

Project: R-2233BB

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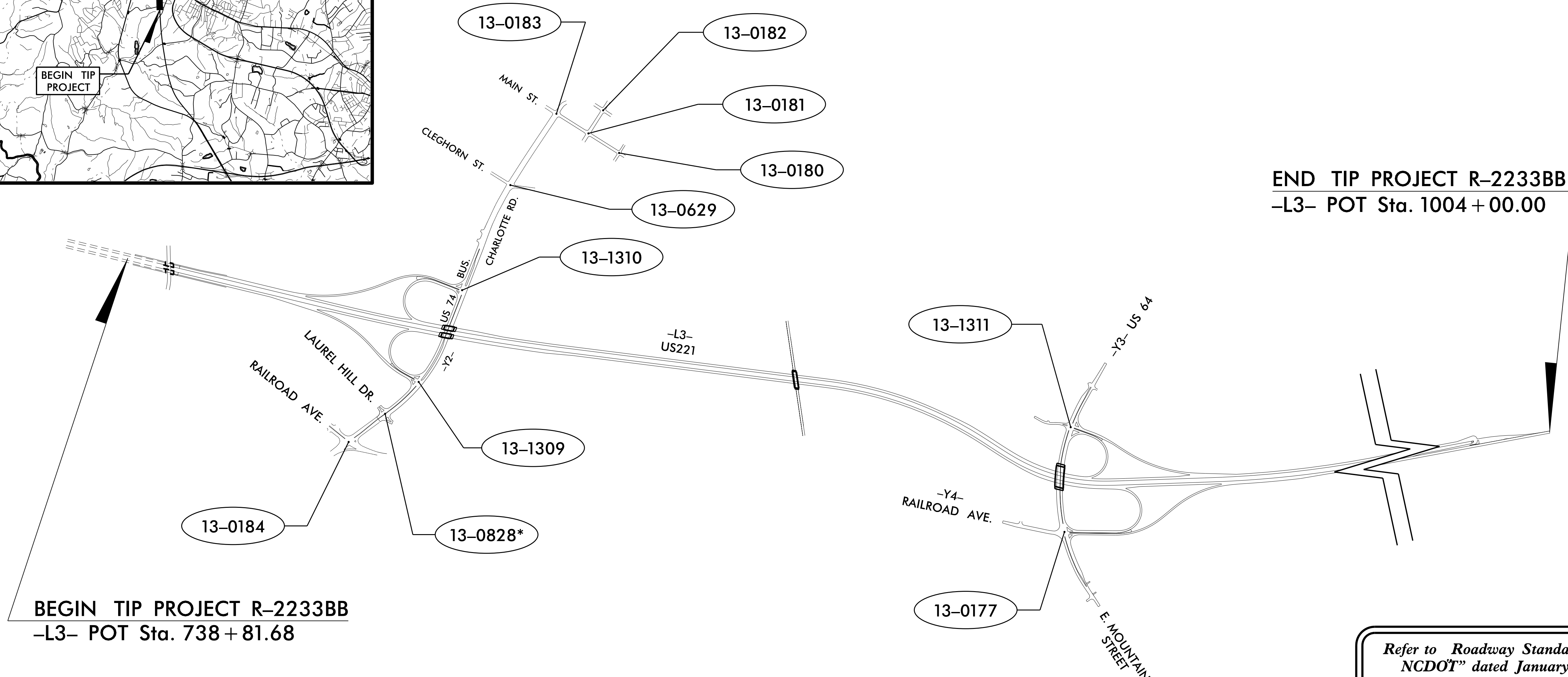
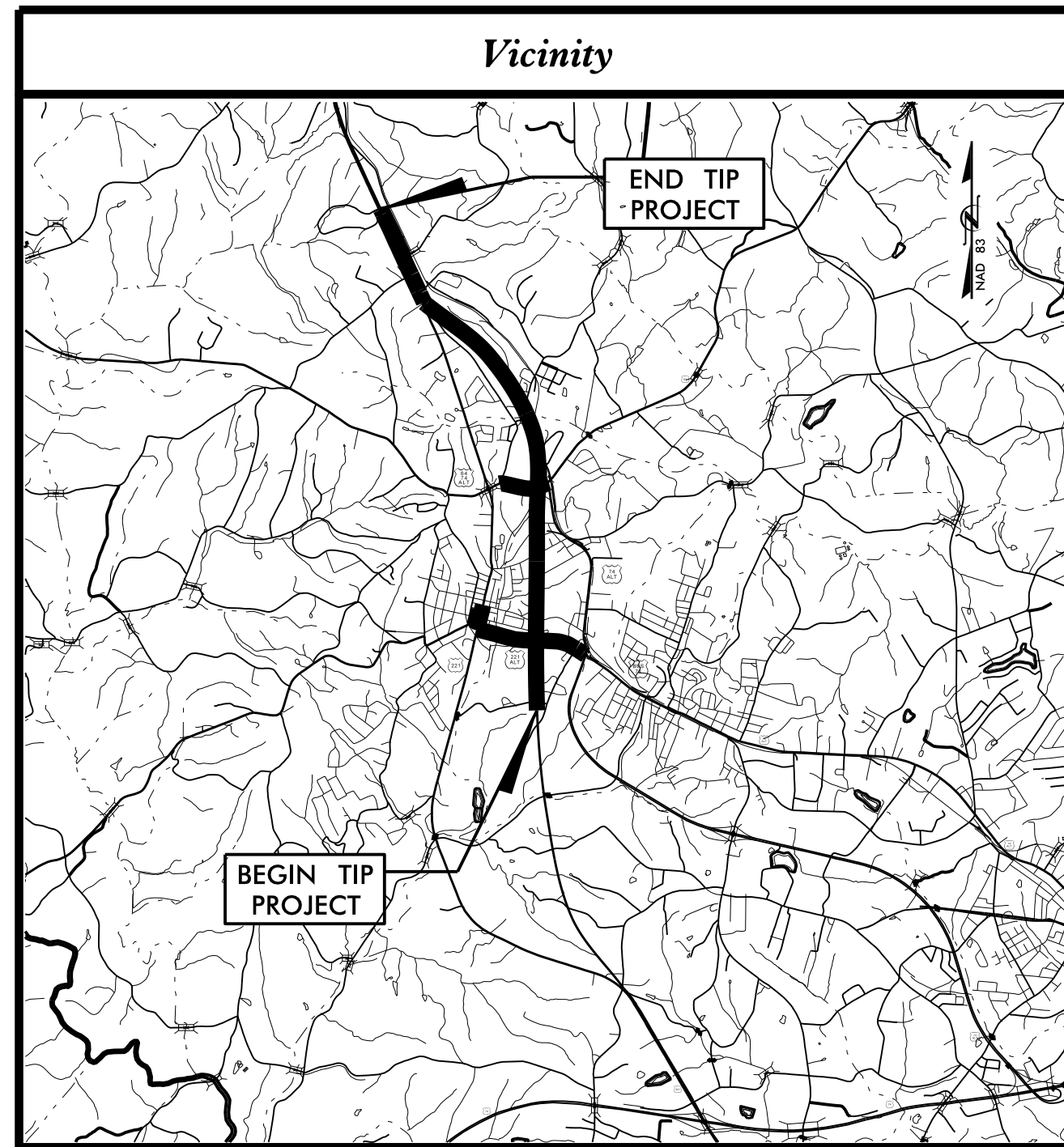
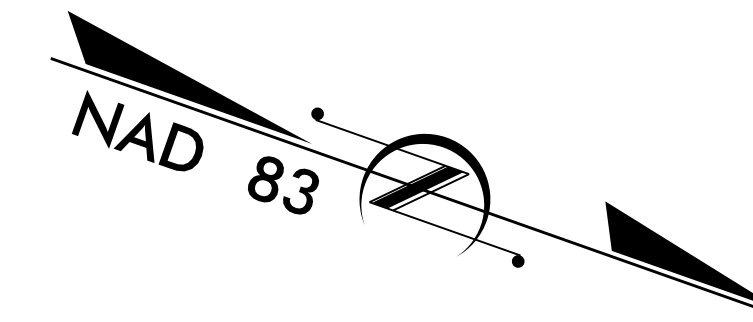
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

Project No.	Sheet No.
R-2233BB	Sig. 1.0

RUTHERFORD COUNTY

**LOCATION: US 221 SOUTH OF US 74 BUSINESS (CHARLOTTE ROAD)
TO NORTH OF SR 1366 (ROPER LOOP ROAD)**

TYPE OF WORK: TRAFFIC SIGNALS AND WIRELESS COMMUNICATION



**END TIP PROJECT R-2233BB
-L3- POT Sta. 1004 + 00.00**

**BEGIN TIP PROJECT R-2233BB
-L3- POT Sta. 738 + 81.68**

* SIGNAL TO BE REMOVED

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

Sheet #	Reference #	Location/Description
Sig. 1.0	-----	Title Sheet
Sig. 2.0-2.1	13-0184	US 221A/US 74 Bus. at US 74A (Railroad Ave.)
Sig. 3.0-5.0	13-1309	US 221A/US 74 Bus. (Charlotte Rd.) at US 221 Northbound Ramps
Sig. 6.0-8.0	13-1310	US 221A/US 74 Bus. (Charlotte Rd.) at US 221 Southbound Ramps
Sig. 9.0-9.1	13-0629	US 221A/US 74 Bus. (Charlotte Rd.) at Cleghorn Street
Sig. 10.0-10.1	13-0183	US 221A (Charlotte Rd.)/Maple Street at US 221 (Main St.)/US 221-74 Bus.
Sig. 11.0-11.1	13-0181	US 221 (Main St.) at Court Street
Sig. 12.0-12.1	13-0182	US 74 (Washington St.) at Court Street
Sig. 13.0-13.1	13-0180	US 221 (Main St.) at 2nd Street
Sig. 14.0-18.0	13-0177	US 64/US 74A at US 74/US 1520 (Rock Rd.)
Sig. 19.0-21.0	13-1311	US 64 at US 221 Southbound Ramps
Sig. 22.0-22.1	-----	Revised Standard Drawings
Sig. M1-M8	-----	Metal Pole Standard Drawings
SCP. 1.0-3.0	-----	Signal Communication Plans

**TRANSPORTATION SYSTEMS
MANAGEMENT & OPERATIONS**

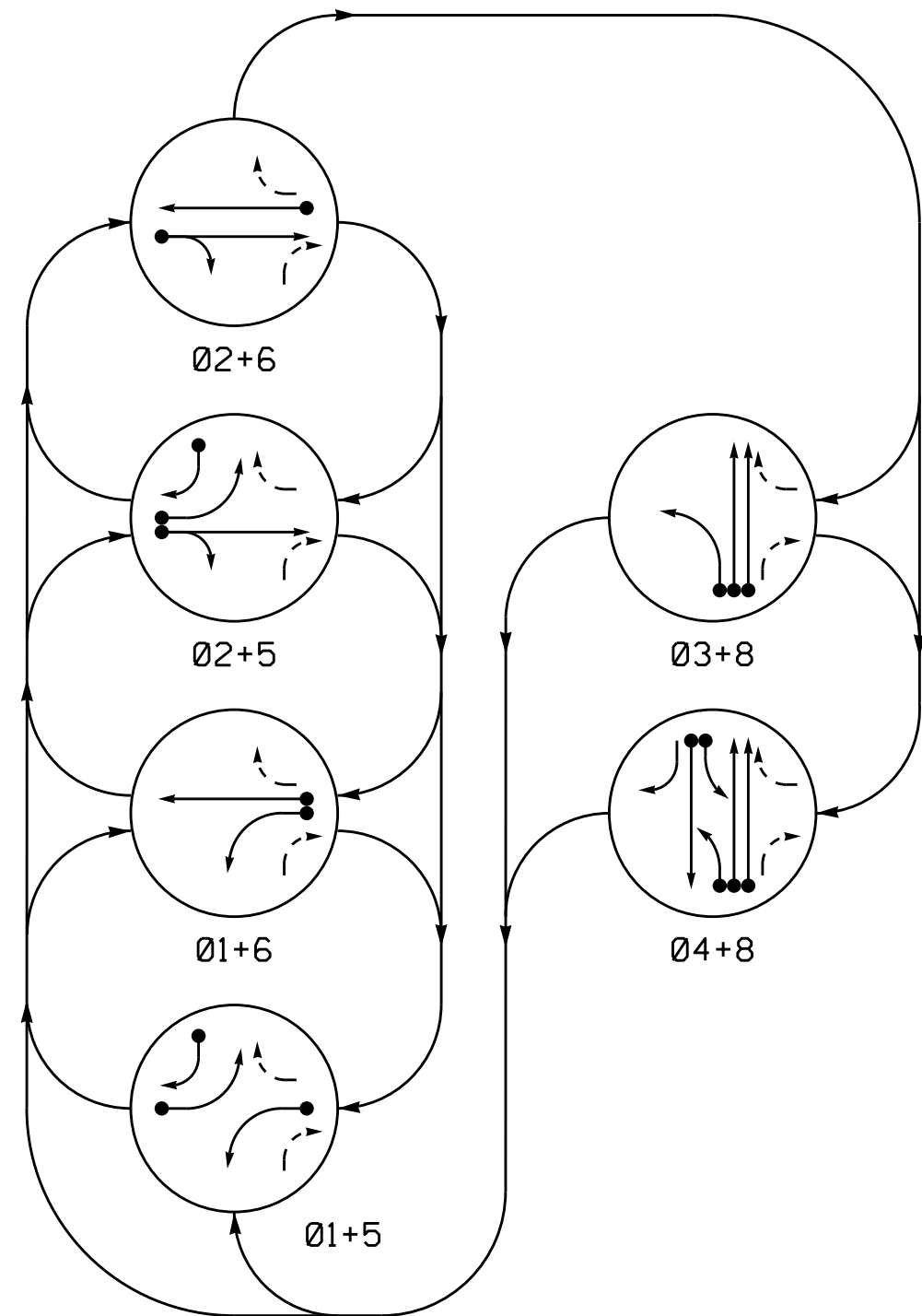
Contacts:

Timothy J. Williams, PE - Western Region Signals Engineer
Keith M. Mims, PE - Signal Equipment Design Engineer
Neil Avery - Intelligent Transportation Systems Engineer
Matthew T. Carlisle, PE - State Signal Systems Engineer

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

750 N. Greenfield Parkway, Garner, NC 27529

PHASING DIAGRAM



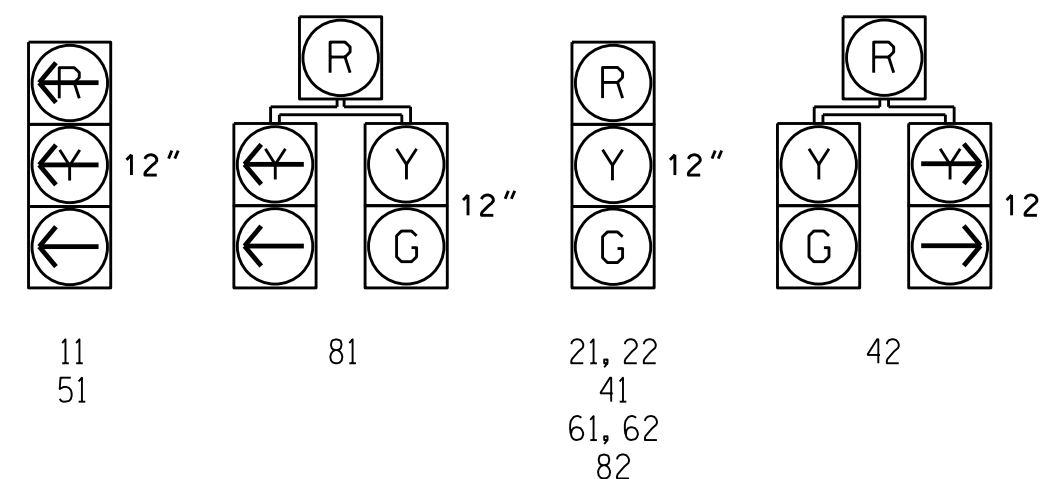
PHASING DIAGRAM DETECTION LEGEND

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

SIGNAL FACE	PHASE							
	01+5	01+6	02+5	02+6	03+8	04+8	F	P
11	←	←	←	←	←	←	←	←
21,22	R	R	G	G	R	R	Y	
41	R	R	R	R	R	G	R	
42	R	R	R	R	R	G	R	
51	←	←	←	←	←	←	←	
61,62	R	G	R	G	R	R	Y	
81	R	R	R	R	R	G	R	
82	R	R	R	R	G	G	R	

SIGNAL FACE I.D.

All Heads L.E.D.



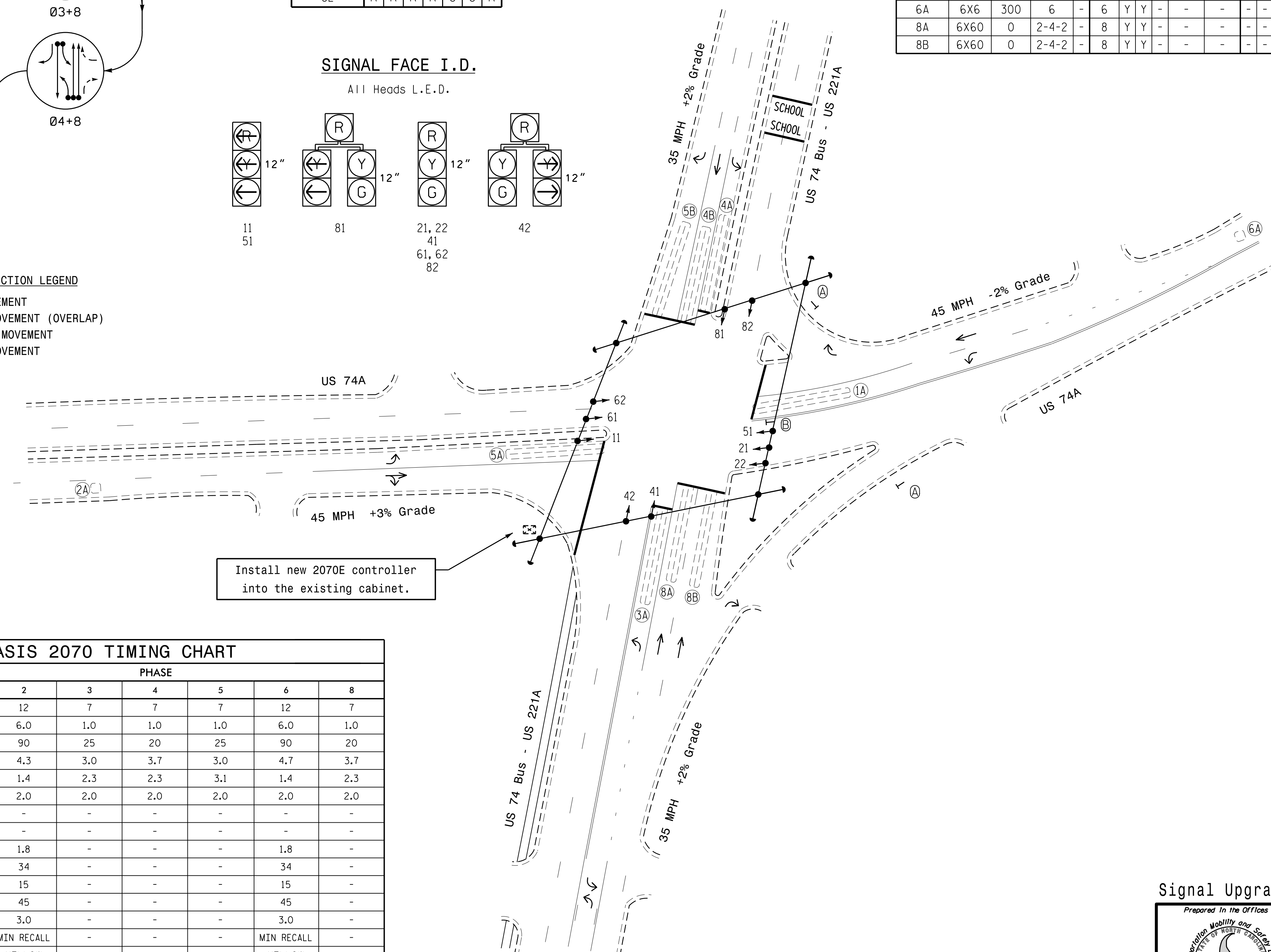
OASIS 2070 LOOP & DETECTOR INSTALLATION

LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	DETECTOR PROGRAMMING							
					PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
1A	6X60	0	2-4-2	-	1	Y	Y	-	-	3	-	-
2A	6X6	300	4	-	2	Y	Y	-	-	-	-	-
3A	6X60	0	2-4-2	-	3	Y	Y	-	-	15	-	-
4A	6X60	0	2-4-2	-	4	Y	Y	-	-	3	-	-
4B	6X60	0	2-4-2	-	4	Y	Y	-	-	-	-	-
5A	6X60	0	2-4-2	-	5	Y	Y	-	-	-	-	-
5B	6X60	0	2-4-2	-	5	Y	Y	-	-	15	-	-
6A	6X6	300	6	-	6	Y	Y	-	-	-	-	-
8A	6X60	0	2-4-2	-	8	Y	Y	-	-	-	-	-
8B	6X60	0	2-4-2	-	8	Y	Y	-	-	-	-	-

6 Phase Fully Actuated Signal System #11324

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Install new 2070E Controller in existing cabinet.
- Omit phase 3 during phase 4 on.
- Phase 1 or phase 5 may be lagged.
- Set all detector units to presence mode.
- Pavement markings are existing.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.



Install new 2070E controller into the existing cabinet.

OASIS 2070 TIMING CHART

FEATURE	PHASE							
	1	2	3	4	5	6	8	
Min Green 1 *	7	12	7	7	7	12	7	
Extension 1 *	1.0	6.0	1.0	1.0	1.0	6.0	1.0	
Max Green 1 *	25	90	25	20	25	90	20	
Yellow Clearance	3.0	4.3	3.0	3.7	3.0	4.7	3.7	
Red Clearance	3.2	1.4	2.3	2.3	3.1	1.4	2.3	
Red Revert	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Walk 1 *	-	-	-	-	-	-	-	
Don't Walk 1	-	-	-	-	-	-	-	
Seconds Per Actuation *	-	1.8	-	-	-	1.8	-	
Max Variable Initial *	-	34	-	-	-	34	-	
Time Before Reduction *	-	15	-	-	-	15	-	
Time To Reduction *	-	45	-	-	-	45	-	
Minimum Gap	-	3.0	-	-	-	3.0	-	
Recall Mode	-	MIN RECALL	-	-	-	MIN RECALL	-	
Vehicle Call Memory	-	YELLOW	-	-	-	YELLOW	-	
Dual Entry	-	-	-	ON	-	-	ON	
Simultaneous Gap	ON	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.

LEGEND

- | PROPOSED | EXISTING |
|--|--|
| ○ → Traffic Signal Head | ● → N/A |
| ● → Modified Signal Head | — Sign |
| □ → Pedestrian Signal Head | □ → Signal Pole with Sidewalk Guy |
| □ → Signal Pole with Guy | □ → Signal Pole with Sidewalk Guy |
| □ → Inductive Loop Detector | □ → Controller & Cabinet |
| □ → Junction Box | □ → Junction Box |
| □ → 2-in Underground Conduit | □ → Right of Way |
| → → Directional Arrow | → → Directional Arrow |
| → → Pavement Marking Arrow | → → Pavement Marking Arrow |
| Ⓐ → "YIELD" Sign (R1-2) | Ⓐ → "YIELD" Sign (R1-2) |
| Ⓑ → "U-TURN YIELD TO RIGHT TURN" Sign (R10-16) | Ⓑ → "U-TURN YIELD TO RIGHT TURN" Sign (R10-16) |

Signal Upgrade

Prepared in the Offices of:

750 N. Greenfield Pkwy, Garner, NC 27529

US 74A
at
US 74 BUS / US 221A

Division 13 Rutherford County Rutherfordton

PLAN DATE: January 2020 REVIEWED BY: T.J. Williams

PREPARED BY: R.N. Zinser REVIEWED BY:

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL

SEAL

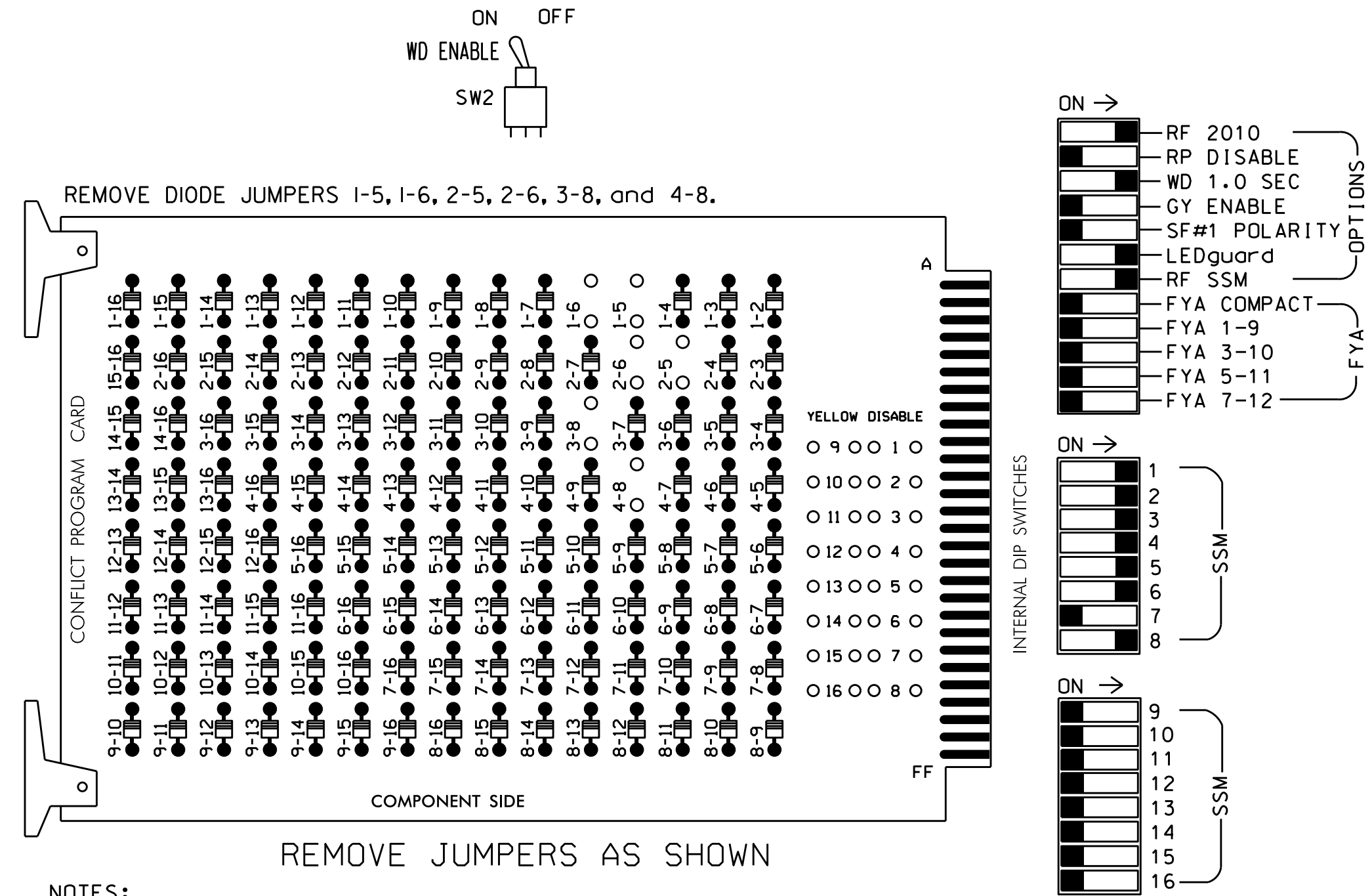
SEAL

DATE: 2/28/2020

SIG. INVENTORY NO. 13-0184

EDI MODEL 2010ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



NOTES:

- Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
- Make sure jumpers SEL2-SEL5 are present on the monitor board.

NOTES

- 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.
- To prevent red failures on unused monitor channels, see Red Monitor Board Programming Detail this sheet.
- Program phases 4 and 8 for Dual Entry.
- Enable Simultaneous Gap-Out for all phases.
- Program phases 2 and 6 for Variable Initial and Gap Reduction.
- Program phases 2 and 6 for Start Up In Green.
- Program phases 2 and 6 for Yellow Flash..
- If this signal will be managed by an ATMS software, enable controller and detector logging for all enabled detectors.
- The cabinet and controller are part of the Signal System #11324.

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S2P	S3	S4	S4P	S5	S6	S6P	S7	S8	S8P
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED
SIGNAL HEAD NO.	11	21,22	NU	81	41,42	NU	42	51	61,62	NU	81,82	NU
RED		128		*	101				134		107	
YELLOW		129			102				135		108	
GREEN		130			103				136		109	
RED ARROW	125								131			
YELLOW ARROW	126			117			132	132				
GREEN ARROW	127			118			133	133				
Hand icon												
Person icon												

NU = Not Used
* Denotes install load resistor. See load resistor installation detail this sheet.

EQUIPMENT INFORMATION

CONTROLLER.....2070E
CABINET.....McCAIN/CONTROL TECHNOLOGIES (DWG.NO.9500-332-NCDDOT)
SOFTWARE.....ECONOLITE OASIS
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...12
LOAD SWITCHES USED.....S1,S2,S3,S4,S5,S6,S8
PHASES USED.....1,2,3,4,5,6,8
OVERLAPS.....NONE

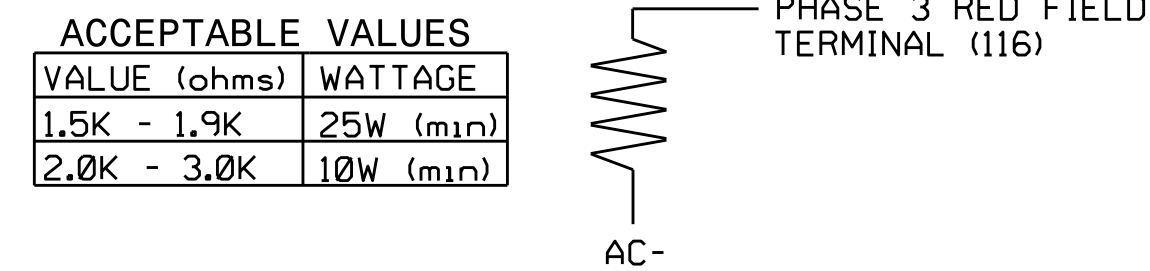
INPUT FILE POSITION LAYOUT

(front view)

FILE	1	2	3	4	5	6	7	8	9	10	11	12	13	14
U	∅ 1 1A	∅ 2 2A	∅ 3 3A	∅ 4 4A	∅ 5 5A	∅ 6 6A	∅ 7 7A	∅ 8 8A	∅ 9 9A	∅ 10 10A	∅ 11 11A	∅ 12 12A	∅ 13 13A	∅ 14 14A
L	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED
U	∅ 1 1A	∅ 2 2A	∅ 3 3A	∅ 4 4A	∅ 5 5A	∅ 6 6A	∅ 7 7A	∅ 8 8A	∅ 9 9A	∅ 10 10A	∅ 11 11A	∅ 12 12A	∅ 13 13A	∅ 14 14A
L	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	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 cord

LOAD RESISTOR INSTALLATION DETAIL



NOTE: The purpose of this resistor is to load the channel red monitor input in order for the Signal Sequence Monitor to use the full signal sequence monitoring capability on channels that do not use the red display in the field.

DYNAMIC BACK-UP CONTROL PROGRAMMING

(program controller as shown below)

- From Main Menu press '2' (Phase Control), then '1' (Phase Control Functions). Scroll to the bottom of the menu and enable Dynamic/Backup Control Function 1.
- From Phase Control Functions Menu press '2' (Dynamic/Backup Control Functions).

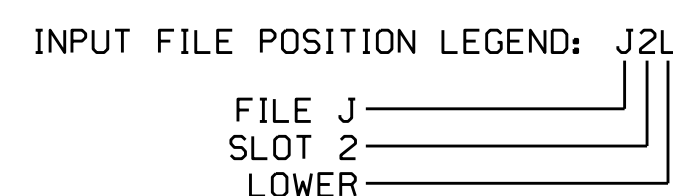
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DYNAMIC/BACKUP CONTROL FUNCTION #01
OVERLAPS: ABCDEFGHIJKLMNPO
IF OVERLAPS ARE ACTIVE:
OR PHASES: 12345678910111213141516
IF PHASES ARE ON: X
OMIT PHASES: X
CALL PHASES: X
```

BACKUP PROTECTION PROGRAMMING COMPLETE

INPUT FILE CONNECTION & PROGRAMMING CHART

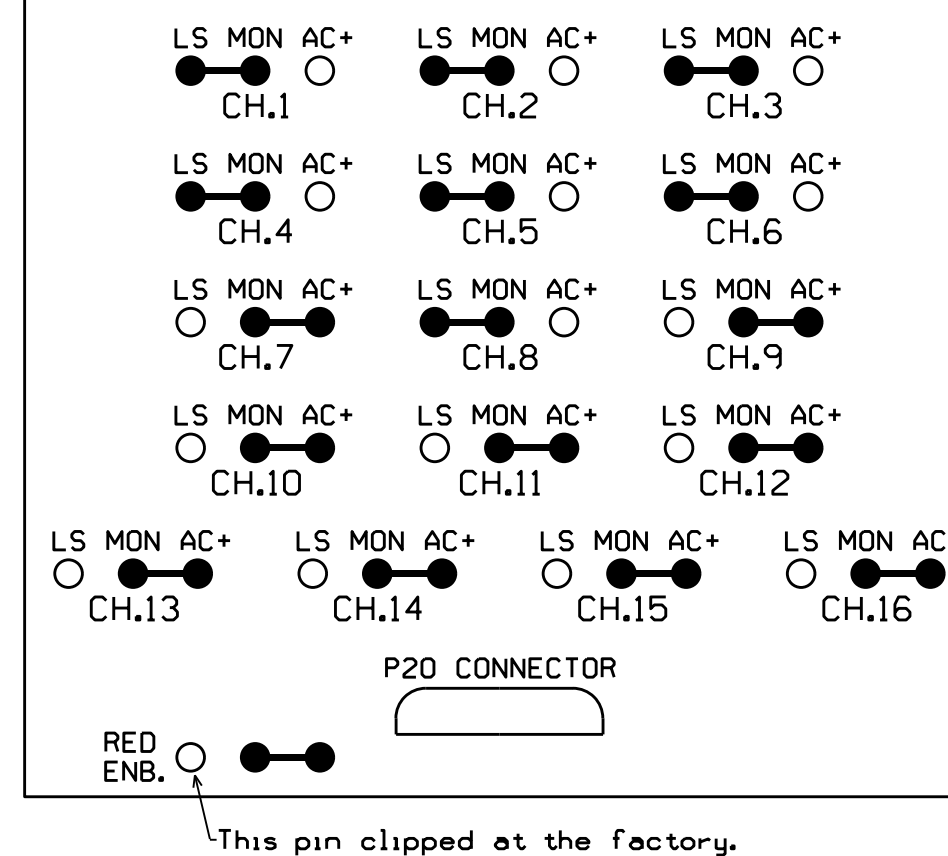
LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
1A	TB2-1,2	I1U	56	18	1	1	Y	Y			3
2A	TB2-5,6	I2U	39	1	2	2	Y	Y			
3A ¹	TB4-5,6	I5U	58	20	3	3	Y	Y			15
	-	J8U	50	12	28	8	Y	Y			3
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			
4B	TB4-11,12	I6L	45	7	14	4	Y	Y			
5A	TB3-5,6	J2U	40	2	6	5	Y	Y			
5B	TB3-7,8	J2L	44	6	16	5	Y	Y			15
6A	TB3-9,10	J3U	64	26	36	6	Y	Y			
8A	TB5-9,10	J6U	42	4	8	8	Y	Y			
8B	TB5-11,12	J6L	46	8	18	8	Y	Y			

¹Add jumper from I5-F to J8-F, on rear of input file.



RED MONITOR BOARD PROGRAMMING

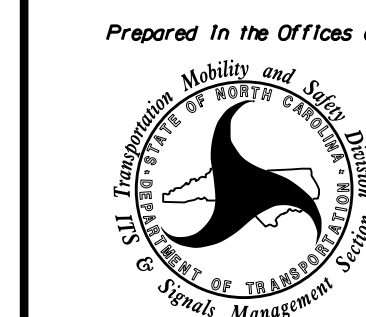
(position jumpers as shown below)



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 13-0184
DESIGNED: January 2020
SEALED: 2/28/2020
REVISED:

Electrical Detail

ELECTRICAL AND PROGRAMMING DETAILS FOR:



750 N. Greenfield Pkwy, Garner, NC 27529

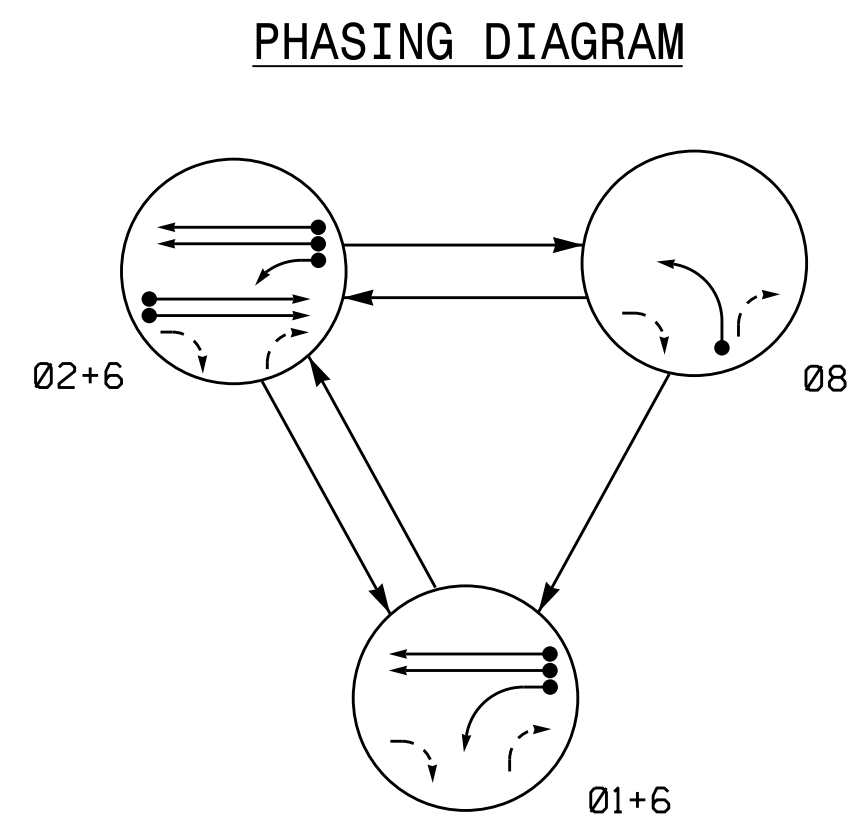
US 74A
at
US 74 Bus / US 221A

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
NORTH CAROLINA
PROFESSIONAL ENGINEER
SEAL 031001
TODD JOYCE

Division 13 Rutherford County Rutherfordton
PLAN DATE: February 2020 REVIEWED BY: T. Joyce
PREPARED BY: C. Strickland REVIEWED BY:
DocuSign
D. Todd Joyce 3/3/2020
APPROVED FOR: DATE
SIG. INVENTORY NO. 13-0184



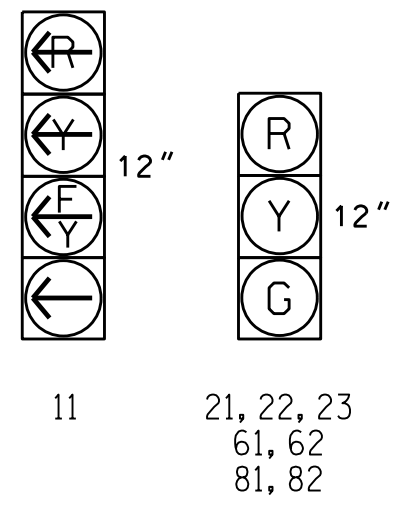
PHASING DIAGRAM DETECTION LEGEND

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

SIGNAL FACE	PHASE			
	01+6	02+6	08	F L EIGHT
11	←	←	←	←
21, 22, 23	R	G	R	Y
61, 62	G	G	R	Y
81, 82	R	R	G	R

SIGNAL FACE I.D.

All Heads L.E.D.

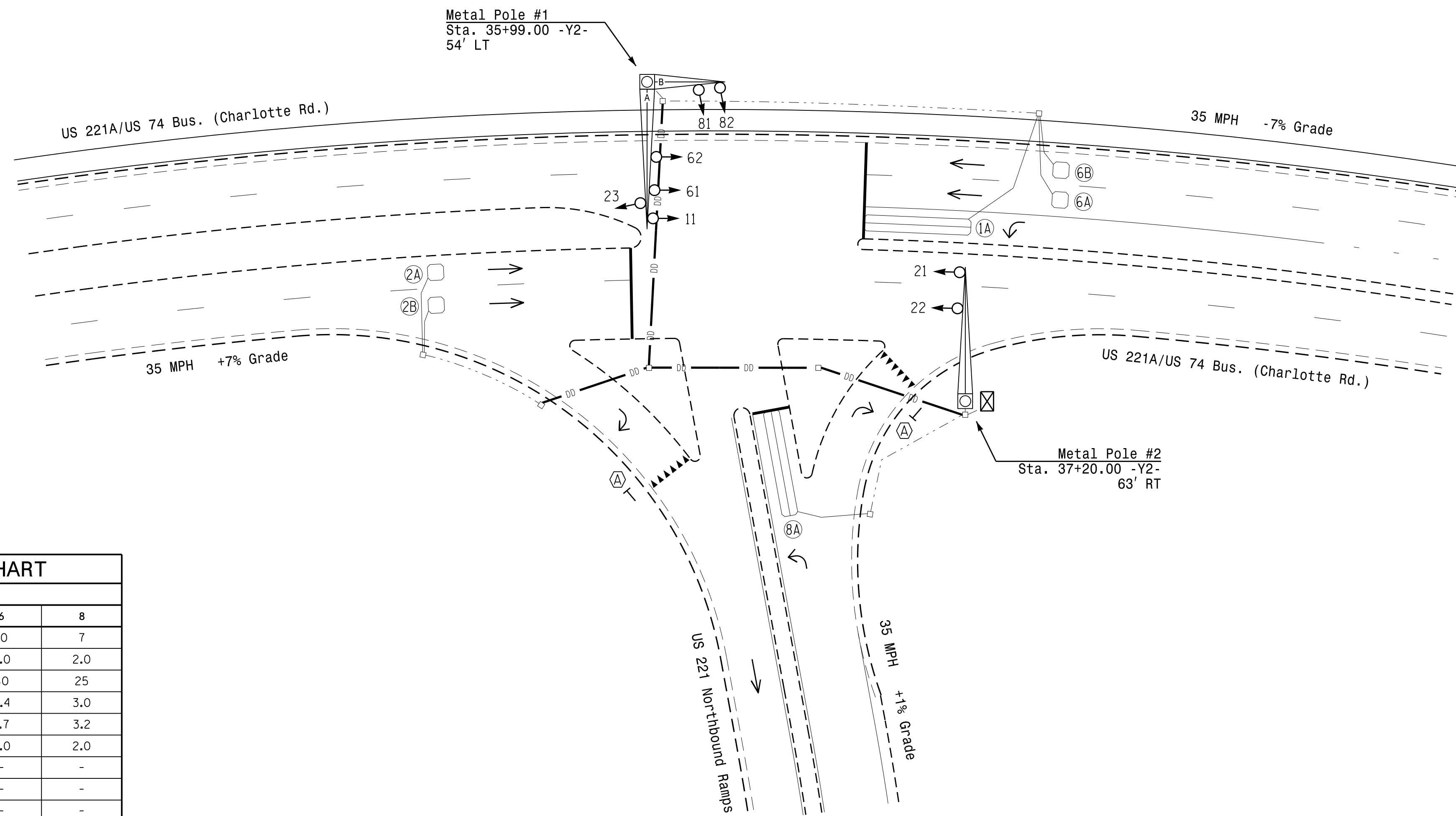


OASIS 2070 LOOP & DETECTOR INSTALLATION CHART												
INDUCTIVE LOOPS					DETECTOR PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
1A	6X40	0	2-4-2	Y	1	Y	Y	-	-	15	-	Y
2A	0	70	4	Y	2	Y	Y	-	-	-	-	Y
2B	0	70	4	Y	2	Y	Y	-	-	-	-	Y
6A	0	70	4	Y	6	Y	Y	-	-	-	-	Y
6B	0	70	4	Y	6	Y	Y	-	-	-	-	Y
8A	6X40	0	2-4-2	Y	8	Y	Y	-	-	3	-	Y

3 Phase Fully Actuated Signal System #11324

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 may be lagged.
4. Set all detector units to presence mode.
5. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
6. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.



LEGEND

- | PROPOSED | EXISTING |
|----------|----------|
| ○ → | ● → |
| ○ → | N/A |
| — | — |
| □ → | □ → |
| ○ → | ○ → |
| □ → | □ → |
| □ | □ |
| □ | □ |
| □ | □ |
| N/A | N/A |
| → | → |
| — | N/A |
| ○ → | ○ → |
| ○ → | ○ → |

OASIS 2070 TIMING CHART				
FEATURE	PHASE			
	1	2	6	8
Min Green 1 *	7	10	10	7
Extension 1 *	2.0	3.0	3.0	2.0
Max Green 1 *	15	60	60	25
Yellow Clearance	3.2	4.4	4.4	3.0
Red Clearance	2.6	1.7	1.7	3.2
Red Revert	2.0	2.0	2.0	2.0
Walk 1 *	-	-	-	-
Don't Walk 1	-	-	-	-
Seconds Per Actuation *	-	-	-	-
Max Variable Initial *	-	-	-	-
Time Before Reduction *	-	-	-	-
Time To Reduce *	-	-	-	-
Minimum Gap	-	-	-	-
Recall Mode	-	MIN RECALL	MIN RECALL	-
Vehicle Call Memory	-	YELLOW	YELLOW	-
Dual Entry	-	-	-	-
Simultaneous Gap	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.

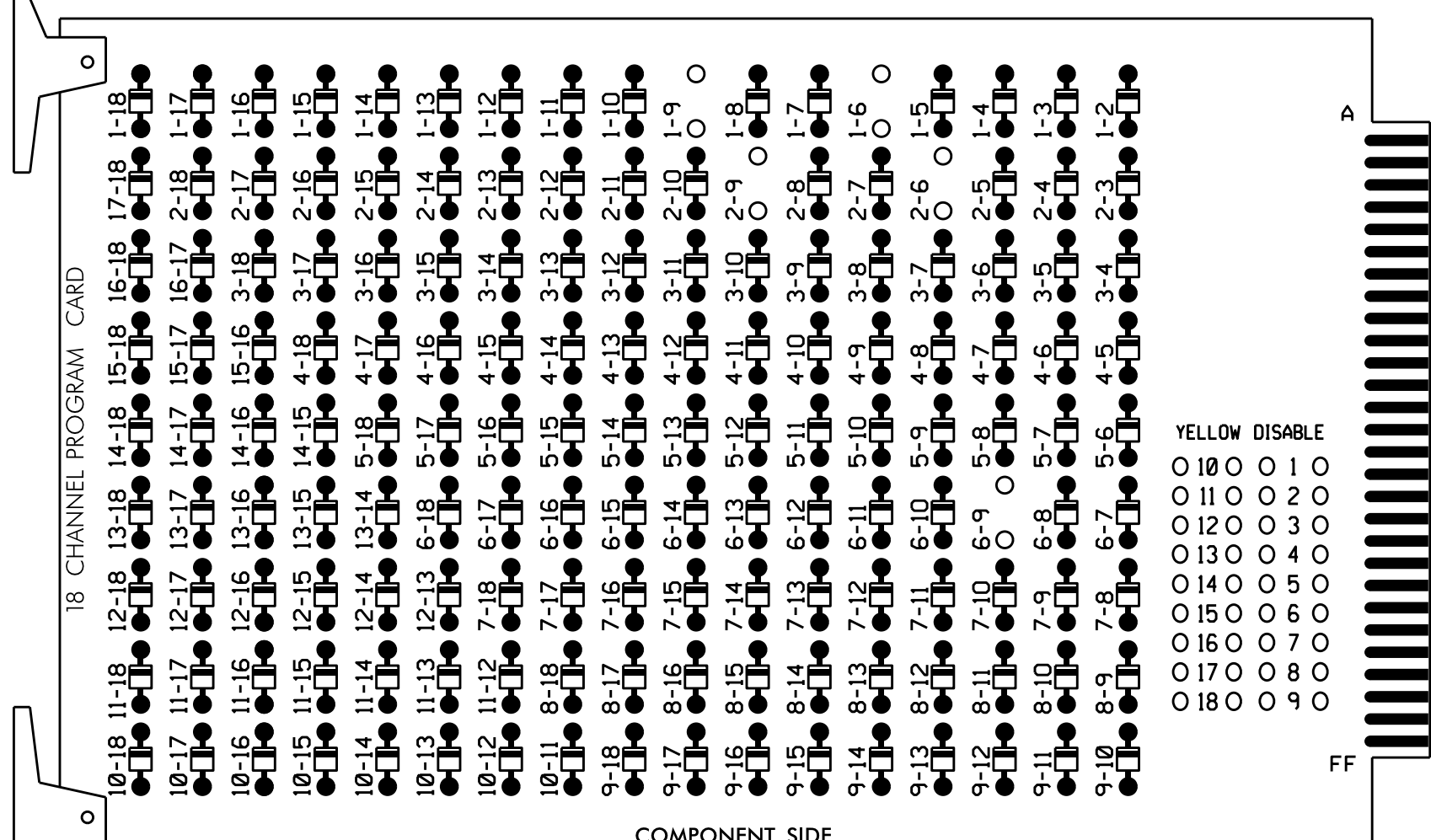
New Installation

	US 221A/US 74 Bus. (Charlotte Rd.) at US 221 Northbound Ramps		
	Division 13 Rutherford County Rutherfordton PLAN DATE: January 2020 REVIEWED BY: T.J. Williams PREPARED BY: R.N. Zinser REVIEWED BY:		
750 N. Greenfield Pkwy, Garner, NC 27529 SCALE: 1" = 30' DATE: 2/28/2020			DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED DATE: 2/28/2020 SIG. INVENTORY NO. 13-1309

**EDI MODEL 2018ECL-NC CONFLICT MONITOR
PROGRAMMING DETAIL**

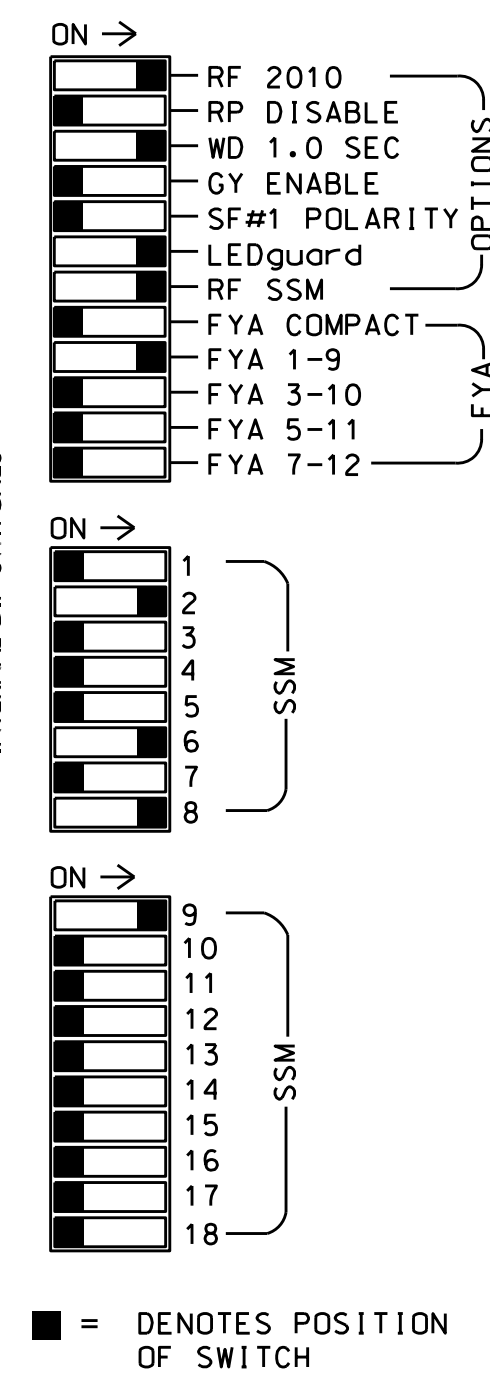
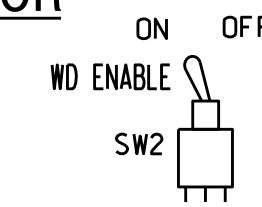
(remove jumpers and set switches as shown)

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



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 Startup In Green.
4. Program phases 2 and 6 for Yellow Flash, and overlap 1 as Wag Overlaps.
5. If this signal will be managed by an ATMS software, enable controller and detector logging for all enabled detectors.
6. The cabinet and controller are part of the Signal System #11324.

EQUIPMENT INFORMATION

CONTROLLER.....2070E
 CABINET.....332 W/ AUX
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
 LOAD SWITCHES USED.....S1,S2,S8,S11,AUX S1
 PHASES USED.....1,2,6,8
 OVERLAP "A".....1+2
 OVERLAP "B".....NOT USED
 OVERLAP "C".....NOT USED
 OVERLAP "D".....NOT USED

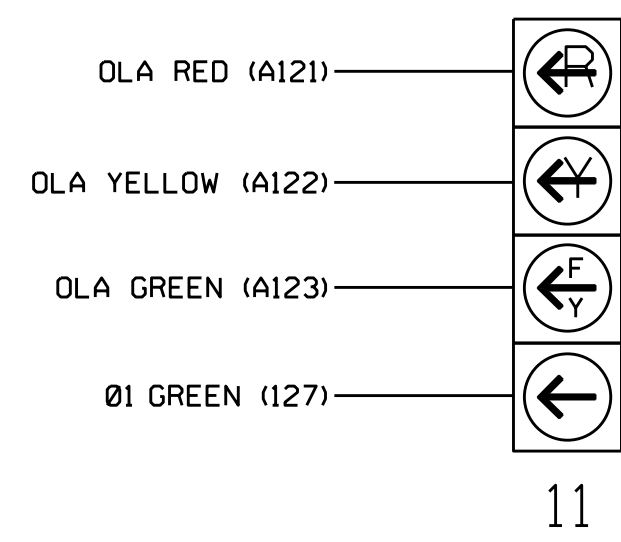
SIGNAL HEAD HOOK-UP CHART

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.	11	21, 22, 23	NU	NU	NU	NU	NU	61, 62	NU	NU	81, 82	NU	11	NU	NU	NU	NU	NU
RED		128						134			107							
YELLOW	*	129						135			108							
GREEN		130						136			109							
RED ARROW													A121					
YELLOW ARROW													A122					
FLASHING YELLOW ARROW													A123					
GREEN ARROW	127																	

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

4 SECTION FYA PPLT SIGNAL WIRING DETAIL

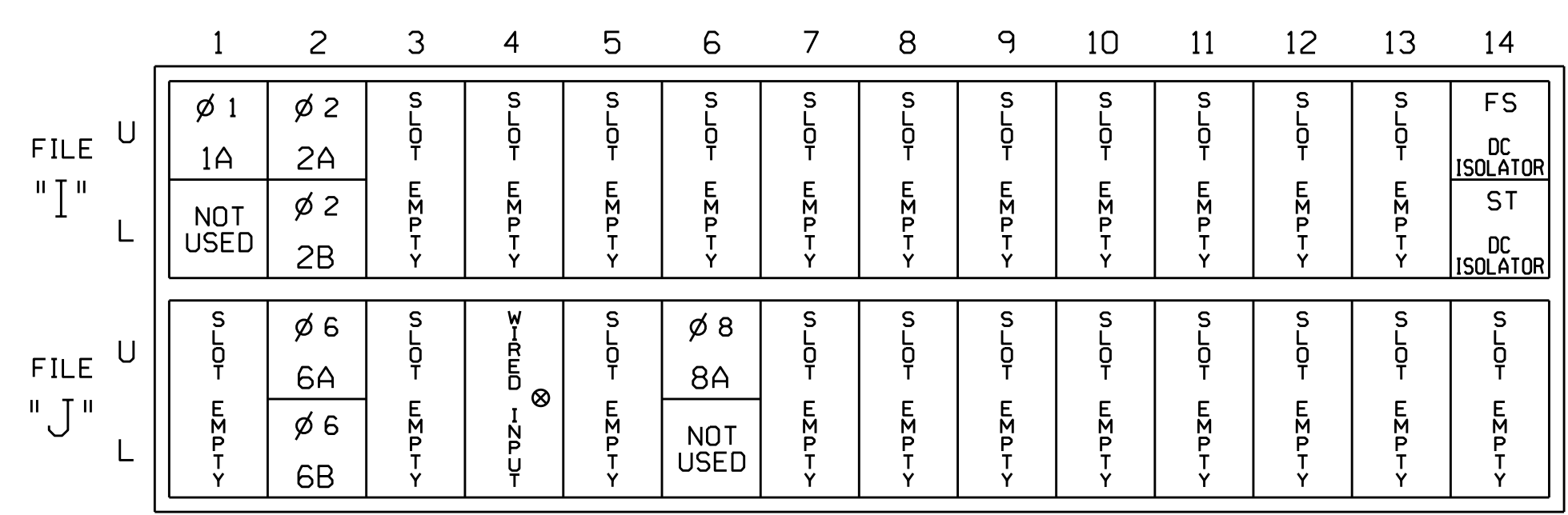
(wire signal head as shown)



NOTE
 1. The sequence display for this signal requires special logic programming. See sheet 2 of 2 for programming instructions.

INPUT FILE POSITION LAYOUT

(front view)



EX.: 1A, 2A, ETC. = LOOP NO.'S
 FS = FLASH SENSE
 ST = STOP TIME

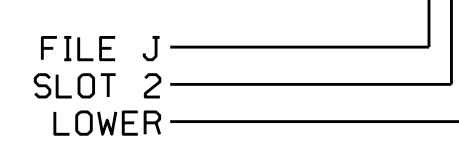
⊗ Wired Input - Do not populate slot with detector card

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
1A ¹	TB2-1,2	I1U	56	18	1	1	Y	Y			15
		J4U	48	10	26	6	Y	Y			
2A	TB2-5,6	I2U	39	1	2	2	Y	Y			
2B	TB2-7,8	I2L	43	5	12	2	Y	Y			
6A	TB3-5,6	J2U	40	2	6	6	Y	Y			
6B	TB3-7,8	J2L	44	6	16	6	Y	Y			
8A	TB5-9,10	J6U	42	4	8	8	Y	Y			3

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

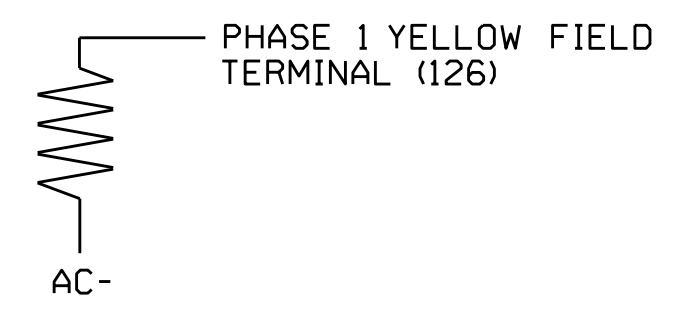
INPUT FILE POSITION LEGEND: J2L



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)



Electrical Detail - Sheet 1 of 2

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 13-1309
 DESIGNED: January 2020
 SEALED: 2/28/2020
 REVISED:

Electrical AND PROGRAMMING DETAILS FOR:

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

US 221A/US 74 Bus.
 (Charlotte Rd.) at
 US 221 Northbound Ramps

Division 13 Rutherford County Rutherfordton
 PLAN DATE: February 2020 REVIEWED BY: T. Joyce
 PREPARED BY: C. Strickland REVIEWED BY:

REVISIONS INIT. DATE

DocuSigned by:
 D. Todd Joyce
 3/3/2020

SEAL
 NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 PROFESSIONAL ENGINEER
 SEAL 031001
 TODD JOYCE

SIG. INVENTORY NO. 13-1309

02-1485-2020_11-159
 C:\MTSAS\13-1309\Signal\work\hgr\hgr\sig\Map\511\ck\lanc#131309_sml_e_xxx.dgn
 C:\MTSAS\13-1309\Signal\work\hgr\hgr\sig\Map\511\ck\lanc#131309_sml_e_xxx.dgn
 C:\MTSAS\13-1309\Signal\work\hgr\hgr\sig\Map\511\ck\lanc#131309_sml_e_xxx.dgn

**LOGICAL I/O PROCESSOR PROGRAMMING DETAIL
TO PRODUCE SPECIAL FYA-PPLT SIGNAL SEQUENCE**

(program controller as shown below)

- FROM MAIN MENU PRESS '2' (PHASE CONTROL), THEN '1' (PHASE CONTROL FUNCTIONS). SCROLL TO THE BOTTOM OF THE MENU AND ENABLE ACT LOGIC COMMANDS 1, 2, AND 3.
- FROM MAIN MENU PRESS '6' (OUTPUTS), THEN '3' (LOGICAL I/O PROCESSOR).

```

LOGICAL I/O COMMAND #1 (+/-COMMAND#)
IF ACTIVE PHASE #1 IS ON
AND RED CLEAR ON PHASE #1 IS ON
    ↓
    SCROLL DOWN
    ↓
THEN:
SET OUTPUT ASSIGNMENT #50 ON
SET OUTPUT ASSIGNMENT #51 OFF
    ↓
    PRESS '+'
  
```

NOTE: LOGIC FOR PHASE 1 RED CLEAR WHEN TRANSITIONING FROM PHASE 1 TO PHASE 2 (HEAD 11).

```

LOGICAL I/O COMMAND #2 (+/-COMMAND#)
IF ACTIVE PHASE #1 IS ON
    ↓
    SCROLL DOWN
    ↓
THEN:
SET OUTPUT ASSIGNMENT #52 OFF
    ↓
    PRESS '+'
  
```

NOTE: LOGIC FOR SWITCHING FLASHING YELLOW ARROW "OFF" DURING PHASE 1 (HEAD 11).

