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Project: R-5799

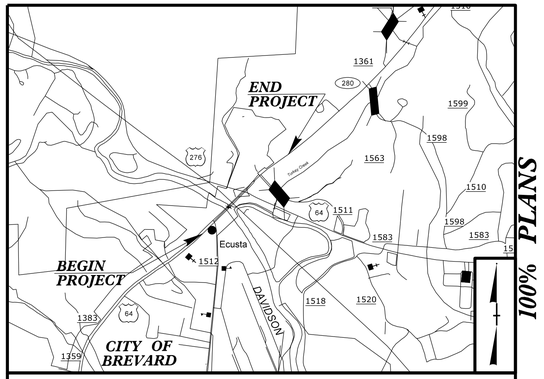
Project No.	Sheet No.
R-5799	Sig. 1.0

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

TRANSYLVANIA COUNTY

LOCATION: INTERSECTIONS OF US 64, US 276 AND NC 280
CONSTRUCT INTERSECTION IMPROVEMENTS

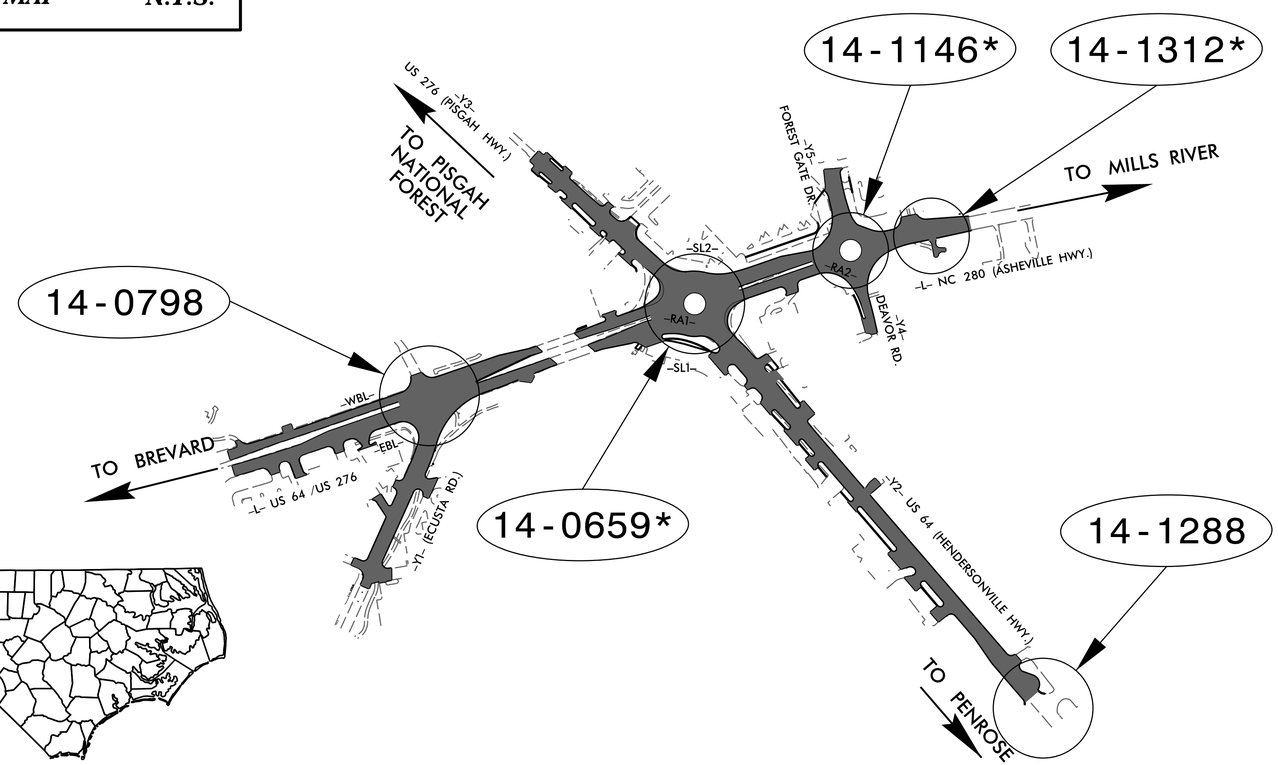
TYPE OF WORK: TRAFFIC SIGNALS



VICINITY MAP N.T.S.

100% PLANS

NAD 83/NA 2011



*SIGNAL TO BE REMOVED

Index of Plans

Sheet #	Reference #	Location/Description
Sig. 1.0	N/A	Title Sheet
Sig. 1.1 – 1.2	N/A	Standard Plate Sheets
Sig. 2.0 – 2.2	14-0798 T1	US 64-276 /NC 280 (Asheville Highway) At SR 1512 (Ecusta Road)/Bank Driveway
Sig. 3.0 – 3.2	14-0798 T2	US 64-276 /NC 280 (Asheville Highway) At SR 1512 (Ecusta Road)/Bank Driveway
Sig. 4.0 – 4.2	14-0798 T3	US 64-276 /NC 280 (Asheville Highway) At SR 1512 (Ecusta Road)/Bank Driveway
Sig. 5.0 – 5.2	14-0798 T4	US 64-276 /NC 280 (Asheville Highway) At SR 1512 (Ecusta Road)/Bank Driveway
Sig. 6.0 – 6.2	14-0798 T5	US 64-276 /NC 280 (Asheville Highway) At SR 1512 (Ecusta Road)/Bank Driveway
Sig. 7.0 – 7.2	14-0798 T6	US 64-276 /NC 280 (Asheville Highway) At SR 1512 (Ecusta Road)/Bank Driveway
Sig. 8.0 – 8.2	14-0798	US 64-276 /NC 280 (Asheville Highway) At SR 1512 (Ecusta Road)/Bank Driveway
Sig. 9.0 – 9.1	14-0659 T1	US 64-276 /NC 280 (Asheville Highway) At US 64 (Hendersonville Hwy) /US 276 (Pisgah Hwy)
Sig. 10.0 – 10.1	14-0659 T2	US 64-276 /NC 280 (Asheville Highway) At US 64 (Hendersonville Hwy) /US 276 (Pisgah Hwy)
Sig. 11.0	14-5026	US 64-276 /NC 280 (Asheville Highway) At US 64 (Hendersonville Hwy) /US 276 (Pisgah Hwy)
Sig. 12.0 – 12.2	14-1146 T1	NC 280 (Asheville Highway) At SR 1511 (Deavor Road) /Forest Gate Drive
Sig. 13.0	14-5027	NC 280 (Asheville Highway) At SR 1511 (Deavor Road) /Forest Gate Drive
Sig. 14.0 – 14.2	14-1312 T1	NC 280 (Asheville Highway) At Forest Gate Circle
Sig. 15.0 – 15.2	14-1288	US 64 (Hendersonville Highway) At Ecusta Bypass /Store Entrance
Sig. 16.0	14-5028	US 276 (Pisgah Highway) At Driveways
Sig. MP1 – MP8	N/A	Standard Drawings for All Metal Poles

NCDOT
INTELLIGENT TRANSPORTATION AND SIGNALS UNIT
Contacts:

R. Nicholas Zinser, PE – Western Region Signals Engineer
D. Todd Joyce, PE – Signal Equipment Design Engineer

Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.

Prepared in the Office of:

RS&H
NC FIRM LICENSE No: F-0493
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CHARLOTTE, NC 28203
(704) 332-0616

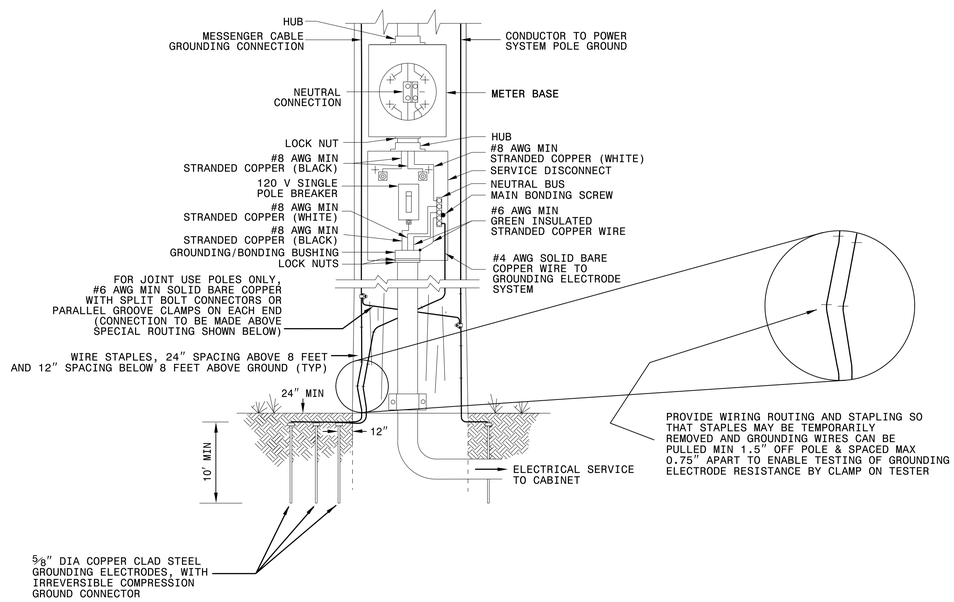
Prepared for the Offices of:

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

750 N. Greenfield Pkwy, Garner, NC 27529

$$$$$$$$$$SYSTIME$$$$$$$$$$
$$$$$$$$$$USERNAME$$$$$$$$$$

PROJECT NO.	SHEET NO.
	Sig.



1-18 STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.

ENGLISH STANDARD DRAWING FOR

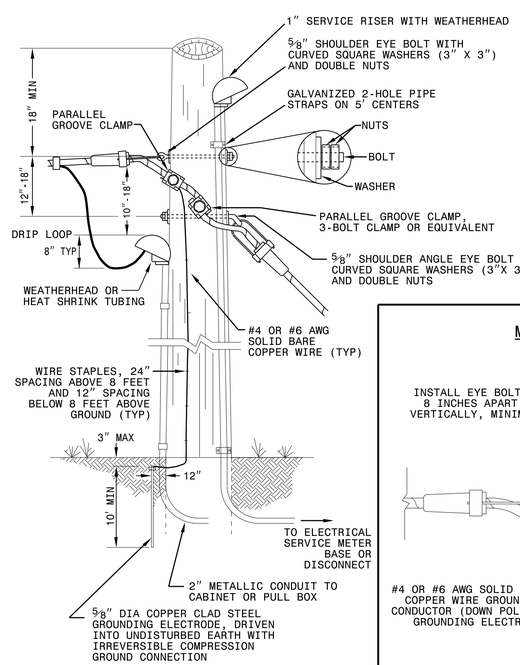
ELECTRICAL SERVICE GROUNDING

GROUNDING AND BONDING

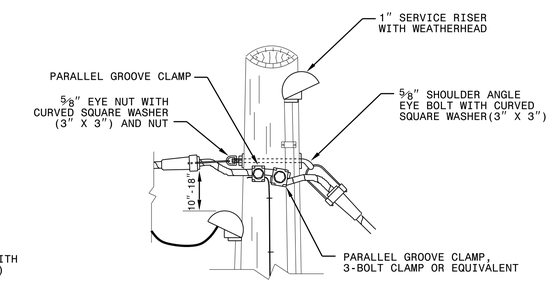
SHEET 1 OF 1

1700D01

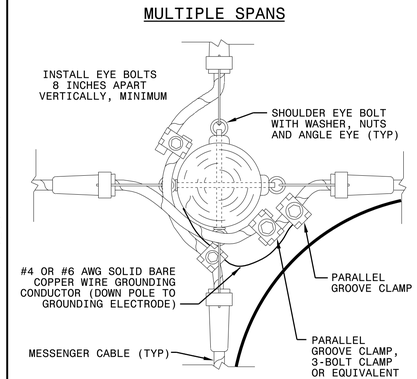
TWO-BOLT METHOD (PREFERRED)



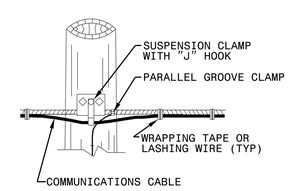
ONE-BOLT METHOD



MULTIPLE SPANS



COMMUNICATIONS CABLE AT INTERMEDIATE POLE



NOTE

FOR CONNECTING MESSENGER TO MESSENGER, USE PARALLEL GROOVE CLAMP, 3-BOLT CLAMP OR EQUIVALENT. FOR CONNECTING COPPER WIRE TO MESSENGER, USE PARALLEL GROOVE CLAMP.

1-18 STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.

ENGLISH STANDARD DRAWING FOR

WOOD POLES

METHODS OF ATTACHMENT AND GROUNDING

SHEET 1 OF 1

1720D01

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See Plate for Title

Prepared in the Offices of:

Transportation Mobility and Safety Division
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
ITS & Signals Unit

750 N. Greenfield Parkway
Garner, NC 27529

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 032108 ENGINEER MOHD A. ASLAMI

DocuSigned by: Mohd Aslami
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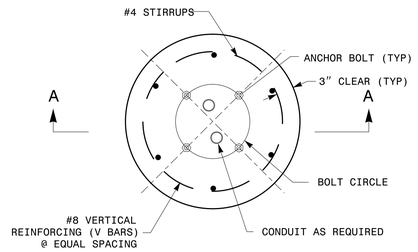
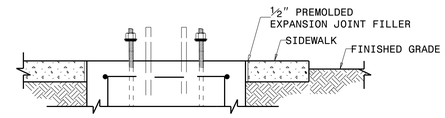


PEDESTAL FOUNDATION - PLAN VIEW

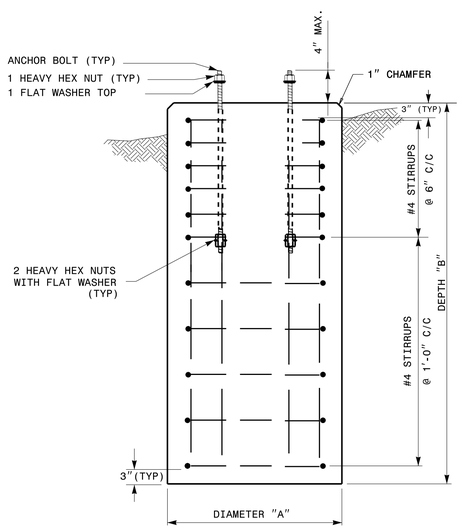


PEDESTAL FOUNDATION DETAILS FOR SIDEWALK

NOTES:

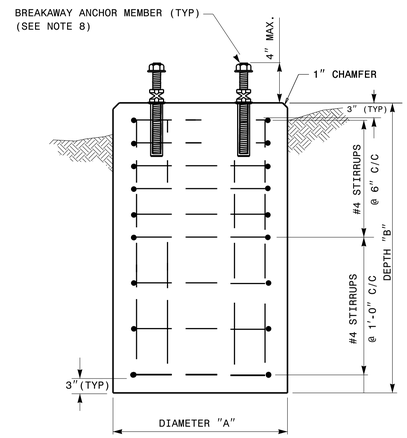
1. CAST FOUNDATION AGAINST UNDISTURBED SOIL WHEREVER CONDITIONS PERMIT. IN UNSTABLE SOIL, CAST-IN-PLACE TUBE FORMS ARE ALLOWED WITH APPROVAL.
2. COMPLY WITH APPLICABLE PROVISIONS OF SECTION 825 FOR CONCRETE CONSTRUCTION.
3. USE CLASS "A" CONCRETE THAT MEETS THE REQUIREMENTS OF SECTION 1000 WITH A COMPRESSION STRENGTH AT 28 DAYS OF F'c= 3000 PSI (MIN.).
4. USE ASTM GRADE 60 DEFORMED BARS FOR ALL REINFORCING STEEL.
5. GRADE IS ASSUMED TO BE (8H:1V) OR FLATTER. FOUNDATION SIZE AND DEPTHS ARE BASED ON THE FOLLOWING SOIL DESIGN PARAMETERS:
   A. SANDY TYPE SOIL
   B. NO GROUND WATER WITHIN 5'-0" OF SURFACE ELEVATION
   C. WIND SPEED NOT TO EXCEED 140 MPH

   IF ACTUAL CONDITIONS VARY SUBSTANTIALLY FROM THOSE ASSUMED, THE FOUNDATION DEPTH MAY BE ADJUSTED. IN THIS CASE, CONTACT THE ENGINEER.
6. MAINTAIN AT LEAST 3" COVER ON ALL REINFORCEMENT.
7. ORIENT CONDUIT AS REQUIRED BY THE DESIGN OR AS DICTATED BY FIELD CONDITIONS.
8. USE ADHESIVE ANCHOR FOR THREADED COUPLING INSERT. FOR TYPE I MINIMUM DEPTH NECESSARY IS 0'-4½" AND FOR TYPE II MINIMUM DEPTH NECESSARY IS 0'-6⅝". FOLLOW MANUFACTURER'S INSTALLATION INSTRUCTIONS.



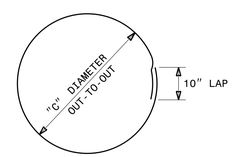
TYPES I, II & III

SECTION A-A

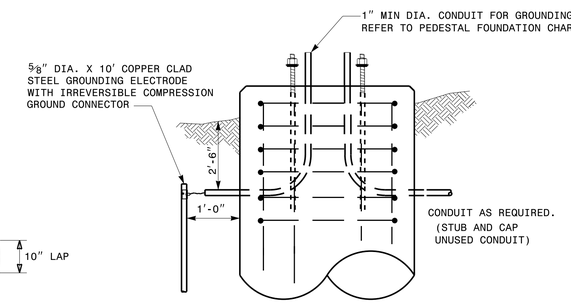


TYPES I & II ONLY

SECTION A-A



CLOSED HOOPS



GROUNDING & CONDUIT DETAIL

PEDESTAL FOUNDATION TYPE AND SIZE

TYPE	PEDESTAL DESCRIPTION	SIZE			ANCHOR BOLT		INSTALL GROUNDING SYSTEM (YES/NO)
		DIAMETER "A" FT	DEPTH "B" FT	CONCRETE VOLUME CY	DIAMETER (MIN.) IN	LENGTH FT-IN	
I	PEDESTRIAN PUSHBUTTON	2'-0"	3'-6"	.41	½	1'-6"	NO
II	NORMAL-DUTY	2'-0"	5'-0"	.58	¾	2'-0"	YES
III	HEAVY-DUTY	2'-6"	7'-0"	1.27	1	4'-0"	YES

REINFORCING STEEL SCHEDULE

TYPE	V-BAR				STIRRUP								TOTAL STEEL WEIGHT LBS
	SIZE #	QTY	LENGTH	WEIGHT LBS	SIZE #	QUANTITY VERTICAL SPACING ON 6" CENTERS	QUANTITY VERTICAL SPACING ON 12" CENTERS	QUANTITY TOTAL	LENGTH	DIAMETER "C" FT	OVERLAP MIN.	WEIGHT LBS	
I	8	6	3'-0"	56	4	0	4	4	5'-7"	1'-6"	0'-10"	15	71
II	8	6	4'-6"	86	4	5	3	8	5'-7"	1'-6"	0'-10"	30	116
III	8	6	6'-6"	122	4	7	4	11	7'-2"	2'-0"	0'-10"	53	175

STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

1-18

ENGLISH STANDARD DRAWING FOR
PEDESTALS
FOUNDATIONS

SHEET 1 OF 1

1743D01

See Plate for Title

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Prepared in the Offices of:

Transportation Mobility and Safety Division
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
ITS & Signals Unit

750 N. Greenfield Parkway
Garner, NC 27529

SEAL
NORTH CAROLINA
PROFESSIONAL
SEAL
028094
ENGINEER
DEBESH C. SARKAR

DocuSigned by:
Debesh C. Sarkar
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10/11/2017
DATE

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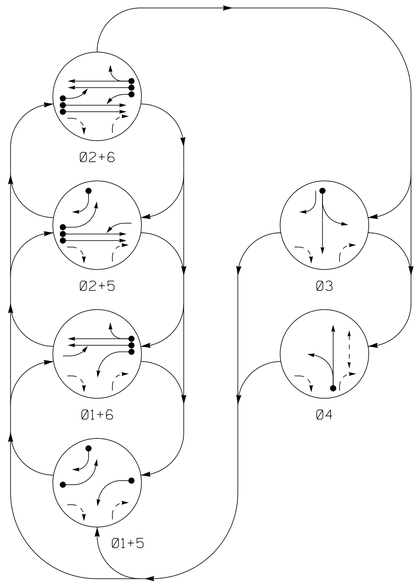
PROJECT REFERENCE NO.	SHEET NO.
R-5799	Sig. 2.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

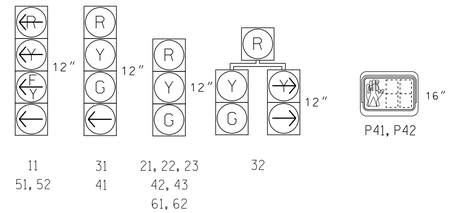
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE 01+5	01+6	02+5	02+6	03	04	FLASH
11	←	←	F Y	F Y	R	R	R
21, 22, 23	R	R	G	G	R	R	Y
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, 43	R	R	R	R	R	G	R
51, 52	←	F Y	←	F Y	R	R	R
61, 62	R	G	R	G	R	R	Y
P41, P42	DW	DW	DW	DW	DW	W	DRK

SIGNAL FACE I.D.

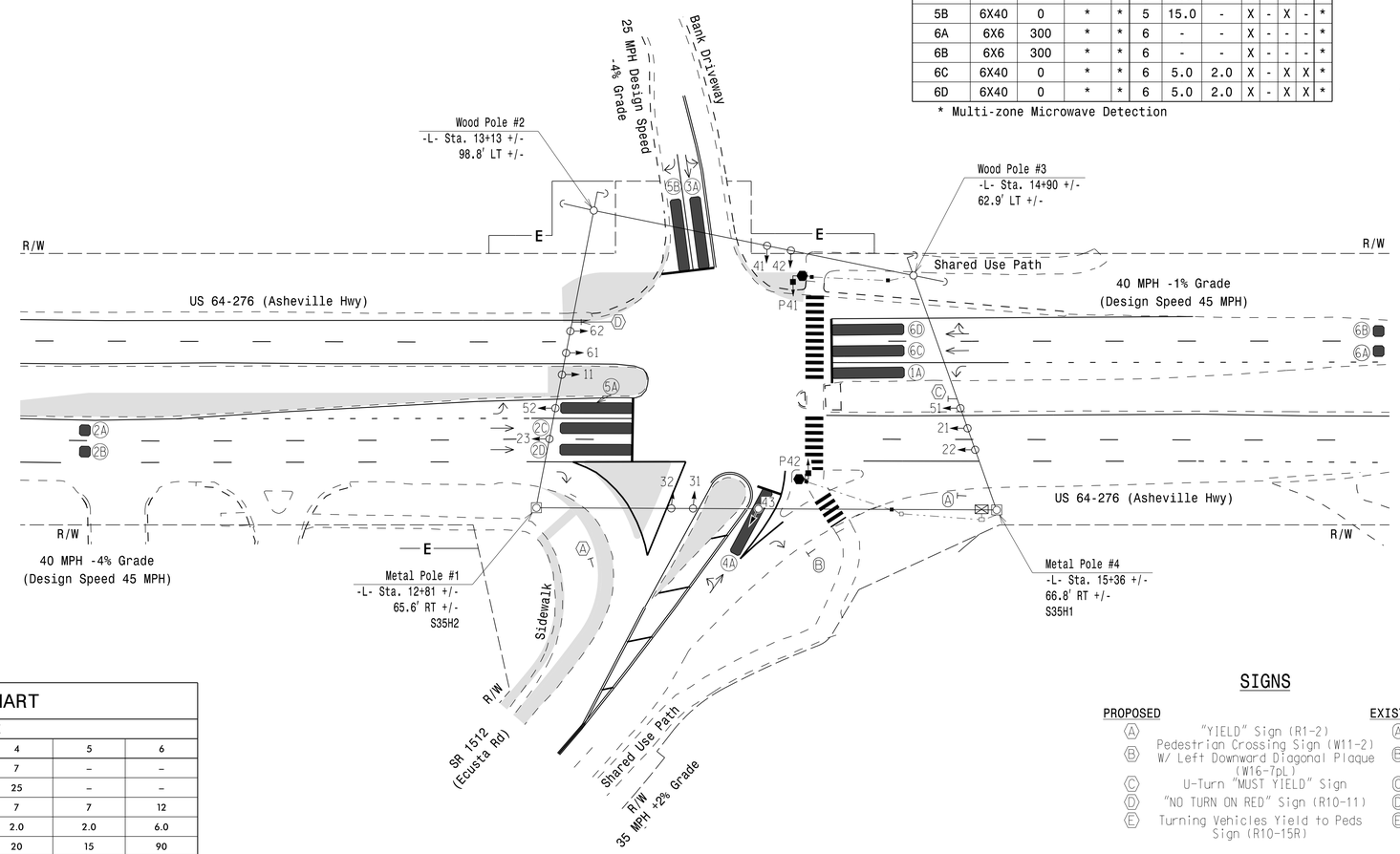
All Heads L.E.D.



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
1A	6X40	0	*	*	1	15.0	-	X	-	X	-	*
					6	3.0	-	X	-	X	X	*
2A	6X6	300	*	*	2	-	-	X	-	-	-	*
2B	6X6	300	*	*	2	-	-	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	3.0	-	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	-	-	-	*
6B	6X6	300	*	*	6	-	-	X	-	-	-	*
6C	6X40	0	*	*	6	5.0	2.0	X	-	X	X	*
6D	6X40	0	*	*	6	5.0	2.0	X	-	X	X	*

* Multi-zone Microwave Detection



6 Phase
Fully Actuated
(Time Based Coordination)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 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. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
8. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
9. This intersection uses multi-zone microwave detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.
10. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
11. Portions of high-visibility crosswalk and Detection Zone 4A not shown for clarity.
12. See pavement marking plans for proposed stop bar locations.
13. Install NCDOT-supplied cell modem. Request cell modem from Division Traffic Engineer eight weeks prior to deployment.

LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Pedestrian Signal Head With Push Button & Sign	
	Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Video Detection Zone	
	Controller & Cabinet	
	Junction Box	
	Oversized Junction Box	
	Type I Pushbutton Post	
	Type II Signal Pedestal	
	Strain Pole	
	Construction Zone	
	Curb Ramp	
	2-in Underground Conduit	
DD	Directional Drill	N/A
	Directional Arrow	
N/A	Right of Way	
E	Temp. Construction Easement	N/A

SIGNS

PROPOSED		EXISTING
A	"YIELD" Sign (R1-2)	A
B	Pedestrian Crossing Sign (W11-2) W/ Left Downward Diagonal Plaque (W16-7pL)	B
C	U-Turn "MUST YIELD" Sign	C
D	"NO TURN ON RED" Sign (R10-11)	D
E	Turning Vehicles Yield to Peds Sign (R10-15R)	E

MAXTIME TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6
Walk *	–	–	–	7	–	–
Ped Clear *	–	–	–	25	–	–
Min Green	7	12	7	7	7	12
Passage *	2.0	6.0	2.0	2.0	2.0	6.0
Max 1 *	25	90	15	20	15	90
Yellow Change	3.0	4.5	3.4	3.7	3.0	4.5
Red Clear	3.1	1.9	3.0	2.5	2.8	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	–
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.

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Temporary Signal 1 - TCP Phase II Step 1

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

US 64-276 (Asheville Highway)
at
SR 1512 (Ecusta Road) /
Bank Driveway

Division 14 Transylvania County Brevard

PLAN DATE:	April 2023	REVIEWED BY:	S.G. Haynie
PREPARED BY:	P. Koloski	REVIEWED BY:	

SCALE 0 40 1"=40'

REVISIONS | INIT. | DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 029531 ENGINEER STEVEN G. HAYNIE

DocuSigned by: Steven G. Haynie 4/28/2023
DESIGN SIGNATURE DATE

Sig Inventory No. 14-0798T1

RS&H
NC FIRM LICENSE No: F-0493
1520 SOUTH BOULEVARD, SUITE 200
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(704) 752-0610

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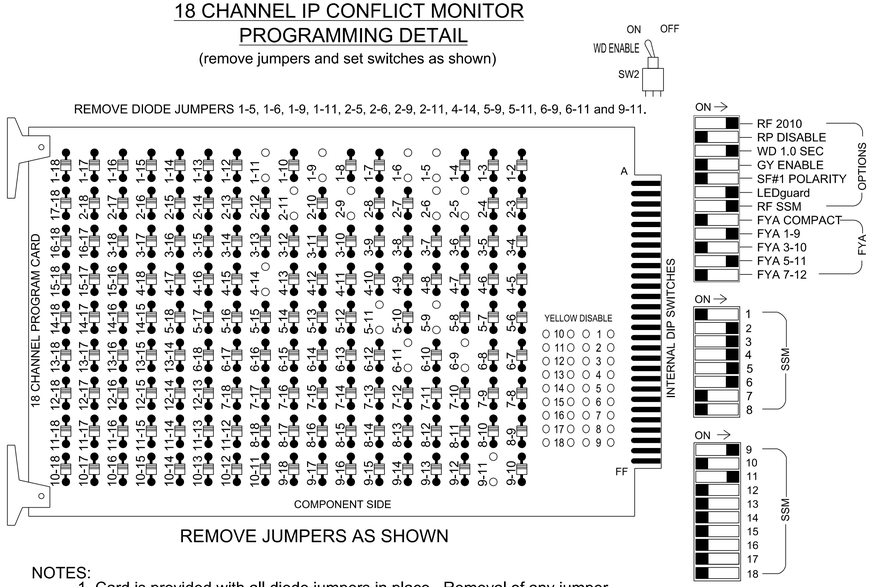
PROJECT REFERENCE NO.	SHEET NO.
R-5799	Sig. 2.1

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 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 a Temporary Time Based Coordination System.

EQUIPMENT INFORMATION

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

*See overlap programming detail on sheet 2

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4		S5		S6	S7		S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3		4		14	5		6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3		4		4 PED	5		6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	★ 11	21, 22,23	NU	31	32	41	42,43	P41, P42	★ 51,52	32	61,62	NU	NU	NU	NU	★ 11	NU	NU	★ 51,52	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										132						A122			A115		
FLASHING YELLOW ARROW																A123			A116		
GREEN ARROW	127			118		103			133	133											
✋								104													
🚶								106													

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	1O	11	12	13	14
FILE "I"	U	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	NOT USED	SLOT EMPTY	FS DC ISOLATOR
	L												∅ 4 PED DC ISOLATOR		ST DC ISOLATOR
FILE "J"	U	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L														

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

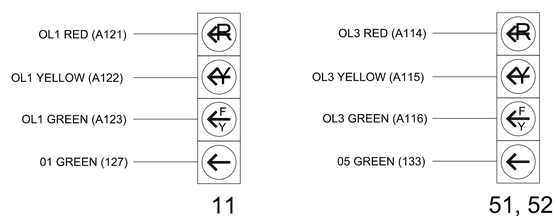
LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN
PED PUSH BUTTONS												
P41,P42	TB8-5,6	I12L	69	35	4	PED 4						

NOTE:
INSTALL DC ISOLATORS IN INPUT FILE SLOT I12.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

FYA SIGNAL WIRING DETAIL

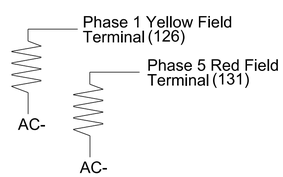
(wire signal heads as shown)



LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

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



SPECIAL DETECTOR NOTE

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

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.

RS&H
NC FIRM LICENSE No: F-0493
1520 SOUTH BOULEVARD, SUITE 200
CHARLOTTE, NC 28203
(704) 752-0610

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 14-0798T1
DESIGNED: April 2023
SEALED: April 28, 2023
REVISED: _____

Temporary Signal 1 - TCP Phase II Step I
Electrical Detail - Sheet 1 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

US 64-276 (Asheville Highway)
at
SR 1512 (Ecusta Road) /
Bank Driveway

Division 14 Transylvania County Brevard

PLAN DATE:	April 2023	REVIEWED BY:	V. Kaiser
PREPARED BY:	S.G. Haynie	REVIEWED BY:	

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 029531 STEVEN G. HAYNIE
DocuSigned by: Steven G. Haynie 4/28/2023
DATE
SIG. INVENTORY NO. 14-0798T1

4/28/2023
Workspace:c:\pwworkingcom\#Files&Transportation\#103004902I_R-5799_US 64-276 Intersection Design\Design\Traffic&Signals\Design\Plan Sheets\R5799_sig_psh_2^1_14079BT1_elec.dgn
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PROJECT REFERENCE NO.	SHEET NO.
R-5799	Sig. 2.2

OVERLAP PROGRAMMING

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

Overlap Plan 1

Overlap	1	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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 14-0798T1
DESIGNED: April 2023
SEALED: April 28, 2023
REVISED: _____

Temporary Signal 1 - TCP Phase II Step I
Electrical Detail - Sheet 2 of 2

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REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 029531 ENGINEER STEVEN G. HAYNIE

DocuSigned by:
Steven G. Haynie 4/28/2023
D633DCC0A5D448B...
DATE

SIG. INVENTORY NO. 14-0798T1

4/28/2023
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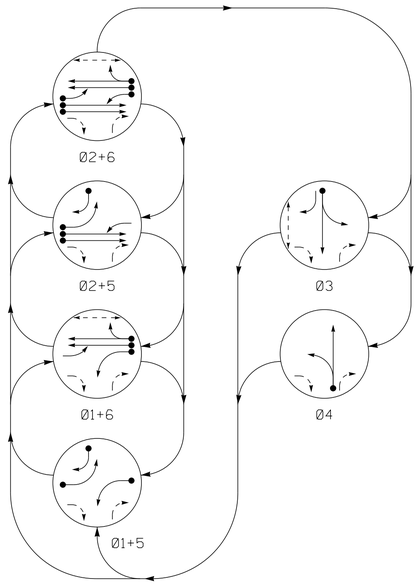
PROJECT REFERENCE NO.	SHEET NO.
R-5799	Sig. 3.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

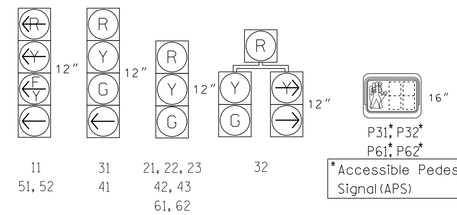
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE 01+5	01+6	02+5	02+6	03	04	FLASH
11	←	←	F Y	F Y	R	R	R
21, 22, 23	R	R	G	G	R	R	Y
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, 43	R	R	R	R	R	G	R
51, 52	←	F Y	←	F Y	R	R	R
61, 62	R	G	R	G	R	R	Y
P31, P32	DW	DW	DW	DW	W	DW	DRK
P61, P62	DW	W	DW	W	DW	DW	DRK

SIGNAL FACE I.D.

All Heads L.E.D.

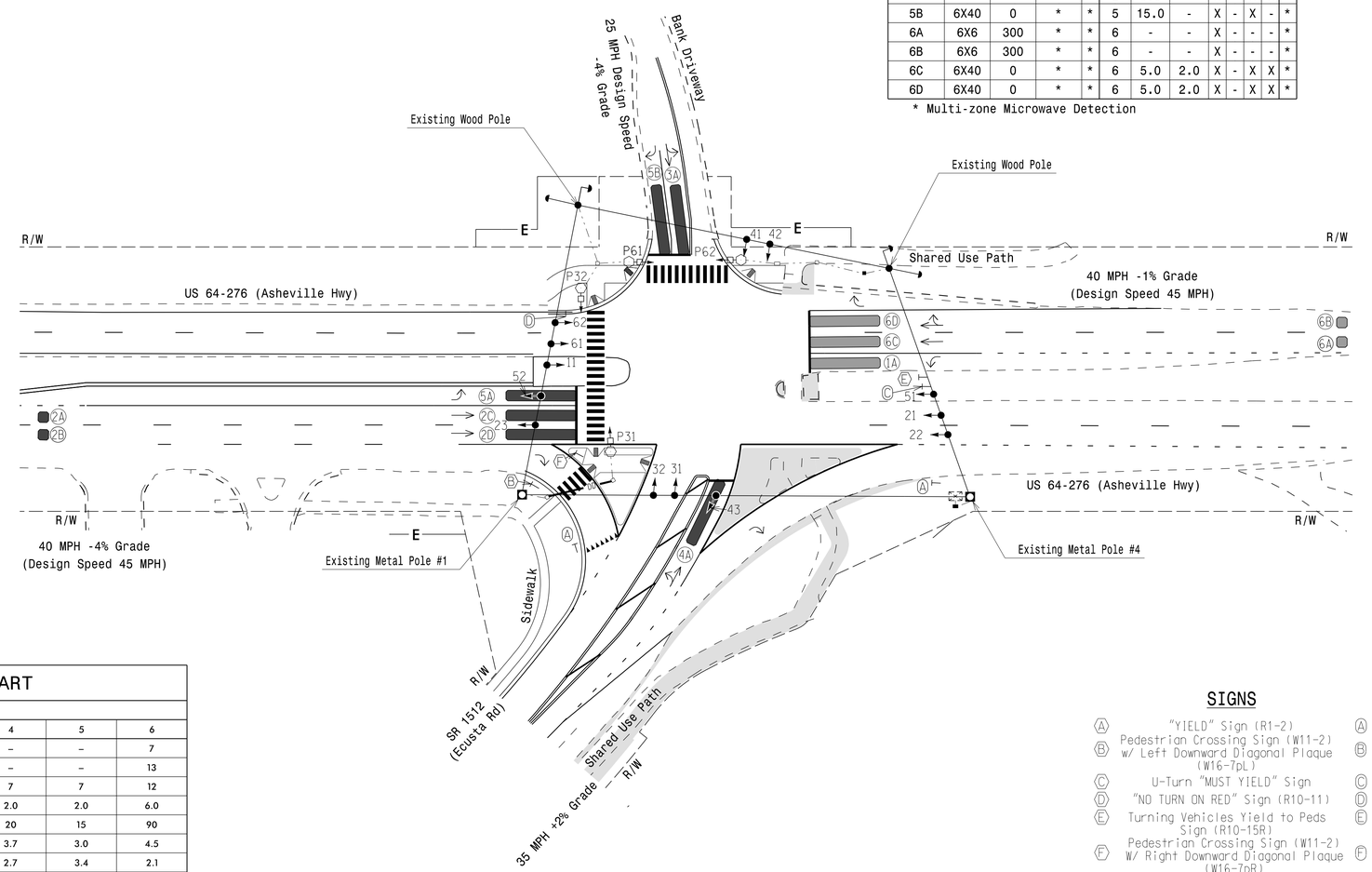


*Accessible Pedestrian Signal (APS)

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	*
2A	6X6	300	*	*	2	-	-	X	-	-	-	*
2B	6X6	300	*	*	2	-	-	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	3.0	-	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	-	-	-	*
6B	6X6	300	*	*	6	-	-	X	-	-	-	*
6C	6X40	0	*	*	6	5.0	2.0	X	-	X	X	*
6D	6X40	0	*	*	6	5.0	2.0	X	-	X	X	*

* Multi-zone Microwave Detection



MAXTIME TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6
Walk *	–	–	7	–	–	7
Ped Clear *	–	–	20	–	–	13
Min Green	7	12	7	7	7	12
Passage *	2.0	6.0	2.0	2.0	2.0	6.0
Max 1 *	25	90	15	20	15	90
Yellow Change	3.0	4.5	3.4	3.7	3.0	4.5
Red Clear	2.8	2.1	3.0	2.7	3.4	2.1
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	–
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.

ACCESSIBLE PEDESTRIAN SIGNAL OPERATION

SIGNAL FACE	VOICE	TONES	INTERVAL	SPEECH MESSAGE
P31	-	X	Walk	(Percussive Tone)
	X	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Asheville.
P32	-	X	Walk	(Percussive Tone)
	X	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Asheville.
P61	-	X	Walk	(Percussive Tone)
	X	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Driveway.
P62	-	X	Walk	(Percussive Tone)
	X	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Driveway.

6 Phase
Fully Actuated
(Time Based Coordination)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 or phase 5 may be lagged.
4. The order of phase 3 and phase 4 may be reversed.
5. Reposition existing signal heads # 21, 22, 23, 41, 42, 43, 51, and 52.
6. Set all detector units to presence mode.
7. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
8. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
9. This intersection uses multi-zone microwave detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.
10. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
11. Portions of detector zones 4A and 5A not shown for clarity.
12. See pavement marking plans for proposed stop bar locations.
13. Pedestrian push buttons P31, P32, P61 and P62 shall be Vibro-Tactile.
14. All APS shall use "Rapid Tick" sound.

LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Pedestrian Signal Head With Push Button & Sign	
	Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Video Detection Zone	
	Controller & Cabinet	
	Junction Box	
	Oversized Junction Box	
	Type I Pushbutton Post	
	Type II Signal Pedestal	
	Strain Pole	
	Construction Zone	
	Curb Ramp	
	2-in Underground Conduit	
DD	Directional Drill	N/A
	Directional Arrow	
N/A	Right of Way	
E	Temp. Construction Easement	N/A

SIGNS

- (A) "YIELD" Sign (R1-2) (A)
- (B) Pedestrian Crossing Sign (W11-2) w/ Left Downward Diagonal Plaque (W16-7pL) (B)
- (C) U-Turn "MUST YIELD" Sign (C)
- (D) "NO TURN ON RED" Sign (R10-11) (D)
- (E) Turning Vehicles Yield to Peds Sign (R10-15R) (E)
- (F) Pedestrian Crossing Sign (W11-2) W/ Right Downward Diagonal Plaque (W16-7pR) (F)

Temporary Signal 2 - TCP Phase II Step 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

RS&H
NC FIRM LICENSE No: F-0493
1520 SOUTH BOULEVARD, SUITE 200
CHARLOTTE, NC 28203
(704) 752-0610

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

SCALE 0 40 1"=40'

US 64-276 (Asheville Highway)
at
SR 1512 (Ecusta Road) /
Bank Driveway

Division 14 Transylvania County Brevard

PLAN DATE:	May 2023	REVIEWED BY:	S.G. Haynie
PREPARED BY:	P. Koloski	REVIEWED BY:	

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 029531 ENGINEER STEVEN G. HAYNIE
DocuSigned by: Steven G. Haynie 5/4/2023
DESIGN ENGINEER DATE

Sig Inventory No. 14-0798T2

5/4/2023
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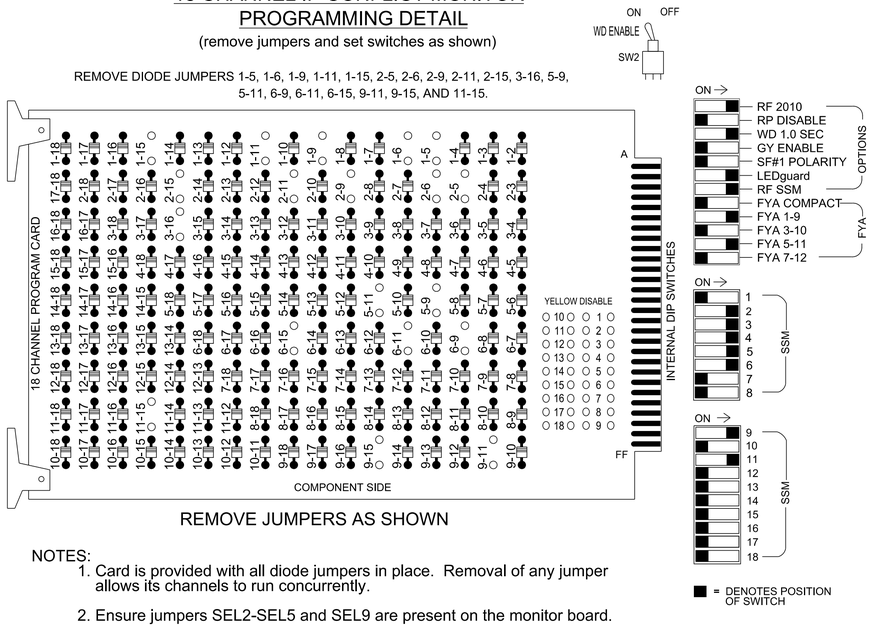
PROJECT REFERENCE NO.	SHEET NO.
R-5799	Sig. 3.1

18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 1-5, 1-6, 1-9, 1-11, 1-15, 2-5, 2-6, 2-9, 2-11, 2-15, 3-16, 5-9, 5-11, 6-9, 6-11, 6-15, 9-11, 9-15, AND 11-15.



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 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 a Temporary Time Based Coordination System.

EQUIPMENT INFORMATION

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

*See overlap programming detail on sheet 2

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4		S5		S6	S7		S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3		4		14	5		6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3		4		4 PED	5		6	6 PED	7	8	3 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	★ 11	21, 22,23	NU	31	32	41	42,43	NU	★ 51,52	32	61,62	P61, P62	NU	NU	P31, P32	★ 11	NU	NU	★ 51,52	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										132						A122			A115		
FLASHING YELLOW ARROW																A123			A116		
GREEN ARROW	127			118		103			133	133											
✋												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.

INPUT FILE POSITION LAYOUT

(front view)

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

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

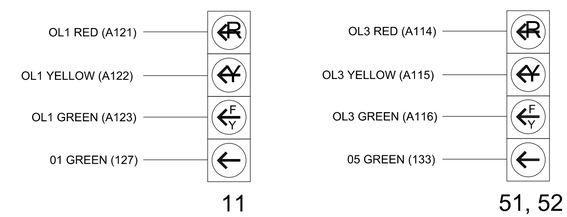
LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN
PED PUSH BUTTONS												
P31,P32	TB8-8,9	I13L	70	36	8	PED 3						
P61,P62	TB8-7,9	I13U	68	34	6	PED 6						

NOTE:
INSTALL DC ISOLATORS IN INPUT FILE SLOT I13.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



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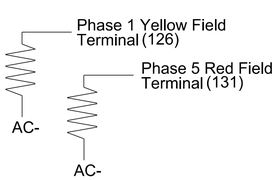
(install resistors as shown)

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



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THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 14-0798T2
DESIGNED: May 2023
SEALED: May 4, 2023
REVISED: _____

Temporary Signal 2 - TCP Phase II Step 2
Electrical Detail - Sheet 1 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Electrical and Programming Details For:

Prepared for the Offices of:
Transportation Mobility and Safety Division
STATE OF NORTH CAROLINA
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Division 14 Transylvania County Brevard

PLAN DATE: May 2023	REVIEWED BY: V. Kaiser
PREPARED BY: S.G. Haynie	REVIEWED BY:

REVISIONS	INIT.	DATE

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NORTH CAROLINA PROFESSIONAL SEAL 029531 ENGINEER STEVEN G. HAYNIE
DocuSigned by: Steven G. Haynie 5/4/2023
DATE
SIG. INVENTORY NO. 14-0798T2

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R-5799	Sig. 3.2

OVERLAP PROGRAMMING

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

Overlap Plan 1

Overlap	1	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

PED 3 PROGRAMMING DETAIL

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

Web Interface
Home >Controller >Detector Configuration >Pedestrian Detector

Plan 1

NOTICE PHASE 3 PED ASSIGNED TO DETECTOR 8 PED →

Detector	Descripton	Call Phase	Call Overlap
2		2	0
4		4	0
6		6	0
8		3	0

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

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

Channel Configuration

NOTICE PHASE 3 PED ASSIGNED TO CHANNEL 16 →

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	3				16
17	Overlap	5		X	X	17
18	Overlap	6		X		18

ACCESSIBLE PEDESTRIAN SIGNAL (APS) INSTALLATION NOTES

1. Install push buttons and APS equipment per manufacturer's instructions.
2. Provide a dedicated cable to each push button per manufacturer's instructions.
3. If APS equipment is mounted in cabinet, use filtered power (i.e., Controller Receptacle) to power APS equipment. Do not use Equipment Receptacle, which is a GFCI outlet.
4. Never attempt to operate a standard contact closure push button with the APS system unless cabinet is re-wired for standard button operation or unless explicitly allowed by the manufacturer.
5. Place manufacturer's instructions in cabinet with cabinet prints, signal plans, and electrical details.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 14-0798T2
DESIGNED: May 2023
SEALED: May 4, 2023
REVISED: _____

RS&H
NC FIRM LICENSE No: F-0493
1520 SOUTH BOULEVARD, SUITE 200
CHARLOTTE, NC 28203
(704) 752-0610

Temporary Signal 2 - TCP Phase II, Step 2
Electrical Detail - Sheet 2 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Electrical and Programming Details For:

US 64-276 (Asheville Highway)
at
SR 1512 (Ecusta Road) /
Bank Driveway

Division 14 Transylvania County Brevard

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

PLAN DATE: May 2023 REVIEWED BY: V. Kaiser
PREPARED BY: S.G. Haynie REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 029531 ENGINEER STEVEN G. HAYNIE
DocuSigned by: Steven G. Haynie 5/4/2023
DATE

SIG. INVENTORY NO. 14-0798T2

5/4/2023
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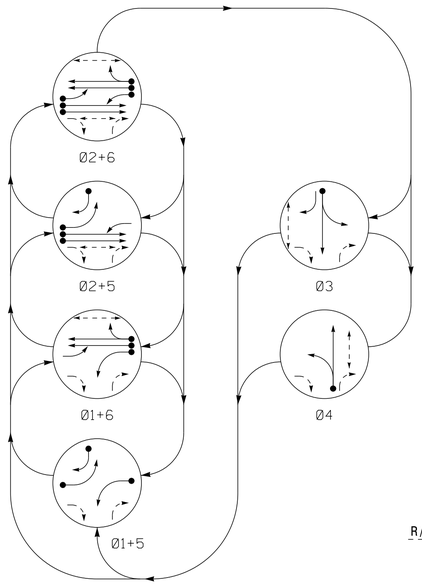
PROJECT REFERENCE NO.	SHEET NO.
R-5799	Sig. 4.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

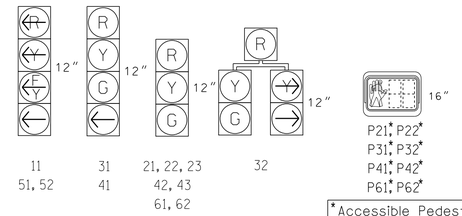
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE 01+5	01+6	02+5	02+6	03	04	FLASH
11	←	←	F Y	F Y	R	R	R
21, 22, 23	R	R	G	G	R	R	Y
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, 43	R	R	R	R	R	G	R
51, 52	←	F Y	←	F Y	R	R	R
61, 62	R	G	R	G	R	R	Y
P21, P22	DW	DW	W	W	DW	DW	DRK
P31, P32	DW	DW	DW	DW	W	DW	DRK
P41, P42	DW	DW	DW	DW	DW	W	DRK
P61, P62	DW	W	DW	W	DW	DW	DRK

SIGNAL FACE I.D.

All Heads L.E.D.

