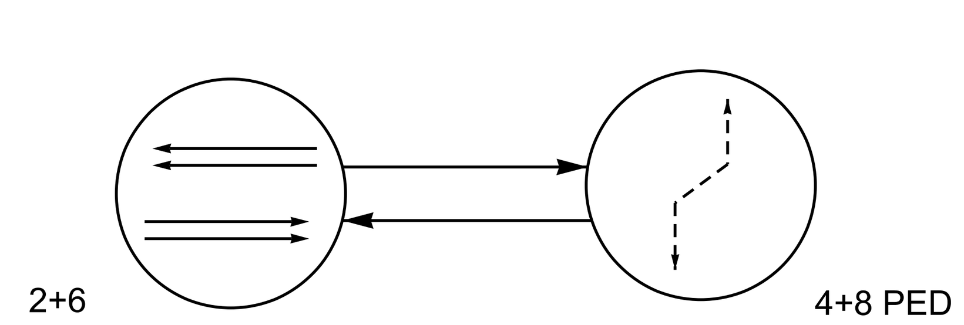
PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

SIGNAL FACE I.D.

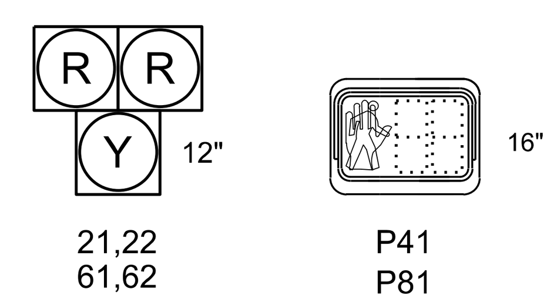


TABLE OF OPERATION

SIGNAL FACE	PHASE: 2+6 DARK	ACUTATION	STEADY YELLOW	ALL RED	4+8 PED WALK	4+8 PED CLEAR	FLASH
21,22	DRK	FY	Y	R	R	FR*	Y
61,62	DRK	FY	Y	R	R	FR*	Y
P41	DW	DW	DW	DW	W	FDW	DRK
P81	DW	DW	DW	DW	W	FDW	DRK

Y = Steady Yellow
FY = Flashing Yellow
R = Steady Red
FR = Flashing Red
W = Walk
DW = Don't Walk
FDW = Flashing Don't Walk
DRK = Dark

* ALTERNATING FLASH

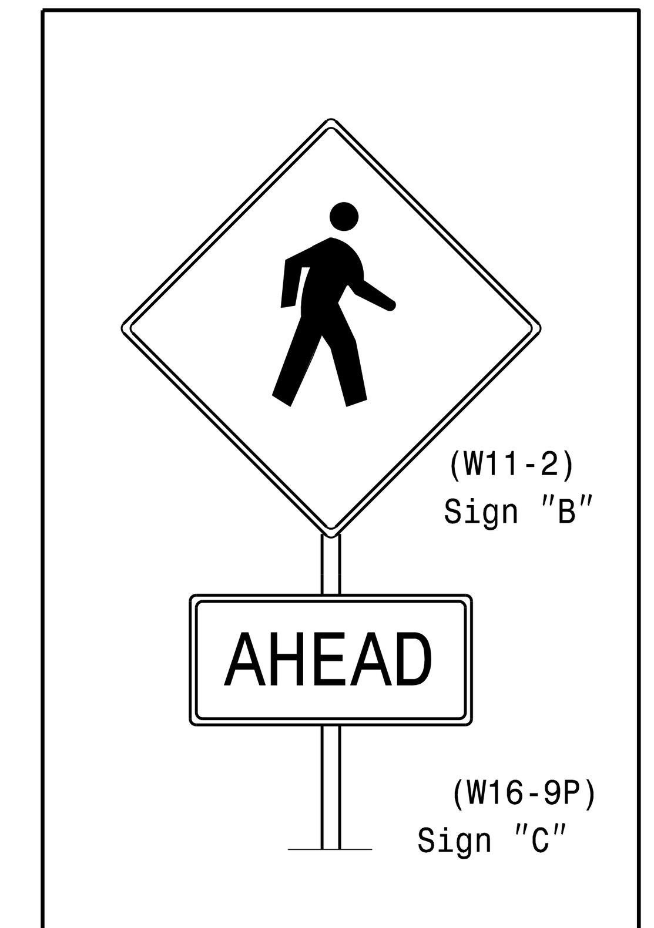
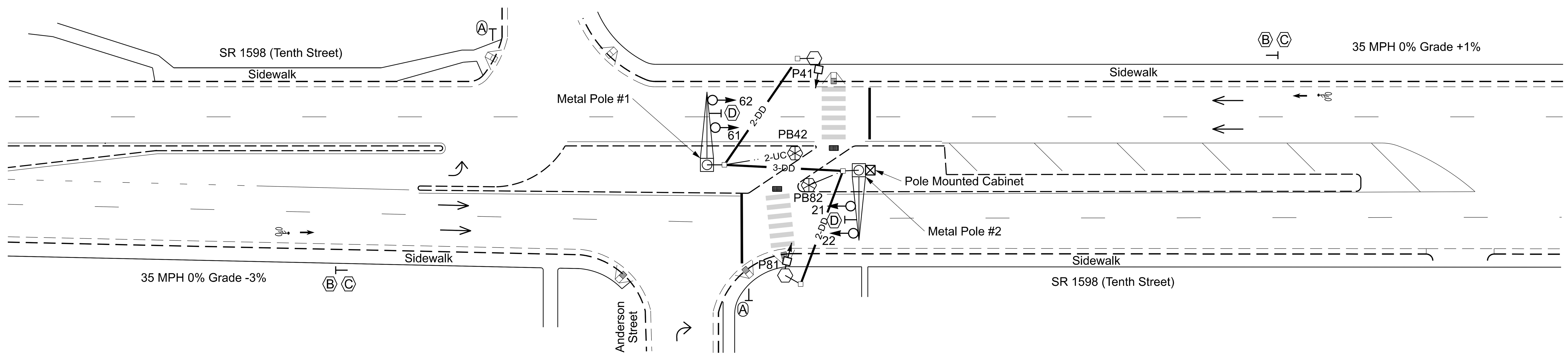


