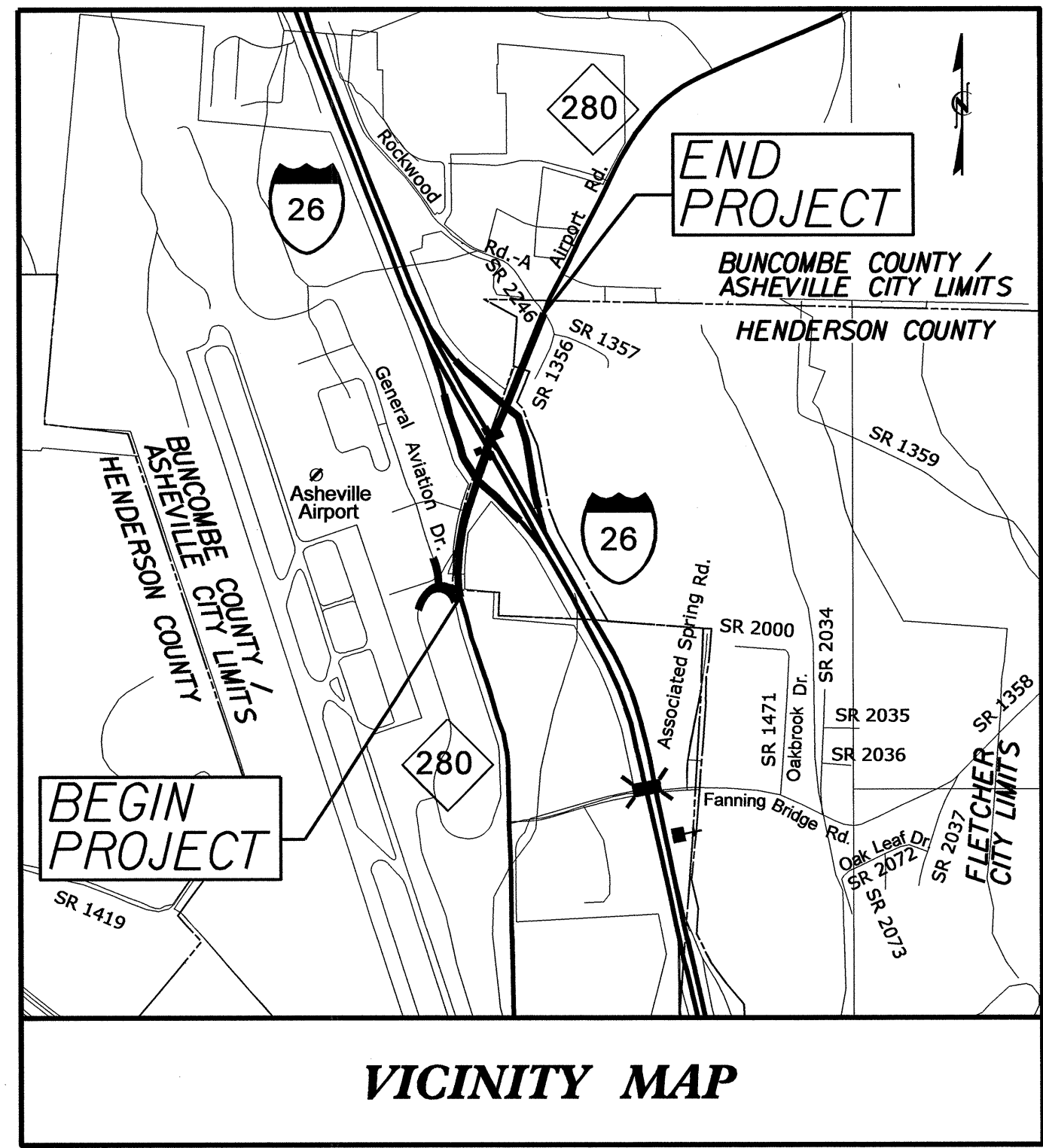


STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

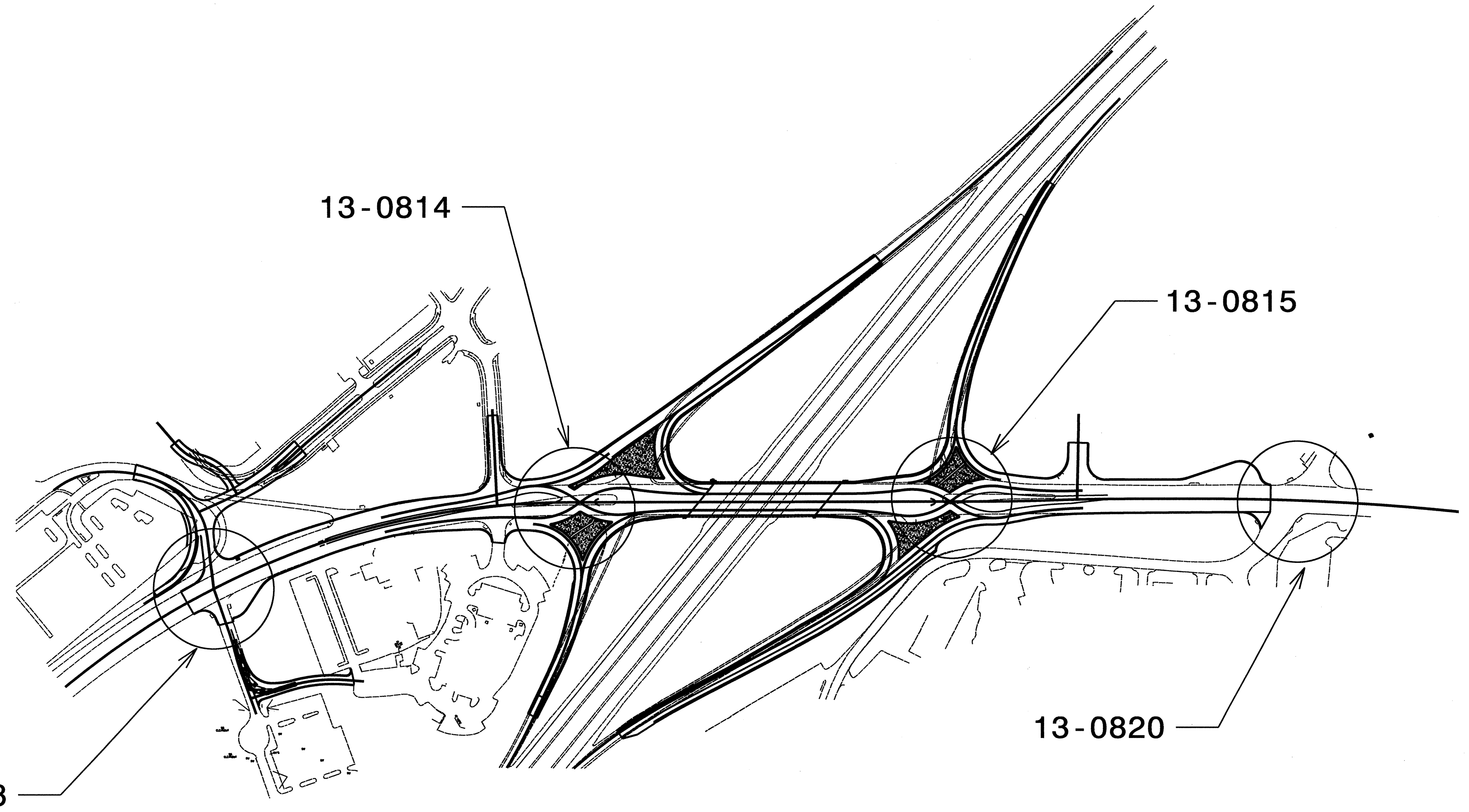
BUNCOMBE & HENDERSON COUNTIES

LOCATION: I-26 / NC 280 INTERCHANGE IN ASHEVILLE
TYPE OF WORK: TRAFFIC SIGNALS

Project: I-5501



VICINITY MAP



Refer to "Roadway Standard Drawings
NCDOT" dated January 2012 and
"Standard Specifications for Roads
and Structures" dated January 2012.

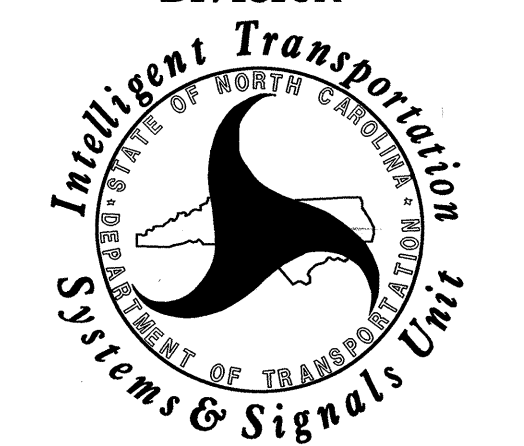
Sheet #	Reference #	Index of Plans Location/Description
Sig. 1		Title Sheet
Sig. 2-7	13-1118	NC 280 (Airport Road) at Airport Park Road/Airport Entrance
Sig. 8-16	13-0814	NC 280 (Airport Road) at I-26 Eastbound Ramps
Sig. 17-25	13-0815	NC 280 at I-26 Westbound Ramps
Sig. 26-31	13-0820	NC 280 (Airport Road) at SR 3568 (Rockwood Road)
Sig. 32-36	N/A	Signal Communication Plans
Sig. 37-44	N/A	Metal Pole Standard Drawings

INTELLIGENT TRANSPORTATION AND SIGNALS UNIT

Contacts:

Greg A. Fuller, PE - State ITS and Signals Engineer
Timothy J. Williams, PE - Western Region Signals Engineer
John T. Rowe, Jr., PE - Signal Equipment Design Engineer

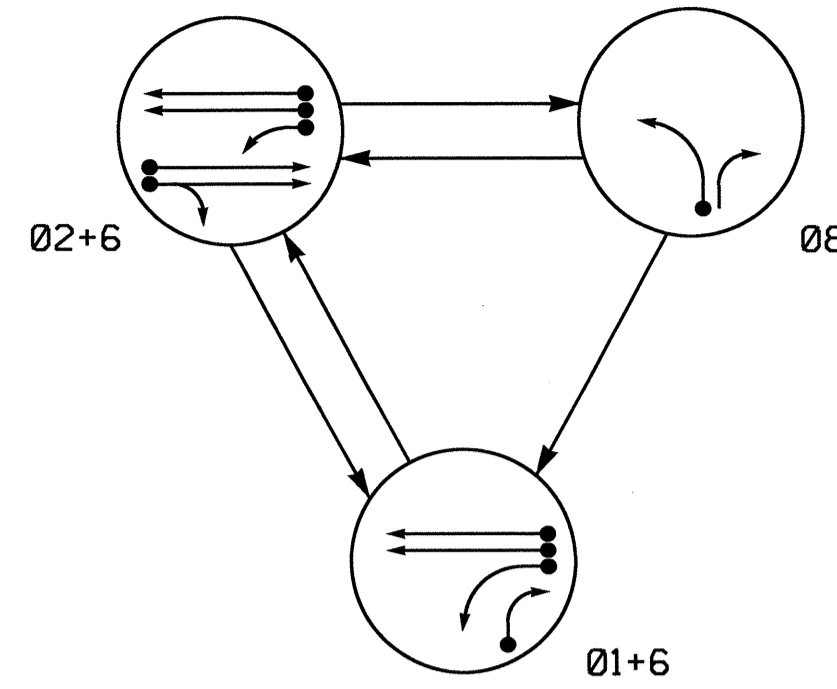
Prepared in the Office of:
DIVISION OF HIGHWAYS
TRANSPORTATION MOBILITY AND SAFETY
DIVISION



29-MAY-2013 2:13:33
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3 Phase Fully Actuated NC 280 CLS

PHASING DIAGRAM



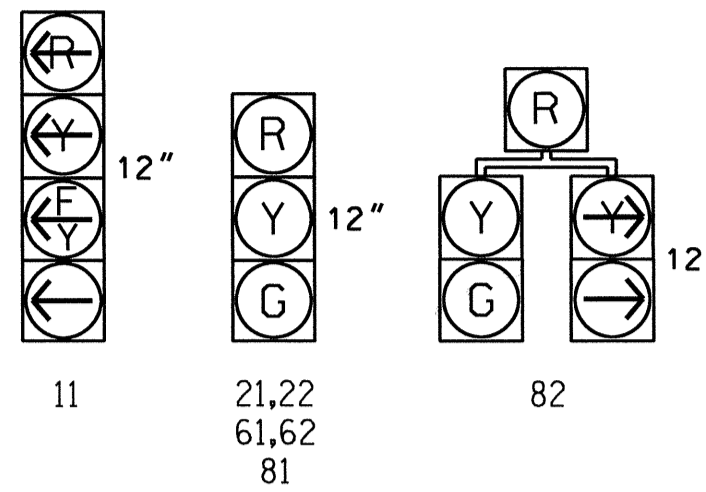
PHASING DIAGRAM DETECTION LEGEND

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

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

SIGNAL FACE I.D.

All Heads L.E.D.



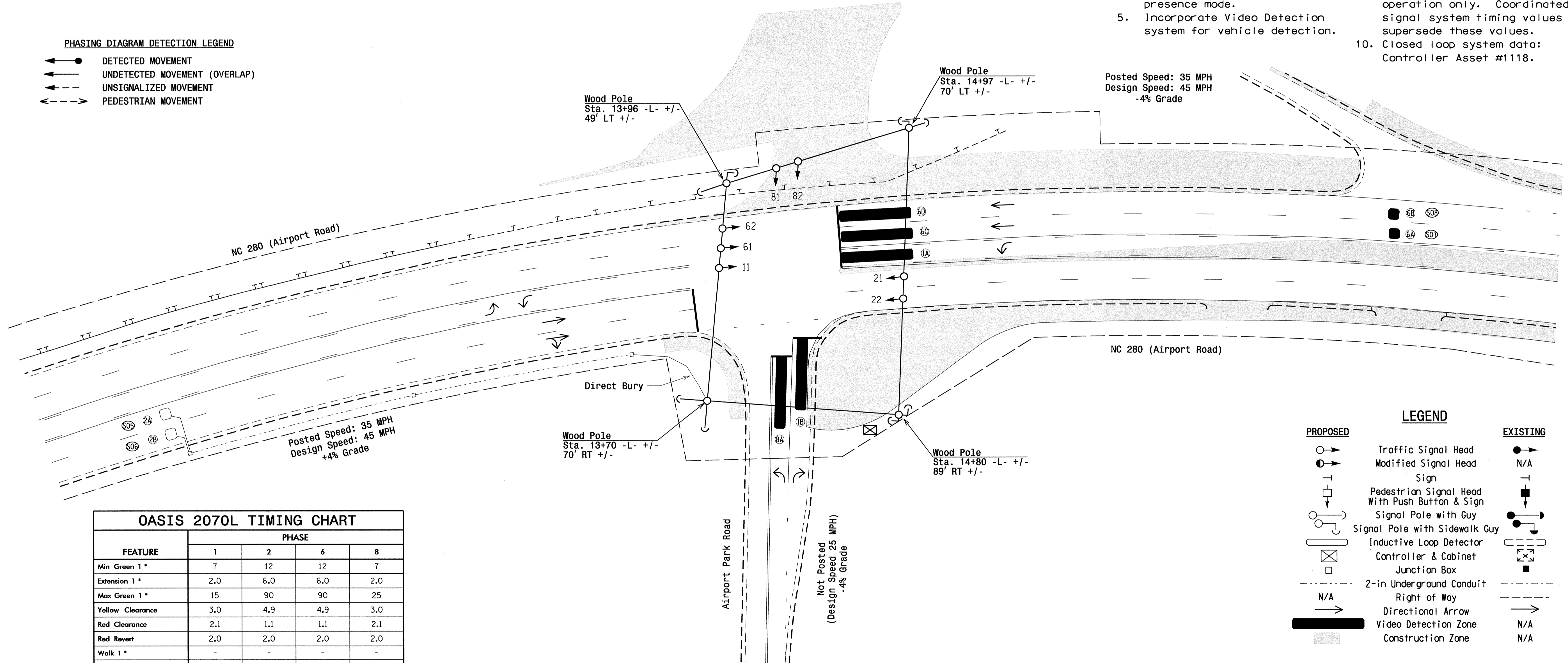
OASIS 2070L LOOP & DETECTOR INSTALLATION CHART

LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	DETECTOR PROGRAMMING					SYSTEM LOOP	NEW CARD	
					PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME			DELAY TIME
1A	6X40	0	*	Y	1	Y	Y	-	-	15	-	Y
1B	6X40	0	*	Y	1	Y	Y	-	-	15	-	Y
2A/S05	6X6	300	5	Y	2	Y	Y	-	-	-	-	Y
2B/S06	6X6	300	5	Y	2	Y	Y	-	-	-	-	Y
6A/S07	6X6	300	*	Y	6	Y	Y	-	-	-	-	Y
6B/S08	6X6	300	*	Y	6	Y	Y	-	-	-	-	Y
6C	6X40	0	*	Y	6	Y	Y	Y	2.0	5	-	Y
6D	6X40	0	*	Y	6	Y	Y	Y	2.0	5	-	Y
8A	6X40	0	*	Y	8	Y	Y	-	-	3	-	Y

* Video Detection Zone

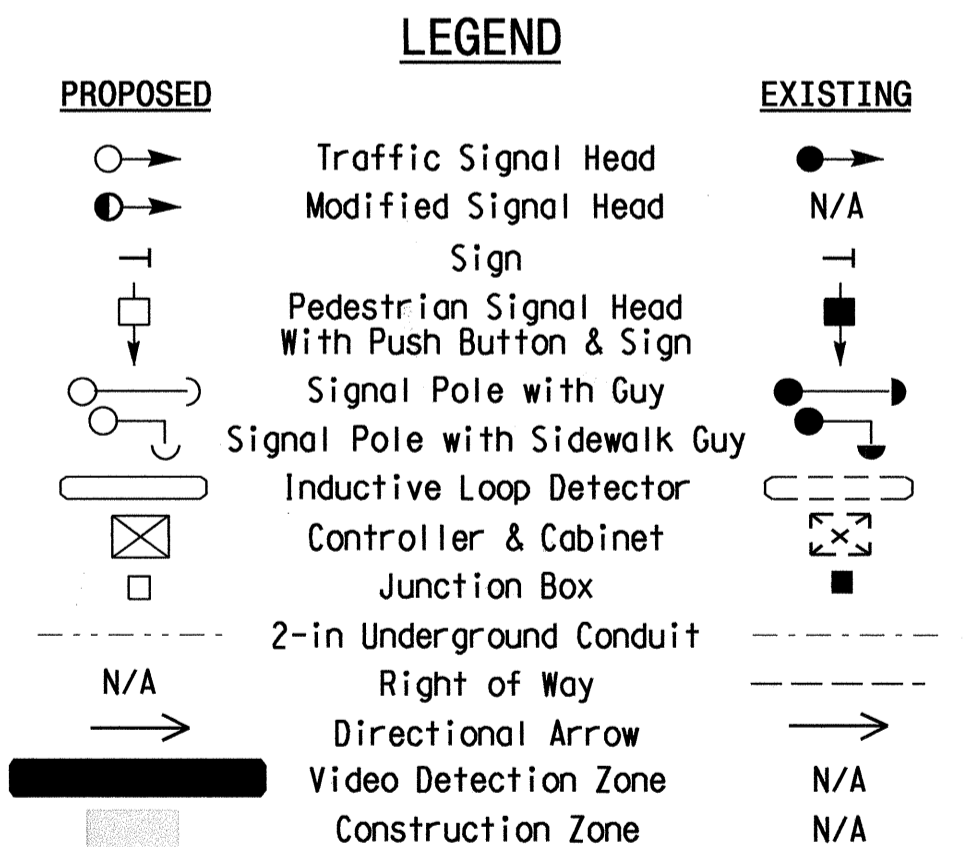
NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.
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. Incorporate Video Detection system for vehicle detection.
6. Provide the Engineer with the Manufacturer's approved Video Detection locations and mounting heights to obtain detection zones as shown.
7. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
8. Pavement markings are existing.
9. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
10. Closed loop system data: Controller Asset #1118.



FEATURE	PHASE			
	1	2	6	8
Min Green 1 *	7	12	12	7
Extension 1 *	2.0	6.0	6.0	2.0
Max Green 1 *	15	90	90	25
Yellow Clearance	3.0	4.9	4.9	3.0
Red Clearance	2.1	1.1	1.1	2.1
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 *	-	15	15	-
Time To Reduce *	-	30	30	-
Minimum Gap	-	3.0	3.0	-
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.

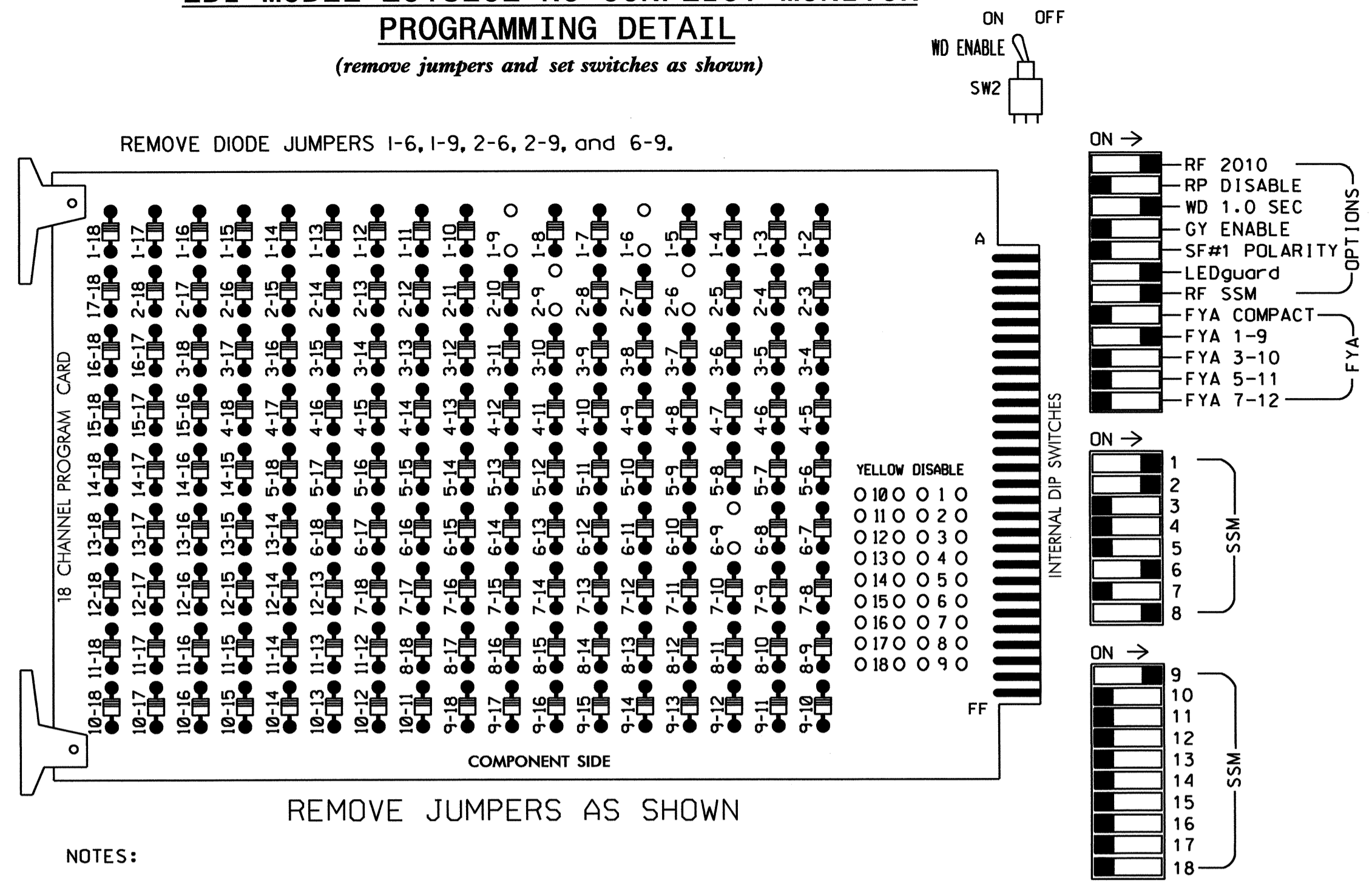


Temporary Signal - Construction Phases I & II

Prepared In the Offices of:

NC 280 (Airport Road) at Airport Park Road
 Division 13 Buncombe County Fletcher
 PLAN DATE: April 2013 REVIEWED BY: Z.M. Little
 PREPARED BY: R.N. Zinser REVIEWED BY:
 REVISIONS: _____ INIT. DATE: _____
 SCALE: 1" = 30'
 SIGNATURE: DATE: 5/24/13
 SIG. INVENTORY NO. 13-1118 T

EDI MODEL 2018ECL-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.
- 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.

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 Gap Reduction.
- Program phases 2 and 6 for Start Up In Green.
- Program phases 2 and 6 for Yellow Flash, and overlap 1 as Wag Overlaps.
- The cabinet and controller are part of the NC 280 (Airport Road) Closed Loop System.

EQUIPMENT INFORMATION

CONTROLLER.....2070L
 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*	82	21,22	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		126											A122					
FLASHING YELLOW ARROW													A123					
GREEN ARROW	127	127																

NU = Not Used

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

* See pictorial of head wiring in detail below.

INPUT FILE POSITION LAYOUT
(front view)

FILE	1	2	3	4	5	6	7	8	9	10	11	12	13	14
U	FS	2A/S05	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS
L	FS	2B/S06	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS
U	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS
L	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS

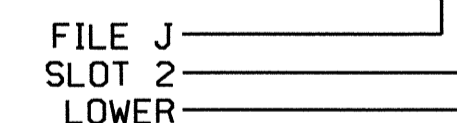
EX.: 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE
 ST = STOP TIME

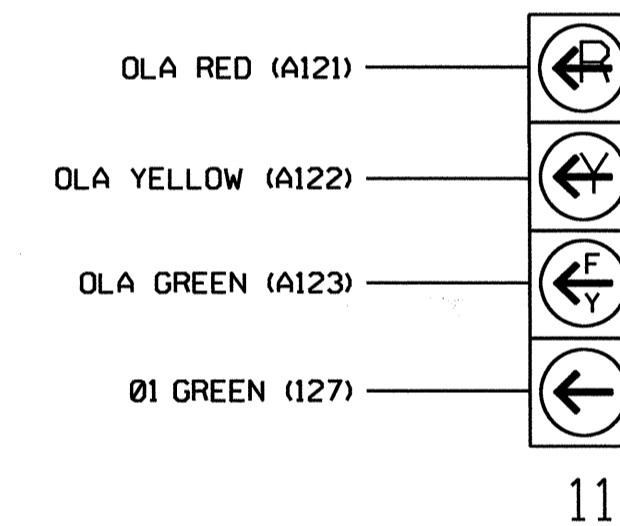
INPUT FILE CONNECTION & PROGRAMMING CHART

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
*1A						1	Y	Y			15
*1B						1	Y	Y	Y		3
2A/S05	TB2-5,6	I2U	39	1	2	2/SYS	Y	Y			
2B/S06	TB2-7,8	I2L	43	5	12	2/SYS	Y	Y			
*6A/S07						6/SYS	Y	Y			
*6B/S08						6/SYS	Y	Y			
*6C						6	Y	Y	Y	2.0	5
*6D						6	Y	Y	Y	2.0	5
*8A						8	Y	Y			3

INPUT FILE POSITION LEGEND: J2L



FYA SIGNAL WIRING DETAIL
(wire signal head as shown)

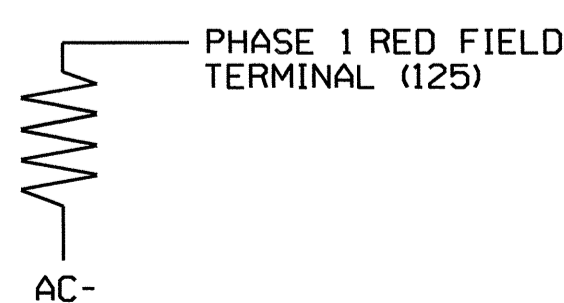


NOTE

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

LOAD RESISTOR INSTALLATION DETAIL
(install resistor as shown below)

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



*** 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.

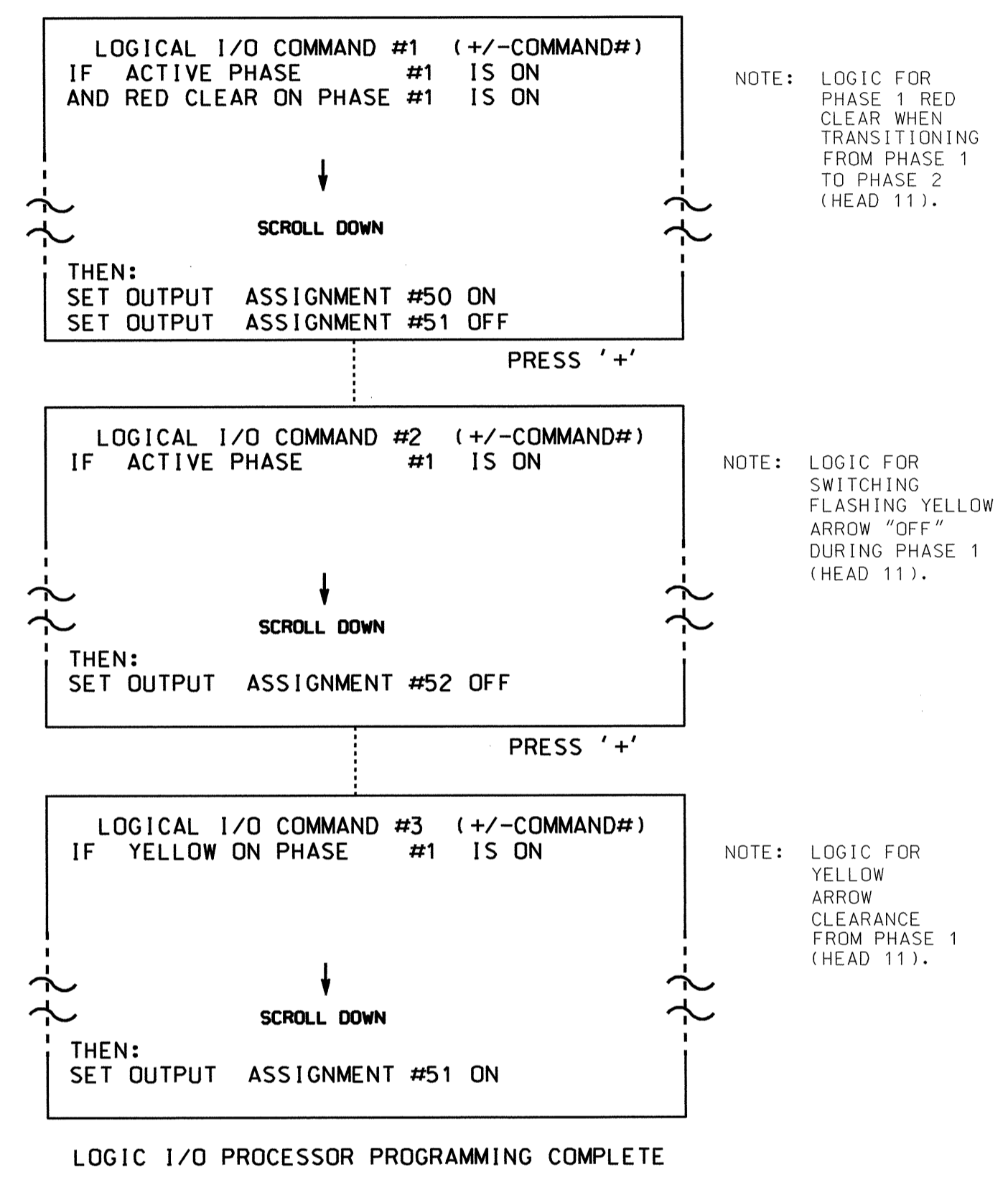
Temporary Signal - Construction Phases I & II - Sheet 1 of 2

ELECTRICAL AND PROGRAMMING DETAILS FOR: Prepared in the Office of: 750 N. Greenfield Pkwy, Garner, NC 27529	NC 280 (Airport Road) at Airport Park Road		SEAL SEAL 008453 JOHN T. ROWEL, P.E. ENGINEER
	Division 13 PLAN DATE: May 2013 PREPARED BY: S. Armstrong REVISIONS:	Buncombe County REVIEWED BY: JTR REVIEWED BY:	
Signature: DATE: 5-28-13 DATE:			SIG. INVENTORY NO. 13-1118T

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).



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: 13-1118T
 DESIGNED: April 2013
 SEALED: 5/24/13
 REVISED: N/A

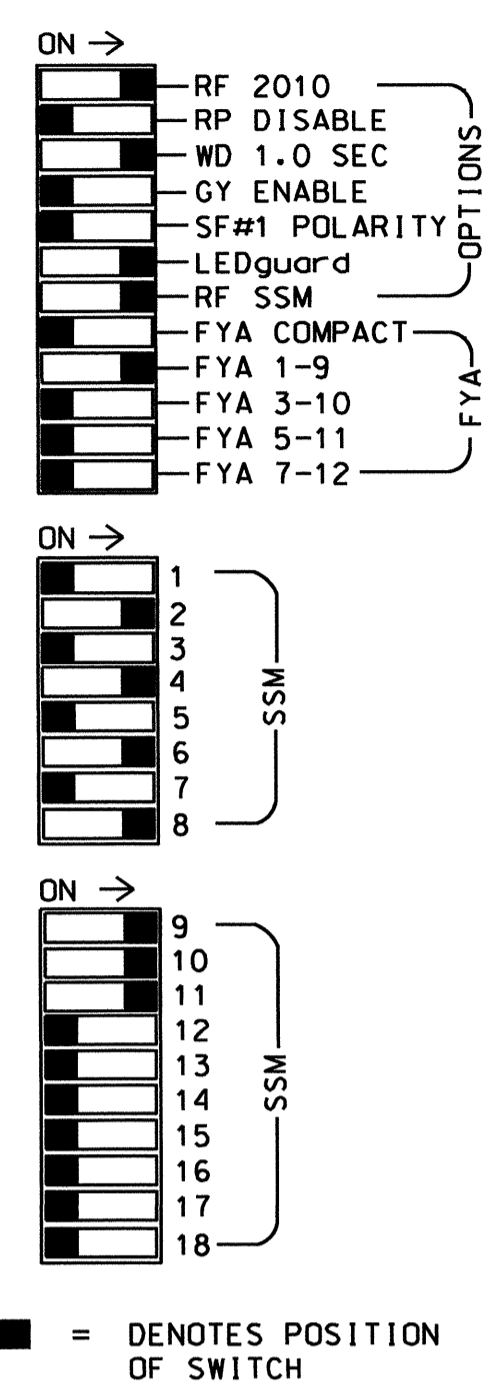
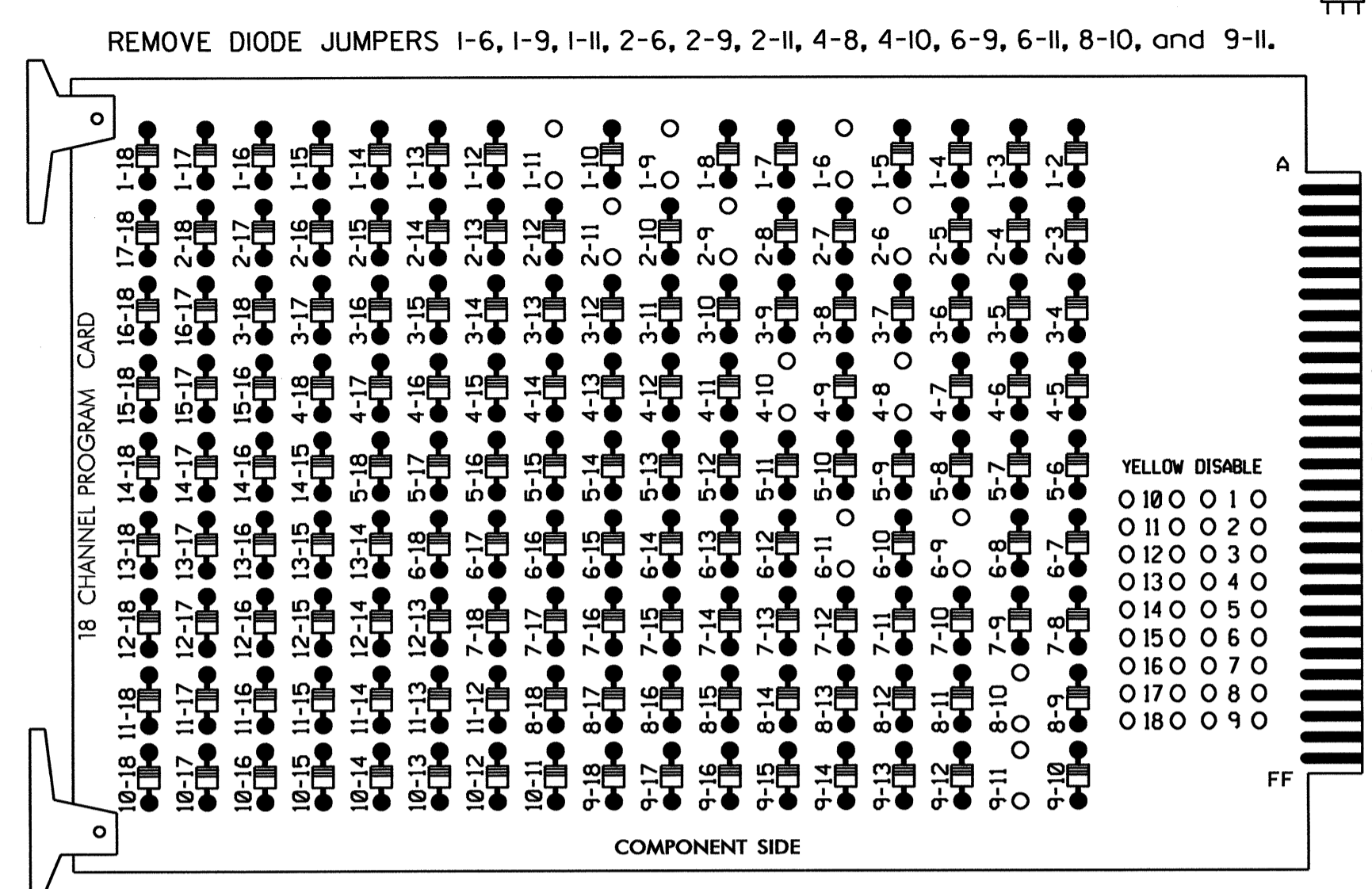
Temporary Signal - Construction Phases I & II - Sheet 2 of 2

	ELECTRICAL AND PROGRAMMING DETAILS FOR:		NC 280 (Airport Road) at Airport Park Road		
	Prepared In the Offices of:	Division 13	Buncombe County	Fletcher	
	PLAN DATE: May 2013	REVIEWED BY: JTR	SEAL	008453	
	PREPARED BY: S. Armstrong	REVIEWED BY:	ENGINEER	JOHN T. ROWE, JR.	
REVISIONS		INIT.	DATE	5-28-13 SIGNATURE DATE SIG. INVENTORY NO. 13-1118T	

28 MAY 2013 08:08 C:\PES\Signal\Signal Management\31118_sml.ele_xxx.dgn scarmstrong

EDI MODEL 2018ECL-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.
- 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. part 1 of 2070 controller. Ensure conflict monitor communicates with 2070.

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.
- 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 and overlaps 1 and 2 as Wag Overlaps.
- The cabinet and controller are part of the NC 280 (Airport Road) Closed Loop System.

EQUIPMENT INFORMATION

CONTROLLER.....2070L
 CABINET.....332 W/ AUX
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
 LOAD SWITCHES USED.....S1,S2,S5,S8,S11,AUX S1,AUX S2,AUX S4
 PHASES USED.....1,2,4,6,8
 OVERLAP "A".....1+2
 OVERLAP "B".....8
 OVERLAP "C".....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*	22,23	NU	NU	41,42	NU	NU	61,62	NU	NU	82,83	NU	11*	81*	NU	21*	NU	NU						
RED		128			101			134			107													
YELLOW	*	129			102			135			108													
GREEN		130			103			136			109													
RED ARROW													A121	A124				A114						
YELLOW ARROW																			A122	A125	A115			
FLASHING YELLOW ARROW																						A123	A126	A116
GREEN ARROW	127																							

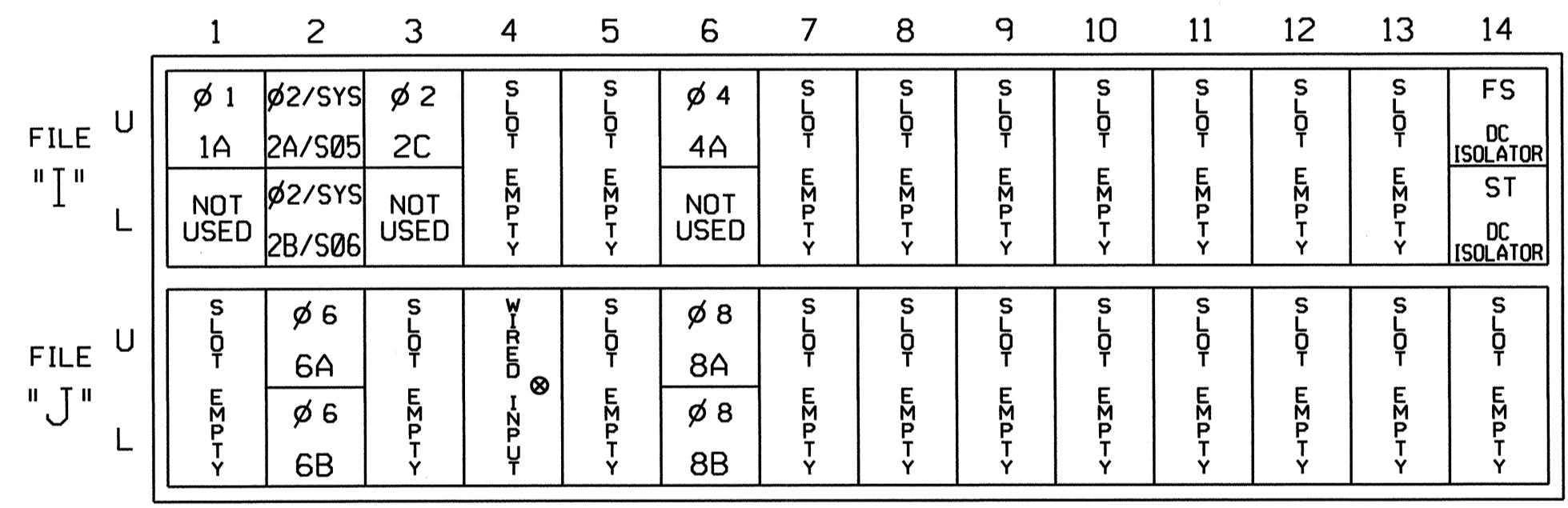
NU = Not Used

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

* See pictorial of head wiring in detail below.

INPUT FILE POSITION LAYOUT

(front view)



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

FS = FLASH SENSE
 ST = STOP TIME

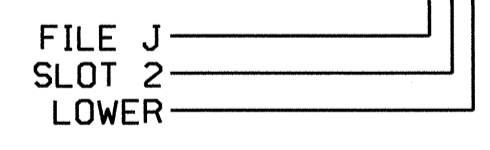
⊗ Wired Input - Do not populate slot with detector card

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	Y		3
2A/S05	TB2-5,6	I2U	39	1	2	2/SYS	Y	Y			
2B/S06	TB2-7,8	I2L	43	5	12	2/SYS	Y	Y			
2C	TB2-9,10	I3U	63	25	32	2	Y	Y	Y		3
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			5
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
8B	TB5-11,12	J6L	46	8	18	8	Y	Y			

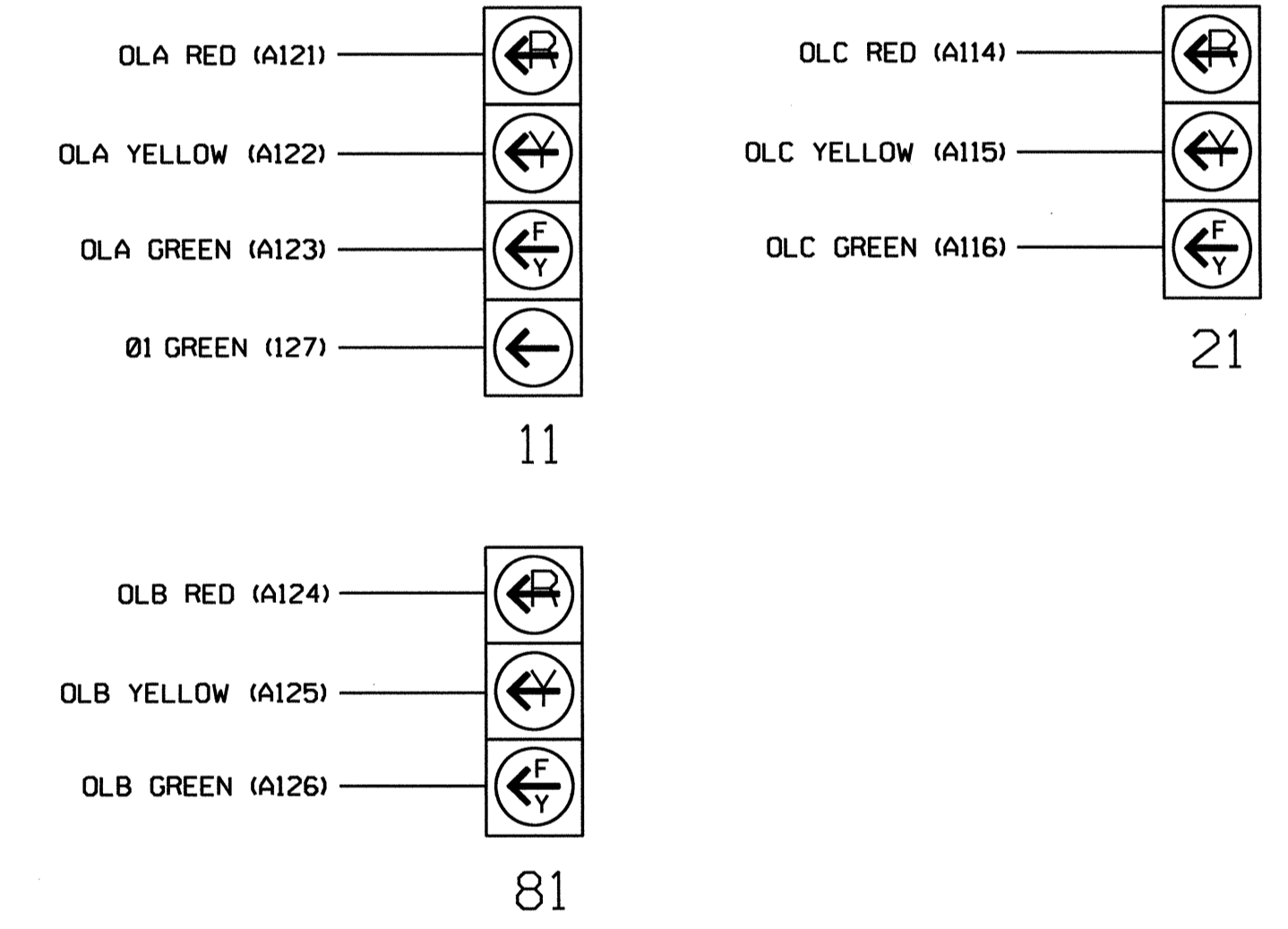
¹Add jumper from 11-W to J4-W. on rear of input file.