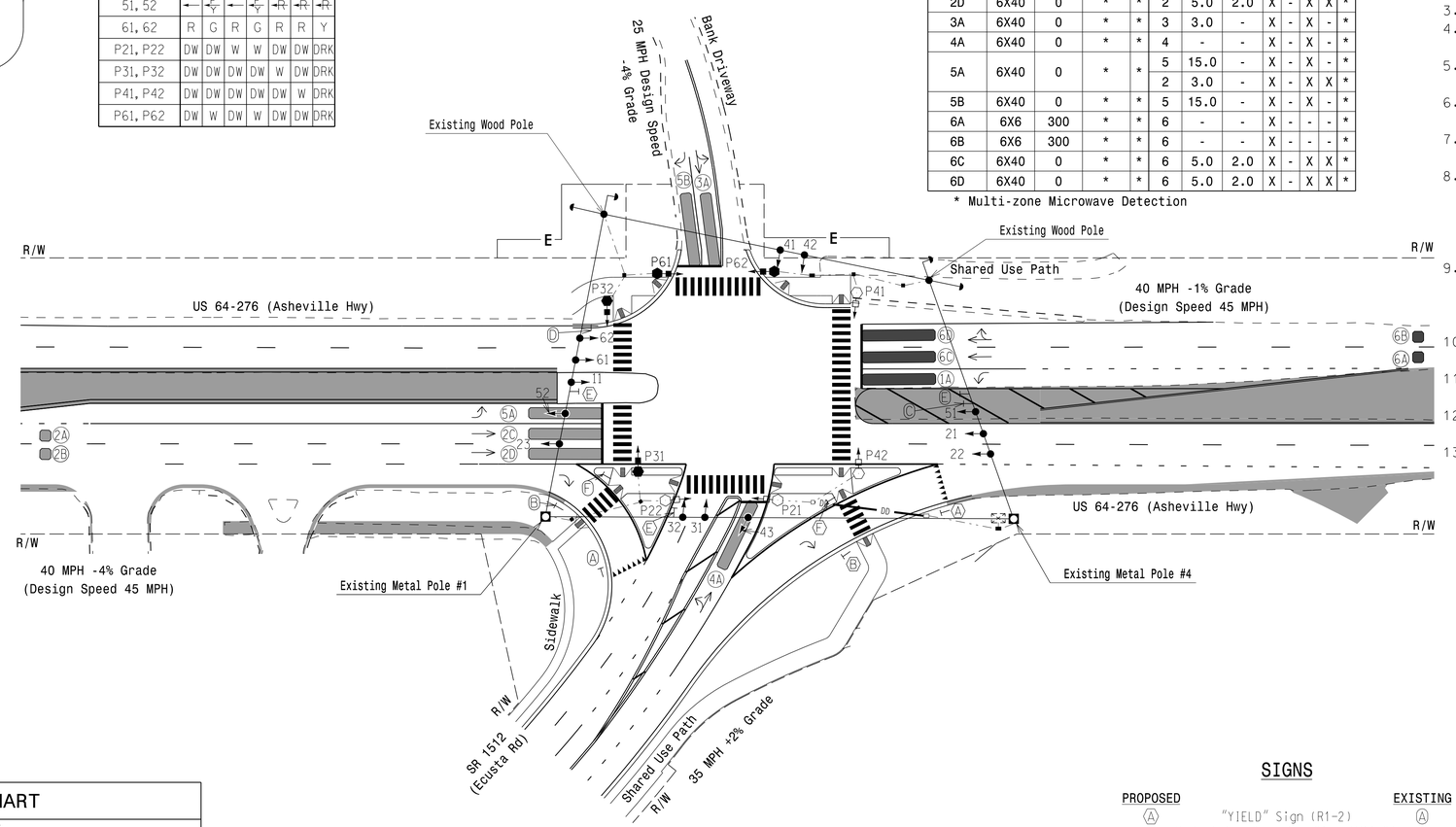


*Accessible Pedestrian Signal (APS)

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	*
2A	6X6	300	*	*	2	-	-	X	-	-	-	*
2B	6X6	300	*	*	2	-	-	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	3.0	-	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	-	-	-	*
6B	6X6	300	*	*	6	-	-	X	-	-	-	*
6C	6X40	0	*	*	6	5.0	2.0	X	-	X	X	*
6D	6X40	0	*	*	6	5.0	2.0	X	-	X	X	*

* Multi-zone Microwave Detection



6 Phase
Fully Actuated
(Time Based Coordination)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 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. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
7. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
8. This intersection uses multi-zone microwave detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.
9. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
10. Portions of detector zones 4A and 5A not shown for clarity.
11. See pavement marking plans for proposed stop bar locations.
12. All edestrian push buttons shall be Vibro-Tactile.
13. All APS shall use "Rapid Tick" sound.

LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Pedestrian Signal Head With Push Button & Sign	
	Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Video Detection Zone	
	Controller & Cabinet	
	Junction Box	
	Oversized Junction Box	
	Type I Pushbutton Post	
	Type II Signal Pedestal	
	Strain Pole	
	Construction Zone	
	Curb Ramp	
	2-in Underground Conduit	
DD	Directional Drill	N/A
	Directional Arrow	
N/A	Right of Way	
E	Temp. Construction Easement	N/A

SIGNS

PROPOSED		EXISTING
A	"YIELD" Sign (R1-2)	A
B	Pedestrian Crossing Sign (W11-2) W/ Left Downward Diagonal Plaque (W16-7pL)	B
C	U-Turn "MUST YIELD" Sign	C
D	"NO TURN ON RED" Sign (R10-11)	D
E	Turning Vehicles Yield to Peds Sign (R10-15R)	E
F	Pedestrian Crossing Sign (W11-2) W/ Right Downward Diagonal Plaque (W16-7pR)	F

MAXTIME TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6
Walk *	–	7	7	7	–	7
Ped Clear *	–	10	20	21	–	13
Min Green	7	12	7	7	7	12
Passage *	2.0	6.0	2.0	2.0	2.0	6.0
Max 1 *	25	90	15	20	15	90
Yellow Change	3.0	4.5	3.4	3.7	3.0	4.5
Red Clear	3.1	2.2	3.1	2.7	3.4	2.2
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	–
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.

ACCESSIBLE PEDESTRIAN SIGNAL OPERATION

SIGNAL FACE	VOICE	TONES	INTERVAL	SPEECH MESSAGE
P21	-	X	Walk	(Percussive Tone)
	X	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Ecusta.
P22	-	X	Walk	(Percussive Tone)
	X	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Ecusta.
P31	-	X	Walk	(Percussive Tone)
	X	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Asheville.
P32	-	X	Walk	(Percussive Tone)
	X	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Asheville.
P41	-	X	Walk	(Percussive Tone)
	X	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Asheville.
P42	-	X	Walk	(Percussive Tone)
	X	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Asheville.
P61	-	X	Walk	(Percussive Tone)
	X	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Driveway.
P62	-	X	Walk	(Percussive Tone)
	X	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Driveway.

RS&H
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CHARLOTTE, NC 28203
(704) 752-0610

Temporary Signal 3 - TCP Phases III and IV

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

US 64-276 (Asheville Highway) at SR 1512 (Ecusta Road) / Bank Driveway

Division 14 Transylvania County Brevard

PLAN DATE:	April 2023	REVIEWED BY:	S.G. Haynie
PREPARED BY:	P. Koloski	REVIEWED BY:	

SCALE 0 40 1"=40'

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL: NORTH CAROLINA PROFESSIONAL SEAL 029531 ENGINEER STEVEN G. HAYNIE

DocuSigned by: Steven G. Haynie 4/28/2023
SIGNATURE DATE

Sig Inventory No. 14-0798T3

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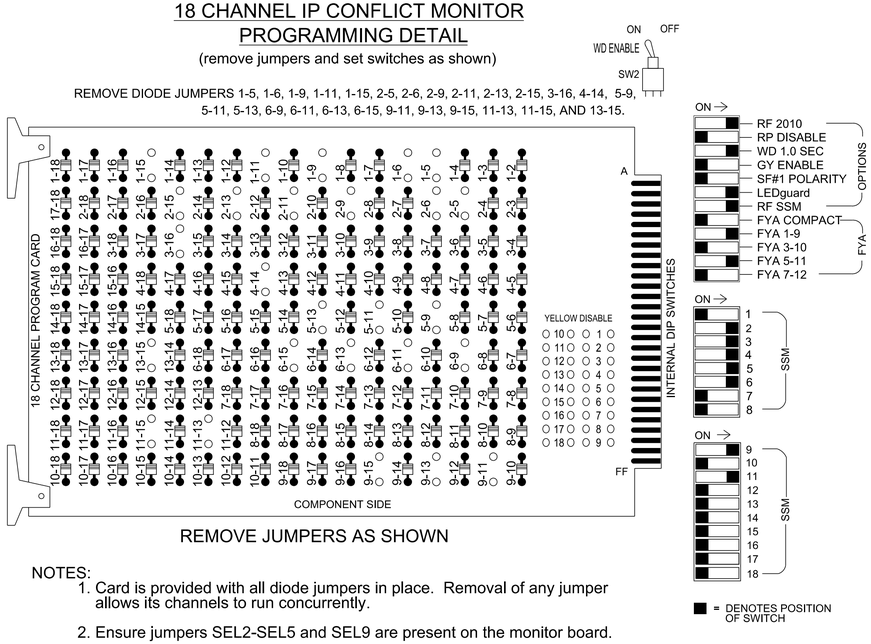
PROJECT REFERENCE NO.	SHEET NO.
R-5799	Sig. 4.1

18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 1-5, 1-6, 1-9, 1-11, 1-15, 2-5, 2-6, 2-9, 2-11, 2-13, 2-15, 3-16, 4-14, 5-9, 5-11, 5-13, 6-9, 6-11, 6-13, 6-15, 9-11, 9-13, 9-15, 11-13, 11-15, AND 13-15.



REMOVE JUMPERS AS SHOWN

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 Walk and 6 Green 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 a Temporary Time Based Coordination System.

EQUIPMENT INFORMATION

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

*See overlap programming detail on sheet 2

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4		S5		S6	S7		S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3		4		14	5		6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3		4		4 PED	5		6	6 PED	7	8	3 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	★ 11	21, 22,23	P21, P22	31	32	41	42,43	P41, P42	★ 51,52	32	61,62	P61, P62	NU	NU	P31, P32	★ 11	NU	NU	★ 51,52	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										132						A122			A115		
FLASHING YELLOW ARROW																A123			A116		
GREEN ARROW	127			118		103			133	133											
✋			113					104				119			110						
🚶			115					106				121			112						

NU = Not Used

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

★See pictorial of head wiring in detail this sheet.

INPUT FILE POSITION LAYOUT

(front view)

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

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

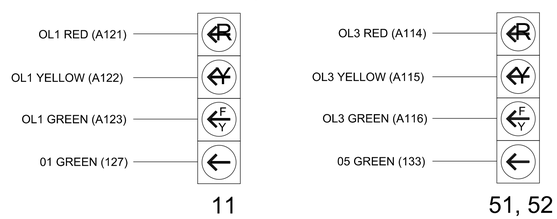
LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN
PED PUSH BUTTONS												
P21,P22	TB8-4,6	I12U	67	33	2	PED 2						
P31,P32	TB8-8,9	I13L	70	36	8	PED 3						
P41,P42	TB8-5,6	I12L	69	35	4	PED 4						
P61,P62	TB8-7,9	I13U	68	34	6	PED 6						

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

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

FYA SIGNAL WIRING DETAIL

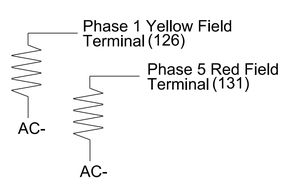
(wire signal heads as shown)



LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

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



SPECIAL DETECTOR NOTE

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

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.

RS&H
NC FIRM LICENSE No: F-0493
1520 SOUTH BOULEVARD, SUITE 200
CHARLOTTE, NC 28203
(704) 752-0610

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 14-0798T3
DESIGNED: April 2023
SEALED: April 28, 2023
REVISED: _____

Temporary Signal 3 - TCP Phases III and IV
Electrical Detail - Sheet 1 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Electrical and Programming Details For:

US 64-276 (Asheville Highway) at SR 1512 (Ecusta Road) / Bank Driveway

Division 14 Transylvania County Brevard

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:	April 2023	REVIEWED BY:	V. Kaiser
PREPARED BY:	S.G. Haynie	REVIEWED BY:	

REVISIONS	INIT.	DATE

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 029531 STEVEN G. HAYNIE
DocuSigned by: Steven G. Haynie 4/28/2023
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SIG. INVENTORY NO. 14-0798T3

4/28/2023
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PROJECT REFERENCE NO.	SHEET NO.
R-5799	Sig. 4.2

OVERLAP PROGRAMMING

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

Overlap Plan 1

Overlap	1	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

PED 3 PROGRAMMING DETAIL

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

Web Interface
Home >Controller >Detector Configuration >Pedestrian Detector

Plan 1

NOTICE PHASE 3 PED ASSIGNED TO DETECTOR 8 PED →

Detector	Descripton	Call Phase	Call Overlap
2	-	2	0
4	-	4	0
6	-	6	0
8	-	3	0

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

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

Channel Configuration

NOTICE PHASE 3 PED ASSIGNED TO CHANNEL 16 →

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	3	-	-	-	16
17	Overlap	5	-	X	X	17
18	Overlap	6	-	X	-	18

ACCESSIBLE PEDESTRIAN SIGNAL (APS) INSTALLATION NOTES

1. Install push buttons and APS equipment per manufacturer's instructions.
2. Provide a dedicated cable to each push button per manufacturer's instructions.
3. If APS equipment is mounted in cabinet, use filtered power (i.e., Controller Receptacle) to power APS equipment. Do not use Equipment Receptacle, which is a GFCI outlet.
4. Never attempt to operate a standard contact closure push button with the APS system unless cabinet is re-wired for standard button operation or unless explicitly allowed by the manufacturer.
5. Place manufacturer's instructions in cabinet with cabinet prints, signal plans, and electrical details.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 14-0798T3
DESIGNED: April 2023
SEALED: April 28, 2023
REVISED: _____

RS&H
NC FIRM LICENSE No: F-0493
1520 SOUTH BOULEVARD, SUITE 200
CHARLOTTE, NC 28203
(704) 752-0610

Temporary Signal 3 - TCP Phases III and IV
Electrical Detail - Sheet 2 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Electrical and Programming Details For:

US 64-276 (Asheville Highway) at SR 1512 (Ecusta Road) / Bank Driveway

Division 14 Transylvania County Brevard

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

PLAN DATE: April 2023	REVIEWED BY: V. Kaiser
PREPARED BY: S.G. Haynie	REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 029531 ENGINEER STEVEN G. HAYNIE

DocuSigned by: Steven G. Haynie 4/28/2023
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DATE

SIG. INVENTORY NO. 14-0798T3

4/28/2023
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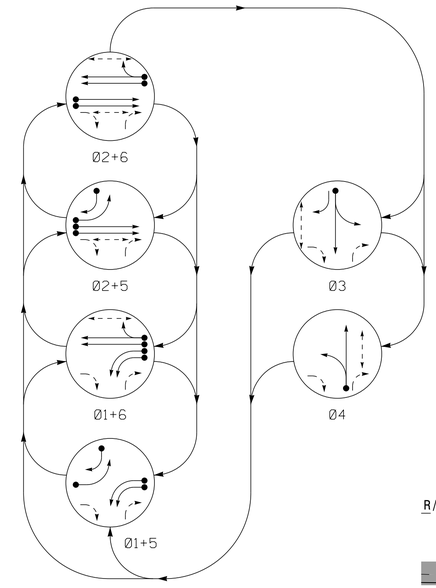
PROJECT REFERENCE NO.	SHEET NO.
R-5799	Sig. 5.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

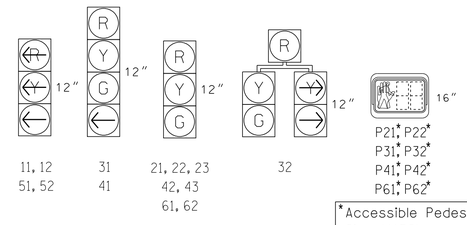
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE 01+5	01+6	02+5	02+6	03	04	FLASH
11, 12	←	←	←R	←R	←R	←R	←R
21, 22, 23	R	R	G	G	R	R	Y
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, 43	R	R	R	R	R	G	R
51, 52	←R	←R	←	←R	←R	←R	←R
61, 62	R	G	R	G	R	R	Y
P21, P22	DW	DW	W	W	DW	DW	DRK
P31, P32	DW	DW	DW	DW	W	DW	DRK
P41, P42	DW	DW	DW	DW	DW	W	DRK
P61, P62	DW	W	DW	W	DW	DW	DRK

SIGNAL FACE I.D.

All Heads L.E.D.

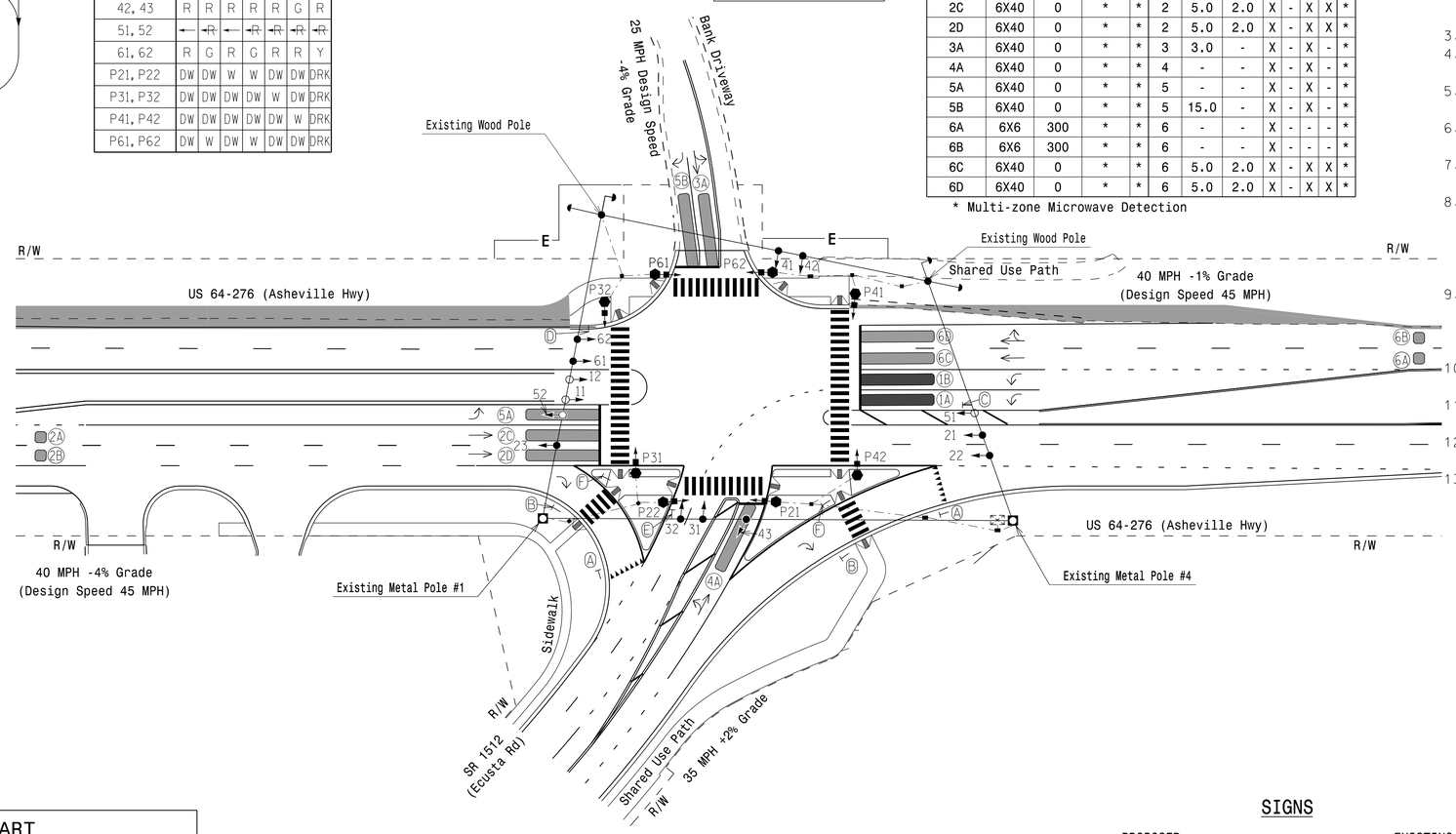


*Accessible Pedestrian Signal (APS)

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	-	-	X	-	X	-	*
1B	6X40	0	*	*	1	-	-	X	-	X	-	*
2A	6X6	300	*	*	2	-	-	X	-	-	-	*
2B	6X6	300	*	*	2	-	-	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	3.0	-	X	-	X	-	*
4A	6X40	0	*	*	4	-	-	X	-	X	-	*
5A	6X40	0	*	*	5	-	-	X	-	X	-	*
5B	6X40	0	*	*	5	15.0	-	X	-	X	-	*
6A	6X6	300	*	*	6	-	-	X	-	-	-	*
6B	6X6	300	*	*	6	-	-	X	-	-	-	*
6C	6X40	0	*	*	6	5.0	2.0	X	-	X	X	*
6D	6X40	0	*	*	6	5.0	2.0	X	-	X	X	*

* Multi-zone Microwave Detection



6 Phase
Fully Actuated
(Time Based Coordination)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 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. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
7. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
8. This intersection uses multi-zone microwave detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.
9. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
10. Portions of detector zones 4A and 5A not shown for clarity.
11. See pavement marking plans for proposed stop bar locations.
12. All edestrian push buttons shall be Vibro-Tactile.
13. All APS shall use "Rapid Tick" sound.

LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Pedestrian Signal Head With Push Button & Sign	
	Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Video Detection Zone	
	Controller & Cabinet	
	Junction Box	
	Oversized Junction Box	
	Type I Pushbutton Post	
	Type II Signal Pedestal	
	Strain Pole	
	Construction Zone	
	Curb Ramp	
	2-in Underground Conduit	
DD	Directional Drill	N/A
	Directional Arrow	
N/A	Right of Way	
E	Temp. Construction Easement	N/A

SIGNS

PROPOSED		EXISTING
A	"YIELD" Sign (R1-2)	A
B	Pedestrian Cross Sign (W11-2) W/ Left Downward Diagonal Plaque (W16-7pL)	B
C	U-Turn "MUST YIELD" Sign	C
D	"NO TURN ON RED" Sign (R10-11)	D
E	Turning Vehicles Yield to Peds Sign (R10-15R)	E
F	Pedestrian Crossing Sign (W11-2) W/ Right Downward Diagonal Plaque (W16-7pR)	F

MAXTIME TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6
Walk *	–	7	7	7	–	7
Ped Clear *	–	10	20	21	–	13
Min Green	7	12	7	7	7	12
Passage *	2.0	6.0	2.0	2.0	2.0	6.0
Max 1 *	25	90	15	20	15	90
Yellow Change	3.0	4.5	3.4	3.7	3.0	4.5
Red Clear	3.3	2.2	3.1	2.7	3.3	2.2
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	–
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.

ACCESSIBLE PEDESTRIAN SIGNAL OPERATION

SIGNAL FACE	VOICE	TONES	INTERVAL	SPEECH MESSAGE
P21	-	X	Walk	(Percussive Tone)
	X	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Ecusta.
P22	-	X	Walk	(Percussive Tone)
	X	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Ecusta.
P31	-	X	Walk	(Percussive Tone)
	X	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Asheville.
P32	-	X	Walk	(Percussive Tone)
	X	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Asheville.
P41	-	X	Walk	(Percussive Tone)
	X	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Asheville.
P42	-	X	Walk	(Percussive Tone)
	X	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Asheville.
P61	-	X	Walk	(Percussive Tone)
	X	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Driveway.
P62	-	X	Walk	(Percussive Tone)
	X	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Driveway.

RS&H
NC FIRM LICENSE No: F-0493
1520 SOUTH BOULEVARD, SUITE 200
CHARLOTTE, NC 28203
(704) 752-0610

Temporary Signal 4 - TCP Phase V

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

SCALE 0 40 1"=40'

US 64-276 (Asheville Highway)
at
SR 1512 (Ecusta Road) /
Bank Driveway

Division 14 Transylvania County Brevard

PLAN DATE:	April 2023	REVIEWED BY:	S.G. Haynie
PREPARED BY:	P. Koloski	REVIEWED BY:	

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 029531 ENGINEER STEVEN G. HAYNIE

DocuSigned by: Steven G. Haynie 4/28/2023
DESIGN ENGINEER SIGNATURE DATE

Sig Inventory No. 14-0798T4

4/28/2023
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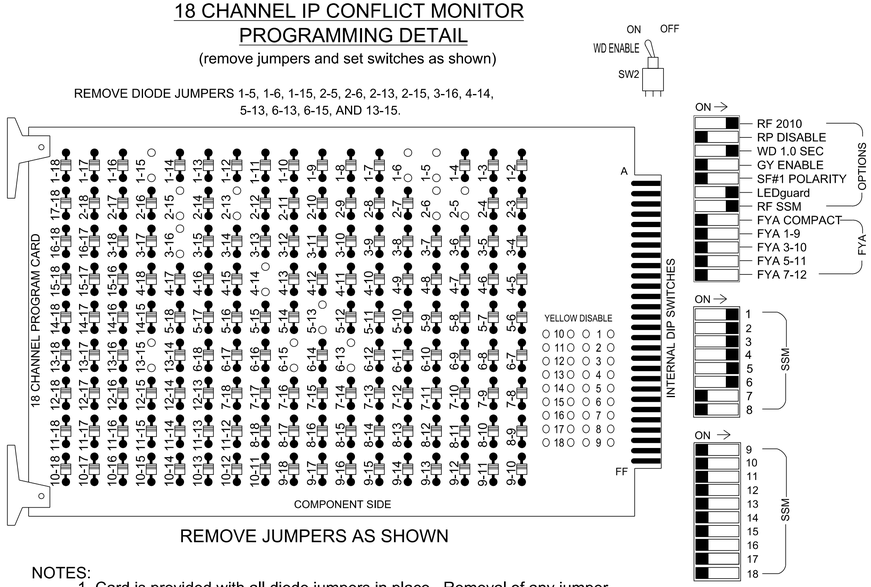
PROJECT REFERENCE NO.	SHEET NO.
R-5799	Sig. 5.1

18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 1-5, 1-6, 1-15, 2-5, 2-6, 2-13, 2-15, 3-16, 4-14, 5-13, 6-13, 6-15, AND 13-15.



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. Return controller to Factory Defaults before programming per this electrical detail.
3. Program controller to start up in phase 2 Green Walk and 6 Green Walk.
4. If this signal will be managed by an ATMS software, enable controller and detectors used at this location.
5. The cabinet and controller are part of a Temporary Time Based Coordination System.

EQUIPMENT INFORMATION

Controller.....2070LX
Cabinet.....332 w/ Aux
Software.....Q-Free MAXTIME
Cabinet Mount.....18 With Aux. Output File
Load Switches Used.....S1, S2, S3, S4, S5, S6, S7, S8, S9, S12
Phases Used.....1, 2, 2PED, 3, 3PED, 4, 4PED, 5, 6, 6PED
Overlaps.....NONE

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	3 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	11,12	21, 22,23	P21, P22	31	32	41	42,43	P41, P42	51,52	32	61,62	P61, P62	NU	NU	P31, P32	NU	NU	NU	NU	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	125								131												
YELLOW ARROW	126								132	132											
FLASHING YELLOW ARROW																					
GREEN ARROW	127			118		103			133	133											
✋			113					104				119			110						
🚶			115					106				121			112						

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)

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

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN
PED PUSH BUTTONS												
P21,P22	TB8-4,6	I12U	67	33	2	PED 2						
P31,P32	TB8-8,9	I13L	70	36	8	PED 3						
P41,P42	TB8-5,6	I12L	69	35	4	PED 4						
P61,P62	TB8-7,9	I13U	68	34	6	PED 6						

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

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

SPECIAL DETECTOR NOTE

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

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.

