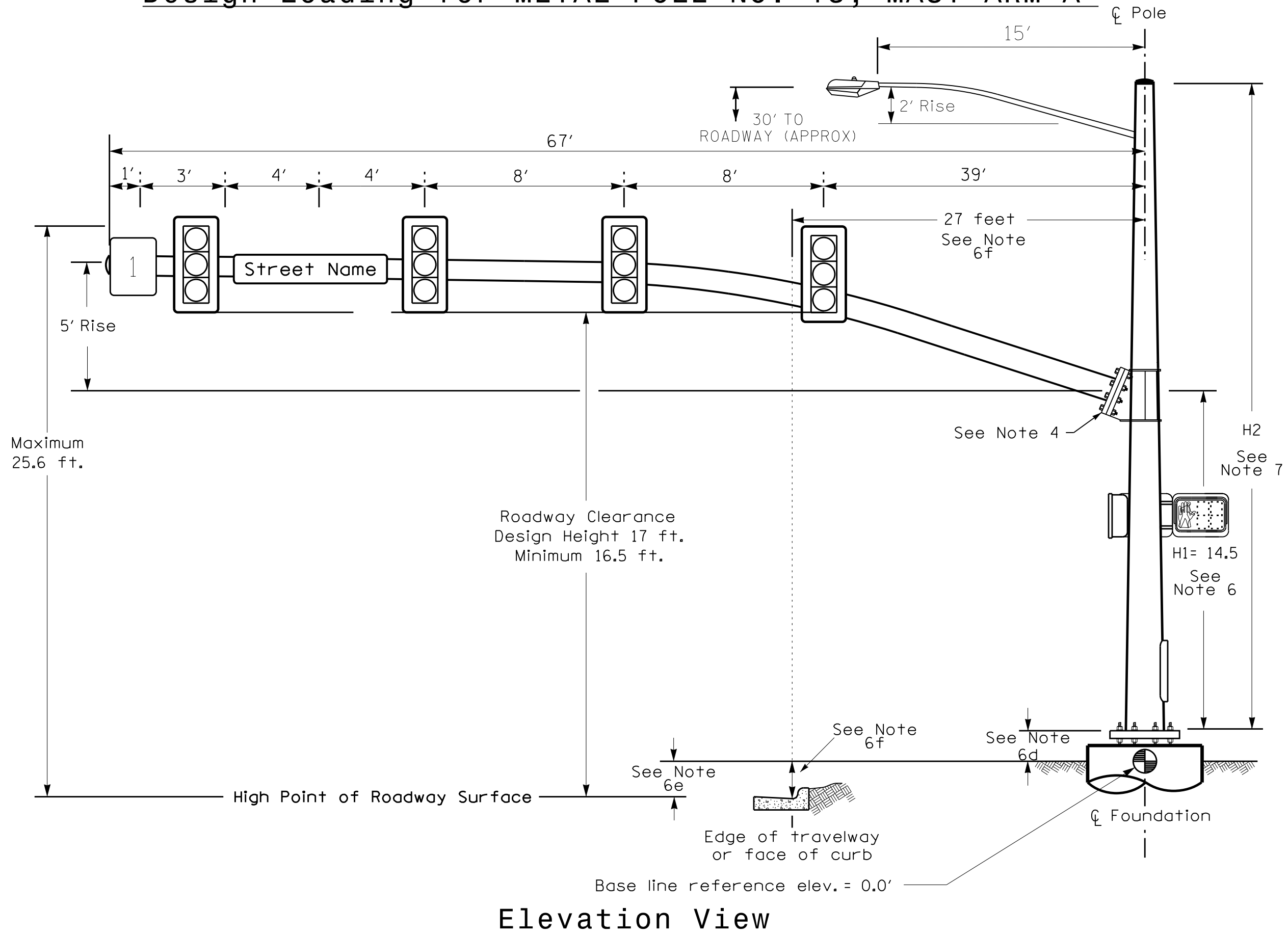
SIG. INVENTORY NO. 10-1686

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FINAL UNLESS ALL
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PROFESSIONAL
ENGINEER
KARL E. HECTOR
039071

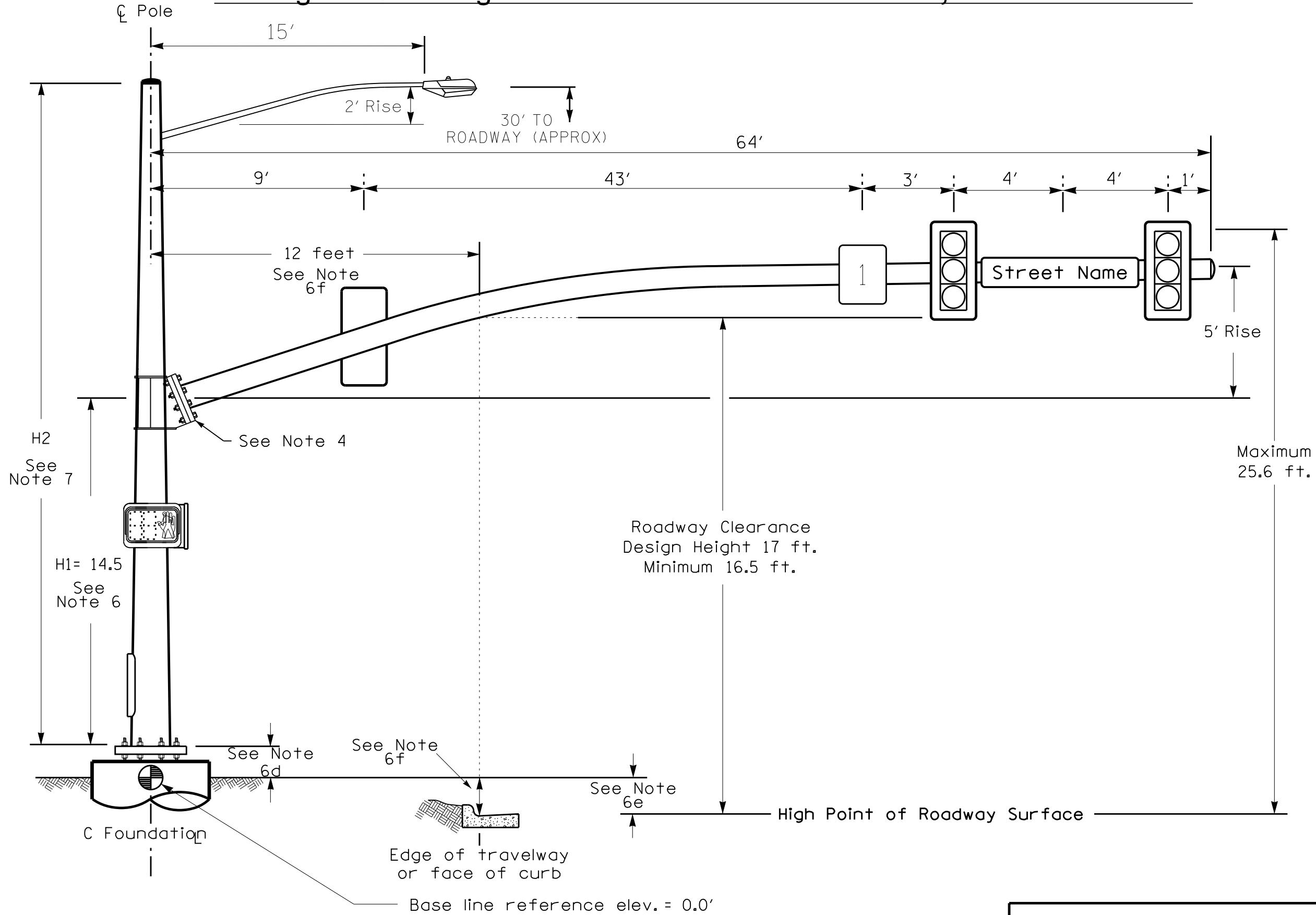
7/10/2026

Design Loading for METAL POLE NO. 13, MAST ARM A



Elevation View

Design Loading for METAL POLE NO. 13, MAST ARM B



Elevation View



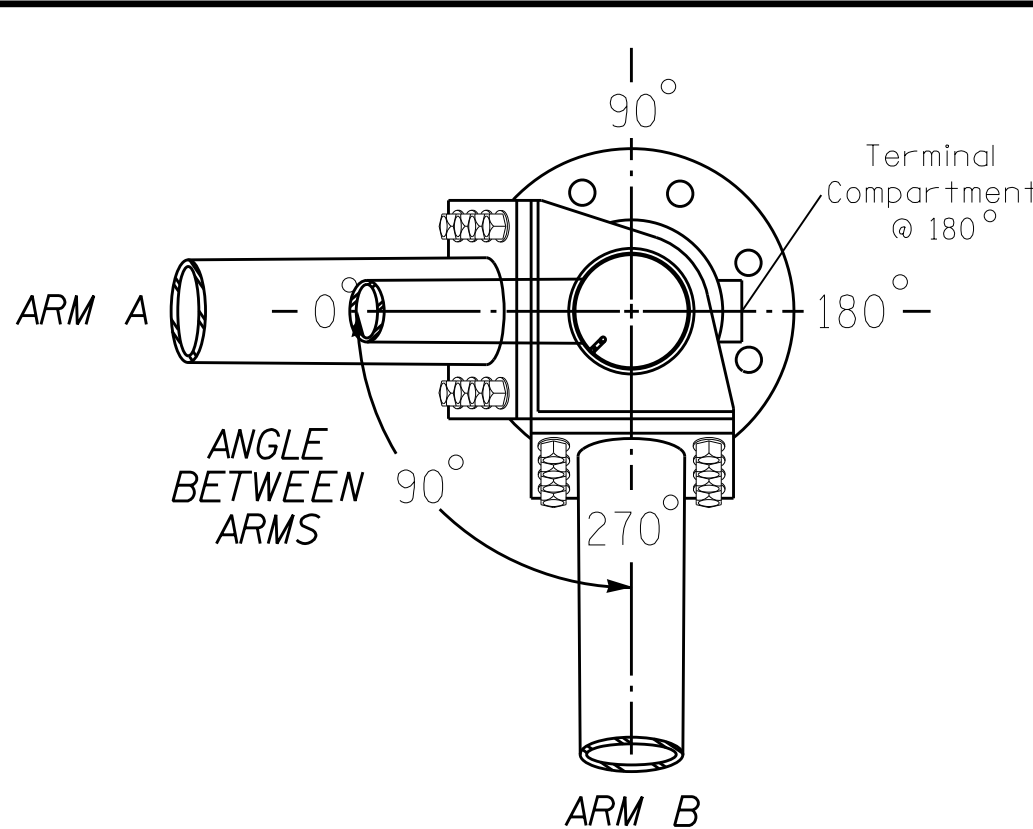
HDR Engineering, Inc. of the Carolinas
555 Fayetteville St, Suite 900 Raleigh, N.C. 27601
N.C.B.E.L.S. License Number: F-0116

SPECIAL NOTE

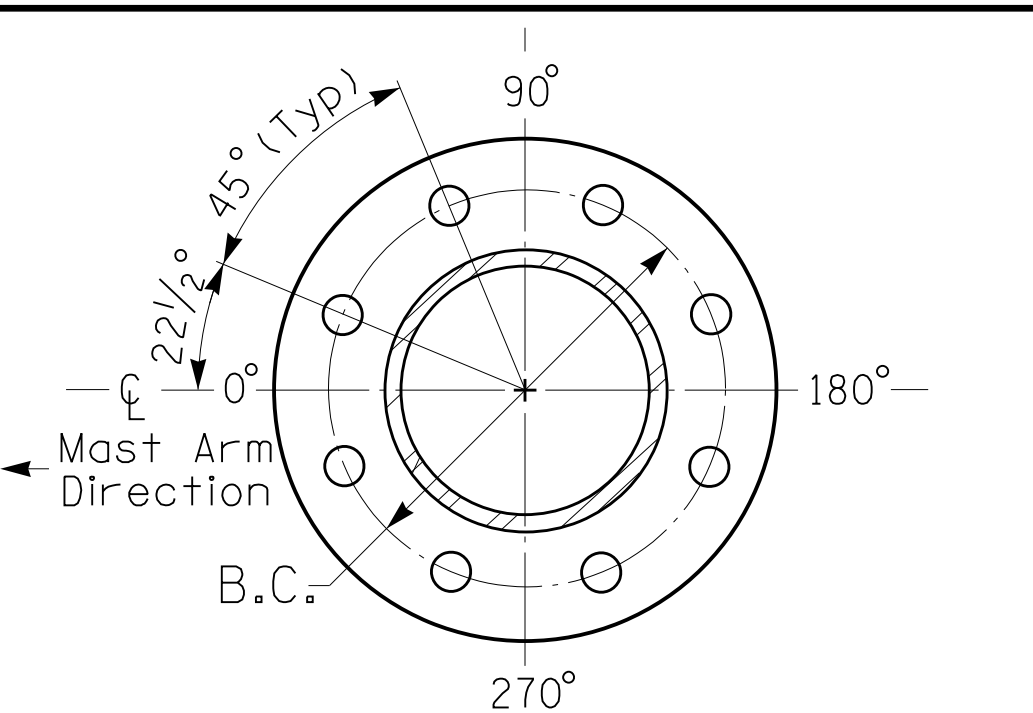
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Arm A	Arm B
Baseline reference point at ϕ Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	+0.8 ft.	+0.2 ft.
Elevation difference at Edge of travelway or face of curb	-0.3 ft.	+0.1 ft.

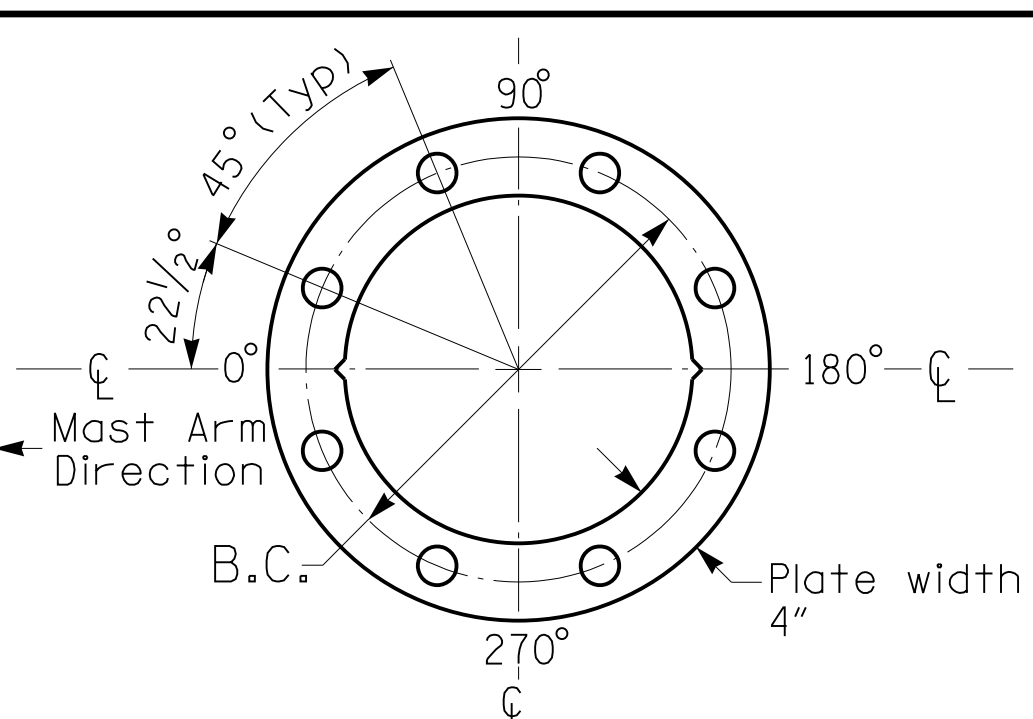


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 5



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

METAL POLE No. 13

PROJECT REFERENCE NO.	SHEET NO.
U-5765	Sig. 31.3

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
	LUMINAIRE	EPA 0.87 S.F.	13.25"W X 26.25"L	35 LBS
	STREET NAME SIGN RIGID MOUNTED	16.0 S.F.	24.0"W X 96.0"L	36 LBS
	SIGN RIGID MOUNTED	5.0 S.F.	24.0"W X 30.0"L	11 LBS

NOTES

DESIGN REFERENCE MATERIAL

- Design the traffic signal structure and foundation in accordance with:
 - The 1st Edition 2015 AASHTO LRFD "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
 - The 2024 NCDOT "Standard Specifications for Roads and Structures." The latest addenda to the specifications can be found in the traffic signal project special provisions.
 - The 2024 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 force 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 based on the luminaire height requirement of 30 ft.
- 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.
- Comply with NEC code 230.2(E) concerning service equipment disconnect.
- Lighting fixture and luminaire arm represent a load condition to the pole and may not represent exactly how the fixtures will be mounted. The contractor is responsible for ensuring that any required factory preps for mounting fixtures to the pole are included on the shop drawings.
- Design the luminaire support arm using design dimensions as shown on elevations views. Refer to the Radial Orientation Detail for attachment to the signal pole. Design arm end for a nominal 2 inch slip fit socket connection for light assembly.