```

LOGICAL I/O COMMAND #3 (+/-COMMAND#)
IF YELLOW ON PHASE #1 IS ON
    ↓
    SCROLL DOWN
    ↓
THEN:
SET OUTPUT ASSIGNMENT #51 ON
  
```

NOTE: LOGIC FOR YELLOW ARROW CLEARANCE FROM PHASE 1 (HEAD 11).

LOGIC I/O PROCESSOR PROGRAMMING COMPLETE

<p>OUTPUT REFERENCE SCHEDULE</p> <p>OUTPUT 50 = Overlap A Red OUTPUT 51 = Overlap A Yellow OUTPUT 52 = Overlap A Green</p>

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: {XX
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?...Y
GREEN EXTENSION (0=255 SEC)...0.0
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
  
```

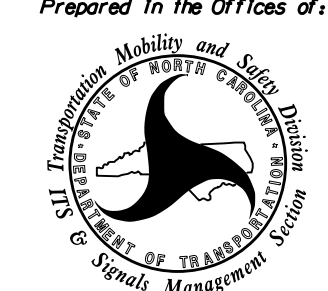
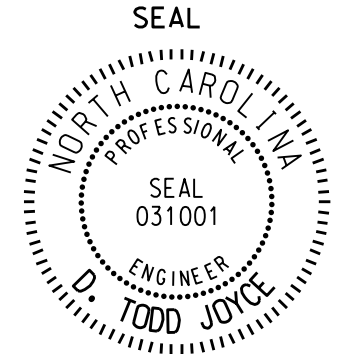
← NOTICE GREEN FLASH

OVERLAP PROGRAMMING COMPLETE

<p>THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 13-1309 DESIGNED: January 2020 SEALED: 2/28/2020 REVISED:</p>

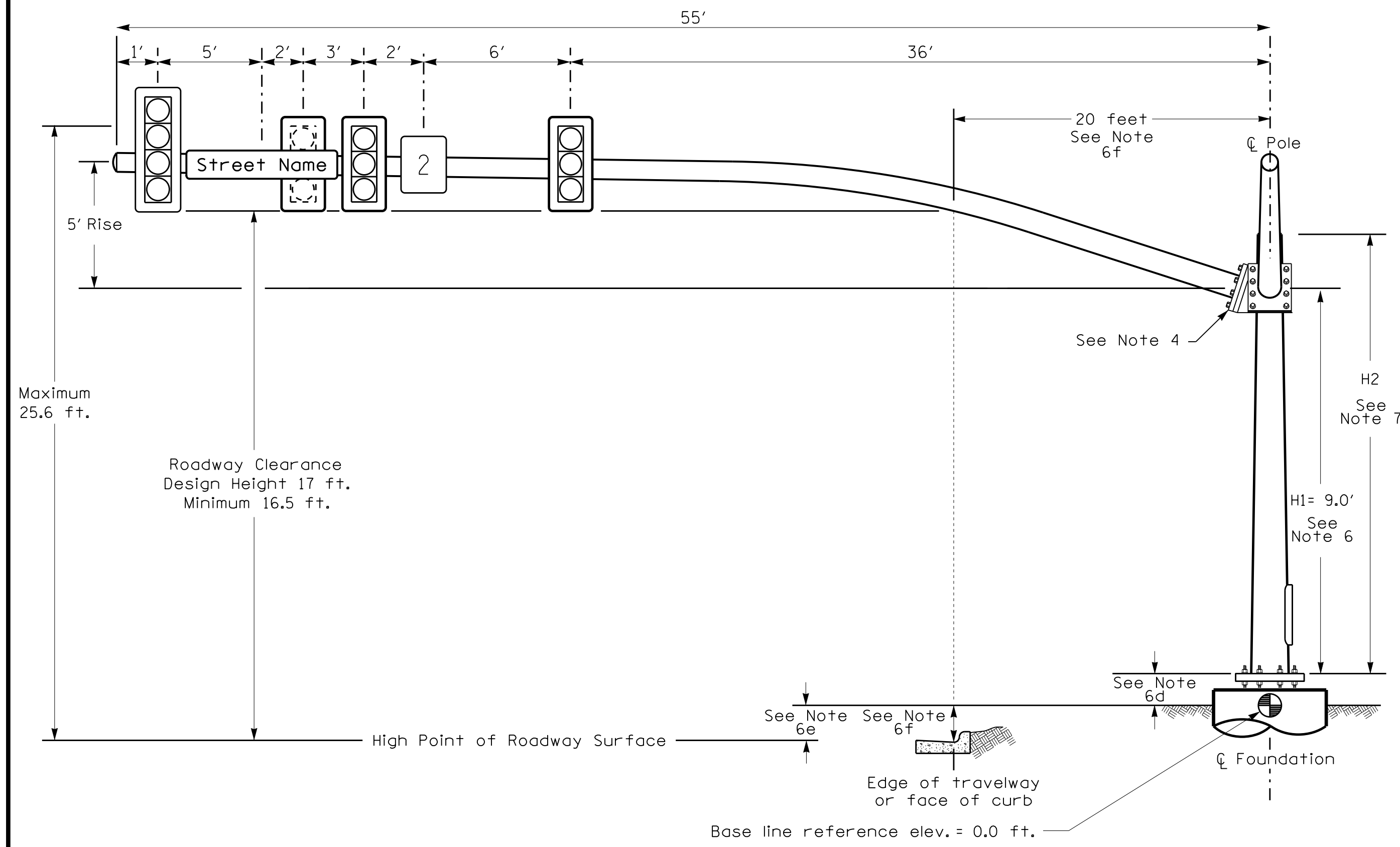
Electrical Detail - Sheet 2 of 2

**DOCUMENT NOT CONSIDERED
FINAL UNLESS ALL
SIGNATURES COMPLETED**

ELECTRICAL AND PROGRAMMING DETAILS FOR: Prepared In the Offices of:  750 N. Greenfield Pkwy, Garner, NC 27529	US 221A/US 74 Bus. (Charlotte Rd.) at US 221 Northbound Ramps	SEAL 						
	Division 13 Rutherford County Rutherfordton PLAN DATE: February 2020 REVIEWED BY: T. Joyce PREPARED BY: C. Strickland REVIEWED BY:	<table border="1"> <tr> <th>REVISIONS</th> <th>INIT.</th> <th>DATE</th> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> </table>	REVISIONS	INIT.	DATE			
REVISIONS	INIT.	DATE						

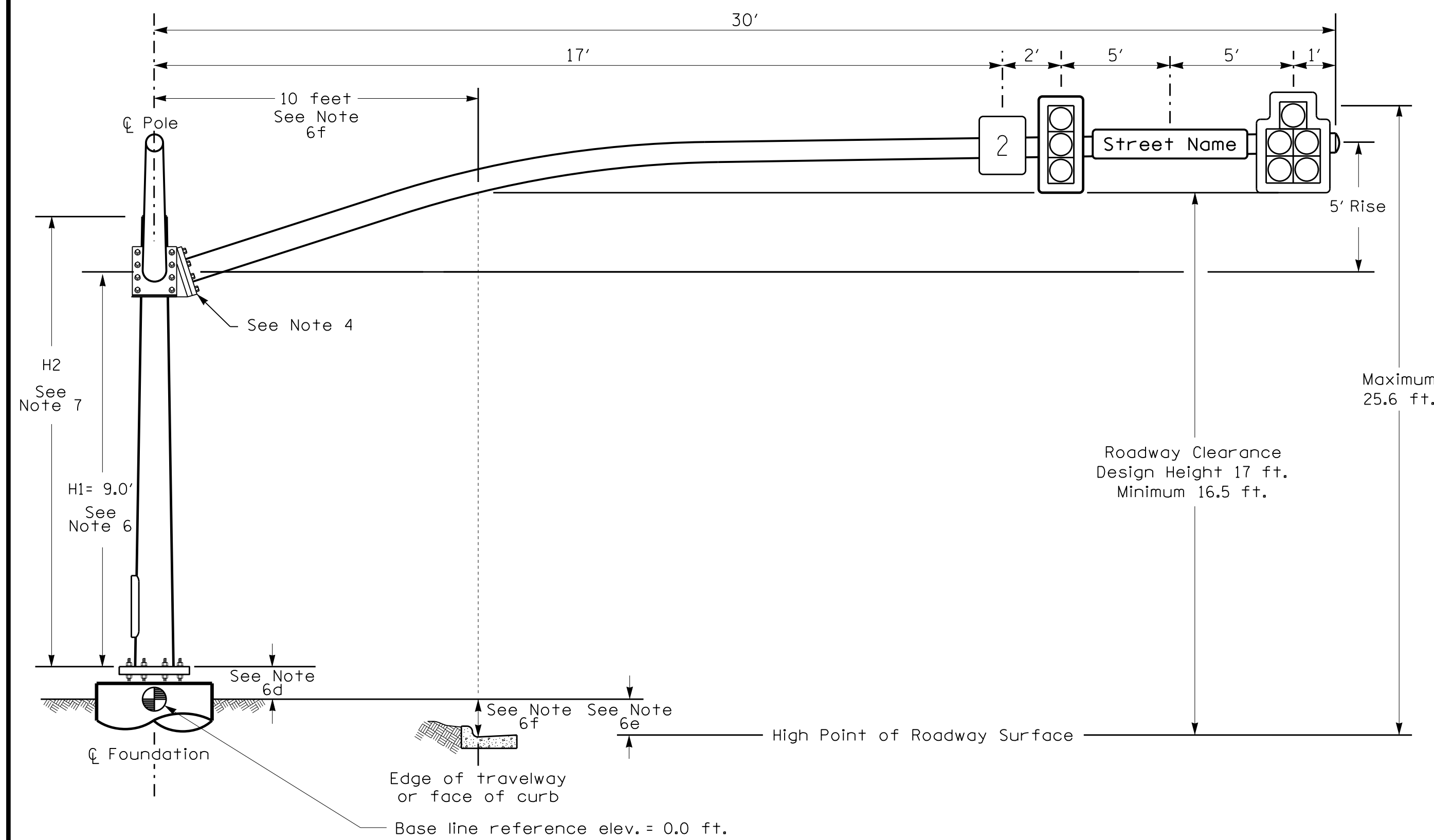
02-1456-2020 12:00
 131309.dwg
 1/28/2020
 C:\Users\cstrickland

Design Loading for METAL POLE NO. 1, MAST ARM A



Elevation View @ 270°

Design Loading for METAL POLE NO. 1, MAST ARM B



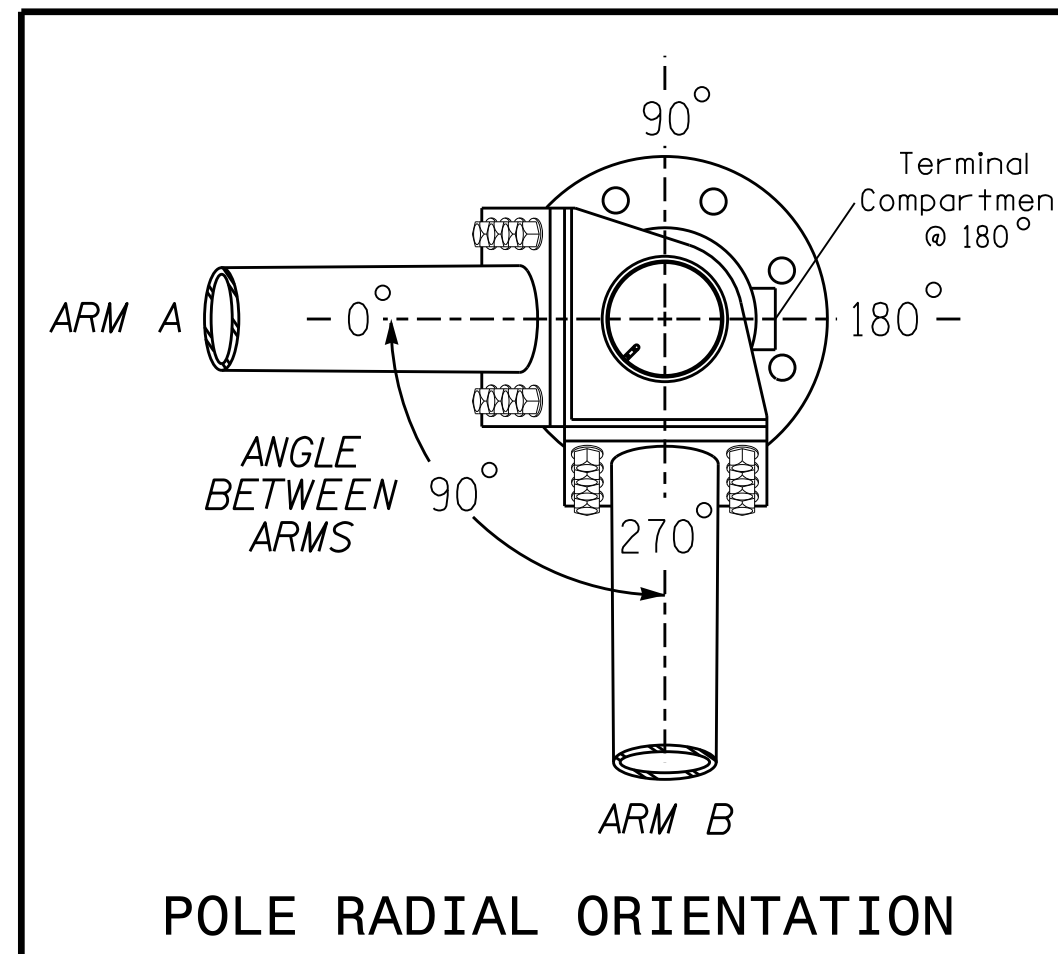
Elevation View @ 0°

SPECIAL NOTE

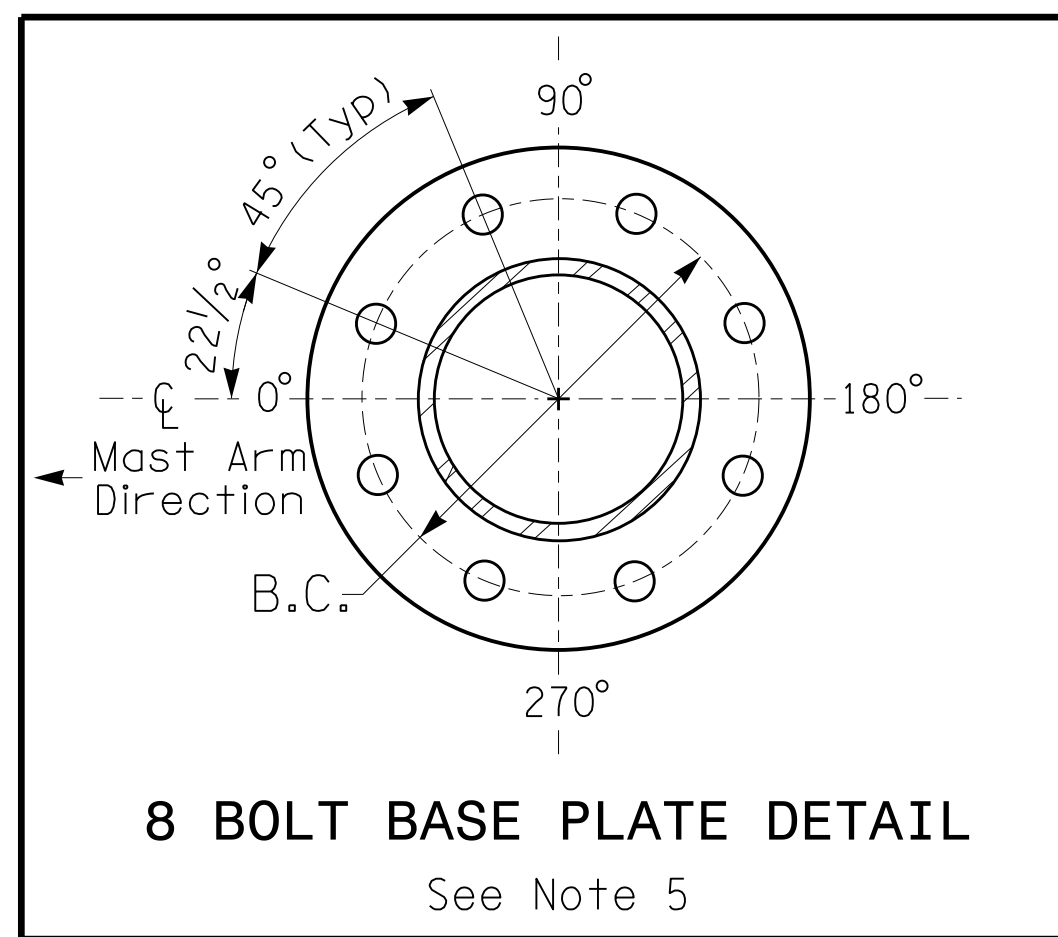
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Arm A	Arm B
Baseline reference point at ϕ Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	-5.62 ft.	N/A
Elevation difference at Edge of travelway or face of curb	-5.12 ft.	N/A

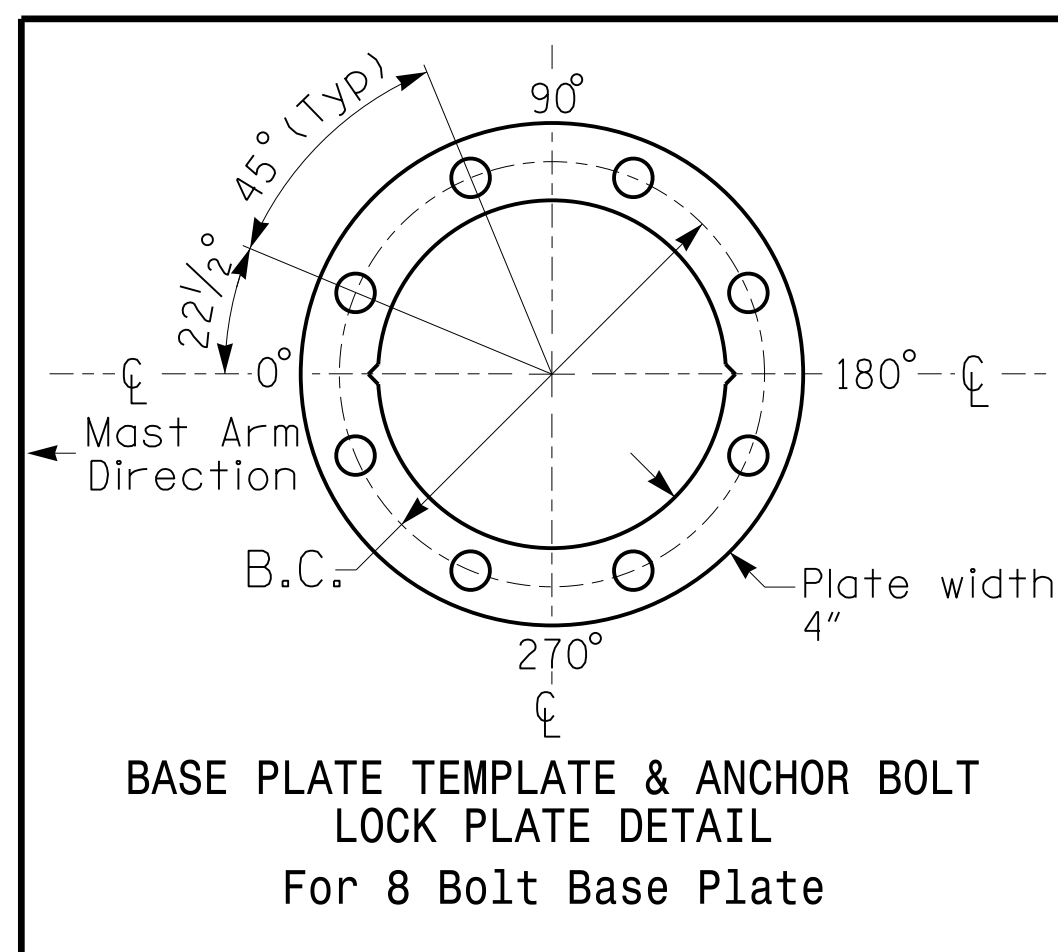


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 5



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

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
[Symbol]	RIGID MOUNTED SIGNAL HEAD 12"-4 SECTION-WITH BACKPLATE	11.5 S.F.	25.5" W X 66.0" L	74 LBS
[Symbol]	RIGID MOUNTED SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE	9.3 S.F.	25.5" W X 52.5" L	60 LBS
[Symbol]	RIGID MOUNTED SIGNAL HEAD 12"-5 SECTION-WITH BACKPLATE	16.3 S.F.	42.0" W X 56.0" L	103 LBS
[Symbol]	STREET NAME SIGN RIGID MOUNTED	16.0 S.F.	24.0" W X 96.0" L	36 LBS
[Symbol]	SIGN RIGID MOUNTED	7.5 S.F.	30.0" W X 36.0" L	14 LBS

NOTES

DESIGN REFERENCE MATERIAL

- 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

- 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.
- Design all signal supports using stress ratios that do not exceed 0.9.
- A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements. This requires staggering the connections. Use elevation data for each arm to determine appropriate connection points.
- Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
- The mast arm attachment height (H1) shown is based on the following design assumptions:
 - Nominal vertical rise in mast arm is 5 feet as measured from the centerline of the arm base to the centerline of the free end of the arm.
 - Signal heads are rigidly mounted and vertically centered on the mast arm.
 - The roadway clearance height for design is as shown in the elevation views.
 - The top of the pole base plate is 0.75 feet above the ground elevation.
 - Refer to the Elevation Data Chart for the elevation differences between the proposed foundation ground level and the high point of the roadway.
 - Provide horizontal distance from the proposed centerline of the foundation to the edge of travelway. Refer to the Elevation Data Chart for elevation difference between the proposed foundation ground level and the edge of travelway. This information is necessary to ensure that the roadway clearance is maintained at the edge of the travelway and to aid in the camber design of the arm.
- The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
 - Mast arm attachment height (H1) plus 2 feet, or
 - H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
- If 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.
- The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
- The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

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

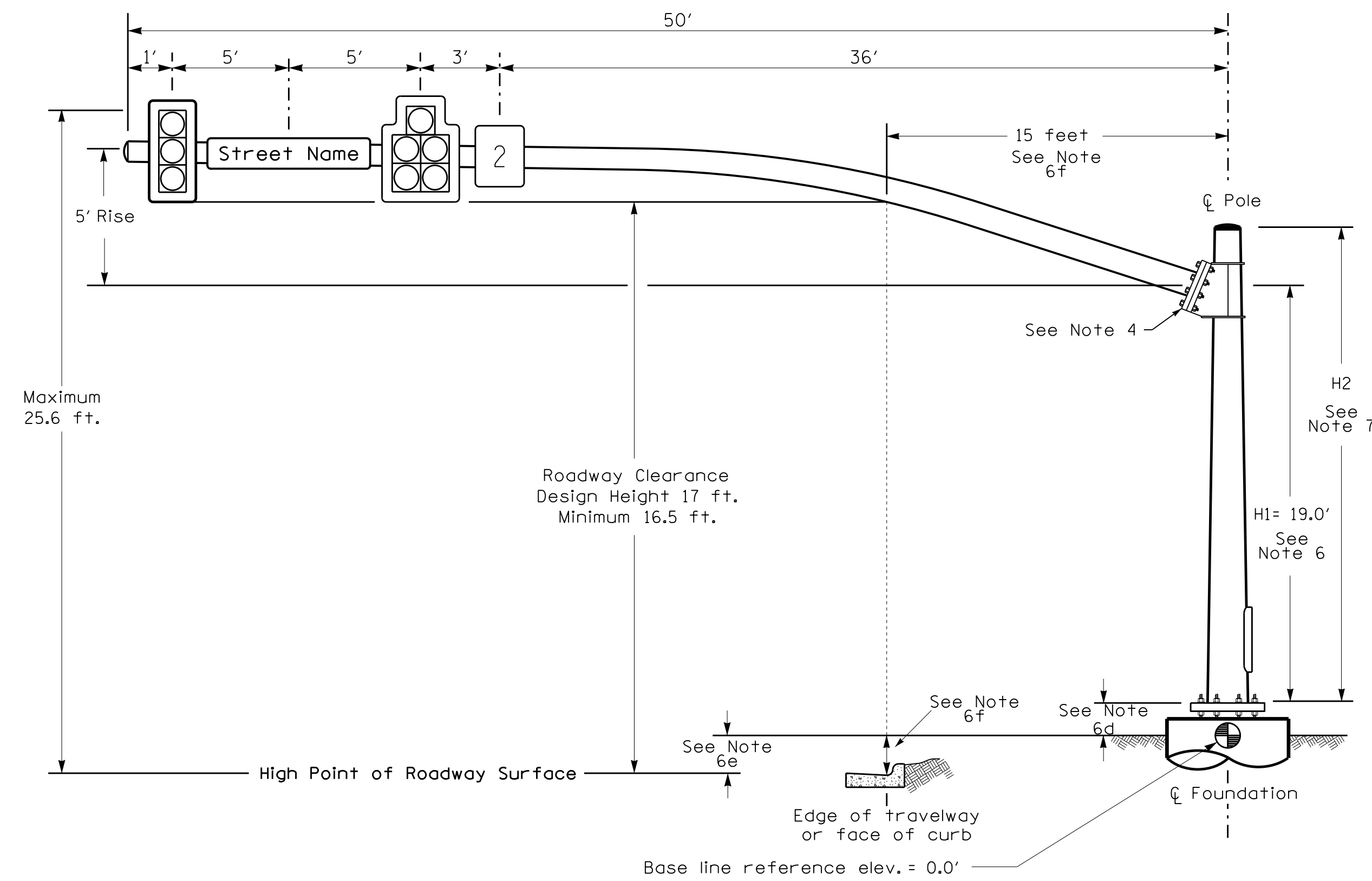
NCDOT Wind Zone 4 (90 mph)

	<p>US 221A/US 74 Bus. (Charlotte Rd.) at US 221 Northbound Ramps</p>		
	<p>Division 13 Rutherford County Rutherfordton</p>	<p>PLAN DATE: January 2020 REVIEWED BY: T.J. Williams</p>	
<p>SCALE: 0 N/A N/A</p>	<p>REVISIONS:</p>	<p>INIT. DATE</p>	<p>DocuSigned by: R. N. Zinser 2/28/2020</p>

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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 R.N.Zinser

Design Loading for METAL POLE NO. 2

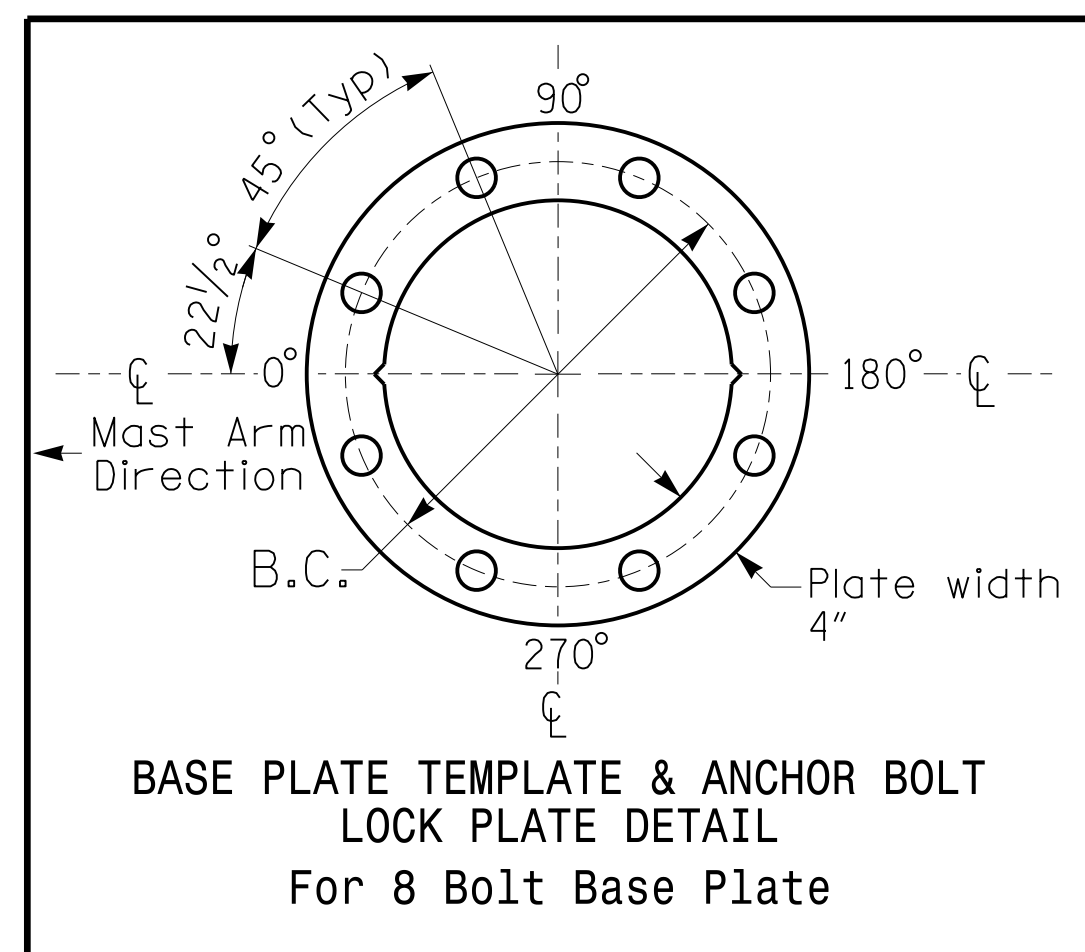
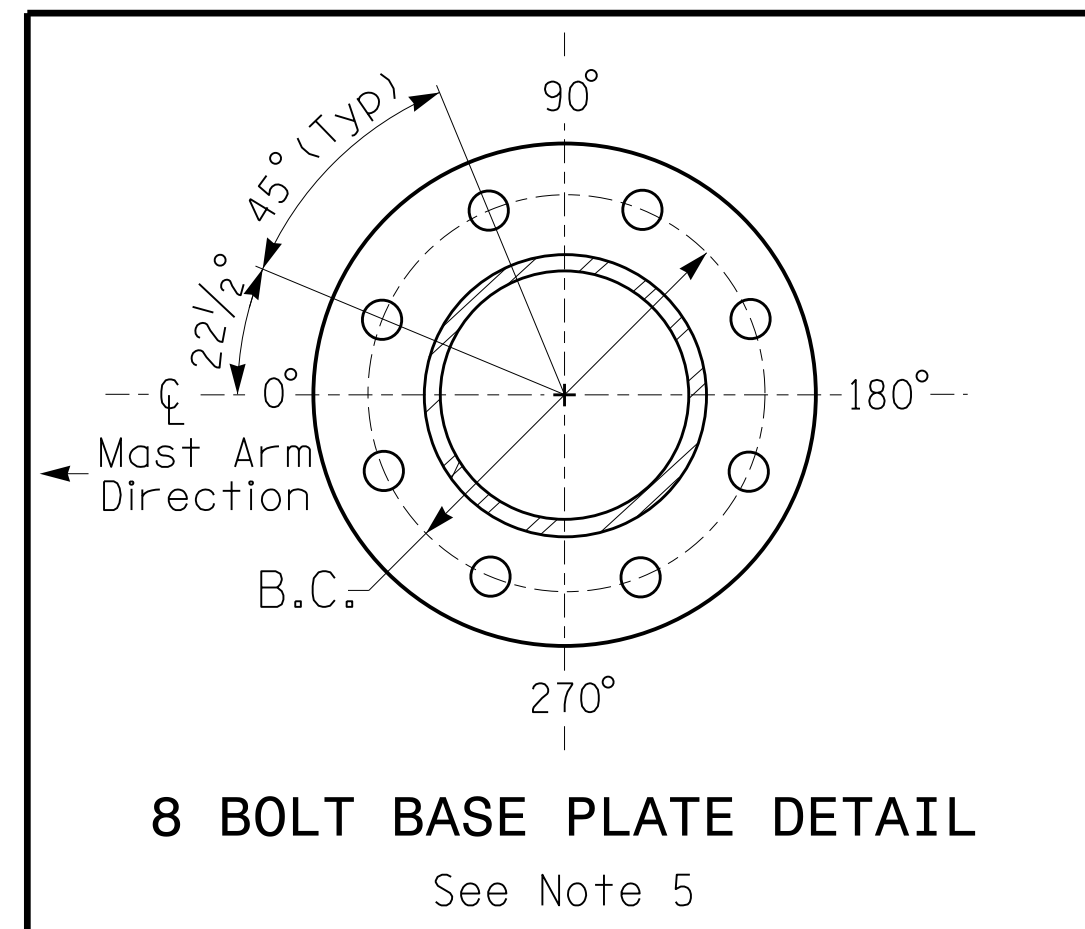
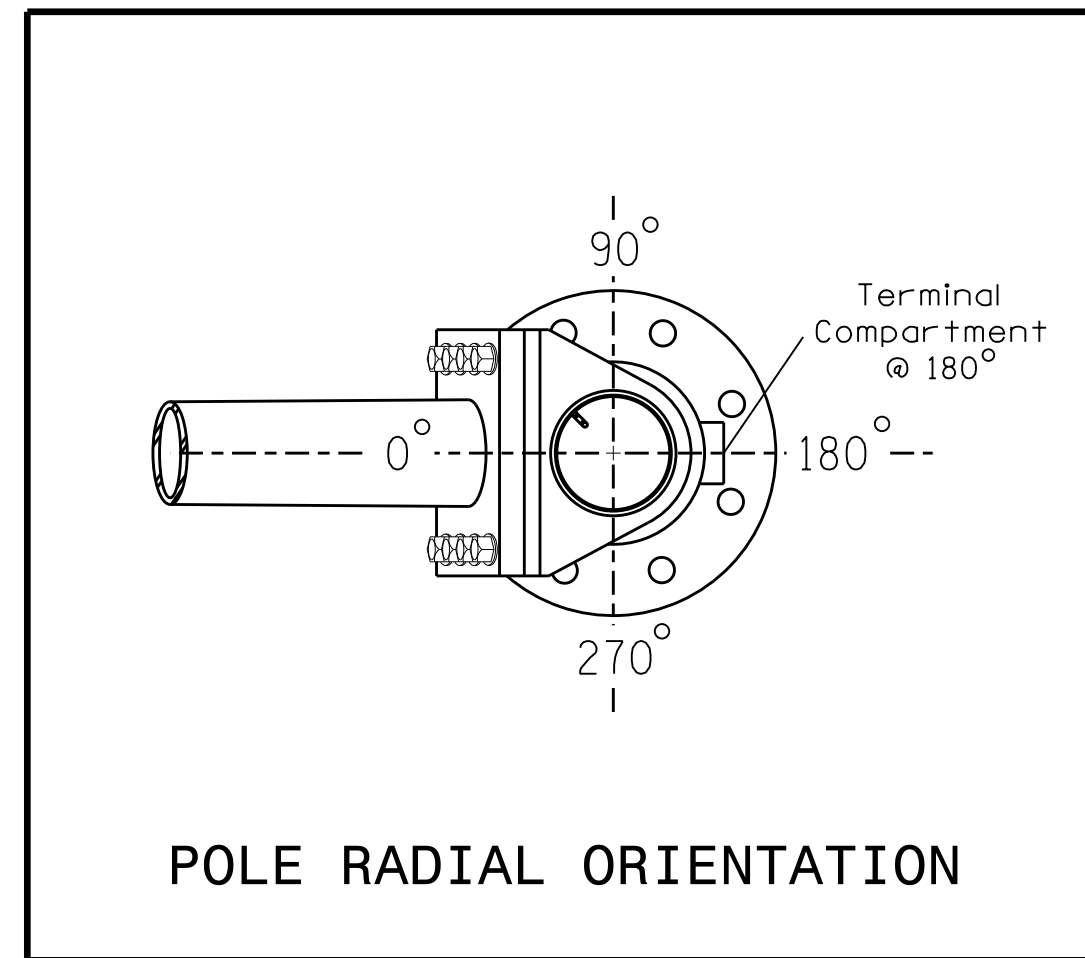


Elevation View

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 \odot Foundation @ ground level	0.0 ft.	
Elevation difference at High point of roadway surface	+4.74 ft.	
Elevation difference at Edge of travelway or face of curb	+1.99 ft.	



MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	RIGID MOUNTED SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE	9.3 S.F.	25.5" W X 52.5" L	60 LBS
	RIGID MOUNTED SIGNAL HEAD 12"-5 SECTION-WITH BACKPLATE	16.3 S.F.	42.0" W X 56.0" L	103 LBS
	STREET NAME SIGN RIGID MOUNTED	16.0 S.F.	24.0" W X 96.0" L	36 LBS
	SIGN RIGID MOUNTED	7.5 S.F.	30.0" W X 36.0" L	14 LBS

NOTES

DESIGN REFERENCE MATERIAL

- 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

- 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.
- Design all signal supports using stress ratios that do not exceed 0.9.
- 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.
- Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
- The mast arm attachment height (H1) shown is based on the following design assumptions:
 - Nominal vertical rise in mast arm is 5 feet as measured from the centerline of the arm base to the centerline of the free end of the arm.
 - Signal heads are rigidly mounted and vertically centered on the mast arm.
 - The roadway clearance height for design is as shown in the elevation views.
 - The top of the pole base plate is 0.75 feet above the ground elevation.
 - Refer to the Elevation Data Chart for the elevation differences between the proposed foundation ground level and the high point of the roadway.
 - Provide horizontal distance from the proposed centerline of the foundation to the edge of travelway. Refer to the Elevation Data Chart for elevation difference between the proposed foundation ground level and the edge of travelway. This information is necessary to ensure that the roadway clearance is maintained at the edge of the travelway and to aid in the camber design of the arm.
- The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
 - Mast arm attachment height (H1) plus 2 feet, or
 - H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
- If 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.
- The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
- The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

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

NCDOT Wind Zone 4 (90 mph)

	US 221A/US 74 Bus. (Charlotte Rd.) at US 221 Northbound Ramps		
	Division 13 Rutherford County Rutherfordton	PLAN DATE: January 2020 REVIEWED BY: T.J. Williams	
PREPARED BY: R.N. Zinser	REVISIONS	REVIEWED BY:	DATE
SCALE: 0 N/A	REVISIONS	INIT.	DATE
N/A	REVISIONS	INIT.	DATE

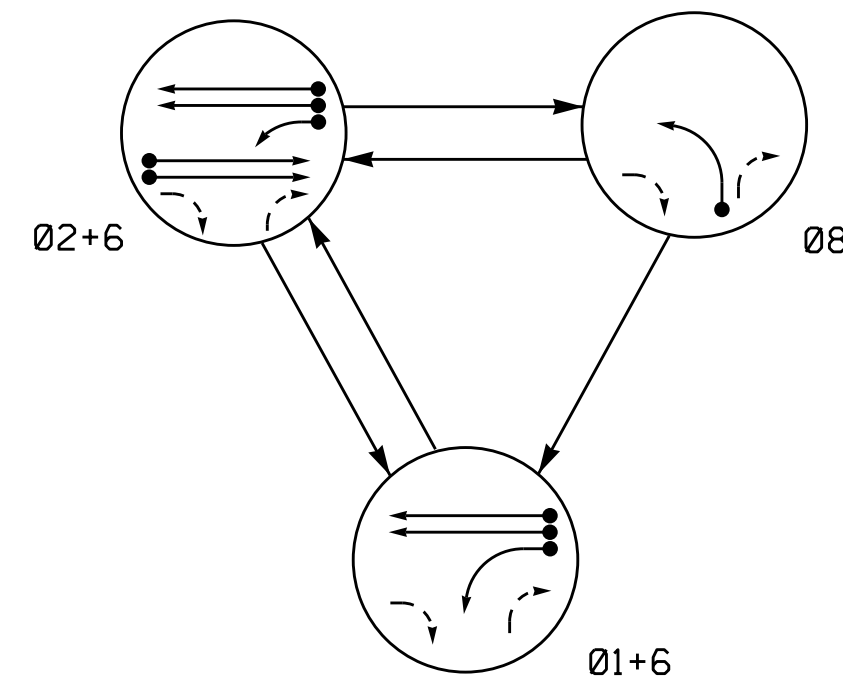
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Seal: R. N. Zinser, Professional Engineer, No. 043914, State of North Carolina

2/28/2020

SIG. INVENTORY NO. 13-1309

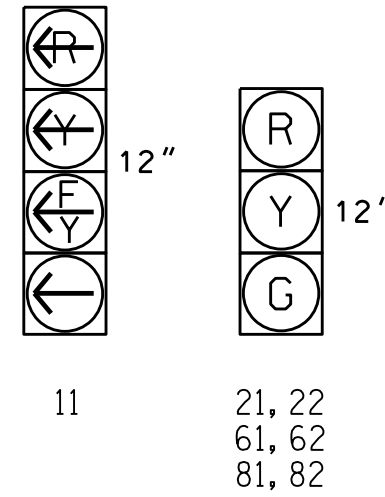
PHASING DIAGRAM



SIGNAL FACE	PHASE			
	Ø 1 + 6	Ø 2 + 6	Ø 8	F L EIGHT
11	←	←	←	←
21, 22	R	G	R	Y
61, 62	G	G	R	Y
81, 82	R	R	G	R

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	2-4-2	Y	1	Y	Y	-	-	15	-	Y
2A	0	70	4	Y	2	Y	Y	-	-	-	-	Y
2B	0	70	4	Y	2	Y	Y	-	-	-	-	Y
6A	0	70	4	Y	6	Y	Y	-	-	-	-	Y
6B	0	70	4	Y	6	Y	Y	-	-	-	-	Y
8A	6X40	0	2-4-2	Y	8	Y	Y	-	-	3	-	Y

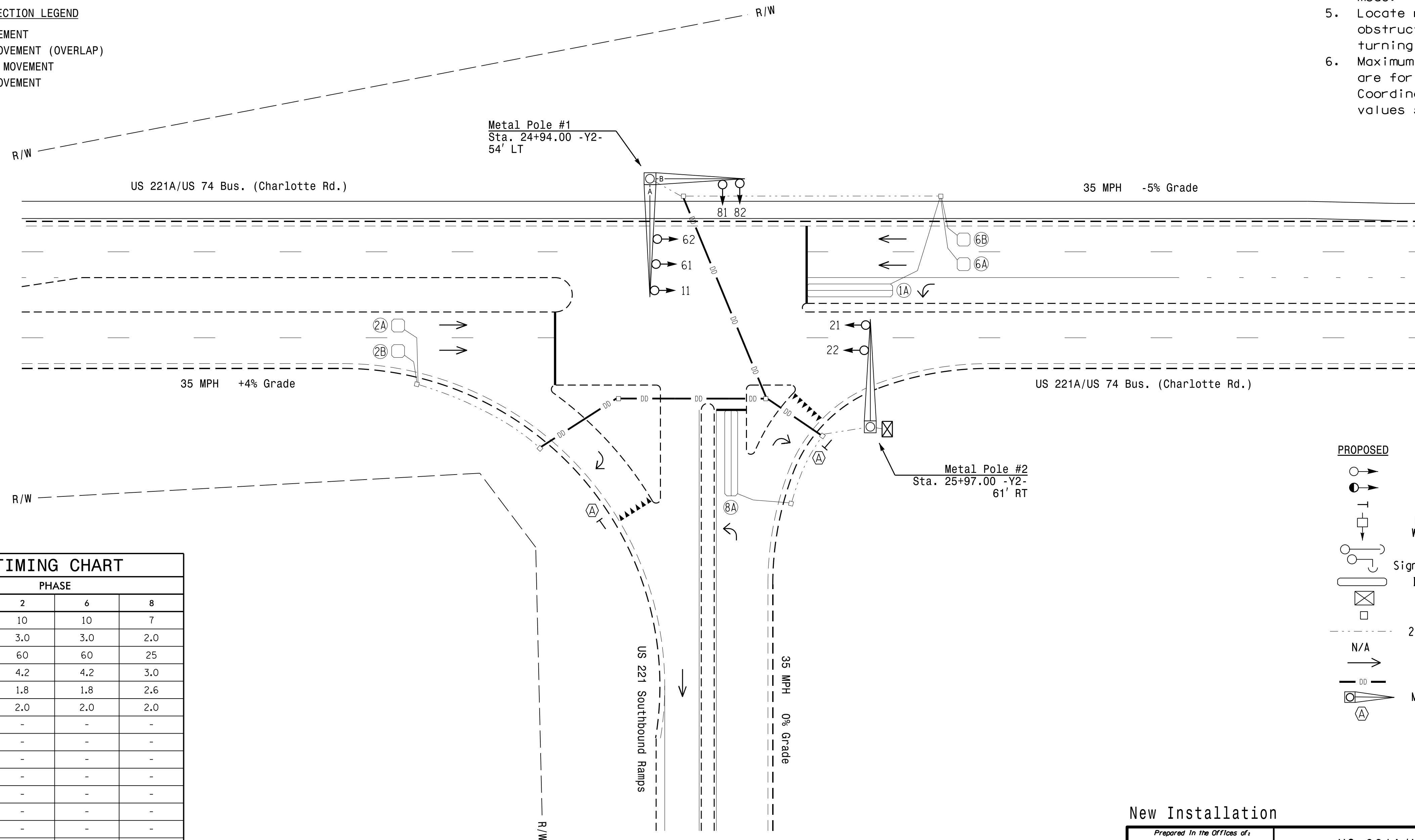
3 Phase Fully Actuated Signal System #11324

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Phase 1 may be lagged.
- Set all detector units to presence mode.
- Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
- 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



OASIS 2070 TIMING CHART				
FEATURE	PHASE			
	1	2	6	8
Min Green 1 *	7	10	10	7
Extension 1 *	2.0	3.0	3.0	2.0
Max Green 1 *	15	60	60	25
Yellow Clearance	3.1	4.2	4.2	3.0
Red Clearance	2.6	1.8	1.8	2.6
Red Revert	2.0	2.0	2.0	2.0
Walk 1 *	-	-	-	-
Don't Walk 1	-	-	-	-
Seconds Per Actuation *	-	-	-	-
Max Variable Initial *	-	-	-	-
Time Before Reduction *	-	-	-	-
Time To Reduce *	-	-	-	-
Minimum Gap	-	-	-	-
Recall Mode	-	MIN RECALL	MIN RECALL	-
Vehicle Call Memory	-	YELLOW	YELLOW	-
Dual Entry	-	-	-	-
Simultaneous Gap	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.

PROPOSED	LEGEND	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	→
→	Directional Drill	N/A
⊥	Metal Pole with Mastarm	⊥
⊥	"YIELD" Sign (R1-2)	⊥

New Installation

Prepared in the Offices of:

750 N. Greenfield Pkwy, Garner, NC 27529

US 221A/US 74 Bus. (Charlotte Rd.) at US 221 Southbound Ramps

Division 13 Rutherford County Rutherfordton

PLAN DATE: January 2020 REVIEWED BY: T.J. Williams

PREPARED BY: R.N. Zinser REVIEWED BY:

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL

SEAL

043914

ENGINEER

RICHARD N. ZINSER

2/28/2020

DATE

SIG. INVENTORY NO. 13-1310

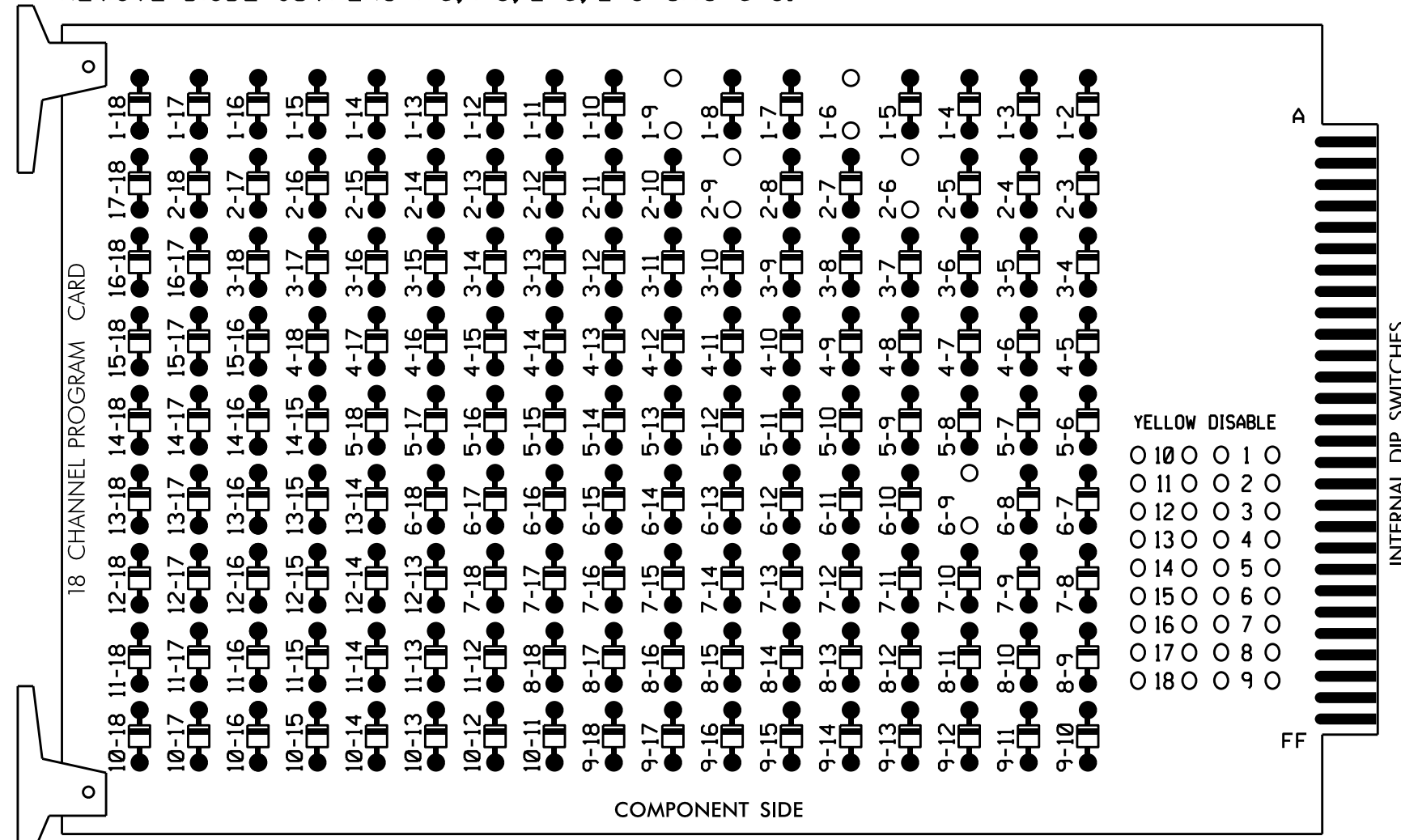
REVISIONS	INIT.	DATE

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**EDI MODEL 2018ECL-NC CONFLICT MONITOR
PROGRAMMING DETAIL**

(remove jumpers and set switches as shown)

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



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 Startup In Green.
4. Program phases 2 and 6 for Yellow Flash, and overlap 1 as Wag Overlaps.
5. If this signal will be managed by an ATMS software, enable controller and detector logging for all enabled detectors.
6. The cabinet and controller are part of the Signal System #11324.

EQUIPMENT INFORMATION

CONTROLLER.....2070E
 CABINET.....332 W/ AUX
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
 LOAD SWITCHES USED.....S1,S2,S8,S11,AUX S1
 PHASES USED.....1,2,6,8
 OVERLAP "A".....1+2
 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.	11	21,22	NU	NU	NU	NU	NU	61,62	NU	NU	81,82	NU	11	NU	NU	NU	NU	NU
RED		128						134			107							
YELLOW	*	129						135			108							
GREEN		130						136			109							
RED ARROW													A121					
YELLOW ARROW													A122					
FLASHING YELLOW ARROW													A123					
GREEN ARROW	127																	

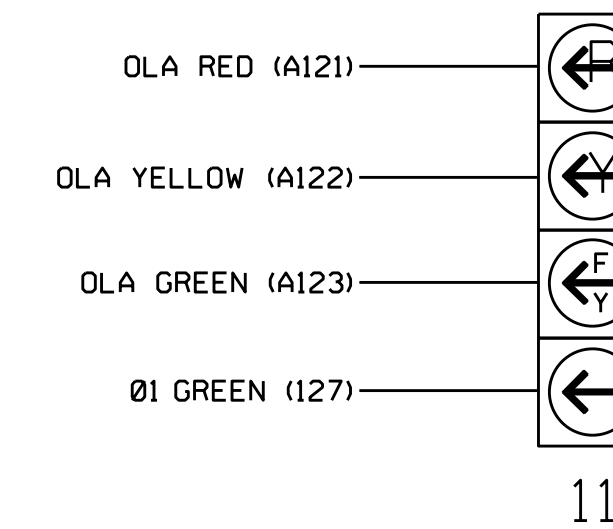
NU = Not Used

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

★ See pictorial of head wiring in detail this sheet.

4 SECTION FYA PPLT SIGNAL WIRING DETAIL

(wire signal head as shown)



NOTE

1. The sequence display for this signal requires special logic programming. See sheet 2 of 2 for programming instructions.

INPUT FILE POSITION LAYOUT

(front view)

FILE	1	2	3	4	5	6	7	8	9	10	11	12	13	14
U	∅ 1	∅ 2	∅ 3	∅ 4	∅ 5	∅ 6	∅ 7	∅ 8	∅ 9	∅ 10	∅ 11	∅ 12	∅ 13	∅ 14
L	NOT USED	∅ 2	∅ 3	∅ 4	∅ 5	∅ 6	∅ 7	∅ 8	∅ 9	∅ 10	∅ 11	∅ 12	∅ 13	∅ 14
U	∅ 1	∅ 2	∅ 3	∅ 4	∅ 5	∅ 6	∅ 7	∅ 8	∅ 9	∅ 10	∅ 11	∅ 12	∅ 13	∅ 14
L	∅ 1	∅ 2	∅ 3	∅ 4	∅ 5	∅ 6	∅ 7	∅ 8	∅ 9	∅ 10	∅ 11	∅ 12	∅ 13	∅ 14

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

FS = FLASH SENSE
 ST = STOP TIME

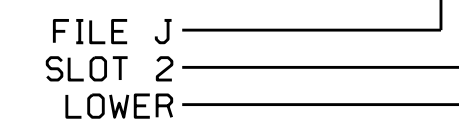
⊗ Wired Input - Do not populate slot with detector card

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
1A ¹	TB2-1,2	I1U	56	18	1	1	Y	Y			15
2A	TB2-5,6	I2U	39	1	2	2	Y	Y			
2B	TB2-7,8	I2L	43	5	12	2	Y	Y			
6A	TB3-5,6	J2U	40	2	6	6	Y	Y			
6B	TB3-7,8	J2L	44	6	16	6	Y	Y			
8A	TB5-9,10	J6U	42	4	8	8	Y	Y			3

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

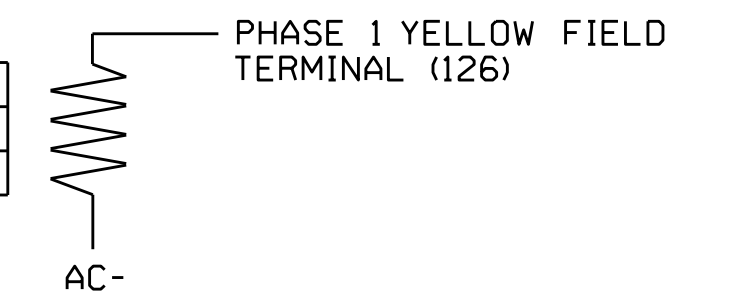
INPUT FILE POSITION LEGEND: J2L



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)



Electrical Detail - Sheet 1 of 2

Prepared In the Offices of:

 750 N. Greenfield Pkwy, Garner, NC 27529

US 221A/US 74 Bus.
 (Charlotte Rd.) at
 US 221 Southbound Ramps

Division 13 Rutherford County Rutherfordton
 PLAN DATE: February 2020 REVIEWED BY: T. Joyce
 PREPARED BY: C. Strickland REVIEWED BY:

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL

 D. Todd Joyce
 3/3/2020
 DATE

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 13-1310
 DESIGNED: January 2020
 SEALED: 2/28/2020
 REVISED:

02-0486-2020 11-152
 C:\MITSAS\1151\SIGNAL\work\hgr\oups\51g_Maps\5111\ck\lanc#131310_sml.e...xxe.dgn
 C:\MITSAS\1151\SIGNAL\work\hgr\oups\51g_Maps\5111\ck\lanc#131310_sml.e...xxe.dgn

**LOGICAL I/O PROCESSOR PROGRAMMING DETAIL
TO PRODUCE SPECIAL FYA-PPLT SIGNAL SEQUENCE**

(program controller as shown below)

- FROM MAIN MENU PRESS '2' (PHASE CONTROL), THEN '1' (PHASE CONTROL FUNCTIONS). SCROLL TO THE BOTTOM OF THE MENU AND ENABLE ACT LOGIC COMMANDS 1, 2, AND 3.
- FROM MAIN MENU PRESS '6' (OUTPUTS), THEN '3' (LOGICAL I/O PROCESSOR).

```

LOGICAL I/O COMMAND #1 (+/-COMMAND#)
IF ACTIVE PHASE #1 IS ON
AND RED CLEAR ON PHASE #1 IS ON
    ↓
    SCROLL DOWN
    ↓
    THEN:
    SET OUTPUT ASSIGNMENT #50 ON
    SET OUTPUT ASSIGNMENT #51 OFF
    ↓
    PRESS '+'
  
```

NOTE: LOGIC FOR PHASE 1 RED CLEAR WHEN TRANSITIONING FROM PHASE 1 TO PHASE 2 (HEAD 11).

```

LOGICAL I/O COMMAND #2 (+/-COMMAND#)
IF ACTIVE PHASE #1 IS ON
    ↓
    SCROLL DOWN
    ↓
    THEN:
    SET OUTPUT ASSIGNMENT #52 OFF
    ↓
    PRESS '+'
  
```

NOTE: LOGIC FOR SWITCHING FLASHING YELLOW ARROW "OFF" DURING PHASE 1 (HEAD 11).

```

LOGICAL I/O COMMAND #3 (+/-COMMAND#)
IF YELLOW ON PHASE #1 IS ON
    ↓
    SCROLL DOWN
    ↓
    THEN:
    SET OUTPUT ASSIGNMENT #51 ON
  
```

NOTE: LOGIC FOR YELLOW ARROW CLEARANCE FROM PHASE 1 (HEAD 11).

LOGIC I/O PROCESSOR PROGRAMMING COMPLETE

OUTPUT REFERENCE SCHEDULE

OUTPUT 50 = Overlap A Red
 OUTPUT 51 = Overlap A Yellow
 OUTPUT 52 = Overlap A Green

