Project No.	Sheet No.
U-5760	SIG. 1.0

TIP PROJECT: U-5760

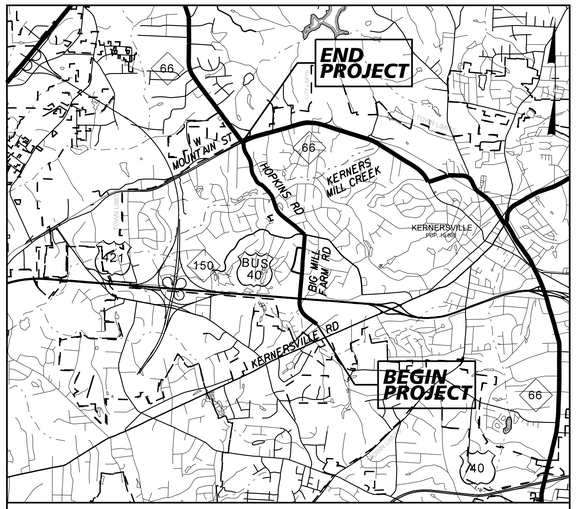
CONTRACT: C205012

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

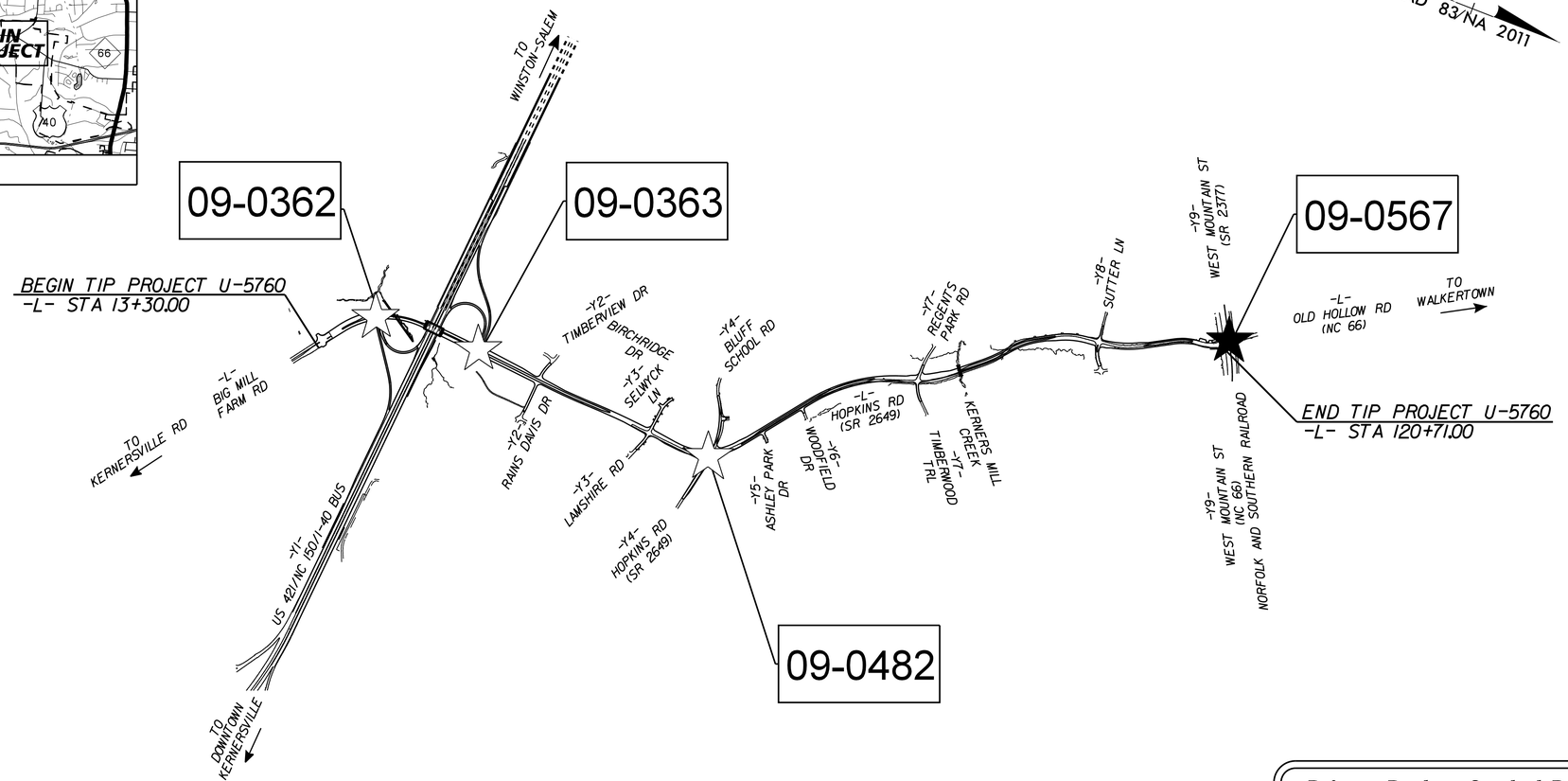
FORSYTH COUNTY

LOCATION: BIG MILL FARM ROAD AT US 421 /NC 150 (SALEM PKWY.) TO NC 66 (WEST MOUNTAIN STREET) IN KERNERSVILLE

TYPE OF WORK: TRAFFIC SIGNALS AND SIGNAL COMMUNICATIONS



VICINITY MAP



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

Index of Plans

Sheet #	Reference #	Location/Description
Sig. 1.0	--------	Title Sheet
Sig. 2.0 – 5.3	09-0567	NC 66 /SR 2377 (W. Mountain St.) at NC 66 (Old Hollow Rd.) and SR 2649 (Hopkins Rd.)
Sig. 6.0 – 7.3	09-0482	Big Mill Farm Rd./SR 2649 (Hopkins Rd.) at Bluff School Rd.
Sig. 8.0 – 8.3	09-0363	Big Mill Farm Rd. at US 421 NB /NC 150 WB (Salem Pkwy) Ramps
Sig. 9.0 – 9.3	09-0362	Big Mill Farm Rd. at US 421 SB /NC 150 EB (Salem Pkwy) Ramps
MIA-M9	--------	Standard Metal Pole Loading Details
SCP 1-13	--------	Cable Routing Plans & Splice Details

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8/6/2025
SIGNATURE: ***P.E.***

Prepared for:

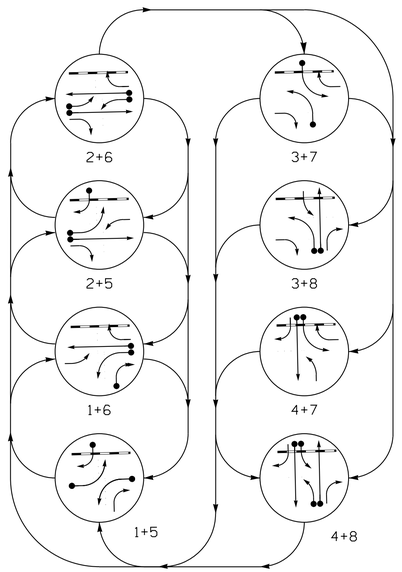
Transportation Mobility and Safety Division
STATE OF NORTH CAROLINA • DEPARTMENT OF TRANSPORTATION •
Signal Design Section

750 N.Greenfield Pkwy.Garner.NC 27529

8/6/2025 K:\RAL_Roadway\0110363\2 - U-5760 Big Mill Farm Road\Traffic Signal\S4 - Signal Design\TitleSheet.dgn

PROJECT REFERENCE NO.	SHEET NO.
U-5760	Sig. 2.0

PHASING DIAGRAM

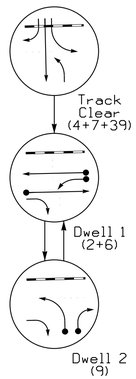


PHASING DIAGRAM DETECTION LEGEND

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

RAIL PREEMPT PHASES

(High Priority)



MAXTIME PREEMPTION CHART

FUNCTION	PRE 1
Type	RAIL ROAD
Exit Phases	4,8
Delay	0
Call Extend Time	1.0
Max Presence	0
Enter Min Green	1
Enter Walk	0
Enter Ped Clear	0
Enter Yellow Change	4.9
Enter Red Clear	2.9
Track Green	28
Track Yellow Change	4.4
Track Red Clear	2.3
Dwell Green	0
Exit Min Green	255 *
Exit Yellow Change	25.5 *
Exit Red Clear	25.5 *
Exit Type	EXIT PHASES
Ped Clear Through Yellow	–
Require All Red Entry	–

* Controller uses lesser of time shown and the normal time used for all phases.

This signal was designed for advance preemption.

TABLE OF OPERATION

SIGNAL FACE	PHASE 1+5	1+6	2+5	2+6	3+7	3+8	4+7	4+8	RR CLR	RR DWELL 1	RR DWELL 2	FLASH
11	←R	←R	←F/Y	←F/Y	←R	←R	←R	←R	←R	←R	←F/Y	←R
21	R	R	G	G	R	R	R	R	R	G	R	R
22	R	R	G	G	R/→R	R/→R	R	R	R	G	R/→R	R
31	←R	←R	←R	←R	←—	←—	←F/Y	←F/Y	←F/Y	←R	←—	←R
41	R	R	R	R	R	R	G	G	G	R	R	R
42	R/→—	R	R/→—	R	R	R	G	G	G	R	R	R
51	←—	←F/Y	←—	←F/Y	←R	←R	←R	←R	←R	←R	←R	←R
61	R	G	R	G	R	R	R	R	R	G	R	R
62	R	G	R	G	R/→—	R	R/→—	R	R	G	R	R
71	←R	←R	←R	←R	←—	←F/Y	←—	←F/Y	←—	←R	←R	←R
81	R	R	R	R	R	G	R	G	R	R	R	R
82	R/→—	R/→—	R	R	R	G	R	G	R	R	R/→—	R
Sign A	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	✳

✳ See Note 9.

MAXTIME DETECTOR INSTALLATION CHART

DETECTOR LOOP/ZONE	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP/ZONE	PROGRAMMING CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
1A	6X40	0	2-4-2	-	1	15.0	-	X	-	X	-	-
					6	3.0	-	X	-	X	X	-
1B	6X40	0	✳	X	1/9	15.0	-	X	-	X	-	-
2A	6X6	355	EXIST	-	2	-	-	X	X	X	-	-
3A	6X40	0	✳	X	3/9	15.0	-	X	-	X	-	-
					8	3.0	-	X	-	X	-	-
4A	6X40	0	2-4-2	-	4	-	-	X	-	X	-	-
4B	6X25	+12 #	2-4-2	-	4	-	-	X	-	X	-	-
4C	6X25	0 ##	2-4-2	-	4	-	-	X	-	X	-	-
4D	6X25	0 ##	2-4-2	-	4	5.0	-	X	-	X	-	-
5A	6X40	0	2-4-2	-	5	15.0	-	X	-	X	-	-
					2	3.0	-	X	-	X	X	-
5B	6X40	0	2-4-2	-	5	15.0	-	X	-	X	-	-
5C	6X25	+12 #	2-4-2	-	5	10.0	-	X	-	X	-	-
6A	6X6	355	EXIST	-	6	-	-	X	X	X	-	-
7A	6X35	0	2-4-2	-	7	15.0	-	X	-	X	-	-
					4	3.0	-	X	-	X	-	-
7B	6X25	+12 #	2-4-2	-	7	3.0	-	X	-	X	-	-
7C	6X25	0 ##	2-4-2	-	7	3.0	-	X	-	X	-	-
8A	6X40	0	✳	X	8	-	-	X	-	X	-	-

\# From Stopbar at Railroad Gate.
\## From Stopbar at SR 2403.
✳ Video Detection Zone

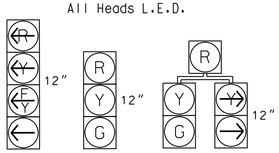
8 Phase
Fully Actuated
w/ Railroad Preemption
(Isolated)

NOTES

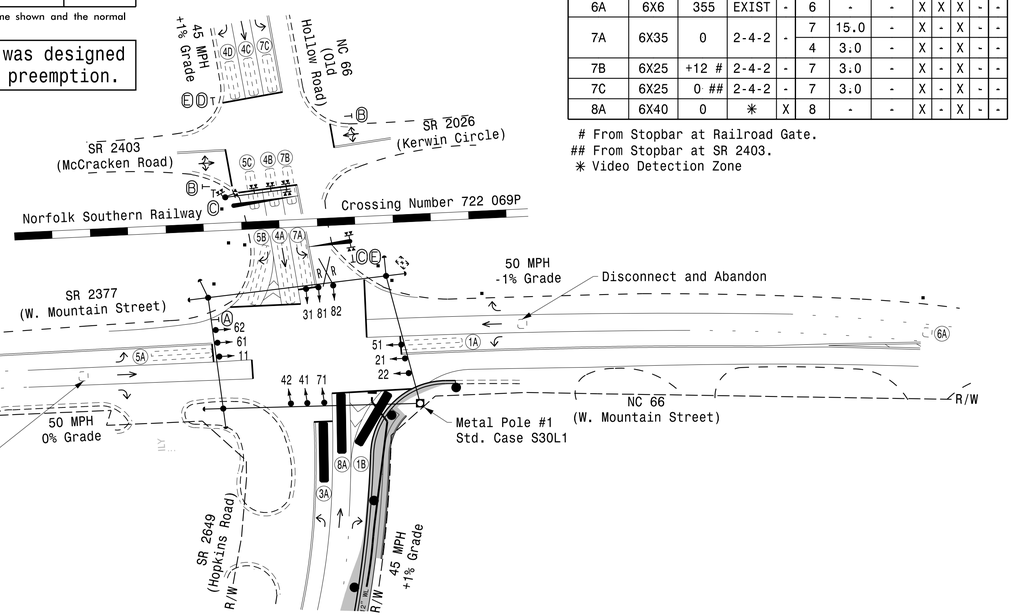
1. Refer to "Roadway Standard Drawings NCDOT" dated January 2024 and "Standard Specifications for Roads and Structures" dated January 2024.
2. This location contains railroad preemption phasing. Do not program signal for late night flashing operation.
3. Phase 1 and/or phase 5 may be lagged.
4. Phase 3 and/or phase 7 may be lagged.
5. Set all detector units to presence mode.
6. In the event of loop replacement, refer to the current ITS and Signals Design Manual and submit a Plan of Record to the Signal Design Section.
7. Disconnect and Abandon existing loops 2B and 6B.
8. Pavement markings are existing.
9. Ensure flashing operation does not alter operation of blank out signs.
10. Install new 2070LX controller in existing signal cabinet.
11. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
12. This intersection uses video detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.
13. Program phase 40 to run concurrently with all phases during normal operation. Phase 39 must be incompatible with phase 40 and included as a track clear phase.

SIGNAL FACE I.D.

All Heads L.E.D.



11	21	22
31	41	42
51	61	62
71	81	82



LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
□↓	Pedestrian Signal Head With Push Button & Sign	■↓
○	Signal Pole with Guy	●
◐	Signal Pole with Sidewalk Guy	◘
◎	Metal Strain Pole	◘
▭	Inductive Loop Detector	▬
▬	Non-intrusive Detection Area	▬
⊠	Controller & Cabinet	⛶
□	Junction Box	■
----	2-in Underground Conduit	----
N/A	Right of Way	----
→	Directional Arrow	→
N/A	Railroad Tracks	▬
N/A	Railroad Cantilever	✳✳●
N/A	Railroad Gate and Flasher	▬✳
▩	Construction Zone	▩
● ●	Construction Zone Drums	● ●
Ⓐ	"NO RIGHT TURN - TRAIN" L.E.D. Blankout Sign	Ⓐ
Ⓑ	"STOP" Sign (R1-1)	Ⓑ
Ⓒ	"DO NOT STOP ON TRACKS" Sign (R8-8)	Ⓒ
Ⓓ	"DO NOT BLOCK INTERSECTION" Sign (R10-7)	Ⓓ
Ⓔ	"STOP HERE WHEN FLASHING" Sign (R8-10)	Ⓔ

MAXTIME TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6	7	8	9	39	40
Walk *	–	–	–	–	–	–	–	–	–		
Ped Clear	–	–	–	–	–	–	–	–	–		
Min Green *	7	14	7	7	7	14	7	7	7		
Passage *	2.0	6.0	2.0	2.0	2.0	6.0	2.0	2.0	2.0		
Max 1 *	20	60	20	30	30	60	40	30	20		
Yellow Change	3.0	4.9	3.0	4.4	3.0	4.9	3.0	4.4	3.0	4.4	4.9
Red Clear	2.6	1.1	2.8	1.4	2.9	1.1	2.3	1.4	2.8	2.3	2.9
Added Initial *	–	2.5	–	–	–	2.5	–	–	–		
Maximum Initial *	–	40	–	–	–	40	–	–	–		
Time Before Reduction *	–	15	–	–	–	15	–	–	–		
Time To Reduce *	–	20	–	–	–	20	–	–	–		
Minimum Gap	–	3.0	–	–	–	3.0	–	–	–		
Advance Walk	–	–	–	–	–	–	–	–	–		
Non Lock Detector	X	–	X	X	X	–	X	X	X		
Vehicle Recall	–	MIN 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.

Signal Upgrade - Temporary Design 1
(TMP Phase 1)

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PLANS PREPARED IN THE OFFICE OF:
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Prepared For: Transportation Mobility and Safety Division, North Carolina Department of Transportation, Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

NC 66/SR 2377 (W. Mountain St.)
at
NC 66 (Old Hollow Road) and
SR 2649 (Hopkins Road)

Division 9 Forsyth County Kernersville

PLAN DATE: August 2024 REVIEWED BY: KP Baumann
PREPARED BY: CF Davis REVIEWED BY:

SCALE 0 50 1"=50'

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 044434 ENGINEER KEVIN P. BAUMANN
DocuSigned by: 5DC709A66C8447...
7/14/2025
SIGNATURE DATE

SIG. INVENTORY NO. 09-0567T1

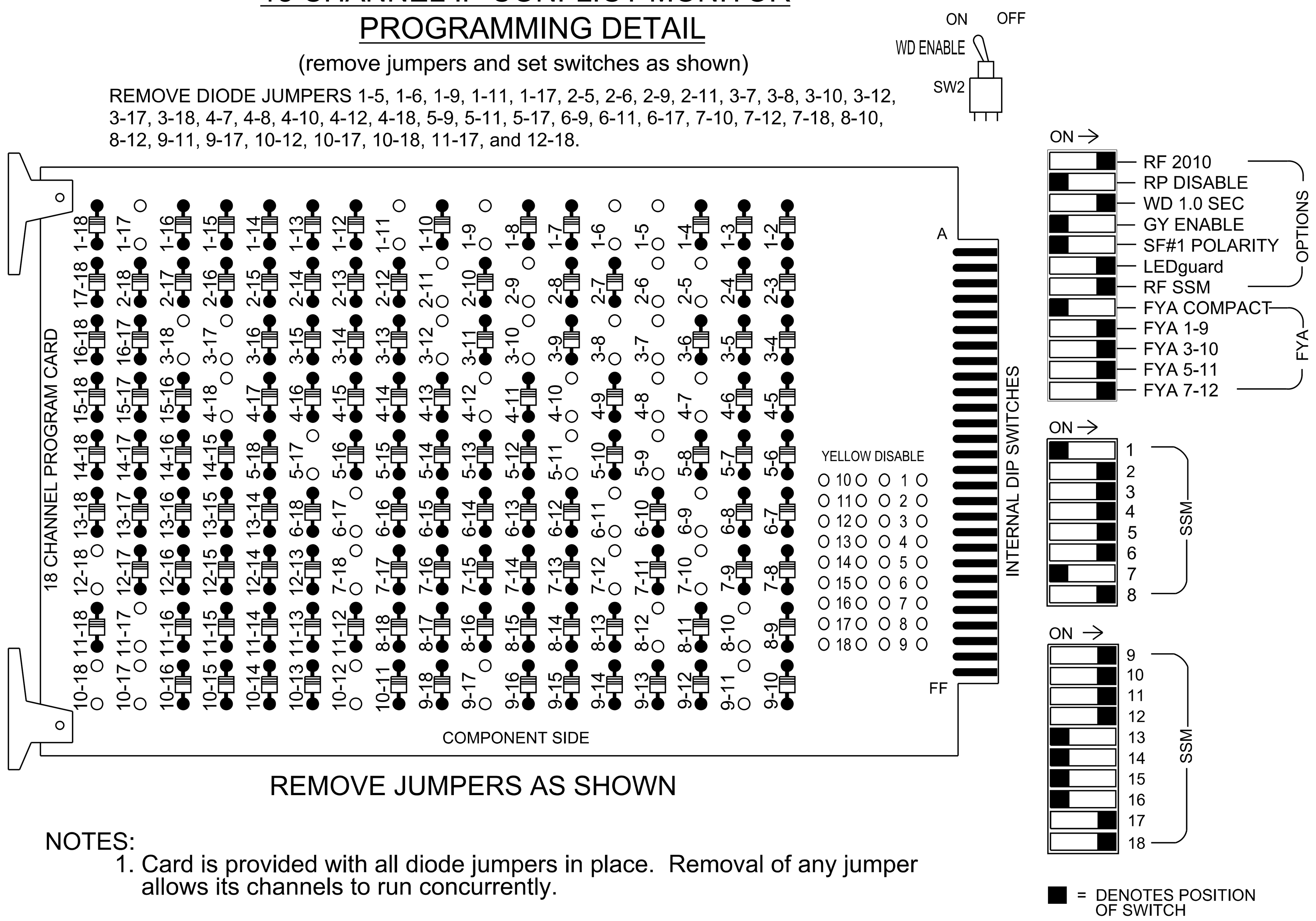
K:\RAL_Roadway\011036312 - U-5760 Big Mill Farm Road\Traffic Signal\SG4 - Signal Design\090567-2024g-t1.dgn
9:00:58 AM Craig.Davis
7/14/2025

PROJECT REFERENCE NO.	SHEET NO.
U-5760	Sig. 2.1

18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 1-5, 1-6, 1-9, 1-11, 1-17, 2-5, 2-6, 2-9, 2-11, 3-7, 3-8, 3-10, 3-12, 3-17, 3-18, 4-7, 4-8, 4-10, 4-12, 4-18, 5-9, 5-11, 5-17, 6-9, 6-11, 6-17, 7-10, 7-12, 7-18, 8-10, 8-12, 9-11, 9-17, 10-12, 10-17, 10-18, 11-17, and 12-18.



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 phases 2, 6, and 40 for Min Veh Recall.
3. Program phases 4 and 8 for Dual Entry.
4. Program phases 9 and 39 for No Startup Veh Call.
5. Program controller to start up in phase 2 Green No Walk, 6 Green No Walk, 9 Phase Not On, 39 Phase Not On, and 40 Green No Walk.
6. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.

EQUIPMENT INFORMATION

Controller..2070LX
Cabinet...332 w/ Aux
Software..Q-Free MAXTIME
Cabinet Mount.....................................Base
Output File Positions...........................18 With Aux. Output File
Load Switches Used............................S1,S2,S4,S5,S7,S8,S10,S11,AUX S1, AUX S2,AUX S3,AUX S4,AUX S5,AUX S6
Phases Used..1,2,3,4,5,6,7,8,9**,39**,40**
Overlap "1"..*
Overlap "2"..*
Overlap "3"..*
Overlap "4"..*
Overlap "5"..*
Overlap "6"..*
Overlap "7"..*

*See overlap programming detail on sheet 2.
**Phase used for preemption timing purposes only.

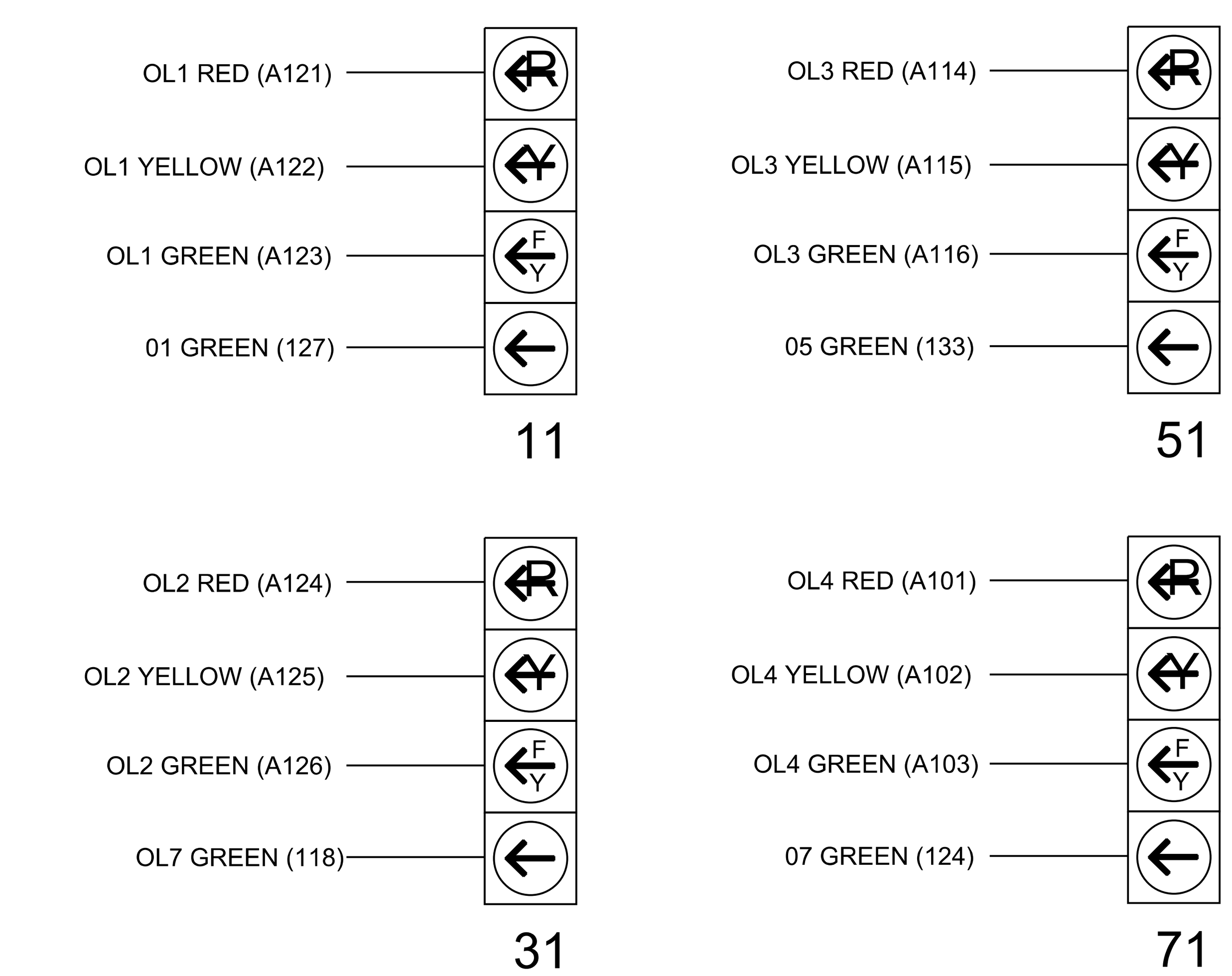
SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4		S5	S6	S7		S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3		4	14	5		6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	OL7		4	4 PED	5		6	6 PED	7	8	8 PED	OL1	OL2	OL5	OL3	OL4	OL6
SIGNAL HEAD NO.	11★	21,22	NU	22	31★	41,42	NU	42	51★	61,62	NU	71★	81,82	NU	11★	31★	82	51★	71★	62
RED	·	128	·	*	·	101	·	*	·	134	·	·	107	·	·	·	*	·	·	*
YELLOW	*	129	·	·	·	102	·	·	·	135	·	*	108	·	·	·	·	·	·	·
GREEN	·	130	·	·	·	103	·	·	·	136	·	·	109	·	·	·	·	·	·	·
RED ARROW	·	·	·	·	·	·	·	·	·	·	·	·	·	·	A121	A124	·	A114	A101	·
YELLOW ARROW	·	·	·	117	·	·	·	132	·	·	·	·	·	·	A122	A125	A112	A115	A102	A105
FLASHING YELLOW ARROW	·	·	·	·	·	·	·	·	·	·	·	·	·	·	A123	A126	·	A116	A103	·
GREEN ARROW	127	·	·	118	118	·	·	133	133	·	·	124	·	·	·	·	A113	·	·	A106

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

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



INPUT FILE POSITION LAYOUT

(front view)

FILE		1	2	3	4	5	6	7	8	9	1O	11	12	13	14
FILE "I"	U	∅ 1 1A	SLOT EMPTY	∅ 2 2A	SLOT EMPTY	SLOT EMPTY	∅ 4 4A	∅ 4 4C	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
	L	NOT USED		NOT USED			∅ 4 4B	∅ 4 4D							ST DC ISOLATOR
FILE "J"	U	∅ 5 5A	∅ 5 5B	∅ 6 6A	SLOT EMPTY	∅ 7 7A	∅ 7 7B	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	PRE1 AC ISOLATOR
	L	NOT USED	∅ 5 5C	NOT USED		NOT USED	∅ 7 7C								NOT USED

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

FS = FLASH SENSE
ST = STOP TIME
PRE = PREEMPT

! REMOVE JUMPER FROM I1-W TO J4-W, FROM J1-W TO I4-W, FROM I5-W TO J8-W, AND FROM J5-W TO I8-W ON REAR OF INPUT FILE.

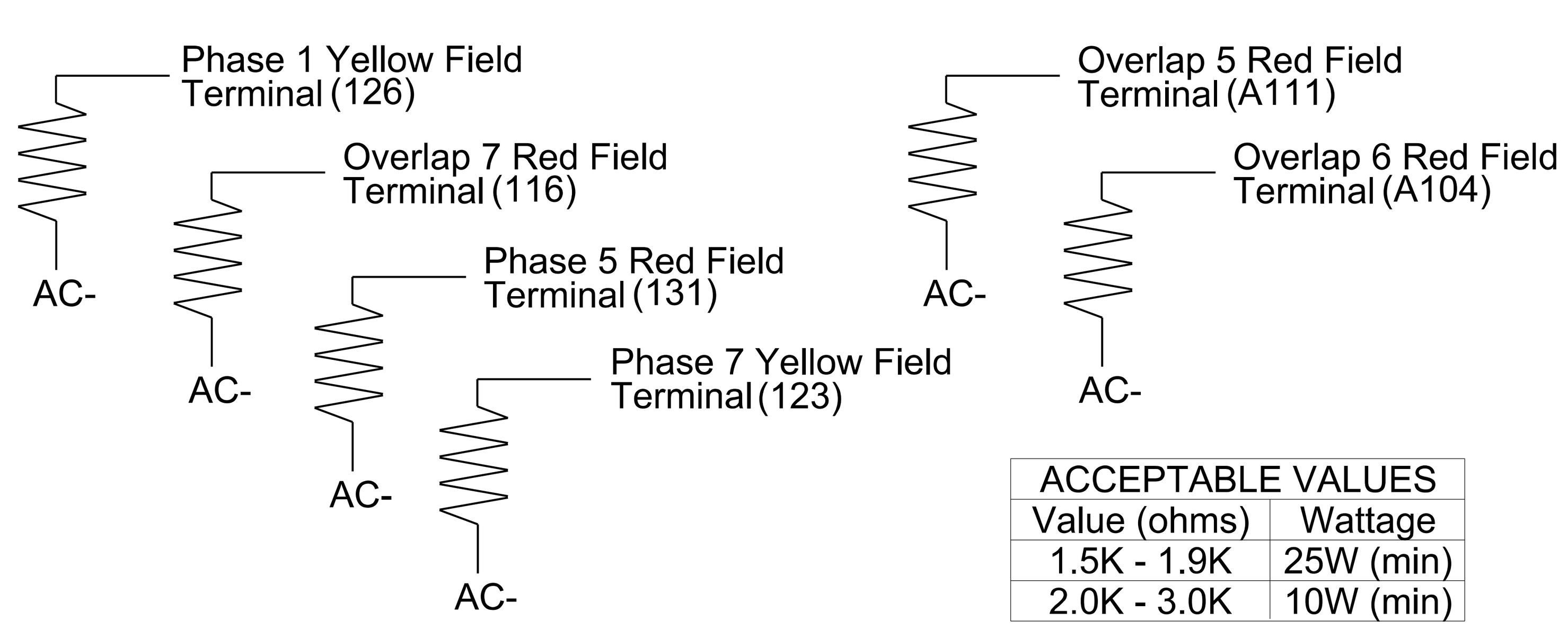
INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN
1A	TB2-1,2	I1U	56	18	1	1	15.0		X		X	
				-	29	6	3.0		X		X	X
2A	TB2-9,10	I3U	63	29	4	2			X	X	X	
4A	TB4-9,10	I6U	41	3	8	4			X		X	
4B	TB4-11,12	I6L	45	7	9	4			X		X	
4C	TB6-1,2	I7U	65	31	10	4			X		X	
4D	TB6-3,4	I7L	78	44	11	4	5.0		X		X	
5A	TB3-1,2	J1U	55	17	15	5	15.0		X		X	
				-	31	2	3.0		X		X	X
5B	TB3-5,6	J2U	40	2	16	5	15.0		X		X	
5C	TB3-7,8	J2L	44	6	17	5	10.0		X		X	
6A	TB3-9,10	J3U	64	30	18	6			X	X	X	
7A	TB5-5,6	J5U	57	19	21	7	15.0		X		X	
				-	32	4	3.0		X		X	
7B	TB5-9,10	J6U	42	4	22	7	3.0		X		X	
7C	TB5-11,12	J6L	46	8	23	7	3.0		X		X	

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)



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

SPECIAL DETECTOR NOTE

For zones 1B, 3A, & 8A, 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: 09-0567T1
DESIGNED: August 2024
SEALED: 07/14/2025
REVISED: N/A

Electrical Detail - Temporary Design 1
Sheet 1 of 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PLANS PREPARED IN THE OFFICE OF:
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ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared For: Transportation Mobility and Safety Division, State of North Carolina Department of Transportation, ITS & Signals Management Section
750 N.Greenfield Pkwy,Garner,NC 27529

NC 66/SR 2377 (W. Mountain St.) at NC 66 (Old Hollow Road) and SR 2649 (Hopkins Road)

Division 9 | Forsyth County | Kernersville

PLAN DATE: August 2024	REVIEWED BY: KP Baumann
PREPARED BY: CF Davis	REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 044434 ENGINEER KEVIN P. BAUMANN

DocuSigned by: 5DC709A86BCB447...
SIGNATURE 7/14/2025 DATE

SIG. INVENTORY NO. 09-0567T1

K:\RAL_Roadway\011036312 - U-5760 Big Mill Farm Road\Traffic Signal\S4 - Signal Design\090567-2024e-t1.dgn Craig.Davis 9:01:00 AM 7/14/2025

PROJECT REFERENCE NO.	SHEET NO.
U-5760	Sig. 2.2

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	5	6	7
Type	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section	Normal	Normal	Normal
Included Phases	2	4	6	8	1,9	7	3,9
Modifier Phases	1	3,9	5	7	-	-	-
Modifier Overlaps	-	-	-	-	-	-	-
Trail Green	0	0	0	0	0	0	0
Trail Yellow	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Trail Red	0.0	0.0	0.0	0.0	0.0	0.0	0.0

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	Phase Phase Omit	9	Result=!A	Preempt Status	1	-	-	0.0	0.0

LOGIC STATEMENT DESCRIPTION

Statement 1 Description: Omits phase 9 while not in preempt 1.

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.

SEQUENCE DETAIL

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

Web Interface
Home >Controller >Sequence

Sequence 1

Ring	Sequence Data
1	1,2,a,3,4,b,9,c
2	5,6,a,7,8,b,c
3	39,c,40,d

OUTPUT CHANNEL CONFIGURATION

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

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

Channel Configuration

NOTICE OVERLAP 7 ASSIGNED TO CHANNEL 3 →

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	Overlap	7	·	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

NOTICE: FLASH RED

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 09-0567T1
DESIGNED: August 2024
SEALED: 07/14/2025
REVISED: N/A

Electrical Detail - Temporary Design 1
Sheet 2 of 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PLANS PREPARED IN THE OFFICE OF:
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NC License #F-0102
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(919) 677-2000

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared For:
Transportation Mobility and Safety Division — ITS & Signals Management Section — State of North Carolina Department of Transportation
750 N.Greenfield Pkwy,Garner,NC 27529

NC 66/SR 2377 (W. Mountain St.)
at
NC 66 (Old Hollow Road) and
SR 2649 (Hopkins Road)

Division 9 | Forsyth County | Kernersville

PLAN DATE: August 2024	REVIEWED BY: KP Baumann
PREPARED BY: CF Davis	REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 044434 ENGINEER KEVIN P. BAUMANN

DocuSigned by:
5DC709A86BCB447...
SIGNATURE | DATE 7/14/2025

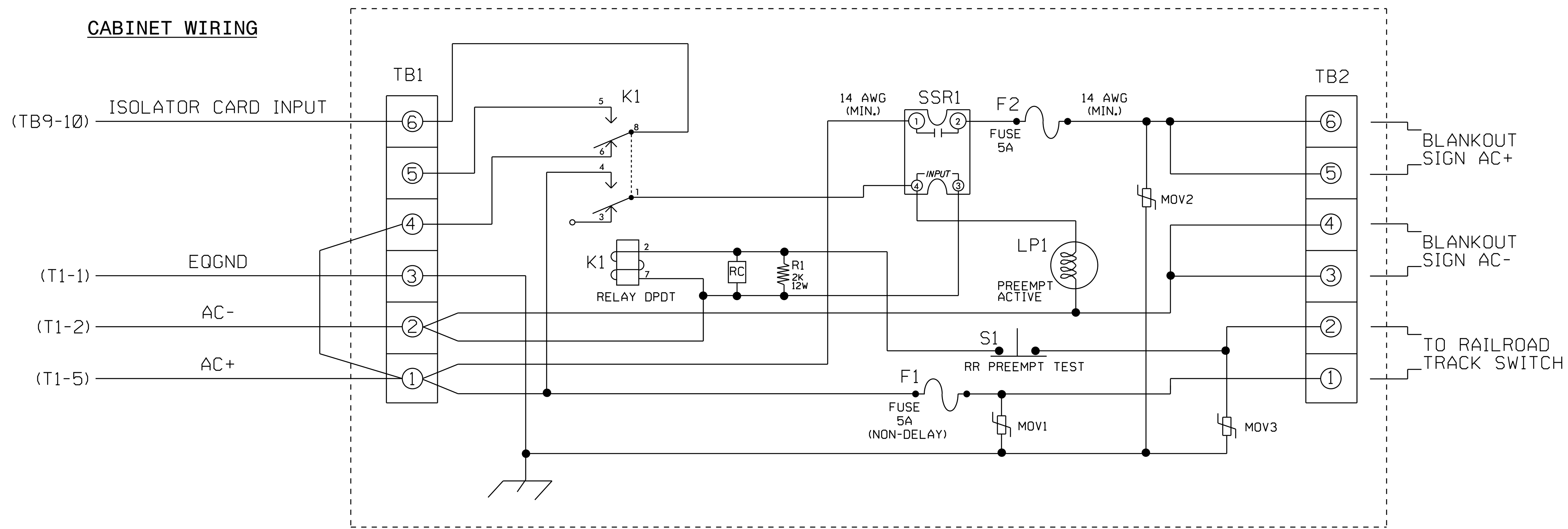
SIG. INVENTORY NO. 09-0567T1

RAILROAD PREEMPTION WIRING DETAIL

(wire as shown below)

PREEMPTION AND BLANKOUT SIGN CONTROL BOX

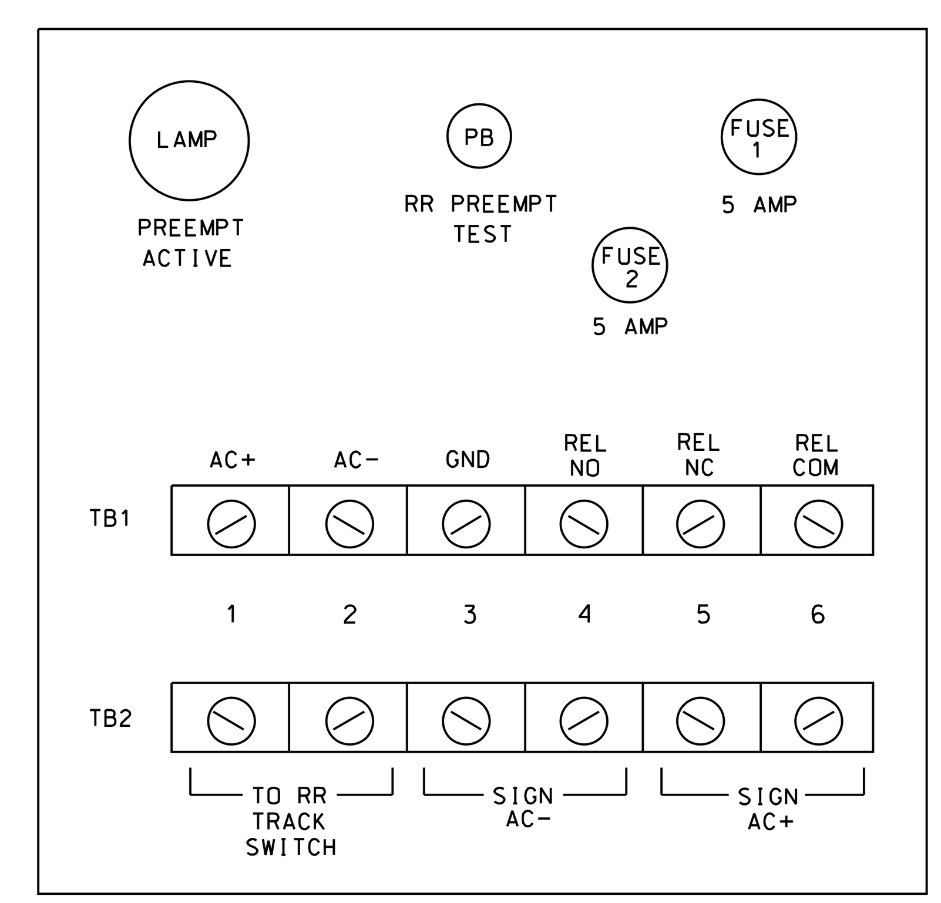
CABINET WIRING



NOTES

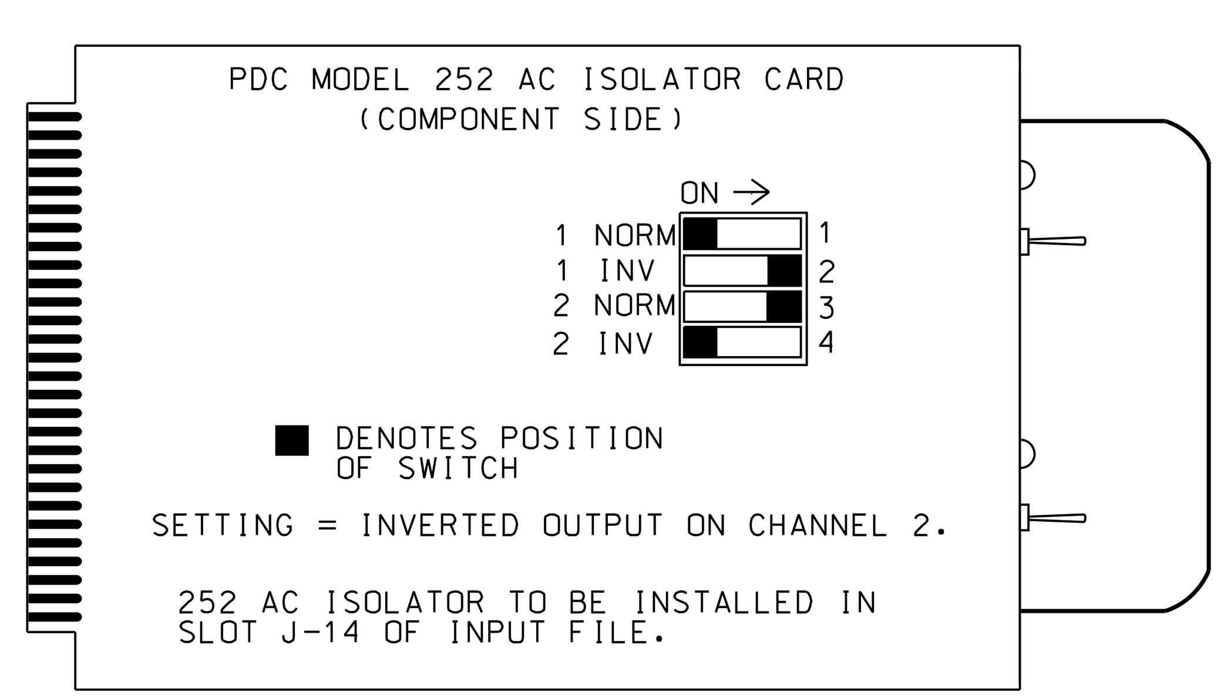
1. Relay K1 is shown in the energized (Preempt not active) normal operation state.
2. Relay K1 is a DPDT with 120VAC coil with octal base.
3. Relay SSR1 is a SPST (normally open) Solid State Relay with AC input and AC (25 amp) output.
4. AC Isolator Card shall activate preemption upon removal of AC+ from the input (as shown above). To accomplish this set invert dip switch on AC Isolator Card.
5. IMPORTANT!! A jumper must be added between input file terminals J14-E and J14-K if not already present. Also, terminal TB9-12 (on input panel) shall be connected to AC neutral (jumper may have to be added).

