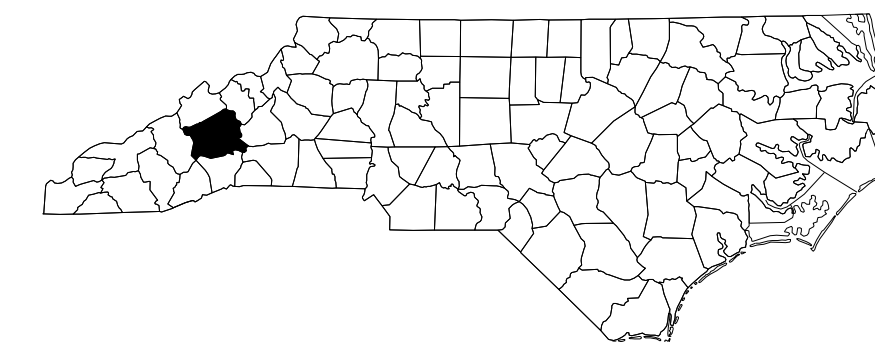


STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

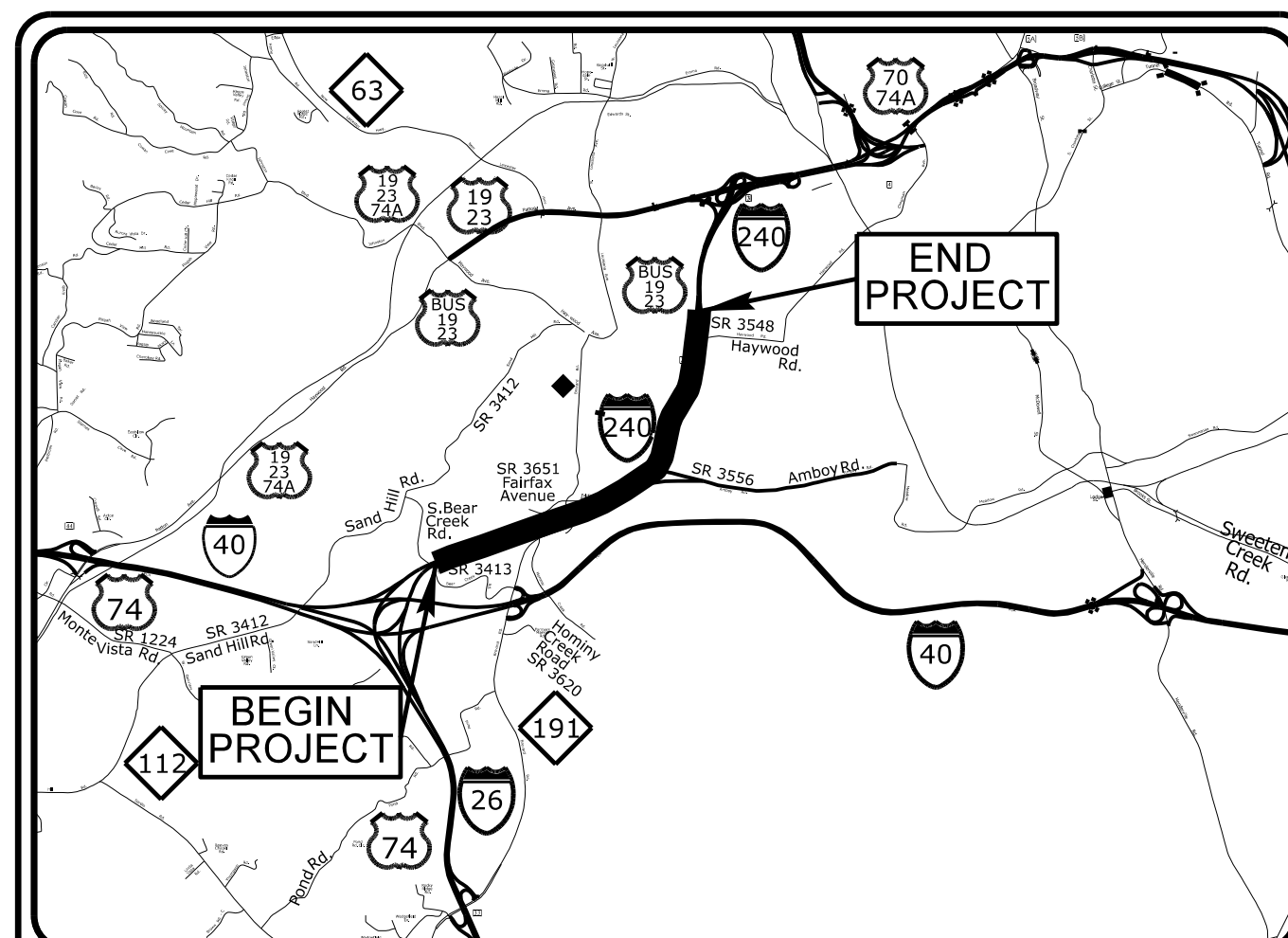
BUNCOMBE COUNTY

LOCATION: I-26/I-40/I-240 INTERCHANGE TO SR 3548 (HAYWOOD RD)

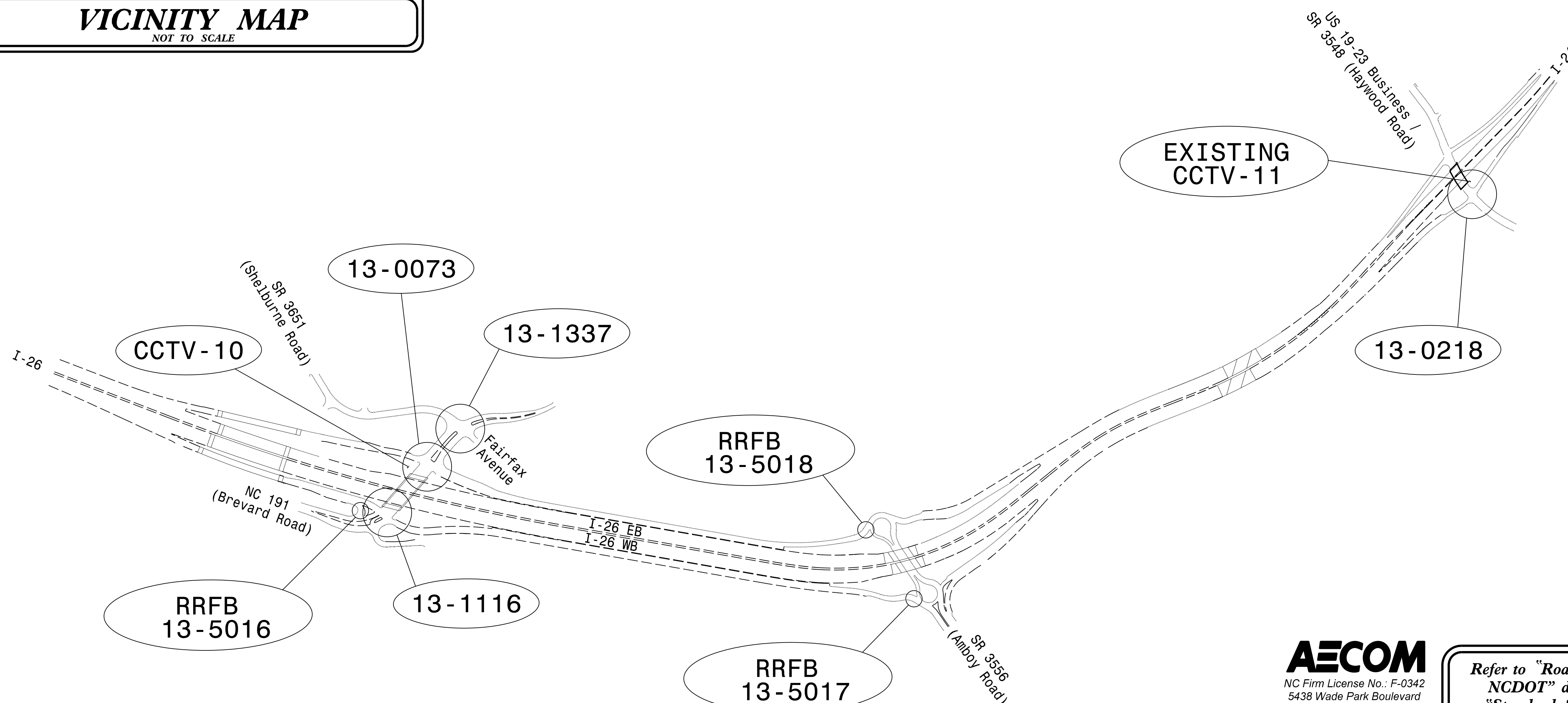
TYPE OF WORK: TRAFFIC SIGNALS AND SIGNAL COMMUNICATIONS



**DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETE**



VICINITY MAP
NOT TO SCALE

**AECOM**

NC Firm License No.: F-0342
5438 Wade Park Boulevard
Suite 200 Raleigh, NC 27607
Phone: 919-461-1100

*Refer to "Roadway Standard Drawings
NCDOT" dated January 2024 and
"Standard Specifications for Roads
and Structures" dated January 2024.*

Prepared for the Office of:
DIVISION OF HIGHWAYS
TRANSPORTATION MOBILITY AND SAFETY
DIVISION



750 N. Greenfield Parkway, Garner, NC 27529

**NCDOT TRANSPORTATION SYSTEMS
MANAGEMENT & OPERATIONS UNIT**

Contacts:

Lee Cowhig, PE – Western Region Signal Project Engineer
D. Todd Joyce, PE – Signal Equipment Project Engineer
Taylor Kenion – State Signal System Design Engineer

AECOM

Contacts:

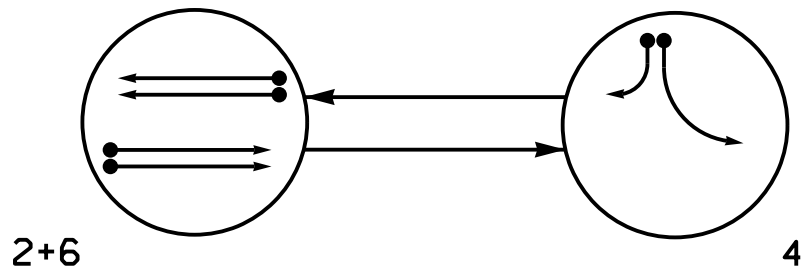
Gregory Cols, PE – Project Engineer
Courtney Kalencik, PE – NC Signals Engineer

Index of Plans

<i>Sheet #</i>	<i>Reference #</i>	<i>Location/Description</i>
<i>Sig. 1</i>	---	<i>Project Titlesheet</i>
<i>Sig. 2.0 - 6.5</i>	<i>13-1116</i>	<i>NC 191 (Brevard Road) at I-26 WB / I-240 EB Ramps</i>
<i>Sig. 7.0 - 9.4</i>	<i>13-0073</i>	<i>NC 191 (Brevard Road) at I-26 EB / I-240 WB Ramps</i>
<i>Sig. 10.0 - 12.4</i>	<i>13-1337</i>	<i>NC 191 (Brevard Road) at SR 3651 (Shelburne Road) / Fairfax Avenue</i>
<i>Sig. 13.0 - 13.2</i>	<i>13-0218</i>	<i>US 19-23 Business / SR 3548 (Haywood Road) at I-26 WB / I-240 EB Ramps</i>
<i>Sig. 14.0</i>	<i>N/A</i>	<i>Rectangular Rapid Flashing Beacon Standard Drawing</i>
<i>Sig. M1A - M9</i>	<i>N/A</i>	<i>Metal Pole Standard Drawings</i>
<i>SCP 1 - 24</i>	<i>N/A</i>	<i>Signal Communication Plans and Splice Details</i>

28-JUL-2026 13:57
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PHASING DIAGRAM



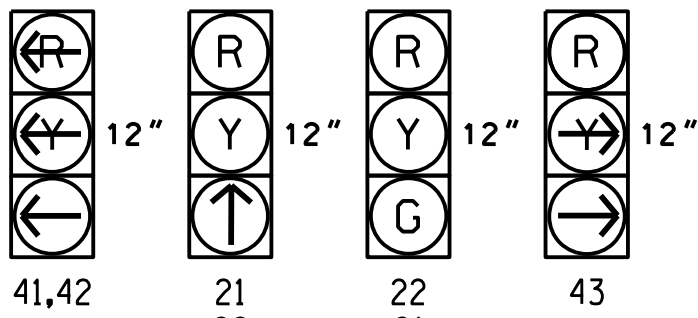
PHASING DIAGRAM DETECTION LEGEND

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

SIGNAL FACE	PHASE		
	2+6	4	FLASH
21	↑	R	R
22	G	R	R
41,42	R	←	R
43	R	←	R
61	G	R	R
62	↑	R	R

SIGNAL FACE I.D.

All Heads L.E.D.



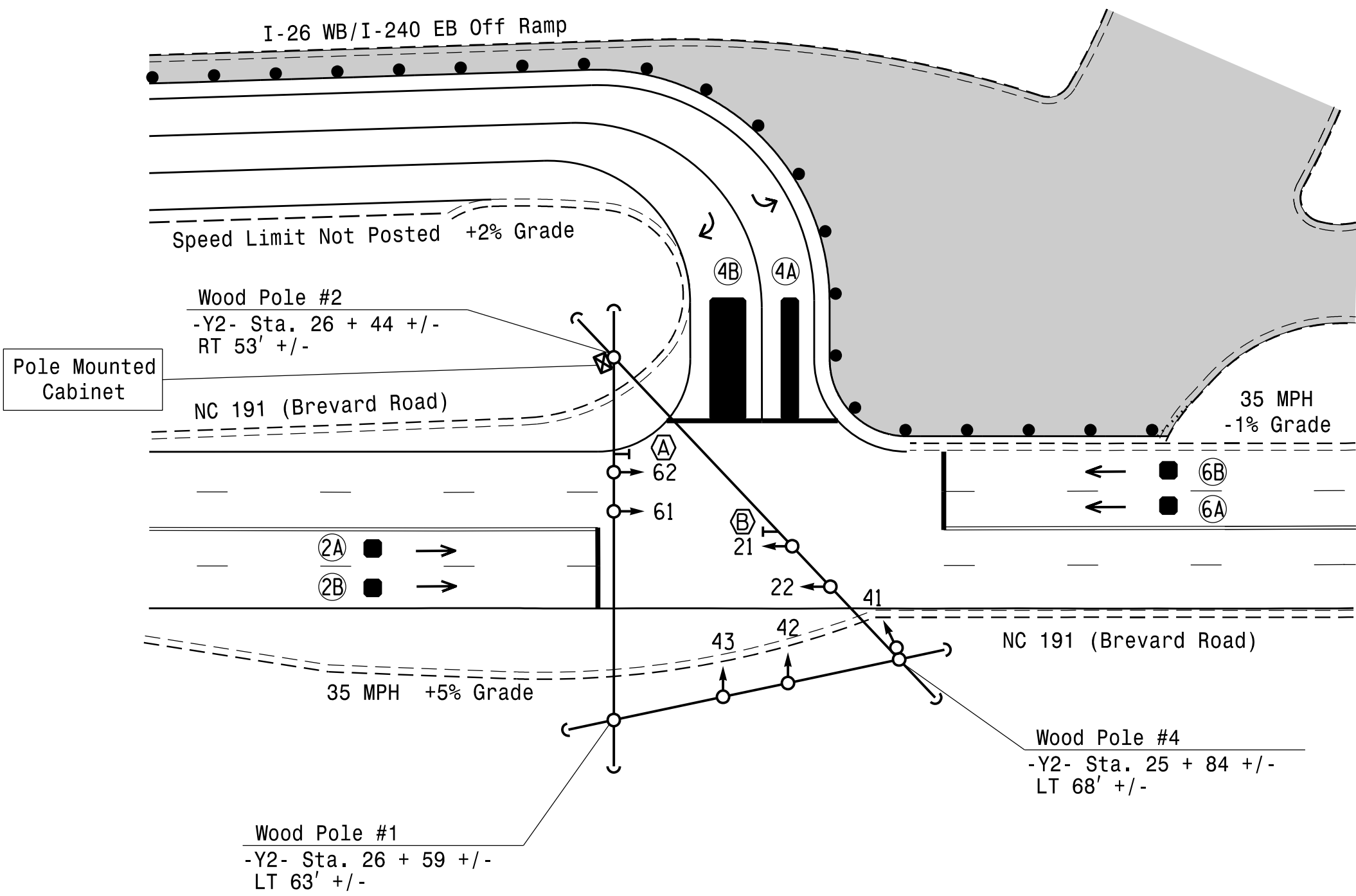
MAXTIME DETECTOR INSTALLATION CHART												
DETECTOR						PROGRAMMING						
ZONE	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
2A ★	6X6	70	★	★	2	-	-	X	-	X	-	★
2B ★	6X6	70	★	★	2	-	-	X	-	X	-	★
4A ★	6X40	0	★	★	4	-	-	X	-	X	-	★
4B ★	12X40	0	★	★	4	15.0	-	X	-	X	-	★
6A ★	6X6	70	★	★	6	-	-	X	-	X	-	★
6B ★	6X6	70	★	★	6	-	-	X	-	X	-	★

★ Video Detection Zone

2 Phase
Fully Actuated
D13-02 Asheville

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2024 and "Standard Specifications for Roads and Structures" dated January 2024.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Set all detector units to presence mode.
- Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
- This intersection uses video 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 Transportation Management Plans for stop bar locations.



MAXTIME TIMING CHART

FEATURE	PHASE		
	2	4	6
Walk *	-	-	-
Ped Clear *	-	-	-
Min Green *	10	7	10
Passage *	3.0	2.0	3.0
Max I *	45	30	45
Yellow Change	3.9	3.7	3.9
Red Clear	1.7	1.0	1.7
Added Initial *	-	-	-
Maximum Initial *	-	-	-
Time Before Reduction *	-	-	-
Time To Reduce *	-	-	-
Minimum Gap	-	-	-
Advance Walk	-	-	-
Non Lock Detector	-	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.

LEGEND

PROPOSED	EXISTING

New Installation
Temporary Design 1 (TMP Phase I Step 3)

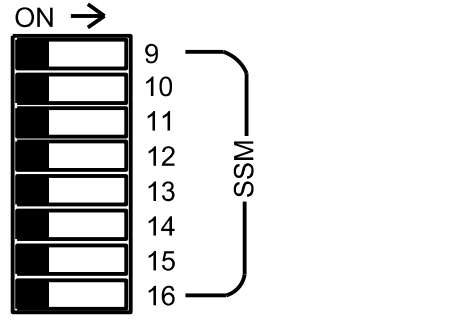
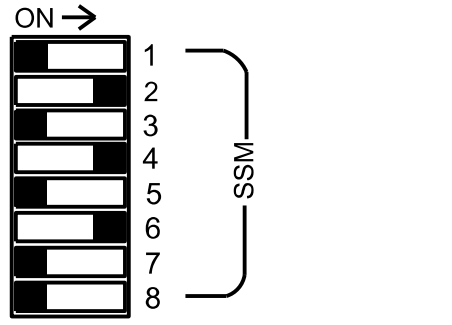
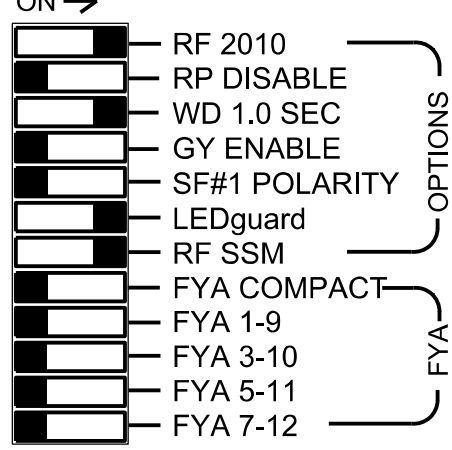
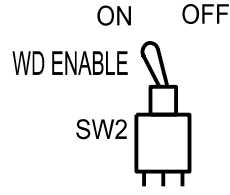
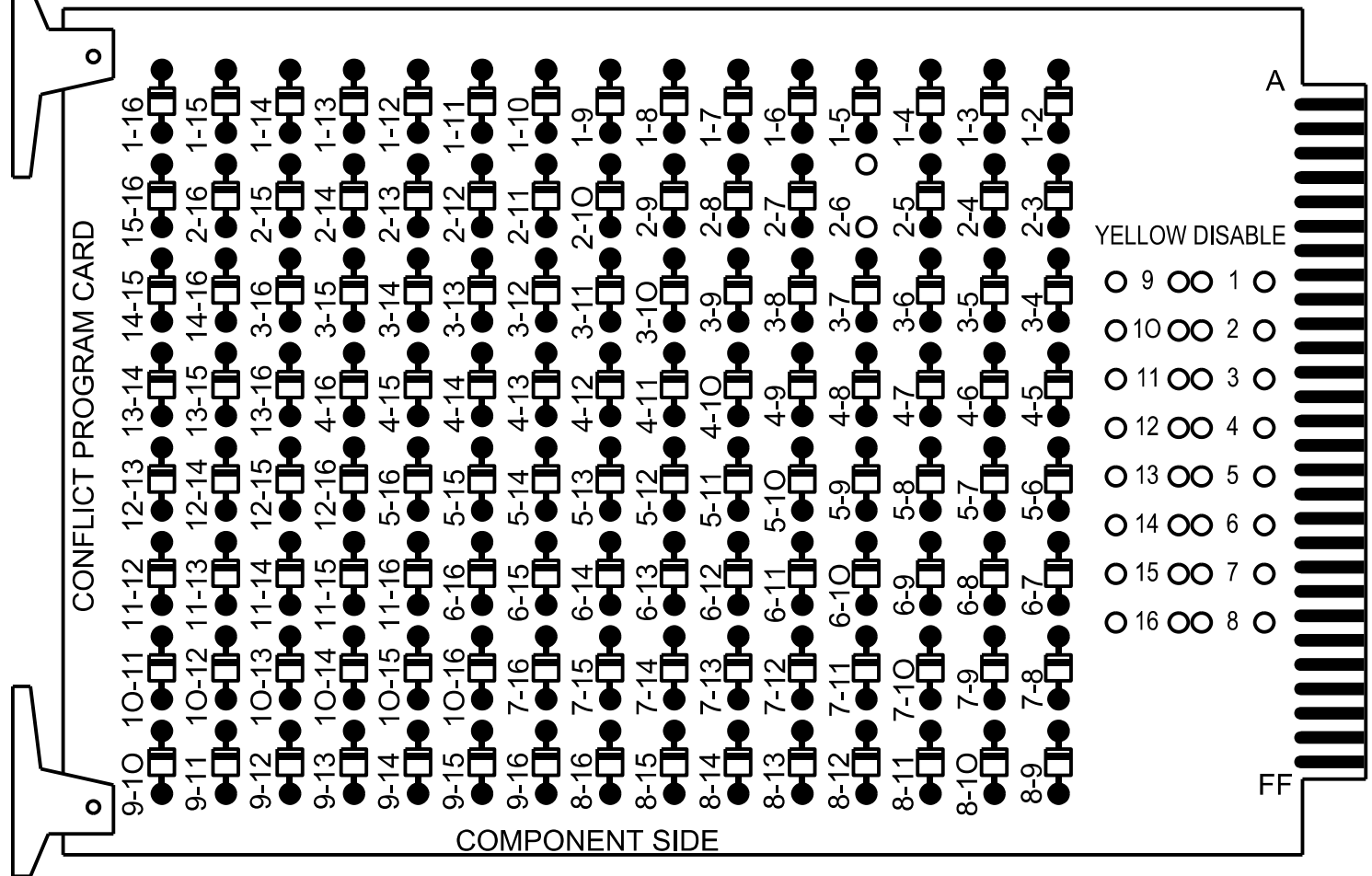
DOCUMENT NOT CONSIDERED
FINAL UNLESS ALL
SIGNATURES COMPLETED

 750 N. Greenfield Pkwy, Garner, NC 27529 Prepared For the Offices of: TRANSPORTATION MOBILITY AND SAFETY DIVISION DEPARTMENT OF TRANSPORTATION SIGNAL DESIGN SECTION	NC 191 (Brevard Road) at I-26 WB / I-240 EB Off Ramp		SEAL NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 040715 COURTNEY L. KALENICK	
	Division 13 Buncombe County Asheville		DocuSigned by: Courtney L. Kalenick 8/7/2026	
	PLAN DATE: May 2026		REVIEWED BY: C. Kalenick	
	PREPARED BY: M. Tindal		REVIEWED BY:	
	REVISIONS		INIT. DATE	
0 SCALE 40 1"=40'		SIGNATURE DATE		
		SIG. INVENTORY NO. I3-III6T1		

16 CHANNEL IP CONFLICT MONITOR
PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPER 2-6.



■ = DENOTES POSITION
OF SWITCH

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 phase 6 Green No Walk.
- If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
- The cabinet and controller are part of the D13-02 Asheville System.

EQUIPMENT INFORMATION

Controller.....2070LX
Cabinet.....336
Software.....Q-Free MAXTIME
Cabinet Mount.....Pole
Output File Positions.....12
Load Switches Used.....S2, S5, S8
Phases Used.....2, 4, 6
Overlaps.....Not Used

PROJECT REFERENCE NO.	SHEET NO.
I-2513AC	Sig. 2.1

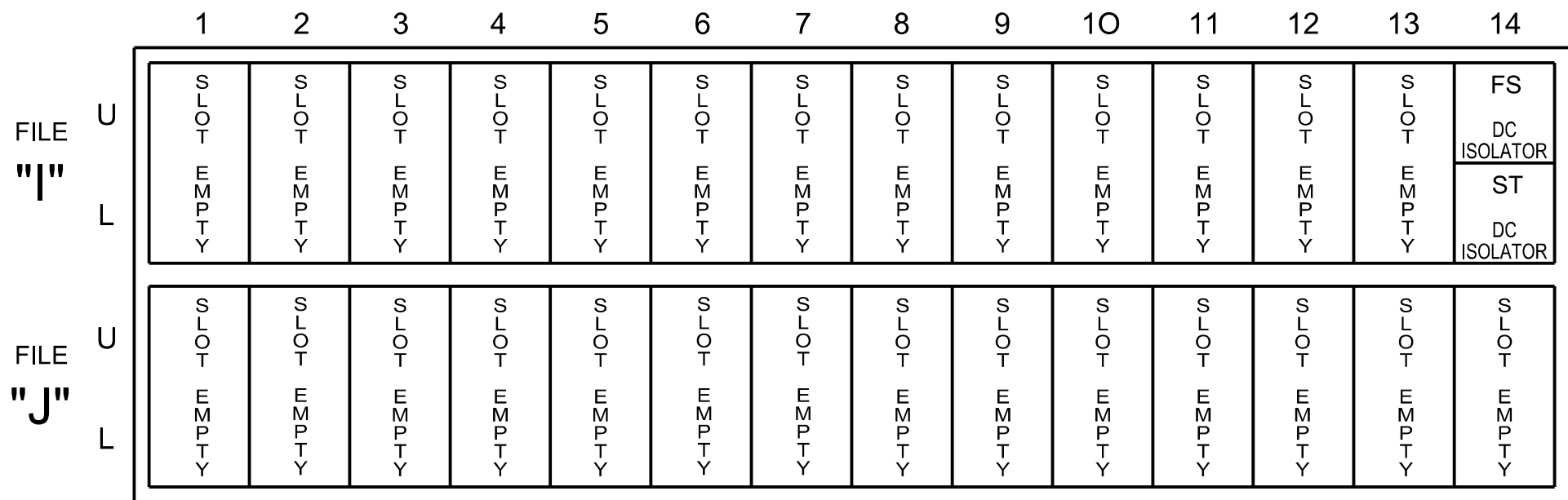
SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED
SIGNAL HEAD NO.	NU	21	22	NU	41,42	43	NU	61	62	NU	NU	NU
RED		128	128			101		134	134			
YELLOW		129	129					135	135			
GREEN			130					136				
RED ARROW					101							
YELLOW ARROW					102	102						
GREEN ARROW		130			103	103			136			

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)



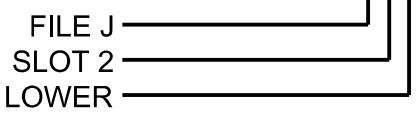
EX.: 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN
2A	-	-	-	*	38	2			X		X	
2B	-	-	-	*	39	2			X		X	
4A	-	-	-	*	44	4			X		X	
4B	-	-	-	*	45	4	15.0		X		X	
6A	-	-	-	*	54	6			X		X	
6B	-	-	-	*	55	6			X		X	

INPUT FILE POSITION LEGEND: J2L



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	2B	55	6B
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	NU	62	NU
15	47	NU	63	NU
16	48	NU	64	NU

NU = Not Used

SPECIAL DETECTOR NOTE

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 13-1116T1
DESIGNED: May 2026
SEALED: 08/07/2026
REVISED: N/A

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

Electrical and Programming Details For:	NC 191 (Brevard Road) at I-26 WB / I-240 EB Off Ramp	DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
Prepared for the Offices of:	Division 13 Buncombe County Asheville	SEAL
	PLAN DATE: May 2026 REVIEWED BY: J O Deaton	
	PREPARED BY: M W Yalch REVIEWED BY:	DocuSigned by: James O. Deaton 8/10/2026
	REVISIONS	INIT. DATE
750 N. Greenfield Pkwy, Garner, NC 27529		
		SIG. INVENTORY NO. 13-1116T1

AECOM
NC Firm License No.: F-0342
5438 Wade Park Boulevard
Suite 200, Raleigh, NC 27607
Phone: 919-461-1100

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

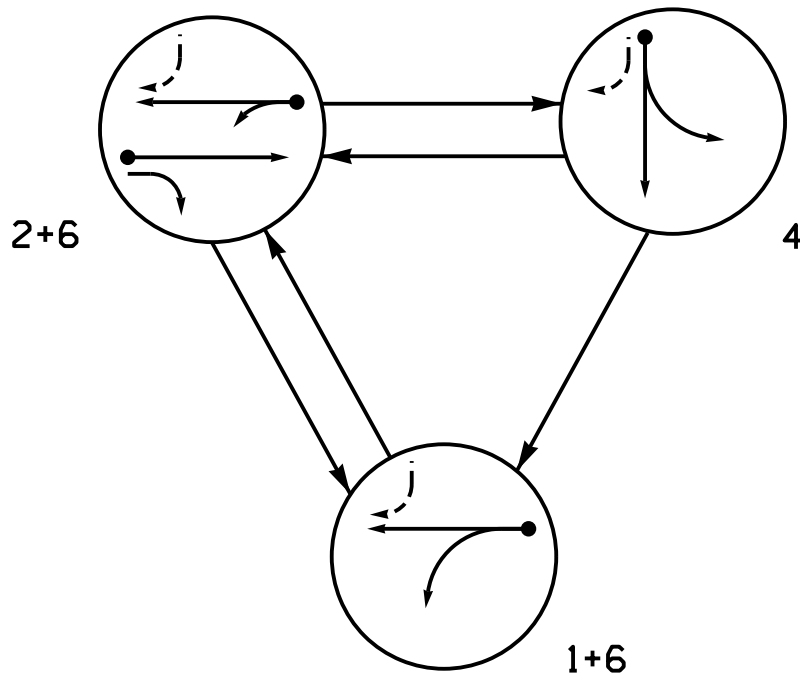
All Red Flash Exit Time
6



8/10/2026

SIG. INVENTORY NO. 13-1116T1

PHASING DIAGRAM



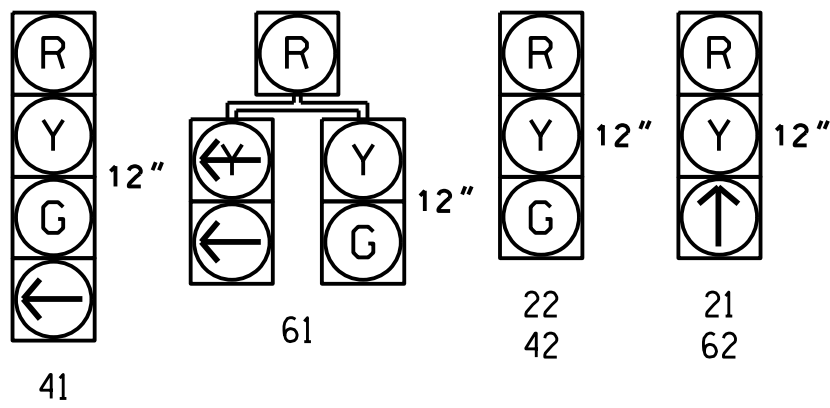
PHASING DIAGRAM DETECTION LEGEND

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

SIGNAL FACE	PHASE			
	1 + 6	2 + 6	4	FLASH
21	R	↑	R	R
22	R	G	R	R
41	R	R	G	R
42	R	R	G	R
61	G	G	R	R
62	↑	↑	R	R

SIGNAL FACE I.D.

All Heads L.E.D.



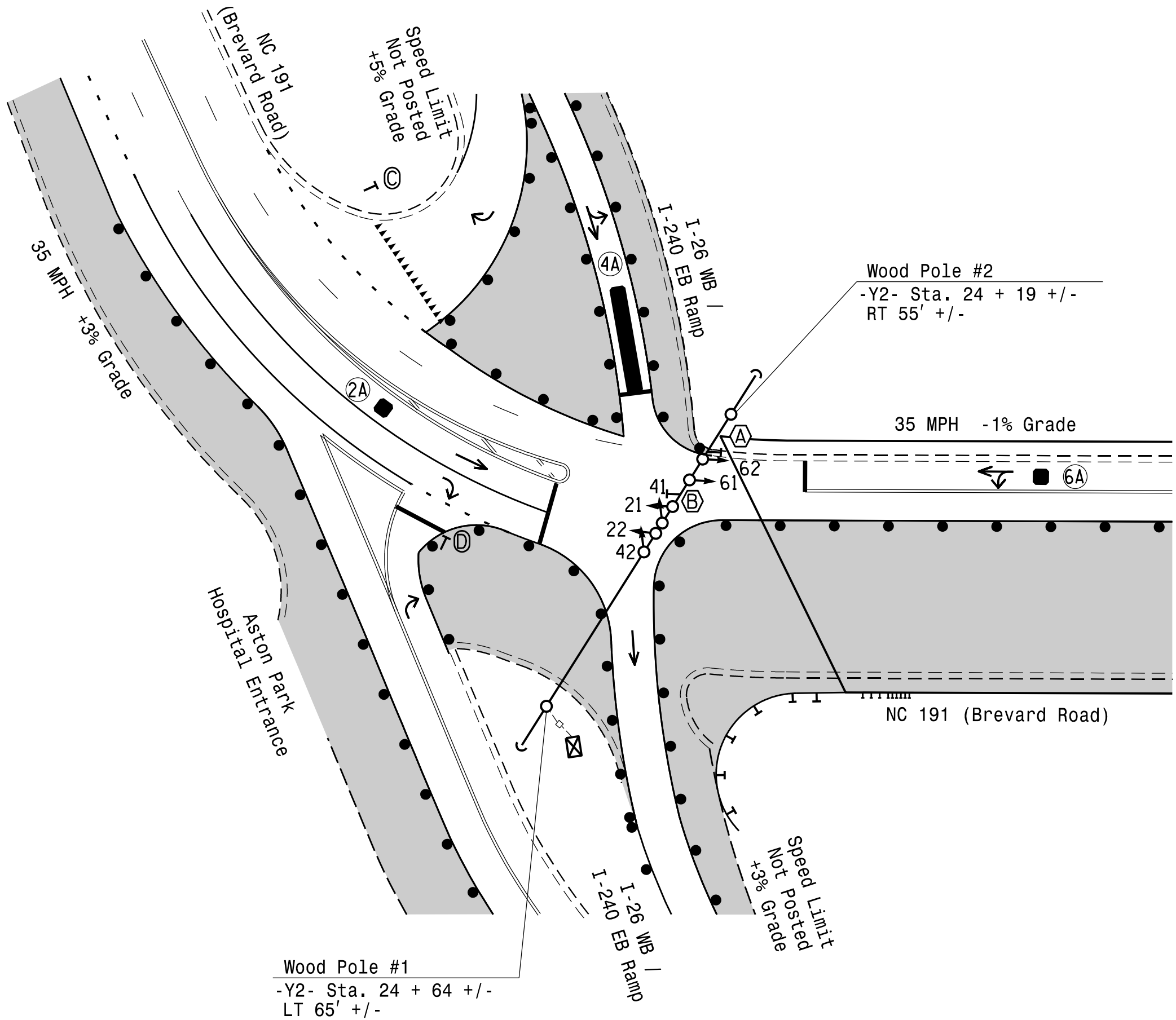
MAXTIME DETECTOR INSTALLATION CHART											
DETECTOR						PROGRAMMING					
ZONE	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURN	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	NEW CARD
2A ★	6X6	70	★	★	2	-	-	X	-	X	★
4A ★	6X40	0	★	★	4	-	-	X	-	X	★
6A ★	6X6	70	★	★	6	-	-	X	-	X	★

★ Video Detection Zone

3 Phase
Fully Actuated
D13-02 Asheville

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2024 and "Standard Specifications for Roads and Structures" dated January 2024.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Set all detector units to presence mode.
- This intersection uses video detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- See Transportation Management Plans for stop bar locations.



MAXTIME TIMING CHART					
FEATURE	PHASE				
	1	2	4	6	
Walk *	-	-	-	-	
Ped Clear *	-	-	-	-	
Min Green *	7	10	7	10	
Passage *	0.0	3.0	2.0	3.0	
Max I *	7	45	7	45	
Yellow Change	3.0	3.9	3.6	3.9	
Red Clear	3.1	2.2	1.5	2.2	
Added Initial *	-	-	-	-	
Maximum Initial *	-	-	-	-	
Time Before Reduction *	-	-	-	-	
Time To Reduce *	-	-	-	-	
Minimum Gap	-	-	-	-	
Advance Walk	-	-	-	-	
Non Lock Detector	-	-	X	-	
Vehicle Recall	MAX 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.