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: {XX
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?...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
  
```

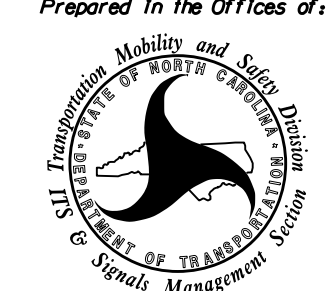
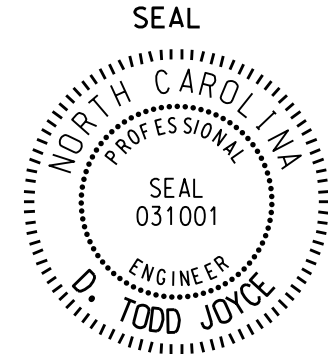
← NOTICE GREEN FLASH

OVERLAP PROGRAMMING COMPLETE

THIS ELECTRICAL DETAIL IS FOR
 THE SIGNAL DESIGN: 13-1310
 DESIGNED: January 2020
 SEALED: 2/28/2020
 REVISED:

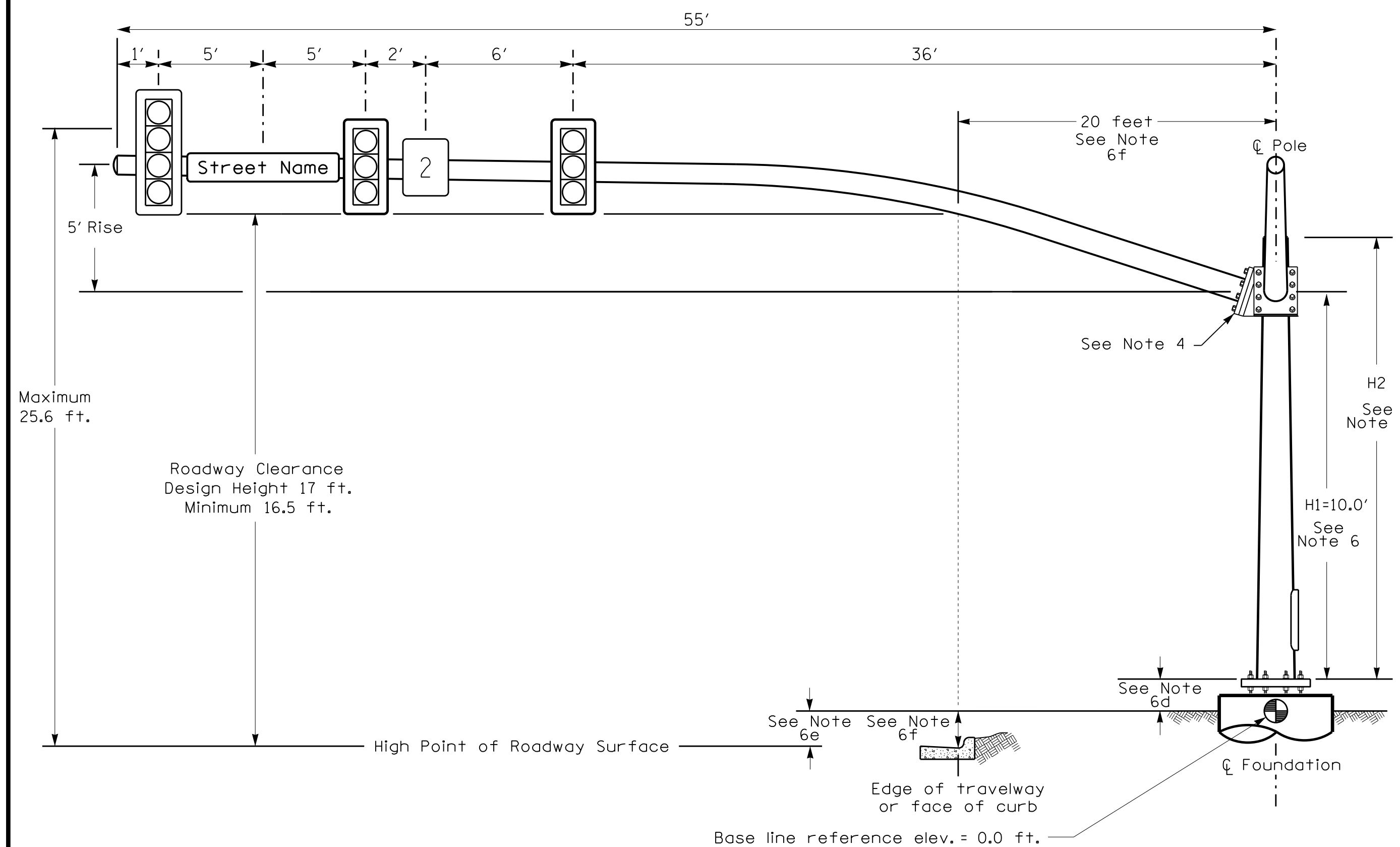
Electrical Detail - Sheet 2 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR: Prepared In the Offices of:  750 N. Greenfield Pkwy, Garner, NC 27529	US 221A/US 74 Bus. (Charlotte Rd.) at US 221 Southbound Ramps	SEAL  SEAL 031001 ENGINEER TODD JOYCE
	Division 13 Rutherford County Rutherfordton PLAN DATE: February 2020 REVIEWED BY: T. Joyce PREPARED BY: C. Strickland REVIEWED BY:	REVISIONS INIT. DATE

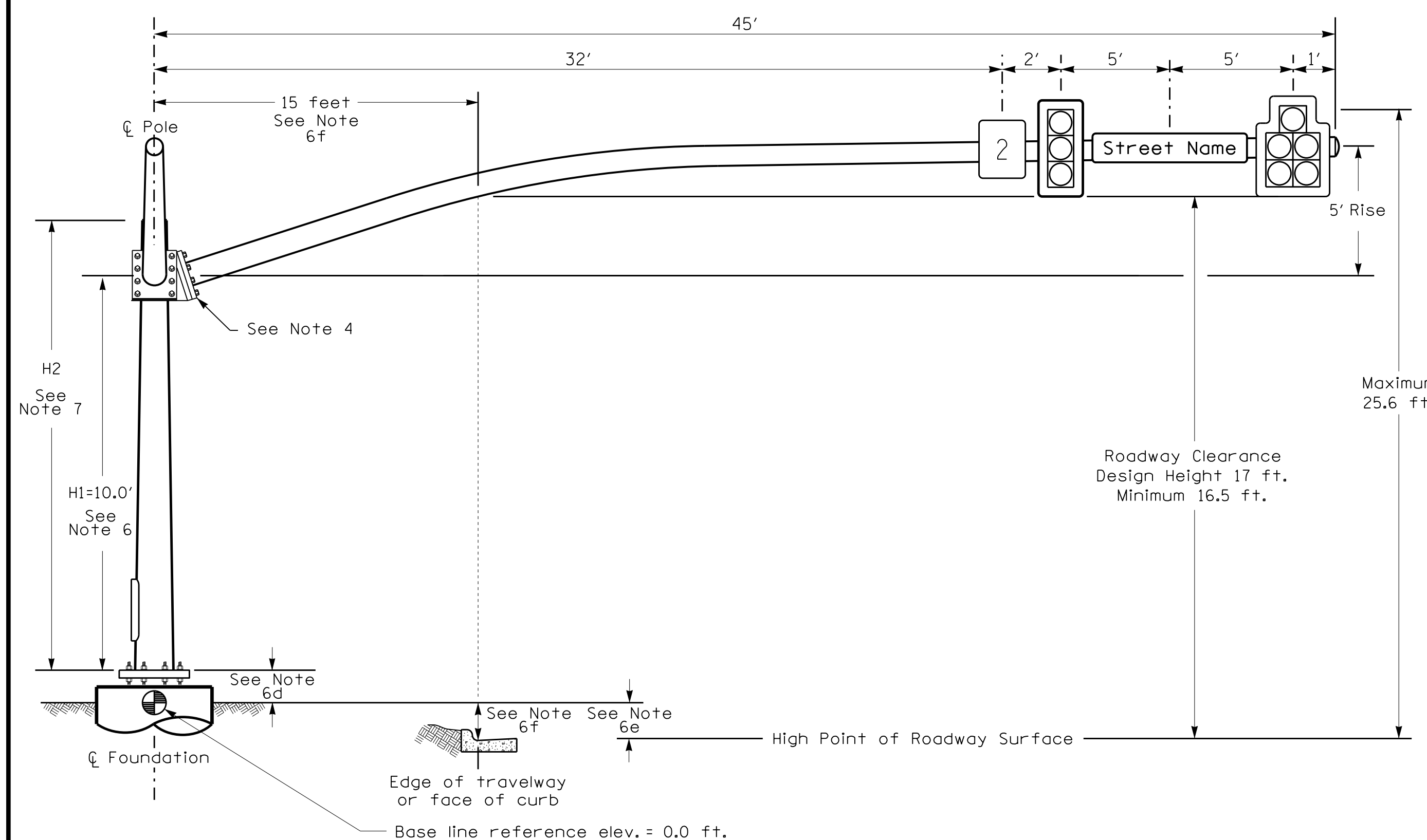
02-1485-2020 11:23
 131310.dwg en162.wmk.dgn
 cbsstrickland

Design Loading for METAL POLE NO. 1, MAST ARM A



Elevation View @ 270°

Design Loading for METAL POLE NO. 1, MAST ARM B



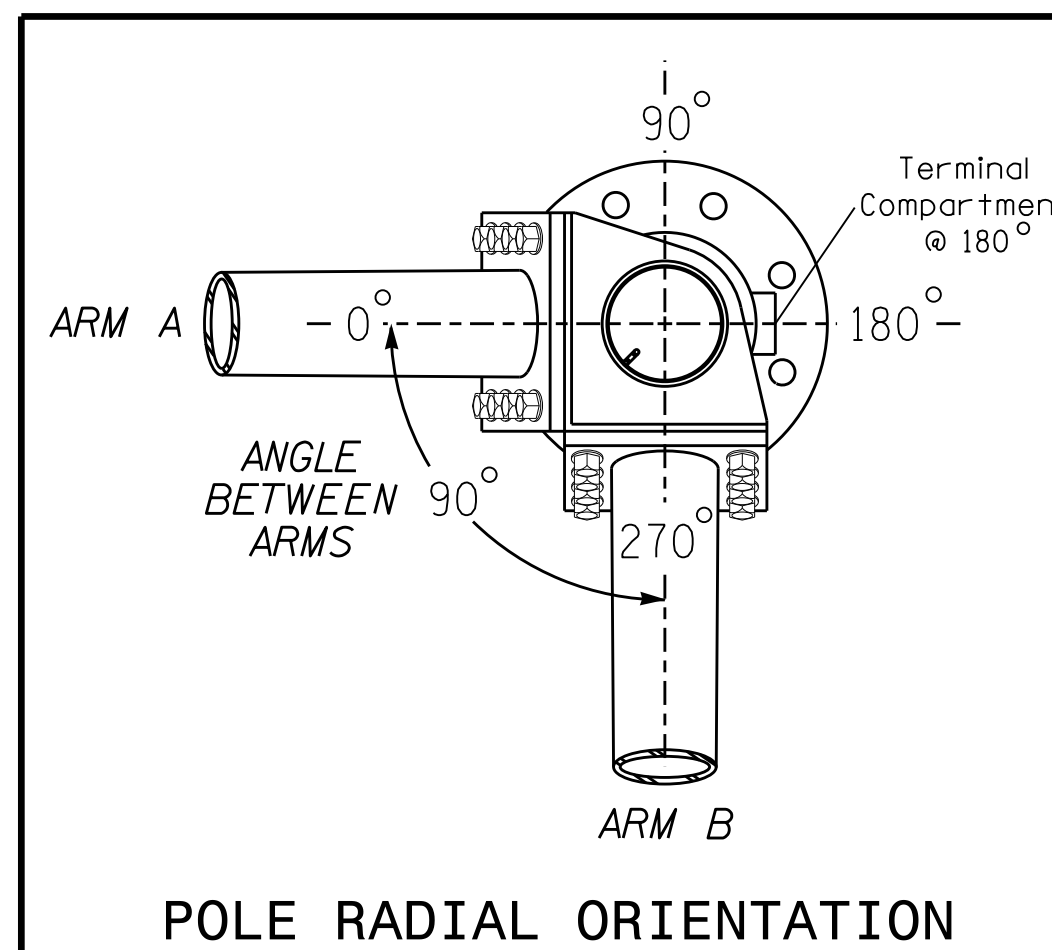
Elevation View @ 0°

SPECIAL NOTE

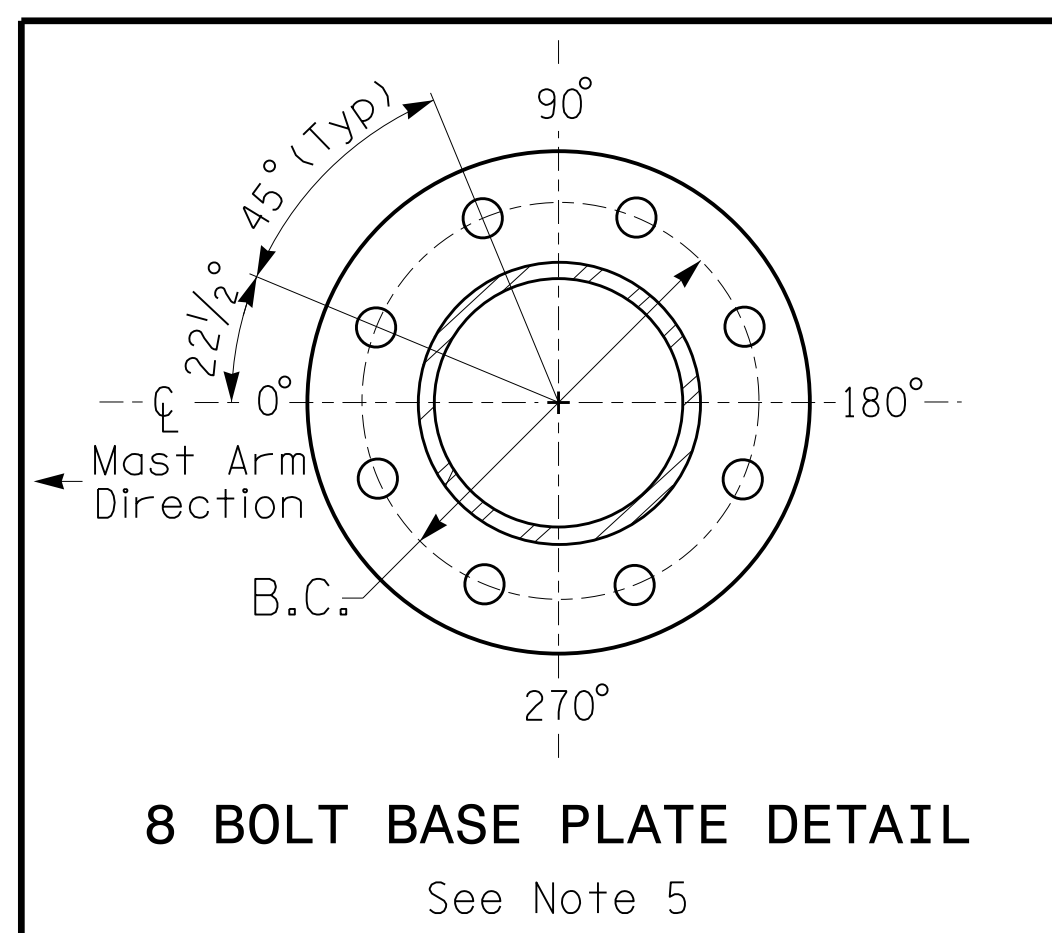
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

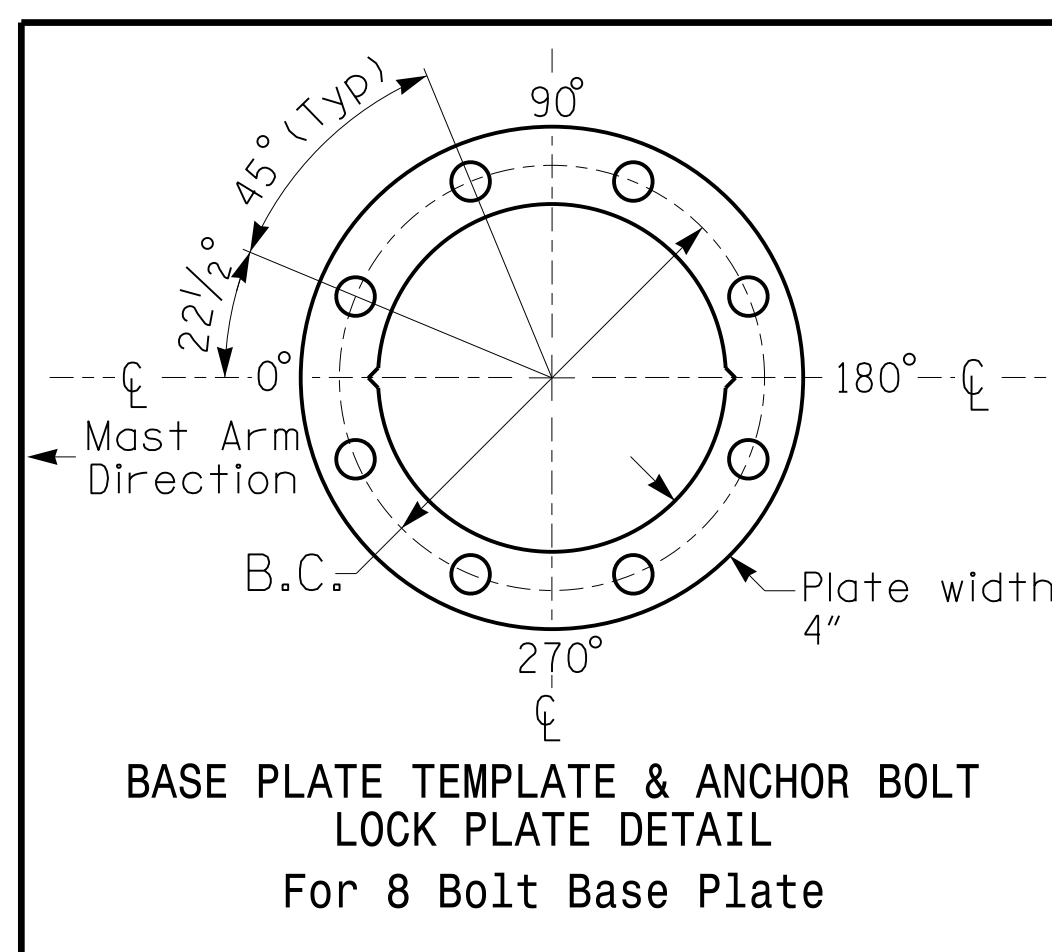
Elevation Differences for:	Arm A	Arm B
Baseline reference point at ϕ Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	-4.95 ft.	N/A
Elevation difference at Edge of travelway or face of curb	-5.50 ft.	N/A



POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL



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

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	RIGID MOUNTED SIGNAL HEAD 12"-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
	RIGID MOUNTED SIGNAL HEAD 12"-5 SECTION-WITH BACKPLATE	16.3 S.F.	42.0" W X 56.0" L	103 LBS
	STREET NAME SIGN RIGID MOUNTED	16.0 S.F.	24.0" W X 96.0" L	36 LBS
	SIGN RIGID MOUNTED	7.5 S.F.	30.0" W X 36.0" L	14 LBS

NOTES

DESIGN REFERENCE MATERIAL

- 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

- 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.
- Design all signal supports using stress ratios that do not exceed 0.9.
- A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements. This requires staggering the connections. Use elevation data for each arm to determine appropriate connection points.
- Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
- The mast arm attachment height (H1) shown is based on the following design assumptions:
 - Nominal vertical rise in mast arm is 5 feet as measured from the centerline of the arm base to the centerline of the free end of the arm.
 - Signal heads are rigidly mounted and vertically centered on the mast arm.
 - The roadway clearance height for design is as shown in the elevation views.
 - The top of the pole base plate is 0.75 feet above the ground elevation.
 - Refer to the Elevation Data Chart for the elevation differences between the proposed foundation ground level and the high point of the roadway.
 - Provide horizontal distance from the proposed centerline of the foundation to the edge of travelway. Refer to the Elevation Data Chart for elevation difference between the proposed foundation ground level and the edge of travelway. This information is necessary to ensure that the roadway clearance is maintained at the edge of the travelway and to aid in the camber design of the arm.
- The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
 - Mast arm attachment height (H1) plus 2 feet, or
 - H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
- If 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.
- The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
- The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

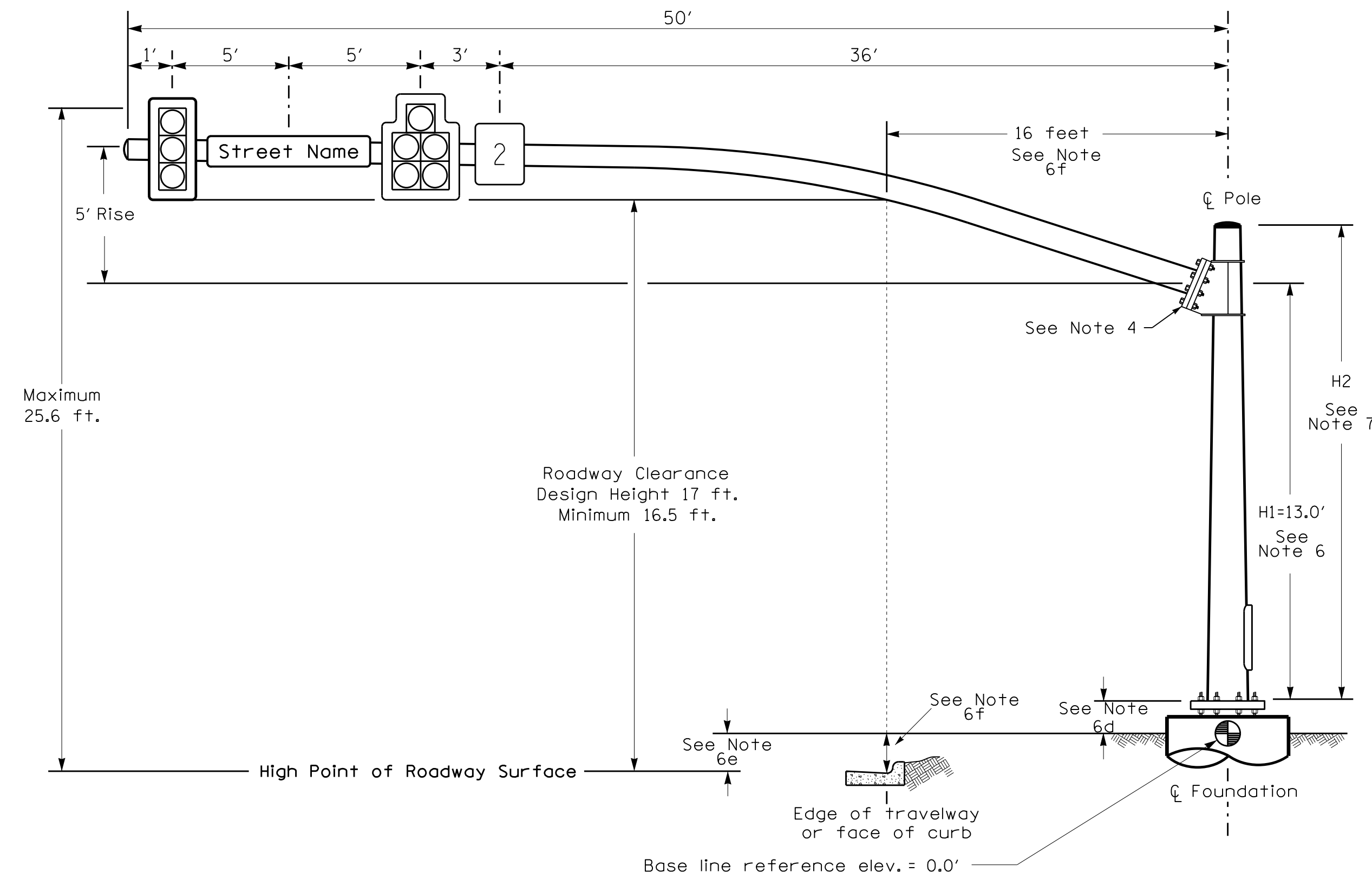
All metal poles and arms should be BLACK in color as specified in the project special provisions.

NCDOT Wind Zone 4 (90 mph)

	US 221A/US 74 Bus. (Charlotte Rd.) at US 221 Southbound Ramps		
	Division 13 Rutherford County Rutherfordton PLAN DATE: January 2020 REVIEWED BY: T.J. Williams	PREPARED BY: R.N. Zinser REVIEWED BY:	
SCALE: 0 N/A N/A	REVISIONS:	INIT. DATE	SEAL: R. N. Zinser 2/28/2020 DATE: 2/28/2020 SIG. INVENTORY NO. 13-1310

31-FEB-2021 09:38
 S:\17565\17565\SIGNAL\Signal Design Section\Western Reg\on401.v-13\WR-2233_BB\13-1310.dwg, 20200228.dgn
 rnz:insr

Design Loading for METAL POLE NO. 2

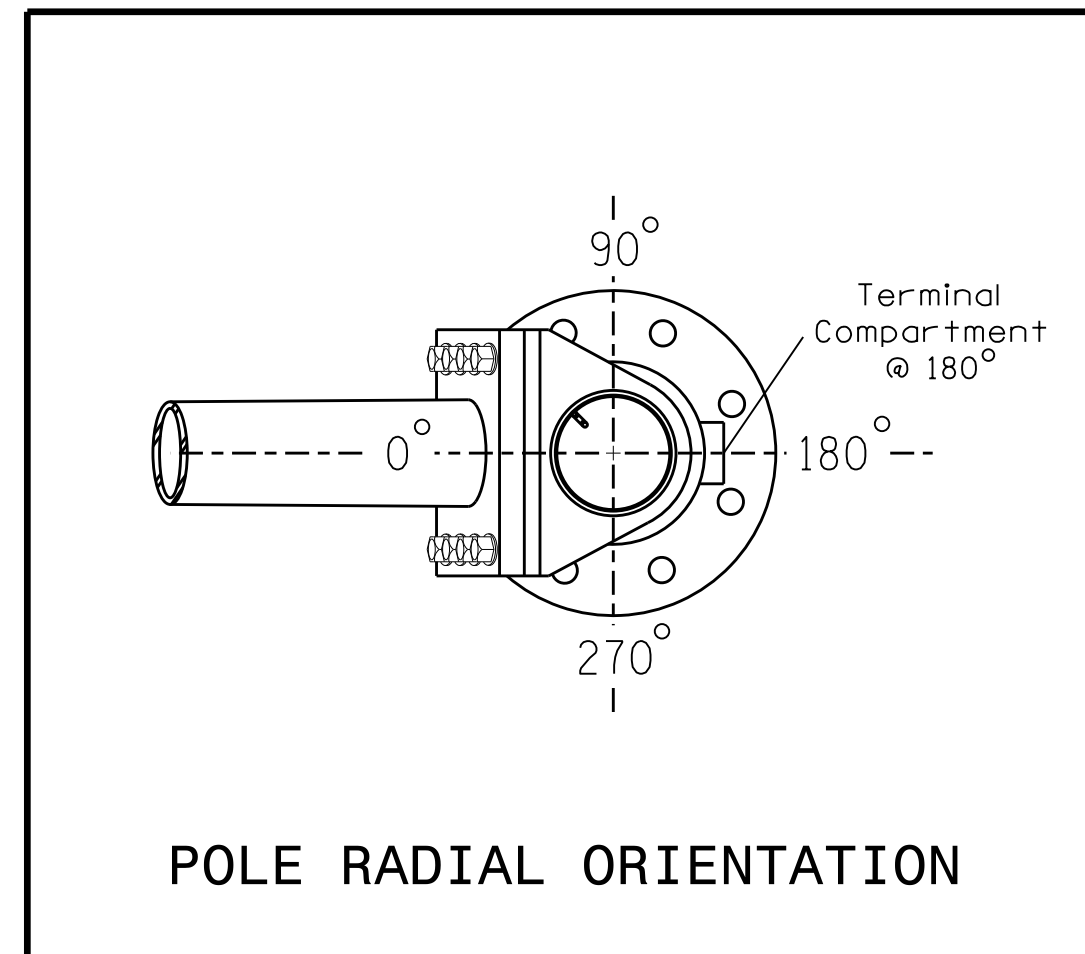


Elevation View

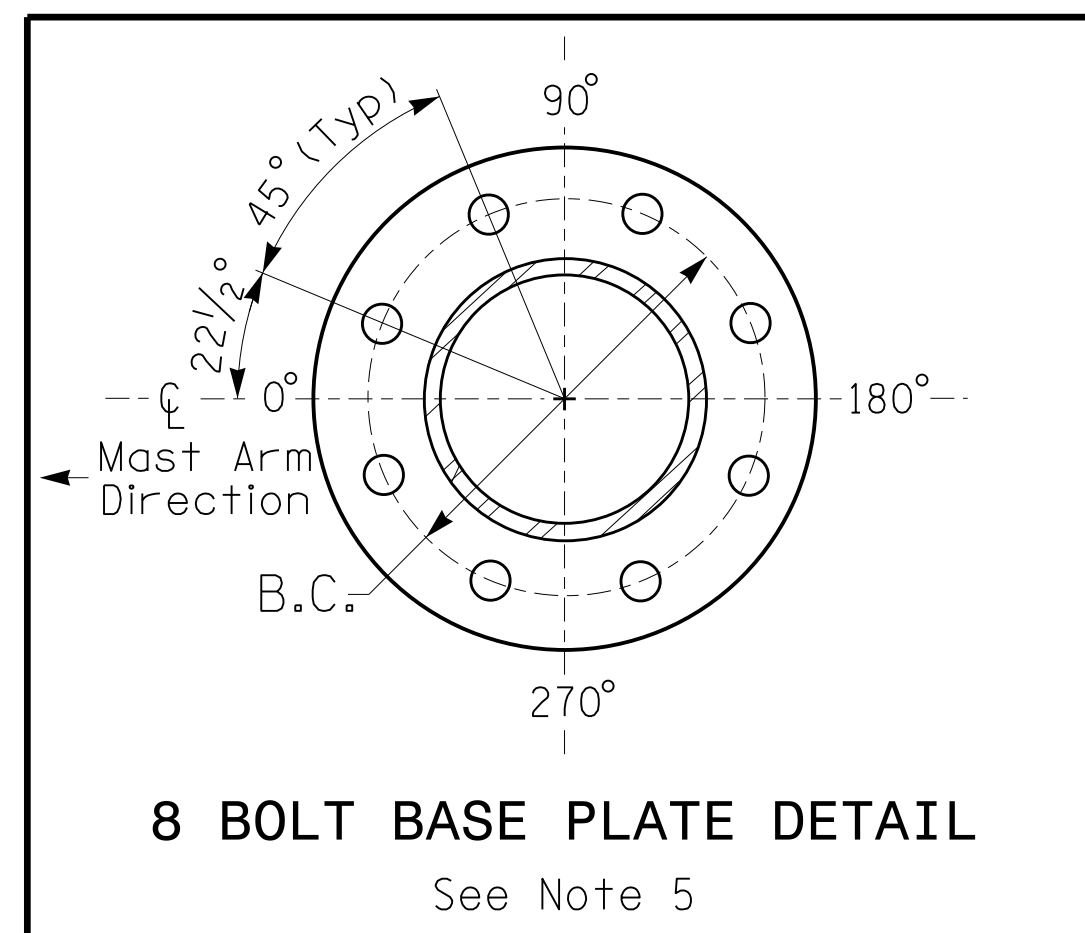
SPECIAL NOTE
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project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

Elevation Data for Mast Arm Attachment (H1)

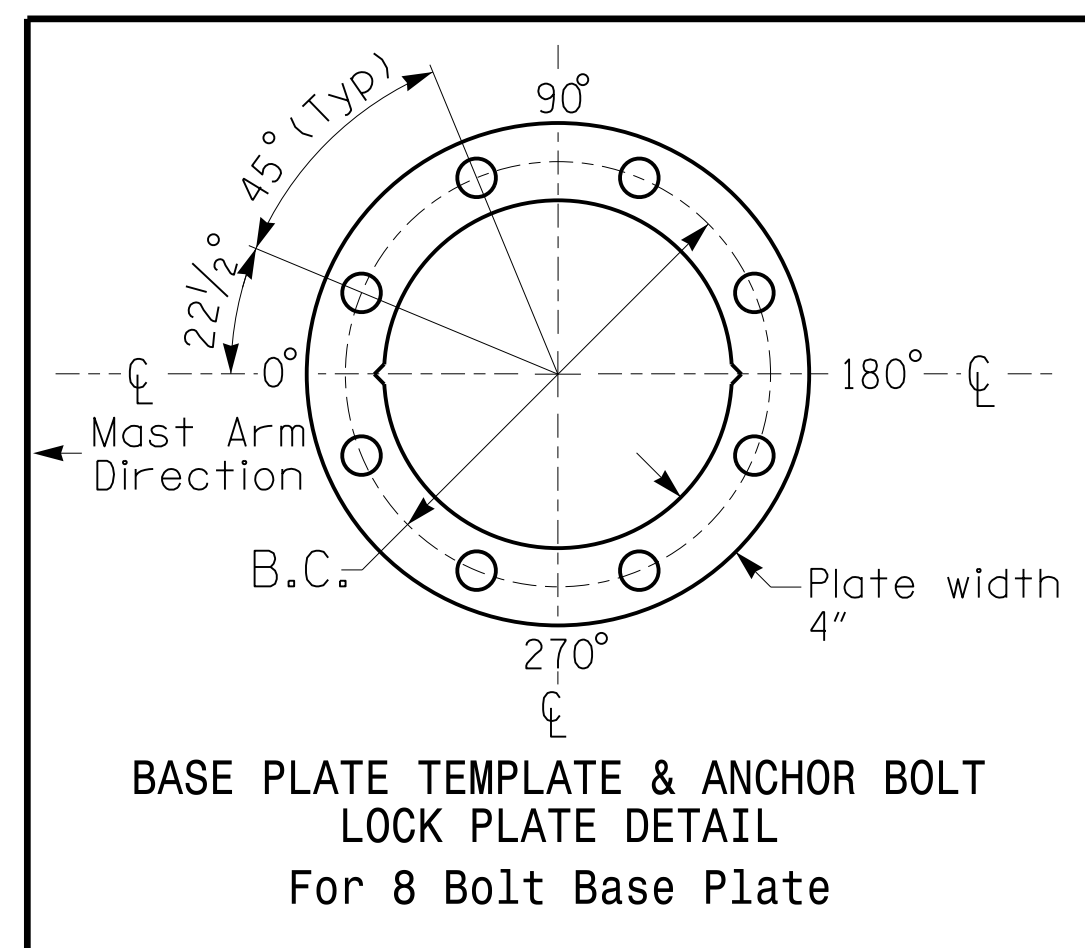
Elevation Differences for:	Pole 2	
Baseline reference point at \odot Foundation @ ground level	0.0 ft.	
Elevation difference at High point of roadway surface	-1.49 ft.	
Elevation difference at Edge of travelway or face of curb	-1.92 ft.	



POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL
See Note 5



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

METAL POLE No. 2

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	RIGID MOUNTED SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE	9.3 S.F.	25.5" W X 52.5" L	60 LBS
	RIGID MOUNTED SIGNAL HEAD 12"-5 SECTION-WITH BACKPLATE	16.3 S.F.	42.0" W X 56.0" L	103 LBS
	STREET NAME SIGN RIGID MOUNTED	16.0 S.F.	24.0" W X 96.0" L	36 LBS
	SIGN RIGID MOUNTED	7.5 S.F.	30.0" W X 36.0" L	14 LBS

NOTES

DESIGN REFERENCE MATERIAL

- 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

- 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.
- Design all signal supports using stress ratios that do not exceed 0.9.
- 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.
- Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
- The mast arm attachment height (H1) shown is based on the following design assumptions:
 - Nominal vertical rise in mast arm is 5 feet as measured from the centerline of the arm base to the centerline of the free end of the arm.
 - Signal heads are rigidly mounted and vertically centered on the mast arm.
 - The roadway clearance height for design is as shown in the elevation views.
 - The top of the pole base plate is 0.75 feet above the ground elevation.
 - Refer to the Elevation Data Chart for the elevation differences between the proposed foundation ground level and the high point of the roadway.
 - Provide horizontal distance from the proposed centerline of the foundation to the edge of travelway. Refer to the Elevation Data Chart for elevation difference between the proposed foundation ground level and the edge of travelway. This information is necessary to ensure that the roadway clearance is maintained at the edge of the travelway and to aid in the camber design of the arm.
- The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
 - Mast arm attachment height (H1) plus 2 feet, or
 - H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
- If 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.
- The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
- The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

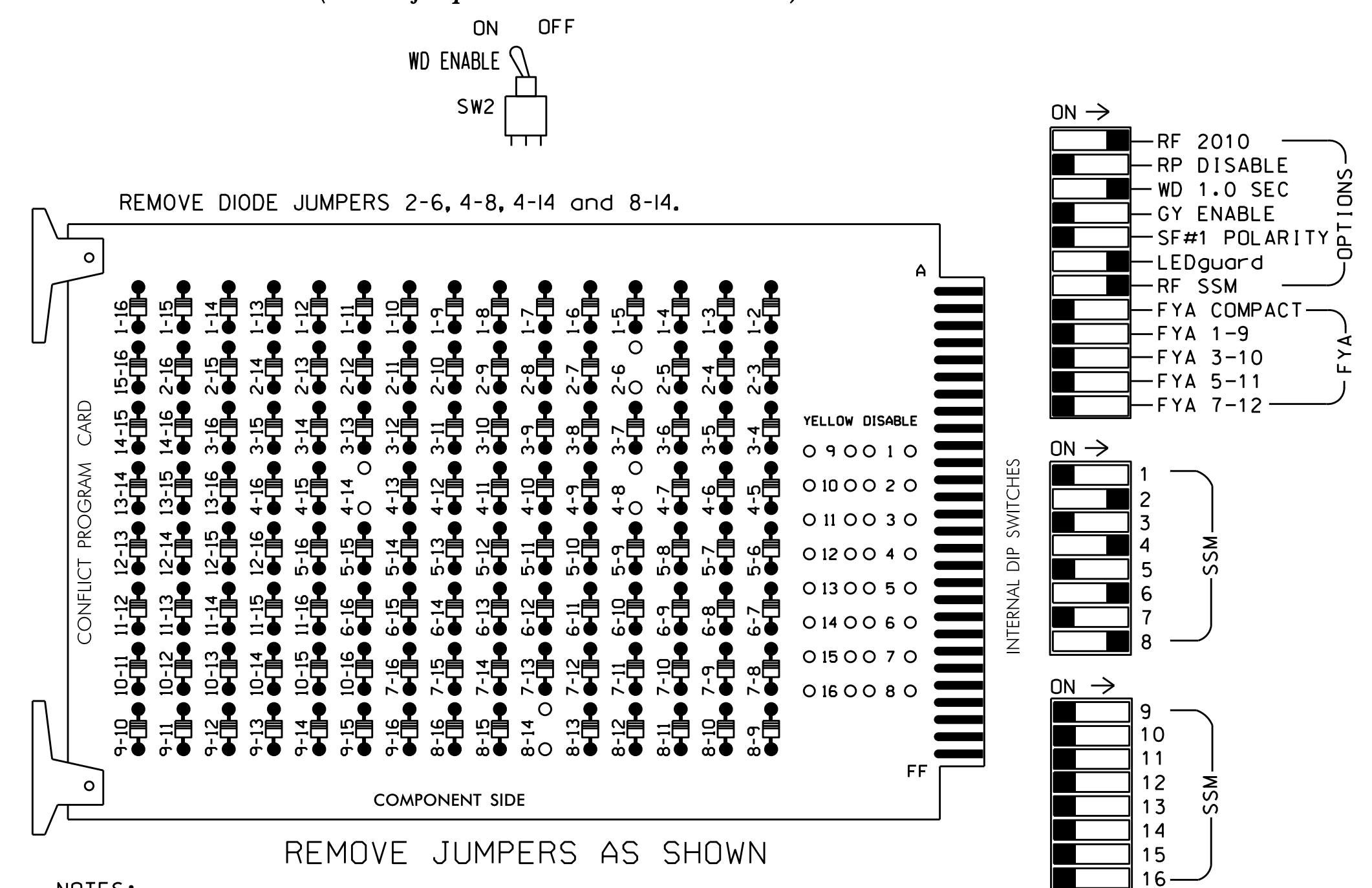
All metal poles and arms should be BLACK in color as specified in the project special provisions.

NCDOT Wind Zone 4 (90 mph)

<p>Prepared in the Offices of: TRANSPORTATION MOBILITY AND SAFETY DIVISION STATE OF NORTH CAROLINA SIGNAL DESIGN SECTION</p> <p>750 N. Greenfield Pkwy, Garner, NC 27529</p>	<p>US 221A/US 74 Bus. (Charlotte Rd.) at US 221 Southbound Ramps</p> <p>Division 13 Rutherford County Rutherfordton</p> <p>PLAN DATE: January 2020 REVIEWED BY: T.J. Williams</p> <p>PREPARED BY: R.N. Zinser REVIEWED BY:</p>		<p>SEAL</p> <p>NORTH CAROLINA PROFESSIONAL ENGINEER</p> <p>SEAL 043914</p> <p>R. CHARLO N. ZINSER</p> <p>DocuSigned by: R. N. Zinser 2/28/2020</p>
	<p>SCALE</p> <p>0 N/A</p> <p>N/A</p>	<p>REVISIONS</p> <p>INIT. DATE</p>	

EDI MODEL 2010ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



NOTES:

- Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
- Make sure jumpers SEL2-SEL5 are present on the monitor board.

NOTES

- 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.
- Ensure that Red Enable is active at all times during normal operation. To prevent Red Failures on unused monitor channels, tie unused red monitor inputs 1,3,5,7,9,10,11,12,13,14,15 & 16 to load switch AC+ per the cabinet manufacturer's instructions.
- Program phases 4 and 8 for Dual Entry.
- Enable Simultaneous Gap-Out for all phases.
- Program phases 2 and 6 for Start Up In Green.
- Program phase 4 for 'STARTUP PED CALL'.
- Program phases 2 and 6 for Yellow Flash.
- If this signal will be managed by an ATMS software, enable controller and detector logging for all enabled detectors.
- The cabinet and controller are part of the Signal System #11324.

EQUIPMENT INFORMATION

CONTROLLER.....2070E
 CABINET.....332
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...12
 LOAD SWITCHES USED.....S2,S4,S4P,S6,S8
 PHASES USED.....2,4,4 PED,6,8
 OVERLAPS.....NONE

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S2P	S3	S4	S4P	S5	S6	S6P	S7	S8	S8P
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED
SIGNAL HEAD NO.	NU	21,22	NU	NU	41,42	P41, P42	NU	61,62	NU	NU	81,82	NU
RED		128			101			134			107	
YELLOW		129			102			135			108	
GREEN		130			103			136			109	
RED ARROW												
YELLOW ARROW												
GREEN ARROW												
							104					
							106					

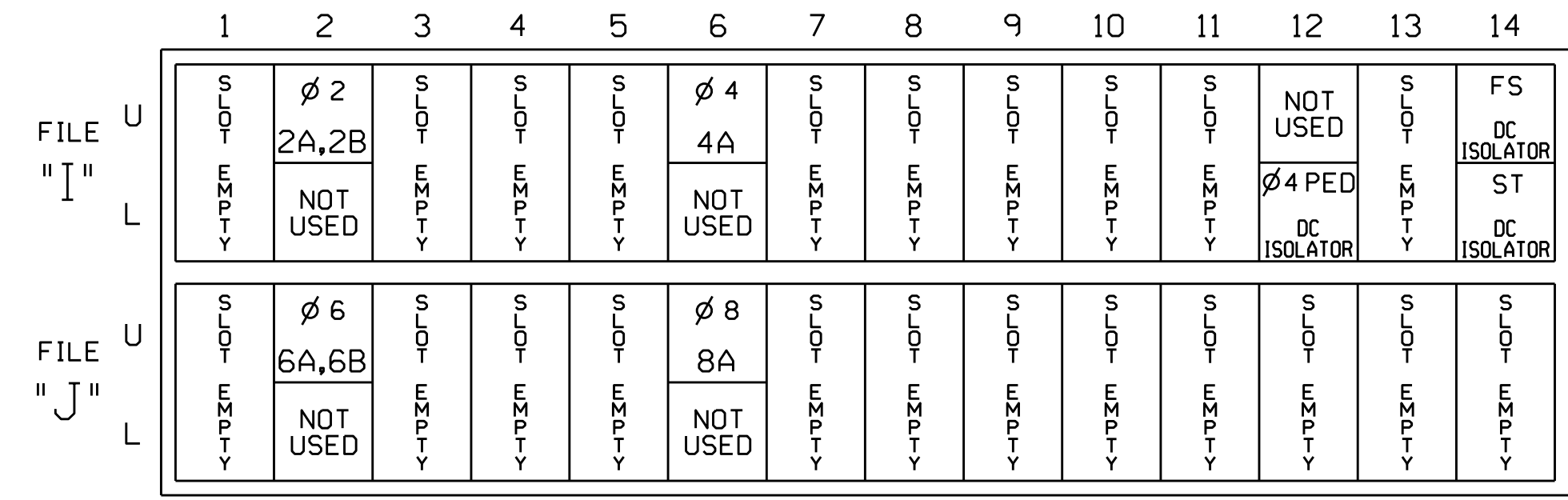
NU = Not Used

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

INPUT FILE POSITION LAYOUT

(front view)



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

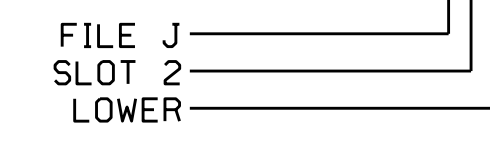
FS = FLASH SENSE
 ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
2A,2B	TB2-5,6	I2U	39	1	2	2	Y	Y			
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			10
6A,6B	TB3-5,6	J2U	40	2	6	6	Y	Y			
8A	TB5-9,10	J6U	42	4	8	8	Y	Y			10
PED PUSH BUTTONS											
P41,P42	TB8-5,6	I12L	69	31			PED 4	4 PED			

NOTE:
 INSTALL DC ISOLATORS IN INPUT FILE SLOT 112.

INPUT FILE POSITION LEGEND: J2L



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 13-0629
 DESIGNED: January 2020
 SEALED: 2/28/2020
 REVISED:

Electrical Detail

Electrical and Programming Details For:
 Prepared In the Offices of:

 750 N. Greenfield Pkwy, Garner, NC 27529

US 221A/US 74 Business (Charlotte Rd.) at Cleghorn Street
 Division 13 Rutherford County Rutherfordton
 PLAN DATE: February 2020 REVIEWED BY: T. Joyce
 PREPARED BY: C. Strickland REVIEWED BY:
 REVISIONS INIT. DATE
 DocuSigned by: *D. Todd Joyce* 3/3/2020
 SIG. INVENTORY NO. 13-0629

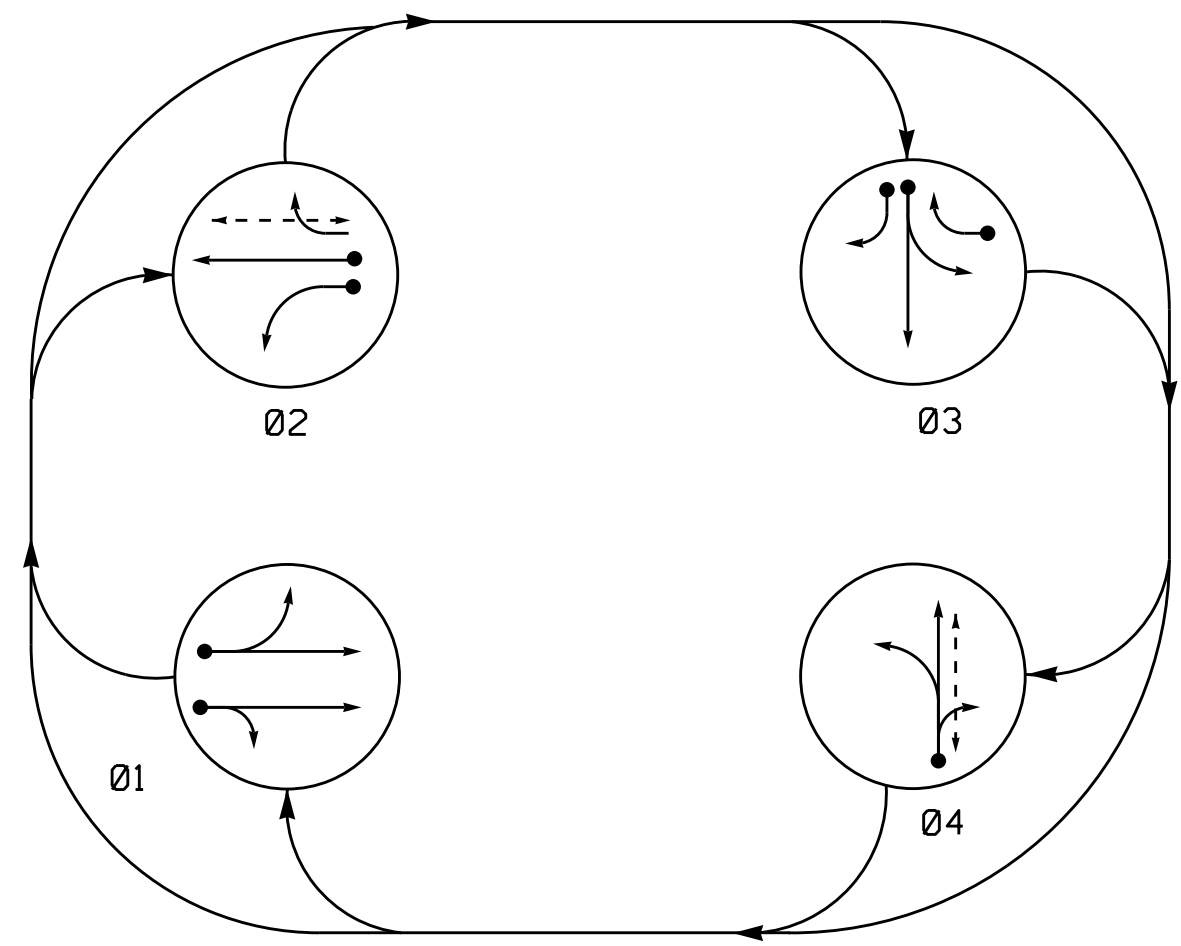
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL

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 ENGINEER
 D. TODD JOYCE

02-1465-2020 11:57
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PHASING DIAGRAM



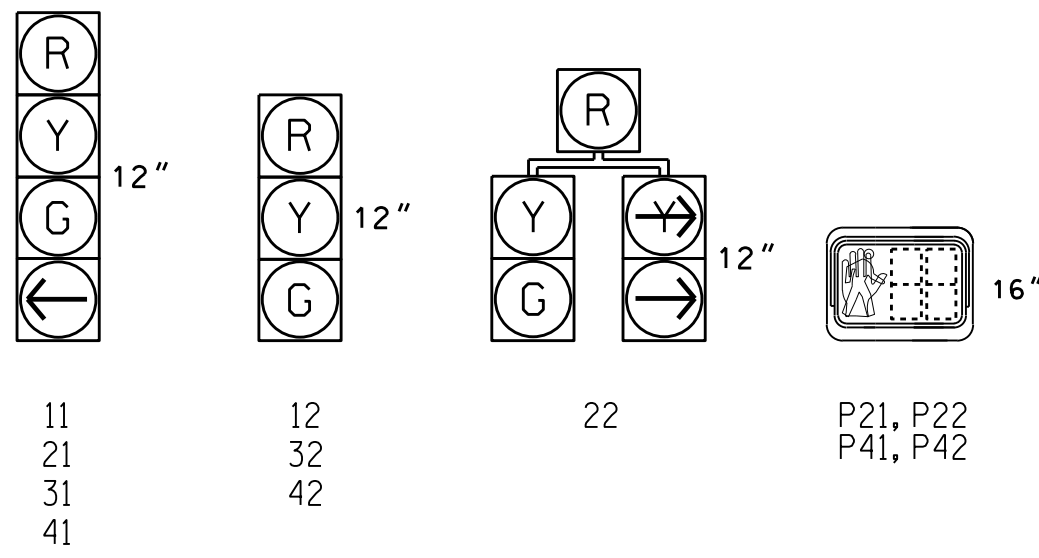
PHASING DIAGRAM DETECTION LEGEND

- → DETECTED MOVEMENT
- ← UNDETECTED MOVEMENT (OVERLAP)
- - - UNSIGNALIZED MOVEMENT
- ◄ - - - PEDESTRIAN MOVEMENT

SIGNAL FACE	PHASE				
	Ø1	Ø2	Ø3	Ø4	F L
11	G	R	R	R	R
12	G	R	R	R	R
21	R	G	R	R	Y
22	R	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
P21, P22	DW	W	DW	DW	DRK
P41, P42	DW	DW	DW	W	DRK

SIGNAL FACE I.D.

All Heads L.E.D.

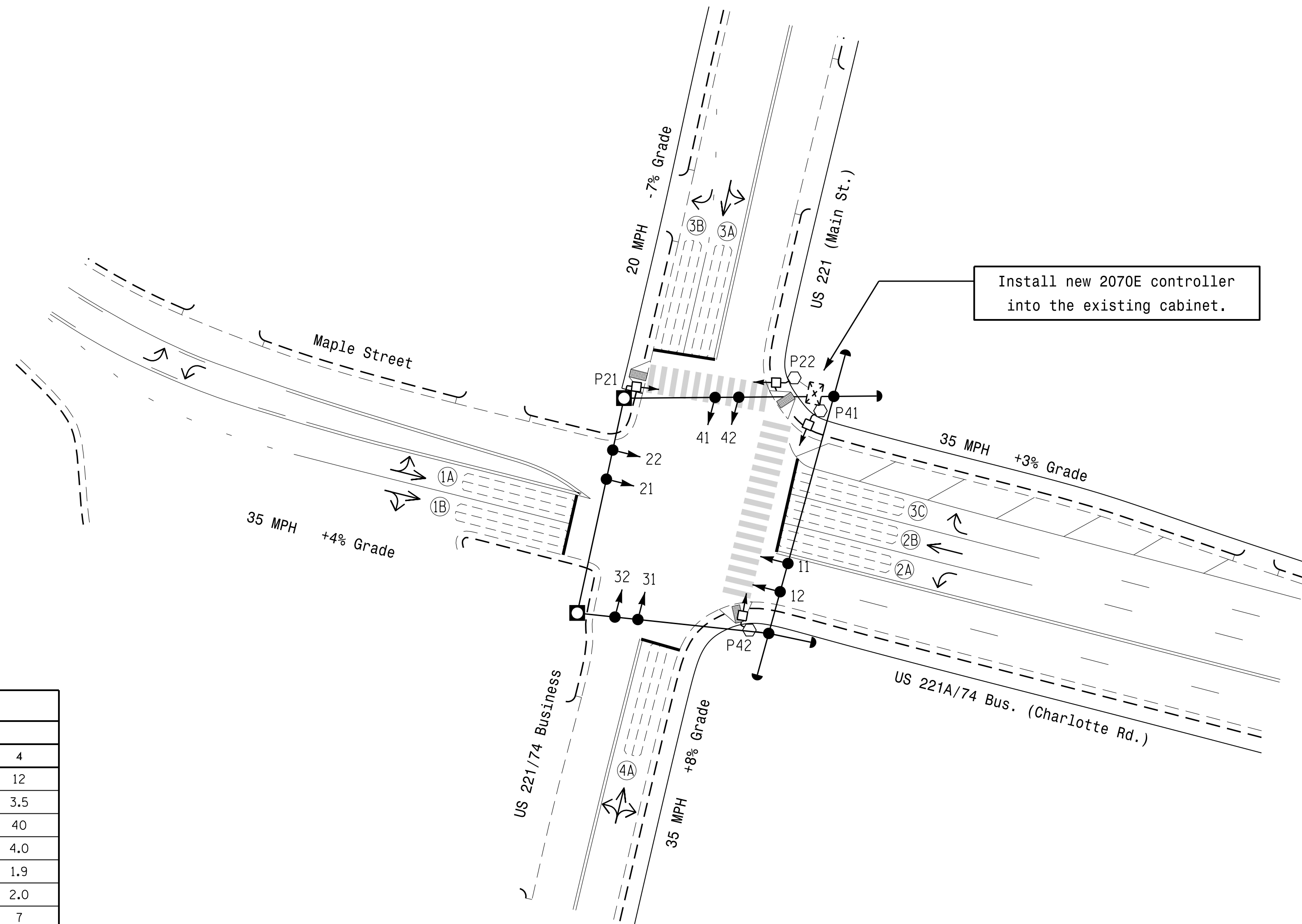


LOOP	SIZE (FT)	INDUCTIVE LOOPS			DETECTOR PROGRAMMING							
		DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
1A,1B	6X40	0	2-4-2	-	1	Y	Y	-	-	-	-	-
2A,2B	6X40	0	2-4-2	-	2	Y	Y	-	-	-	-	-
3A,3B	6X40	0	2-4-2	-	3	Y	Y	-	-	3	-	-
3C	6X40	0	2-4-2	-	3	Y	Y	-	-	15	-	-
4A	6X40	0	2-4-2	-	4	Y	Y	-	-	3	-	-

4 Phase Fully Actuated Signal System #11324

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. Install new 2070E Controller in existing cabinet.
4. Phase 1 and/or phase 2 may be lagged.
5. Phase 3 and/or phase 4 may be lagged.
6. Set all detector units to presence mode.
7. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
8. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
9. Pavement markings are existing.
10. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.



Install new 2070E controller into the existing cabinet.

OASIS 2070 TIMING CHART

FEATURE	PHASE			
	1	2	3	4
Min Green 1*	10	10	10	12
Extension 1*	2.0	2.0	2.0	3.5
Max Green 1*	40	40	40	40
Yellow Clearance	4.0	4.0	4.0	4.0
Red Clearance	1.7	1.2	2.9	1.9
Red Revert	2.0	2.0	2.0	2.0
Walk 1*	-	7	-	7
Don't Walk 1	-	10	-	17
Seconds Per Actuation*	-	-	-	-
Max Variable Initial*	-	-	-	-
Time Before Reduction*	-	-	-	-
Time To Reduce*	-	-	-	-
Minimum Gap	-	-	-	-
Recall Mode	-	-	-	-
Vehicle Call Memory	-	-	-	-
Dual Entry	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON

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

LEGEND

- | PROPOSED | EXISTING |
|--|-----------|
| ○ → Traffic Signal Head | ● → N/A |
| ○ → Modified Signal Head | ○ → N/A |
| ⊥ Sign | ⊥ N/A |
| ⊥ Pedestrian Signal Head With Push Button & Sign | ⊥ N/A |
| ⊥ Signal Pole with Guy | ⊥ N/A |
| ⊥ Signal Pole with Sidewalk Guy | ⊥ N/A |
| ⊠ Inductive Loop Detector | ⊠ N/A |
| □ Controller & Cabinet | □ N/A |
| □ Junction Box | □ N/A |
| - - - 2-in Underground Conduit | - - - N/A |
| N/A Right of Way | - - - N/A |
| → Directional Arrow | → N/A |
| ○ Metal Strain Pole | ○ N/A |
| ○ Type II Signal Pedestal | ○ N/A |
| N/A Curb Ramp | ⏏ N/A |

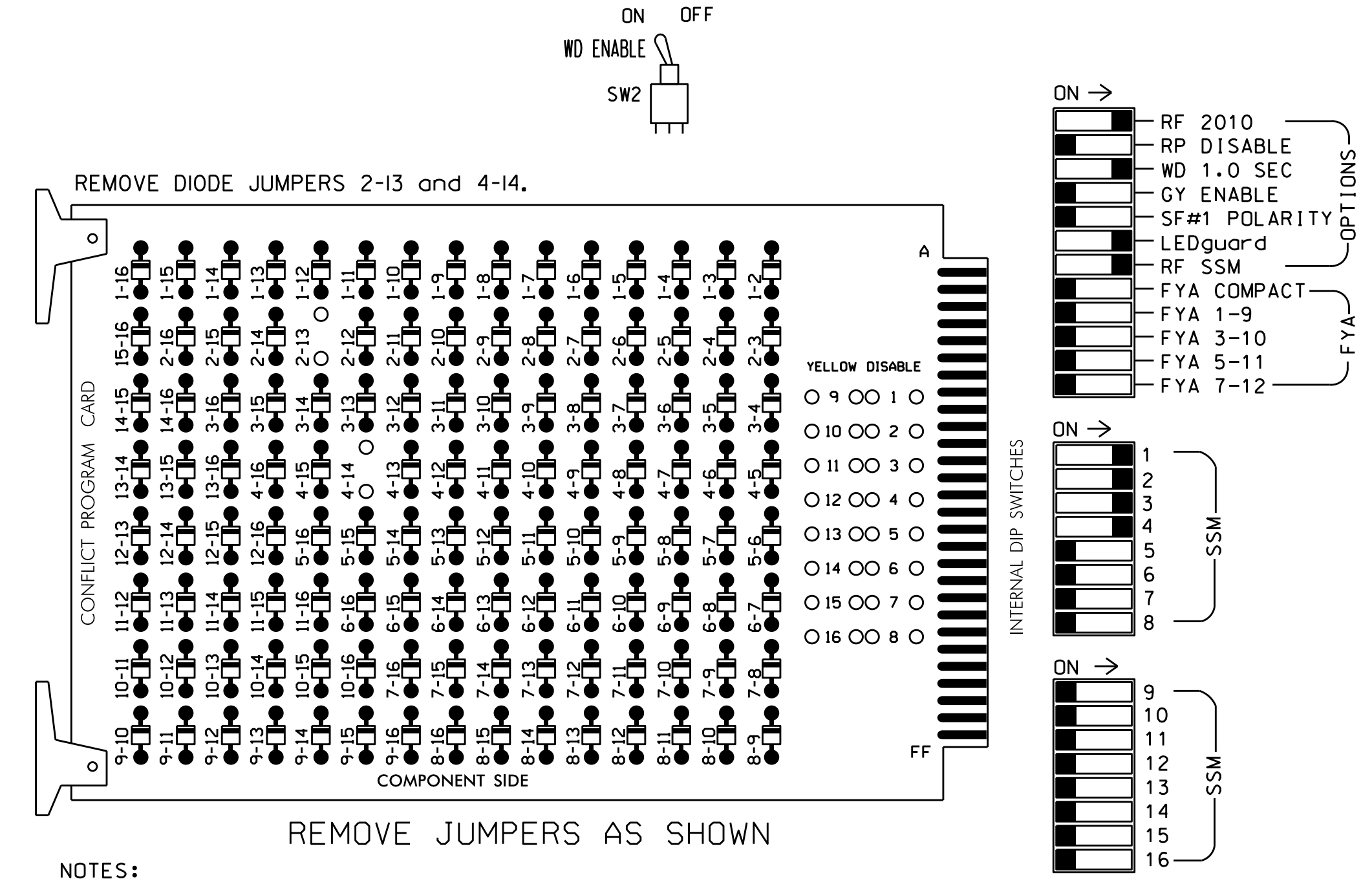
Signal Upgrade

<p>750 N. Greenfield Pkwy, Garner, NC 27529</p>	<p>US 221A - US74 Business (Charlotte Rd.)/Maple Street at US 221 (Main St)/US 221-74 Bus.</p> <p>Division 13 Rutherford County Rutherfordton</p>		
	<p>PLAN DATE: January 2020</p> <p>PREPARED BY: R.N. Zinser</p>	<p>REVIEWED BY: T.J. Williams</p> <p>REVIEWED BY:</p>	

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EDI MODEL 2010ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



- NOTES:
- Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
 - Make sure jumpers SEL2-SEL5 are present on the monitor board.

NOTES

- 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.
- Ensure that Red Enable is active at all times during normal operation. To prevent Red Failures on unused monitor channels, tie unused red monitor inputs 5,6,7, 8,9,10,11,12,13,14,15 & 16 to load switch AC+ per the cabinet manufacturer's instructions.
- Enable Simultaneous Gap-Out for all phases.
- Program phase 2 for Start Up In Green.
- Program phase 2 for Yellow Flash.
- Program phases 2 and 4 for Startup Ped Call.
- If this signal will be managed by an ATMS software, enable controller and detector logging for all enabled detectors.
- The cabinet and controller are part of the Signal System #11324.

EQUIPMENT INFORMATION

CONTROLLER.....2070E
 CABINET.....332
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...12
 LOAD SWITCHES USED.....S1,S2,S2P,S3,S4,S4P
 PHASES USED.....1,2,2 PED,3,4,4 PED
 OVERLAPS.....NONE

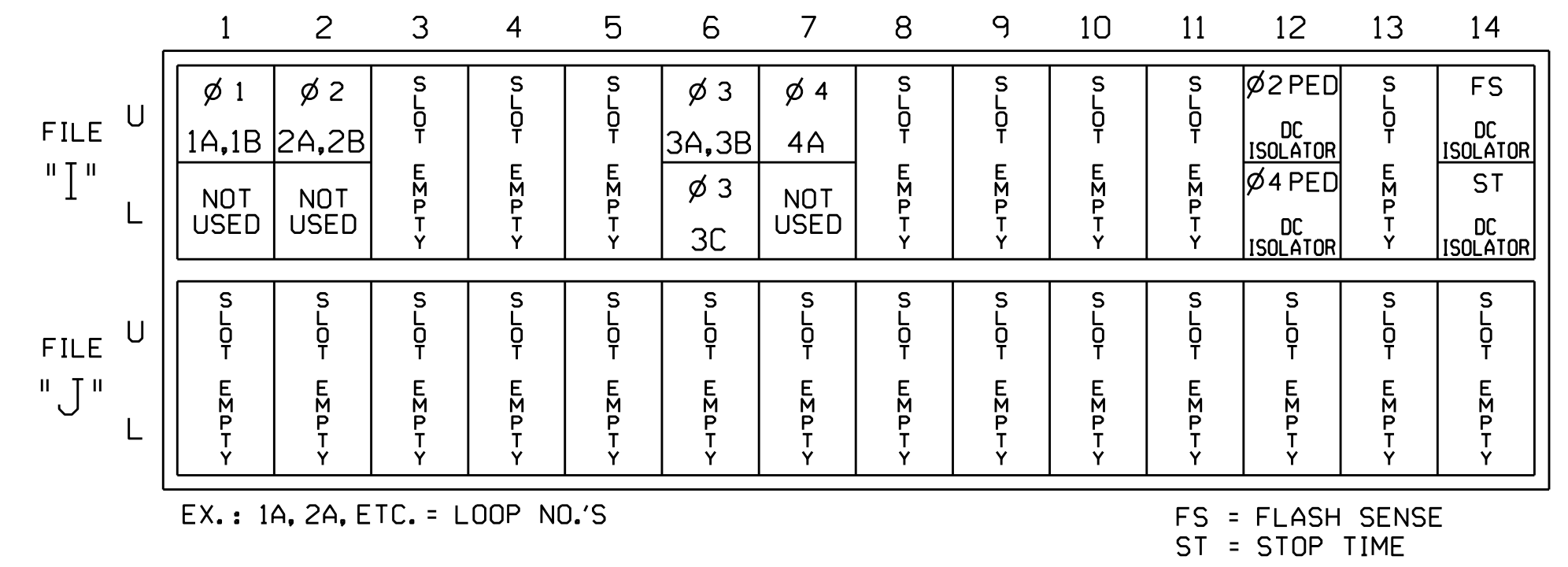
SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S2P	S3	S4	S4P	S5	S6	S6P	S7	S8	S8P				
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED				
SIGNAL HEAD NO.	11	12	21	22	P21, P22	31	32	22	41	42	P41, P42	NU	NU	NU	NU	NU
RED	125	125	128	128		116	116		101	101						
YELLOW	126	126	129	129		117	117		102	102						
GREEN	127	127	130	130		118	118		103	103						
RED ARROW																
YELLOW ARROW								117								
GREEN ARROW	127		130			118		103								
Hand										113						104
Walker																106

NU = Not Used

INPUT FILE POSITION LAYOUT

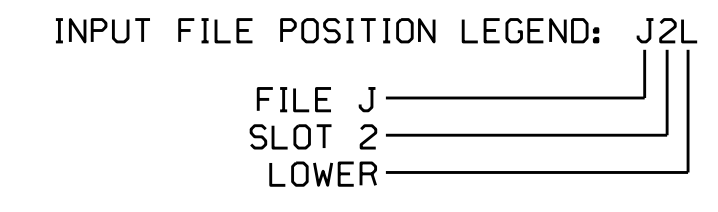
(front view)



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
1A,1B	TB2-1,2	I1U	56	18	1	1	Y	Y			
2A,2B	TB2-5,6	I2U	39	1	2	2	Y	Y			
3A,3B	TB4-9,10	I6U	41	3	4	3	Y	Y			3
3C	TB4-11,12	I6L	45	7	14	3	Y	Y			15
4A	TB6-1,2	I7U	65	27	34	4	Y	Y			3
PED PUSH BUTTONS											
P21,P22	TB8-4,6	I12U	67	29	PED 2	2 PED					
P41,P42	TB8-5,6	I12L	69	31	PED 4	4 PED					

NOTE:
INSTALL DC ISOLATORS
IN INPUT FILE SLOT 112.



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: 13-0183
 DESIGNED: January 2020
 SEALED: 2/28/2020
 REVISED:

Electrical Detail

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared in the Offices of:

750 N. Greenfield Pkwy, Garner, NC 27529

US 221A - US74 Business (Charlotte Rd.)/Maple Street at US 221 (Main St)/US 221-74 Bus.

Division 13 Rutherford County Rutherfordton

PLAN DATE: February 2020 REVIEWED BY: T. Joyce

PREPARED BY: C. Strickland REVIEWED BY:

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL

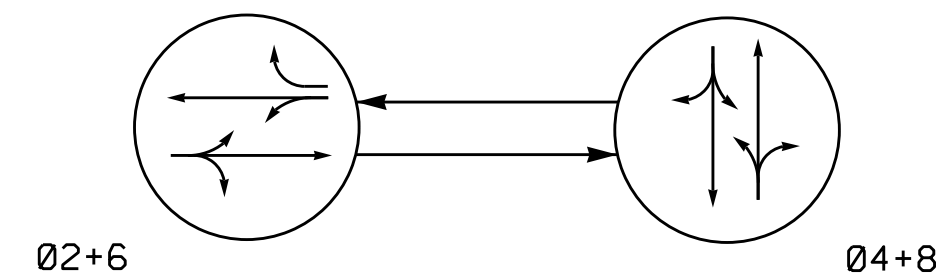
Seal Signed by: Todd Joyce 3/3/2020

DATE

SIG. INVENTORY NO. 13-0183

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PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

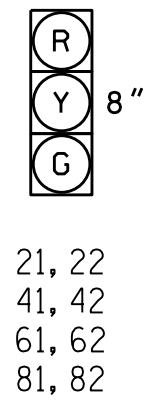
- ← DETECTED MOVEMENT
- ← UNDETECTED MOVEMENT (OVERLAP)
- ←-- UNSIGNALIZED MOVEMENT
- ←-- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE		
	02+6	04+8	FLASH
21, 22	G	R	Y
41, 42	R	G	R
61, 62	G	R	Y
81, 82	R	G	R

SIGNAL FACE I.D.

All Heads L.E.D.

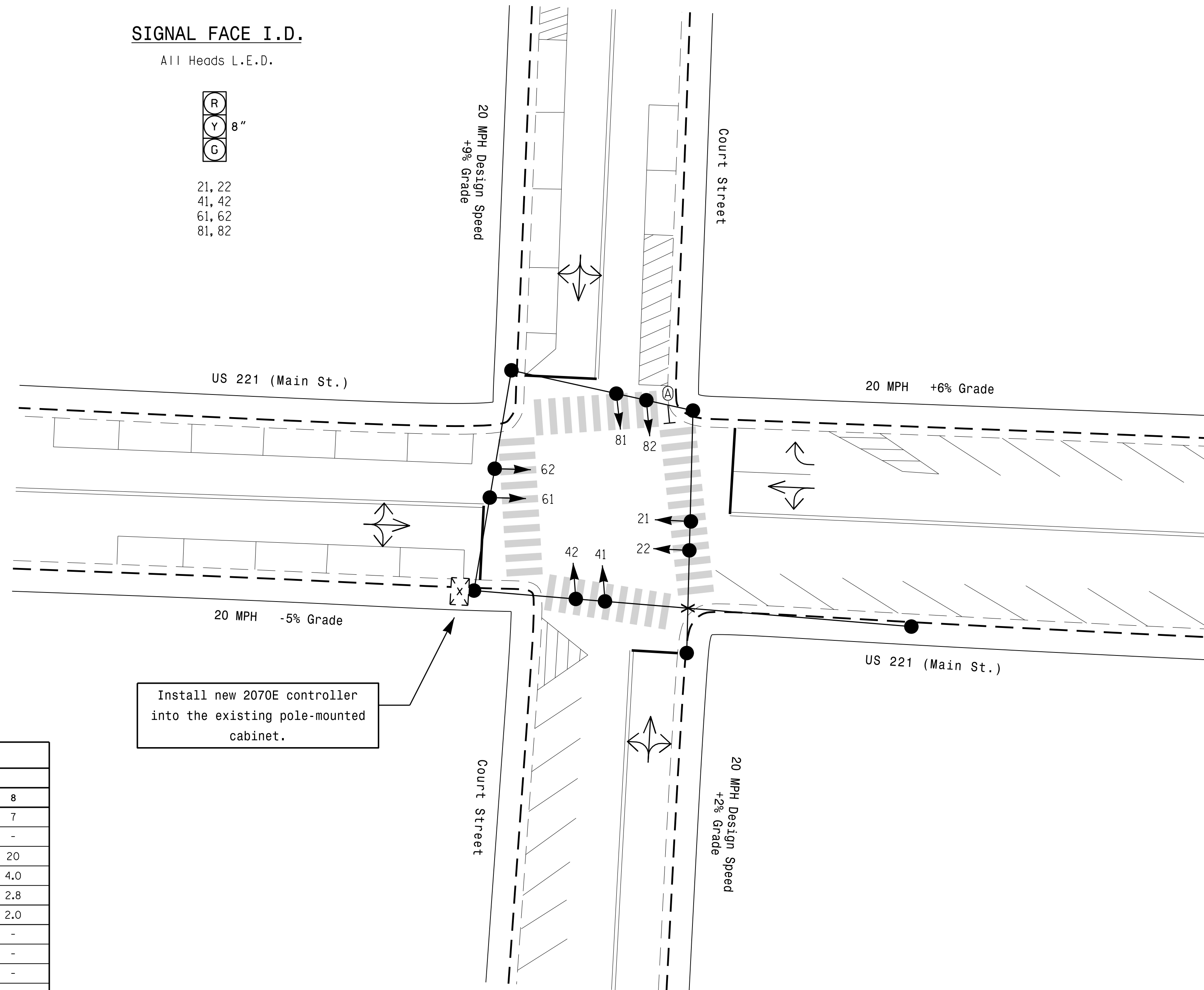


21, 22
41, 42
61, 62
81, 82

2 Phase
Pre-Timed
Signal System #11324

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. Install new 2070E Controller in existing cabinet.
4. Pavement markings are existing.
5. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.



Install new 2070E controller into the existing pole-mounted cabinet.

OASIS 2070 TIMING CHART

FEATURE	PHASE			
	2	4	6	8
Min Green 1 *	10	7	10	7
Extension 1 *	-	-	-	-
Max Green 1 *	40	20	40	20
Yellow Clearance	4.0	4.0	4.0	4.0
Red Clearance	2.2	2.8	2.2	2.8
Red Revert	2.0	2.0	2.0	2.0
Walk 1 *	-	-	-	-
Don't Walk 1	-	-	-	-
Seconds Per Actuation *	-	-	-	-
Max Variable Initial *	-	-	-	-
Time Before Reduction *	-	-	-	-
Time To Reduce *	-	-	-	-
Minimum Gap	-	-	-	-
Recall Mode	MAX RECALL	MAX RECALL	MAX RECALL	MAX RECALL
Vehicle Call Memory	-	-	-	-
Dual Entry	-	-	-	-
Simultaneous Gap	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.

LEGEND

- | | | | |
|--|--|--|-----|
| | Traffic Signal Head | | N/A |
| | Modified Signal Head | | N/A |
| | Sign | | N/A |
| | Pedestrian Signal Head With Push Button & Sign | | N/A |
| | Signal Pole with Guy | | N/A |
| | Signal Pole with Sidewalk Guy | | N/A |
| | Inductive Loop Detector | | N/A |
| | Controller & Cabinet | | N/A |
| | Junction Box | | N/A |
| | 2-in Underground Conduit | | N/A |
| | Right of Way | | N/A |
| | Directional Arrow | | N/A |
| | "NO TURN ON RED" Sign (R10-11) | | N/A |

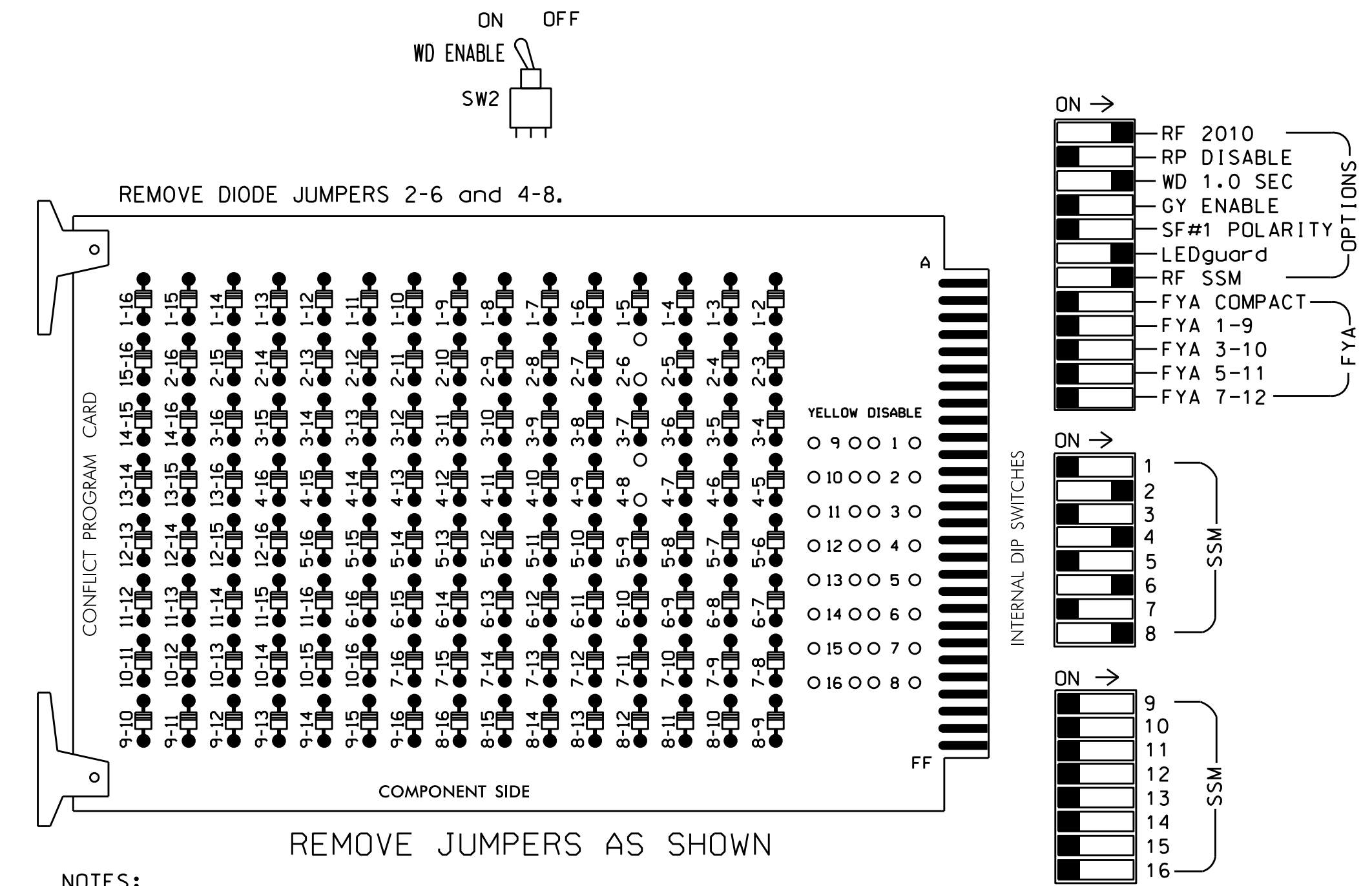
Signal Upgrade

<p>750 N. Greenfield Pkwy, Garner, NC 27529</p>	<p>US 221 (Main St.) at Court Street</p>		<p>SEAL</p>							
	<p>Division 13 Rutherford County Rutherfordton</p> <p>PLAN DATE: January 2020 REVIEWED BY: T.J. Williams</p> <p>PREPARED BY: R.N. Zinser REVIEWED BY:</p>	<p>REVISIONS</p> <table border="1"> <tr> <th>NO.</th> <th>DESCRIPTION</th> <th>INIT.</th> <th>DATE</th> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </table>		NO.	DESCRIPTION	INIT.	DATE			
NO.	DESCRIPTION	INIT.	DATE							

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 R.N.ZINSE

EDI MODEL 2010ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



NOTES:

- Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
- Make sure jumpers SEL2-SEL5 are present on the monitor board.

NOTES

- 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.
