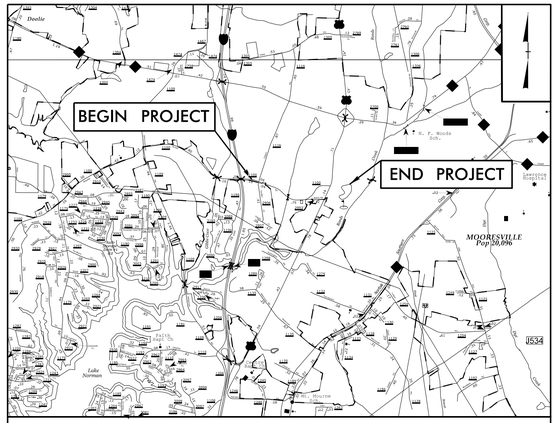
Project No.	Sheet No.
R–3833C	Sig. 1.0

TIP PROJECT: R–3833C

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

IREDELL COUNTY



VICINITY MAP

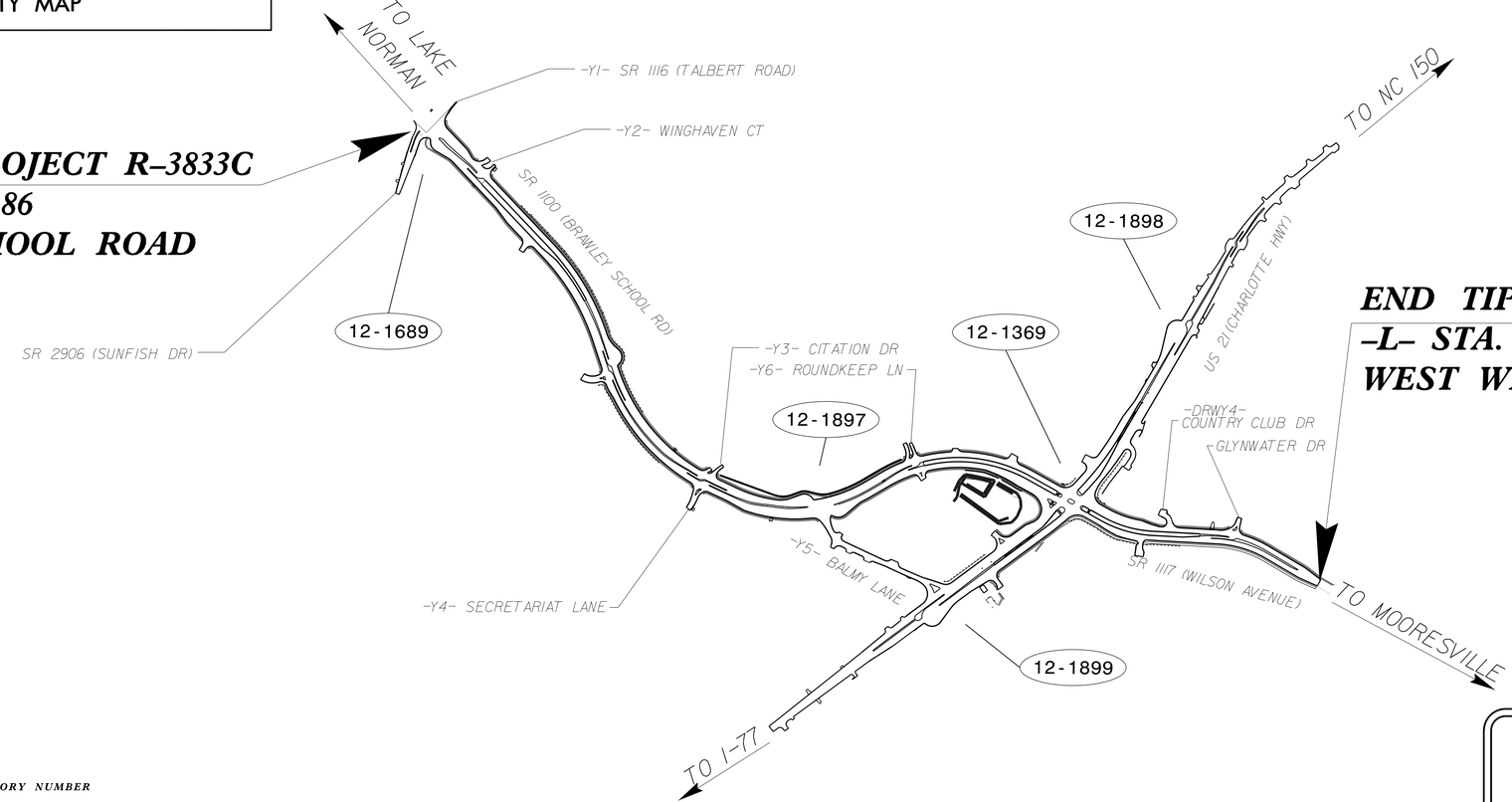
LOCATION: SR 1100 BRAWLEY SCHOOL ROAD FROM SR 1116 TALBERT ROAD TO 1000' EAST OF US 21

TYPE OF WORK: TRAFFIC SIGNALS & SIGNAL COMMUNICATIONS

NAD 83/NSRS 2007

BEGIN TIP PROJECT R–3833C
–L– POT 18+05.86
BRAWLEY SCHOOL ROAD

END TIP PROJECT R–3833C
–L– STA. 75+82.64
WEST WILSON AVENUE



LEGEND

(XX-XXXX) – *SIGNAL INVENTORY NUMBER*

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

INDEX OF PLANS

SHEET NO.	SIG. INV. #	DESCRIPTION
SIG–1.0		Title Sheet
SIG–1.1 – SIG–1.2		Standard Plate Sheets
SIG–2.0 – SIG–5.3	12–1689	SR 1100 (Brawley School Road) at SR 1116 (Talbert Road) /SR 2906 (Sunfish Drive)
SIG–6.0 – SIG 6.6	12–1897	SR 1100 (Brawley School Road) at Balmy Lane
SIG–7.0 – SIG–12.5	12–1369	US 21 (Charlotte Highway) at SR 1100 (Brawley School Road) /SR 1117 (Wilson Avenue)
SIG–13.0 – SIG–13.2	12–1898	US 21 (Charlotte Highway) at SR 1100 (Brawley School Road) U–Turn
SIG–14.0 – SIG–14.2	12–1899	US 21 (Charlotte Highway) at SR 1100 (Wilson Avenue) U–Turn /Balmy Lane
M1 – M8		Metal Pole Standards
SCP–01 – SCP–10		Signal Communication Plans

INTELLIGENT TRANSPORTATION AND SIGNALS UNIT
Contacts:

Tim Williams, PE
Signals Engineer, Western Region

Todd Joyce, PE
Signal Equipment Design Review Engineer

Gregory Green
Signal Communication Project Engineer

Heidi Berggren, EIT
Signal Communication Project Design Engineer

Plans Prepared for the NCDOT
DIVISION OF HIGHWAYS
TRANSPORTATION MOBILITY & SAFETY DIVISION

Transportation Mobility and Safety Division · State of North Carolina · Department of Transportation

TSMO UNIT

750 N. Greenfield Parkway, Garner, NC 27529

Stantec

Stantec Consulting Services Inc.
801 Jones Franklin Rd-Suite 300
Raleigh, NC 27606

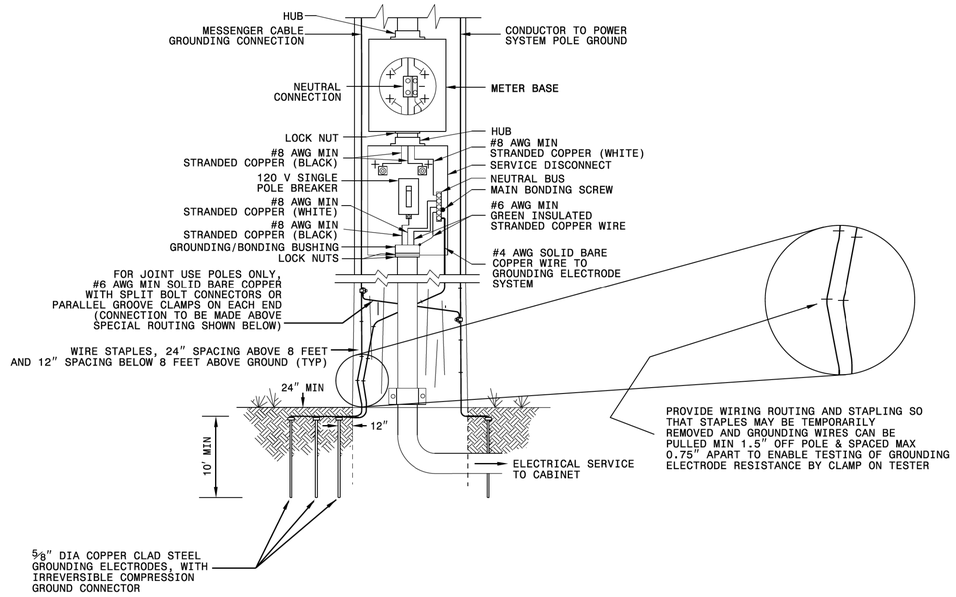
Tel. 919.851.6866
Fax. 919.851.7024
www.stantec.com
License No. F-0672

Betsy L. Watson, PE – *Senior Principal*
Derrick Waller, PE – *Transportation Engineer*
Regina Muncey, PE – *Transportation Engineer*
James Hambright – *Senior Transportation Technician*

APPROVED: DocuSigned by: Derrick Waller B3C95880610A4F5...
DATE: 3/22/2023

NORTH CAROLINA PROFESSIONAL SEAL 042678 ENGINEER DERRICK A. WALLER

PROJECT NO.	SHEET NO.
R-3833C	Sig.-1.1



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

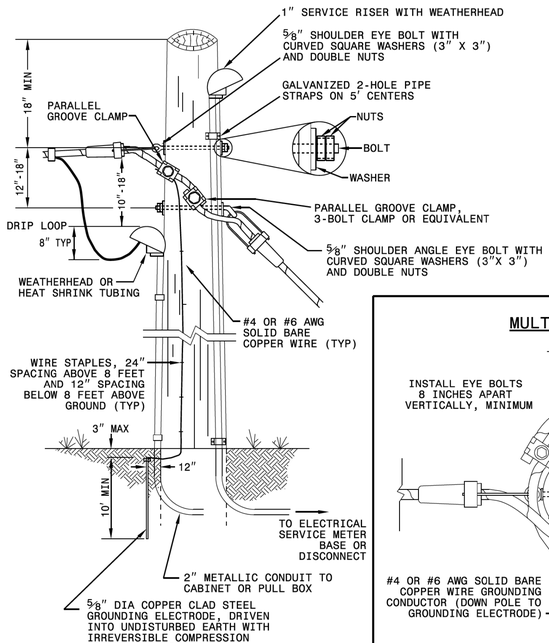
ENGLISH STANDARD DRAWING FOR

ELECTRICAL SERVICE GROUNDING

GROUNDING AND BONDING

SHEET 1 OF 1

1700D01



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
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

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DATE

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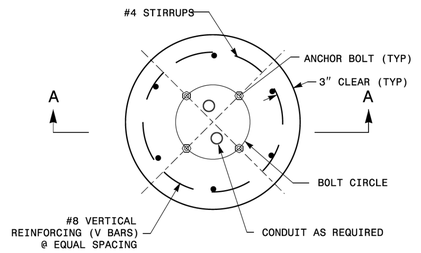
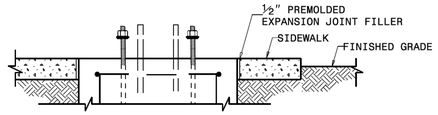
PROJECT NO.	SHEET NO.
R-3833C	Sig.-1.2



PEDESTAL FOUNDATION - PLAN VIEW

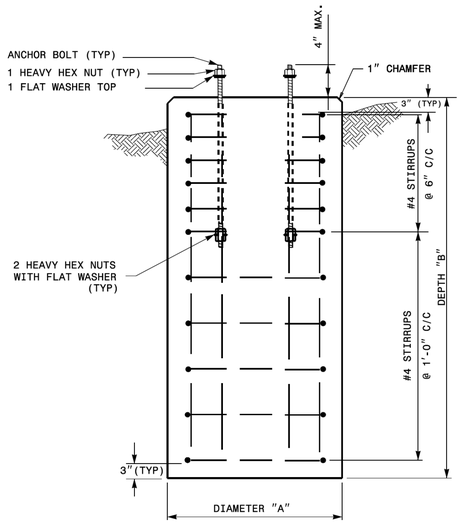


PEDESTAL FOUNDATION DETAILS FOR SIDEWALK

NOTES:

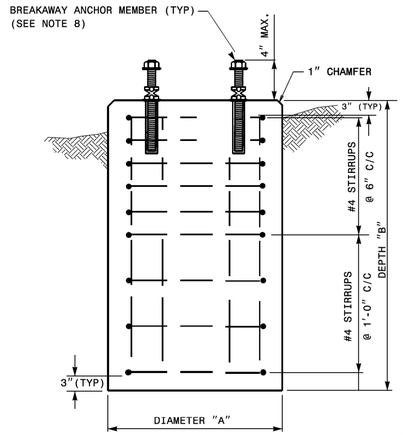
1. CAST FOUNDATION AGAINST UNDISTURBED SOIL WHEREVER CONDITIONS PERMIT. IN UNSTABLE SOIL, CAST-IN-PLACE TUBE FORMS ARE ALLOWED WITH APPROVAL.
2. COMPLY WITH APPLICABLE PROVISIONS OF SECTION 825 FOR CONCRETE CONSTRUCTION.
3. USE CLASS "A" CONCRETE THAT MEETS THE REQUIREMENTS OF SECTION 1000 WITH A COMPRESSION 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.



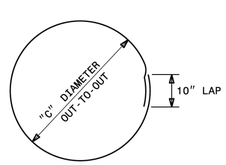
TYPES I, II & III

SECTION A-A

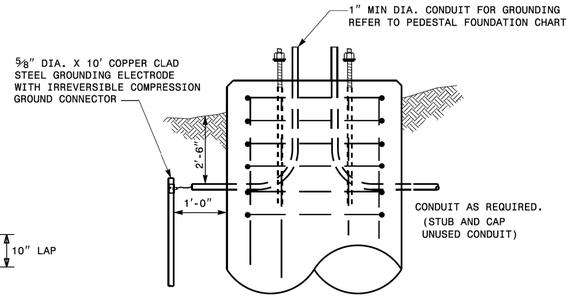


TYPES I & II ONLY

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

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PROJECT REFERENCE NO.	SHEET NO.
R-3833C	SIG-2.0

PHASING DIAGRAM

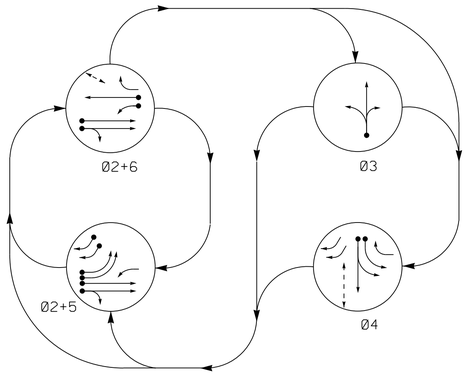
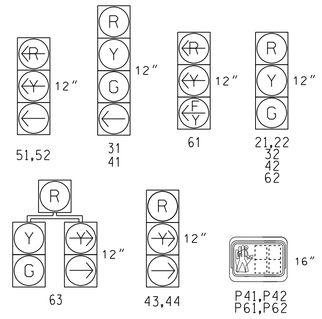


TABLE OF OPERATION					
SIGNAL FACE	PHASE Ø2+5	Ø2+6	Ø3	Ø4	FLASH
21,22	G	G	R	R	Y
31	R	R	G	R	R
32	R	R	G	R	R
41	R	R	R	G	R
42	R	R	R	G	R
43,44	→	R	R	→	R
51,52	←	R	R	R	R
61	FY	FY	R	R	Y
62	R	G	R	R	Y
63	R	G	R	R	Y
P41,P42	DW	DW	DW	W	DRK
P61,P62	DW	W	DW	DW	DRK

SIGNAL FACE I.D.

All Heads L.E.D.



OASIS 2070 LOOP & DETECTOR INSTALLATION CHART												
INDUCTIVE LOOPS					DETECTOR PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
2A/S1	6X6	300	EXIST	-	2	Y	Y	-	-	-	Y	-
2B/S2	6X6	300	EXIST	-	2	Y	Y	-	-	-	Y	-
3A	6X40	0	2-4-2	-	3	Y	Y	-	-	10	-	-
4A	6X40	0	2-4-2	-	4	Y	Y	-	-	-	-	-
4B	6X40	0	2-4-2	-	4	Y	Y	-	-	-	-	-
5A	6X40	0	2-4-2	-	5	Y	Y	-	-	-	-	-
5B	6X40	0	2-4-2	-	5	Y	Y	-	-	-	-	-
5C	6X40	0	2-4-2	-	5	Y	Y	-	-	-	-	-
5D	6X40	0	2-4-2	-	5	Y	Y	-	-	-	-	-
6A	6X6	300	*	*	6	Y	Y	-	-	-	-	*
6B	6X40	0	*	*	6	Y	Y	Y	-	3	-	*
6C	6X40	0	*	*	6	Y	Y	Y	2.0	5	-	*

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

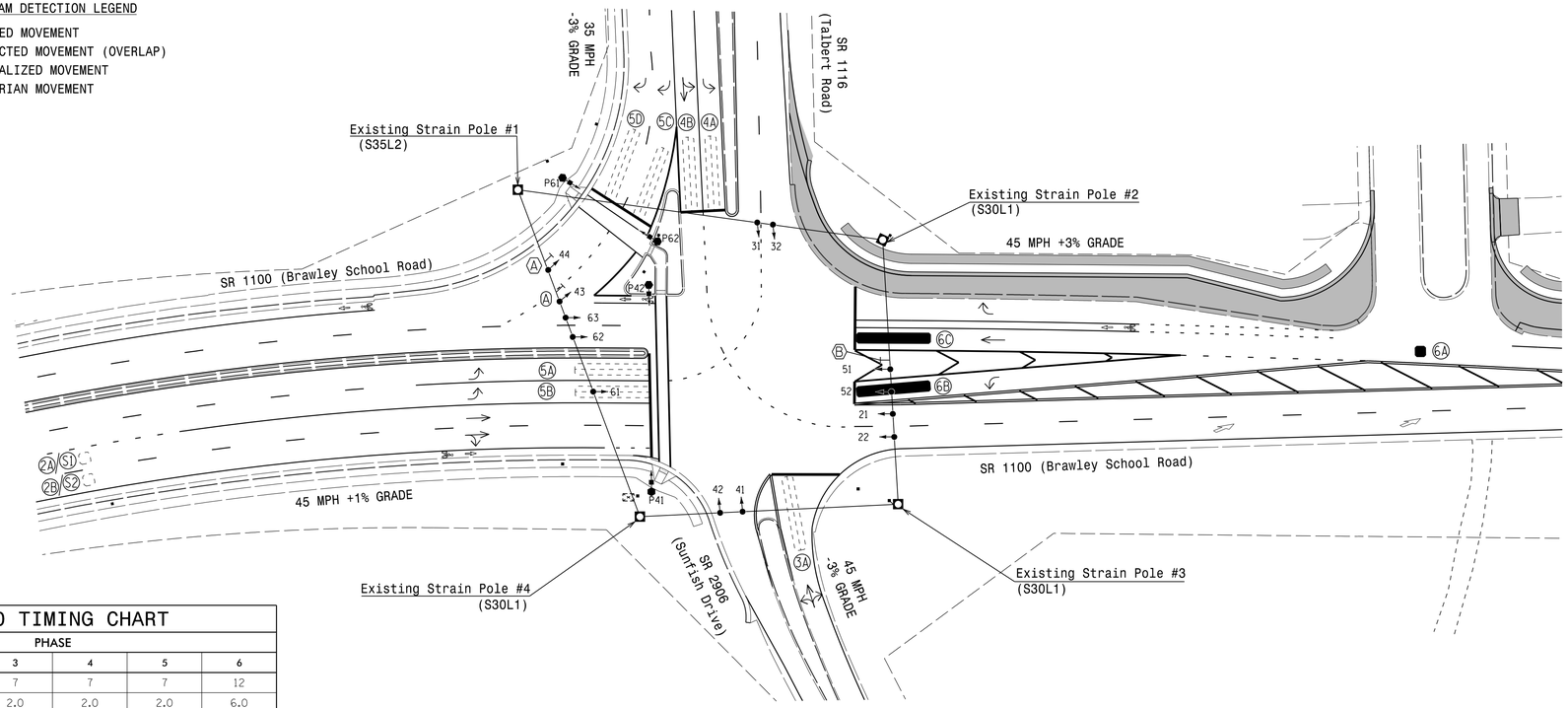
4 Phase Fully Actuated Signal System 11210

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. The order of phase 3 and phase 4 may be reversed.
5. Set all detector units to presence mode.
6. This intersection features a video detection system. Shown locations of detectors are conceptual only. Detectors should be placed to ensure the desired operation parameters are achieved.
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. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.

PHASING DIAGRAM DETECTION LEGEND

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



LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
□↓	Pedestrian Signal Head With Push Button & Sign	■↓
○→	Signal Pole with Guy	●→
○↷	Signal Pole with Sidewalk Guy	●↷
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
□	Junction Box	■
·-·-·	2-in Underground Conduit	·-·-·
N/A	Right of Way	———
→	Directional Arrow	→
◯	Metal Strain Pole	◘
DD	Directional Drill	N/A
▬	Video Detection Area	N/A
⬡	Type II Signal Pedestal	⬢
▭	Construction Zone	N/A
Ⓐ	"NO TURN ON RED" Sign (R10-11)	Ⓐ
Ⓑ	"U-TURN YIELD TO RIGHT TURN" Sign (R10-16)	Ⓑ

OASIS 2070 TIMING CHART					
FEATURE	PHASE 2	3	4	5	6
Min Green 1 *	12	7	7	7	12
Extension 1 *	6.0	2.0	2.0	2.0	6.0
Max Green 1 *	90	25	25	30	90
Yellow Clearance	4.4	4.8	4.1	3.0	4.4
Red Clearance	1.6	1.6	2.9	2.9	1.6
Red Revert	2.0	2.0	2.0	2.0	2.0
Walk 1 *	-	-	7	-	7
Don't Walk 1	-	-	24	-	9
Seconds Per Actuation *	1.5	-	-	-	-
Max Variable Initial *	34	-	-	-	-
Time Before Reduction *	15	-	-	-	15
Time To Reduce *	30	-	-	-	30
Minimum Gap	3.0	-	-	-	3.0
Recall Mode	MIN RECALL	-	-	-	MIN RECALL
Vehicle Call Memory	YELLOW	-	-	-	-
Dual Entry	-	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON	ON

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

Signal Upgrade
Temporary Design 1 - TMP Phase I

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

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

SCALE 0 40 1" = 40'

SR 1100 (Brawley School Road) at SR 1116 (Talbert Road)/SR 2906 (Sunfish Drive)

Division 12 Iredell County Mooresville

PLAN DATE: May 2022 REVIEWED BY: E D Harris
PREPARED BY: J. Hambright REVIEWED BY: R M Muncey

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER DERRICK A. WALLER SEAL 042678

DocuSigned by: Derrick Waller 3/24/2023
SIGNATURE DATE

SIG. INVENTORY NO. 12-1689T1

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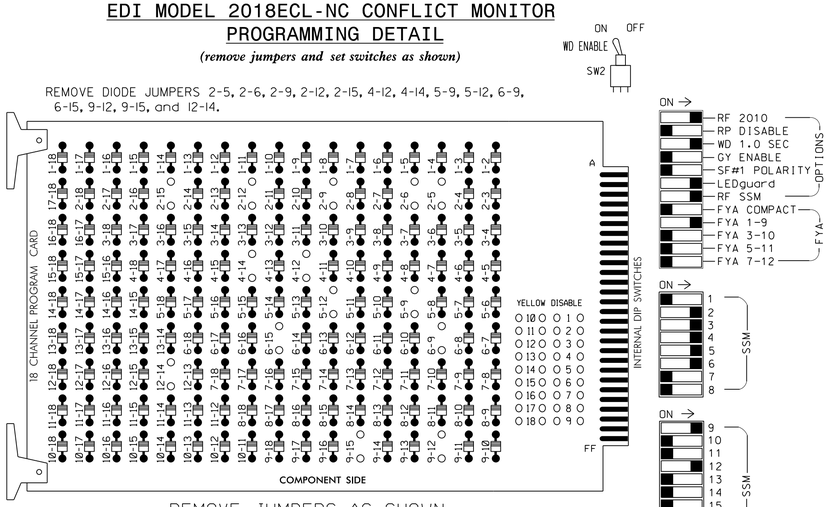
User:dwaller

PROJECT REFERENCE NO.	SHEET NO.
R-3833C	SIG-2.1

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE JUMPERS AS SHOWN

NOTES:

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

■ = DENOTES POSITION OF SWITCH

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Enable Simultaneous Gap-Out for all Phases.
3. Program phases 2 and 6 for Variable Initial and Gap Reduction.
4. Program phases 2 and 6 for Startup In Green.
5. Program phases 4 and 6 for Startup Ped Call.
6. Program phases 2 and 6 for Yellow Flash, and overlap 1 as Wag Overlaps.
7. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.

EQUIPMENT INFORMATION

CONTROLLER.....2070
CABINET.....332 W/ AUX
SOFTWARE.....ECONOLITE OASIS
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
LOAD SWITCHES USED.....S2,S4,S5,S6,S7,S8,S9,AUX S1, AUX S5
PHASES USED.....2,3,4,4PED,5,6,6PED
OVERLAP "A".....2
OVERLAP "B".....NOT USED
OVERLAP "C".....NOT USED
OVERLAP "D".....4+5

SIGNAL HEAD HOOK-UP CHART

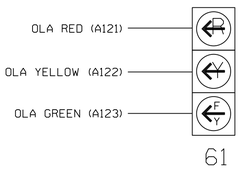
LOAD SWITCH NO.	S1	S2	S3	S4		S5			S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3		4			14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3		4			4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	NU	21,22	NU	31	32	41	42	63	P41, P42	51,52	62,63	P61, P62	NU	NU	NU	61 ★	NU	NU	NU	43,44	NU
RED		128		116	116	101	101				134									A101	
YELLOW		129		117	117	102	102				135										
GREEN		130		118	118	103	103				136										
RED ARROW										131						A121					
YELLOW ARROW								102		132						A122				A102	
FLASHING YELLOW ARROW																A123					
GREEN ARROW				118		103		103		133										A103	
✋									104			119									
🚶									106			121									

NU = Not Used

★ See pictorial of head wiring in detail this sheet.

FYA SIGNAL WIRING DETAIL

(wire signal head as shown)



INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	SLOT EMPTY	Ø2/SYS 2A/S1	SLOT EMPTY	SLOT EMPTY	Ø 3 3A	Ø 4 4A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	NOT USED	Ø6 PED DC ISOLATOR	FS DC ISOLATOR
	L		Ø2/SYS 2B/S2			NOT USED	Ø 4 4B						Ø4 PED DC ISOLATOR	NOT USED	ST DC ISOLATOR
FILE "J"	U	Ø 5 5A	Ø 5 5C	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L	Ø 5 5B	Ø 5 5D												

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 ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
2A/S1	TB2-5,6	I2U	39	1	2	2/SYS	Y	Y			
2B/S2	TB2-7,8	I2L	43	5	12	2/SYS	Y	Y			
3A	TB4-5,6	I5U	58	20	3	3	Y	Y			10
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			
4B	TB4-11,12	I6L	45	7	14	4	Y	Y			
5A	TB3-1,2	J1U	55	17	5	5	Y	Y			
5B	TB3-3,4	J1L	55	17	5	5	Y	Y			
5C	TB3-5,6	J2U	40	2	6	5	Y	Y			
5D	TB3-7,8	J2L	44	6	16	5	Y	Y			
PED PUSH BUTTONS											
P41,P42	TB8-5,6	I12L	69	31	PED 4	4 PED					
P61,P62	TB8-7,9	I13U	68	30	PED 6	6 PED					

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

INPUT FILE POSITION LEGEND: J2L
- FILE J
- SLOT 2
- LOWER

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

SPECIAL DETECTOR NOTE

For Detector Zones 6A, 6B and 6C, install a temporary video detection system for vehicle detection. Perform installation according to manufacturer's directions and NCDOT engineer approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 12-1689T1
DESIGNED: MAY 2022
SEALED: 3/24/2023
REVISED: N/A

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

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801 Jones Franklin Road-Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
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Prepared for the Offices of:
Transportation Mobility and Safety Division
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

SR 1100 (Brawley School Road) at SR 1116 (Talbert Road)/SR 2906 (Sunfish Drive)

Division 12 | Iredell County | Mooresville

PLAN DATE:	May 2022	REVIEWED BY:	E D Harris
PREPARED BY:	D A Waller	REVIEWED BY:	R M Muncey

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 042678 ENGINEER DERRICK A WALLER

DocuSigned by: Derrick Waller 3/24/2023
ENGINEER'S SIGNATURE DATE

SIG. INVENTORY NO. 12-1689T1

PROJECT REFERENCE NO.	SHEET NO.
R-3833C	SIG-2.2

OVERLAP PROGRAMMING DETAIL

(program controller as shown below)

FROM MAIN MENU PRESS '8' (OVERLAPS), THEN '1' (VEHICLE OVERLAP SETTINGS).

```
 PAGE 1: VEHICLE OVERLAP 'A' SETTINGS
 PHASE:          |12345678910111213141516
VEH OVL PARENTS:| X
VEH OVL NOT VEH:|
VEH OVL NOT PED:|
VEH OVL GRN EXT:|
STARTUP COLOR: _ RED  _ YELLOW  _ GREEN
FLASH COLORS:  _ RED  _ YELLOW  X GREEN
SELECT VEHICLE OVERLAP OPTIONS:   (Y/N)
FLASH YELLOW IN CONTROLLER FLASH?...N
GREEN EXTENSION (0-255 SEC).........0
YELLOW CLEAR (0=PARENT,3-25.5 SEC)..0.0
RED CLEAR (0=PARENT,0.1-25.5 SEC)...0.0
OUTPUT AS PHASE # (0=NONE, 1-16)....0
```

← NOTICE GREEN FLASH

PRESS '+' THREE TIMES

```
 PAGE 1: VEHICLE OVERLAP 'D' SETTINGS
 PHASE:          |12345678910111213141516
VEH OVL PARENTS:|   XX
VEH OVL NOT VEH:|
VEH OVL NOT PED:|
VEH OVL GRN EXT:|
STARTUP COLOR: _ RED  _ YELLOW  _ GREEN
FLASH COLORS:  _ RED  _ YELLOW  _ GREEN
SELECT VEHICLE OVERLAP OPTIONS:   (Y/N)
FLASH YELLOW IN CONTROLLER FLASH?...Y
GREEN EXTENSION (0-255 SEC).........0
YELLOW CLEAR (0=PARENT,3-25.5 SEC)..0.0
RED CLEAR (0=PARENT,0.1-25.5 SEC)...0.0
OUTPUT AS PHASE # (0=NONE, 1-16)....0
```

OVERLAP PROGRAMMING COMPLETE

FLASHER CIRCUIT MODIFICATION DETAIL

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

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

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 12-1689T1
DESIGNED: MAY 2022
SEALED: 3/24/2023
REVISED: N/A

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

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PLAN DATE:	May 2022	REVIEWED BY:	E D Harris
PREPARED BY:	D A Waller	REVIEWED BY:	R M Muncey

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 042678 ENGINEER DERRICK A. WALLER

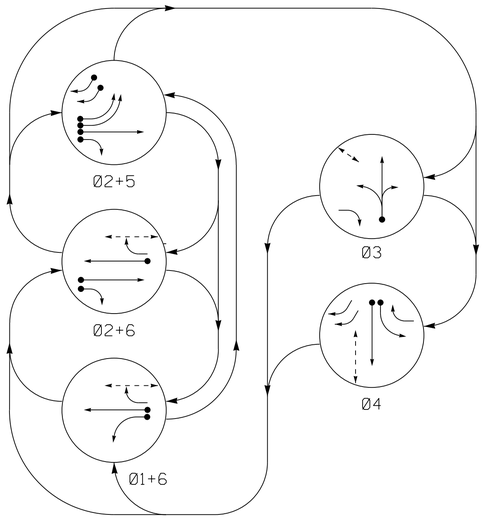
DocuSigned by: Derrick Waller 3/24/2023
SIGNATURE DATE

SIG. INVENTORY NO. 12-1689T1

11:14:23 AM
User:dawller
C:\projects\dgnols\Design\Electrical Details\Temporary Design\R-3833C_sig_ele_12_1689T1.dgn
User:dawller

PROJECT REFERENCE NO.	SHEET NO.
R-3833C	SIG-3.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

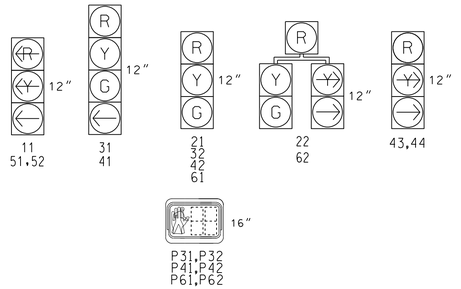
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+6	Ø2+6	Ø2+5	Ø3	Ø4	FLASH
11	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~Y~~
21	R	G	G	R	R	Y
22	R	G	G	R/→	R	Y
31	R	R	R	G	R	R
32	R	R	R	G	R	R
41	R	R	R	R	G	R
42	R	R	R	R	G	R
43,44	R	R	→	R	→	R
51,52	~~R~~	~~R~~	~~←~~	~~R~~	~~R~~	~~R~~
61	G	G	R	R	R	Y
62	G	G	R	R	R/→	Y
P31,P32	DW	DW	DW	W	DW	DRK
P41,P42	DW	DW	DW	DW	W	DRK
P61,P62	W	W	DW	DW	DW	DRK

SIGNAL FACE I.D.

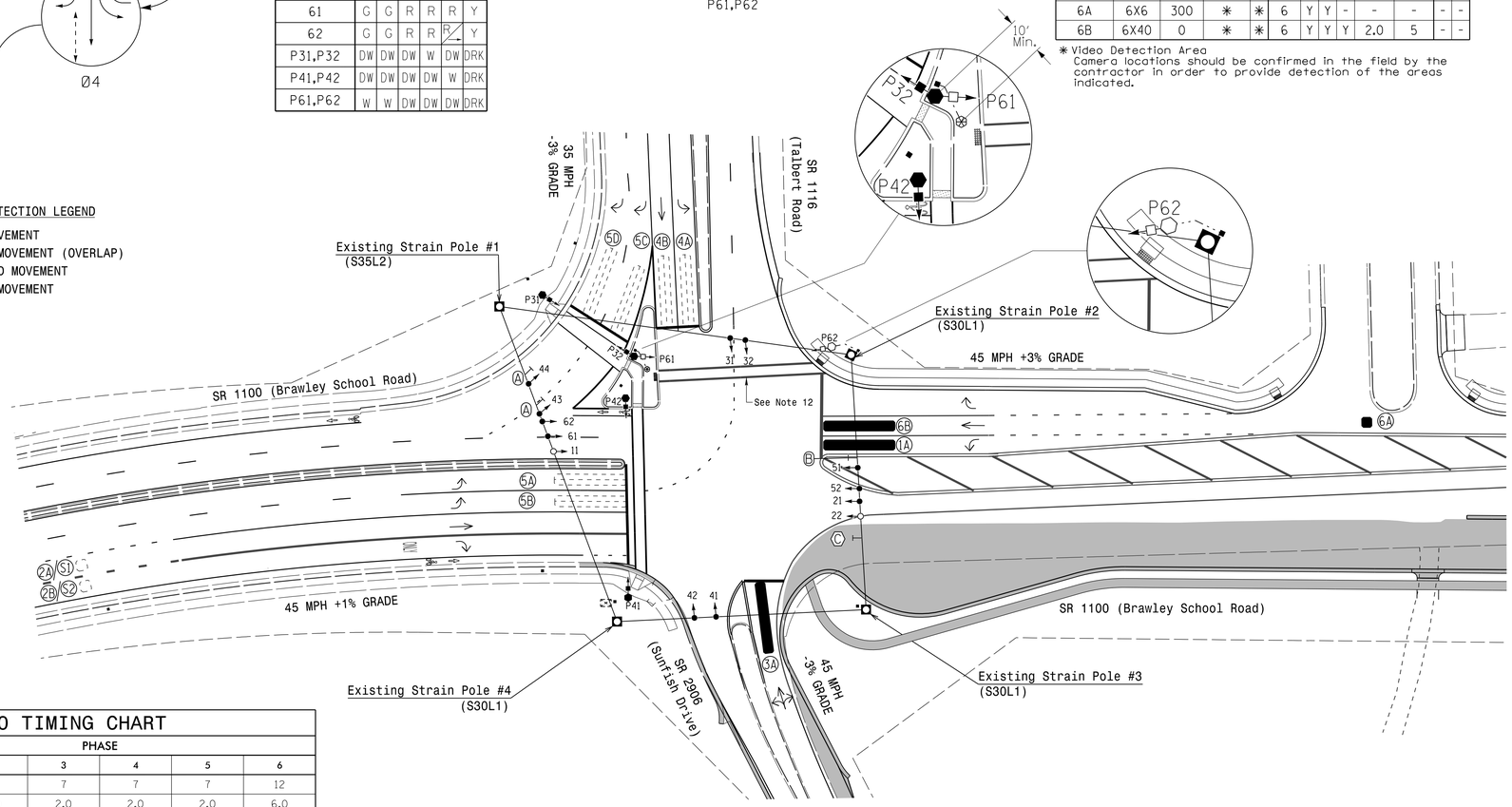
All Heads L.E.D.



OASIS 2070 LOOP & DETECTOR INSTALLATION CHART

INDUCTIVE LOOPS					DETECTOR PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
1A	6X40	0	✳	✳	1	Y	Y	-	-	-	-	✳
2A/S1	6X6	300	EXIST	-	2	Y	Y	-	-	-	Y	-
2B/S2	6X6	300	EXIST	-	2	Y	Y	-	-	-	Y	-
3A	6X40	0	✳	✳	3	Y	Y	-	-	10	-	-
4A	6X40	0	2-4-2	-	4	Y	Y	-	-	-	-	-
4B	6X40	0	2-4-2	-	4	Y	Y	-	-	-	-	-
5A	6X40	0	2-4-2	-	5	Y	Y	-	-	-	-	-
5B	6X40	0	2-4-2	-	5	Y	Y	-	-	-	-	-
5C	6X40	0	2-4-2	-	5	Y	Y	-	-	-	-	-
5D	6X40	0	2-4-2	-	5	Y	Y	-	-	-	-	-
6A	6X6	300	✳	✳	6	Y	Y	-	-	-	-	-
6B	6X40	0	✳	✳	6	Y	Y	Y	2.0	5	-	-

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



OASIS 2070 TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6
Min Green 1 *	7	12	7	7	7	12
Extension 1 *	2.0	6.0	2.0	2.0	2.0	6.0
Max Green 1 *	15	90	25	25	30	90
Yellow Clearance	3.0	4.4	4.8	4.1	3.0	4.3
Red Clearance	3.2	1.4	1.8	2.7	3.2	1.6
Red Revert	2.0	2.0	2.0	2.0	2.0	2.0
Walk 1 *	-	-	7	7	-	7
Don't Walk 1	-	-	9	24	-	22
Seconds Per Actuation *	-	1.5	-	-	-	-
Max Variable Initial *	-	34	-	-	-	-
Time Before Reduction *	-	15	-	-	-	15
Time To Reduce *	-	30	-	-	-	30
Minimum Gap	-	3.0	-	-	-	3.0
Recall Mode	-	MIN RECALL	-	-	-	MIN RECALL
Vehicle Call Memory	-	YELLOW	-	-	-	-
Dual Entry	-	-	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON	ON	ON

* 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.

5 Phase Fully Actuated Signal System 11210

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/or phase 5 may be lagged.
4. The order of phase 3 and phase 4 may be reversed.
5. Renumber signal heads 62 and 63 to 61 and 62, renumber pedestrian signal heads P61 and P62 to P31 and P32, and renumber pedestrian signal heads P63 and P64 to P61 and P62, respectively.
6. Set all detector units to presence mode.
7. This intersection features a video detection system. Shown locations of detectors are conceptual only. Detectors should be placed to ensure the desired operation parameters are achieved.
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. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
11. Shift signal heads 11,21,51,52,61, 62, and Sign B.
12. Crosswalk to be installed as shown in final pattern as part of the TMP.

LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
□↓	Pedestrian Signal Head With Push Button & Sign	■↓
○	Signal Pole with Guy	●
○⤵	Signal Pole with Sidewalk Guy	●⤵
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
□	Junction Box	■
·-·-·	2-in Underground Conduit	·-·-·
N/A	Right of Way	———
→	Directional Arrow	→
◎	Metal Strain Pole	◘
— DD —	Directional Drill	N/A
▬	Video Detection Area	N/A
⊛	Type I Pushbutton Post	⊛
⬡	Type II Signal Pedestal	⬢
▭	Construction Zone	N/A
Ⓐ	"NO TURN ON RED" Sign (R10-11)	Ⓐ
Ⓑ	"U-TURN YIELD TO RIGHT TURN" Sign (R10-16)	Ⓑ
Ⓒ	Right Arrow "ONLY" Sign (R3-5R)	Ⓒ

Signal Upgrade
Temporary Design 2 - TMP Phase II

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750 N.Greenfield Pkwy.Garner,NC 27529

SCALE 0 40 1" = 40'

SR 1100 (Brawley School Road) at SR 1116 (Talbert Road)/SR 2906 (Sunfish Drive)

Division 12 Iredell County Mooresville

PLAN DATE: May 2022 REVIEWED BY: E D Harris
PREPARED BY: J. Hambright REVIEWED BY: R M Muncey

REVISIONS	INIT.	DATE

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NORTH CAROLINA PROFESSIONAL SEAL 042678 ENGINEER DERRICK A. WALLER

DocuSigned by: Derrick Waller 3/24/2023
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SIG. INVENTORY NO. 12-168972

3/24/2023
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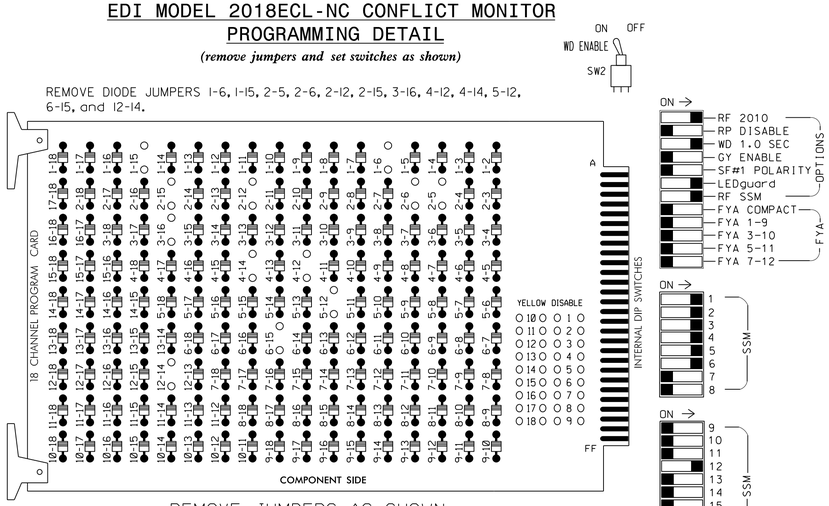
User:dwaller
Z:\Signals\Oasis\Design\Signal Design\Temporary Design\R-3833C_sig_dsn_12_168972.dgn

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 1-6, 1-15, 2-5, 2-6, 2-12, 2-15, 3-16, 4-12, 4-14, 5-12, 6-15, and 12-14.



REMOVE JUMPERS AS SHOWN

NOTES:

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

■ = DENOTES POSITION OF SWITCH

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Return controller to Factory Defaults before programming per this electrical detail.
3. Enable Simultaneous Gap-Out for all Phases.
4. Program phases 2 and 6 for Variable Initial and Gap Reduction.
5. Program phases 2 and 6 for Startup In Green.
6. Program phases 3, 4 and 6 for Startup Ped Call.
7. Program phases 2 and 6 for Yellow Flash.
8. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.

EQUIPMENT INFORMATION

CONTROLLER.....2070
CABINET.....332 W/ AUX
SOFTWARE.....ECONOLITE OASIS
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
LOAD SWITCHES USED.....S1,S2,S4,S5,S6,S7,S8,S9,S12,AUX S5
PHASES USED.....1,2,3,3PED,4,4PED,5,6,6PED
OVERLAP "A".....NOT USED
OVERLAP "B".....NOT USED
OVERLAP "C".....NOT USED
OVERLAP "D".....4+5

PROJECT REFERENCE NO.	SHEET NO.
R-3833C	SIG-3.1

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4			S5			S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3			4			14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3			4			4 PED	5	6	6 PED	7	8	3 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	11	21,22	NU	22	31	32	41	42	62	P41, P42	51,52	61,62	P61, P62	NU	NU	P31, P32	NU	NU	NU	NU	43,44	NU
RED		128			116	116	101	101				134									A101	
YELLOW		129			117	117	102	102				135										
GREEN		130			118	118	103	103				136										
RED ARROW	125										131											
YELLOW ARROW	126			117					102		132										A102	
GREEN ARROW	127			118	118		103		103		133										A103	
✋										104			119			110						
🚶										106			121			112						

NU = Not Used

★ See pictorial of head wiring in detail this sheet.