LEGEND

- | PROPOSED | EXISTING |
|--|------------------------------|
| Traffic Signal Head | Modified Signal Head |
| Pedestrian Signal Head With Push Button & Sign | Signal Pole with Guy |
| Signal Pole with Sidewalk Guy | Metal Pole with Mastarm |
| Inductive Loop Detector | Controller & Cabinet |
| Junction Box | 2-in Underground Conduit |
| Right of Way | Directional Arrow |
| Guardrail | Non-Intrusive Detection Zone |
| Construction Zone | Construction Zone Drums |
| No Right Turn Sign (R3-1) | No Left Turn Sign (R3-1) |
| "YIELD" Sign (R1-2) | "DO NOT ENTER" Sign (R5-1) |

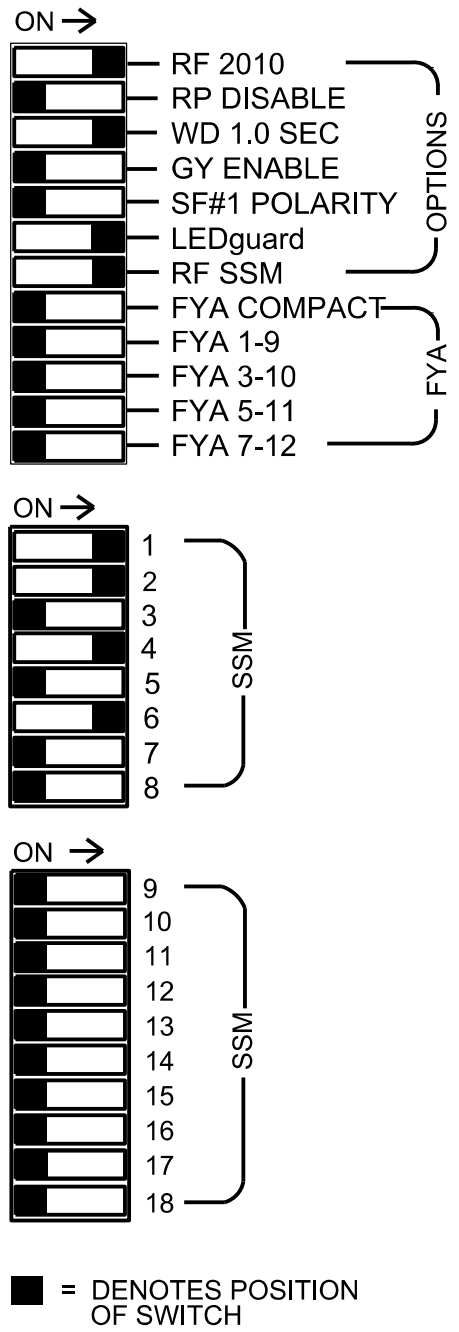
New Installation
Temporary Design 2 (TMP Phase I Step 6)

AECOM
NC Firm License No.: F-0342
5438 Wade Park Boulevard
Suite 200 Raleigh, NC 27607
Phone: 919-461-1100

	NC 191 (Brevard Road) at I-26 WB / I-240 EB Ramps	
	Division 13 Buncombe County Asheville	
	PLAN DATE: May 2026 REVIEWED BY: C. Kalencik	
	PREPARED BY: M. Tindal REVIEWED BY:	
REVISIONS	INIT.	DATE
SIGNATURE DATE		
SIG. INVENTORY NO. I3-1116T2		

(remove jumpers and set switches as shown)

ON OFF
WD ENABLE
SW2



YEL
☐ 10
☐ 11
☐ 12
☐ 13
☐ 14
☐ 15
☐ 16
☐ 17
☐ 18

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.

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 phase 6 Green No Walk.
3. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
4. The cabinet and controller are part of the D13-02 Asheville System.

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
Phases Used.....	1, 2, 4, 6
Overlaps.....	Not Used

[illegible]

* Denotes install load resistor. See LOAD RESISTOR INSTALLATION DETAIL this sheet.

(front view)



FS = FLASH SENSE
ST = STOP TIME

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	
6A	-	-	-	*	54	6			X		X	

	DETECTOR RACK #3		DETECTOR RACK #4	
Input Port	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	NU
13	45	NU	61	NU
14	46	NU	62	NU
15	47	NU	63	NU
16	48	NU	64	NU

NU = Not Used

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

(install resistor as shown)

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

Phase 1 Red Field
Terminal (125)



AC-

Temporary Design 2 (TMP Phase I Step 6)
Electrical Detail - Sheet 1 of 2

DOCUMENT NOT CONSIDERED
FINAL UNLESS ALL
SIGNATURES COMPLETED

Electrical and Programming

750 N. Greenfield Pkwy, Garner, NC 27529

NC 191 (Brevard Road)
at
-26 WB / I-240 EB Ramps

SEAL

DocuSigned by:
James O. Deaton 8/10/2020
40FF8AC430BD40E...

SIG. INVENTORY NO. 13-1116T2

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

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

OUTPUT CHANNEL CONFIGURATION

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

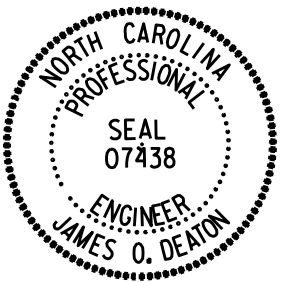
Web Interface
Home >Controller >Advanced IO>Channels>Channel Configuration

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

Temporary Design 2 (TMP Phase I Step 6)
Electrical Detail - Sheet 2 of 2

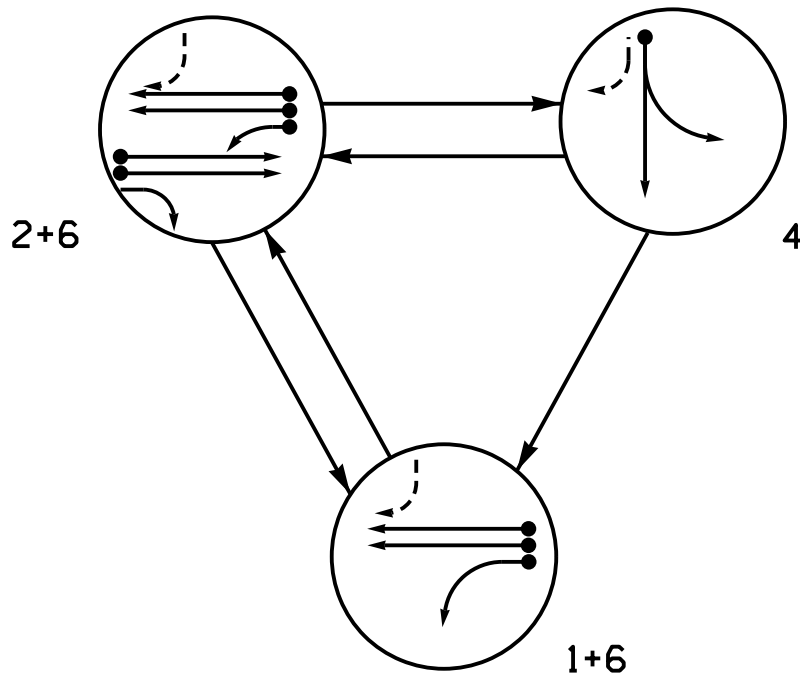
DOCUMENT NOT CONSIDERED
FINAL UNLESS ALL
SIGNATURES COMPLETED

Electrical and Programming Details For Prepared for the Offices of:  750 N. Greenfield Pkwy, Garner, NC 27529	NC 191 (Brevard Road) at I-26 WB / I-240 EB Ramps			SEAL  DocuSigned by: <i>James O. Deaton</i> 8/10/2026 SIG. INVENTORY NO. 13-1116T2	
	Division 13	Buncombe County	Asheville		
	PLAN DATE:	May 2026	REVIEWED BY:		J O Deaton
	PREPARED BY:	M W Yalch	REVIEWED BY:		
	REVISIONS	INIT.	DATE		

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 13-1116T2
DESIGNED: May 2026
SEALED: 08/07/2026
REVISED: N/A

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5438 Wade Park Boulevard
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Phone: 919-461-1100

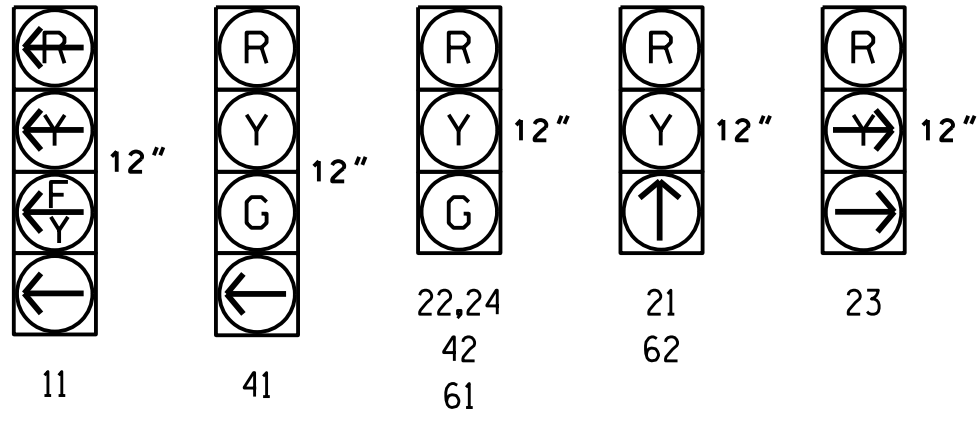
DEFAULT PHASING DIAGRAM



DEFAULT PHASING TABLE OF OPERATION				
SIGNAL FACE	PHASE			
	1 + 6	2 + 6	4	F L A S H
11	—	—	—	—
21	R	↑	R	R
22,24	R	G	R	R
23	R	—	R	R
41	R	R	G	R
42	R	R	G	R
61	G	G	R	R
62	↑	↑	R	R

SIGNAL FACE I.D.

All Heads L.E.D.



MAXTIME DETECTOR INSTALLATION CHART											
DETECTOR					PROGRAMMING						
ZONE	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND TIME	ADDED INITIAL	CALL DELAY DURING GREEN	NEW CARD
1A ★	6X40	0	★	★	1	15.0**	-	X	-	X	★
2A ★	6X6	70	★	★	6#	-	-	X	-	X	★
2B ★	6X6	70	★	★	2	-	-	X	-	X	★
4A ★	6X40	0	★	★	4	-	-	X	-	X	★
6A ★	6X6	70	★	★	6	-	-	X	-	X	★
6B ★	6X6	70	★	★	6	-	-	X	-	X	★

★ Video Detection Zone

** Disable Delay During Alternate Phasing Operation

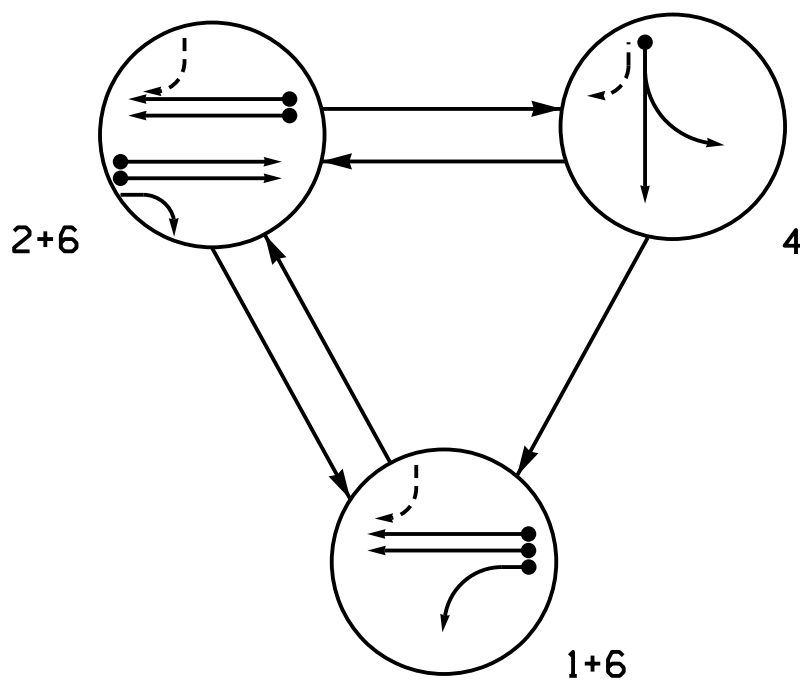
Disable Phase Call for Zone(s) During Alternate Phasing Operation

3 Phase
Fully Actuated
D13-02_Ashville

NOTES

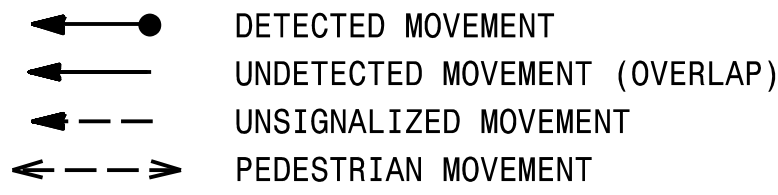
- Refer to "Roadway Standard Drawings NCDOT" dated January 2024 and "Standard Specifications for Roads and Structures" dated January 2024.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Reposition existing signal head numbered 62.
- Set all detector units to presence mode.
- This intersection uses video detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- See Transportation Management Plans for stop bar locations.

ALTERNATE PHASING DIAGRAM



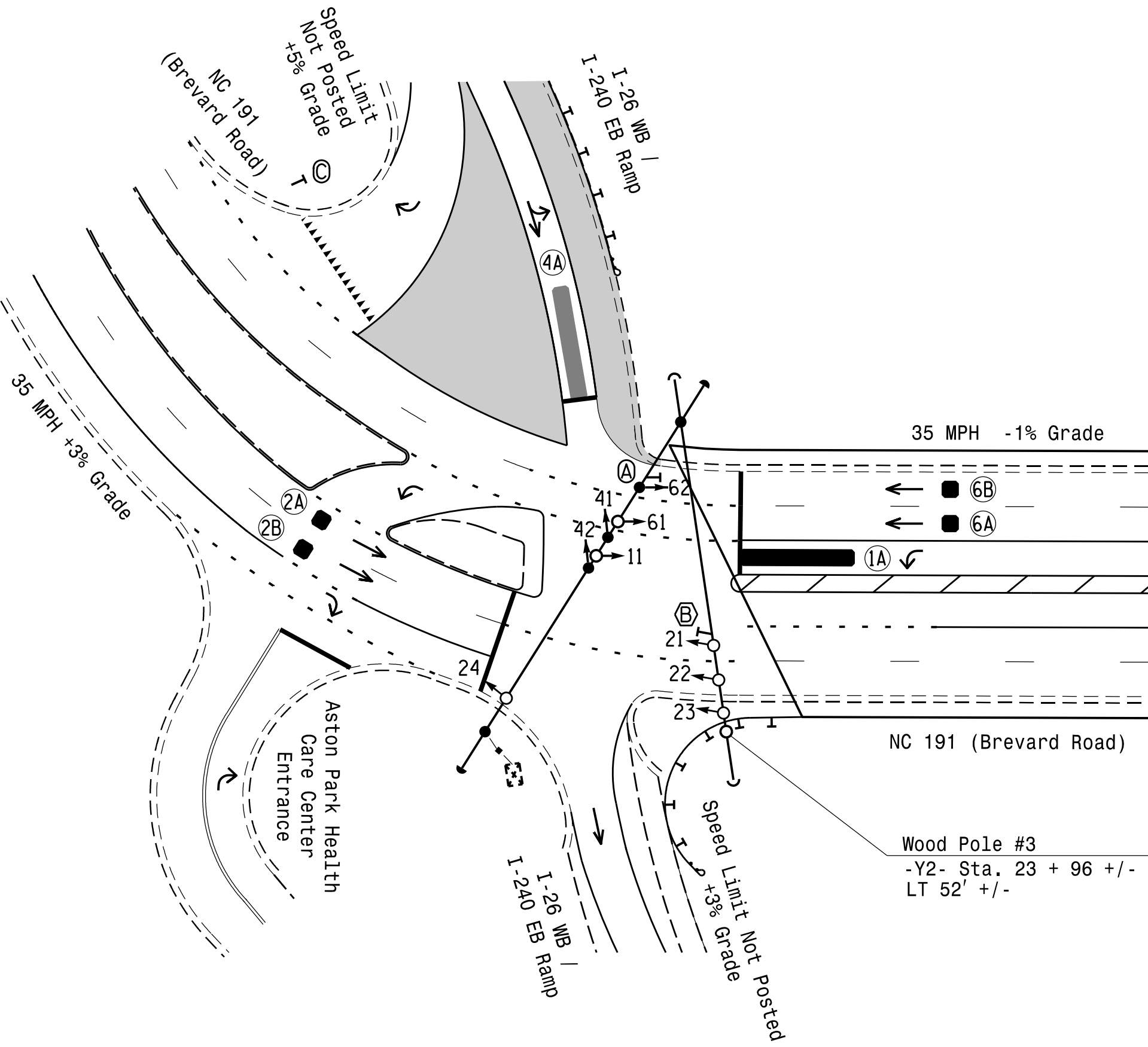
ALTERNATE PHASING TABLE OF OPERATION				
SIGNAL FACE	PHASE			
	1 + 6	2 + 6	4	F L A S H
11	—	—	—	—
21	R	↑	R	R
22,24	R	G	R	R
23	R	—	R	R
41	R	R	G	R
42	R	R	G	R
61	G	G	R	R
62	↑	↑	R	R

PHASING DIAGRAM DETECTION LEGEND

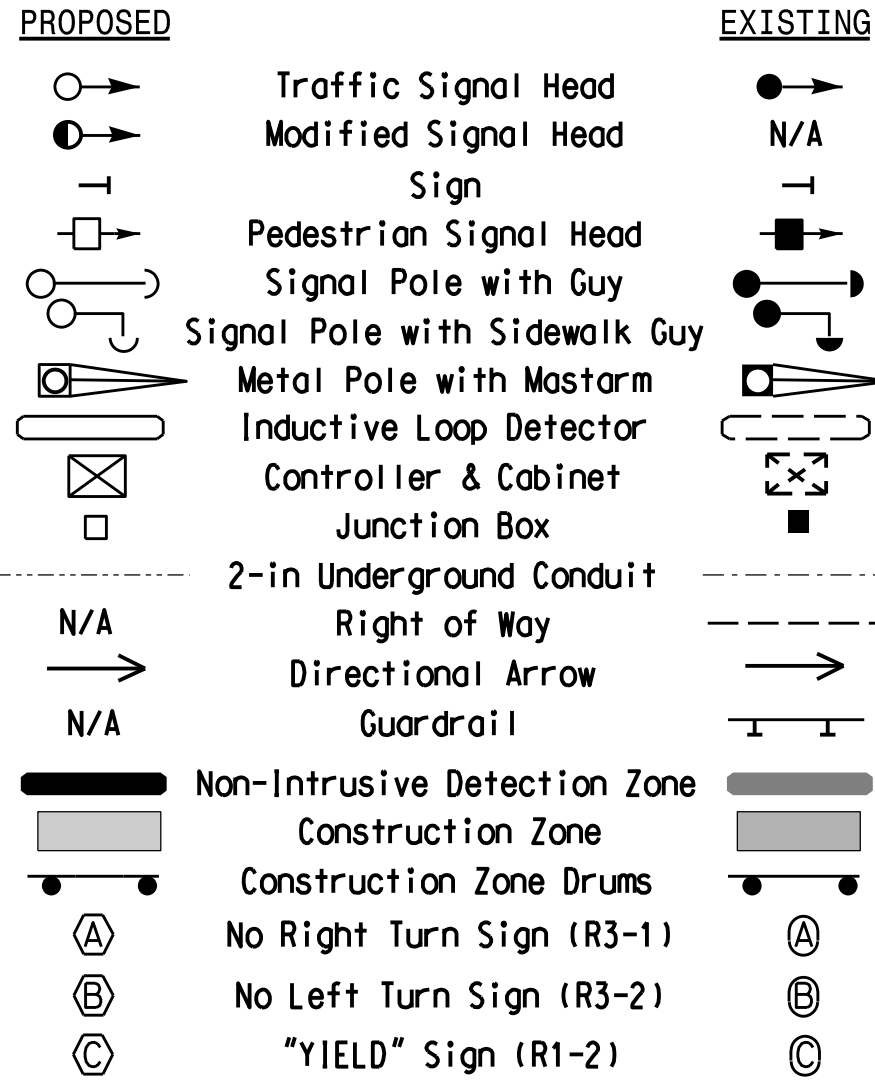


MAXTIME TIMING CHART				
FEATURE	PHASE			
	1	2	4	6
Walk *	-	-	-	-
Ped Clear *	-	-	-	-
Min Green *	7	10	7	10
Passage *	2.0	3.0	2.0	3.0
Max I *	25	45	30	45
Yellow Change	3.0	3.9	3.6	3.9
Red Clear	2.9	2.0	2.7	2.0
Added Initial *	-	-	-	-
Maximum Initial *	-	-	-	-
Time Before Reduction *	-	-	-	-
Time To Reduce *	-	-	-	-
Minimum Gap	-	-	-	-
Advance Walk	-	-	-	-
Non Lock Detector	X	-	X	-
Vehicle Recall	-	MIN RECALL	-	MIN RECALL
Dual Entry	-	-	-	-

* 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.



LEGEND



New Installation
Temporary Design 3 (TMP Phase II Step 1)

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Phone: 919-461-1100

Prepared For the Offices of: 750 N. Greenfield Pkwy, Garner, NC 27529		NC 191 (Brevard Road) at I-26 WB / I-240 EB Ramps Division 13 Buncombe County Asheville PLAN DATE: May 2026 REVIEWED BY: C. Kalencik PREPARED BY: M. Tindal REVIEWED BY:		DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED DocuSigned by: Courtney L. Kalencik 8/7/2026 SIGNATURE DATE SIG. INVENTORY NO. I3-1116T3	
SCALE 0 40 1"=40'		REVISIONS		INIT. DATE	

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

LOGIC STATEMENT DESCRIPTION

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

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	Off	Off	Off
Included Phases	2	-	-	-
Modifier Phases	1	-	-	-
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

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	Off	Off	Off
Included Phases	-	-	-	-
Modifier Phases	1	-	-	-
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

← NOTICE INCLUDED PHASE

MAXTIME ALTERNATE PHASING ACTIVATION DETAIL

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

PHASING

OVERLAP PLAN

VEH DET PLAN

ACTIVE PLAN REQUIRED TO RUN DEFAULT PHASING

1

1

ACTIVE PLAN REQUIRED TO RUN ALTERNATE PHASING

2

2

ALTERNATE PHASING CHANGE SUMMARY

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

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

VEH DET PLAN 2: Disables phase 6 call on loop 1A and reduces delay time for phase 1 call on loop 1A to 0 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.

MAXTIME DETECTOR PROGRAMMING DETAIL
FOR ALTERNATE PHASING LOOP 1A

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.

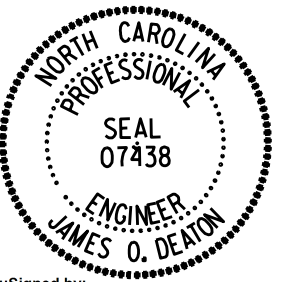
1A

Plan 2		
Detector	Call Phase	Delay
33	1	-
125	0	-

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 13-1116T3
DESIGNED: May 2026
SEALED: 08/07/2026
REVISED: N/A

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NC Firm License No.: F-0342
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Suite 200, Raleigh, NC 27607
Phone: 919-461-1100

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

Electrical and Programming Details For:	NC 191 (Brevard Road) at I-26 WB / I-240 EB Ramps	DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
Prepared for the Offices of:  750 N. Greenfield Pkwy, Garner, NC 27529	Division 13 Buncombe County Asheville PLAN DATE: May 2026 REVIEWED BY: J O Deaton PREPARED BY: M W Yalch REVIEWED BY: REVISIONS INIT. DATE 7/10/2026	SEAL  DocuSigned by: James O. Deaton 8/10/2026 DATE SIG. INVENTORY NO. 13-1116T3

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

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

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 13-1116T3
DESIGNED: May 2026
SEALED: 08/07/2026
REVISED: N/A

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

DOCUMENT NOT CONSIDERED
FINAL UNLESS ALL
SIGNATURES COMPLETED

Electrical and Programming
Details For:

Prepared for the Offices of:



750 N. Greenfield Pkwy, Garner, NC 27529

NC 191 (Brevard Road)
at
I-26 WB / I-240 EB Ramps

Division 13Buncombe CountyAsheville

PLAN DATE: May 2026

REVIEWED BY: J O Deaton

PREPARED BY: M W Yalch

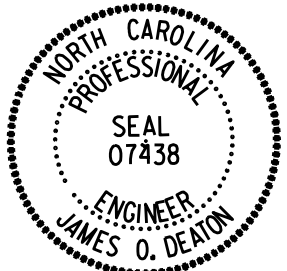
REVIEWED BY:

REVISIONS

INT.

DATE

SEAL



DocuSigned by
*James O. Deaton*8/10/2026

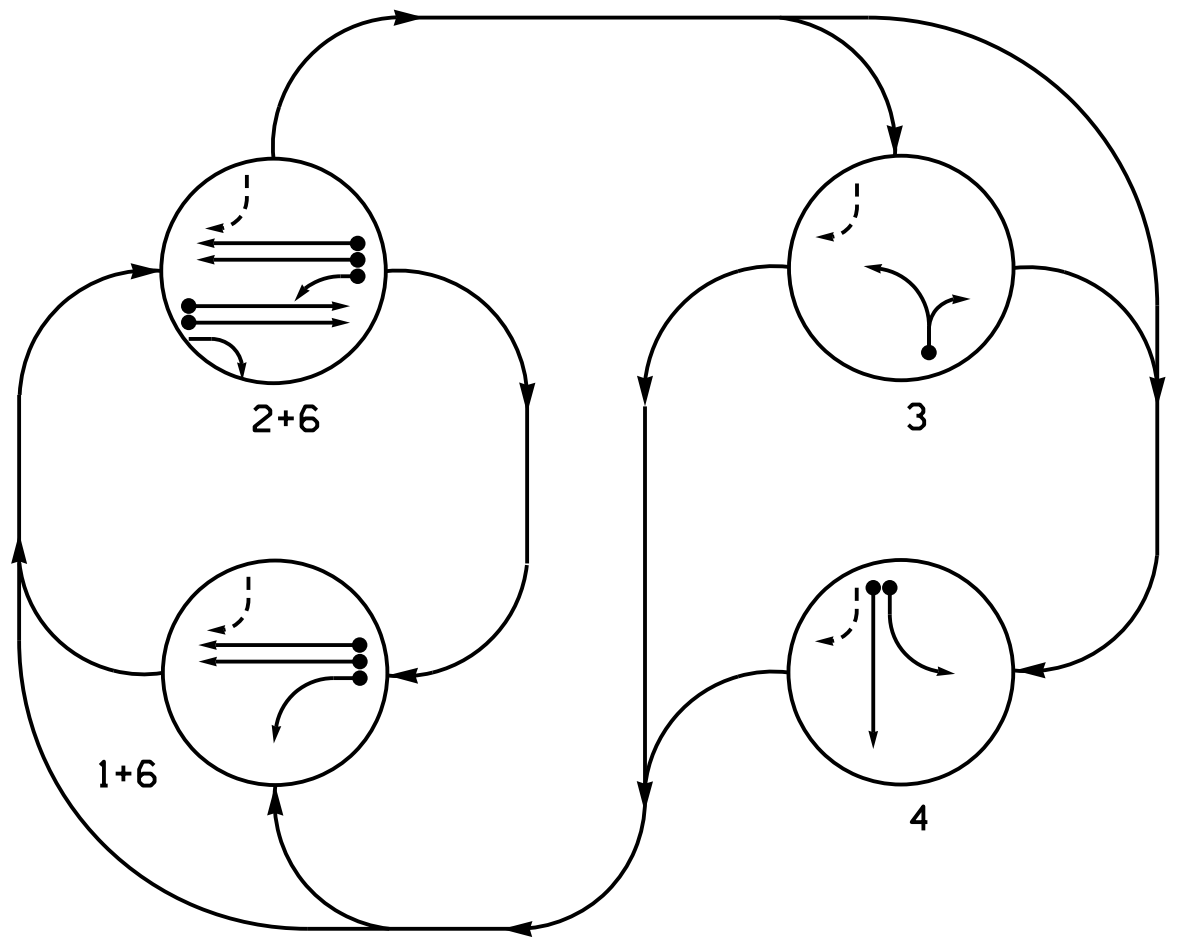
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DATE

SIG. INVENTORY NO. 13-1116T3

AECOM
NC Firm License No.: F-0342
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Suite 200, Raleigh, NC 27607
Phone: 919-461-1100

DEFAULT PHASING DIAGRAM

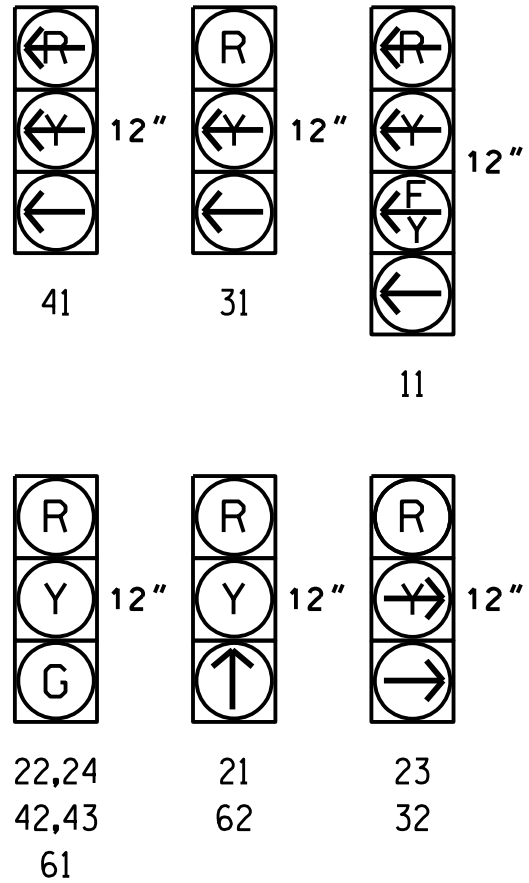


SIGNAL FACE	PHASE				
	1 + 6	2 + 6	3	4	FLASH
11	—	—	—	—	—
21	R	↑	R	R	R
22,24	R	G	R	R	R
23	R	—	R	R	R
31	R	R	—	R	R
32	R	R	—	R	R
41	—	—	—	—	—
42,43	R	R	R	G	R
61	G	G	R	R	R
62	↑	↑	R	R	R

SIGNAL FACE	PHASE				
	1 + 6	2 + 6	3	4	FLASH
11	—	—	—	—	—
21	R	↑	R	R	R
22,24	R	G	R	R	R
23	R	—	R	R	R
31	R	R	—	R	R
32	R	R	—	R	R
41	—	—	—	—	—
42,43	R	R	R	G	R
61	G	G	R	R	R
62	↑	↑	R	R	R

SIGNAL FACE I.D.

All Heads L.E.D.



MAXTIME DETECTOR INSTALLATION CHART											
DETECTOR						PROGRAMMING					
ZONE	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND INITIAL	ADDED INITIAL	CALL DELAY DURING GREEN	NEW CARD
1A ★	6X40		★	★	1 6#	15.0**	-	X	-	X	★
2A ★	6X6	70	★	★	2	-	-	X	-	X	★
2B ★	6X6	70	★	★	2	-	-	X	-	X	★
3A ★	6X40	0	★	★	3	-	-	X	-	X	★
4A ★	6X40	0	★	★	4	-	-	X	-	X	★
4B ★	6X40	0	★	★	4	-	-	X	-	X	★
6A ★	6X6	70	★	★	6	-	-	X	-	X	★
6B ★	6X6	70	★	★	6	-	-	X	-	X	★

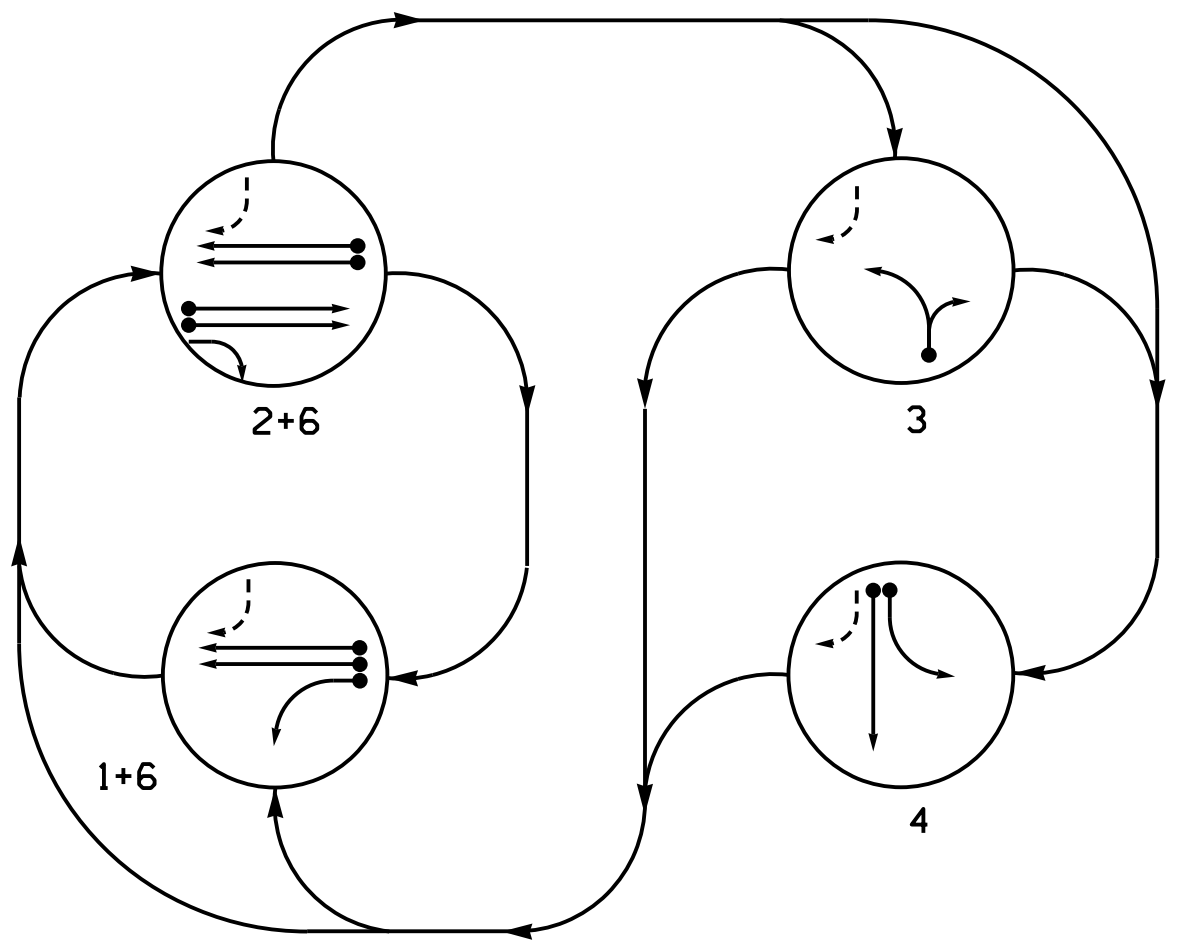
- ★ Video Detection Zone
** Disable Delay During Alternate Phasing Operation
Disable Phase Call for Zone(s) During Alternate Phasing Operation

3 Phase
Fully Actuated
D13-02_Ashville

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2024 and "Standard Specifications for Roads and Structures" dated January 2024.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Reposition existing signal heads numbered 42.
- Set all detector units to presence mode.
- This intersection uses video detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- See Transportation Management Plans for stop bar locations.