- Ensure that Red Enable is active at all times during normal operation. To prevent Red Failures on unused monitor channels, tie unused red monitor inputs 1,3, 5,7,9,10,11,12,13,14,15 & 16 to load switch AC+ per the cabinet manufacturer's instructions.
- Enable Simultaneous Gap-Out for all phases.
- Program phases 2 and 6 for Start Up In Green.
- Program phases 2 and 6 for Yellow Flash.
- If this signal will be managed by an ATMS software, enable controller and detector logging for all enabled detectors.
- The cabinet and controller are part of the Signal System #11324.

EQUIPMENT INFORMATION

CONTROLLER.....2070E
 CABINET.....336
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....POLE
 OUTPUT FILE POSITIONS...12
 LOAD SWITCHES USED.....S2,S4,S6,S8
 PHASES USED.....2,4,6,8
 OVERLAPS.....NONE

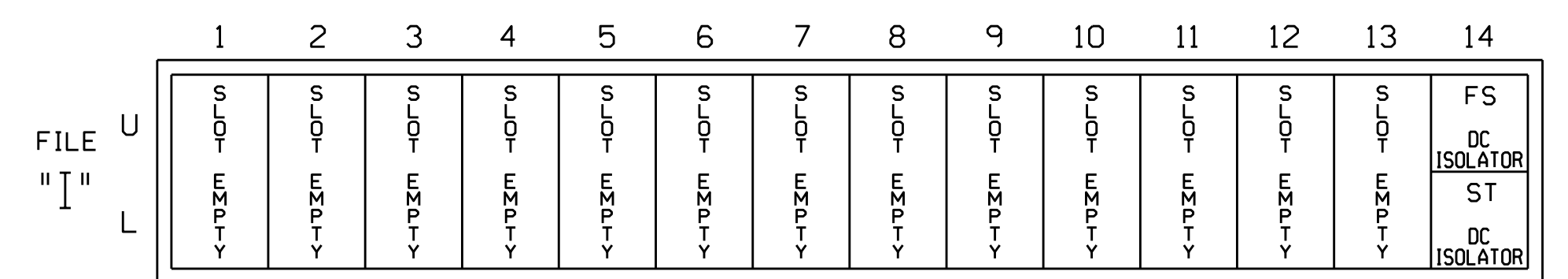
SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S2P	S3	S4	S4P	S5	S6	S6P	S7	S8	S8P
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED
SIGNAL HEAD NO.	NU	21,22	NU	NU	41,42	NU	NU	61,62	NU	NU	81,82	NU
RED		128			101			134			107	
YELLOW		129			102			135			108	
GREEN		130			103			136			109	
RED ARROW												
YELLOW ARROW												
GREEN ARROW												

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)



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

FS = FLASH SENSE
 ST = STOP TIME

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 13-0181
 DESIGNED: January 2020
 SEALED: 2/28/2020
 REVISED:

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Electrical Detail

Electrical and Programming Details For:

Prepared In the Offices of:

750 N. Greenfield Pkwy, Garner, NC 27529

US 221 (Main St.)
 at
 Court Street

Division 13	Rutherford County	Rutherfordton
PLAN DATE: February 2020	REVIEWED BY: T. Joyce	
PREPARED BY: C. Strickland	REVIEWED BY:	
REVISIONS	INIT.	DATE

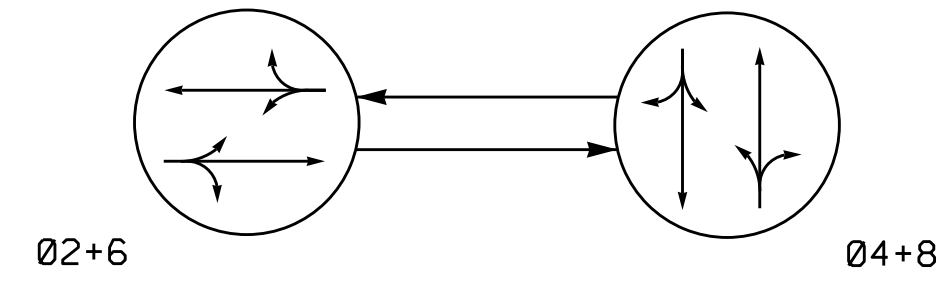
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL

DocuSigned by:
 Todd Joyce
 3/3/2020

SIG. INVENTORY NO. 13-0181

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

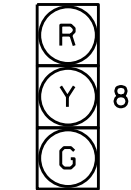
- ← DETECTED MOVEMENT
- ← ← UNDETECTED MOVEMENT (OVERLAP)
- ← - - UN SIGNALIZED MOVEMENT
- ← - - > PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE		
	02+6	04+8	FLASH
21, 22	G	R	Y
41, 42	R	G	R
61, 62	G	R	Y
81, 82	R	G	R

SIGNAL FACE I.D.

All Heads L.E.D.

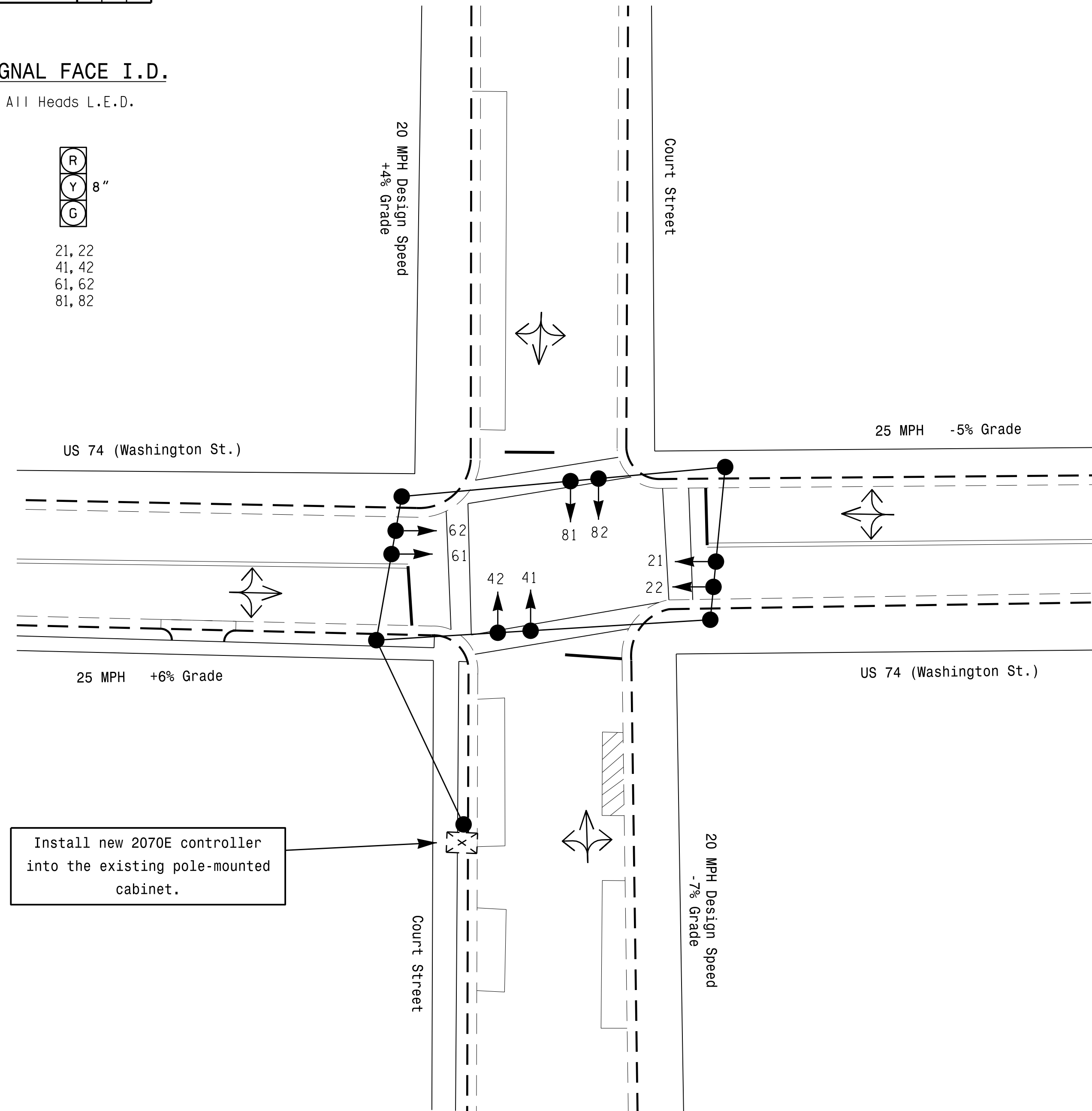


21, 22
41, 42
61, 62
81, 82

2 Phase Pre-Timed Signal System #11324

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Install new 2070E Controller in existing cabinet.
- Pavement markings are existing.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.



Install new 2070E controller into the existing pole-mounted cabinet.

OASIS 2070 TIMING CHART

FEATURE	PHASE			
	2	4	6	8
Min Green 1 *	10	7	10	7
Extension 1 *	-	-	-	-
Max Green 1 *	40	20	40	20
Yellow Clearance	4.0	4.0	4.0	4.0
Red Clearance	2.0	2.3	2.0	2.3
Red Revert	2.0	2.0	2.0	2.0
Walk 1 *	-	-	-	-
Don't Walk 1	-	-	-	-
Seconds Per Actuation *	-	-	-	-
Max Variable Initial *	-	-	-	-
Time Before Reduction *	-	-	-	-
Time To Reduce *	-	-	-	-
Minimum Gap	-	-	-	-
Recall Mode	MAX RECALL	MAX RECALL	MAX RECALL	MAX RECALL
Vehicle Call Memory	-	-	-	-
Dual Entry	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON

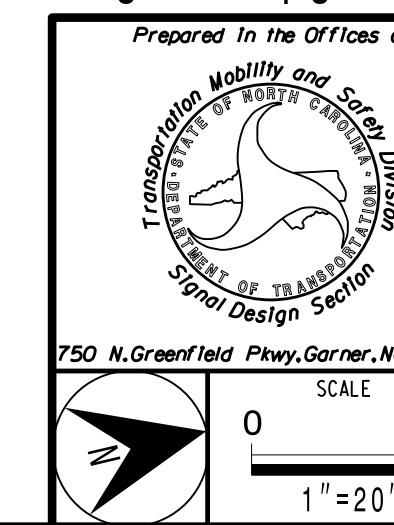
* These values may be field adjusted. Do not adjust Min Green and Extension times for phases 2 and 6 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.

LEGEND

PROPOSED	EXISTING
	Traffic Signal Head
	Modified Signal Head
	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
	Right of Way
	Directional Arrow

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 R.N.Zinzer

Signal Upgrade



US 74 (Washington St.) & Court Street

Division 13 Rutherford County Rutherfordton

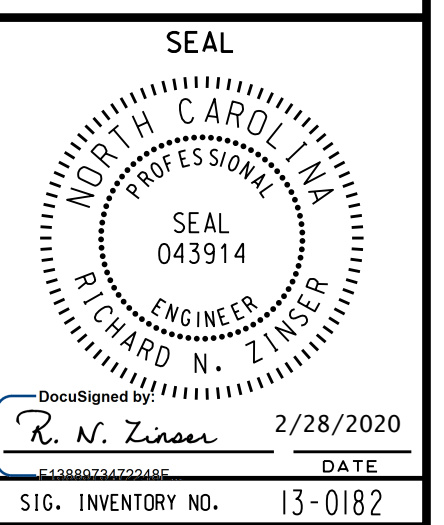
PLAN DATE: January 2020 REVIEWED BY: T.J. Williams

PREPARED BY: R.N. Zinzer REVIEWED BY:

REVISIONS	INIT.	DATE

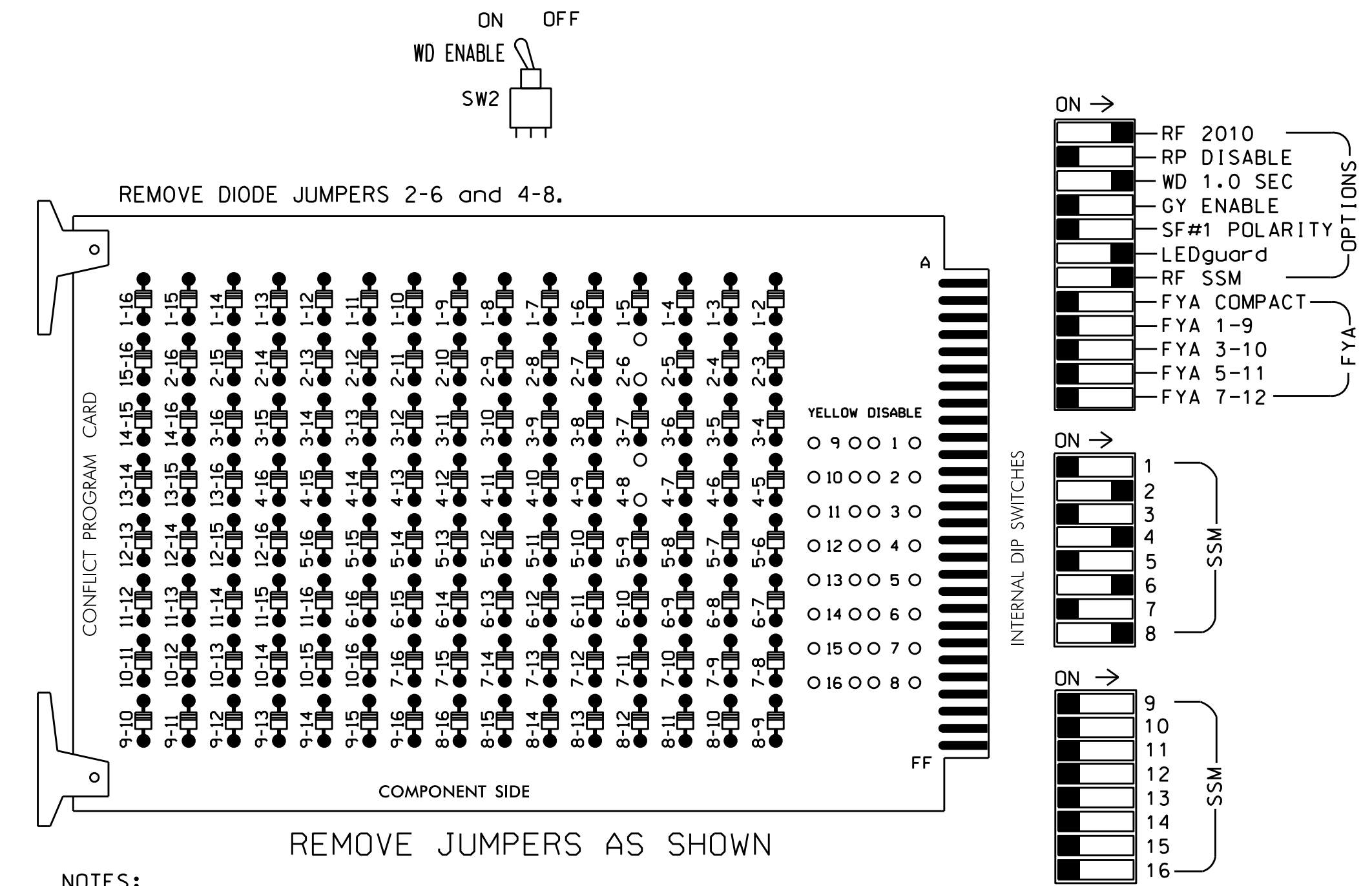
2/28/2020

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



EDI MODEL 2010ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



- NOTES:
- Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
 - Make sure jumpers SEL2-SEL5 are present on the monitor board.
- = DENOTES POSITION OF SWITCH

NOTES

- 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.
- Ensure that Red Enable is active at all times during normal operation. To prevent Red Failures on unused monitor channels, tie unused red monitor inputs 1,3, 5,7,9,10,11,12,13,14,15 & 16 to load switch AC+ per the cabinet manufacturer's instructions.
- Enable Simultaneous Gap-Out for all phases.
- Program phases 2 and 6 for Start Up In Green.
- Program phases 2 and 6 for Yellow Flash.
- If this signal will be managed by an ATMS software, enable controller and detector logging for all enabled detectors.
- The cabinet and controller are part of the Signal System #11324.

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S2P	S3	S4	S4P	S5	S6	S6P	S7	S8	S8P
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED
SIGNAL HEAD NO.	NU	21,22	NU	NU	41,42	NU	NU	61,62	NU	NU	81,82	NU
RED		128			101			134			107	
YELLOW		129			102			135			108	
GREEN		130			103			136			109	
RED ARROW												
YELLOW ARROW												
GREEN ARROW												

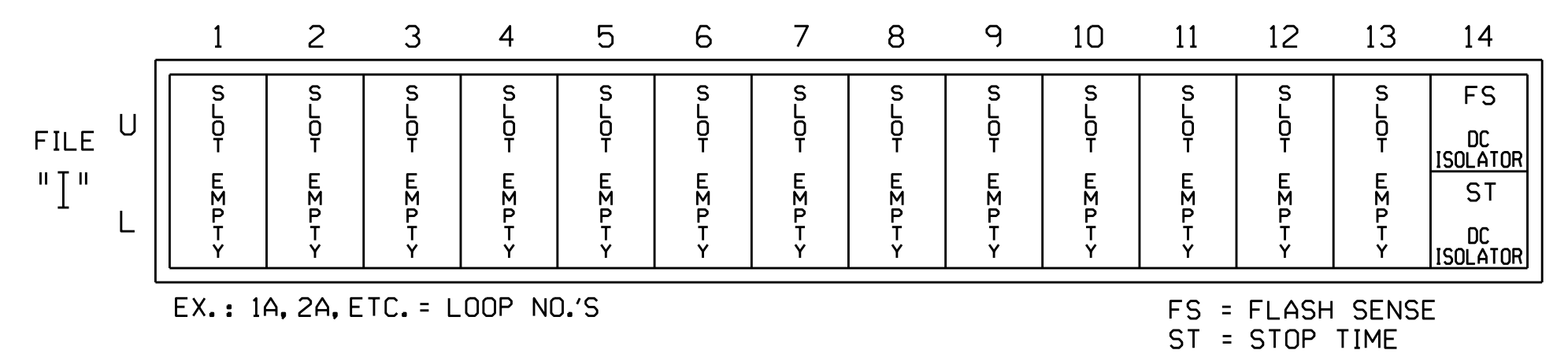
NU = Not Used

EQUIPMENT INFORMATION

CONTROLLER.....2070E
 CABINET.....336
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....POLE
 OUTPUT FILE POSITIONS...12
 LOAD SWITCHES USED.....S2,S4,S6,S8
 PHASES USED.....2,4,6,8
 OVERLAPS.....NONE

INPUT FILE POSITION LAYOUT

(front view)



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 13-0182
 DESIGNED: January 2020
 SEALED: 2/28/2020
 REVISED:

Electrical Detail

Electrical and Programming Details for: **US 74 (Washington St.) & Court Street**

Prepared In the Offices of: **750 N. Greenfield Pkwy, Garner, NC 27529**

Division 13 Rutherford County Rutherfordton

PLAN DATE: February 2020 REVIEWED BY: T. Joyce

PREPARED BY: C. Strickland REVIEWED BY:

REVISIONS INIT. DATE

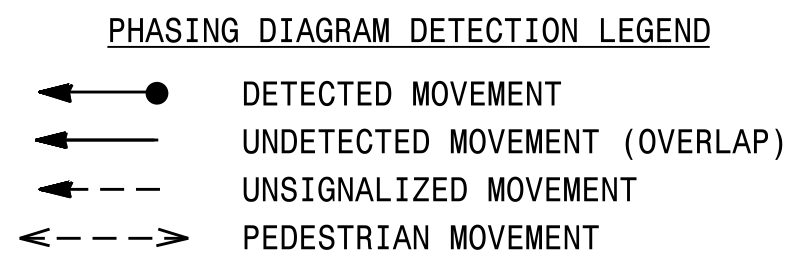
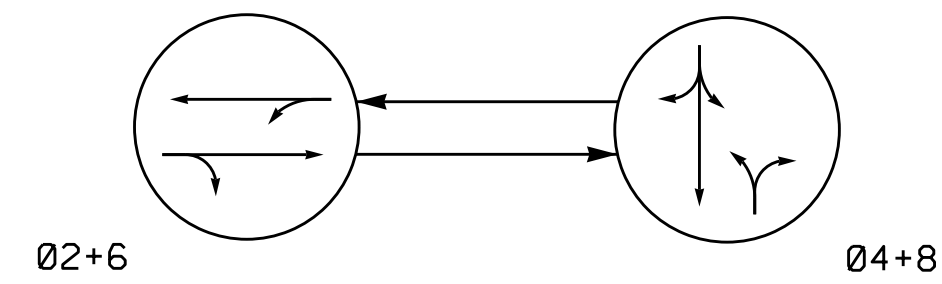
DocSigned by: **D. Todd Joyce** 3/3/2020

SEAL: SEAL 031001 ENGINEER D. TODD JOYCE

SIG. INVENTORY NO. 13-0182

02-0458-2020_13-15
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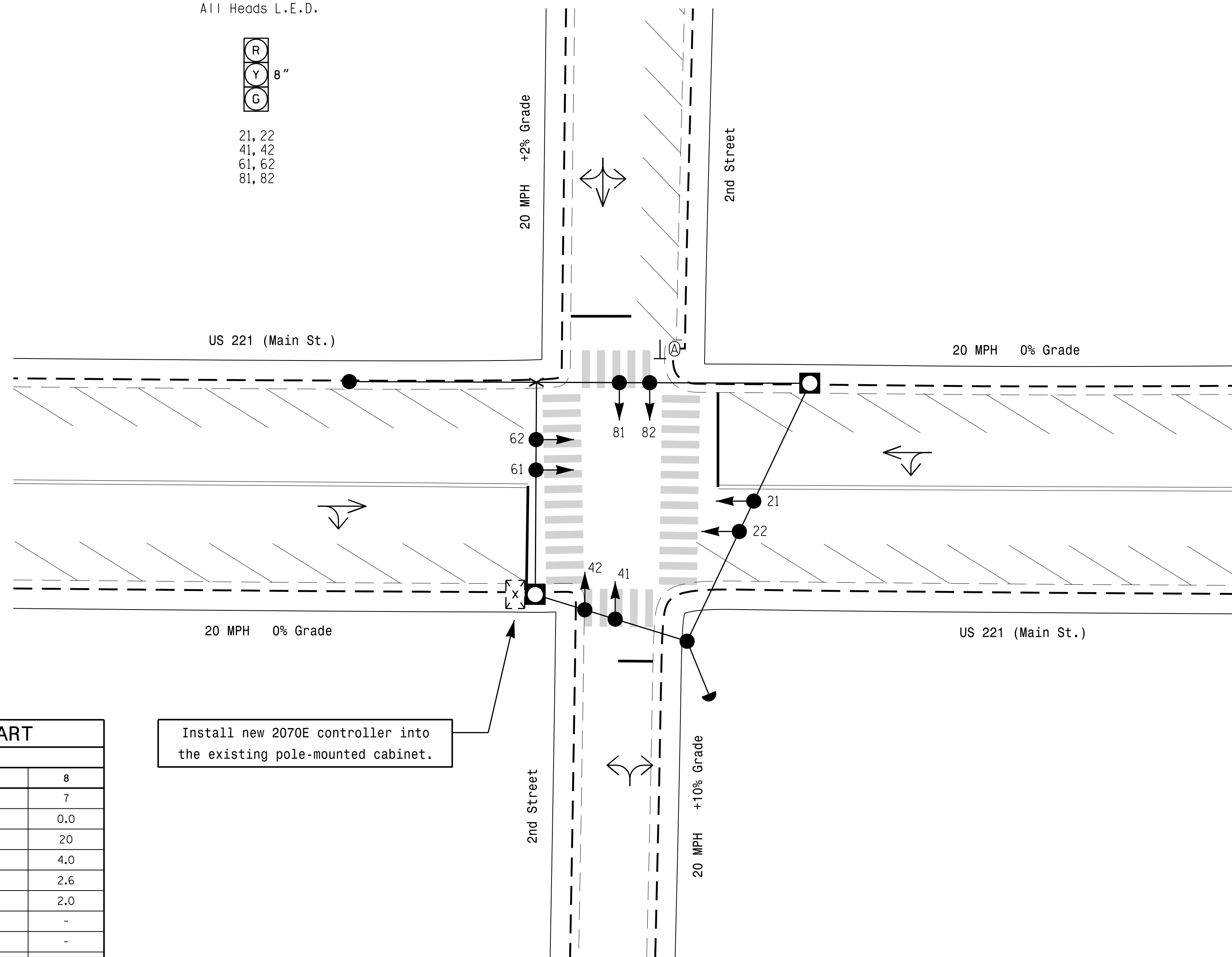
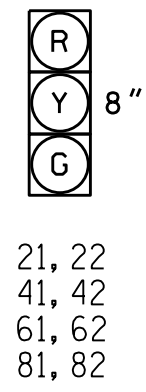
PHASING DIAGRAM



SIGNAL FACE	PHASE		
	02+6	04+8	FLASH
21, 22	G	R	Y
41, 42	R	G	R
61, 62	G	R	Y
81, 82	R	G	R

SIGNAL FACE I.D.

All Heads L.E.D.



Install new 2070E controller into the existing pole-mounted cabinet.

FEATURE	PHASE			
	2	4	6	8
Min Green 1 *	10	7	10	7
Extension 1 *	0.0	0.0	0.0	0.0
Max Green 1 *	40	20	40	20
Yellow Clearance	4.0	4.0	4.0	4.0
Red Clearance	2.3	2.6	2.3	2.6
Red Revert	2.0	2.0	2.0	2.0
Walk 1 *	-	-	-	-
Don't Walk 1	-	-	-	-
Seconds Per Actuation *	-	-	-	-
Max Variable Initial *	-	-	-	-
Time Before Reduction *	-	-	-	-
Time To Reduce *	-	-	-	-
Minimum Gap	-	-	-	-
Recall Mode	MAX RECALL	MAX RECALL	MAX RECALL	MAX RECALL
Vehicle Call Memory	-	-	-	-
Dual Entry	-	-	-	-
Simultaneous Gap	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.

2 Phase Pre-Timed Signal System #11324

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Install new 2070E Controller in existing cabinet.
- Set all detector units to presence mode.
- Pavement markings are existing.
- 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	●→ N/A
●→ Modified Signal Head Sign	○→ N/A
⊥ Pedestrian Signal Head With Push Button & Sign	⊥ N/A
○ Signal Pole with Guy	● Signal Pole with Sidewalk Guy
⊗ Inductive Loop Detector	⊗ Existing Inductive Loop Detector
□ Controller & Cabinet Junction Box	□ Existing Controller & Cabinet Junction Box
- - - 2-in Underground Conduit	- - - Existing 2-in Underground Conduit
- - - Right of Way	- - - Existing Right of Way
→ Directional Arrow	→ Existing Directional Arrow
○ Metal Strain Pole	○ Existing Metal Strain Pole
⊗ "DO NOT ENTER" Sign (R5-1)	⊗ Existing "DO NOT ENTER" Sign (R5-1)

Signal Upgrade

Prepared in the Offices of:

750 N. Greenfield Pkwy, Garner, NC 27529

US 221 (Main St.) at 2nd Street

Division 13 Rutherford County Rutherfordton

PLAN DATE: January 2020 REVIEWED BY: T.J. Williams

PREPARED BY: R.N. Zinser REVIEWED BY:

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DocuSigned by: R. N. Zinser 2/28/2020

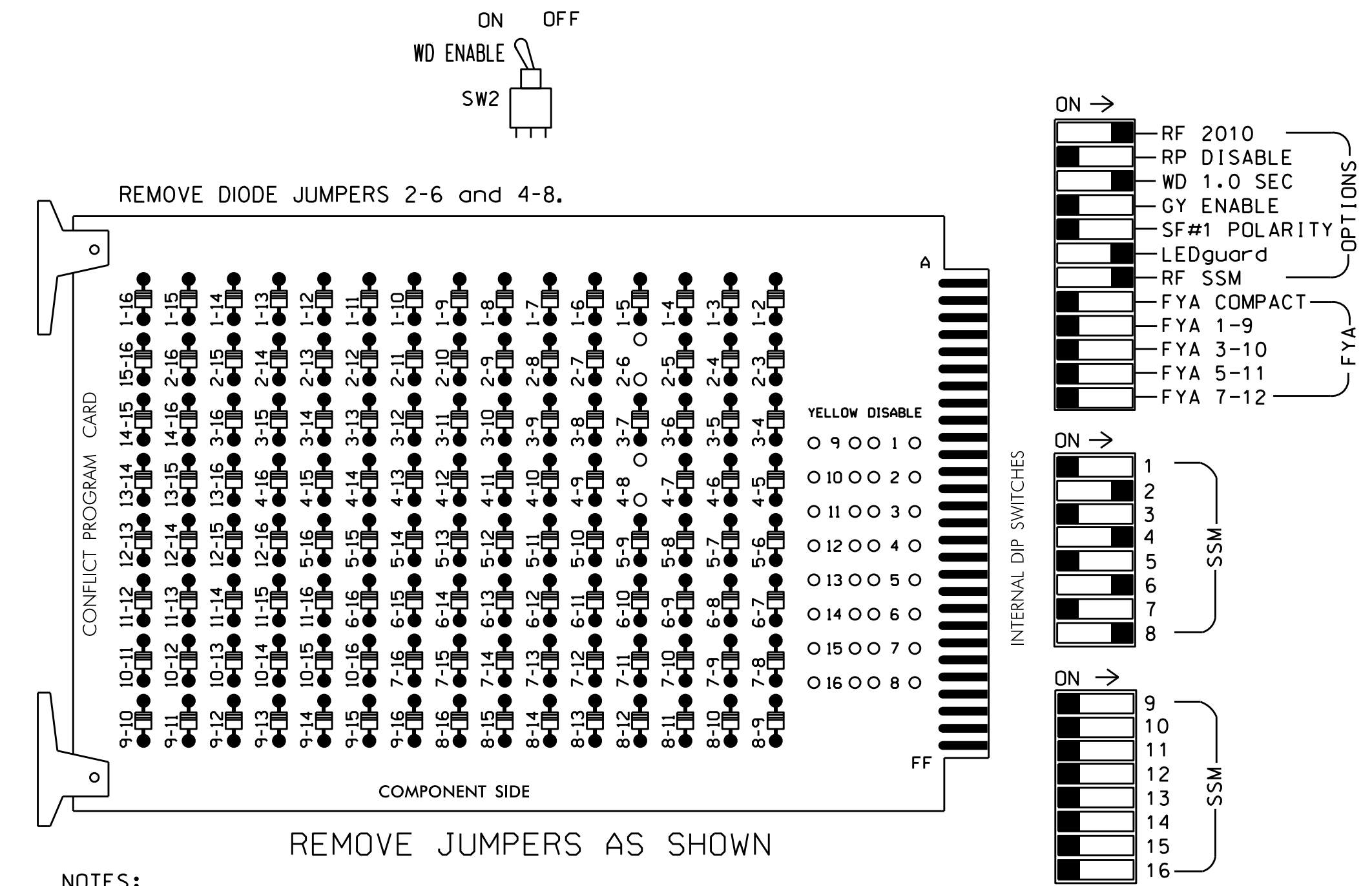
REVISIONS	INIT.	DATE

SCALE: 0 20
1" = 20'

SIG. INVENTORY NO. 13-0180

EDI MODEL 2010ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



- NOTES:
- Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
 - Make sure jumpers SEL2-SEL5 are present on the monitor board.

NOTES

- 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.
- Ensure that Red Enable is active at all times during normal operation. To prevent Red Failures on unused monitor channels, tie unused red monitor inputs 1,3, 5,7,9,10,11,12,13,14,15 & 16 to load switch AC+ per the cabinet manufacturer's instructions.
- Enable Simultaneous Gap-Out for all phases.
- Program phases 2 and 6 for Start Up In Green.
- Program phases 2 and 6 for Yellow Flash.
- If this signal will be managed by an ATMS software, enable controller and detector logging for all enabled detectors.
- The cabinet and controller are part of the Signal System #11324.

EQUIPMENT INFORMATION

CONTROLLER.....2070E
 CABINET.....336
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....POLE
 OUTPUT FILE POSITIONS...12
 LOAD SWITCHES USED.....S2,S4,S6,S8
 PHASES USED.....2,4,6,8
 OVERLAPS.....NONE

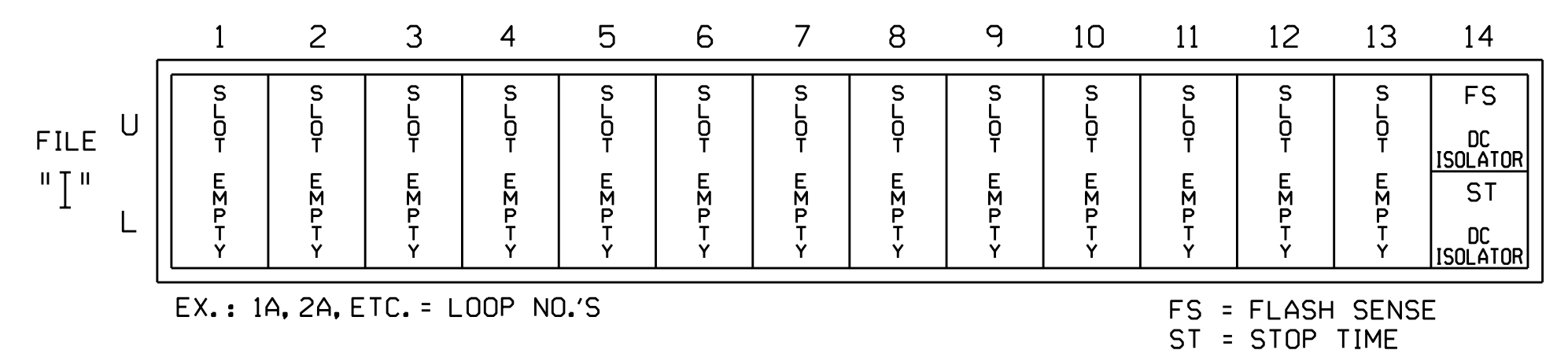
SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S2P	S3	S4	S4P	S5	S6	S6P	S7	S8	S8P
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED
SIGNAL HEAD NO.	NU	21,22	NU	NU	41,42	NU	NU	61,62	NU	NU	81,82	NU
RED		128			101			134			107	
YELLOW		129			102			135			108	
GREEN		130			103			136			109	
RED ARROW												
YELLOW ARROW												
GREEN ARROW												

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 13-0180
 DESIGNED: January 2020
 SEALED: 2/28/2020
 REVISED:

02-0485-2020_14516
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Electrical Detail

Electrical and Programming Details for:

Prepared In the Offices of:

750 N. Greenfield Pkwy, Garner, NC 27529

US 221 (Main Street) at 2nd Street

Division 13 Rutherford County Rutherfordton

PLAN DATE: February 2020 REVIEWED BY: T. Joyce

PREPARED BY: C. Strickland REVIEWED BY:

REVISIONS	INIT.	DATE

DocuSigned by: *T. Joyce* 3/3/2020

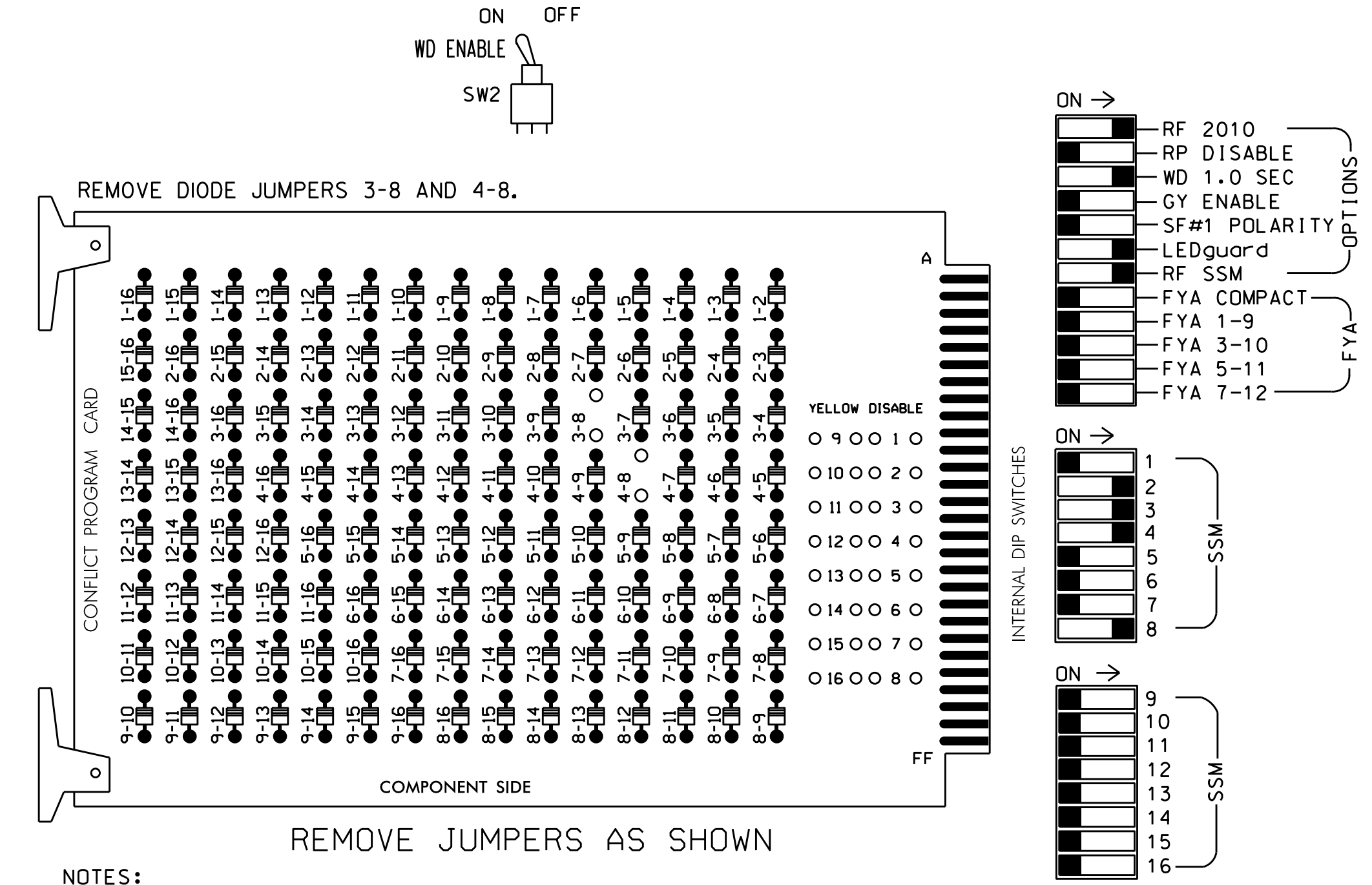
SEAL: SEAL OF NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 031001 ENGINEER T. TODD JOYCE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SIG. INVENTORY NO. 13-0180

EDI MODEL 2010ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



- NOTES:
- Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
 - Make sure jumpers SEL2-SEL5 are present on the monitor board.

NOTES

- 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.
- Ensure that Red Enable is active at all times during normal operation. To prevent Red Failures on unused monitor channels, tie unused red monitor inputs 1,5,6,7,9,10,11,12,13,14,15 & 16 to load switch AC+ per the cabinet manufacturer's instructions.
- Program phases 4 and 8 for Dual Entry.
- Enable Simultaneous Gap-Out for all phases.
- Program phases 4 and 8 for Start Up In Green.
- Program phases 4 and 8 for Yellow Flash.

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S2P	S3	S4	S4P	S5	S6	S6P	S7	S8	S8P
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED
SIGNAL HEAD NO.	NU	21,22	42	NU	22,81	41,42	NU	NU	NU	NU	81,82	NU
RED		128		*	101						107	
YELLOW		129			102						108	
GREEN		130			103						109	
RED ARROW												
YELLOW ARROW			129		117							
GREEN ARROW			130		118							

NU = Not Used
* Denotes install load resistor. See load resistor installation detail this sheet.

EQUIPMENT INFORMATION

CONTROLLER.....2070L
CABINET.....332
SOFTWARE.....ECONOLITE OASIS
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...12
LOAD SWITCHES USED.....S2,S3,S4,S8
PHASES USED.....2,3,4,8
OVERLAPS.....NONE

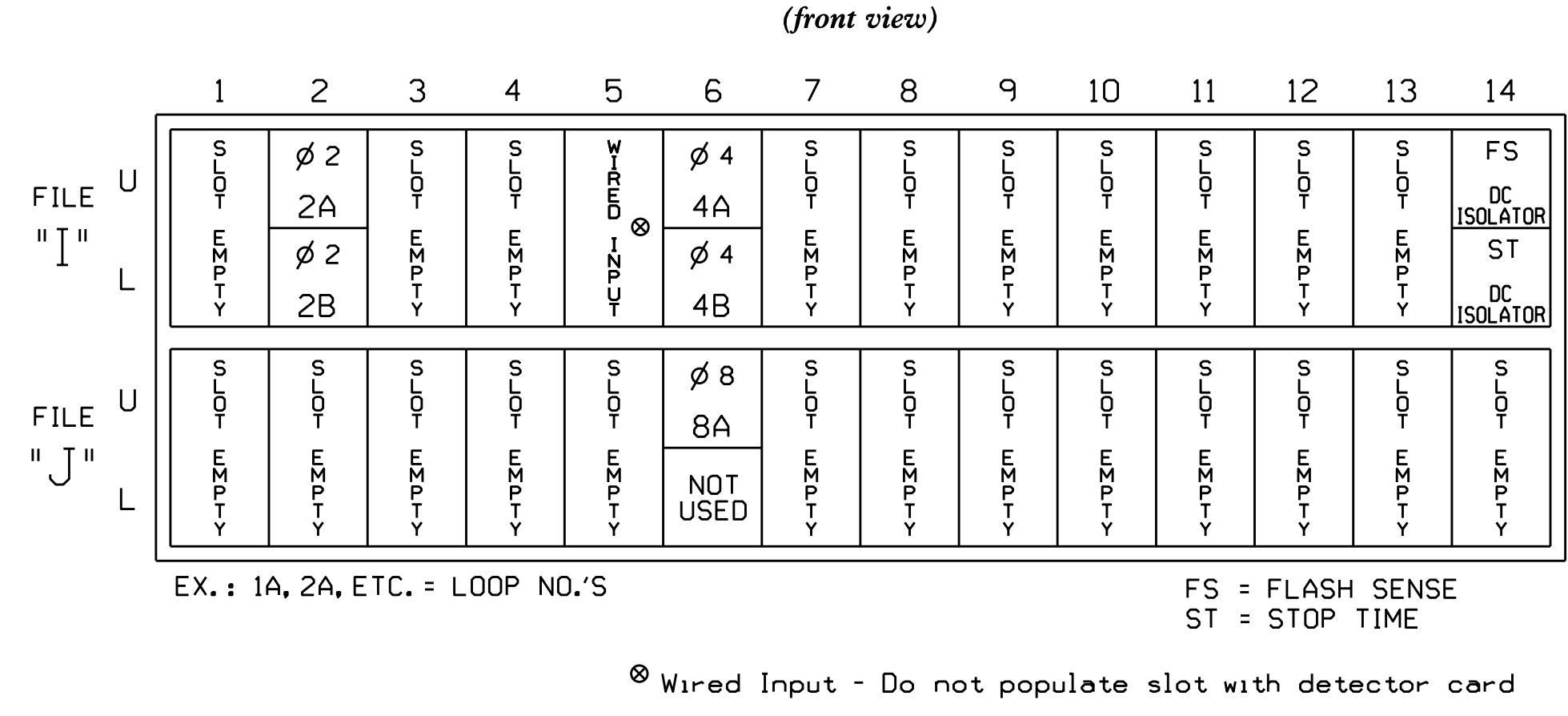
BACKUP PROTECTION NOTE

(program controller as shown below)

From Main Menu press '2' (Phase Control), then '1' (Phase Control Functions). Program phase 2 for 'Backup Protect'. Make sure the Red Revert times shown on the Signal Design Plans are programmed in the 'Phase Timing' menu.

! IMPORTANT: If present, remove all phases from 'Backup Protect'.

INPUT FILE POSITION LAYOUT



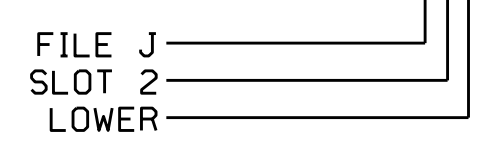
INPUT FILE CONNECTION & PROGRAMMING CHART

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	TB2-5,6	I2U	39	1	2	2	Y	Y			3
2B	TB2-7,8	I2L	43	5	12	2	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			
8A ¹	-	I5U	58	20	3	3	Y	Y			3
	TB5-9,10	J6U	42	4	8	8	Y	Y			

¹Add jumper from I5-W to J6-F, on rear of input file.

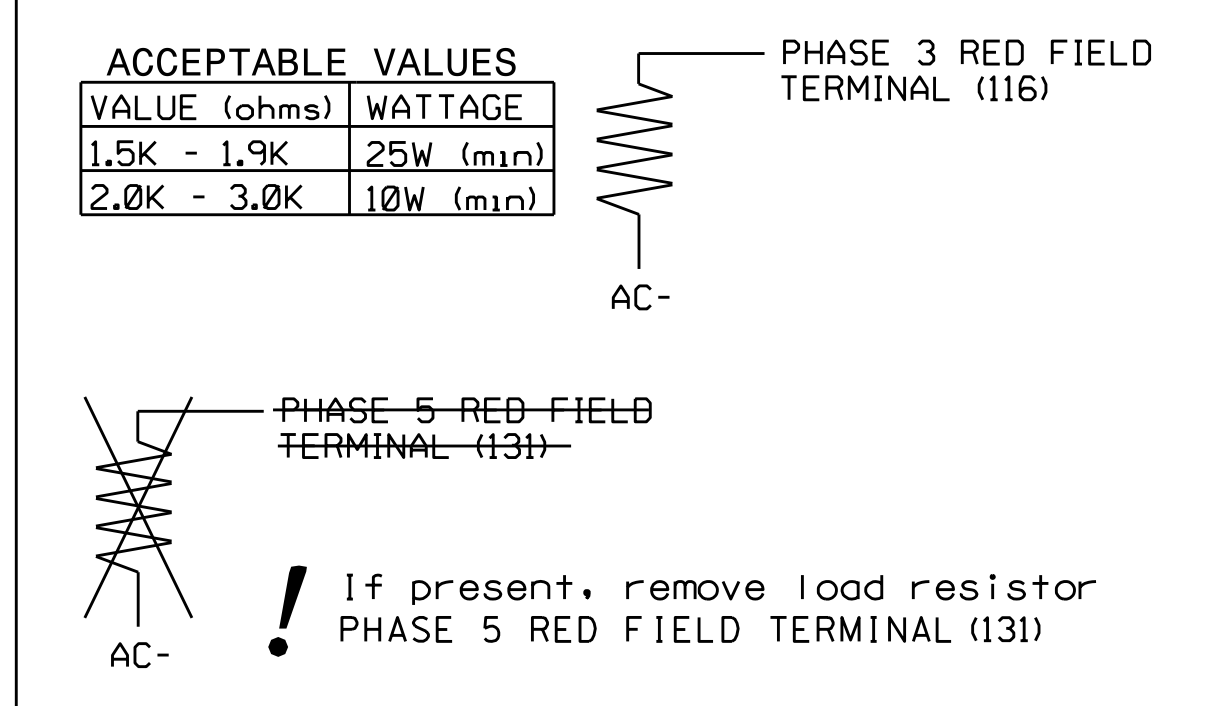
! IMPORTANT: If present, remove jumper from I4-W to J2-F, on rear of input file.

INPUT FILE POSITION LEGEND: J2L



LOAD RESISTOR INSTALLATION DETAIL

(install resistor as shown below)



DYNAMIC BACK-UP CONTROL PROGRAMMING

(program controller as shown below)

- From Main Menu press '2' (Phase Control), then '1' (Phase Control Functions). Scroll to the bottom of the menu and enable Dynamic/Backup Control Function 1.
- From Phase Control Functions Menu press '2' (Dynamic/Backup Control Functions).

DYNAMIC/BACKUP CONTROL FUNCTION #01
OVERLAPS: ABCDEFGHIJKLMNO
IF OVERLAPS ARE ACTIVE:
OR PHASES: 12345678910111213141516
IF PHASES ARE ON: X
OMIT PHASES: X
CALL PHASES: X

BACKUP PROTECTION PROGRAMMING COMPLETE

- !** IMPORTANT: 1. If present, remove all functions from 'Dynamic/Backup'.
- !** IMPORTANT: 2. If present, remove all phases from all 'Dynamic/Backup Control Functions'.

Electrical Detail - Temp 1

Electrical and Programming Details For:

Prepared In the Office of:

750 N. Greenfield Pkwy, Garner, NC 27529

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 13-01771
DESIGNED: January 2020
SEALED: 3/2/2020
REVISED:

US 64/74A at US 74A

Division 13 Rutherford County Ruth

PLAN DATE: February 2020 REVIEWED BY: T. Joyce

PREPARED BY: C. Strickland REVIEWED BY:

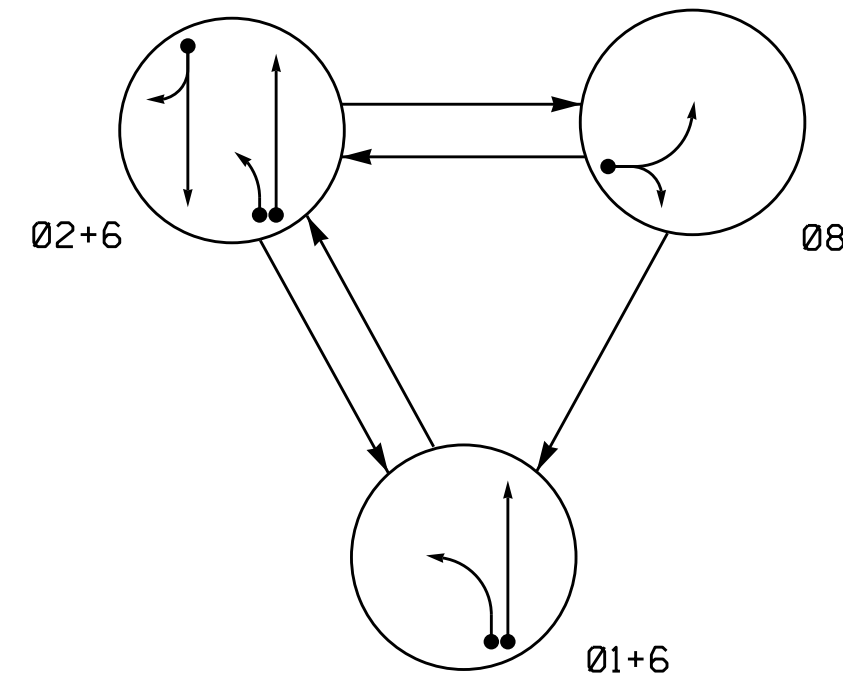
REVISIONS	INIT.	DATE

DocuSigned by: D. Todd Joyce 3/3/2020

SIG. INVENTORY NO. 13-01771

03-1485-2020_01-158
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C:\Users\cstrickland

PHASING DIAGRAM



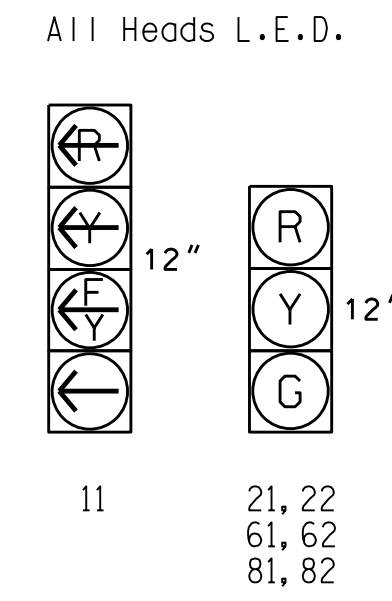
PHASING DIAGRAM DETECTION LEGEND

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

TABLE OF OPERATION

SIGNAL FACE	PHASE			
	Ø1+6	Ø2+6	Ø8	FLIGHT
11	←	←	←	←
21, 22	R	G	R	Y
61, 62	G	G	R	Y
81, 82	R	R	G	R

SIGNAL FACE I.D.



OASIS 2070 LOOP & DETECTOR INSTALLATION CHART

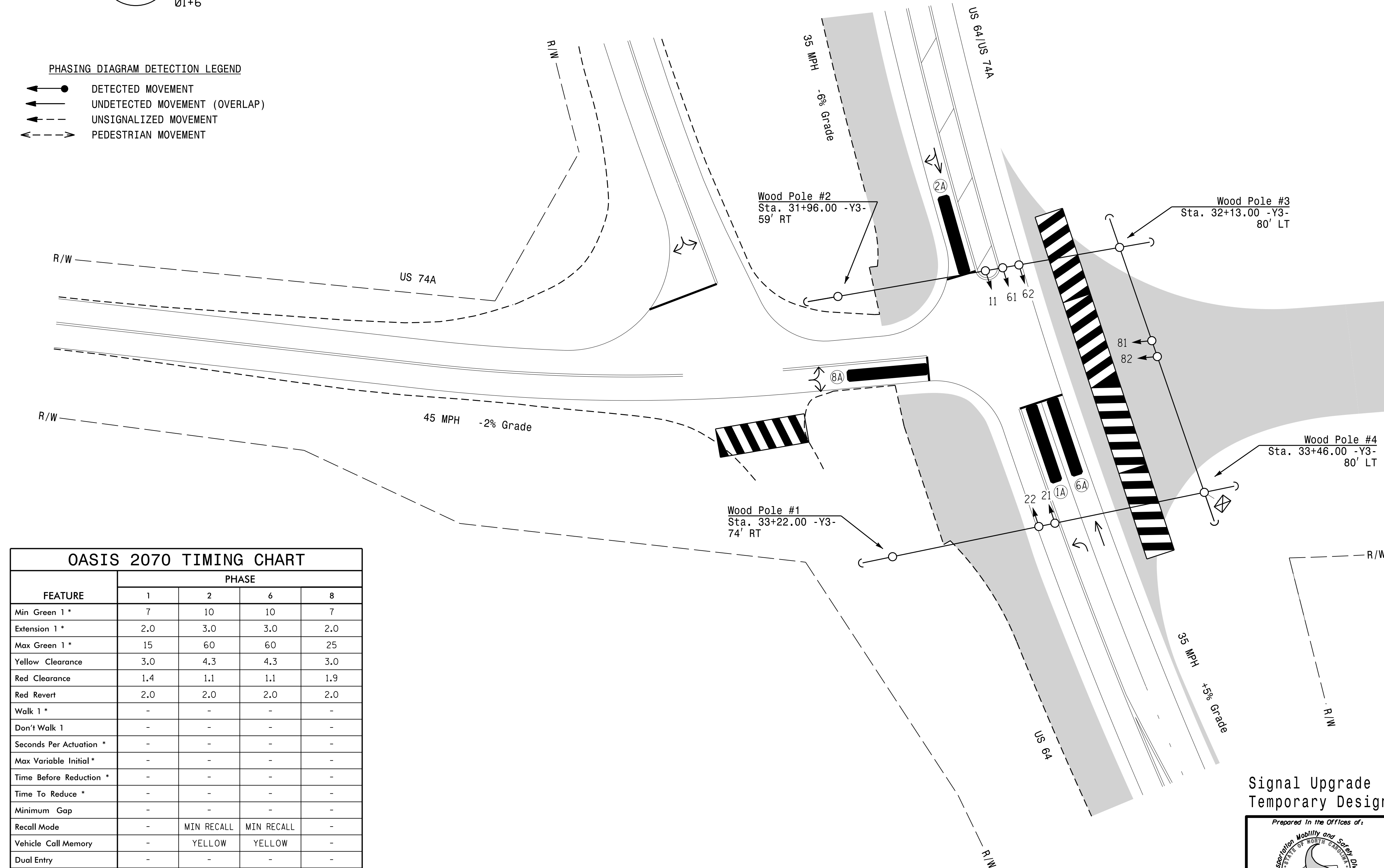
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	DETECTOR PROGRAMMING				STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
					PHASE	CALLING	EXTENSION	FULL TIME DELAY				
1A*	6X40	0	*	Y	1	Y	Y	-	-	15	-	*
					6	Y	Y	-	-	-	-	*
2A*	6X40	0	*	Y	2	Y	Y	-	-	-	-	*
6A*	6X40	0	*	Y	6	Y	Y	-	-	-	-	*
8A*	6X40	0	*	Y	8	Y	Y	-	-	5	-	*

* Video Detection Zone

3 Phase Fully Actuated Isolated

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 may be logged.
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.



OASIS 2070 TIMING CHART

FEATURE	PHASE			
	1	2	6	8
Min Green 1 *	7	10	10	7
Extension 1 *	2.0	3.0	3.0	2.0
Max Green 1 *	15	60	60	25
Yellow Clearance	3.0	4.3	4.3	3.0
Red Clearance	1.4	1.1	1.1	1.9
Red Revert	2.0	2.0	2.0	2.0
Walk 1 *	-	-	-	-
Don't Walk 1	-	-	-	-
Seconds Per Actuation *	-	-	-	-
Max Variable Initial *	-	-	-	-
Time Before Reduction *	-	-	-	-
Time To Reduce *	-	-	-	-
Minimum Gap	-	-	-	-
Recall Mode	-	MIN RECALL	MIN RECALL	-
Vehicle Call Memory	-	YELLOW	YELLOW	-
Dual Entry	-	-	-	-
Simultaneous Gap	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.

LEGEND

PROPOSED	EXISTING
○ → Traffic Signal Head	● → N/A
◐ → Modified Signal Head	◐ → N/A
⊥ Sign	⊥ → N/A
⊥ Pedestrian Signal Head With Push Button & Sign	⊥ → N/A
○ Signal Pole with Guy	● → N/A
○ Signal Pole with Sidewalk Guy	● → N/A
⊠ Inductive Loop Detector	⊠ → N/A
⊠ Controller & Cabinet	⊠ → N/A
□ Junction Box	□ → N/A
--- 2-in Underground Conduit	--- → N/A
N/A Right of Way	--- → N/A
→ Directional Arrow	→ → N/A
▬ Video Detection Area	▬ → N/A
▬ Construction Zone	▬ → N/A

Signal Upgrade
Temporary Design 2 - Phase III

Prepared in the Offices of:

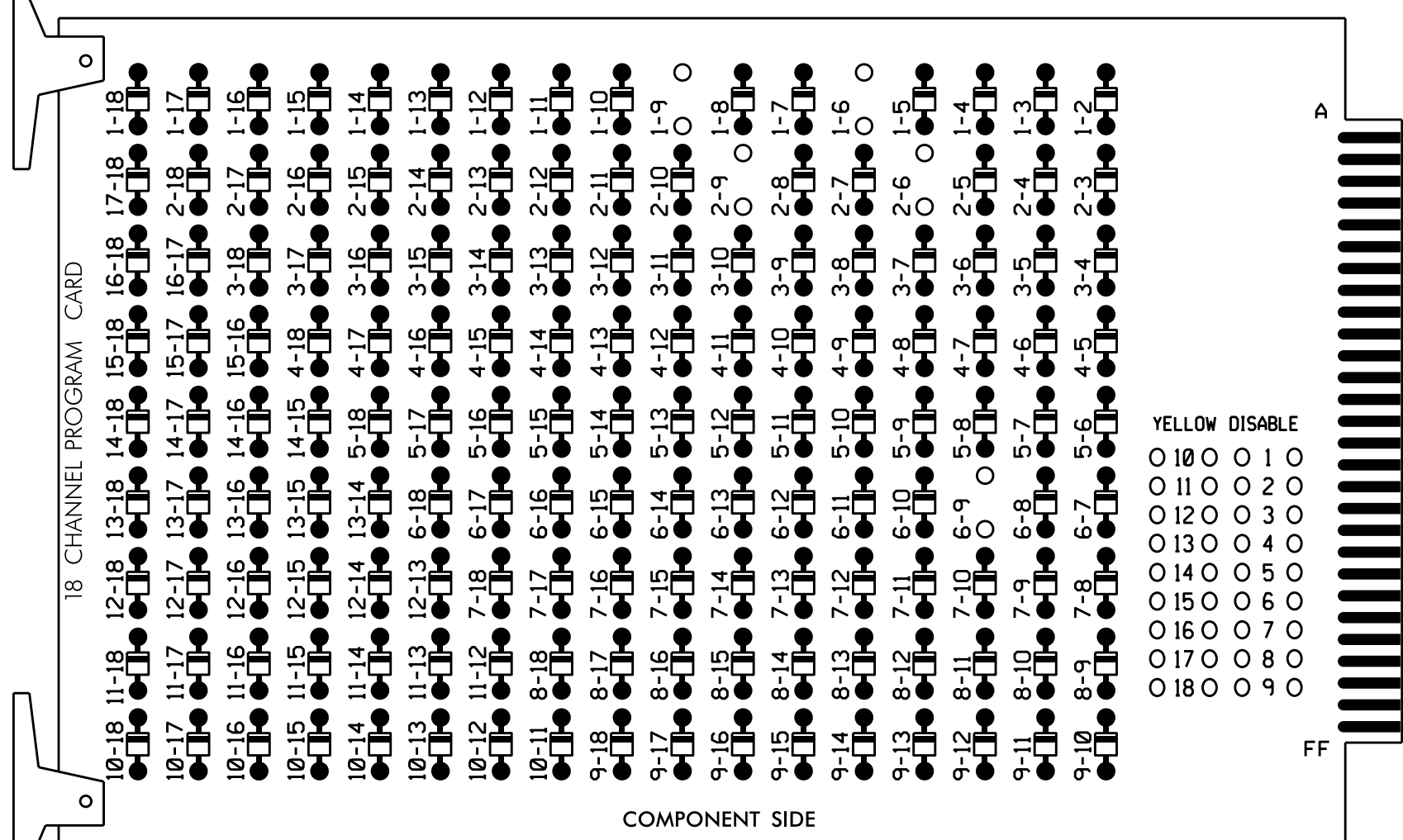
US 64/74A at US 74A
 Division 13 Rutherford County
 PLAN DATE: January 2020 REVIEWED BY: T.J. Williams
 PREPARED BY: R.N. Zinser REVIEWED BY:
 SCALE: 1" = 30'
 REVISIONS: _____ INIT. DATE
 DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
 SEAL: NORTH CAROLINA PROFESSIONAL ENGINEER R. CHARLES N. ZINSER 043914
 Date: 3/2/2020
 S.I.G. INVENTORY NO. 13-017712

02-MAR-2020 09:25
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 R.N. Zinser

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

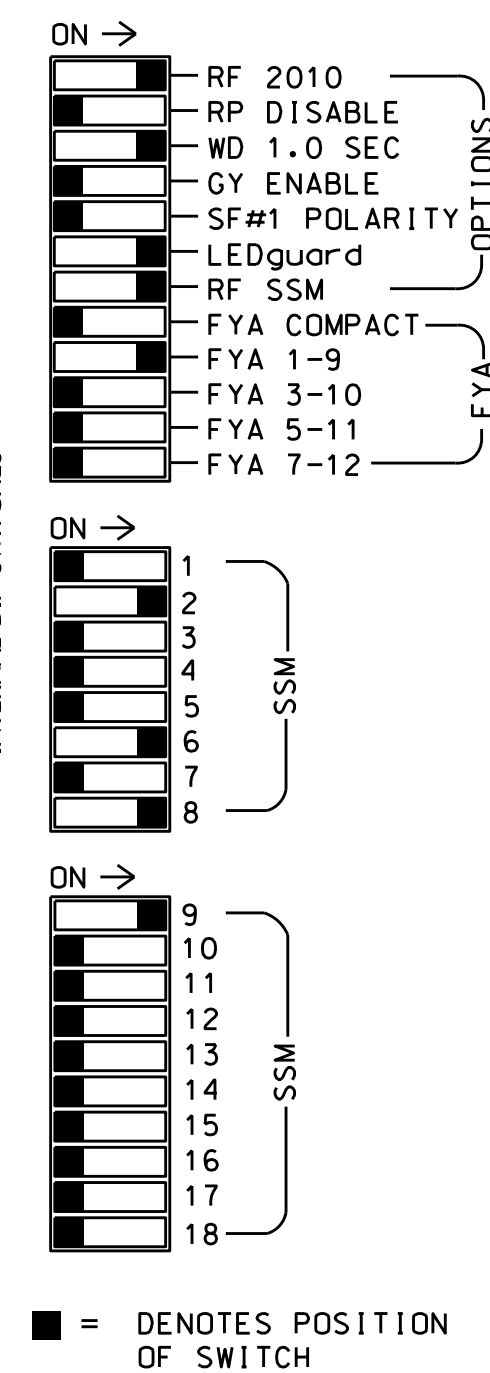
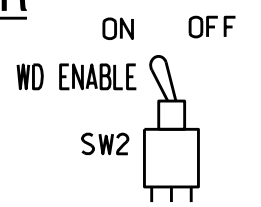
REMOVE DIODE JUMPERS 1-6, 1-9, 2-6, 2-9 and 6-9.



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 Startup In Green.
4. Program phases 2 and 6 for Yellow Flash, and overlap 1 as Wag Overlaps.

EQUIPMENT INFORMATION

CONTROLLER.....2070E
 CABINET.....332 W/ AUX
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
 LOAD SWITCHES USED.....S1,S2,S8,S11,AUX S1
 PHASES USED.....1,2,6,8
 OVERLAP "A".....1+2
 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.	11	21,22	NU	NU	NU	NU	NU	61,62	NU	NU	81,82	NU	11	NU	NU	NU	NU	NU
RED		128						134			107							
YELLOW	*	129						135			108							
GREEN		130						136			109							
RED ARROW													A121					
YELLOW ARROW													A122					
FLASHING YELLOW ARROW													A123					
GREEN ARROW	127																	

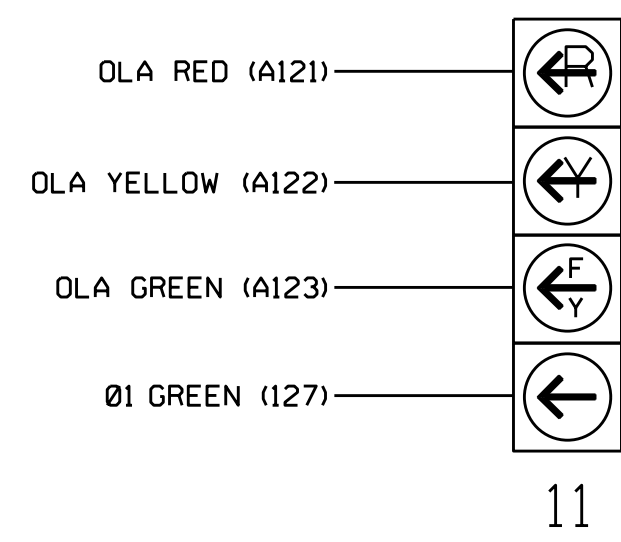
NU = Not Used

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

★ See pictorial of head wiring in detail this sheet.

4 SECTION FYA PPLT SIGNAL WIRING DETAIL

(wire signal head as shown)

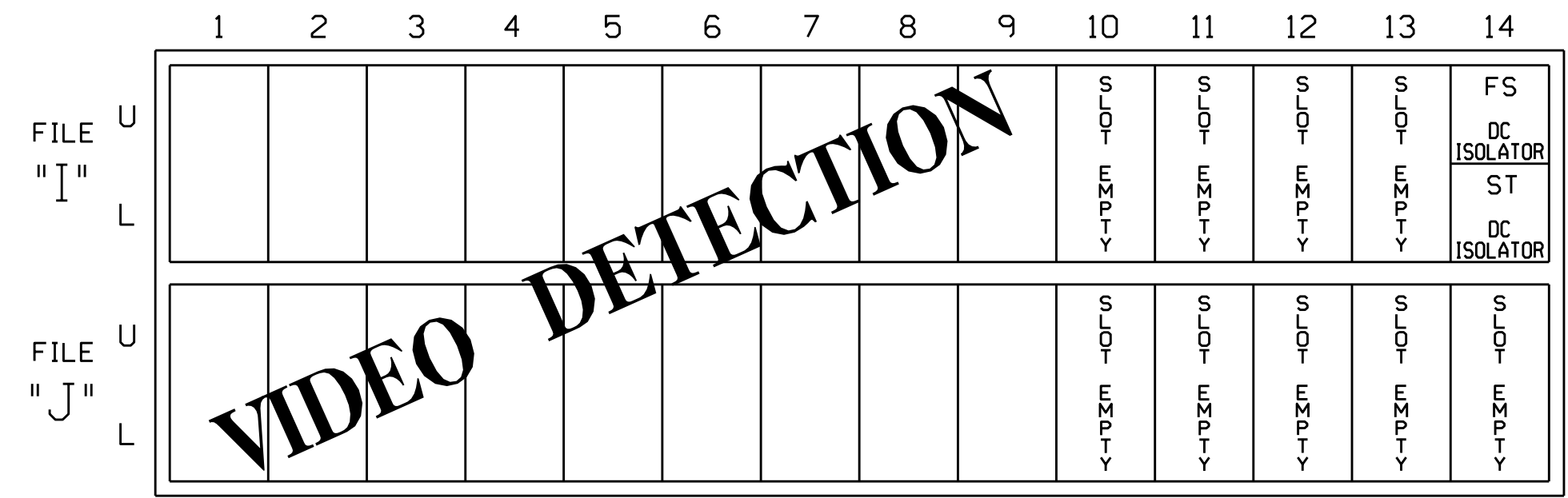


NOTE

1. The sequence display for this signal requires special logic programming. See sheet 2 of 2 for programming instructions.

INPUT FILE POSITION LAYOUT

(front view)



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

FS = FLASH SENSE
 ST = STOP TIME

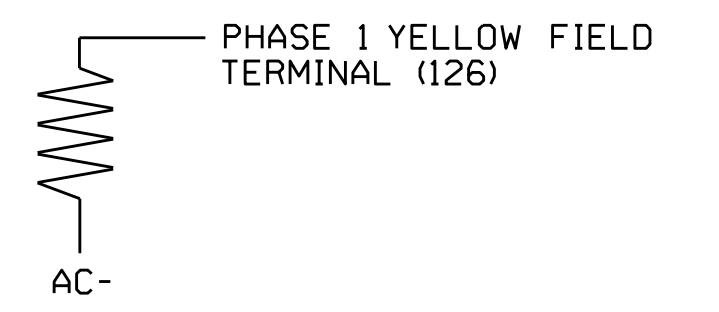
SPECIAL DETECTOR NOTE

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

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)



Electrical Detail - Temp 2 - Sheet 1 of 2

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 13-0177T2
 DESIGNED: January 2020
 SEALED: 3/2/2020
 REVISED:

ELECTRICAL AND PROGRAMMING DETAILS FOR: Prepared In the Offices of: 750 N. Greenfield Pkwy, Garner, NC 27529	US 64/74A at US 74A	SEAL PROFESSIONAL ENGINEER SEAL 031001 D. TODD JOYCE
	Division 13 Rutherford County Ruth PLAN DATE: February 2020 REVIEWED BY: T. Joyce PREPARED BY: C. Strickland REVIEWED BY:	
REVISIONS INIT. DATE	3/3/2020 DATE	SIGNED BY: D. Todd Joyce 3/3/2020 DATE

03-1458-2020 08:22
 *130177T2.edi et c...mk.dgn
 cbsstr/ckl/and

**LOGICAL I/O PROCESSOR PROGRAMMING DETAIL
TO PRODUCE SPECIAL FYA-PPLT SIGNAL SEQUENCE**

(program controller as shown below)

- FROM MAIN MENU PRESS '2' (PHASE CONTROL), THEN '1' (PHASE CONTROL FUNCTIONS). SCROLL TO THE BOTTOM OF THE MENU AND ENABLE ACT LOGIC COMMANDS 1, 2, AND 3.
- FROM MAIN MENU PRESS '6' (OUTPUTS), THEN '3' (LOGICAL I/O PROCESSOR).