ALL METAL POLES AND ARMS, PEDESTRIAN PEDESTALS, POSTS, BACKPLATES, LUMINAIRES AND SIGNAL HEADS SHOULD BE BLACK IN COLOR RAL-9005 (JET BLACK) OR EQUIVALENT IN COLOR. LUMINAIRES AS SPECIFIED IN THE PROJECT SPECIAL PROVISIONS.

NCDOT Wind Zone 5 (110 mph)

 Prepared in the Offices of: 750 N. Greenfield Pkwy, Garner, NC 27525	NC 73 (Sam Furr Rd) at Northcross Dr	
	Division 10 Mecklenburg County PLANNING: July 2026 PREPARED BY: K Hector	Huntersville REVIEWED BY: Z Wang REVISIONS: INIT. DATE

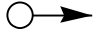
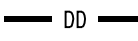
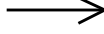
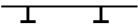
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
SEAL K. Wang 7/10/2026
SIG. INVENTORY NO. 10-1686

2 Phase
Semi-Actuated
Signal System #: D10-43_Huntersville

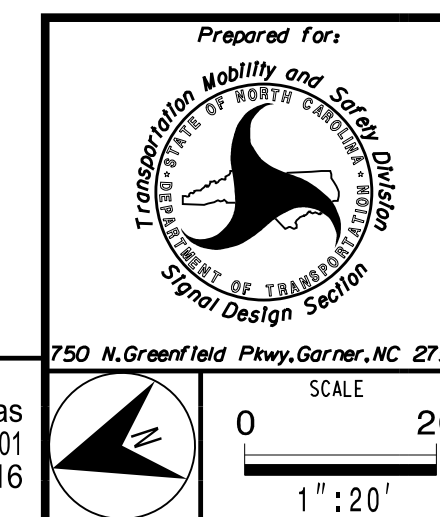
NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2024, "Standard Specifications for Roads and Structures" dated January 2024, and all applicable sections of the latest version of the generic Project Special Provisions. The PSP can be accessed at the following website: <https://connect.ncdot.gov/resources/safety/Pages/TSMO-Design-Resources.aspx>
2. All signal heads shall have backplates with retro-reflective sheeting.
3. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
4. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
5. This intersection features accessible pedestrian signals utilizing percussive tone walk indications and/or speech messages.
6. Enable Ped Clear Through Red for Phase 4+8.
7. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
8. Pedestrian and Crosswalk advance signs (see Figure 1) located in accordance with Table 2C-3 in Section 2C.04 of the 2023 MUTCD or as otherwise directed by the Engineer.
9. See pavement markings plans for stopline and crosswalk placement.

LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Metal Pole with Mastarm	
	Type I Pushbutton Post	
	Type II Signal Pedestal	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
	Directional Drill	N/A
N/A	Right of Way	
	Directional Arrow	
N/A	Guardrail	
N/A	Curb Ramp	
	" STOP ON RED - YIELD ON FLASHING RED AFTER STOP" Sign (R10-23a)	
	Pedestrian Warning Sign (W11-2) (See Figure 1)	
	"AHEAD" Sign (W16-9p) (See Figure 1)	

New Installation



Pedestrian Hybrid Beacon #1
at
SR 2316 (Northcross Dr.) Roundabout

Division 10 Mecklenburg County		Huntersville
PLAN DATE:	July 2026	REVIEWED BY: Z Wang

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DOCUMENT NOT CONSIDERED
FINAL UNLESS ALL
SIGNATURES COMPLETED

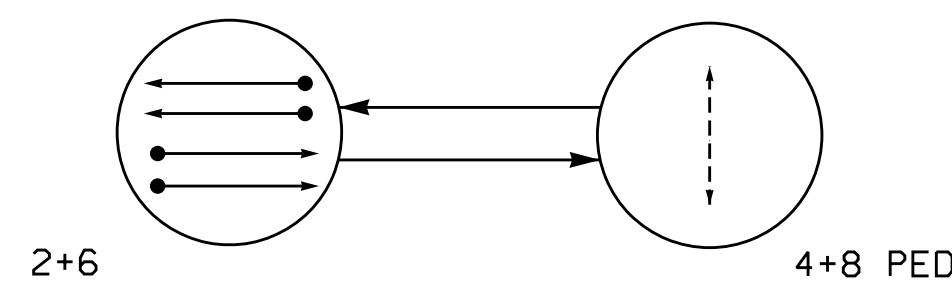
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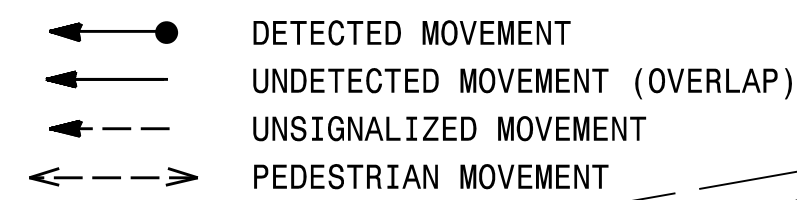


SIGNATURE	7/10/2026
DATE	
G. INVENTORY NO.	10-2542

PHASING DIAGRAM

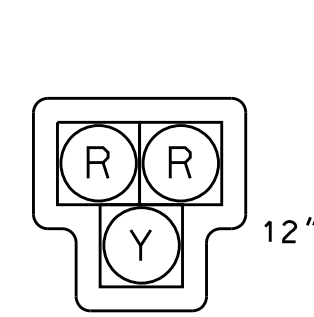


PHASING DIAGRAM DETECTION LEGEND

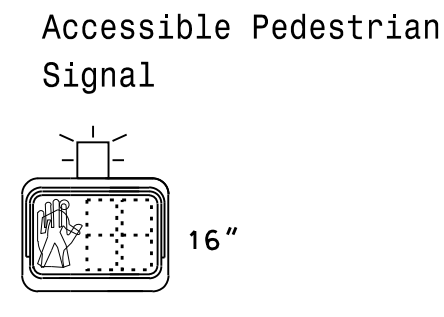


SIGNAL FACE I.D.

All Heads L.E.D.



21,22,23,24
61,62,63,64



P4I
P8I

TABLE OF OPERATION

SIGNAL FACE	PHASE						
	2 + 6 DARK	A C T I V A T I O N	S T E A D Y Y E L L O W	A L L R E D	4 + 8 P E D W A L K	4 + 8 P E D C E L E R A T E	F L O O T
21,22,23,24	DRK	FY	Y	R	R	FR*	Y
61,62,63,64	DRK	FY	Y	R	R	FR*	Y
P41	DW	DW	DW	DW	DW	DW	DR
P81	DW	DW	DW	DW	DW	DW	DR

* Alternating Flash

Y - Steady Yellow
FR - Flashing Yellow
R - Steady Red
FR - Flashing Red
W - Walk
DW - Don't Walk
DRK - Dark

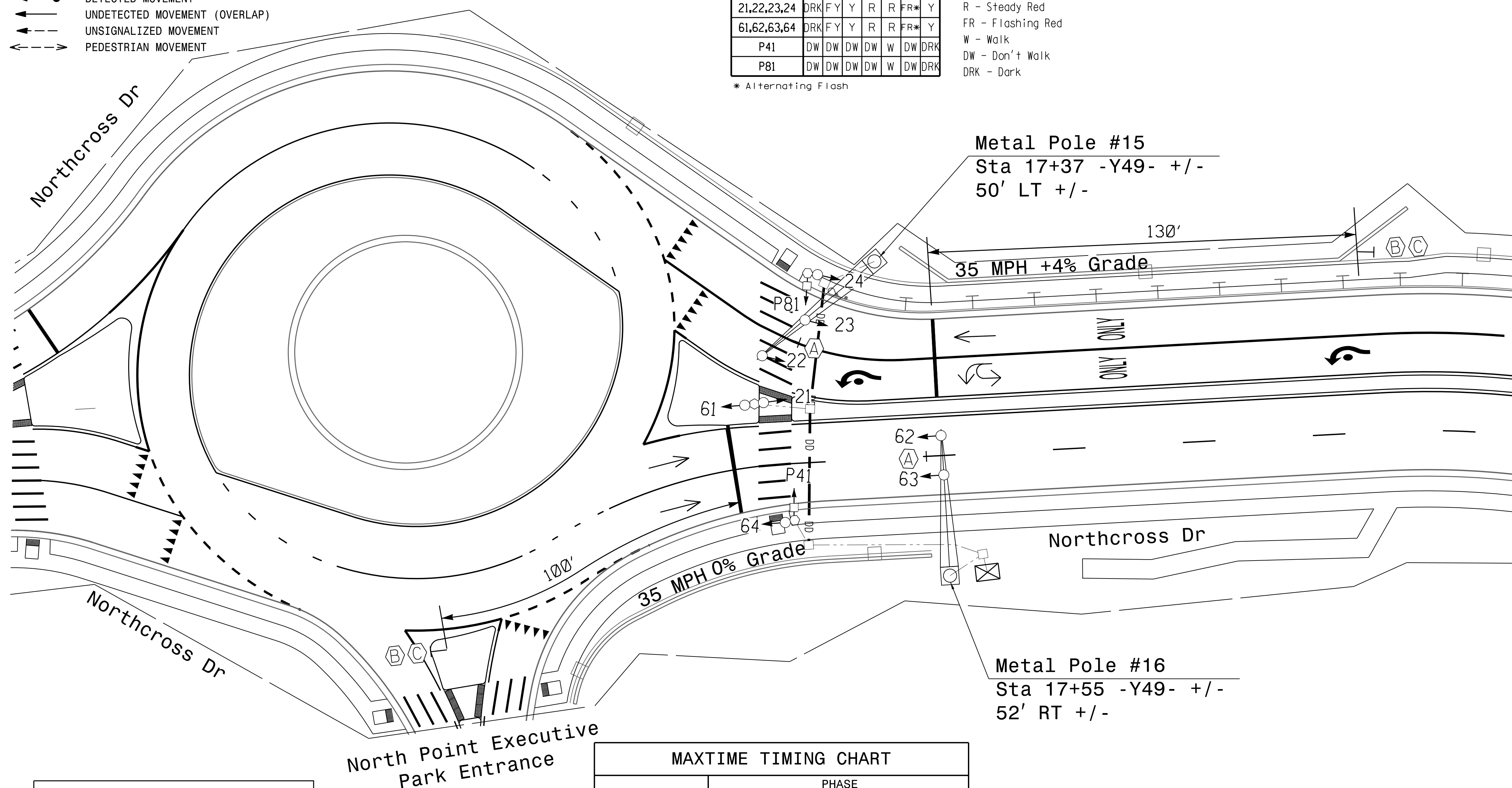


Figure 1



(W11-2)
Sign 

(W16-9P)
Sign

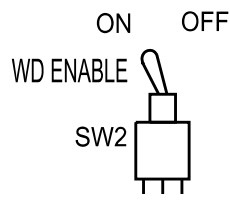
MAXTIME TIMING CHART

FEATURE	PHASE			
	2	4 PED	6	8 PED
Walk *	–	7	–	7
Ped Clear *	0	21	0	21
Min Green *	10	7	10	7
Passage *	0.0	0.0	0.0	0.0
Max 1 *	30	7	30	7
Yellow Change	3.8	3.0	3.8	3.0
Red Clear	1.0	0.0	1.0	0.0
Added Initial *	–	–	–	–
Maximum Initial *	–	–	–	–
Time Before Reduction *	–	–	–	–
Time To Reduce *	–	–	–	–
Minimum Gap	–	–	–	–
Advance Walk	–	–	–	–
Pre Clearance	5	–	5	–
Non Lock Detector	–	X	–	X
Vehicle Recall	MIN RECALL	–	–	MIN RECALL
Dual Entry	–	–	–	–

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

(remove jumpers and set switches as shown)

(remove jumpers and set switches as shown)



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

1. To prevent "flash-conflict" problems, insert red flash program blocks for all vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the signal plan. Install yellow flash program block to load switches S2 and S8.

*Phase used for timing purposes only.

(front view)

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

FS = FLASH SENSE
ST = STOP TIME

* FOR THE ABOVE DETECTION TO CALL ANOTHER PHASE, SCROLL OVER AND ENTER SECOND PHASE IN "ADDITIONAL CALL PHASES" COLUMN.

FILE J _____
SLOT 2 _____
LOWER _____

21, 22, 23, 24
61, 62, 63, 64

750 N. Greenfield Pkwy, Garner, NC 27529

REVISIONS

SEAL



7/10/2026

SIG. INVENTORY NO.

10-2542

H2R

HDR Engineering, Inc. of the Carolinas
555 Fayetteville St, Suite 900 Raleigh, N.C. 27601
N.C.B.E.L.S. License Number: F-0116

OUTPUT CHANNEL CONFIGURATION

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

Web Interface
Home >Controller >Advanced IO>Channels>Channel 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	8				16
17	Overlap	5		X	X	17
18	Overlap	6		X		18

TIMING INTERVAL

PHASE 2+6 = DARK DISPLAY
PHASE 2+6 PRE CLEARANCE = FLASHING YELLOW DISPLAY
PHASE 2+6 YELLOW CHANGE = STEADY YELLOW DISPLAY
PHASE 2+6 RED CLEAR THROUGH 4+8 WALK = STEADY RED DISPLAY
PED 4+8 DON'T WALK = ALTERNATING FLASHING RED DISPLAY

OPERATIONAL NOTES

1. In order for the controller to perform the Pedestrian Hybird Beacon (HAWK signal) sequence, the 332_NCDOT_HAWK_v1_X database must be installed on controller.
2. The only Phase 6 load switch output that is being used drivers one of the red signal faces of each signal head.
3. The Logic Processor flashes Phase 2 Yellow during the Phase 2 Pre-Clearance interval. Phase 2 Yellow drives the solid yellow signal face during the Phase 2 vehicle Yellow Change.
4. Phase 2 and Phase 6 Red outputs drives the solid Red displays during the Phase 2 and 6 Red Clear and Ped 4 and 8 Walk interval. The Logic Processor flashes Phase 2 and 6 Red Outputs in a wig-wag pattern during Phase 4+8 Ped Clear interval.
5. The controller must be programmed for Ped Clear During Red Clear for Pedestrian Phase 4 and 8 so that Red displays continue to flash during Phase 4 and 8 Yellow Change and Red Clear.
6. Make sure that all Phases 2 and Phase 6 timing match each other and that all Phase 4 and Phase 8 timings match each other.
7. The Ped 4 push button is programmed to call Ped 4 and Ped 8. The Ped 8 push button is programmed to call Ped 8 and Ped 4.