ALTERNATE PHASING DIAGRAM



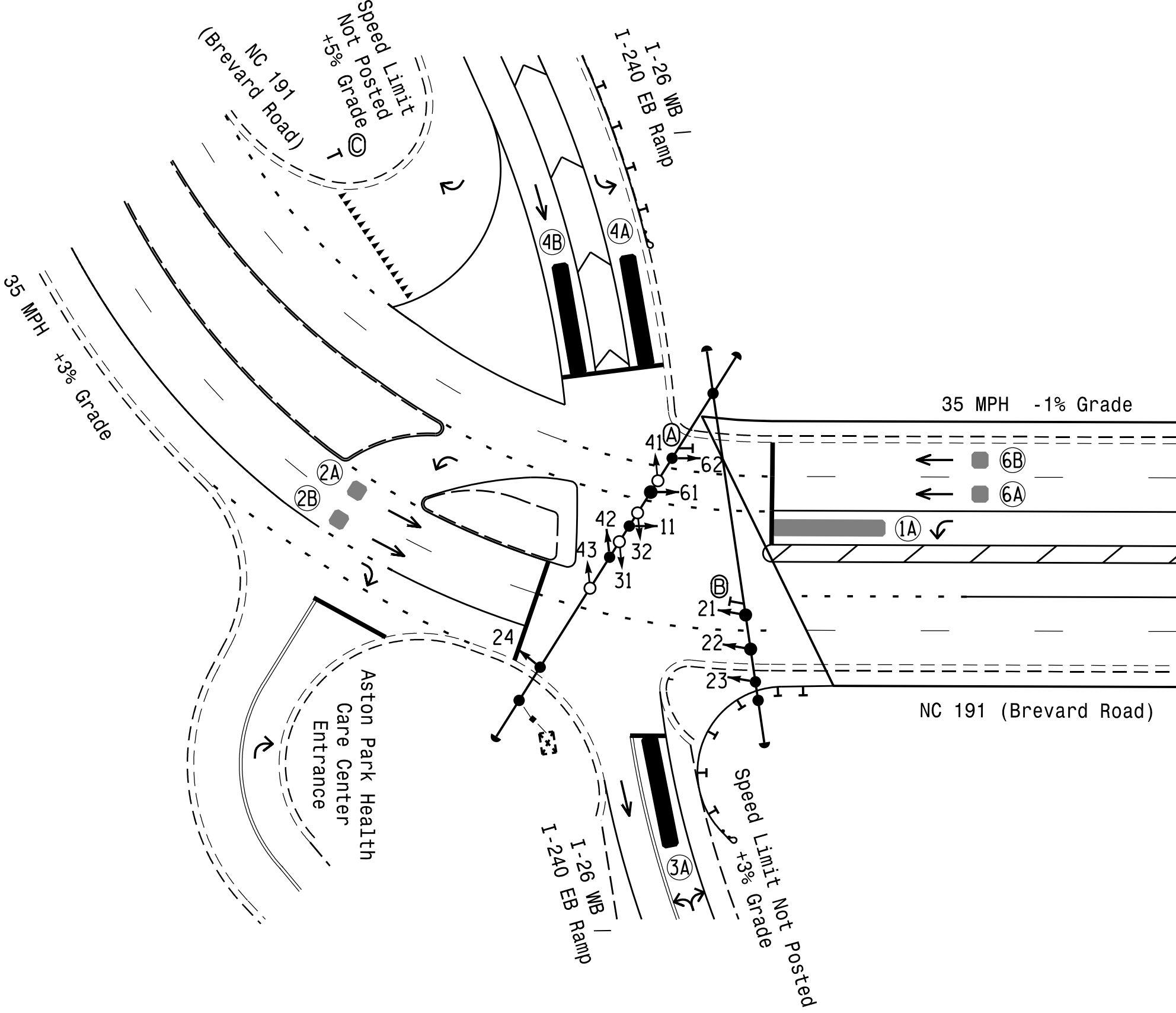
PHASING DIAGRAM DETECTION LEGEND

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

MAXTIME TIMING CHART

FEATURE	PHASE				
	1	2	3	4	6
Walk *	-	-	-	-	-
Ped Clear *	-	-	-	-	-
Min Green *	7	10	7	7	10
Passage *	2.0	3.0	2.0	2.0	3.0
Max I *	25	45	30	30	45
Yellow Change	3.0	3.9	3.7	3.6	3.9
Red Clear	2.9	2.0	2.5	2.7	2.0
Added Initial *	-	-	-	-	-
Maximum Initial *	-	-	-	-	-
Time Before Reduction *	-	-	-	-	-
Time To Reduce *	-	-	-	-	-
Minimum Gap	-	-	-	-	-
Advance Walk	-	-	-	-	-
Non Lock Detector	X	-	X	X	-
Vehicle Recall	-	MIN RECALL	-	-	MIN RECALL
Dual Entry	-	-	-	-	-

* 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.



LEGEND

- | PROPOSED | | EXISTING |
|----------|-------------------------------|----------|
| ○ → | Traffic Signal Head | ● → |
| ● → | Modified Signal Head | N/A |
| — | Sign | — |
| □ → | Pedestrian Signal Head | ■ → |
| ○ → | Signal Pole with Guy | ● → |
| ○ → | Signal Pole with Sidewalk Guy | ● → |
| ○ → | Metal Pole with Mastarm | ● → |
| □ | Inductive Loop Detector | □ |
| □ | Controller & Cabinet | □ |
| □ | Junction Box | □ |
| — | 2-in Underground Conduit | — |
| N/A | Right of Way | — |
| → | Directional Arrow | → |
| N/A | Guardrail | — |
| — | Non-Intrusive Detection Zone | — |
| Ⓐ | No Right Turn Sign (R3-1) | Ⓐ |
| Ⓑ | No Left Turn Sign (R3-2) | Ⓑ |
| Ⓒ | "YIELD" Sign (R1-2) | Ⓒ |

New Installation
Temporary Design 4 (TMP Phase II Step 4)

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Suite 200 Raleigh, NC 27607
Phone: 919-461-1100

Prepared For the Offices of: 750 N. Greenfield Pkwy, Garner, NC 27529		NC 191 (Brevard Road) at I-26 WB / I-240 EB Ramps		DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	
Division 13 Buncombe County Asheville		PLAN DATE: May 2026 REVIEWED BY: C. Kalencik		 DocuSigned by: Courtney L. Kalencik 8/7/2026	
PREPARED BY: M. Tindal		REVIEWED BY:			
REVISIONS		INIT.		DATE	
0 SCALE 40		1"=40'		SIGNATURE DATE	
				SIG. INVENTORY NO. I3-1116T4	

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

LOGIC STATEMENT DESCRIPTION

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

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	Off	Off	Off
Included Phases	2	-	-	-
Modifier Phases	1	-	-	-
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

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	Off	Off	Off
Included Phases	-	-	-	-
Modifier Phases	1	-	-	-
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

← NOTICE INCLUDED PHASE

MAXTIME ALTERNATE PHASING ACTIVATION DETAIL

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

PHASING

OVERLAP PLAN

VEH DET PLAN

ACTIVE PLAN REQUIRED TO RUN DEFAULT PHASING

1

1

ACTIVE PLAN REQUIRED TO RUN ALTERNATE PHASING

2

2

ALTERNATE PHASING CHANGE SUMMARY

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

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

VEH DET PLAN 2: Disables phase 6 call on loop 1A and reduces delay time for phase 1 call on loop 1A to 0 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.

MAXTIME DETECTOR PROGRAMMING DETAIL
FOR ALTERNATE PHASING LOOP 1A

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.

1A

Plan 2		
Detector	Call Phase	Delay
33	1	-
125	0	-

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 13-1116T4
DESIGNED: May 2026
SEALED: 08/07/2026
REVISED: N/A

AECOM
NC Firm License No.: F-0342
5438 Wade Park Boulevard
Suite 200, Raleigh, NC 27607
Phone: 919-461-1100

Temporary Design 4 (TMP Phase II Step 4)
Electrical Detail - Sheet 2 of 3

Electrical and Programming Details For:	NC 191 (Brevard Road) at I-26 WB / I-240 EB Ramps	DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
Prepared for the Offices of:  750 N. Greenfield Pkwy, Garner, NC 27529	Division 13 Buncombe County Asheville PLAN DATE: May 2026 REVIEWED BY: J O Deaton PREPARED BY: M W Yalch REVIEWED BY: REVISIONS INIT. DATE	SEAL NORTH CAROLINA PROFESSIONAL SEAL 07438 ENGINEER JAMES O. DEATON DocuSigned by: James O. Deaton 8/10/2026 40FF8AC430BD40F DATE SIG. INVENTORY NO. 13-1116T4

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

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

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 13-1116T4
DESIGNED: May 2026
SEALED: 08/07/2026
REVISED: N/A

Temporary Design 4 (TMP Phase II Step 4)
Electrical Detail - Sheet 3 of 3

AECOM
NC Firm License No.: F-0342
5438 Wade Park Boulevard
Suite 200, Raleigh, NC 27607
Phone: 919-461-1100

Electrical and Programming
Details For:

Prepared for the Offices of:

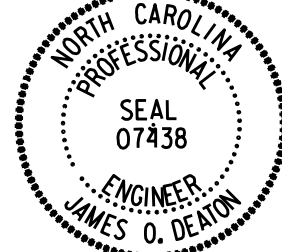
750 N. Greenfield Pkwy, Garner, NC 27529

NC 191 (Brevard Road)
at
I-26 WB / I-240 EB Ramps

Division 13 Buncombe County Asheville

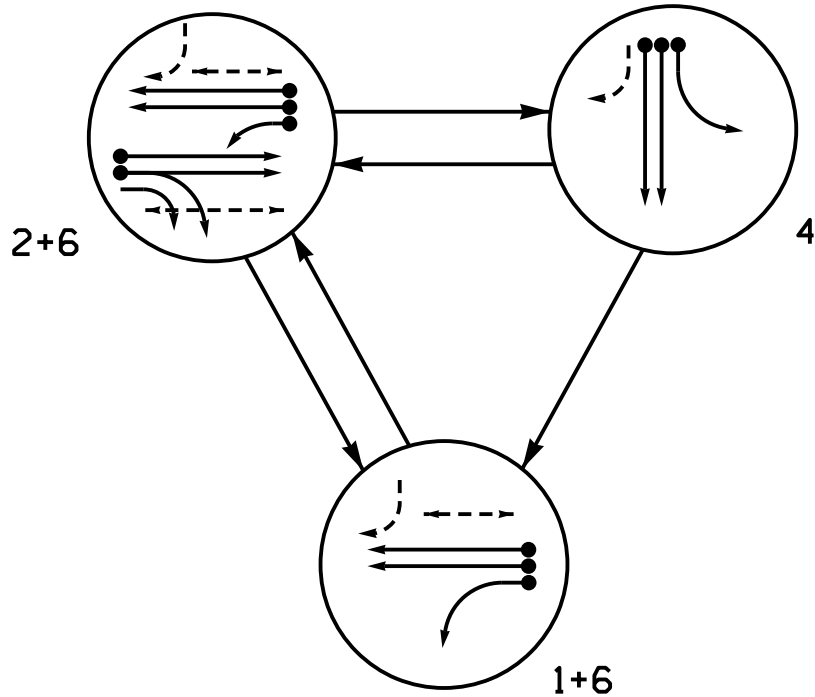
PLAN DATE: May 2026	REVIEWED BY: J O Deaton	
PREPARED BY: M W Yalch	REVIEWED BY:	
REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED
FINAL UNLESS ALL
SIGNATURES COMPLETED

SEAL

DocuSigned by:
James O. Deaton
8/10/2026
DATE
SIG. INVENTORY NO. 13-1116T4

\$\$\$\$\$SYTIME\$\$\$\$\$
\$\$\$\$\$CON\$\$\$\$\$
\$\$\$\$\$USERNAME\$\$\$\$\$

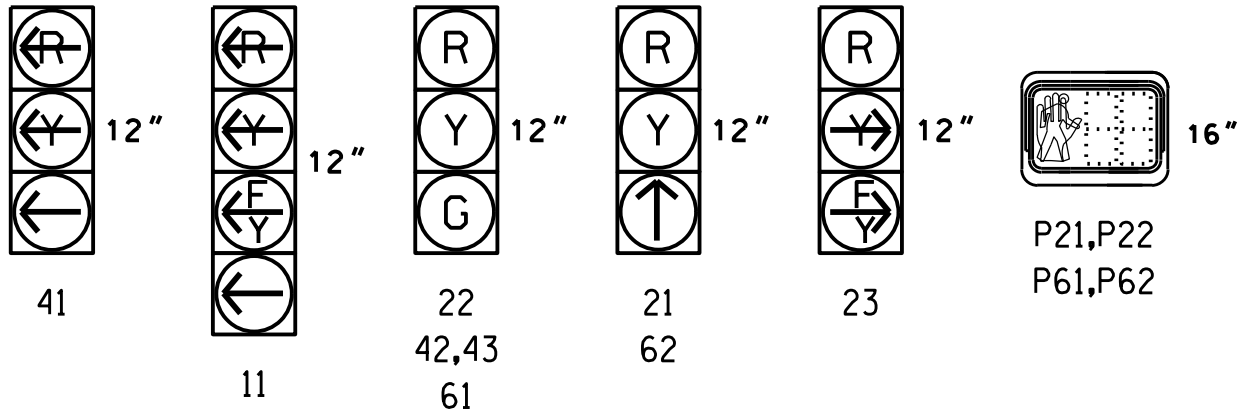
DEFAULT PHASING DIAGRAM



DEFAULT PHASING TABLE OF OPERATION				
SIGNAL FACE	PHASE			
	1 + 6	2 + 6	4	FLASH
11	—	—	—	—
21	R	—	R	R
22	R	G	R	R
23	R	—	R	R
41	—	—	—	—
42,43	R	R	G	R
61	G	G	R	R
62	↑	↑	R	R
P21,P22	DW	W	DW	DRK
P61,P62	W	W	DW	DRK

SIGNAL FACE I.D.

All Heads L.E.D.



MAXTIME DETECTOR INSTALLATION CHART												
DETECTOR						PROGRAMMING						
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND INITIAL	ADDED INITIAL	CALL DURING GREEN	NEW CARD	
1A ★	6X40	0	★	★	1	15.0**	-	X	-	X	-	★
2A	6X6	70	3	X	6#	-	-	X	-	X	-	★
2B	6X6	70	3	X	2	-	-	X	-	X	-	X
4A	6X40	0	2-4-2	X	4	-	-	X	-	X	-	X
4B	6X40	0	2-4-2	X	4	-	-	X	-	X	-	X
4C	6X40	0	2-4-2	X	4	-	-	X	-	X	-	X
6A ★	6X6	70	★	★	6	-	-	X	-	X	-	★
6B ★	6X6	70	★	★	6	-	-	X	-	X	-	★

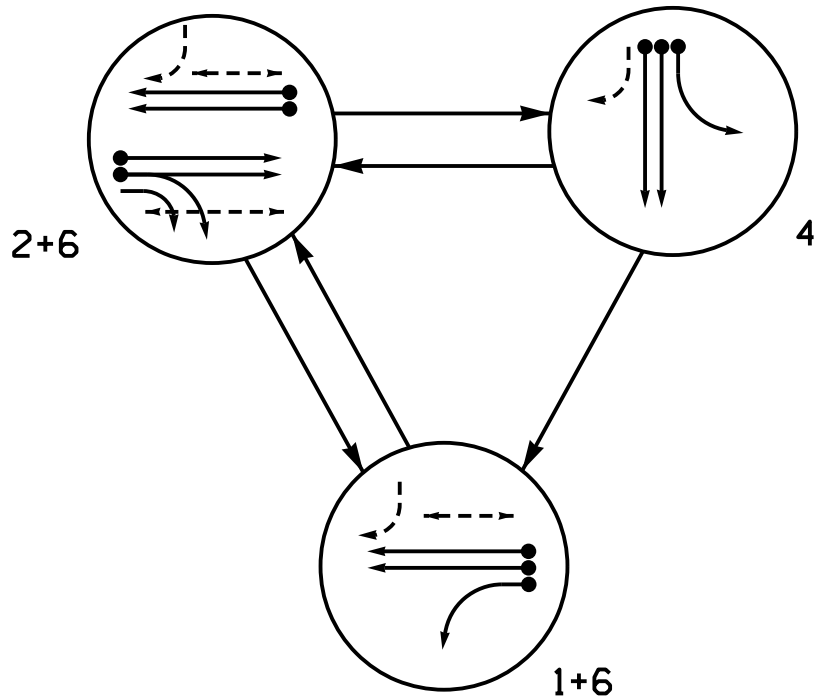
- ★ Multi-Zone Microwave Detection
** Disable Delay During Alternate Phasing Operation
Disable Phase Call for Zone(s) During Alternate Phasing Operation

3 Phase
Fully Actuated
D13-02_Ashville

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2024 and "Standard Specifications for Roads and Structures" dated January 2024.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Phase 1 may be lagged.
- Set all detector units to presence mode.
- Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
- Program pedestrian heads to countdown the flashing "Don't Walk" time only.
- This intersection 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 Pavement Marking Plans for stop bar and crosswalk locations.

ALTERNATE PHASING DIAGRAM



ALTERNATE PHASING TABLE OF OPERATION				
SIGNAL FACE	PHASE			
	1 + 6	2 + 6	4	FLASH
11	—	—	—	—
21	R	—	R	R
22	R	G	R	R
23	R	—	R	R
41	—	—	—	—
42,43	R	R	G	R
61	G	G	R	R
62	↑	↑	R	R
P21,P22	DW	W	DW	DRK
P61,P62	W	W	DW	DRK

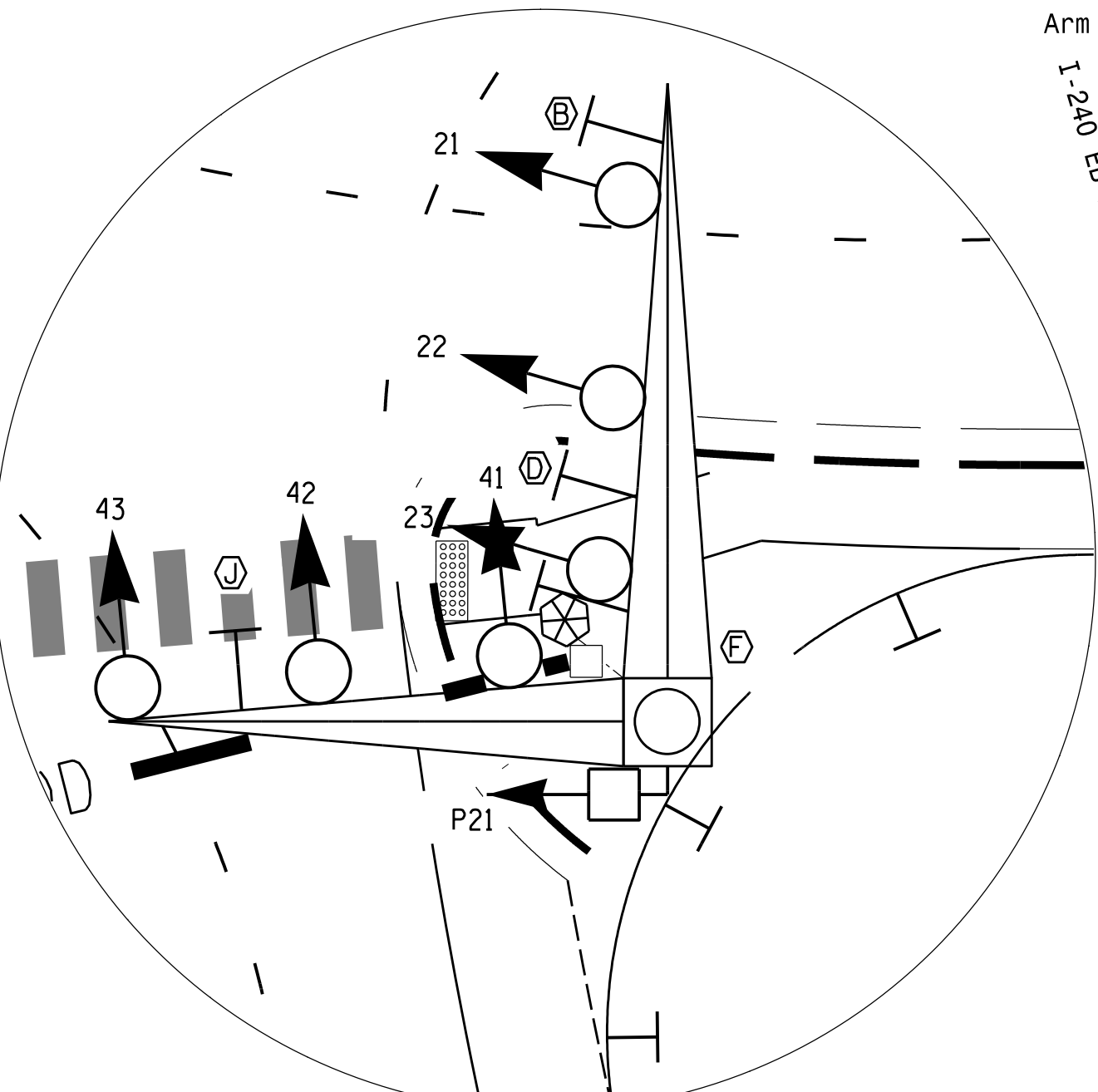
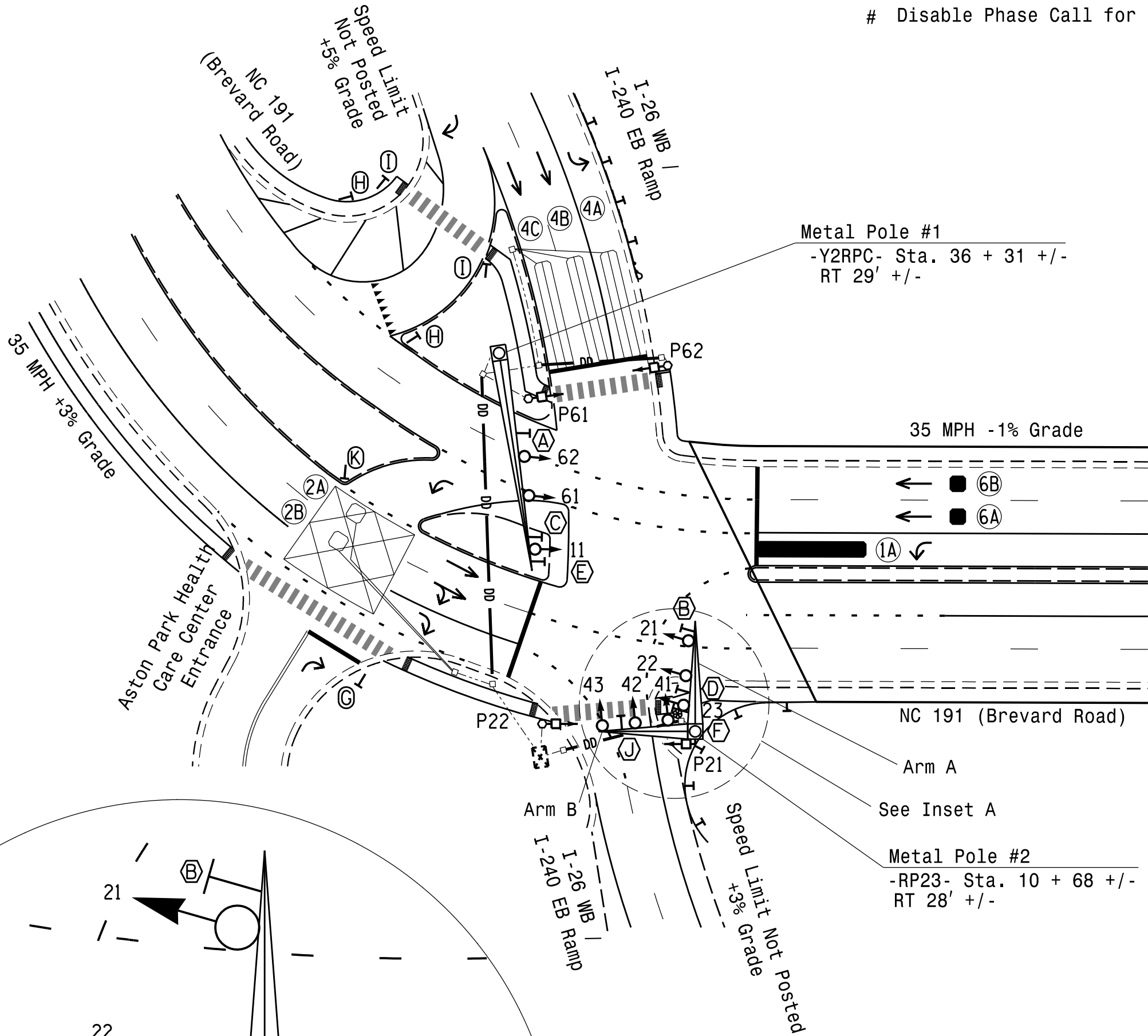
PHASING DIAGRAM DETECTION LEGEND

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

MAXTIME TIMING CHART

FEATURE	PHASE			
	1	2	4	6
Walk *	—	14	—	7
Ped Clear	—	9	—	8
Min Green *	7	10	7	10
Passage *	2.0	3.0	2.0	3.0
Max 1 *	25	45	30	45
Yellow Change	3.0	3.9	3.6	3.9
Red Clear	2.6	1.7	2.7	1.7
Added Initial *	—	—	—	—
Maximum Initial *	—	—	—	—
Time Before Reduction *	—	—	—	—
Time To Reduce *	—	—	—	—
Minimum Gap	—	—	—	—
Advance Walk	—	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.



SIGNS

PROPOSED	EXISTING
(A) No Right Turn Sign (R3-1)	(A) No Right Turn Sign (R3-1)
(B) No Left Turn Sign (R3-2)	(B) No Left Turn Sign (R3-2)
(C) Left Arrow "ONLY" Sign (R3-5L)	(C) Left Arrow "ONLY" Sign (R3-5L)
(D) Right "TURNING VEHICLES" Yield "TO" Pedestrians Sign (R10-15R)	(D) Right "TURNING VEHICLES" Yield "TO" Pedestrians Sign (R10-15R)
(E) Left "TURNING VEHICLES" Yield "TO" Pedestrians Sign (R10-15L)	(E) Left "TURNING VEHICLES" Yield "TO" Pedestrians Sign (R10-15L)
(F) "Right Turn Signal" Sign (R10-10R)	(F) "Right Turn Signal" Sign (R10-10R)
(G) "STOP" Sign (R1-1)	(G) "STOP" Sign (R1-1)
(H) "YIELD" Sign (R1-2)	(H) "YIELD" Sign (R1-2)
(I) Rectangular Rapid Flashing Beacon Assembly	(I) Rectangular Rapid Flashing Beacon Assembly
(J) Street Name Sign By Others (D3-1)	(J) Street Name Sign By Others (D3-1)
(K) "ONE WAY" Sign (R6-1R)	(K) "ONE WAY" Sign (R6-1R)

LEGEND

PROPOSED	EXISTING
Traffic Signal Head	Traffic Signal Head
Modified Signal Head	Modified Signal Head
Pedestrian Signal Head	Pedestrian Signal Head
Signal Pole with Guy	Signal Pole with Guy
Signal Pole with Sidewalk Guy	Signal Pole with Sidewalk Guy
Metal Pole with Mastarm	Metal Pole with Mastarm
Inductive Loop Detector	Inductive Loop Detector
Controller & Cabinet	Controller & Cabinet
Junction Box	Junction Box
2-in Underground Conduit	2-in Underground Conduit
Right of Way	Right of Way
Directional Arrow	Directional Arrow
Guardrail	Guardrail
Type I Pushbutton Post	Type I Pushbutton Post
Type II Signal Pedestal	Type II Signal Pedestal
Non-Intrusive Detection Zone	Non-Intrusive Detection Zone
Curb Ramp	Curb Ramp

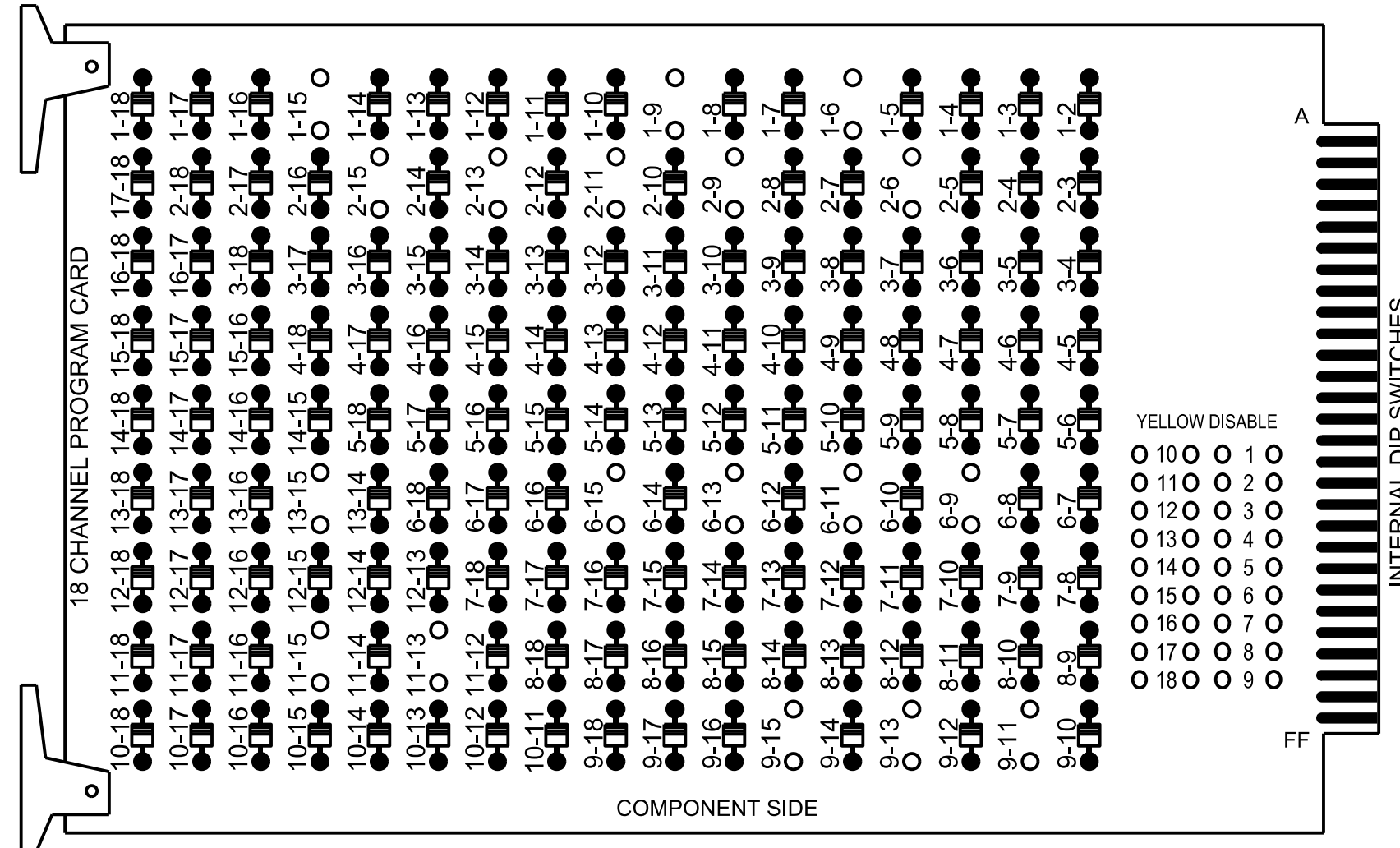
New Installation
Final Design (Phase IV Step 4)

AECOM
NC Firm License No.: F-0342
5438 Wade Park Boulevard
Suite 200 Raleigh, NC 27607
Phone: 919-461-1100

Prepared For the Offices of: 750 N. Greenfield Pkwy, Garner, NC 27529	NC 191 (Brevard Road) at I-26 WB / I-240 EB Ramps Division 13 Bunccombe County Asheville PLAN DATE: May 2026 REVIEWED BY: C. Kalencik PREPARED BY: M. Tindal REVIEWED BY: REVISIONS INIT. DATE SIGNATURE DATE SIC. INVENTORY NO. 13-1116	DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED SEAL NORTH CAROLINA PROFESSIONAL SEAL 040715 ENGINEER COURTNEY L. KALENCIK 8/7/2026
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18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

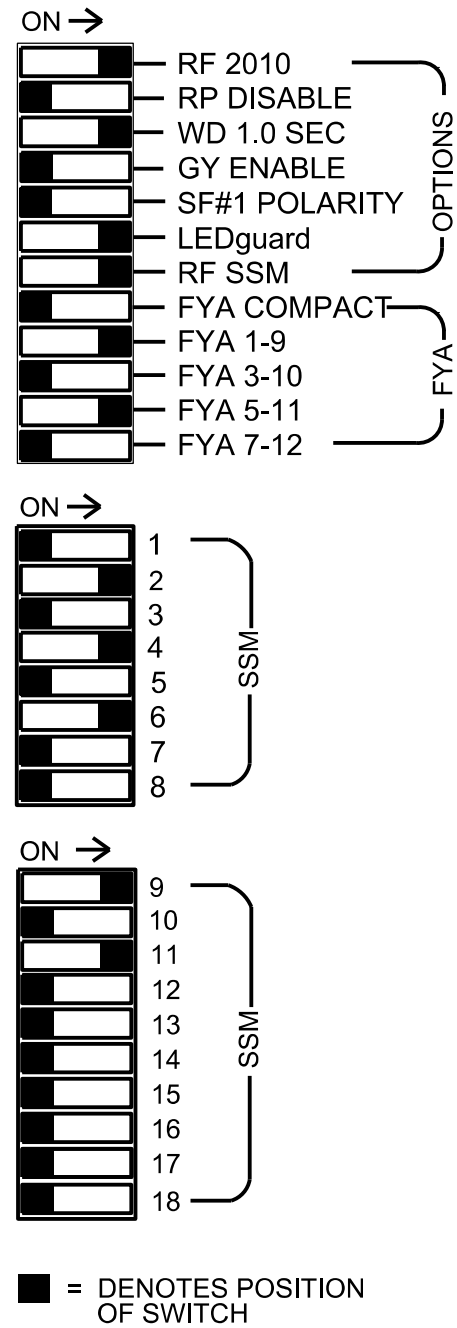
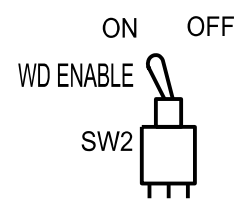
(remove jumpers and set switches as shown)



REMOVE JUMPERS AS SHOWN

NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that the Red Enable is active at all times during normal operation.
4. 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 phase 6 Green No Walk.
3. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
4. The cabinet and controller are part of the D13-02 Asheville System.

EQUIPMENT INFORMATION

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

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

*See overlap programming detail on sheet 2.

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2		S3	S4	S5		S6	S7	S8		S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2		13	3	4		14	5	6		15	7	8	16	9	10	17	11	12	18
PHASE	1	2		2 PED	3	4		4 PED	5	6		6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	11★	21	22	P21, P22	NU	41	42,43	NU	NU	61	62	P61, P62	NU	NU	NU	11★	NU	NU	23★	NU	NU
RED		128	128				101			134	134								A114		
YELLOW	★	129	129				102			135	135										
GREEN			130				103			136											
RED ARROW						101										A121					
YELLOW ARROW						102										A122			A115		
FLASHING YELLOW ARROW																A123			A116		
GREEN ARROW	127	130				103					136										
				113								119									
				115								121									

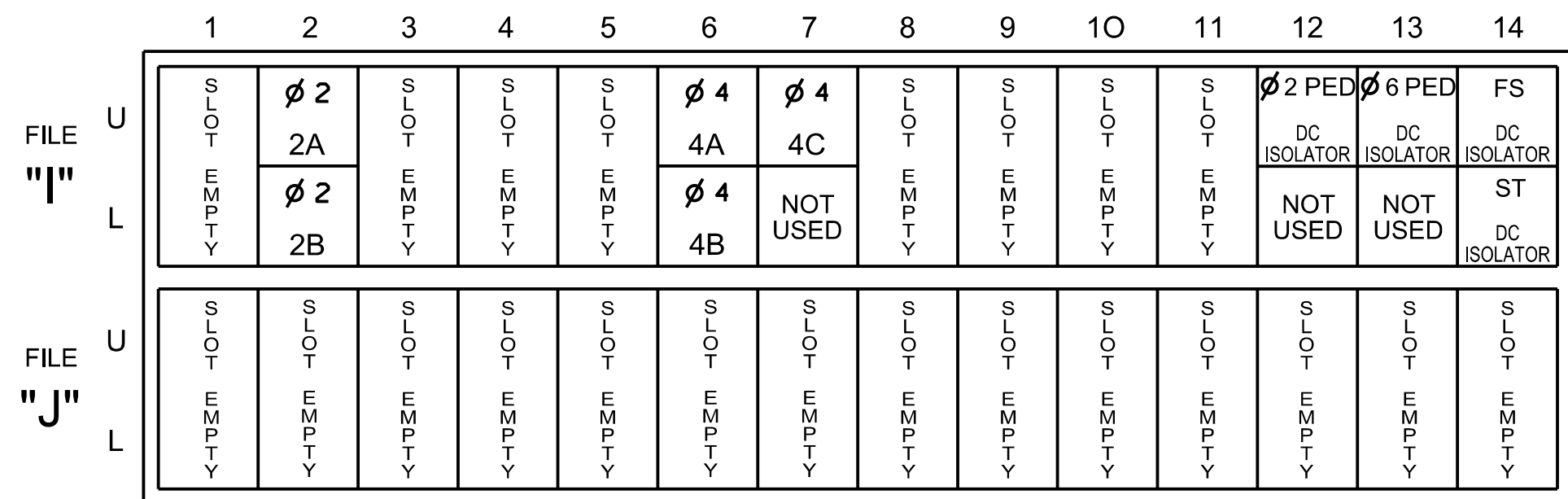
NU = Not Used

* Denotes install load resistor. See LOAD RESISTOR INSTALLATION DETAIL this sheet.

★ See pictorial of head wiring in FYA SIGNAL WIRING DETAIL on sheet 2.

INPUT FILE POSITION LAYOUT

(front view)



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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

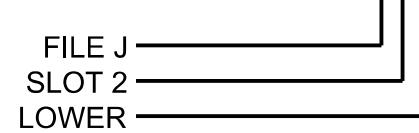
[illegible]

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.