FRONT VIEW



PREEMPT 2 AC ISOLATOR (MODEL 252) OUTPUT PROGRAMMING DETAIL

*(set **DIP** switches as shown below)*



NOTE: IF ANOTHER MANUFACTURER TYPE OF AC ISOLATOR IS USED, OUTPUT PROGRAMMING IS LIKELY NOT TO EQUATE TO THAT SHOWN ABOVE.

PREEMPTION PROGRAMMING

Front Panel
Main Menu >Controller >Preemption
>Preempt Phasing/Preempt Parameters

Web Interface
Home >Controller >Preempt Configuration >Preempts

Preempt Configuration

Preempt	1
Enabled	Enabled
Type	Rail Road
Track Phases	4,7,39
Track Overlaps	2,4
Dwell Phases	2,6
Dwell Peds	-
Dwell Overlaps	1
Cycling Phases	2,6,9
Cycling Peds	-
Cycling Overlaps	1,5,7
Exit Phases	4,8
Exit Overlaps	2,4
Delay	0
Call Ext Time	1.0
Max Presence	0
Max Pres Act	Terminate
Enter Min Green	1
Enter Walk	0
Enter Ped Clear	0
Enter Yellow Change	4.9
Enter Red Clear	2.9
Track Green	28
Track Yellow Clr	4.4
Track Red Clear	2.3
Dwell Green	0
Exit Min Green	255
Exit Yellow Change	25.5
Exit Red Clear	25.5
Exit Type	Exit Phases
Non Locking Memory	-
Not Ovrd Flash	X
Not Ovrd Nxt Pre	-
Require All Red Entry	-
Track Clear Ovrd	X
Ped Clear During Yellow	-
Entry Omit OLTG	X
Track Reserve	X

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 09-0567T1
DESIGNED: August 2024
SEALED: 07/14/2025
REVISED: N/A

Electrical Detail - Temporary Design 1
Sheet 3 of 3

PLANS PREPARED IN THE OFFICE OF:
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ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared For: Transportation Mobility and Safety Division, ITS & Signals Management Section
750 N.Greenfield Pkwy.Garner.NC 27529

NC 66/SR 2377 (W. Mountain St.)
at
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SR 2649 (Hopkins Road)

Division 9 | Forsyth County | Kernersville

PLAN DATE:	August 2024	REVIEWED BY:	KP Baumann
PREPARED BY:	CF Davis	REVIEWED BY:	

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

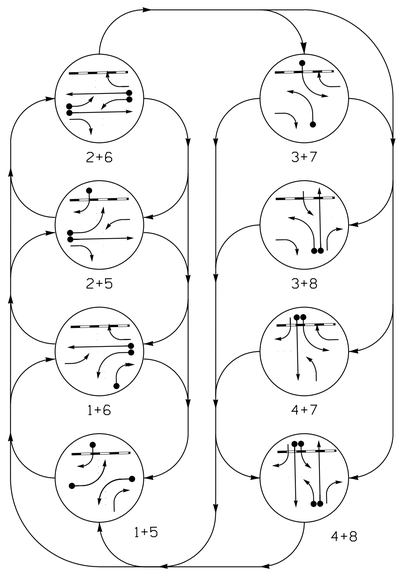
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 044434 ENGINEER KEVIN P. BAUMANN

DocuSigned by: 5DC709A86BCB447...
SIGNATURE | DATE 7/14/2025

SIG. INVENTORY NO. 09-0567T1

PROJECT REFERENCE NO.	SHEET NO.
U-5760	Sig. 3.0

PHASING DIAGRAM

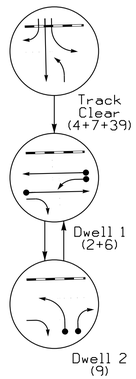


PHASING DIAGRAM DETECTION LEGEND

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

RAIL PREEMPT PHASES

(High Priority)



MAXTIME PREEMPTION CHART

FUNCTION	PRE 1
Type	RAIL ROAD
Exit Phases	4,8
Delay	0
Call Extend Time	1.0
Max Presence	0
Enter Min Green	1
Enter Walk	0
Enter Ped Clear	0
Enter Yellow Change	4.9
Enter Red Clear	3.3
Track Green	28
Track Yellow Change	4.4
Track Red Clear	2.3
Dwell Green	0
Exit Min Green	255 *
Exit Yellow Change	25.5 *
Exit Red Clear	25.5 *
Exit Type	EXIT PHASES
Ped Clear Through Yellow	–
Require All Red Entry	–

* Controller uses lesser of time shown and the normal time used for all phases.

This signal was designed for advance preemption.

TABLE OF OPERATION

SIGNAL FACE	PHASE 1+5	1+6	2+5	2+6	3+7	3+8	4+7	4+8	RR CLR	RR DWELL 1	RR DWELL 2	FLASH
11	←	←	F	F	R	R	R	R	R	R	R	R
21	R	R	G	G	R	R	R	R	R	G	R	R
22	R	R	G	G	R/—	R/—	R	R	R	G	R/—	R
31	R	R	R	R	←	←	F	F	F	R	←	R
41	R	R	R	R	R	R	G	G	G	R	R	R
42	R/—	R	R/—	R	R	R	G	G	G	R	R	R
51	←	F	←	F	R	R	R	R	R	R	R	R
61	R	G	R	G	R	R	R	R	R	G	R	R
62	R	G	R	G	R/—	R	R/—	R	R	G	R	R
71	R	R	R	R	←	F	←	F	←	R	R	R
81	R	R	R	R	R	G	R	G	R	R	R	R
82	R/—	R/—	R	R	R	G	R	G	R	R	R/—	R
Sign A	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	✳

✳ See Note 8.

MAXTIME DETECTOR INSTALLATION CHART

DETECTOR					PROGRAMMING						
LOOP/ ZONE	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP/ZONE	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
1A	6X40	0	2-4-2	-	1	15.0	-	X	-	X	-	-
					6	3.0	-	X	-	X	-	X
1B	6X40	0	✳	-	1/9	15.0	-	X	-	X	-	-
2A	6X6	355	✳	X	2	-	-	X	X	X	-	-
3A	6X40	0	✳	-	3/9	15.0	-	X	-	X	-	-
					8	3.0	-	X	-	X	-	-
4A	6X40	0	2-4-2	-	4	-	-	X	-	X	-	-
4B	6X25	+12 #	2-4-2	-	4	-	-	X	-	X	-	-
4C	6X25	0 ##	2-4-2	-	4	-	-	X	-	X	-	-
4D	6X25	0 ##	2-4-2	-	4	5.0	-	X	-	X	-	-
5A	6X40	0	✳	X	5	15.0	-	X	-	X	-	-
					2	3.0	-	X	-	X	-	X
5B	6X40	0	2-4-2	-	5	15.0	-	X	-	X	-	-
5C	6X25	+12 #	2-4-2	-	5	10.0	-	X	-	X	-	-
6A	6X6	355	EXIST	-	6	-	-	X	X	X	-	-
7A	6X35	0	2-4-2	-	7	15.0	-	X	-	X	-	-
					4	3.0	-	X	-	X	-	-
7B	6X25	+12 #	2-4-2	-	7	3.0	-	X	-	X	-	-
7C	6X25	0 ##	2-4-2	-	7	3.0	-	X	-	X	-	-
8A	6X40	0	✳	-	8	-	-	X	-	X	-	-

\# From Stopbar at Railroad Gate.
\## From Stopbar at SR 2403.
✳ Video Detection Zone

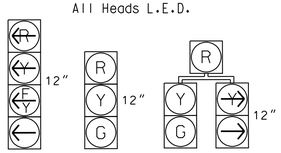
8 Phase
Fully Actuated
w/ Railroad Preemption
(Isloated)

NOTES

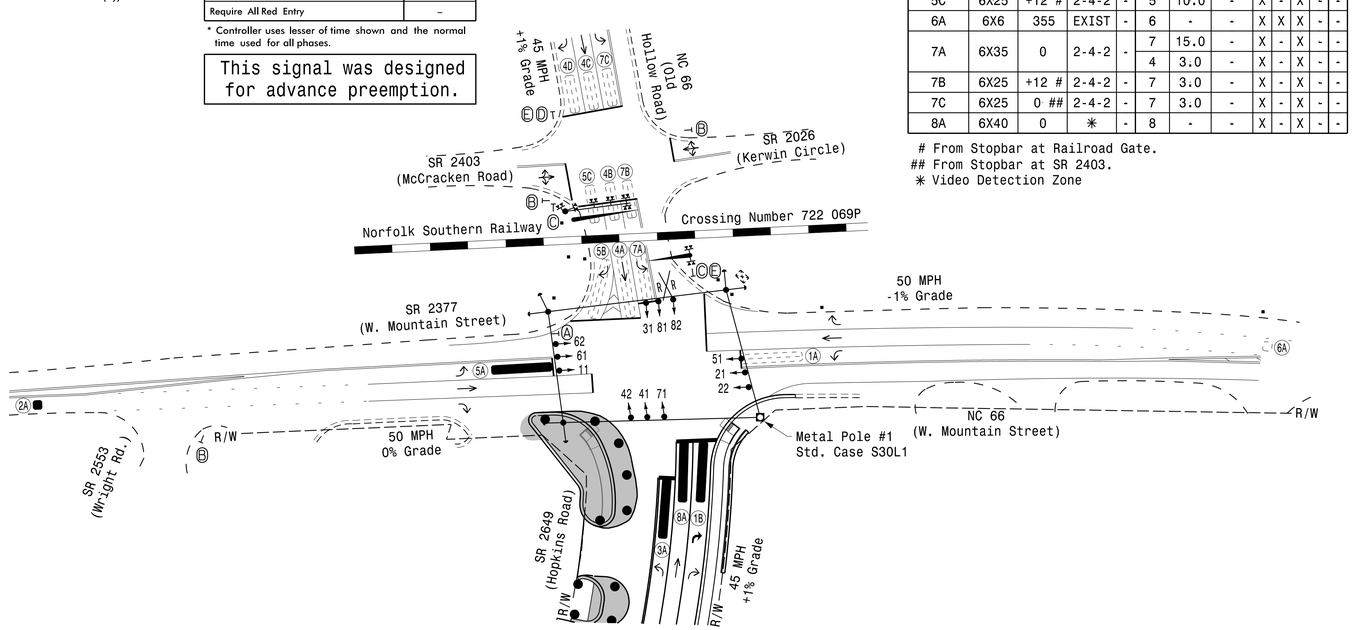
1. Refer to "Roadway Standard Drawings NCDOT" dated January 2024 and "Standard Specifications for Roads and Structures" dated January 2024.
2. This location contains railroad preemption phasing. Do not program signal for late night flashing operation.
3. Phase 1 and/or phase 5 may be lagged.
4. Phase 3 and/or phase 7 may be lagged.
5. Set all detector units to presence mode.
6. In the event of loop replacement, refer to the current ITS and Signals Design Manual and submit a Plan of Record to the Signal Design Section.
7. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
8. Ensure flashing operation does not alter operation of blank out signs.
9. This intersection uses video detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.
10. Program phase 40 to run concurrently with all phases during normal operation. Phase 39 must be incompatible with phase 40 and included as a track clear phase.

SIGNAL FACE I.D.

All Heads L.E.D.



11	21	22
31	41	42
51	61	62
71	81	82



LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
□↓	Pedestrian Signal Head With Push Button & Sign	■↓
○	Signal Pole with Guy	●
◐	Signal Pole with Sidewalk Guy	◘
◎	Metal Strain Pole	◘
▭	Inductive Loop Detector	▬
▬	Non-intrusive Detection Area	▬
⊠	Controller & Cabinet	⛶
□	Junction Box	■
·-·-·	2-in Underground Conduit	·-·-·
N/A	Right of Way	– – – –
→	Directional Arrow	→
N/A	Railroad Tracks	▬
N/A	Railroad Cantilever	✳✳✳●
N/A	Railroad Gate and Flasher	▬✳
▭	Construction Zone	▭
● ●	Construction Zone Drums	● ●
Ⓐ	"NO RIGHT TURN - TRAIN" L.E.D. Blankout Sign	Ⓐ
Ⓑ	"STOP" Sign (R1-1)	Ⓑ
Ⓒ	"DO NOT STOP ON TRACKS" Sign (R8-8)	Ⓒ
Ⓓ	"DO NOT BLOCK INTERSECTION" Sign (R10-7)	Ⓓ
Ⓔ	"STOP HERE WHEN FLASHING" Sign (R8-10)	Ⓔ

MAXTIME TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6	7	8	9	39	40
Walk *	–	–	–	–	–	–	–	–	–		
Ped Clear	–	–	–	–	–	–	–	–	–		
Min Green *	7	14	7	7	7	14	7	7	7		
Passage *	2.0	6.0	2.0	2.0	2.0	6.0	2.0	2.0	2.0		
Max 1 *	20	60	20	30	30	60	40	30	20		
Yellow Change	3.0	4.9	3.0	4.4	3.0	4.9	3.0	4.4	3.0	4.4	4.9
Red Clear	2.4	1.1	3.3	1.9	2.9	1.1	2.3	1.9	3.3	2.3	3.3
Added Initial *	–	2.5	–	–	–	2.5	–	–	–		
Maximum Initial *	–	40	–	–	–	40	–	–	–		
Time Before Reduction *	–	15	–	–	–	15	–	–	–		
Time To Reduce *	–	20	–	–	–	20	–	–	–		
Minimum Gap	–	3.0	–	–	–	3.0	–	–	–		
Advance Walk	–	–	–	–	–	–	–	–	–		
Non Lock Detector	X	–	X	X	X	–	X	X	X		
Vehicle Recall	–	MIN 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.

Signal Upgrade - Temporary Design 2
(TMP Phase 2)

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PLANS PREPARED IN THE OFFICE OF:
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Prepared For:
Transportation Mobility and Safety Division
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

NC 66/SR 2377 (W. Mountain St.)
at
NC 66 (Old Hollow Road) and
SR 2649 (Hopkins Road)

Division 9 Forsyth County Kernersville

PLAN DATE: August 2024 REVIEWED BY: KP Baumann
PREPARED BY: CF Davis REVIEWED BY:

SCALE 0 50 1"=50'

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 044434 ENGINEER KEVIN P. BAUMANN

DocuSigned by: 5DC709A66C8447...
SIGNATURE 7/14/2025 DATE

SIG. INVENTORY NO. 09-0567T2

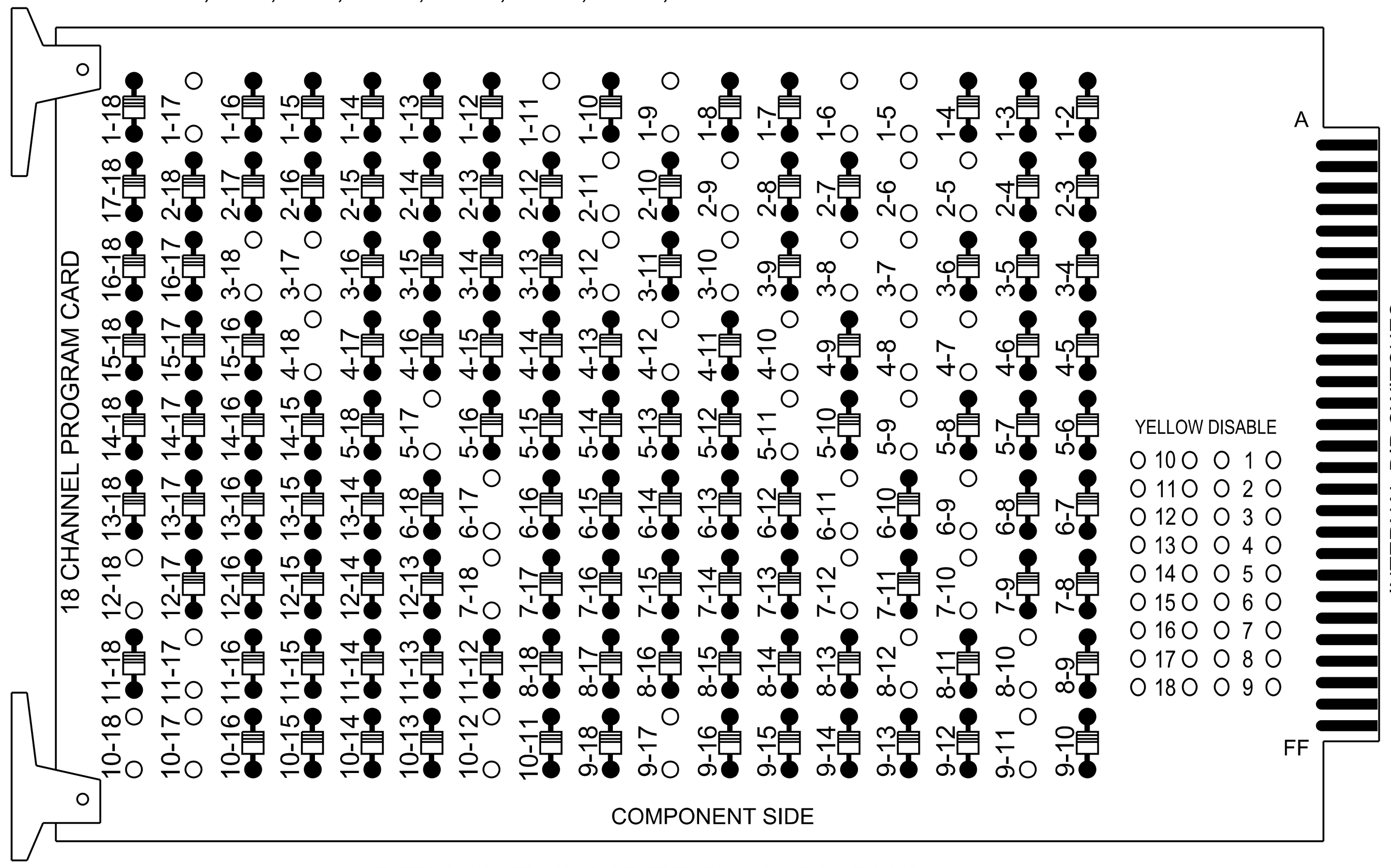
K:\RAL_Roadway\011036312 - U-5760 Big Mill Farm Road\Traffic Signal\SS4 - Signal Design\090567-2024g-t2.dgn
Craig.Davis
9:01:04 AM
7/14/2025

PROJECT REFERENCE NO.	SHEET NO.
U-5760	Sig. 3.1

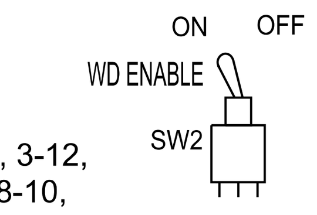
18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

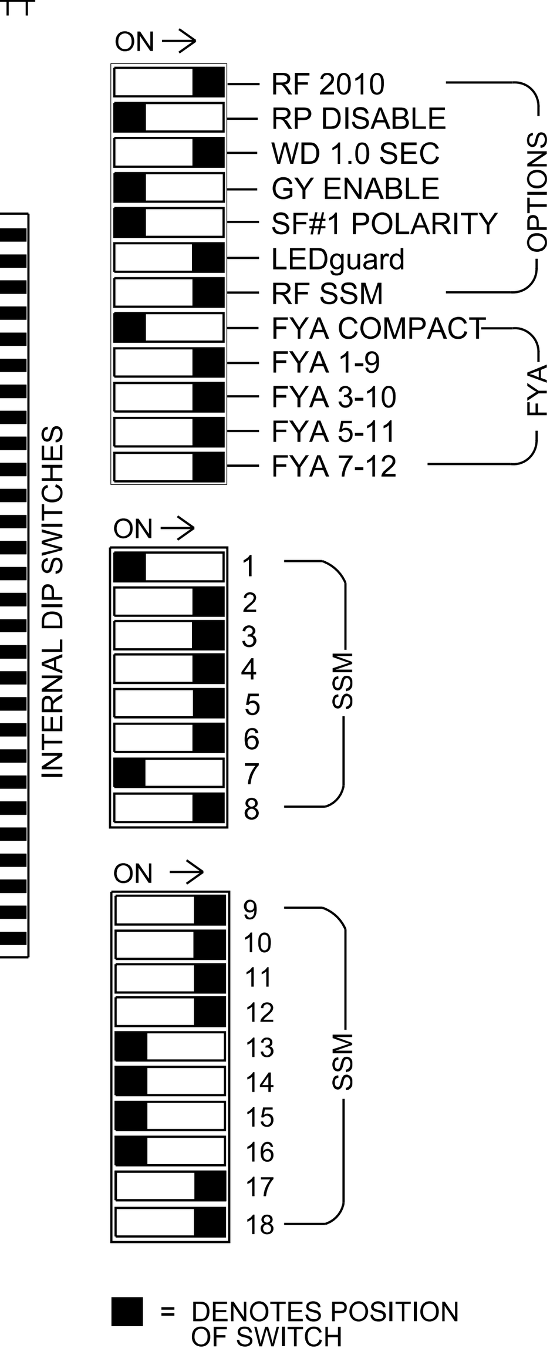
(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 1-5, 1-6, 1-9, 1-11, 1-17, 2-5, 2-6, 2-9, 2-11, 3-7, 3-8, 3-10, 3-12, 3-17, 3-18, 4-7, 4-8, 4-10, 4-12, 4-18, 5-9, 5-11, 5-17, 6-9, 6-11, 6-17, 7-10, 7-12, 7-18, 8-10, 8-12, 9-11, 9-17, 10-12, 10-17, 10-18, 11-17, and 12-18.



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 phases 2, 6, and 40 for Min Veh Recall.
3. Program phases 4 and 8 for Dual Entry.
4. Program phases 9 and 39 for No Startup Veh Call.
5. Program controller to start up in phase 2 Green No Walk, 6 Green No Walk, 9 Phase Not On, 39 Phase Not On, and 40 Green No Walk.
6. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.

EQUIPMENT INFORMATION

Controller..2070LX
Cabinet...332 w/ Aux
Software..Q-Free MAXTIME
Cabinet Mount....................................Base
Output File Positions...........................18 With Aux. Output File
Load Switches Used............................S1,S2,S4,S5,S7,S8,S10,S11,AUX S1, AUX S2,AUX S3,AUX S4,AUX S5,AUX S6
Phases Used.......................................1,2,3,4,5,6,7,8,9**,39**,40**
Overlap "1"..*
Overlap "2"..*
Overlap "3"..*
Overlap "4"..*
Overlap "5"..*
Overlap "6"..*
Overlap "7"..*

*See overlap programming detail on sheet 2.
**Phase used for preemption timing purposes only.

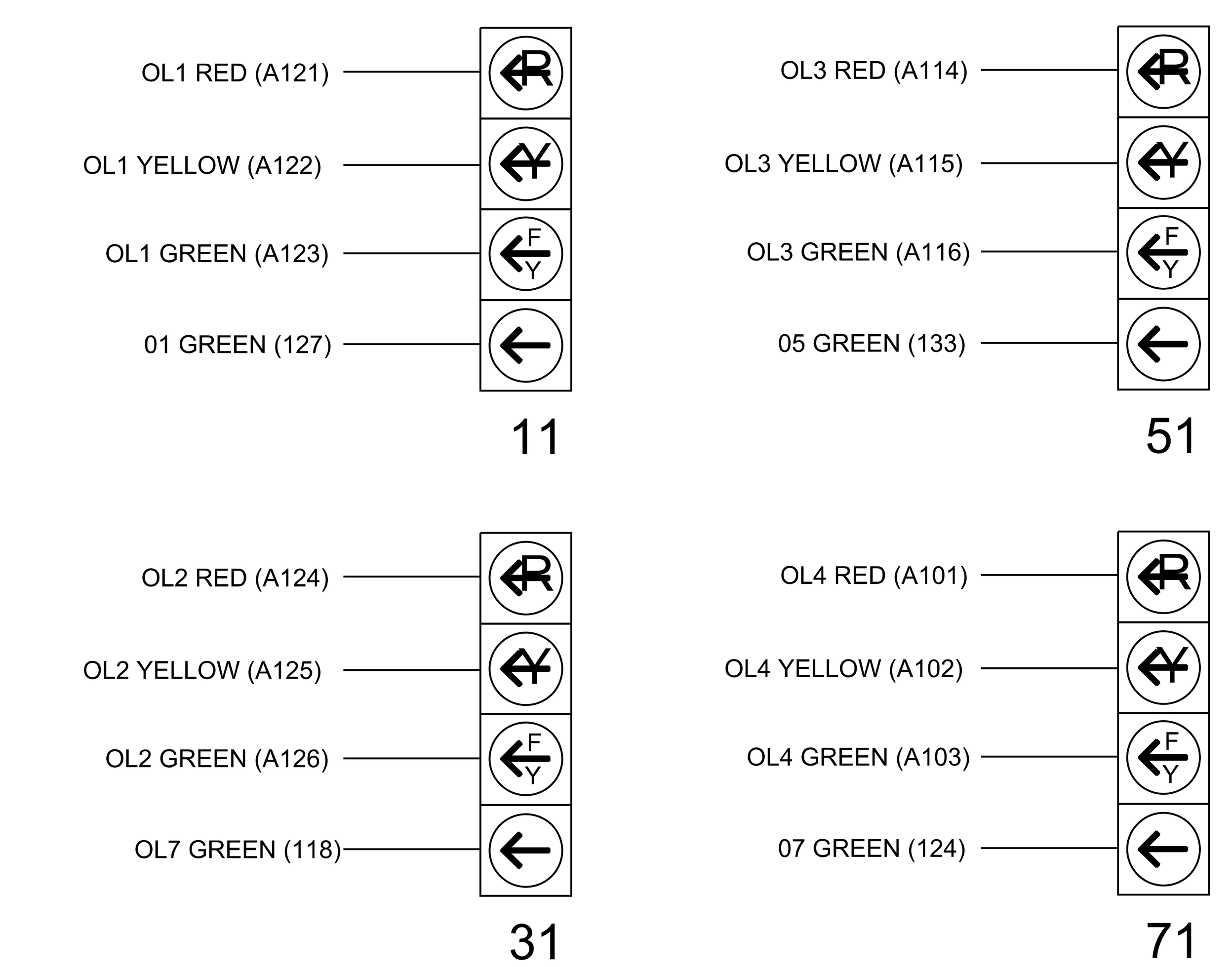
SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4		S5	S6	S7		S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3		4	14	5		6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	OL7		4	4 PED	5		6	6 PED	7	8	8 PED	OL1	OL2	OL5	OL3	OL4	OL6
SIGNAL HEAD NO.	11★	21,22	NU	22	31★	41,42	NU	42	51★	61,62	NU	71★	81,82	NU	11★	31★	82	51★	71★	62
RED	·	128	·	*	·	101	·	*	·	134	·	·	107	·	·	·	*	·	·	*
YELLOW	*	129	·	·	·	102	·	·	·	135	·	*	108	·	·	·	·	·	·	·
GREEN	·	130	·	·	·	103	·	·	·	136	·	·	109	·	·	·	·	·	·	·
RED ARROW	·	·	·	·	·	·	·	·	·	·	·	·	·	·	A121	A124	·	A114	A101	·
YELLOW ARROW	·	·	·	117	·	·	·	132	·	·	·	·	·	·	A122	A125	A112	A115	A102	A105
FLASHING YELLOW ARROW	·	·	·	·	·	·	·	·	·	·	·	·	·	·	A123	A126	·	A116	A103	·
GREEN ARROW	127	·	·	118	118	·	·	133	133	·	·	124	·	·	·	·	A113	·	·	A106

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

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



INPUT FILE POSITION LAYOUT

(front view)

FILE		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	ø 1 1A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	ø 4 4A	ø 4 4C	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
	L	NOT USED					ø 4 4B	ø 4 4D							ST DC ISOLATOR
FILE "J"	U	SLOT EMPTY	ø 5 5B	ø 6 6A	SLOT EMPTY	ø 7 7A	ø 7 7B	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	PRE1 AC ISOLATOR
	L		ø 5 5C	NOT USED		NOT USED	ø 7 7C								NOT USED

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

FS = FLASH SENSE
ST = STOP TIME
PRE = PREEMPT

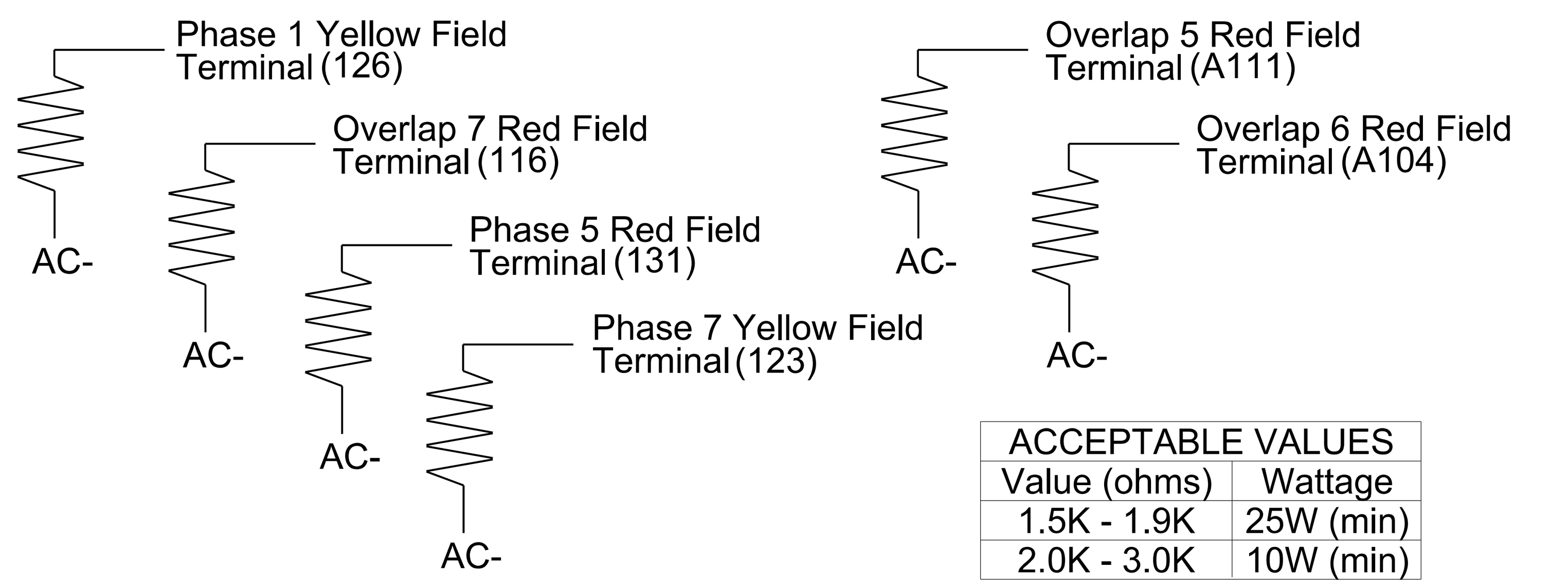
INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN
1A	TB2-1,2	I1U	56	18	1	1	15.0		X		X	
				-	29	6	3.0		X		X	X
4A	TB4-9,10	I6U	41	3	8	4			X		X	
4B	TB4-11,12	I6L	45	7	9	4			X		X	
4C	TB6-1,2	I7U	65	31	10	4			X		X	
4D	TB6-3,4	I7L	78	44	11	4	5.0		X		X	
5B	TB3-5,6	J2U	40	2	16	5	15.0		X		X	
5C	TB3-7,8	J2L	44	6	17	5	10.0		X		X	
6A	TB3-9,10	J3U	64	30	18	6			X	X	X	
7A	TB5-5,6	J5U	57	19	21	7	15.0		X		X	
				-	32	4	3.0		X		X	
7B	TB5-9,10	J6U	42	4	22	7	3.0		X		X	
7C	TB5-11,12	J6L	46	8	23	7	3.0		X		X	

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)



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

SPECIAL DETECTOR NOTE

For zones 1B, 2A, 3A, 5A, & 8A, 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: 09-0567T2
DESIGNED: August 2024
SEALED: 07/14/2025
REVISED: N/A

Electrical Detail - Temporary Design 2
Sheet 1 of 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PLANS PREPARED IN THE OFFICE OF:
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421 Fayetteville Street, Suite 600
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ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared For: Transportation Mobility and Safety Division — State of North Carolina Department of Transportation — ITS & Signals Management Section
750 N.Greenfield Pkwy,Garner,NC 27529

NC 66/SR 2377 (W. Mountain St.) at NC 66 (Old Hollow Road) and SR 2649 (Hopkins Road)
Division 9 Forsyth County Kernersville

PLAN DATE: August 2024	REVIEWED BY: KP Baumann
PREPARED BY: CF Davis	REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 044434 ENGINEER KEVIN P. BAUMANN
DocuSigned by: 5DC709A86BCB447...
SIGNATURE 7/14/2025 DATE
SIG. INVENTORY NO. 09-0567T2

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	5	6	7
Type	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section	Normal	Normal	Normal
Included Phases	2	4	6	8	1,9	7	3,9
Modifier Phases	1	3,9	5	7	-	-	-
Modifier Overlaps	-	-	-	-	-	-	-
Trail Green	0	0	0	0	0	0	0
Trail Yellow	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Trail Red	0.0	0.0	0.0	0.0	0.0	0.0	0.0

OUTPUT CHANNEL CONFIGURATION

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

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

Channel Configuration

NOTICE OVERLAP 7 ASSIGNED TO CHANNEL 3 →

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	Overlap	7	·	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

NOTICE: FLASH RED

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	Phase Phase Omit	9	Result=!A	Preempt Status	1	-	-	0.0	0.0

LOGIC STATEMENT DESCRIPTION

Statement 1 Description: Omits phase 9 while not in preempt 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

StartUp Clearance Hold
6

Unit Flash Parameters

All Red Flash Exit Time
6

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.

SEQUENCE DETAIL

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

Web Interface
Home >Controller >Sequence

Sequence 1

Ring	Sequence Data
1	1,2,a,3,4,b,9,c
2	5,6,a,7,8,b,c
3	39,c,40,d

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REVISED: N/A

Electrical Detail - Temporary Design 2
Sheet 2 of 3

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ELECTRICAL AND PROGRAMMING DETAILS FOR:

NC 66/SR 2377 (W. Mountain St.)
at
NC 66 (Old Hollow Road) and
SR 2649 (Hopkins Road)

Division 9 Forsyth County Kernersville

PLAN DATE: August 2024	REVIEWED BY: KP Baumann
PREPARED BY: CF Davis	REVIEWED BY:

REVISIONS	INIT.	DATE

Prepared For: Transportation Mobility and Safety Division, ITS & Signals Management Section, State of North Carolina Department of Transportation
750 N.Greenfield Pkwy,Garner,NC 27529

PLANS PREPARED IN THE OFFICE OF:
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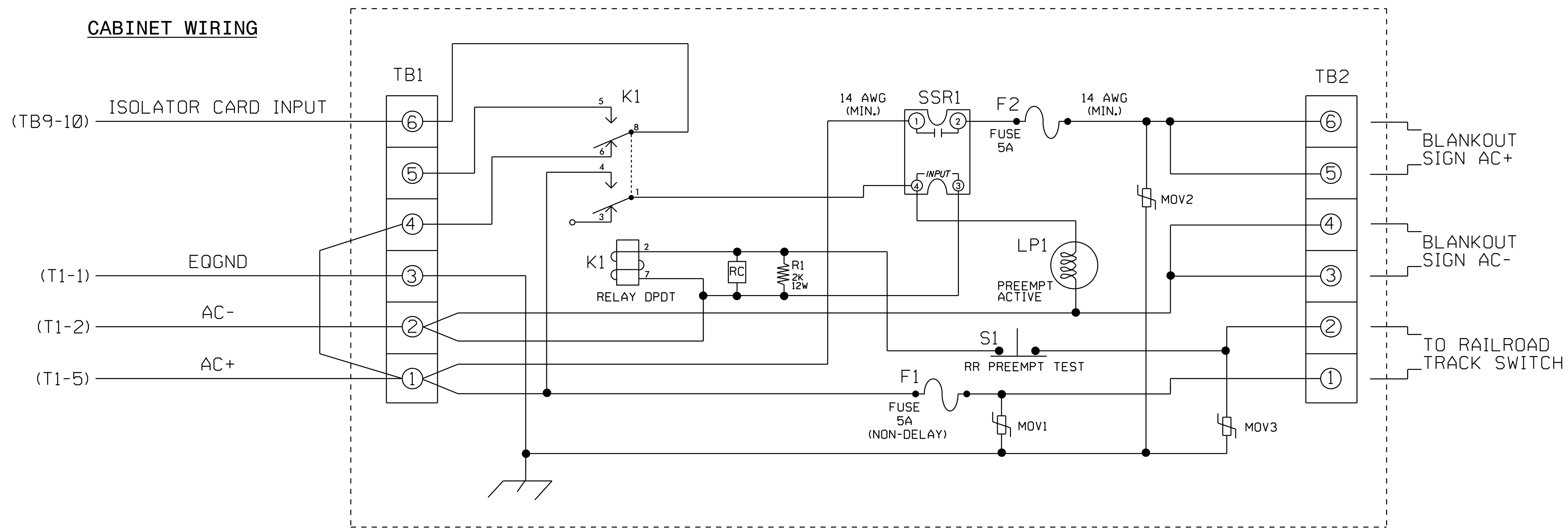
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 044434 ENGINEER KEVIN P. BAUMANN

DocuSigned by: 5DC709A86BCB447...
SIGNATURE 7/14/2025 DATE

SIG. INVENTORY NO. 09-0567T2

RAILROAD PREEMPTION WIRING DETAIL

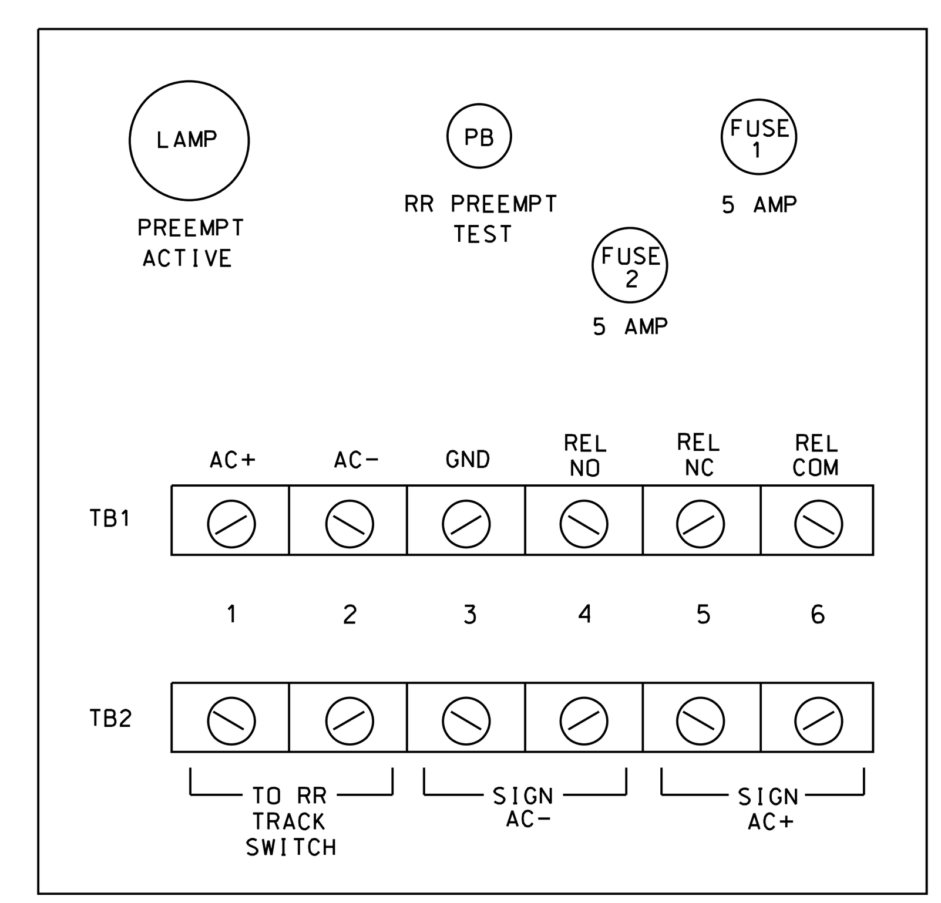
(wire as shown below)



NOTES

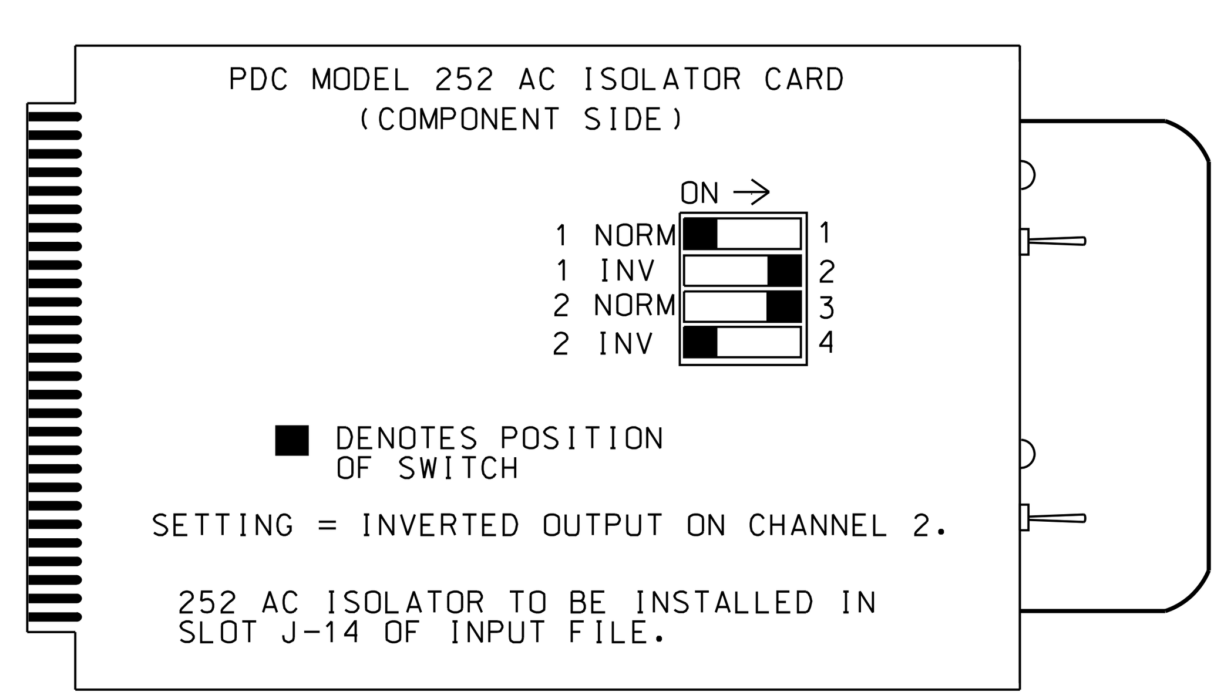
1. Relay K1 is shown in the energized (Preempt not active) normal operation state.
2. Relay K1 is a DPDT with 120VAC coil with octal base.
3. Relay SSR1 is a SPST (normally open) Solid State Relay with AC input and AC (25 amp) output.
4. AC Isolator Card shall activate preemption upon removal of AC+ from the input (as shown above). To accomplish this set invert dip switch on AC Isolator Card.
5. IMPORTANT!! A jumper must be added between input file terminals J14-E and J14-K if not already present. Also, terminal TB9-12 (on input panel) shall be connected to AC neutral (jumper may have to be added).

FRONT VIEW



PREEMPT 2 AC ISOLATOR (MODEL 252) OUTPUT PROGRAMMING DETAIL

*(set **DIP** switches as shown below)*



NOTE: IF ANOTHER MANUFACTURER TYPE OF AC ISOLATOR IS USED, OUTPUT PROGRAMMING IS LIKELY NOT TO EQUATE TO THAT SHOWN ABOVE.

PREEMPTION PROGRAMMING

Front Panel
Main Menu >Controller >Preemption
>Preempt Phasing/Preempt Parameters

Web Interface
Home >Controller >Preempt Configuration >Preempts

Preempt Configuration

Preempt	1
Enabled	Enabled
Type	Rail Road
Track Phases	4,7,39
Track Overlaps	2,4
Dwell Phases	2,6
Dwell Peds	-
Dwell Overlaps	1
Cycling Phases	2,6,9
Cycling Peds	-
Cycling Overlaps	1,5,7
Exit Phases	4,8
Exit Overlaps	2,4
Delay	0
Call Ext Time	1.0
Max Presence	0
Max Pres Act	Terminate
Enter Min Green	1
Enter Walk	0
Enter Ped Clear	0
Enter Yellow Change	4.9
Enter Red Clear	3.3
Track Green	28
Track Yellow Clr	4.4
Track Red Clear	2.3
Dwell Green	0
Exit Min Green	255
Exit Yellow Change	25.5
Exit Red Clear	25.5
Exit Type	Exit Phases
Non Locking Memory	-
Not Ovrd Flash	X
Not Ovrd Nxt Pre	-
Require All Red Entry	-
Track Clear Ovrd	X
Ped Clear During Yellow	-
Entry Omit OLTG	X
Track Reserve	X

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 09-0567T2
DESIGNED: August 2024
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REVISED: N/A

Electrical Detail - Temporary Design 2
Sheet 3 of 3

PLANS PREPARED IN THE OFFICE OF:
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ELECTRICAL AND PROGRAMMING DETAILS FOR:
Prepared For:
Transportation Mobility and Safety Division — ITS & Signals Management Section — State of North Carolina Department of Transportation
750 N.Greenfield Pkwy,Garner,NC 27529

NC 66/SR 2377 (W. Mountain St.)
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Division 9 | Forsyth County | Kernersville

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NORTH CAROLINA PROFESSIONAL SEAL 044434 ENGINEER KEVIN P. BAUMANN
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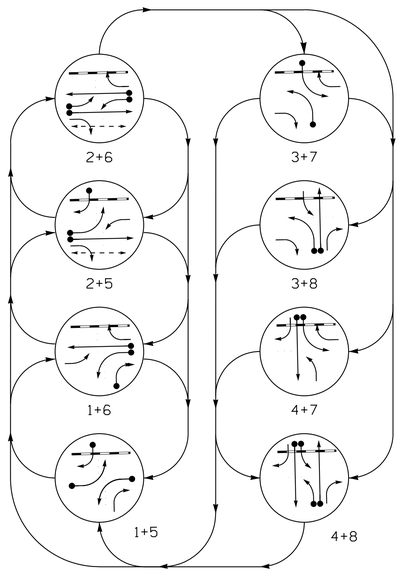
SIGNATURE 7/14/2025 DATE

SIG. INVENTORY NO. 09-0567T2

PROJECT REFERENCE NO.	SHEET NO.
U-5760	Sig. 4.0

PHASING DIAGRAM

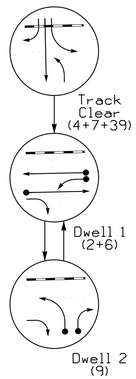


PHASING DIAGRAM DETECTION LEGEND

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

RAIL PREEMPT PHASES

(High Priority)



MAXTIME PREEMPTION CHART

FUNCTION	PRE 1
Type	RAIL ROAD
Exit Phases	4,8
Delay	0
Call Extend Time	1.0
Max Presence	0
Enter Min Green	1
Enter Walk	1
Enter Ped Clear	5
Enter Yellow Change	4.9
Enter Red Clear	3.3
Track Green	28
Track Yellow Change	4.4
Track Red Clear	2.3
Dwell Green	0
Exit Min Green	255 *
Exit Yellow Change	25.5 *
Exit Red Clear	25.5 *
Exit Type	EXIT PHASES
Ped Clear Through Yellow	Y
Require All Red Entry	–

* Controller uses lesser of time shown and the normal time used for all phases.