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 10-2542
DESIGNED: June 2026
SEALED: 07-10-2026
REVISED: N/A

Electrical Detail - Sheet 2 of 2

DOCUMENT NOT CONSIDERED
FINAL UNLESS ALL
SIGNATURES COMPLETED

 HDR Engineering, Inc. of the Carolinas
555 Fayetteville St, Suite 900 Raleigh, N.C. 27601
N.C.B.E.L.S. License Number: F-0116

Electrical and Programming
Details For:

Prepared in the Offices of:



750 N. Greenfield Pkwy, Garner, NC 27529

Pedestrian Hybrid Beacon #1
at
SR 2316 (Northcross Dr.) Roundabout

Division 10Wecklenburg CountyHuntersville

PLAN DATE: July 2026REVIEWED BY: Z Wang

PREPARED BY: K HectorREVIEWED BY:

REVISIONS

INIT. DATE

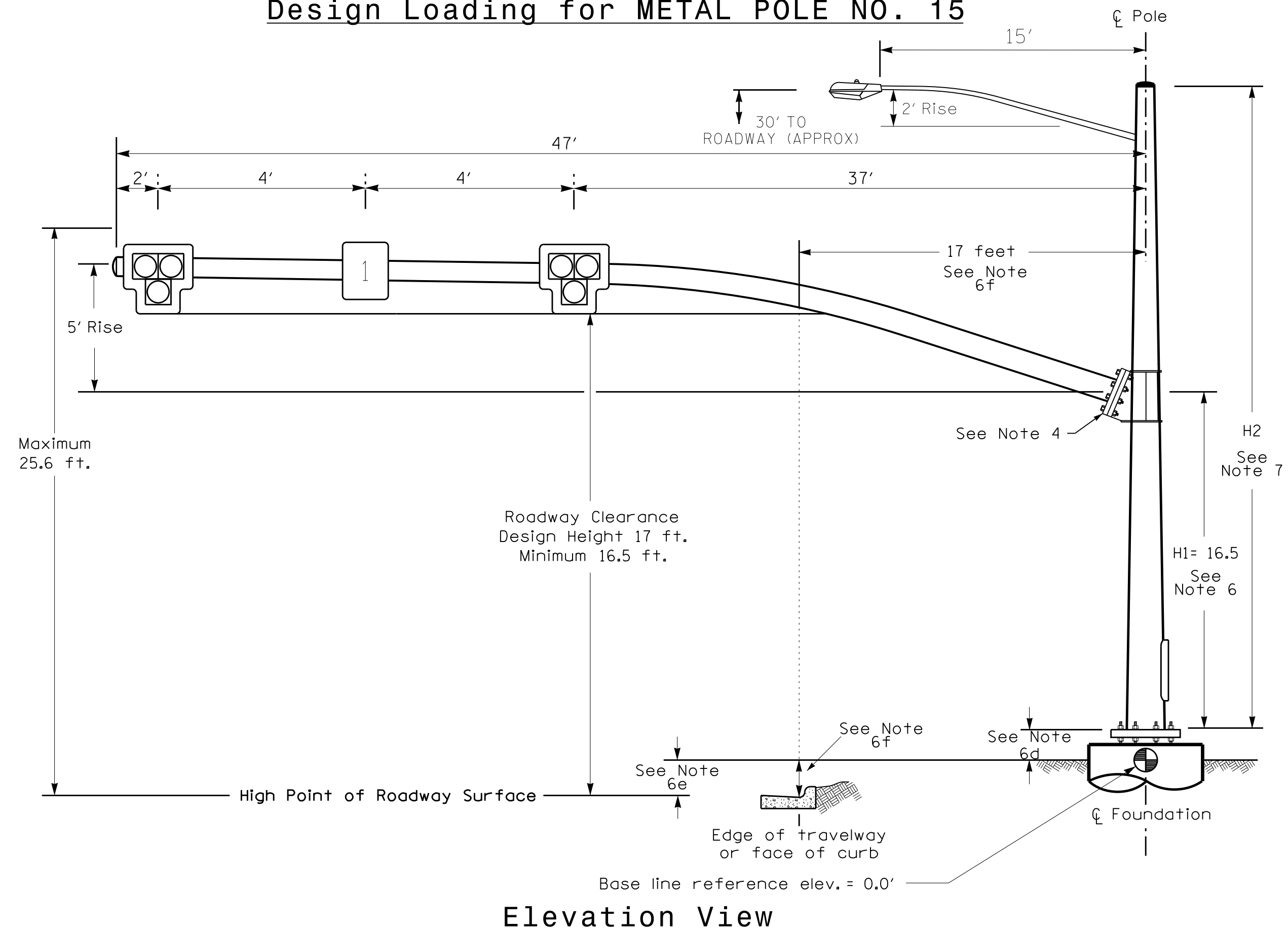
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7/10/2026

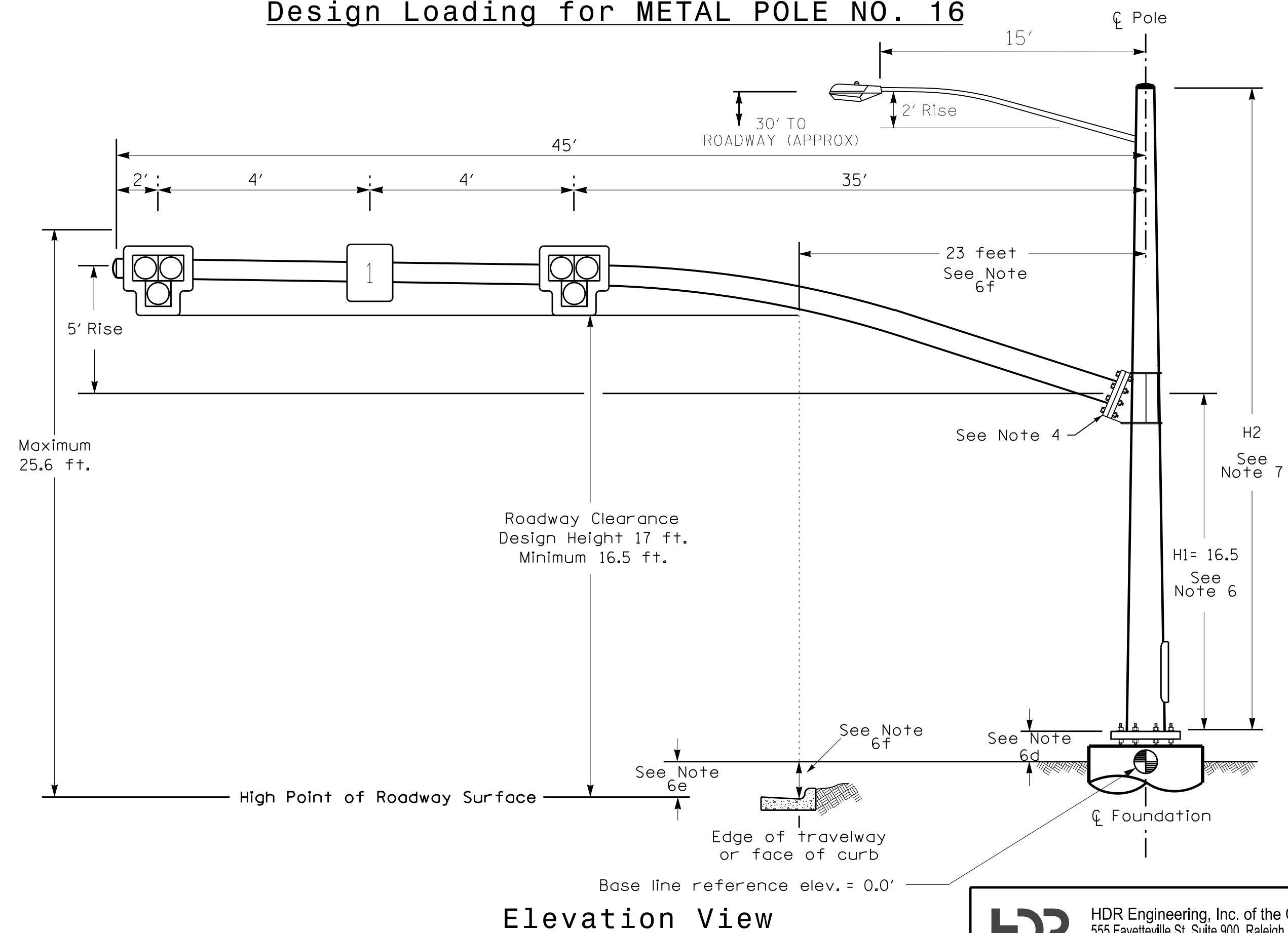
SIG. INVENTORY NO. 10-2542

Design Loading for METAL POLE NO. 15



Elevation View

Design Loading for METAL POLE NO. 16



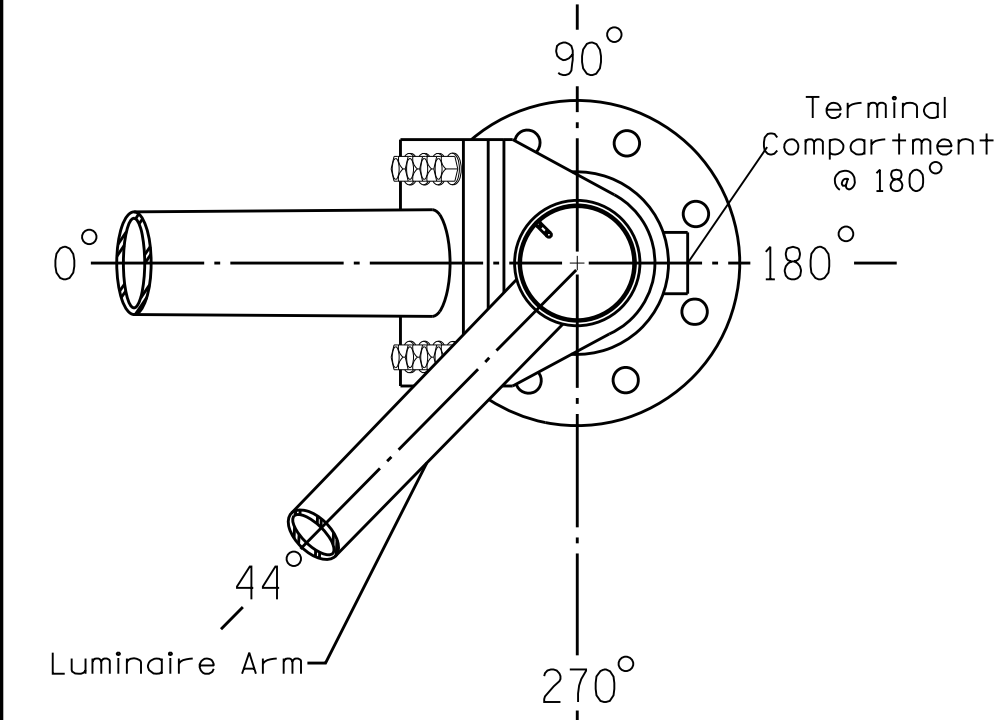
Elevation View

SPECIAL NOTE

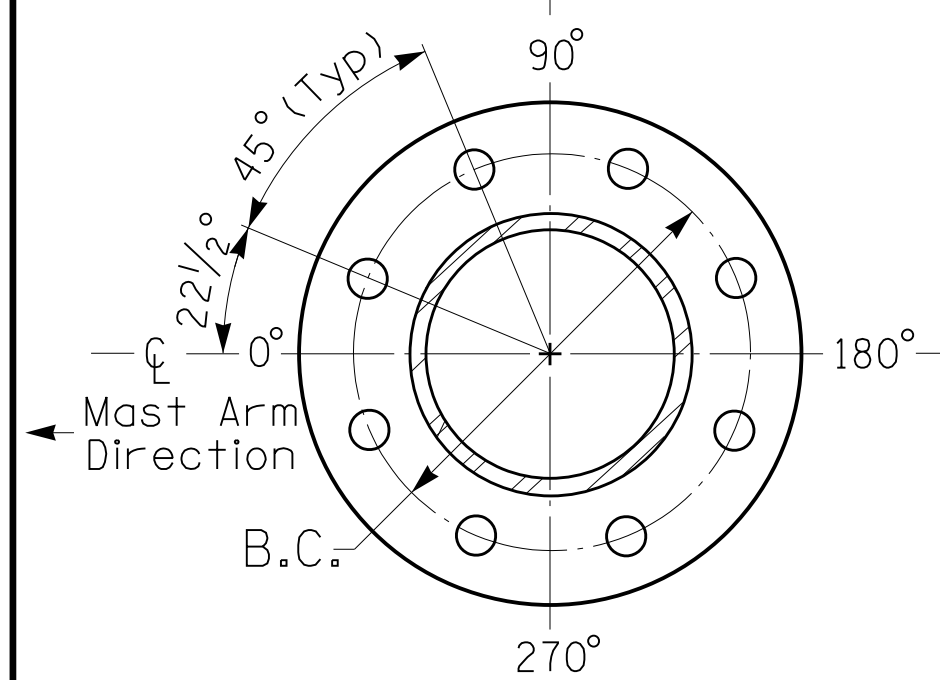
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 15	Pole 16
Baseline reference point at ϕ Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	+3.6 ft.	+3.4 ft.
Elevation difference at Edge of travelway or face of curb	+1.9 ft.	+0.5 ft.

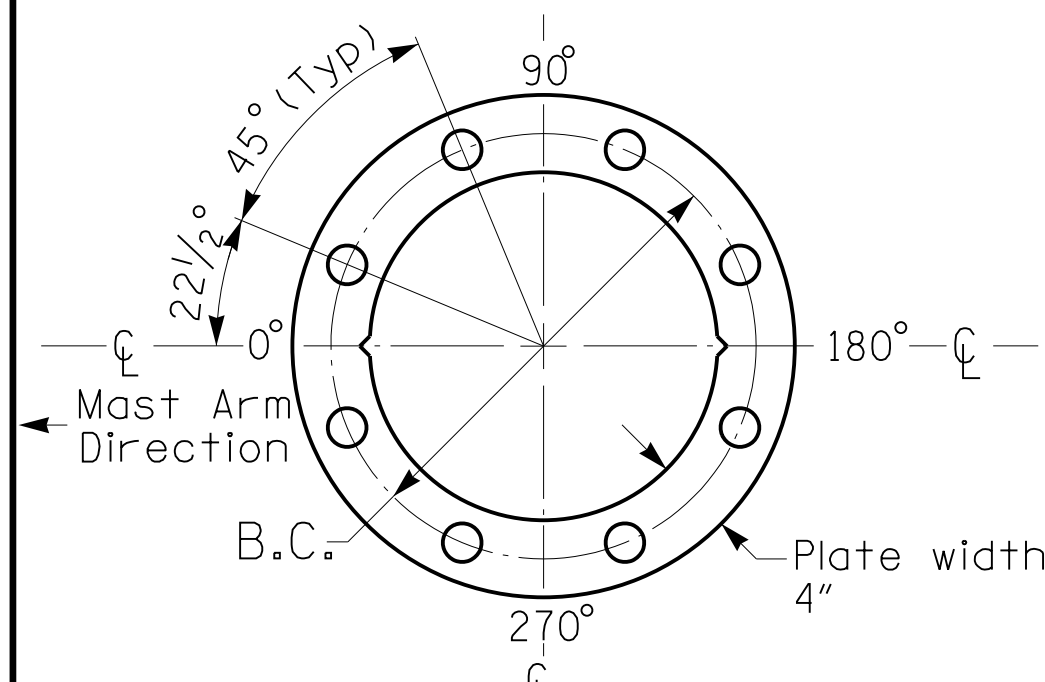


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 5

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"x3 SECTION (T-TYPE HYBRID BEACON) WITH BACKPLATE	10.5 S.F.	39.0"W X 39.0"L	58 LBS
	SIGN RIGID MOUNTED	5.0 S.F.	24.0"W X 30.0"L	11 LBS
	LUMINAIRE	EPA 0.87 S.F.	13.25"W X 26.25"L	35 LBS

NOTES

DESIGN REFERENCE MATERIAL

- Design the traffic signal structure and foundation in accordance with:
 - The 1st Edition 2015 AASHTO LRFD "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
 - The 2024 NCDOT "Standard Specifications for Roads and Structures." The latest addenda to the specifications can be found in the traffic signal project special provisions.
 - The 2024 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 force 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 based on the luminaire height requirement of 30 ft.
- 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.
- Comply with NEC code 230.2(E) concerning service equipment disconnect.
- Lighting fixture and luminaire arm represent a load condition to the pole and may not represent exactly how the fixtures will be mounted. The contractor is responsible for ensuring that any required factory preps for mounting fixtures to the pole are included on the shop drawings.
- Design the luminaire support arm using design dimensions as shown on elevations views. Refer to the Radial Orientation Detail for attachment to the signal pole. Design arm end for a nominal 2 inch slip fit socket connection for light assembly.