```

LOGICAL I/O COMMAND #1 (+/-COMMAND#)
IF ACTIVE PHASE #1 IS ON
AND RED CLEAR ON PHASE #1 IS ON
    ↓
    SCROLL DOWN
    ↓
THEN:
SET OUTPUT ASSIGNMENT #50 ON
SET OUTPUT ASSIGNMENT #51 OFF
    ↓
    PRESS '+'
  
```

NOTE: LOGIC FOR PHASE 1 RED CLEAR WHEN TRANSITIONING FROM PHASE 1 TO PHASE 2 (HEAD 11).

```

LOGICAL I/O COMMAND #2 (+/-COMMAND#)
IF ACTIVE PHASE #1 IS ON
    ↓
    SCROLL DOWN
    ↓
THEN:
SET OUTPUT ASSIGNMENT #52 OFF
    ↓
    PRESS '+'
  
```

NOTE: LOGIC FOR SWITCHING FLASHING YELLOW ARROW "OFF" DURING PHASE 1 (HEAD 11).

```

LOGICAL I/O COMMAND #3 (+/-COMMAND#)
IF YELLOW ON PHASE #1 IS ON
    ↓
    SCROLL DOWN
    ↓
THEN:
SET OUTPUT ASSIGNMENT #51 ON
  
```

NOTE: LOGIC FOR YELLOW ARROW CLEARANCE FROM PHASE 1 (HEAD 11).

LOGIC I/O PROCESSOR PROGRAMMING COMPLETE

<p>OUTPUT REFERENCE SCHEDULE</p> <p>OUTPUT 50 = Overlap A Red OUTPUT 51 = Overlap A Yellow OUTPUT 52 = Overlap A Green</p>

OVERLAP PROGRAMMING DETAIL

(program controller as shown below)

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

```

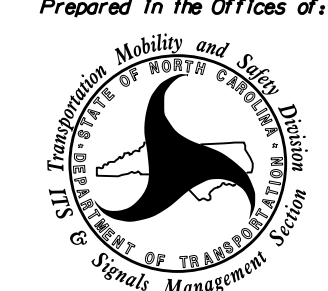
PAGE 1: VEHICLE OVERLAP 'A' SETTINGS
PHASE: {12345678910111213141516
VEH OVL PARENTS: {XX
VEH OVL NOT VEH: {
VEH OVL NOT PED: {
VEH OVL GRN EXT: {
STARTUP COLOR: - RED - YELLOW - GREEN
FLASH COLORS: - RED - YELLOW X GREEN
SELECT VEHICLE OVERLAP OPTIONS: (Y/N)
FLASH YELLOW IN CONTROLLER FLASH?...Y
GREEN EXTENSION (0-255 SEC)...0.0
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

OVERLAP PROGRAMMING COMPLETE

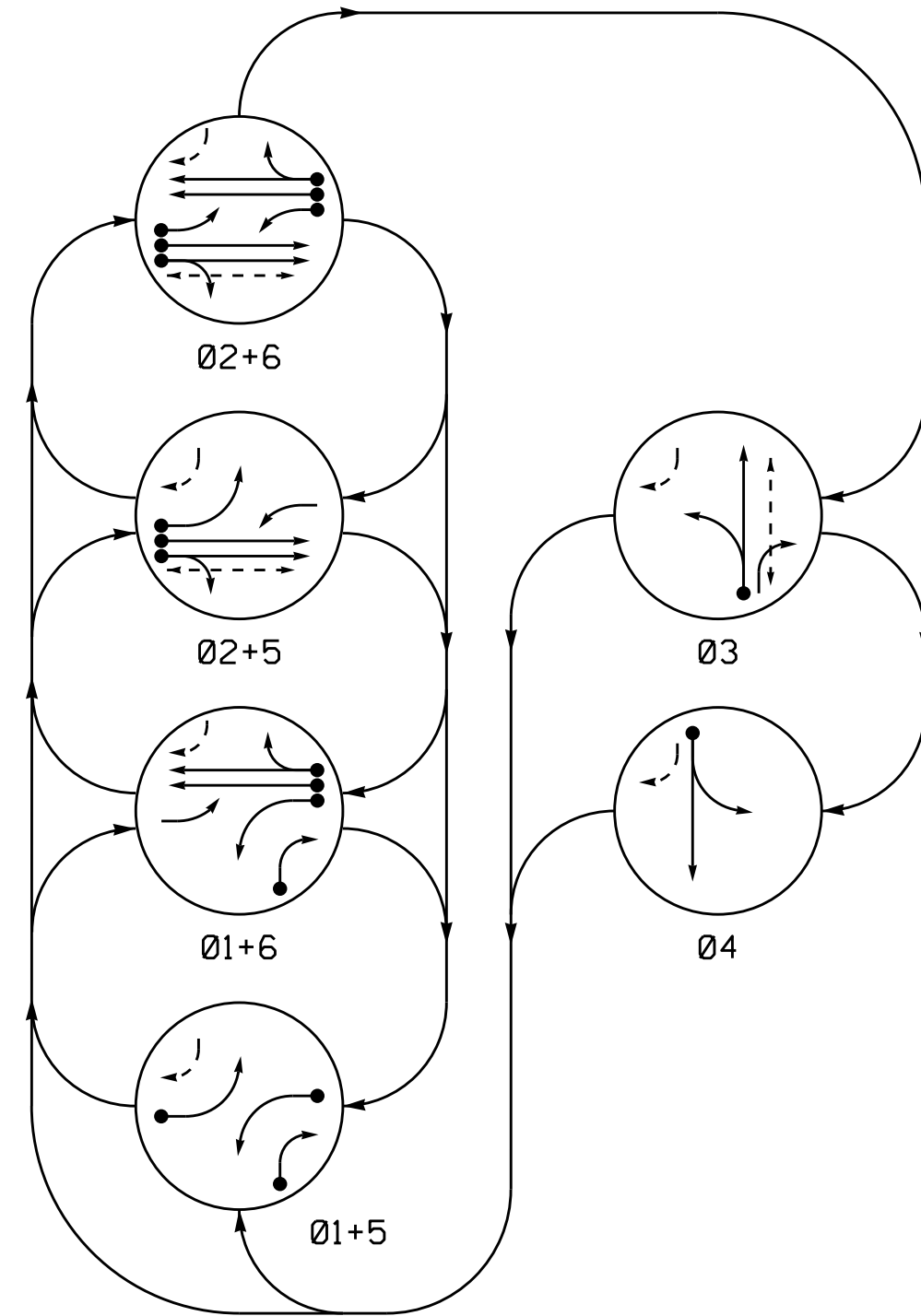
<p>THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 13-0177T2 DESIGNED: January 2020 SEALED: 3/2/2020 REVISED:</p>
--

Electrical Detail - Temp 2 - Sheet 2 of 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:	US 64/74A at US 74A		SEAL NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 031001 TODD JOYCE
	Prepared In the Offices of:  750 N. Greenfield Pkwy, Garner, NC 27529	Division 13 Rutherford County Ruth PLAN DATE: February 2020 REVIEWED BY: T. Joyce PREPARED BY: C. Strickland REVIEWED BY:	REVISIONS INIT. DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

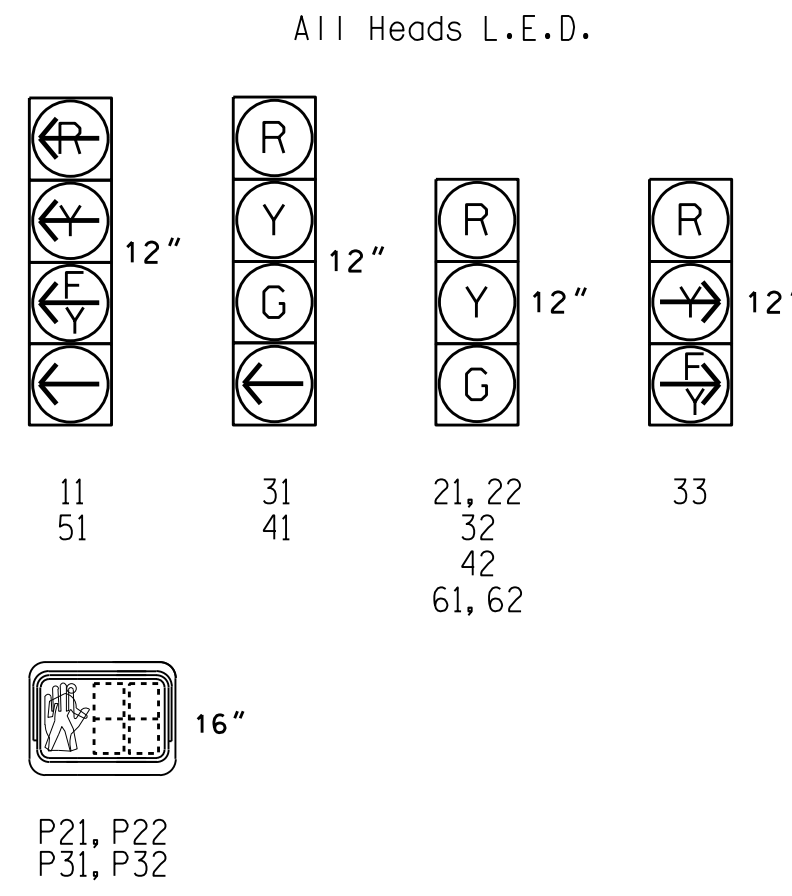
PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND
 -●- DETECTED MOVEMENT
 -○- UNDETECTED MOVEMENT (OVERLAP)
 - - - UNSIGNALIZED MOVEMENT
 - - - PEDESTRIAN MOVEMENT

SIGNAL FACE	PHASE						FLASH
	01+5	01+6	02+5	02+6	03	04	
11	-	-	-	-	-	-	-
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
33	E	E	R	R	E	R	R
41	R	R	R	R	G	R	R
42	R	R	R	R	G	R	R
51	-	-	-	-	-	-	-
61, 62	R	G	R	G	R	R	Y
P21, P22	DW	DW	W	DW	DW	DRK	
P31, P32	DW	DW	DW	W	DW	DRK	
SIGN "E"	OFF	OFF	ON	OFF	OFF	OFF	
SIGN "F"	OFF	OFF	OFF	ON	OFF	OFF	

SIGNAL FACE I.D.



LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	DETECTOR PROGRAMMING							
					PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
1A	6X40	0	2-4-2	Y	1	Y	Y	-	-	15	-	Y
1B	6X40	0	2-4-2	Y	1	Y	Y	-	-	15	-	Y
2A	6X6	70	5	Y	2	Y	Y	-	-	-	-	Y
2B	6X6	70	5	Y	2	Y	Y	-	-	-	-	Y
3A	6X40	0	2-4-2	Y	3	Y	Y	-	-	3	-	Y
4A	6X40	0	2-4-2	Y	4	Y	Y	-	-	-	-	Y
4B	6X40	0	2-4-2	Y	4	Y	Y	-	-	20	-	Y
5A	6X40	0	2-4-2	Y	5	Y	Y	-	-	15	-	Y
6A	6X6	70	4	Y	6	Y	Y	-	-	-	-	Y
6B	6X6	70	4	Y	6	Y	Y	-	-	-	-	Y

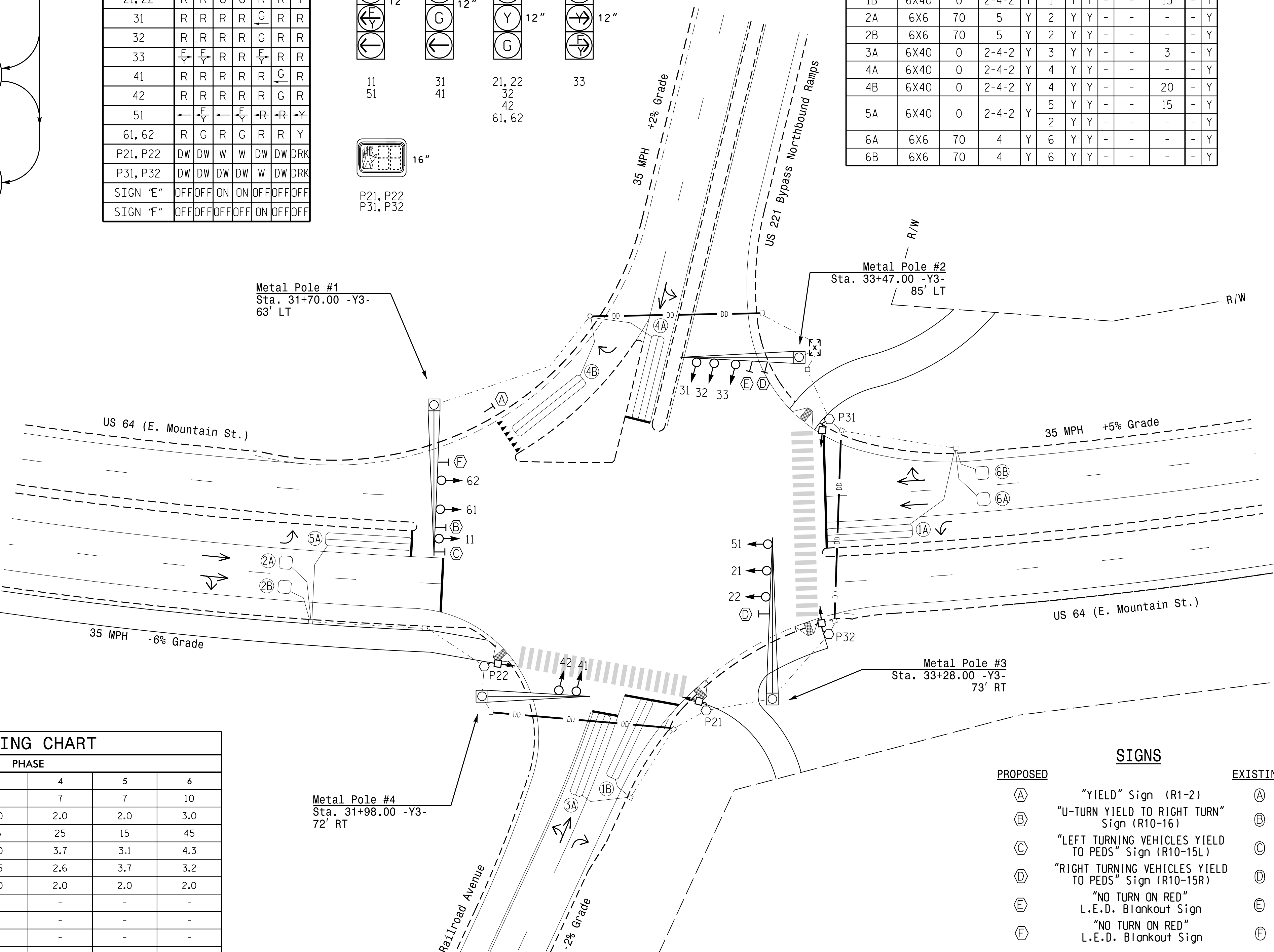
6 Phase Fully Actuated D13-31_Rutherfordton

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Phase 1 and/or phase 5 may be lagged.
- The order of phase 3 and phase 4 may be reversed.
- When a pedestrian call is present on phase 2, illuminate Sign "E" at the beginning of the preceding yellow clearance interval. This sign will remain on through the flashing "DON'T WALK" interval.
- When a pedestrian call is present on phase 3, illuminate Sign "F" at the beginning of the preceding yellow clearance interval. This sign will remain on through the flashing "DON'T WALK" interval.
- Set all detector units to presence mode.
- Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
- Program pedestrian heads to countdown the flashing "Don't Walk" time only.
- Ensure flashing operation does not alter operation of blankout signs.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.

FEATURE	PHASE					
	1	2	3	4	5	6
Min Green 1 *	7	10	7	7	7	10
Extension 1 *	2.0	3.0	2.0	2.0	2.0	3.0
Max Green 1 *	15	45	25	25	15	45
Yellow Clearance	3.0	4.3	4.0	3.7	3.1	4.3
Red Clearance	3.6	3.2	2.5	2.6	3.7	3.2
Red Revert	2.0	2.0	2.0	2.0	2.0	2.0
Advance Walk	-	5	5	-	-	-
Walk 1 *	-	7	7	-	-	-
Don't Walk 1	-	22	24	-	-	-
Seconds Per Actuation *	-	-	-	-	-	-
Max Variable Initial *	-	-	-	-	-	-
Time Before Reduction *	-	-	-	-	-	-
Time To Reduce *	-	-	-	-	-	-
Minimum Gap	-	-	-	-	-	-
Recall Mode	-	MIN RECALL	-	-	-	MIN RECALL
Vehicle Call Memory	-	YELLOW	-	-	-	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.



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	- - - →
- - - → Right of Way	- - - →
→ → Directional Arrow	→ →
○ → Metal Pole with Mastarm	○ →
○ → Directional Drill	N/A
○ → Type II Signal Pedestal	○ →
N/A →	○ →
	⚓ → Curb Ramp

SIGNS

PROPOSED	EXISTING
(A) "YIELD" Sign (R1-2)	(A)
(B) "U-TURN YIELD TO RIGHT TURN" Sign (R10-16)	(B)
(C) "LEFT TURNING VEHICLES YIELD TO PEDS" Sign (R10-15L)	(C)
(D) "RIGHT TURNING VEHICLES YIELD TO PEDS" Sign (R10-15R)	(D)
(E) "NO TURN ON RED" L.E.D. Blankout Sign	(E)
(F) "NO TURN ON RED" L.E.D. Blankout Sign	(F)

This plan supersedes the one signed and sealed on 2/23/2021.

Signal Upgrade - Final Design

US 64 (E. Mountain St.) at US 221 Bypass Northbound Ramps/ Railroad Avenue

Division 13 Rutherford County Rutherfordton
 PLAN DATE: January 2022 REVIEWED BY: T.J. Williams
 PREPARED BY: R.N. Zinser REVIEWED BY:

REVISIONS

NO.	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL

R. N. Zinser
 PROFESSIONAL ENGINEER
 No. 043914

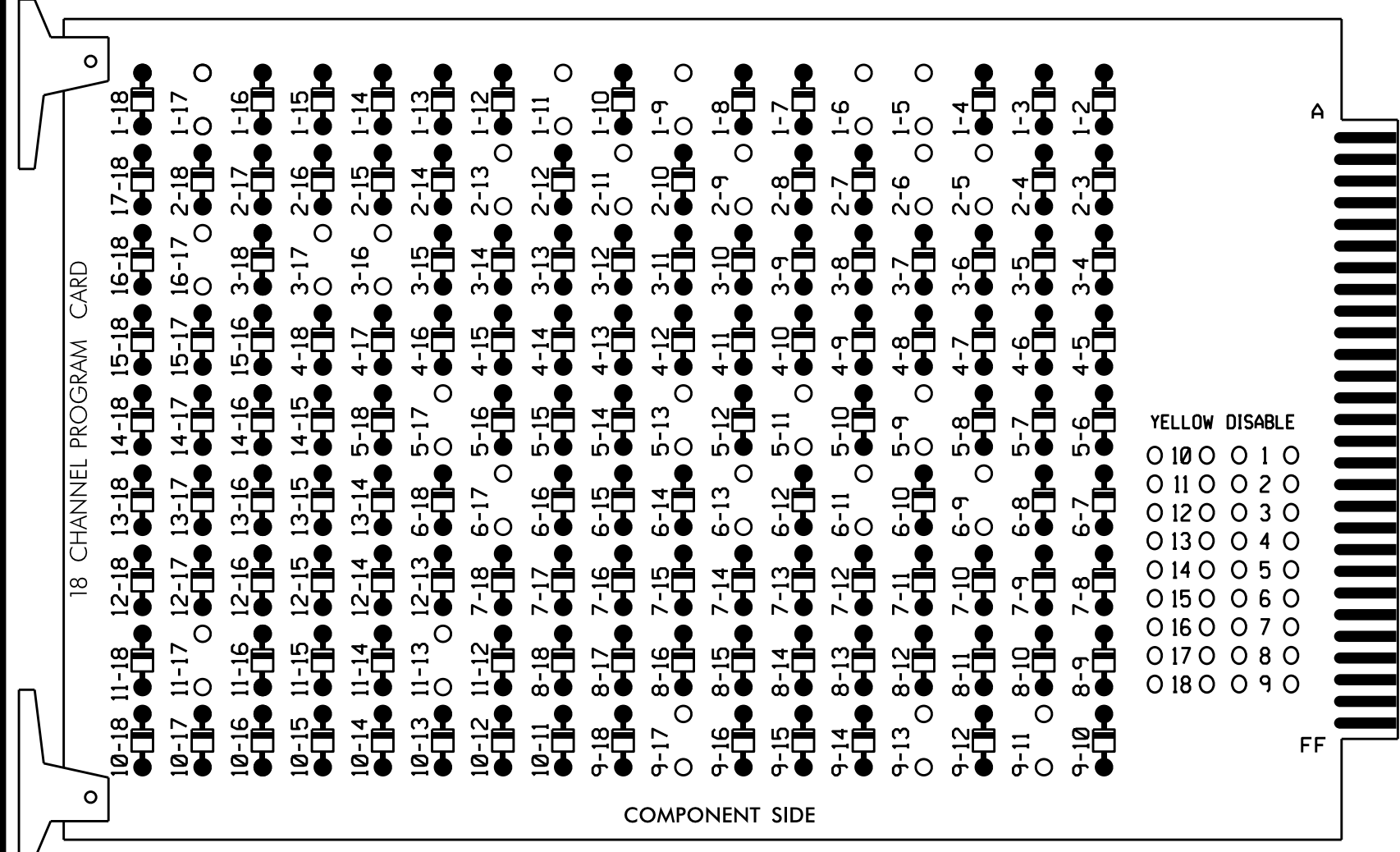
DATE: 2/1/2022
 SCALE: 1" = 30'

EDI MODEL 2018ECL-NC CONFLICT MONITOR

PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

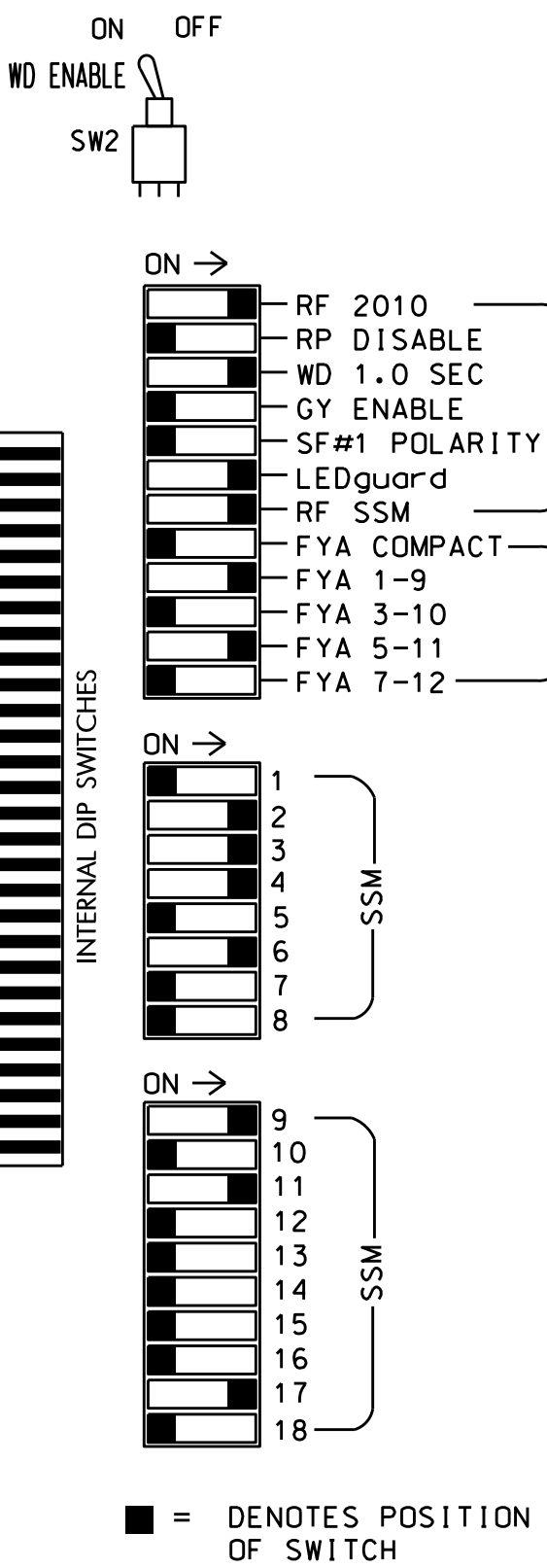
REMOVE DIODE JUMPERS 1-5, 1-6, 1-9, 1-11, 1-17, 2-5, 2-6, 2-9, 2-11, 2-13, 3-16, 3-17, 5-9, 5-11, 5-13, 5-17, 6-9, 6-11, 6-13, 6-17, 9-11, 9-13, 9-17, 11-13, 11-17, and 16-17.



REMOVE JUMPERS AS SHOWN

NOTES:

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



■ = DENOTES POSITION OF SWITCH

NOTES

- 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.
- Enable Simultaneous Gap-Out for all Phases.
- Program phases 2 and 6 for Startup In Green.
- Program phase 3 for Startup Ped Call.
- Program phases 2 and 6 for Yellow Flash, and overlaps 1 and 5 as Wag Overlaps.
- If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
- The cabinet and controller are part of the D13-31_Rutherfordon Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070E
 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 S1,AUX S3,AUX S4
 PHASES USED.....1,2,2 PED,3,3 PED,4,5,6
 OVERLAP "A".....1+2
 OVERLAP "B".....NOT USED
 OVERLAP "C".....5+6
 OVERLAP "D".....NOT USED
 OVERLAP "E".....1+3
 * Used for Blankout Signs.

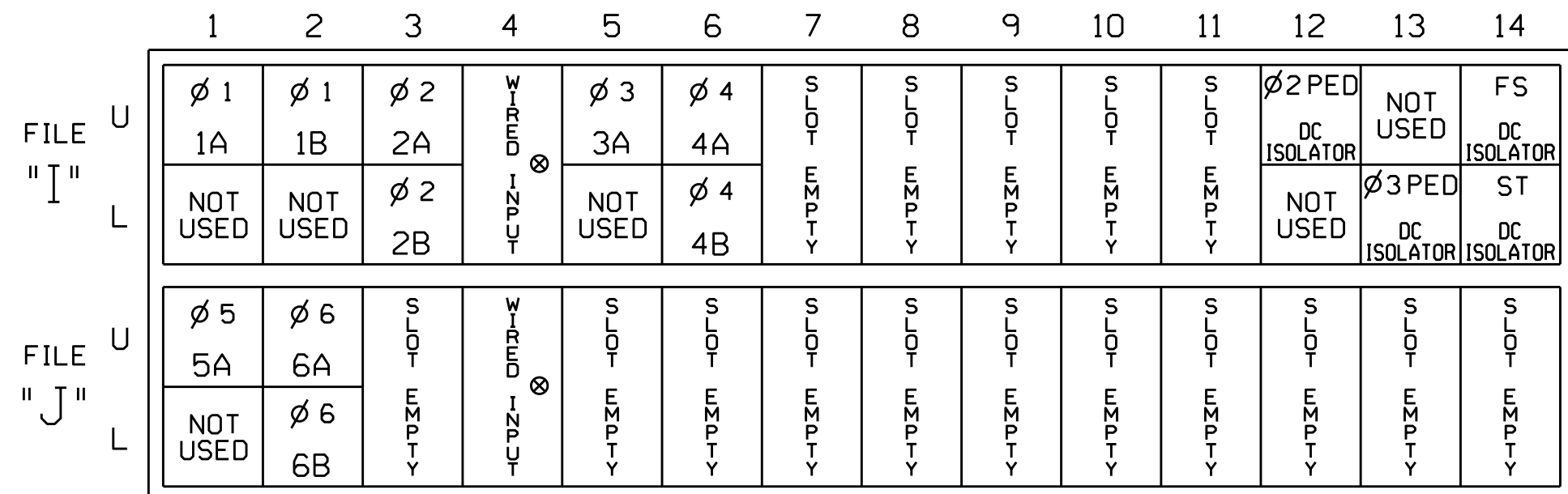
SIGNAL HEAD HOOK-UP CHART

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	N/A	5	6	6 PED	N/A	7	8	3 PED	OLA	OLB	OLE	OLC	OLD	SPARE	
SIGNAL HEAD NO.	11★	21,22	P21,P22	31	32	41	42	NU	SIGN 'E'	51★	61,62	NU	SIGN 'F'	NU	NU	NU	33★	51★	NU	NU	
RED		128		116	116	101	101				134							A111			
YELLOW	*	129		117	117	102	102			*	135										
GREEN		130		118	118	103	103				136										
RED ARROW																		A121		A114	
YELLOW ARROW																		A122		A112	A115
FLASHING YELLOW ARROW																		A123		A113	A116
GREEN ARROW	127			118	103			133													
PED			113												110						
PED YELLOW								** 105			** 120										
WALK								*		*					112						

NU = Not Used
 * Denotes install load resistor. See load resistor installation detail this sheet.
 ★ See pictorial of head wiring in detail this sheet.
 ** Blankout Signs will be driven by S6-Y and S9-Y. See sheets 2 and 3 for wiring and programming details.
 NOTE: Outputs for AUX S3 have been reassigned. See sheet 4 for details.

INPUT FILE POSITION LAYOUT

(front view)



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

FS = FLASH SENSE
 ST = STOP TIME

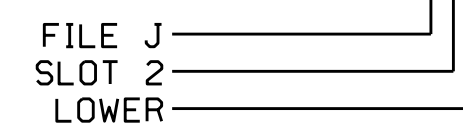
⊗ Wired Input - Do not populate slot with detector card

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
1A ¹	TB2-1,2	I1U	56	18	1	1	Y	Y			15
	-	J4U	48	10	26	6	Y	Y			
1B	TB2-5,6	I2U	39	1	2	1	Y	Y			15
2A	TB2-9,10	I3U	63	25	32	2	Y	Y			
2B	TB2-11,12	I3L	76	38	42	2	Y	Y			
3A	TB4-5,6	I5U	58	20	3	3	Y	Y			3
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			
4B	TB4-11,12	I6L	45	7	14	4	Y	Y			20
5A ²	TB3-1,2	J1U	55	17	5	5	Y	Y			15
	-	I4U	47	9	22	2	Y	Y			
6A	TB3-5,6	J2U	40	2	6	6	Y	Y			
6B	TB3-7,8	J2L	44	6	16	6	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				

- ¹Add jumper from I1-W to J4-W. on rear of input file.
²Add jumper from J1-W to I4-W. on rear of input file.

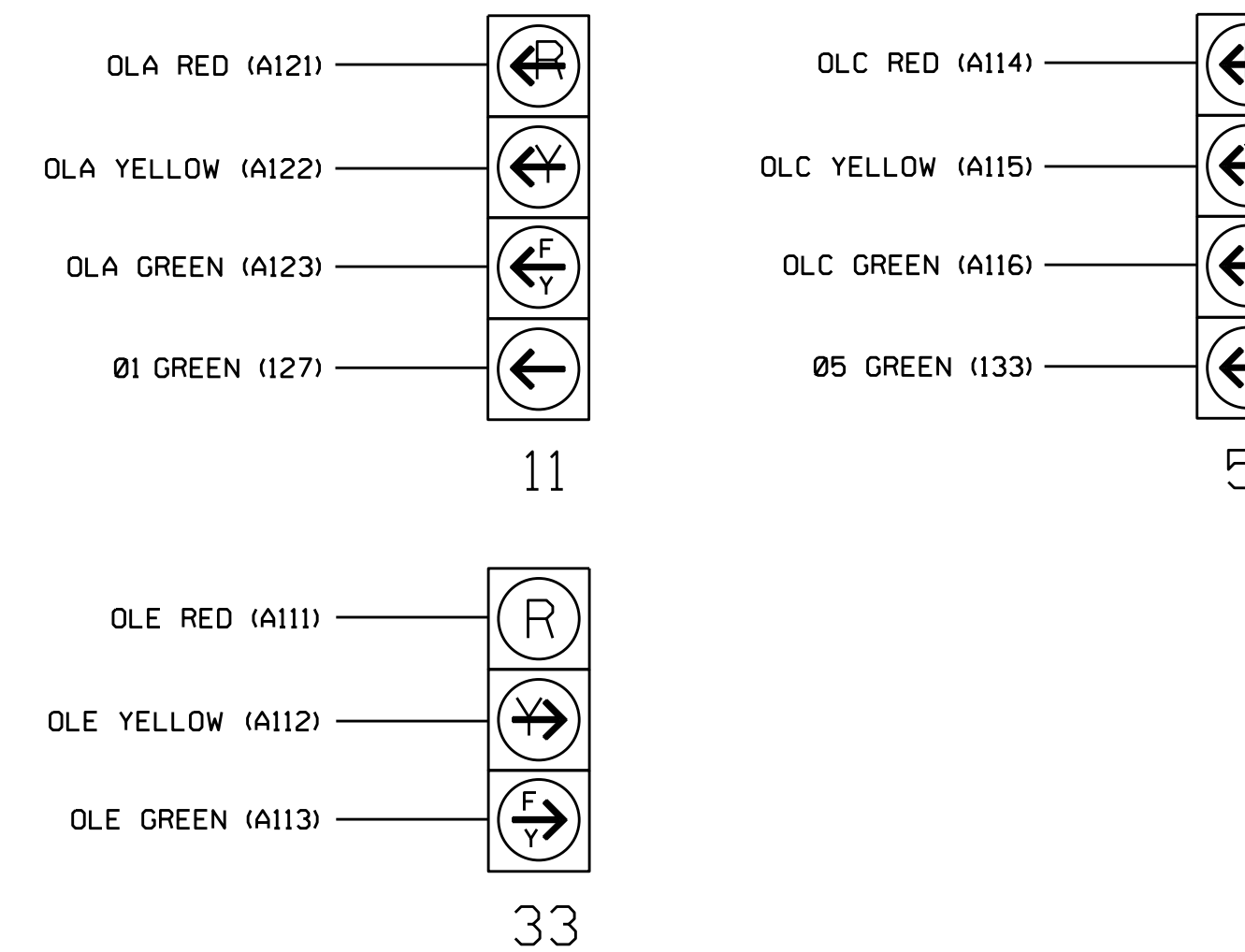
INPUT FILE POSITION LEGEND: J2L



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

FYA SIGNAL WIRING DETAIL

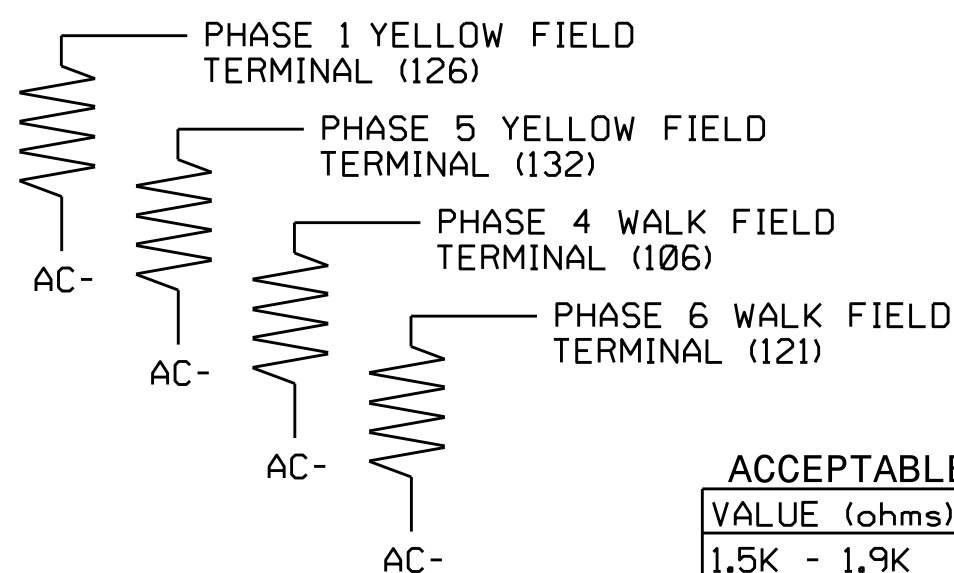
(wire signal heads as shown)



NOTE:
 The sequence display for signal heads 11 and 51 requires special logic programming. See sheet 2 for programming instructions.

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown below)



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

THIS ELECTRICAL DETAIL SUPERSEDES THE DETAIL SEALED ON 3/1/2021.

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 13-0177
 DESIGNED: January 2022
 SEALED: 2/1/2022
 REVISED: N/A

Electrical Detail - Sheet 1 of 4

Prepared In the Offices of:
 G.L. Transportation, Mobility and Signal
 750 N. Greenfield Pkwy, Garner, NC 27529

US 64 (E. Mountain St.)
 at
 US 221 Bypass Northbound Ramps/
 Railroad Avenue

Division 13 Rutherford County Rutherfordon

PLAN DATE: January 2022 REVIEWED BY:
 PREPARED BY: S. Armstrong REVIEWED BY:

REVISIONS: INIT. DATE

DocuSigned by:
 Ryan W. Hough 02/04/2022

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

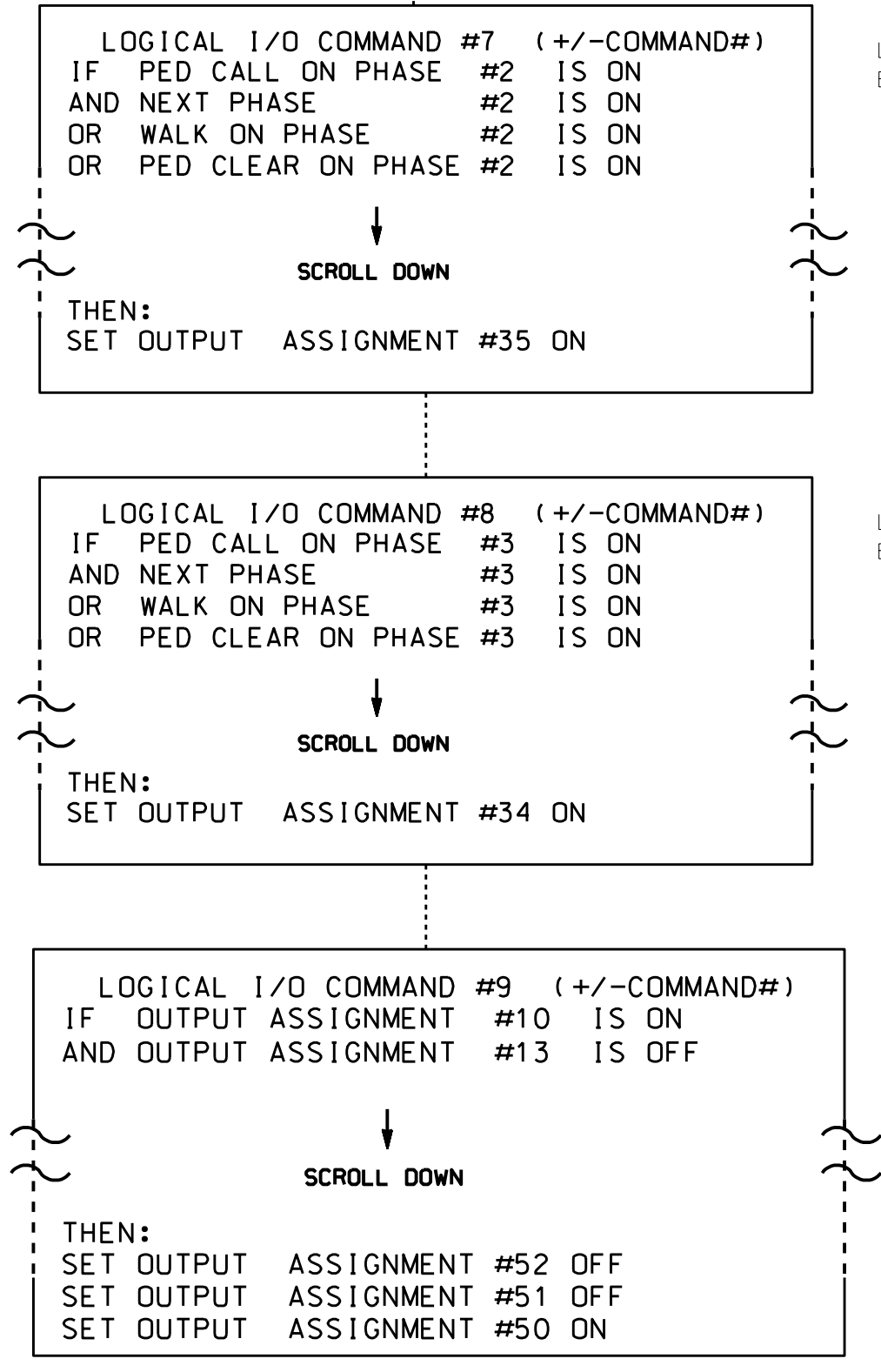
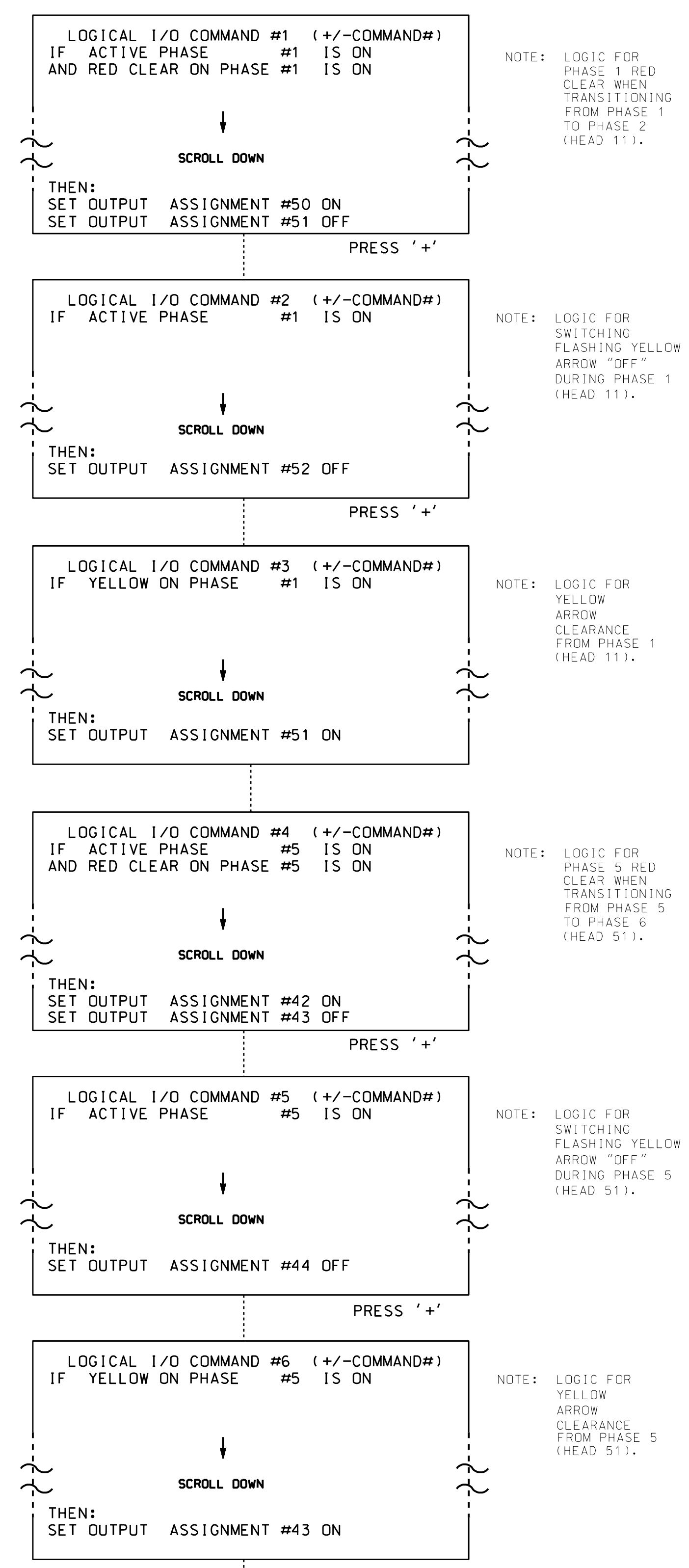
SEAL
 RYAN W. HOUGH
 PROFESSIONAL ENGINEER
 SEAL 036833

SIG. INVENTORY NO. 13-0177

LOGICAL I/O PROCESSOR PROGRAMMING DETAIL TO PRODUCE FYA-PPLT SIGNAL SEQUENCE, LPI CONTROL, AND TO CONTROL BLANKOUT SIGNS

(program controller as shown below)

- FROM MAIN MENU PRESS '2' (PHASE CONTROL), THEN '1' (PHASE CONTROL FUNCTIONS). SCROLL TO THE BOTTOM OF THE MENU AND ENABLE ACT LOGIC COMMANDS 1, 2, 3, 4, 5, 6, 7, 8 AND 9.
- FROM MAIN MENU PRESS '6' (OUTPUTS), THEN '3' (LOGICAL I/O PROCESSOR).



LOGIC I/O PROCESSOR PROGRAMMING COMPLETE

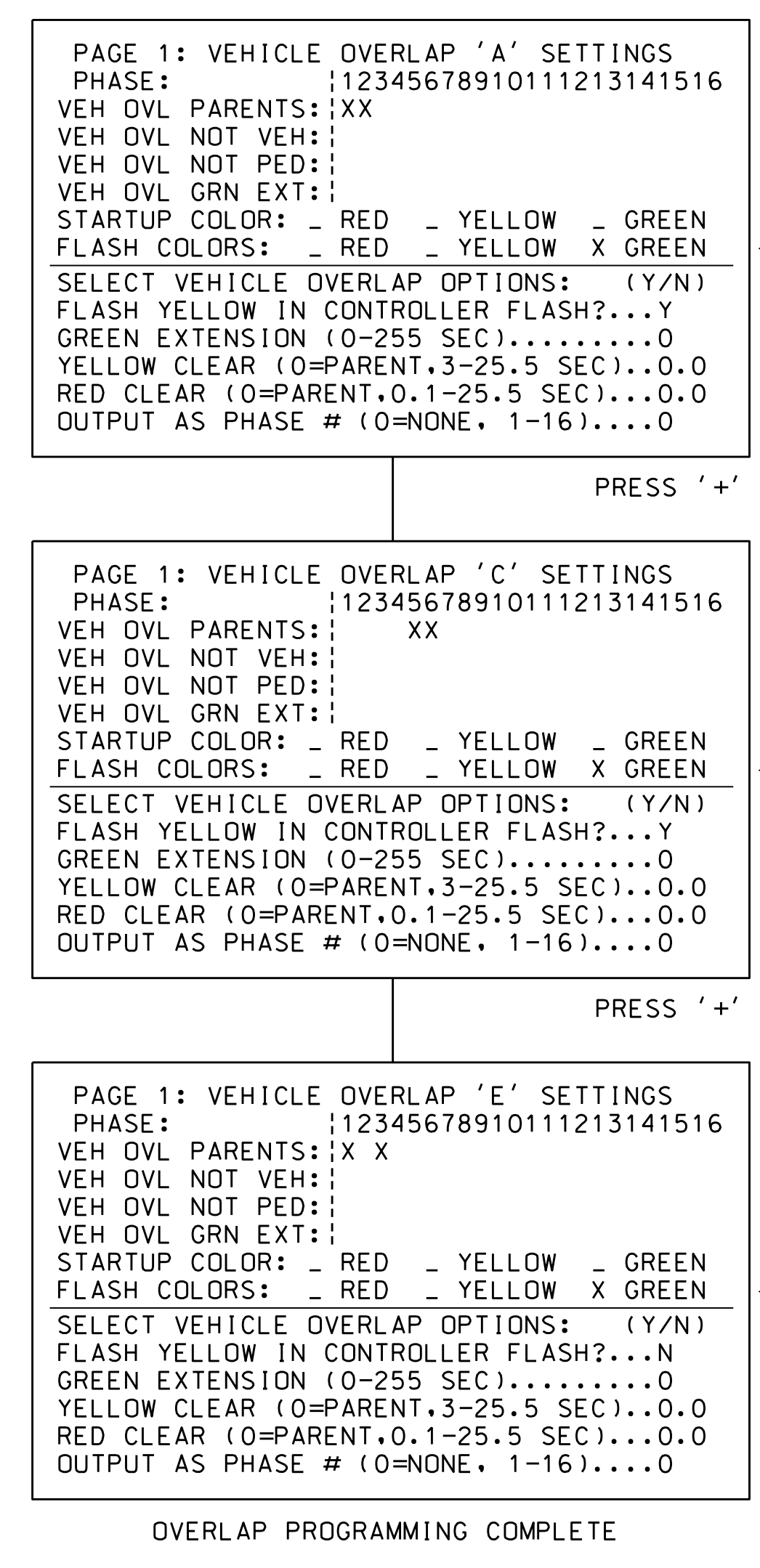
OUTPUT REFERENCE SCHEDULE

OUTPUT 10	=	2 PED Walk
OUTPUT 13	=	Vehicle 2 Green
OUTPUT 34	=	Ped 6 Yellow
OUTPUT 35	=	Ped 4 Yellow
OUTPUT 42	=	Overlap C Red
OUTPUT 43	=	Overlap C Yellow
OUTPUT 44	=	Overlap C Green
OUTPUT 50	=	Overlap A Red
OUTPUT 51	=	Overlap A Yellow
OUTPUT 52	=	Overlap A Green

OVERLAP PROGRAMMING DETAIL

(program controller as shown below)

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



OVERLAP PROGRAMMING COMPLETE

THIS ELECTRICAL DETAIL SUPERSEDES THE DETAIL SEALED ON 3/1/2021.

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 13-0177
 DESIGNED: January 2022
 SEALED: 2/1/2022
 REVISED: N/A

Electrical Detail - Sheet 2 of 4

Prepared In the Offices of:

 750 N. Greenfield Pkwy, Garner, NC 27529

US 64 (E. Mountain St.)
 at
 US 221 Bypass Northbound Ramps/
 Railroad Avenue

Division 13 Rutherford County Rutherfordton
 PLAN DATE: January 2022 REVIEWED BY:
 PREPARED BY: S. Armstrong REVIEWED BY:

REVISIONS INIT. DATE

DocuSigned by:
 Ryan W. Hough 02/04/2022
 430320FA6385403 DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SIG. INVENTORY NO. 13-0177

04-FEB-2022 06:13
 *130177.dwg e:\e-20210301.dgn
 s0r.mstr.dwg

PED 3 PROGRAMMING DETAIL

(program controller as shown below)

CHANGING OUTPUT ASSIGNMENTS

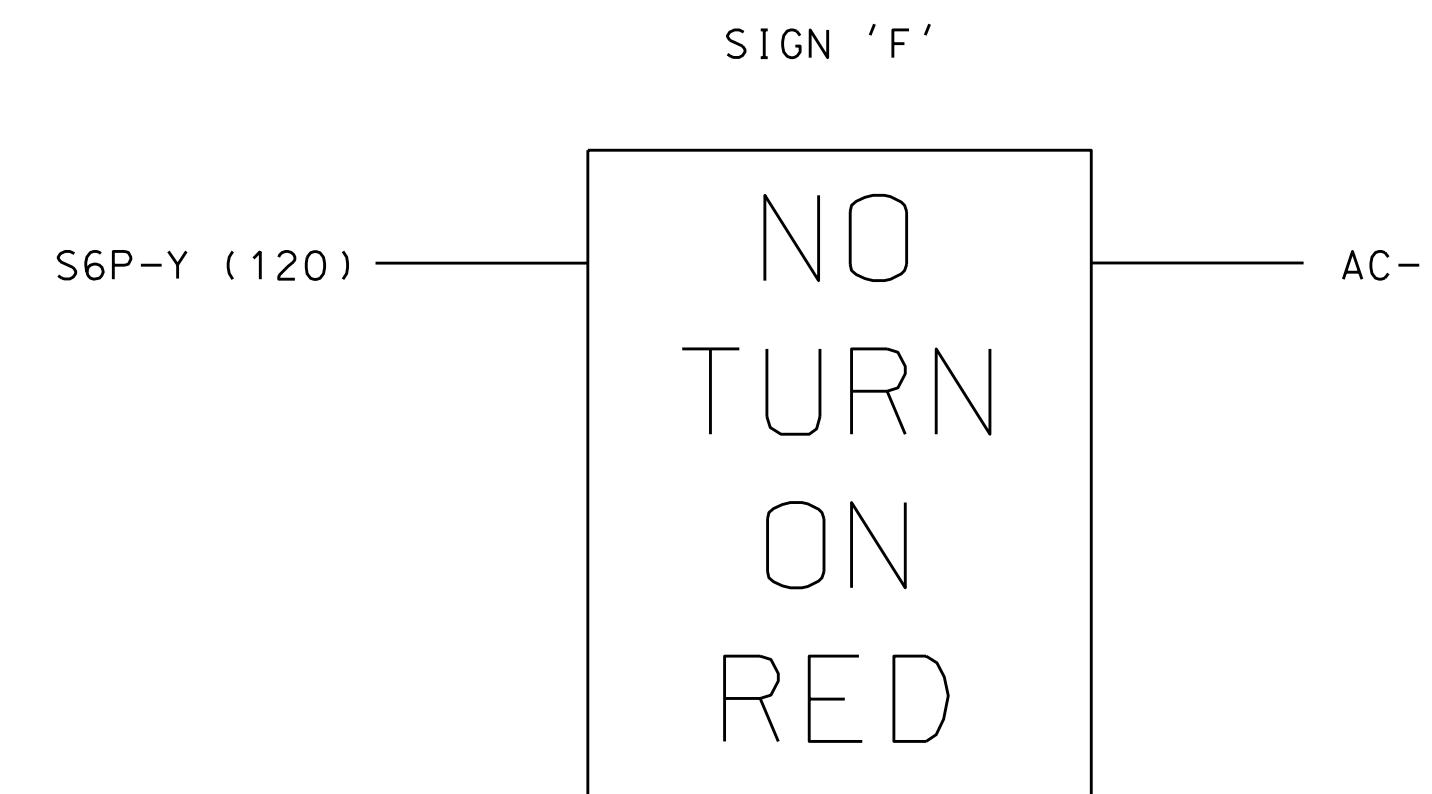
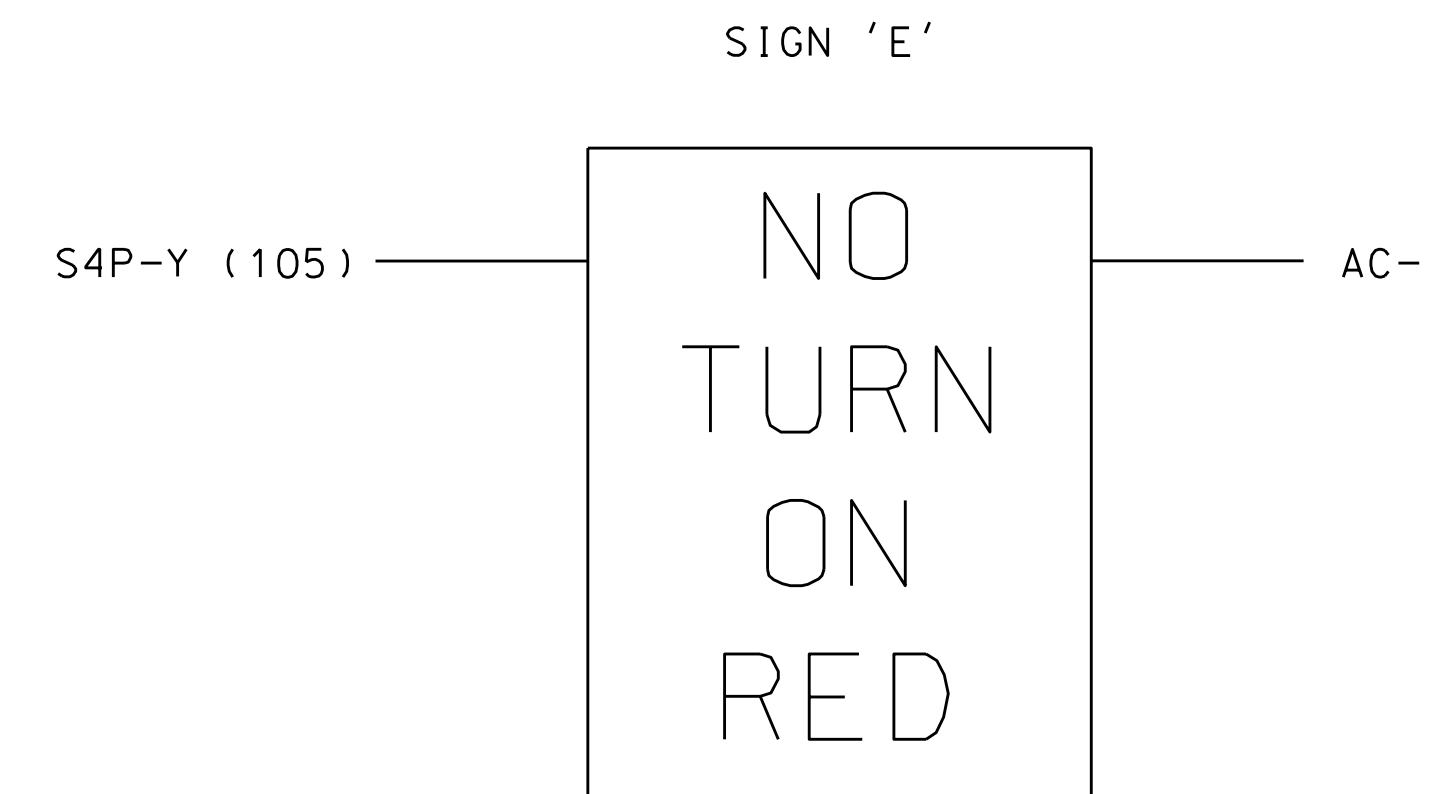
1. FROM MAIN MENU SELECT '6' (OUTPUTS), THEN '1' (OUTPUT ASSIGNMENTS)
2. ENTER 17 (PHASE 8 DW) FOR OUTPUT ASSIGNMENT #.
3. SCROLL DOWN TO 'PEDESTRIAN PHASE' AND ENTER 'Y' REGARDLESS OF DEFAULT PROGRAMMING
4. ENTER '3' FOR 'SELECT PEDESTRIAN PHASE'. NO CHANGE NEEDED FOR 'SELECT COLOR'
5. BACKUP TO 'OUTPUT 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

WIRING DETAIL FOR BLANKOUT SIGNS 'E' AND 'F'



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.

ADVANCE WALK NOTE

(program controller as shown below)

From Main Menu press '2' (Phase Control), then '1' (Phase Control Functions). Program phases 2 and 3 for 'Advanced Walk'. Make sure the Walk Advance Time shown on the Signal Design plans are programmed in the 'Phase Timing' menu.

**THIS ELECTRICAL DETAIL SUPERSEDES
THE DETAIL SEALED ON 3/1/2021.**

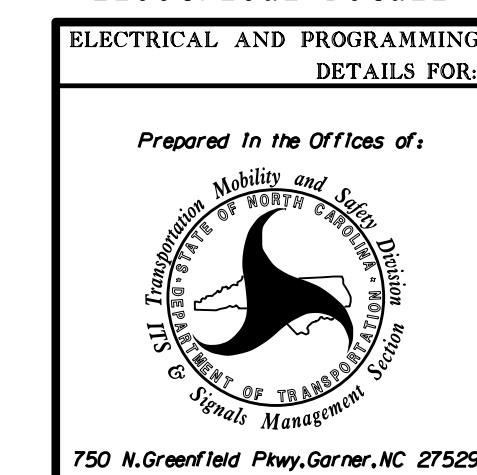
THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 13-0177
DESIGNED: January 2022
SEALED: 2/1/2022
REVISED: N/A

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.

Electrical Detail - Sheet 3 of 4



ELECTRICAL AND PROGRAMMING DETAILS FOR:		US 64 (E. Mountain St.) at US 221 Bypass Northbound Ramps/ Railroad Avenue	
PLAN DATE:	January 2022	REVIEWED BY:	
PREPARED BY:	S. Armstrong	REVIEWED BY:	
REVISIONS	INIT.	DATE	

**DOCUMENT NOT CONSIDERED
FINAL UNLESS ALL
SIGNATURES COMPLETED**



DocuSigned by:
Ryan W. Hough 02/04/2022
DATE
SIG. INVENTORY NO. 13-0177

**OUTPUT REMAPPING ASSIGNMENT PROGRAMMING DETAIL
TO ASSIGN LOADSWITCH AUX S3 TO OVERLAP 'E'
(FOR SIGNAL HEAD 33)**

(program controller as shown below)

FROM MAIN MENU PRESS '6' (OUTPUTS), THEN
'1' (OUTPUT ASSIGNMENTS).
WITH CURSOR IN "OUTPUT ASSIGNMENT#" POSITION, ENTER "45"

DISPLAY WILL NOW SHOW THE SPECIFIED OUTPUT
ASSIGNED AS 'VEHICLE OVERLAP' AS SHOWN BELOW.

```

PAGE:1 C1 PIN:91 NOT ENABLED
OUTPUT ASSIGNMENT #.....45
FREQUENCY (0=DEFAULT) (0-25.5 HZ)...0.0
DUTY CYCLE (0=DEFAULT) (0 - 100%)...0
MODE (0=SOLID,1=FLASH).....0
SELECT ASSIGNMENT:
NOT ENABLED.....Y
VEHICLE PHASE.....
PEDESTRIAN PHASE.....
VEHICLE OVERLAP.....Y
PEDESTRIAN OVERLAP.....
WATCHDOG.....
DETECTOR RESET.....
ADVANCE BEACON.....
OUT OF PHASE FLASHER.....
CONTROLLER FLASH.....
RUN FREE.....
RESERVED.....
PREEMPT.....
SOFT PREEMPT.....
ANY PREEMPT.....
COORDINATION PLAN.....
OFFSET.....
PHASE CHECK.....
PHASE ON.....
PHASE NEXT.....
    
```

OVERLAP 'E' RED

THE OUTPUT IS SET AS NOT ENABLED BY DEFAULT. THIS
"Y" WILL REMAIN UNTIL THE OUTPUT IS CHANGED.

ENTER A "Y" FOR VEHICLE OVERLAP.

```

PAGE:1 C1 PIN:91 NOT ENABLED
SELECT VEHICLE OVERLAP (A=1,P=16)...5
SELECT COLOR(0=RED,1=YEL,2=GRN).....0
    
```

WHEN A 'Y' IS ENTERED FOR 'VEHICLE OVERLAP'
THE SCREEN SHOWN ABOVE WILL APPEAR.
ENTER DATA AS SHOWN.
PRESS THE 'ENT' KEY AFTER ENTERING DATA,
THEN 'ESC'.

```

PAGE:1 C1 PIN:91 VEHICLE OVERLAP
OUTPUT ASSIGNMENT #.....45
FREQUENCY (0=DEFAULT) (0-25.5 HZ)...0.0
DUTY CYCLE (0=DEFAULT) (0 - 100%)...0
MODE (0=SOLID,1=FLASH).....0
SELECT ASSIGNMENT:
NOT ENABLED.....
VEHICLE PHASE.....
PEDESTRIAN PHASE.....
VEHICLE OVERLAP.....Y
PEDESTRIAN OVERLAP.....
WATCHDOG.....
DETECTOR RESET.....
ADVANCE BEACON.....
OUT OF PHASE FLASHER.....
CONTROLLER FLASH.....
RUN FREE.....
RESERVED.....
PREEMPT.....
SOFT PREEMPT.....
ANY PREEMPT.....
COORDINATION PLAN.....
OFFSET.....
PHASE CHECK.....
PHASE ON.....
PHASE NEXT.....
    
```

PRESS "+" KEY FOR OUTPUT 46

DISPLAY WILL NOW SHOW THE SPECIFIED OUTPUT
ASSIGNED AS 'VEHICLE OVERLAP' AS SHOWN BELOW.

```

PAGE:1 C1 PIN:93 NOT ENABLED
OUTPUT ASSIGNMENT #.....46
FREQUENCY (0=DEFAULT) (0-25.5 HZ)...0.0
DUTY CYCLE (0=DEFAULT) (0 - 100%)...0
MODE (0=SOLID,1=FLASH).....0
SELECT ASSIGNMENT:
NOT ENABLED.....Y
VEHICLE PHASE.....
PEDESTRIAN PHASE.....
VEHICLE OVERLAP.....Y
PEDESTRIAN OVERLAP.....
WATCHDOG.....
DETECTOR RESET.....
ADVANCE BEACON.....
OUT OF PHASE FLASHER.....
CONTROLLER FLASH.....
RUN FREE.....
RESERVED.....
PREEMPT.....
SOFT PREEMPT.....
ANY PREEMPT.....
COORDINATION PLAN.....
OFFSET.....
PHASE CHECK.....
PHASE ON.....
PHASE NEXT.....
    
```

OVERLAP 'E' GREEN

THE OUTPUT IS SET AS NOT ENABLED BY DEFAULT. THIS
"Y" WILL REMAIN UNTIL THE OUTPUT IS CHANGED.

ENTER A "Y" FOR VEHICLE OVERLAP.

```

PAGE:1 C1 PIN:93 NOT ENABLED
SELECT VEHICLE OVERLAP (A=1,P=16)...5
SELECT COLOR(0=RED,1=YEL,2=GRN).....2
    
```

WHEN A 'Y' IS ENTERED FOR 'VEHICLE OVERLAP'
THE SCREEN SHOWN ABOVE WILL APPEAR.
ENTER DATA AS SHOWN.
PRESS THE 'ENT' KEY AFTER ENTERING DATA,
THEN 'ESC'.

```

PAGE:1 C1 PIN:93 VEHICLE OVERLAP
OUTPUT ASSIGNMENT #.....46
FREQUENCY (0=DEFAULT) (0-25.5 HZ)...0.0
DUTY CYCLE (0=DEFAULT) (0 - 100%)...0
MODE (0=SOLID,1=FLASH).....0
SELECT ASSIGNMENT:
NOT ENABLED.....
VEHICLE PHASE.....
PEDESTRIAN PHASE.....
VEHICLE OVERLAP.....Y
PEDESTRIAN OVERLAP.....
WATCHDOG.....
DETECTOR RESET.....
ADVANCE BEACON.....
OUT OF PHASE FLASHER.....
CONTROLLER FLASH.....
RUN FREE.....
RESERVED.....
PREEMPT.....
SOFT PREEMPT.....
ANY PREEMPT.....
COORDINATION PLAN.....
OFFSET.....
PHASE CHECK.....
PHASE ON.....
PHASE NEXT.....
    
```

PRESS "+" KEY TO ADVANCE TO OUTPUT 54

DISPLAY WILL NOW SHOW THE SPECIFIED OUTPUT
ASSIGNED AS 'VEHICLE OVERLAP' AS SHOWN BELOW.

```

PAGE:1 C1 PIN:101 CONTROLLER FLASH
OUTPUT ASSIGNMENT #.....54
FREQUENCY (0=DEFAULT) (0-25.5 HZ)...0.0
DUTY CYCLE (0=DEFAULT) (0 - 100%)...0
MODE (0=SOLID,1=FLASH).....0
SELECT ASSIGNMENT:
NOT ENABLED.....Y
VEHICLE PHASE.....
PEDESTRIAN PHASE.....
VEHICLE OVERLAP.....Y
PEDESTRIAN OVERLAP.....
WATCHDOG.....
DETECTOR RESET.....
ADVANCE BEACON.....
OUT OF PHASE FLASHER.....
CONTROLLER FLASH.....
RUN FREE.....
RESERVED.....
PREEMPT.....
SOFT PREEMPT.....
ANY PREEMPT.....
COORDINATION PLAN.....
OFFSET.....
PHASE CHECK.....
PHASE ON.....
PHASE NEXT.....
    
```

OVERLAP 'E' YELLOW

THE OUTPUT IS SET AS NOT ENABLED BY DEFAULT. THIS
"Y" WILL REMAIN UNTIL THE OUTPUT IS CHANGED.

ENTER A "Y" FOR VEHICLE OVERLAP.

```

PAGE:1 C1 PIN:101 CONTROLLER FLASH
SELECT VEHICLE OVERLAP (A=1,P=16)...5
SELECT COLOR(0=RED,1=YEL,2=GRN).....1
    
```

WHEN A 'Y' IS ENTERED FOR 'VEHICLE OVERLAP'
THE SCREEN SHOWN ABOVE WILL APPEAR.
ENTER DATA AS SHOWN.
PRESS THE 'ENT' KEY AFTER ENTERING DATA,
THEN 'ESC'.

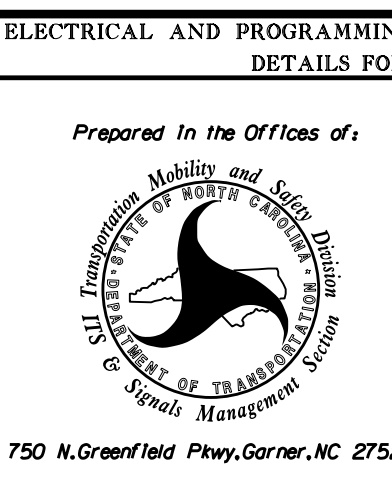
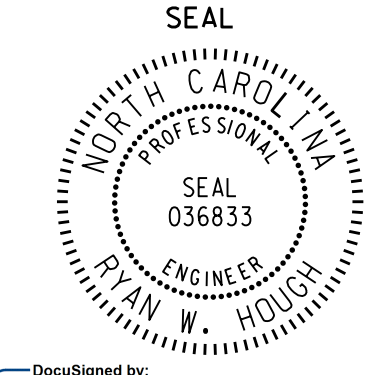
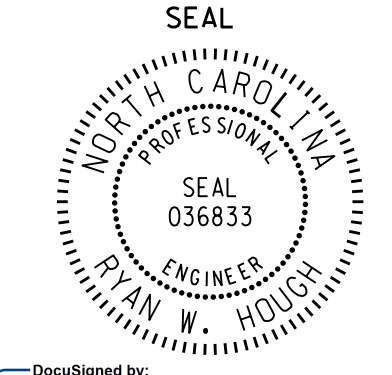
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PAGE:1 C1 PIN:101 VEHICLE OVERLAP
OUTPUT ASSIGNMENT #.....54
FREQUENCY (0=DEFAULT) (0-25.5 HZ)...0.0
DUTY CYCLE (0=DEFAULT) (0 - 100%)...0
MODE (0=SOLID,1=FLASH).....0
SELECT ASSIGNMENT:
NOT ENABLED.....
VEHICLE PHASE.....
PEDESTRIAN PHASE.....
VEHICLE OVERLAP.....Y
PEDESTRIAN OVERLAP.....
WATCHDOG.....
DETECTOR RESET.....
ADVANCE BEACON.....
OUT OF PHASE FLASHER.....
CONTROLLER FLASH.....
RUN FREE.....
RESERVED.....
PREEMPT.....
SOFT PREEMPT.....
ANY PREEMPT.....
COORDINATION PLAN.....
OFFSET.....
PHASE CHECK.....
PHASE ON.....
PHASE NEXT.....
    