This signal was designed for advance preemption.

TABLE OF OPERATION

SIGNAL FACE	PHASE 1+5	1+6	2+5	2+6	3+7	3+8	4+7	4+8	RR CLR	RR DWELL 1	RR DWELL 2	FLASH
11	←	←	F	F	R	R	R	R	R	R	R	R
21	R	R	G	G	R	R	R	R	R	G	R	R
22	R	R	G	G	R/—	R/—	R	R	R	G	R/—	R
31	R	R	R	R	←	←	F	F	F	R	←	R
41	R	R	R	R	R	R	G	G	G	R	R	R
42	R/—	R	R/—	R	R	R	G	G	G	R	R	R
51	←	F	←	F	R	R	R	R	R	R	R	R
61	R	G	R	G	R	R	R	R	R	G	R	R
62	R	G	R	G	R/—	R	R/—	R	R	G	R	R
71	R	R	R	R	←	F	←	F	←	R	R	R
81	R	R	R	R	R	G	R	G	R	R	R	R
82	R/—	R/—	R	R	R	G	R	G	R	R	R/—	R
P21, P22	DW	DW	W	W	DW	DW	DW	DW	DW	DW	DW	DRK
Sign A	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	ON	*

* See Note 8.

MAXTIME DETECTOR INSTALLATION CHART

DETECTOR					PROGRAMMING						
LOOP/ ZONE	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP/ZONE	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
1A	6X40	0	2-4-2	-	1	15.0	-	X	-	X	-	-
					6	3.0	-	X	-	X	X	-
1B	6X40	0	✳	-	1/9	15.0	-	X	-	X	-	-
2A	6X6	355	✳	-	2	-	-	X	X	X	-	-
3A	6X40	0	✳	-	3/9	15.0	-	X	-	X	-	-
					8	-	-	X	-	X	-	-
4A	6X40	0	2-4-2	-	4	-	-	X	-	X	-	-
4B	6X25	+12 #	2-4-2	-	4	-	-	X	-	X	-	-
4C	6X25	0 ##	2-4-2	-	4	-	-	X	-	X	-	-
4D	6X25	0 ##	2-4-2	-	4	5.0	-	X	-	X	-	-
5A	6X40	0	✳	-	5	15.0	-	X	-	X	-	-
					2	3.0	-	X	-	X	X	-
5B	6X40	0	2-4-2	-	5	15.0	-	X	-	X	-	-
5C	6X25	+12 #	2-4-2	-	5	10.0	-	X	-	X	-	-
6A	6X6	355	EXIST	-	6	-	-	X	X	X	-	-
7A	6X35	0	2-4-2	-	7	15.0	-	X	-	X	-	-
					4	3.0	-	X	-	X	-	-
7B	6X25	+12 #	2-4-2	-	7	3.0	-	X	-	X	-	-
7C	6X25	0 ##	2-4-2	-	7	3.0	-	X	-	X	-	-
8A	6X40	0	✳	-	8	-	-	X	-	X	-	-

\# From Stopbar at Railroad Gate.
\## From Stopbar at SR 2403.
✳ Video Detection Zone

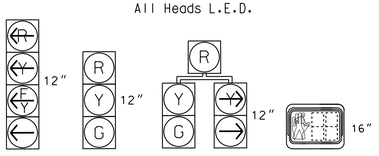
8 Phase
Fully Actuated
w/ Railroad Preemption
(Isolated)

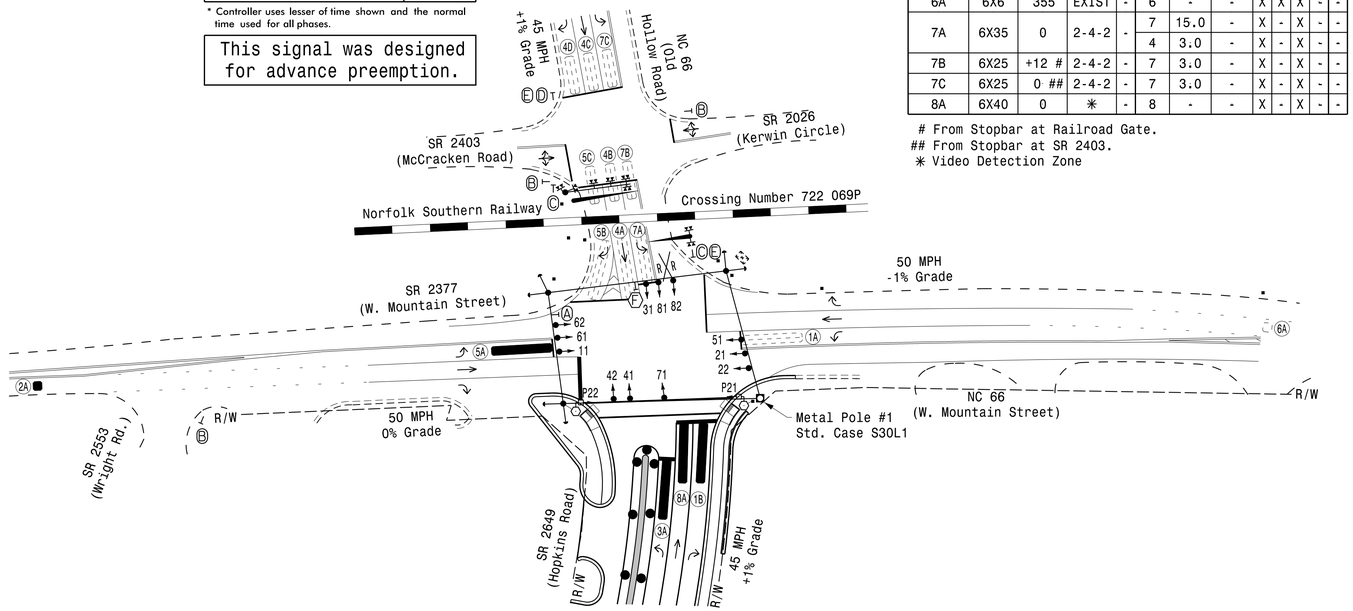
NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2024 and "Standard Specifications for Roads and Structures" dated January 2024.
2. This location contains railroad preemption phasing. Do not program signal for late night flashing operation.
3. Phase 1 and/or phase 5 may be lagged.
4. Phase 3 and/or phase 7 may be lagged.
5. Set all detector units to presence mode.
6. In the event of loop replacement, refer to the current ITS and Signals Design Manual and submit a Plan of Record to the Signal Design Section.
7. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
8. Ensure flashing operation does not alter operation of blank out signs.
9. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
10. Program pedestrian heads to countdown the flashing "DON'T WALK" time only.
11. Reposition existing signal heads numbered 41 and 42.
12. This intersection uses video detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.
13. Program phase 40 to run concurrently with all phases during normal operation. Phase 39 must be incompatible with phase 40 and included as a track clear phase.

SIGNAL FACE I.D.

All Heads L.E.D.





LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
□↓	Pedestrian Signal Head With Push Button & Sign	■↓
○	Signal Pole with Guy	●
○	Signal Pole with Sidewalk Guy	●
▣	Metal Strain Pole	■
▭	Inductive Loop Detector	▭
▬	Non-intrusive Detection Area	▬
⊠	Controller & Cabinet	⊡
□	Junction Box	■
·-·-·	2-in Underground Conduit	·-·-·
N/A	Right of Way	– – –
→	Directional Arrow	→
N/A	Railroad Tracks	▬
N/A	Railroad Cantilever	✕✕
N/A	Railroad Gate and Flasher	◥
▭	Construction Zone	▭
● ●	Construction Zone Drums	● ●
Ⓐ	"NO RIGHT TURN - TRAIN" L.E.D. Blankout Sign	Ⓐ
Ⓑ	"STOP" Sign (R1-1)	Ⓑ
Ⓒ	"DO NOT STOP ON TRACKS" Sign (R8-8)	Ⓒ
Ⓓ	"DO NOT BLOCK INTERSECTION" Sign (R10-7)	Ⓓ
Ⓔ	"STOP HERE WHEN FLASHING" Sign (R8-10)	Ⓔ
Ⓕ	"U-TURN YIELD TO RIGHT TURN" Sign (R10-16)	Ⓕ

MAXTIME TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6	7	8	9	39	40
Walk *	–	14	–	–	–	–	–	–	–		
Ped Clear	–	22	–	–	–	–	–	–	–		
Min Green *	7	14	7	7	7	14	7	7	7		
Passage *	2.0	6.0	2.0	2.0	2.0	6.0	2.0	2.0	2.0		
Max 1 *	20	60	20	30	30	60	40	30	20		
Yellow Change	3.0	4.9	3.0	4.4	3.0	4.9	3.0	4.4	3.0	4.4	4.9
Red Clear	2.4	1.3	3.3	1.9	2.9	1.3	2.3	1.9	3.3	2.3	3.3
Added Initial *	–	2.5	–	–	–	2.5	–	–	–		
Maximum Initial *	–	40	–	–	–	40	–	–	–		
Time Before Reduction *	–	15	–	–	–	15	–	–	–		
Time To Reduce *	–	20	–	–	–	20	–	–	–		
Minimum Gap	–	3.0	–	–	–	3.0	–	–	–		
Advance Walk	–	7	–	–	–	–	–	–	–		
Non Lock Detector	X	–	X	X	X	–	X	X	X		
Vehicle Recall	–	MIN 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.

PLANS PREPARED IN THE OFFICE OF:
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Signal Upgrade - Temporary Design 3
(TMP Phase 3)

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Prepared For: Transportation Mobility and Safety Division, State of North Carolina Department of Transportation, Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

NC 66/SR 2377 (W. Mountain St.) at NC 66 (Old Hollow Road) and SR 2649 (Hopkins Road)

Division 9 Forsyth County Kernersville

PLAN DATE: August 2024 REVIEWED BY: KP Baumann
PREPARED BY: CF Davis REVIEWED BY:

SCALE 0 50 1"=50'

REVISIONS	INIT.	DATE

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NORTH CAROLINA PROFESSIONAL SEAL 044434 ENGINEER KEVIN P. BAUMANN
DocuSigned by: 5DC70DA868CB447...
SIGNATURE 7/14/2025 DATE

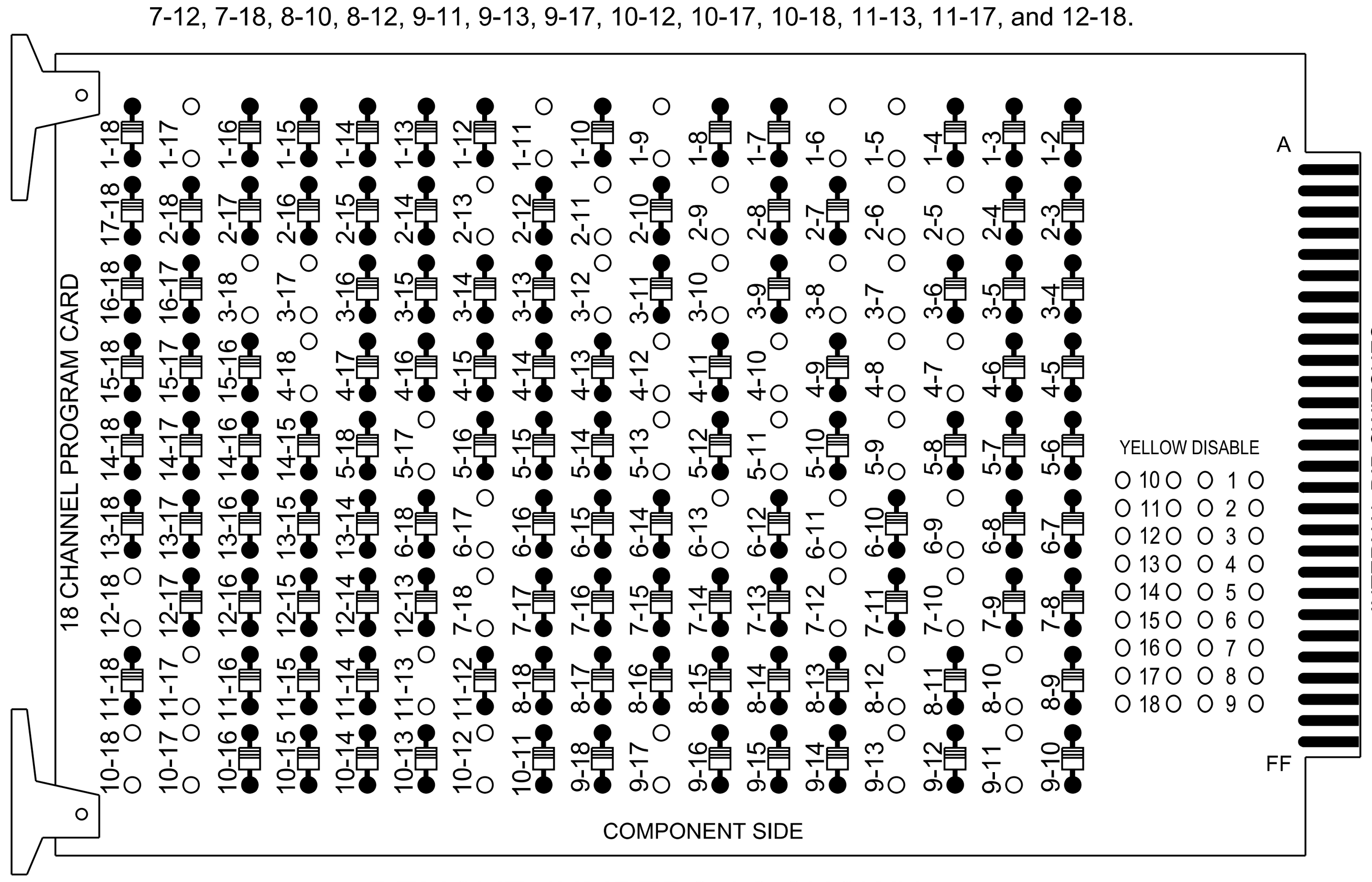
SIG. INVENTORY NO. 09-0567T3

K:\RAL_Roadway\011036312 - U-5760 Big Mill Farm Road\Traffic Signal\SG4 - Signal Design\090567-2024g-r3.dgn
9:01:09 AM Craig.Davis
7/14/2025

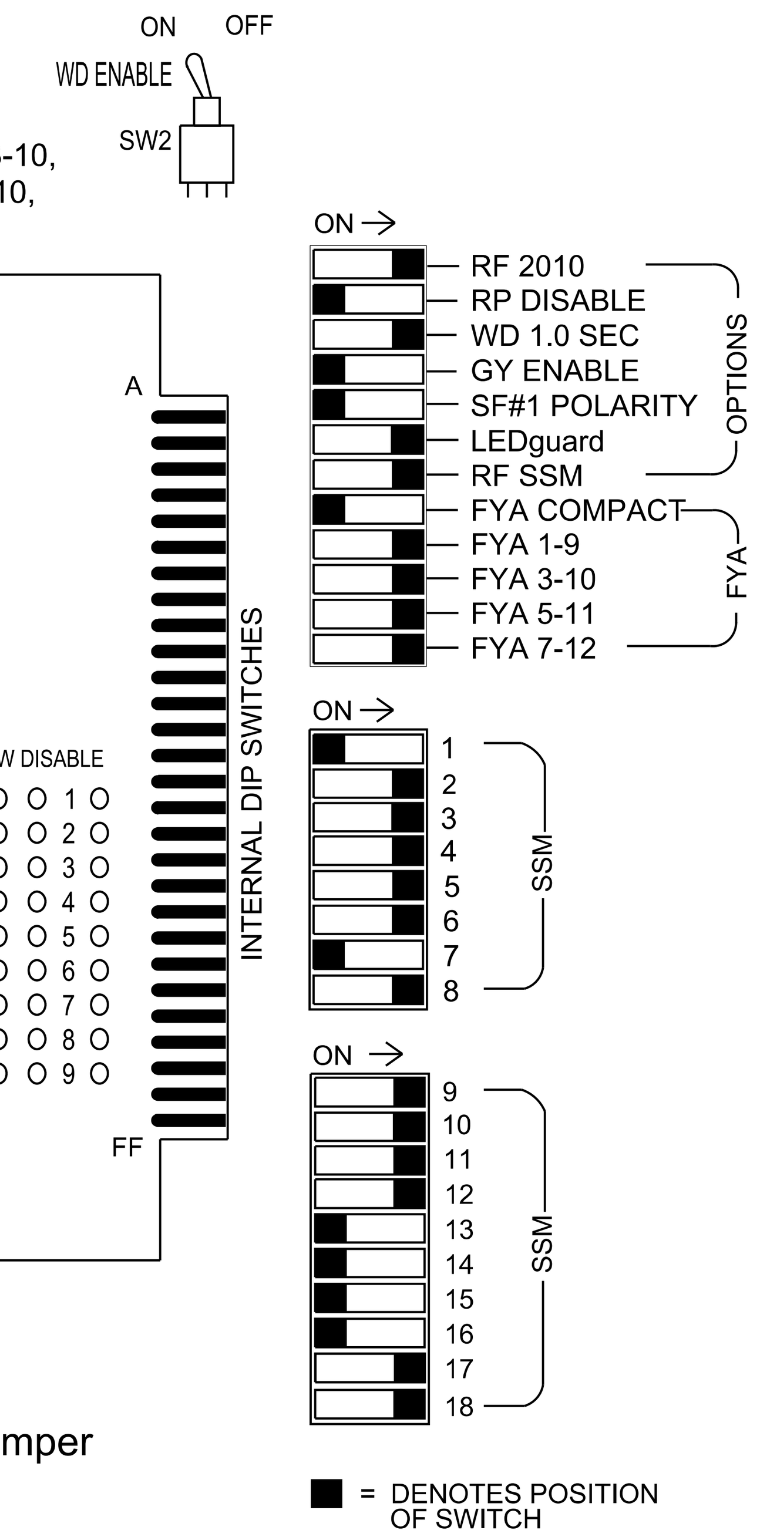
18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 1-5, 1-6, 1-9, 1-11, 1-17, 2-5, 2-6, 2-9, 2-11, 2-13, 3-7, 3-8, 3-10, 3-12, 3-17, 3-18, 4-7, 4-8, 4-10, 4-12, 4-18, 5-9, 5-11, 5-13, 5-17, 6-9, 6-11, 6-13, 6-17, 7-10, 7-12, 7-18, 8-10, 8-12, 9-11, 9-13, 9-17, 10-12, 10-17, 10-18, 11-13, 11-17, and 12-18.



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 phases 2, 6, and 40 for Min Veh Recall.
3. Program phases 4 and 8 for Dual Entry.
4. Program phases 9 and 39 for No Startup Veh Call.
5. Program controller to start up in phase 2 Green No Walk, 6 Green No Walk, 9 Phase Not On, 39 Phase Not On, and 40 Green No Walk.
6. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.

EQUIPMENT INFORMATION

Controller..2070LX
Cabinet..332 w/ Aux
Software..Q-Free MAXTIME
Cabinet Mount...................................Base
Output File Positions..........................18 With Aux. Output File
Load Switches Used...........................S1,S2,S3,S4,S5,S7,S8,S10,S11,AUX S1, AUX S2,AUX S3,AUX S4,AUX S5,AUX S6
Phases Used.......................................1,2,2 PED,3,4,5,6,7,8,9**,39**,40**
Overlap "1"..*
Overlap "2"..*
Overlap "3"..*
Overlap "4"..*
Overlap "5"..*
Overlap "6"..*
Overlap "7"..*

*See overlap programming detail on sheet 2.
**Phase used for preemption timing purposes only.

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4		S5	S6	S7		S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3		4	14	5		6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	OL7		4	4 PED	5		6	6 PED	7	8	8 PED	OL1	OL2	OL5	OL3	OL4	OL6
SIGNAL HEAD NO.	11★	21,22	P21, P22	22	31★	41,42	NU	42	51★	61,62	NU	71★	81,82	NU	11★	31★	82	51★	71★	62
RED		128		*		101		*		134			107				*			*
YELLOW	*	129				102				135		*	108							
GREEN		130				103				136			109							
RED ARROW															A121	A124		A114	A101	
YELLOW ARROW				117				132							A122	A125	A112	A115	A102	A105
FLASHING YELLOW ARROW															A123	A126		A116	A103	
GREEN ARROW	127			118	118			133	133			124					A113			A106
(hand)			113																	
(walk)			115																	

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

INPUT FILE POSITION LAYOUT

(front view)

FILE		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	Ø 1 1A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	Ø 4 4A	Ø 4 4C	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	Ø 2 PED DC ISOLATOR	SLOT EMPTY	FS DC ISOLATOR
	L	NOT USED					Ø 4 4B	Ø 4 4D					NOT USED		ST DC ISOLATOR
FILE "J"	U	SLOT EMPTY	Ø 5 5B	Ø 6 6A	SLOT EMPTY	Ø 7 7A	Ø 7 7B	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	PRE1 AC ISOLATOR
	L		Ø 5 5C	NOT USED		NOT USED	Ø 7 7C								NOT USED

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

FS = FLASH SENSE
ST = STOP TIME
PRE = PREEMPT

INPUT FILE CONNECTION & PROGRAMMING CHART

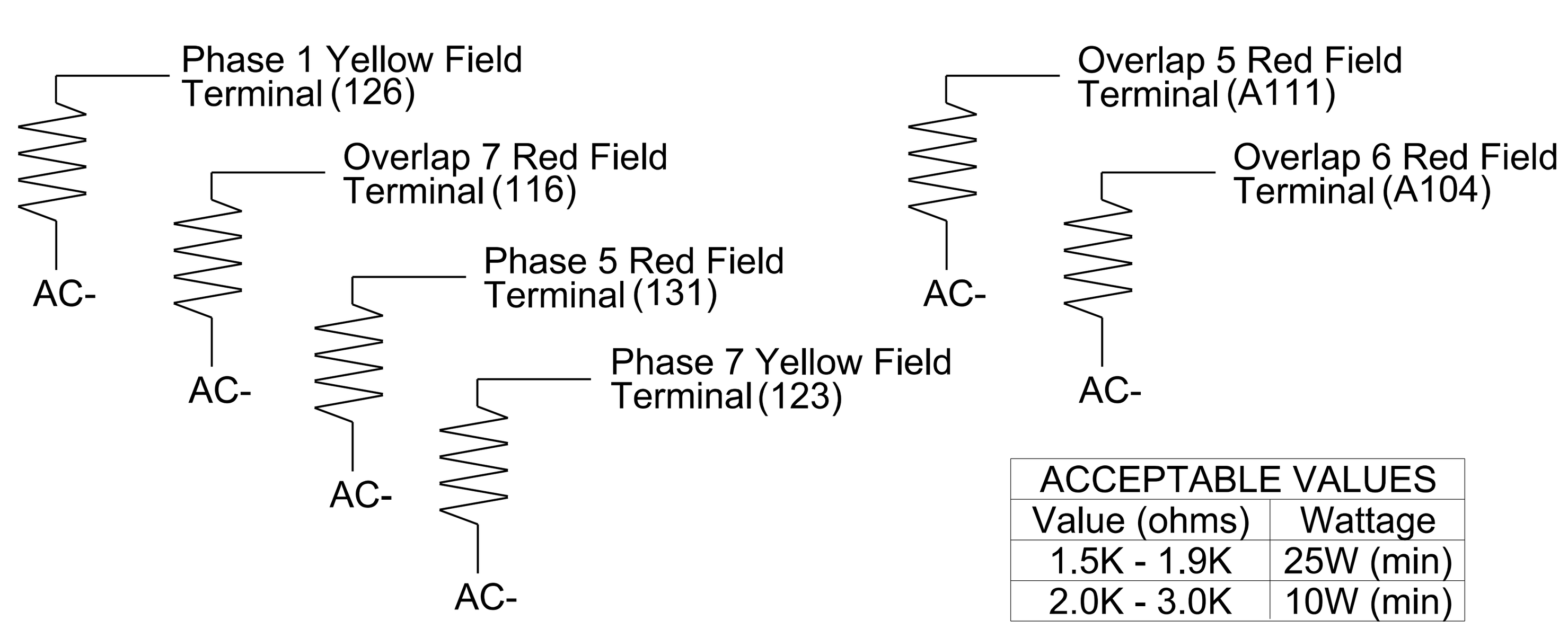
LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN
1A	TB2-1,2	I1U	56	18	1	1	15.0		X		X	
				-	29	6	3.0		X		X	X
4A	TB4-9,10	I6U	41	3	8	4			X		X	
4B	TB4-11,12	I6L	45	7	9	4			X		X	
4C	TB6-1,2	I7U	65	31	10	4			X		X	
4D	TB6-3,4	I7L	78	44	11	4	5.0		X		X	
5B	TB3-5,6	J2U	40	2	16	5	15.0		X		X	
5C	TB3-7,8	J2L	44	6	17	5	10.0		X		X	
6A	TB3-9,10	J3U	64	30	18	6			X	X	X	
7A	TB5-5,6	J5U	57	19	21	7	15.0		X		X	
				-	32	4	3.0		X		X	
7B	TB5-9,10	J6U	42	4	22	7	3.0		X		X	
7C	TB5-11,12	J6L	46	8	23	7	3.0		X		X	
PED PUSH BUTTONS												
P21;P22	TB8-4,6	I12U	67	33	2	PED 2						

NOTE:
INSTALL DC ISOLATOR IN INPUT FILE SLOT I12.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)



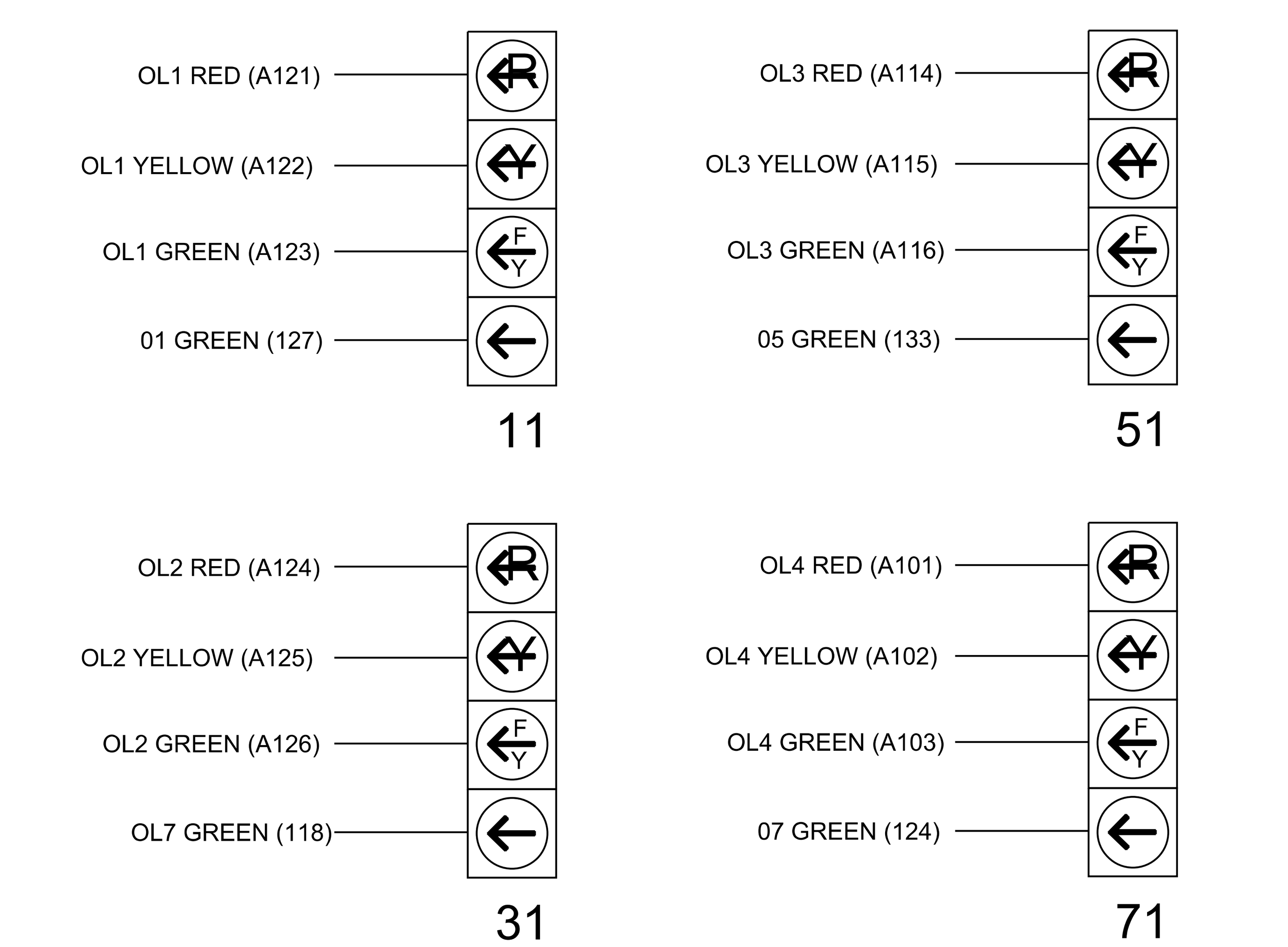
ACCEPTABLE VALUES	
Value (ohms)	Wattage
1.5K - 1.9K	25W (min)
2.0K - 3.0K	10W (min)

SPECIAL DETECTOR NOTE

For zones 1B, 2A, 3A, 5A, & 8A, install a video detection system for vehicle detection. Perform installation according to manufacturer's directions and NCDOT engineer -approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 09-0567T3
DESIGNED: August 2024
SEALED: 07/14/2025
REVISED: N/A

Electrical Detail - Temporary Design 3
Sheet 1 of 3

PLANS PREPARED IN THE OFFICE OF:
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(919) 677-2000

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared For: Transportation Mobility and Safety Division, ITS & Signals Management Section, State of North Carolina Department of Transportation
750 N.Greenfield Pkwy,Garner,NC 27529

NC 66/SR 2377 (W. Mountain St.) at NC 66 (Old Hollow Road) and SR 2649 (Hopkins Road)

Division 9 Forsyth County Kernersville

PLAN DATE: August 2024	REVIEWED BY: KP Baumann
PREPARED BY: CF Davis	REVIEWED BY:

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 044434 ENGINEER KEVIN P. BAUMANN
DocuSigned by: 5DC709A86BCB447...
SIGNATURE 7/14/2025 DATE

SIG. INVENTORY NO. 09-0567T3

PROJECT REFERENCE NO.	SHEET NO.
U-5760	Sig. 4.2

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	5	6	7
Type	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section	Normal	Normal	Normal
Included Phases	2	4	6	8	1,9	7	3,9
Modifier Phases	1	3,9	5	7	-	-	-
Modifier Overlaps	-	-	-	-	-	-	-
Trail Green	0	0	0	0	0	0	0
Trail Yellow	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Trail Red	0.0	0.0	0.0	0.0	0.0	0.0	0.0

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	Phase Phase Omit	9	Result=!A	Preempt Status	1	-	-	0.0	0.0

LOGIC STATEMENT DESCRIPTION

Statement 1 Description: Omits phase 9 while not in preempt 1.

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.

SEQUENCE DETAIL

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

Web Interface
Home >Controller >Sequence

Sequence 1

Ring	Sequence Data
1	1,2,a,3,4,b,9,c
2	5,6,a,7,8,b,c
3	39,c,40,d

OUTPUT CHANNEL CONFIGURATION

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

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

Channel Configuration

NOTICE OVERLAP 7 ASSIGNED TO CHANNEL 3 →

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	Overlap	7	·	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

NOTICE: FLASH RED

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 09-0567T3
DESIGNED: August 2024
SEALED: 07/14/2025
REVISED: N/A

Electrical Detail - Temporary Design 3
Sheet 2 of 3

PLANS PREPARED IN THE OFFICE OF:
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ITS & Signals Management Section
State of North Carolina Department of Transportation
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NC 66/SR 2377 (W. Mountain St.)
at
NC 66 (Old Hollow Road) and
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Division 9 Forsyth County Kernersville

PLAN DATE: August 2024 REVIEWED BY: KP Baumann
PREPARED BY: CF Davis REVIEWED BY:

REVISIONS	INIT.	DATE

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SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 044434 KEVIN P. BAUMANN

DocuSigned by:
5DC709A86BCB447...
SIGNATURE 7/14/2025 DATE

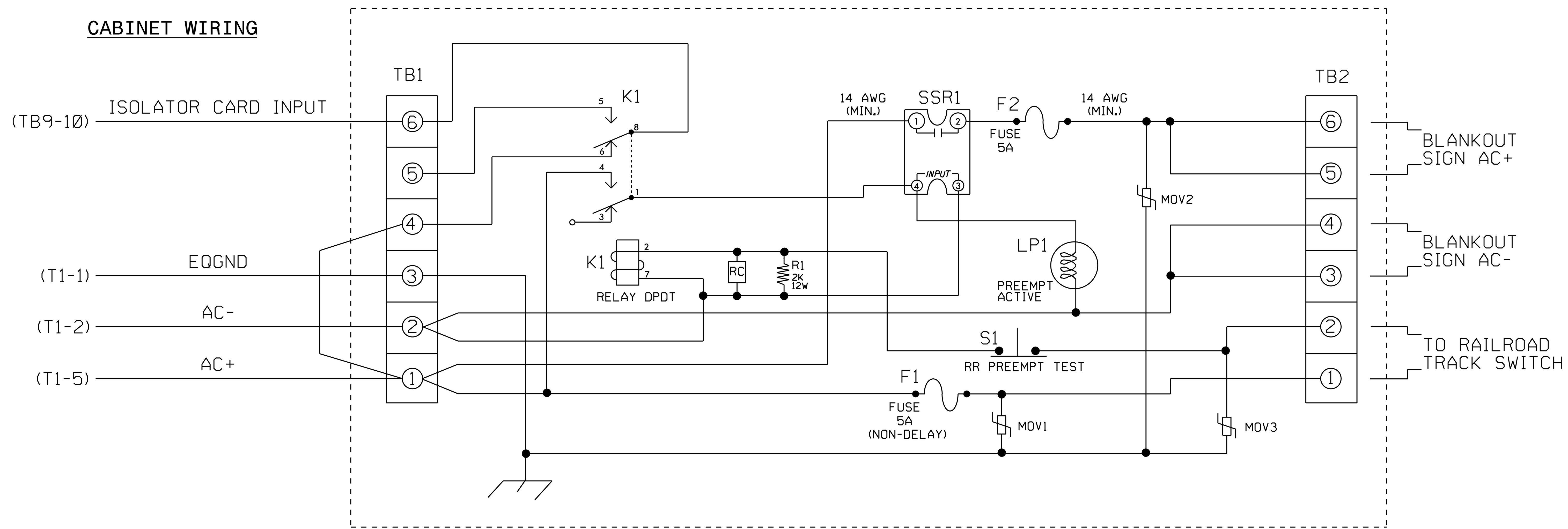
SIG. INVENTORY NO. 09-0567T3

PROJECT REFERENCE NO.	SHEET NO.
U-5760	Sig. 4.3

RAILROAD PREEMPTION WIRING DETAIL

(wire as shown below)

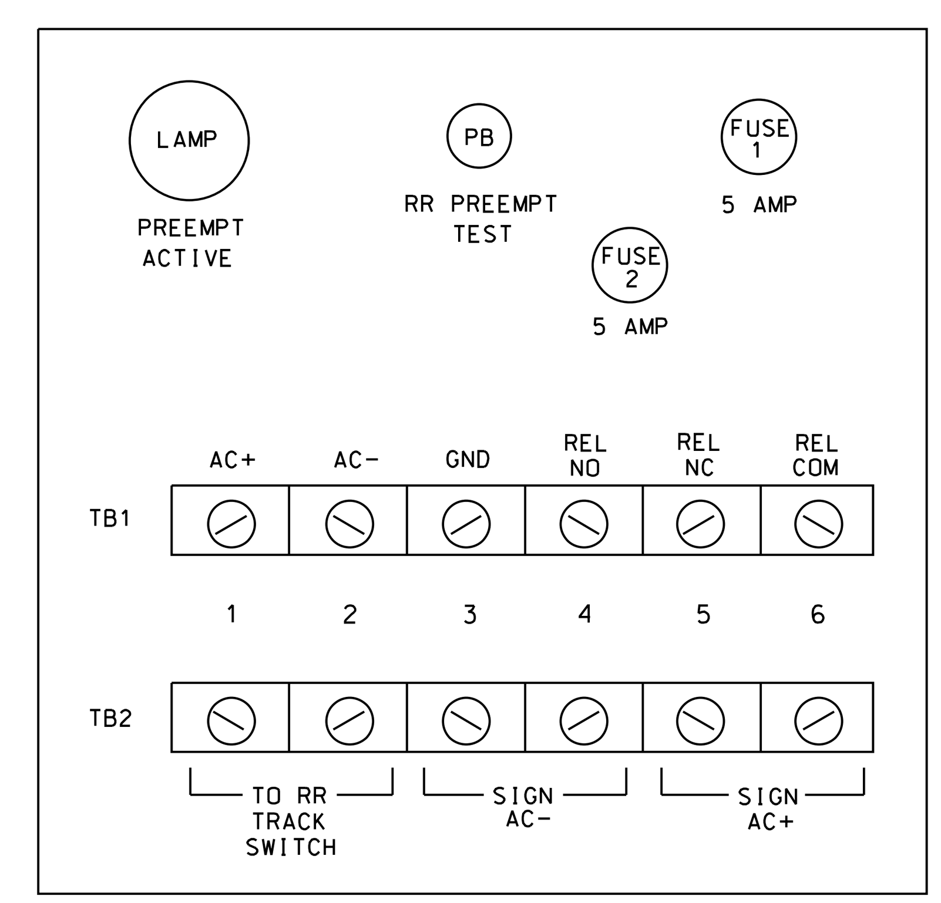
PREEMPTION AND BLANKOUT SIGN CONTROL BOX



NOTES

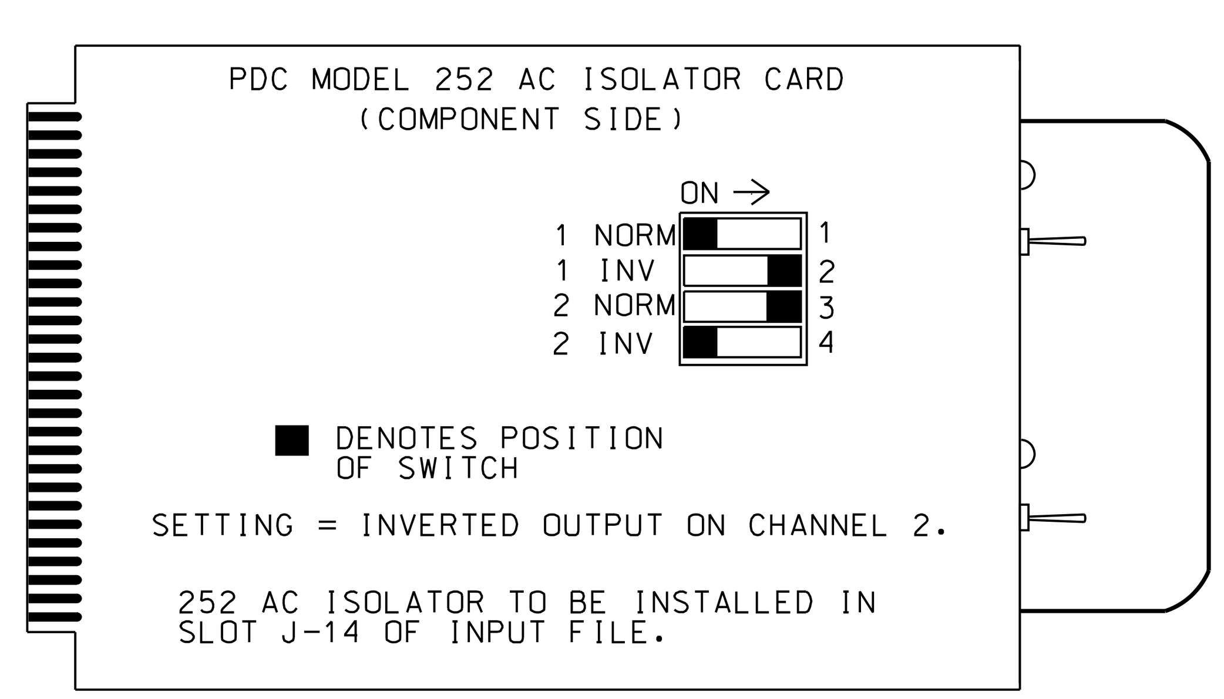
1. Relay K1 is shown in the energized (Preempt not active) normal operation state.
2. Relay K1 is a DPDT with 120VAC coil with octal base.
3. Relay SSR1 is a SPST (normally open) Solid State Relay with AC input and AC (25 amp) output.
4. AC Isolator Card shall activate preemption upon removal of AC+ from the input (as shown above). To accomplish this set invert dip switch on AC Isolator Card.
5. IMPORTANT!! A jumper must be added between input file terminals J14-E and J14-K if not already present. Also, terminal TB9-12 (on input panel) shall be connected to AC neutral (jumper may have to be added).

FRONT VIEW



PREEMPT 2 AC ISOLATOR (MODEL 252) OUTPUT PROGRAMMING DETAIL

*(set **DIP** switches as shown below)*



NOTE: IF ANOTHER MANUFACTURER TYPE OF AC ISOLATOR IS USED, OUTPUT PROGRAMMING IS LIKELY NOT TO EQUATE TO THAT SHOWN ABOVE.

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.