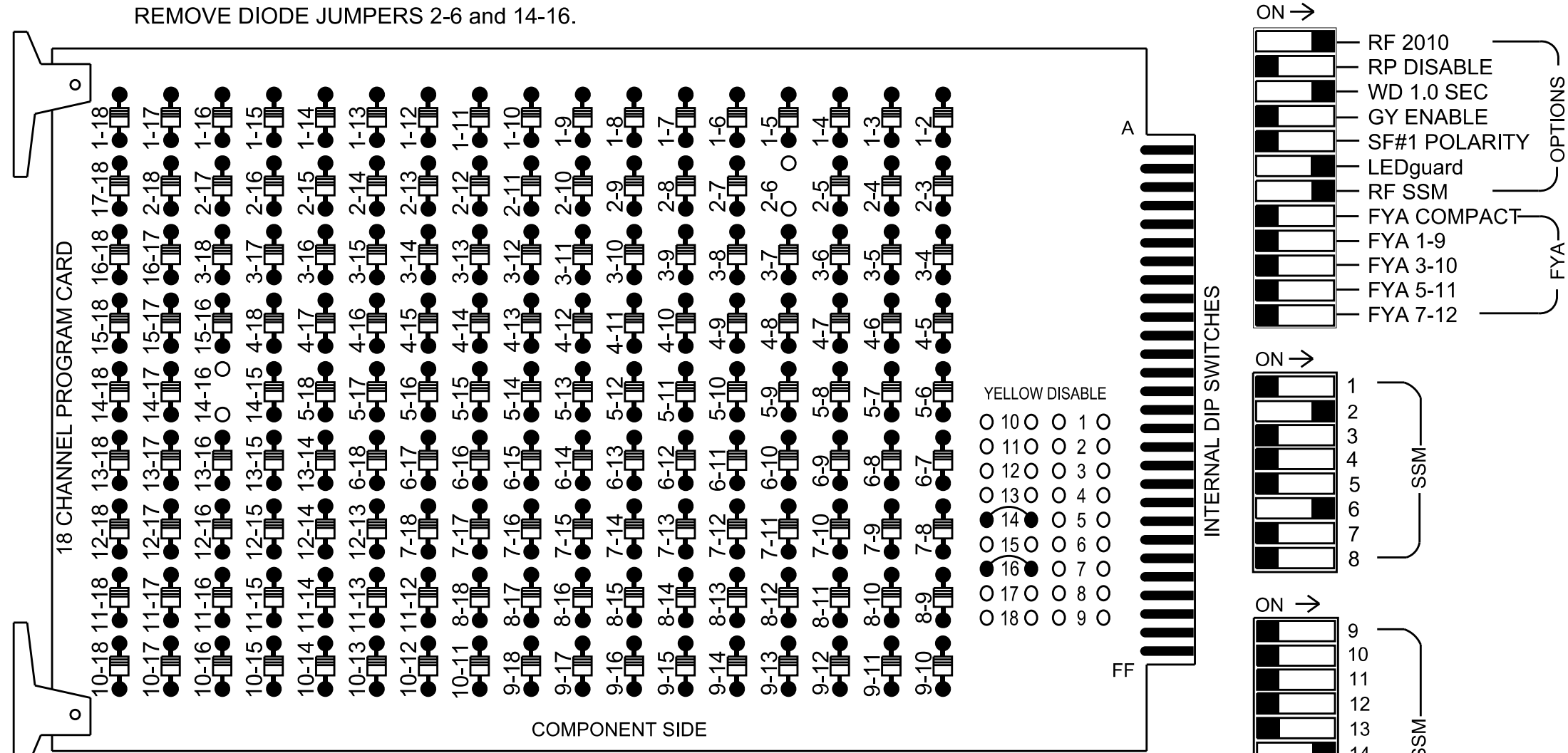
ALL METAL POLES AND ARMS, PEDESTRIAN PEDESTALS, POST BACKPLATES, LUMINAIRES AND SIGNAL HEADS SHOULD BE BLACK IN COLOR RL-9005 JET BLACK ALL WEATHER ENAMEL (OR APPROVED EQUAL). LUMINAIRES AS SPECIFIED IN THE PROJECT SPECIAL PROVISIONS.

NCDOT Wind Zone 5 (110 mph)

 750 N. Greenfield Pkwy, Garner, NC 27525	Prepared In the Offices of: Transportation Mobility and Safety DIVISION OF NORTH CAROLINA SIGNAL DESIGN SECTION		Pedestrian Hybrid Beacon #1 at SR 2316 (Northcross Dr.) Roundabout Division 10 Mecklenburg County Huntersville PLAN DATE: July 2026 REVIEWED BY: Z Wang PREPARED BY: K Hector REVIEWED BY:		DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED SEAL KARL E. HEC 7/10/2026 DATE SIG. INVENTORY NO. 10-2542
	SCALE 0 N/A N/A		REVISIONS INIT. DATE		

18 CHANNEL CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



NOTES:

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

NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the signal plan. Install yellow flash program block to load switches S2 and S8.

- Install 332_NCDOT_HAWK_v1_X database onto controller.

- Program controller to start up in phase 2 Green No Walk and 6 Green No Walk.
- Program phases 4 and 8 for No Startup Veh Call and No Startup Ped Call.
- Program phases 4 and 8 for Ped Clear During Red Clear.
- The cabinet and controller are part of the Signal System #: D10-43_Huntersville

EQUIPMENT INFORMATION

Controller.....2070LX
Cabinet.....332 w/ Aux
Software.....Q-Free MAXTIME
Cabinet Mount.....Base
Output File Positions.....18 With Aux. Output File
Load Switches Used.....S2,S6,S8,S12
Phases Used.....2, 4*, 4PED, 6, 8*, 8PED
Overlaps.....Not Used

*Phase used for timing purposes only.

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	NU	21,22,23,24 61,62,63,64	NU	NU	NC	P41	NU	21,22,23,24 61,62,63,64	NU	NU	NC	P81	NU	NU	NU	NU	NU	NU
RED		128						134										
YELLOW		129						*										
GREEN		*						*										
RED ARROW																		
YELLOW ARROW																		
FLASHING YELLOW ARROW																		
GREEN ARROW																		
Hand icon							104					110						
Walking person icon							106					112						

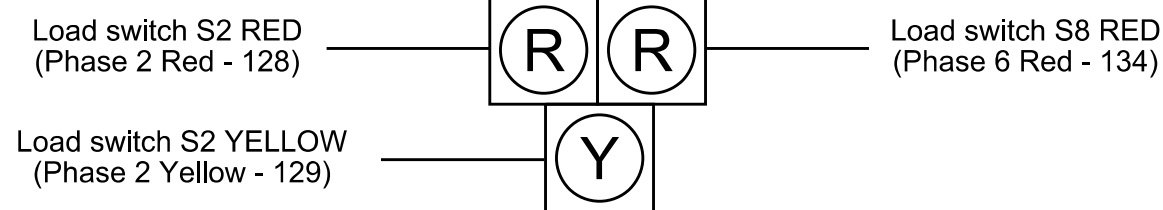
NU = Not Used

NC = Not Connected

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

FYA SIGNAL WIRING DETAIL

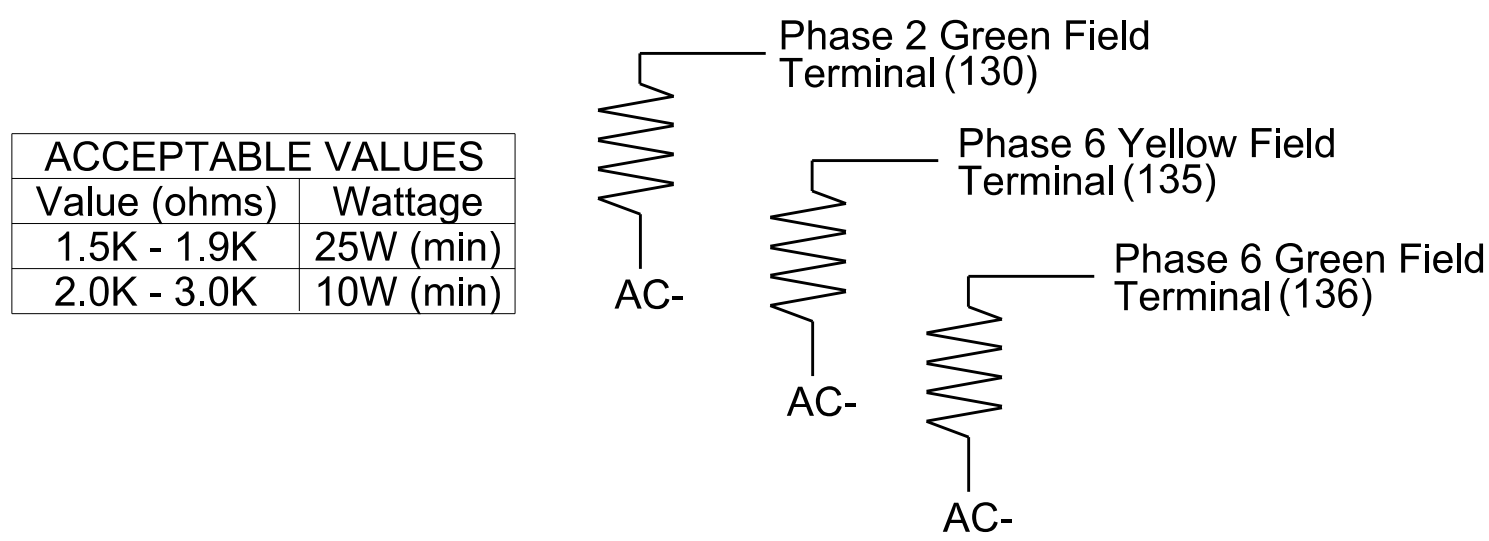
(wire signal heads as shown)



21, 22, 23, 24
61, 62, 63, 64

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)

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												
P41	TB8-5.6	I12L	69	35	4	PED 4/8*						
P81	TB8-8.9	I13L	70	36	8	PED 8/4*						

* FOR THE ABOVE DETECTION TO CALL ANOTHER PHASE, SCROLL OVER AND ENTER SECOND PHASE IN "ADDITIONAL CALL PHASES" COLUMN.

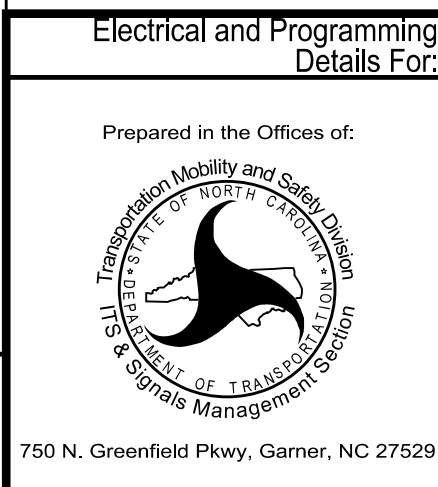
INPUT FILE POSITION LEGEND: J2L

FILE J
SLOT 2
LOWER



HDR Engineering, Inc. of the Carolinas
555 Fayetteville St. Suite 900 Raleigh, N.C. 27601
N.C.B.E.L.S. License Number: F-0116

Electrical Detail - Sheet 1 of 2



Pedestrian Hybrid Beacon #2
at
SR 2316 (Northcross Dr.) Roundabout

Division 10 Wecklenburg County Huntersville

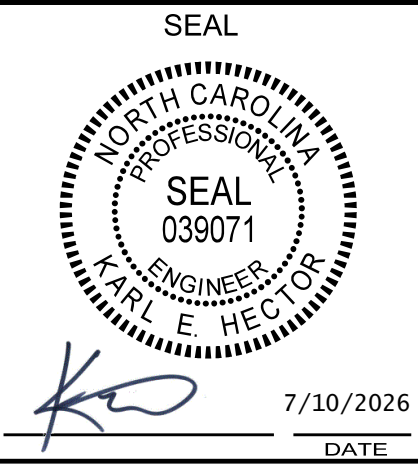
PLAN DATE: July 2026 REVIEWED BY: Z Wang

PREPARED BY: K Hector REVIEWED BY:

REVISIONS

INIT. DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



SIG. INVENTORY NO. 10-2543

OUTPUT CHANNEL CONFIGURATION

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

Web Interface
Home >Controller >Advanced IO>Channels>Channel 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	8				16
17	Overlap	5		X	X	17
18	Overlap	6		X		18

TIMING INTERVAL

PHASE 2+6 = DARK DISPLAY
PHASE 2+6 PRE CLEARANCE = FLASHING YELLOW DISPLAY
PHASE 2+6 YELLOW CHANGE = STEADY YELLOW DISPLAY
PHASE 2+6 RED CLEAR THROUGH 4+8 WALK = STEADY RED DISPLAY
PED 4+8 DON'T WALK = ALTERNATING FLASHING RED DISPLAY

OPERATIONAL NOTES

1. In order for the controller to perform the Pedestrian Hybird Beacon (HAWK signal) sequence, the 332_NCDOT_HAWK_v1_X database must be installed on controller.
2. The only Phase 6 load switch output that is being used drivers one of the red signal faces of each signal head.
3. The Logic Processor flashes Phase 2 Yellow during the Phase 2 Pre-Clearance interval. Phase 2 Yellow drives the solid yellow signal face during the Phase 2 vehicle Yellow Change.
4. Phase 2 and Phase 6 Red outputs drives the solid Red displays during the Phase 2 and 6 Red Clear and Ped 4 and 8 Walk interval. The Logic Processor flashes Phase 2 and 6 Red Outputs in a wig-wag pattern during Phase 4+8 Ped Clear interval.
5. The controller must be programmed for Ped Clear During Red Clear for Pedestrian Phase 4 and 8 so that Red displays continue to flash during Phase 4 and 8 Yellow Change and Red Clear.
6. Make sure that all Phases 2 and Phase 6 timing match each other and that all Phase 4 and Phase 8 timings match each other.
7. The Ped 4 push button is programmed to call Ped 4 and Ped 8. The Ped 8 push button is programmed to call Ped 8 and Ped 4.