OVERLAP PROGRAMMING DETAIL

(program controller as shown below)

FROM MAIN MENU PRESS '8' (OVERLAPS), THEN '1' (VEHICLE OVERLAP SETTINGS).

PRESS '+' FOUR TIMES

```
 PAGE 1: VEHICLE OVERLAP 'D' SETTINGS
 PHASE:          |12345678910111213141516
VEH OVL PARENTS:|    XX
VEH OVL NOT VEH:|
VEH OVL NOT PED:|
VEH OVL GRN EXT:|
STARTUP COLOR: _ RED  _ YELLOW  _ GREEN
FLASH COLORS:  _ RED  _ YELLOW  _ GREEN
SELECT VEHICLE OVERLAP OPTIONS:   (Y/N)
FLASH YELLOW IN CONTROLLER FLASH?...Y
GREEN EXTENSION (0-255 SEC).........0
YELLOW CLEAR (0=PARENT,3-25.5 SEC)..0.0
RED CLEAR (0=PARENT,0.1-25.5 SEC)...0.0
OUTPUT AS PHASE # (0=NONE, 1-16)....0
```

OVERLAP PROGRAMMING COMPLETE

INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	SLOT EMPTY	Ø2/SYS 2A/S1	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	Ø 4 4A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	NOT USED	Ø6 PED DC ISOLATOR	FS DC ISOLATOR
	L		Ø2/SYS 2B/S2				Ø 4 4B						Ø4 PED DC ISOLATOR	Ø3 PED DC ISOLATOR	ST DC ISOLATOR
FILE "J"	U	Ø 5 5A	Ø 5 5C	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L	Ø 5 5B	Ø 5 5D												

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 ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
2A/S1	TB2-5,6	I2U	39	1	2	2/SYS	Y	Y			
2B/S2	TB2-7,8	I2L	43	5	12	2/SYS	Y	Y			
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			
4B	TB4-11,12	I6L	45	7	14	4	Y	Y			
5A	TB3-1,2	J1U	55	17	5	5	Y	Y			
5B	TB3-3,4	J1L	55	17	5	5	Y	Y			
5C	TB3-5,6	J2U	40	2	6	5	Y	Y			
5D	TB3-7,8	J2L	44	6	16	5	Y	Y			
PED PUSH BUTTONS											
P41,P42	TB8-5,6	I12L	69	31	PED 4	4 PED					
P61,P62	TB8-7,9	I13U	68	30	PED 6	6 PED					
P31,P32	TB8-8,9	I13L	70	32	PED 8	3 PED					

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

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

SPECIAL DETECTOR NOTE

For Detector Zones 1A, 3A, 6A and 6B, install a temporary 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.

FLASHER CIRCUIT MODIFICATION DETAIL

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

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

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 12-1689T2
DESIGNED: MAY 2022
SEALED: 3/24/2023
REVISED: N/A

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

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Division 12 | Iredell County | Mooresville

PLAN DATE: May 2022	REVIEWED BY: E D Harris
PREPARED BY: D A Waller	REVIEWED BY: R M Muncey

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 042678 DERRICK A. WALLER

DocuSigned by: Derrick Waller 3/24/2023
SIGNATURE DATE

SIG. INVENTORY NO. 12-1689T2

PROJECT REFERENCE NO.	SHEET NO.
R-3833C	SIG-3.2

PED 3 PROGRAMMING DETAIL

(program controller as shown below)

CHANGING OUTPUT ASSIGNMENTS

1. FROM MAIN MENU SELECT '6' (OUTPUTS), THEN '1' (OUTPUT ASSIGNMENTS)
2. ENTER 17 (PHASE 8 DW) FOR OUTPUT ASSIGNMENT #.
3. SCROLL DOWN TO 'PEDESTRIAN PHASE' AND ENTER 'Y' REGARDLESS OF DEFAULT PROGRAMMING
4. ENTER '3' FOR 'SELECT PEDESTRIAN PHASE'. NO CHANGE NEEDED FOR 'SELECT COLOR'
5. BACKUP TO 'OUTPUT ASSIGNMENTS AND SETTINGS MENU:' BY PRESSING THE 'ESC' BUTTON ON KEYBOARD.
6. SELECT '1' (OUTPUT ASSIGNMENTS)
7. ENTER 18 (PHASE 8 W) FOR OUTPUT ASSIGNMENT #.
8. REPEAT STEPS # 3 AND # 4.

CHANGING INPUT ASSIGNMENTS

1. FROM MAIN MENU SELECT '7' (DETECTORS), THEN '2' (PEDESTRIAN DETECTOR ASSIGNMENTS)
2. CYCLE TO PED DETECTOR #8 BY REPEATEDLY DEPRESSING '+' KEY
3. MODIFY PHASE ASSIGNED TO PED DETECTOR # 8 FROM PHASE 8 TO PHASE 3

PROGRAMMING COMPLETE

PHASE SEQUENCE PROGRAMMING DETAIL

(program controller as shown below)

FROM OASIS LOCAL CONTROLLER MAIN MENU
SELECT: 4 PHASE SEQUENCE

PHASE SEQUENCE: PAGE 1 NEXT: PAGES) ↘

RNG	LEAD	BARRIER 1		X-LAG	LEAD	BARRIER 2		X-LAG
1	1	2	0	0	3	4	0	0
2	0	6	0	5	0	0	0	0
3	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 12-1689T2
DESIGNED: MAY 2022
SEALED: 3/24/2023
REVISED: N/A

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

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Fax. (919) 851-7024
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Prepared for the Offices of:
Transportation Mobility and Safety Division
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

SR 1100 (Brawley School Road) at SR 1116 (Talbert Road)/SR 2906 (Sunfish Drive)

Division 12 Iredell County Mooresville

PLAN DATE:	May 2022	REVIEWED BY:	E D Harris
PREPARED BY:	D A Waller	REVIEWED BY:	R M Muncey

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 042678 ENGINEER DERRICK A WALLER

DocuSigned by: Derrick Waller 3/24/2023
SIGNATURE DATE

SIG. INVENTORY NO. 12-1689T2

11:45:57 AM
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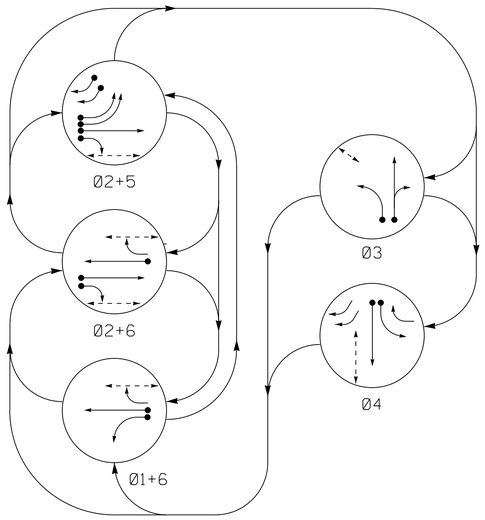
User:dwaller

PROJECT REFERENCE NO.	SHEET NO.
R-3833C	SIG-4.0

5 Phase Fully Actuated Signal System 11210

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

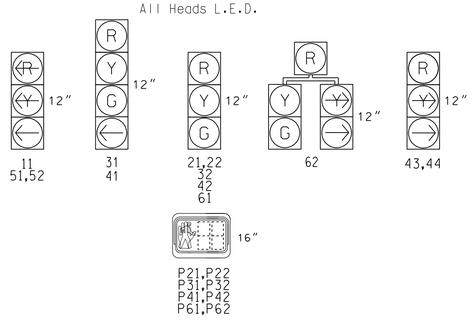
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+6	Ø2+6	Ø2+5	Ø3	Ø4	FLASH
11	~~←~~	~~R~~	~~R~~	~~R~~	~~R~~	~~Y~~
21,22	R	G	G	R	R	Y
31	R	R	R	G	R	R
32	R	R	R	G	R	R
41	R	R	R	R	G	R
42	R	R	R	R	G	R
43,44	R	R	→	R	→	R
51,52	~~R~~	~~R~~	←	~~R~~	~~R~~	~~R~~
61	G	G	R	R	R	Y
62	G	G	R	R	R/	Y
P21,P22	DW	W	W	DW	DW	DRK
P31,P32	DW	DW	DW	W	DW	DRK
P41,P42	DW	DW	DW	DW	W	DRK
P61,P62	W	W	DW	DW	DW	DRK

SIGNAL FACE I.D.

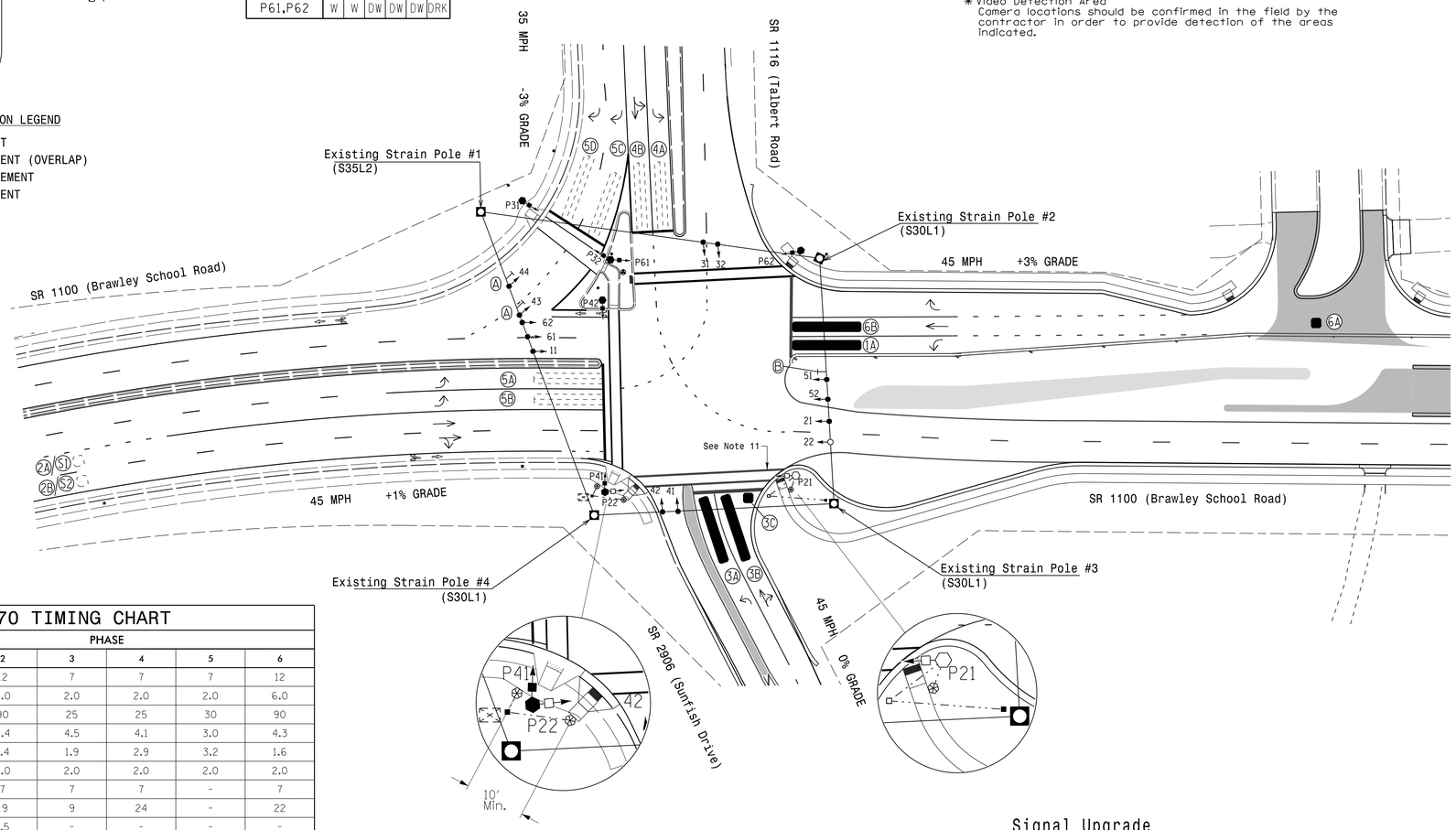
All Heads L.E.D.



OASIS 2070 LOOP & DETECTOR INSTALLATION CHART

INDUCTIVE LOOPS					DETECTOR PROGRAMMING						
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
1A	6X40	0	✳	✳	1	Y	Y	-	-	-	-	-
2A/S1	6X6	300	EXIST	-	2	Y	Y	-	-	-	Y	-
2B/S2	6X6	300	EXIST	-	2	Y	Y	-	-	-	Y	-
3A	6X40	0	✳	✳	3	Y	Y	-	-	-	-	-
3B	6X40	0	✳	✳	3	Y	Y	-	-	10	-	✳
3C	6X40	0	✳	✳	3	Y	Y	-	-	10	-	✳
4A	6X40	0	2-4-2	-	4	Y	Y	-	-	-	-	-
4B	6X40	0	2-4-2	-	4	Y	Y	-	-	-	-	-
5A	6X40	0	2-4-2	-	5	Y	Y	-	-	-	-	-
5B	6X40	0	2-4-2	-	5	Y	Y	-	-	-	-	-
5C	6X40	0	2-4-2	-	5	Y	Y	-	-	-	-	-
5D	6X40	0	2-4-2	-	5	Y	Y	-	-	-	-	-
6A	6X6	300	✳	✳	6	Y	Y	-	-	-	-	-
6B	6X40	0	✳	✳	6	Y	Y	Y	2.0	5	-	-

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



NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 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/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. This intersection features a video detection system. Shown locations of detectors are conceptual only. Detectors should be placed to ensure the desired operation parameters are achieved.
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. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
10. Shift signal heads 11.21.51.52, and Sign B.
11. Crosswalk to be installed as shown in final pattern as part of the TMP.

LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
▯↓	Pedestrian Signal Head With Push Button & Sign	■↓
○/	Signal Pole with Guy	●/
○⌒	Signal Pole with Sidewalk Guy	●⌒
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
□	Junction Box	■
------	2-in Underground Conduit	------
N/A	Right of Way	------
→	Directional Arrow	→
◯	Metal Strain Pole	■
DD —	Directional Drill	N/A
▬	Video Detection Area	N/A
⊛	Type I Pushbutton Post	⊛
⬡	Type II Signal Pedestal	⬢
▭	Construction Zone	N/A
Ⓐ	"NO TURN ON RED" Sign (R10-11)	Ⓐ
Ⓑ	"U-TURN YIELD TO RIGHT TURN" Sign (R10-16)	Ⓑ

OASIS 2070 TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6
Min Green 1 *	7	12	7	7	7	12
Extension 1 *	2.0	6.0	2.0	2.0	2.0	6.0
Max Green 1 *	15	90	25	25	30	90
Yellow Clearance	3.0	4.4	4.5	4.1	3.0	4.3
Red Clearance	3.3	1.4	1.9	2.9	3.2	1.6
Red Revert	2.0	2.0	2.0	2.0	2.0	2.0
Walk 1 *	-	7	7	7	-	7
Don't Walk 1	-	19	9	24	-	22
Seconds Per Actuation *	-	1.5	-	-	-	-
Max Variable Initial *	-	34	-	-	-	-
Time Before Reduction *	-	15	-	-	-	15
Time To Reduce *	-	30	-	-	-	30
Minimum Gap	-	3.0	-	-	-	3.0
Recall Mode	-	MIN RECALL	-	-	-	MIN RECALL
Vehicle Call Memory	-	YELLOW	-	-	-	-
Dual Entry	-	-	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON	ON	ON

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

Signal Upgrade
Temporary Design 3 - TMP Phase III

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750 N.Greenfield Pkwy.Garner,NC 27529

SCALE 0 40 1" = 40'

SR 1100 (Brawley School Road) at SR 1116 (Talbert Road)/SR 2906 (Sunfish Drive)

Division 12 Iredell County Mooresville

PLAN DATE:	May 2022	REVIEWED BY:	E D Harris
PREPARED BY:	J. Hambright	REVIEWED BY:	R M Muncey

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 042678 ENGINEER DERRICK A. WALLER

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SIG. INVENTORY NO. 12-1689T3

3/24/2023
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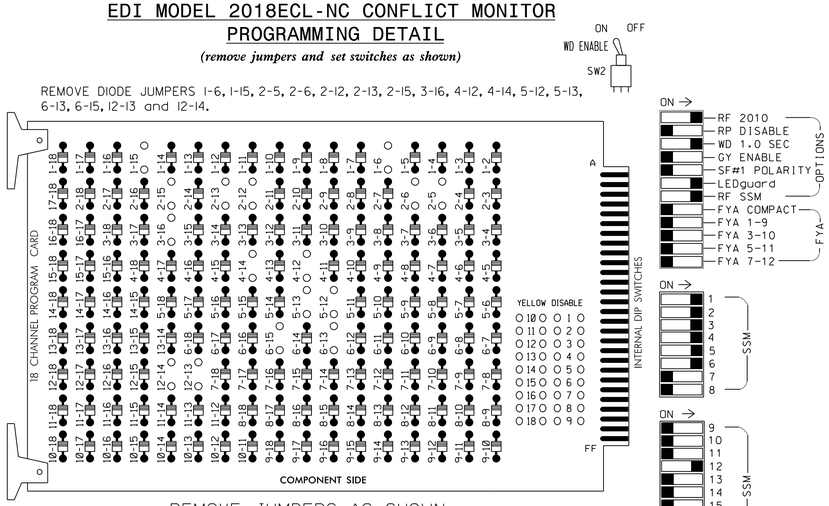
User:dwaller

PROJECT REFERENCE NO.	SHEET NO.
R-3833C	SIG-4.1

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 1-6, 1-15, 2-5, 2-6, 2-12, 2-13, 2-15, 3-16, 4-12, 4-14, 5-12, 5-13, 6-13, 6-15, 12-13 and 12-14.



REMOVE JUMPERS AS SHOWN

■ = DENOTES POSITION OF SWITCH

NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that Red Enable is active at all times during normal operation.
4. 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 Plans.
2. Enable Simultaneous Gap-Out for all Phases.
3. Program phases 2 and 6 for Variable Initial and Gap Reduction.
4. Program phases 2 and 6 for Startup In Green.
5. Program phases 2, 3, 4 and 6 for Startup Ped Call.
6. Program phases 2 and 6 for Yellow Flash.
7. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.

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	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	11	21,22	P21, P22	31	32	41	42	62	P41, P42	51,52	61,62	P61, P62	NU	NU	P31, P32	NU	NU	NU	NU	43,44	NU
RED		128		116	116	101	101				134									A101	
YELLOW		129		117	117	102	102				135										
GREEN		130		118	118	103	103				136										
RED ARROW	125									131											
YELLOW ARROW	126							102		132										A102	
GREEN ARROW	127			118		103		103		133										A103	
✋			113						104			119			110						
🚶			115						106			121			112						

NU = Not Used

★ See pictorial of head wiring in detail this sheet.

EQUIPMENT INFORMATION

CONTROLLER.....2070
CABINET.....332 W/ AUX
SOFTWARE.....ECONOLITE OASIS
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 S5
PHASES USED.....1,2,2PED,3,3PED,4,4PED,5,6,6PED
OVERLAP "A".....NOT USED
OVERLAP "B".....NOT USED
OVERLAP "C".....NOT USED
OVERLAP "D".....4+5

OVERLAP PROGRAMMING DETAIL

(program controller as shown below)

FROM MAIN MENU PRESS '8' (OVERLAPS), THEN '1' (VEHICLE OVERLAP SETTINGS).

PRESS '+' FOUR TIMES

```
 PAGE 1: VEHICLE OVERLAP 'D' SETTINGS
 PHASE:          |12345678910111213141516
VEH OVL PARENTS: |   XX
VEH OVL NOT VEH: |
VEH OVL NOT PED: |
VEH OVL GRN EXT: |
STARTUP COLOR: _ RED  _ YELLOW  _ GREEN
FLASH COLORS:  _ RED  _ YELLOW  _ GREEN
SELECT VEHICLE OVERLAP OPTIONS:   (Y/N)
FLASH YELLOW IN CONTROLLER FLASH?...Y
GREEN EXTENSION (0-255 SEC).........0
YELLOW CLEAR (0=PARENT,3-25.5 SEC)..0.0
RED CLEAR (0=PARENT,0.1-25.5 SEC)...0.0
OUTPUT AS PHASE # (0=NONE, 1-16)....0
```

OVERLAP PROGRAMMING COMPLETE

INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	SLOT EMPTY	ø2/SYS 2A/S1	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	ø4 4A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	ø2 PED ø6 PED DC ISOLATOR DC ISOLATOR	FS DC ISOLATOR
	L		ø2/SYS 2B/S2				ø4 4B						ø4 PED DC ISOLATOR	ø3 PED DC ISOLATOR	ST DC ISOLATOR
FILE "J"	U	ø5 5A	ø5 5C	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	ø5 5B	ø5 5D												

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 ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
2A/S1	TB2-5,6	I2U	39	1	2	2/SYS	Y	Y			
2B/S2	TB2-7,8	I2L	43	5	12	2/SYS	Y	Y			
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			
4B	TB4-11,12	I6L	45	7	14	4	Y	Y			
5A	TB3-1,2	J1U	55	17	5	5	Y	Y			
5B	TB3-3,4	J1L	55	17	5	5	Y	Y			
5C	TB3-5,6	J2U	40	2	6	5	Y	Y			
5D	TB3-7,8	J2L	44	6	16	5	Y	Y			
PED PUSH BUTTONS											
P21,P22	TB8-4,6	I12U	67	29	PED 2	2 PED					
P31,P32	TB8-8,9	I13L	70	32	PED 8	3 PED					
P41,P42	TB8-5,6	I12L	69	31	PED 4	4 PED					
P61,P62	TB8-7,9	I13U	68	30	PED 6	6 PED					

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

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

SPECIAL DETECTOR NOTE

For Detector Zones 1A, 3A, 3B, 3C, 6A and 6B, install a temporary 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.

FLASHER CIRCUIT MODIFICATION DETAIL

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

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

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

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 12-1689T3
DESIGNED: MAY 2022
SEALED: 3/24/2023
REVISED: N/A

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

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Division 12 Iredell County Mooresville

PLAN DATE:	May 2022	REVIEWED BY:	E D Harris
PREPARED BY:	D A Waller	REVIEWED BY:	R M Muncey

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 042678 ENGINEER DERRICK A WALLER

DocuSigned by: Derrick Waller 3/24/2023
SIGNATURE DATE

SIG. INVENTORY NO. 12-1689T3

PROJECT REFERENCE NO.	SHEET NO.
R-3833C	SIG-4.2

PED 3 PROGRAMMING DETAIL

(program controller as shown below)

CHANGING OUTPUT ASSIGNMENTS

1. FROM MAIN MENU SELECT '6' (OUTPUTS), THEN '1' (OUTPUT ASSIGNMENTS)
2. ENTER 17 (PHASE 8 DW) FOR OUTPUT ASSIGNMENT #.
3. SCROLL DOWN TO 'PEDESTRIAN PHASE' AND ENTER 'Y' REGARDLESS OF DEFAULT PROGRAMMING
4. ENTER '3' FOR 'SELECT PEDESTRIAN PHASE'. NO CHANGE NEEDED FOR 'SELECT COLOR'
5. BACKUP TO 'OUTPUT ASSIGNMENTS AND SETTINGS MENU:' BY PRESSING THE 'ESC' BUTTON ON KEYBOARD.
6. SELECT '1' (OUTPUT ASSIGNMENTS)
7. ENTER 18 (PHASE 8 W) FOR OUTPUT ASSIGNMENT #.
8. REPEAT STEPS # 3 AND # 4.

CHANGING INPUT ASSIGNMENTS

1. FROM MAIN MENU SELECT '7' (DETECTORS), THEN '2' (PEDESTRIAN DETECTOR ASSIGNMENTS)
2. CYCLE TO PED DETECTOR #8 BY REPEATEDLY DEPRESSING '+' KEY
3. MODIFY PHASE ASSIGNED TO PED DETECTOR # 8 FROM PHASE 8 TO PHASE 3

PROGRAMMING COMPLETE

PHASE SEQUENCE PROGRAMMING DETAIL

(program controller as shown below)

FROM OASIS LOCAL CONTROLLER MAIN MENU
SELECT: 4 PHASE SEQUENCE

PHASE SEQUENCE: PAGE 1 NEXT: PAGES) ↘

RNG	LEAD	BARRIER 1		X-LAG	LEAD	BARRIER 2		X-LAG
1	1	2	0	0	3	4	0	0
2	0	6	0	5	0	0	0	0
3	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 12-1689T3
DESIGNED: MAY 2022
SEALED: 3/24/2023
REVISED: N/A

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

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PLAN DATE:	May 2022	REVIEWED BY:	E D Harris
PREPARED BY:	D A Waller	REVIEWED BY:	R M Muncey

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 042678 ENGINEER DERRICK A WALLER

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Derrick Waller 3/24/2023
ENGINEER'S SIGNATURE DATE

SIG. INVENTORY NO. 12-1689T3

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User:dawaller
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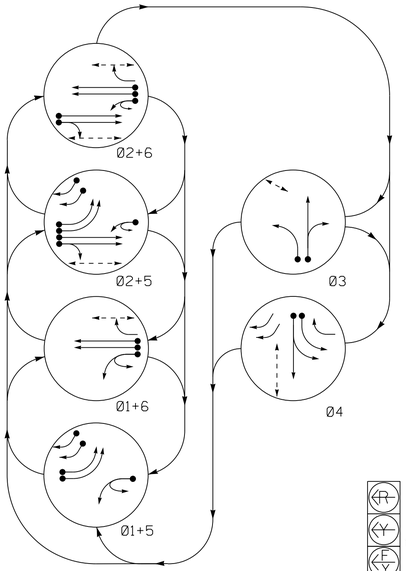
User:dawaller

PROJECT REFERENCE NO.	SHEET NO.
R-3833C	SIG-5.0

6 Phase Fully Actuated w/Alternate Phasing Operation Signal System 11210

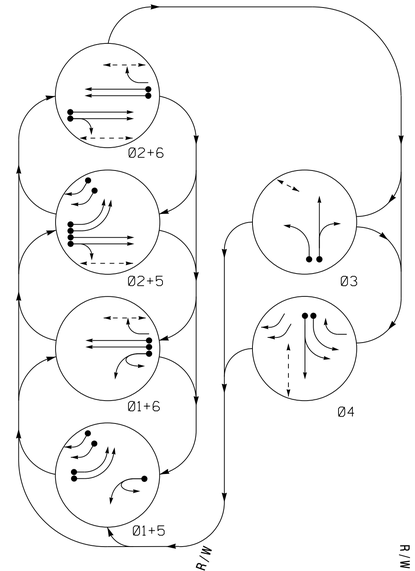
DEFAULT PHASING DIAGRAM



DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3	Ø4	FLASH
11	←●	←	~~F~~ Y	~~F~~ Y	~~R~~	~~R~~	~~Y~~
21,22	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~~	←	~~R~~
42	R	R	R	R	R	~~G~~	R
43,44	→	R	→	R	R	→	R
51,52	←	~~R~~	←	~~R~~	~~R~~	~~R~~	~~R~~
61,63	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	DW	DW	DW	DW	DW	W	DRK
P61,P62	DW	W	DW	W	DW	DW	DRK

ALTERNATE PHASING DIAGRAM



ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3	Ø4	FLASH
11	←●	←	~~R~~	~~R~~	~~R~~	~~R~~	~~Y~~
21,22	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~~	←	~~R~~
42	R	R	R	R	R	~~G~~	R
43,44	→	R	→	R	R	→	R
51,52	←	~~R~~	←	~~R~~	~~R~~	~~R~~	~~R~~
61,63	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	DW	DW	DW	DW	DW	W	DRK
P61,P62	DW	W	DW	W	DW	DW	DRK

ASC/3 DETECTOR INSTALLATION CHART

DETECTOR LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
1A	6X40	0	2-4-2	X	1	Yes	-	15*	-	N	-	X
					6#	Yes	-	-	-	G	-	X
2A/S1	6X6	300	EXIST	-	2	Yes	-	-	X	N	X	X
2B/S2	6X6	300	EXIST	-	2	Yes	-	-	X	N	X	X
3A	6X40	0	2-4-2	X	3	Yes	-	-	-	N	-	X
3B	6X40	0	2-4-2	X	3	Yes	-	10	-	N	-	X
3C	6X6	0	4	X	3	Yes	-	15	-	N	-	X
4A	6X40	0	2-4-2	-	4	Yes	-	-	-	N	-	X
4B	6X40	0	2-4-2	-	4	Yes	-	-	-	N	-	X
5A	6X40	0	2-4-2	-	5	Yes	-	-	-	N	-	X
5B	6X40	0	2-4-2	-	5	Yes	-	-	-	N	-	X
5C	6X40	0	2-4-2	-	5	Yes	-	-	-	N	-	X
5D	6X40	0	2-4-2	-	5	Yes	-	-	-	N	-	X
6A/S3	6X6	325	6	X	6	Yes	-	-	X	N	X	X
6B/S4	6X6	325	6	X	6	Yes	-	-	X	N	X	X

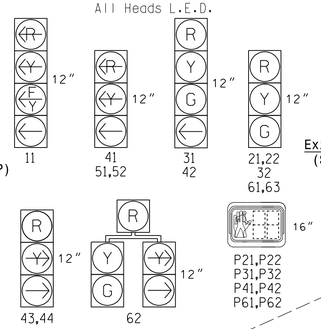
* Disable delay during Alternate Phasing operation.
\# Disable phase call for loop during Alternate Phasing operation.

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/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. The Division Traffic Engineer will determine the hours of use for each phasing plan.
9. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
10. Install new cabinet on the existing cabinet foundation.
11. Shift signal heads 11,61,62 and Sign B.

SIGNAL FACE I.D.

All Heads L.E.D.



PHASING DIAGRAM DETECTION LEGEND

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

LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
□↓	Pedestrian Signal Head With Push Button & Sign	■↓
○	Signal Pole with Guy	●
○	Signal Pole with Sidewalk Guy	●
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
□	Junction Box	■
□	Oversized Junction Box	■
·····	2-in Underground Conduit	·····
N/A	Right of Way	———
→	Directional Arrow	→
○	Metal Pole with Mastarm	○
—DD#—	Directional Drill	N/A
⊛	Type I Pushbutton Post	●
⬡	Type II Signal Pedestal	⬢
Ⓐ	"NO TURN ON RED" Sign (R10-11)	Ⓐ
Ⓑ	"U-TURN YIELD TO RIGHT TURN" Sign (R10-16)	Ⓑ
Ⓒ	"RIGHT TURN YIELD TO U-TURN" Sign (R10-30)	Ⓒ

ASC/3 TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6
Min Green *	7	12	7	7	7	12
Walk *	-	7	7	7	-	7
Ped Clear	-	19	9	24	-	22
Veh. Extension *	2.0	6.0	2.0	2.0	2.0	6.0
Max 1 *	15	90	20	25	30	90
Yellow	3.0	4.4	4.5	4.1	3.0	4.4
Red Clear	3.4	2.1	1.9	2.9	3.2	2.1
Red Revert	2.0	2.0	2.0	2.0	2.0	2.0
Actuations B4 Add *	-	-	-	-	-	-
Seconds /Actuation *	-	1.5	-	-	-	1.5
Max Initial *	-	34	-	-	-	34
Time Before Reduction *	-	15	-	-	-	15
Time To Reduce *	-	30	-	-	-	30
Minimum Gap	-	3.0	-	-	-	3.0
Locking Detector	-	X	-	-	-	X
Recall Position	-	VEH. RECALL	-	-	-	VEH. RECALL
Dual Entry	-	-	-	-	-	-
Simultaneous Gap	X	X	X	X	X	X

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

Signal Upgrade - Final Design

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Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road-Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
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Prepared for the Offices of:
Transportation Mobility and Safety Division
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signal Design Section
750 N.Greenfield Pkwy.Garner,NC 27529

SCALE 0 40 1" = 40'

SR 1100 (Brawley School Road) at SR 1116 (Talbert Road)/SR 2906 (Sunfish Drive)

Division 12 Iredell County Mooresville

PLAN DATE: May 2022 REVIEWED BY: E D Harris
PREPARED BY: J. Hambright REVIEWED BY: R M Muncey

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 042678 DERRICK A WALLER

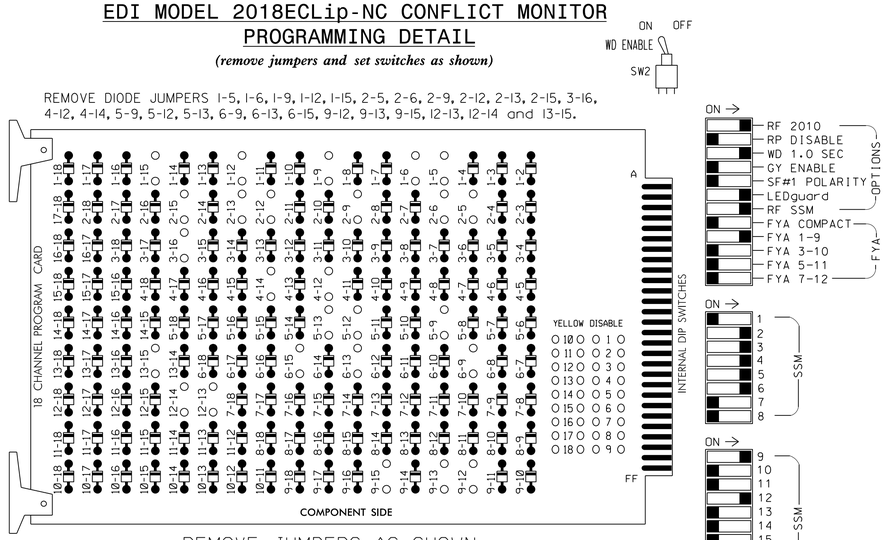
DocuSigned by: Derrick Waller 3/24/2023
SIGNATURE DATE

SIG. INVENTORY NO. 12-1689

3/24/2023 11:48:03 AM
U:\Mobility\Traffic Signals\Design\Signal Design\R-3833C_sig_dsn_12-1689.dgn
User:dwaller

EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE JUMPERS AS SHOWN

NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that Red Enable is active at all times during normal operation.
4. 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. Return controller to Factory Defaults before programming per this electrical detail.
3. Program controller to start up in phase 2 Walk and 6 Walk.
4. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.

EQUIPMENT INFORMATION

CONTROLLER.....2070LX
CABINET.....332 W/AUX
SOFTWARE.....ECONOLITE ASC/3-2070
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 S1,AUX S5
PHASES USED.....1,2,2PED,3,3PED,4,4PED,5,6, 6PED
OVERLAP "A".....*
OVERLAP "B".....NOT USED
OVERLAP "C".....NOT USED
OVERLAP "D".....*

* See overlap programming detail on sheet 2

PROJECT REFERENCE NO.	SHEET NO.
R-3833C	SIG-5.1

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4		S5			S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3		4			14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3		4			4 PED	5	6	6 PED	7	8	3 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	11 ★	21,22	P21, P22	31	32	41	42	62	P41, P42	51,52	61,63	P61, P62	NU	NU	P31, P32	11 ★	NU	NU	NU	43,44	NU
RED		128		116	116		101				134									A101	
YELLOW	*	129		117	117		102				135										
GREEN		130		118	118		103				136										
RED ARROW						101				131						A121					
YELLOW ARROW						102		102		132						A122				A102	
FLASHING YELLOW ARROW																A123					
GREEN ARROW	127			118		103	103	103		133										A103	
✋			113						104			119			110						
🚶			115						106			121			112						

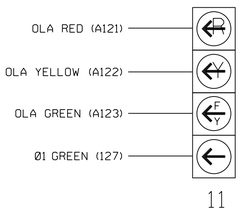
NU = Not Used

* 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 head as shown)



INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	Ø 1	Ø2/SYS	SLOT	WIRED ⊗ INPUT	Ø 3	Ø 3	Ø 4	SLOT	SLOT	SLOT	SLOT	Ø2 PED DC ISOLATOR	Ø6 PED DC ISOLATOR	FS DC ISOLATOR
		1A	2A/S1	EMPTY		3A	3B	4A	EMPTY	EMPTY	EMPTY	EMPTY			
	L	NOT USED	Ø2/SYS			NOT USED	Ø 3	Ø 4					Ø4 PED DC ISOLATOR	Ø3 PED DC ISOLATOR	ST DC ISOLATOR
			2B/S2				3C	4B							
FILE "J"	U	Ø 5	Ø 5	Ø6/SYS	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
		5A	5C	6A/S3											
	L	Ø 5	Ø 5	Ø6/SYS											
		5B	5D	6B/S4											

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

FS = FLASH SENSE
ST = STOP TIME

⊗ Wired Input - Do not populate slot with detector card

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND TIME	DELAY TIME	ADDED INITIAL	DETECTOR TYPE
1A [1]	TB2-1,2	I1U	56	1 ★	1	YES		15		N
	-	J4U	48	26 ★	6	YES				G
2A/S1	TB2-5,6	I2U	39	2	2/SYS	YES			X	N
2B/S2	TB2-7,8	I2L	43	12	2/SYS	YES			X	N
3A	TB4-5,6	I5U	58	3	3	YES				N
3B	TB4-9,10	I6U	41	4	3	YES		10		N
3C	TB4-11,12	I6L	45	14	3	YES		15		N
4A	TB6-1,2	I7U	65	34	4	YES				N
4B	TB6-3,4	I7L	78	44	4	YES				N
5A	TB3-1,2	J1U	55	5	5	YES				N
5B	TB3-3,4	J1L	55	5	5	YES				N
5C	TB3-5,6	J2U	40	6	5	YES				N
5D	TB3-7,8	J2L	44	16	5	YES				N
6A/S3	TB3-9,10	J3U	64	36	6/SYS	YES			X	N
6B/S4	TB3-11,12	J3L	77	46	6/SYS	YES			X	N
PED PUSH BUTTONS										
P21,P22	TB8-4,6	I12U	67	PED 2	2 PED					
P31,P32	TB8-8,9	I13L	70	PED 8	3 PED					
P41,P42	TB8-5,6	I12L	69	PED 4	4 PED					
P61,P62	TB8-7,9	I13U	68	PED 6	6 PED					

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

[1] Add jumper from I1-W to J4-W, on rear of input file.

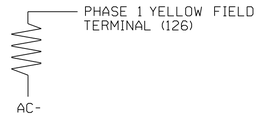
★ For the detectors to work as shown on the signal design plan, see the Vehicle Detector Setup Programming Detail for Alternate Phasing on sheet 2.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

LOAD RESISTOR INSTALLATION DETAIL

(install resistor as shown below)

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



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: 12-1689
DESIGNED: MAY 2022
SEALED: 3/24/2023
REVISED: N/A

Final Design
Electrical Detail - Sheet 1 of 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road-Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
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SR 1100 (Brawley School Road) at SR 1116 (Talbert Road)/SR 2906 (Sunfish Drive)

Division 12 | Iredell County | Mooresville

PLAN DATE:	May 2022	REVIEWED BY:	E D Harris
PREPARED BY:	D A Waller	REVIEWED BY:	R M Muncey

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 042678 DERRICK A. WALLER

DocuSigned by: Derrick Waller 3/24/2023
SIGNATURE DATE

SIG. INVENTORY NO. 12-1689

12:21:55 PM
J:\Traffic Signals\Design\Electrical Details\Final Design\R-3833C_sig_ele_12_1689.dgn
User:dwaller

PROJECT REFERENCE NO.	SHEET NO.
R-3833C	SIG-5.2

ECONOLITE ASC/3-2070 VEHICLE DETECTOR SETUP PROGRAMMING DETAIL FOR ALTERNATE PHASING LOOP 1A

(program controller as shown)

IMPORTANT!

Program detectors per the input file connection and programming chart shown on sheet 1 before proceeding.

1. From Main Menu select [8. UTILITIES]
2. From UTILITIES Submenu select [1. COPY/CLEAR]
3. Copy from DETECTOR PLAN "1" to DETECTOR PLAN "2".

```
COPY / CLEAR UTILITY
      FROM                TO
PHASE TIMING.... . > PHASE TIMING.... .
TIMING PLAN..... . > TIMING PLAN..... .
PH DET OPT PLAN. . > PH DET OPT PLAN. .
DETECTOR PLAN... 1 > DETECTOR PLAN... 2
  TOGGLE TO SELECT A "FROM" AND A "TO"
          THEN PRESS ENTER
```

4. From Main Menu select [6. DETECTORS]
5. From DETECTOR Submenu select [2. VEHICLE DETECTOR SETUP]
6. Place cursor in VEH DET PLAN [ ] position and enter "2".
   - Place cursor in VEH DETECTOR [ ] position and enter "1".
   - Set delay time to "0".

```
VEH DETECTOR [ 1]   VEH DET PLAN [ 2]
TYPE: N-NTCIP
TS2 DETECTOR..... . ECPI LOG.......   NO
DET PH - 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 1  1    . . . . . . . . . . . . . . . .
EXTEND TIME...  0.0 DELAY TIME...    0.0
USE ADDED INITIAL . CROSS SWITCH PH..  0
LOCK IN..... NONE NTCIP VOL . OR OCC .
PMT QUEUE DELAY. NO
```

← NOTICE VEH DET PLAN 2

← ENSURE DELAY IS SET TO '0'

   - Place cursor in VEH DETECTOR [ ] position and enter "26".
   - Set assigned phase to "0".

```
VEH DETECTOR [26]   VEH DET PLAN [ 2]
TYPE: G-GREEN EXTENSION/DELAY
TS2 DETECTOR..... . ECPI LOG.......   NO
DET PH - 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 26 0    . . . . . . . . . . . . . . . .
EXTEND TIME...  0.0 DELAY TIME...    0.0
USE ADDED INITIAL . CROSS SWITCH PH..  0
LOCK IN..... NONE NTCIP VOL . OR OCC .
PMT QUEUE DELAY. NO
```

← NOTICE VEH DET PLAN 2

ENSURE PHASE IS SET TO "0" →

END PROGRAMMING

ECONOLITE ASC/3-2070 PED 3 PROGRAMMING ASSIGNMENT DETAIL

(program controller as shown)

1. From Main Menu select [6. DETECTORS]
2. From DETECTOR Submenu select [3. PED DETECTOR INPUT ASSIGNMENT]

```
PED DET PHASE ASSIGNMENT MODE:  NTCIP

   PHASE  1   2   3   4   5   6   7   8
DETECTOR  0   2   8   4   0   6   0   0

   PHASE  9  10  11  12  13  14  15  16
DETECTOR  0   0   0   0   0   0   0   0
```

← NOTICE PED DETECTOR 8 ASSIGNED TO PHASE 3

1. From Main Menu select [1. CONFIGURATION]
2. From CONFIGURATION Submenu select [3. LOAD SW ASSIGN]

```
LD SWITCH ASSIGN
    PHASE      DIMMING ---FLASH---
    /OVLP TYPE R Y G D PWR AUT TGR
1     1    V    . . . + A    R    X
2     2    V    . . . + A    Y    .
3     3    V    . . . + A    R    X
4     4    V    . . . + A    R    .
5     5    V    . . . - A    R    .
6     6    V    . . . - A    Y    X
7     7    V    . . . - A    R    .
8     8    V    . . . - A    R    X
9     1    O    . . . + A    R    X
10    2    O    . . . + A    R    X
11    3    O    . . . - A    R    .
12    4    O    . . . - A    R    .
13    2    P    . . . + A    .    .
14    4    P    . . . - A    .    .
15    6    P    . . . + A    .    .
16    3    P    . . . - A    .    .
```

NOTICE PHASE 3 PED ASSIGNED TO LD SWITCH 16 →

ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select [2. CONTROLLER]
2. From CONTROLLER Submenu select [2. VEHICLE OVERLAPS]

OVERLAP A

Select TMG VEH OVLP [A] and 'PPLT FYA'

```
TMG VEH OVLP...[A] TYPE: .....PPLT FYA

PROTECTED LEFT TURN....   PHASE    1
OPPOSING THROUGH.......   PHASE    2

FLASHING ARROW OUTPUT.....CH9  ISOLATE

DELAY START OF: FYA..0.0 CLEARANCE..0.0
ACTION PLAN SF BIT DISABLE.......... 1
```

← NOTICE ACTION PLAN SF BIT "1"

Toggle Three Times

OVERLAP D

Select TMG VEH OVLP [D] and 'NORMAL'

```
TMG VEH OVLP...[D] TYPE: ......NORMAL
  PHASES 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
INCLUDED . . . X X . . . . . . . . . . .

LAG GRN 0.0 YEL 0.0 RED 0.0
```

END PROGRAMMING

FLASHER CIRCUIT MODIFICATION DETAIL

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

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

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 12-1689
DESIGNED: MAY 2022
SEALED: 3/24/2023
REVISED: N/A

Final Design
Electrical Detail - Sheet 2 of 3

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Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road-Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
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Division 12 | Iredell County | Mooresville

PLAN DATE:	May 2022	REVIEWED BY:	E D Harris
PREPARED BY:	D A Waller	REVIEWED BY:	R M Muncey

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 042678 ENGINEER DERRICK A. WALLER

DocuSigned by: Derrick Waller 3/24/2023
SIGNATURE DATE

SIG. INVENTORY NO. 12-1689

PROJECT REFERENCE NO.	SHEET NO.
R-3833C	SIG-5.3

ALTERNATE PHASING ACTIVATION DETAIL

TO RUN ALT. PHASING DURING FREE RUN - PROGRAM CHANGES (SHOWN BELOW) IN A TIME BASED ACTION PLAN. SCHEDULE A DAY PLAN THAT INCLUDES THE ACTION PLAN PROGRAMMED TO SELECT VEH DET PLAN 2 AND ENABLE SF BIT 1.