PREEMPTION PROGRAMMING

Front Panel
Main Menu >Controller >Preemption
>Preempt Phasing/Preempt Parameters

Web Interface
Home >Controller >Preempt Configuration >Preempts

Preempt Configuration

Preempt	1
Enabled	Enabled
Type	Rail Road
Track Phases	4,7,39
Track Overlaps	2,4
Dwell Phases	2,6
Dwell Peds	-
Dwell Overlaps	1
Cycling Phases	2,6,9
Cycling Peds	-
Cycling Overlaps	1,5,7
Exit Phases	4,8
Exit Overlaps	2,4
Delay	0
Call Ext Time	1.0
Max Presence	0
Max Pres Act	Terminate
Enter Min Green	1
Enter Walk	1
Enter Ped Clear	5
Enter Yellow Change	4.9
Enter Red Clear	3.3
Track Green	28
Track Yellow Clr	4.4
Track Red Clear	2.3
Dwell Green	0
Exit Min Green	255
Exit Yellow Change	25.5
Exit Red Clear	25.5
Exit Type	Exit Phases
Non Locking Memory	·
Not Ovrd Flash	X
Not Ovrd Nxt Pre	-
Require All Red Entry	-
Track Clear Ovrd	X
Ped Clear During Yellow	X
Entry Omit OLTG	X
Track Reserve	X

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 09-0567T3
DESIGNED: August 2024
SEALED: 07/14/2025
REVISED: N/A

Electrical Detail - Temporary Design 3
Sheet 3 of 3

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Division 9 Forsyth County Kernersville

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PREPARED BY: CF Davis	REVIEWED BY:

REVISIONS	INIT.	DATE

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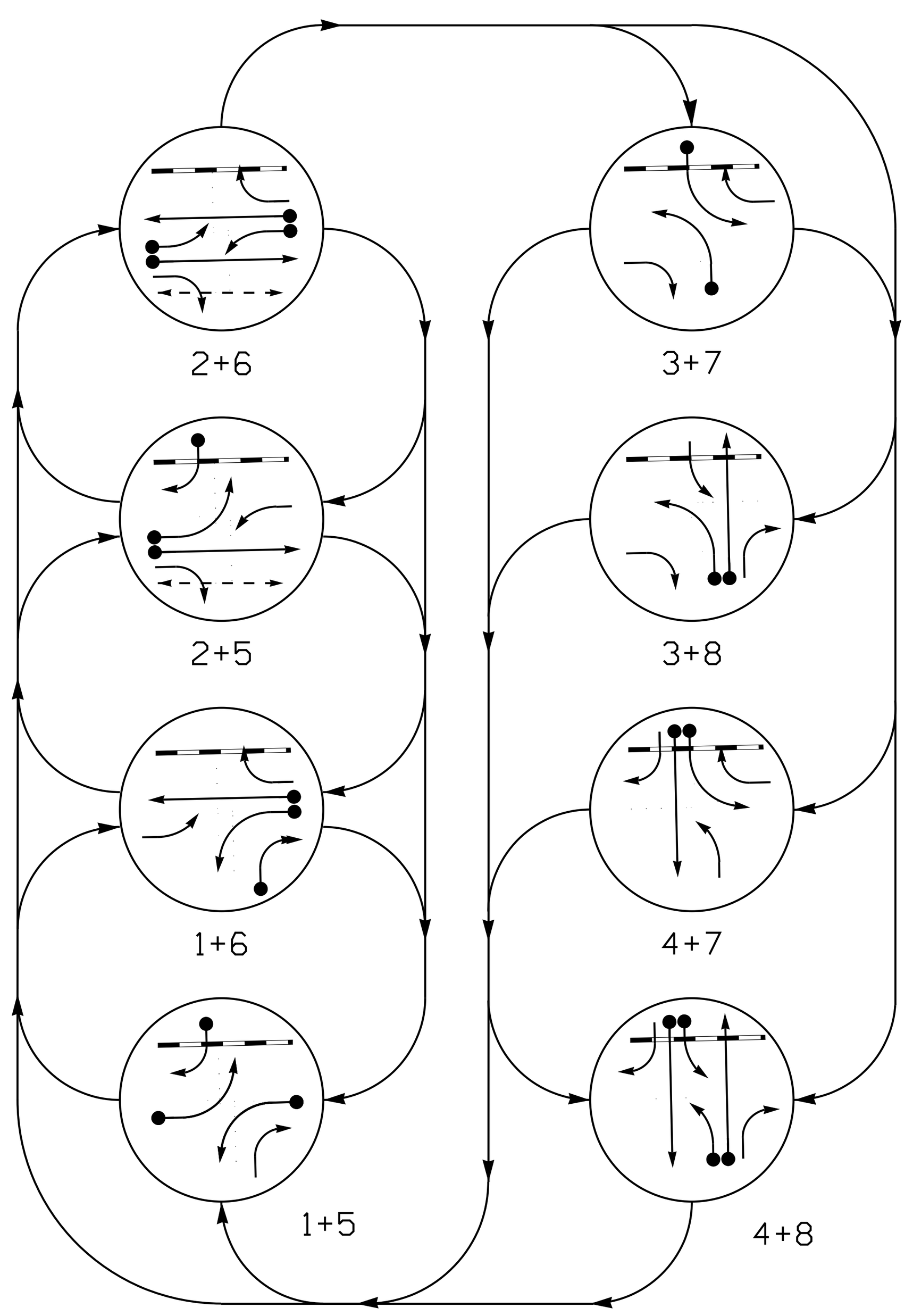
SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 044434 KEVIN P. BAUMANN
DocuSigned by: 5DC709A86BCB447...
7/14/2025
SIGNATURE DATE
SIG. INVENTORY NO. 09-0567T3

7/14/2025 9:01:13 AM Craig.Davis K:*RAL_Roadway*011036312 - U-5760 Big Mill Farm Road*Traffic Signal*S4 - Signal Design*090567-2024e-t3.dgn

PROJECT REFERENCE NO.	SHEET NO.
U-5760	Sig. 5.0

PHASING DIAGRAM

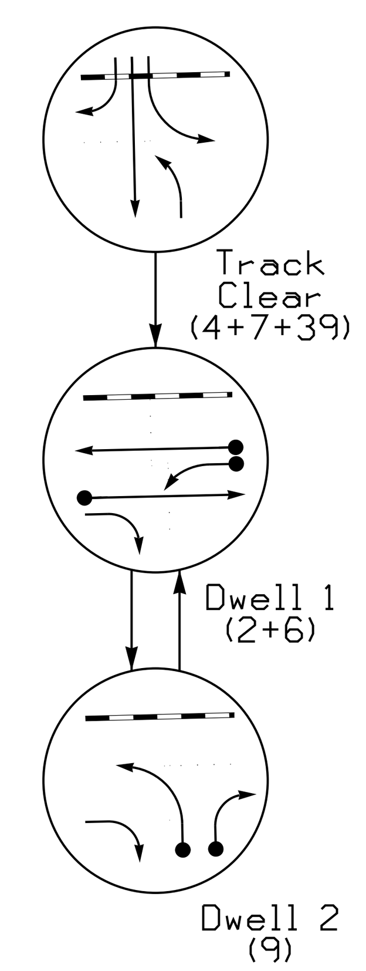


PHASING DIAGRAM DETECTION LEGEND

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

RAIL PREEMPT PHASES

(High Priority)



MAXTIME PREEMPTION CHART

FUNCTION	PRE 1
Type	RAIL ROAD
Exit Phases	4,8
Delay	0
Call Extend Time	1.0
Max Presence	0
Enter Min Green	1
Enter Walk	1
Enter Ped Clear	5
Enter Yellow Change	4.9
Enter Red Clear	3.3
Track Green	28
Track Yellow Change	4.4
Track Red Clear	2.3
Dwell Green	0
Exit Min Green	255 *
Exit Yellow Change	25.5 *
Exit Red Clear	25.5 *
Exit Type	EXIT PHASES
Ped Clear Through Yellow	Y
Require All Red Entry	–

* Controller uses lesser of time shown and the normal time used for all phases.

This signal was designed for advance preemption.

TABLE OF OPERATION

SIGNAL FACE	PHASE 1+5	1+6	2+5	2+6	3+7	3+8	4+7	4+8	RR CLR	RR DWELL 1	RR DWELL 2	FLASH
11	←	←	F/Y←	F/Y←	←R	←R	←R	←R	←R	F/Y←	←R	←R
21	R	R	G	G	R	R	R	R	R	G	R	R
22	R	R	G	G	R/→	R/→	R	R	R	G	R/→	R
31	←R	←R	←R	←R	←	←	F/Y←	F/Y←	F/Y←	←R	←	←R
41	R	R	R	R	R	R	G	G	G	R	R	R
42	R/→	R	R/→	R	R	R	G	G	G	R	R	R
51	←	F/Y←	←	F/Y←	←R	←R	←R	←R	←R	←R	←R	←R
61	R	G	R	G	R	R	R	R	R	G	R	R
62	R	G	R	G	R/→	R	R/→	R	R	G	R	R
71	←R	←R	←R	←R	←	F/Y←	←	F/Y←	←	←R	←R	←R
81	R	R	R	R	R	G	R	G	R	R	R	R
82	R/→	R/→	R	R	R	G	R	G	R	R	R/→	R
P21, P22	DW	DW	W	W	DW	DW	DW	DW	DW	DW	DW	DRK
Sign A	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	ON	✱

✱ See Note 8.

MAXTIME DETECTOR INSTALLATION CHART

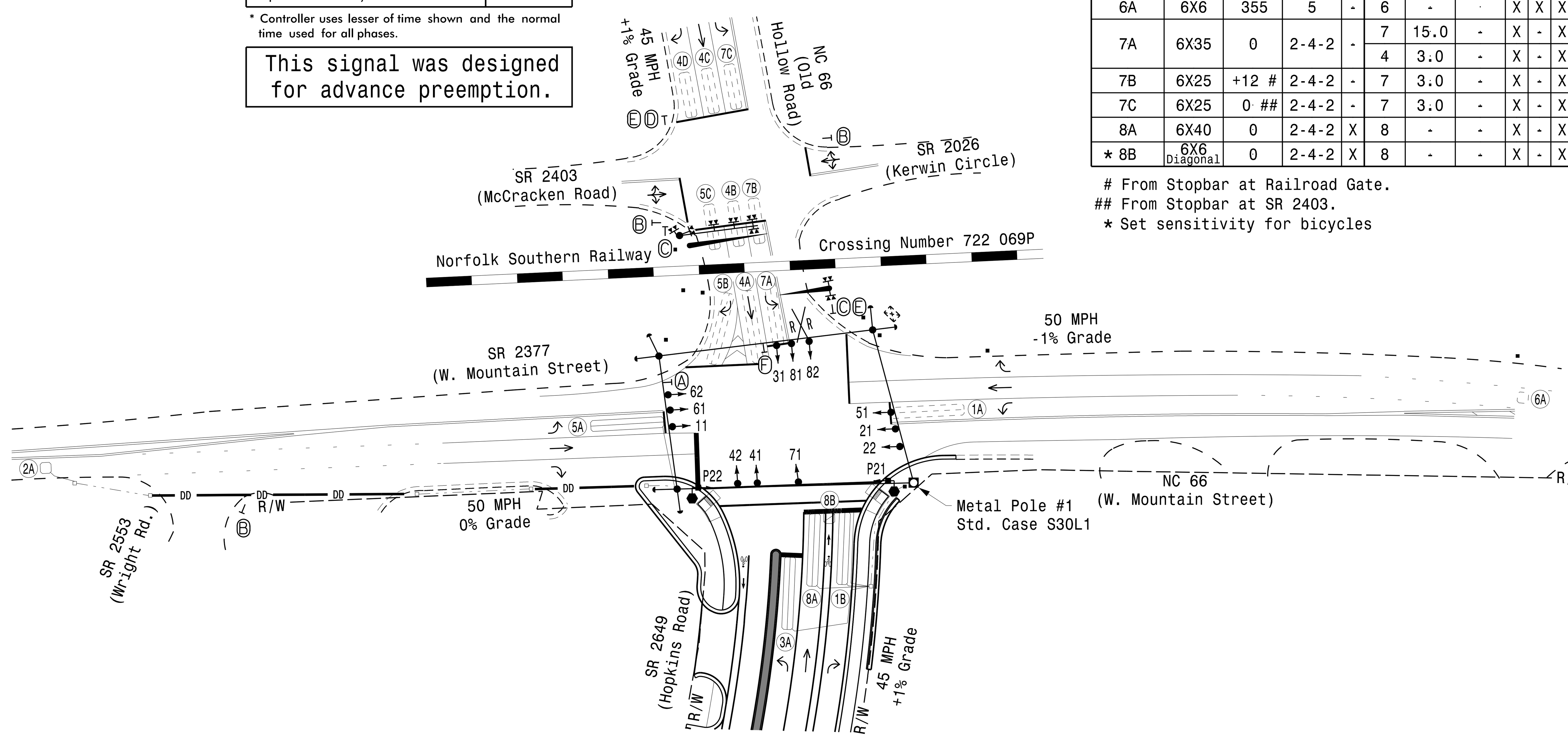
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
1A	6X40	0	2-4-2	-	1	15.0	-	X	-	X	-	-
					6	3.0	-	X	-	X	X	-
1B	6X40	0	2-4-2	X	1/9	15.0	-	X	-	X	-	-
2A	6X6	355	5	X	2	-	·	X	X	X	-	-
3A	6X40	0	2-4-2	X	3/9	15.0	-	X	-	X	-	-
					8	-	-	X	-	X	-	-
4A	6X40	0	2-4-2	-	4	-	-	X	-	X	-	-
4B	6X25	+12 #	2-4-2	-	4	-	-	X	-	X	-	-
4C	6X25	0 ##	2-4-2	-	4	-	-	X	-	X	-	-
4D	6X25	0 ##	2-4-2	-	4	5.0	-	X	-	X	-	-
5A	6X40	0	2-4-2	X	5	15.0	-	X	-	X	-	-
					2	3.0	-	X	-	X	X	-
5B	6X40	0	2-4-2	-	5	15.0	-	X	-	X	-	-
5C	6X25	+12 #	2-4-2	-	5	10.0	-	X	-	X	-	-
6A	6X6	355	5	-	6	-	·	X	X	X	-	-
7A	6X35	0	2-4-2	-	7	15.0	-	X	-	X	-	-
					4	3.0	-	X	-	X	-	-
7B	6X25	+12 #	2-4-2	-	7	3.0	-	X	-	X	-	-
7C	6X25	0 ##	2-4-2	-	7	3.0	-	X	-	X	-	-
8A	6X40	0	2-4-2	X	8	-	-	X	-	X	-	-
* 8B	6X6 Diagonal	0	2-4-2	X	8	-	-	X	-	X	-	X

\# From Stopbar at Railroad Gate.
\## From Stopbar at SR 2403.
* Set sensitivity for bicycles

8 Phase
Fully Actuated
w/ Railroad Preemption
(Isolated)

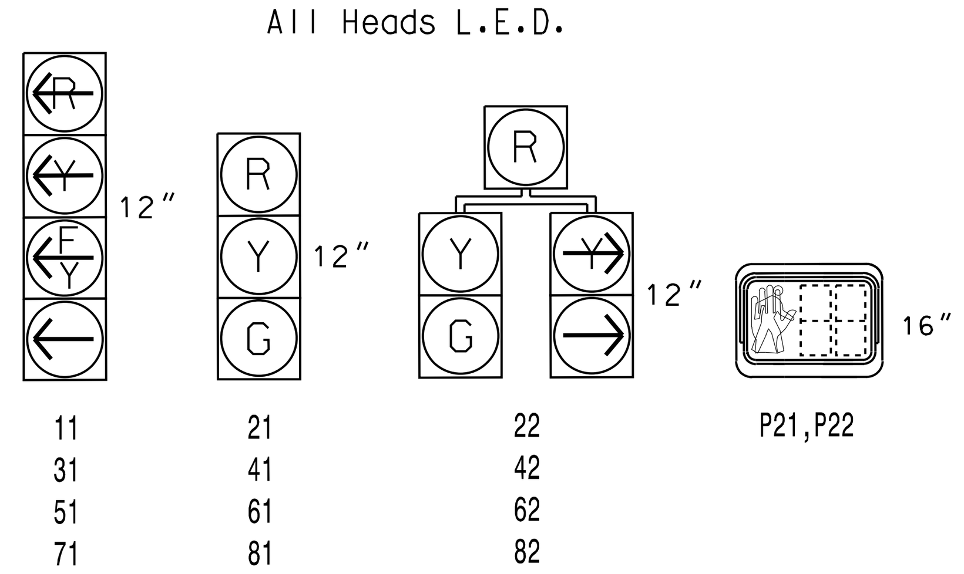
NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2024 and "Standard Specifications for Roads and Structures" dated January 2024.
2. This location contains railroad preemption phasing. Do not program signal for late night flashing operation.
3. Phase 1 and/or phase 5 may be lagged.
4. Phase 3 and/or phase 7 may be lagged.
5. Set all detector units to presence mode.
6. In the event of loop replacement, refer to the current ITS and Signals Design Manual and submit a Plan of Record to the Signal Design Section.
7. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
8. Ensure flashing operation does not alter operation of blank out signs.
9. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
10. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
11. Program phase 40 to run concurrently with all phases during normal operation. Phase 39 must be incompatible with phase 40 and included as a track clear phase.



SIGNAL FACE I.D.

All Heads L.E.D.



LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Metal Strain Pole	
	Type I Pushbutton Post	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
N/A	Railroad Tracks	
N/A	Railroad Cantilever	
N/A	Railroad Gate and Flasher	
(A)	"NO RIGHT TURN - TRAIN" L.E.D. Blankout Sign	(A)
(B)	"STOP" Sign (R1-1)	(B)
(C)	"DO NOT STOP ON TRACKS" Sign (R8-8)	(C)
(D)	"DO NOT BLOCK INTERSECTION" Sign (R10-7)	(D)
(E)	"STOP HERE WHEN FLASHING" Sign (R8-10)	(E)
(F)	"U-TURN YIELD TO RIGHT TURN" Sign (R10-16)	(F)

MAXTIME TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6	7	8	9	39	40
Walk *	–	14	–	–	–	–	–	–	–		
Ped Clear	–	22	–	–	–	–	–	–	–		
Min Green *	7	14	7	7	7	14	7	7	7		
Passage *	2.0	6.0	2.0	2.0	2.0	6.0	2.0	2.0	2.0		
Max 1 *	20	60	20	30	30	60	40	30	20		
Yellow Change	3.0	4.9	3.0	4.4	3.0	4.9	3.0	4.4	3.0	4.4	4.9
Red Clear	2.8	1.3	3.3	1.9	2.9	1.3	2.3	1.9	3.3	2.3	3.3
Added Initial *	–	2.5	–	–	–	2.5	–	–	–		
Maximum Initial *	–	40	–	–	–	40	–	–	–		
Time Before Reduction *	–	15	–	–	–	15	–	–	–		
Time To Reduce *	–	20	–	–	–	20	–	–	–		
Minimum Gap	–	3.0	–	–	–	3.0	–	–	–		
Advance Walk	–	7	–	–	–	–	–	–	–		
Non Lock Detector	X	–	X	X	X	–	X	X	X		
Vehicle Recall	–	MIN 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.

PLANS PREPARED IN THE OFFICE OF:
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421 Fayetteville Street, Suite 600
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Signal Upgrade - Final Design

Prepared For: Transportation Mobility and Safety Division, State of North Carolina Department of Transportation, Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

NC 66/SR 2377 (W. Mountain St.)
at
NC 66 (Old Hollow Road) and
SR 2649 (Hopkins Road)

Division 9 Forsyth County Kernersville

PLAN DATE: August 2024	REVIEWED BY: KP Baumann
PREPARED BY: CF Davis	REVIEWED BY:

SCALE 0 50 1"=50'

REVISIONS	INIT.	DATE

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SEAL
NORTH CAROLINA PROFESSIONAL SEAL 044434 ENGINEER KEVIN P. BAUMANN
DocuSigned by: 5DC709A86BCB447...
SIGNATURE 7/14/2025 DATE

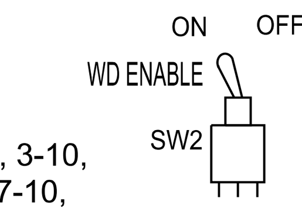
SIG. INVENTORY NO. 09-0567

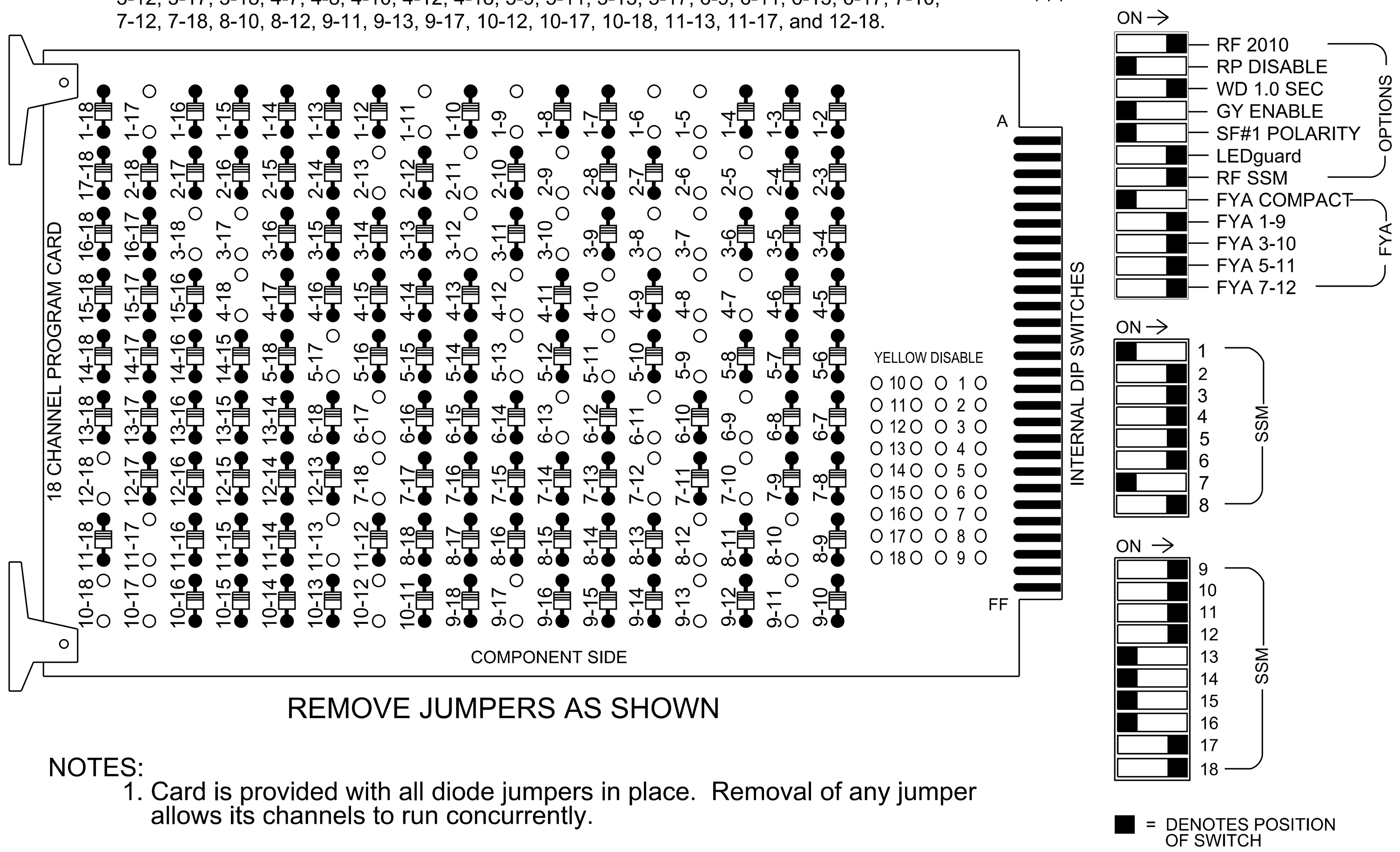
K:*RAL_Roadway*011036312 - U-5760 Big Mill Farm Road*Traffic Signal*S4 - Signal Design*090567-2024g.dgn
7/14/2025 9:01:15 AM Craig.Davis

18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 1-5, 1-6, 1-9, 1-11, 1-17, 2-5, 2-6, 2-9, 2-11, 2-13, 3-7, 3-8, 3-10, 3-12, 3-17, 3-18, 4-7, 4-8, 4-10, 4-12, 4-18, 5-9, 5-11, 5-13, 5-17, 6-9, 6-11, 6-13, 6-17, 7-10, 7-12, 7-18, 8-10, 8-12, 9-11, 9-13, 9-17, 10-12, 10-17, 10-18, 11-13, 11-17, and 12-18.





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 phases 2, 6, and 40 for Min Veh Recall.
3. Program phases 4 and 8 for Dual Entry.
4. Program phases 9 and 39 for No Startup Veh Call.
5. Program controller to start up in phase 2 Green No Walk, 6 Green No Walk, 9 Phase Not On, 39 Phase Not On, and 40 Green No Walk.
6. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.

EQUIPMENT INFORMATION

Controller..2070LX
Cabinet...332 w/ Aux
Software...Q-Free MAXTIME
Cabinet Mount....................................Base
Output File Positions..........................18 With Aux. Output File
Load Switches Used............................S1,S2,S3,S4,S5,S7,S8,S10,S11,AUX S1, AUX S2,AUX S3,AUX S4,AUX S5,AUX S6
Phases Used.......................................1,2,2 PED,3,4,5,6,7,8,9**,39**,40**
Overlap "1"..*
Overlap "2"..*
Overlap "3"..*
Overlap "4"..*
Overlap "5"..*
Overlap "6"..*
Overlap "7"..*

*See overlap programming detail on sheet 2.
**Phase used for preemption timing purposes only.

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4		S5	S6	S7		S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3		4	14	5		6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	OL7		4	4 PED	5		6	6 PED	7	8	8 PED	OL1	OL2	OL5	OL3	OL4	OL6
SIGNAL HEAD NO.	11★	21,22	P21, P22	22	31★	41,42	NU	42	51★	61,62	NU	71★	81,82	NU	11★	31★	82	51★	71★	62
RED		128		*		101		*		134			107				*			*
YELLOW	*	129				102				135		*	108							
GREEN		130				103				136			109							
RED ARROW															A121	A124		A114	A101	
YELLOW ARROW				117				132							A122	A125	A112	A115	A102	A105
FLASHING YELLOW ARROW															A123	A126		A116	A103	
GREEN ARROW	127			118	118			133	133			124					A113			A106
(hand)			113																	
(walk)			115																	

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

INPUT FILE POSITION LAYOUT

(front view)

FILE		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	Ø 1 1A	Ø 1 1B	Ø 2 2A	SLOT EMPTY	Ø 3 3A	Ø 4 4A	Ø 4 4C	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	Ø 2 PED DC ISOLATOR	SLOT EMPTY	FS DC ISOLATOR
	L	NOT USED	NOT USED	NOT USED		NOT USED	Ø 4 4B	Ø 4 4D					NOT USED		ST DC ISOLATOR
FILE "J"	U	Ø 5 5A	Ø 5 5B	Ø 6 6A	SLOT EMPTY	Ø 7 7A	Ø 7 7B	Ø 8 8A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	PRE1 AC ISOLATOR
	L	NOT USED	Ø 5 5C	NOT USED		NOT USED	Ø 7 7C	Ø 8 8B							NOT USED

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

FS = FLASH SENSE
ST = STOP TIME
PRE = PREEMPT

INPUT FILE CONNECTION & PROGRAMMING CHART

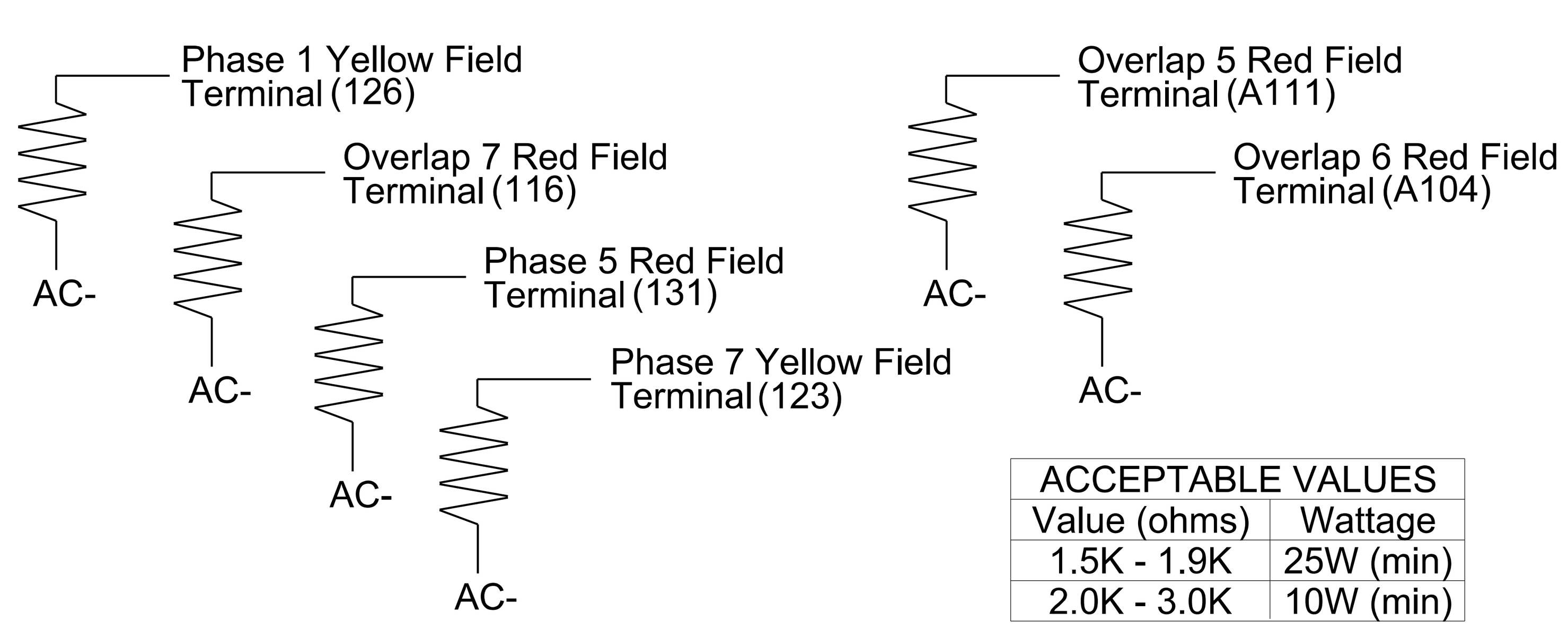
LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN
1A	TB2-1,2	I1U	56	18	1	1	15.0		X		X	
				-	29	6	3.0		X		X	X
1B	TB2-5,6	I2U	39	1	2	1/9	15.0		X		X	
2A	TB2-9,10	I3U	63	29	4	2			X	X	X	
3A	TB4-5,6	I5U	58	20	7	3/9	15.0		X		X	
				-	30	8			X		X	
4A	TB4-9,10	I6U	41	3	8	4			X		X	
4B	TB4-11,12	I6L	45	7	9	4			X		X	
4C	TB6-1,2	I7U	65	31	10	4			X		X	
4D	TB6-3,4	I7L	78	44	11	4	5.0		X		X	
5A	TB3-1,2	J1U	55	17	15	5	15.0		X		X	
				-	31	2	3.0		X		X	X
5B	TB3-5,6	J2U	40	2	16	5	15.0		X		X	
5C	TB3-7,8	J2L	44	6	17	5	10.0		X		X	
6A	TB3-9,10	J3U	64	30	18	6			X	X	X	
7A	TB5-5,6	J5U	57	19	21	7	15.0		X		X	
				-	32	4	3.0		X		X	
7B	TB5-9,10	J6U	42	4	22	7	3.0		X		X	
7C	TB5-11,12	J6L	46	8	23	7	3.0		X		X	
8A	TB7-1,2	J7U	66	32	24	8			X		X	
8B	TB7-3,4	J7L	79	45	25	8			X		X	
PED PUSH BUTTONS												
P21;P22	TB8-4,6	I12U	67	33	2	PED 2						

NOTE:
INSTALL DC ISOLATOR IN INPUT FILE SLOT I12.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

LOAD RESISTOR INSTALLATION DETAIL

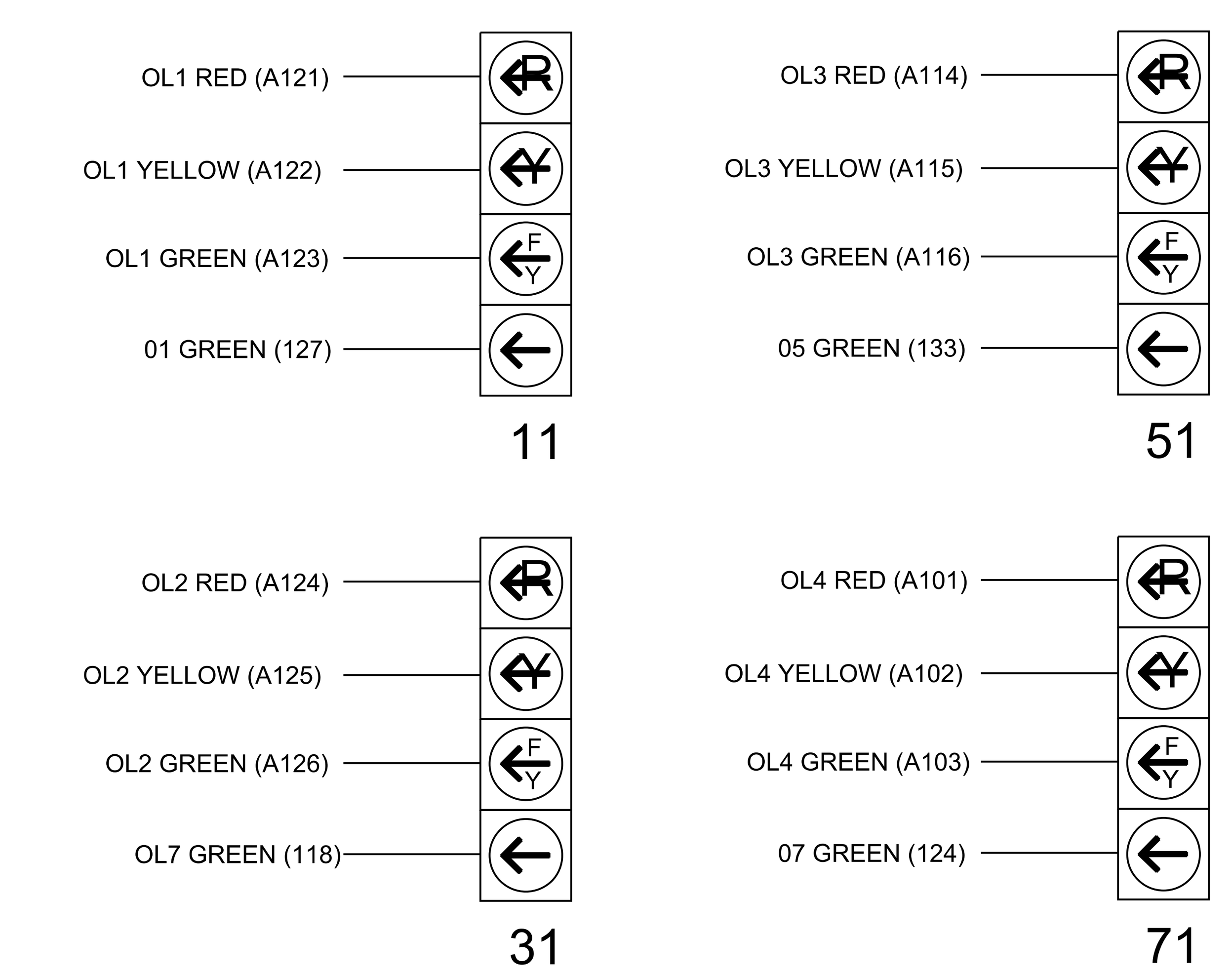
(install resistors as shown)



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

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 09-0567
DESIGNED: August 2024
SEALED: 07/14/2025
REVISED: N/A

Electrical Detail - Final Design
Sheet 1 of 3

PLANS PREPARED IN THE OFFICE OF:
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ELECTRICAL AND PROGRAMMING DETAILS FOR:
Prepared For:
Transportation Mobility and Safety Division – ITS & Signals Management Section – State of North Carolina Department of Transportation
750 N.Greenfield Pkwy,Garner,NC 27529

NC 66/SR 2377 (W. Mountain St.)
at
NC 66 (Old Hollow Road) and
SR 2649 (Hopkins Road)
Division 9 Forsyth County Kernersville

PLAN DATE: August 2024 | REVIEWED BY: KP Baumann
PREPARED BY: CF Davis | REVIEWED BY:

REVISIONS	INIT.	DATE

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SEAL
NORTH CAROLINA PROFESSIONAL SEAL 044434 ENGINEER KEVIN P. BAUMANN
DocuSigned by: 5DC709A86BCB447...
SIGNATURE 7/14/2025 DATE
SIG. INVENTORY NO. 09-0567

PROJECT REFERENCE NO.	SHEET NO.
U-5760	Sig. 5.2

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	5	6	7
Type	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section	Normal	Normal	Normal
Included Phases	2	4	6	8	1,9	7	3,9
Modifier Phases	1	3,9	5	7	-	-	-
Modifier Overlaps	-	-	-	-	-	-	-
Trail Green	0	0	0	0	0	0	0
Trail Yellow	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Trail Red	0.0	0.0	0.0	0.0	0.0	0.0	0.0

VEHICLE DETECTOR PROGRAMMING

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

Web Interface
Home >Controller >Detector Configuration >Vehicle Detectors

Plan 1

Detector	Call Phase	Call Overlap	Additional Call Phases
2	1	0	9
7	3	0	9

OUTPUT CHANNEL CONFIGURATION

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

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

Channel Configuration

NOTICE OVERLAP 7 ASSIGNED TO CHANNEL 3

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	Overlap	7	-	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

NOTICE: FLASH RED

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	Phase Phase Omit	9	Result=!A	Preempt Status	1	-	-	0.0	0.0

LOGIC STATEMENT DESCRIPTION

Statement 1 Description: Omits phase 9 while not in preempt 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

StartUp Clearance Hold
6

Unit Flash Parameters

All Red Flash Exit Time
6

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.

SEQUENCE DETAIL

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

Web Interface
Home >Controller >Sequence

Sequence 1

Ring	Sequence Data
1	1,2,a,3,4,b,9,c
2	5,6,a,7,8,b,c
3	39,c,40,d

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 09-0567
DESIGNED: August 2024
SEALED: 07/14/2025
REVISED: N/A

Electrical Detail - Final Design
Sheet 2 of 3

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PLANS PREPARED IN THE OFFICE OF:
Kimley»Horn
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ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared For:
Transportation Mobility and Safety Division
ITS & Signals Management Section
750 N.Greenfield Pkwy,Garner,NC 27529

NC 66/SR 2377 (W. Mountain St.)
at
NC 66 (Old Hollow Road) and
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Division 9 Forsyth County Kernersville

PLAN DATE: August 2024	REVIEWED BY: KP Baumann
PREPARED BY: CF Davis	REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 044434 ENGINEER KEVIN P. BAUMANN

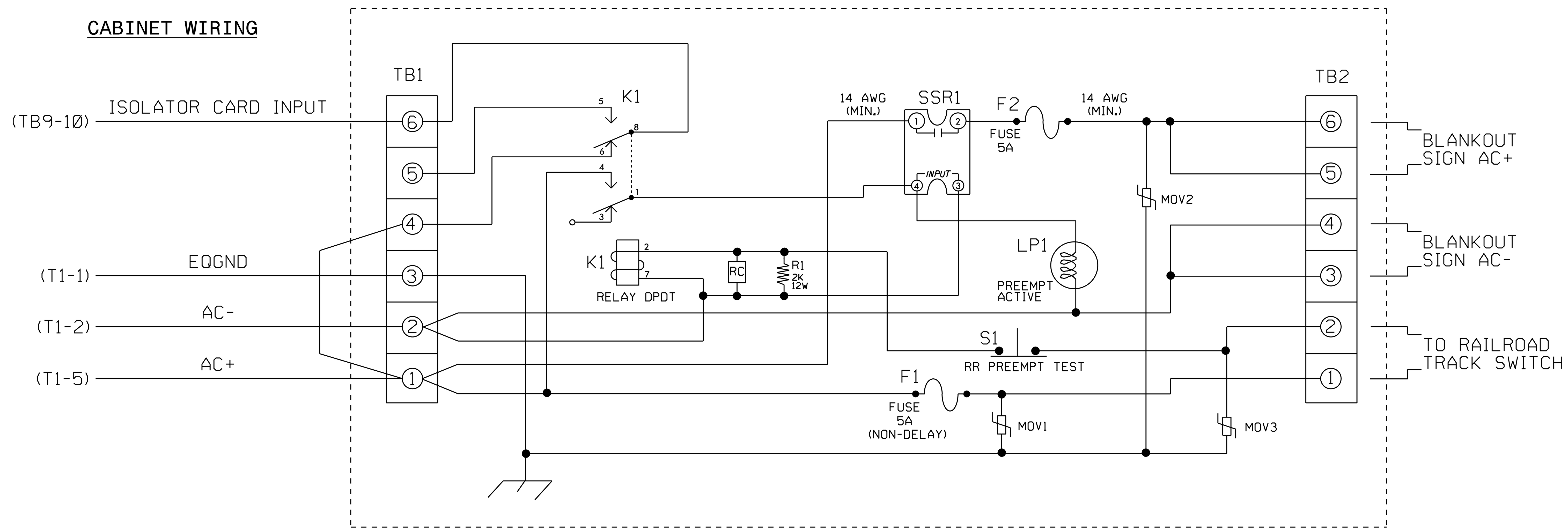
DocuSigned by:
5DC709A86BCB447...
SIGNATURE 7/14/2025 DATE

SIG. INVENTORY NO. 09-0567

RAILROAD PREEMPTION WIRING DETAIL

(wire as shown below)

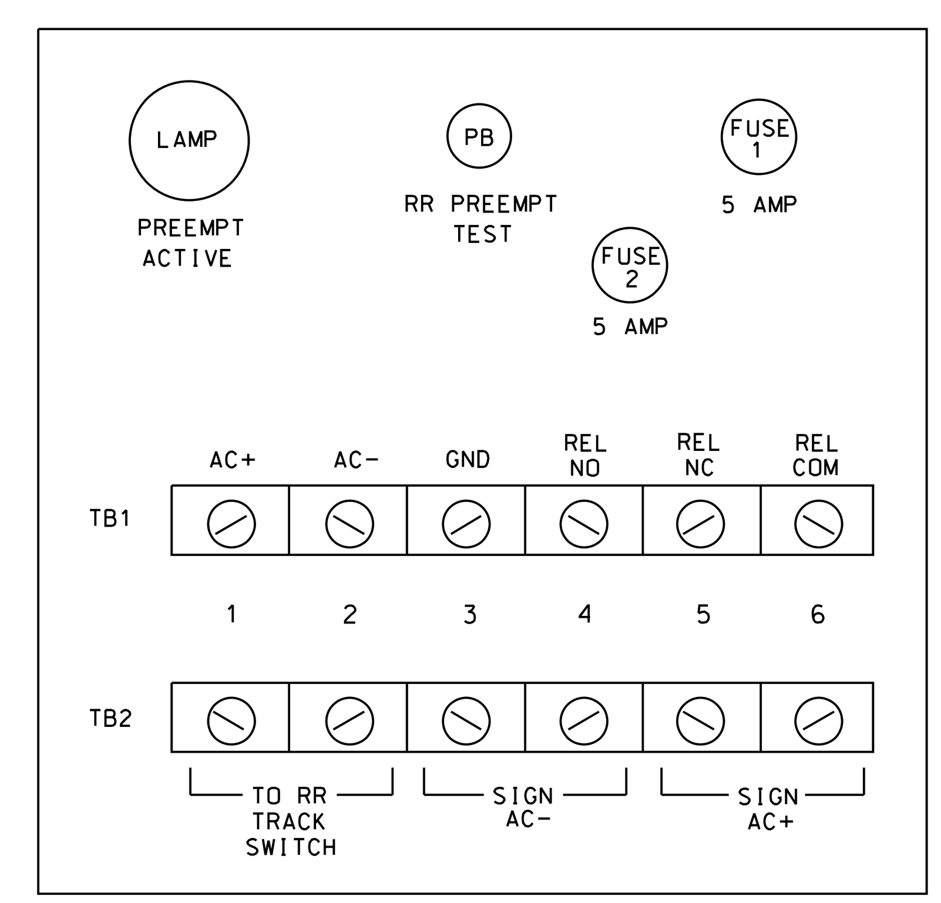
PREEMPTION AND BLANKOUT SIGN CONTROL BOX



NOTES

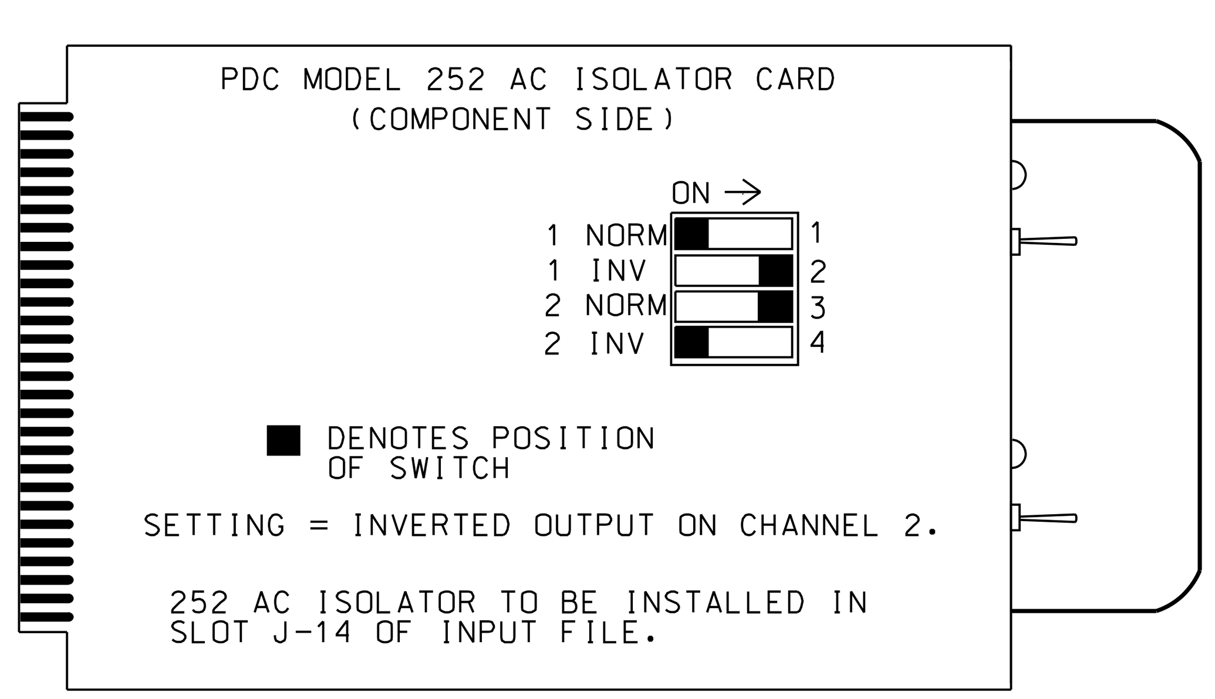
1. Relay K1 is shown in the energized (Preempt not active) normal operation state.
2. Relay K1 is a DPDT with 120VAC coil with octal base.
3. Relay SSR1 is a SPST (normally open) Solid State Relay with AC input and AC (25 amp) output.
4. AC Isolator Card shall activate preemption upon removal of AC+ from the input (as shown above). To accomplish this set invert dip switch on AC Isolator Card.
5. IMPORTANT!! A jumper must be added between input file terminals J14-E and J14-K if not already present. Also, terminal TB9-12 (on input panel) shall be connected to AC neutral (jumper may have to be added).