FIGURE 1

2 Phase
Semi-actuated
Pedestrian Hybrid Beaon
Greenville Signal System

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2024 and "Standard Specifications for Roads and Structures" dated January 2024.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
4. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
5. Locate Pedestrian and Crosswalk advane signs in accordane with Table 2C-4 in Section 2C.05 of the 11th Edition MUTCD or as otherwise directed by the Engineer.



LEGEND

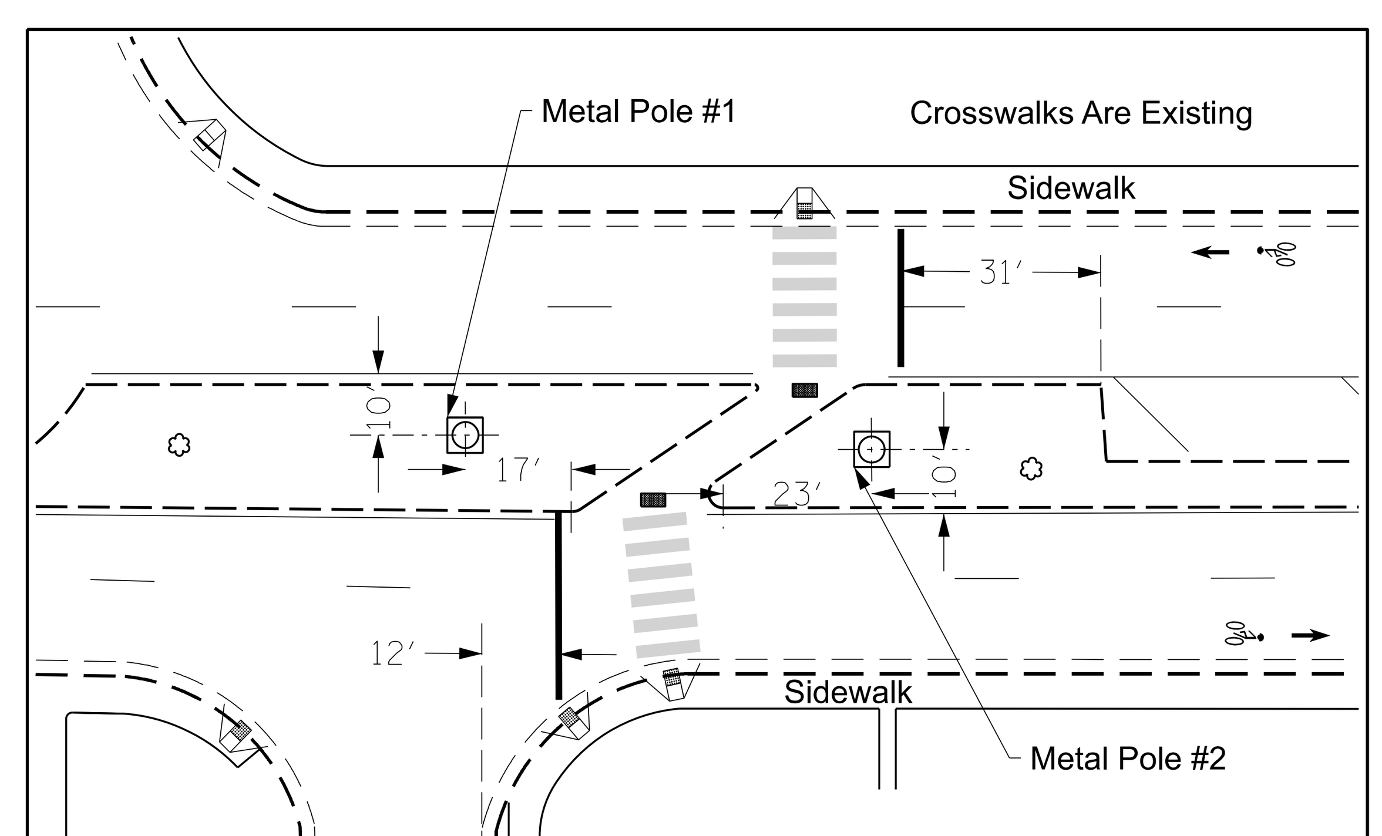
PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
X-UC	2-in Underground Conduit	UC
N/A	Right of Way	
	Directional Arrow	
A	"STOP" Sign (R1-1)	A
B	Pedestrian Warning Sign (W11-2) See Figure 1	B
C	"AHEAD" Plaque (W16-9P) Figure 1	C
D	"STOP ON RED - YIELD ON FLASHING RED AFTER STOP" Sign (R10-23A)	D
	Type I Pushbutton Post	
	Type II Signal Pedestal	
	Metal Pole with Mastarm	