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

INPUT FILE POSITION LEGEND: J2L



SDLC NON-INTRUSIVE DETECTION CHART

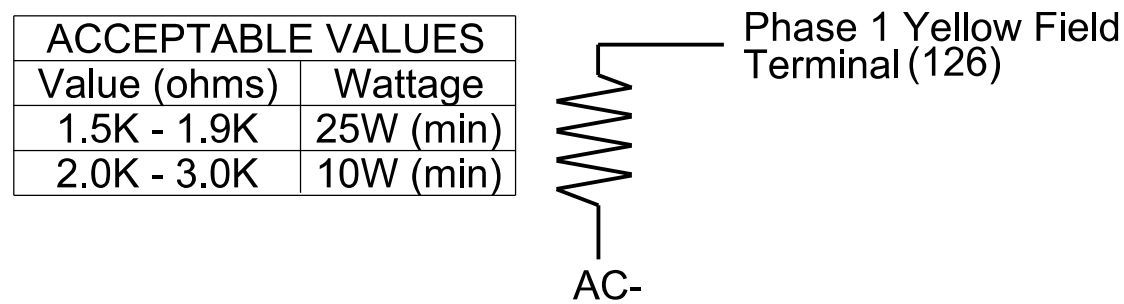
	DETECTOR RACK #3		DETECTOR RACK #4	
Input Point	Det # (Index)	Detector Zone	Det # (Index)	Detector Zone
1	33	1A	49	NU
2	34	NU	50	NU
3	35	NU	51	NU
4	36	NU	52	NU
5	37	NU	53	NU
6	38	NU	54	6A
7	39	NU	55	6B
8	40	NU	56	NU
9	41	NU	57	NU
10	42	NU	58	NU
11	43	NU	59	NU
12	44	NU	60	NU
13	45	NU	61	NU
14	46	NU	62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

NU = Not Used

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 13-1116
DESIGNED: May 2026
SEALED: 08/07/2026
REVISED: N/A

LOAD RESISTOR INSTALLATION DETAIL

(install resistor as shown)



SPECIAL DETECTOR NOTE

For Zone 1A, 6A and 6B, 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.



Final (Phase IV Step 4)
Electrical Detail - Sheet 1 of 3

Electrical and Programming Details For:	NC 191 (Brevard Road) at I-26 WB / I-240 EB Ramps	SEAL 																																	
Prepared for the Offices of:																																			
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PLAN DATE: May 2026 REVIEWED BY: J O Deaton																																			
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SIG. INVENTORY NO. 40FF8AC4308D40F DATE 13-1116																																			

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

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

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

Overlap	1	2	3	4
Type	FYA 4 - Section	Off	FYA 4 - Section	Off
Included Phases	2	-	2	-
Modifier Phases	1	-	-	-
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

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	Off	FYA 4 - Section	Off
Included Phases	-	-	2	-
Modifier Phases	1	-	-	-
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

← NOTICE INCLUDED PHASE

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	-
125	0	-

1A

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.

<u>PHASING</u>	<u>OVERLAP PLAN</u>	<u>VEH DET PLAN</u>
ACTIVE PLAN REQUIRED TO <u>RUN DEFAULT PHASING</u>	1	1
ACTIVE PLAN REQUIRED TO <u>RUN ALTERNATE PHASING</u>	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 head 11 to run protected turns only.

VEH DET PLAN 2: Disables phase 6 call on loop 1A and reduces delay time for phase call on loop 1A to 0 seconds.

Front Panel
Main Menu >Controller >Coordination >Patterns

Web Interface
Home > Controller > Coordination > Patterns

Pattern Parameters

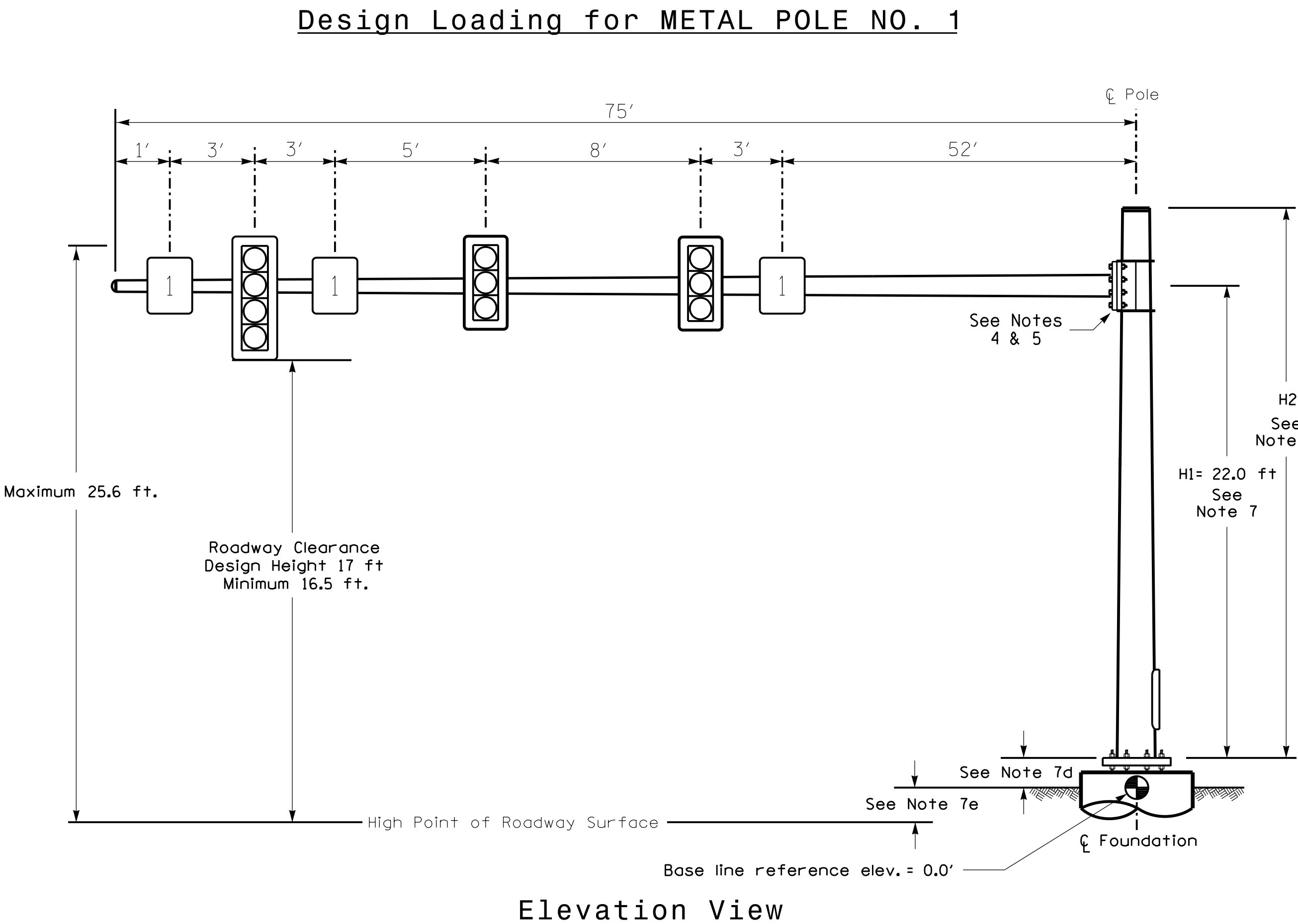
Pattern	Veh Det Plan	Overlap Plan
*	2	2

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

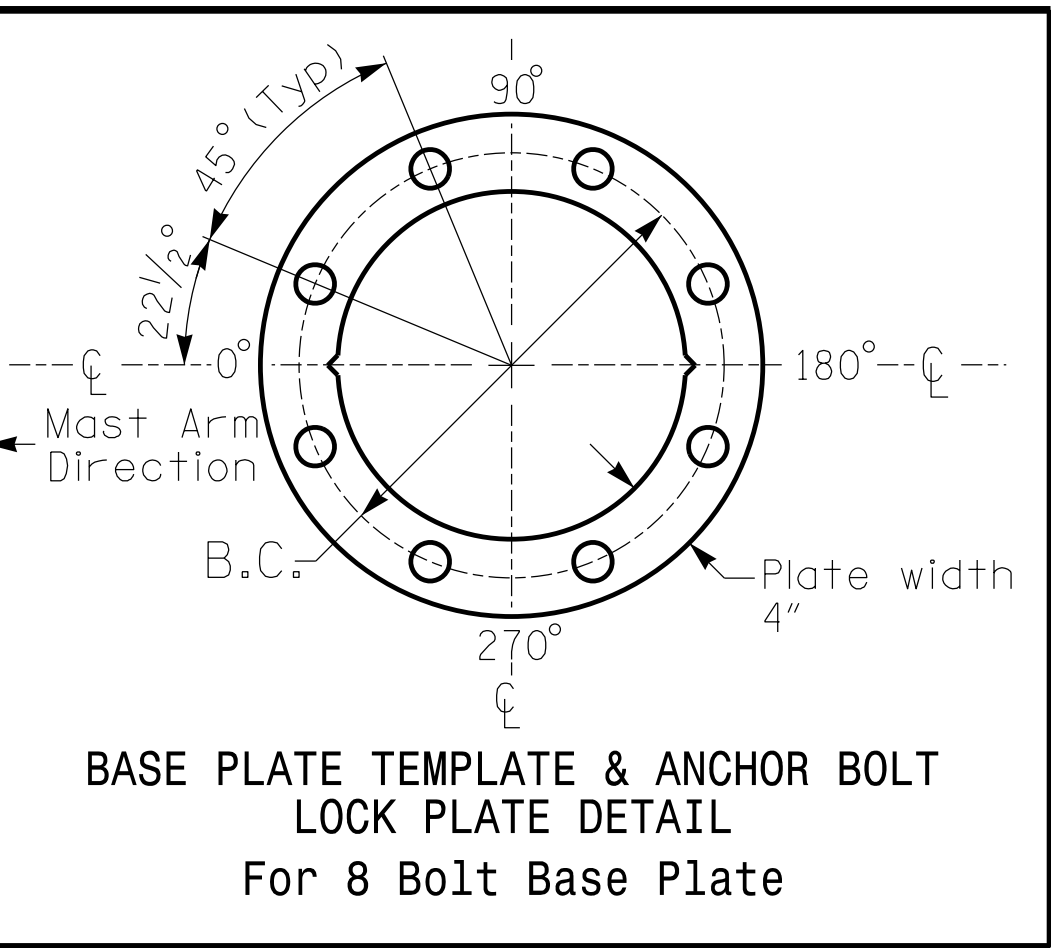
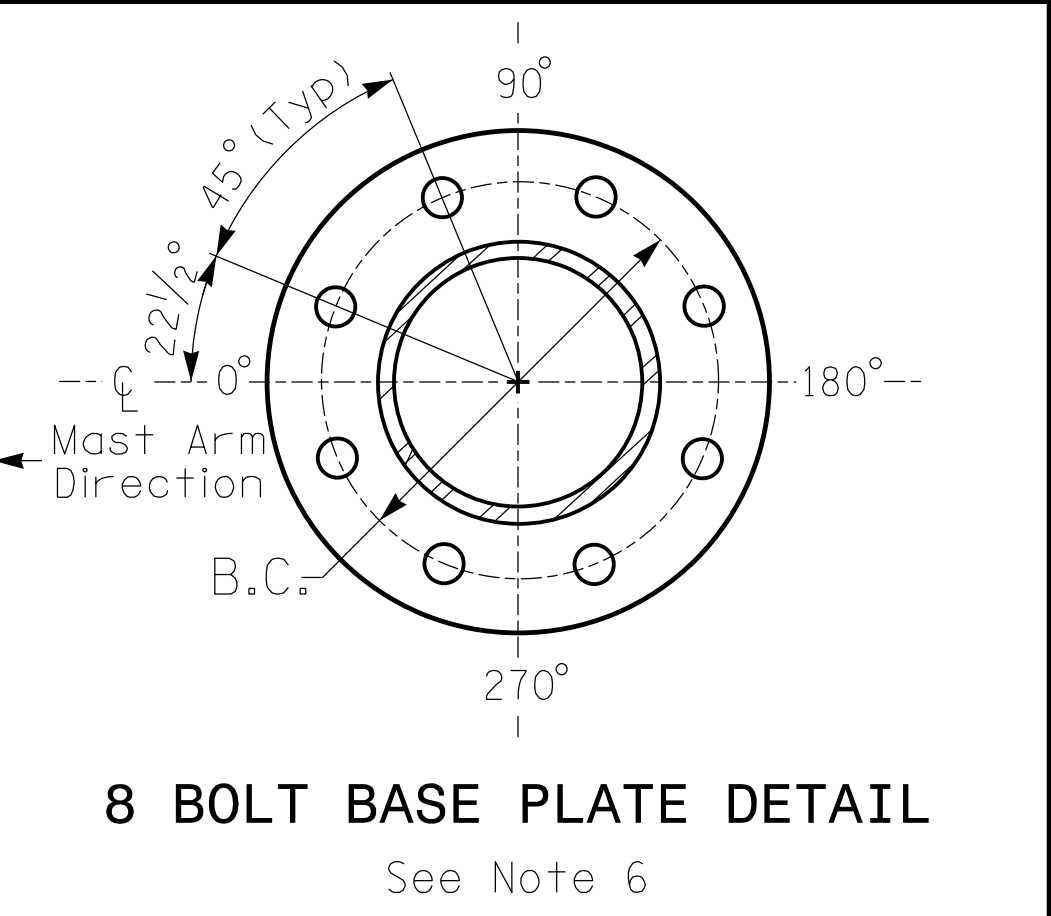
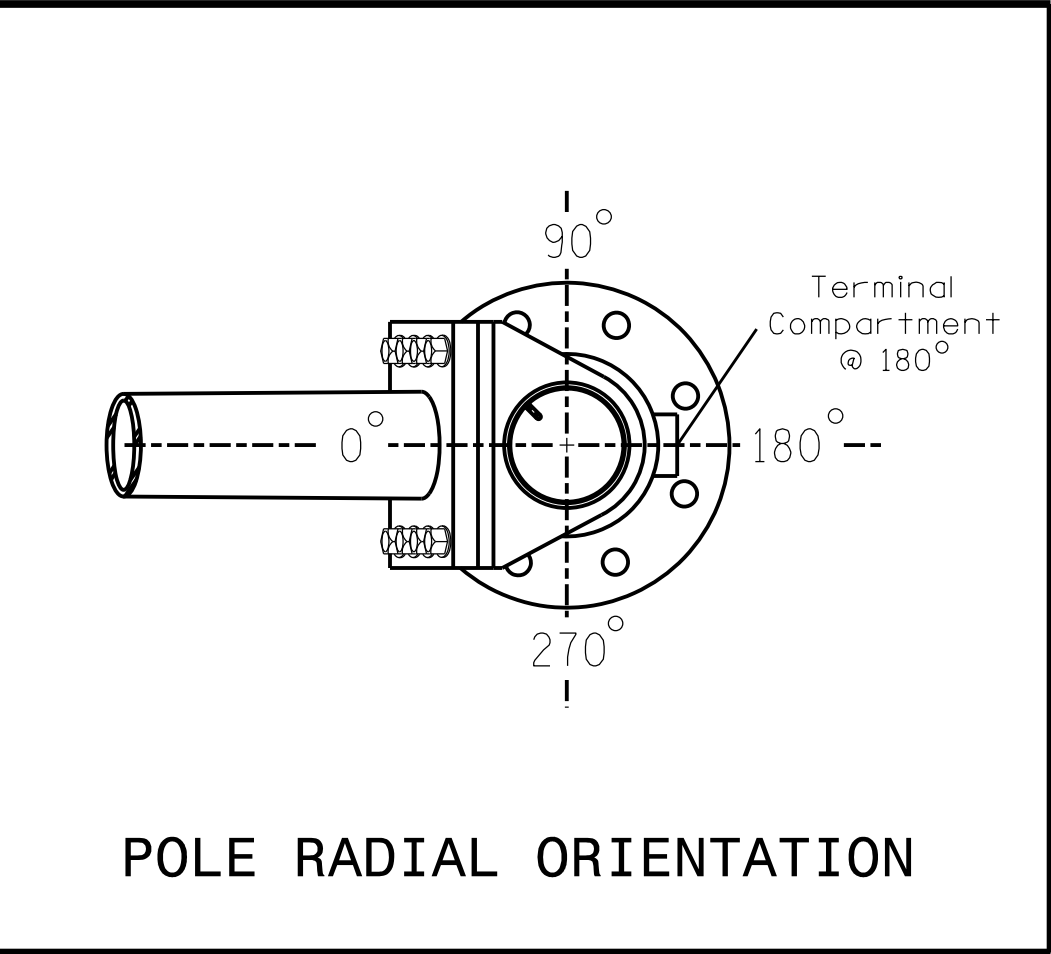
Final (Phase IV Step 4)
Electrical Detail - Sheet 3 of 3

Electrical and Programming Details For:	NC 191 (Brevard Road) at I-26 WB / I-240 EB Ramps	SEAL 																																	
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750 N. Greenfield Pkwy, Garner, NC 27529	DocuSigned by:  James O. Deaton 8/10/2026 1005634347040007 DATE SIG. INVENTORY NO. 13-1116																																		

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nt chael 1. covernaugh



SPECIAL NOTE	
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.	
Elevation Data for Mast Arm Attachment (H1)	
Elevation Differences for:	Pole 1
Baseline reference point at ℄ Foundation @ ground level	0.0 ft.
Elevation difference at High point of roadway surface	+2.93 ft.
Elevation difference at Edge of travelway or face of curb	+0.98 ft.



METAL POLE No. 1

PROJECT REFERENCE NO.	SHEET NO.
I-2513AC	Sig. 6.4

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
	RIGID MOUNTED SIGNAL HEAD 12"-4 SECTION-WITH BACKPLATE	11.5 S.F.	25.5"W X 66.0"L	74 LBS
	SIGN RIGID MOUNTED	9.0 S.F.	36.0"W X 36.0"L	17 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

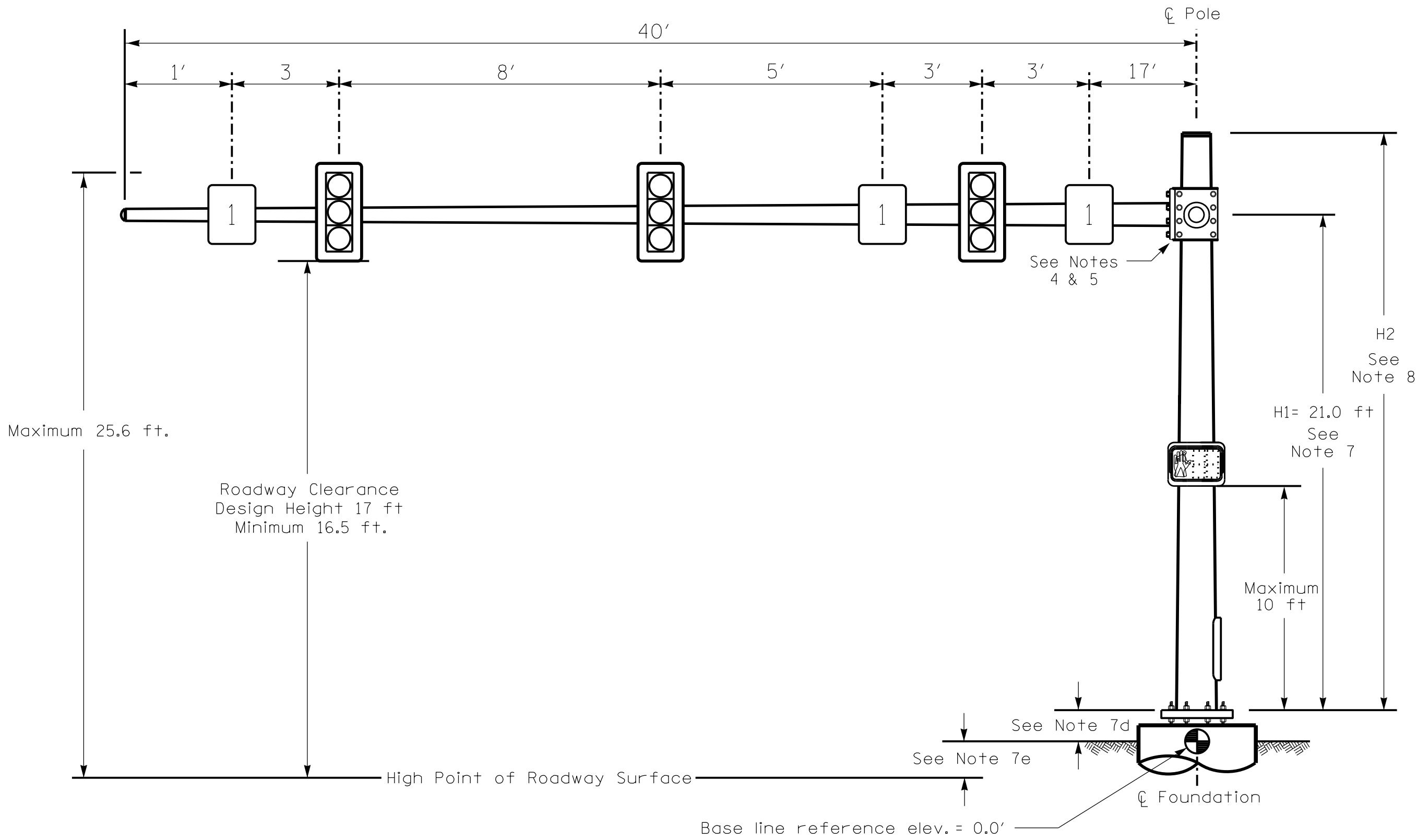
- Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the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

All metal poles and arms should be 27038 in color as specified in the project special provisions.

NCDOT Wind Zone 5 (110 mph)

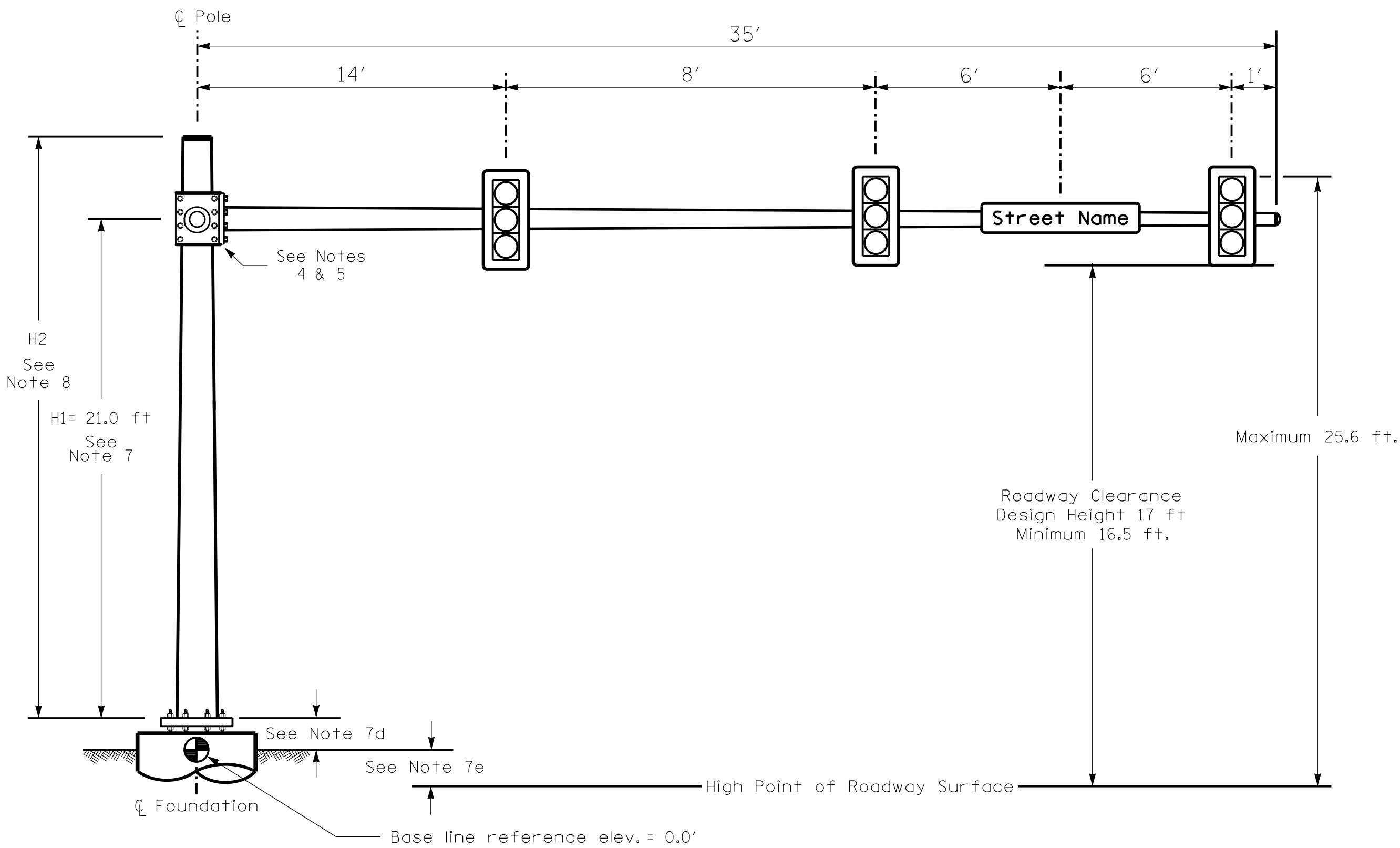
Prepared For the Offices of: 	NC 191 (Brevard Road) at I-26 WB / I-240 EB Ramps			SEAL 																		
	Division 13 Buncombe County Asheville																					
	PLAN DATE: November 2025 REVIEWED BY: C. Kalencik																					
	PREPARED BY: M. Tindal REVIEWED BY:																					
750 N. Greenfield Pkwy, Garner, NC 27529																						
DocuSigned by <i>Cecily K. Kalencik</i> 8/11/2026																						
SCALE 0 N/A  N/A																						
<table><thead><tr><th>REVISIONS</th><th>INIT.</th><th>DATE</th></tr></thead><tbody><tr><td> </td><td> </td><td> </td></tr><tr><td> </td><td> </td><td> </td></tr><tr><td> </td><td> </td><td> </td></tr><tr><td> </td><td> </td><td> </td></tr><tr><td> </td><td> </td><td> </td></tr></tbody></table>					REVISIONS	INIT.	DATE															
REVISIONS	INIT.	DATE																				
DATE SIG. INVENTORY NO. 13-1116																						

Design Loading for METAL POLE NO. 2, MAST ARM A



Elevation View @ 270°

Design Loading for METAL POLE NO. 2, MAST ARM B



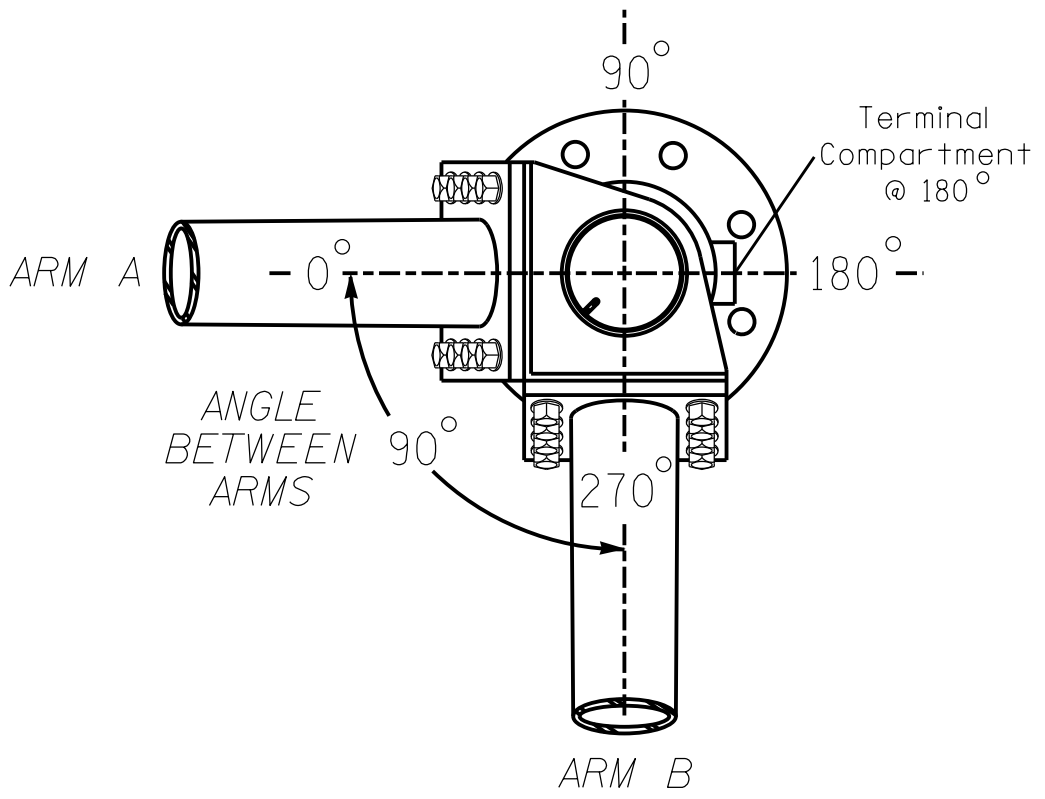
Elevation View @ 0°

SPECIAL NOTE

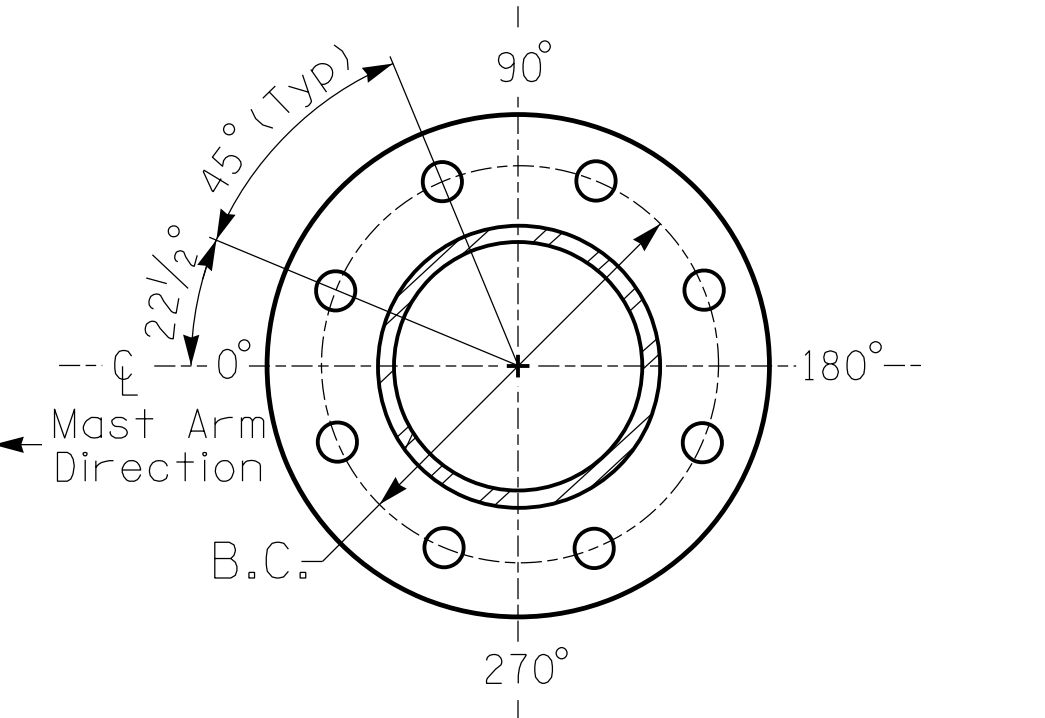
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 2
Baseline reference point at ⌀ Foundation @ ground level	0.0 ft.
Elevation difference at High point of roadway surface	+2.46 ft.
Elevation difference at Edge of travelway or face of curb	+2.09 ft.

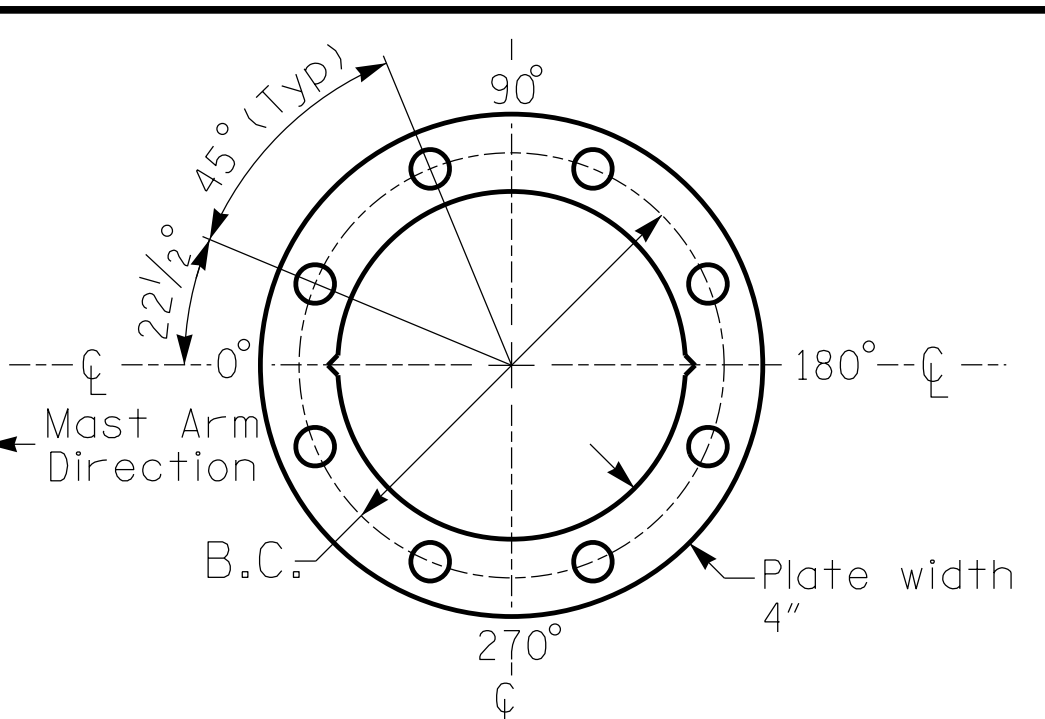


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



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

METAL POLE No. 2

PROJECT REFERENCE NO.	SHEET NO.
I-2513AC	Sig. 6.5

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	RIGID MOUNTED SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE	9.3 S.F.	25.5"W X 52.5"L	60 LBS
	SIGN RIGID MOUNTED	9.0 S.F.	36.0"W X 36.0"L	17 LBS
	STREET NAME SIGN RIGID MOUNTED	16.0 S.F.	24.0"W X 96.0"L	36 LBS
	PEDESTRIAN SIGNAL HEAD WITH MOUNTING HARDWARE	2.2 S.F.	18.5"W X 17.0"L	21 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

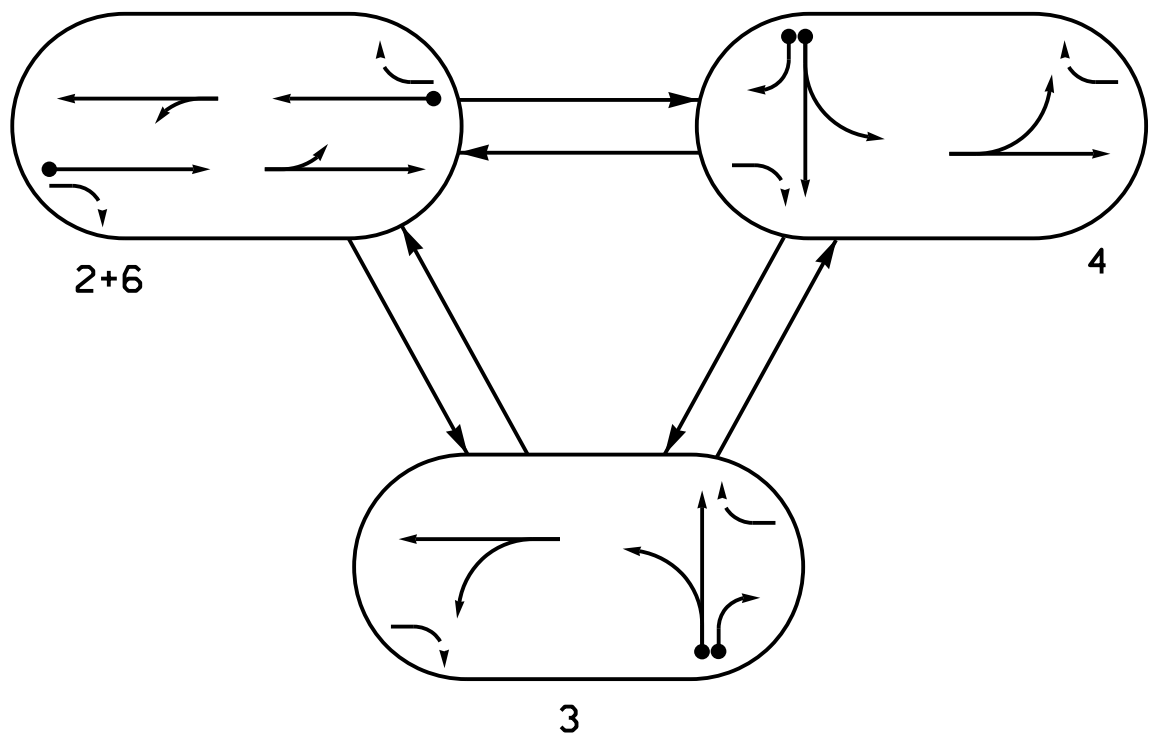
- Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the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

All metal poles and arms should be 27038 in color as specified in the project special provisions.