```

OUTPUT PROGRAMMING FOR HEAD 33 COMPLETE

**THIS ELECTRICAL DETAIL SUPERSEDES
THE DETAIL SEALED ON 3/1/2021.**

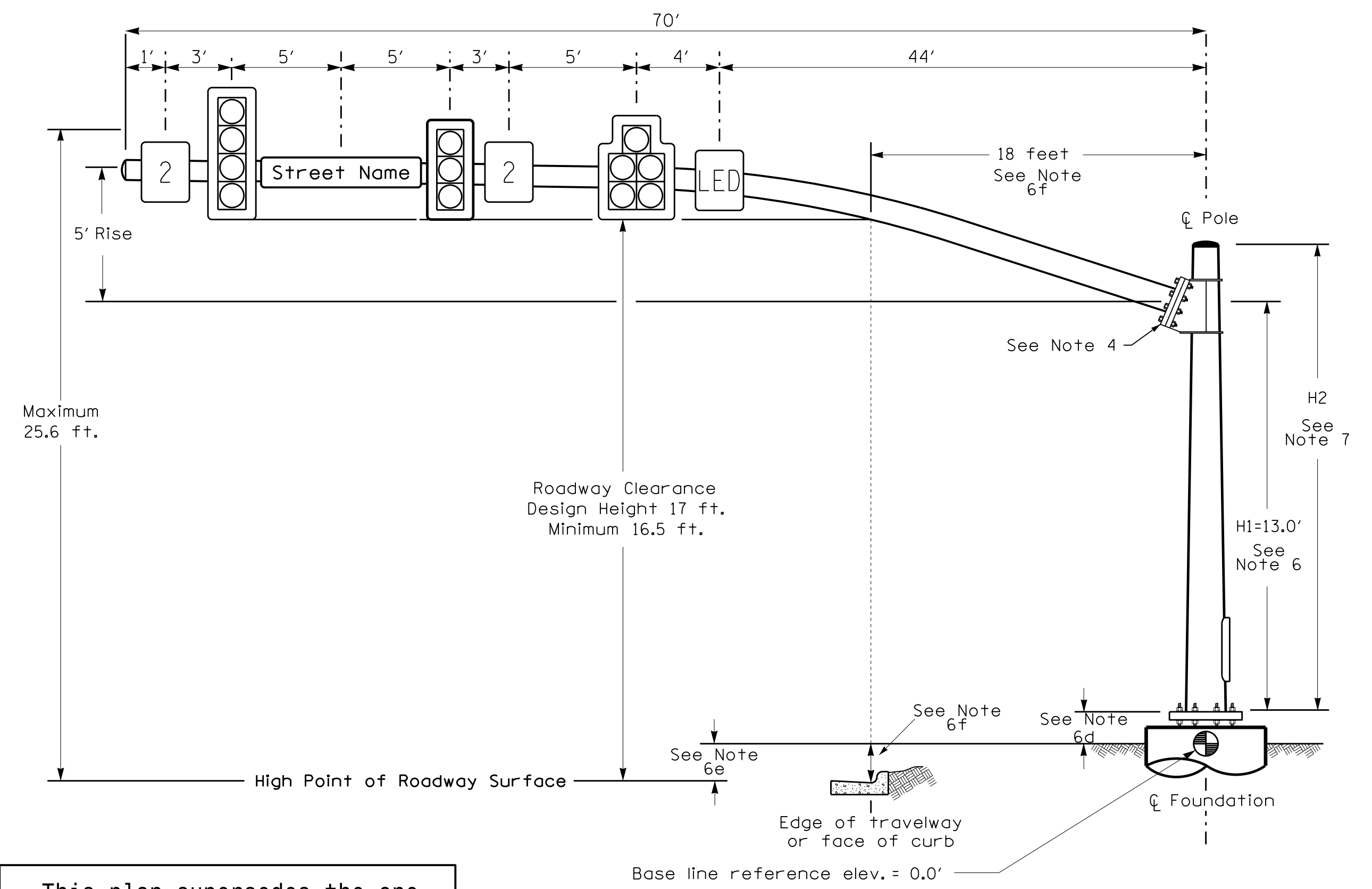
THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 13-0177
DESIGNED: January 2022
SEALED: 2/1/2022
REVISED: N/A

Electrical Detail - Sheet 4 of 4		DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	
	DETAILS FOR: US 64 (E. Mountain St.) at US 221 Bypass Northbound Ramps/ Railroad Avenue	SEAL 	SEAL 
	Division 13 Rutherford County Rutherfordton PLAN DATE: January 2022 REVIEWED BY: PREPARED BY: S. Armstrong REVIEWED BY:	REVISIONS INIT. DATE	DocuSigned by: Ryan W. Hough 02/04/2022 DATE

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METAL POLE No. 1 and 2

Design Loading for METAL POLE NO. 1



This plan supersedes the one signed and sealed on 2/23/2021.

Elevation View

SPECIAL NOTE

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

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 1	Pole 2
Baseline reference point at Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	-1.32 ft.	+4.24 ft.
Elevation difference at Edge of travelway or face of curb	-1.54 ft.	+1.91 ft.

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
[Signal Head]	RIGID MOUNTED SIGNAL HEAD 12"-4 SECTION-WITH BACKPLATE	11.5 S.F.	25.5" W X 66.0" L	74 LBS
[Signal Head]	RIGID MOUNTED SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE	9.3 S.F.	25.5" W X 52.5" L	60 LBS
[Signal Head]	RIGID MOUNTED SIGNAL HEAD 12"-5 SECTION-WITH BACKPLATE	16.3 S.F.	42.0" W X 56.0" L	103 LBS
[Street Name]	STREET NAME SIGN RIGID MOUNTED	16.0 S.F.	24.0" W X 96.0" L	36 LBS
[2]	SIGN RIGID MOUNTED	7.5 S.F.	30.0" W X 36.0" L	14 LBS
[LED]	L.E.D. BLANKOUT SIGN RIGID MOUNTED	5.0 S.F.	24.0" W X 36.0" L	110 LBS

NOTES

DESIGN REFERENCE MATERIAL

- 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

- 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.
- Design all signal supports using stress ratios that do not exceed 0.9.
- 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.
- Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
- The mast arm attachment height (H1) shown is based on the following design assumptions:
 - Nominal vertical rise in mast arm is 5 feet as measured from the centerline of the arm base to the centerline of the free end of the arm.
 - Signal heads are rigidly mounted and vertically centered on the mast arm.
 - The roadway clearance height for design is as shown in the elevation views.
 - The top of the pole base plate is 0.75 feet above the ground elevation.
 - Refer to the Elevation Data Chart for the elevation differences between the proposed foundation ground level and the high point of the roadway.
 - Provide horizontal distance from the proposed centerline of the foundation to the edge of travelway. Refer to the Elevation Data Chart for elevation difference between the proposed foundation ground level and the edge of travelway. This information is necessary to ensure that the roadway clearance is maintained at the edge of the travelway and to aid in the camber design of the arm.
- The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
 - Mast arm attachment height (H1) plus 2 feet, or
 - H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
- If 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.
- The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
- The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

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

NCDOT Wind Zone 4 (90 mph)

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Prepared in the Offices of:
 Transportation Mobility and Safety Division
 STATE OF NORTH CAROLINA
 SIGNAL DESIGN SECTION

US 64 (E. Mountain St.)
 at
 US 221 Bypass Northbound Ramps/
 Railroad Avenue
 Division 13 Rutherford County Rutherfordton
 PLAN DATE: January 2022 REVIEWED BY: T.J. Williams
 PREPARED BY: R.N. Zinser REVIEWED BY:

750 N. Greenfield Pkwy, Garner, NC 27529

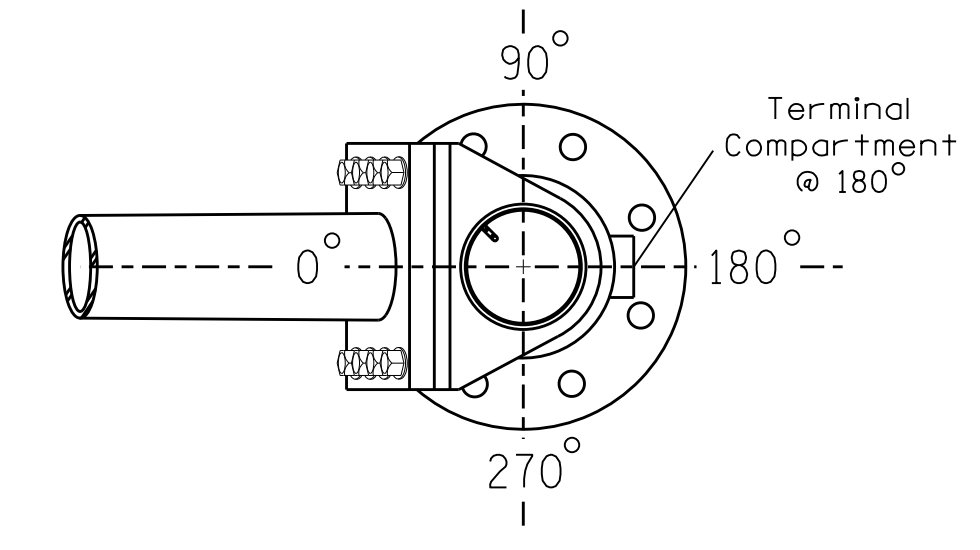
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REVISIONS: _____

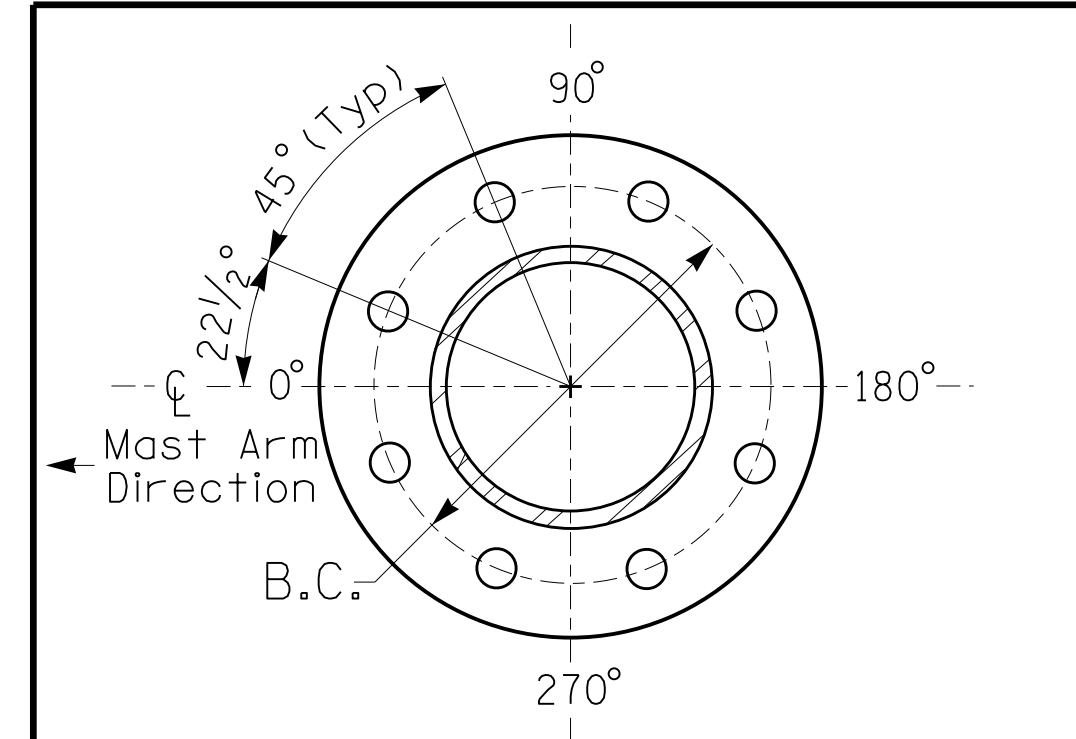
INIT. DATE

R. N. Zinser 02/01/2022
 SEAL 043914
 SEAL 043914
 R. N. ZINSE
 DATE

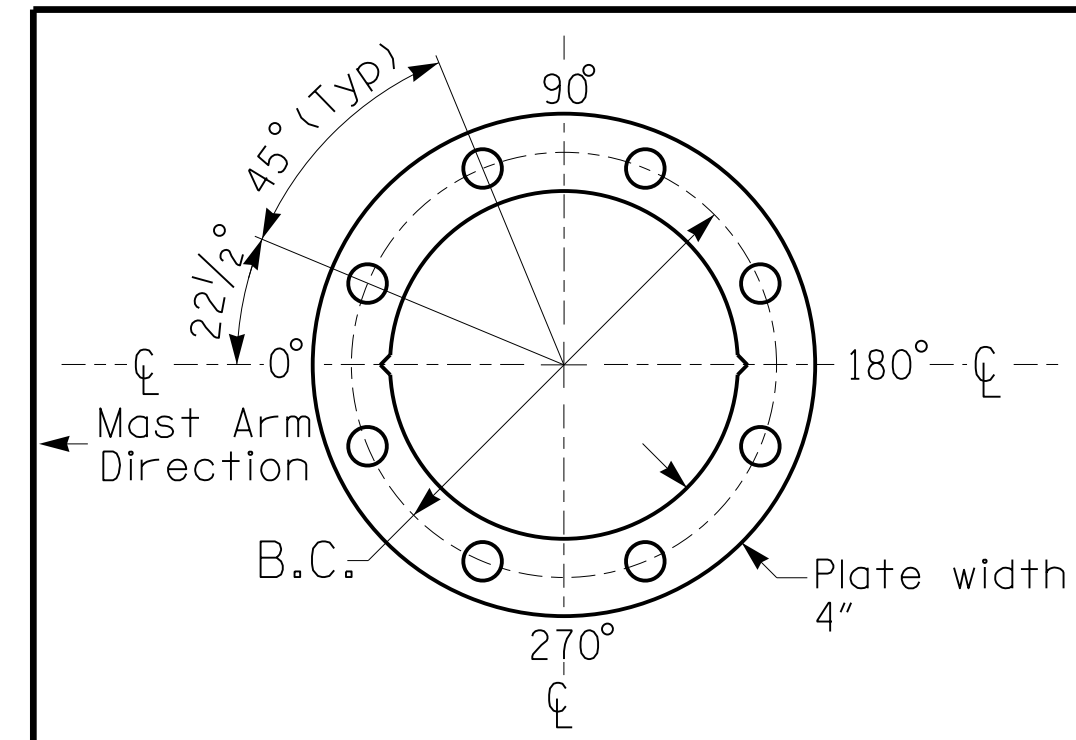
SIG. INVENTORY NO. 13-0177



POLE RADIAL ORIENTATION

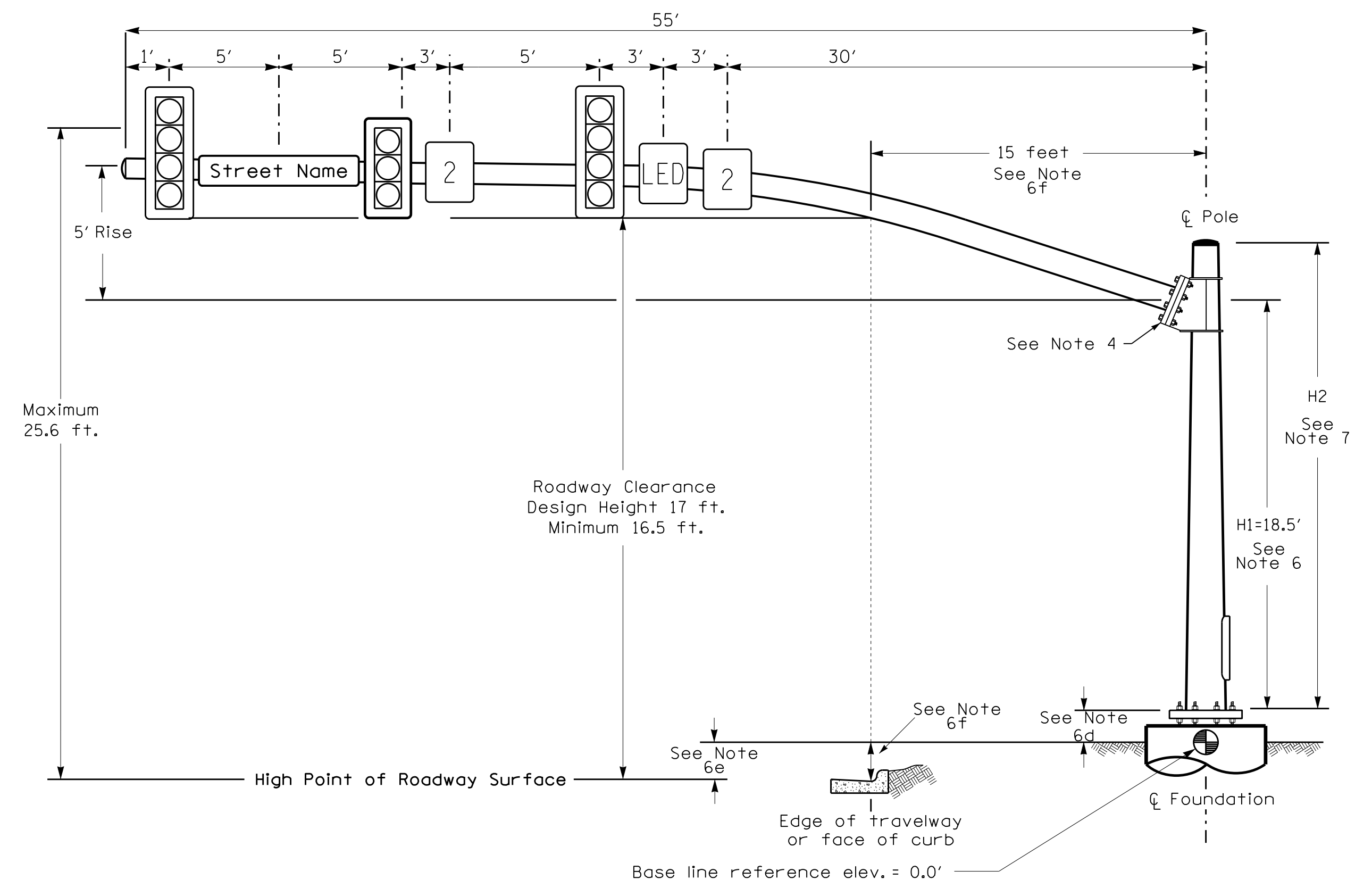


8 BOLT BASE PLATE DETAIL



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

Design Loading for METAL POLE NO. 2

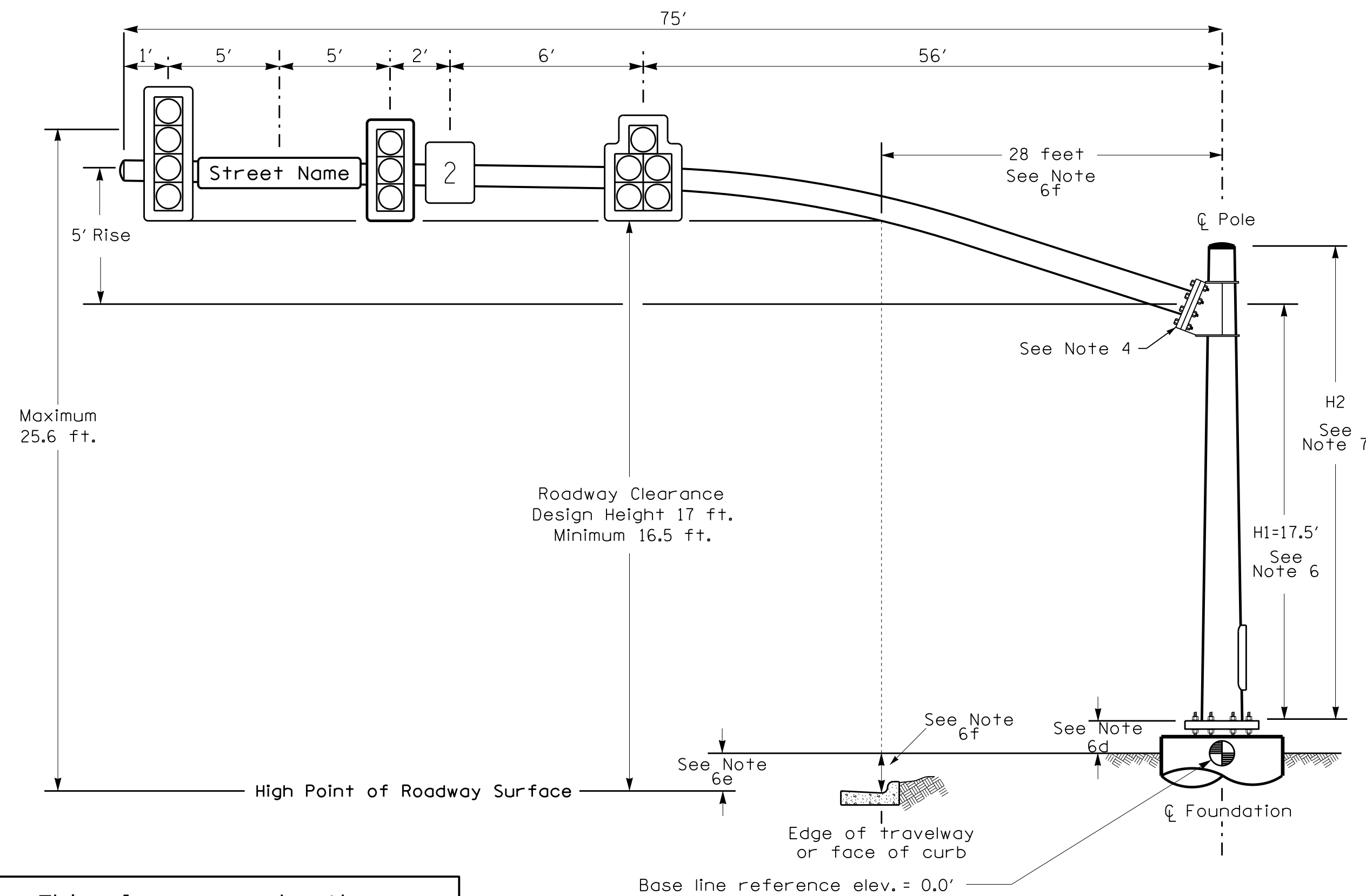


Elevation View

01-FEB-2022 09:15
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METAL POLE No. 3 and 4

Design Loading for METAL POLE NO. 3



This plan supersedes the one signed and sealed on 2/23/2021.

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 3	Pole 4
Baseline reference point at \odot Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	+3.31 ft.	+2.90 ft.
Elevation difference at Edge of travelway or face of curb	+2.37 ft.	+3.40 ft.

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
	RIGID MOUNTED SIGNAL HEAD 12"-5 SECTION-WITH BACKPLATE	16.3 S.F.	42.0" W X 56.0" L	103 LBS
	STREET NAME SIGN RIGID MOUNTED	16.0 S.F.	24.0" W X 96.0" L	36 LBS
	SIGN RIGID MOUNTED	7.5 S.F.	30.0" W X 36.0" L	14 LBS

NOTES

DESIGN REFERENCE MATERIAL

- 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

- 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.
- Design all signal supports using stress ratios that do not exceed 0.9.
- 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.
- Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
- The mast arm attachment height (H1) shown is based on the following design assumptions:
 - Nominal vertical rise in mast arm is 5 feet as measured from the centerline of the arm base to the centerline of the free end of the arm.
 - Signal heads are rigidly mounted and vertically centered on the mast arm.
 - The roadway clearance height for design is as shown in the elevation views.
 - The top of the pole base plate is 0.75 feet above the ground elevation.
 - Refer to the Elevation Data Chart for the elevation differences between the proposed foundation ground level and the high point of the roadway.
 - Provide horizontal distance from the proposed centerline of the foundation to the edge of travelway. Refer to the Elevation Data Chart for elevation difference between the proposed foundation ground level and the edge of travelway. This information is necessary to ensure that the roadway clearance is maintained at the edge of the travelway and to aid in the camber design of the arm.
- The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
 - Mast arm attachment height (H1) plus 2 feet, or
 - H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
- If 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.
- The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
- The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

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

NCDOT Wind Zone 4 (90 mph)

Prepared in the Offices of:

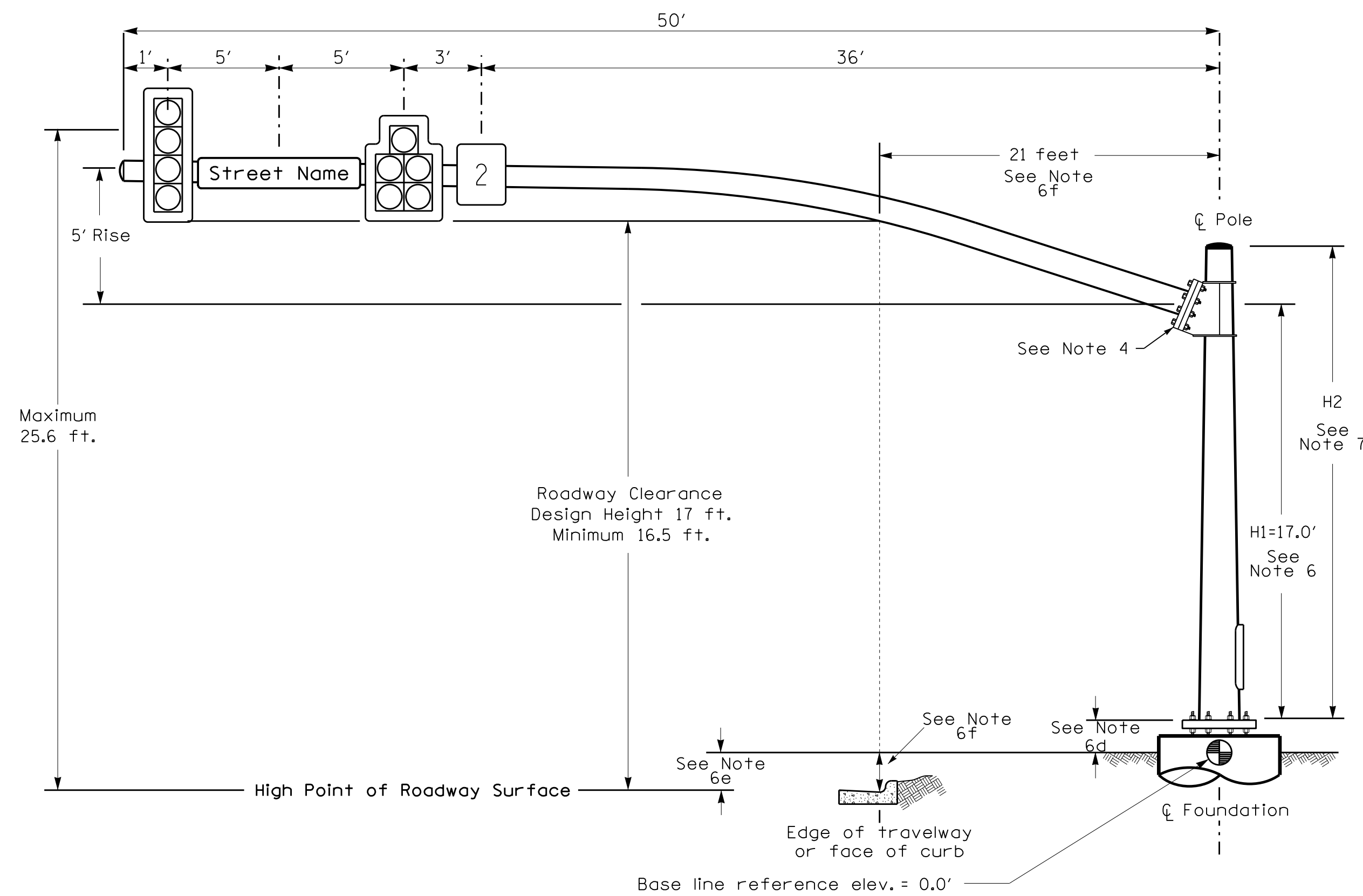
 US 64 (E. Mountain St.)
 at
 US 221 Bypass Northbound Ramps/
 Railroad Avenue
 Division 13 Rutherford County Rutherfordton
 PLAN DATE: January 2022 REVIEWED BY: T.J. Williams
 PREPARED BY: R.N. Zinser REVIEWED BY:
 SCALE: 0 N/A
 REVISIONS: _____ INIT. DATE _____
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DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

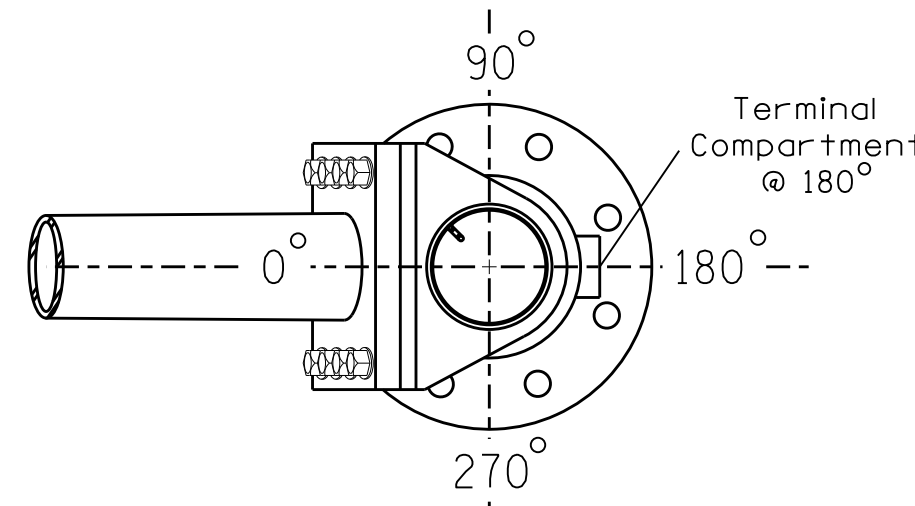
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 043914
 RICHARD N. ZINSER
 ENGINEER
 DocuSigned by:
 R. N. Zinser 02/01/2022
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 SIG. INVENTORY NO. 13-0177

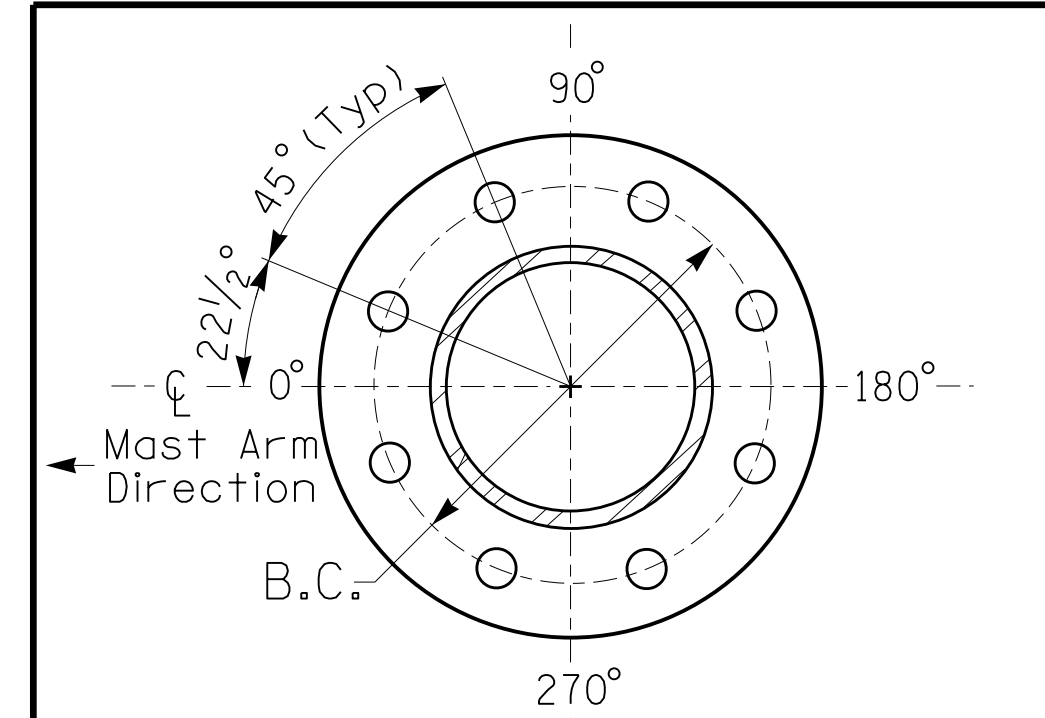
Design Loading for METAL POLE NO. 4



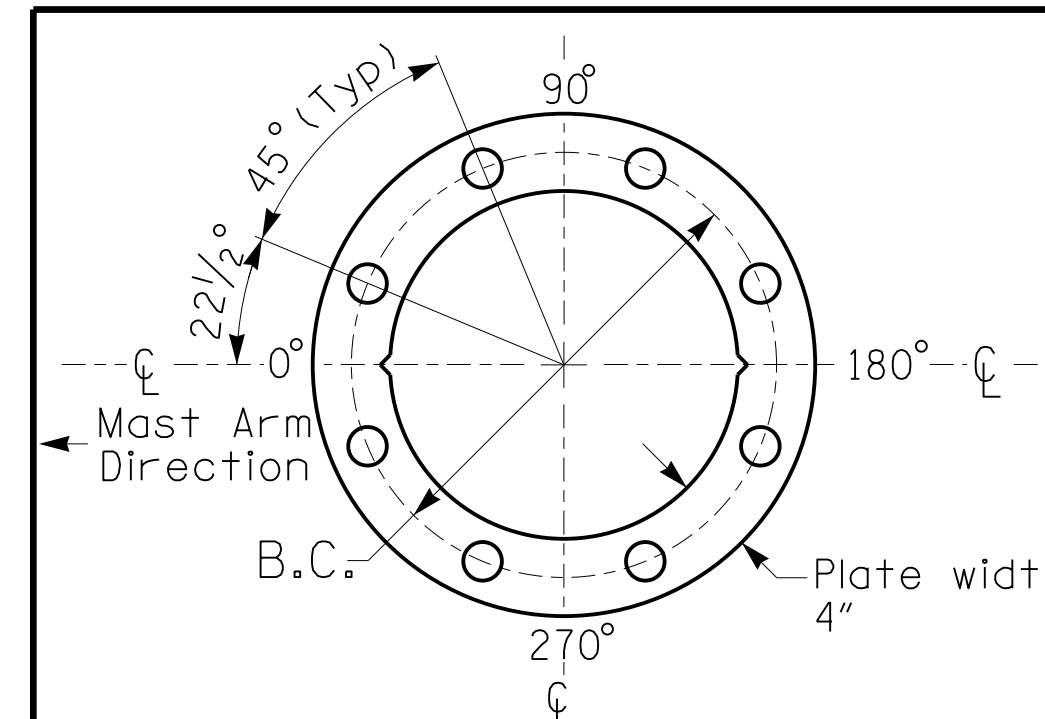
Elevation View



POLE RADIAL ORIENTATION



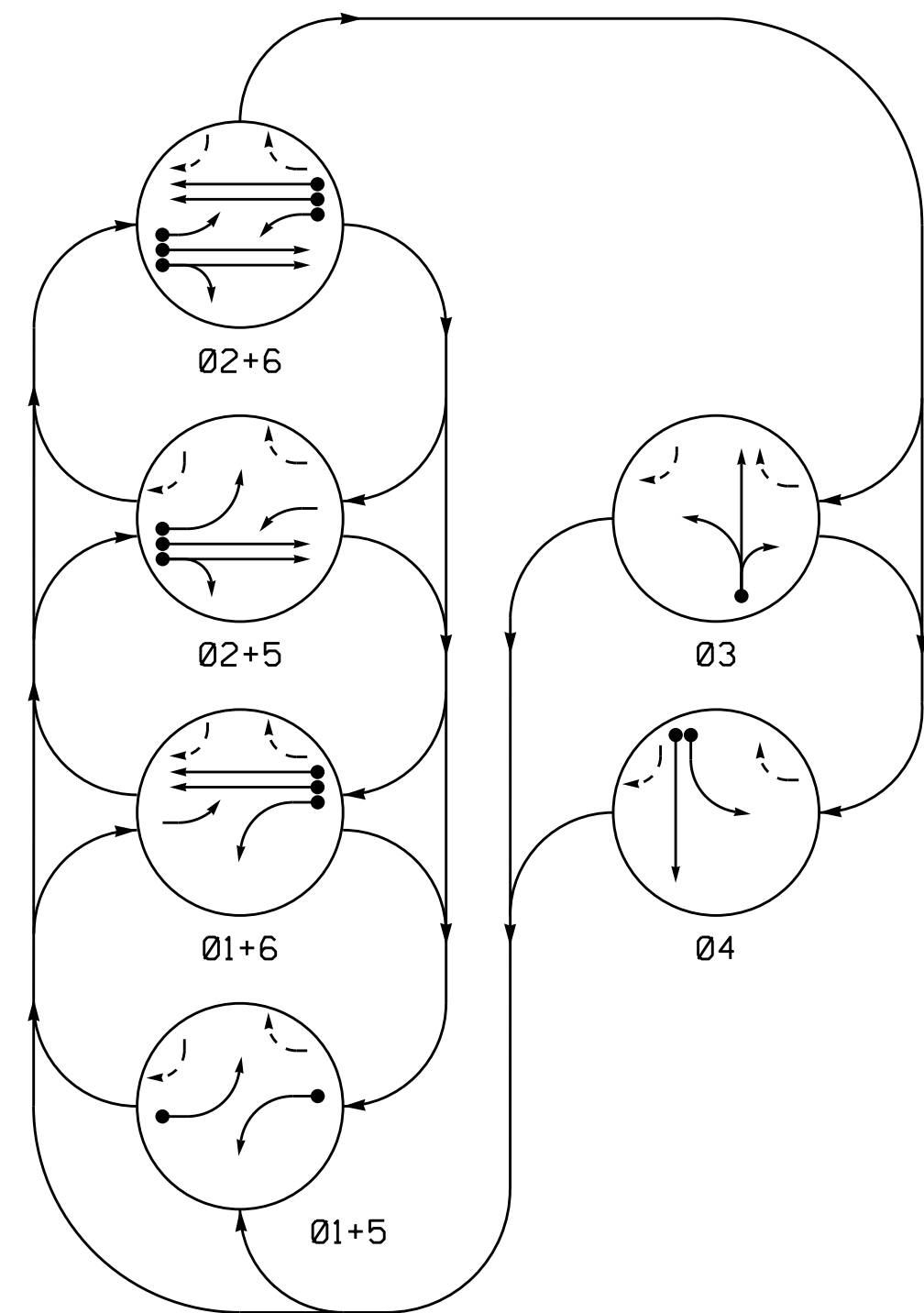
8 BOLT BASE PLATE DETAIL
See Note 5



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

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PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

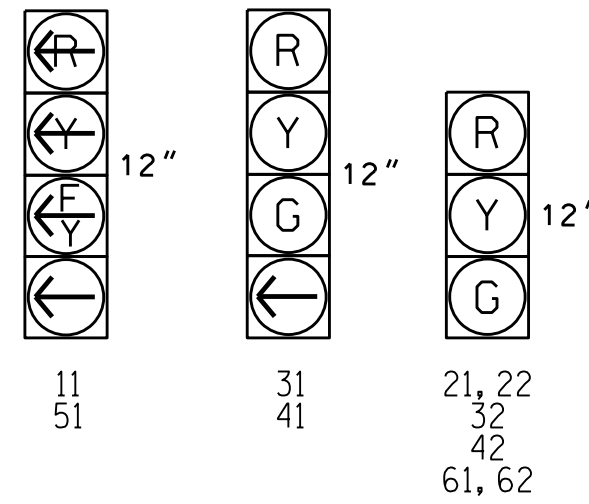
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- ←○→ UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- ←- - -> PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE					
	Ø 1 + 5	Ø 1 + 6	Ø 2 + 5	Ø 2 + 6	Ø 3	Ø 4
11	←	←	←	←	←	←
21, 22	R	R	G	G	R	R
31	R	R	R	R	G	R
32	R	R	R	R	G	R
41	R	R	R	R	R	G
42	R	R	R	R	R	G
51	←	←	←	←	←	←
61, 62	R	G	R	G	R	R

SIGNAL FACE I.D.

All Heads L.E.D.



OASIS 2070 LOOP & DETECTOR INSTALLATION CHART

LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	DETECTOR PROGRAMMING							
					PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
1A	6X40	0	2-4-2	Y	1	Y	Y	-	-	15	-	Y
2A	6X6	70	3	Y	2	Y	Y	-	-	-	-	Y
2B	6X6	70	3	Y	2	Y	Y	-	-	-	-	Y
3A	6X40	0	2-4-2	Y	3	Y	Y	-	-	10	-	Y
4A	6X40	0	2-4-2	Y	4	Y	Y	-	-	-	-	Y
4B	6X40	0	2-4-2	Y	4	Y	Y	-	-	-	-	Y
5A	6X40	0	2-4-2	Y	5	Y	Y	-	-	15	-	Y
6A	6X6	70	4	Y	6	Y	Y	-	-	-	-	Y
6B	6X6	70	4	Y	6	Y	Y	-	-	-	-	Y

6 Phase Fully Actuated Signal System #11331

NOTES

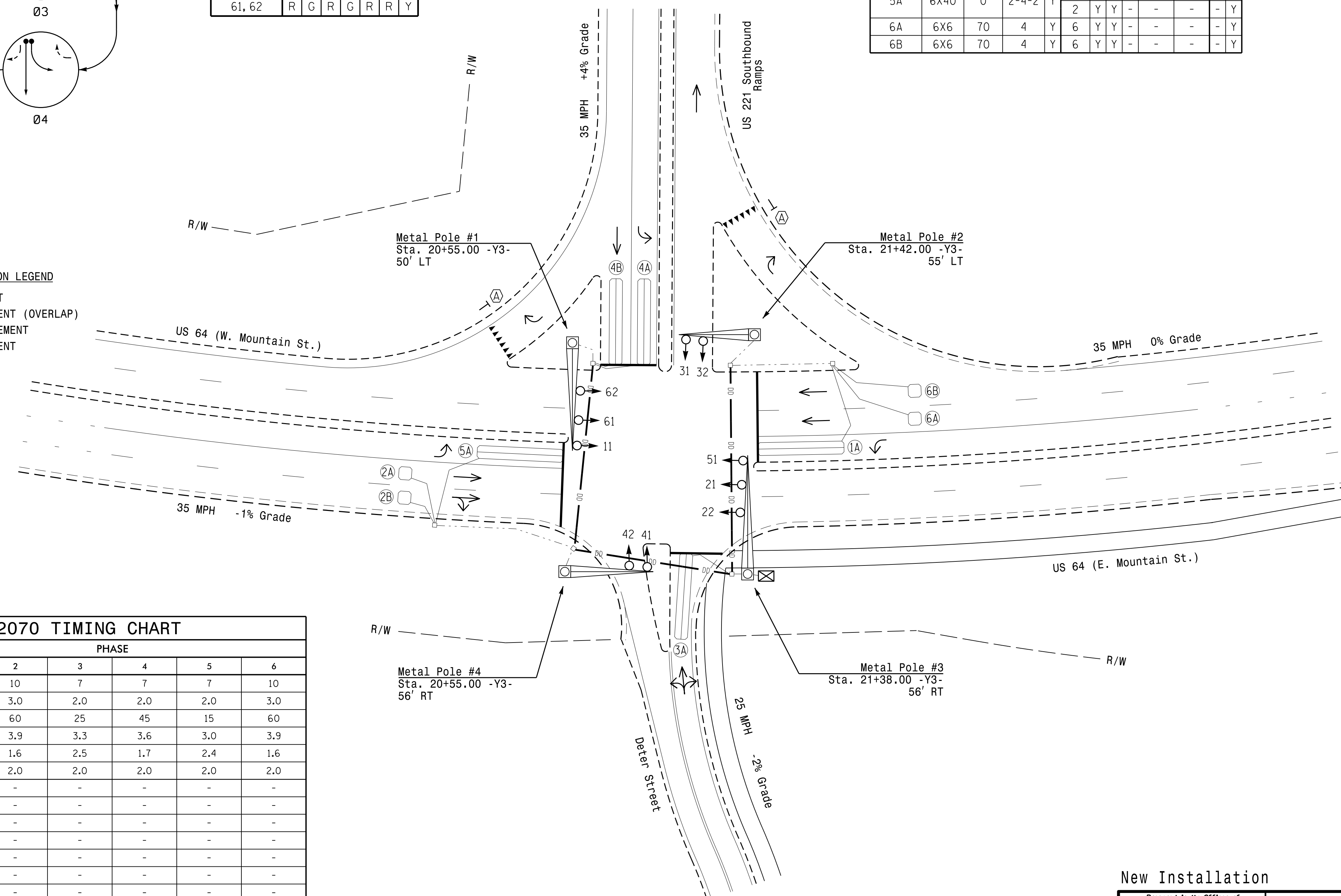
- Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Phase 1 and/or phase 5 may be lagged.
- The order of phase 3 and phase 4 may be reversed.
- Set all detector units to presence mode.
- Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.

FEATURE	PHASE					
	1	2	3	4	5	6
Min Green 1 *	7	10	7	7	7	10
Extension 1	2.0	3.0	2.0	2.0	2.0	3.0
Max Green 1 *	15	60	25	45	15	60
Yellow Clearance	3.0	3.9	3.3	3.6	3.0	3.9
Red Clearance	2.4	1.6	2.5	1.7	2.4	1.6
Red Revert	2.0	2.0	2.0	2.0	2.0	2.0
Walk 1 *	-	-	-	-	-	-
Don't Walk 1	-	-	-	-	-	-
Seconds Per Actuation *	-	-	-	-	-	-
Max Variable Initial *	-	-	-	-	-	-
Time Before Reduction *	-	-	-	-	-	-
Time To Reduce *	-	-	-	-	-	-
Minimum Gap	-	-	-	-	-	-
Recall Mode	-	MIN RECALL	-	-	-	MIN RECALL
Vehicle Call Memory	-	YELLOW	-	-	-	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.

LEGEND

- | PROPOSED | EXISTING |
|--|----------|
