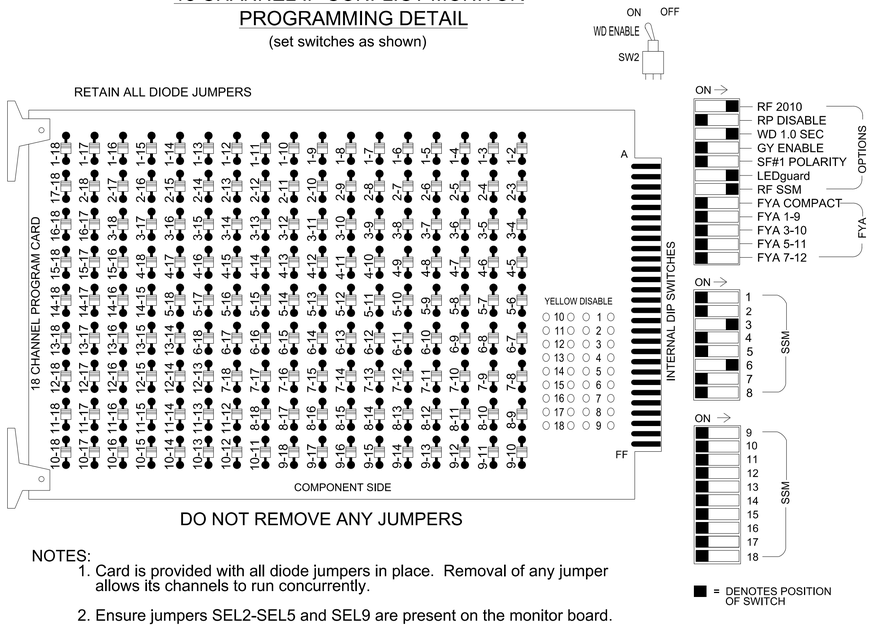
18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(set switches as shown)



DO NOT REMOVE ANY JUMPERS

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 Phase Not On 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 NC 150 D12-02_Mooresville CLS.

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.....S4, S8
Phases Used.....3, 6
Overlap "1".....NOT USED
Overlap "2".....NOT USED
Overlap "3".....NOT USED
Overlap "4".....NOT USED

PROJECT REFERENCE NO.	SHEET NO.
R-2307B	Sig. 17.1

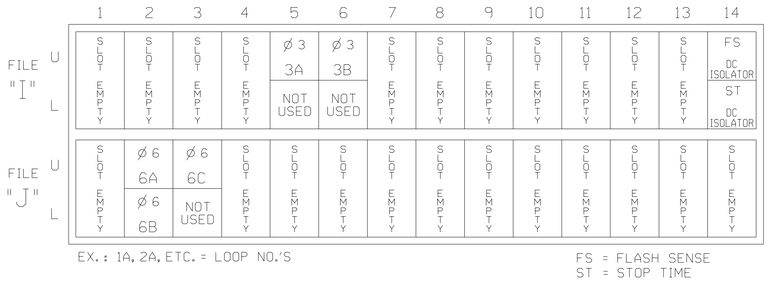
SIGNAL HEAD HOOK-UP CHART

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	NU	NU	31,32	NU	NU	NU	61	62,63	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU
RED								134	134										
YELLOW								135	135										
GREEN									136										
RED ARROW				116															
YELLOW ARROW				117															
GREEN ARROW				118				136											

NU = Not Used

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
3A	TB4-5,6	I5U	58	20	7	3			X		X	
3B	TB4-9,10	I6U	41	3	8	3			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	
6C	TB3-9,10	J3U	64	30	18	6			X	X	X	

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

SEQUENCE DETAIL

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

Web Interface
Home >Controller >Sequence

Sequence 1

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 12-1851
DESIGNED: MAY 2024
SEALED: 5/17/2024
REVISED: N/A

Final Design
Electrical Detail

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road-Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
License No. F-0672

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

NC 150 WB
at U-turn
across from Antiquity Lane

Division 12 Iredell County Mooresville

PLAN DATE:	May 2024	REVIEWED BY:	J Galloway, PE
PREPARED BY:	R M Muncey	REVIEWED BY:	R Muncey, PE

REVISIONS	INIT.	DATE

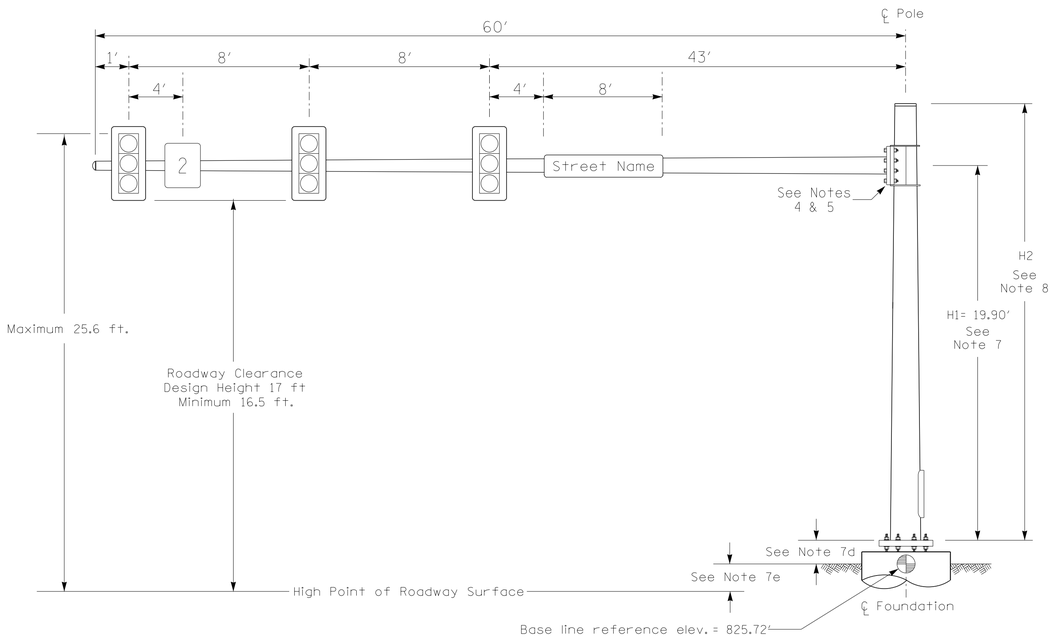
SEAL 029904 ENGINEER JASON P. GALLOWAY NORTH CAROLINA PROFESSIONAL SEAL

DocuSigned by: Jason Galloway 5/17/2024
10D1E2B40B4B48E DATE
SIG. INVENTORY NO. 12-1851

METAL POLE No. 1

PROJECT REFERENCE NO.	SHEET NO.
R-2307B	Sig. 17.2

Design Loading for METAL POLE NO. 1



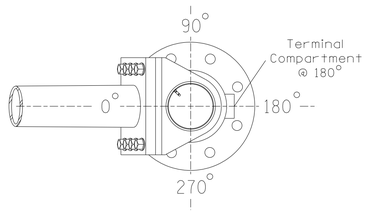
Elevation View

SPECIAL NOTE

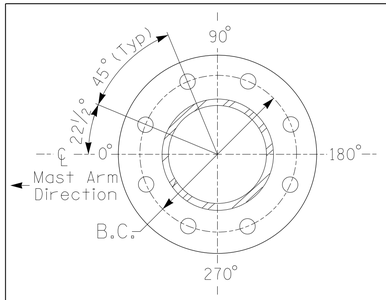
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 1	
Baseline reference point at ℄ Foundation @ ground level	825.72 ft.	
Elevation difference at High point of roadway surface	+0.84 ft.	
Elevation difference at Edge of travelway or face of curb	+/-0.0 ft.	

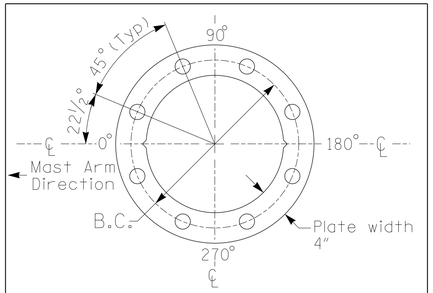


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



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

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
Street Name	STREET NAME SIGN RIGID MOUNTED	16.0 S.F.	24.0″W X 96.0″L	36 LBS

NOTES

DESIGN REFERENCE MATERIAL

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

DESIGN REQUIREMENTS

2. Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
3. Design all signal supports using force ratios that do not exceed 0.9.
4. 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 5 (110 mph)

Stantec

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

NC 150 WB
at U-turn
across from Antiquity Lane

Division 12 Iredell County Mooresville

PLAN DATE: November 2023 REVIEWED BY: J. Galloway, PE
PREPARED BY: J. Hambright REVIEWED BY: R. Muncey, PE

SCALE 0 N/A N/A

REVISIONS	INIT.	DATE

NORTH CAROLINA PROFESSIONAL SEAL 029904 ENGINEER JASON M. GALLOWAY

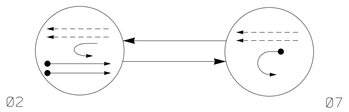
DocuSigned by: Jason Galloway 5/17/2024
DATE

SIG. INVENTORY NO. 12-1851

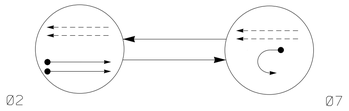
5/16/2024
1:08:13 PM
\\ntcdata01\Projects\Signals\Design\Metal Poles\Loading Diagrams\Loading Diagram_Single Mast Arm_12-1851.dgn
User:jgalloway

PROJECT REFERENCE NO.	SHEET NO.
R-2307B	Sig. 18.0

DEFAULT PHASING DIAGRAM



ALTERNATE PHASING DIAGRAM



DEFAULT PHASING TABLE OF OPERATION

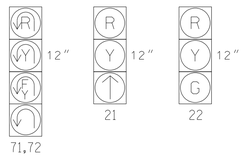
SIGNAL FACE	PHASE Ø2	PHASE Ø7	PHASE FLASH
21	↑	R	R
22	G	R	R
71,72	(FY) ↓ ∩ ↓ (R)		

ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2	PHASE Ø7	PHASE FLASH
21	↑	R	R
22	G	R	R
71,72	(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
2A	6X6	300	✳	✳	2	-	-	X	-	X	-	✳
2B	6X6	300	✳	✳	2	-	-	X	-	X	-	✳
2C	6X40	0	✳	✳	2	5.0	2.0	X	-	X	X	✳
2D	6X40	0	✳	✳	2	5.0	2.0	X	-	X	X	✳
7A	6X40	0	✳	✳	7	15.0★	-	X	-	X	-	✳

✳ Video Detection Area
Camera locations should be confirmed in the field by the contractor in order to provide detection of the areas indicated.

★ Disable delay during Alternate Phasing Operation.

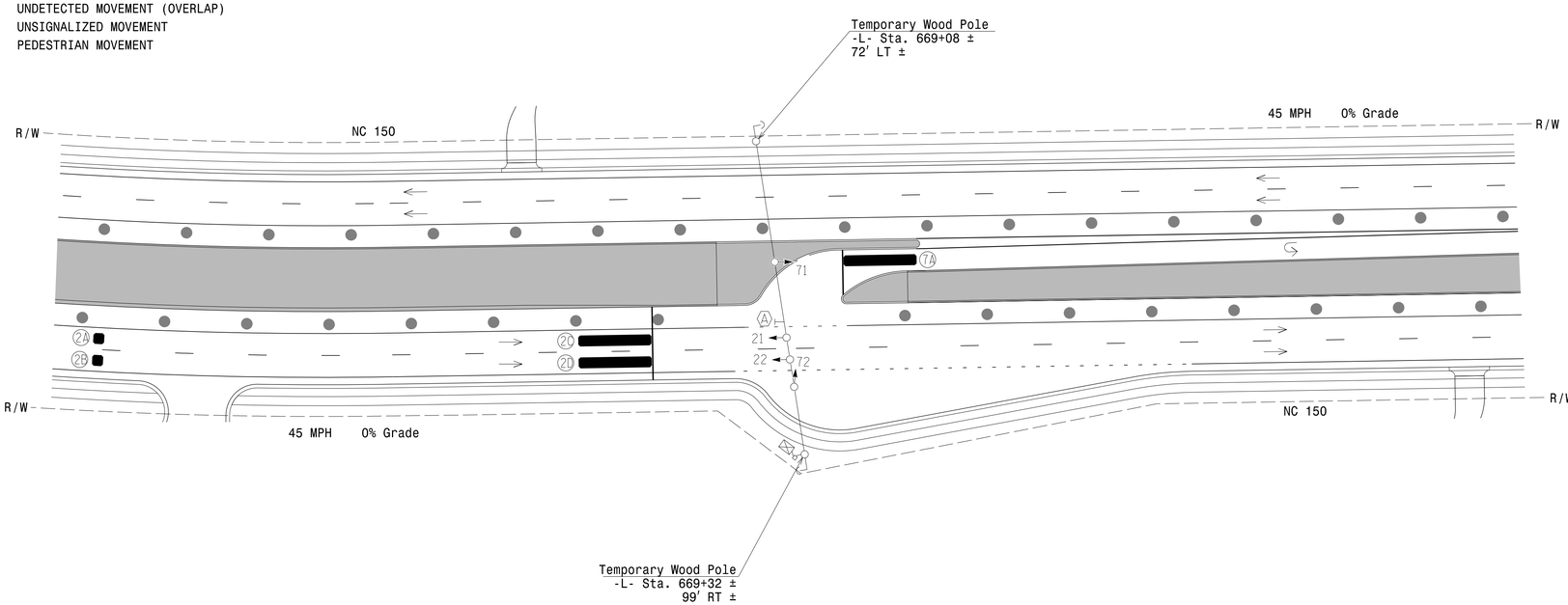
2 Phase
Fully Actuated w/
Alternate Phasing
NC 150 D12-02_MOORESVILLE
CLS

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2024 and "Standard Specifications for Roads and Structures" dated January 2024.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Set all detector units to presence mode.
4. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
5. The Division Traffic Engineer will determine 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.
7. Field adjust temporary poles as needed.

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	→
▬	Video Detection Area	N/A
▭	Construction Zone	N/A
● ● ●	Drums	N/A
Ⓐ	No Left Turn Sign (R3-2)	Ⓐ

MAXTIME TIMING CHART

FEATURE	PHASE 2	PHASE 7
Walk *	–	–
Ped Clear *	–	–
Min Green	12	7
Passage *	6.0	2.0
Max 1 *	60	30
Yellow Change	4.5	3.0
Red Clear	1.6	4.0
Added Initial *	–	–
Maximum Initial *	–	–
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	–	–

* 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
Temporary Design 1 - TMP Phase III

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road-Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
License No. F-0672

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

NC 150 EB
at
SR 1304 (Ervin Road) U-turn

Division 12 Iredell County Mooresville

PLAN DATE: May 2024 REVIEWED BY: J Galloway, PE
PREPARED BY: J Hambright REVIEWED BY: R Muncey, PE

SCALE 0 40 1"=40'

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 029904 ENGINEER JASON P GALLOWAY

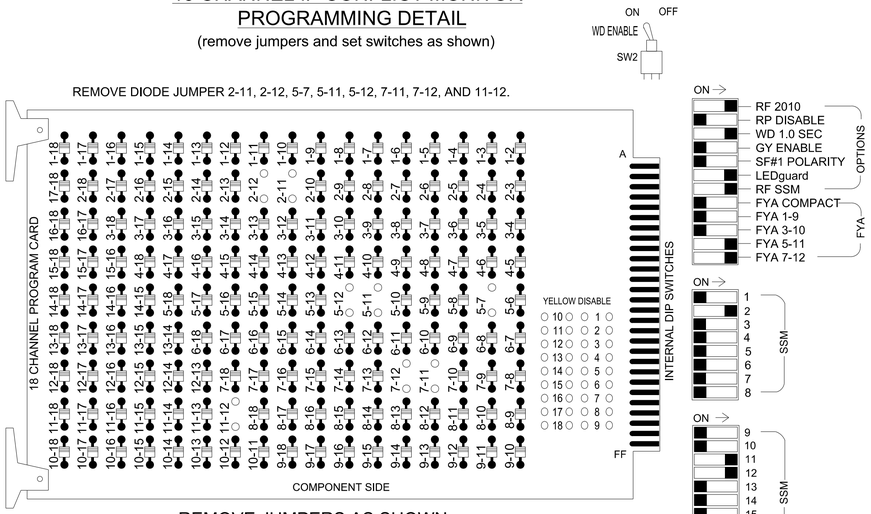
DocuSigned by: Jason Galloway 12/17/2024
10D1E2B40B4B46E... DATE
SIG. INVENTORY NO. 12-1835TI

$$$$$$SYSDATE$$$$$
5:07:40 PM
U:\NCDOT\Signals\Design\Signal Design\Temporary Design\Phase 3 TEMP\R-2307B_sig_dsn_12-1835TI.dgn
User:jgalloway

PROJECT REFERENCE NO.	SHEET NO.
R-2307B	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.

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 Phase Not On.
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 NC 150 D12-02_Mooresville CLS.

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".....*

*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	7	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	128																
YELLOW		129	129					✳			✳								
GREEN			130																
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 this sheet.

INPUT FILE POSITION LAYOUT

(front view)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I" UPPER	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
FILE "I" LOWER	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	ST DC ISOLATOR
FILE "J" UPPER	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	Ø7 7A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
FILE "J" LOWER					NOT USED									

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

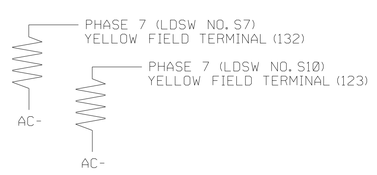
FS = FLASH SENSE
ST = STOP TIME

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown below)

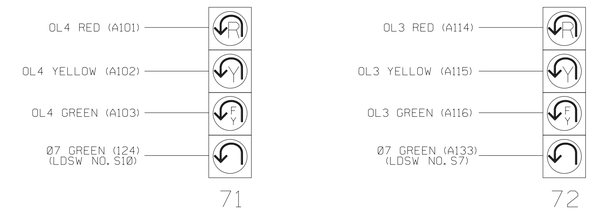
ACCEPTABLE VALUES

VALUE (ohms)	WATTAGE
1.5K - 1.9K	25W (min)
2.0K - 3.0K	10W (min)



FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



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	15.0		X		X	

* For the detectors to work as shown on the signal design plan, see the Detector Programming Detail for Alternate Phasing on sheet 2 of 3.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

SPECIAL DETECTOR NOTE

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

For Detection Zone 7A, the equipment placement is typical for a NCDOT installation. Inputs associated with this slot are compatible with alternate operation programming located on sheets 2 and3 of this electrical detail.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 12-1835T1
DESIGNED: MAY 2024
SEALED: 5/17/2024
REVISED: N/A

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

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road-Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
License No. F-0672

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

NC 150 EB
at
SR 1304 (Ervin Road) U-Turn

Division 12 Iredell County Mooresville

PLAN DATE:	May 2024	REVIEWED BY:	J Galloway, PE
PREPARED BY:	J Galloway	REVIEWED BY:	R Muncey, PE

REVISIONS	INIT.	DATE

SEAL 029904 NORTH CAROLINA PROFESSIONAL ENGINEER JASON P. CALLOWAY

DocuSigned by: Jason Galloway 5/17/2024
10D1E2B40B4B48E DATE
SIG. INVENTORY NO. 12-1835T1

5:08:17 PM
\\stantec.com\projects\Designs\Design\Electrical Details\Temporary Design\MAXTIME\WR-23078_sm_ele_12-1835t1.dgn
User:jgalloway

PROJECT REFERENCE NO.	SHEET NO.
R-2307B	Sig. 18.2

OUTPUT CHANNEL CONFIGURATION

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

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

Channel Configuration

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

NOTICE CONTROL SOURCE 7 ASSIGNED TO CHANNEL 5 ➡

MAXTIME DETECTOR PROGRAMMING DETAIL FOR ALTERNATE PHASING LOOP 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.

7A

Detector	Call Phase	Delay
21	7	0

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

⬅ NOTICE INCLUDED PHASE

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: I2-1835T1
DESIGNED: MAY 2024
SEALED: 5/17/2024
REVISED: N/A

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

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road-Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
License No. F-0672

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

NC 150 EB
at
SR 1304 (Ervin Road) U-Turn

Division 12 | Iredell County | Mooresville

PLAN DATE:	May 2024	REVIEWED BY:	J Galloway, PE
PREPARED BY:	J Galloway	REVIEWED BY:	R Muncey, PE

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA
PROFESSIONAL
SEAL
029904
ENGINEER
JASON P. GALLOWAY

DocuSigned by:
Jason Galloway 5/17/2024
10D1E2B40B4B46E... DATE
SIG. INVENTORY NO. I2-1835T1

PROJECT REFERENCE NO.	SHEET NO.
R-2307B	Sig. 18.3

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.

SEQUENCE DETAIL

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

Web Interface
Home >Controller >Sequence

Sequence 1

Ring	Sequence Data
1	2,a,7,b
2	

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: 12-1835T1
DESIGNED: MAY 2024
SEALED: 5/17/2024
REVISED: N/A

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

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road-Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
License No. F-0672

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

NC 150 EB
at
SR 1304 (Ervin Road) U-Turn

Division 12 | Iredell County | Mooresville

PLAN DATE:	May 2024	REVIEWED BY:	J Galloway, PE
PREPARED BY:	J Galloway	REVIEWED BY:	R Muncey, PE

REVISIONS	INIT.	DATE

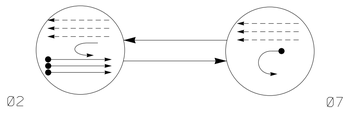
SEAL 029904 NORTH CAROLINA PROFESSIONAL ENGINEER JASON P. GALLOWAY

DocuSigned by: Jason Galloway 5/17/2024
10D1E2B40B4B48E DATE

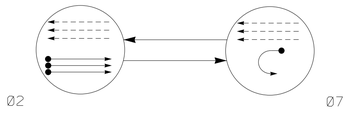
SIG. INVENTORY NO. 12-1835T1

PROJECT REFERENCE NO.	SHEET NO.
R-2307B	Sig. 19.0

DEFAULT PHASING DIAGRAM



ALTERNATE PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

DEFAULT PHASING TABLE OF OPERATION

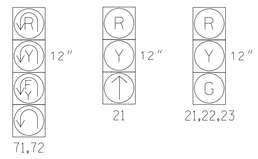
SIGNAL FACE	PHASE Ø2	PHASE Ø7	PHASE FLASH
21	↑	R	R
22, 23	G	R	R
71,72	FY	R	R

ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2	PHASE Ø7	PHASE FLASH
21	↑	R	R
22,23	G	R	R
71,72	R	R	R

SIGNAL FACE I.D.

All Heads L.E.D.



MAXTIME DETECTOR INSTALLATION CHART

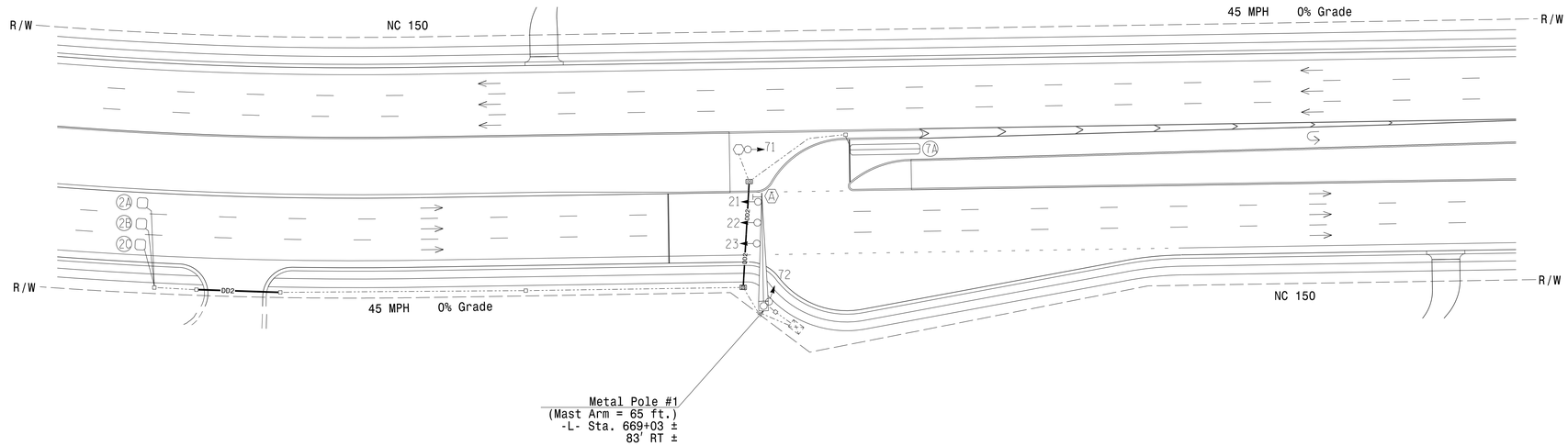
DETECTOR					PROGRAMMING						
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
2A	6X6	300	4	X	2	-	-	X	X	X	-	X
2B	6X6	300	4	X	2	-	-	X	X	X	-	X
2C	6X6	300	4	X	2	-	-	X	X	X	-	X
7A	6X40	0	2-4-2	X	7	★15.0	-	X	-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

★ Disable delay during Alternate Phasing Operation.

2 Phase
Fully Actuated w/
Alternate Phasing
NC 150 D12-02_MOORESVILLE
CLS

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2024 and "Standard Specifications for Roads and Structures" dated January 2024.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Set all detector units to presence mode.
4. The Division Traffic Engineer will determine hours of use for each phasing plan.
5. 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 2	PHASE 7
Walk *	–	–
Ped Clear *	–	–
Min Green	12	7
Passage *	6.0	2.0
Max 1 *	60	30
Yellow Change	4.5	3.0
Red Clear	1.6	4.0
Added Initial *	1.0	–
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.

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 (#) x 2" Conduit	N/A
⬡	Type II Signal Pedestal	⬢
OS	Oversized Junction Box	■
Ⓐ	No Left Turn Sign (R3-2)	Ⓐ

New Installation - Final Design

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road-Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
License No. F-0672

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

NC 150 EB
at
SR 1304 (Ervin Road) U-turn

Division 12 | Iredell County | Mooresville

PLAN DATE: May 2024 | REVIEWED BY: J Galloway, PE
PREPARED BY: J Hambright | REVIEWED BY: R Muncey, PE

SCALE 1"=40' (0 – 40)

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 029904 ENGINEER JASON P. GALLOWAY

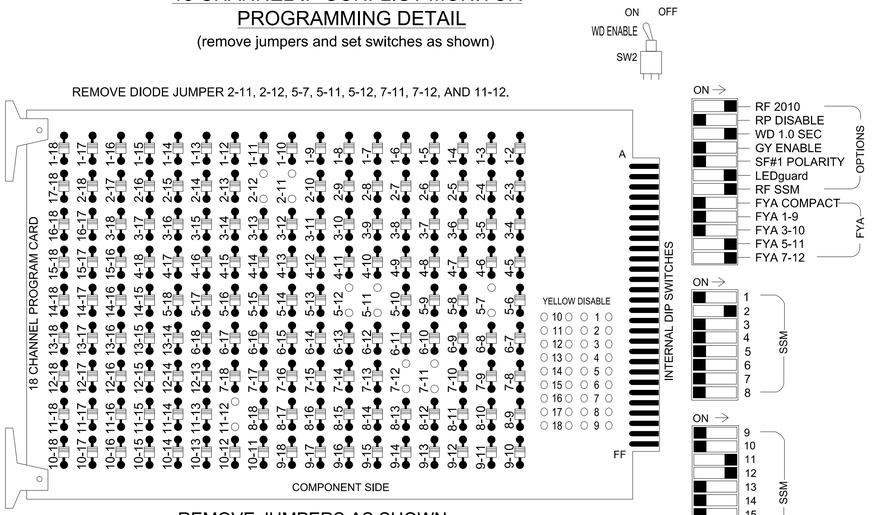
DocuSigned by: Jason Galloway 10D1E2B40B4B46E... 9/17/2024
DATE
SIG. INVENTORY NO. 12-1835

$$$$$$$S:\SDATE$$$$$$
5:10:11 PM
User:jgalloway
Style Table: MSignals@Design@MSignal Design#Final Design#R-2307B_sig_dsn_12-1835.dgn

PROJECT REFERENCE NO.	SHEET NO.
R-2307B	Sig. 19.1

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 Phase Not On.
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 NC 150 D12-02_Mooresville CLS.

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, S7, S12, S13
Phases Used.....2, 7
Overlap "1".....NOT USED
Overlap "2".....NOT USED
Overlap "3".....*
Overlap "4".....*

*See overlap programming detail on sheet 2

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2		S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2		13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2		2 PED	3	4	4 PED	7	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	NU	21	22,23	NU	NU	NU	NU	72★	NU	NU	71★	NU	NU	NU	NU	NU	72★	71★	NU
RED		128	128																
YELLOW		129	129					✳			✳								
GREEN			130																
RED ARROW																	A114	A101	
YELLOW ARROW																	A115	A102	
FLASHING YELLOW ARROW																	A116	A103	
GREEN ARROW		130						133			124								

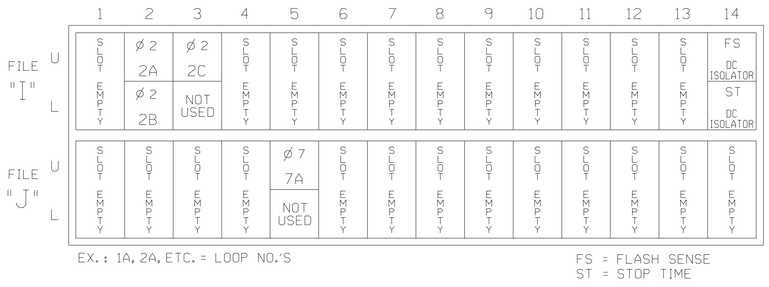
NU = Not Used

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

★ See pictorial of head wiring in detail this sheet.