RS&H
NC FIRM LICENSE No: F-0493
1520 SOUTH BOULEVARD, SUITE 200
CHARLOTTE, NC 28203
(704) 752-0610

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 14-0798T4
DESIGNED: April 2023
SEALED: April 28, 2023
REVISED: _____

Temporary Signal 4 - TCP Phase V
Electrical Detail - Sheet 1 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Electrical and Programming Details For:

US 64-276 (Asheville Highway) at SR 1512 (Ecusta Road) / Bank Driveway

Division 14 Transylvania County Brevard

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

PLAN DATE: April 2023	REVIEWED BY: V. Kaiser
PREPARED BY: S.G. Haynie	REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 029531 ENGINEER STEVEN G. HAYNIE

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PROJECT REFERENCE NO.	SHEET NO.
R-5799	Sig. 5.2

PED 3 PROGRAMMING DETAIL

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

Web Interface
Home >Controller >Detector Configuration >Pedestrian Detector

Plan 1

NOTICE PHASE 3 PED ASSIGNED TO DETECTOR 8 PED

Detector	Descripton	Call Phase	Call Overlap
2		2	0
4		4	0
6		6	0
8		3	0

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

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

Channel Configuration

NOTICE PHASE 3 PED ASSIGNED TO CHANNEL 16

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	3				16
17	Overlap	5		X	X	17
18	Overlap	6		X		18

ACCESSIBLE PEDESTRIAN SIGNAL (APS) INSTALLATION NOTES

1. Install push buttons and APS equipment per manufacturer's instructions.
2. Provide a dedicated cable to each push button per manufacturer's instructions.
3. If APS equipment is mounted in cabinet, use filtered power (i.e., Controller Receptacle) to power APS equipment. Do not use Equipment Receptacle, which is a GFCI outlet.
4. Never attempt to operate a standard contact closure push button with the APS system unless cabinet is re-wired for standard button operation or unless explicitly allowed by the manufacturer.
5. Place manufacturer's instructions in cabinet with cabinet prints, signal plans, and electrical details.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 14-0798T4
DESIGNED: April 2023
SEALED: April 28, 2023
REVISED: _____

RS&H
NC FIRM LICENSE No: F-0493
1520 SOUTH BOULEVARD, SUITE 200
CHARLOTTE, NC 28203
(704) 752-0610

Temporary Signal 4 - TCP Phase V
Electrical Detail - Sheet 2 of 2

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Electrical and Programming Details For: US 64-276 (Asheville Highway) at SR 1512 (Ecusta Road) / Bank Driveway

Division 14 Transylvania County Brevard

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PLAN DATE: April 2023	REVIEWED BY: V. Kaiser
PREPARED BY: S.G. Haynie	REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 029531 ENGINEER STEVEN G. HAYNIE

DocuSigned by: Steven G. Haynie 4/28/2023
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SIG. INVENTORY NO. 14-0798T4

4/28/2023
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R-5799	Sig. 6.0

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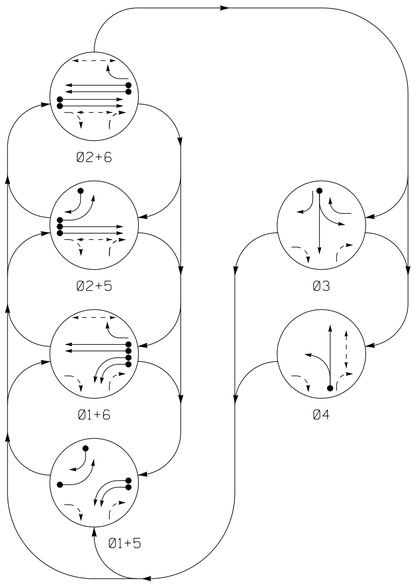

PHASING DIAGRAM DETECTION LEGEND

- DETECTED MOVEMENT
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- PEDESTRIAN MOVEMENT

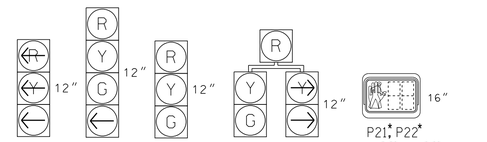
TABLE OF OPERATION

SIGNAL FACE	PHASE 01+5	01+6	02+5	02+6	03	04	FLASH
11, 12	←	←	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~
21, 22, 23	R	R	G	G	R	R	Y
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, 43	R	R	R	R	R	G	R
51, 52	←	~~R~~	←	~~R~~	~~R~~	~~R~~	~~R~~
61	R	G	R	G	R	R	Y
62	R	G	R	G	R/→	R	Y
P21, P22	DW	DW	W	W	DW	DW	DRK
P31, P32*	DRK	DRK	DRK	DRK	DRK	DRK	DRK
P41, P42	DW	DW	DW	DW	DW	W	DRK
P61, P62	DW	W	DW	W	DW	DW	DRK

*See Note 6

SIGNAL FACE I.D.

All Heads L.E.D.



11, 12
51, 52

31
41

21, 22, 23
42, 43
61

32
62

P21,* P22*
P31,*,** P32*,**
P41,* P42*
P61,* P62*

*Accessible Pedestrian Signal (APS)

**See Note 6

MAXTIME DETECTOR INSTALLATION CHART

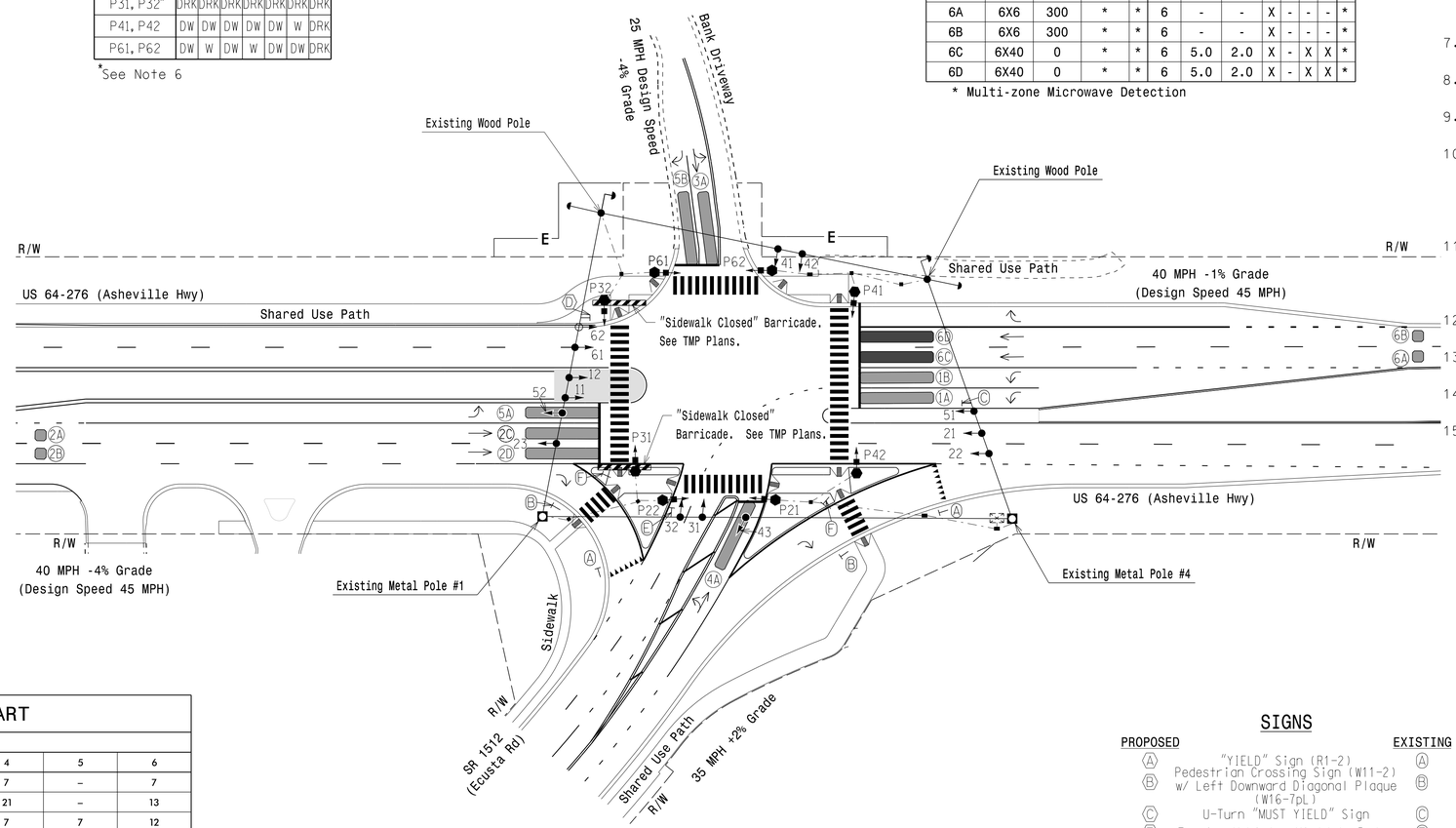
DETECTOR					PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
1A	6X40	0	*	*	1	-	-	X	-	X	-	*
1B	6X40	0	*	*	1	-	-	X	-	X	-	*
2A	6X6	300	*	*	2	-	-	X	-	-	-	*
2B	6X6	300	*	*	2	-	-	X	-	-	-	*
2C	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	3.0	-	X	-	X	-	*
4A	6X40	0	*	*	4	-	-	X	-	X	-	*
5A	6X40	0	*	*	5	-	-	X	-	X	-	*
5B	6X40	0	*	*	5	15.0	-	X	-	X	-	*
6A	6X6	300	*	*	6	-	-	X	-	-	-	*
6B	6X6	300	*	*	6	-	-	X	-	-	-	*
6C	6X40	0	*	*	6	5.0	2.0	X	-	X	X	*
6D	6X40	0	*	*	6	5.0	2.0	X	-	X	X	*

* Multi-zone Microwave Detection

6 Phase Fully Actuated (Time Based Coordination)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 or phase 5 may be lagged.
4. The order of phase 3 and phase 4 may be reversed.
5. Reposition existing signal head #61.
6. Bag existing pedestrian heads P31 and P32 and temporarily disable associated pushbuttons.
7. Set all detector units to presence mode.
8. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
9. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
10. This intersection uses multi-zone microwave detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.
11. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
12. Portions of detector zones 4A and 5A not shown for clarity.
13. See pavement marking plans for proposed stop bar locations.
14. All edestrian push buttons shall be Vibro-Tactile.
15. All APS shall use "Rapid Tick" sound.



LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Pedestrian Signal Head With Push Button & Sign	
	Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Video Detection Zone	
	Controller & Cabinet	
	Junction Box	
	Oversized Junction Box	
	Type I Pushbutton Post	
	Type II Signal Pedestal	
	Strain Pole	
	Construction Zone	
	Curb Ramp	
	2-in Underground Conduit	
DD	Directional Drill	N/A
	Directional Arrow	
N/A	Right of Way	
E	Temp. Construction Easement	N/A

SIGNS

PROPOSED		EXISTING
A	"YIELD" Sign (R1-2)	A
B	Pedestrian Crossing Sign (W11-2) w/ Left Downward Diagonal Plaque (W16-7pL)	B
C	U-Turn "MUST YIELD" Sign	C
E	Turning Vehicles Yield to Peds Sign (R10-15R)	E
F	Pedestrian Crossing Sign (W11-2) w/ Right Downward Diagonal Plaque (W16-7pR)	F

MAXTIME TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6
Walk *	–	7	–	7	–	7
Ped Clear *	–	10	–	21	–	13
Min Green	7	12	7	7	7	12
Passage *	2.0	6.0	2.0	2.0	2.0	6.0
Max 1 *	25	90	15	20	15	90
Yellow Change	3.0	4.5	3.4	3.7	3.0	4.5
Red Clear	3.3	2.2	3.1	2.7	3.3	2.2
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	–
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.

ACCESSIBLE PEDESTRIAN SIGNAL OPERATION

SIGNAL FACE	VOICE	TONES	INTERVAL	SPEECH MESSAGE
P21	-	X	Walk	(Percussive Tone)
	X	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Ecusta.
P22	-	X	Walk	(Percussive Tone)
	X	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Ecusta.
P41	-	X	Walk	(Percussive Tone)
	X	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Asheville.
P42	-	X	Walk	(Percussive Tone)
	X	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Asheville.
P61	-	X	Walk	(Percussive Tone)
	X	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Driveway.
P62	-	X	Walk	(Percussive Tone)
	X	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Driveway.

RS&H
NC FIRM LICENSE No: F-0493
1520 SOUTH BOULEVARD, SUITE 200
CHARLOTTE, NC 28203
(704) 752-0610

Temporary Signal 5 - TCP Phase VI Step 1

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

US 64-276 (Asheville Highway)
at
SR 1512 (Ecusta Road) /
Bank Driveway

Division 14 Transylvania County Brevard

PLAN DATE: May 2023	REVIEWED BY: S.G. Haynie
PREPARED BY: P. Koloski	REVIEWED BY:

SCALE 0 40 1"=40'

REVISIONS	INIT.	DATE

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SEAL
NORTH CAROLINA PROFESSIONAL SEAL 029531 ENGINEER STEVEN G. HAYNIE

DocuSigned by: Steven G. Haynie 5/4/2023
DESIGN ENGINEER DATE

Sig Inventory No. 14-079875

5/4/2023
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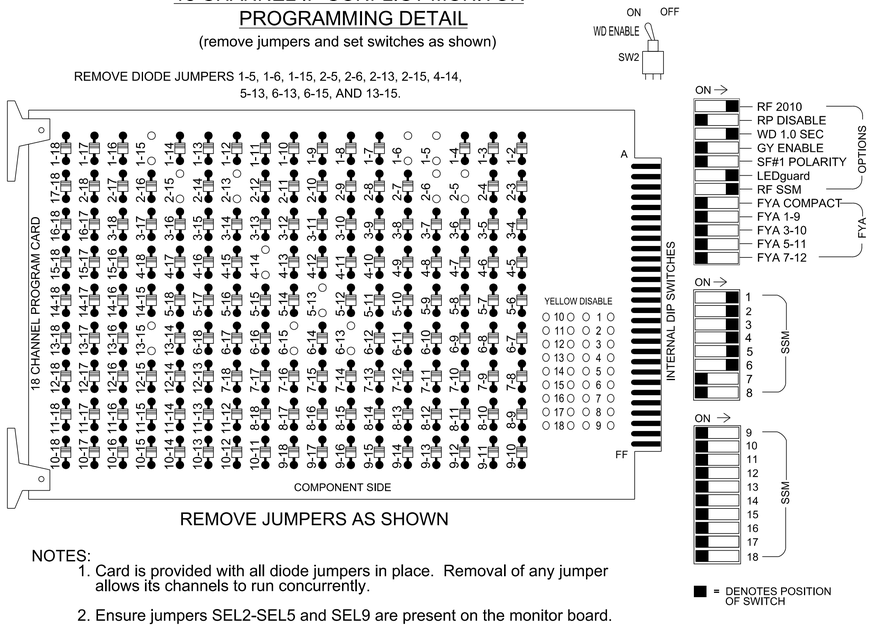
PROJECT REFERENCE NO.	SHEET NO.
R-5799	Sig. 6.1

18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 1-5, 1-6, 1-15, 2-5, 2-6, 2-13, 2-15, 4-14, 5-13, 6-13, 6-15, AND 13-15.



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. Return controller to Factory Defaults before programming per this electrical detail.

3. Program controller to start up in phase 2 Green Walk and 6 Green 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 a Temporary Time Based Coordination System.

EQUIPMENT INFORMATION

Controller.....2070LX
Cabinet.....332 w/ Aux
Software.....Q-Free MAXTIME
Cabinet Mount.....18 With Aux. Output File
Load Switches Used.....S1, S2, S3, S4, S5, S6, S7, S8, S9
Phases Used.....1, 2, 2PED, 3, 4, 4PED, 5, 6, 6PED
Overlaps.....NONE

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4			S5		S6	S7		S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3			4		14	5		6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3			4		4 PED	5		6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	11,12	21, 22,23	P21, P22	31	32	62	41	42,43	P41, P42	51,52	32	61,62	P61, P62	NU	NU	NU	NU	NU	NU	NU	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	125									131												
YELLOW ARROW	126					117				132	132											
FLASHING YELLOW ARROW																						
GREEN ARROW	127			118		118	103			133	133											
✋			113						104				119									
🚶			115						106				121									

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)

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

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN
PED PUSH BUTTONS												
P21,P22	TB8-4,6	I12U	67	33	2	PED 2						
P41,P42	TB8-5,6	I12L	69	35	4	PED 4						
P61,P62	TB8-7,9	I13U	68	34	6	PED 6						

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

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

SPECIAL DETECTOR NOTE

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

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 14-0798T5
DESIGNED: May 2023
SEALED: May 4, 2023
REVISED: _____

Temporary Signal 5 - TCP Phase VI Step 1
Electrical Detail - Sheet 1 of 2

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RS&H
NC FIRM LICENSE No: F-0493
1520 SOUTH BOULEVARD, SUITE 200
CHARLOTTE, NC 28203
(704) 752-0610

Electrical and Programming Details For: US 64-276 (Asheville Highway) at SR 1512 (Ecusta Road) / Bank Driveway

Division 14 Transylvania County Brevard

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

PLAN DATE: May 2023	REVIEWED BY: V. Kaiser		
PREPARED BY: S.G. Haynie	REVIEWED BY:		
REVISIONS		INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 029531 ENGINEER STEVEN G. HAYNIE

DocuSigned by: Steven G. Haynie 5/4/2023
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SIG. INVENTORY NO. 14-0798T5

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PROJECT REFERENCE NO.	SHEET NO.
R-5799	Sig. 6.2

ACCESSIBLE PEDESTRIAN SIGNAL (APS) INSTALLATION NOTES

1. Install push buttons and APS equipment per manufacturer's instructions.

2. Provide a dedicated cable to each push button per manufacturer's instructions.

3. If APS equipment is mounted in cabinet, use filtered power (i.e., Controller Receptacle) to power APS equipment. Do not use Equipment Receptacle, which is a GFCI outlet.

4. Never attempt to operate a standard contact closure push button with the APS system unless cabinet is re-wired for standard button operation or unless explicitly allowed by the manufacturer.

5. Place manufacturer's instructions in cabinet with cabinet prints, signal plans, and electrical details.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 14-0798T5
DESIGNED: May 2023
SEALED: May 4, 2023
REVISED: _____

RS&H
NC FIRM LICENSE No: F-0493
1520 SOUTH BOULEVARD, SUITE 200
CHARLOTTE, NC 28203
(704) 752-0610

Temporary Signal 5 - TCP Phase VI, Step 1
Electrical Detail - Sheet 2 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

US 64-276 (Asheville Highway)
at
SR 1512 (Ecusta Road) /
Bank Driveway

Division 14 Transylvania County Brevard

PLAN DATE:	May 2023	REVIEWED BY:	V. Kaiser
PREPARED BY:	S.G. Haynie	REVIEWED BY:	

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 029531 ENGINEER STEVEN G. HAYNIE

DocuSigned by:
Steven G. Haynie 5/4/2023
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DATE

SIG. INVENTORY NO. 14-0798T5

5/4/2023
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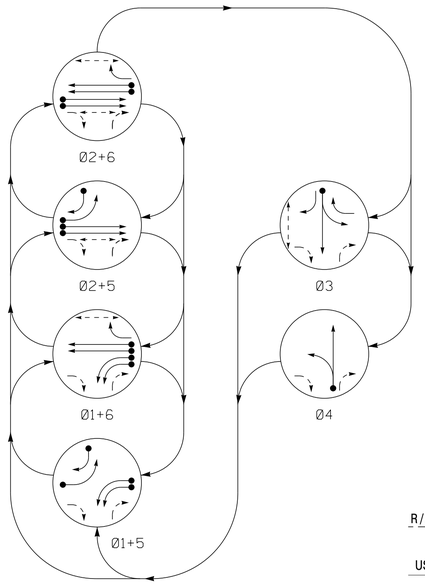
PROJECT REFERENCE NO.	SHEET NO.
R-5799	Sig. 7.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

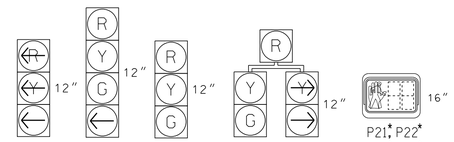
TABLE OF OPERATION

SIGNAL FACE	PHASE 01+5	01+6	02+5	02+6	03	04	FLASH
11, 12	←	←	←R	←R	←R	←R	←R
21, 22, 23	R	R	G	G	R	R	Y
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, 43	R	R	R	R	R	G	R
51, 52	←	←R	←	←R	←R	←R	←R
61	R	G	R	G	R	R	Y
62	R	G	R	G	R/→	R	Y
P21, P22	DW	DW	W	W	DW	DW	DRK
P31, P32	DW	DW	DW	DW	W	DW	DRK
P41, P42*	DRK	DRK	DRK	DRK	DRK	DRK	DRK
P61, P62	DW	W	DW	W	DW	DW	DRK

*See Note 5

SIGNAL FACE I.D.

All Heads L.E.D.



11, 12
51, 52

31
41

21, 22, 23
42, 43
61

32
62

P21,* P22*
P31,* P32*
P41,*,** P42*,**
P61,* P62*

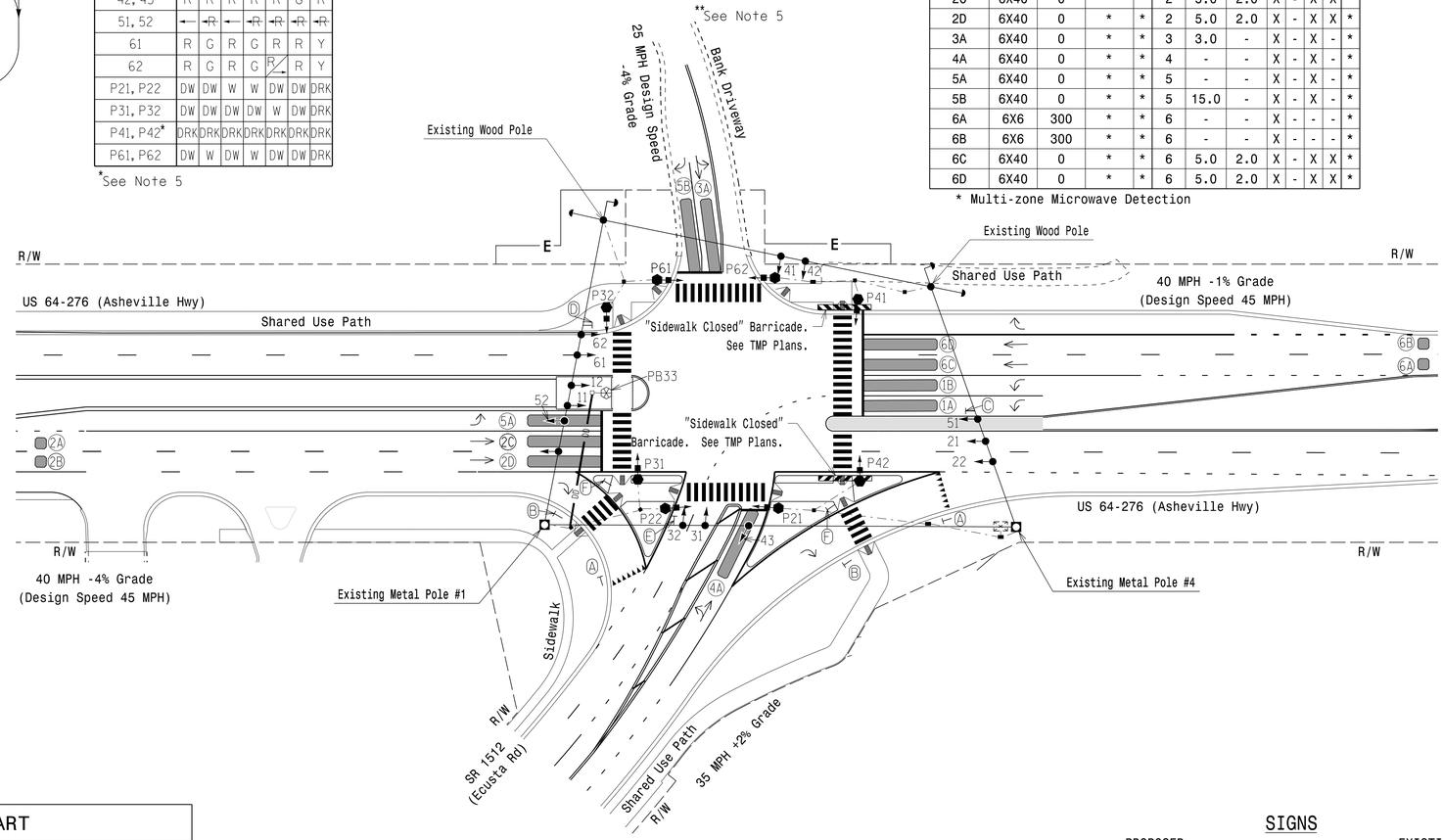
*Accessible Pedestrian Signal (APS)

**See Note 5

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	-	-	X	-	X	-	*
1B	6X40	0	*	*	1	-	-	X	-	X	-	*
2A	6X6	300	*	*	2	-	-	X	-	-	-	*
2B	6X6	300	*	*	2	-	-	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	3.0	-	X	-	X	-	*
4A	6X40	0	*	*	4	-	-	X	-	X	-	*
5A	6X40	0	*	*	5	-	-	X	-	X	-	*
5B	6X40	0	*	*	5	15.0	-	X	-	X	-	*
6A	6X6	300	*	*	6	-	-	X	-	-	-	*
6B	6X6	300	*	*	6	-	-	X	-	-	-	*
6C	6X40	0	*	*	6	5.0	2.0	X	-	X	X	*
6D	6X40	0	*	*	6	5.0	2.0	X	-	X	X	*

* Multi-zone Microwave Detection



6 Phase
Fully Actuated
(Time Based Coordination)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 or phase 5 may be lagged.
4. The order of phase 3 and phase 4 may be reversed.
5. Bag existing pedestrian heads P41 and P42 and temporarily disable associated pushbuttons.
6. Set all detector units to presence mode.
7. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
8. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
9. This intersection uses multi-zone microwave detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.
10. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
11. Portions of detector zones 4A and 5A not shown for clarity.
12. See pavement marking plans for proposed stop bar locations.
13. All edestrian push buttons shall be Vibro-Tactile.
14. All APS shall use "Rapid Tick" sound.

LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Pedestrian Signal Head With Push Button & Sign	
	Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Video Detection Zone	
	Controller & Cabinet	
	Junction Box	
	Oversized Junction Box	
	Type I Pushbutton Post	
	Type II Signal Pedestal	
	Strain Pole	
	Construction Zone	
	Curb Ramp	
	2-in Underground Conduit	
DD	Directional Drill	N/A
	Directional Arrow	
N/A	Right of Way	
E	Temp. Construction Easement	N/A

SIGNS

PROPOSED		EXISTING
A	"YIELD" Sign (R1-2)	A
B	Pedestrian Crossing Sign (W11-2) w/ Left Downward Diagonoal Plaque (W16-7pL)	B
C	U-Turn "MUST YIELD" Sign	C
E	Turning Vehicles Yield to Peds Sign (R10-15R)	E
F	Pedestrian Crossing Sign (W11-2) w/ Right Downward Diagonal Plaque (W16-7pR)	F

MAXTIME TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6
Walk *	–	7	7	–	–	7
Ped Clear *	–	10	20	–	–	13
Min Green	7	12	7	7	7	12
Passage *	2.0	6.0	2.0	2.0	2.0	6.0
Max 1 *	25	90	15	20	15	90
Yellow Change	3.0	4.5	3.4	3.7	3.0	4.5
Red Clear	3.3	2.2	3.1	2.7	3.3	2.2
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	–
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.

ACCESSIBLE PEDESTRIAN SIGNAL OPERATION

SIGNAL FACE	VOICE	TONES	INTERVAL	SPEECH MESSAGE
P21	-	X	Walk	(Percussive Tone)
	X	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Ecusta.
P22	-	X	Walk	(Percussive Tone)
	X	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Ecusta.
P31	-	X	Walk	(Percussive Tone)
	X	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Asheville.
P32	-	X	Walk	(Percussive Tone)
	X	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Asheville.
PB33	-	X	Walk	(Percussive Tone)
	X	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Asheville.
P61	-	X	Walk	(Percussive Tone)
	X	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Driveway.
P62	-	X	Walk	(Percussive Tone)
	X	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Driveway.

Temporary Signal 6 - TCP Phase VI Step 2

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RS&H
NC FIRM LICENSE No: F-0493
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(704) 752-0610

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

SCALE 0 40 1"=40'

US 64-276 (Asheville Highway)
at
SR 1512 (Ecusta Road) /
Bank Driveway

Division 14 Transylvania County Brevard

PLAN DATE: May 2023	REVIEWED BY: S.G. Haynie
PREPARED BY: P. Koloski	REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 029531 ENGINEER STEVEN G. HAYNIE

DocuSigned by: Steven G. Haynie 5/4/2023
DESIGN ENGINEER SIGNATURE DATE

Sig Inventory No. 14-0798T6

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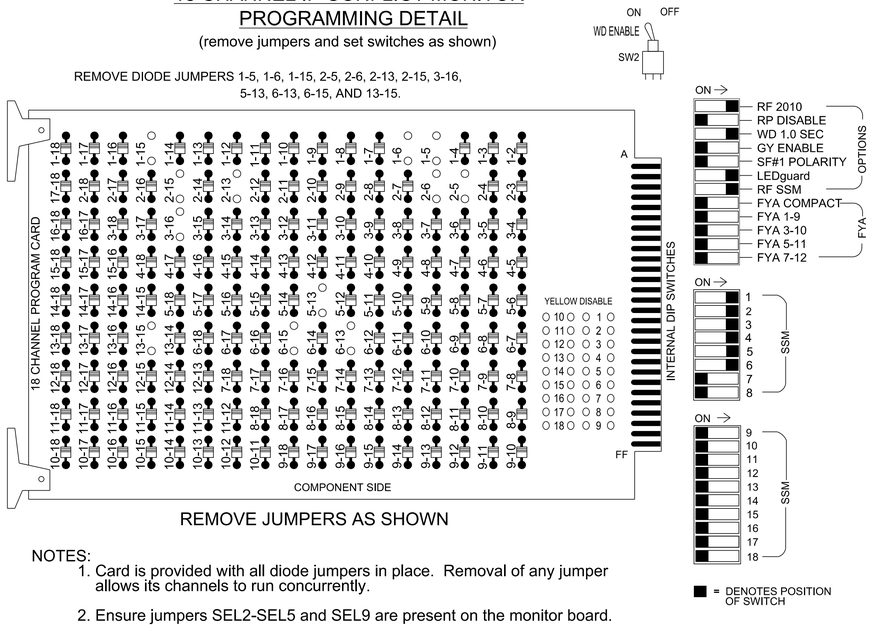
R-5799	Sig. 7.1

18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 1-5, 1-6, 1-15, 2-5, 2-6, 2-13, 2-15, 3-16, 5-13, 6-13, 6-15, AND 13-15.



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 Walk and 6 Green Walk.
3. If 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 a Temporary Time Based Coordination System.

EQUIPMENT INFORMATION

Controller.....2070LX
Cabinet.....332 w/ Aux
Software.....Q-Free MAXTIME
Cabinet Mount.....18 With Aux. Output File
Load Switches Used.....S1, S2, S3, S4, S5, S7, S8, S9, S12
Phases Used.....1, 2, 2PED, 3, 3PED, 4, 5, 6, 6PED
Overlaps.....NONE

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	3 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	11,12	21, 22,23	P21, P22	31	32	62	41	42,43	NU	51,52	32	61,62	P61, P62	NU	NU	P31, P32	NU	NU	NU	NU	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	125									131												
YELLOW ARROW	126					117				132	132											
FLASHING YELLOW ARROW																						
GREEN ARROW	127			118		118	103			133	133											
✋			113										119			110						
🚶			115										121			112						

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)

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

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN
PED PUSH BUTTONS												
P21,P22	TB8-4,6	I12U	67	33	2	PED 2						
P31,P32	TB8-8,9	I13L	70	36	8	PED 3						
P61,P62	TB8-7,9	I13U	68	34	6	PED 6						

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

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

SPECIAL DETECTOR NOTE

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

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 14-0798T6
DESIGNED: May 2023
SEALED: May 4, 2023
REVISED: _____

Temporary Signal 6 - TCP Phase VI, Step 2
Electrical Detail - Sheet 1 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Electrical and Programming Details For:

US 64-276 (Asheville Highway) at SR 1512 (Ecusta Road) / Bank Driveway

Division 14 Transylvania County Brevard

PLAN DATE: May 2023 REVIEWED BY: V. Kaiser
PREPARED BY: S.G. Haynie REVIEWED BY:

REVISIONS | INIT. | DATE

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

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 029531 ENGINEER STEVEN G. HAYNIE

DocuSigned by: Steven G. Haynie 5/4/2023
D633DCC6A5D448B... DATE

SIG. INVENTORY NO. 14-0798T6

RS&H
NC FIRM LICENSE No: F-0493
1520 SOUTH BOULEVARD, SUITE 200
CHARLOTTE, NC 28203
(704) 752-0610

5/4/2023
Electric\Signals\Design\Plan Sheets\R5799_sig_psh_7-1_14079816_elec.dgn
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PROJECT REFERENCE NO.	SHEET NO.
R-5799	Sig. 7.2

PED 3 PROGRAMMING DETAIL

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

Web Interface
Home >Controller >Detector Configuration >Pedestrian Detector

Plan 1

NOTICE PHASE 3 PED ASSIGNED TO DETECTOR 8 PED

Detector	Descripton	Call Phase	Call Overlap
2		2	0
4		4	0
6		6	0
8		3	0

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

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

Channel Configuration

NOTICE PHASE 3 PED ASSIGNED TO CHANNEL 16

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	3				16
17	Overlap	5		X	X	17
18	Overlap	6		X		18

ACCESSIBLE PEDESTRIAN SIGNAL (APS) INSTALLATION NOTES

1. Install push buttons and APS equipment per manufacturer's instructions.
2. Provide a dedicated cable to each push button per manufacturer's instructions.
3. If APS equipment is mounted in cabinet, use filtered power (i.e., Controller Receptacle) to power APS equipment. Do not use Equipment Receptacle, which is a GFCI outlet.
4. Never attempt to operate a standard contact closure push button with the APS system unless cabinet is re-wired for standard button operation or unless explicitly allowed by the manufacturer.
5. Place manufacturer's instructions in cabinet with cabinet prints, signal plans, and electrical details.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 14-0798T6
DESIGNED: May 2023
SEALED: May 4, 2023
REVISED: _____

RS&H
NC FIRM LICENSE No: F-0493
1520 SOUTH BOULEVARD, SUITE 200
CHARLOTTE, NC 28203
(704) 752-0610

Temporary Signal 6 - TCP Phase VI, Step 2
Electrical Detail - Sheet 2 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Electrical and Programming Details For:

US 64-276 (Asheville Highway)
at
SR 1512 (Ecusta Road) /
Bank Driveway

Division 14 Transylvania County Brevard

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: May 2023	REVIEWED BY: V. Kaiser
PREPARED BY: S.G. Haynie	REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 029531 ENGINEER STEVEN G. HAYNIE
DocuSigned by: Steven G. Haynie 5/4/2023
D030BD09A5D44B0...
DATE

SIG. INVENTORY NO. 14-0798T6

5/4/2023
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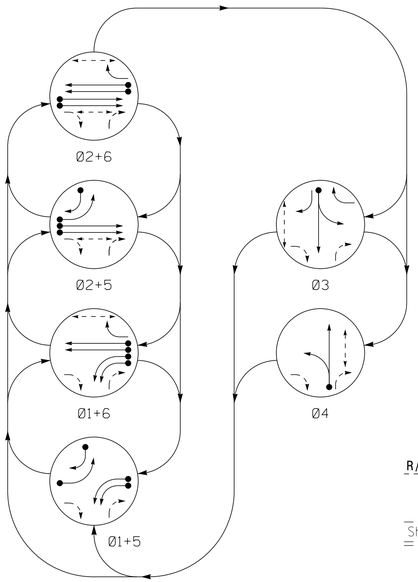
PROJECT REFERENCE NO.	SHEET NO.
R-5799	Sig. 8.0

6 Phase
Fully Actuated
(Time Based Coordination)

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

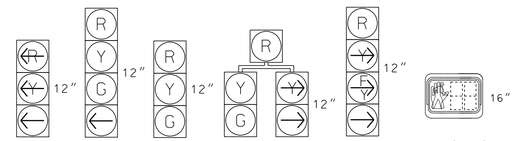
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE 01+5	01+6	02+5	02+6	03	04	FLASH
11, 12	←	←	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~
21, 22, 23	R	R	G	G	R	R	Y
31	R	R	R	R	G ←	R	R
32	R ↗	R	R ↗	R	G	R	R
41	R	R	R	R	R	G ←	R
42,43	R	R	R	R	R	G	R
51	←	~~R~~	←	~~R~~	~~R~~	~~R~~	~~R~~
61	R	G	R	G	R	R	Y
62	R	G	R	G	R	R	Y
63	R	~~F~~ ↓	R	~~F~~ ↓	→	R	~~Y~~
P21, P22	DW	DW	W	W	DW	DW	DRK
P31, P32	DW	DW	DW	DW	W	DW	DRK
P41, P42	DW	DW	DW	DW	DW	W	DRK
P61, P62	DW	W	DW	W	DW	DW	DRK

SIGNAL FACE I.D.

All Heads L.E.D.



11, 12
51

31
41

21, 22, 23
42, 43
61, 62

32

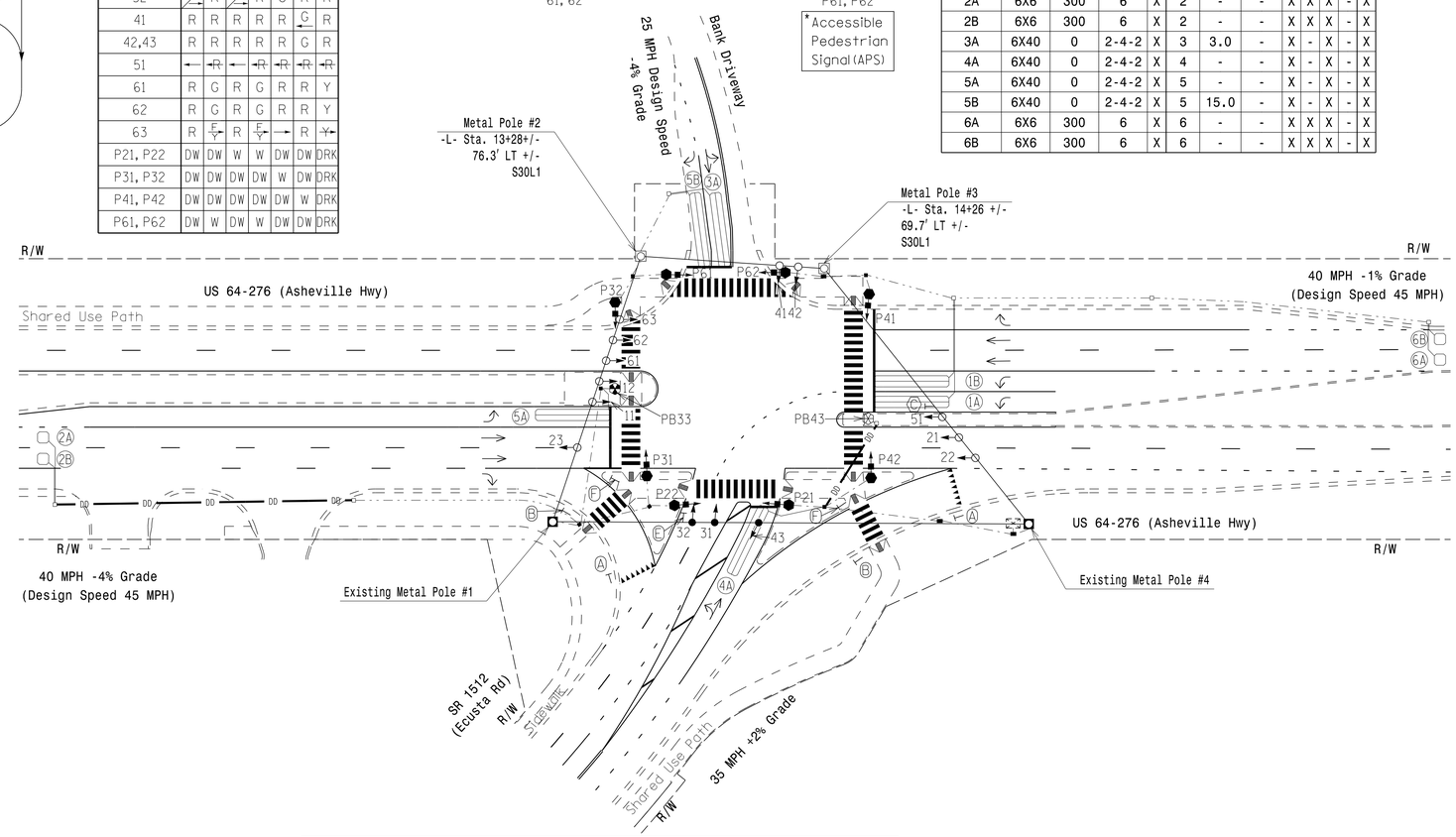
63

P21,* P22*
P31,* P32*
P41,* P42*
P61,* P62*

*Accessible Pedestrian Signal (APS)

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	-	-	X	-	X	-	X
1B	6X40	0	2-4-2	X	1	-	-	X	-	X	-	X
2A	6X6	300	6	X	2	-	-	X	X	X	-	X
2B	6X6	300	6	X	2	-	-	X	X	X	-	X
3A	6X40	0	2-4-2	X	3	3.0	-	X	-	X	-	X
4A	6X40	0	2-4-2	X	4	-	-	X	-	X	-	X
5A	6X40	0	2-4-2	X	5	-	-	X	-	X	-	X
5B	6X40	0	2-4-2	X	5	15.0	-	X	-	X	-	X
6A	6X6	300	6	X	6	-	-	X	X	X	-	X
6B	6X6	300	6	X	6	-	-	X	X	X	-	X



NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 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. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
7. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
8. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
9. Portions of high-visibility crosswalk not shown for clarity.
10. See pavement marking plans for proposed stop bar locations.
11. All pedestrian pushbuttons shall be Vibro-Tactile.
12. All APS shall use "Rapid Tick" sound.

MAXTIME TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6
Walk *	–	7	7	7	–	7
Ped Clear *	–	10	20	21	–	13
Min Green	7	12	7	7	7	12
Passage *	2.0	6.0	2.0	2.0	2.0	6.0
Max 1 *	25	90	15	20	15	90
Yellow Change	3.0	4.5	3.4	3.7	3.0	4.5
Red Clear	3.3	2.2	3.1	2.7	3.3	2.2
Added Initial *	–	1.5	–	–	–	1.5
Maximum Initial *	–	34	–	–	–	34
Time Before Reduction *	–	15	–	–	–	15
Time To Reduce *	–	30	–	–	–	30
Minimum Gap	–	3.0	–	–	–	3.0
Advance Walk	–	–	–	–	–	–
Non Lock Detector	X	–	X	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.

ACCESSIBLE PEDESTRIAN SIGNAL OPERATION

SIGNAL FACE	VOICE	TONES	INTERVAL	SPEECH MESSAGE
P21	-	X	Walk	(Percussive Tone)
	X	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Ecusta.
P22	-	X	Walk	(Percussive Tone)
	X	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Ecusta.
P31	-	X	Walk	(Percussive Tone)
	X	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Asheville.
P32	-	X	Walk	(Percussive Tone)
	X	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Asheville.
PB33	-	X	Walk	(Percussive Tone)
	X	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Asheville.
P41	-	X	Walk	(Percussive Tone)
	X	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Asheville.
P42	-	X	Walk	(Percussive Tone)
	X	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Asheville.
PB43	-	X	Walk	(Percussive Tone)
	X	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Asheville.
P61	-	X	Walk	(Percussive Tone)
	X	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Driveway.
P62	-	X	Walk	(Percussive Tone)
	X	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Driveway.

LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Pedestrian Signal Head With Push Button & Sign	
	Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	Oversized Junction Box	
	Type I Pushbutton Post	
	Type II Signal Pedestal	
	Strain Pole	
	Curb Ramp	
	2-in Underground Conduit	
DD	Directional Drill	N/A
	Directional Arrow	
N/A	Right of Way	

SIGNS

PROPOSED		EXISTING
A	"YIELD" Sign (R1-2)	A
B	Pedestrian Crossing Sign (W11-2) w/ Left Downward Diagonal Plaque (W16-7pL)	B
C	U-Turn "MUST YIELD" Sign	C
E	Turning Vehicles Yield to Peds Sign (R10-15R)	E
F	Pedestrian Crossing Sign (W11-2) w/ Right Downward Diagonal Plaque (W16-7pR)	F

RS&H
NC FIRM LICENSE No: F-0493
1520 SOUTH BOULEVARD, SUITE 200
CHARLOTTE, NC 28203
(704) 752-0610

Final Signal Design

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

US 64-276 (Asheville Highway)
at
SR 1512 (Ecusta Road) /
Bank Driveway

Division 14 Transylvania County Brevard

PLAN DATE: May 2023 REVIEWED BY: S.G. Haynie
PREPARED BY: P. Koloski REVIEWED BY:

SCALE 0 40 1"=40'

REVISIONS | INIT. | DATE

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 029531 STEVEN G. HAYNIE

DocuSigned by: Steven G. Haynie 5/4/2023
D633DCC6A5D4EB6...
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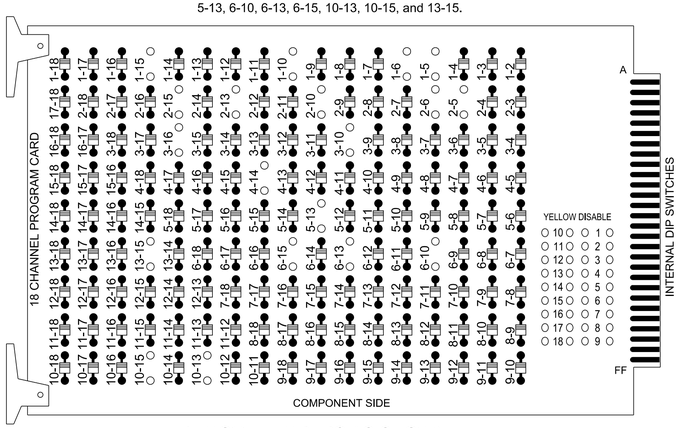
PROJECT REFERENCE NO.	SHEET NO.
R-5799	Sig. 8.1

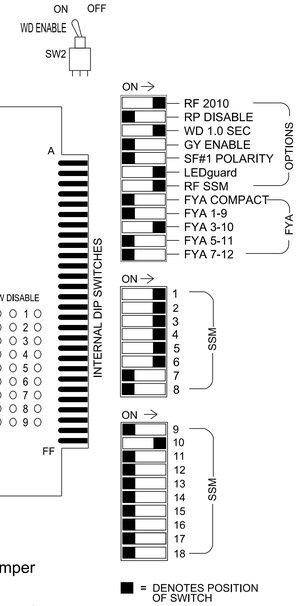
18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

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



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. Return controller to Factory Defaults before programming per this electrical detail.

3. Program controller to start up in phase 2 Green Walk and 6 Green 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 a Time Based Coordination System.

EQUIPMENT INFORMATION

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

*See overlap programming detail on sheet 2

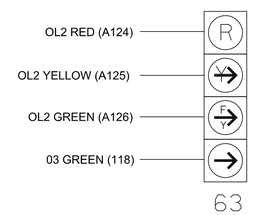
SIGNAL HEAD HOOK-UP CHART

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	3 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	11,12	21, 22,23	P21, P22	31	32	63★	41	42,43	P41, P42	51	32	61,62	P61, P62	NU	NU	P31, P32	NU	63★	NU	NU	NU	NU
RED		128		116	116		101	101				134						A124				
YELLOW		129		117	117		102	102				135										
GREEN		130		118	118		103	103				136										
RED ARROW	125									131												
YELLOW ARROW	126									132	132							A125				
FLASHING YELLOW ARROW																		A126				
GREEN ARROW	127			118		118	103			133	133											
✋			113						104				119			110						
🚶			115						106				121			112						

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

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



INPUT FILE POSITION LAYOUT

(front view)

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

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN
1A	TB2-1,2	I1U	56	18	1	1	---	---	X	-	X	-
1B	TB2-5,6	I2U	39	1	2	1	---	---	X	-	X	-
2A	TB2-9,10	I3U	63	29	4	2	---	---	X	X	X	-
2B	TB2-11,12	I3L	76	42	5	2	---	---	X	X	X	-
3A	TB4-5,6	I5U	58	20	7	3	3.0	---	X	-	X	-
4A	TB4-9,10	I6U	41	3	8	4	---	---	X	-	X	-
5A	TB3-1,2	J1U	55	17	15	5	---	---	X	-	X	-
5B	TB3-5,6	J2U	40	2	16	5	15.0	---	X	-	X	-
6A	TB3-9,10	J3U	64	30	18	6	---	---	X	X	X	-
6B	TB3-11,12	J3L	77	43	19	6	---	---	X	X	X	-
PED PUSH BUTTONS												
P21,P22	TB8-4,6	I12U	67	33	2	PED 2						
P31,P32	TB8-8,9	I13L	70	36	8	PED 3						
P41,P42	TB8-5,6	I12L	69	35	4	PED 4						
P61,P62	TB8-7,9	I13U	68	34	6	PED 6						

NOTE:
INSTALL DC ISOLATORS IN INPUT FILE SLOTS 112 AND 113.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 14-0798
DESIGNED: May 2023
SEALED: May 4, 2023
REVISED: N/A

Final Signal Design
Electrical Detail - Sheet 1 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Electrical and Programming Details For:

US 64-276 (Asheville Highway)
at
SR 1512 (Ecusta Road) /
Bank Driveway

Division 14 Transylvania County Brevard

PLAN DATE: May 2023 REVIEWED BY: V. Kaiser
PREPARED BY: S.G. Haynie REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 029531 ENGINEER STEVEN G. HAYNIE

DocuSigned by: Steven G. Haynie 5/4/2023
D633DCC9A5D4486...
DATE

SIG. INVENTORY NO. 14-0798

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

RS&H
NC FIRM LICENSE No: F-0493
1520 SOUTH BOULEVARD, SUITE 200
CHARLOTTE, NC 28203
(704) 752-0610

5/4/2023
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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.

PED 3 PROGRAMMING DETAIL

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

Web Interface
Home >Controller >Detector Configuration >Pedestrian Detector

Plan 1

NOTICE PHASE 3 PED ASSIGNED TO DETECTOR 8 PED →

Detector	Descripton	Call Phase	Call Overlap
2		2	0
4		4	0
6		6	0
8		3	0

OUTPUT CHANNEL CONFIGURATION

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

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

Channel Configuration

NOTICE PHASE 3 PED ASSIGNED TO CHANNEL 16 →

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	3				16
17	Overlap	5		X	X	17
18	Overlap	6		X		18

OVERLAP PROGRAMMING

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

Overlap Plan 1

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

ACCESSIBLE PEDESTRIAN SIGNAL (APS) INSTALLATION NOTES

1. Install push buttons and APS equipment per manufacturer's instructions.
2. Provide a dedicated cable to each push button per manufacturer's instructions.
3. If APS equipment is mounted in cabinet, use filtered power (i.e., Controller Receptacle) to power APS equipment. Do not use Equipment Receptacle, which is a GFCI outlet.
4. Never attempt to operate a standard contact closure push button with the APS system unless cabinet is re-wired for standard button operation or unless explicitly allowed by the manufacturer.
5. Place manufacturer's instructions in cabinet with cabinet prints, signal plans, and electrical details.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 14-0798
DESIGNED: May 2023
SEALED: May 4, 2023
REVISED: N/A

RS&H
NC FIRM LICENSE No: F-0493
1520 SOUTH BOULEVARD, SUITE 200
CHARLOTTE, NC 28203
(704) 752-0610

Final Signal Design
Electrical Detail - Sheet 2 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Electrical and Programming Details For: US 64-276 (Asheville Highway) at SR 1512 (Ecusta Road) / Bank Driveway

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

Division 14 Transylvania County Brevard

PLAN DATE: May 2023 REVIEWED BY: V. Kaiser
PREPARED BY: S.G. Haynie REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 029531 ENGINEER STEVEN G. HAYNIE
DocuSigned by: Steven G. Haynie 5/4/2023
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DATE
SIG. INVENTORY NO. 14-0798

5/4/2023
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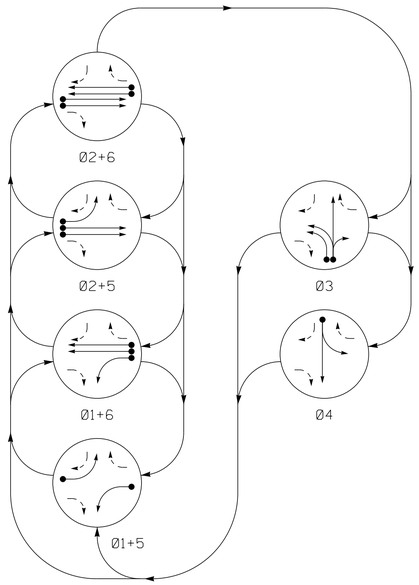
PROJECT REFERENCE NO.	SHEET NO.
R-5799	Sig. 9.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

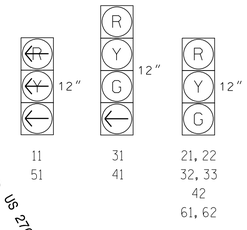
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE 01+5	01+6	02+5	02+6	03	04	FLASH
11	←	←	←R	←R	←R	←R	←R
21, 22	R	R	G	G	R	R	Y
31	R	R	R	R	G ←	R	R
32, 33	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	←R
61, 62	R	G	R	G	R	R	Y

SIGNAL FACE I.D.

