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09/08/59

CONTRACT:

TIP PROJECT: R–5711

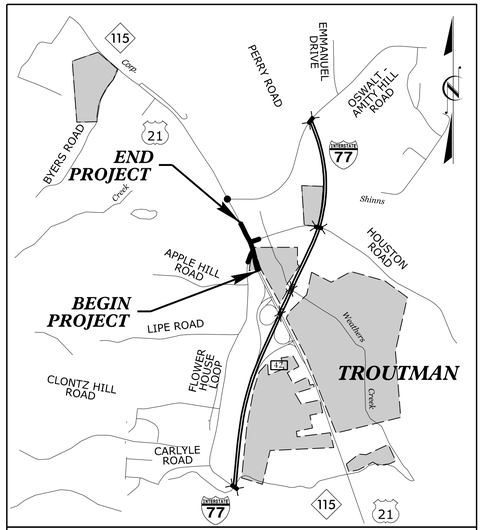
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

Project No.	Sheet No.
R–5711	Sig. 1.0

IREDELL COUNTY

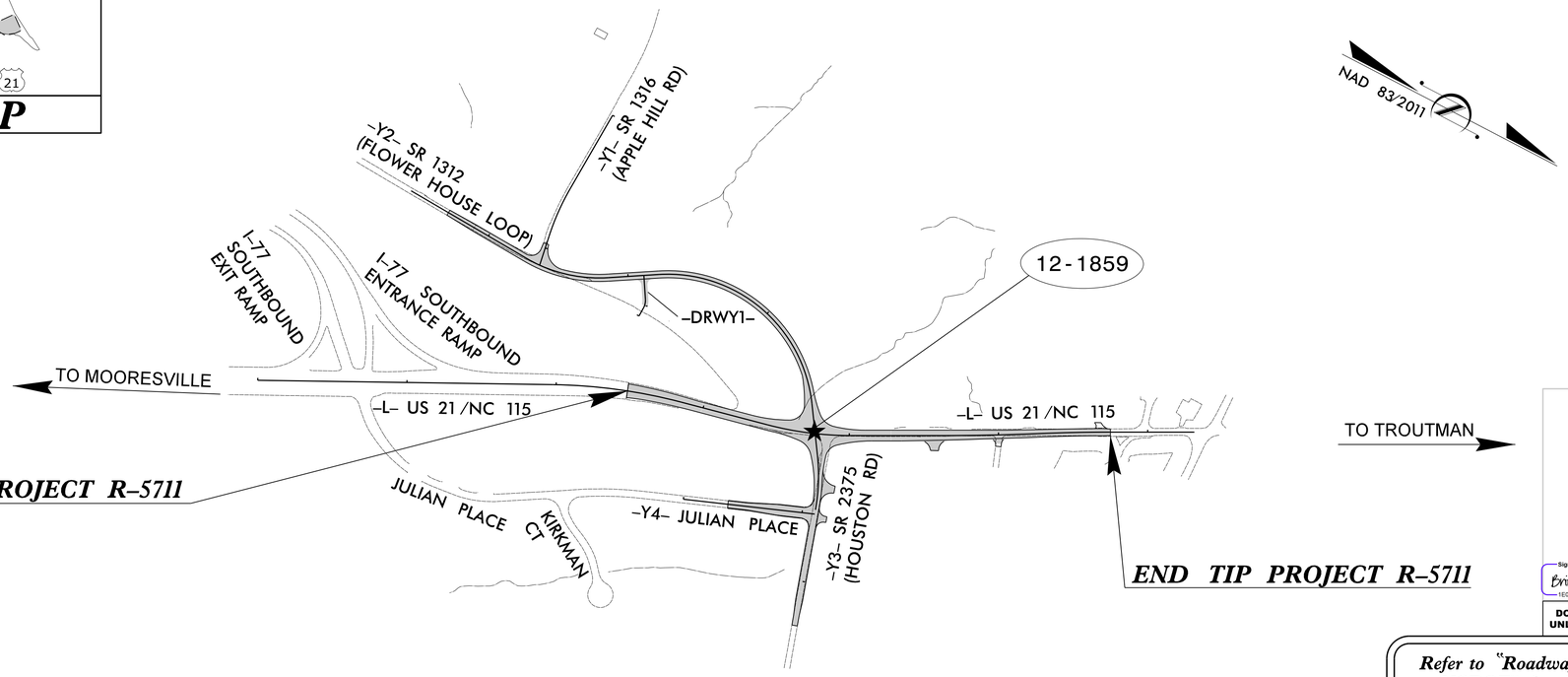
LOCATION: INTERSECTION IMPROVEMENTS AT US 21/NC 115 AND SR 1312 (FLOWER HOUSE LOOP)/ SR 2375 (HOUSTON ROAD)