INPUT FILE POSITION LEGEND: J2L



FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)

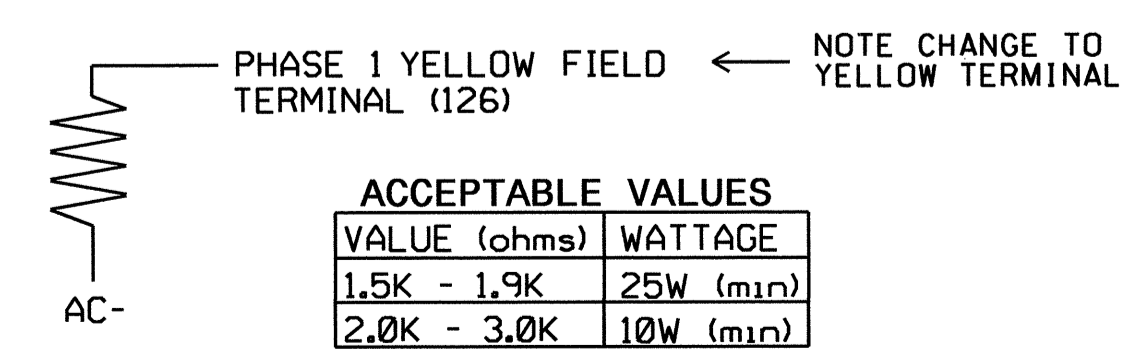


NOTE

The sequence display for signal head 11 requires special logic programming. See sheet 2 for programming instructions.

LOAD RESISTOR INSTALLATION DETAIL

(install resistor as shown below)



IMPORTANT: Move Load Resistor from Red Field Terminal to Yellow Field Terminal for Phase 1.

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 13-1118
 DESIGNED: April 2013
 SEALED: 5/24/13
 REVISED: N/A

Final Design - Sheet 1 of 2

Electrical and Programming Details For: **NC 280 (Airport Road) at Airport Park Road/ Airport Entrance**

Division 13 Buncombe County Fletcher

Prepared In the Offices of: **TRANSPORTATION MOBILITY AND SAFETY DIVISION**

Prepared By: **S. Armstrong** Reviewed By: **JTR**

PLAN DATE: **May 2013** REVIEWED DATE: **JTR**

SEAL: **JOHN T. ROWE, P.E.** SEAL 008453

SIGNATURE: **John T. Rowe** DATE: **5-28-13**

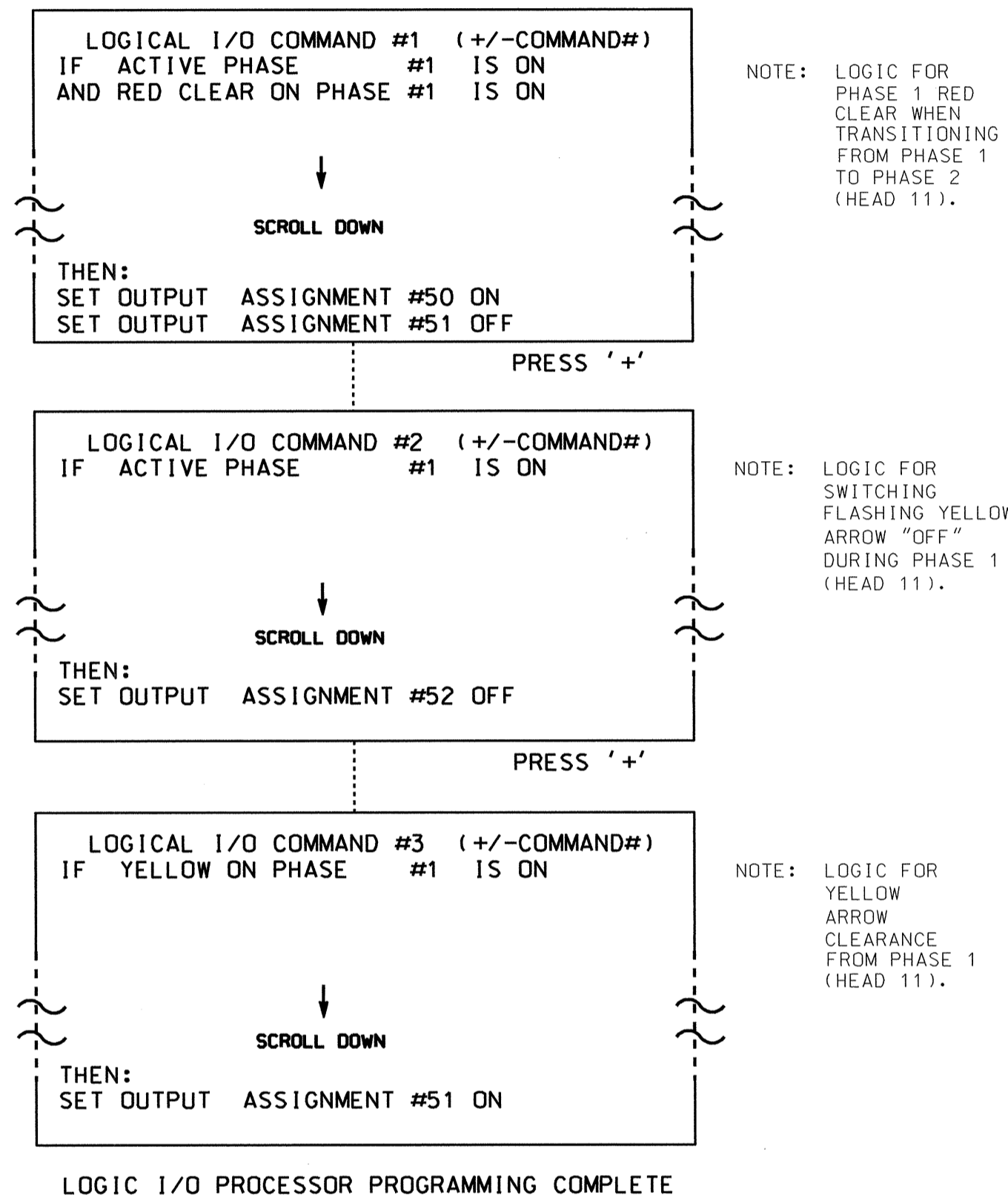
SIG. INVENTORY NO. 13-1118

24-May-2013 10:08 AM \\sigs\swm\kgr\cousa\sig_mon\mstron\31118_scl.ele.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).



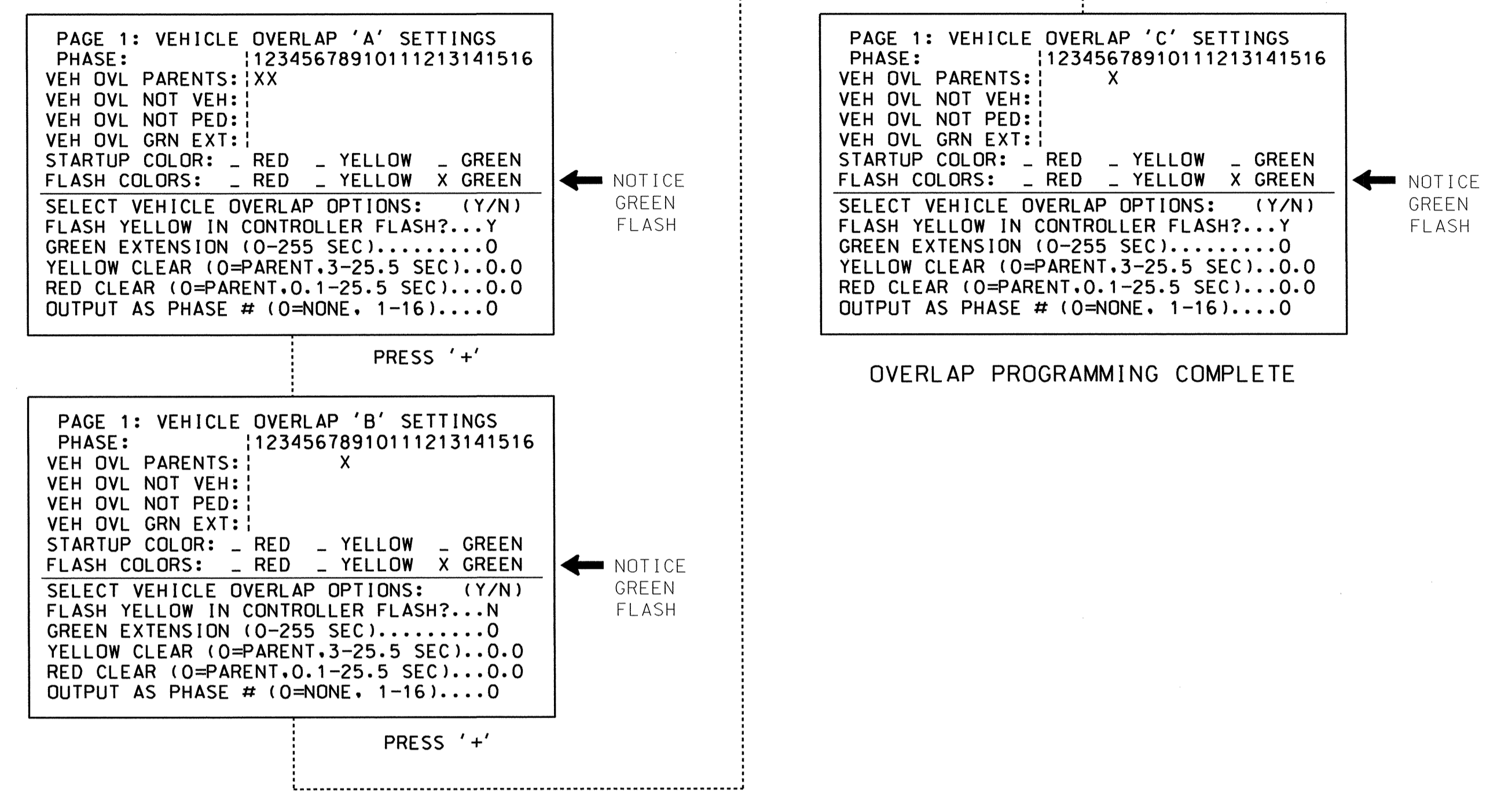
OUTPUT REFERENCE SCHEDULE

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).



FLASHER CIRCUIT MODIFICATION DETAIL

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

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

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

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 13-1118
DESIGNED: April 2013
SEALED: 5/24/13
REVISED: N/A

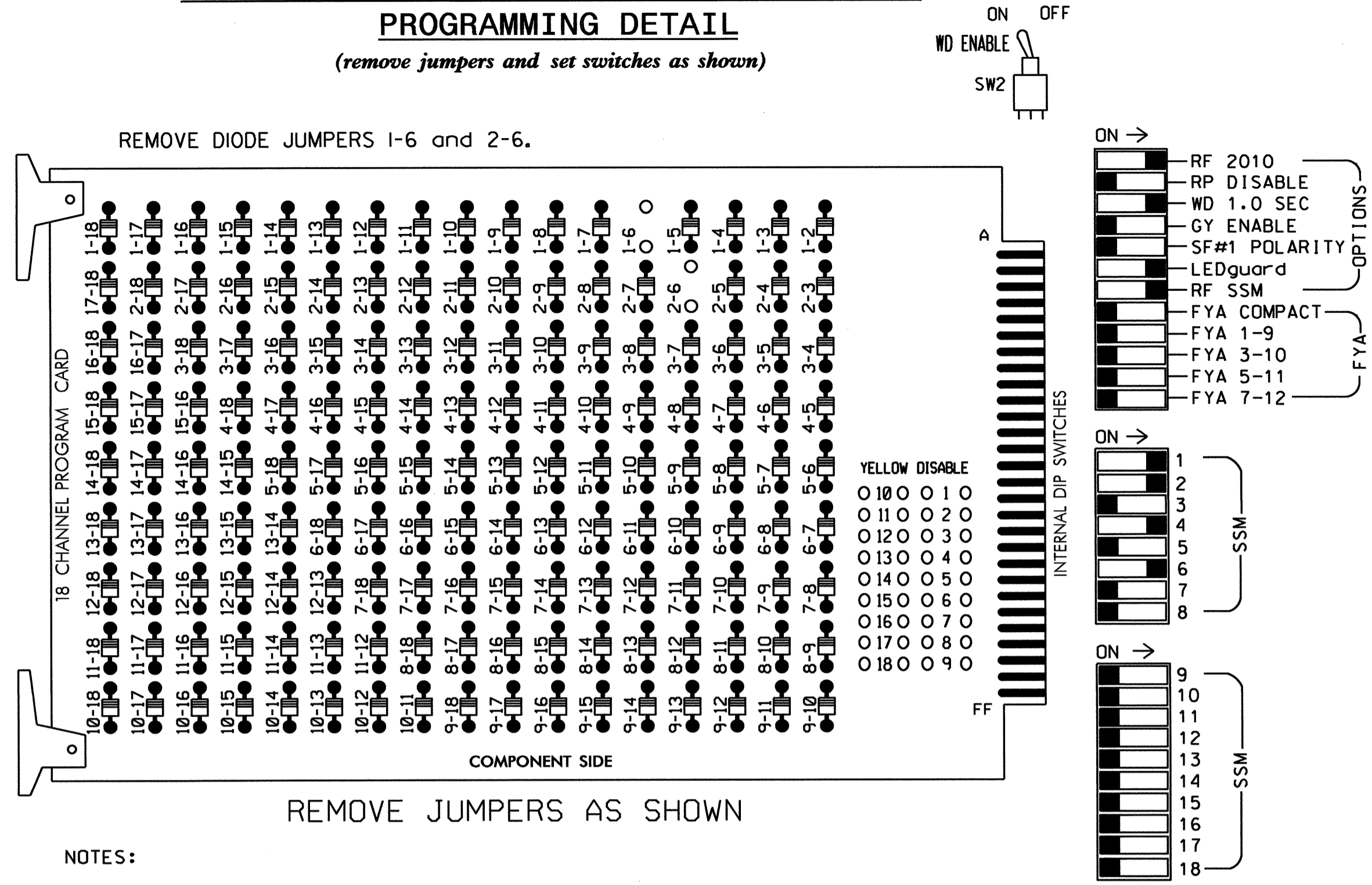
Final Design - Sheet 2 of 2

	<p>NC 280 (Airport Road) at Airport Park Road/ Airport Entrance</p>		
	<p>Division 13 Buncombe County Fletcher</p>	<p>PLANNING DATE: May 2013 REVIEWED BY: JTR</p>	
<p>750 N. Grantfield Pkwy, Garner, NC 27529</p>	<p>REVISIONS</p>	<p>INIT. DATE</p>	<p>SIGNATURE: John T. Rowe 5-29-13 DATE</p>

SIG. INVENTORY NO. 13-1118

28-MAY-2013 10:06:08 I:\projects\13-1118\13-1118-001\13-1118-001.dgn

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 Gap Reduction.
4. Program phases 2 and 6 for Start Up In Green.
5. Program phases 2 and 6 for Yellow Flash.
6. The cabinet and controller are part of the NC 280 (Airport Road) Closed Loop System.

EQUIPMENT INFORMATION

CONTROLLER.....2070L
 CABINET.....336
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....POLE
 OUTPUT FILE POSITIONS...12
 LOAD SWITCHES USED.....S1,S2,S5,S8
 PHASES USED.....1,2,4,6
 OVERLAPS.....NONE

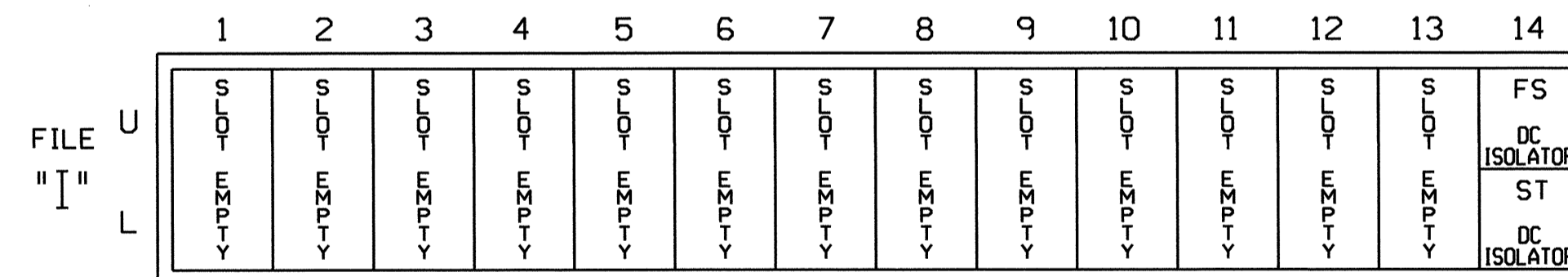
SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED
SIGNAL HEAD NO.	11	21,22	NU	NU	41,42	43	NU	NU	61,62	NU	NU	NU
RED		128				101			134			
YELLOW		129							135			
GREEN		130							136			
RED ARROW	125				101							
YELLOW ARROW	126				102	102						
GREEN ARROW	127				103	103						

NU = Not Used

INPUT FILE POSITION LAYOUT

(from 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.

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 13-0814T1
 DESIGNED: April 2013
 SEALED: 5/24/13
 REVISED: N/A

Temporary Design 1 - Construction Phase I

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared In the Offices of:

750 N. Grandfield Pkwy, Garner, NC 27529

NC 280 (Airport Road) at I-26 Eastbound Ramps

Division 13 Buncombe County Fletcher

PLAN DATE: May 2013 REVIEWED BY: JTR

PREPARED BY: S. Armstrong REVIEWED BY:

REVISIONS	INIT.	DATE

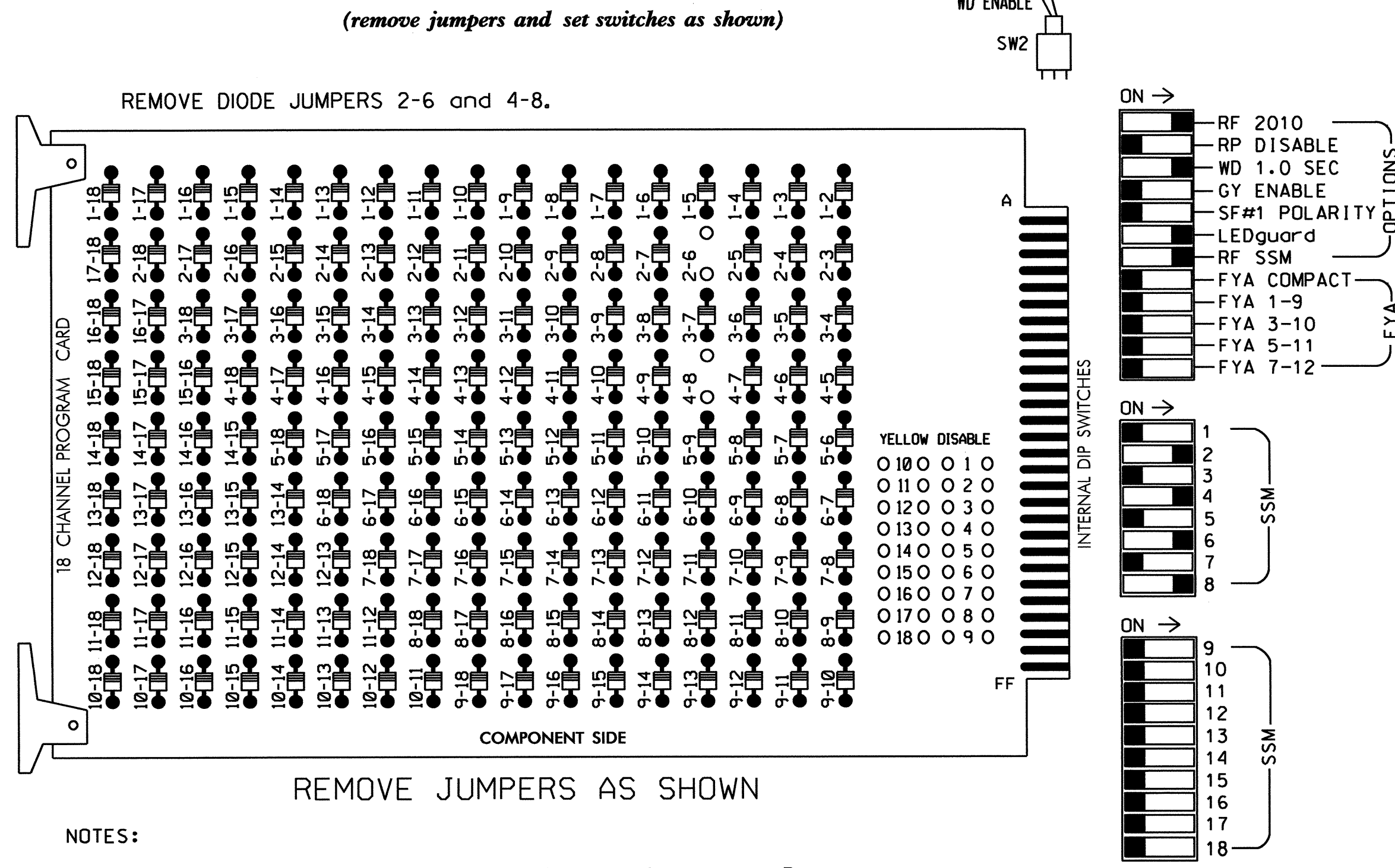
SEAL NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 008453 JOHN T. ROWE, JR.

Signature: John Rowe 5-28-13
 DATE: 5-28-13

SIG. INVENTORY NO. 13-0814T1

28-MAY-2013 10:32 I:\projects\2013\Sigs\Sig9\sig9\cups\10 Mon\mstron\30814_snc.dwg...xxx.dgn sarmstrong

EDI MODEL 2018ECL-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.
- 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.

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.
- Program phases 2, 3, 4, 6, and 8 for Dual Entry.
- Enable Simultaneous Gap-Out for all phases.
- Program phases 2 and 6 for Start Up In Green.
- Program phases 2, 3, 4, 6, and 8 for Red Rest.
- The cabinet and controller are part of the NC 280 (Airport Road) Closed Loop System.

SIGNAL HEAD HOOK-UP CHART

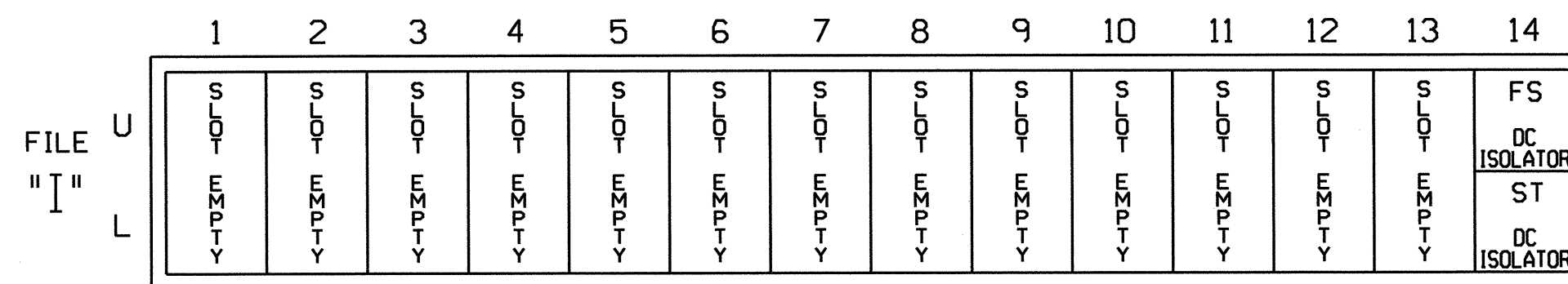
LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED
SIGNAL HEAD NO.	NU	21,22 23	NU	NC	41,42	NU	NU	61,62	NU	NU	81,82	NU
RED		128			101			134			107	
YELLOW		129			102			135			108	
GREEN					103			136				
RED ARROW												
YELLOW ARROW												
GREEN ARROW		130									109	

NU = Not Used
NC = Not Connected

EQUIPMENT INFORMATION

CONTROLLER.....2070L
CABINET.....336
SOFTWARE.....ECONOLITE OASIS
CABINET MOUNT.....POLE
OUTPUT FILE POSITIONS...12
LOAD SWITCHES USED.....S2,S5,S8,S11
PHASES USED.....2,*3,4,6,8
OVERLAPS.....NONE
* PHASE USED FOR TIMING PURPOSES ONLY

INPUT FILE POSITION LAYOUT
(front view)



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.

DYNAMIC OMIT 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 Functions 1 and 2.
- From Phase Control Functions Menu press '2' (Dynamic/Backup Control Functions).

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

PRESS 'NEXT'

DYNAMIC/BACKUP CONTROL FUNCTION #02
OVERLAPS: ABCDEFGHIJKLMNPO
IF OVERLAPS ARE ACTIVE :
OR PHASES: 12345678910111213141516
IF PHASES ARE ON: X
OMIT PHASES : X
CALL PHASES : X

DYNAMIC OMIT PROGRAMMING COMPLETE

NOTE: THIS PROGRAMMING ENSURES THAT PHASE 3 WILL BE SERVED PRIOR TO PHASE 4 WHEN CONTROLLER IS ADVANCING FROM 2+6.

PHASE 3 IS USED TO PROVIDE EXTENDED RED CLEARANCE BEFORE SERVING PHASE 4.

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 13-0814T2
DESIGNED: April 2013
SEALED: 5/24/13
REVISED: N/A

Temporary Design 2 - Construction Phase II

ELECTRICAL AND PROGRAMMING DETAILS FOR:

NC 280 (Airport Road) at I-26 Eastbound Ramps

Division 13 Buncombe County Fletcher

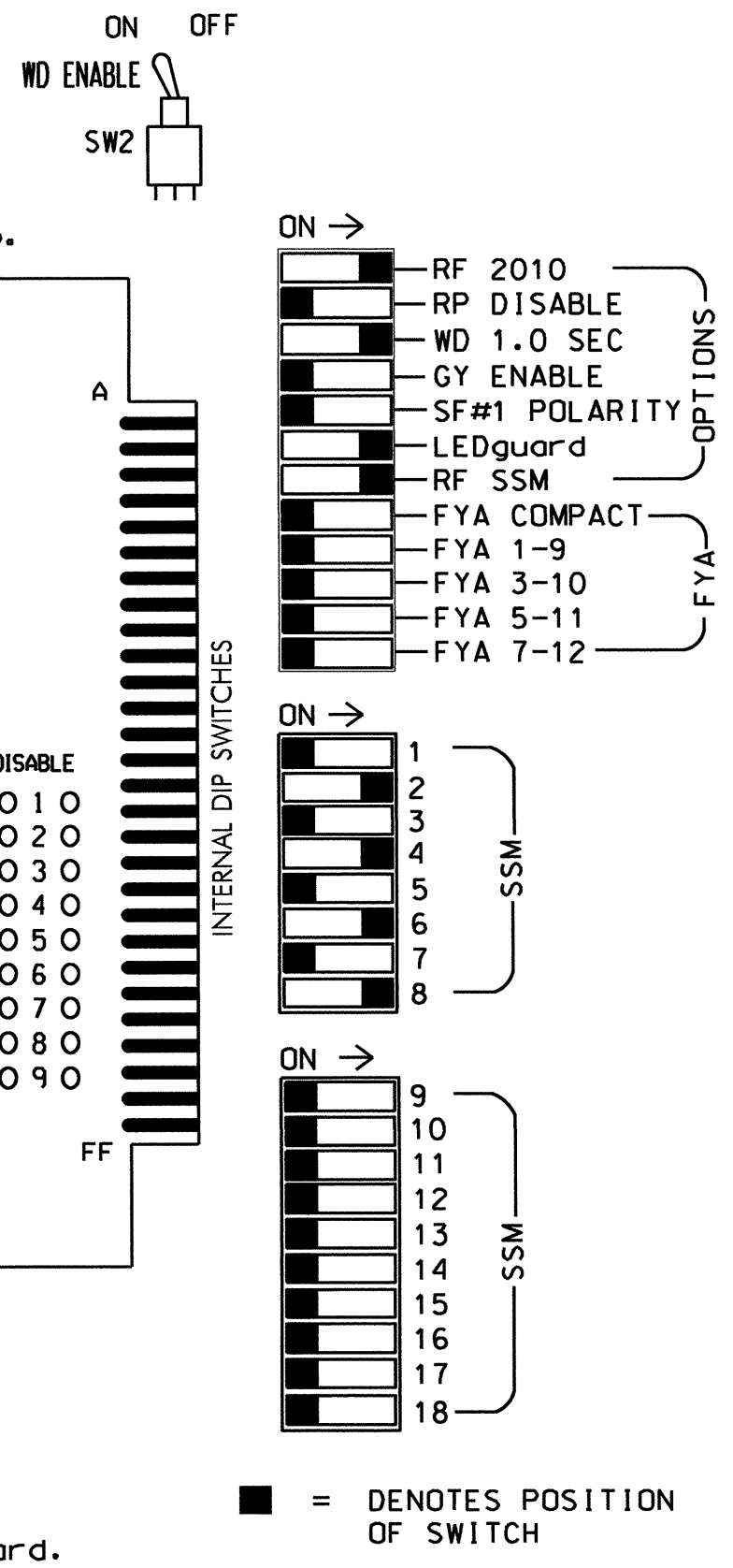
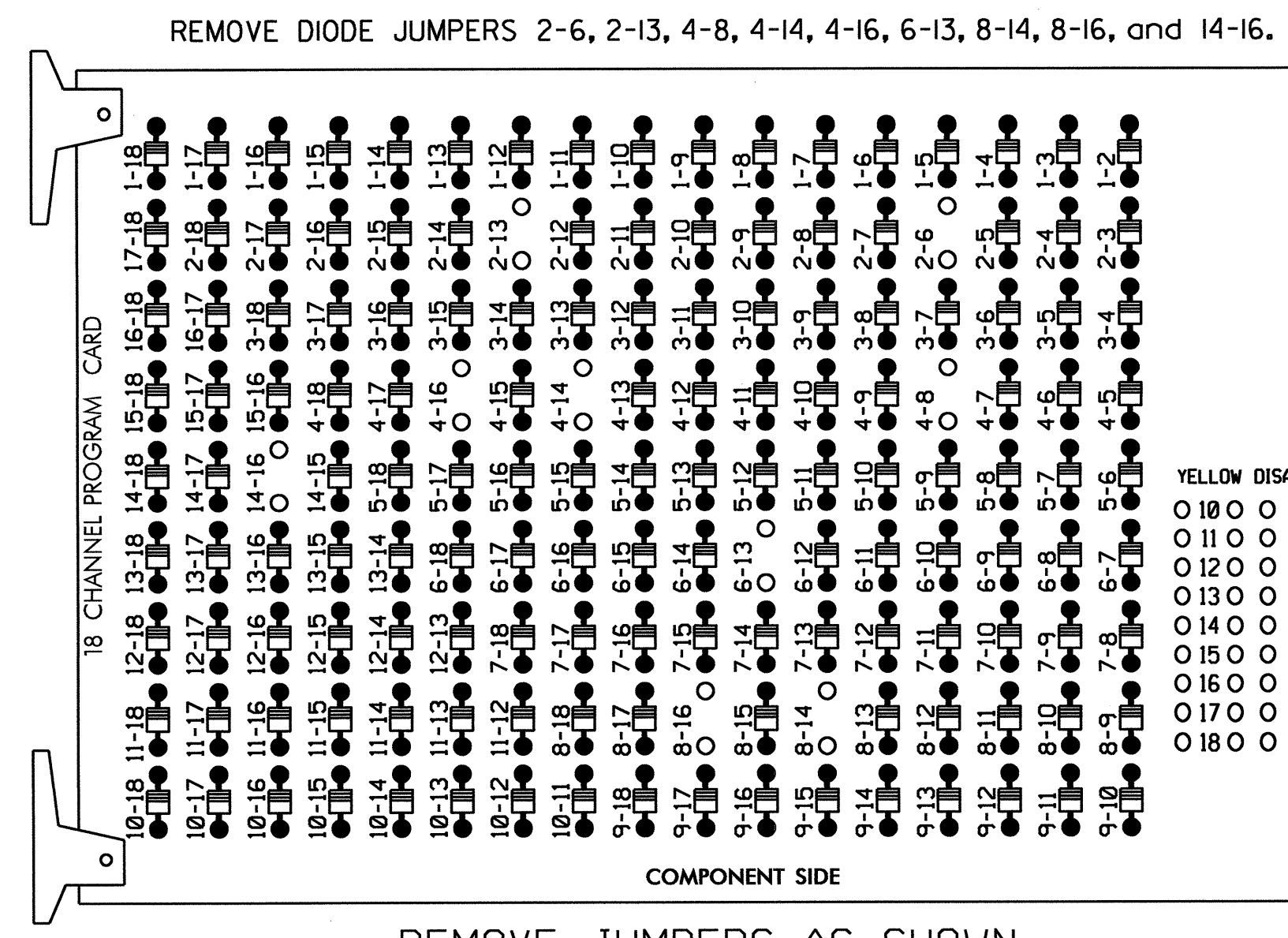
Prepared in the Offices of:
TRANSPORTATION MOBILITY AND SAFETY DIVISION
STATE OF NORTH CAROLINA
Signal Management Services
750 N. Greenfield Pkwy, Garner, NC 27529

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER
SEAL 008453
JOHN T. ROWE, JR.

PLAN DATE: May 2013 REVIEWED BY: JTR
PREPARED BY: S. Armstrong REVIEWED BY:
REVISIONS INIT. DATE
SIGNATURE: [Signature] DATE: 5-28-13
SIG. INVENTORY NO. 13-0814T2

EDI MODEL 2018ECL-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.
- 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.

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.
- Program phases 2, 3, 4, 6, and 8 for Dual Entry.
- Enable Simultaneous Gap-Out for all phases.
- Program phases 2 and 6 for Start Up In Green.
- Program phases 2, 4, and 8 for 'STARTUP PED CALL'.
- Program phases 2, 3, 4, 6, and 8 for Red Rest.
- The cabinet and controller are part of the NC 280 (Airport Road) Closed Loop System.

EQUIPMENT INFORMATION

CONTROLLER.....2070L
 CABINET.....332
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...12
 LOAD SWITCHES USED.....S2,S3,S5,S6,S8,S11,S12
 PHASES USED.....2,2PED,*3,4,4PED,6,8,8PED
 OVERLAPS.....NONE
 * PHASE USED FOR TIMING PURPOSES ONLY

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED
SIGNAL HEAD NO.	NU	21,22 23	24,25	P21, P22	NC	41,42 43,44	P41, P42	NU	61,62 63,64	NU	81,82 83,84	P81, P82
RED	128				101			134			107	
YELLOW	129				102			135			108	
GREEN					103			136				
RED ARROW		128				101			134			107
YELLOW ARROW		129				102			135			108
GREEN ARROW		130	130			103			136		109	109
				113			104					110
				115			106					112

NU = Not Used
 NC = Not Connected

INPUT FILE POSITION LAYOUT

(front view)

FILE	1	2	3	4	5	6	7	8	9	10	11	12	13	14
U	S	∅ 2	∅ 2	S	S	∅ 3/4	SYS. DET. S07	SYS. DET. S09	SYS. DET. S10	S	S	∅ 2 PED	NOT USED	FS
I	∅ 2	2A	2C	∅ 2	∅ 2	∅ 3/4	SYS. DET. S08	NOT USED	SYS. DET. S11	∅ 4 PED	∅ 8 PED	∅ 4 PED	∅ 8 PED	DC ISOLATOR
L	∅ 2	2B	NOT USED	∅ 2	∅ 2	4A	SYS. DET. S08	NOT USED	SYS. DET. S11	DC ISOLATOR	DC ISOLATOR	DC ISOLATOR	DC ISOLATOR	DC ISOLATOR
U	S	∅ 6	∅ 6	S	S	∅ 8	SYS. DET. S12	S	SYS. DET. S14	S	S	S	S	S
I	∅ 6	6A	6C	∅ 6	∅ 6	6A	SYS. DET. S12	∅ 8	SYS. DET. S14	∅ 8	SYS. DET. S15	∅ 8	SYS. DET. S15	∅ 8
L	∅ 6	6B	6D	∅ 6	∅ 6	6B	SYS. DET. S13	∅ 8	SYS. DET. S15	∅ 8	SYS. DET. S15	∅ 8	SYS. DET. S15	∅ 8

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

FS = FLASH SENSE
 ST = STOP TIME

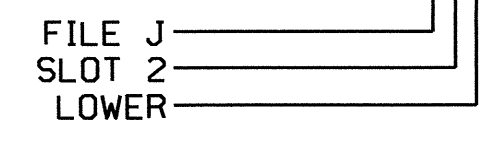
INPUT FILE CONNECTION & PROGRAMMING CHART

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	TB2-5,6	I2U	39	1	2	2	Y	Y			
2B	TB2-7,8	I2L	43	5	12	2	Y	Y			
2C	TB2-9,10	I3U	63	25	32	2	Y	Y			
4A	TB4-9,10	I6U	41	3	4	3/4	Y	Y			
4B	TB4-11,12	I6L	45	7	14	3/4	Y	Y			
6A	TB3-5,6	J2U	40	2	6	6		Y		2.4	
6B	TB3-7,8	J2L	44	6	16	6		Y		2.4	
6C	TB3-9,10	J3U	64	26	36	6	Y	Y			
6D	TB3-11,12	J3L	77	39	46	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			
*S07	TB6-1,2	I7U	65	27	34	SYS					
*S08	TB6-3,4	I7L	78	40	44	SYS					
*S09	TB6-5,6	I8U	49	11	24	SYS					
*S10	TB6-9,10	I9U	60	22	11	SYS					
*S11	TB6-11,12	I9L	62	24	13	SYS					
*S12	TB7-1,2	J7U	66	28	38	SYS					
*S13	TB7-3,4	J7L	79	41	48	SYS					
*S14	TB7-9,10	J9U	59	21	15	SYS					
*S15	TB7-11,12	J9L	61	23	17	SYS					
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					
P81,P82	TB8-8,9	I13L	70	32	PED 8	8 PED					

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

* System detector only. Remove the vehicle phase assigned to this detector in the default programming.

INPUT FILE POSITION LEGEND: J2L



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: 13-0814
 DESIGNED: April 2013
 SEALED: 5/24/13
 REVISED: N/A

Final Design - Sheet 1 of 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:

NC 280 (Airport Road) at I-26 Eastbound Ramps

Division 13 Buncombe County Fletcher

PLAN DATE: May 2013 REVIEWED BY: JTR

PREPARED BY: S. Armstrong REVIEWED BY:

REVISIONS: _____ INIT. DATE

750 N. Greenfield Pkwy, Garner, NC 27529

SEAL NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 008453 JOHN T. ROWE JR.

SIGNATURE: *John T. Rowe Jr.* DATE: 5-28-13

SIG. INVENTORY NO. 13-0814

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.

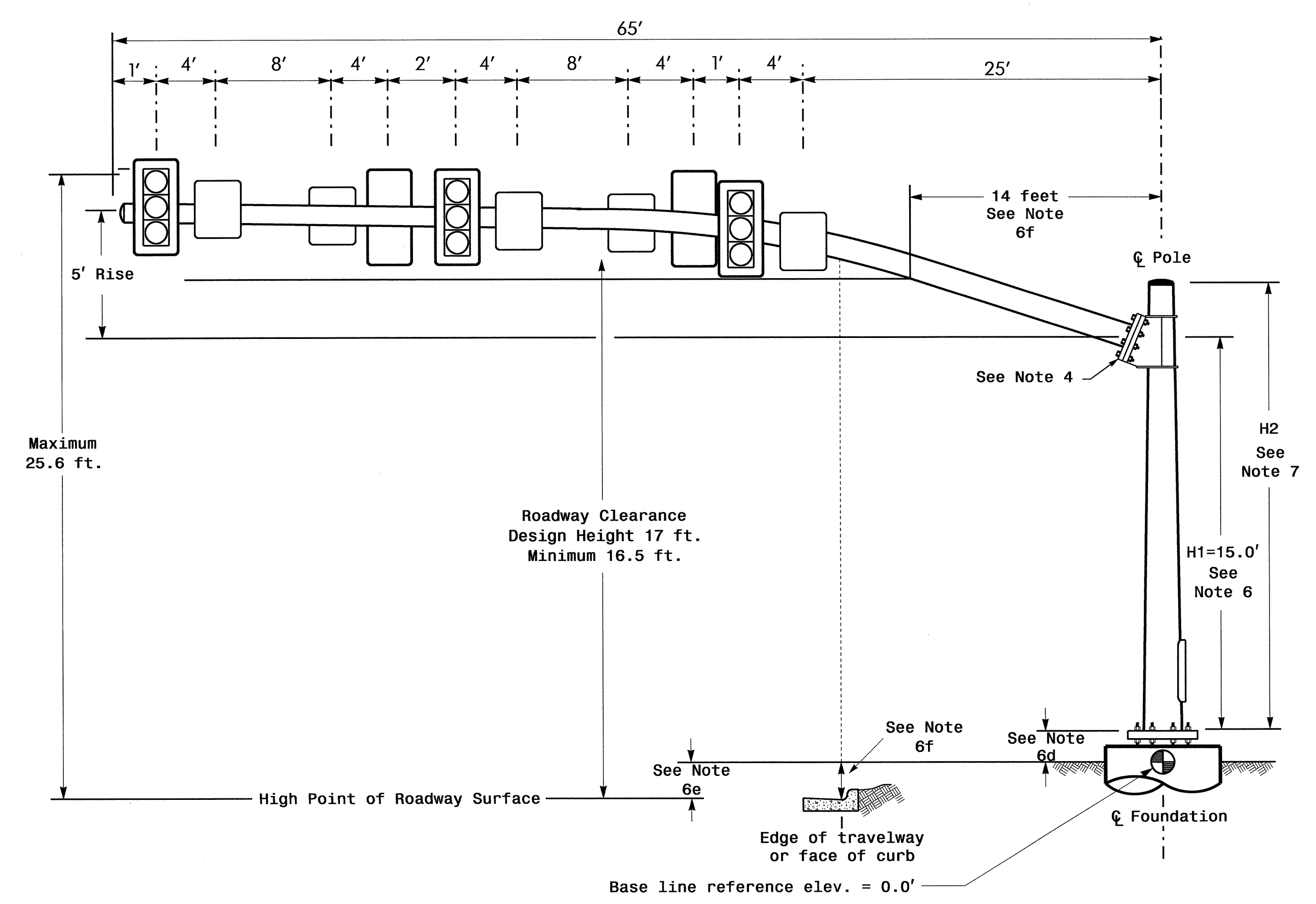
Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 7
Baseline reference point at ϕ Foundation @ ground level	0.0 ft.
Elevation difference at High point of roadway surface	+0.9 ft.
Elevation difference at Edge of travelway or face of curb	+0.4 ft.