TO RUN ALT. PHASING DURING COORDINATION - SELECT THE TIME BASED ACTION PLAN THAT IS PROGRAMMED TO SELECT VEH DET PLAN 2 AND ENABLE SF BIT 1.

PHASING	VEH DET PLAN	SF BIT ENABLED
ACTIONS REQUIRED TO RUN DEFAULT PHASING	1	NONE
ACTIONS REQUIRED TO RUN ALTERNATE PHASING	2	1

IMPORTANT: IF ALT. PHASING IS USED DURING FREE RUN AND COORDINATION, DO NOT OPERATE TIME OF DAY EVENTS CONCURRENTLY WITH COORDINATION PLAN EVENTS IN THE EVENT SCHEDULER. (EX. FREE RUN EVENT SHOULD END BEFORE COORDINATION PLAN EVENT STARTS AND VICE-VERSA).

ALTERNATE PHASING CHANGE SUMMARY

THE FOLLOWING IS A SUMMARY OF WHAT TAKES PLACE WHEN SF BIT 1 AND VEH DET PLAN 2 ACTIVATE TO CALL THE "ALTERNATE PHASING":

SF BIT 1: Modifies overlap parent phases for head 11 to run protected turns only.

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

ECONOLITE ASC/3-2070 ACTION PLAN PROGRAMMING DETAIL

1. From Main Menu select [5. TIME BASE]
2. From TIME BASE Submenu select [2. ACTION PLAN]

```
ACTION PLAN...[  *]
PATTERN.....AUTO   SYS OVERRIDE.... NO
TIMING PLAN..... 0   SEQUENCE.....  0
VEH DETECTOR PLAN.. 2   DET LOG.....NONE
FLASH.....   --   RED REST..... NO
VEH DET DIAG PLN... 0   PED DET DIAG PLN..0
DIMMING ENABLE..   NO   PRIORITY RETURN. NO
PED PR RETURN..    NO   QUEUE DELAY..... NO
PMT COND DELAY     NO
  PHASE   1  2  3  4  5  6  7  8  9  0  1  2  3  4  5  6
PED RCL   .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
WALK 2    .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
VEX 2     .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
VEH RCL   .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
MAX RCL   .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
MAX 2     .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
  PHASE   1  2  3  4  5  6  7  8  9  0  1  2  3  4  5  6
MAX 3     .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
CS INH    .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
OMIT      .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
SPC FCT   X  .  .  .  .  .  .  .  (1-8)
AUX FCT   .  .  .  (1-3)
          1  2  3  4  5  6  7  8  9  0  1  2  3  4  5
LP 1-15   .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 16-30  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 31-45  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 46-60  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 61-75  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 76-90  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 91-100 .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
```

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 12-1689
DESIGNED: MAY 2022
SEALED: 3/24/2023
REVISED: N/A

Final Design
Electrical Detail - Sheet 3 of 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road-Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
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Prepared for the Offices of:
Transportation Mobility and Safety Division
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

SR 1100 (Brawley School Road) at SR 1116 (Talbert Road)/SR 2906 (Sunfish Drive)

Division 12 Iredell County Mooresville

PLAN DATE:	May 2022	REVIEWED BY:	E D Harris
PREPARED BY:	D A Waller	REVIEWED BY:	R M Muncey

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 042678 ENGINEER DERRICK A WALLER

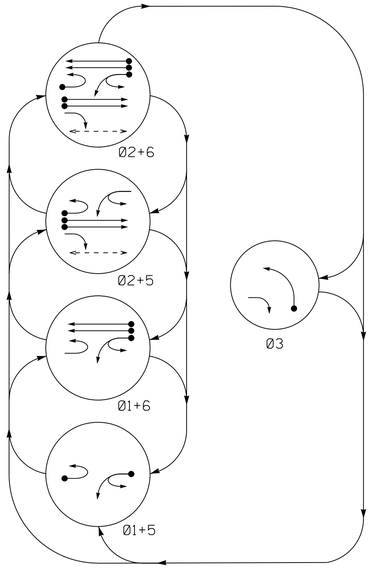
DocuSigned by:
Derrick Waller
B3C9B0A04B5E...
SIGNATURE 3/24/2023
DATE

SIG. INVENTORY NO. 12-1689

PROJECT REFERENCE NO.	SHEET NO.
R-3833C	SIG-6.0

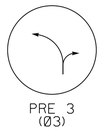
5 Phase Fully Actuated with Emergency Vehicle Preemption & Alternate Phasing Operation Signal System 11210

DEFAULT PHASING DIAGRAM



DEFAULT PHASING EV PREEMPT PHASES

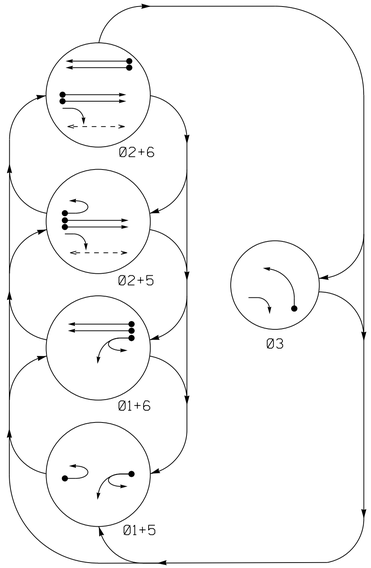
(Medium Priority)



DEFAULT PHASNG TABLE OF OPERATION

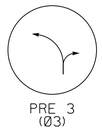
SIGNAL FACE	PHASE 01+05	01+06	02+05	02+06	03	PRE 3	FLASH
11	←-	←-	~~F~~ Y	~~F~~ Y	~~R~~	~~R~~	~~Y~~
21,22	R	R	G	G	R	R	Y
23	R	R	~~F~~ Y	~~F~~ Y	~~F~~ Y	R	~~Y~~
31,32	R	R	R	R	G	G	R
51	↶	~~F~~ Y	↶	~~F~~ Y	~~R~~	~~R~~	~~Y~~
61,62	R	G	R	G	R	R	Y
P21,P22	DW	DW	W	W	DW	DW	DRK

ALTERNATE PHASING DIAGRAM



ALTERNATE PHASING EV PREEMPT PHASES

(Medium Priority)



ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE 01+05	01+06	02+05	02+06	03	PRE 3	FLASH
11	←-	←-	~~R~~	~~R~~	~~R~~	~~R~~	~~Y~~
21,22	R	R	G	G	R	R	Y
23	R	R	~~F~~ Y	~~F~~ Y	~~F~~ Y	R	~~Y~~
31,32	R	R	R	R	G	G	R
51	↶	~~R~~	↶	~~R~~	~~R~~	~~R~~	~~Y~~
61,62	R	G	R	G	R	R	Y
P21,P22	DW	DW	W	W	DW	DW	DRK

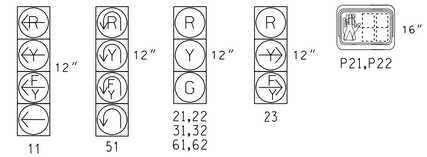
ASC/3 DETECTOR INSTALLATION CHART

DETECTOR LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
1A	6X40	0	2-4-2	X	1	Yes	-	15*	-	N	-	X
					6#	Yes	-	-	-	G	-	X
2A	6X6	300	5	X	2	Yes	-	-	X	N	-	X
2B	6X6	300	5	X	2	Yes	-	-	X	N	-	X
3A	6X40	0	2-4-2	X	3	Yes	-	3	-	N	-	X
5A	6X40	0	2-4-2	X	5	Yes	-	15*	-	N	-	X
					2#	Yes	-	-	-	G	-	X
6A	6X6	300	5	X	6	Yes	-	-	X	N	-	X
6B	6X6	300	5	X	6	Yes	-	-	X	N	-	X

* Disable delay during Alternate Phasing operation.
\# Disable phase call for loop during Alternate Phasing operation.

SIGNAL FACE I.D.

All Heads L.E.D.

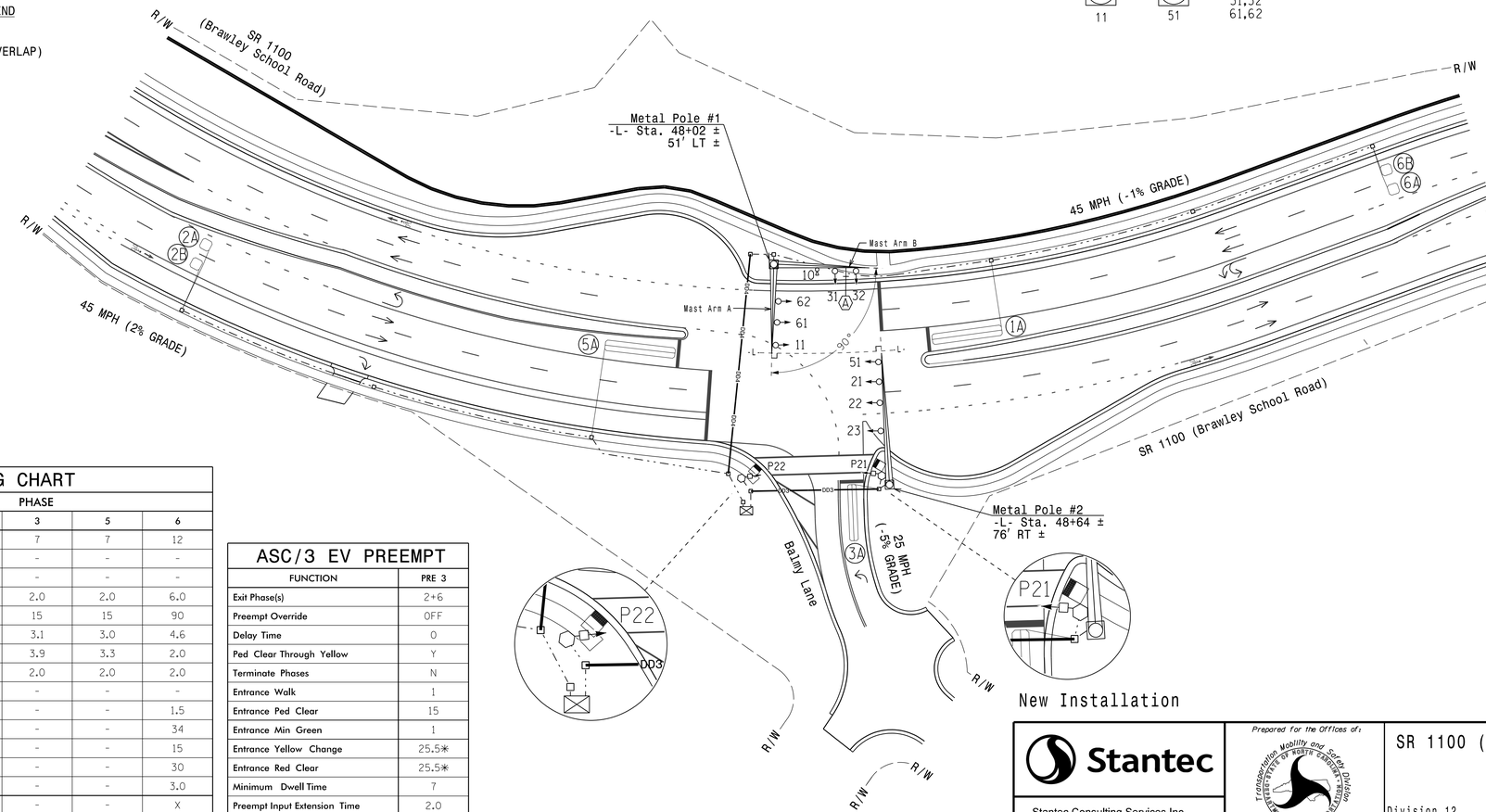


NOTES

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/or 5 may be lagged.
4. Set all detector units to presence mode
5. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
6. 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 features an optical preemption system. Shown locations of optical detectors are conceptual only.
9. Optical detector 10 calls PRE 3.
10. The Division Traffic Engineer will determine the hours of use for each phasing plan.
11. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.

PHASING DIAGRAM DETECTION LEGEND

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



LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
▭↓	Pedestrian Signal Head With Push Button & Sign	■↓
○	Signal Pole with Guy	●
○	Signal Pole with Sidewalk Guy	●
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
□	Junction Box	■
·····	2-in Underground Conduit	·····
N/A	Right of Way	———
→	Directional Arrow	→
◁▭	Metal Pole with Mastarm	◁■
—DD#—	Directional Drill	N/A
⬡	Type II Signal Pedestal	⬢
⊙◁	Optical EVP Detector	⊙◀
	Curb Ramps	N/A
Ⓐ	Left Arrow "ONLY" Sign (R3-5L)	Ⓐ

ASC/3 TIMING CHART

FEATURE	PHASE 1	2	3	5	6
Min Green *	7	12	7	7	12
Walk *	-	7	-	-	-
Ped Clear	-	15	-	-	-
Veh. Extension *	2.0	6.0	2.0	2.0	6.0
Max 1 *	15	90	15	15	90
Yellow	3.0	4.6	3.1	3.0	4.6
Red Clear	3.3	2.0	3.9	3.3	2.0
Red Revert	2.0	2.0	2.0	2.0	2.0
Actuations B4 Add *	-	-	-	-	-
Seconds /Actuation *	-	1.5	-	-	1.5
Max Initial *	-	34	-	-	34
Time Before Reduction *	-	15	-	-	15
Time To Reduce *	-	30	-	-	30
Minimum Gap	-	3.0	-	-	3.0
Locking Detector	-	X	-	-	X
Recall Position	-	VEH. RECALL	-	-	VEH. RECALL
Dual Entry	-	-	-	-	-
Simultaneous Gap	X	X	X	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.

ASC/3 EV PREEMPT

FUNCTION	PRE 3
Exit Phase(s)	2+6
Preempt Override	OFF
Delay Time	0
Ped Clear Through Yellow	Y
Terminate Phases	N
Entrance Walk	1
Entrance Ped Clear	15
Entrance Min Green	1
Entrance Yellow Change	25.5*
Entrance Red Clear	25.5*
Minimum Dwell Time	7
Preempt Input Extension Time	2.0
Preempt Max Time	120
Exit Yellow Change	25.5*
Exit Red Clear	25.5*

* Time defaults to time used for phase during normal operation.

New Installation

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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Raleigh, NC 27606
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Prepared for the Offices of:
Transportation Mobility and Safety Division
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signal Design Section
750 N.Greenfield Pkwy.Garner,NC 27529

SCALE 0 40 1" = 40'

SR 1100 (Brawley School Road) at Balmy Lane

Division 12 Iredell County Mooresville

PLAN DATE: May 2022 REVIEWED BY: E D Harris
PREPARED BY: J. Hambright REVIEWED BY: R M Muncey

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 042678 ENGINEER DERRICK A. WALLER

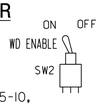
DocuSigned by: Derrick Waller 3/22/2023
SIGNATURE DATE

SIG. INVENTORY NO. 12-1897

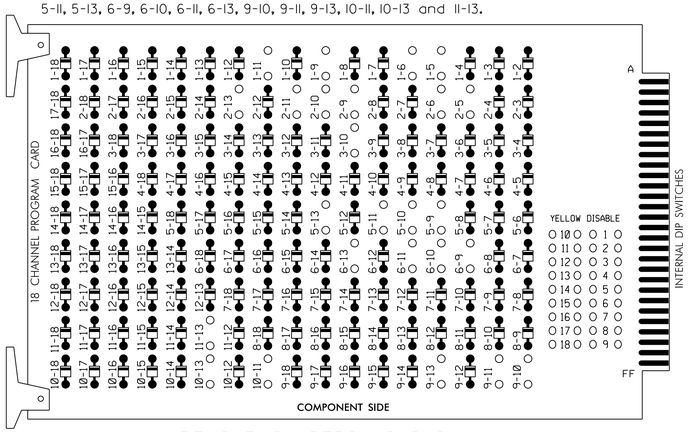
3/22/2023 2:13:37 PM
J:\Projects\MSignals\Design\Signal Design\Final Design\R-3833C_sig_dsn_12-1897.dgn
User:dwaller

EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

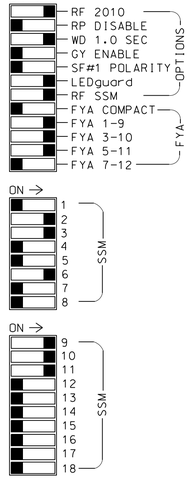
(remove jumpers and set switches as shown)



REMOVE DIODE JUMPERS 1-5, 1-6, 1-9, 1-11, 2-5, 2-6, 2-9, 2-10, 2-11, 2-13, 3-10, 5-9, 5-10, 5-11, 5-13, 6-9, 6-10, 6-11, 6-13, 9-10, 9-11, 9-13, 10-11, 10-13 and 11-13.



REMOVE JUMPERS AS SHOWN



■ = DENOTES POSITION OF SWITCH

NOTES:

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

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Program controller to start up in phase 2 Walk and 6 Green.
3. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.

EQUIPMENT INFORMATION

CONTROLLER.....2070LX
CABINET.....332 W/AUX
SOFTWARE.....ECONOLITE ASC/3-2070
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
LOAD SWITCHES USED.....S1,S2,S3,S4,S7,S8,AUX S1, AUX S2,AUX S4
PHASES USED.....1,2,2PED,3,5,6
OVERLAP "A".....*
OVERLAP "B".....*
OVERLAP "C".....*
OVERLAP "D".....NOT USED

* See overlap programming detail on sheet 2

PROJECT REFERENCE NO.	SHEET NO.
R-3833C	SIG-6.1

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	11 ★	21,22	P21, P22	31,32	NU	NU	51 ★	61,62	NU	NU	NU	NU	11 ★	23 ★	NU	51 ★	NU	NU
RED		128		116				134										
YELLOW	*	129		117			*	135										
GREEN		130		118				136										
RED ARROW													A121	A124		A114		
YELLOW ARROW													A122	A125		A115		
FLASHING YELLOW ARROW													A123	A126		A116		
GREEN ARROW	127						133											
✋			113															
🚶			115															

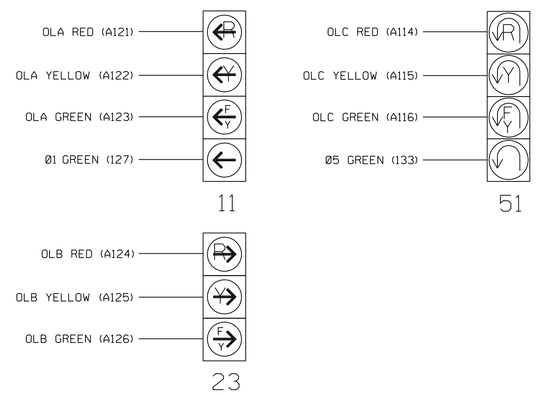
NU = Not Used

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

★ See pictorial of head wiring in detail this sheet.

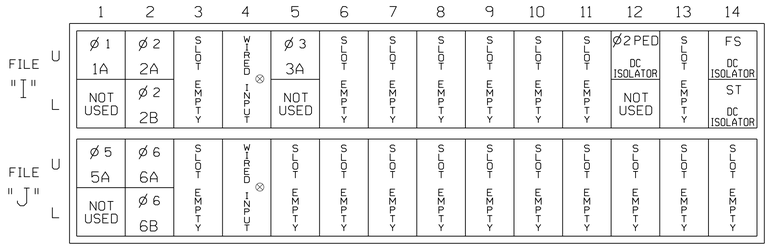
FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



INPUT FILE POSITION LAYOUT

(front view)



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	CALL	EXTEND TIME	DELAY TIME	ADDED INITIAL	DETECTOR TYPE
1A [1]	TB2-1,2	I1U	56	1 ★	1	YES		15		N
	-	J4U	48	26 ★	6	YES				G
2A	TB2-5,6	I2U	39	2	2	YES			X	N
2B	TB2-7,8	I2L	43	12	2	YES			X	N
3A	TB4-5,6	I5U	58	3	3	YES		3		N
5A [2]	TB3-1,2	J1U	55	5 ★	5	YES		15		N
	-	I4U	47	22 ★	2	YES				G
6A	TB3-5,6	J2U	40	6	6	YES			X	N
6B	TB3-7,8	J2L	44	16	6	YES			X	N
PED PUSH BUTTONS										
P21,P22	TB8-4,6	I12U	67	PED 2	2 PED					

NOTE:
INSTALL DC ISOLATORS IN INPUT FILE SLOT I12.

[1] Add jumper from I1-W to J4-W, on rear of input file.

[2] Add jumper from J1-W to I4-W, on rear of input file.

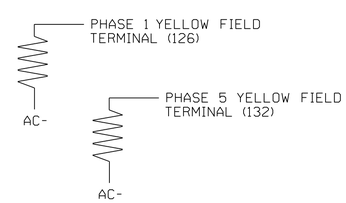
★ For the detectors to work as shown on the signal design plan, see the Vehicle Detector Setup Programming Detail for Alternate Phasing on sheet 2.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown below)

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



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: 12-1897
DESIGNED: MAY 2022
SEALED: 3/22/2023
REVISED: N/A

Final Design
Electrical Detail - Sheet 1 of 4

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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Stantec Consulting Services Inc.
801 Jones Franklin Road-Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
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SR 1100 (Brawley School Road) at Balmy Lane

Division 12 | Iredell County | Mooresville

PLAN DATE:	May 2022	REVIEWED BY:	E D Harris
PREPARED BY:	D A Waller	REVIEWED BY:	R M Muncey

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 042678 ENGINEER DERRICK A. WALLER

DocuSigned by: Derrick Waller 3/24/2023
SIGNATURE DATE

SIG. INVENTORY NO. 12-1897

PROJECT REFERENCE NO.	SHEET NO.
R-3833C	SIG-6.2

ECONOLITE ASC/3-2070 VEHICLE DETECTOR SETUP PROGRAMMING DETAIL FOR ALTERNATE PHASING LOOPS 1A, 5A

(program controller as shown)

IMPORTANT!

Program detectors per the input file connection and programming chart shown on sheet 1 before proceeding.

1. From Main Menu select [8. UTILITIES]
2. From UTILITIES Submenu select [1. COPY/CLEAR]
3. Copy from DETECTOR PLAN "1" to DETECTOR PLAN "2".

```
COPY / CLEAR UTILITY
       FROM              TO
PHASE TIMING.... . > PHASE TIMING.... .
TIMING PLAN..... . > TIMING PLAN..... .
PH DET OPT PLAN. . > PH DET OPT PLAN. .
DETECTOR PLAN... 1 > DETECTOR PLAN... 2
  TOGGLE TO SELECT A "FROM" AND A "TO"
            THEN PRESS ENTER
```

4. From Main Menu select [6. DETECTORS]
5. From DETECTOR Submenu select [2. VEHICLE DETECTOR SETUP]
6. Place cursor in VEH DET PLAN [ ] position and enter "2".

- Place cursor in VEH DETECTOR [ ] position and enter "1".
- Set delay time to "0".

```
VEH DETECTOR [ 1]   VEH DET PLAN [ 2]
TYPE: N-NTCIP
TS2 DETECTOR..... . ECPI LOG.......   NO
DET PH - 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 1  1    . . . . . .
EXTEND TIME...  0.0 DELAY TIME...    0.0
USE ADDED INITIAL . CROSS SWITCH PH..  0
LOCK IN..... NONE NTCIP VOL . OR OCC .
PMT QUEUE DELAY. NO
```

← NOTICE VEH DET PLAN 2

← ENSURE DELAY IS SET TO '0'

- Place cursor in VEH DETECTOR [ ] position and enter "26".
- Set assigned phase to "0".

```
VEH DETECTOR [26]   VEH DET PLAN [ 2]
TYPE: G-GREEN EXTENSION/DELAY
TS2 DETECTOR..... . ECPI LOG.......   NO
DET PH - 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 26 0    . . . . . .
EXTEND TIME...  0.0 DELAY TIME...    0.0
USE ADDED INITIAL . CROSS SWITCH PH..  0
LOCK IN..... NONE NTCIP VOL . OR OCC .
PMT QUEUE DELAY. NO
```

← NOTICE VEH DET PLAN 2

ENSURE PHASE IS SET TO "0" →

- Place cursor in VEH DETECTOR [ ] position and enter "5".
- Set delay time to "0".

```
VEH DETECTOR [ 5]   VEH DET PLAN [ 2]
TYPE: N-NTCIP
TS2 DETECTOR..... . ECPI LOG.......   NO
DET PH - 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 5  5    . . . . . .
EXTEND TIME...  0.0 DELAY TIME...    0.0
USE ADDED INITIAL . CROSS SWITCH PH..  0
LOCK IN..... NONE NTCIP VOL . OR OCC .
PMT QUEUE DELAY. NO
```

← NOTICE VEH DET PLAN 2

← ENSURE DELAY IS SET TO '0'

- Place cursor in VEH DETECTOR [ ] position and enter "22".
- Set assigned phase to "0".

```
VEH DETECTOR [22]   VEH DET PLAN [ 2]
TYPE: G-GREEN EXTENSION/DELAY
TS2 DETECTOR..... . ECPI LOG.......   NO
DET PH - 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 22 0    . . . . . .
EXTEND TIME...  0.0 DELAY TIME...    0.0
USE ADDED INITIAL . CROSS SWITCH PH..  0
LOCK IN..... NONE NTCIP VOL . OR OCC .
PMT QUEUE DELAY. NO
```

← NOTICE VEH DET PLAN 2

ENSURE PHASE IS SET TO "0" →

END PROGRAMMING

ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select [2. CONTROLLER]
2. From CONTROLLER Submenu select [2. VEHICLE OVERLAPS]

OVERLAP A

Select TMG VEH OVLP [A] and 'PPLT FYA'

```
TMG VEH OVLP...[A] TYPE: .....[PPLT FYA]

PROTECTED LEFT TURN....   PHASE    1
OPPOSING THROUGH.......   PHASE    2

FLASHING ARROW OUTPUT.....CH9  ISOLATE

DELAY START OF: FYA..0.0 CLEARANCE..0.0
ACTION PLAN SF BIT DISABLE.......... 1
```

← NOTICE ACTION PLAN SF BIT "1"

Toggle Once

OVERLAP B

Select TMG VEH OVLP [B] and 'OTHER/ECONOLITE'

```
TMG VEH OVLP...[B] TYPE:[OTHER/ECONOLITE]
  PHASES 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
INCLUDED . X X . . . . . .
PROTECT  . . . . . .
PED PRTC . . . . . .
NOT OVLP . . . . . .
FLSH GRN . 1 1 . . . . . .
LAG X PH . . . . . .
LAG 2 PH . . . . . .

LAG GRN 0.0 YEL 0.0 RED 0.0 ADV GRN 0.0
```

Toggle Once

OVERLAP C

Select TMG VEH OVLP [C] and 'PPLT FYA'

```
TMG VEH OVLP...[C] TYPE: .....[PPLT FYA]

PROTECTED LEFT TURN....   PHASE    5
OPPOSING THROUGH.......   PHASE    6

FLASHING ARROW OUTPUT.....CH11 ISOLATE

DELAY START OF: FYA..0.0 CLEARANCE..0.0
ACTION PLAN SF BIT DISABLE.......... 5
```

← NOTICE ACTION PLAN SF BIT "5"

END PROGRAMMING

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 12-1897
DESIGNED: MAY 2022
SEALED: 3/22/2023
REVISED: N/A

Final Design
Electrical Detail - Sheet 2 of 4

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Stantec

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

Prepared for the Offices of:

Transportation Mobility and Safety Division
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signal Design Section

750 N.Greenfield Pkwy.Garner,NC 27529

SR 1100 (Brawley School Road)
at
Balmy Lane

Division 12 | Iredell County | Mooresville

PLAN DATE:	May 2022	REVIEWED BY:	E D Harris
PREPARED BY:	D A Waller	REVIEWED BY:	R M Muncey

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 042678 ENGINEER DERRICK A. WALLER

DocuSigned by: Derrick Waller 3/22/2023
SIGNATURE DATE

SIG. INVENTORY NO. 12-1897

PROJECT REFERENCE NO.	SHEET NO.
R-3833C	SIG-6.3

ALTERNATE PHASING ACTIVATION DETAIL

TO RUN ALT. PHASING DURING FREE RUN - PROGRAM CHANGES (SHOWN BELOW) IN A TIME BASED ACTION PLAN. SCHEDULE A DAY PLAN THAT INCLUDES THE ACTION PLAN PROGRAMMED TO SELECT VEH DET PLAN 2 AND ENABLE SF BITS 1 AND 5.

TO RUN ALT. PHASING DURING COORDINATION - SELECT THE TIME BASED ACTION PLAN THAT IS PROGRAMMED TO SELECT VEH DET PLAN 2 AND ENABLE SF BITS 1 AND 5.

PHASING	VEH DET PLAN	SF BITS ENABLED
ACTIONS REQUIRED TO RUN DEFAULT PHASING	1	NONE
ACTIONS REQUIRED TO RUN ALTERNATE PHASING	2	1,5

IMPORTANT: IF ALT. PHASING IS USED DURING FREE RUN AND COORDINATION, DO NOT OPERATE TIME OF DAY EVENTS CONCURRENTLY WITH COORDINATION PLAN EVENTS IN THE EVENT SCHEDULER. (EX. FREE RUN EVENT SHOULD END BEFORE COORDINATION PLAN EVENT STARTS AND VICE-VERSA).

ALTERNATE PHASING CHANGE SUMMARY

THE FOLLOWING IS A SUMMARY OF WHAT TAKES PLACE WHEN SF BITS 1 AND 5 AND VEH DET PLAN 2 ACTIVATE TO CALL THE "ALTERNATE PHASING":

SF BITS 1,5: Modifies overlap parent phases for heads 11 and 51 to run protected turns only.

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

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

FLASHER CIRCUIT MODIFICATION DETAIL

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

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

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

ECONOLITE ASC/3-2070 ACTION PLAN PROGRAMMING DETAIL

1. From Main Menu select [5. TIME BASE]
2. From TIME BASE Submenu select [2. ACTION PLAN]

```
ACTION PLAN...[  *]
PATTERN.....AUTO   SYS OVERRIDE.... NO
TIMING PLAN..... 0   SEQUENCE.....  0
VEH DETECTOR PLAN.. 2   DET LOG.....NONE
FLASH.....    --   RED REST..... NO
VEH DET DIAG PLN... 0   PED DET DIAG PLN..0
DIMMING ENABLE..   NO   PRIORITY RETURN. NO
PED PR RETURN..    NO   QUEUE DELAY..... NO
PMT COND DELAY     NO
  PHASE   1  2  3  4  5  6  7  8  9  0  1  2  3  4  5  6
PED RCL   .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
WALK 2    .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
VEX 2     .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
VEH RCL   .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
MAX RCL   .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
MAX 2     .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
  PHASE   1  2  3  4  5  6  7  8  9  0  1  2  3  4  5  6
MAX 3     .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
CS INH    .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
OMIT      .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
SPC FCT   X  .  .  .  X  .  .  .  (1-8)
AUX FCT   .  .  .  (1-3)
          1  2  3  4  5  6  7  8  9  0  1  2  3  4  5
LP 1-15   .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 16-30  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 31-45  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 46-60  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 61-75  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 76-90  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 91-100 .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
```

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 12-1897
DESIGNED: MAY 2022
SEALED: 3/22/2023
REVISED: N/A

Final Design
Electrical Detail - Sheet 3 of 4

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

SR 1100 (Brawley School Road)
at
Balmy Lane

Division 12 | Iredell County | Mooresville

PLAN DATE:	May 2022	REVIEWED BY:	E D Harris
PREPARED BY:	D A Waller	REVIEWED BY:	R M Muncey

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 042678 ENGINEER DERRICK A WALLER

DocuSigned by:
Derrick Waller
BYC4E8E8E8E8E8E8...
SIGNATURE 3/22/2023 DATE

SIG. INVENTORY NO. 12-1897

PROJECT REFERENCE NO.	SHEET NO.
R-3833C	SIG-6.4

ECONOLITE ASC/3-2070 EMERGENCY VEHICLE PREEMPT PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select [4. PREEMPTOR/TSP]
2. From PREEMPTOR/TSP/SCP Submenu select [1. PREEMPT PLAN 1-10]

Place cursor in [ ] next to Preempt Plan and press 3. Then press the right cursor arrow and toggle the controller to YES. Next cursor down. This will select Emergency Vehicle Preempt #3.

```
PREEMPT PLAN [  3]    ENABLE....YES
 VEH/PED 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 OVERLAP A B C D E F G H I J K L M N O P
TRKCLR V . . . . . . . . . . . . . . . .
TRKCLR O . . . . . . . . . . . . . . . .
ENA TRL  . . . . . . . . . . . . . . . .
DWEL VEH . . X . . . . . . . . . . . . .
DWEL PED . . . . . . . . . . . . . . . .
DWEL OLP . . . . . . . . . . . . . . . .
CYC VEH  . . . . . . . . . . . . . . . .
CYC PED  . . . . . . . . . . . . . . . .
CYC OLP  . . . . . . . . . . . . . . . .
EXIT PH  . X . . . X . . . . . . . . . .
EXIT CAL . . . . . . . . . . . . . . . .
SP FUNC  . . . . . . . . . . . . . . . .

ENABLE... YES|PMT OVRIDE..|INTERLOCK. NO
DET LOCK... X|DELAY..    0|INHIBIT...  0
OVERIDE FL. .|DURATION   0|CLR-GRN... NO
TERM OLP.  NO|PC>YEL   YES|TERM PH    NO
PED DARK.. NO|TC RESRV  NO|DWELL FL  OFF
LINK PMT....0|X FLCOLR RED|EXIT OPT. OFF
X TMG PLN...0|RE-SERV..  0|FLT TYPE.HARD
FREE DUR PMT|R1  NO|R2  NO|R3  NO|R4  NO
--TIMING-----WALK|PED CL|MN GR| YEL| RED
ENTRANCE TM.   1|   15|   1|25.5|25.5
----------MIN GR|EXT GR|MX GR| YEL| RED
TRACK CLEAR    0|    0|   0|25.5|25.5
----------MIN DL|PMTEXT|MX TM| YEL| RED
DWL/CYC-EXIT   7|  2.0|  120|25.5|25.5
PMT ACTIVE OUT..ON   PMT ACT DWELL...NO
OTHER - PRI PMT.OFF  NON-PRI PMT.....OFF
INH EXT TIME... 0.0  PED PR RETURN...OFF
PRIORITY RETURN.OFF  QUEUE DELAY.... OFF
COND DELAY......OFF
PHASES     1   2   3   4   5   6   7   8
PR RTN%    0   0   0   0   0   0   0   0
PHASES     9  10  11  12  13  14  15  16
PR RTN%    0   0   0   0   0   0   0   0
```

PROGRAM EXTEND TIME ON OPTICAL DETECTOR UNITS FOR 2.0 SEC.

ECONOLITE ASC/3-2070 PREEMPT FILTERING PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select [4. PREEMPTOR/TSP]
2. From PREEMPT/TSP/SCP Submenu select [2. ENABLE PREEMPT FILTERING & TSP/SCP]

```
ENABLE PREEMPT FILTERING & TSP/SCP
FILTERED     SOLID          PULSING
INPUT  1 ...BYPASSED.. ...BYPASSED..
       2 ...BYPASSED.. ...BYPASSED..
       3 ..PREEMPT  3. ...BYPASSED..
       4 ..PREEMPT  4. ...BYPASSED..
       5 ..PREEMPT  5. ...BYPASSED..
       6 ..PREEMPT  6. ...BYPASSED..
       7 ...BYPASSED.. ...BYPASSED..
       8 ...BYPASSED.. ...BYPASSED..
       9 ...BYPASSED.. ...BYPASSED..
      10 ...BYPASSED.. ...BYPASSED..
```

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 12-1897
DESIGNED: MAY 2022
SEALED: 3/22/2023
REVISED: N/A

Final Design
Electrical Detail - Sheet 4 of 4

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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Signal Design Section
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Division 12 | Iredell County | Mooresville

PLAN DATE:	May 2022	REVIEWED BY:	E D Harris
PREPARED BY:	D A Waller	REVIEWED BY:	R M Muncey

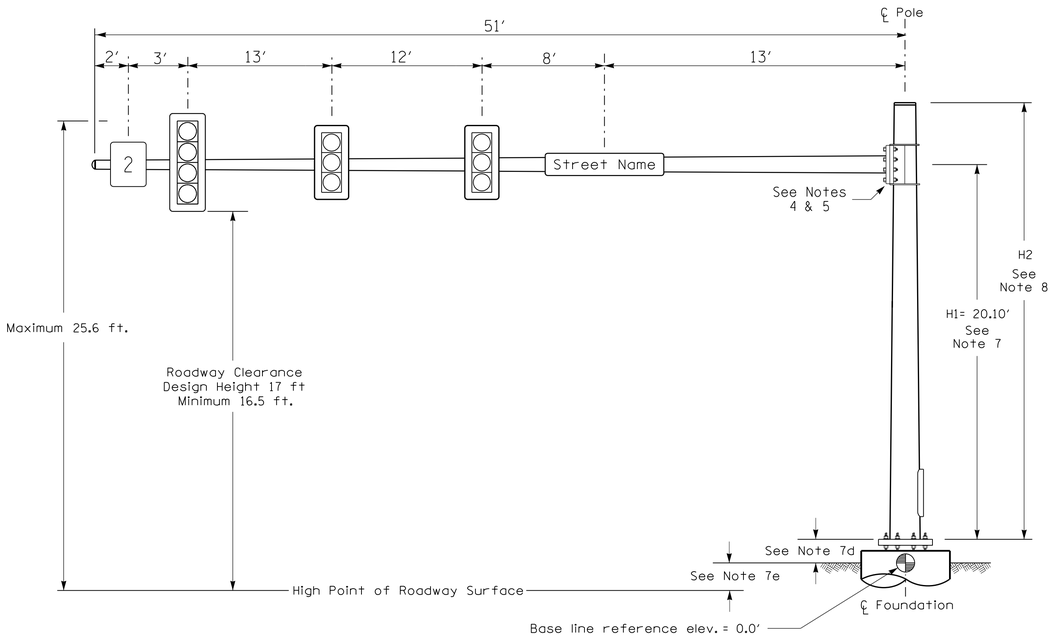
REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 042678 ENGINEER DERRICK A WALLER

DocuSigned by:
Derrick Waller
SIGNATURE
3/22/2023
DATE

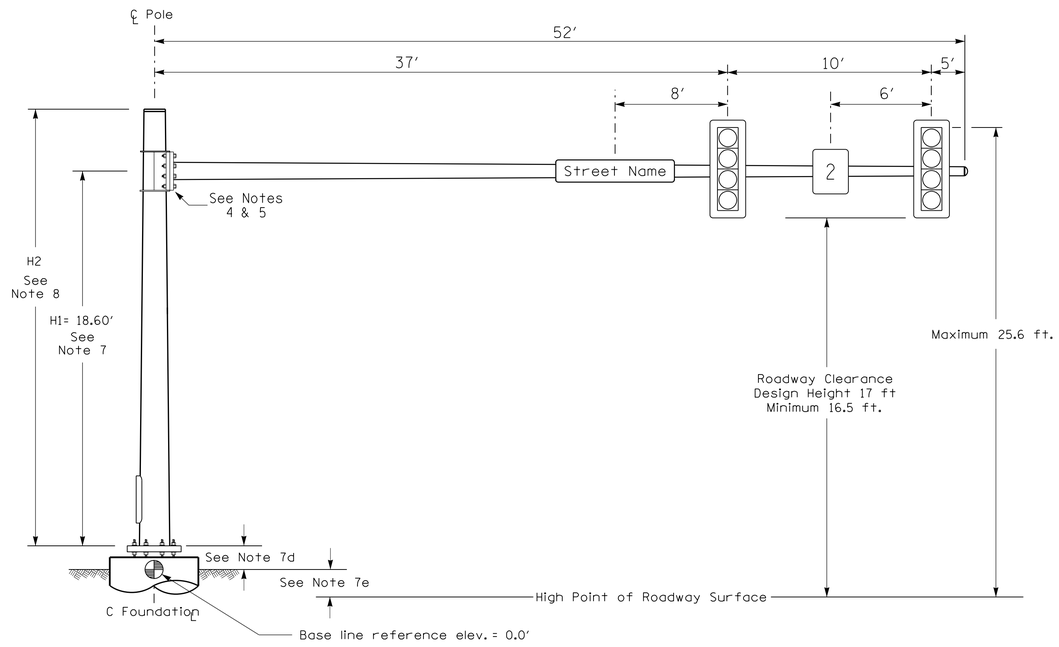
SIG. INVENTORY NO. 12-1897

Design Loading for METAL POLE NO. 1 (Mast Arm "A")



Elevation View

Design Loading for METAL POLE NO. 1 (Mast Arm "B")



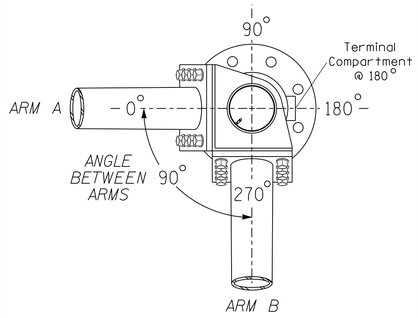
Elevation View

SPECIAL NOTE

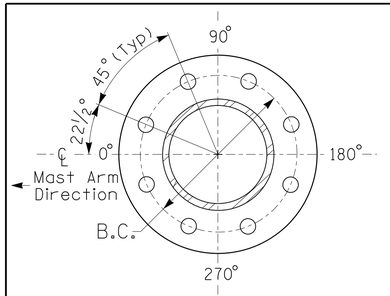
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Arm "A"	Arm "B"
Baseline reference point at ℄ Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	+1.08 ft.	-0.48 ft.
Elevation difference at Edge of travelway or face of curb	+/-0.0 ft.	+/-0.0 ft.

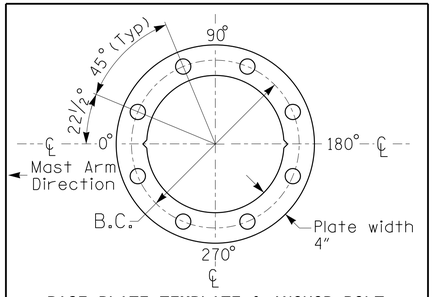


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL

For 8 Bolt Base Plate

METAL POLE No. 1

PROJECT REFERENCE NO.	SHEET NO.
R-3833C	SIG-6.5

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	RIGID MOUNTED SIGNAL HEAD 12″-4 SECTION-WITH BACKPLATE	11.5 S.F.	25.5″W X 66.0″L	74 LBS
	RIGID MOUNTED SIGNAL HEAD 12″-3 SECTION-WITH BACKPLATE	9.3 S.F.	25.5″W X 52.5″L	60 LBS
Street Name	STREET NAME SIGN RIGID MOUNTED	12.0 S.F.	18.0″W X 96.0″L	27 LBS
2	SIGN RIGID MOUNTED	7.5 S.F.	30.0″W X 36.0″L	14 LBS

NOTES

DESIGN REFERENCE MATERIAL

1. Design the traffic signal structure and foundation in accordance with:
   The 6th Edition 2013 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
   The 2018 NCDOT "Standard Specifications for Roads and Structures." The latest addenda to the specifications can be found in the traffic signal project special provisions.
   The 2018 NCDOT Roadway Standard Drawings.
   The traffic signal project plans and special provisions.
   The NCDOT "Metal Pole Standards" located at the following NCDOT website:
   https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx

DESIGN REQUIREMENTS

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

NCDOT Wind Zone 4 (90 mph)

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

SR 1100 (Brawley School Road) at Balmy Lane

Division 12 Iredell County Mooresville

PLAN DATE:	May 2022	REVIEWED BY:	E D Harris
PREPARED BY:	J Hambright	REVIEWED BY:	R M Muncey

SCALE 0 N/A N/A

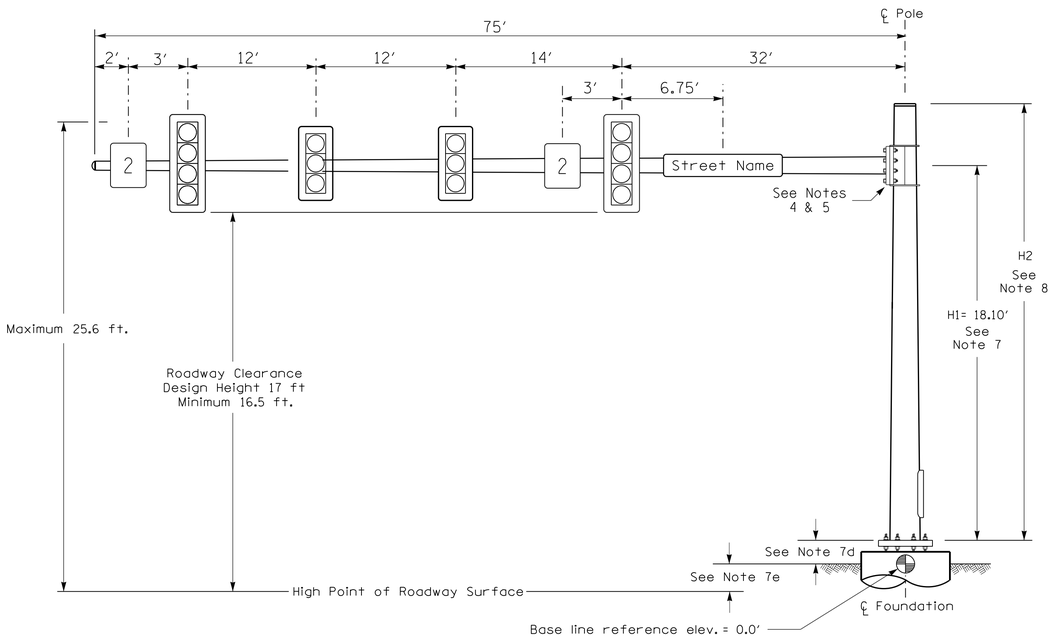
REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 042678 ENGINEER DERRICK A. WALLER

DocuSigned by: Derrick Waller 3/22/2023
SIGNATURE DATE

SIG. INVENTORY NO. 12-1897

Design Loading for METAL POLE NO. 2



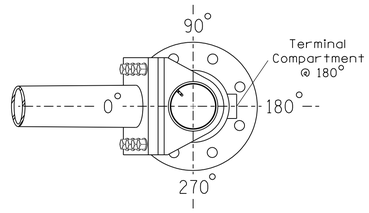
Elevation View

SPECIAL NOTE

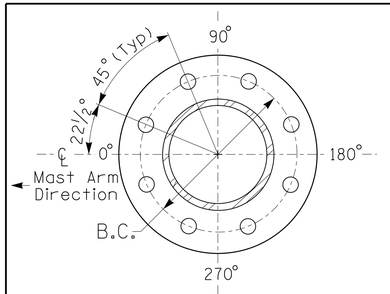
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 2	
Baseline reference point at ⊕ Foundation @ ground level	0.0 ft.	
Elevation difference at High point of roadway surface	-0.99 ft.	
Elevation difference at Edge of travelway or face of curb	+/-0.0 ft.	