NCDOT Wind Zone 5 (110 mph)

	NC 191 (Brevard Road) at I-26 WB / I-240 EB Ramps		Division 13 Buncombe County Asheville	
	PLAN DATE: November 2025	REVIEWED BY: C. Kalencik	PREPARED BY: M. Tindal	
750 N. Greenfield Place, Garner, NC 27529		REVISIONS	INIT.	DATE
SCALE 0 N/A N/A				
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED		SEAL NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 040715 COURTNEY L. KALENICK		
DocuSigned by: Courtney L. Kalencik		8/11/2026		
SIG. INVENTORY NO.		13-1116		

PHASING DIAGRAM



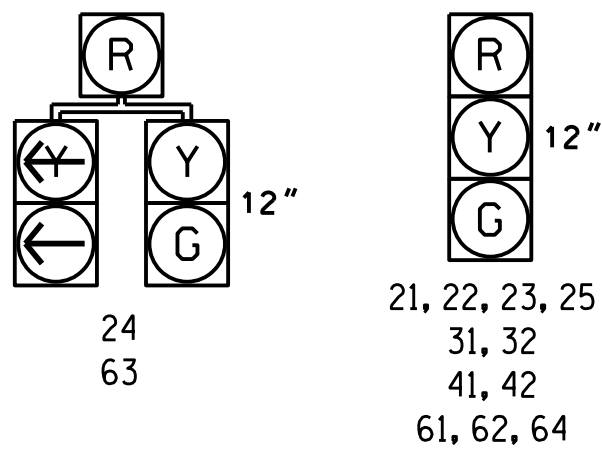
PHASING DIAGRAM DETECTION LEGEND

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

SIGNAL FACE	PHASE			
	2+6	3	4	FLIGHT
21,22,23	G	R	R	R
24	G	R	G	R
25	G	R	G	R
31,32	R	G	R	R
41,42	R	G	R	R
61,62	G	R	R	R
63	G	G	R	R
64	G	G	R	R

SIGNAL FACE I.D.

All Heads L.E.D.



MAXTIME DETECTOR INSTALLATION CHART											
DETECTOR						PROGRAMMING					
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
2A★	6X6	70	★	★	2	-	-	X	-	X	★
3A★	6X40	0	★	★	3	-	-	X	-	X	★
3B★	6X40	0	★	★	3	15.0	-	X	-	X	★
4A★	6X40	0	★	★	4	3.0	-	X	-	X	★
6A★	6X6	70	★	★	6	-	-	X	-	X	★

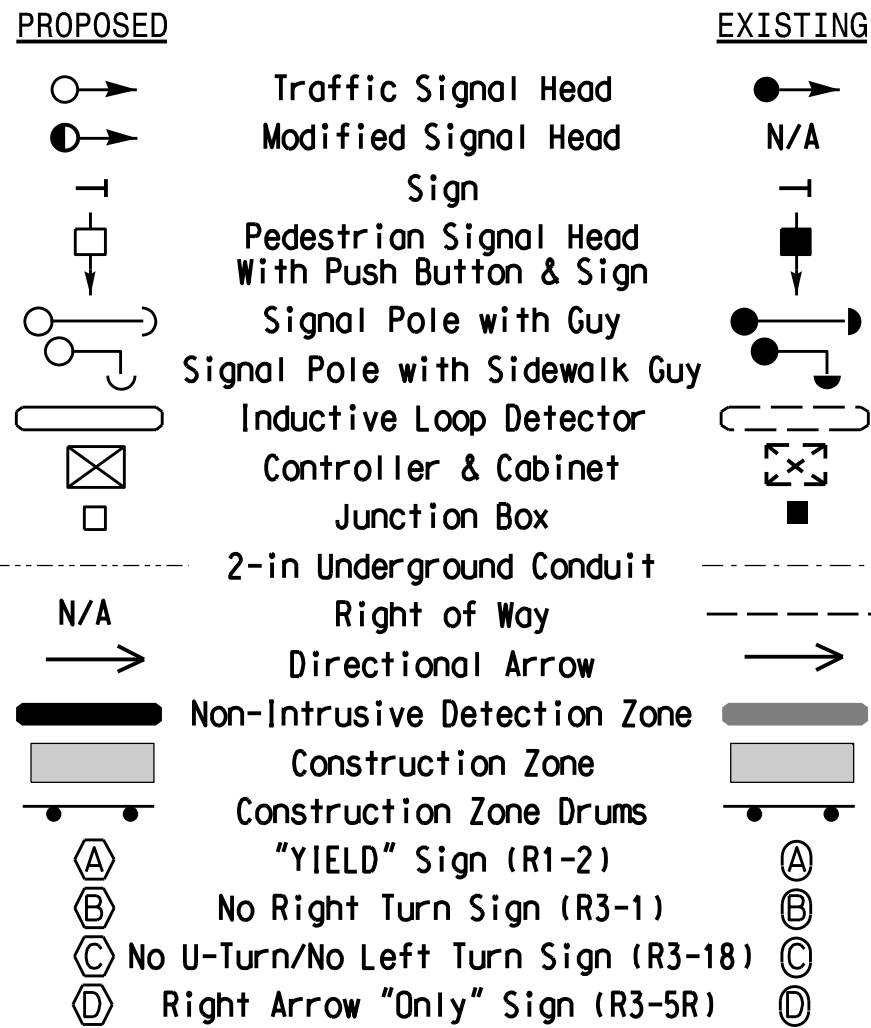
★ Video Detection Zone

3 Phase
Fully Actuated
D13-02 Asheville

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2024 and "Standard Specifications for Roads and Structures" dated January 2024.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Reposition existing signal heads numbered 24, 25, 61, and 62.
- Set all detector units to presence mode.
- This intersection uses video detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- See Transportation Management Plans for stop bar locations.

LEGEND



MAXTIME TIMING CHART				
FEATURE	PHASE			
	2	3	4	6
Walk *	-	-	-	-
Ped Clear *	-	-	-	-
Min Green *	12	7	7	12
Passage *	3.0	5.0	3.0	3.0
Max I *	60	50	30	60
Yellow Change	4.1	3.6	3.7	4.1
Red Clear	1.4	1.2	1.4	1.4
Added Initial *	-	-	-	-
Maximum Initial *	-	-	-	-
Time Before Reduction *	-	-	-	-
Time To Reduce *	-	-	-	-
Minimum Gap	-	-	-	-
Advance Walk	-	-	-	-
Non Lock Detector	-	X	X	-
Vehicle Recall	SOFT RECALL	-	-	SOFT 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.

Signal Upgrade
Temporary Design 1 (TMP Phase I Step 2)

AECOM
NC Firm License No.: F-0342
5438 Wade Park Boulevard
Suite 200 Raleigh, NC 27607
Phone: 919-461-1100

Prepared For the Offices of:

750 N. Greenfield Pkwy, Garner, NC 27529

NC 191 (Brevard Road)
at
I-26 / I-240 Ramps

Division 13 Buncombe County Asheville

PLAN DATE: May 2026 REVIEWED BY: C. Kalencik

PREPARED BY: M. Tindal REVIEWED BY:

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL

DocuSigned by:
Courtney L. Kalencik 8/7/2026

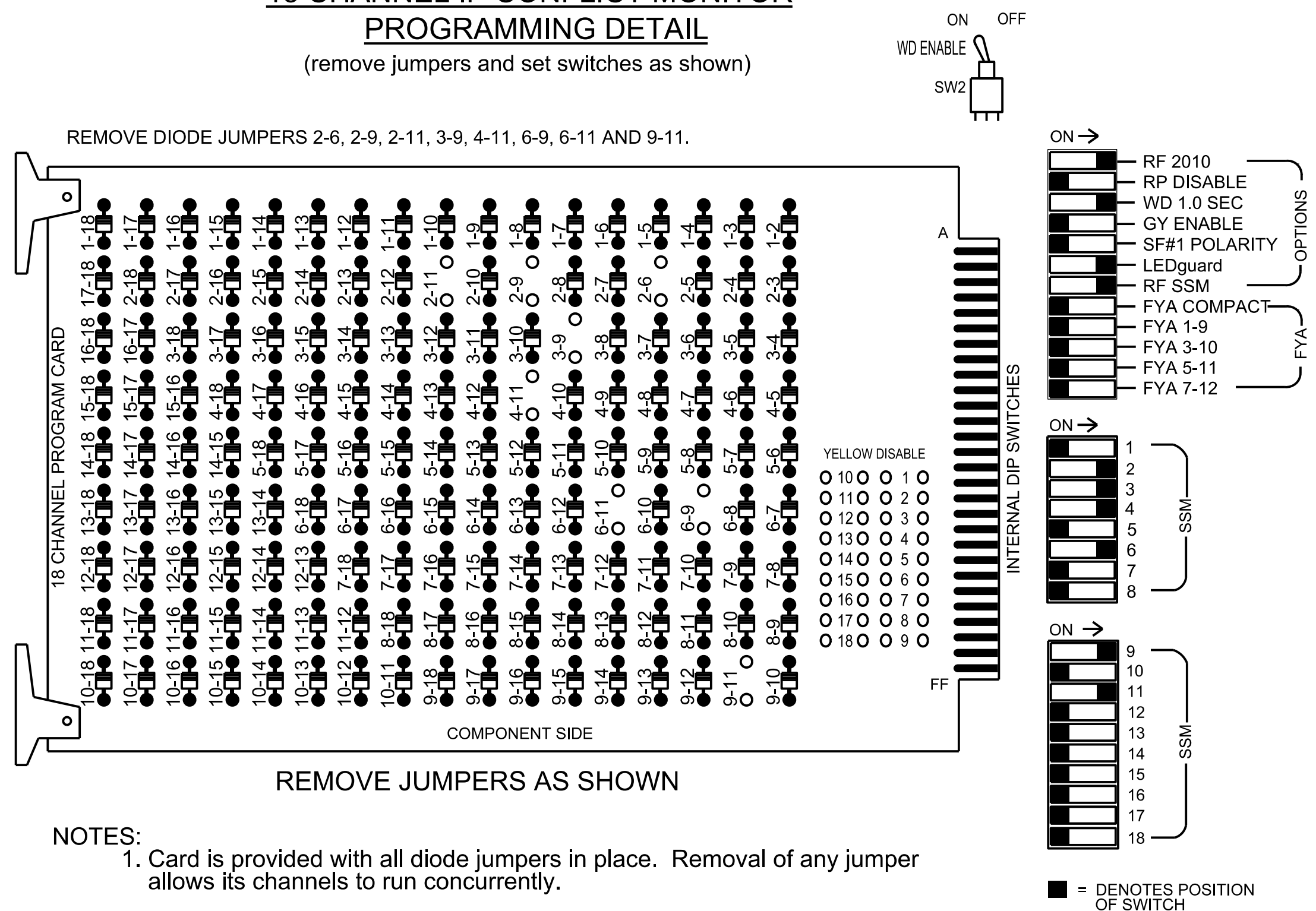
SIGNATURE DATE

SIG. INVENTORY NO. I3-007311

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 phase 6 Green No Walk.
3. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
4. The cabinet and controller are part of the D13-02 Asheville System.

EQUIPMENT INFORMATION

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

*See overlap programming detail on sheet 2.

SIGNAL HEAD HOOK-UP CHART

[illegible]

NU = Not Used

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: 13-0073T1
DESIGNED: May 2026
SEALED: 08/07/2026
REVISED: N/A

SPECIAL DETECTOR NOTE

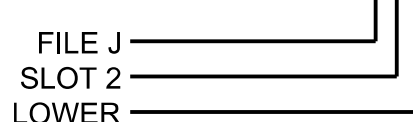
Install a video detection system for vehicle detection. Perform installation according to manufacturer's directions and NCDOT engineer -approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.

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	
3A	-	-	-	*	34	3			X		X	
3B	-	-	-	*	50	3	15.0		X		X	
4A	-	-	-	*	44	4	3.0		X		X	
6A	-	-	-	*	54	6			X		X	

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

INPUT FILE POSITION LEGEND: J2L



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	NU
2	34	3A	50	3B
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	NU	61	NU
14	46	NU	62	NU
15	47	NU	63	NU
16	48	NU	64	NU

NU = Not Used

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

DOCUMENT NOT CONSIDERED
FINAL UNLESS ALL
SIGNATURES COMPLETED

SEAL

DocuSigned by:
James O. Deaton 8/10/2026

DATE _____

SIG. INVENTORY NO. 13-0073T

Electrical and Programming
Details For

Prepared for the Offices of:



750 N. Greenfield Pkwy, Garner, NC 27529

NC 191 (Brevard Road)
at
I-26 / I-240 Ramps

Division 13 Buncombe County Asheville

PLAN DATE:	May 2026	REVIEWED BY:	J O Deaton
------------	----------	--------------	------------

PREPARED BY: M W Yalch	REVIEWED BY:
------------------------	--------------

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

AECOM
NC Firm License No.: F-0342
5438 Wade Park Boulevard
Suite 200, Raleigh, NC 27607
Phone: 919-461-1100

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	Normal	Off	Normal	Off
Included Phases	3,6	-	2,4	-
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

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

SEQUENCE DETAIL

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

Web Interface
Home >Controller >Sequence

Sequence 1

Ring	Sequence Data
1	2,a,4,3,b
2	6,a,b

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

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

DOCUMENT NOT CONSIDERED
FINAL UNLESS ALL
SIGNATURES COMPLETED

Electrical and Programming
Details For:

Prepared for the Offices of:

Seal of the State of North Carolina

Department of Transportation

Division of Traffic and Safety

750 N. Greenfield Pkwy, Garner, NC 27529

NC 191 (Brevard Road)
at
I-26 / I-240 Ramps

Division 13

Buncombe County

Asheville

PLAN DATE: May 2026

REVIEWED BY: J O Deaton

PREPARED BY: M W Yalch

REVIEWED BY:

REVISIONS

INIT.

DATE

SEAL

SEAL 07438

ENGINEER JAMES O. DEATON

DocuSigned by:

James O. Deaton

8/10/2026

SIG. INVENTORY NO. 13-0073T1

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 13-0073T1
DESIGNED: May 2026
SEALED: 08/07/2026
REVISED: N/A

AECOM
NC Firm License No.: F-0342
5438 Wade Park Boulevard
Suite 200, Raleigh, NC 27607
Phone: 919-461-1100

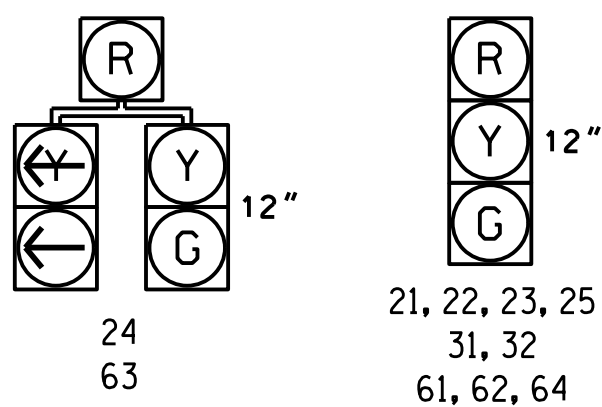
\$\$\$\$\$ACTIVE\$\$\$\$\$
\$\$\$\$\$DESIGNED BY: JAL\$\$\$\$\$
\$\$\$\$\$DRAWN BY: JAL\$\$\$\$\$
\$\$\$\$\$CHECKED BY: JAL\$\$\$\$\$
\$\$\$\$\$USER NAME: JAL\$\$\$\$\$

The diagram shows three ovals connected by arrows. The top-left oval is labeled $2+6$ and contains four arrows: two pointing left and two pointing right, with a dot at the end of each right-pointing arrow. The top-right oval is labeled 3 and contains two arrows: one pointing left and one pointing up, with a dot at the end of each. The bottom oval is labeled $2+5$ and contains two arrows: one pointing left and one pointing right, with a dot at the end of each. Arrows connect the top-left oval to the top-right oval, the top-left oval to the bottom oval, and the top-right oval to the bottom oval.

	DETECTED MOVEMENT
	UNDETECTED MOVEMENT (OVERLAP)
	UNSIGNALIZED MOVEMENT
	PEDESTRIAN MOVEMENT

SIGNAL FACE	PHASE			
	2 + 5	2 + 6	3	F A S H
21,22,23	G	G	R	R
24		G	R	R
25	G	G	R	R
31,32	R	G	R	R
61,62	R	G	R	R
63	R	G		R
64	R	G	G	R

All Heads L.E.D.



DETECTOR					PROGRAMMING								
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
2A★	6X6	70	★	★	2	-	-	X	-	X	-	★	
3A★	6X40	0	★	★	3	-	-	X	-	X	-	★	
3B★	6X40	0	★	★	3	15.0	-	X	-	X	-	★	
6A★	6X6	70	★	★	6	-	-	X	-	X	-	★	

* Video Detection Zone

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2024 and "Standard Specifications for Roads and Structures" dated January 2024.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Set all detector units to presence mode.
4. This intersection uses video detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.
5. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
6. See Transportation Management Plans for stop bar locations.

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	N/A
	Pedestrian Signal Head	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
	Non-Intrusive Detection Zone	
	Construction Zone	
	Construction Zone Drums	
(A)	"YIELD" Sign (R1-2)	(A)
(B)	No Right Turn Sign (R3-1)	(B)
(C)	No U-Turn/No Left Turn Sign (R3-18)	(C)
(D)	Right Arrow "Only" Sign (R3-SR)	(D)

FEATURE	PHASE			
	2	3	5	6
Walk *	–	–	–	–
Ped Clear *	–	–	–	–
Min Green *	12	7	7	12
Passage *	3.0	5.0	0.0	3.0
Max 1 *	60	50	7	60
Yellow Change	4.1	3.6	3.0	4.1
Red Clear	1.4	1.2	1.8	1.4
Added Initial *	–	–	–	–
Maximum Initial *	–	–	–	–
Time Before Reduction *	–	–	–	–
Time To Reduce *	–	–	–	–
Minimum Gap	–	–	–	–
Advance Walk	–	–	–	–
Non Lock Detector	–	X	–	–
Vehicle Recall	SOFT RECALL	–	MAX RECALL	SOFT 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.

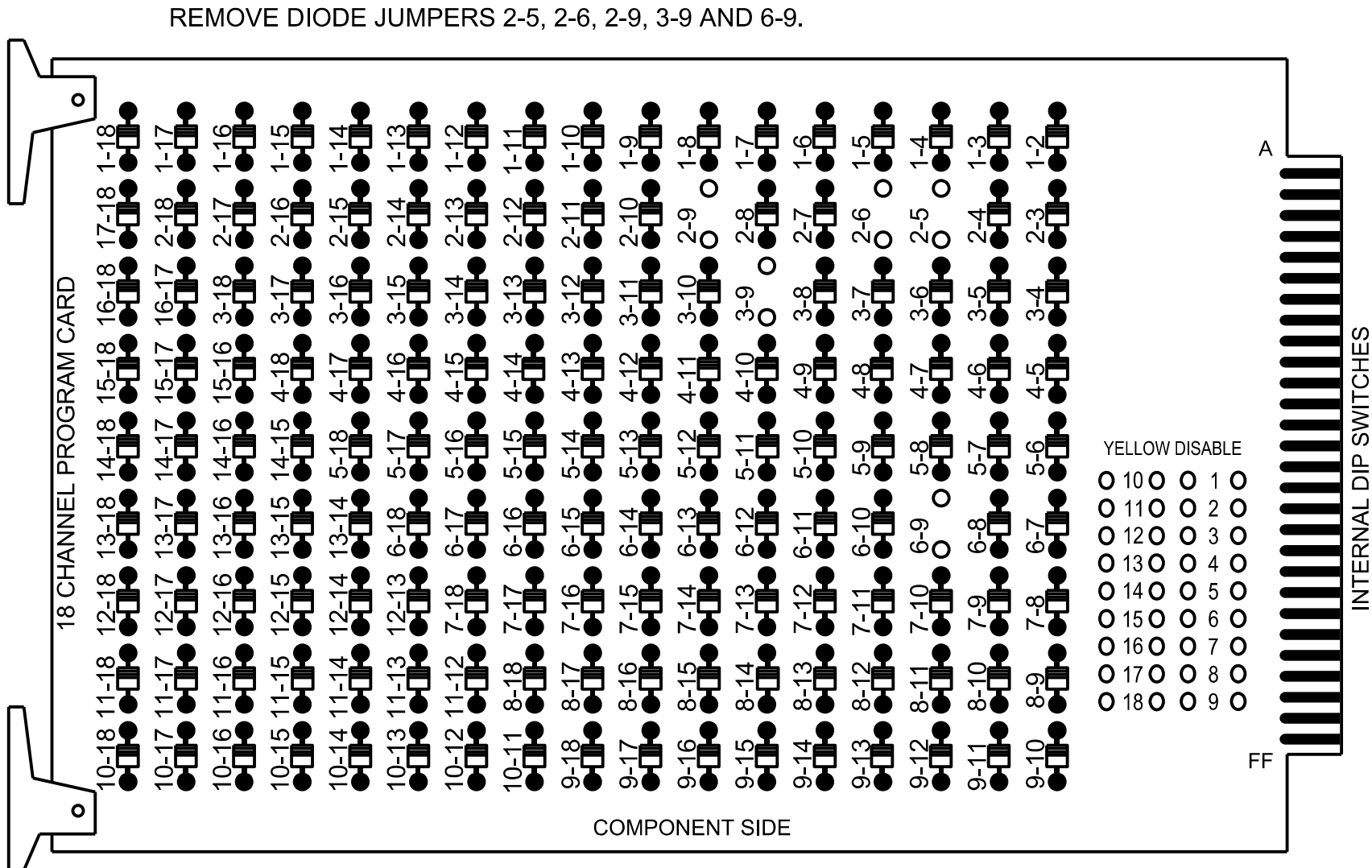
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Phone: 919-461-1100

Prepared For the Offices of:  750 N. Greenfield Pkwy, Garner, NC 27529	NC 191 (Brevard Road) at I-26 / I-240 Ramps	SEAL 																					
Division 13 Buncombe County Asheville																							
PLAN DATE: May 2026 REVIEWED BY: C. Kalenick																							
PREPARED BY: M. Tindal REVIEWED BY:																							
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REVISONS	INIT.	DATE																					
Document by:  DESIGN/PROJECT 8/7/2026																							
SIGNATURE DATE																							
SIG. INVENTORY NO. 13-007312																							

18 CHANNEL IP CONFLICT MONITOR
PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



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

NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all 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 phase 6 Green No Walk.
- If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
- The cabinet and controller are part of the D13-02 Asheville System.

EQUIPMENT INFORMATION

Controller.....2070LX
Cabinet.....332 w/ Aux
Software.....Q-Free MAXTIME
Cabinet Mount.....Base
Output File Positions.....18 With Aux. Output File
Load Switches Used.....S2, S4, S7, S8, AUX S1
Phases Used.....2, 3, 5, 6
Overlap "1".....*
Overlap "2".....NOT USED
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.	NU	21,22,23,24,25	NU	31,32	63	NU	NU	24	61,62	NU	NU	NU	NU	63,64	NU	NU	NU	NU
RED		128		116			*	134					A121					
YELLOW		129		117				135					A122					
GREEN		130		118				136					A123					
RED ARROW																		
YELLOW ARROW				117			132											
GREEN ARROW				118			133											

NU = Not Used

* Denotes install load resistor. See LOAD RESISTOR INSTALLATION DETAIL on sheet 2.

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: 13-0073T2
DESIGNED: May 2026
SEALED: 08/07/2026
REVISED: N/A

SPECIAL DETECTOR NOTE

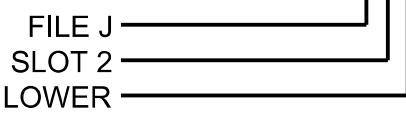
Install a video detection system for vehicle detection. Perform installation according to manufacturer's directions and NCDOT engineer -approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.

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	
3A	-	-	-	*	34	3			X		X	
3B	-	-	-	*	50	3	15.0		X		X	
6A	-	-	-	*	54	6			X		X	

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

INPUT FILE POSITION LEGEND: J2L



SDLC NON-INTRUSIVE
DETECTION CHART

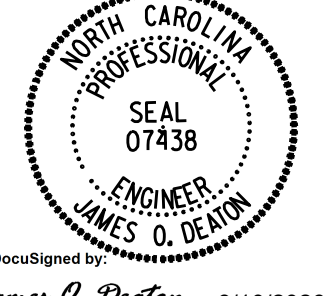
	DETECTOR RACK #3		DETECTOR RACK #4	
Input Point	Det # (Index)	Detector Zone	Det # (Index)	Detector Zone
1	33	NU	49	NU
2	34	3A	50	3B
3	35	NU	51	NU
4	36	NU	52	NU
5	37	NU	53	NU
6	38	2A	54	6A
7	39	NU	55	NU
8	40	NU	56	NU
9	41	NU	57	NU
10	42	NU	58	NU
11	43	NU	59	NU
12	44	NU	60	NU
13	45	NU	61	NU
14	46	NU	62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

NU = Not Used

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

Electrical and Programming Details For	NC 191 (Brevard Road) at I-26 / I-240 Ramps	DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
Prepared for the Offices of:  750 N. Greenfield Pkwy, Garner, NC 27529	Division 13 Buncombe County Asheville PLAN DATE: May 2026 REVIEWED BY: J O Deaton PREPARED BY: M W Yalch REVIEWED BY: REVISIONS INIT. DATE	SEAL  James O. Deaton 8/10/2026 40FFBAC430B040F DATE SIG. INVENTORY NO. 13-0073T2

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

Overlap	1	2	3	4
Type	Normal	Off	Off	Off
Included Phases	3,6	-	-	-
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

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

Web Interface
Home >Controller >Advanced IO>Channels>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

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

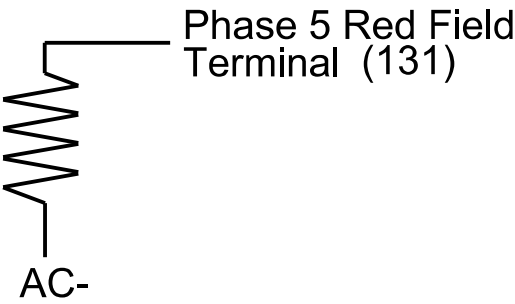
Front Panel
Main Menu >Controller >Sequence & Phs Config>Sequences

Web Interface
Home >Controller >Sequence

Ring	Sequence Data
1	2,a,3,b
2	5,6,a,b

(install resistor as shown)

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



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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 13-0073T2
DESIGNED: May 2026
SEALED: 08/07/2026
REVISED: N/A



Electrical and Programming
Details For:

Prepared for the Offices of:

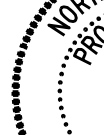


750 N. Greenfield Pkwy, Garner, NC 27529

NC 191 (Brevard Road) at I-26 / I-240 Ramps			
Division 13		Buncombe County	
Asheville			
PLAN DATE:	May 2026	REVIEWED BY:	J O Deaton
PREPARED BY:	M W Yalch	REVIEWED BY:	
REVISIONS		INIT.	DATE

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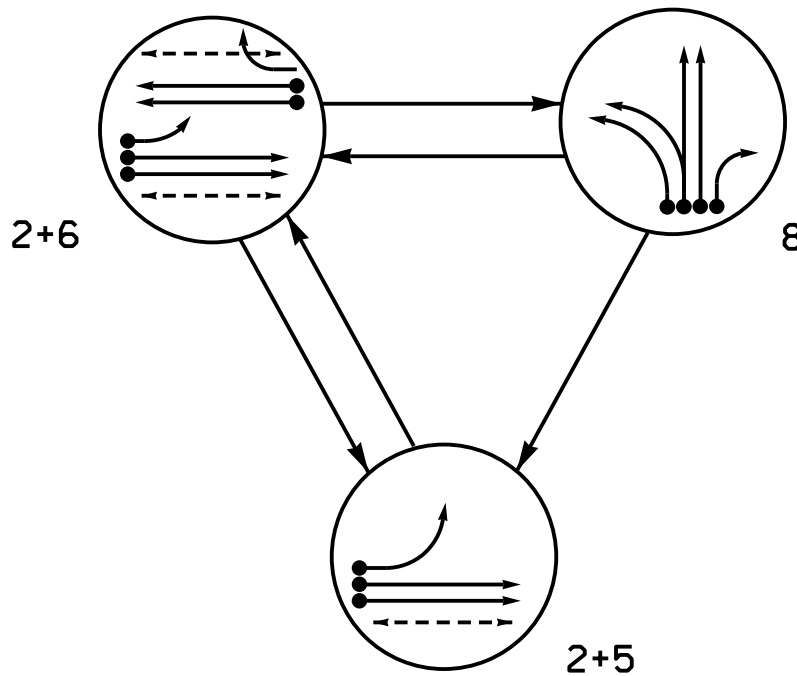
DocuSigned by:
James O. Deaton 8/10/2026

~~VERIFIED~~

DATE

SIG. INVENTORY NO. 13-007372

PHASING DIAGRAM



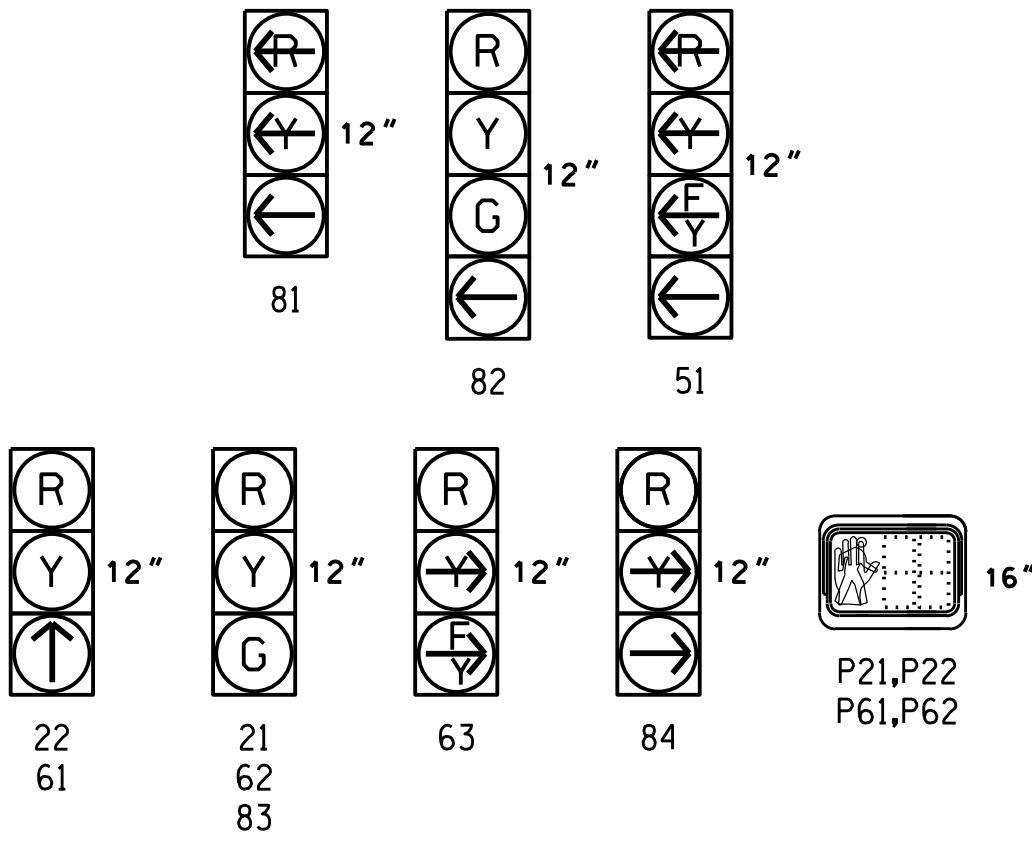
PHASING DIAGRAM DETECTION LEGEND

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

SIGNAL FACE	PHASE			
	2 + 6	2 + 5	8	FLSH
21	G	G	R	R
22	↑	↑	R	R
51	←	←	←	←
61	↑	R	R	R
62	G	R	R	R
63	←	R	R	R
81	←	←	←	←
82	R	R	G	R
83	R	R	G	R
84	R	R	←	R
P21,P22	W	W	DW	DRK
P61,P62	W	DW	DW	DRK

SIGNAL FACE I.D.

All Heads L.E.D.



MAXTIME DETECTOR INSTALLATION CHART											
DETECTOR						PROGRAMMING					
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	URNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	NEW CARD
2A *	6X6	70	*	*	2	-	-	X	-	X	*
2B *	6X6	70	*	*	2	-	-	X	-	X	*
5A *	6X40	0	*	*	5	15.0	-	X	-	X	*
6A	6X6	70	3	X	6	-	-	X	-	X	X
6B	6X6	70	3	X	6	-	-	X	-	X	X
8A	6X40	0	2-4-2	X	8	-	-	X	-	X	X
8B	6X40	0	2-4-2	X	8	-	-	X	-	X	X
8C	6X40	0	2-4-2	X	8	-	-	X	-	X	X
8D	6X40	0	2-4-2	X	8	15.0	-	X	-	X	X

* Multi-Zone Microwave Detection

2 Phase
Fully Actuated
D13-02 Asheville

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2024 and "Standard Specifications for Roads and Structures" dated January 2024.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Phase 1 and/or phase 5 may be lagged.
- Set all detector units to presence mode.
- Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
- Program pedestrian heads to countdown the flashing "Don't Walk" time only.
- To provide a leading pedestrain interval on phase 6, program FYA heads numbered 51 and 63 to delay for 7 seconds after the start of the phase 6 walk interval. See Electrical Details for programming.
- 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 Pavement Marking Plans for stop bar and crosswalk locations.

LEGEND

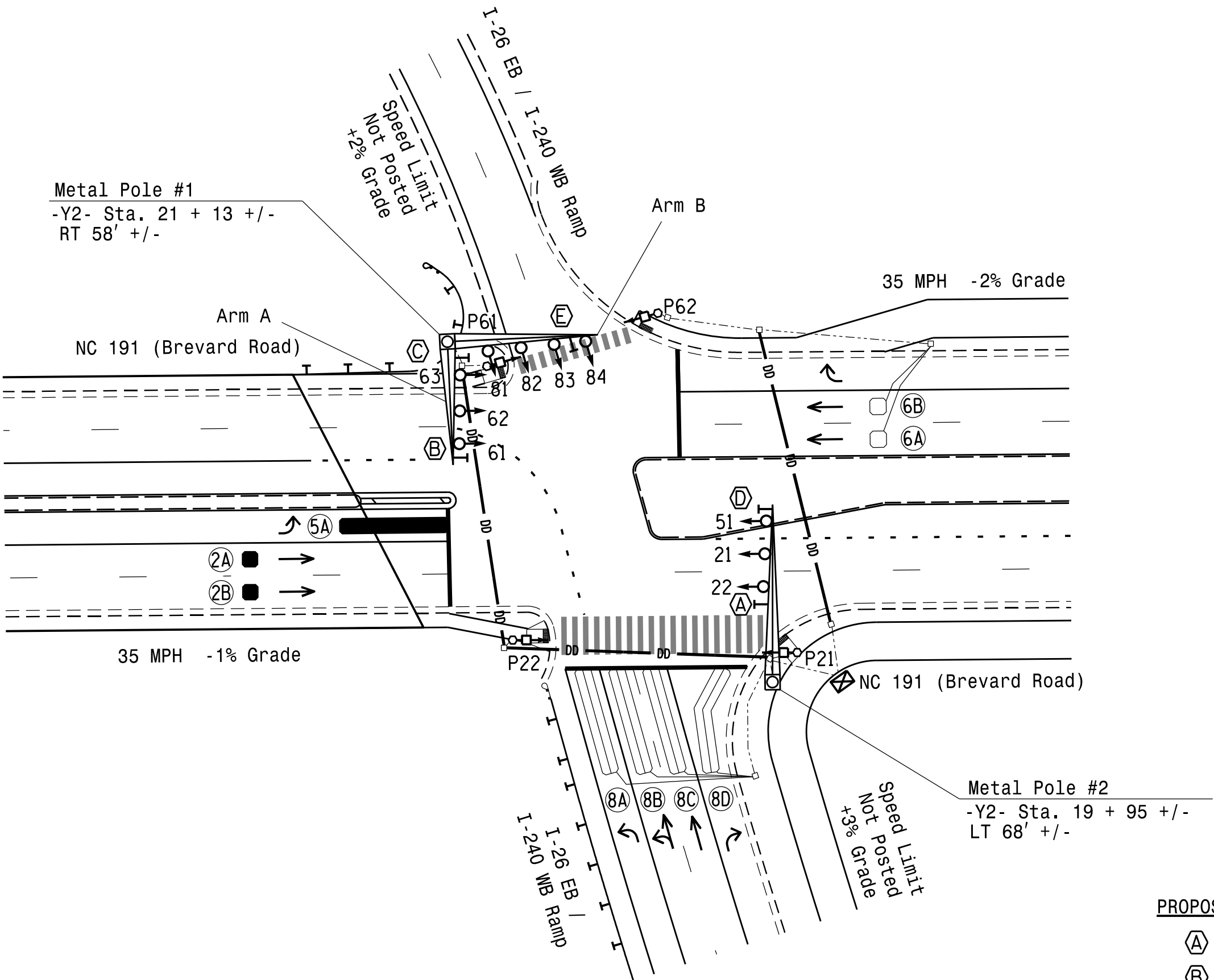
PROPOSED	EXISTING

SIGNS

PROPOSED	EXISTING

MAXTIME TIMING CHART				
FEATURE	PHASE			
	2	5	6	8
Walk *	7	-	14	-
Ped Clear	21	-	12	-
Min Green *	10	7	10	7
Passage *	3.0	2.0	3.0	2.0
Max I *	45	25	45	30
Yellow Change	4.0	3.0	4.0	3.0
Red Clear	1.7	2.6	1.7	3.5
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	-	-	-	-

* 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.
* See Note 6.



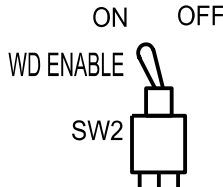
Signal Upgrade
Final Design (Phase IV Step 5)

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 750 N. Greenfield Pkwy, Garner, NC 27529 SCALE 0 40 1"=40'	NC 191 (Brevard Road) at I-26 EB / I-240 WB Ramps Division 13 Buncombe County Asheville PLAN DATE: May 2026 REVIEWED BY: C. Kalencik PREPARED BY: M. Tindal REVIEWED BY: REVISIONS INIT. DATE SIGNATURE DATE SIG. INVENTORY NO. I3-0073	DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED SEAL NORTH CAROLINA PROFESSIONAL SEAL 040715 ENGINEER COURTNEY L. KALENICK 8/7/2026
---	--	---

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 2-5, 2-6, 2-9, 2-11, 2-13, 2-15, 5-11, 5-13, 6-9, 6-11, 6-13, 6-15, 9-11, 9-13, 9-15, 11-13, 11-15 AND 13-15.