TYPE OF WORK: TRAFFIC SIGNALS AND WIRELESS COMMUNICATION



VICINITY MAP

NOT TO SCALE



★ PROPOSED SIGNAL

NORTH CAROLINA PROFESSIONAL SEAL 052936 ENGINEER BRITTANY N GROOME

Signed by: Brittany Groome 1E09340E1094484...
10/13/2025

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

Index of Plans

Sheet #	Reference #	Location/Description
Sig. 1.0	--------	Title Sheet
Sig. 2.0–2.2	12–1859	US 21/NC 115 (S. Main Street) at SR 2375 (Houston Rd)/SR 1312 (Flower House Loop)
SCP 1	--------	Wireless Communication Plans

TRANSPORTATION SYSTEMS MANAGEMENT & OPERATIONS

Contacts:

Nick Zinser, PE – Western Region Signals Engineer
Todd Joyce, PE – Signal Equipment Design Engineer
Gregg A. Green – Signal Communications Project Engineer
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DRMP
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(704) 549-4260
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Brittany N. Groome, PE, PTOE, RSP1 – Signals Engineer/ Task Manager
Darren J. White – Project Design Engineer

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

Transportation Mobility and Safety Division · STATE OF NORTH CAROLINA · DEPARTMENT OF TRANSPORTATION · TSMO UNIT

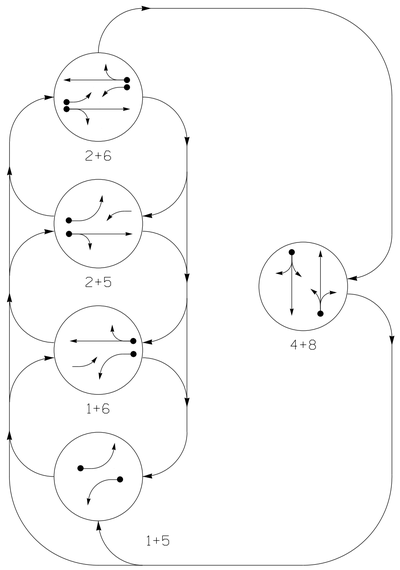
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PROJECT REFERENCE NO.	SHEET NO.
R-5711	Sig 2.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

TABLE OF OPERATION

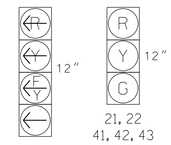
SIGNAL FACE	PHASE 1+5	1+6	2+5	2+6	4+8	FLASH
11	←	←	~~F Y~~	~~F Y~~	~~R~~	~~R~~
21, 22	R	R	G	G	R	R
41, 42, 43	R	R	R	R	G	R
51	←	~~F Y~~	←	~~F Y~~	~~R~~	~~R~~
61, 62	R	G	R	G	R	R
81, 82	R	R	R	R	G	R