ASC/3 TIMING CHART

FEATURE	2	4 PED	6	8 PED
Min Green*	10	7	10	7
Walk*	7	7	7	7
Ped Clear	5	20	5	20
Vehicle Extension*	0.0	0.0	0.0	0.0
Max 1*	30	7	30	7
Yellow Clear	4.1	3.0	4.1	3.0
Red Clear	1.0	0.0	1.0	0.0
Red Revert	2.0	2.0	2.0	2.0
Actuations Before Add*	-	-	-	-
Seconds Per Actuation*	-	-	-	-
Max Initial*	-	-	-	-
Time Before Reduction*	-	-	-	-
Time To Reduce*	-	-	-	-
Minimum Gap	-	-	-	-
Locking Detector	-	-	-	-
Recall Position	PED RECALL	-	PED RECALL	-
Dual Entry	-	X	-	X
Simultaneous Gap	X	X	X	X

Serves as Flashing Yellow Time
Serves as Steady Yellow Clearance Time
Serves as All Red Clearance Time

* 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.



Proposed Metal Pole and Stopbar Locations

New Installation - Corr. File No. 02-23-72171

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

SR 1598 (Tenth Street) at Anderson Street

Division 2 | Pitt County | Greenville

PLAN DATE:	June 2024	REVIEWED BY:	ZML
PREPARED BY:	KGP, Jr.	REVIEWED BY:	

SCALE 0 30 1"=30'