INPUT FILE POSITION LAYOUT

(front view)



INPUT FILE CONNECTION & PROGRAMMING CHART

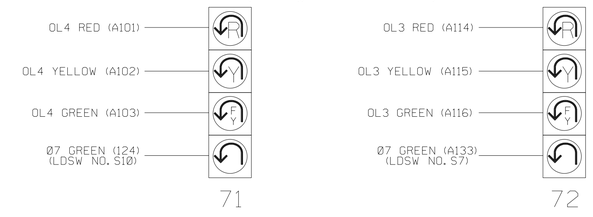
LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN
2A	TB2-5,6	I2U	39	1	2	2			X	X	X	
2B	TB2-7,8	I2L	43	5	3	2			X	X	X	
2C	TB2-9,10	I3U	63	29	4	2			X	X	X	
7A	TB5-5,6	J5U	57	19	21 *	7	15.0		X		X	

* For the detectors to work as shown on the signal design plan, see the Detector Programming Detail for Alternate Phasing on sheet 2 of 3.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)

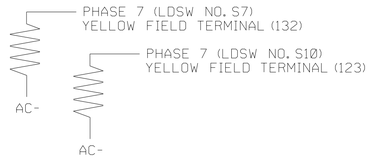


LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown below)

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: 12-1835
DESIGNED: MAY 2024
SEALED: 5/17/2024
REVISED: N/A

Final Design
Electrical Detail - Sheet 1 of 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road-Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
License No. F-0672

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

NC 150 EB
at
SR 1304 (Ervin Road) U-Turn

Division 12 | Iredell County | Mooresville

PLAN DATE:	May 2024	REVIEWED BY:	J Galloway, PE
PREPARED BY:	J Galloway	REVIEWED BY:	R Muncey, PE

REVISIONS	INIT.	DATE

SEAL 029904 NORTH CAROLINA PROFESSIONAL ENGINEER JASON P. GALLOWAY

DocuSigned by: Jason Galloway 5/17/2024
10D1E2B40B4B48E... DATE
SIG. INVENTORY NO. 12-1835

PROJECT REFERENCE NO.	SHEET NO.
R-2307B	Sig. 19.2

OUTPUT CHANNEL CONFIGURATION

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

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

Channel Configuration

NOTICE CONTROL SOURCE 7 ASSIGNED TO CHANNEL 5 →

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

MAXTIME DETECTOR PROGRAMMING DETAIL FOR ALTERNATE PHASING LOOP 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.

7A

Detector	Call Phase	Delay
21	7	0.0

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

← NOTICE INCLUDED PHASE

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 12-1835
DESIGNED: MAY 2024
SEALED: 5/17/2024
REVISED: N/A

Final Design
Electrical Detail - Sheet 2 of 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road-Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
License No. F-0672

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

NC 150 EB
at
SR 1304 (Ervin Road) U-Turn

Division 12 | Iredell County | Mooresville

PLAN DATE:	May 2024	REVIEWED BY:	J Galloway, PE
PREPARED BY:	J Galloway	REVIEWED BY:	R Muncey, PE

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA
PROFESSIONAL
SEAL
029904
ENGINEER
JASON P. GALLOWAY

DocuSigned by:
Jason Galloway 5/17/2024
10D1E2B40B4B46E... DATE
SIG. INVENTORY NO. 12-1835

PROJECT REFERENCE NO.	SHEET NO.
R-2307B	Sig. 19.3

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.

SEQUENCE DETAIL

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

Web Interface
Home >Controller >Sequence

Sequence 1

Ring	Sequence Data
1	2,a,7,b
2	

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: 12-1835
DESIGNED: MAY 2024
SEALED: 5/17/2024
REVISED: N/A

Final Design
Electrical Detail - Sheet 3 of 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road-Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
License No. F-0672

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

NC 150 EB
at
SR 1304 (Ervin Road) U-Turn

Division 12 | Iredell County | Mooresville

PLAN DATE:	May 2024	REVIEWED BY:	J Galloway, PE
PREPARED BY:	J Galloway	REVIEWED BY:	R Muncey, PE

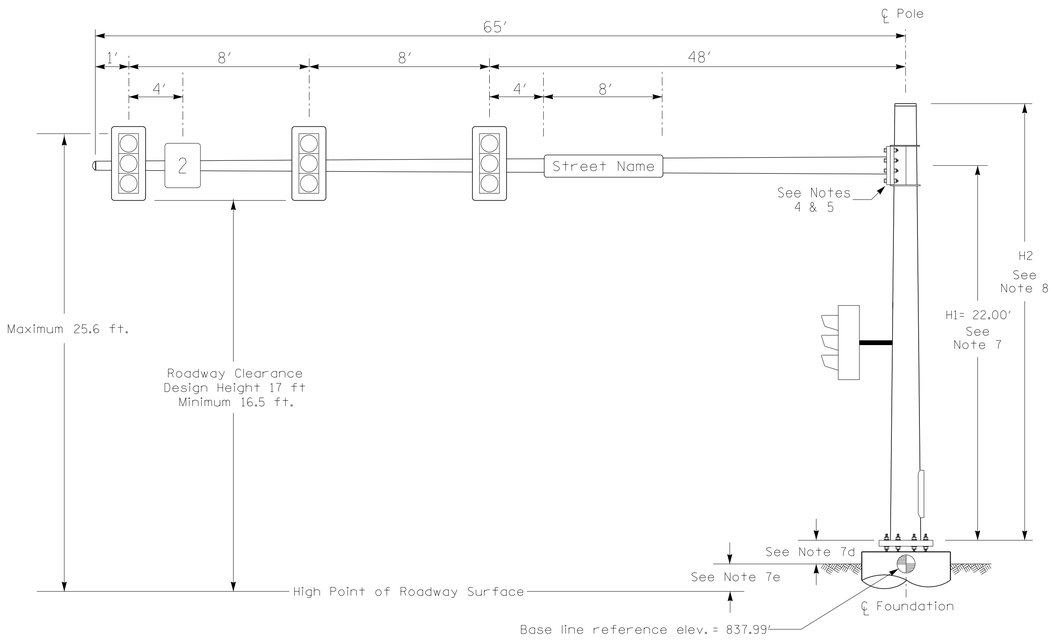
REVISIONS	INIT.	DATE

SEAL 029904 ENGINEER JASON P. GALLOWAY NORTH CAROLINA PROFESSIONAL

DocuSigned by: Jason Galloway 5/17/2024
10D1E2B40B4B48E... DATE

SIG. INVENTORY NO. 12-1835

Design Loading for METAL POLE NO. 1



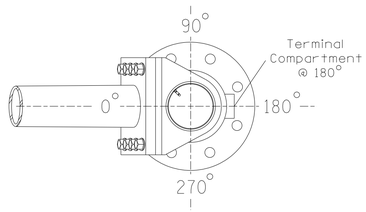
Elevation View

SPECIAL NOTE

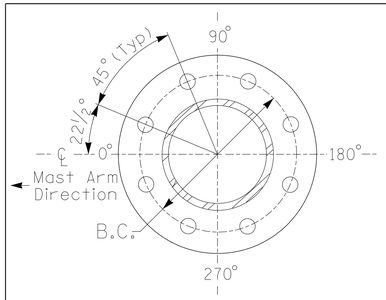
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 1	
Baseline reference point at ℄ Foundation @ ground level	837.99 ft.	
Elevation difference at High point of roadway surface	+2.96 ft.	
Elevation difference at Edge of travelway or face of curb	+/-0.0 ft.	

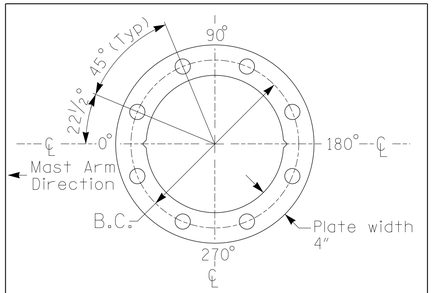


POLE RADIAL ORIENTATION



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-2307B	Sig. 19.4

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	RIGID MOUNTED SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE	9.3 S.F.	25.5"W X 52.5"L	60 LBS
2	SIGN RIGID MOUNTED	7.5 S.F.	30.0"W X 36.0"L	14 LBS
Street Name	STREET NAME SIGN RIGID MOUNTED	16.0 S.F.	24.0"W X 96.0"L	36 LBS

NOTES

DESIGN REFERENCE MATERIAL

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

DESIGN REQUIREMENTS

2. Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
3. Design all signal supports using force ratios that do not exceed 0.9.
4. 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 5 (110 mph)

Stantec

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

NC 150 EB
at
SR 1304 (Ervin Road) U-turn

Division 12 Iredell County Mooresville

PLAN DATE: November 2023 REVIEWED BY: J. Galloway, PE
PREPARED BY: J. Hambright REVIEWED BY: R. Muncey, PE

SCALE 0 N/A N/A

REVISIONS	INIT.	DATE

NORTH CAROLINA PROFESSIONAL SEAL 029904 ENGINEER JASON M. GALLOWAY

DocuSigned by: Jason Galloway 5/17/2024
DATE

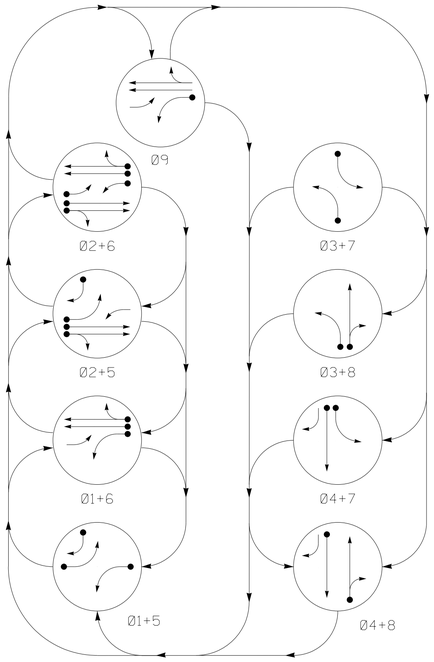
SIG. INVENTORY NO. 12-1835

5/16/2024
3:11:52 PM
\\stantec.com\projects\Signals\Design\Metal Poles\Loading Diagrams\Loading Diagram_Single Mast Arm_12-1835.dgn
User:jgalloway

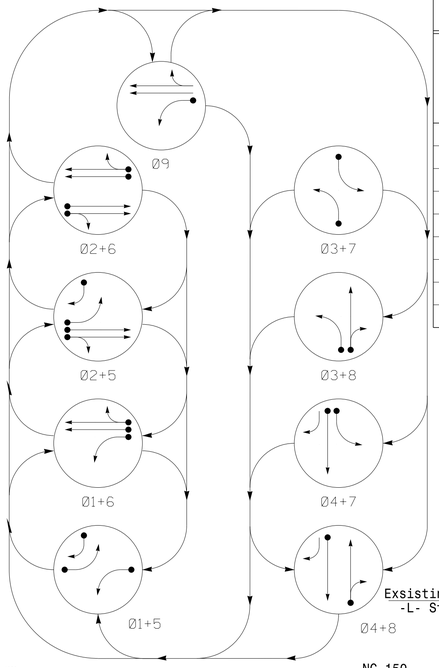
PROJECT REFERENCE NO.	SHEET NO.
R-2307B	Sig. 20.0

9 Phase Fully Actuated w/ Alternate Phasing NC 150 D12-02_MOORESVILLE CLS

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	Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø9	Ø3+7	Ø3+8	Ø4+7	Ø4+8	FLASH
11	←●	←	←F/Y	←F/Y	←	←R	←R	←R	←R	←R
21,22	R	R	G	G	R	R	R	R	R	R
31	←R	←R	←R	←R	←	←R	←R	←R	←R	←R
41	R	R	R	R	R	R	R	G	G	R
42	R/←	R	R/←	R	R	R	R	G	G	R
51	←●	←F/Y	←	←F/Y	←F/Y	←R	←R	←R	←R	←R
61,62	R	G	R	G	G	R	R	R	R	R
71	←R	←R	←R	←R	←	←R	←R	←R	←R	←R
81,82	R	R	R	R	R	R	R	G	R	G

ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø9	Ø3+7	Ø3+8	Ø4+7	Ø4+8	FLASH
11	←●	←	←R	←R	←	←R	←R	←R	←R	←R
21,22	R	R	G	G	R	R	R	R	R	R
31	←R	←R	←R	←R	←	←R	←R	←R	←R	←R
41	R	R	R	R	R	R	R	G	G	R
42	R/←	R	R/←	R	R	R	R	G	G	R
51	←●	←R	←	←R	←R	←R	←R	←R	←R	←R
61,62	R	G	R	G	G	R	R	R	R	R
71	←R	←R	←R	←R	←	←R	←R	←R	←R	←R
81,82	R	R	R	R	R	R	G	R	G	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
1A	6X40	0	✳	✳	1/9	15.0★	-	X	-	X	-	✳
					6#	3.0	-	X	-	X	X	✳
2A	6X6	300	✳	✳	2	-	-	X	-	X	-	✳
2B	6X40	0	✳	✳	2	5.0	2.0	X	-	X	X	✳
2C	6X40	0	✳	✳	2	5.0	2.0	X	-	X	X	✳
3A	6X40	0	✳	✳	3	-	-	X	-	X	-	✳
4A	6X40	0	✳	✳	4	-	-	X	-	X	-	✳
5A	6X40	0	✳	✳	5	15.0★	-	X	-	X	-	✳
					2#	3.0	-	X	-	X	X	✳
5B	6X40	0	✳	✳	5	15.0	-	X	-	X	-	✳
6A	6X6	300	✳	✳	6	-	-	X	-	X	-	✳
6B	6X6	300	✳	✳	6	-	-	X	-	X	-	✳
6C	6X40	0	✳	✳	6	5.0	2.0	X	-	X	X	✳
6D	6X40	0	✳	✳	6	5.0	2.0	X	-	X	X	✳
7A	6X40	0	✳	✳	7	-	-	X	-	X	-	✳
8A	6X40	0	✳	✳	8	10.0	-	X	-	X	-	✳

✳ Video Detection Area
Camera locations should be confirmed in the field by the contractor in order to provide detection of the areas indicated.

Disable Phase(s) call during Alternate Phasing Operation.

★ Disable delay during Alternate Phasing Operation.

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2024 and "Standard Specifications for Roads and Structures" dated January 2024.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 and/or phase 5 may be lagged.
4. Phase 3 and/or phase 7 may be lagged.
5. Set all detector units to presence mode.
6. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
7. This signal utilizes a special ring configuration. See electrical details.
8. Phase 9 is used only during coordination.
9. The Division Traffic Engineer will determine hours of use for each phasing plan.
10. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
11. Field adjust temporary poles as needed.
12. See TMP Phase I For Pedestrian detour and sidewalk closures.

MAXTIME TIMING CHART

FEATURE	PHASE										
	1	2	3	4	5	6	7	8	9	OL7 (1+9)	OL8 (6+9)
Walk *	–	–	–	–	–	–	–	–	–		
Ped Clear *	–	–	–	–	–	–	–	–	–		
Min Green	7	12	7	7	7	12	7	7	7	0	0
Passage *	2.0	6.0	2.0	2.0	20	6.0	2.0	2.0	2.0		
Max 1 *	15	90	15	35	15	90	15	35	30		
Yellow Change	3.0	4.7	3.0	4.1	3.0	4.7	3.0	3.6	3.0	3.0	4.7
Red Clear	3.6	1.9	3.3	2.0	3.4	1.9	3.2	2.2	3.6	3.6	1.9
Added Initial *	–	–	–	–	–	–	–	–	–		
Maximum Initial *	–	–	–	–	–	–	–	–	–		
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	X	X	X	X		
Vehicle Recall	–	MIN RECALL	–	–	–	MIN RECALL	–	–	–		
Dual Entry	–	–	–	–	–	–	–	–	–		

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

LEGEND

PROPOSED		EXISTING
●→	Traffic Signal Head	●→
◐→	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 Area	N/A
▬	Construction Zone	N/A
● ● ●	Drums	N/A
Ⓐ	"DO NOT BLOCK INTERSECTION" Sign (R10-7)	Ⓐ

SIGNAL FACE I.D.

All Heads L.E.D.

Signal Upgrade
Temporary Design 1 - TMP Phase I

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road-Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
License No. F-0672

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

NC 150
at SR 1304 (Ervin Road) /
Morrison Plantation Parkway

Division 12 Iredell County Mooresville

PLAN DATE:	May 2024	REVIEWED BY:	J Galloway, PE
PREPARED BY:	J Hambright	REVIEWED BY:	R Muncey, PE

SCALE 0 40 1"=40'

REVISIONS	INIT.	DATE

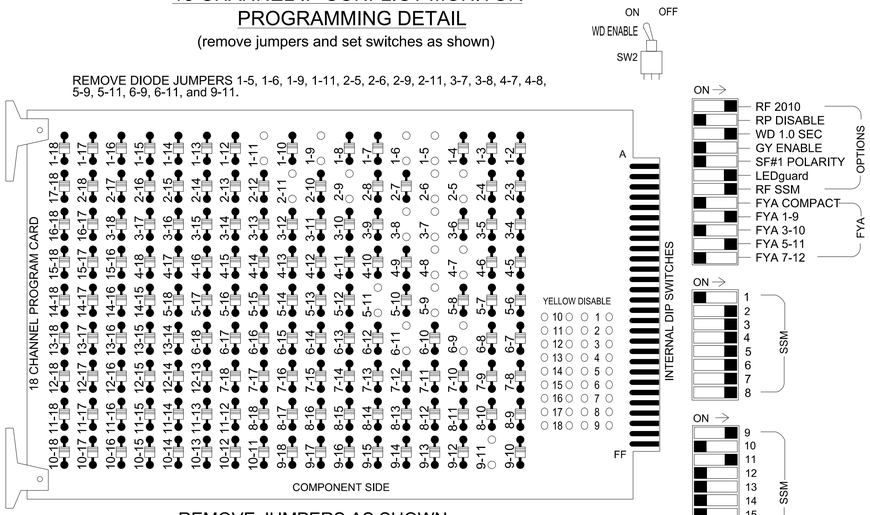
SEAL 029904 NORTH CAROLINA PROFESSIONAL ENGINEER JASON P. GALLOWAY

DocuSigned by: Jason Galloway 5/17/2024
10D1E2B40B4B4CE DATE
SIG. INVENTORY NO. 12-16701

PROJECT REFERENCE NO.	SHEET NO.
R-2307B	Sig. 20.1

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 NC 150 D12-02_Mooresville CLS.

EQUIPMENT INFORMATION

Controller.....2070LX
Cabinet.....332 w/ Aux
Software.....Q-Free MAXTIME
Cabinet Mount.....Base
Output File Positions.....18 With Aux. Output File
Load Switches Used.....S1, S2, S4, S5, S7, S8, S10, S11, AUX S1, AUX S4
Phases Used.....1, 2, 3, 4, 5, 6, 7, 8,9**
Overlap "1".....*
Overlap "2".....NOT USED
Overlap "3".....*
Overlap "4".....NOT USED
Overlap "7".....*
Overlap "8".....*

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

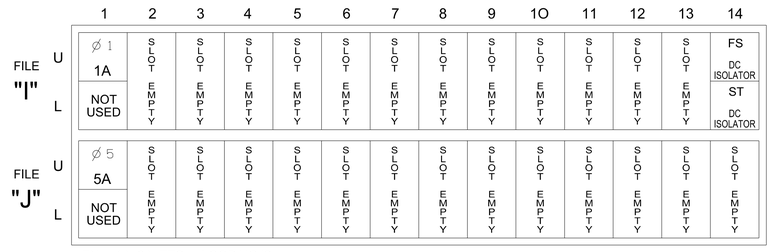
SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7		S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5		6	15	7	8	16	9	10	17	11	12	18
PHASE	OL7	2	2 PED	3	4	4 PED	5		OL8	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	11★	21,22	NU	31	41,42	NU	42	51★	61,62	NU	71	81,82	NU	11★	NU	NU	51★	NU	NU
RED		128			101			*	134			107							
YELLOW	*	129			102				135			108							
GREEN		130			103				136			109							
RED ARROW				116							122			A121			A114		
YELLOW ARROW				117			132				123			A122			A115		
FLASHING YELLOW ARROW														A123			A116		
GREEN ARROW	127			118			133	133			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)



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 *	1/9	15.0		X		X	
				-	29 *	6	3.0		X		X	X
5A	TB3-1,2	J1U	55	17	15 *	5	15.0		X		X	
				-	31 *	2	3.0		X		X	X

* For the detectors to work as shown on the signal design plan, see the Detector Programming Detail for Alternate Phasing on sheet 3 of 3.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

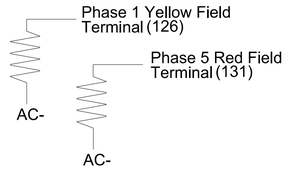
DETECTOR NOTES

1. For all loops install a video detection system for vehicle detection. Perform installation according to manufacturer's directions and NCDOT engineer-approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.
2. For loops 1A and 5A detector card placements and slots reserved for wired inputs are typical for a NCDOT installation. Inputs associated with these slots are compatible with time of day instructions located on sheets 2 and 3 of this electrical detail.

LOAD RESISTOR INSTALLATION DETAIL

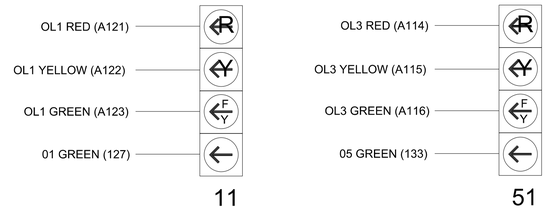
(install resistors as shown)

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



FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 12-1670T1
DESIGNED: MAY 2024
SEALED: 5/17/2024
REVISED: N/A

Temporary Design 1 - TMP Phase I
Electrical Detail - Sheet 1 of 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road-Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
License No. F-0672

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

NC 150
at SR 1304 (Erwin Road)/
Morrison Plantation Parkway

Division 12 Iredell County Mooresville

PLAN DATE:	May 2024	REVIEWED BY:	J Galloway, PE
PREPARED BY:	JPG/RMM	REVIEWED BY:	R Muncey, PE

REVISIONS	INIT.	DATE

SEAL 029904 ENGINEER JASON P. GALLOWAY NORTH CAROLINA PROFESSIONAL

DocuSigned by:
Jason Galloway 5/17/2024
10D1E2B40B4B46E...
SIG. INVENTORY NO. 12-1670TI

PROJECT REFERENCE NO.	SHEET NO.
R-2307B	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	1	3	7	8
Type	FYA 4 - Section	FYA 4 - Section	Normal	Normal
Included Phases	2	6,9	1,9	6,9
Modifier Phases	1,9	5	-	-
Modifier Overlaps	-	-	-	-
Trail Green	0	0	0	0
Trail Yellow	0.0	0.0	3.0	4.7
Trail Red	0.0	0.0	3.6	1.9

MAXTIME OVERLAP PROGRAMMING DETAIL FOR ALTERNATE PHASING

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

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

Overlap Plan 2

Overlap	1	3
Type	FYA 4 - Section	FYA 4 - Section
Included Phases	-	-
Modifier Phases	1,9	5
Modifier Overlaps	-	-
Trail Green	0	0
Trail Yellow	0.0	0.0
Trail Red	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	Overlap	7		X	X	1
2	Phase Vehicle	2		X		2
3	Phase Vehicle	3		X	X	3
4	Phase Vehicle	4		X		4
5	Phase Vehicle	5		X		5
6	Overlap	8		X	X	6
7	Phase Vehicle	7		X		7
8	Phase Vehicle	8		X	X	8
9	Overlap	1		X	X	9
10	Overlap	2		X	X	10
11	Overlap	3		X		11
12	Overlap	4		X		12
13	Phase Ped	2				13
14	Phase Ped	4				14
15	Phase Ped	6				15
16	Phase Ped	8				16
17	Overlap	5		X	X	17
18	Overlap	6		X		18

NOTICE CONTROL TYPE & CONTROL SOURCE →

NOTICE CONTROL TYPE & CONTROL SOURCE →

SEQUENCE PARAMETERS

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

Web Interface
Home >Controller >Sequence

Sequence 1

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

Sequence 2

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

Phase Sequence Plan 2 is for use during coordination only

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 12-1670T1
DESIGNED: MAY 2024
SEALED: 5/17/2024
REVISED: N/A

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

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road-Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
License No. F-0672

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

NC 150
at SR 1304 (Erwin Road)/
Morrison Plantation Parkway

Division 12 | Iredell County | Mooresville

PLAN DATE:	May 2024	REVIEWED BY:	J Galloway, PE
PREPARED BY:	JPG/RMM	REVIEWED BY:	R Muncey, PE

REVISIONS	INIT.	DATE

SEAL 029904 NORTH CAROLINA PROFESSIONAL ENGINEER JASON P. GALLOWAY

DocuSigned by: Jason Galloway 5/17/2024
10D1E2B40B4B46E...
SIG. INVENTORY NO. 12-1670T1

5:13:17 PM
User:jpgalloway
C:\Users\jpgalloway\Documents\Signals\Design\Electrical Details\Temporary Design\MAXTIME\R-2307B_sm_ele_12-1670t1.dgn

PROJECT REFERENCE NO.	SHEET NO.
R-2307B	Sig. 20.3

MAXTIME ALTERNATE PHASING ACTIVATION DETAIL

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

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

ALTERNATE PHASING CHANGE SUMMARY

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

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

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

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

MAXTIME ALTERNATE PHASING PATTERN PROGRAMMING DETAIL

Front Panel
Main Menu >Controller >Coordination >Patterns

Web Interface
Home >Controller >Coordination >Patterns

Pattern Parameters

Pattern	Veh Det Plan	Overlap Plan
*	2	2

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

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

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

Web Interface
Home >Controller >Detector Configuration >Vehicle Detectors

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

Plan 2

1A

Detector	Call Phase	Delay
1	1	0.0
29	0	-

5A

Detector	Call Phase	Delay
15	5	0.0
31	0	-

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 12-1670T1
DESIGNED: MAY 2024
SEALED: 5/17/2024
REVISED: N/A

Temporary Design 1 - TMP Phase I
Electrical Detail - Sheet 3 of 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road-Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
License No. F-0672

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

NC 150
at SR 1304 (Erwin Road)/
Morrison Plantation Parkway

Division 12 | Iredell County | Mooresville

PLAN DATE:	May 2024	REVIEWED BY:	J Galloway, PE
PREPARED BY:	JPG/RMM	REVIEWED BY:	R Muncey, PE

REVISIONS	INIT.	DATE

SEAL 029904 NORTH CAROLINA PROFESSIONAL ENGINEER JASON P. GALLOWAY

DocuSigned by:
Jason Galloway 5/17/2024
10D1E2B40B4B46E...
SIG. INVENTORY NO. 12-1670T1

5:13:27 PM
User:jgalloway
Z:\Projects\Designs\Design\Electrical Details\Temporary Design\MAXTIME\R-2307B_sm_ele_12-1670t1.dgn

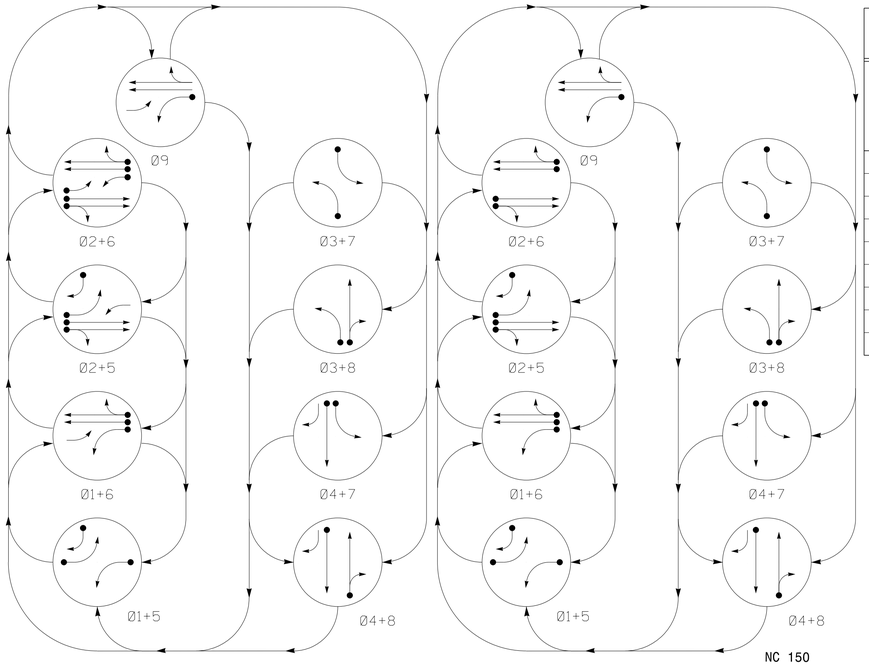
PROJECT REFERENCE NO.	SHEET NO.
R-2307B	Sig. 21.0

9 Phase Fully Actuated w/ Alternate Phasing NC 150 D12-02_MOORESVILLE CLS

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2024 and "Standard Specifications for Roads and Structures" dated January 2024.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 and/or phase 5 may be lagged.
4. Phase 3 and/or phase 7 may be lagged.
5. Set all detector units to presence mode.
6. Reposition existing signal heads numbered # 31,41,42,71,81, and 82.
7. This signal utilizes a special ring configuration. See electrical details.
8. Phase 9 is used only during coordination.
9. The Division Traffic Engineer will determine the hours of use for each phasing plan.
10. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
11. See TMP Phase II for pedestrian detour and sidewalk closures.

