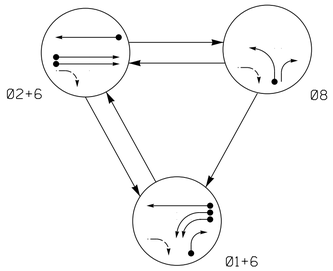
PROJECT REFERENCE NO.	SHEET NO.
R-2577A	Sig. 12.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

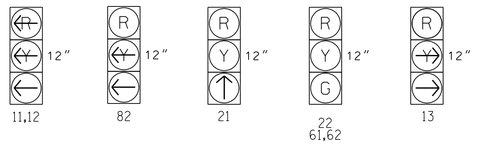
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+6	PHASE Ø2+6	PHASE Ø8	FLASH
11,12	←-	-R	-R	-R
13	→	R	→	R
21	R	↑	R	Y
22	R	G	R	Y
61,62	G	G	R	Y
82	R	R	←-	R

SIGNAL FACE I.D.

All Heads L.E.D.



MAXTIME DETECTOR INSTALLATION CHART

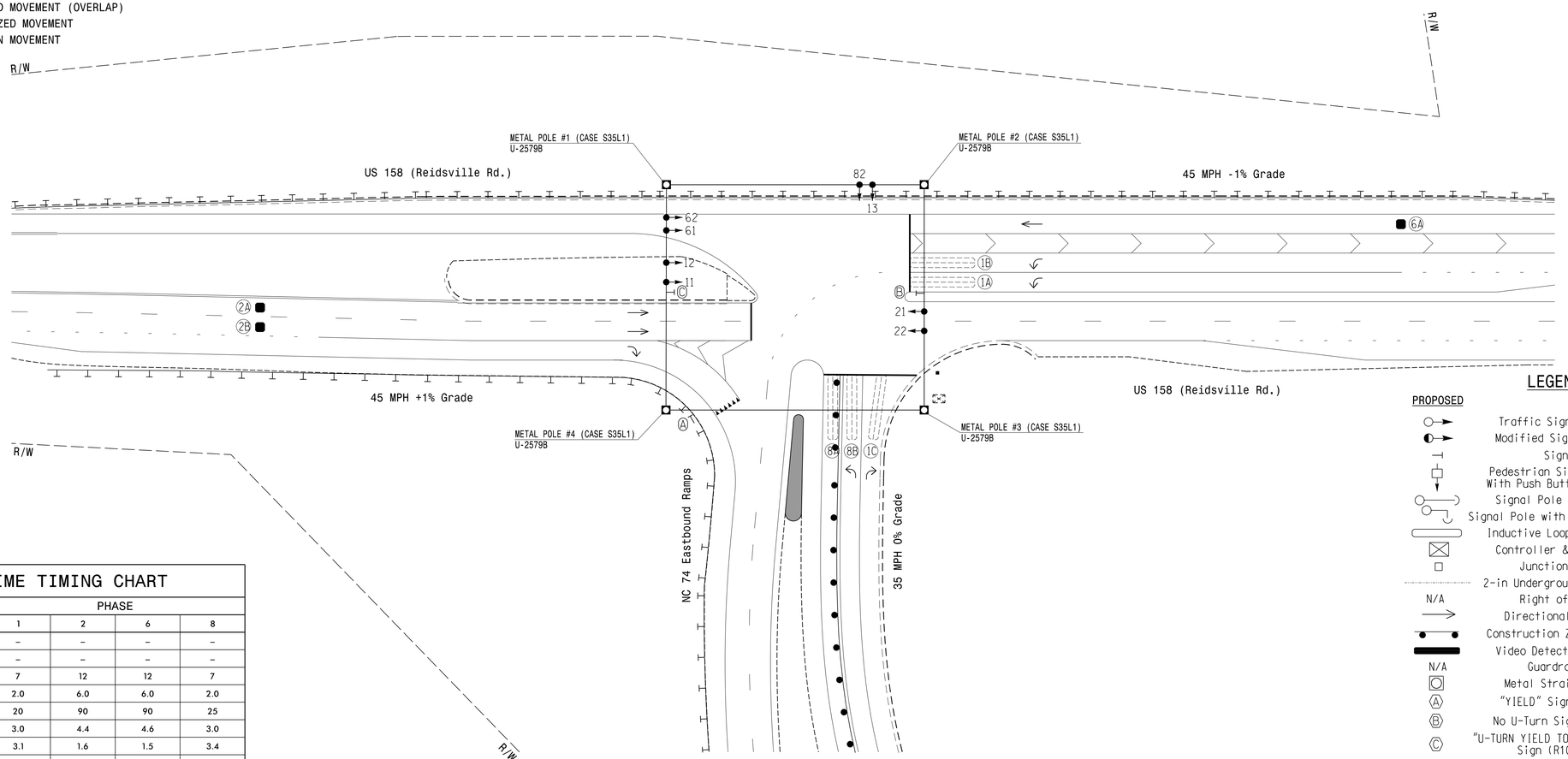
DETECTOR					PROGRAMMING							
LOOP/ ZONE	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
1A	6X40	0	2-4-2	-	1	-	-	X	-	X	-	-
1B	6X40	0	2-4-2	-	1	-	-	X	-	X	-	-
1C	6X40	0	2-4-2	-	1	15	-	X	-	X	-	-
2A✳	6X6	300	✳	✳	2	-	-	X	X	X	-	✳
2B✳	6X6	300	✳	✳	2	-	-	X	X	X	-	✳
6A✳	6X6	300	✳	✳	6	-	-	X	X	X	-	✳
8A	6X40	0	2-4-2	-	DISCONNECT							
8B	6X40	0	2-4-2	-	8	-	-	X	-	X	-	-

✳ Video Detection Zone

3 Phase
Fully Actuated
(US 158 Signal System)
Signal System #: D09-11_Winston-Salem

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. Reposition existing signal heads numbered 61 and 62.
5. Set all detector units to presence mode.
6. This intersection uses video detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.
7. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.



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	●↷
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
□	Junction Box	■
·····	2-in Underground Conduit	·····
N/A	Right of Way	— — — —
→	Directional Arrow	→
●●	Construction Zone Drums	●●
▬	Video Detection Zone	▬
N/A	Guardrail	⊥⊥
◎	Metal Strain Pole	◎
Ⓐ	"YIELD" Sign (R1-2)	Ⓐ
Ⓑ	No U-Turn Sign (R3-4)	Ⓑ
Ⓒ	"U-TURN YIELD TO RIGHT TURN" Sign (R10-16)	Ⓒ

MAXTIME TIMING CHART

FEATURE	PHASE 1	PHASE 2	PHASE 6	PHASE 8
Walk *	–	–	–	–
Ped Clear *	–	–	–	–
Min Green	7	12	12	7
Passage *	2.0	6.0	6.0	2.0
Max 1 *	20	90	90	25
Yellow Change	3.0	4.4	4.6	3.0
Red Clear	3.1	1.6	1.5	3.4
Added Initial *	–	1.5	2.5	–
Maximum Initial *	–	34	34	–
Time Before Reduction *	–	15	15	–
Time To Reduce *	–	30	30	–
Minimum Gap	–	3.0	3.0	–
Advance Walk	–	–	–	–
Non Lock Detector	X	–	–	X
Vehicle Recall	–	MIN RECALL	MIN RECALL	–
Dual Entry	–	–	–	–

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

2/12/2024
R:\Traffic\Signals\Designs\Signals\09051012_sig_dsn_XXXXXXXX.dgn
wpjones

Signal Upgrade - Temporary Design 2 (TMP Phase I Step 3)

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Prepared for the Offices of:
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'

US 158 (Reidsville Rd.) at NC 74 Eastbound Ramps

Division 9 Forsyth County Winston-Salem

PLAN DATE: February 2024 REVIEWED BY: DT Sears

PREPARED BY: WP Erickson-Jones REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 056142 ENGINEER PORTER JONES

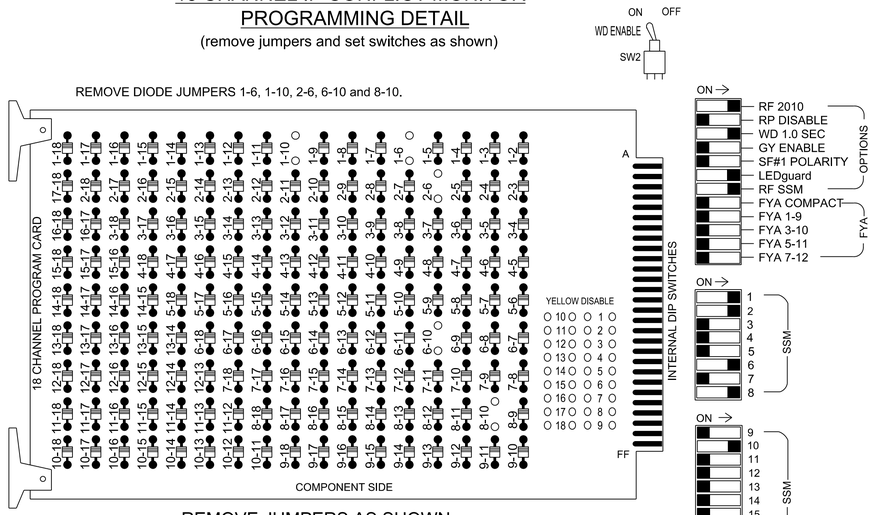
DocuSigned by: Porter Jones DOSE13E3ADE0496... SIGNATURE 2/12/2024 DATE

SIG. INVENTORY NO. 09-0510T2

PROJECT REFERENCE NO.	SHEET NO.
R-2577A	Sig. 12.1

18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



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 unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the signal plan.
2. Program controller to start up in phase 2 Green No Walk and 6 Green No Walk.
3. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
4. The cabinet and controller are part of the US 158 Signal System, Signal System:D09-11_Winston-Salem 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, S8, S11, AUX S2
Phases Used.....1, 2, 6, 8
Overlap "1".....NOT USED
Overlap "2".....*
Overlap "3".....NOT USED
Overlap "4".....NOT USED

*See overlap programming detail this sheet.

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2		S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2		13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2		2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	11,12	21	22	NU	NU	NU	NU	NU	61,62	NU	NU	82	NU	NU	13	NU	NU	NU	NU
RED	·	128	128	·	·	·	·	·	134	·	·	107	·	·	A124	·	·	·	·
YELLOW	·	129	129	·	·	·	·	·	135	·	·	·	·	·	·	·	·	·	·
GREEN	·	·	130	·	·	·	·	·	136	·	·	·	·	·	·	·	·	·	·
RED ARROW	125	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
YELLOW ARROW	126	·	·	·	·	·	·	·	·	·	·	108	·	·	A125	·	·	·	·
GREEN ARROW	127	130	·	·	·	·	·	·	·	·	·	109	·	·	A126	·	·	·	·

NU = Not Used

OVERLAP PROGRAMMING

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

Overlap Plan 1

Overlap	2
Type	Normal
Included Phases	1,8
Modifier Phases	-
Modifier Overlaps	-
Trail Green	0
Trail Yellow	0.0
Trail Red	0.0

INPUT FILE POSITION LAYOUT

(front view)

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

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	TB2-5,6	I2U	39	1	2	1			X		X	
1B	TB2-7,8	I2L	43	5	3	1			X		X	
1C	TB2-1,2	I1U	56	18	1	1	15		X		X	
8B	TB5-11,12	J6L	46	8	23	8			X		X	

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

FLASHER CIRCUIT MODIFICATION DETAIL

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

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

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

SPECIAL DETECTOR NOTE

Install a video detection system for vehicle detection for zones 2A, 2B and 6A. 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: 09-0510T2
DESIGNED: February 2024
SEALED: February 12, 2024
REVISED:

Signal Upgrade - Temporary Design 2
(TMP Phase I Step 3) Electrical Detail

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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Electrical and Programming Details For:

Prepared for the Offices of:
Transportation Mobility and Safety Division
Traffic Engineering Branch
Traffic Signal Management Section
750 N. Greenfield Pkwy, Garner, NC 27529

US 158 (Reidsville Rd.)
at
NC 74 Eastbound Ramps

Division 9 | Forsyth County | Winston-Salem

PLAN DATE:	February 2024	REVIEWED BY:	DT Sears
PREPARED BY:	WP Erickson-Jones	REVIEWED BY:	

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 056142 ENGINEER WILLIAM PORTER JONES
DocuSigned by: Porter Jones D06E13F3AD6D498...
2/12/2024
DATE

SIG. INVENTORY NO. 09-0510T2

2/12/2024
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wpjones

PROJECT REFERENCE NO.	SHEET NO.
R-2577A	Sig. 13.0

PHASING DIAGRAM

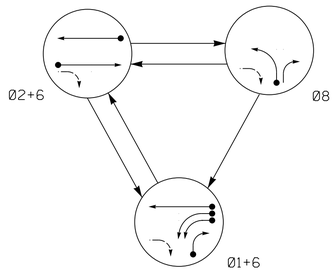
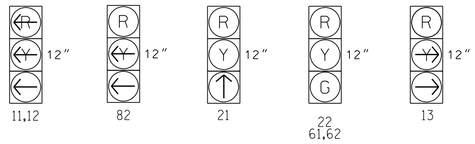


TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+6	PHASE Ø2+6	PHASE Ø8	FLASH
11,12	←	~~R~~	~~R~~	~~R~~
13	→	R	→	R
21	R	↑	R	Y
22	R	G	R	Y
61,62	G	G	R	Y
82	R	R	←	R

SIGNAL FACE I.D.

All Heads L.E.D.



MAXTIME DETECTOR INSTALLATION CHART

DETECTOR					PROGRAMMING							
LOOP/ ZONE	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
1A	6X40	0	2-4-2	-	1	-	-	X	-	X	-	-
1B	6X40	0	2-4-2	-	1	-	-	X	-	X	-	-
1C	6X40	0	2-4-2	-	1	15	-	X	-	X	-	-
2A ✳	6X6	300	✳	✳	2	-	-	X	X	X	-	✳
6A ✳	6X6	300	✳	✳	6	-	-	X	X	X	-	✳
8A	6X40	0	2-4-2	-	DISCONNECT							
8B	6X40	0	2-4-2	-	8	-	-	X	-	X	-	-

✳ Video Detection Zone

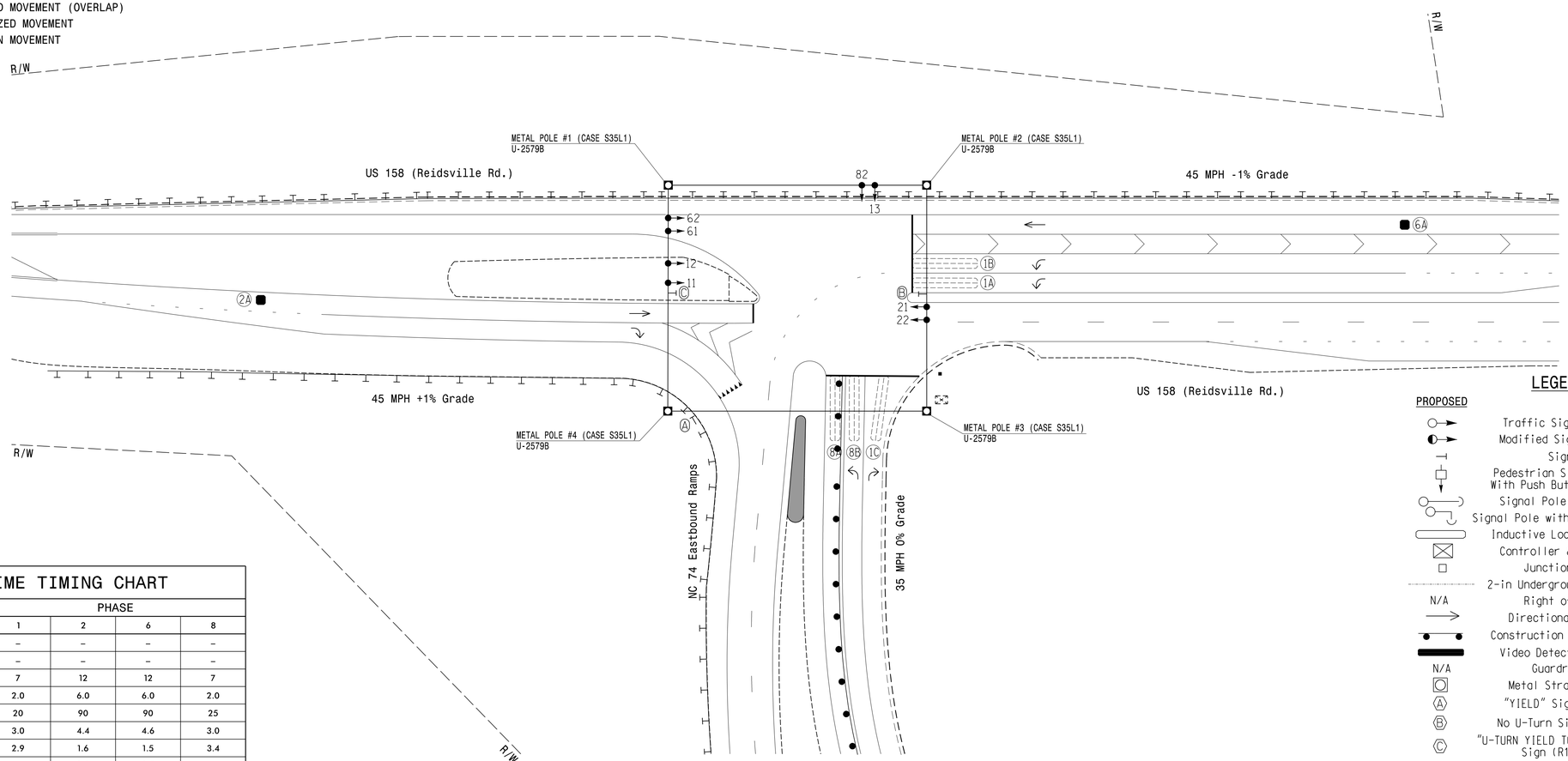
3 Phase
Fully Actuated
(US 158 Signal System)
Signal System #: D09-11_Winston-Salem

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. Reposition existing signal heads numbered 21 and 22.
5. Set all detector units to presence mode.
6. This intersection uses video detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.
7. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.

PHASING DIAGRAM DETECTION LEGEND

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



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	●\
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
□	Junction Box	■
·····	2-in Underground Conduit	·····
N/A	Right of Way	— — — —
→	Directional Arrow	→
●▬●	Construction Zone Drums	●▬●
▬	Video Detection Zone	▬
N/A	Guardrail	⊥T⊥
○	Metal Strain Pole	○
Ⓐ	"YIELD" Sign (R1-2)	Ⓐ
Ⓑ	No U-Turn Sign (R3-4)	Ⓑ
Ⓒ	"U-TURN YIELD TO RIGHT TURN" Sign (R10-16)	Ⓒ

MAXTIME TIMING CHART

FEATURE	PHASE 1	PHASE 2	PHASE 6	PHASE 8
Walk *	–	–	–	–
Ped Clear *	–	–	–	–
Min Green	7	12	12	7
Passage *	2.0	6.0	6.0	2.0
Max 1 *	20	90	90	25
Yellow Change	3.0	4.4	4.6	3.0
Red Clear	2.9	1.6	1.5	3.4
Added Initial *	–	2.5	2.5	–
Maximum Initial *	–	34	34	–
Time Before Reduction *	–	15	15	–
Time To Reduce *	–	30	30	–
Minimum Gap	–	3.0	3.0	–
Advance Walk	–	–	–	–
Non Lock Detector	X	–	–	X
Vehicle Recall	–	MIN RECALL	MIN RECALL	–
Dual Entry	–	–	–	–

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

Signal Upgrade - Temporary Design 3 (TMP Phase II)

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Traffic Engineering Branch
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

SCALE 0 40 1" = 40'

US 158 (Reidsville Rd.)
at
NC 74 Eastbound Ramps
Division 9 Forsyth County Winston-Salem

PLAN DATE: February 2024 REVIEWED BY: DT Sears
PREPARED BY: WP Erickson-Jones REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 056142 PORTER JONES
DocuSigned by: Porter Jones D0EE13E3A0E0498...
SIGNATURE 2/12/2024 DATE
SIG. INVENTORY NO. 09-0510T3

2/12/2024
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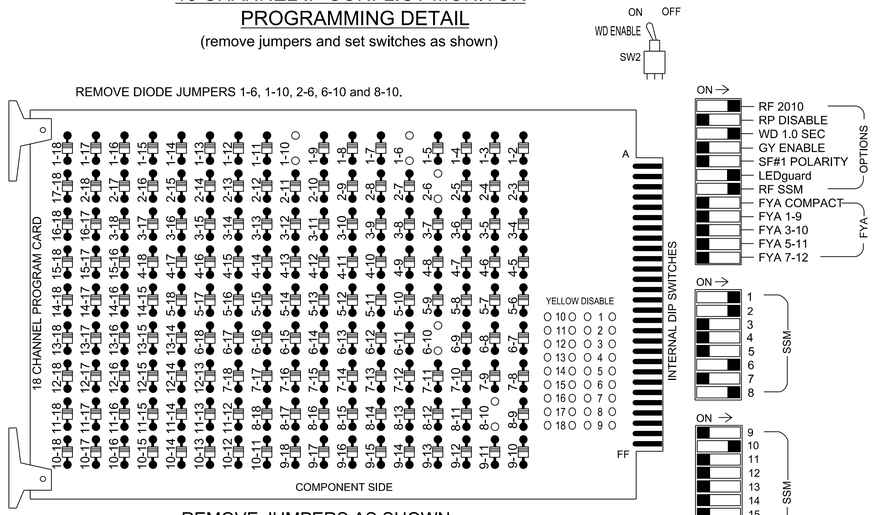
WPJones

PROJECT REFERENCE NO.	SHEET NO.
R-2577A	Sig. 13.1

18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



= DENOTES POSITION OF SWITCH

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 unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the signal plan.
2. Program controller to start up in phase 2 Green No Walk and 6 Green No Walk.
3. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
4. The cabinet and controller are part of the US 158 Signal System, Signal System : D09-11_Winston-Salem System.

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.	11,12	21	22	NU	NU	NU	NU	NU	61,62	NU	NU	82	NU	NU	13	NU	NU	NU	NU
RED	·	128	128	·	·	·	·	·	134	·	·	107	·	·	A124	·	·	·	·
YELLOW	·	129	129	·	·	·	·	·	135	·	·	·	·	·	·	·	·	·	·
GREEN	·	·	130	·	·	·	·	·	136	·	·	·	·	·	·	·	·	·	·
RED ARROW	125	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
YELLOW ARROW	126	·	·	·	·	·	·	·	·	·	·	108	·	·	A125	·	·	·	·
GREEN ARROW	127	130	·	·	·	·	·	·	·	·	·	109	·	·	A126	·	·	·	·

NU = Not Used

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, S8, S11, AUX S2
Phases Used.....1, 2, 6, 8
Overlap "1".....NOT USED
Overlap "2".....*
Overlap "3".....NOT USED
Overlap "4".....NOT USED

*See overlap programming detail this sheet.

OVERLAP PROGRAMMING

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

Overlap Plan 1

Overlap	2
Type	Normal
Included Phases	1,8
Modifier Phases	-
Modifier Overlaps	-
Trail Green	0
Trail Yellow	0.0
Trail Red	0.0

INPUT FILE POSITION LAYOUT

(front view)

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

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	TB2-5,6	I2U	39	1	2	1			X		X	
1B	TB2-7,8	I2L	43	5	3	1			X		X	
1C	TB2-1,2	I1U	56	18	1	1	15		X		X	
8B	TB5-11,12	J6L	46	8	23	8			X		X	

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

FLASHER CIRCUIT MODIFICATION DETAIL

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

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

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

SPECIAL DETECTOR NOTE

Install a video detection system for vehicle detection for zones 2A and 6A. 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: 09-0510T3
DESIGNED: February 2024
SEALED: February 12, 2024
REVISED:

Signal Upgrade - Temporary Design 3
(TMP Phase II) Electrical Detail

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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Electrical and Programming Details For:

Prepared for the Offices of:
Transportation Mobility and Safety Division
Traffic Engineering Branch
Traffic Signal Management Section
DEPARTMENT OF TRANSPORTATION
STATE OF NORTH CAROLINA
750 N. Greenfield Pkwy, Garner, NC 27529

US 158 (Reidsville Rd.)
at
NC 74 Eastbound Ramps

Division 9 | Forsyth County | Winston-Salem
PLAN DATE: February 2024 | REVIEWED BY: DT Sears
PREPARED BY: WP Erickson-Jones | REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 056142 ENGINEER W. PORTER JONES

DocuSigned by: Porter Jones DOBE13F3AD6D498...
2/12/2024
DATE

SIG. INVENTORY NO. 09-0510T3

2/12/2024
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wpjones

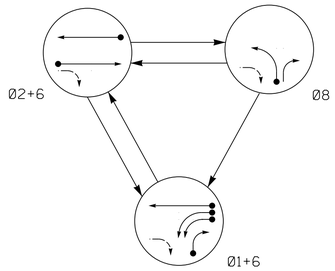
PROJECT REFERENCE NO.	SHEET NO.
R-2577A	Sig. 14.0

3 Phase
Fully Actuated
(US 158 Signal System)
Signal System #: D09-11_Winston-Salem

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. Reposition existing signal heads numbered 21 and 22.
5. Set all detector units to presence mode.
6. This intersection uses video detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.
7. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

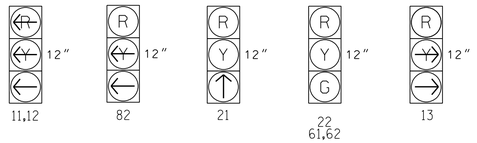
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+6	PHASE Ø2+6	PHASE Ø8	FLASH
11,12	←	~~R~~	~~R~~	~~R~~
13	→	R	→	R
21	R	↑	R	Y
22	R	G	R	Y
61,62	G	G	R	Y
82	R	R	←	R

SIGNAL FACE I.D.

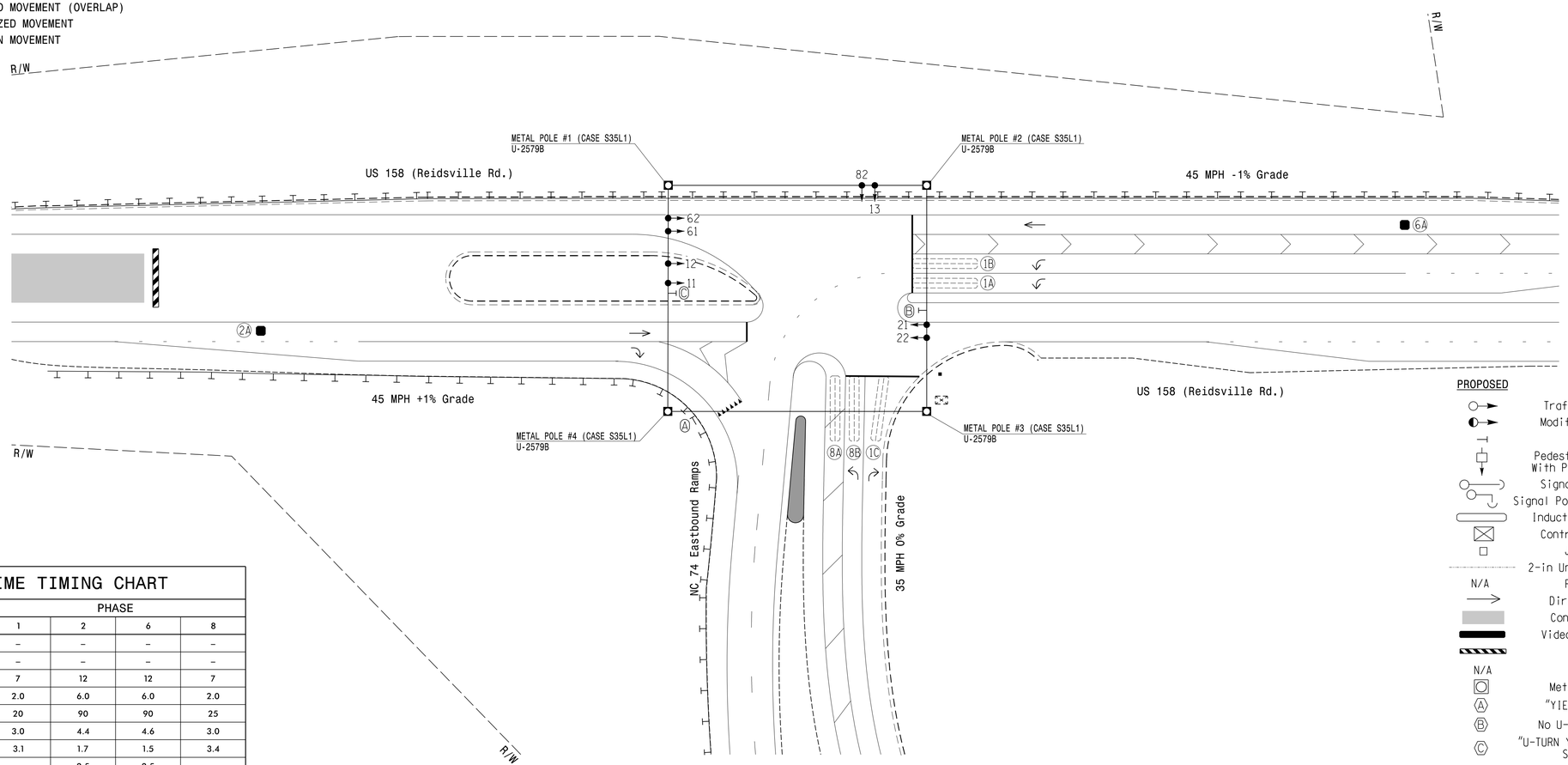
All Heads L.E.D.