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 10-2543
DESIGNED: June 2026
SEALED: 07-10-2026
REVISED: N/A

Electrical Detail - Sheet 2 of 2

DOCUMENT NOT CONSIDERED
FINAL UNLESS ALL
SIGNATURES COMPLETED



HDR Engineering, Inc. of the Carolinas
555 Fayetteville St, Suite 900 Raleigh, N.C. 27601
N.C.B.E.L.S. License Number: F-0116

Electrical and Programming
Details For:

Prepared in the Offices of:



750 N. Greenfield Pkwy, Garner, NC 27529

Pedestrian Hybrid Beacon #2
at
SR 2316 (Northcross Dr.) Roundabout

Division 10Wecklenburg CountyHuntersville

PLAN DATE: July 2026REVIEWED BY: Z Wang

PREPARED BY: K HectorREVIEWED BY:

REVISIONS

INIT. DATE

SEAL



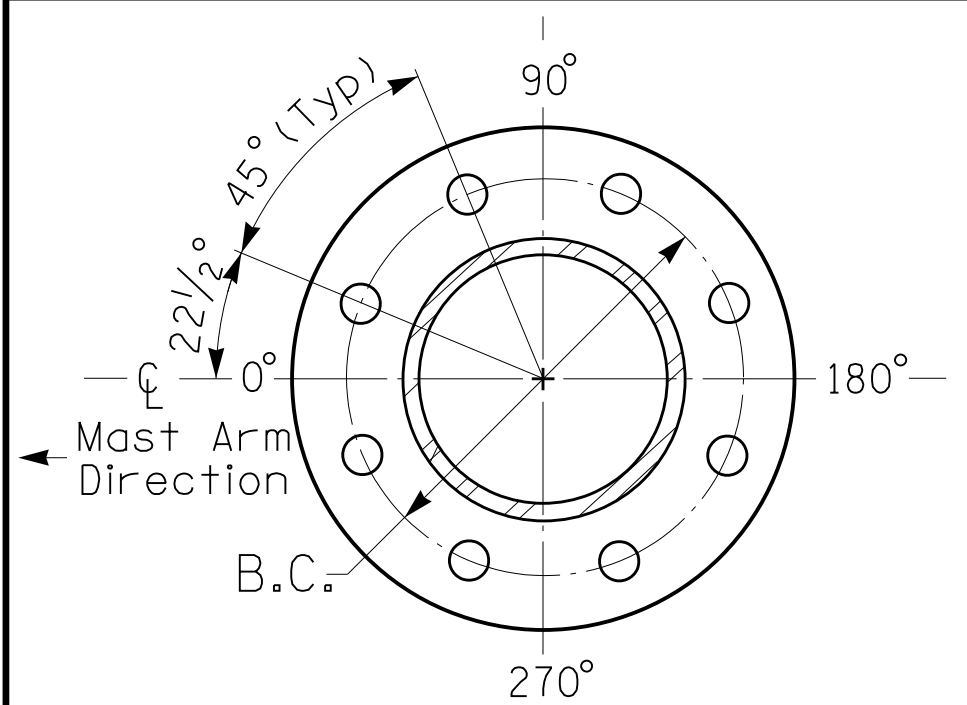
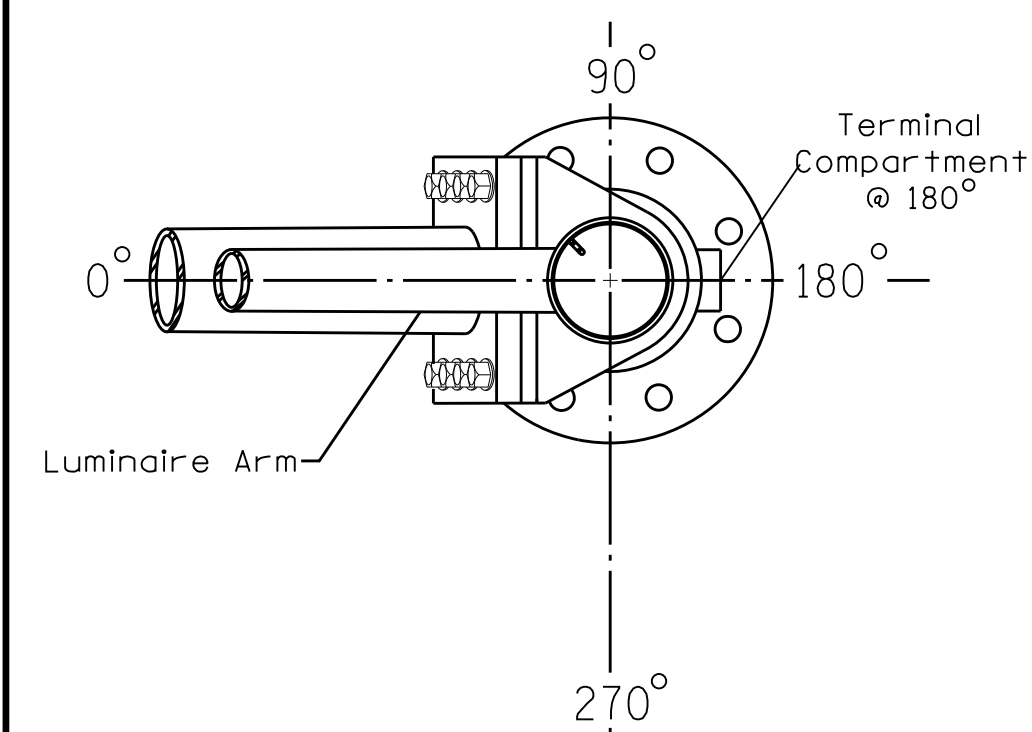
7/10/2026
DATE

SIG. INVENTORY NO. 10-2543

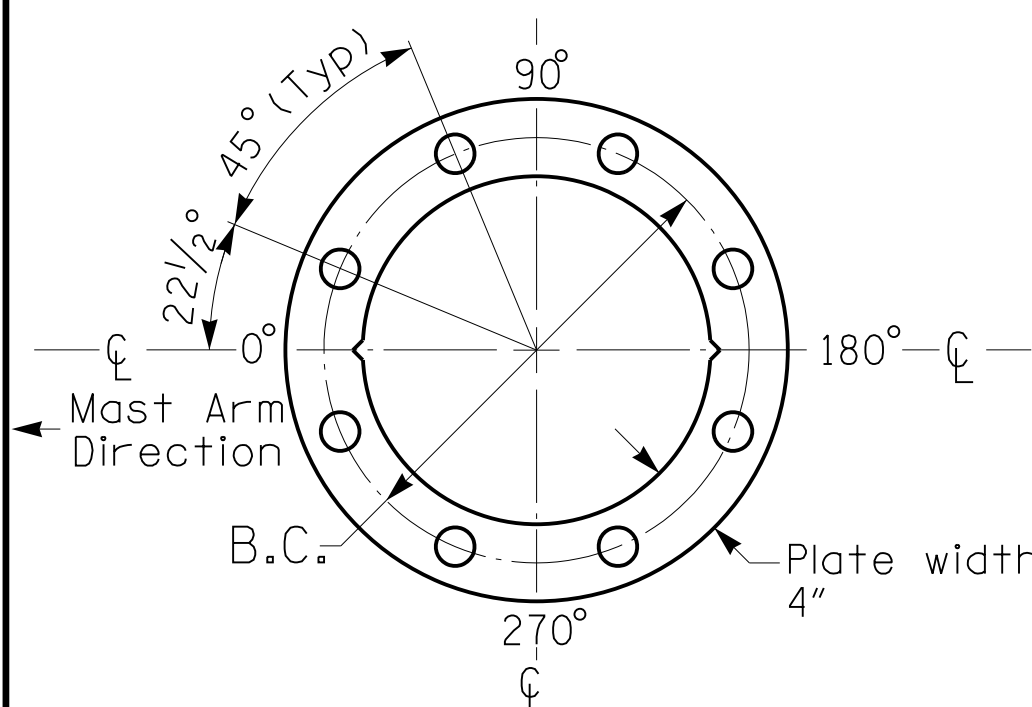
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The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field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

Elevation Differences for:	Pole 17	Pole 18
Baseline reference point at Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	+1.6 ft.	-0.5 ft.
Elevation difference at Edge of travelway or face of curb	+2.6 ft.	+0.4 ft.



See Note 5



HDR HDR Engineering, Inc. of the Carolinas
555 Fayetteville St, Suite 900 Raleigh, N.C. 27601
N.C.B.E.L.S. License Number: F-0116

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	RIGID MOUNTED SIGNAL HEAD 12"-3 SECTION (T-TYPE HYBRID BEACON) WITH BACKPLATE	10.5 S.F.	39.0" W X 39.0" L	58 LBS
	SIGN RIGID MOUNTED	5.0 S.F.	24.0" W X 30.0" L	11 LBS
	LUMINAIRE	EPA 0.87 S.F.	13.25" W X 26.25" L	35 LBS

DESIGN REFERENCE MATERIAL

1. Design the traffic signal structure and foundation in accordance with:
 - The 1st Edition 2015 AASHTO LRFD "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
 - The 2024 NCDOT "Standard Specifications for Roads and Structures." The latest addenda to the specifications can be found in the traffic signal project special provisions.
 - The 2024 NCDOT Roadway Standard Drawings.
 - The traffic signal project plans and special provisions.
 - The NCDOT "Metal Pole Standards" located at the following NCDOT website:
<https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx>

DESIGN REQUIREMENTS

2. Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
3. Design all signal supports using force ratios that do not exceed 0.9.
4. 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.
5. Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
6. The mast arm attachment height (H1) shown is based on the following design assumptions:
 - a. 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.
 - b. Signal heads are rigidly mounted and vertically centered on the mast arm.
 - c. The roadway clearance height for design is as shown in the elevation views.
 - d. The top of the pole base plate is 0.75 feet above the ground elevation.
 - e. Refer to the Elevation Data Chart for the elevation differences between the proposed foundation ground level and the high point of the roadway.
 - f. 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.
7. The pole manufacturer will determine the total height (H2) of each pole based on the luminaire height requirement of 30 ft.
8. 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.
9. The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
10. The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.
11. Comply with NEC code 230.2(E) concerning service equipment disconnect.
12. Lighting fixture and luminaire arm represent a load condition to the pole and may not represent exactly how the fixtures will be mounted. The contractor is responsible for ensuring that any required factory preps for mounting fixtures to the pole are included on the shop drawings.
13. Design the luminaire support arm using design dimensions as shown on elevations views. Refer to the Radial Orientation Detail for attachment to the signal pole. Design arm end for a nominal 2 inch slip fit socket connection for light assembly.

ALL METAL POLES AND ARMS, PEDESTRIAN PEDESTALS, POSTS, BACKPLATES, LUMINAIRES AND SIGNAL HEADS SHOULD BE BLACK IN COLOR RAL-9005 (JET BLACK) OR EQUIVALENT IN COLOR. LUMINAIRES AS SPECIFIED IN THE PROJECT SPECIAL PROVISIONS.

Prepared In the Offices of:

Transportation Mobility and Safety Division
NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
Signal Design Section

750 N. Greenfield, P.O. Box 6009, Raleigh, NC 27602

Pedestrian Hybrid Beacon #2	
at	
SR 2316 (Northcross Dr.) Roundabout	
Division 10	Huntersville
Mecklenburg County	
PLAN DATE: July 2026	REVIEWED BY: Z Wang
PREPARED BY: K Hector	REVIEWED BY:

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SIGNATURES COMPLETED

SEAL



K E

7/10/2026

DATE

SIG. INVENTORY NO. 10-2543

2 Phase
Semi-Actuated
Signal System #: D10-43_Huntersville

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2024, "Standard Specifications for Roads and Structures" dated January 2024, and all applicable sections of the latest version of the generic Project Special Provisions. The PSP can be accessed at the following website: <https://connect.ncdot.gov/resources/safety/Pages/TSMO-Design-Resources.aspx>
- All signal heads shall have backplates with retro-reflective sheeting.
- Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
- 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.
- Enable Ped Clear Through Red for Phase 4+8.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- Pedestrian and Crosswalk advance signs (see Figure 1) located in accordance with Table 2C-3 in Section 2C.04 of the 2023 MUTCD or as otherwise directed by the Engineer.
- See pavement markings plans for stopline and crosswalk placement.

LEGEND

PROPOSED	EXISTING
	N/A

DOCUMENT NOT CONSIDERED
FINAL UNLESS ALL
SIGNATURES COMPLETED

SEAL



SIGNATURE DATE
7/10/2026
SIC. INVENTORY NO. 10-2544

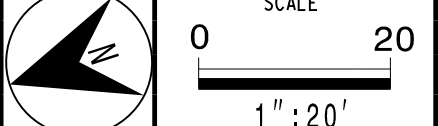
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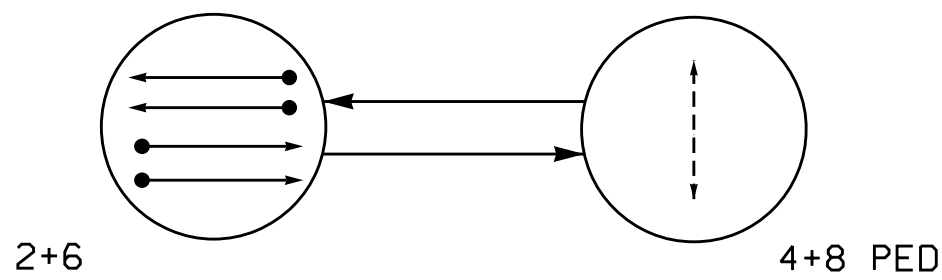
Pedestrian Hybrid Beacon # 3 at SR 2316 (Northcross Dr.) Roundabout	
Division 10 Mecklenburg County	Huntersville
PLAN DATE: July 2026	REVIEWED BY: Z Wang
PREPARED BY: K Hector	RKA PROJ. No.:
REVISIONS	
INIT.	DATE



HDR Engineering, Inc. of the Carolinas
555 Fayetteville St, Suite 900, Raleigh, N.C. 27601
N.C.B.E.L.S. License Number: F-0116
10-2442



PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

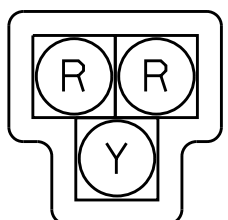
TABLE OF OPERATION

SIGNAL FACE	PHASE							
	2+6 DARK	ACTIVATION NO	STEADY YELLOW	ALL RED	4+8 DARK	4+8 DARK	4+8 DARK	4+8 DARK
21,22,23,24	DRK	FY	Y	R	FR*	Y		
61,62,63,64	DRK	FY	Y	R	FR*	Y		
P41	DW	DW	DW	DW	W	DW	DRK	
P81	DW	DW	DW	DW	W	DW	DRK	

* Alternating Flash

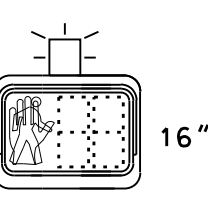
SIGNAL FACE I.D.

All Heads L.E.D.



21,22,23,24
61,62,63,64

Accessible Pedestrian
Signal



P41
P81

Y - Steady Yellow
FR - Flashing Yellow
R - Steady Red
FR - Flashing Red
W - Walk
DW - Don't Walk
DRK - Dark

Metal Pole #19

Sta 16+26 -Y50- +/-
48' LT +/-

Metal Pole #20

Sta 16+55 -Y50- +/-
70' RT +/-

MAXTIME TIMING CHART

FEATURE	PHASE			
	2	4 PED	6	8 PED
Walk *	-	7	-	7
Ped Clear *	0	22	0	22
Min Green *	10	7	10	7
Passage *	0.0	0.0	0.0	0.0
Max 1 *	30	7	30	7
Yellow Change	3.4	3.0	3.4	3.0
Red Clear	1.0	0.0	1.0	0.0
Added Initial *	-	-	-	-
Maximum Initial *	-	-	-	-
Time Before Reduction *	-	-	-	-
Time To Reduce *	-	-	-	-
Minimum Gap	-	-	-	-
Advance Walk	-	-	-	-
Pre Clearance	5	-	5	-
Non Lock Detector	-	X	-	X
Vehicle Recall	MIN RECALL	-	-	MIN RECALL
Dual Entry	-	-	-	-

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

Figure 1



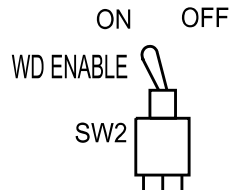
(W11-2)
Sign



(W16-9P)
Sign

(remove jumpers and set switches as shown)

(remove jumpers and set switches as shown)



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

1. To prevent "flash-conflict" problems, insert red flash program blocks for all vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the signal plan. Install yellow flash program block to load switches S2 and S8.