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								
	Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø9	Ø3+7	Ø3+8	Ø4+7	Ø4+8	FLASH
11	←●	←	F	F	←	R	R	R	R	R
21,22	R	R	G	G	R	R	R	R	R	R
31	R	R	R	R	←	←	R	R	R	R
41	R	R	R	R	R	R	G	G	R	R
42	R	R	R	R	R	R	G	G	R	R
51	←	F	←	F	F	R	R	R	R	R
61,62	R	G	R	G	G	R	R	R	R	R
71	R	R	R	R	←	R	←	R	R	R
81,82	R	R	R	R	R	G	R	G	R	R

ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE								
	Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø9	Ø3+7	Ø3+8	Ø4+7	Ø4+8	FLASH
11	←●	←	R	R	←	R	R	R	R	R
21,22	R	R	G	G	R	R	R	R	R	R
31	R	R	R	R	R	←	←	R	R	R
41	R	R	R	R	R	R	G	G	R	R
42	R	R	R	R	R	R	G	G	R	R
51	←	R	←	R	R	R	R	R	R	R
61,62	R	G	R	G	G	R	R	R	R	R
71	R	R	R	R	R	←	R	←	R	R
81,82	R	R	R	R	R	G	R	G	R	R

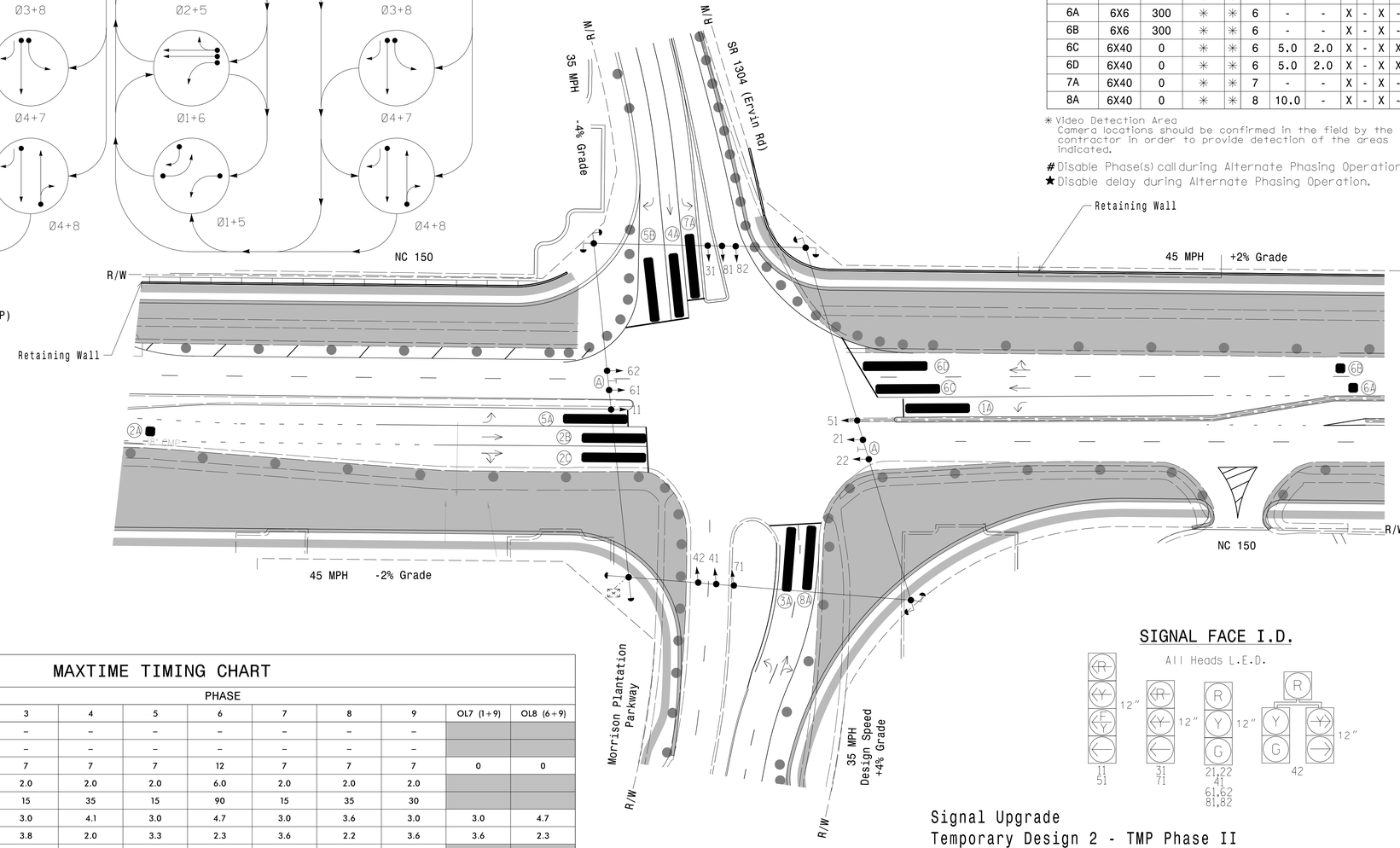
MAXTIME DETECTOR INSTALLATION CHART

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
1A	6X40	0	✳	✳	1/9	15.0★	-	X	-	X	-	✳
					6#	3.0	-	X	-	X	X	✳
2A	6X6	300	✳	✳	2	-	-	X	-	X	-	✳
2B	6X40	0	✳	✳	2	5.0	2.0	X	-	X	X	✳
2C	6X40	0	✳	✳	2	5.0	2.0	X	-	X	X	✳
3A	6X40	0	✳	✳	3	-	-	X	-	X	-	✳
4A	6X40	0	✳	✳	4	-	-	X	-	X	-	✳
5A	6X40	0	✳	✳	5	15.0★	-	X	-	X	-	✳
					2#	3.0	-	X	-	X	X	✳
5B	6X40	0	✳	✳	5	15.0	-	X	-	X	-	✳
6A	6X6	300	✳	✳	6	-	-	X	-	X	-	✳
6B	6X6	300	✳	✳	6	-	-	X	-	X	-	✳
6C	6X40	0	✳	✳	6	5.0	2.0	X	-	X	X	✳
6D	6X40	0	✳	✳	6	5.0	2.0	X	-	X	X	✳
7A	6X40	0	✳	✳	7	-	-	X	-	X	-	✳
8A	6X40	0	✳	✳	8	10.0	-	X	-	X	-	✳

✳ Video Detection Area
Camera locations should be confirmed in the field by the contractor in order to provide detection of the areas indicated.

Disable Phase(s) call during Alternate Phasing Operation.

★ Disable delay during Alternate Phasing Operation.



MAXTIME TIMING CHART

FEATURE	PHASE										
	1	2	3	4	5	6	7	8	9	OL7 (1+9)	OL8 (6+9)
Walk *	–	–	–	–	–	–	–	–	–		
Ped Clear *	–	–	–	–	–	–	–	–	–		
Min Green	7	12	7	7	7	12	7	7	7	0	0
Passage *	2.0	6.0	2.0	2.0	2.0	6.0	2.0	2.0	2.0		
Max 1 *	15	90	15	35	15	90	15	35	30		
Yellow Change	3.0	4.7	3.0	4.1	3.0	4.7	3.0	3.6	3.0	3.0	4.7
Red Clear	3.6	2.3	3.8	2.0	3.3	2.3	3.6	2.2	3.6	3.6	2.3
Added Initial *	–	–	–	–	–	–	–	–	–		
Maximum Initial *	–	–	–	–	–	–	–	–	–		
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	X	X	X	X		
Vehicle Recall	–	MIN RECALL	–	–	–	MIN RECALL	–	–	–		
Dual Entry	–	–	–	–	–	–	–	–	–		

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

SIGNAL 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 Area	N/A
▬	Construction Zone	N/A
●●●	Drums	N/A
Ⓐ	"DO NOT BLOCK INTERSECTION" Sign (R10-7)	Ⓐ

Signal Upgrade
Temporary Design 2 - TMP Phase II

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road-Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
License No. F-0672

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

NC 150
at SR 1304 (Erwin Road) /
Morrison Plantation Parkway

Division 12 Iredell County Mooresville

PLAN DATE:	May 2024	REVIEWED BY:	J Galloway, PE
PREPARED BY:	J Hambright	REVIEWED BY:	R Muncey, PE

SCALE 0 40

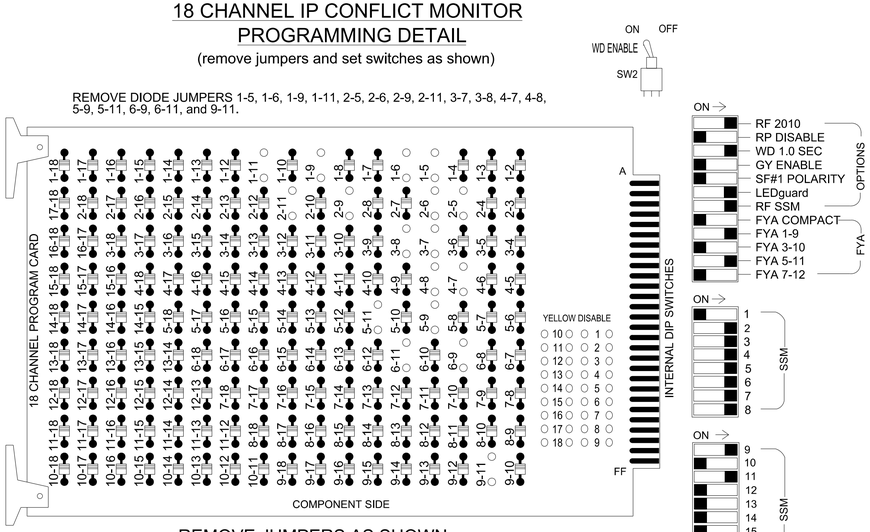
REVISIONS	INIT.	DATE

SEAL NORTH CAROLINA PROFESSIONAL SEAL 029904 ENGINEER JASON A GALLOWAY

DocuSigned by: Jason Galloway 5/17/2024
10D1E2B40B4B46E...
SIG. INVENTORY NO. 12-167072

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 NC 150 D12-02_Mooresville CLS.

EQUIPMENT INFORMATION

Controller.....2070LX
Cabinet.....332 w/ Aux
Software.....Q-Free MAXTIME
Cabinet Mount.....Base
Output File Positions.....18 With Aux. Output File
Load Switches Used.....S1, S2, S4, S5, S7, S8, S10, S11, AUX S1, AUX S4
Phases Used.....1, 2, 3, 4, 5, 6, 7, 8,9**
Overlap "1".....*
Overlap "2".....NOT USED
Overlap "3".....*
Overlap "4".....NOT USED
Overlap "7".....*
Overlap "8".....*

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

PROJECT REFERENCE NO.	SHEET NO.
R-2307B	Sig. 21.1

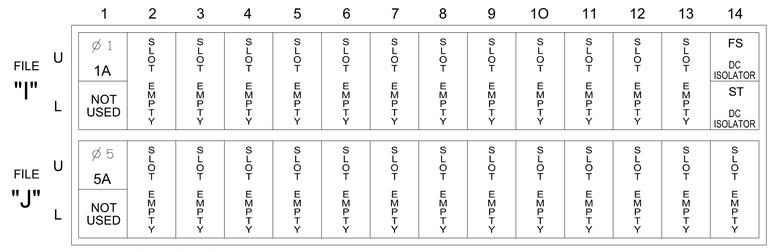
SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7		S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5		6	15	7	8	16	9	10	17	11	12	18
PHASE	OL7	2	2 PED	3	4	4 PED	5		OL8	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	11★	21,22	NU	31	41,42	NU	42	51★	61,62	NU	71	81,82	NU	11★	NU	NU	51★	NU	NU
RED		128			101			*	134			107							
YELLOW	*	129			102				135			108							
GREEN		130			103				136			109							
RED ARROW				116							122			A121			A114		
YELLOW ARROW				117			132				123			A122			A115		
FLASHING YELLOW ARROW														A123			A116		
GREEN ARROW	127			118			133	133			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)



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 *	1/9	15.9		X		X	
				-	29 *	6	3.0		X		X	X
5A	TB3-1,2	J1U	55	17	15 *	5	15.0		X		X	
				-	31 *	2	3.0		X		X	X

* For the detectors to work as shown on the signal design plan, see the Detector Programming Detail for Alternate Phasing on sheet 3 of 3.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

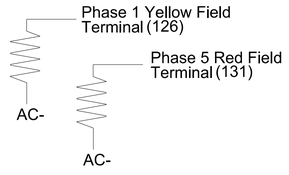
DETECTOR NOTES

1. For all loops install a video detection system for vehicle detection. Perform installation according to manufacturer's directions and NCDOT engineer-approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.
2. For loops 1A and 5A, detector card placement is typical for a NCDOT installation.Detection associated with these slots are compatible with the Vehicle Detector Programming located on sheet 2 and 3 of this electrical detail.

LOAD RESISTOR INSTALLATION DETAIL

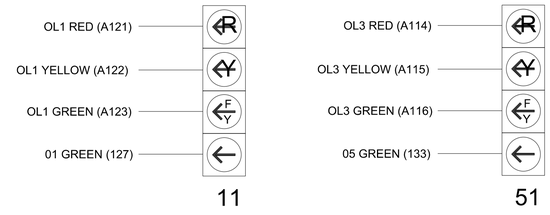
(install resistors as shown)

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



FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 12-1670T2
DESIGNED: MAY 2024
SEALED: 5/17/2024
REVISED: N/A

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

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road-Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
License No. F-0672

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

NC 150
at SR 1304 (Ervin Road)/
Morrison Plantation Parkway

Division 12 Iredell County Mooresville

PLAN DATE:	May 2024	REVIEWED BY:	J Galloway, PE
PREPARED BY:	JPG/RMM	REVIEWED BY:	R Muncey, PE

REVISIONS	INIT.	DATE

SEAL NORTH CAROLINA PROFESSIONAL SEAL 029904 ENGINEER JASON P. GALLOWAY

DocuSigned by: Jason Galloway 5/17/2024
10D1E2B40B4B46E...

SIG. INVENTORY NO. T2-1670T2

5:14:17 PM
\\stantec.com\projects\Designs\Design\Electrical Details*Temporary Designs\MAXTIME\R-2307B_sm_ele_12-1670t2.dgn
User:jgalloway

PROJECT REFERENCE NO.	SHEET NO.
R-2307B	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	1	3	7	8
Type	FYA 4 - Section	FYA 4 - Section	Normal	Normal
Included Phases	2	6,9	1,9	6,9
Modifier Phases	1,9	5	-	-
Modifier Overlaps	-	-	-	-
Trail Green	0	0	0	0
Trail Yellow	0.0	0.0	3.0	4.7
Trail Red	0.0	0.0	3.6	1.9

MAXTIME OVERLAP PROGRAMMING DETAIL FOR ALTERNATE PHASING

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

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

Overlap Plan 2

Overlap	1	3
Type	FYA 4 - Section	FYA 4 - Section
Included Phases	-	-
Modifier Phases	1,9	5
Modifier Overlaps	-	-
Trail Green	0	0
Trail Yellow	0.0	0.0
Trail Red	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

NOTICE CONTROL TYPE & CONTROL SOURCE

NOTICE CONTROL TYPE & CONTROL SOURCE

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

SEQUENCE PARAMETERS

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

Web Interface
Home >Controller >Sequence

Sequence 1

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

Sequence 2

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

Phase Sequence Plan 2 is for use during coordination only

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 12-1670T2
DESIGNED: MAY 2024
SEALED: 5/17/2024
REVISED: N/A

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

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road-Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
License No. F-0672

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

NC 150
at SR 1304 (Erwin Road)/
Morrison Plantation Parkway

Division 12 | Iredell County | Mooresville

PLAN DATE:	May 2024	REVIEWED BY:	J Galloway, PE
PREPARED BY:	JPG/RMM	REVIEWED BY:	R Muncey, PE

REVISIONS	INIT.	DATE

SEAL 029904 NORTH CAROLINA PROFESSIONAL ENGINEER JASON P. GALLOWAY

DocuSigned by: Jason Galloway 5/17/2024
10D1E2B40B4B46E...
SIG. INVENTORY NO. 12-1670T2

5:15:31 PM
User:jpgalloway
S:\Traffic\Signals\Design\Electrical Details\Temporary Design\MAXTIME\R-2307B_sm_ele_12-1670T2.dgn

PROJECT REFERENCE NO.	SHEET NO.
R-2307B	Sig. 21.3

MAXTIME ALTERNATE PHASING ACTIVATION DETAIL

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

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

ALTERNATE PHASING CHANGE SUMMARY

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

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

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

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

MAXTIME ALTERNATE PHASING PATTERN PROGRAMMING DETAIL

Front Panel
Main Menu >Controller >Coordination >Patterns

Web Interface
Home >Controller >Coordination >Patterns

Pattern Parameters

Pattern	Veh Det Plan	Overlap Plan
*	2	2

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

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

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

Web Interface
Home >Controller >Detector Configuration >Vehicle Detectors

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

Plan 2

1A

Detector	Call Phase	Delay
1	1	0.0
29	0	-

5A

Detector	Call Phase	Delay
15	5	0.0
31	0	-

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 12-1670T2
DESIGNED: MAY 2024
SEALED: 5/17/2024
REVISED: N/A

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

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road-Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
License No. F-0672

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

NC 150
at SR 1304 (Erwin Road)/
Morrison Plantation Parkway

Division 12 | Iredell County | Mooresville

PLAN DATE:	May 2024	REVIEWED BY:	J Galloway, PE
PREPARED BY:	JPG/RMM	REVIEWED BY:	R Muncey, PE

REVISIONS	INIT.	DATE

SEAL 029904 NORTH CAROLINA PROFESSIONAL ENGINEER JASON P. GALLOWAY

DocuSigned by: Jason Galloway 5/17/2024
10D1E2B40B4B46E...

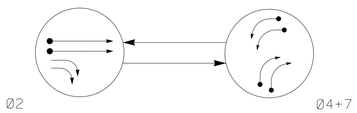
SIG. INVENTORY NO. T2-1670T2

5:16:16 PM
User:jgalloway
Users\jgalloway\Designs\Design\Electrical Details\Temporary Design\MAXTIME\MR-2307B_sm_ele_12-1670t2.dgn

PROJECT REFERENCE NO.	SHEET NO.
R-2307B	Sig. 22.0

2 Phase
Fully Actuated
NC 150 D12-02_MOORESVILLE
CLS

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

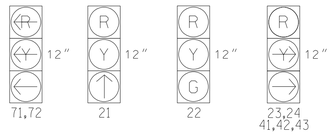
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2	PHASE Ø4+7	PHASE FLASH
21	↑	R	R
22	G	R	R
23,24	→	R	R
41,42,43	R	→	R
71,72	←R	←R	←R

SIGNAL FACE I.D.

All Heads L.E.D.



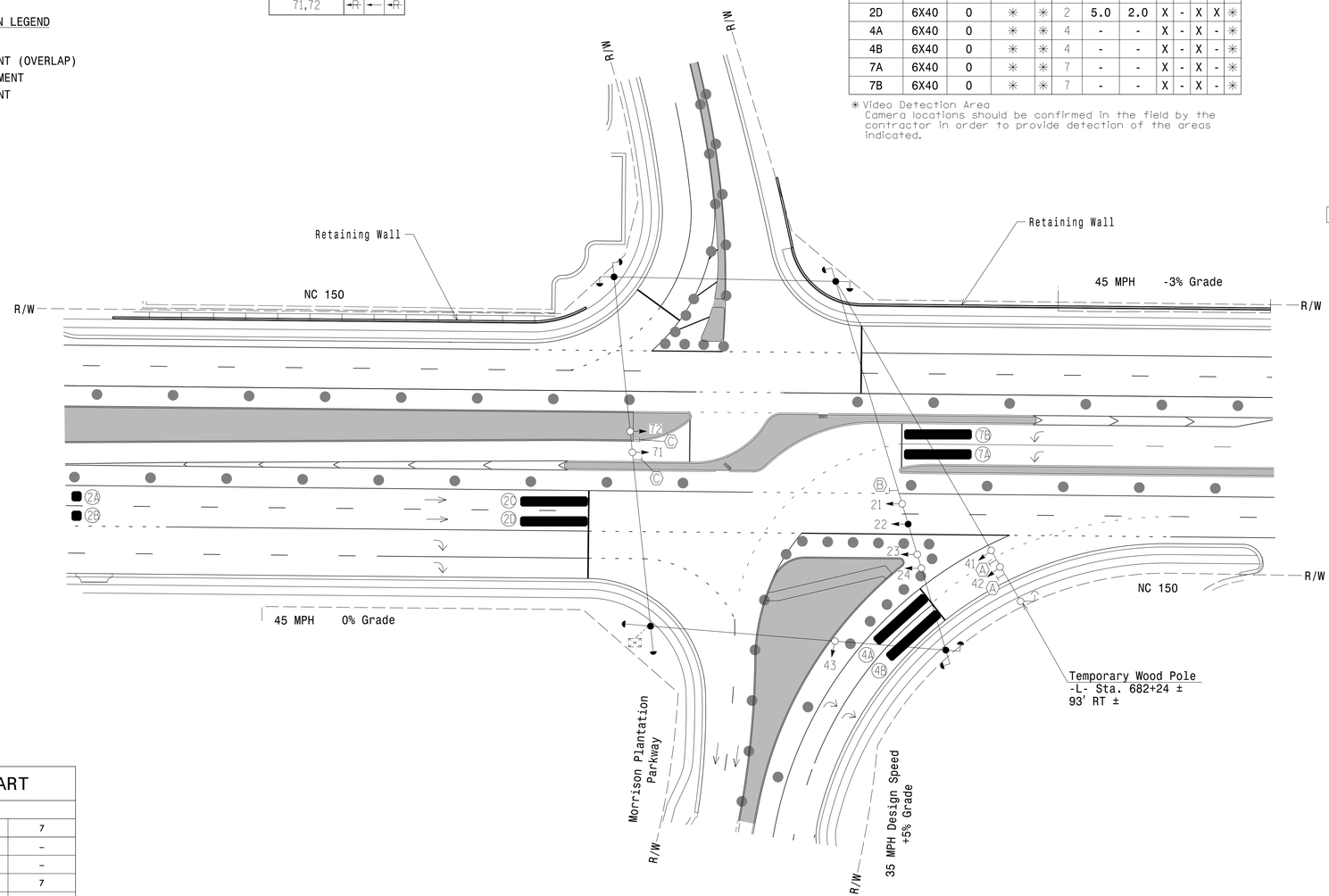
MAXTIME DETECTOR INSTALLATION CHART

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
2A	6X6	300	✳	✳	2	-	-	X	-	X	-	✳
2B	6X6	300	✳	✳	2	-	-	X	-	X	-	✳
2C	6X40	0	✳	✳	2	5.0	2.0	X	-	X	X	✳
2D	6X40	0	✳	✳	2	5.0	2.0	X	-	X	X	✳
4A	6X40	0	✳	✳	4	-	-	X	-	X	-	✳
4B	6X40	0	✳	✳	4	-	-	X	-	X	-	✳
7A	6X40	0	✳	✳	7	-	-	X	-	X	-	✳
7B	6X40	0	✳	✳	7	-	-	X	-	X	-	✳

✳ Video Detection Area
Camera locations should be confirmed in the field by the contractor in order to provide detection of the areas indicated.

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. Reposition existing signal head number #22.
5. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
6. See TMP Phase III for pedestrian detour and sidewalk closures.
7. Field adjust temporary pole as needed.



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 Area	N/A
▬	Construction Zone	N/A
● ● ●	Drums	N/A
Ⓐ	No Turn on Red Sign (R10-11)	Ⓐ
Ⓑ	No Left Turn Sign (R3-2)	Ⓑ
Ⓒ	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 *	60	30	30
Yellow Change	4.5	3.3	3.0
Red Clear	3.6	3.1	3.9
Added Initial *	–	–	–
Maximum Initial *	–	–	–
Time Before Reduction *	15	–	–
Time To Reduce *	30	–	–
Minimum Gap	3.0	–	–
Advance Walk	–	–	–
Non Lock Detector	X	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 3 - TMP Phase III

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road-Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
License No. F-0672

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'

NC 150 EB
at
Morrison Plantation Parkway

Division 12 Iredell County Mooresville

PLAN DATE: May 2024 REVIEWED BY: J Galloway, PE
PREPARED BY: J Hambright REVIEWED BY: R Muncey, PE

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA
PROFESSIONAL
SEAL 029904
ENGINEER
JASON P. GALLOWAY

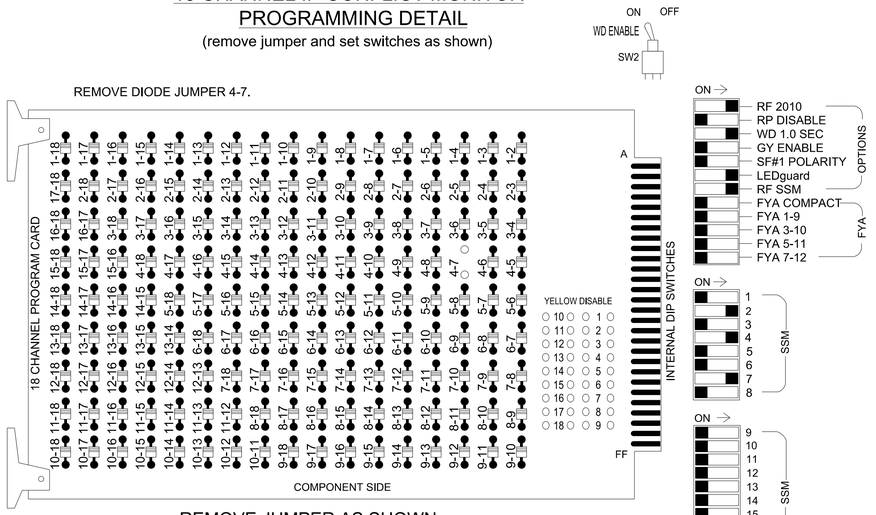
DocuSigned by:
Jason Galloway 12/17/2024
10D1E2B40B4B46E...
DATE
SIG. INVENTORY NO. 12-167073

$$$$$$$$$DATE$$$$$$$$
3:17:30 PM
User:jgalloway
C:\Users\jgalloway\Design#Signal Design#Temporary Design#Phase 3 TEMP#R-2307B_sig_dsn_12-167073.dgn
User:jgalloway

PROJECT REFERENCE NO.	SHEET NO.
R-2307B	Sig. 22.1

18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumper and set switches as shown)



■ = DENOTES POSITION OF SWITCH

REMOVE JUMPER 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 phases 4 and 7 for Dual Entry.
3. Program controller to start up in phase 2 Green No Walk and 6 Phase Not On.
4. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
5. The cabinet and controller are part of the NC 150 D12-02_Mooresville CLS.

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
Phases Used.....2, 4, 7
Overlap "1".....NOT USED
Overlap "2".....NOT USED
Overlap "3".....NOT USED
Overlap "4".....NOT USED

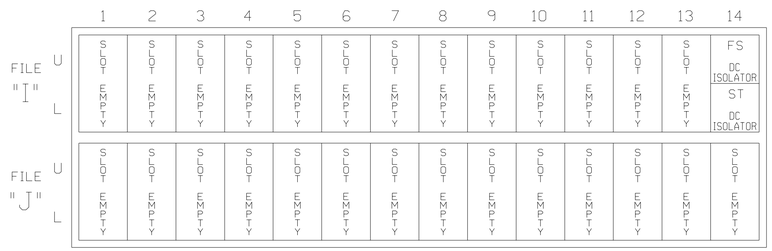
SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2			S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2			13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2			2 PED	3	4	4 PED	7	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	NU	21	22	23,24	NU	NU	41, 42,43	NU	NU	NU	NU	71,72	NU	NU	NU	NU	NU	NU	NU	NU
RED		128	128	128			101					122								
YELLOW		129	129																	
GREEN			130																	
RED ARROW																				
YELLOW ARROW				129			102					123								
FLASHING YELLOW ARROW																				
GREEN ARROW		130		130			103					124								

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)



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

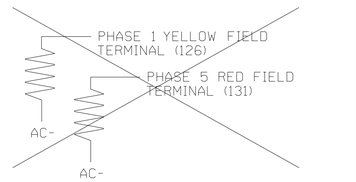
FS = FLASH SENSE
ST = STOP TIME

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown below)

ACCEPTABLE VALUES

VALUE (ohms)	WATTAGE
1.5K - 1.9K	25W (min)
2.0K - 3.0K	10W (min)



IMPORTANT! Remove resistor from field terminal as shown above, if present.

DETECTOR NOTE

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

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 12-1670T3
DESIGNED: MAY 2024
SEALED: 5/17/2024
REVISED: N/A

Temporary Design 3 - TMP Phase III
Electrical Detail

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road-Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
License No. F-0672

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

NC 150 EB
at
Morrison Plantation Parkway

Division 12 | Iredell County | Mooresville

PLAN DATE:	May 2024	REVIEWED BY:	J Galloway, PE
PREPARED BY:	JPG/RMM	REVIEWED BY:	R Muncey, PE

REVISIONS	INIT.	DATE

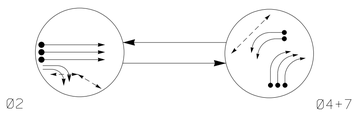
SEAL 029904 ENGINEER JASON P GALLOWAY NORTH CAROLINA PROFESSIONAL

DocuSigned by: Jason Galloway 5/17/2024
10D1E2B40B4B46E...
SIG. INVENTORY NO. 12-1670T3

PROJECT REFERENCE NO.	SHEET NO.
R-2307B	Sig. 23.0

2 Phase
Fully Actuated
NC 150 D12-02_MOORESVILLE
CLS

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

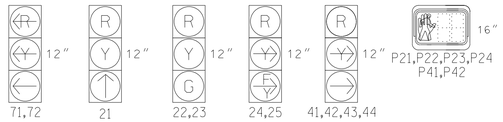
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2	PHASE Ø4+7	FLASH
21	↑	R	R
22,23	G	R	R
24,25	F	R	R
41,42,43,44	R	→	R
71,72	~~R~~	~~←~~	~~R~~
P21, P22, P23, P24	W	DW	DRK
P41,P42	DW	W	DRK

SIGNAL FACE I.D.

All Heads L.E.D.