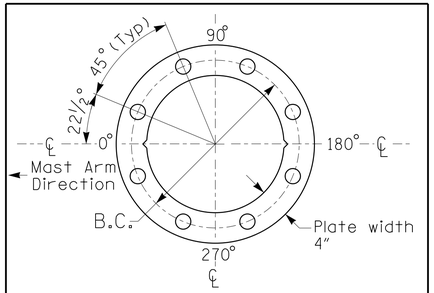


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



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

METAL POLE No. 2

PROJECT REFERENCE NO.	SHEET NO.
R-3833C	SIG-6.6

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	RIGID MOUNTED SIGNAL HEAD 12"-4 SECTION-WITH BACKPLATE	11.5 S.F.	25.5"W X 66.0"L	74 LBS
	RIGID MOUNTED SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE	9.3 S.F.	25.5"W X 52.5"L	60 LBS
Street Name	STREET NAME SIGN RIGID MOUNTED	12.0 S.F.	18.0"W X 96.0"L	27 LBS
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NOTES

DESIGN REFERENCE MATERIAL

1. Design the traffic signal structure and foundation in accordance with:
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   - The 2018 NCDOT "Standard Specifications for Roads and Structures." The latest addenda to the specifications can be found in the traffic signal project special provisions.
   - The 2018 NCDOT Roadway Standard Drawings.
   - The traffic signal project plans and special provisions.
   - The NCDOT "Metal Pole Standards" located at the following NCDOT website: https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx

DESIGN REQUIREMENTS

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

NCDOT Wind Zone 4 (90 mph)

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

SR 1100 (Brawley School Road)
at
Balmy Lane

Division 12 Iredell County Mooresville

PLAN DATE:	May 2022	REVIEWED BY:	E D Harris
PREPARED BY:	J Hambright	REVIEWED BY:	R M Muncey

SCALE 0 N/A N/A

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 042678 ENGINEER DERRICK A. WALLER

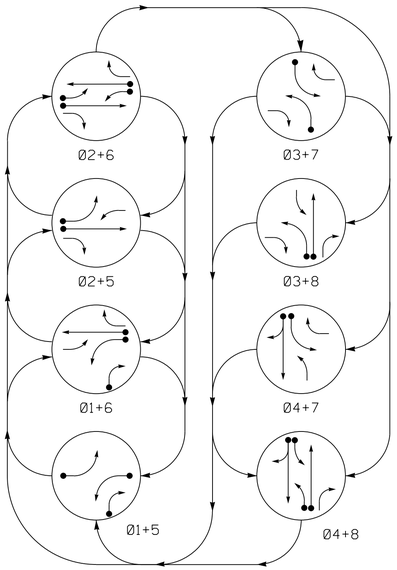
DocuSigned by: Derrick Waller 3/22/2023
SIGNATURE DATE

SIG. INVENTORY NO. 12-1897

2:14:50 PM
D:\Traffic\Signals\Design\Metal Poles\Loading Diagrams\Loading Diagram_Single Mast Arm_12-1897_Pole 2.dgn
User:dwaller

PROJECT REFERENCE NO.	SHEET NO.
R-3833C	SIG-7.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

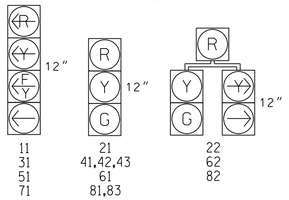
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE 01+05	01+06	02+05	02+06	03+07	03+08	04+07	04+08	FLASH
11	←̶	←̶	←̶ F.Y.	←̶ F.Y.	←̶ R	←̶ R	←̶ R	←̶ R	Y
21	R	R	G	G	R	R	R	R	Y
22	R	R	G	G	R/→	R/→	R	R	Y
31	←̶ R	←̶ R	←̶ R	←̶ R	←	←	←̶ F.Y.	←̶ F.Y.	←̶ R
41,42,43	R	R	R	R	R	R	G	G	R
51	←	←̶ F.Y.	←	←̶ F.Y.	←̶ R	←̶ R	←̶ R	←̶ R	Y
61	R	G	R	G	R	R	R	R	Y
62	R	G	R	G	R/→	R	R/→	R	Y
71	←̶ R	←̶ R	←̶ R	←̶ R	←	←̶ F.Y.	←	←̶ F.Y.	←̶ R
81,83	R	R	R	R	R	G	R	G	R
82	R/→	R/→	R	R	R	G	R	G	R

SIGNAL FACE I.D.

All Heads L.E.D.



ASC/3 DETECTOR INSTALLATION CHART

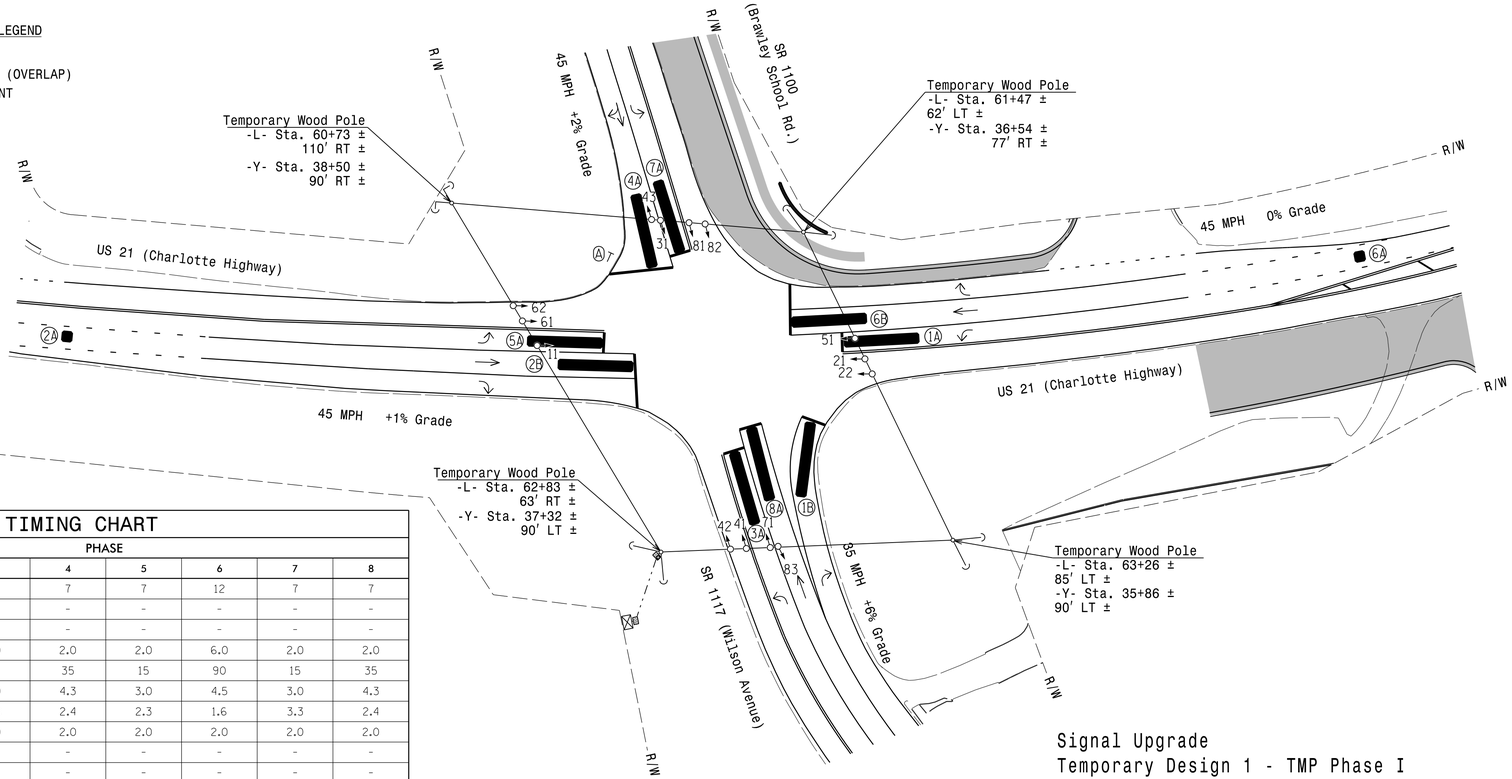
DETECTOR					PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
1A	6X40	0	*	*	1	Yes	-	15	-	N	-	*
					6	Yes	-	3	-	C	-	*
1B	6X40	0	*	*	1	Yes	-	15	-	N	-	*
2A	6X6	300	*	*	2	Yes	-	-	-	N	-	*
2B	6X40	0	*	*	2	Yes	2.0	5	-	C	-	*
3A	6X40	0	*	*	3	Yes	-	15	-	N	-	*
					8	Yes	-	3	-	N	-	*
4A	6X40	0	*	*	4	Yes	-	10	-	N	-	*
5A	6X40	0	*	*	5	Yes	-	15	-	N	-	*
					2	Yes	-	3	-	C	-	*
6A	6X6	300	*	*	6	Yes	-	-	-	N	-	*
6B	6X40	0	*	*	6	Yes	2.0	5	-	C	-	*
7A	6X40	0	*	*	7	Yes	-	15	-	N	-	*
					4	Yes	-	3	-	N	-	*
8A	6X40	0	*	*	8	Yes	-	-	-	N	-	*

* Video Detection Area

8 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 and/or phase 5 may be lagged.
4. Phase 3 and/or phase 7 may be lagged.
5. Set all detector units to presence mode.
6. This intersection features a video detection system. Detectors should be placed to ensure the desired operation parameters are achieved.
7. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.



LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
▯↓	Pedestrian Signal Head With Push Button & Sign	■↓
○	Signal Pole with Guy	●●
○	Signal Pole with Sidewalk Guy	●●
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
□	Junction Box	■
·-·-·	2-in Underground Conduit	·-·-·
N/A	Right of Way	———
→	Directional Arrow	→
▬	Video Detection Area	N/A
▭	Construction Zone	N/A
OS	Oversized Junction Box	■
Ⓐ	"YIELD" Sign (R1-2)	Ⓐ

ASC/3 TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6	7	8
Min Green *	7	12	7	7	7	12	7	7
Walk *	-	-	-	-	-	-	-	-
Ped Clear	-	-	-	-	-	-	-	-
Veh. Extension *	2.0	6.0	2.0	2.0	2.0	6.0	2.0	2.0
Max 1 *	15	90	15	35	15	90	15	35
Yellow	3.0	4.5	3.0	4.3	3.0	4.5	3.0	4.3
Red Clear	2.8	1.6	2.9	2.4	2.3	1.6	3.3	2.4
Red Revert	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Actuations B4 Add *	-	-	-	-	-	-	-	-
Seconds /Actuation *	-	-	-	-	-	-	-	-
Max Initial *	-	-	-	-	-	-	-	-
Time Before Reduction *	-	15	-	-	-	15	-	-
Time To Reduce *	-	30	-	-	-	30	-	-
Minimum Gap	-	3.0	-	-	-	3.0	-	-
Locking Detector	-	X	-	-	-	X	-	-
Recall Position	-	VEH. RECALL	-	-	-	VEH. RECALL	-	-
Dual Entry	-	-	-	X	-	-	-	X
Simultaneous Gap	X	X	X	X	X	X	X	X

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

Signal Upgrade
Temporary Design 1 - TMP Phase I

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801 Jones Franklin Road-Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
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Prepared for the Offices of:
Transportation Mobility and Safety Division
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

SCALE 0 40 1" = 40'

US 21 (Charlotte Highway) at SR 1100 (Brawley School Road) / SR 1117 (Wilson Avenue)

Division 12 Iredell County Mooresville

PLAN DATE: May 2022 REVIEWED BY: E D Harris
PREPARED BY: J. Hambright REVIEWED BY: R M Muncey

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 042678 ENGINEER DERRICK A WALLER

DocuSigned by: Derrick Waller 3/22/2023
SIGNATURE DATE

SIG. INVENTORY NO. 12-13691T1

3/22/2023
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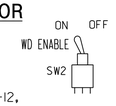
User:dwaller

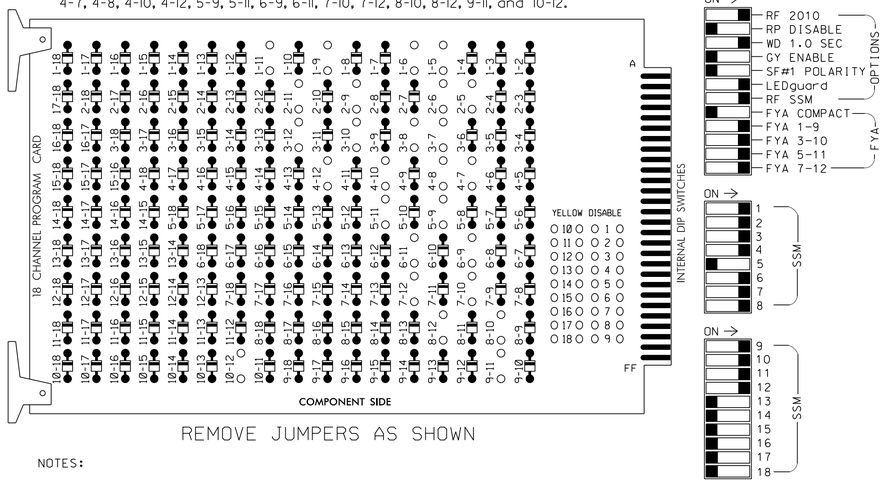
PROJECT REFERENCE NO.	SHEET NO.
R-3833C	SIG-7.1

EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE DIODE JUMPERS 1-5, 1-6, 1-9, 1-11, 2-5, 2-6, 2-9, 2-11, 3-7, 3-8, 3-10, 3-12, 4-7, 4-8, 4-10, 4-12, 5-9, 5-11, 6-9, 6-11, 7-10, 7-12, 8-10, 8-12, 9-11, and 10-12.



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.

■ = DENOTES POSITION OF SWITCH

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Program phases 4 and 8 for Dual Entry.
3. Program controller to start up in phase 2 Green and 6 Green.
4. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.

EQUIPMENT INFORMATION

CONTROLLER.....2070LX
CABINET.....332 W/AUX
SOFTWARE.....ECONOLITE ASC/3-2070
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
LOAD SWITCHES USED.....S1,S2,S4,S5,S7,S8,S10,S11, AUX S1,AUX S2,AUX S4,AUX S5
PHASES USED.....1,2,3,4,5,6,7,8
OVERLAP "A".....*
OVERLAP "B".....*
OVERLAP "C".....*
OVERLAP "D".....*

* 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	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	11 ★	82	21,22	NU	22	31 ★	41,42 43	NU	51 ★	61,62	NU	62	71 ★	81,82 83	NU	11 ★	31 ★	NU	51 ★	71 ★	NU
RED		✳	128		✳		101			134		✳		107							
YELLOW			129				102		✳	135				108							
GREEN			130				103			136				109							
RED ARROW																A121	A124		A114	A101	
YELLOW ARROW		126			117							123				A122	A125		A115	A102	
FLASHING YELLOW ARROW																A123	A126		A116	A103	
GREEN ARROW	127	127			118	118			133			124	124								

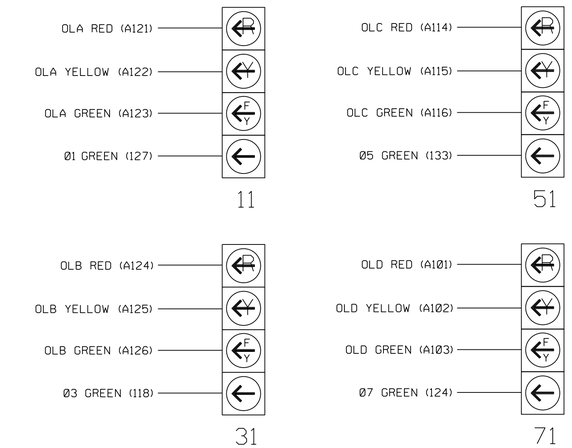
NU = Not Used

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

★ See pictorial of head wiring in detail this sheet.

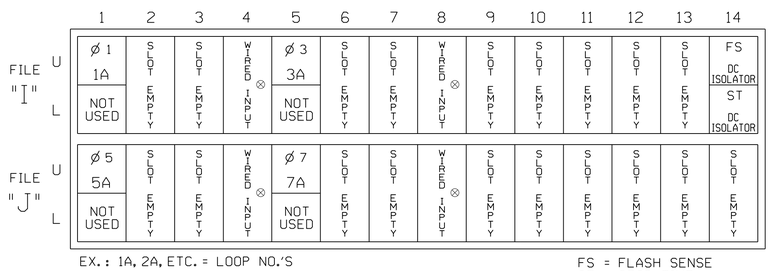
FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



INPUT FILE POSITION LAYOUT

(front view)



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

FS = FLASH SENSE
ST = STOP TIME

⊗ Wired Input - Do not populate slot with detector card

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND TIME	DELAY TIME	ADDED INITIAL	DETECTOR TYPE
1A [1]	TB2-1,2	I1U	56	1 ★	1	YES		15		N
	-	J4U	48	26 ★	6	YES		3		G
3A [2]	TB4-5,6	I5U	58	3 ★	3	YES		15		N
	-	J8U	50	28 ★	8	YES		3		G
5A [3]	TB3-1,2	J1U	55	5 ★	5	YES		15		N
	-	I4U	47	22 ★	2	YES		3		G
7A [4]	TB5-5,6	J5U	57	7 ★	7	YES		15		N
	-	I8U	49	24 ★	4	YES		3		G

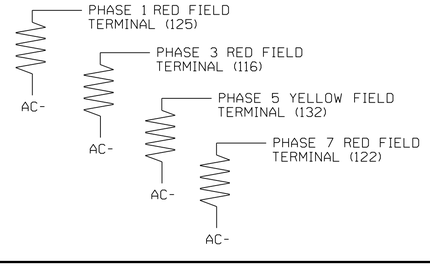
[1] Add jumper from I1-W to J4-W, on rear of input file.
[2] Add jumper from I5-W to J8-W, on rear of input file.
[3] Add jumper from J1-W to I4-W, on rear of input file.
[4] Add jumper from J5-W to I8-W, on rear of input file.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

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



SPECIAL DETECTOR NOTE

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

For Detection Zones 1A, 3A, 5A, and 7A, the equipment placement and slots reserved for wired inputs are typical for a NCDOT installation.

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 12-1369T1
DESIGNED: MAY 2022
SEALED: 3/22/2023
REVISED: N/A

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

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

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

US 21 (Charlotte Highway) at SR 1100 (Brawley School Road) / SR 1117 (Wilson Avenue)

Division 12 Iredell County Mooresville

PLAN DATE:	May 2022	REVIEWED BY:	E D Harris
PREPARED BY:	D A Waller	REVIEWED BY:	R M Muncey

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 042678 ENGINEER DERRICK A WALLER

DocuSigned by: Derrick Waller 3/22/2023
SIGNATURE DATE

SIG. INVENTORY NO. 12-1369T1

ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select [2. CONTROLLER]
2. From CONTROLLER Submenu select [2. VEHICLE OVERLAPS]

OVERLAP A

Select TMG VEH OVLP [A] and 'PPLT FYA'

```
TMG VEH OVLP...[A] TYPE: .....PPLT FYA

PROTECTED LEFT TURN....   PHASE    1
OPPOSING THROUGH.......   PHASE    2

FLASHING ARROW OUTPUT.....CH9  ISOLATE

DELAY START OF: FYA..0.0 CLEARANCE..0.0
ACTION PLAN SF BIT DISABLE.......... 0
```

Toggle Once

↓

OVERLAP B

Select TMG VEH OVLP [B] and 'PPLT FYA'

```
TMG VEH OVLP...[B] TYPE: .....PPLT FYA

PROTECTED LEFT TURN....   PHASE    3
OPPOSING THROUGH.......   PHASE    4

FLASHING ARROW OUTPUT.....CH10 ISOLATE

DELAY START OF: FYA..0.0 CLEARANCE..0.0
ACTION PLAN SF BIT DISABLE.......... 0
```

Toggle Once

↓

OVERLAP C

Select TMG VEH OVLP [C] and 'PPLT FYA'

```
TMG VEH OVLP...[C] TYPE: .....PPLT FYA

PROTECTED LEFT TURN....   PHASE    5
OPPOSING THROUGH.......   PHASE    6

FLASHING ARROW OUTPUT.....CH11 ISOLATE

DELAY START OF: FYA..0.0 CLEARANCE..0.0
ACTION PLAN SF BIT DISABLE.......... 0
```

Toggle Once

↓

OVERLAP D

Select TMG VEH OVLP [D] and 'PPLT FYA'

```
TMG VEH OVLP...[D] TYPE: .....PPLT FYA

PROTECTED LEFT TURN....   PHASE    7
OPPOSING THROUGH.......   PHASE    8

FLASHING ARROW OUTPUT.....CH12 ISOLATE

DELAY START OF: FYA..0.0 CLEARANCE..0.0
ACTION PLAN SF BIT DISABLE.......... 0
```

END PROGRAMMING

PROJECT REFERENCE NO.	SHEET NO.
R-3833C	SIG-7.2

FLASHER CIRCUIT MODIFICATION DETAIL

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

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

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 12-1369T1
DESIGNED: MAY 2022
SEALED: 3/22/2023
REVISED: N/A

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

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Fax. (919) 851-7024
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750 N.Greenfield Pkwy,Garner,NC 27529

US 21 (Charlotte Highway) at SR 1100 (Brawley School Road) / SR 1117 (Wilson Avenue)

Division 12 | Iredell County | Mooresville

PLAN DATE:	May 2022	REVIEWED BY:	E D Harris
PREPARED BY:	D A Waller	REVIEWED BY:	R M Muncey

REVISIONS	INIT.	DATE

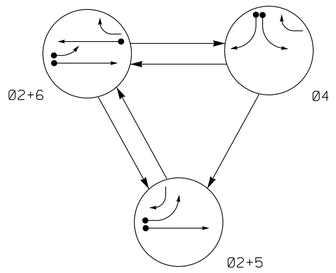
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 042678 ENGINEER DERRICK A WALLER

DocuSigned by: Derrick Waller 3/22/2023
BY: SIGNATURE DATE

SIG. INVENTORY NO. 12-1369T1

PROJECT REFERENCE NO.	SHEET NO.
R-3833C	SIG-8.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

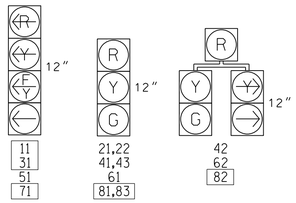
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2+5	PHASE Ø2+6	PHASE Ø4	FLASH
21,22	G	G	R	Y
41,43	R	R	G	R
42	R→	R	G	R
51	←F Y	←R	←Y	
61	R	G	R	Y
62	G	R→	R	Y

SIGNAL FACE I.D.

All Heads L.E.D.



□ - See Note 6

ASC/3 DETECTOR INSTALLATION CHART

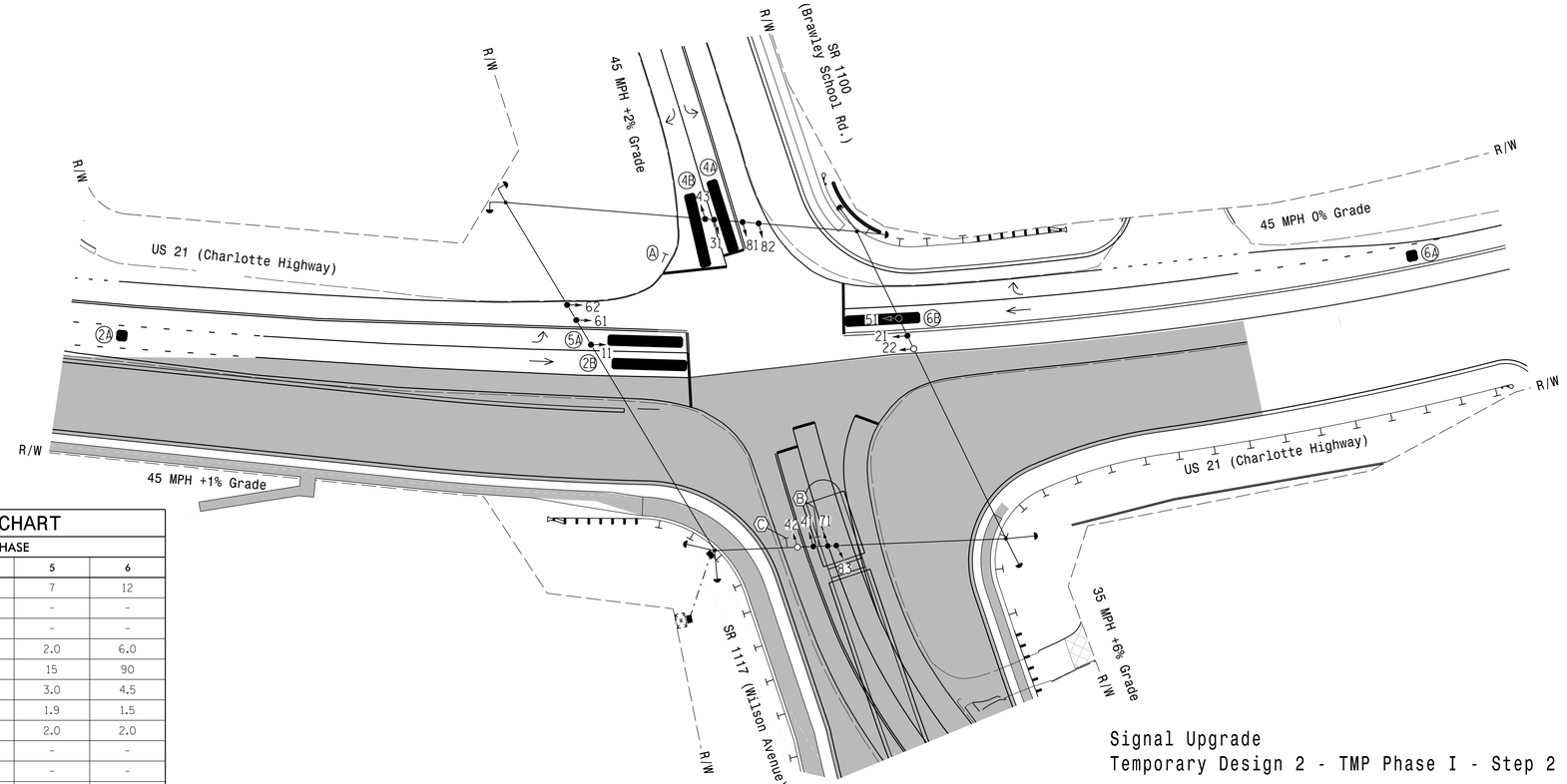
DETECTOR					PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
2A	6X6	300	*	*	2	Yes	-	-	-	N	-	*
2B	6X40	0	*	*	2	Yes	2.0	5	-	G	-	*
4A	6X40	0	*	*	4	Yes	-	3	-	N	-	*
4B	6X40	0	*	*	4	Yes	-	15	-	N	-	*
5A	6X40	0	*	*	5	Yes	-	15	-	N	-	*
					2	Yes	-	-	-	G	-	*
6A	6X6	300	*	*	6	Yes	-	-	-	N	-	*
6B	6X40	0	*	*	6	Yes	2.0	5	-	G	-	*

* Video Detection Area

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 5 may be lagged.
4. Set all detector units to presence mode.
5. This intersection features a video detection system. Detectors should be placed to ensure the desired operation parameters are achieved.
6. Disconnect and cover existing signal heads 11, 31, 71, 81, 82, and 83.
7. Reposition existing signal heads 21, 41, and 51.



LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
▯↓	Pedestrian Signal Head With Push Button & Sign	■↓
○	Signal Pole with Guy	●
○	Signal Pole with Sidewalk Guy	●
▭	Inductive Loop Detector	- - -
⊠	Controller & Cabinet	⊠
□	Junction Box	■
-·-	2-in Underground Conduit	-·-
N/A	Right of Way	- - -
→	Directional Arrow	→
▬	Video Detection Area	N/A
▭	Construction Zone	N/A
OS	Oversized Junction Box	■
Ⓐ	"YIELD" Sign (R1-2)	Ⓐ
Ⓑ	Left Arrow "ONLY" Sign (R3-5L)	Ⓑ
Ⓒ	Rignt Arrow "ONLY" Sign (R3-5R)	Ⓒ

ASC/3 TIMING CHART

FEATURE	PHASE 2	PHASE 4	PHASE 5	PHASE 6
Min Green *	12	7	7	12
Walk *	-	-	-	-
Ped Clear	-	-	-	-
Veh. Extension *	6.0	2.0	2.0	6.0
Max 1 *	90	35	15	90
Yellow	4.5	3.0	3.0	4.5
Red Clear	1.5	2.8	1.9	1.5
Red Revert	2.0	2.0	2.0	2.0
Actuations B4 Add *	-	-	-	-
Seconds /Actuation *	-	-	-	-
Max Initial *	-	-	-	-
Time Before Reduction *	15	-	-	15
Time To Reduce *	30	-	-	30
Minimum Gap	3.0	-	-	3.0
Locking Detector	X	-	-	X
Recall Position	VEH. RECALL	-	-	VEH. RECALL
Dual Entry	-	-	-	-
Simultaneous Gap	X	X	X	X

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

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

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

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

SCALE 0 40 1" = 40'

US 21 (Charlotte Highway) at SR 1100 (Brawley School Road) / SR 1117 (Wilson Avenue)

Division 12 | Iredell County | Mooresville

PLAN DATE:	May 2022	REVIEWED BY:	E D Harris
PREPARED BY:	J. Hambright	REVIEWED BY:	R M Muncey

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER
SEAL 042678
DERRICK A. WALLER

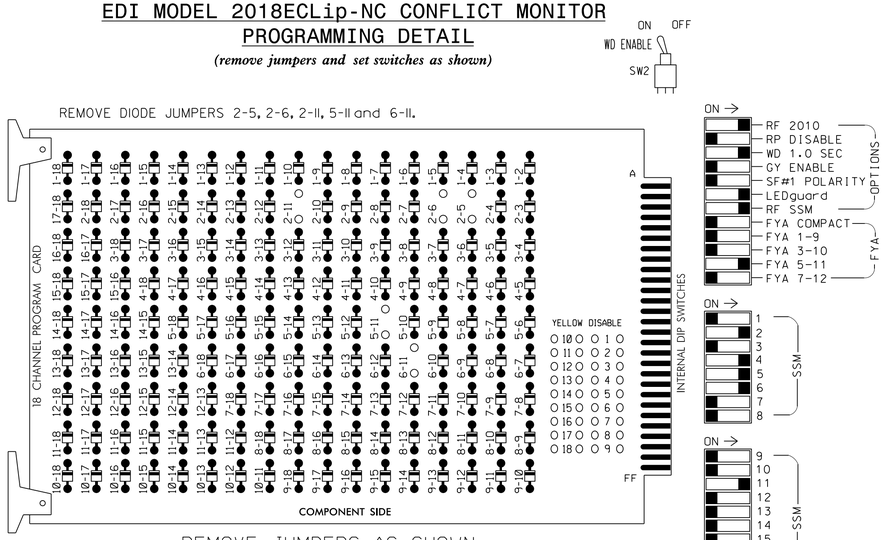
DocuSigned by: Derrick Waller 3/24/2023
SIGNATURE DATE

SIG. INVENTORY NO. 12-136972

3/24/2023 12:48:15 PM
J:\Projects\Designs\Design\Signal Design\R-3833C_sig_dsn_12-136972.dgn
User:dwaller

EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE JUMPERS AS SHOWN

NOTES:

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

■ = DENOTES POSITION OF SWITCH

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Return controller to Factory Defaults before programming per this electrical detail.
3. Program controller to start up in phase 2 Green and 6 Green.
4. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.

EQUIPMENT INFORMATION

CONTROLLER.....2070LX
CABINET.....332 W/AUX
SOFTWARE.....ECONOLITE ASC/3-2070
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
LOAD SWITCHES USED.....S2,S5,S7,S8,AUX S4
PHASES USED.....2,4,5,6
OVERLAP "A".....NOT USED
OVERLAP "B".....NOT USED
OVERLAP "C".....✳
OVERLAP "D".....NOT USED

✳ See overlap programming detail below

PROJECT REFERENCE NO.	SHEET NO.
R-3833C	SIG-8.1

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5		S6	S7		S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4		14	5		6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4		4 PED	5		6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	NU	21,22	NU	NU	41,42 43	62	NU	42	51 ★	61,62	NU	NU	NU	NU	NU	NU	NU	51 ★	NU	NU
RED		128			101			✳		134										
YELLOW		129			102					135										
GREEN		130			103					136										
RED ARROW																		A114		
YELLOW ARROW						102		132										A115		
FLASHING YELLOW ARROW																		A116		
GREEN ARROW						103		133	133											

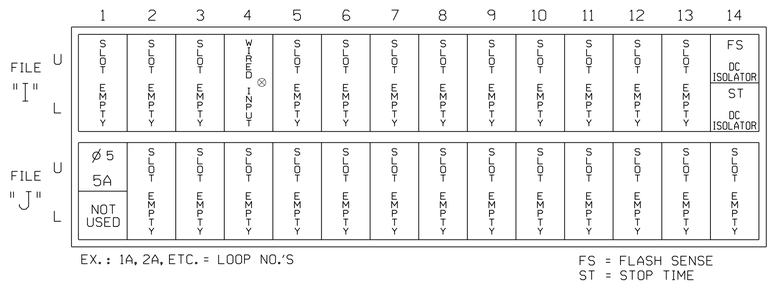
NU = Not Used

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

★ See pictorial of head wiring in detail this sheet.

INPUT FILE POSITION LAYOUT

(front view)



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

FS = FLASH SENSE
ST = STOP TIME

⊗ Wired Input - Do not populate slot with detector card

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND TIME	DELAY TIME	ADDED INITIAL	DETECTOR TYPE
5A[1]	TB3-1,2	J1U	55	5 ★	5	YES		15		N
	-	I4U	47	22 ★	2	YES				G

[1]Add jumper from I1-W to J4-W, on rear of input file.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

SPECIAL DETECTOR NOTE

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

For Detection Zone 5A, the equipment placement and slots reserved for wired inputs are typical for a NCDOT installation.

ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select [2. CONTROLLER]
2. From CONTROLLER Submenu select [2. VEHICLE OVERLAPS]

Toggle Twice

OVERLAP C

Select TMG VEH OVLP [C] and 'PPLT FYA'

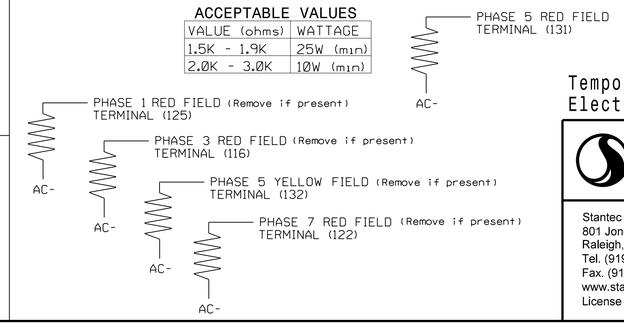
TMG VEH OVLP...[C] TYPE: .....[PPLT FYA]
PROTECTED LEFT TURN.... PHASE 5
OPPOSING THROUGH..... PHASE 6
FLASHING ARROW OUTPUT.....CH11 ISOLATE
DELAY START OF: FYA..0.0 CLEARANCE..0.0
ACTION PLAN SF BIT DISABLE..... 0

END PROGRAMMING

LOAD RESISTOR INSTALLATION DETAIL

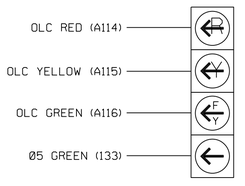
(install resistor as shown)

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



FYA SIGNAL WIRING DETAIL

(wire signal head as shown)



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 12-1369T2
DESIGNED: MAY 2022
SEALED: 3/24/2023
REVISED: N/A

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

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

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

US 21 (Charlotte Highway) at SR 1100 (Brawley School Road) / SR 1117 (Wilson Avenue)

Division 12 | Iredell County | Mooresville

PLAN DATE:	May 2022	REVIEWED BY:	E D Harris
PREPARED BY:	D A Waller	REVIEWED BY:	R M Muncey

REVISIONS	INIT.	DATE

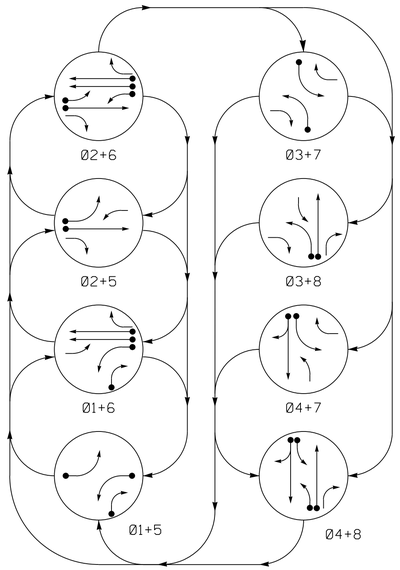
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 042678 ENGINEER DERRICK A. WALLER

DocuSigned by: Derrick Waller 3/24/2023
SIGNATURE DATE

SIG. INVENTORY NO. 12-1369T2

PROJECT REFERENCE NO.	SHEET NO.
R-3833C	SIG-9.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

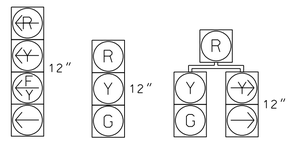
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE 01+5	01+6	02+5	02+6	03+7	03+8	04+7	04+8	FLASH
11	←R	←R	F.Y	F.Y	←R	←R	←R	←R	Y
21,23	R	R	G	G	R	R	R	R	Y
22	R	R	G	G	R/→	R/→	R	R	Y
31	←R	←R	←R	←R	←	←	F.Y	F.Y	←R
41,42,43	R	R	R	R	R	R	G	G	R
51	←	F.Y	←	F.Y	←R	←R	←R	←R	Y
61,63	R	G	R	G	R	R	R	R	Y
62	R	G	R	G	R/→	R	R/→	R	Y
71	←R	←R	←R	←R	←	F.Y	←	F.Y	←R
81, 83	R	R	R	R	R	G	R	G	R
82	R/→	R/→	R	R	R	G	R	G	R

SIGNAL FACE I.D.

All Heads L.E.D.



ASC/3 DETECTOR INSTALLATION CHART

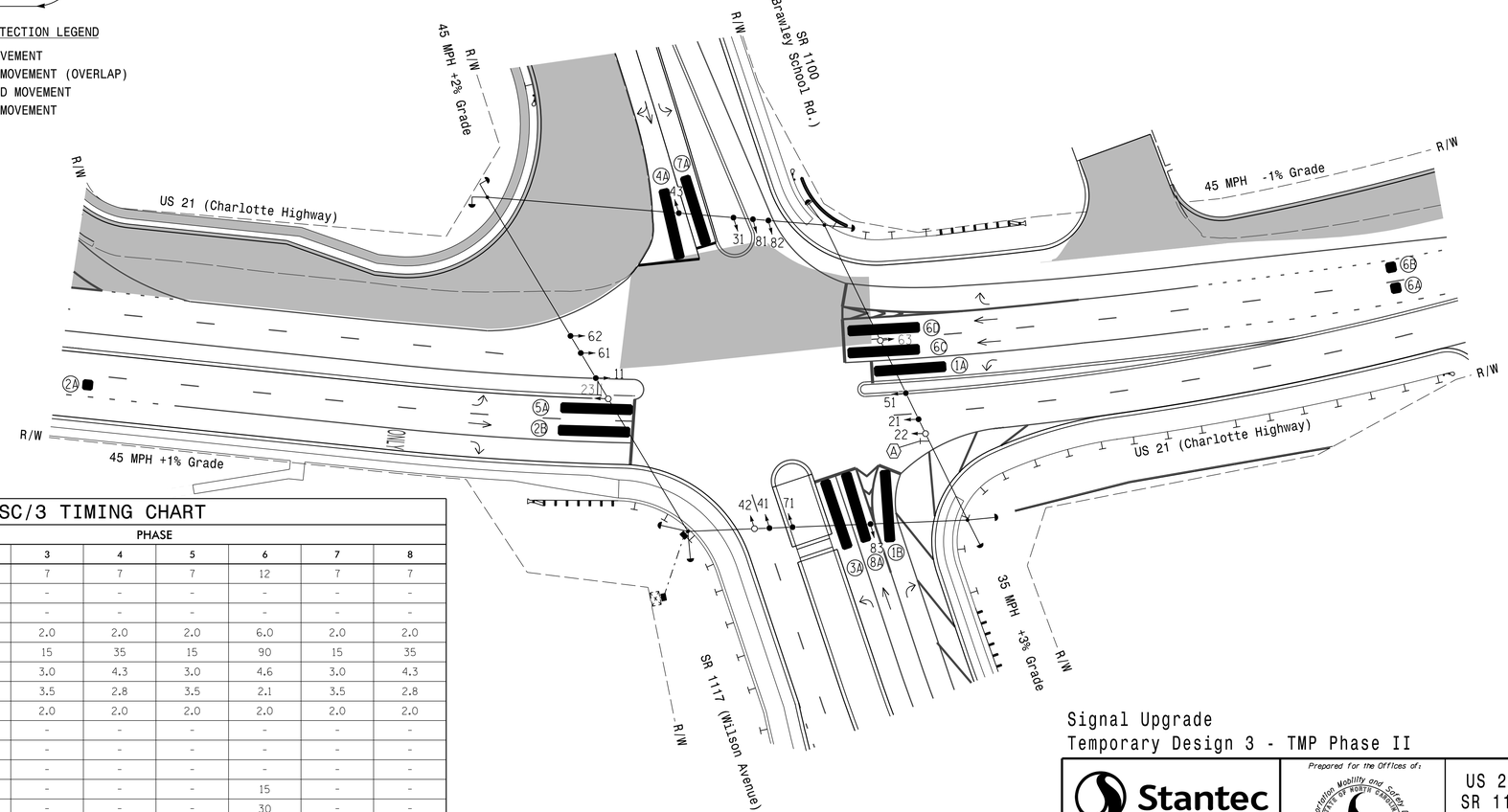
DETECTOR LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
1A	6X40	0	*	*	1	Yes	-	15	-	N	-	*
					6	Yes	-	-	-	G	-	*
1B	6X40	0	*	*	1	Yes	-	15	-	N	-	*
2A	6X6	300	*	*	2	Yes	-	-	-	N	-	*
2B	6X40	0	*	*	2	Yes	2.0	5	-	G	-	*
3A	6X40	0	*	*	3	Yes	-	15	-	N	-	*
					8	Yes	-	3	-	N	-	*
4A	6X40	0	*	*	4	Yes	-	10	-	N	-	*
5A	6X40	0	*	*	5	Yes	-	15	-	N	-	*
					2	Yes	-	-	-	G	-	*
6A	6X6	300	*	*	6	Yes	-	-	-	N	-	*
6B	6X6	300	*	*	6	Yes	-	-	-	N	-	*
6C	6X40	0	*	*	6	Yes	2.0	5	-	G	-	*
6D	6X40	0	*	*	6	Yes	2.0	5	-	G	-	*
7A	6X40	0	*	*	7	Yes	-	15	-	N	-	*
					4	Yes	-	3	-	N	-	*
8A	6X40	0	*	*	8	Yes	-	-	-	N	-	*

* Video Detection Area

8 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 and/or phase 5 may be lagged.
4. Phase 3 and/or phase 7 may be lagged.
5. Set all detector units to presence mode.
6. This intersection features a video detection system. Detectors should be placed to ensure the desired operation parameters are achieved.
7. Reconnect and uncover signal heads 11, 31, 71, 81, 82, and 83.
8. Reposition existing signal heads 11, 21, 22, 31, 41, 51, 61, 62, 81, 82, and 83. Install new signal heads 23, 42, and 63.



LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
▯↓	Pedestrian Signal Head With Push Button & Sign	■↓
○	Signal Pole with Guy	●●
○	Signal Pole with Sidewalk Guy	●●
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
□	Junction Box	■
·-·-·	2-in Underground Conduit	·-·-·
N/A	Right of Way	———
→	Directional Arrow	→
▬	Video Detection Area	N/A
▭	Construction Zone	N/A
OS	Oversized Junction Box	■
Ⓐ	Rignt Arrow "ONLY" Sign (R3-5R)	Ⓐ

ASC/3 TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6	7	8
Min Green *	7	12	7	7	7	12	7	7
Walk *	-	-	-	-	-	-	-	-
Ped Clear	-	-	-	-	-	-	-	-
Veh. Extension *	2.0	6.0	2.0	2.0	2.0	6.0	2.0	2.0
Max 1 *	15	90	15	35	15	90	15	35
Yellow	3.0	4.6	3.0	4.3	3.0	4.6	3.0	4.3
Red Clear	3.2	2.1	3.5	2.8	3.5	2.1	3.5	2.8
Red Revert	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Actuations B4 Add *	-	-	-	-	-	-	-	-
Seconds /Actuation *	-	-	-	-	-	-	-	-
Max Initial *	-	-	-	-	-	-	-	-
Time Before Reduction *	-	15	-	-	-	15	-	-
Time To Reduce *	-	30	-	-	-	30	-	-
Minimum Gap	-	3.0	-	-	-	3.0	-	-
Locking Detector	-	X	-	-	-	X	-	-
Recall Position	-	VEH. RECALL	-	-	-	VEH. RECALL	-	-
Dual Entry	-	-	-	X	-	-	-	X
Simultaneous Gap	X	X	X	X	X	X	X	X

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

Signal Upgrade
Temporary Design 3 - TMP Phase II

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Stantec Consulting Services Inc.
801 Jones Franklin Road-Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
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SCALE 0 40 1" = 40'

US 21 (Charlotte Highway) at SR 1100 (Brawley School Road) / SR 1117 (Wilson Avenue)

Division 12 | Iredell County | Mooresville

PLAN DATE: May 2022 | REVIEWED BY: E D Harris
PREPARED BY: J. Hambright | REVIEWED BY: R M Muncey

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 042678 ENGINEER DERRICK A WALLER

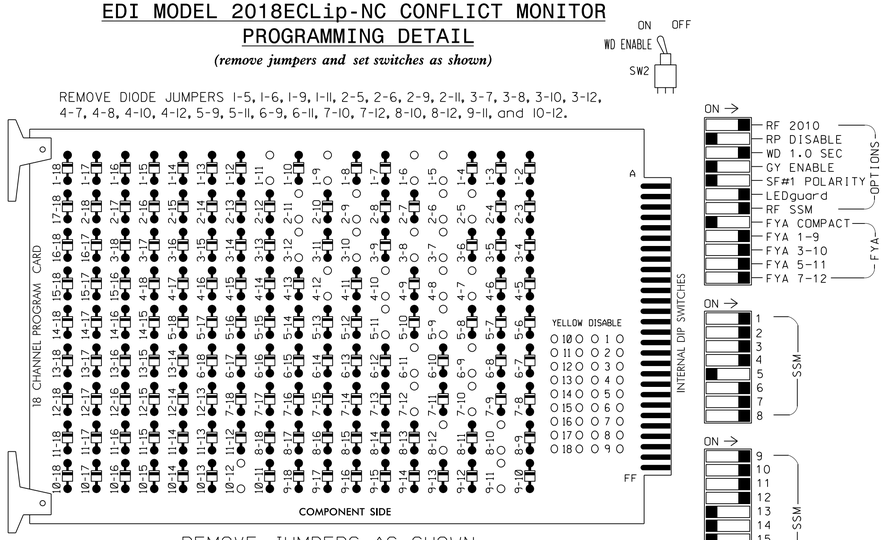
DocuSigned by: Derrick Waller 3/24/2023
SIGNATURE DATE

SIG. INVENTORY NO. 12-136973

3/24/2023
12:19:46 PM
User:dawaller
J:\Signals\Designs\Signal Design\Temporary Designs\R-3833C_sig_dsn_12-136973.dgn

EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE JUMPERS AS SHOWN

NOTES:

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

■ = DENOTES POSITION OF SWITCH

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Program phases 4 and 8 for Dual Entry.
3. Program controller to start up in phase 2 Green and 6 Green.
4. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.

EQUIPMENT INFORMATION

CONTROLLER.....2070LX
CABINET.....332 W/AUX
SOFTWARE.....ECONOLITE ASC/3-2070
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
LOAD SWITCHES USED.....S1,S2,S4,S5,S7,S8,S10,S11, AUX S1,AUX S2,AUX S4,AUX S5
PHASES USED.....1,2,3,4,5,6,7,8
OVERLAP "A".....*
OVERLAP "B".....*
OVERLAP "C".....*
OVERLAP "D".....*

* See overlap programming detail on sheet 2

PROJECT REFERENCE NO.	SHEET NO.
R-3833C	SIG-9.1

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1		S2	S3	S4		S5	S6	S7	S8	S9	S10		S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1		2	13	3		4	14	5	6	15	7		8	16	9	10	17	11	12	18
PHASE	1		2	2 PED	3		4	4 PED	5	6	6 PED	7		8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	11 ★	82	21,22 23	NU	22	31 ★	41,42 43	NU	51 ★	61,62 63	NU	62	71 ★	81,82 83	NU	11 ★	31 ★	NU	51 ★	71 ★	NU
RED		✳	128		✳		101			134		✳		107							
YELLOW			129				102		✳	135				108							
GREEN			130				103			136				109							
RED ARROW																A121	A124		A114	A101	
YELLOW ARROW		126			117							123				A122	A125		A115	A102	
FLASHING YELLOW ARROW																A123	A126		A116	A103	
GREEN ARROW	127	127			118	118			133			124	124								

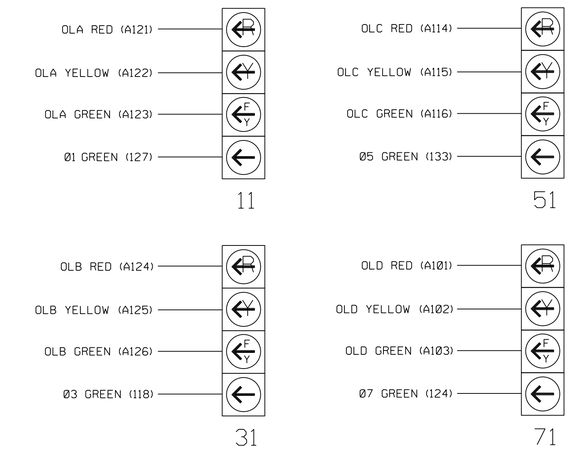
NU = Not Used

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

★ See pictorial of head wiring in detail this sheet.

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	Ø 1 1A	SLOT EMPTY	SLOT EMPTY	WIRED ⊗ INPUT	Ø 3 3A	SLOT EMPTY	SLOT EMPTY	WIRED ⊗ INPUT	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
	L	NOT USED				NOT USED									ST DC ISOLATOR
FILE "J"	U	Ø 5 5A	SLOT EMPTY	SLOT EMPTY	WIRED ⊗ INPUT	Ø 7 7A	SLOT EMPTY	SLOT EMPTY	WIRED ⊗ INPUT	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L	NOT USED				NOT USED									

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

FS = FLASH SENSE
ST = STOP TIME

⊗ Wired Input - Do not populate slot with detector card

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND TIME	DELAY TIME	ADDED INITIAL	DETECTOR TYPE
1A [1]	TB2-1,2	I1U	56	1 ★	1	YES		15		S
	-	J4U	48	26★	6	YES		3		G
3A [2]	TB4-5,6	I5U	58	3 ★	3	YES		15		S
	-	J8U	50	28★	8	YES		3		G
5A [3]	TB3-1,2	J1U	55	5 ★	5	YES		15		S
	-	I4U	47	22★	2	YES		3		G
7A [4]	TB5-5,6	J5U	57	7 ★	7	YES		15		S
	-	I8U	49	24★	4	YES		3		G

[1] Add jumper from I1-W to J4-W, on rear of input file.
[2] Add jumper from I5-W to J8-W, on rear of input file.
[3] Add jumper from J1-W to I4-W, on rear of input file.
[4] Add jumper from J5-W to I8-W, on rear of input file.

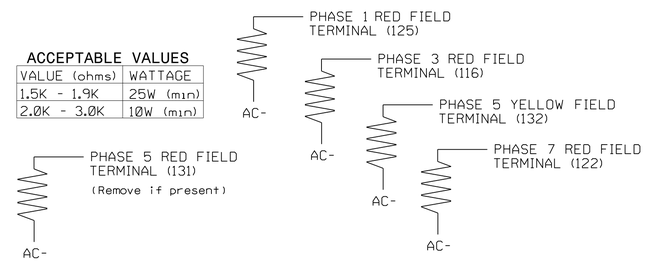
INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

ACCEPTABLE VALUES

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



SPECIAL DETECTOR NOTE

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

For Detection Zones 1A, 3A, 5A, and 7A, the equipment placement and slots reserved for wired inputs are typical for a NCDOT installation.

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 12-1369T3
DESIGNED: MAY 2022
SEALED: 3/24/2023
REVISED: N/A

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

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

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

US 21 (Charlotte Highway) at SR 1100 (Brawley School Road) / SR 1117 (Wilson Avenue)

Division 12 | Iredell County | Mooresville

PLAN DATE:	May 2022	REVIEWED BY:	E D Harris
PREPARED BY:	D A Waller	REVIEWED BY:	R M Muncey

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER
SEAL 042678
DERRICK A WALLER

DocuSigned by:
Derrick Waller
SIGNATURE
3/24/2023
DATE

SIG. INVENTORY NO. 12-1369T3

12/5/2025 PM
I:\projects\Signals\Designs\Electrical Details*Temporary Designs\R-3833C_sig_ele_12_1369T3.dgn
User:dwaller

ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select [2. CONTROLLER]
2. From CONTROLLER Submenu select [2. VEHICLE OVERLAPS]

OVERLAP A

Select TMG VEH OVLP [A] and 'PPLT FYA'

```
TMG VEH OVLP...[A] TYPE: .....PPLT FYA

PROTECTED LEFT TURN....   PHASE    1
OPPOSING THROUGH.......   PHASE    2

FLASHING ARROW OUTPUT.....CH9  ISOLATE

DELAY START OF: FYA..0.0 CLEARANCE..0.0
ACTION PLAN SF BIT DISABLE.......... 0
```

Toggle Once

↓

OVERLAP B

Select TMG VEH OVLP [B] and 'PPLT FYA'

```
TMG VEH OVLP...[B] TYPE: .....PPLT FYA

PROTECTED LEFT TURN....   PHASE    3
OPPOSING THROUGH.......   PHASE    4

FLASHING ARROW OUTPUT.....CH10 ISOLATE

DELAY START OF: FYA..0.0 CLEARANCE..0.0
ACTION PLAN SF BIT DISABLE.......... 0
```

Toggle Once

↓

OVERLAP C

Select TMG VEH OVLP [C] and 'PPLT FYA'

```
TMG VEH OVLP...[C] TYPE: .....PPLT FYA

PROTECTED LEFT TURN....   PHASE    5
OPPOSING THROUGH.......   PHASE    6

FLASHING ARROW OUTPUT.....CH11 ISOLATE

DELAY START OF: FYA..0.0 CLEARANCE..0.0
ACTION PLAN SF BIT DISABLE.......... 0
```

Toggle Once

↓

OVERLAP D

Select TMG VEH OVLP [D] and 'PPLT FYA'

```
TMG VEH OVLP...[D] TYPE: .....PPLT FYA

PROTECTED LEFT TURN....   PHASE    7
OPPOSING THROUGH.......   PHASE    8

FLASHING ARROW OUTPUT.....CH12 ISOLATE

DELAY START OF: FYA..0.0 CLEARANCE..0.0
ACTION PLAN SF BIT DISABLE.......... 0
```

END PROGRAMMING

PROJECT REFERENCE NO.	SHEET NO.
R-3833C	SIG-9.2

FLASHER CIRCUIT MODIFICATION DETAIL

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

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

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 12-1369T3
DESIGNED: MAY 2022
SEALED: 3/24/2023
REVISED: N/A

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

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Division 12 | Iredell County | Mooresville

PLAN DATE:	May 2022	REVIEWED BY:	E D Harris
PREPARED BY:	D A Waller	REVIEWED BY:	R M Muncey

REVISIONS	INIT.	DATE

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 042678 ENGINEER DERRICK A WALLER

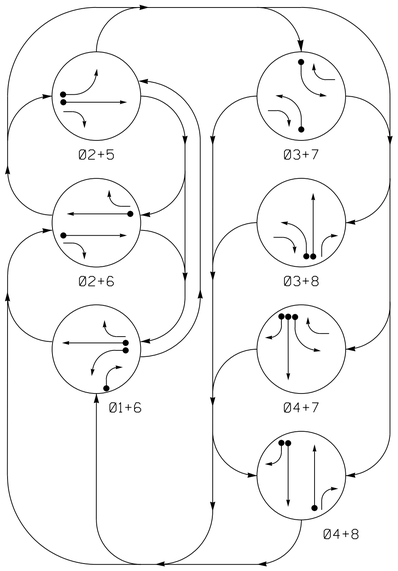
DocuSigned by: Derrick Waller 3/24/2023
SIGNATURE DATE

SIG. INVENTORY NO. 12-1369T3

12:50:12 PM
User:dawaller
Z:\Projects\Designs\Design\Electrical Details\Temporary Design\R-3833C_sig_ele_12_1369T3.dgn

PROJECT REFERENCE NO.	SHEET NO.
R-3833C	SIG-10.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

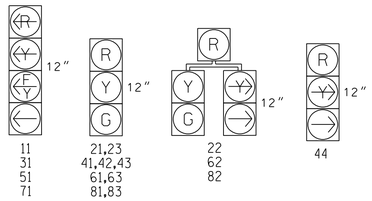
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE 01+06	02+05	03+07	03+08	04+07	04+08	FLASH
11	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~Y~~
21,23	R	G	G	R	R	R	Y
22	R	G	G	R/→	R/→	R	Y
31	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~
41, 42,43	R	R	R	R	G	G	R
44	R	R	R	R	→	→	R
51	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~Y~~
61,63	G	G	R	R	R	R	Y
62	G	G	R	R/→	R	R/→	Y
71	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~
81, 83	R	R	R	R	G	R	G
82	R/→	R	R	R	G	R	G

SIGNAL FACE I.D.

All Heads L.E.D.



ASC/3 DETECTOR INSTALLATION CHART

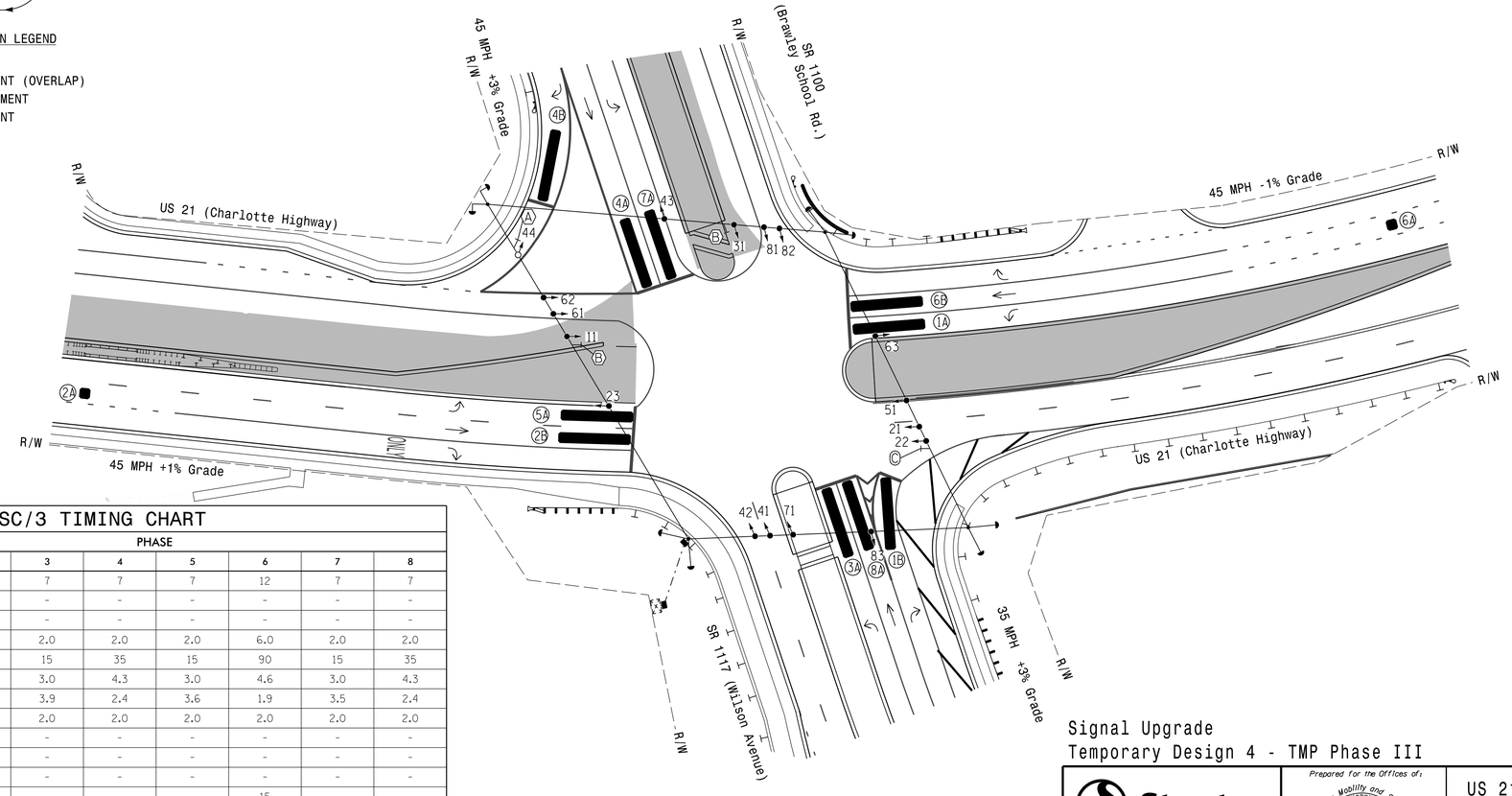
DETECTOR					PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
1A	6X40	0	✳	✳	1	Yes	-	-	-	N	-	✳
1B	6X40	0	✳	✳	1	Yes	-	15	-	N	-	✳
2A	6X6	300	✳	✳	2	Yes	-	-	-	N	-	✳
2B	6X40	0	✳	✳	2	Yes	2.0	5	-	G	-	✳
3A	6X40	0	✳	✳	3	Yes	-	-	-	N	-	✳
4A	6X40	0	✳	✳	4	Yes	-	-	-	N	-	✳
4B	6X40	0	✳	✳	4	Yes	-	-	-	N	-	✳
5A	6X40	0	✳	✳	5	Yes	-	-	-	N	-	✳
6A	6X6	300	✳	✳	6	Yes	-	-	-	N	-	✳
6B	6X40	0	✳	✳	6	Yes	2.0	5	-	G	-	✳
7A	6X40	0	✳	✳	7	Yes	-	-	-	N	-	✳
8A	6X40	0	✳	✳	8	Yes	-	-	-	N	-	✳

✳ Video Detection Area

7 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 and/or phase 5 may be lagged.
4. Phase 3 and/or phase 7 may be lagged.
5. Set all detector units to presence mode.
6. This intersection features a video detection system. Detectors should be placed to ensure the desired operation parameters are achieved.
7. Reposition existing signal heads 11,31,41,42,43,61,62,63,71,81, & 82.



LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
□↓	Pedestrian Signal Head With Push Button & Sign	■↓
○	Signal Pole with Guy	●
○⤵	Signal Pole with Sidewalk Guy	●⤵
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
□	Junction Box	■
·-·-·	2-in Underground Conduit	·-·-·
N/A	Right of Way	———
→	Directional Arrow	→
▬	Video Detection Area	N/A
▭	Construction Zone	N/A
OS	Oversized Junction Box	■
Ⓐ	"NO TURN ON RED" Sign (R10-11)	Ⓐ
Ⓑ	"U-TURN YIELD TO RIGHT TURN" Sign (R10-16)	Ⓑ
Ⓒ	Rignt Arrow "ONLY" Sign (R3-5R)	Ⓒ

ASC/3 TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6	7	8
Min Green *	7	12	7	7	7	12	7	7
Walk *	-	-	-	-	-	-	-	-
Ped Clear	-	-	-	-	-	-	-	-
Veh. Extension *	2.0	6.0	2.0	2.0	2.0	6.0	2.0	2.0
Max 1 *	15	90	15	35	15	90	15	35
Yellow	3.0	4.6	3.0	4.3	3.0	4.6	3.0	4.3
Red Clear	3.5	1.9	3.9	2.4	3.6	1.9	3.5	2.4
Red Revert	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Actuations B4 Add *	-	-	-	-	-	-	-	-
Seconds /Actuation *	-	-	-	-	-	-	-	-
Max Initial *	-	-	-	-	-	-	-	-
Time Before Reduction *	-	15	-	-	-	15	-	-
Time To Reduce *	-	30	-	-	-	30	-	-
Minimum Gap	-	3.0	-	-	-	3.0	-	-
Locking Detector	-	X	-	-	-	X	-	-
Recall Position	-	VEH. RECALL	-	-	-	VEH. RECALL	-	-
Dual Entry	-	-	-	X	-	-	-	X
Simultaneous Gap	X	X	X	X	X	X	X	X

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

Signal Upgrade
Temporary Design 4 - TMP Phase III

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

SCALE 0 40 1" = 40'

US 21 (Charlotte Highway) at SR 1100 (Brawley School Road) / SR 1117 (Wilson Avenue)

Division 12 Iredell County Mooresville

PLAN DATE:	May 2022	REVIEWED BY:	E D Harris
PREPARED BY:	J. Hambright	REVIEWED BY:	R M Muncey

REVISIONS	INIT.	DATE

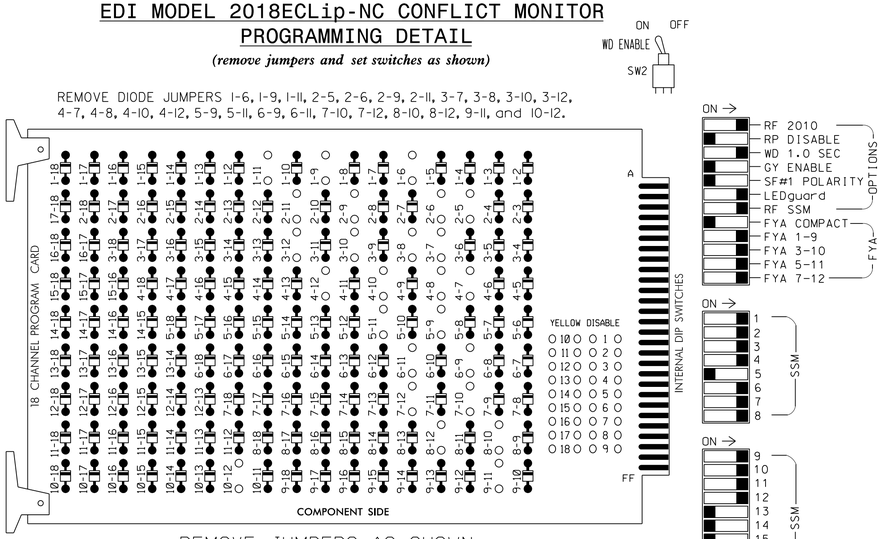
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 042678 ENGINEER DERRICK A. WALLER

DocuSigned by: Derrick Waller 3/22/2023
SIGNATURE DATE

SIG. INVENTORY NO. 12-1369T4

EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE JUMPERS AS SHOWN

NOTES:

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

■ = DENOTES POSITION OF SWITCH

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Program phases 4 and 8 for Dual Entry.
3. Program controller to start up in phase 2 Green and 6 Green.
4. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.

EQUIPMENT INFORMATION

CONTROLLER.....2070LX
CABINET.....332 W/AUX
SOFTWARE.....ECONOLITE ASC/3-2070
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
LOAD SWITCHES USED.....S1,S2,S4,S5,S7,S8,S10,S11, AUX S1,AUX S2,AUX S4,AUX S5
PHASES USED.....1,2,3,4,5,6,7,8
OVERLAP "A".....*
OVERLAP "B".....*
OVERLAP "C".....*
OVERLAP "D".....*

* See overlap programming detail on sheet 2

PROJECT REFERENCE NO.	SHEET NO.
R-3833C	SIG-10.1

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1		S2	S3	S4		S5		S6	S7	S8	S9	S10		S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1		2	13	3		4		14	5	6	15	7		8	16	9	10	17	11	12	18
PHASE	1		2	2 PED	3		4		4 PED	5	6	6 PED	7		8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	11 ★	82	21,22 23	NU	22	31 ★	41,42 43	44	NU	51 ★	61,62 63	NU	62	71 ★	81,82 83	NU	11 ★	31 ★	NU	51 ★	71 ★	NU
RED		✳	128		✳		101	101			134		✳		107							
YELLOW			129				102			✳	135				108							
GREEN			130				103				136				109							
RED ARROW																	A121	A124		A114	A101	
YELLOW ARROW		126			117			102					123				A122	A125		A115	A102	
FLASHING YELLOW ARROW																	A123	A126		A116	A103	
GREEN ARROW	127	127			118	118		103		133			124	124								

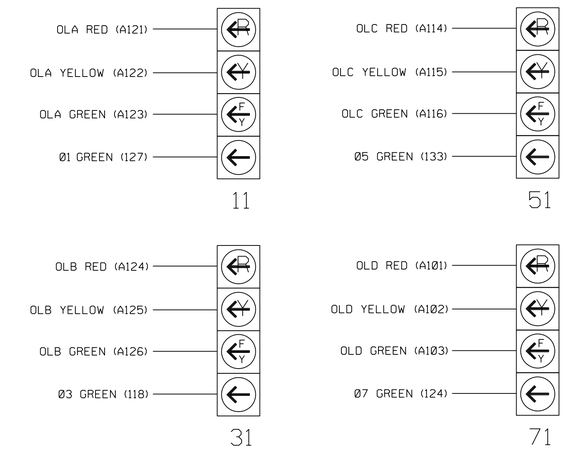
NU = Not Used

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

★ See pictorial of head wiring in detail this sheet.

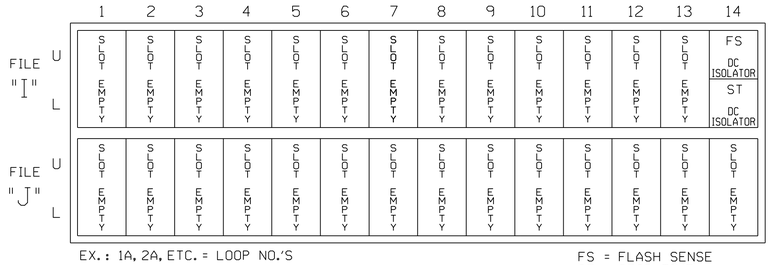
FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



INPUT FILE POSITION LAYOUT

(front view)



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

FS = FLASH SENSE
ST = STOP TIME

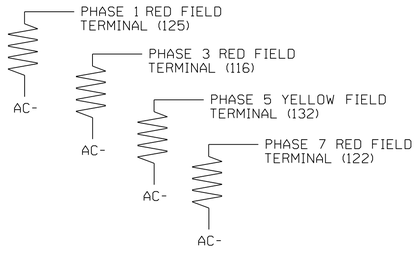
SPECIAL DETECTOR NOTE

For all detector zones, install a temporary 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.

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: 12-1369T4
DESIGNED: MAY 2022
SEALED: 3/22/2023
REVISED: N/A

Temporary Design 4 - TMP Phase III
Electrical Detail - Sheet 1 of 2

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US 21 (Charlotte Highway) at SR 1100 (Brawley School Road) / SR 1117 (Wilson Avenue)

Division 12 Iredell County Mooresville

PLAN DATE:	May 2022	REVIEWED BY:	E D Harris
PREPARED BY:	D A Waller	REVIEWED BY:	R M Muncey

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 042678 ENGINEER DERRICK A WALLER

DocuSigned by: Derrick Waller 3/22/2023
SIGNATURE DATE

SIG. INVENTORY NO. 12-1369T4

PROJECT REFERENCE NO.	SHEET NO.
R-3833C	SIG-10.2

ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select [2. CONTROLLER]
2. From CONTROLLER Submenu select [2. VEHICLE OVERLAPS]

OVERLAP A

Select TMG VEH OVLP [A] and 'PPLT FYA'

```
TMG VEH OVLP...[A] TYPE: .....PPLT FYA

PROTECTED LEFT TURN....   PHASE    1
OPPOSING THROUGH.......   PHASE    2

FLASHING ARROW OUTPUT.....CH9  ISOLATE

DELAY START OF: FYA..0.0 CLEARANCE..0.0
ACTION PLAN SF BIT DISABLE.......... 0
```

Toggle Once

↓

OVERLAP B

Select TMG VEH OVLP [B] and 'PPLT FYA'

```
TMG VEH OVLP...[B] TYPE: .....PPLT FYA

PROTECTED LEFT TURN....   PHASE    3
OPPOSING THROUGH.......   PHASE    4

FLASHING ARROW OUTPUT.....CH10 ISOLATE

DELAY START OF: FYA..0.0 CLEARANCE..0.0
ACTION PLAN SF BIT DISABLE.......... 0
```

Toggle Once

↓

OVERLAP C

Select TMG VEH OVLP [C] and 'PPLT FYA'

```
TMG VEH OVLP...[C] TYPE: .....PPLT FYA

PROTECTED LEFT TURN....   PHASE    5
OPPOSING THROUGH.......   PHASE    6

FLASHING ARROW OUTPUT.....CH11 ISOLATE

DELAY START OF: FYA..0.0 CLEARANCE..0.0
ACTION PLAN SF BIT DISABLE.......... 0
```

Toggle Once

↓

OVERLAP D

Select TMG VEH OVLP [D] and 'PPLT FYA'

```
TMG VEH OVLP...[D] TYPE: .....PPLT FYA

PROTECTED LEFT TURN....   PHASE    7
OPPOSING THROUGH.......   PHASE    8

FLASHING ARROW OUTPUT.....CH12 ISOLATE

DELAY START OF: FYA..0.0 CLEARANCE..0.0
ACTION PLAN SF BIT DISABLE.......... 0
```

END PROGRAMMING

FLASHER CIRCUIT MODIFICATION DETAIL

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

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

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 12-1369T4
DESIGNED: MAY 2022
SEALED: 3/22/2023
REVISED: N/A

Temporary Design 4 - TMP Phase III
Electrical Detail - Sheet 2 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Stantec

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

Prepared for the Offices of:

Transportation Mobility and Safety Division
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signal Design Section

750 N.Greenfield Pkwy.Garner,NC 27529

US 21 (Charlotte Highway) at SR 1100 (Brawley School Road) / SR 1117 (Wilson Avenue)

Division 12 | Iredell County | Mooresville

PLAN DATE:	May 2022	REVIEWED BY:	E D Harris
PREPARED BY:	D A Waller	REVIEWED BY:	R M Muncey

REVISIONS	INIT.	DATE

SEAL

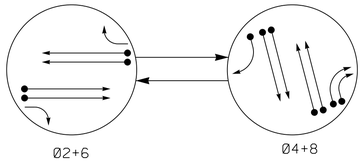
NORTH CAROLINA PROFESSIONAL SEAL 042678 ENGINEER DERRICK A WALLER

DocuSigned by: Derrick Waller 3/22/2023
BY: SIGNATURE DATE

SIG. INVENTORY NO. 12-1369T4

PROJECT REFERENCE NO.	SHEET NO.
R-3833C	SIG-11.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

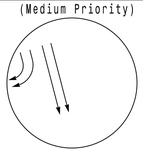
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2+6	PHASE Ø4+8	PHASE PRE 3	PHASE FLASH
21,22	↑	R	R	Y
23	G	R	R	Y
41,42	R	↑	↑	R
43	R	G	G	R
44	R	→	→	R
61,62	↑	R	R	Y
63	G	R	R	Y
81,82	R	↑	R	R
83	R	G	R	R
84,85	R	→	R	R

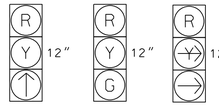
EV PREEMPT PHASES

(Medium Priority)



SIGNAL FACE I.D.

All Heads L.E.D.



ASC/3 DETECTOR INSTALLATION CHART

DETECTOR					PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
2A	6X6	300	✳	X	2	Yes	-	-	-	N	-	✳
2B	6X6	300	✳	X	2	Yes	-	-	-	N	-	✳
2C	6X40	0	✳	X	2	Yes	2.0	5	-	G	-	✳
2D	6X40	0	✳	X	2	Yes	2.0	5	-	G	-	✳
4A	6X40	0	✳	X	4	Yes	-	-	-	N	-	✳
4B	6X40	0	✳	X	4	Yes	-	-	-	N	-	✳
4C	6X40	0	✳	X	4	Yes	-	-	-	N	-	✳
6A	6X6	300	✳	X	6	Yes	-	-	-	N	-	✳
6B	6X6	300	✳	X	6	Yes	-	-	-	N	-	✳
6C	6X40	0	✳	X	6	Yes	2.0	5	-	G	-	✳
6D	6X40	0	✳	X	6	Yes	2.0	5	-	G	-	✳
8A	6X40	0	✳	X	8	Yes	-	-	-	N	-	✳
8B	6X40	0	✳	X	8	Yes	-	-	-	N	-	✳
8C	6X40	0	✳	X	8	Yes	-	-	-	N	-	✳
8D	6X40	0	✳	X	8	Yes	-	-	-	N	-	✳

✳ Video Detection Area

2 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. Set all detector units to presence mode.
4. This intersection features a video detection system. Detectors should be placed to ensure the desired operation parameters are achieved.
5. Optical detector 10 calls PRE 3.
6. Reposition existing signal head 44.

LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
□	Pedestrian Signal Head With Push Button & Sign	■
○	Signal Pole with Guy	●→
○	Signal Pole with Sidewalk Guy	●
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
□	Junction Box	■
----	2-in Underground Conduit	----
N/A	Right of Way	----
→	Directional Arrow	→
▬	Video Detection Area	N/A
▭	Construction Zone	N/A
⋈	Optical EVP Detector	⋈
OS	Oversized Junction Box	■
Ⓐ	"NO TURN ON RED" Sign (R10-11)	Ⓐ
Ⓑ	No Left/U-Turn Sign (R3-18)	Ⓑ
Ⓒ	Rignt Arrow "ONLY" Sign (R3-5R)	Ⓒ

ASC/3 TIMING CHART

FEATURE	PHASE 2	PHASE 4	PHASE 6	PHASE 8
Min Green *	12	7	12	7
Walk *	-	-	-	-
Ped Clear	-	-	-	-
Veh. Extension *	6.0	3.0	6.0	3.0
Max 1 *	90	60	90	60
Yellow	4.4	4.3	4.6	3.7
Red Clear	1.9	1.8	1.8	2.3
Red Revert	2.0	2.0	2.0	2.0
Actuations B4 Add *	-	-	-	-
Seconds /Actuation *	-	-	-	-
Max Initial *	-	-	-	-
Time Before Reduction *	15	-	15	-
Time To Reduce *	30	-	30	-
Minimum Gap	3.0	-	3.0	-
Locking Detector	X	-	X	-
Recall Position	VEH. RECALL	-	VEH. RECALL	-
Dual Entry	-	X	-	X
Simultaneous Gap	X	X	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.

ASC/3 EV PREEMPT

FUNCTION	PRE 3
Exit Phase(s)	2+6
Preempt Override	OFF
Delay Time	0
Ped Clear Through Yellow	N
Terminate Phases	N
Entrance Walk	1
Entrance Ped Clear	255
Entrance Min Green	1
Entrance Yellow Change	25.5✳
Entrance Red Clear	25.5✳
Minimum Dwell Time	7
Preempt Input Extension Time	2.0
Preempt Max Time	120
Exit Yellow Change	25.5✳
Exit Red Clear	25.5✳

* Time defaults to time used for phase during normal operation.

Signal Upgrade
Temporary Design 5 - TMP Phase III - Step 2

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SCALE 0 40 1" = 40'

US 21 (Charlotte Highway) at SR 1100 (Brawley School Road) / SR 1117 (Wilson Avenue)

Division 12 Iredell County Mooresville

PLAN DATE: May 2022 REVIEWED BY: E D Harris

PREPARED BY: J. Hambright REVIEWED BY: R M Muncey

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 042678 ENGINEER DERRICK A. WALLER

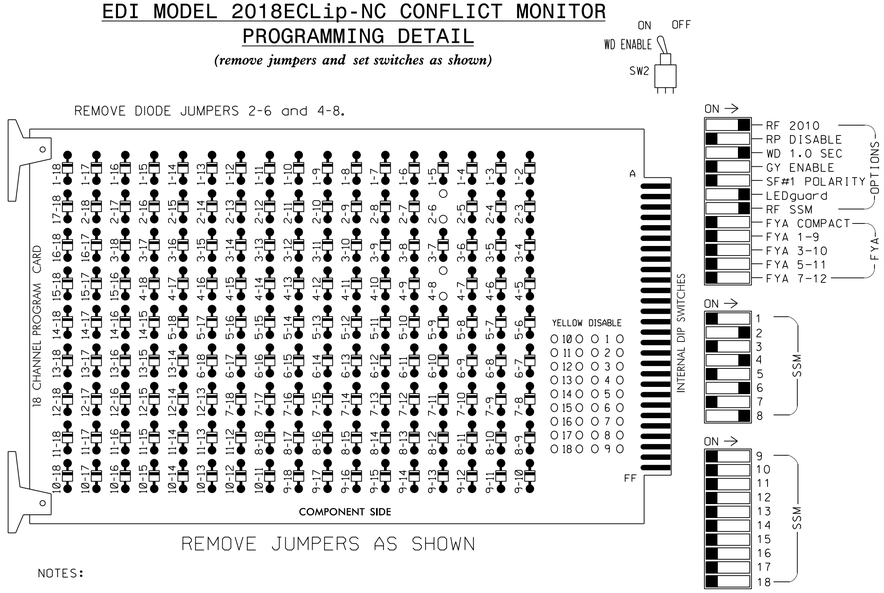
DocuSigned by: Derrick Waller 3/22/2023
SIGNATURE DATE

SIG. INVENTORY NO. 12-1369T5

3/22/2023
2:15:54 PM
Z:\Projects\Signals\Design\Signal Design\Temporary Design\R-3833C_sig_dsn_12-1369T5.dgn
User:dwaller

EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE JUMPERS AS SHOWN

■ = DENOTES POSITION OF SWITCH

NOTES:

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

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Return controller to Factory Defaults before programming per this electrical detail.
3. Program phases 4 and 8 for Dual Entry.
4. Program controller to start up in phase 2 Green and 6 Green.
5. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.

EQUIPMENT INFORMATION

CONTROLLER.....2070LX
CABINET.....332 W/AUX
SOFTWARE.....ECONOLITE ASC/3-2070
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
LOAD SWITCHES USED.....S2,S5,S8,S11
PHASES USED.....2,4,6,8
OVERLAP "A".....NOT USED
OVERLAP "B".....NOT USED
OVERLAP "C".....NOT USED
OVERLAP "D".....NOT USED

PROJECT REFERENCE NO.	SHEET NO.
R-3833C	SIG-11.1

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2		S3	S4	S5			S6	S7	S8		S9	S10	S11			S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2		13	3	4			14	5	6		15	7	8			16	9	10	17	11	12	18
PHASE	1	2		2 PED	3	4			4 PED	5	6		6 PED	7	8			8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	NU	21.22	23	NU	NU	41.42	43	44	NU	NU	61.62	63	NU	NU	81.82	83	84.85	NU	NU	NU	NU	NU	NU	NU
RED		128	128			101	101	101			134	134			107	107	107							
YELLOW		129	129			102	102				135	135			108	108								
GREEN			130				103					136				109								
RED ARROW																								
YELLOW ARROW								102									108							
GREEN ARROW		130				103		103			136				109		109							

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I" U	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
FILE "I" L														ST DC ISOLATOR
FILE "J" U	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	PRE3 DC ISOLATOR NOT USED	SLOT EMPTY	SLOT EMPTY
FILE "J" L														

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

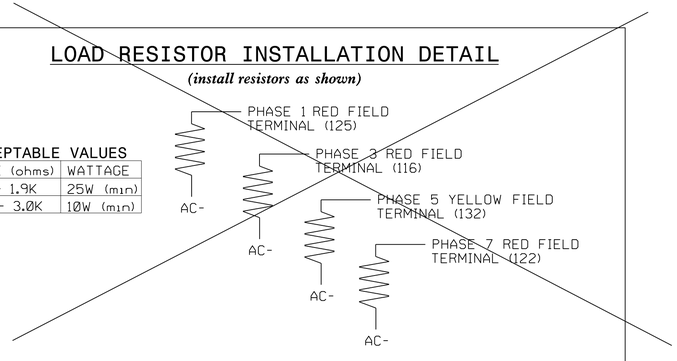
FS = FLASH SENSE
ST = STOP TIME
PRE = PREEMPT

SPECIAL DETECTOR NOTE

For all detector zones, install a temporary 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.

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: 12-1369T5
DESIGNED: MAY 2022
SEALED: 3/22/2023
REVISED: N/A

Temporary Design 5 - TMP Phase III - Step 2
Electrical Detail - Sheet 1 of 2

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Division 12 Iredell County Mooresville

PLAN DATE:	May 2022	REVIEWED BY:	E D Harris
PREPARED BY:	D A Waller	REVIEWED BY:	R M Muncey

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 042678 ENGINEER DERRICK A WALLER

DocuSigned by: Derrick Waller 3/22/2023
SIGNATURE DATE

SIG. INVENTORY NO. 12-1369T5

PROJECT REFERENCE NO.	SHEET NO.
R-3833C	SIG-11.2

ECONOLITE ASC/3-2070 EMERGENCY VEHICLE PREEMPT PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select [4. PREEMPTOR/TSP]
2. From PREEMPTOR/TSP/SCP Submenu select [1. PREEMPT PLAN 1-10]

Place cursor in [ ] next to Preempt Plan and press 3. Then press the right cursor arrow and toggle the controller to YES. Next cursor down. This will select Emergency Vehicle Preempt #3.

```
PREEMPT PLAN [  3]    ENABLE....YES
 VEH/PED 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 OVERLAP A B C D E F G H I J K L M N O P
TRKCLR V . . . . . . . . . . . . . . . .
TRKCLR O . . . . . . . . . . . . . . . .
ENA TRL  . . . . . . . . . . . . . . . .
DWEL VEH . . . X . . . . . . . . . . . .
DWEL PED . . . . . . . . . . . . . . . .
DWEL OLP . . . . . . . . . . . . . . . .
CYC VEH  . . . . . . . . . . . . . . . .
CYC PED  . . . . . . . . . . . . . . . .
CYC OLP  . . . . . . . . . . . . . . . .
EXIT PH  . X . . . X . . . . . . . . . .
EXIT CAL . . . . . . . . . . . . . . . .
SP FUNC  . . . . . . . . . . . . . . . .

ENABLE... YESIPMT OVRIDE..IINTERLOCK. NO
DET LOCK... XIDELAY..    OIINHBIT...  O
OVERIDE FL. .IDURATION   OICLR-GRN... NO
TERM OLP.  NOIPC>YEL     NOITERM PH    NO
PED DARK.. NOITC RESRV   NOIDWELL FL  OFF
LINK PMT....OIX FLCOLR REDIEXIT OPT. OFF
X TMG PLN...OIRE-SERV..  OIFLT TYPE.HARD
FREE DUR PMTIR1  NOIR2  NOIR3  NOIR4  NO
--TIMING-----WALKIPED CLIMN GRI YELI RED
ENTRANCE TM.    1I   255I    1I25.5I25.5
----------MIN GRIEXT GRIMX GRI YELI RED
TRACK CLEAR     OI     OI    OI25.5I25.5
----------MIN DLIPMTEXTIMX TMI YELI RED
DWL/CYC-EXIT    7I   2.0I  120I25.5I25.5
PMT ACTIVE OUT..ON   PMT ACT DWELL...NO
OTHER - PRI PMT.OFF  NON-PRI PMT.....OFF
INH EXT TIME... 0.0  PED PR RETURN...OFF
PRIORITY RETURN.OFF  QUEUE DELAY.... OFF
COND DELAY......OFF
PHASES     1   2   3   4   5   6   7   8
PR RTN%    0   0   0   0   0   0   0   0
PHASES     9  10  11  12  13  14  15  16
PR RTN%    0   0   0   0   0   0   0   0
```

PROGRAM EXTEND TIME ON OPTICAL DETECTOR UNITS FOR 2.0 SEC.