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

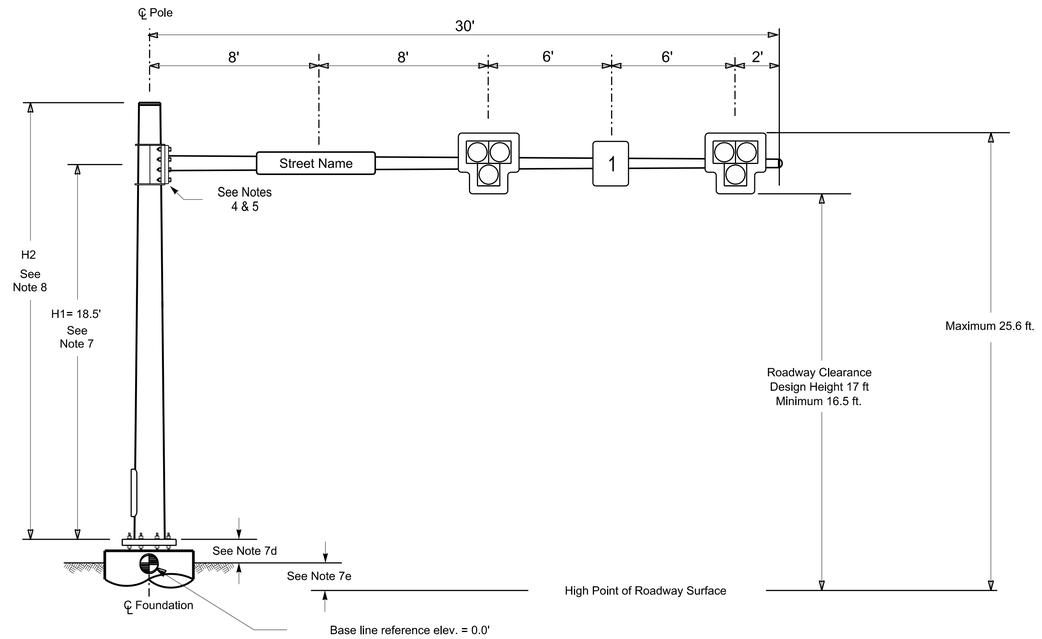
SEAL

NORTH CAROLINA PROFESSIONAL SEAL 030530 ENGINEER ZACHARY M. LITTLE

Signed by: Zachary Little 11/08/2024
0C21EFD94F5341F...
DATE

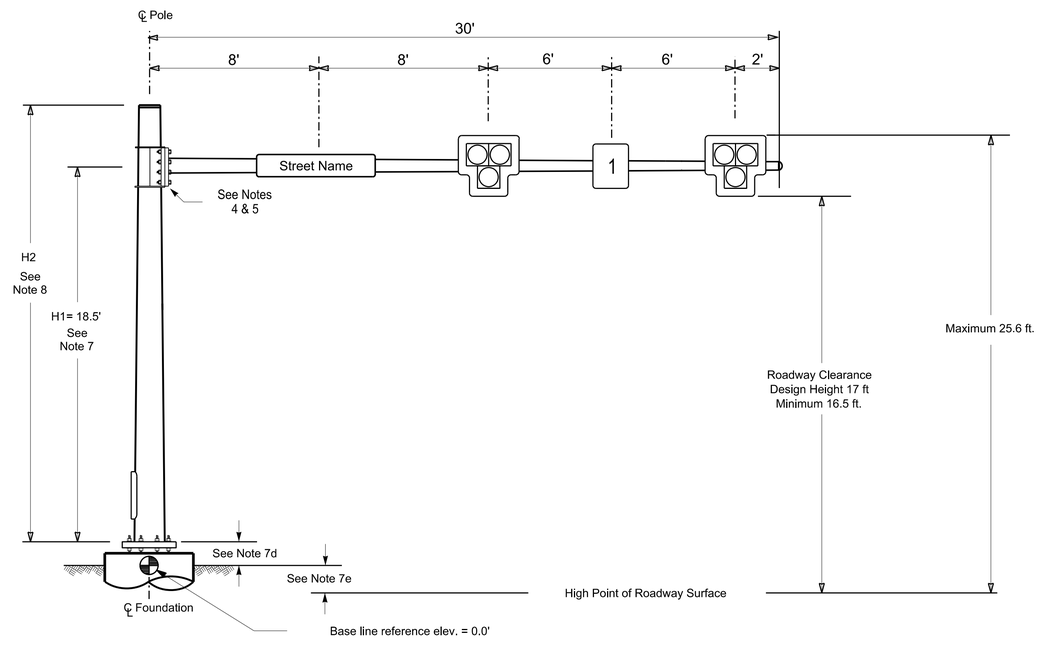
SIG. INVENTORY NO. 02-0957

Design Loading for METAL POLE NO. 1



Elevation View

Design Loading for METAL POLE NO. 2



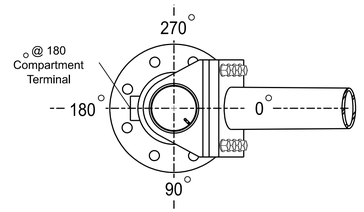
Elevation View

SPECIAL NOTE

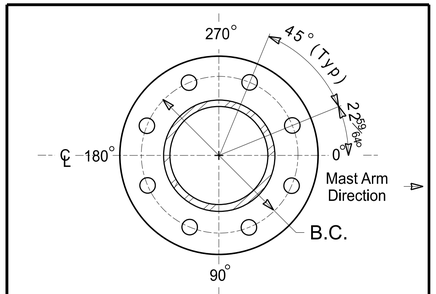
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 1	Pole 2
Baseline reference point at ℄ Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	-0.7 ft.	-0.9 ft.
Elevation difference at Edge of travelway or face of curb	-0.3 ft.	-0.4 ft.

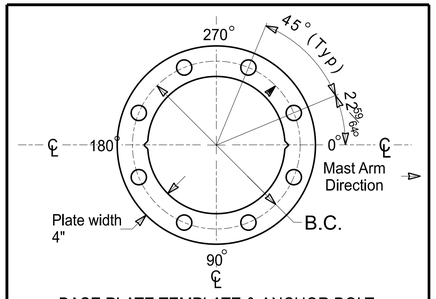


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL

For 8 Bolt Base Plate

METAL POLE No. 1 and 2

PROJECT REFERENCE NO.	SHEET NO.
HS-2402D	Sig. 1.3

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	RIGID MOUNTED SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE	10.5 S.F.	39.0" W X 39.0" L	62 LBS
1	SIGN RIGID MOUNTED	5.0 S.F.	24.0" W X 30.0" L	11 LBS
Street Name	STREET NAME SIGN RIGID MOUNTED	16.0 S.F.	24.0" W X 96.0" L	36 LBS

NOTES

DESIGN REFERENCE MATERIAL

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

DESIGN REQUIREMENTS

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

All metal poles and arms should be black in color as specified in the project special provisions.

NCDOT Wind Zone 3 (130 mph)

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

SR 1598 (Tenth Street)
Westbound
at
Anderson Street

Division 2 | Pitt County | Greenville

PLAN DATE: June 2024 | REVIEWED BY: ZML
PREPARED BY: KGP, Jr. | REVIEWED BY:

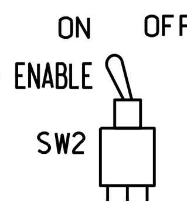
SCALE: 0 N/A N/A

REVISIONS | INIT. | DATE

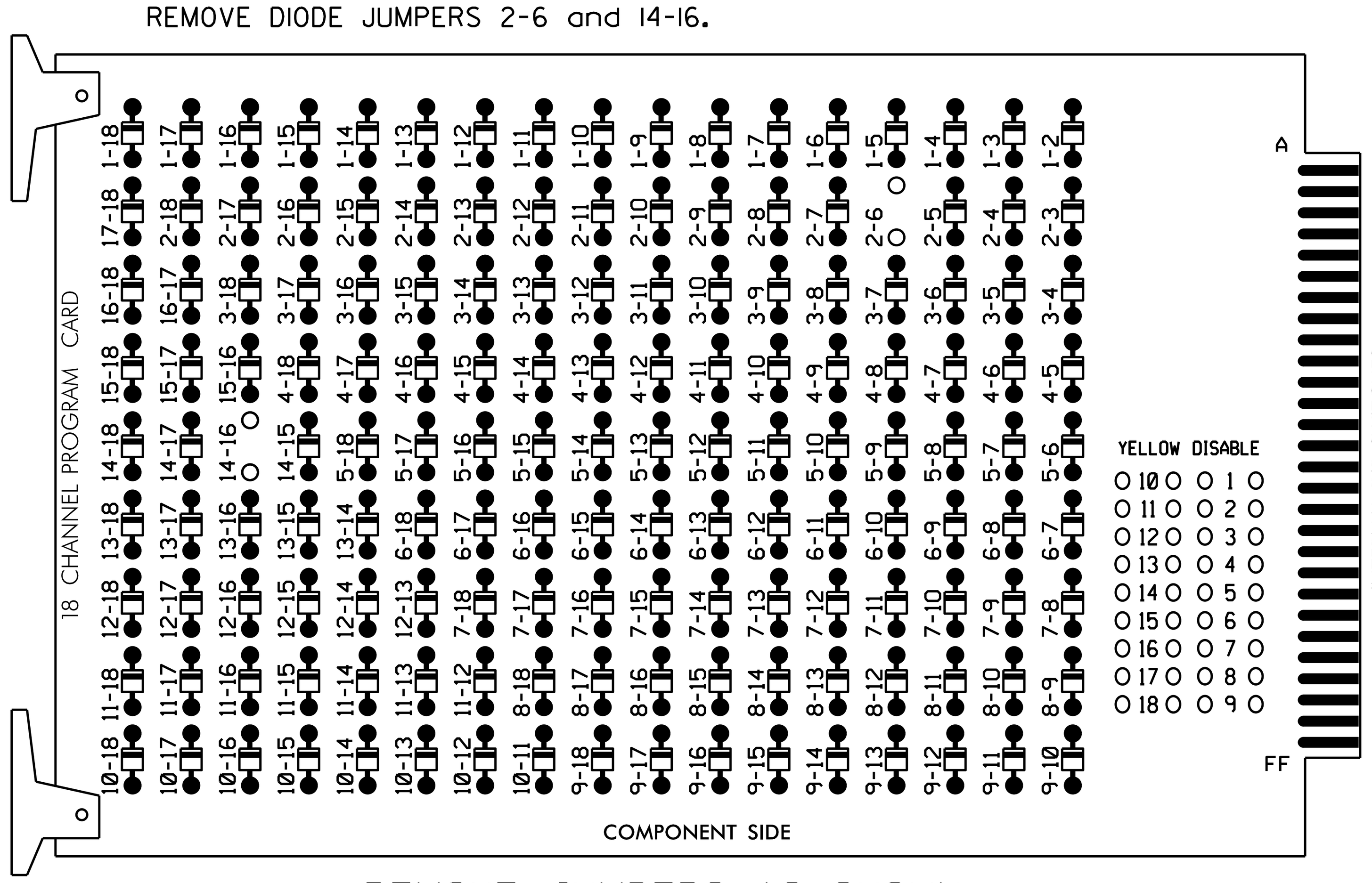
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 030530 ENGINEER ZACHARY M. LITTLE
Signed by: 11/18/2024
DocuSigned by: 5C21EF094F534...
DATE:
SIG. INVENTORY NO. 02-0957

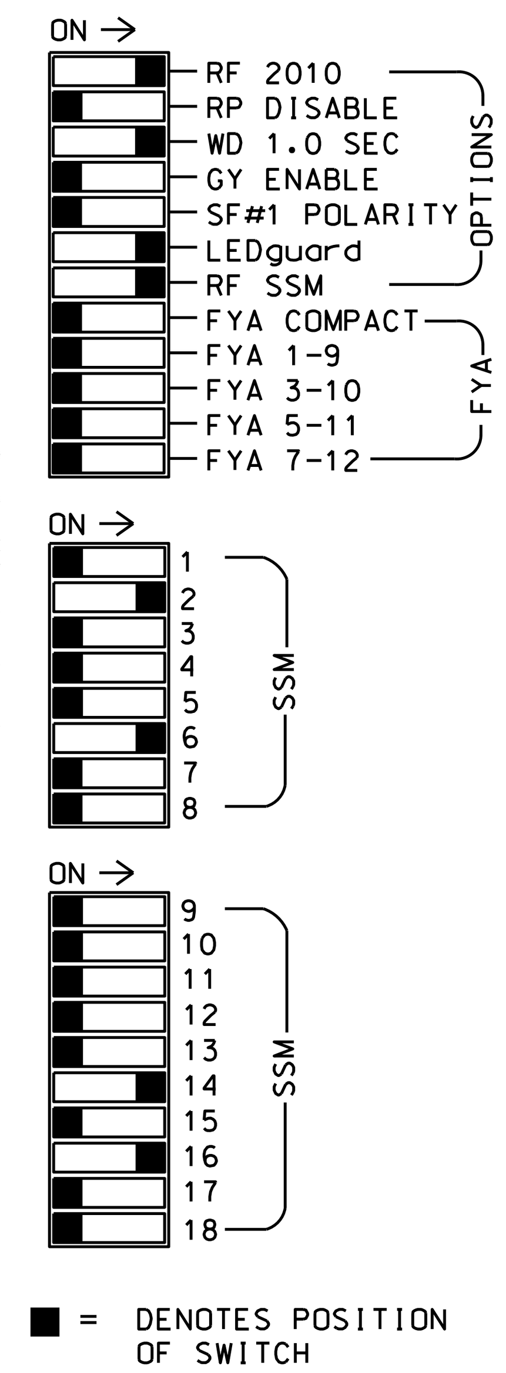
18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE DIODE JUMPERS 2-6 and 14-16.