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	2-4-2	X	1	15.0	-	X	-	X	-	X
				X	6	3.0	-	X	-	X	X	X
2A	6X6	300	4	X	2	-	-	X	X	X	-	X
4A	6X6	300	4	X	4	-	-	X	-	-	-	X
4B	6X40	0	2-4-2	X	4	5.0	2.0	X	-	X	X	X
4C	6X15	0	3	X	4	15.0	-	X	-	X	-	X
5A	6X40	0	2-4-2	X	5	15.0	-	X	-	X	-	X
				X	2	3.0	-	X	-	X	X	X
6A	6X6	300	6	X	6	-	-	X	X	X	-	X
8A	6X6	300	4	X	8	-	-	X	-	-	-	X
8B	6X40	0	2-4-2	X	8	5.0	2.0	X	-	X	X	X
8C	6X15	0	3	X	8	15.0	-	X	-	X	-	X

SIGNAL FACE I.D.

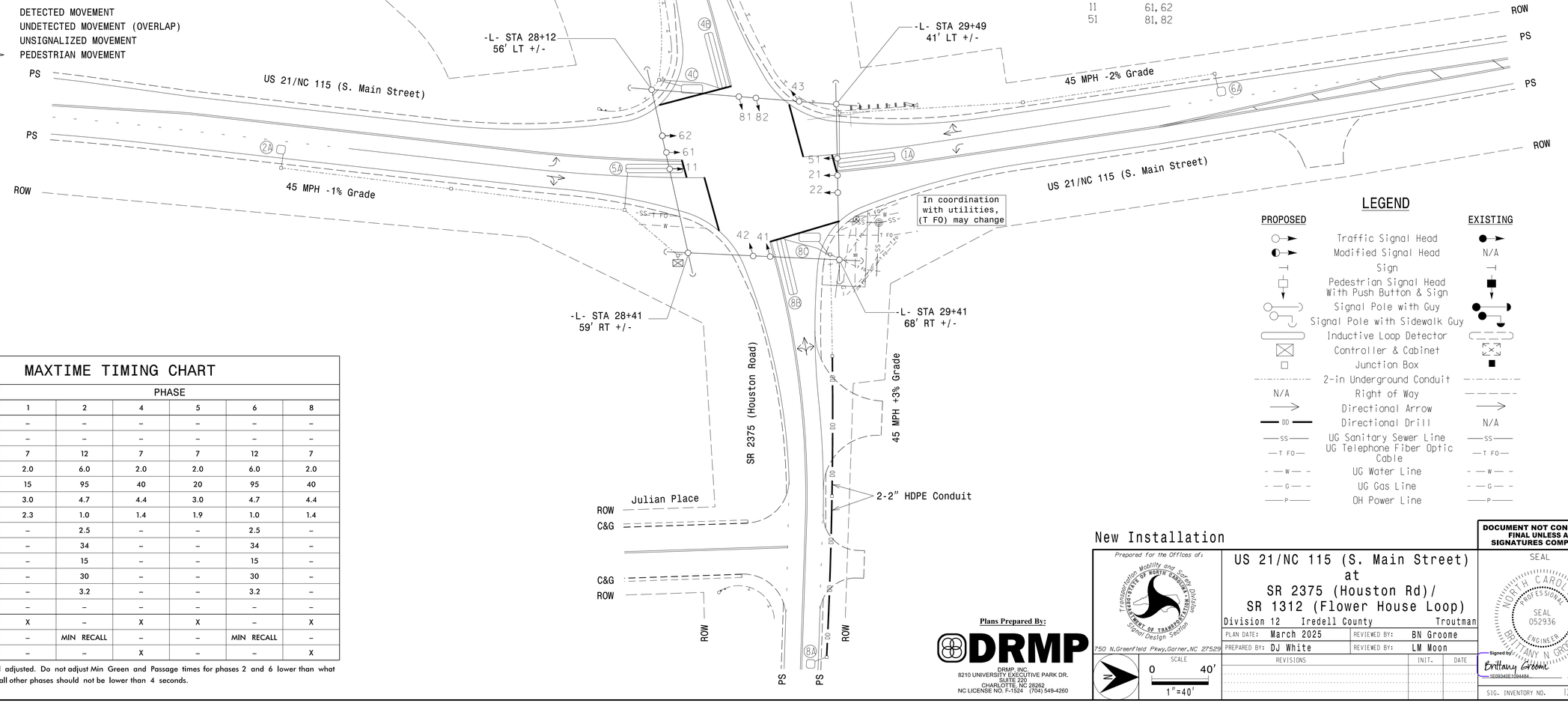
All Heads L.E.D.