ECONOLITE ASC/3-2070 PREEMPT FILTERING PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select [4. PREEMPTOR/TSP]
2. From PREEMPT/TSP/SCP Submenu select [2. ENABLE PREEMPT FILTERING & TSP/SCP]

```
ENABLE PREEMPT FILTERING & TSP/SCP
FILTERED     SOLID          PULSING
INPUT  1 ...BYPASSED.. ...BYPASSED..
       2 ...BYPASSED.. ...BYPASSED..
       3 ..PREEMPT  3. ...BYPASSED..
       4 ..PREEMPT  4. ...BYPASSED..
       5 ..PREEMPT  5. ...BYPASSED..
       6 ..PREEMPT  6. ...BYPASSED..
       7 ...BYPASSED.. ...BYPASSED..
       8 ...BYPASSED.. ...BYPASSED..
       9 ...BYPASSED.. ...BYPASSED..
      10 ...BYPASSED.. ...BYPASSED..
```

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 12-1369T5
DESIGNED: MAY 2022
SEALED: 3/22/2023
REVISED: N/A

Temporary Design 5 - TMP Phase III - Step 2
Electrical Detail - Sheet 2 of 2

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SIG. INVENTORY NO. 12-1369T5

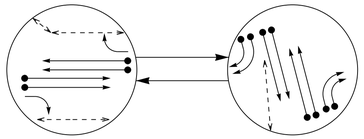
PROJECT REFERENCE NO.	SHEET NO.
R-3833C	SIG-12.0

2 Phase Fully Actuated with Emergency Vehicle Preemption Signal System 11210

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. Set all detector units to presence mode.
4. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
5. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
6. This intersection features an optical preemption system. Shown locations of optical detectors are conceptual only.
7. Optical detector 10 calls PRE 3.
8. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.

PHASING DIAGRAM

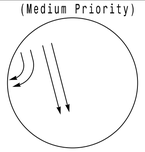


PHASING DIAGRAM DETECTION LEGEND

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

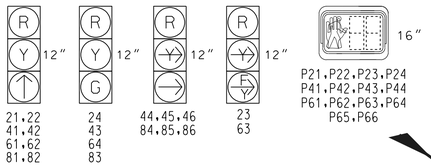
EV PREEMPT PHASES

(Medium Priority)



SIGNAL FACE I.D.

All Heads L.E.D.



ASC/3 DETECTOR INSTALLATION CHART												
DETECTOR					PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
2A	6X6	300	6	X	2	Yes	-	-	X	N	-	X
2B	6X6	300	6	X	2	Yes	-	-	X	N	-	X
4A	6X40	0	2-4-2	X	4	Yes	-	-	-	N	-	X
4B	6X40	0	2-4-2	X	4	Yes	-	-	-	N	-	X
4C	6X40	0	2-4-2	X	4	Yes	-	-	-	N	-	X
4D	6X40	0	2-4-2	X	4	Yes	-	-	-	N	-	X
6A	6X6	300	6	X	6	Yes	-	-	X	N	-	X
6B	6X6	300	6	X	6	Yes	-	-	X	N	-	X
8A	6X40	0	2-4-2	X	8	Yes	-	-	-	N	-	X
8B	6X40	0	2-4-2	X	8	Yes	-	-	-	N	-	X
8C	6X40	0	2-4-2	X	8	Yes	-	-	-	N	-	X
8D	6X40	0	2-4-2	X	8	Yes	-	-	-	N	-	X

TABLE OF OPERATION

SIGNAL FACE	PHASE 02+6	PHASE 04+8	PHASE PRE 3	PHASE FLASH
21,22	↑	R	R	Y
23	F Y	R	R	Y
24	G	R	R	Y
41,42	R	↑	↑	R
43	R	G	G	R
44,45,46	R	→	→	R
61,62	↑	R	R	Y
63	F Y	R	R	Y
64	G	R	R	Y
81,82	R	↑	R	R
83	R	G	R	R
84,85,86	R	→	R	R
P21,P22,P23,P24	W	DW	DW	DRK
P41,P42,P43,P44	DW	W	DW	DRK
P61,P62,P63, P64,P65,P66	W	DW	DW	DRK

ASC/3 TIMING CHART

FEATURE	PHASE 2	PHASE 4	PHASE 6	PHASE 8
Min Green *	12	7	12	7
Walk *	7	7	7	0
Ped Clear	29	25	23	0
Veh. Extension *	6.0	3.0	6.0	3.0
Max 1 *	90	60	90	60
Yellow	4.4	4.3	4.6	3.7
Red Clear	2.6	3.0	2.2	3.3
Red Revert	2.0	2.0	2.0	2.0
Actuations B4 Add *	-	-	-	-
Seconds /Actuation *	1.5	-	1.5	-
Max Initial *	34	-	34	-
Time Before Reduction *	15	-	15	-
Time To Reduce *	30	-	30	-
Minimum Gap	3.0	-	3.0	-
Locking Detector	X	-	X	-
Recall Position	VEH. RECALL	-	VEH. RECALL	-
Dual Entry	-	X	-	X
Simultaneous Gap	X	X	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.

ASC/3 EV PREEMPT

FUNCTION	PRE 3
Exit Phase(s)	2+6
Preempt Override	OFF
Delay Time	0
Ped Clear Through Yellow	Y
Terminate Phases	N
Entrance Walk	1
Entrance Ped Clear	15
Entrance Min Green	1
Entrance Yellow Change	25.5*
Entrance Red Clear	25.5*
Minimum Dwell Time	7
Preempt Input Extension Time	2.0
Preempt Max Time	120
Exit Yellow Change	25.5*
Exit Red Clear	25.5*

* Time defaults to time used for phase during normal operation.

LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
□	Pedestrian Signal Head With Push Button & Sign	■
○	Signal Pole with Guy	●—
○	Signal Pole with Sidewalk Guy	●
▭	Inductive Loop Detector	▭
M	Master Controller & Cabinet	M
□	Junction Box	■
□	Oversized Junction Box	■
-----	2-in Underground Conduit	-----
N/A	Right of Way	-----
→	Directional Arrow	→
○	Metal Pole with Mastarm	○
—DD#—	Directional Drill	N/A
❁	Type I Pushbutton Post	❁
⬡	Type II Signal Pedestal	⬢
⊂	Optical EVP Detector	⊂
OS	Oversized Junction Box	■
(A)	"NO TURN ON RED" Sign (R10-11)	(A)
(B)	No Left/U-Turn Sign (R3-18)	(B)
(C)	"TURNING VEHICLES YIELD TO PEDS" Sign (R10-15R)	(C)

Signal Upgrade - Final Design

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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Stantec Consulting Services Inc.
801 Jones Franklin Road-Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
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Prepared for the Offices of:
Transportation Mobility and Safety Division
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

SCALE 0 40 1" = 40'

US 21 (Charlotte Highway) at SR 1100 (Brawley School Road) / SR 1117 (Wilson Avenue)

Division 12 Iredell County Mooresville

PLAN DATE:	May 2022	REVIEWED BY:	E D Harris
PREPARED BY:	J Hambright	REVIEWED BY:	R M Muncey

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 042678 ENGINEER DERRICK A. WALLER

DocuSigned by: Derrick Waller 3/22/2023
SIGNATURE DATE

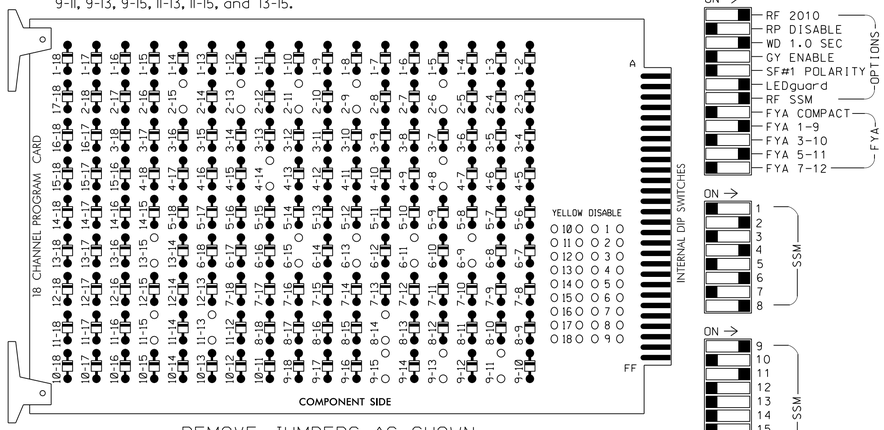
SIG. INVENTORY NO. 12-1369

3/22/2023
2:16:35 PM
User:dwaller
U:\Work Files\Signals\Designs\Signal Design\R-3833C_sig_dsn_12-1369.dgn

EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 2-6, 2-9, 2-11, 2-13, 2-15, 4-8, 4-14, 6-9, 6-11, 6-13, 6-15, 8-14, 9-11, 9-13, 9-15, 11-13, 11-15, and 13-15.



REMOVE JUMPERS AS SHOWN

■ = DENOTES POSITION OF SWITCH

NOTES:

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

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Program phases 4 and 8 for Dual Entry.
3. Program controller to start up in phase 2 Walk and 6 Walk.
4. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.

EQUIPMENT INFORMATION

CONTROLLER.....2070LX
CABINET.....332 W/AUX
SOFTWARE.....ECONOLITE ASC/3-2070
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
LOAD SWITCHES USED.....S2,S3,S5,S6,S8,S9,S11, AUX S1,AUX S4
PHASES USED.....2,2PED,4,4PED,6,6PED,8
OVERLAP "A".....*
OVERLAP "B".....NOT USED
OVERLAP "C".....*
OVERLAP "D".....NOT USED

* See overlap programming detail on sheet 2

PROJECT REFERENCE NO.	SHEET NO.
R-3833C	SIG-12.1

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2		S3	S4	S5			S6	S7	S8		S9	S10	S11			S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2		13	3	4			14	5	6		15	7	8			16	9	10	17	11	12	18
PHASE	1	2		2 PED	3	4			4 PED	5	6		6 PED	7	8			8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	NU	21,22	24	P21,P22 P23,P24	NU	41,42	43	44,45 46	P41,P42 P43,P44	NU	61,62	64	P61,P62 P63,P64 P65,P66	NU	81,82	83	84,85 86	NU	63 ★	NU	NU	23 ★	NU	NU
RED		128	128			101	101	101			134	134			107	107	107							
YELLOW		129	129			102	102				135	135			108	108								
GREEN			130				103					136				109								
RED ARROW																			A121			A114		
YELLOW ARROW								102									108		A122			A115		
FLASHING YELLOW ARROW																			A123			A116		
GREEN ARROW		130				103		103			136				109		109							
✋				113					104				119											
🚶				115					106				121											

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

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)

INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	SLOT EMPTY	ø2 2A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	ø4 4A	ø4 4C	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	ø2 PED DC ISOLATOR	ø6 PED DC ISOLATOR	FS DC ISOLATOR
	L		ø2 2B				ø4 4B	ø4 4D					ø4 PED DC ISOLATOR	NOT USED	ST DC ISOLATOR
FILE "J"	U	SLOT EMPTY	ø6 6A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	ø8 8A	ø8 8C	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	PRE3 DC ISOLATOR	SLOT EMPTY	SLOT EMPTY
	L		ø6 6B				ø8 8B	ø8 8D					NOT USED		

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

FS = FLASH SENSE
ST = STOP TIME
PRE = PREEMPT

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND TIME	DELAY TIME	ADDED INITIAL	DETECTOR TYPE
2A	TB2-5,6	I2U	39	2	2	YES			X	N
2B	TB2-7,8	I2L	43	12	2	YES			X	N
4A	TB4-9,10	I6U	41	4	4	YES				N
4B	TB4-11,12	I6L	45	14	4	YES				N
4C	TB6-1,2	I7U	65	34	4	YES				N
4D	TB6-3,4	I7L	78	44	4	YES				N
6A	TB3-5,6	J2U	40	6	6	YES			X	N
6B	TB3-7,8	J2L	44	16	6	YES			X	N
8A	TB5-9,10	J6U	42	8	8	YES				N
8B	TB5-11,12	J6L	46	18	8	YES				N
8C	TB7-1,2	J7U	66	38	8	YES				N
8D	TB7-3,4	J7L	79	48	8	YES				N
PED PUSH BUTTONS										
P21,P22 P23,P24	TB8-4,6	I12U	67	PED 2	2 PED					
P41,P42 P43,P44	TB8-5,6	I12L	69	PED 4	4 PED					
P61,P62 P63,P64 P65,P66	TB8-7,9	I13U	68	PED 6	6 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: 12-1369
DESIGNED: MAY 2022
SEALED: 3/22/2023
REVISED: N/A

Final Design
Electrical Detail - Sheet 1 of 2

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Stantec
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Raleigh, NC 27606
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US 21 (Charlotte Highway) at SR 1100 (Brawley School Road) / SR 1117 (Wilson Avenue)

Division 12 | Iredell County | Mooresville

PLAN DATE:	May 2022	REVIEWED BY:	E D Harris
PREPARED BY:	D A Waller	REVIEWED BY:	R M Muncey

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 042678 ENGINEER DERRICK A. WALLER

DocuSigned by: Derrick Waller 3/22/2023
SIGNATURE DATE

SIG. INVENTORY NO. 12-1369

PROJECT REFERENCE NO.	SHEET NO.
R-3833C	SIG-12.2

ECONOLITE ASC/3-2070 EMERGENCY VEHICLE PREEMPT PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select [4. PREEMPTOR/TSP]
2. From PREEMPTOR/TSP/SCP Submenu select [1. PREEMPT PLAN 1-10]

Place cursor in [ ] next to Preempt Plan and press 3. Then press the right cursor arrow and toggle the controller to YES. Next cursor down. This will select Emergency Vehicle Preempt #3.

```
PREEMPT PLAN [  3]    ENABLE....YES
 VEH/PED 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 OVERLAP A B C D E F G H I J K L M N O P
TRKCLR V . . . . . . . . . . . . . . . .
TRKCLR O . . . . . . . . . . . . . . . .
ENA TRL  . . . . . . . . . . . . . . . .
DWEL VEH . . . X . . . . . . . . . . . .
DWEL PED . . . . . . . . . . . . . . . .
DWEL OLP . . . . . . . . . . . . . . . .
CYC VEH  . . . . . . . . . . . . . . . .
CYC PED  . . . . . . . . . . . . . . . .
CYC OLP  . . . . . . . . . . . . . . . .
EXIT PH  . X . . . X . . . . . . . . . .
EXIT CAL . . . . . . . . . . . . . . . .
SP FUNC  . . . . . . . . . . . . . . . .

ENABLE... YES|PMT OVRIDE..|INTERLOCK. NO
DET LOCK... X|DELAY..    0|INHIBIT...  0
OVERIDE FL. .|DURATION   0|CLR-GRN... NO
TERM OLP.  NO|PC>YEL   YES|TERM PH    NO
PED DARK.. NO|TC RESRV  NO|DWELL FL   OFF
LINK PMT....0|X FLCOLR RED|EXIT OPT. OFF
X TMG PLN...0|IRE-SERV..  0|FLT TYPE.HARD
FREE DUR PMT|R1  NO|R2  NO|R3  NO|R4  NO
--TIMING-----WALK|PED CLR|MN GR|YEL|RED
ENTRANCE TM.    1|    15|    1|25.5|25.5
-----------MIN GR|EXT GR|MX GR|YEL|RED
TRACK CLEAR     0|     0|    0|25.5|25.5
-----------MIN DLI|PMTEXT|TMX TM|YEL|RED
DWL/CYC-EXIT    7|   2.0|  120|25.5|25.5
PMT ACTIVE OUT..ON   PMT ACT DWELL...NO
OTHER - PRI PMT.OFF  NON-PRI PMT.....OFF
INH EXT TIME... 0.0  PED PR RETURN...OFF
PRIORITY RETURN.OFF  QUEUE DELAY.... OFF
COND DELAY......OFF
PHASES     1   2   3   4   5   6   7   8
PR RTN%    0   0   0   0   0   0   0   0
PHASES     9  10  11  12  13  14  15  16
PR RTN%    0   0   0   0   0   0   0   0
```

PROGRAM EXTEND TIME ON OPTICAL DETECTOR UNITS FOR 2.0 SEC.

ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select [2. CONTROLLER]
2. From CONTROLLER Submenu select [2. VEHICLE OVERLAPS]

OVERLAP A

Select TMG VEH OVLP [A] and 'OTHER/ECONOLITE'

```
TMG VEH OVLP...[A] TYPE:[OTHER/ECONOLITE]
  PHASES 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
INCLUDED . X . . . . . . . . . . . . . .
PROTECT  . . . . . . . . . . . . . . . .
PED PRTC . . . . . . . . . . . . . . . .
NOT OVLP . . . . . . . . . . . . . . . .
FLSH GRN . 1 . . . . . . . . . . . . . .
LAG X PH . . . . . . . . . . . . . . . .
LAG 2 PH . . . . . . . . . . . . . . . .

LAG GRN 0.0 YEL 0.0 RED 0.0 ADV GRN 0.0
```

Toggle Twice

OVERLAP C

Select TMG VEH OVLP [C] and 'OTHER/ECONOLITE'

```
TMG VEH OVLP...[C] TYPE:[OTHER/ECONOLITE]
  PHASES 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
INCLUDED . . . . . X . . . . . . . . . .
PROTECT  . . . . . . . . . . . . . . . .
PED PRTC . . . . . . . . . . . . . . . .
NOT OVLP . . . . . . . . . . . . . . . .
FLSH GRN . . . . . 1 . . . . . . . . . .
LAG X PH . . . . . . . . . . . . . . . .
LAG 2 PH . . . . . . . . . . . . . . . .

LAG GRN 0.0 YEL 0.0 RED 0.0 ADV GRN 0.0
```

END PROGRAMMING

FLASHER CIRCUIT MODIFICATION DETAIL

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

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

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

ECONOLITE ASC/3-2070 PREEMPT FILTERING PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select [4. PREEMPTOR/TSP]
2. From PREEMPT/TSP/SCP Submenu select [2. ENABLE PREEMPT FILTERING & TSP/SCP]

```
ENABLE PREEMPT FILTERING & TSP/SCP
FILTERED     SOLID          PULSING
INPUT  1 ...BYPASSED.. ...BYPASSED..
       2 ...BYPASSED.. ...BYPASSED..
       3 ..PREEMPT  3. ...BYPASSED..
       4 ..PREEMPT  4. ...BYPASSED..
       5 ..PREEMPT  5. ...BYPASSED..
       6 ..PREEMPT  6. ...BYPASSED..
       7 ...BYPASSED.. ...BYPASSED..
       8 ...BYPASSED.. ...BYPASSED..
       9 ...BYPASSED.. ...BYPASSED..
      10 ...BYPASSED.. ...BYPASSED..
```

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 12-1369
DESIGNED: MAY 2022
SEALED: 3/22/2023
REVISED: N/A

Final Design
Electrical Detail - Sheet 2 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Stantec
Stantec Consulting Services Inc.
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Raleigh, NC 27606
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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signal Design Section
750 N.Greenfield Pkwy.Garner,NC 27529

US 21 (Charlotte Highway) at SR 1100 (Brawley School Road) / SR 1117 (Wilson Avenue)

Division 12 | Iredell County | Mooresville

PLAN DATE: May 2022	REVIEWED BY: E D Harris
PREPARED BY: D A Waller	REVIEWED BY: R M Muncey

REVISIONS	INIT.	DATE

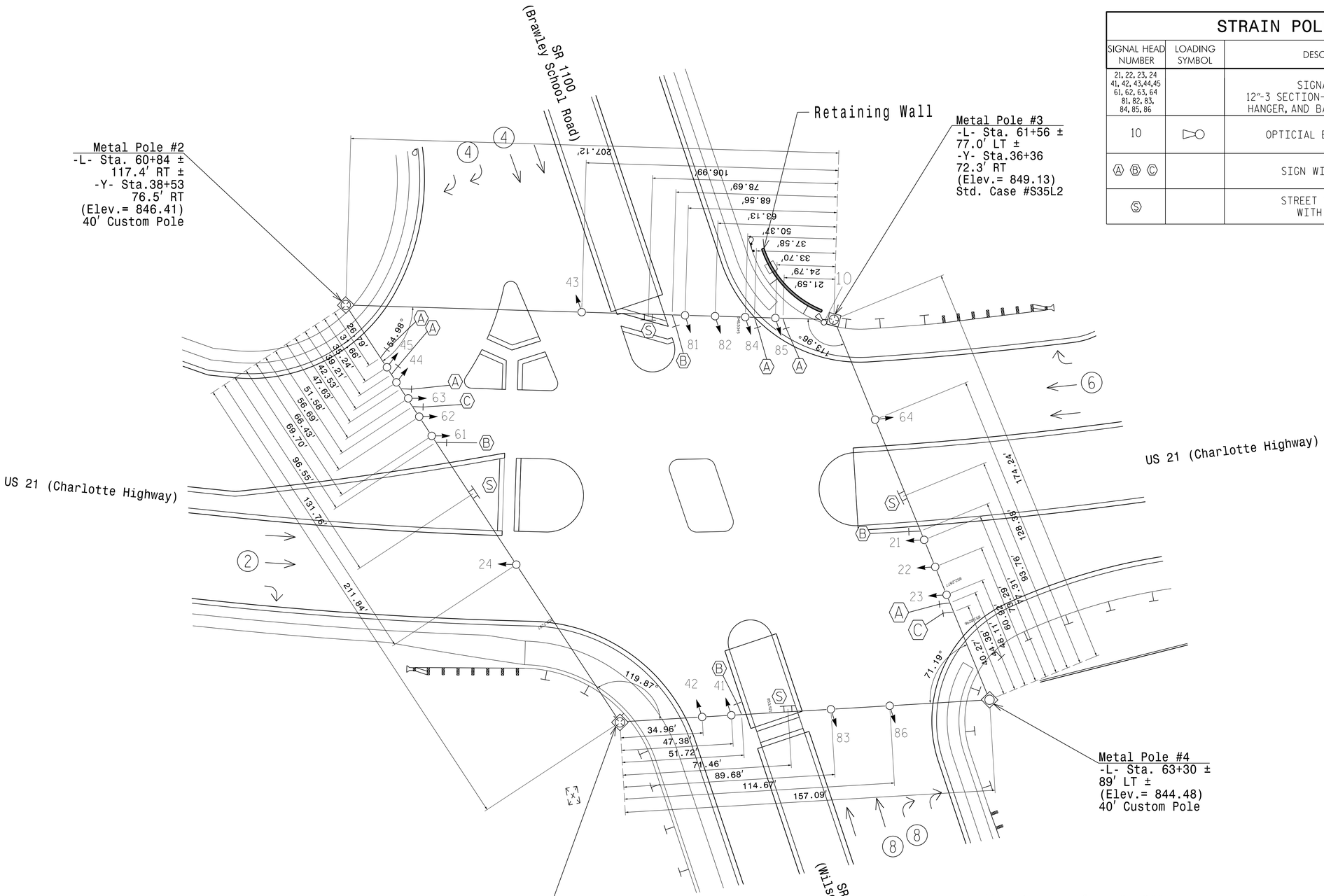
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 042678 ENGINEER DERRICK A. WALLER

DocuSigned by: Derrick Waller 3/22/2023
SIGNATURE DATE

SIG. INVENTORY NO. 12-1369

Design Loading for METAL STRAIN POLES

PROJECT REFERENCE NO.	SHEET NO.
R-3833C	SIG-12.3



STRAIN POLE LOADING SCHEDULE

SIGNAL HEAD NUMBER	LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
21, 22, 23, 24 41, 42, 43, 44, 45 61, 62, 63, 64 81, 82, 83, 84, 85, 86		SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE, HANGER, AND BALANCE ADJUSTER	9.5 S.F.	25.5"W X 53.5"L	56 LBS
10		OPTICIAL EVP DETECTOR	0.25 S.F.	4.75"W X 12.0"L X 7.13"H	1.2 LBS
Ⓐ Ⓑ Ⓒ		SIGN WITH HANGER	7.5 S.F.	30.0"W X 36.0"L	14 LBS
Ⓢ		STREET NAME SIGN WITH HANGER	16.0 S.F.	24.0"W X 96.0"L	36 LBS

Loading Diagram for 12-1369

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SCALE 0 N/A

US 21 (Charlotte Highway) at SR 1100 (Brawley School Road) / SR 1117 (Wilson Avenue)

Division 12 Iredell County Mooresville

PLAN DATE:	May 2022	REVIEWED BY:	E D Harris
PREPARED BY:	J Hambright	REVIEWED BY:	R M Muncey

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 042678 ENGINEER DERRICK A. WALLER

DocuSigned by: Derrick Waller 3/22/2023
SIGNATURE DATE

SIG. INVENTORY NO. 12-1369

METAL STRAIN POLE No. 1 and 2

PROJECT REFERENCE NO.	SHEET NO.
R-3833C	SIG-12.4

SPECIAL NOTE

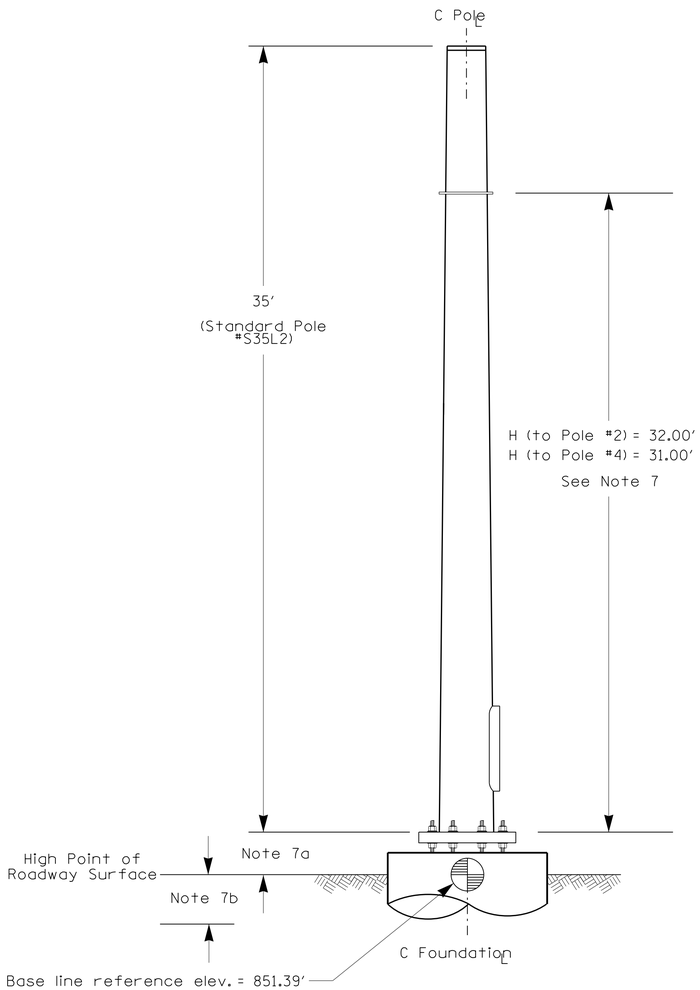
The contractor is responsible for verifying that the attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Span Wire Attachment (H1)

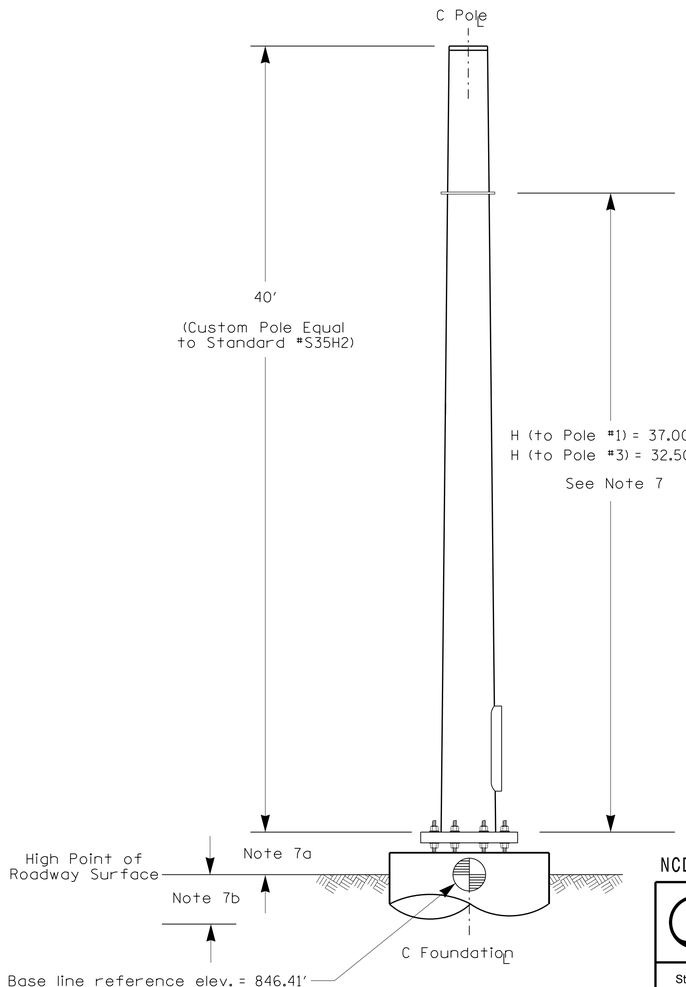
Elevation Differences for:	Pole 1	Pole 2
Baseline reference point at ℄ Foundation @ ground level ⊕	851.39 ft.	
Elevation difference at high point of roadway surface to Pole #2	+ 1.34 ft.	
Elevation difference at high point of roadway surface to Pole #4	+ 2.53 ft.	
Baseline reference point at ℄ Foundation @ ground level ⊕		846.41 ft.
Elevation difference at high point of roadway surface to Pole #1		+ 6.32 ft.
Elevation difference at high point of roadway surface to Pole #3		+ 2.12 ft.

NOTE: SEE SHEET SIG-X.X FOR INTERSECTION LOADING DIAGRAM

Elevation View - Strain Pole #1



Elevation View - Strain Pole #2



STRAIN POLE LOADING SCHEDULE

SIGNAL HEAD NUMBER	LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
21, 22, 23, 24 41, 42, 43, 44, 45 61, 62, 63, 64 81, 82, 83, 84, 85, 86		SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE, HANGER, AND BALANCE ADJUSTER	9.5 S.F.	25.5"W X 53.5"L	56 LBS
Ⓐ Ⓑ Ⓒ		SIGN WITH HANGER	7.5 S.F.	30.0"W X 36.0"L	14 LBS
Ⓢ		STREET NAME SIGN WITH HANGER	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 6th Edition 2013 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
   - The 2018 NCDOT "Standard Specifications for Roads and Structures." The latest addenda to the specifications can be found in the traffic signal project special provisions.
   - The 2018 NCDOT Roadway Standard Drawings.
   - The traffic signal project plans and special provisions.
   - The NCDOT "Metal Pole Standards" located at the following NCDOT website: https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx

DESIGN REQUIREMENTS

2. Fabricate Metal Strain Poles #1 & #2 using design loadings shown. The contractor may revise attachment heights and radial orientations of wire entrances with the approval of the Engineer. Any modifications to the original location of accessories must be reflected on the shop drawings when they are submitted for review and approval.
3. All signal heads are to be tethered at the bottom of the signal head housing.
4. Design a drilled pier foundation that conforms to the requirements of ITSS Project Special Provisions (Version 18.2) included with and as part of these plans.
5. Comply with NEC code 230.2(E) concerning service equipment disconnect.
6. Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
7. The attachment height (H1) shown is based on the following design assumptions:
   a. The top of the pole base plate is 0.75 feet above the ground elevation.
   b. Refer to the Elevation Data Chart for the elevation differences between the proposed foundation ground level and the high point of the roadway below the spans between adjacent pole attachment points.
8. If pole location adjustments are required, the contractor must gain approval from the Engineer as this may affect the 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 attachment heights shown will allow for 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.

NCDOT Wind Zone 4 (90 mph)

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

SCALE: 0 N/A Not to Scale

US 21 (Charlotte Highway) at SR 1100 (Brawley School Road)/ SR 1117 (Wilson Avenue)

Division 12 | Iredell County | Mooresville

PLAN DATE:	May 2022	REVIEWED BY:	E D Harris
PREPARED BY:	J Hambright	REVIEWED BY:	R M Muncey

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 042678 ENGINEER DERRICK A. WALLER

DocuSigned by: Derrick Waller 3/22/2023
SIGNATURE DATE

SIG. INVENTORY NO. 12-1369

SPECIAL NOTE

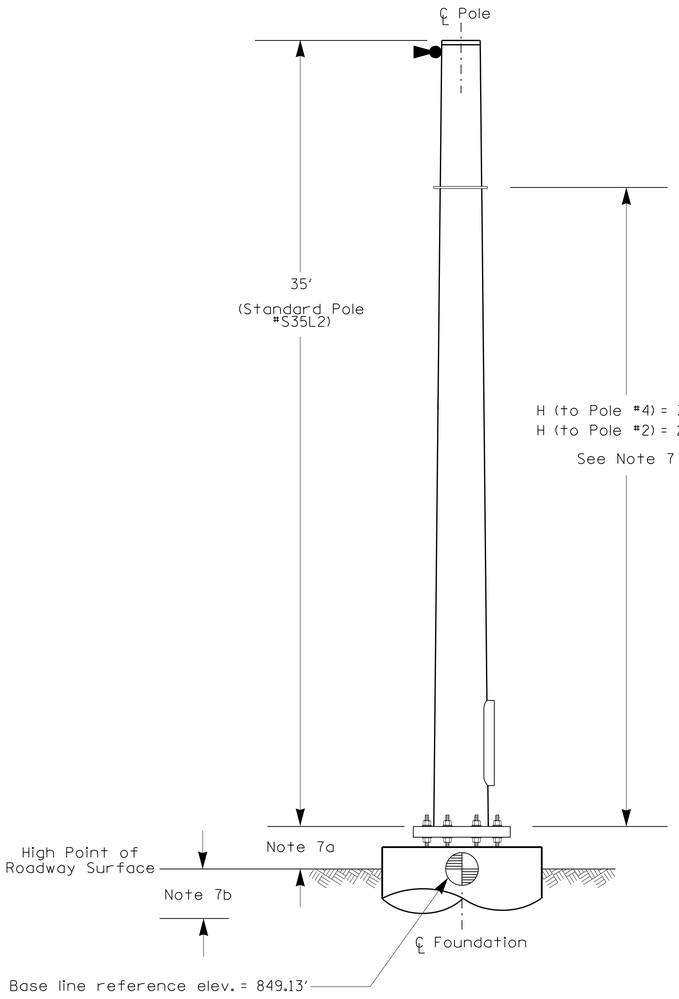
The contractor is responsible for verifying that the attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Span Wire Attachment (H1)

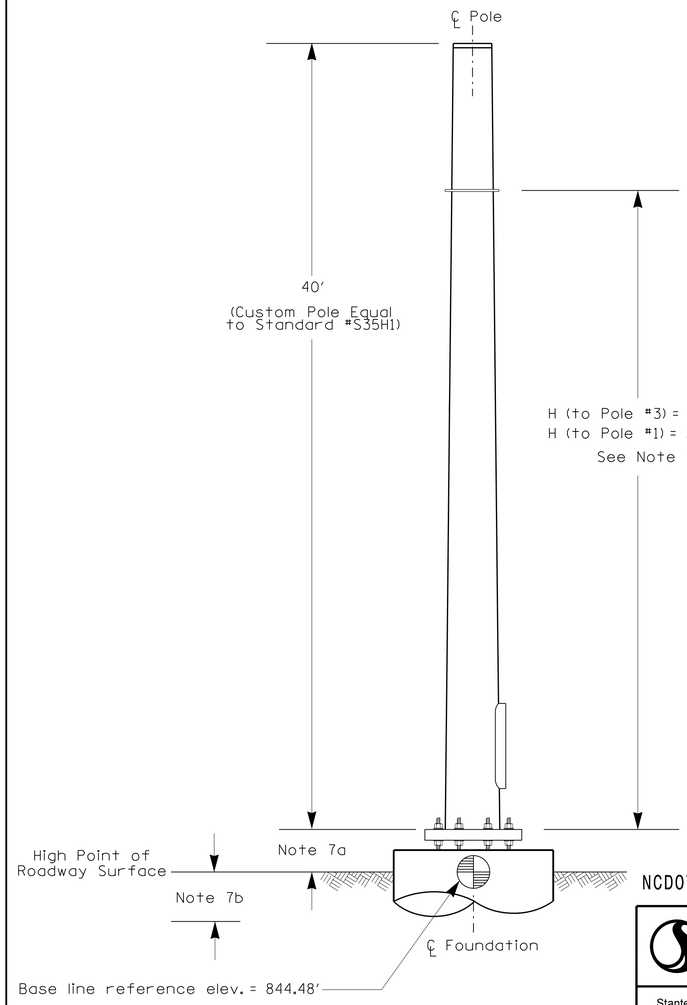
Elevation Differences for:	Pole 3	Pole 4
Baseline reference point at ℄ Foundation @ ground level	849.13 ft.	
Elevation difference at high point of roadway surface to Pole #4	+ 3.90 ft.	
Elevation difference at high point of roadway surface to Pole #2	- 0.60 ft.	
Baseline reference point at ℄ Foundation @ ground level		844.48 ft.
Elevation difference at high point of roadway surface to Pole #3		+ 8.55 ft.
Elevation difference at high point of roadway surface to Pole #1		+ 9.44 ft.

NOTE: SEE SHEET SIG-X.X FOR INTERSECTION LOADING DIAGRAM

Elevation View - Strain Pole #3



Elevation View - Strain Pole #4



METAL STRAIN POLE No. 3 and 4

PROJECT REFERENCE NO.	SHEET NO.
R-3833C	SIG-12.5

STRAIN POLE LOADING SCHEDULE

SIGNAL HEAD NUMBER	LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
21, 22, 23, 24 41, 42, 43, 44, 45 61, 62, 63, 64 81, 82, 83, 84, 85, 86		SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE, HANGER, AND BALANCE ADJUSTER	9.5 S.F.	25.5"W X 53.5"L	56 LBS
10		OPTICIAL EVP DETECTOR	0.25 S.F.	4.75"W X 12.0"L X 7.13"H	1.2 LBS
Ⓐ Ⓑ Ⓒ		SIGN WITH HANGER	7.5 S.F.	30.0"W X 36.0"L	14 LBS
Ⓢ		STREET NAME SIGN WITH HANGER	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 6th Edition 2013 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
   - The 2018 NCDOT "Standard Specifications for Roads and Structures." The latest addenda to the specifications can be found in the traffic signal project special provisions.
   - The 2018 NCDOT Roadway Standard Drawings.
   - The traffic signal project plans and special provisions.
   - The NCDOT "Metal Pole Standards" located at the following NCDOT website: https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx

DESIGN REQUIREMENTS

2. Fabricate Metal Strain Poles #3 & #4 using design loadings shown. The contractor may revise attachment heights and radial orientations of wire entrances with the approval of the Engineer. Any modifications to the original location of accessories must be reflected on the shop drawings when they are submitted for review and approval.
3. All signal heads are to be tethered at the bottom of the signal head housing.
4. Design a drilled pier foundation that conforms to the requirements of ITSS Project Special Provisions (Version 18.2) included with and as part of these plans.
5. Comply with NEC code 230.2(E) concerning service equipment disconnect.
6. Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
7. The attachment height (H1) shown is based on the following design assumptions:
   a. The top of the pole base plate is 0.75 feet above the ground elevation.
   b. Refer to the Elevation Data Chart for the elevation differences between the proposed foundation ground level and the high point of the roadway below the spans between adjacent pole attachment points.
8. If pole location adjustments are required, the contractor must gain approval from the Engineer as this may affect the 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 attachment heights shown will allow for 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.

NCDOT Wind Zone 4 (90 mph)

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

Prepared for the Offices of:
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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signal Design Section
750 N.Greenfield Pkwy.Garner,NC 27529

SCALE: 0 N/A

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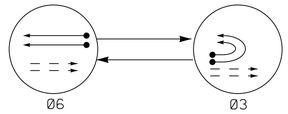
NORTH CAROLINA PROFESSIONAL SEAL 042678 ENGINEER DERRICK A. WALLER

DocuSigned by: Derrick Waller 3/22/2023
SIGNATURE DATE

SIG. INVENTORY NO. 12-1369

PROJECT REFERENCE NO.	SHEET NO.
R-3833C	SIG-13.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

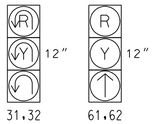
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

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

SIGNAL FACE I.D.

All Heads L.E.D.



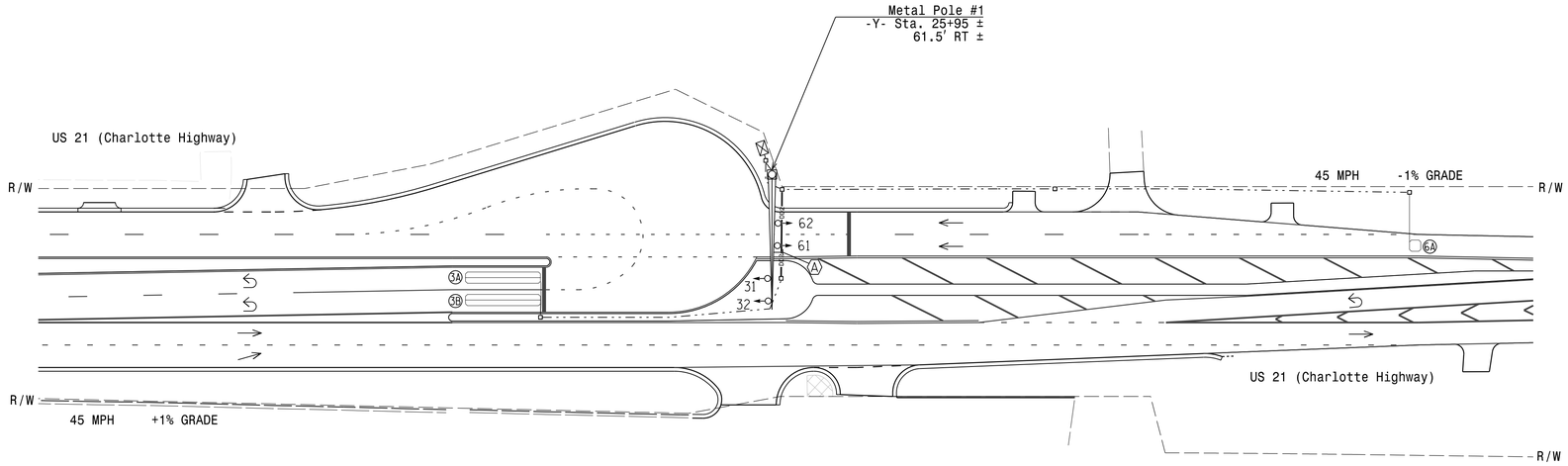
ASC/3 DETECTOR INSTALLATION CHART

DETECTOR					PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
3A	6X40	0	2-4-2	X	3	Yes	-	-	-	N	-	X
3B	6X40	0	2-4-2	X	3	Yes	-	-	-	N	-	X
6A	6X6	300	5	X	6	Yes	-	-	X	N	-	X

2 Phase
Fully Actuated
Signal System 11210

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. Set all detector units to presence mode
4. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.



ASC/3 TIMING CHART

FEATURE	PHASE 3	PHASE 6
Min Green *	7	12
Walk *	-	-
Ped Clear	-	-
Veh. Extension *	2.0	6.0
Max 1 *	30	60
Yellow	3.0	4.6
Red Clear	5.1	2.5
Red Revert	2.0	2.0
Actuations B4 Add *	-	-
Seconds /Actuation *	-	2.5
Max Initial *	-	34
Time Before Reduction *	-	15
Time To Reduce *	-	30
Minimum Gap	-	3.0
Locking Detector	-	X
Recall Position	-	VEH. RECALL
Dual Entry	-	-
Simultaneous Gap	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.

LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
	Metal Pole with Mastarm	
—DD#—	Directional Drill	N/A
	Type II Signal Pedestal	
Ⓐ	No Left Turn Sign (R3-2)	Ⓐ

New Installation

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

SCALE 0 40 1" = 40'

US 21 (Charlotte Highway) at US 21 NB U-Turn to US 21 SB

Division 12 Iredell County Mooresville

PLAN DATE:	May 2022	REVIEWED BY:	E D Harris
PREPARED BY:	J. Hambright	REVIEWED BY:	R M Muncey

REVISIONS	INIT.	DATE

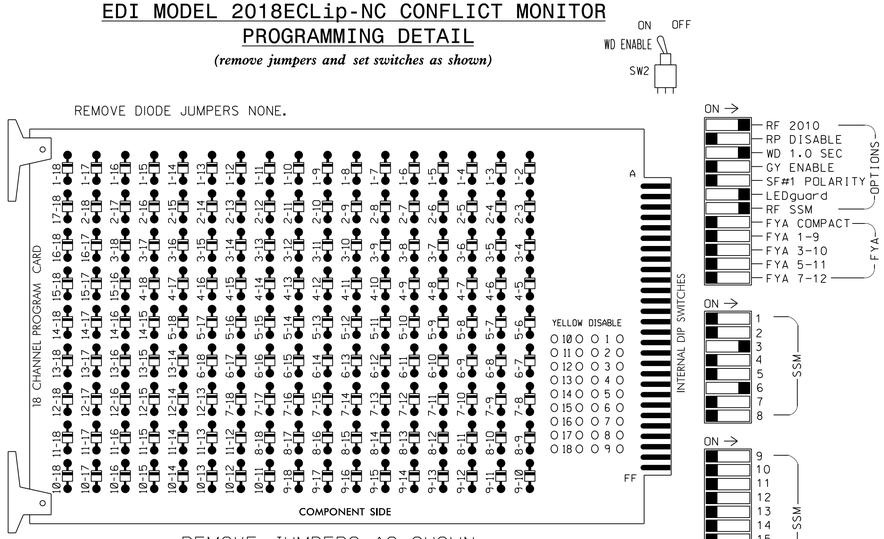
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 042678 ENGINEER DERRICK A. WALLER

DocuSigned by: Derrick Waller 3/22/2023
SIGNATURE DATE

SIG. INVENTORY NO. 12-1898

EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE JUMPERS AS SHOWN

NOTES:

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

■ = DENOTES POSITION OF SWITCH

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Program controller to start up in phase 6 Green.
3. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.

EQUIPMENT INFORMATION

CONTROLLER.....2070LX
CABINET.....332 W/AUX
SOFTWARE.....ECONOLITE ASC/3-2070
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
LOAD SWITCHES USED.....S4,S8
PHASES USED.....3,6
OVERLAP "A".....NOT USED
OVERLAP "B".....NOT USED
OVERLAP "C".....NOT USED
OVERLAP "D".....NOT USED

PROJECT REFERENCE NO.	SHEET NO.
R-3833C	SIG-13.1

SIGNAL HEAD HOOK-UP CHART

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

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I" U	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	ø3 3A	ø3 3B	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
FILE "I" L					NOT USED	NOT USED								ST DC ISOLATOR
FILE "J" U	SLOT EMPTY	ø6 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
FILE "J" 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.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND TIME	DELAY TIME	ADDED INITIAL	DETECTOR TYPE
3A	TB4-5,6	I5U	58	3	3	YES				N
3B	TB4-9,10	I6U	41	4	3	YES				N
6A	TB3-5,6	J2U	40	6	6	YES			X	N

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 12-1898
DESIGNED: MAY 2022
SEALED: 3/22/2023
REVISED: N/A

Final Design
Electrical Detail - Sheet 1 of 1

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US 21 (Charlotte Highway)
at
US 21 NB U-Turn to US 21 SB

Division 12 | Iredell County | Mooresville

PLAN DATE: May 2022 | REVIEWED BY: E D Harris
PREPARED BY: D A Waller | REVIEWED BY: R M Muncey

REVISIONS	INIT.	DATE

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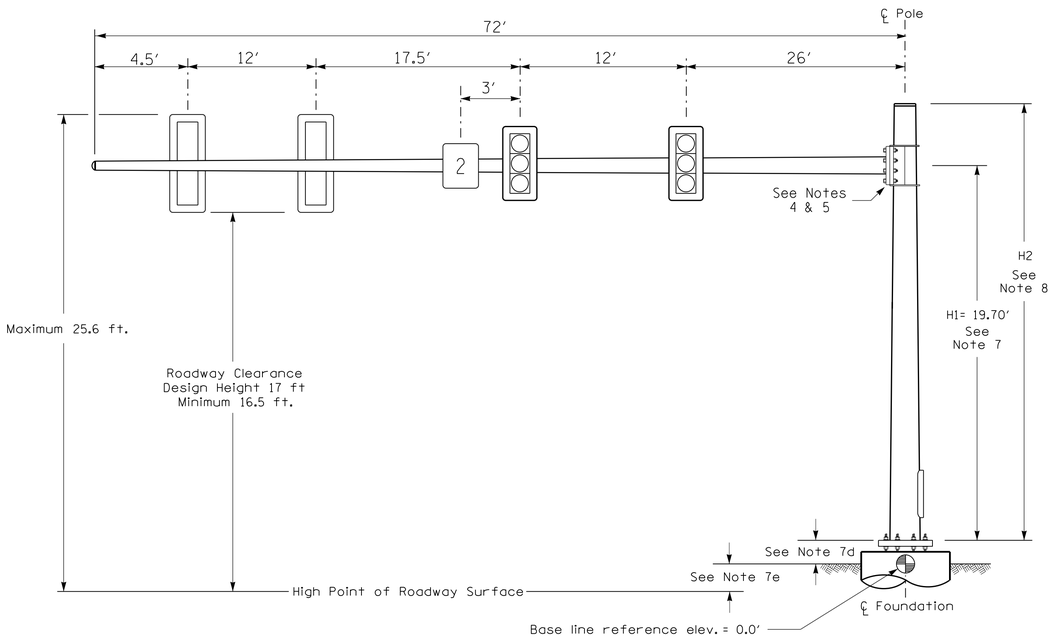
NORTH CAROLINA PROFESSIONAL SEAL 042678 ENGINEER DERRICK A WALLER

DocuSigned by: Derrick Waller 3/22/2023
SIGNATURE DATE

SIG. INVENTORY NO. 12-1898

Design Loading for METAL POLE NO. 1



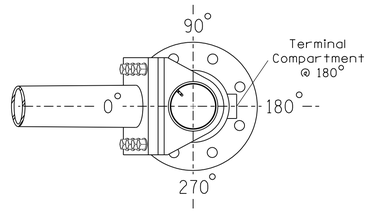
Elevation View

SPECIAL NOTE

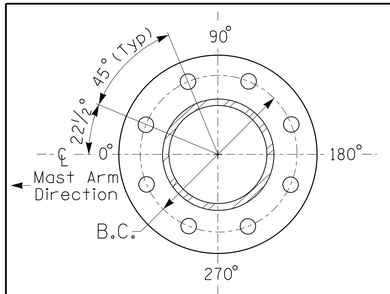
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 1	
Baseline reference point at ℄ Foundation @ ground level ⊕	0.0 ft.	
Elevation difference at High point of roadway surface	+0.69 ft.	
Elevation difference at Edge of travelway or face of curb	+/-0.0 ft.	

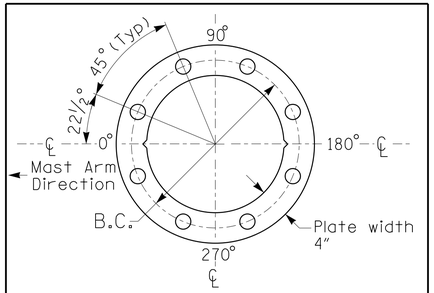


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL

For 8 Bolt Base Plate

METAL POLE No. 1

PROJECT REFERENCE NO.	SHEET NO.
R-3833C	SIG-13.2

MAST ARM LOADING SCHEDULE

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

NOTES

DESIGN REFERENCE MATERIAL

1. Design the traffic signal structure and foundation in accordance with:
   - The 6th Edition 2013 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
   - The 2018 NCDOT "Standard Specifications for Roads and Structures." The latest addenda to the specifications can be found in the traffic signal project special provisions.
   - The 2018 NCDOT Roadway Standard Drawings.
   - The traffic signal project plans and special provisions.
   - The NCDOT "Metal Pole Standards" located at the following NCDOT website: https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx

DESIGN REQUIREMENTS

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

NCDOT Wind Zone 4 (90 mph)

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SCALE 0 N/A N/A

REVISIONS	INIT.	DATE

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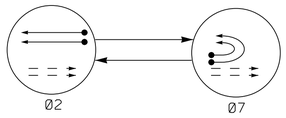
DocuSigned by: Derrick Waller SIGNATURE 3/22/2023 DATE

SIG. INVENTORY NO. 12-1898

PROJECT REFERENCE NO.	SHEET NO.
R-3833C	SIG-14.0

2 Phase
Fully Actuated
Signal System 11210

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

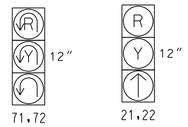
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

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

SIGNAL FACE I.D.

All Heads L.E.D.

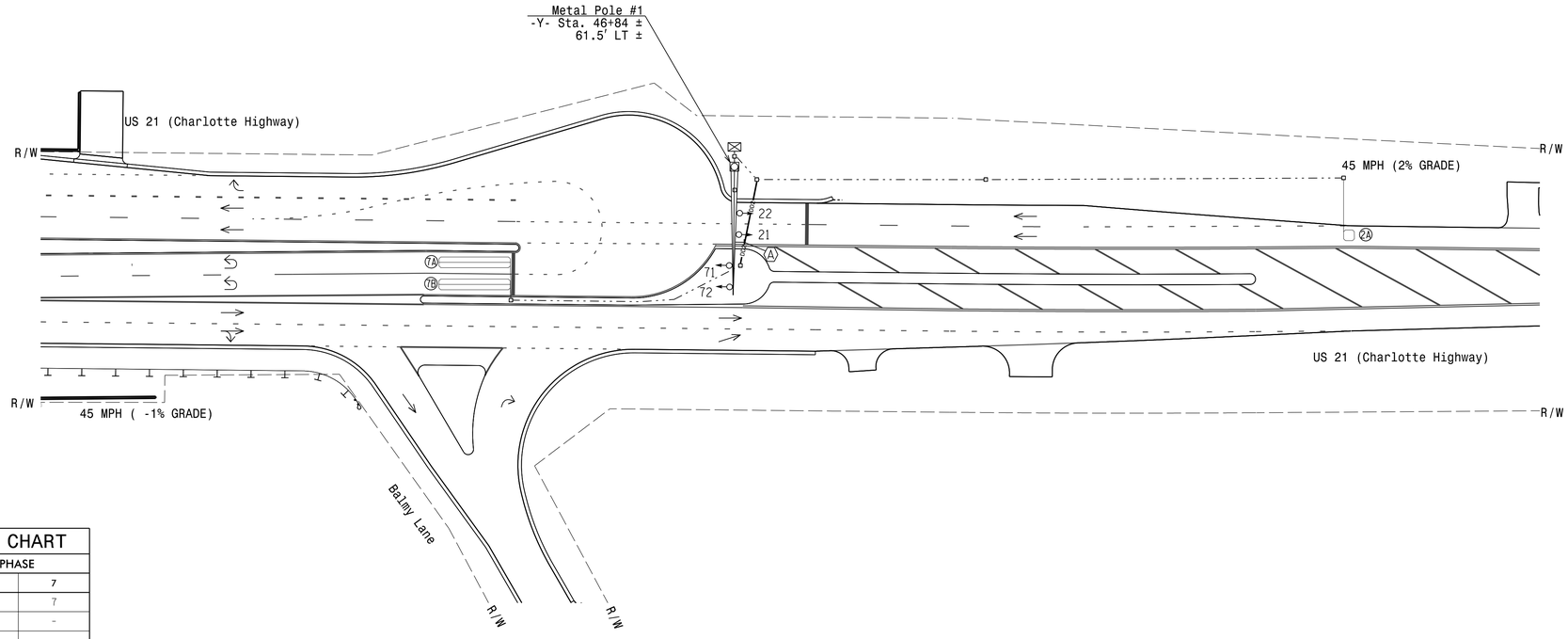


ASC/3 DETECTOR INSTALLATION CHART

DETECTOR						PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
2A	6X6	300	5	X	2	Yes	-	-	X	N	-	X
7A	6X40	0	2-4-2	X	7	Yes	-	-	-	N	-	X
7B	6X40	0	2-4-2	X	7	Yes	-	-	-	N	-	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. Set all detector units to presence mode
4. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.



LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
	Metal Pole with Mastarm	
DD#	Directional Drill	N/A
	Type II Signal Pedestal	
A	No Left Turn Sign (R3-2)	A

ASC/3 TIMING CHART

FEATURE	PHASE 2	PHASE 7
Min Green *	12	7
Walk *	-	-
Ped Clear	-	-
Veh. Extension *	6.0	2.0
Max 1 *	60	30
Yellow	4.3	3.0
Red Clear	2.5	5.0
Red Revert	2.0	2.0
Actuations B4 Add *	-	-
Seconds /Actuation *	2.5	-
Max Initial *	34	-
Time Before Reduction *	15	-
Time To Reduce *	30	-
Minimum Gap	3.0	-
Locking Detector	X	-
Recall Position	VEH. RECALL	-
Dual Entry	-	-
Simultaneous Gap	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.

New Installation

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

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

SCALE 0 40 1" = 40'

US 21 (Charlotte Highway) at US 21 SB U-Turn to US 21 NB

Division 12 Iredell County Mooresville

PLAN DATE: May 2022 REVIEWED BY: E D Harris
PREPARED BY: J. Hambright REVIEWED BY: R M Muncey

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 042678 ENGINEER DERRICK A WALLER

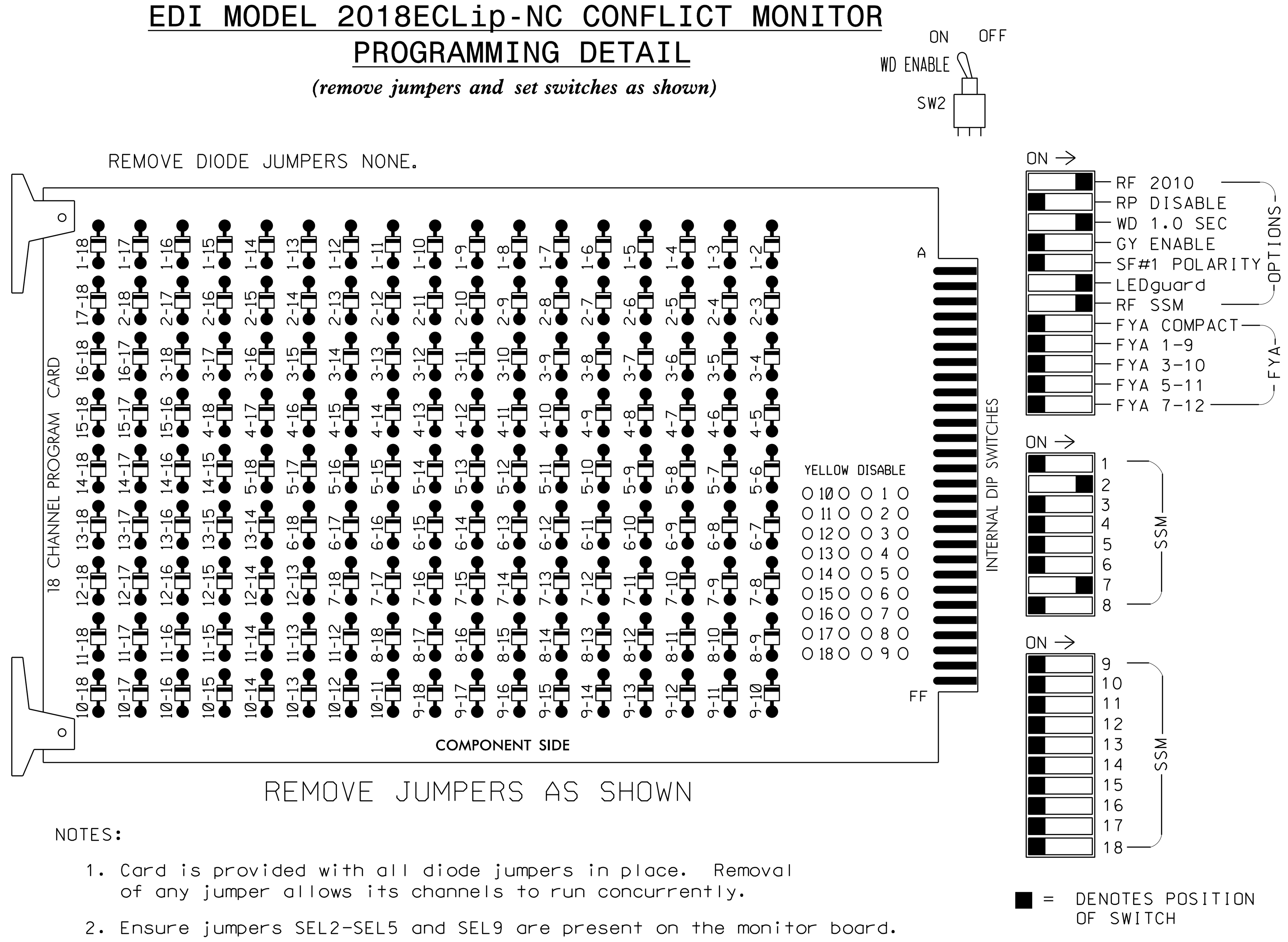
DocuSigned by: Derrick Waller 3/22/2023
SIGNATURE DATE

SIG. INVENTORY NO. 12-1899

3/22/2023
2:11:17 PM
J:\Traffic\Designs\Design\Signal Design\R-3833C_sig_dsn_12-1899.dgn
User:cwaller

EDI MODEL 2018ECLip-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE JUMPERS AS SHOWN

NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that Red Enable is active at all times during normal operation.
4. 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 controller to start up in phase 2 Green.
3. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.

EQUIPMENT INFORMATION

CONTROLLER..............2070LX
CABINET.................332 W/AUX
SOFTWARE................ECONOLITE ASC/3-2070
CABINET MOUNT...........BASE
OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
LOAD SWITCHES USED......S2,S10
PHASES USED.............2,7
OVERLAP "A".............NOT USED
OVERLAP "B".............NOT USED
OVERLAP "C".............NOT USED
OVERLAP "D".............NOT USED

SIGNAL HEAD HOOK-UP CHART

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

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)

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

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND TIME	DELAY TIME	ADDED INITIAL	DETECTOR TYPE
2A	TB2-5,6	I2U	39	2	2	YES			X	N
7A	TB5-5,6	J5U	57	7	7	YES				N
7B	TB5-9,10	J6U	42	8	7	YES				N

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 12-1899
DESIGNED: MAY 2022
SEALED: 3/22/2023
REVISED: N/A

Final Design
Electrical Detail - Sheet 1 of 1

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

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

US 21 (Charlotte Highway)
at
US 21 SB U-Turn to US 21 NB

Division 12 | Iredell County | Mooresville

PLAN DATE: May 2022 | REVIEWED BY: E D Harris
PREPARED BY: D A Waller | REVIEWED BY: R M Muncey

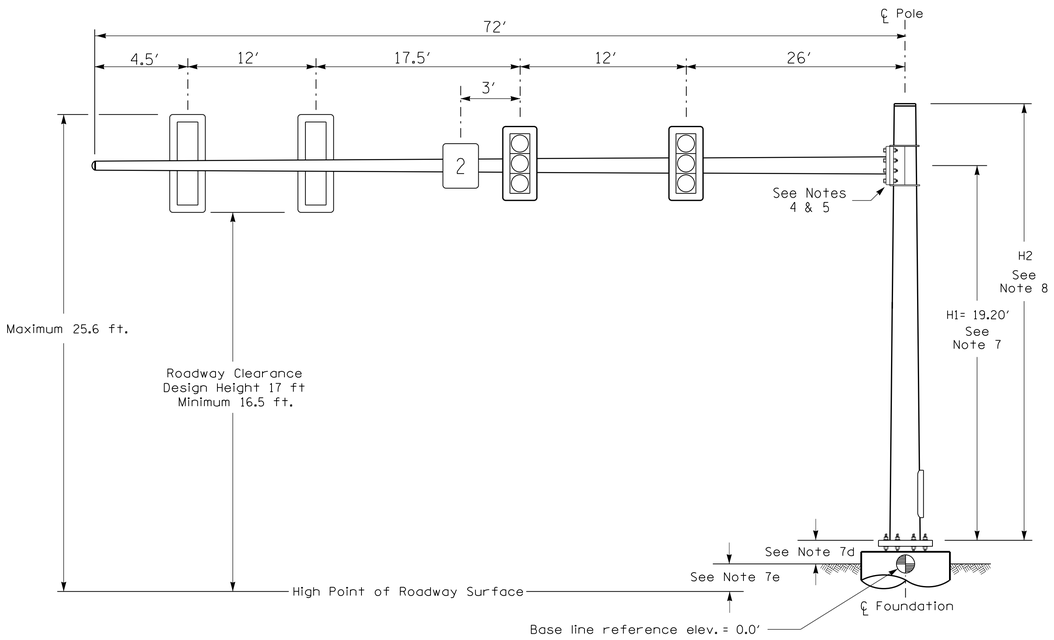
REVISIONS | INIT. | DATE

SEAL
NORTH CAROLINA
PROFESSIONAL
SEAL
042678
ENGINEER
DERRICK A. WALLER

DocuSigned by: Derrick Waller
SIGNATURE 3/22/2023 DATE

SIG. INVENTORY NO. 12-1899

Design Loading for METAL POLE NO. 1



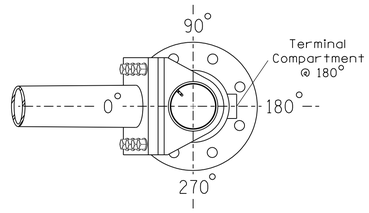
Elevation View

SPECIAL NOTE

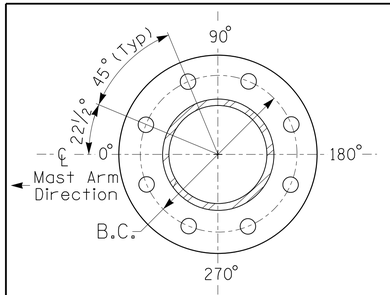
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 1	
Baseline reference point at ℄ Foundation @ ground level ⊕	0.0 ft.	
Elevation difference at High point of roadway surface	+0.11 ft.	
Elevation difference at Edge of travelway or face of curb	+/-0.0 ft.	

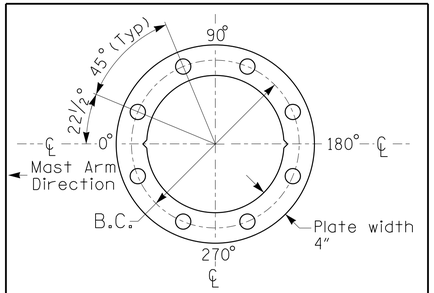


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



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

METAL POLE No. 1

PROJECT REFERENCE NO.	SHEET NO.
R-3833C	SIG-14.2

MAST ARM LOADING SCHEDULE

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

NOTES

DESIGN REFERENCE MATERIAL

1. Design the traffic signal structure and foundation in accordance with:
   - The 6th Edition 2013 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
   - The 2018 NCDOT "Standard Specifications for Roads and Structures." The latest addenda to the specifications can be found in the traffic signal project special provisions.
   - The 2018 NCDOT Roadway Standard Drawings.
   - The traffic signal project plans and special provisions.
   - The NCDOT "Metal Pole Standards" located at the following NCDOT website: https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx

DESIGN REQUIREMENTS

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

NCDOT Wind Zone 4 (90 mph)

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

US 21 (Charlotte Highway)
at
US 21 SB U-Turn to US 21 NB

Division 12 Iredell County Mooresville

PLAN DATE:	May 2022	REVIEWED BY:	E D Harris
PREPARED BY:	J Hambright	REVIEWED BY:	R M Muncey

SCALE 0 N/A N/A

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 042678 ENGINEER DERRICK A. WALLER

DocuSigned by: Derrick Waller 3/22/2023
SIGNATURE DATE

SIG. INVENTORY NO. 12-1899

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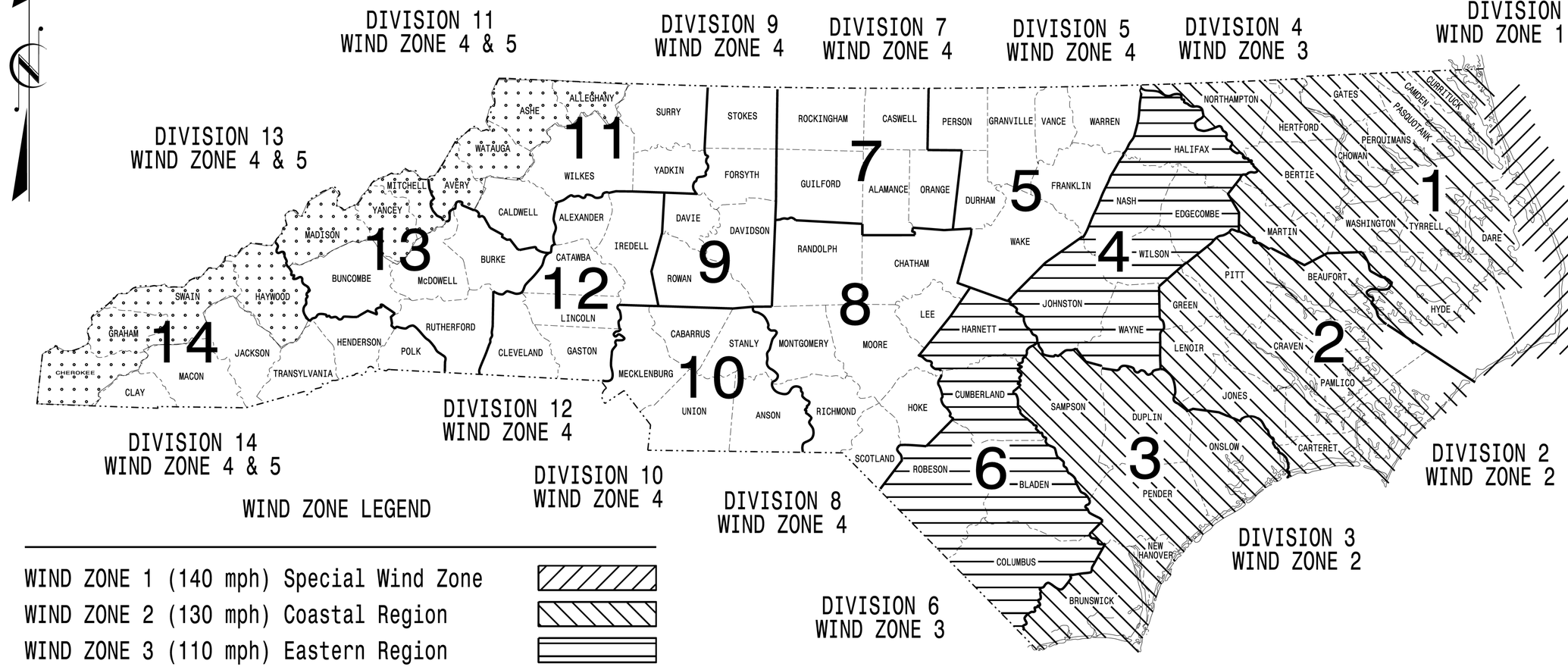
D:\Work\Signals\Design\Metal Poles\Loading Diagrams\Loading Diagram_Single Mast Arm_12-1899_Pole 4.dgn
User:dwaller

NCDOT METAL POLE STANDARDS

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

PROJECT I.D. NO.	SHEET NO.
R-3833C	Sig.M1

STANDARD DRAWINGS FOR ALL METAL POLES



WIND ZONE LEGEND

WIND ZONE 1 (140 mph) Special Wind Zone	
WIND ZONE 2 (130 mph) Coastal Region	
WIND ZONE 3 (110 mph) Eastern Region	
WIND ZONE 4 (90 mph) Central & Mtn. Region	
WIND ZONE 5 (120 mph) Special Wind Zone	

https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx

Prepared In 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

Designed in conformance with the latest 2015 Interim to the 6th Edition 2013

AASHTO

Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals

INDEX OF PLANS

NCDOT CONTACTS:

MOBILITY AND SAFETY DIVISION – ITS AND SIGNALS UNIT

M.M. MCDIARMID, P.E. – STATE ITS AND SIGNALS ENGINEER

J. P. GALLOWAY, P.E. – STATE SIGNALS ENGINEER

D.C. SARKAR, P.E. – ITS AND SIGNALS SENIOR STRUCTURAL ENGINEER

SEAL

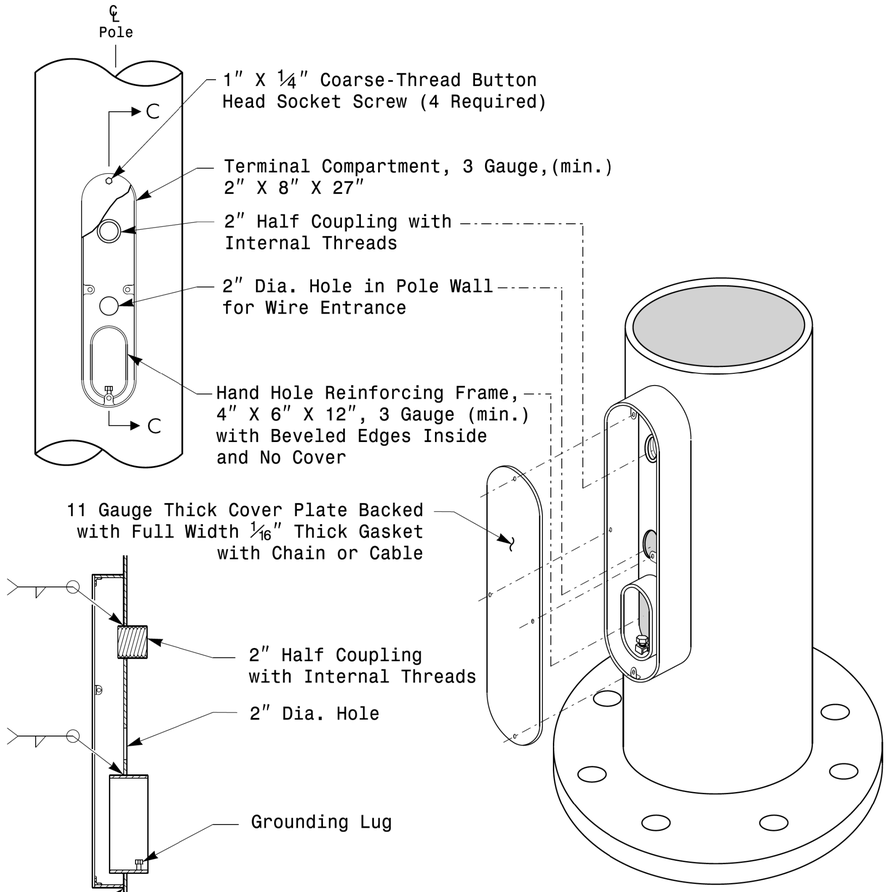
NORTH CAROLINA PROFESSIONAL SEAL 028094 ENGINEER DEBESH C. SARKAR

DocuSigned by: Debesh C. Sarkar 44E8E3... SIGNATURE

10/11/2017 DATE

PROJECT ID. NO.	SHEET NO.
R-3833C	Sig.M2

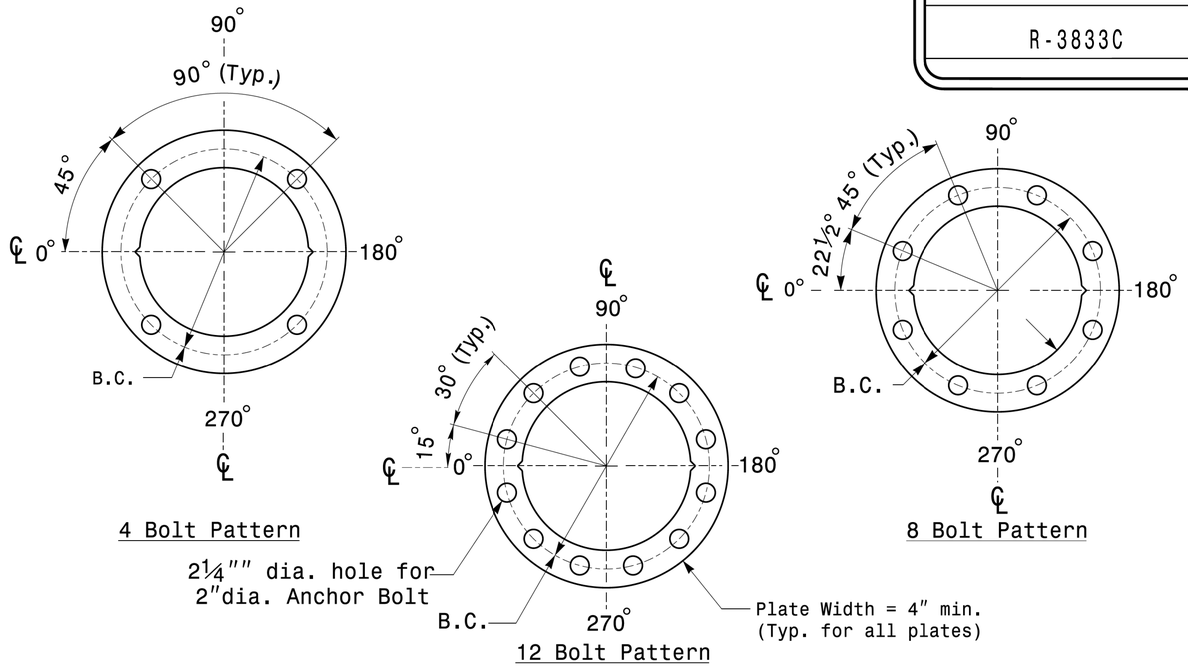
Fabrication Details – All Metal Poles



Section C-C

Note: Unless otherwise specified, locate Terminal Compartment 1 foot above the pole base plate at 180 degrees on the pole's radial index.

Terminal Compartment Detail



Construct Templates and Plates from ¼″ min. thick Steel. Galvanizing is not required.

Base Plate Template and Anchor Bolt Lock Plate Details

MFG _____ MFG. DATE: MM/YY
SHAFT D/T/L/Y ----/----/----/----
ARM-A D/T/L/Y ----/----/----/----
----/----/----/----
ARM-B D/T/L/Y ----/----/----/----
----/----/----/----
A.B. DIA./B.C./L/Y ----/----/----/----
NCDOT SIG. INV. NO. _____
NCDOT POLE NO. _____

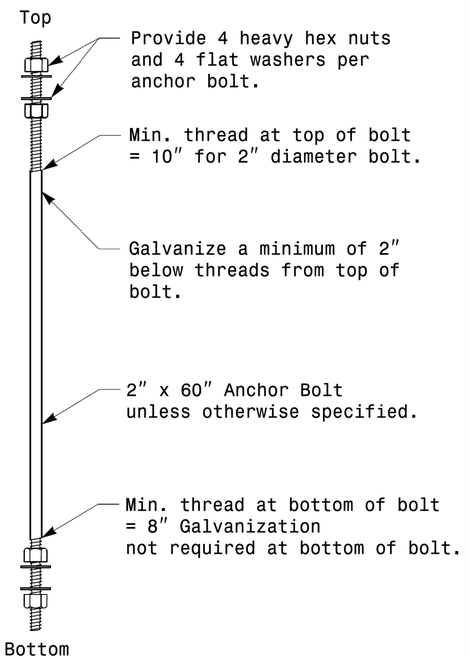
Shaft I.D. Tag
(Provide on Shaft of Strain Poles and Mast Arm Poles Shaft)

MFG _____ MFG. DATE: MM/YY
SECTION D/T/L/Y ----/----/----/----
NCDOT SIG. INV. NO. _____
NCDOT POLE NO. _____

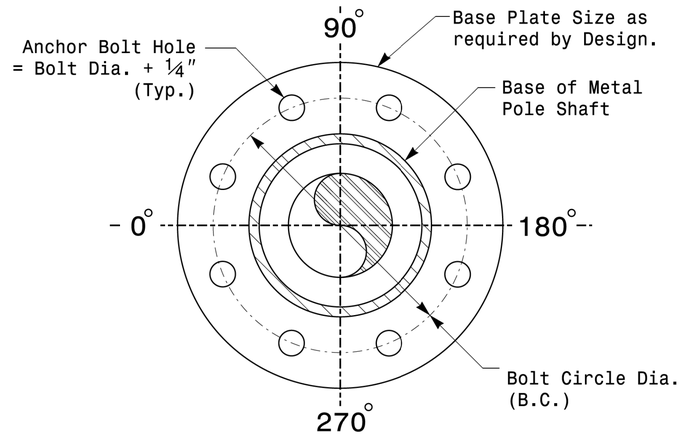
Arm I.D. Tag
(Provide on each section of a multi-section mast arm.)

Notes:
1) D= Diameter, T= Thickness, L= Length, Y= Yield Strength
2) A.B. = Anchor Bolt
3) B.C. = Bolt Circle of Anchor Bolts
4) If Custom Design, use "NCDOT STANDARD" line for Signal Inv. Number and pole I.D. number
5) See drawing M3 and M4 for mounting positions of I.D. tags.

Identification Tag Details



Anchor Bolt Detail



Note: Base plate may be circular,octagonal,square or rectangular in shape.

Typical Base Plate Detail

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

SCALE
0 NA
NONE

Typical Fabrication Details For All Metal Poles

PLAN DATE:	OCTOBER 2017	DESIGNED BY:	C.F.ANDREWS
PREPARED BY:	N. BITTING	REVIEWED BY:	D.C. SARKAR

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 028094 ENGINEER DEBESH C. SARKAR

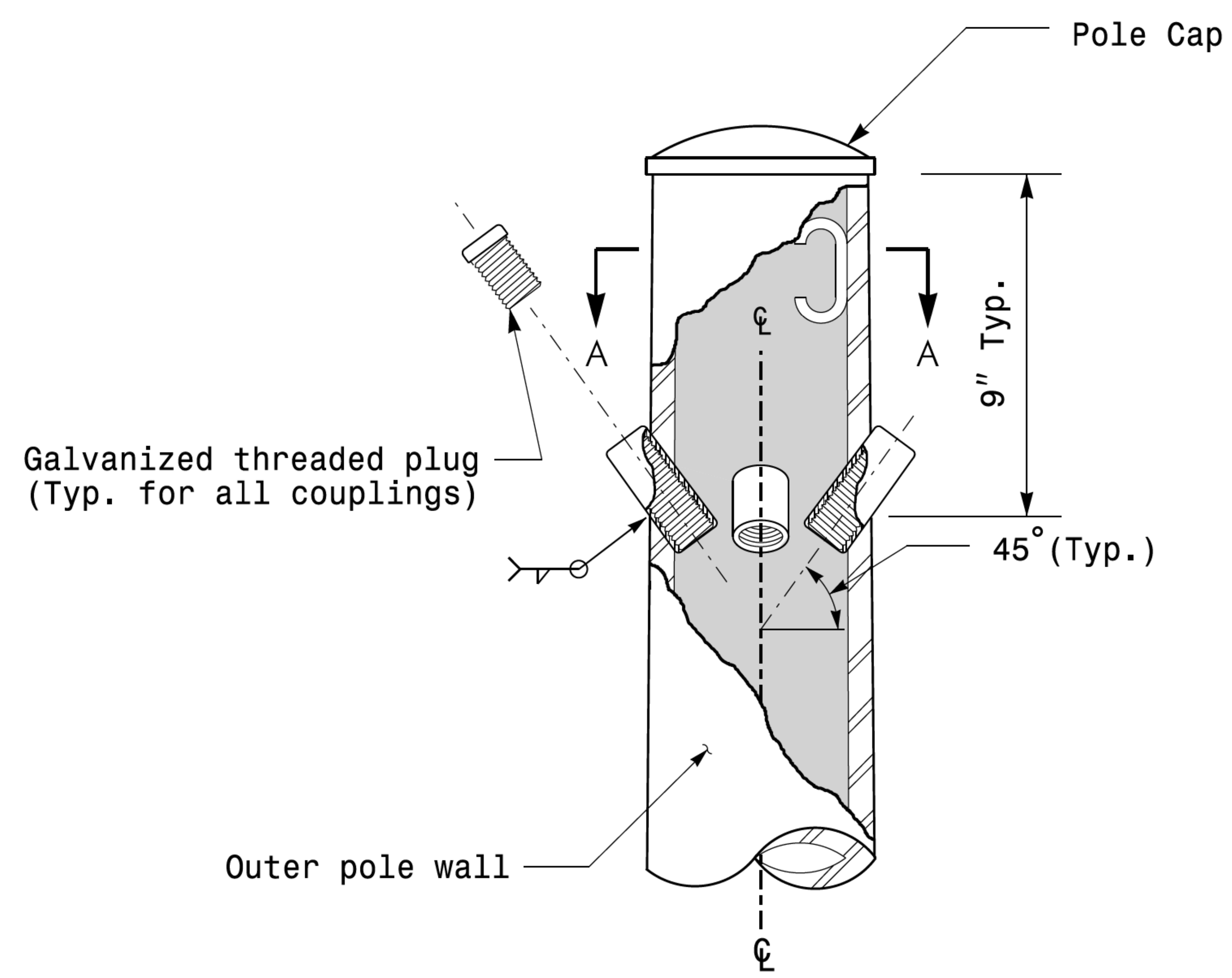
DocuSigned by: Debesh C. Sarkar
44E8E32E SIGNATURE

10/11/2017
DATE

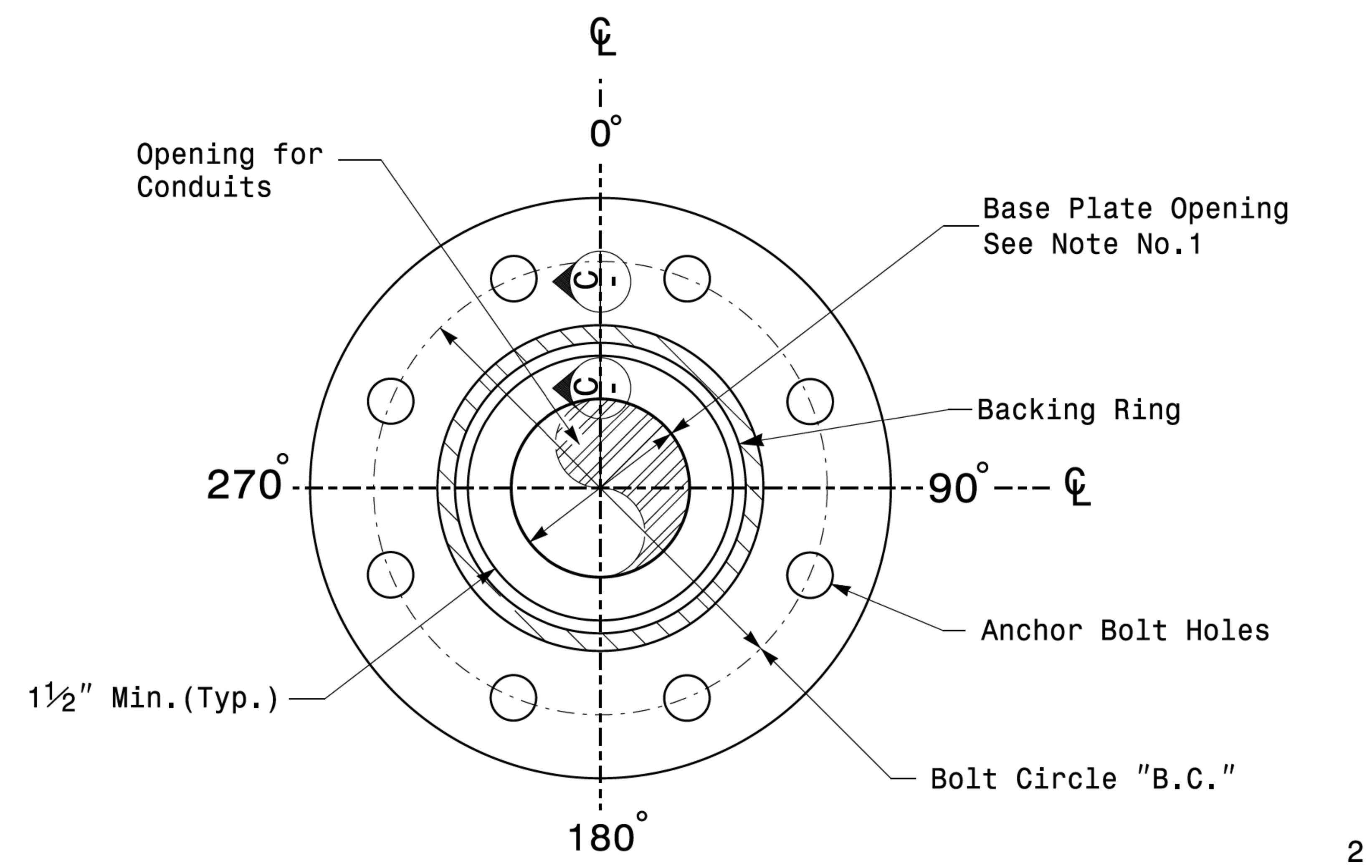
11-OCT-2017 08:30
S:\MTS&SW\ITS Signals\Signal Design Section\Eastern Region\M Sheets\2016\2014 Sig.M2 Std. Fabrication Details-All Poles..dgn
rnelmsgr

PROJECT ID. NO.	SHEET NO.
R-3833C	Sig.M3

Note:
1. Opening in pole base plate shall be equal to pole base inside diameter minus 3½″ but shall not be less than 8½″.