MAXTIME DETECTOR INSTALLATION CHART

DETECTOR					PROGRAMMING							
LOOP/ ZONE	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
1A	6X40	0	2-4-2	-	1	-	-	X	-	X	-	-
1B	6X40	0	2-4-2	-	1	-	-	X	-	X	-	-
1C	6X40	0	2-4-2	-	1	15	-	X	-	X	-	-
2A	6X6	300	✳	✳	2	-	-	X	X	X	-	✳
6A	6X6	300	✳	✳	6	-	-	X	X	X	-	✳
8A	6X40	0	2-4-2	-	DISCONNECT							
8B	6X40	0	2-4-2	-	8	-	-	X	-	X	-	-

✳ Video Detection Zone



MAXTIME TIMING CHART

FEATURE	PHASE 1	PHASE 2	PHASE 6	PHASE 8
Walk *	–	–	–	–
Ped Clear *	–	–	–	–
Min Green	7	12	12	7
Passage *	2.0	6.0	6.0	2.0
Max 1 *	20	90	90	25
Yellow Change	3.0	4.4	4.6	3.0
Red Clear	3.1	1.7	1.5	3.4
Added Initial *	–	2.5	2.5	–
Maximum Initial *	–	34	34	–
Time Before Reduction *	–	15	15	–
Time To Reduce *	–	30	30	–
Minimum Gap	–	3.0	3.0	–
Advance Walk	–	–	–	–
Non Lock Detector	X	–	–	X
Vehicle Recall	–	MIN RECALL	MIN RECALL	–
Dual Entry	–	–	–	–

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

LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
→	Directional Arrow	→
	Construction Zone	
	Video Detection Zone	
	Barricade	
N/A	Guardrail	
	Metal Strain Pole	
Ⓐ	"YIELD" Sign (R1-2)	Ⓐ
Ⓑ	No U-Turn Sign (R3-4)	Ⓑ
Ⓒ	"U-TURN YIELD TO RIGHT TURN" Sign (R10-16)	Ⓒ

Signal Upgrade - Temporary Design 4 (TMP Phase III)

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

SCALE 0 40 1" = 40'

US 158 (Reidsville Rd.) at NC 74 Eastbound Ramps

Division 9 Forsyth County Winston-Salem

PLAN DATE: February 2024 REVIEWED BY: DT Sears

PREPARED BY: WP Erickson-Jones REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 056142 ENGINEER WILLIAM PORTER JONES

DocuSigned by: Porter Jones DOBE13E3AEDE4A8... SIGNATURE 2/12/2024 DATE

SIG. INVENTORY NO. 09-0510T4

2/12/2024
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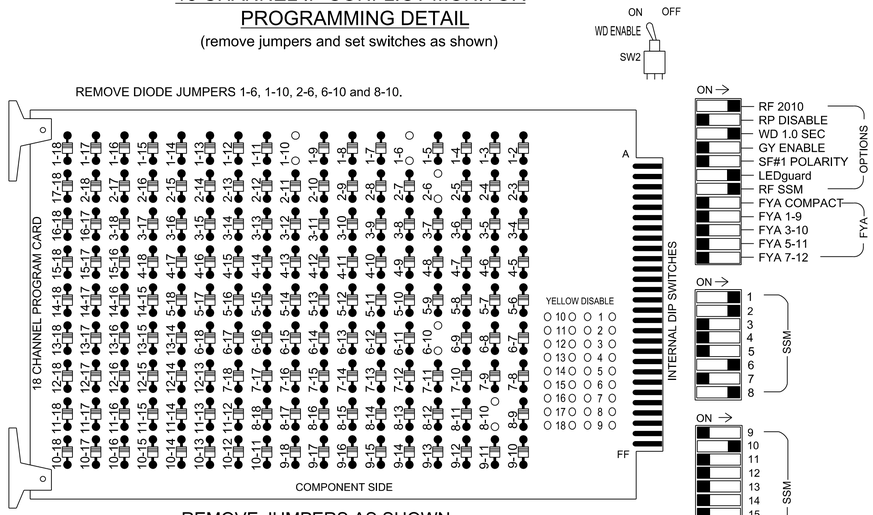
WPJones

PROJECT REFERENCE NO.	SHEET NO.
R-2577A	Sig. 14.1

18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE JUMPERS AS SHOWN

NOTES:

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

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the signal plan.
2. Program controller to start up in phase 2 Green No Walk and 6 Green No Walk.
3. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
4. The cabinet and controller are part of the US 158 Signal System, Signal System: D09-11_Winston-Salem 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, S8, S11, AUX S2
Phases Used.....1, 2, 6, 8
Overlap "1".....NOT USED
Overlap "2".....*
Overlap "3".....NOT USED
Overlap "4".....NOT USED

*See overlap programming detail this sheet.

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2		S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2		13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2		2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	11,12	21	22	NU	NU	NU	NU	NU	61,62	NU	NU	82	NU	NU	13	NU	NU	NU	NU
RED	·	128	128	·	·	·	·	·	134	·	·	107	·	·	A124	·	·	·	·
YELLOW	·	129	129	·	·	·	·	·	135	·	·	·	·	·	·	·	·	·	·
GREEN	·	·	130	·	·	·	·	·	136	·	·	·	·	·	·	·	·	·	·
RED ARROW	125	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
YELLOW ARROW	126	·	·	·	·	·	·	·	·	·	·	108	·	·	A125	·	·	·	·
GREEN ARROW	127	130	·	·	·	·	·	·	·	·	·	109	·	·	A126	·	·	·	·

NU = Not Used

OVERLAP PROGRAMMING

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

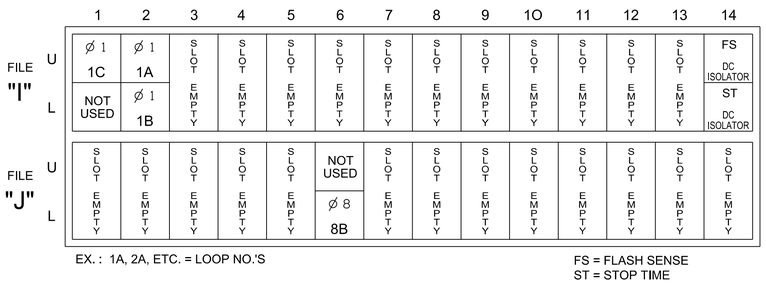
Web Interface
Home >Controller >Overlap Configuration >Overlaps

Overlap Plan 1

Overlap	2
Type	Normal
Included Phases	1,8
Modifier Phases	-
Modifier Overlaps	-
Trail Green	0
Trail Yellow	0.0
Trail Red	0.0

INPUT FILE POSITION LAYOUT

(front view)



INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN
1A	TB2-5,6	I2U	39	1	2	1			X		X	
1B	TB2-7,8	I2L	43	5	3	1			X		X	
1C	TB2-1,2	I1U	56	18	1	1	15		X		X	
8B	TB5-11,12	J6L	46	8	23	8			X		X	

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

FLASHER CIRCUIT MODIFICATION DETAIL

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

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

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

SPECIAL DETECTOR NOTE

Install a video detection system for vehicle detection for zones 2A and 6A. Perform installation according to manufacturer's directions and NCDOT engineer -approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.

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THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 09-0510T4
DESIGNED: February 2024
SEALED: February 12, 2024
REVISED:

Signal Upgrade - Temporary Design 4
(TMP Phase III) Electrical Detail

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Electrical and Programming Details For:

Prepared for the Offices of:
Transportation Mobility and Safety Division
Traffic Engineering Branch
Signals & Signal Management Section
DEPARTMENT OF TRANSPORTATION
STATE OF NORTH CAROLINA
750 N. Greenfield Pkwy, Garner, NC 27529

US 158 (Reidsville Rd.)
at
NC 74 Eastbound Ramps

Division 9 | Forsyth County | Winston-Salem

PLAN DATE:	February 2024	REVIEWED BY:	DT Sears
PREPARED BY:	WP Erickson-Jones	REVIEWED BY:	

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 056142 ENGINEER W. PORTER JONES
DocuSigned by: Porter Jones DO6E13F3AD6D498...
2/12/2024
DATE

SIG. INVENTORY NO. 09-0510T4

2/12/2024
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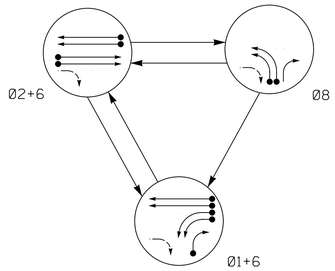
wpjones

PROJECT REFERENCE NO.	SHEET NO.
R-2577A	Sig. 15.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

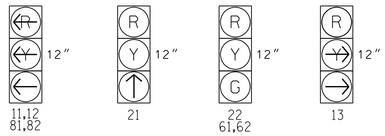
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+6	PHASE Ø2+6	PHASE Ø8	FLASH
11,12	←-	~~R~~	~~R~~	~~R~~
13	→	R	→	R
21	R	↑	R	Y
22	R	G	R	Y
61,62	G	G	R	Y
81,82	~~R~~	~~R~~	←-	~~R~~

SIGNAL FACE I.D.

All Heads L.E.D.



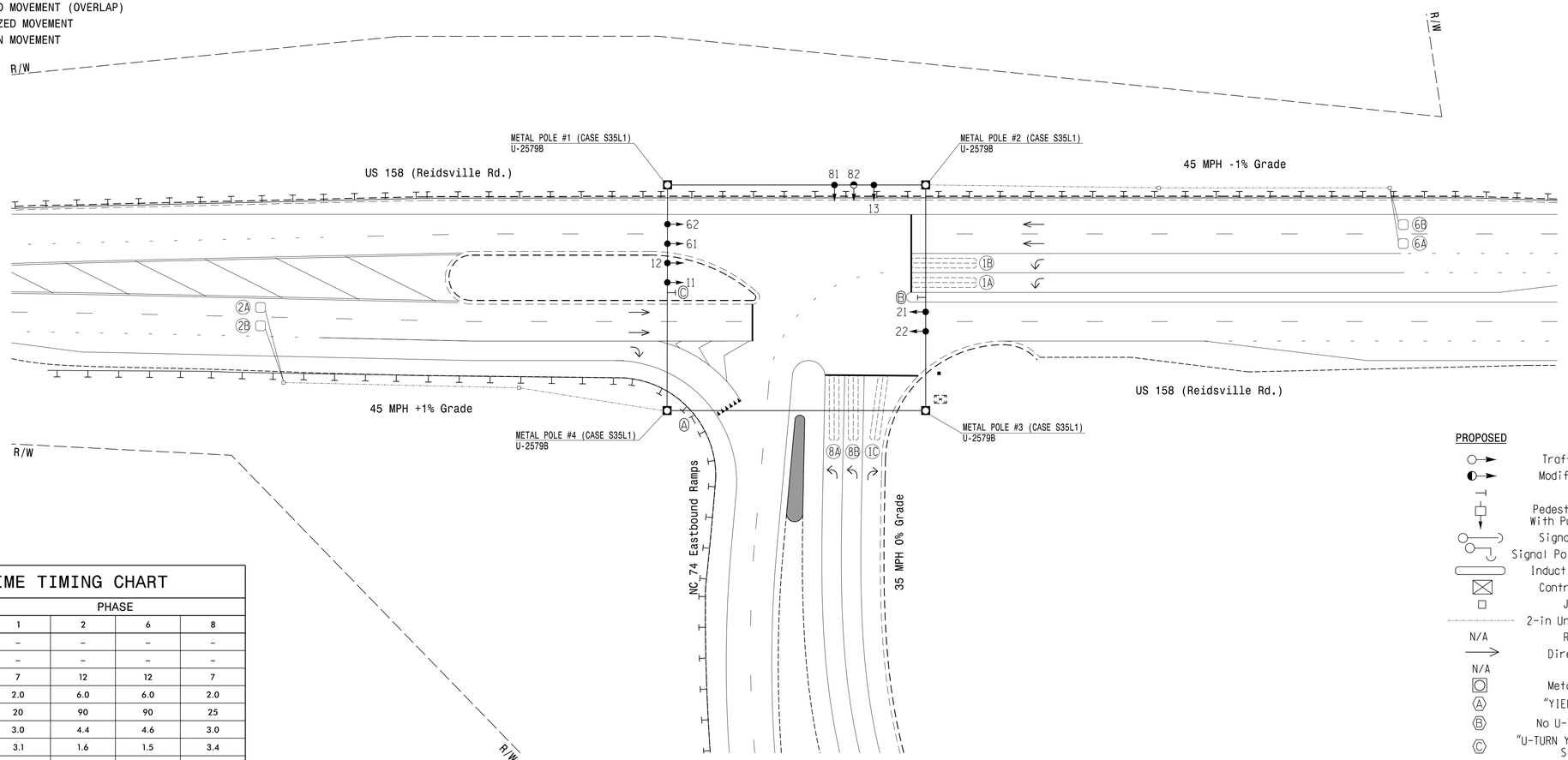
MAXTIME DETECTOR INSTALLATION CHART

DETECTOR					PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
1A	6X40	0	2-4-2	-	1	-	-	X	-	X	-	-
1B	6X40	0	2-4-2	-	1	-	-	X	-	X	-	-
1C	6X40	0	2-4-2	-	1	15	-	X	-	X	-	-
2A	6X6	300	5	X	2	-	-	X	X	X	-	X
2B	6X6	300	5	X	2	-	-	X	X	X	-	X
6A	6X6	300	5	X	6	-	-	X	X	X	-	X
6B	6X6	300	5	X	6	-	-	X	X	X	-	X
8A	6X40	0	2-4-2	-	8	-	-	X	-	X	-	-
8B	6X40	0	2-4-2	-	8	-	-	X	-	X	-	-

3 Phase
Fully Actuated
(US 158 Signal System)
Signal System #: D09-11_Winston-Salem

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. Reconnect existing loop 8A.
5. Reposition existing signal heads numbered 21, 22, 61, 62, 81, and 82.
6. Modify existing signal head numbered 82.
7. Set all detector units to presence mode.
8. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
9. Reconnect and unbag existing signal head 81.



MAXTIME TIMING CHART

FEATURE	PHASE 1	PHASE 2	PHASE 6	PHASE 8
Walk *	–	–	–	–
Ped Clear *	–	–	–	–
Min Green	7	12	12	7
Passage *	2.0	6.0	6.0	2.0
Max 1 *	20	90	90	25
Yellow Change	3.0	4.4	4.6	3.0
Red Clear	3.1	1.6	1.5	3.4
Added Initial *	–	1.5	1.5	–
Maximum Initial *	–	34	34	–
Time Before Reduction *	–	15	15	–
Time To Reduce *	–	30	30	–
Minimum Gap	–	3.0	3.0	–
Advance Walk	–	–	–	–
Non Lock Detector	X	–	–	X
Vehicle Recall	–	MIN RECALL	MIN RECALL	–
Dual Entry	–	–	–	–

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

LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
□↓	Pedestrian Signal Head With Push Button & Sign	■↓
○→	Signal Pole with Guy	●→
○↴	Signal Pole with Sidewalk Guy	●↴
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
□	Junction Box	■
·····	2-in Underground Conduit	·····
N/A	Right of Way	– – – –
→	Directional Arrow	→
N/A	Guardrail	⊣⊣
◎	Metal Strain Pole	■
Ⓐ	"YIELD" Sign (R1-2)	Ⓐ
Ⓑ	No U-Turn Sign (R3-4)	Ⓑ
Ⓒ	"U-TURN YIELD TO RIGHT TURN" Sign (R10-16)	Ⓒ

Signal Upgrade - Final Design

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

US 158 (Reidsville Rd.) at NC 74 Eastbound Ramps

Division 9 Forsyth County Winston-Salem

PLAN DATE: February 2024 REVIEWED BY: DT Sears

PREPARED BY: WP Erickson-Jones REVIEWED BY:

REVISIONS	INIT.	DATE

SCALE 0 40 1" = 40'

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 056142 ENGINEER WILLIAM PORTER JONES

DocuSigned by: Porter Jones DOSE13E3ADE0496... SIGNATURE 2/12/2024 DATE

SIG. INVENTORY NO. 09-0510

2/12/2024
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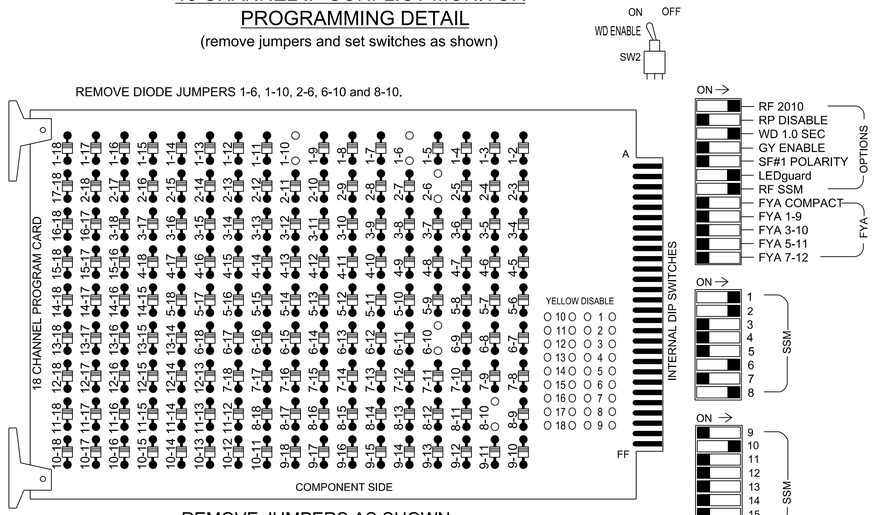
wdjones

PROJECT REFERENCE NO.	SHEET NO.
R-2577A	Sig. 15.1

18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE JUMPERS AS SHOWN

NOTES:

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

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the signal plan.
2. Program controller to start up in phase 2 Green No Walk and 6 Green No Walk.
3. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
4. The cabinet and controller are part of the US 158 Signal System, Signal System : D09-11_Winston-Salem 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, S8, S11, AUX S2
Phases Used.....1, 2, 6, 8
Overlap "1".....NOT USED
Overlap "2".....*
Overlap "3".....NOT USED
Overlap "4".....NOT USED

*See overlap programming detail this sheet.

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2		S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2		13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2		2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	11,12	21	22	NU	NU	NU	NU	NU	61,62	NU	NU	81,82	NU	NU	13	NU	NU	NU	NU
RED	·	128	128	·	·	·	·	·	134	·	·	·	·	·	A124	·	·	·	·
YELLOW	·	129	129	·	·	·	·	·	135	·	·	·	·	·	·	·	·	·	·
GREEN	·	·	130	·	·	·	·	·	136	·	·	·	·	·	·	·	·	·	·
RED ARROW	125	·	·	·	·	·	·	·	·	·	·	107	·	·	·	·	·	·	·
YELLOW ARROW	126	·	·	·	·	·	·	·	·	·	·	108	·	·	A125	·	·	·	·
GREEN ARROW	127	130	·	·	·	·	·	·	·	·	·	109	·	·	A126	·	·	·	·

NU = Not Used

OVERLAP PROGRAMMING

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

Overlap Plan 1

Overlap	2
Type	Normal
Included Phases	1,8
Modifier Phases	-
Modifier Overlaps	-
Trail Green	0
Trail Yellow	0.0
Trail Red	0.0

INPUT FILE POSITION LAYOUT

(front view)

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

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	TB2-5,6	I2U	39	1	2	1			X		X	
1B	TB2-7,8	I2L	43	5	3	1			X		X	
1C	TB2-1,2	I1U	56	18	1	1	15		X		X	
2A	TB2-9,10	I3U	63	29	4	2			X	X	X	
2B	TB2-11,12	I3L	76	42	5	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	
8A	TB5-9,10	J6U	42	4	22	8			X		X	
8B	TB5-11,12	J6L	46	8	23	8			X		X	

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

FLASHER CIRCUIT MODIFICATION DETAIL

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

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

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 09-0510
DESIGNED: February 2024
SEALED: February 12, 2024
REVISED:

Signal Upgrade - Final Design - Electrical Detail

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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Prepared for the Offices of:
Transportation Mobility and Safety Division
Traffic Engineering Branch
Traffic Signal Management Section
DEPARTMENT OF TRANSPORTATION
STATE OF NORTH CAROLINA
750 N. Greenfield Pkwy, Garner, NC 27529

US 158 (Reidsville Rd.)
at
NC 74 Eastbound Ramps

Division 9 | Forsyth County | Winston-Salem

PLAN DATE: February 2024 | REVIEWED BY: DT Sears
PREPARED BY: WP Erickson-Jones | REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 056142 ENGINEER W. PORTER JONES

DocuSigned by: Porter Jones DOSE13F3AD6D498...
2/12/2024
DATE

SIG. INVENTORY NO. 09-0510

2/12/2024
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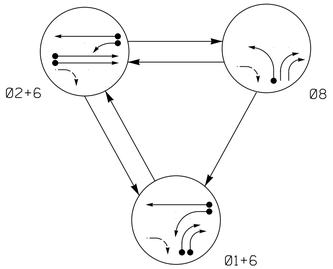
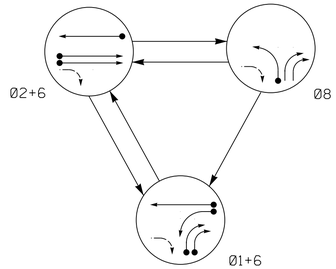
wpjones

PROJECT REFERENCE NO.	SHEET NO.
R-2577A	Sig. 16.0

DEFAULT PHASING DIAGRAM



ALTERNATE PHASING DIAGRAM



DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+6	Ø2+6	Ø8	FLASH
11	←	~~FY~~	~~R~~	~~Y~~
12,13	→	R	→	R
21	R	↑	R	Y
22	R	G	R	Y
61,62	G	G	R	Y
81	~~R~~	~~R~~	←	~~R~~

ALTERNATE PHASING TABLE OF OPERATION

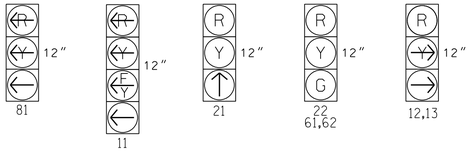
SIGNAL FACE	PHASE Ø1+6	Ø2+6	Ø8	FLASH
11	←	~~R~~	~~R~~	~~Y~~
12,13	→	R	→	R
21	R	↑	R	Y
22	R	G	R	Y
61,62	G	G	R	Y
81	~~R~~	~~R~~	←	~~R~~

PHASING DIAGRAM DETECTION LEGEND

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

SIGNAL FACE I.D.

All Heads L.E.D.



MAXTIME DETECTOR INSTALLATION CHART

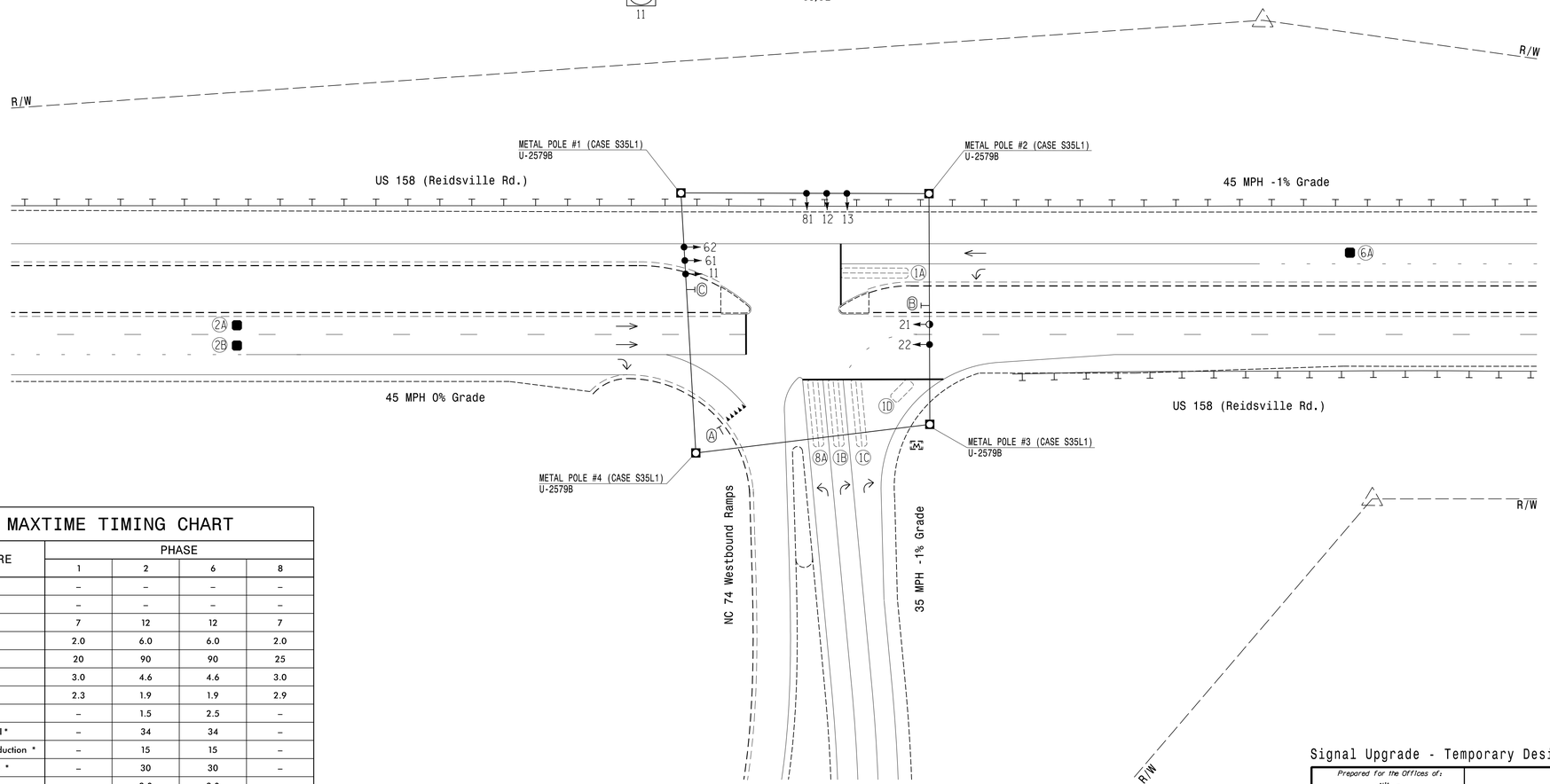
DETECTOR					PROGRAMMING							
LOOP/ ZONE	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
1A	6X40	0	2-4-2	-	1	15#	-	X	-	X	-	-
					6##	3	-	X	-	X	X	-
1B	6X40	0	2-4-2	-	1	15	-	X	-	X	-	-
1C	6X40	0	2-4-2	-	1	15	-	X	-	X	-	-
1D	6X15	0	4	-	1	15	-	X	-	X	-	-
2A ✳	6X6	300	✳	✳	2	-	-	X	X	X	-	✳
2B ✳	6X6	300	✳	✳	2	-	-	X	X	X	-	✳
6A ✳	6X6	300	✳	✳	6	-	-	X	X	X	-	✳
8B	6X40	0	2-4-2	-	8	-	-	X	-	X	-	-

\# Disable Delay During Alternate Phasing Operation.
\## Disable Phase Call For Loop(s) During Alternate Phasing Operation.
✳ Video Detection Zone

3 Phase Fully Actuated (US 158 Signal System) Signal System #: D09-11_Winston-Salem

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. Reposition existing signal heads numbered 61 and 62.
5. Modify existing signal head numbered 21.
6. Set all detector units to presence mode.
7. This intersection uses video detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.
8. Install new 2070LX Controller and conflict monitor in existing signal cabinet.
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.