| ○→ Traffic Signal Head | ●→ N/A |
| ●→ Modified Signal Head | ○→ N/A |
| ⊥ Sign | ⊥ N/A |
| ⊥ Pedestrian Signal Head With Push Button & Sign | ⊥ N/A |
| ⊥ Signal Pole with Guy | ⊥ N/A |
| ⊥ Signal Pole with Sidewalk Guy | ⊥ N/A |
| ⊥ Inductive Loop Detector | ⊥ N/A |
| ⊥ Controller & Cabinet | ⊥ N/A |
| ⊥ Junction Box | ⊥ N/A |
| ⊥ 2-in Underground Conduit | ⊥ N/A |
| --- Right of Way | --- N/A |
| → Directional Arrow | → N/A |
| → Directional Drill | → N/A |
| ⊥ Metal Pole with Mastarm | ⊥ N/A |
| ⊥ "YIELD" Sign (R1-2) | ⊥ N/A |



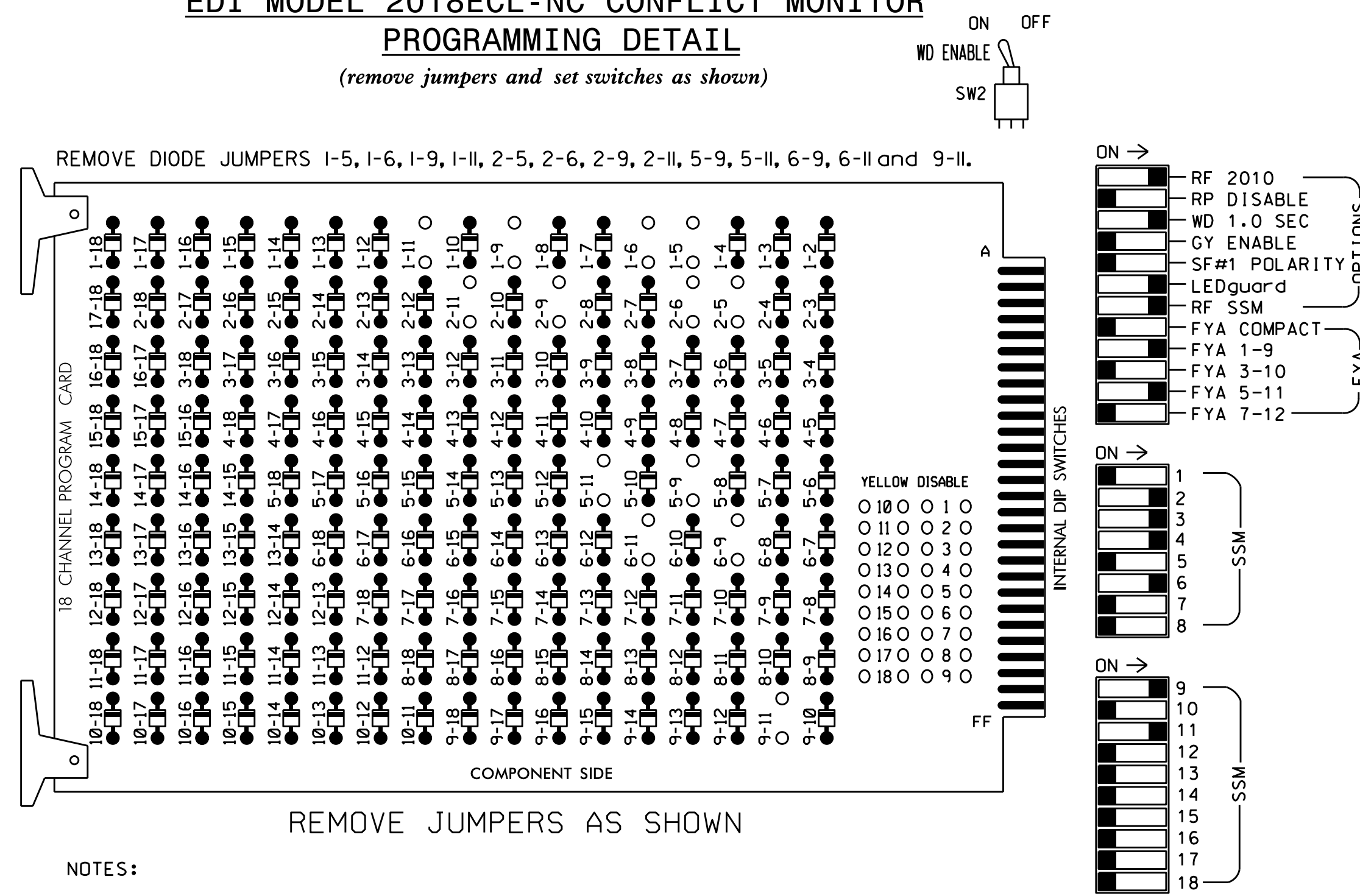
New Installation

	<p>US 64 (Mountain St.) at US 221 SB Ramps/Deter Street</p>		<p>DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED</p>					
	<p>Division 13 Rutherford County Rutherfordton</p> <p>PLAN DATE: January 2020 REVIEWED BY: T.J. Williams</p> <p>PREPARED BY: R.N. Zinser REVIEWED BY:</p>	<p>REVISIONS</p> <table border="1"> <tr> <th>NO.</th> <th>INIT.</th> <th>DATE</th> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> </table>		NO.	INIT.	DATE		
NO.	INIT.	DATE						

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**EDI MODEL 2018ECL-NC CONFLICT MONITOR
PROGRAMMING DETAIL**

(remove jumpers and set switches 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.

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 Startup In Green.
4. Program phases 2 and 6 for Yellow Flash, and overlap 1 as Wag Overlaps.
5. If this signal will be managed by an ATMS software, enable controller and detector logging for all enabled detectors.
6. The cabinet and controller are part of the Signal System #11331.

EQUIPMENT INFORMATION

CONTROLLER.....2070E
 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,S7,S8,AUX S1,AUX S4
 PHASES USED.....1,2,3,4,5,6
 OVERLAP "A".....1+2
 OVERLAP "B".....NOT USED
 OVERLAP "C".....5+6
 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.	11★	21,22	NU	31	32	41	42	NU	51★	61,62	NU	NU	NU	NU	11★	NU	NU	51★	NU
RED		128		116	116	101	101			134									
YELLOW	*	129		117	117	102	102		*	135									
GREEN		130		118	118	103	103			136									
RED ARROW													A121					A114	
YELLOW ARROW													A122					A115	
FLASHING YELLOW ARROW													A123					A116	
GREEN ARROW	127			118		103				133									

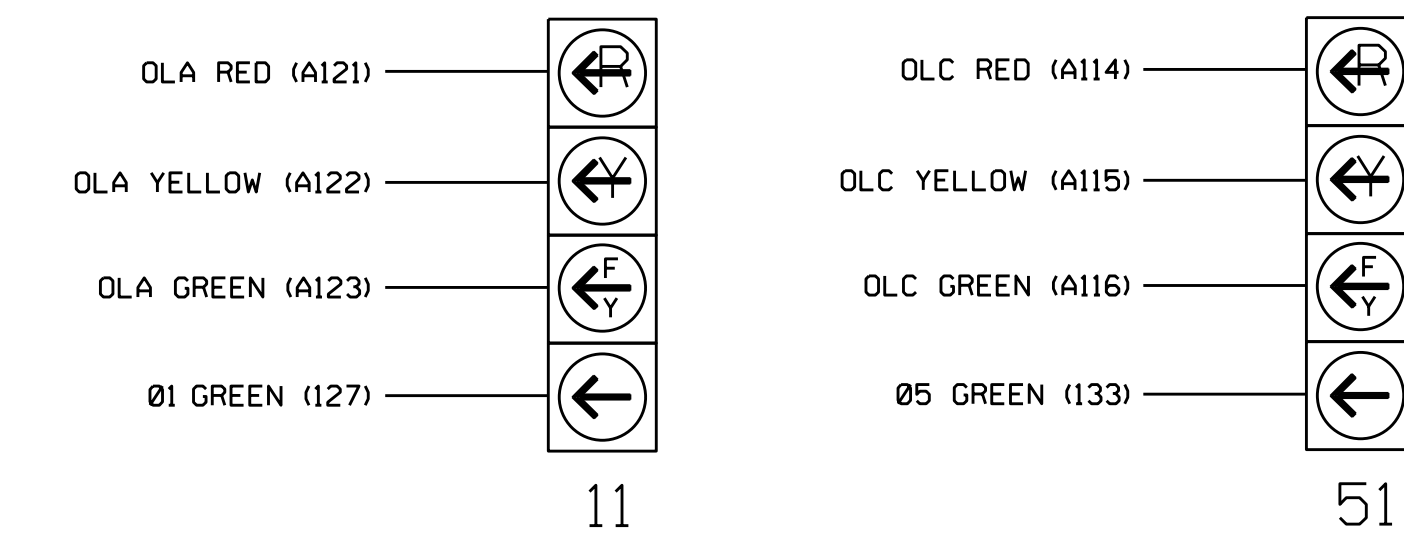
NU = Not Used

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

★ See pictorial of head wiring in detail this sheet.

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)

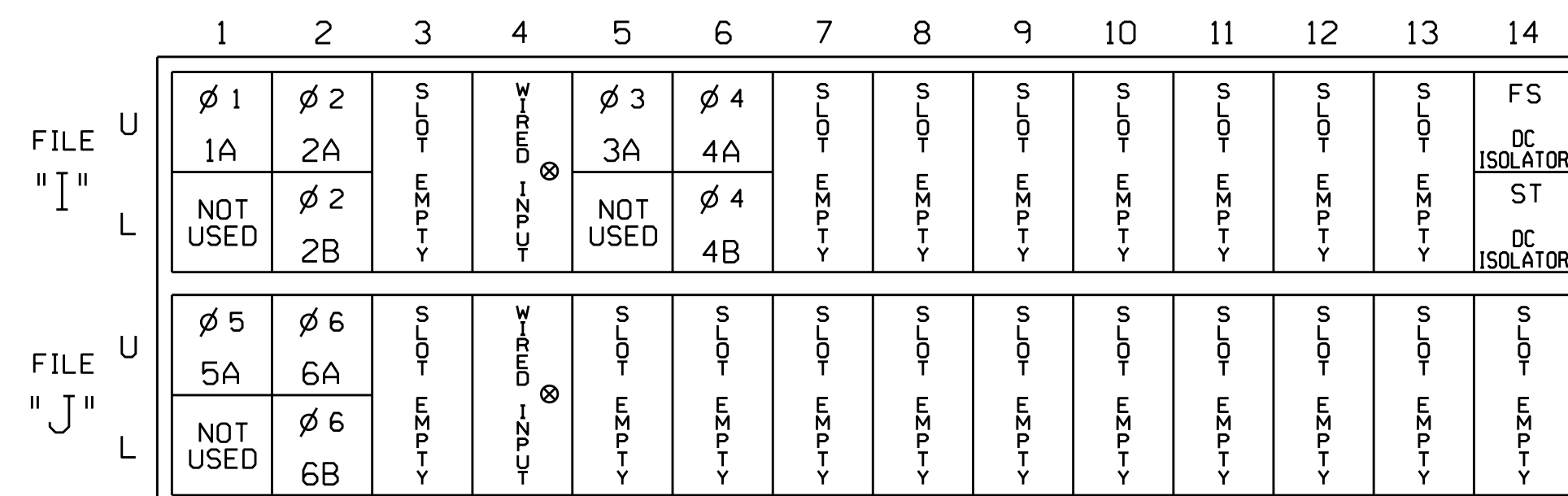


NOTE

The sequence display for signal heads 11 and 51 requires special logic programming. See sheet 2 for programming instructions.

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

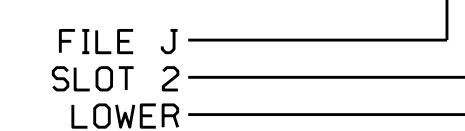
INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
1A ¹	TB2-1,2	J1U	56	18	1	1	Y	Y			15
2A	TB2-5,6	J4U	48	10	26	6	Y	Y			
2B	TB2-7,8	J2L	43	5	12	2	Y	Y			
3A	TB4-5,6	J5U	58	20	3	3	Y	Y			10
4A	TB4-9,10	J6U	41	3	4	4	Y	Y			
4B	TB4-11,12	J6L	45	7	14	4	Y	Y			
5A ²	TB3-1,2	J1U	55	17	5	5	Y	Y			15
6A	TB3-5,6	J2U	40	2	6	6	Y	Y			
6B	TB3-7,8	J2L	44	6	16	6	Y	Y			

¹Add jumper from J1-W to J4-W, on rear of input file.

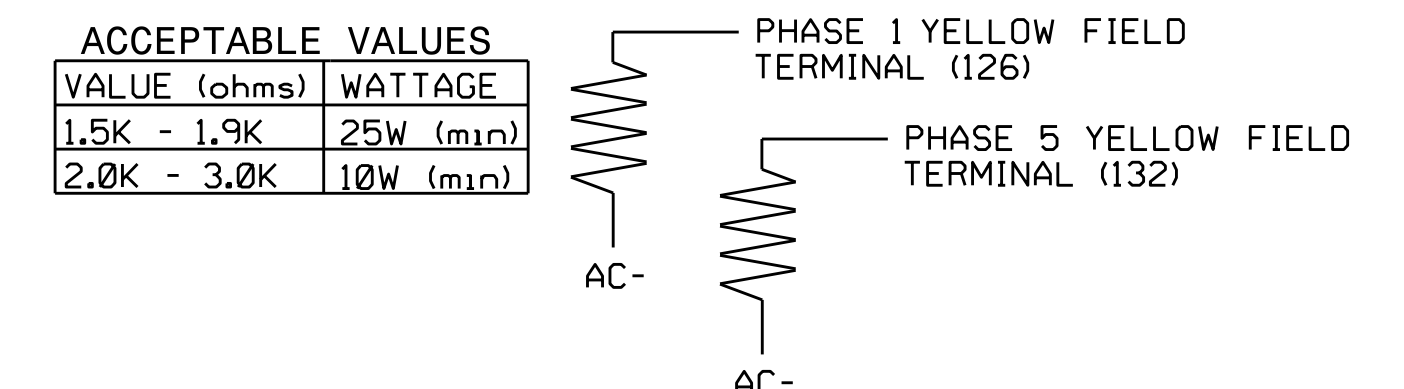
²Add jumper from J1-W to J4-W, on rear of input file.

INPUT FILE POSITION LEGEND: J2L



LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown below)



Electrical Detail - Sheet 1 of 2

Electrical and Programming Details for: **US 64 (Mountain St.) at US 221 SB Ramps/Deter St.**

Prepared In the Offices of: **Transitional Mobility and Safety Division**

Division 13 Rutherford County Rutherfordton

PLAN DATE: February 2020 REVIEWED BY: T. Joyce

PREPARED BY: C. Strickland REVIEWED BY:

REVISIONS: _____ INIT. DATE

DocuSigned by: **D. Todd Joyce** 3/3/2020

SIG. INVENTORY NO. 13-1311

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 13-1311
 DESIGNED: January 2020
 SEALED: 2/28/2020
 REVISED:

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL: **D. Todd Joyce** ENGINEER 031001

LOGICAL I/O PROCESSOR PROGRAMMING DETAIL TO PRODUCE SPECIAL FYA-PPLT SIGNAL SEQUENCE

(program controller as shown below)

- FROM MAIN MENU PRESS '2' (PHASE CONTROL), THEN '1' (PHASE CONTROL FUNCTIONS), SCROLL TO THE BOTTOM OF THE MENU AND ENABLE ACT LOGIC COMMANDS 1, 2, 3, 4, 5 AND 6.
- FROM MAIN MENU PRESS '6' (OUTPUTS), THEN '3' (LOGICAL I/O PROCESSOR).

LOGICAL I/O COMMAND #1 (+/-COMMAND#)
IF ACTIVE PHASE #1 IS ON
AND RED CLEAR ON PHASE #1 IS ON

↓
SCROLL DOWN

THEN:
SET OUTPUT ASSIGNMENT #50 ON
SET OUTPUT ASSIGNMENT #51 OFF

PRESS '+'

NOTE: LOGIC FOR PHASE 1 RED CLEAR WHEN TRANSITIONING FROM PHASE 1 TO PHASE 2 (HEAD 11).

LOGICAL I/O COMMAND #2 (+/-COMMAND#)
IF ACTIVE PHASE #1 IS ON

↓
SCROLL DOWN

THEN:
SET OUTPUT ASSIGNMENT #52 OFF

PRESS '+'

NOTE: LOGIC FOR SWITCHING FLASHING YELLOW ARROW "OFF" DURING PHASE 1 (HEAD 11).

LOGICAL I/O COMMAND #3 (+/-COMMAND#)
IF YELLOW ON PHASE #1 IS ON

↓
SCROLL DOWN

THEN:
SET OUTPUT ASSIGNMENT #51 ON

PRESS '+'

NOTE: LOGIC FOR YELLOW ARROW CLEARANCE FROM PHASE 1 (HEAD 11).

LOGICAL I/O COMMAND #4 (+/-COMMAND#)
IF ACTIVE PHASE #5 IS ON
AND RED CLEAR ON PHASE #5 IS ON

↓
SCROLL DOWN

THEN:
SET OUTPUT ASSIGNMENT #42 ON
SET OUTPUT ASSIGNMENT #43 OFF

PRESS '+'

NOTE: LOGIC FOR PHASE 5 RED CLEAR WHEN TRANSITIONING FROM PHASE 5 TO PHASE 6 (HEAD 51).

LOGICAL I/O COMMAND #5 (+/-COMMAND#)
IF ACTIVE PHASE #5 IS ON

↓
SCROLL DOWN

THEN:
SET OUTPUT ASSIGNMENT #44 OFF

PRESS '+'

NOTE: LOGIC FOR SWITCHING FLASHING YELLOW ARROW "OFF" DURING PHASE 5 (HEAD 51).

LOGICAL I/O COMMAND #6 (+/-COMMAND#)
IF YELLOW ON PHASE #5 IS ON

↓
SCROLL DOWN

THEN:
SET OUTPUT ASSIGNMENT #43 ON

PRESS '+'

NOTE: LOGIC FOR YELLOW ARROW CLEARANCE FROM PHASE 5 (HEAD 51).

LOGIC I/O PROCESSOR PROGRAMMING COMPLETE

OUTPUT REFERENCE SCHEDULE

- OUTPUT 42 = Overlap C Red
- OUTPUT 43 = Overlap C Yellow
- OUTPUT 44 = Overlap C Green
- OUTPUT 50 = Overlap A Red
- OUTPUT 51 = Overlap A Yellow
- OUTPUT 52 = Overlap A Green

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: |XX
VEH OVL NOT VEH: |
VEH OVL NOT PED: |
VEH OVL GRN EXT: |
STARTUP COLOR: - RED - YELLOW - GREEN
FLASH COLORS: - RED - YELLOW X GREEN

← NOTICE GREEN FLASH

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

PRESS '+' TWICE

PAGE 1: VEHICLE OVERLAP 'C' 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 X GREEN

← NOTICE GREEN FLASH

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

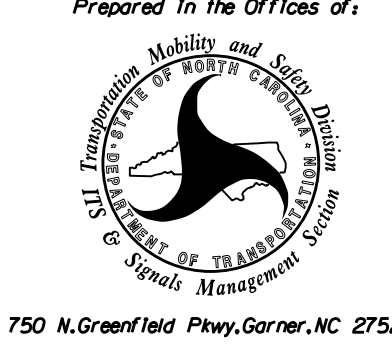
OVERLAP PROGRAMMING COMPLETE

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 13-1311
DESIGNED: January 2020
SEALED: 2/28/2020
REVISED:

Electrical Detail - Sheet 2 of 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared In the Offices of:

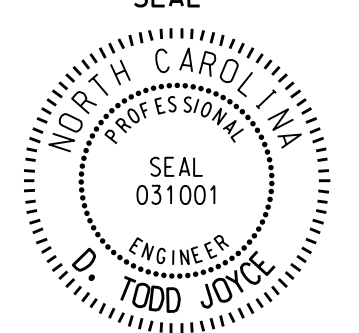


750 N. Greenfield Pkwy, Garner, NC 27529

US 64 (Mountain St.) at US 221 SB Ramps/Deter St.)	
Division 13	Rutherford County
PLAN DATE: February 2020	REVIEWED BY: T. Joyce
PREPARED BY: C. Strickland	REVIEWED BY:
REVISIONS	INIT. DATE

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SEAL



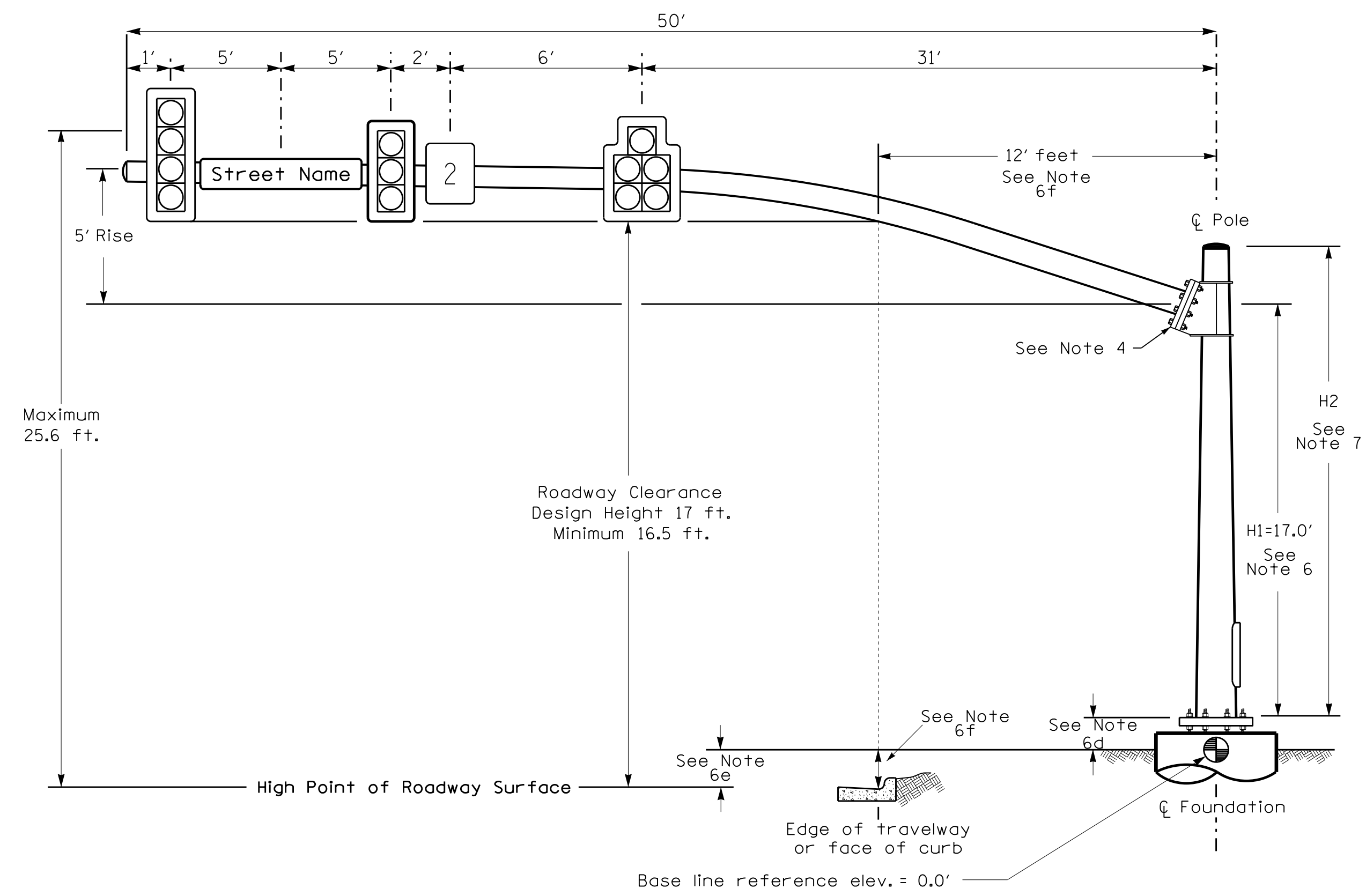
D. Todd Joyce
ENGINEER
031001

DocuSigned by:
D. Todd Joyce
3/3/2020

SIG. INVENTORY NO. 13-1311

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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	Pole 2
Baseline reference point at \odot Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	+2.25 ft.	+0.38 ft.
Elevation difference at Edge of travelway or face of curb	+0.60 ft.	+0.27 ft.

METAL POLE No. 1 and 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
	RIGID MOUNTED SIGNAL HEAD 12"-5 SECTION-WITH BACKPLATE	16.3 S.F.	42.0" W X 56.0" L	103 LBS
	STREET NAME SIGN RIGID MOUNTED	16.0 S.F.	24.0" W X 96.0" L	36 LBS
	SIGN RIGID MOUNTED	7.5 S.F.	30.0" W X 36.0" L	14 LBS

NOTES

DESIGN REFERENCE MATERIAL

- 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

- 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.
- Design all signal supports using stress ratios that do not exceed 0.9.
- 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.
- Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
- The mast arm attachment height (H1) shown is based on the following design assumptions:
 - Nominal vertical rise in mast arm is 5 feet as measured from the centerline of the arm base to the centerline of the free end of the arm.
 - Signal heads are rigidly mounted and vertically centered on the mast arm.
 - The roadway clearance height for design is as shown in the elevation views.
 - The top of the pole base plate is 0.75 feet above the ground elevation.
 - Refer to the Elevation Data Chart for the elevation differences between the proposed foundation ground level and the high point of the roadway.
 - Provide horizontal distance from the proposed centerline of the foundation to the edge of travelway. Refer to the Elevation Data Chart for elevation difference between the proposed foundation ground level and the edge of travelway. This information is necessary to ensure that the roadway clearance is maintained at the edge of the travelway and to aid in the camber design of the arm.
- The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
 - Mast arm attachment height (H1) plus 2 feet, or
 - H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
- If 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.
- The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
- The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

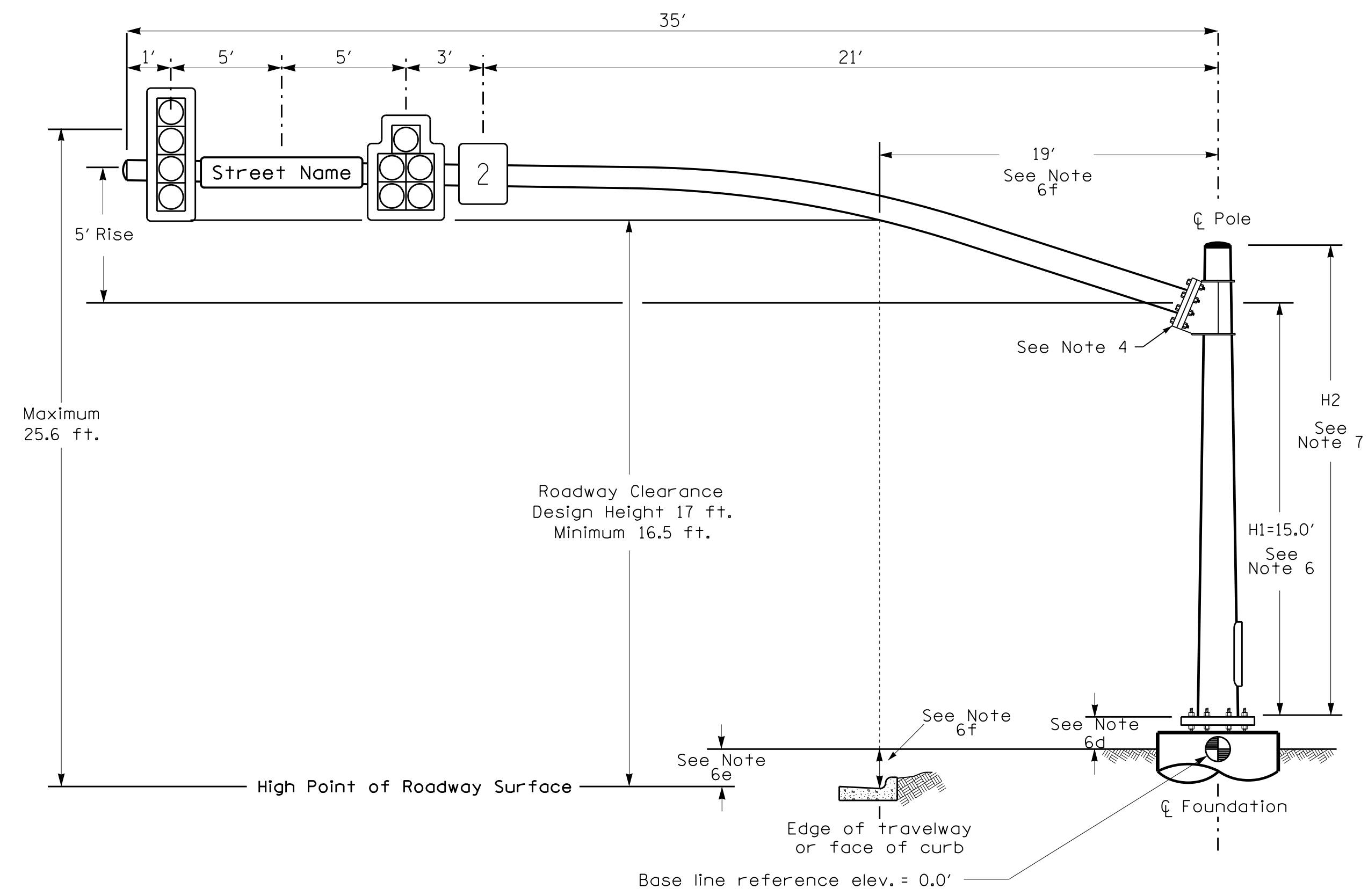
All metal poles and arms should be BLACK in color as specified in the project special provisions.

NCDOT Wind Zone 4 (90 mph)

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

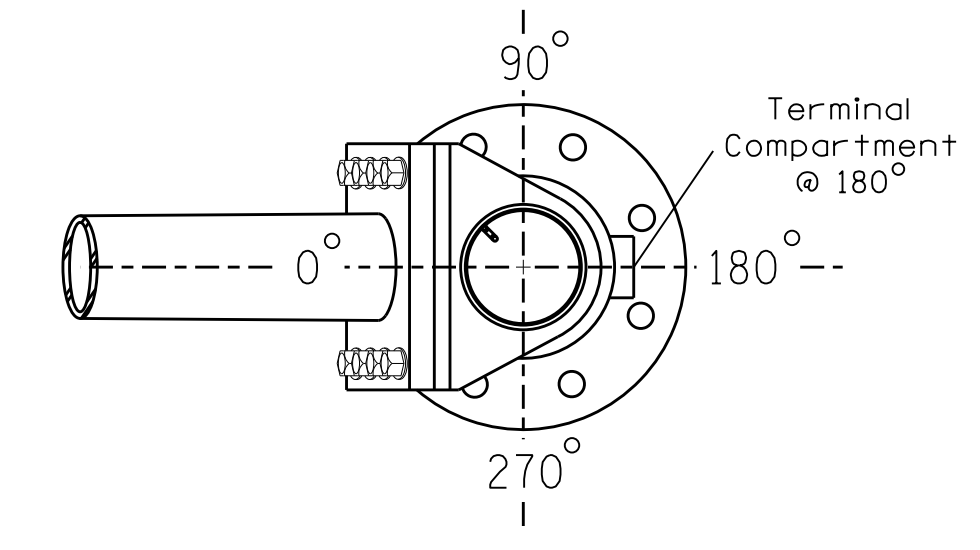
<p>Prepared in the Offices of: TRANSPORTATION MOBILITY AND SAFETY DIVISION STATE OF NORTH CAROLINA SIGNAL DESIGN SECTION</p> <p>750 N. Greenfield Pkwy, Garner, NC 27529</p>	<p>US 64 (Mountain St.) at US 221 SB Ramps/Deter Street</p> <p>Division 13 Rutherford County Rutherfordton</p> <p>PLAN DATE: January 2020 REVIEWED BY: T.J. Williams</p> <p>PREPARED BY: R.N. Zinser REVIEWED BY:</p>					