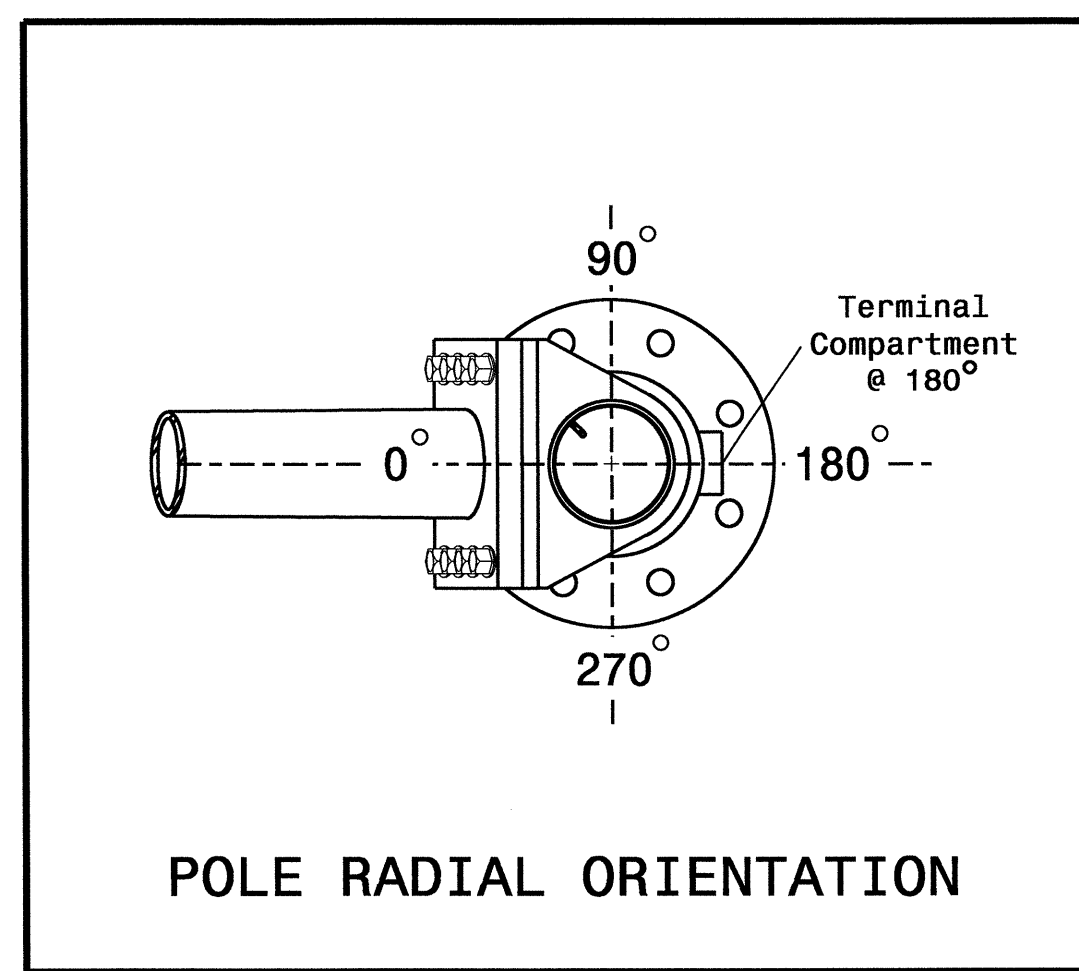
MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE AND ASTRO-BRAC	9.3 S.F.	25.5" W X 52.5" L	60 LBS
	SIGN RIGID MOUNTED WITH ASTRO-SIGN-BRAC	5.0 S.F.	24.0" W X 30.0" L	11 LBS

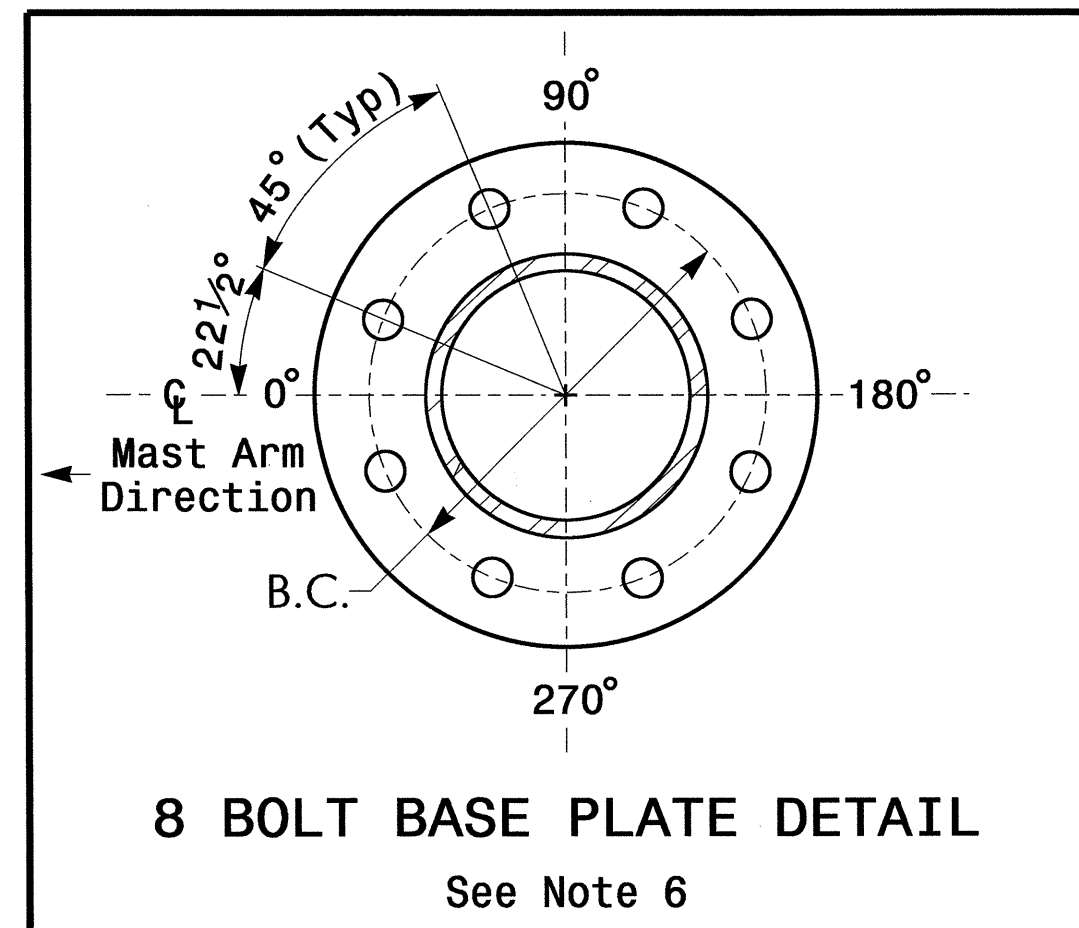
Design Loading for METAL POLE NO. 7



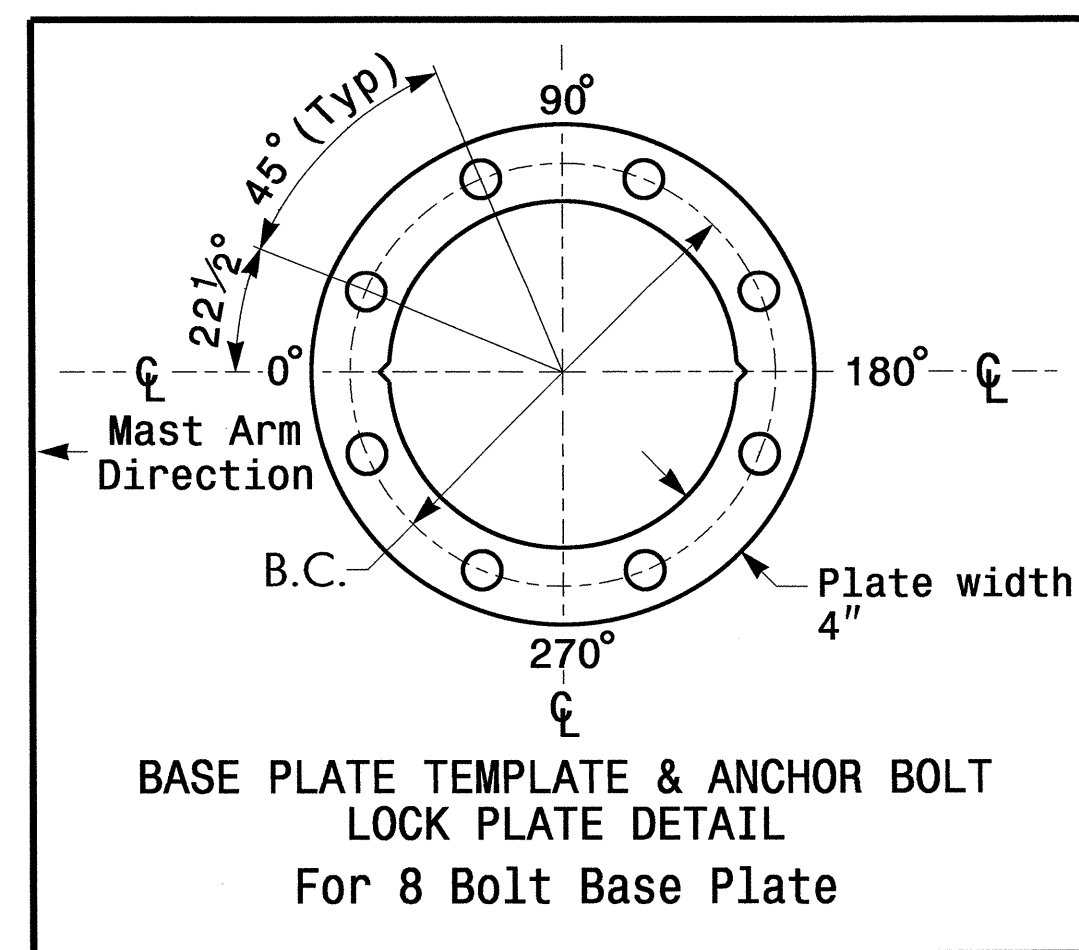
Elevation View



POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL

For 8 Bolt Base Plate

Design Reference Material

- Design the traffic signal structure and foundation in accordance with:
 - The 4th Edition 2001 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
 - The 2012 NCDOT "Standard Specifications for Roads and Structures". The latest addenda to these specifications can be found in the traffic signal project special provisions.
 - The 2012 NCDOT Roadway Standard Drawings.
 - The traffic signal project plans and special provisions.

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 attached to the mast arm are rigid mounted and vertically centered on the arm.
 - The roadway clearance height for design is as shown in the elevation views.
 - The top of the pole base plate is .75 feet above the ground elevation.
 - Refer to the Elevation Data chart for elevation differences between the proposed foundation ground level and the high point on the roadway.
 - Provide horizontal distance from proposed centerline of foundation to edge of travelway. Refer to the Elevation Data chart above for elevation difference between the proposed foundation ground level and the edge of travelway. This information is necessary when arched arms are specified to ensure that the roadway clearance is maintained at the edge of the travelway and to assist in the camber design of the mast 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 Signals Design Section Structural Engineer for assistance at (919) 773-2800.
- 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.

NOTES

NCDOT Wind Zone 4 (90 mph)

Prepared in the Offices of:

NC 280 (Airport Road)
 at
I-26 Eastbound Ramps

Division 13 Buncombe County Fletcher

PLAN DATE: April 2013 REVIEWED BY: T.J. Williams

750 N. Greenfield Pkwy, Garner, NC 27529 PREPARED BY: Z.M. Little REVIEWED BY:

SCALE: 0 N/A

REVISIONS: INIT. DATE

SEAL: NORTH CAROLINA PROFESSIONAL ENGINEER 24393

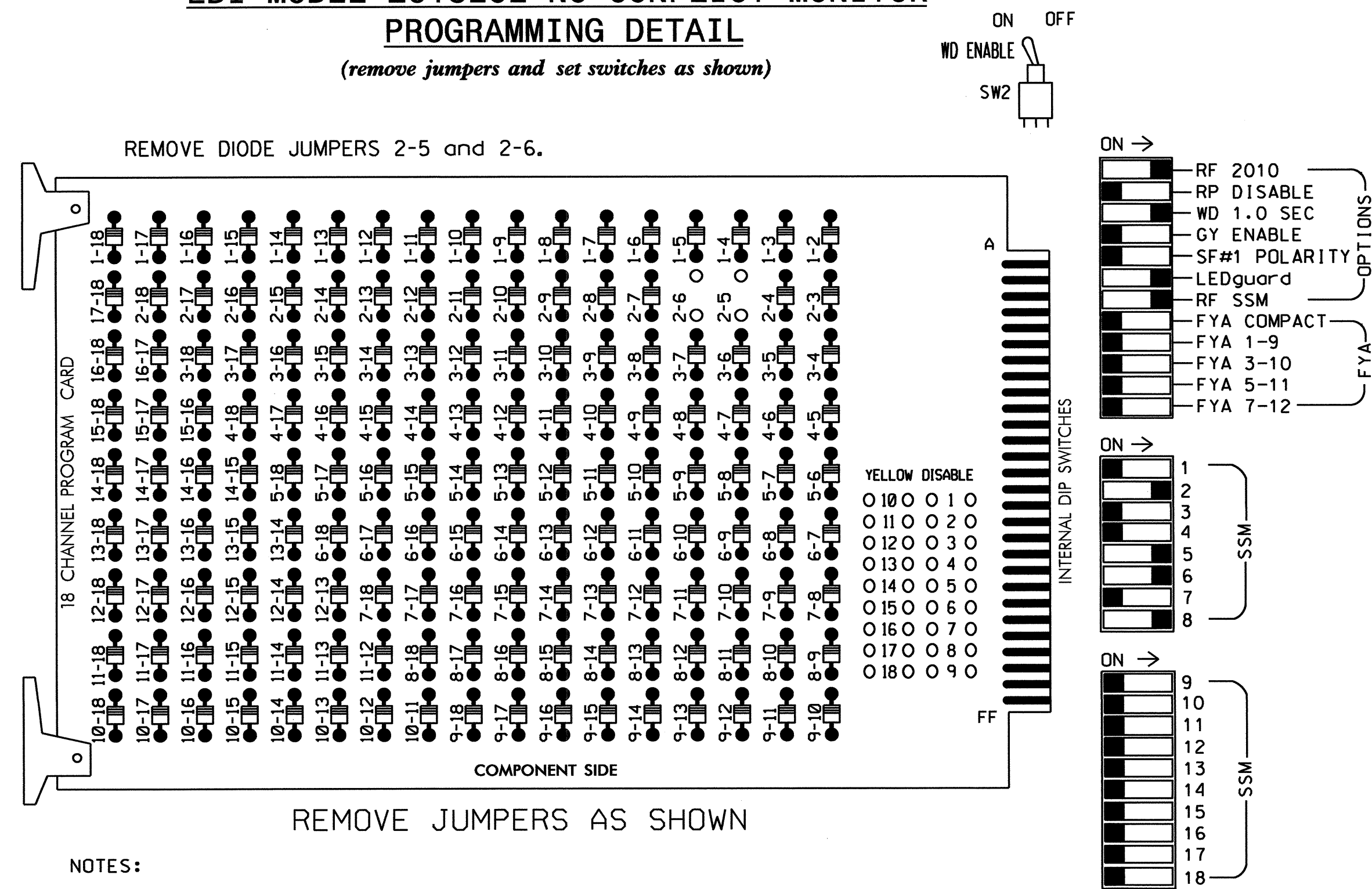
7. J. Williams 5/30/13

SIG. INVENTORY NO. 13-0814

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 zmlittle

**EDI MODEL 2018ECL-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.
- 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.

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 Gap Reduction.
- Program phases 2 and 6 for Start Up In Green.
- Program phases 2 and 6 for Yellow Flash.
- The cabinet and controller are part of the NC 280 (Airport Road) Closed Loop System.

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED
SIGNAL HEAD NO.	NU	21,22	NU	NU	NU	NU	51	61,62	NU	NU	81,82 83	NU
RED		128						134			107	
YELLOW		129						135			108	
GREEN		130						136			109	
RED ARROW							131					
YELLOW ARROW							132					
GREEN ARROW							133					

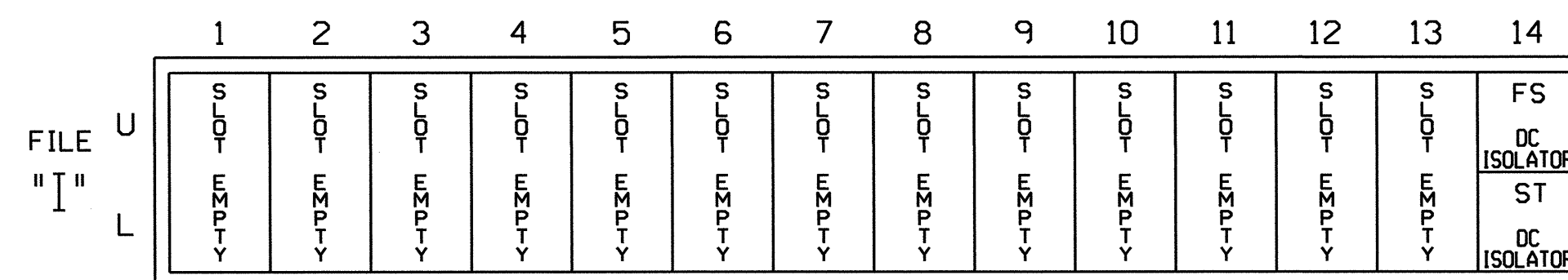
NU = Not Used

EQUIPMENT INFORMATION

CONTROLLER.....2070L
 CABINET.....336
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....POLE
 OUTPUT FILE POSITIONS...12
 LOAD SWITCHES USED.....S2,S7,S8,S11
 PHASES USED.....2,5,6,8
 OVERLAPS.....NONE

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.

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 13-0815T1
 DESIGNED: April 2013
 SEALED: 5/24/13
 REVISED: N/A

Temporary Design 1 - Construction Phase I

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared In the Offices of:

Transportation Mobility and Safety Solutions
 A Division of
 Signal Management Services
 750 N. Greenfield Pkwy, Garner, NC 27529

**NC 280 (Airport Road)
at
I-26 Westbound Ramps**

Division 13 Buncombe County Fletcher

PLAN DATE: May 2013 REVIEWED BY: JTR

PREPARED BY: S. Armstrong REVIEWED BY:

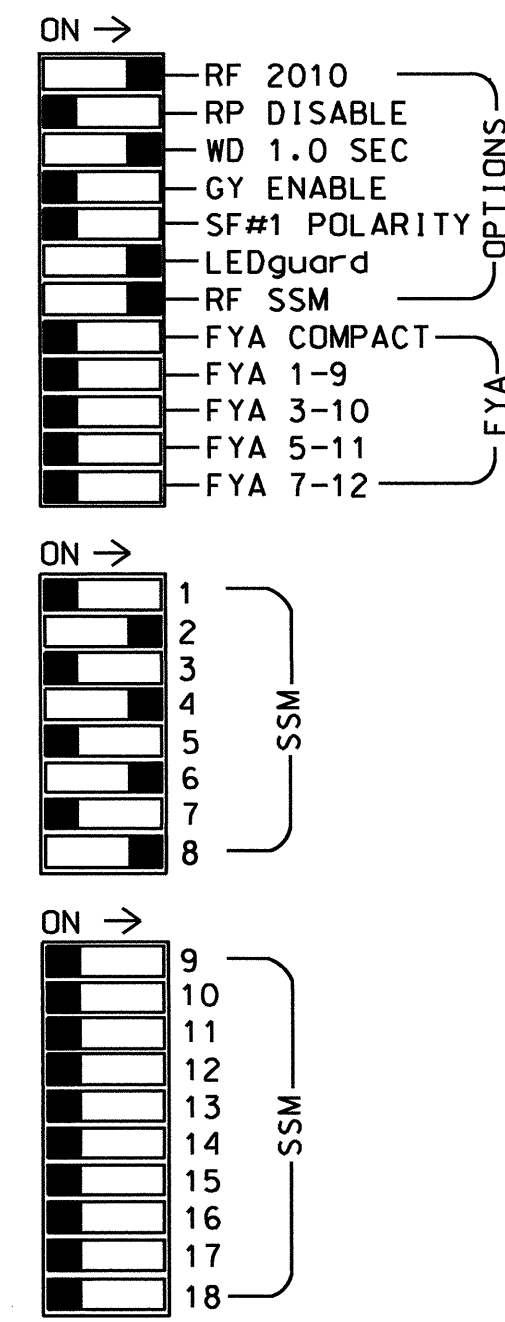
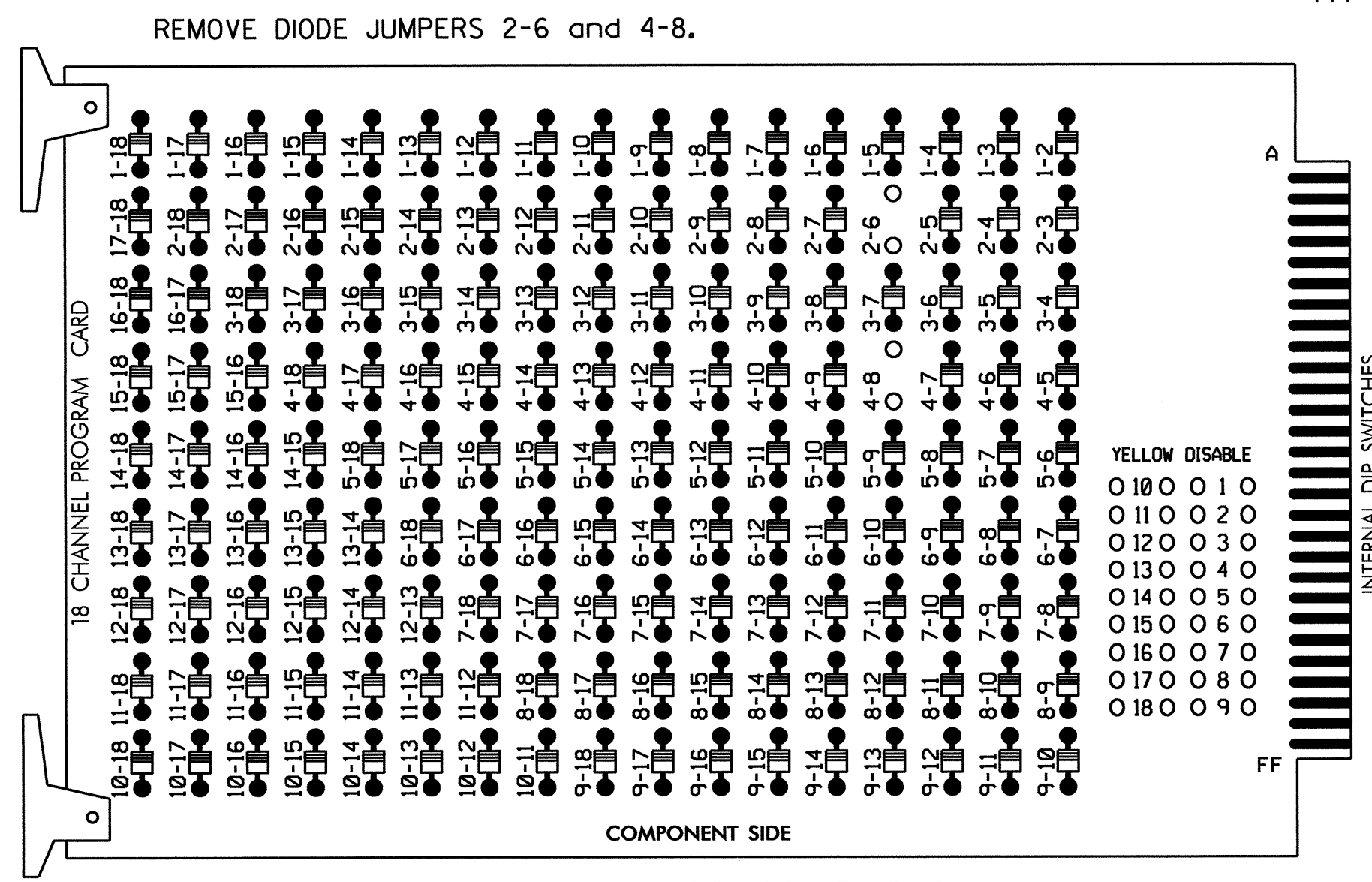
REVISIONS	INIT.	DATE

SEAL
 NORTH CAROLINA PROFESSIONAL ENGINEER
 SEAL 008453
 JOHN T. ROWE, P.E.

Signature: [Signature] 5-28-13
 DATE: 5-28-13
 SIG. INVENTORY NO. 13-0815T1

28-MAY-2013 09:27 S:\ITSASIS\115 Signal\workgroups\Sig Man\mstron@130815.sm.ele...xxx.dgn sarms@sig

**EDI MODEL 2018ECL-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.
 - 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.

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.
- Program phases 2, 4, 6, 7, and 8 for Dual Entry.
- Enable Simultaneous Gap-Out for all phases.
- Program phases 2 and 6 for Start Up In Green.
- Program phases 2, 4, 6, 7, and 8 for Red Rest.
- The cabinet and controller are part of the NC 280 (Airport Road) Closed Loop System.

SIGNAL HEAD HOOK-UP CHART

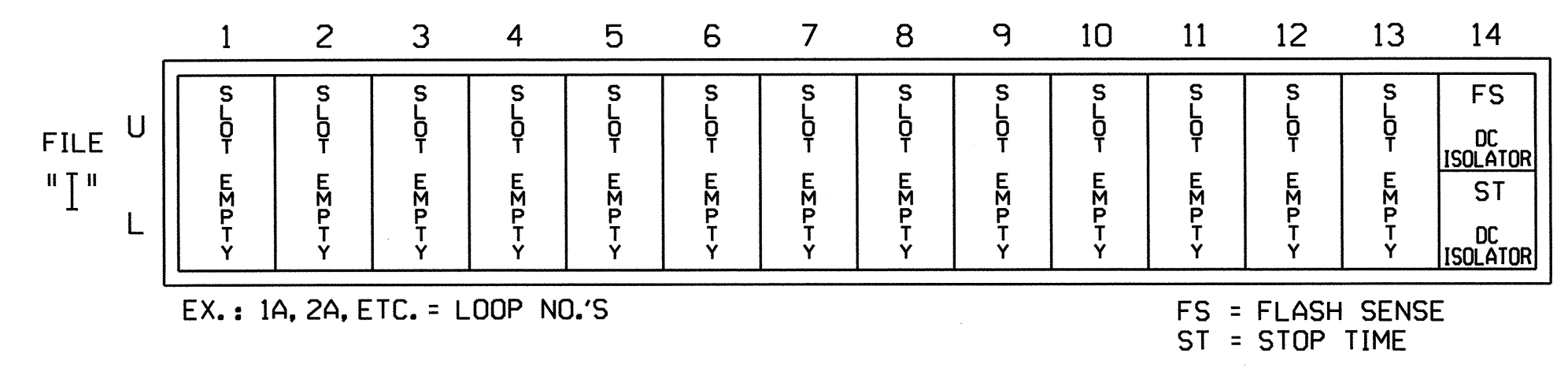
LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED
SIGNAL HEAD NO.	NU	21,22	NU	NU	41,42	NU	NU	61,62	NU	NC	81,82	NU
RED		128			101			134			107	
YELLOW		129			102			135			108	
GREEN		130									109	
RED ARROW												
YELLOW ARROW												
GREEN ARROW					103			136				

NU = Not Used
NC = Not Connected

EQUIPMENT INFORMATION

CONTROLLER.....2070L
CABINET.....336
SOFTWARE.....ECONOLITE OASIS
CABINET MOUNT.....PDL
OUTPUT FILE POSITIONS...12
LOAD SWITCHES USED.....S2,S5,S8,S11
PHASES USED.....2,4,6,*7,8
OVERLAPS.....NONE
* PHASE USED FOR TIMING PURPOSES ONLY

INPUT FILE POSITION LAYOUT
(front view)



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.

DYNAMIC OMIT 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 Functions 1 and 2.
- From Phase Control Functions Menu press '2' (Dynamic/Backup Control Functions).

```

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

PRESS 'NEXT'

```

DYNAMIC/BACKUP CONTROL FUNCTION #02
OVERLAPS: ABCDEFGHIJKLMNPO
IF OVERLAPS ARE ACTIVE:
OR PHASES: 12345678910111213141516
IF PHASES ARE ON: X
OMIT PHASES: X
CALL PHASES:
    