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	●
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
□	Junction Box	■
	2-in Underground Conduit	
N/A	Right of Way	
→	Directional Arrow	→
▬	Video Detection Zone	▬
N/A	Guardrail	
◯	Metal Strain Pole	◘
Ⓜ	Master Controller & Cabinet	Ⓜ
Ⓐ	"YIELD" Sign (R1-2)	Ⓐ
Ⓑ	No U-Turn Sign (R3-4)	Ⓑ
Ⓒ	"U-TURN YIELD TO RIGHT TURN" Sign (R10-16)	Ⓒ

MAXTIME TIMING CHART

FEATURE	PHASE 1	2	6	8
Walk *	–	–	–	–
Ped Clear *	–	–	–	–
Min Green	7	12	12	7
Passage *	2.0	6.0	6.0	2.0
Max 1 *	20	90	90	25
Yellow Change	3.0	4.6	4.6	3.0
Red Clear	2.3	1.9	1.9	2.9
Added Initial *	–	1.5	2.5	–
Maximum Initial *	–	34	34	–
Time Before Reduction *	–	15	15	–
Time To Reduce *	–	30	30	–
Minimum Gap	–	3.0	3.0	–
Advance Walk	–	–	–	–
Non Lock Detector	X	–	–	X
Vehicle Recall	–	MIN RECALL	MIN RECALL	–
Dual Entry	–	–	–	–

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

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

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Prepared for the Offices of:
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'

US 158 (Reidsville Rd.) at NC 74 Westbound Ramps

Division 9 Forsyth County Winston-Salem

PLAN DATE: February 2024 REVIEWED BY: DT Sears
PREPARED BY: WP Erickson-Jones REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 056142 ENGINEER PORTER JONES

DocuSigned by: Porter Jones
SIGNATURE 2/12/2024 DATE

SIG. INVENTORY NO. 09-05III

2/12/2024
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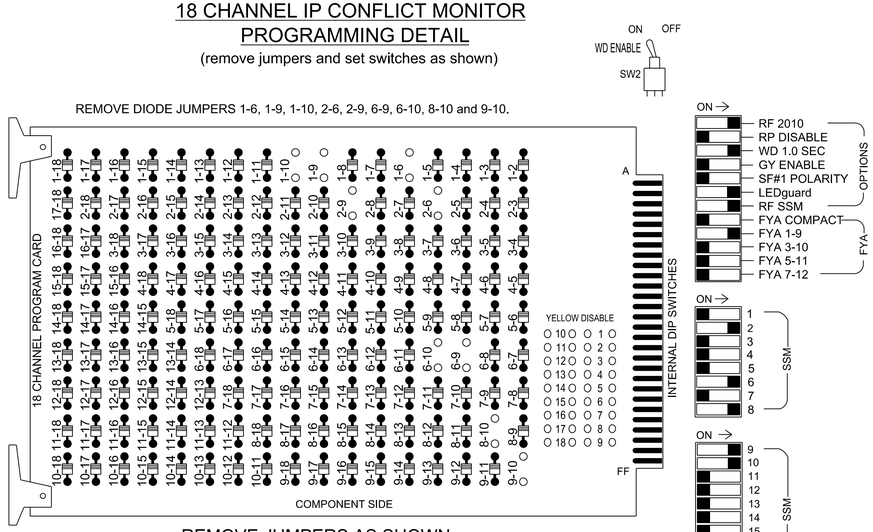
wp1jones

PROJECT REFERENCE NO.	SHEET NO.
R-2577A	Sig. 16.1

18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE JUMPERS AS SHOWN

NOTES:

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

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the signal plan.
2. Program controller to start up in phase 2 Green No Walk and 6 Green No Walk.
3. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
4. The cabinet and controller are part of the US 158 Signal Sytem, Signal System : D09-11_Winston-Salem 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, S8, S11, AUX S1, AUX S2
Phases Used.....1, 2, 6, 8
Overlap "1".....*
Overlap "2".....*
Overlap "3".....NOT USED
Overlap "4".....NOT USED

*See overlap programming detail on sheet 2.

SIGNAL HEAD HOOK-UP CHART

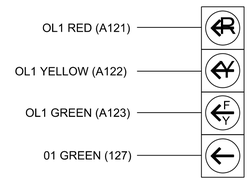
LOAD SWITCH NO.	S1	S2		S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2		13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2		2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	11★	21	22	NU	NU	NU	NU	NU	61,62	NU	NU	81	NU	11★	12,13	NU	NU	NU	NU
RED	·	128	128	·	·	·	·	·	134	·	·	·	·	·	A124	·	·	·	·
YELLOW	*	129	129	·	·	·	·	·	135	·	·	·	·	·	·	·	·	·	·
GREEN	·	·	130	·	·	·	·	·	136	·	·	·	·	·	·	·	·	·	·
RED ARROW	·	·	·	·	·	·	·	·	·	·	·	107	·	A121	·	·	·	·	·
YELLOW ARROW	·	·	·	·	·	·	·	·	·	·	·	108	·	A122	A125	·	·	·	·
FLASHING YELLOW ARROW	·	·	·	·	·	·	·	·	·	·	·	·	·	A123	·	·	·	·	·
GREEN ARROW	127	130	·	·	·	·	·	·	·	·	·	109	·	·	A126	·	·	·	·

NU = Not Used

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

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



INPUT FILE POSITION LAYOUT

(front view)

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

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

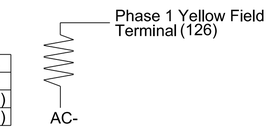
LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN
1A	TB2-1,2	I1U	56	18	1	1	15		X		X	
				-	29	6	3		X		X	X
1B	TB2-5,6	I2U	39	1	2	1	15		X		X	
1C	TB2-7,8	I2L	43	5	3	1	15		X		X	
1D	TB6-9,10	I9U	60	22	13	1	15		X		X	
8A	TB6-11,12	I9L	62	24	14	8			X		X	

REMOVE, jumper from 1-W to J4-W, on rear of input file, if present.

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

Install a video detection system for vehicle detection for zones. 2A, 2B and 6A. 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: 09-0511T1
DESIGNED: February 2024
SEALED: February 12, 2024
REVISED:

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

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750 N. Greenfield Pkwy, Garner, NC 27529

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Division 9 | Forsyth County | Winston-Salem

PLAN DATE: February 2024	REVIEWED BY: DT Sears
PREPARED BY: WP Erickson-Jones	REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 056142 ENGINEER W. PORTER JONES
DocuSigned by: Porter Jones 2/12/2024
DOCUSIGNATURE DATE
SIG. INVENTORY NO. 09-0511T1

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wpjones

PROJECT REFERENCE NO.	SHEET NO.
R-2577A	Sig. 16.2

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

MAXTIME OVERLAP PROGRAMMING DETAIL FOR ALTERNATE PHASING

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

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

Overlap Plan 2

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

← NOTICE INCLUDED PHASE

FLASHER CIRCUIT MODIFICATION DETAIL

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

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

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

MAXTIME ALTERNATE PHASING ACTIVATION DETAIL

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

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

ALTERNATE PHASING CHANGE SUMMARY

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

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

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

MAXTIME 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

1A

Detector	Call Phase	Delay
1	1	0
29	0	3

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: 09-0511T1
DESIGNED: February 2024
SEALED: February 12, 2024
REVISED:

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

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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Electrical and Programming Details For:

Prepared for the Offices of:
Transportation Mobility and Safety Division
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
Signals Management Section
750 N. Greenfield Pkwy, Garner, NC 27529

US 158 (Reidsville Rd.)
at
NC 74 Westbound Ramps

Division 9 | Forsyth County | Winston-Salem

PLAN DATE: February 2024	REVIEWED BY: DT Sears
PREPARED BY: WP Erickson-Jones	REVIEWED BY:

REVISIONS	INIT.	DATE

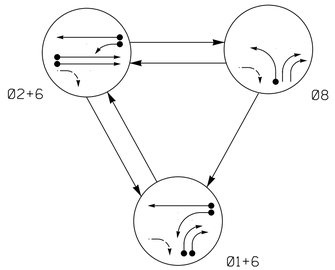
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 056142 ENGINEER PORTER JONES

DocuSigned by: Porter Jones D06E13E3A0E0498...
2/12/2024
DATE

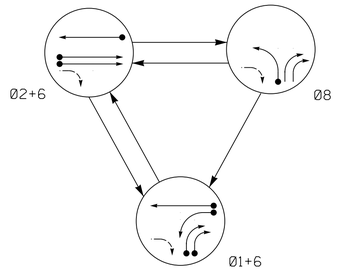
SIG. INVENTORY NO. 09-0511T1

PROJECT REFERENCE NO.	SHEET NO.
R-2577A	Sig. 17.0

DEFAULT PHASING DIAGRAM



ALTERNATE PHASING DIAGRAM



DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+6	PHASE Ø2+6	PHASE Ø8	PHASE FLASH
11	←	F Y	~~R~~	~~Y~~
12,13	→	R	→	R
21	R	↑	R	Y
22	R	G	R	Y
61,62	G	G	R	Y
81	~~R~~	~~R~~	←	~~R~~

ALTERNATE PHASING TABLE OF OPERATION

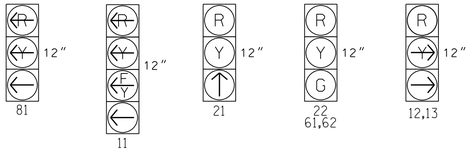
SIGNAL FACE	PHASE Ø1+6	PHASE Ø2+6	PHASE Ø8	PHASE FLASH
11	←	~~R~~	~~R~~	~~Y~~
12,13	→	R	→	R
21	R	↑	R	Y
22	R	G	R	Y
61,62	G	G	R	Y
81	~~R~~	~~R~~	←	~~R~~

PHASING DIAGRAM DETECTION LEGEND

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

SIGNAL FACE I.D.

All Heads L.E.D.



MAXTIME DETECTOR INSTALLATION CHART

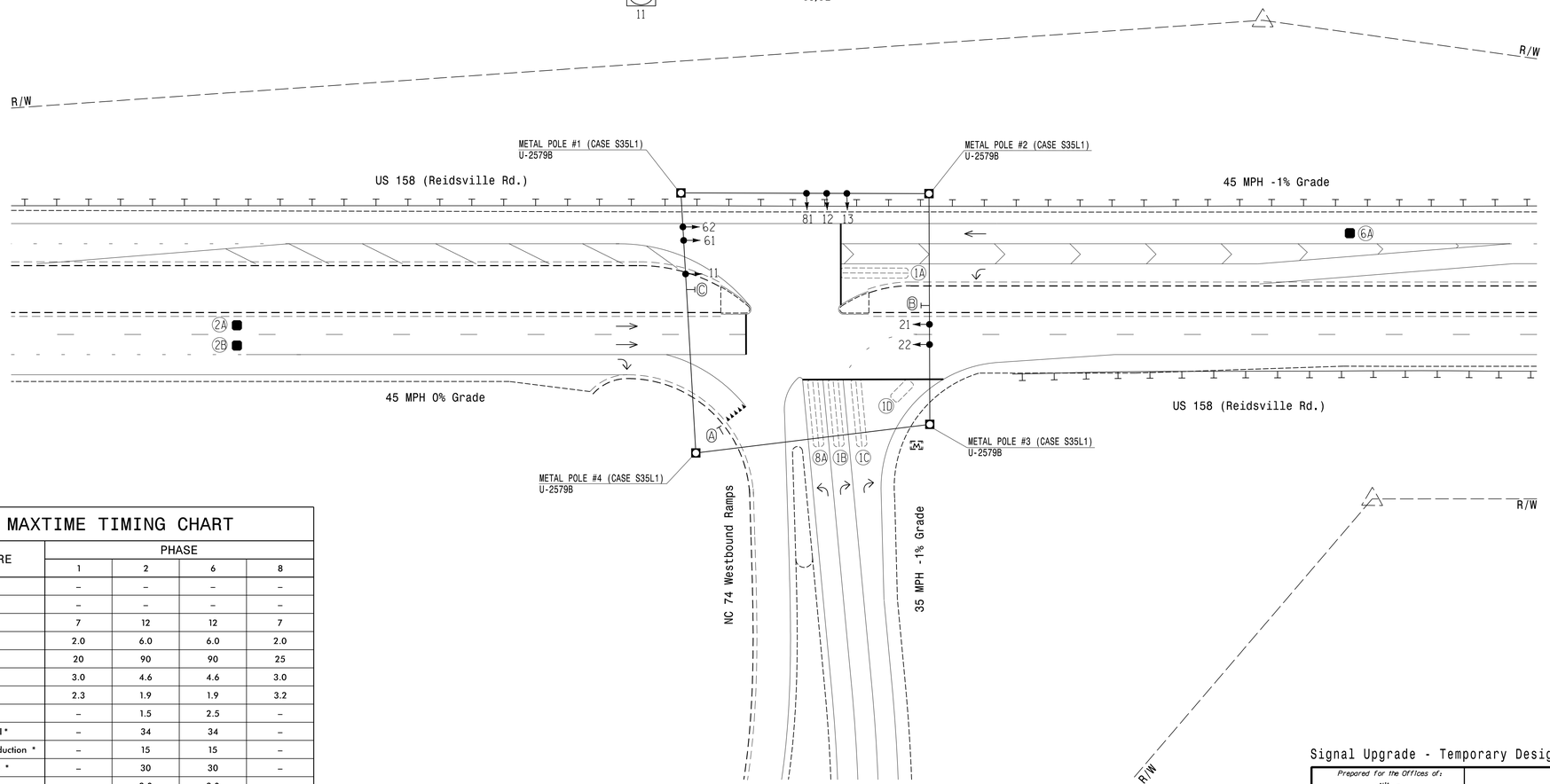
DETECTOR					PROGRAMMING							
LOOP/ ZONE	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
1A	6X40	0	2-4-2	-	1	15#	-	X	-	X	-	-
					6##	3	-	X	-	X	X	-
1B	6X40	0	2-4-2	-	1	15	-	X	-	X	-	-
1C	6X40	0	2-4-2	-	1	15	-	X	-	X	-	-
1D	6X15	0	4	-	1	15	-	X	-	X	-	-
2A ✳	6X6	300	✳	✳	2	-	-	X	X	X	-	✳
2B ✳	6X6	300	✳	✳	2	-	-	X	X	X	-	✳
6A ✳	6X6	300	✳	✳	6	-	-	X	X	X	-	✳
8B	6X40	0	2-4-2	-	8	-	-	X	-	X	-	-

\# Disable Delay During Alternate Phasing Operation.
Disable Phase Call For Loop(s) During Alternate Phasing Operation.
✳ Video Detection Zone

3 Phase
Fully Actuated
(US 158 Signal System)
Signal System #: D09-11_Winston-Salem

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. Reposition existing signal heads numbered 61 and 62.
5. Set all detector units to presence mode.
6. This intersection uses video detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.
7. The Division Traffic Engineer will determine the hours of use for each phasing plan.
8. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.



MAXTIME TIMING CHART

FEATURE	PHASE 1	PHASE 2	PHASE 6	PHASE 8
Walk *	–	–	–	–
Ped Clear *	–	–	–	–
Min Green	7	12	12	7
Passage *	2.0	6.0	6.0	2.0
Max 1 *	20	90	90	25
Yellow Change	3.0	4.6	4.6	3.0
Red Clear	2.3	1.9	1.9	3.2
Added Initial *	–	1.5	2.5	–
Maximum Initial *	–	34	34	–
Time Before Reduction *	–	15	15	–
Time To Reduce *	–	30	30	–
Minimum Gap	–	3.0	3.0	–
Advance Walk	–	–	–	–
Non Lock Detector	X	–	–	X
Vehicle Recall	–	MIN RECALL	MIN RECALL	–
Dual Entry	–	–	–	–

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

LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
▭↓	Pedestrian Signal Head With Push Button & Sign	■↓
○	Signal Pole with Guy	●
○	Signal Pole with Sidewalk Guy	●
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
□	Junction Box	■
	2-in Underground Conduit	
N/A	Right of Way	
→	Directional Arrow	→
▬	Video Detection Zone	▬
N/A	Guardrail	
◯	Metal Strain Pole	◘
Ⓜ	Master Controller & Cabinet	Ⓜ
Ⓐ	"YIELD" Sign (R1-2)	Ⓐ
Ⓑ	No U-Turn Sign (R3-4)	Ⓑ
Ⓒ	"U-TURN YIELD TO RIGHT TURN" Sign (R10-16)	Ⓒ

Signal Upgrade - Temporary Design 2 (TMP Phases I Step 3-II)

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

SCALE 0 40 1" = 40'

US 158 (Reidsville Rd.) at NC 74 Westbound Ramps
Division 9 Forsyth County Winston-Salem

PLAN DATE:	February 2024	REVIEWED BY:	DT Sears
PREPARED BY:	WP Erickson-Jones	REVIEWED BY:	

REVISIONS	INIT.	DATE

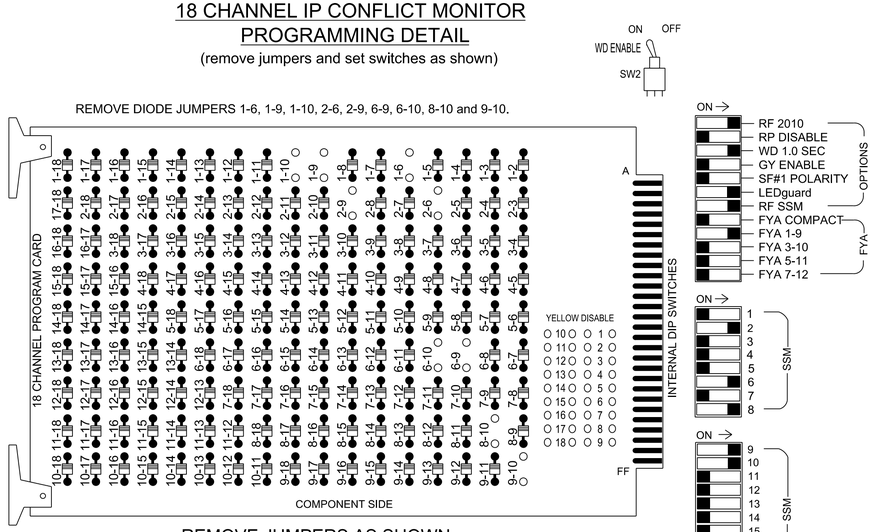
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 056142 ENGINEER WILLIAM PORTER JONES
DocuSigned by: Porter Jones
SIGNATURE 2/12/2024 DATE
SIG. INVENTORY NO. 09-05111T2

2/12/2024
R:\Active\Signals\Designs\Signals\09051172_sig_dsn_XXXXXXXX.dgn
wp jones

PROJECT REFERENCE NO.	SHEET NO.
R-2577A	Sig. 17.1

18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE JUMPERS AS SHOWN

NOTES:

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

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the signal plan.
2. Program controller to start up in phase 2 Green No Walk and 6 Green No Walk.
3. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
4. The cabinet and controller are part of the US 158 Signal System, Signal System : D09-11_Winston-Salem 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, S8, S11, AUX S1, AUX S2
Phases Used.....1, 2, 6, 8
Overlap "1".....*
Overlap "2".....*
Overlap "3".....NOT USED
Overlap "4".....NOT USED

*See overlap programming detail on sheet 2.

SIGNAL HEAD HOOK-UP CHART

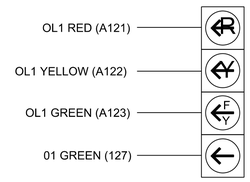
LOAD SWITCH NO.	S1	S2		S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2		13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2		2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	11★	21	22	NU	NU	NU	NU	NU	61,62	NU	NU	81	NU	11★	12,13	NU	NU	NU	NU
RED	·	128	128	·	·	·	·	·	134	·	·	·	·	·	A124	·	·	·	·
YELLOW	*	129	129	·	·	·	·	·	135	·	·	·	·	·	·	·	·	·	·
GREEN	·	·	130	·	·	·	·	·	136	·	·	·	·	·	·	·	·	·	·
RED ARROW	·	·	·	·	·	·	·	·	·	·	·	107	·	A121	·	·	·	·	·
YELLOW ARROW	·	·	·	·	·	·	·	·	·	·	·	108	·	A122	A125	·	·	·	·
FLASHING YELLOW ARROW	·	·	·	·	·	·	·	·	·	·	·	·	·	A123	·	·	·	·	·
GREEN ARROW	127	130	·	·	·	·	·	·	·	·	·	109	·	·	A126	·	·	·	·

NU = Not Used

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

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



INPUT FILE POSITION LAYOUT

(front view)

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

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

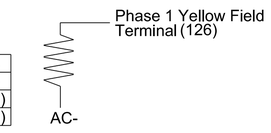
LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN
1A	TB2-1,2	I1U	56	18	1	1	15		X		X	
				-	29	6	3		X		X	X
1B	TB2-5,6	I2U	39	1	2	1	15		X		X	
1C	TB2-7,8	I2L	43	5	3	1	15		X		X	
1D	TB6-9,10	I9U	60	22	13	1	15		X		X	
8A	TB6-11,12	I9L	62	24	14	8			X		X	

REMOVE, jumper from I1-W to J4-W, on rear of input file, if present.

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

Install a video detection system for vehicle detection for zones. 2A, 2B and 6A. 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: 09-0511T2
DESIGNED: February 2024
SEALED: February 12, 2024
REVISED:

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

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Traffic Engineering Branch
Traffic & Signals Management Section

750 N. Greenfield Pkwy, Garner, NC 27529

US 158 (Reidsville Rd.)
at
NC 74 Westbound Ramps

Division 9 | Forsyth County | Winston-Salem

PLAN DATE: February 2024	REVIEWED BY: DT Sears
PREPARED BY: WP Erickson-Jones	REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 056142 ENGINEER PORTER JONES

DocuSigned by: Porter Jones 2/12/2024
DOE13E3AA5D4A9... DATE

SIG. INVENTORY NO. 09-0511T2

2/12/2024
2:47:07 PM
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wpjones

PROJECT REFERENCE NO.	SHEET NO.
R-2577A	Sig. 17.2

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

MAXTIME OVERLAP PROGRAMMING DETAIL FOR ALTERNATE PHASING

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

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

Overlap Plan 2

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

← NOTICE INCLUDED PHASE

FLASHER CIRCUIT MODIFICATION DETAIL

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

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

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

MAXTIME ALTERNATE PHASING ACTIVATION DETAIL

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

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

ALTERNATE PHASING CHANGE SUMMARY

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

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

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

MAXTIME 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

1A

Detector	Call Phase	Delay
1	1	0
29	0	3

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: 09-0511T2
DESIGNED: February 2024
SEALED: February 12, 2024
REVISED:

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

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US 158 (Reidsville Rd.)
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Division 9 | Forsyth County | Winston-Salem

PLAN DATE:	February 2024	REVIEWED BY:	DT Sears
PREPARED BY:	WP Erickson-Jones	REVIEWED BY:	

REVISIONS	INIT.	DATE

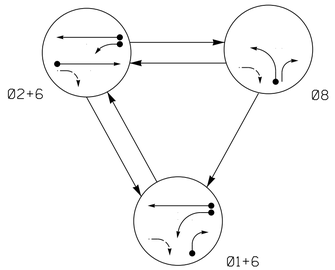
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 056142 ENGINEER WILLIAM PORTER JONES

DocuSigned by: Porter Jones D06E13E3A0E0498...
2/12/2024
DATE

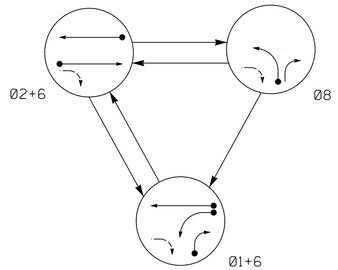
SIG. INVENTORY NO. 09-0511T2

PROJECT REFERENCE NO.	SHEET NO.
R-2577A	Sig. 18.0

DEFAULT PHASING DIAGRAM



ALTERNATE PHASING DIAGRAM



DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+6	PHASE Ø2+6	PHASE Ø8	PHASE FLASH
11	←	FY	~~R~~	~~Y~~
12	→	R	→	R
21	R	↑	R	Y
22	R	G	R	Y
61,62	G	G	R	Y
81	~~R~~	~~R~~	←	~~R~~

ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+6	PHASE Ø2+6	PHASE Ø8	PHASE FLASH
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12	→	R	→	R
21	R	↑	R	Y
22	R	G	R	Y
61,62	G	G	R	Y
81	~~R~~	~~R~~	←	~~R~~

MAXTIME DETECTOR INSTALLATION CHART

DETECTOR					PROGRAMMING							
LOOP/ ZONE	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
1A	6X40	0	2-4-2	-	1	15#	-	X	-	X	DE	-
					6##	3	-	X	-	X	X	-
1B	6X40	0	2-4-2	-	1	15	-	X	-	X	-	-
1C	6X40	0	2-4-2	-	1	15	-	X	-	X	-	-
1D	6X15	0	4	-	DISCONNECTED							
2A ✳	6X6	300	✳	✳	2	-	-	X	X	X	-	✳
6A ✳	6X6	300	✳	✳	6	-	-	X	X	X	-	✳
8B	6X40	0	2-4-2	-	8	-	-	X	-	X	-	-

\# Disable Delay During Alternate Phasing Operation.
\## Disable Phase Call For Loop(s) During Alternate Phasing Operation.
✳ Video Detection Zone

3 Phase
Fully Actuated
(US 158 Signal System)
Signal System #: D09-11_Winston-Salem

NOTES

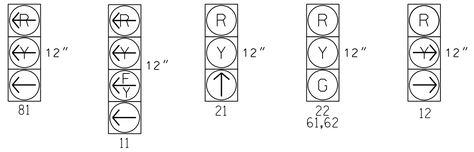
1. Refer to "Roadway Standard Drawings NCDOT" dated January 2024 and "Standard Specifications for Roads and Structures" dated January 2024.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 may be lagged.
4. Reposition existing signal heads numbered 21 and 22.
5. Set all detector units to presence mode.
6. Disconnect existing loop 1D.
7. This intersection uses video detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.
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. Disconnect and bag existing signal head 13.