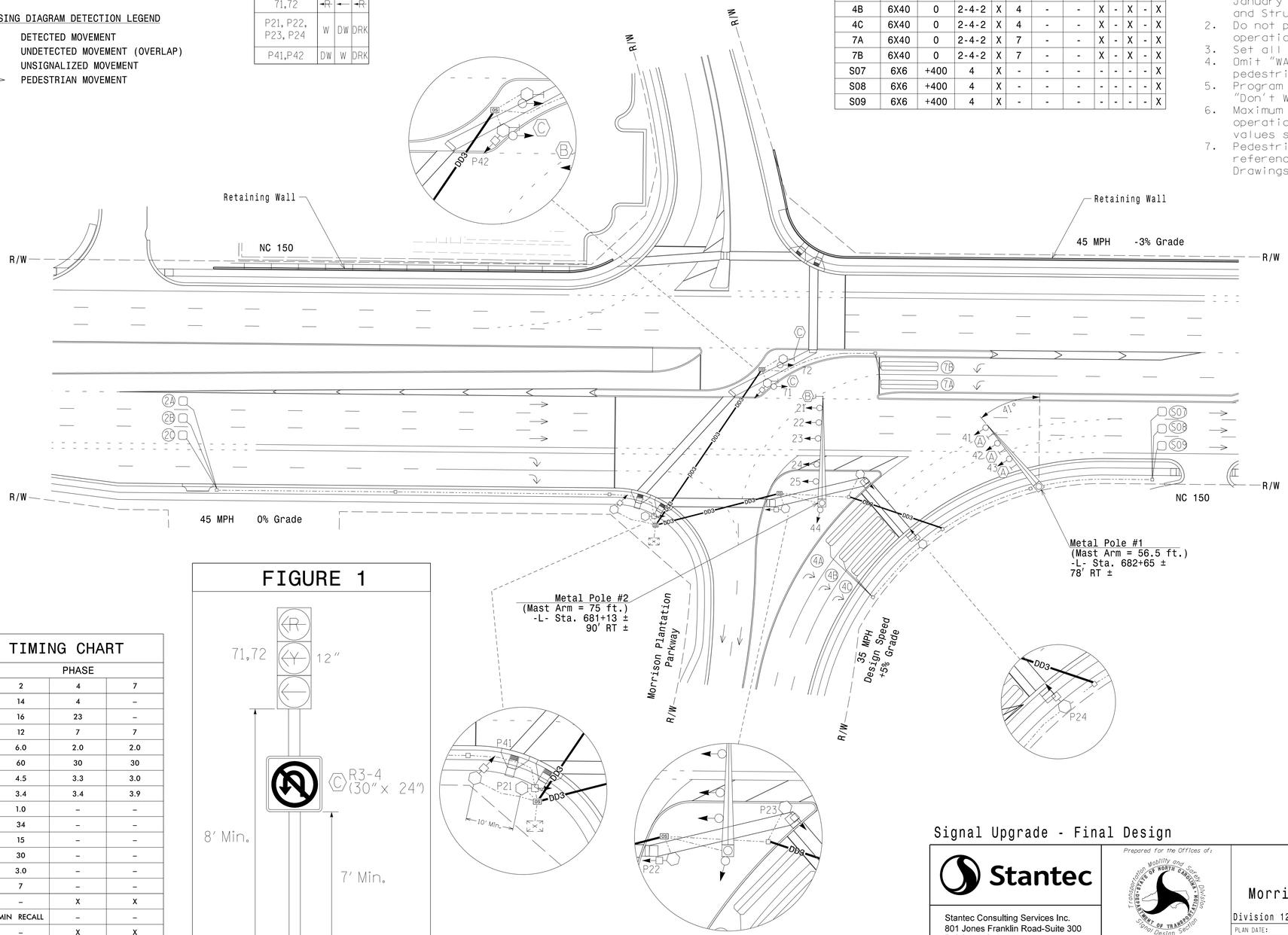


MAXTIME DETECTOR INSTALLATION CHART

DETECTOR					PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
2A	6X6	300	4	X	2	-	-	X	X	X	-	X
2B	6X6	300	4	X	2	-	-	X	X	X	-	X
2C	6X6	300	4	X	2	-	-	X	X	X	-	X
4A	6X40	0	2-4-2	X	4	-	-	X	-	X	-	X
4B	6X40	0	2-4-2	X	4	-	-	X	-	X	-	X
4C	6X40	0	2-4-2	X	4	-	-	X	-	X	-	X
7A	6X40	0	2-4-2	X	7	-	-	X	-	X	-	X
7B	6X40	0	2-4-2	X	7	-	-	X	-	X	-	X
S07	6X6	+400	4	X	-	-	-	-	-	-	-	X
S08	6X6	+400	4	X	-	-	-	-	-	-	-	X
S09	6X6	+400	4	X	-	-	-	-	-	-	-	X

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. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
5. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
6. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
7. Pedestrian pedestals are conceptual and shown for reference only. See 2024 NCDOT Roadway Standard Drawings for push button location details.



MAXTIME TIMING CHART

FEATURE	PHASE 2	PHASE 4	PHASE 7
Walk *	14	4	–
Ped Clear *	16	23	–
Min Green	12	7	7
Passage *	6.0	2.0	2.0
Max 1 *	60	30	30
Yellow Change	4.5	3.3	3.0
Red Clear	3.4	3.4	3.9
Added Initial *	1.0	–	–
Maximum Initial *	34	–	–
Time Before Reduction *	15	–	–
Time To Reduce *	30	–	–
Minimum Gap	3.0	–	–
Advance Walk	7	–	–
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.

FIGURE 1

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 (#) x 2" Conduit	N/A
⬡	Type II Signal Pedestal	⬢
OS	Oversized Junction Box	■
Ⓐ	"NO TURN ON RED" Sign (R10-11)	Ⓐ
Ⓑ	No Left Turn Sign (R3-2)	Ⓑ
Ⓒ	No U-Turn Sign (R3-4) (SEE FIGURE 1)	Ⓒ

Signal Upgrade - Final Design

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road-Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
License No. F-0672

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

NC 150 EB
at
Morrison Plantation Parkway

Division 12 Iredell County Mooresville

PLAN DATE:	May 2024	REVIEWED BY:	J Galloway, PE
PREPARED BY:	J Hambright	REVIEWED BY:	R Muncey, PE

SCALE 0 40 1"=40'

REVISIONS	INIT.	DATE

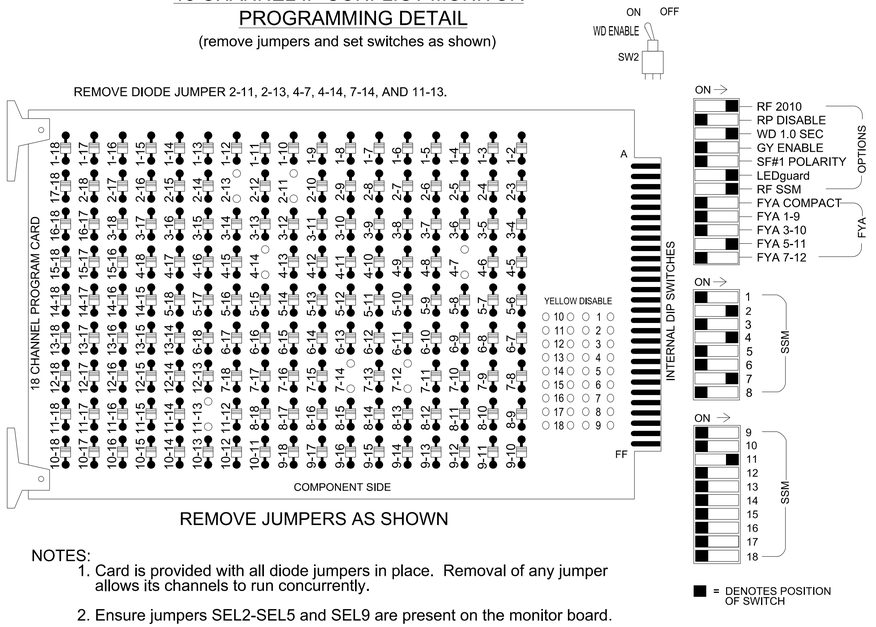
SEAL 029904 NORTH CAROLINA PROFESSIONAL ENGINEER JASON M. GALLOWAY

DocuSigned by: Jason Galloway 5/17/2024
10D1E2B40B4B46E...
SIG. INVENTORY NO. T2-1670

PROJECT REFERENCE NO.	SHEET NO.
R-2307B	Sig. 23.1

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 phase 4 and 7 for Dual Entry.
3. Program controller to start up in phase 2 Green No Walk and 6 Phase Not On.
4. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
5. The cabinet and controller are part of the NC 150 D12-02_Mooresville CLS.

EQUIPMENT INFORMATION

Controller.....2070LX
Cabinet.....332 w/ Aux
Software.....Q-Free MAXTIME
Cabinet Mount.....Base
Output File Positions.....18 With Aux. Output File
Load Switches Used.....S2, S3, S5, S6, S10, AUX S4,
Phases Used.....2, 2PED, 4, 4PED, 7
Overlap "1".....NOT USED
Overlap "2".....NOT USED
Overlap "3".....*
Overlap "4".....NOT USED

*See overlap programming detail on sheet 2

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2		S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2		13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2		2 PED	3	4	4 PED	7	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	NU	21	22,23	P21,P22, P23,P24	NU	41,42 43,44	P41,P42	NU	NU	NU	71,72	NU	NU	NU	NU	NU	★ 24,25	NU	NU
RED		128	128			101											A114		
YELLOW		129	129																
GREEN			130																
RED ARROW											122								
YELLOW ARROW						102					123						A115		
FLASHING YELLOW ARROW																	A116		
GREEN ARROW		130				103					124								
✋				113			104												
🚶				115			106												

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

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)

24,25

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	∅ 2 2C	SLOT EMPTY	SLOT EMPTY	∅ 4 4A	∅ 4 4C	SLOT EMPTY	SYS. DET. S07	SLOT EMPTY	SLOT EMPTY	∅ 2 PED DC ISOLATOR	SLOT EMPTY	FS DC ISOLATOR
	L		∅ 2 2B	NOT USED			∅ 4 4B	NOT USED		SYS. DET. S08			∅ 4 PED DC ISOLATOR		ST DC ISOLATOR
FILE "J"	U	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	∅ 7 7A	∅ 7 7B	SLOT EMPTY	SLOT EMPTY	SYS. DET. S09	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L					NOT USED	NOT USED			NOT USED					

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN
2A	TB2-5,6	I2U	39	1	2	2			X	X	X	
2B	TB2-7,8	I2L	43	5	3	2			X	X	X	
2C	TB2-9,10	I3U	63	29	4	2			X	X	X	
4A	TB4-9,10	I6U	41	3	8	4			X		X	
4B	TB4-11,12	I6L	45	7	9	4			X		X	
4C	TB6-1,2	I7U	65	31	10	4			X		X	
7A	TB5-5,6	J5U	57	19	21	7			X		X	
7B	TB5-9,10	J6U	42	4	22	7			X		X	
*S07	TB6-9,10	I9U	60	22	13	SYS						
*S08	TB6-11,12	I9L	62	24	14	SYS						
*S09	TB7-9,10	J9U	59	21	27	SYS						
PED PUSH BUTTONS												
P21,P22,P23,P24	TB8-4,6	I12U	67	33	2	PED 2						
P41,P42	TB8-5,6	I12L	69	35	4	PED 4						

*System detector only. Remove any assigned vehicle phase.

NOTE:
INSTALL DC ISOLATORS IN INPUT FILE SLOT I12.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

OVERLAP PROGRAMMING

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

Overlap Plan 1

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

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 12-1670
DESIGNED: MAY 2024
SEALED: 5/17/2024
REVISED: N/A

Final Design
Electrical Detail

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road-Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
License No. F-0672

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

NC 150 EB
at
Morrison Plantation Parkway

Division 12 Iredell County Mooresville

PLAN DATE:	May 2024	REVIEWED BY:	J Galloway, PE
PREPARED BY:	JPG/RMM	REVIEWED BY:	R Muncey, PE

REVISIONS	INIT.	DATE

SEAL 029904 ENGINEER NORTH CAROLINA PROFESSIONAL JASON P. GALLOWAY

DocuSigned by: Jason Galloway 5/17/2024
10D1E2B40B4B46E...
SIG. INVENTORY NO.

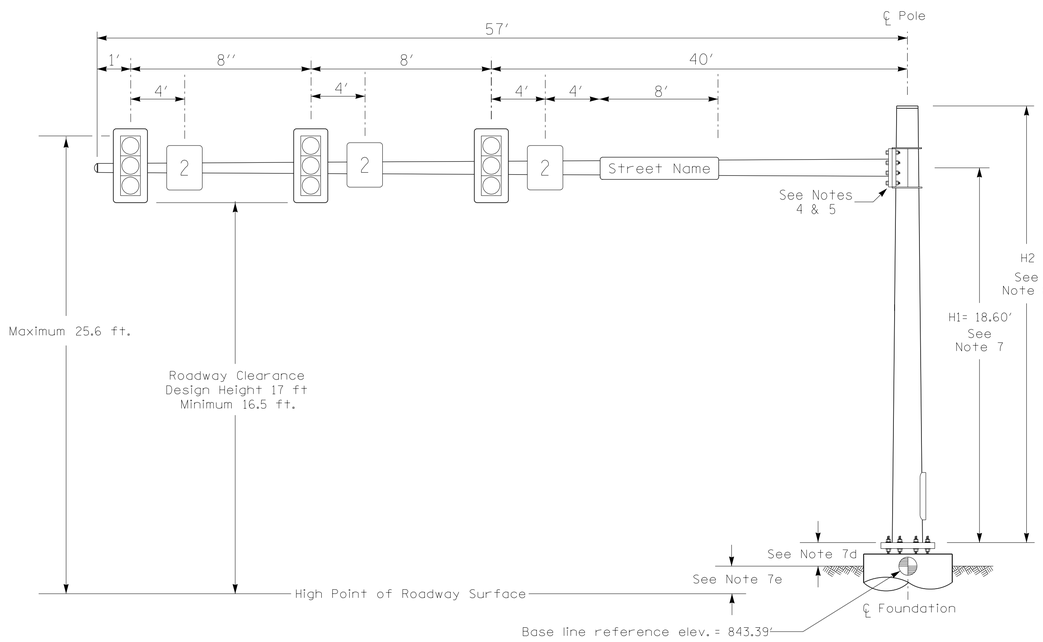
DATE

T2-1670

METAL POLES No. 1 & 2

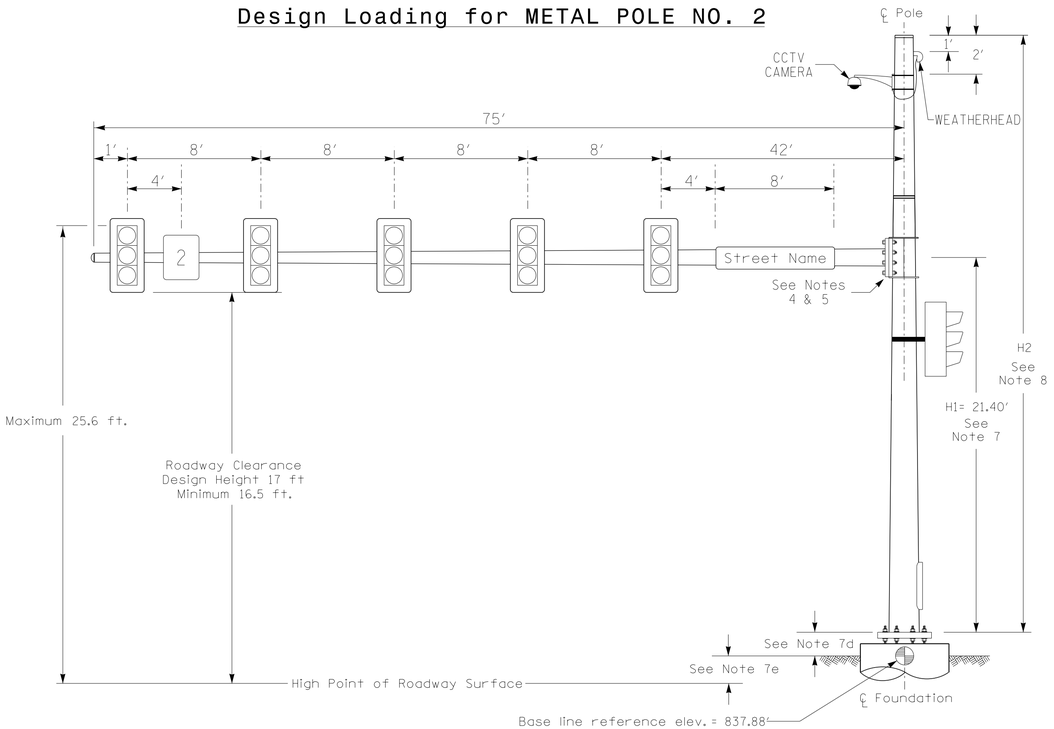
PROJECT REFERENCE NO.	SHEET NO.
R-2307B	Sig. 23.2

Design Loading for METAL POLE NO. 1



Elevation View

Design Loading for METAL POLE NO. 2



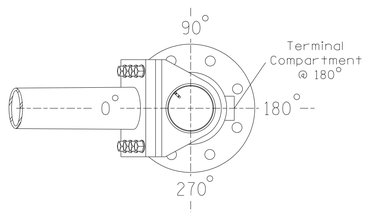
Elevation View

SPECIAL NOTE

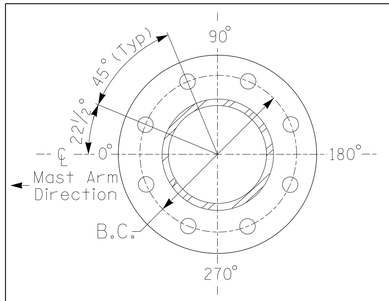
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 1	Pole 2
Baseline reference point at ℄ Foundation @ ground level	843.39 ft.	837.88 ft.
Elevation difference at High point of roadway surface	- 0.49 ft.	+2.38 ft.
Elevation difference at Edge of travelway or face of curb	+/-0.0 ft.	+/-0.0 ft.

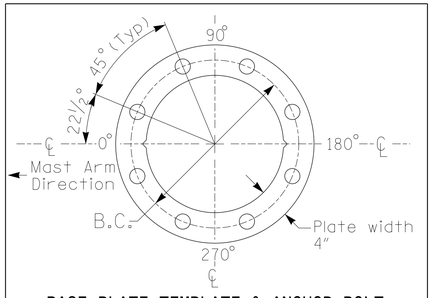


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL

For 8 Bolt Base Plate

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
Street Name	STREET NAME SIGN RIGID MOUNTED	16.0 S.F.	24.0"W X 96.0"L	36 LBS
	CCTV CAMERA ARM-MOUNTED	1.0 S.F.	11.0"W X 11.0"L	30 LBS

NOTES

DESIGN REFERENCE MATERIAL

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

DESIGN REQUIREMENTS

2. Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
3. Design all signal supports using force ratios that do not exceed 0.9.
4. 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.
   - If the pole assembly includes a CCTV camera, the total height of the pole (H2) will be the calculated value of the mast arm attachment height (H1) plus 10 feet.
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 5 (110 mph)

Stantec

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

NC 150 EB
at
Morrison Plantation Parkway

Division 12 | Iredell County | Mooresville

PLAN DATE: November 2023 | REVIEWED BY: J. Galloway, PE

PREPARED BY: J. Hambright | REVIEWED BY: R. Muncey, PE

SCALE: 0 N/A N/A

REVISIONS	INIT.	DATE

NORTH CAROLINA PROFESSIONAL SEAL 029904 ENGINEER JASON P. GALLOWAY

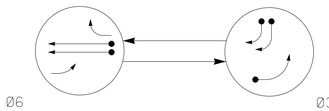
DocuSigned by: Jason Galloway 5/17/2024
1D1E3B4B04B46E...

SIG. INVENTORY NO. 12-1670

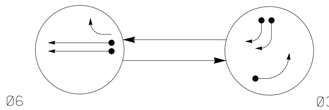
5/16/2024
5:18:59 PM
U:\Projects\Signals\Design\Metal Poles\Loading Diagrams\Loading Diagram_Single Mast Arm_12-1670.dgn
User:jgalloway

PROJECT REFERENCE NO.	SHEET NO.
R-2307B	Sig. 24.0

DEFAULT PHASING DIAGRAM



ALTERNATE PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

DEFAULT PHASING TABLE OF OPERATION

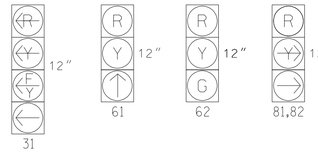
SIGNAL FACE	PHASE Ø6	PHASE Ø3+8	PHASE FLASH
31	FY	←	R
61	↑	R	R
62	G	R	R
81,82	R	→	R

ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE Ø6	PHASE Ø3+8	PHASE FLASH
31	R	←	R
61	↑	R	R
62	G	R	R
81,82	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
3A	6X40	0	✳	✳	3	15.0★	-	X	-	X	-	✳
6A	6X6	300	✳	✳	6	-	-	X	-	X	-	✳
6B	6X6	300	✳	✳	6	-	-	X	-	X	-	✳
6C	6X40	0	✳	✳	6	5.0	2.0	X	-	X	X	✳
6D	6X40	0	✳	✳	6	5.0	2.0	X	-	X	X	✳
8A	6X40	0	✳	✳	3	-	-	X	-	X	-	✳
8B	6X40	0	✳	✳	3	-	-	X	-	X	-	✳

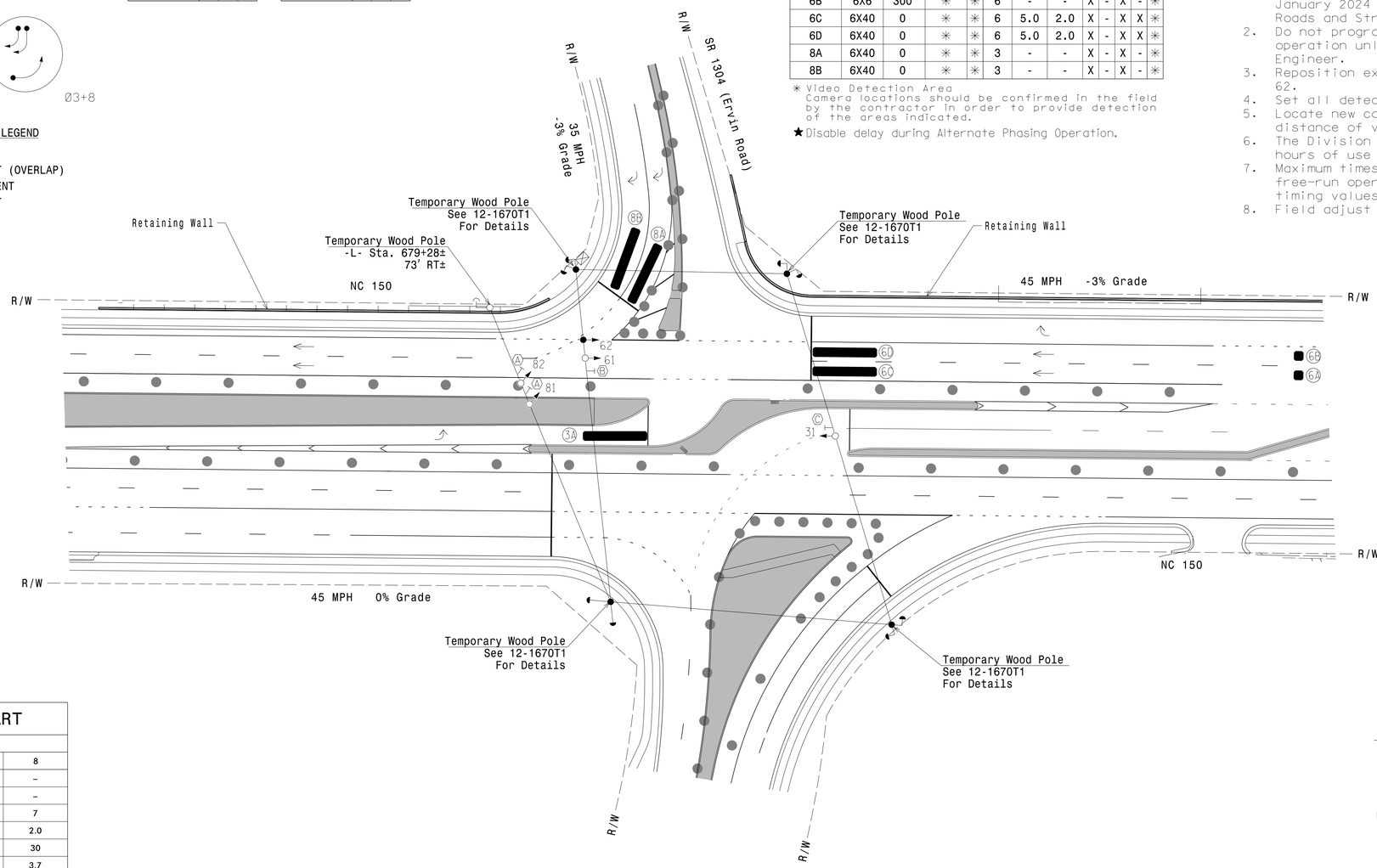
✳ Video Detection Area
Camera locations should be confirmed in the field by the contractor in order to provide detection of the areas indicated.

★ Disable delay during Alternate Phasing Operation.

2 Phase
Fully Actuated w/
Alternate Phasing
NC 150 D12-02_MOORESVILLE
CLS

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2024 and "Standard Specifications for Roads and Structures" dated January 2024.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Reposition existing signal heads numbered #61 and 62.
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. The Division Traffic Engineer will determine the hours of use for each phasing plan.
7. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
8. Field adjust temporary poles as needed.



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	→
—DD#—	Directional Drill (#) x 2" Conduit	N/A
▬	Video Detection Area	N/A
▭	Construction Zone	N/A
● ● ●	Drums	N/A
Ⓐ	"NO TURN ON RED" Sign (R10-11) (SEE FIGURE 1)	Ⓐ
Ⓑ	No Left Turn Sign (R3-2)	Ⓑ
Ⓒ	No U-Turn Sign (R3-4)	Ⓒ

MAXTIME TIMING CHART

FEATURE	PHASE 3	PHASE 6	PHASE 8
Walk *	–	–	–
Ped Clear *	–	–	–
Min Green	7	12	7
Passage *	2.0	6.0	2.0
Max 1 *	30	60	30
Yellow Change	3.0	4.8	3.7
Red Clear	3.2	2.4	2.1
Added Initial *	–	–	–
Maximum Initial *	–	–	–
Time Before Reduction *	–	15	–
Time To Reduce *	–	30	–
Minimum Gap	–	3.0	–
Advance Walk	–	–	–
Non Lock Detector	X	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 6 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.

New Installation
Temporary Design 1 - TMP Phase III

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road-Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
License No. F-0672

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'

NC 150 WB
at
SR 1304 (Ervin Road)

Division 12 Iredell County Mooresville

PLAN DATE:	May 2024	REVIEWED BY:	J Galloway, PE
PREPARED BY:	J Hambright	REVIEWED BY:	R Muncey, PE

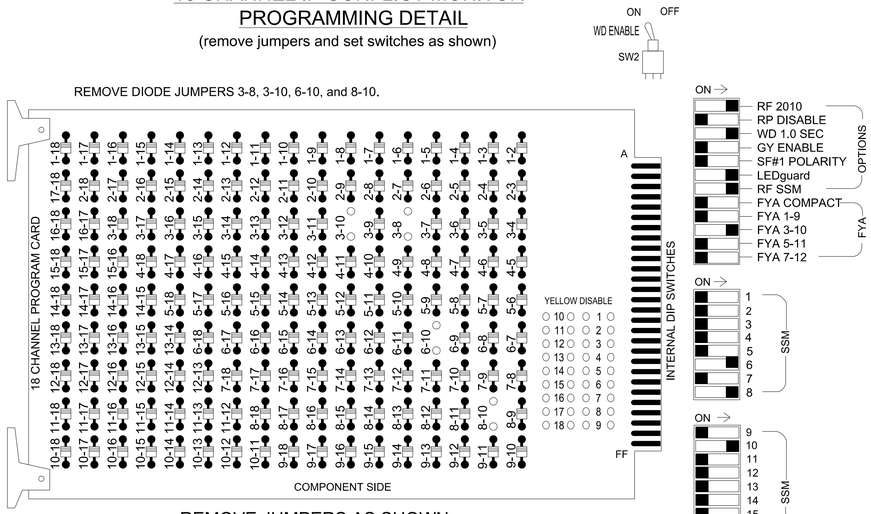
REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA
PROFESSIONAL
SEAL 029904
ENGINEER
JASON P. GALLOWAY

DocuSigned by:
Jason Galloway 9/17/2024
10D1E2B40B4B46E...
SIG. INVENTORY NO. 12-1836T1

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 phases 3 and 8 for Dual Entry.
3. Program controller to start up in phase 2 Phase Not On and 6 Green No Walk.
4. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
5. The cabinet and controller are part of the NC 150 D12-02_Mooresville CLS.

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.....S4, S8, S11, AUX S2
Phases Used.....3, 6, 8
Overlap "1".....NOT USED
Overlap "2".....*
Overlap "3".....NOT USED
Overlap "4".....NOT USED

*See overlap programming detail on sheet 2

PROJECT REFERENCE NO.	SHEET NO.
R-2307B	Sig. 24.1

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	NU	NU	31 ★	NU	NU	NU	61	62	NU	NU	81.82	NU	NU	31 ★	NU	NU	NU	NU
RED								134	134			107							
YELLOW				✳				135	135										
GREEN									136										
RED ARROW															A124				
YELLOW ARROW												108			A125				
FLASHING YELLOW ARROW															A126				
GREEN ARROW				118				136				109							

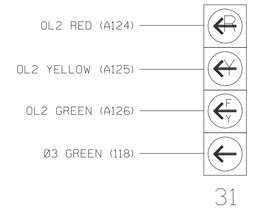
NU = Not Used

★ See pictorial of head wiring in detail this sheet.