REMOVE JUMPERS AS SHOWN

NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that 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 Plans.
2. Program phases 4 and 8 for Dual Entry.
3. Program controller to start up in Phase 2 Green and Phase 6 Green.
4. Program Phase 2 and 6 for Rest in Walk.
5. Program phases 2 and 6 for Ped Recall.
6. Program phases 4 and 8 for PED CLR>RED.

EQUIPMENT INFORMATION

CONTROLLER..............2070LX
CABINET.................336
SOFTWARE................ECONOLITE ASC/3-2070
CABINET MOUNT...........BASE
OUTPUT FILE POSITIONS...12
LOAD SWITCHES USED......S2,S6,S8,S12
PHASES USED............2,*2PED,*4,4PED,6,*6PED,*8,8PED
OVERLAPS................NONE

* Used for timing purposes only.

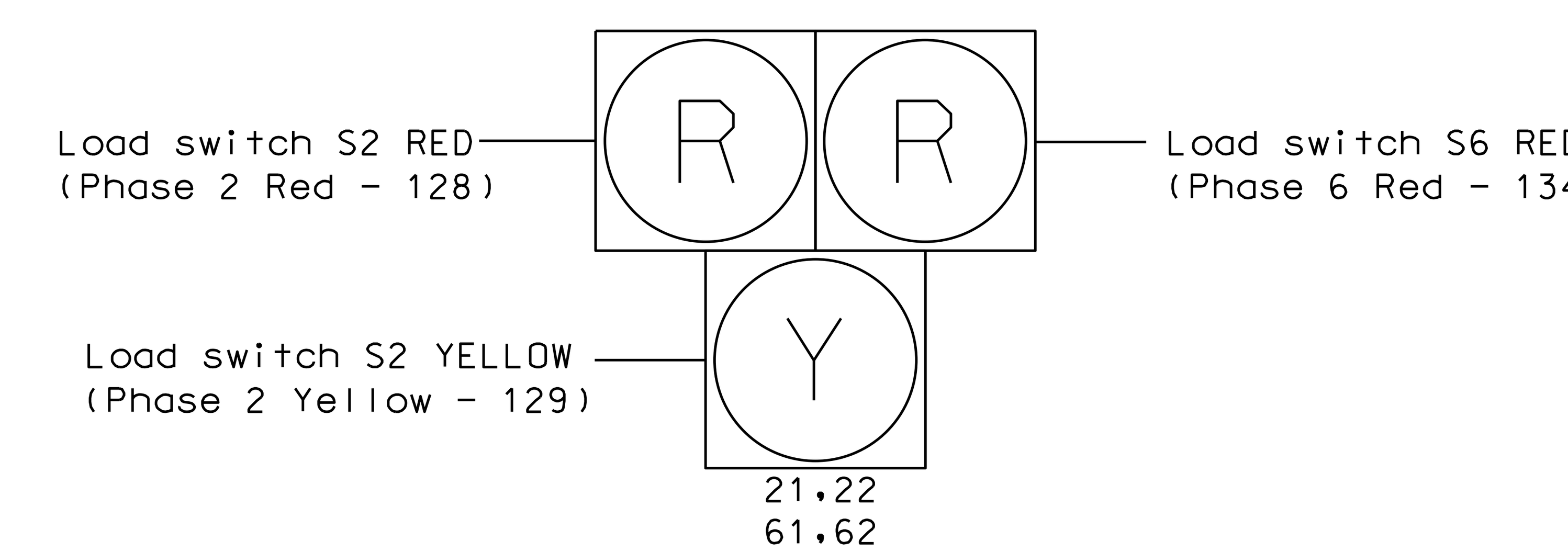
SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12
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.	NU	21,22 61,62	NC	NU	NC	P41	NU	21,22 61,62	NC	NU	NC	P81
RED		128						134				
YELLOW		129						*				
GREEN		*						*				
RED ARROW												
YELLOW ARROW												
FLASHING YELLOW ARROW												
GREEN ARROW												
(Don't Walk hand)						104						110
(Walk person)						106						112

NU = Not Used
NC = No Connection
* Denotes install load resistor. See load resistor installation detail this sheet.