REMOVE JUMPERS AS SHOWN

- ON →
-
- RF 2010
RP DISABLE
WD 1.0 SEC
GY ENABLE
SF#1 POLARITY
RF SSM
FYA COMPACT
FYA 1-9
FYA 3-10
FYA 5-11
FYA 7-12
- OPTIONS
FYA
- ON →
-
- 1
2
3
4
5
6
7
8
- SSM
- ON →
-
- 9
10
11
12
13
14
15
16
17
18
- SSM
- = DENOTES POSITION OF SWITCH

(wire signal head as shown)



Front Panel
Main Menu >Controller >Unit

Web Interface
Home > Controller > Unit

Modify parameters as shown below and save changes.

Unit Flash Parameters	
All Red Flash Exit Time	6

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 phase 6 Green No Walk.
3. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
4. The cabinet and controller are part of the D13-02 Asheville System.

Controller.....	2070LX
Cabinet.....	332 w/ Aux
Software.....	Q-Free MAXTIME
Cabinet Mount.....	Base
Output File Positions.....	18 With Aux. Output File
Load Switches Used.....	S2, S3, S7, S8, S9, S11, AUX S1, AUX S4
Phases Used.....	2, 2PED, 5, 6, 6PED, 8
Overlap "1".....	*
Overlap "2".....	NOT USED
Overlap "3".....	*
Overlap "4".....	NOT USED

*See overlap programming detail on Sheet 2.

(install resistor as shown)

Phase 5 Yellow Field
Terminal (132)



AC-

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.

Final (Phase IV Step 5)
Electrical Detail - Sheet 1 of 2

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 13-0073
DESIGNED: May 2026
SEALED: 08/07/2026
REVISED: N/A

Electrical and Programming Details For:

NC 191 (Brevard Road)
at
I-26 EB / I-240 WB Ramps

Division 13 Buncombe County Asheville

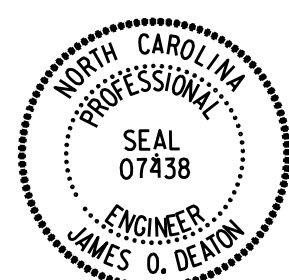
PLAN DATE: May 2026	REVIEWED BY: J O Deaton
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REVISIONS	INIT.	DATE
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SEAL



DocuSigned by

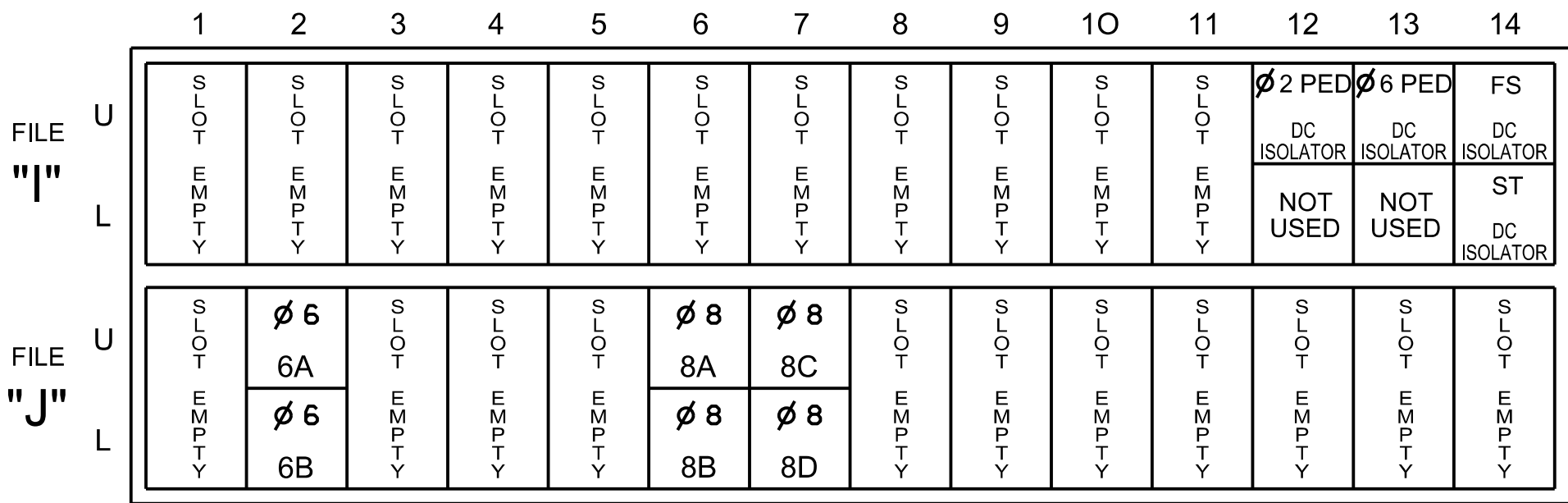
8/10/2026

DAT

SIG. INVENTORY NO. 13-0073

INPUT FILE POSITION LAYOUT

(front view)



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

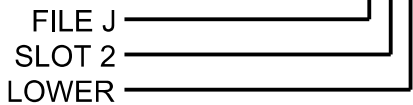
FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN
2A	-	-	-	*	38	2			X		X	
2B	-	-	-	*	39	2			X		X	
5A	-	-	-	*	35	5	15.0		X		X	
				-	127	2			X		X	
6A	TB3-5,6	J2U	40	2	16	6			X		X	
6B	TB3-7,8	J2L	44	6	17	6			X		X	
8A	TB5-9,10	J6U	42	4	22	8			X		X	
8B	TB5-11,12	J6L	46	8	23	8			X		X	
8C	TB7-1,2	J7U	66	32	24	8			X		X	
8D	TB7-3,4	J7L	79	45	25	8	15.0		X		X	
PED PUSH BUTTONS							NOTE: INSTALL DC ISOLATORS IN INPUT FILE SLOTS I12 AND I13.					
P21,P22	TB8-4,6	I12U	67	33	2	PED 2						
P61,P62	TB8-7,9	I13U	68	34	6	PED 6						

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

INPUT FILE POSITION LEGEND: J2L



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 MMU	Default

Advanced Cabinet Options

☒ Disable TS2 Cabinet Alarms

SPECIAL DETECTOR NOTE

For Zone 2A, 2B and 5A install a multizone microwave detection system for vehicle detection.

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

OVERLAP PROGRAMMING

Front Panel

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

Web Interface

Home >Controller >Overlap Configuration >Overlaps

Overlap Plan 1

Overlap	1	2	3	4
Type	FYA 4 - Section	Off	FYA 4 - Section	Off
Included Phases	6	-	6	-
Modifier Phases	-	-	5	-
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	7.0	0.0	7.0	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

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
3	Veh Detector Call	127	Is Module A Input B ON	Number	2	Number	3	0.0	0.0

LOGIC STATEMENT DESCRIPTION

Statement 2 Description: Mirrors vehicle detector 35 to vehicle detector 127

SDLC NON-INTRUSIVE DETECTION CHART

DETECTOR RACK #3		
Input Point	Det # (Index)	Detector Zone
1	33	NU
2	34	NU
3	35	5A
4	36	NU
5	37	NU
6	38	2A
7	39	2B
8	40	NU
9	41	NU
10	42	NU
11	43	NU
12	44	NU
13	45	NU
14	46	NU
15	47	NU
16	48	NU

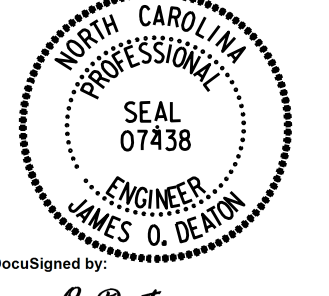
NU = Not Used

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 13-0073
DESIGNED: May 2026
SEALED: 08/07/2026
REVISED: N/A

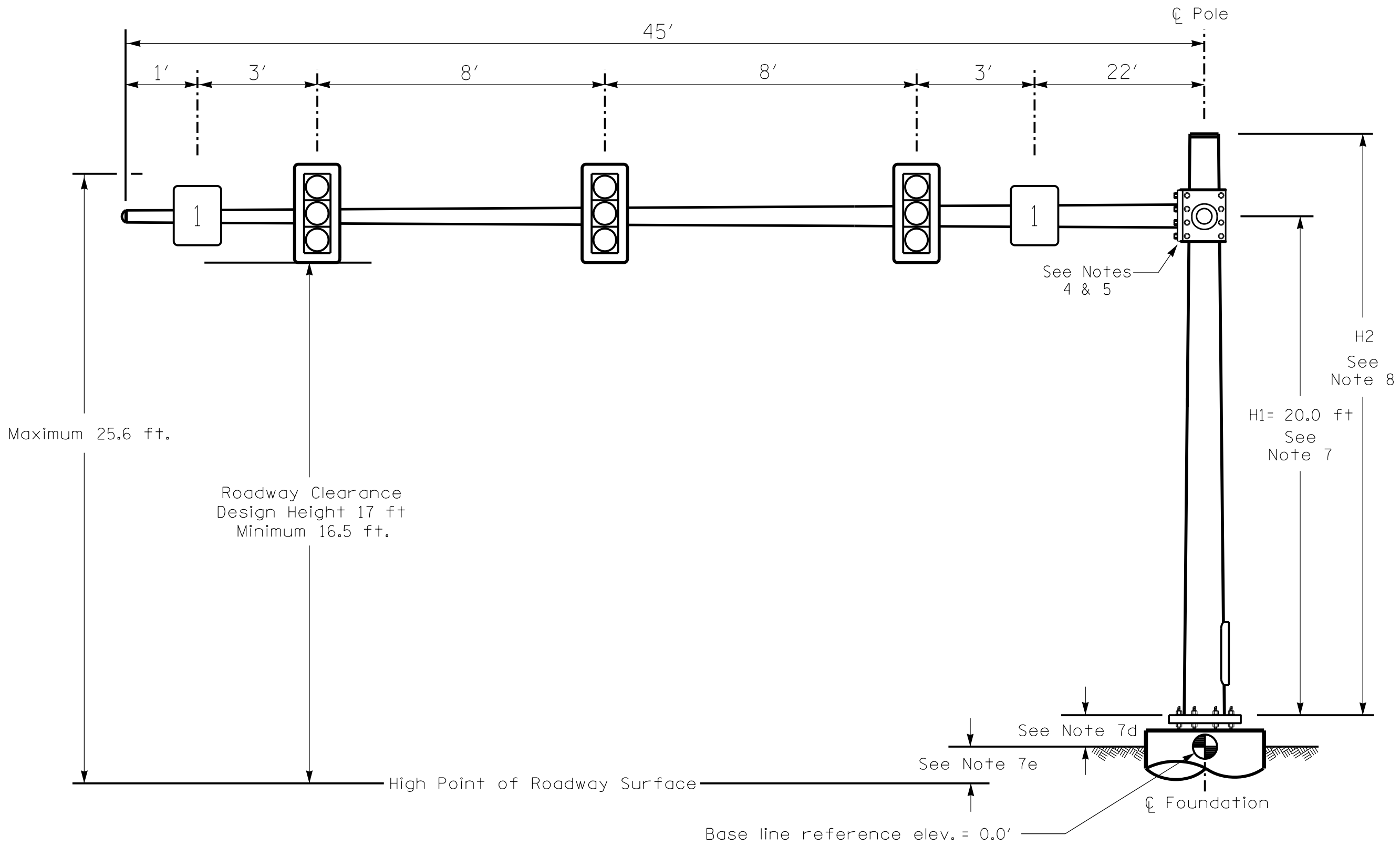
AECOM
NC Firm License No.: F-0342
5438 Wade Park Boulevard
Suite 200, Raleigh, NC 27607
Phone: 919-461-1100

Final (Phase IV Step 5)

Electrical Detail - Sheet 2 of 2

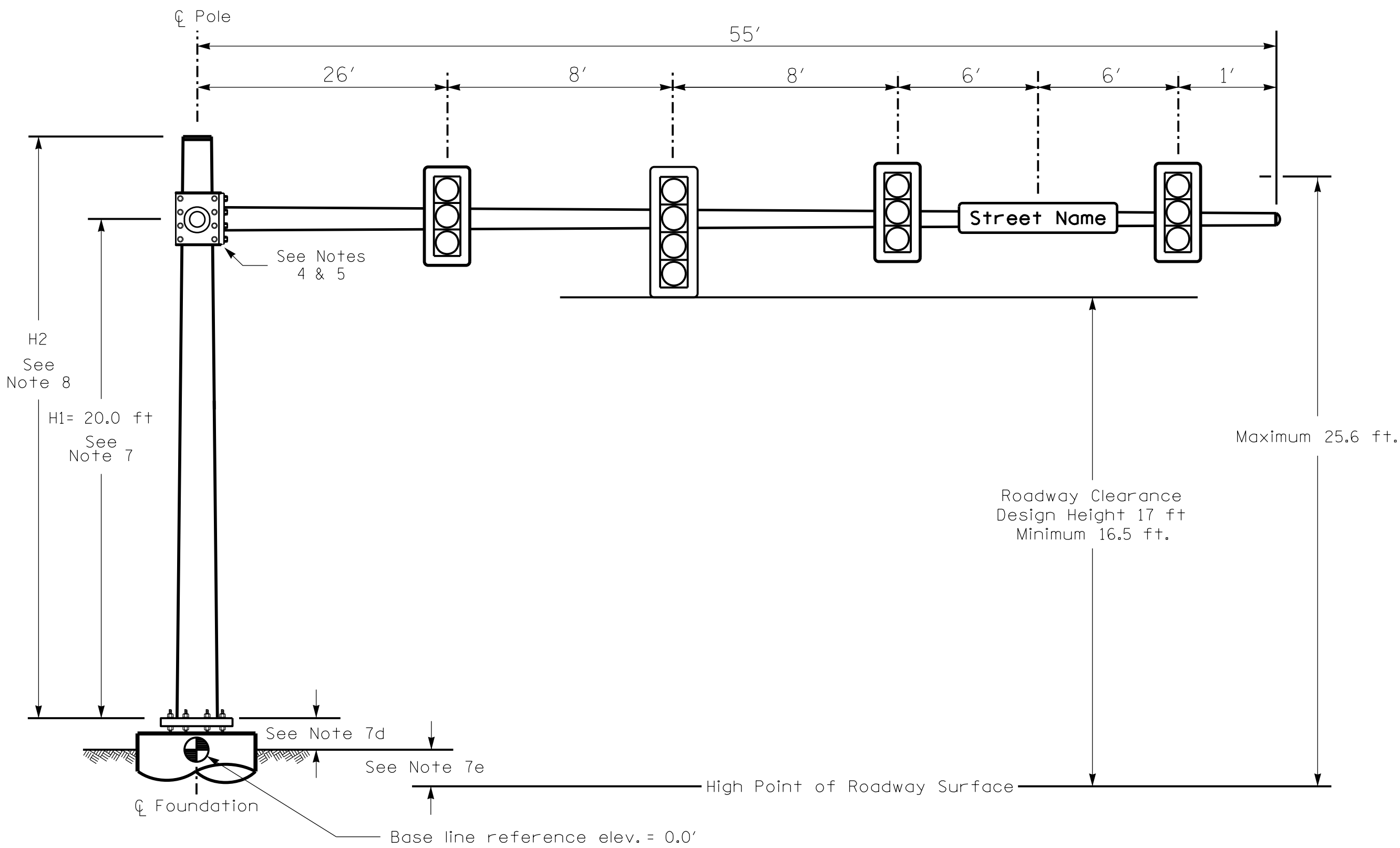
Electrical and Programming Details For:	NC 191 (Brevard Road) at I-26 EB / I-240 WB Ramps	DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
Prepared for the Offices of:	Division 13 Buncombe County Asheville	SEAL
	PLAN DATE: May 2026 REVIEWED BY: J O Deaton	
	PREPARED BY: M W Yalch REVIEWED BY:	DocuSigned by: James O. Deaton 8/10/2026
	REVISIONS	INT. DATE
750 N. Greenfield Pkwy, Garner, NC 27529		SIG. INVENTORY NO. 13-0073

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



Elevation View @ 270°

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



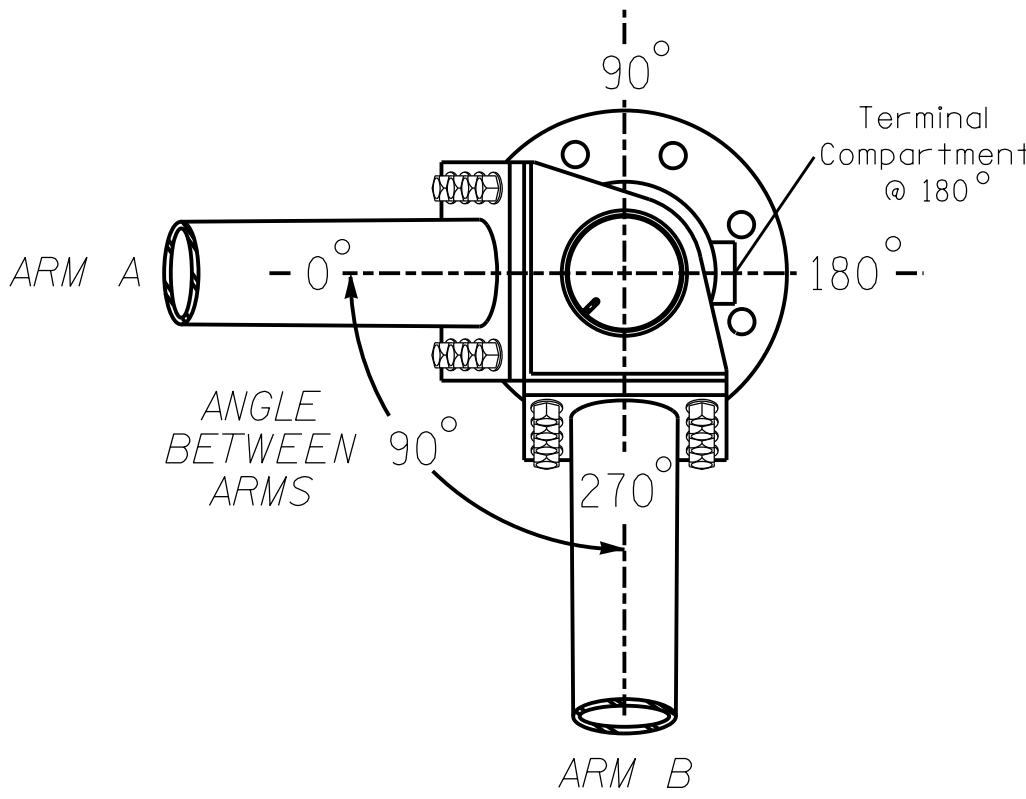
Elevation View @ 0°

SPECIAL NOTE

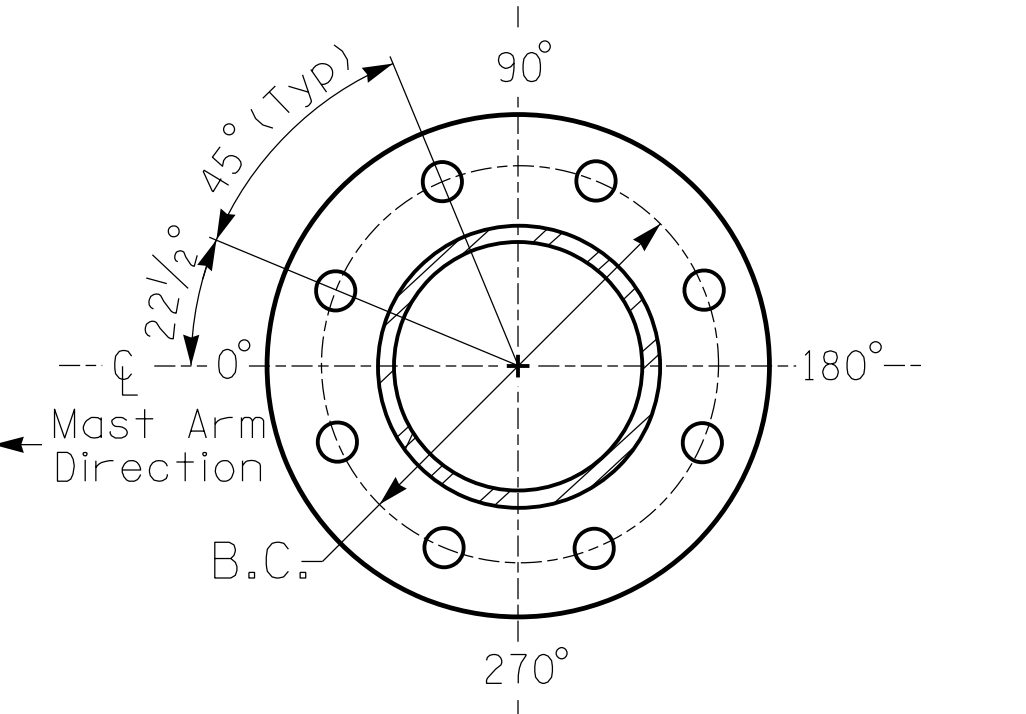
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 1
Baseline reference point at ⌀ Foundation @ ground level	0.0 ft.
Elevation difference at High point of roadway surface	+1.00 ft.
Elevation difference at Edge of travelway or face of curb	+0.48 ft.

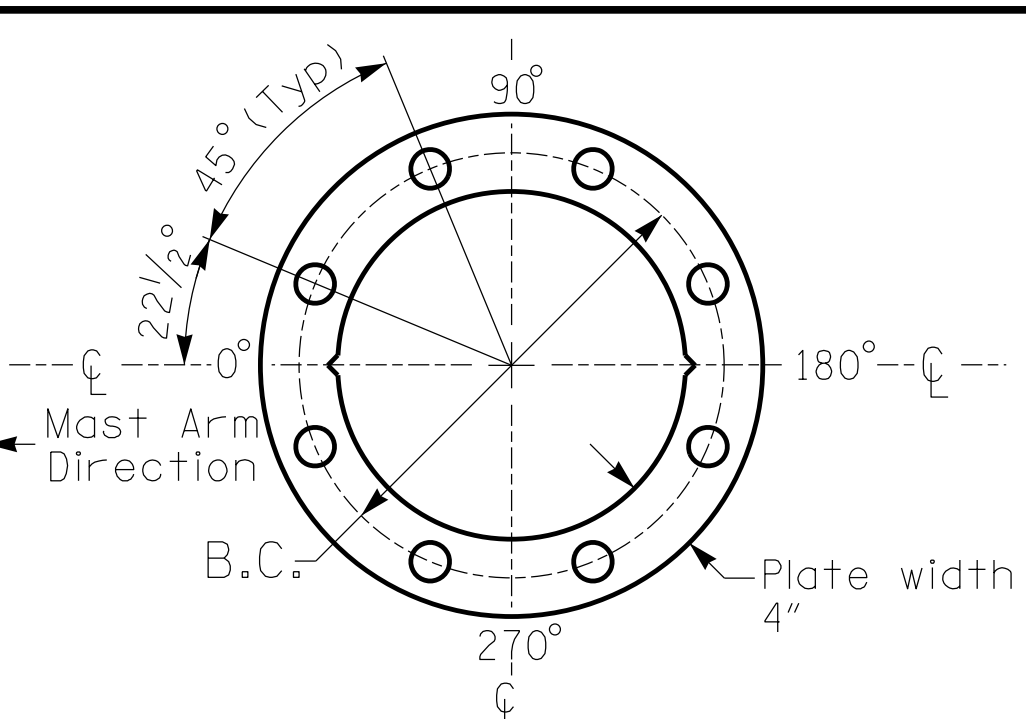


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



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

METAL POLE No. 1

PROJECT REFERENCE NO.	SHEET NO.
I-2513AC	Sig. 9.3

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
	RIGID MOUNTED SIGNAL HEAD 12"-4 SECTION-WITH BACKPLATE	11.5 S.F.	25.5"W X 66.0"L	74 LBS
	SIGN RIGID MOUNTED	9.0 S.F.	36.0"W X 36.0"L	17 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

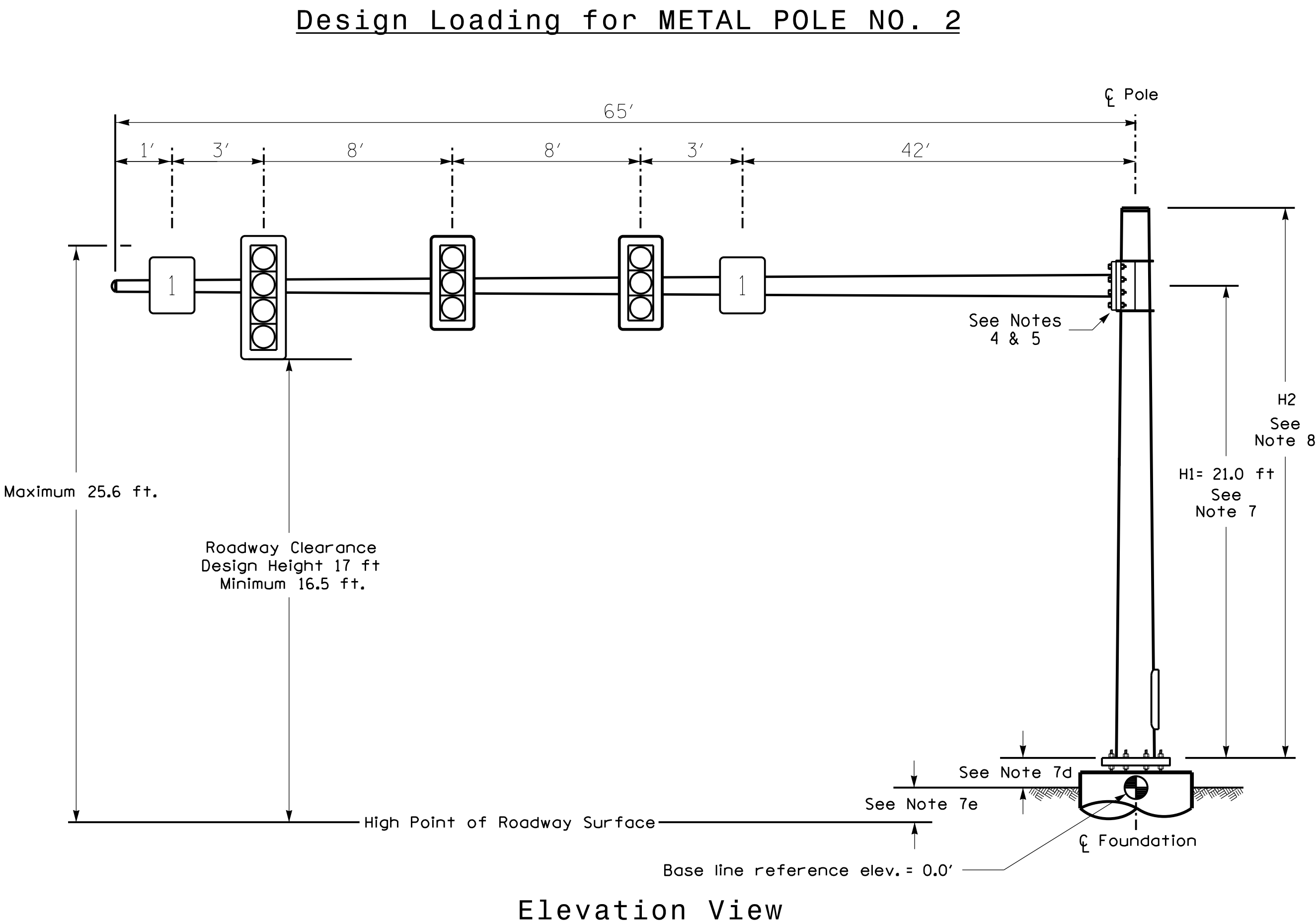
- Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the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

All metal poles and arms should be 27038 in color as specified in the project special provisions.

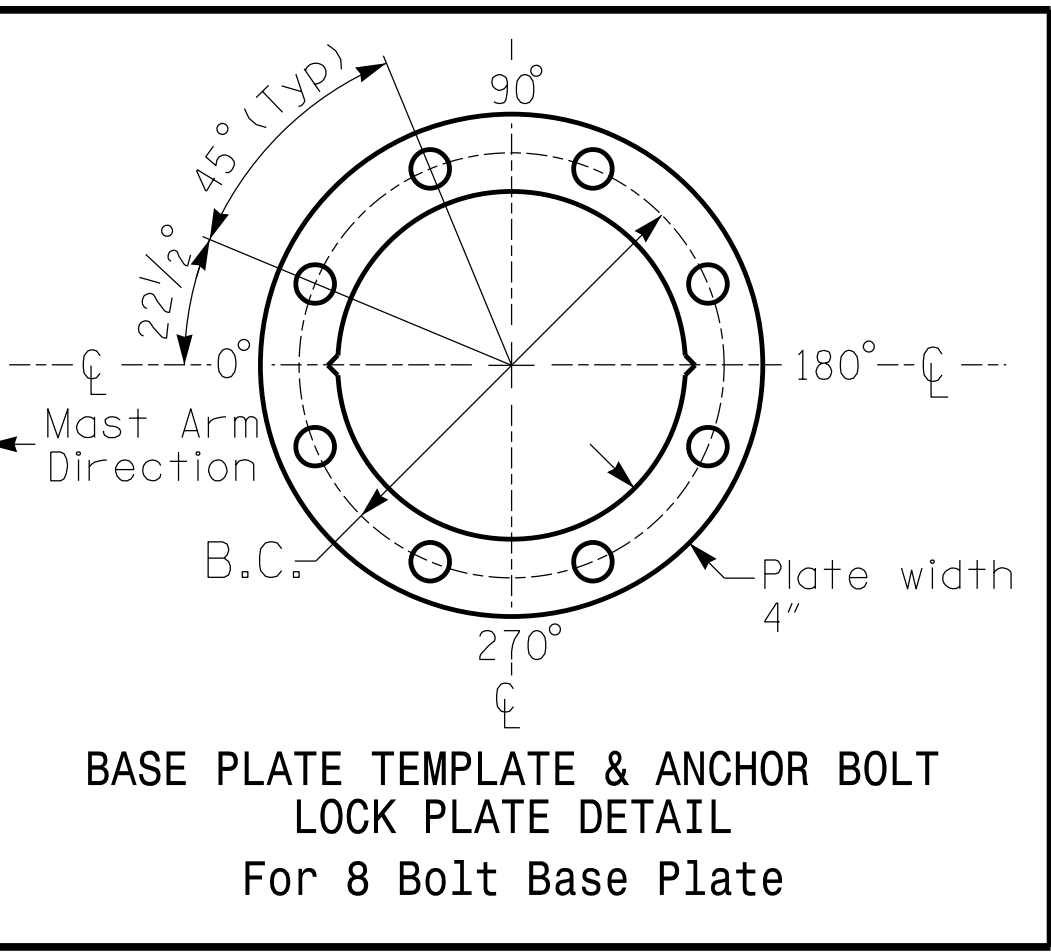
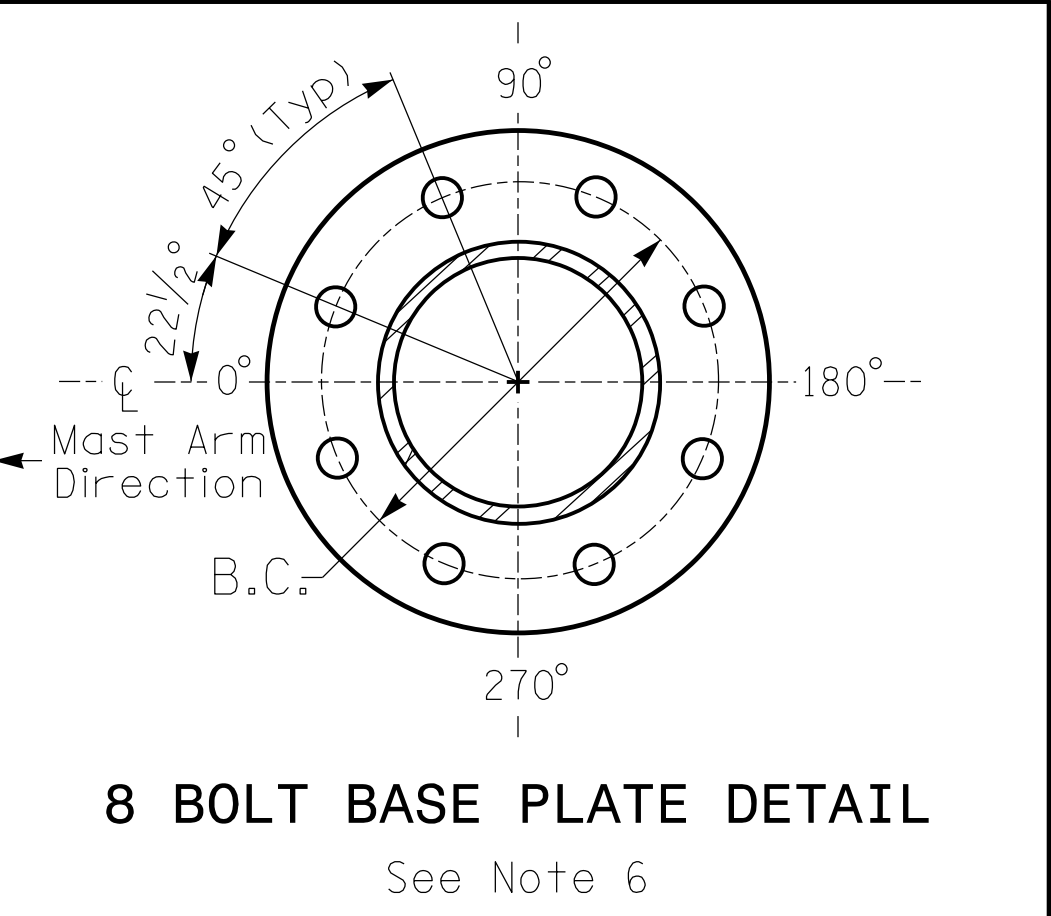
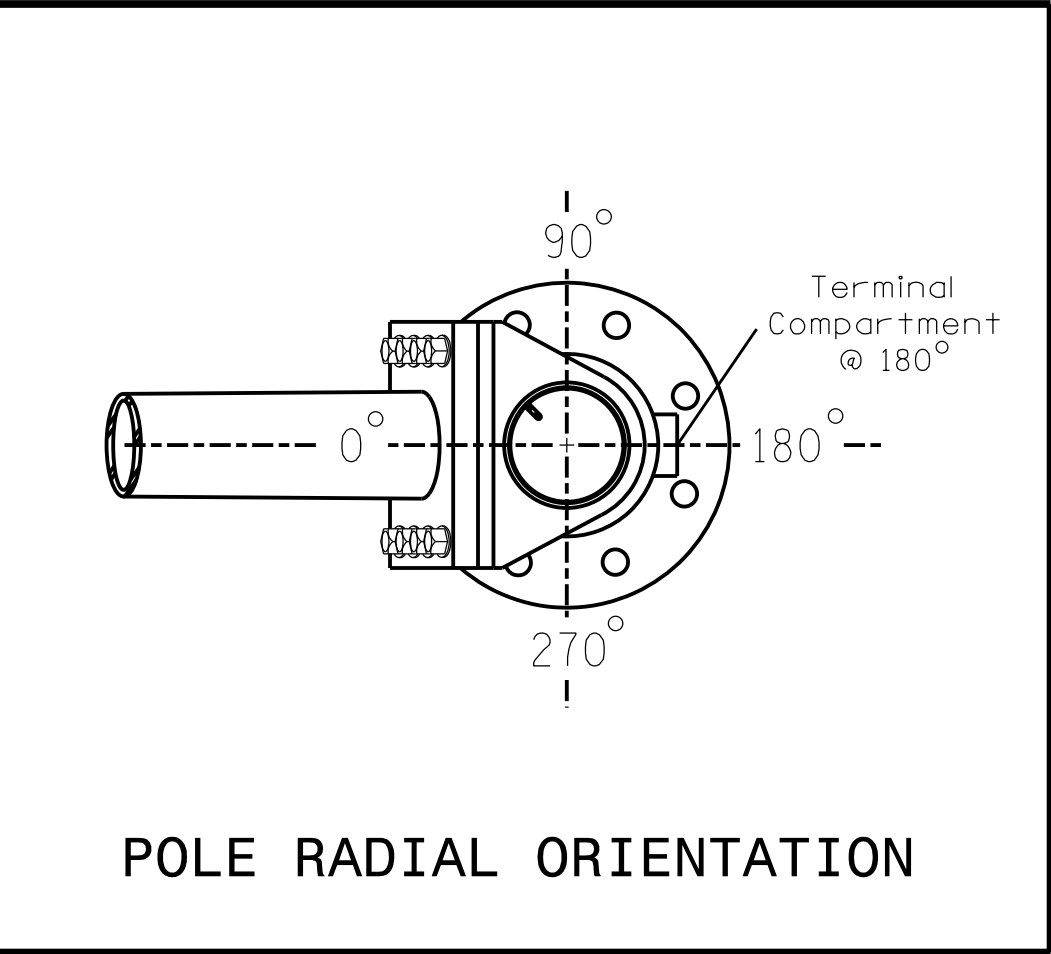
NCDOT Wind Zone 5 (110 mph)

 Prepared for the Offices of: TRANSPORTATION, MOBILITY AND SAFETY DEPARTMENT OF TRANSPORTATION SIGNAL DESIGN SECTION 750 N. Greenfield Place, Garner, NC 27529	NC 191 (Brevard Road) at I-26 EB / I-240 WB Ramps		DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	
	Division 13	Buncombe County	Asheville	SEAL NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 040715 COURTNEY L. KALENICK
PLAN DATE: November 2025	REVIEWED BY: C. Kalenick	PREPARED BY: M. Tindal	REVIEWED BY:	DocuSigned by: Courtney L. Kalenick 8/7/2026
SCALE 0 N/A N/A		REVISIONS		DATE
				SIG. INVENTORY NO. I3-0073

7/1/2025
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SPECIAL NOTE	
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.	
Elevation Data for Mast Arm Attachment (H1)	
Elevation Differences for:	Pole 2
Baseline reference point at ℄ Foundation @ ground level	0.0 ft.
Elevation difference at High point of roadway surface	+2.47 ft.
Elevation difference at Edge of travelway or face of curb	+3.46 ft



METAL POLE No. 2

PROJECT REFERENCE NO.	SHEET NO.
I-2513AC	Sig. 9.4

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
	RIGID MOUNTED SIGNAL HEAD 12"-4 SECTION-WITH BACKPLATE	11.5 S.F.	25.5"W X 66.0"L	74 LBS
	SIGN RIGID MOUNTED	9.0 S.F.	36.0"W X 36.0"L	17 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.
- The camber design for the mast arm deflection should provide an appearance of a low pitched arch where the tip or the free end of the mast arm does not deflect below horizontal when fully loaded.
- A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements.
- Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
- The mast arm attachment height (H1) shown is based on the following design assumptions:
 - Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
 - Signal heads are rigidly mounted and vertically centered on the mast arm.
 - The roadway clearance height for design is as shown in the elevation views.
 - The top of the pole base plate is 0.75 feet above the ground elevation.
 - Refer to the Elevation Data Chart for the elevation differences between the proposed foundation ground level and the high point of the roadway.
- The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
 - Mast arm attachment height (H1) plus 2 feet, or
 - H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
- If pole location adjustments are required, the contractor must gain approval from the Engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signal Design Section Senior Structural Engineer for assistance at (919) 814-5000.
- The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
- The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

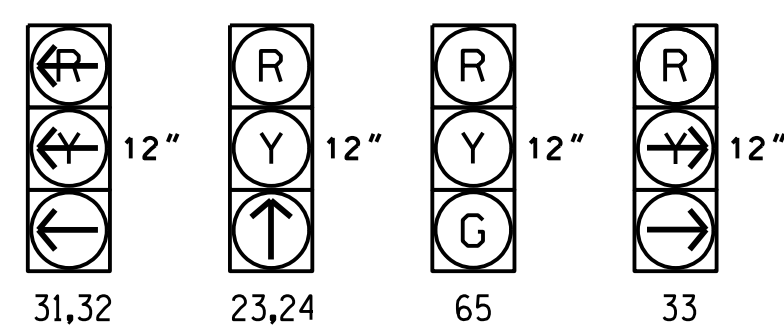
All metal poles and arms should be 27038 in color as specified in the project special provisions.