5 Phase
Fully Actuated
012-10 TROUTMAN US 21/NC 115 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. 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. See pavement marking plans for new markings.
7. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
8. Closed loop system data: Controller Asset 1859.



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	N/A
SS	UG Sanitary Sewer Line	SS
T FO	UG Telephone Fiber Optic Cable	T FO
W	UG Water Line	W
G	UG Gas Line	G
P	OH Power Line	P

MAXTIME TIMING CHART

FEATURE	PHASE 1	2	4	5	6	8
Walk *	–	–	–	–	–	–
Ped Clear	–	–	–	–	–	–
Min Green *	7	12	7	7	12	7
Passage *	2.0	6.0	2.0	2.0	6.0	2.0
Max 1 *	15	95	40	20	95	40
Yellow Change	3.0	4.7	4.4	3.0	4.7	4.4
Red Clear	2.3	1.0	1.4	1.9	1.0	1.4
Added Initial *	–	2.5	–	–	2.5	–
Maximum Initial *	–	34	–	–	34	–
Time Before Reduction *	–	15	–	–	15	–
Time To Reduce *	–	30	–	–	30	–
Minimum Gap	–	3.2	–	–	3.2	–
Advance Walk	–	–	–	–	–	–
Non Lock Detector	X	–	X	X	–	X
Vehicle Recall	–	MIN RECALL	–	–	MIN RECALL	–
Dual Entry	–	–	X	–	–	X

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

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Plotted At 1"=40'
DWhite AT IRAL-DWHITE

Plans Prepared By:

DRMP

DRMP, INC.
8210 UNIVERSITY EXECUTIVE PARK DR.
SUITE 220
CHARLOTTE, NC 28262
NC LICENSE NO. F-1524 (704) 549-4260

New Installation

Prepared for the Offices of:
Transportation Mobility and Safety Division
Signal Design Section
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
1750 N.Greenfield Pkwy.Garner,NC 27529

SCALE 0 40' 1"=40'

US 21/NC 115 (S. Main Street)
at
SR 2375 (Houston Rd)/
SR 1312 (Flower House Loop)

Division 12 Iredell County Troutman

PLAN DATE:	March 2025	REVIEWED BY:	BN Groome
PREPARED BY:	DJ White	REVIEWED BY:	LM Moon

REVISIONS	INIT.	DATE

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SEAL
NORTH CAROLINA PROFESSIONAL SEAL 052936 ENGINEER BRITTANY N. GROOME

Signed by: Brittany Groome 10/13/2025
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DATE

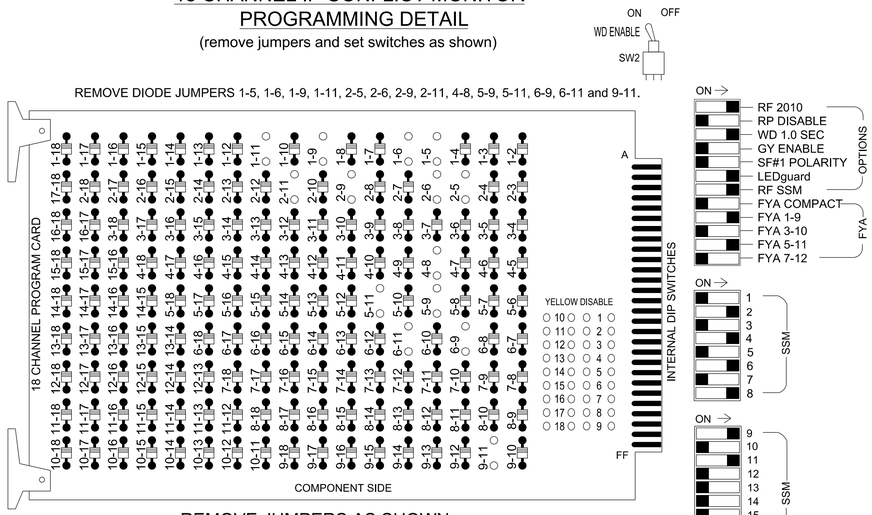
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PROJECT REFERENCE NO.	SHEET NO.
R-5711	Sig. 2.1