*Phase used for timing purposes only.

PROJECT REFERENCE NO.	SHEET NO.
U-5765	Sig.34.1

NU = Not Used
 NC = Not Connected
 * Denotes install load resistor. See load resistor installation detail this sheet.

21, 22, 23, 24
61, 62, 63, 64

INPUT FILE POSITION LEGEND: J2L

FILE J _____

SLOT 2 _____

LOWER _____

FS = FLASH SENSE
ST = STOP TIME

DOCUMENT NOT CONSIDERED
FINAL UNLESS ALL
SIGNATURES COMPLETED

Electrical and Programming Details For:	
--	--

Prepared in the Offices of:



750 N. Greenfield Pkwy, Garner, NC 27529

--	--	--

SEAL



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SEAL

039071



Professional Engineer Seal

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✓

7/

SIG. INVENTORY NO.

OUTPUT CHANNEL CONFIGURATION

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

Web Interface
Home >Controller >Advanced IO>Channels>Channel 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	8				16
17	Overlap	5		X	X	17
18	Overlap	6		X		18

TIMING INTERVAL

PHASE 2+6 = DARK DISPLAY
PHASE 2+6 PRE CLEARANCE = FLASHING YELLOW DISPLAY
PHASE 2+6 YELLOW CHANGE = STEADY YELLOW DISPLAY
PHASE 2+6 RED CLEAR THROUGH 4+8 WALK = STEADY RED DISPLAY
PED 4+8 DON'T WALK = ALTERNATING FLASHING RED DISPLAY

OPERATIONAL NOTES

1. In order for the controller to perform the Pedestrian Hybird Beacon (HAWK signal) sequence, the 332_NCDOT_HAWK_v1_X database must be installed on controller.
2. The only Phase 6 load switch output that is being used drivers one of the red signal faces of each signal head.
3. The Logic Processor flashes Phase 2 Yellow during the Phase 2 Pre-Clearance interval. Phase 2 Yellow drives the solid yellow signal face during the Phase 2 vehicle Yellow Change.
4. Phase 2 and Phase 6 Red outputs drives the solid Red displays during the Phase 2 and 6 Red Clear and Ped 4 and 8 Walk interval. The Logic Processor flashes Phase 2 and 6 Red Outputs in a wig-wag pattern during Phase 4+8 Ped Clear interval.
5. The controller must be programmed for Ped Clear During Red Clear for Pedestrian Phase 4 and 8 so that Red displays continue to flash during Phase 4 and 8 Yellow Change and Red Clear.
6. Make sure that all Phases 2 and Phase 6 timing match each other and that all Phase 4 and Phase 8 timings match each other.
7. The Ped 4 push button is programmed to call Ped 4 and Ped 8. The Ped 8 push button is programmed to call Ped 8 and Ped 4.

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 10-2544
DESIGNED: June 2026
SEALED: 07-10-2026
REVISED: N/A

Electrical Detail - Sheet 2 of 2

DOCUMENT NOT CONSIDERED
FINAL UNLESS ALL
SIGNATURES COMPLETED

 HDR Engineering, Inc. of the Carolinas
555 Fayetteville St, Suite 900 Raleigh, N.C. 27601
N.C.B.E.L.S. License Number: F-0116

Electrical and Programming
Details For:

Prepared in the Offices of:

750 N. Greenfield Pkwy, Garner, NC 27529

Pedestrian Hybrid Beacon #3
at
SR 2316 (Northcross Dr.) Roundabout

Division 10Wecklenburg CountyHuntersville

PLAN DATE: July 2026REVIEWED BY: Z Wang

PREPARED BY: K HectorREVIEWED BY:

REVISIONS
INIT. DATE

SEAL
NORTH CAROLINA
PROFESSIONAL
ENGINEER
039071
KARLE E. HECTOR

7/10/2026
DATE

SIG. INVENTORY NO. 10-2544

Design Loading for METAL POLE NO. 19

Maximum 25.6 ft.

5' Rise

2' 4' 4' 34'

44'

30' TO ROADWAY (APPROX)

2' Rise

17 feet See Note 6f

See Note 4

See Note 6e

See Note 6d

See Note 6f

Edge of travelway or face of curb

Base line reference elev. = 0.0'

High Point of Roadway Surface

Roadway Clearance Design Height 17 ft. Minimum 16.5 ft.

15'

1' Pole

H2 See Note 7

H1 = 14.0 See Note 6

Foundation

Elevation View

Design Loading for METAL POLE NO. 20

Maximum 25.6 ft.

5' Rise

2' 4' 4' 40' 15'

30' TO ROADWAY (APPROX)

2' Rise

17 feet See Note 6f

See Note 4

Roadway Clearance Design Height 17 ft. Minimum 16.5 ft.

See Note 6e

Edge of travelway or face of curb

See Note 6f

See Note 6d

See Note 6

H1= 14.0

H2 See Note 7

⌀ Pole

⌀ Foundation

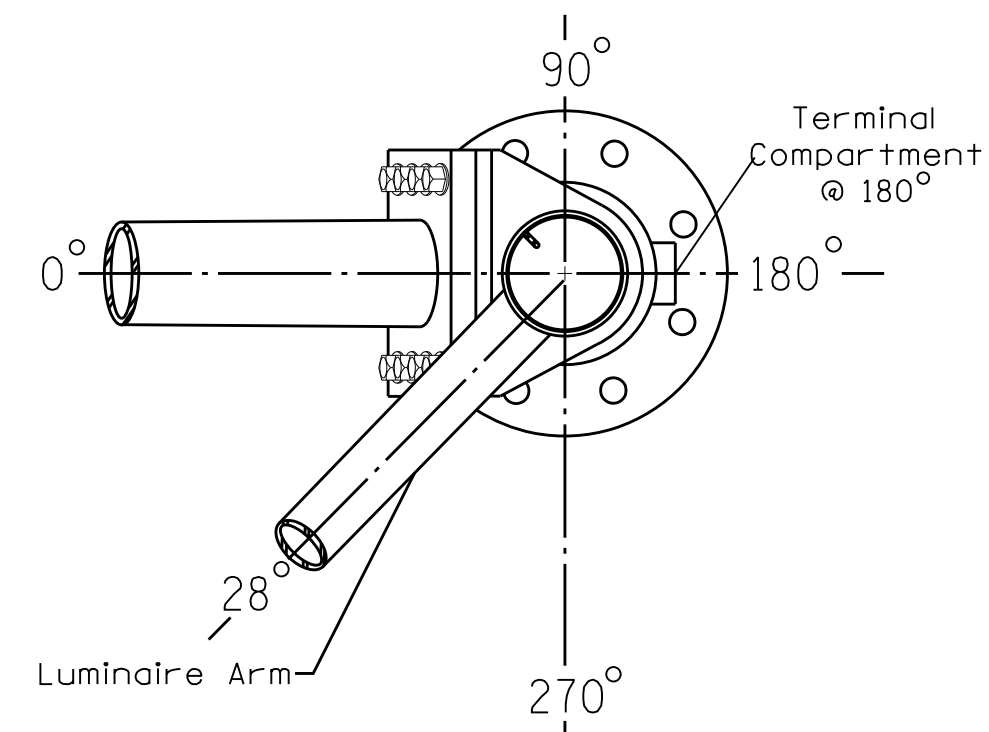
Base line reference elev. = 0.0'

High Point of Roadway Surface

Elevation View

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 Differences for:	Pole 21	Pole 22
Baseline reference point at Ⓢ Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	+0.9 ft.	+0.8 ft.
Elevation difference at Edge of travelway or face of curb	+0.8 ft.	+0.6 ft.



8 BOLT BASE PLATE DETAIL

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

PROJECT REFERENCE NO.	SHEET NO.
U-5765	Sig. 34.3

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	RIGID MOUNTED SIGNAL HEAD 12"-3 SECTION (T-TYPE HYBRID BEACON) WITH BACKPLATE	10.5 S.F.	39.0" W X 39.0" L	58 LBS
	SIGN RIGID MOUNTED	5.0 S.F.	24.0" W X 30.0" L	11 LBS
	LUMINAIRE	EPA 0.87 S.F.	13.25" W X 26.25" L	35 LBS

DESIGN REFERENCE MATERIAL

1. Design the traffic signal structure and foundation in accordance with:
 - The 1st Edition 2015 AASHTO LRFD "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
 - The 2024 NCDOT "Standard Specifications for Roads and Structures." The latest addenda to the specifications can be found in the traffic signal project special provisions.
 - The 2024 NCDOT Roadway Standard Drawings.
 - The traffic signal project plans and special provisions.
 - The NCDOT "Metal Pole Standards" located at the following NCDOT website:
<https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx>

DESIGN REQUIREMENTS

2. Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
3. Design all signal supports using force ratios that do not exceed 0.9.
4. 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.
5. Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
6. The mast arm attachment height (H1) shown is based on the following design assumptions:
 - a. 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.
 - b. Signal heads are rigidly mounted and vertically centered on the mast arm.
 - c. The roadway clearance height for design is as shown in the elevation views.
 - d. The top of the pole base plate is 0.75 feet above the ground elevation.
 - e. Refer to the Elevation Data Chart for the elevation differences between the proposed foundation ground level and the high point of the roadway.
 - f. 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.
7. The pole manufacturer will determine the total height (H2) of each pole based on the luminaire height requirement of 30 ft.
8. 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.
9. The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
10. The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.
11. Comply with NEC code 230.2(E) concerning service equipment disconnect.
12. Lighting fixture and luminaire arm represent a load condition to the pole and may not represent exactly how the fixtures will be mounted. The contractor is responsible for ensuring that any required factory preps for mounting fixtures to the pole are included on the shop drawings.
13. Design the luminaire support arm using design dimensions as shown on elevations views. Refer to the Radial Orientation Detail for attachment to the signal pole. Design arm end for a nominal 2 inch slip fit socket connection for light assembly.

ALL METAL POLES AND ARMS, PEDESTRIAN PEDESTALS, POSTS, BACKPLATES, LUMINAIRES AND SIGNAL HEADS SHOULD BE BLACK IN COLOR RAL-9005 (JET BLACK) OR EQUIVALENT IN COLOR. LUMINAIRES AS SPECIFIED IN THE PROJECT SPECIAL PROVISIONS.

DOCUMENT NOT CONSIDERED
FINAL UNLESS ALL
SIGNATURES COMPLETED



KW 7/10/2026
DATE
SIG. INVENTORY NO. 10-2544

2 Phase
Semi-Actuated
Signal System #: D10-43_Huntersville

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2024, "Standard Specifications for Roads and Structures" dated January 2024, and all applicable sections of the latest version of the generic Project Special Provisions. The PSP can be accessed at the following website: <https://connect.ncdot.gov/resources/safety/Pages/TSMO-Design-Resources.aspx>
- All signal heads shall have backplates with retro-reflective sheeting.
- Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
- 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.
- Enable Ped Clear Through Red for Phase 4+8.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- Pedestrian and Crosswalk advance signs (see Figure 1) located in accordance with Table 2C-3 in Section 2C.04 of the 2023 MUTCD or as otherwise directed by the Engineer.
- See pavement markings plans for stopline and crosswalk placement.

LEGEND

PROPOSED	EXISTING
	N/A

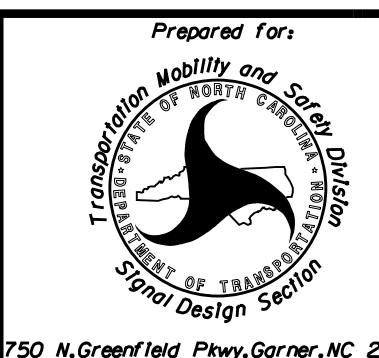
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL



SIGNATURE DATE 7/10/2026
SIC. INVENTORY NO. 10-2545

New Installation



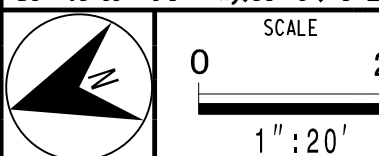
Pedestrian Hybrid Beacon # 4
at
SR 2316 (Northcross Dr.) Roundabout

Division 10 Mecklenburg County Huntersville
PLAN DATE: July 2026 REVIEWED BY: Z Wang
PREPARED BY: K Hector RKA PROJ. No.:

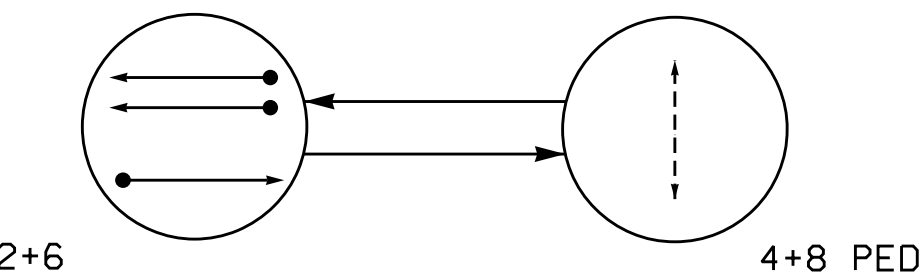
REVISIONS	INIT.	DATE



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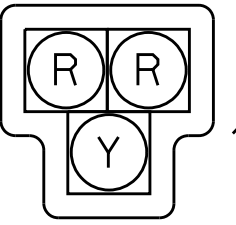
PHASING DIAGRAM



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

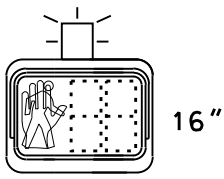
SIGNAL FACE I.D.

All Heads L.E.D.