```

DYNAMIC OMIT PROGRAMMING COMPLETE

NOTE: THIS PROGRAMMING ENSURES THAT PHASE 7 WILL BE SERVED PRIOR TO PHASE 8 WHEN CONTROLLER IS ADVANCING FROM 2+6.

PHASE 7 IS USED TO PROVIDE EXTENDED RED CLEARANCE BEFORE SERVING PHASE 8.

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 13-0815T2
DESIGNED: April 2013
SEALED: 5/24/13
REVISED: N/A

Temporary Design 2 - Construction Phase II

ELECTRICAL AND PROGRAMMING DETAILS FOR:

NC 280 (Airport Road) at I-26 Westbound Ramps

Division 13 Buncombe County Fletcher

PLAN DATE: May 2013 REVIEWED BY: JTR

PREPARED BY: S. Armstrong REVIEWED BY:

REVISIONS INIT. DATE

750 N. Grantfield Pkwy, Garner, NC 27529

SEAL NORTH CAROLINA PROFESSIONAL ENGINEER JOHN T. ROWE 008453

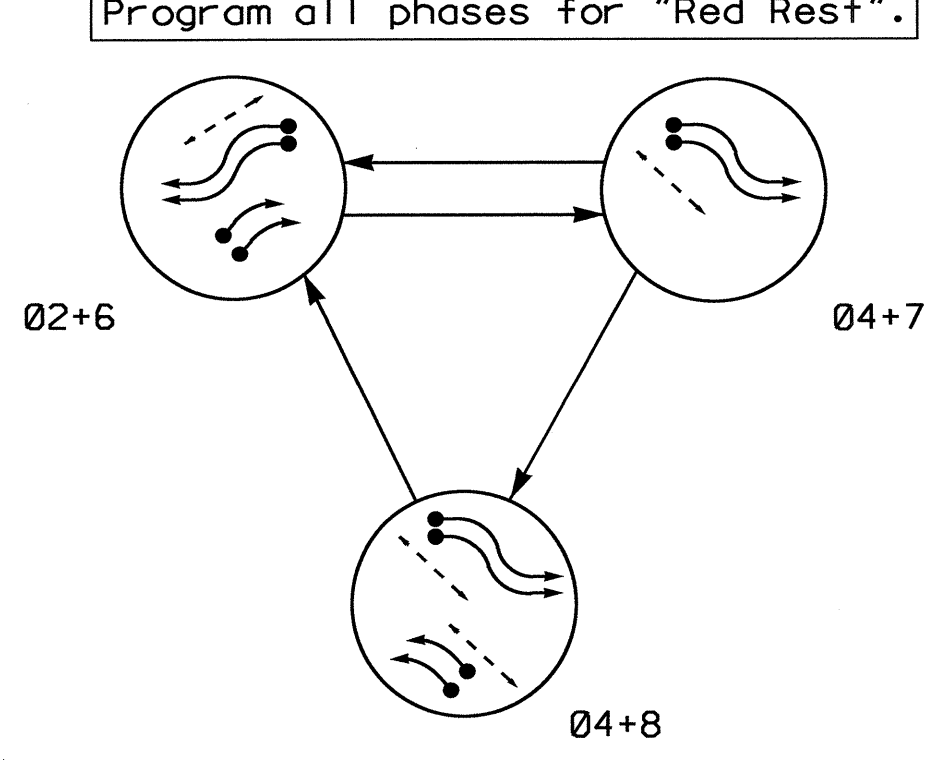
SIGNATURE DATE 5-28-13

SIG. INVENTORY NO. 13-0815T2

28-MAY-2013 10:28 I:\Signal\swkr\kgcupas\519_MonMstron\30815_snc.ele.xxx.dgn sarmstrong

3 Phase Fully Actuated NC 280 (Airport Road) CLS

PHASING DIAGRAM



Program all phases for "Red Rest".

PHASING DIAGRAM DETECTION LEGEND

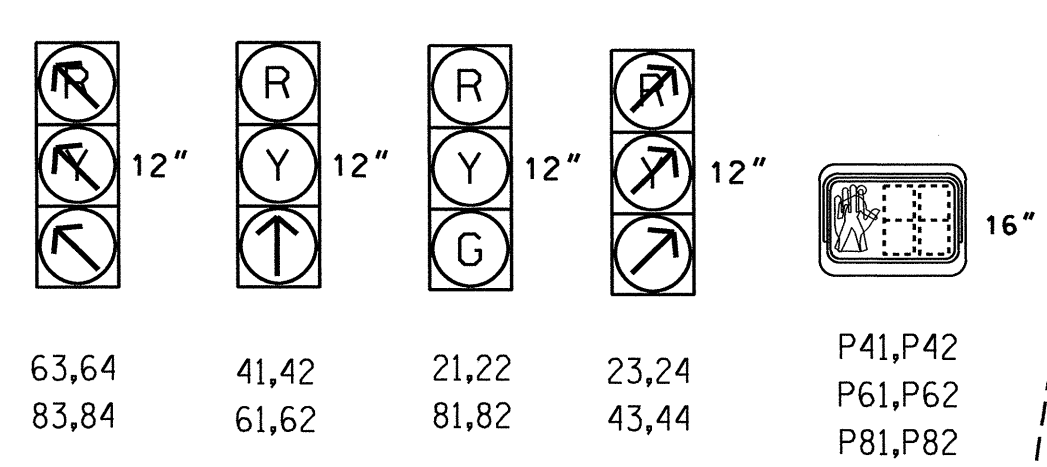
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE			
	02+6	04+7	04+8	FLASH
21,22	G	R	R	R
23,24	/	/	/	/
41,42	R	↑	↑	R
43,44	/	/	/	/
61,62	↑	R	R	R
63,64	/	R	R	R
81,82	R	R	G	R
83,84	/	/	/	/
P41,P42	DW	W	W	DRK
P61,P62	W	DW	DW	DRK
P81,P82	DW	DW	W	DRK

W - Walk
DW - Don't Walk
DRK - Dark

SIGNAL FACE I.D.

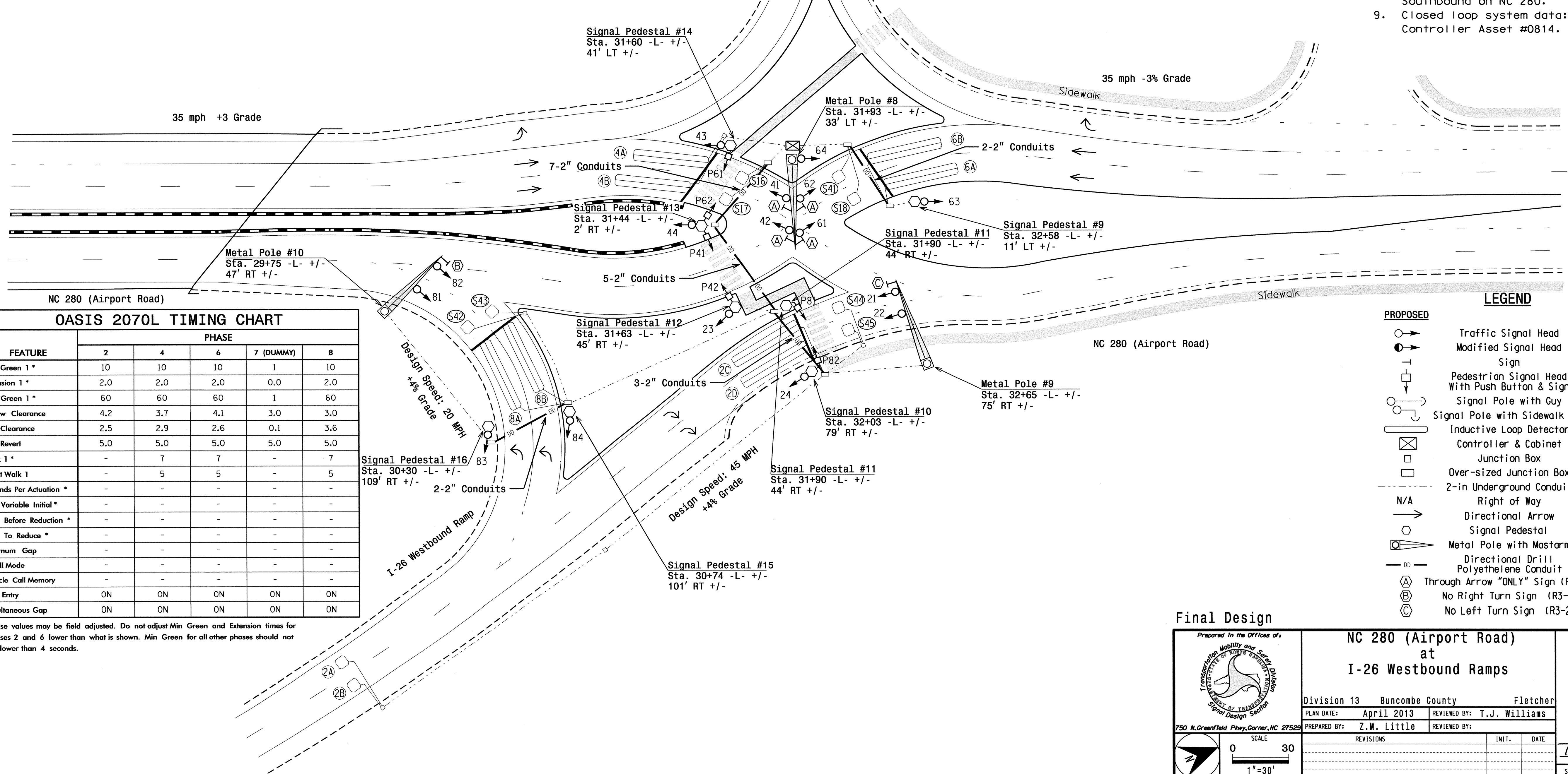


OASIS 2070L LOOP & DETECTOR INSTALLATION CHART

LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	DETECTOR PROGRAMMING							
					PHASE	CALLING	EXTENSION	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD	
2A	6X6	300	5	Y	2	-	Y	-	2.4	-	-	Y
2B	6X6	300	5	Y	2	-	Y	-	2.4	-	-	Y
2C	6X40	0	2-4-2	Y	2	Y	Y	-	-	-	-	Y
2D	6X40	0	2-4-2	Y	2	Y	Y	-	-	-	-	Y
4A	6X40	0	2-4-2	Y	4	Y	Y	-	-	-	-	Y
4B	6X40	0	2-4-2	Y	4	Y	Y	-	-	-	-	Y
6A	6X40	0	2-4-2	Y	6	Y	Y	-	-	-	-	Y
6B	6X40	0	2-4-2	Y	6	Y	Y	-	-	-	-	Y
8A	6X40	0	2-4-2	Y	7/8	Y	Y	-	-	-	-	Y
8B	6X40	0	2-4-2	Y	7/8	Y	Y	-	-	-	-	Y
S16	6X40	+15	3	Y	-	-	-	-	-	-	-	Y
S17	6X40	+15	3	Y	-	-	-	-	-	-	-	Y
S18	6X6	+15	3	Y	-	-	-	-	-	-	-	Y
S41	6X6	+15	3	Y	-	-	-	-	-	-	-	Y
S42	6X6	+8	4	Y	-	-	-	-	-	-	-	Y
S43	6X6	+8	4	Y	-	-	-	-	-	-	-	Y
S44	6X6	+20	3	Y	-	-	-	-	-	-	-	Y
S45	6X6	+20	3	Y	-	-	-	-	-	-	-	Y

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.
- Do not program signal for late night flashing operation.
- Set all detector units to presence mode.
- Program all phases for "Red Rest".
- Omit phase 8 during phase 2+6 on.
- Program controller to clear from phase 2+6 to phase 8 by progressing through phase 7.
- Omit phase 7 during phase 8 on.
- Phase 7 provides red clearance time for vehicles traveling Southbound on NC 280.
- Closed loop system data: Controller Asset #0814.

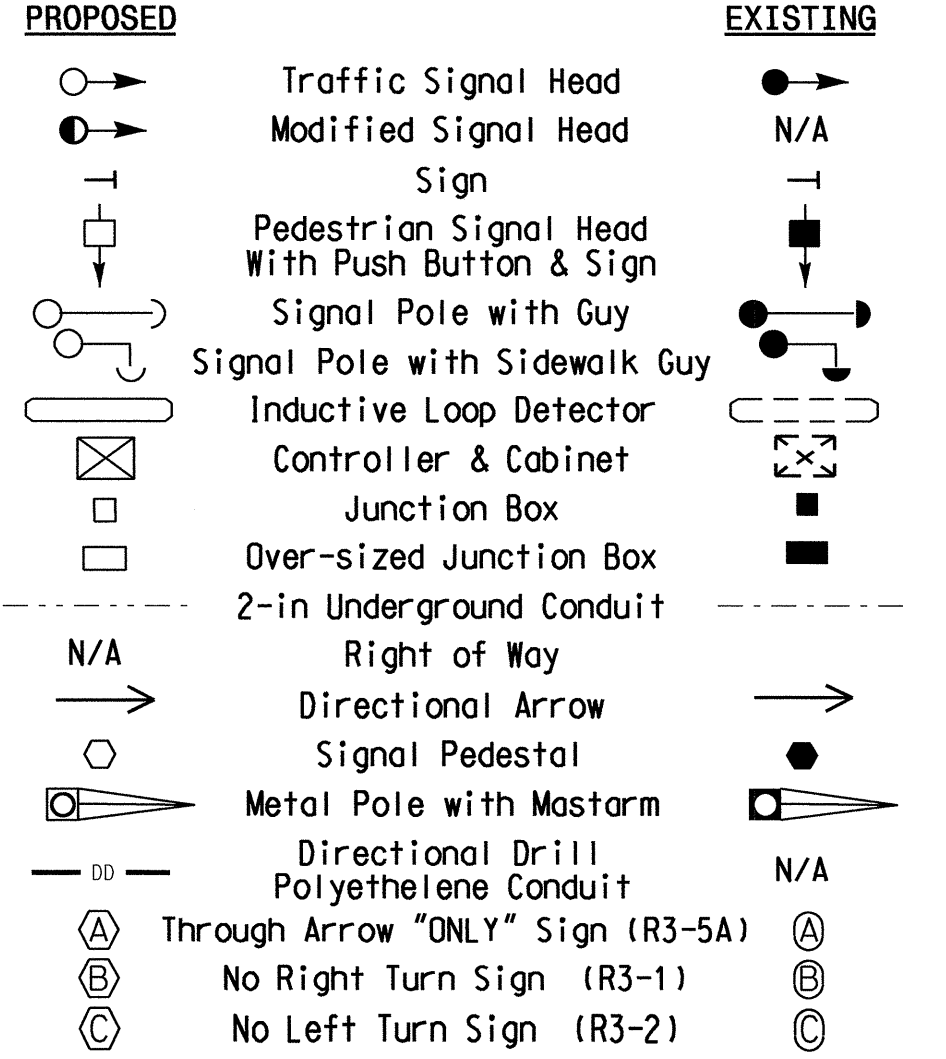


OASIS 2070L TIMING CHART

FEATURE	PHASE				
	2	4	6	7 (DUMMY)	8
Min Green 1 *	10	10	10	1	10
Extension 1 *	2.0	2.0	2.0	0.0	2.0
Max Green 1 *	60	60	60	1	60
Yellow Clearance	4.2	3.7	4.1	3.0	3.0
Red Clearance	2.5	2.9	2.6	0.1	3.6
Red Revert	5.0	5.0	5.0	5.0	5.0
Walk 1 *	-	7	7	-	7
Don't Walk 1	-	5	5	-	5
Seconds Per Actuation *	-	-	-	-	-
Max Variable Initial *	-	-	-	-	-
Time Before Reduction *	-	-	-	-	-
Time To Reduce *	-	-	-	-	-
Minimum Gap	-	-	-	-	-
Recall Mode	-	-	-	-	-
Vehicle Call Memory	-	-	-	-	-
Dual Entry	ON	ON	ON	ON	ON
Simultaneous Gap	ON	ON	ON	ON	ON

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

LEGEND



Final Design

Prepared in the Offices of:

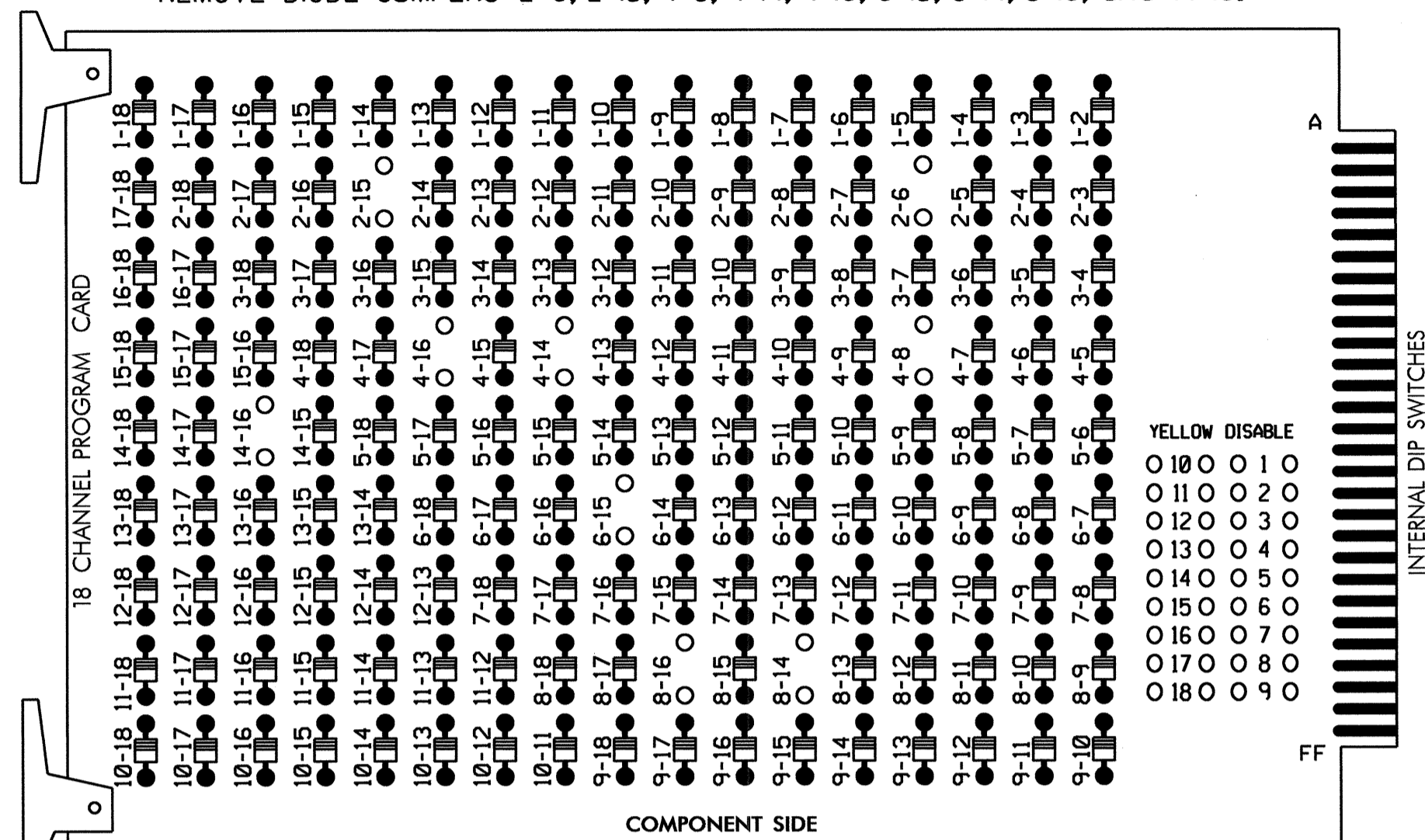
NC 280 (Airport Road) at I-26 Westbound Ramps
 Division 13 Buncombe County Fletcher
 PLAN DATE: April 2013 REVIEWED BY: T.J. Williams
 PREPARED BY: Z.M. Little REVIEWED BY:
 SCALE: 0 30
 1"=30'
 REVISIONS: INIT. DATE
 SIGNATURE: DATE
 SEAL: 24393
 INVENTORY NO. 13-0815

02-JUN-2013 14:05
 R:\TCD\offices\signal\50001\50001.dgn
 zml 11/11

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

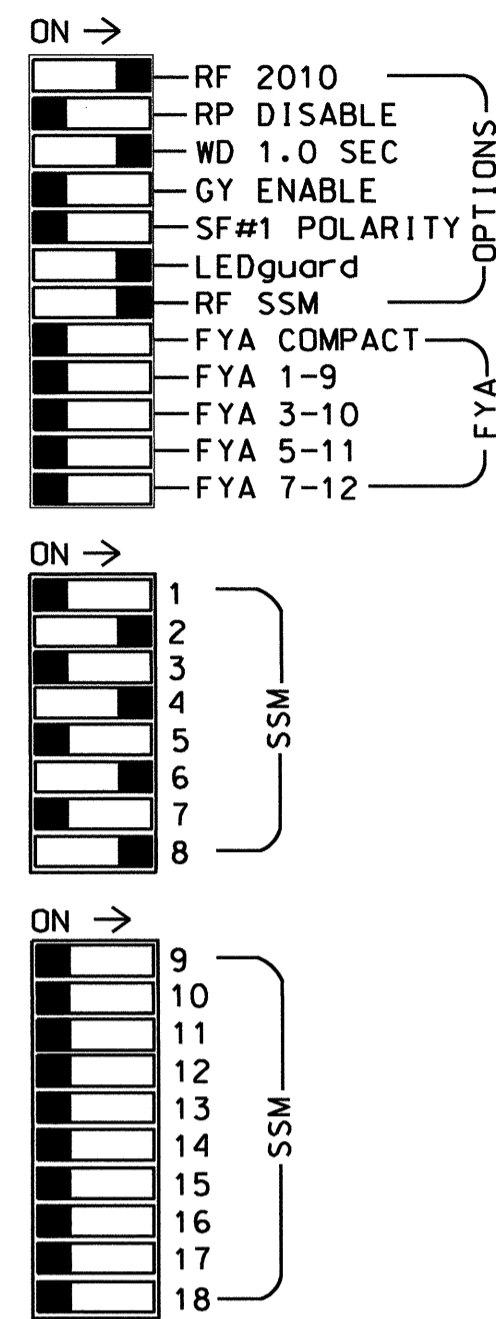
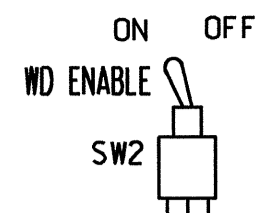
REMOVE DIODE JUMPERS 2-6, 2-15, 4-8, 4-14, 4-16, 6-15, 8-14, 8-16, and 14-16.



REMOVE JUMPERS AS SHOWN

NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that Red Enable is active at all times during normal operation.
4. 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. Program phases 2, 4, 6, 7, and 8 for Dual Entry.
3. Enable Simultaneous Gap-Out for all phases.
4. Program phases 2 and 6 for Start Up In Green.
5. Program phases 4, 6 and 8 for 'STARTUP PED CALL'.
6. Program phases 2, 4, 6, 7, and 8 for Red Rest.
7. The cabinet and controller are part of the NC 280 (Airport Road) Closed Loop System.

EQUIPMENT INFORMATION

CONTROLLER.....2070L
 CABINET.....332
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...12
 LOAD SWITCHES USED.....S2,S5,S6,S8,S9,S11,S12
 PHASES USED.....2,4,4PED,6,6PED,*7,8,8PED
 OVERLAPS.....NONE

* PHASE USED FOR TIMING PURPOSES ONLY

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED
SIGNAL HEAD NO.	NU	21,22	23,24	NU	41,42	43,44	P41, P42	NU	61,62	63,64	P61, P62	NC
RED	128				101			134			107	
YELLOW	129				102			135			108	
GREEN	130										109	
RED ARROW		128			101			134			107	
YELLOW ARROW		129			102			135			108	
GREEN ARROW		130			103	103		136	136		109	
Hand icon							104			119		110
Person icon							106			121		112

NU = Not Used
 NC = Not Connected

INPUT FILE POSITION LAYOUT

(front view)

FILE "I"	1	2	3	4	5	6	7	8	9	10	11	12	13	14
U	∅ 2	∅ 2	∅ 2	∅ 2	∅ 4	SYS. DET. S16	S	SYS. DET. S18	S	S	NOT USED	∅ 6 PED DC ISOLATOR	∅ 8 PED DC ISOLATOR	FS DC ISOLATOR
L	2A	2C	2B	2D	4A	SYS. DET. S17	∅ 4 PED DC ISOLATOR	SYS. DET. S41	∅ 4 PED DC ISOLATOR	∅ 8 PED DC ISOLATOR	∅ 8 PED DC ISOLATOR	∅ 8 PED DC ISOLATOR	∅ 8 PED DC ISOLATOR	∅ 8 PED DC ISOLATOR
U	∅ 6	∅ 6	∅ 6	∅ 6	∅ 7/8	SYS. DET. S42	S	SYS. DET. S44	S	S	S	S	S	S
L	6A	6B	6A	6B	8A	SYS. DET. S43	∅ 7/8	SYS. DET. S45	∅ 7/8	∅ 7/8	∅ 7/8	∅ 7/8	∅ 7/8	∅ 7/8

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

FS = FLASH SENSE
 ST = STOP TIME

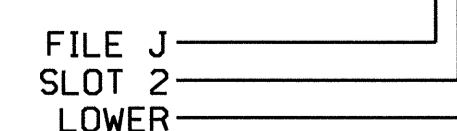
INPUT FILE CONNECTION & PROGRAMMING CHART

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	TB2-5,6	I2U	39	1	2	2		Y		2.4	
2B	TB2-7,8	I2L	43	5	12	2		Y		2.4	
2C	TB2-9,10	I3U	63	25	32	2	Y	Y			
2D	TB2-11,12	I3L	76	38	42	2	Y	Y			
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			
4B	TB4-11,12	I6L	45	7	14	4	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	7/8	Y	Y			
8B	TB5-11,12	J6L	46	8	18	7/8	Y	Y			
*S16	TB6-1,2	I7U	65	27	34	SYS					
*S17	TB6-3,4	I7L	78	40	44	SYS					
*S18	TB6-9,10	I9U	60	22	11	SYS					
*S41	TB6-11,12	I9L	62	24	13	SYS					
*S42	TB7-1,2	J7U	66	28	38	SYS					
*S43	TB7-3,4	J7L	79	41	48	SYS					
*S44	TB7-9,10	J9U	59	21	15	SYS					
*S45	TB7-11,12	J9L	61	23	17	SYS					
PED PUSH BUTTONS											
P41,P42	TB8-5,6	I12L	69	31	PED 4	4 PED					
P61,P62	TB8-7,9	I13U	68	30	PED 6	6 PED					
P81,P82	TB8-8,9	I13L	70	32	PED 8	8 PED					

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

* System detector only. Remove the vehicle phase assigned to this detector in the default programming.

INPUT FILE POSITION LEGEND: J2L



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: 13-0815
 DESIGNED: April 2013
 SEALED: 5/24/13
 REVISED: N/A

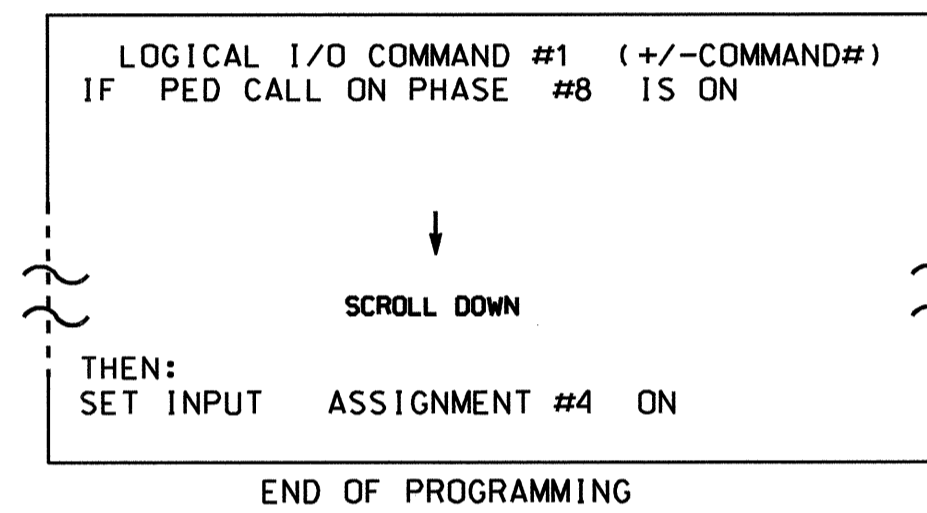
Final Design - Sheet 1 of 2

	NC 280 (Airport Road) at I-26 Westbound Ramps		
	Division 13 Buncombe County Fletcher		
	PLAN DATE: May 2013	REVIEWED BY: JTR	
	PREPARED BY: S. Armstrong	REVIEWED BY:	
REVISIONS	INIT.	DATE	
750 N. Greenfield Pkwy, Garner, NC 27529		Signature: <i>John T. Rowley</i> 5-29-13 Date: _____ Sig. Inventory No. 13-0815	

**LOGICAL I/O PROCESSOR PROGRAMMING DETAIL
TO APPLY PHASE 8 VEH. CALL WITH PHASE 8 PED CALL**

(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 COMMAND 1.
- FROM MAIN MENU PRESS '6' (OUTPUTS), THEN '3' (LOGICAL I/O PROCESSOR).



NOTE: THIS LOGIC ENSURES THAT WHENEVER A PHASE 8 PED CALL EXISTS, A PHASE 8 VEH. CALL WILL ALSO BE PLACED.

THIS IS NECESSARY SO THAT THE "DYNAMIC" PROGRAMMING OPERATES PROPERLY WHEN ONLY A PED CALL EXISTS IN THE FIELD ON PHASE 8.

INPUT REFERENCE INPUT 4 = VEH. DET. 8
--

DYNAMIC OMIT 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 Functions 1 and 2.
- From Phase Control Functions Menu press '2' (Dynamic/Backup Control Functions).

DYNAMIC/BACKUP CONTROL FUNCTION #01 OVERLAPS: ABCDEFGHIJKLMNOP IF OVERLAPS ARE ACTIVE : OR PHASES: 12345678910111213141516 IF PHASES ARE ON: X X OMIT PHASES : X CALL PHASES : X	PRESS 'NEXT'
--	--------------

DYNAMIC/BACKUP CONTROL FUNCTION #02 OVERLAPS: ABCDEFGHIJKLMNOP IF OVERLAPS ARE ACTIVE : OR PHASES: 12345678910111213141516 IF PHASES ARE ON: X OMIT PHASES : X CALL PHASES :
--

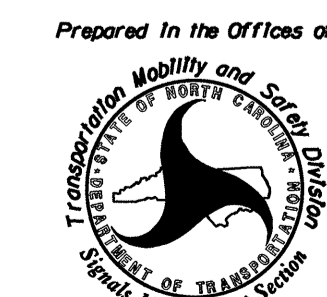
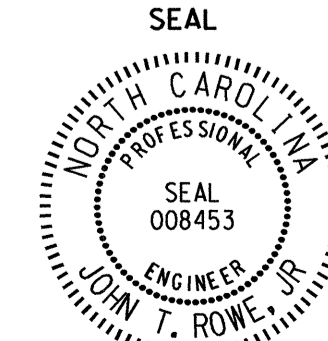
DYNAMIC OMIT PROGRAMMING COMPLETE

NOTE: THIS PROGRAMMING ENSURES THAT PHASE 7 WILL BE SERVED PRIOR TO PHASE 8 WHEN CONTROLLER IS ADVANCING FROM 2+6.

PHASE 7 IS USED TO PROVIDE EXTENDED RED CLEARANCE BEFORE SERVING PHASE 8.

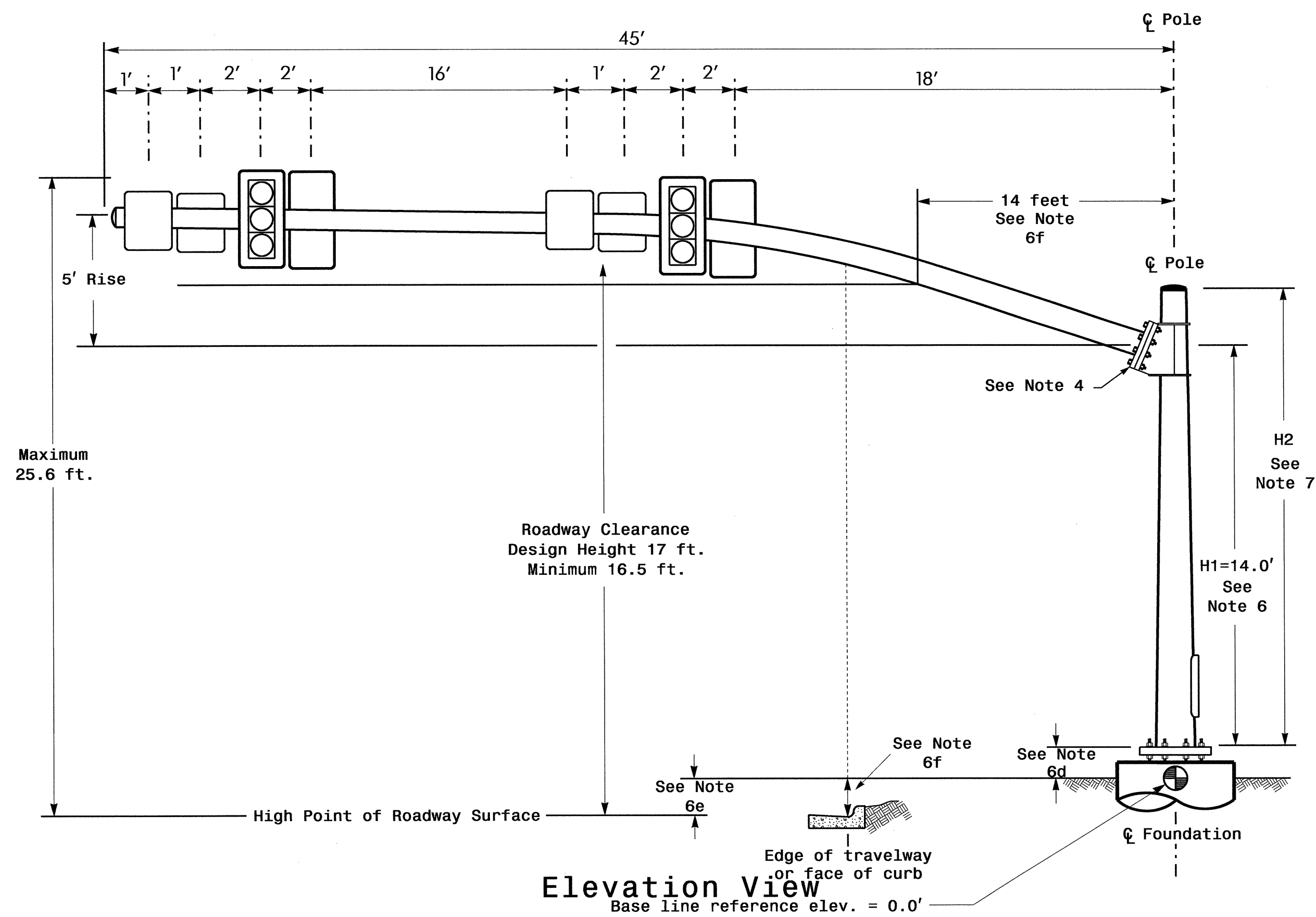
THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 13-0815 DESIGNED: April 2013 SEALED: 5/24/13 REVISED: N/A