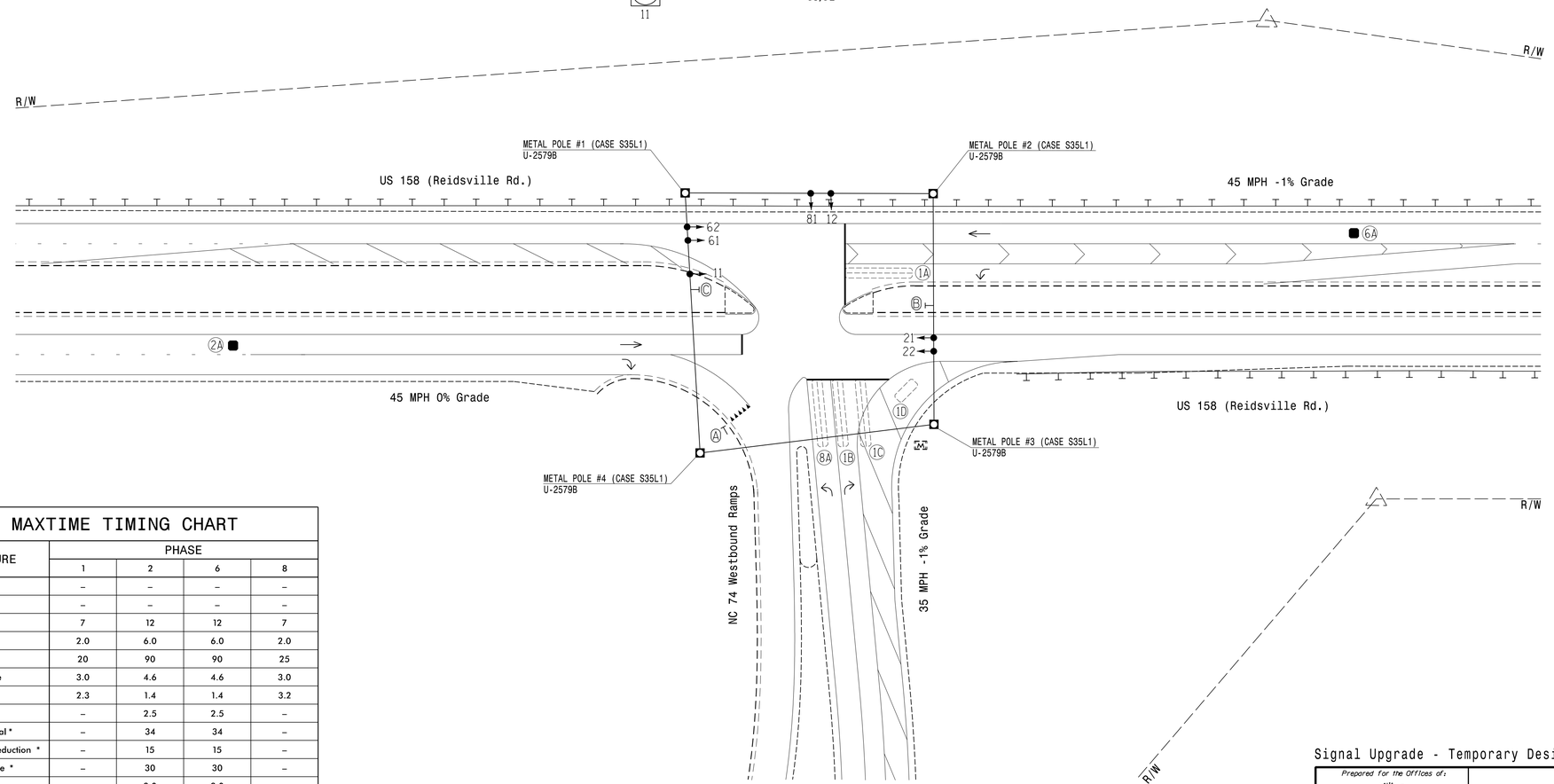
PHASING DIAGRAM DETECTION LEGEND

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

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	●
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
□	Junction Box	■
	2-in Underground Conduit	
N/A	Right of Way	
→	Directional Arrow	→
▬	Video Detection Zone	▬
N/A	Guardrail	
◯	Metal Strain Pole	◘
Ⓜ	Master Controller & Cabinet	Ⓜ
Ⓐ	"YIELD" Sign (R1-2)	Ⓐ
Ⓑ	No U-Turn Sign (R3-4)	Ⓑ
Ⓒ	"U-TURN YIELD TO RIGHT TURN" Sign (R10-16)	Ⓒ

MAXTIME TIMING CHART

FEATURE	PHASE 1	PHASE 2	PHASE 6	PHASE 8
Walk *	–	–	–	–
Ped Clear *	–	–	–	–
Min Green	7	12	12	7
Passage *	2.0	6.0	6.0	2.0
Max 1 *	20	90	90	25
Yellow Change	3.0	4.6	4.6	3.0
Red Clear	2.3	1.4	1.4	3.2
Added Initial *	–	2.5	2.5	–
Maximum Initial *	–	34	34	–
Time Before Reduction *	–	15	15	–
Time To Reduce *	–	30	30	–
Minimum Gap	–	3.0	3.0	–
Advance Walk	–	–	–	–
Non Lock Detector	X	–	–	X
Vehicle Recall	–	MIN RECALL	MIN RECALL	–
Dual Entry	–	–	–	–

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

Signal Upgrade - Temporary Design 3 (TMP Phase III)

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Prepared for the Offices of:
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'

US 158 (Reidsville Rd.) at NC 74 Westbound Ramps
Division 9 Forsyth County Winston-Salem

PLAN DATE: February 2024 REVIEWED BY: DT Sears
PREPARED BY: WP Erickson-Jones REVIEWED BY:

REVISIONS	INIT.	DATE

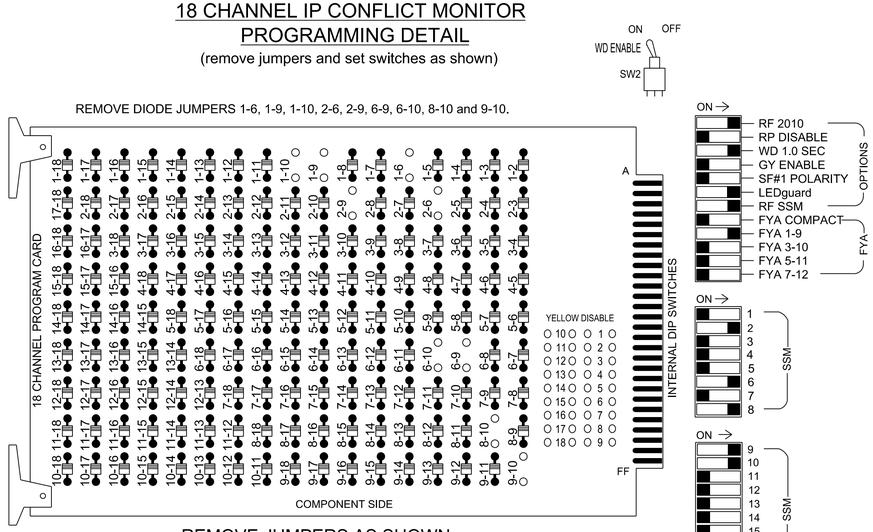
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 056142 ENGINEER WILLIAM PORTER JONES
DocuSigned by: Porter Jones
SIGNATURE 2/12/2024 DATE
SIG. INVENTORY NO. 09-05111T3

2/12/2024
R-2577A_Sig_18.dgn
wpjones

PROJECT REFERENCE NO.	SHEET NO.
R-2577A	Sig. 18.1

18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE JUMPERS AS SHOWN

NOTES:

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

■ = DENOTES POSITION OF SWITCH

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the signal plan.
2. Program controller to start up in phase 2 Green No Walk and 6 Green No Walk.
3. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
4. The cabinet and controller are part of the US 158 Signal System, Signal System : D09-11_Winston-Salem 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, S8, S11, AUX S1, AUX S2
Phases Used.....1, 2, 6, 8
Overlap "1".....*
Overlap "2".....*
Overlap "3".....NOT USED
Overlap "4".....NOT USED

*See overlap programming detail on sheet 2.

SIGNAL HEAD HOOK-UP CHART

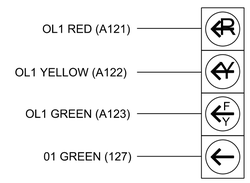
LOAD SWITCH NO.	S1	S2		S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2		13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2		2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	11★	21	22	NU	NU	NU	NU	NU	61,62	NU	NU	81	NU	11★	12	NU	NU	NU	NU
RED	·	128	128	·	·	·	·	·	134	·	·	·	·	·	A124	·	·	·	·
YELLOW	*	129	129	·	·	·	·	·	135	·	·	·	·	·	·	·	·	·	·
GREEN	·	·	130	·	·	·	·	·	136	·	·	·	·	·	·	·	·	·	·
RED ARROW	·	·	·	·	·	·	·	·	·	·	·	107	·	A121	·	·	·	·	·
YELLOW ARROW	·	·	·	·	·	·	·	·	·	·	·	108	·	A122	A125	·	·	·	·
FLASHING YELLOW ARROW	·	·	·	·	·	·	·	·	·	·	·	·	·	A123	·	·	·	·	·
GREEN ARROW	127	130	·	·	·	·	·	·	·	·	·	109	·	·	A126	·	·	·	·

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)



11

INPUT FILE POSITION LAYOUT

(front view)

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

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

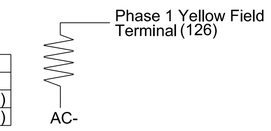
LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN
1A	TB2-1,2	I1U	56	18	1	1	15		X		X	
				-	29	6	3		X		X	X
1B	TB2-5,6	I2U	39	1	2	1	15		X		X	
1C	TB2-7,8	I2L	43	5	3	1	15		X		X	
1D	TB6-9,10	I9U	60	22	13	1	15		X		X	
8A	TB6-11,12	I9L	62	24	14	8			X		X	

REMOVE, jumper from I1-W to J4-W, on rear of input file, if present.

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

Install a video detection system for vehicle detection for zones. 2A and 6A. 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: 09-0511T3
DESIGNED: February 2024
SEALED: February 12, 2024
REVISED:

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

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Electrical and Programming Details For:

Prepared for the Offices of:
Transportation Mobility and Safety Division
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Traffic Engineering & Signals Management Section
750 N. Greenfield Pkwy, Garner, NC 27529

US 158 (Reidsville Rd.)
at
NC 74 Westbound Ramps

Division 9 | Forsyth County | Winston-Salem

PLAN DATE: February 2024	REVIEWED BY: DT Sears
PREPARED BY: WP Erickson-Jones	REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 056142 ENGINEER W. PORTER JONES

DocuSigned by: Porter Jones 2/12/2024
DOE13E3A0E0A4A6... DATE

SIG. INVENTORY NO. 09-0511T3

2/12/2024
2:47:07 PM
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wpjones

PROJECT REFERENCE NO.	SHEET NO.
R-2577A	Sig. 18.2

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

MAXTIME OVERLAP PROGRAMMING DETAIL FOR ALTERNATE PHASING

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

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

Overlap Plan 2

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

← NOTICE INCLUDED PHASE

FLASHER CIRCUIT MODIFICATION DETAIL

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

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

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

MAXTIME ALTERNATE PHASING ACTIVATION DETAIL

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

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

ALTERNATE PHASING CHANGE SUMMARY

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

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

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

MAXTIME 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

1A

Detector	Call Phase	Delay
1	1	0
29	0	3

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: 09-0511T3
DESIGNED: February 2024
SEALED: February 12, 2024
REVISED:

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

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Traffic Signals Management Section
750 N. Greenfield Pkwy, Garner, NC 27529

US 158 (Reidsville Rd.)
at
NC 74 Westbound Ramps

Division 9 | Forsyth County | Winston-Salem

PLAN DATE:	February 2024	REVIEWED BY:	DT Sears
PREPARED BY:	WP Erickson-Jones	REVIEWED BY:	

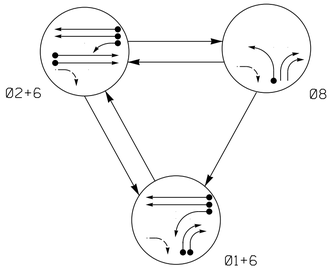
REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 056142 ENGINEER PORTER JONES
DocuSigned by: Porter Jones D06E13E3A0E0498...
2/12/2024
DATE

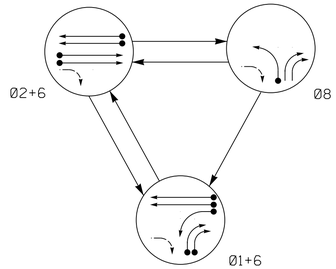
SIG. INVENTORY NO. 09-0511T3

PROJECT REFERENCE NO.	SHEET NO.
R-2577A	Sig. 19.0

DEFAULT PHASING DIAGRAM



ALTERNATE PHASING DIAGRAM



DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+6	PHASE Ø2+6	PHASE Ø8	PHASE FLASH
11	←	~~F Y~~	~~R~~	~~Y~~
12,13	→	R	→	R
21	R	↑	R	Y
21	R	G	R	Y
61,62	G	G	R	Y
81	~~R~~	~~R~~	←	~~R~~

ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+6	PHASE Ø2+6	PHASE Ø8	PHASE FLASH
11	←	~~R~~	~~R~~	~~Y~~
12,13	→	R	→	R
21	R	↑	R	Y
22	R	G	R	Y
61,62	G	G	R	Y
81	~~R~~	~~R~~	←	~~R~~

MAXTIME DETECTOR INSTALLATION CHART

DETECTOR LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
1A	6X40	0	2-4-2	-	1	15✳	-	X	-	X	-	-
					6#	3	-	X	-	X	X	-
1B	6X40	0	2-4-2	-	1	15	-	X	-	X	-	-
1C	6X40	0	2-4-2	-	1	15	-	X	-	X	-	-
1D	6X15	0	4	-	1	15	-	X	-	X	-	-
2A	6X6	300	5	X	2	-	-	X	X	X	-	X
2B	6X6	300	5	X	2	-	-	X	X	X	-	X
6A	6X6	300	5	X	6	-	-	X	X	X	-	X
6A	6X6	300	5	X	6	-	-	X	X	X	-	X
8B	6X40	0	2-4-2	-	8	-	-	X	-	X	-	-

✳ Disable Delay During Alternate Phasing Operation.
Disable Phase Call For Loop(s) During Alternate Phasing Operation.

3 Phase
Fully Actuated
(US 158 Signal System)
Signal System #: D09-11_Winston-Salem

NOTES

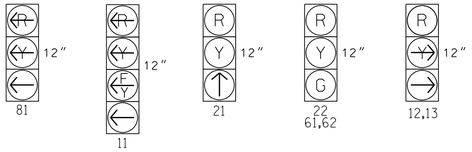
1. Refer to "Roadway Standard Drawings NCDOT" dated January 2024 and "Standard Specifications for Roads and Structures" dated January 2024.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 may be lagged.
4. Reposition existing signal heads numbered 21, 22, 61, and 62.
5. Reconnect existing loop 1D.
6. Set all detector units to presence mode.
7. The Division Traffic Engineer will determine the hours of use for each phasing plan.
8. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
9. Reconnect and unbag existing signal head 13.

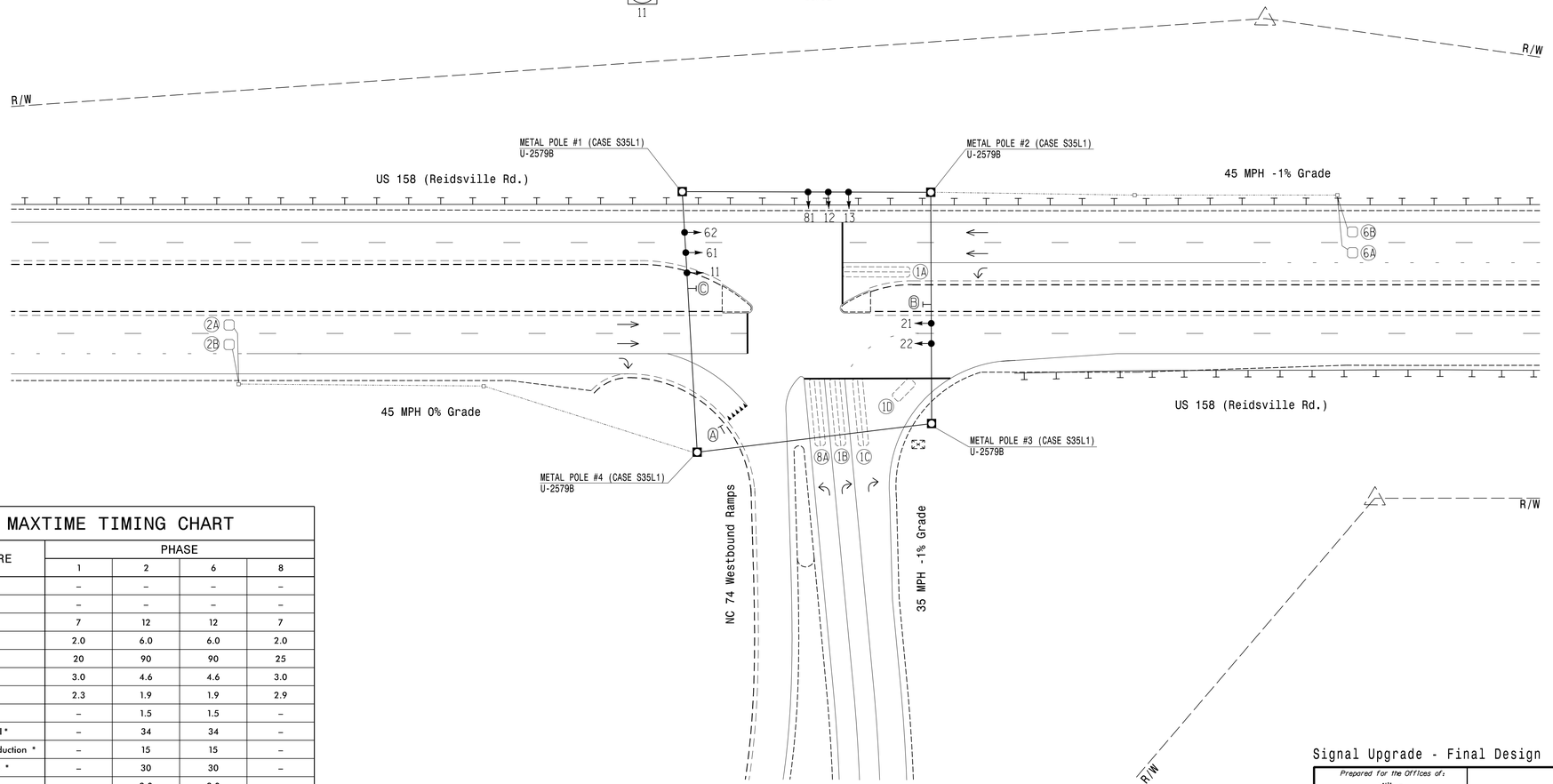
PHASING DIAGRAM DETECTION LEGEND

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

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	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
N/A	Guardrail	
	Metal Strain Pole	
A	"YIELD" Sign (R1-2)	A
B	No U-Turn Sign (R3-4)	B
C	"U-TURN YIELD TO RIGHT TURN" Sign (R10-16)	C

MAXTIME TIMING CHART

FEATURE	PHASE 1	PHASE 2	PHASE 6	PHASE 8
Walk *	–	–	–	–
Ped Clear *	–	–	–	–
Min Green	7	12	12	7
Passage *	2.0	6.0	6.0	2.0
Max 1 *	20	90	90	25
Yellow Change	3.0	4.6	4.6	3.0
Red Clear	2.3	1.9	1.9	2.9
Added Initial *	–	1.5	1.5	–
Maximum Initial *	–	34	34	–
Time Before Reduction *	–	15	15	–
Time To Reduce *	–	30	30	–
Minimum Gap	–	3.0	3.0	–
Advance Walk	–	–	–	–
Non Lock Detector	X	–	–	X
Vehicle Recall	–	MIN RECALL	MIN RECALL	–
Dual Entry	–	–	–	–

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

Signal Upgrade - Final Design

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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

SCALE 0 40 1" = 40'

US 158 (Reidsville Rd.) at NC 74 Westbound Ramps
Division 9 Forsyth County Winston-Salem
PLAN DATE: February 2024 REVIEWED BY: DT Sears
PREPARED BY: WP Erickson-Jones REVIEWED BY:

REVISIONS	INIT.	DATE

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SEAL
NORTH CAROLINA PROFESSIONAL SEAL 056142 ENGINEER PORTER JONES

DocuSigned by: Porter Jones 2/12/2024
SIGNATURE DOCUMENT/ENVELOPE DATE

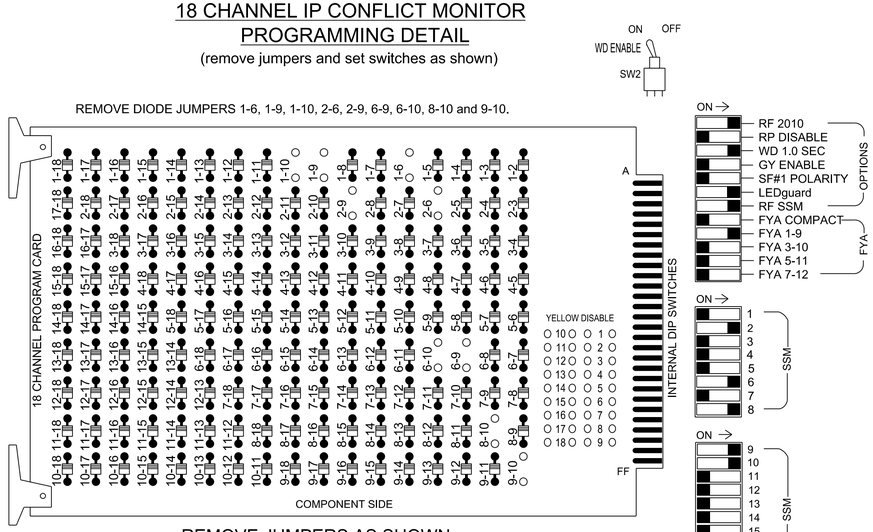
SIG. INVENTORY NO. 09-0511

2/12/2024
R:\Active\Signals\Designs\Signals\09051l_sig_dsn_XXXXXXXX.dgn
wpjones

PROJECT REFERENCE NO.	SHEET NO.
R-2577A	Sig. 19.1

18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



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 unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the signal plan.
2. Program controller to start up in phase 2 Green No Walk and 6 Green No Walk.
3. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
4. The cabinet and controller are part of the US 158 Signal System, Signal System : D09-11_Winston-Salem 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, S8, S11, AUX S1, AUX S2
Phases Used.....1, 2, 6, 8
Overlap "1".....*
Overlap "2".....*
Overlap "3".....NOT USED
Overlap "4".....NOT USED

*See overlap programming detail on sheet 2.

SIGNAL HEAD HOOK-UP CHART

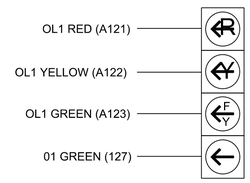
LOAD SWITCH NO.	S1	S2		S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2		13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2		2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	11★	21	22	NU	NU	NU	NU	NU	61,62	NU	NU	81	NU	11★	12,13	NU	NU	NU	NU
RED	·	128	128	·	·	·	·	·	134	·	·	·	·	·	A124	·	·	·	·
YELLOW	★	129	129	·	·	·	·	·	135	·	·	·	·	·	·	·	·	·	·
GREEN	·	·	130	·	·	·	·	·	136	·	·	·	·	·	·	·	·	·	·
RED ARROW	·	·	·	·	·	·	·	·	·	·	·	107	·	A121	·	·	·	·	·
YELLOW ARROW	·	·	·	·	·	·	·	·	·	·	·	108	·	A122	A125	·	·	·	·
FLASHING YELLOW ARROW	·	·	·	·	·	·	·	·	·	·	·	·	·	A123	·	·	·	·	·
GREEN ARROW	127	130	·	·	·	·	·	·	·	·	·	109	·	·	A126	·	·	·	·

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)



11

INPUT FILE POSITION LAYOUT

(front view)

		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	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	Ø 1 1D	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
	L	NOT USED	Ø 1 1C	Ø 2 2B						Ø 8 8A					ST DC ISOLATOR
FILE "J"	U	SLOT EMPTY	Ø 6 6A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L		Ø 6 6B												

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

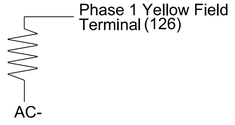
LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN
1A	TB2-1,2	I1U	56	18	1	1	15		X		X	
				-	29	6	3		X		X	X
1B	TB2-5,6	I2U	39	1	2	1	15		X		X	
1C	TB2-7,8	I2L	43	5	3	1	15		X		X	
1D	TB6-9,10	I9U	60	22	13	1	15		X		X	
2A	TB2-9,10	I3U	63	29	4	2			X	X	X	
2B	TB2-11,12	I3L	76	42	5	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	
8A	TB6-11,12	I9L	62	24	14	8			X		X	

REMOVE, jumper from I1-W to J4-W, on rear of input file, if present.

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)

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 09-0511
DESIGNED: February 2024
SEALED: February 12, 2024
REVISED:

Signal Upgrade - Final Design - Electrical Detail- Sheet 1 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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Electrical and Programming Details For:

Prepared for the Offices of:
Transportation Mobility and Safety Division
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Traffic Engineering & Signals Management Section
750 N. Greenfield Pkwy, Garner, NC 27529

US 158 (Reidsville Rd.)
at
NC 74 Westbound Ramps

Division 9 | Forsyth County | Winston-Salem

PLAN DATE: February 2024	REVIEWED BY: DT Sears
PREPARED BY: WP Erickson-Jones	REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 056142 ENGINEER W. PORTER JONES
DocuSigned by: Porter Jones 2/12/2024
DOCUSIGNATURE DATE

SIG. INVENTORY NO. 09-0511

2/12/2024
2:41:07 PM
C:\Projects\Designs\Signals\09511e_sig_dsn_XXXXXXX.dgn
wpjones

PROJECT REFERENCE NO.	SHEET NO.
R-2577A	Sig. 19.2

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

MAXTIME OVERLAP PROGRAMMING DETAIL FOR ALTERNATE PHASING

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

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

Overlap Plan 2

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

← NOTICE INCLUDED PHASE

FLASHER CIRCUIT MODIFICATION DETAIL

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

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

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

MAXTIME ALTERNATE PHASING ACTIVATION DETAIL

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

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

ALTERNATE PHASING CHANGE SUMMARY

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

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

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

MAXTIME 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

1A

Detector	Call Phase	Delay
1	1	0
29	0	3

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: 09-0511
DESIGNED: February 2024
SEALED: February 12, 2024
REVISED:

Signal Upgrade - Final Design - Electrical Detail- Sheet 2 of 2

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
ITS & Signals Management Section
750 N. Greenfield Pkwy, Garner, NC 27529

US 158 (Reidsville Rd.)
at
NC 74 Westbound Ramps

Division 9 | Forsyth County | Winston-Salem

PLAN DATE:	February 2024	REVIEWED BY:	DT Sears
PREPARED BY:	WP Erickson-Jones	REVIEWED BY:	

REVISIONS	INIT.	DATE

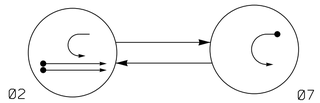
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 056142 ENGINEER W. PORTER JONES

DocuSigned by:
Porter Jones
D06E13E3A0E0498
2/12/2024
DATE

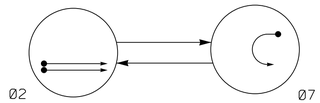
SIG. INVENTORY NO. 09-0511

PROJECT REFERENCE NO.	SHEET NO.
R-2577A	Sig. 20.0

DEFAULT PHASING DIAGRAM



ALTERNATE PHASING DIAGRAM



DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2	PHASE Ø7	FLASH
21,22	↑	R	Y
71	F Y ↰	↱	↑ Y
72	F Y ←	→	→ Y

ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2	PHASE Ø7	FLASH
21,22	↑	R	Y
71	R ↰	↱	↑ Y
72	R ←	→	→ Y

MAXTIME DETECTOR INSTALLATION CHART

DETECTOR					PROGRAMMING							
ZONE	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
2A ✳	6X6	300	✳	✳	2	-	-	X	X	X	-	✳
7A ✳	6X40	0	✳	✳	7	15#	-	X	-	X	-	✳

\# Disable Delay During Alternate Phasing Operation.
✳ Video Detection Zone

2 Phase
Fully Actuated
(Isolated)

NOTES

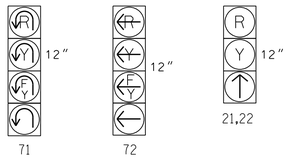
1. Refer to "Roadway Standard Drawings NCDOT" dated January 2024 and "Standard Specifications for Roads and Structures" dated January 2024.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Set all detector units to presence mode.
4. The Division Traffic Engineer will determine the hours of use for each phasing plan.
5. This intersection uses video detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.