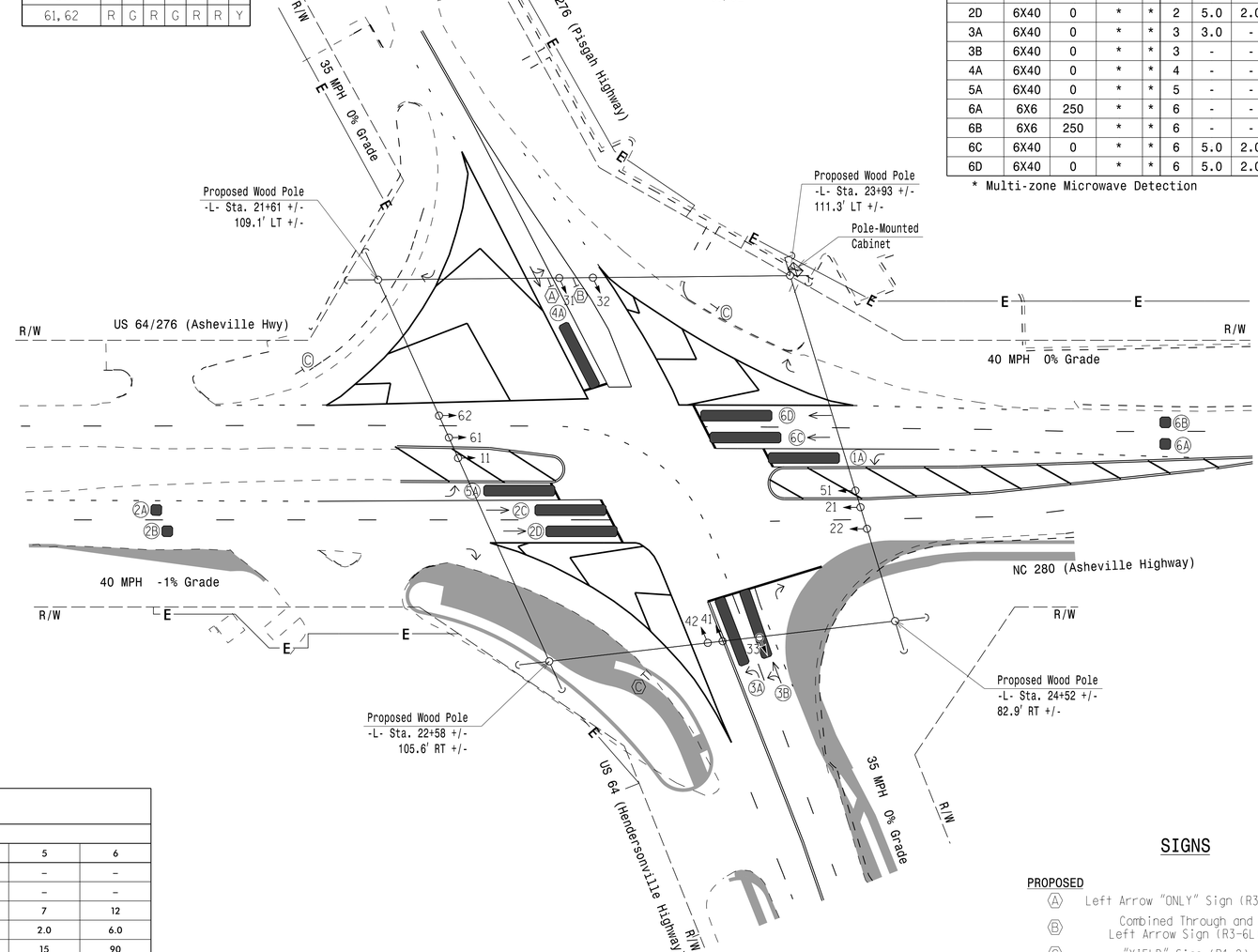
All Heads L.E.D.



MAXTIME DETECTOR INSTALLATION CHART

DETECTOR					PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
1A	6X40	0	*	*	1	-	-	X	-	X	-	*
2A	6X6	250	*	*	2	-	-	X	-	-	-	*
2B	6X6	250	*	*	2	-	-	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	3.0	-	X	-	X	-	*
3B	6X40	0	*	*	3	-	-	X	-	X	-	*
4A	6X40	0	*	*	4	-	-	X	-	X	-	*
5A	6X40	0	*	*	5	-	-	X	-	X	-	*
6A	6X6	250	*	*	6	-	-	X	-	-	-	*
6B	6X6	250	*	*	6	-	-	X	-	-	-	*
6C	6X40	0	*	*	6	5.0	2.0	X	-	X	X	*
6D	6X40	0	*	*	6	5.0	2.0	X	-	X	X	*

* Multi-zone Microwave Detection



6 Phase
Fully Actuated
(Time Based Coordination)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 and Phase 5 may be lagged.
4. The order of Phase 3 and Phase 4 may be reversed.
5. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
6. Set all detector units to presence mode.
7. See R-5799 TMP Phase IV for pavement markings.
8. This intersection uses multi-zone microwave detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.
9. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
10. Furnish and install GPS Unit.

LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Pedestrian Signal Head With Push Button & Sign	
	Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Video Detection Zone	
	Controller & Cabinet	
	Junction Box	
	Oversized Junction Box	
	Type I Pushbutton Post	
	Type II Signal Pedestal	
	Strain Pole	
	Construction Zone	
	Curb Ramp	
	2-in Underground Conduit	
DD	Directional Drill	N/A
	Directional Arrow	
N/A	Right of Way	
E	Temp. Construction Easement	N/A

SIGNS

PROPOSED		EXISTING
A	Left Arrow "ONLY" Sign (R3-5L)	A
B	Combined Through and Left Arrow Sign (R3-6L)	B
C	"YIELD" Sign (R1-2)	C

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	25	35	15	90
Yellow Change	3.0	4.2	3.8	3.8	3.0	4.2
Red Clear	2.4	1.2	3.0	2.5	2.6	1.2
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	–
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.

Temporary Signal 1 - TCP Phase IV

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

US 64-276 / NC 280 (Asheville Highway)
at
US 64 (Hendersonville Highway) /
US 276 (Pisgah Highway)

Division 14 Transylvania County Brevard

PLAN DATE: April 2023 REVIEWED BY: S.G. Haynie
PREPARED BY: P. Koloski REVIEWED BY: _____

SCALE 0 40 1"=40'

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 029531 ENGINEER STEVEN G. HAYNIE

DocuSigned by: Steven G. Haynie 4/28/2023
DESIGN ENGINEER SIGNATURE DATE

Sig Inventory No. 14-0659T1

RS&H
NC FIRM LICENSE No: F-0493
1520 SOUTH BOULEVARD, SUITE 200
CHARLOTTE, NC 28203
(704) 752-0610

4/28/2023
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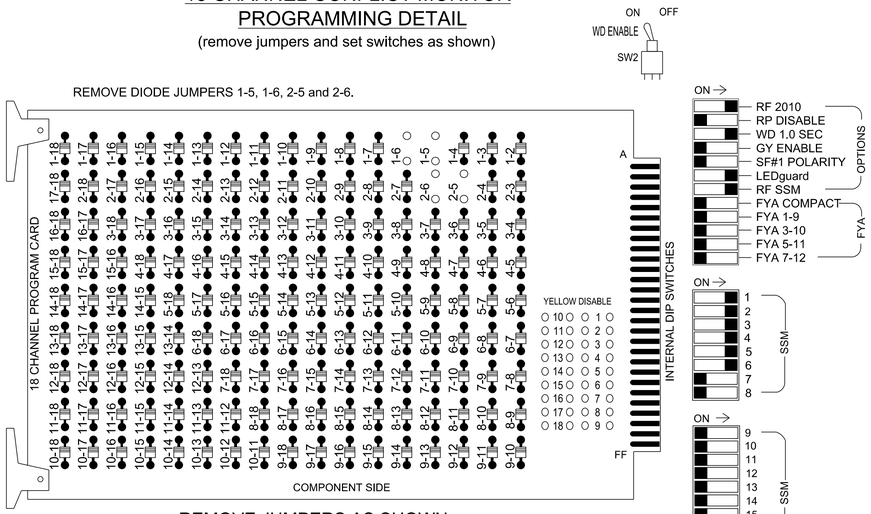
PROJECT REFERENCE NO.	SHEET NO.
R-5799	Sig. 9.1

18 CHANNEL CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE JUMPERS AS SHOWN

NOTES:

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

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the signal plan.
2. Program controller to start up in phase 2 Green No Walk and 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 a temporary Time Based Coordination System.

EQUIPMENT INFORMATION

Controller.....2070LX
Cabinet.....336
Software.....Q-Free MAXTIME
Cabinet Mount.....Pole
Output File Positions.....12
Load Switches Used.....S1, S2, S4, S5, S7, S8
Phases Used.....1, 2, 3, 4, 5, 6
Overlaps .....NONE

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4		S5		S6	S7	S8	S9	S10	S11	S12
CMU CHANNEL NO.	1	2	13	3		4		14	5	6	15	7	8	16
PHASE	1	2	2 PED	3		4		4 PED	5	6	6 PED	7	8	8 PED
SIGNAL HEAD NO.	11	21,22	NU	31	32,33	41	42	NU	51	61,62	NU	NU	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	125	·	·	·	·				131		·	·	·	·
YELLOW ARROW	126	·	·	·	·				132		·	·	·	·
GREEN ARROW	127	·	·	118	·	103	·		133		·	·	·	·

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)

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

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

FS = FLASH SENSE
ST = STOP TIME

SPECIAL DETECTOR NOTE

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 14-0659T1
DESIGNED: April 2023
SEALED: April 28, 2023
REVISED: _____

Temporary Signal 1 - TCP Phase IV
Electrical Detail

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Electrical and Programming Details For:

US 64-276 / NC 280 (Asheville Highway)
at
US 64 (Hendersonville Highway) /
US 276 (Pisgah Highway)

Division 14 Transylvania County Brevard

PLAN DATE: April 2023 REVIEWED BY: V. Kaiser
PREPARED BY: S.G. Haynie REVIEWED BY: _____

REVISIONS | INIT. | DATE

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

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 029531 ENGINEER STEVEN G. HAYNIE
DocuSigned by: Steven G. Haynie 4/28/2023
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SIG. INVENTORY NO. 14-0659T1

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CHARLOTTE, NC 28203
(704) 752-0610

4/28/2023
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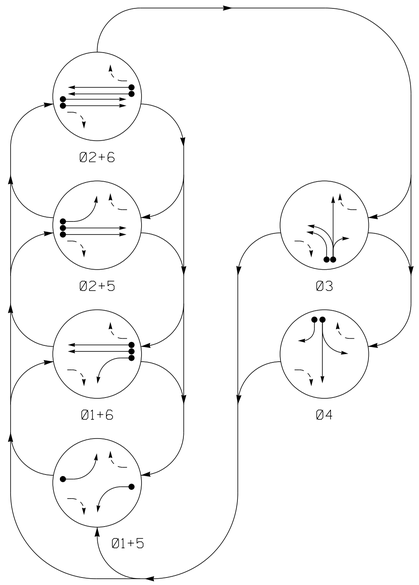
PROJECT REFERENCE NO.	SHEET NO.
R-5799	Sig. 10.0

6 Phase
Fully Actuated
(Time Based Coordination)

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

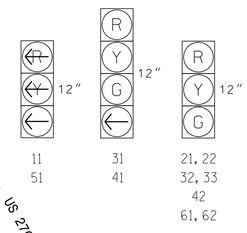
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE 01+5	01+6	02+5	02+6	03	04	FLASH
11	←	←	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~
21, 22	R	R	G	G	R	R	Y
31	R	R	R	R	G ←	R	R
32, 33	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, 62	R	G	R	G	R	R	Y

SIGNAL FACE I.D.

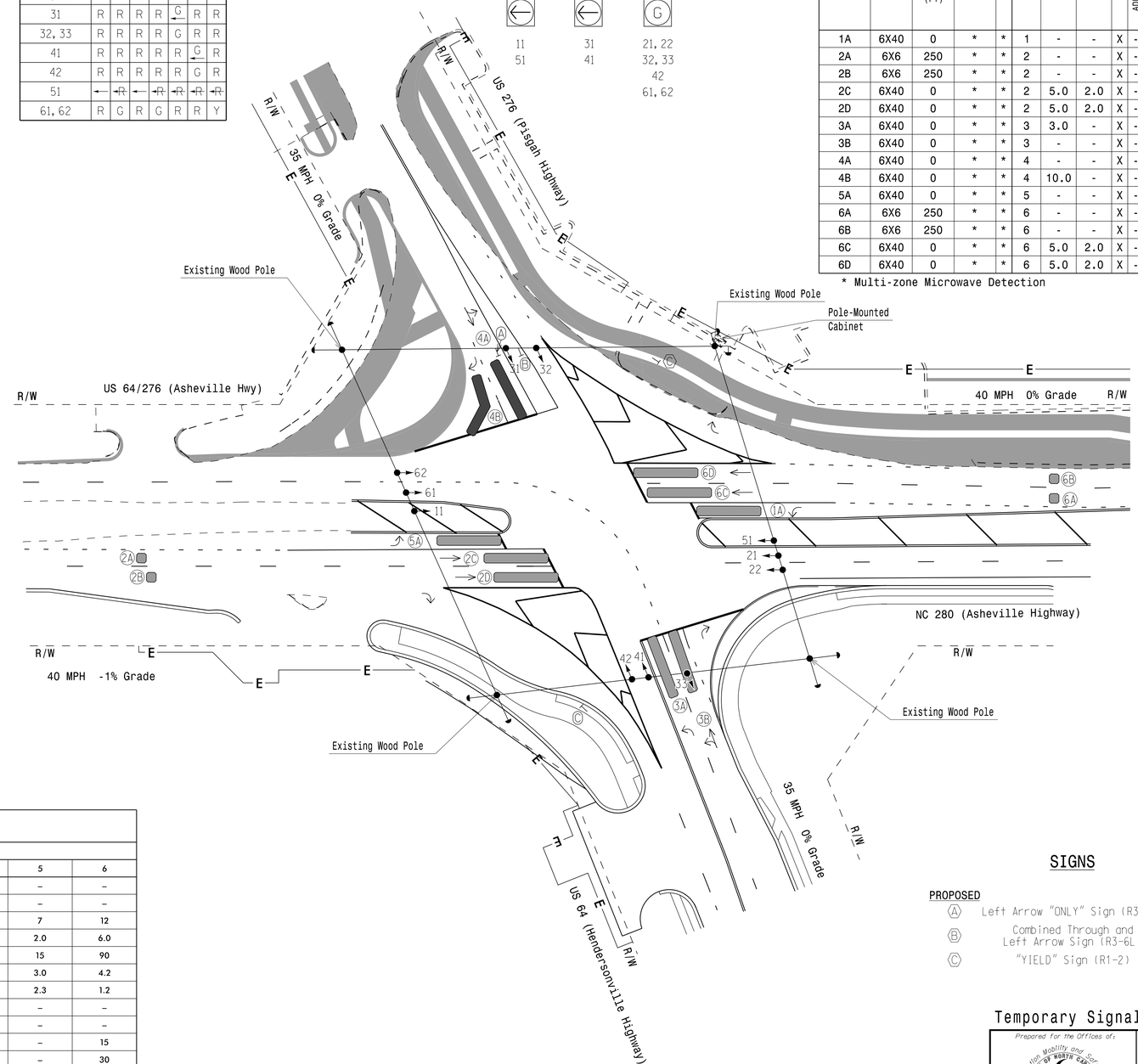
All Heads L.E.D.



MAXTIME DETECTOR INSTALLATION CHART

DETECTOR					PROGRAMMING						
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
1A	6X40	0	*	*	1	-	-	X	-	X	-	*
2A	6X6	250	*	*	2	-	-	X	-	-	-	*
2B	6X6	250	*	*	2	-	-	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	3.0	-	X	-	X	-	*
3B	6X40	0	*	*	3	-	-	X	-	X	-	*
4A	6X40	0	*	*	4	-	-	X	-	X	-	*
4B	6X40	0	*	*	4	10.0	-	X	-	X	-	*
5A	6X40	0	*	*	5	-	-	X	-	X	-	*
6A	6X6	250	*	*	6	-	-	X	-	-	-	*
6B	6X6	250	*	*	6	-	-	X	-	-	-	*
6C	6X40	0	*	*	6	5.0	2.0	X	-	X	X	*
6D	6X40	0	*	*	6	5.0	2.0	X	-	X	X	*

* Multi-zone Microwave Detection



NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 and Phase 5 may be lagged.
4. The order of Phase 3 and Phase 4 may be reversed.
5. Reposition existing signal heads #22, 41, and 42.
6. Set all detector units to presence mode.
7. See R-5799 TMP Phase V for pavement markings.
8. This intersection uses multi-zone microwave detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.
9. 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
	Pedestrian Signal Head With Push Button & Sign	
	Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Video Detection Zone	
	Controller & Cabinet	
	Junction Box	
	Oversized Junction Box	
	Type I Pushbutton Post	
	Type II Signal Pedestal	
	Strain Pole	
	Construction Zone	
	Curb Ramp	
	2-in Underground Conduit	
DD	Directional Drill	N/A
	Directional Arrow	
N/A	Right of Way	
E	Temp. Construction Easement	N/A

SIGNS

PROPOSED		EXISTING
A	Left Arrow "ONLY" Sign (R3-5L)	A
B	Combined Through and Left Arrow Sign (R3-6L)	B
C	"YIELD" Sign (R1-2)	C

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	25	35	15	90
Yellow Change	3.0	4.2	3.8	3.8	3.0	4.2
Red Clear	2.4	1.2	3.0	2.8	2.3	1.2
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	–
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.

Temporary Signal 2 - TCP Phase V

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RS&H
NC FIRM LICENSE No: F-0493
1520 SOUTH BOULEVARD, SUITE 200
CHARLOTTE, NC 28203
(704) 752-0610

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

SCALE 0 40 1"=40'

US 64-276 / NC 280 (Asheville Highway)
at
US 64 (Hendersonville Highway) /
US 276 (Pisgah Highway)

Division 14 Transylvania County Brevard

PLAN DATE:	April 2023	REVIEWED BY:	S.G. Haynie
PREPARED BY:	P. Koloski	REVIEWED BY:	

REVISIONS | INIT. | DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 029531 ENGINEER STEVEN G. HAYNIE
DocuSigned by: Steven G. Haynie 4/28/2023
DESIGN ENGINEER SIGNATURE DATE
Sig Inventory No. 14-0659T2

4/28/2023
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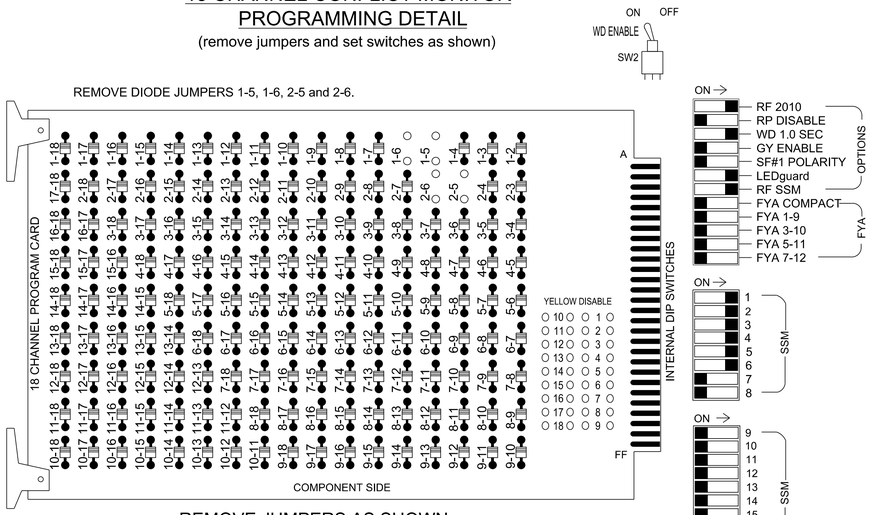
PROJECT REFERENCE NO.	SHEET NO.
R-5799	Sig. 10.1

18 CHANNEL CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE JUMPERS AS SHOWN

NOTES:

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

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the signal plan.
2. Program controller to start up in phase 2 Green No Walk and 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 a temporary Time Based Coordination System.

EQUIPMENT INFORMATION

Controller.....2070LX
Cabinet.....336
Software.....Q-Free MAXTIME
Cabinet Mount.....Pole
Output File Positions.....12
Load Switches Used.....S1, S2, S4, S5, S7, S8
Phases Used.....1, 2, 3, 4, 5, 6
Overlaps .....NONE

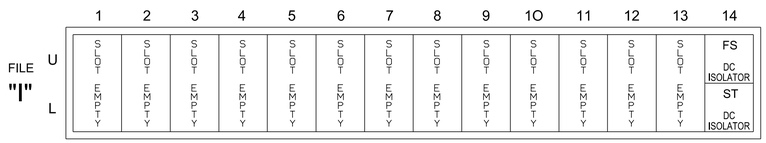
SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4		S5		S6	S7	S8	S9	S10	S11	S12
CMU CHANNEL NO.	1	2	13	3		4		14	5	6	15	7	8	16
PHASE	1	2	2 PED	3		4		4 PED	5	6	6 PED	7	8	8 PED
SIGNAL HEAD NO.	11	21,22	NU	31	32,33	41	42	NU	51	61,62	NU	NU	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	125	·	·	·	·	·	·	·	131	·	·	·	·	·
YELLOW ARROW	126	·	·	·	·	·	·	·	132	·	·	·	·	·
GREEN ARROW	127	·	·	118	·	103	·	·	133	·	·	·	·	·

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 14-0659T2
DESIGNED: April 2023
SEALED: April 28, 2023
REVISED: _____

Temporary Signal 2 - TCP Phase V
Electrical Detail

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Electrical and Programming Details For:

US 64-276 / NC 280 (Asheville Highway)
at
US 64 (Hendersonville Highway) /
US 276 (Pisgah Highway)

Division 14 Transylvania County Brevard

PLAN DATE: April 2023 REVIEWED BY: V. Kaiser
PREPARED BY: S.G. Haynie REVIEWED BY:

REVISIONS | INIT. | DATE

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

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 029531 ENGINEER STEVEN G. HAYNIE

DocuSigned by: Steven G. Haynie 4/28/2023
0633DC09A5D448G
DATE

SIG. INVENTORY NO. 14-0659T2

RS&H
NC FIRM LICENSE No: F-0493
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CHARLOTTE, NC 28203
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mwilson@rsandh.com
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PROJECT REFERENCE NO.	SHEET NO.
R-5799	Sig. 11.0

Semi-Actuated Rectangular Rapid Flashing Beacon (RRFB)

ERECT RRFB ON TYPE II PEDESTAL (STD. DWG. 1743.02) WITH SIGNS

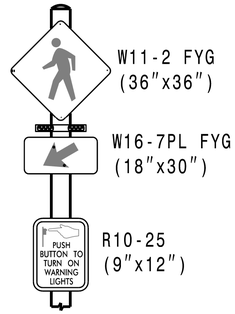


FIGURE 1 - SIGN B

ERECT RRFB ON TYPE II PEDESTAL (STD. DWG. 1743.02) WITH SIGNS

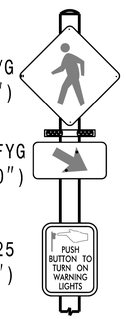
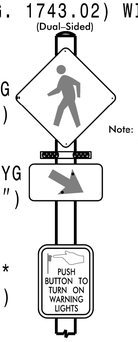


FIGURE 2 - SIGN C

ERECT RRFB ON TYPE II PEDESTAL (STD. DWG. 1743.02) WITH SIGNS



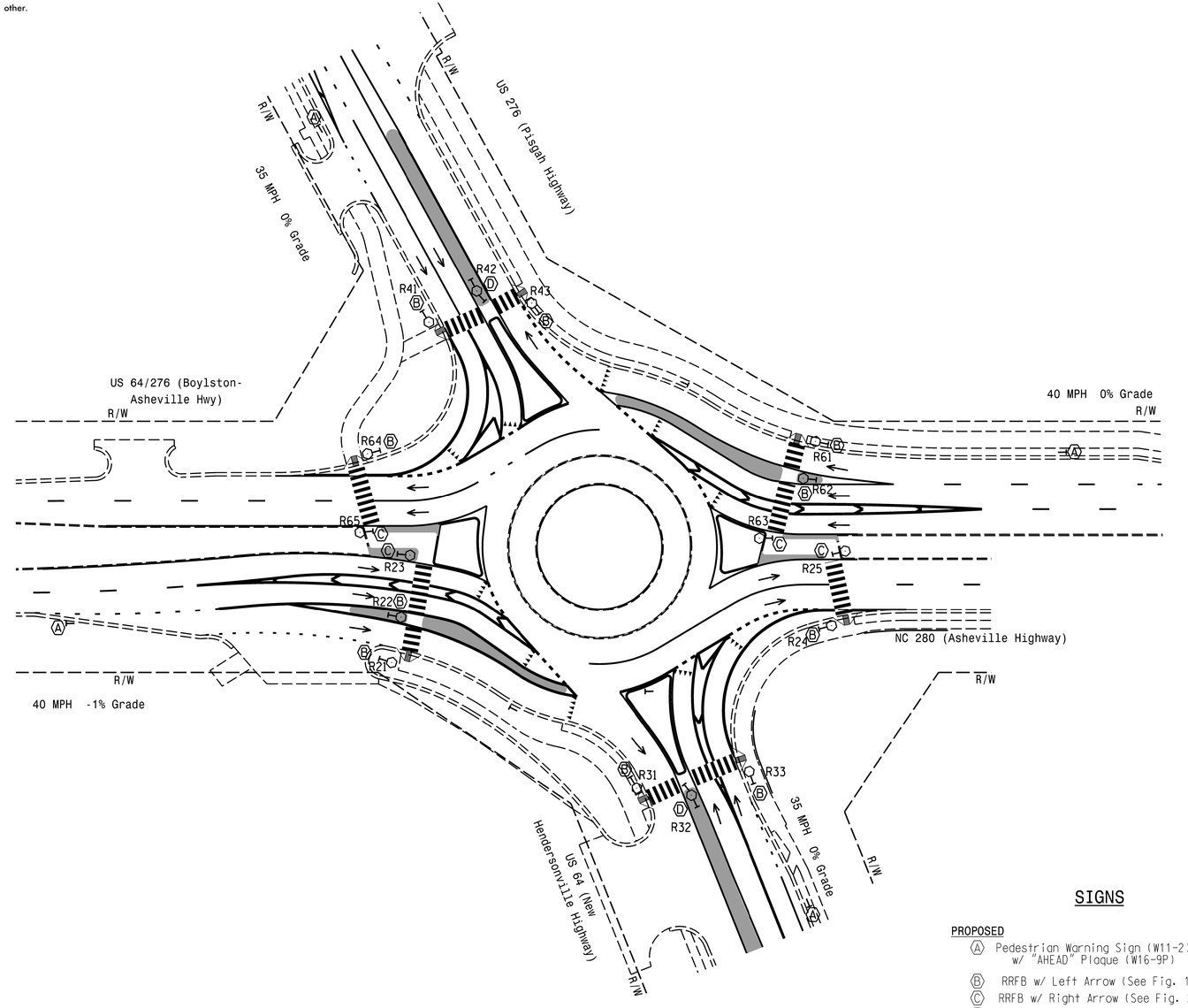
* R10-25 sign only required on side of pole with pushbutton and shall be oriented to be centered above the pushbutton.