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

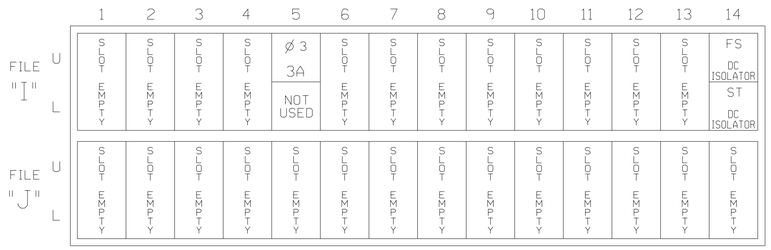
FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



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
3A	TB4-5,6	I5U	58	20	7 *	3	15.0		X		X	

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

INPUT FILE POSITION LEGEND: J2L
J = FILE
2 = SLOT
L = LOWER

SPECIAL DETECTOR NOTE

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

For Detection Zone 3A, the equipment placement is typcal for a NCDOT installation. Inputs associated with this slot are compatible with alternate operation programming located on sheets 2 of this electrical detail.

LOAD RESISTOR INSTALLATION DETAIL

(install resistor as shown below)

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: 12-1836T1
DESIGNED: MAY 2024
SEALED: 5/17/2024
REVISED: N/A

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

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road-Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
License No. F-0672

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

NC 150 WB
at
SR 1304 (Ervin Road)

Division 12 Iredell County Mooresville

PLAN DATE:	May 2024	REVIEWED BY:	J Galloway, PE
PREPARED BY:	J Galloway	REVIEWED BY:	R Muncey, PE

REVISIONS	INIT.	DATE

SEAL 029904 NORTH CAROLINA PROFESSIONAL ENGINEER JASON P. GALLOWAY

DocuSigned by: Jason Galloway 5/17/2024
10D1F2B40B4B46E...
SIG. INVENTORY NO. 12-1836T1

5:21:14 PM
12/17/2024
User: jgalloway

C:\Users\jgalloway\DocuSign\Electrical Details\Temporary Design\MAXTIME\R-2307B_sm_ele_12-1836t1.dgn

PROJECT REFERENCE NO.	SHEET NO.
R-2307B	Sig. 24.2

MAXTIME OVERLAP PROGRAMMING DEFAULT PHASING

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

Overlap Plan 1

Overlap	2
Type	FYA 4 - Section
Included Phases	6
Modifier Phases	3
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	2	
Type	FYA 4 - Section	
Included Phases	-	← NOTICE INCLUDED PHASE
Modifier Phases	3	
Modifier Overlaps	-	
Trail Green	0	
Trail Yellow	0.0	
Trail Red	0.0	

MAXTIME DETECTOR PROGRAMMING DETAIL FOR ALTERNATE PHASING LOOP 3A

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.

3A

Detector	Call Phase	Delay
7	3	0.0

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 head 31 to run protected turns only.

VEH DET PLAN 2: Reduces delay time for phase 3 call on loop 3A 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: 12-1836T1
DESIGNED: MAY 2024
SEALED: 5/17/2024
REVISED: N/A

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

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road-Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
License No. F-0672

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

NC 150 WB
at
SR 1304 (Erwin Road)

Division 12 | Iredell County | Mooresville

PLAN DATE:	May 2024	REVIEWED BY:	J Galloway, PE
PREPARED BY:	J Galloway	REVIEWED BY:	R Muncey, PE

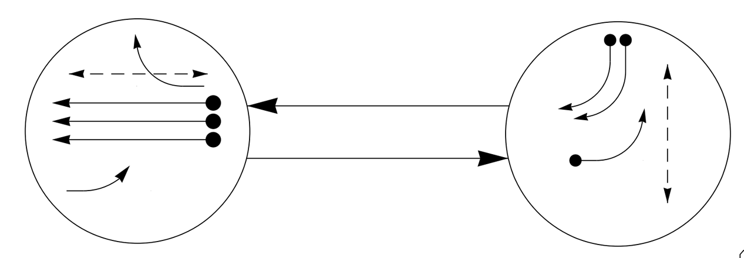
REVISIONS	INIT.	DATE

SEAL 029904 ENGINEER JASON P. GALLOWAY NORTH CAROLINA PROFESSIONAL SEAL

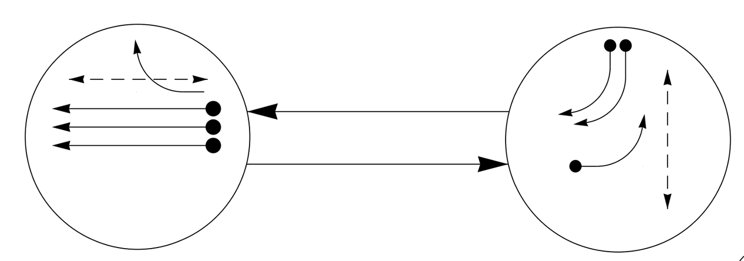
DocuSigned by: Jason Galloway 5/17/2024
10D1E2B40B4B46E...
SIG. INVENTORY NO. 12-1836T1

PROJECT REFERENCE NO.	SHEET NO.
R-2307B	Sig. 25.0

DEFAULT PHASING DIAGRAM



ALTERNATE PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

DEFAULT PHASING TABLE OF OPERATION

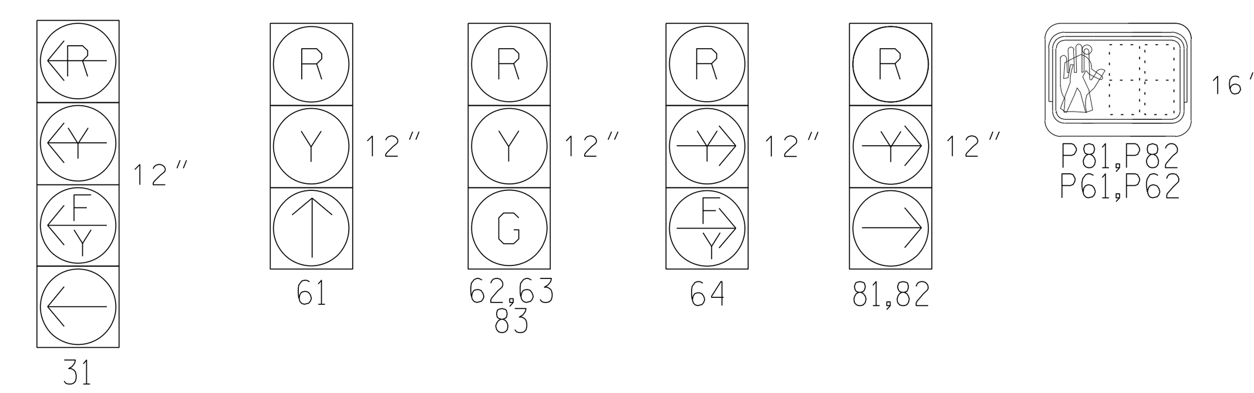
SIGNAL FACE	PHASE Ø6	PHASE Ø3+8	PHASE FLASH
31	←F/Y	←	←R
61	↑	R	R
62,63	G	R	R
64	F/Y→	R	R
81,82	R	→	R
83	R	G	R
P61,P62	W	DW	DRK
P81,P82	DW	W	DRK

ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE Ø6	PHASE Ø3+8	PHASE FLASH
31	←R	←	←R
61	↑	R	R
62,63	G	R	R
64	F/Y→	R	R
81,82	R	→	R
83	R	G	R
P61,P62	W	DW	DRK
P81,P82	DW	W	DRK

SIGNAL FACE I.D.

All Heads L.E.D.



MAXTIME DETECTOR INSTALLATION CHART

LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
3A	6X40	0	2-4-2	X	3	★15.0	-	X	-	X	-	X
6A	6X6	300	4	X	6	-	-	X	X	X	-	X
6B	6X6	300	4	X	6	-	-	X	X	X	-	X
6C	6X6	300	4	X	6	-	-	X	X	X	-	X
8A	6X40	0	2-4-2	X	8	-	-	X	-	X	-	X
8B	6X40	0	2-4-2	X	3	-	-	X	-	X	-	X
S10	6X6	+300	4	X	-	-	-	-	-	-	-	X
S11	6X6	+300	4	X	-	-	-	-	-	-	-	X
S12	6X6	+300	4	X	-	-	-	-	-	-	-	X

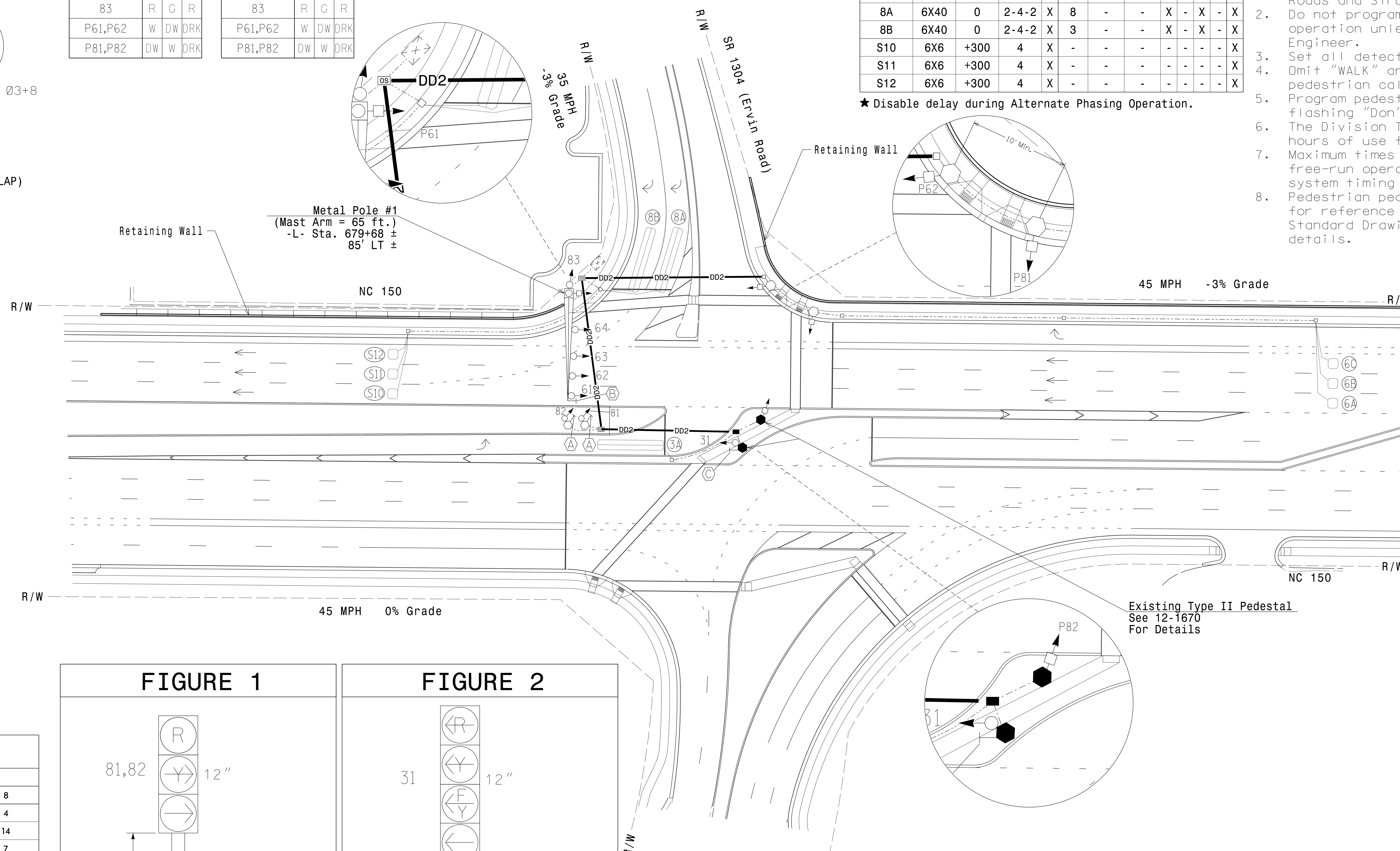
(DETECTOR: LOOP through NEW LOOP; PROGRAMMING: CALL PHASE through NEW CARD)

★ Disable delay during Alternate Phasing Operation.

2 Phase
Fully Actuated w/
Alternate Phasing
NC 150 D12-02_MOORESVILLE
CLS

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2024 and "Standard Specifications for Roads and Structures" dated January 2024.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Set all detector units to presence mode.
4. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
5. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
6. The Division Traffic Engineer will determine the hours of use for each phasing plan.
7. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
8. Pedestrian pedestals are conceptual and shown for reference only. See 2024 NCDOT Roadway Standard Drawings for push button location details.



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 (#) x 2" Conduit	N/A
	Type II Signal Pedestal	
OS	Oversized Junction Box	
Ⓐ	"NO TURN ON RED" Sign (R10-11) (SEE FIGURE 1)	Ⓐ
Ⓑ	No Left Turn Sign (R3-2)	Ⓑ
Ⓒ	No U-Turn Sign (R3-4) (SEE FIGURE 2)	Ⓒ

MAXTIME TIMING CHART

FEATURE	PHASE 3	PHASE 6	PHASE 8
Walk *	–	14	4
Ped Clear *	–	26	14
Min Green	7	12	7
Passage *	2.0	6.0	2.0
Max 1 *	30	60	30
Yellow Change	3.0	4.8	3.7
Red Clear	3.3	2.5	3.3
Added Initial *	–	1.0	–
Maximum Initial *	–	34	–
Time Before Reduction *	–	15	–
Time To Reduce *	–	30	–
Minimum Gap	–	3.0	–
Advance Walk	–	7	–
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 6 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.

FIGURE 1

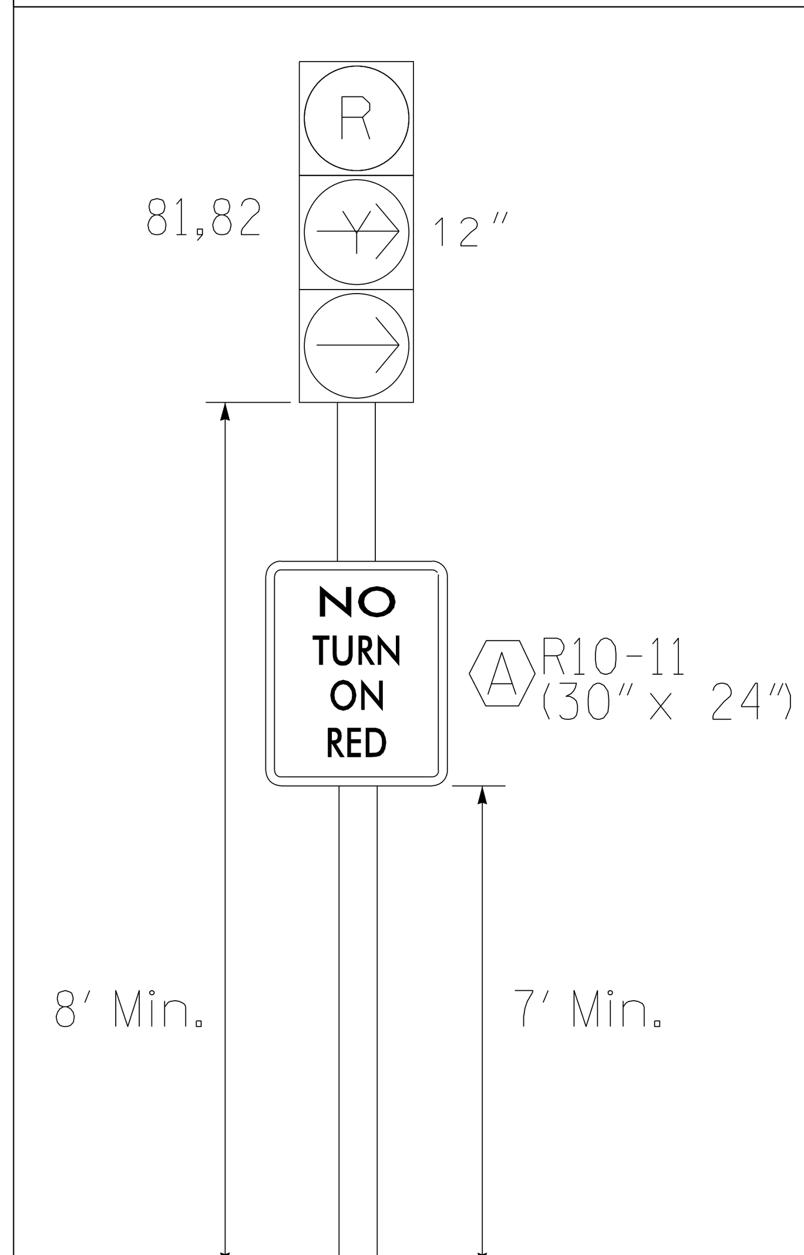
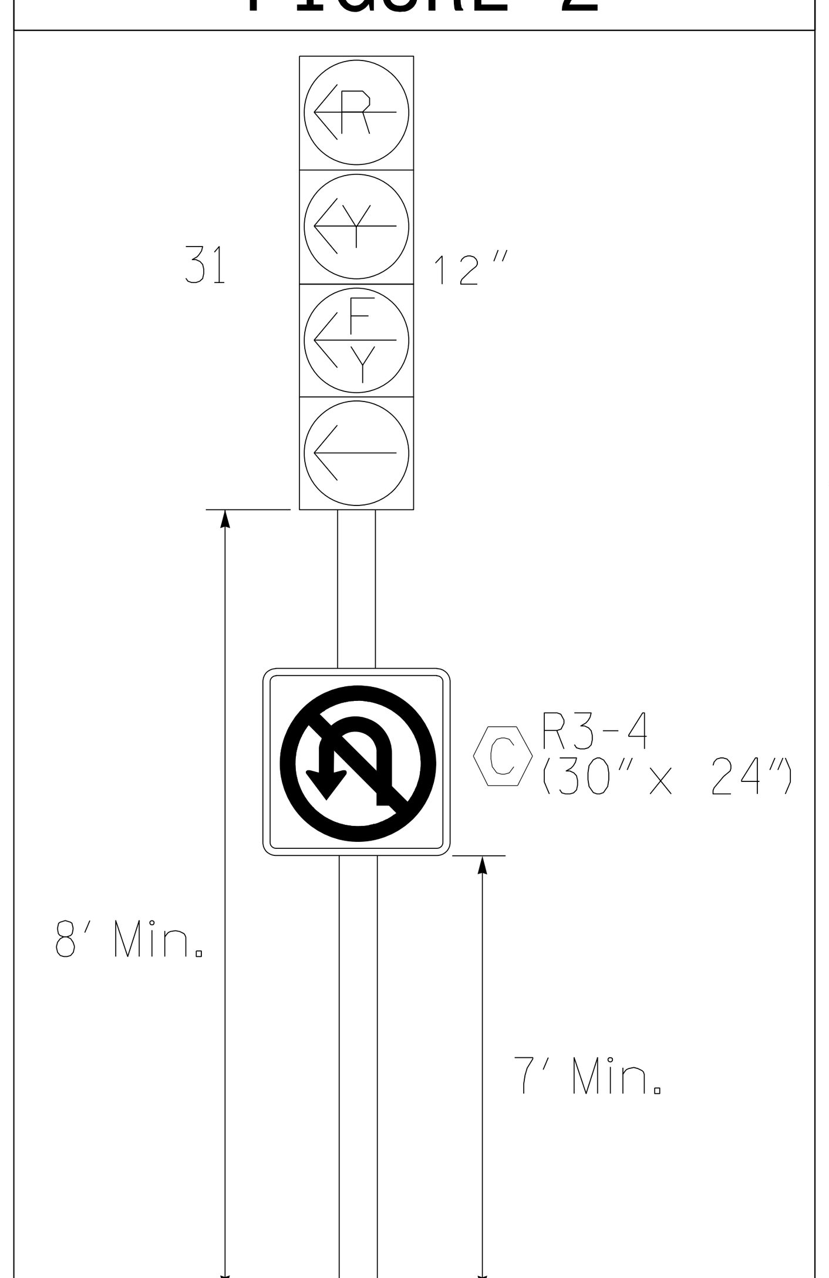


FIGURE 2



New Installation - Final Design

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road-Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
License No. F-0672

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'

NC 150 WB
at
SR 1304 (Ervin Road)

Division 12	Iredell County	Mooresville
PLAN DATE: May 2024	REVIEWED BY: J Galloway, PE	
PREPARED BY: J Hambright	REVIEWED BY: R Muncey, PE	

REVISIONS | INIT. | DATE

SEAL 029904 — NORTH CAROLINA PROFESSIONAL ENGINEER — JASON P. GALLOWAY

DocuSigned by: Jason Galloway 7/17/2024
10D1E2B40B4B46E...

SIG. INVENTORY NO. 12-1836

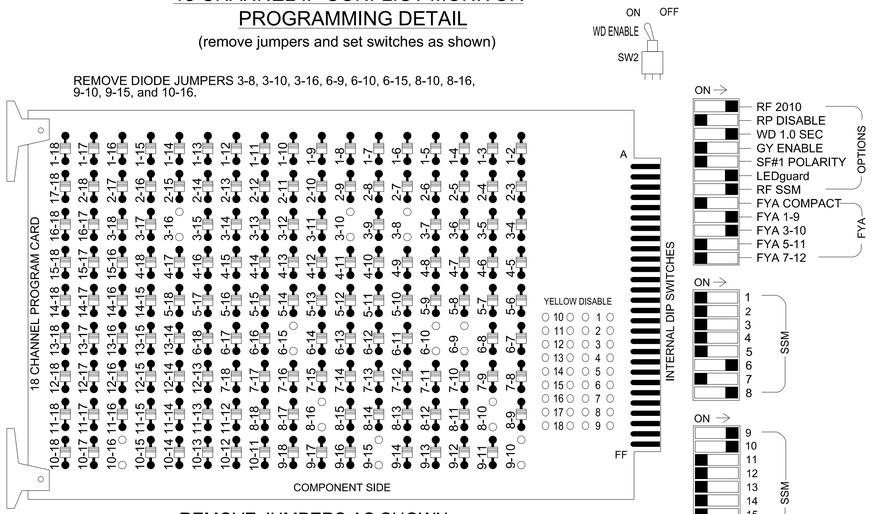
$$$$$SYSDATE$$$$$ U:\Traffic\Signals\Design\Signal Design\Final Design\R-2307B_sig_dsn_12-1836.dgn User:jgalloway

PROJECT REFERENCE NO.	SHEET NO.
R-2307B	Sig. 25.1

18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 3-8, 3-10, 3-16, 6-9, 6-10, 6-15, 8-10, 8-16, 9-10, 9-15, and 10-16.



REMOVE JUMPERS AS SHOWN

NOTES:

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

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the signal plan.
2. Program phases 3 and 8 for Dual Entry.
3. Program controller to start up in phase 2 Phase Not On and 6 Green No Walk.
4. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
5. The cabinet and controller are part of the NC 150 D12-02_Mooresville CLS.

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.....S4, S8, S9, S11, S12, AUX S1, AUX S2
Phases Used.....3, 6, 6PED, 8, 8PED
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.	NU	NU	NU	31 ★	NU	NU	NU	61	62,63	P61, P62	NU	81,82	83	P81, P82	64 ★	31 ★	NU	NU	NU	NU
RED								134	134			107	107		A121					
YELLOW				✳				135	135				108							
GREEN									136				109							
RED ARROW																A124				
YELLOW ARROW												108			A122	A125				
FLASHING YELLOW ARROW															A123	A126				
GREEN ARROW				118				136				109								
✋										119				110						
🚶										121				112						

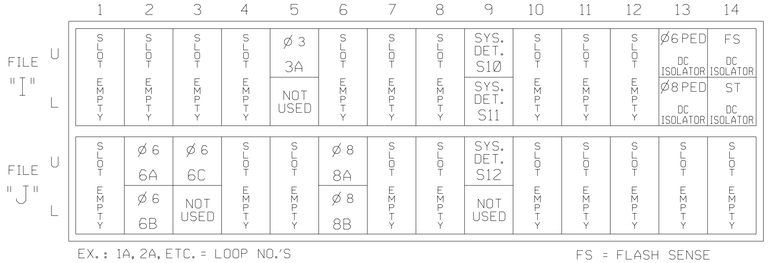
NU = Not Used
✳ Denotes install load resistor. See load resistor installation detail this sheet.
★ See pictorial of head wiring in detail this sheet.

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

INPUT FILE POSITION LAYOUT

(front view)



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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN
3A	TB4-5,6	I5U	58	20	7 *	3			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	
6C	TB3-9,10	J3U	64	30	18	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	
*S10	TB6-9,10	I9U	60	22	13	SYS						
*S11	TB6-11,12	I9L	62	24	14	SYS						
*S12	TB7-9,10	J9U	59	21	27	SYS						
PED PUSH BUTTONS												
P61,P62	TB8-7,9	I13U	68	34	6	PED 6						
P81,P82	TB8-8,9	I13L	70	36	8	PED 8						

NOTE:
INSTALL DC ISOLATORS IN INPUT FILE SLOT I13.

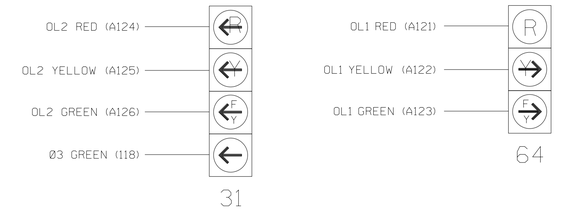
*System detector only. Remove any assigned vehicle phase.

* For the detectors to work as shown on the signal design plan, see the Detector Programming Detail for Alternate Phasing on sheet 2 of 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 resistor as shown below)

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: 12-1836
DESIGNED: MAY 2024
SEALED: 5/17/2024
REVISED: N/A

Final Design
Electrical Detail - Sheet 1 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road-Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
License No. F-0672

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

NC 150 WB
at
SR 1304 (Ervin Road)

Division 12 Iredell County Mooresville

PLAN DATE:	May 2024	REVIEWED BY:	J Galloway, PE
PREPARED BY:	JPG/RMM	REVIEWED BY:	R Muncey, PE

REVISIONS	INIT.	DATE

SEAL 029904 ENGINEER JASON P. CALLOWAY NORTH CAROLINA PROFESSIONAL

DocuSigned by:
Jason Galloway 5/17/2024
10D1E2B40B4B46E...
SIG. INVENTORY NO. T2-1836

5:23:40 PM
User:jgalloway
\\Mooresville\Designs\Design\Electrical Details\Final Design\MAXTIME\R-2307B_sm_ele_12-1836.dgn

PROJECT REFERENCE NO.	SHEET NO.
R-2307B	Sig. 25.2

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 31 to run protected turns only.

VEH DET PLAN 2: Reduces delay time for phase 3 call on loop 3A to 0 seconds.

MAXTIME DETECTOR PROGRAMMING DETAIL FOR ALTERNATE PHASING LOOP 3A

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
3A	7	3	0.0

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 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	FYA 4 - Section
Included Phases	6	6
Modifier Phases	-	3
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	FYA 4 - Section	
Included Phases	6	-	← NOTICE INCLUDED PHASE
Modifier Phases	-	3	
Modifier Overlaps	-	-	
Trail Green	0	0	
Trail Yellow	0.0	0.0	
Trail Red	0.0	0.0	

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 12-1836
DESIGNED: MAY 2024
SEALED: 5/17/2024
REVISED: N/A

Final Design
Electrical Detail - Sheet 2 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road-Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
License No. F-0672

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

NC 150 WB
at
SR 1304 (Ervin Road)

Division 12 | Iredell County | Mooresville

PLAN DATE:	May 2024	REVIEWED BY:	J Galloway, PE
PREPARED BY:	J Galloway	REVIEWED BY:	R Muncey, PE

REVISIONS	INIT.	DATE

SEAL 029904 ENGINEER JASON E. CALLOWAY NORTH CAROLINA PROFESSIONAL SEAL

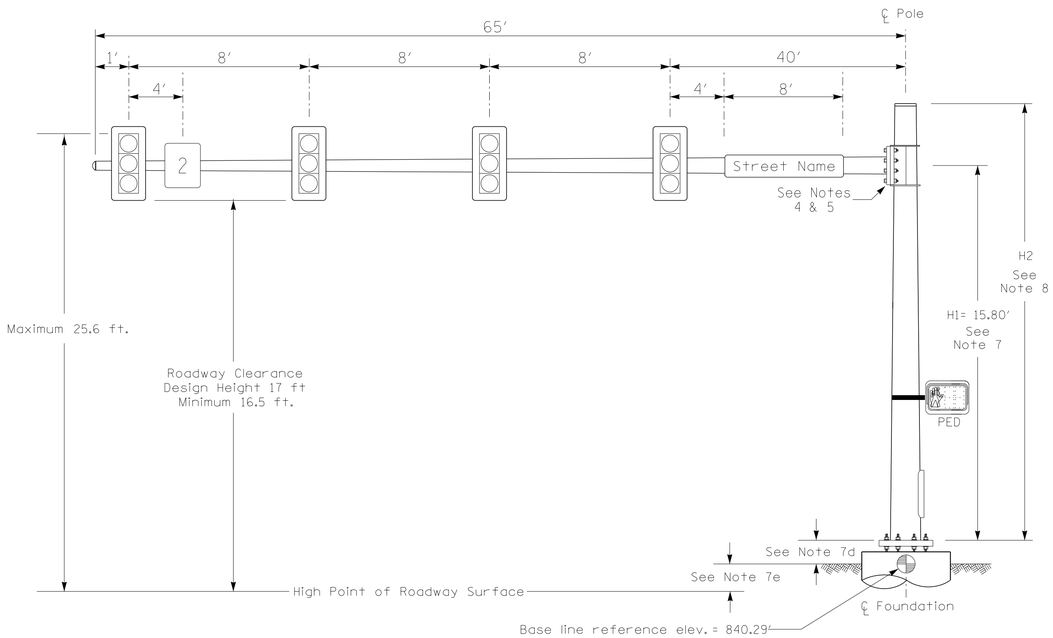
DocuSigned by:
Jason Galloway 5/17/2024
10D1E2B40B4B46E...
SIG. INVENTORY NO. T2-1836

5:23:44 PM
User:jgalloway
Design:MAXTIME#R-2307B_sm_ele_12-1836.dgn
Electrical Details\Final Design\

METAL POLE No. 1

PROJECT REFERENCE NO.	SHEET NO.
R-2307B	Sig. 25.3

Design Loading for METAL POLE NO. 1



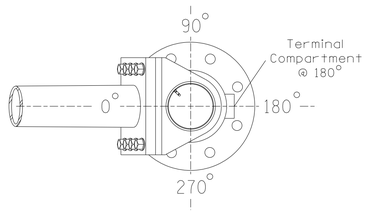
Elevation View

SPECIAL NOTE

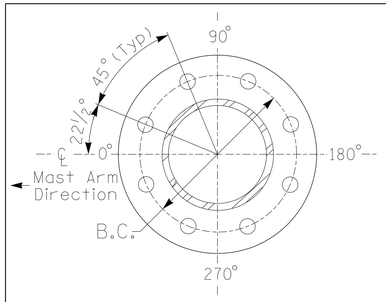
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 1	
Baseline reference point at ⊕ Foundation @ ground level	840.29 ft.	
Elevation difference at High point of roadway surface	-3.25 ft.	
Elevation difference at Edge of travelway or face of curb	+/-0.0 ft.	