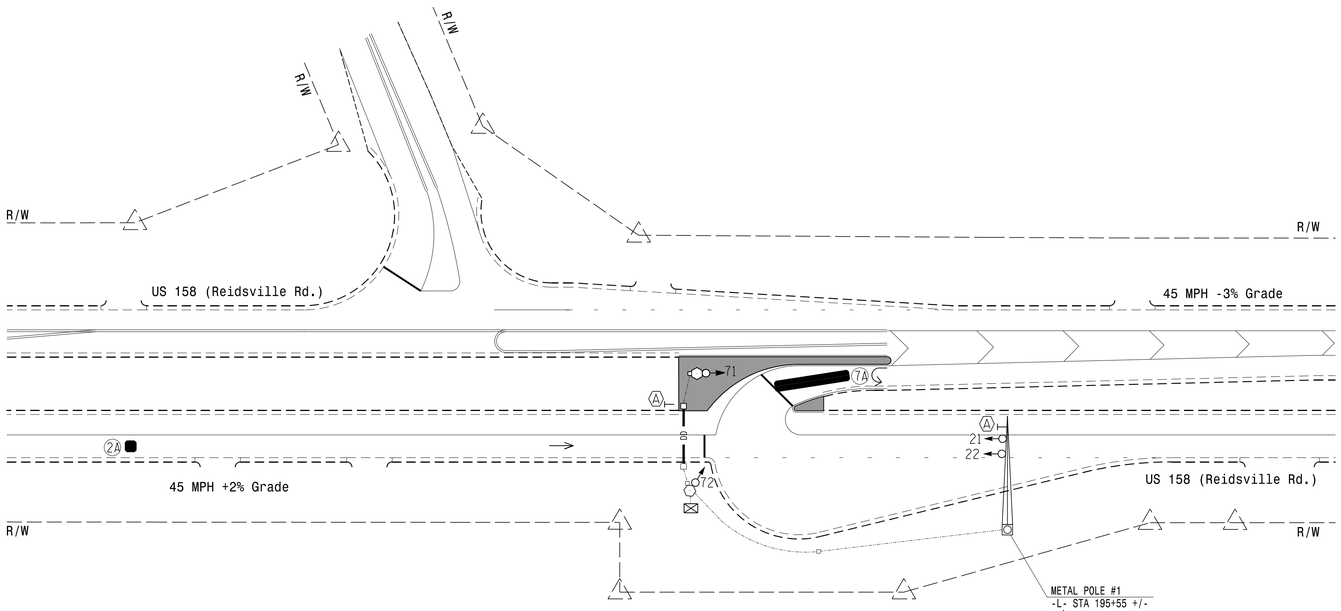
PHASING DIAGRAM DETECTION LEGEND

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

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	●
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⤧
□	Junction Box	■
·····	2-in Underground Conduit	·····
N/A	Right of Way	– – – –
→	Directional Arrow	→
◯▭	Metal Pole with Mastarm	◯▭
DD —	Directional Drill	N/A
Ⓐ	No Left Turn Sign (R3-2)	Ⓐ
⬡	Type II Signal Pedestal	⬢

MAXTIME TIMING CHART

FEATURE	PHASE 2	PHASE 7
Walk *	–	–
Ped Clear *	–	–
Min Green	12	7
Passage *	6.0	2.0
Max 1 *	90	30
Yellow Change	4.3	3.0
Red Clear	1.0	3.9
Added Initial *	2.5	–
Maximum Initial *	34	–
Time Before Reduction *	15	–
Time To Reduce *	30	–
Minimum Gap	3.0	–
Advance Walk	–	–
Non Lock Detector	–	X
Vehicle Recall	MIN RECALL	–
Dual Entry	–	–

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

New Installation (TMP Phase III Step 3)

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Prepared for the Offices of:
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'

US 158 EB (Reidsville Rd.) at U-Turn West of SR 2385 (Darrow Road)

Division 9 Forsyth County Walkertown

PLAN DATE: February 2024 REVIEWED BY: WP Erickson-Jones
PREPARED BY: H Townsend REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 056142 ENGINEER W. PORTER JONES

DocuSigned by: Porter Jones 2/12/2024
SIGNATURE DATE

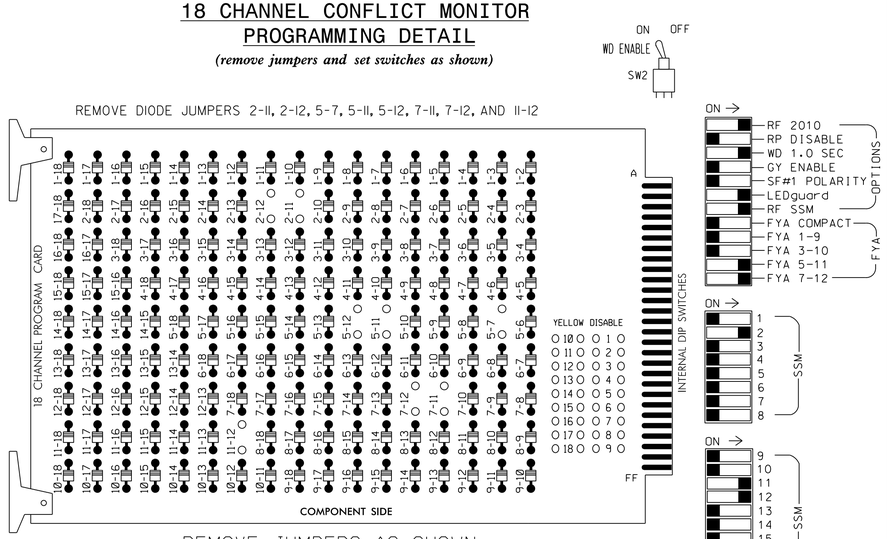
SIG. INVENTORY NO. 09-0983T

2/12/2024
R:\Traffic\Signals\Design\Signals\09098 3T_sig_dsn_XXXXXXX.dgn
wpjones

PROJECT REFERENCE NO.	SHEET NO.
R-2577A	Sig. 20.1

18 CHANNEL CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE JUMPERS AS SHOWN

NOTES:

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

■ = DENOTES POSITION OF SWITCH

NOTES

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

EQUIPMENT INFORMATION

Controller.....2070LX
Cabinet.....332 w/ Aux
Software.....Q-Free MAXTIME
Cabinet Mount.....Base
Output File Positions.....18 With Aux. Output File
Load Switches Used.....S2, S7, S10, AUX S4, AUX S5
Phases Used.....2,7
Overlap "1".....NOT USED
Overlap "2".....NOT USED
Overlap "3".....*
Overlap "4".....*
Overlap "7".....*

*See overlap programming detail on sheet 2

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	OL7	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	NU	21,22	NU	NU	NU	NU	72★	NU	NU	71★	NU	NU	NU	NU	NU	72★	71★	NU
RED		128																
YELLOW		129					✳			✳								
GREEN																		
RED ARROW																A114	A101	
YELLOW ARROW																A115	A102	
FLASHING YELLOW ARROW																A116	A103	
GREEN ARROW		130					133			124								

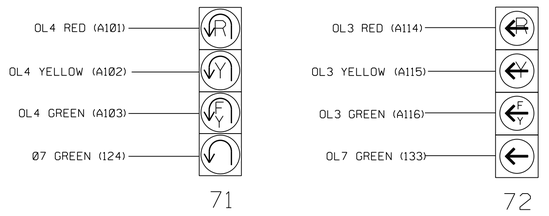
NU = Not Used

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

★ See pictorial of head wiring in detail below.

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	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS / DC ISOLATOR
	L														ST / DC ISOLATOR
FILE "J"	U	SLOT EMPTY	SLOT EMPTY	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									

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

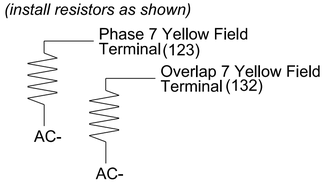
LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN
7A	TB5-5,6	J5U	57	19	21★	7	15		X		X	

★ For the detector to work as shown on the signal design plan, see the vehicle detector setup programming detail for alternate phasing on sheet 2.

INPUT FILE POSITION LEGEND: J2L
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

Install a video detection system for vehicle detection for zones 2A and 7A. 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 Detection Zone 7A, the equipment placement and slots are typical for a NCDOT installation. Inputs associated with these slots are compatible with time of day instructions located on sheet 2 of this electrical detail.

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THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 09-0983T
DESIGNED: February 2024
SEALED: February 12, 2024
REVISED:

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

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Electrical and Programming Details For:

Prepared for the Offices of:
Transportation Mobility and Safety Division
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Traffic Engineering & Signals Management Section
750 N. Greenfield Pkwy, Garner, NC 27529

US 158 EB (Reidsville Rd.)
at
U-Turn West of
SR 2385 (Darrow Road)

Division 9 | Forsyth County | Walkertown

PLAN DATE: February 2024	REVIEWED BY: DT Sears
PREPARED BY: WP Erickson-Jones	REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 056142 ENGINEER WILLIAM PORTER JONES
DocuSigned by: Porter Jones DOSE13F3AD6D498...
2/12/2024
DATE

SIG. INVENTORY NO. 09-0983T

2/12/2024
12:47:07 PM
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wpjones

PROJECT REFERENCE NO.	SHEET NO.
R-2577A	Sig. 20.2

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

← NOTICE INCLUDED PHASE

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	Overlap	7	X			5
6	Phase Vehicle	6	X		X	6
7	Phase Vehicle	7	X			7
8	Phase Vehicle	8		X	X	8
9	Overlap	1	X		X	9
10	Overlap	2		X	X	10
11	Overlap	3	X		X	11
12	Overlap	4	X		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 OVERLAP 7 ASSIGNED TO CHANNEL 5. →

← NOTICE CHANNEL 5 YELLOW FLASH

← NOTICE CHANNEL 7 YELLOW FLASH

← NOTICE CHANNEL 12 YELLOW FLASH

MAXTIME DETECTOR PROGRAMMING DETAIL FOR ALTERNATE PHASING LOOPS 7A

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

Web Interface
Home >Controller >Detector Configuration >Vehicle Detectors

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

Plan 2

7A

Detector	Call Phase	Delay
21	7	0

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 71 and 72 to run protected turns only.

VEH DET PLAN 2: Reduces delay time for phase 7 call on loop 7A to 0 seconds.

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: 09-0983T
DESIGNED: February 2024
SEALED: February 12, 2024
REVISED:

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

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Prepared for the Offices of:
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Signals & Signal Management Section
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PREPARED BY:	WP Erickson-Jones	REVIEWED BY:	

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 056142 ENGINEER W. PORTER JONES

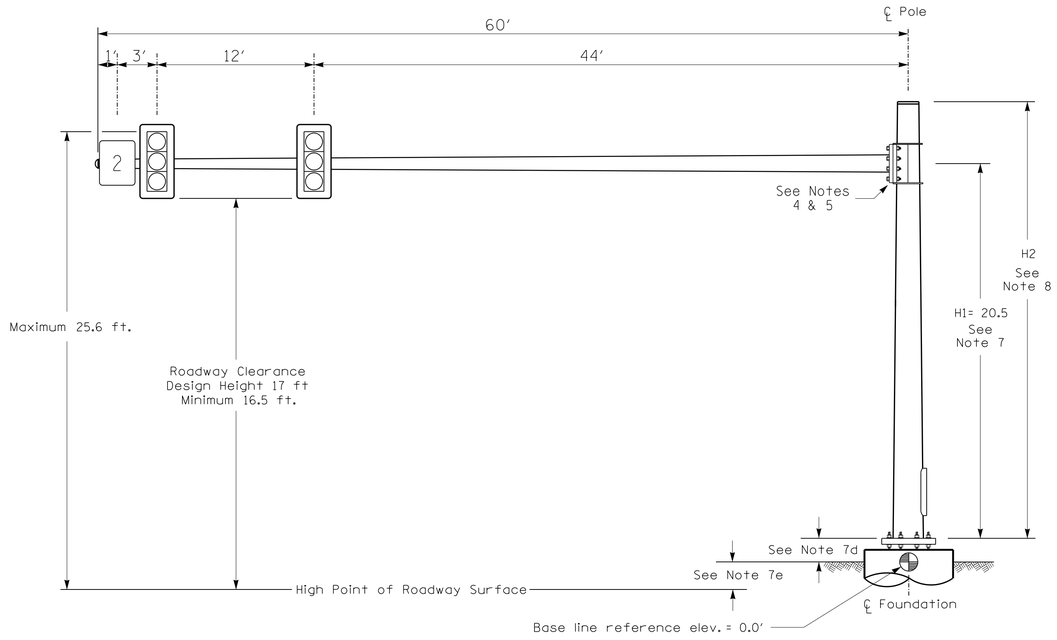
DocuSigned by: Porter Jones DOSE13E3AE6D498...
2/12/2024 DATE

SIG. INVENTORY NO. 09-0983T

METAL POLE No. 1

PROJECT REFERENCE NO.	SHEET NO.
R-2577A	Sig. 20.3

Design Loading for METAL POLE NO. 1



Elevation View

SPECIAL NOTE

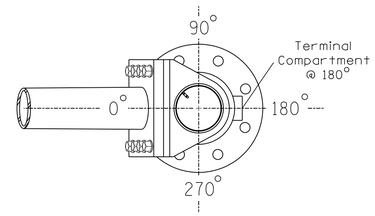
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

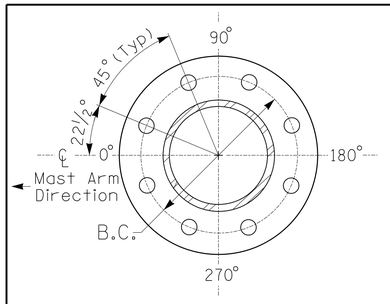
Elevation Differences for:	Pole 1	
Baseline reference point at ℄ Foundation @ ground level	0.0 ft.	
Elevation difference at High point of roadway surface	+1.7 ft.	
Elevation difference at Edge of travelway or face of curb	+1.7 ft.	

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	RIGID MOUNTED SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE	9.3 S.F.	25.5"W X 52.5"L	60 LBS
2	SIGN RIGID MOUNTED	7.5 S.F.	30.0"W X 36.0"L	14 LBS

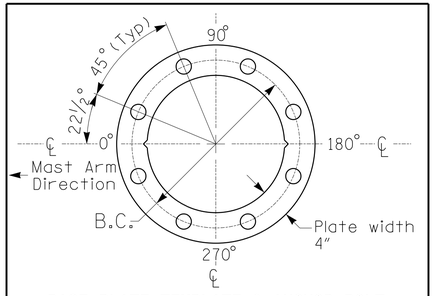


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL

For 8 Bolt Base Plate

NOTES

DESIGN REFERENCE MATERIAL

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

DESIGN REQUIREMENTS

2. Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
3. Design all signal supports using force ratios that do not exceed 0.9.
4. The camber design for the mast arm deflection should provide an appearance of a low pitched arch where the tip or the free end of the mast arm does not deflect below horizontal when fully loaded.
5. A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements.
6. Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
7. The mast arm attachment height (H1) shown is based on the following design assumptions:
   a. Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
   b. Signal heads are rigidly mounted and vertically centered on the mast arm.
   c. The roadway clearance height for design is as shown in the elevation views.
   d. The top of the pole base plate is 0.75 feet above the ground elevation.
   e. Refer to the Elevation Data Chart for the elevation differences between the proposed foundation ground level and the high point of the roadway.
8. The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
   - Mast arm attachment height (H1) plus 2 feet, or
   - H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
9. If pole location adjustments are required, the contractor must gain approval from the Engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signal Design Section Senior Structural Engineer for assistance at (919) 814-5000.
10. The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
11. The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

NCDOT Wind Zone 4 (90 mph)

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Division 9 Forsyth County Walkertown

PLAN DATE: February 2024 REVIEWED BY: DT Sears

PREPARED BY: WP Erickson-Jones REVIEWED BY:

SCALE 0 N/A N/A

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 056142 ENGINEER WILLIAM PORTER JONES

DocuSigned by: Porter Jones 2/12/2024
SIGNATURE DATE

SIG. INVENTORY NO. 09-0983T

2/12/2024
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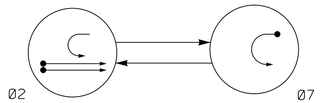
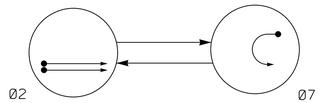
PROJECT REFERENCE NO.	SHEET NO.
R-2577A	Sig. 21.0

DEFAULT PHASING DIAGRAM



ALTERNATE PHASING DIAGRAM



DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2	PHASE Ø7	FLASH
21,22	↑	R	Y
71	F Y	↶	Y
72	F Y	←	Y

ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2	PHASE Ø7	FLASH
21,22	↑	R	Y
71	R	↶	Y
72	R	←	Y

PHASING DIAGRAM DETECTION LEGEND

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

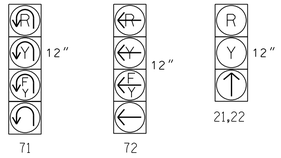
MAXTIME DETECTOR INSTALLATION CHART

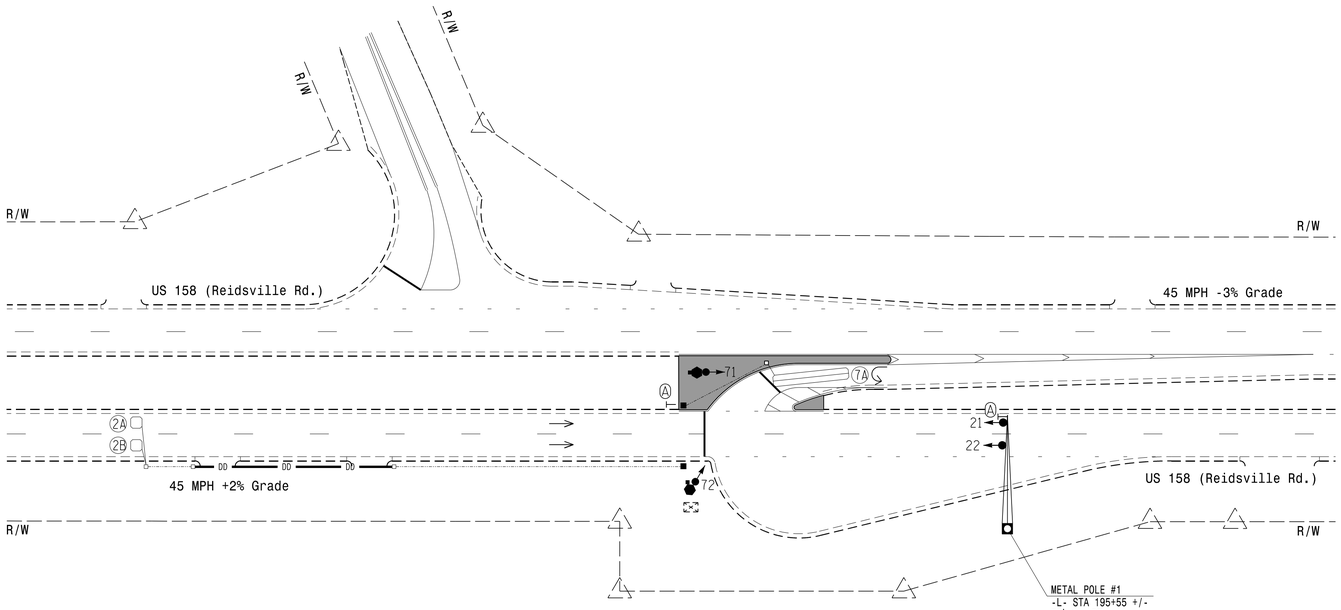
DETECTOR					PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
2A	6X6	300	4	X	2	-	-	X	X	X	-	X
2B	6X6	300	4	X	2	-	-	X	X	X	-	X
7A	6X40	0	2-4-2	X	7	15#	-	X	-	X	-	X

Disable Delay During Alternate Phasing Operation.

SIGNAL FACE I.D.

All Heads L.E.D.





2 Phase
Fully Actuated
(US 158 Signal System)
Signal System #: D09-11_Winston-Salem

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. Reposition existing signal heads numbered 61 and 62.
4. Set all detector units to presence mode.
5. The Division Traffic Engineer will determine the hours of use for each phasing plan.
6. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.

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	●
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
□	Junction Box	■
·····	2-in Underground Conduit	·····
N/A	Right of Way	– – – – –
→	Directional Arrow	→
○	Metal Pole with Mastarm	○
DD	Directional Drill	N/A
Ⓐ	No Left Turn Sign (R3-2)	Ⓐ
⬡	Type II Signal Pedestal	⬢

MAXTIME TIMING CHART

FEATURE	PHASE 2	PHASE 7
Walk *	–	–
Ped Clear *	–	–
Min Green	12	7
Passage *	6.0	2.0
Max 1 *	90	30
Yellow Change	4.3	3.0
Red Clear	1.0	3.9
Added Initial *	1.5	–
Maximum Initial *	34	–
Time Before Reduction *	15	–
Time To Reduce *	30	–
Minimum Gap	3.0	–
Advance Walk	–	–
Non Lock Detector	–	X
Vehicle Recall	MIN RECALL	–
Dual Entry	–	–

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

2/12/2024
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Signal Upgrade - Final Design

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SCALE 0 40 1" = 40'

US 158 EB (Reidsville Rd.)
at
U-Turn West of
SR 2385 (Darrow Road)

Division 9 Forsyth County Walkertown

PLAN DATE: February 2024
PREPARED BY: H Townsend
REVIEWED BY: WP Erickson-Jones
REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 056142 W. PORTER JONES

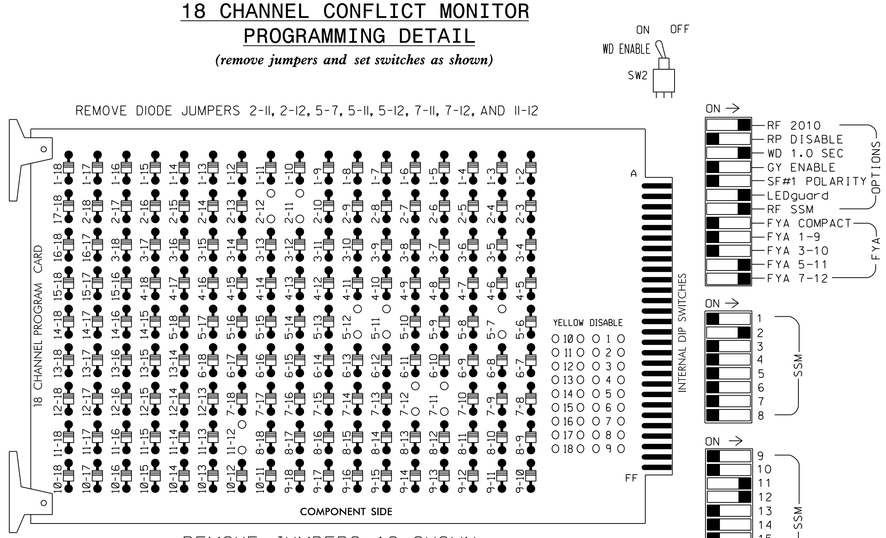
DocuSigned by: Porter Jones 2/12/2024
SIGNATURE DATE

SIG. INVENTORY NO. 09-0983

PROJECT REFERENCE NO.	SHEET NO.
R-2577A	Sig. 21.1

18 CHANNEL CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



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 Red Enable is active at all times during normal operation.
4. Integrate monitor with Ethernet network in cabinet.

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the signal plan.
2. Program controller to start up in phase 2 Green No Walk.
3. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
4. The cabinet and controller are part of the US 158, Signal System : D09-11_Winston-Salem System.

EQUIPMENT INFORMATION

Controller.....2070LX
Cabinet.....332 w/ Aux
Software.....Q-Free MAXTIME
Cabinet Mount.....Base
Output File Positions.....18 With Aux. Output File
Load Switches Used.....S2, S7, S10, AUX S4, AUX S5
Phases Used.....2,7
Overlap "1".....NOT USED
Overlap "2".....NOT USED
Overlap "3".....*
Overlap "4".....*
Overlap "7".....*

*See overlap programming detail on sheet 2

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	OL7	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	NU	21,22	NU	NU	NU	NU	72★	NU	NU	71★	NU	NU	NU	NU	NU	72★	71★	NU
RED		128																
YELLOW		129					✳			✳								
GREEN																		
RED ARROW																A114	A101	
YELLOW ARROW																A115	A102	
FLASHING YELLOW ARROW																A116	A103	
GREEN ARROW		130					133			124								

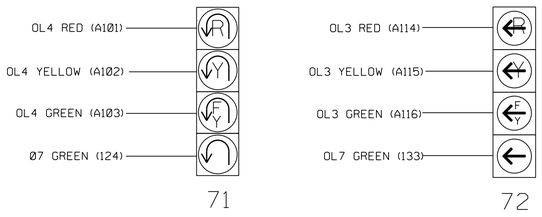
NU = Not Used

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

★ See pictorial of head wiring in detail below.

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	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
	L		Ø 2 2B												ST DC ISOLATOR
FILE "J"	U	SLOT EMPTY	SLOT EMPTY	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									

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	
7A	TB5-5,6	J5U	57	19	21★	7	15		X		X	

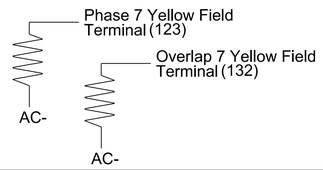
★ For the detector to work as shown on the signal design plan, see the vehicle detector setup programming detail for alternate phasing on sheet 2.

INPUT FILE POSITION LEGEND: J2L
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)



THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 09-0983
DESIGNED: February 2024
SEALED: February 12, 2024
REVISED:

Signal Upgrade - Final Desing - Electrical Detail- Sheet 1 of 2

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Division 9 | Forsyth County | Walkertown

PLAN DATE: February 2024	REVIEWED BY: DT Sears
PREPARED BY: WP Erickson-Jones	REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 056142 ENGINEER WILLIAM PORTER JONES

DocuSigned by: Porter Jones D06E13E3ADE0498... 2/12/2024 DATE

SIG. INVENTORY NO. 09-0983

2/12/2024
R-2577A_Traffic_Signals_Design_Signals#090983e_sig_dsn_XXXXXXXX.dgn
wpjones

PROJECT REFERENCE NO.	SHEET NO.
R-2577A	Sig. 21.2

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	3	4	7
Type	FYA 4 - Section	FYA 4 - Section	Normal
Included Phases	2	2	7
Modifier Phases	-	7	-
Modifier Overlaps	7	-	-
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	3	4	7
Type	FYA 4 - Section	FYA 4 - Section	Normal
Included Phases	-	-	7
Modifier Phases	-	7	-
Modifier Overlaps	7	-	-
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 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.

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	Overlap	7	X	·	·	5
6	Phase Vehicle	6	X	·	X	6
7	Phase Vehicle	7	X	·	·	7
8	Phase Vehicle	8	·	X	X	8
9	Overlap	1	X	·	X	9
10	Overlap	2	·	X	X	10
11	Overlap	3	X	·	X	11
12	Overlap	4	X	·	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 OVERLAP 7 ASSIGNED TO CHANNEL 5 →

← NOTICE CHANNEL 5 YELLOW FLASH

← NOTICE CHANNEL 7 YELLOW FLASH

← NOTICE CHANNEL 12 YELLOW FLASH

MAXTIME DETECTOR PROGRAMMING DETAIL FOR ALTERNATE PHASING LOOPS 7A

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

Web Interface
Home >Controller >Detector Configuration >Vehicle Detectors

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

Plan 2

7A

Detector	Call Phase	Delay
21	7	0

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 71 and 72 to run protected turns only.