--

Final Design - Sheet 2 of 2

ELECTRICAL AND PROGRAMMING DETAILS FOR: Prepared In the Offices of:  750 N. Grant Field Pkwy, Garner, NC 27529	NC 280 (Airport Road) at I-26 Westbound Ramps		SEAL  SEAL 008453 ENGINEER JOHN T. ROWE, PE						
	Division 13 Buncombe County Fletcher	PREPARED BY: S. Armstrong REVIEWED BY: JTR	REVISIONS <table border="1"> <tr> <th>NO.</th> <th>DATE</th> <th>DESCRIPTION</th> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> </table>	NO.	DATE	DESCRIPTION			
NO.	DATE	DESCRIPTION							

SIGNATURE: *John T. Rowe* 5-28-13
 DATE: 5-28-13
 SIG. INVENTORY NO. 13-0815

Design Loading for METAL POLE NO. 8



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 8	Pole 9
Baseline reference point at ϕ Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	0.0 ft.	+1.7 ft.
Elevation difference at Edge of travelway or face of curb	-0.5 ft.	+0.8 ft.

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE AND ASTRO-BRAC	9.3 S.F.	25.5" W X 52.5" L	60 LBS
	SIGN RIGID MOUNTED WITH ASTRO-SIGN-BRAC	5.0 S.F.	24.0" W X 30.0" L	11 LBS

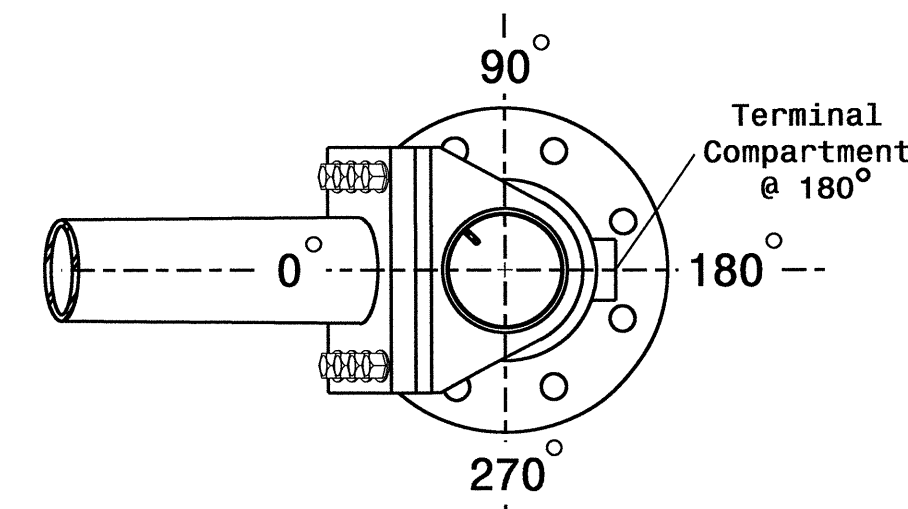
NOTES

Design Reference Material

- Design the traffic signal structure and foundation in accordance with:
 - The 4th Edition 2001 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
 - The 2012 NCDOT "Standard Specifications for Roads and Structures". The latest addenda to these specifications can be found in the traffic signal project special provisions.
 - The 2012 NCDOT Roadway Standard Drawings.
 - The traffic signal project plans and special provisions.

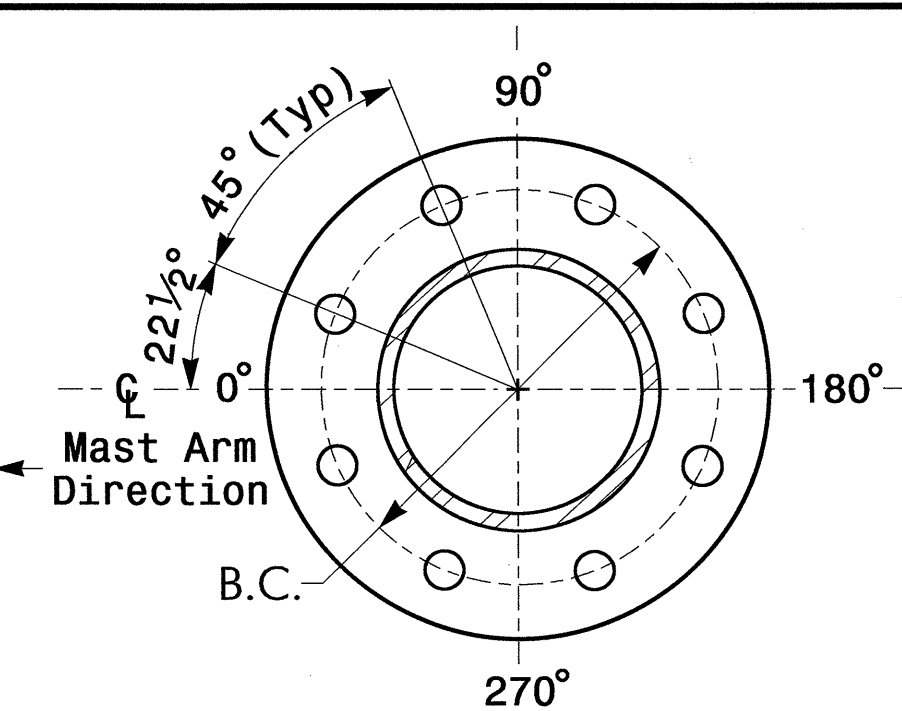
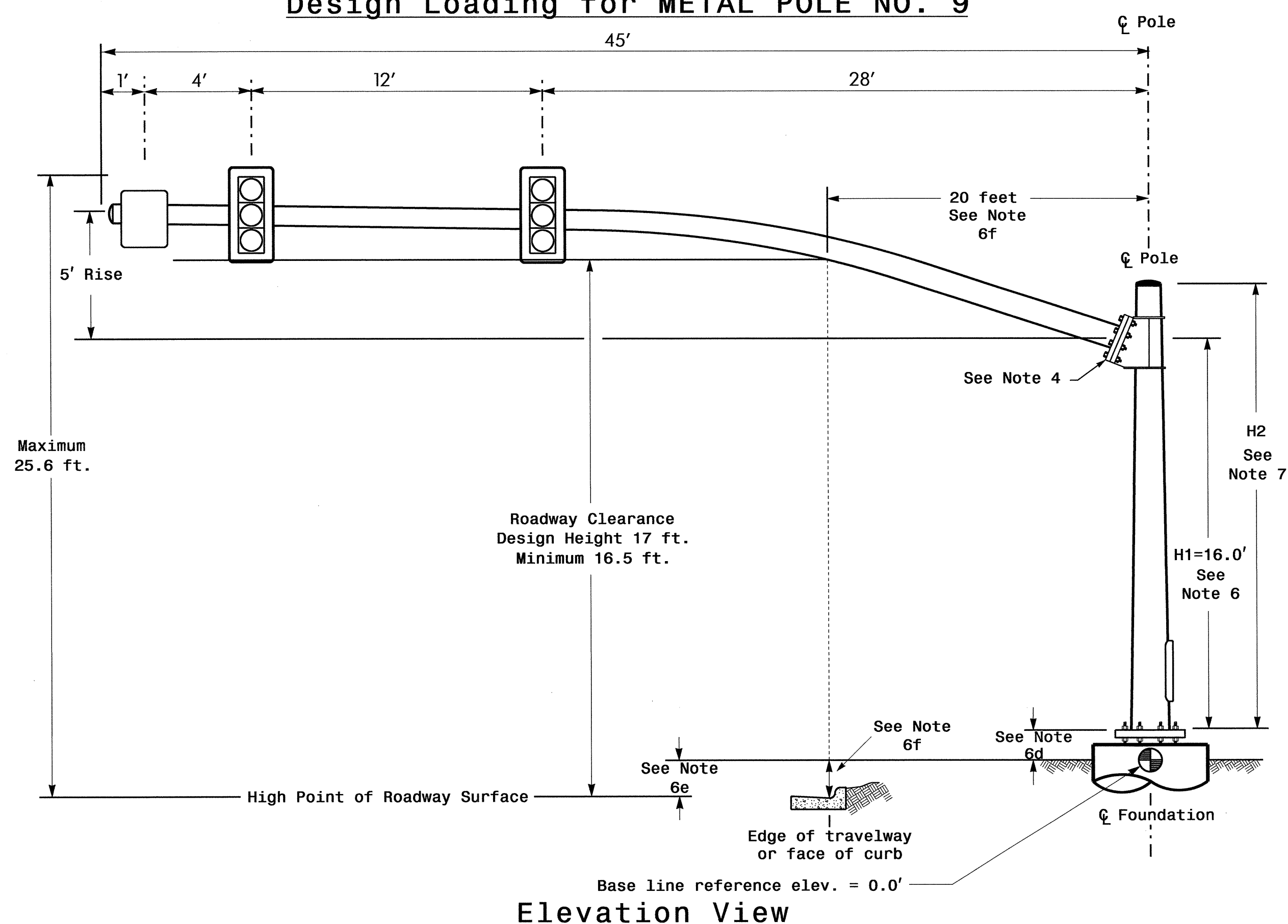
Design Requirements

- 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 attached to the mast arm are rigid mounted and vertically centered on the arm.
 - The roadway clearance height for design is as shown in the elevation views.
 - The top of the pole base plate is .75 feet above the ground elevation.
 - Refer to the Elevation Data chart for elevation differences between the proposed foundation ground level and the high point on the roadway.
 - Provide horizontal distance from proposed centerline of foundation to edge of travelway. Refer to the Elevation Data chart above for elevation difference between the proposed foundation ground level and the edge of travelway. This information is necessary when arched arms are specified to ensure that the roadway clearance is maintained at the edge of the travelway and to assist in the camber design of the mast 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 Signals Design Section Structural Engineer for assistance at (919) 773-2800.
- 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.

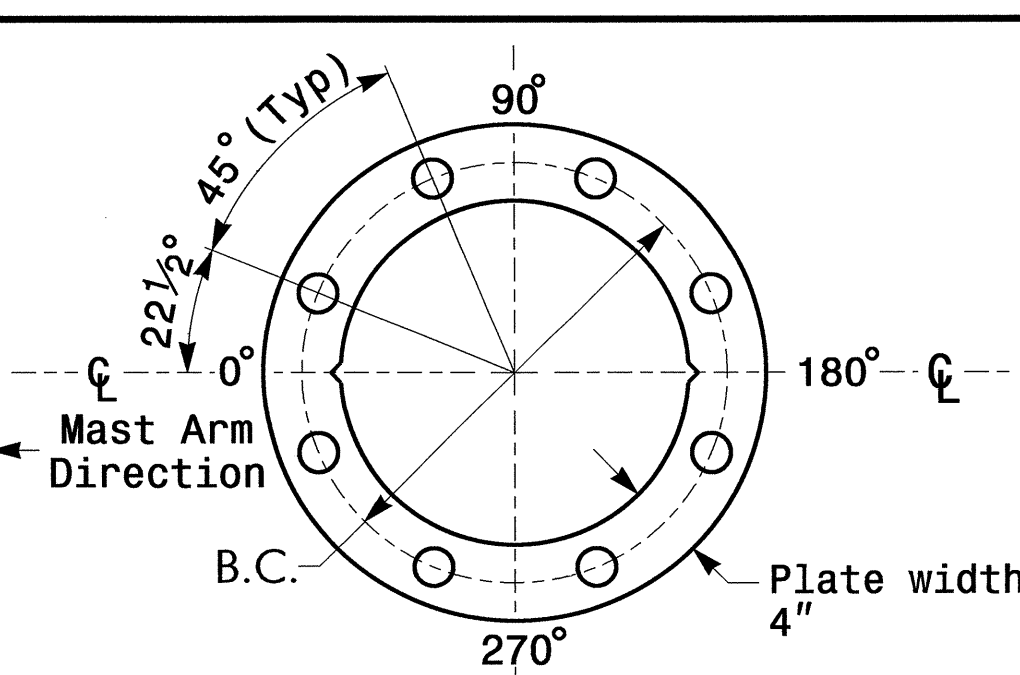


POLE RADIAL ORIENTATION

Design Loading for METAL POLE NO. 9



8 BOLT BASE PLATE DETAIL
See Note 6



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

NCDOT Wind Zone 4 (90 mph)

	NC 280 (Airport Road) at I-26 Westbound Ramps		SEAL STATE OF NORTH CAROLINA PROFESSIONAL ENGINEER T. J. WILLIAMS 24393
	Division 13 Buncombe County Fletcher	REVIEWED BY: T.J. Williams	
PLAN DATE: April 2013	PREPARED BY: Z.M. Little	REVIEWED BY:	DATE: 5/30/13
SCALE: 0 N/A N/A	REVISIONS:	INIT.:	DATE:
SIGNATURE:			DATE:
750 N. Greenfield Phwy, Garner, NC 27529			SIG. INVENTORY NO. 13-0815

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.

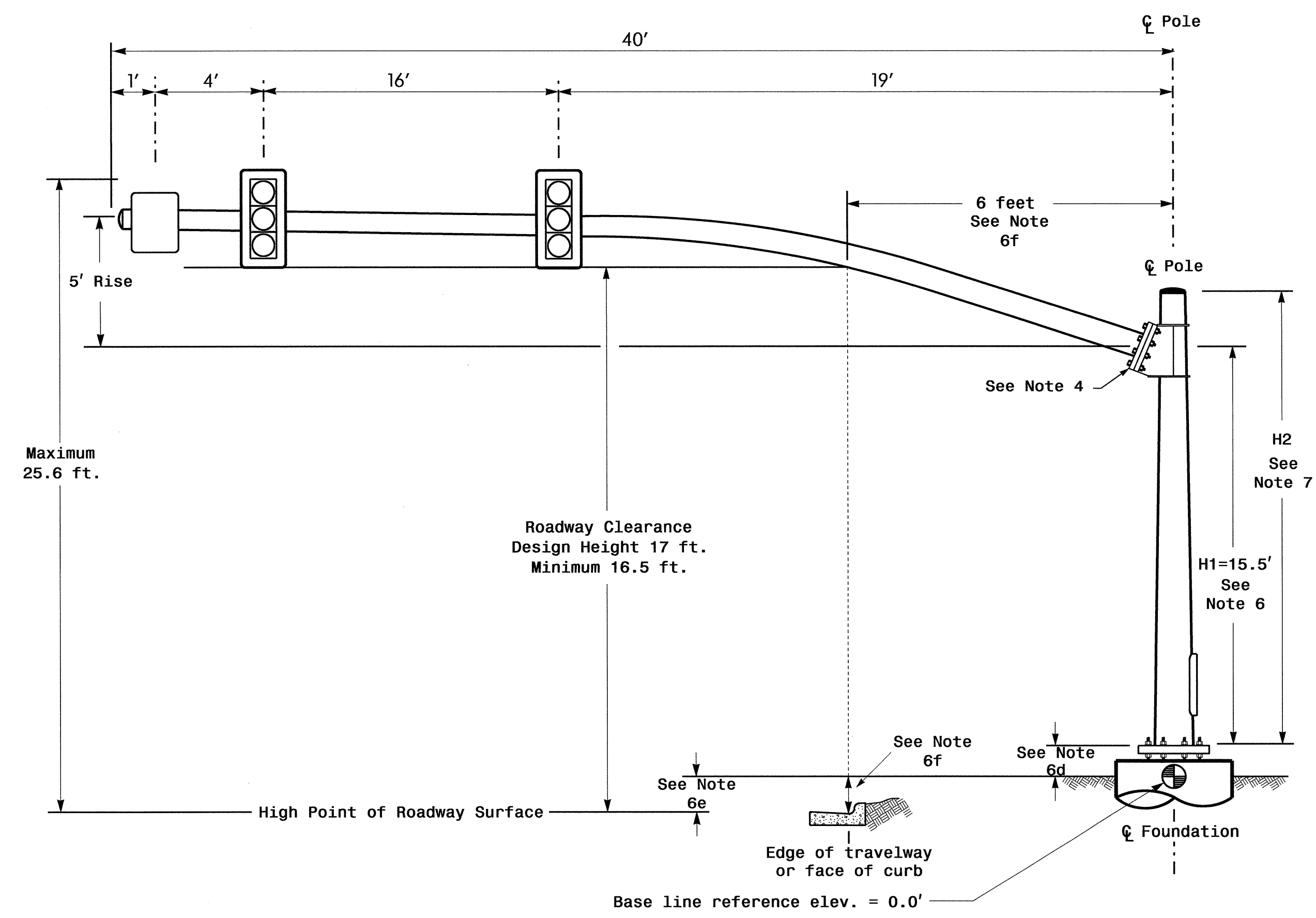
Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 10
Baseline reference point at ϕ Foundation @ ground level	0.0 ft.
Elevation difference at High point of roadway surface	+1.2 ft.
Elevation difference at Edge of travelway or face of curb	+0.6 ft.

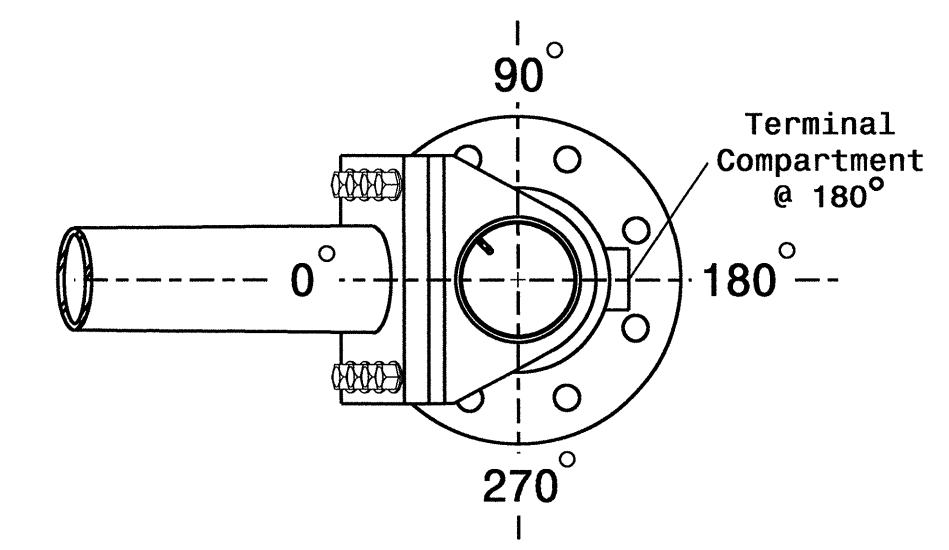
MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE AND ASTRO-BRAC	9.3 S.F.	25.5" W X 52.5" L	60 LBS
	SIGN RIGID MOUNTED WITH ASTRO-SIGN-BRAC	5.0 S.F.	24.0" W X 30.0" L	11 LBS

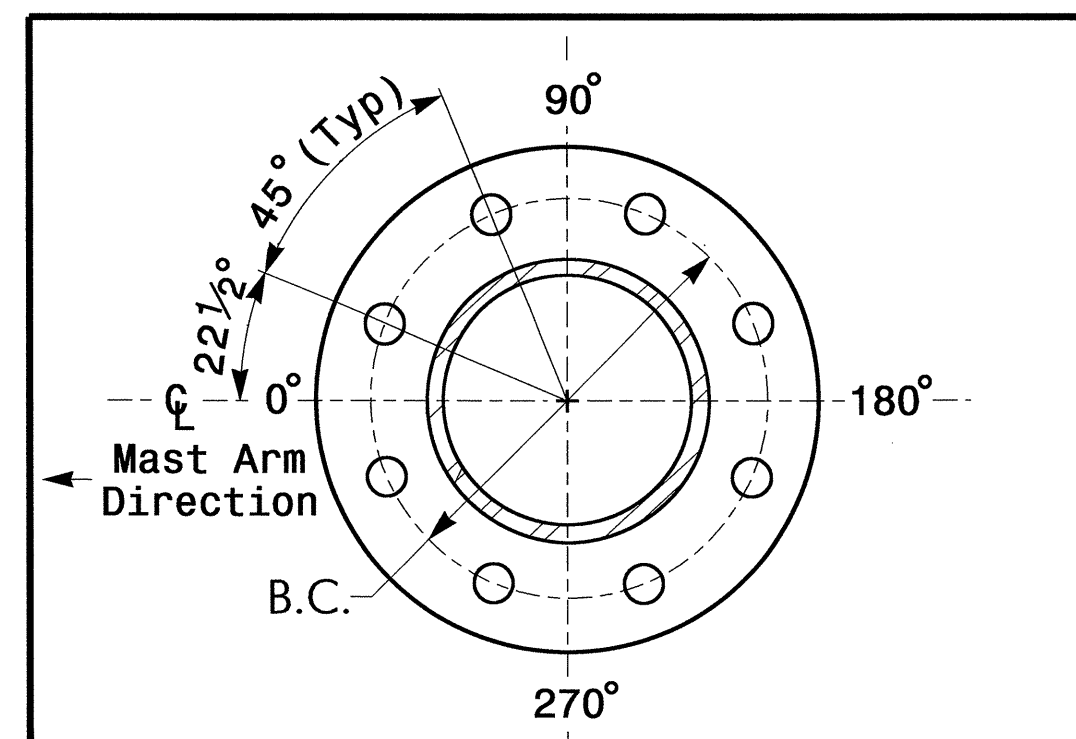
Design Loading for METAL POLE NO. 10



Elevation View

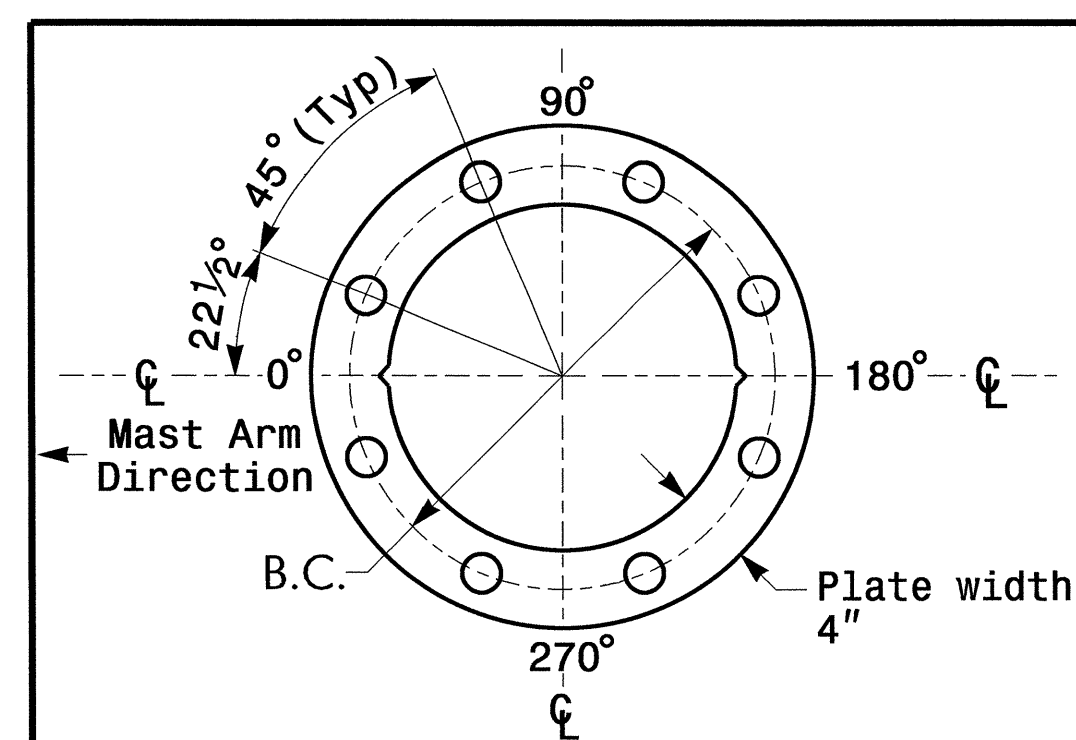


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



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

NOTES

Design Reference Material

- Design the traffic signal structure and foundation in accordance with:
 - The 4th Edition 2001 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
 - The 2012 MCDOT "Standard Specifications for Roads and Structures". The latest addenda to these specifications can be found in the traffic signal project special provisions.
 - The 2012 MCDOT Roadway Standard Drawings.
 - The traffic signal project plans and special provisions.

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 attached to the mast arm are rigid mounted and vertically centered on the arm.
 - The roadway clearance height for design is as shown in the elevation views.
 - The top of the pole base plate is .75 feet above the ground elevation.
 - Refer to the Elevation Data chart for elevation differences between the proposed foundation ground level and the high point on the roadway.
 - Provide horizontal distance from proposed centerline of foundation to edge of travelway. Refer to the Elevation Data chart above for elevation difference between the proposed foundation ground level and the edge of travelway. This information is necessary when arched arms are specified to ensure that the roadway clearance is maintained at the edge of the travelway and to assist in the camber design of the mast 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 Signals Design Section Structural Engineer for assistance at (919) 773-2800.
- 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.

NCDOT Wind Zone 4 (90 mph)

Prepared in the Office of:

 Mobility and Safety Division
 Division 13 - Buncombe County
 at
 I-26 Westbound Ramps
 Division 13 - Buncombe County
 PLAN DATE: April 2013 REVIEWED BY: T.J. Williams
 PREPARED BY: Z.M. Little REVIEWED BY:
 SCALE: 0 N/A
 DATE: 5/30/13
 SIGNATURE: T.J. Williams
 SEAL: 24393
 INVENTORY NO. 13-0815

20-MAY-2013 2:04:21
 R:\Traffic\66130101\66130101.dgn
 zmlittle

PHASING DIAGRAM

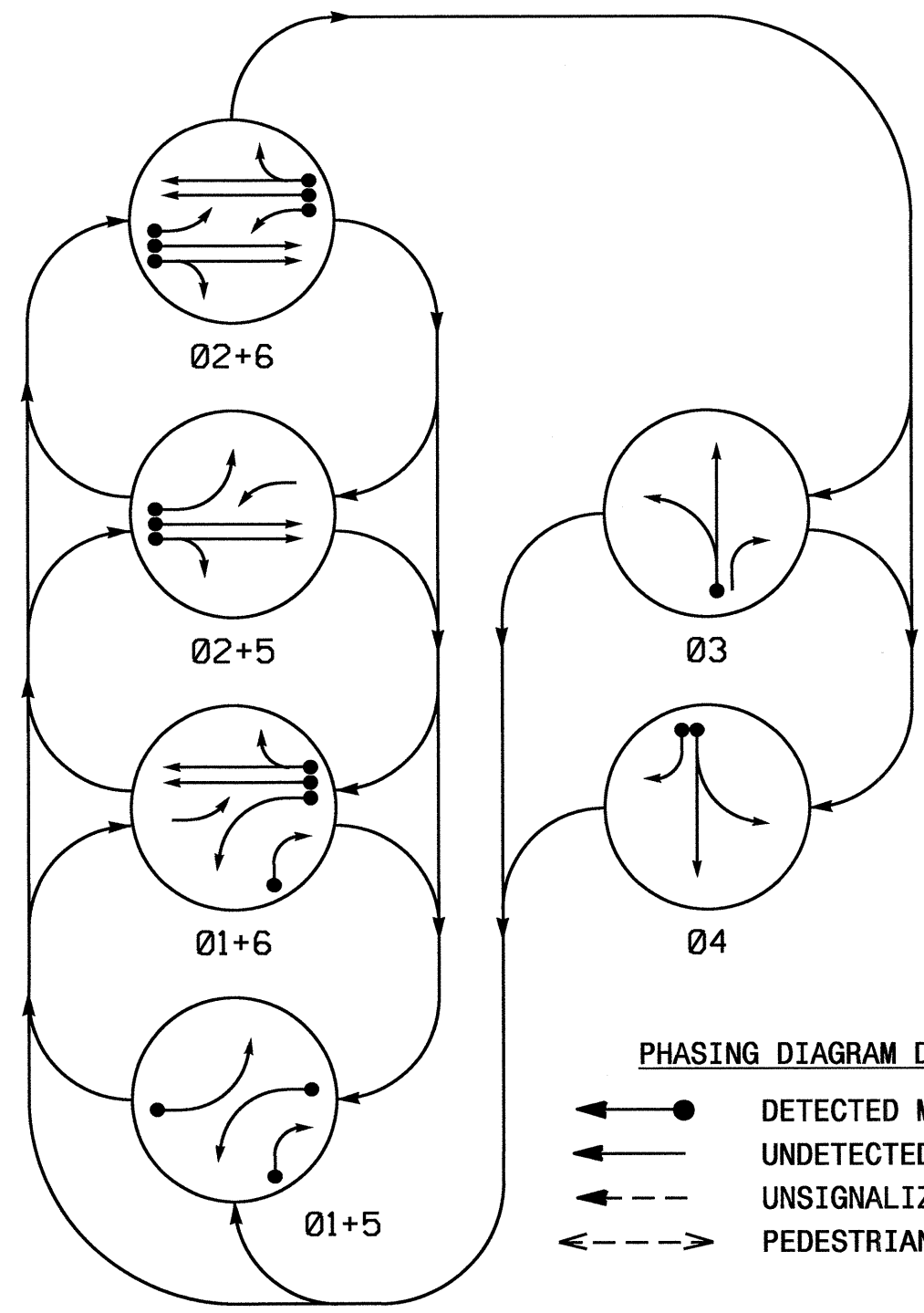
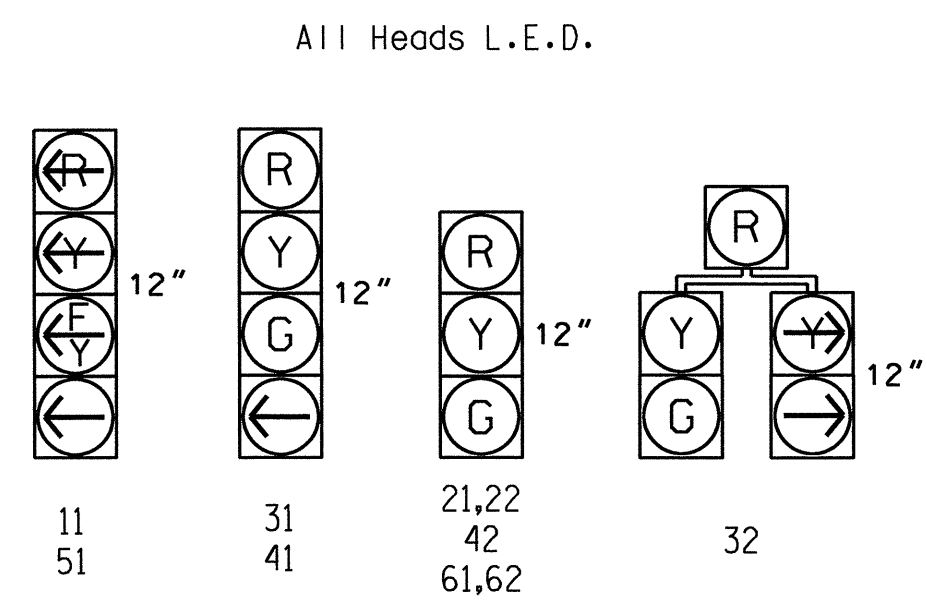


TABLE OF OPERATION

SIGNAL FACE	PHASE						
	01+5	01+6	02+5	02+6	03	04	H/S/D/F
11	←	→	←	→	←	→	Y
21,22	R	R	G	G	R	R	Y
31	R	R	R	R	G	R	R
32	R	R	R	R	G	R	R
41	R	R	R	R	R	G	R
42	R	R	R	R	R	G	R
51	←	→	←	→	←	→	Y
61,62	R	G	R	G	R	R	Y

SIGNAL FACE I.D.



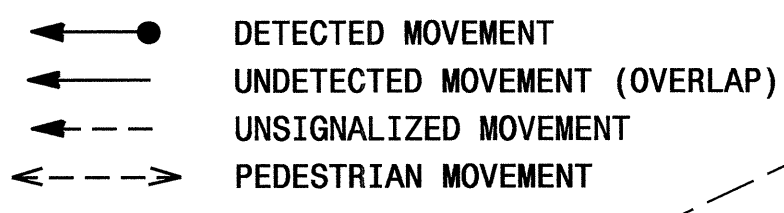
INDUCTIVE LOOPS				DETECTOR PROGRAMMING								
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTENSION	PULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
1A	6X40	0	2-4-2	-	1	Y	Y	-	-	15	-	-
1B	6X40	0	2-4-2	-	1	Y	Y	-	-	15	-	-
2A/S17	6X6	300	*	Y	2	Y	Y	-	-	-	Y	-
2B/S18	6X6	300	*	Y	2	Y	Y	-	-	-	Y	-
2C	6X40	0	*	Y	2	Y	Y	Y	2.0	5	-	-
2D	6X40	0	*	Y	2	Y	Y	Y	2.0	5	-	-
3A	6X40	0	2-4-2	-	3	Y	Y	-	-	3	-	-
4A	6X40	0	2-4-2	-	4	Y	Y	-	-	3	-	-
4B	6X40	0	2-4-2	-	4	Y	Y	-	-	15	-	-
5A	6X40	0	*	Y	5	Y	Y	Y	-	3	-	-
6A/S19	6X6	300	5	-	6	Y	Y	-	-	-	Y	-
6B/S20	6X6	300	5	-	6	Y	Y	-	-	-	Y	-

6 Phase Fully Actuated NC 280 CLS

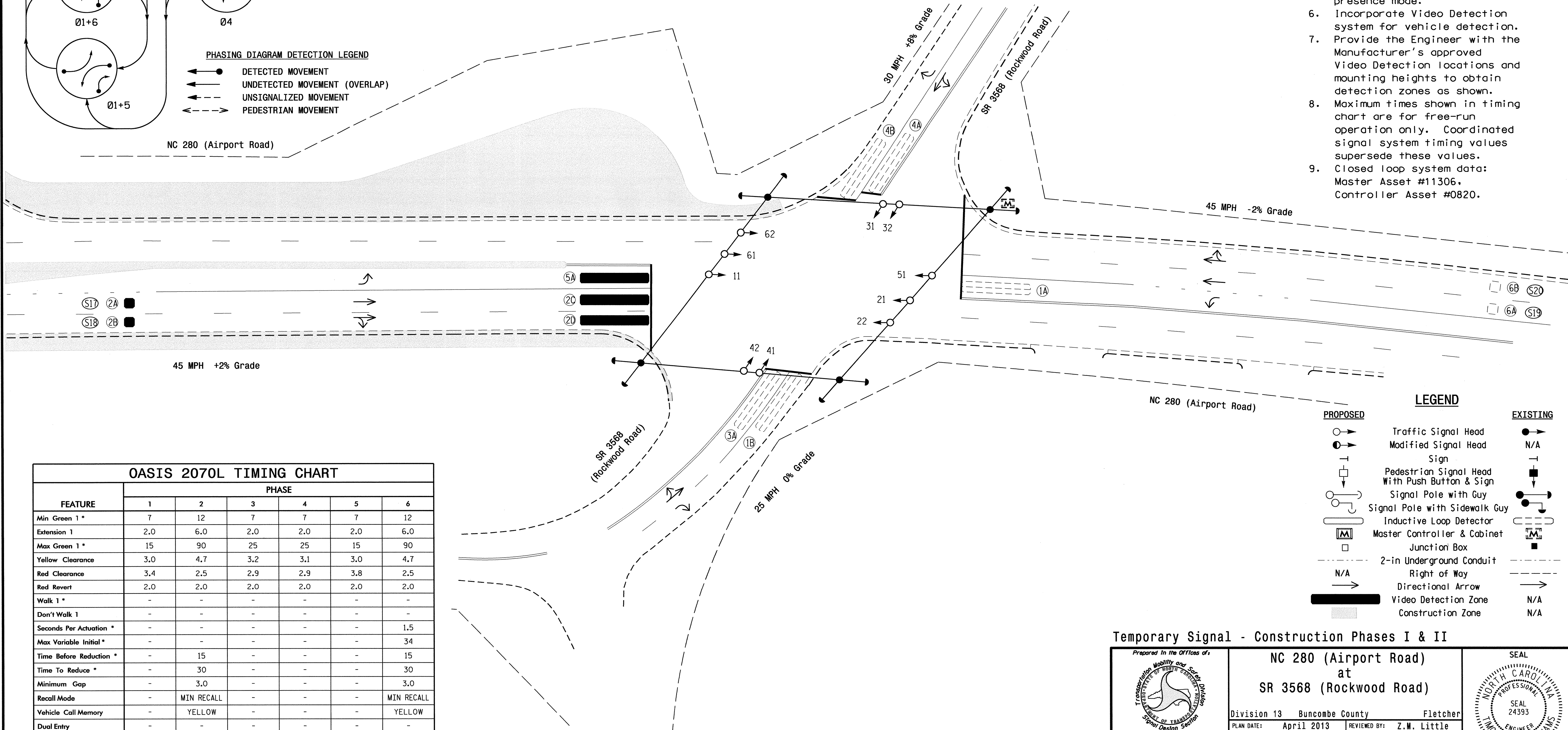
NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.
- 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.
- Incorporate Video Detection system for vehicle detection.
- Provide the Engineer with the Manufacturer's approved Video Detection locations and mounting heights to obtain detection zones as shown.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- Closed loop system data: Master Asset #11306, Controller Asset #0820.

PHASING DIAGRAM DETECTION LEGEND



* Video Detection Zone



FEATURE	PHASE					
	1	2	3	4	5	6
Min Green 1 *	7	12	7	7	7	12
Extension 1	2.0	6.0	2.0	2.0	2.0	6.0
Max Green 1 *	15	90	25	25	15	90
Yellow Clearance	3.0	4.7	3.2	3.1	3.0	4.7
Red Clearance	3.4	2.5	2.9	2.9	3.8	2.5
Red Revert	2.0	2.0	2.0	2.0	2.0	2.0
Walk 1 *	-	-	-	-	-	-
Don't Walk 1	-	-	-	-	-	-
Seconds Per Actuation *	-	-	-	-	-	1.5
Max Variable Initial *	-	-	-	-	-	34
Time Before Reduction *	-	15	-	-	-	15
Time To Reduce *	-	30	-	-	-	30
Minimum Gap	-	3.0	-	-	-	3.0
Recall Mode	-	MIN RECALL	-	-	-	MIN RECALL
Vehicle Call Memory	-	YELLOW	-	-	-	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.

PROPOSED	EXISTING
	N/A
	N/A
	N/A
	N/A
	N/A
	N/A
	N/A
	N/A
	N/A
	N/A
	N/A
	N/A
	N/A

Temporary Signal - Construction Phases I & II

750 N. Greenfield Pkwy, Garner, NC 27529

NC 280 (Airport Road) at SR 3568 (Rockwood Road)

Division 13 Buncombe County Fletcher

PLAN DATE: April 2013 REVIEWED BY: Z.M. Little

PREPARED BY: R.N. Zinser REVIEWED BY: [Signature]

SEAL

PROFESSIONAL ENGINEER

SEAL 24393

W. LITTLE

DATE 5/24/13

SCALE 1"=30'

REVISIONS	INIT.	DATE

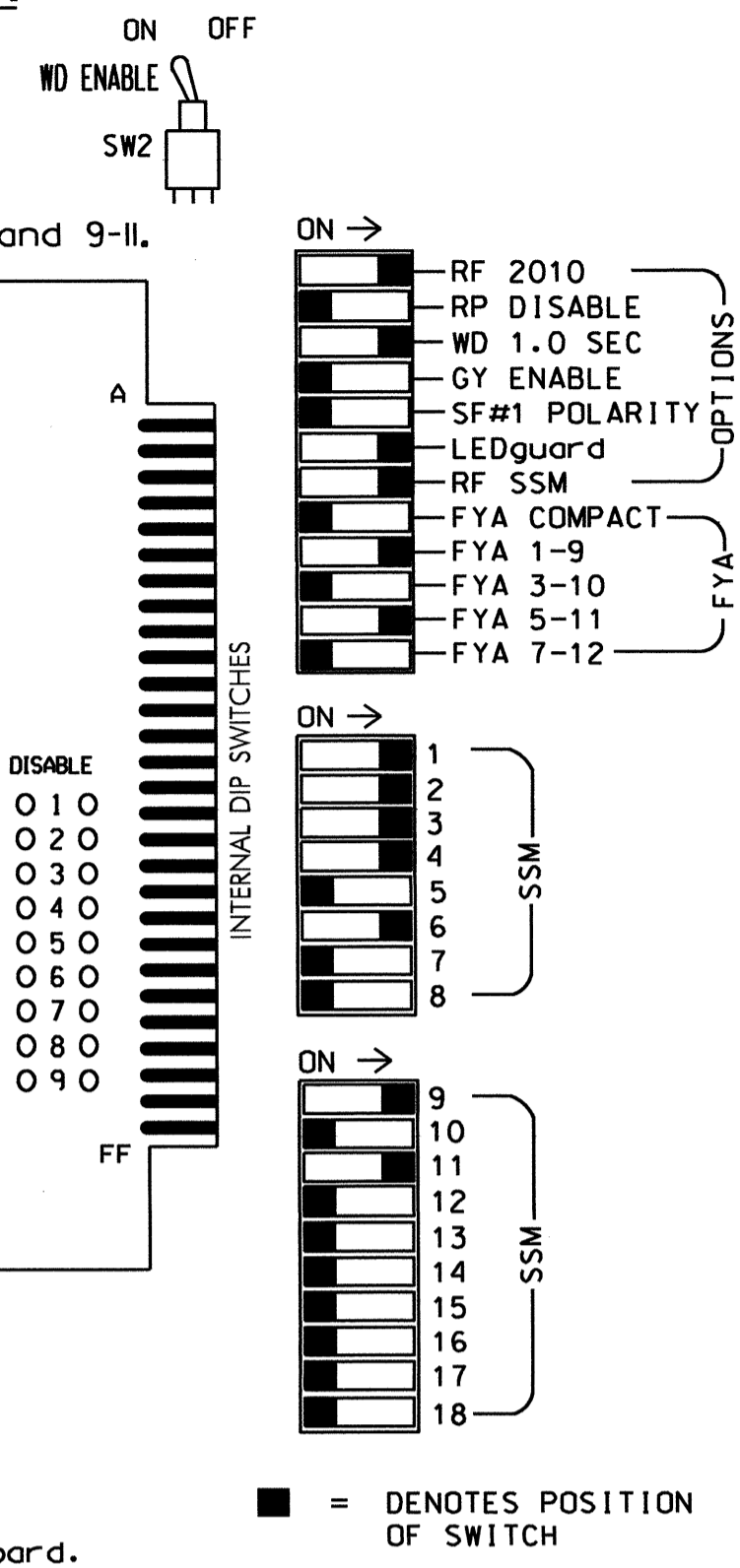
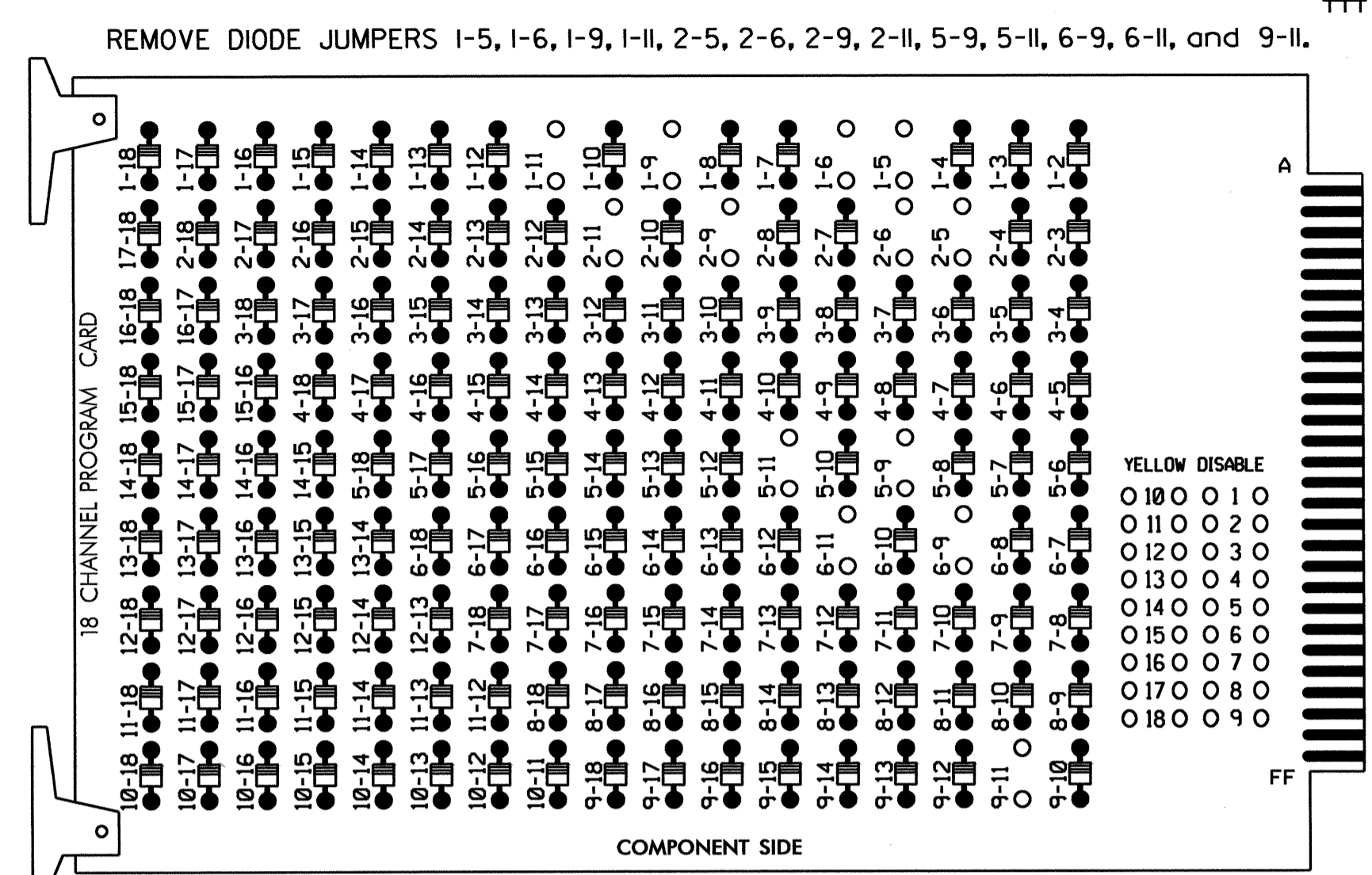
SIG. INVENTORY NO. 13-0820 T

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EDI MODEL 2018ECL-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.
- 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.