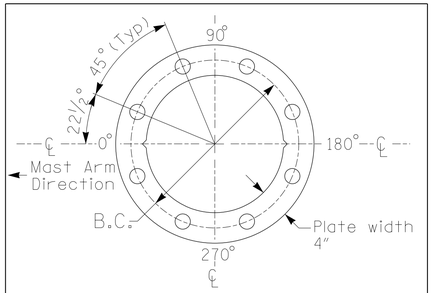


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



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

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
	PEDESTRIAN SIGNAL HEAD WITH MOUNTING HARDWARE	2.2 S.F.	18.5″W X 17.0″L	21 LBS
2	SIGN RIGID MOUNTED	7.5 S.F.	30.0″W X 36.0″L	14 LBS
Street Name	STREET NAME SIGN RIGID MOUNTED	16.0 S.F.	24.0″W X 96.0″L	36 LBS

NOTES

DESIGN REFERENCE MATERIAL

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

DESIGN REQUIREMENTS

2. Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
3. Design all signal supports using force ratios that do not exceed 0.9.
4. 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 5 (110 mph)

Stantec

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

NC 150 WB
at
SR 1304 (Ervin Road)

Division 12 Iredell County Mooresville

PLAN DATE:	November 2023	REVIEWED BY:	J. Galloway, PE
PREPARED BY:	J. Hambright	REVIEWED BY:	R. Muncey, PE

SCALE: 0 N/A N/A

REVISIONS	INIT.	DATE

NORTH CAROLINA PROFESSIONAL SEAL 029904 ENGINEER JASON W. GALLOWAY

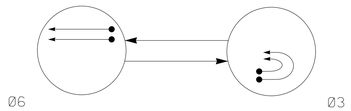
DocuSigned by: Jason Galloway 5/17/2024
10D1E2B40B4B46E...

SIG. INVENTORY NO. 12-1836

5/16/2024
1:21:24 PM
Z:\Projects\Signals\Design\Metal Poles\Loading Diagrams\Loading Diagram_Single Mast Arm_12-1836.dgn
User:jgalloway

PROJECT REFERENCE NO.	SHEET NO.
R-2307B	Sig. 26.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

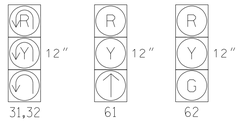
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø6	PHASE Ø3	PHASE FLASH
31,32	(R)	↶	(R)
61	↑	R	R
62	G	R	R

SIGNAL FACE I.D.

All Heads L.E.D.



MAXTIME DETECTOR INSTALLATION CHART

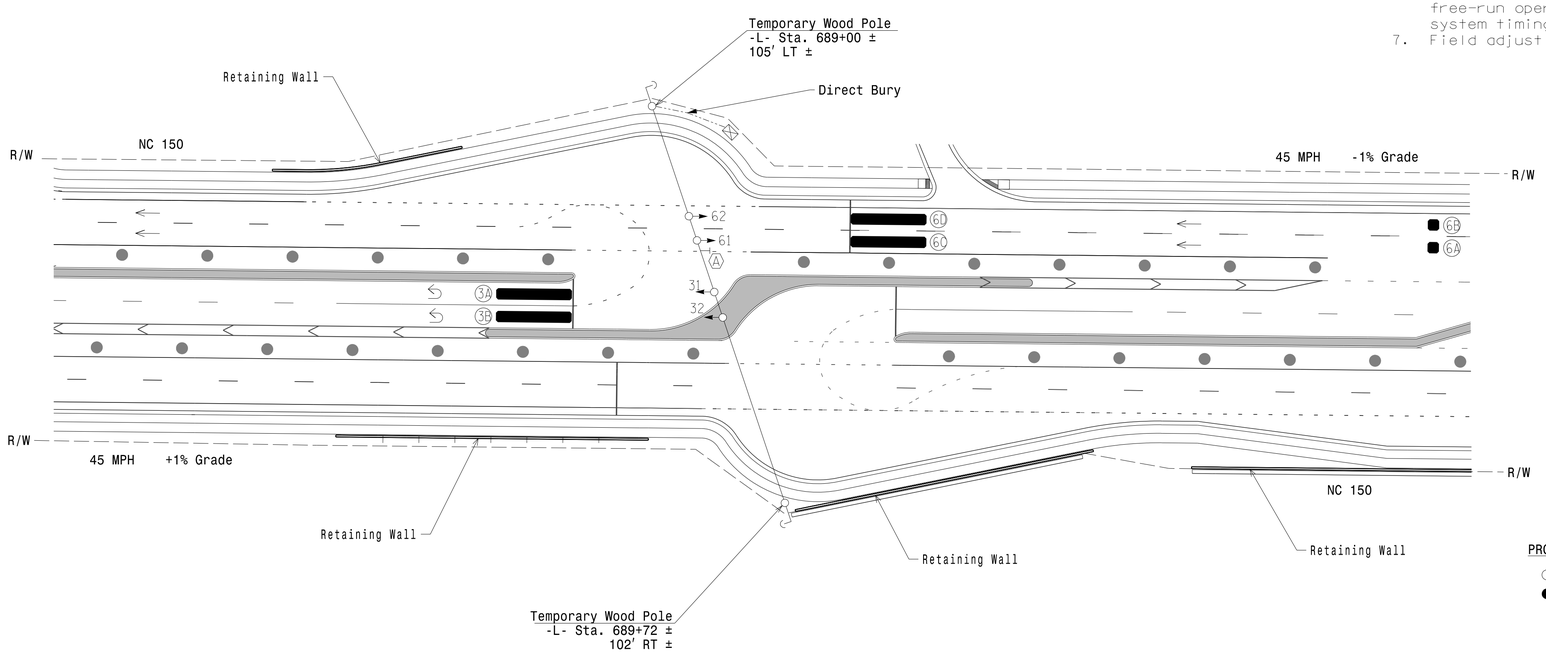
DETECTOR					PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
3A	6X40	0	✳	✳	3	-	-	X	-	X	-	✳
3B	6X40	0	✳	✳	3	-	-	X	-	X	-	✳
6A	6X6	300	✳	✳	6	-	-	X	-	X	-	✳
6B	6X6	300	✳	✳	6	-	-	X	-	X	-	✳
6C	6X40	0	✳	✳	6	5.0	2.0	X	-	X	X	✳
6D	6X40	0	✳	✳	6	5.0	2.0	X	-	X	X	✳

✳ Video Detection Area
Camera locations should be confirmed in the field by the contractor in order to provide detection of the areas indicated.

2 Phase
Fully Actuated
NC 150 D12-02_MOORESVILLE
CLS

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2024 and "Standard Specifications for Roads and Structures" dated January 2024.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Set all detector units to presence mode.
4. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
5. The cabinet should be designed to include an Auxiliary Output File for future use.
6. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
7. Field adjust temporary poles as needed.



MAXTIME TIMING CHART

FEATURE	PHASE 3	PHASE 6
Walk *	–	–
Ped Clear *	–	–
Min Green	7	12
Passage *	2.0	6.0
Max 1 *	30	60
Yellow Change	3.0	4.6
Red Clear	4.2	2.2
Added Initial *	–	–
Maximum Initial *	–	–
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	–	–

* These values may be field adjusted. Do not adjust Min Green and Extension times for phase 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 Area	N/A
▬	Construction Zone	N/A
● ● ●	Drums	N/A
Ⓐ	No Left Turn Sign (R3-2)	Ⓐ

New Installation
Temporary Design 1 - TMP Phase III

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road-Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
License No. F-0672

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

NC 150 WB
at
Morrison Plantation
Parkway U-turn

Division 12 Iredell County Mooresville

PLAN DATE: May 2024 REVIEWED BY: J Galloway, PE
PREPARED BY: J Hambright REVIEWED BY: R Muncey, PE

REVISIONS	INIT.	DATE

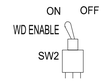
SCALE 0 40 1"=40'

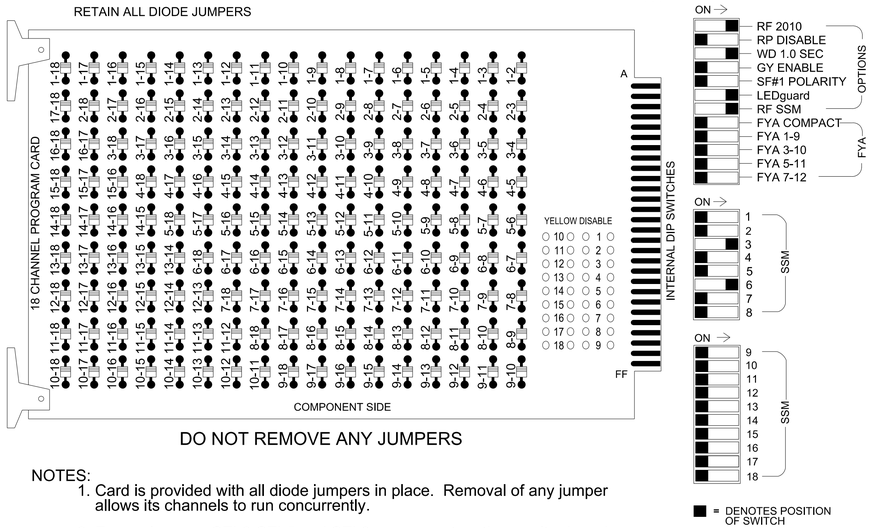
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 029904 ENGINEER
JASON P. GALLOWAY

DocuSigned by: Jason Galloway 12/17/2024
10D1E2B40B4B46E...
DATE
SIG. INVENTORY NO. 12-1838T1

18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(set switches as shown)





DO NOT REMOVE ANY JUMPERS

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 Phase Not On and 6 Green No Walk.
4. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
5. The cabinet and controller are part of the NC 150 D12-02_Mooresville CLS.

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.....S4, S8
Phases Used.....3, 6
Overlap "1".....NOT USED
Overlap "2".....NOT USED
Overlap "3".....NOT USED
Overlap "4".....NOT USED

PROJECT REFERENCE NO.	SHEET NO.
R-2307B	Sig. 26.1

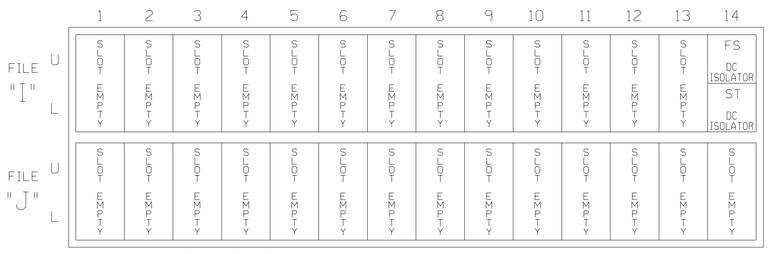
SIGNAL HEAD HOOK-UP CHART

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	NU	NU	31,32	NU	NU	NU	61	62,63	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU
RED								134	134										
YELLOW								135	135										
GREEN									136										
RED ARROW				116															
YELLOW ARROW				117															
FLASHING YELLOW ARROW																			
GREEN ARROW				118				136											

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)



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

FS = FLASH SENSE
ST = STOP TIME

SPECIAL DETECTOR NOTE

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

SEQUENCE DETAIL

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

Web Interface
Home >Controller >Sequence

Sequence 1

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

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 12-1838T1
DESIGNED: MAY 2024
SEALED: 5/17/2024
REVISED: N/A

Temporary Design 1 - TMP Phase III
Electrical Detail

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road-Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
License No. F-0672

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

NC 150 WB
at
Morrison Plantation
Parkway U-Turn

Division 12 | Iredell County | Mooresville

PLAN DATE:	May 2024	REVIEWED BY:	J Galloway, PE
PREPARED BY:	JPG/RMM	REVIEWED BY:	R Muncey, PE

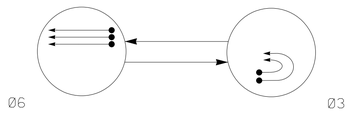
REVISIONS	INIT.	DATE

SEAL 029904 ENGINEER JASON P. CALLOWAY NORTH CAROLINA PROFESSIONAL

DocuSigned by:
Jason Galloway 5/17/2024
10D1E2B40B4B46E...
SIG. INVENTORY NO. 12-1838T1 DATE

PROJECT REFERENCE NO.	SHEET NO.
R-2307B	Sig. 27.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

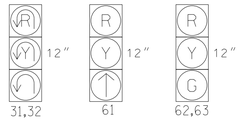
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø6	PHASE Ø3	PHASE FLASH
31,32	R		R
61		R	R
62,63	G	R	R

SIGNAL FACE I.D.

All Heads L.E.D.



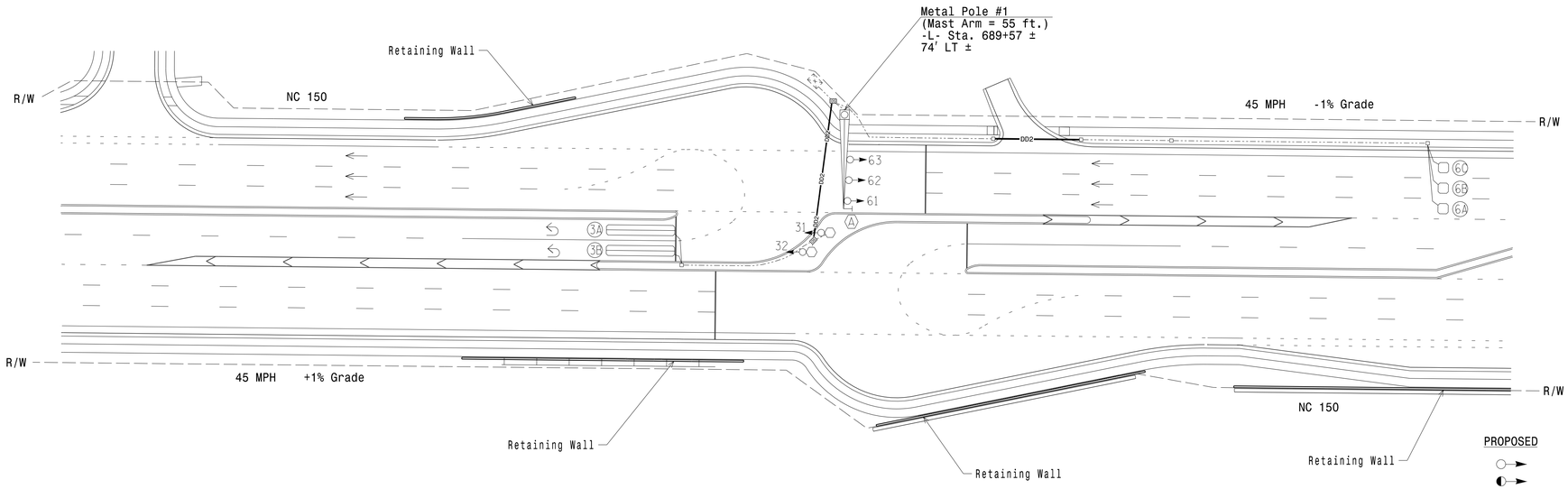
MAXTIME DETECTOR INSTALLATION CHART

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
3A	6X40	0	2-4-2	X	3	-	-	X	-	X	-	X
3B	6X40	0	2-4-2	X	3	-	-	X	-	X	-	X
6A	6X6	300	4	X	6	-	-	X	X	X	-	X
6B	6X6	300	4	X	6	-	-	X	X	X	-	X
6C	6X6	300	4	X	6	-	-	X	X	X	-	X

2 Phase
Fully Actuated
NC 150 D12-02_MOORESVILLE
CLS

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 20124 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. 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 3	PHASE 6
Walk *	–	–
Ped Clear *	–	–
Min Green	7	12
Passage *	2.0	6.0
Max 1 *	30	60
Yellow Change	3.0	4.6
Red Clear	4.9	2.2
Added Initial *	–	1.0
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 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	
	Metal Pole with Mastarm	
DD#	Directional Drill (#) x 2" Conduit	N/A
	Type II Signal Pedestal	
OS	Oversized Junction Box	
A	No Left Turn Sign (R3-2)	A

New Installation - Final Design

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road-Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
License No. F-0672

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'

NC 150 WB
at
Morrison Plantation
Parkway U-turn

Division 12 Iredell County Mooresville

PLAN DATE: May 2024 REVIEWED BY: J Galloway, PE
PREPARED BY: J Hambright REVIEWED BY: R Muncey, PE

REVISIONS	INIT.	DATE

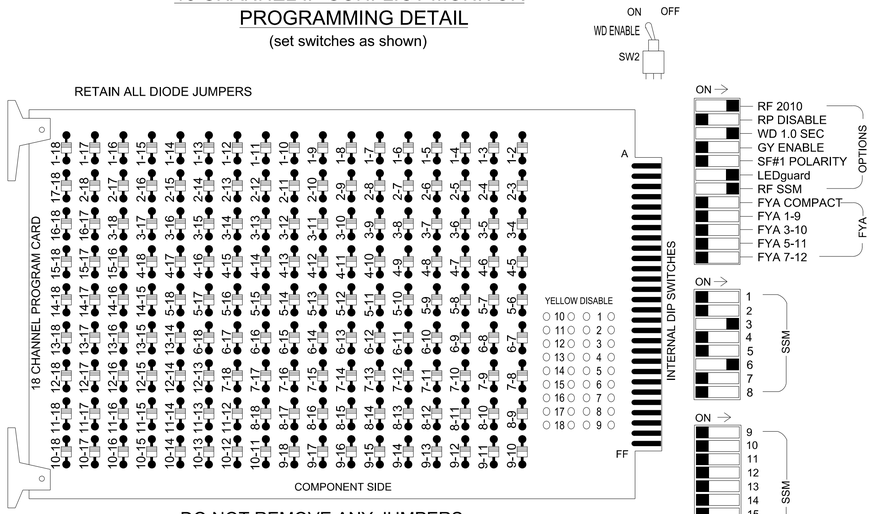
SEAL
NORTH CAROLINA
PROFESSIONAL
SEAL
029904
ENGINEER
JASON R GALLOWAY

DocuSigned by:
Jason Galloway 9/17/2024
10D1E2B40B4B46E...
SIG. INVENTORY NO. 12-1838

PROJECT REFERENCE NO.	SHEET NO.
R-2307B	Sig. 27.1

18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(set switches as shown)



DO NOT REMOVE ANY JUMPERS

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 Phase Not On and 6 Green No Walk.
4. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
5. The cabinet and controller are part of the NC 150 D12-02_Mooresville CLS.

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.....S4, S8
Phases Used.....3, 6
Overlap "1".....NOT USED
Overlap "2".....NOT USED
Overlap "3".....NOT USED
Overlap "4".....NOT USED

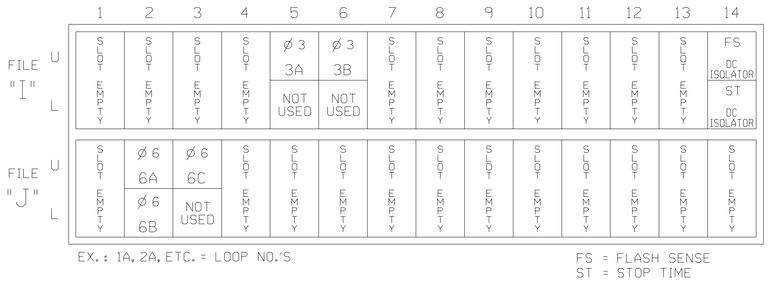
SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8		S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6		15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6		6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	NU	NU	NU	31,32	NU	NU	NU	61	62,63	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU
RED								134	134										
YELLOW								135	135										
GREEN								136	136										
RED ARROW				116															
YELLOW ARROW				117															
FLASHING YELLOW ARROW																			
GREEN ARROW				118															

NU = Not Used

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
3A	TB4-5,6	I5U	58	20	7	3			X		X	
3B	TB4-9,10	I6U	41	3	8	3			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	
6C	TB3-9,10	J3U	64	30	18	6			X	X	X	

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

SEQUENCE DETAIL

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

Web Interface
Home >Controller >Sequence

Sequence 1

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 12-1838
DESIGNED: MAY 2024
SEALED: 5/17/2024
REVISED: N/A

Final Design
Electrical Detail

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road-Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
License No. F-0672

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

NC 150 WB
at
Morrison Plantation
Parkway U-Turn

Division 12 | Iredell County | Mooresville

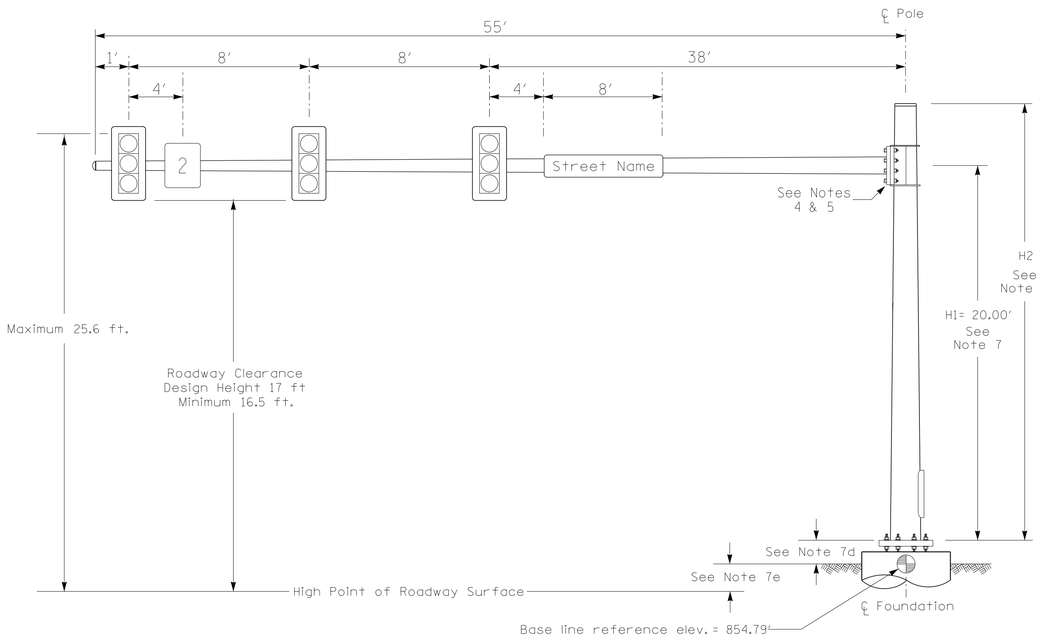
PLAN DATE:	May 2024	REVIEWED BY:	J Galloway, PE
PREPARED BY:	R M Muncey	REVIEWED BY:	R Muncey, PE

REVISIONS	INIT.	DATE

SEAL 029904 ENGINEER JASON P. CALLOWAY NORTH CAROLINA PROFESSIONAL

DocuSigned by:
Jason Galloway 5/17/2024
10D1E2B40B4B46E...
SIG. INVENTORY NO. T2-1838

Design Loading for METAL POLE NO. 1



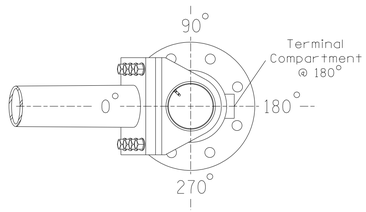
Elevation View

SPECIAL NOTE

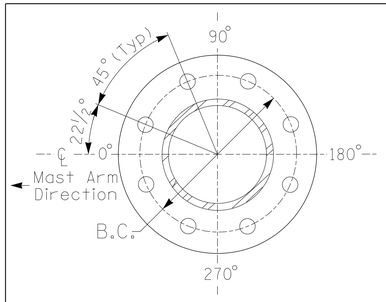
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 1	
Baseline reference point at ℄ Foundation @ ground level	854.79 ft.	
Elevation difference at High point of roadway surface	+0.92 ft.	
Elevation difference at Edge of travelway or face of curb	+/-0.0 ft.	

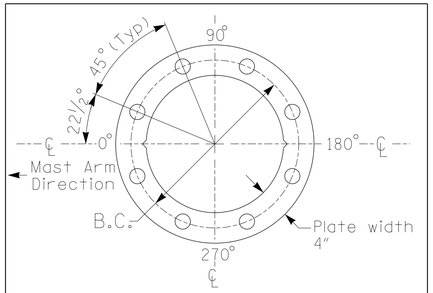


POLE RADIAL ORIENTATION



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-2307B	Sig. 27.2

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
Street Name	STREET NAME SIGN RIGID MOUNTED	16.0 S.F.	24.0″W X 96.0″L	36 LBS

NOTES

DESIGN REFERENCE MATERIAL

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

DESIGN REQUIREMENTS

2. Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
3. Design all signal supports using force ratios that do not exceed 0.9.
4. 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 5 (110 mph)

Stantec

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

NC 150 WB
at
Morrison Plantation
Parkway U-turn

Division 12 | Iredell County | Mooresville

PLAN DATE:	November 2023	REVIEWED BY:	J. Galloway, PE
PREPARED BY:	J. Hambright	REVIEWED BY:	R. Muncey, PE

SCALE: 0 N/A N/A

REVISIONS	INIT.	DATE

NORTH CAROLINA PROFESSIONAL SEAL 029904 ENGINEER JASON L. GALLOWAY

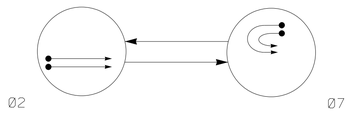
DocuSigned by: Jason Galloway 5/17/2024
10D1E2B40B4B46E...

SIG. INVENTORY NO. 12-1838

5/16/2024
1:23:23 PM
\\ntcarfil01\Projects\Signals\Design\Metal Poles\Loading Diagrams\Loading Diagram_Single Mast Arm_12-1838.dgn
User:jgalloway

PROJECT REFERENCE NO.	SHEET NO.
R-2307B	Sig. 28.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

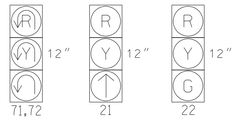
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2	PHASE Ø7	FLASH
21	↑	R	R
22	G	R	R
71,72	↓R	↓R	

SIGNAL FACE I.D.

All Heads L.E.D.



MAXTIME DETECTOR INSTALLATION CHART

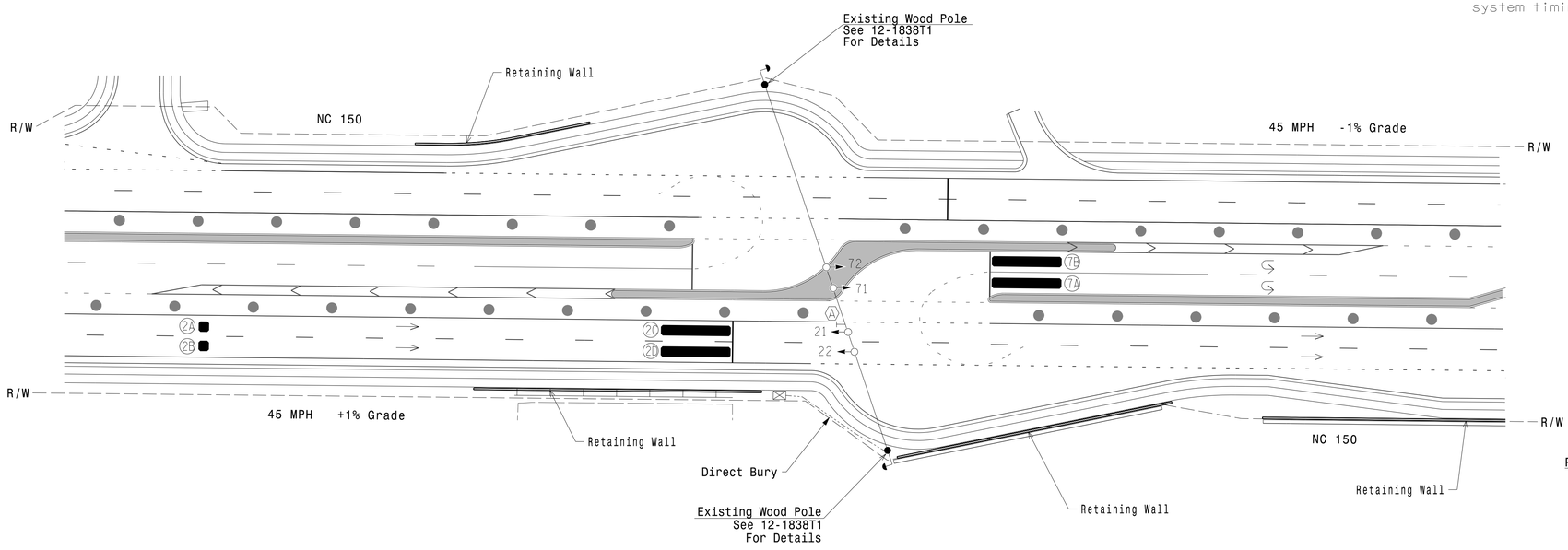
DETECTOR					PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
2A	6X6	300	✳	✳	2	-	-	X	-	X	-	✳
2B	6X6	300	✳	✳	2	-	-	X	-	X	-	✳
2C	6X40	0	✳	✳	2	5.0	2.0	X	-	X	X	✳
2D	6X40	0	✳	✳	2	5.0	2.0	X	-	X	X	✳
7A	6X40	0	✳	✳	7	-	-	X	-	X	-	✳
7B	6X40	0	✳	✳	7	-	-	X	-	X	-	✳

✳ Video Detection Area
Camera locations should be confirmed in the field by the contractor in order to provide detection of the areas indicated.