FRONT VIEW



PREEMPT 2 AC ISOLATOR (MODEL 252) OUTPUT PROGRAMMING DETAIL

(set DIP switches as shown below)



NOTE: IF ANOTHER MANUFACTURER TYPE OF AC ISOLATOR IS USED, OUTPUT PROGRAMMING IS LIKELY NOT TO EQUATE TO THAT SHOWN ABOVE.

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.

PREEMPTION PROGRAMMING

Front Panel
Main Menu >Controller >Preemption
>Preempt Phasing/Preempt Parameters

Web Interface
Home >Controller >Preempt Configuration >Preempts

Preempt Configuration

Preempt	1
Enabled	Enabled
Type	Rail Road
Track Phases	4,7,39
Track Overlaps	2,4
Dwell Phases	2,6
Dwell Peds	-
Dwell Overlaps	1
Cycling Phases	2,6,9
Cycling Peds	-
Cycling Overlaps	1,5,7
Exit Phases	4,8
Exit Overlaps	2,4
Delay	0
Call Ext Time	1.0
Max Presence	0
Max Pres Act	Terminate
Enter Min Green	1
Enter Walk	1
Enter Ped Clear	5
Enter Yellow Change	4.9
Enter Red Clear	3.3
Track Green	28
Track Yellow Clr	4.4
Track Red Clear	2.3
Dwell Green	0
Exit Min Green	255
Exit Yellow Change	25.5
Exit Red Clear	25.5
Exit Type	Exit Phases
Non Locking Memory	-
Not Ovrd Flash	X
Not Ovrd Nxt Pre	-
Require All Red Entry	-
Track Clear Ovrd	X
Ped Clear During Yellow	X
Entry Omit OLTG	X
Track Reserve	X

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 09-0567
DESIGNED: August 2024
SEALED: 07/14/2025
REVISED: N/A

Electrical Detail - Final Design
Sheet 3 of 3

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NC 66/SR 2377 (W. Mountain St.)
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PLAN DATE: August 2024	REVIEWED BY: KP Baumann
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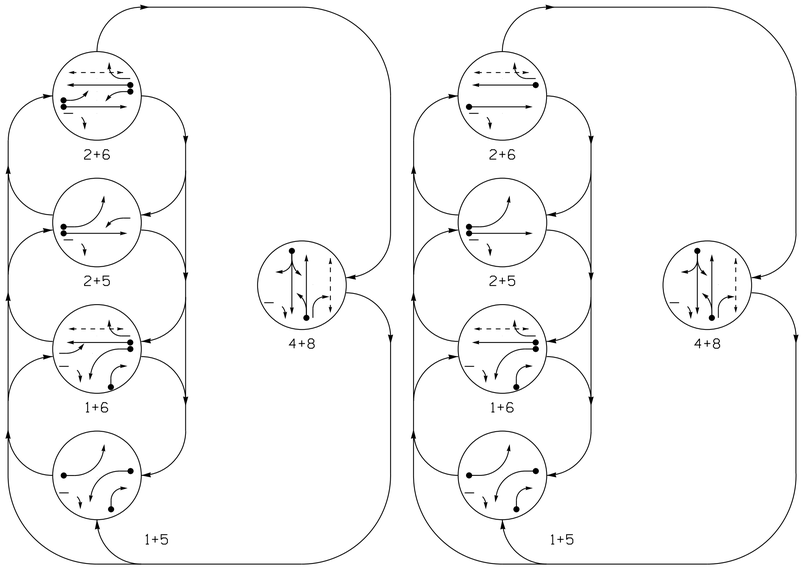
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 044434 KEVIN P. BAUMANN

DocuSigned by: 5DC709A86BCB447...
SIGNATURE 7/14/2025 DATE

SIG. INVENTORY NO. 09-0567

PROJECT REFERENCE NO.	SHEET NO.
U-5760	Sig. 6.0

DEFAULT PHASING DIAGRAM



ALTERNATE PHASING DIAGRAM

DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE 1+5	1+6	2+5	2+6	4+8	FLASH
11	←●	←●	F Y	F Y	~~R~~	~~R~~
21,22,23	R	R	G	G	R	R
41,42	R	R	R	R	G	R
51	←●	F Y	←●	F Y	~~R~~	~~R~~
61,62,64	R	G	R	G	R	R
63	R	F Y	R	F Y	R	R
81,82	R	R	R	R	G	R
83	→●	→●	R	R	F Y	R
P61,P62	DW	W	DW	W	DW	DRK
P81,P82	DW	DW	DW	DW	W	DRK

ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE 1+5	1+6	2+5	2+6	4+8	FLASH
11	←●	←●	~~R~~	~~R~~	~~R~~	~~R~~
21,22,23	R	R	G	G	R	R
41,42	R	R	R	R	G	R
51	←●	~~R~~	←●	~~R~~	~~R~~	~~R~~
61,62,64	R	G	R	G	R	R
63	R	F Y	R	F Y	R	R
81,82	R	R	R	R	G	R
83	→●	→●	R	R	F Y	R
P61,P62	DW	W	DW	W	DW	DRK
P81,P82	DW	DW	DW	DW	W	DRK

MAXTIME DETECTOR INSTALLATION CHART

DETECTOR / ZONE					PROGRAMMING						
LOOP / ZONE	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP / ZONE	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
1A	6X40	0	*	X	1	15.0@	-	X	-	X	-	-
					6#	3.0	-	X	-	X	X	-
1B	6X40	0	2-4-2	X	1	15.0	-	X	-	X	-	X
2A	6X6	300	*	X	2	-	-	X	X	X	-	-
4A	6X40	0	2-4-2	X	4	5.0	-	X	-	X	-	X
5A	6X40	0	*	X	5	15.0@	-	X	-	X	-	-
					2#	3.0	-	X	-	X	X	-
6A	6X6	300	*	X	6	-	-	X	X	X	-	-
8A	6X40	0	2-4-2	X	8	3.0	-	X	-	X	-	X

@ Disable delay during Alternate Phasing operation.
# Disable Phase call for loop during Alternate Phasing operation.
* Video Detection Zone

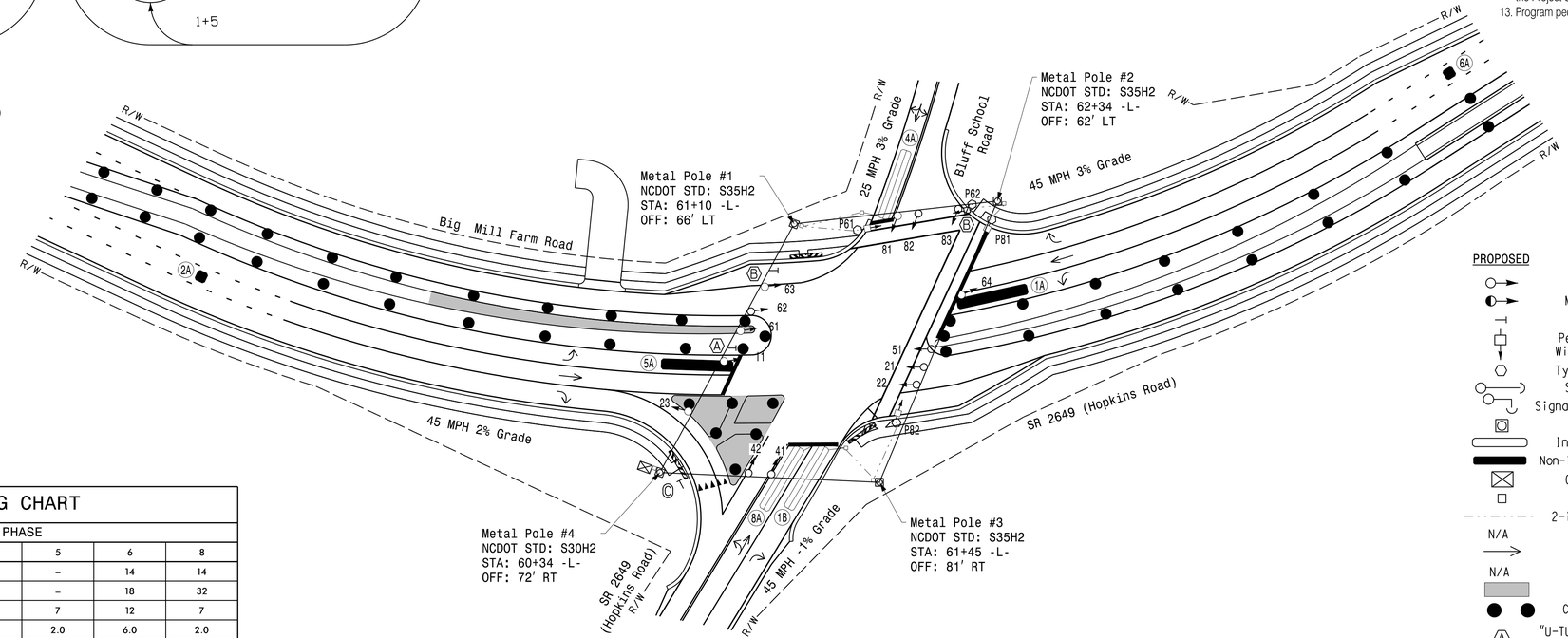
5 Phase
Fully Actuated
(Isolated)

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. Phase 1 and/or phase 5 may be lagged.
4. Set all detector units to presence mode.
5. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
6. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
7. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
8. The Division Traffic Engineer will determine the hours of use for each phasing plan.
9. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
10. This intersection uses video detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.
11. To provide a leading pedestrian interval on Phase 6, program FYA heads 63 and 51 to delay for 7 seconds after the start of the phase 6 Walk interval. See electrical details.
12. All metal poles and pedestals shall be painted black as specified in the Project Special Provisions.
13. Program pedestrian detector for Ped 8 to call both Ped 8 and Ped 4.

PHASING DIAGRAM DETECTION LEGEND

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



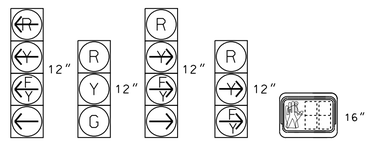
MAXTIME TIMING CHART

FEATURE	PHASE 1	2	4	5	6	8
Walk *	–	–	14	–	14	14
Ped Clear	–	–	32	–	18	32
Min Green *	7	12	7	7	12	7
Passage *	2.0	6.0	2.0	2.0	6.0	2.0
Max 1 *	25	90	30	25	90	30
Yellow Change	3.0	4.3	4.6	3.0	4.3	4.6
Red Clear	3.3	2.2	3.0	3.5	2.2	3.0
Added Initial *	–	2.5	–	–	2.5	–
Maximum Initial *	–	34	–	–	34	–
Time Before Reduction *	–	15	–	–	15	–
Time To Reduce *	–	45	–	–	45	–
Minimum Gap	–	3.0	–	–	3.0	–
Advance Walk	–	–	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.
** See Note 11.

SIGNAL FACE I.D.

All Heads L.E.D.



LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
□↓	Pedestrian Signal Head With Push Button & Sign	■↓
⬡	Type II Signal Pedestal	⬢
○─○	Signal Pole with Guy	●─●
○─○↓	Signal Pole with Sidewalk Guy	●─●↓
▣	Metal Strain Pole	■
▭	Inductive Loop Detector	▭
▬	Non-intrusive Detection Area	▬
⊠	Controller & Cabinet	⊠
□	Junction Box	■
·-·-·	2-in Underground Conduit	·-·-·
N/A	Right of Way	- - - -
→	Directional Arrow	→
N/A	Curb Ramp	◢
▭	Construction Zone	▭
● ●	Construction Zone Drums	● ●
Ⓐ	"U-TURN YIELD TO RIGHT TURN" Sign (R10-16)	Ⓐ
Ⓑ	"RIGHT TURN SIGNAL" Sign (R10-10R)	Ⓑ
Ⓒ	"YIELD" Sign (R1-2)	Ⓒ

New Installation - Temporary Design
(TMP Phase 3)

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PLANS PREPARED IN THE OFFICE OF:
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Prepared for:
Transportation Mobility and Safety Division
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signal Design Section
750 N.Greenfield Pkwy.Garner,NC 27529

SCALE 0 40 1"=40'

Big Mill Farm Road / SR 2649 (Hopkins Road) at Bluff School Road

Division 9 Forsyth County Kernersville

PLAN DATE:	August 2024	REVIEWED BY:	SP Pennington
PREPARED BY:	CF Davis	REVIEWED BY:	KP Baumann

REVISIONS	INIT.	DATE

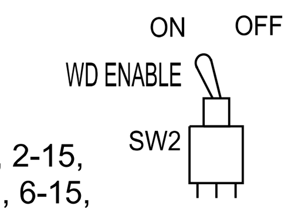
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 044434 ENGINEER KEVIN P. BAUMANN
DocuSigned by: 5DC709A868CB447...
7/14/2025
SIGNATURE DATE
SIG. INVENTORY NO. 09-0482T

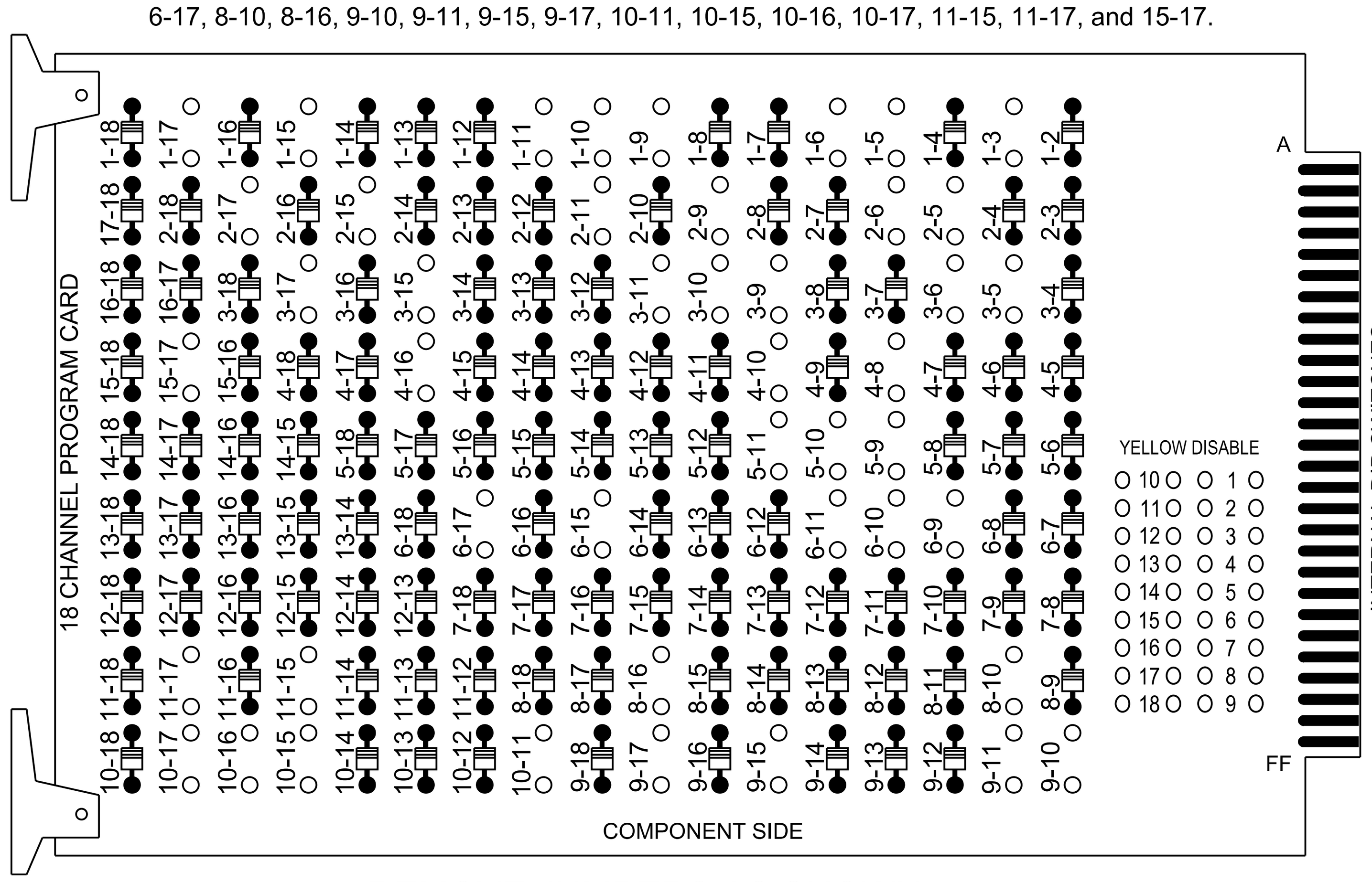
PROJECT REFERENCE NO.	SHEET NO.
U-5760	Sig. 6.1

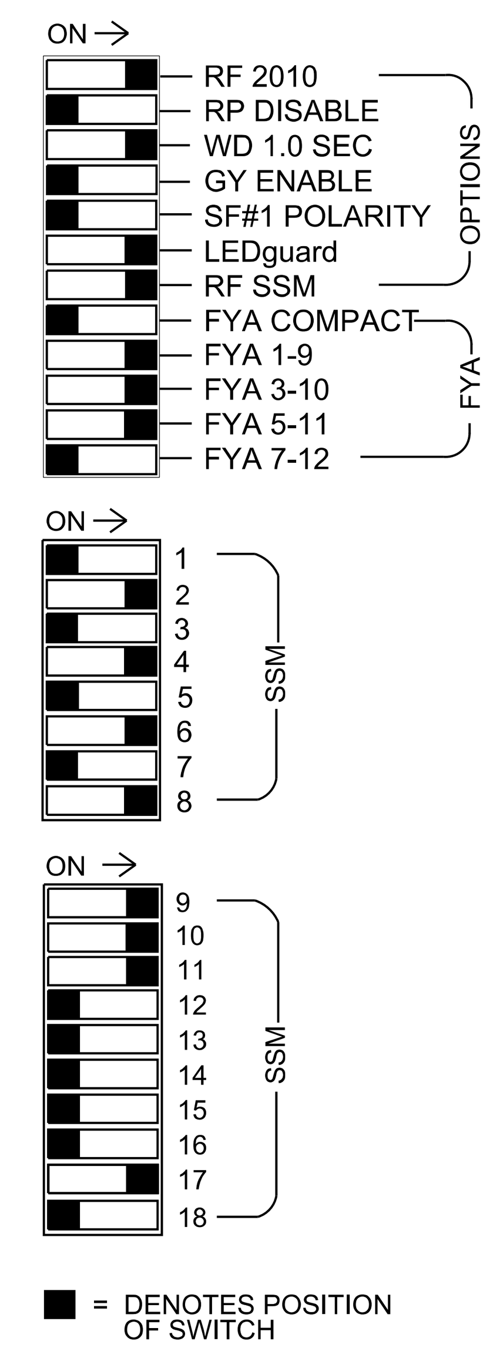
18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 1-3, 1-5, 1-6, 1-9, 1-10, 1-11, 1-15, 1-17, 2-5, 2-6, 2-9, 2-11, 2-15, 2-17, 3-5, 3-6, 3-9, 3-10, 3-11, 3-15, 3-17, 4-8, 4-10, 4-16, 5-9, 5-10, 5-11, 6-9, 6-10, 6-11, 6-15, 6-17, 8-10, 8-16, 9-10, 9-11, 9-15, 9-17, 10-11, 10-15, 10-16, 10-17, 11-15, 11-17, and 15-17.







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 phases 4 and 8 for Dual Entry.
3. Program controller to start up in phase 2 Green No Walk and 6 Green No Walk.
4. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.

EQUIPMENT INFORMATION

Controller..2070LX
Cabinet...332 w/ Aux
Software...Q-Free MAXTIME
Cabinet Mount....................................Base
Output File Positions...........................18 With Aux. Output File
Load Switches Used............................S1, S2, S4, S5, S7, S8, S9, S11, S12, AUX S1, AUX S2, AUX S3, AUX S4
Phases Used.......................................1, 2, 4, 5, 6, 6PED, 8, 8 PED
Overlap "1"..*
Overlap "2"..*
Overlap "3"..*
Overlap "4"..NOT USED
Overlap "5"..*
Overlap "6"..NOT USED
Overlap "7"..*

*See overlap programming detail on sheet 2

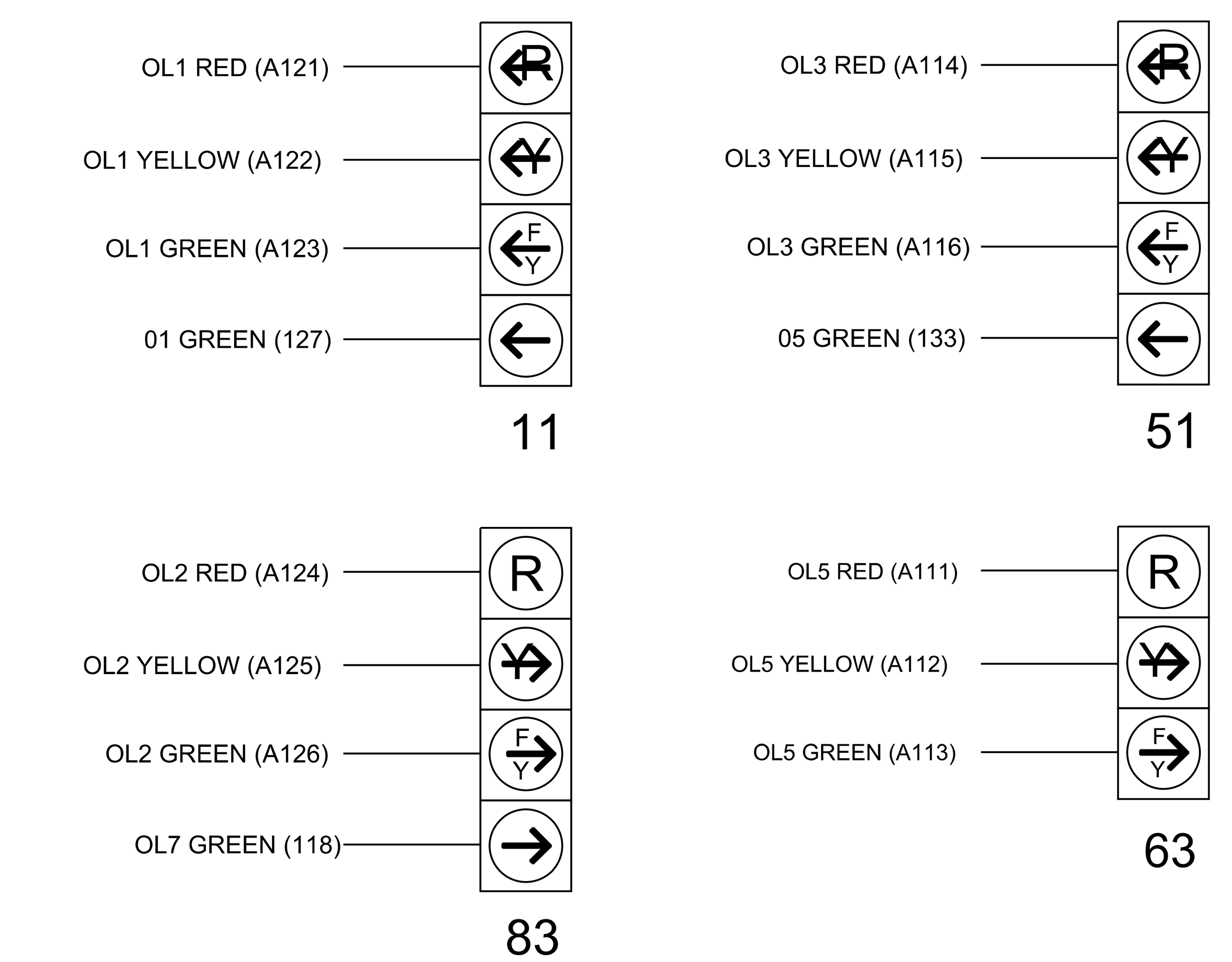
SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	OL7	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	OL5	OL3	OL4	SPARE
SIGNAL HEAD NO.	11★	21,22 23	NU	83★	41,42	NU	51★	61,62 64	P61, P62	NU	81,82	P81, P82	11★	83★	63★	51★	NU	NU
RED		128			101			134			107			A124	A111			
YELLOW	*	129		*	102		*	135			108							
GREEN		130			103			136			109							
RED ARROW													A121			A114		
YELLOW ARROW													A122	A125	A112	A115		
FLASHING YELLOW ARROW													A123	A126	A113	A116		
GREEN ARROW	127			118			133											
(Don't Walk)									119			110						
(Walk)									121			112						

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

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



INPUT FILE POSITION LAYOUT

(front view)

FILE		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	Ø 1 1A	Ø 1 1B	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	Ø 4 4A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	Ø 6 PED DC ISOLATOR	FS DC ISOLATOR
	L	NOT USED	NOT USED				NOT USED							Ø 8 PED DC ISOLATOR	ST DC ISOLATOR
FILE "J"	U	Ø 5 5A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	Ø 8 8A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L	NOT USED					NOT USED								

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN
1A	**	I1U	56	18	1 ★	1	15.0		X		X	
				-	29 ★	6	3.0		X		X	X
1B	TB2-5,6	I2U	39	1	2	1	15.0		X		X	
4A	TB4-9,10	I6U	41	3	8	4	5.0		X		X	
5A	**	J1U	55	17	15 ★	5	15.0		X		X	
				-	31 ★	2	3.0		X		X	X
8A	TB5-9,10	J6U	42	4	22	8	3.0		X		X	
PED PUSH BUTTONS												
P61;P62	TB8-7,9	I13U	68	34	6	PED 6						
P81;P82	TB8-8,9	I13L	70	36	8	PED 8						

NOTE:
INSTALL DC ISOLATORS IN INPUT FILE SLOT I13.

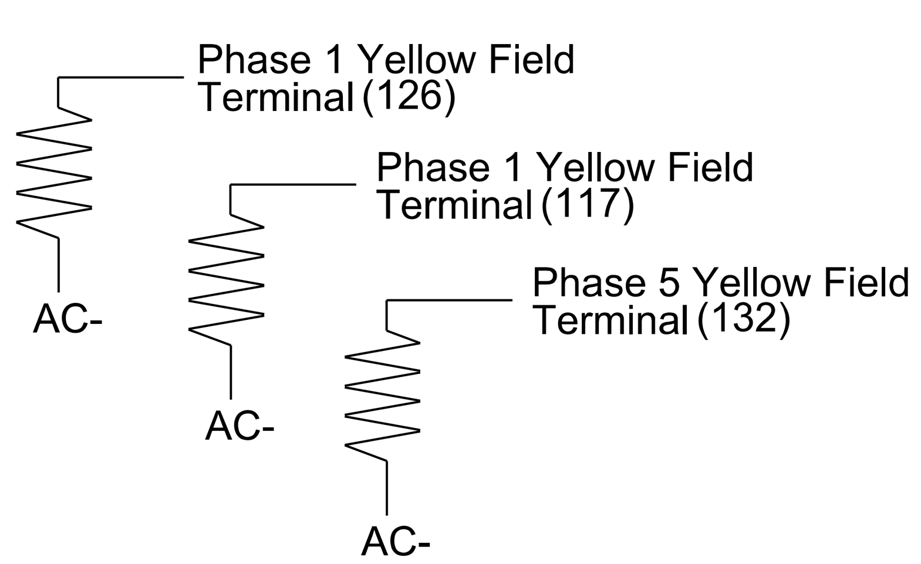
★ For the detectors to work as shown on the signal design plan, see the Detector Programming Detail for Alternate Phasing on sheet 2.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

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



** SPECIAL DETECTOR NOTE

For zones 1A, 2A, 5A, & 6A, 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.

For zones 1A & 5A, inputs associated with the typical slots for an NCDOT installation are compatible with time of day instructions located on sheet 2 of this electrical detail.

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 09-0482T
DESIGNED: August 2024
SEALED: 07/14/2025
REVISED: N/A

Electrical Detail - Temporary Design
Sheet 1 of 3

PLANS PREPARED IN THE OFFICE OF:
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ELECTRICAL AND PROGRAMMING DETAILS FOR:
Prepared For:
Transportation Mobility and Safety Division · ITS & Signals Management Section · State of North Carolina Department of Transportation
750 N.Greenfield Pkwy,Garner,NC 27529

Big Mill Farm Road / Sr 2649 (Hopkins Road) at Bluff School Road

Division 9 Forsyth County Kernersville

PLAN DATE: August 2024	REVIEWED BY: KP Baumann
PREPARED BY: CF Davis	REVIEWED BY:

REVISIONS	INIT.	DATE

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SEAL
NORTH CAROLINA PROFESSIONAL SEAL 044434 ENGINEER KEVIN P. BAUMANN
DocuSigned by:
5DC709A86BCB447...
SIGNATURE 7/14/2025 DATE
SIG. INVENTORY NO. 09-0482T

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

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

Web Interface
Home >Controller >Detector Configuration >Vehicle Detectors

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

Plan 2

1A

Detector	Call Phase	Delay
1	1	0.0
29	0	3.0

5A

Detector	Call Phase	Delay
15	5	0.0
31	0	3.0

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.

OUTPUT CHANNEL CONFIGURATION

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

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

Channel Configuration

NOTICE OVERLAP 7 ASSIGNED TO CHANNEL 3 →

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	Overlap	7	·	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

NOTICE: FLASH RED

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

← NOTICE FYA PED DELAY

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

← NOTICE INCLUDED PHASE

← NOTICE FYA PED DELAY

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

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 09-0482T
DESIGNED: August 2024
SEALED: 07/14/2025
REVISED: N/A

Electrical Detail - Temporary Design
Sheet 2 of 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared For: Transportation Mobility and Safety Division, ITS & Signals Management Section, State of North Carolina Department of Transportation
750 N.Greenfield Pkwy,Garner,NC 27529

Big Mill Farm Road / Sr 2649 (Hopkins Road) at Bluff School Road

Division 9 | Forsyth County | Kernersville

PLAN DATE: August 2024	REVIEWED BY: KP Baumann
PREPARED BY: CF Davis	REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 044434 KEVIN P. BAUMANN

DocuSigned by: 5DC709A86BCB447... 7/14/2025
SIGNATURE | DATE

SIG. INVENTORY NO. 09-0482T

PLANS PREPARED IN THE OFFICE OF: Kimley»Horn
NC License #F-0102
421 Fayetteville Street, Suite 600
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K:*RAL_Roadway*011036312 - U-5760 Big Mill Farm Road*Traffic Signal*S4 - Signal Design*090482-2024e-t.dgn
Craig.Davis 9:01:24 AM 7/14/2025

MAXTIME ALTERNATE PHASING ACTIVATION DETAIL

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

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

ALTERNATE PHASING CHANGE SUMMARY

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

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

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

Disables phase 2 call on loop 5A and reduces delay time for phase 5 call on loop 5A 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.

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 09-0482T
DESIGNED: August 2024
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REVISED: N/A

Electrical Detail - Temporary Design
Sheet 3 of 3

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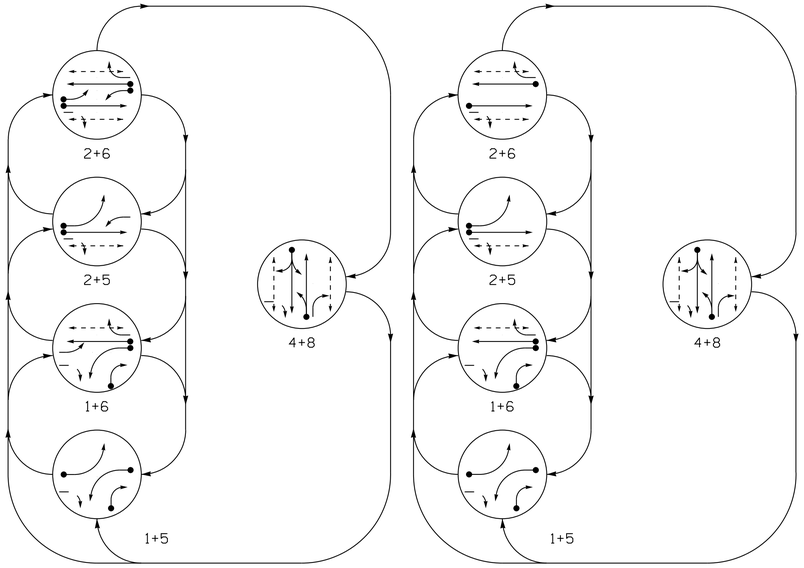
SIGNATURE | DATE 7/14/2025

SIG. INVENTORY NO. 09-0482T

PROJECT REFERENCE NO.	SHEET NO.
U-5760	Sig. 7.0

DEFAULT PHASING DIAGRAM



ALTERNATE PHASING DIAGRAM

PHASING DIAGRAM DETECTION LEGEND

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

DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE 1+5	1+6	2+5	2+6	4+8	FLASH
11	←●	←	~~F Y~~	~~F Y~~	~~R~~	~~R~~
21,22	R	R	G	G	R	R
41,42	R	R	R	R	G	R
51	←	~~F Y~~	←	~~F Y~~	~~R~~	~~R~~
61,62	R	G	R	G	R	R
63	R	~~F Y~~	R	~~F Y~~	R	R
81,82	R	R	R	R	G	R
83	→	→	R	R	~~F Y~~	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
P81,P82	DW	DW	DW	DW	W	DRK

ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE 1+5	1+6	2+5	2+6	4+8	FLASH
11	←	←	~~R~~	~~R~~	~~R~~	~~R~~
21,22	R	R	G	G	R	R
41,42	R	R	R	R	G	R
51	←	~~R~~	←	~~R~~	~~R~~	~~R~~
61,62	R	G	R	G	R	R
63	R	~~F Y~~	R	~~F Y~~	R	R
81,82	R	R	R	R	G	R
83	→	→	R	R	~~F Y~~	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
P81,P82	DW	DW	DW	DW	W	DRK

MAXTIME DETECTOR INSTALLATION CHART

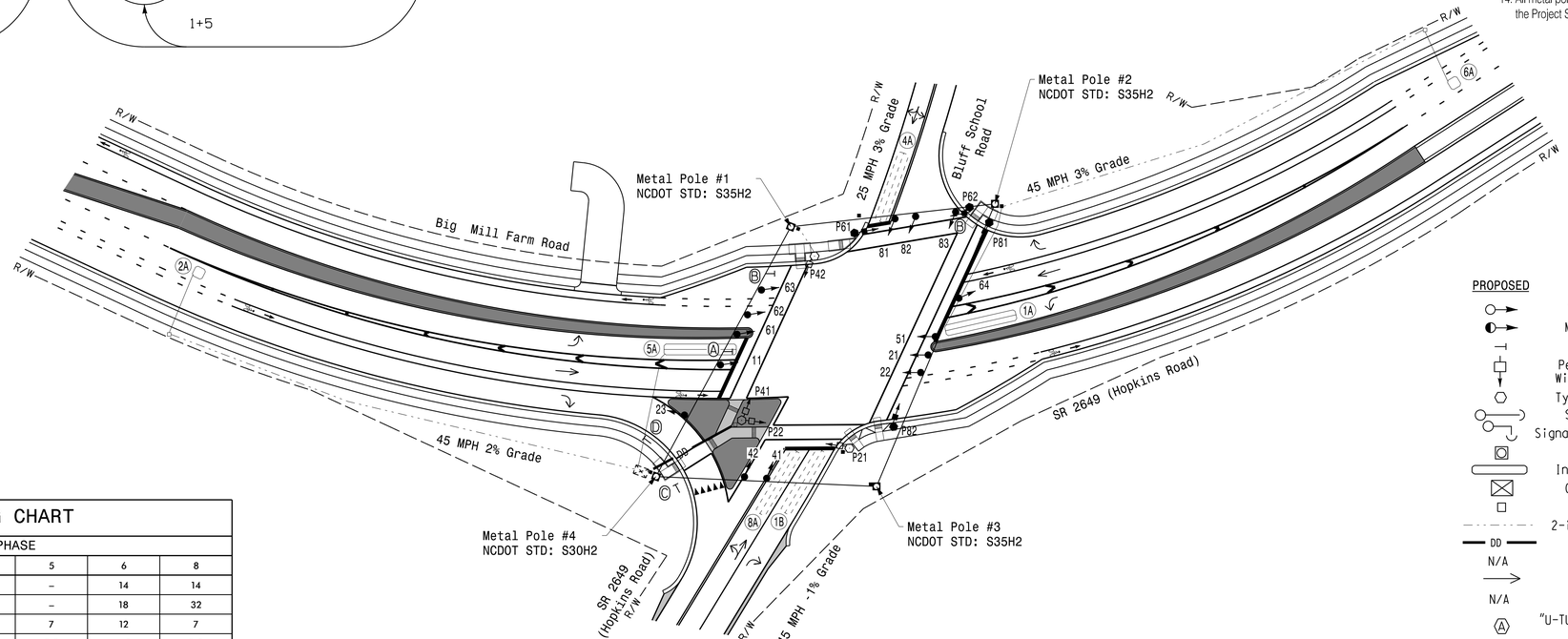
DETECTOR					PROGRAMMING						
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
1A	6X40	0	2-4-2	X	1	15.0*	-	X	-	X	-	X
					6#	3.0	-	X	-	X	X	X
1B	6X40	0	2-4-2	-	1	15.0	-	X	-	X	-	-
2A	6X6	300	6	X	2	-	-	X	X	X	-	X
4A	6X40	0	2-4-2	-	4	5.0	-	X	-	X	-	-
5A	6X40	0	2-4-2	X	5	15.0*	-	X	-	X	-	X
					2#	3.0	-	X	-	X	X	X
6A	6X6	300	6	X	6	-	-	X	X	X	-	X
8A	6X40	0	2-4-2	-	8	3.0	-	X	-	X	-	-

* Disable delay during Alternate Phasing operation.
\# Disable Phase call for loop during Alternate Phasing operation.

5 Phase
Fully Actuated
(Isolated)

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. Phase 1 and/or phase 5 may be lagged.
4. Set all detector units to presence mode.
5. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
6. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
7. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
8. The Division Traffic Engineer will determine the hours of use for each phasing plan.
9. Reposition existing signal heads 21, 22, & 51.
10. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
11. Program pedestrian detector for Ped 4 to call both Ped 4 and Ped 8.
12. Program pedestrian detector for Ped 8 to call both Ped 8 and Ped 4.
13. To provide a leading pedestrian interval on Phase 6, program FYA heads 63 and 51 to delay for 7 seconds after the start of the phase 6 Walk interval. See electrical details.
14. All metal poles and pedestals shall be painted black as specified in the Project Special Provisions.



MAXTIME TIMING CHART

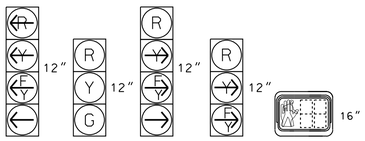
FEATURE	PHASE 1	2	4	5	6	8
Walk *	–	7	14	–	14	14
Ped Clear	–	12	23	–	18	32
Min Green *	7	12	7	7	12	7
Passage *	2.0	6.0	2.0	2.0	6.0	2.0
Max 1 *	25	90	30	25	90	30
Yellow Change	3.0	4.3	4.6	3.0	4.3	4.6
Red Clear	3.3	2.0	3.3	3.3	2.0	3.3
Added Initial *	–	2.5	–	–	2.5	–
Maximum Initial *	–	34	–	–	34	–
Time Before Reduction *	–	15	–	–	15	–
Time To Reduce *	–	45	–	–	45	–
Minimum Gap	–	3.0	–	–	3.0	–
Advance Walk	–	–	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.

** See Note 13.

SIGNAL FACE I.D.

All Heads L.E.D.



11
51

21,22,23
41,42
61,62,64
81,82

83

63

P21,P22
P41,P42
P61,P62
P81,P82

LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
□↓	Pedestrian Signal Head With Push Button & Sign	■↓
⬡	Type II Signal Pedestal	⬢
○↓	Signal Pole with Guy	●↓
○↓	Signal Pole with Sidewalk Guy	●↓
◎	Metal Strain Pole	◎
▭	Inductive Loop Detector	- - -
⊠	Controller & Cabinet	⊠
□	Junction Box	■
·-·-·	2-in Underground Conduit	·-·-·
DD	Directional Drill	DD
N/A	Right of Way	- - - -
→	Directional Arrow	→
N/A	Curb Ramp	◢
Ⓐ	"U-TURN YIELD TO RIGHT TURN" Sign (R10-16)	Ⓐ
Ⓑ	"RIGHT TURN SIGNAL" Sign (R10-10R)	Ⓑ
Ⓒ	"YIELD" Sign (R1-2)	Ⓒ
Ⓓ	Pedestrian Crossing Sign (W11-2)	Ⓓ

PLANS PREPARED IN THE OFFICE OF:
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NC License #F-0102
421 Fayetteville Street, Suite 600
Raleigh, NC 27601
(919) 677-2000

Signal Upgrade - Final Design

Prepared for: Transportation Mobility and Safety Division, North Carolina Department of Transportation, Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

Big Mill Farm Road / SR 2649 (Hopkins Road) at Bluff School Road

Division 9 Forsyth County Kernersville

PLAN DATE:	August 2024	REVIEWED BY:	SP Pennington
PREPARED BY:	CF Davis	REVIEWED BY:	KP Baumann

SCALE 0 40 1"=40'

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 044434 ENGINEER KEVIN P. BAUMANN

DocuSigned by: 5DC70A866CB447
SIGNATURE 7/14/2025 DATE

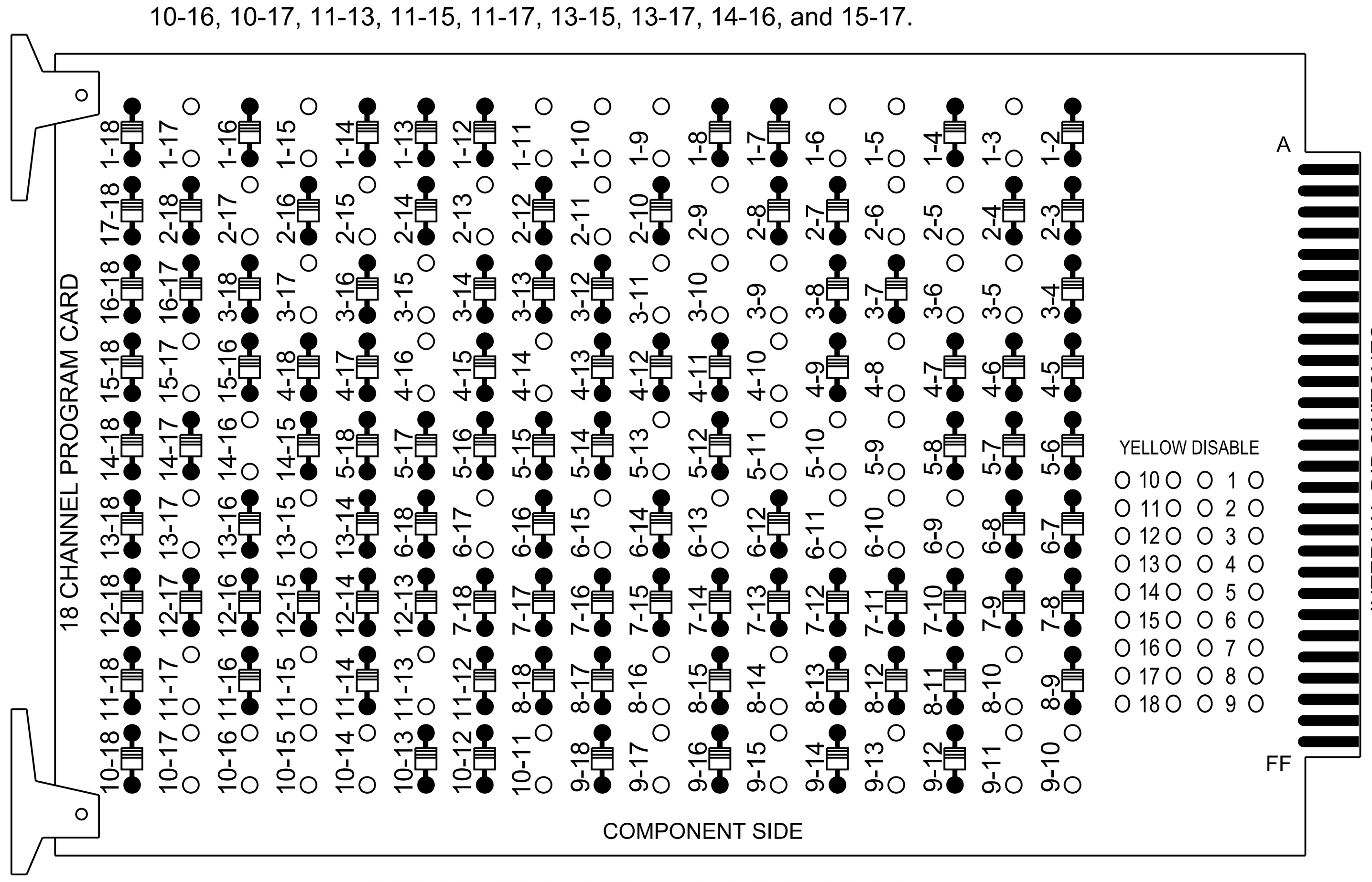
SIG. INVENTORY NO. 09-0482

K:\RAL_Roadway\011036312 - U-5760 Big Mill Farm Road\Traffic Signal\SG4 - Signal Design\090482-2024g.dgn
7/14/2025 9:01:28 AM Craig.Davis

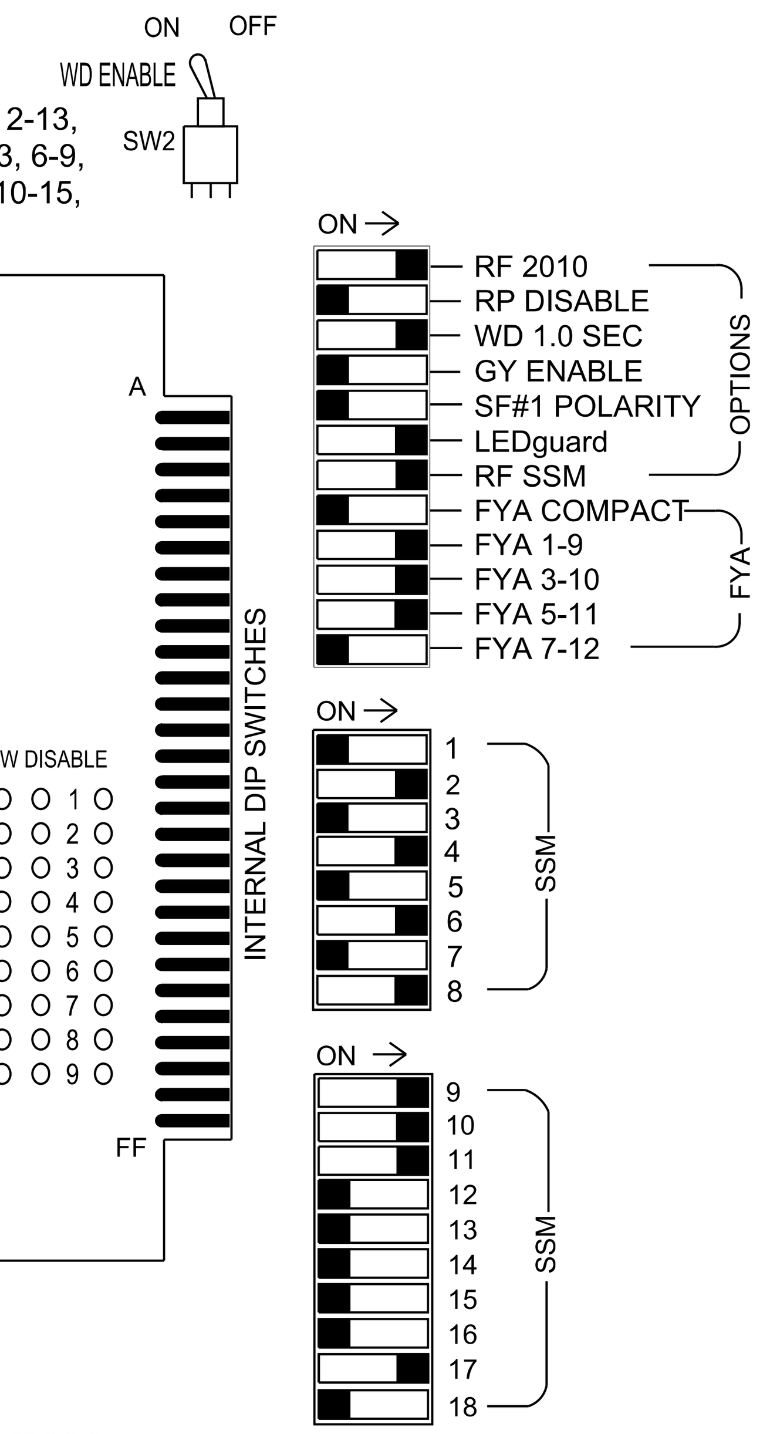
18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 1-3, 1-5, 1-6, 1-9, 1-10, 1-11, 1-15, 1-17, 2-5, 2-6, 2-9, 2-11, 2-13, 2-15, 2-17, 3-5, 3-6, 3-9, 3-10, 3-11, 3-15, 3-17, 4-8, 4-10, 4-14, 4-16, 5-9, 5-10, 5-11, 5-13, 6-9, 6-10, 6-11, 6-13, 6-15, 6-17, 8-10, 8-14, 8-16, 9-10, 9-11, 9-13, 9-15, 9-17, 10-11, 10-14, 10-15, 10-16, 10-17, 11-13, 11-15, 11-17, 13-15, 13-17, 14-16, and 15-17.