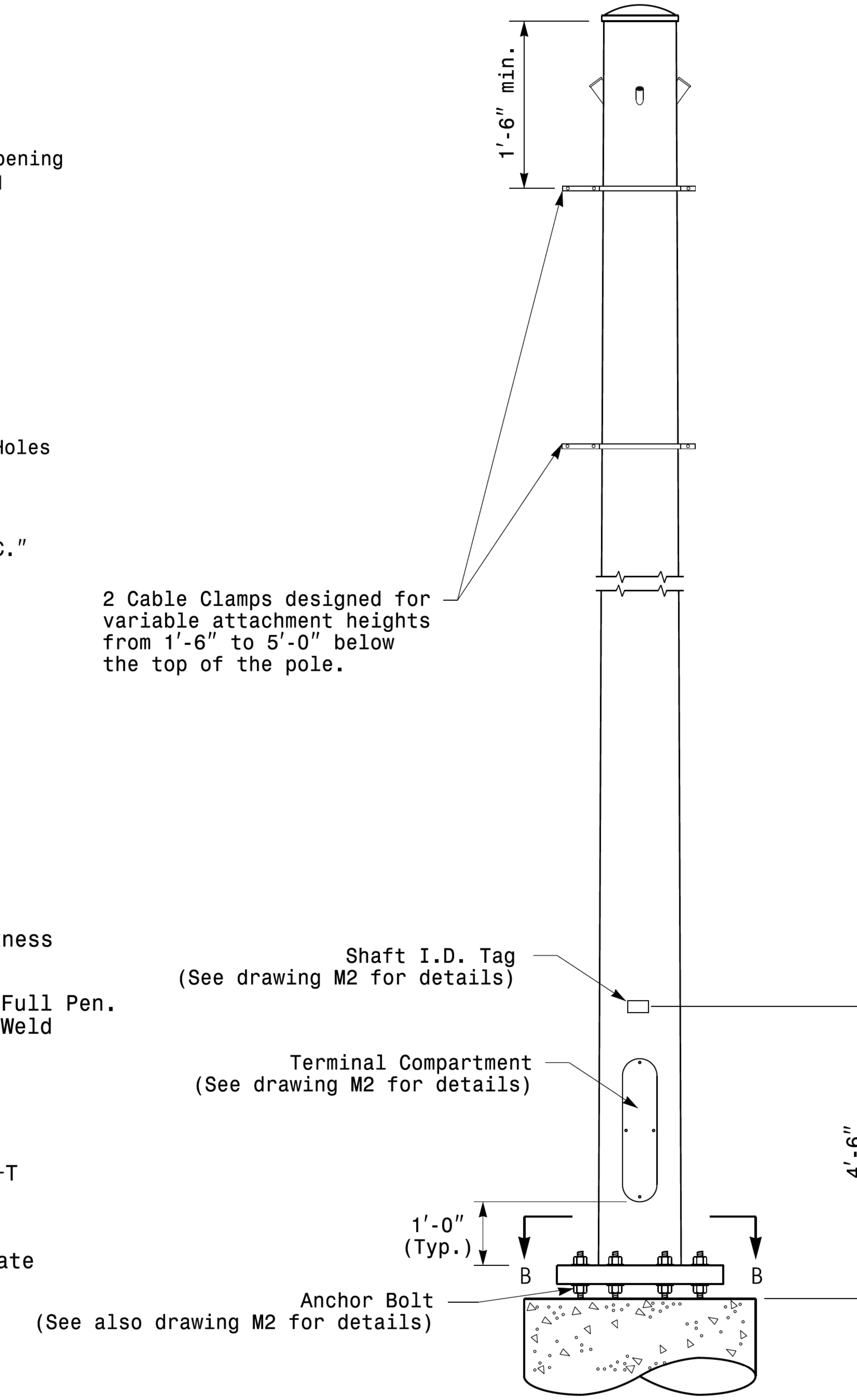


Cable Entrances at Top of Pole

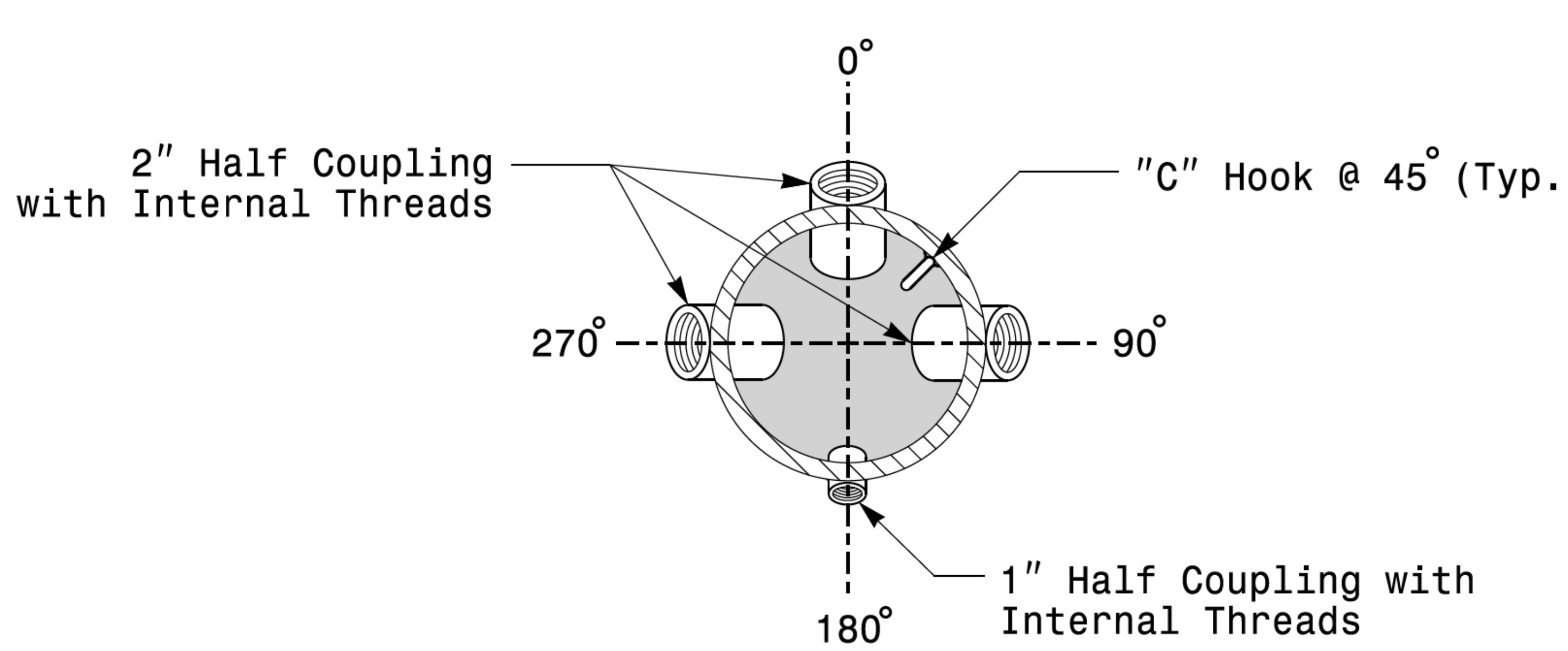


Section B-B

Pole Base Plate Details
(8 and 12 Bolt Pattern)

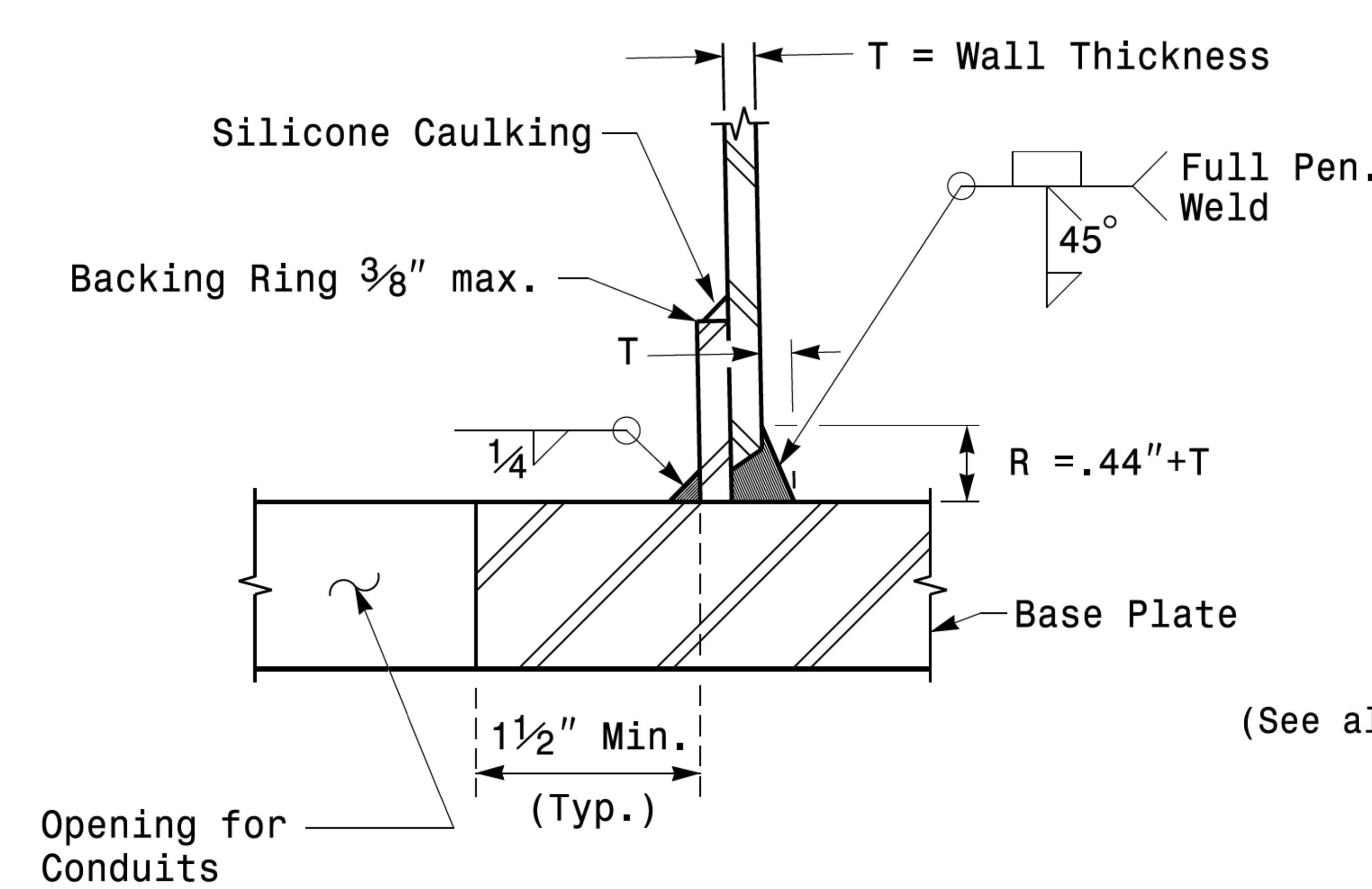


Monotube Strain Pole



Section A-A

Radial Orientation for Factory Installed Accessories at Top of Pole



Section C-C

(Pole Attachment to Base Plate)

Full-Penetration Groove Weld Detail

Fabrication Details – Strain Poles

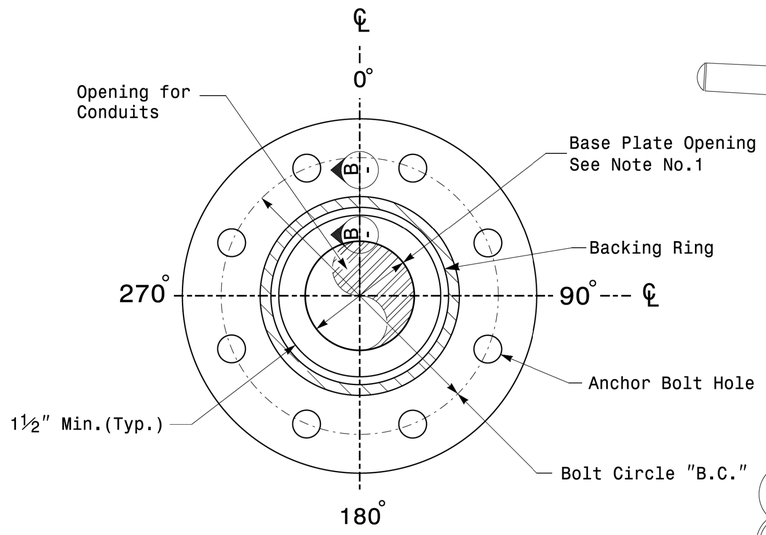
Prepared in the Offices of: Transportation Mobility and Safety Division, Signal Design Section, 750 N.Greenfield Pkwy.Garner,NC 27529	Typical Fabrication Details For Strain Poles	SEAL
PLAN DATE: OCTOBER 2017	DESIGNED BY: K.C.DURIGON	NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 028094 DEBESH C. SARKAR
PREPARED BY: N. BITTING	REVIEWED BY: D.C. SARKAR	
SCALE 0 NA NONE	REVISIONS / INIT. / DATE	Debesh C. Sarkar SIGNATURE 10/11/2017 DATE

11-OCT-2017 08:25
S:*ITS&SU*ITS Signals*Signal Design Section*Eastern Region*M Sheets*2016*2014 Sig.M3 Std. Fabrication Details-Strain Poles.dgn

PROJECT ID. NO.	SHEET NO.
R-3833C	Sig.M4

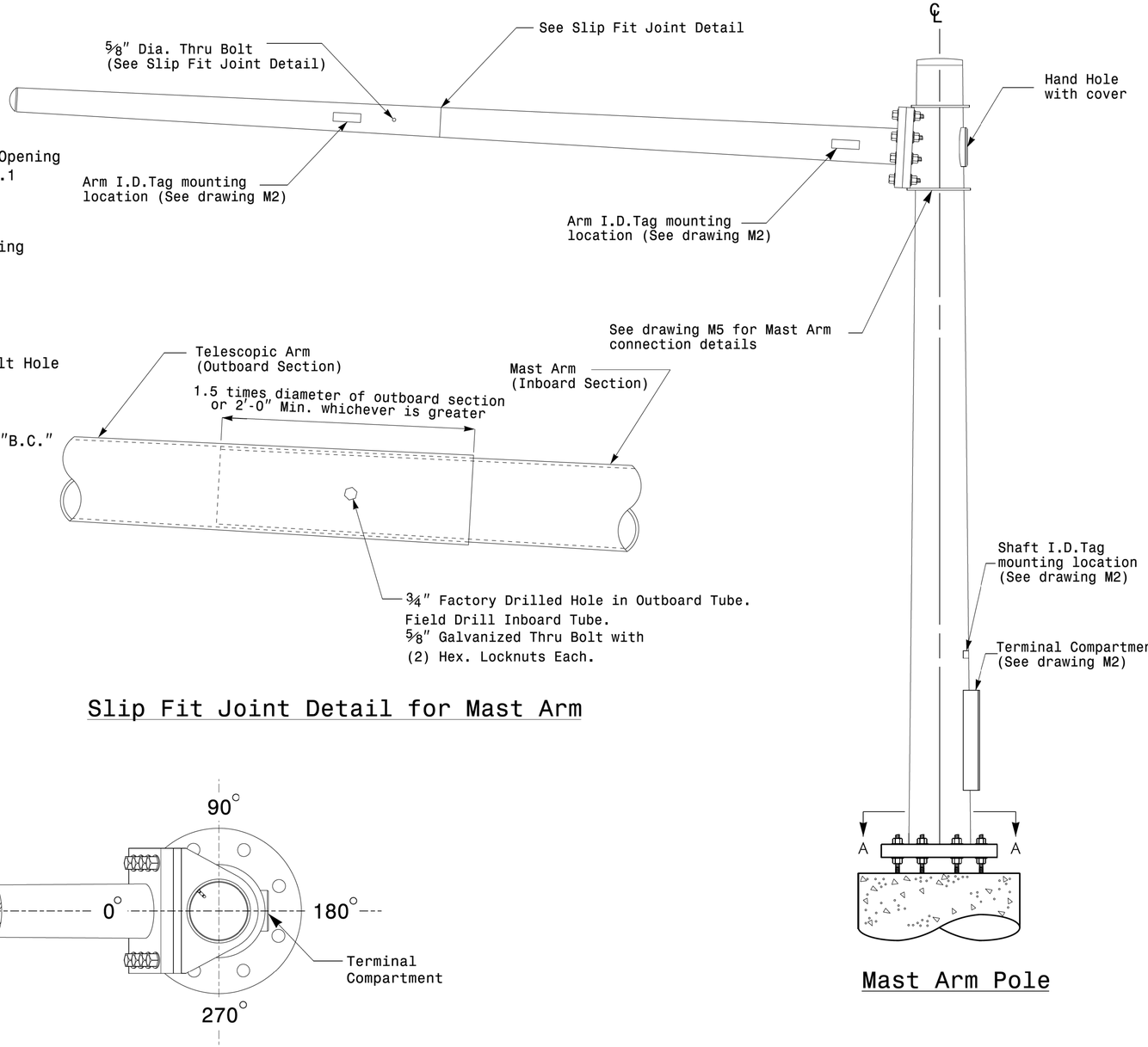
Fabrication Details – Mast Arm Poles

Note:
1. Opening in pole base plate shall be equal to pole base inside diameter minus 3½" but shall not be less than 8½".



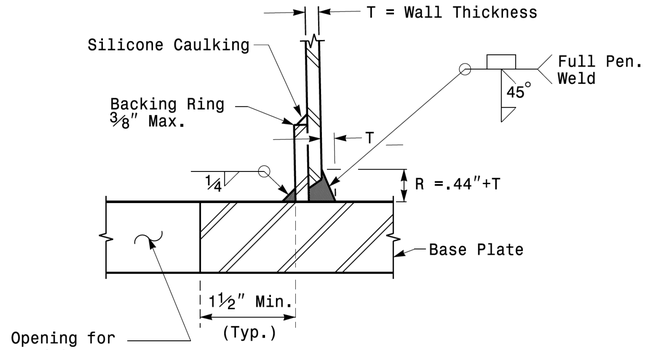
Section A-A

Pole Base Plate Details



Slip Fit Joint Detail for Mast Arm

Mast Arm Pole



Section B-B

(Pole Attachment to Base Plate)

Full-Penetration Groove Weld Detail

Mast Arm Radial Orientation

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

SCALE
0 NA
NONE

Typical Fabrication Details For Mast Arm Poles

PLAN DATE:	OCTOBER 2017	DESIGNED BY:	K.C.DURIGON
PREPARED BY:	N. BITTING	REVIEWED BY:	D.C. SARKAR

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 028094 ENGINEER DEBESH C. SARKAR

DocuSigned by: Debesh C. Sarkar
SIGNATURE

10/11/2017
DATE

11-OCT-2017 08:33
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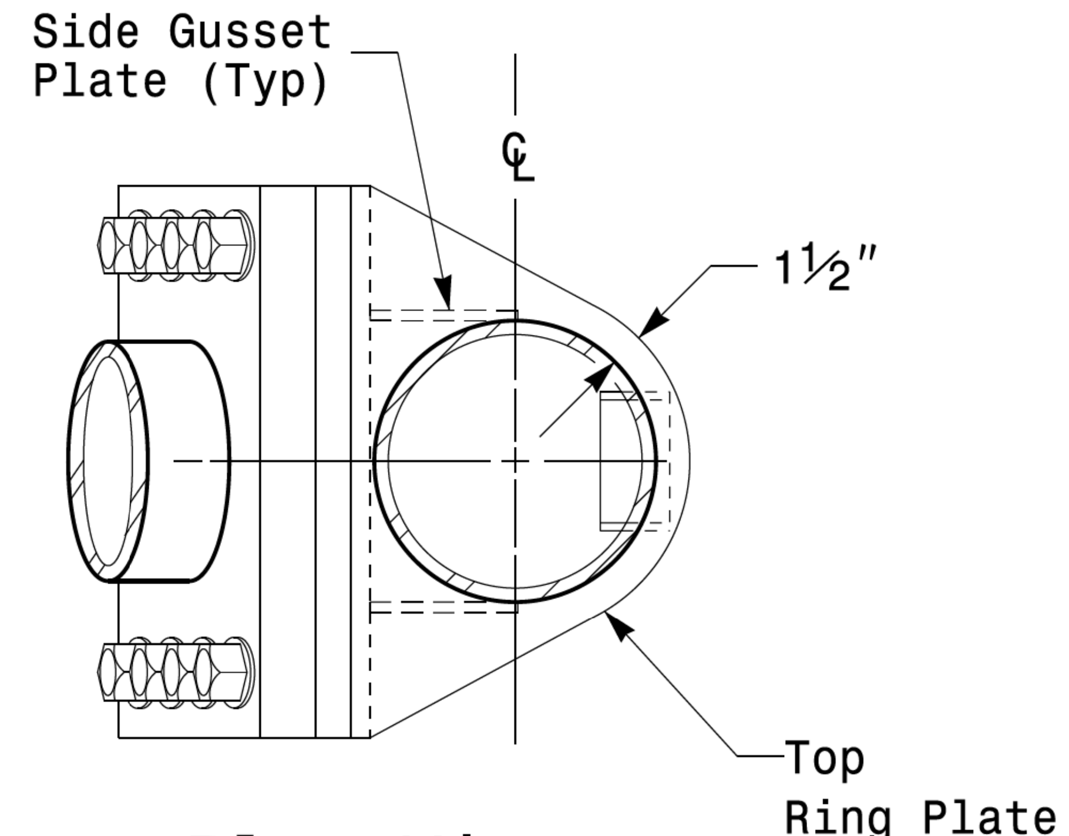
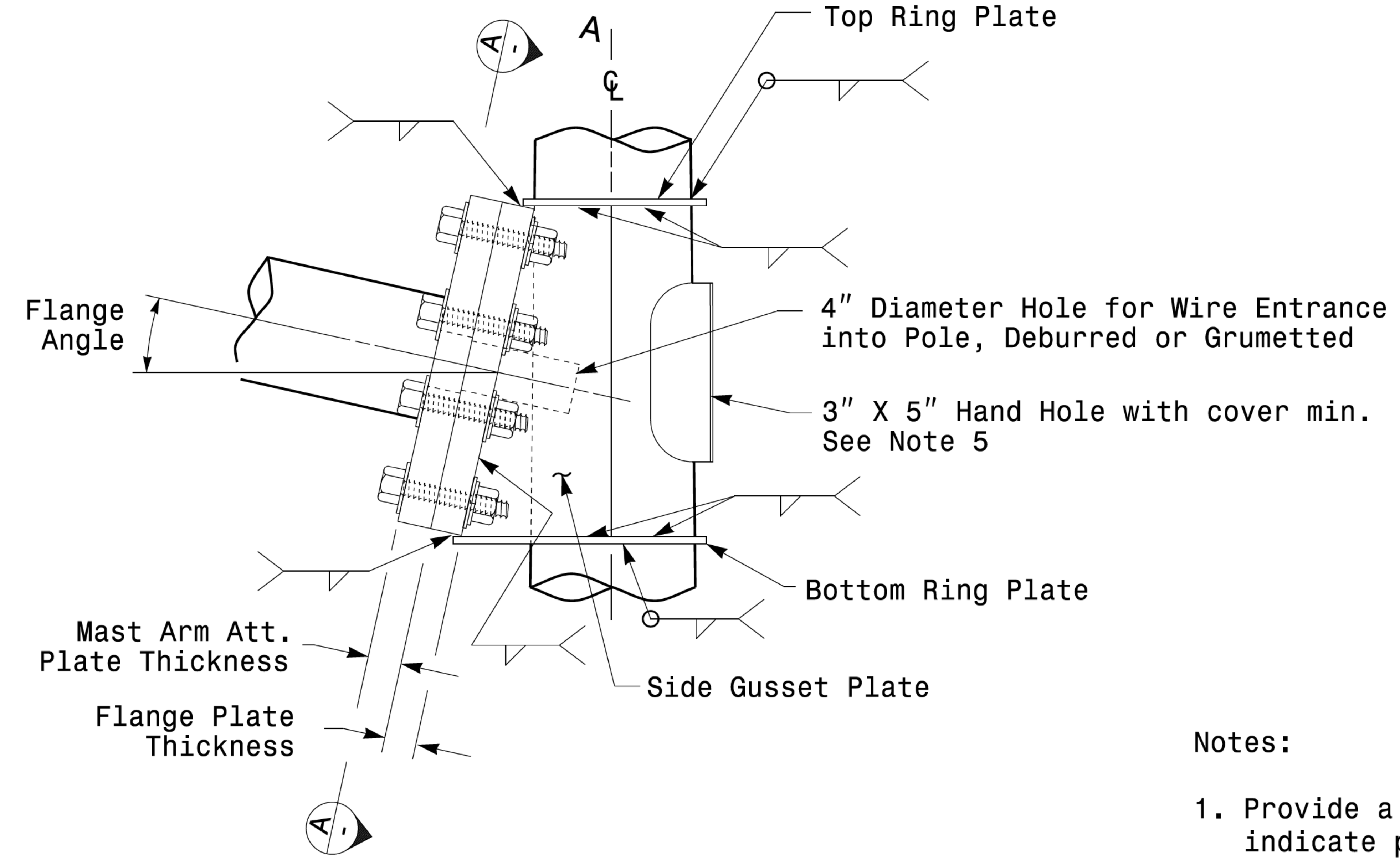
rtaylor

Welded Ring Stiffened Mast Arm Connection

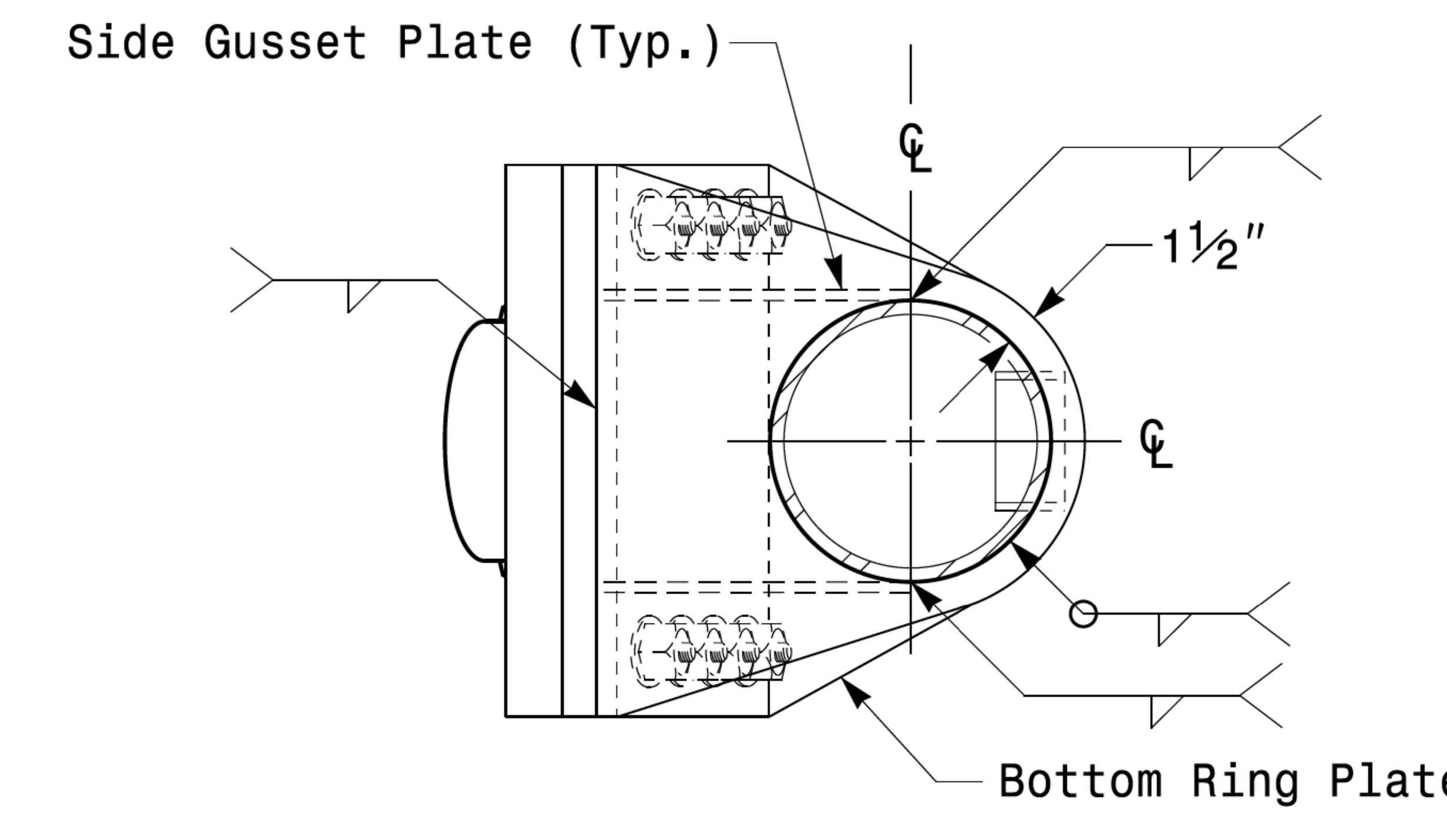
PROJECT ID. NO.	SHEET NO.
R-3833C	Sig.M5



Plan View



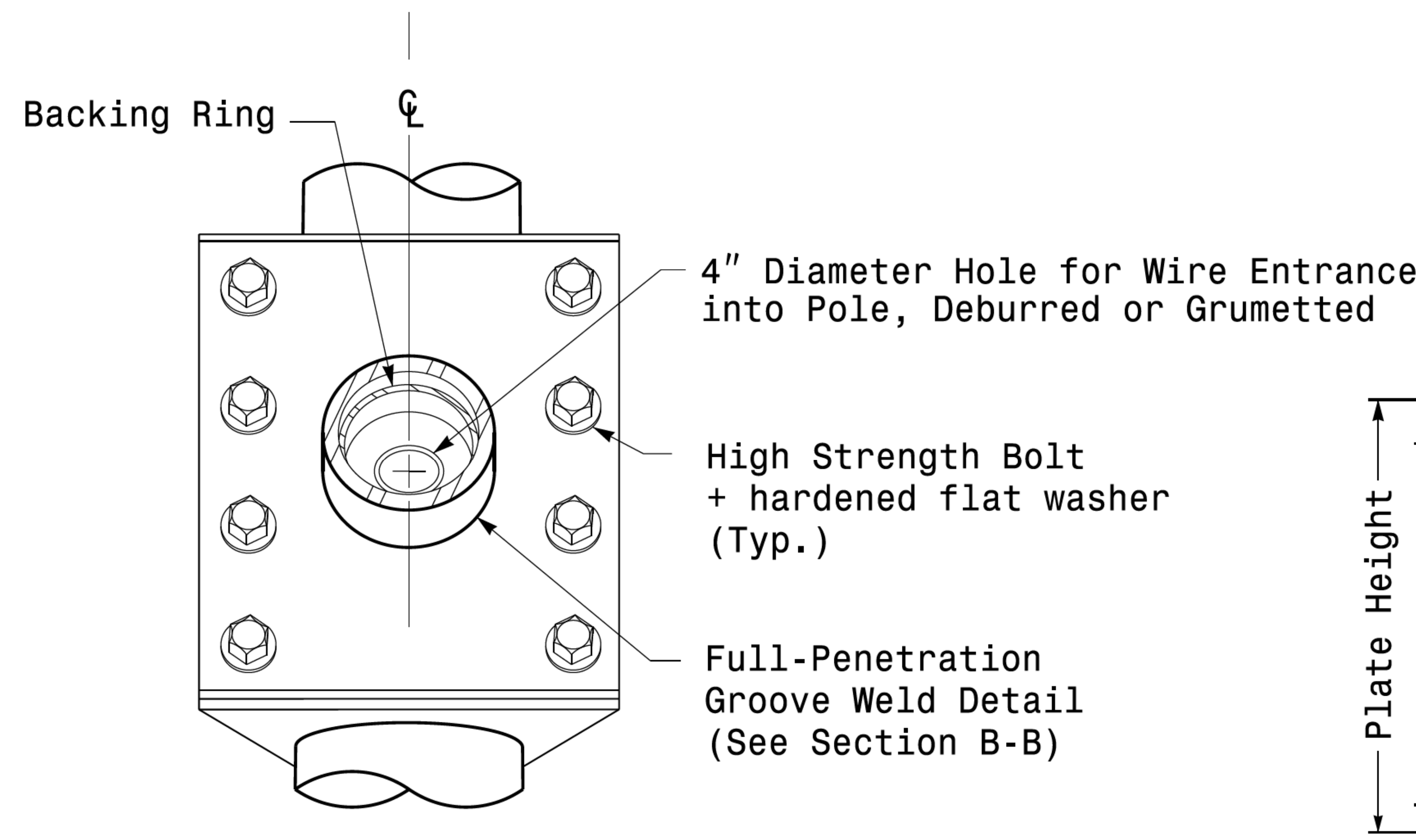
Side Elevation View



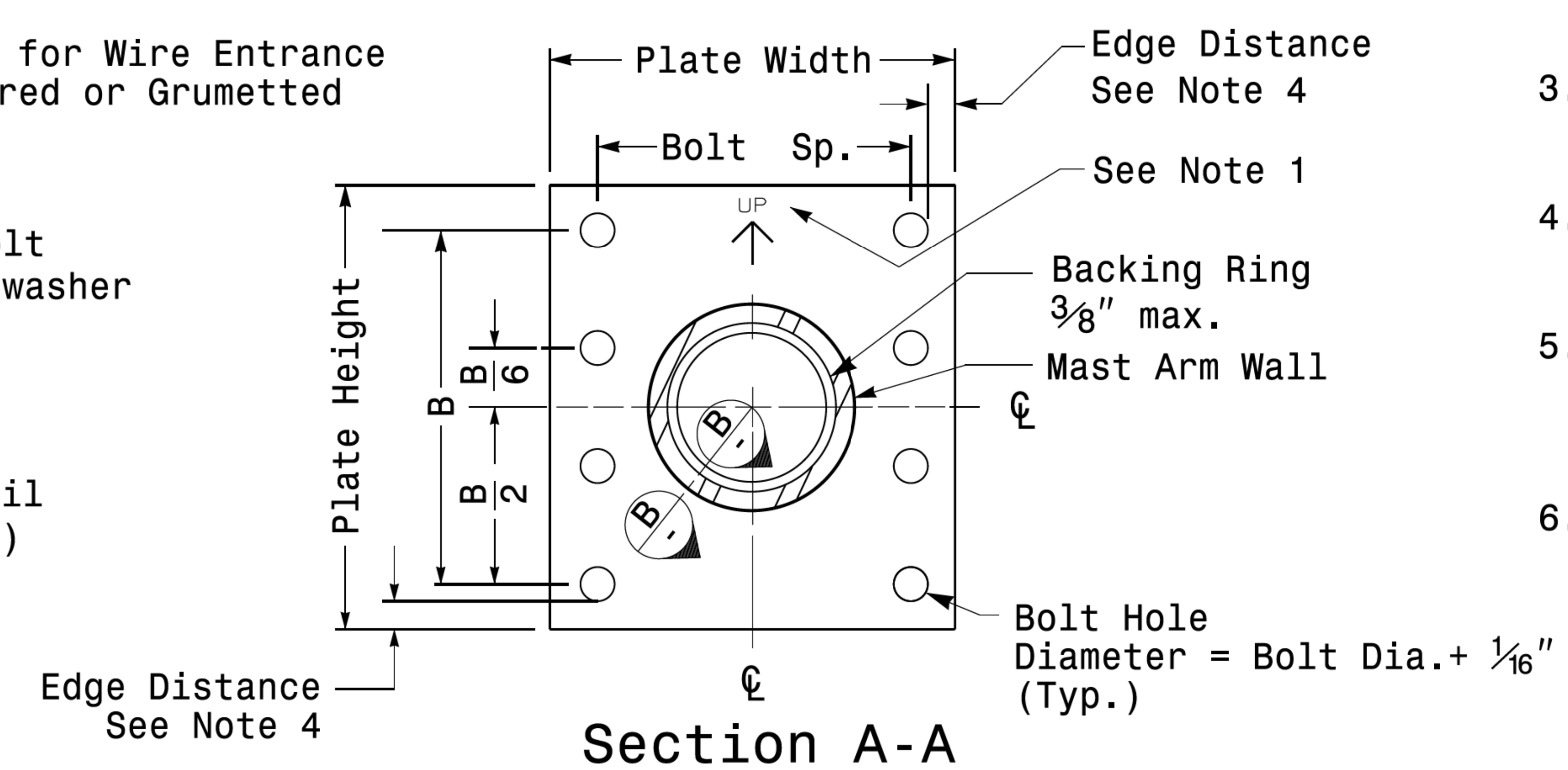
Bottom View

Notes:

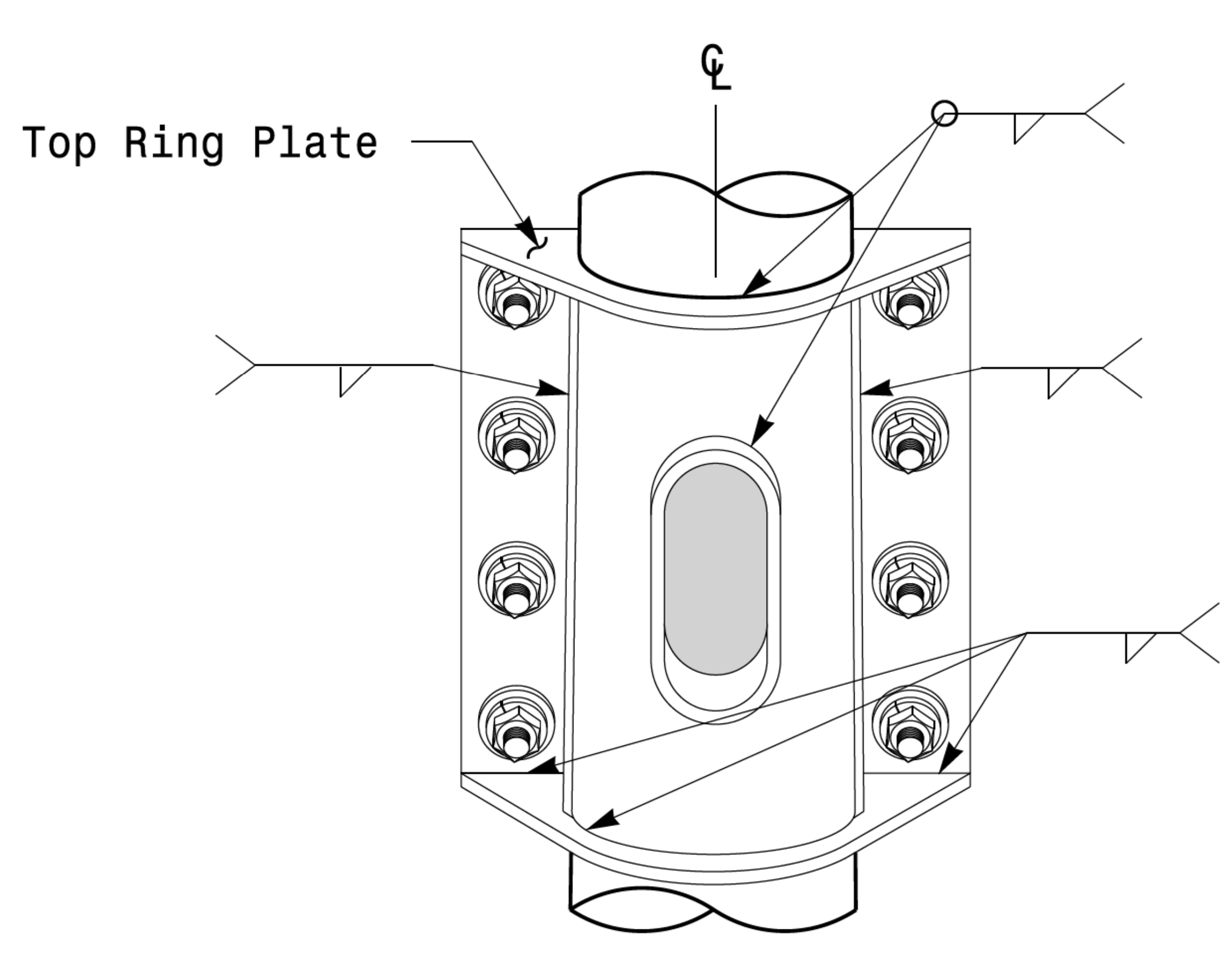
1. Provide a permanent means of identification above the mast arm to indicate proper attachment orientation of the mast arm.
2. Designer will determine the size of all structural components, plates, fasteners, and welds shown unless they are already specified.
3. Fabricator is responsible for providing appropriate holes at drainage points to drain galvanizing materials.
4. For minimum edge distance follow AISC Table J3.4 and J3.5. For nominal bolt hole size use Table J3.3.
5. Provide upper handhole as necessary when shaft extensions are reguired for luminaire arms or camera. For poles without luminaires/camera, wiring can be done through the top of pole.
6. Allowable range of flange tilt angle will vary from 0° to as required.



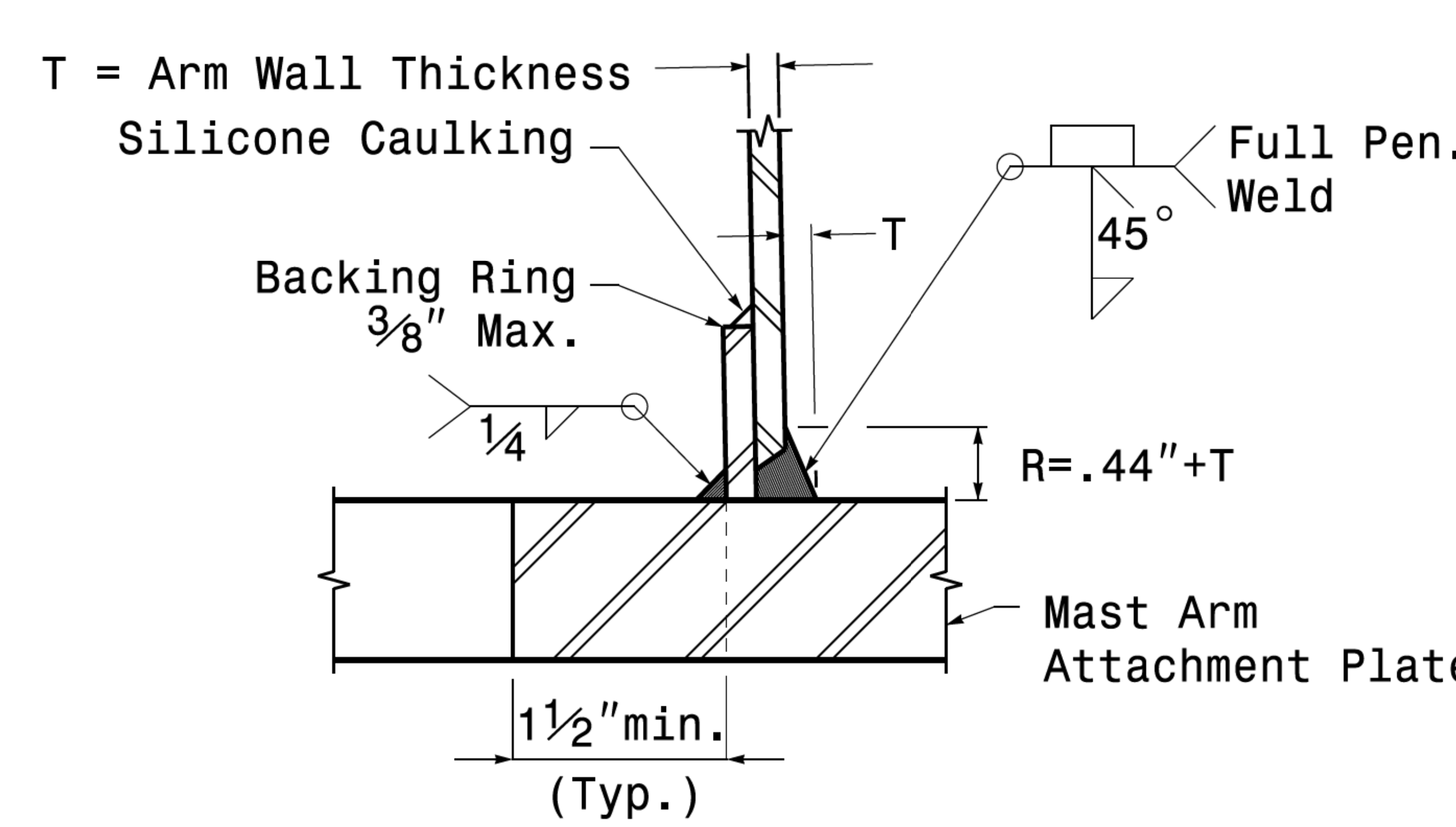
Front Elevation View



Section A-A
Mast Arm Attachment Plate



Back Elevation View



Section B-B
Full-Penetration Groove Weld Detail

Fabrication Details – Mast Arm Connection

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

Typical Fabrication Details For Mast Arm Connection To Pole

PLAN DATE:	OCTOBER 2017	DESIGNED BY:	C.F.ANDREWS
PREPARED BY:	N. BITTING	REVIEWED BY:	D.C. SARKAR

REVISIONS	INIT.	DATE

SCALE: 0 NA — NONE

SEAL: North Carolina Professional Engineer, SEAL 028094, Debesh C. Sarkar

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

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