21,22,23,24
61,62,63,64

Accessible Pedestrian
Signal



P41
P81

TABLE OF OPERATION

SIGNAL FACE	PHASE							
	2+6 DARK	ACTIVATION	STEADY YELLOW	ALL RED	4+8 PED WALK	4+8 PED CLEAR	4+8 PED WALK	4+8 PED CLEAR
21,22,23,24	DRK	FY	Y	R	R	FR*	Y	Y
61,62,63,64	DRK	FY	Y	R	R	FR*	Y	Y
P41	DW	DW	DW	DW	W	DW	DRK	DRK
P81	DW	DW	DW	DW	W	DW	DRK	DRK

* Alternating Flash

Y - Steady Yellow
FR - Flashing Yellow
R - Steady Red
FR - Flashing Red
W - Walk
DW - Don't Walk
DRK - Dark

ACCESSIBLE PEDESTRIAN SIGNAL OPERATION

SIGNAL FACE	VOICE	TONES	INTERVAL	SPEECH MESSAGE
P41	-	X	Walk	(Percussive Tone)
P81	-	X	Walk	(Percussive Tone)
P41	X	-	Flashing Don't Walk / Don't Walk	Wait, wait to cross Northcross
P81	X	-	Flashing Don't Walk / Don't Walk	Wait, wait to cross Northcross

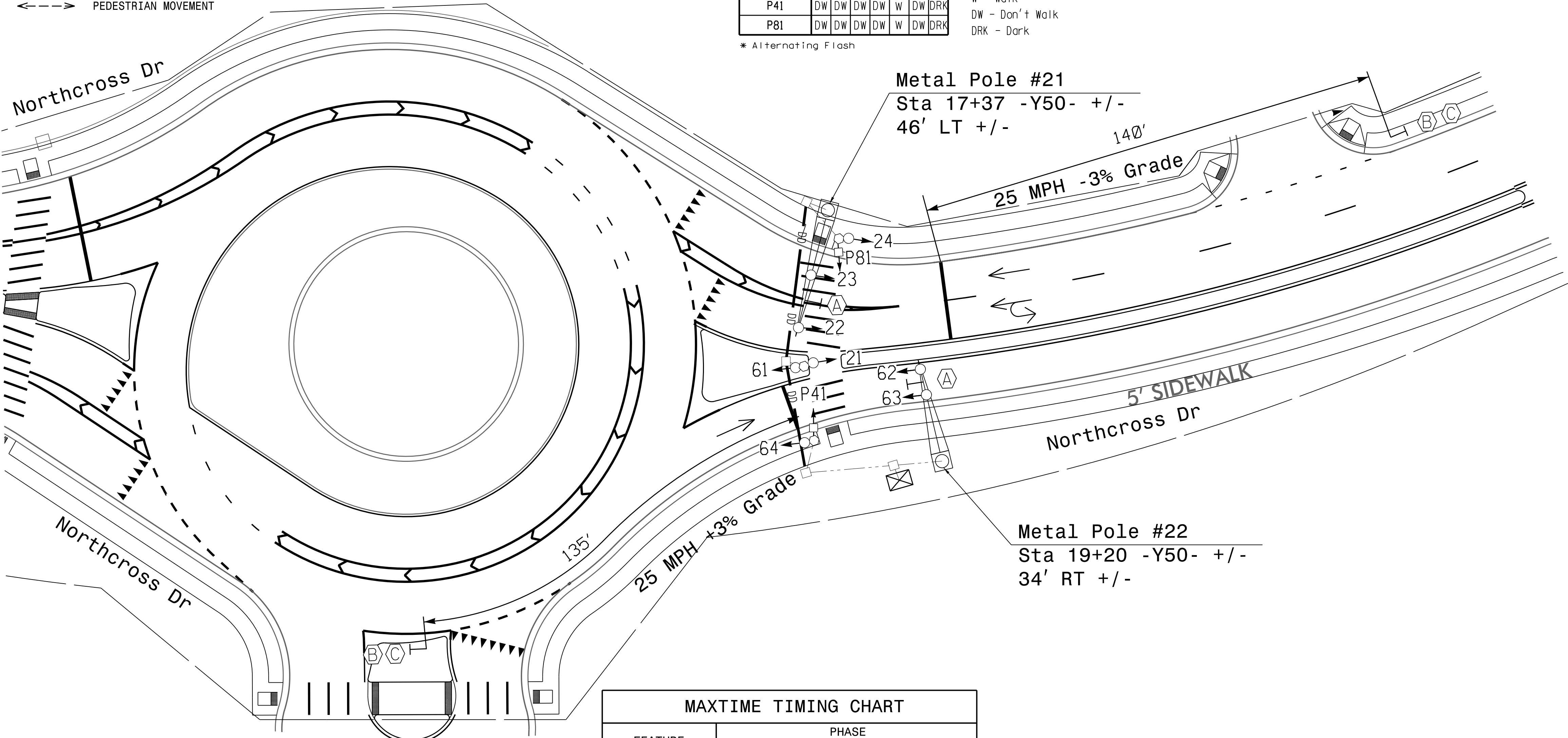
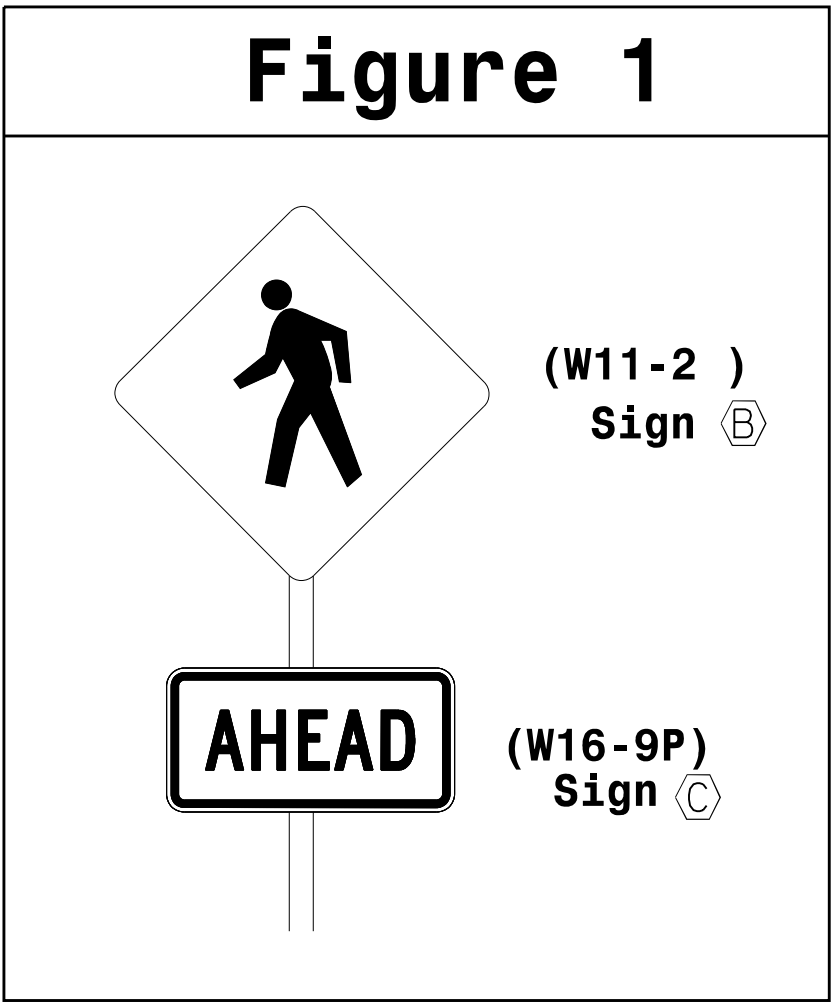


Figure 1



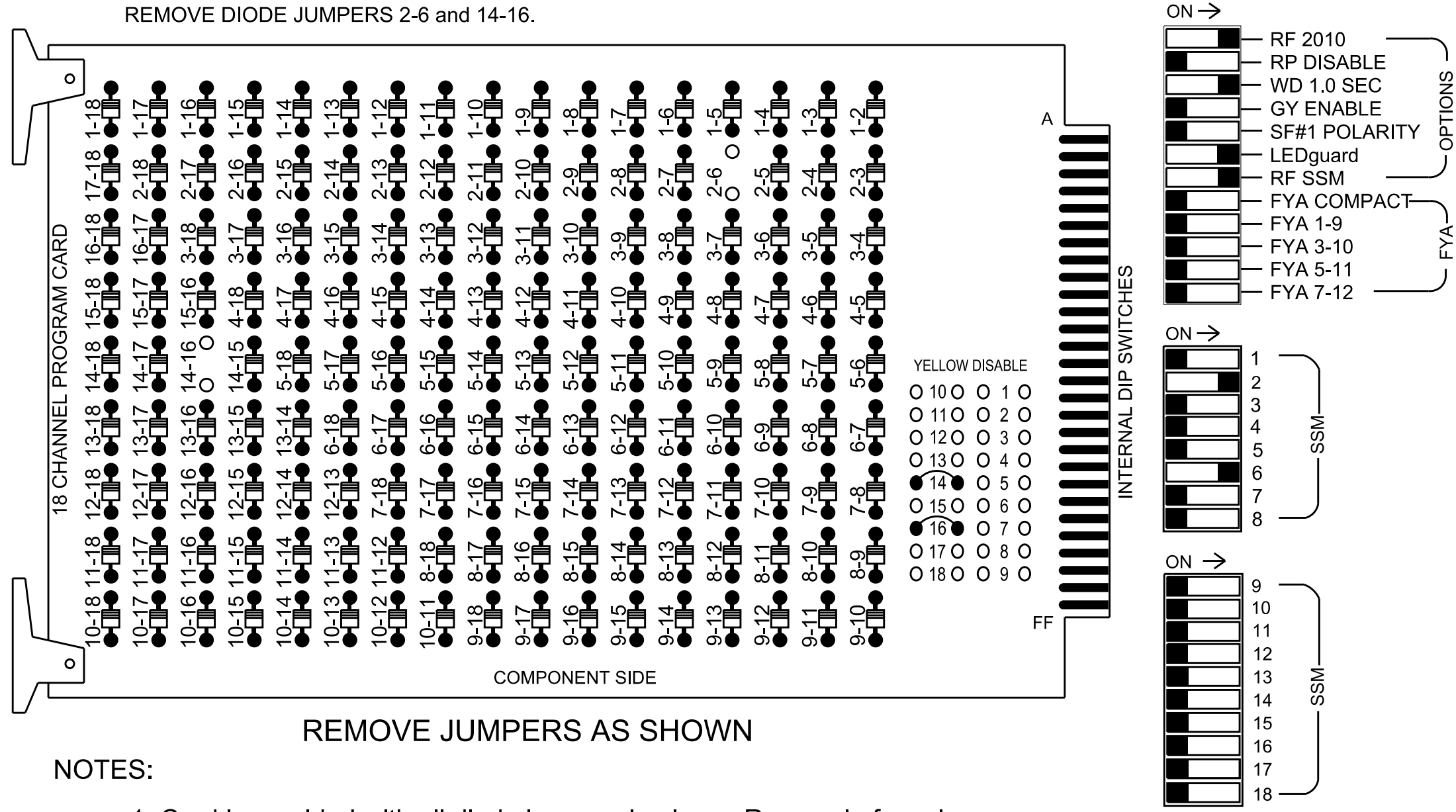
MAXTIME TIMING CHART

FEATURE	PHASE			
	2	4 PED	6	8 PED
Walk *	-	7	-	7
Ped Clear *	0	16	0	16
Min Green *	10	7	10	7
Passage *	0.0	0.0	0.0	0.0
Max I *	30	7	30	7
Yellow Change	3.2	3.0	3.2	3.0
Red Clear	1.0	0.0	1.0	0.0
Added Initial *	-	-	-	-
Maximum Initial *	-	-	-	-
Time Before Reduction *	-	-	-	-
Time To Reduce *	-	-	-	-
Minimum Gap	-	-	-	-
Advance Walk	-	-	-	-
Pre Clearance	5	-	5	-
Non Lock Detector	-	X	-	X
Vehicle Recall	MIN RECALL	-	-	MIN RECALL
Dual Entry	-	-	-	-

* These values may be field adjusted. Do not adjust Min Green and Passage 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 CONFLICT MONITOR
PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



NOTES:

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

NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the signal plan. Install yellow flash program block to load switches S2 and S8.

- Install 332_NCDOT_HAWK_v1_X database onto controller.

- Program controller to start up in phase 2 Green No Walk and 6 Green No Walk.
- Program phases 4 and 8 for No Startup Veh Call and No Startup Ped Call.
- Program phases 4 and 8 for Ped Clear During Red Clear.
- The cabinet and controller are part of the Signal System #: D10-43_Huntersville

EQUIPMENT INFORMATION

Controller.....2070LX
Cabinet.....332 w/ Aux
Software.....Q-Free MAXTIME
Cabinet Mount.....Base
Output File Positions.....18 With Aux. Output File
Load Switches Used.....S2,S6,S8,S12
Phases Used.....2, 4*, 4PED, 6, 8*, 8PED
Overlaps.....Not Used

*Phase used for timing purposes only.

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	NU	21,22,23,24 61,62,63,64	NU	NU	NC	P41	NU	21,22,23,24 61,62,63,64	NU	NU	NC	P81	NU	NU	NU	NU	NU	NU
RED		128						134										
YELLOW		129						*										
GREEN		*						*										
RED ARROW																		
YELLOW ARROW																		
FLASHING YELLOW ARROW																		
GREEN ARROW																		
Hand icon							104					110						
Walking person icon							106					112						

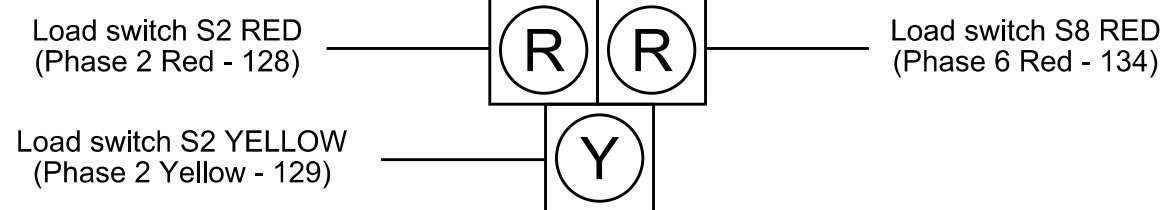
NU = Not Used

NC = Not Connected

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

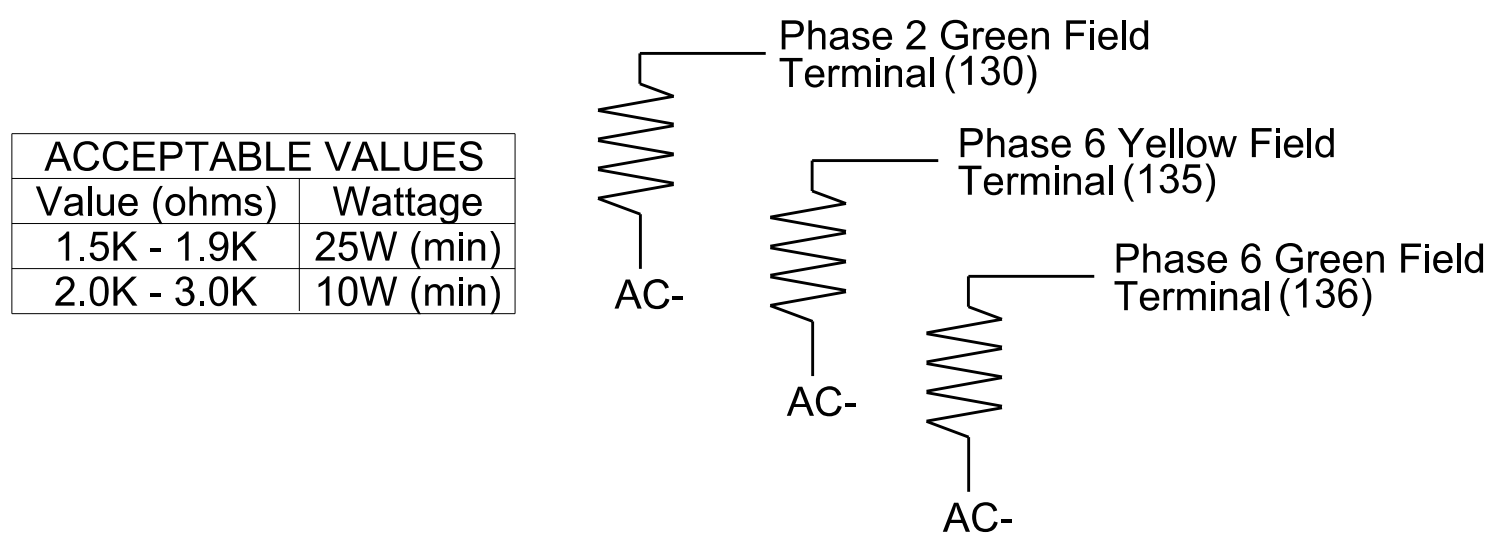
FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

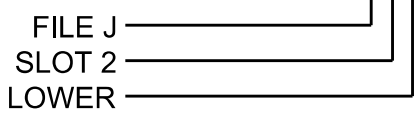


INPUT FILE CONNECTION & PROGRAMMING CHART

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												
P41	TB8-5.6	I12L	69	35	4	PED 4/8*						
P81	TB8-8.9	I13L	70	36	8	PED 8/4*						

* FOR THE ABOVE DETECTION TO CALL ANOTHER PHASE. SCROLL OVER AND ENTER SECOND PHASE IN "ADDITIONAL CALL PHASES" COLUMN.