VEH DET PLAN 2: Reduces delay time for phase 7 call on loop 7A to 0 seconds.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 09-0983
DESIGNED: February 2024
SEALED: February 12, 2024
REVISED:

Signal Upgrade - Final Design - Electrical Detail- Sheet 2 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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Prepared for the Offices of:
Transportation Mobility and Safety Division
State of North Carolina
Department of Transportation
Traffic Engineering & Signals Management Section
750 N. Greenfield Pkwy, Garner, NC 27529

Electrical and Programming Details For:

US 158 EB (Reidsville Rd.)
at
U-Turn West of
SR 2385 (Darrow Road)

Division 9 | Forsyth County | Walkertown

PLAN DATE: February 2024	REVIEWED BY: DT Sears
PREPARED BY: WP Erickson-Jones	REVIEWED BY:

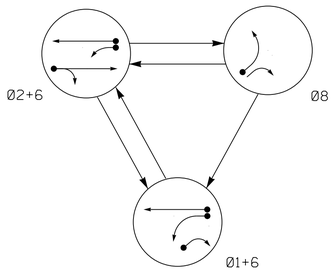
REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 056142 ENGINEER PORTER JONES
DocuSigned by: Porter Jones 2/12/2024
DATE

SIG. INVENTORY NO. 09-0983

PROJECT REFERENCE NO.	SHEET NO.
R-2577A	Sig. 22.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+6	PHASE Ø2+6	PHASE Ø8	FLASH
11	←	F Y	R	Y
21	R	↑	R	Y
22	R	G	R	Y
61, 62	G	G	R	Y
81	R	R	←	R
82	→	R	→	R
83	R ↘	R	↘ ↘	R

MAXTIME DETECTOR INSTALLATION CHART

DETECTOR					PROGRAMMING							
ZONE	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
1A ✳	6X40	0	✳	✳	1	15	-	X	-	X	-	✳
					6	3	-	X	-	X	X	✳
1B ✳	6X40	0	✳	✳	1	15	-	X	-	X	-	✳
2A ✳	6X6	300	✳	✳	2	-	-	X	X	X	-	✳
6A ✳	6X6	300	✳	✳	6	-	-	X	X	X	-	✳
8A ✳	6X40	0	✳	✳	8	3	-	X	-	X	-	✳

✳ Video Detection Zone

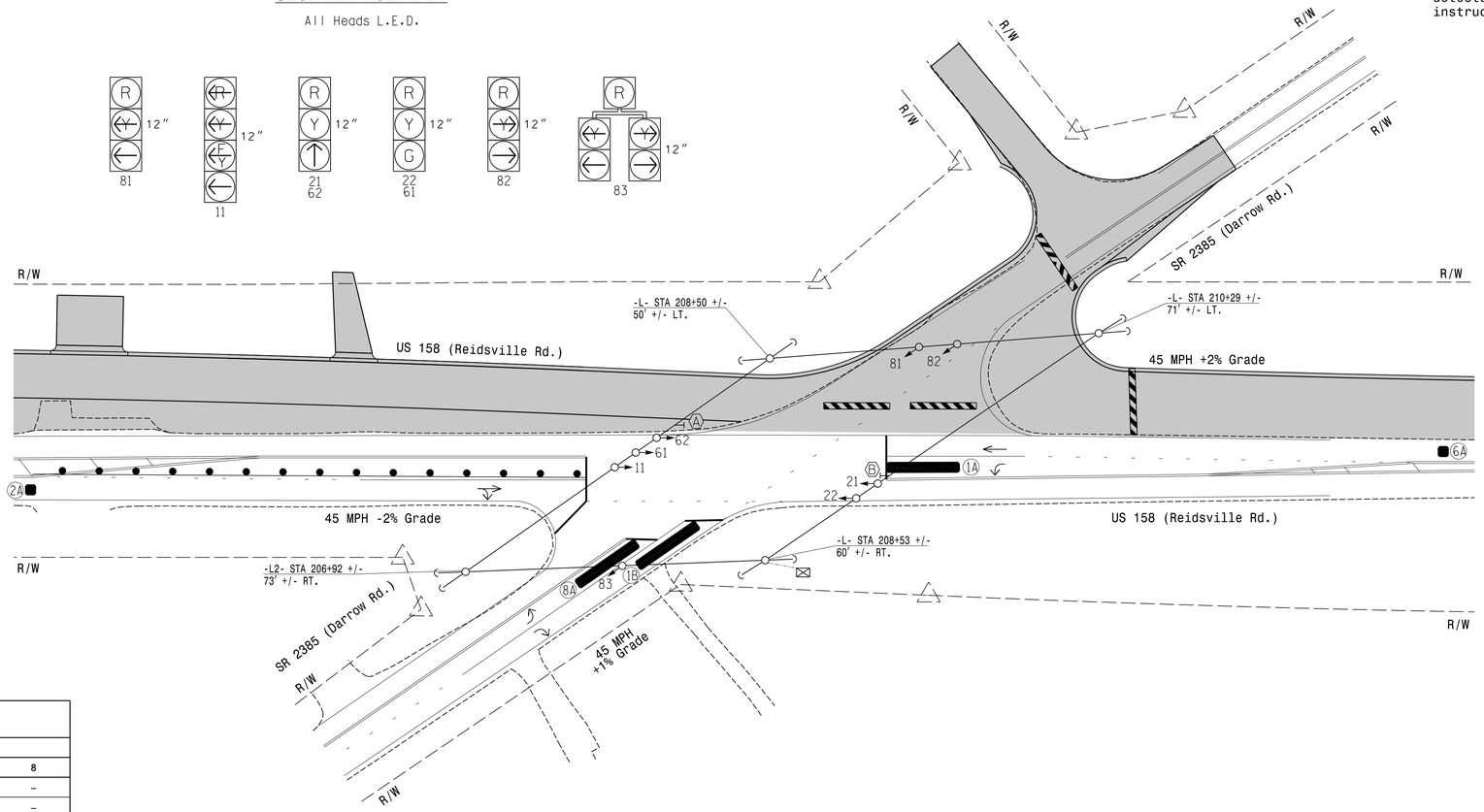
3 Phase Fully Actuated (Isolated)

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 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. This intersection uses video detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.

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	●⤵
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
□	Junction Box	■
·····	2-in Underground Conduit	·····
N/A	Right of Way	– – – – –
→	Directional Arrow	→
●▭●	Construction Zone Drums	●▭●
▭	Construction Zone	▭
▬	Video Detection Zone	▬
▬	Barricade	▬
Ⓐ	No Right Turn Sign (R3-1)	Ⓐ
Ⓑ	No Left Turn Sign (R3-2)	Ⓑ

MAXTIME TIMING CHART

FEATURE	PHASE 1	PHASE 2	PHASE 6	PHASE 8
Walk *	–	–	–	–
Ped Clear *	–	–	–	–
Min Green	7	12	12	7
Passage *	2.0	6.0	6.0	2.0
Max 1 *	15	100	100	35
Yellow Change	3.0	4.7	4.7	3.0
Red Clear	3.5	2.2	2.2	1.9
Added Initial *	–	2.5	2.5	–
Maximum Initial *	–	34	34	–
Time Before Reduction *	–	15	15	–
Time To Reduce *	–	30	30	–
Minimum Gap	–	3.0	3.0	–
Advance Walk	–	–	–	–
Non Lock Detector	X	–	–	X
Vehicle Recall	–	MIN RECALL	MIN RECALL	–
Dual Entry	–	–	–	–

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

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

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

SCALE 0 40 1" = 40'

US 158 (Reidsville Rd.) at SR 2385 (Darrow Rd.)

Division 9 Forsyth County Walkertown

PLAN DATE:	February 2024	REVIEWED BY:	WP Erickson-Jones
PREPARED BY:	H Townsend	REVIEWED BY:	

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 056142 ENGINEER PORTER JONES
DocuSigned by: Porter Jones 2/12/2024
SIGNATURE DATE
SIG. INVENTORY NO. 09-09961I

2/12/2024
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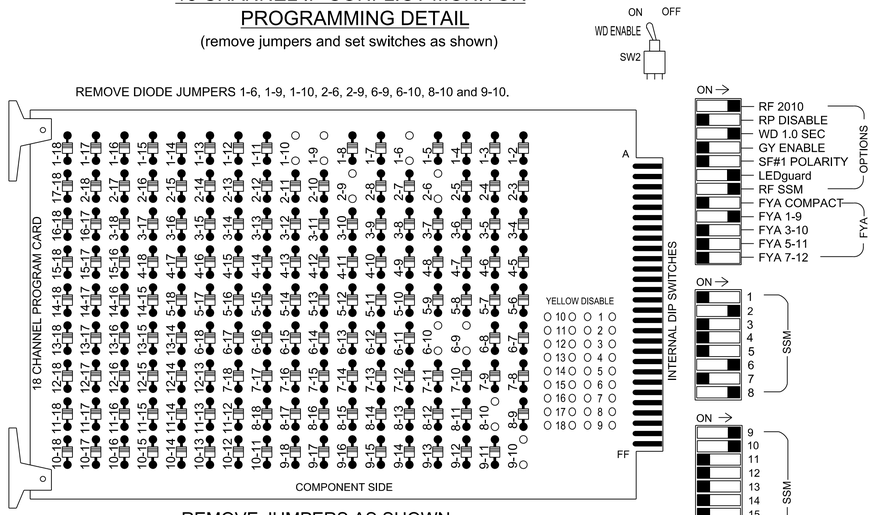
wpjones

PROJECT REFERENCE NO.	SHEET NO.
R-2577A	Sig. 22.1

18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



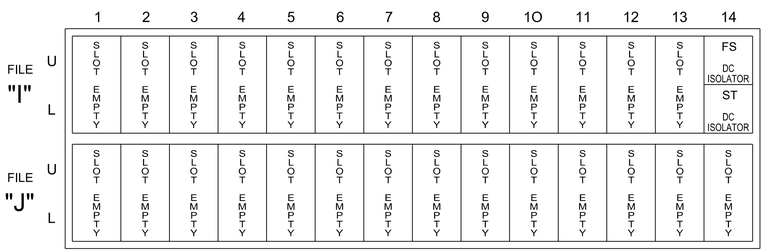
REMOVE JUMPERS AS SHOWN

NOTES:

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

INPUT FILE POSITION LAYOUT

(front view)



NOTES

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

EQUIPMENT INFORMATION

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

*See overlap programming detail on this sheet.

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

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2		S3	S4	S5	S6	S7	S8		S9	S10	S11	S12	AUX S1	AUX S2		AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2		13	3	4	14	5	6		15	7	8	16	9	10		17	11	12	18
PHASE	1	2		2 PED	3	4	4 PED	5	6		6 PED	7	8	8 PED	OL1	OL2		SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	11★	21	22	NU	NU	NU	NU	NU	61	62	NU	NU	81,83	NU	11★	82	83	NU	NU	NU	NU
RED		128	128						134	134			107			A124					
YELLOW	*	129	129						135	135											
GREEN			130						136												
RED ARROW															A121						
YELLOW ARROW													108		A122	A125	A125				
FLASHING YELLOW ARROW															A123						
GREEN ARROW	127	130								136			109			A126	A126				

NU = Not Used

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

FLASHER CIRCUIT MODIFICATION DETAIL

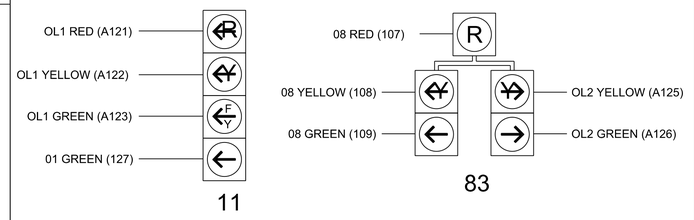
IN ORDER TO INSURE THAT SIGNALS FLASH CONCURRENTLY ON THE SAME APPROACH, MAKE THE FOLLOWING FLASHER CIRCUIT CHANGES:

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

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

FYA/SPECIAL SIGNAL WIRING DETAIL

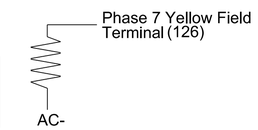
(wire signal heads as shown)



LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

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



SPECIAL DETECTOR NOTE

Install a video detection system for vehicle detection for zones. 1A, 1B, 2A, 6A, and 8A. 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: 09-0966T1
DESIGNED: February 2024
SEALED: February 12, 2024
REVISED:

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Signal Upgrade - Temporary Design 1
(TMP Phase I Step 1) Electrical Detail

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Electrical and Programming Details For:

Prepared for the Offices of:
Transportation Mobility and Safety Division
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
Traffic Signals Management Section
750 N. Greenfield Pkwy, Garner, NC 27529

US 158 (Reidsville Rd.)
at
SR 2385 (Darrow Road)

Division 9 | Forsyth County | Walkertown

PLAN DATE: February 2024 | REVIEWED BY: DT Sears
PREPARED BY: WP Erickson-Jones | REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 056142 ENGINEER PORTER JONES

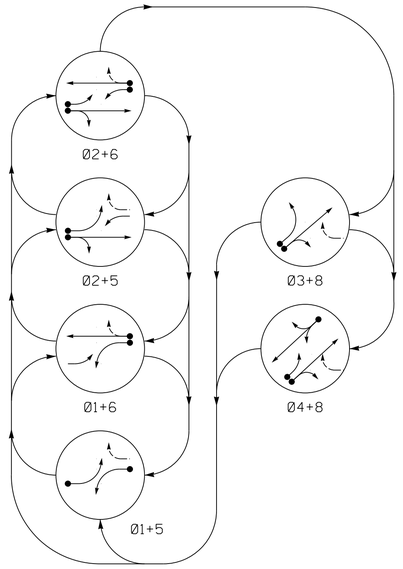
DocuSigned by: Porter Jones D06E13E3AE6D498... 2/12/2024 DATE

SIG. INVENTORY NO. 09-0996T1

2/12/2024
C:\Traffic\Signals\Designs\Signals\#0909966t1_sig_dsn_XXXXXXXX.dgn
wpjones

PROJECT REFERENCE NO.	SHEET NO.
R-2577A	Sig. 23.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

TABLE OF OPERATION

SIGNAL FACE	PHASE						
	Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3+8	Ø4+8	FLASH
11	←	←	~~F Y~~	~~F Y~~	~~R~~	~~R~~	~~Y~~
21, 22	R	R	G	G	R	R	Y
31	~~R~~	~~R~~	~~R~~	~~R~~	←	~~F Y~~	~~R~~
41, 42	R	R	R	R	R	G	R
51	←	~~F Y~~	←	~~F Y~~	~~R~~	~~R~~	~~Y~~
61, 62	R	G	R	G	R	R	Y
81, 82, 83	R	R	R	R	G	G	R

SIGNAL FACE I.D.

All Heads L.E.D.

Denotes Louvers

MAXTIME DETECTOR INSTALLATION CHART

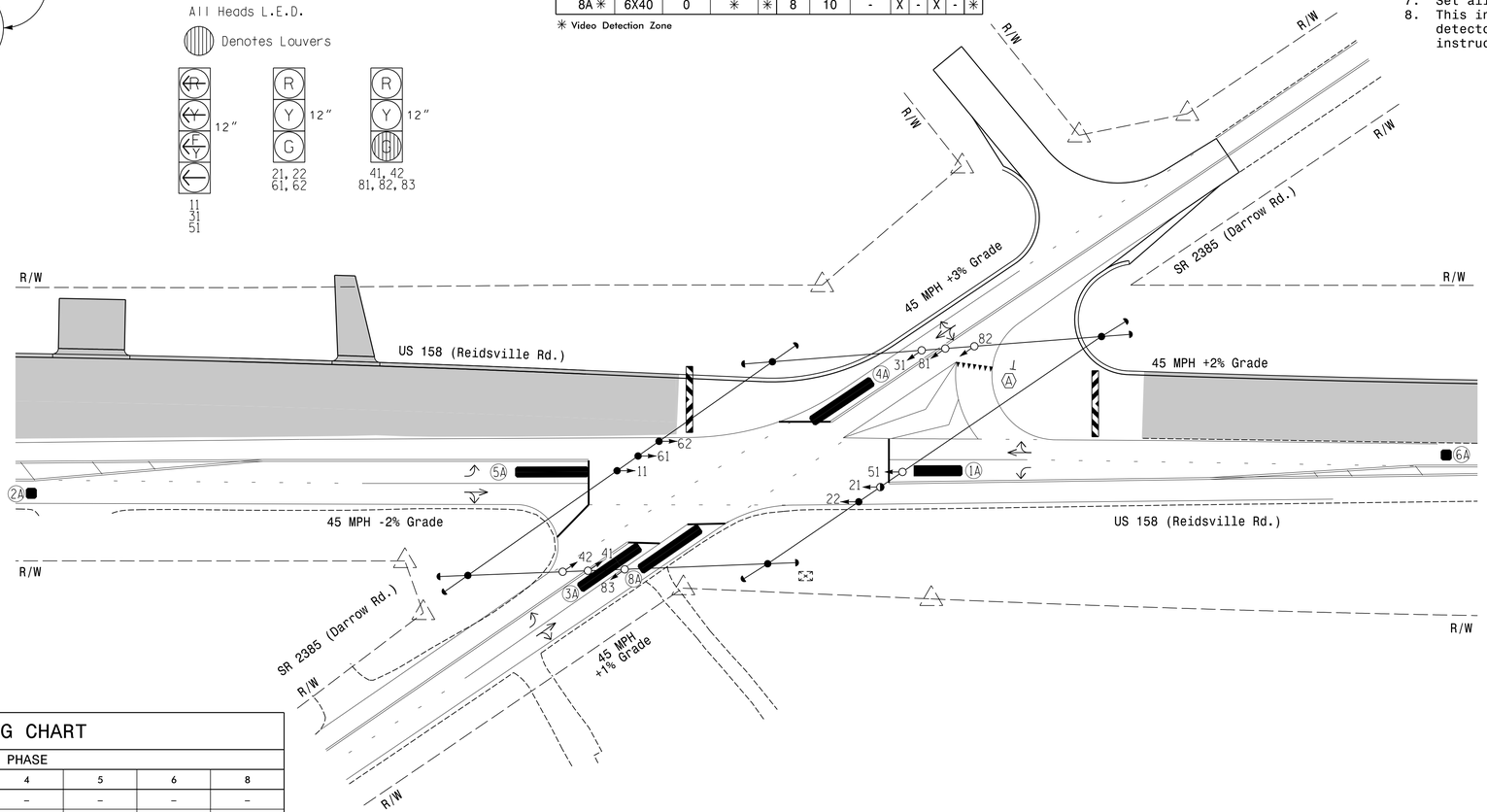
ZONE	DETECTOR: SIZE (FT)	DETECTOR: DISTANCE FROM STOPBAR (FT)	DETECTOR: TURNS	DETECTOR: NEW LOOP	PROGRAMMING: CALL PHASE	PROGRAMMING: DELAY TIME	PROGRAMMING: EXTEND TIME	PROGRAMMING: EXTEND	PROGRAMMING: ADDED INITIAL	PROGRAMMING: CALL	PROGRAMMING: DELAY DURING GREEN	PROGRAMMING: NEW CARD
1A ✳	6X40	0	✳	✳	1	15	-	X	-	X	-	✳
					6	3	-	X	-	X	X	✳
2A ✳	6X6	300	✳	✳	2	-	-	X	X	X	-	✳
3A ✳	6X40	0	✳	✳	3	15	-	X	-	X	-	✳
					8	3	-	X	-	X	-	✳
4A ✳	6X40	0	✳	✳	4	5	-	X	-	X	-	✳
5A ✳	6X40	0	✳	✳	5	15	-	X	-	X	-	✳
					2	3	-	X	-	X	X	✳
6A ✳	6X6	300	✳	✳	6	-	-	X	X	X	-	✳
8A ✳	6X40	0	✳	✳	8	10	-	X	-	X	-	✳

✳ Video Detection Zone

6 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. Omit phase 3 during phase 4 on.
4. Phase 1 and/or phase 5 may be lagged.
5. Reposition existing signal heads numbered 81 and 82.
6. Modify existing signal head 21.
7. Set all detector units to presence mode.
8. This intersection uses video detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.



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	●↓
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
□	Junction Box	■
·····	2-in Underground Conduit	·····
N/A	Right of Way	– – – – –
→	Directional Arrow	→
▒	Construction Zone	▒
▬	Video Detection Zone	▬
▨	Barricade	▨
Ⓐ	"YIELD" Sign (R1-2)	Ⓐ

MAXTIME TIMING CHART

FEATURE	PHASE						
	1	2	3	4	5	6	8
Walk *	–	–	–	–	–	–	–
Ped Clear *	–	–	–	–	–	–	–
Min Green	7	12	7	7	7	12	7
Passage *	2.0	6.0	2.0	2.0	2.0	6.0	2.0
Max 1 *	15	100	20	30	15	100	30
Yellow Change	3.0	4.7	3.0	4.3	3.0	4.7	4.3
Red Clear	3.5	2.2	1.9	2.4	3.7	2.2	2.4
Added Initial *	–	2.5	–	–	–	2.5	–
Maximum Initial *	–	34	–	–	–	34	–
Time Before Reduction *	–	15	–	–	–	15	–
Time To Reduce *	–	30	–	–	–	30	–
Minimum Gap	–	3.0	–	–	–	3.0	–
Advance Walk	–	–	–	–	–	–	–
Non Lock Detector	X	–	X	X	X	–	X
Vehicle Recall	–	MIN RECALL	–	–	–	MIN RECALL	–
Dual Entry	–	–	–	X	–	–	X

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

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

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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'

US 158 (Reidsville Rd.)
at
SR 2385 (Darrow Rd.)

Division 9 Forsyth County Walkertown

PLAN DATE: February 2024 REVIEWED BY: WP Erickson-Jones
PREPARED BY: H Townsend REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 056142 ENGINEER W. PORTER JONES

DocuSigned by: Porter Jones D06E13E3A9E0498... 2/12/2024
SIGNATURE DATE

SIG. INVENTORY NO. 09-0996T2

2/12/2024
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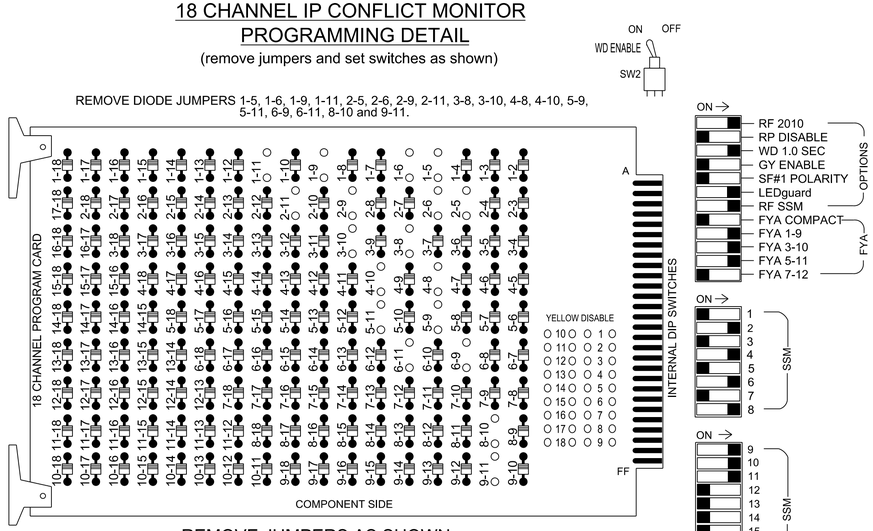
wjones

PROJECT REFERENCE NO.	SHEET NO.
R-2577A	Sig. 23.1

18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



■ = DENOTES POSITION OF SWITCH

REMOVE JUMPERS AS SHOWN

NOTES:

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

NOTES

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

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, S11, AUX S1, AUX S2, AUX S4
Phases Used.....1, 2, 3, 4, 5, 6, 8
Overlap "1".....*
Overlap "2".....*
Overlap "3".....*
Overlap "4".....NOT USED

*See overlap programming detail on sheet 2.

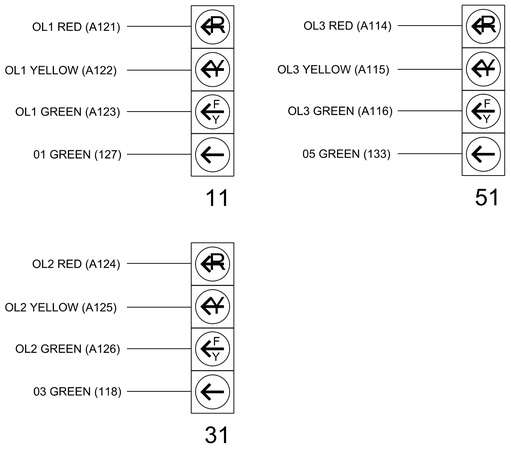
SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	11★	21,22	NU	31★	41,42	NU	51★	61,62	NU	NU	81,82, 83	NU	11★	31★	NU	51★	NU	NU
RED	·	128	·	·	101	·	·	134	·	·	107	·	·	·	·	·	·	·
YELLOW	*	129	·	*	102	·	*	135	·	·	108	·	·	·	·	·	·	·
GREEN	·	130	·	·	103	·	·	136	·	·	109	·	·	·	·	·	·	·
RED ARROW	·	·	·	·	·	·	·	·	·	·	·	·	A121	A124	·	A114	·	·
YELLOW ARROW	·	·	·	·	·	·	·	·	·	·	·	·	A122	A125	·	A115	·	·
FLASHING YELLOW ARROW	·	·	·	·	·	·	·	·	·	·	·	·	A123	A126	·	A116	·	·
GREEN ARROW	127	·	·	118	·	·	133	·	·	·	·	·	·	·	·	·	·	·

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

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	1O	11	12	13	14
FILE "I"	U	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
	L														ST DC ISOLATOR
FILE "J"	U	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L														

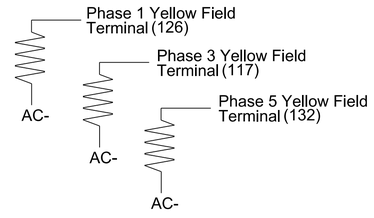
EX.: 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE
ST = STOP TIME

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

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



SPECIAL DETECTOR NOTE

Install a video detection system for vehicle detection for zones. 1A, 2A, 3A, 4A, 5A, 6A, and 8A. 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: 09-0966T2
DESIGNED: February 2024
SEALED: February 12, 2024
REVISED:

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

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Electrical and Programming Details For:

US 158 (Reidsville Rd.)
at
SR 2385 (Darrow Road)

Division 9 | Forsyth County | Walkertown

PLAN DATE: February 2024 | REVIEWED BY: DT Sears
PREPARED BY: WP Erickson-Jones | REVIEWED BY:

REVISIONS	INIT.	DATE

SIG. INVENTORY NO. 09-0966T2

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 056142 ENGINEER WILLIAM PORTER JONES

DocuSigned by: Porter Jones DOSE13E3A9E0498... 2/12/2024 DATE

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Prepared for the Offices of:
Traffic Engineering Branch
Traffic Signals Management Section
750 N. Greenfield Pkwy, Garner, NC 27529

2/12/2024
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WPJones

PROJECT REFERENCE NO.	SHEET NO.
R-2577A	Sig. 23.2

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

BACKUP PREVENTION PROGRAMMING

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

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

Sequence 1

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

FLASHER CIRCUIT MODIFICATION DETAIL

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

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

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

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wpjones

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 09-0966T2
DESIGNED: February 2024
SEALED: February 12, 2024
REVISED:

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

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PREPARED BY:	WP Erickson-Jones	REVIEWED BY:	

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 056142 ENGINEER PORTER JONES

DocuSigned by:
Porter Jones
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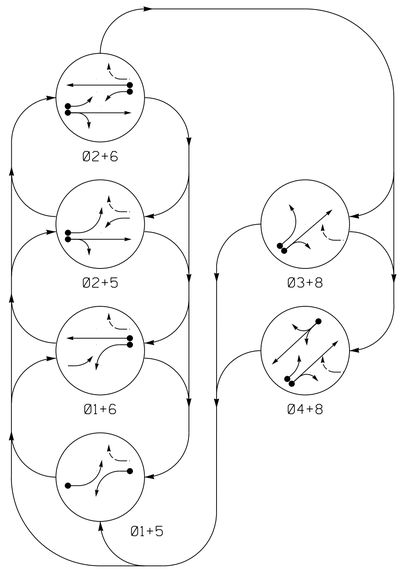
2/12/2024
DATE

SIG. INVENTORY NO. 09-0996T2

PROJECT REFERENCE NO.	SHEET NO.
R-2577A	Sig. 24.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

TABLE OF OPERATION

SIGNAL FACE	PHASE 01+05	01+06	02+05	02+06	03+08	04+08	FLASH
11	←	←	~~F Y~~	~~F Y~~	~~R~~	~~R~~	~~Y~~
21, 22, 23	R	R	G	G	R	R	Y
31	~~R~~	~~R~~	~~R~~	~~R~~	←	~~F Y~~	~~R~~
41, 42, 43	R	R	R	R	R	G	R
51	←	~~F Y~~	←	~~F Y~~	~~R~~	~~R~~	~~Y~~
61, 62	R	G	R	G	R	R	Y
81, 82, 83	R	R	R	R	G	G	R

SIGNAL FACE I.D.

All Heads L.E.D.