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 vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the signal plan.
2. Program phases 4 and 8 for Dual Entry.
3. Program controller to start up in phase 2 Green No Walk and 6 Green No Walk.
4. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
5. The cabinet and controller are part of the 012-10 Troutman US 21/NC 115 Closed Loop System.

EQUIPMENT INFORMATION

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

*See overlap programming detail on sheet 2

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	11★	21,22	NU	NU	41,42 43	NU	51★	61,62	NU	NU	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													A121			A114		
YELLOW ARROW													A122			A115		
FLASHING YELLOW ARROW													A123			A116		
GREEN ARROW	127						133											
✋																		
🚶																		

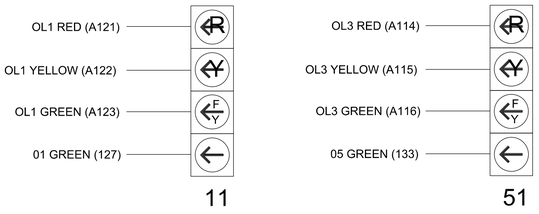
NU = Not Used

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

★See pictorial of head wiring in detail this sheet.

FYA SIGNAL WIRING DETAIL

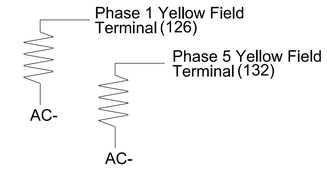
(wire signal heads as shown)



LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

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



INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	1O	11	12	13	14
FILE "I"	U	ø1 1A	ø2 2A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	ø4 4A	ø4 4C	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
	L	NOT USED	NOT USED				ø4 4B	NOT USED							ST DC ISOLATOR
FILE "J"	U	ø5 5A	ø6 6A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	ø8 8A	ø8 8C	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L	NOT USED	NOT USED				ø8 8B	NOT USED							

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN
1A	TB2-1,2	I1U	56	18	1	1	15.0		X		X	
				-	29	6	3.0		X		X	X
2A	TB2-5,6	I2U	39	1	2	2			X	X	X	
4A	TB4-9,10	I6U	41	3	8	4			X		-	
4B	TB4-11,12	I6L	45	7	9	4	5.0	2.0	X		X	X
4C	TB6-1,2	I7U	65	31	10	4	15.0		X		X	
5A	TB3-1,2	J1U	55	17	15	5	15.0		X		X	
				-	31	2	3.0		X		X	X
6A	TB3-5,6	J2U	40	2	16	6			X	X	X	
8A	TB5-9,10	J6U	42	4	22	8			X		-	
8B	TB5-11,12	J6L	46	8	23	8	5.0	2.0	X		X	X
8C	TB7-1,2	J7U	66	32	24	8	15.0		X		X	

INPUT FILE POSITION LEGEND: J2L

FILE J
SLOT 2
LOWER

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 12-1859
DESIGNED: Mar 2025
SEALED: 10/13/2025
REVISED: N/A

Electrical Detail - Sheet 1 of 2

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8210 UNIVERSITY EXECUTIVE PARK DR. SUITE 220
CHARLOTTE, NC 28262
PHONE: 704-549-4260
NC LICENSE NO. F-1524
www.drmp.com