NCDOT Wind Zone 5 (110 mph)

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	
Prepared For the Offices of: 750 N. Greenfield Place, Corner, NC 27529	
NC 191 (Brevard Road) at I-26 EB / I-240 WB Ramps	
Division 13 Buncombe County Asheville	
PLAN DATE: November 2025 PREPARED BY: W. Tindal REVIEWED BY: C. Kalencik	
REVISIONS	
INIT. DATE	
SIG. INVENTORY NO. I3-0073	

	DETECTED MOVEMENT
	UNDETECTED MOVEMENT (OVERLAP)
	UNSIGNALIZED MOVEMENT
	PEDESTRIAN MOVEMENT

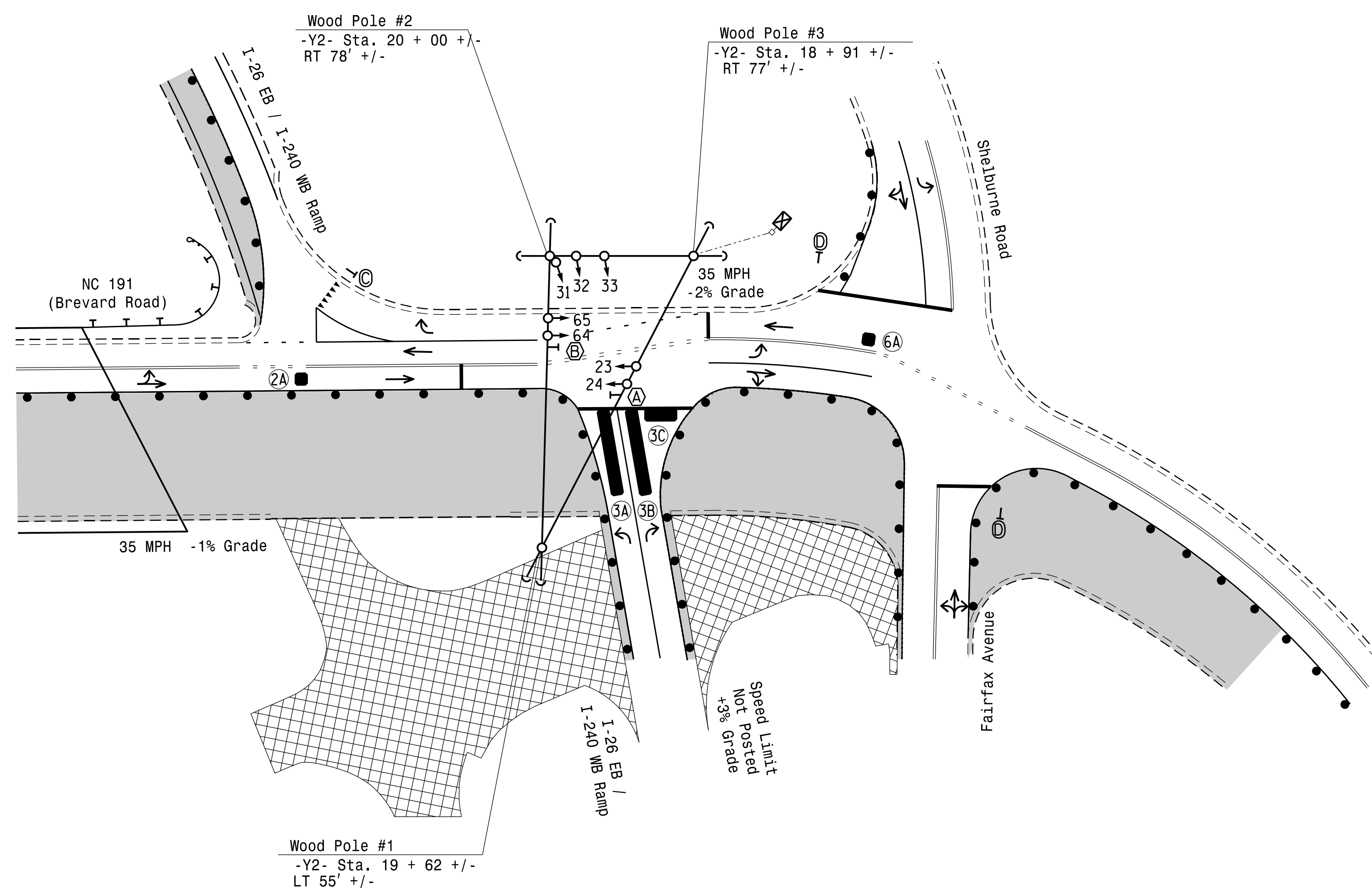
All Heads L.E.D.



DETECTOR					PROGRAMMING						
ZONE	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN
2A *	6X6	70	*	*	2	-	-	X	-	X	-
3A *	6X40	0	*	*	3	-	-	X	-	X	-
3B *	6X40	0	*	*	3	15.0	-	X	-	X	-
3C *	15X6	0	*	*	3	15.0	-	X	-	X	-
6A *	6X6	70	*	*	6	-	-	X	-	X	-

* Video Detection Zone

SIGNAL FACE	PHASE		
	2 + 6	3	F L A S H
23,24	↑	R	R
64	↑	R	R
65	G	R	R
31,32	→	→	→
33	R	→	R



MAXTIME TIMING CHART			
FEATURE	PHASE		
	2	3	6
Walk *	—	—	—
Ped Clear *	—	—	—
Min Green *	10	7	10
Passage *	3.0	2.0	3.0
Max 1 *	45	30	45
Yellow Change	4.0	3.7	4.0
Red Clear	1.6	1.0	1.6
Added Initial *	—	—	—
Maximum Initial *	—	—	—
Time Before Reduction *	—	—	—
Time To Reduce *	—	—	—
Minimum Gap	—	—	—
Advance Walk	—	—	—
Non Lock Detector	—	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.

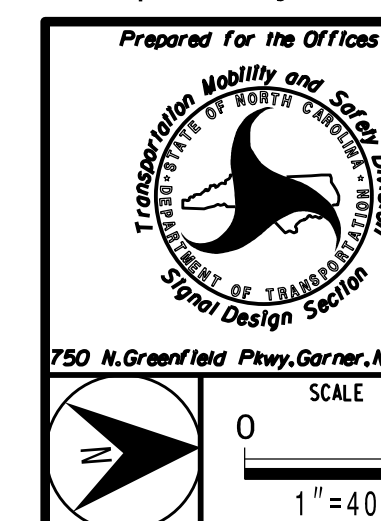
1. Refer to "Roadway Standard Drawings NCDOT" dated January 2024 and "Standard Specifications for Roads and Structures" dated January 2024.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Set all detector units to presence mode.
4. This intersection uses video detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.
5. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
6. See Transportation Management Plans for stop bar locations.

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
-----	2-in Underground Conduit	-----
N/A	Right of Way	-----
	Directional Arrow	
N/A	Guardrail	
	Non-Intrusive Detection Zone	
	Construction Zone	
	Pavement Removal Zone	
	Construction Zone Drums	
	No Right Turn Sign (R3-1)	
	No Left Turn Sign (R3-2)	
	"YIELD" Sign (R2-1)	
	"STOP" Sign (R1-1)	

New Installation
Temporary Design 1 (TMP Phase I Step 6)



NC Firm License No.: F-0342
5438 Wade Park Boulevard
Suite 200 Raleigh, NC 27607
Phone: 919-461-1100



NC 191 (Brevard Road)
at
I-26 EB / I-240 WB Ramps

Division 13 Buncombe County Asheville

PLAN DATE:	May 2026
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529 PREPARED BY: M. Tinda

	REVISIONS
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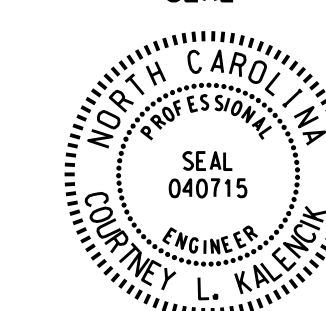
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DOCUMENT NOT CONSIDERED
FINAL UNLESS ALL
SIGNATURES COMPLETED

SEARCH



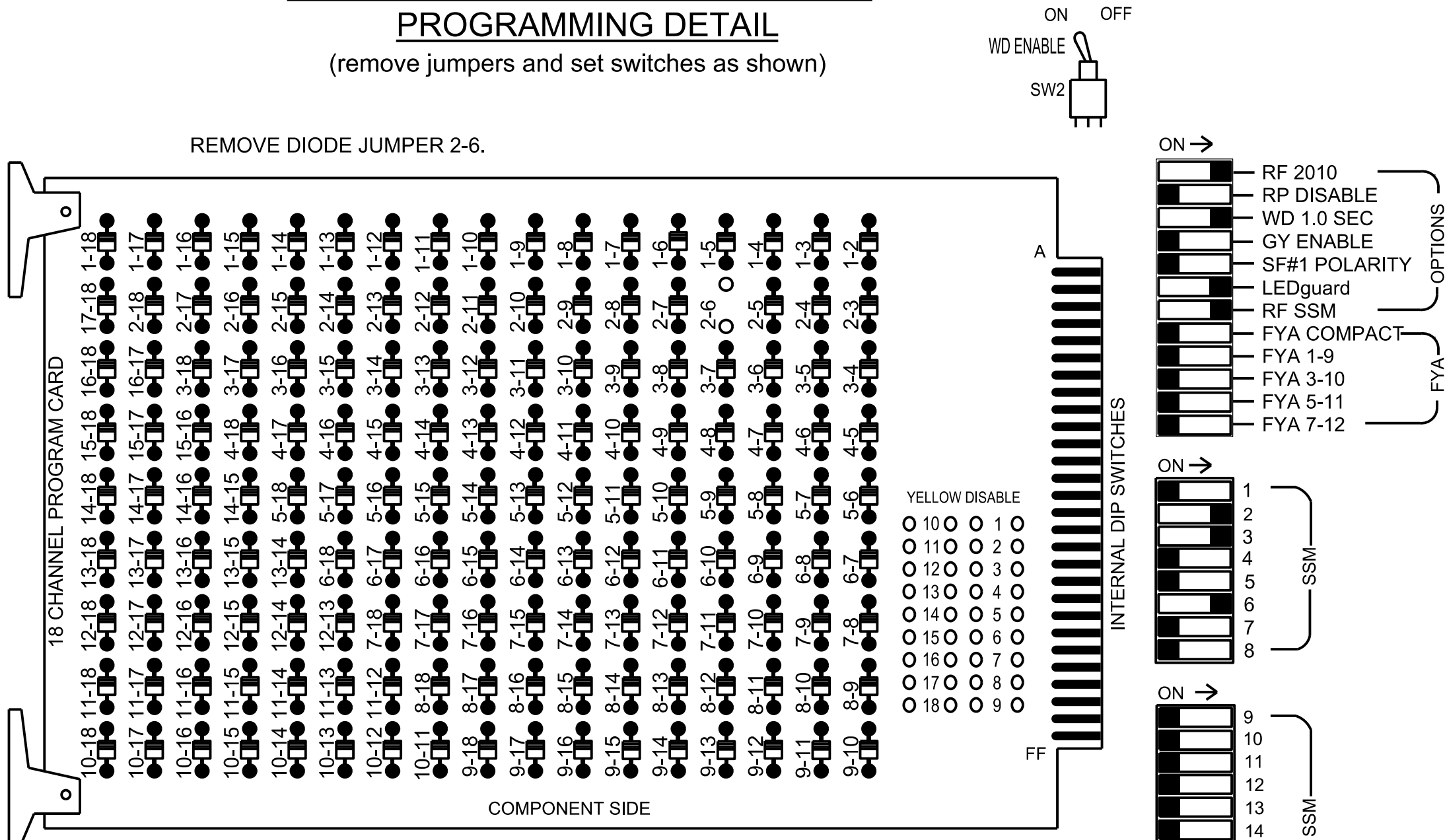
DocuSigned by:
Courtney L. Kalencik 8/7/20

SIGNATURE

SIG. INVENTORY NO.	13-1
--------------------	------

18 CHANNEL IP CONFLICT MONITOR
PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



NOTES:

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

NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all 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 phase 6 Green No Walk.
- If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
- The cabinet and controller are part of the D13-02 Asheville System.

EQUIPMENT INFORMATION

Controller.....2070LX
Cabinet.....332 w/ Aux
Software.....Q-Free MAXTIME
Cabinet Mount.....Base
Output File Positions.....18 With Aux. Output File
Load Switches Used.....S2, S4, S8
Phases Used.....2, 3, 6
Overlaps.....Not Used

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	NU	23,24	NU	31,32	33	NU	NU	64	65	NU	NU	NU	NU	NU	NU	NU	NU	NU
RED		128			116				134	134								
YELLOW		129							135	135								
GREEN									136									
RED ARROW				116														
YELLOW ARROW				117	117													
GREEN ARROW		130		118	118				136									

NU = Not Used

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

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	3A	50	3B
3	35	NU	51	3C
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	NU	60	NU
13	45	NU	61	NU
14	46	NU	62	NU
15	47	NU	63	NU

SPECIAL DETECTOR NOTE

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

INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	S	S	S	S	S	S	S	S	S	S	S	S	S	FS
	L	T	T	T	T	T	T	T	T	T	T	T	T	T	DC ISOLATOR
FILE "J"	U	S	S	S	S	S	S	S	S	S	S	S	S	S	FS
	L	T	T	T	T	T	T	T	T	T	T	T	T	T	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
2A	-	-	-	*	38	2			X		X	
3A	-	-	-	*	34	3			X		X	
3B	-	-	-	*	50	3	15.0		X		X	
3C	-	-	-	*	51	3	15.0		X		X	
6A	-	-	-	*	54	6			X		X	

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

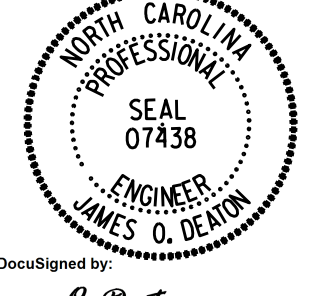
INPUT FILE POSITION LEGEND: J2L

FILE J
SLOT 2
LOWER

AECOM

NC Firm License No.: F-0342
5438 Wade Park Boulevard
Suite 200, Raleigh, NC 27607
Phone: 919-461-1100

Temporary Design 1 (TMP Phase I Step 6)
Electrical Detail - Sheet 1 of 2

Electrical and Programming Details For	NC 191 (Brevard Road) at I-26 EB / I-240 WB Ramps	SEAL
Prepared for the Offices of: 	Division 13 Buncombe County Asheville	
PLAN DATE: May 2026	REVIEWED BY: J O Deaton	DocuSigned by: James O. Deaton 8/10/2026
PREPARED BY: M W Yalch	REVIEWED BY:	DATE
REVISIONS	INIT.	DATE
750 N. Greenfield Pkwy, Garner, NC 27529		SIG. INVENTORY NO. 13-1337T1

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

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

SEQUENCE DETAIL

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

Web Interface
Home >Controller >Sequence

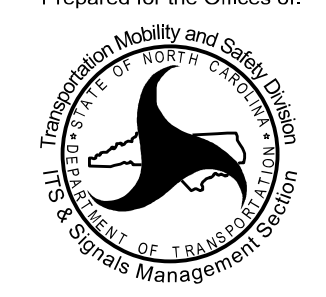
Sequence 1

Ring	Sequence Data
1	2,a,3,b
2	6,a,b

Temporary Design 3 (TMP Phase I Step 6)
Electrical Detail - Sheet 2 of 2

DOCUMENT NOT CONSIDERED
FINAL UNLESS ALL
SIGNATURES COMPLETED

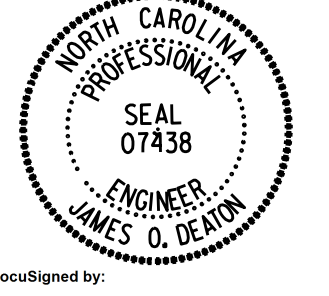
Electrical and Programming
Details For:

Prepared for the Offices of:

750 N. Greenfield Pkwy, Garner, NC 27529

NC 191 (Brevard Road)
at
I-26 EB / I-240 WB Ramps

Division 13 Buncombe County Asheville

PLAN DATE:	May 2026	REVIEWED BY:	J O Deaton
PREPARED BY:	M W Yalch	REVIEWED BY:	
REVISIONS	INIT.	DATE	

SEAL

ENGINEER
JAMES O. DEATON

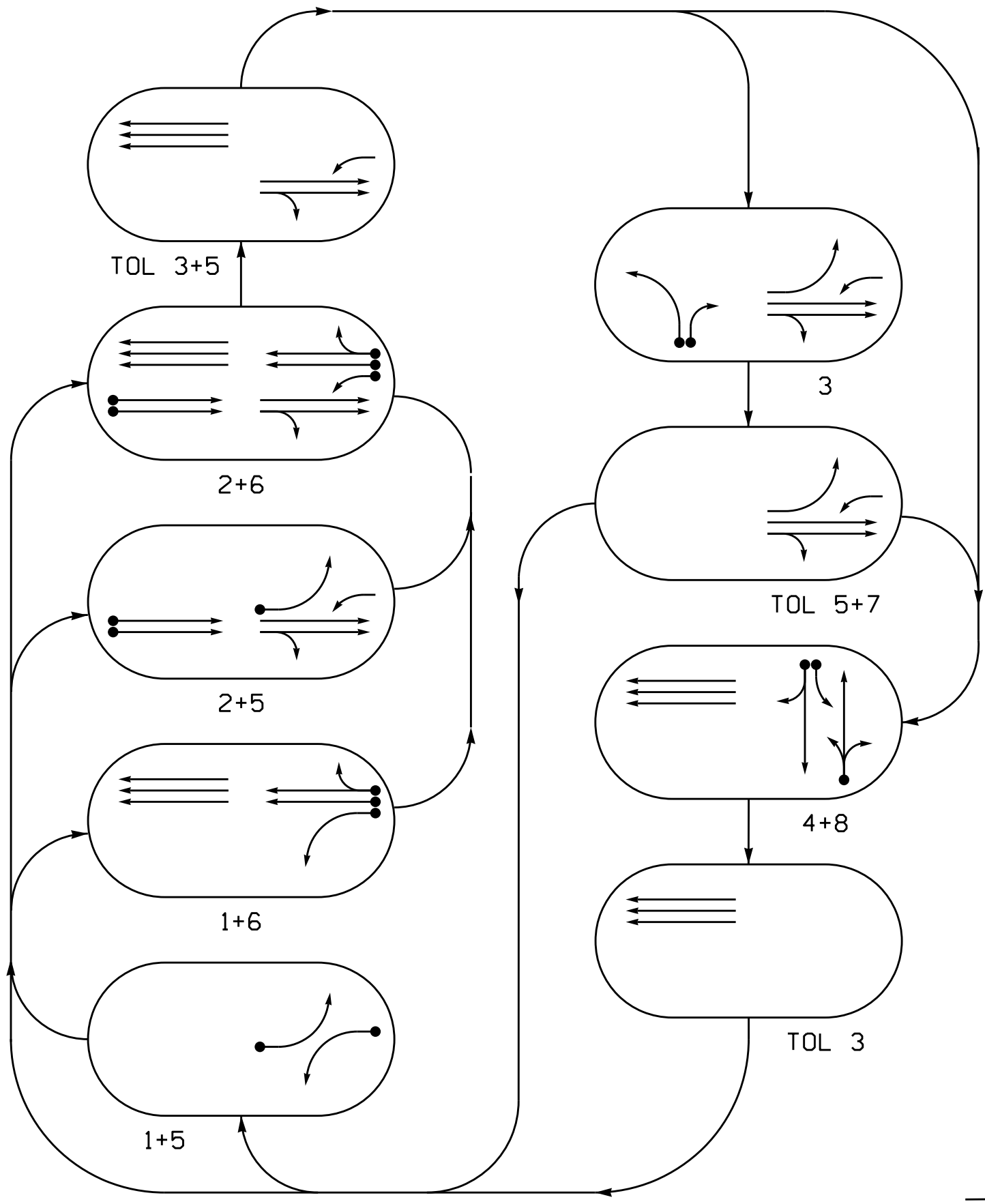
DocuSigned by:
James O. Deaton 8/10/2026

DATE
SIG. INVENTORY NO. 13-1337T1

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 13-1337T1
DESIGNED: May 2026
SEALED: 08/07/2026
REVISED: N/A

AECOM
NC Firm License No.: F-0342
5438 Wade Park Boulevard
Suite 200, Raleigh, NC 27607
Phone: 919-461-1100

PHASING DIAGRAM



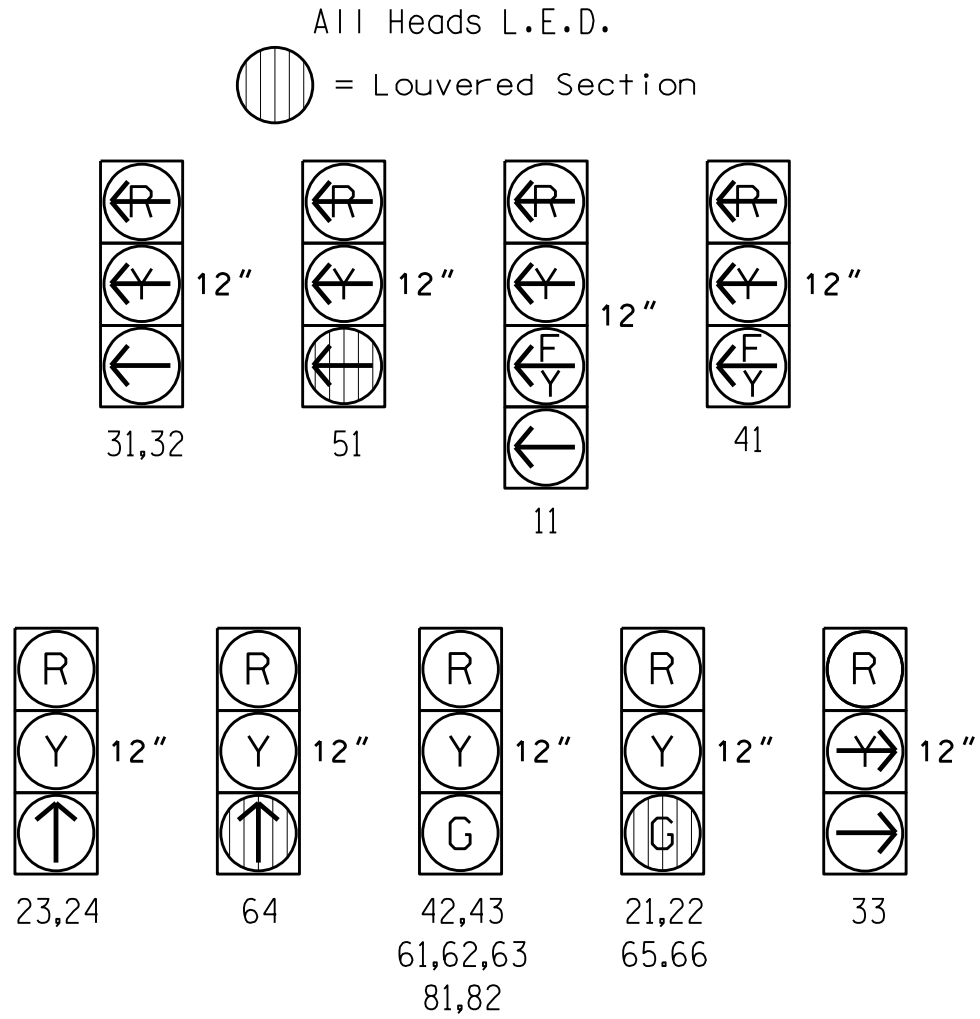
PHASING DIAGRAM DETECTION LEGEND

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

TABLE OF OPERATION

SIGNAL FACE	PHASE									
	1 + 5	1 + 6	2 + 5	2 + 6	3	4 + 8	TOL 3	TOL 5	TOL 7	FLASH
11	←	←	←	←	←	←	←	←	←	←
21,22	R	R	G	G	R	R	G	G	R	
23,24	R	R	↑	↑	R	R	R	R	R	
31,32	←	←	←	←	←	←	←	←	←	
33	R	R	R	R	→	R	R	R	R	
41	←	←	←	←	←	←	←	←	←	
42,43	R	R	R	R	G	R	R	R	R	
51	←	←	←	←	←	←	←	←	←	
61,62,63	R	G	R	G	R	R	R	R	R	
64	R	↑	R	↑	R	↑	R	↑	R	
65,66	R	G	R	G	R	G	R	G	R	
81,82	R	R	R	R	R	G	R	R	R	

SIGNAL FACE I.D.



MAXTIME DETECTOR INSTALLATION CHART

DETECTOR					PROGRAMMING						
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	INITIAL	ADDED CALL	NEW CARD
1A	6X40	0	2-4-2	X	1	15.0	-	X	-	X	-
2A	6X6	70	*	*	2	-	-	X	-	X	-
2B	6X6	70	*	*	2	-	-	X	-	X	-
3A	6X40	0	*	*	3	-	-	X	-	X	-
3B	6X40	0	*	*	3	15.0	-	X	-	X	-
4A	6X40	0	2-4-2	X	4	3.0	-	X	-	X	-
4B	6X40	0	2-4-2	X	4	10.0	-	X	-	X	-
4C	6X15	0	2	X	4	15.0	-	X	-	X	-
5A	6X40	0	2-4-2	X	5	-	-	X	-	X	-
6A	6X6	70	3	X	6	-	-	X	-	X	-
6B	6X6	70	3	X	6	-	-	X	-	X	-
8A	6X40	0	2-4-2	X	8	10.0	-	X	-	X	-

* Video Detection Zone

6 Phase
Fully Actuated
D13-02 Asheville

NOTES

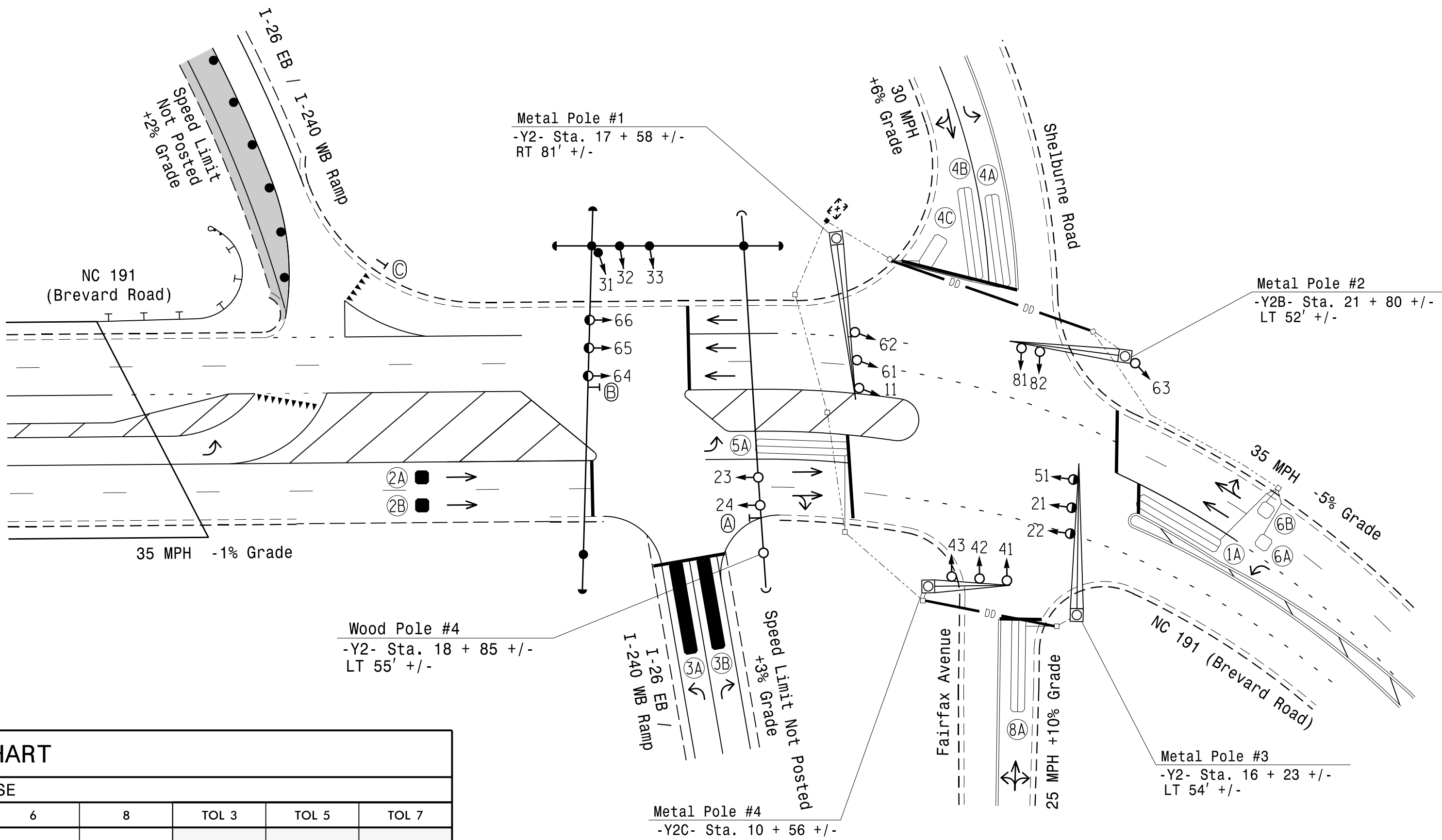
- Refer to "Roadway Standard Drawings NCDOT" dated January 2024 and "Standard Specifications for Roads and Structures" dated January 2024.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer. Reposition existing signal heads numbered 64 and 65 and Sign "B."
- Relocate Sign "A" to new span.
- Set all detector units to presence mode.
- Phase 3 and phase 8 shall not operate simultaneously.
- This intersection uses video 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 Transportation Management Plans for stop bar locations.

LEGEND

PROPOSED	EXISTING

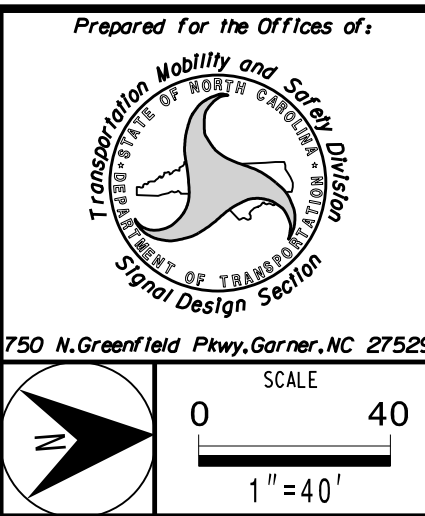
FEATURE	PHASE									
	1	2	3	4	5	6	8	TOL 3	TOL 5	TOL 7
Walk *	-	-	-	-	-	-	-			
Ped Clear *	-	-	-	-	-	-	-			
Min Green *	7	10	7	7	7	10	7	7	7	7
Passage *	2.0	3.0	2.0	2.0	2.0	3.0	2.0			
Max 1 *	20	45	30	30	25	45	30			
Yellow Change	3.1	4.2	3.1	3.2	3.0	4.2	3.2	4.0	4.0	3.0
Red Clear	2.3	1.7	2.8	3.3	3.3	1.7	3.3	1.7	1.7	3.2
Added Initial *	-	-	-	-	-	-	-			
Maximum Initial *	-	-	-	-	-	-	-			
Time Before Reduction *	-	-	-	-	-	-	-			
Time To Reduce *	-	-	-	-	-	-	-			
Minimum Gap	-	-	-	-	-	-	-			
Advance Walk	-	-	-	-	-	-	-			
Non Lock Detector	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.



New Installation
Temporary Design 2 (TMP Phase II Step 1)

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Suite 200 Raleigh, NC 27607
Phone: 919-461-1100



NC 191 (Brevard Road) at I-26 EB / I-240 WB Ramps & Fairfax Avenue / Shelburne Road	
Division 13	Buncombe County Asheville
PLAN DATE: May 2026	REVIEWED BY: C. Kalencik
PREPARED BY: M. Tindal	REVIEWED BY:
REVISIONS	INIT. DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

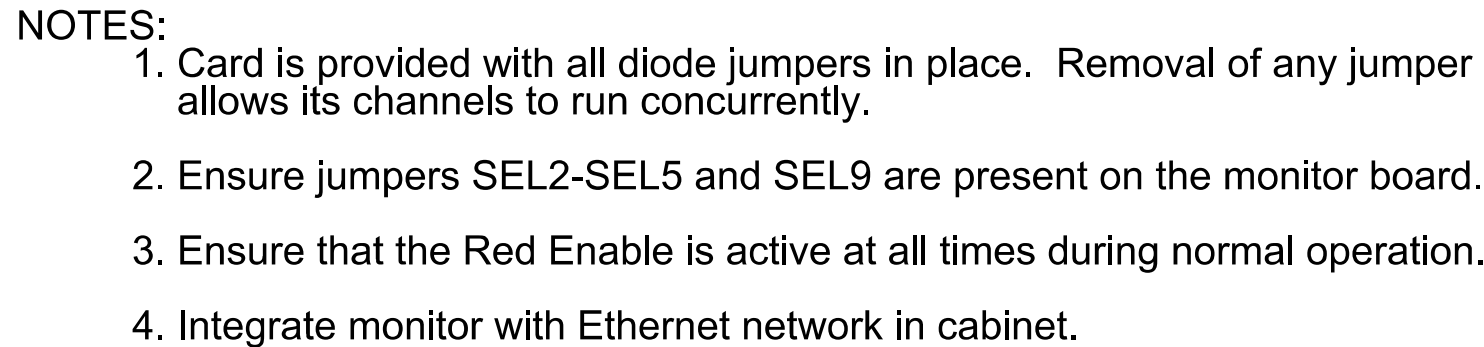
SEAL

NORTH CAROLINA
REGISTERED PROFESSIONAL ENGINEER
SEAL 040715
COURTNEY L. KALENCIK

DocuSigned by:
Courtney L. Kalencik 8/7/2026

SIGNATURE DATE

SIG. INVENTORY NO. 13-133772



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

INPUT FILE POSITION LEGEND: J2L

FILE J _____

SLOT 2 _____

LOWER _____

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 phases 4 and 8 for Dual Entry.
3. Program controller to start up in phase 2 Green No Walk and phase 6 Green No Walk.
4. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
5. The cabinet and controller are part of the D13-02 Asheville System.

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, S11, AUX S1, AUX S3, AUX S4, AUX S5
Phases Used.....	1, 2, 3, 4, 5, 6, 8
Overlap '1'.....	*
Overlap '2'.....	Not Used
Overlap '3'.....	*
Overlap '4'.....	*
Overlap '5'.....	*
Overlap '7'.....	*

* See OVERLAP PROGRAMMING DETAIL on sheet 2.