2 Phase
Fully Actuated
NC 150 D12-02_MOORESVILLE
CLS

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2024 and "Standard Specifications for Roads and Structures" dated January 2024.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Set all detector units to presence mode.
4. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
5. The cabinet should be designed to include an Auxiliary Output File for future use.
6. 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 2	PHASE 7
Walk *	–	–
Ped Clear *	–	–
Min Green	12	7
Passage *	6.0	2.0
Max 1 *	60	30
Yellow Change	4.4	3.0
Red Clear	2.3	4.8
Added Initial *	–	–
Maximum Initial *	–	–
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	–	–

* 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	→
▬	Video Detection Area	N/A
▭	Construction Zone	N/A
●●●	Drums	N/A
Ⓐ	No Left Turn Sign (R3-2)	Ⓐ

New Installation
Temporary Design 1 - TMP Phase III

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road-Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
License No. F-0672

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

NC 150 EB
at
Target U-turn

Division 12 Iredell County Mooresville

PLAN DATE: May 2024 REVIEWED BY: J Galloway, PE
PREPARED BY: J Hambright REVIEWED BY: R Muncey, PE

SCALE 0 40 1"=40'

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA
PROFESSIONAL
SEAL
029904
ENGINEER
JASON P. GALLOWAY

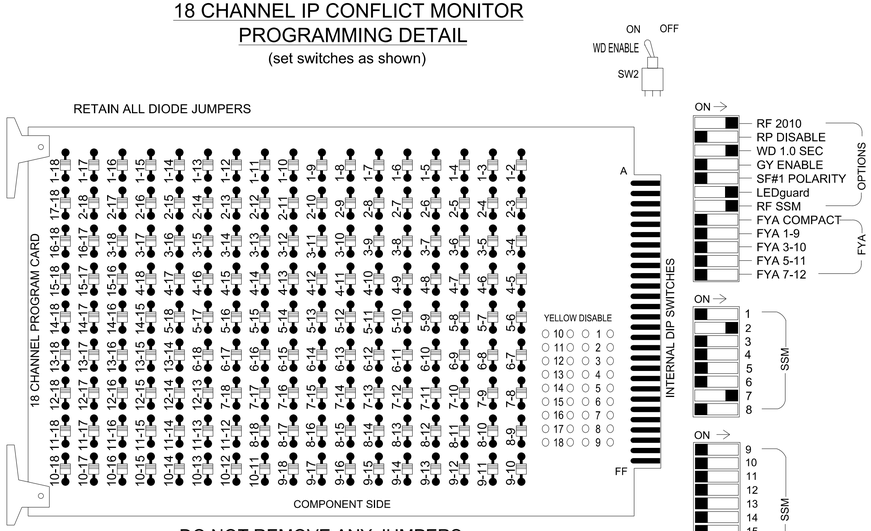
DocuSigned by:
Jason Galloway 8/17/2024
10D1E2B40B4B46E... DATE
SIG. INVENTORY NO. 12-1837TI

$$$$$$SYSDATE$$$$$
5:30:16 PM
J:\Traffic Projects\Design\Signal Design\Temporary Design\Phase 3 TEMP\R-2307B_sig_dsn_12-1837T1.dgn
User:jgalloway

PROJECT REFERENCE NO.	SHEET NO.
R-2307B	Sig. 28.1

18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(set switches as shown)



DO NOT REMOVE ANY JUMPERS

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 Phase Not On.
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 NC 150 D12-02_Mooresville CLS.

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, S10
Phases Used.....2, 7
Overlap "1".....NOT USED
Overlap "2".....NOT USED
Overlap "3".....NOT USED
Overlap "4".....NOT USED

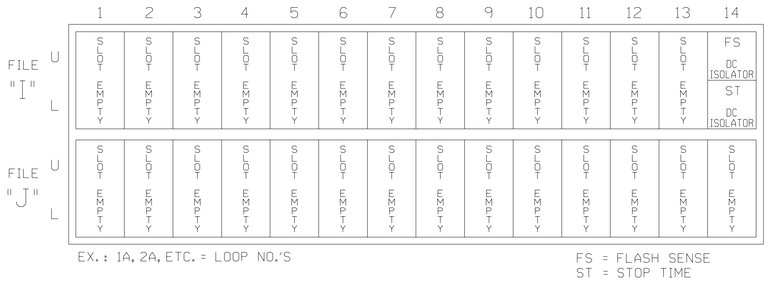
SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2		S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2		13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2		2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	NU	21	22	NU	NU	NU	NU	NU	NU	NU	71,72	NU	NU	NU	NU	NU	NU	NU	NU
RED		128	128																
YELLOW		129	129																
GREEN			130																
RED ARROW											122								
YELLOW ARROW											123								
FLASHING YELLOW ARROW																			
GREEN ARROW		130									124								

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)



SPECIAL DETECTOR NOTE

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

SEQUENCE DETAIL

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

Web Interface
Home >Controller >Sequence

Sequence 1

Ring	Sequence Data
1	2,a,7,b
2	

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 12-1837T1
DESIGNED: MAY 2024
SEALED: 5/17/2024
REVISED: N/A

Temporary Design 1 - TMP Phase III
Electrical Detail

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road-Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
License No. F-0672

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

NC 150 EB
at
Target U-Turn

Division 12 | Iredell County | Mooresville

PLAN DATE:	May 2024	REVIEWED BY:	J Galloway, PE
PREPARED BY:	JPG/RMM	REVIEWED BY:	R Muncey, PE

REVISIONS	INIT.	DATE

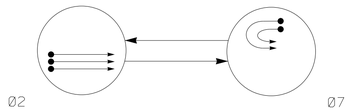
SEAL 029904 ENGINEER JASON P. CALLOWAY NORTH CAROLINA PROFESSIONAL

DocuSigned by: Jason Galloway 5/17/2024
10D1E2B40B4B46E... SIG. INVENTORY NO. 12-1837T1 DATE

5/17/24 PM
User:jgalloway
File:C:\Users\jgalloway\Documents\Designs\Design\Electrical Details\Temporary Design\MAXTIME\MR-2307B_sm_ele_12-1837t1.dgn

PROJECT REFERENCE NO.	SHEET NO.
R-2307B	Sig. 29.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

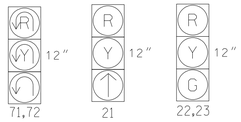
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2	PHASE Ø7	FLASH
21	↑	R	R
22,23	G	R	R
71,72	(R) ↓	∩	(R) ↓

SIGNAL FACE I.D.

All Heads L.E.D.



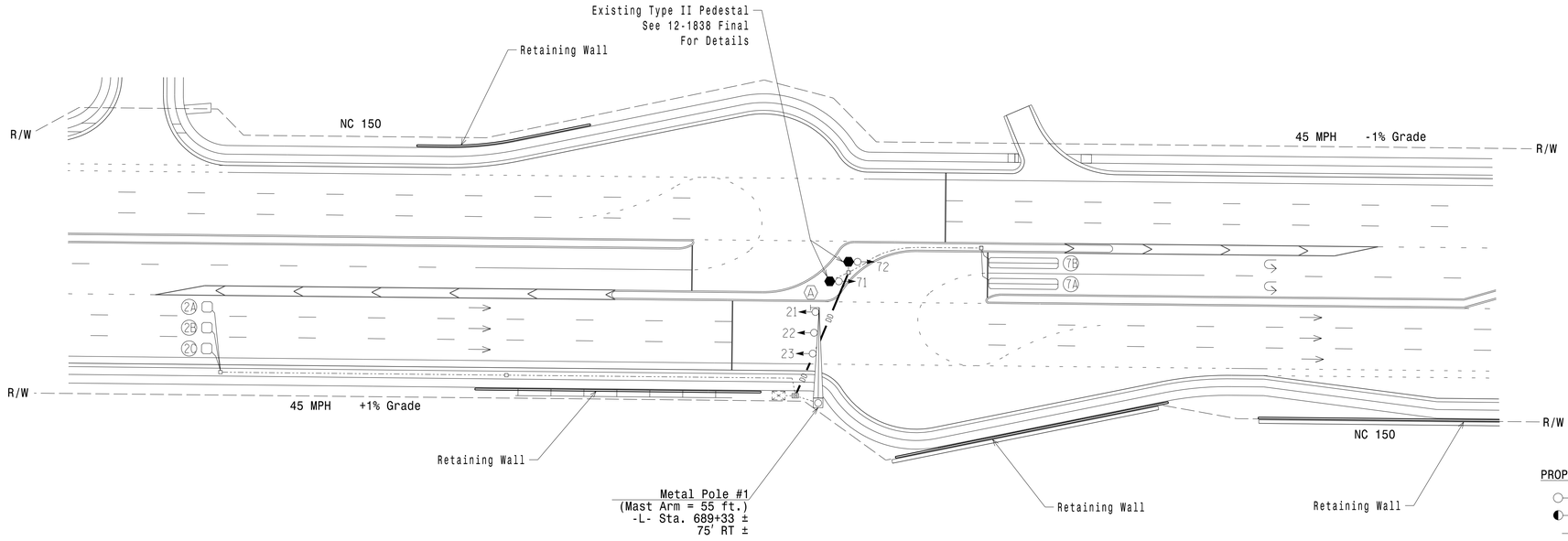
MAXTIME DETECTOR INSTALLATION CHART

DETECTOR					PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITTIAL	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
2C	6X6	300	4	X	2	-	-	X	X	X	-	X
7A	6X40	0	2-4-2	X	7	-	-	X	-	X	-	X
7B	6X40	0	2-4-2	X	7	-	-	X	-	X	-	X

2 Phase
Fully Actuated
NC 150 D12-02_MOORESVILLE
CLS

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2024 and "Standard Specifications for Roads and Structures" dated January 2024.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Set all detector units to presence mode.
4. 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 (#) x 2" Conduit	N/A
⬡	Type II Signal Pedestal	⬢
OS	Oversized Junction Box	■
Ⓐ	No Left Turn Sign (R3-2)	Ⓐ

MAXTIME TIMING CHART

FEATURE	PHASE 2	PHASE 7
Walk *	–	–
Ped Clear *	–	–
Min Green	12	7
Passage *	6.0	2.0
Max 1 *	60	30
Yellow Change	4.4	3.0
Red Clear	2.3	5.1
Added Initial *	1.0	–
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 - Final Design

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road-Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
License No. F-0672

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'

NC 150 EB
at
Target U-turn

Division 12 Iredell County Mooresville

PLAN DATE:	May 2024	REVIEWED BY:	J Galloway, PE
PREPARED BY:	J Hambright	REVIEWED BY:	R Muncey, PE

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA
PROFESSIONAL
SEAL 029904
ENGINEER
JASON P. GALLOWAY

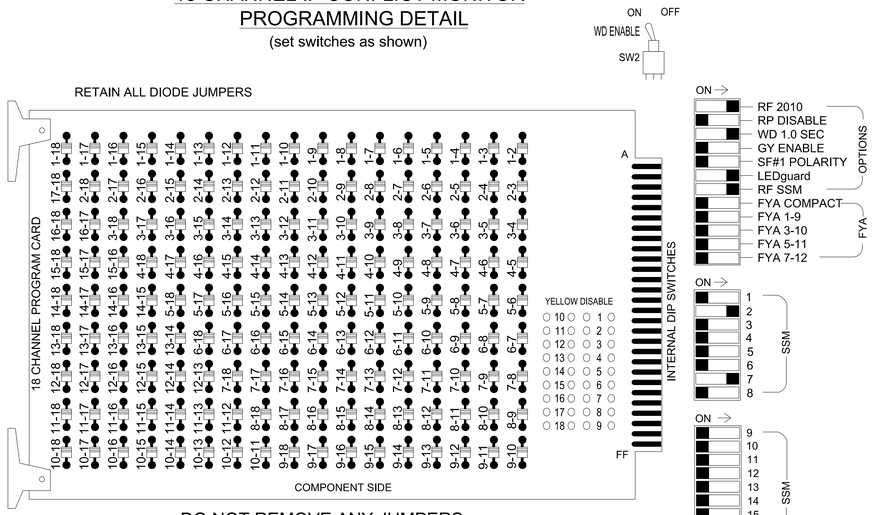
DocuSigned by:
Jason Galloway 12/17/2024
10D1E2B40B4B46E...
SIG. INVENTORY NO. 12-1837

DATE

PROJECT REFERENCE NO.	SHEET NO.
R-2307B	Sig. 29.1

18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(set switches as shown)



DO NOT REMOVE ANY JUMPERS

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 Phase Not On.
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 NC 150 D12-02_Mooresville CLS.

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, S10
Phases Used.....2, 7
Overlap "1".....NOT USED
Overlap "2".....NOT USED
Overlap "3".....NOT USED
Overlap "4".....NOT USED

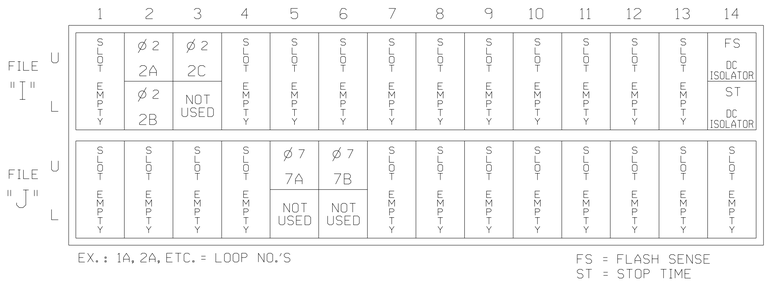
SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2		S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2		13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2		2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	NU	21	22,23	NU	NU	NU	NU	NU	NU	NU	71,72	NU	NU	NU	NU	NU	NU	NU	NU
RED		128	128																
YELLOW		129	129																
GREEN			130																
RED ARROW											122								
YELLOW ARROW											123								
FLASHING YELLOW ARROW																			
GREEN ARROW		130									124								

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)



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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN
2A	TB2-5,6	I2U	39	1	2	2			X	X	X	
2B	TB2-7,8	I2L	43	5	3	2			X	X	X	
2C	TB2-9,10	I3U	63	29	4	2			X	X	X	
7A	TB5-5,6	J5U	57	19	21	7			X		X	
7B	TB5-9,10	J6U	42	4	22	7			X		X	

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

SEQUENCE DETAIL

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

Web Interface
Home >Controller >Sequence

Sequence 1

Ring	Sequence Data
1	2,a,7,b
2	

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 12-1837
DESIGNED: MAY 2024
SEALED: 5/17/2024
REVISED: N/A

Final Design
Electrical Detail

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road-Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
License No. F-0672

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

NC 150 EB
at
Target U-Turn

Division 12 Iredell County Mooresville

PLAN DATE:	May 2024	REVIEWED BY:	J Galloway, PE
PREPARED BY:	R M Muncey	REVIEWED BY:	R Muncey, PE

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA
PROFESSIONAL
SEAL
029904
ENGINEER
JASON P. GALLOWAY

DocuSigned by:
Jason Galloway 5/17/2024
10D1E2B40B4B46E...
SIG. INVENTORY NO. DATE

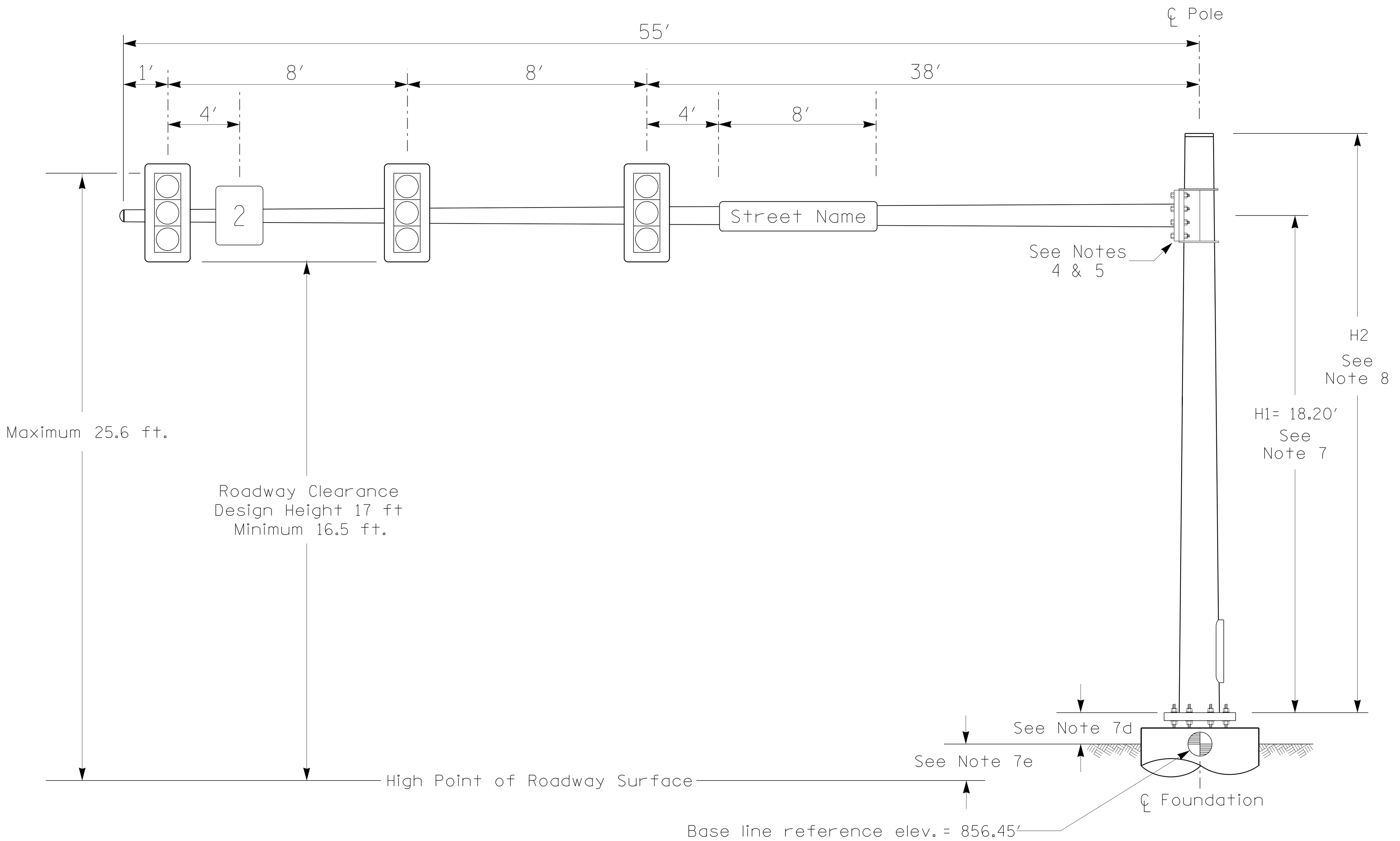
T2-1837

5:33:47 PM
\\stantec.com\designs\Design\Electrical Details\Final Design\MAXTIME\R-2307B_sm_ele_12-1837.dgn
User:jgalloway

PROJECT REFERENCE NO.	SHEET NO.
R-2307B	Sig. 29.2

METAL POLE No. 1

Design Loading for METAL POLE NO. 1



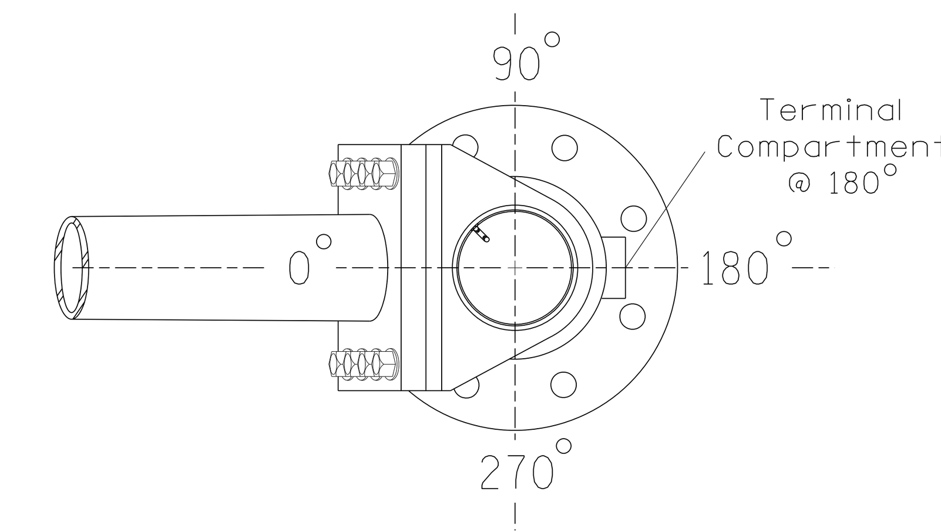
Elevation View

SPECIAL NOTE

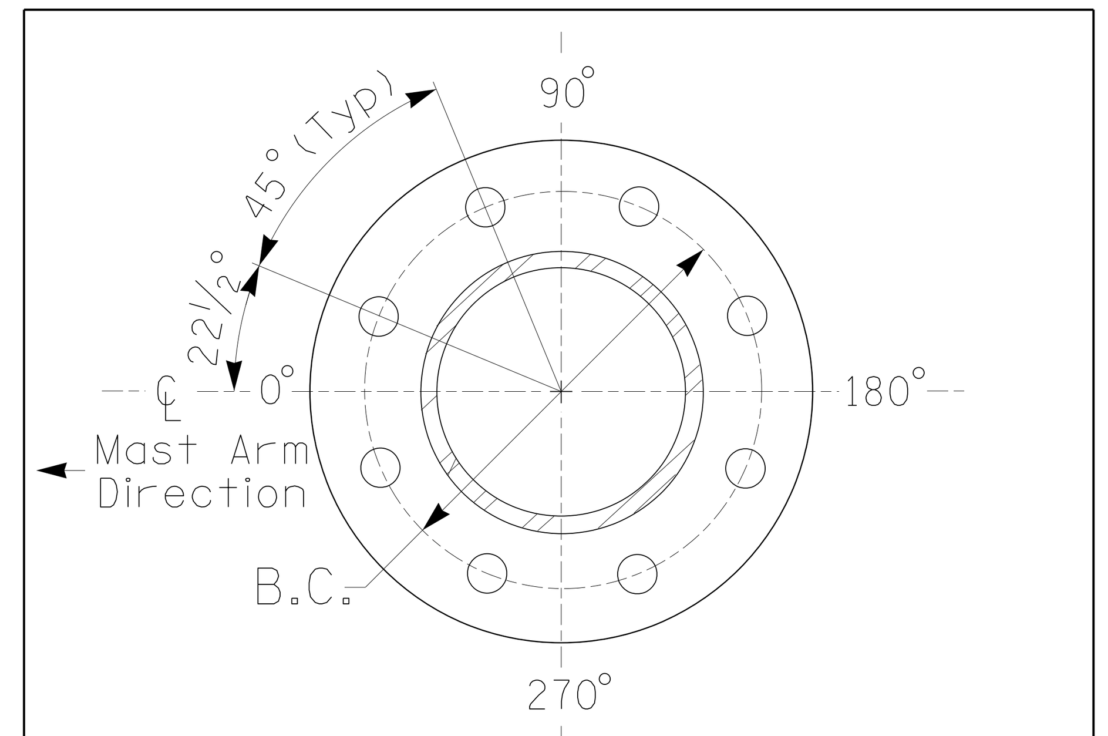
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 1	
Baseline reference point at ℄ Foundation @ ground level	856.45 ft.	
Elevation difference at High point of roadway surface	-0.80 ft.	
Elevation difference at Edge of travelway or face of curb	+/-0.0 ft.	

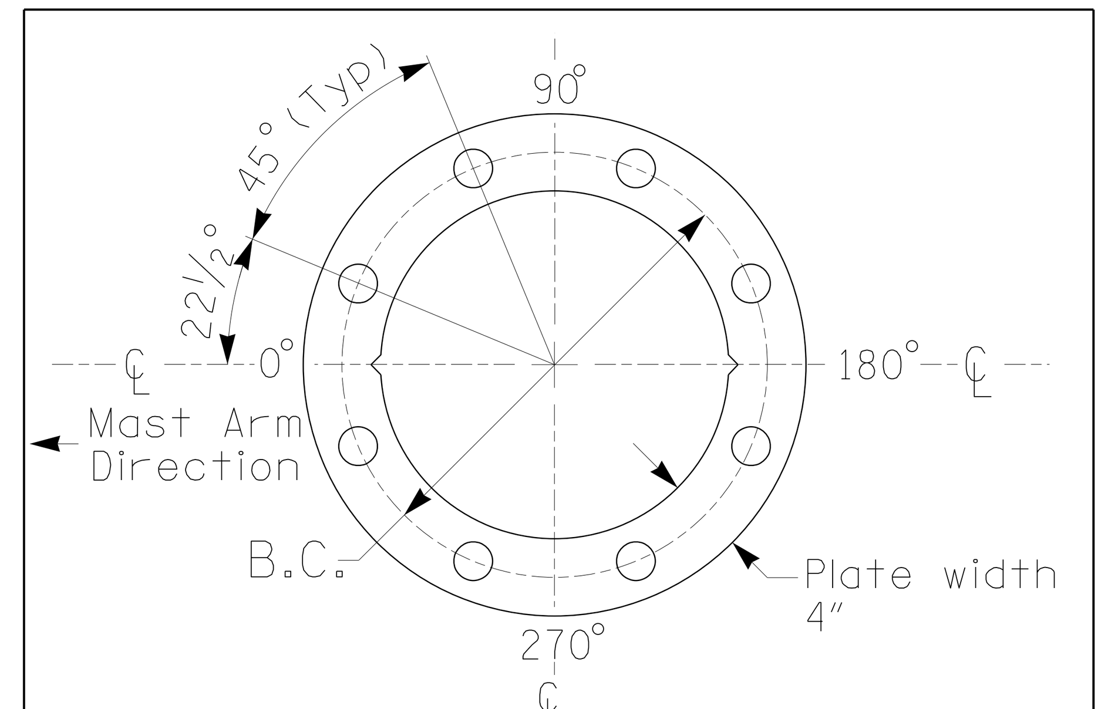


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL

For 8 Bolt Base Plate

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
[signal head]	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
Street Name	STREET NAME SIGN RIGID MOUNTED	16.0 S.F.	24.0" W X 96.0" L	36 LBS

NOTES

DESIGN REFERENCE MATERIAL

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

DESIGN REQUIREMENTS

2. Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
3. Design all signal supports using force ratios that do not exceed 0.9.
4. 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 5 (110 mph)

Stantec

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

NC 150 EB
at
Target U-turn

Division 12 | Iredell County | Mooresville

PLAN DATE:	November 2023	REVIEWED BY:	J. Galloway, PE
PREPARED BY:	J. Hambright	REVIEWED BY:	R. Muncey, PE

SCALE 0 N/A — N/A

REVISIONS	INIT.	DATE

NORTH CAROLINA PROFESSIONAL SEAL 029904 ENGINEER JASON P. GALLOWAY

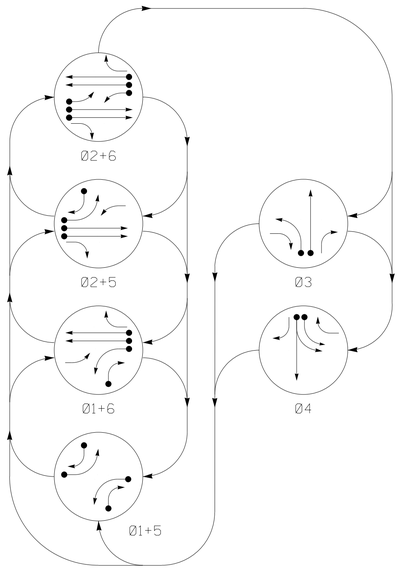
DocuSigned by: Jason Galloway 10D1E2B40B4B46E... 5/17/2024

SIGNATURE DATE

SIG. INVENTORY NO. 12-1837

PROJECT REFERENCE NO.	SHEET NO.
R-2307B	Sig. 30.0

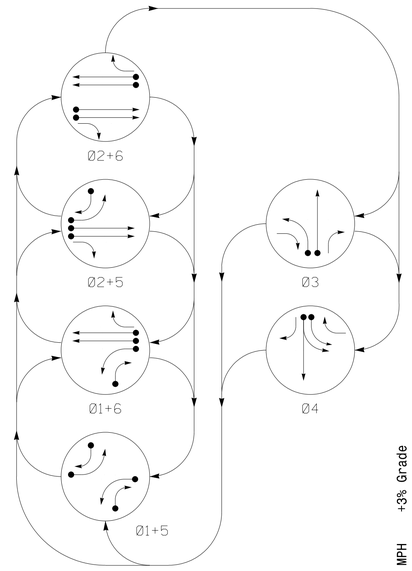
DEFAULT PHASING DIAGRAM



DEFAULT PHASING TABLE OF OPERATION

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

ALTERNATE PHASING DIAGRAM



ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3	Ø4	FLASH
11	←	←	←R	←R	←R	←R	←R
21	R	R	G	G	R	R	R
22	R	R	G	G	R/←	R	R
31	R	R	R	R	G	R	R
32	R/→	R/→	R	R	G	R	R
41	R	R	R	R	G←	R	R
42	R/→	R	R/→	R	R	G	R
51	←	←R	←	←R	←R	←R	←R
61	R	G	R	G	R	R	R
62	R	G	R	G	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	✳	✳	1	15.0★	-	X	-	X	-	✳
					6#	3.0	-	X	-	X	X	✳
1B	6X40	0	✳	✳	1	15.0	-	X	-	X	-	✳
2A	6X6	300	✳	✳	2	-	-	X	-	X	-	✳
2B	6X6	300	✳	✳	2	-	-	X	-	X	-	✳
2C	6X40	0	✳	✳	2	5.0	2.0	X	-	X	X	✳
2D	6X40	0	✳	✳	2	5.0	2.0	X	-	X	X	✳
3A	6X40	0	✳	✳	3	-	-	X	-	X	-	✳
3B	6X40	0	✳	✳	3	-	-	X	-	X	-	✳
4A	6X40	0	✳	✳	4	-	-	X	-	X	-	✳
4B	6X40	0	✳	✳	4	-	-	X	-	X	-	✳
5A	6X40	0	✳	✳	5	15.0★	-	X	-	X	-	✳
					2#	3.0	-	X	-	X	X	✳
5B	6X40	0	✳	✳	5	15.0	-	X	-	X	-	✳
6A	6X6	300	✳	✳	6	-	-	X	-	X	-	✳
6B	6X6	300	✳	✳	6	-	-	X	-	X	-	✳
6C	6X40	0	✳	✳	6	5.0	2.0	X	-	X	X	✳
6D	6X40	0	✳	✳	6	5.0	2.0	X	-	X	X	✳

✳ Video Detection Area
Camera locations should be confirmed in the field by the contractor in order to provide detection of the areas indicated.