INPUT FILE POSITION LEGEND: J2L

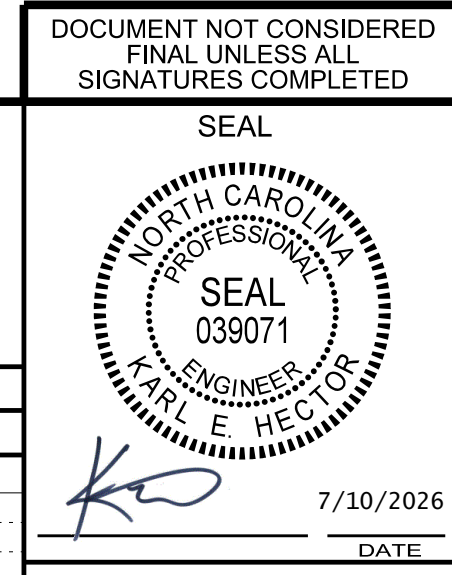


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Electrical Detail - Sheet 1 of 2



Prepared in the Offices of:		Pedestrian Hybrid Beacon #4 at SR 2316 (Northcross Dr.) Roundabout	
Division 10	Wecklenburg County	Huntersville	
PLAN DATE: July 2026	REVIEWED BY: Z Wang		
PREPARED BY: K Hector	REVIEWED BY:		
REVISIONS	INIT.	DATE	



OUTPUT CHANNEL CONFIGURATION

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

Web Interface
Home >Controller >Advanced IO>Channels>Channel 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	8				16
17	Overlap	5		X	X	17
18	Overlap	6		X		18

TIMING INTERVAL

PHASE 2+6 = DARK DISPLAY
PHASE 2+6 PRE CLEARANCE = FLASHING YELLOW DISPLAY
PHASE 2+6 YELLOW CHANGE = STEADY YELLOW DISPLAY
PHASE 2+6 RED CLEAR THROUGH 4+8 WALK = STEADY RED DISPLAY
PED 4+8 DON'T WALK = ALTERNATING FLASHING RED DISPLAY

OPERATIONAL NOTES

1. In order for the controller to perform the Pedestrian Hybird Beacon (HAWK signal) sequence, the 332_NCDOT_HAWK_v1_X database must be installed on controller.
2. The only Phase 6 load switch output that is being used drivers one of the red signal faces of each signal head.
3. The Logic Processor flashes Phase 2 Yellow during the Phase 2 Pre-Clearance interval. Phase 2 Yellow drives the solid yellow signal face during the Phase 2 vehicle Yellow Change.
4. Phase 2 and Phase 6 Red outputs drives the solid Red displays during the Phase 2 and 6 Red Clear and Ped 4 and 8 Walk interval. The Logic Processor flashes Phase 2 and 6 Red Outputs in a wig-wag pattern during Phase 4+8 Ped Clear interval.
5. The controller must be programmed for Ped Clear During Red Clear for Pedestrian Phase 4 and 8 so that Red displays continue to flash during Phase 4 and 8 Yellow Change and Red Clear.
6. Make sure that all Phases 2 and Phase 6 timing match each other and that all Phase 4 and Phase 8 timings match each other.
7. The Ped 4 push button is programmed to call Ped 4 and Ped 8. The Ped 8 push button is programmed to call Ped 8 and Ped 4.

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 10-2545
DESIGNED: June 2026
SEALED: 07-10-2026
REVISED: N/A

Electrical Detail - Sheet 2 of 2

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 HDR Engineering, Inc. of the Carolinas
555 Fayetteville St, Suite 900 Raleigh, N.C. 27601
N.C.B.E.L.S. License Number: F-0116

Electrical and Programming
Details For:

Prepared in the Offices of:



750 N. Greenfield Pkwy, Garner, NC 27529

Pedestrian Hybrid Beacon #4
at
SR 2316 (Northcross Dr.) Roundabout

Division 10 Wecklenburg County Huntersville

PLAN DATE: July 2026 REVIEWED BY: Z Wang

PREPARED BY: K Hector REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL



7/10/2026

SIG. INVENTORY NO. 10-2545

Design Loading for METAL POLE NO. 21

Maximum 25.6 ft.

5' Rise

2' 4' 4' 20'

40'

30' TO ROADWAY (APPROX)

2' Rise

15'

13 feet See Note 6f

See Note 4

Roadway Clearance Design Height 17 ft. Minimum 16.5 ft.

High Point of Roadway Surface

Edge of travelway or face of curb

Base line reference elev. = 0.0'

See Note 6e

See Note 6f

See Note 6d

See Note 6

H1 = 13.0 See Note 6

H2 See Note 7

Foundation

Pole

Elevation View

Design Loading for METAL POLE NO. 22

Maximum 25.6 ft.

5' Rise

2' 4' 4' 22'

32'

30' TO ROADWAY (APPROX)

2' Rise

17 feet See Note 6f

See Note 4

Roadway Clearance Design Height 17 ft. Minimum 16.5 ft.

High Point of Roadway Surface

Edge of travelway or face of curb

Base line reference elev. = 0.0'

See Note 6e

See Note 6f

See Note 6d

See Note 6

H1 = 13.0 See Note 6

H2 See Note 7

Foundation

Pole

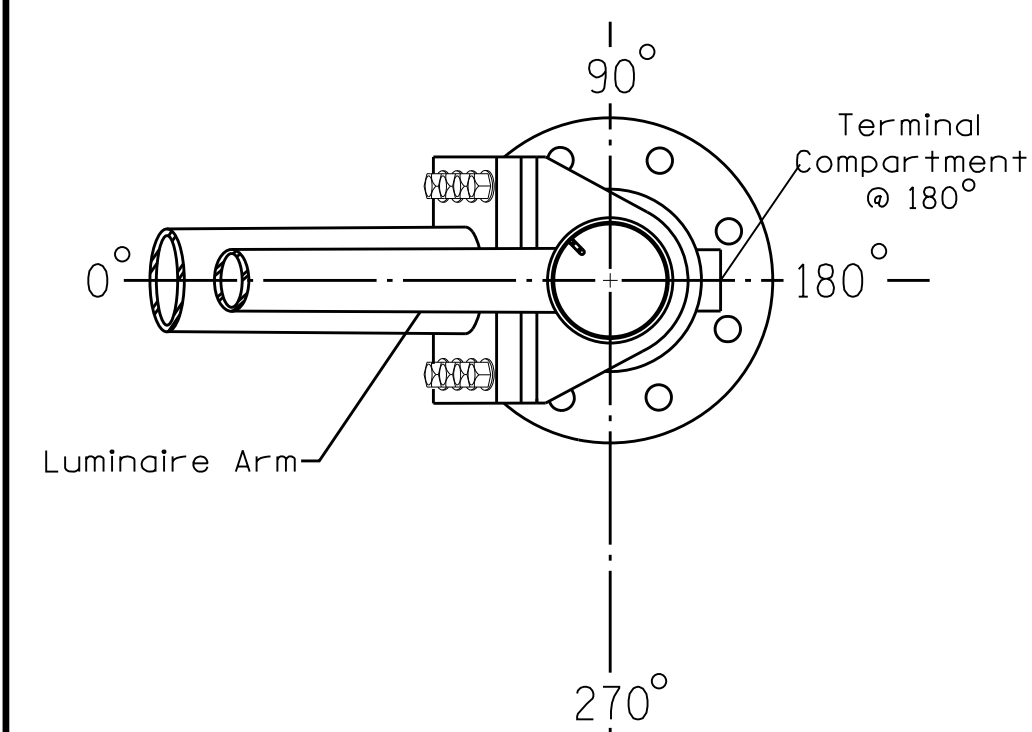
Elevation View



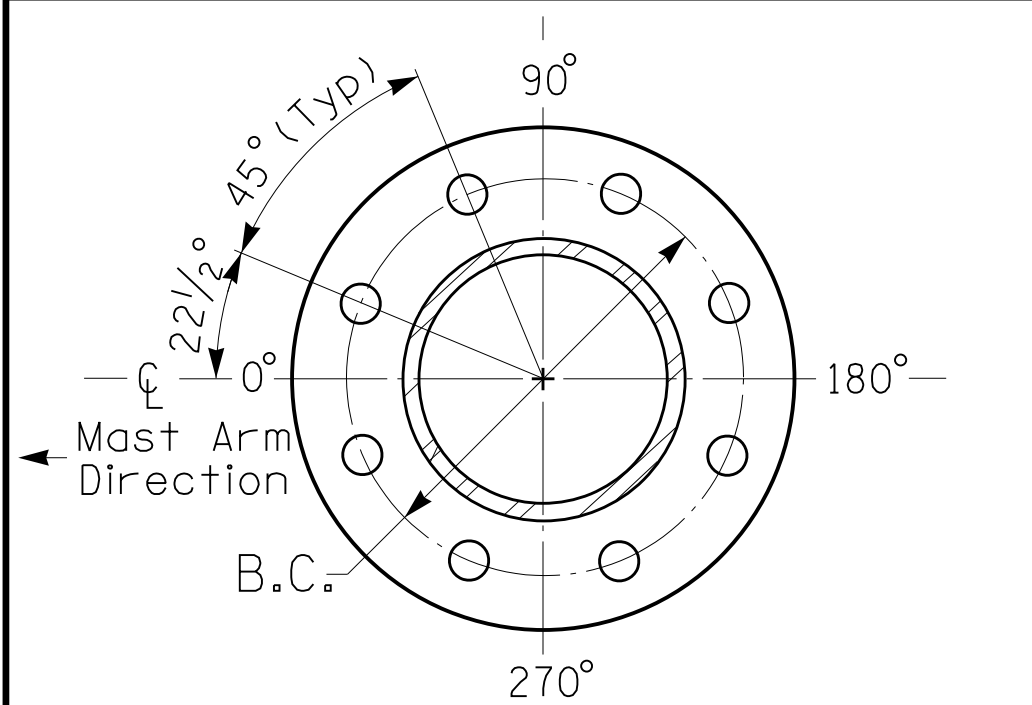
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 21	Pole 22
Baseline reference point at Ⓢ Foundation Ⓢ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	-0.3 ft.	-0.2 ft.
Elevation difference at Edge of travelway or face of curb	+0.6 ft.	+0.2 ft.

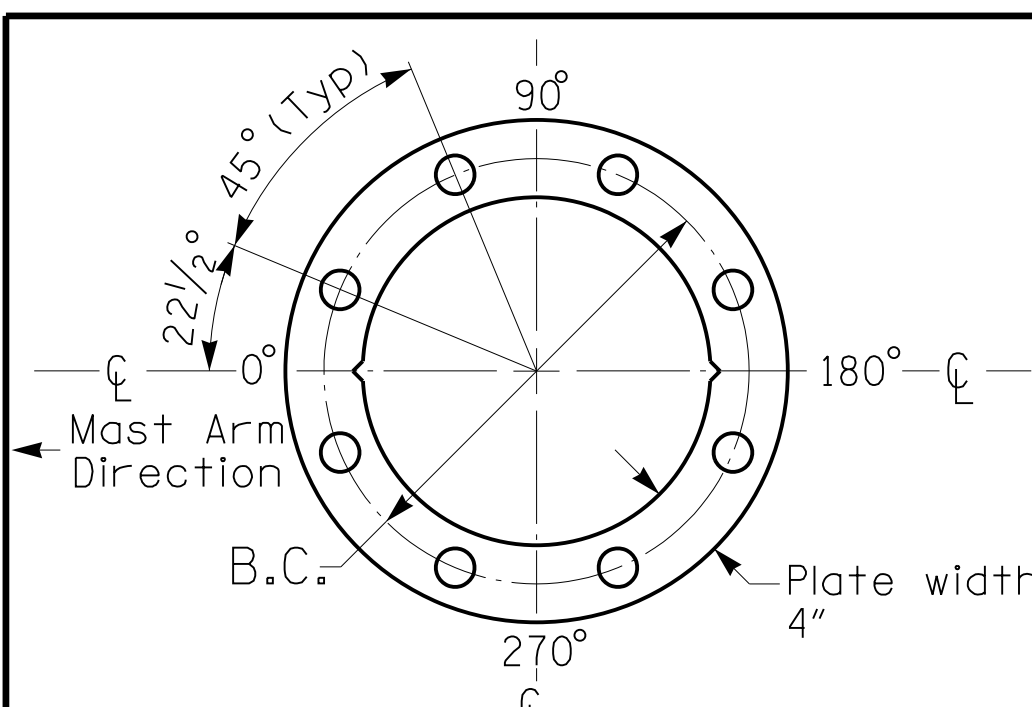


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 5



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

PROJECT REFERENCE NO.	SHEET NO.
U-5765	Sig. 35.3

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	RIGID MOUNTED SIGNAL HEAD 12"-3 SECTION (T-TYPE HYBRID BEACON) WITH BACKPLATE	10.5 S.F.	39.0" W X 39.0" L	58 LBS
	SIGN RIGID MOUNTED	5.0 S.F.	24.0" W X 30.0" L	11 LBS
	LUMINAIRE	EPA 0.87 S.F.	13.25" W X 26.25" L	35 LBS

NOTES

DESIGN REFERENCE MATERIAL

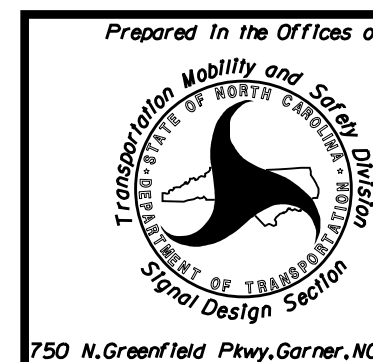
1. Design the traffic signal structure and foundation in accordance with:
 - The 1st Edition 2015 AASHTO LRFD "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
 - The 2024 NCDOT "Standard Specifications for Roads and Structures." The latest addenda to the specifications can be found in the traffic signal project special provisions.
 - The 2024 NCDOT Roadway Standard Drawings.
 - The traffic signal project plans and special provisions.
 - The NCDOT "Metal Pole Standards" located at the following NCDOT website: <https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx>

DESIGN REQUIREMENTS

2. Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
3. Design all signal supports using force ratios that do not exceed 0.9.
4. 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.
5. Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
6. The mast arm attachment height (H1) shown is based on the following design assumptions:
 - a. 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.
 - b. Signal heads are rigidly mounted and vertically centered on the mast arm.
 - c. The roadway clearance height for design is as shown in the elevation views.
 - d. The top of the pole base plate is 0.75 feet above the ground elevation.
 - e. Refer to the Elevation Data Chart for the elevation differences between the proposed foundation ground level and the high point of the roadway.
 - f. 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.
7. The pole manufacturer will determine the total height (H2) of each pole based on the luminaire height requirement of 30 ft.
8. 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.
9. The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
10. The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.
11. Comply with NEC code 230.2(E) concerning service equipment disconnect.
12. Lighting fixture and luminaire arm represent a load condition to the pole and may not represent exactly how the fixtures will be mounted. The contractor is responsible for ensuring that any required factory preps for mounting fixtures to the pole are included on the shop drawings.
13. Design the luminaire support arm using design dimensions as shown on elevations views. Refer to the Radial Orientation Detail for attachment to the signal pole. Design arm end for a nominal 2 inch slip fit socket connection for light assembly.

ALL METAL POLES AND ARMS, PEDESTRIAN PEDESTALS, POSTS, BACKPLATES, LUMINAIRES AND SIGNAL HEADS SHOULD BE BLACK IN COLOR RAL-9005 (JET BLACK) OR EQUIVALENT IN COLOR. LUMINAIRES AS SPECIFIED IN THE PROJECT SPECIAL PROVISIONS.

NCDOT Wind Zone 5 (110 mph)



Pedestrian Hybrid Beacon # 4
at
SR 2316 (Northcross Dr.) Roundabout

Division 10 Mecklenburg County Huntersville

PLAN DATE:	July 2026	REVIEWED BY:	Z Wang
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29	PREPARED BY: K Hector	REVIEWED BY:
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REVISIONS	INIT.	DATE
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7/10/2026

SIG. INVENTORY NO.	10-2545
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