Electrical and Programming Details For:

US 21/NC 115 (S Main Street) at SR 2375 (Houston Rd)/ SR 1312 (Flower House Loop)

Division 12 | Iredell County | Troutman

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

PLAN DATE:	March 2025	REVIEWED BY:	BN Groome
PREPARED BY:	DJ White	REVIEWED BY:	LM Moon

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 052936 ENGINEER BRITTANY N. GROOME

Signed by: Brittany Groome 10/13/2025
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DATE

SIG. INVENTORY NO. 12-1859

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MAXTIME STARTUP AND SOFTWARE FLASH PROGRAMMING DETAIL

Front Panel
Main Menu >Controller >Unit

Web Interface
Home >Controller >Unit

Modify parameters as shown below and save changes.

Start Up Parameters

StartUp Clearance Hold
6

Unit Flash Parameters

All Red Flash Exit Time
6

OVERLAP PROGRAMMING

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

Overlap Plan 1

Overlap	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

OUTPUT CHANNEL CONFIGURATION

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

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

Channel Configuration

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 12-1859
DESIGNED: Mar 2025
SEALED: 10/13/2025
REVISED: N/A

Electrical Detail - Sheet 2 of 2

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Electrical and Programming Details For:

US 21/NC 115 (S Main Street)
at
SR 2375 (Houston Rd)/
SR 1312 (Flower House Loop)

Division 12 Iredell County Troutman

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

PLAN DATE:	March 2025	REVIEWED BY:	BN Groome
PREPARED BY:	DJ White	REVIEWED BY:	LM Moon

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 052936 ENGINEER BRITTANY N GROOME

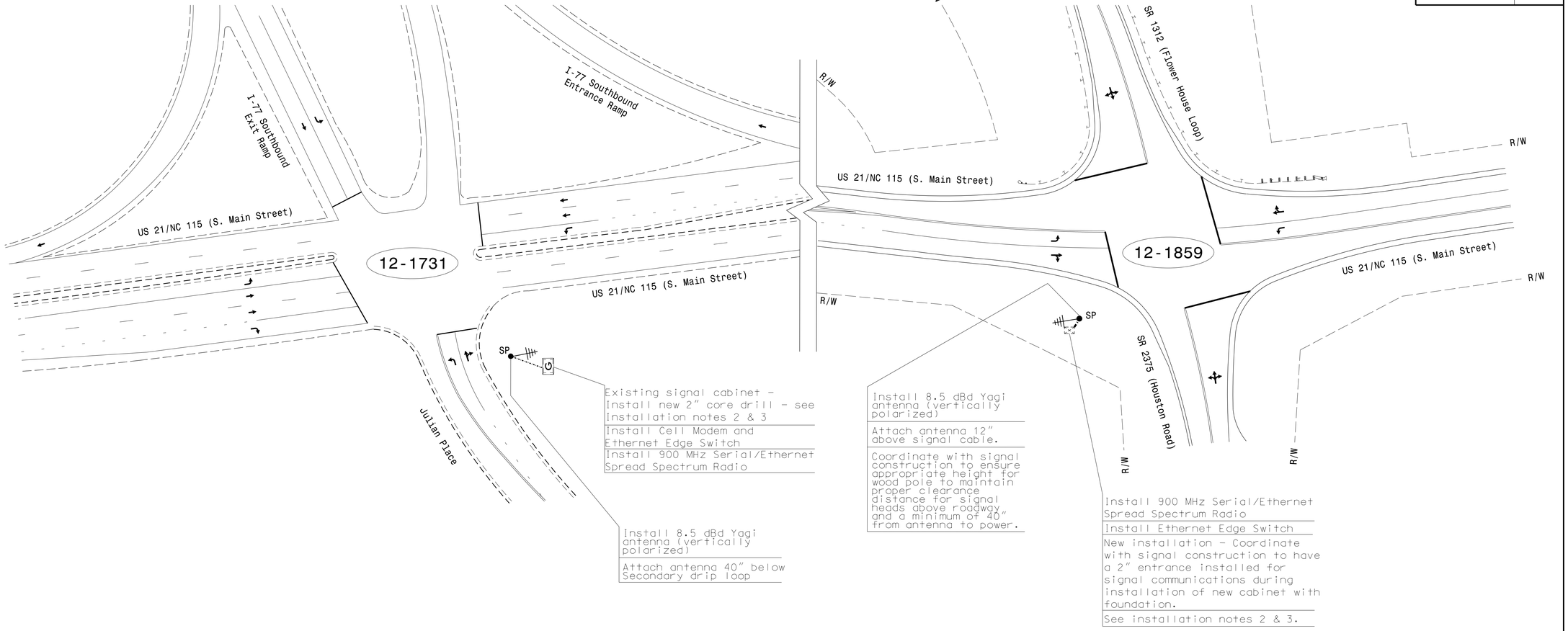
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PROJECT REFERENCE NO.	SHEET NO.
R-5711	SCP-1