SIGNAL HEAD WIRING DETAIL

(wire signal heads as shown)



INPUT FILE POSITION LAYOUT

(front view)

FILE "I"	1	2	3	4	5	6	7	8	9	10	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	NOT USED	NOT USED	FS DC ISOLATOR
L												Ø4 PED DC ISOLATOR	Ø8 PED DC ISOLATOR	ST DC ISOLATOR

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.	DETECTOR NO.	NEMA PHASE
PED PUSH BUTTONS					
P41	TB24-9,10	I12L	69	PED 4	4/8 PED
P81	TB24-11,12	I13L	70	PED 8	8/4 PED

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

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

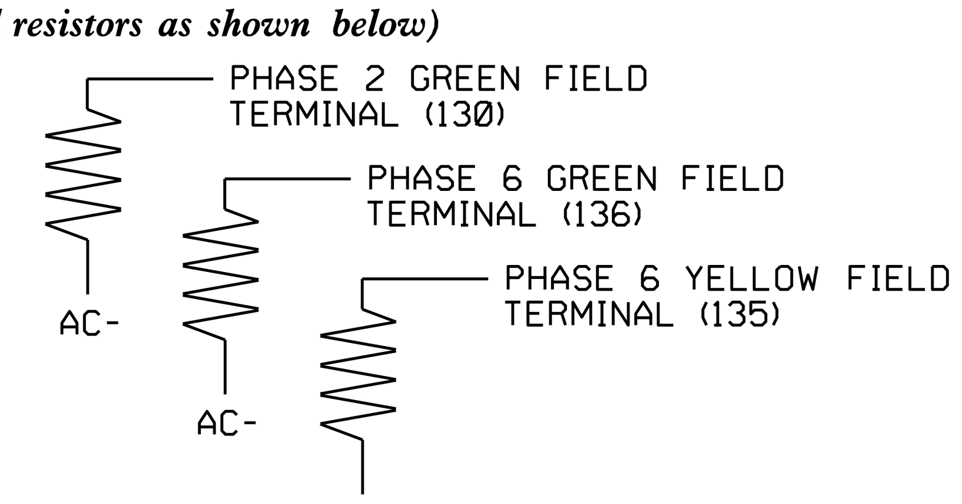
THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 02-0957
DESIGNED: June 2024
SEALED: 11/08/2024
REVISED: N/A

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown below)

ACCEPTABLE VALUES

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



TIMING INTERVAL

PHASE 2 WALK = Dark Display
PHASE 2 PED CLEAR = Flashing Yellow Display
PHASE 2 VEH YEL CLR = Steady Yellow Display
PHASE 2 RED CLEAR = Steady Red Display
PHASE 4+8 WALK = Steady Red Display
PHASE 4+8 PED CLEAR = Alternating Flashing Red Display
PHASE 4+8 VEH YEL CLR = Alternating Flashing Red Display
PHASE 4+8 VEH RED CLR = Alternating Flashing Red Display

Electrical Detail - Sheet 1 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

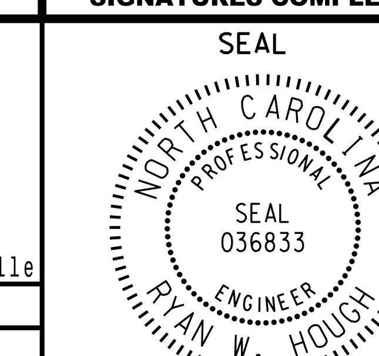
SR 1598 (Tenth Street)
at
Anderson Street

Division 2 Pitt County Greenville

PLAN DATE: October 2024	REVIEWED BY:
PREPARED BY: S.Kirkpatrick	REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL



Signed by:
Ryan W. Hough 11/12/2024
430320FAA2654C3...
DATE

SIG. INVENTORY NO. 02-0957

PROJECT REFERENCE NO.	SHEET NO.
HS-2402D	Sig.1.2

ECONOLITE ASC/3-2070 PEDESTRIAN DETECTOR PHASE ASSIGNMENT PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select [6. DETECTORS]
2. From DETECTOR Submenu select [3. PED DETECTOR INPUT ASSIGNMENT]
3. Press the TOGGLE key to select [ECONOLITE MODE] and press ENTER.

PED DET PHASE ASSIGNMENT MODE:ECONOLITEv

PHASE		1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6
D	1	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
E	2	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.
T	3	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.
E	4	.	.	.	X	.	.	.	X	.	.	.	.	.	.	.	.
C	5	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.
T	6	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.
O	7	.	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.
R	8	.	.	.	X	.	.	.	X	.	.	.	.	.	.	.	.
	9	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.	.
	10	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.
	11	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.
	12	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.
	13	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.
	14	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.
	15	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.
	16	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X

"." = No assignment, disabled
X = Assigns Pedestrian Push Button (PPB) to call the phase or phases
2 = Call for Ped timing 2
B = Allows for the PPB to call for Min Green 2 (BIKE GREEN)