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 phase 6 for Variable Initial.
- Program phases 2 and 6 for Gap Reduction.
- Program phases 2 and 6 for Start Up In Green.
- Program phases 2 and 6 for Yellow Flash, and overlap 1 as Wag Overlaps.
- The cabinet and controller are part of the NC 280 (Airport Road) Closed Loop System.

EQUIPMENT INFORMATION

CONTROLLER.....2070L
 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

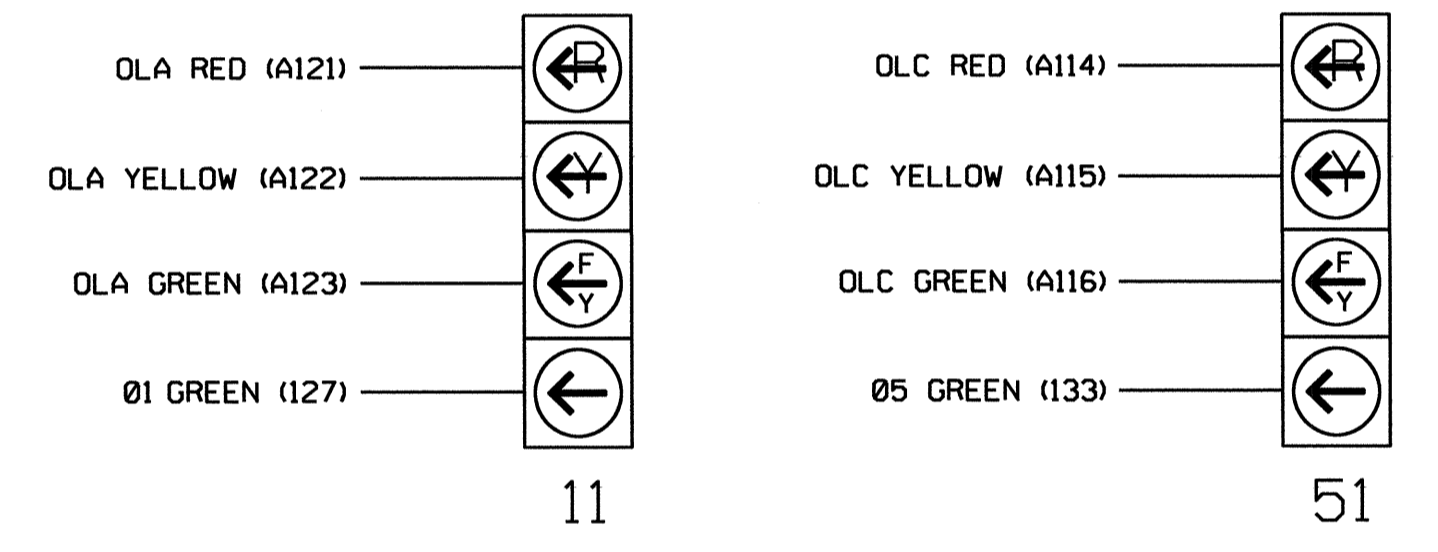
SIGNAL HEAD HOOK-UP CHART

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*	32	21,22	31	32	41	42	51*	61,62	NU	NU	NU	11*	NU	NU	51*	NU	NU
RED		*	128	116	116	101	101		134									
YELLOW			129	117	117	102	102	*	135									
GREEN			130	118	118	103	103		136									
RED ARROW																A121		A114
YELLOW ARROW																A122		A115
FLASHING YELLOW ARROW																A123		A116
GREEN ARROW	127	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 below.

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)

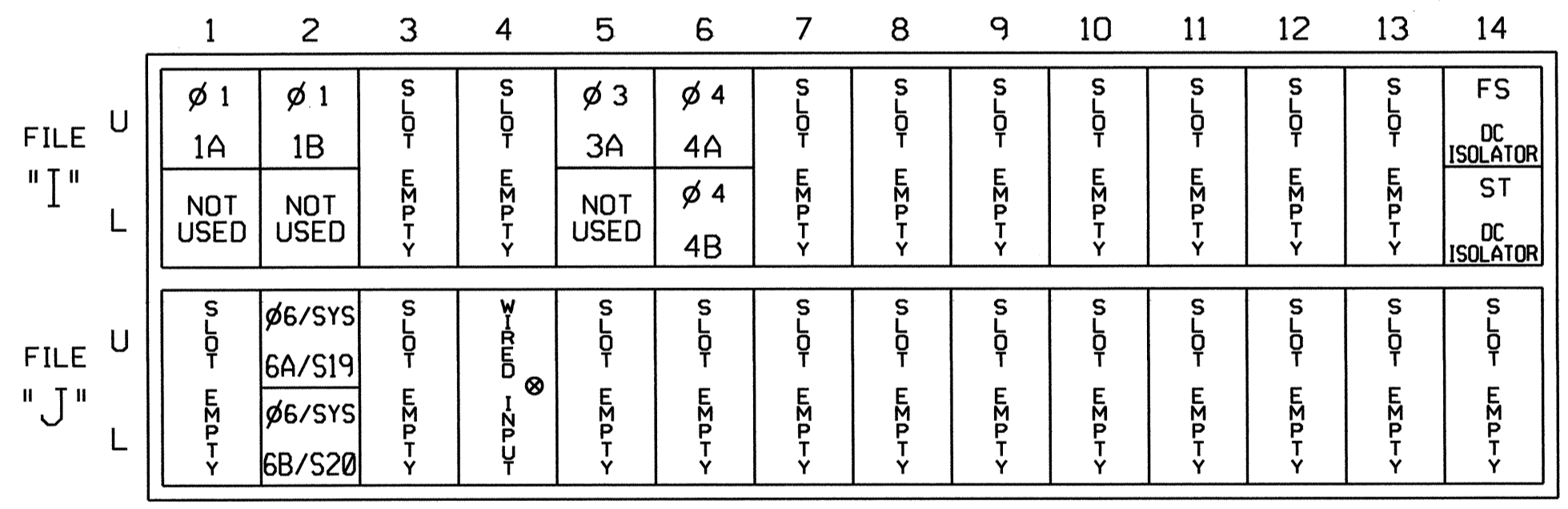


NOTE

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)



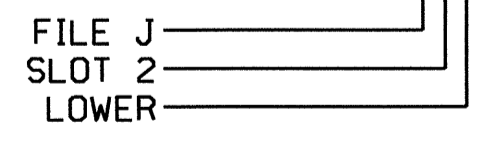
EX.: 1A, 2A, ETC. = LOOP NO.'S
 FS = FLASH SENSE
 ST = STOP TIME
 * Wired Input - Do not populate slot with detector card

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	I1U	56	18	1	1	Y	Y			15
	-	J4U	48	10	26	6	Y	Y	Y		3
1B	TB2-5,6	I2U	39	1	2	1	Y	Y			15
*2A/S17						2/SYS	Y	Y			
*2B/S18						2/SYS	Y	Y			
*2C						2	Y	Y	Y	2.0	5
*2D						2	Y	Y	Y	2.0	5
3A	TB4-5,6	I5U	58	20	3	3	Y	Y			3
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			3
4B	TB4-11,12	I6L	45	7	14	4	Y	Y			15
*5A						5	Y	Y			15
						2	Y	Y	Y		3
6A/S19	TB3-5,6	J2U	40	2	6	6/SYS	Y	Y			
6B/S20	TB3-7,8	J2L	44	6	16	6/SYS	Y	Y			

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

INPUT FILE POSITION LEGEND: J2L



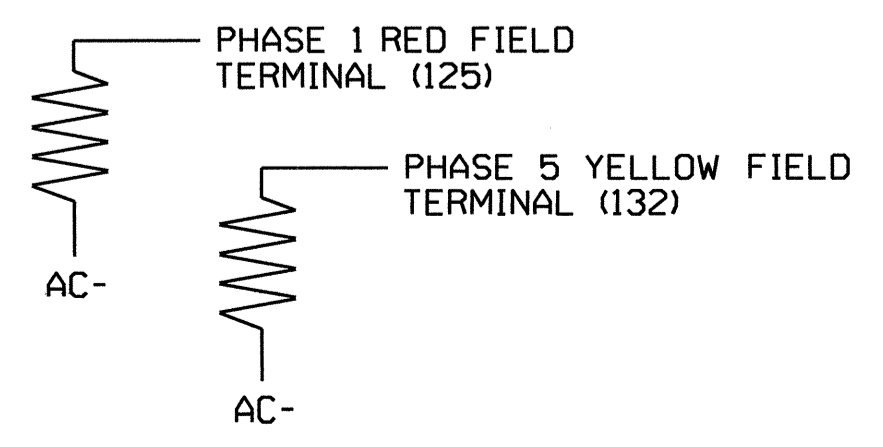
*** SPECIAL DETECTOR NOTE**

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 resistors as shown below)

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



Temporary Signal - Construction Phases I & II - Sheet 1 of 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:

NC 280 (Airport Road) at SR 3568 (Rockwood Road)

Division 13 Buncombe County Fletcher

PLAN DATE: May 2013 REVIEWED BY: JTR

PREPARED BY: S. Armstrong REVIEWED BY:

REVISIONS: INIT. DATE

750 N. Greenfield Pkwy, Garner, NC 27529

SEAL: JOHN T. ROWE, ENGINEER, SEAL 008453

SIGNATURE: John Rowe 5-28-13 DATE: 5-28-13

SIG. INVENTORY NO. 13-0820T

28-May-2013 11:31 28-MAY-2013 11:31 Signal\worker\cupes45\g... MonMarcsFromg...30820_sml@16_xxx.dgn

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

(program controller as shown below)

1. 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.
2. 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)...0.0
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

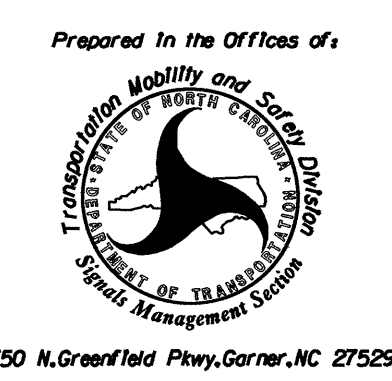
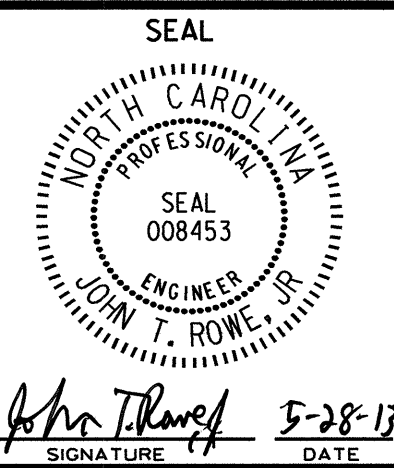
← NOTICE GREEN FLASH

SELECT VEHICLE OVERLAP OPTIONS: (Y/N)
FLASH YELLOW IN CONTROLLER FLASH?...Y
GREEN EXTENSION (0-255 SEC)...0.0
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: 13-0820T
DESIGNED: April 2013
SEALED: 5/24/13
REVISED: N/A

Temporary Signal - Construction Phases I & II - Sheet 2 of 2

 Prepared in the Office of: Transportation Mobility and Safety Division STATE OF NORTH CAROLINA Department of Transportation Signal Management Section 750 N. Greenfield Pkwy, Garner, NC 27529	NC 280 (Airport Road) at SR 3568 (Rockwood Road)	SEAL  SEAL 008453 JOHN T. ROWE, JR. ENGINEER
	Division 13 Buncombe County Fletcher	
	PLAN DATE: May 2013 REVIEWED BY: <i>JTR</i>	
	PREPARED BY: S. Armstrong REVIEWED BY:	
REVISIONS:		INIT. DATE
SIGNATURE: <i>John T. Rowe</i> DATE: 5-28-13		SIG. INVENTORY NO. 13-0820T

PHASING DIAGRAM

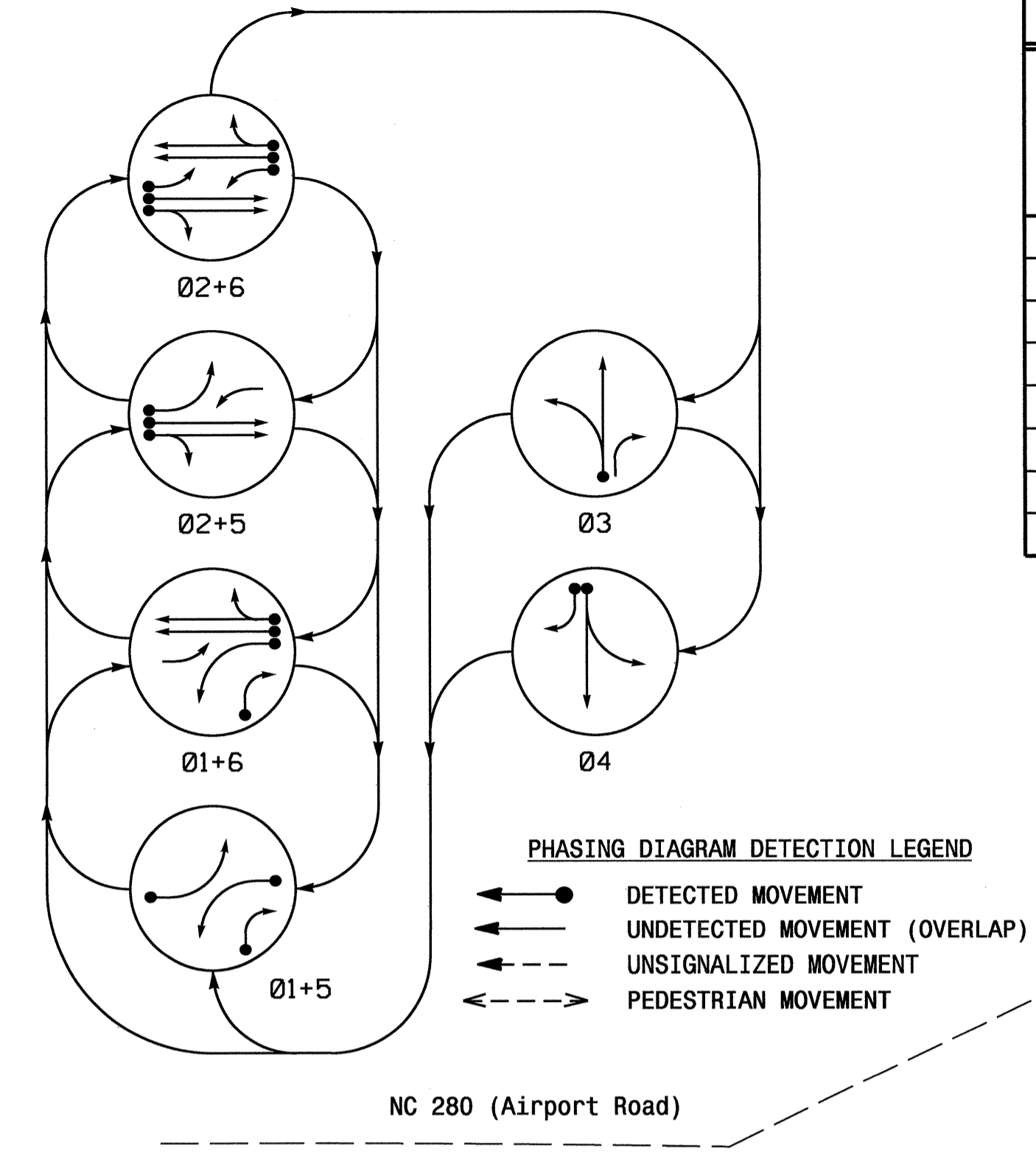
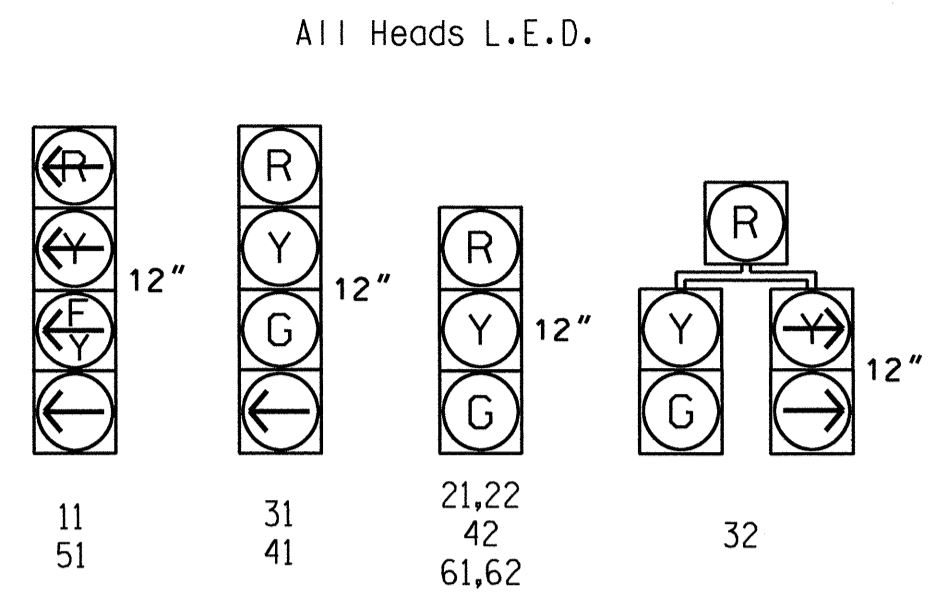


TABLE OF OPERATION

SIGNAL FACE	PHASE						FLIGHT
	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
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

SIGNAL FACE I.D.



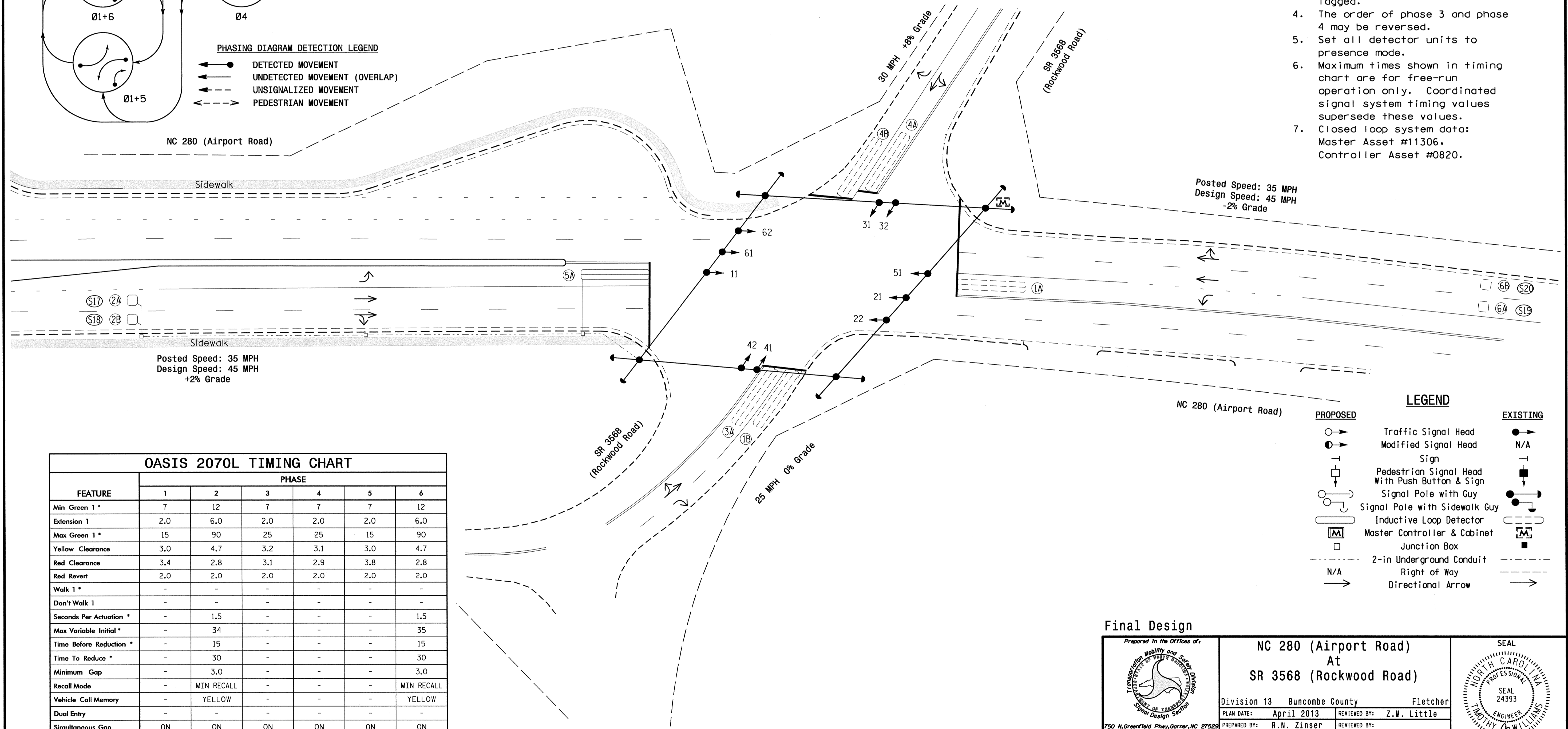
OASIS 2070L LOOP & DETECTOR INSTALLATION CHART

LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	DETECTOR PROGRAMMING				SYSTEM LOOP	NEW CARD
					PHASE	CALLING	EXTENSION	STRETCH TIME		
1A	6x40	0	2-4-2	-	1	Y	Y	-	15	-
1B	6x40	0	2-4-2	-	1	Y	Y	-	15	-
2A/S17	6x6	300	6	Y	2	Y	Y	-	-	Y
2B/S18	6x6	300	6	Y	2	Y	Y	-	-	Y
3A	6x40	0	2-4-2	-	3	Y	Y	-	3	-
4A	6x40	0	2-4-2	-	4	Y	Y	-	3	-
4B	6x40	0	2-4-2	-	4	Y	Y	-	15	-
5A	6x40	0	2-4-2	Y	5	Y	Y	-	15	-
6A/S19	6x6	300	5	-	6	Y	Y	-	-	Y
6B/S20	6x6	300	5	-	6	Y	Y	-	-	Y

6 Phase Fully Actuated NC 280 (Airport Road) CLS

NOTES

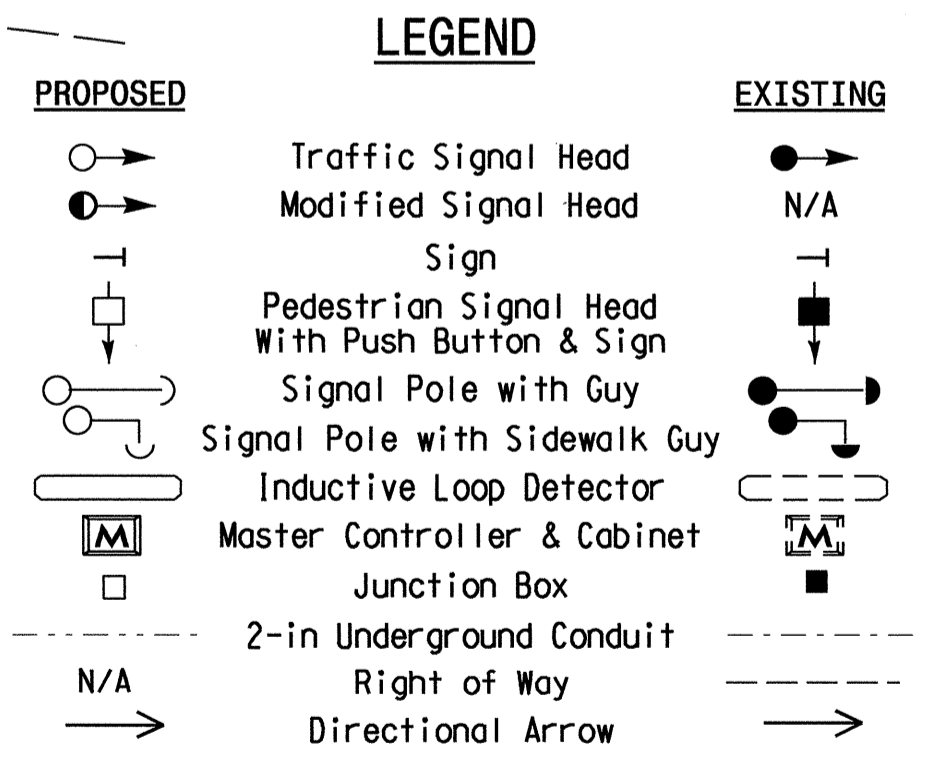
- Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Phase 1 and/or phase 5 may be lagged.
- The order of phase 3 and phase 4 may be reversed.
- Set all detector units to presence mode.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- Closed loop system data: Master Asset #11306, Controller Asset #0820.



OASIS 2070L TIMING CHART

FEATURE	PHASE					
	1	2	3	4	5	6
Min Green 1 *	7	12	7	7	7	12
Extension 1	2.0	6.0	2.0	2.0	2.0	6.0
Max Green 1 *	15	90	25	25	15	90
Yellow Clearance	3.0	4.7	3.2	3.1	3.0	4.7
Red Clearance	3.4	2.8	3.1	2.9	3.8	2.8
Red Revert	2.0	2.0	2.0	2.0	2.0	2.0
Walk 1 *	-	-	-	-	-	-
Don't Walk 1	-	-	-	-	-	-
Seconds Per Actuation *	-	1.5	-	-	-	1.5
Max Variable Initial *	-	34	-	-	-	35
Time Before Reduction *	-	15	-	-	-	15
Time To Reduce *	-	30	-	-	-	30
Minimum Gap	-	3.0	-	-	-	3.0
Recall Mode	-	MIN RECALL	-	-	-	MIN RECALL
Vehicle Call Memory	-	YELLOW	-	-	-	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.



Final Design

Prepared In the Offices of:

NC 280 (Airport Road) At SR 3568 (Rockwood Road)

Division 13 Buncombe County Fletcher

PLAN DATE: April 2013 REVIEWED BY: Z.M. Little

PREPARED BY: R.N. Zinser REVIEWED BY:

SCALE: 1"=30'

REVISIONS: _____ INIT. DATE

SEAL: NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 24393

TIMOTHY J. WILLIAMS ENGINEER

5/24/13

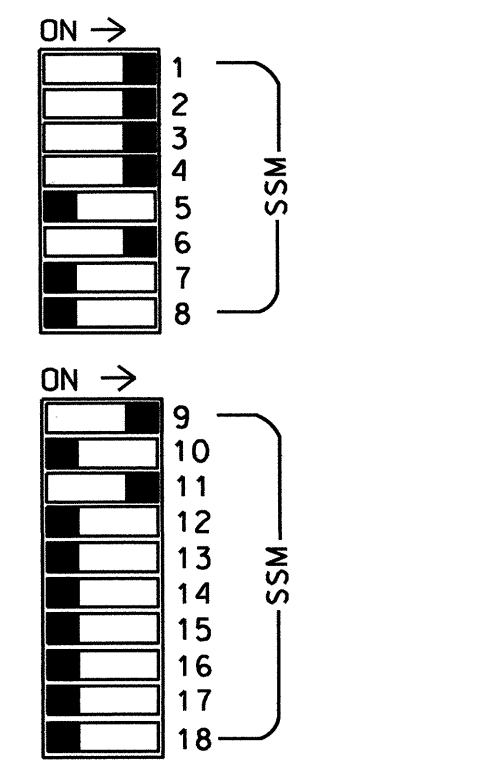
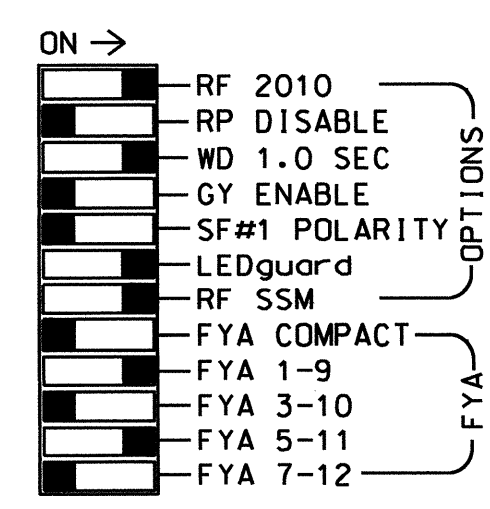
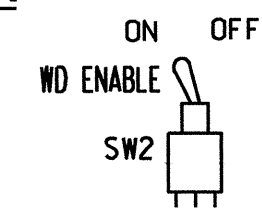
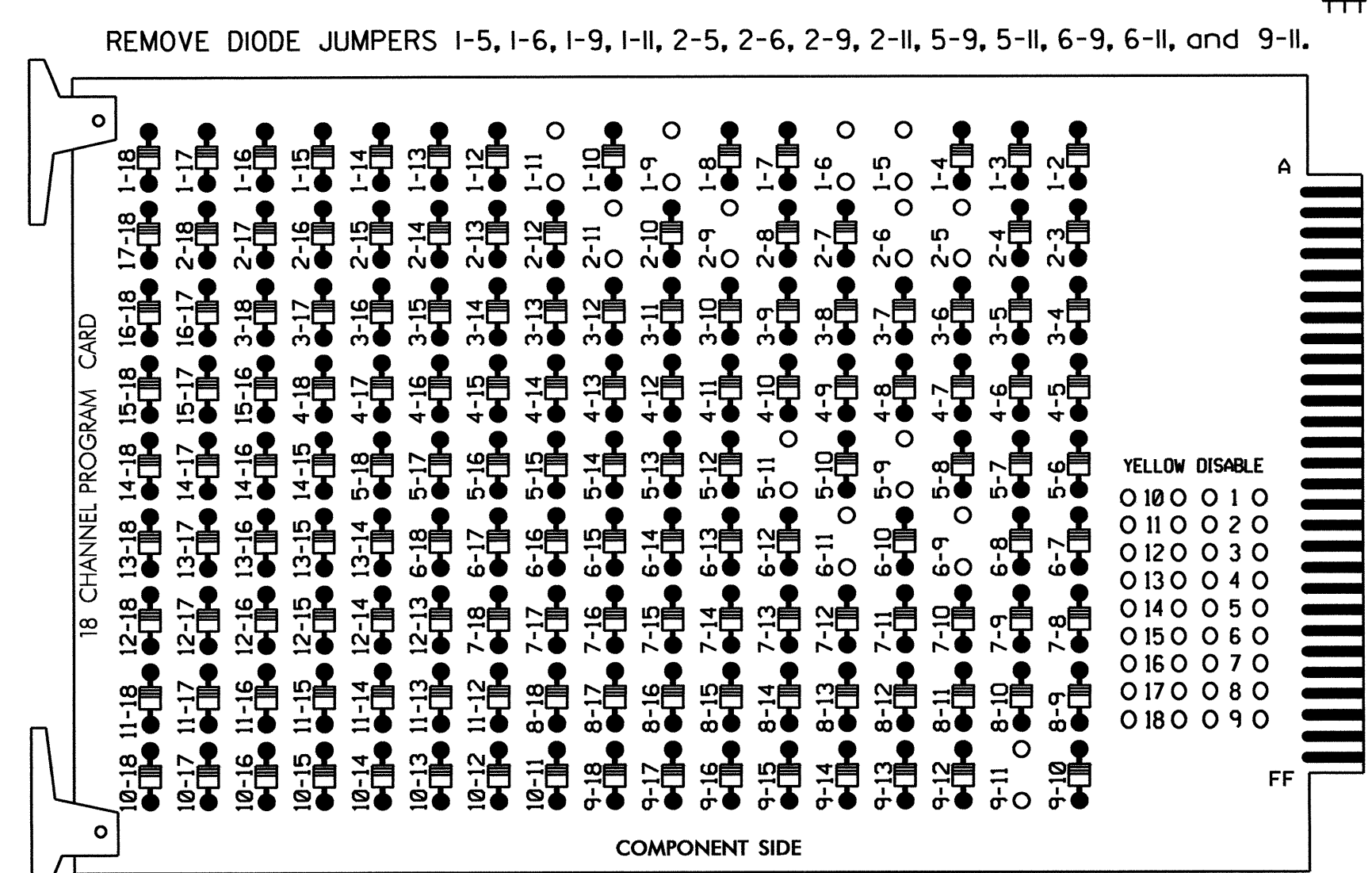
SIG. INVENTORY NO. 13-0820

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EDI MODEL 2018ECL-NC CONFLICT MONITOR

PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



■ = DENOTES POSITION OF SWITCH

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.

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 Variable Initial and Gap Reduction.
- Program phases 2 and 6 for Start Up In Green.
- Program phases 2 and 6 for Yellow Flash, and overlap 1 as Wag Overlaps.
- The cabinet and controller are part of the NC 280 (Airport Road) Closed Loop System.

EQUIPMENT INFORMATION

CONTROLLER.....2070L
 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	32	21,22	31	32	41	42	51	61,62	NU	NU	NU	11	NU	NU	51	NU	NU
RED	*	128		116	116	101	101			134								
YELLOW			129	117	117	102	102	*	135									
GREEN			130	118	118	103	103		136									
RED ARROW													A121				A114	
YELLOW ARROW		126											A122				A115	
FLASHING YELLOW ARROW													A123				A116	
GREEN ARROW	127	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 below.

INPUT FILE POSITION LAYOUT

(front view)

FILE "I"	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
U	∅ 1	∅ 1	∅ 2/SYS	∅ 3	∅ 4	∅ 5	∅ 6	∅ 7	∅ 8	∅ 9	∅ 10	∅ 11	∅ 12	∅ 13	FS
L	1A	1B	2A/S17	3A	4A	5A	6A	7A	8A	9A	10A	11A	12A	13A	DC ISOLATOR
U	NOT USED	NOT USED	∅ 2/SYS	NOT USED	∅ 4	∅ 5	∅ 6	∅ 7	∅ 8	∅ 9	∅ 10	∅ 11	∅ 12	∅ 13	ST
L	2A/S18	2A/S18	2A/S18	4B	5A	6A	7A	8A	9A	10A	11A	12A	13A	14A	DC ISOLATOR
U	∅ 5	∅ 6/SYS	S	∅ 7	∅ 8	∅ 9	∅ 10	∅ 11	∅ 12	∅ 13	∅ 14	∅ 15	∅ 16	∅ 17	∅ 18
L	5A	6A/S19	∅ 6/SYS	6B/S20	7A	8A	9A	10A	11A	12A	13A	14A	15A	16A	17A
U	NOT USED	∅ 6/SYS	6B/S20	7A	8A	9A	10A	11A	12A	13A	14A	15A	16A	17A	18A
L	6B/S20	6B/S20	6B/S20	7A	8A	9A	10A	11A	12A	13A	14A	15A	16A	17A	18A

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

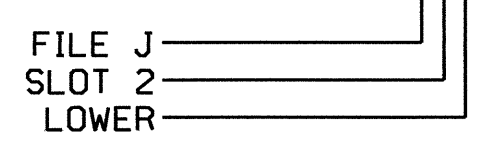
⊗ Wired Input - Do not populate slot with detector card

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	Y		3
1B	TB2-5,6	I2U	39	1	2	1	Y	Y			15
2A/S17	TB2-9,10	I3U	63	25	32	2/SYS	Y	Y			
2B/S18	TB2-11,12	I3L	76	38	42	2/SYS	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			3
4B	TB4-11,12	I6L	45	7	14	4	Y	Y			15
5A ²	TB3-1,2	J1U	55	17	5	5	Y	Y			15
		I4U	47	9	22	2	Y	Y	Y		3
6A/S19	TB3-5,6	J2U	40	2	6	6/SYS	Y	Y			
6B/S20	TB3-7,8	J2L	44	6	16	6/SYS	Y	Y			

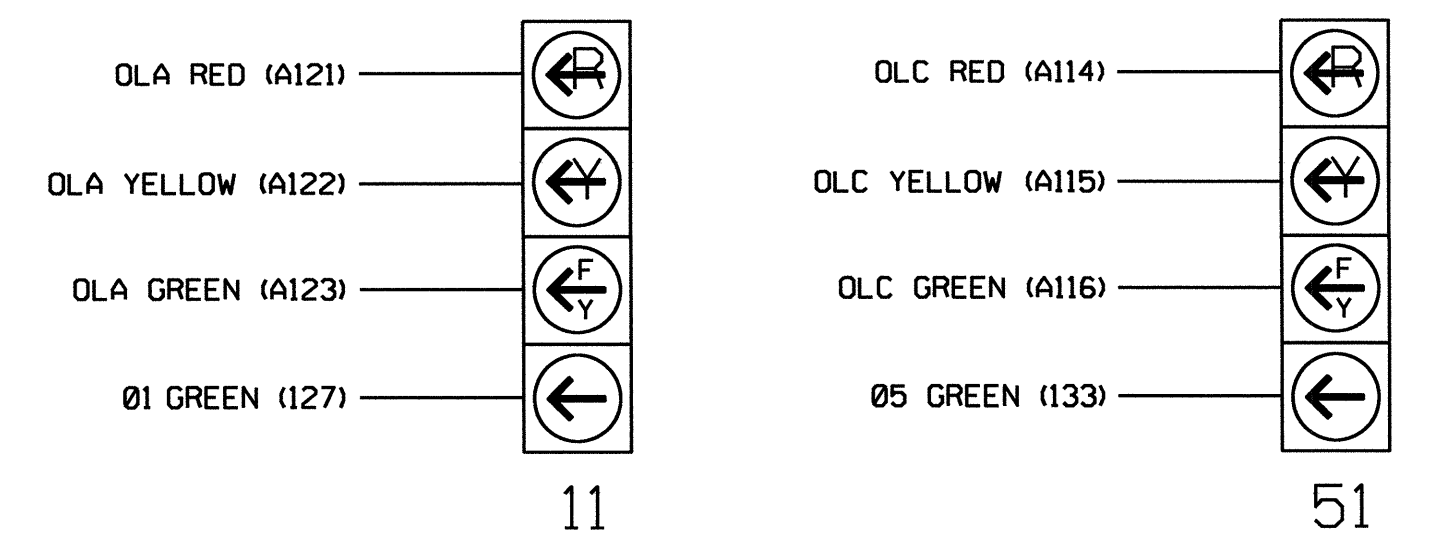
¹Add jumper from I1-W to J4-W, on rear of input file.
²Add jumper from J1-W to I4-W, on rear of input file.

INPUT FILE POSITION LEGEND: J2L



FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



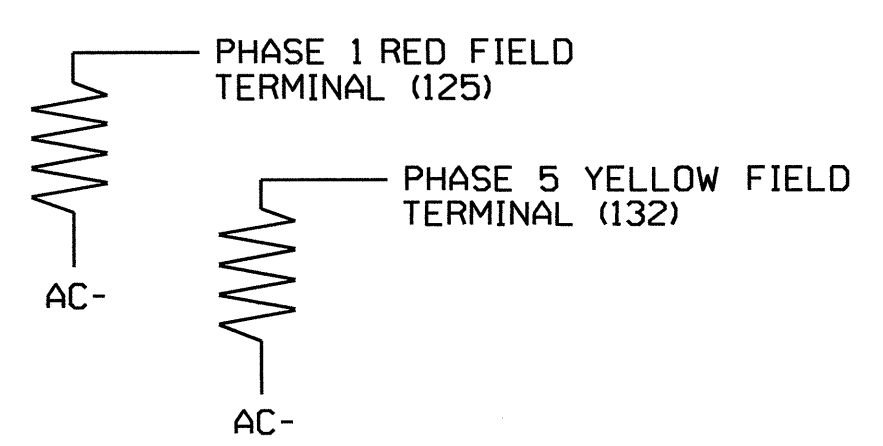
NOTE

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)



Final Design - Sheet 1 of 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:

NC 280 (Airport Road) at SR 3568 (Rockwood Road)

Division 13 Buncombe County Fletcher

PLAN DATE: May 2013 REVIEWED BY: JTK