Disable Phase(s) call during Alternate Phasing Operation.

★ Reduce delay to 3 sec during Alternate Phasing Operation.

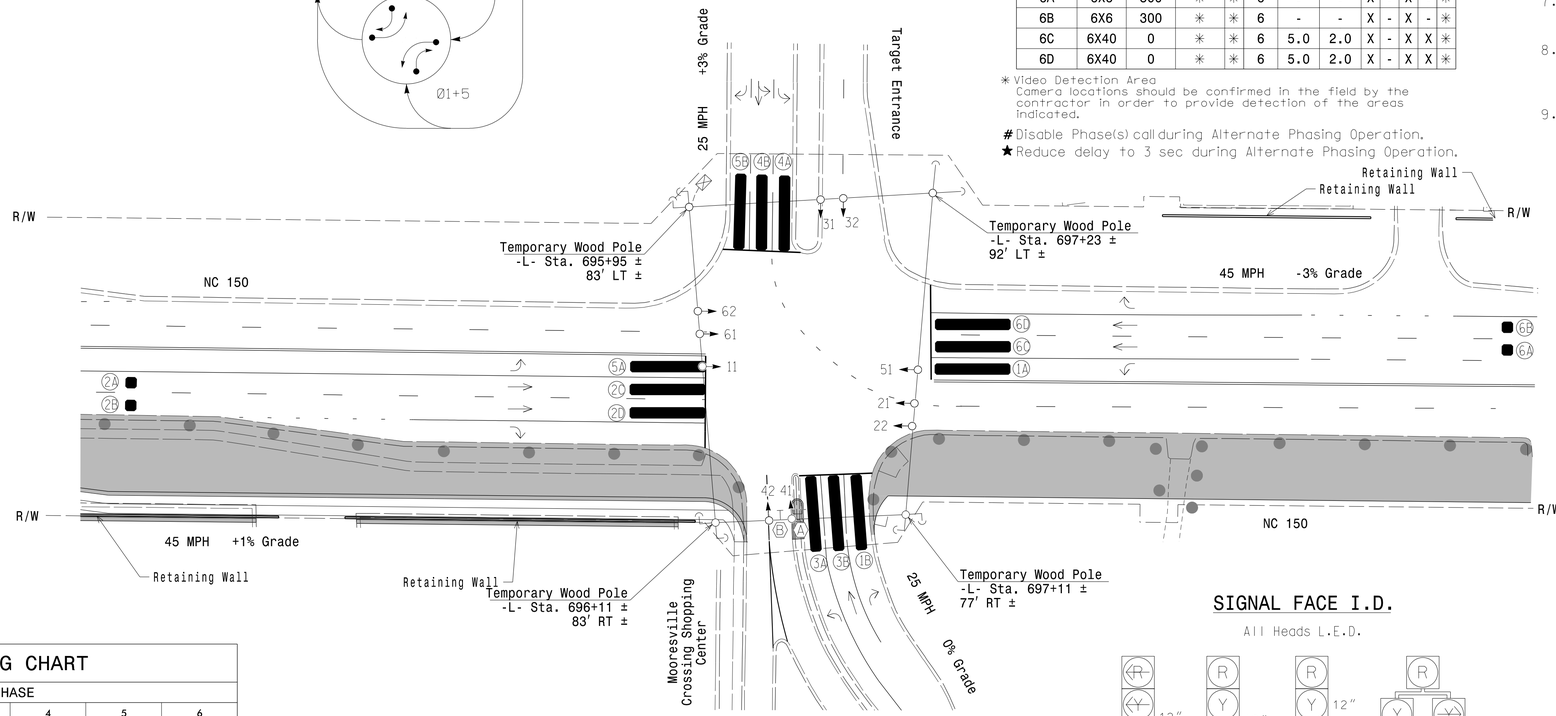
6 Phase Fully Actuated w/ Alternate Phasing NC 150 D12-02_MOORESVILLE CLS

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2024 and "Standard Specifications for Roads and Structures" dated January 2024.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 and/or phase 5 may be lagged.
4. The order of phase 3 and phase 4 may be reversed.
5. Set all detector units to presence mode.
6. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
7. The Division Traffic Engineer will determine 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. Field adjust temporary poles as needed.

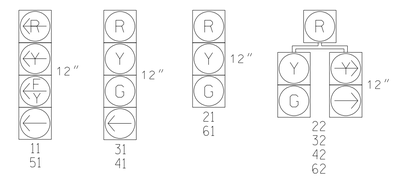
PHASING DIAGRAM DETECTION LEGEND

- 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 Area	N/A
▱	Construction Zone	N/A
●●●	Drums	N/A
Ⓐ	Left Arrow "ONLY" Sign (R3-5L)	Ⓐ
Ⓑ	Combined Through and Left Arrow Sign (R3-6L)	Ⓑ

MAXTIME TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6
Walk *	–	–	–	–	–	–
Ped Clear *	–	–	–	–	–	–
Min Green	7	12	7	7	7	12
Passage *	2.0	6.0	2.0	2.0	2.0	6.0
Max 1 *	15	90	35	35	15	90
Yellow Change	3.0	4.8	3.2	3.1	3.0	4.8
Red Clear	3.1	1.7	2.8	3.2	2.8	1.7
Added Initial *	–	–	–	–	–	–
Maximum Initial *	–	–	–	–	–	–
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	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

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road-Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
License No. F-0672

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

NC 150
at
Mooresville Crossing Shopping Center/Target Entrance

Division 12 Iredell County Mooresville

PLAN DATE: May 2024 REVIEWED BY: J Galloway, PE
PREPARED BY: J Hambright REVIEWED BY: R Muncey, PE

SCALE 0 40 1"=40'

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 029904 ENGINEER JASON P GALLOWAY

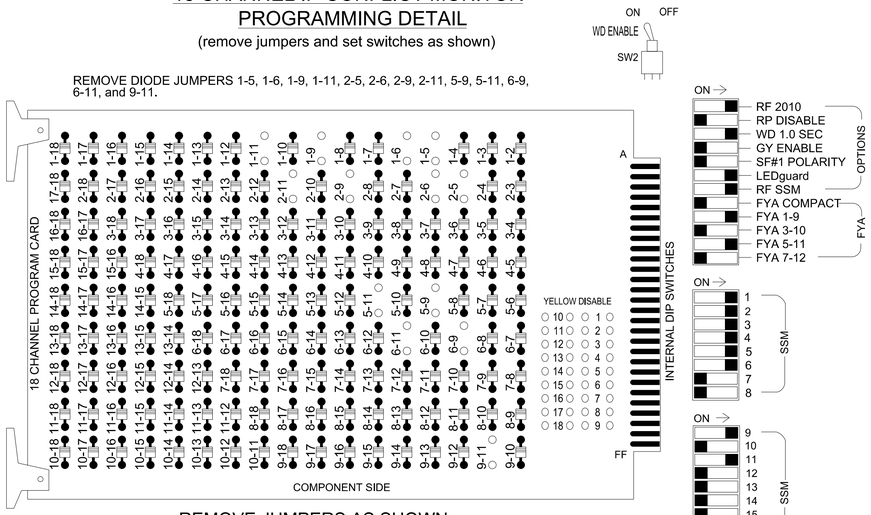
DocuSigned by: Jason Galloway 9/17/2024
10D1E2B40B4B46E... DATE
SIG. INVENTORY NO. 12-16731I

$$$$$$SYSDATE$$$$$$
5:33:33 PM
User:jgalloway
C:\Users\jgalloway\Designs\Design#Signal Design#Temporary Design#Phase 1 TEMP#R-2307B_sig_dsn_12-16731.dgn

18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

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



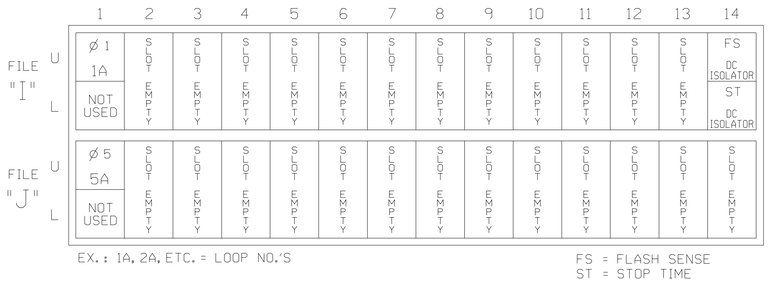
REMOVE JUMPERS AS SHOWN

NOTES:

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.

INPUT FILE POSITION LAYOUT

(front view)



INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN
1A	TB2-1,2	I1U	56	18	1 *	1	15.0		X		X	
				-	29 *	6	3.0		X		X	X
5A	TB3-1,2	J1U	55	17	15 *	5	15.0		X		X	
				-	31 *	2	3.0		X		X	X

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

INPUT FILE POSITION LEGEND: J2L

FILE J
SLOT 2
LOWER

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 NC 150 D12-02_Mooresville CLS.

EQUIPMENT INFORMATION

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

*See overlap programming detail on sheet 2

SPECIAL DETECTOR NOTE

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

For Detection Zones 1A and 5A, the equipment placement is typical for a NCDOT installation. Inputs associated wtih these slots are compatible with alternate operation programming located on the following sheets of this electrical detail.

PROJECT REFERENCE NO.	SHEET NO.
R-2307B	Sig. 30.1

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1		S2	S3	S4			S5			S6	S7		S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1		2	13	3			4			14	5		6	15	7	8	16	9	10	17	11	12	18
PHASE	1		2	2 PED	3			4			4 PED	5		6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	11★	32	21,22	NU	22	31	32	41	42	62	NU	42	51★	61,62	NU	NU	NU	NU	11★	NU	NU	51★	NU	NU
RED		*	128			116	116	101	101			*		134										
YELLOW			129			117	117	102	102					135										
GREEN			130			118	118	103	103					136										
RED ARROW																			A121			A114		
YELLOW ARROW		126			117					102		132							A122			A115		
FLASHING YELLOW ARROW																			A123			A116		
GREEN ARROW	127	127			118	118		103		103		133	133											

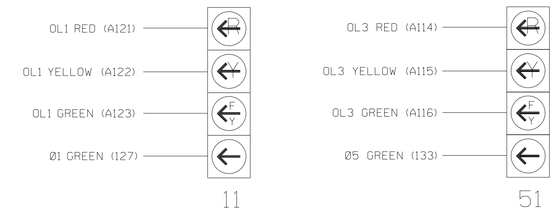
NU = Not Used

* 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)

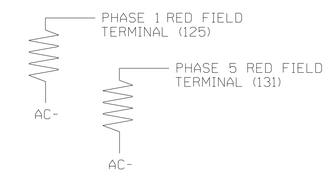


LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown below)

ACCEPTABLE VALUES

VALUE (ohms)	WATTAGE
1.5K - 1.9K	25W (min)
2.0K - 3.0K	10W (min)



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

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 12-1673T1
DESIGNED: MAY 2024
SEALED: 5/17/2024
REVISED: N/A

Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road-Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
License No. F-0672

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

NC 150
at
Mooresville Crossing Shopping Center/Target Entrance

Division 12 Iredell County Mooresville

PLAN DATE:	May 2024	REVIEWED BY:	J Galloway, PE
PREPARED BY:	JPG/RMM	REVIEWED BY:	R Muncey, PE

REVISIONS	INIT.	DATE

SEAL 029904 ENGINEER JASON PAUL GALLOWAY NORTH CAROLINA PROFESSIONAL

DocuSigned by: Jason Galloway 5/17/2024
10D1E2B40B4B46E...
SIG. INVENTORY NO. 12-1673T1

PROJECT REFERENCE NO.	SHEET NO.
R-2307B	Sig. 30.2

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

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

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

Web Interface
Home >Controller >Detector Configuration >Vehicle Detectors

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

Plan 2

1A

Detector	Call Phase	Delay
1	1	3.0
29	0	-

5A

Detector	Call Phase	Delay
15	5	3.0
31	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 11 and 51 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 3 seconds.

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

MAXTIME ALTERNATE PHASING PATTERN PROGRAMMING DETAIL

Front Panel
Main Menu >Controller >Coordination >Patterns

Web Interface
Home >Controller >Coordination >Patterns

Pattern Parameters

Pattern	Veh Det Plan	Overlap Plan
*	2	2

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

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 12-1673T1
DESIGNED: MAY 2024
SEALED: 5/17/2024
REVISED: N/A

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

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road-Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
License No. F-0672

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

NC 150
at
Mooresville Crossing Shopping Center/Target Entrance
Division 12 Iredell County Mooresville

PLAN DATE:	May 2024	REVIEWED BY:	J Galloway, PE
PREPARED BY:	JPG/RMM	REVIEWED BY:	R Muncey, PE

REVISIONS	INIT.	DATE

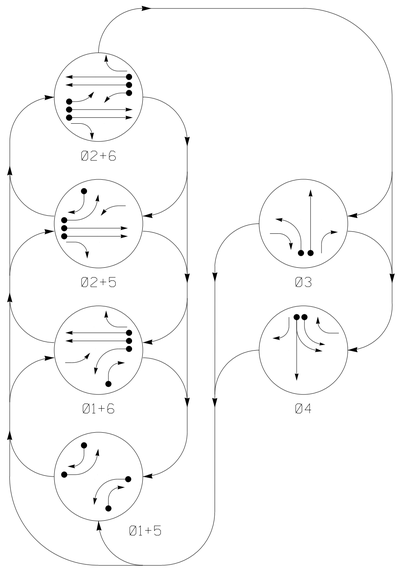
SEAL 029904 ENGINEER NORTH CAROLINA PROFESSIONAL JASON P. GALLOWAY

DocuSigned by:
Jason Galloway 5/17/2024
10D1E2B40B4B46E... DATE
SIG. INVENTORY NO. 12-1673T1

PROJECT REFERENCE NO.	SHEET NO.
R-2307B	Sig. 31.0

6 Phase
Fully Actuated w/
Alternate Phasing
NC 150 D12-02_MOORESVILLE
CLS

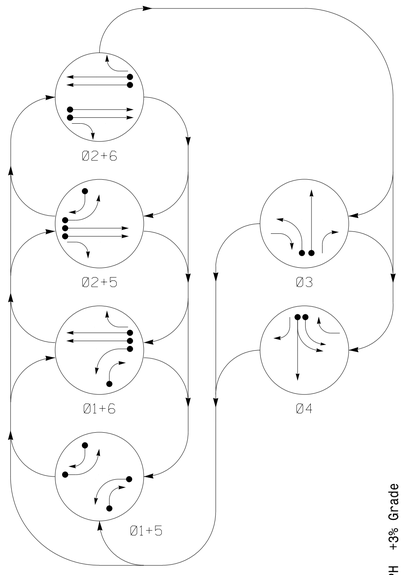
DEFAULT PHASING DIAGRAM



DEFAULT PHASING TABLE OF OPERATION

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

ALTERNATE PHASING DIAGRAM



ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3	Ø4	FLASH
11	←	←	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~
21	R	R	G	G	R	R	R
22	R	R	G	G	R →	R	R
31	R	R	R	R	G ←	R	R
32	R →	R →	R	R	G	R	R
41	R	R	R	R	R	G ←	R
42	R →	R	R →	R	R	G	R
51	←	~~R~~	←	~~R~~	~~R~~	~~R~~	~~R~~
61	R	G	R	G	R	R	R
62	R	G	R	G	R	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
1A	6X40	0	✳	✳	1	15.0★	-	X	-	X	-	✳
					6#	3.0	-	X	-	X	X	✳
1B	6X40	0	✳	✳	1	15.0	-	X	-	X	-	✳
2A	6X6	300	✳	✳	2	-	-	X	-	X	-	✳
2B	6X6	300	✳	✳	2	-	-	X	-	X	-	✳
2C	6X40	0	✳	✳	2	5.0	2.0	X	-	X	X	✳
2D	6X40	0	✳	✳	2	5.0	2.0	X	-	X	X	✳
3A	6X40	0	✳	✳	3	-	-	X	-	X	-	✳
3B	6X40	0	✳	✳	3	-	-	X	-	X	-	✳
4A	6X40	0	✳	✳	4	-	-	X	-	X	-	✳
4B	6X40	0	✳	✳	4	-	-	X	-	X	-	✳
5A	6X40	0	✳	✳	5	15.0★	-	X	-	X	-	✳
					2#	3.0	-	X	-	X	X	✳
5B	6X40	0	✳	✳	5	15.0	-	X	-	X	-	✳
5C	6x6	0	✳	✳	5	15.0	-	X	-	X	-	✳
6A	6X6	300	✳	✳	6	-	-	X	-	X	-	✳
6B	6X6	300	✳	✳	6	-	-	X	-	X	-	✳
6C	6X40	0	✳	✳	6	5.0	2.0	X	-	X	X	✳
6D	6X40	0	✳	✳	6	5.0	2.0	X	-	X	X	✳

✳ Video Detection Area
Camera locations should be confirmed in the field by the contractor in order to provide detection of the areas indicated.

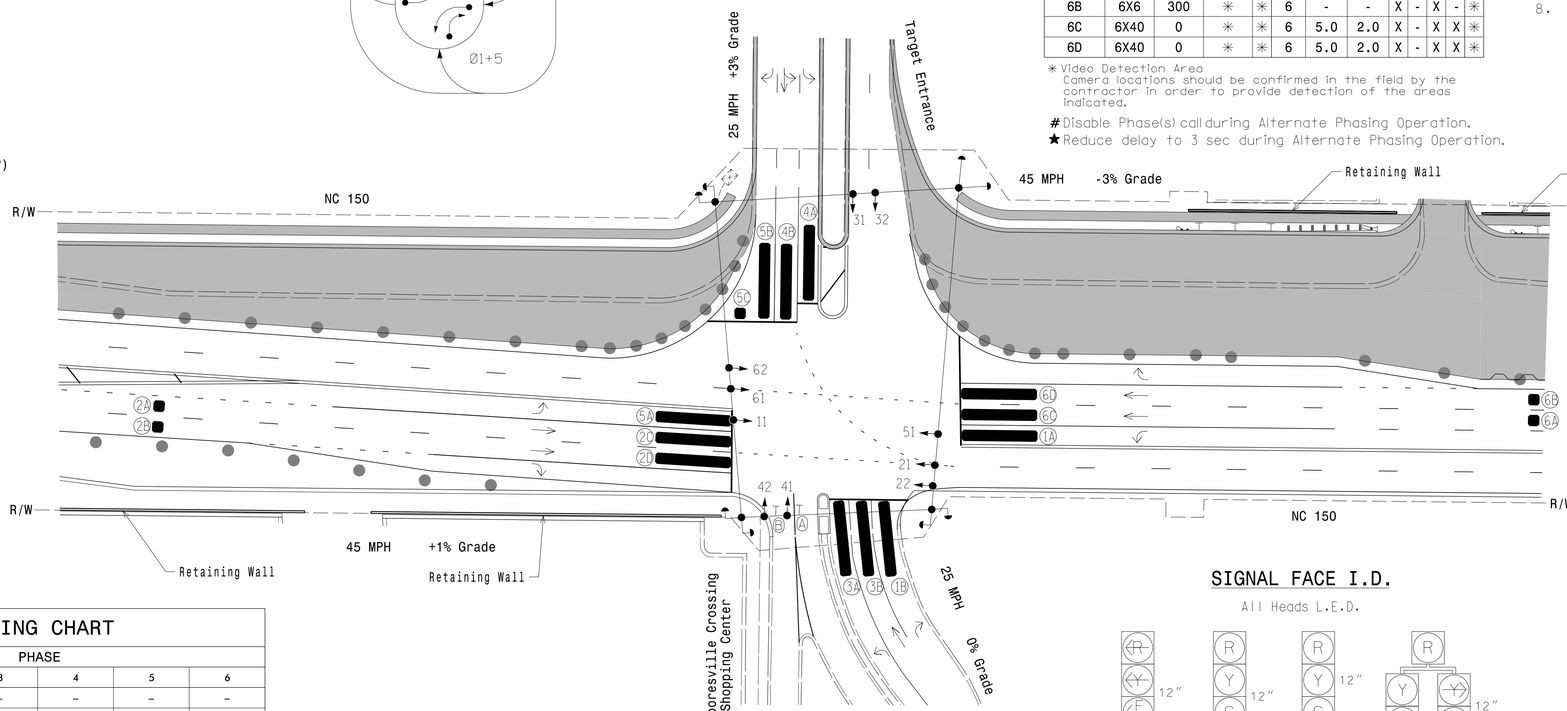
Disable Phase(s) call during Alternate Phasing Operation.
★ Reduce delay to 3 sec during Alternate Phasing Operation.

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2024 and "Standard Specifications for Roads and Structures" dated January 2024.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 and/or phase 5 may be lagged.
4. The order of phase 3 and phase 4 may be reversed.
5. Reposition existing signal heads numbered #11, 21, 22, 51, 61 and 62.
6. Set all detector units to presence mode.
7. The Division Traffic Engineer will determine 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.

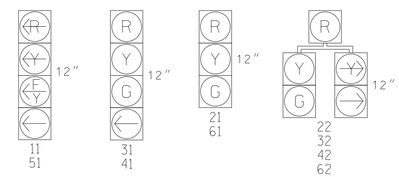
PHASING DIAGRAM DETECTION LEGEND

- 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 Area	N/A
▭	Construction Zone	N/A
● ● ●	Drums	N/A
(A)	Left Arrow "ONLY" Sign (R3-5L)	(A)
(B)	Combined Through and Left Arrow Sign (R3-6L)	(B)

MAXTIME TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6
Walk *	–	–	–	–	–	–
Ped Clear *	–	–	–	–	–	–
Min Green	7	12	7	7	7	12
Passage *	2.0	6.0	2.0	2.0	2.0	6.0
Max 1 *	15	90	35	35	15	90
Yellow Change	3.0	4.8	3.2	3.1	3.0	4.8
Red Clear	3.1	1.7	2.2	3.2	2.6	1.7
Added Initial *	–	–	–	–	–	–
Maximum Initial *	–	–	–	–	–	–
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	X
Vehicle Recall	–	MIN RECALL	–	–	–	MIN RECALL
Dual Entry	–	–	–	–	–	–

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

Signal Upgrade
Temporary Design 2 - TMP Phase II

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road-Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
License No. F-0672

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'

NC 150
at
Mooresville Crossing Shopping Center/Target Entrance
Division 12 Iredell County Mooresville

PLAN DATE:	May 2024	REVIEWED BY:	J Galloway, PE
PREPARED BY:	J Hambright	REVIEWED BY:	R Muncey, PE

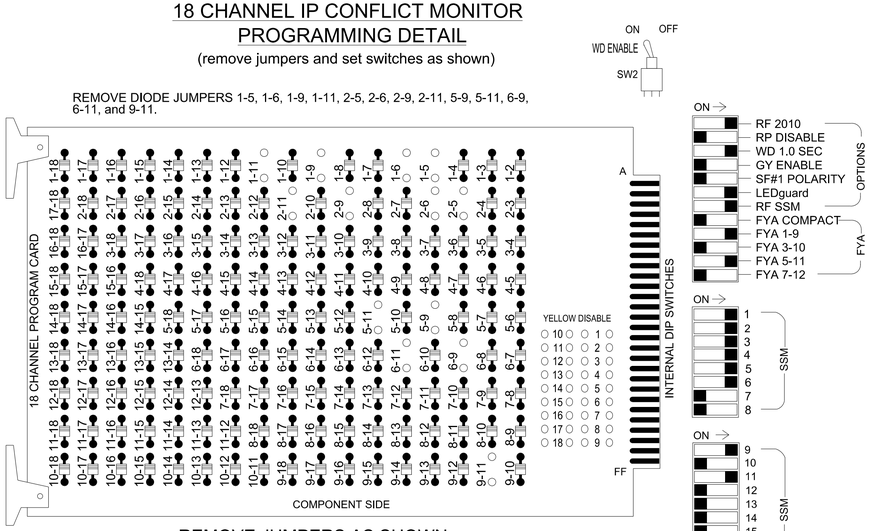
REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA
PROFESSIONAL
SEAL 029904
ENGINEER
JASON P. GALLOWAY

DocuSigned by: Jason Galloway 9/17/2024
10D1E2B40B4B46E... DATE
SIG. INVENTORY NO. 12-167312

18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



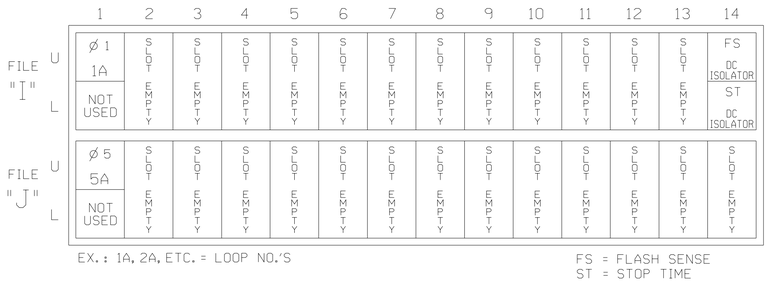
REMOVE JUMPERS AS SHOWN

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.

INPUT FILE POSITION LAYOUT

(front view)



INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN
1A	TB2-1,2	I1U	56	18	1 *	1	15.0		X		X	
				-	29 *	6	3.0		X		X	X
5A	TB3-1,2	J1U	55	17	15 *	5	15.0		X		X	
				-	31 *	2	3.0		X		X	X

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

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

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 NC 150 D12-02_Mooresville CLS.

EQUIPMENT INFORMATION

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

*See overlap programming detail on sheet 2

SPECIAL DETECTOR NOTE

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

For Detection Zones 1A and 5A, the equipment placement is typical for a NCDOT installation. Inputs associated wtih these slots are compatible with alternate operation programming located on the following sheets of this electrical detail.

PROJECT REFERENCE NO.	SHEET NO.
R-2307B	Sig. 31.1

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1		S2	S3	S4			S5			S6	S7		S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1		2	13	3			4			14	5		6	15	7	8	16	9	10	17	11	12	18
PHASE	1		2	2 PED	3			4			4 PED	5		6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	11★	32	21,22	NU	22	31	32	41	42	62	NU	42	51★	61,62	NU	NU	NU	NU	11★	NU	NU	51★	NU	NU
RED		*	128			116	116	101	101			*		134										
YELLOW			129			117	117	102	102					135										
GREEN			130			118	118	103	103					136										
RED ARROW																			A121			A114		
YELLOW ARROW		126			117					102		132							A122			A115		
FLASHING YELLOW ARROW																			A123			A116		
GREEN ARROW	127	127			118	118		103		103		133	133											

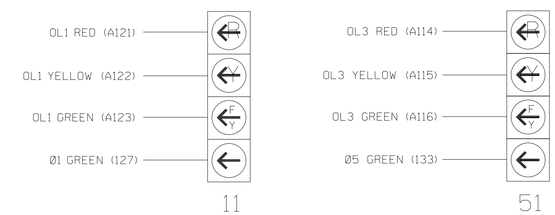
NU = Not Used

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

★ See pictorial of head wiring in detail this sheet.

FYA SIGNAL WIRING DETAIL

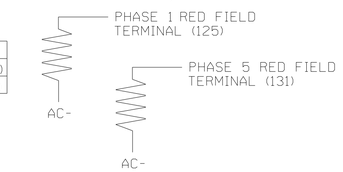
(wire signal heads as shown)



LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown below)

ACCEPTABLE VALUES	
VALUE (ohms)	WATTAGE
1.5K - 1.9K	25W (min)
2.0K - 3.0K	10W (min)



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

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 12-1673T2
DESIGNED: MAY 2024
SEALED: 5/17/2024
REVISED: N/A

Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road-Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
License No. F-0672

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

NC 150
at
Mooresville Crossing Shopping Center/Target Entrance

Division 12 Iredell County Mooresville

PLAN DATE:	May 2024	REVIEWED BY:	J Galloway, PE
PREPARED BY:	JPG/RMM	REVIEWED BY:	R Muncey, PE

REVISIONS	INIT.	DATE

SEAL 029904 ENGINEER JASON PAUL GALLOWAY NORTH CAROLINA PROFESSIONAL

DocuSigned by: Jason Galloway 5/17/2024 DATE
10D1E2B40B4B46E...
SIG. INVENTORY NO. 12-1673T2