	<p>SCALE: 0 N/A</p>	<p>REVISIONS:</p> <table border="1"> <thead> <tr> <th>INIT.</th> <th>DATE</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> </tr> </tbody> </table>		INIT.	DATE	
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Design Loading for METAL POLE NO. 2

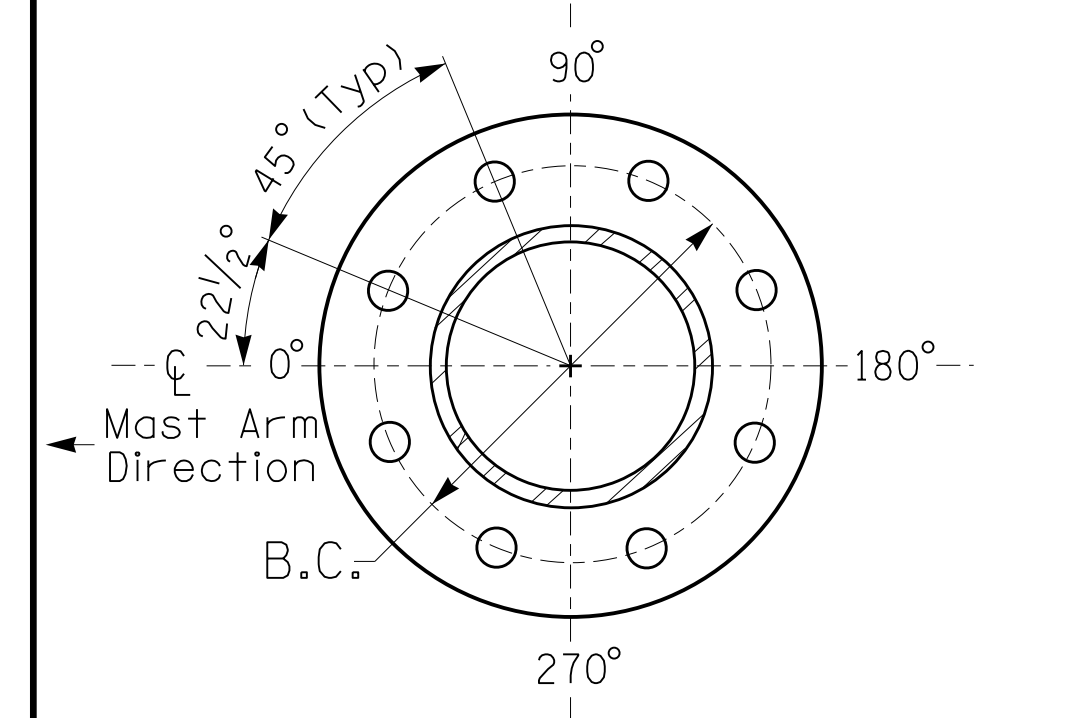


Elevation View

POLE RADIAL ORIENTATION

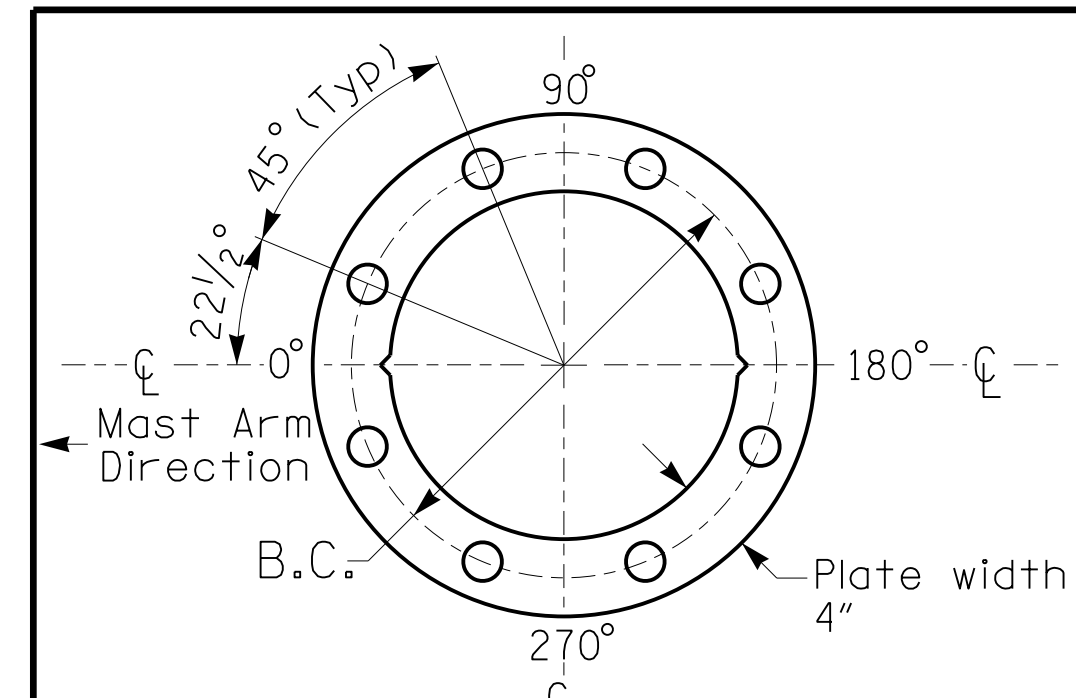


8 BOLT BASE PLATE DETAIL



See Note 5

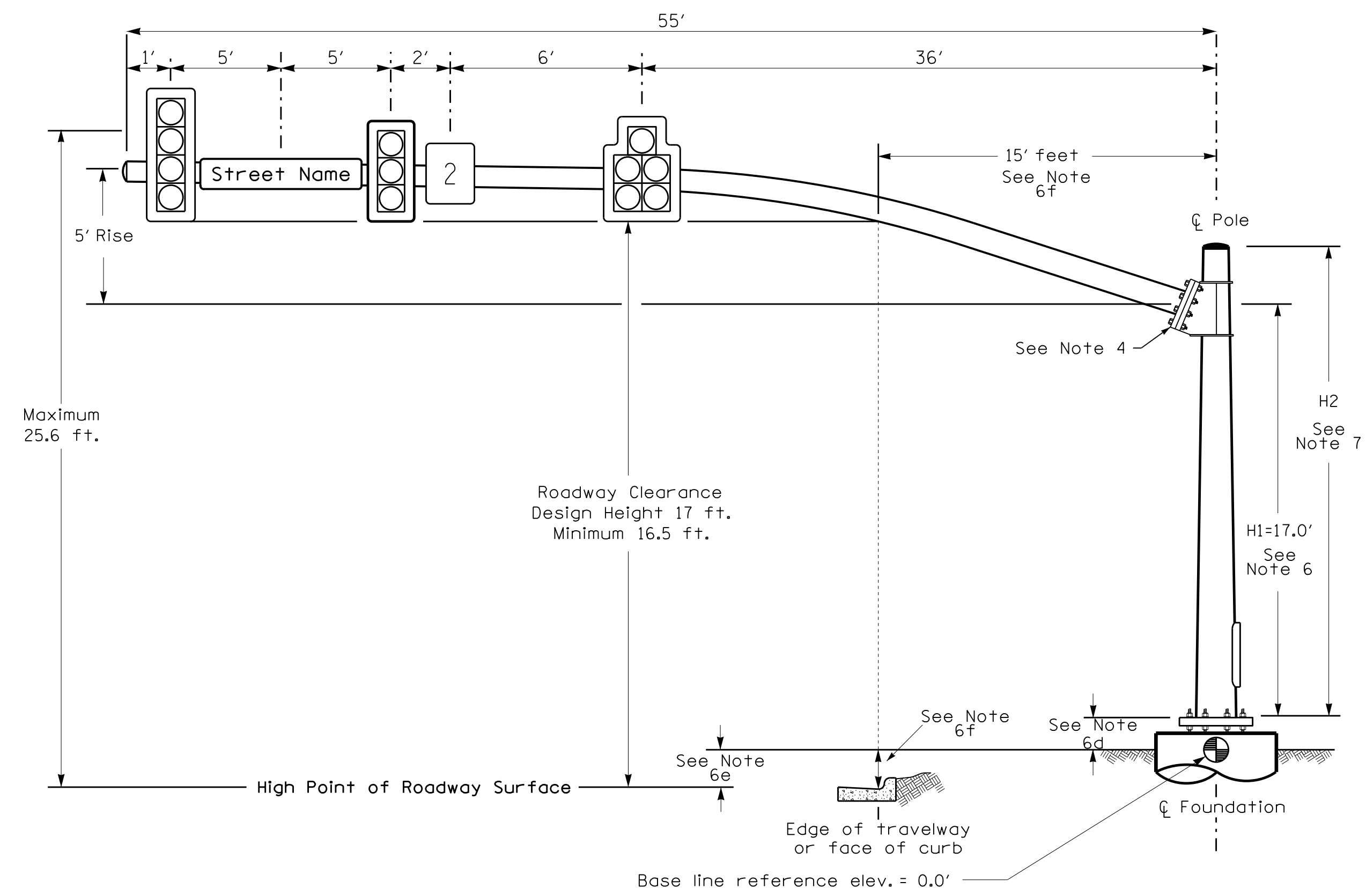
BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL For 8 Bolt Base Plate



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METAL POLE No. 3 and 4

Design Loading for METAL POLE NO. 3



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 3	Pole 4
Baseline reference point at \odot Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	+2.46 ft.	+3.24 ft.
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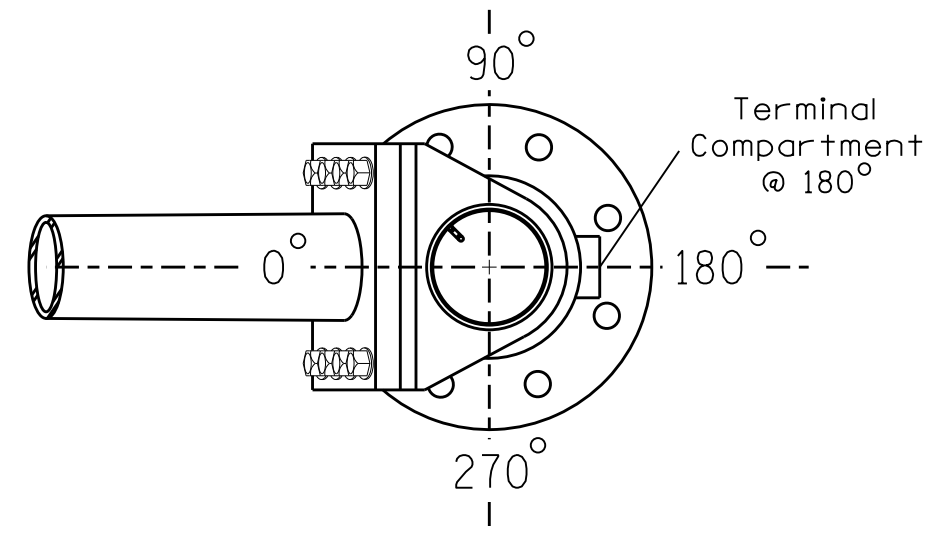
DESIGN REQUIREMENTS

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 - Signal heads are rigidly mounted and vertically centered on the mast arm.
 - The roadway clearance height for design is as shown in the elevation views.
 - The top of the pole base plate is 0.75 feet above the ground elevation.
 - Refer to the Elevation Data Chart for the elevation differences between the proposed foundation ground level and the high point of the roadway.
 - Provide horizontal distance from the proposed centerline of the foundation to the edge of travelway. Refer to the Elevation Data Chart for elevation difference between the proposed foundation ground level and the edge of travelway. This information is necessary to ensure that the roadway clearance is maintained at the edge of the travelway and to aid in the camber design of the arm.
- The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
 - Mast arm attachment height (H1) plus 2 feet, or
 - H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
- If 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.
- The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
- The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

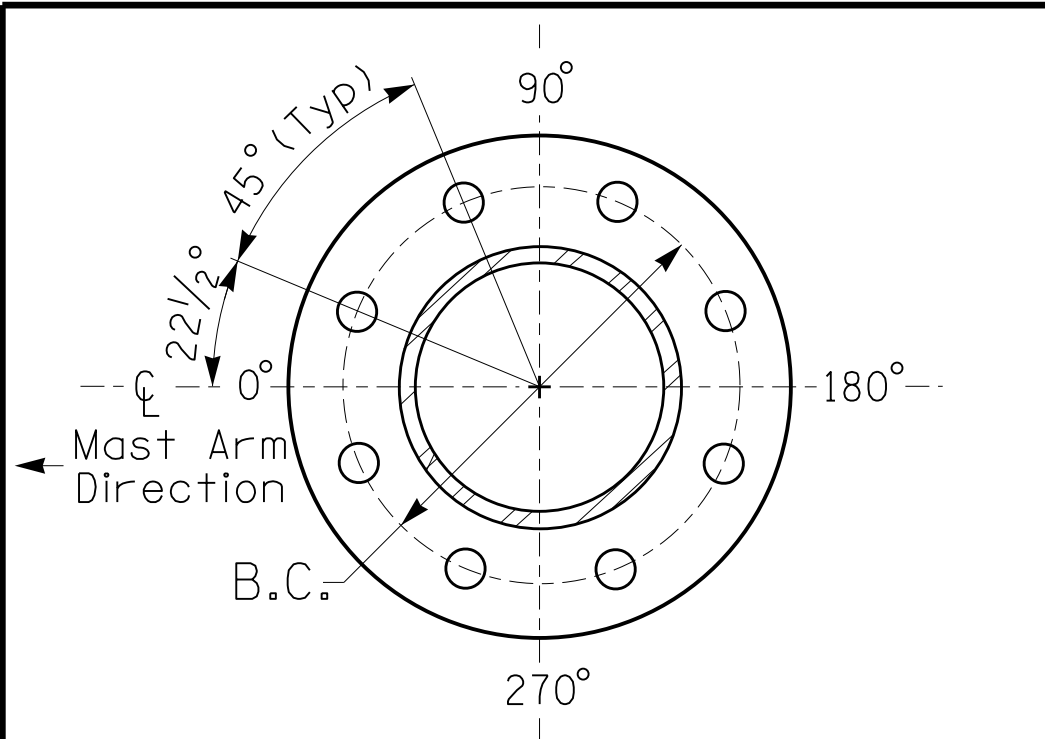
All metal poles and arms should be BLACK in color as specified in the project special provisions.

NCDOT Wind Zone 4 (90 mph)

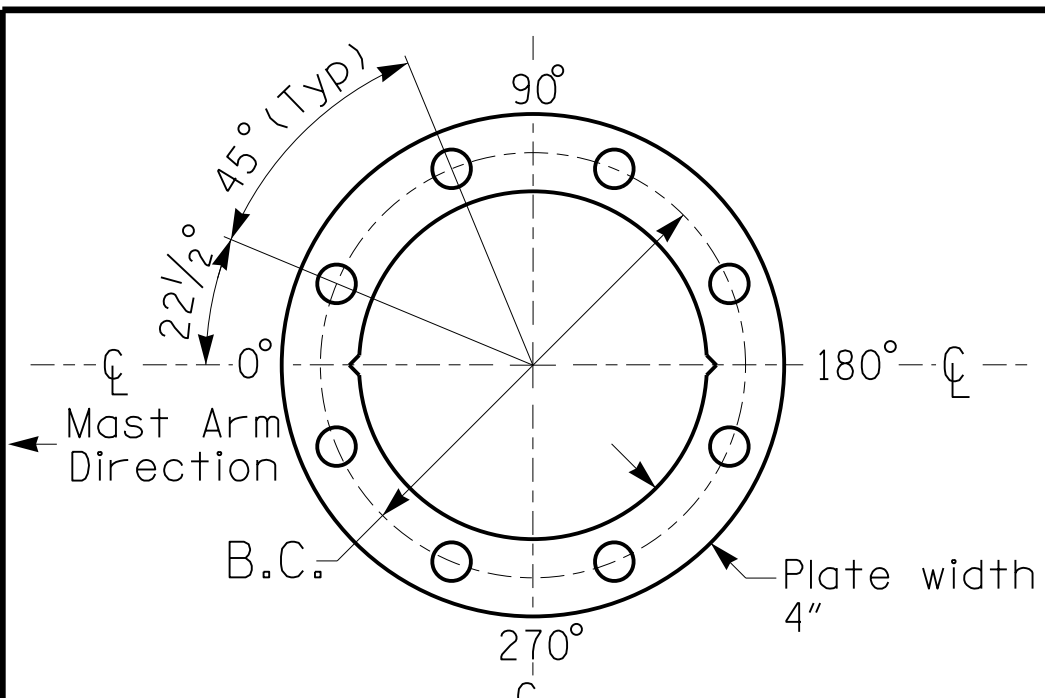
	US 64 (Mountain St.) at US 221 SB Ramps/Deter Street		
	Division 13 Rutherford County Rutherfordton PLAN DATE: January 2020 PREPARED BY: R.N. Zinser	REVIEWED BY: T.J. Williams REVIEWED BY:	



POLE RADIAL ORIENTATION

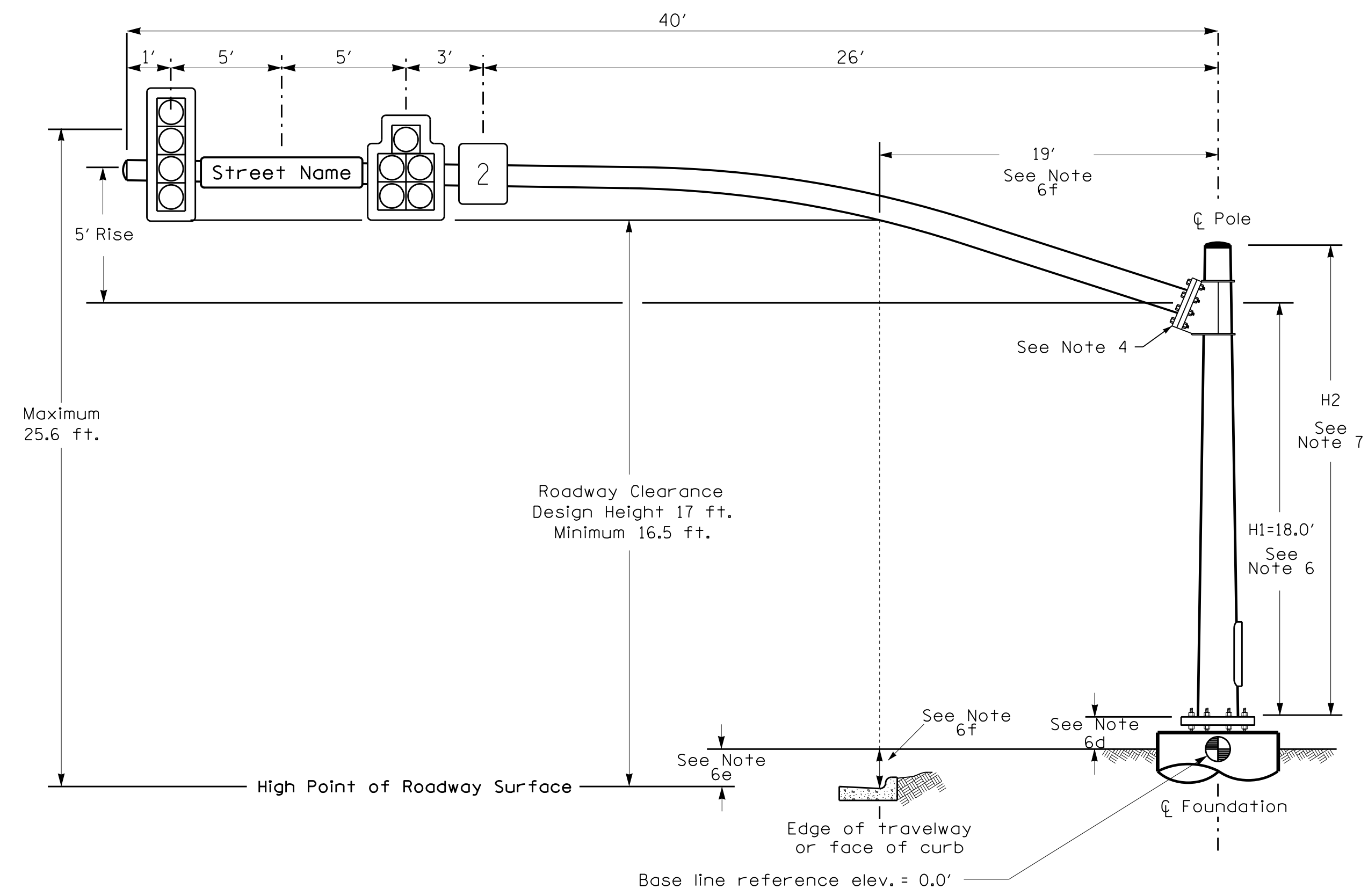


8 BOLT BASE PLATE DETAIL



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

Design Loading for METAL POLE NO. 4



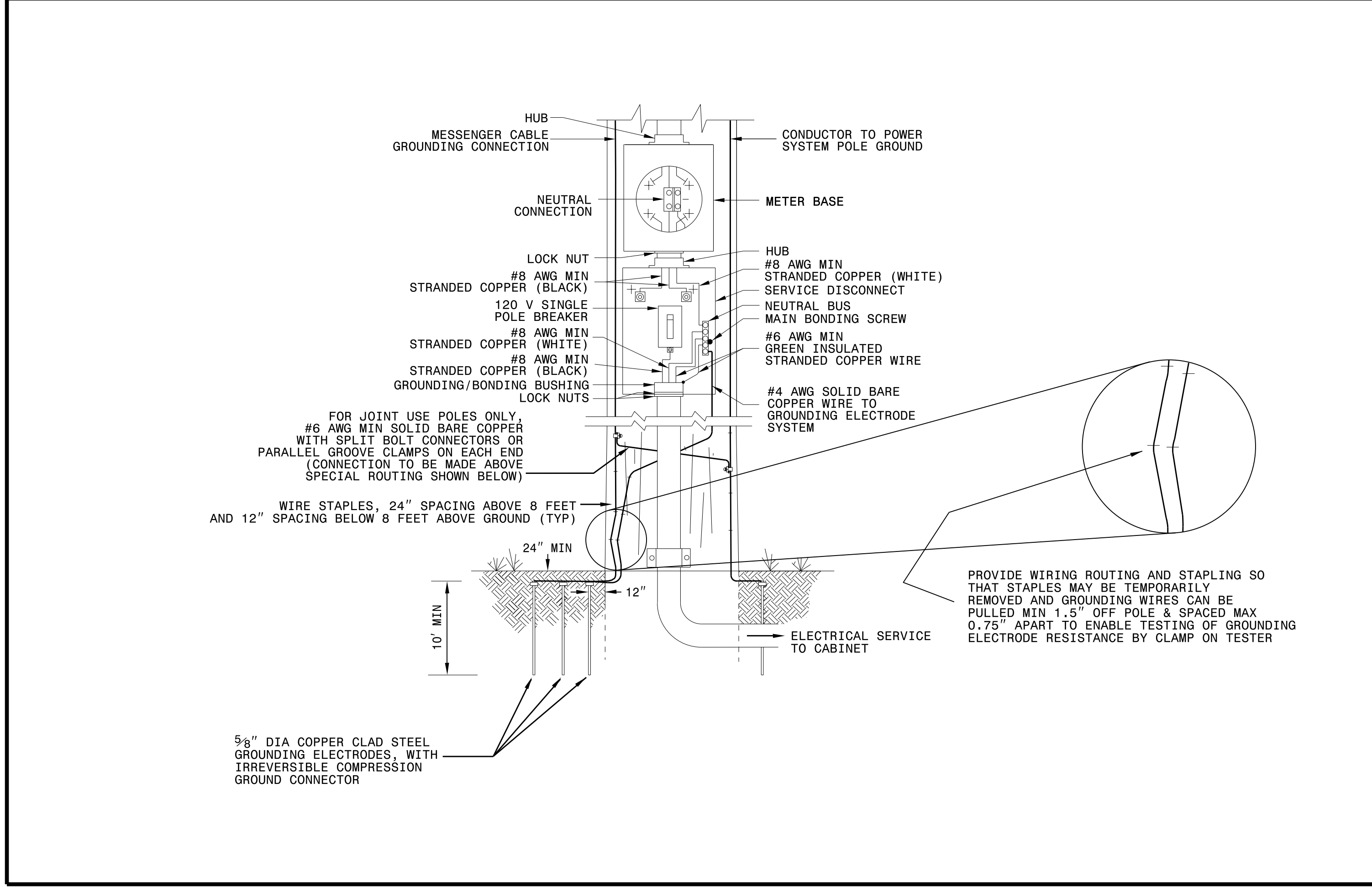
Elevation View

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 rnz:lnsr

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

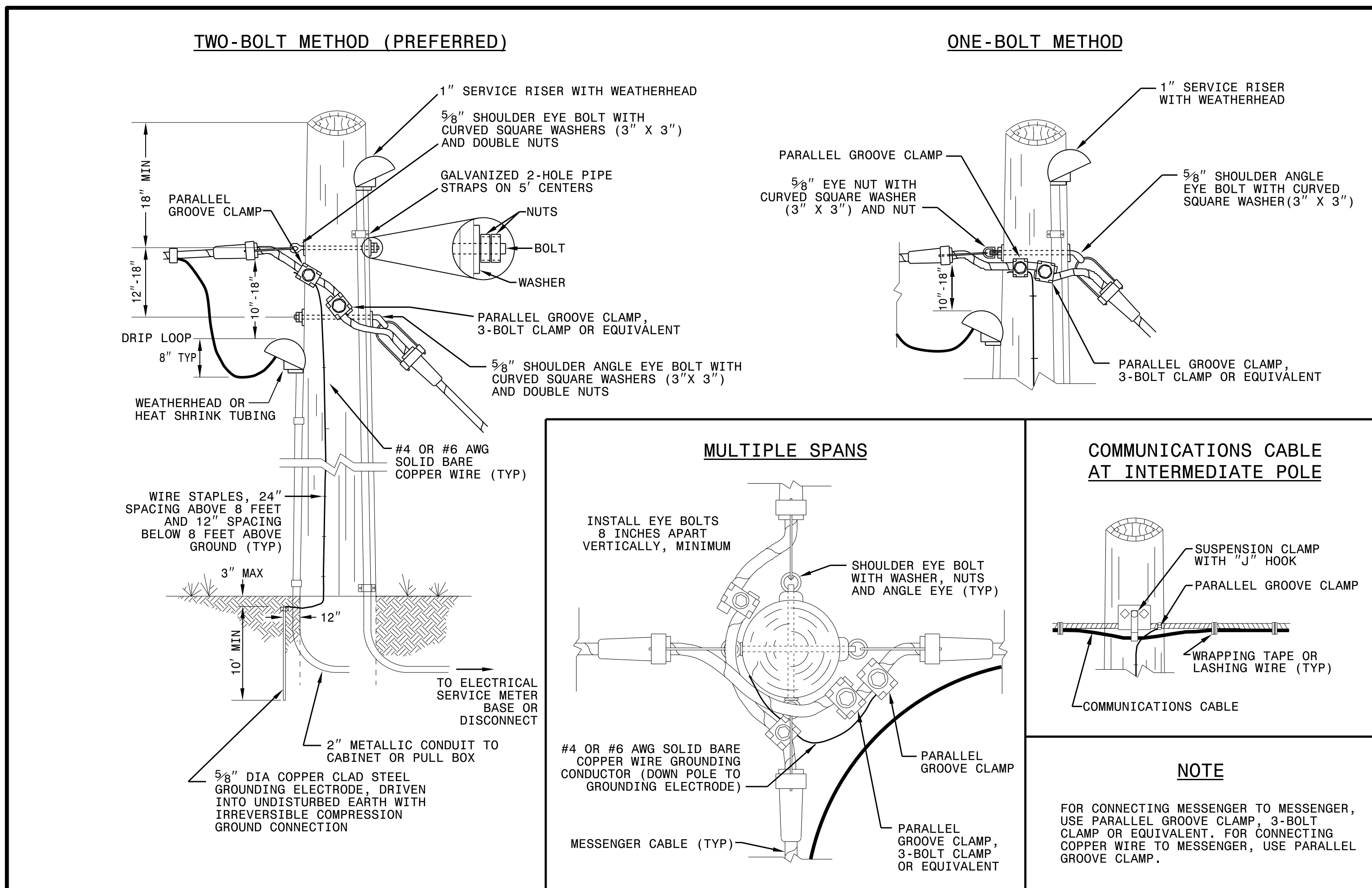
SHEET 1 OF 1
1700D01



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



DOCUMENT NOT CONSIDERED
FINAL UNLESS ALL
SIGNATURES COMPLETED

See Plate for Title

Prepared in the Offices of:

SEAL

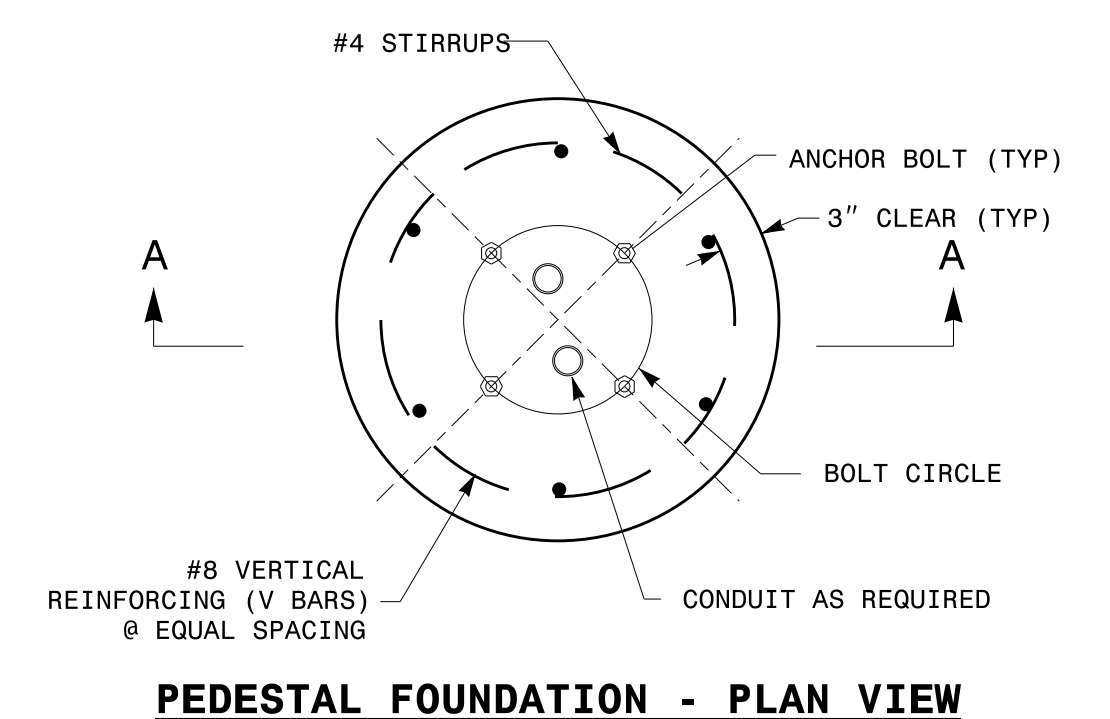
DocuSigned by:
Mohd Aslami

10/11/2017

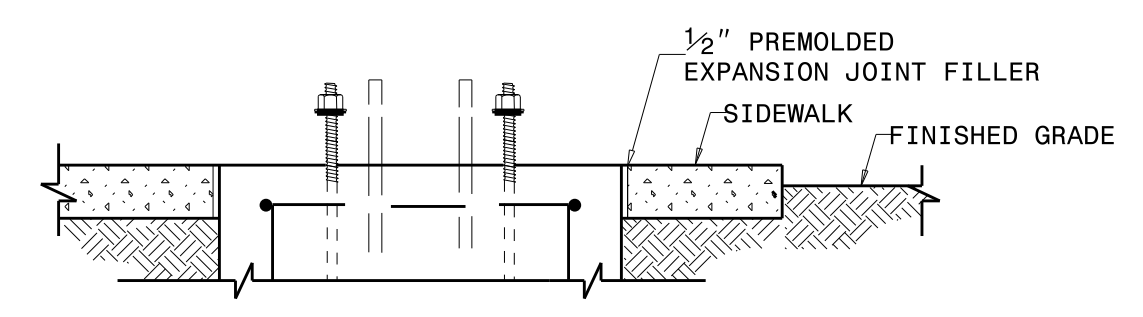
750 N. Greenfield Parkway
Garner, NC 27529

DATE

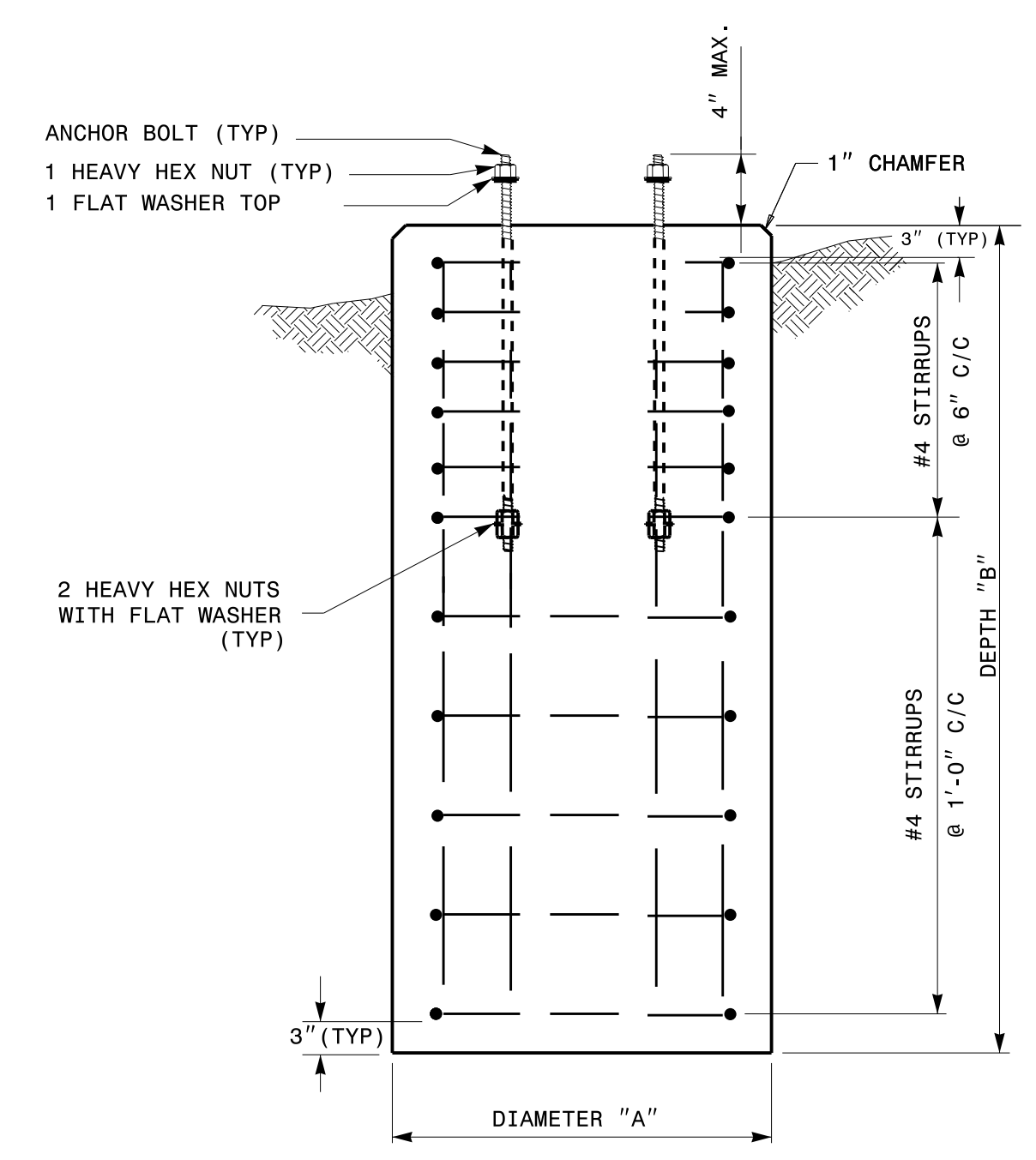
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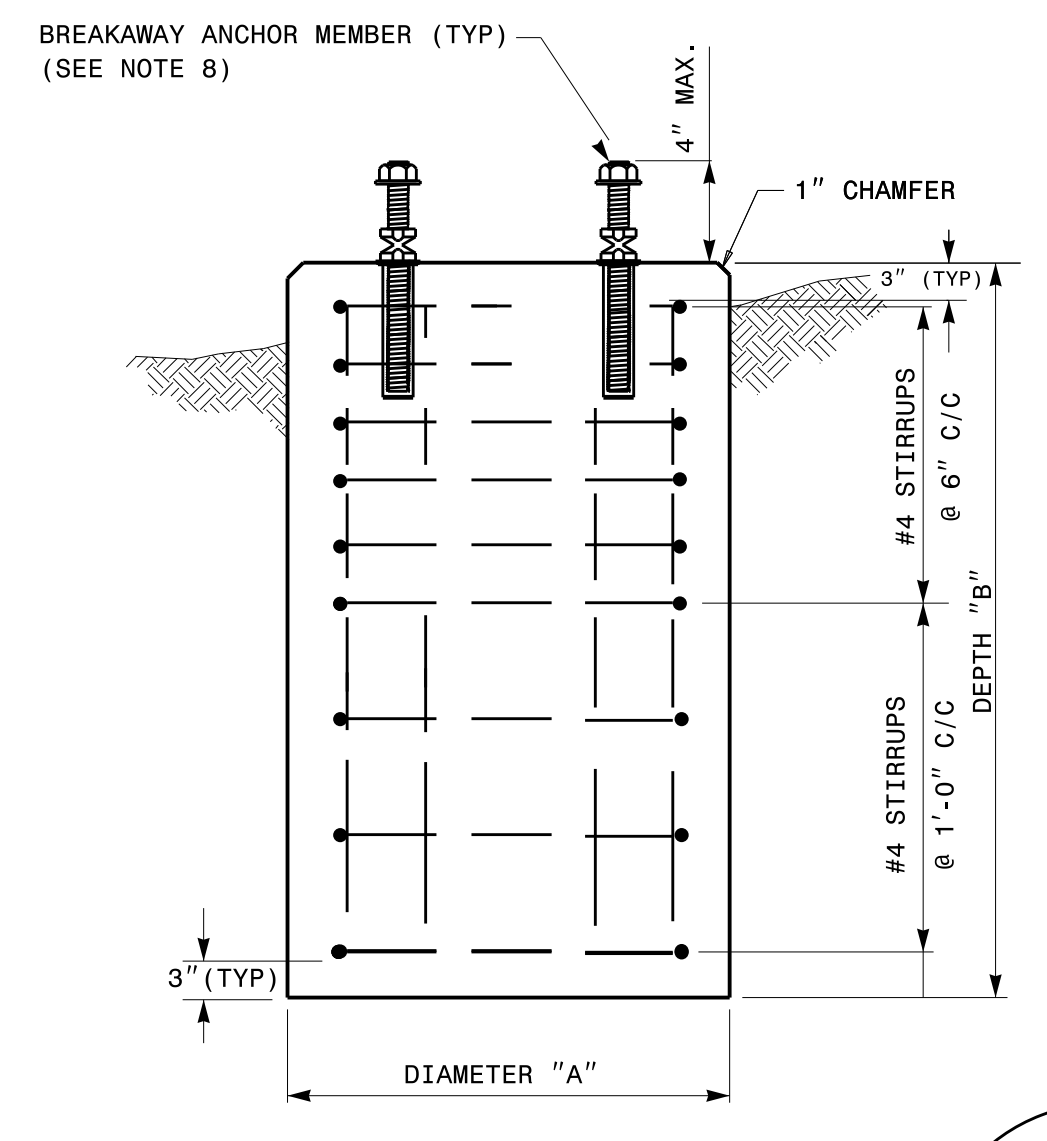
PEDESTAL FOUNDATION - PLAN VIEW



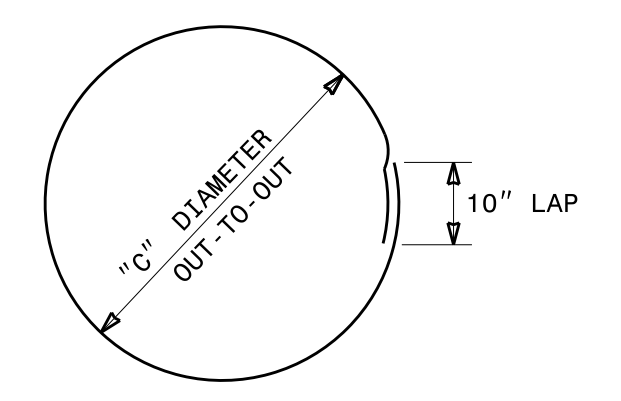
PEDESTAL FOUNDATION DETAILS FOR SIDEWALK



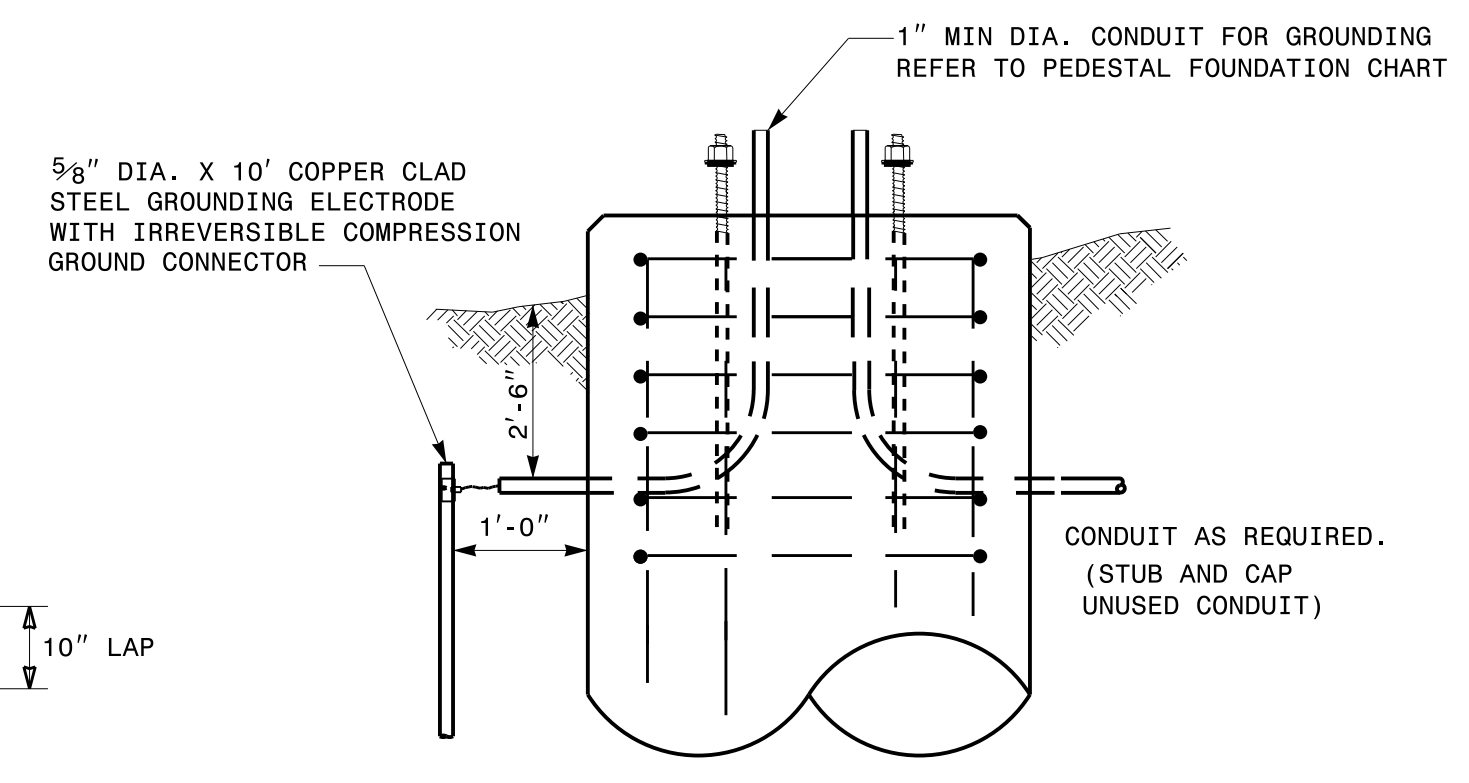
TYPES I, II & III SECTION A-A



TYPES I & II ONLY SECTION A-A



CLOSED HOOPS



GROUNDING & CONDUIT DETAIL

NOTES:

- CAST FOUNDATION AGAINST UNDISTURBED SOIL WHEREVER CONDITIONS PERMIT. IN UNSTABLE SOIL, CAST-IN-PLACE TUBE FORMS ARE ALLOWED WITH APPROVAL.
- COMPLY WITH APPLICABLE PROVISIONS OF SECTION 825 FOR CONCRETE CONSTRUCTION.
- USE CLASS "A" CONCRETE THAT MEETS THE REQUIREMENTS OF SECTION 1000 WITH A COMPRESSION STRENGTH AT 28 DAYS OF F'c= 3000 PSI (MIN.).
- USE ASTM GRADE 60 DEFORMED BARS FOR ALL REINFORCING STEEL.
- 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.
- MAINTAIN AT LEAST 3" COVER ON ALL REINFORCEMENT.
- ORIENT CONDUIT AS REQUIRED BY THE DESIGN OR AS DICTATED BY FIELD CONDITIONS.
- USE ADHESIVE ANCHOR FOR THREADED COUPLING INSERT. FOR TYPE I MINIMUM DEPTH NECESSARY IS 0'-4 1/2" AND FOR TYPE II MINIMUM DEPTH NECESSARY IS 0'-6 5/8". FOLLOW MANUFACTURER'S INSTALLATION INSTRUCTIONS.

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	1/2	1'-6"	NO
II	NORMAL-DUTY	2'-0"	5'-0"	.58	3/4	2'-0"	YES
III	HEAVY-DUTY	2'-6"	7'-0"	1.27	1	4'-0"	YES

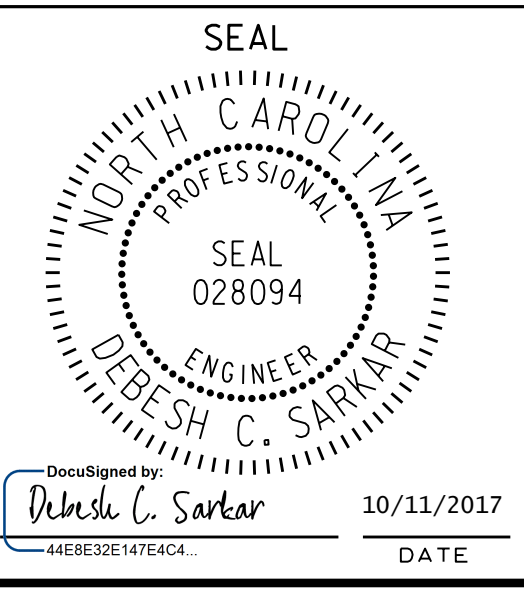
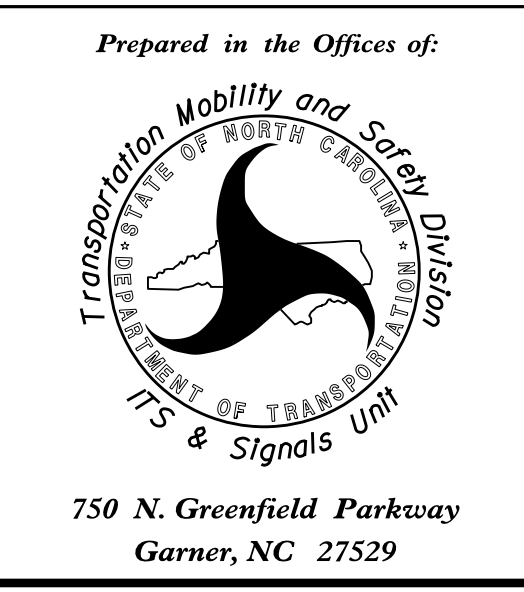
REINFORCING STEEL SCHEDULE													
TYPE	V-BAR				STIRRUP								
	SIZE #	QTY	LENGTH	WEIGHT LBS	SIZE #	QUANTITY			LENGTH	DIAMETER "C" FT	OVERLAP MIN.	WEIGHT LBS	TOTAL STEEL WEIGHT LBS
						VERTICAL ON 6" CENTERS	ON 12" CENTERS	TOTAL					
I	8	6	3'-0"	56	4	0	4	4	5'-7"	1'-6"	0'-10"	15	71
II	8	6	4'-6"	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

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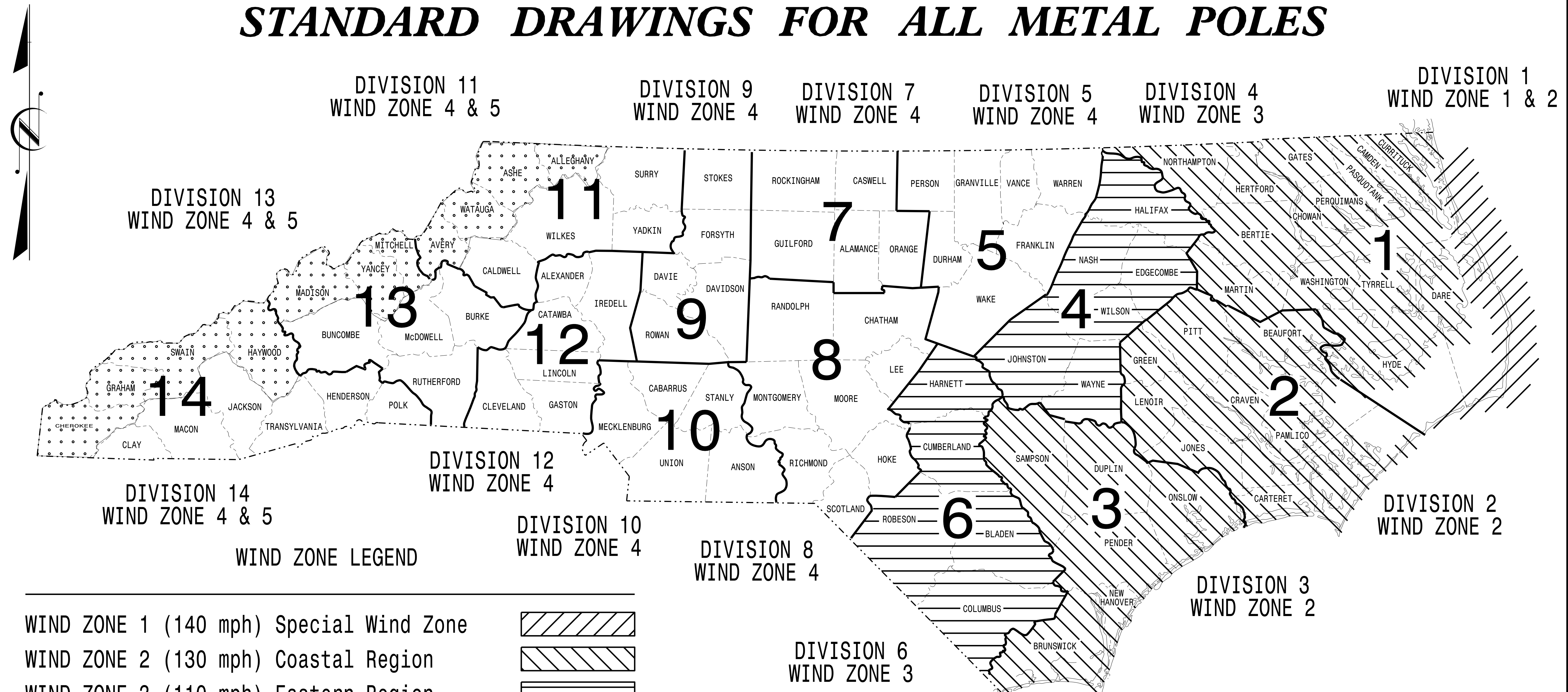
See Plate for Title



STATE OF NORTH CAROLINA DIVISION OF HIGHWAYS

PROJECT I.D. NO.	SHEET NO.
R-2233BB	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:

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

DRAWING NUMBER	DESCRIPTION
Sig. M 1	Statewide Wind Zone Map
Sig. M 2	Typical Fabrication Details-All Metal Poles
Sig. M 3	Typical Fabrication Details-Strain Poles
Sig. M 4	Typical Fabrication Details-Mast Arm Poles
Sig. M 5	Typical Fabrication Details-Mast Arm Connection
Sig. M 6	Typical Fabrication Details-Strain Pole Attachments
Sig. M 7	Construction Details-Foundations
Sig. M 8	Standard Strain Pole Foundation-All Soil Conditions

NC DOT CONTACTS:

MOBILITY AND SAFETY DIVISION - ITS AND SIGNALS UNIT

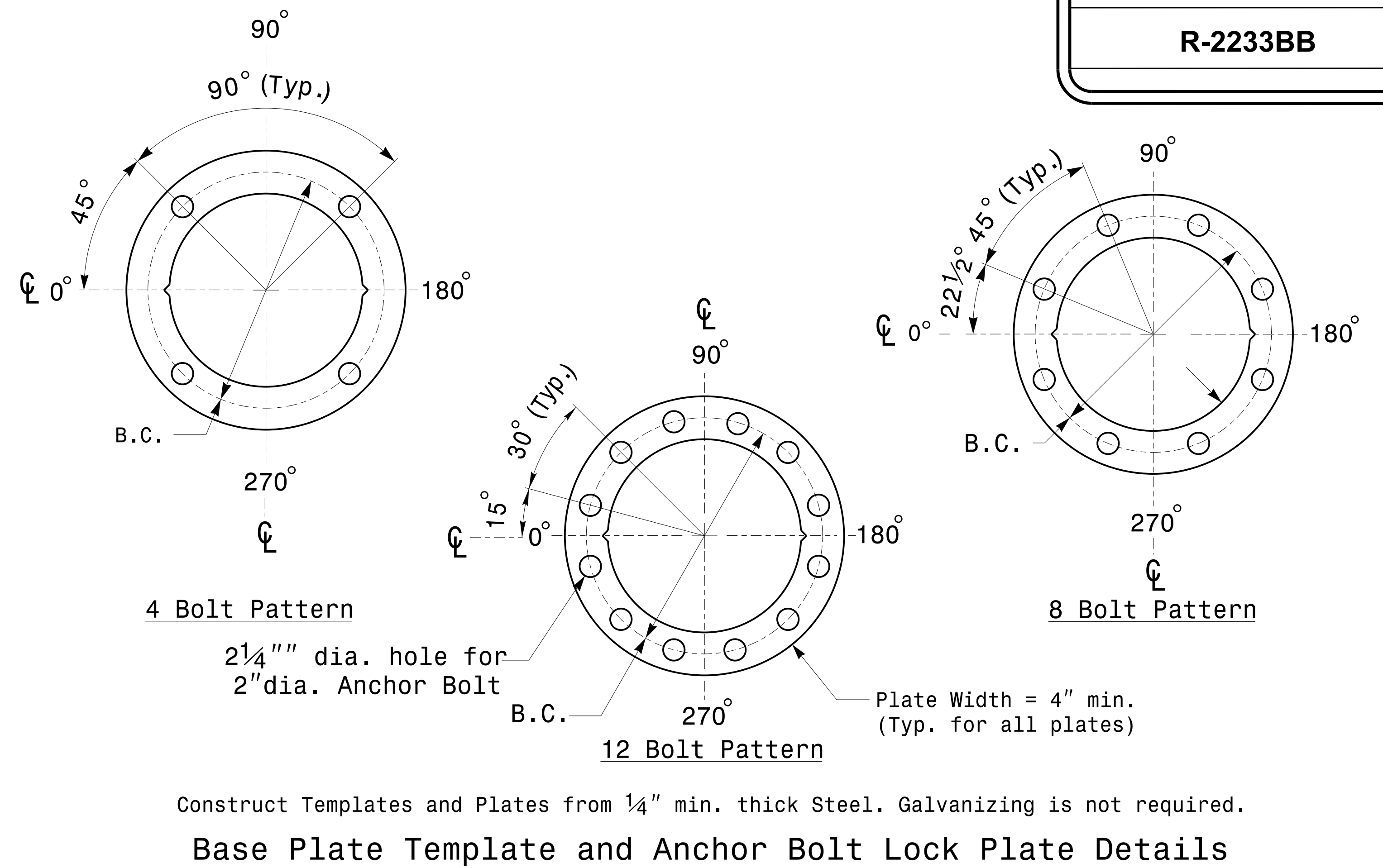
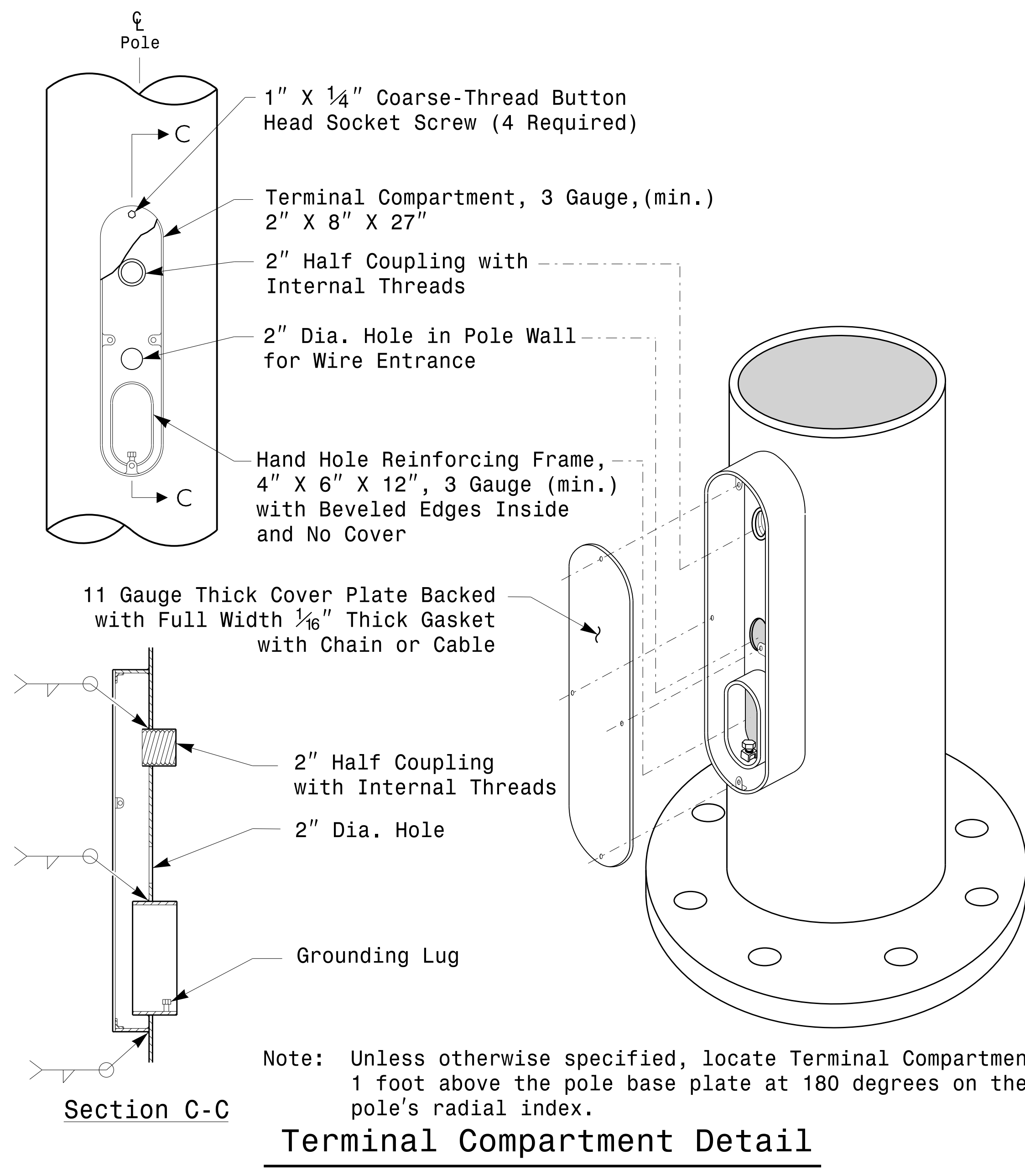
M.M. MCDIARMID, P.E. - STATE ITS AND SIGNALS ENGINEER

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

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

SEAL

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



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

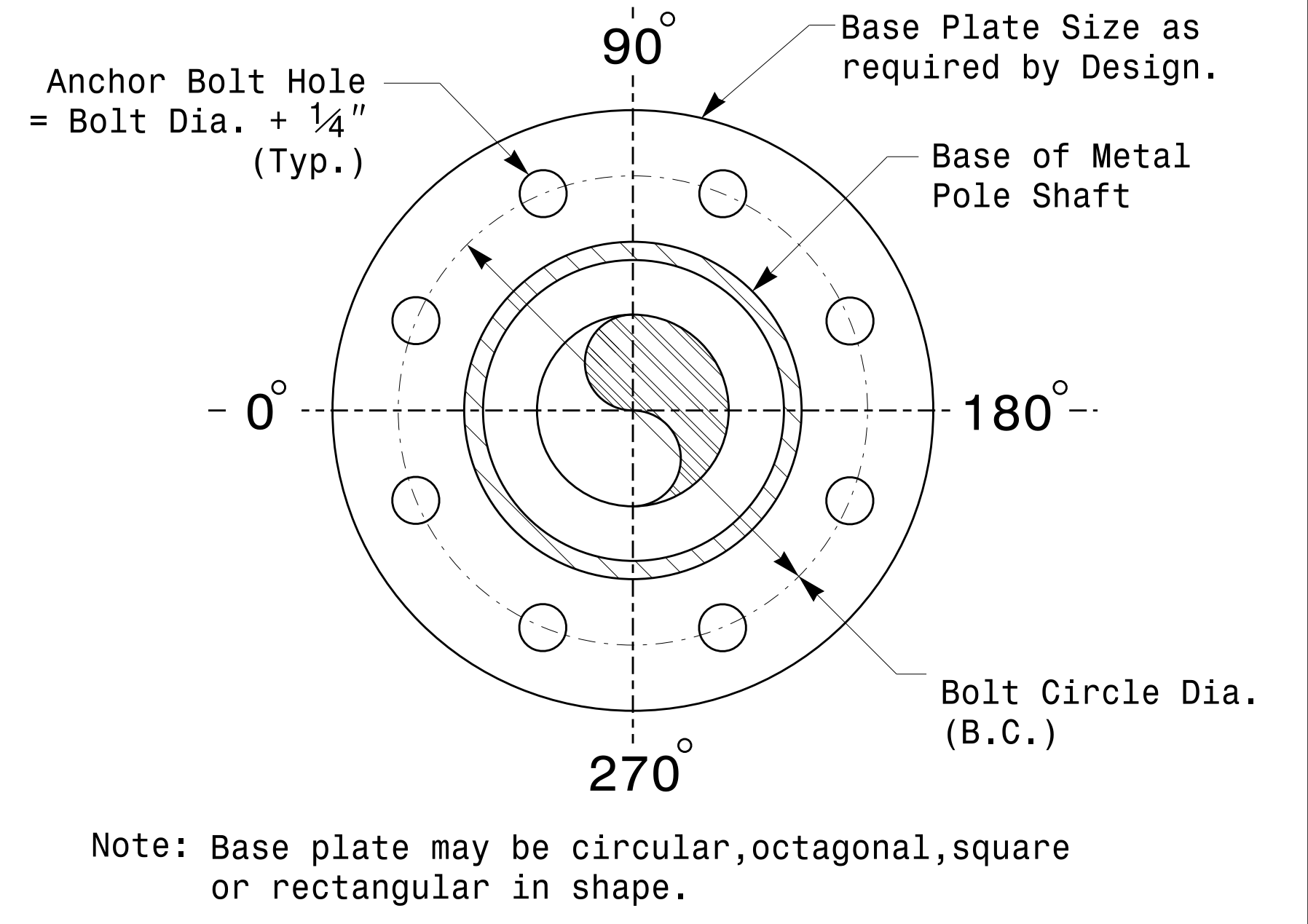
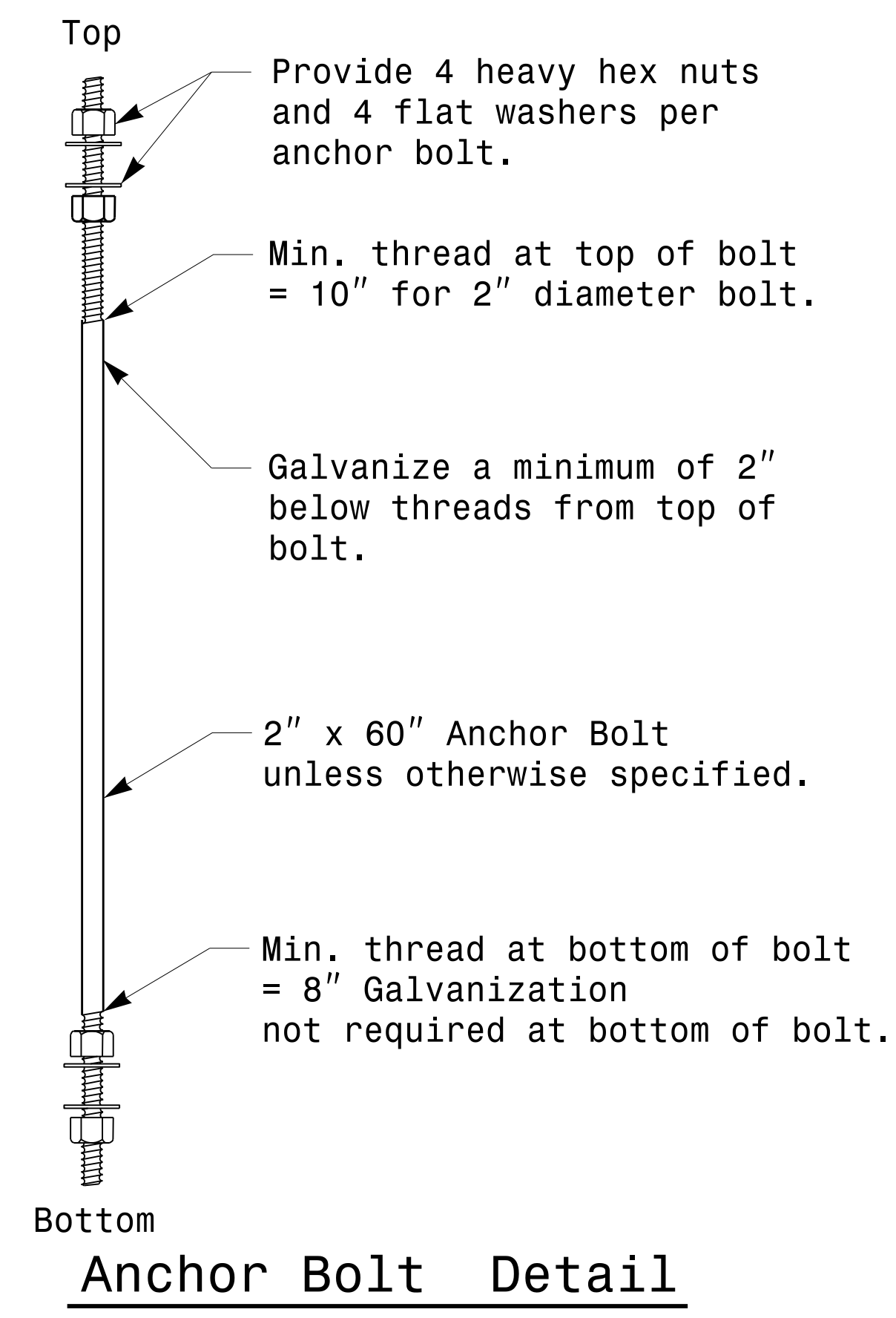
MFG _____	MFG. DATE:MM/YY _____
SECTION D/T/L/Y _____	
NCDOT SIG. INV. NO. _____	
NCDOT POLE NO. _____	

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

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.

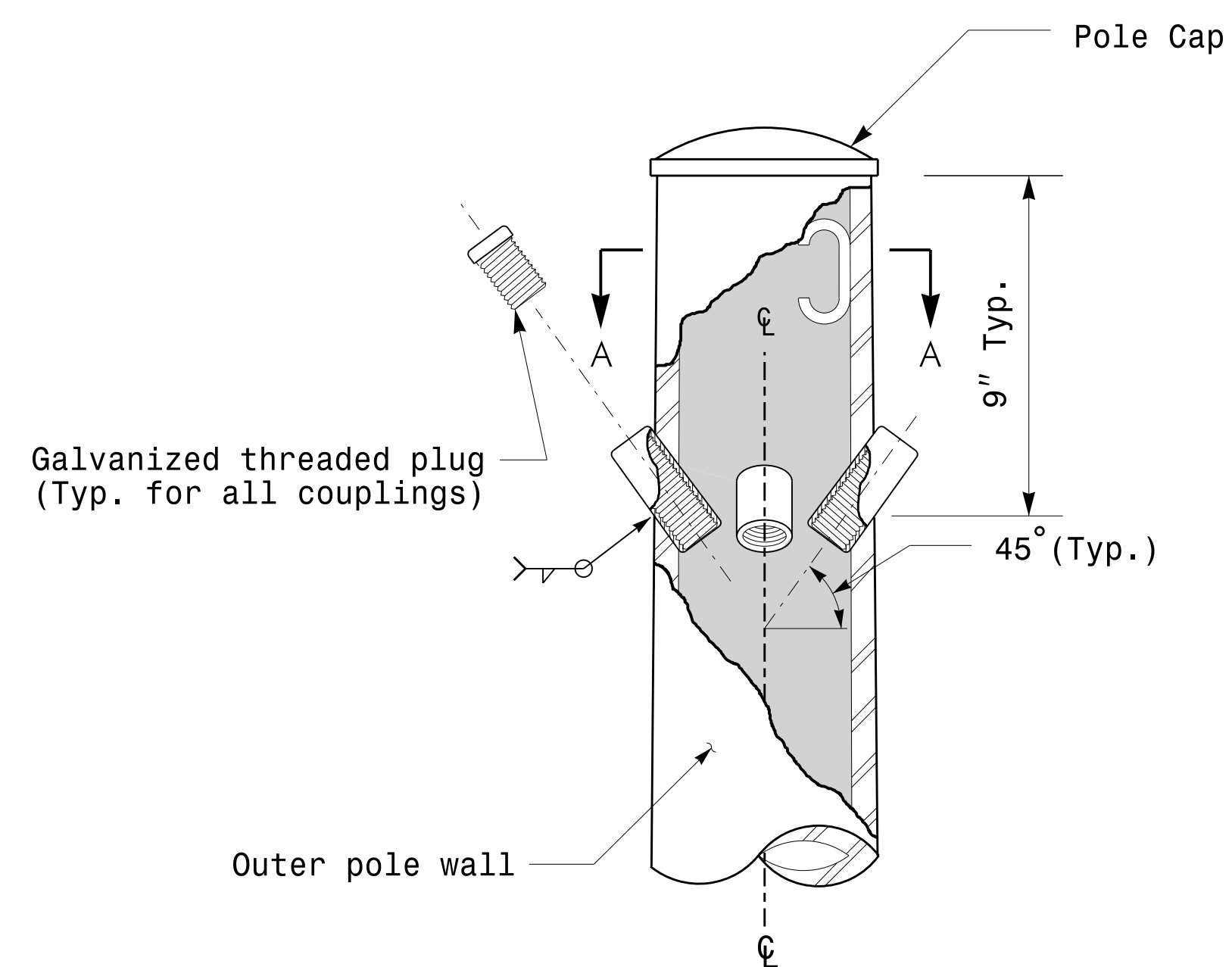
Identification Tag Details



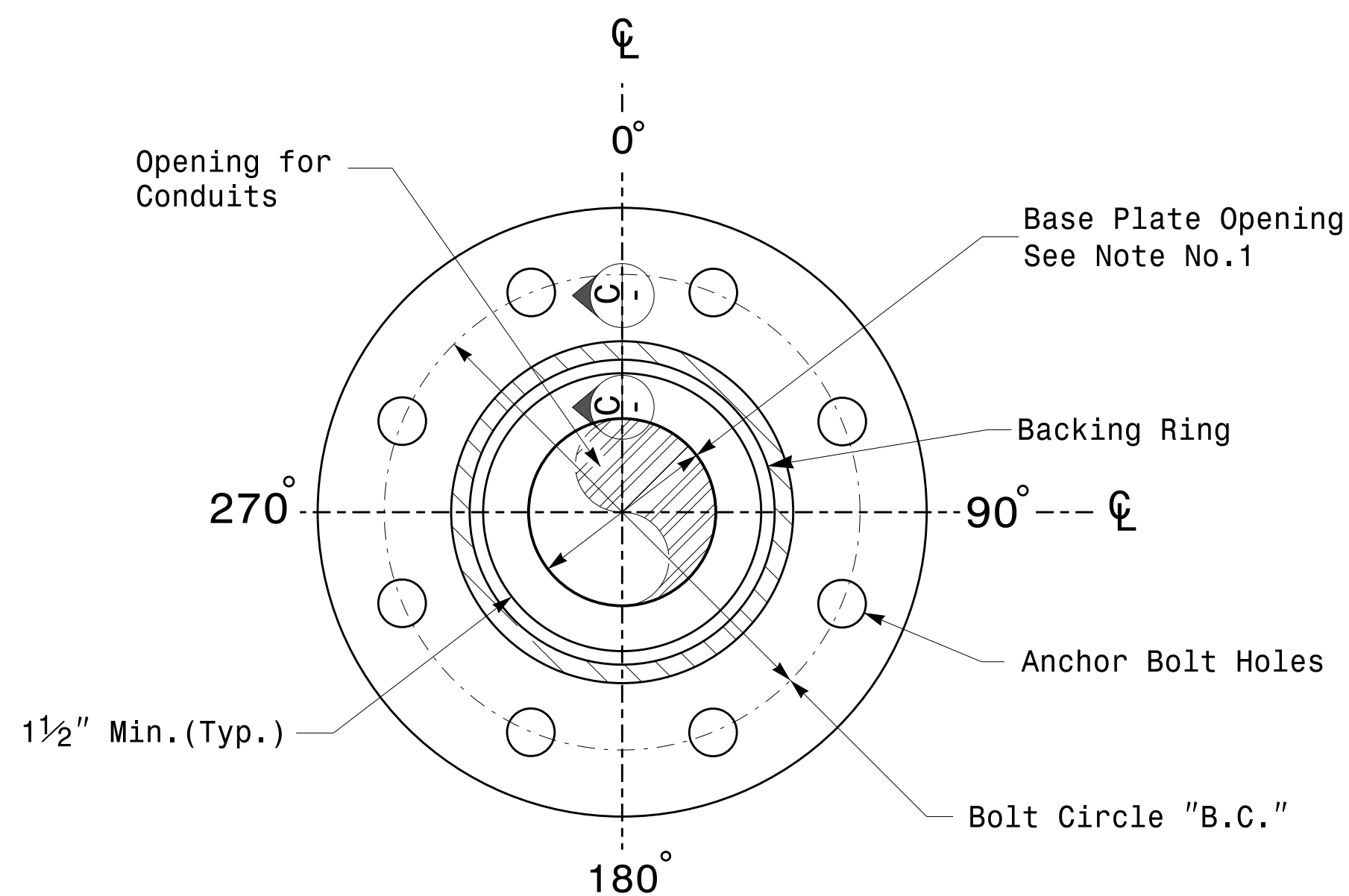
	Typical Fabrication Details For All Metal Poles		
	PLAN DATE: OCTOBER 2017 DESIGNED BY: C.F. ANDREWS	PREPARED BY: N. BITTING REVIEWED BY: D.C. SARKAR	
SCALE: 0 NA NONE	REVISIONS:	INITI:	DATE:
DocuSigned by: <i>Debes C. Sarkar</i> 44E6328			10/11/2017 DATE

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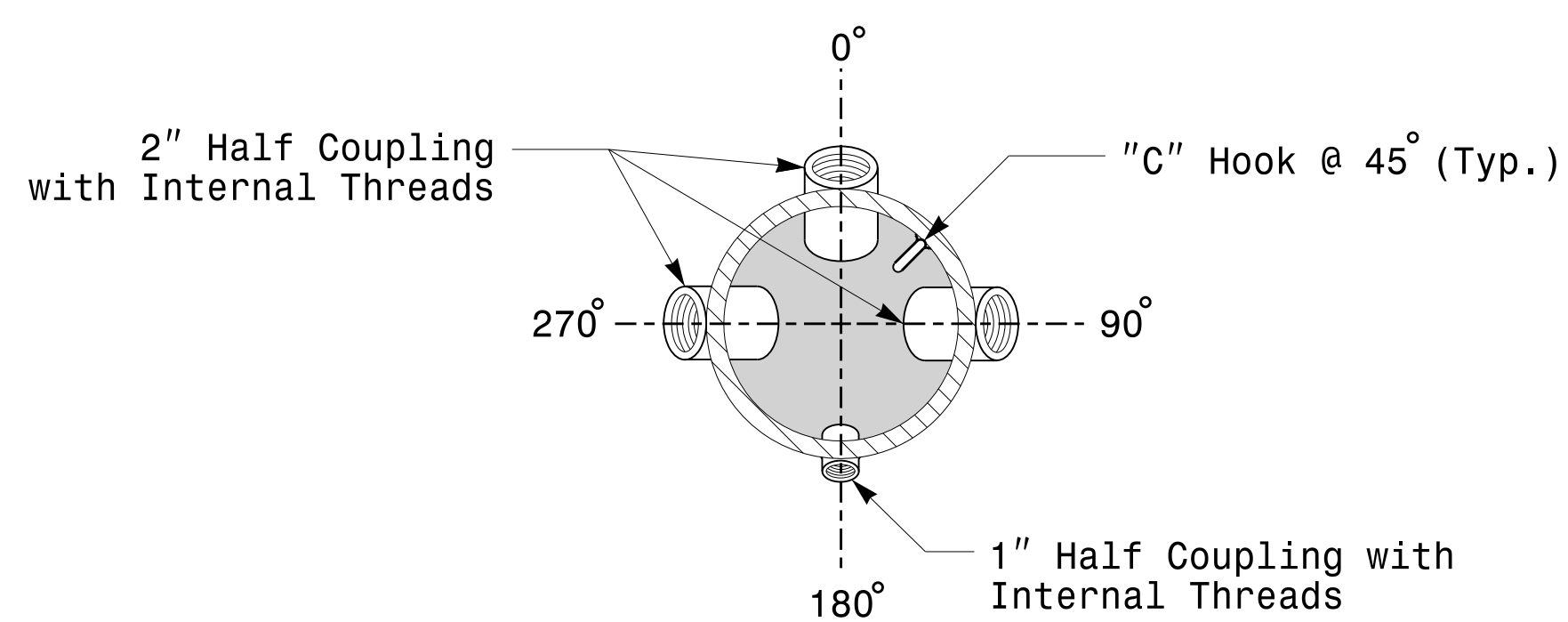
Note:
 1. Opening in pole base plate shall be equal to pole base inside diameter minus 3 1/2" but shall not be less than 8 1/2".



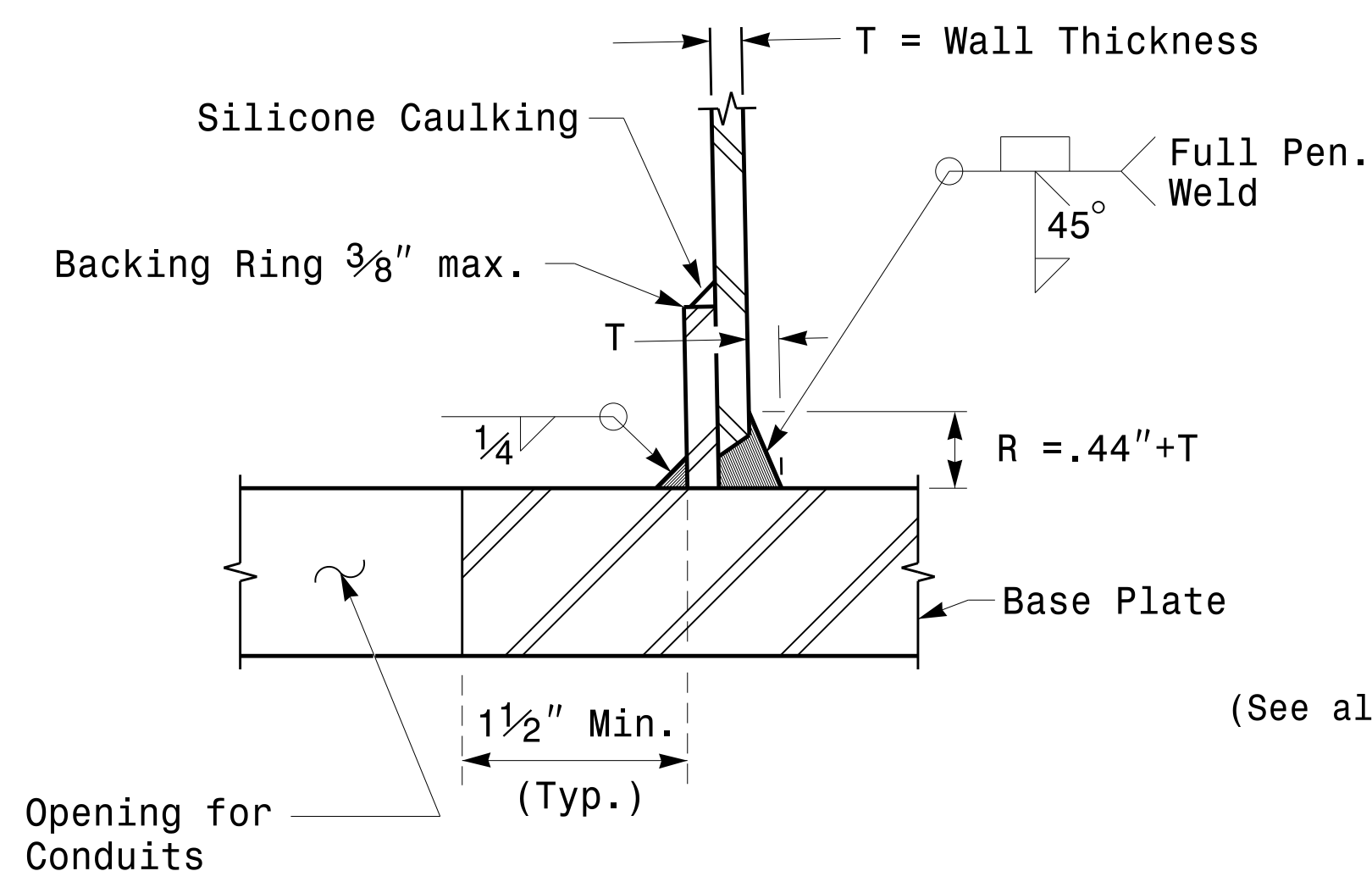
Cable Entrances at Top of Pole



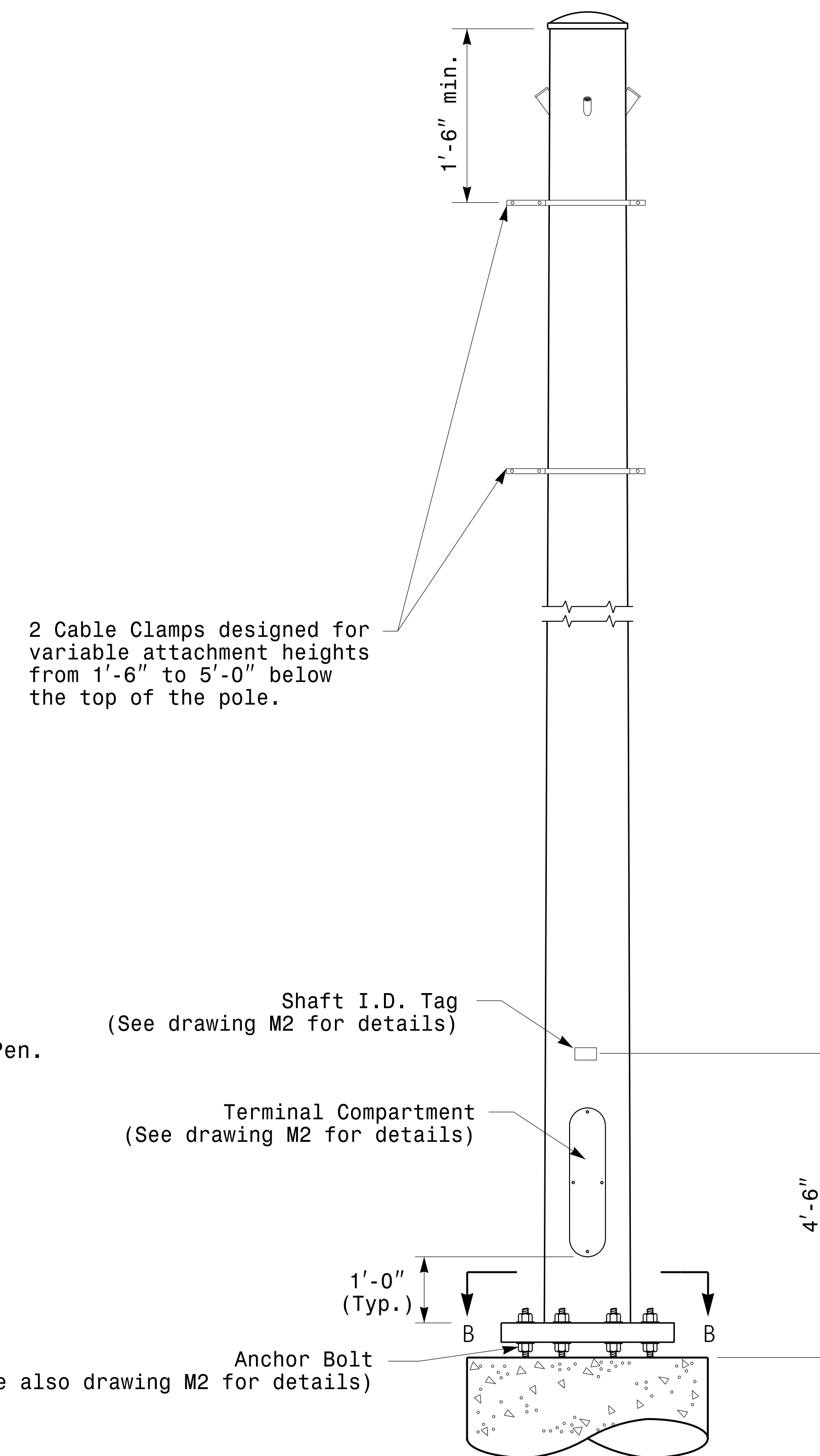
Section B-B Pole Base Plate Details (8 and 12 Bolt Pattern)



Section A-A Radial Orientation for Factory Installed Accessories at Top of Pole



Section C-C Full-Penetration Groove Weld Detail (Pole Attachment to Base Plate)



Monotube Strain Pole

Prepared in the Offices of:

 750 N. Greenfield Pkwy, Garner, NC 27529

Typical Fabrication Details For Strain Poles

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

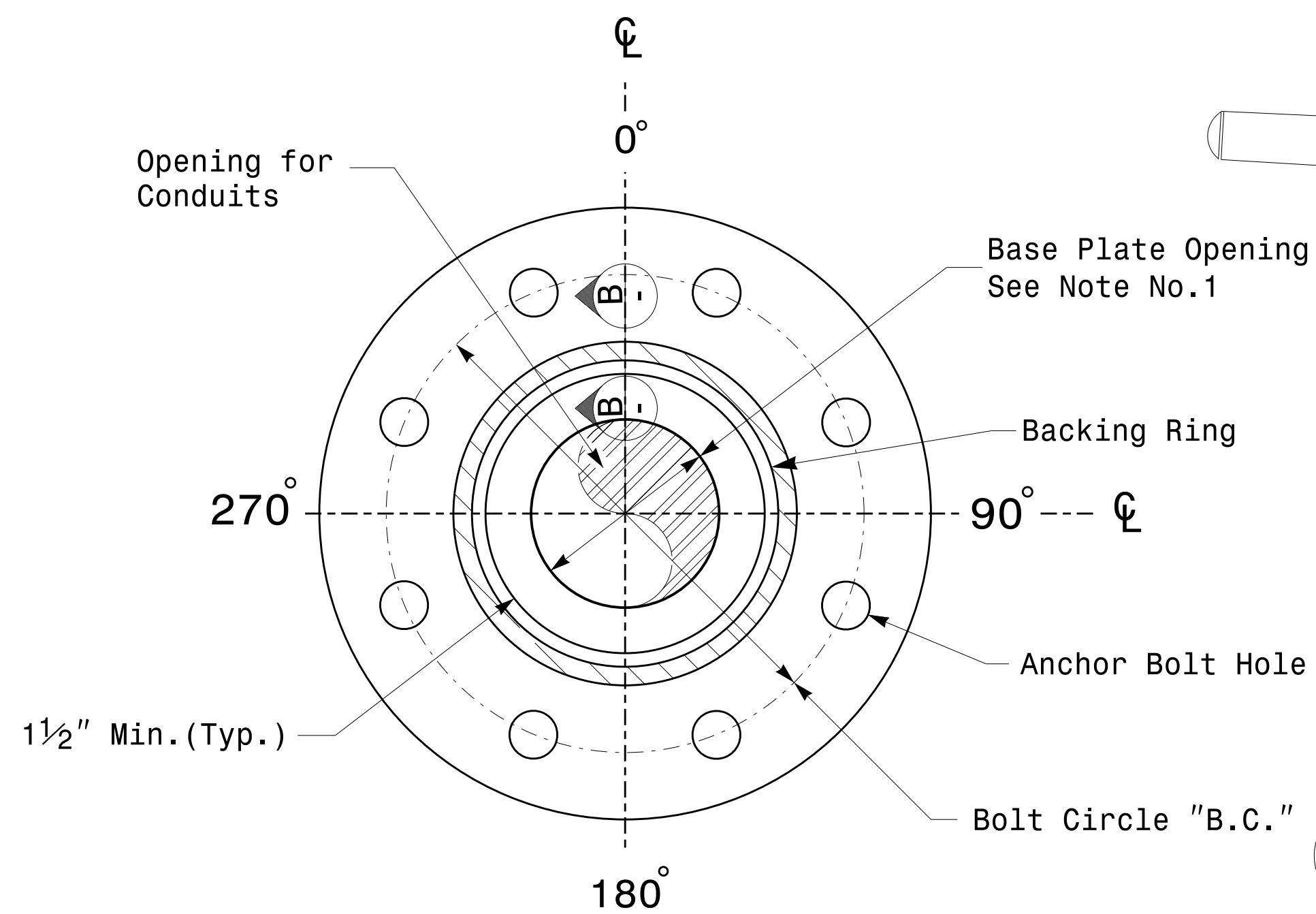
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 SEAL 028094
 ENGINEER
 D.C. SARKAR
 DocuSigned by: D.C. Sarkar
 44EB87816FA4F49E

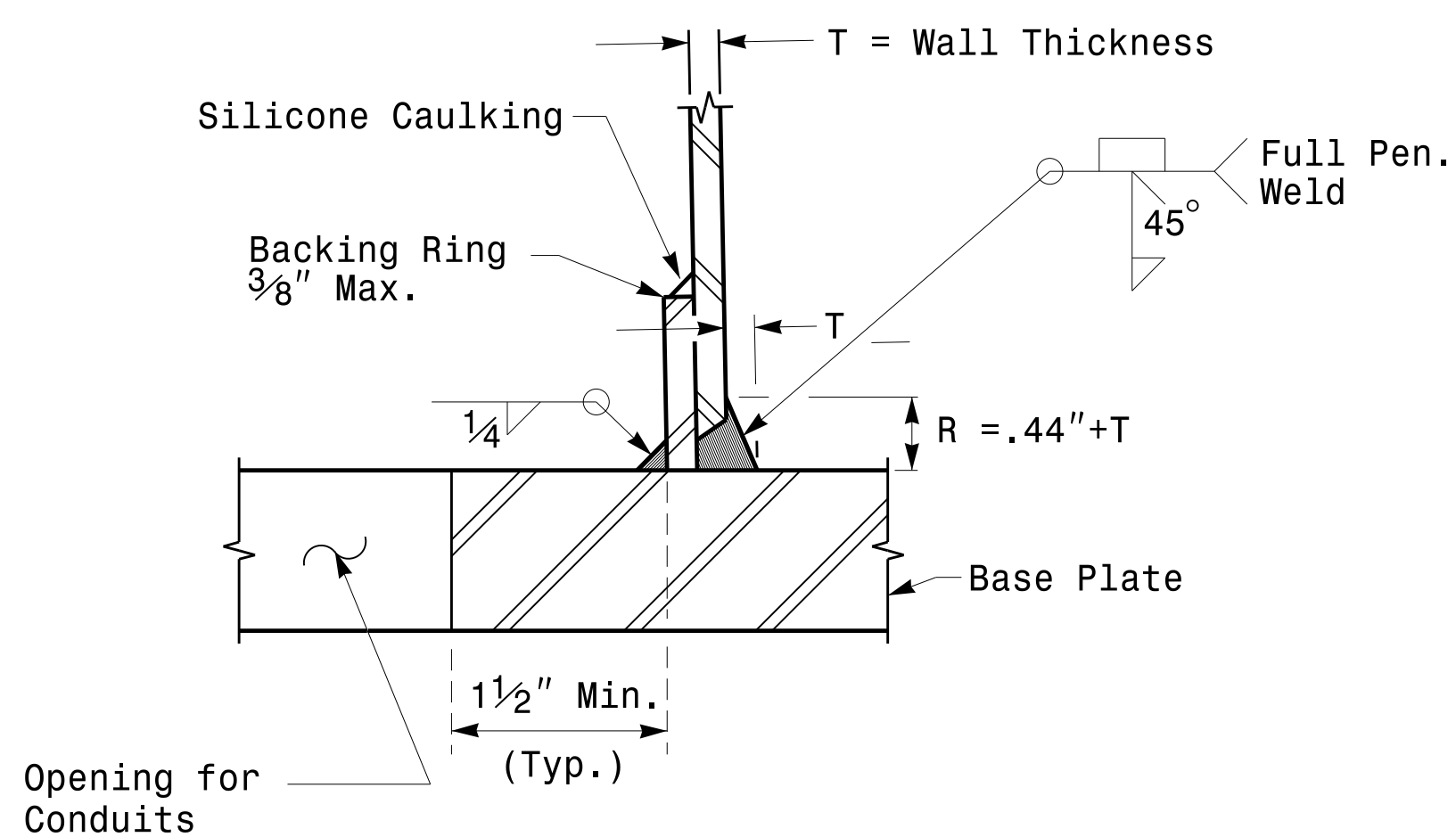
10/11/2017 DATE

Fabrication Details – Strain Poles

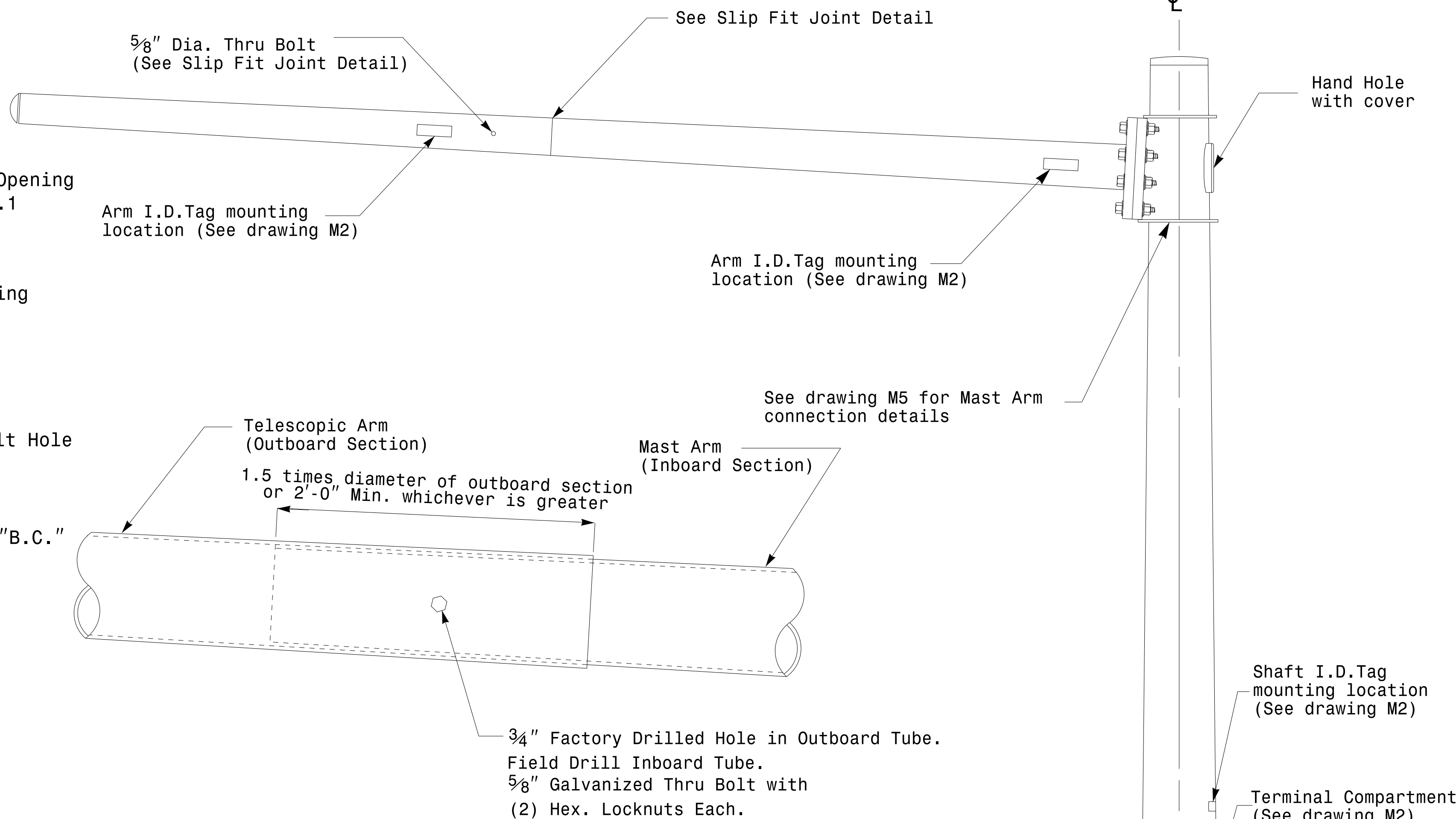
Note:
 1. Opening in pole base plate shall be equal to pole base inside diameter minus 3 1/2" but shall not be less than 8 1/2".



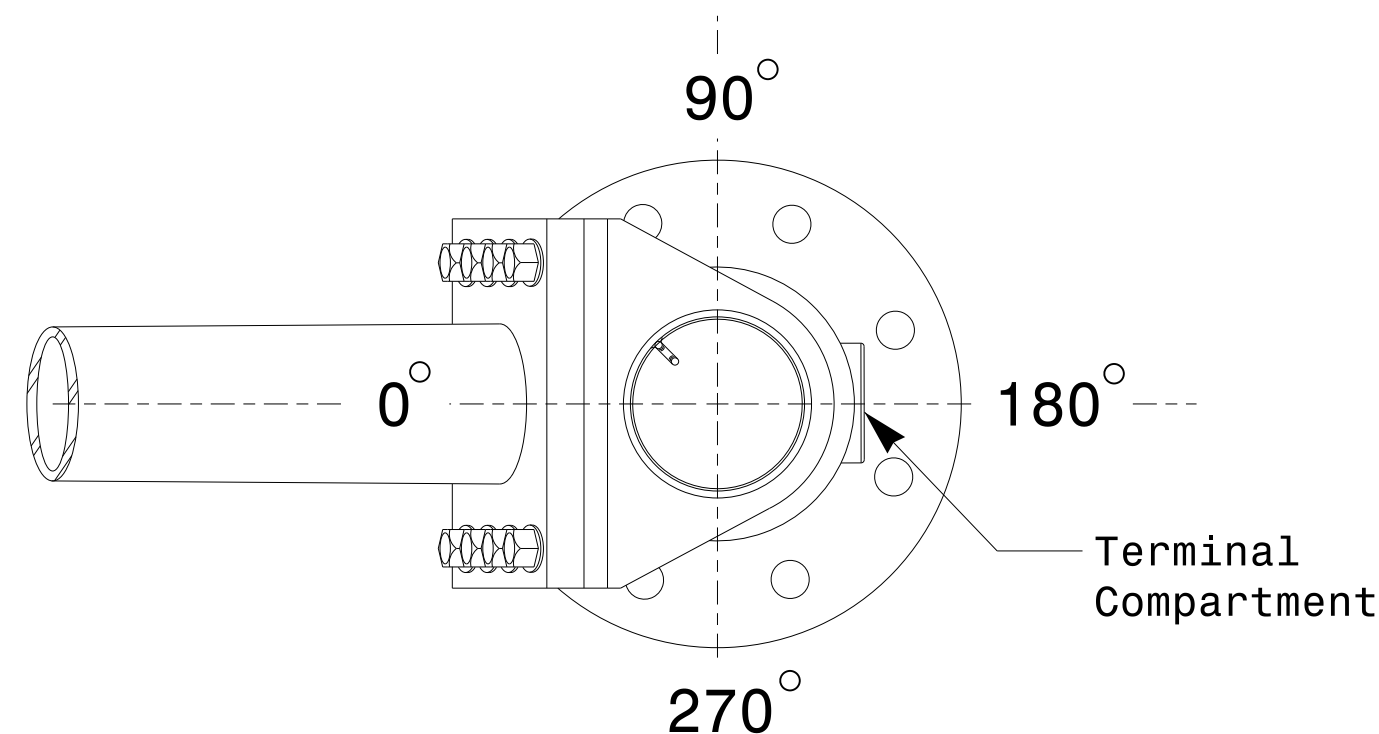
Section A-A
 Pole Base Plate Details



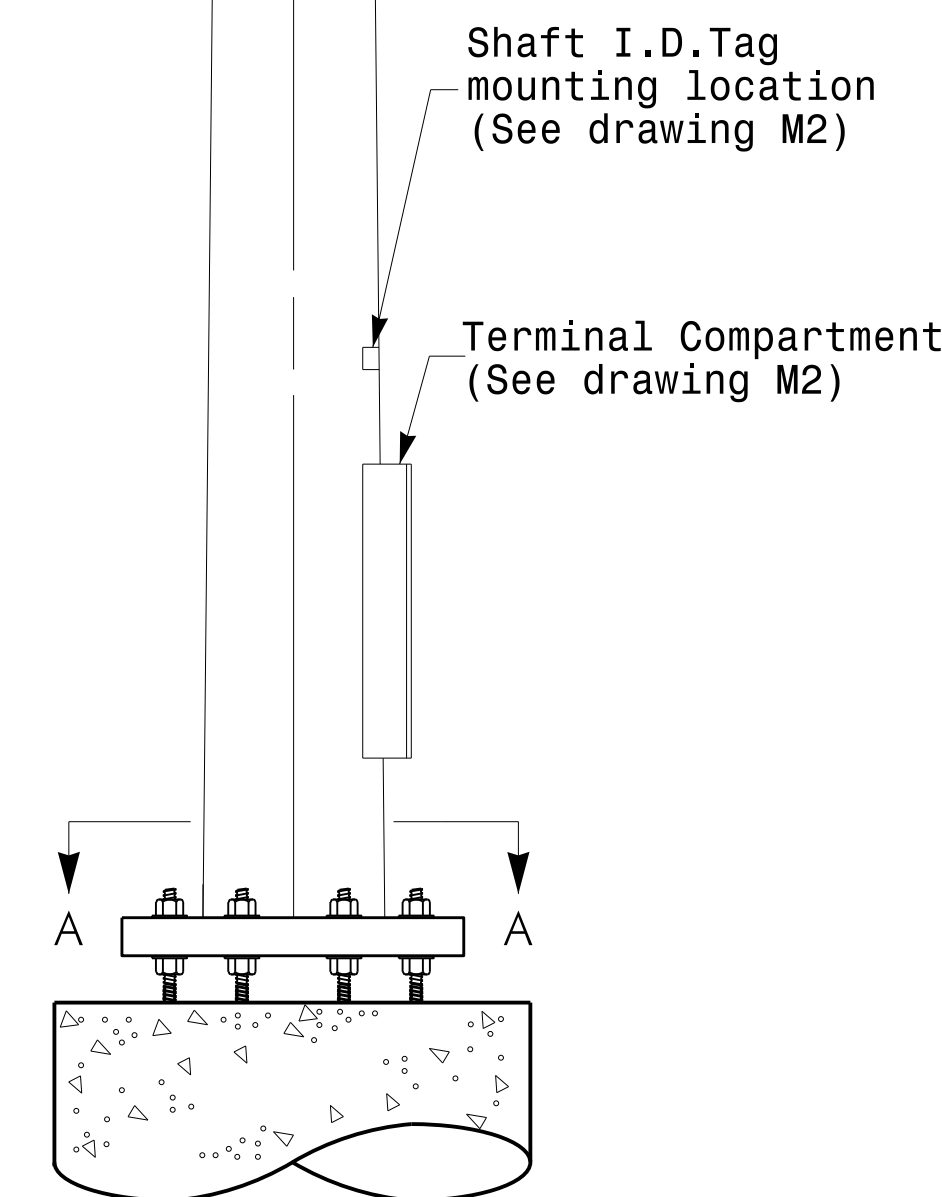
Section B-B
 (Pole Attachment to Base Plate)
 Full-Penetration Groove Weld Detail



Slip Fit Joint Detail for Mast Arm



Mast Arm Radial Orientation



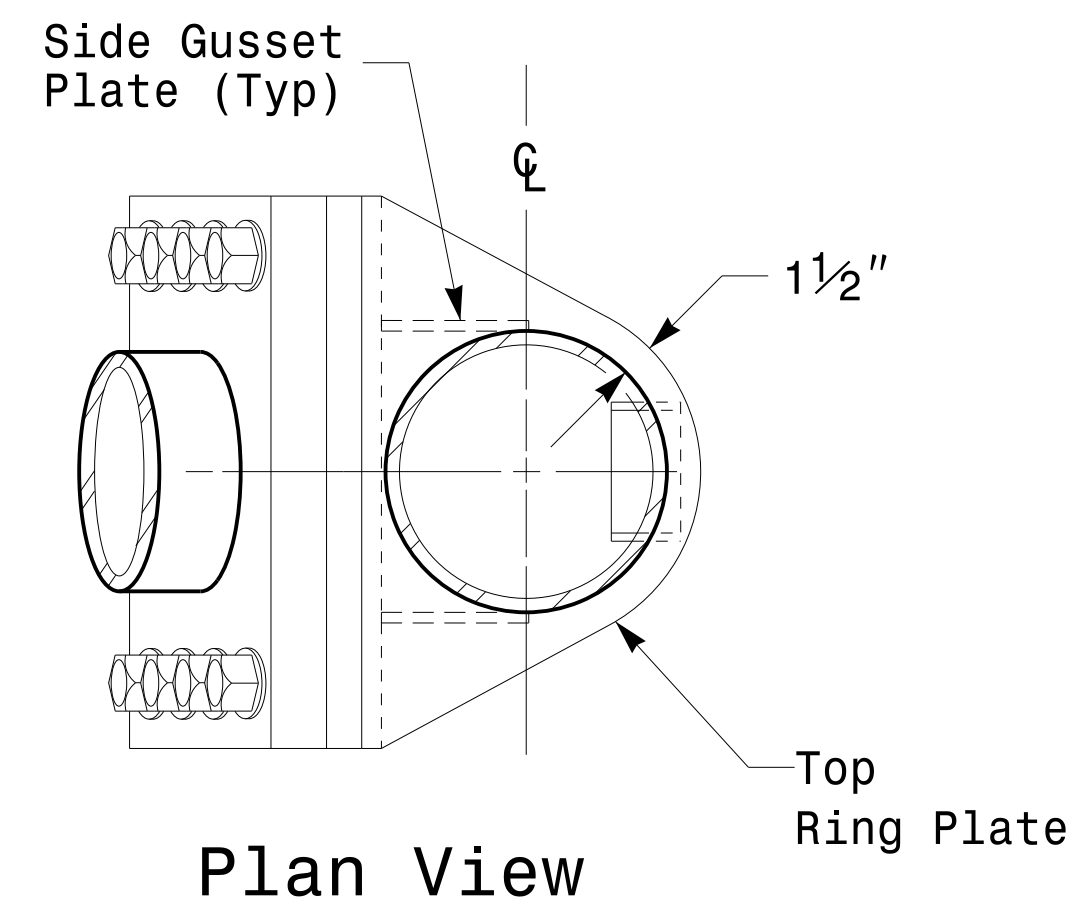
Mast Arm Pole

<p>Prepared in the Offices of:</p> <p>750 N. Greenfield Pkwy, Garner, NC 27529</p>	<p>Typical Fabrication Details For Mast Arm Poles</p>		<p>SEAL</p>
	<p>PLAN DATE: OCTOBER 2017</p>	<p>DESIGNED BY: K.C. DURIGON</p>	
<p>SCALE: 0 NA NONE</p>	<p>PREPARED BY: N. BITTING</p>	<p>REVIEWED BY: D.C. SARKAR</p>	<p>10/11/2017</p>
<p>REVISIONS</p>	<p>INIT.</p>	<p>DATE</p>	<p>DATE</p>

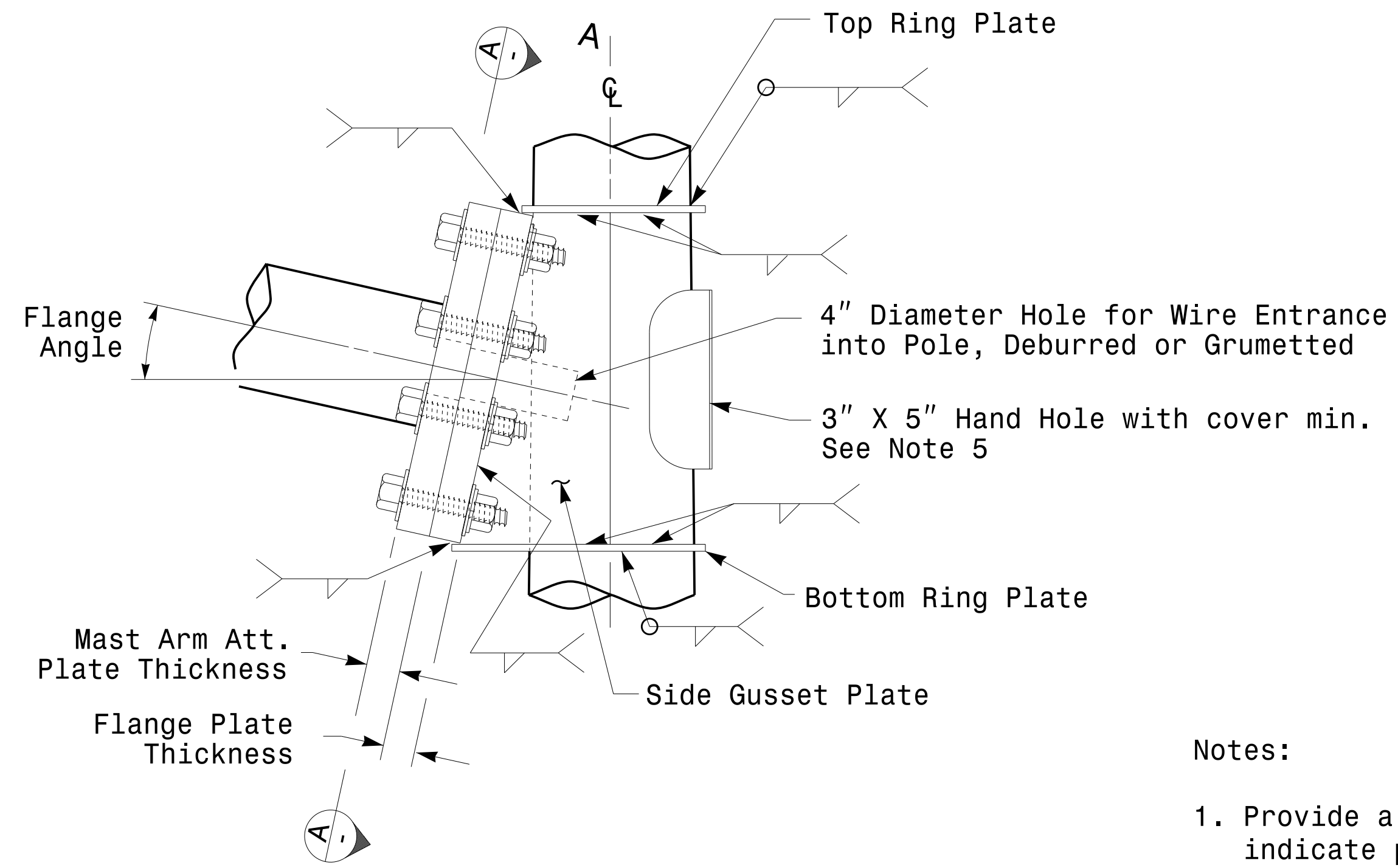
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 P1/2/2017

Fabrication Details - Mast Arm Poles

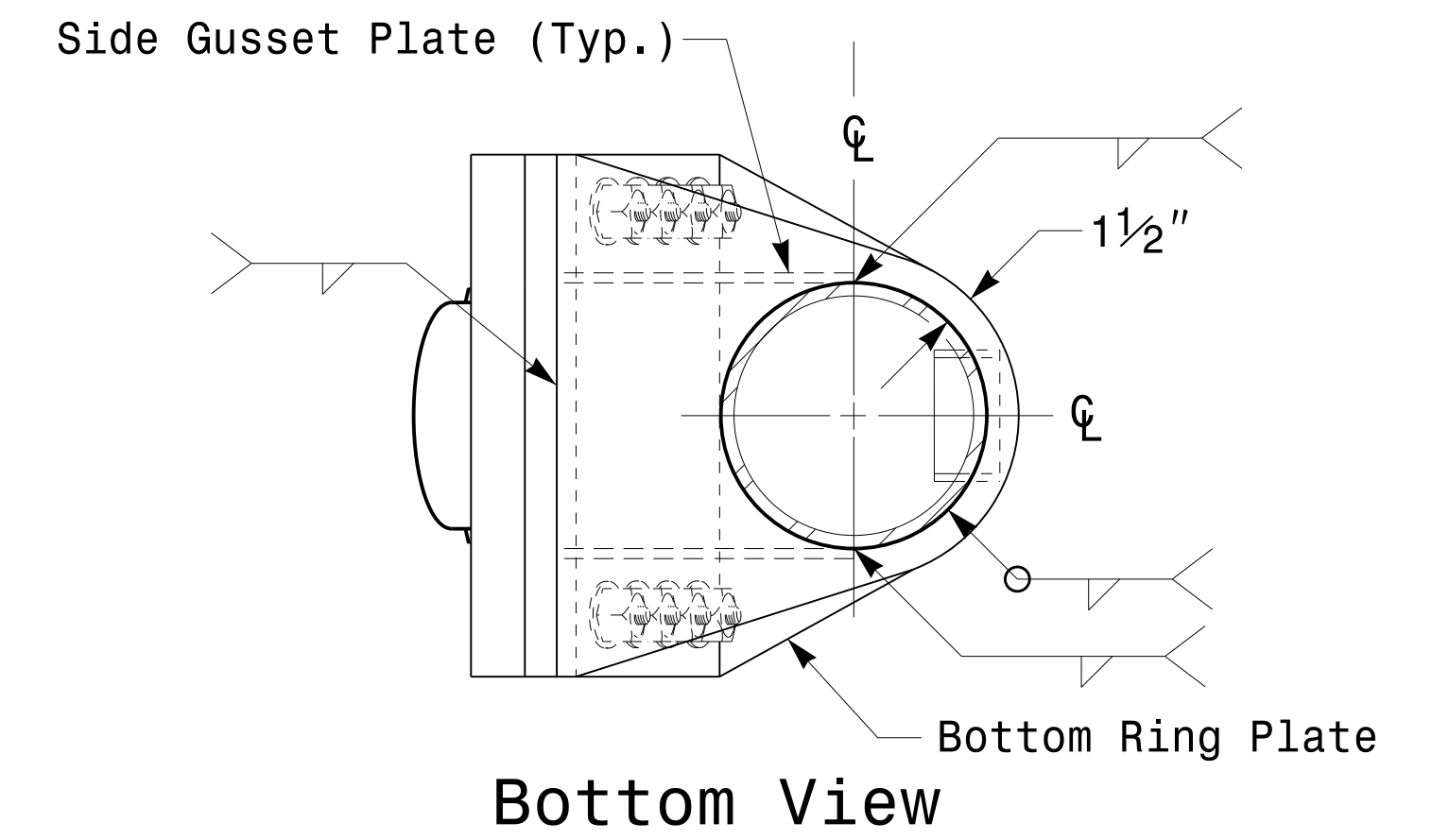
Welded Ring Stiffened Mast Arm Connection



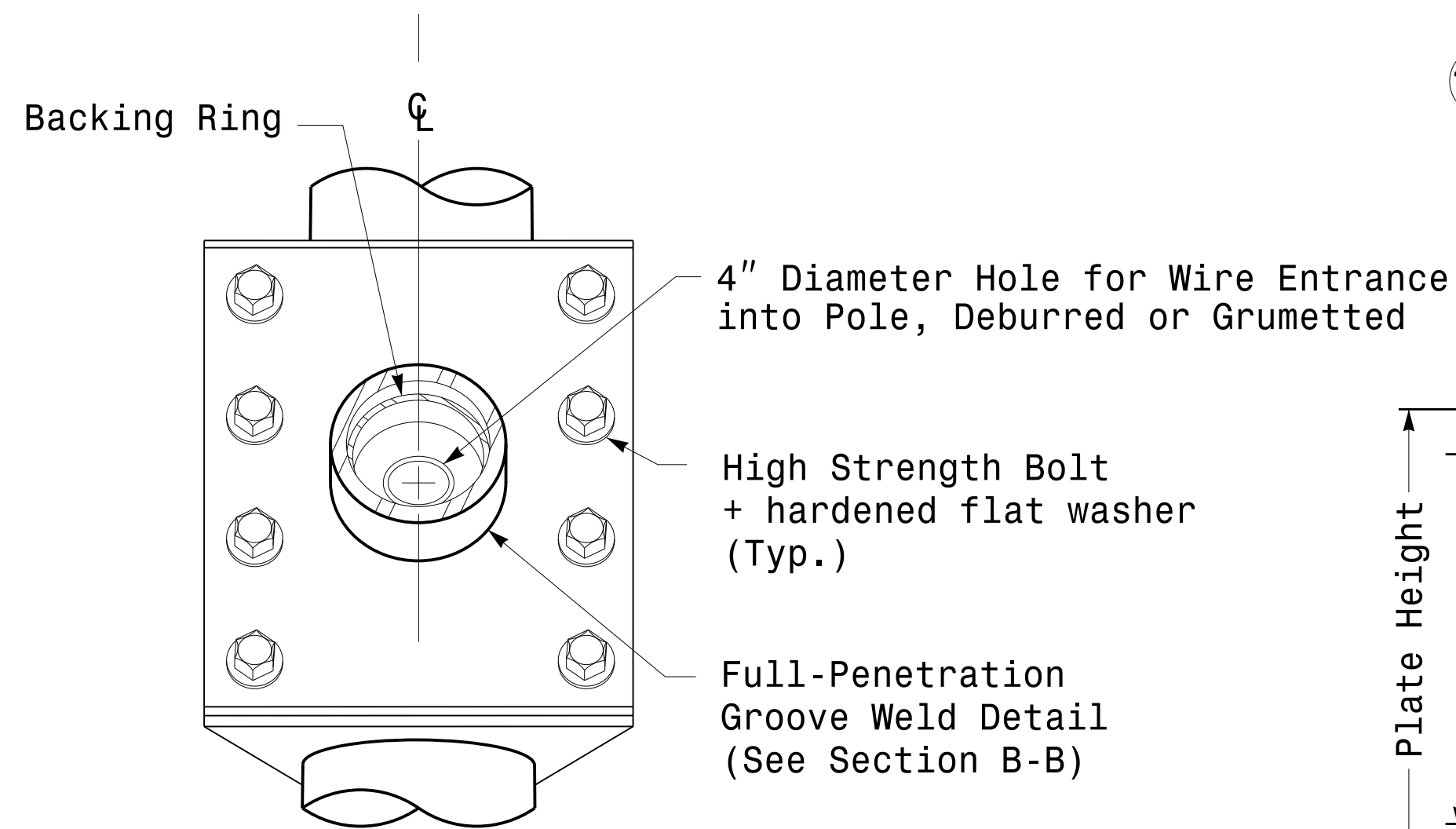
Plan View



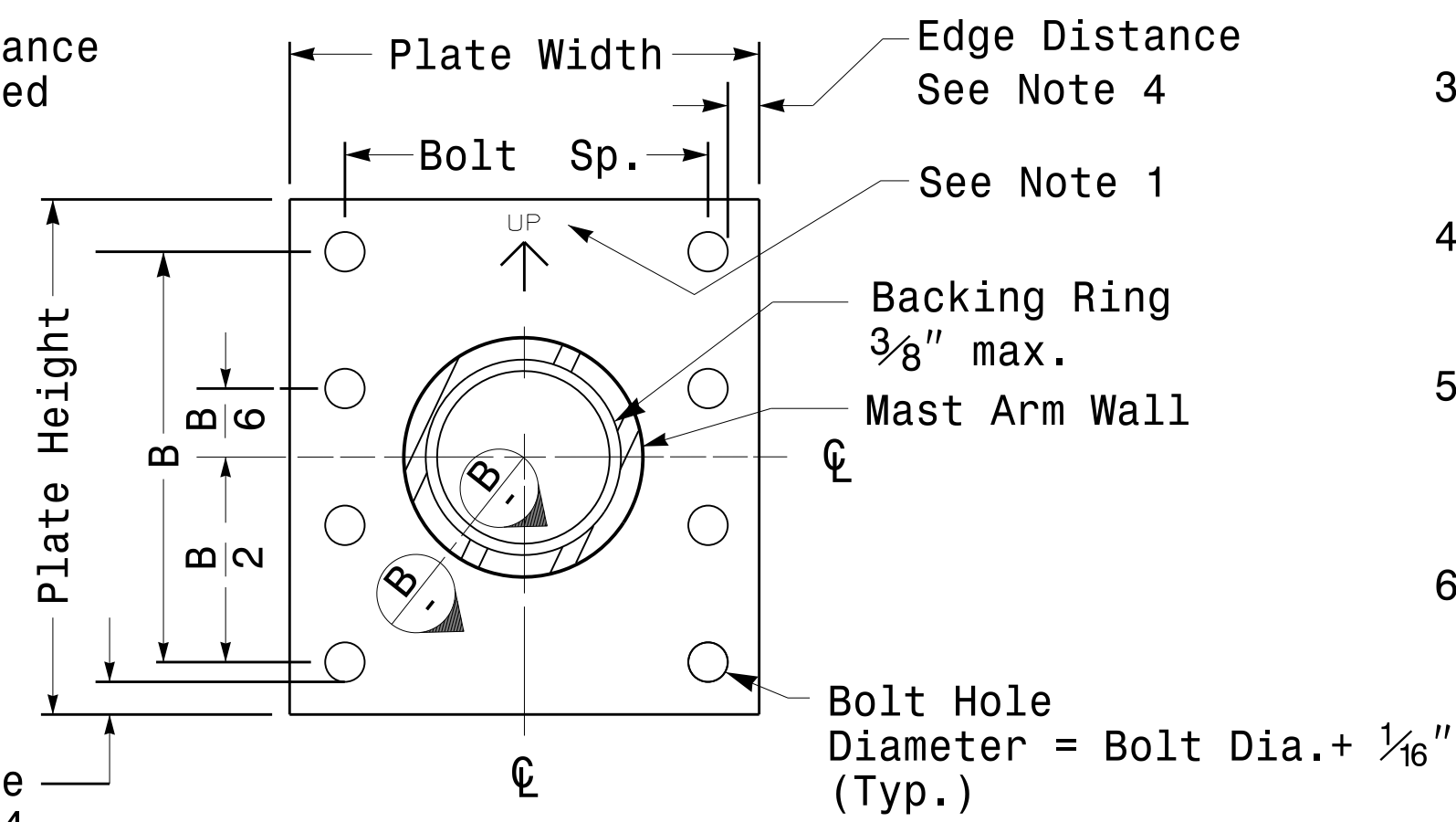
Side Elevation View



Bottom View



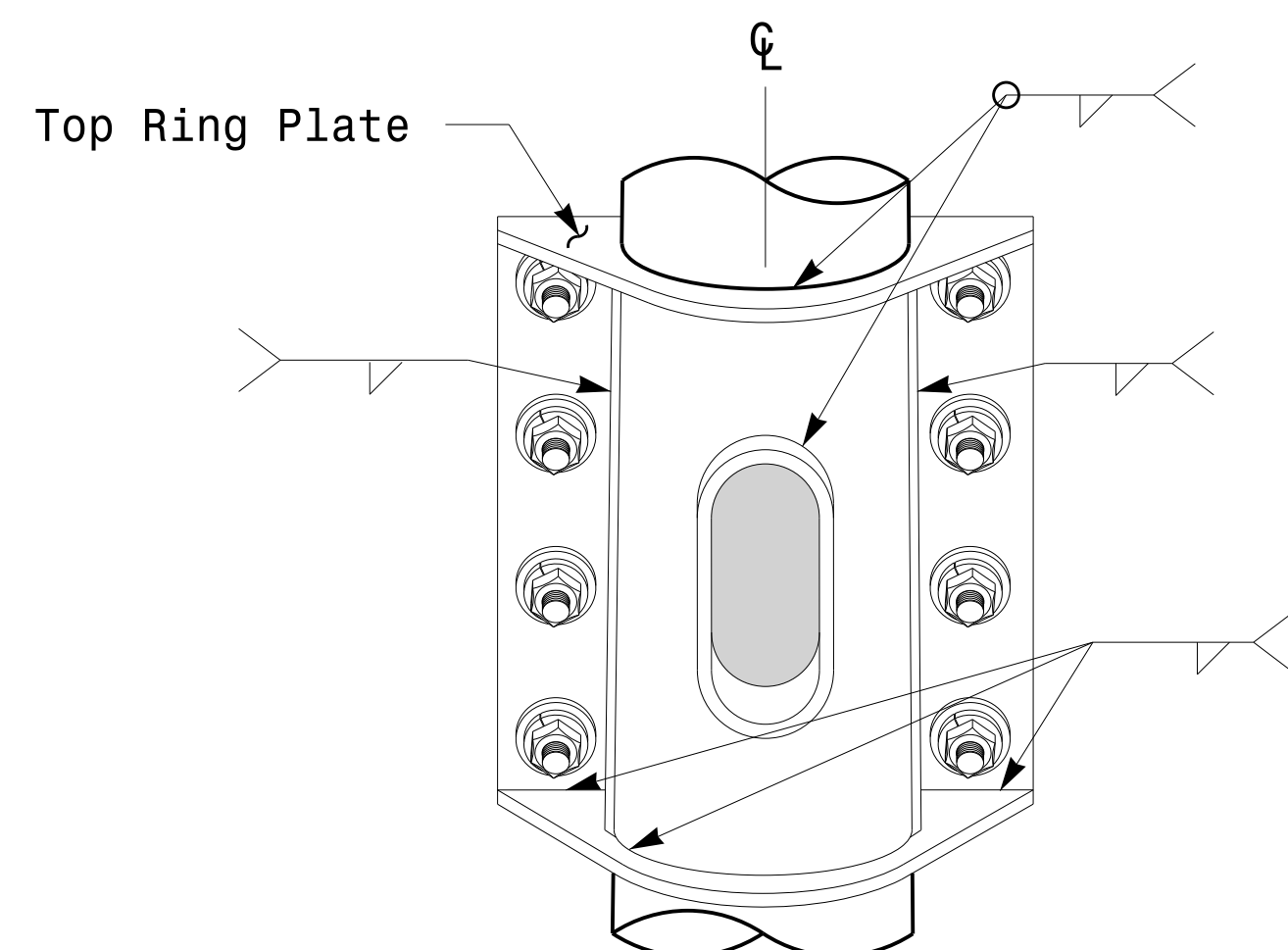
Front Elevation View



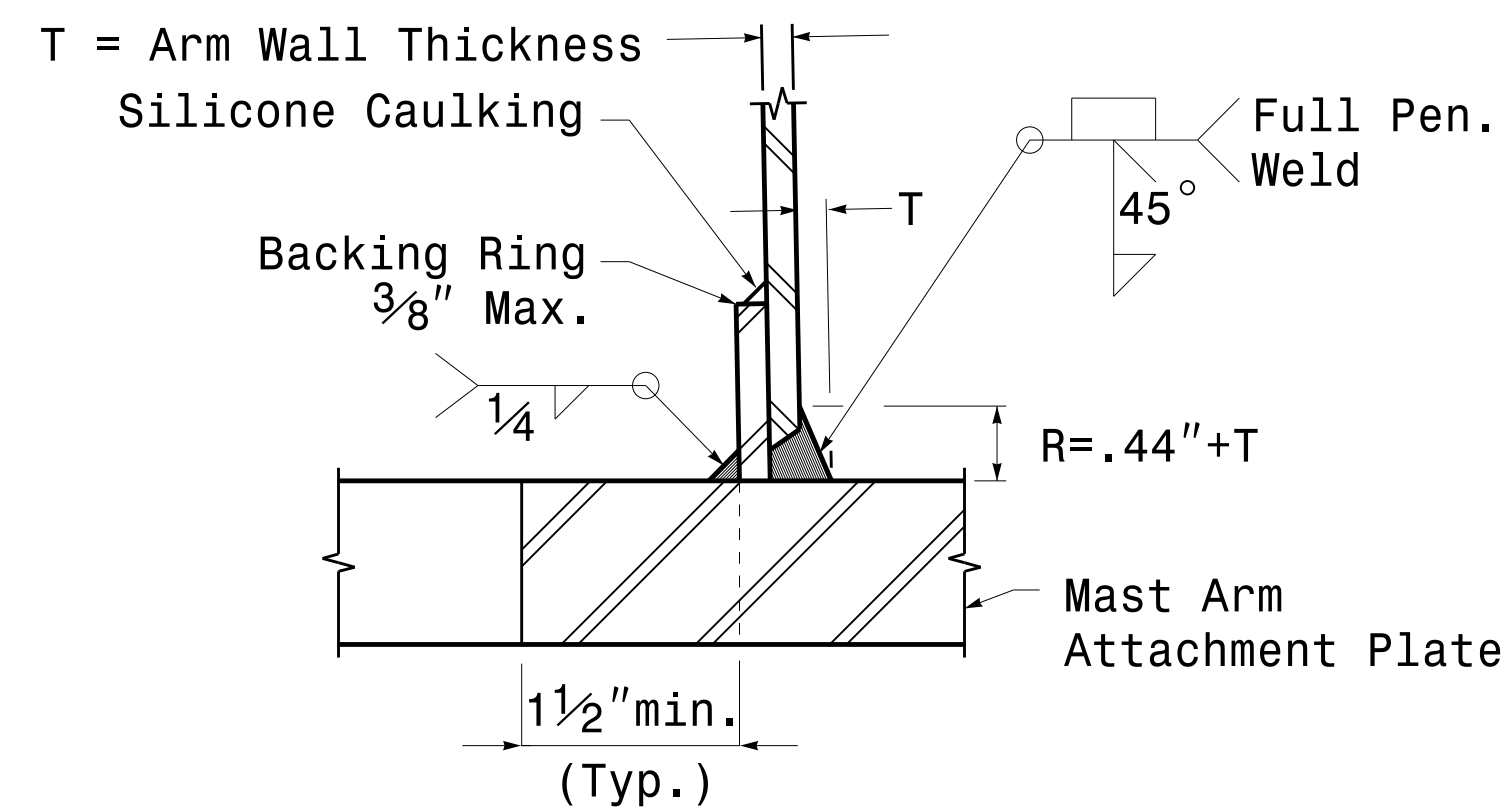
Section A-A Mast Arm Attachment Plate

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 required 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.



Back Elevation View



Section B-B Full-Penetration Groove Weld Detail

Prepared in the Offices of:

 N. BITTING
 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

SEAL

 D.C. SARKAR
 10/11/2017
 DATE

11-OCT-2017 08:35
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 P:\SSD\W115-Strat\15451.dgn

Fabrication Details - Mast Arm Connection