PREPARED BY: S. Armstrong REVIEWED BY:

REVISIONS: INIT. DATE

750 N. Grandfield Pkwy, Garner, NC 27529

SEAL NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 008453 JOHN T. ROWE, JR. ENGINEER

SIGNATURE: [Signature] DATE: 5-29-13

SIG. INVENTORY NO. 13-0820

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)...0.0
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

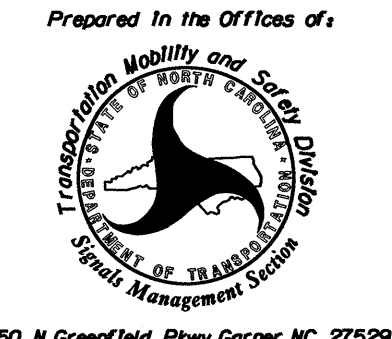
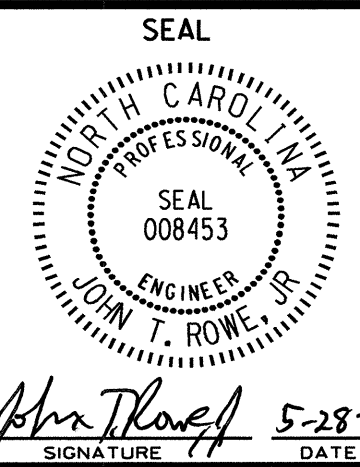

← NOTICE GREEN FLASH

SELECT VEHICLE OVERLAP OPTIONS: (Y/N)
FLASH YELLOW IN CONTROLLER FLASH?...Y
GREEN EXTENSION (0-255 SEC)...0.0
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: 13-0820
DESIGNED: April 2013
SEALED: 5/24/13
REVISED: N/A

Final Design - Sheet 2 of 2

	ELECTRICAL AND PROGRAMMING DETAILS FOR:		NC 280 (Airport Road) at SR 3568 (Rockwood Road)		
	Prepared in the Offices of:		Division 13 Buncombe County Fletcher		
	PLAN DATE: May 2013		REVIEWED BY: JTR		
	PREPARED BY: S. Armstrong		REVIEWED BY:		
REVISIONS		INIT.	DATE		
					
				SIGNATURE DATE 5-28-13	
				SIG. INVENTORY NO. 13-0820	

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LEGEND	
	YAGI ANTENNA (DOUBLE) FOR REPEATER OPERATION
	YAGI ANTENNA (SINGLE)
	OMNI ANTENNA
	EXISTING CONTROLLER AND CABINET
	EXISTING MASTER CONTROLLER AND CABINET
	SIGNAL INVENTORY NUMBER
	NEW METAL POLE W/MAST ARM
	EXISTING WOOD POLE
	NEW METAL POLE
	SIGNAL POLE
	EXISTING METAL POLE
	NEW OVERSIZED JUNCTION BOX
	EXISTING OVERSIZED JUNCTION BOX
	EXISTING CONDUIT
	EXISTING COMMUNICATIONS CABLE

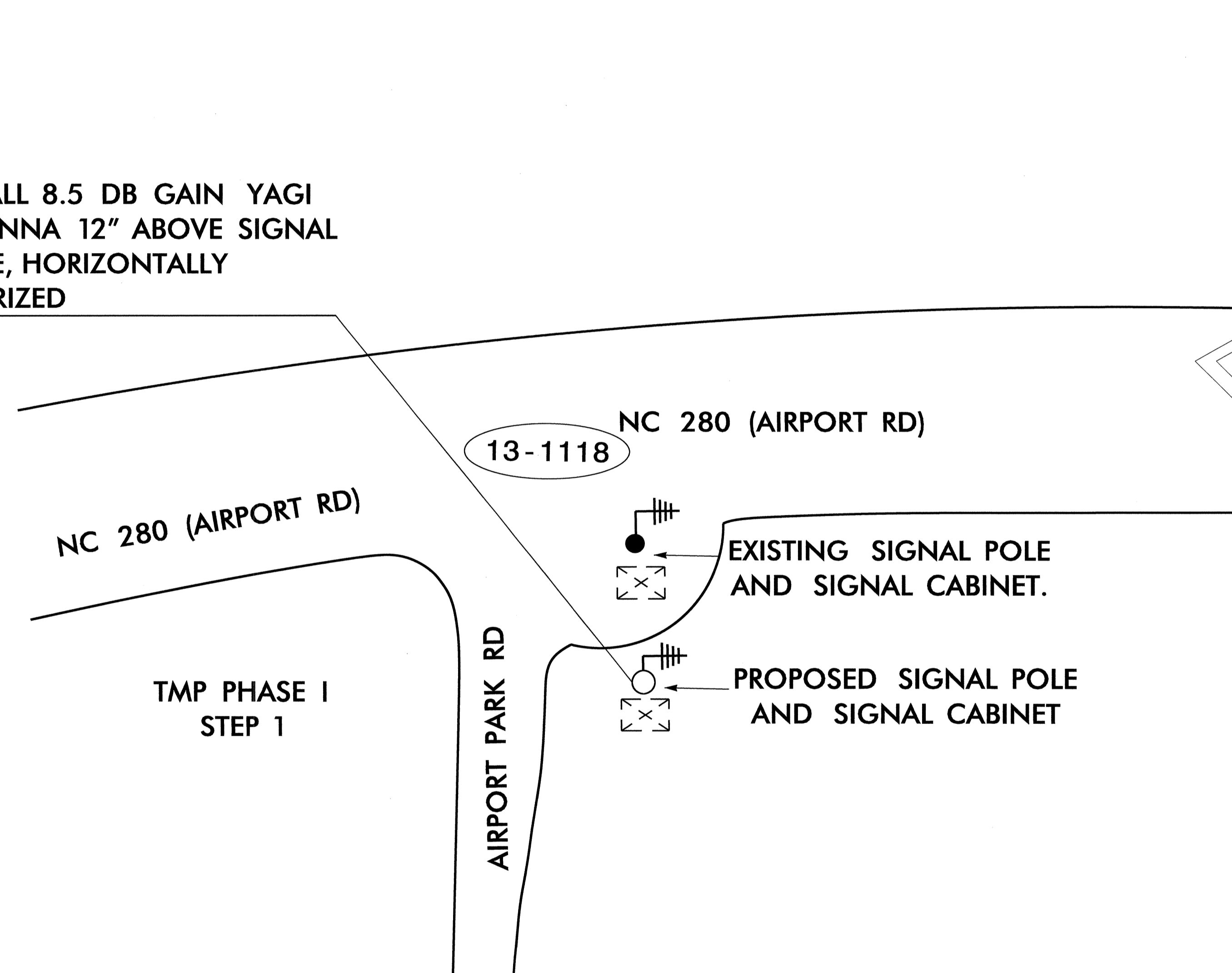
- NOTES FOR WIRELESS COMMUNICATIONS:**
- INSTALL COAXIAL CABLE:
 - ON WOOD POLES, REQUIRING A NEW RIGID GALVANIZED STEEL RISER, INSTALL A 2" RISER WITH WEATHERHEAD AND ROUTE THE COAXIAL CABLE TO THE ANTENNA.
 - ON METAL POLES WITH MAST ARMS, RUN COAXIAL CABLE UP THROUGH THE POLE AND OUT THE MAST ARM; FIELD DRILL A 1/2" HOLE UP THROUGH THE BOTTOM OF MAST ARM FOR INSTALLATION OF THE COAXIAL CABLE TO THE ANTENNA.
 - ON METAL STRAIN POLES, RUN COAXIAL CABLE UP THROUGH THE POLE AND OUT THE WEATHERHEAD AND ROUTE THE COAXIAL CABLE TO THE ANTENNA.
 - BETWEEN THE POINT OF EXITING THE RISER, METAL POLE OR MAST ARM AND THE ANTENNA, SECURE THE COAXIAL CABLE TO THE STRUCTURE USING 3/4" STAINLESS STEEL STRAPS EVERY 12".
 - IF AN EXISTING 2" SPARE RIGID GALVANIZED STEEL RISER IS AVAILABLE, INSTALL THE COAXIAL CABLE IN THE SPARE RISER.
 - INSTALL WIRELESS ANTENNA ON POLE WITH RF WARNING SIGN.
(NOTE: RF WARNING SIGN NOT REQUIRED WHEN ANTENNA IS INSTALLED ON AN NCDOT-OWNED POLE.)
 - MAINTAIN PROPER CLEARANCE FROM ALL UTILITIES PER THE NATIONAL ELECTRICAL SAFETY CODE.
 - INSTALL WIRELESS SERIAL RADIO MODEM WITH EXTERIOR DISCONNECT SWITCH LOCATED ON CABINET.
(NOTE: RF ANTENNA DISCONNECT SWITCH AND DECAL ARE NOT REQUIRED WHEN THE ANTENNA IS INSTALLED ON AN NCDOT-OWNED POLE.)
 - REFERENCE "WIRELESS RADIO ANTENNA TYPICAL DETAILS."

<p>Prepared in the Offices of: 750 N. Greenfield Pkwy., Garner, NC 27529</p>	WIRELESS COMMUNICATIONS PLANS ALONG NC 280 (AIRPORT ROAD)													
	DIVISION 13 BUNCOMBE COUNTY FLETCHER PLAN DATE: MAY 2013 REVIEWED BY: I. N. AVERY PREPARED BY: P. C. LOUDER REVIEWED BY: G.A. FULLER, PE	<table border="1"> <thead> <tr> <th>REVISIONS</th> <th>INIT.</th> <th>DATE</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>		REVISIONS	INIT.	DATE								
REVISIONS	INIT.	DATE												
SCALE 	SIGNATURE: <i>G. A. Fuller</i> DATE: 5-21-13 CADD Filenote:		SEAL NORTH CAROLINA PROFESSIONAL SEAL 023919 ENGINEER GREGORY A. FULLER											

- 1) RELOCATE EXISTING RADIO SYSTEM (RADIO, ANTENNA, AND ANTENNA MOUNTING HARDWARE) TO NEW POLE AND PROPOSED CABINET.
- 2) INSTALL NEW 2" RISER WITH WEATHERHEAD, CONDUIT AND COAXIAL CABLE BETWEEN RELOCATED RADIO AND RELOCATED ANTENNA.
- 3) INSTALL NEW COAXIAL CABLE SHIELD GROUNDING AND WEATHERPROOFING KIT.

- 1) RELOCATE EXISTING RADIO SYSTEM (RADIO, ANTENNA, AND ANTENNA MOUNTING HARDWARE) TO NEW POLE AND PROPOSED CABINET.
- 2) INSTALL NEW 2" RISER WITH WEATHERHEAD, CONDUIT AND COAXIAL CABLE BETWEEN RELOCATED RADIO AND RELOCATED ANTENNA.
- 3) INSTALL NEW COAXIAL CABLE SHIELD GROUNDING AND WEATHERPROOFING KIT.

INSTALL 8.5 DB GAIN YAGI ANTENNA 12" ABOVE SIGNAL CABLE, HORIZONTALLY POLARIZED

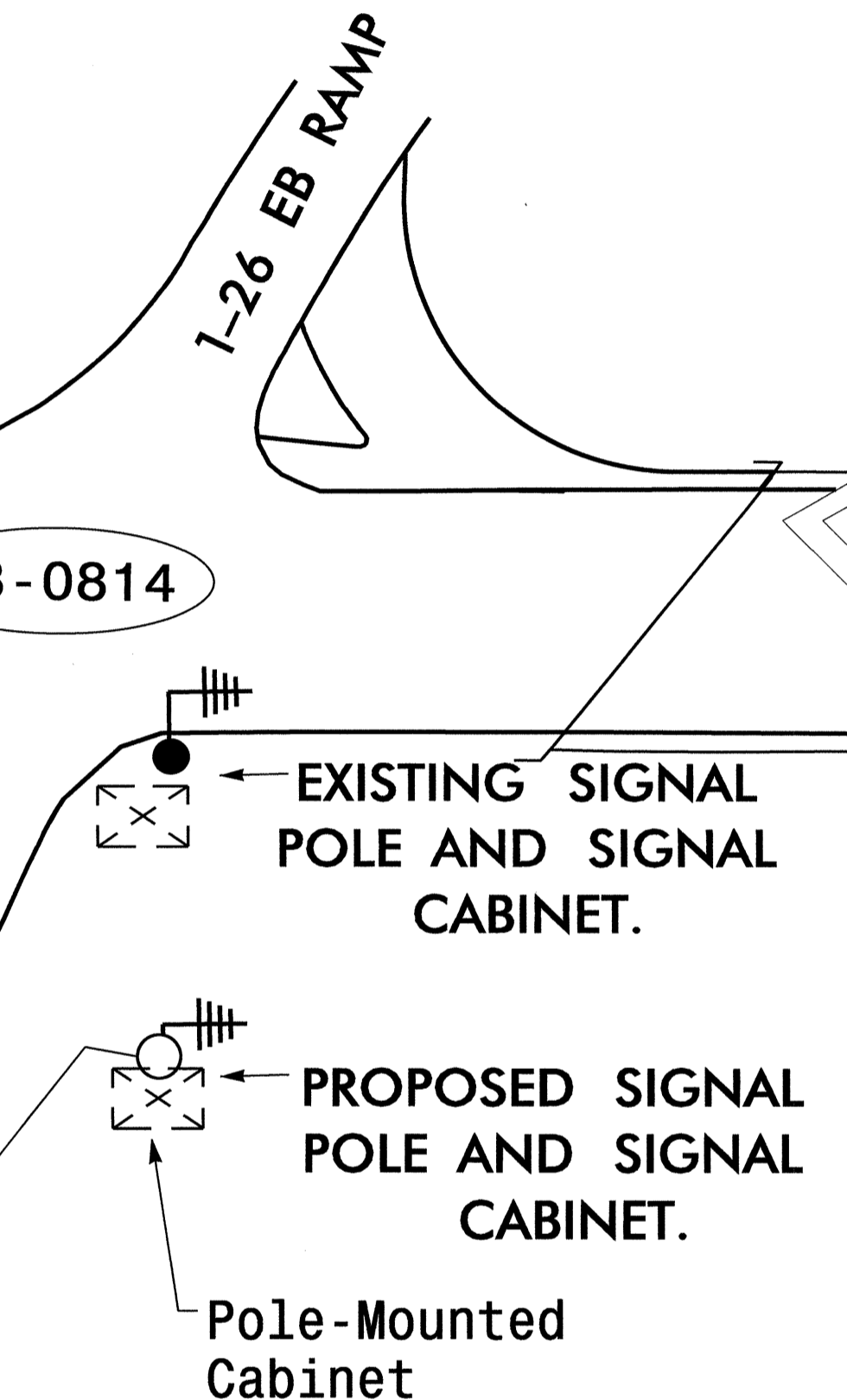


NC 280 (AIRPORT RD)

13-0814

INSTALL 8.5 DB GAIN YAGI ANTENNA 12" ABOVE SIGNAL CABLE, HORIZONTALLY POLARIZED

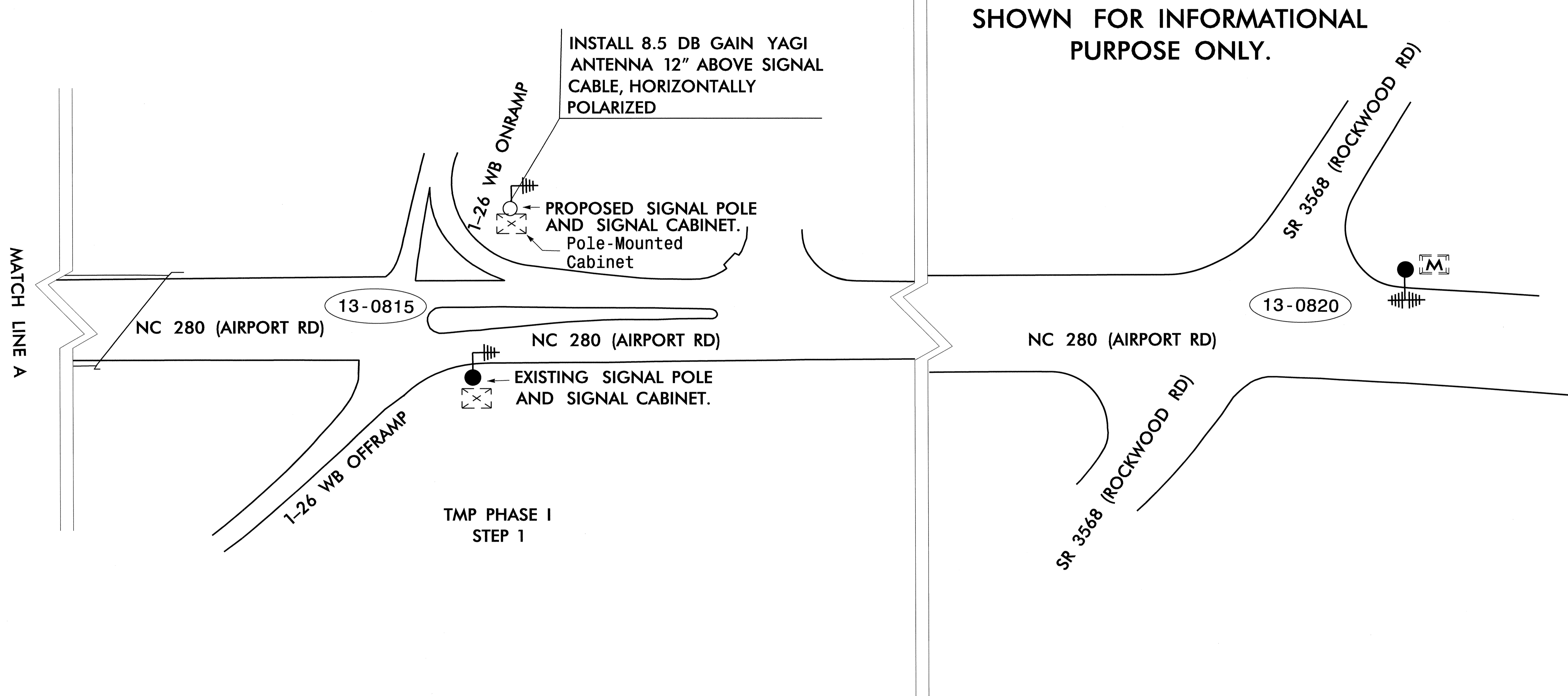
TMP PHASE I
STEP 1



TMP PHASE I (MAINTAIN RADIO SYSTEM)

	WIRELESS COMMUNICATIONS PLANS ALONG NC 280 (AIRPORT ROAD)		
	DIVISION 13 BUNCOMBE COUNTY FLETCHER	PLAN DATE: MAY 2013 REVIEWED BY: I. N. AVERY	
PREPARED BY: P. C. LOUDER	REVIEWED BY: G.A. FULLER, PE	REVISIONS	INIT. DATE
SCALE: 0	SIGNATURE: <i>Gregory A. Fuller</i>	DATE: 5/21/13	SEAL

- 1) RELOCATE EXISTING RADIO SYSTEM (RADIO, ANTENNA, AND ANTENNA MOUNTING HARDWARE) TO NEW POLE AND PROPOSED CABINET.
- 2) INSTALL NEW 2" RISER WITH WEATHERHEAD, CONDUIT AND COAXIAL CABLE BETWEEN RELOCATED RADIO AND RELOCATED ANTENNA.
- 3) INSTALL NEW COAXIAL CABLE SHIELD GROUNDING AND WEATHERPROOFING KIT.

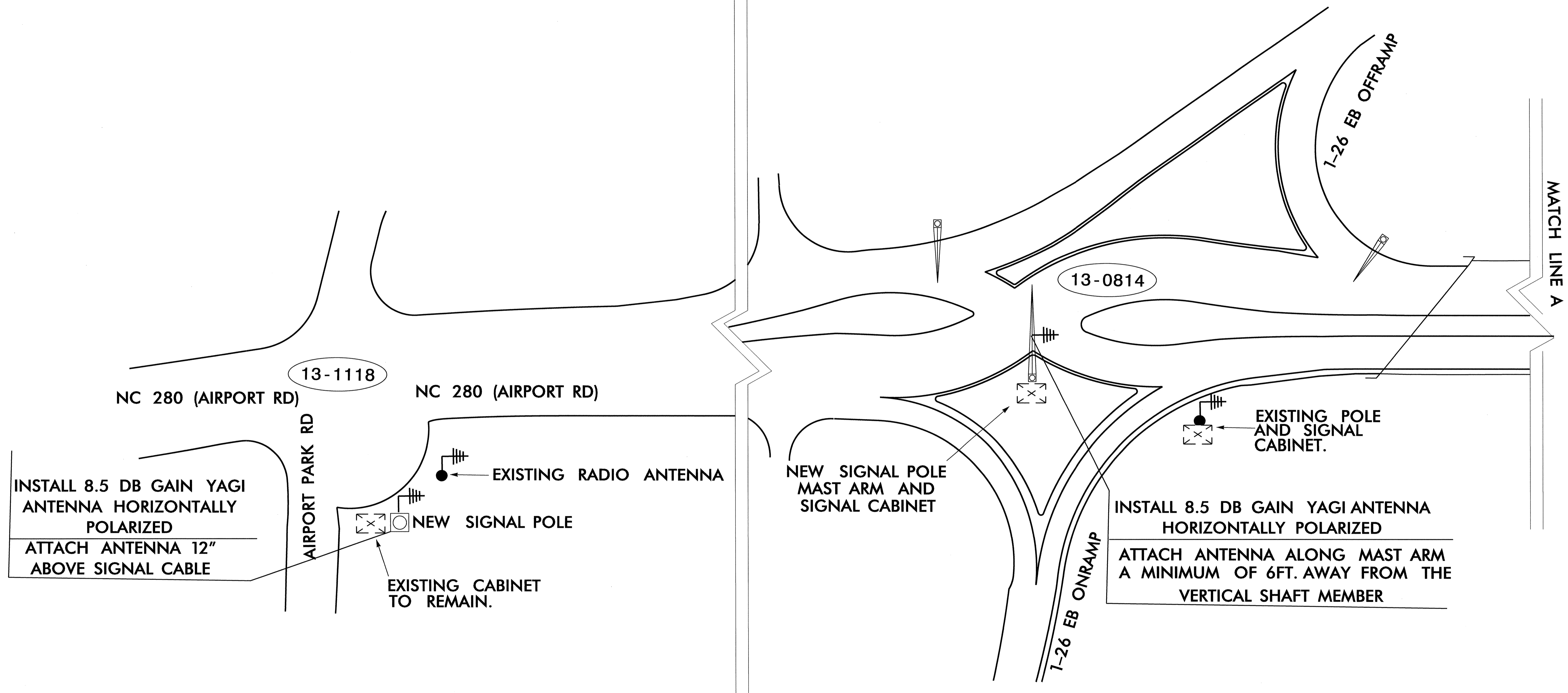


TMP PHASE I (MAINTAIN RADIO SYSTEM)

	WIRELESS COMMUNICATIONS PLANS ALONG NC 280 (AIRPORT ROAD)		
	DIVISION 13 BUNCOMBE COUNTY FLETCHER		
PLAN DATE: MAY 2013	REVIEWED BY: I. N. AVERY		SIGNATURE: <i>Gregory A. Fuller</i> DATE: 5-21-13
PREPARED BY: P. C. LOUDER	REVIEWED BY: G. A. FULLER, PE		
SCALE: 0	REVISIONS	INIT.	DATE
CADD File name:			

- 1) RELOCATE EXISTING RADIO ANTENNA FROM EXISTING SIGNAL POLE TO NEW METAL STRAIN POLE.
- 2) INSTALL NEW 2" RISER WITH WEATHERHEAD, CONDUIT AND COAXIAL CABLE BETWEEN RADIO AND RELOCATED ANTENNA.
- 3) INSTALL NEW COAXIAL CABLE SHIELD GROUNDING AND WEATHERPROOFING KIT.

- 1) RELOCATE EXISTING RADIO SYSTEM (RADIO, ANTENNA, AND ANTENNA MOUNTING HARDWARE) TO NEW POLE AND PROPOSED CABINET.
- 2) INSTALL NEW 2" RISER WITH WEATHERHEAD, CONDUIT AND COAXIAL CABLE BETWEEN RELOCATED RADIO AND RELOCATED ANTENNA.
- 3) INSTALL NEW COAXIAL CABLE SHIELD GROUNDING AND WEATHERPROOFING KIT.



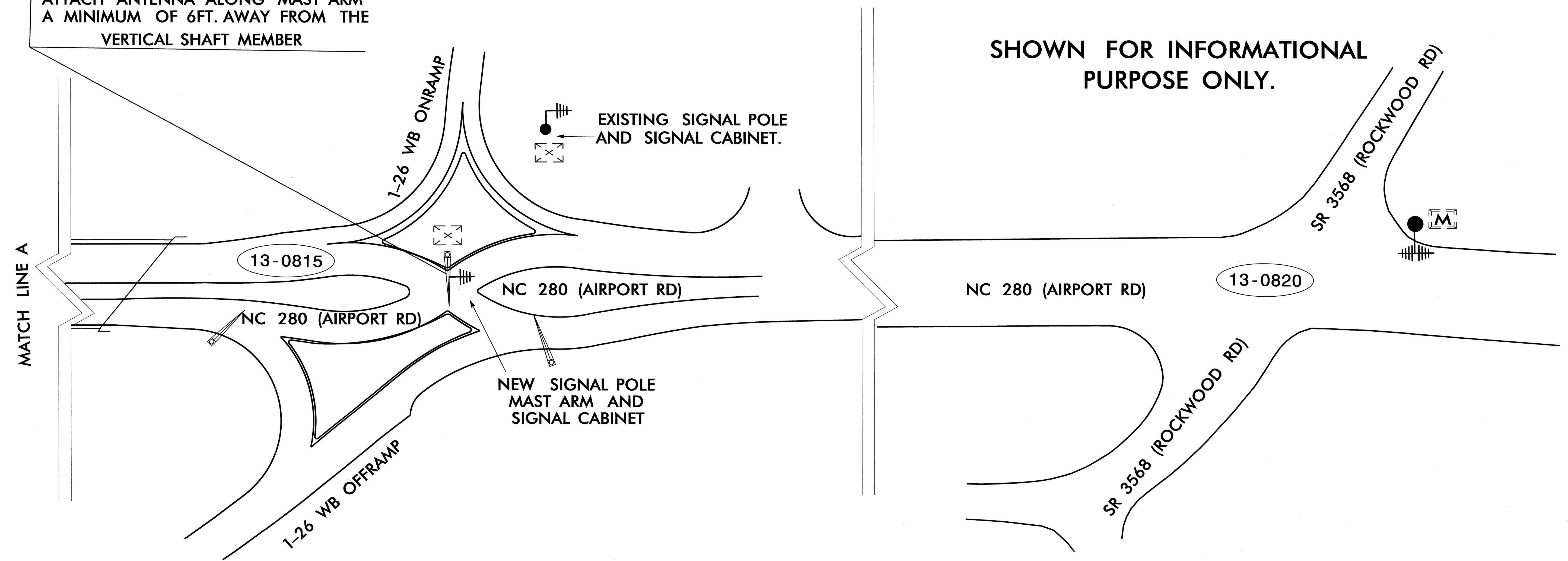
TMP PHASE FINAL

	WIRELESS COMMUNICATIONS PLANS ALONG NC 280 (AIRPORT ROAD)		
	DIVISION 13 BUNCOMBE COUNTY FLETCHER	PLAN DATE: MAY 2013 REVIEWED BY: I. N. AVERY	
PREPARED BY: P. C. LOUDER	REVISIONS	REVIEWED BY: G.A. FULLER, PE	SIGNATURE: <i>Gregory A. Fuller</i> DATE: 5/21/13
SCALE: 0	CADD File Name:		

- 1) RELOCATE EXISTING RADIO SYSTEM (RADIO, ANTENNA, AND ANTENNA MOUNTING HARDWARE) TO NEW POLE AND PROPOSED CABINET.
- 2) INSTALL NEW 2" RISER WITH WEATHERHEAD, CONDUIT AND COAXIAL CABLE BETWEEN RELOCATED RADIO AND RELOCATED ANTENNA.
- 3) INSTALL NEW COAXIAL CABLE SHIELD GROUNDING AND WEATHERPROOFING KIT.

INSTALL 8.5 DB GAIN YAGI ANTENNA
HORIZONTALLY POLARIZED

ATTACH ANTENNA ALONG MAST ARM
A MINIMUM OF 6FT. AWAY FROM THE
VERTICAL SHAFT MEMBER



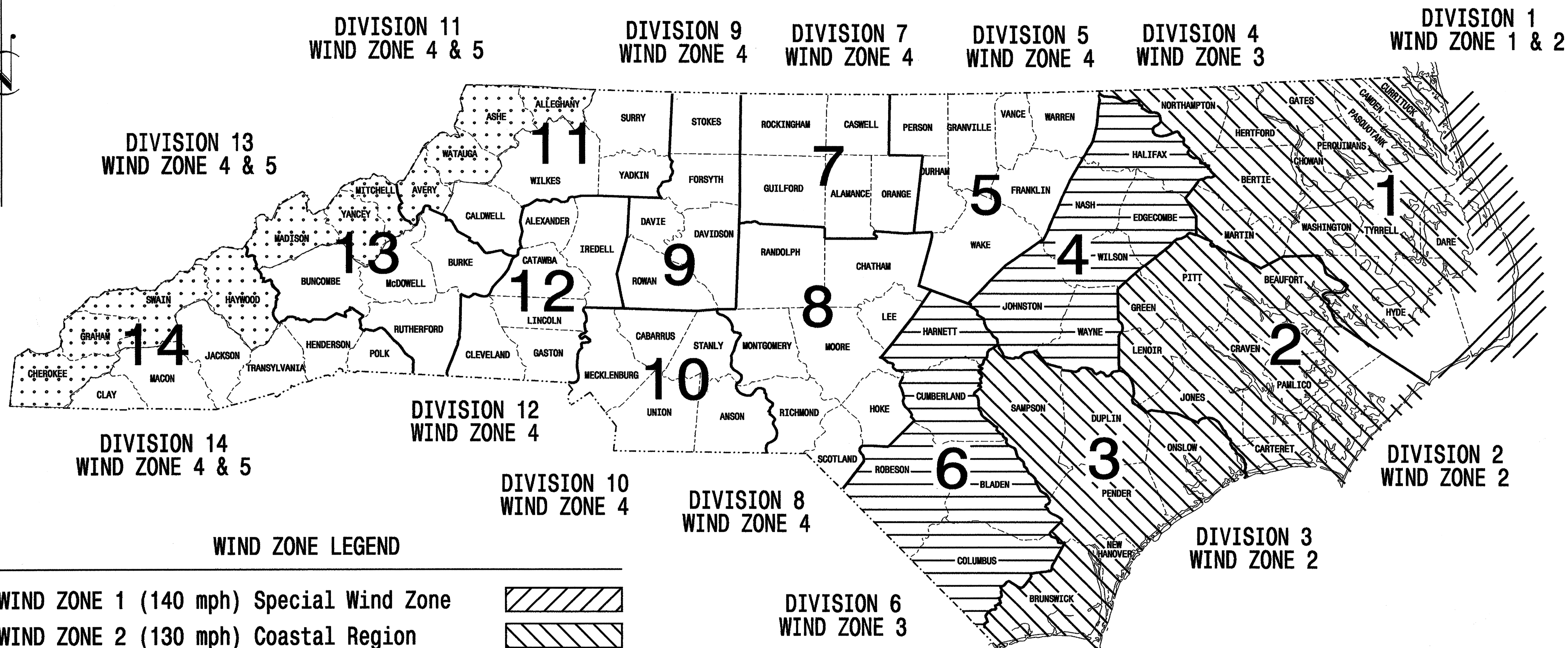
TMP PHASE FINAL

	WIRELESS COMMUNICATIONS PLANS ALONG NC 280 (AIRPORT ROAD)		
	DIVISION 13 BUNCOMBE COUNTY FLETCHER	PLAN DATE: MAY 2013 REVIEWED BY: I. N. AVERY	
PREPARED BY: P. C. LOUDER	REVISIONS	REVIEWED BY: G. A. FULLER, PE	SIGNATURE DATE: 5-21-13
SCALE: 0	REVISIONS	INIT. DATE	CADD File name:

STATE OF NORTH CAROLINA DIVISION OF HIGHWAYS

STATE	PROJECT NO.	SHEET NO.
N.C.	I-5501	Sig. 37
F. A. PROJ. NO.	M 1	
PROJECT ID. NO.		

STANDARD DRAWINGS FOR 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	

<http://www.ncdot.org/doh/preconstruct/traffic/tmssu/ws/default.htm>

Prepared in the Offices of:

122 N. McDowell St., Raleigh, NC 27603

Designed in conformance with the 2002 Interim to the 4th Edition 2001 **AASHTO** Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals

INDEX OF PLANS

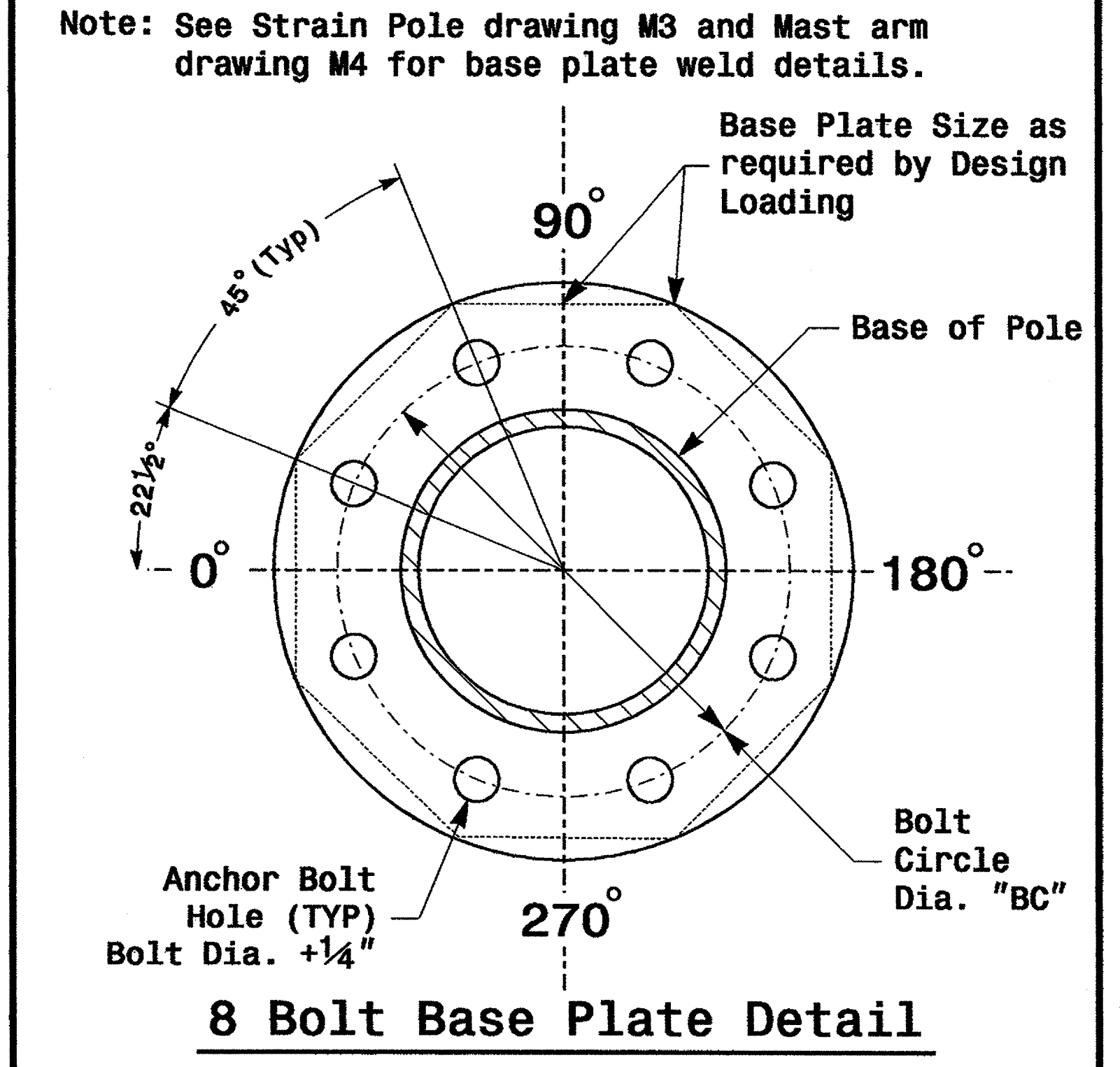
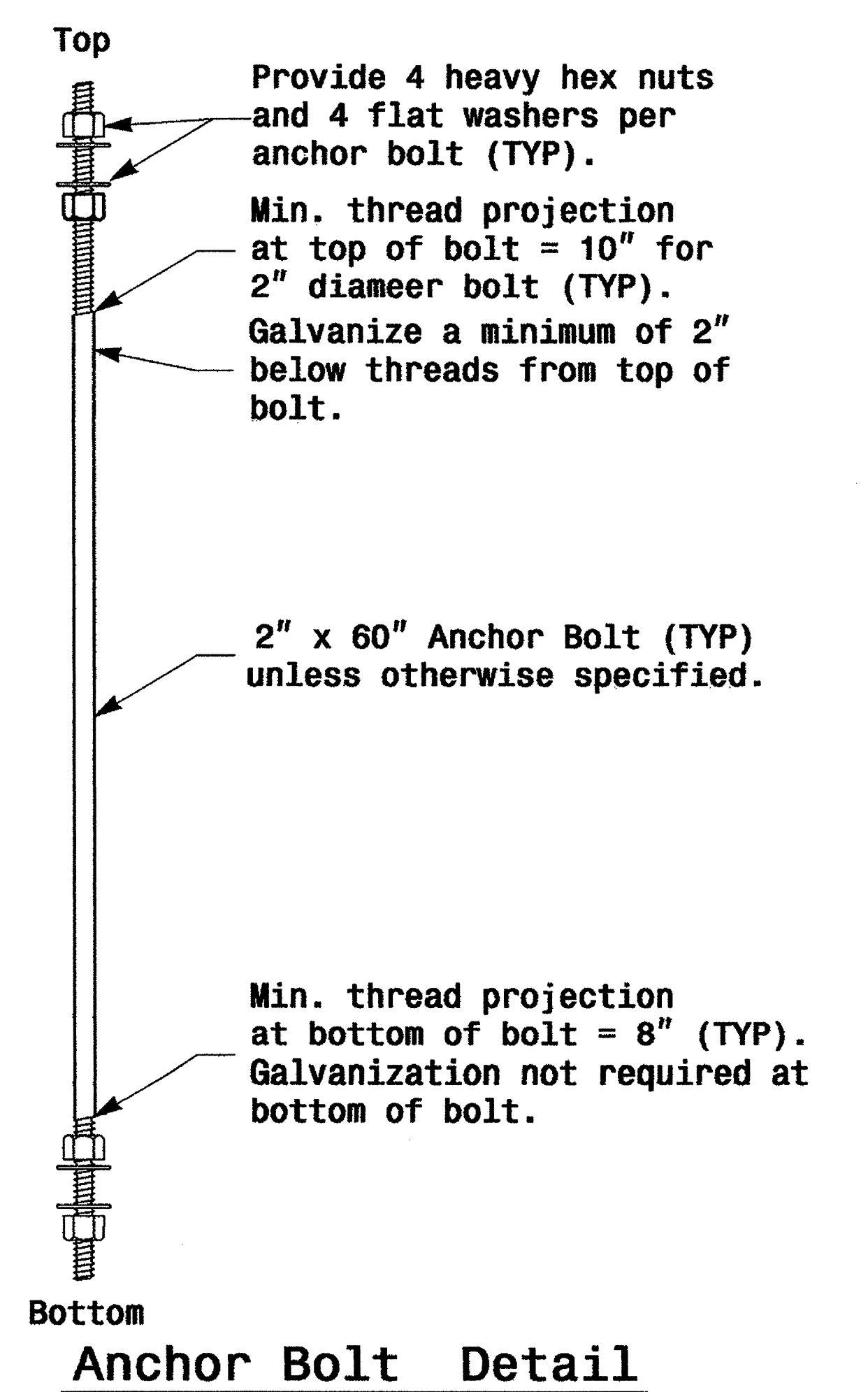
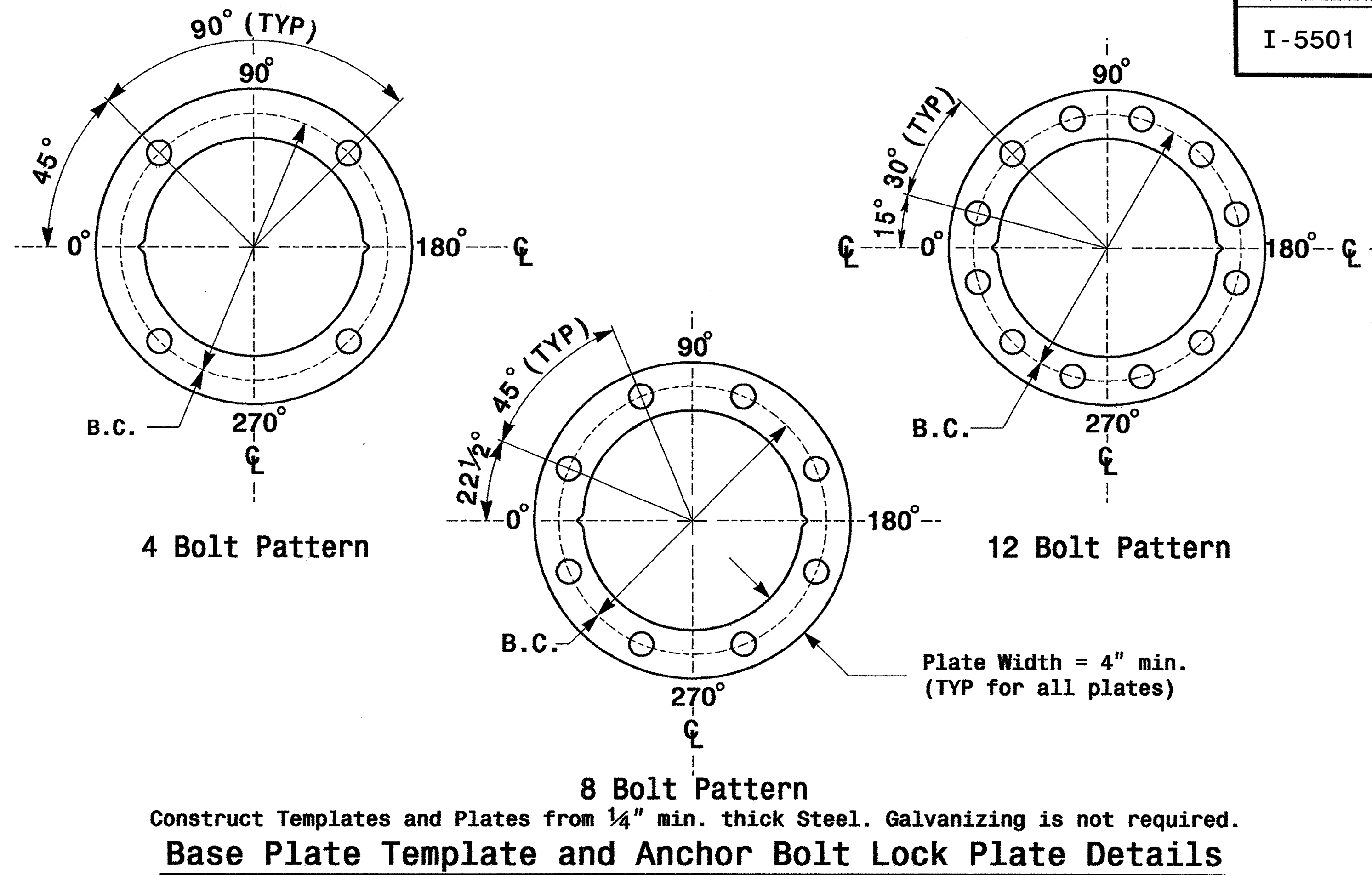
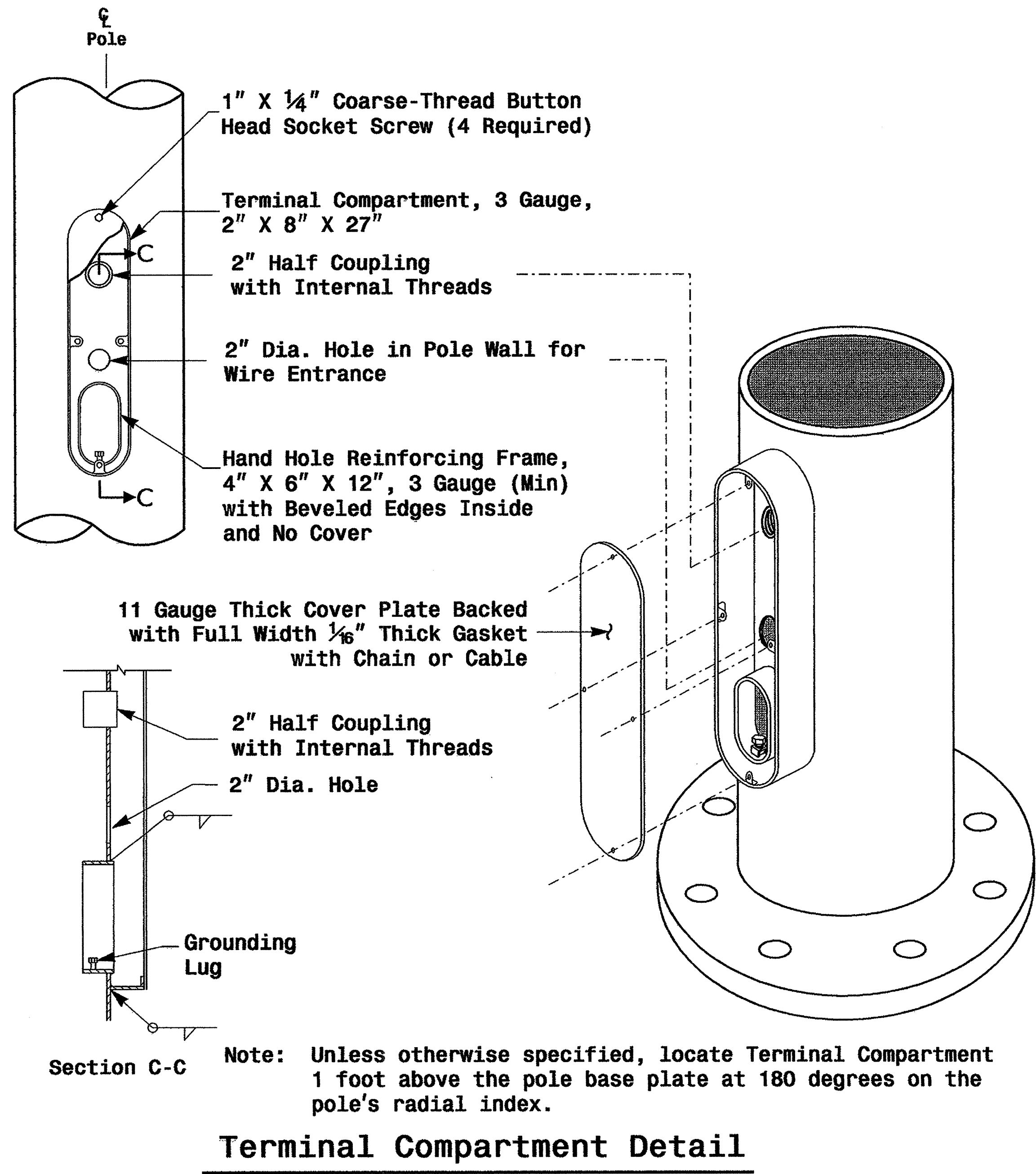
DRAWING NUMBER	DESCRIPTION
M 1	Title Sheet
M 2	Fabrication Details - All Poles
M 3	Fabrication Details - Strain Poles
M 4,5	Fabrication Details - Mast Arm Poles
M 6	Construction Details - Strain Poles
M 7	Construction Details - Foundations
M 8	Standard Strain Poles

NCDOT CONTACTS:
TRAFFIC ENGINEERING AND SAFETY SYSTEMS BRANCH

G. A. Fuller, P.E. - State ITS and Signals Engineer
 R. E. Mullinax, P.E. - Signals and Geometrics Engineer
 P. L. Alexander, P.E. - Signals and Geometrics Special Projects Engineer
 D. C. Sarkar, P.E. - Signals and Geometrics Structural Engineer
 A. M. Esposito, P.E. - Signals and Geometrics Project Engineer
 C. F. Andrews, Jr. - Signals and Geometrics Project Engineer

SEAL

D. Sarkar 9.2.2005
SIGNATURE DATE



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

MFG _____ MFG. DATE: MM/YY
SHAFT D/T/L/Y _____
ARM-A D/T/L/Y _____
ARM-B D/T/L/Y _____
A.B. DIA./B.C./L/Y _____
NCDOT STANDARD _____

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

MFG _____ MFG. DATE: MM/YY
SECTION D/T/L/Y _____
NCDOT STANDARD _____

- 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 plan pole I.D.