Denotes Louvers

MAXTIME DETECTOR INSTALLATION CHART

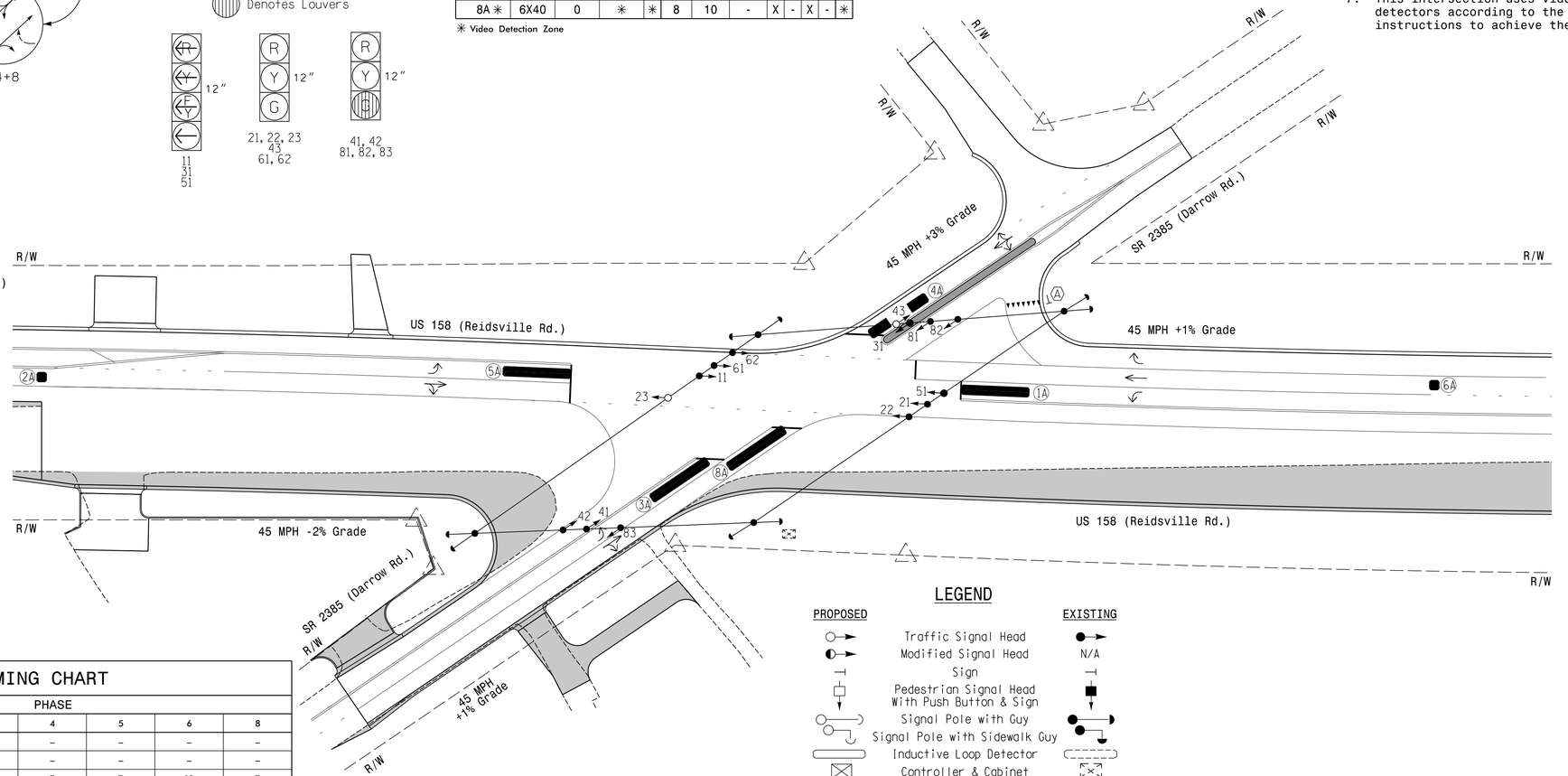
DETECTOR ZONE	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
1A ✳	6X40	0	✳	✳	1	15	-	X	-	X	-	✳
					6	3	-	X	-	X	X	✳
2A ✳	6X6	300	✳	✳	2	-	-	X	X	X	-	✳
3A ✳	6X40	0	✳	✳	3	15	-	X	-	X	-	✳
					8	3	-	X	-	X	-	✳
4A ✳	6X40	0	✳	✳	4	10	-	X	-	X	-	✳
5A ✳	6X40	0	✳	✳	5	15	-	X	-	X	-	✳
					2	3	-	X	-	X	X	✳
6A ✳	6X6	300	✳	✳	6	-	-	X	X	X	-	✳
8A ✳	6X40	0	✳	✳	8	10	-	X	-	X	-	✳

✳ Video Detection Zone

6 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. Omit phase 3 during phase 4 on.
4. Phase 1 and/or phase 5 may be lagged.
5. Reposition existing signal heads numbered 11, 21, 22, 31, 51, 61, 62, 81, and 82.
6. Set all detector units to presence mode.
7. This intersection uses video detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.



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	● ■
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
□	Junction Box	■
·····	2-in Underground Conduit	·····
N/A	Right of Way	— — —
→	Directional Arrow	→
▒	Construction Zone	▒
▬	Video Detection Zone	▬
Ⓐ	"YIELD" Sign (R1-2)	Ⓐ

MAXTIME TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6	8
Walk *	–	–	–	–	–	–	–
Ped Clear *	–	–	–	–	–	–	–
Min Green	7	12	7	7	7	12	7
Passage *	2.0	6.0	2.0	2.0	2.0	6.0	2.0
Max 1 *	15	100	20	30	15	100	30
Yellow Change	3.0	4.7	3.0	4.3	3.0	4.7	4.3
Red Clear	3.6	2.5	2.4	2.3	4.5	2.5	2.3
Added Initial *	–	2.5	–	–	–	2.5	–
Maximum Initial *	–	34	–	–	–	34	–
Time Before Reduction *	–	15	–	–	–	15	–
Time To Reduce *	–	30	–	–	–	30	–
Minimum Gap	–	3.0	–	–	–	3.0	–
Advance Walk	–	–	–	–	–	–	–
Non Lock Detector	X	–	X	X	X	–	X
Vehicle Recall	–	MIN RECALL	–	–	–	MIN RECALL	–
Dual Entry	–	–	–	X	–	–	X

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

Signal Upgrade - Temporary Design 3 (TMP Phase II)

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SCALE 0 40 1" = 40'

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Division 9 Forsyth County Walkertown

PLAN DATE:	February 2024	REVIEWED BY:	WP Erickson-Jones
PREPARED BY:	H Townsend	REVIEWED BY:	

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 056142 ENGINEER WILLIAM PORTER JONES
DocuSigned by: Porter Jones 2/12/2024
DIGITAL SIGNATURE SIGNATURE DATE
SIG. INVENTORY NO. 09-09963

2/12/2024
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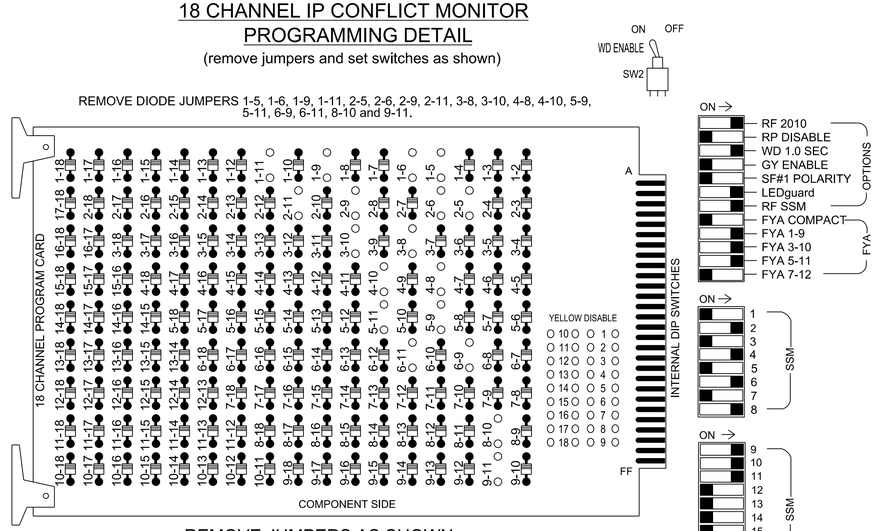
wpjones

PROJECT REFERENCE NO.	SHEET NO.
R-2577A	Sig. 24.1

18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



■ = DENOTES POSITION OF SWITCH

REMOVE JUMPERS AS SHOWN

NOTES:

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2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that the Red Enable is active at all times during normal operation.
4. Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.

NOTES

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

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, S11, AUX S1, AUX S2, AUX S4
Phases Used.....1, 2, 3, 4, 5, 6, 8
Overlap "1".....*
Overlap "2".....*
Overlap "3".....*
Overlap "4".....NOT USED

*See overlap programming detail on sheet 2.

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	11★	21,22 23	NU	31★	41,42, 43	NU	51★	61,62	NU	NU	81,82, 83	NU	11★	31★	NU	51★	NU	NU
RED	·	128	·	·	101	·	·	134	·	·	107	·	·	·	·	·	·	·
YELLOW	★	129	·	★	102	·	★	135	·	·	108	·	·	·	·	·	·	·
GREEN	·	130	·	·	103	·	·	136	·	·	109	·	·	·	·	·	·	·
RED ARROW	·	·	·	·	·	·	·	·	·	·	·	·	A121	A124	·	A114	·	·
YELLOW ARROW	·	·	·	·	·	·	·	·	·	·	·	·	A122	A125	·	A115	·	·
FLASHING YELLOW ARROW	·	·	·	·	·	·	·	·	·	·	·	·	A123	A126	·	A116	·	·
GREEN ARROW	127	·	·	118	·	·	133	·	·	·	·	·	·	·	·	·	·	·

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

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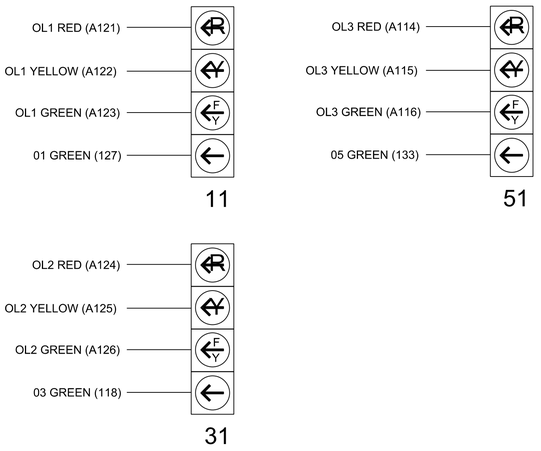
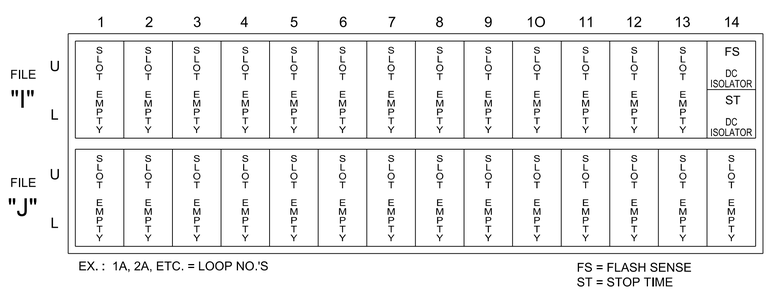
(wire signal heads as shown)



INPUT FILE POSITION LAYOUT

(front view)



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LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

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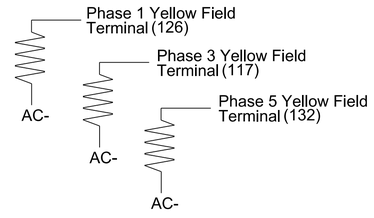
2.0K - 3.0K	10W (min)



SPECIAL DETECTOR NOTE

Install a video detection system for vehicle detection for zones. 1A, 2A, 3A, 4A, 5A, 6A, and 8A. 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: 09-0966T3
DESIGNED: February 2024
SEALED: February 12, 2024
REVISED:

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

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Division 9 | Forsyth County | Walkertown

PLAN DATE: February 2024 | REVIEWED BY: DT Sears
PREPARED BY: WP Erickson-Jones | REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 056142 ENGINEER W. PORTER JONES
DocuSigned by: Porter Jones D06E13E3A9E0498...
2/12/2024
DATE

SIG. INVENTORY NO. 09-0966T3

2/12/2024
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WPJones

PROJECT REFERENCE NO.	SHEET NO.
R-2577A	Sig. 24.2

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

BACKUP PREVENTION PROGRAMMING

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

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

Sequence 1

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

FLASHER CIRCUIT MODIFICATION DETAIL

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

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

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 09-0966T3
DESIGNED: February 2024
SEALED: February 12, 2024
REVISED:

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

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Traffic Engineering Branch
Traffic & Signals Management Section
750 N. Greenfield Pkwy, Garner, NC 27529

US 158 (Reidsville Rd.)
at
SR 2385 (Darrow Road)

Division 9 | Forsyth County | Walkertown

PLAN DATE: February 2024	REVIEWED BY: DT Sears
PREPARED BY: WP Erickson-Jones	REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 056142 ENGINEER PORTER JONES
DocuSigned by: Porter Jones 2/12/2024
DATE

SIG. INVENTORY NO. 09-0996T3

2/12/2024
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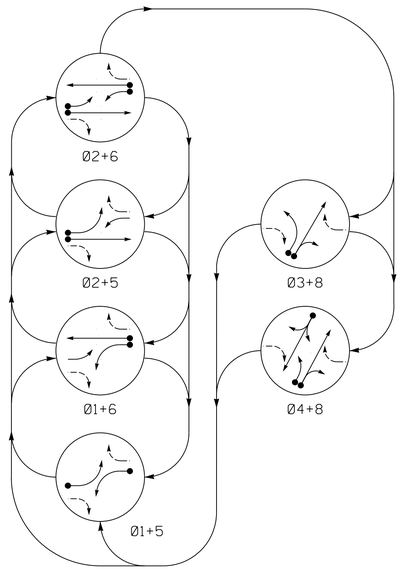
wpjones

PROJECT REFERENCE NO.	SHEET NO.
R-2577A	Sig. 25.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3+8	Ø4+8	FLASH
11	←	←	~~F Y~~	F Y	~~R~~	~~R~~	~~Y~~
21, 22, 23	R	R	G	G	R	R	Y
31	~~R~~	~~R~~	~~R~~	~~R~~	←	~~F Y~~	~~R~~
41, 42, 43	R	R	R	R	R	G	R
51	←	~~F Y~~	←	~~F Y~~	~~R~~	~~R~~	~~Y~~
61, 62	R	G	R	G	R	R	Y
81, 82, 83	R	R	R	R	G	G	R

SIGNAL FACE I.D.

All Heads L.E.D.

Denotes Louvers

MAXTIME DETECTOR INSTALLATION CHART

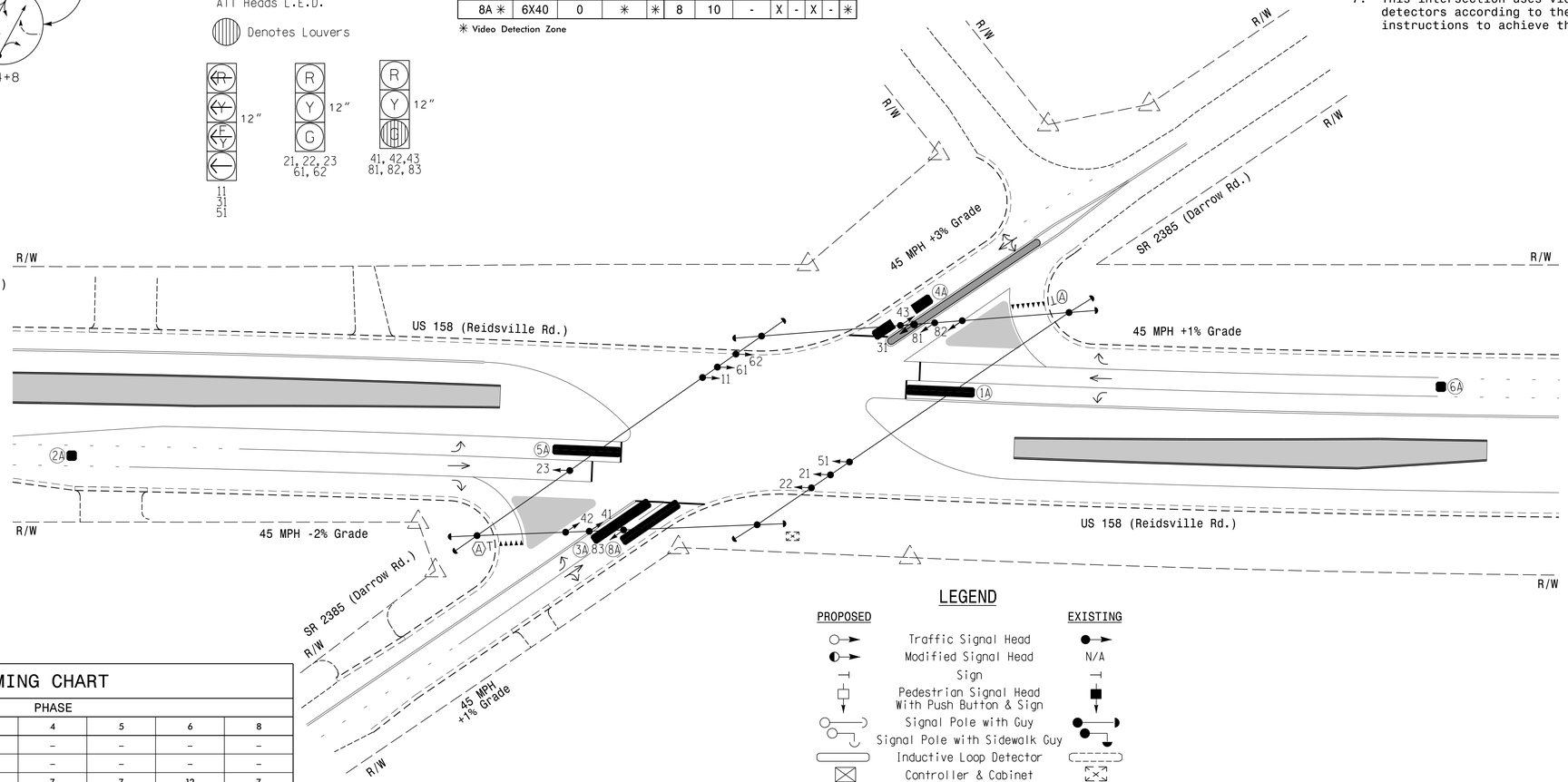
DETECTOR ZONE	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
1A ✳	6X40	0	✳	✳	1	15	-	X	-	X	-	✳
					6	3	-	X	-	X	X	✳
2A ✳	6X6	300	✳	✳	2	-	-	X	X	X	-	✳
3A ✳	6X40	0	✳	✳	3	15	-	X	-	X	-	✳
					8	3	-	X	-	X	-	✳
4A ✳	6X40	0	✳	✳	4	10	-	X	-	X	-	✳
5A ✳	6X40	0	✳	✳	5	15	-	X	-	X	-	✳
					2	3	-	X	-	X	X	✳
6A ✳	6X6	300	✳	✳	6	-	-	X	X	X	-	✳
8A ✳	6X40	0	✳	✳	8	10	-	X	-	X	-	✳

✳ Video Detection Zone

6 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. Omit phase 3 during phase 4 on.
4. Phase 1 and/or phase 5 may be lagged.
5. Reposition existing signal heads numbered 21, 22, 23 and 51.
6. Set all detector units to presence mode.
7. This intersection uses video detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.



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	●
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
□	Junction Box	■
·····	2-in Underground Conduit	·····
N/A	Right of Way	———
→	Directional Arrow	→
▒	Construction Zone	▒
▬	Video Detection Zone	▬
Ⓐ	"YIELD" Sign (R1-2)	Ⓐ

MAXTIME TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6	8
Walk *	–	–	–	–	–	–	–
Ped Clear *	–	–	–	–	–	–	–
Min Green	7	12	7	7	7	12	7
Passage *	2.0	6.0	2.0	2.0	2.0	6.0	2.0
Max 1 *	15	100	20	30	15	100	30
Yellow Change	3.0	4.7	3.0	4.3	3.0	4.7	4.3
Red Clear	4.3	2.9	1.9	3.6	4.3	2.9	3.6
Added Initial *	–	2.5	–	–	–	2.5	–
Maximum Initial *	–	34	–	–	–	34	–
Time Before Reduction *	–	15	–	–	–	15	–
Time To Reduce *	–	30	–	–	–	30	–
Minimum Gap	–	3.0	–	–	–	3.0	–
Advance Walk	–	–	–	–	–	–	–
Non Lock Detector	X	–	X	X	X	–	X
Vehicle Recall	–	MIN RECALL	–	–	–	MIN RECALL	–
Dual Entry	–	–	–	X	–	–	X

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

Signal Upgrade -
Temporary Design 4 (TMP Phase III Steps 1-2)

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Traffic Engineering Branch
Signal Design Section
750 N.Greenfield Pkwy.Garner,NC 27529

SCALE
0 40
1" = 40'

US 158 (Reidsville Rd.)
at
SR 2385 (Darrow Rd.)

Division 9 Forsyth County Walkertown

PLAN DATE:	February 2024	REVIEWED BY:	WP Erickson-Jones
PREPARED BY:	H Townsend	REVIEWED BY:	

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 056142 ENGINEER WILLIAM PORTER JONES
DocuSigned by: Porter Jones
SIGNATURE
2/12/2024
DATE
SIG. INVENTORY NO. 09-0996T4

2/12/2024
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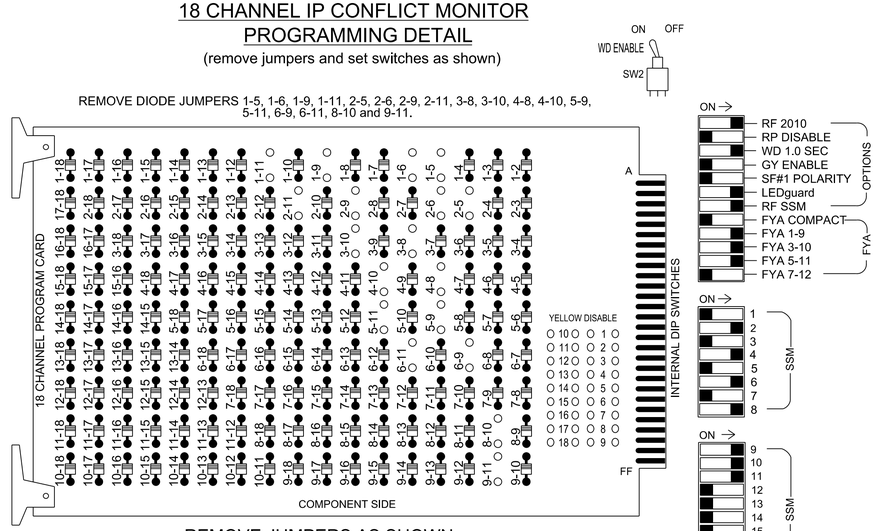
WPJones

PROJECT REFERENCE NO.	SHEET NO.
R-2577A	Sig. 25.1

18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



■ = DENOTES POSITION OF SWITCH

REMOVE JUMPERS AS SHOWN

NOTES:

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

NOTES

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

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, S11, AUX S1, AUX S2, AUX S4
Phases Used.....1, 2, 3, 4, 5, 6, 8
Overlap "1".....*
Overlap "2".....*
Overlap "3".....*
Overlap "4".....NOT USED

*See overlap programming detail on sheet 2.

SIGNAL HEAD HOOK-UP CHART

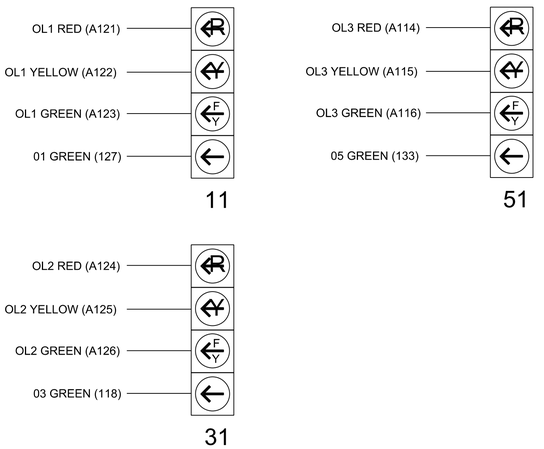
LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	11★	21,22 23	NU	31★	41,42 43	NU	51★	61,62	NU	NU	81,82 83	NU	11★	31★	NU	51★	NU	NU
RED		128			101			134			107							
YELLOW	★	129		★	102		★	135			108							
GREEN		130			103			136			109							
RED ARROW													A121	A124		A114		
YELLOW ARROW													A122	A125		A115		
FLASHING YELLOW ARROW													A123	A126		A116		
GREEN ARROW	127			118			133											

NU = Not Used

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

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	1O	11	12	13	14
FILE "I"	U	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
	L														ST DC ISOLATOR
FILE "J"	U	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L														

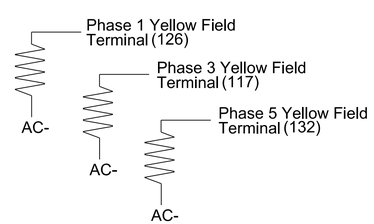
EX.: 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE
ST = STOP TIME

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

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



SPECIAL DETECTOR NOTE

Install a video detection system for vehicle detection for zones. 1A, 2A, 3A, 4A, 5A, 6A, and 8A. 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: 09-0966T4
DESIGNED: February 2024
SEALED: February 12, 2024
REVISED:

Signal Upgrade - Temporary Design 4
(TMP Phase III Steps 1-2) Electrical Detail - Sheet 1 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Electrical and Programming Details For:

US 158 (Reidsville Rd.) at SR 2385 (Darrow Road)

Division 9 | Forsyth County | Walkertown

PLAN DATE: February 2024 | REVIEWED BY: DT Sears
PREPARED BY: WP Erickson-Jones | REVIEWED BY:

REVISIONS	INIT.	DATE

SIG. INVENTORY NO. 09-0966T4

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 056142 ENGINEER PORTER JONES

DocuSigned by: Porter Jones DOSE13E3A9E0498... 2/12/2024 DATE

Prepared for the Offices of: NC Department of Transportation Mobility and Safety Division, Traffic Engineering Branch, Signals Management Section

750 N. Greenfield Pkwy, Garner, NC 27529

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PROJECT REFERENCE NO.	SHEET NO.
R-2577A	Sig. 25.2

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

BACKUP PREVENTION PROGRAMMING

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

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

Sequence 1

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

FLASHER CIRCUIT MODIFICATION DETAIL

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

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

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 09-0966T4
DESIGNED: February 2024
SEALED: February 12, 2024
REVISED:

Signal Upgrade - Temporary Design 4
(TMP Phase III Steps 1-2) Electrical Detail - Sheet 2 of 2

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Electrical and Programming Details For:

Prepared for the Offices of:
Transportation Mobility and Safety Division
State of North Carolina Department of Transportation
Traffic Engineering & Signals Management Section
750 N. Greenfield Pkwy, Garner, NC 27529

US 158 (Reidsville Rd.)
at
SR 2385 (Darrow Road)

Division 9 | Forsyth County | Walkertown

PLAN DATE:	February 2024	REVIEWED BY:	DT Sears
PREPARED BY:	WP Erickson-Jones	REVIEWED BY:	

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 056142 ENGINEER W. PORTER JONES

DocuSigned by: Porter Jones 2/12/2024
DATE

SIG. INVENTORY NO. 09-0996T4

2/12/2024
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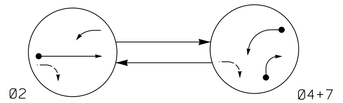
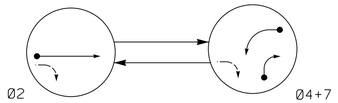
wpjones

PROJECT REFERENCE NO.	SHEET NO.
R-2577A	Sig. 26.0

DEFAULT PHASING DIAGRAM



ALTERNATE PHASING DIAGRAM



DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2	PHASE Ø4+7	PHASE FLASH
21, 22	↑	R	Y
41, 42	R	→	R
71	~~F~~	←	~~Y~~

ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2	PHASE Ø4+7	PHASE FLASH
21, 22	↑	R	Y
41, 42	R	→	R
71	~~R~~	←	~~Y~~

MAXTIME DETECTOR INSTALLATION CHART

DETECTOR ZONE	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
2A	6X6	300	✳	✳	2	-	-	X	X	X	-	✳
4A	6X40	0	✳	✳	4	15	-	X	-	X	-	✳
7A	6X40	0	✳	✳	7	15#	-	X	-	X	-	✳

✳ Video Detection Zone
\# Disable Delay During Alternate Phasing Operation.