FIGURE 4 - SIGN D

TIMING CHART

FEATURE	RRFB GROUP					
	R21\R22\R23	R24\R25	R31\R32\R33	R41\R42\R43	R61\R62\R63	R64\R65
RRFB Flash Time	23	17	23	21	23	19

Notes:
1. These values may be field adjusted. Do not adjust RRFB Flash times lower than what is shown.
2. R31\R32\R33 and R41\R42\R43 RRFB Flash time is intended to be sufficient time to cross from one side of the road to the other.



NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Align the front face of the pedestrian push button assembly parallel with the crosswalk.
3. The distance to the pushbutton from the edge of the sidewalk should be no greater than 18".
4. The pay item for Rectangular Rapid Flashing Beacon (RRFB) shall include, but not be limited to the signs, pushbuttons, flashing beacons, solar panel, battery, controller assembly, and all incidentals related to the installation of the RRFB. (1)

LEGEND

PROPOSED		EXISTING
	Sign	
	Type II Signal Pedestal	
	Curb Ramp	
	Directional Arrow	
	Right of Way	

SIGNS

PROPOSED		EXISTING
(A)	Pedestrian Warning Sign (W11-2) w/ "AHEAD" Plaque (W16-9P)	(A)
(B)	RRFB w/ Left Arrow (See Fig. 1)	(B)
(C)	RRFB w/ Right Arrow (See Fig. 2)	(C)
(D)	RRFB w/ Right Arrow (See Fig. 4)	(D)

Pedestrian Crossings

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

NC 280 (Asheville Highway) / US 64-276 (Boylston-Asheville Highway) at US 64 (Hendersonville Highway) / US 276 (Pisgah Highway)

Division 14 Transylvania County Brevard

PLAN DATE:	April 2023	REVIEWED BY:	S.G. Haynie
PREPARED BY:	P. Koloski	REVIEWED BY:	

SCALE 0 40 1"=40'

REVISIONS	INIT.	DATE
Note Change	SGH	8/1/23

SEAL: NORTH CAROLINA PROFESSIONAL SEAL 029531 ENGINEER STEVEN G. HAYNIE

DocuSigned by: Steven G. Haynie 4/28/2023
SIGNATURE DATE

Sig Inventory No. 14-5026

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R-5799_SIG20049021_R-5799_US 64-276 Intersection Design#Design#Traffic#Signals#Design#Plan Sheets#R5799_sig_psh_11-0_145026.dgn
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R-5799	Sig. 12.0

PHASING DIAGRAM

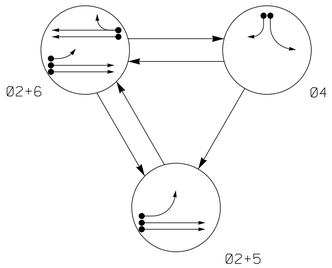
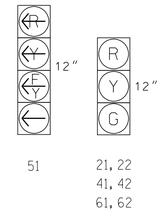


TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2+5	Ø2+6	Ø4	FLASH
21, 22	G	G	R	Y
41, 42	R	R	G	R
51	←Y	←FY	←R	←Y
61, 62	R	G	R	Y

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	250	*	*	2	-	-	X	-	-	-	*
2B	6X6	250	*	*	2	-	-	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	3.0	-	X	-	X	-	*
4B	6X40	0	*	*	4	15.0	-	X	-	X	-	*
5A	6X40	0	*	*	5	15.0	-	X	-	X	-	*
					2	3.0	-	X	-	X	X	*
6A	6X6	250	*	*	6	-	-	X	-	-	-	*
6B	6X6	250	*	*	6	-	-	X	-	-	-	*
6C	6X40	0	*	*	6	5.0	2.0	X	-	X	X	*
6D	6X40	0	*	*	6	5.0	2.0	X	-	X	X	*

* Multi-zone Microwave Detection

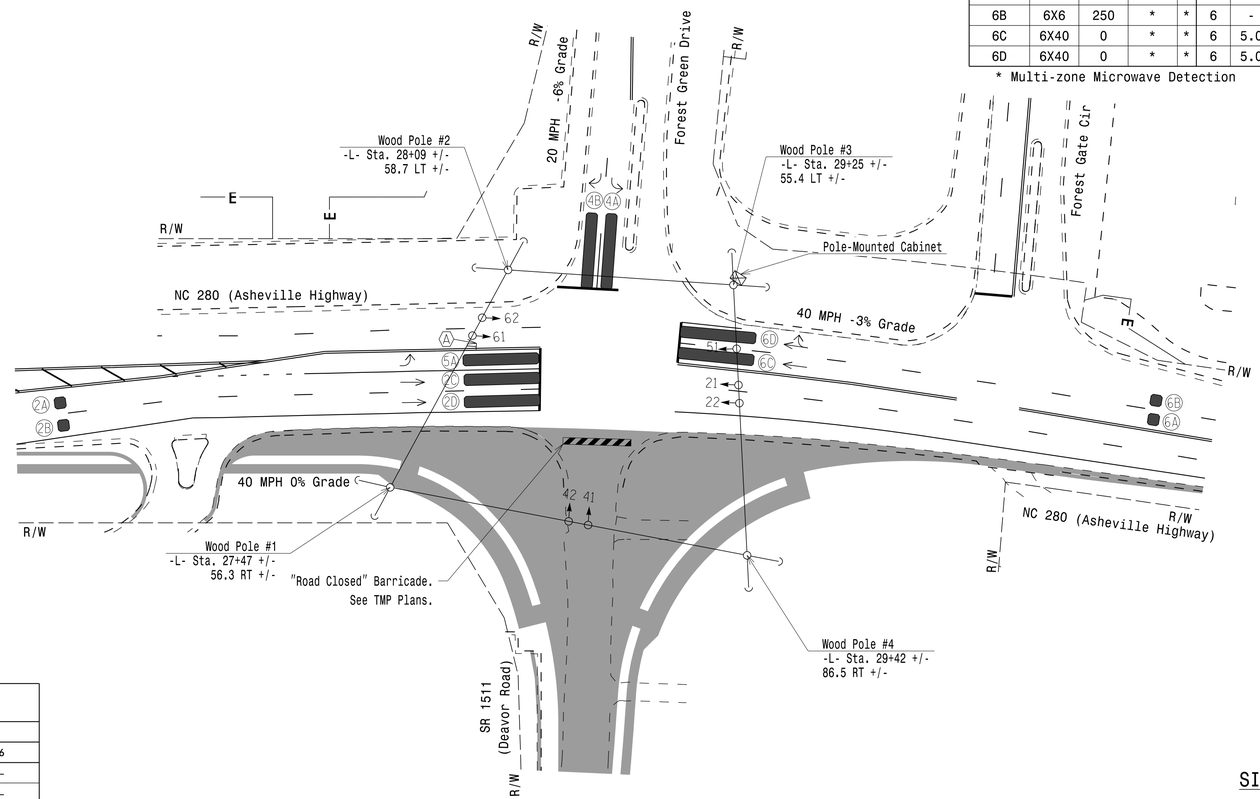
3 Phase
Fully Actuated
(Time Based Coordination)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 5 may be lagged.
4. Set all detector units to presence mode.
5. Program controller to operate using FYA compact mode.
6. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
7. See R-5799 TMP Phase V for pavement markings.
8. This intersection uses multi-zone microwave detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.
9. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
10. Furnish and install GPS Unit.

PHASING DIAGRAM DETECTION LEGEND

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



MAXTIME TIMING CHART

FEATURE	PHASE 2	4	5	6
Walk *	–	–	–	–
Ped Clear *	–	–	–	–
Min Green	12	7	7	12
Passage *	6.0	2.0	2.0	6.0
Max 1 *	90	20	15	90
Yellow Change	4.4	3.1	3.0	4.4
Red Clear	1.1	1.8	2.1	1.1
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	–
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.

SIGNS

PROPOSED		EXISTING	
Ⓐ	No Left Turn Sign (R3-2)	Ⓐ	

LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Pedestrian Signal Head With Push Button & Sign	
	Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Video Detection Zone	
	Controller & Cabinet	
	Junction Box	
	Oversized Junction Box	
	Type I Pushbutton Post	
	Type II Signal Pedestal	
	Strain Pole	
	Construction Zone	
	Curb Ramp	
	2-in Underground Conduit	
DD	Directional Drill	N/A
	Directional Arrow	
N/A	Right of Way	
E	Temp. Construction Easement	N/A

Temporary Signal 1 - TCP Phase IV

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

NC 280 (Asheville Highway)
at
SR 1511 (Deavor Road) /
Forest Gate Drive

Division 14 Transylvania County Brevard

PLAN DATE: April 2023 REVIEWED BY: S.G. Haynie
PREPARED BY: P. Koloski REVIEWED BY:

SCALE 0 40 1"=40'

REVISIONS	INIT.	DATE

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NORTH CAROLINA PROFESSIONAL SEAL 029531 ENGINEER STEVEN G. HAYNIE

DocuSigned by: Steven G. Haynie 4/28/2023
SIGNATURE DATE

Sig Inventory No. 14-1146T1

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NC FIRM LICENSE No: F-0493
1520 SOUTH BOULEVARD, SUITE 200
CHARLOTTE, NC 28203
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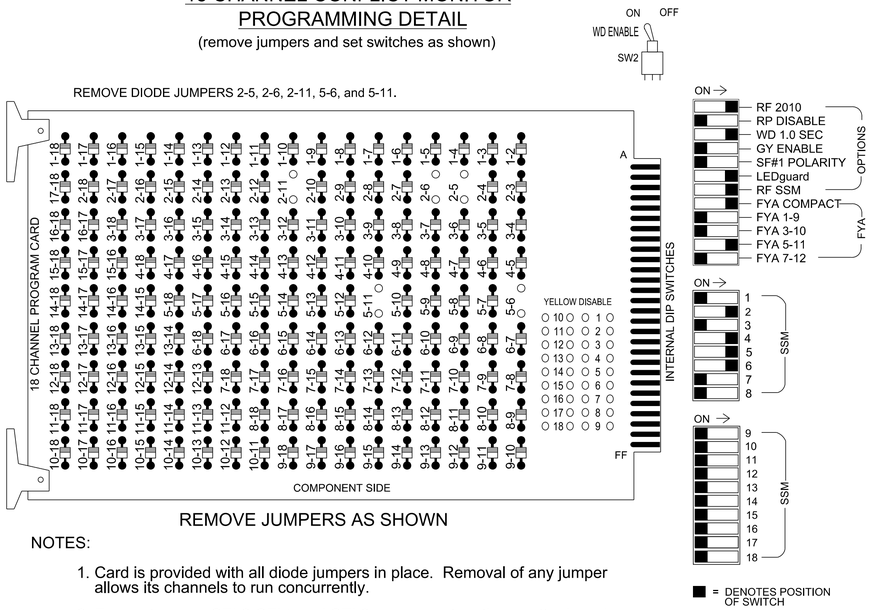
R-5799	Sig. 12.1

18 CHANNEL CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



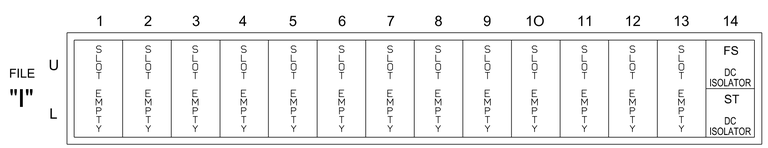
REMOVE JUMPERS AS SHOWN

NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that the Red Enable is active at all times during normal operation.
4. Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.
5. Special cabinet wiring is required to utilize FYA COMPACT mode. See Ped Yellow Conflict Monitor Wiring Detail on this sheet.
6. Install jumper to SEL15 position.

INPUT FILE POSITION LAYOUT

(front view)



SPECIAL DETECTOR NOTE

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

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 a temporary Time Based Coordination System.

EQUIPMENT INFORMATION

Controller.....2070LX
Cabinet.....336
Software.....Q-Free MAXTIME
Cabinet Mount.....Pole
Output File Positions.....12
Load Switches Used.....S2, S5, S7, S8, S9
Phases Used.....2, 4, 5, 6
Overlap "1".....NOT USED
Overlap "2".....NOT USED
Overlap "3".....*
Overlap "4".....NOT USED

*See overlap programming detail on sheet 2

PED YELLOW CONFLICT MONITOR WIRING DETAIL

(make cabinet wiring changes as shown below)

In order to use FYA COMPACT mode with the 16 or 18 Channel Monitor, the cabinet must be wired such that the (unused) Ped Yellow load switch outputs are wired to the conflict monitor as follows: From 6 PY (field term. 120) to chan. 10 green (monitor pin R).

Follow the instructions below to make appropriate connections:

STEP 1: Fold down rear panel of output file.

STEP 2: Find unused wiring harness fom conflict monitor card edge connector (which should be tied and bundled together).

STEP 3: Find the connector that correspond to the following conflict monitor card edge pins and solder wire the the appropiate terminal on the rear of the output file shown below:

CMU-R ----------6PY (term. 120)

NOTE: Some cabinet manufacturers use keyed connectors to accomlplish this wiring configuration. If connectors are used, fold down the rear panel of the output file and find the set of 3 keyed connectors and connect them as shown below:

1 - 2PY	----------	1- CMU-13
2 - 4PY	----------	2- CMU-16
3 - 6PY	----------	3- CMU-R
4 - 8PY	----------	4- CMU-U

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CHARLOTTE, NC 28203
(704) 752-0610

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9		S10	S11	S12
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	11	15	7	8	16
PHASE	1	2	2 PED	3	4	4 PED	OL3	6	5 GRN	6 PED	7	8	8 PED
SIGNAL HEAD NO.	NU	21,22	NU	NU	41,42	NU	51★	61,62	51★	NU	NU	NU	NU
RED		128			101			134					
YELLOW		129			102			135					
GREEN		130			103			136					
RED ARROW							131						
YELLOW ARROW							132						
FLASHING YELLOW ARROW							133						
✋													
GREEN ARROW									120				
🚶										*			

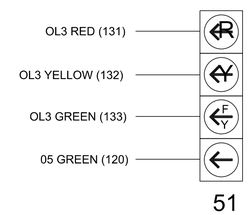
NU = Not Used

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

★ See pictorial of head wiring in detail this sheet.

FYA SIGNAL WIRING DETAIL

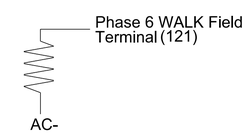
(wire signal heads as shown)



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)



THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 14-1146T1
DESIGNED: April 2023
SEALED: April 28, 2023
REVISED: _____

Temporary Signal 1 - TCP Phase IV
Electrical Detail Sheet 1 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Electrical and Programming Details For:

NC 280 (Asheville Highway) at SR 1511 (Deavor Road) / Forest Gate Drive

Division 14 Transylvania County Brevard

PLAN DATE:	April 2023	REVIEWED BY:	V. Kaiser
PREPARED BY:	S.G. Haynie	REVIEWED BY:	

REVISIONS	INIT.	DATE

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

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 029531 ENGINEER STEVEN G. HAYNIE
DocuSigned by: Steven G. Haynie 4/28/2023
DATE
SIG. INVENTORY NO. 14-1146T1

4/28/2023
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PROJECT REFERENCE NO.	SHEET NO.
R-5799	Sig. 12.2

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	6
Modifier Phases	5
Modifier Overlaps	-
Trail Green	0
Trail Yellow	0.0
Trail Red	0.0

OUTPUT CHANNEL CONFIGURATION

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

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

Channel Configuration

	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
NOTE CHANGE IN CONTROL TYPE AND SOURCE →	5	Overlap	3	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
NOTE CHANGE IN CONTROL TYPE AND SOURCE →	11	Phase Vehicle	5	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

RECONFIGURE OUTPUT PINS FOR COMPACT FYA

Front Panel
Main Menu >Controller >More>Advanced IO>Output Points

Web Interface
Home >Controller >Advanced IO>Cabinet Configuration>Output Points

IO Module 1

Output Point	Description	Output Control Type	Index
34	C1-36	Phase Green	5

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 14-1146T1
DESIGNED: April 2023
SEALED: April 28, 2023
REVISED: _____

RS&H
NC FIRM LICENSE No: F-0493
1520 SOUTH BOULEVARD, SUITE 200
CHARLOTTE, NC 28203
(704) 752-0610

Temporary Signal 1 - TCP Phase IV
Electrical Detail Sheet 2 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Electrical and Programming Details For:

NC 280 (Asheville Highway)
at
SR 1511 (Deavor Road) /
Forest Gate Drive

Division 14 Transylvania County Brevard

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

PLAN DATE: April 2023	REVIEWED BY: V. Kaiser		
PREPARED BY: S.G. Haynie	REVIEWED BY:		
REVISIONS		INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 029531 ENGINEER STEVEN G. HAYNIE

DocuSigned by: Steven G. Haynie 4/28/2023
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PROJECT REFERENCE NO.	SHEET NO.
R-5799	Sig. 13.0

Semi-Actuated
Rectangular Rapid Flashing Beacon (RRFB)

ERECT RRFB ON TYPE II PEDESTAL
(STD. DWG. 1743.02) WITH SIGNS

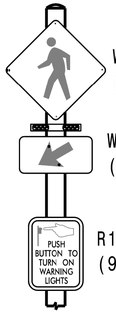
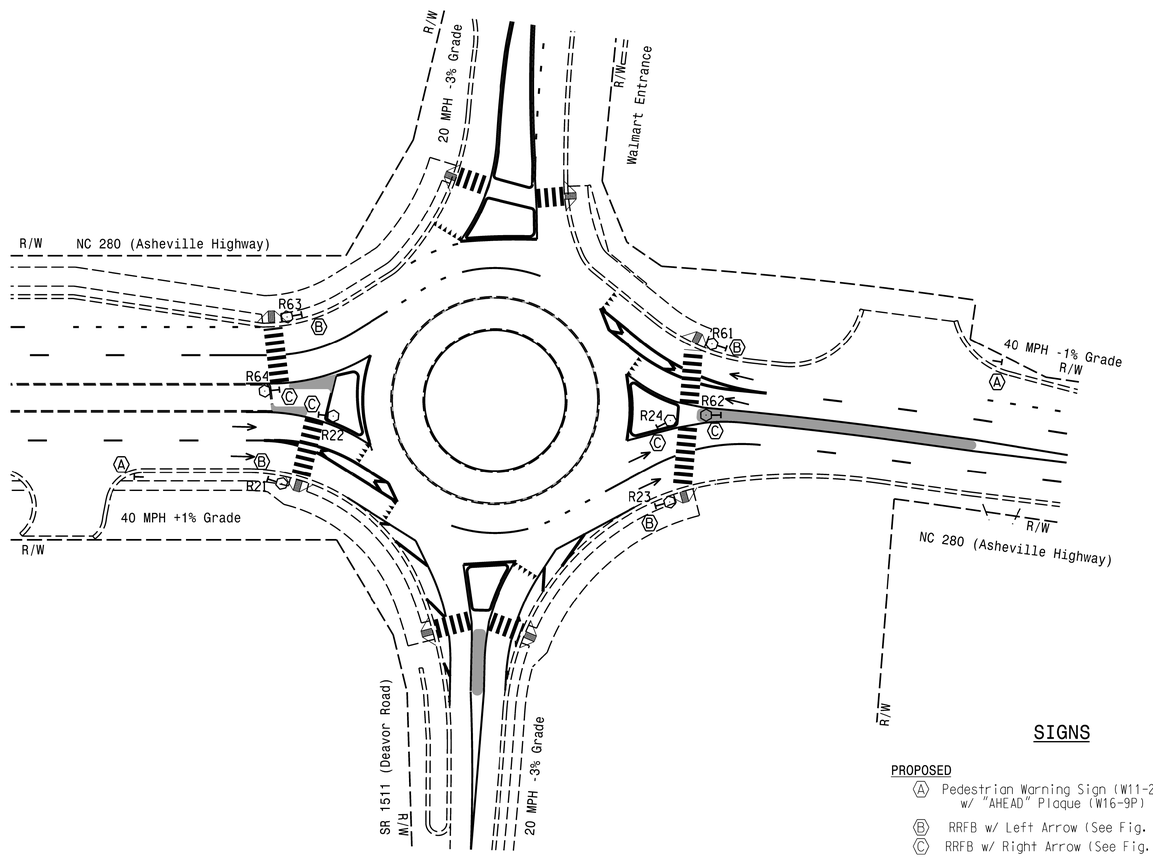


FIGURE 1 - SIGN B

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Align the front face of the pedestrian push button assemble parallel with the crosswalk.
3. The distance to the pushbutton from the edge of the sidewalk should be no greater than 18".
4. The pay item for Rectangular Rapid Flashing Beacon (RRFB) shall include, but not be limited to the signs, pushbuttons, flashing beacons, solar panel, battery, controller assembly, and all incidentals related to the installation of the RRFB. (1)



ERECT RRFB ON TYPE II PEDESTAL
(STD. DWG. 1743.02) WITH SIGNS

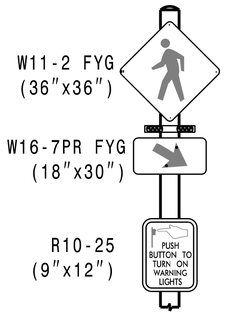


FIGURE 2 - SIGN C

SIGNS

PROPOSED		EXISTING
(A)	Pedestrian Warning Sign (W11-2) w/ "AHEAD" Plaque (W16-9P)	(A)
(B)	RRFB w/ Left Arrow (See Fig. 1)	(B)
(C)	RRFB w/ Right Arrow (See Fig. 2)	(C)

LEGEND

PROPOSED		EXISTING
	Sign	
	Type II Signal Pedestal	
	Curb Ramp	
	Directional Arrow	
	Right of Way	

TIMING CHART

FEATURE	RRFB GROUP			
	R21/R22	R23/R24	R61/R62	R63/R64
RRFB Flash Time	17	17	16	16

Notes:
1. These values may be field adjusted. Do not adjust RRFB Flash times lower than what is shown.

Pedestrian Crossings

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RS&H
NC FIRM LICENSE No: F-0493
1520 SOUTH BOULEVARD, SUITE 200
CHARLOTTE, NC 28203
(704) 752-0610

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

NC 280
at
SR 1511 (Deavor Road) /
Walmart Entrance

Division 14 Transylvania County Brevard

PLAN DATE:	April 2023	REVIEWED BY:	S.G. Haynie
PREPARED BY:	P. Koloski	REVIEWED BY:	

SCALE 0 40 1"=40'

REVISIONS	INIT.	DATE
Note Change	SGH	8/1/23

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 029531 ENGINEER STEVEN G. HAYNIE

DocuSigned by: Steven G. Haynie 4/28/2023
SIGNATURE DATE

Sig Inventory No. 14-5027

8/1/2023
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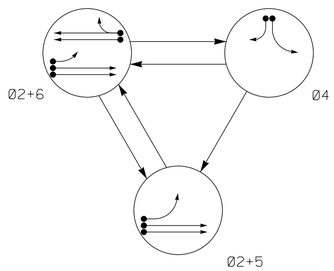
PROJECT REFERENCE NO.	SHEET NO.
R-5799	Sig. 14.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

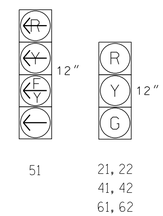
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE 02+5	PHASE 02+6	PHASE 04	PHASE FLASH
21, 22	G	G	R	Y
41, 42	R	R	G	R
51	←	F Y	R	Y
61, 62	R	G	R	Y

SIGNAL FACE I.D.

All Heads L.E.D.