OPERATIONAL NOTES

1. In order for the controller to perform the Pedestrian Hybrid Beacon (HAWK signal) sequence, special logic programming is necessary. Refer to sheet 2 for the Econolite ASC/3-2070 Logic Processor Programming Detail.
2. For operational purposes, Phase 2 and Phase 6 both run dummy pedestrian phases that are required to produce the correct HAWK signal sequence. There are no Phase 2 or Phase 6 pedestrian heads.
3. The only Phase 6 load switch output that is being used drives one of the red signal faces of each signal head.
4. The Logic Processor flashes Phase 2 Yellow during the Phase 2 pedestrian clearance phase, and Phase 2 Yellow drives the solid Yellow signal faces during Phase 2 vehicle Yellow clear.
5. The Phase 2 and Phase 6 Red outputs drive the solid Red displays during Phase 2 and 6 Red. The Logic Processor flashes the Phase 2 and Phase 6 Red outputs in a wig-wag pattern during Phase 4+8 Ped Clear and thru Phase 4+8 vehicle Yellow and Red clear.
6. The controller must be programmed for Ped Clear Thru Red for Pedestrian Phases 4 and 8 so that the Red displays continue to flash during Phases 4 and 8 Yellow Clear and Red clear.
7. Make sure that all Phase 2 and Phase 6 timings match each other, and that all Phase 4 and Phase 8 timings match each other.
8. The Ped 4 push button is programmed to call Ped 4 and Ped 8, and the Ped 8 push button is programmed to call Ped 8 and Ped 4.

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.

ECONOLITE ASC/3 LOGIC PROCESSOR PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select [1. CONFIGURATION]
2. From CONFIGURATION Submenu select [8. LOGIC PROCESSOR]

From the LOGIC PROCESSOR Submenu select: [2. LOGIC STATEMENTS]

ENTER A "1" IN THE LP# FIELD, PRESS 'ENTER', AND PROGRAM AS SHOWN.

```
LP#:   1  COPY FROM:   1  ACTIVE:  M   (T/F)
IF     PED ON PH PED CLR     2     IS  ON
AND    LP COB CODE ON                   546

THEN   SIG SET PH YELLOW     2         ON

ELSE
```

LOGIC TO FLASH YELLOW SIGNAL FACES AFTER A PED CALL IS PLACED.

ENTER A "2" IN THE LP# FIELD, PRESS 'ENTER', AND PROGRAM AS SHOWN.

```
LP#:   2  COPY FROM:   2  ACTIVE:  M   (T/F)
IF     PED ON PH PED CLR     4     IS  ON
AND    LP COB CODE ON                   546

THEN   SIG SET PHASE RED     2         OFF

ELSE
```

LOGIC TO PRODUCE ALTERNATING FLASHING RED INDICATIONS ON HEADS 21, 22, 61, 62 DURING PED 4+8 CLEAR (FORCES PHASE 2 RED OFF).

ENTER A "3" IN THE LP# FIELD, PRESS 'ENTER', AND PROGRAM AS SHOWN.

```
LP#:   3  COPY FROM:   3  ACTIVE:  M   (T/F)
IF     PED ON PH PED CLR     4     IS  ON
AND    LP COB CODE OFF                  546

THEN   SIG SET PH RED        6         OFF

ELSE
```

LOGIC FOR ALTERNATING FLASHING RED INDICATIONS ON HEADS 21, 22, 61, 62 DURING PED 4+8 CLEAR (FORCES PHASE 6 RED OFF)

ENTER A "4" IN THE LP# FIELD, PRESS 'ENTER', AND PROGRAM AS SHOWN.

```
LP#:   4  COPY FROM:   4  ACTIVE:  M   (T/F)
IF     PED ON PH PED CLR     2     IS  ON

THEN   SIG SET PH GREEN      2         OFF

ELSE
```

TURNS LOAD SWITCH 2 GREEN OFF DURING PHASE 2 PED CLEAR TO AVOID A G/Y DUAL INDICATION.

END PROGRAMMING

NOTE: COB CODE 546 is a 1Hz 50% Duty Cycle internal logic processor reference.

From the LOGIC PROCESSOR Submenu select: [1. LOGIC STATEMENT CONTROL]

ENABLE LOGIC PROCESSOR STATEMENTS 1-4 BY POSITIONING THE CURSOR OVER THE FIELDS SHOWN BELOW AND USING THE TOGGLE KEY TO ENABLE THEM.

LOGIC STATEMENT CONTROL

	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6
LP 1-15	E	E	E	E	.	.	.	.	.	.	.	.	.	.	.	.
LP 16-30	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
LP 31-45	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
LP 46-60	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
LP 61-75	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
LP 76-90	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

END PROGRAMMING

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 02-0957
DESIGNED: June 2024
SEALED: 11/08/2024
REVISED: N/A

Electrical Detail - Sheet 2 of 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

SR 1598 (Tenth Street) at Anderson Street

Division 2 Pitt County Greenville

PLAN DATE: October 2024 REVIEWED BY:
PREPARED BY: S.Kirkpatrick REVIEWED BY:

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 036833 RYAN W. HOUGH

Signed by: Ryan W. Hough 11/12/2024
430320FAA2654C3...
DATE

SIG. INVENTORY NO. 02-0957