 - 5) See drawing M4 for mounting positions of I.D. tags.

Identification Tag Details

Fabrication Details - All Poles

Prepared in the Offices of:

Typical Fabrication Details Common To All Metal Poles

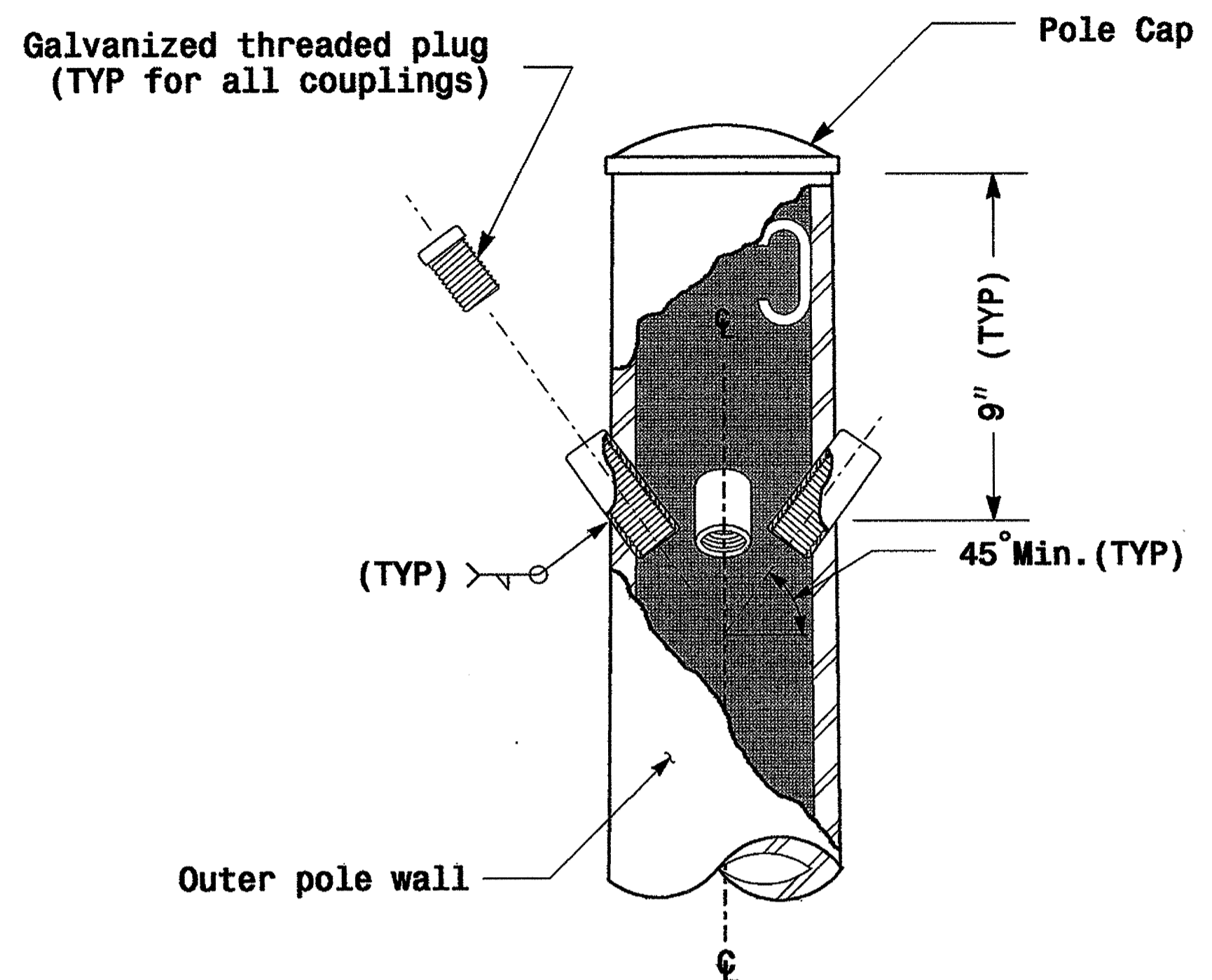
PLAN DATE: May 2005 REVIEWED BY: C.F. Andrews
PREPARED BY: P.L. Alexander REVIEWED BY: A.W. Esposito

REVISIONS	INIT.	DATE

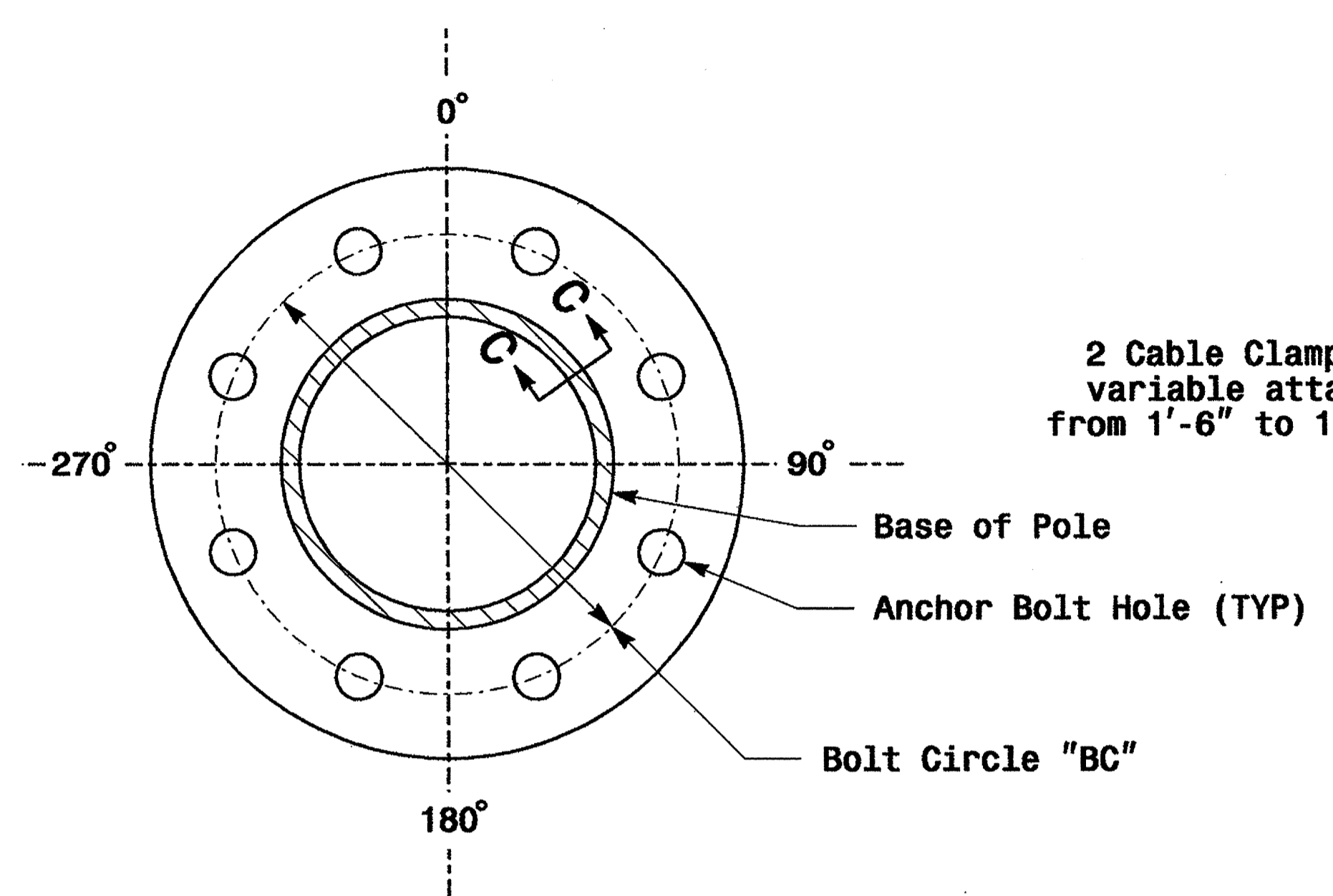
SCALE: 0 NA NONE

Signature: *D. Sarker* 22.2005
DATE: 22.2005
SIG. INVENTORY NO. _____

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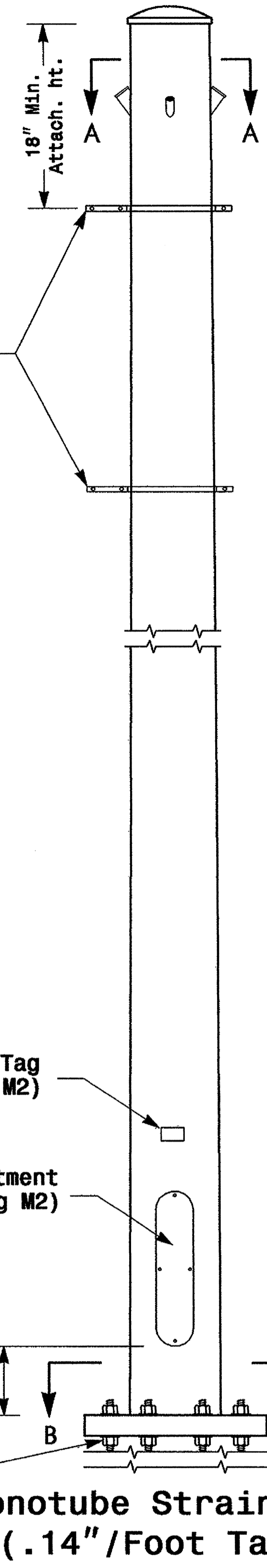


Cable Entrances at Top of Pole

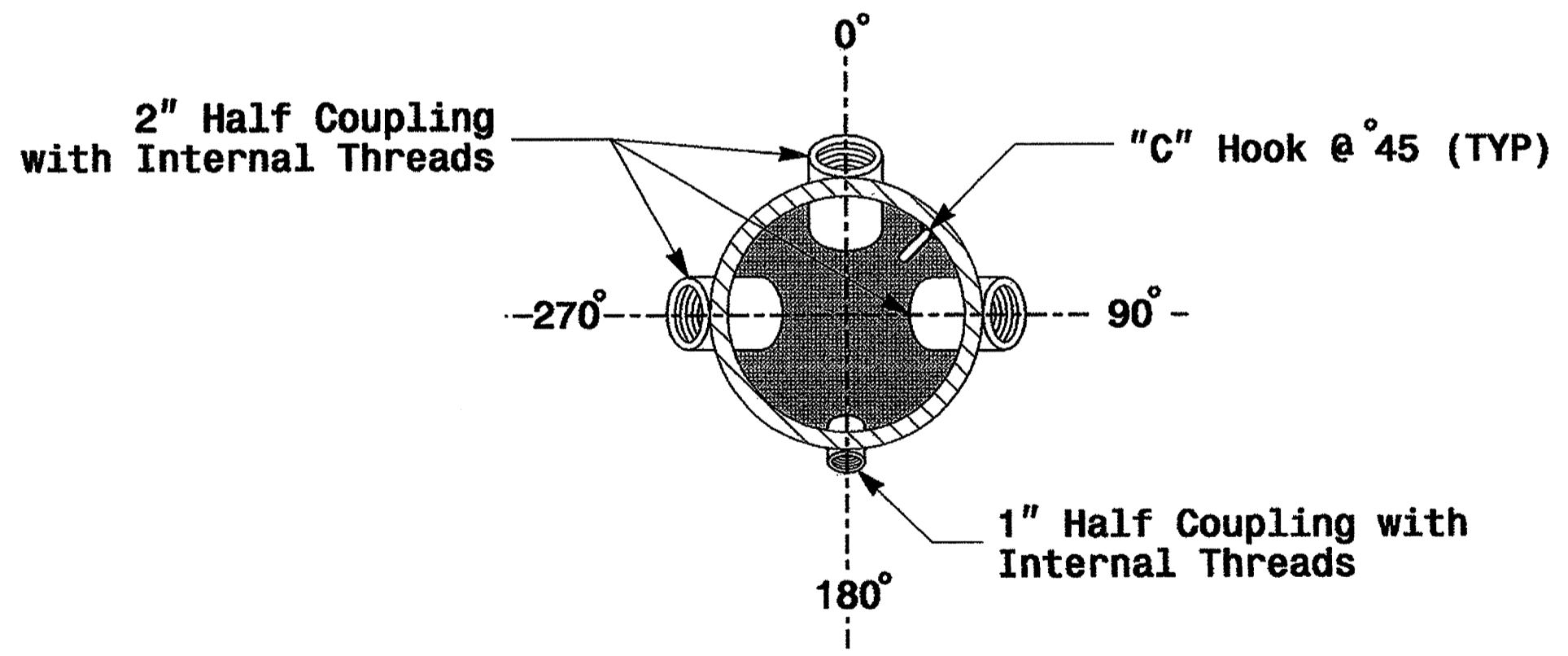


Section B-B
(See drawing M2)
Pole Base Plate

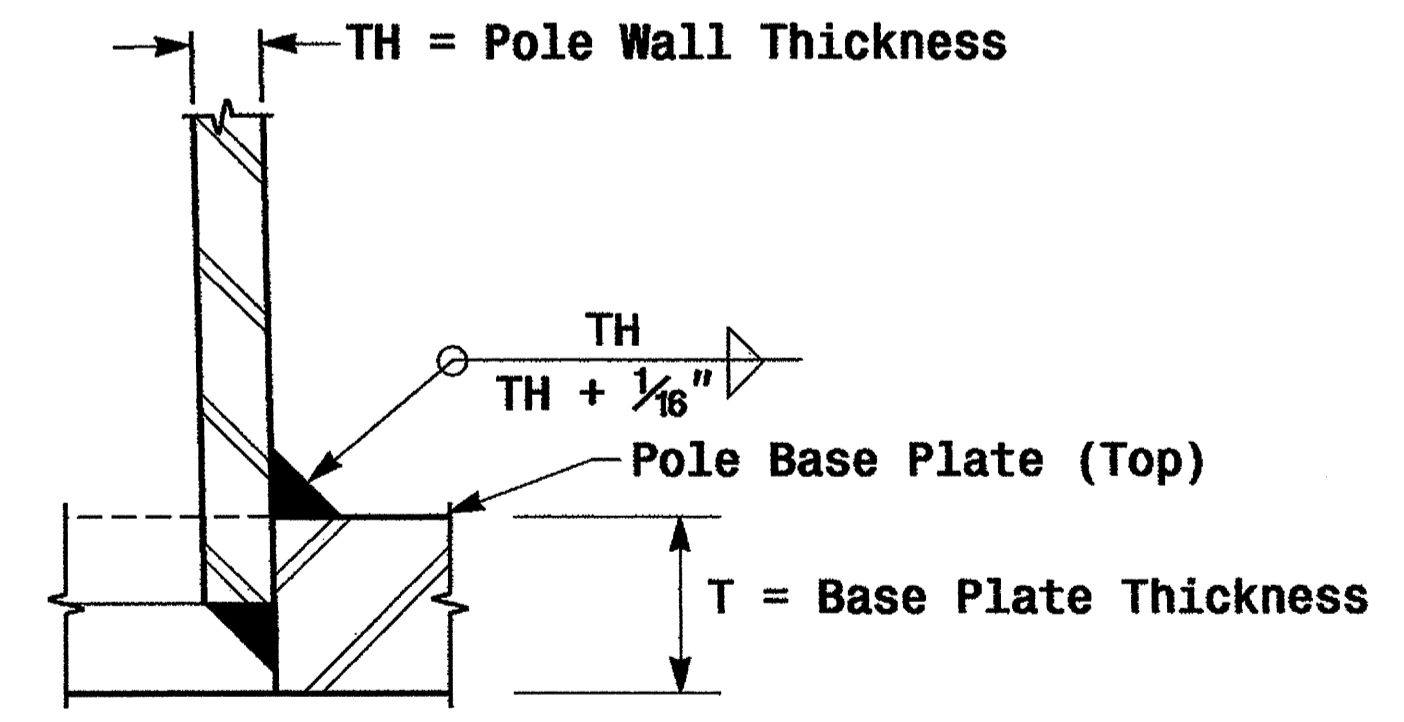
2 Cable Clamps designed for variable attachment heights from 1'-6" to 10' below the top of the pole.



Monotube Strain Pole
(.14"/Foot Taper)



Radial Orientation for Factory Installed Accessories at Top of Pole

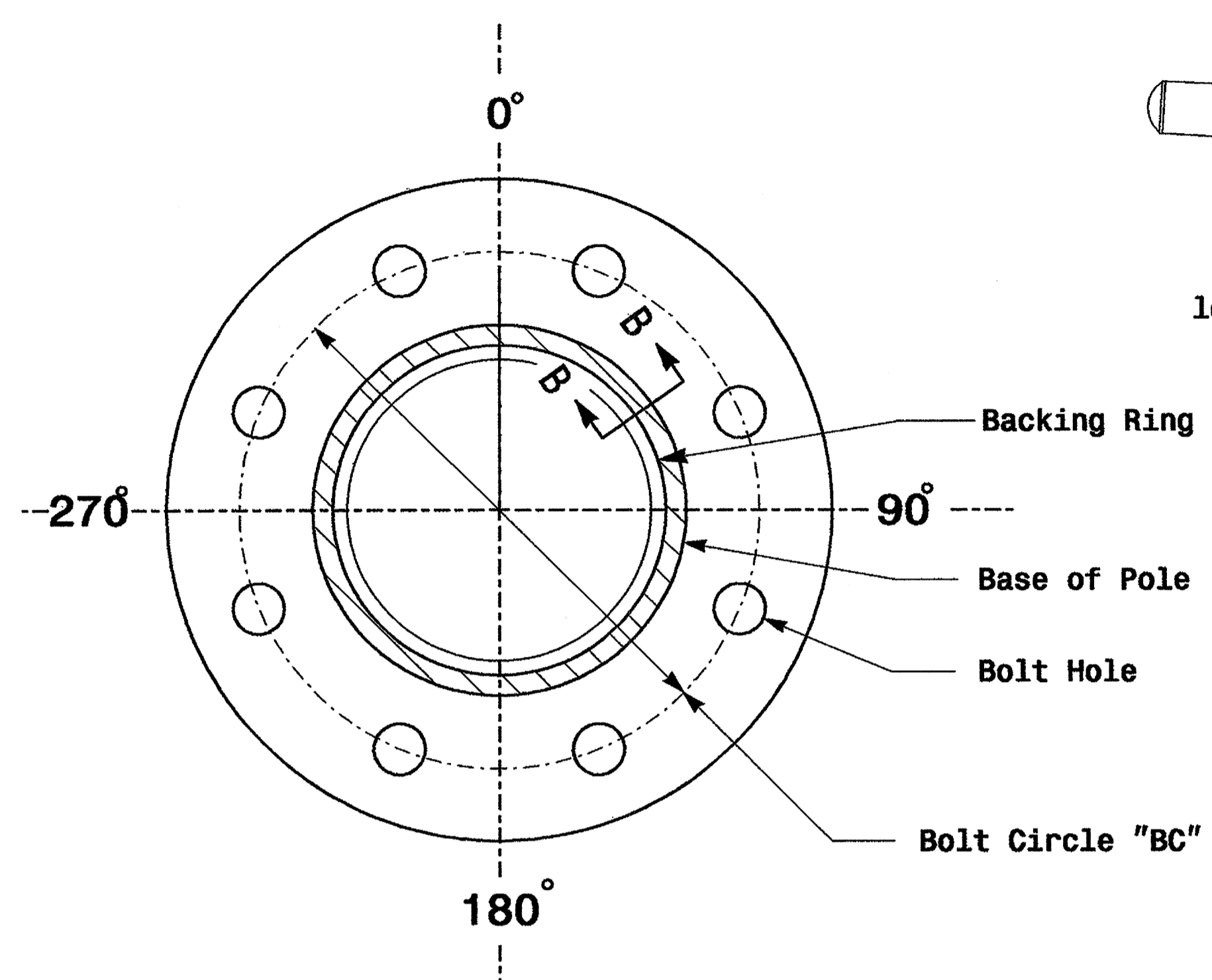


Socket Connection Weld Detail

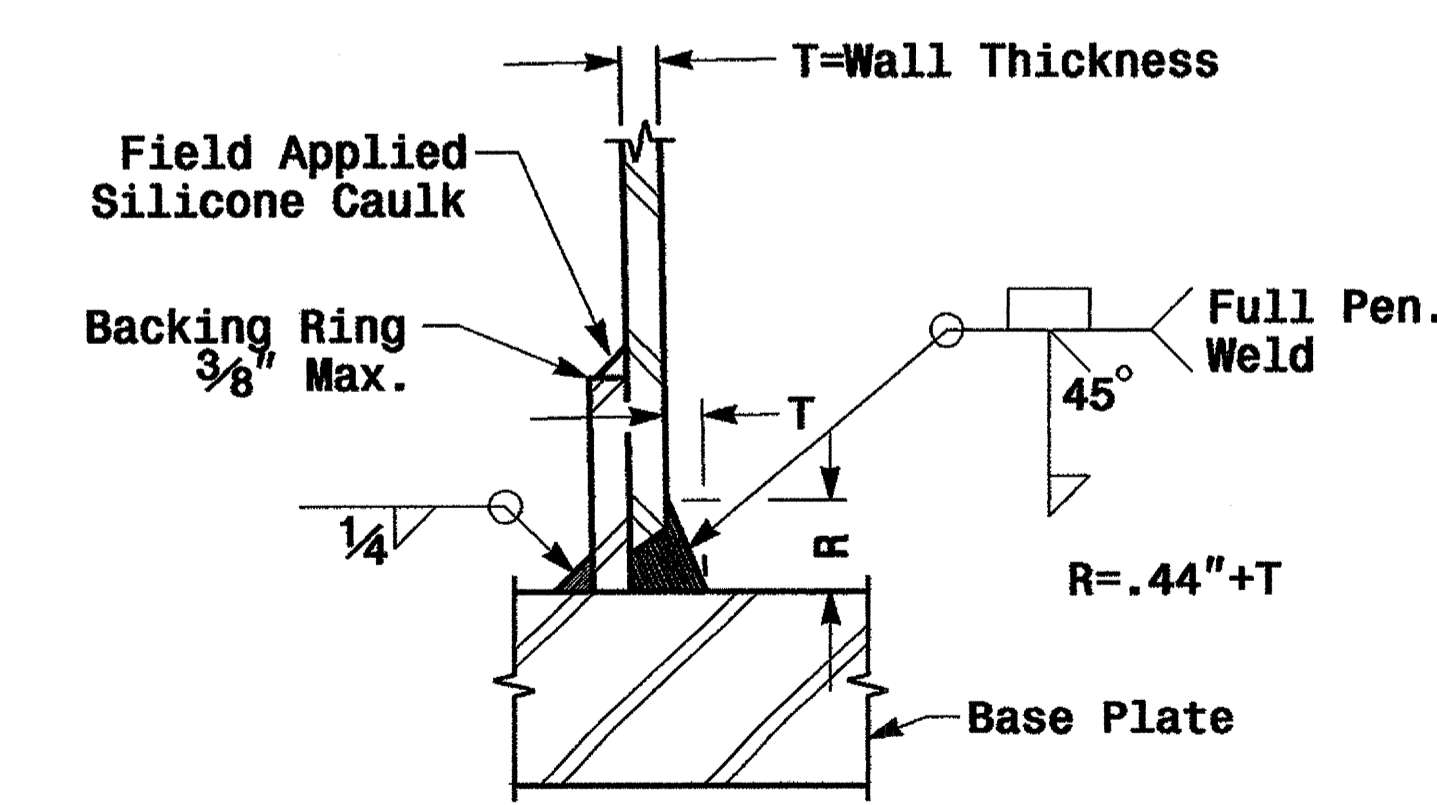
	Typical Fabrication Details For Strain Poles		
	PLAN DATE: May 2005	REVIEWED BY: C.F. Andrews	
PREPARED BY: P.L. Alexander	REVIEWED BY: A.M. Esposito	SIGNATURE: <i>D. Sarker</i>	DATE: 9.2.2005
SCALE: NA	REVISIONS:	INIT.:	DATE:
NONE	_____	_____	_____
122 N. McDowell St., Raleigh, NC 27603			SIG. INVENTORY NO.

Fabrication Details - Strain Poles

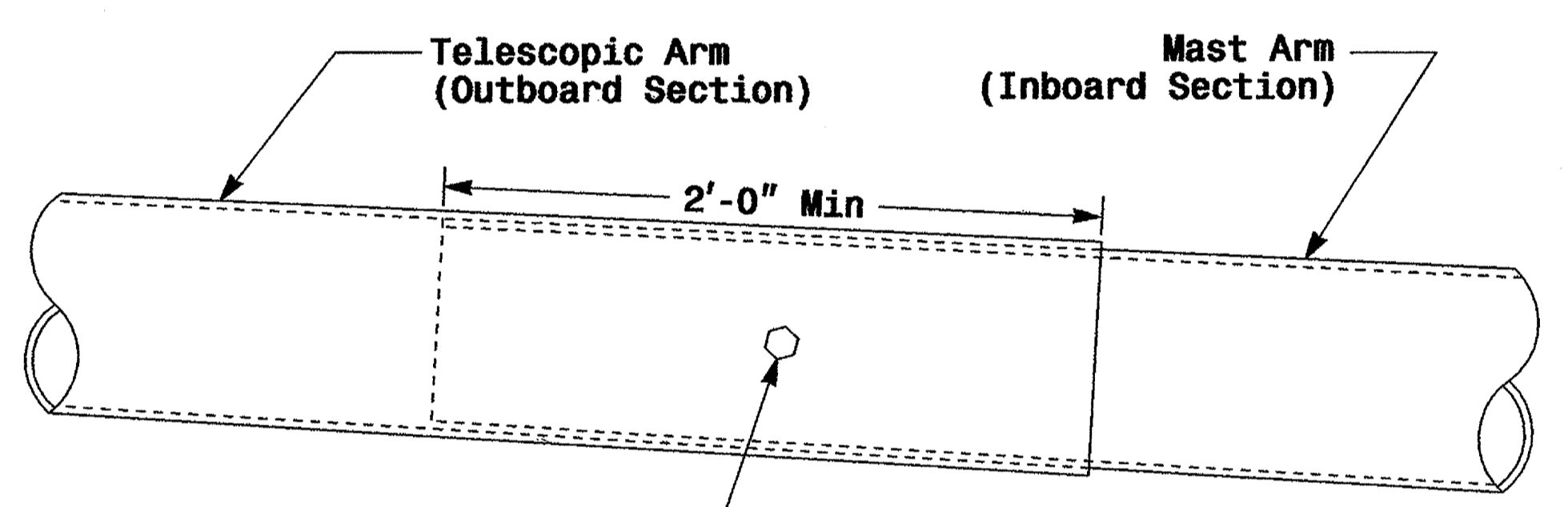
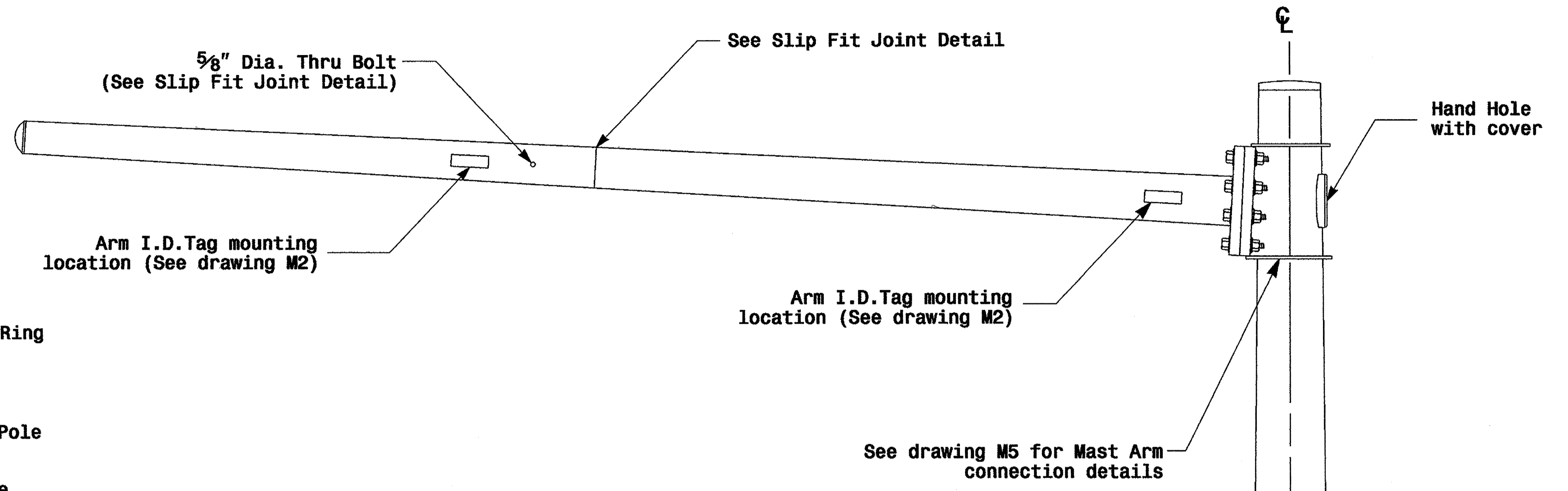
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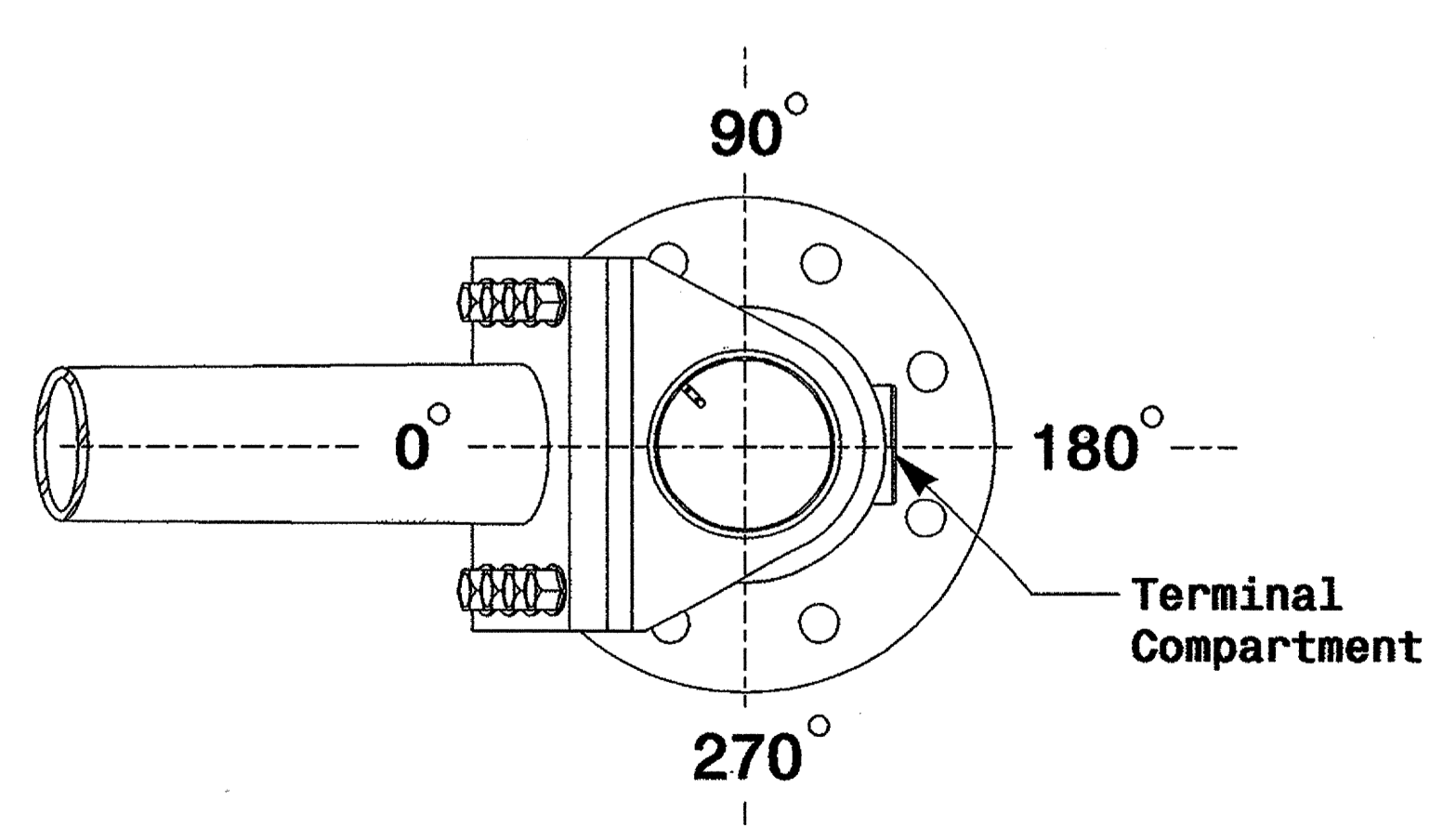
Section A-A
(See drawing M 2)
Pole Base Plate



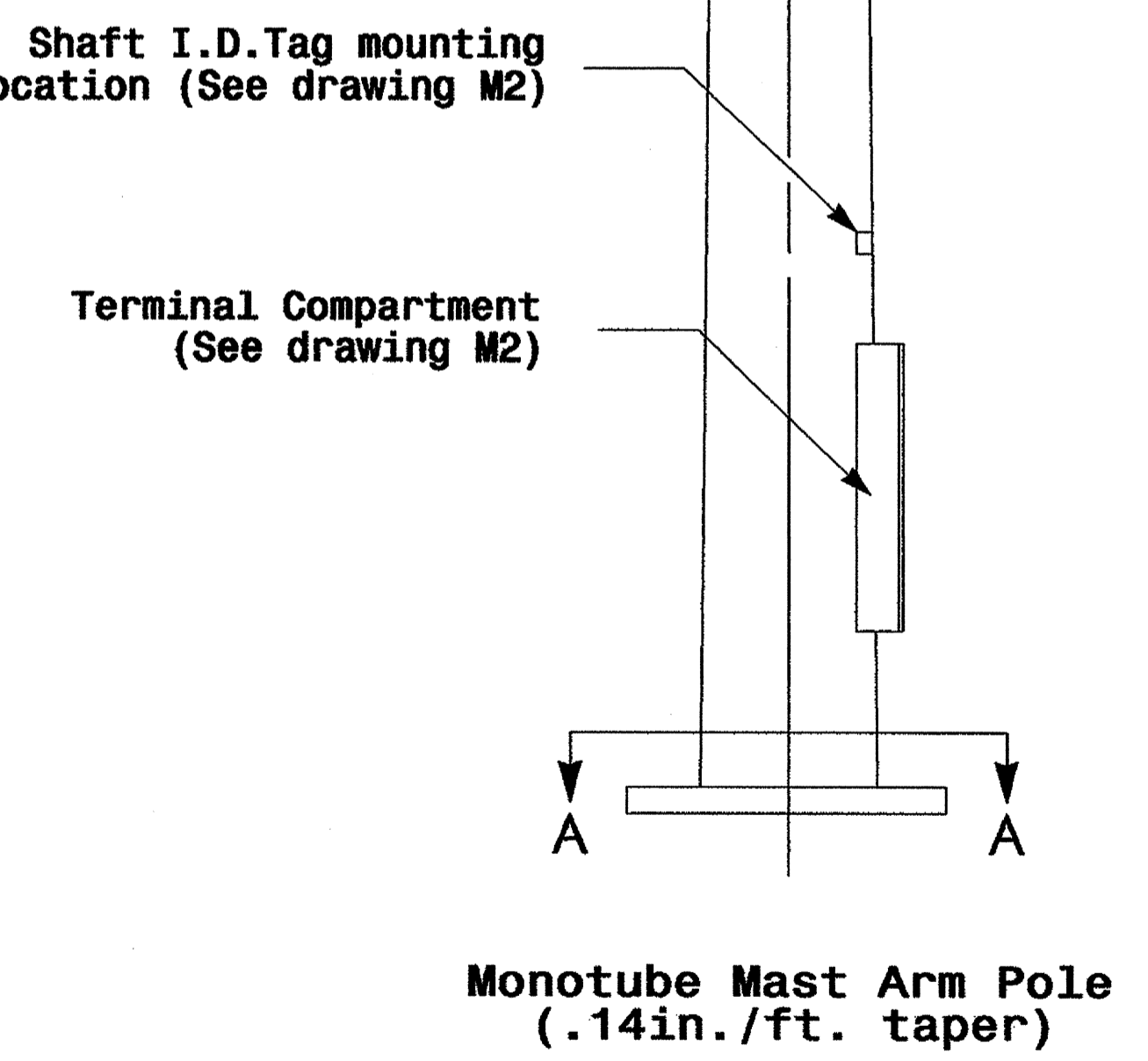
Section B-B
(Pole Attachment to Base Plate)
Full-Penetration Groove Weld Detail



Slip Fit Joint Detail for Mast Arm



Mast Arm Radial Orientation



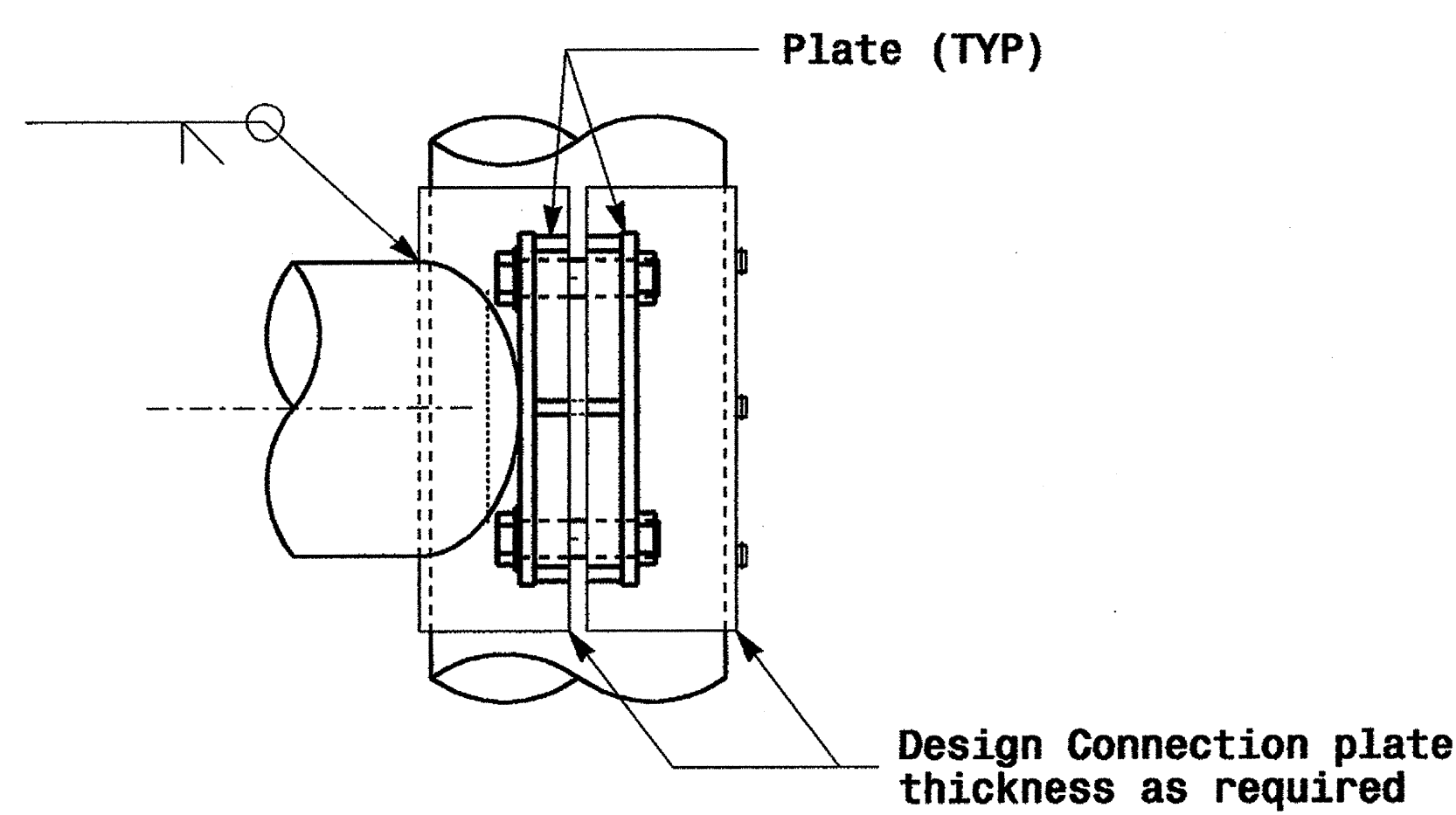
Monotube Mast Arm Pole
(.14in./ft. taper)

Fabrication Details - Mast Arm Poles

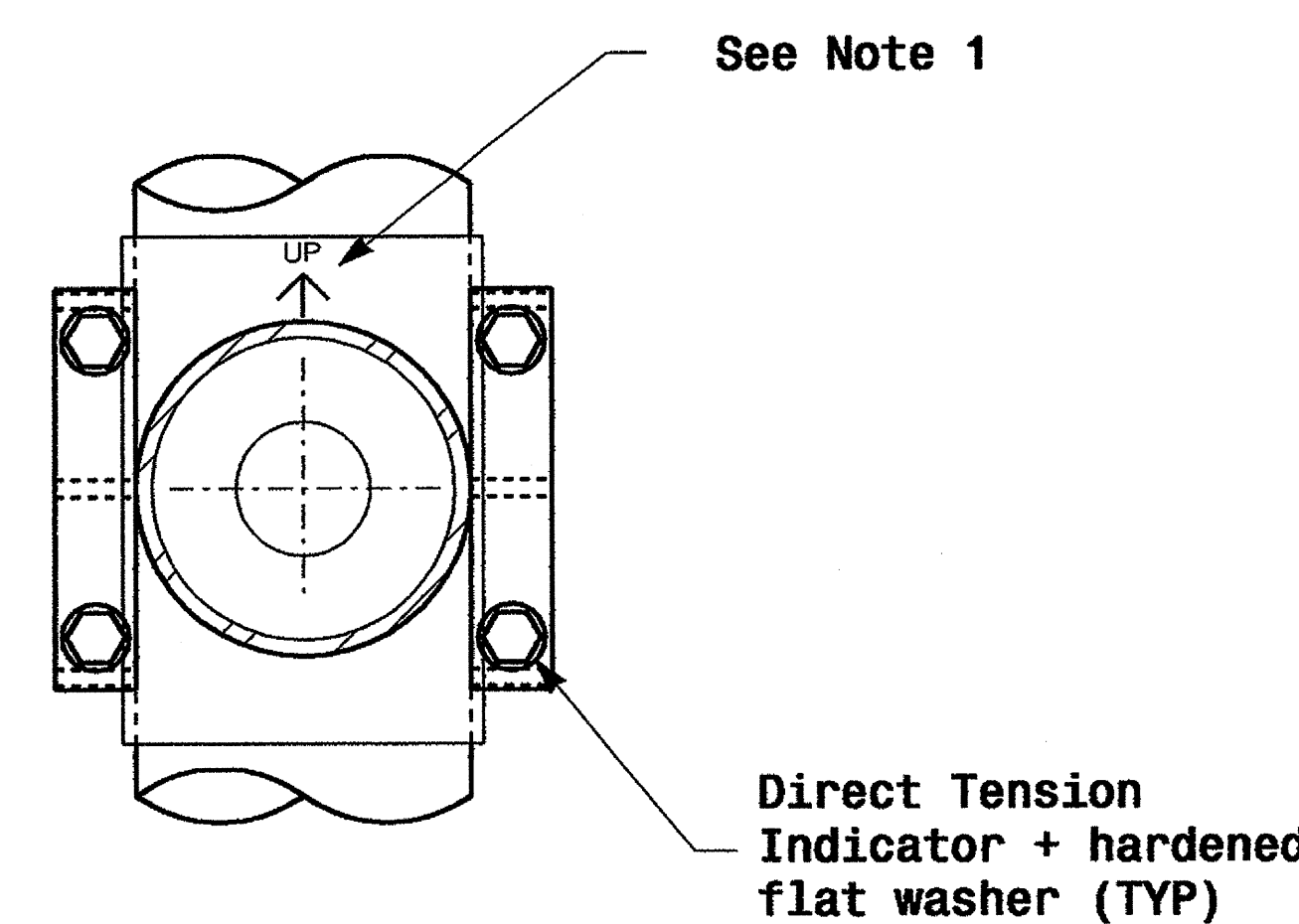
01-SEP-2005 14:08 v:\p\p\p\1es-un1\work\kgroups\2004\m1.dgn

	Typical Fabrication Details for Mast Arm Poles		
	PLAN DATE: May 2005 PREPARED BY: P.L. Alexander	REVIEWED BY: C.F. Andrews REVIEWED BY: A.M. Esposito	
SCALE: NA NONE	REVISIONS:	INIT. DATE	STG. INVENTORY NO.

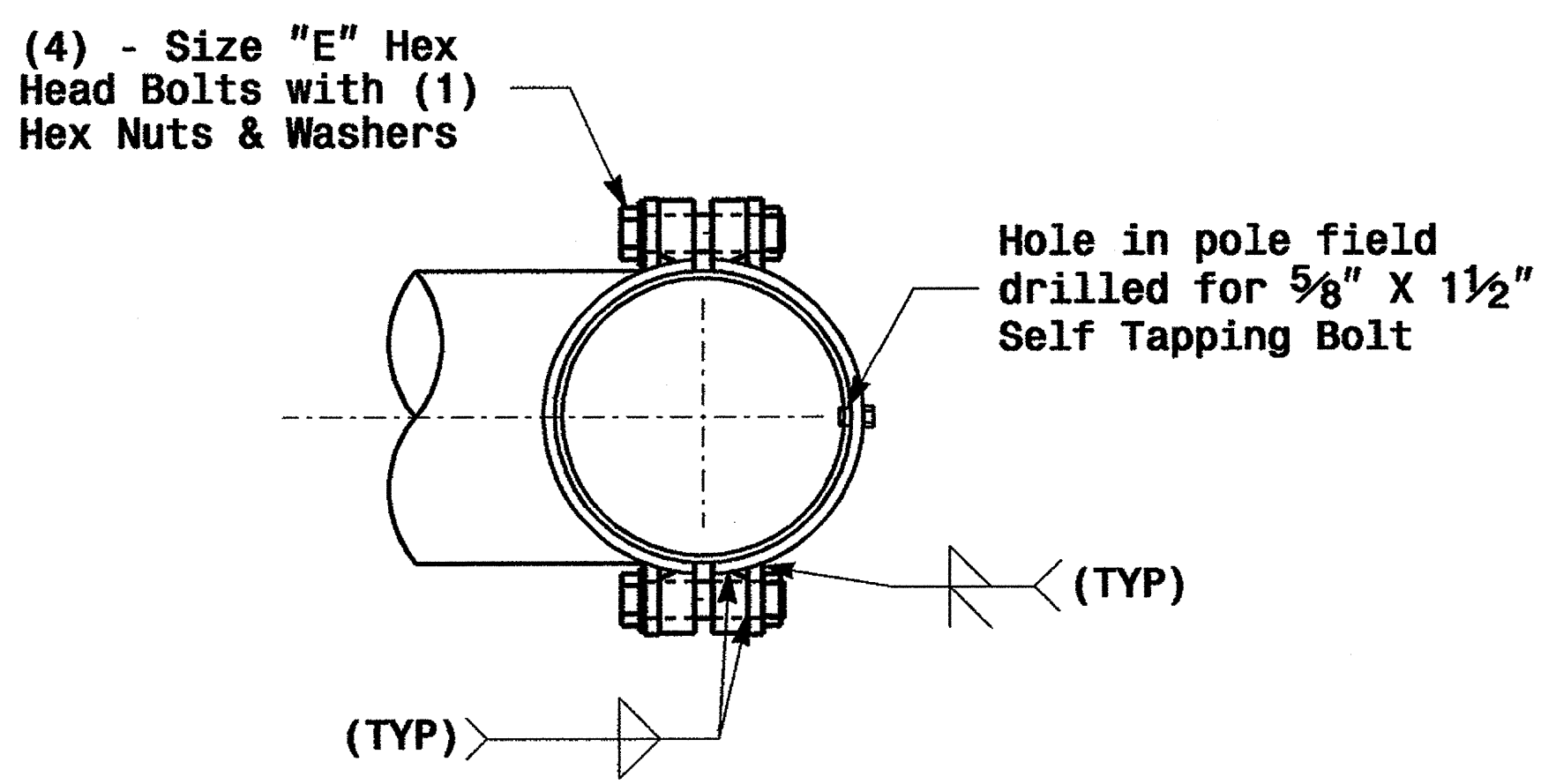
Adjustable Clamp Type Bolted Mast Arm Connection



Side Elevation View

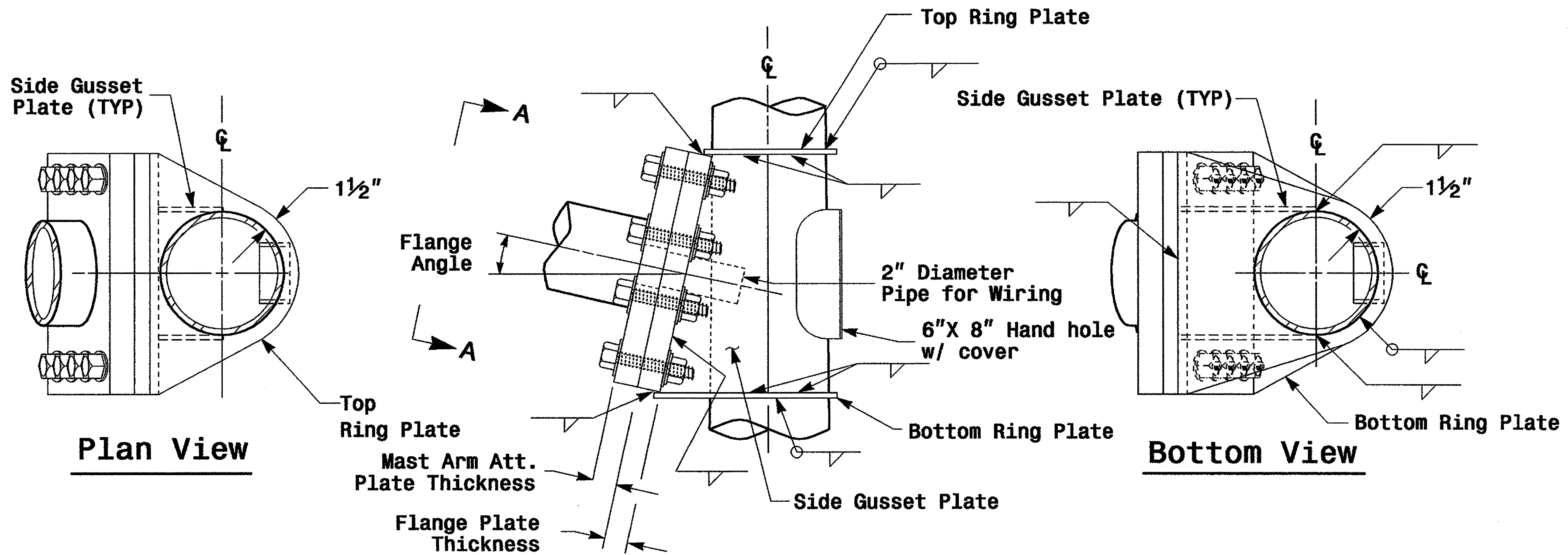


Front Elevation View



Plan View

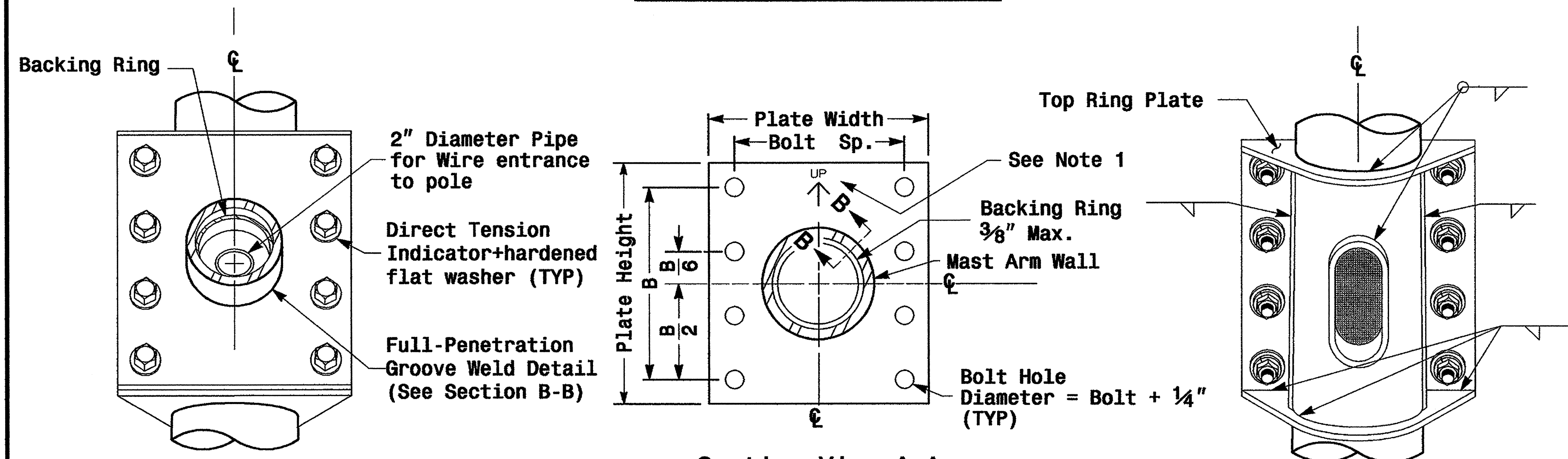
Welded Ring Stiffened Mast Arm Connection



Plan View

Side Elevation View

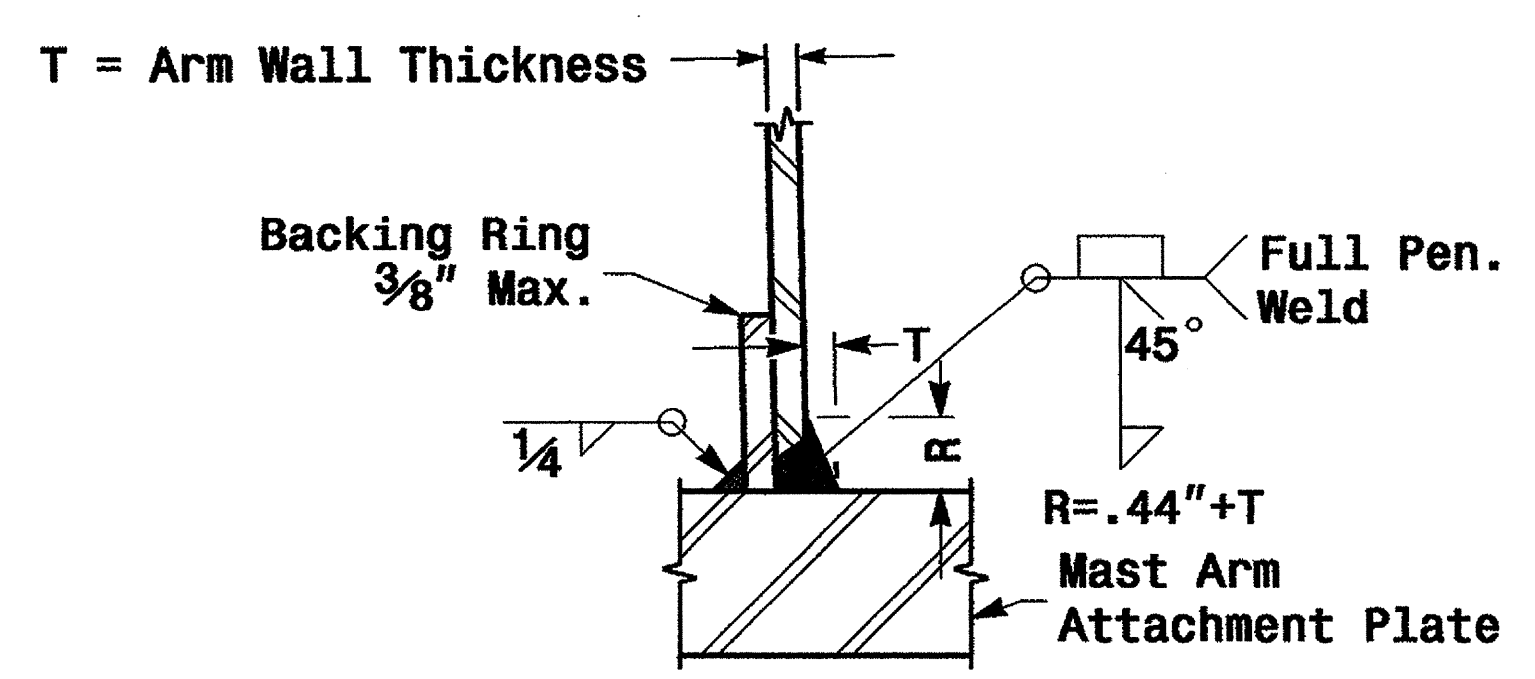
Bottom View



Front Elevation View

Mast Arm Attachment Plate

Back Elevation View



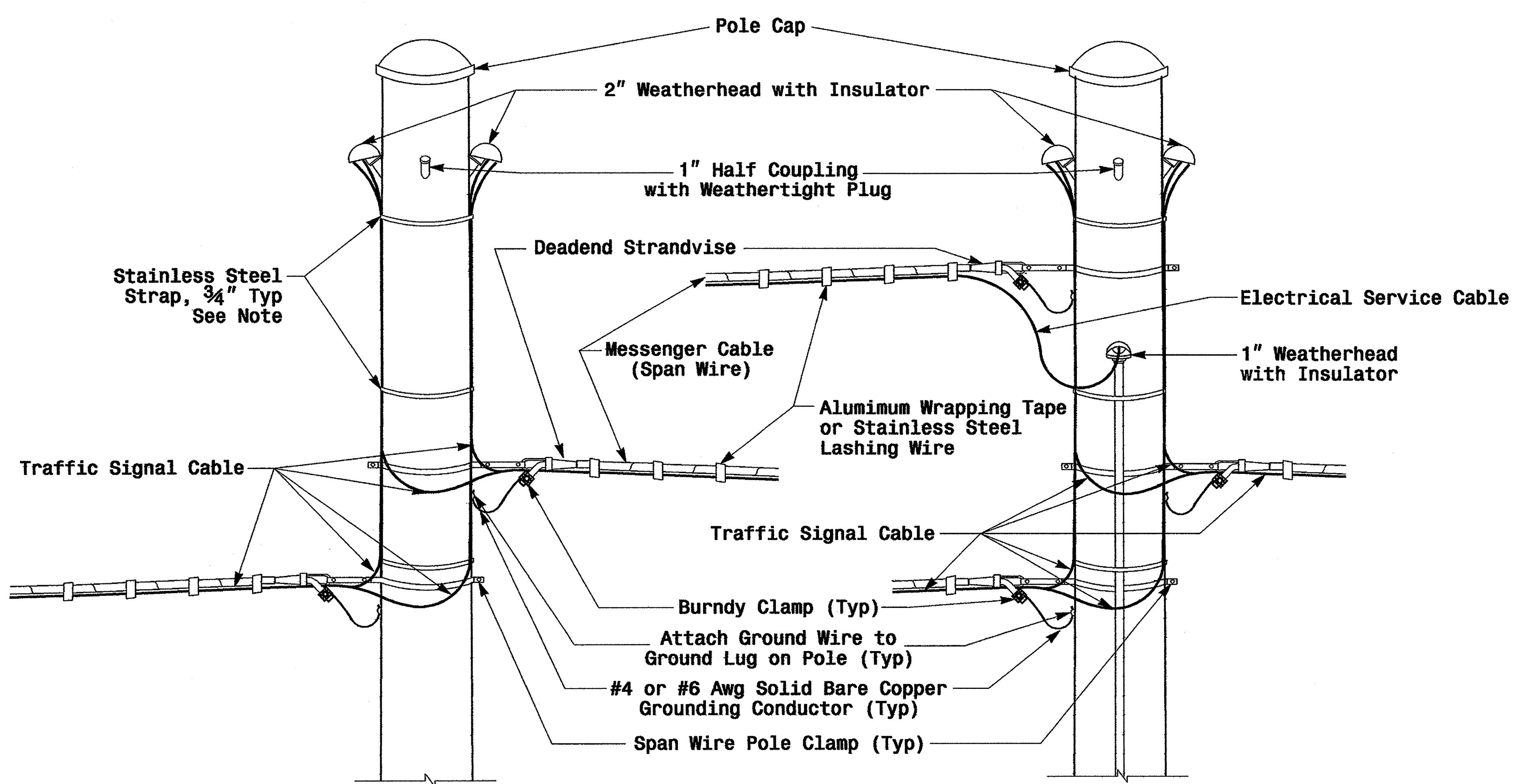
Section B-B Full-Penetration Groove Weld Detail

- 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. Designer is responsible for providing appropriate drainage points.

	Fabrication Details For Mast Arm Connection To Pole		
	PLAN DATE: May 2005 PREPARED BY: P.L. Alexander SCALE: NONE	REVIEWED BY: C.F. Andrews REVIEWED BY: A.W. Esposito REVISIONS: _____ INIT. DATE: _____	

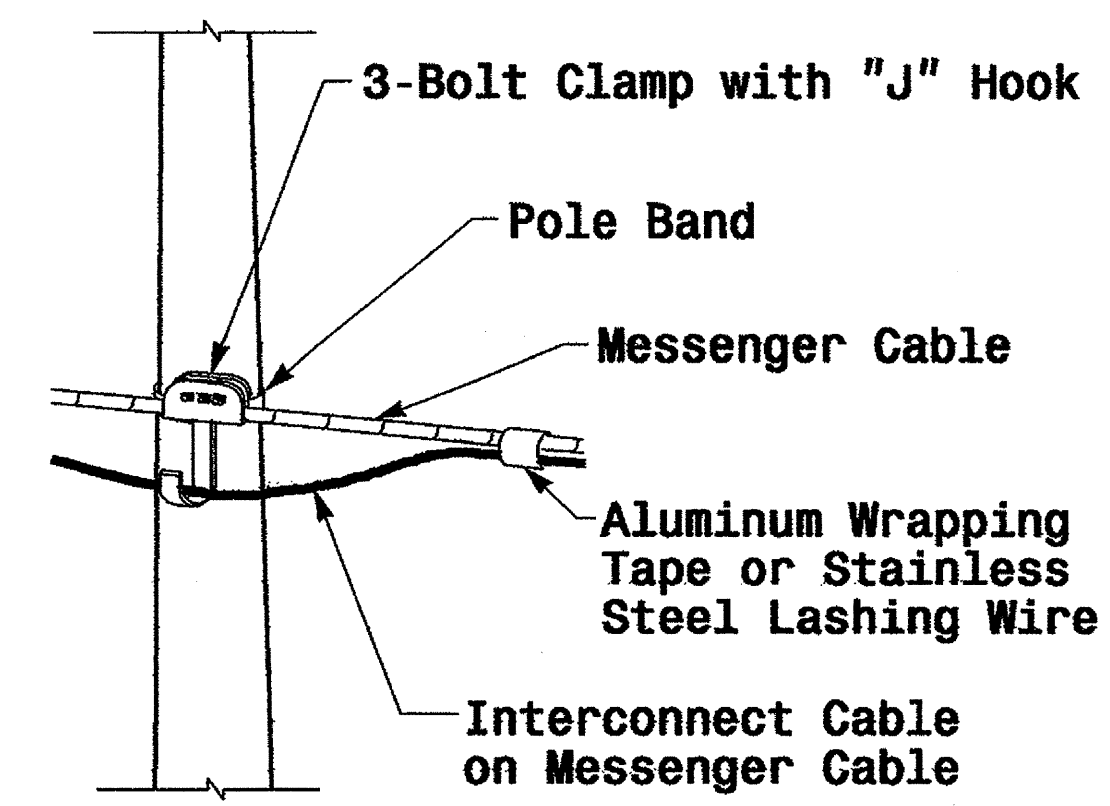
Fabrication Details - Mast Arm Poles

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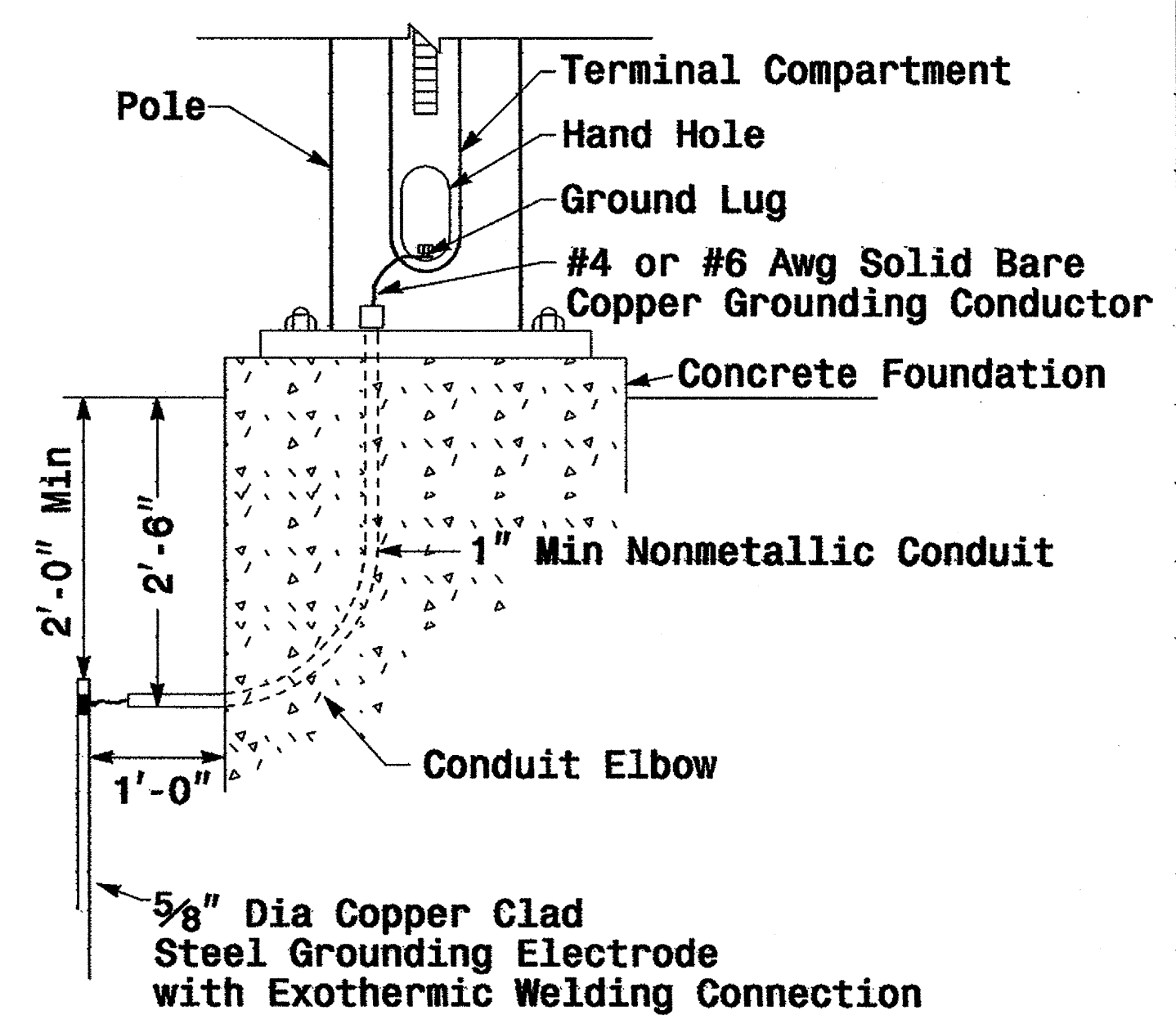


Note: Strap all signal cables to the side of the pole with 3/4" stainless steel straps when the distance between the spanwire attachment clamp and the weatherheads exceeds 36"

Strain Pole Attachments



Attachment of Cable to Intermediate Metal Pole

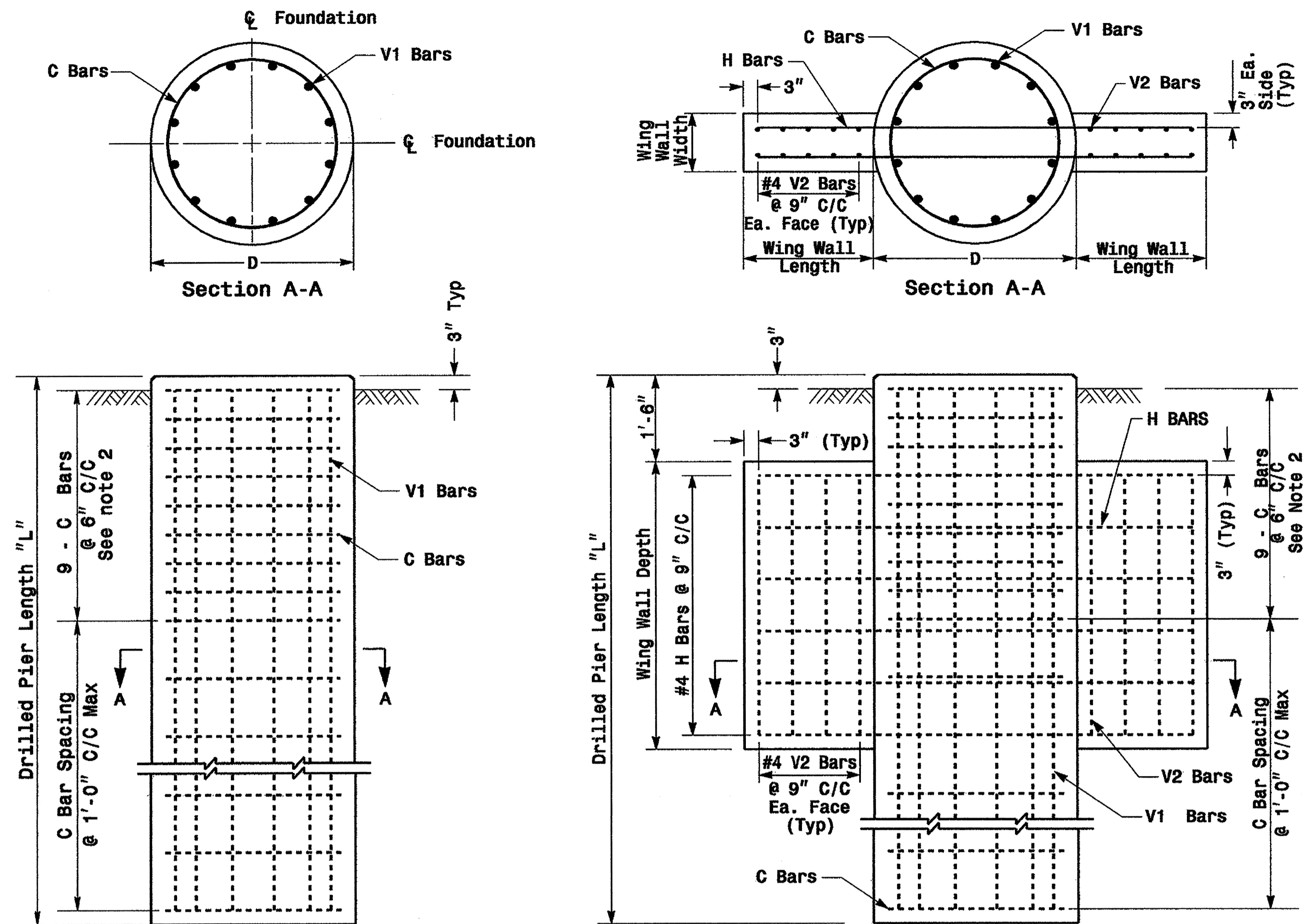


Metal Pole Grounding Detail

01-SEP-2005 16:33
w:\projects\sum\theck\pape\2004 metal pole standard\2004 mg.dgn
palexander

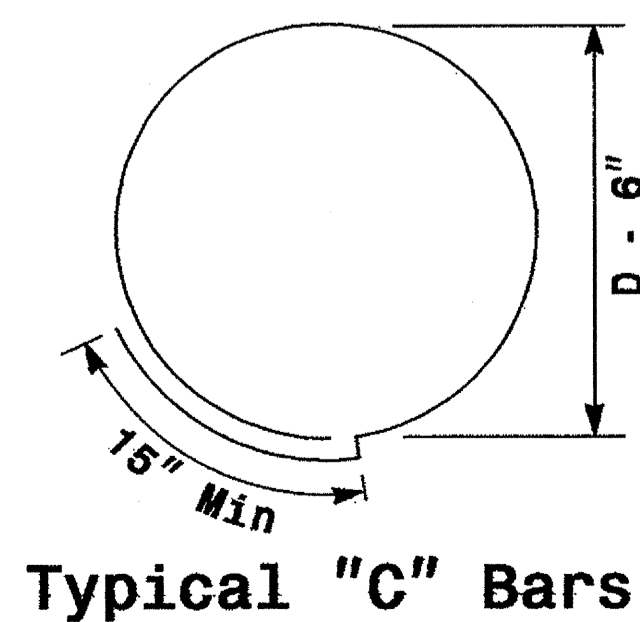
	Construction Details Strain Poles		
	PLAN DATE: May 2005 PREPARED BY: C.F. ANDREWS REVISIONS:	REVIEWED BY: P.L. ALEXANDER REVIEWED BY: D.C. SARKAR INT. DATE:	
SCALE: 0 NA NONE			

Reinforcing Steel Bars



REINFORCING STEEL TABLE FOR STANDARD DRILL PIER SHAFT (42" & 48" DIAMETER)						
Shaft Dia (in.)	Conc. Volume (cu. yds.)	Bar Name	No.	Size	Type	Length
42"	.356 x L	V1	9	#8	STR.	**
		C	*	#4	CIR.	10'-9"
48"	.465 x L	V1	12	#8	STR.	**
		C	*	#4	CIR.	12'-6"

* See Note No. 1
** See Note No. 3



Typical "C" Bars

REINFORCING STEEL TABLE FOR STANDARD 42" and 48" DRILL PIER SHAFT WITH TYPE 1 AND TYPE 2 WING WALLS						
Wing Wall Type	Drill Pier Shaft Dia. (in.)	Reinforcing Steel				
		Bar Name	No.	Size	Type	Length
TYPE 1	42"	V1	9	#8	STR.	**
		V2	12	#4	STR.	2'-6"
		H	8	#4	STR.	6'-0"
		C	*	#4	CIR.	10'-9"
TYPE 2	42"	V1	9	#8	STR.	**
		V2	16	#4	STR.	4'-6"
		H	12	#4	STR.	9'-0"
		C	*	#4	CIR.	10'-9"
TYPE 2	48"	V1	12	#8	STR.	**
		V2	16	#4	STR.	4'-6"
		H	12	#4	STR.	9'-6"
		C	*	#4	CIR.	12'-6"

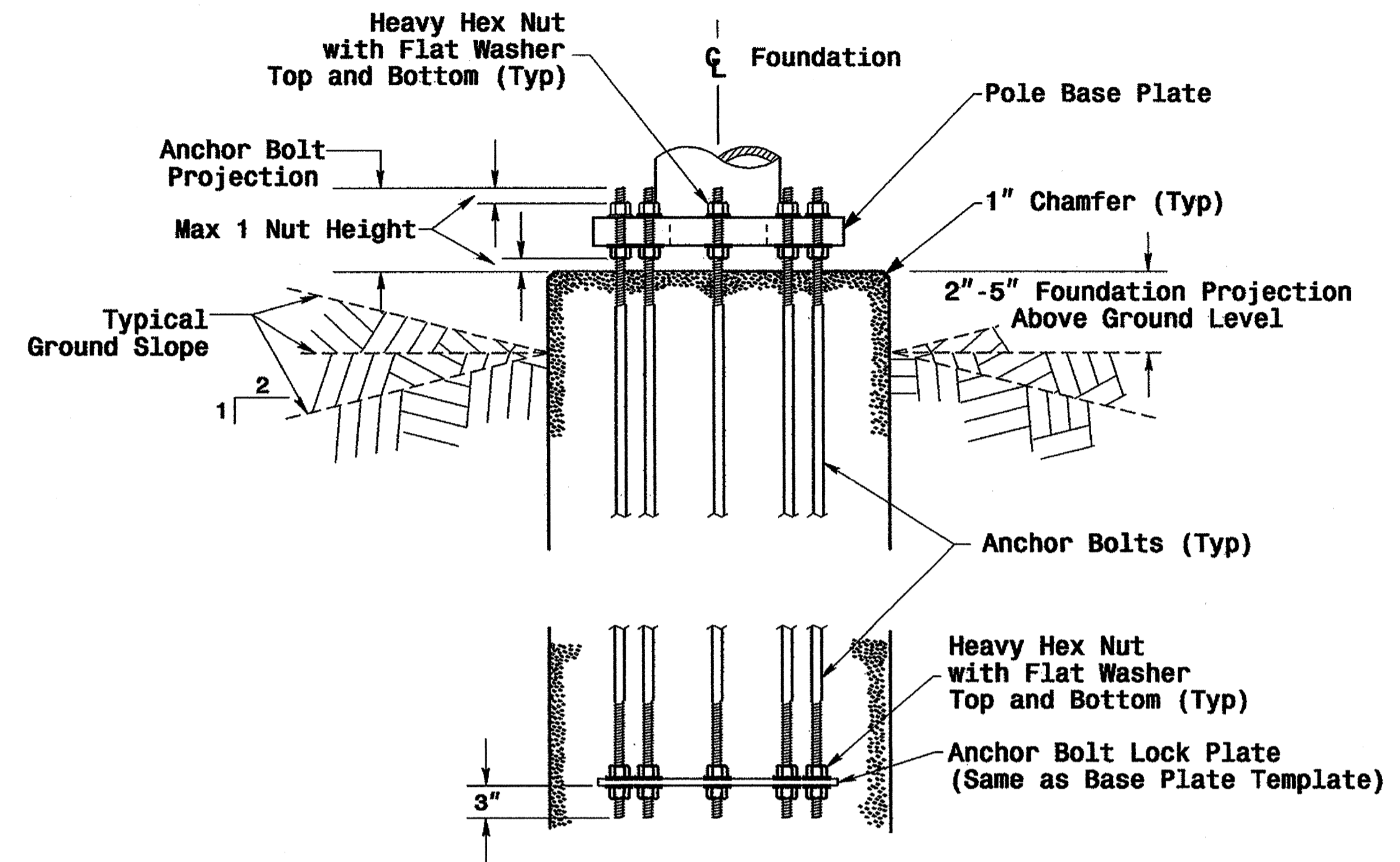
* See Note No. 1
** See Note No. 3

WING WALL DETAILS				
Wing Wall Type	Wing Wall Length (Ft.)	Wing Wall Width (Ft.)	Wing Wall Depth (Ft.)	Concrete Volume (Cu. Yds.)
TYPE 1	1'-6"	1'-0"	3'-0"	.4
TYPE 2	3'-0"	1'-0"	5'-0"	1.2

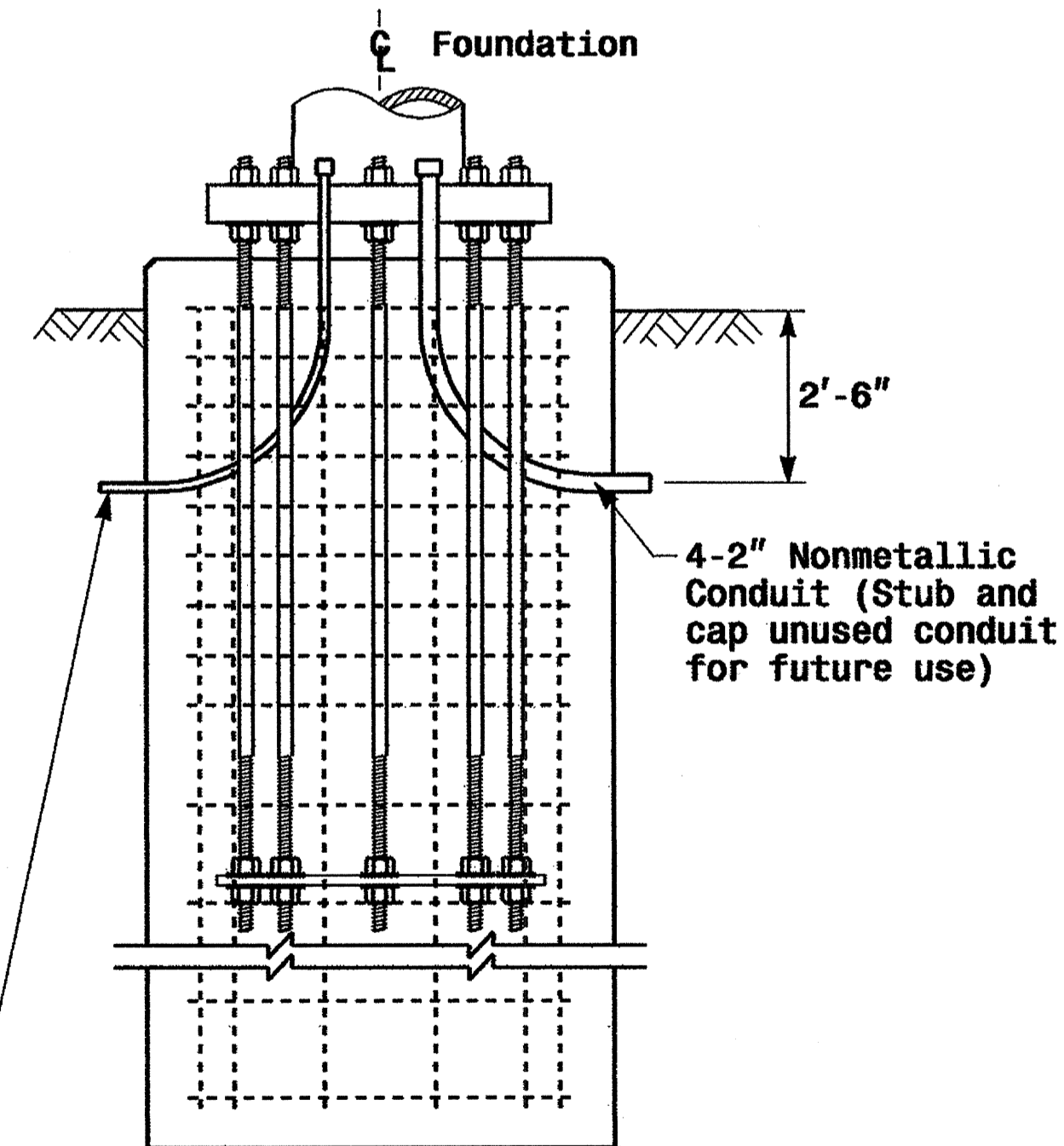
See Note No. 4

Typical Foundation Anchor Bolt Details

(Reinforcing Cage Not Shown for Clarity)



Typical Foundation Conduit Details



2-1" Nonmetallic Conduits for Electrical Service and Grounding Electrode Conductor

Notes

- The number of C-bars is based on foundation depth. For standard foundations, see sheet M 8.
- Circular tie reinforcing rings may be vertically adjusted by +/- 3" at a depth between 2'-0" and 3'-0" to facilitate the installation of electrical conduit entering in the cage.
- The length of V1-bars is based on foundation depth. For standard foundations, see sheet M 8.
- The quantities for steel and concrete shown in the Wing Wall Details Chart reflect the amount of material for 1 pair of wing walls (2 wing walls per drilled pier shaft.)

	Construction Details Foundations		SEAL
	PLAN DATE: May 2005 PREPARED BY: C.F. ANDREWS	REVIEWED BY: P.L. ALEXANDER REVIEWED BY: A.M. ESPOSITO	REVISIONS INIT. DATE
SCALE: 0 NA NONE			

		STANDARD STRAIN POLES				STANDARD FOUNDATIONS 42" Diameter Drilled Pier Length (L) - Feet						
		Case No.	Pole Height (Ft.)	Base Plate BC (In.)	Moment at the Pole Base (ft-kp)	Clay				Sand		
						Medium N-Value 4-8	Stiff N-Value 9-15	Very Stiff N-Value 16-30	Hard N-Value >30	Loose N-Value 4-10	Medium N-Value 11-30	Dense N-Value >30
WIND ZONE 1	LIGHT	S26L3	26	25	280	20.5	14.0	11.5	9.5	18.0	16.0	14.0
		S30L3	30	25	310	21.0	14.5	11.5	9.5	18.5	16.5	14.5
		S35L3	35	25	350	22.5	15.0	12.0	10.0	19.5	17.5	15.5
	HEAVY	S30H3	30	29	450	25.5	16.5	13.0	11.0	21.0	18.5	16.5
		S35H3	35	29	540	26.0	17.0	13.5	11.5	22.0	19.5	17.0
WIND ZONE 2	LIGHT	S26L2	26	23	250	19.5	13.5	11.0	9.0	18.0	15.5	14.0
		S30L2	30	23	290	20.0	14.0	11.5	9.5	18.5	16.0	14.0
		S35L2	35	23	315	21.0	14.5	11.5	9.5	19.0	16.5	14.5
	HEAVY	S30H2	30	29	415	24.5	16.0	13.0	10.5	21.0	18.5	16.0
		S35H2	35	29	485	25.5	16.5	13.5	11.0	21.5	19.0	16.5
WIND ZONE 3	LIGHT	S26L2	26	23	250	18.5	13.0	10.5	9.0	17.5	15.0	13.5
		S30L2	30	23	290	19.5	13.5	11.0	9.0	18.0	15.5	14.0
		S35L2	35	23	315	20.0	14.0	11.5	9.5	18.5	16.0	14.5
	HEAVY	S30H2	30	29	415	23.0	15.5	12.5	10.0	20.5	17.5	16.0
		S35H2	35	29	485	24.0	16.0	13.0	10.5	21.0	18.0	16.5
WIND ZONE 4	LIGHT	S26L1	26	22	195	18.0	13.0	10.5	9.0	16.5	14.5	13.0
		S30L1	30	22	225	18.5	13.0	10.5	9.0	17.0	15.0	13.5
		S35L1	35	22	255	19.0	13.5	11.0	9.0	17.5	15.5	14.0
	HEAVY	S30H1	30	25	330	22.0	15.0	12.0	9.5	19.5	17.0	15.0
		S35H1	35	25	385	23.0	15.5	12.5	10.0	20.0	17.5	15.5
WIND ZONE 5	LIGHT	S26L2	26	23	250	19.0	13.5	10.5	9.0	17.5	15.5	13.5
		S30L2	30	23	290	20.0	14.0	11.0	9.5	18.0	16.0	14.0
		S35L2	35	23	315	21.0	14.5	11.5	10.0	19.0	16.5	14.5
	HEAVY	S30H2	30	29	415	23.5	15.5	12.5	10.5	21.0	18.0	16.0
		S35H2	35	29	485	25.0	16.5	13.0	11.0	21.5	18.5	16.5

Concrete Volume (cubic yards)=.356 X L

Fabrication Design Notes:

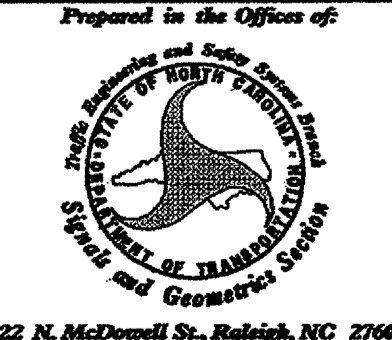
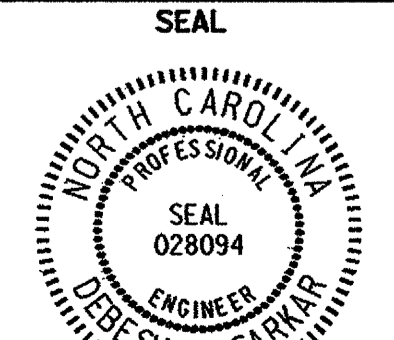
1. Values shown in "Moment at the Pole Base" column represents the minimum acceptable capacity allowable for design using a design CSR of 1.
2. Base plate thickness (T) is 2.0 inches.

Foundation Selection:

1. Perform a standard penetration test at each proposed foundation site to determine "N" value.
2. Select the appropriate wind zone from sheet M 1.
3. Select the soil type (Clay or Sand) that best describes the soil characteristics.
4. Get the appropriate pole case load number from the plans or from the Engineer.
5. Select the appropriate column in the chart based on soil type and "N" value. Select the appropriate row based on the pole load case. The foundation depth is the value where the column and the row intersect.

Standard Strain Poles

02-SEP-2005 12:42
V:\0001\05-011\work\groups\2004\metal\pole standard\ds2004.m8 std strain pole.dgn
pol1.ecadab

	Standard Strain Poles and Standard Foundations		
	PLAN DATE: May 2005	REVIEWED BY: C.F. Andrews	
PREPARED BY: P.L. Alexander		REVIEWED BY: A.M. Esposito	SCALE: None
REVISIONS	INIT.	DATE	SIGNATURE: D. Sarker
		DATE: 9.2.2005	