2 Phase
Fully Actuated
(Isolated)

NOTES

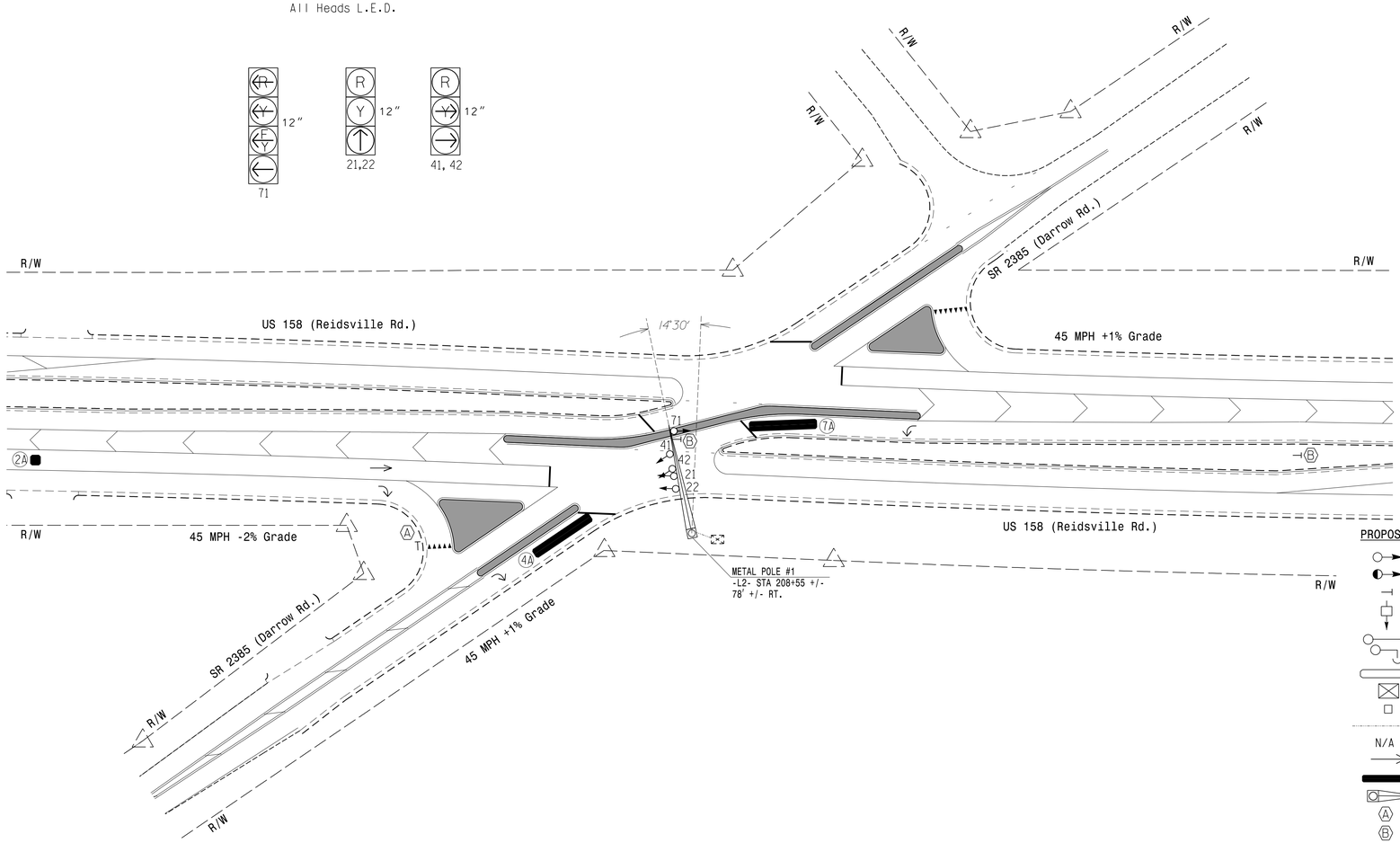
1. Refer to "Roadway Standard Drawings NCDOT" dated January 2024 and "Standard Specifications for Roads and Structures" dated January 2024.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Set all detector units to presence mode.
4. This intersection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

PHASING DIAGRAM DETECTION LEGEND

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

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	●⤵
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
□	Junction Box	■
·····	2-in Underground Conduit	·····
N/A	Right of Way	– – – –
→	Directional Arrow	→
▬	Video Detection Zone	▬
○◁	Metal Pole with Mastarm	●◁
Ⓐ	"YIELD" Sign (R1-2)	Ⓐ
Ⓑ	No U-Turn Sign (R3-4)	Ⓑ

MAXTIME TIMING CHART

FEATURE	PHASE 2	PHASE 4	PHASE 7
Walk *	–	–	–
Ped Clear *	–	–	–
Min Green	12	7	7
Passage *	6.0	2.0	2.0
Max 1 *	90	30	30
Yellow Change	4.7	3.0	3.0
Red Clear	1.3	3.2	3.2
Added Initial *	2.5	–	–
Maximum Initial *	34	–	–
Time Before Reduction *	15	–	–
Time To Reduce *	30	–	–
Minimum Gap	3.0	–	–
Advance Walk	–	–	–
Non Lock Detector	–	X	X
Vehicle Recall	MIN RECALL	–	–
Dual Entry	–	X	X

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

Signal Upgrade - Temporary Design 5 (TMP Phase III Step 5)

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Prepared for the Offices of:
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'

US 158 EB (Reidsville Rd.) at SR 2385 (Darrow Rd.)

Division 9 Forsyth County Walkertown

PLAN DATE: February 2024 REVIEWED BY: WP Erickson-Jones
PREPARED BY: H Townsend REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 056142 ENGINEER PORTER JONES
DocuSigned by: Porter Jones 2/12/2024
SIGNATURE DATE

SIG. INVENTORY NO. 09-09961S

2/12/2024
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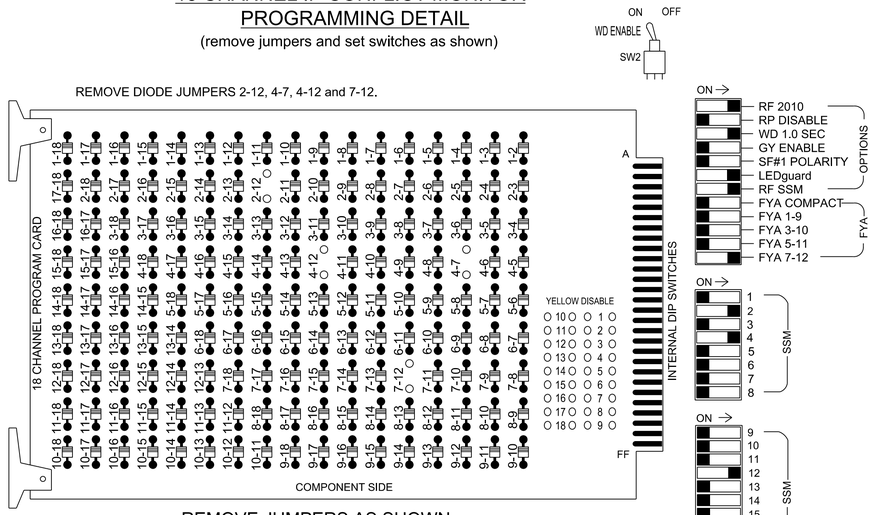
wplones

PROJECT REFERENCE NO.	SHEET NO.
R-2577A	Sig. 26.1

18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



■ = DENOTES POSITION OF SWITCH

REMOVE JUMPERS AS SHOWN

NOTES:

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

NOTES

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

EQUIPMENT INFORMATION

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

*See overlap programming detail on sheet 2.

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	NU	21,22	NU	NU	41,42	NU	NU	NU	NU	71★	NU	NU	NU	NU	NU	NU	71★	NU
RED		128			101													
YELLOW		129								*								
GREEN																		
RED ARROW																	A101	
YELLOW ARROW					102												A102	
FLASHING YELLOW ARROW																	A103	
GREEN ARROW		130			103					124								

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)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
	L														ST DC ISOLATOR
FILE "J"	U	SLOT EMPTY	SLOT EMPTY	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									

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
7A	TB5-5,6	J5U	57	19	21★	7	15		X		X	

★ For the detector to work as shown on the signal design plan, see the vehicle detector setup programming detail for alternate phasing on sheet 2.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

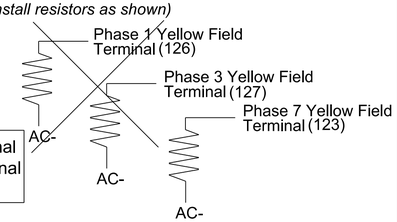
FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

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



!Remove Phase 1 Yellow Field Terminal (126) and Phase 3 Yellow Field Terminal (117) if present.

SPECIAL DETECTOR NOTE

Install a video detection system for vehicle detection for zones. 2A, 4A and 7A. 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 Detection Zone 7A, the equipment placement and slots are typical for a NCDOT installation. Inputs associated with these slots are compatible with time of day instructions located on sheet 2 of this electrical detail.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 09-0966T5
DESIGNED: February 2024
SEALED: February 12, 2024
REVISED:

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Signal Upgrade - Temporary Design 5
(TMP Phase III Step 5) Electrical Detail - Sheet 1 of 2

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Electrical and Programming Details For:

Prepared for the Offices of:
Traffic Engineering Branch
Signals Management Section
750 N. Greenfield Pkwy, Garner, NC 27529

US 158 EB (Reidsville Rd.)
at
SR 2385 (Darrow Road)

Division 9 | Forsyth County | Walkertown

PLAN DATE: February 2024	REVIEWED BY: DT Sears
PREPARED BY: WP Erickson-Jones	REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 056142 ENGINEER PORTER W. JONES
DocuSigned by: Porter Jones D05E13E3A0E0498...
2/12/2024
DATE

SIG. INVENTORY NO. 09-0996T5

2/12/2024
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wjones

PROJECT REFERENCE NO.	SHEET NO.
R-2577A	Sig. 26.2

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	4
Type	FYA 4 - Section
Included Phases	2
Modifier Phases	7
Modifier Overlaps	-
Trail Green	0
Trail Yellow	0.0
Trail Red	0.0

MAXTIME OVERLAP PROGRAMMING DETAIL FOR ALTERNATE PHASING

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

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

Overlap Plan 2

Overlap	4
Type	FYA 4 - Section
Included Phases	-
Modifier Phases	7
Modifier Overlaps	-
Trail Green	0
Trail Yellow	0.0
Trail Red	0.0

← NOTICE INCLUDED PHASE

MAXTIME ALTERNATE PHASING PATTERN PROGRAMMING DETAIL

Front Panel
Main Menu >Controller >Coordination >Patterns

Web Interface
Home >Controller >Coordination >Patterns

Pattern Parameters

Pattern	Veh Det Plan	Overlap Plan
*	2	2

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

MAXTIME ALTERNATE PHASING ACTIVATION DETAIL

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

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

ALTERNATE PHASING CHANGE SUMMARY

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

OVERLAP PLAN 2: Modifies overlap included phases for head 71 to run protected turns only.

VEH DET PLAN 2: Reduces delay time for phase 7 call on loop 7A to 0 seconds.

MAXTIME DETECTOR PROGRAMMING DETAIL FOR ALTERNATE PHASING LOOPS 7A

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

Web Interface
Home >Controller >Detector Configuration >Vehicle Detectors

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

Plan 2

	Detector	Call Phase	Delay
7A	21	7	0

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 09-0966T5
DESIGNED: February 2024
SEALED: February 12, 2024
REVISED:

Signal Upgrade - Temporary Design 5
(TMP Phase III Step 5) Electrical Detail - Sheet 2 of 2

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Transportation Mobility and Safety Division
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
ITS & Signals Management Section
750 N. Greenfield Pkwy, Garner, NC 27529

US 158 EB (Reidsville Rd.)
at
SR 2385 (Darrow Road)

Division 9 | Forsyth County | Walkertown

PLAN DATE:	February 2024	REVIEWED BY:	DT Sears
PREPARED BY:	WP Erickson-Jones	REVIEWED BY:	

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 056142 ENGINEER W. PORTER JONES
DocuSigned by:
Porter Jones
D06E13E3A0E0498
2/12/2024
DATE

SIG. INVENTORY NO. 09-0996T5

2/12/2024
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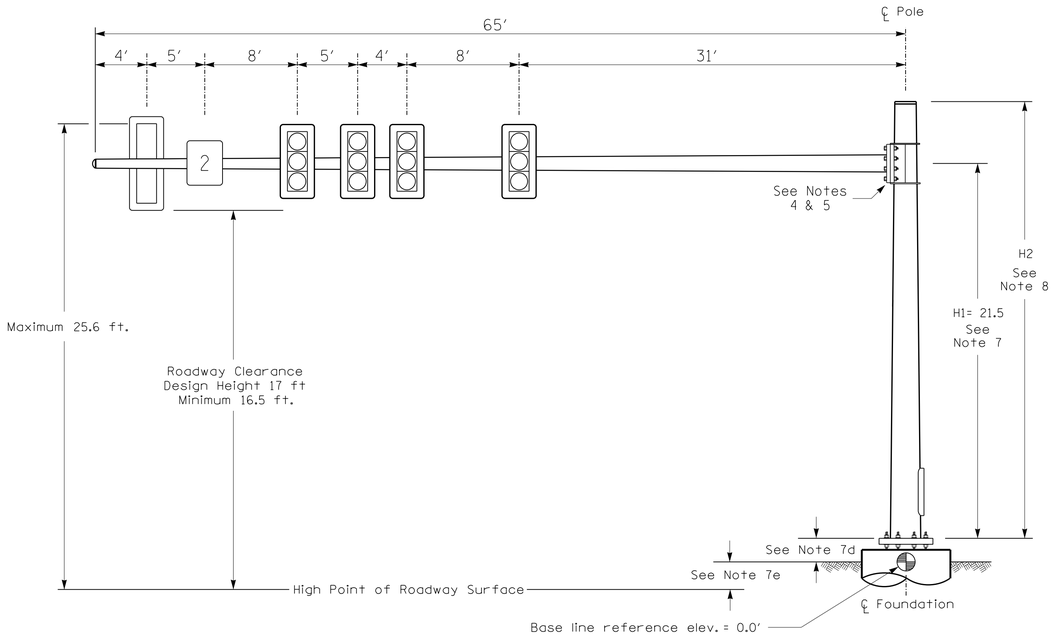
wpjones

Design Loading for METAL POLE NO. 1



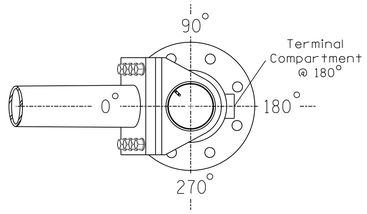
Elevation View

SPECIAL NOTE

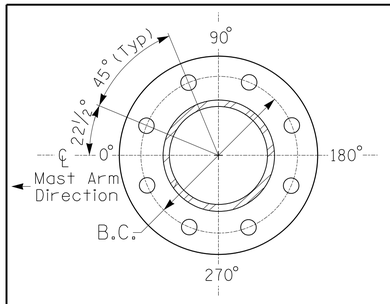
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 1	
Baseline reference point at ℄ Foundation @ ground level	0.0 ft.	
Elevation difference at High point of roadway surface	+2.5 ft.	
Elevation difference at Edge of travelway or face of curb	+1.5 ft.	

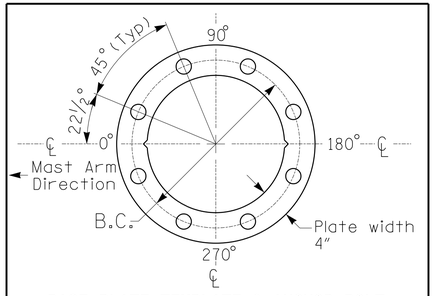


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



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

METAL POLE No. 1

PROJECT REFERENCE NO.	SHEET NO.
R-2577A	Sig. 26.3

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	RIGID MOUNTED SIGNAL HEAD 12″-3 SECTION-WITH BACKPLATE	9.3 S.F.	25.5″ W X 52.5″L	60 LBS
	RIGID MOUNTED SIGNAL HEAD 12″-4 SECTION-WITH BACKPLATE	11.5 S.F.	25.5″ W X 66.0″L	74 LBS
2	SIGN RIGID MOUNTED	7.5 S.F.	30.0″ W X 36.0″L	14 LBS

DESIGN REFERENCE MATERIAL

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

DESIGN REQUIREMENTS

2. Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
3. Design all signal supports using force ratios that do not exceed 0.9.
4. The camber design for the mast arm deflection should provide an appearance of a low pitched arch where the tip or the free end of the mast arm does not deflect below horizontal when fully loaded.
5. A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements.
6. Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
7. The mast arm attachment height (H1) shown is based on the following design assumptions:
   a. Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
   b. Signal heads are rigidly mounted and vertically centered on the mast arm.
   c. The roadway clearance height for design is as shown in the elevation views.
   d. The top of the pole base plate is 0.75 feet above the ground elevation.
   e. Refer to the Elevation Data Chart for the elevation differences between the proposed foundation ground level and the high point of the roadway.
8. The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
   - Mast arm attachment height (H1) plus 2 feet, or
   - H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
9. If pole location adjustments are required, the contractor must gain approval from the Engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signal Design Section Senior Structural Engineer for assistance at (919) 814-5000.
10. The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
11. The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

NCDOT Wind Zone 4 (90 mph)

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North Carolina Department of Transportation
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at
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Division 9 Forsyth County Walkertown

PLAN DATE: February 2024 REVIEWED BY: DT Sears

PREPARED BY: WP Erickson-Jones REVIEWED BY:

SCALE 0 N/A N/A

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 056142 ENGINEER W. PORTER JONES

DocuSigned by: Porter Jones 2/12/2024
SIGNATURE DATE

SIG. INVENTORY NO. 09-09965

2/12/2024
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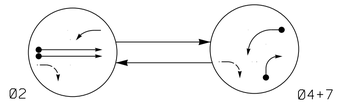
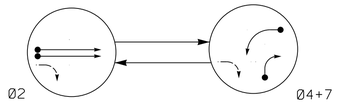
wpjones

PROJECT REFERENCE NO.	SHEET NO.
R-2577A	Sig. 27.0

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 Ø2	PHASE Ø4+7	FLASH
21,22	↑	R	Y
41, 42	R	→	R
71	~~F Y~~	←	~~Y~~

ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2	PHASE Ø4+7	FLASH
21,22	↑	R	Y
41, 42	R	→	R
71	~~R~~	←	~~R~~

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	5	X	2	-	-	X	X	X	-	X
2B	6X6	300	5	X	2	-	-	X	X	X	-	X
4A	6X40	0	2-4-2	X	4	15	-	X	-	X	-	X
7A	6X40	0	2-4-2	X	7	15#	-	X	-	X	-	X

Disable Delay During Alternate Phasing Operation.

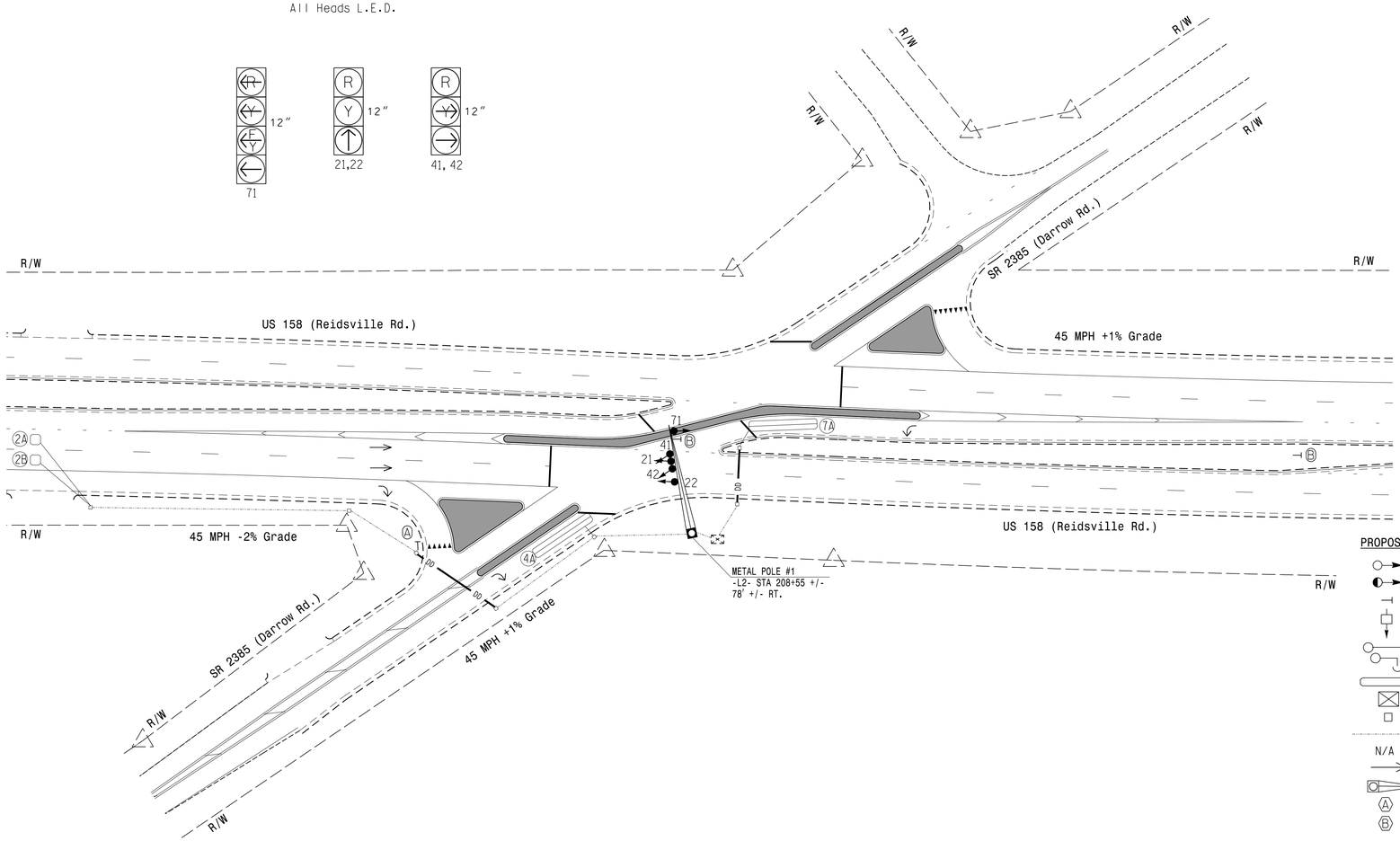
2 Phase
Fully Actuated
(US 158 Signal System)
Signal System #: D09-11_Winston-Salem

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. Reposition existing signal heads numbered 21 and 22.
4. Set all detector units to presence mode.
5. The Division Traffic Engineer will determine the hours of use for each phasing plan.
6. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.

SIGNAL FACE I.D.

All Heads L.E.D.



MAXTIME TIMING CHART

FEATURE	PHASE 2	PHASE 4	PHASE 7
Walk *	–	–	–
Ped Clear *	–	–	–
Min Green	12	7	7
Passage *	6.0	2.0	2.0
Max 1 *	90	30	30
Yellow Change	4.7	3.0	3.0
Red Clear	1.3	3.2	3.2
Added Initial *	1.5	–	–
Maximum Initial *	34	–	–
Time Before Reduction *	15	–	–
Time To Reduce *	30	–	–
Minimum Gap	3.0	–	–
Advance Walk	–	–	–
Non Lock Detector	–	X	X
Vehicle Recall	MIN RECALL	–	–
Dual Entry	–	X	X

* These values may be field adjusted. Do not adjust Min Green and Extension times for phase 2 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	■↓
○↓	Signal Pole with Guy	●↓
○⤵	Signal Pole with Sidewalk Guy	●⤵
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
□	Junction Box	■
·····	2-in Underground Conduit	·····
N/A	Right of Way	– – –
→	Directional Arrow	→
○→	Metal Pole with Mastarm	○→
Ⓐ	"YIELD" Sign (R1-2)	Ⓐ
Ⓑ	No U-Turn Sign (R3-4)	Ⓑ

Signal Upgrade - Final Design

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PREPARED BY: H Townsend REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 056142 ENGINEER W. PORTER JONES

DocuSigned by: Porter Jones 2/12/2024
SIGNATURE DATE

SIG. INVENTORY NO. 09-0996

2/12/2024
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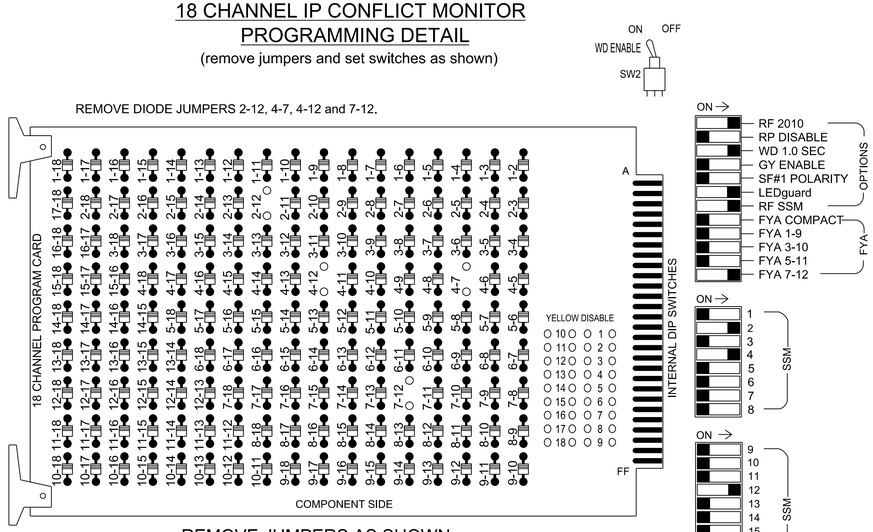
wporones

PROJECT REFERENCE NO.	SHEET NO.
R-2577A	Sig. 27.1

18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE JUMPERS AS SHOWN

NOTES:

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

■ = DENOTES POSITION OF SWITCH

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the signal plan.
2. Program controller to start up in phase 2 Green No Walk.
3. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
4. The cabinet and controller are part of the US 158 Signal System, Signal System : D09-11_Winston-Salem System.

EQUIPMENT INFORMATION

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

*See overlap programming detail on sheet 2

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	NU	21,22	NU	NU	41,42	NU	NU	NU	NU	71★	NU	NU	NU	NU	NU	NU	71★	NU
RED	·	128	·	·	101	·	·	·	·	·	·	·	·	·	·	·	·	·
YELLOW	·	129	·	·	·	·	·	·	·	*	·	·	·	·	·	·	·	·
GREEN	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
RED ARROW	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	A101	·
YELLOW ARROW	·	·	·	·	102	·	·	·	·	·	·	·	·	·	·	·	A102	·
FLASHING YELLOW ARROW	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	A103	·
GREEN ARROW	·	130	·	·	103	·	·	·	·	124	·	·	·	·	·	·	·	·

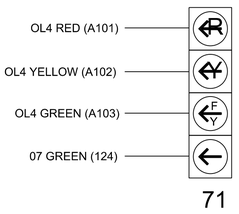
NU = Not Used

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

★See pictorial of head wiring in detail this sheet.

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



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	∅ 2 2A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	∅ 4 4A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
	L		∅ 2 2B				NOT USED								ST DC ISOLATOR
FILE "J"	U	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	∅ 7 7A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L					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	
4A	TB4-9,10	I6U	41	3	8	4	15		X		X	
7A	TB5-5,6	J5U	57	19	21★	7	15		X		X	

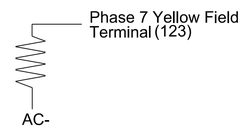
★ For the detector to work as shown on the signal design plan, see the vehicle detector setup programming detail for alternate phasing on sheet 2.

INPUT FILE POSITION LEGEND: J2L
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)



THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 09-0966
DESIGNED: February 2024
SEALED: February 12, 2024
REVISED:

Signal Upgrade - Final Design - Electrical Detail - Sheet 1 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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Traffic Engineering Branch
Signals Management Section
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US 158 EB (Reidsville Rd.)
at
SR 2385 (Darrow Road)

Division 9 | Forsyth County | Walkertown

PLAN DATE: February 2024	REVIEWED BY: DT Sears
PREPARED BY: WP Erickson-Jones	REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 056142 ENGINEER WILLIAM PORTER JONES

DocuSigned by: Porter Jones
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2/12/2024
DATE

SIG. INVENTORY NO. 09-0996

2/12/2024
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WPJones