REMOVE JUMPERS AS SHOWN



■ = DENOTES POSITION OF SWITCH

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 phases 4 and 8 for Dual Entry.
3. Program controller to start up in phase 2 Green No Walk and 6 Green No Walk.
4. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.

EQUIPMENT INFORMATION

Controller..2070LX
Cabinet..332 w/ Aux
Software..Q-Free MAXTIME
Cabinet Mount...................................Base
Output File Positions..........................18 With Aux. Output File
Load Switches Used...........................S1, S2, S3, S4, S5, S6, S7, S8, S9, S11, S12, AUX S1, AUX S2, AUX S3, AUX S4
Phases Used.......................................1, 2, 2 PED, 4, 4PED, 5, 6, 6PED, 8, 8 PED
Overlap "1"..*
Overlap "2"..*
Overlap "3"..*
Overlap "4"..NOT USED
Overlap "5"..*
Overlap "6"..NOT USED
Overlap "7"..*

*See overlap programming detail on sheet 2

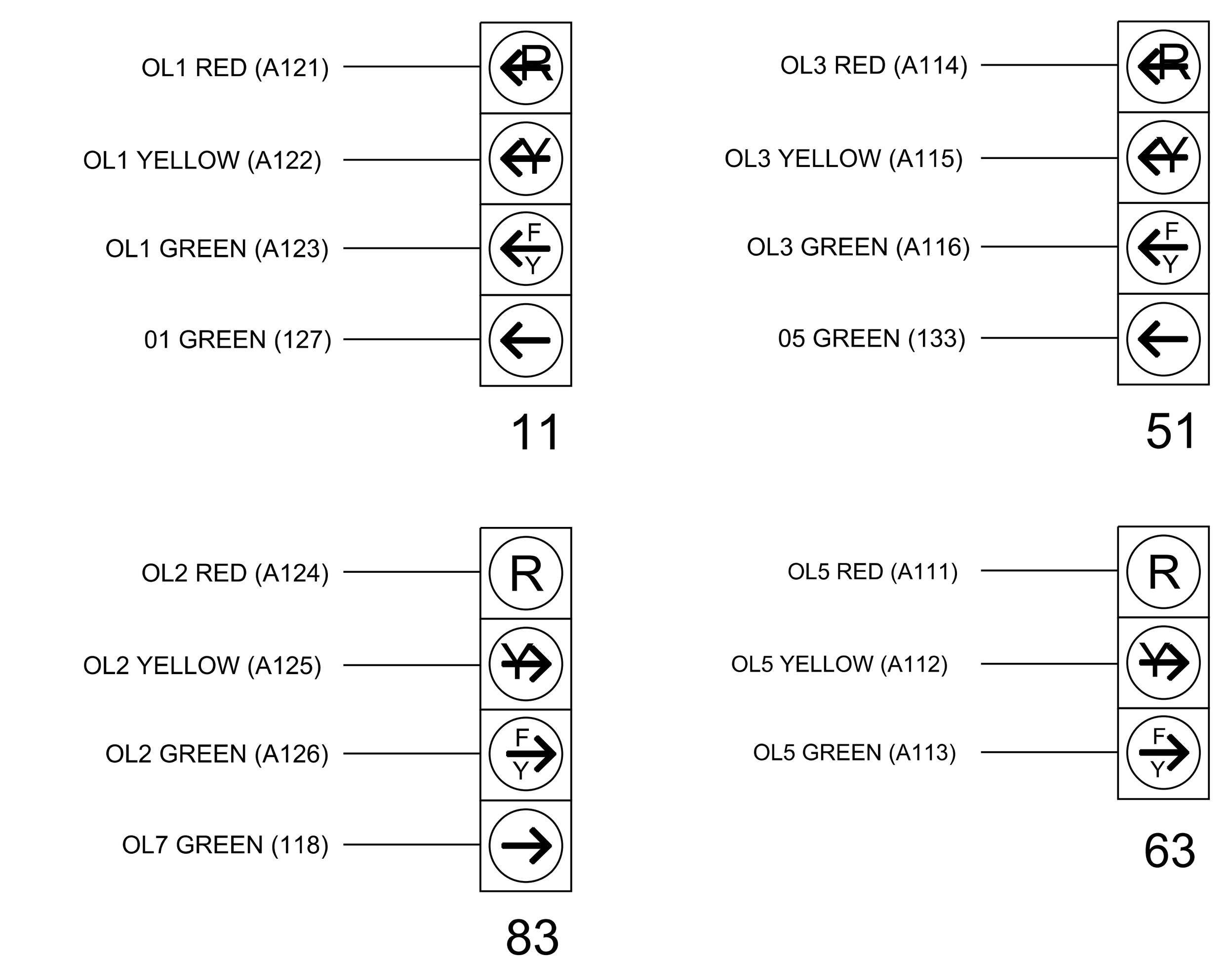
SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	OL7	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	OL5	OL3	OL4	SPARE
SIGNAL HEAD NO.	11★	21,22 23	P21, P22	83★	41,42	P41, P42	51★	61,62 64	P61, P62	NU	81,82	P81, P82	11★	83★	63★	51★	NU	NU
RED		128			101			134			107			A124	A111			
YELLOW	*	129		*	102		*	135			108							
GREEN		130			103			136			109							
RED ARROW													A121			A114		
YELLOW ARROW													A122	A125	A112	A115		
FLASHING YELLOW ARROW													A123	A126	A113	A116		
GREEN ARROW	127			118			133											
(Don't Walk hand)			113			104			119			110						
(Walk person)			115			106			121			112						

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

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



INPUT FILE POSITION LAYOUT

(front view)

FILE		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	Ø 1 1A	Ø 1 1B	Ø 2 2A	SLOT EMPTY	SLOT EMPTY	Ø 4 4A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	Ø 2 PED DC ISOLATOR	Ø 6 PED DC ISOLATOR	FS DC ISOLATOR
	L	NOT USED	NOT USED	NOT USED			NOT USED						Ø 4 PED DC ISOLATOR	Ø 8 PED DC ISOLATOR	ST DC ISOLATOR
FILE "J"	U	Ø 5 5A	Ø 6 6A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	Ø 8 8A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L	NOT USED	NOT USED				NOT USED								

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN
1A	TB2-1,2	I1U	56	18	1 ★	1	15.0		X		X	
				-	29 ★	6	3.0		X		X	X
1B	TB2-5,6	I2U	39	1	2	1	15.0		X		X	
2A	TB2-9,10	I3U	63	29	4	2			X	X	X	
4A	TB4-9,10	I6U	41	3	8	4	5.0		X		X	
5A	TB3-1,2	J1U	55	17	15 ★	5	15.0		X		X	
				-	31 ★	2	3.0		X		X	X
6A	TB3-5,6	J2U	40	2	16	6			X	X	X	
8A	TB5-9,10	J6U	42	4	22	8	3.0		X		X	
PED PUSH BUTTONS												
P21,P22	TB8-4,6	I12U	67	33	2	PED 2						
P41,P42	TB8-5,6	I12L	69	35	4	PED 4						
P61,P62	TB8-7,9	I13U	68	34	6	PED 6						
P81,P82	TB8-8,9	I13L	70	36	8	PED 8						

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

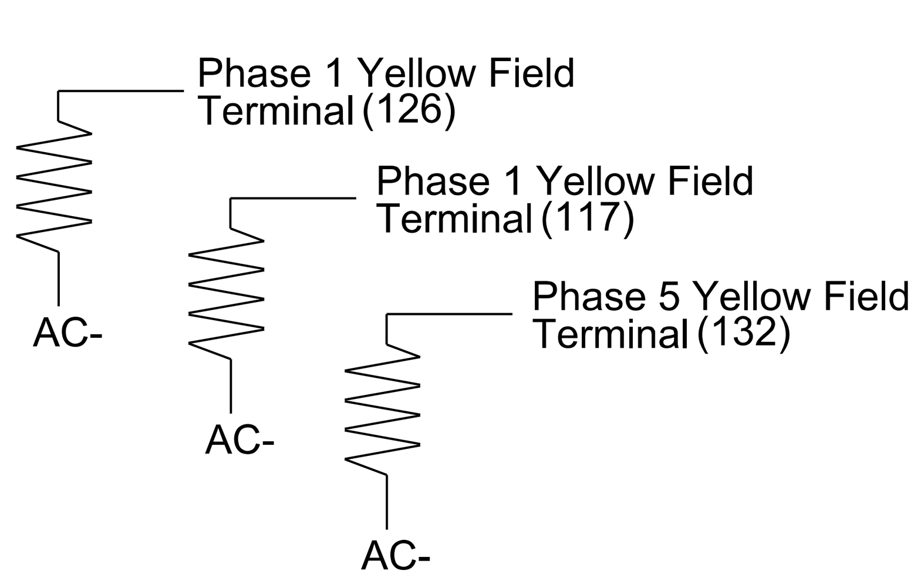
★ For the detectors to work as shown on the signal design plan, see the Detector Programming Detail for Alternate Phasing on sheet 2.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

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



COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 09-0482
DESIGNED: August 2024
SEALED: 07/14/2025
REVISED: N/A

Electrical Detail - Final Design
Sheet 1 of 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PLANS PREPARED IN THE OFFICE OF:
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ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared For:
Transportation Mobility and Safety Division – State of North Carolina – Department of Transportation – ITS & Signals Management Section
750 N.Greenfield Pkwy.Garner.NC 27529

Big Mill Farm Road / Sr 2649 (Hopkins Road) at Bluff School Road

Division 9 Forsyth County Kernersville

PLAN DATE: August 2024	REVIEWED BY: KP Baumann
PREPARED BY: CF Davis	REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 044434 ENGINEER KEVIN P. BAUMANN
DocuSigned by:
5DC709A86BCB447...
SIGNATURE 7/14/2025 DATE
SIG. INVENTORY NO. 09-0482

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

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

Web Interface
Home >Controller >Detector Configuration >Vehicle Detectors

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

Plan 2

1A

Detector	Call Phase	Delay
1	1	0.0
29	0	3.0

5A

Detector	Call Phase	Delay
15	5	0.0
31	0	3.0

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.

OUTPUT CHANNEL CONFIGURATION

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

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

Channel Configuration

NOTICE OVERLAP 7 ASSIGNED TO CHANNEL 3 →

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	Overlap	7	·	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

NOTICE: FLASH RED

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

← NOTICE FYA PED DELAY

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

← NOTICE INCLUDED PHASE

← NOTICE FYA PED DELAY

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 09-0482
DESIGNED: August 2024
SEALED: 07/14/2025
REVISED: N/A

Electrical Detail - Final Design
Sheet 2 of 3

PLANS PREPARED IN THE OFFICE OF:
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ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared For:
Transportation Mobility and Safety Division
ITS & Signals Management Section
State of North Carolina Department of Transportation
750 N.Greenfield Pkwy.Garner,NC 27529

Big Mill Farm Road /
Sr 2649 (Hopkins Road) at
Bluff School Road

Division 9 Forsyth County Kernersville

PLAN DATE: August 2024	REVIEWED BY: KP Baumann
PREPARED BY: CF Davis	REVIEWED BY:

REVISIONS	INIT.	DATE

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NORTH CAROLINA PROFESSIONAL SEAL 044434 ENGINEER KEVIN P. BAUMANN

DocuSigned by:
5DC709A86BCB447...
SIGNATURE 7/14/2025 DATE

SIG. INVENTORY NO. 09-0482

MAXTIME ALTERNATE PHASING ACTIVATION DETAIL

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

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

ALTERNATE PHASING CHANGE SUMMARY

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

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

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

Disables phase 2 call on loop 5A and reduces delay time for phase 5 call on loop 5A 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.

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 09-0482
DESIGNED: August 2024
SEALED: 07/14/2025
REVISED: N/A

Electrical Detail - Final Design
Sheet 3 of 3

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ELECTRICAL AND PROGRAMMING DETAILS FOR:

Big Mill Farm Road / Sr 2649 (Hopkins Road) at Bluff School Road

Division 9 Forsyth County Kernersville

PLAN DATE: August 2024	REVIEWED BY: KP Baumann
PREPARED BY: CF Davis	REVIEWED BY:

REVISIONS	INIT.	DATE

PLANS PREPARED IN THE OFFICE OF:
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Prepared For:
Transportation Mobility and Safety Division
ITS & Signals Management Section
750 N.Greenfield Pkwy.Garner,NC 27529

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 044434 ENGINEER KEVIN P. BAUMANN

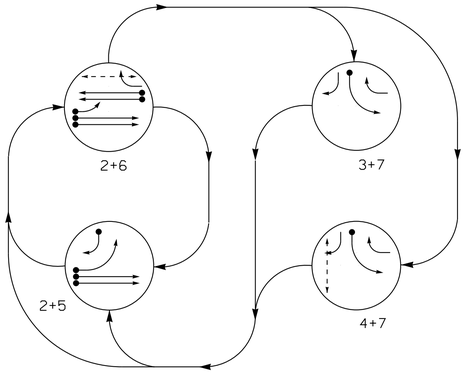
DocuSigned by:
5DC709A86BCB447...

SIGNATURE	DATE
	7/14/2025

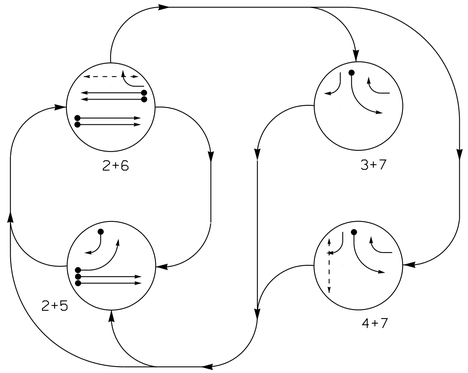
SIG. INVENTORY NO. 09-0482

PROJECT REFERENCE NO.	SHEET NO.
U-5760	Sig. 8.0

DEFAULT PHASING DIAGRAM



ALTERNATE PHASING DIAGRAM



DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE 2+5	2+6	3+7	4+7	FLASH
21,22	G	G	R	R	R
41,43	~~R~~	~~R~~	←	←	~~R~~
42	→	R	→	FY	R
51	←	FY	~~R~~	~~R~~	~~R~~
61	R	↑	R	R	R
62	R	G	R	R	R
63	R	FY	→	→	R
P41,P42	DW	DW	DW	W	DRK
P61,P62	DW	W	DW	DW	DRK

ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE 2+5	2+6	3+7	4+7	FLASH
21,22	G	G	R	R	R
41,43	~~R~~	~~R~~	←	←	~~R~~
42	→	R	→	FY	R
51	←	~~R~~	~~R~~	~~R~~	~~R~~
61	R	↑	R	R	R
62	R	G	R	R	R
63	R	FY	→	→	R
P41,P42	DW	DW	DW	W	DRK
P61,P62	DW	W	DW	DW	DRK

MAXTIME DETECTOR INSTALLATION CHART

DETECTOR					PROGRAMMING						
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
2A	6X6	300	6	X	2	-	-	X	X	X	-	X
2B	6X6	300	6	X	2	-	-	X	X	X	-	X
5A	6X40	0	2-4-2	X	5	15.0*	-	X	-	X	-	X
					2#	3.0	-	X	-	X	X	X
5B	6X40	0	2-4-2	X	5	15.0	-	X	-	X	-	X
6A	6X6	300	6	X	6	-	-	X	X	X	-	X
6B	6X6	300	6	X	6	-	-	X	X	X	-	X
7A	6X40	0	2-4-2	X	7	-	-	X	-	X	-	X

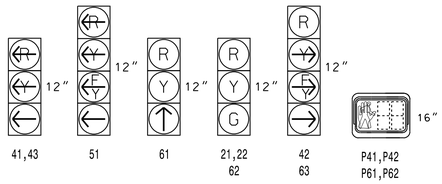
* Disable delay during Alternate Phasing operation.
\# Disable Phase call for loop during Alternate Phasing operation.

PHASING DIAGRAM DETECTION LEGEND

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

SIGNAL FACE I.D.

All Heads L.E.D.



MAXTIME TIMING CHART

FEATURE	PHASE 2	3	4	5	6	7
Walk *	–	–	11	–	14	–
Ped Clear	–	–	22	–	27	–
Min Green *	12	7	7	7	12	7
Passage *	6.0	2.0	2.0	2.0	6.0	2.0
Max 1 *	90	40	40	25	90	40
Yellow Change	4.9	3.0	3.0	3.0	4.9	3.0
Red Clear	2.2	3.3	3.3	3.4	2.2	3.3
Added Initial *	1.5	–	–	–	2.5	–
Maximum Initial *	34	–	–	–	34	–
Time Before Reduction *	15	–	–	–	15	–
Time To Reduce *	45	–	–	–	45	–
Minimum Gap	3.0	–	–	–	3.0	–
Advance Walk	–	–	4	–	**	–
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.

** See Note 11.

4 Phase
Fully Actuated
(D09-32_Kernersville CLS)

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. Phase 5 may be lagged.
4. Omit Phase 3 during Phase 4 on.
5. Set all detector units to presence mode.
6. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
7. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
8. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
9. The Division Traffic Engineer will determine the hours of use for each phasing plan.
10. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
11. To provide a leading pedestrian interval on Phase 6, program FYA heads 51 & 63 to delay for 7 seconds after the start of phase 6 Walk interval. See electrical details.
12. All metal poles and pedestals shall be painted black as specified in the Project Special Provisions.

LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
▣	Metal Strain Pole	■
⬡	Type II Signal Pedestal	●
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
□	Junction Box	■
	2-in Underground Conduit	
N/A	Right of Way	
→	Directional Arrow	→
N/A	Guardrail	
N/A	Curb Ramp	
Ⓐ	"RIGHT TURN SIGNAL" Sign (R10-10R)	Ⓐ
Ⓑ	No U-Turn/No Left Turn Sign (R3-18)	Ⓑ
Ⓒ	"U-TURN YIELD TO RIGHT TURN" Sign (R10-16)	Ⓒ

New Installation

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PLANS PREPARED IN THE OFFICE OF:
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Prepared for:
Transportation Mobility and Safety Division
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

Big Mill Farm Road
at
US 421 NB / NC 150 WB
(Salem Parkway) Ramps
Division 9 Forsyth County Kernersville

PLAN DATE:	December 2024	REVIEWED BY:	KP Baumann
PREPARED BY:	CF Davis	REVIEWED BY:	

SCALE 0 40 1"=40'

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 044434 ENGINEER KEVIN P. BAUMANN
DocuSigned by: 5DC709A868CB447...
8/4/2025
SIGNATURE DATE
SIG. INVENTORY NO. 09-0363

K:\RAL_Roadway\01036312 - U-5760 Big Mill Farm Road\Traffic Signal\S4 - Signal Design\090363-2024g.dgn
Craig.Davis
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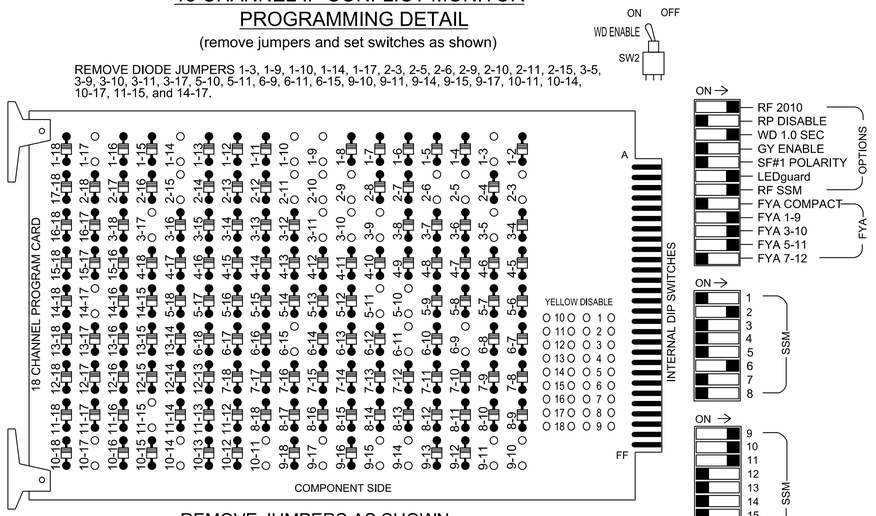
8/1/2025

PROJECT REFERENCE NO.	SHEET NO.
U-5760	Sig. 8.1

18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 1-3, 1-9, 1-10, 1-14, 1-17, 2-3, 2-5, 2-6, 2-9, 2-10, 2-11, 2-15, 3-5, 3-9, 3-10, 3-11, 3-17, 5-10, 5-11, 6-9, 6-11, 6-15, 9-10, 9-11, 9-14, 9-15, 9-17, 10-11, 10-14, 10-17, 11-15, and 14-17.



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 phases 3 and 7 for Dual Entry.
3. Program controller to start up in phase 2 Green No Walk and 6 Green No Walk.
4. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
5. The cabinet and controller are part of the D09-32_Kernersville Closed Loop System.

EQUIPMENT INFORMATION

Controller.....2070LX
Cabinet.....332 w/ Aux
Software.....Q-Free MAXTIME
Cabinet Mount.....Base
Output File Positions.....18 With Aux. Output File
Load Switches Used.....S1, S2, S4, S6, S7, S8, S9, AUX S1, AUX S2, AUX S3, AUX S4
Phases Used.....2, 3, 4**, 4PED, 5, 6, 6PED, 7**
Overlap "1".....*
Overlap "2".....*
Overlap "3".....*
Overlap "4".....NOT USED
Overlap "5".....*
Overlap "7".....*
Overlap "8".....*

*See overlap programming detail on sheet 2
**Phase used for timing purposes only

SIGNAL HEAD HOOK-UP CHART

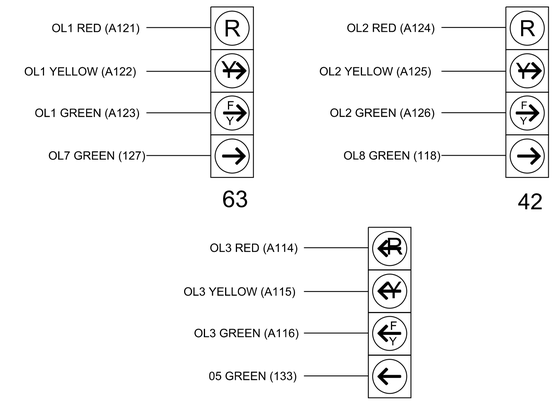
LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8		S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6		15	7	8	16	9	10	17	11	12	18
PHASE	OL7	2	2 PED	OL8	4	4 PED	5	6		6 PED	7	8	8 PED	OL1	OL2	OL5	OL3	OL4	SPARE
SIGNAL HEAD NO.	63 ★	21,22	NU	42 ★	NC	P41, P42	51 ★	61	62	P61, P62	NC	NU	NU	63 ★	42 ★	41,43	51 ★	NU	NU
RED		128						134	134					A121	A124				
YELLOW	*	129		*			*	135	135										
GREEN		130							136										
RED ARROW																A111	A114		
YELLOW ARROW														A122	A125	A112	A115		
FLASHING YELLOW ARROW														A123	A126		A116		
GREEN ARROW	127			118			133	136								A113			
✋						104				119									
🚶						106				121									

NU = Not Used
NC = No Connection

* Denotes install load resistor. See load resistor installation detail this sheet.
★ See pictorial of head wiring in detail this sheet.
Load Switch S1 requires special output remapping. See electrical sheet 2 for Channel Configuration details.

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	SLOT EMPTY	Ø 2 2A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	Ø 5 5B	SLOT EMPTY	SLOT EMPTY	NOT USED	Ø 6 PED DC ISOLATOR	FS DC ISOLATOR
	L		Ø 2 2B							NOT USED			Ø 4 PED DC ISOLATOR	NOT USED	ST DC ISOLATOR
FILE "J"	U	Ø 5 5A	Ø 6 6A	SLOT EMPTY	SLOT EMPTY	Ø 7 7A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L	NOT USED	Ø 6 6B			NOT USED									

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	TB2-5,6	I2U	39	1	2	2			X	X	X	
2B	TB2-7,8	I2L	43	5	3	2			X	X	X	
5A	TB3-1,2	J1U	55	17	15 ★	5	15.0		X		X	
				-	31 ★	2	3.0		X		X	X
5B	TB6-9,10	I9U	60	22	13	5	15.0		X		X	
6A	TB3-5,6	J2U	40	2	16	6			X	X	X	
6B	TB3-7,8	J2L	44	6	17	6			X	X	X	
7A	TB5-5,6	J5U	57	19	21	7			X		X	
PED PUSH BUTTONS												
P41;P42	TB8-5,6	I12L	69	35	4	PED 4						
P61;P62	TB8-7,9	I13U	68	34	6	PED 6						

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

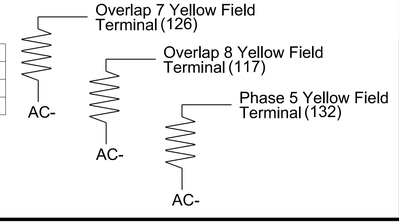
★ For the detectors to work as shown on the signal design plan, see the Detector Programming Detail for Alternate Phasing on sheet 2.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

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



COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 09-0363
DESIGNED: December 2024
SEALED: 08/04/2025
REVISED: N/A

PLANS PREPARED IN THE OFFICE OF:
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Electrical Detail - Sheet 1 of 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared For: NC Department of Transportation Integrated Mobility and Safety Division Traffic Engineering & Safety Systems Branch Signals Management Section

750 N.Greenfield Pkwy,Garner,NC 27529

Big Mill Farm Road at US 421 NB / NC 150 WB (Salem Parkway) Ramps

Division 9 Forsyth County Kernersville

PLAN DATE: December 2024	REVIEWED BY: KP Baumann
PREPARED BY: CF Davis	REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 044434 ENGINEER KEVIN P. BAUMANN
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8/4/2025
SIGNATURE DATE
SIG. INVENTORY NO. 09-0363

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8/1/2025 2:38:59 PM CraigDavis

PROJECT REFERENCE NO.	SHEET NO.
U-5760	Sig. 8.2

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	5	7	8
Type	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section	Normal	Normal	Normal
Included Phases	6	4	6	7	7	3,5
Modifier Phases	-	3,5	5	-	-	-
Modifier Overlaps	7	-	-	-	-	-
Trail Green	0	0	0	0	0	0
Trail Yellow	0.0	0.0	0.0	0.0	0.0	0.0
Trail Red	0.0	0.0	0.0	0.0	0.0	0.0
FYA Ped Delay	7.0	0.0	7.0	0.0	0.0	0.0

NOTICE FYA PED DELAY

MAXTIME DETECTOR PROGRAMMING DETAIL FOR ALTERNATE PHASING LOOP 5A

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

Web Interface
Home >Controller >Detector Configuration >Vehicle Detectors

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

Plan 2

	Detector	Call Phase	Delay
5A	15	5	0
	31	0	3

OUTPUT CHANNEL CONFIGURATION

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

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

Channel Configuration

NOTICE OVERLAP 7 ASSIGNED TO CHANNEL 1

NOTICE OVERLAP 8 ASSIGNED TO CHANNEL 3

Channel	Control Type	Control Source	Flash Yellow	Flash Red	Flash Alt	MMU Channel
1	Overlap	7	·	X	X	1
2	Phase Vehicle	2	·	X	·	2
3	Overlap	8	·	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

NOTICE: FLASH RED

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	5	7	8
Type	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section	Normal	Normal	Normal
Included Phases	6	4	-	7	7	3,5
Modifier Phases	-	3,5	5	-	-	-
Modifier Overlaps	7	-	-	-	-	-
Trail Green	0	0	0	0	0	0
Trail Yellow	0.0	0.0	0.0	0.0	0.0	0.0
Trail Red	0.0	0.0	0.0	0.0	0.0	0.0
FYA Ped Delay	7.0	0.0	0.0	0.0	0.0	0.0

NOTICE INCLUDED PHASE

NOTICE FYA PED DELAY

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 09-0363
DESIGNED: December 2024
SEALED: 08/04/2025
REVISED: N/A

Electrical Detail - Sheet 2 of 3

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PLANS PREPARED IN THE OFFICE OF:
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(919) 677-2000

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared For: Transportation Mobility and Safety Division, ITS & Signals Management Section, State of North Carolina Department of Transportation
750 N.Greenfield Pkwy.Garner,NC 27529

Big Mill Farm Road
at
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(Salem Parkway) Ramps

Division 9 Forsyth County Kernersville

PLAN DATE: December 2024	REVIEWED BY: KP Baumann
PREPARED BY: CF Davis	REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 044434 ENGINEER KEVIN P. BAUMANN

DocuSigned by:
5DC709A86BCB447...
SIGNATURE 8/4/2025 DATE

SIG. INVENTORY NO. 09-0363

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 phase for head 51 to run protected turn only.

VEH DET PLAN 2: Disables phase 2 call on loop 5A and reduces delay time for phase 5 call on loop 5A to 0 seconds.

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	Phase Phase Omit	3	Result=A	Ped Call	4	None	0	0.0	0.0
2	Phase Phase Omit	4	Result=A	Phase On	3	None	0	0.0	0.0

LOGIC STATEMENT DESCRIPTION

Statement 1 Description: Omits phase 3 if there is a call on ped detector 4.

Statement 2 Description: Omits phase 4 if phase 3 is served.

MAXTIME ALTERNATE PHASING PATTERN PROGRAMMING DETAIL

Front Panel
Main Menu >Controller >Coordination >Patterns

Web Interface
Home >Controller >Coordination >Patterns

Pattern Parameters

Pattern	Veh Det Plan	Overlap Plan
*	2	2

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 09-0363
DESIGNED: December 2024
SEALED: 08/04/2025
REVISED: N/A

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Electrical Detail - Sheet 3 of 3

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ELECTRICAL AND PROGRAMMING DETAILS FOR:

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State of North Carolina Department of Transportation
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Division 9 | Forsyth County | Kernersville

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SEAL
NORTH CAROLINA PROFESSIONAL SEAL 044434 ENGINEER KEVIN P. BAUMANN

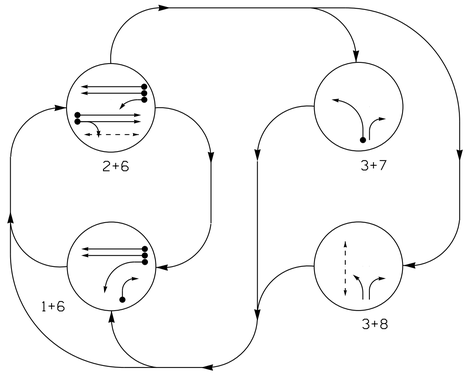
DocuSigned by:
5DC709A86BCB447...

SIGNATURE	DATE
	8/4/2025

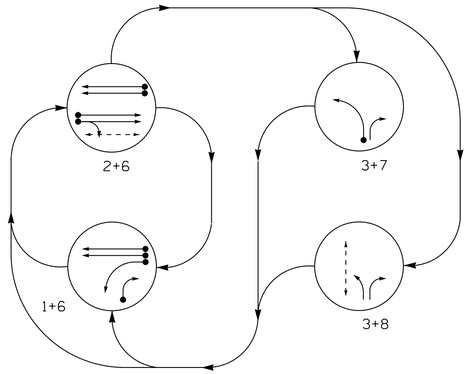
SIG. INVENTORY NO. 09-0363

PROJECT REFERENCE NO.	SHEET NO.
U-5760	Sig. 9.0

DEFAULT PHASING DIAGRAM



ALTERNATE PHASING DIAGRAM



DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE 1+6	2+6	3+7	3+8	FLASH
11	←	F Y	~~R~~	~~R~~	~~R~~
21	R	↑	R	R	R
22	R	G	R	R	R
61,62	G	G	R	R	R
71,73	~~R~~	~~R~~	←	F Y	~~R~~
72	→	R	→	→	R
P21,P22	DW	W	DW	DW	DRK
P81,P82	DW	DW	DW	W	DRK

DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE 1+6	2+6	3+7	3+8	FLASH
11	←	~~R~~	~~R~~	~~R~~	~~R~~
21	R	↑	R	R	R
22	R	G	R	R	R
61,62	G	G	R	R	R
71,73	~~R~~	~~R~~	←	F Y	~~R~~
72	→	R	→	→	R
P21,P22	DW	W	DW	DW	DRK
P81,P82	DW	DW	DW	W	DRK

MAXTIME DETECTOR INSTALLATION CHART

DETECTOR					PROGRAMMING						
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
1A	6X40	0	2-4-2	X	1	15.0*	-	X	-	X	-	X
					6#	3.0	-	X	-	X	X	X
1B	6X40	0	2-4-2	X	1	15.0	-	X	-	X	-	X
2A	6X6	300	6	X	2	-	-	X	X	X	-	X
2B	6X6	300	6	X	2	-	-	X	X	X	-	X
6A	6X6	300	6	X	6	-	-	X	X	X	-	X
6B	6X6	300	6	X	6	-	-	X	X	X	-	X
7A	6X40	0	2-4-2	X	7	-	-	X	-	X	-	X

* Disable delay during Alternate Phasing operation.
\# Disable Phase call for loop during Alternate Phasing operation.

4 Phase
Fully Actuated
D09-32_Kernersville CLS

NOTES

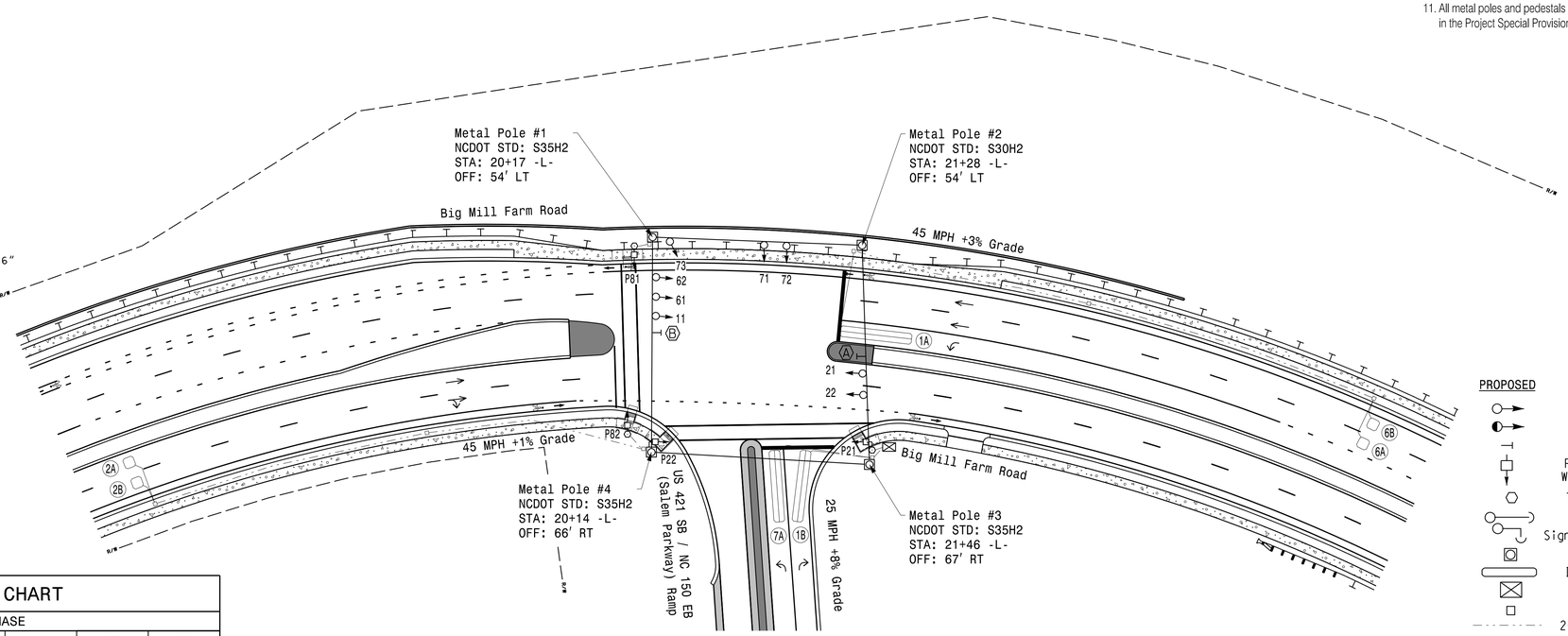
1. Refer to "Roadway Standard Drawings NCDOT" dated January 2024 and "Standard Specifications for Roads and Structures" dated January 2024.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 may be lagged.
4. Omit Phase 7 during Phase 8 on.
5. Set all detector units to presence mode.
6. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
7. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
8. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
9. The Division Traffic Engineer will determine the hours of use for each phasing plan.
10. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
11. All metal poles and pedestals shall be painted black as specified in the Project Special Provisions.

PHASING DIAGRAM DETECTION LEGEND

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

SIGNAL FACE I.D.

All Heads L.E.D.



MAXTIME TIMING CHART

FEATURE	PHASE 1	2	3	6	7	8
Walk *	–	14	–	–	–	11
Ped Clear	–	27	–	–	–	22
Min Green *	7	12	7	12	7	7
Passage *	2.0	6.0	2.0	6.0	2.0	2.0
Max 1 *	25	90	40	90	40	40
Yellow Change	3.0	4.4	3.0	4.4	3.0	3.0
Red Clear	2.9	1.9	3.4	1.9	3.4	3.4
Added Initial *	–	1.5	–	1.5	–	–
Maximum Initial *	–	34	–	34	–	–
Time Before Reduction *	–	15	–	15	–	–
Time To Reduce *	–	45	–	45	–	–
Minimum Gap	–	3.0	–	3.0	–	–
Advance Walk	–	7	–	–	–	4
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.

LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
□	Pedestrian Signal Head With Push Button & Sign	■
⬡	Type II Signal Pedestal	⬢
○	Signal Pole with Guy	●
○	Signal Pole with Sidewalk Guy	●
▣	Metal Strain Pole	■
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊡
□	Junction Box	■
·····	2-in Underground Conduit	·····
N/A	Right of Way	– – – – –
→	Directional Arrow	→
N/A	Guardrail	⊥⊥⊥
N/A	Curb Ramp	◢
Ⓐ	No U-Turn/No Left Turn Sign (R3-18)	Ⓐ
Ⓑ	"U-TURN YIELD TO RIGHT TURN" Sign (R10-16)	Ⓑ

New Installation

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PLANS PREPARED IN THE OFFICE OF:
Kimley»Horn
NC License #F-0102
421 Fayetteville Street, Suite 600
Raleigh, NC 27601
(919) 677-2000

Prepared for: Transportation Mobility and Safety Division, North Carolina Department of Transportation, Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

SCALE 0 40 1"=40'

Big Mill Farm Road
at
US 421 SB / NC 150 EB
(Salem Parkway) Ramps

Division 9 Forsyth County Kernersville

PLAN DATE:	December 2024	REVIEWED BY:	KP Baumann
PREPARED BY:	CF Davis	REVIEWED BY:	

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 044434 ENGINEER KEVIN P. BAUMANN
DocuSigned by: SDC720AA85CB447...
8/4/2025
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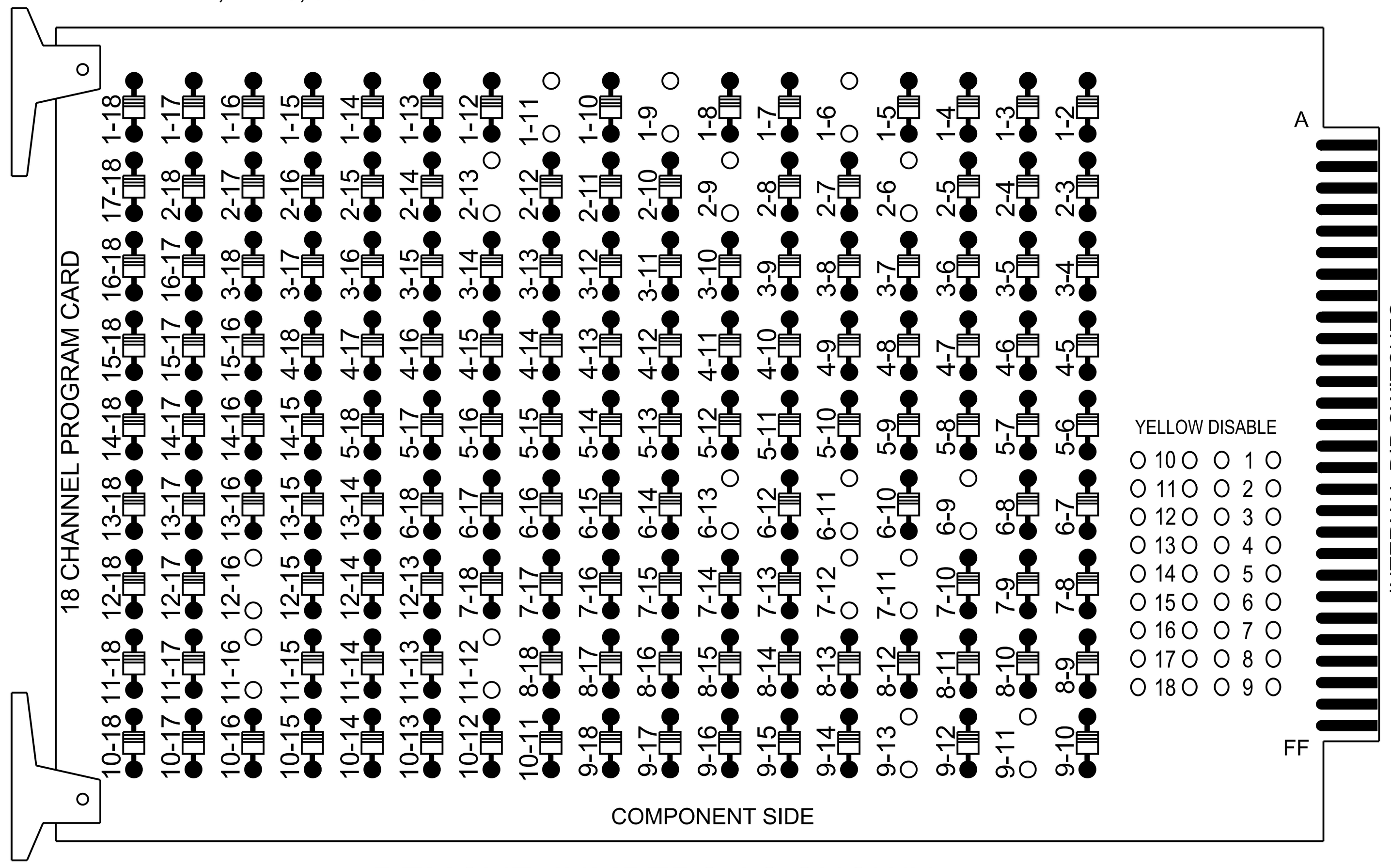
SIG. INVENTORY NO. 09-0362

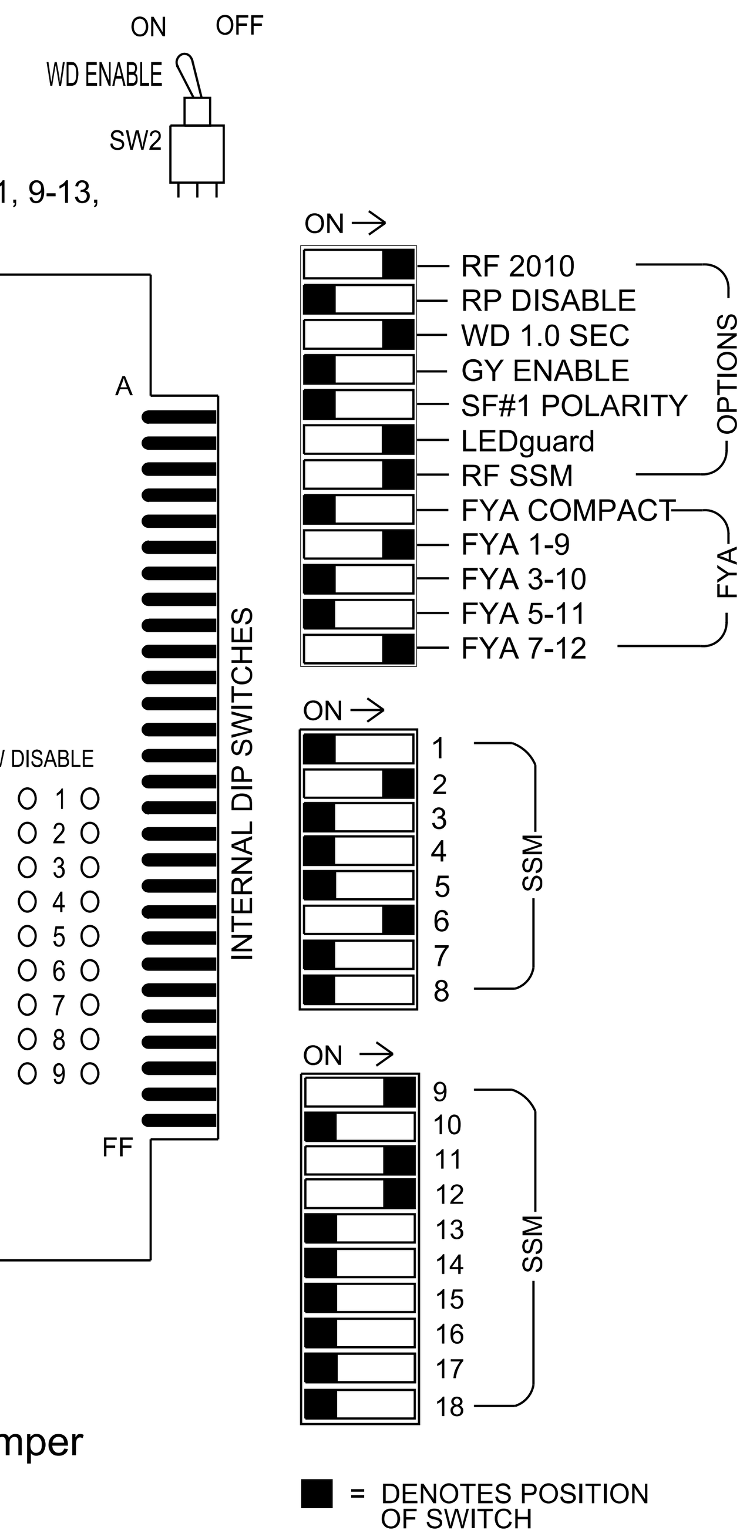
PROJECT REFERENCE NO.	SHEET NO.
U-5760	Sig. 9.1

18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 1-6, 1-9, 1-11, 2-6, 2-9, 2-13, 6-9, 6-11, 6-13, 7-11, 7-12, 9-11, 9-13, 11-12, 11-16, and 12-16.





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 phases 3 and 7 for Dual Entry.
3. Program controller to start up in phase 2 Green No Walk and 6 Green No Walk.
4. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
5. The cabinet and controller are part of the D09-32_Kernersville Closed Loop System.

EQUIPMENT INFORMATION

Controller..2070LX
Cabinet...332 w/ Aux
Software...Q-Free MAXTIME
Cabinet Mount....................................Base
Output File Positions...........................18 With Aux. Output File
Load Switches Used............................S1, S2, S3, S8, S10, S12, AUX S1, AUX S4, AUX S5
Phases Used..1, 2, 2PED, 3**, 6, 7, 8**, 8PED
Overlap "1"..*
Overlap "2"..NOT USED
Overlap "3"..*
Overlap "4"..*

*See overlap programming detail on sheet 2
**Phase used for timing purposes only.

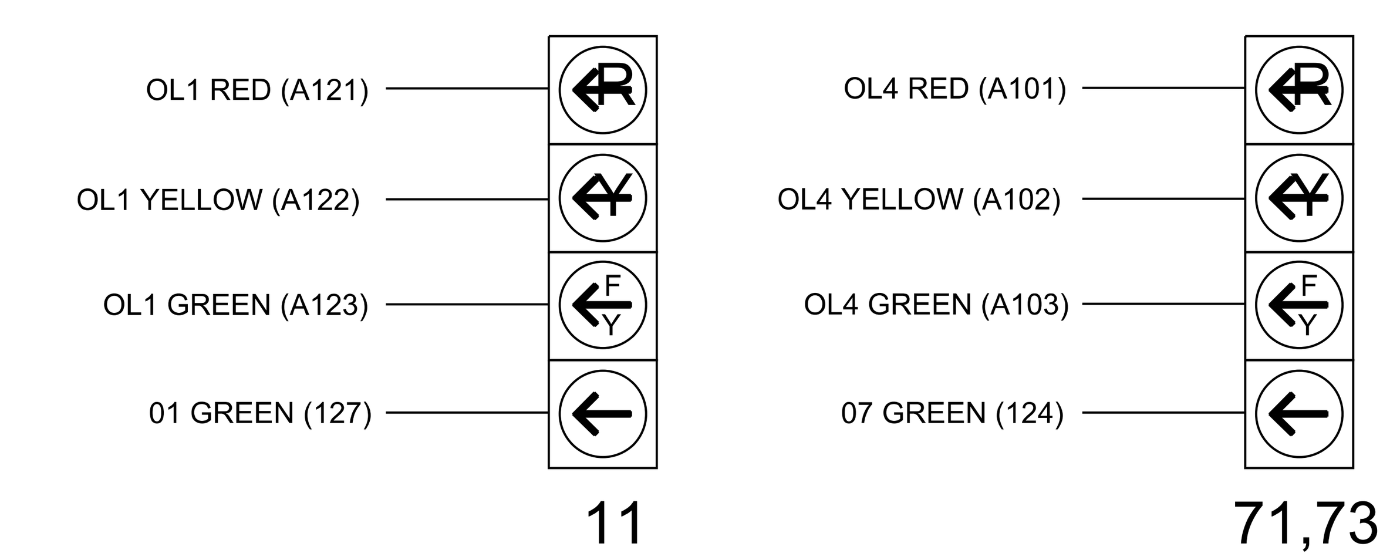
SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2		S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2		13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2		2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	11★	21	22	P21, P22	NC	NU	NU	NU	61,62	NU	71,73★	NC	P81, P82	11★	NU	NU	72★	71,73★	NU
RED		128	128						134								A114		
YELLOW	*	129	129						135		*								
GREEN			130						136										
RED ARROW														A121				A101	
YELLOW ARROW														A122			A115	A102	
FLASHING YELLOW ARROW														A123				A103	
GREEN ARROW	127	130									124						A116		
(DON'T WALK hand symbol)				113									110						
(WALK pedestrian symbol)				115									112						

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

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



INPUT FILE POSITION LAYOUT

(front view)

FILE		1	2	3	4	5	6	7	8	9	10	11	12	13	14
"I"	U	Ø 1 1A	Ø 2 2A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	Ø 1 1B	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	Ø 2 PED DC ISOLATOR	NOT USED	FS DC ISOLATOR
"I"	L	NOT USED	Ø 2 2B						NOT USED				NOT USED	Ø 8 PED DC ISOLATOR	ST DC ISOLATOR
"J"	U	SLOT EMPTY	Ø 6 6A	SLOT EMPTY	SLOT EMPTY	Ø 7 7A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
"J"	L		Ø 6 6B			NOT USED									

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN
1A	TB2-1,2	I1U	56	18	1 ★	1	15.0		X		X	
				-	29 ★	6	3.0		X		X	X
1B	TB6-5,6	I8U	49	11	12	1	15.0		X		X	
2A	TB2-5,6	I2U	39	1	2	2			X	X	X	
2B	TB2-7,8	I2L	43	5	3	2			X	X	X	
6A	TB3-5,6	J2U	40	2	16	6			X	X	X	
6B	TB3-7,8	J2L	44	6	17	6			X	X	X	
7A	TB5-5,6	J5U	57	19	21	7			X		X	
PED PUSH BUTTONS												
P21;P22	TB8-4,6	I12U	67	33	2	PED 2						
P81;P82	TB8-8,9	I13L	70	36	8	PED 8						

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

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

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

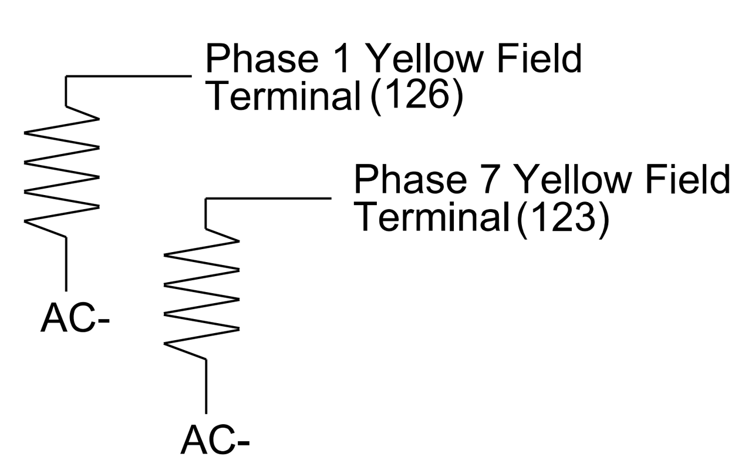
COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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.

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

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



THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 09-0362
DESIGNED: December 2024
SEALED: 08/04/2025
REVISED: N/A

Electrical Detail - Sheet 1 of 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared For:
ITS & Signals Management Section, Transportation Mobility and Safety Division, State of North Carolina Department of Transportation
750 N.Greenfield Pkwy.Garner.NC 27529

Big Mill Farm Road
at
US 421 SB / NC 150 EB
(Salem Parkway) Ramps

Division 9 Forsyth County Kernersville

PLAN DATE: December 2024	REVIEWED BY: KP Baumann
PREPARED BY: CF Davis	REVIEWED BY:

REVISIONS	INIT.	DATE

PLANS PREPARED IN THE OFFICE OF:
Kimley»Horn
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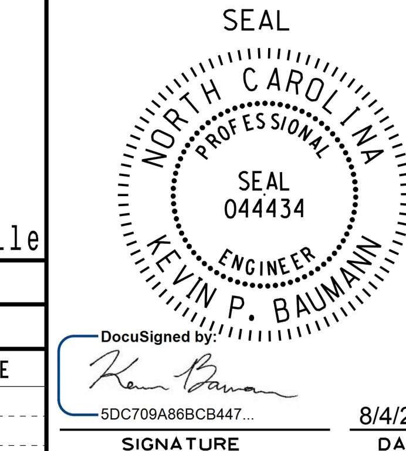
SEAL



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5DC709A86BCB447...
SIGNATURE 8/4/2025 DATE

SIG. INVENTORY NO. 09-0362

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	3	4
Type	FYA 4 - Section	Normal	FYA 4 - Section
Included Phases	2	1,3	8
Modifier Phases	1	-	7
Modifier Overlaps	-	-	-
Trail Green	0	0	0
Trail Yellow	0.0	0.0	0.0
Trail Red	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	3	4
Type	FYA 4 - Section	Normal	FYA 4 - Section
Included Phases	-	1,3	8
Modifier Phases	1	-	7
Modifier Overlaps	-	-	-
Trail Green	0	0	0
Trail Yellow	0.0	0.0	0.0
Trail Red	0.0	0.0	0.0

← NOTICE INCLUDED PHASE

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.

Plan 2

	Detector	Call Phase	Delay
1A	1	1	0
	29	0	-

MAXTIME STARTUP AND SOFTWARE FLASH PROGRAMMING DETAIL

Front Panel
Main Menu >Controller >Unit

Web Interface
Home >Controller >Unit

Modify parameters as shown below and save changes.

Start Up Parameters

StartUp Clearance Hold
6

Unit Flash Parameters

All Red Flash Exit Time
6

OUTPUT CHANNEL CONFIGURATION

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

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

Channel Configuration

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

NOTICE: FLASH RED

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DESIGNED: December 2024
SEALED: 08/04/2025
REVISED: N/A

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Electrical Detail - Sheet 2 of 3

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ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared For: Transportation Mobility and Safety Division, ITS & Signals Management Section, State of North Carolina Department of Transportation
750 N.Greenfield Pkwy.Garner,NC 27529

Big Mill Farm Road
at
US 421 SB / NC 150 EB
(Salem Parkway) Ramps

Division 9 Forsyth County Kernersville

PLAN DATE: December 2024	REVIEWED BY: KP Baumann
PREPARED BY: CF Davis	REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 044434 ENGINEER KEVIN P. BAUMANN

DocuSigned by: 5DC709A86BCB447...
SIGNATURE 8/4/2025 DATE

SIG. INVENTORY NO. 09-0362

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 phase for head 11 to run protected turn 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.

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	Phase Phase Omit	7	Result=A	Ped Call	8	None	0	0.0	0.0
2	Phase Phase Omit	8	Result=A	Phase On	7	None	0	0.0	0.0

LOGIC STATEMENT DESCRIPTION

Statement 1 Description: Omits phase 7 if there is a call on ped detector 8.

Statement 2 Description: Omits phase 8 if phase 7 is served.

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.

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THE SIGNAL DESIGN: 09-0362
DESIGNED: December 2024
SEALED: 08/04/2025
REVISED: N/A

Electrical Detail - Sheet 3 of 3

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SIG. INVENTORY NO. 09-0362

PROJECT I.D.NO.	SHEET NO.
	Sig.M1A

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

STANDARD DRAWINGS FOR ALL METAL POLES (LRFD)

NCDOT METAL POLE STANDARDS

DIVISION 11
WIND ZONE 5 & 6

DIVISION 9
WIND ZONE 5

DIVISION 7
WIND ZONE 5

DIVISION 5
WIND ZONE 4 & 5

DIVISION 4
WIND ZONE 3 & 4

DIVISION 1
WIND ZONE 2, 3, 4 & 5

DIVISION 13
WIND ZONE 5 & 6

DIVISION 14
WIND ZONE 5 & 6

DIVISION 12
WIND ZONE 5

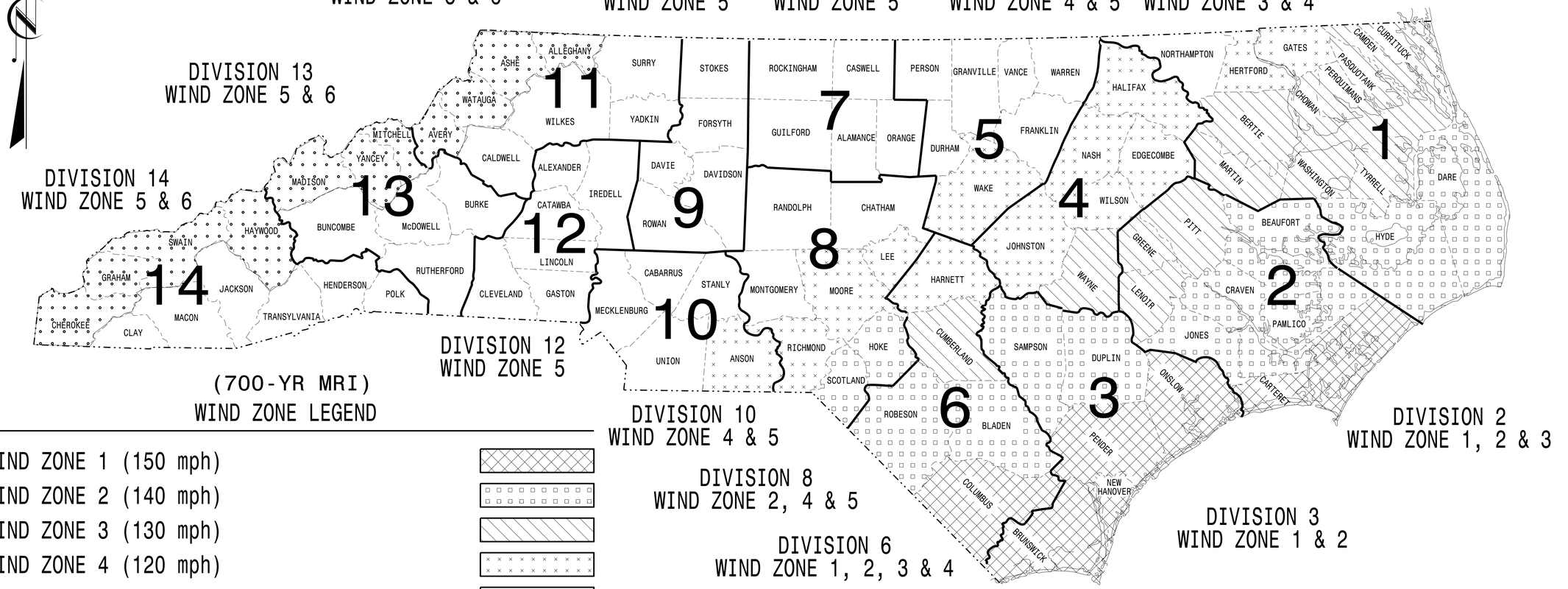
DIVISION 10
WIND ZONE 4 & 5

DIVISION 8
WIND ZONE 2, 4 & 5

DIVISION 6
WIND ZONE 1, 2, 3 & 4

DIVISION 2
WIND ZONE 1, 2 & 3

DIVISION 3
WIND ZONE 1 & 2



(700-YR MRI)
WIND ZONE LEGEND

WIND ZONE 1 (150 mph)	
WIND ZONE 2 (140 mph)	
WIND ZONE 3 (130 mph)	
WIND ZONE 4 (120 mph)	
WIND ZONE 5 (110 mph)	
WIND ZONE 6 (135 mph) Special Wind Zone	

https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx

Prepared in the Offices of:

Transportation Mobility and Safety Division
Signal Design Section
750 N.Greenfield Pkwy.
Garner, NC 27529

Designed in conformance with the latest 2020 Interim to the 1st Edition 2015

AASHTO LRFD

Standard Specifications for Highway Signs, Luminaires, and Traffic Signals

INDEX OF PLANS

DRAWING NUMBER	DESCRIPTION
Sig. M 1A	Statewide Wind Zone Map (700–yr MRI)
Sig. M 1B	Statewide Wind Zone Map (10–yr MRI)
Sig. M 2	Typical Fabrication Details–All Metal Poles
Sig. M 3	Typical Fabrication Details–Strain Poles
Sig. M 4	Typical Fabrication Details–Mast Arm Poles
Sig. M 5	Typical Fabrication Details–Mast Arm Connection
Sig. M 6	Typical Fabrication Details–Strain Pole Attachments
Sig. M 7	Construction Details–Foundations
Sig. M 8	Standard Strain Pole Foundation–All Soil Conditions
Sig. M 9	Typical Fabrication Details–CCTV Camera Poles

MOBILITY AND SAFETY DIVISION – TRANSPORTATION SYSTEMS MANAGEMENT AND OPERATIONS UNIT

D.Y. ISHAK – STATE SIGNALS ENGINEER

K. DURIGON, P.E. – ITS AND SIGNALS STRUCTURAL ENGINEER

B. WALKER, P.E. – ITS AND SIGNALS STRUCTURAL ENGINEER

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 036626 ENGINEER KEVIN C. DURIGON

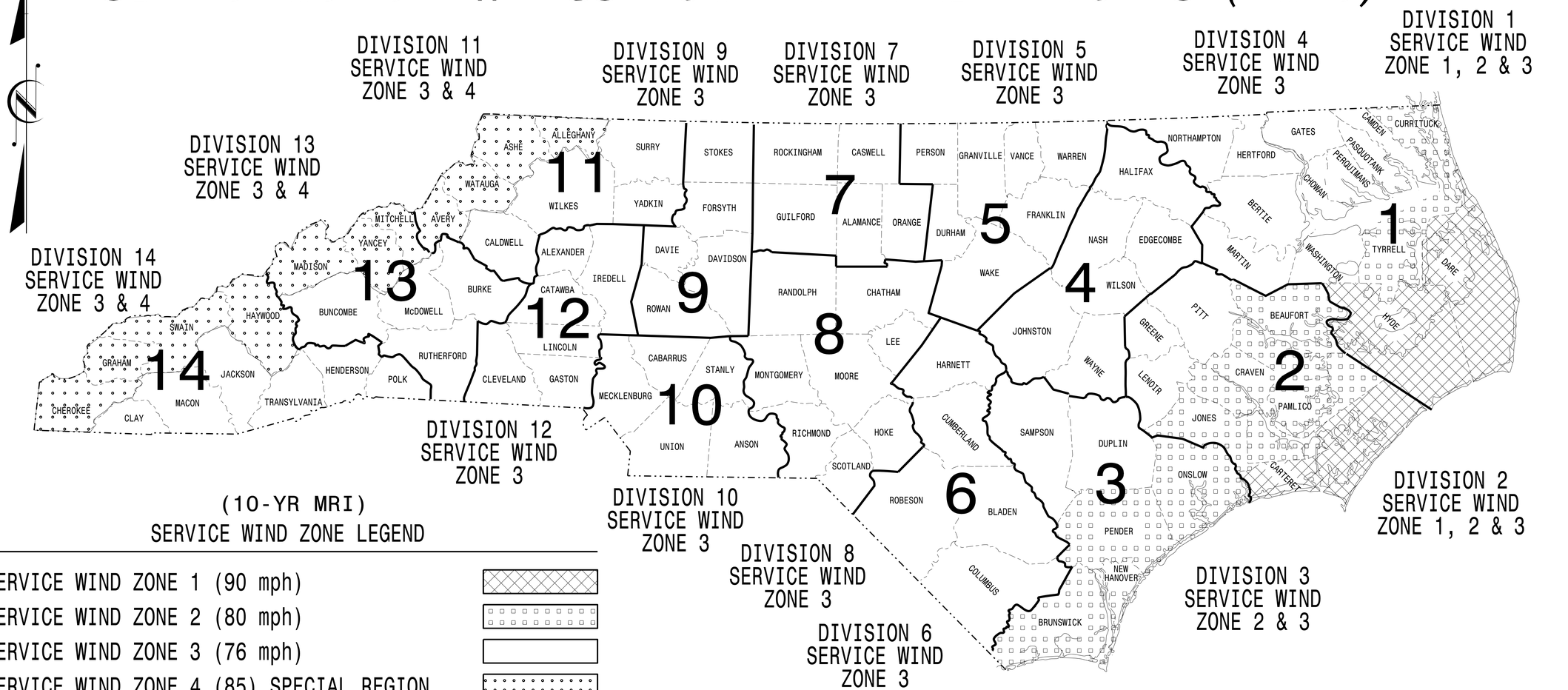
DocuSigned by:
Kevin Durigon
SIGNATURE
4B23DC79B3784DA...
09/21/2023
DATE

PROJECT I.D.NO.	SHEET NO.
	Sig.M1B

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

STANDARD DRAWINGS FOR ALL METAL POLES (LRFD)

NCDOT METAL POLE STANDARDS



(10-YR MRI)
SERVICE WIND ZONE LEGEND

SERVICE WIND ZONE 1 (90 mph)	
SERVICE WIND ZONE 2 (80 mph)	
SERVICE WIND ZONE 3 (76 mph)	
SERVICE WIND ZONE 4 (85) SPECIAL REGION	

https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx

Prepared in the Offices of:

Transportation Mobility and Safety Division
Signal Design Section
750 N.Greenfield Pkwy.
Garner, NC 27529

Designed in conformance with the latest 2020 Interim to the 1st Edition 2015

AASHTO LRFD

Standard Specifications for Highway Signs, Luminaires, and Traffic Signals

INDEX OF PLANS

DRAWING NUMBER	DESCRIPTION
Sig. M 1A	Statewide Wind Zone Map (700–yr MRI)
Sig. M 1B	Statewide Wind Zone Map (10–yr MRI)
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NCDOT CONTACTS:

MOBILITY AND SAFETY DIVISION – TRANSPORTATION SYSTEMS MANAGEMENT AND OPERATIONS UNIT

D.Y. ISHAK – STATE SIGNALS ENGINEER

K. DURIGON, P.E. – ITS AND SIGNALS STRUCTURAL ENGINEER

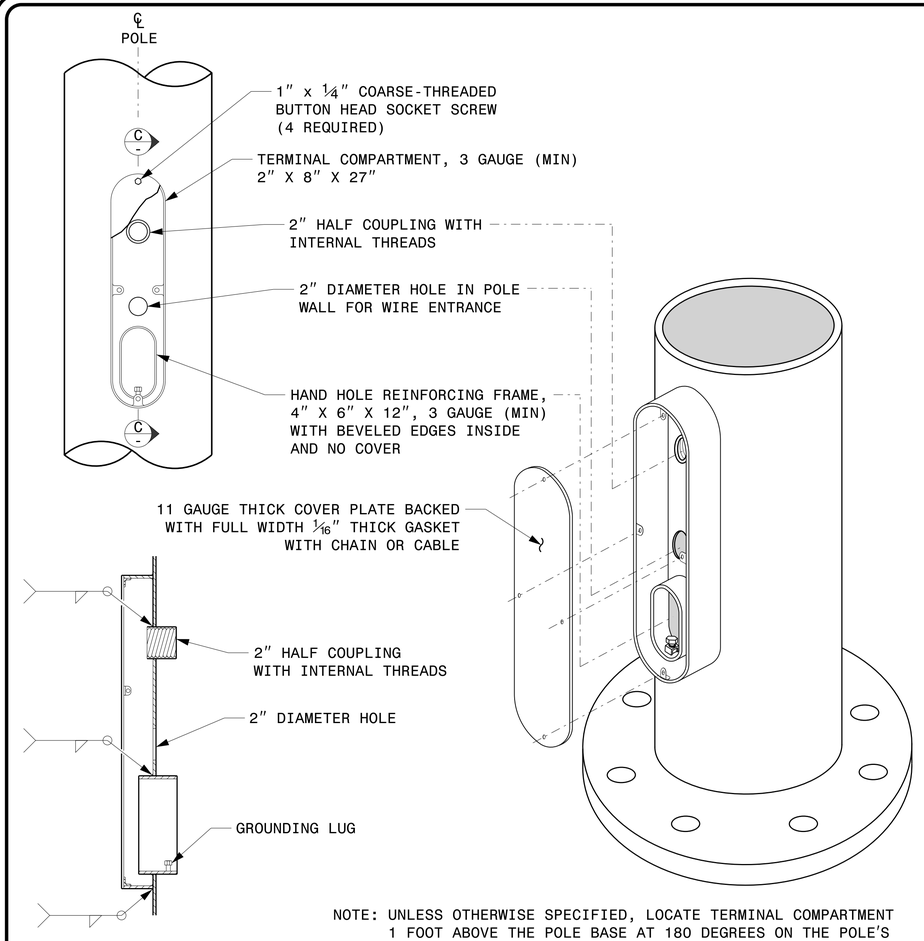
B. WALKER, P.E. – ITS AND SIGNALS STRUCTURAL ENGINEER

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 036626 ENGINEER KEVIN C. DURIGON

DocuSigned by:
Kevin Durigon
SIGNATURE
4B23DC79B3784DA...

09/21/2023
DATE



SECTION C-C

NOTE: UNLESS OTHERWISE SPECIFIED, LOCATE TERMINAL COMPARTMENT 1 FOOT ABOVE THE POLE BASE AT 180 DEGREES ON THE POLE'S RADIAL INDEX.

TERMINAL COMPARTMENT DETAIL

MFG _____ MFG. DATE: MM/YY
SHAFT D/T/L/Y ----/----/----/----
ARM-A D/T/L/Y ----/----/----/----
----/----/----/----
ARM-B D/T/L/Y ----/----/----/----
----/----/----/----
A.B. DIA./B.C./L/Y ----/----/----/----
NCDOT SIG. INV. NO. _ _ _ _ _ _ _ _
NCDOT POLE NO. _ _ _ _ _ _ _ _

SHAFT I.D. TAG
(PROVIDE ON SHAFT OF STRAIN POLES
AND MAST ARM POLE SHAFT)

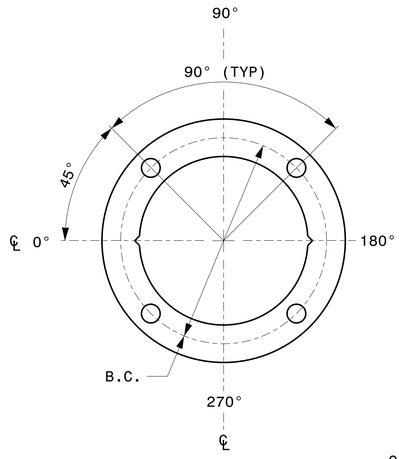
MFG _____ MFG. DATE: MM/YY
SECTION D/T/L/Y ----/----/----/----
NCDOT SIG. INV. NO. _ _ _ _ _ _ _ _
NCDOT POLE NO. _ _ _ _ _ _ _ _

ARM I.D. TAG
(PROVIDE ON EACH SECTION OF
A MULTI-SECTION MAST ARM)

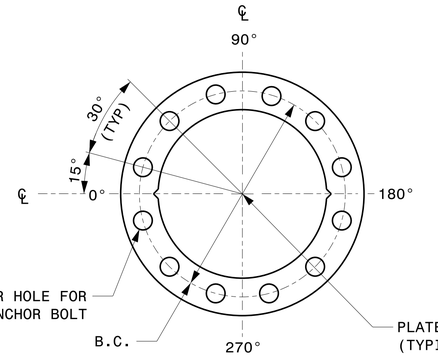
NOTES:

1. D = DIAMETER, T = THICKNESS, L = LENGTH, Y = YIELD STRENGTH
2. A.B. = ANCHOR BOLT
3. B.C. = BOLT CIRCLE OF ANCHOR BOLTS
4. IF STANDARD DESIGN, INCLUDE CASE NUMBER IN ADDITION TO POLE NUMBER ON "NCDOT POLE NO." LINE.
5. SIGNAL INV. NUMBER AND POLE I.D. NUMBER. SEE DRAWING M3 AND M4 FOR MOUNTING POSITIONS OF I.D. TAGS.

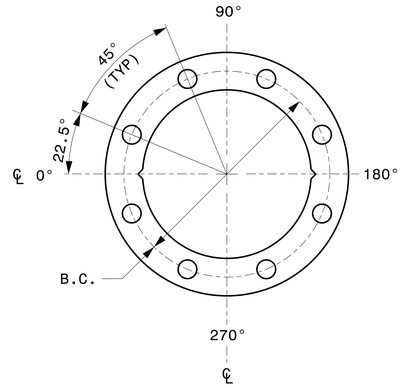
IDENTIFICATION TAG DETAILS



4 BOLT PATTERN



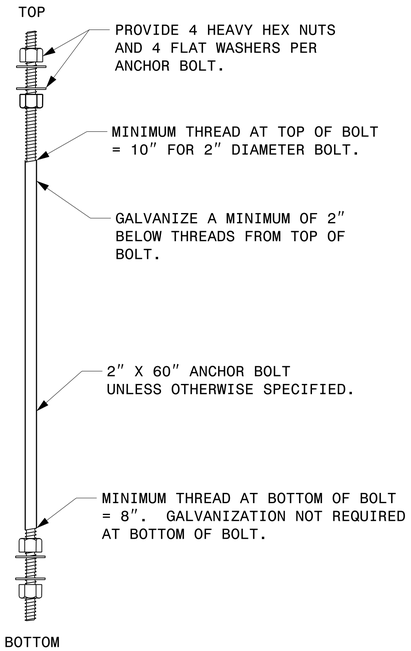
12 BOLT PATTERN



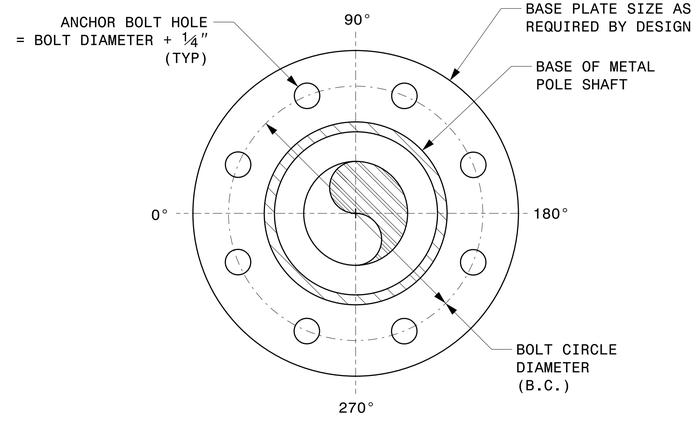
8 BOLT PATTERN

CONSTRUCT TEMPLATES AND PLATES FROM ¼″ (MIN) THICK STEEL. GALVANIZING IS NOT REQUIRED.

BASE PLATE TEMPLATE AND ANCHOR BOLT LOCK PLATE DETAILS



ANCHOR BOLT DETAIL



NOTE: BASE PLATE MAY BE CIRCULAR, OCTAGONAL, SQUARE OR RECTANGULAR IN SHAPE.

TYPICAL BASE PLATE DETAIL

PROJECT I.D. NO.	SHEET NO.
	Sig.M2

Fabrication Details – All Metal Poles

Prepared In the Offices of:
Transportation Mobility and Safety Division
Signal Design Section
750 N.Greenfield Pkwy.Garner,NC 27529

SCALE
0 NA
NONE

Typical Fabrication Details
For
All Metal Poles

PLAN DATE: SEPTEMBER 2023	DESIGNED BY: C.F.ANDREWS
PREPARED BY: K.C. DURIGON	REVIEWED BY: D.C. SARKAR

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA
PROFESSIONAL
SEAL 036626
ENGINEER
KEVIN C. DURIGON

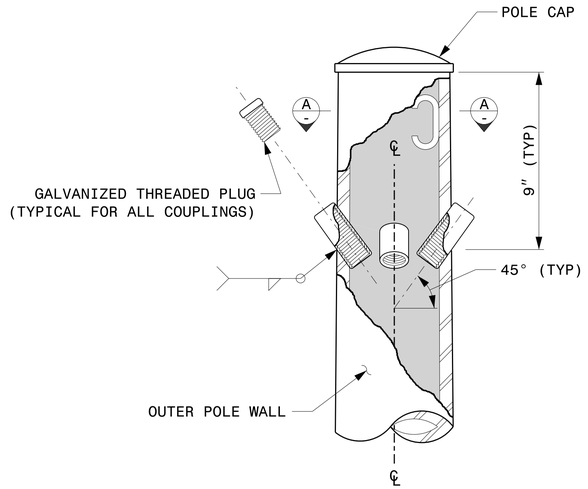
DocuSigned by:
Kevin Durigon
SIGNATURE
4B23DC79B3784DA...
09/21/2023
DATE

PROJECT I.D. NO.	SHEET NO.
	Sig.M3

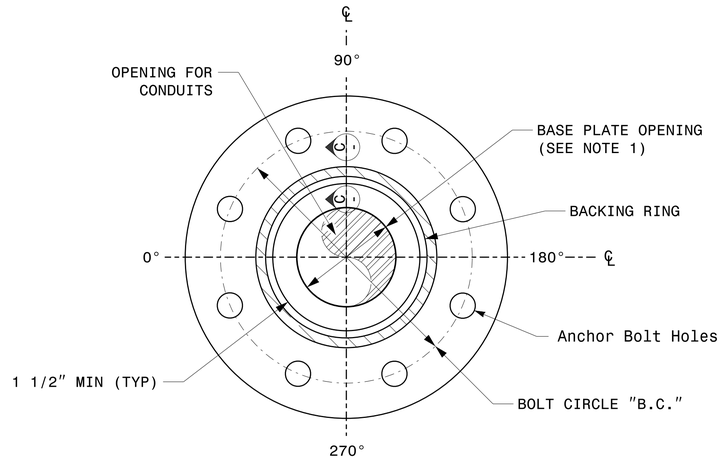
Fabrication Details – Strain Poles

NOTE:

1. OPENING IN POLE BASE PLATE SHALL BE EQUAL TO POLE BASE INSIDE DIAMETER MINUS 3½" BUT SHALL NOT BE LESS THAN 8½".

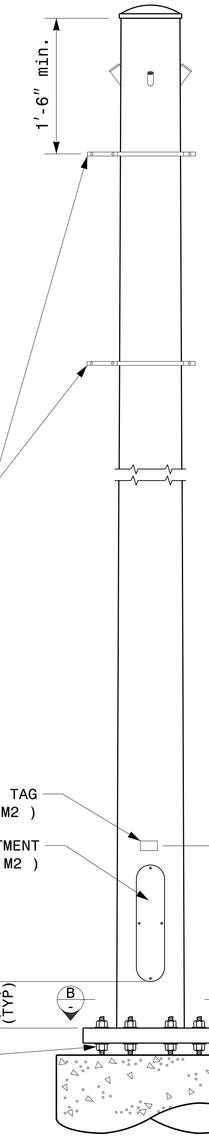


CABLE ENTRANCES AT TOP OF POLE

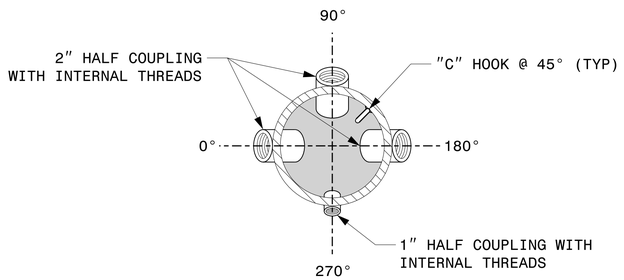


SECTION B-B

POLE BASE PLATE DETAILS
(8 AND 12 BOLT PATTERN)

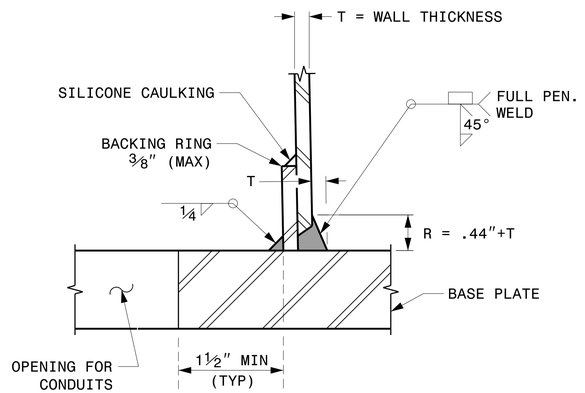


MONOTUBE STRAIN POLE



SECTION A-A

RADIAL ORIENTATION OF FACTORY INSTALLED ACCESSORIES AT TOP OF POLE



SECTION C-C

(POLE ATTACHMENT TO BASE PLATE)

FULL-PENETRATION GROOVE WELD DETAIL

Prepared In the Offices of:
Transportation Mobility and Safety Division
Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

SCALE
0 NA
NONE

Typical Fabrication Details
For
Strain Poles

PLAN DATE:	SEPTEMBER 2023	DESIGNED BY:	K.C. DURIGON
PREPARED BY:	K.C. DURIGON	REVIEWED BY:	D.C. SARKAR

REVISIONS	INIT.	DATE

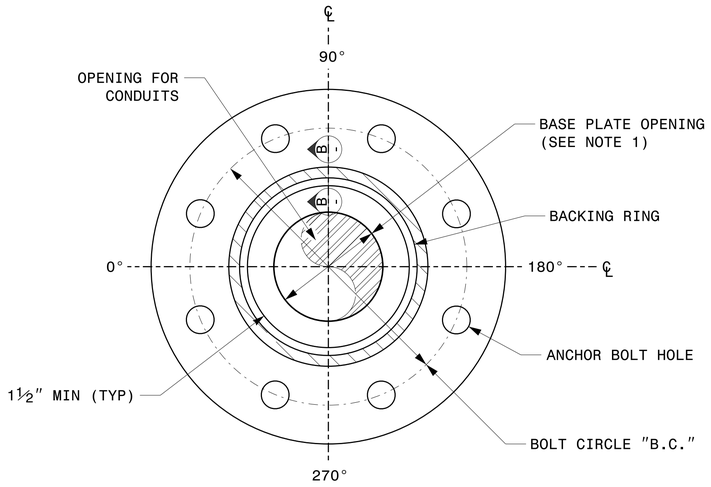
SEAL
NORTH CAROLINA
PROFESSIONAL
SEAL
036626
ENGINEER
KEVIN C. DURIGON

DocuSigned by:
Kevin Durigon
SIGNATURE
4B23DC79B3784DA...
09/21/2023
DATE

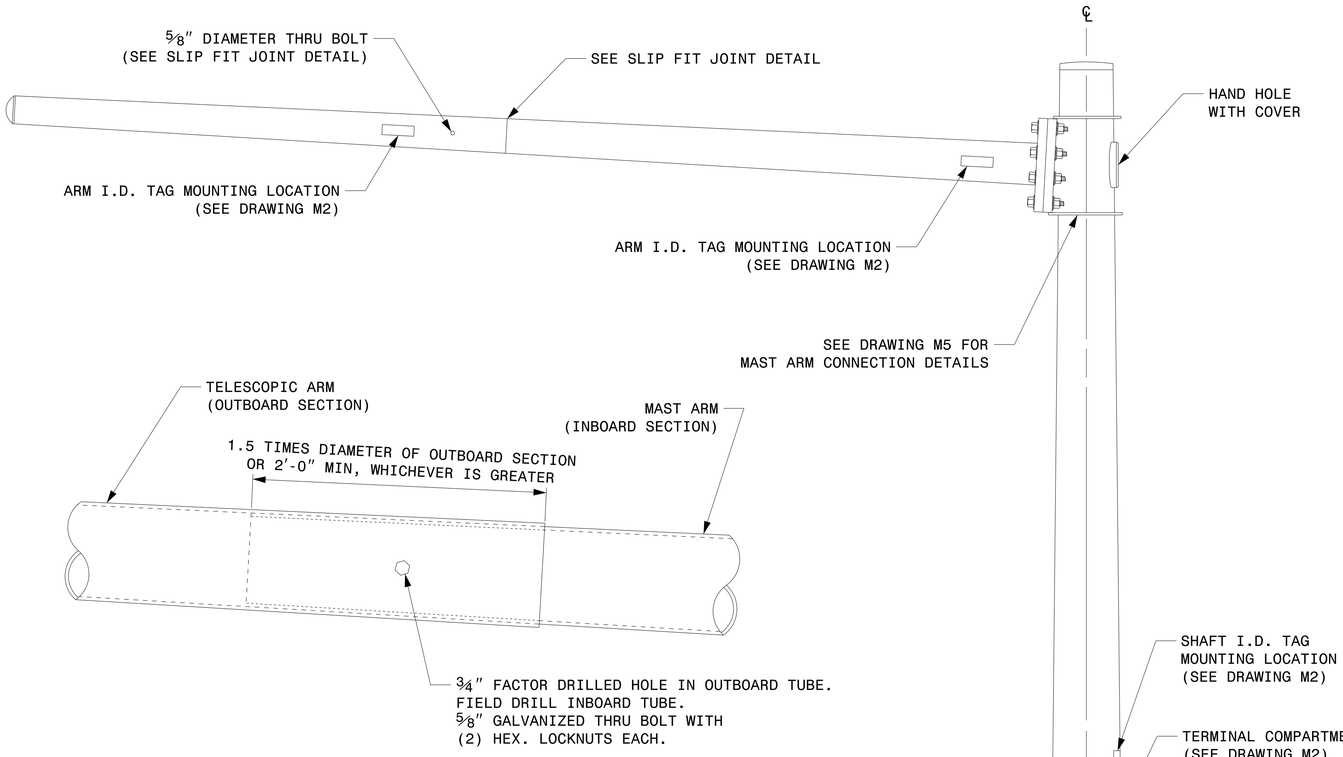
PROJECT I.D. NO.	SHEET NO.
	Sig.M4

NOTE:

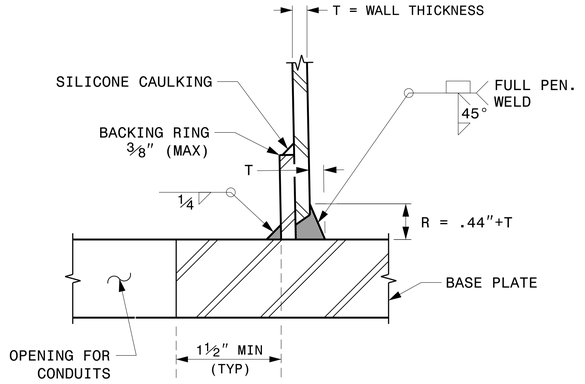
1. OPENING IN POLE BASE PLATE SHALL BE EQUAL TO POLE BASE INSIDE DIAMETER MINUS 3½" BUT SHALL NOT BE LESS THAN 8½".