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

For Loops 2A, 2B, 3A and 3B:
Install a video detection system for vehicle detection. Perform installation according to manufacturer's directions and NCDOT engineer -approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.

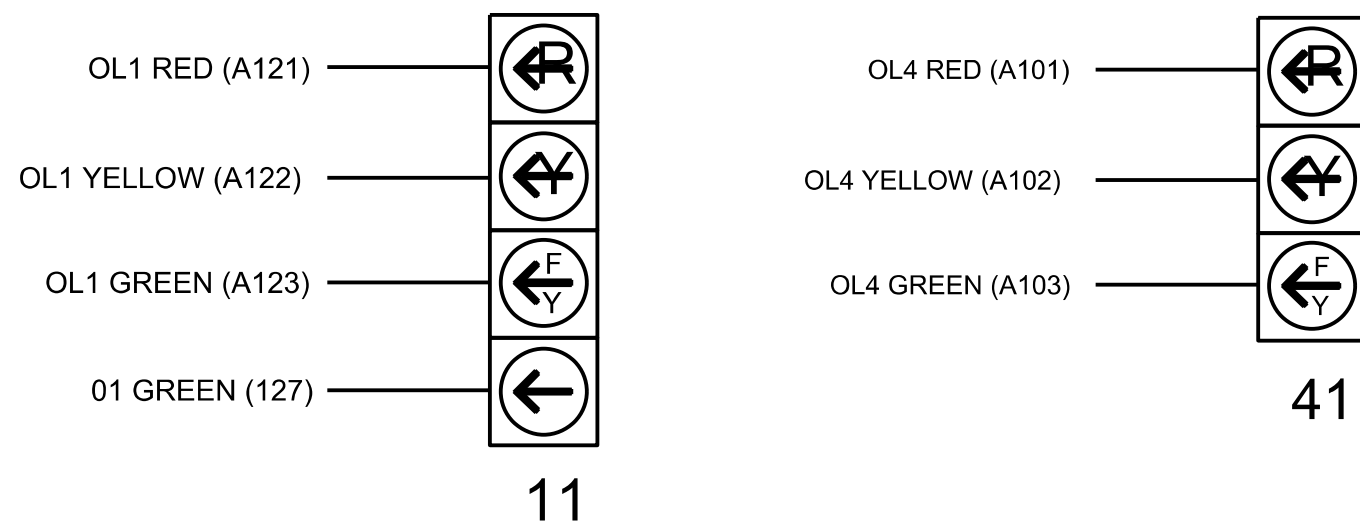
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Suite 200, Raleigh, NC 27607
Phone: 919-461-1100

NU = Not Used

* Denotes install load resistor. See LOAD RESISTOR INSTALLATION DETAIL this sheet.

★ See pictorial of head wiring in FYA SIGNAL WIRING DETAIL this sheet.

(wire signal heads as shown)



(install resistor as shown)

Phase 1 Yellow Field
Terminal (126)



AC-

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 13-1337T2
DESIGNED: May 2026
SEALED: 08/07/2026
REVISED: N/A

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

[illegible]

OVERLAP PROGRAMMING DETAIL

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	5	7
Type	FYA 4 - Section	Off	Normal	FYA 4 - Section	Normal	Normal
Included Phases	2,3	-	4,6	4	2,3	3,5
Modifier Phases	1	-	-	-	-	-
Modifier Overlaps	-	-	-	-	-	-
Trail Green	7	0	7	0	7	7
Trail Yellow	4.0	0.0	4.0	0.0	4.0	3.0
Trail Red	1.7	0.0	1.7	0.0	1.7	3.2

COMPATIBILITY

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

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

Sequence 1

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

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	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	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		17
18	Overlap	6		X		18

OVERLAP 7
ASSIGNED TO
CHANNEL 5

NOTE ALT FLASH
SETTING

NOTE ALT FLASH
SETTING

SEQUENCE DETAIL

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

Web Interface
Home >Controller >Sequence

Sequence 1

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

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

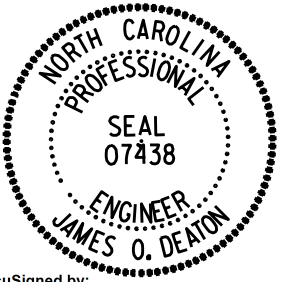
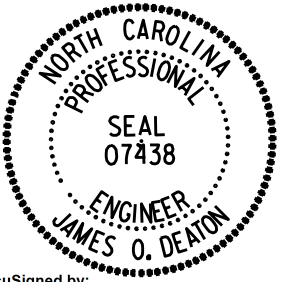
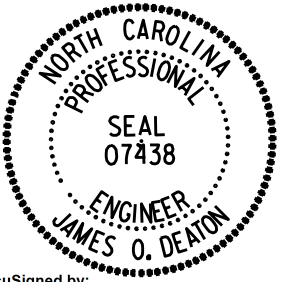
Web Interface
Home >Controller >Advanced IO >Cabinet Configuration >IO Modules

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

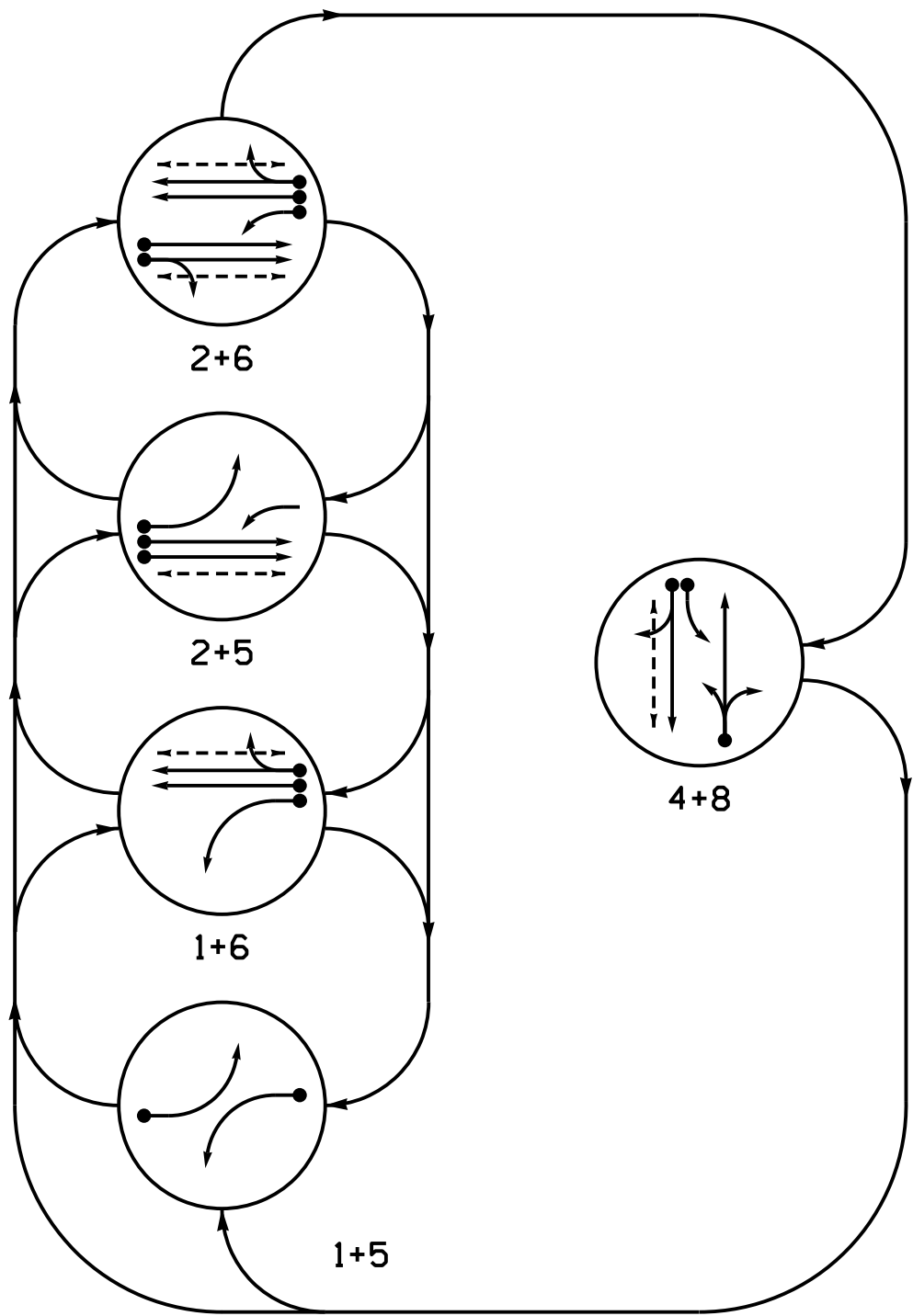
Temporary Design 2 (TMP Phase II Step 1)
Electrical Detail - Sheet 2 of 2

Electrical and Programming Details For	NC 191 (Brevard Road) at I-26 EB / I-240 WB Ramps & Fairfax Avenue / Shelburne Road Division 13 Buncombe County Asheville	DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED																													
Prepared for the Offices of:  750 N. Greenfield Pkwy, Garner, NC 27529	<table><tr><td>PLAN DATE:</td><td>May 2026</td><td>REVIEWED BY:</td><td>J O Deaton</td></tr><tr><td>PREPARED BY:</td><td>M W Yalch</td><td>REVIEWED BY:</td><td></td></tr><tr><td>REVISIONS</td><td>INIT.</td><td>DATE</td><td></td></tr><tr><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td></tr></table>	PLAN DATE:	May 2026	REVIEWED BY:	J O Deaton	PREPARED BY:	M W Yalch	REVIEWED BY:		REVISIONS	INIT.	DATE														<table><tr><td>SEAL</td></tr><tr><td></td></tr><tr><td>DocuSigned by: James O. Deaton 8/10/2026</td></tr><tr><td>DATE</td></tr><tr><td>SIG. INVENTORY NO. 13-1337T2</td></tr></table>	SEAL		DocuSigned by: James O. Deaton 8/10/2026	DATE	SIG. INVENTORY NO. 13-1337T2
PLAN DATE:	May 2026	REVIEWED BY:	J O Deaton																												
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SIG. INVENTORY NO. 13-1337T2																															

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 13-1337T2
DESIGNED: May 2026
SEALED: 08/07/2026
REVISED: N/A

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NC Firm License No.: F-0342
5438 Wade Park Boulevard
Suite 200, Raleigh, NC 27607
Phone: 919-461-1100

PHASING DIAGRAM



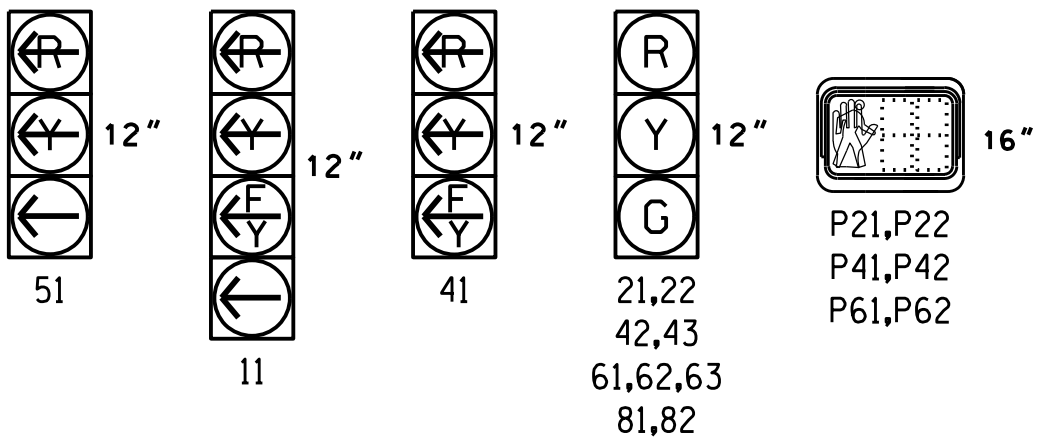
PHASING DIAGRAM DETECTION LEGEND

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

SIGNAL FACE	PHASE					
	1 + 5	1 + 6	2 + 5	2 + 6	4 + 8	FLASH
11	←	←	←	←	←	←
21,22	R	R	G	G	R	R
41	←	←	←	←	←	←
42,43	R	R	R	R	G	R
51	←	←	←	←	←	←
61,62,63	R	G	R	G	R	R
81,82	R	R	R	R	G	R
P21,P22	DW	DW	W	W	DW	DRK
P41,P42	DW	DW	DW	DW	W	DRK
P61,P62	DW	W	DW	W	DW	DRK

SIGNAL FACE I.D.

All Heads L.E.D.



MAXTIME DETECTOR INSTALLATION CHART											
DETECTOR					PROGRAMMING						
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN
1A	6X40	0	2-4-2	-	1 6	15.0	-	X	-	X	-
2A	6X6	70	4	X	2	-	-	X	-	X	-
2B	6X6	70	4	X	2	-	-	X	-	X	-
4A	6X40	0	2-4-2	-	4	3.0	-	X	-	X	-
4B	6X40	0	2-4-2	-	4	10.0	-	X	-	X	-
4C	6X15	0	2	-	4	15.0	-	X	-	X	-
5A	6X40	0	2-4-2	-	5	-	-	X	-	X	-
6A	6X6	70	3	-	6	-	-	X	-	X	-
6B	6X6	70	3	-	6	-	-	X	-	X	-
8A	6X40	0	2-4-2	-	8	10.0	-	X	-	X	-

2 Phase
Fully Actuated
D13-02_Ashville

NOTES

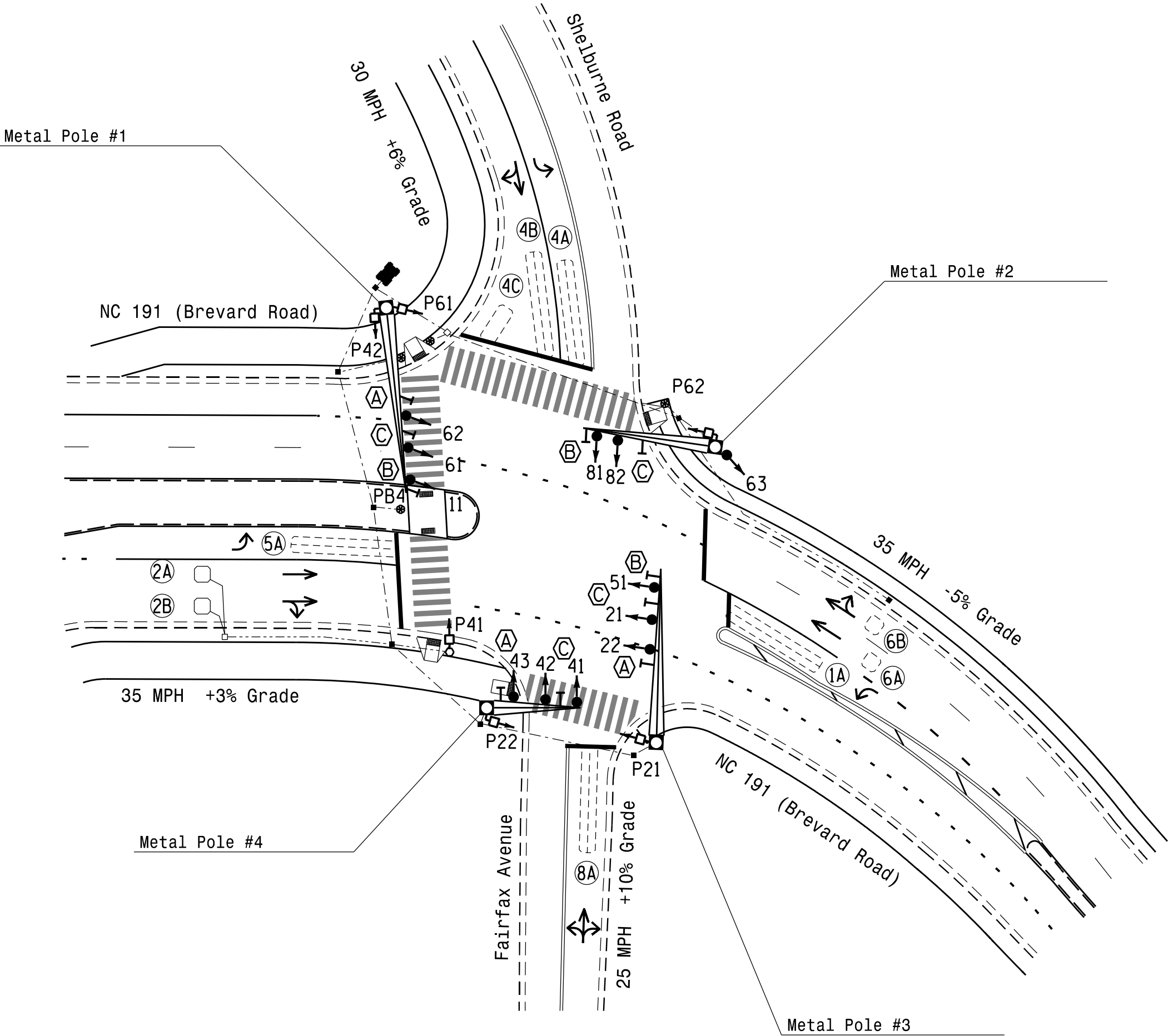
- Refer to "Roadway Standard Drawings NCDOT" dated January 2024 and "Standard Specifications for Roads and Structures" dated January 2024.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Phase 1 and/or phase 5 may be lagged.
- Remove louvers from existing heads numbered 21, 22, and 51.
- Set all detector units to presence mode.
- Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
- Program pedestrian heads to countdown the flashing "Don't Walk" time only.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- See Pavement Marking Plans for stop bar and crosswalk locations.

LEGEND

PROPOSED	EXISTING

MAXTIME TIMING CHART						
FEATURE	PHASE					
	1	2	4	5	6	8
Walk *	-	14	14	-	14	-
Ped Clear	-	11	27	-	21	-
Min Green *	7	10	7	7	10	7
Passage *	2.0	3.0	2.0	2.0	3.0	2.0
Max 1 *	20	45	30	25	45	30
Yellow Change	3.1	4.2	3.2	3.0	4.2	3.2
Red Clear	2.4	2.1	3.4	3.3	2.1	3.4
Added Initial *	-	-	-	-	-	-
Maximum Initial *	-	-	-	-	-	-
Time Before Reduction *	-	-	-	-	-	-
Time To Reduce *	-	-	-	-	-	-
Minimum Gap	-	-	-	-	-	-
Advance Walk	-	7	7	-	7	-
Non Lock Detector	X	-	X	X	-	X
Vehicle Recall	-	MIN RECALL	-	-	MIN RECALL	-
Dual Entry	-	-	X	-	-	X

* These values may be field adjusted. Do not adjust Min Green and 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.



New Installation
Final Design (TMP Phase IV Step 4)

AECOM
NC Firm License No.: F-0342
5438 Wade Park Boulevard
Suite 200 Raleigh, NC 27607
Phone: 919-461-1100

 750 N. Greenfield Pkwy, Garner, NC 27529 Signal Design Section	NC 191 (Brevard Road) at Fairfax Avenue / Shelburne Road		
	Division 13 Buncombe County Asheville		
	PLAN DATE: May 2026	REVIEWED BY: C. Kalencik	
	PREPARED BY: M. Tindal	REVIEWED BY:	
REVISIONS		INIT.	DATE
SIGNATURE		DATE	
SIG. INVENTORY NO.		13-1337	

FLASHER CIRCUIT MODIFICATION DETAIL

IN ORDER TO ENSURE 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 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

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	1	4
Type	FYA 4 - Section	Off	Off	FYA 4 - Section
Included Phases	2	-	-	8
Modifier Phases	1	-	-	-
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

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

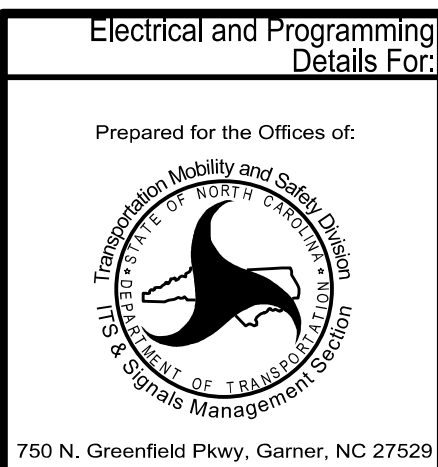
Channel	Control Type	Control Source	Flash Yellow	Flash Red	Flash Alt	MMU Channel
1	Phase Vehicle	1		X	X	1
2	Phase Vehicle	2		X		2
3	Phase Vehicle	3		X	X	3
4	Phase Vehicle	4		X		4
5	Phase Vehicle	5		X		5
6	Phase Vehicle	6		X	X	6
7	Phase Vehicle	7		X		7
8	Phase Vehicle	8		X	X	8
9	Overlap	1		X	X	9
10	Overlap	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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 13-1337
DESIGNED: May 2026
SEALED: 08/07/2026
REVISED: N/A

Final (TMP Phase IV Step 4)
Electrical Detail - Sheet 2 of 2

DOCUMENT NOT CONSIDERED
FINAL UNLESS ALL
SIGNATURES COMPLETED

AECOM
NC Firm License No.: F-0342
5438 Wade Park Boulevard
Suite 200, Raleigh, NC 27607
Phone: 919-461-1100



NC 191 (Brevard Road)
at
Fairfax Avenue / Shelburne Road

[illegible]

SEAL



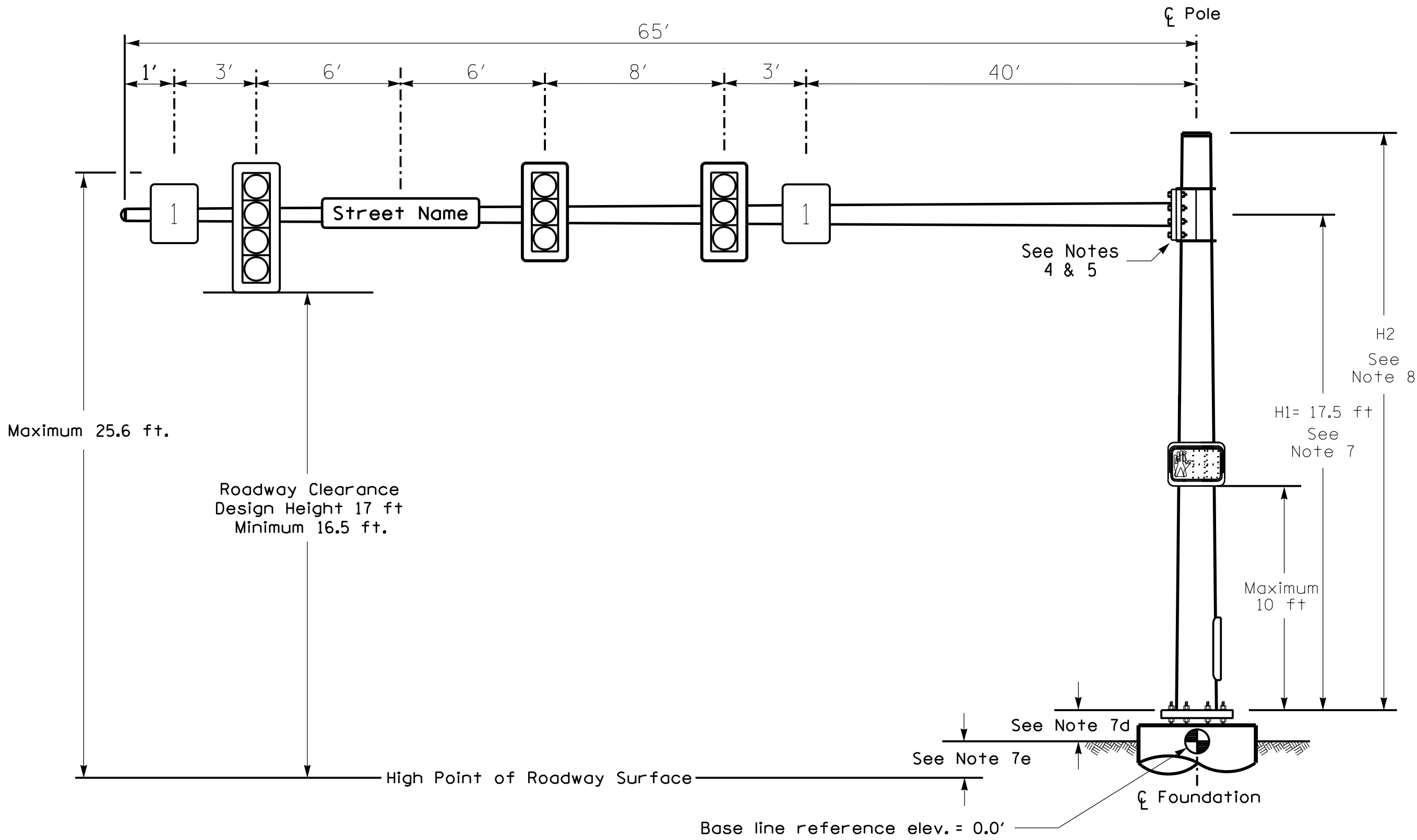
A circular professional engineer seal for the State of North Carolina. The outer ring contains the text "NORTH CAROLINA" at the top and "JAMES O. DEATON" at the bottom. Inside the ring, the words "PROFESSIONAL" and "ENGINEER" are curved along the top and bottom respectively. In the center, the word "SEAL" is above the license number "07438".

—DocuSigned by:
James O. Deaton 8/10/2025
40E8AC430B040E

D/

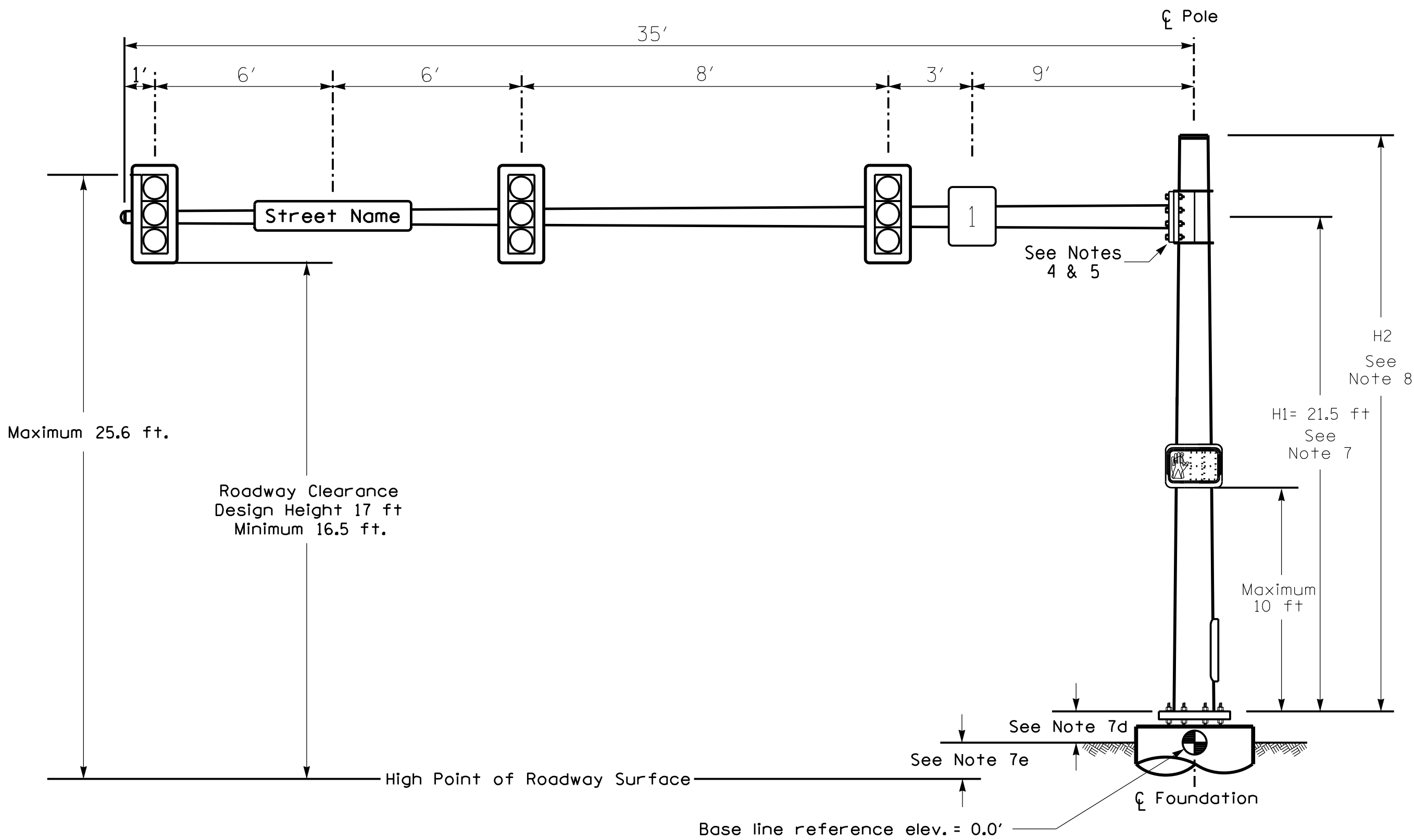
SIG. INVENTORY NO. 13-13

Design Loading for METAL POLE NO. 3



Elevation View

Design Loading for METAL POLE NO. 4



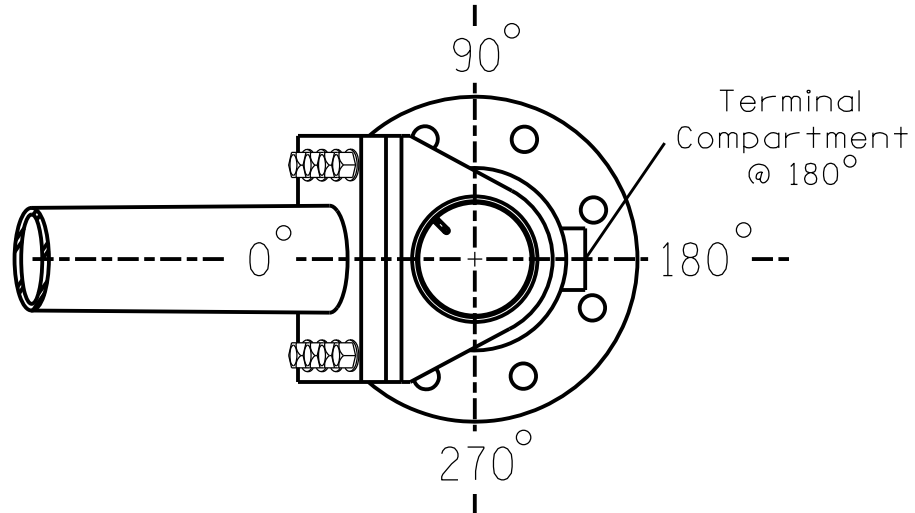
Elevation View

SPECIAL NOTE

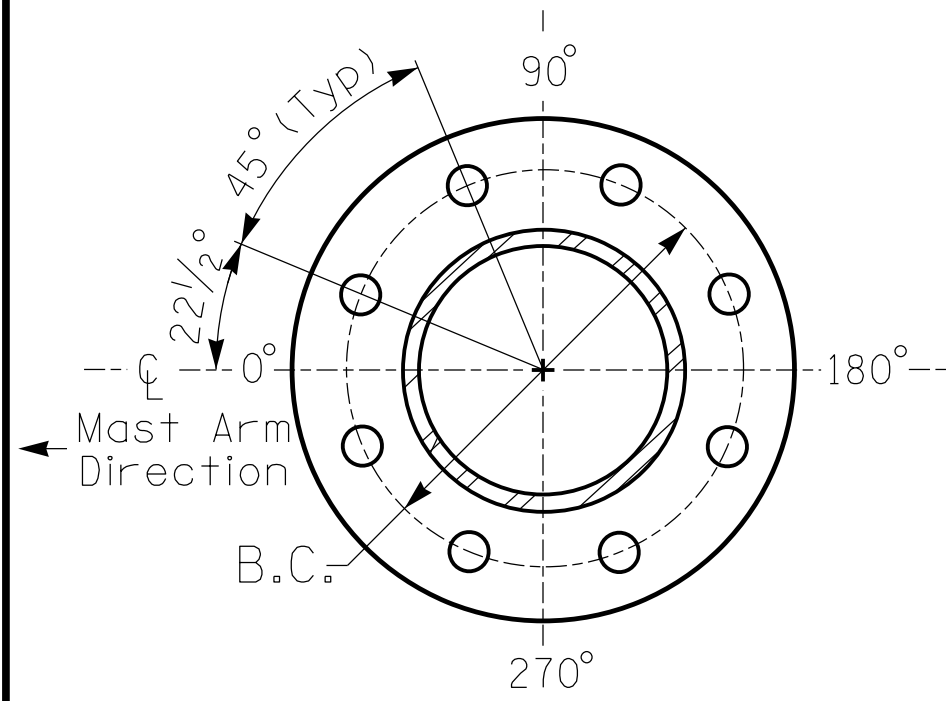
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 3	Pole 4
Baseline reference point at ζ Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	-0.73 ft.	+2.18 ft.
Elevation difference at Edge of travelway or face of curb	-0.83 ft.	+1.00 ft.

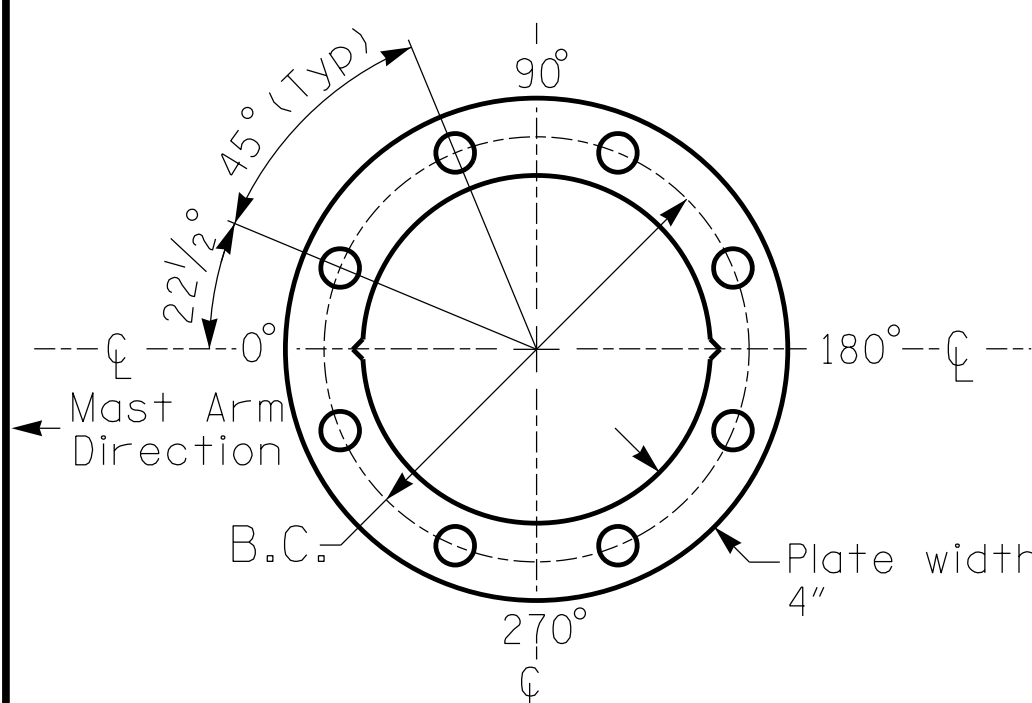


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



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

METAL POLE No. 3 and 4

PROJECT REFERENCE NO.	SHEET NO.
I-2513AC	Sig. 12.4

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
	RIGID MOUNTED SIGNAL HEAD 12"-4 SECTION-WITH BACKPLATE	11.5 S.F.	25.5" W X 66.0" L	74 LBS
	PEDESTRIAN SIGNAL HEAD WITH MOUNTING HARDWARE	2.2 S.F.	18.5" W X 17.0" L	21 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.
- The camber design for the mast arm deflection should provide an appearance of a low pitched arch where the tip or the free end of the mast arm does not deflect below horizontal when fully loaded.
- A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements.
- Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
- The mast arm attachment height (H1) shown is based on the following design assumptions:
 - Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
 - Signal heads are rigidly mounted and vertically centered on the mast arm.
 - The roadway clearance height for design is as shown in the elevation views.
 - The top of the pole base plate is 0.75 feet above the ground elevation.
 - Refer to the Elevation Data Chart for the elevation differences between the proposed foundation ground level and the high point of the roadway.
- The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
 - Mast arm attachment height (H1) plus 2 feet, or
 - H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
- If pole location adjustments are required, the contractor must gain approval from the Engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signal Design Section Senior Structural Engineer for assistance at (919) 814-5000.
- The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
- The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

All metal poles and arms should be 27038 in color as specified in the project special provisions.

NCDOT Wind Zone 5 (110 mph)

 750 N. Greenfield Pkwy, Corner, NC 27529	Prepared For the Offices of: TRANSPORTATION MOBILITY AND SAFETY DEPARTMENT OF TRANSPORTATION SIGNAL DESIGN SECTION		DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	
	NC 191 (Brevard Road) at Fairfax Avenue / Shelburne Road Division 13 Buncombe County Asheville PLAN DATE: November 2025 REVIEWED BY: C. Kalencik PREPARED BY: M. Tindal REVIEWED BY:		SEAL NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 040715 COURTNEY L. KALENICK DocuSigned by: Courtney L. Kalencik 8/7/2026 SIGNATURE DATE SIG. INVENTORY NO. 13-1337	