PROJECT NOTES

1. Expand the existing US 21/NC 115 (Troutman) closed loop system to inlude a wireless link between:
   1. 12-1731 US 21/NC 115 at Julian PL/On-ramp and Off-ramp of I-77.
   2. 12-1859 US 21/NC 115 at Flower House Loop/Houston RD.
2. At new equipment locations, coordinate installation of a separate 2" conduit for coaxial cable in trench with signal cabling between the controller cabinet and pole for the antenna.

INSTALLATION NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2024 and "Standard Specifications for Roads and Structures" dated January 2024. See RSD 1736.01 for Spread Spectrum Radio drawing.
2. On wood poles, requiring a new rigid galvanized steel riser, install a 2" riser with weatherhead and route the coaxial cable to the antenna.
3. If an existing 2" spare rigid galvanized steel riser is available, install the coaxial cable in the spare riser.
4. Install wireless antenna on pole with RF warning sign. (Note: RF warning sign not required when antenna is installed on an NCDOT-owned pole.)
5. Maintain proper clearance from all utilities per the National Electric Safety Code.
6. Install wireless serial/Ethernet radio with exterior disconnect switch located on cabinet. (Note: RF antenna disconnect switch and decal are not required when the antenna is installed on an NCDOT-owned pole.)
7. Request a cell modem from Deputy Division Traffic Engineer (980)552-4215 and allow Division an eight week lead time to acquire the cell modem.

LEGEND

YAGI ANTENNA (DOUBLE) FOR REPEATER OPERATION	EXISTING METAL POLE WITH MASTARM
YAGI ANTENNA (SINGLE)	NEW WOOD POLE
OMNI ANTENNA	EXISTING WOOD POLE
NEW CONDUIT	SP SIGNAL POLE
EXISTING CONDUIT	NEW STANDARD GUY ASSEMBLY
NEW OVERSIZED JUNCTION BOX	NEW STANDARD GUY USING EXISTING ANCHOR
EXISTING OVERSIZED JUNCTION BOX	NEW SIDEWALK GUY ASSEMBLY
XX-XXXX SIGNAL INVENTORY NUMBER	EXISTING CONTROLLER AND CABINET
	G GATEWAY RADIO LOCATION

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www.drmp.com

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

012-10 TROUTMAN
US 21/NC 115 CLS

Division 12 Iredell County near Troutman

PLAN DATE:	March 2025	REVIEWED BY:	BN Groome
PREPARED BY:	DJ White	REVIEWED BY:	LM Moon

REVISIONS	INIT.	DATE

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NORTH CAROLINA PROFESSIONAL SEAL 052936 ENGINEER BRITTANY N GROOME

Signed by: Brittany Groome 1E0934DE1064484 10/13/2025
DATE

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