SECTION A-A
POLE BASE PLATE DETAILS

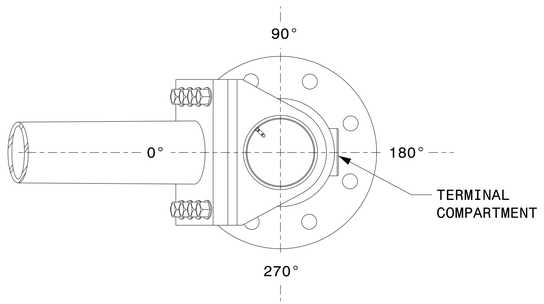


SLIP FIT JOINT DETAIL FOR MAST ARM



SECTION B-B
(POLE ATTACHMENT TO BASE PLATE)

FULL-PENETRATION GROOVE WELD DETAIL



MAST ARM RADIAL ORIENTATION

MAST ARM POLE

Fabrication Details – Mast Arm Poles

Prepared in the Offices of:
Transportation Mobility and Safety Division
Signal Design Section
750 N.Greenfield Pkwy.Garner,NC 27529

SCALE 0 NA NONE

Typical Fabrication Details For Mast Arm Poles

PLAN DATE: SEPTEMBER 2023 DESIGNED BY: K.C. DURIGON
PREPARED BY: K.C. DURIGON REVIEWED BY: D.C. SARKAR

REVISIONS	INIT.	DATE

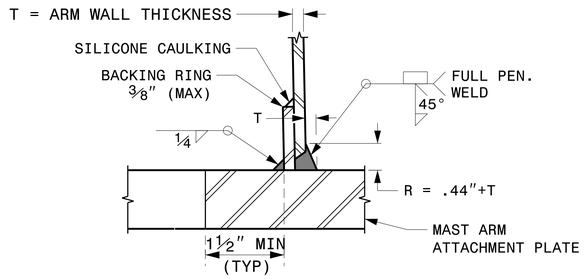
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 036626 ENGINEER KEVIN C. DURIGON

DocuSigned by:
Kevin Durigon
SIGNATURE
4B23DC79B3784DA...
09/21/2023
DATE

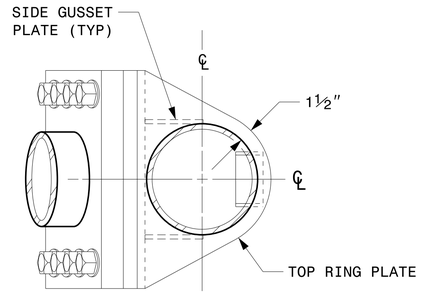
03-OCT-2023 12:25
S:*ITS\SIG\M*ITS\Signals\Signal Design Section\Structures\Drawings*2024 Metal Pole Std Drawings for LRFD*2024 Sig.M4 Std. Fabrication Details-Mast Arm Poles.dgn
kcdurigon

WELDED RING STIFFENED MAST ARM CONNECTION

PROJECT I.D. NO.	SHEET NO.
	Sig.M5



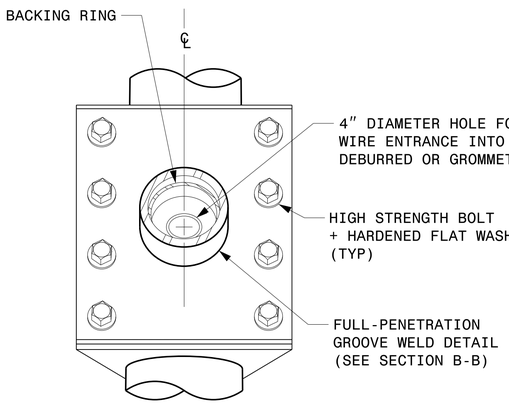
SECTION B-B
FULL-PENETRATION GROOVE WELD DETAIL



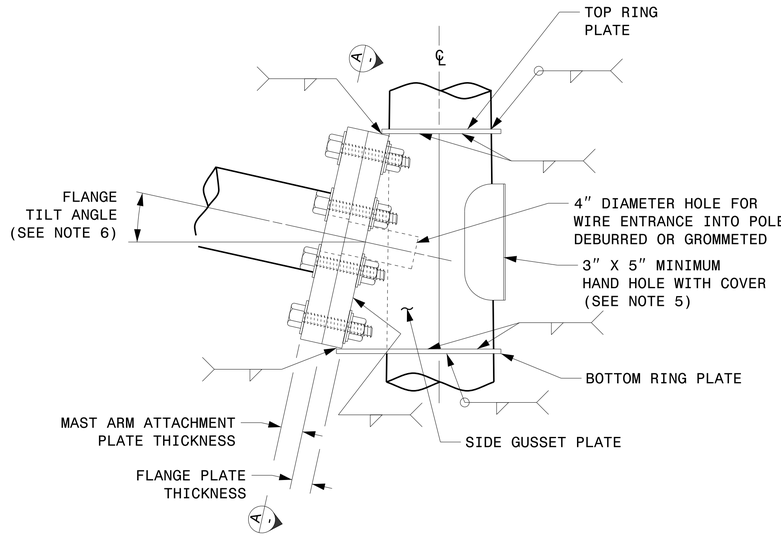
PLAN VIEW

NOTES:

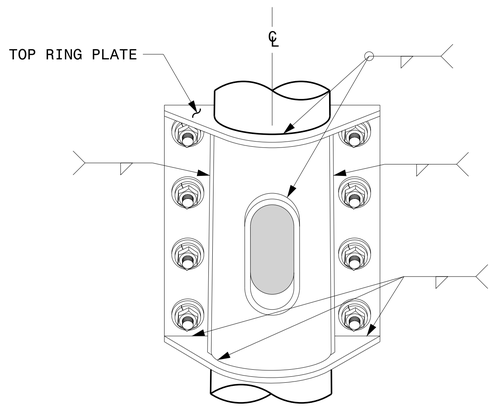
1. PROVIDE A PERMANENT MEANS OF IDENTIFICATION ABOVE THE MAST ARM TO INDICATE PROPER ATTACHMENT ORIENTATION OF THE MAST ARM.
2. DESIGNER WILL DETERMINE THE SIZE OF ALL STRUCTURAL COMPONENTS, PLATES, FASTENERS, AND WELDS SHOWN UNLESS THEY ARE ALREADY SPECIFIED.
3. FABRICATOR IS RESPONSIBLE FOR PROVIDING APPROPRIATE HOLES AT DRAINAGE POINTS TO DRAIN GALVANIZING MATERIALS.
4. FOR MINIMUM EDGE DISTANCE AND NOMINAL BOLT HOLE SIZE, FOLLOW THE LATEST AISC STEEL CONSTRUCTION MANUAL.
5. PROVIDE UPPER HANDHOLE AS NECESSARY WHEN SHAFT EXTENSIONS ARE REQUIRED FOR LUMINAIRE ARMS OR CAMERA. FOR POLES WITHOUT LUMINAIRES/CAMERA, WIRING CAN BE DONE THROUGH THE TOP OF POLE.
6. ALLOWABLE RANGE OF FLANGE TILT ANGLE WILL VARY FROM 0° TO AS REQUIRED.



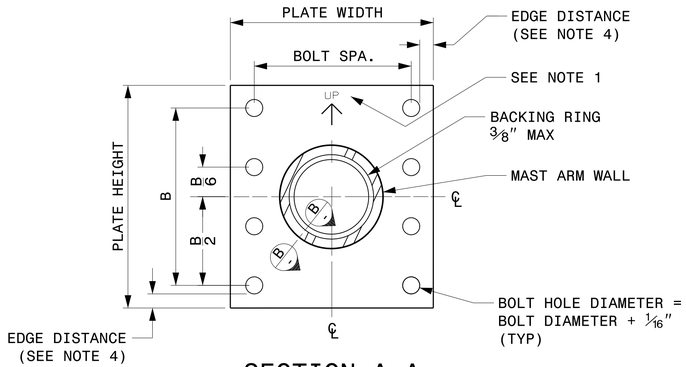
FRONT ELEVATION VIEW



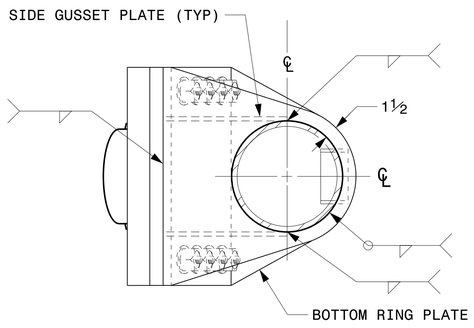
SIDE ELEVATION VIEW



BACK ELEVATION VIEW



SECTION A-A
MAST ARM ATTACHMENT PLATE



BOTTOM VIEW

Prepared in the Offices of:
Transportation Mobility and Safety Division
Signal Design Section
750 N.Greenfield Pkwy.Garner,NC 27529

SCALE
0 NA
NONE

Typical Fabrication Details
For
Mast Arm Connection To Pole

PLAN DATE:	SEPTEMBER 2023	DESIGNED BY:	C.F. ANDREWS
PREPARED BY:	K.C. DURIGON	REVIEWED BY:	D.C. SARKAR

REVISIONS	INIT.	DATE

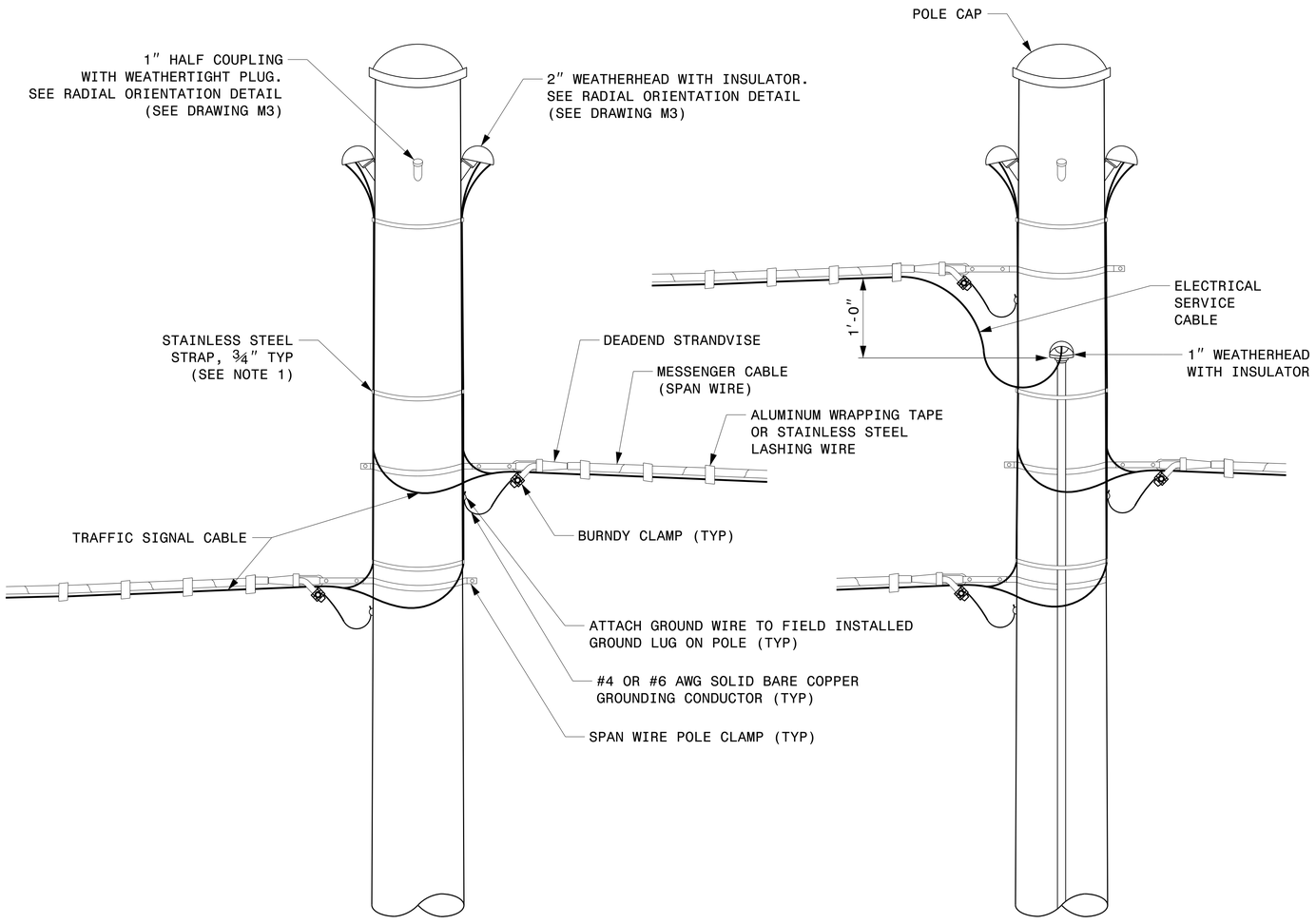
SEAL
NORTH CAROLINA
PROFESSIONAL
SEAL
036626
ENGINEER
KEVIN C. DURIGON

DocuSigned by:
Kevin Durigon
SIGNATURE
4B23DC79B3784DA...
09/21/2023
DATE

Fabrication Details – Mast Arm Connection

PROJECT I.D. NO.	SHEET NO.
	Sig.M6

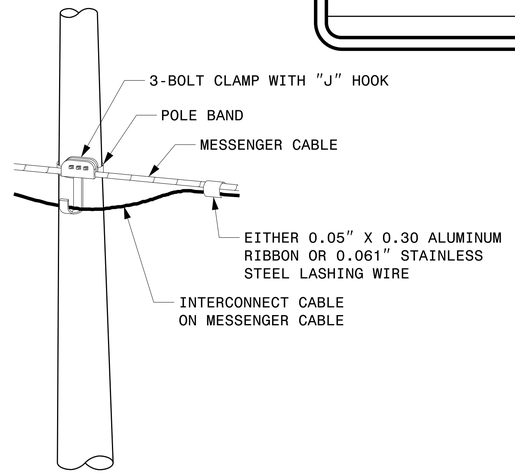
Fabrication Details – Strain Pole Attachments



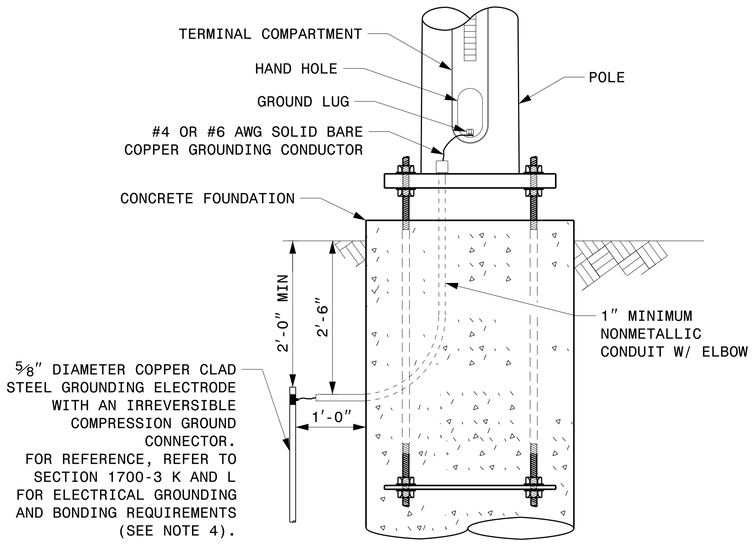
STRAIN POLE ATTACHMENTS

NOTES:

1. STRAP ALL SIGNAL CABLES TO THE SIDE OF THE POLE WITH ¾″ STAINLESS STEEL STRAPS WHEN THE DISTANCE BETWEEN SPAN WIRE ATTACHMENT CLAMP AND WEATHERHEADS EXCEEDS 3′-0″.
2. PROVIDE MINIMUM TWO SPAN WIRE POLE CLAMPS PER POLE.
3. IT IS PROHIBITED TO ATTACH TWO SPAN WIRES AT ONE POLE CLAMP.
4. FOR GENERAL REQUIREMENTS, REFER TO NCDOT STANDARD SPECIFICATIONS FOR ROADWAY AND STRUCTURES, JANUARY 2024.



ATTACHMENT OF CABLE TO INTERMEDIATE METAL POLE



METAL POLE GROUNDING DETAIL FOR STRAIN POLE AND MAST ARM

Prepared In the Offices of:
Transportation Mobility and Safety Division
Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

SCALE
0 NA
NONE

Typical Fabrication Details
For
Strain Pole Attachments

PLAN DATE:	SEPTEMBER 2023	DESIGNED BY:	C.F. ANDREWS
PREPARED BY:	K.C. DURIGON	REVIEWED BY:	D.C. SARKAR

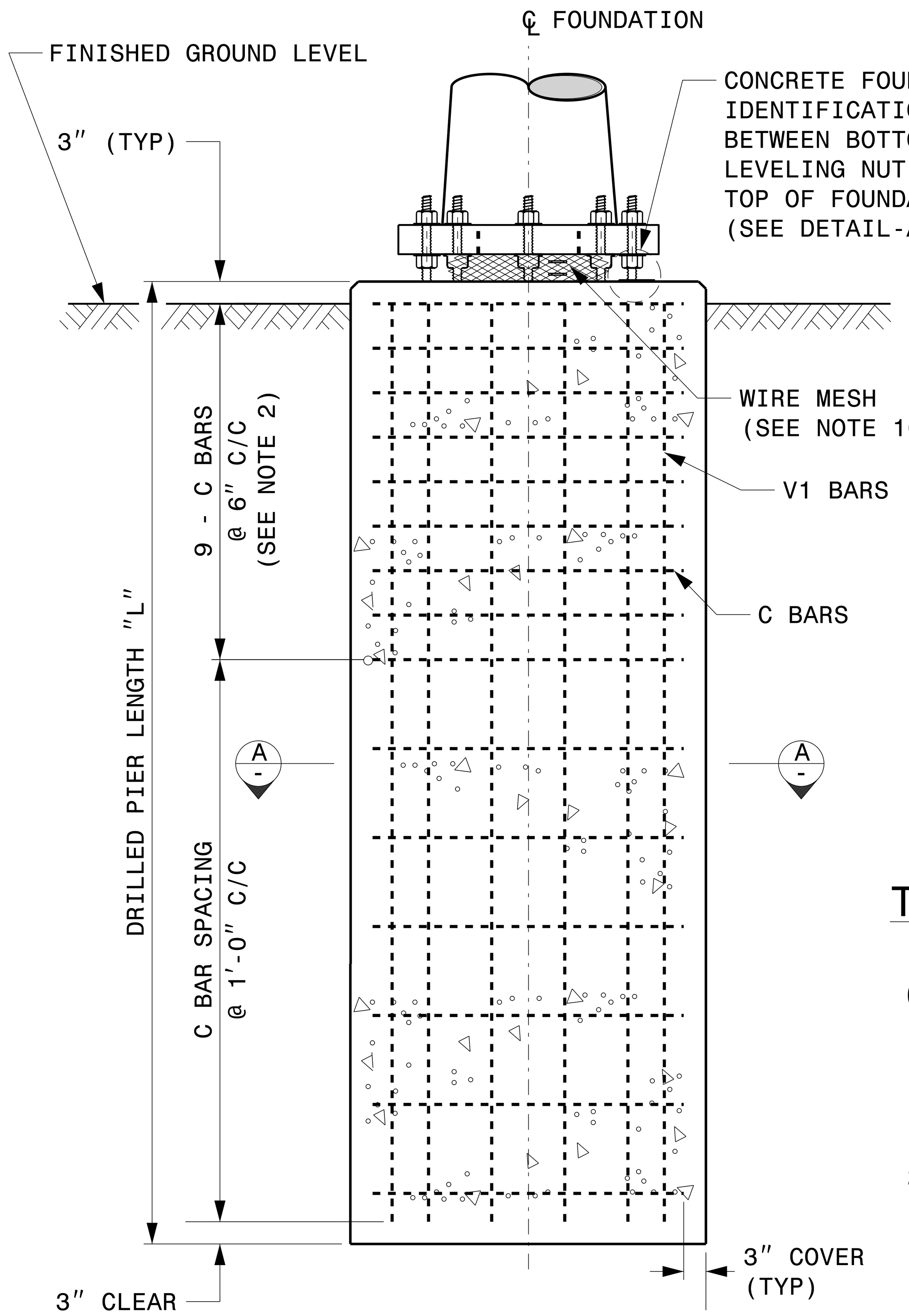
REVISIONS	INIT.	DATE

SEAL

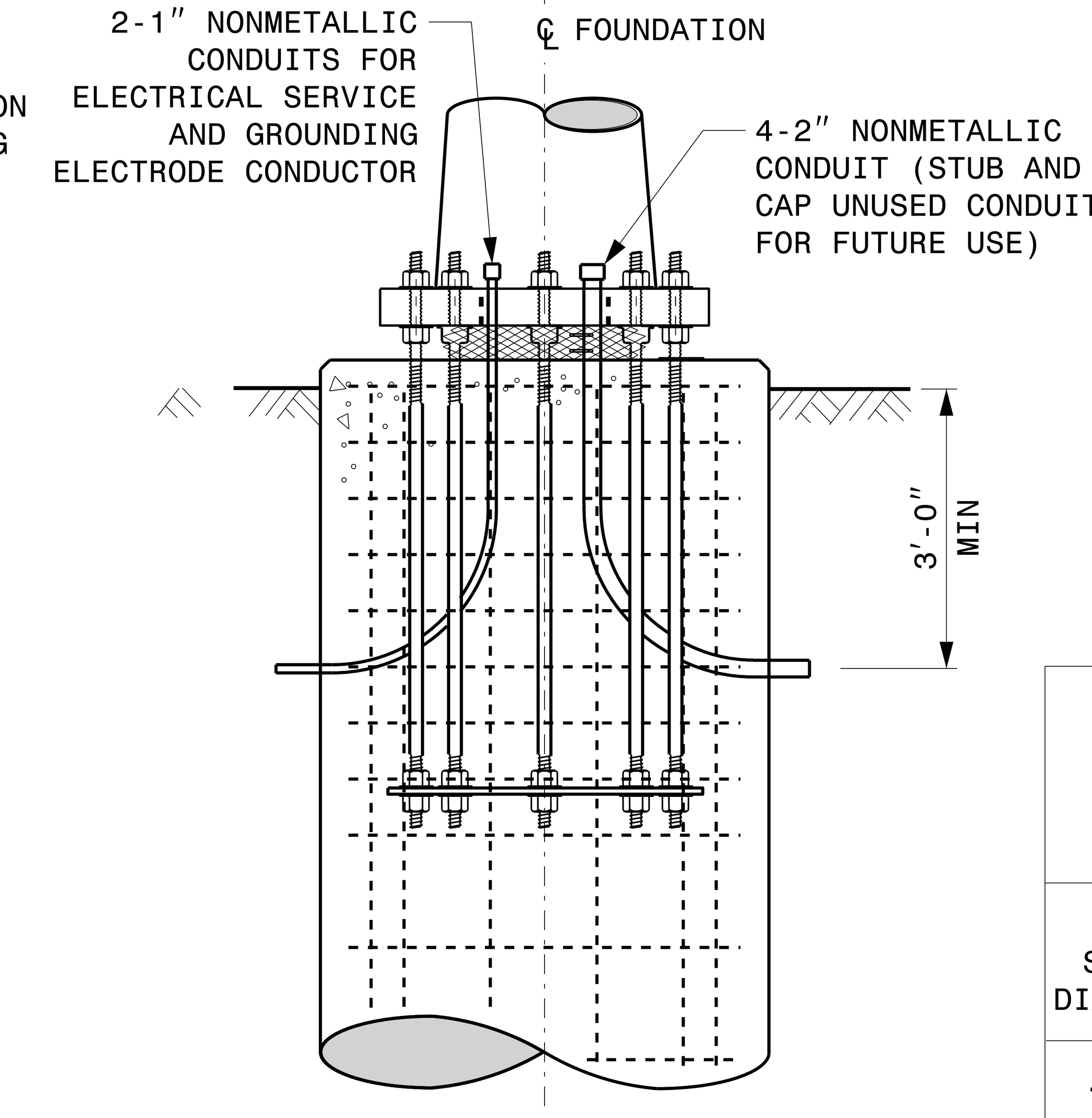
NORTH CAROLINA PROFESSIONAL SEAL 036626 ENGINEER KEVIN C. DURIGON

DocuSigned by:
Kevin Durigon
SIGNATURE
4B23DC79B3784DA...
09/21/2023
DATE

Construction Details – Foundations



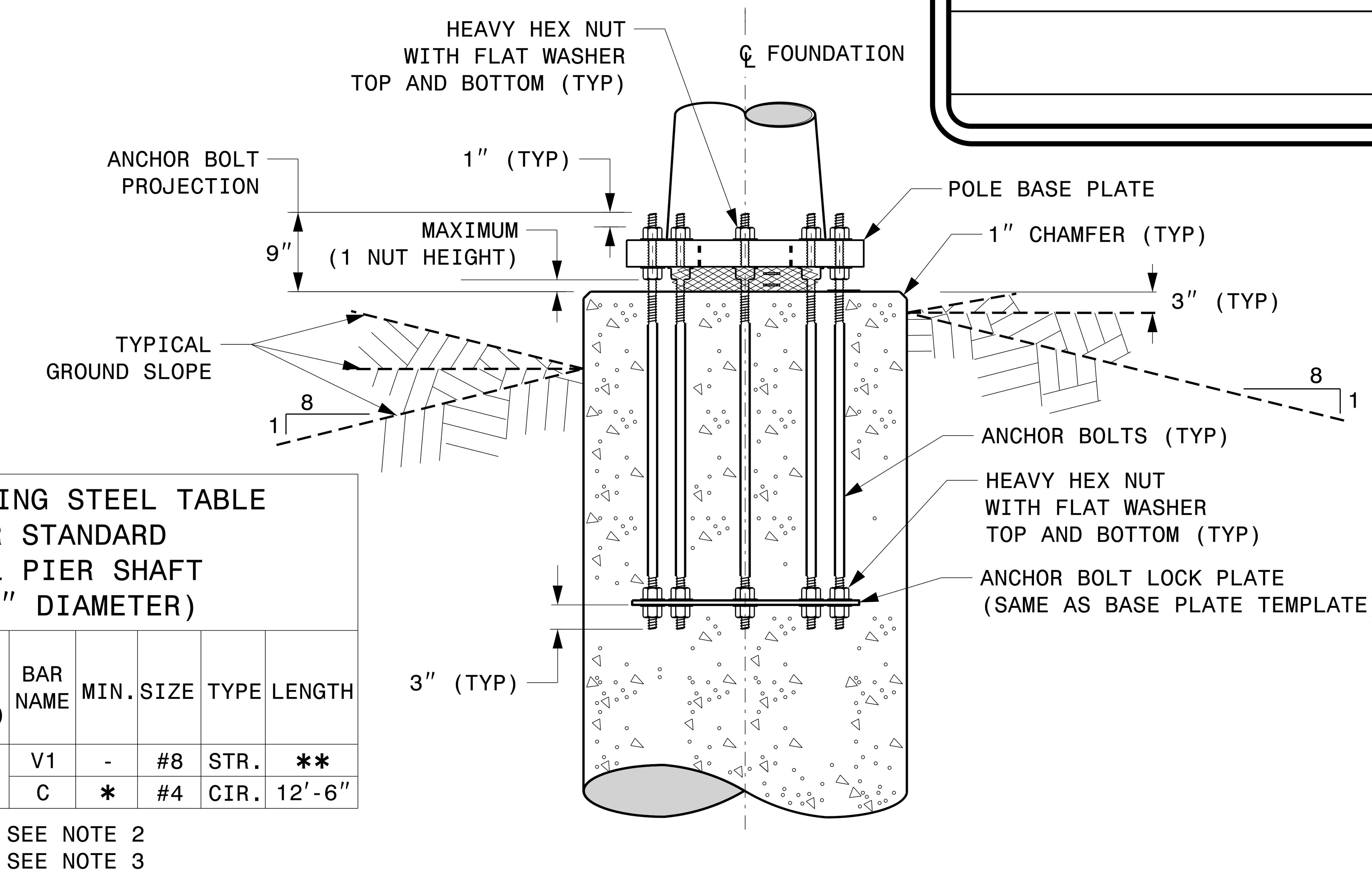
CONCRETE SHAFT ELEVATION



TYPICAL FOUNDATION CONDUIT DETAILS

REINFORCING STEEL TABLE FOR STANDARD DRILL PIER SHAFT (4′-0″ DIAMETER)						
"D" SHAFT DIAMETER	CONCRETE VOLUME (CU. YDS)	BAR NAME	MIN.	SIZE	TYPE	LENGTH
4′-0″	.465 X L	V1	-	#8	STR.	**
		C	*	#4	CIR.	12′-6″

* SEE NOTE 2
** SEE NOTE 3

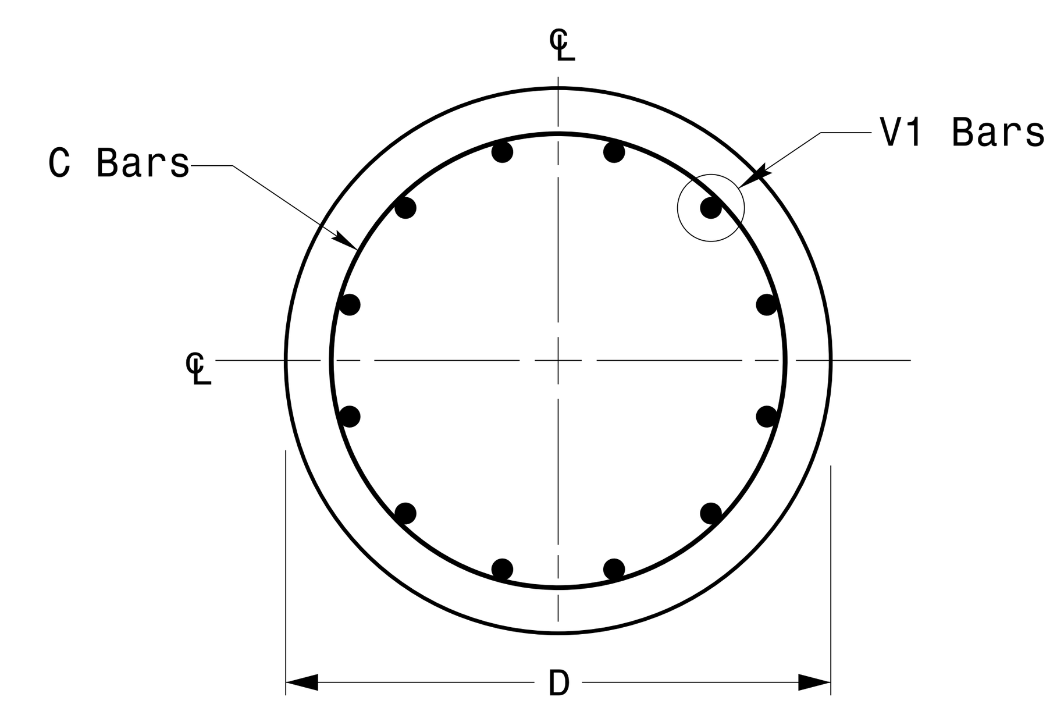


TYPICAL FOUNDATION ANCHOR BOLT DETAILS
(REINFORCING CAGE NOT SHOWN FOR CLARITY)

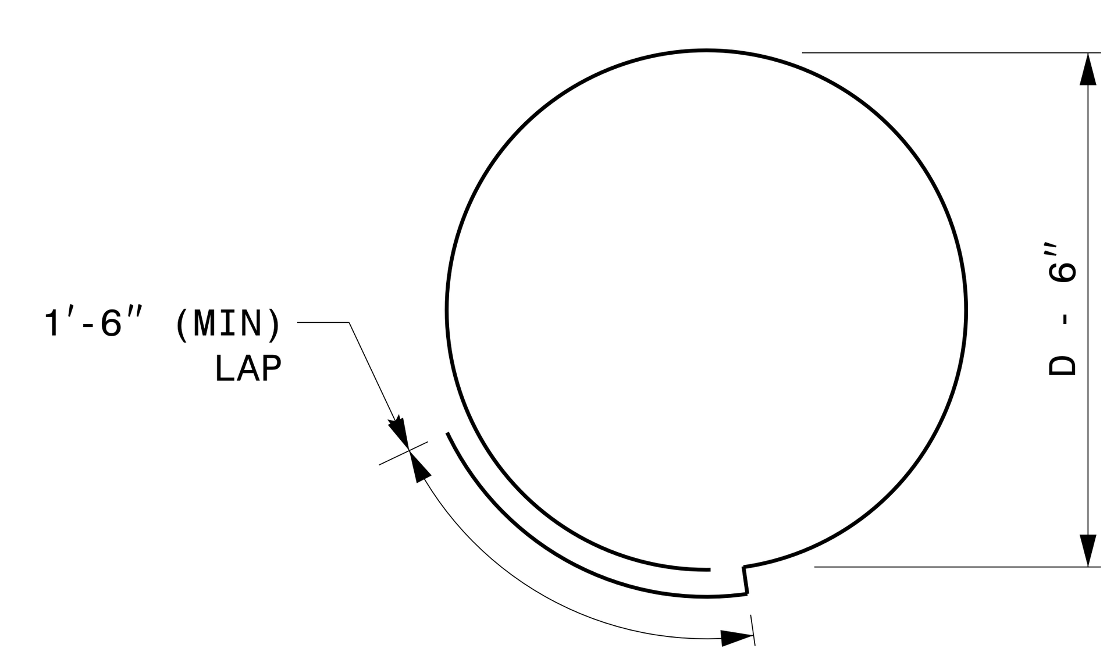
GENERAL NOTES:

1. IF ACTUAL SUBSURFACE CONDITIONS DIFFER SIGNIFICANTLY FROM BORING DATA, CONTACT THE ENGINEER BEFORE EXCAVATING OR PLACING CONCRETE.
2. CIRCULAR TIE REINFORCING RINGS MAY BE VERTICALLY ADJUSTED BY +/-3″ AT A DEPTH BETWEEN 2′-0″ AND 3′-0″ TO FACILITATE THE INSTALLATION OF ELECTRICAL CONDUIT ENTERING IN THE CAGE.
3. FOR STANDARD FOUNDATIONS, SEE SHEET SIG. M8 FOR DETAILS. VERTICAL REINFORCING BARS (V1) MAY BE HORIZONTALLY ADJUSTED BY +/-3″ TO FACILITATE THE INSTALLATION OF ELECTRICAL CONDUIT ENTERING INTO THE CAGE.
4. PROVIDE 2″ TO 5″ FOUNDATION PROJECTION ABOVE GROUND LEVEL, DEPENDING ON THE GROUND SLOPE.
5. UNLESS OTHERWISE SHOWN, FOUNDATION DESIGNS ARE BASED ON NON-SLOPING LEVEL GROUND SURFACES WITH SLOPE RATIOS OF 8:1 (H:V) OR FLATTER. IF ACTUAL GROUND LINE SLOPES ARE STEEPER, CONTACT THE ENGINEER BEFORE EXCAVATING OR PLACING CONCRETE.
6. CONSTRUCT FOUNDATIONS IN ACCORDANCE WITH NCDOT STANDARD PROVISIONS SP09 R005- FOUNDATIONS AND ANCHOR ROD ASSEMBLIES FOR METAL POLES. ALL APPLICABLE 2024 NCDOT STANDARD SPECIFICATIONS ARE REFERENCED IN THIS PROVISION. REFER TO THE NCDOT RESOURCES/SPECIFICATIONS PAGE LOCATED ON THE CONNECT NCDOT WEBSITE.

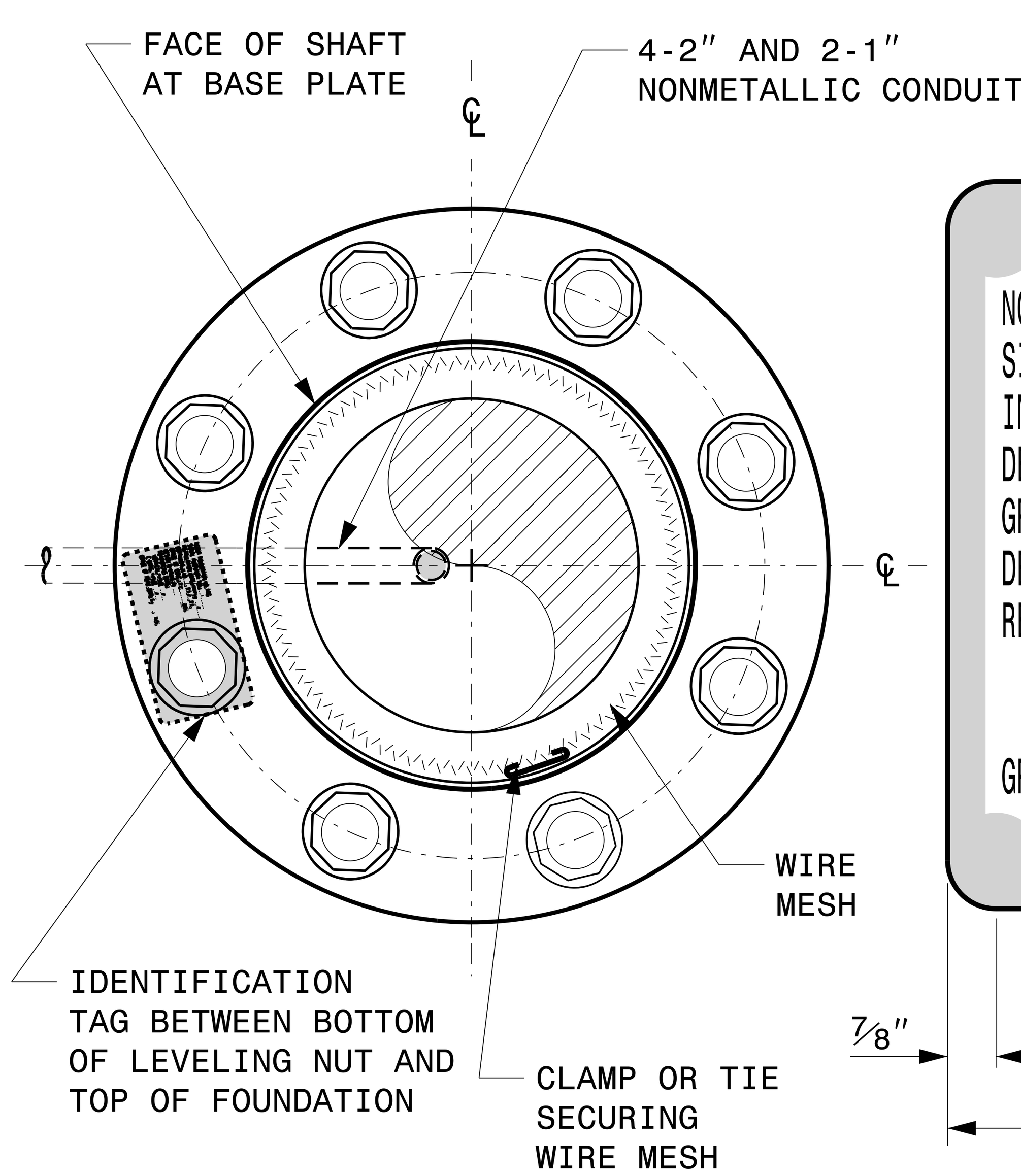
   https://connect.ncdot.gov/resources/Specifications and Special Provisions.aspx
7. USE AIR ENTRAINED AA CONCRETE MIX WITH A COMPRESSION STRENGTH OF f′c=4500 psi (MIN) AFTER 28 DAYS.
8. USE ASTM A615 GRADE 60 DEFORMED BARS FOR ALL REINFORCING STEEL. MAINTAIN AT LEAST 3″ COVER ON ALL REINFORCEMENT.
9. LOCATE IDENTIFICATION TAG ON TOP OF THE FOUNDATION, DIRECTLY ABOVE THE CONDUIT′S ENTRY POINT.
10. PROVIDE TWO LAYERS OF 4 MESH GALVANIZED WELDED 23 GAUGE (0.025) 6″ WIDE AROUND PIPES UNDER THE BASE PLATE AND SECURE IT WITH TIES IF NECESSARY.
11. PREFERRED LOCATION FOR THE I.D. TAG IS AS SHOWN IN DETAIL-A: DIRECTLY ABOVE THE CONDUIT ENTERING THE FOUNDATION.



SECTION A-A

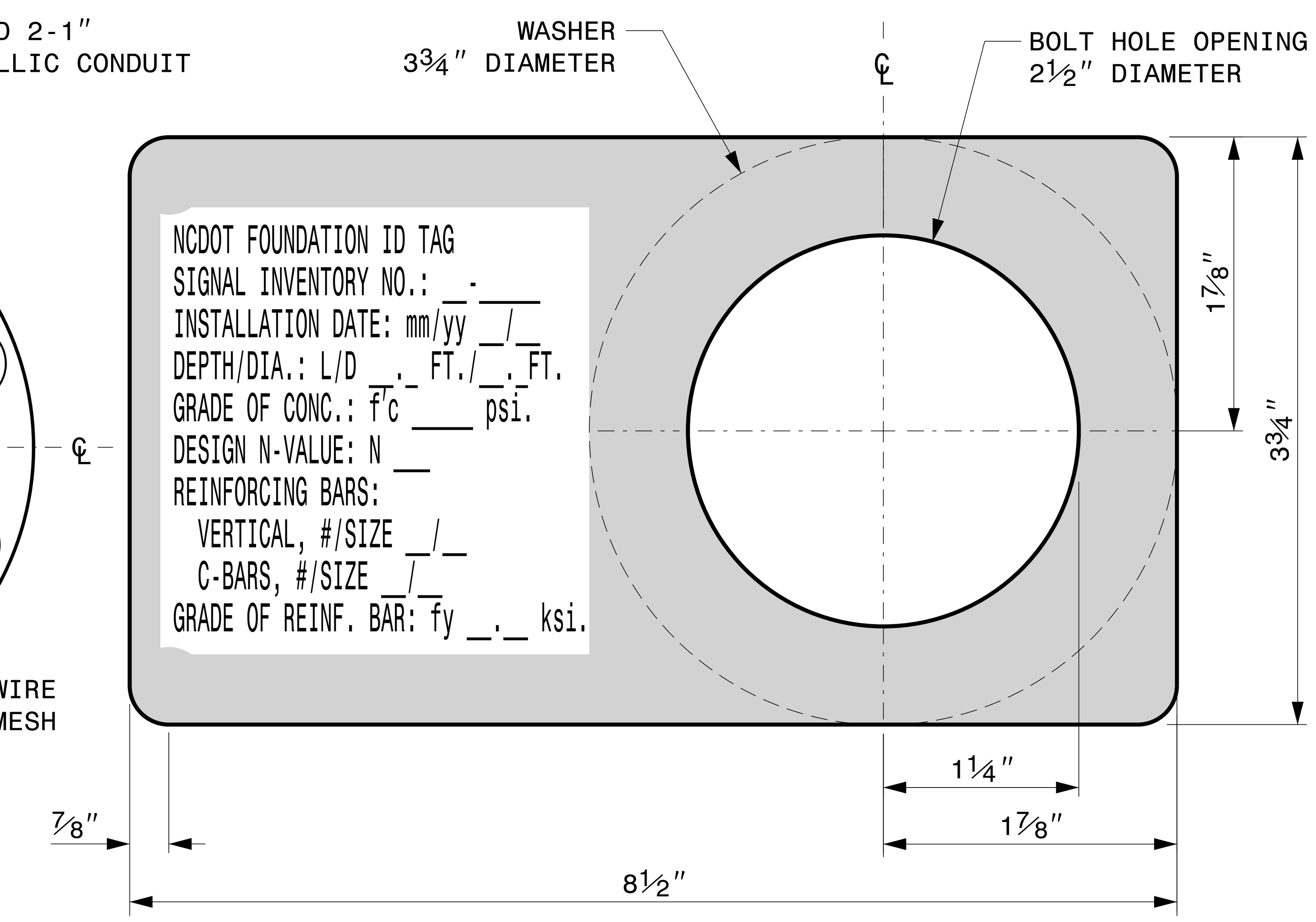


TYPICAL "C" BAR DETAIL



D = DIAMETER
L = LENGTH / DEPTH
mm = MONTH
yy = YEAR

DETAIL-A



CONCRETE FOUNDATION IDENTIFICATION TAG DETAILS

Prepared In the Offices of: Transportation Mobility and Safety Division, Signal Design Section
750 N.Greenfield Pkwy.Garner,NC 27529

SCALE: 0 NA — NONE

Construction Details For Foundations

PLAN DATE:	SEPTEMBER 2023	DESIGNED BY:	K.C. DURIGON
PREPARED BY:	K.C. DURIGON	REVIEWED BY:	D.C. SARKAR

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 036626 KEVIN C. DURIGON

DocuSigned by: Kevin Durigon
SIGNATURE 4B23DC79B3784DA...
DATE 09/21/2023