MAXTIME DETECTOR INSTALLATION CHART

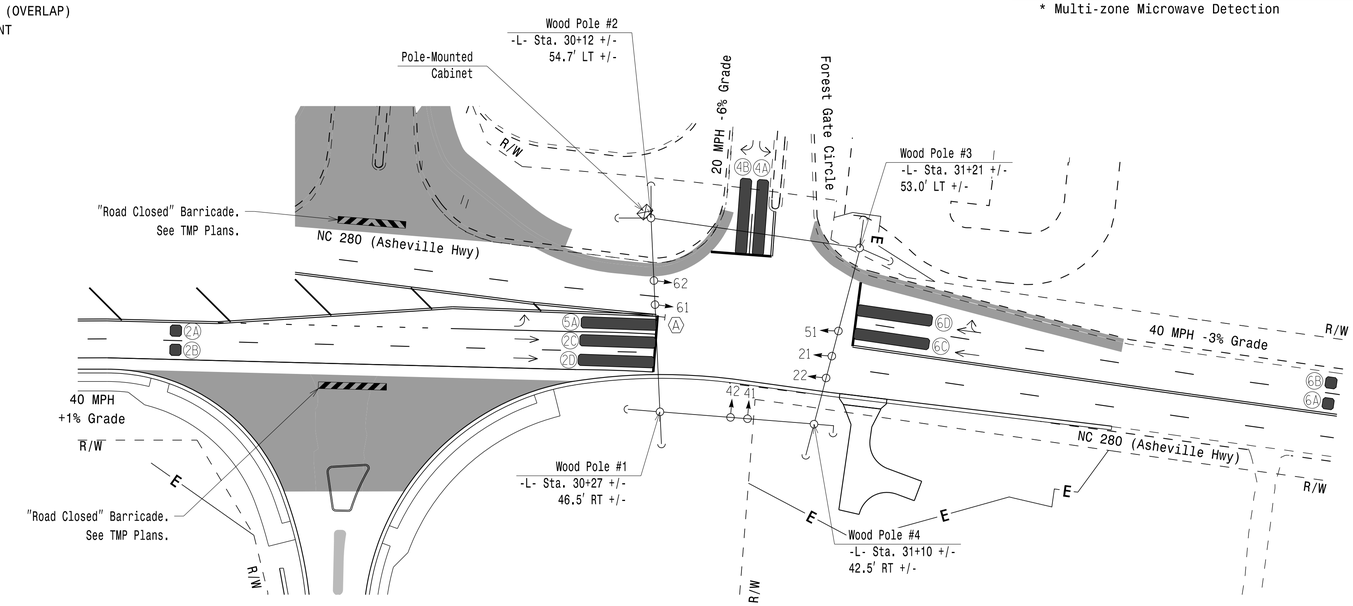
DETECTOR					PROGRAMMING						
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
2A	6X6	250	*	*	2	-	-	X	-	-	-	*
2B	6X6	250	*	*	2	-	-	X	-	-	-	*
2C	6X40	0	*	*	2	5.0	2.0	X	-	X	X	*
2D	6X40	0	*	*	2	5.0	2.0	X	-	X	X	*
4A	6X40	0	*	*	4	3.0	-	X	-	X	-	*
4B	6X40	0	*	*	4	15.0	-	X	-	X	-	*
5A	6X40	0	*	*	5	15.0	-	X	-	X	-	*
					2	3.0	-	X	-	X	X	*
6A	6X6	250	*	*	6	-	-	X	-	-	-	*
6B	6X6	250	*	*	6	-	-	X	-	-	-	*
6C	6X40	0	*	*	6	5.0	2.0	X	-	X	X	*
6D	6X40	0	*	*	6	5.0	2.0	X	-	X	X	*

* Multi-zone Microwave Detection

3 Phase
Fully Actuated
(Time Based Coordination)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 5 may be lagged.
4. Set all detector units to presence mode.
5. Program controller to operate using FYA compact mode.
6. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
7. See R-5799 TMP Phase V for pavement markings.
8. This intersection uses multi-zone microwave detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.
9. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
10. Furnish and install GPS Unit.



LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Pedestrian Signal Head With Push Button & Sign	
	Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Video Detection Zone	
	Controller & Cabinet	
	Junction Box	
	Oversized Junction Box	
	Type I Pushbutton Post	
	Type II Signal Pedestal	
	Strain Pole	
	Construction Zone	
	Curb Ramp	
	2-in Underground Conduit	
DD	Directional Drill	N/A
	Directional Arrow	
N/A	Right of Way	
E	Temp. Construction Easement	N/A

SIGNS

PROPOSED		EXISTING
A	No Left Turn Sign (R3-2)	A

MAXTIME TIMING CHART

FEATURE	PHASE 2	PHASE 4	PHASE 5	PHASE 6
Walk *	–	–	–	–
Ped Clear *	–	–	–	–
Min Green	12	7	7	12
Passage *	6.0	2.0	2.0	6.0
Max 1 *	90	25	15	90
Yellow Change	4.4	3.1	3.0	4.4
Red Clear	1.3	2.6	2.4	1.3
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	–
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.

RS&H
NC FIRM LICENSE No: F-0493
1520 SOUTH BOULEVARD, SUITE 200
CHARLOTTE, NC 28203
(704) 752-0610

Temporary Signal 1 - TCP Phase V

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

NC 280 (Asheville Highway)
at
Forest Gate Circle

Division 14 Transylvania County Brevard

PLAN DATE:	April 2023	REVIEWED BY:	S.G. Haynie
PREPARED BY:	P. Koloski	REVIEWED BY:	

SCALE 0 40 1"=40'

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 029531 ENGINEER STEVEN G. HAYNIE
DocuSigned by: Steven G. Haynie 4/28/2023
DESIGN ENGINEER SIGNATURE DATE
Sig Inventory No. 14-1312T1

4/28/2023
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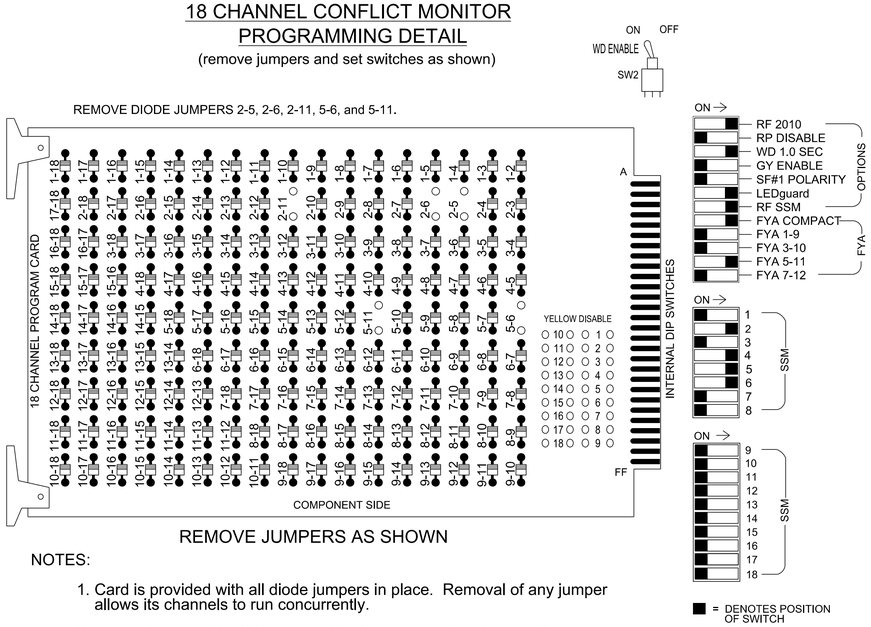
PROJECT REFERENCE NO.	SHEET NO.
R-5799	Sig. 14.1

18 CHANNEL CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE JUMPERS AS SHOWN

NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that the Red Enable is active at all times during normal operation.
4. Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.
5. Special cabinet wiring is required to utilize FYA COMPACT mode. See Ped Yellow Conflict Monitor Wiring Detail on this sheet.
6. Install jumper to SEL15 position.

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 a temporary Time Based Coordination System.

EQUIPMENT INFORMATION

Controller.....2070LX
Cabinet.....336
Software.....Q-Free MAXTIME
Cabinet Mount.....Pole
Output File Positions.....12
Load Switches Used.....S2, S5, S7, S8, S9
Phases Used.....2, 4, 5, 6
Overlap "1".....NOT USED
Overlap "2".....NOT USED
Overlap "3".....*
Overlap "4".....NOT USED

*See overlap programming detail on sheet 2

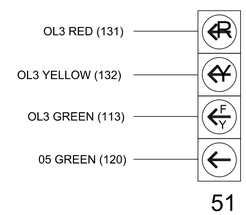
SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9		S10	S11	S12
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	11	15	7	8	16
PHASE	1	2	2 PED	3	4	4 PED	OL3	6	5 GRN	6 PED	7	8	8 PED
SIGNAL HEAD NO.	NU	21,22	NU	NU	41,42	NU	51★	61,62	51★	NU	NU	NU	NU
RED		128			101			134					
YELLOW		129			102			135					
GREEN		130			103			136					
RED ARROW							131						
YELLOW ARROW							132						
FLASHING YELLOW ARROW							133						
GREEN ARROW									120				
										*			

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

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



INPUT FILE POSITION LAYOUT

(front view)

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

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

FS = FLASH SENSE
ST = STOP TIME

SPECIAL DETECTOR NOTE

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

PED YELLOW CONFLICT MONITOR WIRING DETAIL

(make cabinet wiring changes as shown below)

In order to use FYA COMPACT mode with the 16 or 18 Channel Monitor, the cabinet must be wired such that the (unused) Ped Yellow load switch outputs are wired to the conflict monitor as follows: From 6 PY (field term. 120) to chan. 10 green (monitor pin R).

Follow the instructions below to make appropriate connections:

STEP 1: Fold down rear panel of output file.

STEP 2: Find unused wiring harness fom conflict monitor card edge connector (which should be tied and bundled together).

STEP 3: Find the connector that correspond to the following conflict monitor card edge pins and solder wire the the appropiate terminal on the rear of the output file shown below:

CMU-R ----------6PY (term. 120)

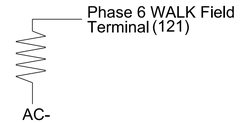
NOTE: Some cabinet manufacturers use keyed connectors to accomlplish this wiring configuration. If connectors are used, fold down the rear panel of the output file and find the set of 3 keyed connectors and connect them as shown below:

1 - 2PY	----------	1- CMU-13
2 - 4PY	----------	2- CMU-16
3 - 6PY	----------	3- CMU-R
4 - 8PY	----------	4- CMU-U

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

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



THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 14-1312T1
DESIGNED: April 2023
SEALED: April 28, 2023
REVISED: _____

Temporary Signal 1 - TCP Phase V
Electrical Detail Sheet 1 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Electrical and Programming Details For:

NC 280 (Asheville Highway)
at
Forest Gate Circle

Division 14 Transylvania County Brevard

PLAN DATE:	April 2023	REVIEWED BY:	V. Kaiser
PREPARED BY:	S.G. Haynie	REVIEWED BY:	

REVISIONS	INIT.	DATE

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

RS&H
NC FIRM LICENSE No: F-0493
1520 SOUTH BOULEVARD, SUITE 200
CHARLOTTE, NC 28203
(704) 752-0610

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 029531 ENGINEER STEVEN G. HAYNIE

DocuSigned by: Steven G. Haynie 4/28/2023
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DATE

SIG. INVENTORY NO. 14-1312T1

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PROJECT REFERENCE NO.	SHEET NO.
R-5799	Sig. 14.2

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	6
Modifier Phases	5
Modifier Overlaps	-
Trail Green	0
Trail Yellow	0.0
Trail Red	0.0

OUTPUT CHANNEL CONFIGURATION

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

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

Channel Configuration

	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
NOTE CHANGE IN CONTROL TYPE AND SOURCE →	5	Overlap	3	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
NOTE CHANGE IN CONTROL TYPE AND SOURCE →	10	Overlap	2		X	X	10
	11	Phase Vehicle	5	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

RECONFIGURE OUTPUT PINS FOR COMPACT FYA

Front Panel
Main Menu >Controller >More>Advanced IO>Output Points

Web Interface
Home >Controller >Advanced IO>Cabinet Configuration>Output Points

IO Module 1

Output Point	Description	Output Control Type	Index
34	C1-36	Phase Green	5

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 14-1312T1
DESIGNED: April 2023
SEALED: April 28, 2023
REVISED: _____

RS&H
NC FIRM LICENSE No: F-0493
1520 SOUTH BOULEVARD, SUITE 200
CHARLOTTE, NC 28203
(704) 752-0610

Temporary Signal 1 - TCP Phase V
Electrical Detail Sheet 2 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Electrical and Programming Details For:

NC 280 (Asheville Highway)
at
Forest Gate Circle

Division 14 Transylvania County Brevard

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

PLAN DATE: April 2023 REVIEWED BY: V. Kaiser
PREPARED BY: S.G. Haynie REVIEWED BY: _____

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 029531 ENGINEER STEVEN G. HAYNIE

DocuSigned by: Steven G. Haynie 4/28/2023
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DATE

SIG. INVENTORY NO. 14-1312T1

4/28/2023
mwcooper@cdm.com
Z:\Projects\Transportation\41030049021_R-5799_US 64-276 Intersection Design\Traffic\Signals\Design\Plan Sheets\R5799_sig_psh_14-1_14131271_elec.dgn
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PROJECT REFERENCE NO.	SHEET NO.
R-5799	Sig. 15.0

PHASING DIAGRAM

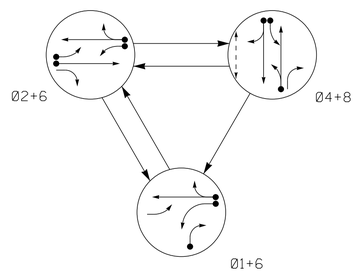
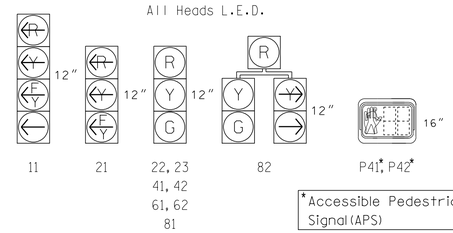


TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+6	Ø2+6	Ø4+8	FLASH
11	←●	←F Y	←R	←Y
21	←F Y	←F Y	←R	←Y
22, 23	R	G	R	Y
41, 42	R	R	G	R
61, 62	G	G	R	Y
81	R	R	G	R
82	R/	R	G	R
P41, P42	DW	DW	W	DRK

SIGNAL FACE I.D.

All Heads L.E.D.



*Accessible Pedestrian Signal (APS)

MAXTIME DETECTOR INSTALLATION CHART

DETECTOR					PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
1A	6X40	0	2-4-2	-	1	15.0	-	X	-	X	-	X
					6	3.0	-	X	-	X	X	X
1B	6X40	0	*	-	1	15.0	-	X	-	X	-	*
2A	6X6	353	6	-	2	-	-	X	X	X	-	X
2B	6X40	0	2-4-2	-	2	3.0	-	X	-	X	X	X
4A	6X40	0	2-4-2	-	4	3.0	-	X	-	X	-	X
4B	6X40	0	2-4-2	-	4	10.0	-	X	-	X	-	X
4C	6X6	0	3	-	4	15.0	-	X	-	X	-	X
6A	6X6	355	6	-	6	-	-	X	X	X	-	X
8A	6X40	0	*	-	8	-	-	X	-	X	-	*

* Video Detection Zone

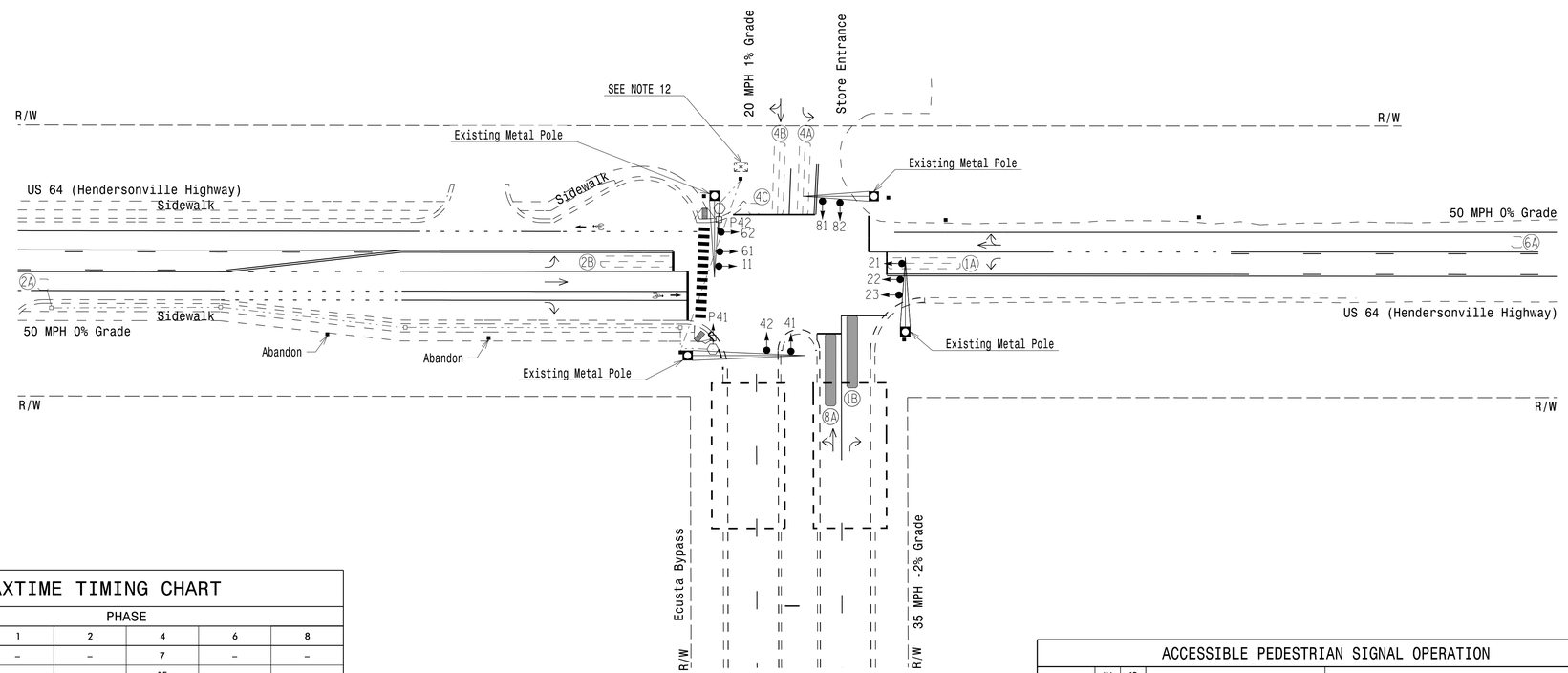
3 Phase
Fully Actuated
Isolated

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 may be lagged.
4. Set all detector units to presence mode.
5. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
6. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
7. Portions of high visibility crosswalk not shown for clarity.
8. All pedestrian pushbuttons shall be Vibro-Tactile.
9. All APS shall use "Rapid Tick" sound.
10. Relocate eastbound approach stopbar as shown.
11. Install new 2070 LX controller in existing signal cabinet.
12. Install NCDOT-supplied cell modem. Request cell modem from Division Traffic Engineer eight weeks prior to deployment.

PHASING DIAGRAM DETECTION LEGEND

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



LEGEND

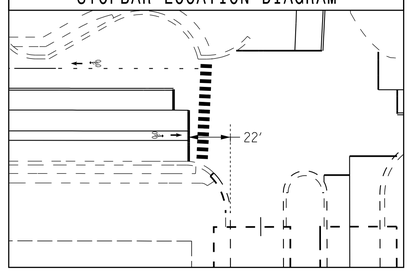
PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Pedestrian Signal Head With Push Button & Sign	
	Sign	
	Metal Pole with Mastarm	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Video Detection Zone	
	Controller & Cabinet	
	Junction Box	
	Oversized Junction Box	
	Type I Pushbutton Post	
	Type II Signal Pedestal	
	Strain Pole	
	Curb Ramp	
	2-in Underground Conduit	
DD	Directional Drill	N/A
	Directional Arrow	
N/A	Right of Way	

MAXTIME TIMING CHART

FEATURE	PHASE 1	2	4	6	8
Walk *	–	–	7	–	–
Ped Clear *	–	–	15	–	–
Min Green	7	14	7	14	7
Passage *	2.0	6.0	2.0	6.0	3.0
Max 1 *	15	90	20	90	20
Yellow Change	3.0	4.8	3.0	4.8	4.0
Red Clear	2.6	1.5	2.1	1.5	1.6
Added Initial *	–	2.5	–	2.5	–
Maximum Initial *	–	40	–	40	–
Time Before Reduction *	–	15	–	15	–
Time To Reduce *	–	30	–	30	–
Minimum Gap	–	3.0	–	3.0	–
Advance Walk	–	–	–	–	–
Non Lock Detector	X	–	X	–	X
Vehicle Recall	–	MIN. RECALL	–	MIN. RECALL	–
Dual Entry	–	–	X	–	X

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

STOPBAR LOCATION DIAGRAM



ACCESSIBLE PEDESTRIAN SIGNAL OPERATION

SIGNAL FACE	VOICE	TONES	INTERVAL	SPEECH MESSAGE
P41	-	X	Walk	(Percussive Tone)
	X	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Hendersonville.
P42	-	X	Walk	(Percussive Tone)
	X	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Hendersonville.

Signal Upgrade

RS&H
NC FIRM LICENSE No: F-0493
1520 SOUTH BOULEVARD, SUITE 200
CHARLOTTE, NC 28203
(704) 752-0610

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

SCALE 0 40 1"=40'

US 64 (Hendersonville Highway)
at
Ecusta Bypass / Store Entrance

Division 14 Transylvania County Brevard

PLAN DATE:	April 2023	REVIEWED BY:	S.G. Haynie
PREPARED BY:	P. Koloski	REVIEWED BY:	

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 029531 ENGINEER STEVEN G. HAYNIE

DocuSigned by: Steven G. Haynie 4/28/2023
DESIGN ENGINEER SIGNATURE DATE

Sig Inventory No. 14-1288

4/28/2023
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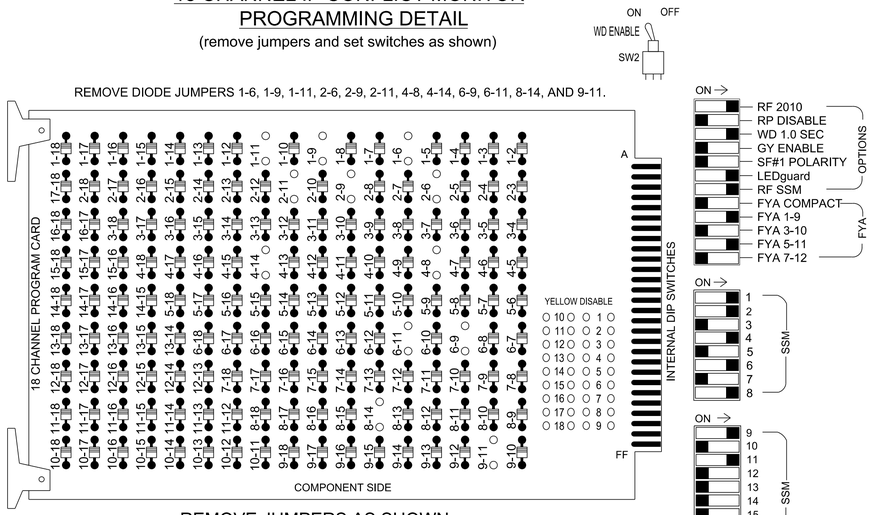
PROJECT REFERENCE NO.	SHEET NO.
R-5799	Sig. 15.1

18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE JUMPERS AS SHOWN

NOTES:

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

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the signal plan.
2. Program 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 a Time Based Coordination 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, S6, S8, S11, AUX S1, AUX S4
Phases Used.....1, 2, 4, 4PED, 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★	82	22,23	NU	NU	41,42	P41, P42	NU	61,62	NU	NU	81,82	NU	11★	NU	NU	21★	NU	NU
RED	·	*	128	·	·	101	·	·	134	·	·	107	·	·	·	·	·	·	·
YELLOW	·	·	129	·	·	102	·	·	135	·	·	108	·	·	·	·	·	·	·
GREEN	·	·	130	·	·	103	·	·	136	·	·	109	·	·	·	·	·	·	·
RED ARROW	·	·	·	·	·	·	·	·	·	·	·	·	·	A121	·	·	A114	·	·
YELLOW ARROW	·	126	·	·	·	·	·	·	·	·	·	·	·	A122	·	·	A115	·	·
FLASHING YELLOW ARROW	·	·	·	·	·	·	·	·	·	·	·	·	·	A123	·	·	A116	·	·
GREEN ARROW	127	127	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
✋	·	·	·	·	·	·	104	·	·	·	·	·	·	·	·	·	·	·	·
🚶	·	·	·	·	·	·	106	·	·	·	·	·	·	·	·	·	·	·	·

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	1O	11	12	13	14
FILE "I"	U	Ø 1 1A	Ø 2 2A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	Ø 4 4A	Ø 4 4C	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	NOT USED	SLOT EMPTY	FS DC ISOLATOR
	L	NOT USED	Ø 2 2B				Ø 4 4B	NOT USED					Ø 4 PED DC ISOLATOR		ST DC ISOLATOR
FILE "J"	U	SLOT EMPTY	Ø 6 6A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L		NOT USED												

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

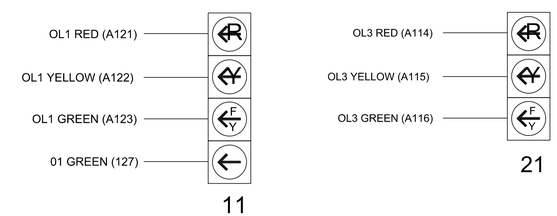
FS = FLASH SENSE
ST = STOP TIME

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	...	X	_	X	_
				-	29	6	3	...	X	_	X	X
2A	TB2-5,6	I2U	39	1	2	2	...	...	X	X	X	_
2B	TB2-7,8	I2L	43	5	3	2	3	...	X	_	X	X
4A	TB4-9,10	I6U	41	3	8	4	3	...	X	_	X	_
4B	TB4-11,12	I6L	45	7	9	4	10	...	X	_	X	_
4C	TB6-1,2	I7U	65	31	10	4	15	...	X	_	X	_
6A	TB3-5,6	J2U	40	2	16	6	...	...	X	X	X	_
PED PUSH BUTTONS												
P41,P42	TB8-5,6	I12L	69	35	4	PED 4						

FYA SIGNAL WIRING DETAIL

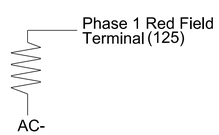
(wire signal heads as shown)



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)



SPECIAL DETECTOR NOTE

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

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.

RS&H
NC FIRM LICENSE No: F-0493
1520 SOUTH BOULEVARD, SUITE 200
CHARLOTTE, NC 28203
(704) 752-0610

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 14-1288
DESIGNED: April 2023
SEALED: April 28, 2023
REVISED: _

Electrical Detail - Sheet 1 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Electrical and Programming Details For:

US 64 (Hendersonville Highway) at Ecusta Bypass/Store Entrance

Division 14 Transylvania County Brevard

PLAN DATE: April 2023 REVIEWED BY: V. Kaiser
PREPARED BY: S.G. Haynie REVIEWED BY:

REVISIONS | INIT. | DATE

Prepared for the Offices of:
Transportation Mobility and Safety Division
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Traffic Engineering & Signals Management Section
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NORTH CAROLINA PROFESSIONAL SEAL 029531 ENGINEER STEVEN G. HAYNIE

DocuSigned by: Steven G. Haynie 4/28/2023
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DATE

SIG. INVENTORY NO. 14-1288

4/28/2023
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